APPENDIX VI-B

DISPOSAL CAPACITY VOLUME CALCULATIONS

Appendix VI-B. Waste Quantities and Site Life
DRPI Landfill - Vertical Expansion

The "Year-End Remaining Permitted Tonnage" is based on the total design disposal volume of 10,793,236 cubic yards.

Airspace Utilization Factor (AUF, tons/cy)[1]:	0.65	(from AUF, received Feb 7, 2018)
Assumed Starting Waste Acceptance Rate in 2013 (tons/yr):	286,626	Average of last 5 years
	279,000	Budgeted Yearly Tonnage

Project Closure Year: **2042**

Total Available Permitted Tonnage: 10,793,236 CY[2]
6,994,017 tons
6,344,865 Mg

Year	Total Waste (tons)[1,2]	Year-End Remaining Permitted Tonnage
2018	279,000	6,715,017
2019	279,000	6,436,017
2020	279,000	6,157,017
2021	279,000	5,878,017
2022	279,000	5,599,017
2023	279,000	5,320,017
2024	279,000	5,041,017
2025	279,000	4,762,017
2026	279,000	4,483,017
2027	279,000	4,204,017
2028	279,000	3,925,017
2029	279,000	3,646,017
2030	279,000	3,367,017
2031	279,000	3,088,017
2032	279,000	2,809,017
2033	279,000	2,530,017
2034	279,000	2,251,017
2035	279,000	1,972,017
2036	279,000	1,693,017
2037	279,000	1,414,017
2038	279,000	1,135,017
2039	279,000	856,017
2040	279,000	577,017
2041	279,000	298,017
2042	279,000	19,017

Notes:
1. AUF based on airspace utilization data from the client.
2. Based on vertical expansion design.
3. Future AUF and tonnage may vary.

APPENDIX VI-C

SOIL CHARACTERIZATION SUMMARY

APPENDIX VI-C

SOIL CHARACTERIZATION SUMMARY

Previous soil characterization reports describing the stratigraphy of the site were reviewed as part of the engineering design for the Delaware Recyclable Products, Inc., Landfill (DRPI Landfill) vertical expansion. These reports included: (i)*"Subsurface Investigation and Geotechnical Report"*, by James Anderson Associates, Inc., dated August 1994; (ii) *"Delaware Recyclable Products Landfill, Cell 4 Geotechnical Exploration"*, by Duffield Associates, dated October 1994; and (iii) boring logs obtained by Geosyntec [1994]. These items are provided in Attachments A through C, respectively.

A review of the information listed above indicates that the soil stratigraphy is consistent throughout the DRPI Landfill property. In general, the subsurface soils consist of clay with interbedded sand layers. The subsurface is divided into an upper and a lower clay layer and an upper and a lower sand layer. The upper and lower clay layers are encountered above the upper and lower sand layers, respectively. Properties of these materials were inferred based on test results presented in the aforementioned reports, as described below.

The upper clay layer consists of a stiff to silty clay often described as brownish-gray or gray, whereas the lower clay layer consists of a stiff pinkish red clay. The undrained shear strength of Clay Layer 1 was found to be 1,000 psf, while Clay Layer 2 was found to be 1,400 psf [James Anderson Associates, 1994], based on unconsolidated undrained triaxial test results. Considering that the clay has undergone 7 to 30 years of consolidation under the weight of overlying waste, the undrained shear strength of clay should have increased over previously tested value. An analysis presented in Appendix VI-I.4 estimated that the undrained shear strength is between 1,000 and 1,265 psf for Clay Layer 1, and between 1430 and 2100 psf for Clay Layer 2, depending on the overlying waste thickness and degree of consolidation achieved. An effective friction angle of 21 degrees is used to represent the drained shear strength for both clay layers based on previous experience with soils in this area. Both layers are assumed to have an average unit weight of 120 pcf.

The upper sand layer, which is encountered under the upper clay layer, consists of varicolored, often found to be gray, red, yellow or white, fine silty-sand and sand. The lower sand layer, encountered under the lower clay layer is a medium to fine-grained layer consisting of white, orange and light-brown sands. An effective a friction angle of 30 degrees and no cohesion are used to model the strength of these layers. The unit weight for these layers was assumed to be 130 pcf.

ATTACHMENT A

JAMES C. ANDERSON ASSOCIATES, INC., "SUBSURFACE INVESTIGATION AND GEOTECHNICAL REPORT" AUGUST 1994

SUBSURFACE INVESTIGATION
AND
GEOTECHNICAL REPORT

C&J ASSOCIATES
MINQUADLE, NEW CASTLE COUNTY
DELAWARE

for

C&J ASSOCIATES
MARSH LANE
MINQUADLE, DELAWARE

by

James C. Anderson Associates, Inc.
907 Pleasant Valley Avenue
Mount Laurel, NJ 08054

August 1994

David W. Munion
Delaware License No. 8418

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1.0 INTRODUCTION

James C. Anderson Associates, Inc. (JCA) performed a geotechnical investigation of a proposed landfill site located in New Castle County, Delaware. Presented in this report are the results of the subsurface investigation, laboratory testing, and geotechnical evaluation of cells 1 and 2 for the proposed landfill. The landfill is broken down into 5 cells with a total acreage of approximately 26 acres. Cell 1 has an acreage of 5.60 acres while cell 2 has an acreage of 5.72 acres. The landfill will be an industrial waste facility. The site location map is presented in Appendix A while the boring location plan is shown in Appendix B.

This report contains descriptions of the field and laboratory testing phases of the investigation, together with the site conditions, groundwater, and related subsurface conditions. The engineering design properties derived from the results of the investigation are tabulated and discussed. The results of foundation engineering analyses for the proposed landfill are presented. Foundation and earthwork recommendations are made based on the results of the site investigation, observations by geotechnical personnel on site, and established geotechnical engineering practices.

2.0 SCOPE OF WORK

The scope of geotechnical services for the preparation of the report included:

- reviewing available information on subsurface conditions,

- developing a boring location plan and specifications for a field and laboratory investigation to provide engineering parameters for analyzing the existing conditions,
- selecting laboratory testing subcontractor,
- assigning laboratory tests for the soil samples,
- developing all geotechnical parameters necessary for design and analysis based on the field and laboratory results and previous data from the site,
- performing analyses to estimate the settlement of the landfill including time duration and maximum amount,
- performing stability analyses of the proposed landfill side slopes and foundations subgrades,
- providing recommendations regarding excavation and earthwork operations,
- providing a geotechnical report to include the field and laboratory results, analyses and recommendations.

The environmental characteristics of the project site and impacts on the project have been addressed separately by others, and are not included in the scope of this report.

3.0 AVAILABLE INFORMATION

Prior to our recent detailed site investigation, several studies were conducted by others primarily for evaluating the site for hydrogeologic conditions relating to the proposed industrial waste facility. One of these studies included the installation of eight (8) monitoring wells in 1992 which were to 1) measure the depth to groundwater, 2) determine the flow direction and gradient of the groundwater, 3) sample groundwater for laboratory analyses, and 4) determine the characteristic of the geologic units. Three (3) of the wells were considered shallow (depths ranging from 16' to 33') and five (5) were deep wells (depths from 33' to 74'). The wells are designated as MW's on the boring location plan enclosed in Appendix B.

Another set of borings was conducted by others in August 1993 and was available for our review. These borings had depths ranging from about 16 to 50 feet below grade. Laboratory testing of the soils was done on some of the samples including sieve analyses, pH, specific gravity, and permeability tests. These borings are designated TB's on the enclosed boring location plan.

The logs of the applicable borings and monitoring wells are enclosed along with our test borings in Appendix C.

4.0 SITE CONDITIONS

The existing grades of the 11½ acres or so included in cells 1 and 2 of the proposed landfill are slightly hilly with elevations varying from elevation 24.0 to 52.0 with respect to NGVD. Significant amounts of concrete rubble/debris are present throughout these two proposed cells with heavy concentrations of concrete debris (apparently used to fill in a pond) located in the northwest corner of proposed cell No. 1.

The site has been utilized in the past as a concrete mixing/batch plan and appears that the spoil of these operations was dumped throughout the site, which in turn, created several large mounded areas. In addition to the mounds, there are several structures that remain on site throughout cells 1 and 2. There are also several low lying areas within these two cells that pond up during heavy amounts of rainfall and have significant amounts of marsh/tall grass.

During the recent subsurface investigation (April 1994), all the borings were accessible to truck-mounted drill rigs. Many of the borings were offset from the original locations specified due to auger refusal in the debris areas.

5.0 SUBSURFACE INVESTIGATION

Our subsurface investigation was conducted at the site in April 1994 to assess the geotechnical conditions in relation to the proposed landfill. Eight (8) borings were drilled to obtain soil samples and to perform standard penetration tests (SPT).

576 linear feet of soil were drilled and soil samples obtained using our truck mounted drilling equipment. Soil samples were selected and reviewed by the geotechnical engineer for the appropriate laboratory testing. The logs of the test borings are presented in Appendix C.

Soil samples were obtained in all borings by driving a 2-inch OD split-barrel samples 24 inches with a 140-pound hammer falling freely through a distance of 30 inches. The standard penetration resistance value (N-value) is defined as the number of blows required to drive the split-spoon sampler a total distance of 12 inches, the count being started after a penetration of 6 inches.

When the sampler could not be driven the required 12 inches, the standard penetration resistance was shown on the number of blows over the inches actually penetrated. Standard penetration test sampling was generally performed continuously in the upper 6 feet and at intervals of 5 feet thereafter. The SPT drilling and sampling were conducted in accordance with ASTM D 1586.

Undisturbed, thin-walled tube samples were obtained from cohesive soils, in general accordance with ASTM D 1587, at locations selected by JCA. Each test boring was grouted up to the ground surface prior to completion of the field work.

6.0 LABORATORY TESTING PROGRAM

Laboratory tests were performed to determine strength, compressibility, and physical characteristics of subsurface materials. They were assigned by JCA and were performed by Golder Associates of Mount Laurel, NJ using applicable ASTM standards or other suitable accepted procedures. The results of the laboratory tests are summarized in Table 1 shown below. The detailed results of all the laboratory tests are presented in Appendix D. The test results, as they relate to the engineering properties of the soils, are discussed in Section 8.0.

TABLE 1 - SUMMARY OF LABORATORY DATA

Boring No.	Depth of Sample (ft)	USCS	Grain Size Distribution			Atterberg Limits		Specific Gravity	Natural Moisture Content (%)	Shear Data			Consolidation Data				
			Gravel %	Sand %	Fines %	LL	PL			Test Type	C (PSF)	ø (degrees)	e_o	P_c (TSF)	C_c	C_r	C_v CM^2/SEC
B1	30-32	CL	0.8	29.9	69.3	27	16	-	16.4								
	35-37	-	19.6	34.5	45.9	-	-	-	14.4								
	45-47	-	7.8	18.0	74.2	-	-	-	23.5								
	50-52	MH	-	-	-	51	29	-	27.8								
	53-55	ML	0.3	5.7	94.0	47	29	2.68	42.3				.765	2.9	.166	.04	$1x10^{-5}$
	65-67	MH	-	-	-	53	30	-	37.2								
B2	20-22	SC	0.3	56.7	43.0	29	18	-	23.5								
	25-27	-	0.4	36.7	62.9	-	-	-	42.0								
	35-37	-	0.5	21.1	78.4	-	-	-	21.5								
	40-42	-	1.7	39.2	59.1	-	-	-	21.0								
	52-54	CH	0.7	8.4	90.9	50	28	2.64	31.6								
	60-62	-	17.3	8.3	74.4	-	-	-	37.0								
	70-72	CL	-	-	-	45	26	-	27.4								
B3	20-22	CH	-	-	-	52	23	-	23.3								
	30-32	-	0.5	6.0	93.5	-	-	-	29.9								
	40-42	CH	-	-	-	59	27	-	33.6								
	49-51	CH	0.3	3.3	96.4	54	29	2.59	34.2								
	60-62	MH	-	-	-	60	34	-	28.3								
B4	25-27	-	0.0	48.6	51.4	-	-	-	37.4								
	30-32	MH	-	-	-	65	35	-	43.1								
	35-37	-	0.2	28.1	71.7	-	-	-	17.9								
	40-42	-	0.0	35.8	64.2	-	-	-	18.3								
	47-49	CH	0.0	4.2	95.8	50	26	2.77	24.9	UU	1400	0					
	50-52	-	0.0	6.3	93.7	-	-	-	28.9								

TABLE 1 - SUMMARY OF LABORATORY DATA

Boring No.	Depth of Sample (ft)	USCS	Grain Size Distribution			Atterberg Limits		Specific Gravity	Natural Moisture Content (%)	Shear Data			Consolidation Data				
			Gravel %	Sand %	Fines %	LL	PL			Test Type	C (PSF)	ø (degrees)	e_o	P_c (TSF)	C_c	C_r	C_v CM^2/SEC
B5	20-22	-	0.5	7.6	91.9	-	-	-	24.7								
	30-32	CL	0.0	8.1	91.9	43	25	2.77	26.2				.895	1.25	0.25	.05	$4X10^{-3}$
	35-37	CH	-	-	-	56	26	-	34.1								
	65-67	-	0.0	65.8	34.2	-	-	-	18.3								
B6	15-17	-	0.0	0.5	99.5	-	-	-	27.9								
	20-22	CL	-	-	-	46	21	-	22.4								
	22-24	CL	11.5	18.3	70.2	42	23	2.78	24.0				.675	1.4	.155	.02	$6X10^{-4}$
	30-32	CH	-	-	-	54	25	-	29.8								
	35-37	-	0.0	1.5	98.5	-	-	-	28.9								
	50-52	CH	-	-	-	53	25	-	26.7								
B7	10-12	-	0.0	80.6	19.4	-	-	-	24.8								
	15-17	CH	-	-	-	62	24	-	26.7								
	20-22	CL	0.0	11.0	89.0	41	22	2.77	20.1	UU	1000	0					
	30-32	-	0.0	12.7	87.3	-	-	-	28.0								
	45-47	CH	-	-	-	51	24	-	28.7								
	60-62	-	0.0	59.0	41.0	-	-	-	17.3								
B8	10-12	-	29.9	60.8	9.3	-	-	-	12.9								
	27-29	CL	0.0	7.0	93.0	46	23	2.76	25.9	R	100	27					
	30-32	CH	-	-	-	59	30	-	31.9								
	50-52	-	0.1	17.7	82.2	-	-	-	27.5								

7.0 SUBSURFACE CONDITIONS

7.1 Site Geology

Prior to site development, the surficial geology was mapped as the Columbia Formation. The Columbia Formation consists of a thin veneer of silty sand and gravel deposits. This formation overlies the Potomac Formation; a Cretaceous Age deposit consisting of variegated red, gray and white silt and clay deposits. Due to sand and gravel mining operations at the site, the Potomac is exposed at the surface (Environmental Assessment Industrial Recycling Center, WIK Associates Inc. March 1993). The clay deposits are laterally discontinuous, and are reported to increase in frequency downdip. The formation is considered to be a near shore marine sequence, although the deposits are more riverine in places. The formation dips gently to the southeast, and strikes northeast. The formation lies directly on crystalline bedrock, with deeply incised channels reported in several areas adjacent to the Delaware River in Camden County, New Jersey. (Geology and Ground Water Resources of Camden County, Farlekas et al, USGS 1976)

7.2 Site Specific Subsurface Conditions

The subsurface profiles, as interpreted from the test borings and the laboratory data, are shown on Sections 1 through 4 in Appendix E. The delineation between soil types shown between the borings on the sections are assumed, and the

descriptions of the strata represent an interpretation of the subgrade conditions at the boring locations. Detailed descriptions of the materials found at the boring locations are given on the boring logs in Appendix C.

Based on our field work, the review of the existing reports and the interpretation of the laboratory test results, the subsurface soils were grouped into strata based on their engineering properties.

Stratum 1A

Stratum 1-A consists of a mixed fill material with substantial amounts of cinders, lumber, and miscellaneous fill in a clayey silty sand and gravel matrix. The colors varied from orange-brown to brown to red brown materials in this strata. This material was encountered in our testing borings 1, 2, and 3 and varied substantially in thickness.

Stratum 1-B

Stratum 1-B consists of brown/tan/orange-brown/red brown interbedded clayey/silty/gravelly sand with some silty clay. Based on the standard penetration resistances, the soils in this zone have a relative density of medium dense to dense. These soils were encountered in most of the borings and were typically encountered either below the ground surface or the soils of Stratum 1-A.

Stratum 1-C

Stratum 1-C was not encountered by our test borings conducted in April 1994. However, based on our research of the available test boring data conducted in August 1993 (particularly Boring No. TB-7), a layer of brown silty clay with organics and peat was encountered below five (5) feet to fill/silt and gravel and was about twelve (12) feet in thickness. The SPT results in this layer ranged from1 to 3 for this layer which correlates to a very soft consistency classification.

Stratum 2 -(Upper Potomac) Sandy Clay w/ Sand lenses

Stratum 2 consists of a gray/tan/brown silty sandy clay with some zones of silty sand and sandy silt. This soil exhibits low to medium plasticity and based on the SPT results has a consistency varying from stiff to very stiff. These soils were encountered below the soils of Strata 1A, 1B and 1C and extend to elevations varying from elevation 0 to near -10.0 based on NGVD.

Stratum 3 (Upper Potomac) Clay

Stratum 3 consists of a red-tan or a red-gray clay. This clay layer exhibits high plasticity and based on the SPT results has a stiff to very stiff consistency. However, some zones of this clay would be classified as hard when the blow counts exceed 30. This clay layer was encountered directly below the soils

of Stratum 2 to the termination of the borings with the exception of borings B-5 and B-7 where some gray to black very dense silty sand was encountered at about 65' below grade.

For a graphic presentation of the generalized soil profiles, see the sections for proposed landfill in Appendix E.

Table 2 shown below summarizes the physical characteristics and SPT results of the various strata. The thickness, classification and SPT N-values of each stratum are summarized below:

G.S. EL. 25-35

Upper Potomac +25 TO -43

Sand lenses el. 16-19

Upper Potomac Fine grained Silt/Clay w/ interbedded Sands

Clay ion w/ depth

Potomac Sands deep @ elev -43

TABLE 2

Stratum	Material	USCS Symbol	Thickness (feet)	SPT N-Values (Blows/Foot)	
			Avg	Range	Avg
1A	Mixed Fill	SM-SP PT	Varies	-	-
1B	Silty/Clayey/Sand	SM-SP CL	Varies	6-100+	36
1C	Silty Clay w/organics	CL,PT	12	0-3	1
2	Silty Sandy Clay	CL	12	8-27	18
3	Clay	CH	40	13-58	27

7.3 Groundwater Conditions

Groundwater at the site was encountered in Test Borings B3, B5, B7 and B8 and varied significantly in depth ranging from twelve to twenty-five feet below grade. Based on our samples and the review of the existing data/reports, there are interconnected layers of sand that provide conduits for the subsurface water to travel. Those conduits (also known as aquifers) were inconsistent throughout the site and depending upon the season and amounts of rain water will typically vary in elevation.

8.0 ENGINEERING PROPERTIES OF SUBSURFACE MATERIALS

The assessment of the engineering properties of the soils encountered was based on the results of the field investigation and laboratory testing,and on generally accepted empirical relationships. Table 3 presents the recommended parameters to be used in the settlement and slope stability analyses. Selected properties and parameters are discussed in the following paragraphs.

TABLE 3 Engineering Parameters								
Stratum	USCS	Moist Density (PCF)	Saturated Density (PCF)	ø Friction angle	C Cohesion (PSF)	Compressibility		
						C_r'	C_c	C_v (Ft^2/day)
1A	SM-SP-PT	-	-	-	-	-	-	-
1B	SM-SP-CL	110	125	30°	-	-	.04	-
1C	CL-PT	90	115	-	300	-	-	-
2	CL	125	130	0	1000 -	.03	.155	.07
3	CH	128	130	0	1400	.04	.25	0.1

8.1 Physical Properties

Physical property index tests on representative samples of the site soils included grain size distribution, moisture content and Atterberg limits tests. Classifications made by the Unified Soil Classification System (USCS) together with the physical property test results are included in Appendix D and summarized in Table 1.

8.2 Strength

Because the strength of the cohesive soils of Strata 2 and 3 is expected to greatly affect the stability calculations, one consolidated-undrained test and two (2) unconsolidated undrained (UU) triaxial compression tests were conducted on undisturbed clay samples from the two (2) strata. The test results indicate that the

unconsolidated (Q) shear strength of Stratum 2 is about 1.0 ksf. While the (Q) strength of Stratum 3 is about 1.4 ksf. The consolidated undrained shear test yielded results of 31° for the friction angle with a cohesion of 0 psf.

For the cohesionless materials, the shear strength of the soil is dependent on the effective angle of internal friction ø, which can be estimated in several ways, including laboratory tests and in-situ field tests. Generally field tests are preferred over laboratory tests because of the inherent difficulty of obtaining a representative sample for testing. Several empirical relationships have been developed to relate the SPT N-value to the friction angle. Table 3 presents the friction value for Stratum 1 based on SPT data.

8.3 Compressibility

Laboratory tests were conducted to determine compressive characteristics of the two (2) cohesive strata encountered at the site. Three (3) undisturbed tube samples were used for consolidation testing. The test results on the Stratum 2 and Stratum 3 samples indicate a normally consolidated clay.

Consolidation test results indicate that the coefficient of consolidation in the vertical direction, C_v of the Stratum 2 clay is about 7×10^{-2} feet^2/day. While C_v is about -1 Ft^2/day in Stratum 3.

The key parameter in determining the compressibility of granular soils is the elastic modulus. It can be estimated from either field or laboratory tests; however field tests are preferred because of the difficulty of obtaining completely undisturbed samples.

9.0 ANALYSES AND RECOMMENDATIONS

9.1 Slope Stability Analysis

A slope stability analysis for the proposed sideslopes was performed for the permit application. For the actual slope stability analyses, a licensed computer program entitled "Geoslope" was utilized for calculating the critical factors of safety for the side slopes of the filled facility. This program is capable of using several methods for solving the minimum safety factors for different types of slopes. The method of analysis used for analyzing the side slopes was the Bishop Method of Slices utilizing circular slip surfaces. To perform the slope stability analysis, all soil parameters were taken from the laboratory data and accepted values in geotechnical engineering practice. A conservative assumption of 1,000 pounds per square foot (psf) was used to estimate the cohesion of the trash/lifts/and cover based on the unit weights expected for the fill. The trash unit weight was provided to JCA by other to be about 124 pcf. We feel this is an optimistic value so we also analyzed the slopes for an average unit weight of 90 pcf. The values of the parameters used in the slope stability analysis are summarized in Table 4 shown below.

TABLE 4			
Description of Stratum	Unit Weight (pcf)	Cohesion (psf)	Friction Angle
Trash	90 to 124	1000	0°
Imported Fill	125	0	36°
Layer 1B	110	0	30°
Layer 2	130	1000	0°
Layer 3	130	1400	0°

With the soil parameters defined, the required slope stability analyses were performed for several different cases with the results summarized below.

TABLE 5			
Section	Located	Trash Unit Weight (pcf)	Factor of Safety
1	See Appendix F	124 90	1.41 1.88
2	See Appendix F	124 90	1.33 1.75
4	See Appendix F Fill	124 124	1.90 2.20

As per standard geotechnical practices, the minimum safety factor for operating conditions should be a minimum of 1.3 to 1.5. As can be seen by the results of the analyses, the landfill side slopes of 1V:3H have an adequate safety factor and the fill side slopes of 1V:2H are also adequate. The detailed results of the slope stability analyses can be found in Appendix F.

9.2 Settlement Analysis

To complete the settlement analysis for the landfill, the following methodology was employed.

1. Several sections were developed using borings,, existing grades and proposed construction and operational grades for the landfill.

2. Laboratory testing was utilized to determine the basic, index properties and consolidation characteristics of selected samples.

3. Values for use in the consolidation analysis were determined from the test data supplied from the laboratory. These were compared to published values for similar materials as a check to assure the adopted design values fell within normal ranges.

4. Vertical normal stress values at selected locations of the embankments were developed using the influence diagrams shown in Appendix G.

5. Settlements in individual layers were then calculated using the formula:

$$Settlement = \Delta H = \frac{(C_c \times H_t)}{(1 + e_o)} \log \frac{(P_o + \Delta P)}{P_o}$$

where: C_c = Coefficient of Consolidation

H_t = total Thickness of layer

C_o = Initial void ratio (from consol. test)

P_o = Effective overburden pressure at midthickness of consol. layer.

D_p = Added pressure @ midthickness of consol. layer due to applied load.

These individual consolidation values were then totaled for each individual station line and are summarized in Table 6 shown below. The values shown for the trash fill densities of 65 pcf to 124 pcf were based on the landfill operators best estimate of the densities and filling operations.

6. The time for 50% and 90% consolidations were calculated using methodologies provided by normal engineering practices.

7. It was assumed for this analyses that Stratum 3 continues approximately an additional 30' and for documentation purposes, this layer has been identified as Stratum 4.

TABLE 6											
Location Cell/Corner	Section #	Estimated Settlement						Consolidation time (Yrs)			
		Unit Weight (trash)=65 pcf			Unit Weight (trash)= 124 pcf			50% Consol.		90% Consol.	
		Sta 1	Sta 2	Sta 3	Sta 1	Sta 2	Sta 3	Unit Wt 65 pcf	Unit Wt 124 pcf	Unit Wt 65 pcf	Unit Wt 124 pcf
1/SW	2	20"	12"	1"	38"	27"	3"	4.4	4.4	30.7	30.7
2/SW	3	8"	7"	1"	29"	24"	2"	-	2.2	-	15.3
1/NW (Under Perimeter Dike)	4	-	-	-	12"	10"	3"	-	4.4	-	38.4

10.0 EARTHWORK CONSIDERATIONS

10.1 Excavation

Based on the test boring findings and the information regarding the proposed liner elevation, significant amounts of excavation will be necessary to remove the concrete debris, the very soft soils and peat of Stratum 1C, and the mixed fill of Stratum 1-A. These areas must be excavated in their entirety due to the natural voids and the compressible nature of these materials. The soils of Stratum I-A may be suitable as use as backfill if the materials are screened and all debris, peat, clay, silt and materials 4" and larger are removed.

It is recommended that the areas being planned for truck traffic have several test pits performed to determine the viability of using the existing materials as a subbase. These materials will have to be investigated for compactability and should not contain any debris, fill, voids or other poor soils.

Since open cut excavations will be used to remove the debris materials, and create final grades, the excavated slopes should not be steeper than 2H:1V. These slopes will have to be reduced if ravelling occurs. The permanent slopes for any final slopes will need to be flat enough for the liner and long term stability. These slopes (if filled with sandy compacted backfill) should be preferably be 3H:1V, but should in no case be steeper than 2H:1V.

Where the surrounding conditions of the site do not permit open cuts, such as adjacent to existing streets, utilities or other structures, shoring and bracing should be utilized to ensure the stability of the sides of the excavation. The shoring or bracing may consist of portable steel shoring box, or steel soldier piles with wood lagging (if necessary), or similar means. In the design of the shoring or bracing system, use the recommended soil parameters shown in Table 3.

Some means of dewatering may be necessary when excavating and maintaining the liner subgrades. It should be the requirement of the contractor to submit a dewatering/water control plan to the engineer for review and approval.

10.2 Backfill requirements

10.2.1 Fill Material Selection

Fill required under the proposed landfill must be select granular material. This fill should be a well-graded sand or gravel, free or organic matter, debris or clay balls, with a maximum size not exceeding 2 inches, and with less than 15 percent passing the No. 200 sieve. This material can also be used for backfilling and for rough grading for the embankments and berms around the site. Material with similar specifications can be used for pipe bedding for the leachate collection pipe, except that the maximum size should not exceed ½ inch.

10.2.2 Fill Placement and Compaction

All soil surfaces to receive fill should be proofrolled with a heavy vibratory roller to detect any soft areas. Areas that "pump" or appear to be soft should be undercut and replaced with compacted granular fill. If excessive pumping occurs, proofrolling should be curtailed. The granular structural fill used below the landfill should be compacted in lifts not exceeding 10 inches loose thickness to at least 95 percent of the modified proctor (ASTM D 1557) maximum dry density. Pipe bedding should be

compacted in 12-inch lifts to 92 percent of the modified Proctor maximum dry density. The granular backfill should be compacted with vibrating rollers or tampers.

Earthwork should be scheduled to avoid the period of December to March if possible, as considerable difficulty may be expected in achieving the necessary compaction during inclement weather conditions. The on-site near-surface soils are sensitive to moisture and will become soft if exposed to water.

10.3 General Recommendations

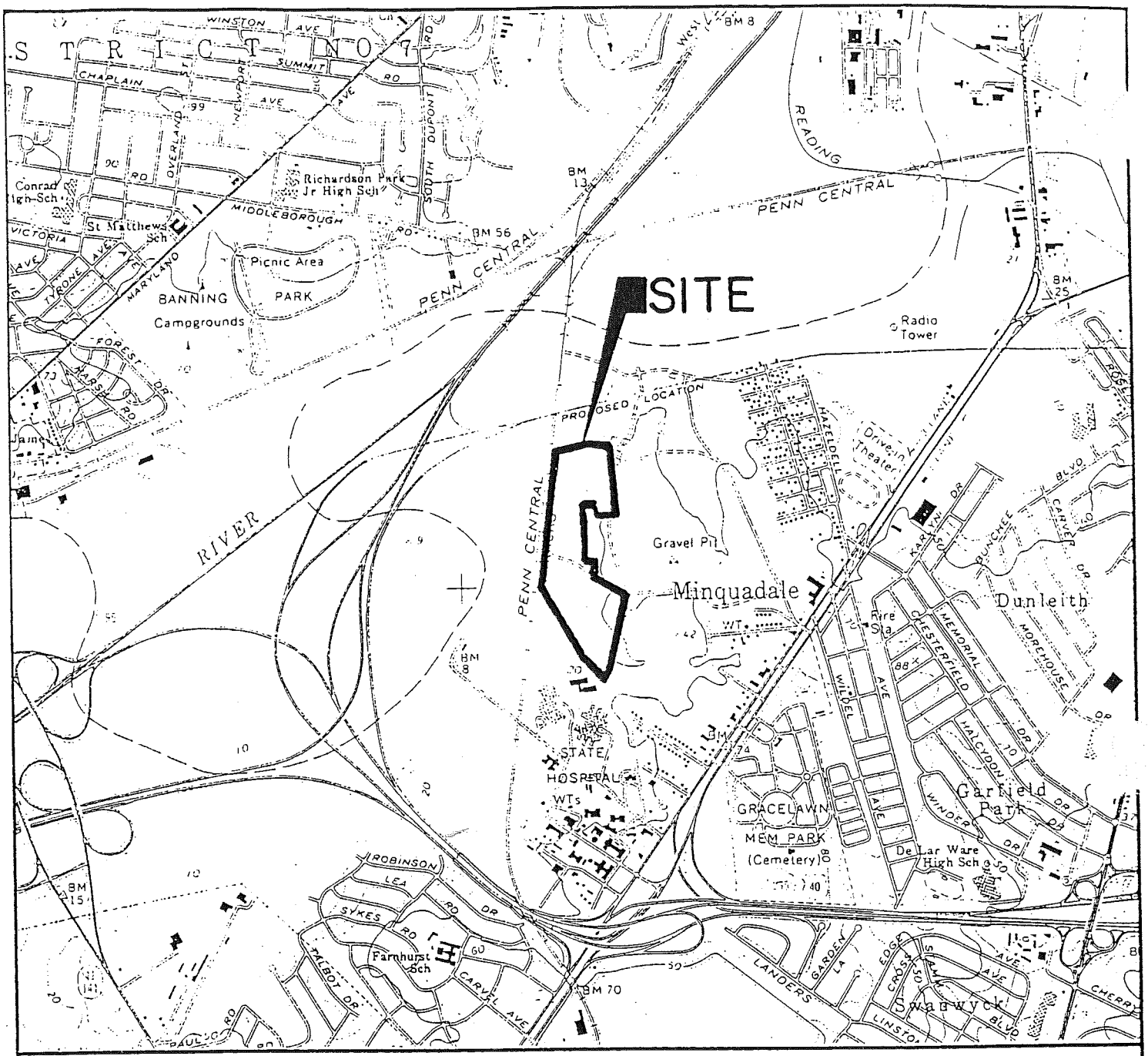
It is recommended that all earthwork operations for cell construction, such as excavations, dewatering, backfilling, etc., should be carried out in the full-time presence of a qualified representative of the Soils engineer who should also examine and approve the landfill subgrades prior to placing the liner.

11.0 LIMITATIONS

This report is intended for use with regard to the specific project discussed herein and any changes in the design of the project, however, slight, should be brought to our attention so that we may determine how they may affect our conclusions. We are responsible for the conclusions and opinions contained in this report based on the data relating to the specific project and location discussed herein.

The analyses and recommendations submitted in this report are based upon the findings of the borings shown on the location plan and geological evidence. This report does not reflect any variations (which should be expected based on the length between the borings) which may occur between the borings and which may be encountered during construction. We should be immediately informed of such conditions so that we may modify our conclusions and recommendations, if necessary.

APPENDIX A
Site Location Map



SITE LOCATION MAP

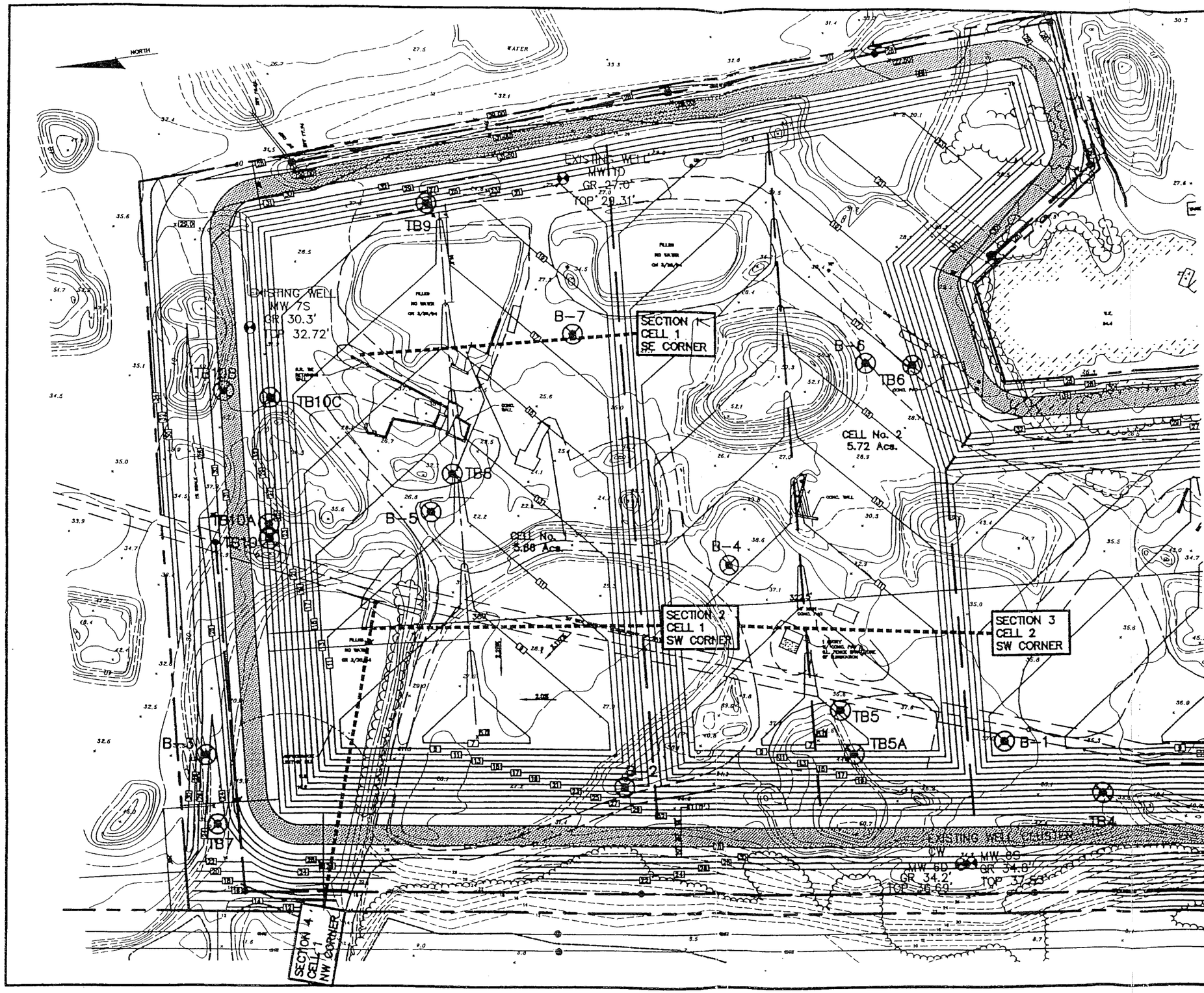
NORTH

C & J ASSOCIATES
INDUSTRIAL LANDFILL
MINQUADLE, DELAWARE

SOURCE:
WILMINGTON SOUTH, DEL. U.S.G.S.
TOPOGRAPHIC QUADRANGLE,
7.5 MINUTE SERIES.

SCALE: 1" = 2000'

APPENDIX B
Boring Location Plan



LEGEND:

- PROPERTY LINE
- CELL BOUNDARY
- TB7 — TEST BORING CONDUCTED IN AUGUST OF 1993
- MONITORING WELL CONSTRUCTED IN 1992
- B-7 — TEST BORING CONDUCTED IN APRIL OF 1994

JAMES C. ANDERSON ASSOCIATES, INC.
JCA
CONSULTING ENGINEERS, SCIENTISTS, PLANNERS
SURVEYORS AND LICENSED DRILLERS
907 PLEASANT VALLEY AVENUE
MOUNT LAUREL, NJ 08054 (609)722-6700

LINER & SUBGRADE PLAN
BORING LOCATIONS AND SECTION MARKS

PROPOSED
C & J ASSOCIATES
INDUSTRIAL LANDFILL

MINQUADLE,
NEW CASTLE COUNTY, DELAWARE

C & J ASSOCIATES
MARSH LANE
MINQUADALE, DELAWARE

SCALE: 1"=100' DATE: 7/12/94

APPENDIX C
Boring Logs

JAMES C. ANDERSON ASSOCIATES INC.
Drilling Contractor

907 Pleasant Valley Avenue Mount Laurel, New Jersey 08054 (609)-722-6700

PROJECT	C&J Landfill				Sheet 1 of 3
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-1
Date	Time	Depth	Hollow Stem Auger	82'	Date Started: 4-22-94
					Date Finished: 4-22-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE No.	Depth	Blows	N	CLASSIFICATION
0	1	0-10			Orange brown sand with small gravel, cinders and lumber fill.
5					
10					
15					
	2	15-17	4-5-5-9	10	Gray brown silty clay.
20					
	3	20-22	7-9-12-14	21	Gray brown silty clay.
25					
	4	25-27	7-9-14-17	23	Light brown and black silty sand.
30					
	5	30-32	3-9-12-11	21	Light brown tan red sandy clay.
35					
	6	35-37	7-12-14-15	26	Light brown tan red silty clay with gravel.

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Drilling Contractor

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PROJECT	C&J Landfill			Sheet 2 of 3
CLIENT	C&J Associates			Job No. : E94CJAS002
GROUNDWATER		DRILLING METHOD	DEPTH	Borehole No.: B-1
Date / Time	Depth	Hollow Stem Auger	82'	Date Started: 4-22-94
				Date Finished: 4-22-94
				Driller: Reeve
WELL CONSTRUCTION	ROD SIZE		SPOON SIZE	Elevation:
				Inspector:

	SAMPLE No.	Depth	Blows	N	CLASSIFICATION
0					
40	7	40-42	6-7-7-9	14	Light brown red fine silty sand and clay.
45	8	45-47	10-12-14-17	26	Gray red silty clay with gravel.
50	9	50-52	8-10-11-14	21	Red tan clay.
	10	53-55			Shelby tube taken.
55	11	55-57	8-9-11-15	20	Red tan clay.
60	12	60-62	12-13-17-21	30	Red tan clay.
65	13	65-67	13-14-19-24	33	Red tan clay.
70	14	70-72	11-11-14-19	25	Red tan clay.

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Drilling Contractor

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PROJECT	C&J Landfill				Sheet 3 of 3
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-1
Date	Time	Depth	Hollow Stem Auger	82'	Date Started: 4-22-94
					Date Finished: 4-22-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE				
0	No.	Depth	Blows	N	CLASSIFICATION
75	15	75-77	10-13-17-19	30	Red tan clay.
80	16	80-82	12-12-14-19	26	Red tan clay.
85					
90					
95					
100					
105					

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Drilling Contractor

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PROJECT	C&J Landfill				Sheet 1 of 3
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-2
Date	Time	Depth	Hollow Stem Auger	82'	Date Started: 4-20-94
					Date Finished: 4-20-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE No.	Depth	Blows	N	CLASSIFICATION
0	1	0-2	4-6-7-6	13	Orange brown medium to coarse sand and gravel, trace silt.
	2	2-4	5-8-7-8	15	Brown red tan clay silt.
5	3	4-6	8-8-12-18	20	Brown black silty sand and mixed fill.
10	4	10-12	Not Reported		Fill.
15	5	15-17	Not Reported		Fill.
20	6	20-22	4-4-4-5	8	Gray brown fine silty clay.
25	7	25-27	6-7-6-8	13	Red brown fine silty sand.
30	8	30-32	7-12-14-16	26	Tan brown fine sandy silt.
35	9	35-37	10-12-15-14	27	Gray red tan silty clay.

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Drilling Contractor

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PROJECT	C&J Landfill	Sheet 2 of 3
CLIENT	C&J Associates	Job No. : E94CJAS002

GROUNDWATER			DRILLING METHOD	DEPTH	
Date	Time	Depth	Hollow Stem Auger	82'	Borehole No.: B-2
					Date Started: 4-20-94
					Date Finished: 4-20-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

0	SAMPLE No.	Depth	Blows	N	CLASSIFICATION
40					
	10	40-42	10-10-11-12	21	Brown red tan silty sand.
45					
	11	45-47	11-16-16-26	32	Red gray clay.
50					
	12	50-52	11-17-19-24	36	Red gray clay.
	13	52-54			Shelby tube taken.
55					
	14	55-57	11-15-16-19	31	Red gray clay.
60					
	15	60-62	11-10-10-12	20	Red gray clay.
65					
	16	65-67	8-10-14-20	24	Red gray clay.
70					
	17	70-72	16-19-24-29	43	Red gray clay.

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PROJECT	C&J Landfill				Sheet 3 of 3
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-2
Date	Time	Depth	Hollow Stem Auger	82'	Date Started: 4-20-94
					Date Finished: 4-20-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE				
0	No.	Depth	Blows	N	CLASSIFICATION
75					
	18	75-77	25-27-31-30	58	Red gray clay.
80					
	19	80-82	23-23-26-25	49	Dark red silty clay.
85					
90					
95					
100					
105					

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PROJECT	C&J Landfill				Sheet 1 of 2
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-3
Date	Time	Depth	Hollow Stem Auger	62'	Date Started: 4-20-94
4-20-94		25'			Date Finished: 4-20-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

		SAMPLE No.	Depth	Blows	N	CLASSIFICATION
15 + 20	0	1	0-17			Dark brown gray clay silt with gravel, cinders and lumber fill.
	5				0-?	Construction material
	10					
	15					
	20	2	20-22	4-8-10-10	18	Gray tan clay. Possible?
	25	3	25-27	7-9-12-13	21	Gray tan clay, wet.
	30	4	30-32	6-10-13-12	23	Red tan clay. Possible FAD Slum
	35	5	35-37	11-13-15-16	28	Red tan clay.

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PROJECT	C&J Landfill				Sheet 2 of 2
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-3
Date	Time	Depth	Hollow Stem Auger	62'	Date Started: 4-20-94
4-20-94		25'			Date Finished: 4-20-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE				
0	No.	Depth	Blows	N	CLASSIFICATION
40	6	40-42	10-12-13-11	25	Red tan clay.
45	7	45-47	11-14-16-21	30	Red tan clay.
50	8	49-51			Shelby tube taken.
	9	50-52	9-13-12-12	25	Red tan clay.
55	10	55-57	14-14-15-13	29	Red tan clay.
60	11	60-62	12-12-11-13	23	Red tan clay.
65					
70					

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PROJECT	C&J Landfill				Sheet 1 of 3
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-4
Date	Time	Depth	Hollow Stem Auger	82'	Date Started: 4-22-94
					Date Finished: 4-22-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE				
0	No.	Depth	Blows	N	CLASSIFICATION
	1	0-15			Brown medium to large gravel and coarse sand.
5					
10					
15					
	2	15-17	4-7-7-9	14	Tan reddish yellow clayey silt.
20					
	3	20-22	7-7-9-10	16	Black and dark brown fine silty sand with organic matter.
25					
	4	25-27	6-7-7-9	14	Dark brown tan fine silty sand.
30					
	5	30-32	10-12-12-14	24	Dark brown silty clay.
35					
	6	35-37	9-11-13-14	24	Red tan fine sandy silt.

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PROJECT	C&J Landfill		Sheet 2 of 3
CLIENT	C&J Associates		Job No. : E94CJAS002

GROUNDWATER			DRILLING METHOD	DEPTH	
Date	Time	Depth	Hollow Stem Auger	82'	Borehole No.: B-4
					Date Started: 4-22-94
					Date Finished: 4-22-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE				
0	No.	Depth	Blows	N	CLASSIFICATION
40					
	7	40-42	10-10-12-15	22	Gray tan fine ~~silty~~ sand
45					
	8	45-47	9-13-12-17	25	Tan red fine silty clay.
	9	47-49			Shelby tube taken.
50					
	10	50-52	11-13-14-19	27	Red gray clay.
55					
	11	55-57	10-12-13-17	25	Red gray clay.
60					
	12	60-62	9-14-14-18	28	Red gray clay.
65					
	13	65-67	11-10-12-14	22	Red gray clay.
70					
	14	70-72	12-14-17-21	31	Red gray clay.

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PROJECT	C&J Landfill				Sheet 3 of 3
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-4
Date	Time	Depth	Hollow Stem Auger	82'	Date Started: 4-22-94
					Date Finished: 4-22-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE				
0	No.	Depth	Blows	N	CLASSIFICATION
75					
	15	75-77	13-16-19-27	35	Red gray clay.
80					
	16	80-82	13-19-19-20	38	Red gray clay.
85					
90					
95					
100					
105					

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PROJECT	C&J Landfill				Sheet 1 of 3
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-5
Date	Time	Depth	Hollow Stem Auger	82'	Date Started: 4-19-94
4-19-94		80'			Date Finished: 4-19-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE				
	No.	Depth	Blows	N	CLASSIFICATION
0	1	0-2	12-17-100/3	100+	Brown tan fine to coarse sand with gravel.
	2	2-4	18-13-42-69	55	Orange tan brown fine to coarse sand with some gravel.
5	3	4-6	20-20-12-13	32	Tan red fine to coarse silty sand with gravel.
10	4	10-12	15-19-16-17	35	Dark brown fine to medium clayey sand.
15	5	15-17			Shelby tube taken.
20	6	20-22	4-5-6-8	11	Red tan clay with small gravel.
25	7	25-27	3-3-5-8	8	Red tan clay.
30	8	30-32			Shelby tube taken. Red tan clay.
35	9	35-37	6-6-7-7	13	Red tan clay.

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PROJECT	C&J Landfill				Sheet 2 of 3
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-5
Date	Time	Depth	Hollow Stem Auger	82'	Date Started: 4-19-94
4-19-94		80'			Date Finished: 4-19-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

0	SAMPLE No.	Depth	Blows	N	CLASSIFICATION
40					
	10	40-42	4-5-7-8	12	Red tan clay.
45					
	11	45-47	8-9-9-11	18	Red tan clay.
50					
	12	50-52	16-16-19-24	35	Red tan clay.
55					
	13	55-57	9-12-17-20	29	Red brown sandy clay.
60					
	14	60-62	12-18-19-24	37	Red brown clay.
65					
	15	65-67	34-74-82-100	156	Light gray fine silty sand.
70					
	16	70-72	50-52-59-69	111	Light gray with black fine to medium silty sand.

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PROJECT	C&J Landfill				Sheet 3 of 3
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-5
Date	Time	Depth	Hollow Stem Auger	82'	Date Started: 4-19-94
4-19-94		80'			Date Finished: 4-19-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE No.	Depth	Blows	N	CLASSIFICATION
0					
75					
	17	75-77	29-41-52-79	93	Light gray red silty clay.
80					
	18	80-82	37-44-50-70	94	White gray red black silty sand, wet.
85					
90					
95					
100					
105					

JAMES C. ANDERSON ASSOCIATES INC.
Drilling Contractor

907 Pleasant Valley Avenue Mount Laurel, New Jersey 08054 (609)-722-6700

PROJECT	C&J Landfill				Sheet 1 of 2
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-6
Date	Time	Depth	Hollow Stem Auger	62'	Date Started: 4-15-94
					Date Finished: 4-15-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE No.	Depth	Blows	N	CLASSIFICATION
0	1	0-2	20-34-43-37	77	Tan brown fine to coarse sand with gravel.
	2	2-4	7-10-12-14	22	Red brown silty clay with gravel.
5	3	4-6	5-7-7-9	14	Red tan brown clay.
10					
	4	10-12			Shelby tube taken.
15					
	5	15-17	3-5-7-8	12	Dark brown black clay.
20					
	6	20-22	5-9-12-14	21	Tan gray clay.
	7	22-24			Shelby tube taken.
25					
	8	25-27	8-10-11-15	21	Tan gray red clay.
30					
	9	30-32	7-9-11-14	20	Tan gray red clay.
35					
	10	35-37	8-12-14-16	26	Tan red clay.

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PROJECT	C&J Landfill				Sheet 2 of 2
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-6
Date	Time	Depth	Hollow Stem Auger	62'	Date Started: 4-15-94
					Date Finished: 4-15-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE				
0	No.	Depth	Blows	N	CLASSIFICATION
40					
	11	40-42	7-9-14-18	23	Red brown clay.
45					
	12	45-47	16-15-19-24	34	Red tan clay.
50					
	13	50-52	11-12-12-14	24	Red tan clay.
55					
	14	55-57	13-12-15-14	27	Red tan clay.
60					
	15	60-62	14-14-13-16	27	Red tan clay.
65					
70					

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Drilling Contractor

907 Pleasant Valley Avenue Mount Laurel, New Jersey 08054 (609)-722-6700

PROJECT	C&J Landfill				Sheet 1 of 2
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-7
Date	Time	Depth	Hollow Stem Auger	62'	Date Started: 4-14-94
4-14-94		10'			Date Finished: 4-14-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

0	SAMPLE No.	Depth	Blows	N	CLASSIFICATION
	1	2-4	3-5-7-11	12	Tan reddish brown clayey silt with gravel.
5	2	4-6	4-7-9-14	16	Tan reddish brown silty clay.
10	3	10-12	3-5-7-9	12	Tan brown fine sand, wet.
15	4	15-17	3-7-9-15	16	Red tan brown clay.
20	5	20-22			Shelby tube taken.
25	6	25-27	3-5-11-17	16	Red tan brown clay.
30	7	30-32	5-8-11-17	19	Red tan brown clay.
35	8	35-37	5-7-10-17	17	Red tan brown clay.

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PROJECT	C&J Landfill				Sheet 2 of 2
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-7
Date	Time	Depth	Hollow Stem Auger	62'	Date Started: 4-14-94
4-14-94		10'			Date Finished: 4-14-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE				
0	No.	Depth	Blows	N	CLASSIFICATION
40	9	40-42	3-5-8-11	13	Red tan brown clay.
45	10	45-47	5-9-13-18	22	Red tan brown clay.
50	11	50-52			Shelby tube taken.
55	12	55-57	8-11-24-37	35	Red tan brown clay.
60	13	60-62	5-8-17-15	25	Tan brown red silty medium coarse sand with thin red clay seams.
65					
70					

JAMES C. ANDERSON ASSOCIATES INC.
Drilling Contractor

907 Pleasant Valley Avenue Mount Laurel, New Jersey 08054 (609)-722-6700

PROJECT	C&J Landfill				Sheet 1 of 2
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-8
Date	Time	Depth	Hollow Stem Auger	62'	Date Started: 4-13-94
4-13-94		15'			Date Finished: 4-13-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE No.	Depth	Blows	N	CLASSIFICATION
0					
	1	0-2	13-40-100/5	100+	Dark brown tan fine silty sand with large gravel.
	2	2-4	13-25-100/2	100+	Tan brown silty clay with large gravel.
5	3	4-6	8-13-25-40	43	Dark brown tan fine to coarse silty sand with gravel.
10					
	4	10-12	11-15-17-20	32	Dark gray brown fine to coarse sand with gravel.
15					
	5	15-17	3-5-10-15	15	Orange brown tan fine silty sand, wet.
20					
	6	20-22	4-3-3-3	6	Orange tan brown silty fine to medium sand.
25					
	7	25-27	7-8-19-20	27	Tan orange red sandy clay.
	8	27-29			Shelby tube taken.
30					
	9	30-32	7-8-13-20	21	Red tan clay with gravel.
35					
	10	35-37	5-7-16-20	23	Red tan clay.

JAMES C. ANDERSON ASSOCIATES INC.
Drilling Contractor

907 Pleasant Valley Avenue Mount Laurel, New Jersey 08054 (609)-722-6700

PROJECT	C&J Landfill				Sheet 2 of 2
CLIENT	C&J Associates				Job No. : E94CJAS002
GROUNDWATER			DRILLING METHOD	DEPTH	Borehole No.: B-8
Date	Time	Depth	Hollow Stem Auger	62'	Date Started: 4-13-94
4-13-94		15'			Date Finished: 4-13-94
					Driller: Reeve
WELL CONSTRUCTION		ROD SIZE		SPOON SIZE	Elevation:
					Inspector:

	SAMPLE				
0	No.	Depth	Blows	N	CLASSIFICATION
40					
	11	40-42	5-7-13-17	20	Red tan clay.
45					
	12	45-47	10-17-24-37	41	Red tan clay.
50					
	13	50-52	8-13-24-34	37	Red tan clay.
55					
	14	55-57	12-15-18-29	33	Red sandy clay with small gravel.
60					
	15	60-62	5-7-24-27	31	Red tan sandy clay.
65					
70					

WALTON CORPORATION

Drilling Contractor

P.O. BOX 1097, NEWARK, DELAWARE 19715

BORING LOG

C & J Landfill

NAME ..... PROJECT NO. #96506

..... SUPERVISOR .....

BORING NO. TB-5	DRILLER G. Truver	DATE 08/18/93
WEATHER	SURFACE ELEVATION 39±	DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0.0	1.0	Augered Yellow Brn Sand &			
					Gravel (Fill)			
			1.0	2.0	Brn (F-C) Sand w/Some Gravel			
					& Tr Silt (Fill)			
			2.0	3.0	Drk Gr Silty Clay w/Wood			
					Fragments & Tr Sand			
			3.0	4.0	Brn Sandy Silt			
			4.0	7.7	Or Brn (F) Sand w/Tr - Little			
					Silt & Wood Fragments			

A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in casing 12 inches.

IARKS: Auger Refusal 7.7

GROUND WATER

BLOWS O CASING I

0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22, 22-23, 23-24, 24-25, 25-26, 26-27, 27-28, 28-29, 29-30, 30-31, 31-32, 32-33, 33-34, 34-35, 35-36, 36-37, 37-38, 38-39, 39-40, 40-41, 41-42, 42-43, 43-44, 44-45, 45-46, 46-47, 47-48, 48-49, 49-50, 50-51, 51-52, 52-53, 53-5, 54-, 55-5, 56-57, 57-58, 58-59, 59-60

WALTON CORPORATION

Drilling Contractor

P.O. BOX 1097, NEWARK, DELAWARE 19715

BORING LOG

NAME C & J Landfill PROJECT NO. #96506

SUPERVISOR

BORING NO. TB-5A	DRILLER G. Truver	DATE 08/18/93
WEATHER	SURFACE ELEVATION	DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials		*Blows A		
			0.0	9.0	Augered (Fill) Wood, Brick				
					Silt, Sand, Gravel, Etc.				
1	9.0	11.0			Same	9	6	17	12
2	24.0	26.0		27.0	Same	10	9	6	3
3	29.0	31.0	27.0		Gr Silt Clay w/Tr Sand	4	2	2	3
4	34.0	36.0		36.0	No Recovery	9	13	13	10
5	38.0	40.0	36.0	39.0	Brn & Gr Silty Clay w/Tr	4	8	12	13
					Sand				
			39.0		Brn R Gr Silty Clay w/Tr				
					Sand				
6	40.0	42.0			Same	8	12	12	13
7	42.0	44.0			Same w/Sand Lenses	4	6	10	8
8	44.0	46.0			R & Gr Silty Clay w/Tr Sand	3	4	7	7
9	46.0	48.0		47.5	Gr Silty Clay	7	8	9	10
			47.5	48.0	Gr Silt w/Tr Sand				
+SH1	48.0	50.0	48.0	50.0	R & Gr Silty Clay w/Tr	S H E L B Y			
					Sand Recovery 22"				

A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in casing 12 inches.

ARKS: Wet on Spoon @ 24.7 + Waxed Tube

GROUND WATER

BLOWS ON CASING B
0-1
1-2
2-3
3-4
4-5
5-6
6-7
7-8
8-9
9-10
10-11
11-12
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MAIL TO:
WATER SUPPLY BRANCH
DIVISION OF WATER RESOURCES
P.O. BOX 1401
DOVER, DELAWARE 19903

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL

WELL COMPLETION REPORT MUST BE RETURNED WITHIN 30 DAYS AFTER CONSTRUCTION DATE

MONITOR / OBSERVATION WELL COMPLETION REPORT

PLEASE PRINT OR TYPE

PERMIT NO. 96506 LOCAL ID TB-5
Owner C+J ASSOCIATES
Address PO. BOX 628
City NEW CASTLE State DEL Zip 19720
Telephone Number
Consulting Firm/Supervising Geologist (If applicable) WIK ASSOCIATES / STEVE NEWSOM
Telephone Number 322-2558
Well Contractor WALTON CORP
Date of Completion 8-18-93
Name of DNREC Contact Person BLAIR VENABLES
Drilling Method H.S.A.

WELL CONSTRUCTION

Total depth drilled: 50 FT
Depth to water 24.7 FT
Surveyed Top of Casing Elevations
_____ Inner _____ Outer Ft. above Sea Level

CASING SEQUENCE

	Inner casing	Outer casing
Casing top		
Casing bottom		
Casing diameter	N/A	
Casing material		

SCREEN SEQUENCE

	Inner casing	Outer casing
Screen top		
Screen bottom	N/A	
Screen diameter		
Screen material		

Type of Grout BENTONITE + CEMENT from 0 to 50.0
Gravel pack interval from N/A to N/A
Aquifer/Formation screened in: N/A
Type of samples (ditch, split spoon, etc.) SPLIT SPOON

Samples Logged By: _____ (Name)
_____ (Title) _____ (Company)

Well Drilled By: WALTON CORP (Company Name)

[signature] 8/24/93
(Signature of Driller in Charge) (Date)

IS COMPLETED WELL LOCATED AS SHOWN ON APPLICATION FORM? YES [✓] NO [ ]
IF NO, DESCRIBE LOCATION CHANGE OR OTHER COMMENTS.

* SOIL BORINGS ONLY

DRILLERS LOG DESCRIP.	TOP OF STRATA	BOTTOM
FILL (YELL SAND+GRVL	0	1.0
FILL (WOOD, BRICK SILT SAND GRVL ETC)	1.0	27.0
BR-GR MOTTLED SILTY CLAY W/TR SAND + SILT LAYERS	27.0	50.0

SUPPLEMENTAL DRILLERS LOG ATTACHED?
YES [ ] NO [X]
PAGE 1 OF 1 PAGES

White - Water Supply • Canary - Other • Pink - Owner • Goldenrod - Contractor

DOCUMENT NO. 40-08/87/02/03 - EC 81

WALTON CORPORATION

Drilling Contractor

P.O. BOX 1097, NEWARK, DELAWARE 19715

BORING LOG

NAME C & J Landfill ..... PROJECT NO. #96507

..... SUPERVISOR .....

BORING NO. TB-6	DRILLER G. Truver	DATE 08/17/93
WEATHER	SURFACE ELEVATION	DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A			
			0.0	0.7	Or (F-C) Sand & Gravel				
					(Fill)				
1	1.0	1.5	0.7	2.4	(Fill) Gr (F-M)Sand w/Some	50			
					Stone & Tr Silt				
2	2.5	4.0	2.4	3.4	R & Gr Silty Clay w/Tr Sand	4	6	8	
			3.4	4.0	Brn Silt w/Some (V/ F) Sand				
3	4.0	6.0	4.0	4.6	Brn Or Silty (F) Sand	4	5	4	6
			4.6		Brn-Gr Silty Clay w/Tr (F)				
					Sand				
4	6.0	8.0			Same	3	3	6	6
5	8.0	10.0		9.6	Same	2	3	6	8
			9.6		Gr & R Silty Clay w/Tr Sand				
6	10.0	12.0			Same	2	5	7	9
7	12.0	14.0			Same	4	6	8	10
8	14.0	16.0		16.0	Same	3	5	8	9

A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in casing 12 inches.

MARKS: .....

GROUND WATER

BLOWS ON CASING B
0- 1
1- 2
2- 3
3- 4
4- 5
5- 6
6- 7
7- 8
8- 9
9-10
10-11
11-12
12-13
13-14
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MAIL TO:
WATER SUPPLY BRANCH
DIVISION OF WATER RESOURCES
P.O. BOX 1401
DOVER, DELAWARE 19903

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL

WELL COMPLETION REPORT MUST BE RETURNED WITHIN 30 DAYS AFTER CONSTRUCTION DATE.

MONITOR / OBSERVATION WELL COMPLETION REPORT

PLEASE PRINT OR TYPE

PERMIT NO. 9687 LOCAL ID TB-6
Owner C+J ASSOCIATES
Address P.O. BOX 628
City NEW CASTLE State DEL Zip 19720
Telephone Number
Consulting Firm/Supervising Geologist (If applicable) WTK ASSOCIATES / STEVE NEWSOM
Telephone Number 322-2558
Well Contractor WALTON CORP
Date of Completion 8-17-93
Name of DNREC Contact Person ELAIR VENABLES
Drilling Method H.S.A.

IS COMPLETED WELL LOCATED AS SHOWN ON APPLICATION FORM? YES [X] NO [ ]
IF NO, DESCRIBE LOCATION CHANGE OR OTHER COMMENTS.

WELL CONSTRUCTION

Total depth drilled: 16.0 FT
Depth to water ~~NO~~
Surveyed Top of Casing Elevations
____ Inner ____ Outer Ft. above Sea Level

CASING SEQUENCE

	Inner casing	Outer casing
Casing top		
Casing bottom		
Casing diameter	N/A	
Casing material		

SCREEN SEQUENCE

	Inner casing	Outer casing
Screen top		
Screen bottom	N/A	
Screen diameter		
Screen material		

Type of Grout BENTONITE + CEMENT from .0 to 16.0
Gravel pack interval from N/A to N/A
Aquifer/Formation screened in: N/A
Type of samples (ditch, split spoon, etc.) SPLIT SPOON

Samples Logged By: ____ (Name)
(Title) (Company)

Well Drilled By: WALTON CORP (Company Name)

(Signature of Driller in Charge) 8/24/93 (Date)

* SOIL BORINGS ONLY

DRILLERS LOG DESCRIP.	TOP OF STRATA	BOTTOM
FILL / BRGE (F-C) SAND + GRVL	.0	0.7
GR (F-M) SAND W/TR SILT	0.7	2.4
RED + GR SILTY CLAY W/TR SAND	2.4	3.4
BR-ORGE SILTY (F) SAND	3.4	4.6
BR-GR-RED SILTY CLAY W/TR SAND	4.6	16.0

SUPPLEMENTAL DRILLERS LOG ATTACHED?
YES [ ] NO [X]
PAGE 1 OF 1 PAGES

White - Water Supply • Canary - Other • Pink - Owner • Goldenrod - Contractor

DOCUMENT NO. 40-08/87/02/03 - EC 81

WALTON CORPORATION

Drilling Contractor

P.O. BOX 1097, NEWARK, DELAWARE 19715

BORING LOG

NAME C & J Landfill PROJECT NO. #96508

SUPERVISOR

BORING NO. TB-7	DRILLER G. Truver	DATE 08/20/93
WEATHER	SURFACE ELEVATION	DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A			
			0.0	1.5	Augered (Fill) Sand & Gravel				
			1.5		Brn Silt w/Tr Sand				
*1	3.0	5.0		4.5	Same	3	3	2	3
			4.5		Brn & Gr silt w/Tr Sand				
					& Gravel				
*2	5.0	7.0			No Recovery	1	1	1	1
	7.0	9.0			Brn Silty Clay w/Tr Sand	W/H	W/H	1	2
	9.0	11.0			Brn Silty Clay w/Tr Silt	W/H	W/H	1	1
					Layers & Tr Sand				
*5	11.0	13.0		11.8	Same	1	1/1		1
			11.8		Drk Gr Silty Clay w/Tr				
					Sand & Organics				
*6	13.0	15.0			Same	W/H	W/H	W/H	1
*7	15.0	17.0		15.5	Same	W/H	1	1	2
			15.5	16.4	Brn Peat				
			16.4		Gr silty Clay				
*8	17.0	19.0		18.5	Same	2	3	5	7
			18.5		Gr silty (F) Sand				
*9	19.0	21.0		19.7	Same	3	3	2	3
			19.7		Gr Micaceous (F) Sandy Silt				
10	21.0	23.0		22.5	Same	8	3	15	9
			22.5		Brn (F-C) Sand & Gravel				

A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in casing 12 inches.

ARKS: .....

GROUND WATER

BLOWS ON CASING B
0-1
1-2
2-3
3-4
4-5
5-6
6-7
7-8
8-9
9-10
10-11
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WALTON CORPORATION

Drilling Contractor

P.O. BOX 1097, NEWARK, DELAWARE 19715

BORING LOG

C & J Landfill

NAME ..... PROJECT NO. .....

..... SUPERVISOR .....

BORING NO. B7 Cont.	DRILLER G. Truver	DATE 8/20/93
WEATHER	SURFACE ELEVATION	DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A			
11	23.0	25.0			Same	4	6	10	14
12	29.0	31.0		33.0	Same	9	16	16	16
13	34.0	36.0	33.0		Gr & R Clay w/Tr Sand	2	2	5	5
14	36.0	38.0			Same w/Sand Lenses	6	6	8	8
15	38.0	40.0		38.3	Same	4	6	8	11
			38.3	39.5	Gr & R Sandy Silt w/				
					Tr Clay				
			39.5		Gr Brn R Silty (F) Sand				
16	40.0	42.0		41.2	Same	5	5	7	11
			41.2		Gr & R Clay w/Tr Sand				
17	42.0	44.0		42.9	R & Gr (C) Sand w/Tr Silt	16	20	28	28
			42.9	44.0	R & Yellow Brn Silty Sand				
					w/Lenses of Silty Clay				

\ Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

3 Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in casing 12 inches.

ARKS: .....

.....

.....

.....

GROUND WATER

BLOWS ON CASING E

0-1
1-2
2-3
3-4
4-5
5-6
6-7
7-8
8-9
9-10
10-11
11-12
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MAIL TO:
WATER SUPPLY BRANCH
DIVISION OF WATER RESOURCES
P.O. BOX 1401
DOVER, DELAWARE 19903

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL

WELL COMPLETION REPORT MUST BE RETURNED WITHIN 30 DAYS AFTER CONSTRUCTION DATE.

MONITOR / OBSERVATION WELL COMPLETION REPORT

PLEASE PRINT OR TYPE

PERMIT NO. 9650.8 LOCAL ID TB-7
Owner CTJ ASSOCIATES
Address PO BOX 628
City NEW CASTLE State DE Zip 19720
Telephone Number
Consulting Firm/Supervising Geologist (If applicable)
WIK ASSOCIATES / STEVE NEWSOM
Telephone Number 322-2558
Well Contractor WALTON CORP
Date of Completion 8-20-93
Name of DNREC Contact Person BLAIR VENABLES
Drilling Method H.S.A.

WELL CONSTRUCTION

Total depth drilled: 44.5 FT
Depth to water —
Surveyed Top of Casing Elevations
_____ Inner _____ Outer Ft. above Sea Level

CASING SEQUENCE

	Inner casing	Outer casing
Casing top		
Casing bottom	N/A	
Casing diameter		
Casing material		

SCREEN SEQUENCE

	Inner casing	Outer casing
Screen top		
Screen bottom		
Screen diameter	N/A	
Screen material		

Type of Grout BENTONITE + CEMENT from 0 to 44.0
Gravel pack interval from N/A to N/A
Aquifer/Formation screened in: N/A
Type of samples (ditch, split spoon, etc.)
SPLIT SPOON

Samples Logged By: _____ (Name)
(Title) (Company)

Well Drilled By: WALTON CORP (Company Name)

(Signature of Driller in Charge) 8-24-93 (Date)

IS COMPLETED WELL LOCATED AS SHOWN ON APPLICATION FORM? YES [ ] NO [ ]
IF NO, DESCRIBE LOCATION CHANGE OR OTHER COMMENTS.

* SOIL BORINGS ONLY

DRILLERS LOG DESCRIP.	TOP OF STRATA	BOTTOM
FILL (SANDY GRVL)	0	1.5
BR-GR SILT W/TR SAND + GRVL	1.5	4.5
BR + GR SILTY CLAY W/TR SAND + GRG	4.5	15.5
BR PEAT	15.5	16.4
GR SILTY CLAY	16.4	18.5
BR + GR MICACEOUS SILTY (F) SAND W/SOM GRVL	18.5	33.0
GRY + RED CLAY W/TR SAND	33.0	38.3
GR-BRN-RED SANDY SILT	38.3	41.2
GR + RED SILTY CLAY W/TR SAND	41.2	42.9
RED + YELL BR SILTY SAND W/ CLAY LAYERS	42.9	44.5

SUPPLEMENTAL DRILLERS LOG ATTACHED?
YES [ ] NO [X]
PAGE 1 OF 1 PAGES

White - Water Supply • Canary - Other • Pink - Owner • Goldenrod - Contractor

DOCUMENT NO. 40-08/87/02/03 - EC 81

WALTON CORPORATION

Drilling Contractor

P.O. BOX 1097, NEWARK, DELAWARE 19715

BORING LOG

C & J Landfill #96509

NAME ..... PROJECT NO. .....

..... SUPERVISOR .....

BORING NO. TB-8	DRILLER G. Truver	DATE 08/17/93
WEATHER	SURFACE ELEVATION	DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials		*Blows A		
			0.0	1.0	Or Brn(F-M)Sand w/Tr Gravel				
1	1.0	3.0	1.0	1.8	Gr Brn silt w/Tr (F) Sand	5	10	7	7
			1.8	2.6	Or Brn (F-M) Sand w/Some				
					Gravel				
			2.6		R Silty Clay w/Tr Sand				
2	3.0	5.0		3.6	Same	2	5	5	5
			3.6		Brn Silty (V/F) Sand w/Tr				
					Clay				
3	5.0	7.0		5.3	Same	5	5	6	7
			5.3	6.7	Or Brn Silty Clay w/tr Sand				
			6.7		Or Brn - Brn Silty (F) Sand				
4	7.0	9.0		7.2	Same	2	2	4	6
			7.2		R & Gr Silty Clay w/(F)				
					Sand Layers				
5	9.0	11.0		9.6	Same	2	5	8	9
			9.6		Brn Gr silty (F) Sand w/				
					Clay Layers				
6	11.0	13.0		13.0	Same	8	11	10	8
7	13.0	15.0	13.0		R Brn Gr silty Clay w/Tr	3	7	11	16
					Sand				
8	15.0	17.0			Same	16	14	22	22
9	17.0	19.0		19.0	Same	13	16	18	20

A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in casing 12 inches.

MARKS: *Wet on Spoon @ 9.5

W/L @ Start of 8/18/93 @ 6.5

GROUND WATER

BLOWS ON CASING B
0- 1
1- 2
2- 3
3- 4
4- 5
5- 6
6- 7
7- 8
8- 9
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10-11
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MAIL TO:
WATER SUPPLY BRANCH
DIVISION OF WATER RESOURCES
P.O. BOX 1401
DOVER, DELAWARE 19903

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL

WELL COMPLETION REPORT MUST BE RETURNED WITHIN 30 DAYS AFTER CONSTRUCTION DATE.

MONITOR / OBSERVATION WELL COMPLETION REPORT

PLEASE PRINT OR TYPE

PERMIT NO. 96509 LOCAL ID TB-B
Owner C J ASSOCIATES
Address P.O. BOX 628
City NEW CASTLE State DEL Zip 19720
Telephone Number
Consulting Firm/Supervising Geologist (If applicable) W K ASSOCIATES / STEVE NEWSOM
Telephone Number 322-2558
Well Contractor WALTON CORP
Date of Completion 8-17-93
Name of DNREC Contact Person BLAIR VENABLES
Drilling Method H.S.A.

IS COMPLETED WELL LOCATED AS SHOWN ON APPLICATION FORM? YES [✓] NO [ ]
IF NO, DESCRIBE LOCATION CHANGE OR OTHER COMMENTS.

WELL CONSTRUCTION

Total depth drilled: 19.0 FT
Depth to water 9.5 FT
Surveyed Top of Casing Elevations
_____ Inner _____ Outer Ft. above Sea Level

CASING SEQUENCE

	Inner casing	Outer casing
Casing top		
Casing bottom	N/A	
Casing diameter		
Casing material		

SCREEN SEQUENCE

	Inner casing	Outer casing
Screen top	N/A	
Screen bottom		
Screen diameter		
Screen material		

Type of Grout BENTONITE + CEMENT from 0 to 19.0
Gravel pack interval from N/A to N/A
Aquifer/Formation screened in: N/A
Type of samples (ditch, split-spoon, etc.) SPLIT SPOON

Samples Logged By: _____ (Name)
_____ (Title) (Company)

Well Drilled By: WALTON CORP (Company Name)

(Signature of Driller in Charge) 8/24/93 (Date)

* SOIL BORINGS ONLY

DRILLERS LOG DESCRIP.	TOP OF STRATA	BOTTOM
OLIVE BR (F-M) SAND W/TR GRVL	0	1.0
OLIVE BR SILT W/TR SAND	1.0	1.5
OLIVE BR-BR (VERY F-M) SAND W/TR CLAY + GRVL	1.8	5.3
OLIVE BR SILTY CLAY W/TR SAND	5.3	6.7
RED & OR SILTY CLAY W/TR SAND	6.7	9.6
BROWN OR SILTY (F) SAND W/TR CLAY	9.6	13.0
RED-BR-OR SILTY CLAY W/TR SAND	13.0	19.0

SUPPLEMENTAL DRILLERS LOG ATTACHED?
YES [ ] NO [✓]
PAGE 1 OF 1 PAGES

White - Water Supply • Canary - Other • Pink - Owner • Goldenrod - Contractor

DOCUMENT NO. 40-08/87/02/03 - EC 81

WALTON CORPORATION

Drilling Contractor

P.O. BOX 1097, NEWARK, DELAWARE 19715

BORING LOG

NAME C & J Landfill PROJECT NO. #96510

SUPERVISOR

BORING NO. TB-9	DRILLER G. Truver	DATE 08/16/93
WEATHER	SURFACE ELEVATION	DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials		*Blows A		
			0.0		Or (F-M) Sand & Gravel				
					(Fill)				
1	1.0	2.0		1.3	Same	9	50		
*2	3.0	5.0		3.3	Same	4	4	6	8
			3.3		Various R Brn Yellow Clayey				
					Silt w/Tr - Little Sand				
*3	5.0	7.0			Same	4	5	6	7
	7.0	9.0		8.5	Same	2	4	6	10
			8.5		R Brn Gr silty Clay w/Tr				
					Sand				
*5	9.0	11.0		9.8	Same	3	7	10	10
			9.8		Gr & Brn Silty (V/F) Sand				
*6	11.0	13.0		12.8	Same	4	5	7	6
			12.8	13.0	Gr Silty Clay w/Tr Sand				
*7	13.0	15.0	13.0	15.0	Gr silty (F) Sand	4	5	6	6
*8	15.0	17.0	15.0		Drk Gr silty Clay w/Tr	4	6	10	11
					- Little Sand				
+*SH1	17.0	19.0		19.0	Same Recovery 24"	S H	E L	B Y	
*9	19.0	21.0	19.0	21.0	Gr Silt Clay w/Tr Charcoal	4	6	8	12
					Sand				

A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

3 Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in casing 12 inches.

MARKS: * Pert Test - 3 Minutes + Waxed Tube

GROUND WATER

BLOWS O: CASING I

0-1
1-2
2-3
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MAIL TO:
WATER SUPPLY BRANCH
DIVISION OF WATER RESOURCES
P.O. BOX 1401
DOVER, DELAWARE 19903

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL

WELL COMPLETION REPORT MUST BE RETURNED WITHIN 30 DAYS AFTER CONSTRUCTION DATE.

MONITOR / OBSERVATION WELL COMPLETION REPORT

PLEASE PRINT OR TYPE

PERMIT NO. 96510 LOCAL ID TB-9
Owner C + J ASSOCIATES
Address P.O. BOX 628
City NEW CASTLE State DEL Zip 19720
Telephone Number
Consulting Firm/Supervising Geologist (If applicable) WIK ASSOCIATES / STEVE NEWSOM
Telephone Number 322-2558
Well Contractor WALTON CORP
Date of Completion 8-14-93
Name of DNREC Contact Person BLAIR VENABLES
Drilling Method H.S.A.

IS COMPLETED WELL LOCATED AS SHOWN ON APPLICATION FORM? YES [X] NO [ ]
IF NO, DESCRIBE LOCATION CHANGE OR OTHER COMMENTS.

WELL CONSTRUCTION

Total depth drilled: 21.0 FT
Depth to water —
Surveyed Top of Casing Elevations
____ Inner ____ Outer Ft. above Sea Level

CASING SEQUENCE

	Inner casing	Outer casing
Casing top	N/A	
Casing bottom		
Casing diameter		
Casing material		

SCREEN SEQUENCE

	Inner casing	Outer casing
Screen top	N/A	
Screen bottom		
Screen diameter		
Screen material		

Type of Grout BENTONITE + CEMENT from 0 to 21.0
Gravel pack interval from N/A to N/A
Aquifer/Formation screened in: N/A
Type of samples (ditch, split spoon, etc.) SPLIT SPOON

Samples Logged By: ____ (Name)
(Title) (Company)

Well Drilled By: WALTON CORP (Company Name)

(Signature of Driller in Charge) 8/24/93 (Date)

* SOIL BORINGS ONLY

DRILLERS LOG DESCRIP.	TOP OF STRATA	BOTTOM
FILL (COCE SAND + GRAVEL)	0	3.3
RED-BR-YELL CLAYEY SILT W/TR-LIT SAND	3.3	8.5
RD-BR-GR SILTY CLAY W/TR SAND	8.5	13.0
GR SILTY (F) SAND	13.0	15.0
DK GR SILTY CLAY W/TR SAND	15.0	21.0

SUPPLEMENTAL DRILLERS LOG ATTACHED?
YES [ ] NO [X]
PAGE 1 OF 1 PAGES

White - Water Supply • Canary - Other • Pink - Owner • Goldenrod - Contractor

DOCUMENT NO. 40-08/87/02/03 - EC 81

WALTON CORPORATION

Drilling Contractor

P.O. BOX 1097, NEWARK, DELAWARE 19715

BORING LOG

NAME C.J. Landfill PROJECT NO. .....

SUPERVISOR .....

BORING NO. MW-1 Deep	DRILLER G. Truver	DATE 10/05/92
WEATHER	SURFACE ELEVATION	DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0.0	0.5	Brn Silty Gravelly (F) Sand			
			0.5	2.2	Brn (F-M) Sand & Gravel			
			2.2	8.5	Brn - R Silty Clay			
			8.5	12.5	R Clayee Silt			
			12.5	14.0	Brn Clayee SIlt			
			14.0	18.0	Brn & R Clayee Silt			
			18.0	22.0	Gr & R Clay (Wet)			
			22.0	24.0	Gr Clay & Silt w/Tr (F) Sand			
			24.0	28.0	R Gr Clay Silt & (F) Sand			
			28.0	34.0	R & Gr (F-M) Sand			

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

*B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in casing 12 inches.

REMARKS: .....Point Set @ 31.9 W/L @ 24.0 After 15 Min Wait.....

GROUND WATER

BLOWS ON CASING B
0-1
1-2
2-3
3-4
4-5
5-6
6-7
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WALTON CORPORATION

Drilling Contractor

P.O. BOX 1097, NEWARK, DELAWARE 19715

BORING LOG

NAME C.J. Landfill PROJECT NO. .....

SUPERVISOR .....

BORING NO. MW-6 Deep	DRILLER G. Truver	DATE 10/10/92
WEATHER	SURFACE ELEVATION	DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0.0	0.5	Fill (Sand & Gravel)			
			0.5	1.5	Concrete			
			1.5	20.0	Fill (Wood, Brick, Silt, Wire			
					Etc.)			
			20.0	23.0	Gr Clayee Silt			
			23.0	35.5	Orange Brn Sand & Gravel			
			35.5	42.0	Orange Brn (F-M) Sand w/Tr			
					Gravel			
	43.5	45.0	42.0		R & Gr Silty Clay	3	4	6
	48.5	50.0			Same	3	5	9
3	50.0	52.0			Same 1	3	5	8
4	52.0	53.5			Same	8	9	12
5	53.5	55.5			Same 3	5	7	9
6	55.5	57.5			Same 7	9	9	11
7	58.5	60.5		61.0	Same 5	7	9	15
8	63.5	65.5	61.0	66.5	Brn & Gr (F) Silty Sand 4	6	9	10
					w/Clay			
9	68.5	70.5	66.5	73.5	White & Light Brn (F-C) W/R	W/R		W/R
					Sand w/Little Silt			

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

*B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in casing 12 inches.

REMARKS: .....W/L..@..33..4.....Point..Set..@..73..5.....

GROUND WATER

BLOWS ON CASING B
0-1
1-2
2-3
3-4
4-5
5-6
6-7
7-8
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WALTON CORPORATION

Drilling Contractor

P.O. BOX 1097, NEWARK, DELAWARE 19715

BORING LOG

C.J. Landfill

AME ..... PROJECT NO. .....

..... SUPERVISOR .....

ORING NO. MW-6 Shallow	DRILLER G. Truver	DATE 10/11/92
EATHER	SURFACE ELEVATION	DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0.0	0.5	Brn Sand & Gravel (fill)			
			0.5	2.3	Concrete			
			2.3	20.0	Fill (Silt, Wood, Brick			
					Wire, Etc.)			
1	29.0	30.5	20.0		Brn Sand & Gravel	4	20	35
2	34.0	35.5		35.5	Or Brn (F-M) Sand & Gravel	12	24	20

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

*B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in casing 12 inches.

E MARKS: .....Point Set @ 33.7 W/L @ 24.1.....

GROUND WATER

BLOWS O: CASING B

0-1
1-2
2-3
3-4
4-5
5-6
6-7
7-8
8-9
9-10
10-11
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WALTON CORPORATION

Drilling Contractor

P.O. BOX 1097, NEWARK, DELAWARE 19715

BORING LOG

NAME C.J. Landfill PROJECT NO.

SUPERVISOR

BORING NO. MW-7 Shallow	DRILLER G. Truver	DATE 10/14/92
WEATHER	SURFACE ELEVATION	DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0.0	3.5	Fill (Brn Sand & Gravel)			
			3.5	5.0	Drk Brn Sand w/Little Gravel			
			5.0	6.0	Brn Sand & Gravel			
			6.0	7.5	Drk Gr Silt w/Some (F) Sand			
			7.5	9.5	Drk Gr Silty Clay w/Little Sand			
			9.5	12.5	Gr Sandy Silt			
			12.5	18.0	Brn Silty (F-M) Sand (Wet)			
			18.0	19.0	R & Gr Silty Clay			

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

*B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in casing 12 inches.

REMARKS: Point Set @ 19.0 W/L @ 13.3

After 15 Min W/L @ 12.0

GROUND WATER

BLOWS ON CASING 6
0-1
1-2
2-3
3-4
4-5
5-6
6-7
7-8
8-9
9-10
10-11
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APPENDIX D
Lab Test Results

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-1 30'-32'	E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK	

WATER CONTENT (Delivered Moisture)

Tare no.		MM-8
Wt soil & tare,moist	(WT1)	308.81
Wt soil & tare,dry	(WT2)	292.16
Wt tare	(WT3)	190.39
Wt moisture	(WT4=WT1-WT2)	16.65
Wt dry soil	(WT5=WT2-WT3)	101.77
% WATER	(WT4/WT5*100)	16.36%

% PASSING #10 SIEVE

Total Wt	(WT6)	101.77
Wt Split #10	(WT7)	100.82
% PASSING #10	(WT7/WT6*100)	99.1%

USCS	SIEVE	wt ret	% ret (WT8 X100/WT5=%)	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375		0.00%	100.00%	0.375	
coarse sand	#4	0.77	0.76%	99.24%	#4	coarse sand
medium sand	#10	1.03	1.01%	98.99%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve		98.99	Initial Moist Wt.	68.14
Specific Gravity	(ASSUMED)	2.65	Calculated Dry Wt	67.95
ml Dispering Agent Used		125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		CH-9
Wt soil and tare,moist	(WT1)	36.15
Wt soil&tare,dry	(WT2)	36.11
Wt tare	(WT3)	21.88
Wt moisture lost	(WT4=WT1-WT2)	0.04
Wt dry soil,final	(WT5=WT2-WT3)	14.23
% HYGROSCOPIC MOISTURE	(WT4/WT5*100)	0.3%

% PASSING 200 SIEVE

Tare no.		BL-11
Wt soil and tare,dry (wt,dry)	(WT1)	263.25
Wt soil&tare,wash (wt,wash)	(WT2)	215.68
Wt tare	(WT3)	195.30
Wt fines lost (wt,dry-wt,wash)	(WT4=WT1-WT2)	47.57
Wt dry soil, (wt,dry-wt,tare)	(WT5=WT1-WT3)	67.95
% FINES LOST	(WT4/WT5*100)	70.0%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING.
#10	0.00	0.69	98.99%
#20	0.78	1.47	97.85%
#40	3.98	4.67	93.19%
#60	11.29	11.98	82.54%
#100	16.75	17.44	74.59%
#200	20.38	21.07	69.30%

LL	27
PL	16
PI	11
Gs	

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/13/94	10:12	2.00	36.0	18.50	0.014	5.00
	10:14	4.00	32.5	18.50	0.014	5.00
	10:18	8.00	29.0	18.50	0.014	5.00
	10:25	15.00	27.0	18.50	0.014	5.00
	10:40	30.00	23.0	18.50	0.014	5.00
	11:10	60.00	21.0	18.50	0.014	5.00
	12:10	120.00	18.5	19.00	0.014	4.50
	14:10	240.00	17.0	19.00	0.014	5.00
	18:10	480.00	15.5	19.00	0.014	4.50
06/14/94	10:10	1440.0	13.0	19.50	0.014	4.00

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	0.8%
% C SAND	0.3%
% M SAND	5.8%
% F SAND	23.9%
% FINES	69.3%
% TOTAL	100.00%

ET (min)	RDNG.C	EFF LTH	K	A	PAR DIA	%FINER
2.00	31.00	11.2	0.014	1.00	0.033	45.2
4.00	27.50	11.9	0.014	1.00	0.024	40.1
8.00	24.00	12.4	0.014	1.00	0.017	35.0
15.00	22.00	12.7	0.014	1.00	0.013	32.0
30.00	18.00	13.3	0.014	1.00	0.009	26.2
60.00	16.00	13.7	0.014	1.00	0.007	23.3
120.00	14.00	14.0	0.014	1.00	0.005	20.4
240.00	12.00	14.3	0.014	1.00	0.003	17.5
480.00	11.00	14.5	0.014	1.00	0.002	16.0
1440.00	9.00	14.8	0.014	1.00	0.001	13.1

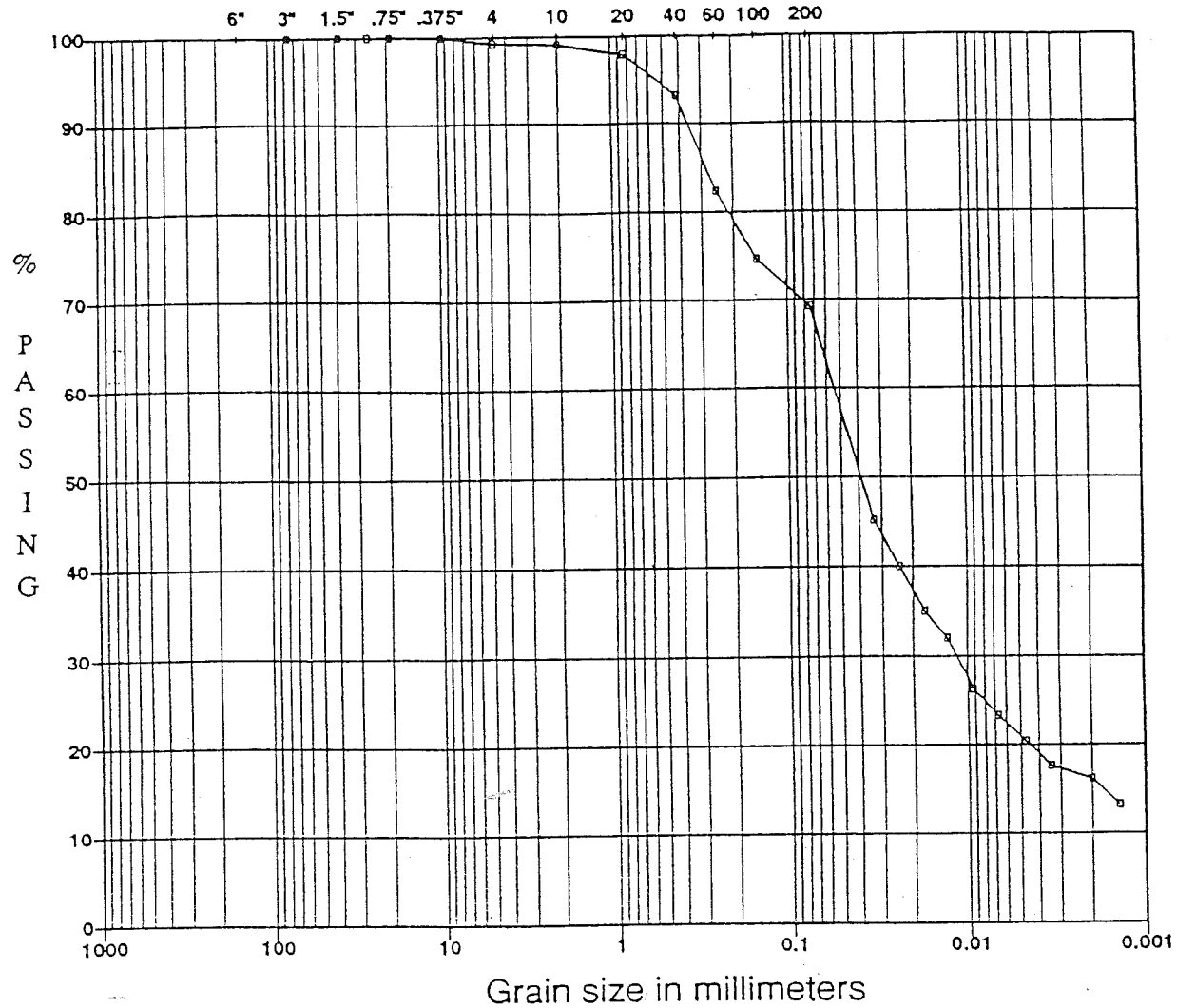
WET COLOR: Reddish, brownish yellow
DESCRIPTION: Lean clay with sand

USCS: CL

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-1	16.4	27	16	11		Reddish, brownish yellow
30'-32'	Date Tested:	6/14/94				Lean clay
E94CJAS002	USCS:	CL				with sand
TECHNICIAN:	TK	DATE: 6/18/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-1
PROJECT NO.:	933-6141	DEPTH:	30'-32'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

PLASTIC LIMIT

		CH28	CH27
Tare Number:			
Weight of Wet Soil & Tare	(W1)	45.96	41.32
Weight of Dry Soil & Tare	(W2)	43.91	39.98
Weight of Tare	(W3)	31.05	31.54
Weight of Water	(W4=W1-W2)	2.05	1.34
Weight of Dry Soil	(W5=W2-W3)	12.86	8.44
Water Content (%)	(W4/W5)*100	15.9%	15.9%

NATURAL MOISTURE

MM-8
308.81
292.16
190.39
16.65
101.77
16.4%

LIQUID LIMIT

		20	22
Number of Blows			
Tare Number:		CH18	M4
Weight of Wet Soil & Tare	(W6)	28.81	32.01
Weight of Dry Soil & Tare	(W7)	27.31	29.90
Weight of Tare	(W8)	21.78	22.10
Weight of Water	(W9=W6-W7)	1.50	2.11
Weight of Dry Soil	(W10=W7-W8)	5.53	7.80
Water Content (%)	(W9/W10)*100	27.1%	27.1%
LL = Wn (N / 25) ^ .121		26.40	26.64

AVERAGE: 26.52

LIQUID LIMIT	27
PLASTIC LIMIT	16
PLASTICITY INDEX	11
MOISTURE CONTENT	16.4%
LIQUIDITY INDEX	0.04

Description: Reddish, brownish yellow
Lean clay
with sand

USCS: CL

DATE:	6/15/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES I
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-1 35'-37'	E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK	

WATER CONTENT (Delivered Moisture)

Tare no.		BM-5
Wt soil & tare,moist	(gm)	369.89
Wt soil & tare,dry	(gm)	347.66
Wt tare	(gm)	192.86
Wt moisture	(gm)	22.23
Wt dry soil	(gm)	154.80
% WATER		14.36%

% PASSING #10 SIEVE

Total Wt	(gm)	154.80
Wt Split #10	(gm)	123.06
% PASSING #10		79.5%

USCS

	SIEVE	wt ret	% ret	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000	29.90	19.32%	80.68%	1.000	
fine gravel	0.750	29.90	19.32%	80.68%	0.750	fine gravel
—	0.375	29.90	19.32%	80.68%	0.375	
coarse sand	#4	30.38	19.63%	80.37%	#4	coarse sand
medium sand	#10	31.90	20.61%	79.39%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve	79.39	Initial Moist Wt.	69.02
Specific Gravity	2.65	Calculated Dry Wt	68.81
ml Dispering Agent Used	125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		143
Wt soil and tare,moist	(gm)	34.38
Wt soil&tare,dry	(gm)	34.34
Wt tare	(gm)	21.08
Wt moisture lost	(gm)	0.04
Wt dry soil,final	(gm)	13.26
% HYGROSCOPIC MOISTURE	(gm)	0.3%

% PASSING 200 SIEVE

Tare no.		MM-4
Wt soil and tare,dry (wt,dry)	(gm)	260.05
Wt soil&tare,wash (wt,wash)	(gm)	220.40
Wt tare	(gm)	191.24
Wt fines lost (wt,dry-wt,wash)	(gm)	39.65
Wt dry soil, (wt,dry-wt,tare)	(gm)	68.81
% FINES LOST	(gm)	57.6%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING
#10	0.00	17.86	79.39%
#20	1.60	19.46	77.55%
#40	7.09	24.95	71.21%
#60	17.35	35.21	59.38%
#100	24.57	42.43	51.04%
#200	29.03	46.89	45.90%

LL	
PL	
PI	
Gs	

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/13/94	09:35	2.00	33.0	18.50	0.014	5.00
	09:37	4.00	27.0	18.50	0.014	5.00
	09:41	8.00	24.0	18.50	0.014	5.00
	09:48	15.00	22.0	18.50	0.014	5.00
	10:03	30.00	20.0	18.50	0.014	5.00
	10:33	60.00	18.0	18.50	0.014	5.00
	11:33	120.00	16.0	19.00	0.014	5.00
	13:33	240.00	15.0	19.00	0.014	5.00
	17:33	480.00	14.0	19.00	0.014	4.50
06/14/94	09:33	1440.0	12.0	20.00	0.014	4.00

Grain Size Percentages

% C GRVL	19.3%
% F GRVL	0.3%
% C SAND	1.0%
% M SAND	8.2%
% F SAND	25.3%
% FINES	45.9%
% TOTAL	100.00%

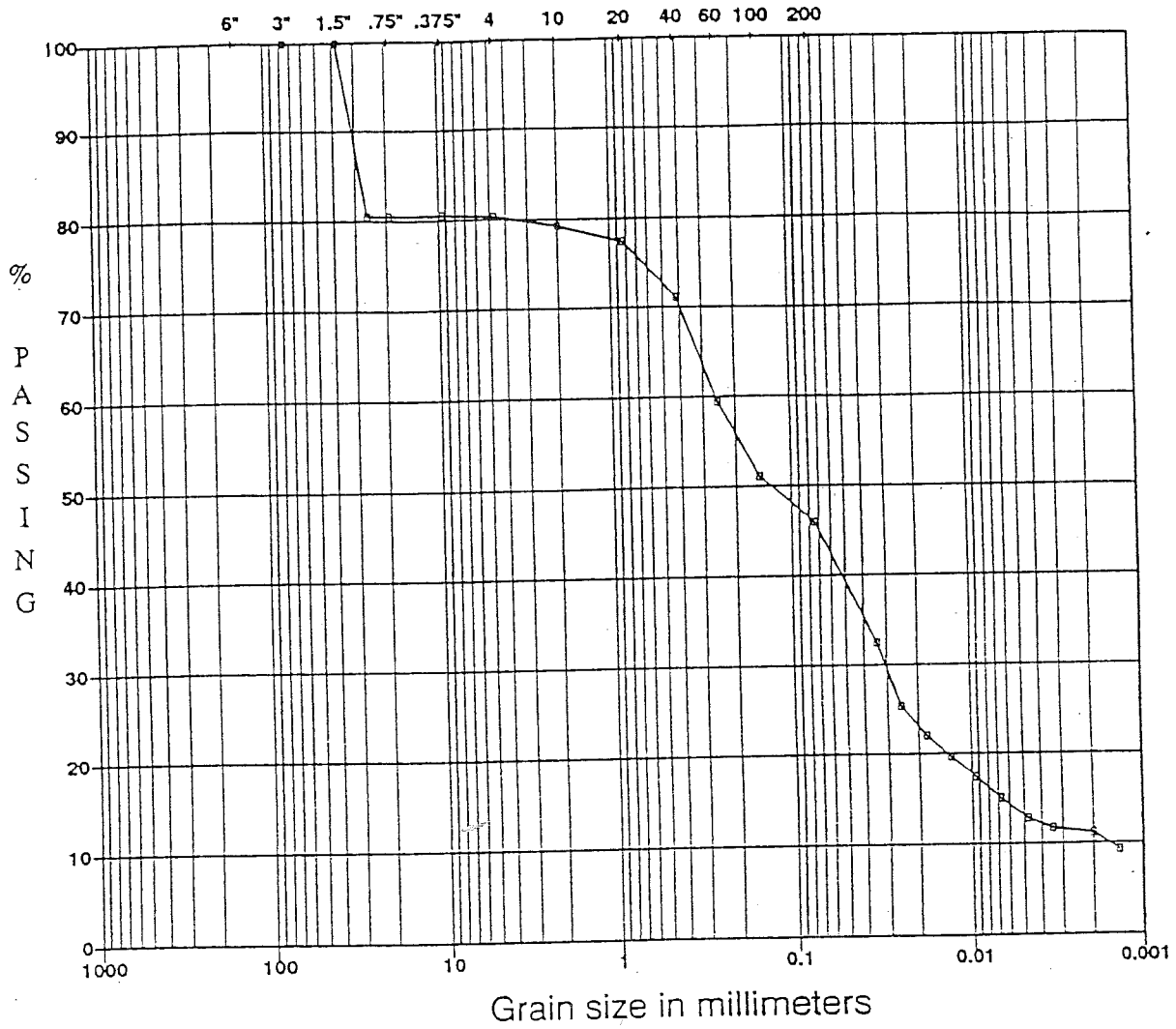
ET (min)	RDNG,C	EFF LTH	K	A	PAR DIA	%FINER
2.00	28.00	11.7	0.014	1.00	0.034	32.3
4.00	22.00	12.7	0.014	1.00	0.025	25.4
8.00	19.00	13.2	0.014	1.00	0.018	21.9
15.00	17.00	13.5	0.014	1.00	0.013	19.6
30.00	15.00	13.8	0.014	1.00	0.009	17.3
60.00	13.00	14.2	0.014	1.00	0.007	15.0
120.00	11.00	14.5	0.014	1.00	0.005	12.7
240.00	10.00	14.7	0.014	1.00	0.003	11.5
480.00	9.50	14.8	0.014	1.00	0.002	11.0
1440.00	8.00	15.0	0.014	1.00	0.001	9.2

WET COLOR:
DESCRIPTION:

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-1	14.4					Reddish, brownish yellow
35'-37'	Date Tested: 6/14/94					FINES and f SAND,
E94CJAS002						some gravel
TECHNICIAN: TK	DATE: 6/14/94		CHECKED: RDD			REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-1	45'-47'	E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK		

WATER CONTENT (Delivered Moisture)

Tare no.		M-20
Wt soil & tare,moist	(WT1)	381.96
Wt soil & tare,dry	(WT2)	344.47
Wt tare	(WT3)	184.93
Wt moisture	(WT4=WT1-WT2)	37.49
Wt dry soil	(WT5=WT2-WT3)	159.54
% WATER	(WT6/WT5*100)	23.50%

% PASSING #10 SIEVE

Total Wt	(WT6)	159.54
Wt Split #10	(WT7)	147.26
% PASSING #10	(WT7/WT6*100)	92.3%

USCS	SIEVE	wt ret	% ret ((WT Ret/WT6)*100)	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375	10.06	6.31%	93.69%	0.375	
coarse sand	#4	10.94	6.86%	93.14%	#4	coarse sand
medium sand	#10	12.41	7.78%	92.22%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve		92.22	Initial Moist Wt.	69.33
Specific Gravity	(ASTM D-854)	2.65	Calculated Dry Wt	69.11
ml Dispering Agent Used		125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		49
Wt soil and tare,moist	(WT1)	40.37
Wt soil&tare,dry	(WT2)	40.31
Wt tare	(WT3)	21.11
Wt moisture lost	(WT4=WT1-WT2)	0.06
Wt dry soil,final	(WT5=WT2-WT3)	19.20
% HYGROSCOPIC MOISTURE	(WT4/WT5*100)	0.3%

% PASSING 200 SIEVE

Tare no.		MM-1
Wt soil and tare,dry (wt,dry)	(WT3)	261.51
Wt soil&tare,wash (wt,wash)	(WT4)	207.24
Wt tare	(WT5)	192.39
Wt fines lost (wt,dry-wt,wash)	(WT6=WT3-WT4)	54.27
Wt dry soil, (wt,dry-wt,tare)	(WT7=WT3-WT5)	69.12
% FINES LOST	(WT6/WT7*100)	78.5%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING
#10	0.00	5.83	92.22%
#20	0.47	6.30	91.59%
#40	1.34	7.17	90.43%
#60	2.80	8.63	88.49%
#100	5.42	11.25	84.99%
#200	13.50	19.33	74.21%

LL	
PL	
PI	
Gs	

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/13/94	09:29	2.00	48.0	19.00	0.014	5.00
	09:31	4.00	43.0	19.00	0.014	5.00
	09:35	8.00	40.0	18.50	0.014	5.00
	09:42	15.00	37.0	18.50	0.014	5.00
	09:57	30.00	36.0	18.50	0.014	5.00
	10:27	60.00	33.0	18.50	0.014	5.00
	11:27	120.00	30.0	19.00	0.014	5.00
	13:27	240.00	27.5	19.00	0.014	5.00
	17:27	480.00	24.5	19.00	0.014	4.50
06/14/94	09:27	1440.0	20.0	20.00	0.014	4.00

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	6.9%
% C SAND	0.9%
% M SAND	1.8%
% F SAND	16.2%
% FINES	74.2%
% TOTAL	100.00%

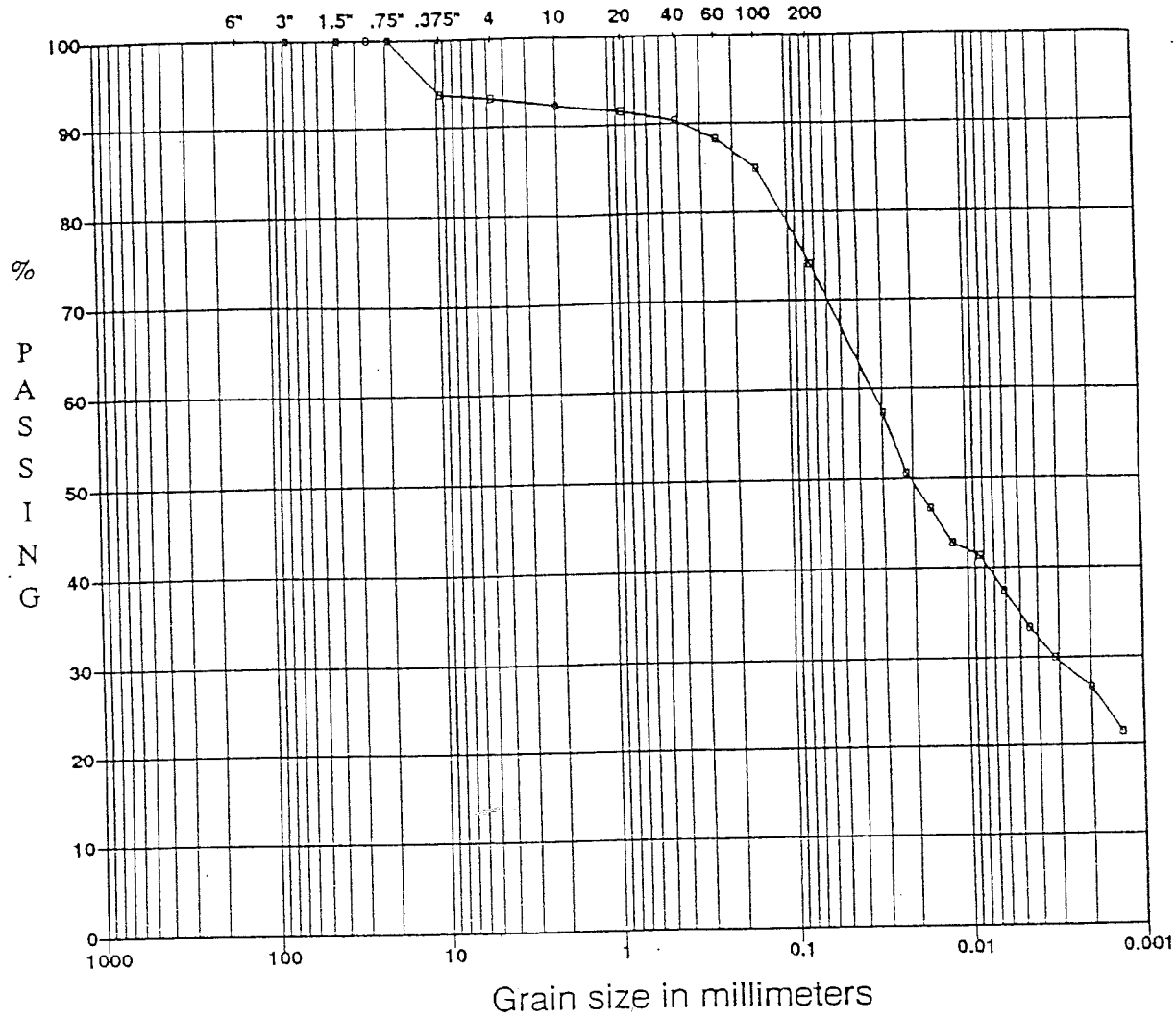
ET (min)	RDNG,C	EFF LTH	K	A	PAR DIA	%FINER
2.00	43.00	9.2	0.014	1.00	0.030	57.4
4.00	38.00	10.1	0.014	1.00	0.022	50.7
8.00	35.00	10.6	0.014	1.00	0.016	46.7
15.00	32.00	11.1	0.014	1.00	0.012	42.7
30.00	31.00	11.2	0.014	1.00	0.009	41.4
60.00	28.00	11.7	0.014	1.00	0.006	37.4
120.00	25.00	12.2	0.014	1.00	0.004	33.4
240.00	22.50	12.7	0.014	1.00	0.003	30.0
480.00	20.00	13.0	0.014	1.00	0.002	26.7
1440.00	16.00	13.7	0.014	1.00	0.001	21.3

WET COLOR: Sand
DESCRIPTION: Fine to medium sand, little silt, little gravel

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-1	23.5					Red
45'-47'	Date Tested:	6/14/94				FINES, some f sand,
E94CJAS002						little gravel
TECHNICIAN:	TK	DATE: 6/18/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-1
PROJECT NO.:	933-6141	DEPTH:	50'-52'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

		PLASTIC LIMIT		NATURAL MOISTURE
Tare Number:		53	47	55D
Weight of Wet Soil & Tare	(W1)	36.62	36.00	62.69
Weight of Dry Soil & Tare	(W2)	33.15	32.58	53.61
Weight of Tare	(W3)	21.29	20.83	20.91
Weight of Water	(W4=W1-W2)	3.47	3.42	9.08
Weight of Dry Soil	(W5=W2-W3)	11.86	11.75	32.70
Water Content (%)	(W4/W5)*100	29.3%	29.1%	27.8%

		LIQUID LIMIT		
Number of Blows		20	29	
Tare Number:		15B	2	
Weight of Wet Soil & Tare	(W6)	31.58	31.04	
Weight of Dry Soil & Tare	(W7)	27.76	28.10	
Weight of Tare	(W8)	20.65	22.15	
Weight of Water	(W9=W6-W7)	3.82	2.94	
Weight of Dry Soil	(W10=W7-W8)	7.11	5.95	
Water Content (%)	(W9/W10)*100	53.7%	49.4%	AVERAGE
LL = Wn (N / 25) ^ .121		52.30	50.31	51.30

LIQUID LIMIT	51
PLASTIC LIMIT	29
PLASTICITY INDEX	22
MOISTURE CONTENT	27.8%
LIQUIDITY INDEX	-0.06

NOTE: USCS Classification based upon material passing #40 sieve only.

Description: Red

USCS: MH

DATE:	6/14/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES IN
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-1	53'-55'	E34CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	S.T.		

WATER CONTENT (Delivered Moisture)

Tare no.		BM-1
Wt soil & tare,moist	(wt1)	319.08
Wt soil & tare,dry	(wt2)	280.28
Wt tare	(wt3)	188.61
Wt moisture	(wt1-wt2)	38.80
Wt dry soil	(wt2-wt3)	91.67
% WATER	(wt4/wt5)*100	42.33%

% PASSING #10 SIEVE

Total Wt	(wt6)	356.59
Wt Split #10	(wt7)	355.86
% PASSING #10	(wt7/wt6)*100	99.8%

USCS	SIEVE	wt ret	% ret (wt/wt6)*100	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375		0.00%	100.00%	0.375	
coarse sand	#4	0.20	0.06%	99.94%	#4	coarse sand
medium sand	#10	0.98	0.27%	99.73%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve	99.73	Initial Moist Wt.	66.05
Specific Gravity	2.68	Calculated Dry Wt	65.21
ml Dispering Agent Used	125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		CH-10
Wt soil and tare,moist	(wt1)	37.96
Wt soil&tare,dry	(wt2)	37.88
Wt tare	(wt3)	31.64
Wt moisture lost	(wt1-wt2)	0.08
Wt dry soil,final	(wt2-wt3)	6.24
% HYGROSCOPIC MOISTURE	(wt1/wt2)*100	1.3%

% PASSING 200 SIEVE

Tare no.		A-2
Wt soil and tare,dry (wt,dry)	(wt1)	258.53
Wt soil&tare,wash (wt,wash)	(wt4)	197.26
Wt tare	(wt3)	192.80
Wt fines lost (wt,dry-wt,wash)	(wt1-wt4-wt3)	61.27
Wt dry soil, (wt,dry-wt,tare)	(wt1-wt3)	65.73
% FINES LOST	(wt5/wt7)*100	93.2%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING
#10	0.00	0.18	99.73%
#20	0.24	0.42	99.36%
#40	0.64	0.82	98.75%
#60	1.21	1.39	97.87%
#100	1.93	2.11	96.77%
#200	3.74	3.92	94.01%

LL	47
PL	29
PI	18
Gs	2.68

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/22/94	07:54	2.00	63.0	23.00	0.013	3.50
	07:56	4.00	61.0	23.00	0.013	3.50
	08:00	8.00	60.0	23.00	0.013	4.00
	08:07	15.00	58.0	23.00	0.013	4.00
	08:22	30.00	54.5	23.00	0.013	4.00
	08:52	60.00	50.0	23.00	0.013	4.00
	09:52	120.00	45.5	23.00	0.013	3.50
	11:52	240.00	41.5	20.50	0.013	4.00
	15:52	480.00	36.5	19.00	0.014	4.50
06/23/94	07:54	1442.0	26.5	20.00	0.013	4.00

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	0.1%
% C SAND	0.2%
% M SAND	1.8%
% F SAND	4.7%
% FINES	94.9%
% TOTAL	100.00%

ET (min)	RDNG,C	EFF LTH	K	A	PAR DIA	%FINER
2.00	59.50	6.6	0.013	1.00	0.024	91.0
4.00	57.50	7.0	0.013	1.00	0.017	87.9
8.00	56.00	7.1	0.013	1.00	0.012	85.6
15.00	54.00	7.4	0.013	1.00	0.009	82.6
30.00	50.50	8.1	0.013	1.00	0.007	77.2
60.00	46.00	8.8	0.013	1.00	0.005	70.3
120.00	42.00	9.4	0.013	1.00	0.004	64.2
240.00	37.50	10.2	0.013	1.00	0.003	57.3
480.00	32.00	11.1	0.014	1.00	0.002	48.9
1440.00	22.50	12.7	0.013	1.00	0.001	34.4

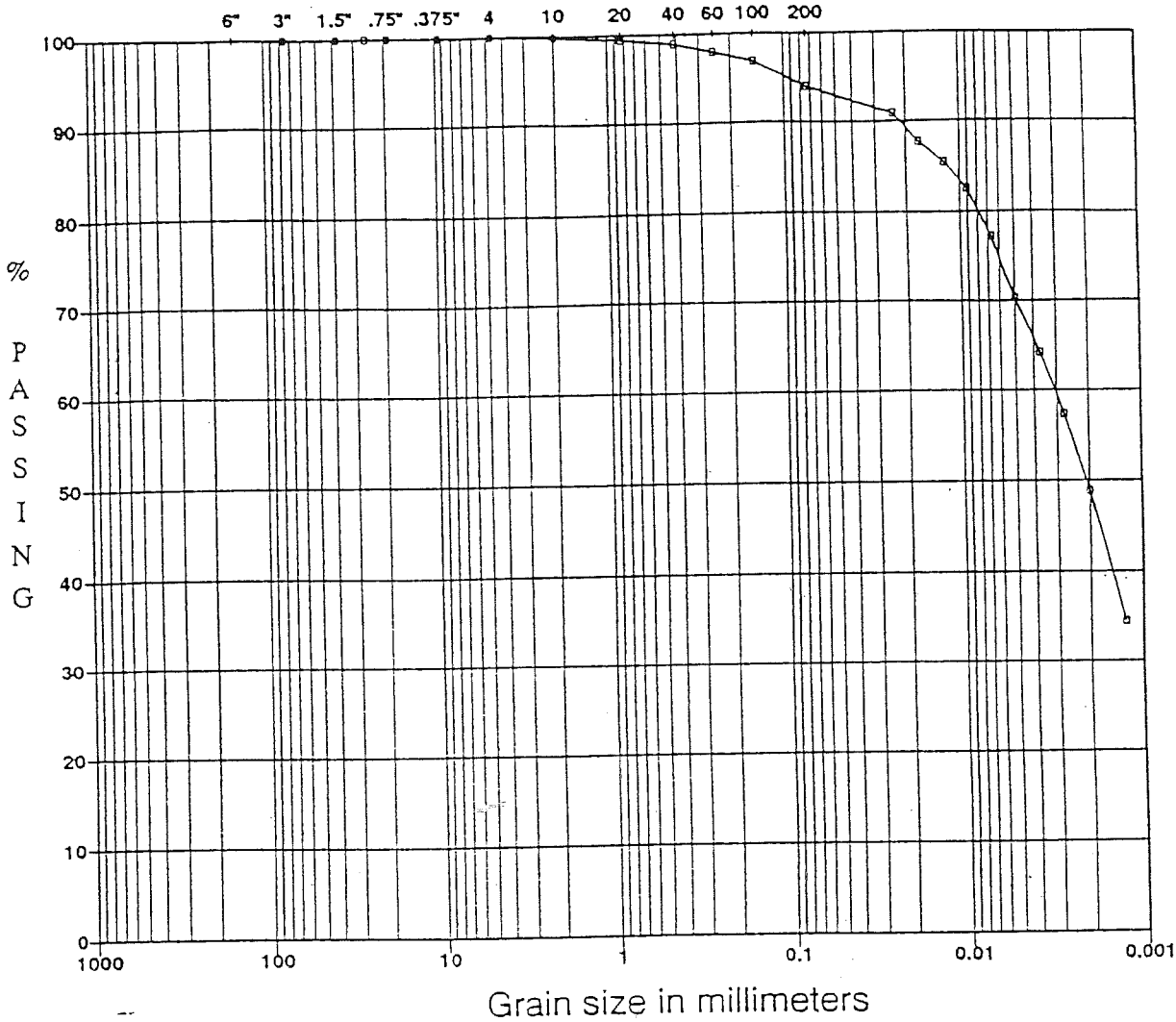
WET COLOR:
DESCRIPTION:

USCS: ML

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/23/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-1	42.3	47	29	18	2.68	Red
53'-55'	Date Tested:	6/23/94				Silt
E94CJAS002	USCS:	ML				
TECHNICIAN:	TK	DATE: 6/24/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-1
PROJECT NO.:	933-6141	DEPTH:	53'-55'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

PLASTIC LIMIT

Tare Number:		N-8	CH26
Weight of Wet Soil & Tare	(W1)	46.84	49.18
Weight of Dry Soil & Tare	(W2)	43.39	45.23
Weight of Tare	(W3)	31.56	31.63
Weight of Water	(W4=W1-W2)	3.45	3.95
Weight of Dry Soil	(W5=W2-W3)	11.83	13.60
Water Content (%)	(W4/W5)*100	29.2%	29.0%

NATURAL MOISTURE

BM-1
319.08
280.28
188.61
38.80
91.67
42.3%

LIQUID LIMIT

Number of Blows		23	30
Tare Number:		N-4	N-1
Weight of Wet Soil & Tare	(W6)	39.67	39.54
Weight of Dry Soil & Tare	(W7)	37.00	36.91
Weight of Tare	(W8)	31.45	31.15
Weight of Water	(W9=W6-W7)	2.67	2.63
Weight of Dry Soil	(W10=W7-W8)	5.55	5.76
Water Content (%)	(W9/W10)*100	48.1%	45.7%
LL = Wn (N / 25)^.121		47.63	46.68

AVERAGE: 47.15

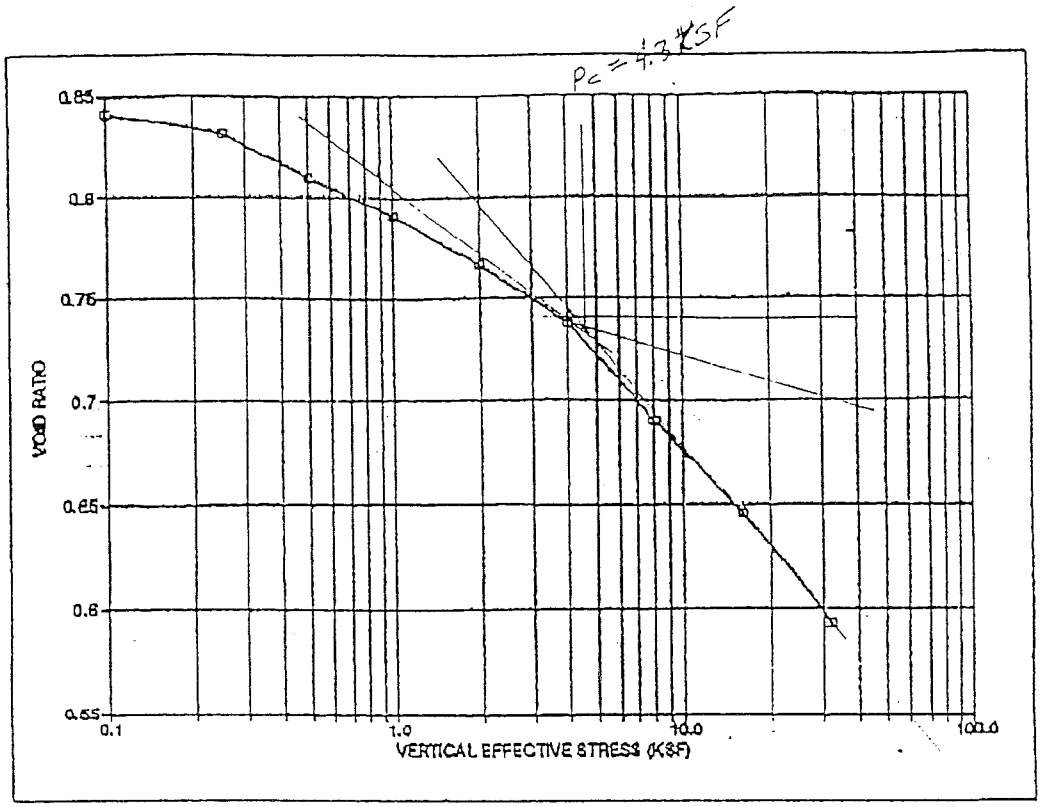
LIQUID LIMIT	47
PLASTIC LIMIT	29
PLASTICITY INDEX	18
MOISTURE CONTENT	42.3%
LIQUIDITY INDEX	0.73

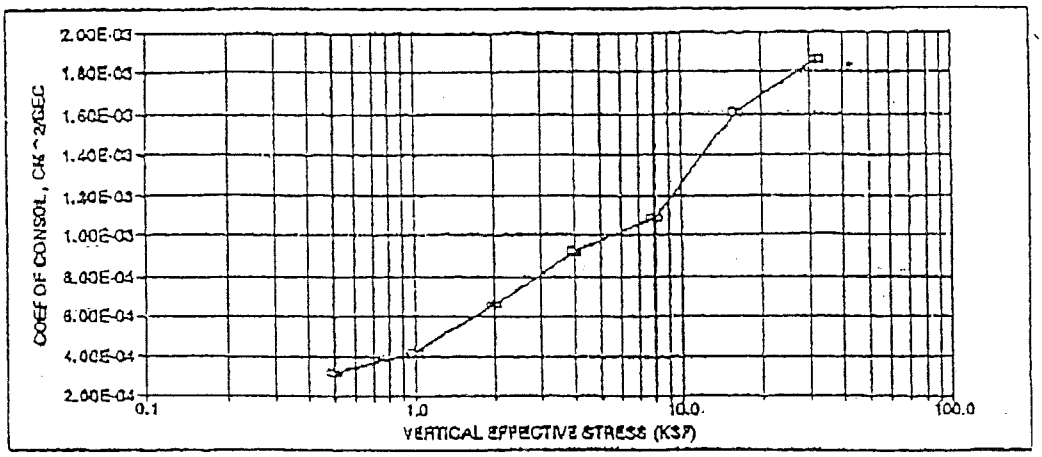
Description: Red Silt

USCS: ML

DATE:	6/22/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES IN
MT. LAUREL, NJ





INITIAL DRY DENSITY.....	122.7 PCF	SATURATION (%) ...	.87	Cc	-
VOID RATIO	.83 PCF	ASTM	2435	Cs	-
WATER CONTENT (%)	33.4	METHOD...	B	Cr	-

GOLDER ASSOCIATES INC.
DENVER, COLORADO

JAC/LAB & GEOTECH/NJ

CONSOLIDATION TEST DATA

DRAWN	DLB	DATE	JULY 1994	BORING	-
CHECKED	KMR	JOB NO.	933-5141	SAMPLE	B-1
REVIEWED		FILE NAME	8141CS	DEPTH	33-5

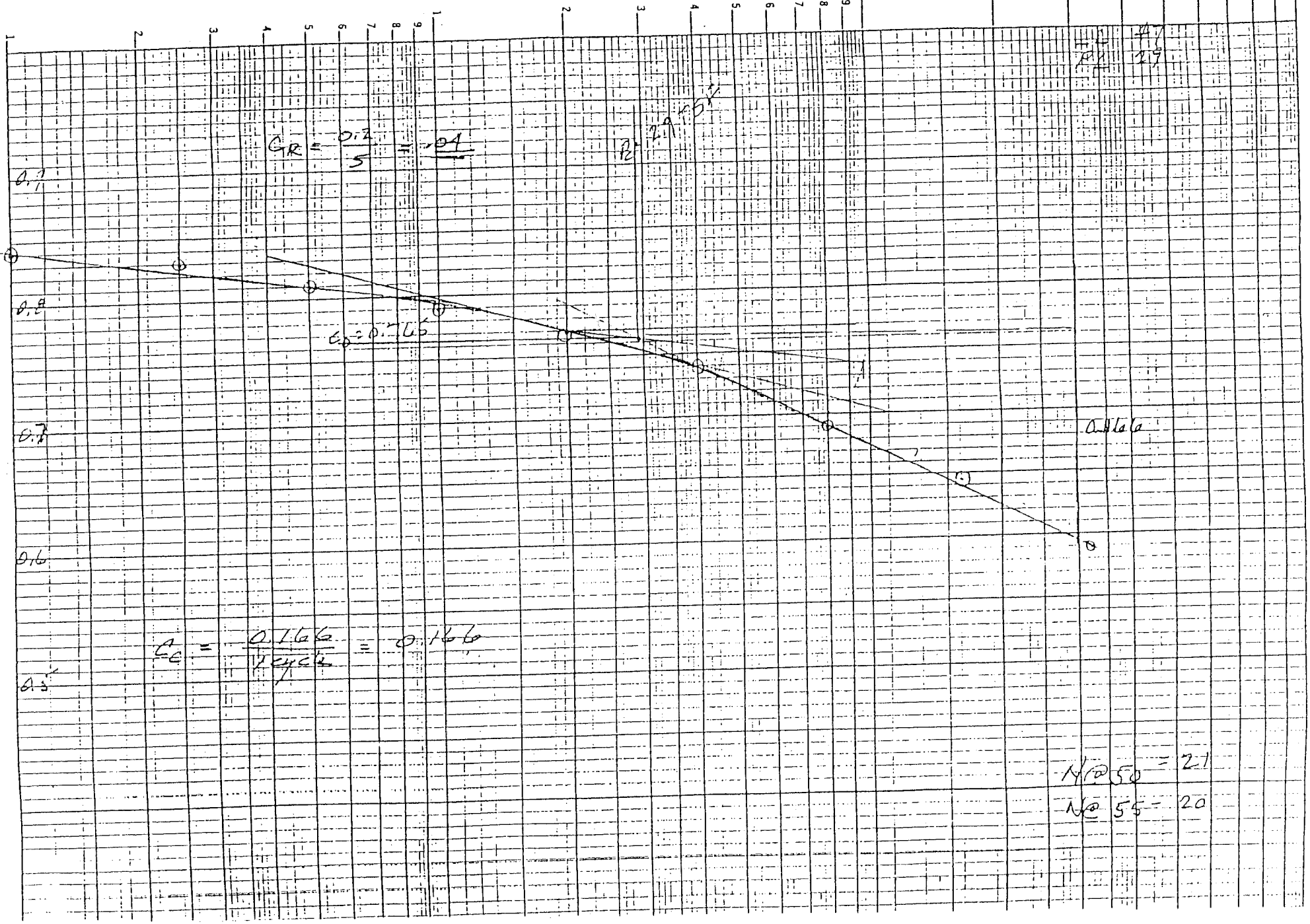
Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 1

To Bob Wilkinson	From K. Repola
Co. GAI - New Jersey	Co. GAI - Denver

K+E SEMI-LOGARITHMIC 46 5493
3 CYCLES X 70 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

LL = 47
PL = 29
G = 2.68
% Fines = 94

CFT LAND.
EY-16 to -
Depth 53 to 55



ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-1
PROJECT NO.:	933-6141	DEPTH:	65'-67'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

		PLASTIC LIMIT		NATURAL MOISTURE
Tare Number:		CH-26	I-48	Z-1
Weight of Wet Soil & Tare	(W1)	39.88	30.48	48.60
Weight of Dry Soil & Tare	(W2)	37.98	28.26	41.34
Weight of Tare	(W3)	31.63	21.08	21.81
Weight of Water	(W4=W1-W2)	1.90	2.22	7.26
Weight of Dry Soil	(W5=W2-W3)	6.35	7.18	19.53
Water Content (%)	(W4/W5)*100	29.9%	30.9%	37.2%

		LIQUID LIMIT		
Number of Blows		22	24	
Tare Number:		M-9	44	
Weight of Wet Soil & Tare	(W6)	27.27	26.59	
Weight of Dry Soil & Tare	(W7)	25.29	24.56	
Weight of Tare	(W8)	21.74	20.67	
Weight of Water	(W9=W6-W7)	1.98	2.03	
Weight of Dry Soil	(W10=W7-W8)	3.55	3.89	
Water Content (%)	(W9/W10)*100	55.8%	52.2%	AVERAGE
LL = Wn (N / 25)^.121		54.92	51.93	53.42

LIQUID LIMIT	53
PLASTIC LIMIT	30
PLASTICITY INDEX	23
MOISTURE CONTENT	37.2%
LIQUIDITY INDEX	0.29

NOTE: USCS Classification based upon material passing #40 sieve only.

Description: Red

USCS: MH

DATE:	6/14/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES IN
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-2 20'-22' E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK

WATER CONTENT (Delivered Moisture)

Tare no.		C-40
Wt soil & tare,moist	(WT1)	339.50
Wt soil & tare,dry	(WT2)	310.47
Wt tare	(WT3)	186.92
Wt moisture	(WT1-WT2)	29.03
Wt dry soil	(WT2-WT3)	123.55
% WATER	(WT4/WT5)*100	23.50%

% PASSING #10 SIEVE

Total Wt	(WT6)	123.55
Wt Split #10	(WT7)	123.37
% PASSING #10	(WT7/WT6)*100	99.9%

USCS	SIEVE	wt ret	% ret (WT8 Ret/WT6*100)	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375		0.00%	100.00%	0.375	
coarse sand	#4		0.00%	100.00%	#4	coarse sand
medium sand	#10	0.33	0.27%	99.73%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve	99.73	Initial Moist Wt.	69.58
Specific Gravity	2.65	Calculated Dry Wt	69.25
ml Dispering Agent Used	125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		27C
Wt soil and tare,moist	(WT1)	35.49
Wt soil&tare,dry	(WT2)	35.42
Wt tare	(WT3)	20.71
Wt moisture lost	(WT1-WT2)	0.07
Wt dry soil,final	(WT2-WT3)	14.71
% HYGROSCOPIC MOISTURE	(WT1/WT2)*100	0.5%

% PASSING 200 SIEVE

Tare no.		BD-3
Wt soil and tare,dry (wt,dry)	(WT1)	260.33
Wt soil&tare,wash (wt,wash)	(WT2)	234.57
Wt tare	(WT3)	191.08
Wt fines lost (wt,dry-wt,wash)	(WT1-WT2,WT1-WT2)	25.76
Wt dry soil, (wt,dry-wt,tare)	(WT1-WT3,WT2-WT3)	69.25
% FINES LOST	(WT4/WT5)*100	37.2%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING
#10	0.00	0.19	99.73%
#20	0.42	0.61	99.13%
#40	1.53	1.72	97.53%
#60	4.78	4.97	92.85%
#100	17.43	17.62	74.63%
#200	39.42	39.61	42.96%

LL	29
PL	18
PI	11
Gs	

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/13/94	09:10	2.00	19.0	19.00	0.014	5.00
	09:12	4.00	16.0	19.00	0.014	5.00
	09:16	8.00	15.0	19.00	0.014	5.00
	09:23	15.00	15.0	19.00	0.014	5.00
	09:38	30.00	13.5	18.50	0.014	5.00
	10:08	60.00	12.5	18.50	0.014	5.00
	11:08	120.00	11.5	18.50	0.014	5.00
	13:08	240.00	10.5	19.00	0.014	4.50
	17:08	480.00	10.0	19.00	0.014	4.50
06/14/94	09:08	1440.0	9.0	20.00	0.014	3.50

ET (min)	RDNG,C	EFF LTH	K	A	PAR DIA	%FINER
2.00	14.00	14.0	0.014	1.00	0.037	20.2
4.00	11.00	14.5	0.014	1.00	0.026	15.8
8.00	10.00	14.7	0.014	1.00	0.019	14.4
15.00	10.00	14.7	0.014	1.00	0.014	14.4
30.00	8.50	15.0	0.014	1.00	0.010	12.2
60.00	7.50	15.2	0.014	1.00	0.007	10.8
120.00	6.50	15.3	0.014	1.00	0.005	9.4
240.00	6.00	15.3	0.014	1.00	0.003	8.6
480.00	5.50	15.5	0.014	1.00	0.002	7.9
1440.00	5.50	15.5	0.014	1.00	0.001	7.9

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	0.0%
% C SAND	8.3%
% M SAND	2.2%
% F SAND	54.6%
% FINES	43.9%
% TOTAL	100.00%

WET COLOR: Brownish yellow
DESCRIPTION: CLAYEY SAND

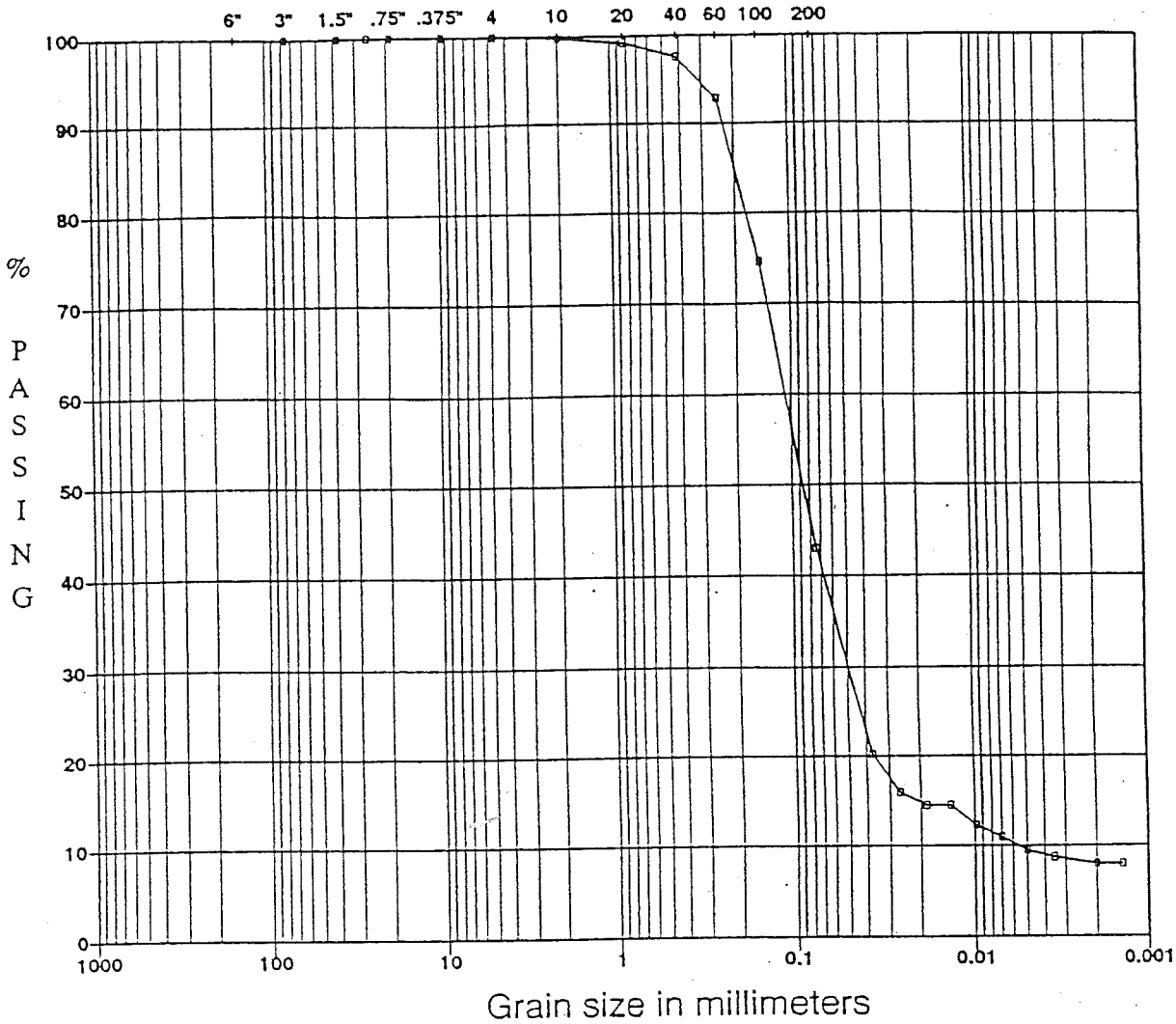
USCS: SC

GOLDER ASSOCIATES INC
MT. LAUREL, NJ

TECH	TK	CHECKED	RDD
DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-2	23.5	29	18	11		Brownish yellow
20'-22'	Date Tested:		6/14/94			CLAYEY SAND
E94CJAS002	USCS:		SC			
TECHNICIAN:	TK	DATE: 6/18/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-2
PROJECT NO.:	933-6141	DEPTH:	20'-22'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

		PLASTIC LIMIT		NATURAL MOISTURE
Tare Number:		CH25	CH29	C-40
Weight of Wet Soil & Tare	(W1)	39.77	47.62	339.50
Weight of Dry Soil & Tare	(W2)	38.39	45.09	310.47
Weight of Tare	(W3)	30.73	31.27	186.92
Weight of Water	(W4=W1-W2)	1.38	2.53	29.03
Weight of Dry Soil	(W5=W2-W3)	7.66	13.82	123.55
Water Content (%)	(W4/W5)*100	18.0%	18.3%	23.5%

		LIQUID LIMIT		
Number of Blows		21	30	
Tare Number:		CH20	CH12	
Weight of Wet Soil & Tare	(W6)	27.55	29.45	
Weight of Dry Soil & Tare	(W7)	26.13	27.75	
Weight of Tare	(W8)	21.29	21.76	
Weight of Water	(W9=W6-W7)	1.42	1.70	
Weight of Dry Soil	(W10=W7-W8)	4.84	5.99	
Water Content (%)	(W9/W10)*100	29.3%	28.4%	AVERAGE
LL = Wn (N / 25)^.121		28.73	29.01	28.87

LIQUID LIMIT	29
PLASTIC LIMIT	18
PLASTICITY INDEX	11
MOISTURE CONTENT	23.5%
LIQUIDITY INDEX	0.50

Description: Brownish yellow CLAYEY SAND

USCS: SC

DATE:	6/14/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES I
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
MECHANICAL SIEVE
ASTM C136, D421, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.	B-2
PROJECT NUMBER:	933-6141	Sample ID:	JAR

WATER CONTENT (Delivered Moisture)

tare no.		X-11
wt soil & tare,moist	(w1)	379.35
wt soil & tare,dry	(w2)	325.52
wt tare	(w3)	197.32
wt moisture	(w4=w1-w2)	53.83
wt dry soil	(w5=w2-w3)	128.20
% water	(w4/w5)*100	41.99%

200 WASH (Percent Fines)

tare no.		X-11
wt soil & tare,before wash	(w6)	325.5
wt soil & tare,after wash	(w7)	244.9
wt tare	(w8)	197.3
wt fines lost	(w9=w6-w7)	80.61
wt dry soil	(w10=w6-w8)	128.20
% lost	(w9/w10)*100	62.88%

USCS SIEVE	wt ret	% ret ((wt ret/w10)*100)	% PASS (100 - %ret)	SIEVE
3.000		0.0%	100.0%	3.000
2.500		0.0%	100.0%	2.500
2.000		0.0%	100.0%	2.000
1.500		0.0%	100.0%	1.500
1.000		0.0%	100.0%	1.000
0.750		0.0%	100.0%	0.750
0.375		0.0%	100.0%	0.375
#4	0.48	0.4%	99.6%	#4
#8	1.23	1.0%	99.0%	#8
#10	1.49	1.2%	98.8%	#10

SPLITTING INFORMATION

Wt in pan, from coarse sieve stack	
Wt split for fine stack sieve	
Percent of original wt in pan	100.00%

#16	2.62	2.0%	98.0%	#16
#30	4.68	3.7%	96.3%	#30
#50	9.50	7.4%	92.6%	#50
#100	26.37	20.6%	79.4%	#100
#200	47.59	37.1%	62.9%	#200
PAN	47.59	37.1%	62.9%	PAN

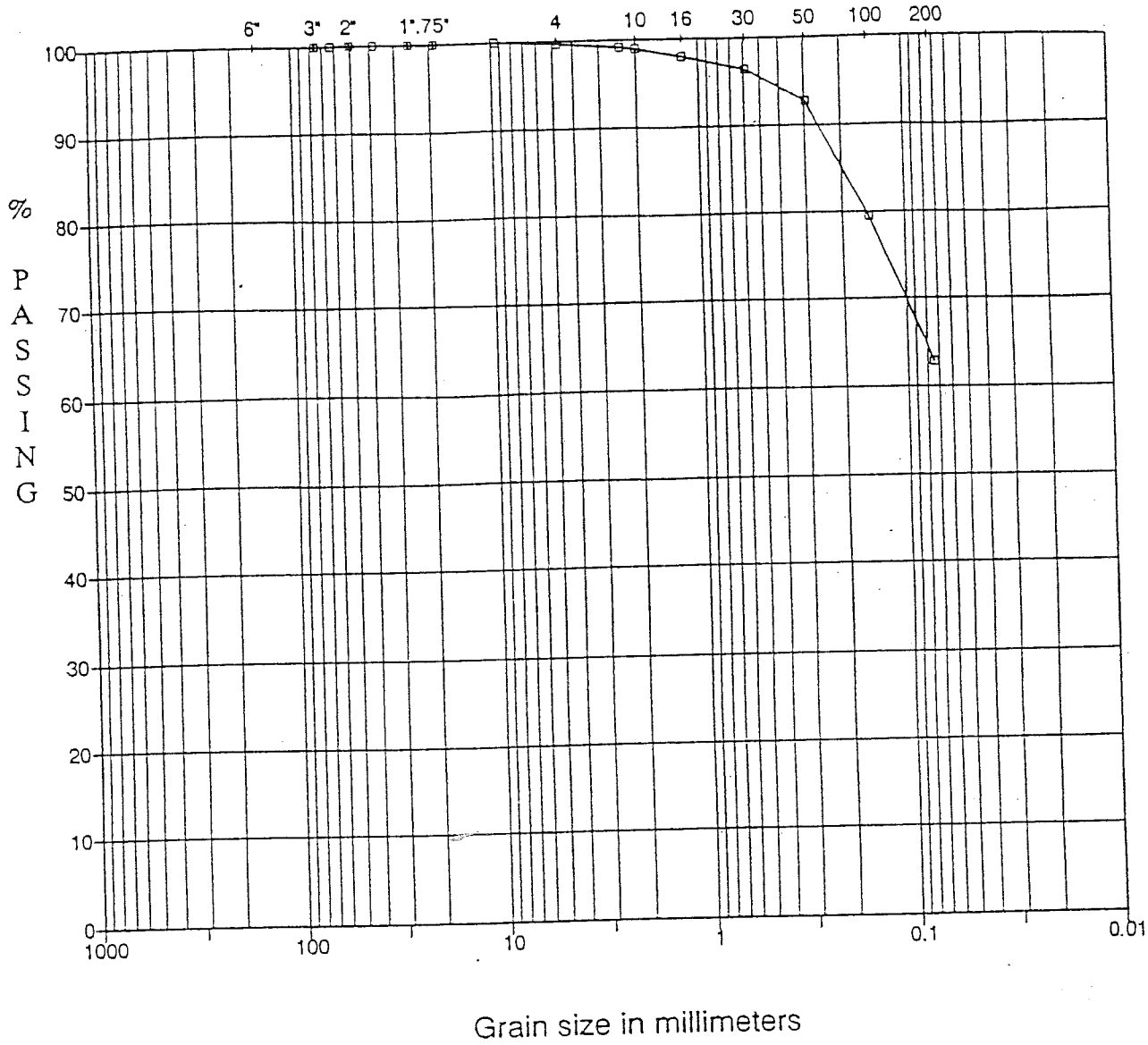
Sample	B-2 25'-27' E94CJAS002	Wet Color:	Brownish yellow

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

TECH	TK	CHECKED	RDD
DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND C-33

US STANDARD SIEVE OPENING SIZES



SAMPLE ID	W%	DATE TESTE	6/14/94	CHECKED:	RDD
B-2	41.99	TECHNICIAN:	TK	REVIEWED:	RMW
25'-27'	E94CJAS002				

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT.LAUREL,NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-2 35'-37'	E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK	

WATER CONTENT (Delivered Moisture)

Tare no.		BD-10
Wt soil & tare,moist	(WT1)	430.54
Wt soil & tare,dry	(WT2)	388.24
Wt tare	(WT3)	191.53
Wt moisture	(WT4=WT1-WT2)	42.30
Wt dry soil	(WT5=WT2-WT3)	196.71
% WATER	(WT4/WT5)*100	21.50%

% PASSING #10 SIEVE

Total Wt	(WT6)	196.71
Wt Split #10	(WT7)	195.91
% PASSING #10	(WT7/WT6)*100	99.6%

USCS	SIEVE	wt ret	% ret (WT8 Raw/WT5)*100	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375		0.00%	100.00%	0.375	
coarse sand	#4		0.00%	100.00%	#4	coarse sand
medium sand	#10	0.94	0.48%	99.52%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve	99.52	Initial Moist Wt.	69.18
Specific Gravity (LABORATORY)	2.65	Calculated Dry Wt	69.09
ml Dispering Agent Used	125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		4B
Wt soil and tare,moist	(WT1)	35.56
Wt soil&tare,dry	(WT2)	35.54
Wt tare	(WT3)	20.75
Wt moisture lost	(WT4=WT1-WT2)	0.02
Wt dry soil,final	(WT5=WT2-WT3)	14.79
% HYGROSCOPIC MOISTURE	(WT4/WT5)*100	0.1%

% PASSING 200 SIEVE

Tare no.		BL-121
Wt soil and tare,dry (wt,dry)	(WT1)	264.81
Wt soil&tare,wash (wt,wash)	(WT2)	210.68
Wt tare	(WT3)	195.72
Wt fines lost (wt,dry-wt,wash)	(WT4=WT1-WT2)	54.13
Wt dry soil, (wt,dry-wt,tare)	(WT5=WT1-WT3)	69.09
% FINES LOST	(WT4/WT5)*100	78.3%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING
#10	0.00	0.33	99.52%
#20	0.80	1.13	98.37%
#40	3.25	3.58	94.84%
#60	7.98	8.31	88.03%
#100	11.56	11.89	82.87%
#200	14.68	15.01	78.37%

LL	
PL	
PI	
Gs	

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/13/94	09:23	2.00	40.0	19.00	0.014	5.00
	09:25	4.00	35.0	19.00	0.014	5.00
	09:29	8.00	32.0	19.00	0.014	5.00
	09:36	15.00	28.5	18.50	0.014	5.00
	09:51	30.00	26.0	18.50	0.014	5.00
	10:21	60.00	22.0	18.50	0.014	5.00
	11:21	120.00	20.5	18.50	0.014	5.00
	13:21	240.00	18.5	19.00	0.014	4.50
	17:21	480.00	17.0	19.00	0.014	4.50
06/14/94	09:21	1440.0	14.5	20.00	0.014	3.50

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	0.0%
% C SAND	0.5%
% M SAND	4.7%
% F SAND	16.5%
% FINES	78.4%
% TOTAL	100.00%

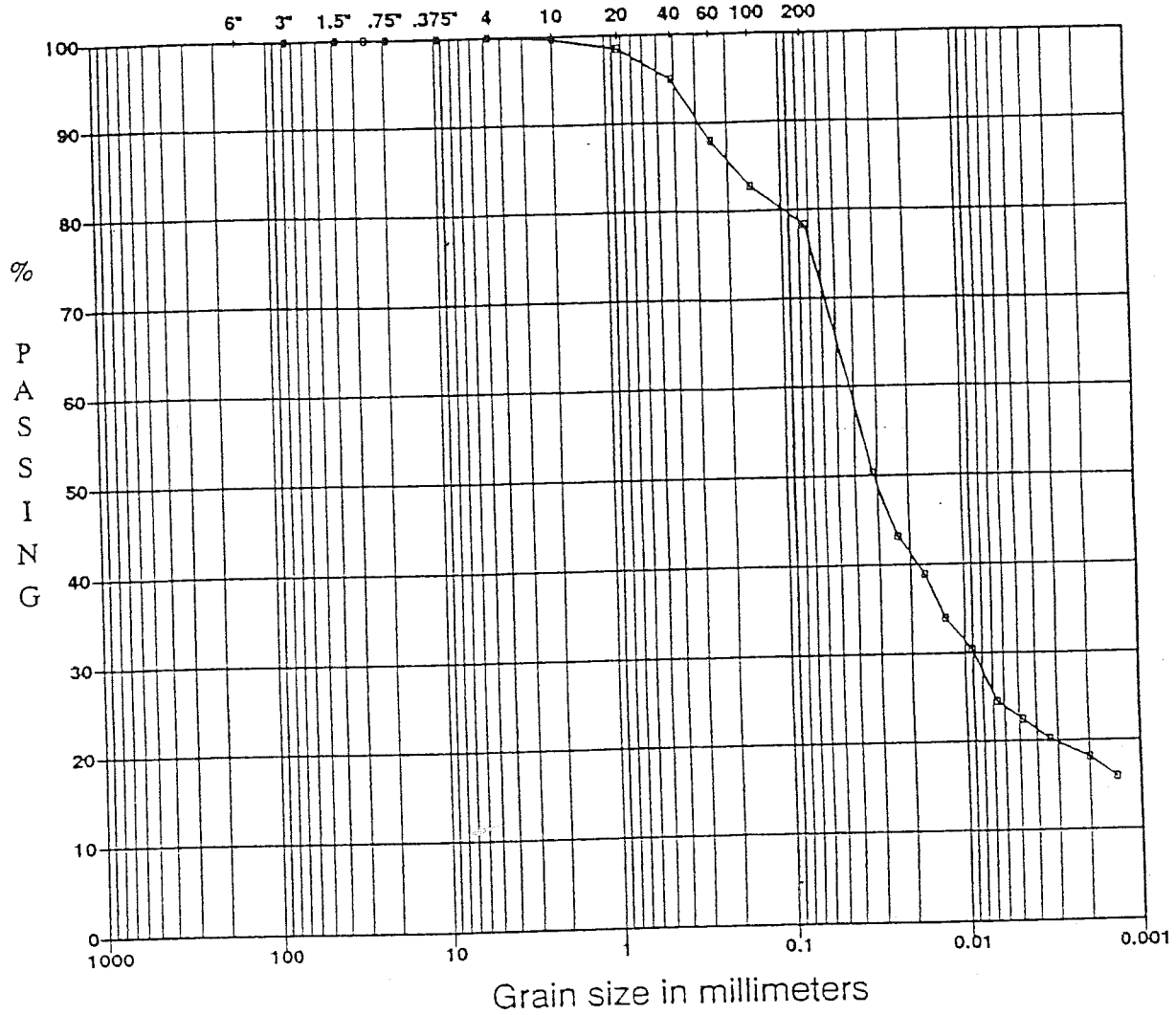
ET (min)	RDNG.C	EFF LTH	K	A	PAR DIA	%FINER
2.00	35.00	10.6	0.014	1.00	0.032	50.4
4.00	30.00	11.4	0.014	1.00	0.023	43.2
8.00	27.00	11.9	0.014	1.00	0.017	38.9
15.00	23.50	12.5	0.014	1.00	0.013	33.9
30.00	21.00	12.9	0.014	1.00	0.009	30.3
60.00	17.00	13.5	0.014	1.00	0.007	24.5
120.00	15.50	13.8	0.014	1.00	0.005	22.3
240.00	14.00	14.0	0.014	1.00	0.003	20.2
480.00	12.50	14.3	0.014	1.00	0.002	18.0
1440.00	11.00	14.5	0.014	1.00	0.001	15.8

WET COLOR: [illegible]
DESCRIPTION: FINES, [illegible]

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-2	21.5					Reddish, brownish yellow
35'-37'	Date Tested:	6/14/94				FINES,
E94CJAS002						some f sand
TECHNICIAN:	TK	DATE: 6/18/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
MECHANICAL SIEVE
ASTM C136, D421, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.	B-2
PROJECT NUMBER:	933-6141	Sample ID:	JAR

WATER CONTENT (Delivered Moisture)

tare no.		R-6
wt soil & tare,moist	(w1)	399.79
wt soil & tare,dry	(w2)	363.35
wt tare	(w3)	189.71
wt moisture	(w4=w1-w2)	36.44
wt dry soil	(w5=w2-w3)	173.64
% water	(w4/w5)*100	20.99%

200 WASH (Percent Fines)

tare no.		R-6
wt soil & tare,before wash	(w6)	363.4
wt soil & tare,after wash	(w7)	260.7
wt tare	(w8)	189.7
wt fines lost	(w9=w6-w7)	102.65
wt dry soil	(w10=w6-w8)	173.64
% lost	(w9/w10)*100	59.12%

USCS SIEVE	wt ret	% ret ((wt ret/w10)*100)	% PASS (100 - %ret)	SIEVE
3.000		0.0%	100.0%	3.000
2.500		0.0%	100.0%	2.500
2.000		0.0%	100.0%	2.000
1.500		0.0%	100.0%	1.500
1.000		0.0%	100.0%	1.000
0.750		0.0%	100.0%	0.750
0.375	2.18	1.3%	98.7%	0.375
#4	2.95	1.7%	98.3%	#4
#8	3.22	1.9%	98.1%	#8
#10	3.36	1.9%	98.1%	#10

SPLITTING INFORMATION

Wt in pan, from coarse sieve stack	
Wt split for fine stack sieve	
Percent of original wt in pan	100.00%

#16	4.37	2.5%	97.5%	#16
#30	10.71	6.2%	93.8%	#30
#50	33.70	19.4%	80.6%	#50
#100	58.28	33.6%	66.4%	#100
#200	70.99	40.9%	59.1%	#200
PAN	70.99	40.9%	59.1%	PAN

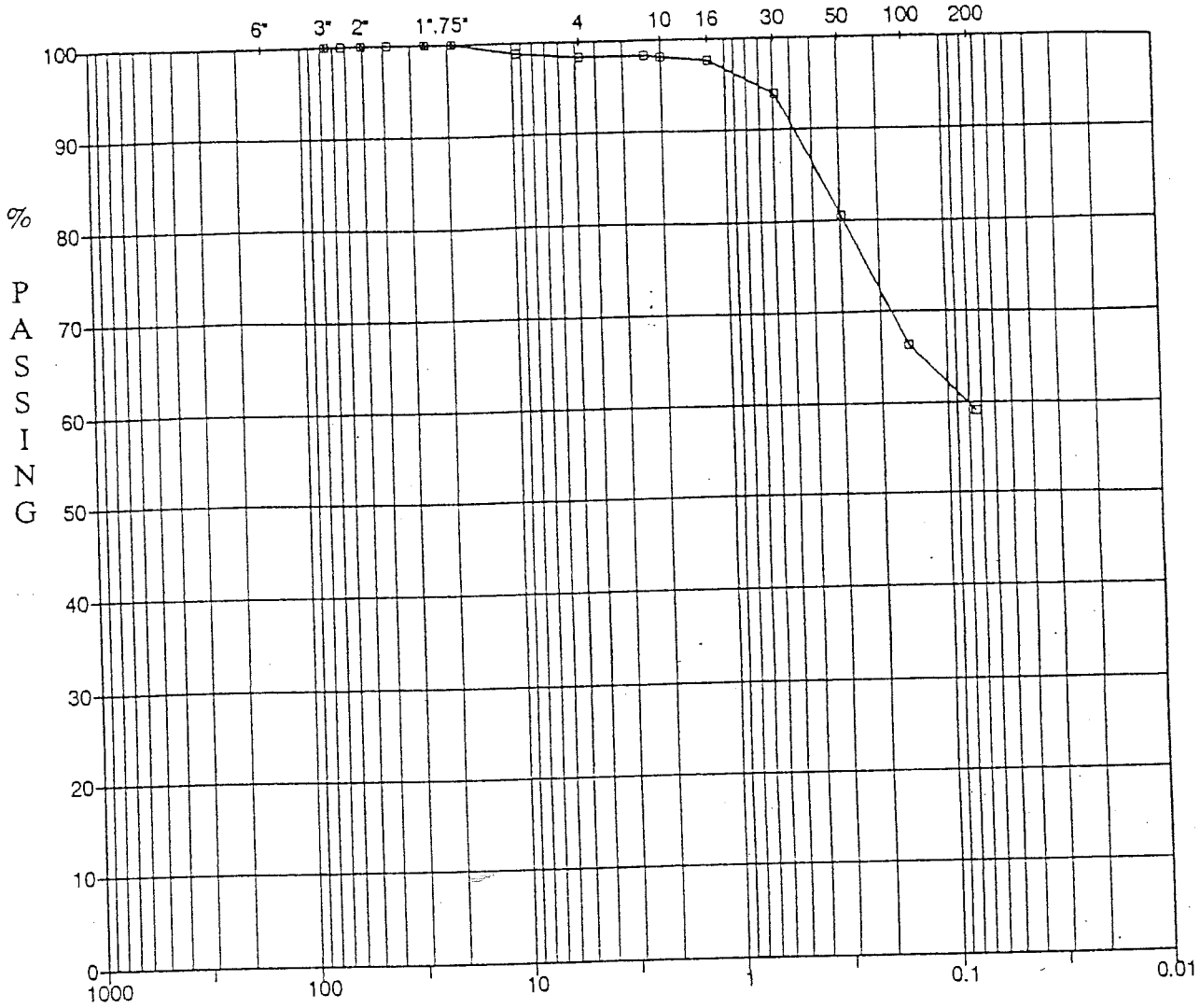
Sample	B-2 40'-42' E94CJAS002	Wet Color:	Brownish yellow

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

TECH	TK	CHECKED	RDD
DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND C-33

US STANDARD SIEVE OPENING SIZES



SAMPLE ID	W%	DATE TESTE 6/14/94	CHECKED: RDD
B-2 40'-42'	20.99	TECHNICIAN: TK	REVIEWED: RMW
	E94CJAS002		

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT.LAUREL,NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-2 52'-54' E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	S.T.

WATER CONTENT (Delivered Moisture)

Tare no.		M-8
Wt soil & tare,moist	(WT1)	847.77
Wt soil & tare,dry	(WT2)	690.33
Wt tare	(WT3)	191.95
Wt moisture	(WT4=WT1-WT2)	157.44
Wt dry soil	(WT5=WT2-WT3)	498.38
% WATER	(WT4/WT5*100)	31.59%

% PASSING #10 SIEVE

Total Wt	(WT6)	492.70
Wt Split #10	(WT7)	489.41
% PASSING #10	(WT7/WT6*100)	99.3%

USCS

	SIEVE	wt ret	% ret (WT8 Ret/WT6*100)	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375	0.02	0.00%	100.00%	0.375	
coarse sand	#4	3.13	0.64%	99.36%	#4	coarse sand
medium sand	#10	3.60	0.73%	99.27%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve	99.27	Initial Moist Wt.	70.43
Specific Gravity	2.64	Calculated Dry Wt	69.99
ml Dispering Agent Used	125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		1-57
Wt soil and tare,moist	(WT1)	44.76
Wt soil&tare,dry	(WT2)	44.61
Wt tare	(WT3)	20.60
Wt moisture lost	(WT4=WT1-WT2)	0.15
Wt dry soil,final	(WT5=WT2-WT3)	24.01
% HYGROSCOPIC MOISTURE	(WT4/WT5*100)	0.6%

% PASSING 200 SIEVE

Tare no.		R-21
Wt soil and tare,dry (wt,dry)	(WT1)	217.45
Wt soil&tare,wash (wt,wash)	(WT2)	154.38
Wt tare	(WT3)	147.45
Wt fines lost (wt,dry-wt,wash)	(WT4=WT1-WT2)	63.07
Wt dry soil, (wt,dry-wt,tare)	(WT5=WT1-WT3)	70.00
% FINES LOST	(WT4/WT5*100)	90.1%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING
#10	0.00	0.52	99.27%
#20	0.26	0.78	98.90%
#40	0.59	1.11	98.43%
#60	0.97	1.49	97.89%
#100	1.70	2.22	96.86%
#200	5.93	6.45	90.86%

LL	50
PL	28
PI	22
Gs	2.64

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/20/94	08:08	2.00	60.0	22.50	0.013	5.00
	08:10	4.00	58.0	22.50	0.013	5.00
	08:14	8.00	57.0	22.50	0.013	5.00
	08:21	15.00	55.0	22.50	0.013	5.00
	08:36	30.00	52.0	22.50	0.013	5.00
	09:06	60.00	49.0	22.50	0.013	5.00
	10:06	120.00	45.0	22.50	0.013	5.00
	12:06	240.00	41.0	22.50	0.013	4.50
	16:06	480.00	36.0	22.50	0.013	5.00
06/21/94	08:06	1440.0	25.5	23.00	0.013	5.00

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	0.6%
% C SAND	0.1%
% M SAND	0.8%
% F SAND	7.6%
% FINES	90.9%
% TOTAL	100.00%

ET (min)	RDNG,C	EFF LTH	K	A	PAR DIA	%FINER
2.00	55.00	7.3	0.013	1.01	0.025	78.8
4.00	53.00	7.6	0.013	1.01	0.018	75.9
8.00	52.00	7.8	0.013	1.01	0.013	74.5
15.00	50.00	8.1	0.013	1.01	0.010	71.6
30.00	47.00	8.6	0.013	1.01	0.007	67.3
60.00	44.00	9.1	0.013	1.01	0.005	63.0
120.00	40.00	9.7	0.013	1.01	0.004	57.3
240.00	36.50	10.4	0.013	1.01	0.003	52.3
480.00	31.00	11.2	0.013	1.01	0.002	44.4
1440.00	20.50	13.0	0.013	1.01	0.001	29.4

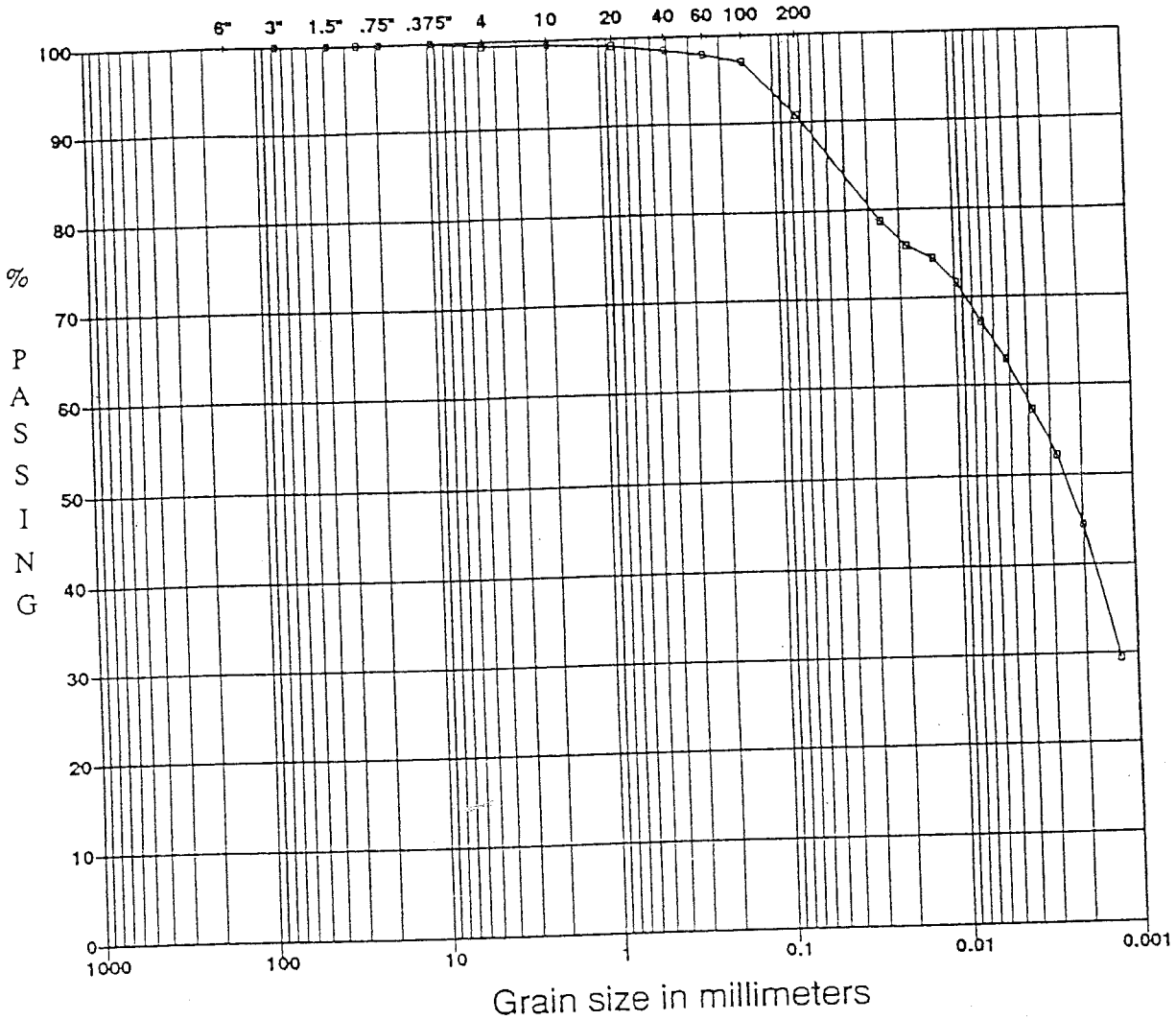
WET COLOR: Red
DESCRIPTION: Pale olive

USCS: CH

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/22/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-2	31.6	50	28	22	2.64	Red
52'-54'	Date Tested:	6/22/94				Fat clay
E94CJAS002	USCS:	CH				
TECHNICIAN:	TK	DATE: 6/23/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-2
PROJECT NO.:	933-6141	DEPTH:	52'-54'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

		PLASTIC LIMIT		NATURAL MOISTURE
Tare Number:		CH24	CH23	M-8
Weight of Wet Soil & Tare	(W1)	49.84	51.82	847.77
Weight of Dry Soil & Tare	(W2)	45.75	47.35	690.33
Weight of Tare	(W3)	31.28	31.52	191.95
Weight of Water	(W4=W1-W2)	4.09	4.47	157.44
Weight of Dry Soil	(W5=W2-W3)	14.47	15.83	498.38
Water Content (%)	(W4/W5)*100	28.3%	28.2%	31.6%

		LIQUID LIMIT		
Number of Blows		22	23	
Tare Number:		4B	AB2	
Weight of Wet Soil & Tare	(W6)	28.74	29.93	
Weight of Dry Soil & Tare	(W7)	26.04	26.57	
Weight of Tare	(W8)	20.75	19.75	
Weight of Water	(W9=W6-W7)	2.70	3.36	
Weight of Dry Soil	(W10=W7-W8)	5.29	6.82	
Water Content (%)	(W9/W10)*100	51.0%	49.3%	AVERAGE
LL = Wn (N / 25)^.121		50.26	48.77	49.51

LIQUID LIMIT	50
PLASTIC LIMIT	28
PLASTICITY INDEX	22
MOISTURE CONTENT	31.6%
LIQUIDITY INDEX	0.15

Description: Red Fat clay

USCS: CH

DATE:	6/21/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES IN
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-2 60'-62'	E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK	

WATER CONTENT (Delivered Moisture)

Tare no.		SM-4
Wt soil & tare,moist	(wt)	398.84
Wt soil & tare,dry	(wt)	342.89
Wt tare	(wt)	191.84
Wt moisture	(wt = wt1-wt2)	55.95
Wt dry soil	(wt = wt2-wt3)	151.05
% WATER	(wt/wt3*100)	37.04%

% PASSING #10 SIEVE

Total Wt	(wt)	151.05
Wt Split #10	(wt)	125.13
% PASSING #10	(wt/wt*100)	82.8%

USCS

	SIEVE	wt ret	% ret (wt/ttl wt*100)	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375	21.59	14.29%	85.71%	0.375	
coarse sand	#4	23.97	15.87%	84.13%	#4	coarse sand
medium sand	#10	26.10	17.28%	82.72%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve		82.72	Initial Moist Wt.	67.86
Specific Gravity	(assumed)	2.65	Calculated Dry Wt	67.47
ml Dispering Agent Used		125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		M-3
Wt soil and tare,moist	(wt)	39.01
Wt soil&tare,dry	(wt)	38.91
Wt tare	(wt)	21.61
Wt moisture lost	(wt1 = wt1-wt2)	0.10
Wt dry soil,final	(wt2 = wt1-wt3)	17.30
% HYGROSCOPIC MOISTURE	(wt1/wt2*100)	0.6%

% PASSING 200 SIEVE

Tare no.		BL-3
Wt soil and tare,dry (wt,dry)	(wt3)	267.41
Wt soil&tare,wash (wt,wash)	(wt4)	206.92
Wt tare	(wt5)	199.94
Wt fines lost (wt,dry-wt,wash)	(wt6 = wt3-wt4)	60.49
Wt dry soil, (wt,dry-wt,tare)	(wt7 = wt4-wt5)	67.47
% FINES LOST	(wt6/wt7*100)	89.7%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR.	PERCENT PASSING
#10	0.00	14.09	82.72%
#20	0.73	14.82	81.83%
#40	1.82	15.91	80.49%
#60	3.02	17.11	79.02%
#100	4.10	18.19	77.69%
#200	6.77	20.86	74.42%

LL	
PL	
PI	
Gs	

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/13/94	09:44	2.00	58.0	18.50	0.014	5.00
	09:46	4.00	57.0	18.50	0.014	5.00
	09:50	8.00	56.0	18.50	0.014	5.00
	09:57	15.00	53.5	18.50	0.014	5.00
	10:12	30.00	52.0	18.50	0.014	5.00
	10:42	60.00	49.5	18.50	0.014	5.00
	11:42	120.00	46.0	19.00	0.014	5.00
	13:42	240.00	42.0	19.00	0.014	5.00
	17:42	480.00	37.5	19.00	0.014	4.50
06/14/94	09:42	1440.0	29.0	20.00	0.014	4.00

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	15.9%
% C SAND	1.4%
% M SAND	2.2%
% F SAND	6.1%
% FINES	74.4%
% TOTAL	100.00%

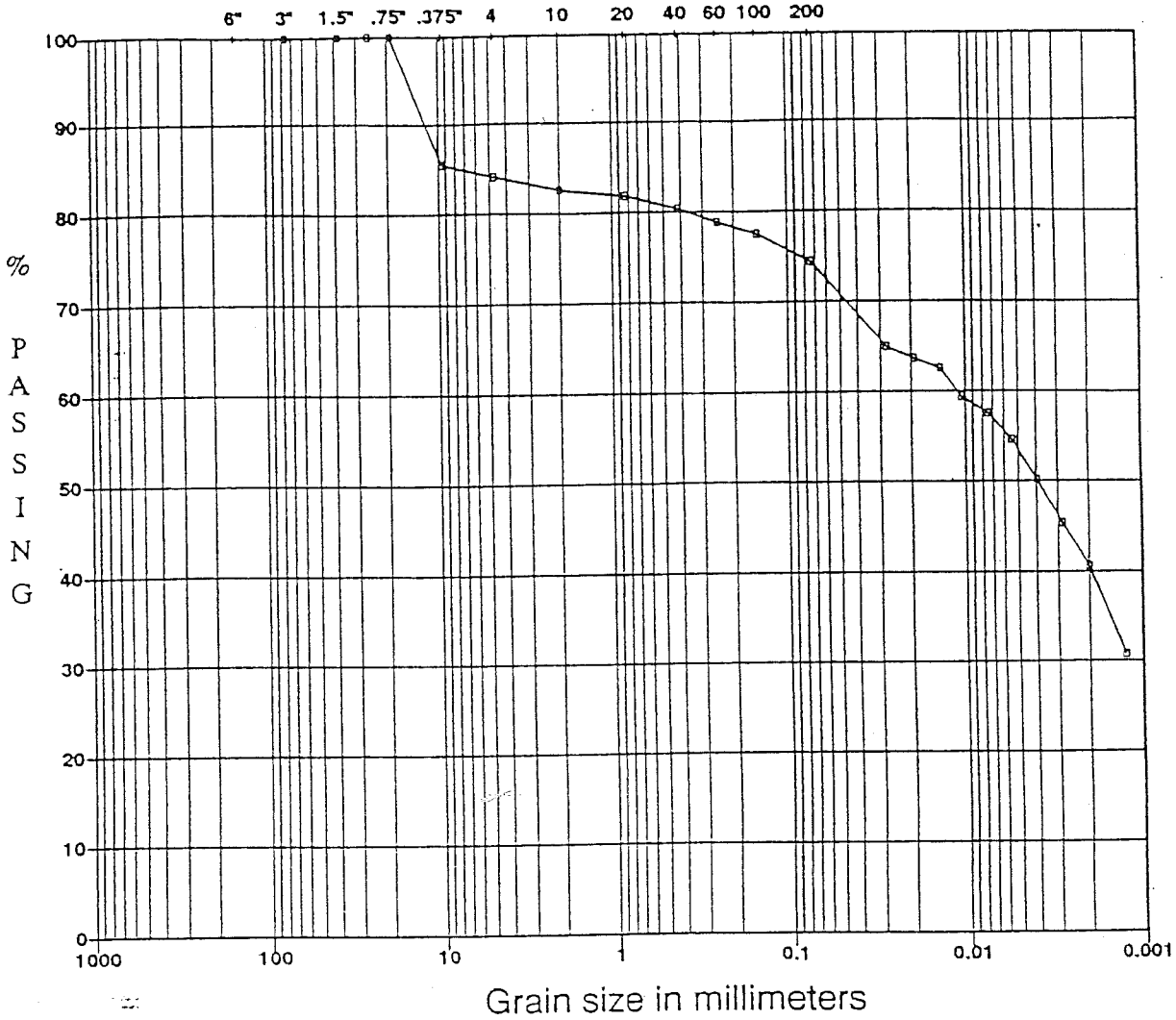
ET (min)	RDNG,C	EFF LTH	K	A	PAR DIA	%FINER
2.00	53.00	7.6	0.014	1.00	0.027	65.0
4.00	52.00	7.8	0.014	1.00	0.020	63.8
8.00	51.00	7.9	0.014	1.00	0.014	62.5
15.00	48.50	8.4	0.014	1.00	0.010	59.5
30.00	47.00	8.6	0.014	1.00	0.007	57.6
60.00	44.50	9.1	0.014	1.00	0.005	54.6
120.00	41.00	9.6	0.014	1.00	0.004	50.3
240.00	37.00	10.2	0.014	1.00	0.003	45.4
480.00	33.00	10.9	0.014	1.00	0.002	40.5
1440.00	25.00	12.2	0.014	1.00	0.001	30.7

WET COLOR: Red
DESCRIPTION: Fines, some f gravel, trace sand

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-2	37.0					Red
60'-62'	Date Tested:	6/14/94				FINES, some f gravel,
E94CJAS002						little sand
TECHNICIAN:	TK	DATE: 6/18/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-2
PROJECT NO.:	933-6141	DEPTH:	70'-72'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

PLASTIC LIMIT

Tare Number:		CH17	7B
Weight of Wet Soil & Tare	(W1)	35.45	35.28
Weight of Dry Soil & Tare	(W2)	32.66	32.33
Weight of Tare	(W3)	21.65	20.94
Weight of Water	(W4=W1-W2)	2.79	2.95
Weight of Dry Soil	(W5=W2-W3)	11.01	11.39
Water Content (%)	(W4/W5)*100	25.3%	25.9%

NATURAL MOISTURE

CH21
68.35
60.39
31.33
7.96
29.06
27.4%

LIQUID LIMIT

Number of Blows		26	22
Tare Number:		21B	17B
Weight of Wet Soil & Tare	(W6)	28.84	28.20
Weight of Dry Soil & Tare	(W7)	26.27	25.77
Weight of Tare	(W8)	20.59	20.38
Weight of Water	(W9=W6-W7)	2.57	2.43
Weight of Dry Soil	(W10=W7-W8)	5.68	5.39
Water Content (%)	(W9/W10)*100	45.2%	45.1%
LL = Wn (N / 25) ^ .121		45.46	44.39

AVERAGE: 44.93

NOTE: USCS Classification based upon material passing #40 sieve only.

LIQUID LIMIT	45
PLASTIC LIMIT	26
PLASTICITY INDEX	19
MOISTURE CONTENT	27.4%
LIQUIDITY INDEX	0.09

Description: Red

USCS: CL

DATE:	6/14/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES IN
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-3
PROJECT NO.:	933-6141	DEPTH:	20'-22'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

		PLASTIC LIMIT		NATURAL MOISTURE
Tare Number:		N-4	CH30	N-6
Weight of Wet Soil & Tare	(W1)	42.89	41.62	53.67
Weight of Dry Soil & Tare	(W2)	40.79	39.70	49.53
Weight of Tare	(W3)	31.45	31.18	31.75
Weight of Water	(W4=W1-W2)	2.10	1.92	4.14
Weight of Dry Soil	(W5=W2-W3)	9.34	8.52	17.78
Water Content (%)	(W4/W5)*100	22.5%	22.5%	23.3%

		LIQUID LIMIT		
Number of Blows		20	21	
Tare Number:		14B	M-1	
Weight of Wet Soil & Tare	(W6)	30.48	30.71	
Weight of Dry Soil & Tare	(W7)	26.95	27.73	
Weight of Tare	(W8)	20.41	22.06	
Weight of Water	(W9=W6-W7)	3.53	2.98	
Weight of Dry Soil	(W10=W7-W8)	6.54	5.67	
Water Content (%)	(W9/W10)*100	54.0%	52.6%	AVERAGE
LL = Wn (N / 25)^.121		52.54	51.46	52.00

NOTE: USCS Classification based upon material passing #40 sieve only.

LIQUID LIMIT	52
PLASTIC LIMIT	23
PLASTICITY INDEX	29
MOISTURE CONTENT	23.3%
LIQUIDITY INDEX	0.03

Description: Reddish, olive yellow

USCS: CH

DATE:	6/13/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES I
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-3	30'-32'	D4CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK		

WATER CONTENT (Delivered Moisture)

Tare no.		X-5
Wt soil & tare,moist	(WT1)	431.53
Wt soil & tare,dry	(WT2)	375.63
Wt tare	(WT3)	188.43
Wt moisture	(WT4=WT1-WT2)	55.90
Wt dry soil	(WT5=WT2-WT3)	187.20
% WATER	(WT4/WT5*100)	29.86%

% PASSING #10 SIEVE

Total Wt	(WT6)	187.20
Wt Split #10	(WT7)	186.46
% PASSING #10	(WT7/WT6*100)	99.6%

USCS

	SIEVE	wt ret	% ret (WT7 Raw/WT6*100)	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375		0.00%	100.00%	0.375	
coarse sand	#4	0.20	0.11%	99.89%	#4	coarse sand
medium sand	#10	0.88	0.47%	99.53%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve	99.53	Initial Moist Wt.	68.39
Specific Gravity (ASTM D854)	2.65	Calculated Dry Wt	68.11
ml Dispering Agent Used	125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		26C
Wt soil and tare,moist	(WT1)	39.82
Wt soil&tare,dry	(WT2)	39.74
Wt tare	(WT3)	20.62
Wt moisture lost	(WT4=WT1-WT2)	0.08
Wt dry soil,final	(WT5=WT2-WT3)	19.12
% HYGROSCOPIC MOISTURE	(WT4/WT5*100)	0.4%

% PASSING 200 SIEVE

Tare no.		CH-3
Wt soil and tare,dry (wt,dry)	(WT1)	260.26
Wt soil&tare,wash (wt,wash)	(WT2)	195.92
Wt tare	(WT3)	192.15
Wt fines lost (wt,dry-wt,wash)	(WT4=WT1-WT2)	64.34
Wt dry soil, (wt,dry-wt,tare)	(WT5=WT1-WT3)	68.11
% FINES LOST	(WT4/WT5*100)	94.5%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING
#10	0.00	0.32	99.53%
#20	0.28	0.60	99.12%
#40	0.88	1.20	98.24%
#60	2.10	2.42	96.46%
#100	2.93	3.25	95.25%
#200	4.10	4.42	93.54%

LL	
PL	
PI	
Gs	

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/13/94	08:53	2.00	66.0	19.00	0.014	5.00
	08:55	4.00	65.0	19.00	0.014	5.00
	08:59	8.00	63.0	19.00	0.014	5.00
	09:06	15.00	60.0	19.00	0.014	5.00
	09:21	30.00	58.0	19.00	0.014	5.00
	09:51	60.00	55.0	18.50	0.014	5.00
	10:51	120.00	52.0	18.50	0.014	5.00
	12:51	240.00	50.0	19.00	0.014	4.50
	16:51	480.00	44.0	19.00	0.014	4.50
06/14/94	08:51	1440.0	35.5	21.00	0.013	3.50

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	0.1%
% C SAND	0.4%
% M SAND	1.3%
% F SAND	4.7%
% FINES	93.5%
% TOTAL	100.00%

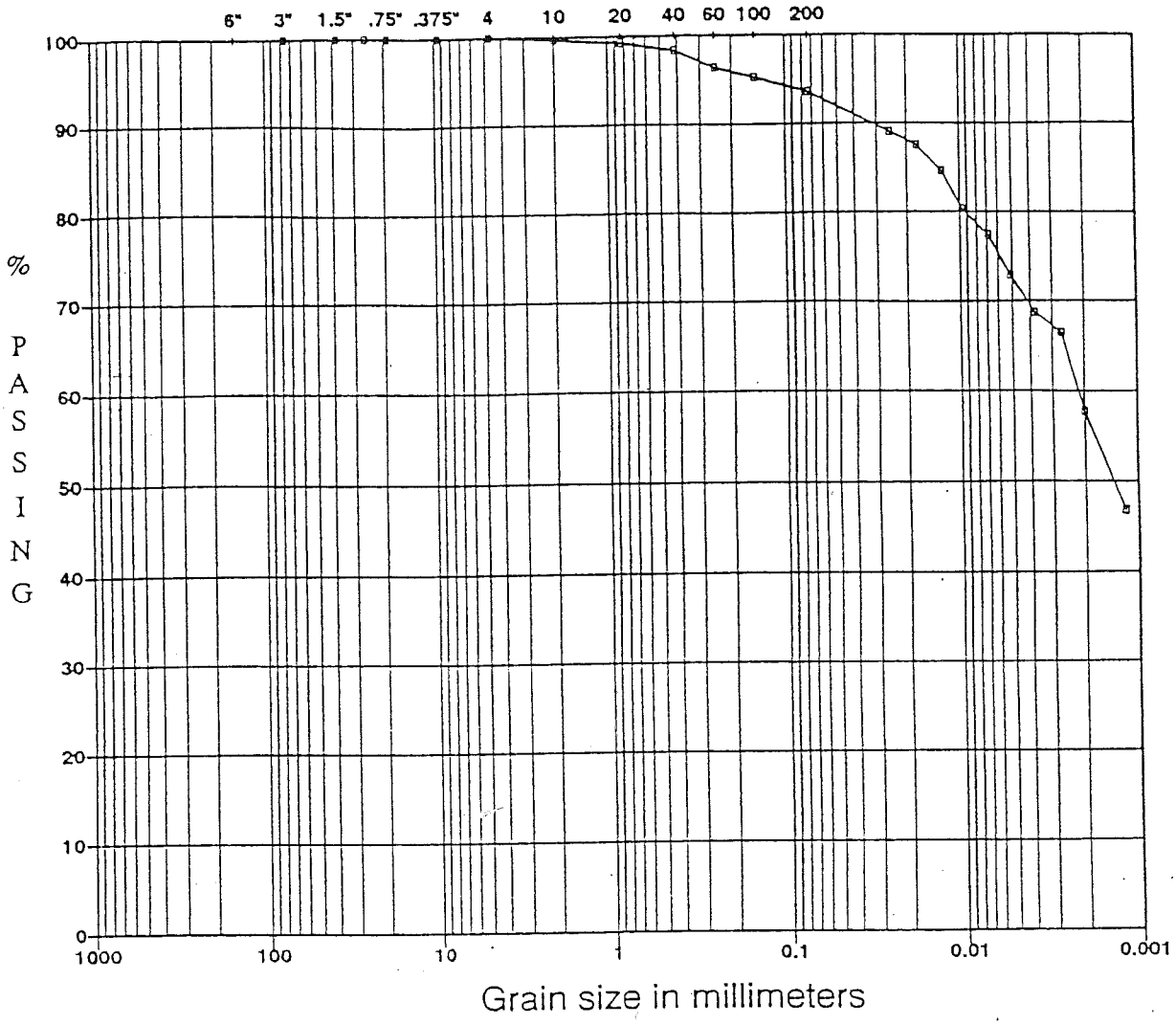
ET (min)	RDNG,C	EFF LTH	K	A	PAR DIA	%FINER
2.00	61.00	6.5	0.014	1.00	0.025	89.1
4.00	60.00	6.5	0.014	1.00	0.018	87.7
8.00	58.00	6.8	0.014	1.00	0.013	84.8
15.00	55.00	7.3	0.014	1.00	0.010	80.4
30.00	53.00	7.6	0.014	1.00	0.007	77.5
60.00	50.00	8.1	0.014	1.00	0.005	73.1
120.00	47.00	8.6	0.014	1.00	0.004	68.7
240.00	45.50	8.9	0.014	1.00	0.003	66.5
480.00	39.50	9.9	0.014	1.00	0.002	57.7
1440.00	32.00	11.1	0.013	1.00	0.001	46.8

WET COLOR: Red
DESCRIPTION: FINES, little sand

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-3	29.9					Red
30'-32'	Date Tested: 6/14/94					FINES,
E94CJAS002						little sand
TECHNICIAN: TK	DATE: 6/18/94		CHECKED: RDD			REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-3
PROJECT NO.:	933-6141	DEPTH:	40'-42'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

		PLASTIC LIMIT		NATURAL MOISTURE
Tare Number:		CH22	N-5	10B
Weight of Wet Soil & Tare	(W1)	40.67	45.28	43.83
Weight of Dry Soil & Tare	(W2)	38.74	42.38	37.88
Weight of Tare	(W3)	31.67	31.80	20.15
Weight of Water	(W4=W1-W2)	1.93	2.90	5.95
Weight of Dry Soil	(W5=W2-W3)	7.07	10.58	17.73
Water Content (%)	(W4/W5)*100	27.3%	27.4%	33.6%

		LIQUID LIMIT		
Number of Blows		24	22	
Tare Number:		CH19	33C	
Weight of Wet Soil & Tare	(W6)	30.53	28.71	
Weight of Dry Soil & Tare	(W7)	27.11	25.75	
Weight of Tare	(W8)	21.37	20.75	
Weight of Water	(W9=W6-W7)	3.42	2.96	
Weight of Dry Soil	(W10=W7-W8)	5.74	5.00	
Water Content (%)	(W9/W10)*100	59.6%	59.2%	AVERAGE
LL = Wn (N / 25)^.121		59.29	58.29	58.79

LIQUID LIMIT	59
PLASTIC LIMIT	27
PLASTICITY INDEX	31
MOISTURE CONTENT	33.6%
LIQUIDITY INDEX	0.20

NOTE: USCS Classification based upon material passing #40 sieve only.

Description: Red

USCS: CH

DATE:	6/13/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES I
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-3 49'-51' E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK

WATER CONTENT (Delivered Moisture)

Tare no.		R-32
Wt soil & tare,moist	(gm)	1037.42
Wt soil & tare,dry	(gm)	822.51
Wt tare	(gm)	194.64
Wt moisture	(gm)	214.91
Wt dry soil	(gm)	627.87
% WATER		34.23%

% PASSING #10 SIEVE

Total Wt	(gm)	634.95
Wt Split #10	(gm)	632.73
% PASSING #10		99.7%

USCS	SIEVE	wt ret	% ret	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375		0.00%	100.00%	0.375	
coarse sand	#4	1.44	0.23%	99.77%	#4	coarse sand
medium sand	#10	2.31	0.36%	99.64%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve	99.64	Initial Moist Wt.	69.33
Specific Gravity	2.59	Calculated Dry Wt	68.96
ml Dispering Agent Used	125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		53
Wt soil and tare,moist	(gm)	43.56
Wt soil&tare,dry	(gm)	43.44
Wt tare	(gm)	21.29
Wt moisture lost	(gm)	0.12
Wt dry soil,final	(gm)	22.15
% HYGROSCOPIC MOISTURE	(gm)	0.5%

% PASSING 200 SIEVE

Tare no.		M-1
Wt soil and tare,dry (wt,dry)	(gm)	215.55
Wt soil&tare,wash (wt,wash)	(gm)	148.91
Wt tare	(gm)	146.59
Wt fines lost (wt,dry-wt,wash)	(gm)	66.64
Wt dry soil, (wt,dry-wt,tare)	(gm)	68.96
% FINES LOST	(gm)	96.6%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR.	PERCENT PASSING
#10	0.00	0.25	99.64%
#20	0.12	0.37	99.46%
#40	0.28	0.53	99.23%
#60	0.49	0.74	98.93%
#100	0.98	1.23	98.22%
#200	2.25	2.50	96.39%

LL	54
PL	29
PI	25
Gs	2.59

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/20/94	08:20	2.00	64.0	22.50	0.014	5.00
	08:22	4.00	63.0	22.50	0.014	5.00
	08:26	8.00	61.0	22.50	0.014	5.00
	08:33	15.00	60.0	22.50	0.014	5.00
	08:48	30.00	57.0	22.50	0.014	5.00
	09:18	60.00	53.0	22.50	0.014	5.00
	10:18	120.00	49.0	22.50	0.014	5.00
	12:18	240.00	44.5	22.50	0.014	4.50
	16:18	480.00	39.0	22.50	0.014	5.00
06/21/94	08:18	1440.0	29.0	23.00	0.013	5.00

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	0.2%
% C SAND	0.1%
% M SAND	0.4%
% F SAND	2.8%
% FINES	96.4%
% TOTAL	100.00%

ET (min)	RDNG,C	EFF LTH	K	A	PAR DIA	%FINER
2.00	59.00	6.6	0.014	1.02	0.025	87.0
4.00	58.00	6.8	0.014	1.02	0.018	85.5
8.00	56.00	7.1	0.014	1.02	0.013	82.5
15.00	55.00	7.3	0.014	1.02	0.009	81.1
30.00	52.00	7.8	0.014	1.02	0.007	76.6
60.00	48.00	8.4	0.014	1.02	0.005	70.7
120.00	44.00	9.1	0.014	1.02	0.004	64.8
240.00	40.00	9.7	0.014	1.02	0.003	59.0
480.00	34.00	10.7	0.014	1.02	0.002	50.1
1440.00	24.00	12.4	0.013	1.02	0.001	35.4

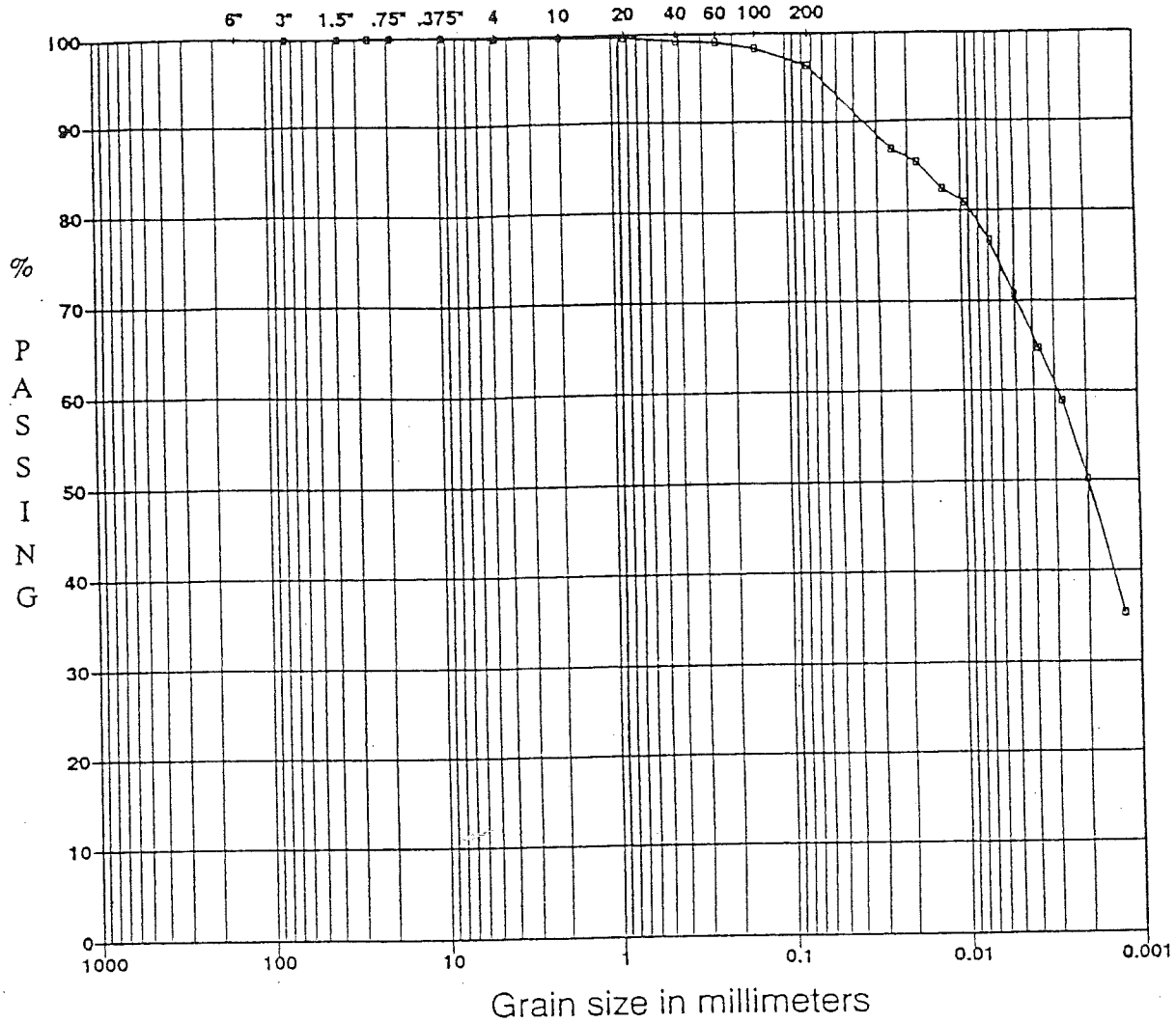
WET COLOR: Red
DESCRIPTION: Pale clay

USCS: CH

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/22/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-3	34.2	54	29	25	2.59	Red
49'-51'	Date Tested:	6/22/94				Fat clay
E94CJAS002	USCS:	CH				
TECHNICIAN:	TK	DATE: 6/23/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-3
PROJECT NO.:	933-6141	DEPTH:	49'-51'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

		PLASTIC LIMIT		NATURAL MOISTURE
Tare Number:		15B	44	R-32
Weight of Wet Soil & Tare	(W1)	31.85	35.80	1037.42
Weight of Dry Soil & Tare	(W2)	29.39	32.31	822.51
Weight of Tare	(W3)	20.65	20.67	194.64
Weight of Water	(W4=W1-W2)	2.46	3.49	214.91
Weight of Dry Soil	(W5=W2-W3)	8.74	11.64	627.87
Water Content (%)	(W4/W5)*100	28.1%	30.0%	34.2%

		LIQUID LIMIT		
Number of Blows		20	25	
Tare Number:		I53	12E	
Weight of Wet Soil & Tare	(W6)	29.54	27.30	
Weight of Dry Soil & Tare	(W7)	26.40	24.75	
Weight of Tare	(W8)	20.73	20.12	
Weight of Water	(W9=W6-W7)	3.14	2.55	
Weight of Dry Soil	(W10=W7-W8)	5.67	4.63	
Water Content (%)	(W9/W10)*100	55.4%	55.1%	AVERAGE
LL = Wn (N / 25)^.121		53.90	55.08	54.49

LIQUID LIMIT	54
PLASTIC LIMIT	29
PLASTICITY INDEX	25
MOISTURE CONTENT	34.2%
LIQUIDITY INDEX	0.20

Description: Red
Fat clay

USCS: CH

DATE:	6/21/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES IN
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-3
PROJECT NO.:	933-6141	DEPTH:	60'-62'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

PLASTIC LIMIT

Tare Number:		N-1	CH-24
Weight of Wet Soil & Tare	(W1)	41.96	43.81
Weight of Dry Soil & Tare	(W2)	39.19	40.59
Weight of Tare	(W3)	31.14	31.26
Weight of Water	(W4=W1-W2)	2.77	3.22
Weight of Dry Soil	(W5=W2-W3)	8.05	9.33
Water Content (%)	(W4/W5)*100	34.4%	34.5%

NATURAL MOISTURE

1
60.11
51.54
21.26
8.57
30.28
28.3%

LIQUID LIMIT

Number of Blows		28	29
Tare Number:		18	M-12
Weight of Wet Soil & Tare	(W6)	28.64	29.54
Weight of Dry Soil & Tare	(W7)	25.25	26.77
Weight of Tare	(W8)	19.54	21.99
Weight of Water	(W9=W6-W7)	3.39	2.77
Weight of Dry Soil	(W10=W7-W8)	5.71	4.78
Water Content (%)	(W9/W10)*100	59.4%	57.9%
LL = Wn (N / 25)^.121		60.19	59.00

AVERAGE: 59.59

LIQUID LIMIT	60
PLASTIC LIMIT	34
PLASTICITY INDEX	25
MOISTURE CONTENT	28.3%
LIQUIDITY INDEX	-0.25

NOTE: USCS Classification based upon material passing #40 sieve only.

Description: Red

USCS: MH

DATE:	6/14/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES I
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
MECHANICAL SIEVE
ASTM C136, D421, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.	B-4
PROJECT NUMBER:	933-6141	Sample ID:	JAR

WATER CONTENT (Delivered Moisture)

tare no.		R-5
wt soil & tare,moist	(w1)	333.98
wt soil & tare,dry	(w2)	294.36
wt tare	(w3)	188.44
wt moisture	(w4=w1-w2)	39.62
wt dry soil	(w5=w2-w3)	105.92
% water	(w4/w5)*100	37.41%

200 WASH (Percent Fines)

tare no.		R-5
wt soil & tare,before wash	(w6)	294.4
wt soil & tare,after wash	(w7)	239.9
wt tare	(w8)	188.4
wt fines lost	(w9=w6-w7)	54.42
wt dry soil	(w10=w6-w8)	105.92
% lost	(w9/w10)*100	51.38%

USCS SIEVE	wt ret	% ret {(wt ret/w10)*100}	% PASS (100 - %ret)	SIEVE
3.000		0.0%	100.0%	3.000
2.500		0.0%	100.0%	2.500
2.000		0.0%	100.0%	2.000
1.500		0.0%	100.0%	1.500
1.000		0.0%	100.0%	1.000
0.750		0.0%	100.0%	0.750
0.375		0.0%	100.0%	0.375
#4		0.0%	100.0%	#4
#8	0.21	0.2%	99.8%	#8
#10	0.33	0.3%	99.7%	#10

SPLITTING INFORMATION

Wt in pan, from coarse sieve stack	
Wt split for fine stack sieves	
Percent of original wt in pan	100.00%

#16	0.75	0.7%	99.3%	#16
#30	1.50	1.4%	98.6%	#30
#50	3.41	3.2%	96.8%	#50
#100	17.20	16.2%	83.8%	#100
#200	51.50	48.6%	51.4%	#200
PAN	51.50	48.6%	51.4%	PAN

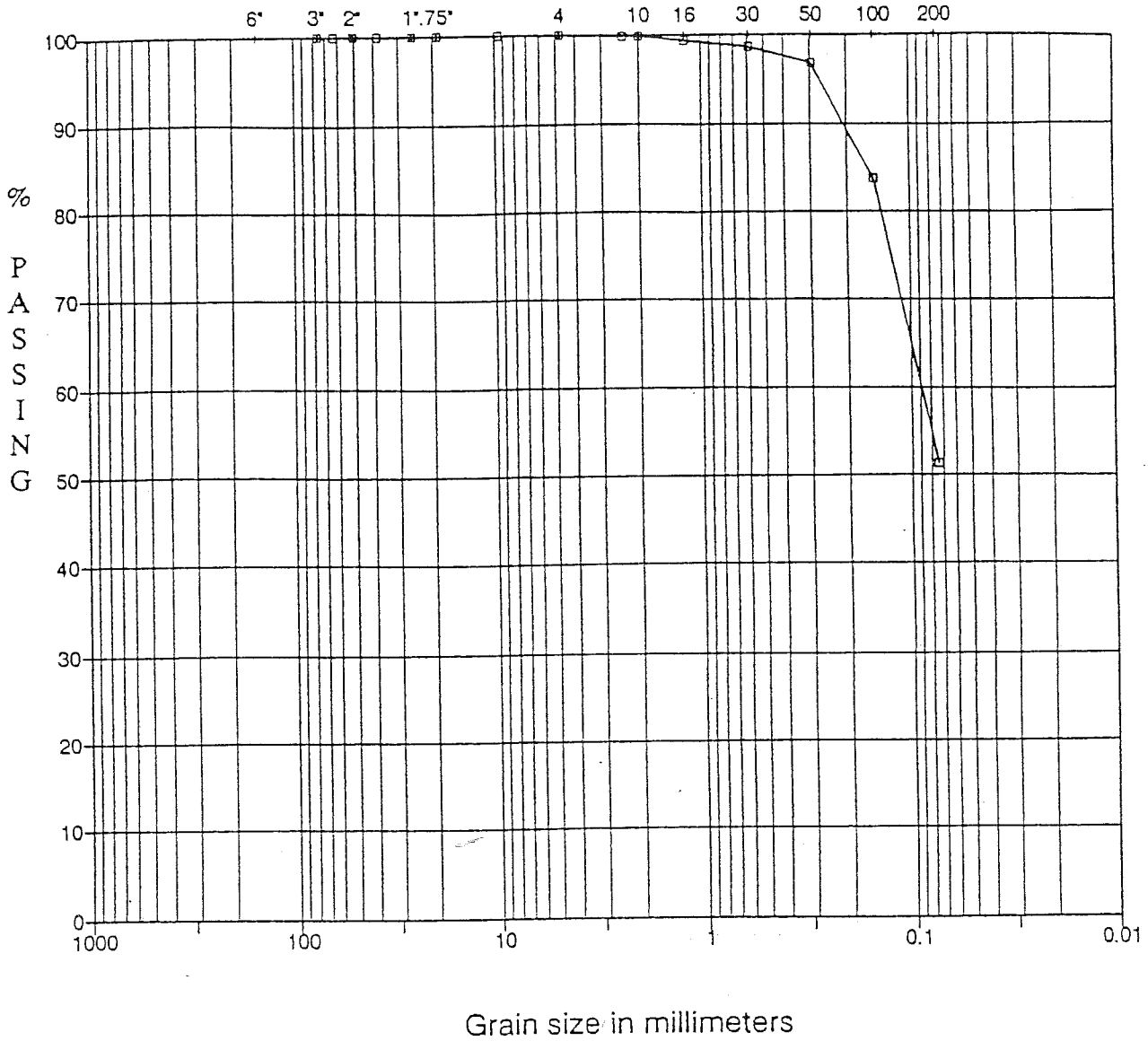
Sample	B-4 25'-27' E94CJAS002	Wet Color:	Yellowish brown

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

TECH	TK	CHECKED	RDD
DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND C-33

US STANDARD SIEVE OPENING SIZES



SAMPLE ID	W%	DATE TESTE	6/14/94	CHECKED:	RDD
B-4	37.41	TECHNICIAN:	TK	REVIEWED:	RMW
25'-27'	E94CJAS002				

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT.LAUREL,NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-4
PROJECT NO.:	933-6141	DEPTH:	30'-32'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

PLASTIC LIMIT

Tare Number:		4	R-1
Weight of Wet Soil & Tare	(W1)	35.42	45.30
Weight of Dry Soil & Tare	(W2)	31.90	41.76
Weight of Tare	(W3)	21.95	31.38
Weight of Water	(W4=W1-W2)	3.52	3.54
Weight of Dry Soil	(W5=W2-W3)	9.95	10.38
Water Content (%)	(W4/W5)*100	35.4%	34.1%

NATURAL MOISTURE

3
53.14
43.80
22.13
9.34
21.67
43.1%

LIQUID LIMIT

Number of Blows		25	21
Tare Number:		28C	M-4
Weight of Wet Soil & Tare	(W6)	29.23	29.39
Weight of Dry Soil & Tare	(W7)	25.86	26.49
Weight of Tare	(W8)	20.77	22.08
Weight of Water	(W9=W6-W7)	3.37	2.90
Weight of Dry Soil	(W10=W7-W8)	5.09	4.41
Water Content (%)	(W9/W10)*100	66.2%	65.8%
LL = Wn (N / 25) ^ .121		66.21	64.39

AVERAGE: 65.30

LIQUID LIMIT	65
PLASTIC LIMIT	35
PLASTICITY INDEX	31
MOISTURE CONTENT	43.1%
LIQUIDITY INDEX	0.27

NOTE: USCS Classification based upon material passing #40 sieve only.

Description: Yellowish brown

USCS: MH

DATE:	6/13/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES I
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
MECHANICAL SIEVE
ASTM C136, D421, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.	B-4
PROJECT NUMBER:	933-6141	Sample ID:	JAR

WATER CONTENT (Delivered Moisture)

tare no.		H-6
wt soil & tare,moist	(w1)	370.57
wt soil & tare,dry	(w2)	343.30
wt tare	(w3)	190.70
wt moisture	(w4=w1-w2)	27.27
wt dry soil	(w5=w2-w3)	152.60
% water	(w4/w5)*100	17.87%

200 WASH (Percent Fines)

tare no.		H-6
wt soil & tare,before wash	(w6)	343.3
wt soil & tare,after wash	(w7)	235.8
wt tare	(w8)	190.7
wt fines lost	(w9=w6-w7)	107.54
wt dry soil	(w10=w6-w8)	152.60
% lost	(w9/w10)*100	70.47%

USCS SIEVE	wt ret	% ret ((wt ret/w10)*100)	% PASS (100 - %ret)	SIEVE
3.000		0.0%	100.0%	3.000
2.500		0.0%	100.0%	2.500
2.000		0.0%	100.0%	2.000
1.500		0.0%	100.0%	1.500
1.000		0.0%	100.0%	1.000
0.750		0.0%	100.0%	0.750
0.375		0.0%	100.0%	0.375
#4	0.36	0.2%	99.8%	#4
#8	0.52	0.3%	99.7%	#8
#10	0.56	0.4%	99.6%	#10

SPLITTING INFORMATION

Wt in pan, from coarse sieve stack	
Wt split for fine stack sieve	
Percent of original wt in pan	100.00%

#16	1.04	0.7%	99.3%	#16
#30	4.88	3.2%	96.8%	#30
#50	19.32	12.7%	87.3%	#50
#100	35.40	23.2%	76.8%	#100
#200	43.21	28.3%	71.7%	#200
PAN	45.12	29.6%	70.4%	PAN

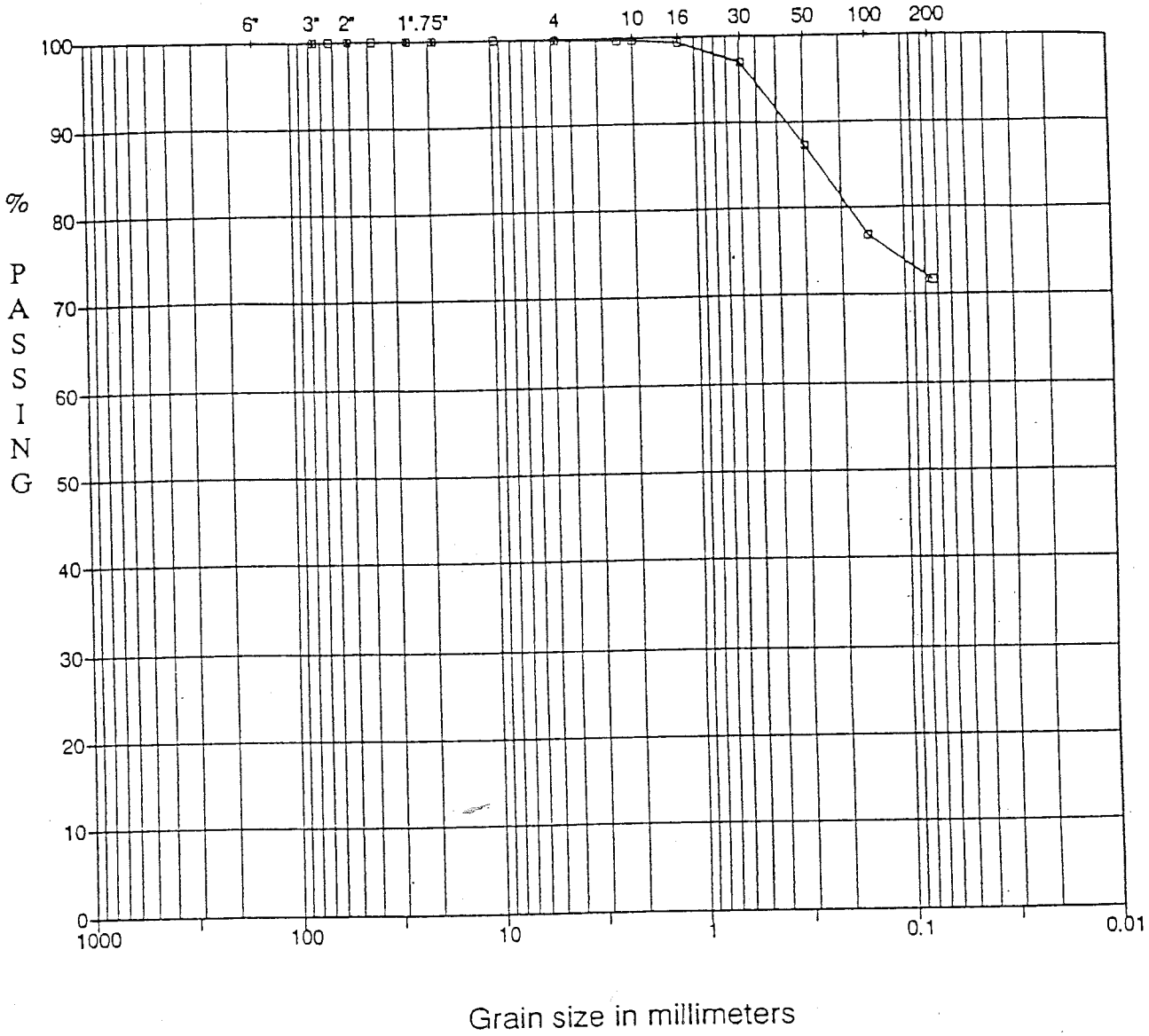
Sample	B-4 35'-37' E94CJAS002	Wet Color:	Reddish, olive yellow

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

TECH	TK	CHECKED	RDD
DATE	6/10/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND C-33

US STANDARD SIEVE OPENING SIZES



SAMPLE ID	W%	DATE TESTE 6/10/94	CHECKED: RDD
B-4	17.87	TECHNICIAN: TK	REVIEWED: RMW
35'-37'	E94CJAS002		

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT.LAUREL,NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-5 30'-32' E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	S.T.

WATER CONTENT (Delivered Moisture)

Tare no.		BD-4
Wt soil & tare,moist	(wt)	834.39
Wt soil & tare,dry	(wt)	700.98
Wt tare	(wt)	192.14
Wt moisture	(wt=wt1-wt2)	133.41
Wt dry soil	(wt=wt2-wt3)	508.84
% WATER	(wt4/wt5)*100	26.22%

% PASSING #10 SIEVE

Total Wt	(wt)	437.24
Wt Split #10	(wt)	437.08
% PASSING #10	(wt/wt*100)	100.0%

USCS

	SIEVE	wt ret	% ret ((wt Ret/wt*100)*100)	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375		0.00%	100.00%	0.375	
coarse sand	#4	0.15	0.03%	99.97%	#4	coarse sand
medium sand	#10	0.30	0.07%	99.93%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve	99.93	Initial Moist Wt.	69.38
Specific Gravity	2.77	Calculated Dry Wt	69.13
ml Dispering Agent Used	125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		M-1
Wt soil and tare,moist	(wt)	41.32
Wt soil&tare,dry	(wt)	41.25
Wt tare	(wt)	22.07
Wt moisture lost	(wt1=wt2-wt3)	0.07
Wt dry soil,final	(wt2=wt3-wt1)	19.18
% HYGROSCOPIC MOISTURE	(wt1/wt2)*100	0.4%

% PASSING 200 SIEVE

Tare no.		M-13
Wt soil and tare,dry (wt,dry)	(wt)	217.11
Wt soil&tare,wash (wt,wash)	(wt)	154.00
Wt tare	(wt)	147.98
Wt fines lost (wt,dry-wt,wash)	(wt1=wt2-wt3)	63.11
Wt dry soil, (wt,dry-wt,tare)	(wt2=wt4-wt5)	69.13
% FINES LOST	(wt1/wt2)*100	91.3%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR.	PERCENT PASSING
#10	0.00	0.05	99.93%
#20	0.04	0.09	99.87%
#40	0.15	0.20	99.71%
#60	0.32	0.37	99.47%
#100	1.11	1.16	98.33%
#200	5.59	5.64	91.85%

LL	43
PL	25
PI	18
Gs	2.77

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/20/94	08:31	2.00	60.0	22.50	0.013	5.00
	08:33	4.00	58.0	22.50	0.013	5.00
	08:37	8.00	56.0	22.50	0.013	5.00
	08:44	15.00	54.0	22.50	0.013	5.00
	08:59	30.00	50.0	22.50	0.013	5.00
	09:29	60.00	45.5	22.50	0.013	5.00
	10:29	120.00	41.5	22.50	0.013	5.00
	12:29	240.00	37.5	22.50	0.013	4.50
	16:29	480.00	32.0	22.50	0.013	5.00
06/21/94	08:29	1440.0	24.0	23.00	0.013	5.00

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	0.0%
% C SAND	0.9%
% M SAND	0.2%
% F SAND	7.9%
% FINES	91.9%
% TOTAL	100.00%

ET (min)	RDNG,C	EFF LTH	K	A	PAR DIA	%FINER
2.00	55.00	7.3	0.013	0.98	0.025	77.9
4.00	53.00	7.6	0.013	0.98	0.018	75.1
8.00	51.00	7.9	0.013	0.98	0.013	72.3
15.00	49.00	8.3	0.013	0.98	0.010	69.4
30.00	45.00	8.9	0.013	0.98	0.007	63.8
60.00	40.50	9.7	0.013	0.98	0.005	57.4
120.00	36.50	10.4	0.013	0.98	0.004	51.7
240.00	33.00	10.9	0.013	0.98	0.003	46.8
480.00	27.00	11.9	0.013	0.98	0.002	38.3
1440.00	19.00	13.2	0.013	0.98	0.001	26.9

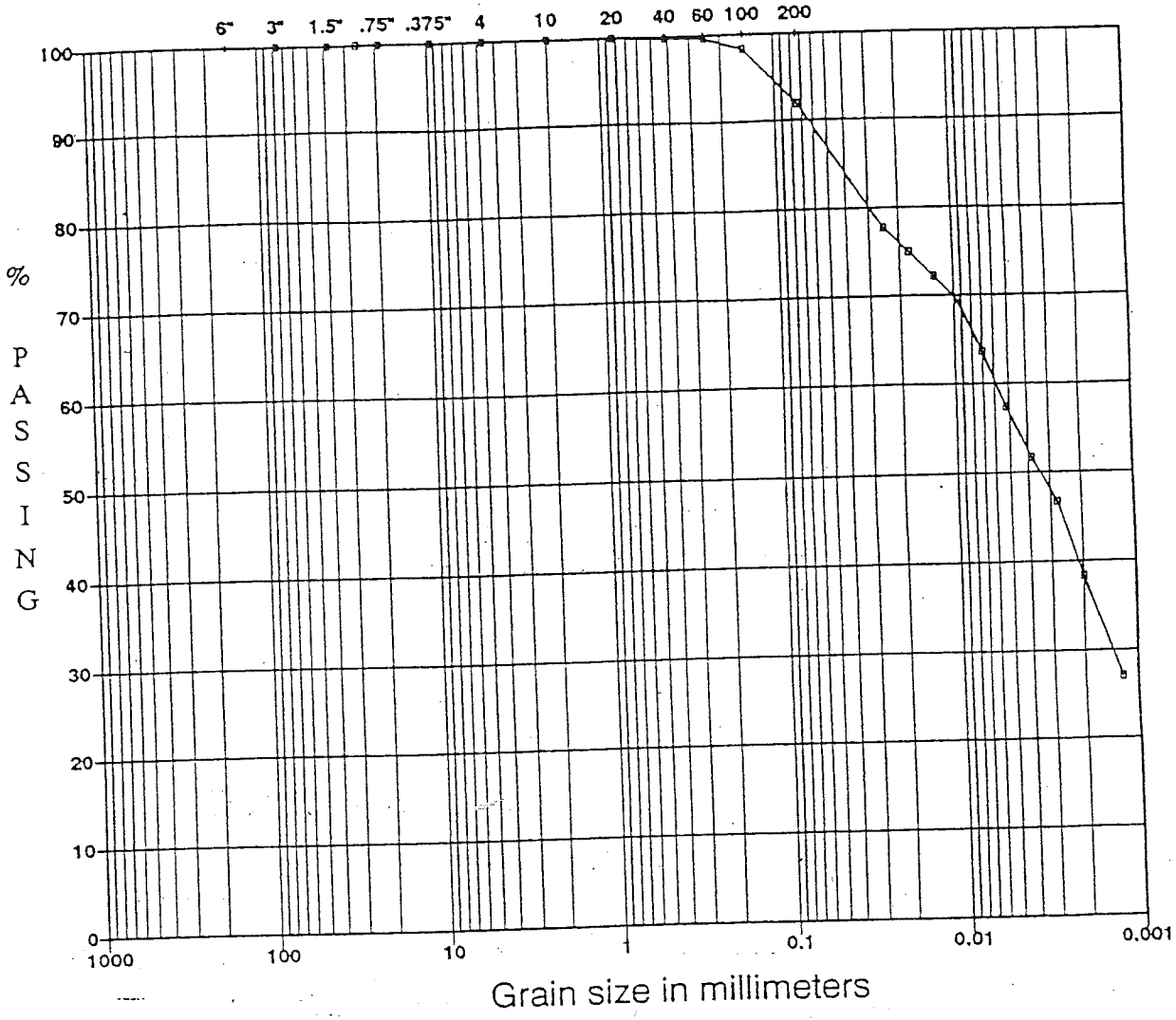
WET COLOR: Light medium gray
DESCRIPTION: Lean clay

USCS: CL

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/22/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-5	26.2	43	25	18	2.77	Light reddish gray
30'-32'	Date Tested:	6/22/94				Lean clay
E94CJAS002	USCS:	CL				
TECHNICIAN:	TK	DATE: 6/18/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-5
PROJECT NO.:	933-6141	DEPTH:	30'-32'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

		PLASTIC LIMIT		NATURAL MOISTURE
Tare Number:		M-9	CH-17	BD-4
Weight of Wet Soil & Tare	(W1)	33.79	35.59	834.39
Weight of Dry Soil & Tare	(W2)	31.35	32.85	700.98
Weight of Tare	(W3)	21.75	21.66	192.14
Weight of Water	(W4=W1-W2)	2.44	2.74	133.41
Weight of Dry Soil	(W5=W2-W3)	9.60	11.19	508.84
Water Content (%)	(W4/W5)*100	25.4%	24.5%	26.2%

		LIQUID LIMIT		
Number of Blows		26	22	
Tare Number:		59	26C	
Weight of Wet Soil & Tare	(W6)	29.99	31.08	
Weight of Dry Soil & Tare	(W7)	27.34	27.93	
Weight of Tare	(W8)	21.15	20.62	
Weight of Water	(W9=W6-W7)	2.65	3.15	
Weight of Dry Soil	(W10=W7-W8)	6.19	7.31	
Water Content (%)	(W9/W10)*100	42.8%	43.1%	AVERAGE
LL = Wn (N / 25)^.121		43.01	42.43	42.72

LIQUID LIMIT	43
PLASTIC LIMIT	25
PLASTICITY INDEX	18
MOISTURE CONTENT	26.2%
LIQUIDITY INDEX	0.07

Description: Red
Lean clay

USCS: CL

DATE:	6/21/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES I
MT. LAUREL, NJ

ONE-DIMENSIONAL CONSOLIDATION
ASTM D 2435

PROJECT NAME:	JCA/LAB GEOTECH/NJ	DATE RECEIVED:	6/6/94	LIQUID LIMIT:	43
PROJECT NO.:	933-6141	DESCRIPTION:	Light reddish gray lean clay	PLASTIC LIMIT:	25
SAMPLE NO.:	B-5	CLASSIFICATION:	CL	PLASTICITY INDEX:	18
SAMPLE DEPTH:	30'-32'	CONSOLIDOMETER No.:	#2	SPECIFIC GRAVITY:	2.77

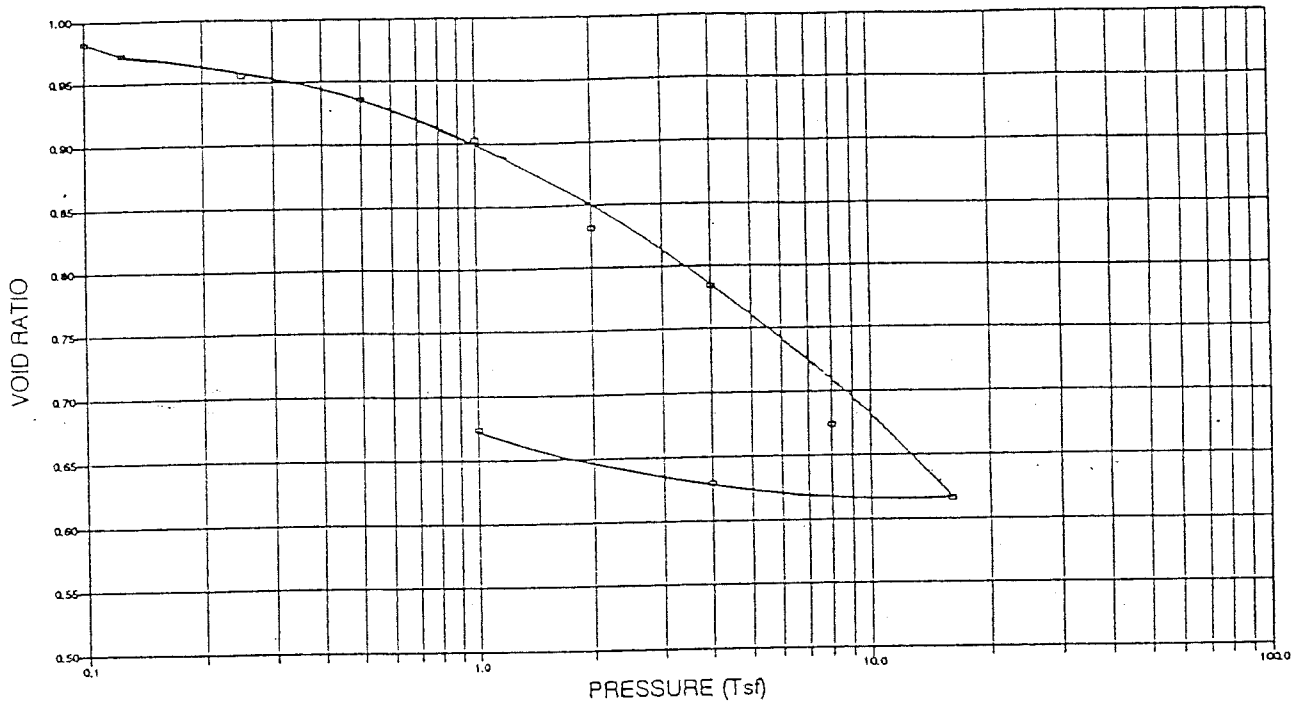
		Specimen Trimmings							INITIAL	FINAL
SAMPLE TYPE:	SHELBY TUBE	1	2	3	After Test	Diameter (in)	2.500			
Tare No.		E023	E017	E008	F003	Height of specimen (in)	0.793	Total Heights(in)	0.793	0.670
Weight in grams	Tare plus wet soil	112.69	125.33	148.19	159.22	Area of specimen (in^2)	4.909	Height of solids(in)	0.400	0.400
	Tare plus dry soil	95.68	105.68	123.24	137.53	Volume of specimen (in^3)	3.892	Height of voids(in)	0.393	0.270
	Water	17.01	19.65	24.95	21.69	Water Content (Avg) from Trimmings	27.82%	Height of water(in)	0.347	0.270
	Tare	33.86	34.86	34.79	48.38	Specimen Wt (wet,g)	117.04	Void ratio	0.981	0.674
	Dry soil	61.82	70.82	88.45	89.15	Specimen Wt (dry,g)	89.15	Degree of saturation	88.35%	99.98%
Water Content		27.52%	27.75%	28.21%	24.33%	Water Wt (g)	27.89	Dry unit weight (pcf)	87.26	103.25
						Unit weight of water (pcf)	62.40	Wet unit weight (pcf)	114.56	128.37

PRESSURE (tsf)	R90 DIAL READING	DIAL CHANGE (in)	FITTING TIME (sec) 90	SPECIMEN HEIGHT (in)	HEIGHT OF VOIDS Hv	VOID RATIO e	CHANGE IN HEIGHT (accum)	STRAIN %	LENGTH OF DRAINAGE PATH (DOUBLE DRAINAGE) H (in)	H^2 (cm^2)	COEFFICIENT OF CONSOLIDATION Cv(cm^2/sec)	(ft^2/day)
0.000	0.1012	0.0000	0	0.7929	0.3926	0.9809	0.0000	0.0000	0.0000	0.0000	0.0E+00	0.0E+00
0.125	0.1048	0.0036	240	0.7893	0.3890	0.9719	0.0036	0.0045	0.3449	0.7672	2.7E-03	2.5E-01
0.250	0.1114	0.0066	240	0.7827	0.3824	0.9554	0.0102	0.0129	0.3408	0.7491	2.6E-03	2.5E-01
0.500	0.1196	0.0082	240	0.7745	0.3742	0.9349	0.0184	0.0232	0.3382	0.7379	2.6E-03	2.4E-01
1.000	0.1323	0.0127	220	0.7618	0.3615	0.9032	0.0311	0.0392	0.3319	0.7107	2.7E-03	2.5E-01
2.000	0.1610	0.0287	604	0.7331	0.3328	0.8315	0.0598	0.0754	0.3187	0.6553	9.2E-04	8.6E-02
4.000	0.1800	0.0190	136	0.7141	0.3138	0.7840	0.0788	0.0994	0.3102	0.6208	3.9E-03	3.6E-01
8.000	0.2242	0.0442	268	0.6699	0.2696	0.6736	0.1230	0.1551	0.2883	0.5361	1.7E-03	1.6E-01
16.000	0.2473	0.0231	392	0.6468	0.2465	0.6159	0.1461	0.1843	0.2784	0.5000	1.1E-03	1.0E-01
4.000	0.2420	-0.0053	230	0.6521	0.2518	0.6291	0.1408	0.1776	0.2734	0.4822	1.8E-03	1.7E-01
1.000	0.2240	-0.0180	644	0.6701	0.2698	0.6741	0.1228	0.1549	0.2810	0.5094	6.7E-04	6.2E-02

GOLDER ASSOCIATES INC.
MT.LAUREL,NJ

TECH:	MLM
DATE:	6/20/94
CHECKED:	JMP
REVIEWED:	RMW

ONE-DIMENSIONAL CONSOLIDATION
ASTM D 2435



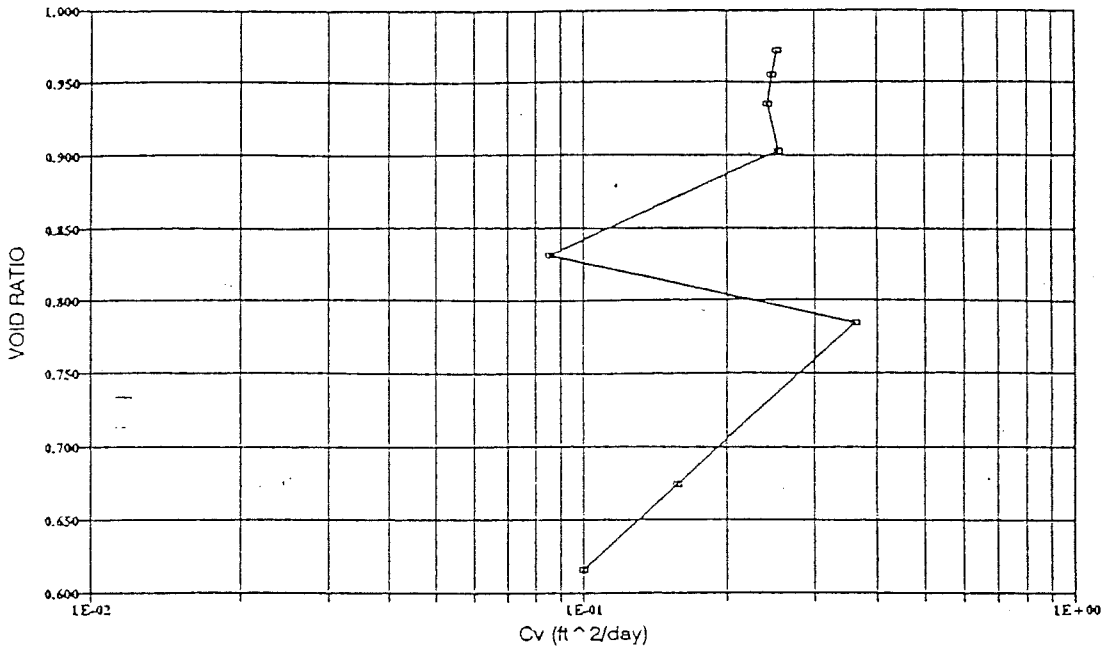
			INITIAL	FINAL
Diameter (in)	2.50			
Height of specimen (in)	0.79	Total Heights(in)	0.79	0.67
Area of specimen (in ^ 2)	4.91	Height of solids(in)	0.400	0.400
Volume of specimen (in ^ 3)	3.89	Height of voids(in)	0.393	0.270
Water Content (Avg) from Trimmings	27.82%	Height of water(in)	0.347	0.270
Specimen Wt (wet,g)	117.04	Void ratio	0.981	0.674
Specimen Wt (dry,g)	89.15	Degree of saturation	88.35%	99.98%
Water Wt (g)	27.89	Dry unit weight (pcf)	87.26	103.25
Unit weight of water (pcf)	62.40	Wet unit weight (pcf)	114.56	128.37

PARAMETERS	
LIQUID LIMIT:	43
PLASTIC LIMIT:	25
PLASTICITY INDEX:	18
SPECIFIC GRAVITY:	2.77
USCS CLASSIFICATION:	CL
DESCRIPTION:	Light reddish gray Lean clay

PROJECT NAME:	JCA/LAB GEOTECH/NJ	SAMPLE DEPTH:	30'-32'
PROJECT NO.:	933-6141	DATE RECEIVED:	6/6/94
SAMPLE NO.:	B-5	CONSOLIDOMETER No.:	#2

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ONE-DIMENSIONAL CONSOLIDATION
ASTM D 2435



PRESSURE (tsf)	COEFFICIENT OF CONSOLIDATION	
	Cv(cm ^ 2/sec)	(ft ^ 2/day)
0.00	0.00E+00	0.00E+00
0.13	2.71E-03	2.52E-01
0.25	2.65E-03	2.46E-01
0.50	2.61E-03	2.42E-01
1.00	2.74E-03	2.54E-01
2.00	9.20E-04	8.55E-02
4.00	3.88E-03	3.61E-01
8.00	1.69E-03	1.58E-01
16.00	1.08E-03	1.00E-01
4.00	1.78E-03	1.65E-01
1.00	6.71E-04	6.24E-02

PARAMETERS	
LIQUID LIMIT:	43
PLASTIC LIMIT:	25
PLASTICITY INDEX:	18
SPECIFIC GRAVITY:	2.77
USCS CLASSIFICATION:	CL
DESCRIPTION:	Light reddish gray Lean clay
SAMPLE DEPTH:	30'-32'
DATE RECEIVED:	6/6/94
CONSOLIDOMETER No.:	#2
PROJECT NAME:	JCA/LAB GEOTECH/NJ
PROJECT NO.:	933-6141
SAMPLE NO.:	B-5

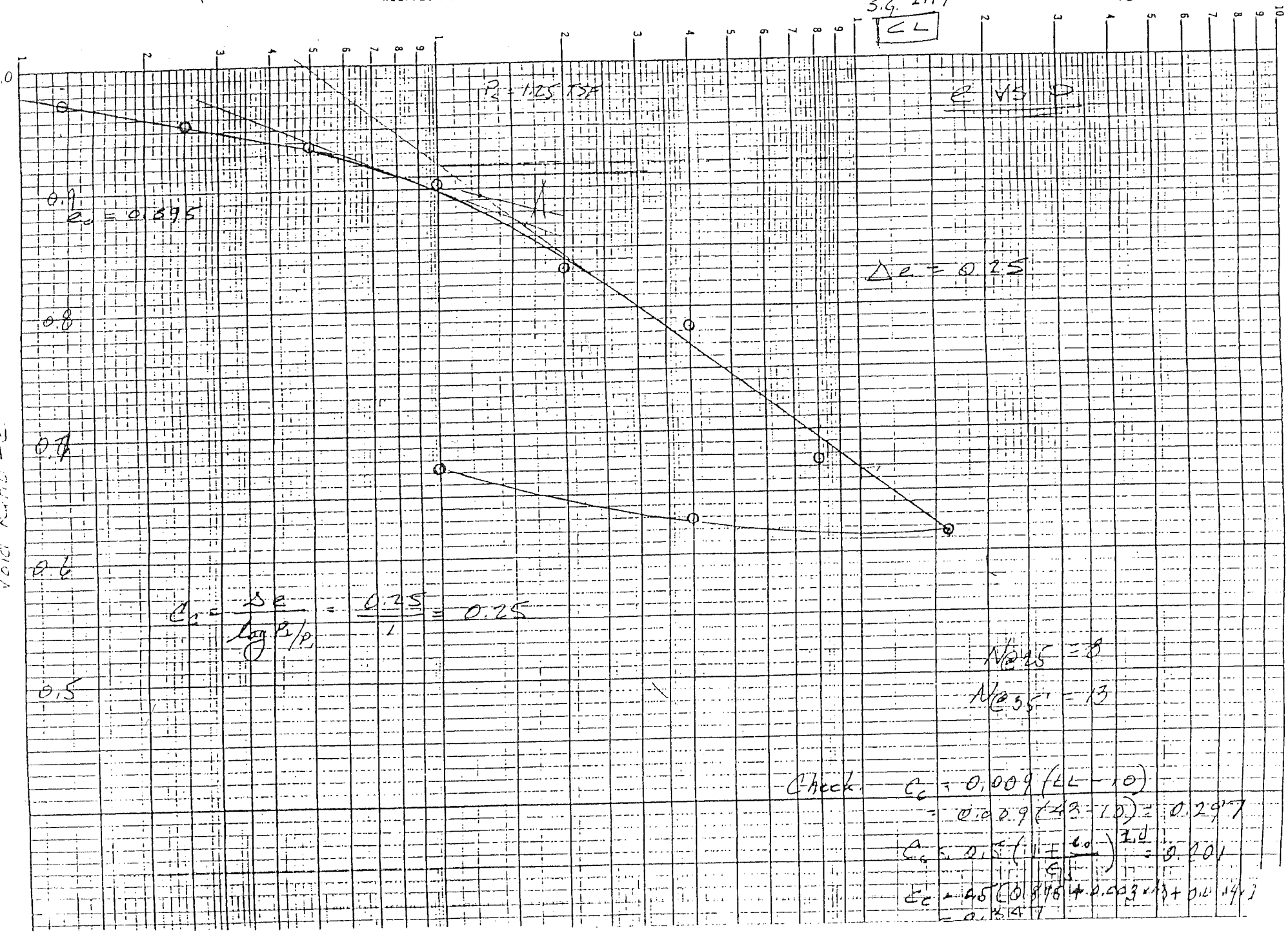
GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

K+E SEMI-LOGARITHMIC 46 5493
3 CYCLES X 70 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

Jufine - 92 LL
PL 25
PI 18
S.G. 2.77

B-5 1' 2'
Lt. red. gy. lean CLAY

CL



$$C_c = \frac{\Delta e}{\log P_2/P_1} = \frac{0.25}{1} = 0.25$$

N@2.5 = 8

N@3.5 = 13

Check $C_c = 0.009(LL - 10)$

$= 0.009(43 - 10) = 0.297$

$C_c = 0.5\left(\frac{e_o}{G_s}\right) \frac{L.L}{} = 0.201$

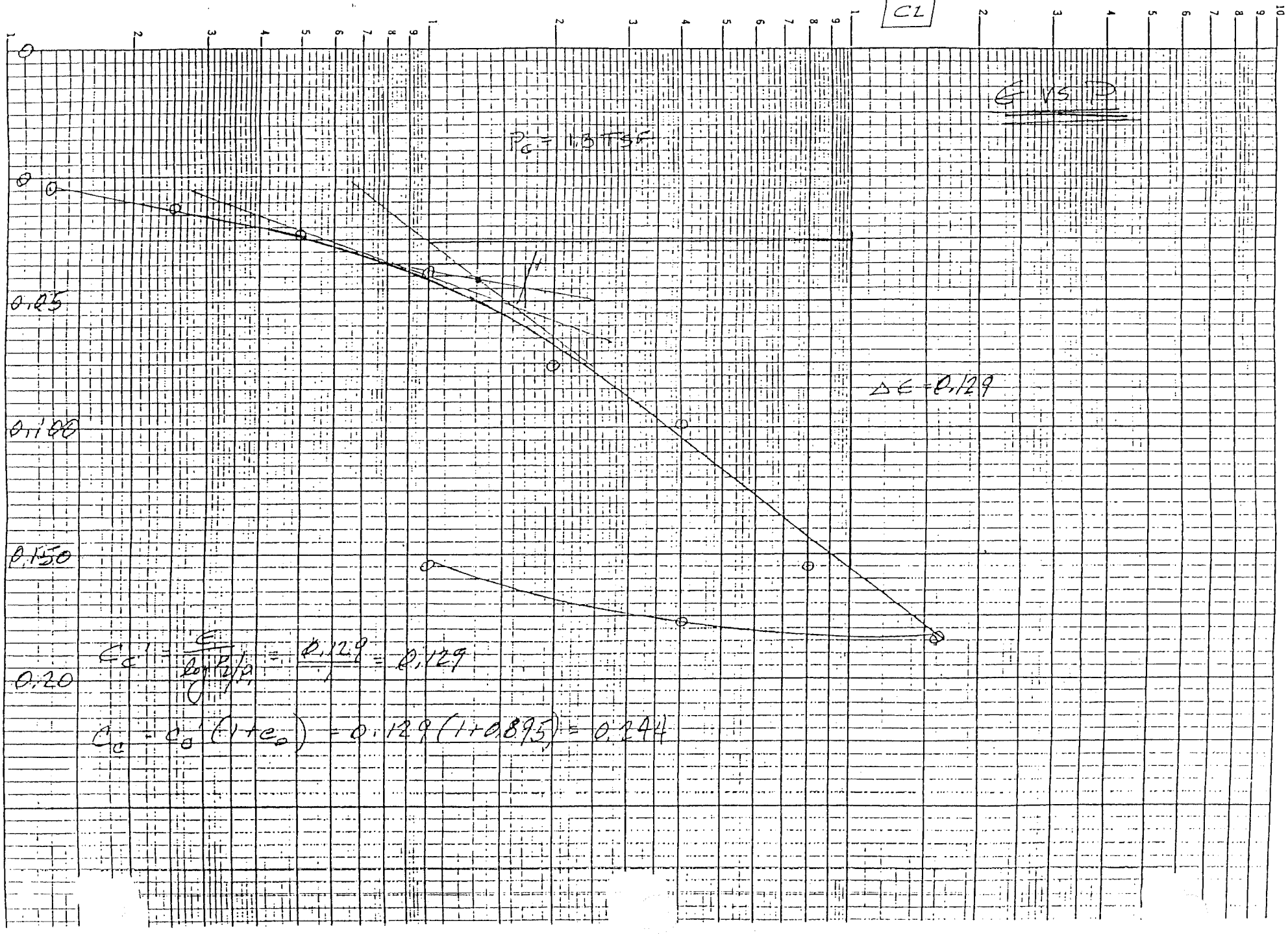
$C_c = 0.5[0.848 + 0.003 \times 13 + 0.014 \times 43]$

$= 0.347$

K+E SEMI-LOGARITHMIC 46 5493
3 CYCLES X 70 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

PL 5
PI 16
SG 2.77
CL

3-5 30'-32'
Lt. red gy. lean CLAY



$C_c' = \frac{\varepsilon}{\log P_2/P_1} = \frac{0.129}{1} = 0.129$

$C_c = C_c'(1+e_0) = 0.129(1+0.895) = 0.244$

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-5
PROJECT NO.:	933-6141	DEPTH:	35'-37'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

PLASTIC LIMIT

		CP2	CH-10
Tare Number:		32.52	33.84
Weight of Wet Soil & Tare	(W1)	30.25	31.32
Weight of Dry Soil & Tare	(W2)	21.71	21.63
Weight of Tare	(W3)	2.27	2.52
Weight of Water	(W4=W1-W2)	8.54	9.69
Weight of Dry Soil	(W5=W2-W3)	26.6%	26.0%
Water Content (%)	(W4/W5)*100		

NATURAL MOISTURE

13B
51.24
43.22
19.70
8.02
23.52
34.1%

LIQUID LIMIT

		20	30
Number of Blows		24B	AB-1
Tare Number:		27.56	30.80
Weight of Wet Soil & Tare	(W6)	24.78	27.68
Weight of Dry Soil & Tare	(W7)	19.81	22.06
Weight of Tare	(W8)	2.78	3.12
Weight of Water	(W9=W6-W7)	4.97	5.62
Weight of Dry Soil	(W10=W7-W8)	55.9%	55.5%
Water Content (%)	(W9/W10)*100	54.45	56.75
LL = Wn (N / 25)^.121			

AVERAGE: 55.60

LIQUID LIMIT	56
PLASTIC LIMIT	26
PLASTICITY INDEX	29
MOISTURE CONTENT	34.1%
LIQUIDITY INDEX	0.27

NOTE: USCS Classification based upon material passing #40 sieve only.

Description: Red

USCS: CH

DATE:	6/14/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES I
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
MECHANICAL SIEVE
ASTM C136, D421, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.	B-5
PROJECT NUMBER:	933-6141	Sample ID:	JAR

WATER CONTENT (Delivered Moisture)

tare no.		BL-10
wt soil & tare,moist	(w1)	459.81
wt soil & tare,dry	(w2)	418.33
wt tare	(w3)	191.87
wt moisture	(w4=w1-w2)	41.48
wt dry soil	(w5=w2-w3)	226.46
% water	(w4/w5)*100	18.32%

200 WASH (Percent Fines)

tare no.		BL-10
wt soil & tare,before wash	(w6)	418.3
wt soil & tare,after wash	(w7)	344.9
wt tare	(w8)	191.9
wt fines lost	(w9=w6-w7)	77.46
wt dry soil	(w10=w6-w8)	226.46
% lost	(w9/w10)*100	34.29%

USCS SIEVE	wt ret	% ret ((wt ret/w10)*100)	% PASS (100 - %ret)	SIEVE
3.000		0.0%	100.0%	3.000
2.500		0.0%	100.0%	2.500
2.000		0.0%	100.0%	2.000
1.500		0.0%	100.0%	1.500
1.000		0.0%	100.0%	1.000
0.750		0.0%	100.0%	0.750
0.375		0.0%	100.0%	0.375
#4		0.0%	100.0%	#4
#8	0.28	0.1%	99.9%	#8
#10	0.37	0.2%	99.8%	#10

SPLITTING INFORMATION

Wt in pan, from coarse sieve stack	148.63
Wt split for fine stack sieve	66.20
Percent of original wt in pan	44.54%

#16	0.23	0.4%	99.6%	#16
#30	2.79	2.9%	97.1%	#30
#50	14.68	14.7%	85.3%	#50
#100	40.35	40.2%	59.8%	#100
#200	66.20	65.8%	34.2%	#200
PAN	66.20	65.8%	34.2%	PAN

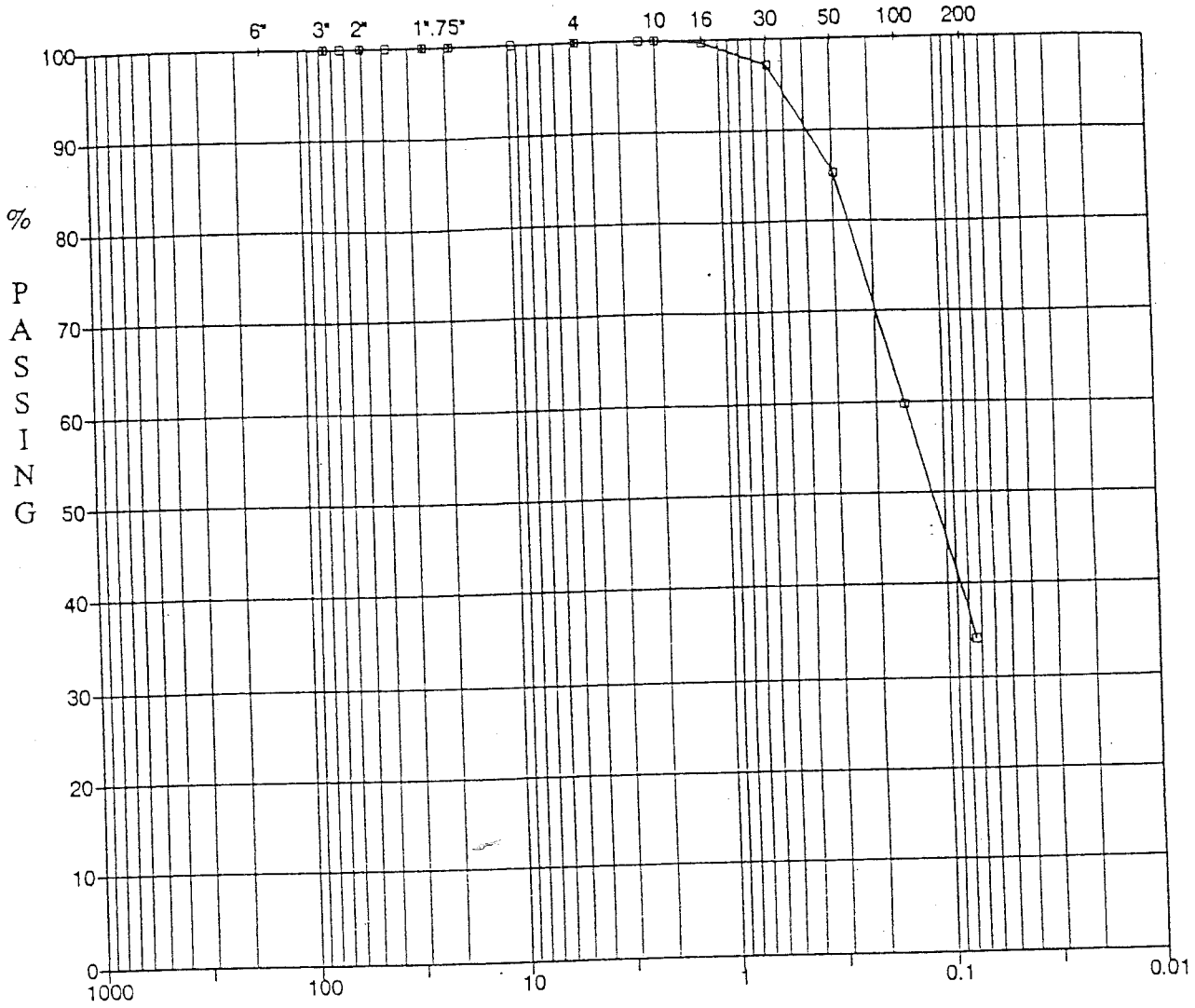
Sample	B-5 65'-67' E94CJAS002	Wet Color:	Light reddish gray

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

TECH	TK	CHECKED	RDD
DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND C-33

US STANDARD SIEVE OPENING SIZES



SAMPLE ID	W%	DATE TESTE	6/14/94	CHECKED:	RDD
B-5	18.32	TECHNICIAN:	TK	REVIEWED:	RMW
65'-67'	E94CJAS002				

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT.LAUREL,NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-6	15'-17'	E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK		

WATER CONTENT (Delivered Moisture)

Tare no.		BM-6
Wt soil & tare,moist	(wm)	420.48
Wt soil & tare,dry	(wd)	370.98
Wt tare	(wt)	193.61
Wt moisture	(wm-wd)	49.50
Wt dry soil	(wd-wt)	177.37
% WATER	(wm/wd)-1	27.91%

% PASSING #10 SIEVE

Total Wt	(wt)	177.37
Wt Split #10	(wt)	177.37
% PASSING #10	(wt/wt)*100	100.0%

USCS	SIEVE	wt ret	% ret (wt/Total wt)*100	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375		0.00%	100.00%	0.375	
coarse sand	#4		0.00%	100.00%	#4	coarse sand
medium sand	#10		0.00%	100.00%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve		100.00	Initial Moist Wt.	69.10
Specific Gravity	(A,B,C,D,E,F)	2.65	Calculated Dry Wt	68.94
ml Dispering Agent Used		125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		20B
Wt soil and tare,moist	(wm)	29.66
Wt soil&tare,dry	(wm)	29.64
Wt tare	(wt)	20.86
Wt moisture lost	(wm-wd)	0.02
Wt dry soil,final	(wd-wt)	8.78
% HYGROSCOPIC MOISTURE	(wm/wd)-1	0.2%

% PASSING 200 SIEVE

Tare no.		P-3
Wt soil and tare,dry (wt,dry)	(wd)	259.72
Wt soil&tare,wash (wt,wash)	(ww)	190.96
Wt tare	(wt)	190.78
Wt fines lost (wt,dry-wt,wash)	(wd-ww)	68.76
Wt dry soil, (wt,dry-wt,tare)	(wd-wt)	68.94
% FINES LOST	(ww/wd)-1	99.7%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING
#10	0.00	0.00	100.00%
#20	0.04	0.04	99.94%
#40	0.15	0.15	99.78%
#60	0.19	0.19	99.72%
#100	0.24	0.24	99.65%
#200	0.37	0.37	99.46%

LL	
PL	
PI	
Gs	

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/13/94	09:00	2.00	67.0	19.00	0.014	5.00
	09:02	4.00	65.0	19.00	0.014	5.00
	09:06	8.00	60.0	19.00	0.014	5.00
	09:13	15.00	57.0	19.00	0.014	5.00
	09:28	30.00	54.0	19.00	0.014	5.00
	09:58	60.00	50.0	18.50	0.014	5.00
	10:58	120.00	44.5	18.50	0.014	5.00
	12:58	240.00	39.5	19.00	0.014	4.50
	16:58	480.00	35.0	19.00	0.014	4.50
06/14/94	08:58	1440.0	28.0	20.00	0.014	3.50

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	0.0%
% C SAND	0.0%
% M SAND	0.2%
% F SAND	0.3%
% FINES	99.5%
% TOTAL	100.00%

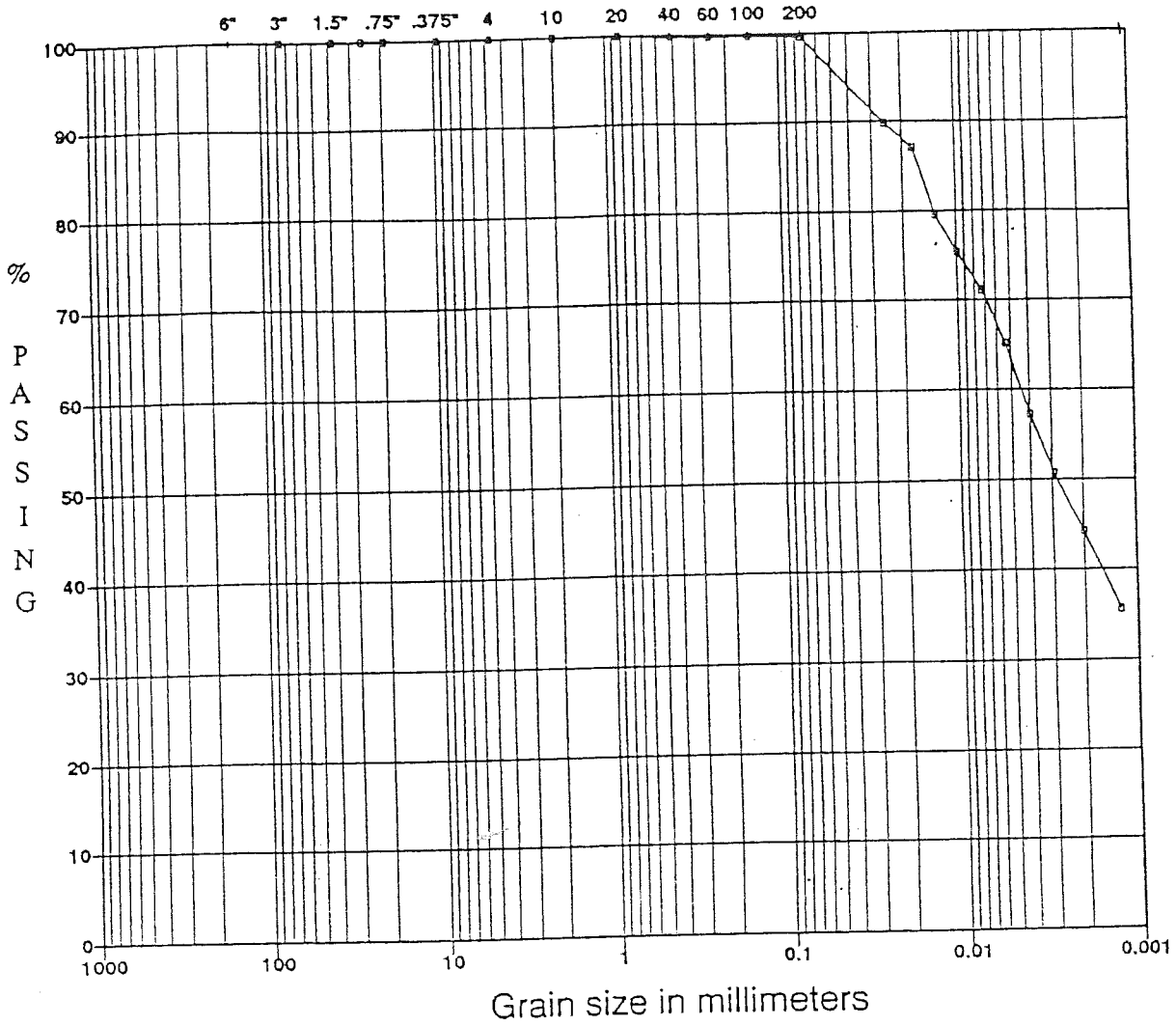
ET (min)	RDNG.C	EFF LTH	K	A	PAR DIA	%FINER
2.00	62.00	6.5	0.014	1.00	0.025	89.9
4.00	60.00	6.5	0.014	1.00	0.018	87.0
8.00	55.00	7.3	0.014	1.00	0.013	79.8
15.00	52.00	7.8	0.014	1.00	0.010	75.4
30.00	49.00	8.3	0.014	1.00	0.007	71.1
60.00	45.00	8.9	0.014	1.00	0.005	65.3
120.00	39.50	9.9	0.014	1.00	0.004	57.3
240.00	35.00	10.6	0.014	1.00	0.003	50.8
480.00	30.50	11.4	0.014	1.00	0.002	44.2
1440.00	24.50	12.4	0.014	1.00	0.001	35.5

WET COLOR: Light reddish gray
DESCRIPTION: FINES, trace sand

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-6	27.9					Light reddish gray
15'-17'	Date Tested:	6/14/94				FINES,
E94CJAS002						trace sand
TECHNICIAN:	TK	DATE: 6/18/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-6
PROJECT NO.:	933-6141	DEPTH:	20'-22'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

PLASTIC LIMIT

Tare Number:		34C	I-53
Weight of Wet Soil & Tare	(W1)	30.97	29.71
Weight of Dry Soil & Tare	(W2)	29.10	28.15
Weight of Tare	(W3)	20.03	20.73
Weight of Water	(W4=W1-W2)	1.87	1.56
Weight of Dry Soil	(W5=W2-W3)	9.07	7.42
Water Content (%)	(W4/W5)*100	20.6%	21.0%

NATURAL MOISTURE

CH-32
50.67
47.15
31.41
3.52
15.74
22.4%

LIQUID LIMIT

Number of Blows		27	30
Tare Number:		T-30	CH-15
Weight of Wet Soil & Tare	(W6)	30.11	31.23
Weight of Dry Soil & Tare	(W7)	27.01	28.29
Weight of Tare	(W8)	20.06	21.82
Weight of Water	(W9=W6-W7)	3.10	2.94
Weight of Dry Soil	(W10=W7-W8)	6.95	6.47
Water Content (%)	(W9/W10)*100	44.6%	45.4%
LL = Wn (N / 25) ^ .121		45.02	46.45

AVERAGE: 45.74

LIQUID LIMIT	46
PLASTIC LIMIT	21
PLASTICITY INDEX	25
MOISTURE CONTENT	22.4%
LIQUIDITY INDEX	0.06

NOTE: USCS Classification based upon material passing #40 sieve only.

Description: Light reddish yellow

USCS: CL

DATE:	6/14/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES IN
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-6 22'-24' E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK

WATER CONTENT (Delivered Moisture)

Tare no.		H-5
Wt soil & tare,moist	(wt)	573.31
Wt soil & tare,dry	(wt)	499.47
Wt tare	(wt)	191.65
Wt moisture	(wt=wt1-wt2)	73.84
Wt dry soil	(wt=wt2-wt3)	307.82
% WATER	(wt/wt*100)	23.99%

% PASSING #10 SIEVE

Total Wt	(wt)	420.31
Wt Split #10	(wt)	370.84
% PASSING #10	(wt/wt*100)	88.2%

USCS

	SIEVE	wt ret	% ret ((wt/total wt)*100)	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000	41.42	9.85%	90.15%	1.000	
fine gravel	0.750	41.42	9.85%	90.15%	0.750	fine gravel
	0.375	45.72	10.88%	89.12%	0.375	
coarse sand	#4	48.23	11.47%	88.53%	#4	coarse sand
medium sand	#10	49.52	11.78%	88.22%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve	88.22	Initial Moist Wt.	69.17
Specific Gravity	2.78	Calculated Dry Wt	68.44
ml Dispering Agent Used	125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		T-30
Wt soil and tare,moist	(wt)	33.40
Wt soil&tare,dry	(wt)	33.26
Wt tare	(wt)	20.07
Wt moisture lost	(wt1-wt2,wt)	0.14
Wt dry soil,final	(wt1-wt3,wt)	13.19
% HYGROSCOPIC MOISTURE	(wt1/wt2)*100	1.1%

% PASSING 200 SIEVE

Tare no.		M-2
Wt soil and tare,dry (wt,dry)	(wt)	219.51
Wt soil&tare,wash (wt,wash)	(wt)	165.09
Wt tare	(wt)	151.07
Wt fines lost (wt,dry-wt,wash)	(wt1-wt2,wt)	54.42
Wt dry soil, (wt,dry-wt,tare)	(wt1-wt3,wt)	68.44
% FINES LOST	(wt/wt)*100	79.5%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING
#10	0.00	9.14	88.22%
#20	0.41	9.55	87.69%
#40	5.15	14.29	81.58%
#60	11.12	20.26	73.89%
#100	12.87	22.01	71.63%
#200	14.00	23.14	70.17%

LL	42
PL	23
PI	19
Gs	2.78

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/20/94	08:45	2.00	53.0	22.50	0.013	5.00
	08:47	4.00	51.0	22.50	0.013	5.00
	08:51	8.00	50.0	22.50	0.013	5.00
	08:58	15.00	47.5	22.50	0.013	5.00
	09:13	30.00	45.0	22.50	0.013	5.00
	09:43	60.00	42.5	22.50	0.013	5.00
	10:43	120.00	40.0	22.50	0.013	5.00
	12:43	240.00	37.0	22.50	0.013	4.50
	16:43	480.00	34.0	22.50	0.013	5.00
06/21/94	08:43	1440.0	30.0	22.50	0.013	5.50

Grain Size Percentages

% C GRVL	9.9%
% F GRVL	1.6%
% C SAND	0.3%
% M SAND	6.6%
% F SAND	11.4%
% FINES	70.2%
% TOTAL	100.00%

ET (min)	RDNG,C	EFF LTH	K	A	PAR DIA	%FINER
2.00	48.00	8.4	0.013	0.98	0.026	60.6
4.00	46.00	8.8	0.013	0.98	0.019	58.1
8.00	45.00	8.9	0.013	0.98	0.013	56.8
15.00	42.50	9.4	0.013	0.98	0.010	53.7
30.00	40.00	9.7	0.013	0.98	0.007	50.5
60.00	37.50	10.2	0.013	0.98	0.005	47.4
120.00	35.00	10.6	0.013	0.98	0.004	44.2
240.00	32.50	11.1	0.013	0.98	0.003	41.1
480.00	29.00	11.5	0.013	0.98	0.002	36.6
1440.00	24.50	12.4	0.013	0.98	0.001	30.9

WET COLOR: Light reddish gray
DESCRIPTION: Lean clay with sand

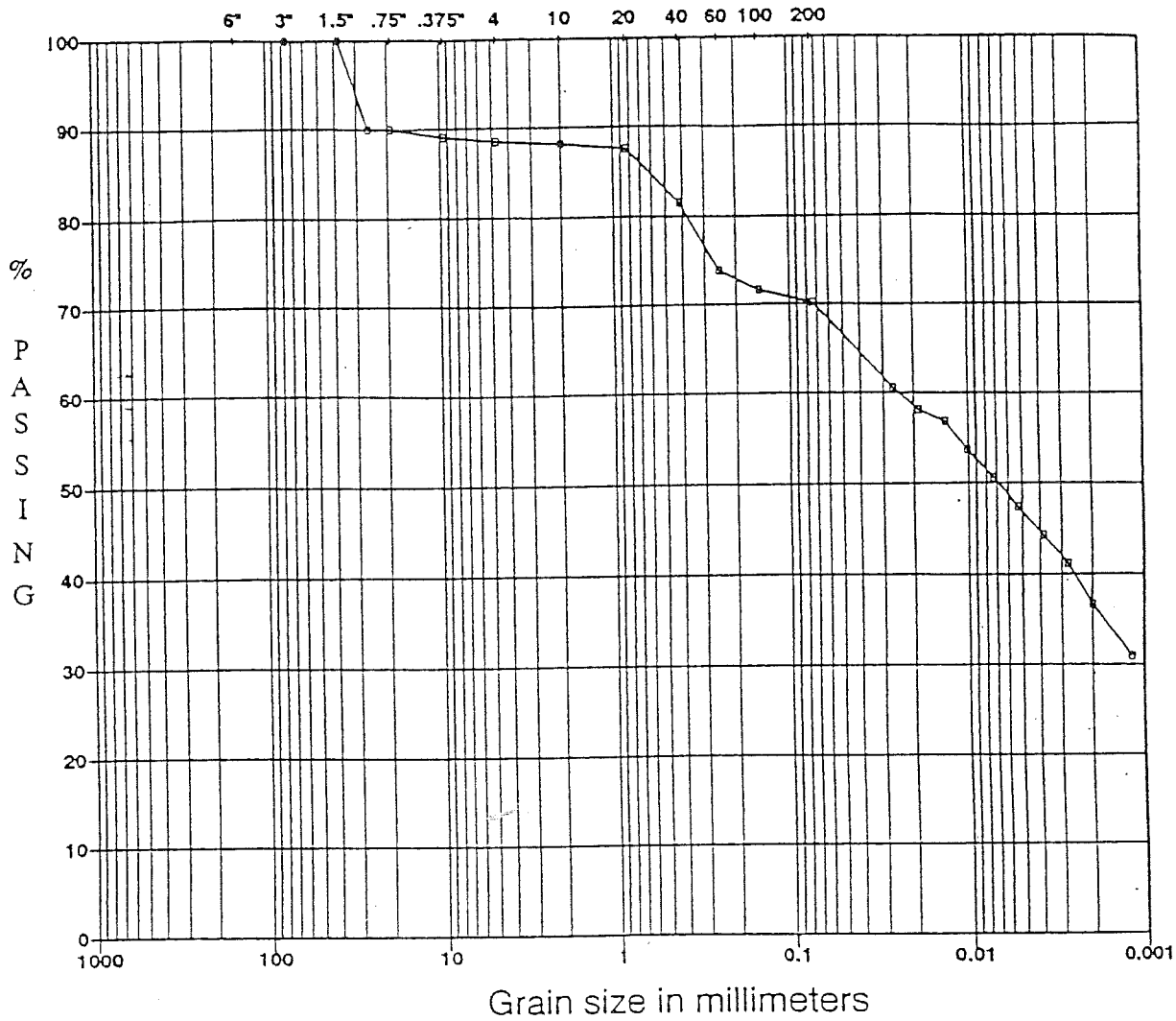
USCS: CL

GOLDER ASSOCIATES INC
MT. LAUREL, NJ

TECH	TK	CHECKED	RDD
DATE	6/22/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-6	24.0	42	23	19	2.78	Light reddish gray
22'-24'	Date Tested:	6/22/94				Lean clay
E94CJAS002	USCS:	CL				with sand
TECHNICIAN:	TK	DATE: 6/23/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-6
PROJECT NO.:	933-6141	DEPTH:	22'-24'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

PLASTIC LIMIT

Tare Number:		21B	5B
Weight of Wet Soil & Tare	(W1)	28.10	33.17
Weight of Dry Soil & Tare	(W2)	26.70	30.93
Weight of Tare	(W3)	20.61	20.83
Weight of Water	(W4=W1-W2)	1.40	2.24
Weight of Dry Soil	(W5=W2-W3)	6.09	10.10
Water Content (%)	(W4/W5)*100	23.0%	22.2%

NATURAL MOISTURE

H-5
573.31
499.47
191.65
73.84
307.82
24.0%

LIQUID LIMIT

Number of Blows		30	30
Tare Number:		17B	46
Weight of Wet Soil & Tare	(W6)	32.78	26.61
Weight of Dry Soil & Tare	(W7)	29.12	24.88
Weight of Tare	(W8)	20.40	20.51
Weight of Water	(W9=W6-W7)	3.66	1.73
Weight of Dry Soil	(W10=W7-W8)	8.72	4.37
Water Content (%)	(W9/W10)*100	42.0%	39.6%
LL = Wn (N / 25) ^ .121		42.91	40.47

AVERAGE: 41.69

LIQUID LIMIT	42
PLASTIC LIMIT	23
PLASTICITY INDEX	19
MOISTURE CONTENT	24.0%
LIQUIDITY INDEX	0.07

Description: Light reddish gray Lean clay with sand

USCS: CL

DATE:	6/21/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES I
MT. LAUREL, NJ

ONE-DIMENSIONAL CONSOLIDATION
ASTM D 2435

PROJECT NAME:	JCA/LAB GEOTECH/NJ	DATE RECEIVED:	6/6/94	LIQUID LIMIT:	42
PROJECT NO.:	933-6141	DESCRIPTION:	Light reddish gray lean clay with sand	PLASTIC LIMIT:	23
SAMPLE NO.:	B-6	CLASSIFICATION:	CL	PLASTICITY INDEX:	19
SAMPLE DEPTH:	22'-24'	CONSOLIDOMETER No.:	#1	SPECIFIC GRAVITY:	2.78

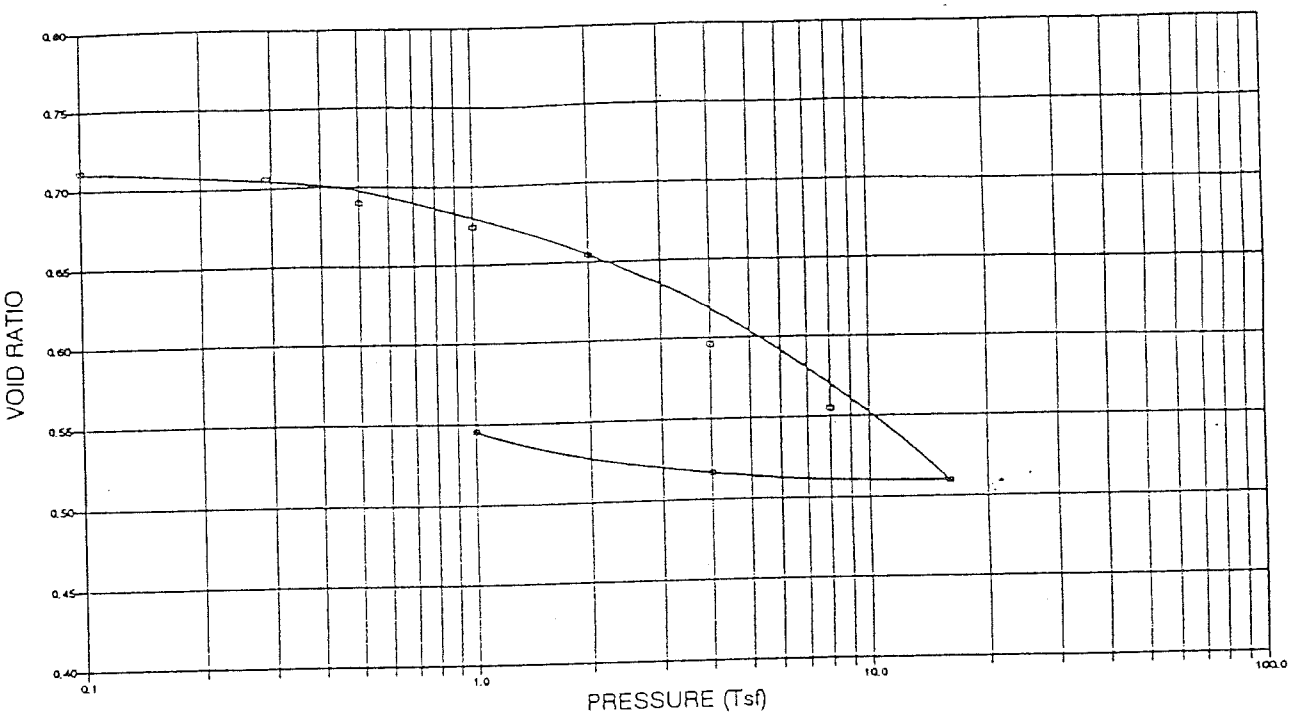
		Specimen Trimmings							INITIAL	FINAL
SAMPLE TYPE:	SHELBY TUBE	1	2	3	After Test	Diameter (in)	2.504			
Tare No.		E010	E033	E028	R-33	Height of specimen (in)	0.800	Total Heights(in)	0.800	0.723
Weight in grams	Tare plus wet soil	119.28	93.39	83.45	489.81	Area of specimen (in^2)	4.924	Height of solids(in)	0.467	0.467
	Tare plus dry soil	104.00	83.62	74.71	469.18	Volume of specimen (in^3)	3.940	Height of voids(in)	0.333	0.255
	Water	15.28	9.77	8.74	20.63	Water Content (Avg) from Trimmings	20.60%	Height of water(in)	0.333	0.256
	Tare	34.47	32.29	32.69	358.92	Specimen Wt (wet,g)	131.67	Void ratio	0.711	0.546
	Dry soil	69.53	51.33	42.02	110.26	Specimen Wt (dry,g)	104.82	Degree of saturation	100.09%	100.20%
Water Content		21.98%	19.03%	20.80%	18.71%	Water Wt (g)	26.85	Dry unit weight (pcf)	101.36	118.02
						Unit weight of water (pcf)	62.40	Wet unit weight (pcf)	127.32	140.11

PRESSURE (tsf)	R90 DIAL READING	DIAL CHANGE (in)	FITTING TIME (sec) 90	SPECIMEN HEIGHT (in)	HEIGHT OF VOIDS Hv	VOID RATIO e	CHANGE IN HEIGHT (accum)	STRAIN %	LENGTH OF DRAINAGE PATH (DOUBLE DRAINAGE) H (in)	H^2 (cm^2)	COEFFICIENT OF CONSOLIDATION Cv(cm^2/sec)	(ft^2/day)
0.000	0.1207	0.0000	0	0.8000	0.3326	0.7114	0.0000	0.0000	0.0000	0.0000	0.0E+00	0.0E+00
0.290	0.1232	0.0025	335	0.7975	0.3301	0.7061	0.0025	0.0031	0.3390	0.7412	1.9E-03	1.7E-01
0.500	0.1305	0.0073	240	0.7902	0.3228	0.6905	0.0098	0.0123	0.3353	0.7251	2.6E-03	2.4E-01
1.000	0.1380	0.0075	268	0.7827	0.3153	0.6744	0.0173	0.0216	0.3318	0.7103	2.2E-03	2.1E-01
2.000	0.1477	0.0097	120	0.7730	0.3056	0.6537	0.0270	0.0338	0.3271	0.6903	4.9E-03	4.5E-01
4.000	0.1746	0.0269	900	0.7461	0.2787	0.5961	0.0539	0.0674	0.3145	0.6381	6.0E-04	5.6E-02
8.000	0.1939	0.0193	699	0.7268	0.2594	0.5548	0.0732	0.0915	0.3061	0.6043	7.3E-04	6.8E-02
16.000	0.2150	0.0211	436	0.7057	0.2383	0.5097	0.0943	0.1179	0.2957	0.5641	1.1E-03	1.0E-01
4.000	0.2118	-0.0032	455	0.7089	0.2415	0.5165	0.0911	0.1139	0.2928	0.5529	1.0E-03	9.6E-02
1.000	0.1980	-0.0138	540	0.7227	0.2553	0.5461	0.0773	0.0966	0.2987	0.5754	9.0E-04	8.4E-02

GOLDER ASSOCIATES INC.
MT.LAUREL,NJ

TECH:	MLM
DATE:	6/20/94
CHECKED:	JMP
REVIEWED:	RMW

ONE-DIMENSIONAL CONSOLIDATION
ASTM D 2435



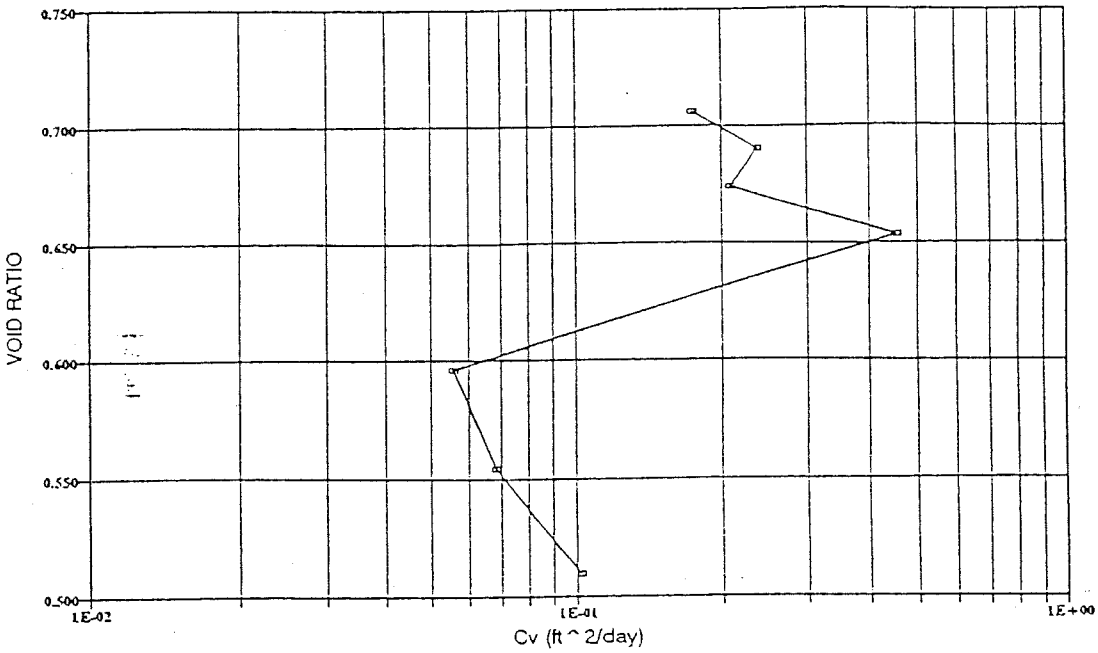
			INITIAL	FINAL
Diameter (in)	2.50			
Height of specimen (in)	0.80	Total Heights(in)	0.80	0.72
Area of specimen (in ^ 2)	4.92	Height of solids(in)	0.467	0.467
Volume of specimen (in ^ 3)	3.94	Height of voids(in)	0.333	0.255
Water Content (Avg) from Trimmings	20.60%	Height of water(in)	0.333	0.256
Specimen Wt (wet,g)	131.67	Void ratio	0.711	0.546
Specimen Wt (dry,g)	104.82	Degree of saturation	100.09%	100.20%
Water Wt (g)	26.85	Dry unit weight (pcf)	101.36	118.02
Unit weight of water (pcf)	62.40	Wet unit weight (pcf)	127.32	140.11

PARAMETERS	
LIQUID LIMIT:	42
PLASTIC LIMIT:	23
PLASTICITY INDEX:	19
SPECIFIC GRAVITY:	2.78
USCS CLASSIFICATION:	CL
DESCRIPTION:	Light reddish gray Lean clay

PROJECT NAME:	JCA/LAB GEOTECH/NJ	SAMPLE DEPTH:	22'-24'
PROJECT NO.:	933-6141	DATE RECEIVED:	6/6/94
SAMPLE NO.:	B-6	CONSOLIDOMETER No.:	#1

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

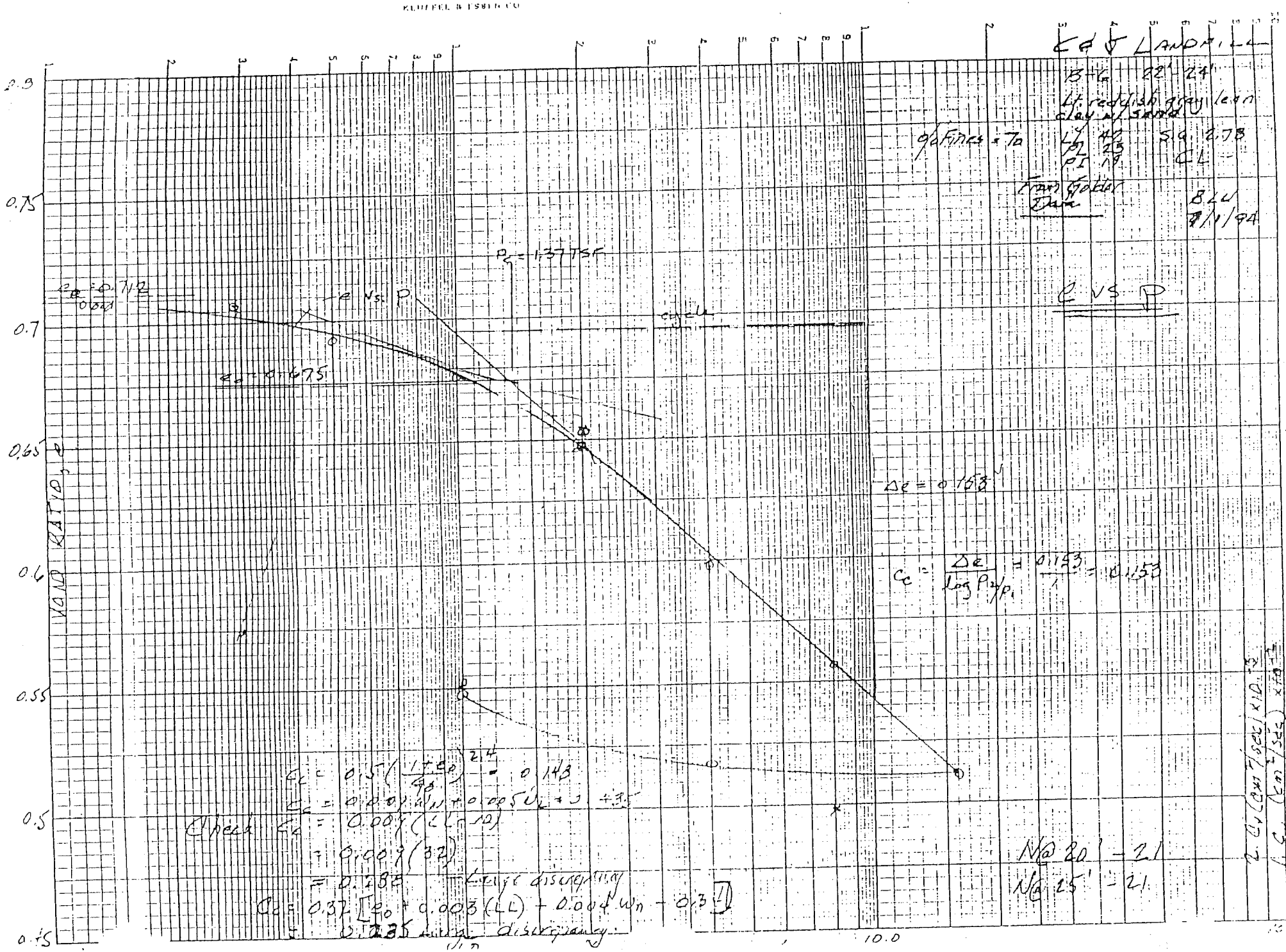
ONE-DIMENSIONAL CONSOLIDATION
ASTM D 2435

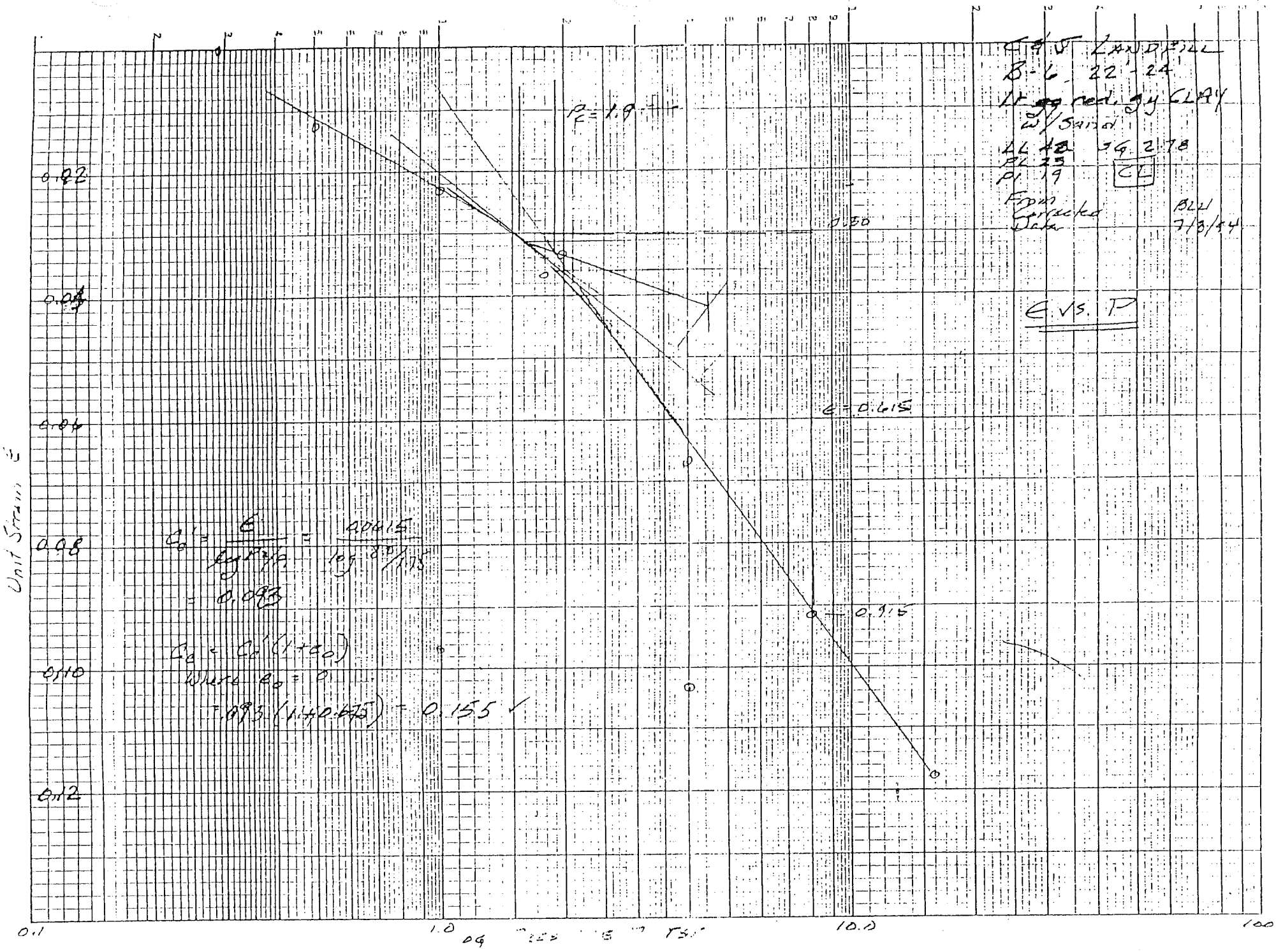


PRESSURE (tsf)	COEFFICIENT OF CONSOLIDATION	
	Cv(cm ^ 2/sec)	(ft ^ 2/day)
0.00	0.00E+00	0.00E+00
0.29	1.87E-03	1.74E-01
0.50	2.56E-03	2.38E-01
1.00	2.25E-03	2.09E-01
2.00	4.88E-03	4.53E-01
4.00	6.01E-04	5.59E-02
8.00	7.33E-04	6.82E-02
16.00	1.10E-03	1.02E-01
4.00	1.03E-03	9.58E-02
1.00	9.04E-04	8.40E-02

PARAMETERS	
LIQUID LIMIT:	42
PLASTIC LIMIT:	23
PLASTICITY INDEX:	19
SPECIFIC GRAVITY:	2.78
USCS CLASSIFICATION:	CL
DESCRIPTION:	Light reddish gray Lean clay
SAMPLE DEPTH:	22'-24'
DATE RECEIVED:	6/6/94
CONSOLIDOMETER No.:	#1
PROJECT NAME:	JCA/LAB GEOTECH/NJ
PROJECT NO.:	933-6141
SAMPLE NO.:	B-6

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ


KEUFFEL & ESSER CO.
VOID RATIO, e
e vs P
P_c = 1.37 TSF
e_o = 0.712
e_c = 0.675
Δe = 0.158
$C_c = \frac{\Delta e}{\log P_2/P_1} = \frac{0.153}{1} = 0.153$
$C_c = 0.5\left(\frac{1+e_o}{G_s}\right) = 0.143$
$C_c = 0.009(LL - 10)$
$= 0.009(32)$
$= 0.288$
$C_c = 0.37 e_o + 0.003(LL) + 0.004 w_n - 0.3$
$= 0.235$
Clyde Landfill
B-6 22'-24'
Lt. reddish gray lean clay w/ sand
Gs Fines = 70
LL 42
PL 25
PI 17
Sig. 2.78
CL
From Gator Zone
8.4.4
8/1/94
N @ 20' = 21
N @ 25' = 21


Unit Strain ε
0.02
0.04
0.06
0.08
0.10
0.12
0.1
1.0
10.0
100.0
$P_c = 1.9$
0.30
$\epsilon = 0.615$
0.915
$\epsilon_a' = \frac{\epsilon}{\log P_c/P_a} = \frac{0.0615}{\log 8.0/1.75}$
$= 0.093$
$\epsilon_a = \epsilon_a'(1+e_0)$
Where $e_0 = 0$
$= .093(1.40+.615) = 0.155$ ✓
ϵ vs. P
CL
Form Extracted Data
BLU
7/3/54

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-6
PROJECT NO.:	933-6141	DEPTH:	30'-32'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

PLASTIC LIMIT

Tare Number:		29C	27C
Weight of Wet Soil & Tare	(W1)	32.75	30.52
Weight of Dry Soil & Tare	(W2)	30.19	28.56
Weight of Tare	(W3)	19.96	20.67
Weight of Water	(W4=W1-W2)	2.56	1.96
Weight of Dry Soil	(W5=W2-W3)	10.23	7.89
Water Content (%)	(W4/W5)*100	25.0%	24.8%

NATURAL MOISTURE

CH-31
58.89
52.66
31.74
6.23
20.92
29.8%

LIQUID LIMIT

Number of Blows		25	30
Tare Number:		M-3	49
Weight of Wet Soil & Tare	(W6)	31.39	27.68
Weight of Dry Soil & Tare	(W7)	27.93	25.43
Weight of Tare	(W8)	21.60	21.12
Weight of Water	(W9=W6-W7)	3.46	2.25
Weight of Dry Soil	(W10=W7-W8)	6.33	4.31
Water Content (%)	(W9/W10)*100	54.7%	52.2%
LL = Wn (N / 25)^.121		54.66	53.37

AVERAGE: 54.01

LIQUID LIMIT	54
PLASTIC LIMIT	25
PLASTICITY INDEX	29
MOISTURE CONTENT	29.8%
LIQUIDITY INDEX	0.17

NOTE: USCS Classification based upon material passing #40 sieve only.

Description: Red

USCS: CH

DATE:	6/15/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES IN
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-6	35'-37'	E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK		

WATER CONTENT (Delivered Moisture)

Tare no.		E-1
Wt soil & tare,moist	(WT1)	394.96
Wt soil & tare,dry	(WT2)	348.54
Wt tare	(WT3)	187.78
Wt moisture	(WT4=WT1-WT2)	46.42
Wt dry soil	(WT5=WT2-WT3)	160.76
% WATER	(WT6/WT5*100)	28.88%

% PASSING #10 SIEVE

Total Wt	(WT6)	160.76
Wt Split #10	(WT7)	160.51
% PASSING #10	(WT7/WT6*100)	99.8%

USCS	SIEVE	wt ret	% ret ((WT Ret/WT6)*100)	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375		0.00%	100.00%	0.375	
coarse sand	#4		0.00%	100.00%	#4	coarse sand
medium sand	#10	0.39	0.24%	99.76%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve		99.76	Initial Moist Wt.	70.35
Specific Gravity	(ASTM D-854)	2.65	Calculated Dry Wt	70.29
ml Dispering Agent Used		125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		29C
Wt soil and tare,moist	(WT1)	32.33
Wt soil&tare,dry	(WT2)	32.32
Wt tare	(WT3)	19.96
Wt moisture lost	(WT4=WT1-WT2)	0.01
Wt dry soil,final	(WT5=WT2-WT3)	12.36
% HYGROSCOPIC MOISTURE	(WT4/WT5)*100	0.1%

% PASSING 200 SIEVE

Tare no.		BL-8
Wt soil and tare,dry (wt,dry)	(WT1)	262.29
Wt soil&tare,wash (wt,wash)	(WT2)	192.51
Wt tare	(WT3)	192.00
Wt fines lost (wt,dry-wt,wash)	(WT4=WT1-WT2)	69.78
Wt dry soil, (wt,dry-wt,tare)	(WT5=WT1-WT3)	70.29
% FINES LOST	(WT4/WT5)*100	99.3%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING
#10	0.00	0.17	99.76%
#20	0.03	0.20	99.71%
#40	0.09	0.26	99.63%
#60	0.24	0.41	99.42%
#100	0.51	0.68	99.03%
#200	0.90	1.07	98.48%

LL	
PL	
PI	
Gs	

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/13/94	10:06	2.00	69.0	18.50	0.014	5.00
	10:08	4.00	68.0	18.50	0.014	5.00
	10:12	8.00	66.0	18.50	0.014	5.00
	10:19	15.00	64.0	18.50	0.014	5.00
	10:34	30.00	63.0	18.50	0.014	5.00
	11:04	60.00	58.0	18.50	0.014	5.00
	12:04	120.00	52.5	19.00	0.014	4.50
	14:04	240.00	48.0	19.00	0.014	5.00
	18:04	480.00	42.5	19.00	0.014	4.50
06/14/94	10:04	1440.0	32.5	20.00	0.014	4.00

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	0.0%
% C SAND	0.2%
% M SAND	0.1%
% F SAND	1.1%
% FINES	98.5%
% TOTAL	100.00%

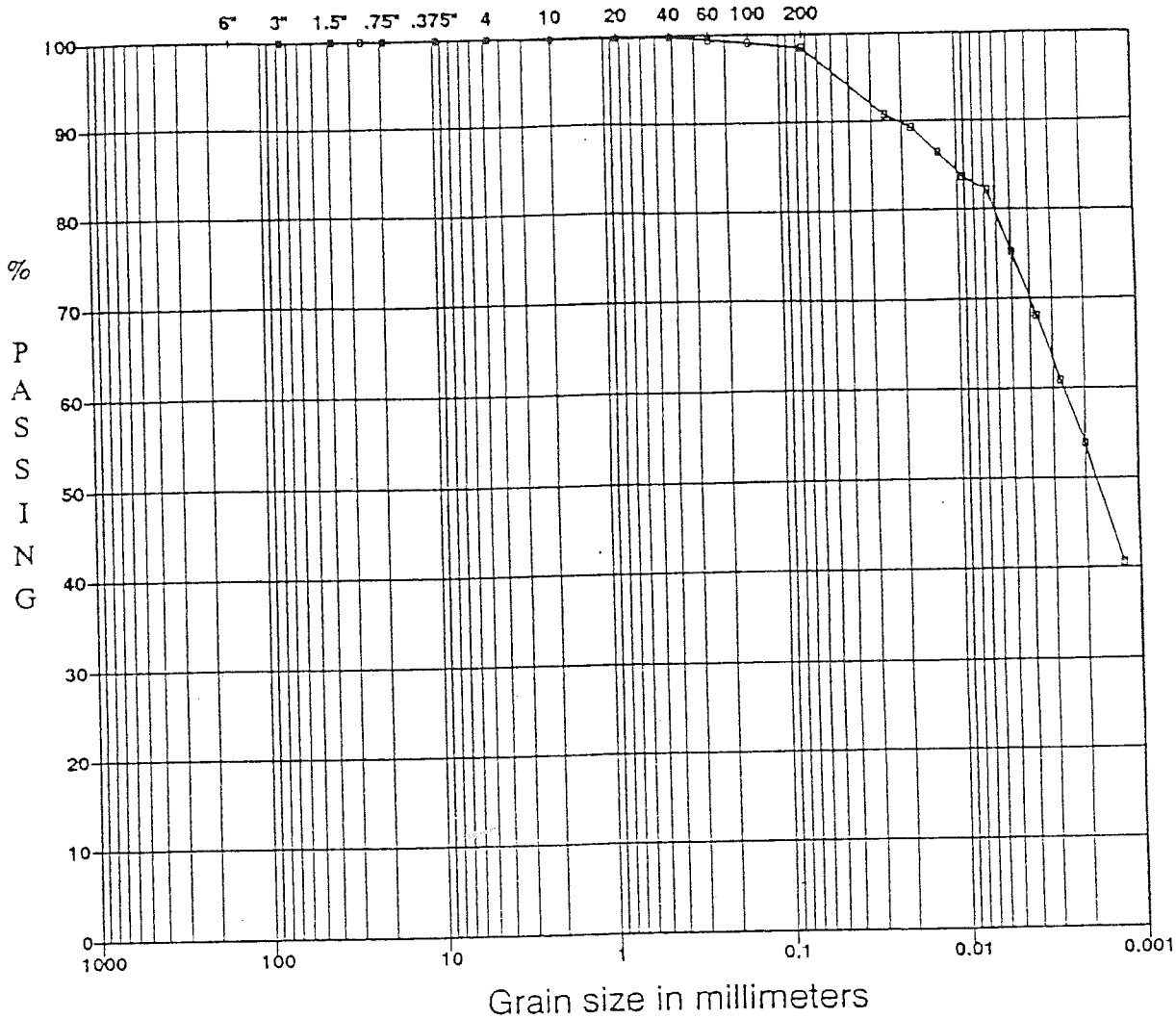
ET (min)	RDNG,C	EFF LTH	K	A	PAR DIA	%FINER
2.00	64.00	6.5	0.014	1.00	0.025	90.8
4.00	63.00	6.5	0.014	1.00	0.018	89.4
8.00	61.00	6.5	0.014	1.00	0.013	86.6
15.00	59.00	6.6	0.014	1.00	0.009	83.7
30.00	58.00	6.8	0.014	1.00	0.007	82.3
60.00	53.00	7.6	0.014	1.00	0.005	75.2
120.00	48.00	8.4	0.014	1.00	0.004	68.1
240.00	43.00	9.2	0.014	1.00	0.003	61.0
480.00	38.00	10.1	0.014	1.00	0.002	53.9
1440.00	28.50	11.7	0.014	1.00	0.001	40.4

WET COLOR: Red
DESCRIPTION: FINES, trace sand

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-6	28.9					Red
35'-37'	Date Tested:	6/14/94				FINES,
E94CJAS002						trace sand
TECHNICIAN:	TK	DATE: 6/18/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-6
PROJECT NO.:	933-6141	DEPTH:	50'-52

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

		PLASTIC LIMIT		NATURAL MOISTURE
Tare Number:		I-43	I-50	19B
Weight of Wet Soil & Tare	(W1)	31.57	30.47	49.55
Weight of Dry Soil & Tare	(W2)	29.45	28.43	43.28
Weight of Tare	(W3)	21.08	20.48	19.78
Weight of Water	(W4=W1-W2)	2.12	2.04	6.27
Weight of Dry Soil	(W5=W2-W3)	8.37	7.95	23.50
Water Content (%)	(W4/W5)*100	25.3%	25.7%	26.7%

		LIQUID LIMIT		
Number of Blows		20	25	
Tare Number:		AB-2	5B	
Weight of Wet Soil & Tare	(W6)	30.29	30.34	
Weight of Dry Soil & Tare	(W7)	26.54	27.05	
Weight of Tare	(W8)	19.73	20.83	
Weight of Water	(W9=W6-W7)	3.75	3.29	
Weight of Dry Soil	(W10=W7-W8)	6.81	6.22	
Water Content (%)	(W9/W10)*100	55.1%	52.9%	AVERAGE
LL = Wn (N / 25)^.121		53.60	52.89	53.25

LIQUID LIMIT	53
PLASTIC LIMIT	25
PLASTICITY INDEX	28
MOISTURE CONTENT	26.7%
LIQUIDITY INDEX	0.04

NOTE: USCS Classification based upon material passing #40 sieve only.

Description: Red

USCS: CH

DATE:	6/14/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES IN
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
MECHANICAL SIEVE
ASTM C136, D421, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.	B-7
PROJECT NUMBER:	933-6141	Sample ID:	JAR

WATER CONTENT (Delivered Moisture)

tare no.		BL-18
wt soil & tare,moist	(w1)	387.11
wt soil & tare,dry	(w2)	347.68
wt tare	(w3)	188.93
wt moisture	(w4=w1-w2)	39.43
wt dry soil	(w5=w2-w3)	158.75
% water	(w4/w5)*100	24.84%

200 WASH (Percent Fines)

tare no.		BL-18
wt soil & tare,before wash	(w6)	347.7
wt soil & tare,after wash	(w7)	316.9
wt tare	(w8)	188.9
wt fines lost	(w9=w6-w7)	30.76
wt dry soil	(w10=w6-w8)	158.75
% lost	(w9/w10)*100	19.38%

USCS SIEVE	wt ret	% ret {(wt ret/w10)*100}	% PASS (100 - %ret)	SIEVE
3.000		0.0%	100.0%	3.000
2.500		0.0%	100.0%	2.500
2.000		0.0%	100.0%	2.000
1.500		0.0%	100.0%	1.500
1.000		0.0%	100.0%	1.000
0.750		0.0%	100.0%	0.750
0.375		0.0%	100.0%	0.375
#4		0.0%	100.0%	#4
#8		0.0%	100.0%	#8
#10		0.0%	100.0%	#10

SPLITTING INFORMATION

Wt in pan, from coarse sieve stack	
Wt split for fine stack sieve	
Percent of original wt in pan	100.00%

#16	0.04	0.0%	100.0%	#16
#30	0.06	0.0%	100.0%	#30
#50	1.33	0.8%	99.2%	#50
#100	72.40	45.6%	54.4%	#100
#200	127.99	80.6%	19.4%	#200
PAN	127.99	80.6%	19.4%	PAN

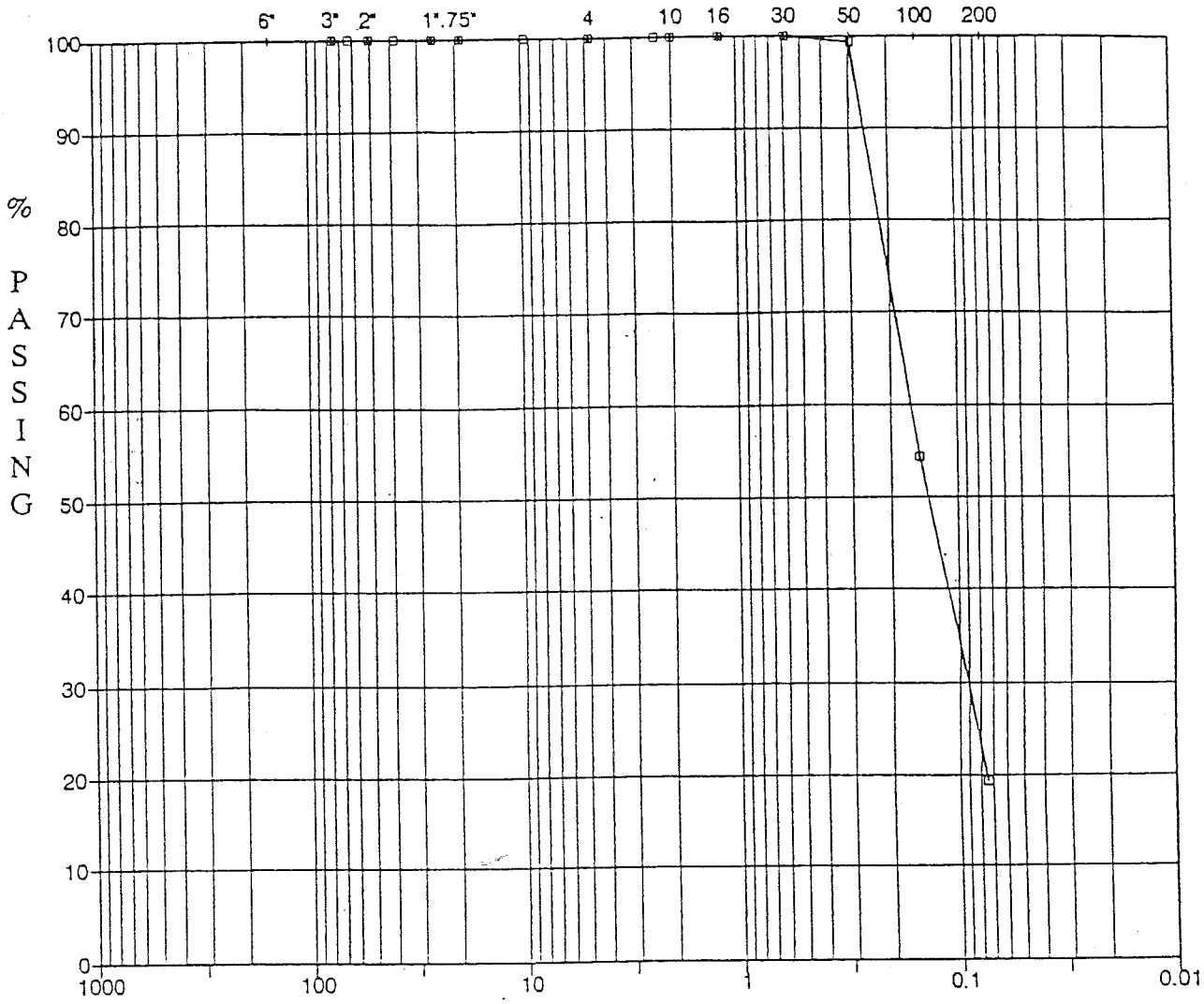
Sample	B-7 10'-12' E94CJAS002	Wet Color:	Very pale brown

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

TECH	TK	CHECKED	RDD
DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND C-33

US STANDARD SIEVE OPENING SIZES



SAMPLE ID	W%	DATE TESTE	6/14/94	CHECKED:	RDD
B-7	24.84	TECHNICIAN:	TK	REVIEWED:	RMW
10'-12'	E94CJAS002				

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT.LAUREL,NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-7
PROJECT NO.:	933-6141	DEPTH:	15'-17'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

PLASTIC LIMIT

		M-7	4B
Tare Number:			
Weight of Wet Soil & Tare	(W1)	32.83	33.49
Weight of Dry Soil & Tare	(W2)	30.67	31.01
Weight of Tare	(W3)	21.69	20.77
Weight of Water	(W4=W1-W2)	2.16	2.48
Weight of Dry Soil	(W5=W2-W3)	8.98	10.24
Water Content (%)	(W4/W5)*100	24.1%	24.2%

NATURAL MOISTURE

N-11
47.89
44.34
31.02
3.55
13.32
26.7%

LIQUID LIMIT

		20	29
Number of Blows			
Tare Number:		N-8	CH-23
Weight of Wet Soil & Tare	(W6)	39.42	39.94
Weight of Dry Soil & Tare	(W7)	36.35	36.78
Weight of Tare	(W8)	31.55	31.51
Weight of Water	(W9=W6-W7)	3.07	3.16
Weight of Dry Soil	(W10=W7-W8)	4.80	5.27
Water Content (%)	(W9/W10)*100	64.0%	60.0%
LL = Wn (N / 25)^.121		62.25	61.05

AVERAGE: 61.65

LIQUID LIMIT	62
PLASTIC LIMIT	24
PLASTICITY INDEX	38
MOISTURE CONTENT	26.7%
LIQUIDITY INDEX	0.07

NOTE: USCS Classification based upon material passing #40 sieve only.

Description: Reddish white

USCS: CH

DATE:	6/14/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES I
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-7 20'-22' E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK

WATER CONTENT (Delivered Moisture)

Tare no.		B-1
Wt soil & tare,moist	(wt1)	436.73
Wt soil & tare,dry	(wt2)	395.31
Wt tare	(wt3)	188.82
Wt moisture	(wt1-wt2)	41.42
Wt dry soil	(wt2-wt3)	206.49
% WATER	(wt4/wt5)*100	20.06%

% PASSING #10 SIEVE

Total Wt	(wt6)	325.55
Wt Split #10	(wt7)	325.17
% PASSING #10	(wt7/wt6)*100	99.9%

USCS	SIEVE	wt ret	% ret (wt8 Sum/wt6)*100	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375		0.00%	100.00%	0.375	
coarse sand	#4		0.00%	100.00%	#4	coarse sand
medium sand	#10	0.59	0.18%	99.82%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve	99.82	Initial Moist Wt.	70.25
Specific Gravity	2.77	Calculated Dry Wt	70.25
ml Dispering Agent Used	125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		N-5
Wt soil and tare,moist	(wt1)	56.88
Wt soil&tare,dry	(wt2)	56.88
Wt tare	(wt3)	31.80
Wt moisture lost	(wt1-wt2)	0.00
Wt dry soil,final	(wt2-wt3)	25.08
% HYGROSCOPIC MOISTURE	(wt1/wt2)*100	0.0%

% PASSING 200 SIEVE

Tare no.		MM-5
Wt soil and tare,dry (wt,dry)	(wt1)	262.49
Wt soil&tare,wash (wt,wash)	(wt2)	199.82
Wt tare	(wt3)	192.24
Wt fines lost (wt,dry-wt,wash)	(wt1-wt2-wt3)	62.67
Wt dry soil, (wt,dry-wt,tare)	(wt1-wt3)	70.25
% FINES LOST	(wt4/wt5)*100	89.2%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING
#10	0.00	0.13	99.82%
#20	0.43	0.56	99.21%
#40	1.15	1.28	98.18%
#60	1.89	2.02	97.13%
#100	3.00	3.13	95.56%
#200	7.58	7.71	89.05%

LL	41
PL	22
PI	19
Gs	2.77

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/22/94	08:04	2.00	52.5	23.00	0.013	4.00
	08:06	4.00	49.0	23.00	0.013	4.00
	08:10	8.00	47.0	23.00	0.013	4.00
	08:17	15.00	44.0	23.00	0.013	4.00
	08:32	30.00	41.0	23.00	0.013	4.00
	09:02	60.00	37.5	23.00	0.013	3.50
	10:02	120.00	34.0	22.50	0.013	3.50
	12:02	240.00	32.0	20.50	0.013	4.00
	16:02	480.00	28.0	19.00	0.013	4.50
06/23/94	08:02	1440.0	23.0	20.00	0.013	4.00

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	0.0%
% C SAND	0.2%
% M SAND	1.6%
% F SAND	9.1%
% FINES	89.9%
% TOTAL	100.00%

ET (min)	RDNG,C	EFF LTH	K	A	PAR DIA	%FINER
2.00	48.50	8.4	0.013	0.98	0.026	67.5
4.00	45.00	8.9	0.013	0.98	0.019	62.7
8.00	43.00	9.2	0.013	0.98	0.014	59.9
15.00	40.00	9.7	0.013	0.98	0.010	55.7
30.00	37.00	10.2	0.013	0.98	0.007	51.5
60.00	34.00	10.7	0.013	0.98	0.005	47.3
120.00	30.50	11.4	0.013	0.98	0.004	42.5
240.00	28.00	11.7	0.013	0.98	0.003	39.0
480.00	23.50	12.5	0.013	0.98	0.002	32.7
1440.00	19.00	13.2	0.013	0.98	0.001	26.5

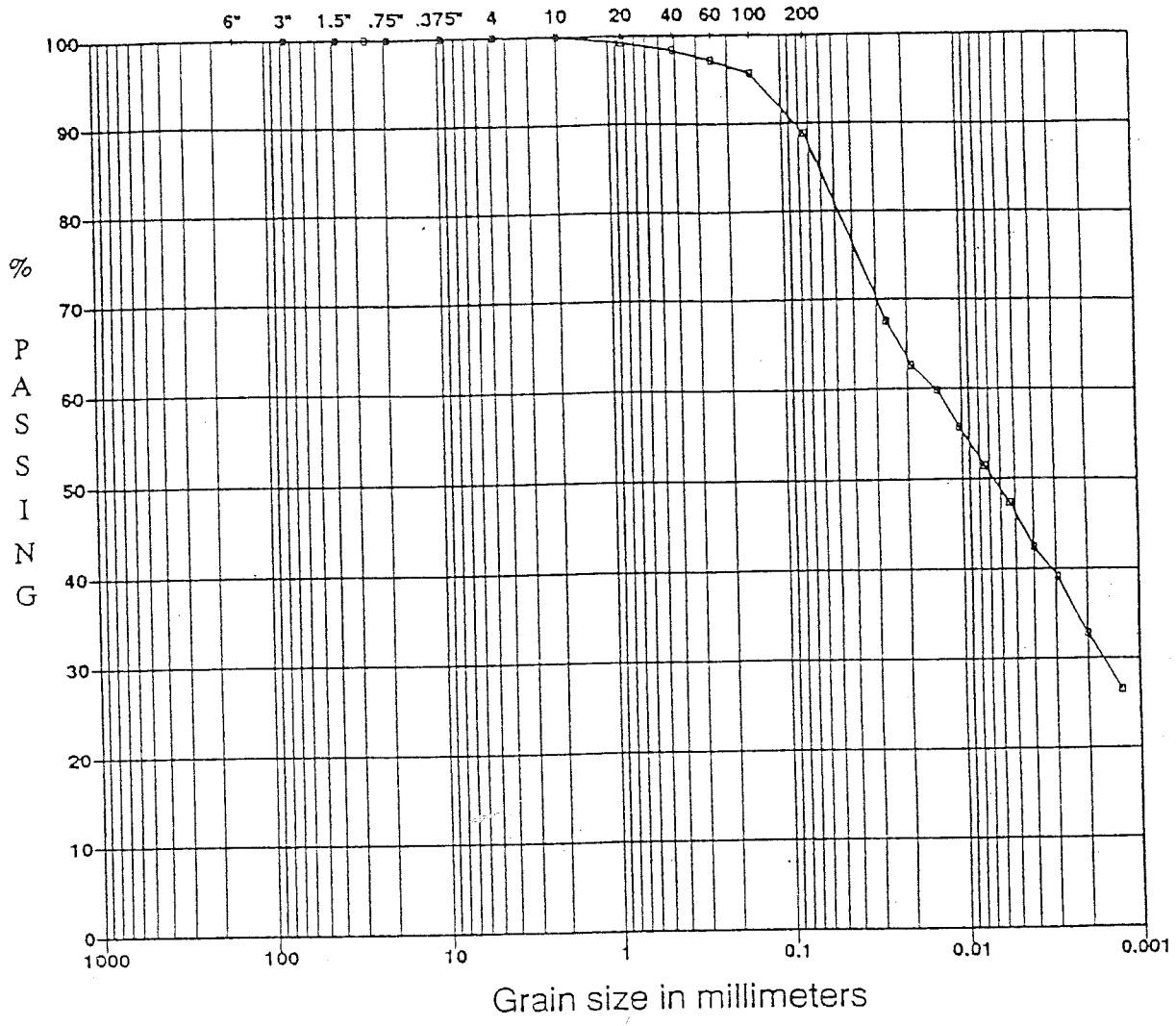
WET COLOR: Red & white
DESCRIPTION: Lean clay

USCS: CL

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/24/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-7	20.1	41	22	19	2.77	Red & white
20'-22'	Date Tested:	6/24/94				Lean clay
E94CJAS002	USCS:	CL				
TECHNICIAN:	TK	DATE: 6/24/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-7
PROJECT NO.:	933-6141	DEPTH:	20'-22'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

		PLASTIC LIMIT		NATURAL MOISTURE
Tare Number:		N-10	CH27	B-1
Weight of Wet Soil & Tare	(W1)	47.42	49.13	436.73
Weight of Dry Soil & Tare	(W2)	44.51	46.01	395.31
Weight of Tare	(W3)	31.07	31.53	188.82
Weight of Water	(W4=W1-W2)	2.91	3.12	41.42
Weight of Dry Soil	(W5=W2-W3)	13.44	14.48	206.49
Water Content (%)	(W4/W5)*100	21.7%	21.5%	20.1%

		LIQUID LIMIT		
Number of Blows		25	26	
Tare Number:		N-7	CH27	
Weight of Wet Soil & Tare	(W6)	43.68	42.14	
Weight of Dry Soil & Tare	(W7)	40.17	38.92	
Weight of Tare	(W8)	31.57	31.06	
Weight of Water	(W9=W6-W7)	3.51	3.22	
Weight of Dry Soil	(W10=W7-W8)	8.60	7.86	
Water Content (%)	(W9/W10)*100	40.8%	41.0%	AVERAGE
LL = Wn (N / 25) ^ .121		40.81	41.16	40.99

LIQUID LIMIT	41
PLASTIC LIMIT	22
PLASTICITY INDEX	19
MOISTURE CONTENT	20.1%
LIQUIDITY INDEX	-0.08

Description: Red & white
Lean clay

USCS: CL

DATE:	6/22/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES IN
MT. LAUREL, NJ

UNCONSOLIDATED/UNDRAINED COMPRESSIVE STRENGTH OF SOILS
ASTM D2850

PROJECT TITLE:	JCA/LAB GEOTECH/NJ
PROJECT NUMBER:	933-6141
REMARKS:	
MACHINE SPEED (in/min):	0.05
STRAIN RATE (%/min):	0.86

SAMPLE ID:	B-7
DEPTH INTERVAL:	20'-21'
CONFINING PRESSURE, (psi):	5

INITIAL SAMPLE DATA	cm	in
HEIGHT (H):	14.821	5.835
DIAMETER (D):	7.183	2.828
H/D RATIO:	2.06	
AREA:	40.52	6.281
VOLUME:	600.61	36.65
WEIGHT (g):	1252.0	
% MOISTURE:	22.81%	
SPECIFIC GRAVITY:	2.77	
MOIST DENSITY (pcf):	130.07	
DRY DENSITY,calc (pcf):	105.91	
VOLUME OF SOLIDS:	368.02	
VOLUME OF VOIDS:	232.59	
SATURATION (%):	99.99%	

FINAL SAMPLE DATA	
DRY DENSITY,calc (pcf):	105.91
VOLUME OF SOLIDS:	368.02
VOLUME OF VOIDS:	232.59
SATURATION (%):	99.99%
WATER CONTENT (% MOISTURE)	
TARE NO.	SM-1
WT SOIL & TARE,MOIST(g)	681.19
WT SOIL & TARE,DRY(g)	591.13
WT TARE(g)	196.38
WT MOISTURE(g)	90.06
WT DRY SOIL(g)	394.75
% MOISTURE	22.81%

TIME (min)	ACCUMULATE DEFLECT (inches)	AXIAL LOAD (lbs)	e % STRAIN (in/in)	CORRCT'D AREA (in ^ 2)	DEVIATOR STRESS (psf)	SIGMA 1 (S1) devstr+cp (psf)	(S1 + S3) / 2 (P)	(S1 - S3) / 2 (Q)
0.0	0.000	0.00	0.00%	6.28	0.00	720.00	720.00	0.00
0.5	0.020	16.00	0.34%	6.30	365.55	1085.55	902.77	182.77
1.0	0.040	21.00	0.69%	6.32	478.13	1198.13	959.07	239.07
1.5	0.060	25.00	1.03%	6.35	567.24	1287.24	1003.62	283.62
2.0	0.080	29.00	1.37%	6.37	655.72	1375.72	1047.86	327.86
2.5	0.120	33.00	2.06%	6.41	740.97	1460.97	1090.49	370.49
3.0	0.140	38.00	2.40%	6.44	850.26	1570.26	1145.13	425.13
3.5	0.180	40.00	3.08%	6.48	888.72	1608.72	1164.36	444.36
4.0	0.200	45.00	3.43%	6.50	996.28	1716.28	1218.14	498.14
4.5	0.220	47.00	3.77%	6.53	1036.86	1756.86	1238.43	518.43
5.0	0.240	48.00	4.11%	6.55	1055.15	1775.15	1247.58	527.58
5.5	0.260	49.00	4.46%	6.57	1073.28	1793.28	1256.64	536.64
6.0	0.280	51.00	4.80%	6.60	1113.08	1833.08	1276.54	556.54
6.5	0.300	53.00	5.14%	6.62	1152.57	1872.57	1296.28	576.28
7.0	0.340	55.00	5.83%	6.67	1187.42	1907.42	1313.71	593.71
7.5	0.360	57.00	6.17%	6.69	1226.12	1946.12	1333.06	613.06
8.0	0.380	58.00	6.51%	6.72	1243.07	1963.07	1341.54	621.54
8.5	0.400	59.00	6.86%	6.74	1259.87	1979.87	1349.93	629.93
9.0	0.440	61.00	7.54%	6.79	1292.99	2012.99	1366.49	646.49
9.5	0.460	62.00	7.88%	6.82	1309.31	2029.31	1374.66	654.66
10.0	0.480	64.00	8.23%	6.84	1346.52	2066.52	1393.26	673.26
11.0	0.540	68.00	9.25%	6.92	1414.65	2134.65	1427.32	707.32
12.0	0.580	72.00	9.94%	6.97	1486.55	2206.55	1463.27	743.27
13.0	0.640	77.00	10.97%	7.06	1571.63	2291.63	1505.81	785.81
14.0	0.680	80.00	11.65%	7.11	1620.29	2340.29	1530.14	810.14
15.0	0.720	84.00	12.34%	7.17	1688.10	2408.10	1564.05	844.05
16.0	0.780	88.00	13.37%	7.25	1747.74	2467.74	1593.87	873.87
17.0	0.820	93.00	14.05%	7.31	1832.43	2552.43	1636.21	916.21
18.0	0.880	98.00	15.08%	7.40	1907.84	2627.84	1673.92	953.92
19.0	0.940	103.00	16.11%	7.49	1980.90	2700.90	1710.45	990.45
20.0	1.000	108.00	17.14%	7.58	2051.60	2771.60	1745.80	1025.80
21.0	1.040	112.00	17.82%	7.64	2109.99	2829.99	1774.99	1054.99
22.0	1.080	117.00	18.51%	7.71	2185.80	2905.80	1812.90	1092.90

NORMAL STRESS AT FAILURE: 2621.98

TIME TO FAILURE:	17.9 min
DEFLECTION @ FAILURE:	0.935 inches
STRAIN @ FAILURE:	15.00%

TECH:	JMP
DATE:	6/14/94
REVIEWED:	RMW

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

UNCONSOLIDATED/UNDRAINED COMPRESSIVE STRENGTH OF SOILS
ASTM D2850

ROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE ID:	B-7
PROJECT NUMBER:	933-6141	DEPTH INTERVAL:	20'-21'
REMARKS:			
ACHINE SPEED (in/min):	0.05		
TRAIN RATE (%/min):	0.81	CONFINING PRESSURE, (psi):	20

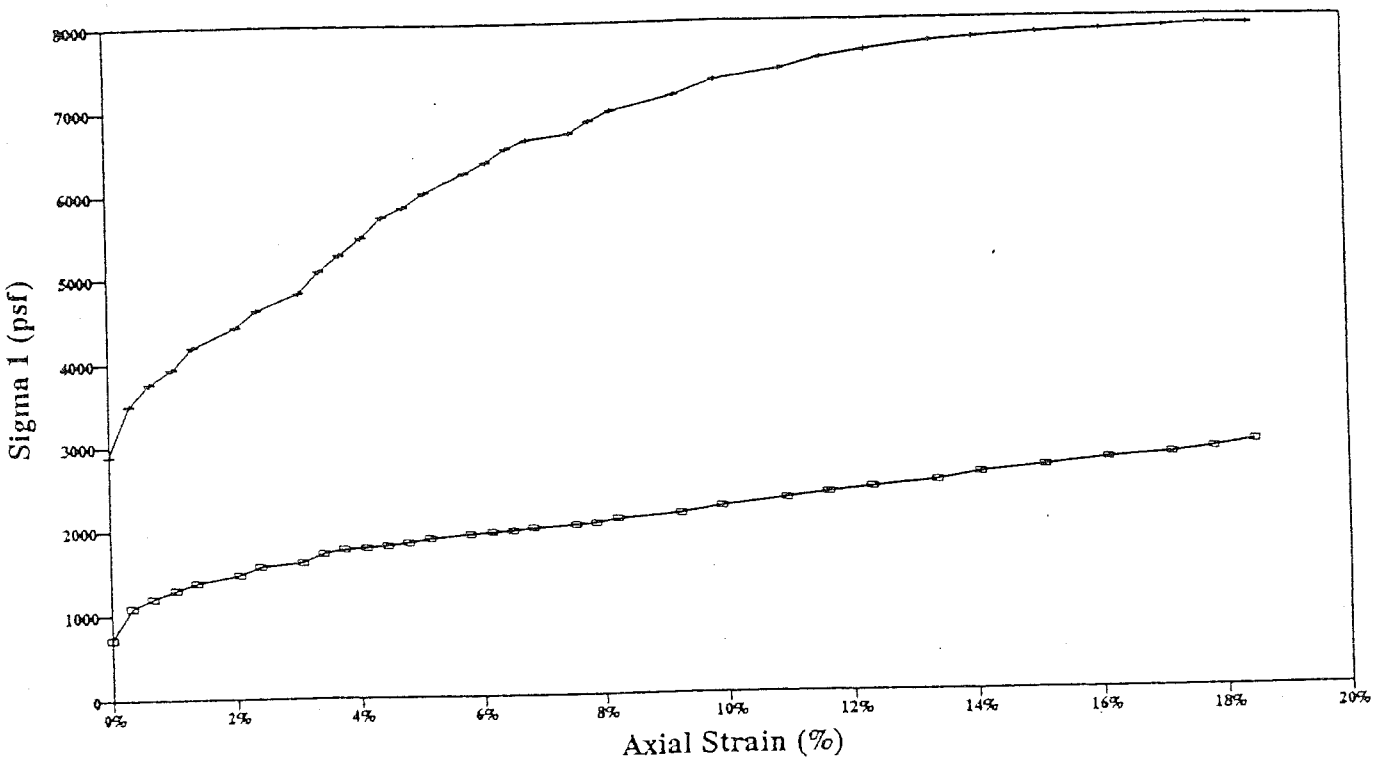
INITIAL SAMPLE DATA	cm	in
HEIGHT (H):	15.760	6.205
IAMETER (D):	7.255	2.856
D RATIO:	2.17	
AREA:	41.34	6.408
VOLUME:	651.51	39.76
EIGHT (g):	1375.0	
MOISTURE:	20.66%	
ECIFIC GRAVITY:	2.77	
MOIST DENSITY (pcf):	131.69	
DRY DENSITY,calc (pcf):	109.15	
OLUME OF SOLIDS:	411.40	
OLUME OF VOIDS:	240.11	
ATURATION (%):	98.05%	

FINAL SAMPLE DATA	
DRY DENSITY,calc (pcf):	109.15
VOLUME OF SOLIDS:	411.40
VOLUME OF VOIDS:	240.11
SATURATION (%):	98.05%
WATER CONTENT (% MOISTURE)	
TARE NO.	MM-10
WT SOIL & TARE,MOIST(g)	541.87
WT SOIL & TARE,DRY(g)	482.04
WT TARE(g)	192.43
WT MOISTURE(g)	59.83
WT DRY SOIL(g)	289.61
% MOISTURE	20.66%

TIME (min)	ACCUMULATE DEFLECT (inches)	AXIAL LOAD (lbs)	e % STRAIN (in/in)	CORRCT'D AREA (in^2)	DEVIATOR STRESS (psf)	SIGMA 1 (S1) devstr+cp (psf)	(S1 + S3) 2 (P)	(S1 - S3) 2 (Q)
0.0	0.000	0.00	0.00%	6.41	0.00	2880.00	2880.00	0.00
0.5	0.040	27.00	0.64%	6.45	602.87	3482.87	3181.43	301.43
1.0	0.060	39.00	0.97%	6.47	867.98	3747.98	3313.99	433.99
1.5	0.080	47.00	1.29%	6.49	1042.62	3922.62	3401.31	521.31
2.0	0.120	59.00	1.93%	6.53	1300.28	4180.28	3530.14	650.14
2.5	0.140	70.00	2.26%	6.56	1537.63	4417.63	3648.82	768.82
3.0	0.160	79.00	2.58%	6.58	1729.60	4609.60	3744.80	864.80
3.5	0.180	89.00	2.90%	6.60	1942.09	4822.09	3851.05	971.05
4.0	0.220	101.00	3.55%	6.64	2189.32	5069.32	3974.66	1094.66
4.5	0.240	110.00	3.87%	6.67	2376.44	5256.44	4068.22	1188.22
5.0	0.260	120.00	4.19%	6.69	2583.78	5463.78	4171.89	1291.89
5.5	0.280	132.00	4.51%	6.71	2832.60	5712.60	4296.30	1416.30
6.0	0.300	138.00	4.84%	6.73	2951.36	5831.36	4355.68	1475.68
6.5	0.340	147.00	5.48%	6.78	3122.54	6002.54	4441.27	1561.27
7.0	0.360	158.00	5.80%	6.80	3344.75	6224.75	4552.38	1672.38
7.5	0.380	165.00	6.12%	6.83	3480.99	6360.99	4620.49	1740.49
8.0	0.400	173.00	6.45%	6.85	3637.23	6517.23	4698.62	1818.62
8.5	0.440	179.00	7.09%	6.90	3737.44	6617.44	4748.72	1868.72
9.0	0.460	183.00	7.41%	6.92	3807.71	6687.71	4783.85	1903.85
9.5	0.480	191.00	7.74%	6.94	3960.33	6840.33	4860.16	1980.16
10.0	0.500	197.00	8.06%	6.97	4070.46	6950.46	4915.23	2035.23
11.0	0.560	208.00	9.03%	7.04	4252.55	7132.55	5006.27	2126.27
12.0	0.600	218.00	9.67%	7.09	4425.41	7305.41	5092.71	2212.71
13.0	0.660	226.00	10.64%	7.17	4538.70	7418.70	5149.35	2269.35
14.0	0.700	234.00	11.28%	7.22	4665.46	7545.46	5212.73	2332.73
15.0	0.760	241.00	12.25%	7.30	4752.65	7632.65	5256.33	2376.33
16.0	0.800	247.00	12.89%	7.36	4835.19	7715.19	5297.60	2417.60
17.0	0.860	252.00	13.86%	7.44	4878.30	7758.30	5319.15	2439.15
18.0	0.900	256.00	14.51%	7.49	4918.65	7798.65	5339.32	2459.32
19.0	0.940	260.00	15.15%	7.55	4957.84	7837.84	5358.92	2478.92
20.0	1.000	264.00	16.12%	7.64	4976.74	7856.74	5368.37	2488.37
21.0	1.040	268.00	16.76%	7.70	5013.32	7893.32	5386.66	2506.66
22.0	1.100	271.00	17.73%	7.79	5010.54	7890.54	5385.27	2505.27
				NORMAL STRESS AT FAILURE:		4948.65		

TIME TO FAILURE:	18.8 min	TECH:	JMP	GOLDER ASSOCIATES INC.
DEFLECTION @ FAILURE:	0.931 inches	DATE:	6/14/94	MT. LAUREL, NJ
STRAIN @ FAILURE:	15.00%	REVIEWED:	RMW	

UNCONSOLIDATED/UNDRAINED COMPRESSIVE STRENGTH

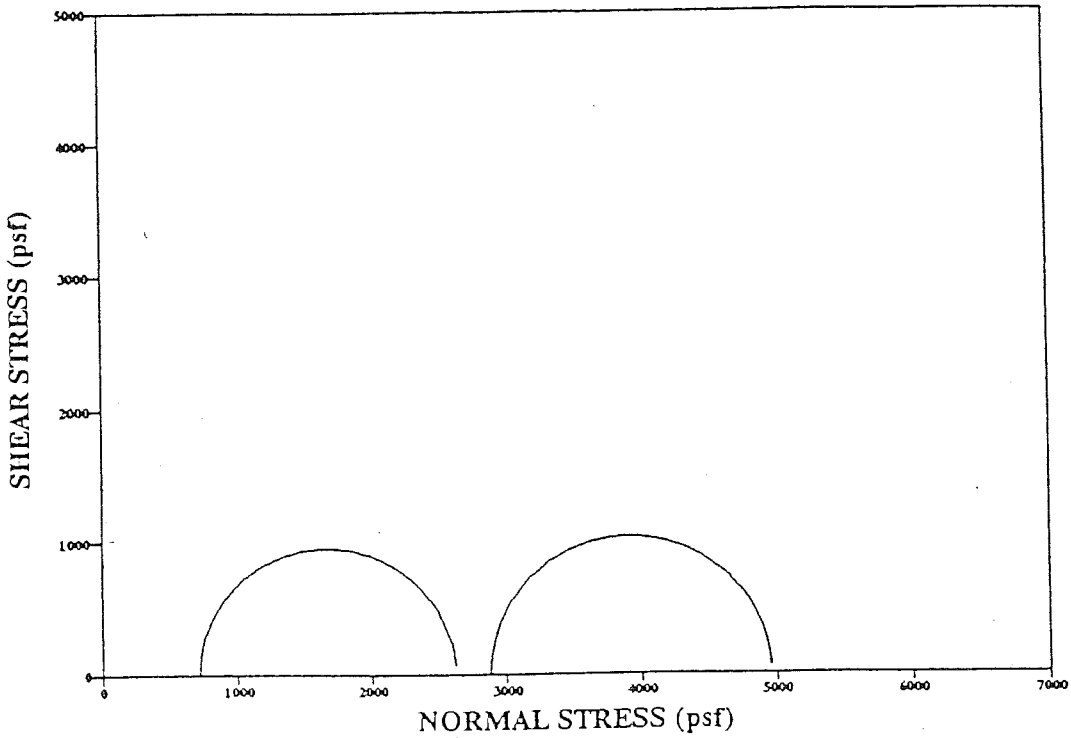


CONFINING PRESSURE (psi)	5	20
INITIAL MOIST DENSITY (pcf)	130.1	131.7
INITIAL WATER CONTENT (%)	22.81%	20.66%
STRAIN RATE (%/min)	0.86	0.81

JCA/LAB GEOTECH/NJ		
933-6141	CHECKED:	JMP
B-7 20'-21'	REVIEWED:	RMW

GOLDER ASSOCIATES INC
MT.LAUREL,NJ

MOHR STRESS CIRCLES



CONFINING PRESSURE (psi)	5	20
INITIAL MOIST DENSITY (pcf)	130.07	131.69
INITIAL WATER CONTENT, %	22.81%	20.66%

JCA/LAB GEOTECH/NJ		
933-6141	CHECKED	JMP
B-7 20'-21'	REVIEWED	RMW

GOLDER ASSOCIATES INC
MT.LAUREL,NJ

C = 1000

$\phi = 0$

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-7 30'-32'	E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK	

WATER CONTENT (Delivered Moisture)

Tare no.		L-1
Wt soil & tare,moist	(W1)	413.68
Wt soil & tare,dry	(W2)	364.42
Wt tare	(W3)	188.26
Wt moisture	(W4=W1-W2)	49.26
Wt dry soil	(W5=W2-W3)	176.16
% WATER	(W4/W5*100)	27.96%

% PASSING #10 SIEVE

Total Wt	(W6)	176.16
Wt Split #10	(W7)	176.02
% PASSING #10	(W7/W6*100)	99.9%

USCS	SIEVE	wt ret	% ret ((W1-Ba)/W5*100)	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375		0.00%	100.00%	0.375	
coarse sand	#4		0.00%	100.00%	#4	coarse sand
medium sand	#10	0.13	0.07%	99.93%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve	99.93	Initial Moist Wt.	68.99
Specific Gravity (ASTM D854)	2.65	Calculated Dry Wt	68.72
ml Dispering Agent Used	125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		34C
Wt soil and tare,moist	(W1)	35.49
Wt soil&tare,dry	(W2)	35.43
Wt tare	(W3)	20.03
Wt moisture lost	(W4=W1-W2)	0.06
Wt dry soil,final	(W5=W2-W3)	15.40
% HYGROSCOPIC MOISTURE	(W4/W5*100)	0.4%

% PASSING 200 SIEVE

Tare no.		M-18
Wt soil and tare,dry (wt,dry)	(W1)	255.22
Wt soil&tare,wash (wt,wash)	(W2)	195.21
Wt tare	(W3)	186.50
Wt fines lost (wt,dry-wt,wash)	(W4=W1-W2)	60.01
Wt dry soil, (wt,dry-wt,tare)	(W5=W1-W3)	68.72
% FINES LOST	(W4/W5*100)	87.3%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING
#10	0.00	0.05	99.93%
#20	0.87	0.92	98.66%
#40	1.35	1.40	97.96%
#60	1.73	1.78	97.41%
#100	3.19	3.24	95.29%
#200	8.71	8.76	87.26%

LL	
PL	
PI	
Gs	

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/13/94	08:39	2.00	51.0	19.00	0.014	4.00
	08:41	4.00	46.0	19.00	0.014	4.00
	08:45	8.00	45.0	19.00	0.014	5.00
	08:52	15.00	43.0	19.00	0.014	5.00
	09:07	30.00	40.0	19.00	0.014	5.00
	09:37	60.00	37.5	18.50	0.014	5.00
	10:37	120.00	35.0	18.50	0.014	5.00
	12:37	240.00	33.0	19.00	0.014	4.50
	16:37	480.00	28.5	19.00	0.014	4.50
06/14/94	08:37	1440.0	22.0	21.00	0.013	3.50

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	0.0%
% C SAND	0.1%
% M SAND	2.8%
% F SAND	10.7%
% FINES	87.3%
% TOTAL	100.00%

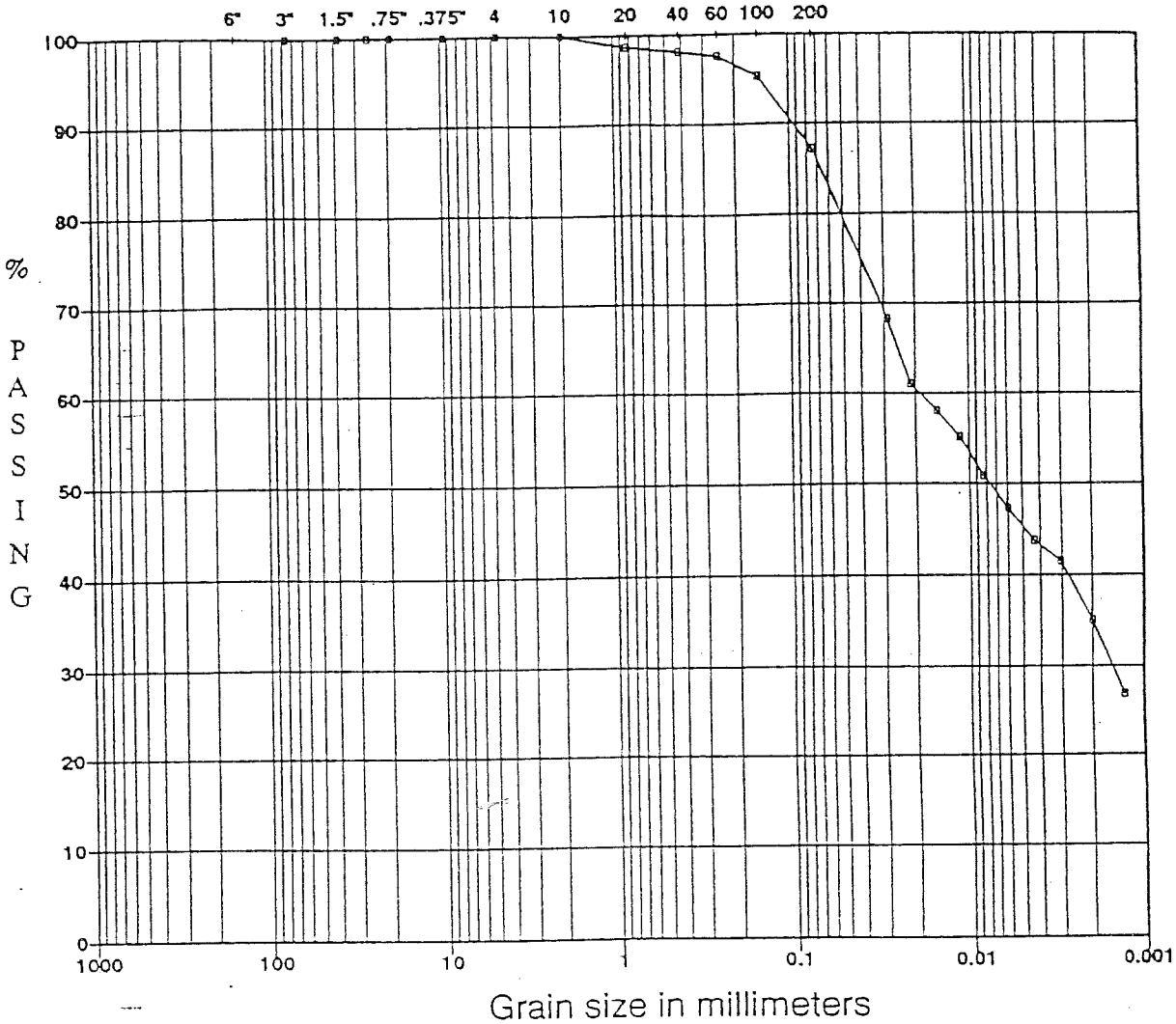
ET (min)	RDNG.C	EFF LTH	K	A	PAR DIA	%FINER
2.00	47.00	8.6	0.014	1.00	0.029	68.3
4.00	42.00	9.4	0.014	1.00	0.021	61.1
8.00	40.00	9.7	0.014	1.00	0.015	58.2
15.00	38.00	10.1	0.014	1.00	0.011	55.3
30.00	35.00	10.6	0.014	1.00	0.008	50.9
60.00	32.50	11.1	0.014	1.00	0.006	47.3
120.00	30.00	11.4	0.014	1.00	0.004	43.6
240.00	28.50	11.7	0.014	1.00	0.003	41.4
480.00	24.00	12.4	0.014	1.00	0.002	34.9
1440.00	18.50	13.3	0.013	1.00	0.001	26.9

WET COLOR: Red
DESCRIPTION: FINES, trace of sand

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-7	28.0					Red
30'-32'	Date Tested: 6/14/94					FINES,
E94CJAS002						little f sand
TECHNICIAN: TK	DATE: 6/18/94		CHECKED: RDD			REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-7
PROJECT NO.:	933-6141	DEPTH:	45'-47'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

		PLASTIC LIMIT		NATURAL MOISTURE
Tare Number:		N-10	11B	1B
Weight of Wet Soil & Tare	(W1)	40.67	33.99	42.08
Weight of Dry Soil & Tare	(W2)	38.81	31.38	37.30
Weight of Tare	(W3)	31.08	20.85	20.62
Weight of Water	(W4=W1-W2)	1.86	2.61	4.78
Weight of Dry Soil	(W5=W2-W3)	7.73	10.53	16.68
Water Content (%)	(W4/W5)*100	24.1%	24.8%	28.7%

		LIQUID LIMIT		
Number of Blows		20	20	
Tare Number:		26C	20B	
Weight of Wet Soil & Tare	(W6)	32.75	34.61	
Weight of Dry Soil & Tare	(W7)	28.53	29.98	
Weight of Tare	(W8)	20.62	20.86	
Weight of Water	(W9=W6-W7)	4.22	4.63	
Weight of Dry Soil	(W10=W7-W8)	7.91	9.12	
Water Content (%)	(W9/W10)*100	53.4%	50.8%	AVERAGE
LL = Wn (N / 25) ^ .121		51.93	49.42	50.67

LIQUID LIMIT	51
PLASTIC LIMIT	24
PLASTICITY INDEX	26
MOISTURE CONTENT	28.7%
LIQUIDITY INDEX	0.16

NOTE: USCS Classification based upon material passing #40 sieve only.

Description: Red

USCS: CH

DATE:	6/14/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES I
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
MECHANICAL SIEVE
ASTM C136, D421, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.	B-7
PROJECT NUMBER:	933-6141	Sample ID:	JAR

WATER CONTENT (Delivered Moisture)

tare no.		M-88
wt soil & tare,moist	(w1)	413.29
wt soil & tare,dry	(w2)	380.53
wt tare	(w3)	191.53
wt moisture	(w4=w1-w2)	32.76
wt dry soil	(w5=w2-w3)	189.00
% water	(w4/w5)*100	17.33%

200 WASH (Percent Fines)

tare no.		M-88
wt soil & tare,before wash	(w6)	380.5
wt soil & tare,after wash	(w7)	305.0
wt tare	(w8)	191.5
wt fines lost	(w9=w6-w7)	75.54
wt dry soil	(w10=w6-w8)	189.00
% lost	(w9/w10)*100	39.97%

USCS SIEVE	wt ret	% ret	% PASS	SIEVE
		{(wt ret/w10)*100}	(100 - %ret)	
3.000		0.0%	100.0%	3.000
2.500		0.0%	100.0%	2.500
2.000		0.0%	100.0%	2.000
1.500		0.0%	100.0%	1.500
1.000		0.0%	100.0%	1.000
0.750		0.0%	100.0%	0.750
0.375		0.0%	100.0%	0.375
#4		0.0%	100.0%	#4
#8	3.86	2.0%	98.0%	#8
#10	6.05	3.2%	96.8%	#10

SPLITTING INFORMATION

Wt in pan, from coarse sieve stack	
Wt split for fine stack sieve	
Percent of original wt in pan	100.00%

#16	14.61	7.7%	92.3%	#16
#30	32.20	17.0%	83.0%	#30
#50	63.88	33.8%	66.2%	#50
#100	97.18	51.4%	48.6%	#100
#200	111.43	59.0%	41.0%	#200
PAN	113.42	60.0%	40.0%	PAN

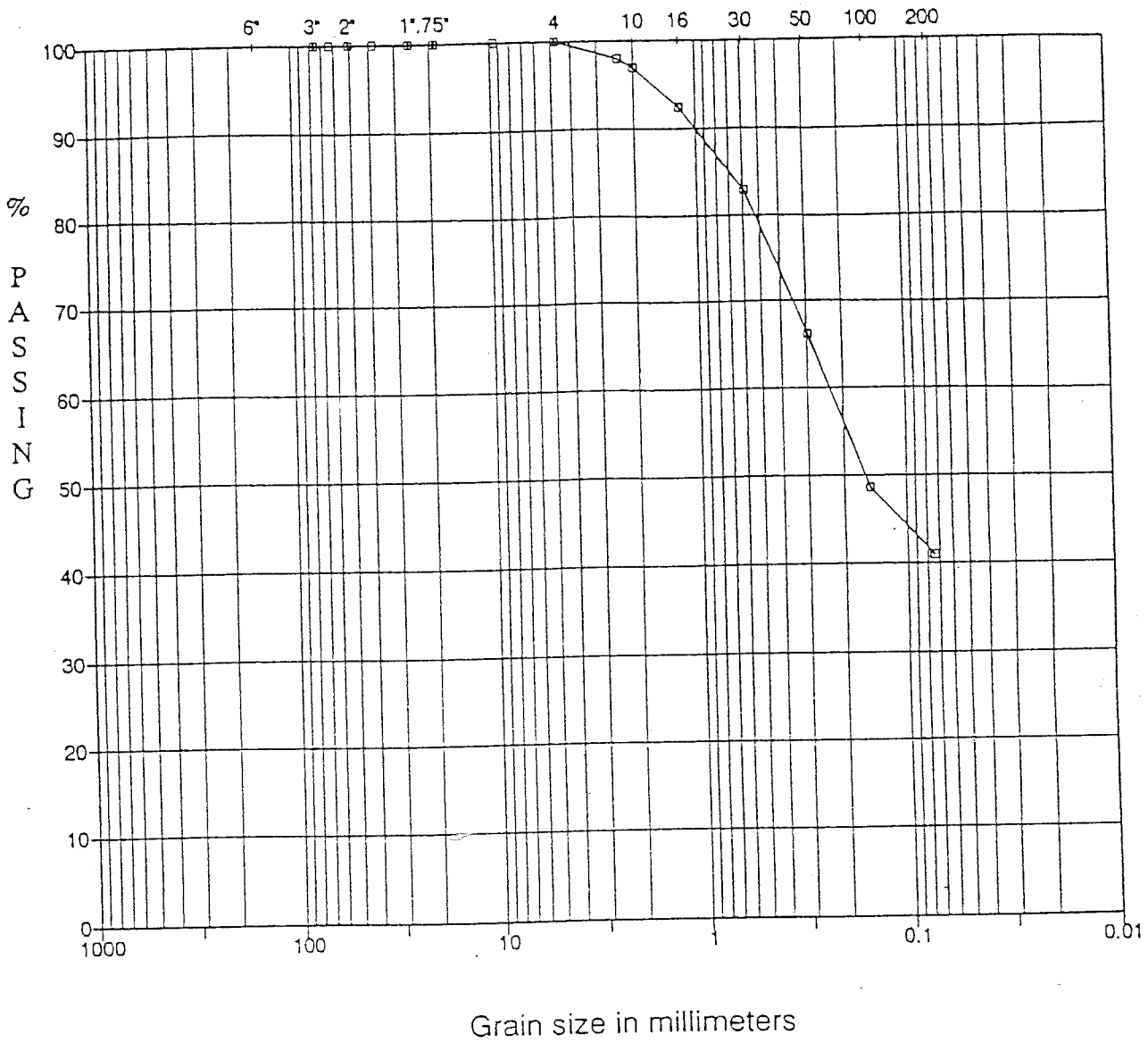
Sample	B-7 60'-62' E94CJAS002	Wet Color:	Reddish, olive yellow

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

TECH	TK	CHECKED	RDD
DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND C-33

US STANDARD SIEVE OPENING SIZES



SAMPLE ID	W%	DATE TESTE	6/14/94	CHECKED:	RDD
B-7	17.33	TECHNICIAN:	TK	REVIEWED:	RMW
60'-62'	E94CJAS002				

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT.LAUREL,NJ

ASTM GRAIN SIZE ANALYSIS
MECHANICAL SIEVE
ASTM C136, D421, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.	B-8
PROJECT NUMBER:	933-6141	Sample ID:	JAR

WATER CONTENT (Delivered Moisture)

tare no.		H-8
wt soil & tare,moist	(w1)	500.26
wt soil & tare,dry	(w2)	465.41
wt tare	(w3)	194.66
wt moisture	(w4=w1-w2)	34.85
wt dry soil	(w5=w2-w3)	270.75
% water	(w4/w5)*100	12.87%

200 WASH (Percent Fines)

tare no.		H-8
wt soil & tare,before wash	(w6)	465.4
wt soil & tare,after wash	(w7)	441.5
wt tare	(w8)	194.7
wt fines lost	(w9=w6-w7)	23.88
wt dry soil	(w10=w6-w8)	270.75
% lost	(w9/w10)*100	8.82%

USCS SIEVE	wt ret	% ret {(wt ret/w10)*100}	% PASS (100 - %ret)	SIEVE
3.000		0.0%	100.0%	3.000
2.500		0.0%	100.0%	2.500
2.000		0.0%	100.0%	2.000
1.500		0.0%	100.0%	1.500
1.000		0.0%	100.0%	1.000
0.750	20.38	7.5%	92.5%	0.750
0.375	54.15	20.0%	80.0%	0.375
#4	80.95	29.9%	70.1%	#4
#8	109.30	40.4%	59.6%	#8
#10	115.46	42.6%	57.4%	#10

SPLITTING INFORMATION

Wt in pan, from coarse sieve stack	131.54
Wt split for fine stack sieve	70.20
Percent of original wt in pan	53.37%

#16	16.81	54.3%	45.7%	#16
#30	46.79	75.0%	25.0%	#30
#50	60.04	84.2%	15.8%	#50
#100	65.53	88.0%	12.0%	#100
#200	69.39	90.7%	9.3%	#200
PAN	70.08	91.1%	8.9%	PAN

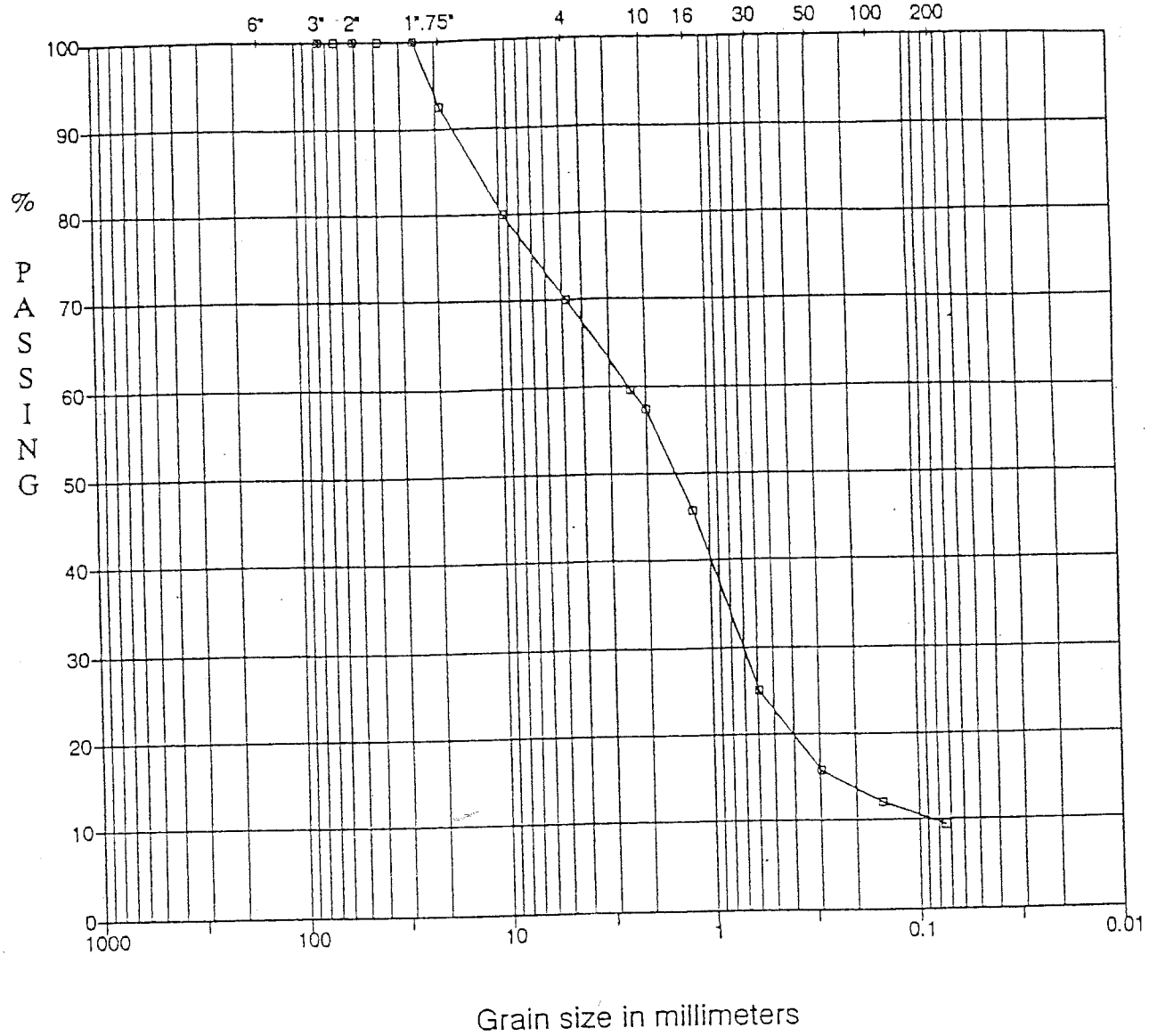
Sample	B-8 10'-12' E94CJAS002	Wet Color:	Olive brown

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

TECH	TK	CHECKED	RDD
DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND C-33

US STANDARD SIEVE OPENING SIZES



SAMPLE ID	W%	DATE TESTE	6/14/94	CHECKED:	RDD
B-8	12.87	TECHNICIAN:	TK	REVIEWED:	RMW
10'-12'	E94CJAS002				

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT.LAUREL,NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-8	27'-29'	E94CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK		

WATER CONTENT (Delivered Moisture)		
Tare no.		TK-9
Wt soil & tare,moist	(wt1)	526.24
Wt soil & tare,dry	(wt2)	456.25
Wt tare	(wt3)	186.51
Wt moisture	(wt4=wt1-wt2)	69.99
Wt dry soil	(wt5=wt2-wt3)	269.74
% WATER	(wt4/wt5*100)	25.95%

% PASSING #10 SIEVE		
Total Wt	(wt6)	242.29
Wt Split #10	(wt7)	242.17
% PASSING #10	(wt7/wt6*100)	100.0%

USCS	SIEVE	wt ret	% ret (wt ret/wt6*100)	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375		0.00%	100.00%	0.375	
coarse sand	#4		0.00%	100.00%	#4	coarse sand
medium sand	#10	0.12	0.05%	99.95%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS			
% Pass #10 Sieve	99.95	Initial Moist Wt.	65.01
Specific Gravity	2.76	Calculated Dry Wt	64.73
ml Dispering Agent Used	125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)		
Tare no.		49
Wt soil and tare,moist	(wt1)	39.72
Wt soil&tare,dry	(wt2)	39.64
Wt tare	(wt3)	21.11
Wt moisture lost	(wt4=wt1-wt2)	0.08
Wt dry soil,final	(wt5=wt2-wt3)	18.53
% HYGROSCOPIC MOISTURE	(wt4/wt5*100)	0.4%

% PASSING 200 SIEVE		
Tare no.		BL-9
Wt soil and tare,dry (wt,dry)	(wt1)	250.60
Wt soil&tare,wash (wt,wash)	(wt2)	190.70
Wt tare	(wt3)	185.87
Wt fines lost (wt,dry-wt,wash)	(wt4=wt1-wt2)	59.90
Wt dry soil, (wt,dry-wt,tare)	(wt5=wt1-wt3)	64.73
% FINES LOST	(wt4/wt5*100)	92.5%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING
#10	0.00	0.03	99.95%
#20	0.16	0.19	99.70%
#40	0.51	0.54	99.16%
#60	1.30	1.33	97.94%
#100	2.14	2.17	96.65%
#200	4.51	4.54	92.99%

LL	46
PL	23
PI	23
Gs	2.76

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/26/94	07:58	2.00	57.5	21.00	0.013	5.00
	08:00	4.00	55.5	21.00	0.013	5.00
	08:04	8.00	54.0	21.00	0.013	4.00
	08:11	15.00	51.0	20.00	0.013	4.00
	08:26	30.00	48.0	20.00	0.013	4.00
	08:56	60.00	47.0	20.00	0.013	5.00
	09:56	120.00	44.0	19.00	0.013	5.00
	11:56	240.00	41.0	19.00	0.013	5.00
	15:56	480.00	39.0	18.50	0.014	5.00
06/27/94	08:04	1448.0	33.0	21.00	0.013	4.00

Grain Size Percentages	
% C GRVL	0.0%
% F GRVL	0.0%
% C SAND	0.0%
% M SAND	0.8%
% F SAND	6.2%
% FINES	93.0%
% TOTAL	100.00%

ET (min)	RDNG,C	EFF LTH	K	A	PAR DIA	%FINER
2.00	52.50	7.8	0.013	0.98	0.026	79.4
4.00	50.50	8.1	0.013	0.98	0.019	76.4
8.00	50.00	8.1	0.013	0.98	0.013	75.7
15.00	47.00	8.6	0.013	0.98	0.010	71.1
30.00	44.00	9.1	0.013	0.98	0.007	66.6
60.00	42.00	9.4	0.013	0.98	0.005	63.6
120.00	39.00	9.9	0.013	0.98	0.004	59.0
240.00	36.00	10.4	0.013	0.98	0.003	54.5
480.00	34.00	10.7	0.014	0.98	0.002	51.4
1440.00	29.00	11.5	0.013	0.98	0.001	43.9

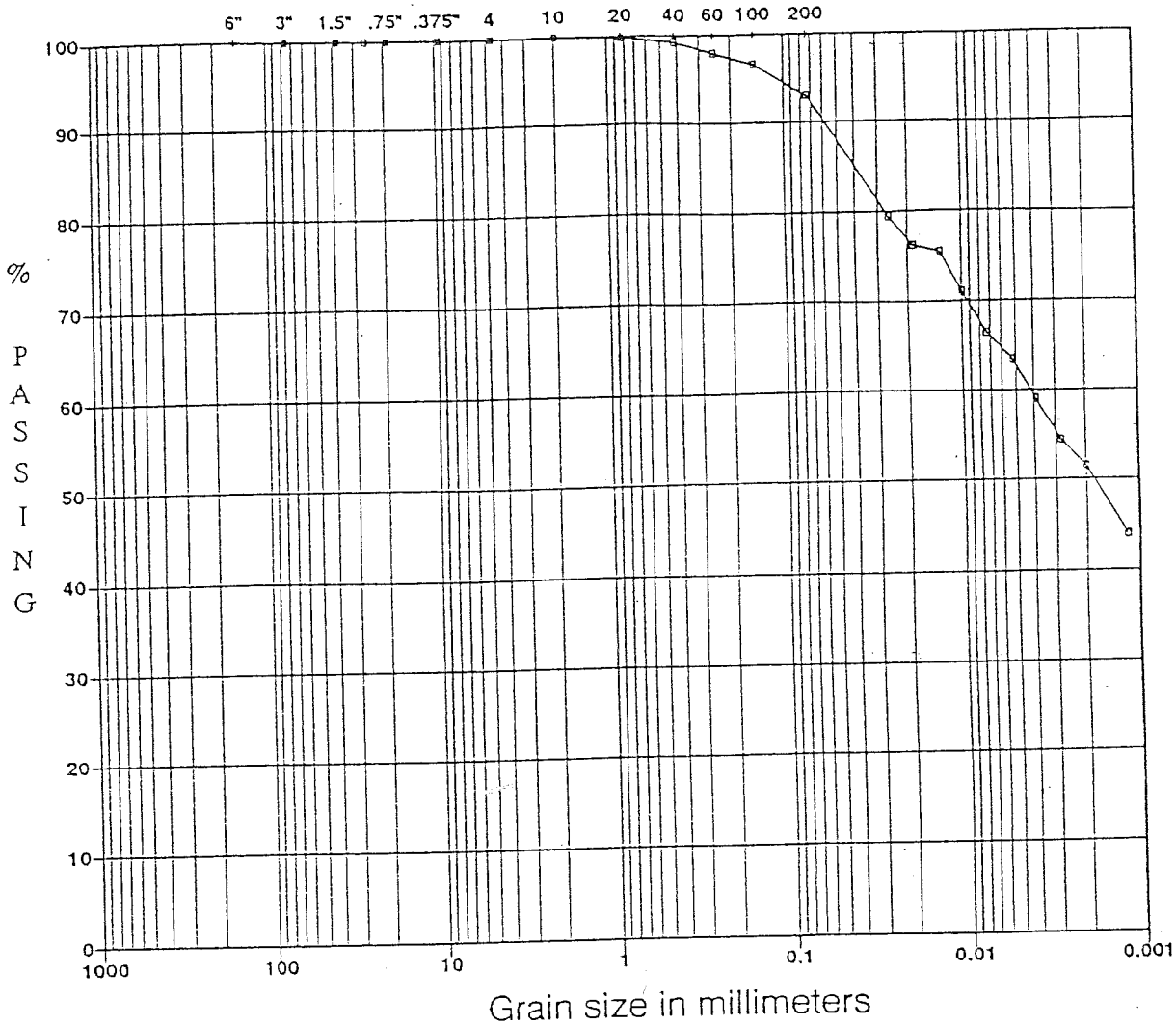
WET COLOR: Red
DESCRIPTION: Lean clay

USCS: CL

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/30/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-8	25.9	46	23	23	2.76	Red
27'-29'	Date Tested:	6/30/94				Lean clay
E94CJAS002	USCS:	CL				
TECHNICIAN:	TK	DATE: 7/5/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-8
PROJECT NO.:	933-6141	DEPTH:	27'-29'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

		PLASTIC LIMIT		NATURAL MOISTURE
Tare Number:		CH15	9B	TK-9
Weight of Wet Soil & Tare	(W1)	33.31	29.81	526.24
Weight of Dry Soil & Tare	(W2)	31.20	27.86	456.25
Weight of Tare	(W3)	21.82	19.54	186.51
Weight of Water	(W4=W1-W2)	2.11	1.95	69.99
Weight of Dry Soil	(W5=W2-W3)	9.38	8.32	269.74
Water Content (%)	(W4/W5)*100	22.5%	23.4%	25.9%

		LIQUID LIMIT		
Number of Blows		30	20	
Tare Number:		CH28	27C	
Weight of Wet Soil & Tare	(W6)	37.36	27.49	
Weight of Dry Soil & Tare	(W7)	35.41	25.27	
Weight of Tare	(W8)	31.06	20.66	
Weight of Water	(W9=W6-W7)	1.95	2.22	
Weight of Dry Soil	(W10=W7-W8)	4.35	4.61	
Water Content (%)	(W9/W10)*100	44.8%	48.2%	AVERAGE
LL = Wn (N / 25)^.121		45.83	46.87	46.35

LIQUID LIMIT	46
PLASTIC LIMIT	23
PLASTICITY INDEX	23
MOISTURE CONTENT	25.9%
LIQUIDITY INDEX	0.13

Description: Red
Lean clay

USCS: CL

DATE:	6/30/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES IN
MT. LAUREL, NJ

CONSOLIDATED UNDRAINED WITH PORE PRESSURE
ASTM D4767

PROJECT TITLE:	JCA/LAB GEOTECH/NJ
PROJECT NUMBER:	933-6141
SAMPLE ID:	B-8
TUBE NUMBER:	
DEPTH INTERVAL:	27'29'
MACHINE SPEED (in/min):	0.01
STRAIN RATE (%/min):	0.27
CELL PRESSURE (psi):	55
SAMPLE PRESSURE (psi):	50
EFF. CONSOLIDATION PRESSURE,S3(psi):	5
FINAL "B" VALUE	0.98
t50 (min)	1.1

INITIAL SAMPLE DATA	cm	in
HEIGHT:	9.477	3.731
DIAMETER:	7.254	2.856
HEIGHT/DIAMETER RATIO:	1.31	
AREA:	41.33	6.41
VOLUME:	391.68	23.90
WEIGHT (g):	804.83	
% MOISTURE	21.31%	
SPECIFIC GRAVITY	2.76	
MOIST DENSITY (pcf)	128.22	
DRY DENSITY,calc (pcf)	105.70	
VOLUME OF SOLIDS	240.38	
VOLUME OF VOIDS	151.30	
VOID RATIO	0.629	
SATURATION	93.44	

FINAL SAMPLE DATA	
DRY DENSITY,calc (pcf)	105.70
VOLUME OF SOLIDS	240.38
VOLUME OF VOIDS	151.30
VOID RATIO	0.63
SATURATION	99.93%
WATER CONTENT (% MOISTURE)	
TARE NO.	FOO8
WT SOIL & TARE,MOIST(g)	863.19
WT SOIL & TARE,DRY(g)	712.00
WT TARE(g)	48.54
WT MOISTURE(g)	151.19
WT DRY SOIL(g)	663.46
% MOISTURE	22.79%

TECH	JMP/RMW
DATE	6/25/94
CHECKED	JMP
REVIEWED	RMW

TIME (MIN)	ACCUMULATED DEFLECTION (inches)	AXIAL LOAD (lbs)	PORE PRESSURE (psi) = U	dU (psi) (acc)	e % STRAIN (%)	(1-e)	CORRCT'D AREA (in 2)	CORRCT'D HEIGHT (in)	DEVIATOR STRESS (psi)	SIGMA 1 devstr+cp (S1)	SIGMA 1 EFFECTIVE (S1-dU)	SIGMA 3 EFFECTIVE (S3-dU)	EFF.PRN STR RATIO (S1'/S3')	(S1'+S3')/2 (P')	(S1'-S3')/2 (Q')
0.0	0.00	0.0	48.4	0.0	0.00%	1.00	6.41	3.731	0.0	720.0	720.0	720.0	1.00	720.0	0.0
0.5	0.00	13.0	49.4	144.0	0.00%	1.00	6.41	3.731	292.2	1012.2	868.2	576.0	1.51	722.1	146.1
1.0	0.00	17.0	49.7	187.2	0.00%	1.00	6.41	3.731	382.1	1102.1	914.9	532.8	1.72	723.9	191.1
1.5	0.00	20.0	50.0	230.4	0.00%	1.00	6.41	3.731	449.6	1169.6	939.2	489.6	1.92	714.4	224.8
2.0	0.00	22.0	50.3	273.6	0.00%	1.00	6.41	3.731	494.5	1214.5	940.9	446.4	2.11	693.7	247.3
2.5	0.02	24.0	50.5	302.4	0.54%	0.99	6.44	3.711	536.6	1256.6	954.2	417.6	2.28	685.9	268.3
3.0	0.02	25.0	50.7	331.2	0.54%	0.99	6.44	3.711	558.9	1278.9	947.7	388.8	2.44	668.3	279.5
3.5	0.02	27.0	50.8	345.6	0.54%	0.99	6.44	3.711	603.7	1323.7	978.1	374.4	2.61	676.2	301.8
4.0	0.02	28.0	50.9	360.0	0.54%	0.99	6.44	3.711	626.0	1346.0	986.0	360.0	2.74	673.0	313.0
4.5	0.02	30.0	51.1	388.8	0.54%	0.99	6.44	3.711	670.7	1390.7	1001.9	331.2	3.03	666.6	335.4
5.0	0.04	31.0	51.2	403.2	1.07%	0.99	6.48	3.691	689.3	1409.3	1006.1	316.8	3.18	661.5	344.7
5.5	0.04	32.0	51.3	417.6	1.07%	0.99	6.48	3.691	711.6	1431.6	1014.0	302.4	3.35	658.2	355.8
6.0	0.04	34.0	51.3	417.6	1.07%	0.99	6.48	3.691	756.1	1476.1	1058.5	302.4	3.50	680.4	378.0
6.5	0.06	34.0	51.4	432.0	1.61%	0.98	6.51	3.671	752.0	1472.0	1040.0	288.0	3.61	664.0	376.0
7.0	0.06	35.0	51.4	432.0	1.61%	0.98	6.51	3.671	774.1	1494.1	1062.1	288.0	3.69	675.0	387.0
7.5	0.06	36.0	51.5	446.4	1.61%	0.98	6.51	3.671	796.2	1516.2	1069.8	273.6	3.91	671.7	398.1
8.0	0.08	37.0	51.5	446.4	2.14%	0.98	6.55	3.651	813.9	1533.9	1087.5	273.6	3.97	680.5	406.9
8.5	0.08	38.0	51.6	460.8	2.14%	0.98	6.55	3.651	835.8	1555.8	1095.0	259.2	4.22	677.1	417.9
9.0	0.08	39.0	51.6	460.8	2.14%	0.98	6.55	3.651	857.8	1577.8	1117.0	259.2	4.31	688.1	428.9
9.5	0.08	40.0	51.6	460.8	2.14%	0.98	6.55	3.651	879.8	1599.8	1139.0	259.2	4.39	699.1	439.9
10.0	0.08	41.0	51.6	460.8	2.14%	0.98	6.55	3.651	901.8	1621.8	1161.0	259.2	4.48	710.1	450.9
11.0	0.10	42.0	51.6	460.8	2.68%	0.97	6.58	3.631	918.8	1638.8	1178.0	259.2	4.54	718.6	459.4
12.0	0.12	44.0	51.7	475.2	3.22%	0.97	6.62	3.611	957.2	1677.2	1202.0	244.8	4.91	723.4	478.6
13.0	0.12	45.0	51.7	475.2	3.22%	0.97	6.62	3.611	979.0	1699.0	1223.8	244.8	5.00	734.3	489.5
14.0	0.14	46.0	51.7	475.2	3.75%	0.96	6.66	3.591	995.2	1715.2	1240.0	244.8	5.07	742.4	497.6
15.0	0.14	47.0	51.8	460.8	3.75%	0.96	6.66	3.591	1016.8	1736.8	1276.0	259.2	4.92	767.6	508.4
16.0	0.16	49.0	51.6	460.8	4.29%	0.96	6.69	3.571	1054.2	1774.2	1313.4	259.2	5.07	786.3	527.1
17.0	0.16	50.0	51.6	460.8	4.29%	0.96	6.69	3.571	1075.7	1795.7	1334.9	259.2	5.15	797.0	537.8
18.0	0.18	51.0	51.6	460.8	4.82%	0.95	6.73	3.551	1091.1	1811.1	1350.3	259.2	5.21	804.7	545.5
19.0	0.18	52.0	51.5	446.4	4.82%	0.95	6.73	3.551	1112.5	1832.5	1386.1	273.6	5.07	829.8	558.2
20.0	0.20	53.0	51.5	446.4	5.36%	0.95	6.77	3.531	1127.5	1847.5	1401.1	273.6	5.12	837.3	563.7

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

TIME (MIN)	ACCUMULATED DEFLECTION (inches)	AXIAL LOAD (lbs)	PORE PRESSURE (psi) =U	dU (psf) (acc)	e % STRAIN (%)	(1-e)	CORRCT'D AREA (in 2)	CORRCT'D HEIGHT (in)	DEVIATOR STRESS (psf)	SIGMA 1 devstr+cp (S1)	SIGMA 1 EFFECTIVE (S1-dU)	SIGMA 3 EFFECTIVE (S3-dU)	EFF.PRN STR RATIO (S1'/S3')	(S1'+S3') 2 (P')	(S1'-S3') 2 (Q')
21.0	0.22	54.0	51.4	432.0	5.90%	0.94	6.81	3.511	1142.2	1862.2	1430.2	288.0	4.97	859.1	571.1
22.0	0.22	55.0	51.3	417.6	5.90%	0.94	6.81	3.511	1163.4	1883.4	1465.8	302.4	4.85	884.1	581.7
23.0	0.24	56.0	51.3	417.6	6.43%	0.94	6.85	3.491	1177.6	1897.6	1480.2	302.4	4.89	891.3	588.9
24.0	0.24	57.0	51.2	403.2	6.43%	0.94	6.85	3.491	1198.8	1918.8	1515.6	316.8	4.78	916.2	599.4
25.0	0.26	58.0	51.3	417.6	6.97%	0.93	6.89	3.471	1212.9	1932.9	1515.3	302.4	5.01	908.8	606.4
26.0	0.26	58.0	51.1	388.8	6.97%	0.93	6.89	3.471	1212.9	1932.9	1544.1	331.2	4.66	937.6	606.4
27.0	0.28	59.0	51.1	388.8	7.50%	0.92	6.93	3.451	1226.7	1946.7	1557.9	331.2	4.70	944.5	613.3
28.0	0.28	60.0	51.0	374.4	7.50%	0.92	6.93	3.451	1247.5	1967.5	1593.1	345.6	4.61	969.3	623.7
29.0	0.30	61.0	50.9	360.0	8.04%	0.92	6.97	3.431	1260.9	1980.9	1620.9	360.0	4.50	990.5	630.5
30.0	0.30	62.0	50.8	345.6	8.04%	0.92	6.97	3.431	1281.6	2001.6	1658.0	374.4	4.42	1015.2	640.8
31.0	0.32	62.0	50.7	331.2	8.58%	0.91	7.01	3.411	1274.1	1994.1	1662.9	388.8	4.28	1025.9	637.1
32.0	0.34	63.0	50.7	331.2	9.11%	0.91	7.05	3.391	1287.1	2007.1	1675.9	388.8	4.31	1032.3	643.5
33.0	0.34	64.0	50.6	316.8	9.11%	0.91	7.05	3.391	1307.5	2027.5	1710.7	403.2	4.24	1058.9	653.7
34.0	0.36	65.0	50.5	302.4	9.65%	0.90	7.09	3.371	1320.1	2040.1	1737.7	417.6	4.16	1077.6	660.0
35.0	0.38	65.0	50.4	288.0	9.65%	0.90	7.09	3.371	1320.1	2040.1	1752.1	432.0	4.06	1092.0	660.0
36.0	0.38	65.0	50.3	273.6	10.18%	0.90	7.13	3.351	1312.3	2032.3	1758.7	446.4	3.94	1102.5	656.1
37.0	0.38	66.0	50.3	273.6	10.18%	0.90	7.13	3.351	1332.4	2052.4	1778.8	446.4	3.98	1112.6	666.2
38.0	0.40	67.0	50.3	273.6	10.72%	0.89	7.18	3.331	1344.6	2064.6	1791.0	446.4	4.01	1118.7	672.3
39.0	0.40	67.0	50.2	259.2	10.72%	0.89	7.18	3.331	1344.6	2064.6	1805.4	460.8	3.92	1133.1	672.3
40.0	0.42	68.0	50.0	230.4	11.26%	0.89	7.22	3.311	1356.4	2076.4	1846.0	489.6	3.77	1167.8	678.2
41.0	0.44	68.0	50.0	230.4	11.79%	0.88	7.26	3.291	1348.2	2068.2	1837.6	489.6	3.75	1163.7	674.1
42.0	0.44	69.0	49.9	216.0	11.79%	0.88	7.26	3.291	1368.1	2088.1	1872.1	504.0	3.71	1188.0	684.0
43.0	0.44	70.0	49.8	201.6	11.79%	0.88	7.26	3.291	1387.9	2107.9	1906.3	518.4	3.68	1212.3	693.9
44.0	0.46	70.0	49.7	187.2	12.33%	0.88	7.31	3.271	1379.5	2099.5	1912.3	532.8	3.59	1222.5	689.7
45.0	0.46	71.0	49.6	172.8	12.33%	0.88	7.31	3.271	1399.2	2119.2	1946.4	547.2	3.56	1246.8	699.6
46.0	0.48	71.0	49.6	172.8	12.87%	0.87	7.35	3.251	1390.6	2110.6	1937.6	547.2	3.54	1242.5	695.3
47.0	0.50	72.0	49.5	158.4	13.40%	0.87	7.40	3.231	1401.5	2121.5	1963.1	561.6	3.50	1262.4	700.8
48.0	0.50	72.0	49.4	144.0	13.40%	0.87	7.40	3.231	1401.5	2121.5	1977.5	576.0	3.43	1276.8	700.8
49.0	0.52	73.0	49.3	129.6	13.94%	0.86	7.44	3.211	1412.2	2132.2	2002.6	590.4	3.39	1296.5	706.1
50.0	0.54	74.0	49.2	115.2	14.47%	0.86	7.49	3.191	1422.6	2142.6	2027.4	604.8	3.35	1316.1	711.3
51.0	0.54	74.0	49.2	115.2	14.47%	0.86	7.49	3.191	1422.6	2142.6	2027.4	604.8	3.35	1316.1	711.3

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

TIME (MIN)	ACCUMULATED DEFLECTION (inches)	AXIAL LOAD (lbs)	PORE PRESSURE (psi) = U	dU (psf) (acc)	e % STRAIN (%)	(1-e)	CORRCT'D AREA (in 2)	CORRCT'D HEIGHT (in)	DEVIATOR STRESS (psf)	SIGMA 1 devsU+cp (S1)	SIGMA 1 EFFECTIVE (S1-dU)	SIGMA 3 EFFECTIVE (S3-dU)	EFF.PRN STR RATIO (S1'/S3')	(S1'+S3') 2 (P')	(S1'-S3') 2 (Q')
52.0	0.54	74.0	48.1	100.8	14.47%	0.86	7.49	3.191	1422.8	2142.8	2041.8	818.2	3.30	1330.5	711.3
53.0	0.58	75.0	48.9	72.0	15.01%	0.85	7.54	3.171	1432.8	2152.8	2080.8	848.0	3.21	1364.4	716.4
54.0	0.58	75.0	48.9	72.0	15.01%	0.85	7.54	3.171	1432.8	2152.8	2080.8	848.0	3.21	1364.4	716.4
55.0	0.58	76.0	48.8	57.6	15.55%	0.84	7.59	3.151	1442.8	2162.8	2105.2	862.4	3.18	1383.8	721.4
56.0	0.60	76.0	48.7	43.2	16.08%	0.84	7.63	3.131	1433.6	2153.6	2110.4	876.8	3.12	1393.6	716.8

DEVIATORIC STRESS @ FAILURE: 1442.8

EFFECTIVE PRINCIPLE STRESS RATIO @ FAILURE: 3.2

CONSOLIDATED UNDRAINED WITH PORE PRESSURE
ASTM D4767

PROJECT TITLE:	JCA/LAB GEOTECH/NJ
PROJECT NUMBER:	933-6141
SAMPLE ID:	B-8
TUBE NUMBER:	
DEPTH INTERVAL:	27'29'
MACHINE SPEED (in/min):	0.02
STRAIN RATE (%/min):	0.33
CELL PRESSURE (psi):	60
SAMPLE PRESSURE (psi):	50
EFF.CONSOLIDATION PRESSURE,S3(psi):	10
FINAL "B" VALUE	0.96
t50 (min)	1.6

INITIAL SAMPLE DATA	cm	in
HEIGHT:	15.199	5.984
DIAMETER:	7.272	2.863
HEIGHT/DIAMETER RATIO:	2.09	
AREA:	41.53	6.44
VOLUME:	631.28	38.52
WEIGHT (g):	1309.41	
% MOISTURE	21.34%	
SPECIFIC GRAVITY	2.76	
MOIST DENSITY (pcf)	129.43	
DRY DENSITY,calc (pcf)	106.66	
VOLUME OF SOLIDS	390.97	
VOLUME OF VOIDS	240.31	
VOID RATIO	0.615	
SATURATION	95.84	

corrected

FINAL SAMPLE DATA	
DRY DENSITY,calc (pcf)	106.66
VOLUME OF SOLIDS	390.97
VOLUME OF VOIDS	240.31
VOID RATIO	0.61
SATURATION	97.94%
WATER CONTENT (% MOISTURE)	
TARE NO.	CH010
WT SOIL & TARE,MOIST(g)	1365.36
WT SOIL & TARE,DRY(g)	1130.00
WT TARE(g)	50.91
WT MOISTURE(g)	235.36
WT DRY SOIL(g)	1079.09
% MOISTURE	21.81%

TECH	JMP/RMW
DATE	6/25/94
CHECKED	JMP
REVIEWED	RMW

TIME (MIN)	ACCUMULATED DEFLECTION (inches)	AXIAL LOAD (lbs)	PORE PRESSURE (psi)=U	dU (psf) (acc)	e % STRAIN (%)	(1-e)	CORRCT'D AREA (in 2)	CORRCT'D HEIGHT (in)	DEVIATOR STRESS (psf)	SIGMA 1 devstr+cp (S1)	SIGMA 1 EFFECTIVE (S1-dU)	SIGMA 3 EFFECTIVE (S3-dU)	EFF.PRN STR RATIO (S1'/S3')	(S1'+S3')/2 (P')	(S1'-S3')/2 (Q')
0.0	0.00	0.0	48.6	0.0	0.00%	1.00	6.44	5.984	0.0	1440.0	1440.0	1440.0	1.00	1440.0	0.0
0.5	0.00	20.0	50.5	273.6	0.00%	1.00	6.44	5.984	447.4	1887.4	1613.8	1166.4	1.38	1390.1	223.7
1.0	0.00	30.0	51.2	374.4	0.00%	1.00	6.44	5.984	671.0	2111.0	1736.6	1065.6	1.63	1401.1	335.5
1.5	0.02	36.0	51.8	460.8	0.33%	1.00	6.46	5.964	802.6	2242.6	1781.8	979.2	1.82	1380.5	401.3
2.0	0.02	41.0	52.4	547.2	0.33%	1.00	6.46	5.964	914.0	2354.0	1806.8	892.8	2.02	1349.8	457.0
2.5	0.04	46.0	52.9	619.2	0.67%	0.99	6.48	5.944	1022.1	2462.1	1842.9	820.8	2.25	1331.8	511.0
3.0	0.06	50.0	53.4	691.2	1.00%	0.99	6.50	5.924	1107.2	2547.2	1856.0	748.8	2.48	1302.4	553.6
3.5	0.06	54.0	53.8	748.8	1.00%	0.99	6.50	5.924	1195.8	2635.8	1887.0	691.2	2.73	1289.1	597.9
4.0	0.06	58.0	54.1	792.0	1.00%	0.99	6.50	5.924	1284.3	2724.3	1932.3	648.0	2.98	1290.2	642.2
4.5	0.08	62.0	54.4	835.2	1.34%	0.99	6.52	5.904	1368.3	2808.3	1973.1	604.8	3.26	1288.9	684.1
5.0	0.08	65.0	54.7	878.4	1.34%	0.99	6.52	5.904	1434.5	2874.5	1996.1	561.6	3.55	1278.8	717.2
5.5	0.10	68.0	54.9	907.2	1.67%	0.98	6.55	5.884	1495.6	2935.6	2028.4	532.8	3.81	1280.6	747.8
6.0	0.12	71.0	55.1	936.0	2.01%	0.98	6.57	5.864	1556.3	2996.3	2060.3	504.0	4.09	1282.1	778.1
6.5	0.12	74.0	55.3	964.8	2.01%	0.98	6.57	5.864	1622.0	3062.0	2097.2	475.2	4.41	1286.2	811.0
7.0	0.12	77.0	55.4	979.2	2.01%	0.98	6.57	5.864	1687.8	3127.8	2148.6	460.8	4.66	1304.7	843.9
7.5	0.14	79.0	55.5	993.6	2.34%	0.98	6.59	5.844	1725.7	3165.7	2172.1	446.4	4.87	1309.3	862.9
8.0	0.14	81.0	55.6	1008.0	2.34%	0.98	6.59	5.844	1769.4	3209.4	2201.4	432.0	5.10	1316.7	884.7
8.5	0.16	84.0	55.6	1008.0	2.67%	0.97	6.61	5.824	1828.7	3268.7	2260.7	432.0	5.23	1346.3	914.3
9.0	0.18	86.0	55.7	1022.4	3.01%	0.97	6.64	5.804	1865.8	3305.8	2283.4	417.6	5.47	1350.5	932.9
9.5	0.18	88.0	55.7	1022.4	3.01%	0.97	6.64	5.804	1909.2	3349.2	2326.8	417.6	5.57	1372.2	954.6
10.0	0.18	89.0	55.8	1036.8	3.01%	0.97	6.64	5.804	1930.9	3370.9	2334.1	403.2	5.79	1368.6	965.4
11.0	0.22	93.0	55.8	1036.8	3.68%	0.96	6.68	5.764	2003.8	3443.8	2407.0	403.2	5.97	1405.1	1001.9
12.0	0.24	96.0	55.8	1036.8	4.01%	0.96	6.71	5.744	2061.2	3501.2	2464.4	403.2	6.11	1433.8	1030.6
13.0	0.24	98.0	55.7	1022.4	4.01%	0.96	6.71	5.744	2104.2	3544.2	2521.8	417.6	6.04	1469.7	1052.1
14.0	0.28	100.0	55.7	1022.4	4.68%	0.95	6.75	5.704	2132.2	3572.2	2549.8	417.6	6.11	1483.7	1066.1
15.0	0.28	103.0	55.6	1008.0	4.68%	0.95	6.75	5.704	2196.1	3636.1	2628.1	432.0	6.08	1530.1	1098.1
16.0	0.30	105.0	55.5	993.6	5.01%	0.95	6.78	5.684	2230.9	3670.9	2677.3	446.4	6.00	1561.9	1115.5
17.0	0.34	107.0	55.3	964.8	5.68%	0.94	6.83	5.644	2257.4	3697.4	2732.6	475.2	5.75	1603.9	1128.7
18.0	0.36	108.0	55.2	950.4	6.02%	0.94	6.85	5.624	2270.4	3710.4	2760.0	489.6	5.64	1624.8	1135.2
19.0	0.38	110.0	55.1	936.0	6.35%	0.94	6.87	5.604	2304.2	3744.2	2808.2	504.0	5.57	1656.1	1152.1
20.0	0.40	112.0	55.0	921.6	6.68%	0.93	6.90	5.584	2337.8	3777.8	2856.2	518.4	5.51	1687.3	1168.9

GO[illegible] ASSOCIATES INC.
M1 [illegible]

TIME (MIN)	ACCUMULATED DEFLECTION (inches)	AXIAL LOAD (lbs)	PORE PRESSURE (psi) = U	dU (psf) (acc)	e % STRAIN (%)	(1-e)	CORRCT'D AREA (in 2)	CORRCT'D HEIGHT (in)	DEVIATOR STRESS (psf)	SIGMA 1 devstr + cp (S1)	SIGMA 1 EFFECTIVE (S1-dU)	SIGMA 3 EFFECTIVE (S3-dU)	EFF.PRN STR RATIO (S1'/S3')	(S1'+S3') 2 (P')	(S1'-S3') 2 (Q')
21.0	0.42	113.0	54.8	892.8	7.02%	0.93	6.92	5.564	2350.2	3790.2	2897.4	547.2	5.29	1722.3	1175.1
22.0	0.44	115.0	54.6	864.0	7.35%	0.93	6.95	5.544	2383.2	3823.2	2959.2	576.0	5.14	1767.6	1191.6
23.0	0.46	118.0	54.3	820.8	7.69%	0.92	6.97	5.524	2395.2	3835.2	3014.4	619.2	4.87	1816.8	1197.6
24.0	0.48	117.0	54.1	792.0	8.02%	0.92	7.00	5.504	2407.1	3847.1	3055.1	648.0	4.71	1851.6	1203.6
25.0	0.50	119.0	54.0	777.6	8.36%	0.92	7.02	5.484	2439.4	3879.4	3101.8	662.4	4.68	1882.1	1219.7
26.0	0.52	121.0	53.8	748.8	8.69%	0.91	7.05	5.464	2471.4	3911.4	3162.6	691.2	4.58	1926.9	1235.7
27.0	0.54	122.0	53.6	720.0	9.02%	0.91	7.08	5.444	2482.7	3922.7	3202.7	720.0	4.45	1961.3	1241.3
28.0	0.56	123.0	53.5	705.6	9.36%	0.91	7.10	5.424	2493.8	3933.8	3228.2	734.4	4.40	1981.3	1246.9
29.0	0.58	124.0	53.3	676.8	9.69%	0.90	7.13	5.404	2504.8	3944.8	3268.0	763.2	4.28	2015.6	1252.4
30.0	0.60	125.0	53.2	662.4	10.03%	0.90	7.16	5.384	2515.7	3955.7	3293.3	777.6	4.24	2035.4	1257.8
31.0	0.62	127.0	53.1	648.0	10.36%	0.90	7.18	5.364	2546.4	3986.4	3338.4	792.0	4.22	2065.2	1273.2
32.0	0.64	128.0	52.9	619.2	10.70%	0.89	7.21	5.344	2556.9	3996.9	3377.7	820.8	4.12	2099.3	1278.5
33.0	0.66	129.0	52.8	604.8	11.03%	0.89	7.24	5.324	2567.2	4007.2	3402.4	835.2	4.07	2118.8	1283.6
34.0	0.68	130.0	52.7	590.4	11.36%	0.89	7.26	5.304	2577.4	4017.4	3427.0	849.6	4.03	2138.3	1288.7
35.0	0.70	131.0	52.5	561.6	11.70%	0.88	7.29	5.284	2587.5	4027.5	3465.9	878.4	3.95	2172.1	1293.7
36.0	0.72	132.0	52.3	532.8	12.03%	0.88	7.32	5.264	2597.3	4037.3	3504.5	907.2	3.86	2205.9	1298.7
37.0	0.76	133.0	52.2	518.4	12.70%	0.87	7.37	5.224	2597.1	4037.1	3518.7	921.6	3.82	2220.2	1298.6
38.0	0.78	134.0	52.1	504.0	13.03%	0.87	7.40	5.204	2606.6	4046.6	3542.6	936.0	3.78	2239.3	1303.3
39.0	0.76	135.0	51.9	475.2	13.03%	0.87	7.40	5.204	2626.1	4066.1	3590.9	964.8	3.72	2277.6	1313.0
40.0	0.82	136.0	51.8	460.8	13.70%	0.86	7.46	5.164	2625.2	4065.2	3604.4	979.2	3.68	2291.8	1312.6
41.0	0.84	137.0	51.6	432.0	14.04%	0.86	7.49	5.144	2634.3	4074.3	3642.3	1008.0	3.61	2325.1	1317.1
42.0	0.86	138.0	51.5	417.6	14.37%	0.86	7.52	5.124	2643.2	4083.2	3665.6	1022.4	3.59	2344.0	1321.6
43.0	0.88	138.0	51.4	403.2	14.71%	0.85	7.55	5.104	2632.9	4072.9	3669.7	1036.8	3.54	2353.2	1316.4
44.0	0.90	139.0	51.3	388.8	15.04%	0.85	7.58	5.084	2641.5	4081.5	3692.7	1051.2	3.51	2372.0	1320.8

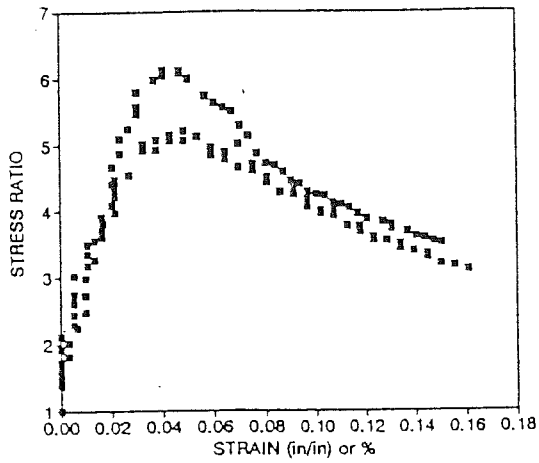
GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

DEVIATORIC STRESS @ FAILURE: 2643.2

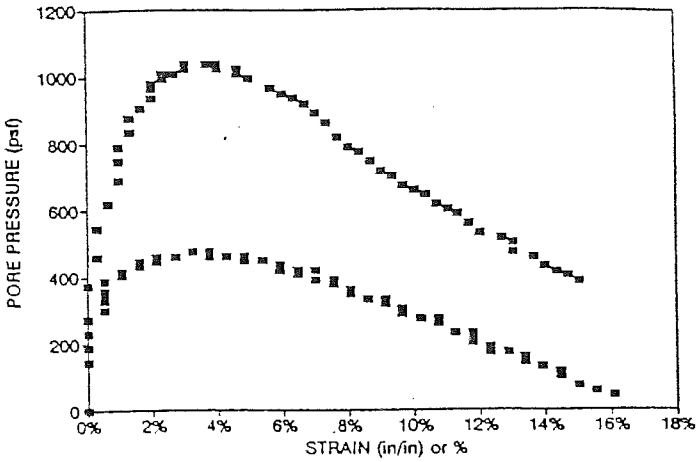
EFFECTIVE PRINCIPLE STRESS RATIO @ FAILURE: 3.59

CONSOLIDATED UNDRAINED WITH PORE PRESSURE
ASTM D4767

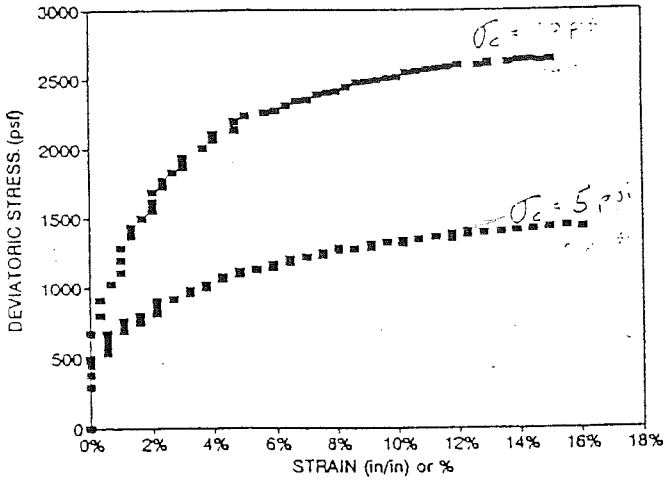
STRESS RATIO-STRAIN CURVE



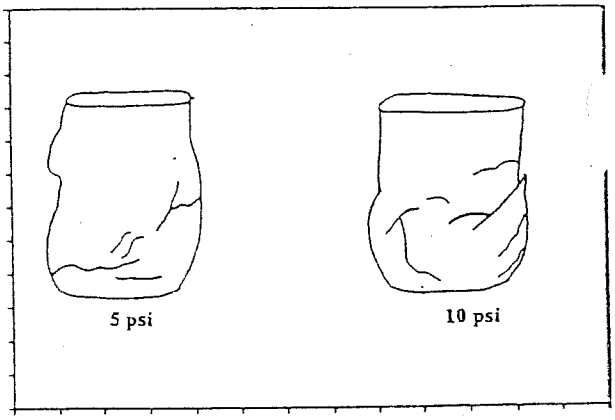
PORE PRESSURE STRAIN CURVE



STRESS-STRAIN CURVE



FAILURE SKETCH



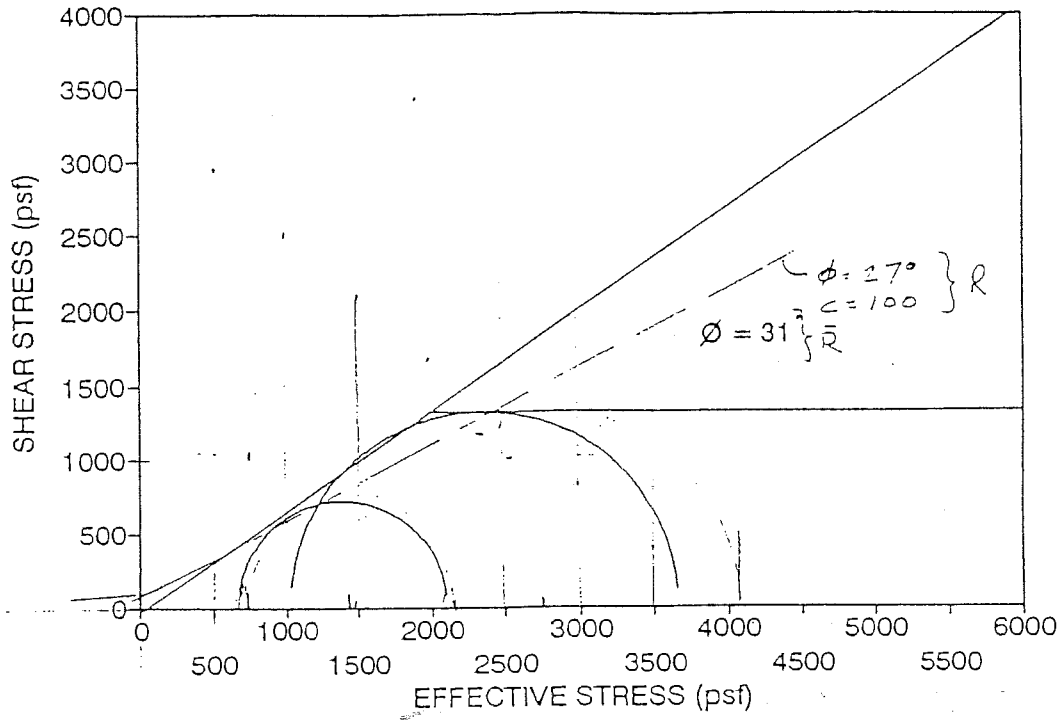
EFFECTIVE CONSOLIDATION PRESS (psi	5	10
INITIAL MOIST DENSITY (pcf)	128.2	129.4
INITIAL WATER CONTENT (%)	21.31%	21.34%
STRAIN RATE (%/min)	0.27	0.33

JCA/LAB GEOTECH/NJ
933-6141
B-8

CHECKED: JMP
REVIEWED: RMW

GOLDER ASSOCIATES INC.
MT.LAUREL,NJ

MOHR STRESS CIRCLES
ASTM D4767



* EFFECTIVE STRENGTH PARAMETERS	
Ø' =	31 °
c' =	0 psf

EFFECTIVE CONSOLIDATION PRESS (psi)	5	10
INITIAL MOIST DENSITY (pcf)	128.2	129.4
INITIAL WATER CONTENT, %	21.31%	21.34%

CHECKED	JMP
REVIEWED	RMW

JCA/LAB GEOTECH/NJ
933-6141
B-8

GOLDER ASSOCIATES INC
MT.LAUREL,NJ

ATTERBERG LIMITS
ASTM D-4318

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	SAMPLE #:	B-8
PROJECT NO.:	933-6141	DEPTH:	30'-32'

SAMPLE PREPARATION

Wet or Dry	WET
Minus #40 Sieve	Y/N

		PLASTIC LIMIT		NATURAL MOISTURE
Tare Number:		N-2	N-7	23
Weight of Wet Soil & Tare	(W1)	40.66	40.34	48.53
Weight of Dry Soil & Tare	(W2)	38.60	38.36	41.80
Weight of Tare	(W3)	31.79	31.57	20.69
Weight of Water	(W4=W1-W2)	2.06	1.98	6.73
Weight of Dry Soil	(W5=W2-W3)	6.81	6.79	21.11
Water Content (%)	(W4/W5)*100	30.2%	29.2%	31.9%

		LIQUID LIMIT		
Number of Blows		24	26	
Tare Number:		26C	CH-9	
Weight of Wet Soil & Tare	(W6)	28.63	33.23	
Weight of Dry Soil & Tare	(W7)	25.47	28.99	
Weight of Tare	(W8)	20.12	21.88	
Weight of Water	(W9=W6-W7)	3.16	4.24	
Weight of Dry Soil	(W10=W7-W8)	5.35	7.11	
Water Content (%)	(W9/W10)*100	59.1%	59.6%	AVERAGE
LL = Wn (N / 25)^.121		58.77	59.92	59.35

NOTE: USCS Classification based upon material passing #40 sieve only.

LIQUID LIMIT	59
PLASTIC LIMIT	30
PLASTICITY INDEX	30
MOISTURE CONTENT	31.9%
LIQUIDITY INDEX	0.07

Description: Red

USCS: CH

DATE:	6/14/94
TECH:	TK
REVIEW:	RMW

GOLDER ASSOCIATES I
MT. LAUREL, NJ

ASTM GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2216 and D2217

PROJECT TITLE:	JCA/LAB GEOTECH/NJ	Sample No.:	B-3 50'-52'	E34CJAS002
PROJECT NUMBER:	933-6141	Sample ID.:	BULK	

WATER CONTENT (Delivered Moisture)

Tare no.		L-5
Wt soil & tare,moist	(WT1)	443.29
Wt soil & tare,dry	(WT2)	389.16
Wt tare	(WT3)	191.95
Wt moisture	(WT4=WT1-WT2)	54.13
Wt dry soil	(WT5=WT2-WT3)	197.21
% WATER	(WT6/WT5*100)	27.45%

% PASSING #10 SIEVE

Total Wt	(WT6)	197.21
Wt Split #10	(WT7)	194.04
% PASSING #10	(WT7/WT6*100)	98.4%

USCS

	SIEVE	wt ret	% ret ((WT Ret/WT6)*100)	% PASS	SIEVE	
coarse gravel	3.000		0.00%	100.00%	3.000	coarse gravel
	1.500		0.00%	100.00%	1.500	
	1.000		0.00%	100.00%	1.000	
fine gravel	0.750		0.00%	100.00%	0.750	fine gravel
	0.375		0.00%	100.00%	0.375	
coarse sand	#4	0.25	0.13%	99.87%	#4	coarse sand
medium sand	#10	3.35	1.70%	98.30%	#10	medium sand

SAMPLE PREPARATION FOR HYDROMETER ANALYSIS

% Pass #10 Sieve	98.30	Initial Moist Wt.	70.37
Specific Gravity (ASTM D854-58)	2.65	Calculated Dry Wt	70.13
ml Dispering Agent Used	125	(40ml Na(PO4)n per 1000ml H2O)	

WATER CONTENT (Hygroscopic #10)

Tare no.		1-50
Wt soil and tare,moist	(WT1)	37.80
Wt soil&tare,dry	(WT2)	37.74
Wt tare	(WT3)	20.50
Wt moisture lost	(WT1-WT2)	0.06
Wt dry soil,final	(WT2-WT3)	17.24
% HYGROSCOPIC MOISTURE	(WT1/WT2)*100	0.3%

% PASSING 200 SIEVE

Tare no.		B-3
Wt soil and tare,dry (wt,dry)	(WT1)	267.24
Wt soil&tare,wash (wt,wash)	(WT2)	209.14
Wt tare	(WT3)	197.11
Wt fines lost (wt,dry-wt,wash)	(WT1-WT2-WT3)	58.10
Wt dry soil, (wt,dry-wt,tare)	(WT1-WT3)	70.13
% FINES LOST	(WT4/WT5)*100	82.8%

PERCENT BETWEEN #10 AND #200 SIEVE CALCULATION

SIEVE	CUMUL WT. RETAINED	CUMUL WT. RET. CORR	PERCENT PASSING
#10	0.00	1.21	98.30%
#20	0.72	1.93	97.29%
#40	1.92	3.13	95.61%
#60	3.68	4.89	93.14%
#100	6.34	7.55	89.41%
#200	11.49	12.70	82.19%

LL	
PL	
PI	
Gs	

DATE	TIME	ET (min)	RDNG R	TEMP T	TEMP.COR K	HYD.RDNG. H
06/13/94	08:45	2.00	60.0	19.00	0.014	5.00
	08:47	4.00	58.0	19.00	0.014	5.00
	08:51	8.00	56.0	19.00	0.014	5.00
	08:58	15.00	55.0	19.00	0.014	5.00
	09:13	30.00	51.0	19.00	0.014	5.00
	09:43	60.00	48.0	18.50	0.014	5.00
	10:43	120.00	45.0	18.50	0.014	5.00
	12:43	240.00	40.5	19.00	0.014	4.50
	16:43	480.00	33.5	19.00	0.014	4.50
06/14/94	08:43	1440.0	14.0	21.00	0.013	3.50

Grain Size Percentages

% C GRVL	0.0%
% F GRVL	0.1%
% C SAND	1.6%
% M SAND	2.7%
% F SAND	13.4%
% FINES	82.2%
% TOTAL	100.00%

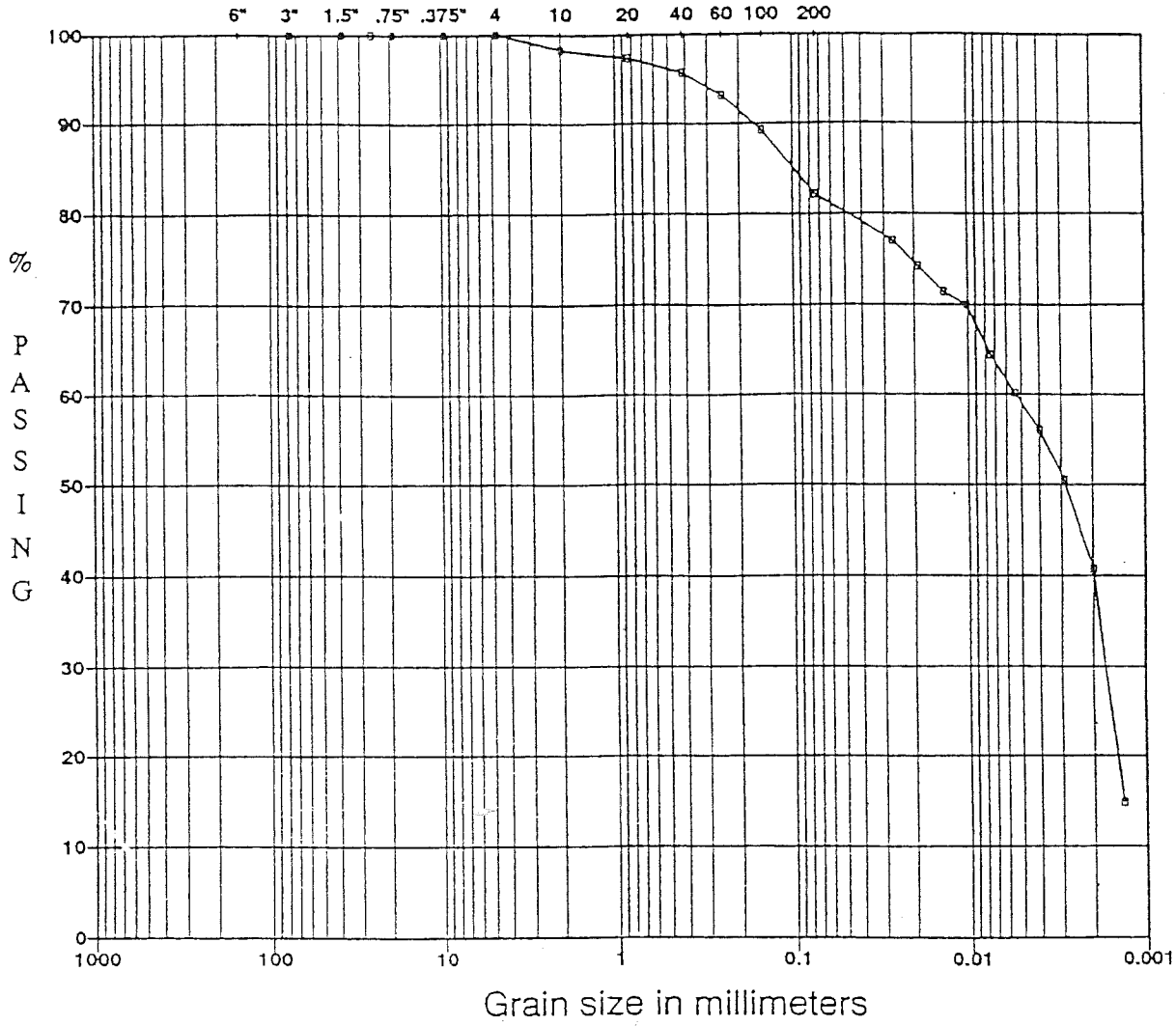
ET (min)	RDNG,C	EFF LTH	K	A	PAR DIA	%FINER
2.00	55.00	7.3	0.014	1.00	0.026	77.1
4.00	53.00	7.6	0.014	1.00	0.019	74.3
8.00	51.00	7.9	0.014	1.00	0.014	71.5
15.00	50.00	8.1	0.014	1.00	0.010	70.1
30.00	46.00	8.8	0.014	1.00	0.007	64.5
60.00	43.00	9.2	0.014	1.00	0.005	60.3
120.00	40.00	9.7	0.014	1.00	0.004	56.1
240.00	36.00	10.4	0.014	1.00	0.003	50.5
480.00	29.00	11.5	0.014	1.00	0.002	40.7
1440.00	10.50	14.7	0.013	1.00	0.001	14.7

WET COLOR: Red
DESCRIPTION: FINES, some f sand

GOLDER ASSOCIATES INC	TECH	TK	CHECKED	RDD
MT. LAUREL, NJ	DATE	6/14/94	REVIEWED	RMW

PARTICLE SIZE DISTRIBUTION ASTM D-421 AND 422

US STANDARD SIEVE OPENING SIZES



COBBLES	Coarse	Fine	Cor	Med	Fine	FINES (Silt and Clay)
	GRAVEL		SAND			

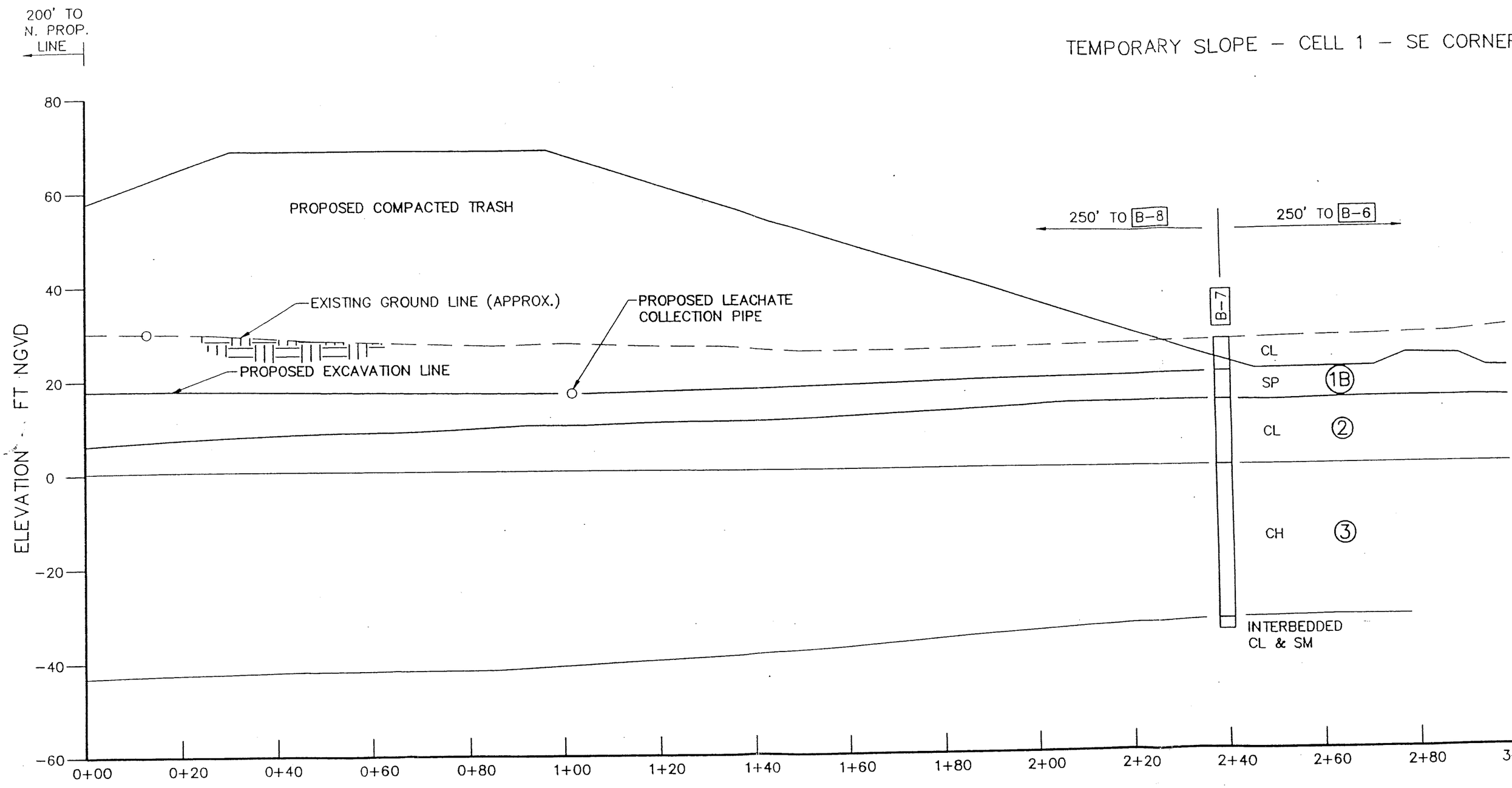
SAMPLE ID	W%	LL	PL	PI	Gs	DESCRIPTION
B-8	27.4					Red
50'-52'	Date Tested:	6/14/94				FINES,
E94CJAS002						some f sand
TECHNICIAN:	TK	DATE: 6/18/94		CHECKED: RDD		REVIEWED: RMW

JCA/LAB GEOTECH/NJ
933-6141

GOLDER ASSOCIATES INC.
MT. LAUREL, NJ

JCA

APPENDIX E
Sections

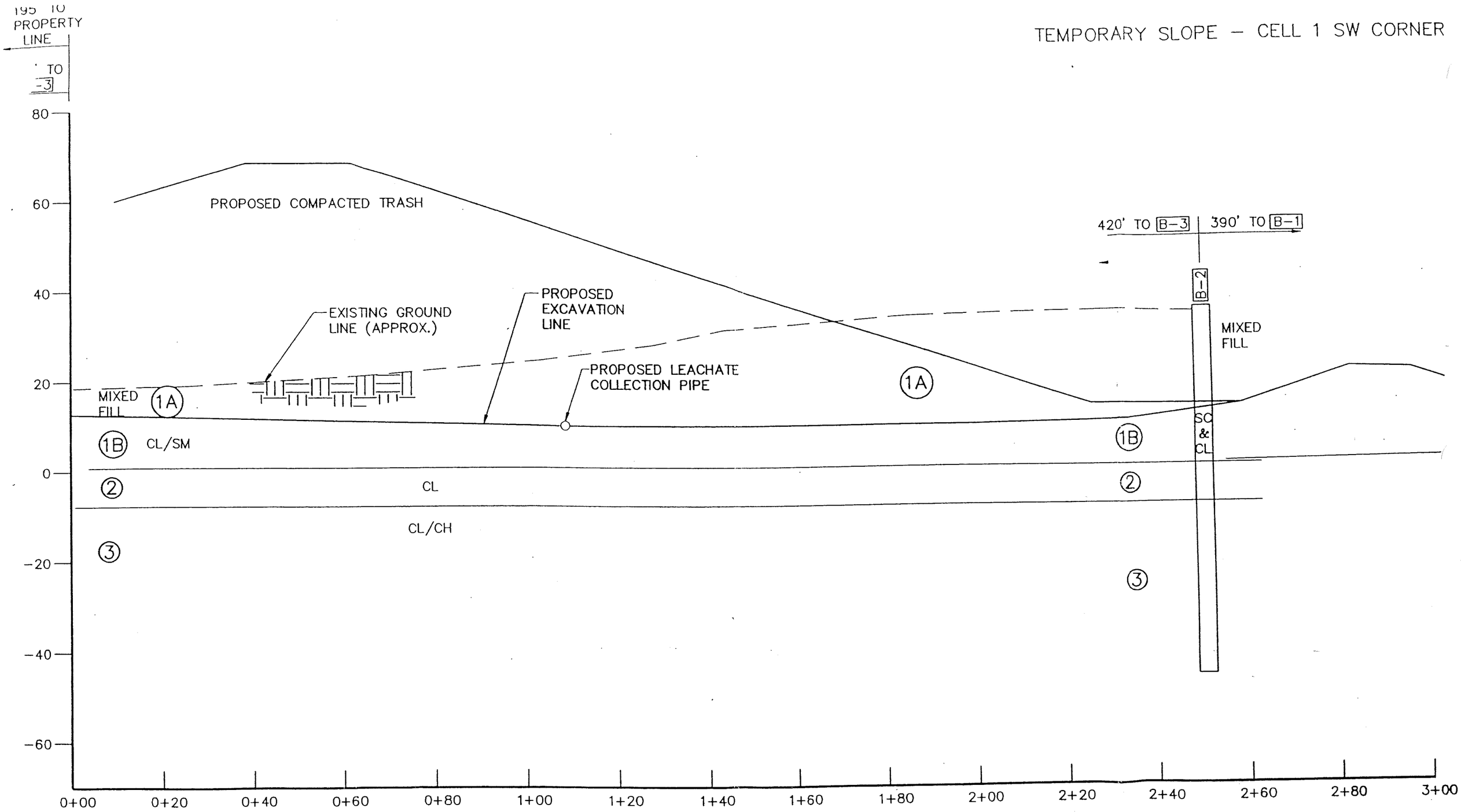


① STRATUM NO.

C & J LANDFILL

SECTION 1

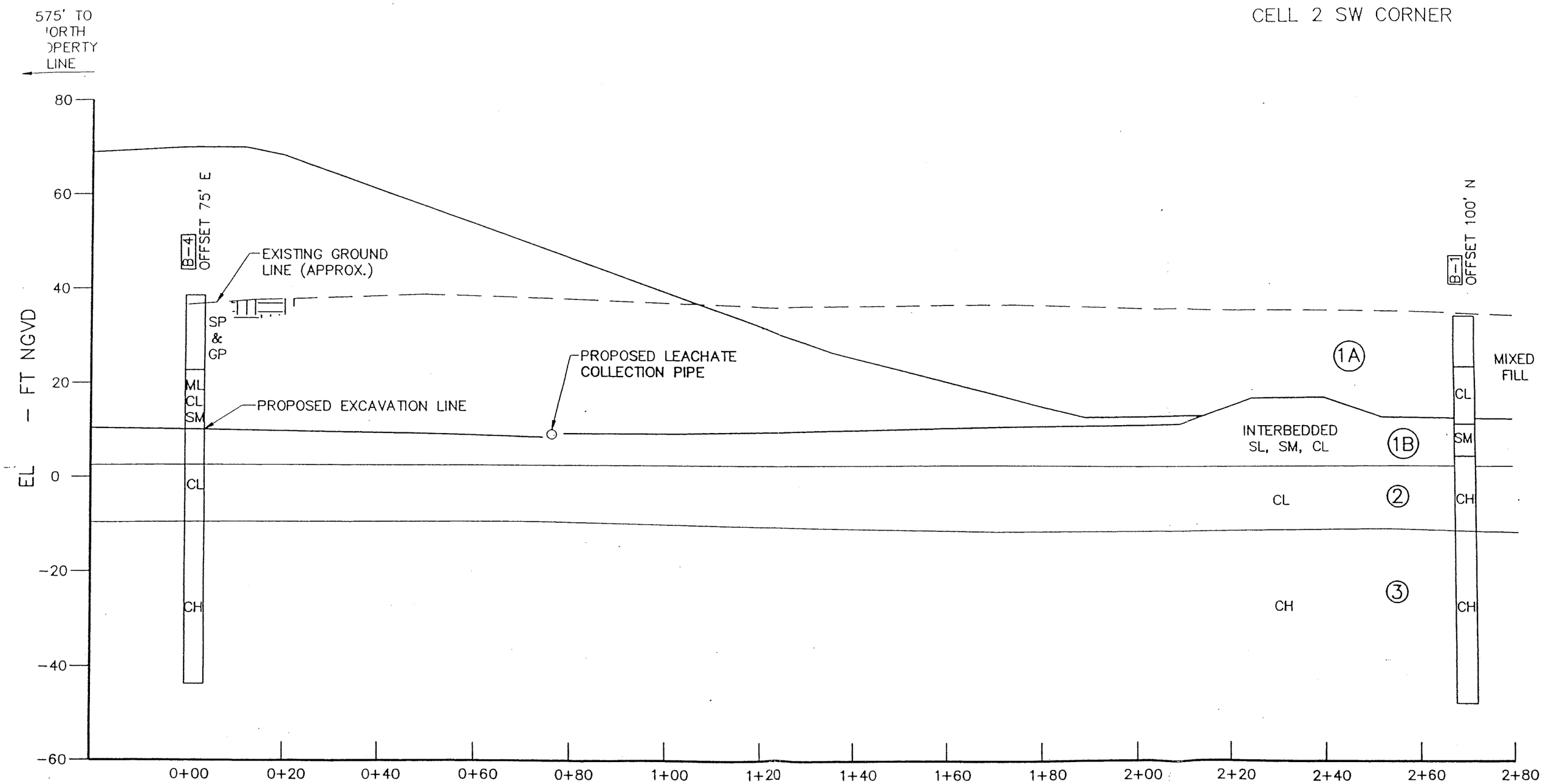
TEMPORARY SLOPE – CELL 1 SW CORNER



C & J LANDFILL

SECTION 2

SCALE: 1" = 20'



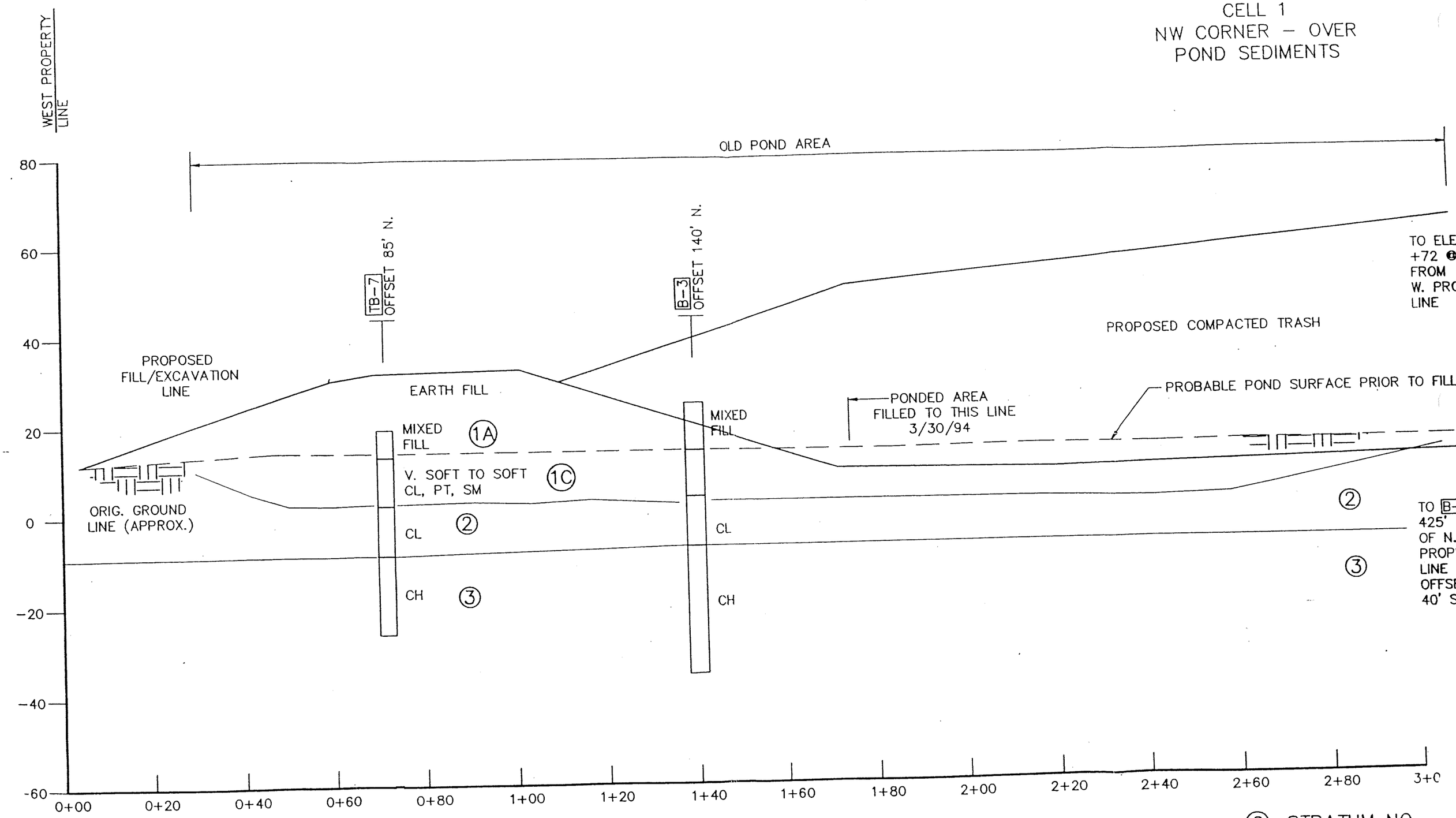
NOTE: THIS SECTION IS AN EXTENSION OF SECTION 2 LINE FOR SW CORNER – CELL 1.

① STRATUM NO.

C & J LANDFILL

SECTION 3

SCALE: 1" = 20'



2 STRATUM NO.

C & J LANDFILL

SECTION 4

SCALE: 1" = 20'

ATTACHMENT B

DUFFIED ASSOCIATES, INC., "DELAWARE RECYLCABLE PRODUCTS LANDFILL, CELL 4 GEOTECHNICAL EXPLORATION" 21 OCTOBER 1994

DUFFIELD ASSOCIATES INC
CONSULTANTS IN THE GEOSCIENCES

OFFICES IN
WILMINGTON, DE
ELKTON, MD

JAMES F. DUFFIELD P.E.
JEFFREY M. BROSS P.E.
GLENN K. ELLIOTT P.G.
R. DAVID CHARLES P.E.
RANDALL M. HORNE P.E.

October 21, 1994

Mr. Steven J. Trettel, P.E.
Vice President
Solid Waste Services
GZA GeoEnvironmental, Inc.
320 Needham Street
Newton Upper Falls, MA 02164

W.O. 2938.GB
RE: Delaware Recyclable Products
Landfill Cell 4
Geotechnical Exploration

Dear Mr. Trettel,

Attached is our summary for the geotechnical exploration, performed as part of the GZA GeoEnvironmental design evaluation for planned Cell 4 of the Delaware Recyclable Products Landfill, located near Minquadale, Delaware. It is our understanding that you will incorporate the data and evaluation into the design report for Cell 4.

Duffield Associates appreciates the opportunity to have worked with GZA GeoEnvironmental on this project. If you have any questions regarding the summary or if we can be of further assistance, please contact us.

Very truly yours,

DUFFIELD ASSOCIATES, INC.

G. K. Elliott

Glenn K. Elliott, P.G.
Geologist

GKE:cbf
GKE18/2938GB.LTR

Enclosure: Summary

5400 LIMESTONE ROAD, WILMINGTON, DELAWARE 19808 (302) 239-6634 FAX (302) 239-8485

- September 1992 - GeoMechanics, Inc. performed 13 continuous sample tube borings, designated GM-12, 14, 15, 17, 19, 20, 21, 22, 25, 26, 27, 28 and 29. These borings penetrated to depths, ranging from 29 feet (GM-15 & 17) to 48 feet (GM-28) below existing ground surface grade.

To supplement these existing data, GZA GeoEnvironmental performed 7 Standard Penetration Test exploration borings (ASTM: D 1586), designated TB-GZA-1 through 7, and 9 trackhoe excavated test pits, designated TP-GZA-A through H, at selected locations throughout the site. In addition, 2 inch diameter, PVC observation wells were installed in the boreholes at TB-3, 5 and 6. The purpose of the exploration borings and test pits was to provide a comparison with the previously performed borings and to obtain samples of the subsurface soils as an indication of subsurface stratigraphy and as a basis for estimation of engineering characteristics and properties.

- Exploration Borings

  Drilling for the exploration borings was performed by the Walton Corporation, between 11 and 18 July 1994, using a truck mounted, CME-55 drill rig and hollow stem augers. The borings were drilled to depths ranging from 3 feet (auger refusal) at GZA-4A to 100 feet at GZA-1. Typically, drilling depths ranged from 35 feet to 40 feet below existing ground surface grade. Subsurface soil samples were obtained at regular depth intervals, using a standard, 2 inch diameter split spoon sampling device (ASTM: D 1586). In the field logging of the samples and technical guidance during drilling were provided by Duffield Associates, Inc. Descriptive logs for the exploration borings are attached.

- Test Pits

  Test pit excavation was performed on 19 July 1994, utilizing a track mounted hoe and operator provided by Sanifill. Test pits were excavated to depths ranging from 5 feet (practical refusal) at GZA-A1 to 18.5 feet at GZA-B (limit of reach). In the field logging of observed subsurface conditions was performed by Duffield Associates. Descriptive logs for the test pits are attached.

A field survey was performed by VanDemark & Lynch, Inc. to establish the locations (Delaware State Plane Coordinate System) and elevations (NGVD - National Geodetic Vertical Datum of 1929) for the exploration borings/test pits.

Site Geology & Stratigraphy

The Delaware Recyclable Products Landfill is located at a "mined out" soil borrow site. This former operation excavated Columbia Formation sands for off-site use. Subsurface conditions, as encountered by the exploration borings and test pits performed in the Cell 4 area, are consistent with this site history. Sediments, having textural characteristics of the Columbia sands were encountered by only 5 of the borings/test pits, performed for this evaluation and, possibly, 2 of the previously performed exploration borings, as follows:

Boring/Pit	Stratum Depth Interval	Boring/Pit	Stratum Depth Interval
GZA-1	0 - 7 Ft.	GZA-D	2 - 8 Ft.
GZA-2	1.2 - 5.4 Ft.		
GZA-3	0 - 10 Ft.	GM-25	3.3 - 8 Ft.
GZA-7	8 - 11.1 Ft.	GM-26	0 - 8.4 Ft.

These borings/test pits are generally located along site roads (GZA-2 and 3, and GM-25) or in the central area of Cell 4 (GZA-1 and D, and GM-26). As such, these residual sediments appear to be localized and, possibly, reworked.

Across the remainder of the Cell 4 area, the exploration data indicate that subsurface geology to a depth of 100 feet can be generalized into 3 major strata: a surfical stratum of reworked soil and miscellaneous fill, an underlying stratum of Potomac silt-clay with interlayered sand, and a deep Potomac sand stratum.

- Surficial Fill Stratum

  Currently, the Cell 4 area is occupied by several large piles of various materials, including: used hot mix in the northeasterly corner, tree debris in the central area, boulder size rock debris along the easterly perimeter road, and miscellaneous soil in the central area and southeasterly corner. In addition to these piles, the exploration data indicate the Cell 4 is generally veneered with a surfically stratum of reworked soil and miscellaneous fill, extending to depths ranging from less than 1 foot to possibly in excess of 18 feet at GM-1.

  As encountered by the exploration borings/test pits, the fill can be characterized as variably graded soil (including sand, silt, clay and gravel) with various amounts of miscellaneous debris, including slag, glass, wood, brick, metal, hot mix, rock and concrete demolition debris. In general, the data indicate that stratum thickness and debris content increase from south to north across the Cell 4 area.

Designation Substratum	Generalized Elevation Interval (NGVD)	Indicated Relative Consistency
Upper	Top to 13 ft.	Stiff - Medium Stiff (N value: range 3-21, median 12)
Middle	13 ft. - 0 ft.	Very Stiff - Stiff (N value: range 11-27, median 16)
Lower	0 ft. - bottom	Very Stiff - Hard (N value: range 17-38, median 24)

o Deeper Sand Stratum

The "upper Potomac" stratum is indicated to be underlain by a stratum of Potomac sands, below approximately elevation -43 feet. This deeper sand stratum was encountered by only 2 borings, performed in the Cell 4 area (GZA-1 and MW-6(D)). Texturally, these sands can generally be characterized as fine to medium sand with little to some (10-35%) silt. The full thickness of this stratum has not been determined, although exploration boring GZA-1 penetrated approximately 30 feet. Based on stratigraphic position, it appears that this stratum corresponds, to the up dip end of the "lower hydrologic zone", a regional aquifer of the Potomac Formation.

DESIGN CRITERIA AND RECOMMENDATIONS

1. The surficial fill stratum and those soils, identified as possible Columbia sands, will be excavated during construction of Cell 4. The debris materials in the fill will have to be disposed of in accordance with State of Delaware regulations, possibly incorporated into the planned industrial landfill. If the materials can be segregated during excavation, debris free soils, particularly the Columbia sands, may be used for landfill cover.

2. As planned, Cell 4 will be excavated into upper Potomac stratum, below the existing groundwater-table. The generally silt-clay texture of these soils (estimated permeability equal to or less than 1×10^{-7} cm/sec) and the indicated localized extent of the interbedded sand layers, indicate that groundwater, encountered during construction, can generally be managed with routine construction procedures, such as sumping.

DUFFIELD ASSOCIATES, INC.
Consultants in the Geosciences

Boring No. GZA-1

Project	Delaware Recyclable Products Landfill Cell 4	Project No. 2938.GB	Logged By LDK
Drilling Agency Walton Corporation	Driller G. Truver	Date Started 07/11/94 Date Finished 07/12/94	
Drilling Equipment CME-55, Truck Mounted Hollow Stem Augers	Weather 75°+, Sunny	Surface Elevation 26.2 Ft.	Datum NGVD
Drilling Procedures Standard Penetration Test (24 inch drive internal)		Groundwater Observations	

Groundwater Observations			
Time			
Level			
Bottom			

Spl. No.	Sample Depth (ft) FROM	Sample Depth (ft) TO	Strata Depth (ft) FROM	Strata Depth (ft) TO	Rec'y (ft.)	No. Blows per 6 inches	Sample Description
			0				Medium sand with some gravel; trace silt
	1.0	3.0			1.7'	10-9-8-8	Brown medium sand with little course sand, little gravel, trace silt
2	4.0	6.0			1.1'	4-7-9-8	Brown medium sand with trace silt, little gravel (moist bottom 0.8')
3A	6.5	7.0		7.0	1.6'	5-5-7-9	Brown medium sand with little course sand, trace silt and clay
B	7.0	8.5	7.0				Red-gray clay with trace fine sand [Potomac Formation]
4	9.0	11.0			1.3'	4-6-9-14	Red-gray-brown clay with trace fine sand
5	14	16.0		16.3±	1.3'	9-8-11-12	Same
6	16.5	18.5	16.3±	17.5	1.8'	4-8-10-12	Gray silt with little clay, trace fine sand
			17.5	18.8±			Brown silt with trace fine sand, trace clay
7	19.0	21.0	18.8±		1.0'	12-16-21-16	Red silt and fine sand; trace mica at bottom
			23±				(wet at 19 feet)

GENERAL NOTES:

Boring No. GZA-1

DUFFIELD ASSOCIATES, INC.
Consultants in the Geosciences

Boring No. GZA-1

Delaware Recyclable Products Landfill Cell 4		Project No. 2938.GB	Logged By LDK
Drilling Agency Walton Corporation	Driller G. Truver	Date Started 07/11/94 Date Finished 07/12/94	
Drilling Equipment CME-55, Truck Mounted Hollow Stem Augers	Weather 75°+, Sunny	Surface Elevation 26.2 Ft.	Datum NGVD
Drilling Procedures Standard Penetration Test (24 inch drive internal)		Groundwater Observations	

Groundwater Observations			
Time			
Level			
Bottom			

Spl. No.	Sample Depth (ft) FROM	Sample Depth (ft) TO	Strata Depth (ft) FROM	Strata Depth (ft) TO	Rec'y (ft.)	No. Blows per 6 inches	Sample Description
17B			69.4	72.5±			Red fine sand with little to some silt, trace clay
18A	74	75.3	72.5±	74.3	1.3'	25-80-100/4"	Gray silt with little clay, little fine sand
			74.3	74.7			Gray-brown fine sand with some silt
C			74.7				Tan fine sand with little trace silt
19	79	81			2.0'	50-74-55-55	Tan-gray fine sand with some medium sand, little to trace silt
20	84	86		84.3		6-72-84-45	Same
A			84.3	84.7	2.0'		Gray clay with trace fine sand
			84.7	85.3			Brown fine sand with little silt, trace medium sand
B			85.3				Gray fine sand with little to some medium sand, some silt
21	89	90.3		91.5±	1.3'	14-54-100/.3'	Gray fine sand with some medium sand, little to some silt; marcasite/pyrite aggregates
22	94	96	91.5±		1.9'	6-12-19-21	Gray-green fine sand with some medium sand, some silt, trace clay
23	98	100			1.8'	14-20-42-35	Green fine sand with some medium sand, some silt, trace clay

GENERAL NOTES:
(2) Samples, Nos. 12 - 17: washed out before sampling
(3) 07/11/94 - halted drilling for night, augers at 74 ft.
(4) 07/12/94 - overnight depth to water in augers = 23.5 ft.
(5) Gamma log, performed through augers by Appalachian Coal Services for Geosyntec Consultants (1 hr. down time)
(6) Grouted borehole (bentonite amended cement) as pulled augers.

Boring No. GZA-1

DUFFIELD ASSOCIATES, INC.
Consultants in the Geosciences

Boring No. GZA-3

Project	Delaware Recyclable Products Landfill Cell 4	Project No. 2938.GB	Logged By LDK
Drilling Agency Walton Corporation	Driller Gary Truver	Date Started 7/18/94 Date Finished 7/18/94	
Drilling Equipment CME-55 Truck Mounted Hollow Stem Augers	Weather 85°, Cloudy	Surface Elevation 32.3 ft.	Datum NGVD
Drilling Procedures Standard Penetration Test (24 inch drive interval)		Groundwater Observations	

Groundwater Observations			
Time			
Level			
Bottom			

Spl. No.	Sample Depth (ft) FROM	Sample Depth (ft) TO	Strata Depth (ft) FROM	Strata Depth (ft) TO	Rec'y (ft.)	No. Blows per 6 inches	Sample Description
1	1.0	3.0	0	3.5±	1.0'	11-10-9-10	Brown fine sand, some silt, trace gravel [HNu = 0]
	4.0	6.0	3.5±		1.5'	30-47-37-42	Yellow-brown, medium sand, little gravel, little coarse sand, little fine sand, trace silt [HNu = 0]
3	6.5	8.5			1.5'	8-12-12-10	Same (some gravel, bottom wet) [HNu = 0]
4	9.0	11.0		10.0		9-7-9-8	Same
			10.0	11.5±	1.2'		Orange silt with little clay, trace fine sand, trace gravel [HNu = 0]
5A	14.0	16.0	11.5±	15.7	1.0'	3-5-7-10	Gray clayey silt, trace fine sand [HNu = 0]
B			15.7	16.4±			Brown fine sand, little silt [HNu=0]
6	16.5	18.5	16.4±		1.5'	3-6-10-13	Gray silty clay, little-trace fine sand [HNu = 0]
7	19.0	21.0		22.5±	1.5'	3-8-13-14	Same [HNu = 0]
8	24.0	25.0	22.5±	27±	1.8'	3-5-7-9	Red and gray silt and fine sand, little clay [HNu = 0]
9A	29.0	31.0	27±	29.5	1.8'	5-7-8-9	Brown silt, some fine sand [HNu = 0]
B			29.5	30.2			Brown fine sand, some silt [HNu = 0]
C			30.2	32.5±			Gray fine sand, some silt [HNu = 0]
10A	33.0	35.0	32.5±	33.5	1.3'	4-8-11-15	Gray and red silt, some clay, trace fine sand [HNu = 0]
			33.5				Gray silt, little clay, little sand [HNu = 0]

GENERAL NOTES:

Boring No. GZA-3

DUFFIELD ASSOCIATES, INC.
Consultants in the Geosciences

Boring No. GZA-4

Project: Delaware Recyclable Products Landfill Cell 4		Project No. 2938.GB	Logged By LDK
Drilling Agency Walton Corporation	Driller G. Truver	Date Started 7/18/94 Date Finished 7/18/94	
Drilling Equipment CME 55, Truck Mounted Hollow Stem Augers	Weather 80°, Cloudy	Surface Elevation GZA-4: 31.5 Ft. GZA-4A: 31.7 Ft.	Datum NGVD
Drilling Procedures Standard Penetration Test (24 inch drive interval)		Groundwater Observations Time Level Bottom	

Spl. No.	Sample Depth (ft) FROM	Sample Depth (ft) TO	Strata Depth (ft) FROM	Strata Depth (ft) TO	Rec'y (ft.)	No. Blows per 6 inches	Sample Description
			0.0				6" stone; fine sand with little gravel
	1.0	3.0			1.5'	11-14-11-11	Brown fine sand with little to some silt, trace clay, trace gravel, trace medium to coarse sand [HNu=0]
2A	4.0	6.0		5.3	1.4'	2-4-7-20	Brown fine sand with little to some silt, little clay, trace gravel, trace medium to coarse sand [HNu=0]
B			5.3				Black silt and wood with trace brick, trace gravel, trace fine to coarse sand [HNu=0]
3	6.5	8.5			0.5'	6-7-8-7	Miscellaneous fill -- black wood [HNu=0]
4	9.0	11.0			0.7'	18-10-12-12	Same (with plastic) [HNu=0]
							Auger refusal at 11± ft., terminated boring
GZA-4A							Offset 100± ft. east of TB-4
							Auger refusal at 3 ft., terminated boring

GENERAL NOTES: (1) HNu: Sample screened with an HNu Model PI 101 Photoionization Detector with 11.7 ev lamp; reported as PID units.

Boring No. GZA-4

DUFFIELD ASSOCIATES, INC.
Consultants in the Geosciences

oring No. GZA-5

ct	Delaware Recylclable Products Landfill Cell 4	Project No. 2938.GB	Logged By WHS
Drilling Agency Walton Corporation	Driller Gary Truver	Date Started 7/14/94 Date Finished 7/14/94	
Drilling Equipment CME 55, Truck Mounted Hollow Stem Augers	Weather Clear	Surface Elevation 32.5 Ft.	Datum NGVD
Drilling Procedures Standard Penetration Test (24 inch drive interval)		Groundwater Observations	

Groundwater Observations			
Time			
Level			
Bottom			

Spl. No.	Sample Depth (ft) FROM	Sample Depth (ft) TO	Strata Depth (ft) FROM	Strata Depth (ft) TO	Rec'y (ft.)	No. Blows per 6 inches	Sample Description
9	33.0	35.0		34.7		5-8-12-18	Gray silty clay, trace to little fine sand; trace lignite [HNu=0]
			34.7				Red & gray clay, trace fine sand
							Set 2 inch diameter, PVC observation well screen interval: 28.9 - 33.9 ft. Depth sand pack interval: 27 - 34.2 ft. Depth grout interval: 0 - 27 ft. Depth top of well elevation: 35.4 ft. (NGVD)

ERAL OTES:
(1) Refusal at 3.5 ft.±; off-set 5 ft± and restart.
(2) HNu: sample screened with an HNu Model PI 101 Photoionization Detector with 11.7 ev lamp; reported as PID units.
(3) Sample 6 - wet on spoon at 16.5 feet.

Boring No. GZA-5

DUFFIELD ASSOCIATES, INC.
Consultants in the Geosciences

Boring No. GZA-6

Project Delaware Recyclable Products Landfill Cell 4		Project No. 2938.GB	Logged By WHS
Drilling Agency Walton Corporation	Driller Gary Truver	Date Started 7/14/94 Date Finished 7/14/94	
Drilling Equipment CME 55, Truck Mounted Hollow Stem Augers	Weather Clear	Surface Elevation 32.2 ft.	Datum NGVD
Drilling Procedures Standard Penetration Test (24 inch drive interval)		Groundwater Observations Time Level Bottom	

Spl. No.	Sample Depth (ft) FROM	Sample Depth (ft) TO	Strata Depth (ft) FROM	Strata Depth (ft) TO	Rec'y (ft.)	No. Blows per 6 inches	Sample Description
9	29.0	31.0	27±		1.2'	3-5-7-10	Gray and red clay, little sand [HNu=0]
10	33.0	35.0			1.8'	4-5-7-10	Same [HNu=0]
							Set 2 inch diameter, PVC observation well washed out to 34 ft.± screen interval: 27.8 - 32.8 ft. Depth sand pack interval: 25.7 - 34 ft. Depth grout interval: 0 - 25.7 ft. Depth top of well elevation: 34.0 ft. (NGVD)

GENERAL NOTES:
(1) HNu: sample screened with a HNu Model PI 101 Photoionization Detector with 11.7 ev lamp; reported as PID units.
(2) Sample 8 - wet on spoon at 20.5 feet.

Boring No. GZA-6

DUFFIELD ASSOCIATES, INC.
Consultants in the Geosciences

TEST PIT DESCRIPTIVE LOG

PROJECT: Delaware Recyclable Products Landfill Cell 4 — W.O. No.: 2938.GB

CLIENT: GZA GeoEnvironmental, Inc. — DATE: 07/19/94

LOGGED BY: MSJ — CHECKED BY: GKE

Test Pit No.	Depth Range (ft.)	Generalized Soil Description
TP-A1	0 - 0.2	Topsoil and root material (brown sandy silt)
	0.2 - ---	Miscellaneous fill and debris -- varicolored silt and fine to medium sand, trace gravel [sample no. 1] and concrete pieces (maximum 3 ft. length), brick, metal and bituminous concrete fragments (loose to stiff)

NOTES:
(1) Test pit is located in level field south of billboard and west of bituminous concrete stockpile.
(2) Excavation terminated at 6 feet below ground surface (practical refusal).
(3) Strong "petroleum-like" odor noticed upon start of excavation, strength of odor diminished over time.
(4) No seepage or caving observed at completion.

Test Pit No.	Depth Range (ft.)	Generalized Soil Description
TP-A2	0 - 0.2	Topsoil and root mat.
	0.2 - ---	Varicolored silt and fine to medium sand, trace gravel and concrete pieces (maximum 5 feet length), brick, wood, glass & wire (loose to stiff).

NOTES:
(1) Test pit location 30± feet east of TP-A1.
(2) Slight organic odor noticed during excavation.
(3) Excavation terminated at 5 feet below surface (practical refusal).
(4) No seepage or caving observed at completion.

DUFFIELD ASSOCIATES, INC.
Consultants in the Geosciences

TEST PIT
DESCRIPTIVE LOG

PROJECT: Delaware Recyclable Products Landfill Cell 4 W.O. No.: 2938.GB

CLIENT: GZA GeoEnvironmental, Inc. DATE: 07/19/94

LOGGED BY: MSJ CHECKED BY: GKE

Test Pit No.	Depth Range (ft.)	Generalized Soil Description
TP-C	0 - 0.2	Mulch with trace miscellaneous debris.
	0.2 - 3	Fill -- varicolored (red, light gray and light brown) silty clay, trace fine sand; with lenses (1 foot thick, 4 feet long) of sand, silt and gravel (stiff) [Sample No. 1].
	3 - 8	Light gray and red clay (stiff) [Sample No. 2].
	8 - 9.5	Varicolored (light gray, red and light brown) clay, trace to little fine sand; with light brown mottles (stiff) [Sample No. 3]
	9.5 - 13	Varicolored (red, light gray, purple, light brown) clay, trace fine sand (stiff) [Sample No. 4].
	13 - 14	Light brown fine sand and silt (medium)
	14 - ---	Light brown fine to very fine sand, some silt (saturated) (loose to medium dense) [Sample No. 5]

NOTES:
(1) Test pit is located in level, mulch-covered area west of maintenance building.
(2) Seepage observation and organic odor noticed from surface mulch layer.
(3) Excavation terminated at 17 feet below ground surface grade.
(4) Rapid seepage and caving at 14 feet below ground surface from all directions observed prior to complete.

DUFFIELD ASSOCIATES, INC.
Consultants in the Geosciences

TEST PIT DESCRIPTIVE LOG

PROJECT:	Delaware Recyclable Products Landfill Cell 4	W.O. No.:	2938.GB
CLIENT:	GZA GeoEnvironmental, Inc.	DATE:	07/19/94
LOGGED BY:	MSJ	CHECKED BY:	GKE

Test Pit No.	Depth Range (ft.)	Generalized Soil Description
TP-E	0 - 2	Orange brown and light brown, varicolored silt and clay, trace fine sand, trace gravel; trace root material (dry) (medium) (appears to be fill) [Sample No. 1].
	2 - 5	Gray silt and fine to very fine sand, trace gravel; with lenses (maximum 1.5 feet) of gray fine sand, little silt (medium stiff) [Sample No. 2].
	5 - 10	Varicolored (orange brown, red and light brown) silty clay, trace fine sand (medium) (appears to be fill) [Sample No. 3].
	10 - 13	Red and light gray clay, (medium stiff) [Sample No. 4].
	13 - 16.5	Dark gray silty clay; with lenses (maximum 0.25 feet thick) of fine sand (medium stiff to stiff) [Sample No. 5].
	16.5 - ---	Dark red and dark gray clay, trace fine sand, trace gravel (stiff to very stiff) [Sample No. 6].

NOTES:
(1) Test pit is located on a "plateau-like" elevated area. Observed gravelly silt-clay at surface over much of "plateau".
(2) Excavation terminated at 18 feet below ground surface.
(3) No seepage or caving observed at completion.

DUFFIELD ASSOCIATES, INC.
Consultants in the Geosciences

TEST PIT
DESCRIPTIVE LOG

PROJECT:	Delaware Recyclable Products Landfill Cell 4	W.O. No.:	2938.GB
CLIENT:	GZA GeoEnvironmental, Inc.	DATE:	07/19/94
LOGGED BY:	MSJ	CHECKED BY:	GKE

Test Pit No.	Depth Range (ft.)	Generalized Soil Description
TP-G	0 - 0.5	Topsoil and root material (dark brown silt and fine sand).
	0.5 - 5	Red and light gray clay, trace fine sand; with lenses (maximum 1.0 foot thick) of light gray clay with some fine sand (stiff) [Sample No. 1 and Bulk Sample].
	5 - ---	Red (with light gray variegations) clay, trace fine sand; with lenses (maximum 0.2 feet thick) of light brown fine sand (stiff to very stiff) [Sample No. 2].

NOTES:
(1) Test pit is located 15± feet north of drainage ditch in low area. Test pit surface elevation 8± above bottom elevation of ditch. Observed exposed clay at surface of north bank of ditch along a distance of 100± feet west of the test pit.
(2) Excavation terminated at 18 feet below ground surface.
(3) No seepage or caving observed at completion.

DELAWARE RECYCLABLE ' JCTS LANDFILL CELL 4
GEOTECHNICA. ALUATION

Table 1

Soils Laboratory Data

Exploration Boring/Test Pit[1]	Sample Depth Interval [Feet][2]	Moisture Content (as received) [%][3]	Silt-Clay Content (< No. 200 sieve) [%][4]	Textural Gradation[5]	Atterberg Limits[6] Liquid Limit [%]	Atterberg Limits[6] Plasticity Index [%]	USCS[7]
TB-GZA-1 (El. 26.2 Ft.)	1 - 3	7.5	9.8	(see Table 2)			SM-SP
	4 - 6	10.4	18.1				SM
	7 - 8.5	26.8	91.2		53.5	35	CH
	9 - 11	25.7	92.4				
	14 - 16	21.7	94.2		27	6.5	CL-ML
	16.5 - 18.5	20.6	90.7				
	19 - 21	21.2	65.2		30.5	15	CL
	28.5 - 30.5	18.5	91.1				
	34 - 36	16.1	77.8		57	27.5	CH/MH
	49 - 51	31.0	94.0				
	54 - 56	24.9	78.6				SM-SP
	79 - 81	18.3	11.1	(see Table 2)			SM
	89 - 90.3	17.9	19.7				SM
	98 - 100	15.0	30.0				
TB-GZA-2 (El. 39.1 Ft.)	1.5 - 3.5	4.3	9.1	(see Table 2)			SM-SP
	6.5 - 8.5	22.4	96.0				
	14 - 16	24.5	99.2		50.5	24.5	CH/CL
	19 - 21	25.8					
	24 - 26	26.0	97.1				
	34 - 36	13.3	88.5				
TB-GZA-3 (El. 32.3 Ft.)	1 - 3	9.8	22.3				SM
	4 - 6	3.8	9.4				SM-SW
	6.5 - 8.5	8.3	8.7	(see Table 2)			
	14 - 15.7	22.8	97.0		38	18	CL
	16.5 - 18.5	22.6	99.4				
	24 - 25	19.9	63.6				

DELAWARE RECYCLABLE PI UCTS LANDFILL CELL 4
GEOTECHNICAL EVALUATION

Table 1

Soils Laboratory Data

Exploration Boring/Test Pit[1]	Sample Depth Interval [Feet][2]	Moisture Content (as received) [%][3]	Silt-Clay Content (< No. 200 sieve) [%][4]	Textural Gradation[5]	Atterberg Limits[6] Liquid Limit [%]	Atterberg Limits[6] Plasticity Index [%]	USCS[7]
TP-GZA-E (El. 33 Ft.)	2 - 5	14.6	62.8				
	5 - 10	20.4	97.0				
	10 - 13	21.6	99.0				
	13 - 16.5	22.5	99.8				
TP-GZA-F (El. 17 Ft.)	1 - 4.5	18.3	99.9				
	4.5 - 8	21.5	99.5				
	15 - 17	19.3	76.2				
TP-GZA-G (El. 17 Ft.)	3.5 - 5	23.7	98.7				

NOTES:
1. TB = Standard Penetration Test Boring
   TP = Excavated Test Pit
   EL. = Ground Surface Elevation (NGVD)
2. Depth below existing ground surface grade at time and location of drilling/excavation.
3. ASTM: D 2216.
4. ASTM: D 1140.
5. Sieve Analysis -- ASTM: D 422
6. ASTM: D 4318
7. Unified Soil Classification System -- ASTM: D 2487
   CL Low Plasticity Clay
   CH High Plasticity Clay
   SM Silty Sand
   SP Clean, Poorly Graded Sand
   MH High Plasticity Silt
   SW Clean, Well Graded Sand

DELAWARE RECYCLABL ODUCTS LANDFILL CELL 4
GEOTECHNICAL EVALUATION

Table 1

Soils Laboratory Data

Exploration Boring/Test Pit[1]	Sample Depth Interval [Feet][2]	Moisture Content (as received) [%][3]	Silt-Clay Content (< No. 200 sieve) [%][4]	Textural Gradation[5]	Atterberg Limits[6] Liquid Limit [%]	Atterberg Limits[6] Plasticity Index [%]	USCS[7]
TB-GZA-1 (El. 26.2 Ft.)	1 - 3	7.5	9.8	(see Table 2)			SM-SP
	4 - 6	10.4	18.1				SM
	7 - 8.5	26.8	91.2				
	9 - 11	25.7	92.4		53.5	35	CH
	14 - 16	21.7	94.2				
	16.5 - 18.5	20.6	90.7		27	6.5	CL-ML
	19 - 21	21.2	65.2				
	28.5 - 30.5	18.5	91.1		30.5	15	CL
	34 - 36	16.1	77.8				
	49 - 51	31.0	94.0		57	27.5	CH/MH
	54 - 56	24.9	78.6				
	79 - 81	18.3	11.1	(see Table 2)			SM-SP
	89 - 90.3	17.9	19.7				SM
	98 - 100	15.0	30.0				SM
TB-GZA-2 (El. 39.1 Ft.)	1.5 - 3.5	4.3	9.1	(see Table 2)			SM-SP
	6.5 - 8.5	22.4	96.0				
	14 - 16	24.5	99.2				
	19 - 21	25.8			50.5	24.5	CH/CL
	24 - 26	26.0	97.1				
	34 - 36	13.3	88.5				
TB-GZA-3 (El. 32.3 Ft.)	1 - 3	9.8	22.3				SM
	4 - 6	3.8	9.4				
	6.5 - 8.5	8.3	8.7	(see Table 2)			SM-SW
	14 - 15.7	22.8	97.0				
	16.5 - 18.5	22.6	99.4		38	18	CL
	24 - 25	19.9	63.6				

DELAWARE RECYCLABLE PRODUCTS LANDFILL CELL 4
GEOTECHNICAL EVALUATION

Table 1

Soils Laboratory Data

Exploration Boring/Test Pit[1]	Sample Depth Interval [Feet][2]	Moisture Content (as received) [%][3]	Silt-Clay Content (< No. 200 sieve) [%][4]	Textural Gradation[5]	Atterberg Limits[6] Liquid Limit [%]	Atterberg Limits[6] Plasticity Index [%]	USCS[7]
TP-GZA-E (El. 33 Ft.)	2 - 5	14.6	62.8				
	5 - 10	20.4	97.0				
	10 - 13	21.6	99.0				
	13 - 16.5	22.5	99.8				
TP-GZA-F (El. 17 Ft.)	1 - 4.5	18.3	99.9				
	4.5 - 8	21.5	99.5				
	15 - 17	19.3	76.2				
TP-GZA-G (El. 17 Ft.)	3.5 - 5	23.7	98.7				

NOTES:
1. TB = Standard Penetration Test Boring
   TP = Excavated Test Pit
   EL = Ground Surface Elevation (NGVD)
2. Depth below existing ground surface grade at time and location of drilling/excavation.
3. ASTM: D 2216.
4. ASTM: D 1140.
5. Sieve Analysis – ASTM: D 422
6. ASTM: D 4318
7. Unified Soil Classification System – ASTM: D 2487
   CL Low Plasticity Clay
   CH High Plasticity Clay
   SM Silty Sand
   SP Clean, Poorly Graded Sand
   MH High Plasticity Silt
   SW Clean, Well Graded Sand

LABORATORY T[illegible]NG DATA SUMMARY

Project Na[illegible] ANIFILL DELJOYA RECYCLING LANDFILL
NEW CASTLE, DELAWARE

Reviewed by _____
Date _____
Required _____

Project No. 13731 Project Engr. SJT Assigned By SJT Date Assigned AUG 94

Boring or Test Pit No.	Sample No.	Depth ft.	Lab No.	IDENTIFICATION TESTS: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	DENSITY: γ_d MAX (pcf) / W_{opt} (%)	Perme-ability cm/sec	STRENGTH TESTS: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	CONSOL. $C_c / 1 + e_0$	Laboratory Log and Soil Description
GZA-1	SH1	26.5-28.5	1	Average Total Unit Weight (26.5-27.7') = 133.3 Pcf																Grey Mottled Red Brown CLAY & SILT of medium plasticity, very stiff consistency
		26.7		26.5										TV=0.40 Tsf						
		26.7-27.2		Save																
		27.2		18.9										TV=1.80 Tsf						
		27.3-27.7		Save																
		27.7		18.6										TV=1.60 Tsf						
	SH3	46.5-48.5	2	Average Total Unit Weight (46.5-48.4') = 133.1 Pcf																Red Brown CLAY & SILT of medium plasticity, stiff to hard consistency
		46.8		30.3										TV=0.62 Tsf						
		46.8-47.2		Save																
		47.2		23.1										TV= 2.0 Tsf						
		47.3-47.8		Save																
		47.8		23.5										TV=1.80 Tsf						
		47.8-48.2		25.3	43	26														

LABORATORY TEST PROCEDURES

SANIFILL DELJOYA RECYCLING LANDFILL
NEW CASTLE, DELEWARE
13731

1. The following tests were performed with the noted ASTM test designation:

TEST	ASTM DESIGNATION
Moisture Content	D2216-92
Moisture Density Relationships	D1557-91
Permeability Test	D5084 (see Item 2)

2. Test Procedures for Permeability Tests

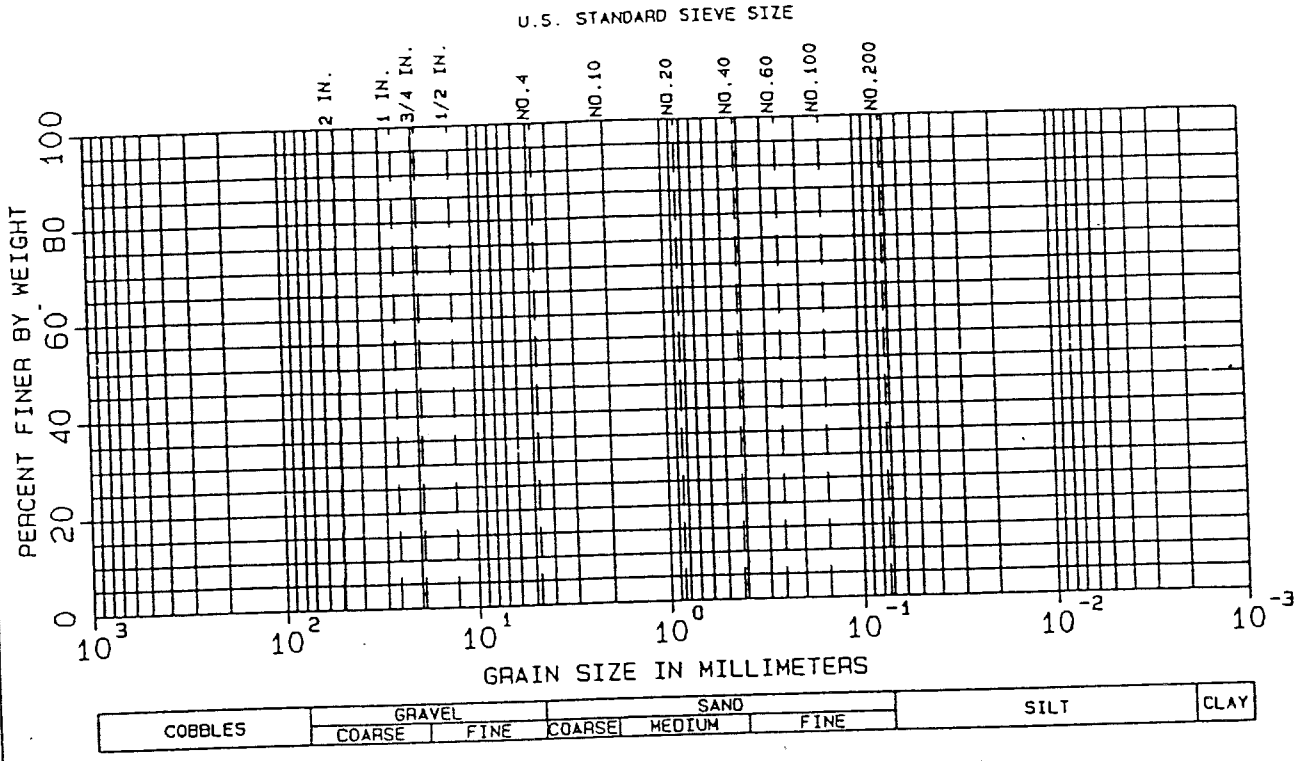
Test samples were run in general agreement with ASTM Designation D-5084 "Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter". Tests were on reconstituted samples to specified densities approximately equivalent to 92 percent of modified proctor (ASTM D1557-91 Method A) at about 3 percent wet of optimum water content.

Reconstituted test specimens were prepared in a manner similar to that described in section 7.3 of the standard. A specified amount of soil at the appropriate water content was weighed in five equal portions. Each portion was tamped by a means of mechanical tamping foot to a specified height in the mold. The final test samples all had a length to diameter ratio of equal to or greater than one. After 5 layers were compacted the sample was weighed dimensioned and its unit weight verified. After verification of the unit weight, the test sample was placed on a previously de-aired, modified triaxial cell base and porous stone. A membrane was added and the sample sealed at the top and bottom by 'O' rings.

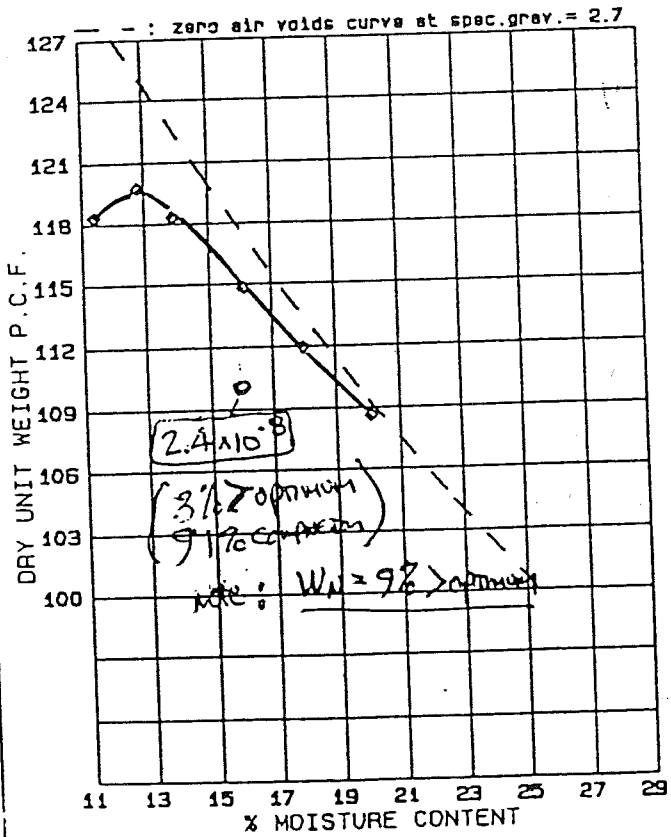
Samples were back pressured under a small effective stress to create complete saturation of the samples. The chamber pressure was then increased such that the desired consolidation effective stress was obtained. This effective consolidation stress was allowed to act approximately 24 hours, or until consolidation was complete. During consolidation phase, readings of volume change versus time were recorded.

After consolidation, the response of the soil samples was checked by increasing the cell pressure and monitoring the pore pressure. Where required, additional back pressure was

GRAIN SIZE DISTRIBUTION



COMPACTION



TEST PIT NO. TP-F

DEPTH 1.0-4.5'

SOIL PROPERTIES		
SOIL DESCRIPTION:	Brown CLAY & SILT	
INITIAL WATER CONTENT 22 %	DRY UNIT WEIGHT	
LIQUID LIMIT %	PLASTIC LIMIT	SPECIFIC GRAVITY

COMPACTION METHOD			
ASTM TEST	D1557-91	METHOD	A
AASHO TEST		METHOD	
MOLD HEIGHT	4.59	MOLD DIA.	4
NO. LAYERS	5	BLOWS/LAYER	25
HAMMER WT.	10 lbs	DROP HEIGHT	18in

SANIFILL DELJOYA RECYCLING LANDFILL NEW CASTLE, DELAWARE

COMPACTION-GRADATION TESTS

BORING NO.	TP-F	TEST SERIES NO.	6
SAMPE		DATE	AUG 94
DEPTH	1.0-4.5'		
TECH.	MCM	FILE	13731
REVIEWER	DAS		

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

APPENDIX E-11

NO.2

ATTACHMENT C

BORING LOGS FROM GEOSYNTEC CONSULTANTS "HYDROGEOLOGICAL ASSESSMENT REPORT FOR PROPOSED CELL 4, DELAWARE RECYCLABLE PRODUCTS INC." OCTOBER 1994

LEGEND

SW-1	SURFACE WATER LOCATION SURVEYED ON 3 AUGUST 1994, HORIZONTAL AND VERTICAL CONTROL ESTABLISHED
MW-1	GROUND WATER MONITORING WELL WELLS MW-1, 2(S), 3(D), 4(D), AND 5(S) DRILLED FOR NTH CONSULTANTS, LTD IN 1989 WELLS MW-3 (S), 4(S), 6(S), 6(D), 7(S), 7(D), AND 8(S) DRILLED FOR METCALF AND EDDY INC. IN 1990
CA-10	GROUND WATER MONITORING WELL ON C&J PROPERTY
P-1	PIEZOMETER INSTALLED BY GEOSYNTEC CONSULTANTS IN1994
GP-4	GEOPROBE SAMPLING LOCATION DRILLED FOR GEOSYNTEC CONSULTANTS IN 1994
GZA-1	PIEZOMETER OR BORING INSTALLED BY GZA GEOENVIRONMENTAL, INC. (1994)
B-7	BORING DRILLED FOR GEODEL, LTD. IN 1970
WP-1	WELL POINT DRILLED FOR GEODEL, LTD. IN 1970
GM26	BORING DRILLED FOR GEO-MECHANICS INC., IN 1991 AND 1992
CD31-16	CONTROL BORING FROM DELAWARE GEOLOGICAL SURVEY (WOODRUFF 1975)
BO-2	BORING DRILLED FOR METCALF AND EDDY, INC IN 1990

NOTES:

1. BASE MAP DEVELOPED FROM CADD FILES BY BLUE RIDGE ENGINEERING OF ATLANTA, GEORGIA ENTITLED "SANFILL-DELAWARE RECYCLABLE PRODUCTS INC., SITE" DATED 1 JULY 1994 ORIGINAL SCALE 1"=200', BASED ON 16 MAY PHOTOGRAPHY.
2. HORIZONTAL GRID IS DELAWARE STATE PLANE COORDINATE SYSTEM.
3. DATUM IS N.G.V.D.
4. UNDERDRAIN SYSTEM LOCATED FROM MAP PROVIDED BY NH CONSULTANTS, LTD. TITLED "LEACHATE COLLECTION SYSTEM" DATED 12 OCTOBER 1988.

100 50 0 100 200
SCALE IN FEET

GEOSYNTEC CONSULTANTS
5850 STEVENSON WOODS RD. SUITE 340
COLUMBIA, MARYLAND 21044 USA

PROJECT: DELAWARE RECYCLABLE PRODUCTS, INC. (DRPI)
MINQUADALE, NEW CASTLE, DELAWARE

TITLE: EXISTING SITE CONDITIONS

MARK	DATE	REVISION	BY	APPROVED

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT BIDDING OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE
DATE
SEAL

DATE: 11 OCTOBER 1994		SCALE:	1"=100'
DESIGN BY:	YT	JOB NO.:	GE3629
DRAWN BY:	PSG /LR	FILE NO:	3629-002
CHECKED BY:	MEC	DOCUMENT NO.	GA940814
REVIEWED BY: (Group Field Chief)	KK	DRAWING NO:	
APPROVED BY: (Principal)	JFB	1	OF 7

GEOSYNTEC CONSULTANTS

Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Borehole Location Sketch Map

Identification: P-1 **Page** 1 **of** 1

Site: Delaware Recylable Products, Inc. **Project No.:** GE3629

Status: Environmental Piezometer **Drilled:** 12 July 1994

Tools & Method: 3.25 in. I.D. H.S. Auger w/ SPT **Bit Diameter:** 7 in.

Total Depth: 32 ft **Ground Elev.:** 34 ft msl **Surveyor:** Vandemark and Lynch

Drilling Co.: Atlantic Environmental Services **Rig:** Failing 100

Supervisor: T. Maier **Reviewer:** H. Gill **Driller:** T. Parks

North: 622,095 ft; East: 455,678 ft

Elev. (feet)	Top (feet)	Lithology Log	Drilling Log
34.0		SAND, brown; fine to coarse, little fine gravel, trace silt, medium dense, dry; (SW).	
		@ 5 ft: lense of SILTY CLAY, red-brown and white; (CH).	@ 5 ft: sample wet.
27.0	7.0	SAND, tan; fine, little silt, loose, dry; (SM).	
22.5	11.5	*POTOMAC FORMATION:* SILTY CLAY, mottled red-brown and white; dry; medium stiff (CH).	
		@ 15 ft: CLAYEY SILT; trace fine sand, dry; stiff (ML).	
		@ 20 ft: SILTY CLAY; trace fine sand, trace fine gravel moist; very stiff (CH).	@ 20 ft: sample wet.
7.5	26.5	SILT AND CLAY, gray; moist; very stiff (ML-CL).	@ 25 ft: sample wet.
2.0	32.0	Total Depth: 32 ft.	@ 30 ft: sample wet.
			@ 32 ft: boring terminated.

Graphic Log — Water — Depth Scale (feet)

Depth (feet)	Blows	Run	Rec.
	5 5 5 5	1	1.0'
5	3 6 9 8	2	1.0'
10	5 3 2 2	3	2.0'
15	3 4 9 14	4	2.0'
20	9 14 16 22	5	0.7'
25	4 9 12 15	6	1.5'
30	4 8 11 16	7	2.0'
35			

GEOSYNTEC CONSULTANTS

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BORING LOG

Borehole Location Sketch Map

Identification: P-3 **Page** 1 **of** 2

Site: Delaware Recyclable Products, Inc. **Project No.:** GE3629

Status: Abandoned and Plugged **Drilled:** 14 July 1994

Tools & Method: 3.25 in. I.D. H.S. Auger w/ SPT **Bit Diameter:** 7 in.

Total Depth: 47 ft **Ground Elev.:** est. 40 ft msl **Surveyor:** not surveyed

Drilling Co.: Atlantic Environmental Services **Rig:** Failing 100

Supervisor: T. Maier **Reviewer:** H. Gill **Driller:** T. Parks

Elev. (feet)	Top (feet)	Lithology Log	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
40.0		*FILL:* SAND, tan; fine to coarse, little silt, trace of fine gravel, dry; medium dense (SM).					
38.5	1.5	*COLUMBIA FORMATION:* SAND, brown, fine to coarse, little fine to coarse gravel, trace silt, dry; medium dense (SW).		9 7 12 17	1	1.3'	
			5	10 7 8 8	2	1.0'	● 6.8 ft: sand wet. ● 7 ft: drill chatter grinding on gravel, until 7.5 ft.
			10	12 7 12 10	3	1.0'	
28.5	11.5	GRAVEL, brown, fine to coarse, little fine to coarse sand, trace silt, wet; medium dense (GW).					
		● 15 ft: SAND AND GRAVEL; brown; fine to coarse, wet; medium dense (SW-GW).	15	23 9 9 9	4	1.5'	
23.0	17.0	GRAVEL, brown; fine to coarse, som fine to coarse sand, trace silt, wet; loose (GW).					● 17 ft: offset boring 3 ft due to inclination of augers, backfilled with auger cuttings.
			20	6 5 4 3	5	0.5'	
			25	52 21 11 16	6	1.0'	
13.5	26.5	*POTOMAC FORMATION:* SILT, red-brown; moist; dense (ML).					
13.0	27.0	CLAY, red-brown; dry; hard (CH).					
12.0	28.0	SILT, red-brownand orange; little fine sand, trace clay, dry; (ML).					
			30	10 9 15 20	7	0.0'	● 30 ft: gravel i tip of spoon.
					7A	0.5'	● 32 ft: drove additional spoon to 32.5 ft.
		● 36 ft: SILTY CLAY, orange-brown; 5 in. lense, moist; very soft (CL).	35	3 1 10 2	8	1.3'	● 35 ft: sample wet.

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BORING LOG

Borehole Location Sketch Map

Identification: P-3B **Page** 1 **of** 1

Site: Delaware Recyclable Products, Inc. **Project No.:** GE3629

Status: Environmental Piezometer **Drilled:** 27 July 1994

Tools & Method: 3.25 in. I.D. H.S. Auger w/ SPT **Bit Diameter:** 7 in.

Total Depth: 27 ft **Ground Elev.:** 40 ft msl **Surveyor:** Vandemark and Lynch

Drilling Co.: Atlantic Environmental Services **Rig:** Failing 100

Supervisor: T. Maier **Reviewer:** H. Gill **Driller:** T. Parks

North: 622,143 ft; East: 457,056 ft

Elev. (feet)	Top (feet)	Lithology Log	Std. Pen. Test Blows	Run	Rec.	Drilling Log
40.0		See P-3 log for lithology.				
25.0	15.0	GRAVEL, light brown; fine to coarse, little fine to coarse sand, trace silt, wet; medium dense (GW).	15 10 7 11	1	1.0'	@ 8 ft: rods wet. @ 16 ft: sample wet.
		@ 20 ft: GRAVEL, light brown; fine to coarse, some fine to coarse sand, trace silt wet; dense (GW-SW).	28 33 7 8	2	2.0'	@ 21 ft: sample wet.
18.5	21.5	*POTOMAC FORMATION:* CLAY, red-brown; dry; stiff (CH).				@ 23 ft: drilling resistance decreased.
		@ 25 ft: SILT, orange-brown and gray; some fine sand, dry; medium dense (ML-SM).	10 9 10 18	3	0.8'	@ 26 ft: sample dry.
13.0	27.0	**Total Depth: 27 ft.**				

Graphic Log — Well — Depth Scale (feet): 5, 10, 15, 20, 25, 30, 35

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BORING LOG

Identification: P-5 **Page** 1 **of** 2

Site: Delaware Recyclable Products, Inc. **Project No.:** GE3629

Status: Environmental Piezometer **Drilled:** 19 July 1994

Tools & Method: 3.25 in. I.D. H.S. Auger w/ SPT **Bit Diameter:** 7 in.

Total Depth: 44.5 ft **Ground Elev.:** 60 ft msl **Surveyor:** Vandemark and Lynch

Drilling Co.: Atlantic Environmental Services **Rig:** Failing 100

Supervisor: S. Qureshi **Reviewer:** H. Gill **Driller:** T. Parks

Borehole Location Sketch Map

North: 622,289 ft; East: 457,303 ft

Elev. (feet)	Top (feet)	Lithology Log	Std. Blows	Pen. Run	Test Rec.	Drilling Log
60.0		*TOPSOIL:* SAND AND GRAVEL, brown; fine, dry; (SW).				
59.0	1.0	*FILL:* SILTY SAND, brown; fine to medium, trace gravel, dry; medium dense (SM).	6 9	1	1.0'	
			4 5 8 24	2	1.2'	
53.0	7.0	*COLUMBIA FORMATION:* SILTY SAND, red-brown; fine, moist; medium dense (SM).	2 4 6 4	3	1.5'	
45.0	15.0	SAND, light brown; coarse, little fine gravel, dry; medium dense (SW).	3 5 9 12	4	1.5'	
			3 5 9 17	5	1.0'	
		@ 25 ft: GRAVEL AND SAND; coarser, moist; (GW).	1 4 6 20	6	0.8'	@ 25 ft: 1 in. to 2 in. diameter gravel observed in auger cuttings.
			4 8 8 13	7	1.1'	@ 30 ft: sand wet.
		@ 35 ft: more gravel.	9 10 12 12	8	1.2'	

Graphic Log / Well / Depth Scale (feet): 5, 10, 15, 20, 25, 30, 35

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BORING LOG

Borehole Location Sketch Map

Identification: P-6 **Page** 1 **of** 1

Site: Delaware Recyclable Products, Inc. **Project No.:** GE3629

Status: Environmental Piezometer **Drilled:** 19 July 1994

Tools & Method: 3.25 in. I.D. H.S. Auger w/ SPT **Bit Diameter:** 7 in.

Total Depth: 20 ft **Ground Elev.:** 23 ft msl **Surveyor:** Vandemark and Lynch

Drilling Co.: Atlantic Environmental Services **Rig:** Failing 100

Supervisor: S. Qureshi **Reviewer:** H. Gill **Driller:** T. Parks

North: 624,777 ft; East: 456,431 ft

Elev. (feet)	Top (feet)	Lithology Log	Drilling Log
23		*FILL:* SAND, brown; fine to coarse, dry; (SW).	
		@ 6 ft: SAND, gray; fine to medium, trace silt, dry; medium dense (SW).	
		@ 8 ft: SAND AND GRAVEL, red-brown; coarse, moist; medium dense (GW).	
		@ 9 ft: CLAYEY SILT, gray; some fine gravel, moist; loose to medium dense (ML).	
10.5	12.5	COARSE SAND AND FINE GRAVEL, brown and gray; moist; very loose (SP-GP).	
7.0	16.0	*POTOMAC FORMATION:* CLAY AND SILT, mottled gray-brown; trace fine sand, moist; stiff to very stiff (CL).	
3.0	20.0	Total Depth: 20ft.	

Graphic Log / Well / Depth Scale (feet)

Std. Pen. Test Blows	Run	Rec.	Drilling Log
4 9 8 29	1	0.2'	
3 5 7 7	2	1.2'	
4 4 7 13	3	1.0'	
2 3 4 7	4	1.7	
7 5 13 23	5	1.7'	
2 1 2 2	6	1.7'	@ 14 ft: wet sand and gravel
3 4 6 9	7	1.7'	
3 8 13 21	8	2.0'	

Depth Scale: 5, 10, 15, 20, 25, 30, 35

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BORING LOG

Borehole Location Sketch Map

North: 622,370 ft; East: 457,209 ft

Identification: PW-1 **Page** 1 **of** 1

Site: Delaware Recyclable Products, Inc. **Project No.:** GE3629

Status: Environmental Piezometer **Drilled:** 25 July 1994

Tools & Method: 3.25 in. I.D. H.S. Auger w/ SPT **Bit Diameter:** 7 in.

Total Depth: 37 ft **Ground Elev.:** 58 ft msl **Surveyor:** Vandemark and Lynch

Drilling Co.: Atlantic Environmental Services **Rig:** Failing 100

Supervisor: S. Qureshi **Reviewer:** H. Gill **Driller:** T. Parks

Elev. (feet)	Top (feet)	Lithology Log	Drilling Log
58.0		*TOPSOIL:* SAND, brown; fine, dry; (SW).	
57.0	1.0	*FILL:* SILTY SAND, brown; medium to coarse, moist; (SW).	
48.0	10.0	*COLUMBIA FORMATION:* SILTY SAND, light brown; coarse, trace of fine gravel, moist; medium dense (SW).	
		@ 15 ft: more gravel; (SW-GW).	@ 15 ft: coarse gravel with an approximate 1 to 2 in. diameter observed in auger cuttings.
		@ 20 ft: coarser sand and gravel; (SW-GW).	
37.0	25.0	SANDY GRAVEL, red-brown; coarse, wet; medium dense (GW).	@ 25 ft: gravel fragments with an approximate 0.5 in. diameter observed in sampling spoon
25.5	34.0	*POTOMAC FORMATION:* SILTY CLAY, red-brown; trace medium sand, moist; stiff (CL).	
21.0	37.0	Total Depth: 37 ft.	

Graphic Log | Well | Depth Scale (feet)

Depth (feet)	Blows	Run	Rec.
5	3, 6, 12, 17	1	1.7'
10	5, 10, 12, 14	2	1.2'
15	3, 4, 5, 10	3	1.3'
20	4, 5, 12, 14	4	0.8
25	3, 3, 10, 17	5	1.5
30	5, 7, 17, 17	6	0.7
35	5, 4, 6, 10	7	0.8'

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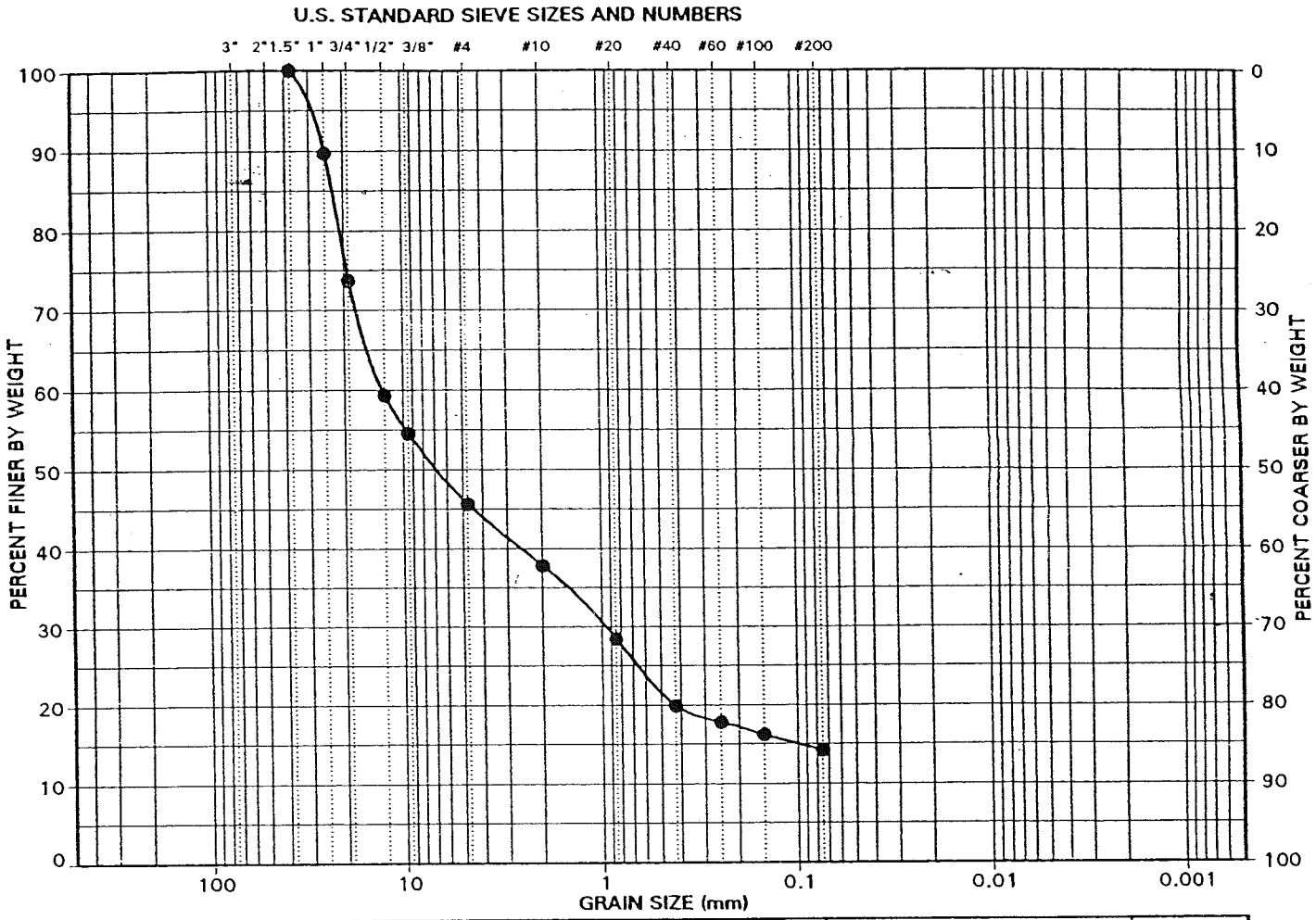
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT DRPI/SANIFILL
LOCATION
NUMBER GE3629

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2487, D 3042 AND D 4318.



COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
	GRAVEL		SAND			FINES	

SAMPLE LOCATION	94G93	MOISTURE CONTENT (%)	SOIL FRACTIONS	GRAVEL (%)	54.4
SAMPLE DEPTH (FT)	35-37	LIQUID LIMIT (%)		SAND (%)	31.4
SITE SAMPLE ID	P-5 (S-8)	PLASTIC LIMIT (%)		FINES (%)	14.2
LAB. SAMPLE NO.	94G93	PLASTICITY INDEX		SILT (%)	
		DRY DENSITY (pcf)		CLAY(%)	
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu		
		VOID RATIO (%)	COEFF. CURVATURE Cc		

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	90	74	59	55	46	38	28	20	18	16	14					

SOIL CLASSIFICATION: -

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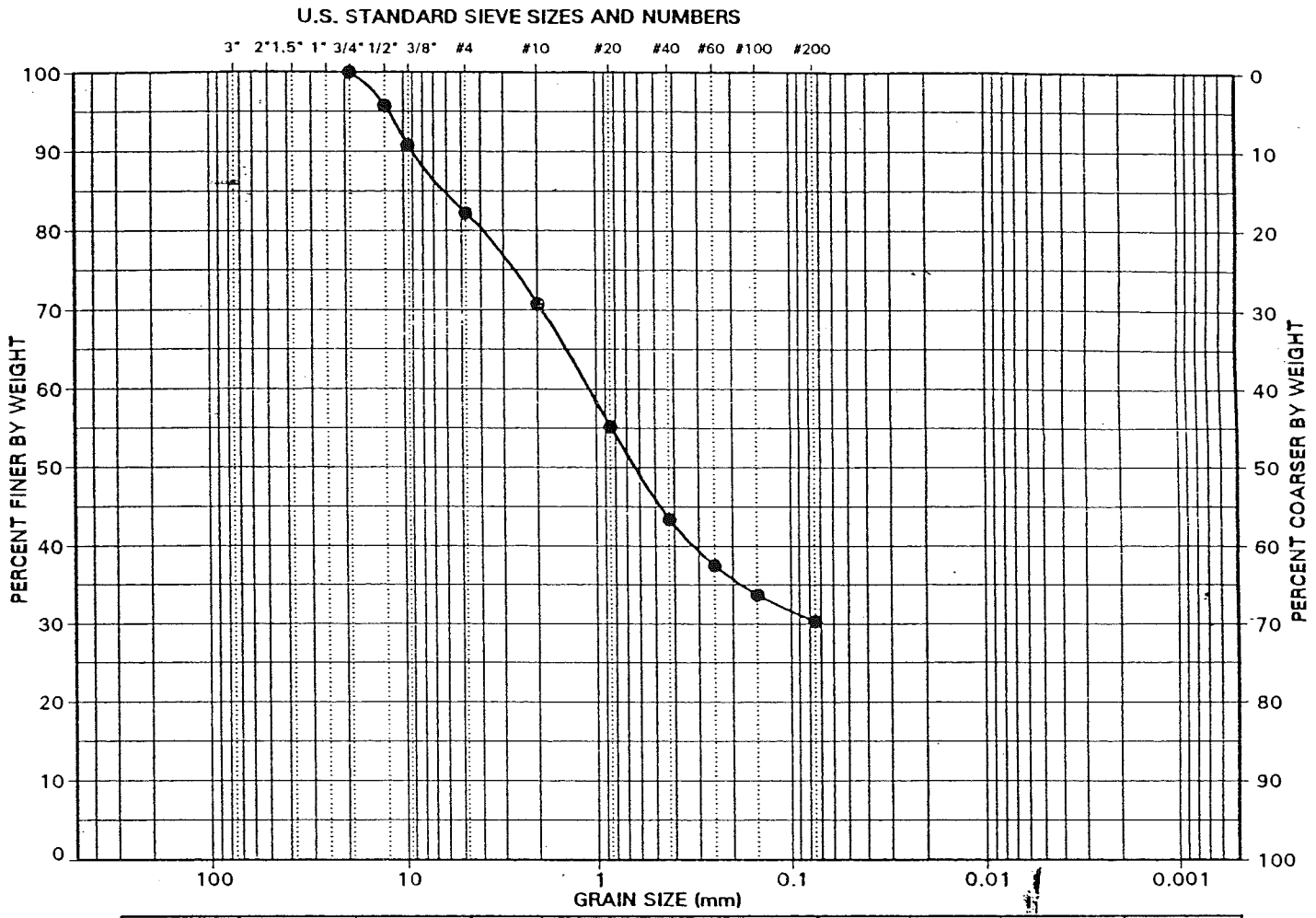
FIGURE
PROJECT DRPI/SANIFILL
LOCATION
NUMBER GE3629

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2487, D 3042 AND D 4318.



SAMPLE LOCATION	94H99	MOISTURE CONTENT (%)	SOIL FRACTIONS	GRAVEL (%)	17.8
SAMPLE DEPTH (FT)	35-37	LIQUID LIMIT (%)		SAND (%)	51.9
SITE SAMPLE ID	PW1 (S-7)	PLASTIC LIMIT (%)		FINES (%)	30.3
LAB. SAMPLE NO.	94H99	PLASTICITY INDEX		SILT (%)	
		DRY DENSITY (pcf)		CLAY(%)	
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu		
		VOID RATIO (%)	COEFF. CURVATURE Cc		

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.00
100	100	100	100	100	96	91	82	71	55	43	38	34	30					

SOIL CLASSIFICATION: -

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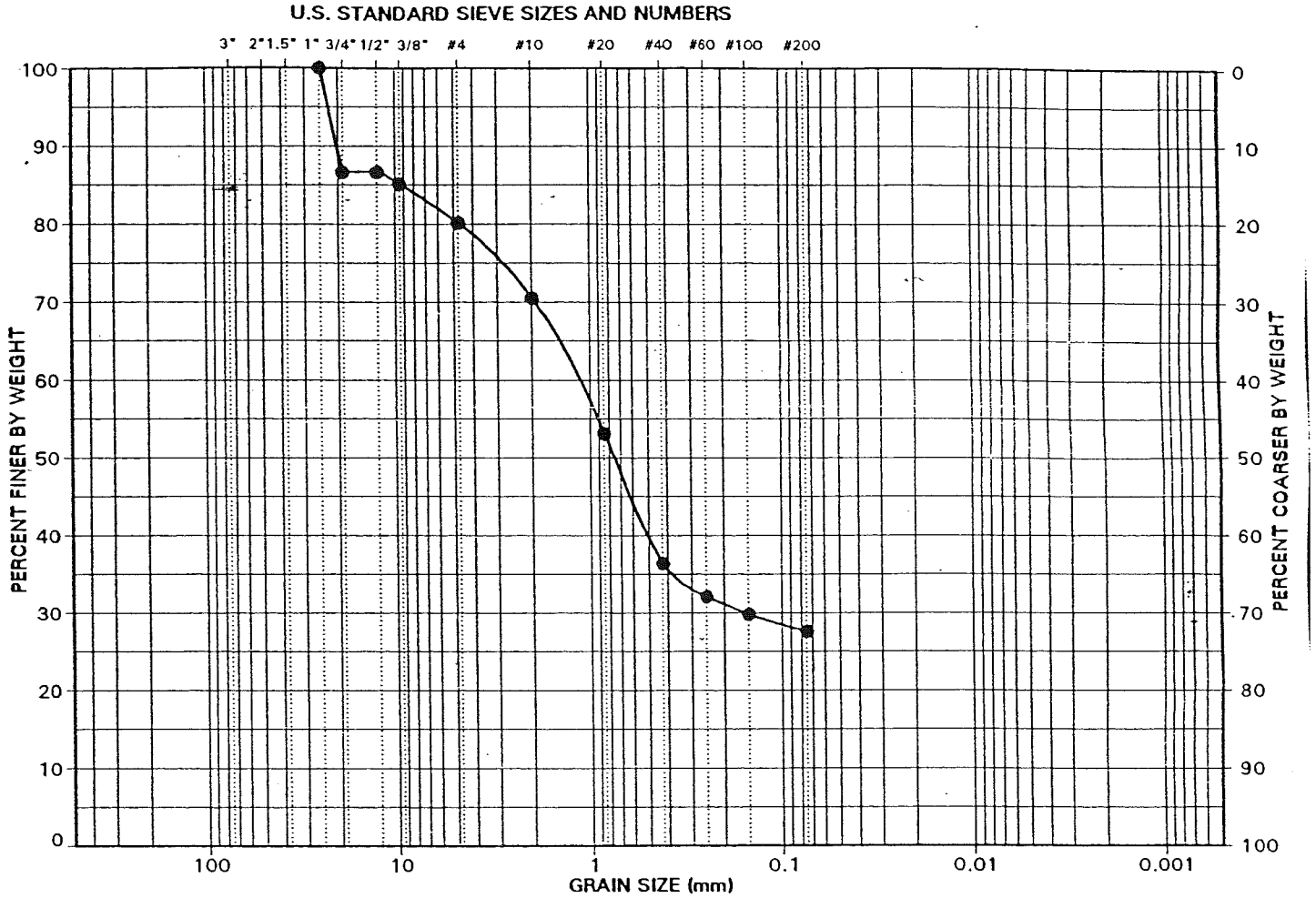
Atlanta, Georgia

FIGURE
PROJECT DRPI/SANIFILL
LOCATION
NUMBER GE3629

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2487, D 3042 AND D 4318.



SAMPLE LOCATION	94H101	MOISTURE CONTENT (%)	SOIL FRACTIONS	GRAVEL (%)	19.9
SAMPLE DEPTH (FT)	5-7	LIQUID LIMIT (%)		SAND (%)	52.5
SITE SAMPLE ID	P-2 (S-2)	PLASTIC LIMIT (%)		FINES (%)	27.6
LAB. SAMPLE NO.	94H101	PLASTICITY INDEX		SILT (%)	
		DRY DENSITY (pcf)		CLAY(%)	
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu		
		VOID RATIO (%)	COEFF. CURVATURE Cc		

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	87	87	85	80	71	53	36	32	30	28					

SOIL CLASSIFICATION: -

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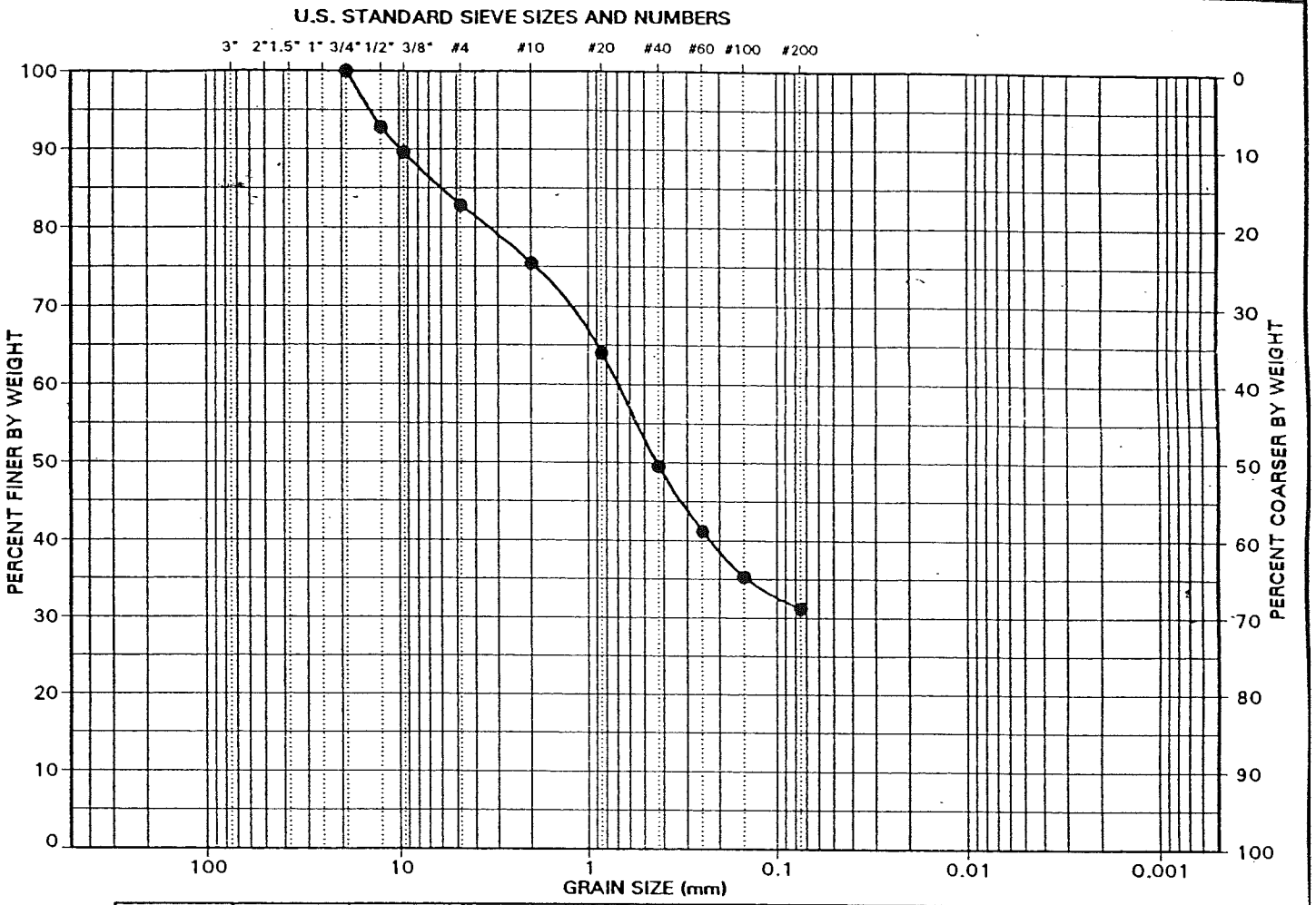
FIGURE
PROJECT DRPI/SANIFILL
LOCATION
NUMBER GE3629

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2487, D 3042 AND D 4318.



COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
	GRAVEL		SAND			FINES	

SAMPLE LOCATION	94H103	MOISTURE CONTENT (%)	SOIL FRACTIONS	GRAVEL (%)	17.2
SAMPLE DEPTH (FT)	10-12	LIQUID LIMIT (%)		SAND (%)	51.6
SITE SAMPLE ID	P-4 (S-3)	PLASTIC LIMIT (%)		FINES (%)	31.2
LAB. SAMPLE NO.	94H103	PLASTICITY INDEX		SILT (%)	
		DRY DENSITY (pcf)		CLAY(%)	
		SPECIFIC GRAVITY		COEFF. UNIFORMITY Cu	
		VOID RATIO (%)		COEFF. CURVATURE Cc	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	93	90	83	75	64	50	41	35	31					

SOIL CLASSIFICATION: -

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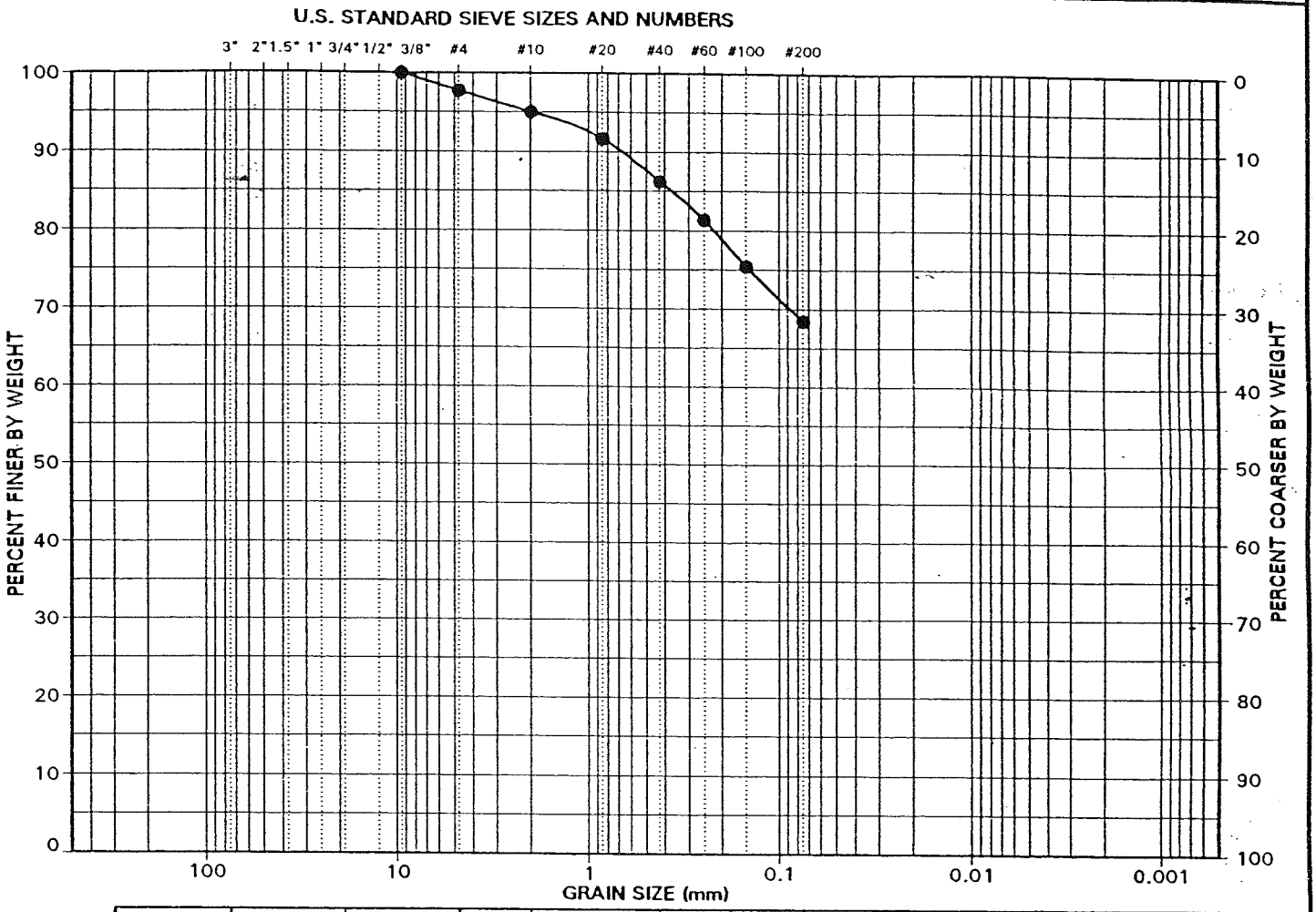
Atlanta, Georgia

FIGURE
PROJECT DRPI/SANIFILL
LOCATION
NUMBER GE3629

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2487, D 3042 AND D 4318.



SAMPLE LOCATION	94H105	MOISTURE CONTENT (%)	SOIL FRACTIONS	GRAVEL (%)	2.3
SAMPLE DEPTH (FT)	7-9	LIQUID LIMIT (%)		SAND (%)	29.3
SITE SAMPLE ID	P-6 (S-3)	PLASTIC LIMIT (%)		FINES (%)	68.4
LAB. SAMPLE NO.	94H105	PLASTICITY INDEX		SILT (%)	
		DRY DENSITY (pcf)		CLAY(%)	
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu		
		VOID RATIO (%)	COEFF. CURVATURE Cc		

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	98	95	92	86	81	75	68					

SOIL CLASSIFICATION: -

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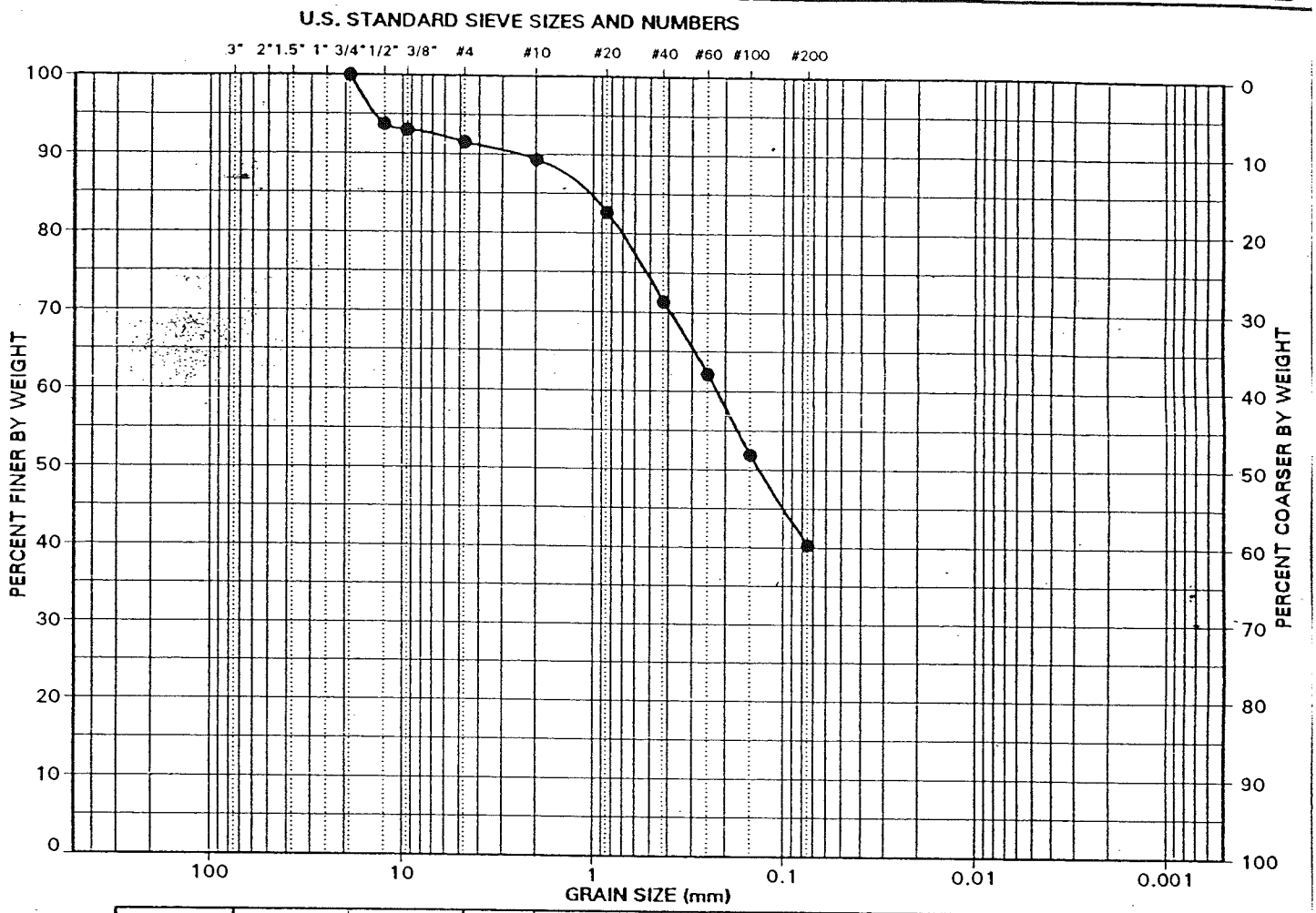
Atlanta, Georgia

FIGURE
PROJECT DRPI/SANIFILL
LOCATION
NUMBER GE3629

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

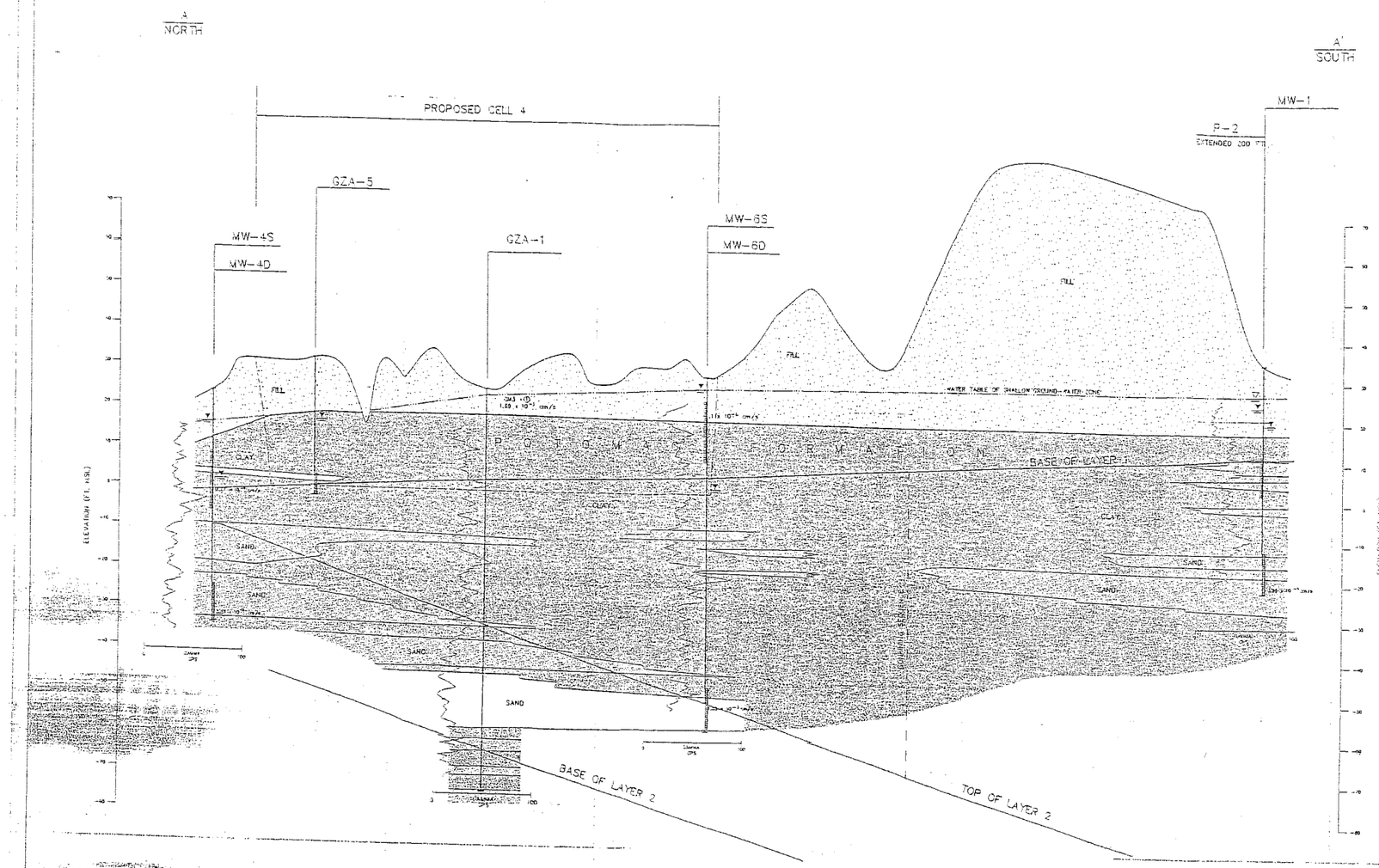
ASTM D 422, D 2487, D 3042 AND D 4318.

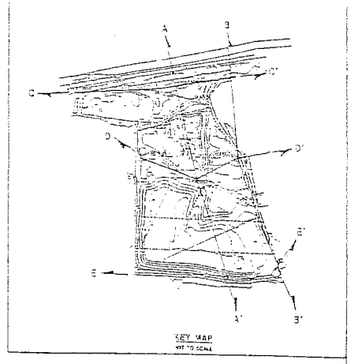


SAMPLE LOCATION	94H107	MOISTURE CONTENT (%)	SOIL FRACTIONS	GRAVEL (%)	8.5
SAMPLE DEPTH (FT)	5-7	LIQUID LIMIT (%)		SAND (%)	51.2
SITE SAMPLE ID	P-7 (S-1)	PLASTIC LIMIT (%)		FINES (%)	40.3
LAB. SAMPLE NO.	94H107	PLASTICITY INDEX		SILT (%)	
		DRY DENSITY (pcf)		CLAY(%)	
		SPECIFIC GRAVITY		COEFF. UNIFORMITY Cu	
		VOID RATIO (%)		COEFF. CURVATURE Cc	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	94	93	92	89	83	71	62	52	40					

SOIL CLASSIFICATION: -





LEGEND

- MAJOR UNCONFORMITIES (NATURAL OR MAN-MADE)
- LITHOLOGIC CONTACTS
- WELL SCREEN
- WATER LEVEL IN WELL
- WATER ENCOUNTERED DURING DRILLING
- FILL (MAINLY SPOILS AND WASTE)
- POTOMAC FORMATION CLAY
- POTOMAC FORMATION SAND

NOTES:

1. HYDRAULIC CONDUCTIVITY FROM TEST BORING (K1) CALCULATED FROM SIZE DISTRIBUTION PLOT BY HAZEN METHOD ON SAMPLE FROM 10 TO 12 FEET.

GeoSYNTEC CONSULTANTS
1100 LAKE HEARN DRIVE SUITE 200
ATLANTA, GEORGIA 30342 USA

PROJECT: DELAWARE RECYCLABLE PRODUCTS, INC. (DRPI)
MINQUADALE, NEW CASTLE, DELAWARE

TITLE: HYDROGEOLOGIC CROSS SECTION A–A'
NORTH – SOUTH THROUGH CENTER OF PROPERTY

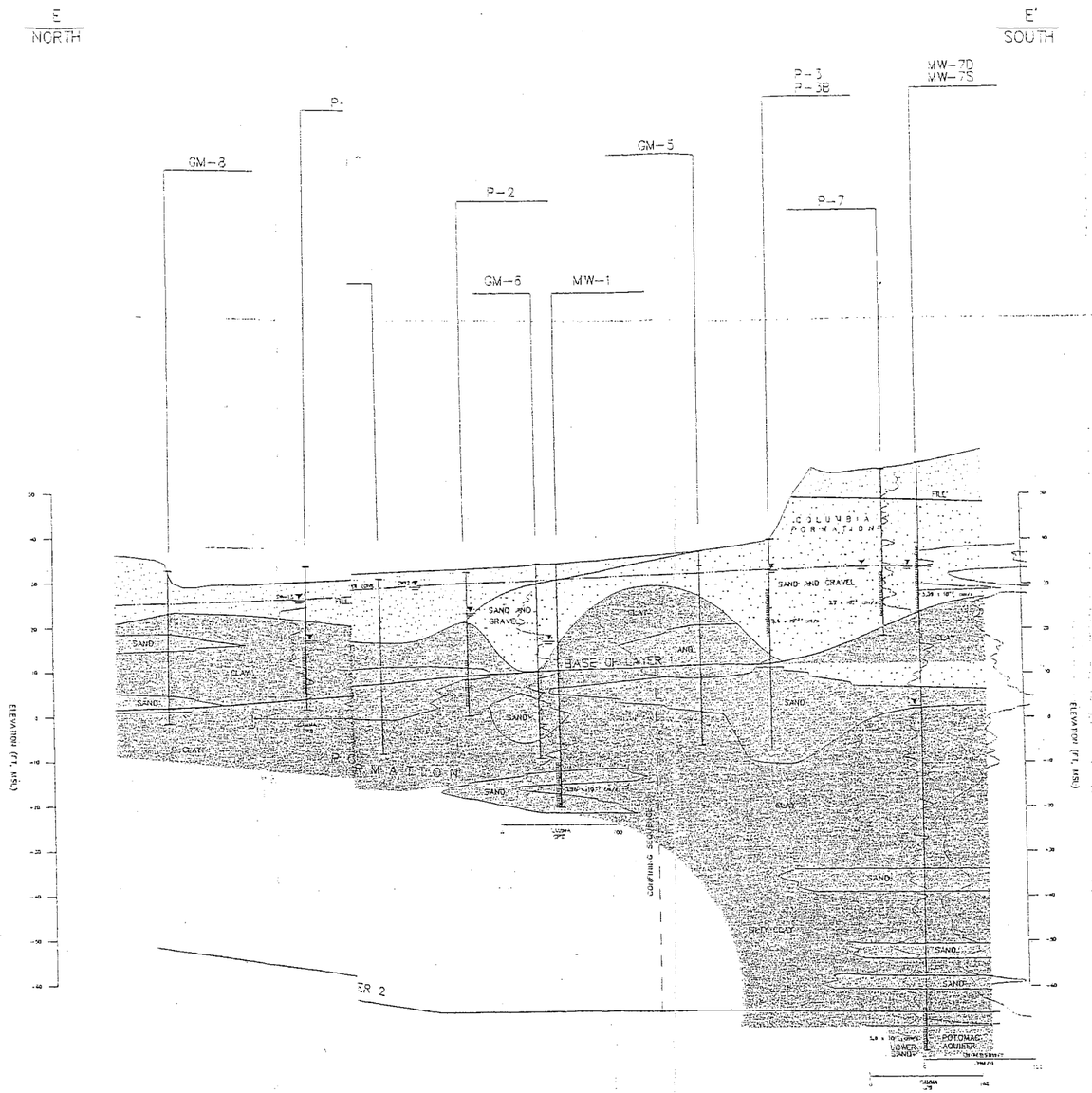
MARK	DATE	REVISION	BY	APPROVED

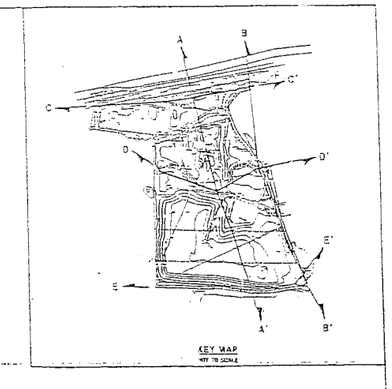
THIS DRAWING MAY NOT BE ISSUED FOR PROJECT USAGE OR CONSTRUCTION UNLESS SIGNED

SIGNATURE

DATE

DATE: 11 OCTOBER 1994		SCALE:	AS SHOWN
DESIGN BY:	JHR	JOB NO.:	3C3629
DRAWN BY:	JBG	FILE NO.:	3629-005
CHECKED BY:	JHR	DRAWING #:	
PROJECT MGR: (SOUTH MTN. OFFICE)	CC	REVISION #:	
APPROVED BY: (SENIOR)	CC		





LEGEND

- MAJOR UNCONFORMITIES (NATURAL OR MAN-MADE)
- LITHOLOGIC CONTACTS
- WELL SCREEN
- WATER LEVEL IN WELL
- WATER ENCOUNTERED DURING DRILLING
- FILL (MINE SPOILS AND WASTE)
- POTOMAC FORMATION CLAY
- POTOMAC FORMATION SAND
- COLUMBIA FORMATION SAND AND GRAVEL
- GROUND-WATER MODEL LAYER

200 100 0 200 400
SCALE IN FEET

GEOSYNTEC CONSULTANTS
1100 LAKE HOLLOW DRIVE, SUITE 100
ATLANTA, GEORGIA 30342 USA

PROJECT: DELAWARE RECYCLABLE PRODUCTS, INC. (DRPI)
WINGUADALE, NEW CASTLE, DELAWARE

TITLE: HYDROGEOLOGIC CROSS SECTION E-E'
NORTH - SOUTH ALONG EASTERN SIDE OF PROPERTY

DATE: 31 OCTOBER 1994	SCALE: AS SHOWN		
DESIGN BY: JHR	JOB NO.: TC8829		
DRAWN BY: HSC	FILE NO.: 8829-016		

THIS DRAWING MAY NOT BE USED FOR PROJECT TASKS OR CONSTRUCTION UNLESS SEALED.