

June 27, 1996

Mr. George Dakes
URS Consultants, Inc.
Mack Centre II
Mack Centre Drive
Paramus, New Jersey 07652

REPORT: Preliminary Geotechnical Investigation
Fountain Avenue Landfill and
Pennsylvania Avenue Landfill
Brooklyn, New York
(95-67109-01/02)

Dear Mr. Dakes,

This report covers the preliminary geotechnical investigation for the subject landfills. The scope of work was performed in accordance with our proposal of May 1, 1995 and your subsequent authorization.

Please call with any questions.

Very truly your,

CONVERSE CONSULTANTS EAST, PC

Issa S. Oweis, Ph.D., P.E.
President

ISO/EMZ/MGK:rmd/jif

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1.0 INTRODUCTION

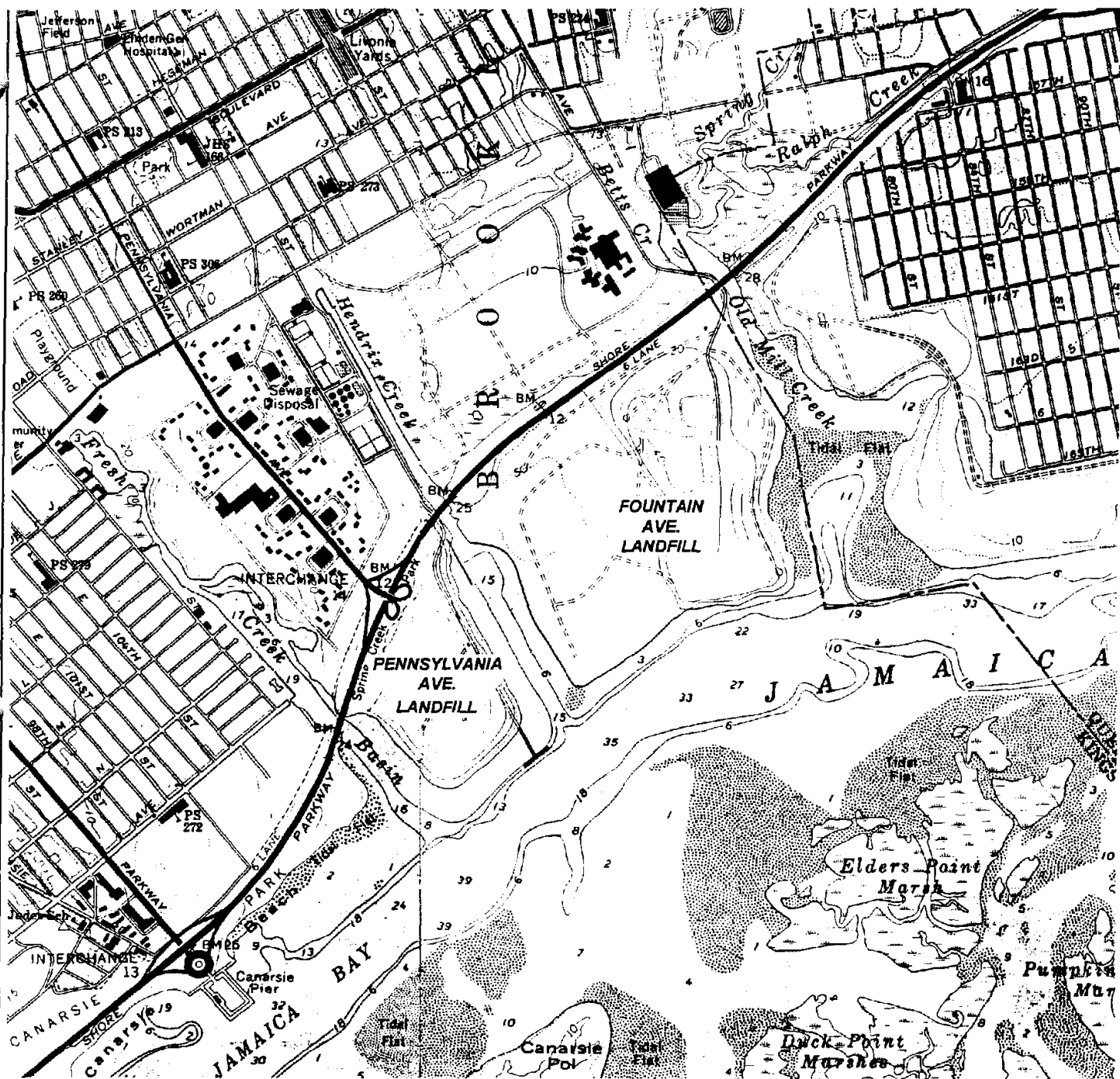
The subject landfills are located on Jamaica Bay, just south of the Belt Parkway in Brooklyn. The Pennsylvania Avenue Landfill (PAL) is approximately 119 acres with a maximum mound height of about 80 feet. The Fountain Avenue Landfill (FAL) covers about 297 acres and has a maximum height of about 120 feet. Both landfills are inactive and presently have minimum soil cover. The landfills are proposed to be closed in accordance with NYSDEC Part 360. The closure is currently planned to include site clearing, regrading, a composite cap, and stormwater control features. Figure No. 1 shows the general location of the landfills.

2.0 PURPOSE AND SCOPE OF WORK

2.1 Purpose

The purpose of the services performed is to conduct geotechnical investigations and engineering analyses to assess existing conditions and the impacts of closure construction on landfill stability and settlement. In addition, the evaluations will identify what construction methods or practices might be appropriate to help enhance long-term cap performance as well as staging of construction depending on stability requirements.

This report summarizes the first portion of the scope of work. It includes a summary of the investigatory work performed at the landfills, evaluation of existing stability conditions, and findings relative to geotechnical parameters to be used later in the evaluation of proposed closure designs.



SCALE: 1" = 2000'

MAP SOURCE: BASE MAP WAS ADAPTED FROM U.S.G.S. MAPS, JAMAICA & BROOKLYN, N.Y., QUADRANGLES, 7.5 MINUTE SERIES, BOTH PHOTOREVISED 1979.
(BASE MAP MAY NOT REFLECT RECENT CARTOGRAPHIC CHANGES)

SITE LOCATION MAP

FOUNTAIN & PENNSYLVANIA AVENUES LANDFILLS
BROOKLYN, NEW YORK
FOR URS CONSULTANTS, INC.

PROJECT No.

95-67109-02



Converse Consultants East, PC

FIGURE No.

1

2.2 Scope of Work

The following scope of work was performed by Converse for the preliminary geotechnical investigation phase of the project:

1. Reviewed project documentation available to us and provided input to the Geotechnical Work Plan and field investigation bid specifications.
2. Participated in the Pre-bid site meetings for the field investigation program.
3. Provided field observation and logging of field explorations (large diameter augers, cone penetrometers and some geotechnical borings).
4. Conducted borehole pressuremeter testing and gas sampling at Fountain Avenue Landfill.
5. Provided periodic field observation of load test fill at Fountain Avenue Landfill.
6. Performed soil mechanics testing in our Whippany, NJ laboratory.
7. Evaluated field and laboratory data.
8. Performed slope stability evaluations of existing conditions.
9. Developed parameter values for settlement evaluation of proposed capping grading.
10. Participated in meetings to discuss our findings and prepared this Report.

3.0 SITE CONDITIONS

3.1 Fountain Avenue Landfill

3.1.1 Investigation Program

The Fountain Avenue Landfill geotechnical investigation program under this project phase consisted of the following:

a. Large Diameter Augers Borings. Five (5) augers borings (ABF-8 through ABF-12) were advanced from the landfill plateau using 30 and 36 inch diameter bucket augers, solid stem augers, and other drilling tools. The auger borings ranged from 65 to 93 feet in depth. Cuttings of waste removed from the hole were weighed when possible to evaluate waste unit weights. The auger borings were logged and air monitoring measurements at the top of the borehole were conducted. During drilling, fluid (water or leachate) level measurements were made in the open hole, and upon completion, in well casing installed in the hole. The purpose of these explorations was to gain direct information regarding waste characteristics, including composition, moisture conditions, state of decay, and weight. The locations are shown on Drawing No. F-1. Logs and a Summary Table are contained in Appendix A.

b. Perimeter Borings. Fourteen (14) borings were drilled at the landfill perimeter. Seven (7) of these, GBF-1 through GBF-7, were drilled near the perimeter access road within the landfill footprint. The remaining seven (7), SBF-1 through SBF-7, were drilled in the tidal flat area adjacent to the landfill. The GBF borings (except for GBF-6 and GBF-7) were drilled with mud rotary methods, using truck-mounted drilling equipment. The SBF (and GBF-6 and GBF-7) borings were drilled

with tracked ATV-mounted equipment using Hollow Stem Augers (HSA). The GBF borings ranged in depths from 19.5 to 22 feet and the SBF borings ranged in depth from 6 to 12 feet.

The purpose of these borings was to collect general stratigraphic data and to obtain undisturbed Shelby tube samples of the Tidal Marsh Deposit (TMD) for soil mechanics testing. Boring locations are shown on Drawing No. F-1. Logs and a Summary Table are contained in Appendix A.

c. **Interior Borings.** At the Large Diameter Auger (ABF) locations, borings GBF-8 through GBF-12 were drilled. These borings were advanced from the base of the auger holes to the top of the TMD. Eight (8) inch diameter casing installed in the open auger holes before backfilling facilitated this operation. Mud rotary drilling methods were employed. The boring depths ranged from 79 to 134.8 feet, being advanced from 4 to 39.8 feet below the base of the auger holes.

The purpose of these borings was to determine conditions below the waste mass, particularly regarding the TMD thickness and consistency. Undisturbed samples of the TMD, when encountered, were attempted. These borings were also used to determine the waste thickness and conditions below the base of the completed auger hole. The boring locations are shown on Drawing No. F-1. Logs and a Summary Table are included in Appendix A.

d. **Pressuremeter Tests/Gas Sampling.** Pressuremeter testing was performed in two boreholes, one each near ABF/GBF-11 and ABF/GBF-10 locations. At the ABF/GBF-11 location one pressuremeter test (PMT) at a depth of 10 feet was conducted. Additional tests were attempted at 20 feet but because of hole collapsing problems they could not be performed. Gas sampling using a slotted probe was conducted at depths of 4.5, 17 and

24 feet. Gas could not be extracted at certain depths because of saturated conditions and/or problems with the probe device. Because the pressuremeter/gas sampling program was not practical at lower depths at this location, a second location (ABF/GBF-10) was selected for testing. Five pressuremeter tests were performed at depths of 10, 20, 30, 40 and 50 feet in a borehole adjacent to the ABF/GBF-10 location. Gas sampling was conducted at depths of 4.5, 14.5, 23.5, 34.5, 43.5 and 53.5 feet. The pressuremeter testing was performed using a Roctest Texam probe. Measurements using air-monitoring field instruments were made of the gas samples. Selected samples were also analyzed in the laboratory.

The purpose of these tests were to assess waste properties important for settlement prediction. PMT results and gas sample test readings and laboratory test results are included in Appendix B.

e. Piezocone Tests. Piezocone or cone penetrometer tests (CPTU) were performed at the five (5) auger boring locations within about 30 feet from the borings. Typically 2 to 3 cone soundings were attempted using a 20 ton piezocone. Fourteen (14) tests were performed. Measurements of tip resistance, side friction, friction ratio, and pore pressure were recorded by the instrument. The soundings ranged from 2 to 31 feet in depth and were terminated because of encountered obstructions or limitations of the cone to withstand wide temperature variations (the waste mass became hotter with depth).

The purpose of the cone penetrometer tests was to assess relative waste density, restrictive zones, and leachate conditions (perched zones) within the shallower depths of the fill.

f. Fill Load Test. Upon completion of the boring program, an area adjacent to ABF/GBF-11 was selected for construction of the load test fill. The test fill material consisted primarily of silty sand. A 10-foot high fill was constructed over a 100 foot by 100 foot area. Prior to fill placement, five (5) settlement plates were constructed within the fill footprint. The fill was completed in about 5 days. A survey was performed of the existing ground and the final fill grades. The plates were surveyed frequently during fill placement and during the first few weeks after completion. Plate survey is continuing on a bi-weekly basis as of the date of this Report. Appendix B includes the load test data.

g. Soil Mechanics Laboratory Testing. All soil samples were delivered to our soil mechanics laboratory in Whippany, New Jersey. The testing program included identification and physical properties tests on representative soil samples. The testing was primarily performed on TMD samples. The following summary table shows the breakdown of number of tests performed on samples from the Fountain Avenue landfill.

**Table No. 1 - Fountain Avenue Landfill
Soil Mechanics Testing**

Test	ASTM Designation	No. of Tests
Atterberg Limits	D4318	6
Water Content	D2216	6
Sieve Analysis	D422	2
Consolidation	D2435	3
Unconfined Compression	D2166	3
CIU Triaxial	D4767	3

The summary of laboratory tests as well as test curves are contained in Appendix A.

3.1.2 Site Description and History

The Fountain Avenue Landfill (FAL) is 297 acres and located in Brooklyn, New York. This site is currently listed as a Class 2A site on the New York State Registry of Inactive Hazardous Waste Sites. The FAL started receiving municipal, industrial and construction & demolition (C&D) wastes in February 1961. By 1968, FAL was expanding more rapidly than anticipated, therefore disposal of C&D debris was shifted to the adjacent closed Pennsylvania Avenue Landfill (PAL). Throughout the 1970's the site received waste oil for control of roadway dust. This practice was discontinued in late 1979. The City of New York transferred ownership of the FAL to the United States Department of the Interior, National Park Services, in 1974. In 1985, all filling at the FAL ceased.

Situated over what was once a tidal marsh, the FAL is surrounded on three sides by water: Hendrix Creek to the west, Jamaica Bay on the south and Old Mill Creek Basin to the east. On the north, the FAL is bounded by the Belt Parkway; farther north is Starrett City, a high-rise housing development.

There is one large main fill mound at the site which rises above Jamaica Bay to an elevation of approximately 130 feet (Borough of Brooklyn Datum). Other fill ridges (running around the perimeter of the Site) are between 10 and 20 feet in height. Soil cover is generally thin.

3.1.3 Site Geology

The regional and site geology and hydrogeology are described in detail in the Remedial Investigation (RI) report dated May, 1994 by URS Consultants. This discussion is limited to the geology which influences landfill stability and settlement.

The stratigraphy of the site includes, in order of increasing depth, municipal fill, dredged sand fill (DSF), tidal marsh deposits (TMD), and upper glacial aquifer (UGA). Below the UGA, the geology is not significant for the purposes of evaluating landfill settlement and static-conditions slope stability. The underlying geology must, however, be considered in the seismic evaluation of landfill stability.

Upper Glacial Aquifer (UGA) - Based on previous explorations, this unit is gray to brown, fine and medium sand with traces of gravel, coarse sand, and fines (SP, SP-SM). Consistency of the unit is medium dense to dense and the sand is poorly graded. Some silt and clayey silt lenses and interlayers were noted below -90 feet elevation in borings completed during previous investigations. The unit is highly permeable with hydraulic conductivities averaging approximately 10^{-2} cm/sec.

UGA is continuous beneath the site and was encountered in all borings of sufficient depth to reach this unit. The top of the UGA occurs between 1.0 and -22.3 feet elevation. All indications are that the UGA is probably in excess of 160 feet thick beneath the site. The top surface of the UGA dips less than 1° to the southeast.

Tidal Marsh Deposits (TMD) - This unit is a dark gray to black organic silt (OL), organic clay (OH), and peat (PT) with some sand. Consistency of the unit is soft to medium stiff. Occasional partings and seams of fine sand were observed. The unit is reported to be poorly permeable with hydraulic conductivities averaging approximately 10^{-8} cm/sec. Where present, the TMD would tend to serve as a confining layer between the UGA (below) and DSF and waste (above).

The TMD was probably a continuous surface unit in the vicinity of the site before landfiling commenced, but landfiling and

other nearby construction had possibly modified the TMD morphology. The TMD appears to have been thinned or perhaps totally removed in some areas. The RI contains additional information regarding the presence of the TMD.

Unit thickness encountered by borings ranges from 12 feet in the eastern portion of the site to zero. The TMD has been compressed under the weight of the overlying municipal fill. The TMD was found at elevations ranging from 0.6 feet to -22.3 feet. The surface of the unit dips less than 1° to the south-southeast.

In the GBF borings drilled for this investigation, below the waste, the TMD ranges from zero to over 5 feet thick. Here it's generally stiffer from compression and is often disturbed, mixed with waste or sands. In the tidal areas (recent SBF borings) the TMD was found to range from about 2 to over 6 feet thick. Because these recent borings were terminated in the TMD the actual thicknesses of the boring locations are not known. In general, the TMD is expected to be about 10 feet thick or less. Beyond the surf areas, the TMD appears to have been removed by dredging as evidenced by borings performed in the water.

The construction of the landfill resulted in the placement of a huge thickness of man-placed fill over the TMD, the first of which was the Dredged Sand Fill (DSF).

Dredged Sand Fill (DSF) - This unit is gray fine and medium sand with a trace to some fines and a trace of coarse sand and gravel (SP, SP-SM). Consistency of the unit varies from very loose to very dense and the sand is poorly graded. The unit is reported to be highly permeable with hydraulic conductivities averaging approximately 10^{-2} cm/sec.

The distribution of the DSF above the TMD and UGA is described in the RI report. The DSF is absent in some areas.

3.1.4 Landfill Characteristics

The uppermost unit at FAL consists of solid waste in a matrix of various types of cover material. Solid waste disposed at the site generally consisted of garbage, rubbish, street dirt, commercial waste, construction and demolition debris, incinerator ash and residue. The site was also permitted to receive asbestos containing waste. Fill materials encountered during the drilling program included: medical waste, concrete slabs, wood, plastic, glass, paper, rags, wire rope, automobile bodies, tires, and large metal pieces.

Municipal fill is reported to range from zero to about 130 feet. Except for an area near the Fountain Avenue entrance gate, the entire site area within the berms appears to be blanketed with some thickness of municipal fill. The landfill plateau area consists of about 90 to 100 acres. The side slope areas account for the remaining 200 to 210 acres. Typically, side slopes are 4H:1V to 5H:1V which are flatter than typical mounded municipal landfills. Drill cuttings from borings installed in the fill were moist, gray to black in color, and exuded a putrid odor likely due to the decomposition of organic materials.

The auger borings encountered zones of saturated waste at levels above the previously reported leachate mound. At the time of drilling, below depths of about 25 feet in ABF-11, 9 feet in ABF-9 and 15 feet in ABF-8, and at the surface in ABF-12, saturated waste was encountered. Subsequent monitoring of these boreholes indicate substantial dropping of the fluid levels (see Table No. A.1, Appendix A). The auger cuttings consistency in these saturated zones resembled a high water

content sludge or slurry. This made identification of waste constituents and estimation of unit weights difficult. It appears as though the action of the drilling tools within the highly decomposed and saturated waste produced this result. Boring data in the area do not indicate that the waste in-situ is this soft. By contrast, most of ABF-8 and the entire ABF-10 explorations showed very little moisture and the waste, mostly paper, was only slightly decomposed. In general, these "dry" holes were producing more gas.

In the "wet" holes, because cascading leachate was typically audible and the leachate level generally dropped throughout and after completion of the drilling, it is believed that the leachate is present in perched zones within the waste. This is usually a result of low permeability soil cover layers or waste materials present within the waste mass. The presence of layers of low permeability material and perched leachate can be inferred to some degree from the CPTU soundings.

Waste cutting weights, when possible, were measured at the borehole as indicated on the drilling logs. Based on the weights and estimated hole diameters, the unit weight of the waste was estimated. The average unit weights of waste material for borings ABF-8, 9, 10, 11 and 12 are 84.6, 33.8, 85.7, 73.5 and 76.8 pcf respectively. The weighted average unit weight for the Fountain Avenue Landfill sampling is 75.1 pcf. Boring ABF-9 revealed higher amounts of plastics, rags and carpet than other borings, which contributed to the lower value of average unit weight. Borings ABF-8 and 10 had the highest percentage of soil in the samples which resulted in high values of average unit weight. The weighted average unit weights for each depth interval of the borings are shown in Figure Nos. A.1 and A.2 in Appendix A. A summary of these values is contained in Table No. A.2 in Appendix A. Percentages of different waste categories, based on field

observations, are shown on Table Nos. A.3 through A.8 in Appendix A. Stabilized leachate mound level measurements for the auger borings contained in Table No. A.1 in Appendix A.

3.2 Pennsylvania Avenue Landfill

3.2.1 Investigation Program

The Pennsylvania Avenue Landfill geotechnical investigation program under this project phase consisted of the following:

a. Large Diameter Augers Borings. Two (2) augers borings (ABP-8 through ABP-9) were advanced from the landfill plateau using 30 and 36 inch diameter bucket augers, solid stem augers, and other drilling tools. The auger boring depths were 76.5 and 34 feet for ABP-8 and ABP-9, respectively. Cuttings of waste removed from the hole were weighed when possible to evaluate waste unit weights. The auger borings were logged and air monitoring measurements at the top of the borehole were conducted. During drilling, water level measurements were made in the open hole, and upon completion, in well casing installed in the hole. The purpose of these explorations was to gain direct information regarding waste characteristics, including composition, moisture conditions, state of decay, and weight. The locations are shown on Drawing No. P-1. Logs and a Summary Table are contained in Appendix A.

b. Perimeter Borings. Eleven (11) borings were drilled at the landfill perimeter. Seven (7) of these, GBP-1 through GBP-7, were drilled near the perimeter access road within the landfill footprint. The remaining four (4), SBP-1 through SBP-4, were drilled in the tidal flat area adjacent to the landfill. The GBP borings were drilled with mud rotary or hollow stem auger (HSA) methods, using truck-mounted and ATV-

mounted drilling equipment. The SBP-series borings were drilled with tracked ATV-mounted equipment using HSA. The GBP borings ranged in depths from 16 to 28 feet and the SBP borings ranged in depth from 9 to 10 feet.

The purpose of these borings were to collect general stratigraphic data and to obtain undisturbed Shelby tube samples of the Tidal Marsh Deposit (TMD) for soil mechanics testings. Boring locations are shown on Drawing No. P-1. Logs and Summary Table are contained in Appendix A.

c. **Interior Borings.** At the Large Diameter Auger (ABP) locations, borings GBP-8 through GBP-9 were drilled. These borings were advanced from the base of the auger holes to the top of the TMD. Eight (8) inch diameter casing installed in the open auger holes before backfilling facilitated this operation. Mud rotary drilling methods were employed. The boring depths were 49 and 89 feet, being advanced 12.5 to 15 feet below the base of the auger holes for ABP-8 and ABP-9, respectively.

The purpose of these holes were to determine conditions below the waste mass, particularly regarding the TMD thickness and consistency. Undisturbed samples of the TMD, when encountered, were attempted. These borings were also used to determine the waste thickness and conditions below the base of the completed auger hole. The boring locations are shown on Drawing No. P-1. Logs and Summary Table are included in Appendix A.

d. **Soil Mechanics Laboratory Testing.** All soil samples were delivered to our soil mechanics laboratory in Whippany, New Jersey. The testing program included identification and physical properties tests on representative soil samples. The testing was primarily performed on TMD samples. The following

summary table shows the breakdown of number of tests performed on samples from the Pennsylvania Avenue landfill.

**Table No. 2 - Pennsylvania Avenue Landfill
Soil Mechanics Testing**

Test	ASTM Designation	No. of Tests
Atterberg Limits	D4318	4
Water Content	D2216	3
Sieve Analysis	D422	3
Consolidation	D2435	3
Unconfined Compression	D2166	-
CIU Triaxial	D4767	3

The summary of laboratory tests as well as test curves are contained in Appendix A.

3.2.2 Site Description and History

The Pennsylvania Avenue Landfill (PAL) is a 110-acre, inactive landfill located in Brooklyn, New York. The PAL is on the New York State Registry of Inactive Hazardous Waste Sites as a Class 2A Site.

The PAL was opened in 1956 and received residential, commercial, incinerator, street cleanings, construction and demolition (C&D) wastes, and waste oil. By 1962, the landfill was closed and filling activities had shifted to the adjacent Fountain Avenue Landfill (FAL). In 1968, the FAL was expanding more rapidly than anticipated and the dumping of C&D debris was shifted to the PAL site. The City of New York transferred ownership of the PAL to the United States Department of the Interior, National Park Service, in 1974. In 1979, all filling at the PAL ceased.

Situated over what was once a tidal marsh, the PAL is surrounded on three sides by water: Hendrix Creek to the east, Jamaica Bay on the south and Fresh Creek Basin to the west. On the north, the PAL is bounded by the Belt Parkway; farther north is Starrett City, a high-rise housing development.

There is one large main fill mound in the northwest half of the PAL which rises above Jamaica Bay to an elevation of approximately 85 feet (Borough of Brooklyn Datum). A round shaped mound in the central portion of the southeast half of the PAL rises to an elevation of approximately 40 feet. Other fill ridges (running around the perimeter of the Site) are between 10 and 20 feet in height. Soil cover is generally thin.

3.2.3 Site Geology

The regional and site geology and hydrogeology are described in detail and in the Remedial Investigation (RI) report dated May, 1994 by URS Consultants. This discussion is limited to the geology which influences landfill stability and settlement. The stratigraphy of the site is generally the same as for FAL and includes, in order of increasing depth, municipal fill, dredged sand fill (DSF), tidal marsh deposits (TMD), and upper glacial aquifer (UGA). Below the UGA, the geology is not significant for the purposes of evaluating landfill settlement and static-conditions slope stability. The underlying geology must, however, be considered in the seismic evaluation of landfill stability.

Upper Glacial Aquifer (UGA) - Based on previous explorations, this unit is gray to brown, fine and medium sand with traces of gravel, coarse sand, and fines (SP, SP-SM). Consistency of the unit is medium dense to dense and the sand is poorly graded. Some silt and clayey silt lenses and interlayers were

noted below -90 feet elevation in borings completed during previous investigations. The unit is highly permeable with hydraulic conductivities averaging approximately 10^{-2} cm/sec.

UGA is continuous beneath the site and was encountered in all borings of sufficient depth to reach this unit. The top of the UGA occurs between -3.7 and -10.0 feet elevation. All indications are that the UGA is probably in excess of 160 feet thick beneath the site. The top surface of the UGA dips less than 1° to the south-southeast.

Tidal Marsh Deposits (TMD) - This unit is a dark gray to black organic silt (OL), organic clay (OH), and peat (PT) with some sand. In some borings, a greenish black or brown stiff silty clay (CL) was encountered. Consistency of the unit is soft to medium stiff. Occasional partings and seams of fine sand were observed. Before the area was modified by landfill construction activities, a continuous cover of recent Tidal Marsh Deposits probably overlayed the UGA.

The TMD unit was encountered in all borings of sufficient depth to reach this unit. Unit thickness encountered by borings ranges from 1.2 to 8.0 feet. The unit is reported to be poorly permeable with hydraulic conductivities averaging approximately 10^{-7} cm/sec. Where present the TMD would tend to serve as a confining layer between the UGA (below) and DSF and waste (above). The TMD has been compressed under the weight of the overlying municipal fill. The RI report contains additional information regarding this deposit.

In the GBP borings drilled for this investigation, below the waste, the TMD ranges from 2 to over 7 feet thick. Here it's generally stiffer from compression and is often disturbed, mixed with waste or sands. In the tidal areas (recent SBP borings) the TMD was found to be over 2 feet in thickness.

Because these recent borings were terminated in the TMD the actual thicknesses at the boring locations are not known. In general, the TMD is expected to be about 10 feet thick or less. Beyond the surf areas, the TMD appears to have been removed by dredging as evidenced by borings performed in the water.

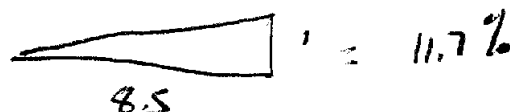
The construction of the landfill resulted in the placement of a huge thickness of man-placed fill over the TMD, the first of which was the Dredged Sand Fill (DSF).

Dredged Sand Fill (DSF) - This unit is tan, brown and grayish black fine to medium sand with a trace to some fines (SP, SP-SM). Consistency of the unit varies from very loose to very dense and the sand is poorly graded. Thickness varies from 2 to 13.5 feet according to previous borings.

3.2.4 Landfill Characteristics

The fill mound is composed of primarily construction and demolition (C&D) debris mixed with sand overlying earlier municipal and waste C&D debris. Fill contents encountered during drilling include concrete slabs, wood, brick, plastic, glass, metal, fabrics, paper and tires. Only a minor amount of municipal waste was encountered during drilling activities. Waste oil was encountered in wells drilled on the southwest side of the fill mound.

Fill thickness varies from 2 feet to 86 feet. The thickness of the major fill mound (north side of site) varies from 68 feet to 86. The smaller fill mound to the south has a thickness of about 30 feet. Side slopes for the higher (northern) mound are typically 2H:1V to 3.5H:1V, and slopes for the lower (southern) mound are typically 8.5H:1V. Some fill is found in ridges near the perimeter of the landfill.



The large diameter auger borings, encountered primarily soil type materials with some C&D waste. The C&D waste was typically brick, wood, concrete, and metal. In ABF-8, below about 70 feet, leachate was encountered, and the waste was decomposed to a higher degree than above. Below about 50 feet waste oil staining of the landfilled materials was evident. ABF-9 was wet below about 33 feet.

The average unit weights of waste material for borings ABP-8 and 9 are 81.0 and 70.7 pcf, respectively. The average unit weight for the Pennsylvania Avenue Landfill sampling is 77.8 pcf. Both borings encountered a considerable percentage of soil type materials which resulted in high values of average unit weight. The percentage of C & D waste recovered in the borings was not significant. The average unit weights for each depth interval of the borings are shown in Figure Nos. A.1 and A.2 in Appendix A. Unit weight estimates for the waste based on field measurements are summarized in Table No. A.2 in Appendix A. Waste composition percentages based on field observations are summarized in Table Nos. A.3 and A.8 in Appendix A. Stabilized leachate mound level measurements for ABF-8 and ABF-9 are contained in Table No. A.1 in Appendix A.

4.0 ENGINEERING EVALUATION

4.1 Methodology and Controlling Factors

4.1.1 Settlement

An evaluation of landfill settlements and their potential impact on landfill closure improvements will be performed once the proposed capping plans are developed. The evaluation will consider characteristics of the landfill waste materials as determined by this and previous studies and supplemented

with published literature on the subject and our experience. Direct field observations and measurements of waste conditions and properties were made to assess the waste materials and select parameters for analysis. Short-term settlements caused by placement of fill material to develop grades for construction of a landfill cap and long-term settlements independent of the cap construction will be estimated. Factors which control settlement include:

- a. Applied load magnitude, areal distribution, and rate of application (construction schedule).
- b. Factors influencing short-term settlement magnitude, including waste areal extent, thickness, density, compressibility/strength, and excess porewater pressure dissipation.
- c. Factors influencing long-term settlement magnitude, including waste areal extent, thickness, biodegradable content, and conditions critical to waste decomposition (including moisture and air).
- d. Factors influencing differential settlement, including all those parameters included in a, b, and c, plus waste mass homogeneity.

For the analysis, specific settlement parameters evaluated by the fill load test and pressuremeters tests will be used, in conjunction with waste mass parameters such as unit weight and leachate level, to arrive at estimates for different landfill areas based on the proposed imposed loading (capping). Based on the boring information, judgements regarding parameter values to be used in different landfill areas will be made.

4.1.2 Stability

An evaluation of existing landfill stability conditions were performed. The evaluation considered characteristics of the waste material as determined by this and previous studies and supplemented with published literature on the subject and our experience. In addition, natural deposit parameters were developed based on this and previous study information. In particular, the TMD properties effecting overall slope stability of the landfill were established. The following factors control stability:

- a. Applied load magnitude, areal distribution, and rate of application (construction schedule) for proposed capping plans.
- b. Stratigraphy and geometry of landfill and underlying deposits.
- c. Physical parameters of the waste and natural deposits including:
 - Unit weight (γ)
 - Shear Strength, as represented by internal friction angle (ϕ) and cohesion (c)
 - Water levels, groundwater and leachate mound and perched leachate conditions.
- d. Seismicity of Area.

4.2 Proposed Grading and Capping Alternatives

The proposed grading and capping alternatives have not been developed at this stage of the projects. The findings included in this report, however, will provide some guidance to the designers. Upon completion of preliminary plans,

stability and settlement evaluations will be made based on the proposed capping configurations. Stability analyses will be performed utilizing the waste and natural deposit parameters, developed for this report, and summarized in sections 4.3.2 and 4.4.2. Settlement computations will be made utilizing the waste and natural deposit parameters developed for this report and summarized in Section 4.3.1 and 4.4.1.

4.3 Fountain Avenue Landfill

4.3.1 Settlement Investigation

Waste Mass Parameters

The waste mass parameters developed for the settlement analysis were selected based on the evaluation of direct field and laboratory data, other factors such as waste age and composition, and review of published data. The following will be utilized for evaluation:

- a. Areal Extent - the lateral limits of the waste mass are well defined by the topographic mapping as shown on Drawing F-1.
- b. Thickness - The waste mass thickness, as depicted on the subsurface sections from the RI, modified as necessary by subsurface explorations from this study.
- c. Density - The five (5) auger borings were used to evaluate waste densities as described in previous sections of this report. The measured densities, and average densities as shown on Table No. A.2 in Appendix A will be used in the analysis. Densities for locations not explored with auger borings will be extrapolated based on comparative waste

descriptions, SPT blow-counts, and other factors from recent or previous explorations..

d. Compressibility/Strength - The compressibility/strength characteristics of the waste were evaluated by performing the borehole pressuremeter tests and the test fill load program.

Five (5) settlement plates at the test fill load area were monitored. A schematic of the settlement plate installations is shown on Figure No. B.1 and approximate test fill load dimensions are summarized on Table No. B-1. The settlement data was evaluated to back-calculate an equivalent compression ratio (C_c') for the waste. This was done by an analysis which utilized the distribution of stress increase due to the test fill load, the waste thickness and density characteristics, and the settlement monitoring data. Based on the analysis, a range of C_c' values was selected for the analysis. Table No. 3 shows the C_c' values back-calculated from each settlement plate data. The range is generally 0.03 to 0.06.

Table No. 3 - Settlement Parameter Values
From Load Test Data
Plate

	IP-1 (South)	IP-2 (Center)	IP-3 (North)	IP-4 (West)	IP-5 (East)
C_c'	0.040	0.051	0.042	0.062	0.030
C_{α}'	0.0073	0.0070	0.0054	0.0081	0.0056

The pressuremeter tests, as previously described, were used to determine the pressuremeter modulus E_p at the test depth intervals. Use of this modulus in an elastic equation represents an alternative method of computing settlements due to imposed loads. The E_p values were found to range from 7.6 ton/ft² (tsf) to 115.3 tsf. The pressuremeter test is very

sensitive to the type of waste being tested and borehole conditions.

After reviewing all the pressuremeter data together with the borehole logs, a pressuremeter modulus (E_p) values will be chosen for use in the settlement analysis. The pressure-volume plots and moduli computations are included in Appendix B.

e. Creep/Waste Decomposition - The long-term consolidation (creep) of the landfill and decomposition of degradable waste materials will contribute to overall settlement.

An equivalent secondary compression ratio or creep (C_α') was determined from the test fill load data as shown on Table No. 3. C_α' values, which were found to range from 0.0054 to 0.0081, are, as expected about one order of magnitude less than C_α .

Natural Deposit Parameters

The compression of the TMD under new capping loads is the only significant contribution to settlement from natural deposits. For the settlement analysis, consolidation of the TMD will be computed based on measured or estimated thickness from the boring information. From the laboratory tests values of C_α ranged from 0.103 to 0.399 and C_α' ranged from 0.007 to 0.08.

4.3.2 Stability Analysis

Waste Parameters

Waste parameters used in the stability analysis of existing conditions are shown on Table No. 4. These were determined

from pressuremeter tests, laboratory test results and published values.

Natural Deposit Parameters

Natural deposit parameters used in the stability analysis of existing conditions are shown on Table No. 4. These were determined from laboratory test results and published values.

For the UGA, and below, the granular nature and density of the material offers a high resistance to shear failure. The TMD is relatively weak and therefore critical failure surfaces are likely to, at least partially, lie within the TMD layer.

TABLE No. 4
Stability Analysis
Waste and Natural Deposit
Parameter Values

Material Type		Total γ (pcf)	Sat γ (pcf)	c' (psf)	ϕ' (deg)
Refuse	FAL	76.5	81.5	200	22
	PAL	78.3	83.3	200	30
Sand (DSF and UGA)		125.0	125.0	0	34
Organic (TMD)	Toe	89.7	94.7	200-725	0
	Center	99.0	104.0	600-1300	0

Analysis and Results of Existing Conditions

The slope stability analyses were performed using the two-dimensional limit equilibrium program called PCSTABL5M, developed by Prof. C.W. Lovell of Purdue University. The program is well-documented, and widely used in the profession. The program employs various searching techniques to generate the probable failure surface based on the cross-section of the landfill and the soil profile. For each acceptable generated surface, a factor of safety is calculated by the Modified Janbu method using a circular type failure surface. In addition, a factor of safety is calculated for a specified failure surface through the TMD. In most cases, this specified failure surface yields the lowest (most critical) F.S.

Existing stability of the landfill was evaluated considering two cross-sections. A-A' and B'-B' as shown on Drawing No. F-1. These sections were selected to represent critical cases, i.e. areas with steep slopes underlain by TMD.

Factors-of-safety against failure (F.S.) values of 1.71 and 2.13 resulted from static conditions analyses for sections A-A' and B-B' respectively. Considering earthquake loading, with a ground acceleration of 0.15 g, F.S. values of 0.98 and 1.10 for sections A-A' and B-B' respectively were derived. As an additional trial case, 10 feet of fill was added to the landfill plateau area and stability reanalyzed. F.S. values of 1.34 and 1.47 for static conditions, and 0.88 and 0.94 for earthquake conditions resulted for sections A-A' and B-B' respectively. The addition of fill on the side slopes would tend to increase the F.S. Table No. 5 contains a summary of the results.

Appendix B includes copies of the computer output which includes a graphical depiction of the critical failure surfaces. The base of the critical failure surface is within the TMD, as expected. The water levels considered in the analysis could be refined after a stabilized leachate mound level is obtained from the auger boring well readings. The analysis is considered conservative because the water levels have continued to drop, somewhat, as of the date of this Report.

Table No. 5
Stability Analysis Results
Fountain and Pennsylvania Avenue Landfills

Site	Section	Computed Critical Factor of Safety							
		Existing		Existing & Earthquake		10' fill on Existing		10' of fill & earthquake	
		1	2	1	2	1	2	1	2
F A L	A-A'	2.53	1.71	1.34	0.98	1.67	1.34	1.18	0.88
	B-B'	2.27	2.13	1.22	1.10	1.59	1.47	1.09	0.94
P A L	A-A'	5.00	4.21	2.21	1.85	2.72	2.38	1.70	1.51
	B-B'	2.06	1.76	1.30	1.13	1.74	1.66	1.23	1.10
	C-C'	1.54	1.79	1.15	1.25	1.29	1.54	1.01	1.14

NOTE: 1 = Circular Failure Surface

2 = Specified Failure Surface

4.4 Pennsylvania Avenue Landfill

4.4.1 Settlement Investigation

Waste Parameters

The waste mass parameters developed for the settlement analysis were selected based on the evaluation of direct field and laboratory data, other factors such as waste age and

composition, and review of published data. The following will be utilized for evaluation:

- a. Areal Extent - the lateral limits of the waste mass are well defined by the topographic mapping as shown on Drawing F-1.
- b. Thickness - The waste mass thickness, as depicted on the subsurface sections from the RI, modified as necessary by subsurface explorations from this study.
- c. Density - The two (2) auger borings were used to evaluate waste densities as described in previous sections of this report. The measured densities, and average densities as shown on Table No. A.2 in Appendix A will be used in the analysis. Densities for locations not explored with auger borings will be selected based on the waste description, SPT blow-counts and other factors.
- d. Compressibility/Strength - The compressibility/strength characteristics of the waste were evaluated at Fountain Avenue Landfill by performing the borehole pressuremeter tests and the test fill load program. Values to be used at PAL will be estimated from the FAL values considering the waste composition of the FAL, primarily soil and C&D waste. C_c' values of about 10 to 30% to be used for PAL will be considered.
- e. Creep/Waste Decomposition - The long-term consolidation (creep) of the landfill and decomposition of degradable waste materials will contribute to overall settlement.

An equivalent secondary compression ratio or creep (C_{α}') was determined from the test fill load data as previously

described. PAL waste contains far less organic (decomposable) matter than FAL waste.

Therefore, for the settlement analysis, a range of combined creep/decomposition ratio of 10 to 20 % of the PAL values will be used to predict long-term settlement of the waste mass.

Natural Deposit Parameters

The compression of the TMD under new capping loads is the only significant contribution to settlement from natural deposits. For the settlement analysis, consolidation of the TMD will be computed based on measured or estimated thickness from the boring information. From the laboratory tests values of C_c and C_α as described for FAL will be used.

4.4.2 Stability Analysis

Waste Parameters

Waste parameters used in the stability analysis of existing conditions are shown on Table No. 4. These were determined from pressuremeter tests, laboratory test results and published values.

Natural Deposit Parameters

Natural deposit parameters used in the stability analysis of existing conditions are shown on Table No. 4. These were determined from laboratory test results and published values.

Analysis and Results of Existing Conditions

Slope stability analyses were performed in the manner as described for FAL in Section 4.3.2. Existing stability of the

landfill was evaluated considering three (3) cross sections, A-A', B-B' and C-C', as shown on Drawing P-1. Sections A-A' and B-B' represent critical conditions cases of slope failure with sections drawn perpendicular to the shoreline. Section A-A' represents a critical section within the lower (southern) part of the landfill and Section B-B' represents a critical section for the higher (northern) part of the landfill, Section C-C' represents a failure section "internal" to the footprint, between the high northern section to the lower southern sections. A 45 foot high steep slope of about 2H:1V exists between these two landfill sections.

Table No. 5 shows the F.S. values resulting from the static and earthquake loading conditions. F.S. values for the cases considering a 10 foot uniformly applied fill on the plateau areas only are also shown. Static F.S. values range from 1.54 to 4.21 for the existing static conditions and 1.13 to 2.21 for the existing conditions with earthquake loadings. Considering a 10 foot surcharge, static condition F.S. values range from 1.29 to 2.72, and earthquake condition F.S. values range from 1.01 to 1.70

4.5 Summary

Based on the preliminary geotechnical investigation study, the following represents a summary of our findings:

General

- FAL has a wide variation of waste types and densities. In addition, significant zones of parched water, indicating low-permeability layers were encountered, Decomposition and gas generation

rates within the landfill appear to be quite variable based on our observations.

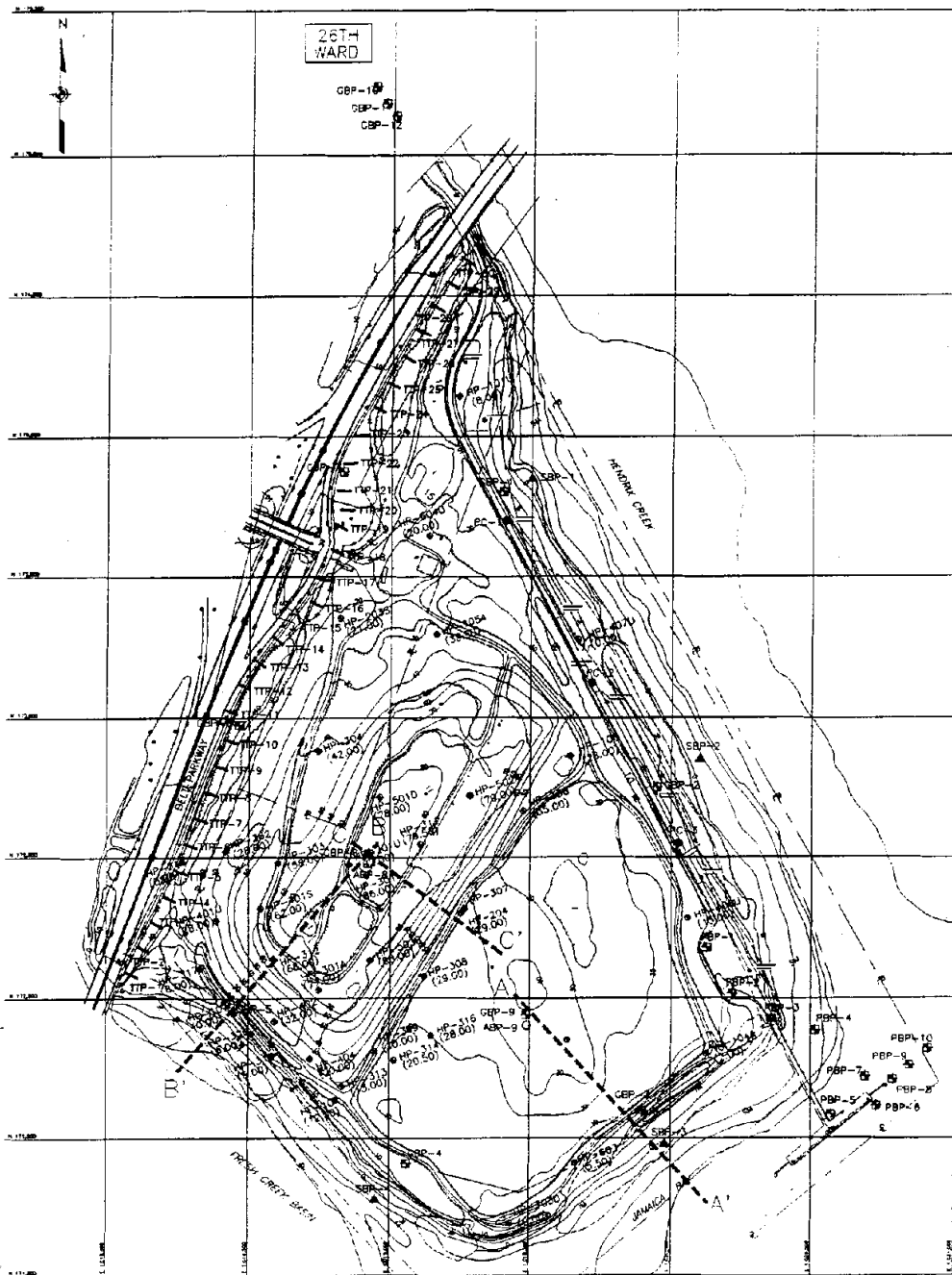
- Pal waste is mostly soil with C&D debris, densities are slightly higher than FAL waste.

Settlement

Waste and natural soil (including TMD) parameter values have been developed from field, laboratory and published data. These values are included in Section 4.3.1 and 4.4.1. Short and long-term gross and differential settlement estimates will be made based on a proposed grading plans to be developed.

Stability

Waste and natural soil (including TMD) parameter values have been developed from field, laboratory, and published data. Factors of safety against slope failure have been completed for critical sections for various cases. Existing stability at both landfills appear to be satisfactory. Capping, at least initially, will decrease the stability F.S. In the event of a significant earthquake, failure at some sections could be expected. Stability will be further analyzed after cap grading plans are developed.



GENERAL NOTES

1. GENERAL LAYOUT/TOPOGRAPHY WAS OBTAINED FROM A DISK PREPARED BY URS CONSULTANTS, INC., ENTITLED "PROPOSED TRENCHES AND BORING LOCATION MAP", JOB NO. 0535331.16, DWG. NO. 1, DATED JULY 95, (PRE-DESIGN GEOTECHNICAL INVESTIGATION, PENNSYLVANIA AVENUE LANDFILL)

LEGEND

- HP-1030 (0.00) EXISTING MONITORING WELL WITH ID CODE AND THICKNESS OF MUNICIPAL/INDUSTRIAL FILL UNKNOWN
- 15' EXISTING TOPOGRAPHY - CONTOUR INTERVAL = 2 FEET
- 24.3 EXISTING SPOT ELEVATION
- CBP-4 SETTLEMENT/STABILITY BORING
- ABP-8 BUCKET AUGER BORING

- TTP-1 TEST TRENCH
- SBP-2 SEDIMENT BORING
- PBP-1 PIER BORING
- EXISTING FENCE LINE
- PROPERTY LINE

SCALE IN FEET



EXPLORATION LOCATION PLAN

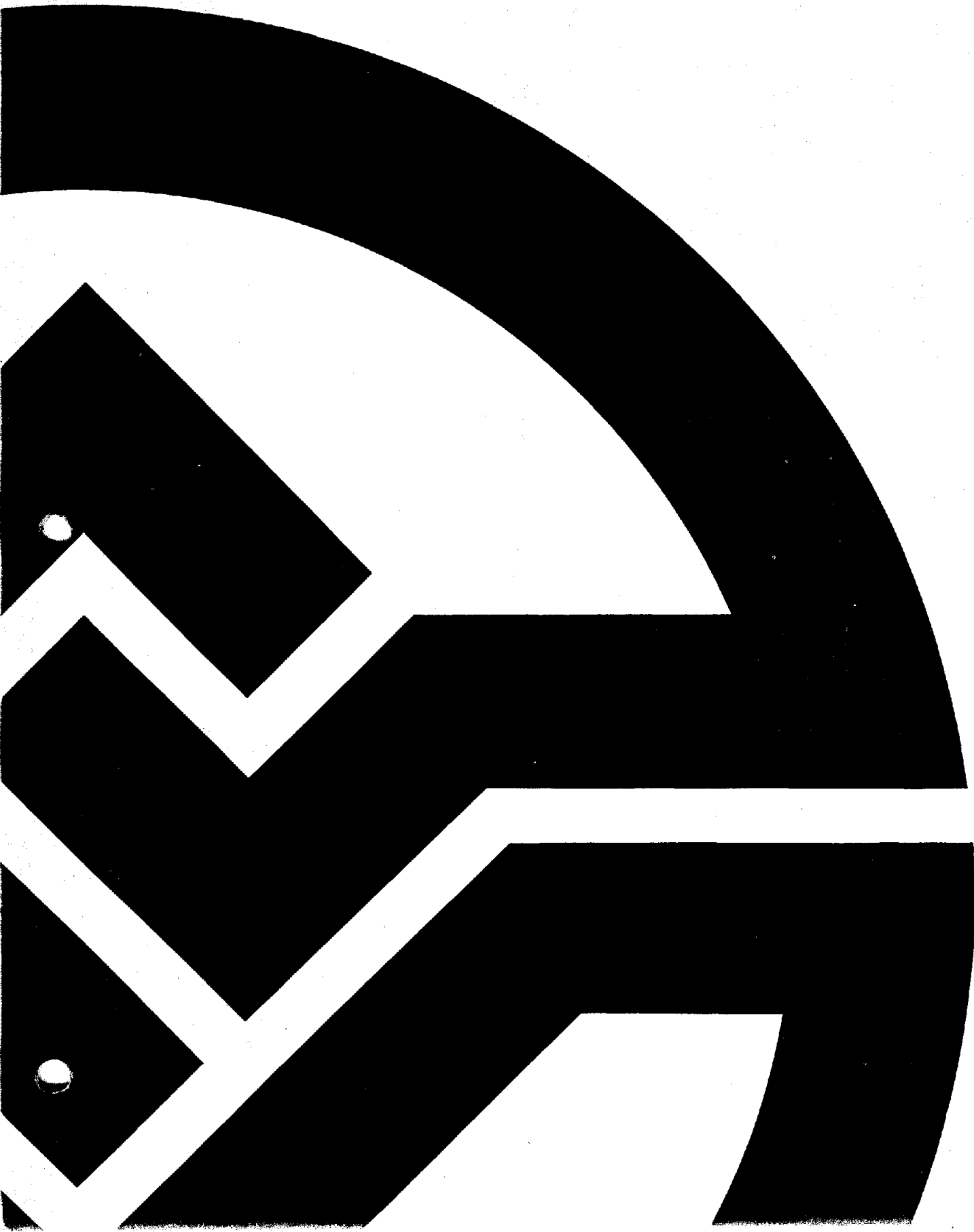
SUBSURFACE INVESTIGATION
PENNSYLVANIA AVENUE LANDFILL, BROOKLYN, NY
FOR URS CONSULTANTS, INC.

Converse Consultants East, PC
NEW YORK, NEW YORK

SCALE 200'
DATE 12 JUN 98
PROJECT NO. 95-67109-D1

DRAWN BY JAP
CHECKED BY MCK
APPROVED BY FMT
1

Appendix A



Converse Consultants East Fountain Ave. Landfill

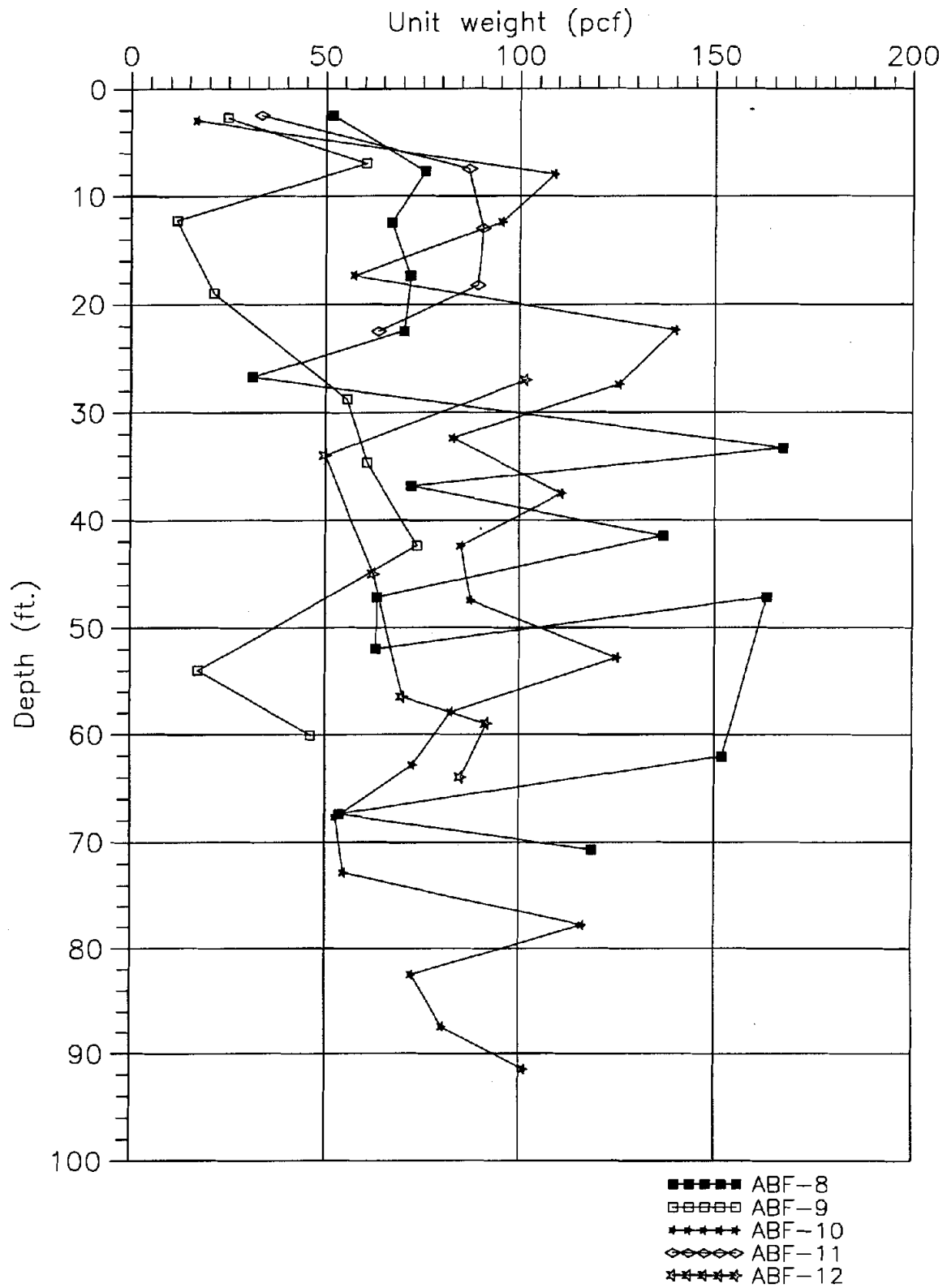


FIGURE NO.: A.1

Converse Consultants East Pennsylvania Ave. Landfill

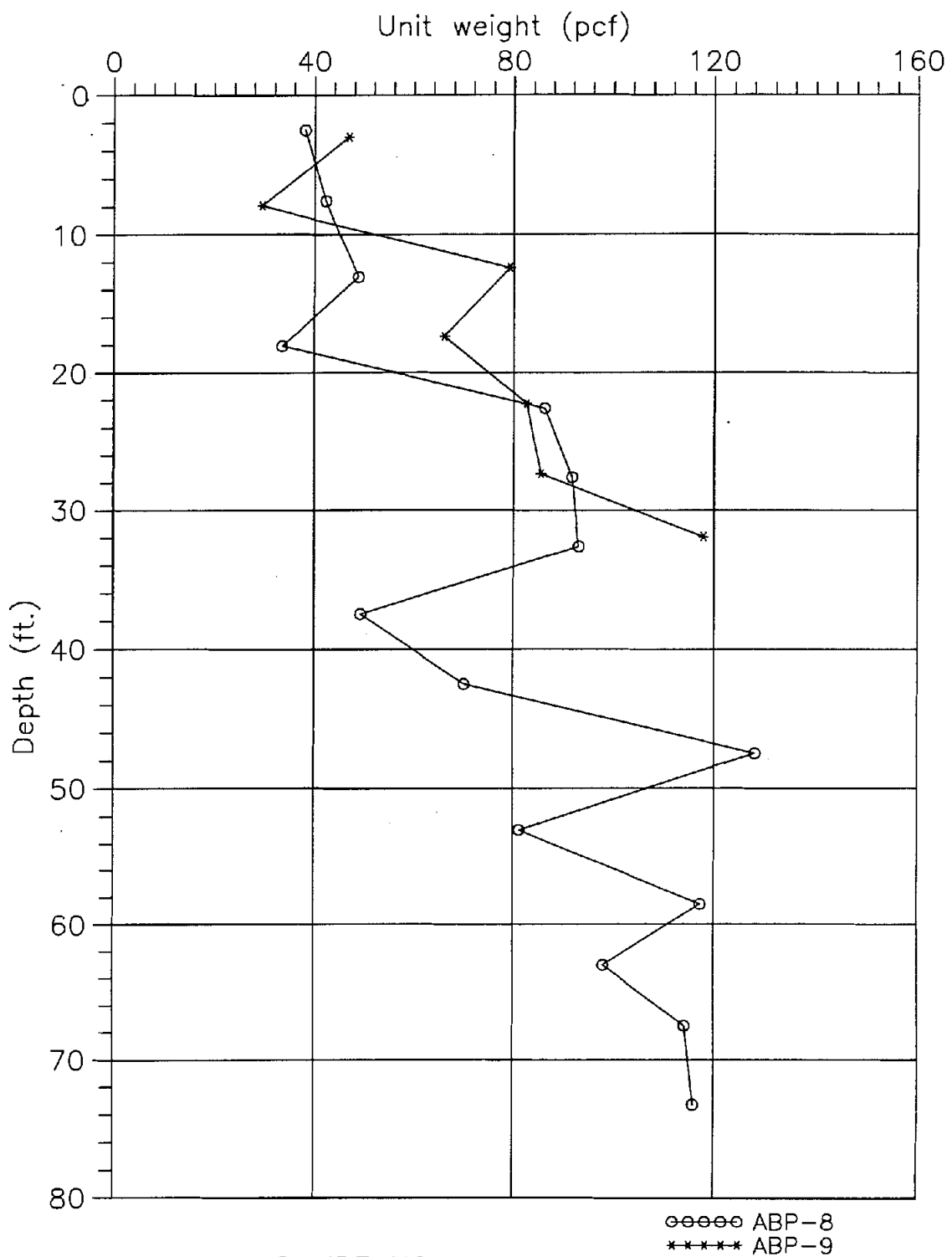


FIGURE NO.: A.2

TABLE NO.: A.1
FOUNTAIN/PENNSYLVANIA AVE. LANDFILLS, BROOKLYN, NY
WATER LEVEL MEASUREMENTS IN LARGE DIAMETER AUGER BORINGS

BORING NO.	DATE	DEPTH BELOW G.S. (ft)	COMMENTS
ABF-8	02/27/96	21.0	Well vents vigorously
	02/28/96	21.0	
	03/11/96	31.0	
	03/19/96	29.0	
	04/19/96	27.9	
	05/03/96	34.2	
	06/11/96	38.2	
ABF-9	04/02/96	33.0	
	04/19/96	32.0	
	05/03/96	34.9	
	06/11/96	35.9	
ABF-10	05/03/96	60.0	App. dry hole, PVC cap opened first time
	06/11/96	82.0	Hot and steamy
ABF-11	02/15/96	39.0	Recovered water looked clear
	02/20/96	39.0	Recovered water looked clear
	02/22/96	38.6	
	02/28/96	37.0	
	03/04/96	35.0	
	03/11/96	37.0	
	03/19/96	38.4	Checked with 2 meters
	04/02/96	37.5	
	04/19/96	36.8	
	05/03/96	51.8	
	06/11/96	59.0	
ABF-12	03/11/96	0.0	Water pouring in
	03/12/96	4.0	
	03/22/96	18.0	
	04/02/96	20.0	
	04/19/96	21.6	
	05/03/96	18.9	
	06/11/96	23.5	
ABP-8	05/03/96	69.9	0.5 ft. of product
	06/11/96	71.1	1.0 ft. of product
ABP-9	05/03/96	32.3	
	06/11/96	32.6	

FOUNTAIN/PENNSYLVANIA AVE. LANDFILLS
BROOKLYN, NY
95-67109-01/02

TABLE NO.: A.2

BORING NO.	DEPTH FROM (ft.)	INTERVAL TO (ft.)	TOTAL WEIGHT (lbs)	UNIT WEIGHT (pcf)	WEIGHTED VALUES (psf)	THICK. (ft.)	REMARKS
ABF-8	0.00	5.00	2010	51.7	258.5	5.0	1.17 ft of weight not recorded 0.67 ft of weight not recorded 1.25 ft of weight not recorded 1.33 ft of weight not recorded
	5.00	10.42	3180	75.5	409.0	5.4	
	10.42	14.50	2130	67.1	273.9	4.1	
	14.50	20.25	2560	71.8	329.2	4.6	
	20.25	24.67	2050	70.3	263.7	3.8	
	24.67	28.75	990	31.2	127.3	4.1	
	31.00	35.67	6070	167.3	780.7	4.7	
	35.67	38.00	1310	72.3	168.5	2.3	
	40.00	43.00	3190	136.8	410.3	3.0	
	44.17	50.17	2960	63.4	380.7	6.0	
	50.17	53.75	1760	63.2	226.4	3.6	
	55.58	60.00	4020	163.2	517.0	3.2	
	60.00	64.17	3350	151.9	430.8	2.8	
	64.67	70.17	2300	53.8	295.8	5.5	
	70.17	71.17	920	118.7	118.3	1.0	
AVG. FOR BORING ABF-8 (pcf) =				90.5	84.6		
ABF-9	0.00	5.50	1060	24.8	136.3	5.5	
	5.50	8.50	1410	60.4	181.3	3.0	
	8.50	16.00	680	11.7	87.5	7.5	
	16.00	22.00	990	21.2	127.3	6.0	
	28.00	29.50	650	55.7	83.6	1.5	
	34.00	35.33	630	60.8	81.0	1.3	
	40.17	44.67	2580	73.7	331.8	4.5	
	52.00	56.00	540	17.4	69.4	4.0	
	59.00	61.17	780	46.3	100.3	2.2	
AVG. FOR BORING ABF-9 (pcf) =				41.3	33.8		
ABF-10	0.00	6.00	790	16.9	101.6	6.0	2.17 ft of weight not recorded 0.42 ft of weight not recorded 0.50 ft of weight not recorded
	6.00	10.00	1550	108.8	199.3	1.8	
	10.00	14.83	3580	95.3	460.4	4.8	
	14.83	19.83	2230	57.4	286.8	5.0	
	19.83	25.00	5620	139.9	722.8	5.2	
	25.00	29.83	4720	125.6	607.0	4.8	
	29.83	35.00	3330	82.9	428.3	5.2	
	35.00	40.08	4380	110.8	563.3	5.1	
	40.08	44.75	3080	84.9	396.1	4.7	
	44.75	50.17	3400	87.5	437.3	5.0	
	50.17	55.50	4700	125.1	604.5	4.8	
	55.50	60.33	3100	82.5	398.7	4.8	
	60.33	65.42	2870	72.6	369.1	5.1	
	65.42	70.00	1880	52.8	241.8	4.6	
	70.00	75.60	2390	54.9	307.4	5.6	
	75.60	80.00	3980	116.3	511.9	4.4	
	80.00	84.90	2760	72.4	355.0	4.9	
	84.90	89.90	3120	80.3	401.3	5.0	
	89.90	93.00	2440	101.2	313.8	3.1	
AVG. FOR BORING ABF-10 (pcf) =				87.8	85.7		

TABLE NO.: A.2

BORING NO.	DEPTH INTERVAL FROM (ft.)	TO (ft.)	TOTAL WEIGHT (lbs)	UNIT WEIGHT (pcf)	WEIGHTED VALUES (psf)	THICK (ft.)	REMARKS
ABF-11	0.00	5.00	1300	33.4	167.2	5.0	
	5.00	10.00	3380	86.9	434.7	5.0	
	10.00	16.00	4220	90.5	542.7	6.0	
	16.00	20.50	3120	89.2	401.3	4.5	
	20.50	24.50	1980	63.7	254.6	4.0	
AVG. FOR BORING ABF-11 (pcf) =				72.7	73.5		
ABF-12	27.00		122	101.7			
	34.00		60	50.0			
	45.00		75	62.5			
	56.50		84	70.0			
	59.00		110	91.7			
	64.00		102	85.0			
AVG. FOR BORING ABF-12 (pcf) =				76.8	NA		
TOTAL AVG. FOR FOUNTAIN AVE. LANDFILL (pcf)				78.2	75.1		
ABP-8	0.00	5.00	1480	38.1	190.3	5.0	0.92 ft of weight not recorded 2.50 ft of weight not recorded
	5.00	10.17	1700	42.3	218.6	5.2	
	10.17	16.00	2220	48.9	285.5	5.8	
	16.00	20.17	1090	33.6	140.2	4.2	
	20.17	25.00	3240	86.2	416.7	4.8	
	25.00	30.25	3090	91.7	397.4	4.3	
	30.25	35.00	3440	93.1	442.4	4.8	
	35.00	40.00	1920	49.4	246.9	5.0	
	40.00	45.00	2730	70.2	351.1	5.0	
	45.00	50.00	4980	128.1	640.5	5.0	
	50.00	56.00	2210	81.2	284.2	3.5	
	56.00	61.00	4560	117.3	586.5	5.0	
	61.00	65.00	3050	98.1	392.3	4.0	
	65.00	70.00	4440	114.2	571.0	5.0	
	70.00	76.50	5860	115.9	753.7	6.5	
AVG. FOR BORING ABP-8 (pcf) =				80.6	81.0		
ABP-9	0.00	6.00	2190	46.9	281.7	6.0	0.83 ft of weight not recorded
	6.00	9.83	880	29.5	113.2	3.8	
	9.83	15.00	3180	79.2	409.0	5.2	
	15.00	19.75	2440	66.1	313.8	4.8	
	19.75	24.75	3210	82.6	412.8	5.0	
	24.75	30.00	3490	85.5	448.8	5.3	
	30.00	33.83	2750	117.9	353.7	3.0	
AVG. FOR BORING ABP-9 (pcf) =				72.5	70.7		
TOTAL AVG. FOR PENN. AVE. LANDFILL (pcf) =				78.0	77.8		

TABLE NO.: A.3

**FOUNTAIN AVE. LANDFILL, BROOKLYN, NY
BORING NO.: ABF-8**

DEPTH (ft.)	WASTE MATERIAL (%)				
	Soil	Wood	Metal	Plastic	Paper
0-5	60	20	-	10	10
5-10'5"	40	15	5	35	5
10-15	35	15	2	40	8
15-20	50	30	10	10	-
20-25	35	40	5	20	-
25-28'9"	30	50	-	20	-
31-35'8"	70	20	5	5	-
35'8"-40'2"	70	20	5	5	-
40'2"-46	70	20	5	5	-
46-50'2"	80	5	5	10	-
50'2"-55'7"	80	10	5	5	-
55'7"-60	80	10	1	9	-
60-64'8"	90	5	2	3	-
64'8"-71'2"	20	50	10	20	-
70-75					
75-80					
80-85					
85-90					
90-95					
95-100					

TABLE NO.: A.4

**FOUNTAIN AVE. LANDFILL, BROOKLYN, NY
BORING NO.: ABF-9**

DEPTH (ft.)	WASTE MATERIAL (%)				
	Soil	Wood	Metal	Plastic	Paper
0-5	50	2	-	48	-
5-10	15	-	-	55	30
13	-	-	5	80	15(carpet)
16'2"-16'1	8	10	2	80	-
22	-	8	2	90	-
28-29'6"	-	10	10	40	40(rags)
34-35'4"	-	5	15	40	40(rags)
35-40	-	-	-	-	-
40-45	-	-	5	35	60(rags)
45-50	5	-	10	80	5
52-56	-	20	5	5	70(carpet)
59-61'2"	40	10	10	40	-
65	100	-	-	-	-
65-70					
70-75					
75-80					
80-85					
85-90					
90-95					
95-100					

TABLE NO.: A.5

**FOUNTAIN AVE. LANDFILL, BROOKLYN, NY
BORING NO.: ABF-10**

DEPTH (ft.)	WASTE MATERIAL (%)				
	Soil	Wood	Metal	Plastic	Paper
0-6	90	9	1	-	-
6-10	90	9	-	-	1(glass)
10-15	25	5	5	50	15(rags)
15-20'6"	60	5	3	30	2(rags/paper)
20'6"-25	75	5	10	10	-
25-30'5"	70	-	5	10	15
30'5"-35	-	-	-	50	50
35-40'1"	60	12	12	6	10
40'1"-45'4"	80	10	1	8	1
45'4"-50'2"	70	1	1	14	14
50'2"-55'6"	40	7	8	17	28
55'6"-60'4"	23	11	5	10	51
60'4"-65'5"	50	6	6	18	20
65'5"-70	-	5	-	15	80
70-75	48	2	-	10	40
75-80	80	10	5	5	-
80-85	80	15	5	-	-
85-90	85	10	1	4	-
90-93	85	10	5	-	-
95-100					

TABLE NO.: A.6

**FOUNTAIN AVE. LANDFILL, BROOKLYN, NY
BORING NO.: ABF-11**

DEPTH (ft.)	WASTE MATERIAL (%)				
	Soil	Wood	Metal	Plastic	Paper
0-5	50	30	10	10	-
5-10	10	80	5	5	-
10-15	40	45	5	10	-
15-20	30	60	5	5	-
20-25					
25-30					
30-35					
35-40					
40-45					
45-50					
50-55					
55-60					
60-65					
65-70					
70-75					
75-80					
80-85					
85-90					
90-95					
95-100					

TABLE NO.: A.7

**PENNSYLVANIA AVE. LANDFILL, BROOKL
BORING NO.: ABP-8**

DEPTH (ft.)	WASTE MATERIAL (%)			
	Soil	Wood	Metal	C&D
0-5	90	5	-	5
5-10'2"	90	5	-	5
10'2"-16	75	20	-	5
16-20'2"	50	40	1	4
20'2"-25	60	34	4	2
25-30'3"	35	60	1	4
30'3"-35	50	49	1	-
35-40	53	45	-	2
40-45	55	45	-	-
45-50	93	5	-	2
50-56	90	5	-	5
56-61	30	60	-	10
61-65	NR	NR	NR	NR
65-70	95	4	1	-
70-76'6"	80	20	-	-
76'6"-80				
80-85				
85-90				
90-95				
95-100				

Note: NR = No Recovery
C&D = Bricks, Concrete, etc.

TABLE NO.: A.8

**PENNSYLVANIA AVE. LANDFILL, BROOKLYN, NY
BORING NO.: ABP-9**

DEPTH (ft.)	WASTE MATERIAL (%)					
	Soil	Wood	Metal	C&D	Paper	Plastic
0-6	60	30	-	10	-	-
6-10'6"	5	95	-	-	-	-
10'6"-15	60	33	-	7	-	-
15-19'9"	55	45	-	-	-	-
19'9"-24'9"	80	17	3	-	-	-
24'9"-30	60	20	3	-	10	7
30-34	95	4	1	-	-	-
35-40						
40-45						
45-50						
50-56						
56-61						
61-65						
65-70						
70-76'6"						
76'6"-80						
80-85						
85-90						
90-95						
95-100						

Note: C&D = Bricks, Concrete, etc.

TABLE NO.: A.9**PENNSYLVANIA AVE. LANDFILL, BROOKLYN, NY****SUMMARY OF BORINGS**

Boring Number	Elevation (ft.)	Depth of Boring (ft.)	Depth of GW/ (ft.)	Elevation Top of TMD (ft.)	Thickness of TMD (ft.)
PERIMETER BORINGS					
GBP-1	6.5	20.0	6.0	-5.5	7.0+
GBP-2	8.4	20.0	7.0	-7.6	3.0
GBP-3	4.5	16.0	3.0	-7.5	2.0
GBP-4	17.0	28.0	4.0	-7.0	2.0
GBP-5	5.1	14.0	5.0	-6.4	2.5+
GBP-6	9.9	18.0	5.0	-5.8	2.3+
GBP-7	6.0	18.0	4.0	-9.5	2.5+
SBP-1	-0.2	10.0	1.0	-7.2	3.0+
SBP-2	-2.0	9.0	0.0	-9.0	2.0+
SBP-3	0.1	10.0	0.0	-7.9	2.0+
SBP-4	-1.0	9.0	0.0	-8.0	2.0+
INTERIOR BORINGS					
GBP-8	79.1	89.0	70.0	NE	NE
GBP-9	39.5	49.0	32.0	-7.5	2.0+
SETTLEMENT/STABILITY INVESTIGATION					
ABP-8	79.5	76.5	70.0		
ABP-9	37.4	34.0	32.0		

Note: NE = Not Encountered

TABLE NO.: A.10

FOUNTAIN AVE. LANDFILL, BROOKLYN, NY

SUMMARY OF BORINGS

Boring Number	Elevation (ft.)	Depth of Boring (ft.)	Depth of GWT (ft.)	Elevation Top of TMD (ft.)	Thickness of TMD (ft.)
PERIMETER BORINGS					
GBF-1	9.8	22.0	4.0	-4.2	6.0
GBF-2	6.5	19.5	NA	-6.5	5.0
GBF-3	8.0	20.0	NA	-9.0	3.0+
GBF-4	12.2	22.0	12.0	-5.8	4.0+
GBF-5	11.4	20.0	NA	-3.6	5.0+
GBF-6	13.8	22.0	9.0	-6.2	2.0+
GBF-7	16.3	24.0	16.0	-4.2	3.5+
SBF-1	-2.5	6.0	0.0	-7.0	1.5+
SBF-2	-1.0	12.0	0.0	-8.0	5.0+
SBF-3	-1.3	12.0	0.0	-8.6	2.7
SBF-4	-0.8	10.0	0.0	-8.6	2.2+
SBF-5	-3.2	9.0	0.0	-10.2	2.0+
SBF-6	-2.0	13.0	0.0	-9.0	6.0+
SBF-7	-3.4	8.0	0.0	-8.9	2.5+
INTERIOR BORINGS					
GBF-8	72.1	79.0	38.0	-3.9	1.0
GBF-9	86.3	98.0	36.0	-10.7	1.0+
GBF-10	118.1	134.0	82.0	-10.9	1.5
GBF-11	110.9	122.5	59.0	-10.6	1.0
GBF-12	92.8	116.0	24.0	NE	NE
SETTLEMENT/STABILITY INVESTIGATION					
ABF-8	72.1	75.5	38.0		
ABF-9	86.3	65.0	36.0		
ABF-10	118.1	93.0	82.0		
ABF-11	110.9	78.0	59.0		
ABF-12	92.8	78.0	24.0		

Note: NA = Not Available
NE = Not Encountered

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. GBF-5

PROJECT: FOUNTAIN AVENUE LANDFILL

SHEET NO. 1 OF 1

CLIENT: NYC DEP

JOB NO.:

BORING CONTRACTOR: WARREN GEORGE INC.

BORING LOCATION:

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 11.4

DATE

TIME

LEV

TYPE

TYPE

SS

SHELBY

DATE STARTED: FEB. 22 '96

DIA.

2"

3"

DATE FINISHED: FEB. 22 '96

WT.

140"

(BRASS)

DRILLER: R.Y. GREGORY

FALL

30"

GEOLOGIST: ALEX ZDRZALKA

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS	
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %						
		1	SS	6 28 28 20	16.6%	DK. BROWN	LOOSE	TOP SOIL, ORGANICS,			
		2	SS	5 5 6 11	8%	W A		BRICK FILL, CERAMICS			
5		3	SS	7 13 5 3	21%	S T		ASH FILL			
		4	SS	3 7 11 14	8%	E	MEDIUM				
10		5	SS	10 12 12 13	42%	GRAY	DENSE	F-M UNIFORM SAND			
		6	SS	7 15 21 17	58%						
		7	SS	7 11 13 13	50%						
15		8	SS	8 6 5 5	63%	DK.					
16		SHELBY			100%	GRAY	MEDIUM	3" PEAT INTERBEDDED		SEA SHELLS	
17		TUBE				TO		WITH TMD		TWO SHELBY TUBES	
18		SHELBY			96%	BLACK	STIFF	ORGANIC SILT		COLLECTED	
20		TUBE						TMD		16'-18'	
										18'-20'	
								BOTTOM OF BORING			
								@ 20'			
25											
30											
35											

COMMENTS BOREHOLE ADVANCED BY MWD ROTARY 3" BID OPEN HOLE 2 SHELBY TUBES COLLECTED BOREHOLE GROUTED BACK TO THE GRADE 20' WITH BENTONITE / CEMENT SLURRY

PROJECT NO.

BORING NO.

GBF-5

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. GBF-6

PROJECT: Mountain Ave Landfill GeoTech Invest.

SHEET NO. 1 OF 1

CLIENT: NYC DEP

JOB NO.: 05-35332-63

BORING CONTRACTOR: Warren George

BORING LOCATION: Near Bern/Belt Parkway

GROUND WATER:

GROUND ELEVATION: 13.8

DATE	TIME	LEV	TYPE	TYPE	CAS.	SAMP	CORE	TUBE
				HSA	SS			
				DIA.	3 1/4"	2"		
				WT.		140#		
				FALL		30"		

DATE STARTED: 3/4/96

DATE FINISHED: 3/5/96

DRILLER: Sal D'Amico

GEOLOGIST: Kevin Kearney

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE					DESCRIPTION				CLASS USCS	H ₂ O (%)	REMARKS
		NO.	TYPE	BLOWS PER 6"		RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION				
		1	SS	6 8	10 12	70	Brown	Loose	Residual Soil	—	0	(moist)	
5													
		2	SS	6 8	7 6	20	Brown	Loose	Residual Soil w/organic material	—	0	(moist)	
10													
		3	SS	7 15	12 17	20	Black	Medium Dense	MF Sand some gravel	SW	0	(wet)	
15													
		4	SS	10 11	10 4	0	—	Loose	No Recovery 2 spoons tried.	—	0	(wet)	
20													
		Shel by Tube				100	Black	Medium Dense	TMP-organic peat	CL	0	(wet)	
25													
30													
35													

COMMENTS

Borehole advanced with the track mounted B-47 mobil rig

PROJECT NO.

05-35332-63

BORING NO.

GBF-6

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. GBE-7

PROJECT: Fountain Ave Landfill

SHEET NO. 1 OF 1

CLIENT: NYCDEP

JOB NO.: 05-35331-63

BORING CONTRACTOR: Warren George

BORING LOCATION: Near Berm / Belt Parkway

GROUND WATER:

CAS. SAMP CORE TUBE

GROUND ELEVATION: 16.3

DATE TIME LEV TYPE

TYPE HSA SS

DATE STARTED: 3/4/96

DIA. 3 1/2" 2"

DATE FINISHED: 3/4/96

WT. 140#

DRILLER: Sal D'Amico

FALL 30"

GEOLOGIST: Kevin Kearney

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	DESCRIPTION			CLASS USCS	H ₂ O (%)	REMARKS
		NO.	TYPE	BLOWS PER 6"					MATERIAL DESCRIPTION					
		1	SS	10 15	17 34	40	Brown	Medium Dense	Residual soil with some brick debris.			—	0	(moist)
5														
		2	SS	5 9	5 16	30	Brown	Loose	Residual soil and wood debris			—	0	(moist)
10														
		3	SS	2 30	5 34	50	Brown	Loose - medium Dense	Residual soil, some plastic glass debris, fine sand at bottom			—	0	(moist)
15														
		4	SS	20 6	17 3	20	Black	medium Dense	Residual soil trace of small gravel.			—	0	(moist - wet)
20														
		5	SS	9 3	4 5	60	Black	Loose	2" or more coarse sand 20.5' TMD organic peat.			SW	0	(wet)
		Shelby Tube				60	Black	medium Dense	TMD - organic silt.			CL	0	(wet)
25														
30														
35														

COMMENTS

Borehole advanced with the truck mounted B-47 mobil rig

PROJECT NO.

05-35332-63

BORING NO.

GBE-7

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. GBF-8

PROJECT: FOUNTAIN AVE LANDFILL

SHEET NO. 1 OF 3

CLIENT:

JOB NO.:

BORING CONTRACTOR: Warren George

BORING LOCATION:

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 72.1

DATE

TIME

LEV

TYPE

TYPE

SS

DATE STARTED: 3-4-96

DIA.

2"

DATE FINISHED: 3-4-96

WT.

140

DRILLER: Mike McCarthy

FALL

30

GEOLOGIST: Mark Demytitz

POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION				REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	
5								Fill 0-75, See boring ABF-8 for detail		
10										
15										
20										
25										
30										
35										

wet

COMMENTS

PROJECT NO.

BORING NO.

TEST BORING LOG
BORING NO. 67F-8

SHEET NO. 2 OF 3

PROJECT: FOUNTAIN AVE LANDFILL

JOB NO. :

CLIENT:

DEPTH FT		STRATA	SAMPLE				DESCRIPTION			REMARKS
			NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS
									FILL	
75										
76			1	SS	36 50	75%	GRAY	DENSE	HEAVY SAND	
77					47 57		BROWN	STIFF	MEDIUM SAND	
78			2	ST	20 24	100%	BROWN	STIFF	SANDY CLAY	

COMMENTS

PROJECT NO.

BORING NO.

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. GBF-9PROJECT: FOUNTAIN AVENUE LANDFILLSHEET NO. 1 OF 2CLIENT: NYC DEP

JOB NO. :

BORING CONTRACTOR: WARREN GEORGE

BORING LOCATION:

GROUND WATER: N/A

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 80' 86.3

DATE TIME LEV TYPE

TYPE

STEEL

SPLT

SHELBY

DATE STARTED: 2/26/96

DATE TIME LEV TYPE

DIA.

4" Ø

3 1/2"

3" Ø

DATE FINISHED: 2/27/96

DATE TIME LEV TYPE

WT.

300 #

140 #

(BRASS)

DRILLER: MIKE MCCARTHY

DATE TIME LEV TYPE

FALL

30"

GEOLOGIST: ALEX ZDRZALKA

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE					DESCRIPTION			REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	
5										
10										
15										
20										
25										
30										
35										

COMMENTS

BORING WAS STARTED AT THE DEPTH OF 65' OVER THE EXISTING 8" GAS WELL

PROJECT NO.

BORING NO.

GBF-9

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. GBF-9

PROJECT: FOUNTAIN AVENUE LANDFILL

SHEET NO. 2 OF 2

CLIENT: NYC DEP

JOB NO.:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION				REMARKS
		NO.	TYPE	BLOWS PER 5'	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	
65 66		1	SS	9 10 4 5	8%	DK. GRAY	LOOSE	WASTE		H ₂ S-2ppm
70 71		2	SS	7 100/11	29%		VERY DENSE	WASTE, PAPER FILL, CERAMIC, WOOD FILL DK. GRAY SAND		H ₂ S-3ppm
75 76		3	SS	100/11	NO RECOVERY					
80 81		4	SS	100/15	4%			WASTE		H ₂ S-3ppm
89 90		5	SS	34 15 20 15	NO RECOVERY					300 LBS. HAMMER WAS USED
95 96 97 98	2/2 2/2 2/2	6	SS SHELLY TUBE	20 17 17 14	100% 92%	GRAY TO BLACK	MEDIUM DENSE MEDIUM STIFF	TOP 4" FILL MATERIAL 8" F.M. UNIFORM SAND SOME SEA SHELLS, 2" PEAT LENS 8" ORGANIC SILT, THO	THO	300 LBS HAMMER AND 3" Ø SPLIT SPOON WAS USED
								BOTTOM OF BORING @ 99.9'		

COMMENTS

BOREHOLE, TREMIE GROUTED TO 65' WITH BENTONITE-CEMENT SLURRY

PROJECT NO.

BORING NO.

GBF-9

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. GBF-10

PROJECT: FOUNTAIN AVENUE LANDFILL

SHEET NO. 2 OF 2

CLIENT: NYC DEP

JOB NO. :

DEPTH FT	STRATA	SAMPLE				COLOR	CONSISTENCY HARDNESS	DESCRIPTION MATERIAL DESCRIPTION	CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY RQD %					
96 97	W A S T E	1	SS	45 30	31 100%	B L A C K		WASTE PLASTIC FILL, PAPER ASHES		140 LBS HAMMER USED
101 102		2	SS	84 16	24 9			WASTE WOOD FILL CONCRETE FILL		300 LB HAMMER USED
106 107		3	SS	18 22	18 23			WASTE WOOD FILL ASHES, SOME SAND		300 LB HAMMER USED
116 117		4	SS	22 14	28 12			WASTE PLASTIC, METAL WOOD FILL		300 LB HAMMER USED
121 122		5	3" SPLIT SPAWN	30 60	36 54			WASTE WOOD FILL, ASHES PLASTIC		300 LBS HAMMER USED
131 132 133 134	S S S S	6	3" SPLIT SPAWN	60 100	90 56	Dk. G R A Y	HARD	F-M SAND TR. OF SILT TR. F GRAVEL	CL	300 lbs hammer used
		7	SS	32 40	36 40		DENSE			
								BOTTOM OF BORING @ 134.0'		

COMMENTS BOREHOLE ADVANCED WITH FAILING KREMASTER RIG MUD ROTARY 5" Ø INNER CORING
4" Ø ROTARY BID. BOREHOLE GRADUALLY BACK TO 75' WITH CEMENT BENTONITE SLURRY.

PROJECT NO.

BORING NO.

GBF-10

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. GRF-11

PROJECT: Fountain Ave Landfill Geo Tech Invest.

SHEET NO. 1 OF 1

CLIENT: NYC DEP

JOB NO.: 05-35332-63

BORING CONTRACTOR: Warren George

BORING LOCATION: Top of Landfill

GROUND WATER:

GROUND ELEVATION: 110.9

DATE	TIME	LEV	TYPE	TYPE	CAS.	SAMP	CORE	TUBE
				DIA.	3/4"			
				WT.	200 #			
				FALL	1/4"			

DATE STARTED: 3/11/96

DATE FINISHED: 3/13/96

DRILLER: Mike McCarthy

GEOLOGIST: Kevin Kearney

REVIEWED BY:

* POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE				DESCRIPTION				CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION			
84 85		1	SS	32-35 20-25"	100	Black	Dense - Very Dense	Black muck paper debris/wood.	-	0	(wet)
91 92		2	SS	100-130"	0	-	Very Dense	No Recovery	-	-	(wet)
96 97		3	SS	50-110"	5	Black	Very Dense	Black muck (plastic debris)	-	0	(wet)
104 105		4	SS	8-19 21-30	40	Black	medium Dense	Black muck (metal debris) wood debris at bottom	-	0	(wet)
111 112		5	SS	40-52 100-130"	0	-	Very Dense	No Recovery	-	0	(wet)
118 119		6	SS	39-47 21-36	40	black	Dense	MF some coarse sand Thin layers of silt	SW	2.0 100	(wet)
120 121		Shelby Tube			0	-	Dense	No Recovery	-	-	(wet)
126.5 127.5		7	SS	41-52 36-25	90	Black	Dense Very Dense	MF trace coarse sand 1215 organic peat TMD	CL	8.0 100	3" split spoon fmbist

COMMENTS Borehole was advanced using a Tilling 1500 (mud rotary)

PROJECT NO.

GRF-11

BORING NO.

05-35332-63

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. G3F-12

PROJECT: Fountain Ave Landfill

SHEET NO. OF

CLIENT: NYC DEP

JOB NO.: 05-35332-63

BORING CONTRACTOR: WARREN George

BORING LOCATION: Top of Landfill

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 92.8

DATE

TIME

LEV

TYPE

TYPE

DIA.

WT.

FALL

DATE STARTED: 3/14/96

DATE FINISHED: -

DRILLER: Ben Rivera/George Kutschera

GEOLOGIST: KEARNEY / DEMYTRK

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION					REMARKS	
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS			
79 80		1	SS	43 26	31 37	40	Brown	Dense	Fill - wood plastic 3" Spooey	-	0	(wet)
81 82		2	SS	66 93-Refuse		40	Brown	Very Dense	Fill wood m/s sand at bottom.	-	0	(wet)
83 84 85 86 87 88 89 90												
91 92 93 94 95		3	SS	50 57	9 39	35	Br/Ol	V. Dense	Fill: plastic, wood	-		wet
96 97 98 99 100		4	SS	100/5		20	var	V. Dense	Fill: Brick, wood, glass, paper, metal	-		wet
101 102 103 104 105		5	SS	46 86	40 100/3	25	Br	-	Particle Brd., wood	-		
106 107 108 109 110		6	SS	46 87	36 45	8	Br	-	Wood	-		
111 112 113 114 115												
116 117 118 119 120		7	SS	36 41	48 35	50	Gy	loose	well rounded gvl cos sa. gvl	GP		
		8	SS	35 40	50 30	42				SP		

COMMENTS Borehole was advanced with Failing 1500 (Mod Rotary)

PROJECT NO.

05-35332-63

BORING NO.

G3F-12

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. SBF-1

PROJECT: Fountain Ave Landfill Eco Tech Invest.

SHEET NO. 1 OF 1

CLIENT: NYC DEP

JOB NO.: 05-35332-63

BORING CONTRACTOR: Warren George

BORING LOCATION: Shore Boring

GROUND WATER:

CAS. SAMP CORE TUBE

GROUND ELEVATION: -2.5

DATE TIME LEV TYPE TYPE HSA SS DIA. 3 1/4" 2" WT. 140# FALL 30"

DATE STARTED: 3/5/96

DATE FINISHED: 3/5/96

DRILLER: Sal D'Amico

GEOLOGIST: Kevin Kearney

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION				REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	
		1	SS	WH = 2'	20	Dark Brown	Very Loose	MF sand some silt	SW	(wet)
		2	SS	WH = 2'	80	Dark Brown	Very Loose	MF sand and seams of silt	SW	(wet)
5		3	SS	WH = 2'	80	Dark Brown	Very Loose	MF sand 4.5' TmD - organic silt	CL	(wet)
10										
15										
20										
25										
30										
35										

COMMENTS

Borehole was advanced with the mobil 2-47 track rig.

PROJECT NO.

05-35332-63

BORING NO.

SBF-1

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. S3F-2

PROJECT: Fountain Ave Landfill- Geo Tech Invest.

SHEET NO. 1 OF 1

CLIENT: NYCDEP

JOB NO.: 05-35331-63

BORING CONTRACTOR: Warren George

BORING LOCATION: Shore Boring

GROUND WATER:

CAS. SAMP CORE TUBE

GROUND ELEVATION: -1.0

DATE TIME LEV TYPE

TYPE HSA SS

DATE STARTED: 2/27/96

DIA. 3 1/4"

WT. 140#

DATE FINISHED: 2/27/96

FALL

POCKET PENETROMETER READING

DRILLER: Sal D'Amico

GEOLOGIST: Kevin Kearney

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	DESCRIPTION	CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"							
		1	SS	3 4	3 3	80	Brown	Very Loose	MF Trace coarse sand	SW	(wet)
		2	SS	2 2	2 3	80	Brown	Very Loose	MF Trace coarse sand Some organic silt at 2'	SW	(wet)
5		3	SS	1 2	1 1	50	Brown	Very Loose	MF trace coarse sand Thin layers of silt.	SW	(wet)
		4	SS	WH 2	1 2	100	Dark Brown Black	Very Loose	MF trace coarse sand 7' TMD with layers of shell.	SW CL	(wet)
10		Shellby Tube		-	-	70	Black	Medium Dense	MF trace coarse sand/shells TMD with some shell	CL	(wet)
		Shellby Tube		-	-	80	Black	Medium Dense	TMD with some shell	CL	(wet)
15											
20											
25											
30											
35											

COMMENTS

Borehole advanced with CME-55 rig mounted on an ATV
using 3 1/4" ID HSA.

PROJECT NO.

05-25331-63

BORING NO.

S3F-2

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. SBF-3

PROJECT: Mountain Ave Landfill-GeoTech Invest.

SHEET NO. 1 OF 1

CLIENT: NYC DEP

JOB NO.: 05-35331-63

BORING CONTRACTOR: Warren George

BORING LOCATION: Shore Boring

GROUND WATER:

GROUND ELEVATION: -1.3

DATE TIME LEV TYPE

DATE STARTED: 2/27/96

TYPE HSA SS

DATE FINISHED: 2/27/96

DIA. 3 1/4" 2"

DRILLER: Sal D'Amico

WT. 140#

GEOLOGIST: Kevin Kearney

FALL 30"

REVIEWED BY:

* POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE				DESCRIPTION				CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION			
		1	SS	1 2	30	Brown	Very Loose	MF Sand	SW	0	(wet)
		2	SS	1 1	60	Gray Brown	Very Loose	MF Sand	SW	0	(wet)
5		3	SS	1 1	30	Gray Brown	Very Loose	MF Sand	SW	0	(wet)
		4	SS	WH 1	80	Dark Brown	Very Loose	MF Sand TMD at 7.3'	SW	0	(wet)
10		Shellby Tube			60	Black	Medium Dense	MF sand on top of tube TMD Organic silt	CL	0	(wet)
		Shellbu Tube			50	Brown	Medium Dense	MF Sand (NO TMD)	SW	0	(wet)
15											
20											
25											
30											
35											

COMMENTS

Borehole advanced with CME-55 rig mounted on an ATV
using 3 1/4" ID HSA.

PROJECT NO.

05-35332-63

BORING NO.

SBF-3

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. S3F-4

PROJECT: Fountain Ave Landfill - Geo Tech Invest.

SHEET NO. 1 OF 1

CLIENT: NYCDEP

JOB NO.: 05-35331-63

BORING CONTRACTOR: Warren George

BORING LOCATION: Shore Boring

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: -0.8

DATE

TIME

LEV

TYPE

TYPE

HSA

SS

DATE STARTED: 2/27/96

DIA.

3 1/4"

2"

DATE FINISHED: 2/27/96

WT.

140#

DRILLER: Sal D'Amico

FALL

30"

GEOLOGIST: Kevin Kearney

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION					REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	WATER CONTENT (%)	
		1	SS	1 2	60	Brown Black	Very Loose	MF with coarse sands	SW	0	(wet)
		2	SS	1 2	90	Brown Black	Very Loose	MF with coarse sands	SW	0	(wet)
5		3	SS	1 2	70	Black	Very Loose	MF with some coarse sands	SW	0	(wet)
		4	SS	2 3	100	Brown Black	Very Loose	MF with some coarse sands TMD 7.8'	SW	0	(wet)
10		Shelby Tube		-	100%	Black gray	Medium Dense	TMD with some shells. MF sand at bottom of tube	CL	0	(wet)
15											
20											
25											
30											
35											

COMMENTS

Borehole advanced with CME-55 rig mounted on an ATV
using 3 1/4" ID USA.

PROJECT NO.

05-35331-63

BORING NO.

S3F-4

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. SBF-5

PROJECT: Fountain Ave Landfill- Geo Tech Invest.

SHEET NO. 1 OF 1

CLIENT: NYCDEP

JOB NO.: 05-35332.63

BORING CONTRACTOR: Warren George

BORING LOCATION: Shore Boring

GROUND WATER:

GROUND ELEVATION: -3.2

DATE	TIME	LEV	TYPE	TYPE	CAS.	SAMP	CORE	TUBE
				HSA	SS			
				DIA.	3 1/4"	2"		
				WT.		140#		
				FALL		30"		

DATE STARTED: 2/28/96

DATE FINISHED: 2/28/96

DRILLER: Sal D'Amico

GEOLOGIST: Kevin Kearney

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE					DESCRIPTION					REMARKS
		NO.	TYPE	BLOWS PER 6"		RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS		
		1	SS	1 1	60	Brown	Very Loose	MF with some coarse sand	SW	0	(wet)	
		2	SS	2 2	80	Dark Brown	Very Loose	MF with trace coarse sand	SW	0	(wet)	
5		3	SS	1 1	80	Dark Brown	Very Loose	MF with trace coarse sand	SW	0	(wet)	
		Shelby Tube			100	Black	Medium Dense	TMP- organic silt	CL	0	(wet)	
10												
15												
20												
25												
30												
35												

COMMENTS Borehole was advanced with CME-55 rig mounted on an ATV using 3/4" ID HSA.

PROJECT NO.

05-35332.63

BORING NO.

SBF-5

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. SBF-6

PROJECT: Fountain Ave Landfill - Geo Tech Invest.

SHEET NO. 1 OF 1

CLIENT: NYC DEP

JOB NO.: 05-35331-63

BORING CONTRACTOR: Warren George

BORING LOCATION: Shore Boring

GROUND WATER:

CAS. SAMP CORE TUBE

GROUND ELEVATION: -2.0

DATE TIME LEV TYPE

TYPE HSA SS

DATE STARTED: 2/28/96

DIA 3 1/2" 2"

WT. 140#

DATE FINISHED: 2/28/96

FALL 30"

POCKET PENETROMETER READING

DRILLER: Sal D'Amico

GEOLOGIST: Kevin Kearney

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE					DESCRIPTION					REMARKS
		NO.	TYPE	BLOWS PER 6"		RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS		
		1	SS	3	3	70	Gray Brown	Very Loose	MF with coarse sand	SW	0	(wet)
		2	SS	2	2	60	Gray Brown	Very Loose	MF with some coarse sand	SW	0	(wet)
5		3	SS	1	1	60	Brown	Very Loose	ME with some coarse sand 7' ~~fine organic silt~~	SW	0	(wet)
		4	SS	2	3	50	Dark Brown	Very Loose	MF with some coarse sand 7' TMD organic silt	SW CL	0	(wet)
10		Shelby Tube	-	-	50	Dark Brown	medium Dense	TMD- organic silt MF sand at bottom	CL SW	0	(wet)	
		Shelby Tube			100	Dark Brown	medium Dense	4-9' TMD- organic silt	CL	0	(wet)	
15												
20												
25												
30												
35												

COMMENTS Borehole advanced with CME-55 rig mounted on an ATV
using 3 1/2" I HSA.

PROJECT NO.

05-35331-63

BORING NO.

SBF-6

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. SBF-7

PROJECT: Fountain Ave Landfill - Geo Tech Invest.

SHEET NO. 1 OF 1

CLIENT: NYC DEP

JOB NO.: 05-35332-63

BORING CONTRACTOR: Warren George

BORING LOCATION: Shore Boring

GROUND WATER:

CAS. SAMP CORE TUBE

GROUND ELEVATION: -3.4

DATE TIME LEV TYPE

TYPE HSA SS

DATE STARTED: 2/28/96

DIA. 3 1/4" 2"

DATE FINISHED: 2/28/96

WT. 140#

DRILLER: Sal D'Amico

FALL 30"

GEOLOGIST: Kevin Kearney

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION					CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION				
		1	SS	1 2	70	dark Brown	Very Loose	MF trace coarse sand	SW	0	(wet)	
		2	SS	2 2	80	Dark Brown	Very Loose	MF some coarse sand	SW	0	(wet)	
5		3	SS	WH 1	80	Brown	Very Loose	MF sand	SW	0	(wet)	
				1 2				5.5' TMD organic silt				
		Shellby Tube			100	Dark Brown	Medium Dense	TMD-organic silt	CL	0	(wet)	
10												
15												
20												
25												
30												
35												

COMMENTS

Borehole was advanced with CME-55 rig mounted on an ATV using 3 1/4" ID HSA

PROJECT NO.

05-35332-63

BORING NO.

SBF-7

Converse Consultants East, P.C.

TEST BORING LOG

BORING NO. **ABF-B**

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT. NO. 1 OF 4

CLIENT URS Consultants

PROJ. NO. 95-67109-01

BORING CONTRACTOR **MOORE TRENCH**

DRILLING RIG **NATSON ATY BOCKET**

ELEVATION 72.1

GROUNDWATER DATA

CASING

SAMPLE

CORE

TUBE

DATUM **NGVD**

DATE

TIME

DEPTH

CASING

TYPE

BUCKET

DATE START **2-23-96**

DATE FINISH **2-28-96**

DRILLER **G. SHEARIN**

CONVERSE REP. **MLD**

DEPTH FT.	CASING BLOWS	SAMPLE NO.	SAMPLER BLOWS PER 6 IN.	SYMBOL	IDENTIFICATION	LAB # M.C.	FIELD PTD (ppm)	FIELD CGI (% LEL)	FIELD H2S (ppm)	EST. UNIT WT. (pcf)	REMARKS
1					Br sandy silt, grass, roots, bricks, concrete					310	
2											
3					D.O.					410	
4	3'9"				Bl sandy sl, plastic, cobble					510	
5	4'4"				Bl sl, wood, plastic, shoes					320	Chemical odor
6					Shoes, wood, paper, plastic		0.6	150	4	460	Moist
7	5'11"				Bl sl, plastic, wood					840	
8	7'2"				Bl sl, wood, plastic, paper, rags					510	
9	7'10"				Plastic, wood, metal wire, vinyl floor tiles					370	
10	9'2"				Paper, wire, glass, wood rags, plastic		0.6	70	1	720	
11	9'7"				Plastic, glass cardboard					310	
12	10'5"				Bl sandy sl, plastic, wood, wire, shoes, cdbd, syringe					430	
13					Plastic, rags, cardboard					280	Newspaper 10/19/85 V. little sand
14	11'7"				Plastic					160	
15	12'3"				Photograph, plastic, wood some metal					450	
16	13'5"				Bl sandy sl, plastic, paper, wire, wood					530	
17					Bl sandy sl, paper, plastic		—	18	0	400	
18					Blk sandy sl, plastic, wood slip, wood, plastic, sn					310	
19	16'2"						1.2	58	0	640	Saturated Blk sand silt
20					D.O.					860	
21	17'3"				Wood, wood fibers, cobbles plastic, rags					510	
22	18'3"				Dr. decompose wood, bricks plastic, cobbles, metal Bl org. sl		0.4	138	16	—	
23	19'5"				Wood, metal, cardboard, plastic Bl org sl					540	
24	20'3"				Plastic, wood, cobbles, brick rags, org sl					880	

BORING NO. AGF-8

SHT NO. 2 OF 4

PROJ. NO. 95-67109-01

[illegible]

Converse Consultants East, P.C.

TEST BORING LOG

BORING NO. ABF-3

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT NO. 3 OF 4

CLIENT URS Consultants

PROJ. NO. 95-67109-01

[illegible]

BORING NO. ABF-8

PROJ. NO. 95-87109-01

[illegible]

Converse Consultants East, P.C.

TEST BORING LOG

BORING NO. ABF-4

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT. NO. 1 OF 3

CLIENT URS Consultants

PROJ. NO. 95-67109-01

BORING CONTRACTOR HARGRETH

DRILLING RIG WATSON RTV

ELEVATION 86.3

GROUNDWATER DATA

CASING

SAMPLE

CORE

TUBE

DATUM NGVD

DATE

TIME

DEPTH

CASING

TYPE

BUCKET

DATE START 2-16-96

2-16-96

0751

6.5

open

DIA.

36"

DATE FINISH 2-20-96

WT.

-

DRILLER TOM KLINE

FALL

-

CONVERSE REP. MKD

DEPTH FT.	CASING BLOWS	SAMPLE NO.	SAMPLER BLOWS PER 6 IN.	SYMBOL	IDENTIFICATION	LAB % M.C.	FIELD PID (ppm)	FIELD CGI (% LEL)	FIELD H2S (ppm)	EST. UNIT WT. (pcf)	REMARKS
1					Loose Br silty med. sa Charred wood, plastic, rags, cobbles		0.0	0	0	560#	
2											
3											
4					Black silty sa, moist, Plastic		2	2	0	500#	moist
5											
6					Black org. sl. plastic brick, wood, paper					490	v. moist
7					Black org. sl. plastic paper, bricks, carpet		1.9	1	0	610	v. moist
8					D.O.					310	wet
9											
10											
11											
12											
13					Blk org sl. plastic carpet, metal, plywood					680#	wet, weigh 90% of float mat.
14											
15											
16			16' 2"		Blk org sl. plastic, wood wood shavings, fire, copper		0.8	23	0	640	wet, weigh 90%
17			16' 10"								
18											
19											
20											
21											
22					Blk organic sl plastic, wood shavings, metal		6	12	0	350	wet

Converse Consultants East, P.C.

TEST BORING LOG

BORING NO. ABF-9

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT. NO. 2 OF 3

CLIENT URS Consultants

PROJ. NO. 95-67109-01

DEPTH FT.	CASING BLOWS	SAMPLE NO.	SAMPLER BLOWS PER 6 IN.	SYMBOL	IDENTIFICATION	LAB % M.C.	FIELD PTD (ppm)	FIELD CGI (% LEL)	FIELD H2S (ppm)	EST. UNIT WT. (pcf)	REMARKS
23											
24											
25											
26											
27											
28											
29					Plastic, rags, metal, wood fibers, trace sa, glass, cardboard			7	0	630	Black, wet heavy, snow
30											
31											
32											
33											
34											
35					Plastic, rags, carpet metal, wood, glass					630	wet rec approx 70% 70%
36											
37											
38											
39											
40											
41					rags, plastic, metal					560	rec 66%
42					rags, wood, wood fibers brick, carpet					780	lost footage, rec down interval
43					Plastic, wood, glass wood fibers					740	
44					fire, plastic, metal, rags, cobbles, trace sa	0.8	32	0		500	lost footage rec 43'6" - 44'7"
45					lime, rags, wood,						distinct odor
46					wood fibers, credit. card, orange plastic, glass						change, strong - sweet/sour
47											

brick

BORING NO. *ABF-9*

SHT.NO. 3 OF 3

PROJ. NO. 95-67109-01

[illegible]

Converse Consultants East, P.C.

TEST BORING LOG

BORING NO. ABF-10

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT. NO. 1 OF 4

CLIENT URS Consultants

PROJ. NO. 95-87109-01

BORING CONTRACTOR MORETRENCH

DRILLING RIG WATSON ATV

ELEVATION 118.1

GROUNDWATER DATA

CASING

SAMPLE

CORE

TUBE

DATUM

NGVD

DATE

TIME

DEPTH

CASING

TYPE

bucket

DATE START

2-21-96

DIA.

36"

DATE FINISH

2-23-96

WT.

DRILLER TOM KLINE

FALL

CONVERSE REP. MKD

DEPTH FT.	CASING BLOWS	SAMPLE NO.	SAMPLER BLOWS PER 6 IN.	SYMBOL	IDENTIFICATION	LAB % M.C.	FIELD PID (ppm)	FIELD CGI (% LEL)	FIELD H2S (ppm)	UNIT WT. G	REMARKS
1					Br silty sa, rope, wood, cardboard					540	
2											
3											
4					Br silty sa, lime					250	
5											
6											
7					Br silty sa, lime cobbles.						
8											
9					Br silty sa, 2 tires, wire, wood, glass					790	
10											
11					Black sandy ss, plastic					760	MOWT
12					BL sandy ss, plastic, rags					560	
13					BL org. ss, plastic, rags, metal conduit, paper, napkins		0.4	4	0	700	
14					rags, iron, metal, some ss					710	
15					fine, metal, rags, plastic over wood		0.8	1	0	710	
16					org ss, plastic, rags, rim		1	32	0	400	
17					org ss, plastic, rags, carpet, wood		1	19	0	710	
18					org ss, plastic, paper, metal clothing, metal wire					410	
19					org ss, metal, brick, glass plastic, rags, wood					610	
20					D.O		1	9	0	500	
21											
22					org ss, plastic, metal					620	
					BLK silty sa, plastic, rags					890	
					rags, plastic, metal, wood cardboard, sandy ss					620	

BORING NO. ABF-10

SHT. NO. 2 OF 4

PROJ. NO. 95-67109-01

DEPTH FT.	CASING BLOWS	SAMPLE NO.	SAMPLER BLOWS PER 6 IN.	SYMBOL	IDENTIFICATION	LAB % M.C.	FIELD PTD (ppm)	FIELD CGI (% LEL)	FIELD H2S (ppm)	EST. UNIT WT. lb/ft ³	REMARKS
23		22'6"			live, wood, plastic, gravel, soil					600	
23					D.O.		NR	40	0	490	
24		23'9"			bricks, cobbles, wood, carpet, sand, ss.					550	
24					fine, rim, black silt, ss., lime, newspaper, metal, plastic		-	18	0	810	
25		24'6"			black silt, ss., paper, plastic					740	2 add. from buckets at 26" 700# 410#
25					black silt, ss., wood, wood, carpet					730	
26		25'9"			D.O.					330	
26					fine, metal, newspaper, wood, silt, ss.		-	13	0	540	
27		26'10"			fine, plastic, cobbles, wood					760	
27					black silt, ss., plastic, cobbles, wood		-	42	0	510	
28		27'6"			Black silt, ss., cobbles, metal					1030	
28		28'7"			bricks, wood						
29					Black silt, ss., cobbles, plastic, wood					820	2 add. from 710# to 29'10" 480#
30		29'10"					-	142	1	760	
30		30'3"			plastic, soap, paper, wood, metal, soil						
31					bricks, cobbles, newspaper, plastic					510	newspaper 8/83
31					cardboard, paper, rag, plastic, soil					510	
32					cardboard, glass, metal						
33		33'4"					-	66	0	300	white sand
34					cardboard, plastic, rag					510	
34		34'7"			paper, plastic					400	
35					D.O.		-	66	0	230	
35		35'3"			carpet, concrete, bumper					190	
36		35'9"			plastic, sand, brown					270	
36					cardboard, soap, shopping cart					720	
37		36'9"			plastic, metal, paper, B.S.					500	
37					black, sand, ss., metal, wood					500	
38					D.O.		-	37	0	390	
39		38'10"			Black sand, ss., wood, plastic					620	
39					D.O.					550	
40		39'6"			D.O.					490	
40		40'1"			Black sand, ss., newspaper, plastic, wood, metal					410	
41					fine, black sand, ss., rags.					480	41'5" 41'0" D.O. 600#
42		41'9"									
43					D.O.					480	
44					D.O.					520	
44					black sand, ss.		-	18	0	410	
45					black silt, ss., wood, plastic, paper					890	
45		44'9"			plastic, rag, plywood, soil					320	plastic detritus
46		45'5"			soil, wood, plastic, metal					490	
46		45'9"			D.O.						
47					black sand, soil, glass, wood, plastic, metal					900	

Converse Consultants East, P.C.

TEST BORING LOG

BORING NO. ABF-10

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT. NO. 3 OF 4

CLIENT URS Consultants

PROJ. NO. 95-67109-01

DEPTH FT.	CASING BLOWS	SAMPLE NO.	SAMPLER BLOWS PER 6 IN.	SYMBOL	IDENTIFICATION	LAB % M.C.	FIELD PID (ppm)	FIELD CGI (% LEL)	FIELD H2S (ppm)	EST. UNIT WT. (pcf)	REMARKS
48		47' 4"			Plastic, cobbles, paper, wood Soil					430	
49		47' 9"			D.O.					540	v. moist
50		50' 2"			Base, paper, soil, plastic					740	legible print
51		50' 9"			Plastic, rags, bottles, metal bands, soil			117	0	450	50' 9" - 51' D.O. 7' 610#
52		51' 4"			Blk sand, plastic, copper Soil, wood, cobbles, plastic					470	
53		53' 4"			Soil, plastic, rags, paper, metal					520	
54					D.O.					550	
55		55' 6"			Computer paper, cardboard, rags, paper, cobbles, brush					630	cardboard plastic metal wood, cobbles, soil
56					wood, carpet, soil, plastic, metal					300	
57					wood, cardboard, metal Some plastic & little soil					460	Smells like fish
58		57' 5"			D.O.		0	38	0	510	paper stained red, purple
59		58' 7"			Cardboard/paper, plastic, soil					720	
60		59' 3"			cardboard plastic		0	40	0	460	
61		60' 4"			concrete, Br. soil, gl., plastic, metal Br. soil, sa, cardboard					260	
62		61' 4"			fire, metal, paper, plastic					340	
63		62' 10"			Black Br. soil, sa					310	
64					Black soil, sa, wood			154	1	360	
65					plastic, metal					610	
66					Black sand, soil, metal wood, plastic, glass					790	
67					Bl. sand, sa, paper plastic					570	
68					newspaper, cardboard plastic, rags					600	
69					plastic, newspapers, wood					540	(80% paper)
70					paper, plastic, rags, Br. soil, sa					600	
71					newspaper, plastic					190	
72					plastic, para. cardboard, wood					550	
					paper, cloth			38	1	410	
					plastic, para. cardboard, paper, wood			40	0	360	

Converse Consultants East, P.C.

TEST BORING LOG

BORING NO. ABF10

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT NO. 4 OF 4

CLIENT URS Consultants

PROJ. NO. 95-87109-01

DEPTH FT.	CASING BLOWS	SAMPLE NO.	SAMPLER BLOWS PER 6 IN.	SYMBOL	IDENTIFICATION	LAB % M.C.	FIELD PTD (ppm)	FIELD CBT (% LEL)	FIELD H2S (ppm)	EST. UNIT WT. (pcf)	REMARKS
73		72.7			D.O.					300	meas. 1/10'
73		73.1			Black sandy gravelly sl					400	Chem. odor
74		73.9			Bl sandy gravelly sl, plastic					250	
74		74.8			Bl sandy gravelly sl					360	P.D. 6-10' per
75		75.6			D.O.					310	readings affected by moisture
76		76.4			D.O.					720	Push needles below 3' and
77		77.4			D.O.					730	
78					Blk sandy gravelly sl metal, wood					700	V. little gas odor
79					metal, concrete, cobbles, brick, Blk sandy gravelly sl					800	
80		79.8			Soil, metal, wood, cardboard					680	
80					Soil, wood					350	
81					Bl sandy gravelly sl, wood, wire brick					710	
82		82.3			Soil, wood, metal		3	150	0	640	
83					Blk sandy gravelly sl metal wire, cobbles, plastic					1000	lost 6'
84					wire, cobbles, wood, Soil		-	130	0	410	
85		84.9			Blk sandy gravelly sl, wood, glass, metal					440	5570 soil
86		85.7			cobbles, wood, soil, plastic soil, newspaper, wires					340	
87										330	addtl. basement 400' 310'
88					Black sandy gravelly sl wire, metal					1110	
89											
90		89.9			D.O.					900	
91		90.8			Soil, wood, metal		0.8	20	1	700	
91					Soil, some wood					700	
92		92.3			Soil, wood, metal					430	
93					Soil - Roots, cobbles					1010	Set well
					Soil						

BORING NO. ABF-11

SHT.NO. 1 OF 4

PROJ.NO. 95-67109-0 :

ELEVATION 110.9

DATUM NGVD

DATE START 2-9-90

DATE FINISH

DRILLER Tom Kline

CONVERSE REP. MK-D

21

TEST BORING LOG

BORING NO. *ABF-11*

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT.NO. 2 OF 2

CLIENT URS Consultants

PROJ.NO. 95-67109-01

[illegible]

BORING NO. ABF-1

SHT NO. 3 OF 2

PROJ. NO. 95-67109-01

CLIENT: ORS Consultants											
DEPTH FT.	CASING BLOWS	SAMPLE NO.	SAMPLER BLOWS PER 6 IN.	SYMBOL	IDENTIFICATION	LAB % H.C.	FIELD PID (ppm)	FIELD CGI (% LEL)	FIELD H2S (ppm)	EST. UNIT WT. (pcf)	REMARKS
48											
49					Wool fiber plastic		0.1	0	0		21
50					Wool fiber plastic						
51					Wool fiber plastic						
52					Wool fiber plastic						
53					Wool fiber plastic						
54					Wool fiber plastic						
55					Wool fiber plastic						
56					Wool fiber plastic						
57					Wool fiber plastic						
58					Wool fiber plastic						
59					Wool fiber plastic						RI-101
60					Wool fiber plastic						
61					Wool fiber plastic						
62					Wool fiber plastic						
63					Wool fiber plastic						
64					Wool fiber plastic						
65					Wool fiber plastic						
66					Wool fiber plastic						
67					Wool fiber plastic						
68					Wool fiber plastic						
69					Wool fiber plastic						
70					Wool fiber plastic		0.2	0	0		RI-14
71					Wool fiber plastic						
72					Wool fiber plastic						

Converse Consultants East, P.C.

TEST BORING LOG

BORING NO. *ABF-1*

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT. NO. OF

CLIENT URS Consultants

PROJ. NO. 95-67109-01

DEPTH FT.	CASING BLOWS	SAMPLE NO.	SAMPLER BLOWS PER 6 IN.	SYMBOL	IDENTIFICATION	LAB % M.C.	FIELD PID (ppm)	FIELD CGI (% LEL)	FIELD H2S (ppm)	EST. UNIT WT. (pcf)	REMARKS
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
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81											
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84											
85											
86											
87											
88											
89											
90											
91											
92											
93											
94											
95											
96											
97											
98											
99											
100											

*Start of hole 2
at 10 ft depth
1000*

0.75 5 2

TEST BORING LOG

BORING NO. ABF-12

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT NO. 1 OF 4

CLIENT URS Consultants

PROJ. NO. 95-67109-01

BORING CONTRACTOR MORETRENCH

DRILLING RIG WATSON

ELEVATION 92.3

GROUNDWATER DATA

CASING

SAMPLE

CORE

TUBE

DATUM

NGVD

DATE _____

TIME

DEPTH

CASING

TYPE

BUCKET

DATE START

2-29-96

2-29

0700

1

DIA

36' 30"

DATE FINISH _____

3-12-96

WT.

DRILLER GEORGE SHEARIN

FALL

—

CONVERSE REP. AKD

[illegible]

TEST BORING LOG

BORING NO. ABF-12

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT NO. 2 OF 4

CLIENT URS Consultants

PROJ. NO. 95-67109-01

[illegible]

Converse Consultants East, P.C.

TEST BORING LOG

BORING NO. 70F112

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT. NO. 3 OF 4

CLIENT URS Consultants

PROJ. NO. 95-67109-01

DEPTH FT.	CASING BLOWS	SAMPLE NO.	SAMPLER BLOWS PER 6 IN.	SYMBOL	IDENTIFICATION	LAB % M.C.	FIELD PID (ppm)	FIELD CGI (% LEL)	FIELD H2S (ppm)	EST. UNIT WT. (pcf)	REMARKS
48											
49											
50											
51											
52					Clayey sa, metal, wood, rags, plastic						
53											
54											
55											
56											
57					Wood fibers, Bl sandy sl plastic, rags, some metal					84	A.O.
58											
59					Bl sl, sa, gravel, plastic metal					110	D.O.
60											
61					wood, plastic, metal						
62											
63											
64					slip, wood, soil, plastic metal					102	D.O.
65					Bl clay sa, gravel, mini blands plastic metal						
66					plastic, metal, wood, news, paper (7-11-76)						
67											
68					wood, Bl sandy sl, plastic metal						
69											
70					D.O.						
71											
72					wood, plastic, metal, glass						D.O.

BORING NO. *A15F12*

PROJNO. 95-87109-01

[illegible]

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. GBF-1

PROJECT: FOUNTAIN AVE LANDFILL - GEOTECH. INVEST

SHEET NO. 1 OF 1

CLIENT:

JOB NO.: 05-35332-63

BORING CONTRACTOR: WARREN - GEORGE

BORING LOCATION: GBF-1

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 9.8

DATE

TIME

LEV

TYPE

TYPE

DIA.

WT.

FALL

DATE STARTED: 2/19/96

DATE FINISHED: 2/19/96

DRILLER: RICHARD GREGORY

GEOLOGIST: KEVIN KEARNEY

REVIEWED BY:

* POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE				RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	H _{max} (PPM)	REMARKS	
		NO.	TYPE	BLOWS PER 6"									
		0	Auger	0	0	0	—	—	Frozen FILL MATERIAL	—	ND	Frozen ground	
		1	SS	25	54	70	Black	Very Dense	MF Sand (FILL)		0.0	(Moist)	
5		2	SS	65	115	5	Gray White	Very Dense	Gravel (FILL)		0.0	(Wet)	
		3	SS	20	7	35	Black	Medium Dense	MF Sand & M gravel		1.0	(wet)	
				7	8								
10		4	SS	2	3	0	—	Loose	No Recovery		—		
				4	3								
		5	SS	8	6	5	Brown	Medium Dense	(FILL) glass, paper		0.0		
				17	17								
		6	SS	6	1	0	—	Very Loose	No Recovery		—	(wet)	
				2	2								
15		7	SS	was 1'		80	Black Brown	Very	14-15' 15-16' TMD/organic Peat		0.0	Moist	
			Shelby Tube			50		Loose			—		
			Shelby Tube			80					—		
20													
		8	SS	9	10	90	Gray Black	Medium Dense	MF Sand trace clay		0.0	(wet)	
				11	12								
25													
30													
35													

COMMENTS

Borehole advanced with Failing 1500 Holmaster

PROJECT NO.

05-35332-63

BORING NO.

GBF-1

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO.

GBF-2

PROJECT: FOUNTAIN AVENUE LANDFILL

SHEET NO. / OF /

CLIENT: NYC DEP

JOB NO.:

BORING CONTRACTOR: WARREN GEORGE INC.

BORING LOCATION:

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 6.5

DATE

TIME

LEV

TYPE

TYPE

DIA.

WGT.

DATE STARTED: FEB. 20, 96

DATE FINISHED: FEB 20, 96

DRILLER: R.V. GREGORY

GEOLOGIST: ALEX ZDRZALKA

REVIEWED BY:

* POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE				DESCRIPTION				REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	
		1	SS	3 6 9 28	58%	BROWNISH	LOOSE	TOP SOIL, ORGANICS SOME FILL		AFTER 15' FOOT SLIGHTED TO SHELBY TUBE
		2	SS	15 16 20 9	46%	GRAY	MEDIUM DENSE	MOSTLY FILL, BRICK CONCRETE FILL SOME SAND TR OF SILT		
5		3	SS	7 17 25 25	42%	LT.		F-M UNIFORM SAND TR. OF SILT		
		4	SS	12 17 20 17	33%	G	VERY LOOSE	F-M SAND SOME SILT.		
		5	SS	8 10 14 12	42%	R				
10		6	SS	3 4 5 5	38%	A				
		7	SS	1 2	42%	Y				
15	S/S/S	SHELBY TUBE			88%	DK. G R A Y		TMD, ORGANIC SILT	CL	
	S/S/S	SHELBY TUBE			66%		SOFT			
	S/S/S	B	SS	2 1 1 4	100%	GRAY		F-C SAND TR. OF WELL SORTED GRAVEL		
20								BOTTOM OF BORING @ 19.5'		
25										
30										
35										

COMMENTS BOREHOLE ADVANCED TO 19.5' WITH FAILING HOLEMASTER RIG. MHD ROTARY, 4" SID BOREHOLE GROUTED BACK TO THE GRADE W. CEMENT BENTONITE SLURRY

PROJECT NO.

BORING NO.

GBF-2

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. GBP-3

PROJECT: Penn Ave. Landfill - Geotech Invest.

SHEET NO. 1 OF 1

CLIENT:

JOB NO.:

BORING CONTRACTOR: Warren-George

BORING LOCATION: *

GROUND WATER:

CAS.

SAMPICORE

TUBE

GROUND ELEVATION: 4.5'

DATE

TIME

LEV

TYPE

TYPE

HSA

SS

Shelby

DATE STARTED: 2/15/96

DIA.

3 1/4"

2"

3"

DATE FINISHED: 2/15/96

WT.

140

(Brass)

DRILLER: Sal D'Amico

FALL

30"

GEOLOGIST: Robert Brossoie

** POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION					CLASS USCS	SPT 2 ft 1 ft	REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION					
		1	SS	2 3 4 4	50	Brown	Loose	fc SAND; trace surface organics			SP	0	(Dry)
		2	SS	3 5 5 7	70	Brown		w/ SAND; trace silt (moist to wet) (Fill)			SH	0	GWT @ ± 3.0'
5		3	SS	4 6 6 7	55							0	(Wet)
		4	SS	5 7 9 13	100	Black to Grey	Medium Dense	F SAND --			SH	0	tr. Shells
10		5	SS	3 3 9 23	100							0	(Wet)
		6	SS	4 18 26 24	100		Dense					0	
	SS	7	ST SS	1 2 5 9	0 75	Black	Medium Stiff	TMD organic silt (roots)			CL	0	(Wet)
15	SS	8	SS	4 10 20 25	100	Grey to Brown	Medium Dense	SAND; trace silt (wet)			SH	0	(Wet)
20								Bottom of Boring @ 16.0'					Shelby Tube pushed from 12.0' to 14.0'
								Augers to 12'					w/ No Recover
								SS Samples to 16'					Resampled
								* Actual boring located 3' SE					from 12.0'
								from staked					to 14.0' w/
25								location ± 2'					SS. Recover
								lower in elevation					75%. As a
								than staked					result N-
								location, due					value & SS
								to slope.					sample may
30													not be
													entirely
													representative
35													of 12.0' to 14.0'

COMMENTS

Borehole advanced w/ CHE-55 rig mounted on an ATV, using 3 1/4" I.D. HSA. Borehole grouted back to ground surface w/ bentonite/cement slurry.

PROJECT NO.

BORING NO.

PROJECT: PENN AVE LANDFILL - GEOTECH INVEST

SHEET NO. 1 OF 2

CLIENT: NYS DEP

JOB NO.: 05-35331-63

BORING CONTRACTOR: WARREN - GEORGE

BORING LOCATION: GBP-4

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 17.0

DATE

TIME

LEV

TYPE

TYPE

HSA

SS

DATE STARTED: 2/16/96

DATE FINISHED: 2/17/96

DRILLER: Sal D'Amico

GEOLOGIST: KEVIN KEARNEY

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	DESCRIPTION	MATERIAL DESCRIPTION	CLASS USCS	FINAL FILL (FPM)	REMARKS
		NO.	TYPE	BLOWS PER 5"									
		1	SS	3 8	4 4	40	Brown	Loose	MF sand and (FILL) Brick Stores		0.0	MOIST	
		2	SS	15 -	8 -	10	Brown	Medium Dense	MF sand and (FILL) wood kick		0.0	MOIST	
5		3	SS	23 9	14 7	5	Brown	Medium Dense	Medium sand (FILL) Brick		0.0	WET	
		4	SS	37 8	7 8	30	Gray	Medium Dense	(FILL) Concrete, Brick, Wood		0.0	WET	
10		5	SS	6 9	7 8	40	Gray	Medium Dense	(FILL) Wood Ceramic Tile 9.5' MF sand		0.0	WET	
		6	SS	10 8	8 9	30	Dark Gray	Medium Dense	MF sand - Dark Gray Bottom 3" Black sand/MF		0.0	WET	
		7	SS	9 22	15 37	45	Dark Gray	Dense	(FILL) Tire Debris MF Sand mix.		0.0	WET	
15		8	SS	18 15	18 15	60	Dark Gray	Dense	Med Sand / Trace Course sand		0.0	WET	
		9	SS	4 14	6 20	90	D. Gray Black	Medium Dense	MF Sand		0.0	WET	
20		10	SS	1 4	2 6	70	D. Gray	Medium	MF sand		0.0	WET	
		11	SS	5 8	8 9	80	Black	Dense			0.0		
		12	SS	5 14	7 15	70					0.0		
25		13	SS	5 4	5 5	80	Black	Loose	TMD Organic Silt #25'		0.0	MOIST	
		Shelby Tube				100					-		
30								2/17/96 →	Shelby 26-28' See Attached log.				
35													

COMMENTS

Borehole advanced w/ CME-55 rig mounted on an ATV using 3/4" ID HSA

PROJECT NO.

05-35331-63

BORING NO.

GBP-4

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. GBP-4

PROJECT: PENN AVE. LANDFILL - GEOTECH INVEST SHEET NO. 2 OF 2

CLIENT: NYSDEP

JOB NO.: 05-35331-63

BORING CONTRACTOR: Warren-George

BORING LOCATION:

GROUND WATER:

CAS.

SAMP CORE

TUBE

GROUND ELEVATION: 17.0

DATE TIME LEV TYPE

TYPE

HSA

SS

Shelby

DATE STARTED: 2/16/96

DIA.

3 1/4"

2"

3"

DATE FINISHED: 2/19/96

WT.

140^{lb}

DRILLER: Sal D'Amico

FALL

30"

GEOLOGIST: Robert Brossiole

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION				REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	
5								SS samples taken to 26' on 2/16/96 w/ Augers to 24'. 2/19/96		
10								HSA advanced to 26'. Push Shelby Tube from 26' to 28' w/ full (100%) recovery.		
15								* Black wet Sand; little silt observed in bottom end of Shelby Tube.		
20								GBP-4 grouted back to ground surface w/ bentonite/cement slurry		
25										
30			ST		100	Black		TMD Organic SILT* 28'		
35								Bottom Boring@ 28.0' Augers to 26.0' SS samples to 26.0' Shelby Tube 26.0' to 28.0'		

COMMENTS

PROJECT NO.

BORING NO.

05-35331-63

GBP-4

TEST BORING LOG
BORING NO. GBP-5

PROJECT: Penn Ave Landfill - Geotech. Invest.

SHEET NO. 1 OF 1

CLIENT:

JOB NO.:

DRILLING CONTRACTOR: Warren-George

BORING LOCATION: **

GROUND WATER:

CAS. SAMP CORE TUBE

GROUND ELEVATION: 5.1

DATE TIME LEV TYPE

TYPE HSA SS

DATE STARTED: 2/19/96

DIA 3/4" 2"

DATE FINISHED: 2/20/96

WT. 146#

DRILLER: Sal D'Amico

FALL 30"

GEOLOGIST: Robert Brossoie

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	DESCRIPTION MATERIAL DESCRIPTION	CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"							
		1	SS	26 11 20	83		Brown	Medium Dense	w/ SAND; trace f gravel; trace silt brick/glass (Fill)	SP	Surface organics 24" (moist)
		2	SS	18 19 16 15	70			Dense	w/ SAND		
5		3	SS	3 5 6 7	70			Medium Dense	trace f gravel	SH	(moist to wet) tr. shells
		4	SS	7 10 16 16	100		Dk Gray to Black		trace to little silt		0.6 (wet)
10		5	SS	4 4 6 7	100			Loose	F SAND; little silt 11.5'		0.6 (wet)
		6	SS	3 3 7 13	100				THO Organic SILT	14' CL	0.4 Numerous shells @ interface
			ST		100						
5									Bottom Boring @ 14.0'		Sheen on SS samples beginning @ 7.0' w/ odor of product to 12' depth.
									Augers to 12.0'		
									SS Samples to 12.0'		
									Shelby Tube 12.0' to 14.0'		Org. vapors fluctuating between 0-3 ppm in breathing zone with NW w/ on slope breeze of 5 to 10 mph.
20									*** At staked location, adjacent to interceptor trench.		Org. vapors @ 738 ppm inside HSA w/ augers to 5' & 55 to 10'
									No head space checks made on SS samples w/ H- this date.		Org. vapors generally < 1 ppm in breathing zone.
									* No recovery on 1st attempt w/ Shelby Tube →		
									2nd attempt 100% recovery.		
30									GW @ ± 5.0'		

MENTS Borehole advanced w/ CME-55 rig mounted on an ATV using
3 1/4" I.D. HSA Borehole grouted back to ground surface
bentonite/cement slurry.

PROJECT NO.

BORING NO.

PROJECT: Penn Ave Landfill - Geotech Invest.

SHEET NO. 1 OF 1

CLIENT:

JOB NO.:

BORING CONTRACTOR: Warren-George

BORING LOCATION: *

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 9.9

DATE TIME LEV TYPE

TYPE

HSA

6S

Shelby

DATE STARTED: 2/20/96

DIA

3 1/4"

2"

3"

DATE FINISHED: 2/21/96

WT.

140#

(Brass)

DRILLER: Sal D'Amico

FALL

30"

GEOLOGIST: Robert Brossoic

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	3/4" 19mm H Cpm	REMARKS
		NO.	TYPE	BLOWS PER 6"								
		1	SS	1	2	66	Brown to Gray- Brown	Very Loose	mf SAND; trace brick, glass, etc. (Fill)	SP	0	Surface Organics ± 3"
		2	SS	2	2	66		Loose	trace Silt	SH	0	(moist)
5		3	SS	3	4	75		Medium Dense	Waste layered w/ sand		0	(wet)
		4	SS	17	17	75		Dense	mf SAND	SH	0	(wet)
10		5	SS	6	9	100	Dk Gray to Black		===== waste		0	(wet)
		6	SS	12	19	100		Medium Dense			0	(wet)
		7	SS	4	5	100					0	(wet)
15		8	SS	10	10	100		Very Dense	Becoming f sand	SH	0	(wet)
	SS SS SS	8	SS	3	12	100			15.7'		0	(wet)
			ST			*** 100	Brown		TMD Organic SILT	CL SH		
								mf SAND?	18'			
20								Bottom Boring @ 18.0'				GBP-6 located adj. to Penn Ave exit ramp Belt Parkway (East bound)
								Augers to 16.0'				
								SS Sampling to 16.0'				
								Shelby Tube 16.0' to 18.0'				
25								* At staked location.				Brown mf SAND recovered @ bottom end of Shelby Tube. Exact depth change is unknown.
								** No recovery on 1st attempt w/ Shelby Tube →				
30								2nd attempt 100% recovery.				
								GWT @ ± 5'				
35												

COMMENTS Borehole advanced w/ CME-55 rig mounted on an ATV using 3 1/4" I.D. HSA. Borehole grouted back to ground surface w/ bentonite/cement slurry.

PROJECT NO.

BORING NO.

TEST BORING LOG
BORING NO. GBP-7

PROJECT: Penn Ave Landfill - Gesteo Invest.

SHEET NO. 1 OF 1

CLIENT:

JOB NO.:

BORING CONTRACTOR: Warren - George

BORING LOCATION: *

GROUND WATER:

DATE	TIME	LEV	TYPE	TYPE	CAS.	SAMP	CORE	TUBE
				DIA.	3 1/4"	2"		3"
				WT.	140*			(Brass)
				FALL	30"			

GROUND ELEVATION: 6.0

DATE STARTED: 2/21/96

DATE FINISHED: 2/21/96

DRILLER: Sal D'Amico

GEOLOGIST: Robert Brossoie

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 5"	RECOVERY ROD %					
0.5				5			Asphalt	AS		
		1	SS	18 23	72	Light Brown & Black	Medium Dense	Mixture of SAND; Gravel; glass, brick asphalt etc. (Fill)		0 (moist)
		2	SS	17 17 23 35	66		Dense	w/ SAND; trace Gravel	SP	0 tr. shells
5		3	SS	6 10 12 14	75		Medium Dense	f SAND; trace Silt	SM	0 (wet)
		4	SS	7 9 12 8	100					SP
10		5	SS	1 1 1 2	92	Grey-Brown	Very Soft	Organic SILT w/ numerous organic fibers	CH	0 Plastic
		6	SS	Woh 1 1 1	100				OH	0 Sulfur odor due to decomposing vegetative matter
		7	SS	1 1 2 3	100					0
15		8	SS	1 1 2 2	100	Dark Grey		Peat - 13.5' Peat - 14.0'		0
			ST		73	Black		THD Organic SILT	CL	
						Brown		w/ SAND -- ?	SM	
20								Bottom Boring @ 18.0'		Brown w/ SAND recovered @ bottom end of Shelby Tube. Exact depth change unknown.
								Augers to 16.0'		
								SS Sampling to 16.0'		
								Shelby Tube 16.0' to 18.0'		
25								* Offset 7' east of staked location @ same elevation due to ponded water.		GBP-7 located adj. to Penn Ave. on ramp to Belt Parkway (East bound) Also outside landfill fence.
								GWT @ ± 4.0'		
30										
						</				

Comments: Borehole advanced w/ CHE-55 rig mounted on an ATU using 3 1/4" I.D. HSA. Borehole grouted back to ground surface w/ bentonite/cement slurry.

PROJECT NO.
BORING NO.

URS
CONSULTANTS, INC.

COMMENTS: Hole grouted upon completion from 89 to 82 ft (up to the bottom of the 8" PVC casing). Boring advanced using mud rotary techniques using an Acker Soil Max drill rig. Drove 4" casing to 85'. HNU and CGI readings at background levels in breathing zone.

URS
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URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. SBP-1

PROJECT: Penn Ave. Landfill - Geotech. Invest.

SHEET NO. 1 OF 1

CLIENT:

JOB NO.:

BORING CONTRACTOR: Warren-George

BORING LOCATION: *

GROUND WATER:

CAS.

SAMP

CORE

TUBE GROUND ELEVATION: -0.2

DATE TIME LEV TYPE

TYPE

HSA

SS

Shells

DATE STARTED: 2/22/96

DIA.

3 1/4"

2"

3"

DATE FINISHED: 2/22/96

WT.

140#

(Brass)

DRILLER: Sal D'Amico

FALL

30"

GEOLOGIST: Robert Brossoie

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE					DESCRIPTION				REMARKS		
		NO.	TYPE	BLOWS		RECOVERY	COLOR	CONSISTENCY	HARDNESS	MATERIAL DESCRIPTION		CLASS USCS	
				PER 6"	ROD %								
		1	SS	2	3	70	Brown	Loose	mf SAND; trace organics	SP	Surface organics		
				3	3								
		2	SS	2	4	75	Black					SH	(wet)
5			3	SS	2	5	70			Brown			(wet)
				5	2						+ shells (wet)		
		4	SS	1	1	100	Dk. Grey to Black	Medium stiff	THD Organic SILT	CL	Plastic; mixed w/ organics (wet)		
				2	5								
10			ST			** 100	Grey		F to mf SAND?	10' SH			
											SBP-1 location under water @ high tide		
15									Bottom Boring @ 10.0'				
									Augers to 8.0'				
									SS Sampling to 8.0'				
									Shelby Tube from 8.0' to 10.0'		Sulfur odor associated w/THD		
									* Offset 3' west of staked location		F to mf SAND in bottom end of ST		
20									** No recovery on 1st attempt w/ Shelby Tube		→ depth of change is unknown		
									→ 2nd attempt 100% recovery				
25													
30													
35													

COMMENTS

Borehole advanced w/CHE-55 rig mounted on an ATV, using
3 1/4" I.D. HSA. Borehole left to naturally fill w/ beach sands.PROJECT NO.
BORING NO.

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. SBP-2

PROJECT: Pennsylvania Ave Landfill GeoTech Invest.

SHEET NO. 1 OF 1

CLIENT: NYC DEP

JOB NO.: 05-35331-63

BORING CONTRACTOR: Warren George

BORING LOCATION: Shore Boring

GROUND WATER:

GROUND ELEVATION: -2.0

DATE

TIME

LEV

TYPE

TYPE

CAS.

SAMP

CORE

TUBE

DATE STARTED: 2/29/96

DATE FINISHED: 2/29/96

DRILLER: Sal D'Amico

GEOLOGIST: Kevin Kearney

REVIEWED BY:

* POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE					DESCRIPTION				REMARKS	
		NO.	TYPE	BLOWS PER 6"		RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS		
		1	SS	1	2	60	Brown	Very Loose	MF some coarse sand Thin silt layer at 1'	SW	0	(wet)
		2	SS	1	1	60	Brown	Very Loose	MF some coarse sand	SW	0	(wet)
5		3	SS	1	1	80	Dark Brown	Very Loose	MF some coarse sand. Some shell. TMD at 5.8'	SW	0	(wet)
		Shallow Tube				100	Black	Medium Dense	TMD-organic silt material.	CL	0	(wet)
10												
15												
20												
25												
30												
35												

COMMENTS

Borehole advanced with CME-55 rig mounted on an ATV
using 3 1/4" ID HSA.

PROJECT NO.

05-35331-63

BORING NO.

SBP-2

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. SBP-3

PROJECT: Pennsylvania Ave Landfill GeoTech Invest.

CLIENT: NYCDEP

BORING CONTRACTOR: Warren George

GROUND WATER:

DATE TIME LEV TYPE

CAS. SAMP CORE TUBE

BORING LOCATION: Shore Boring

GROUND ELEVATION: 0.1

DATE STARTED: 2/29/96

DATE FINISHED: 2/29/96

DRILLER: Sal D'Amico

GEOLOGIST: Kevin Kearney

REVIEWED BY:

* POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE				DESCRIPTION					REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	WATER CONTENT (%)	
		1	SS	2 2 3 3	40	Brown	Very Loose	MF some coarse sand	SW	0	(wet)
		2	SS	2 3 3 4	50	Brown	Very Loose	MF some coarse sand	SW	0	(wet)
5		3	SS	3 5 7 10	80	Brown	Loose	MF some coarse sand	SW	0	(wet)
		4	SS	3 5 7 7	100	Brown	Loose	MF some coarse sand TMD at tip of spoon	SW	0	(wet)
10	Shell by Tube				90	Dark Brown	Medium Dense	TMD organic silt MF sand at bottom	CL	0	(wet)
15											
20											
25											
30											
35											

COMMENTS Borehole advanced with CME-55 rig mounted on an ATV
using 3 1/2" ID HSA

PROJECT NO.

BORING NO.

05-35331-63

SBP-3

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. SBP-4

PROJECT: Pennsylvania Ave Landfill Geo Tech Invest

SHEET NO. / OF /

CLIENT: NYC'DEP

JOB NO.: 05-35331-63

BORING CONTRACTOR: Warren George

BORING LOCATION: Shore Borina

GROUND WATER:

GROUND ELEVATION:

DATE	TIME	LEV	TYPE

	CAS.	SAMP	CORE	TUBE
1				

DATE STARTED: 2/29/96

DIA.	3 1/2"	7"

DATE FINISHED: 2/29/96

WT.		140#

DRILLER: Sal D'Amico

FALL	30"

GEOLOGIST: Kevin Kearney

* POCKET PENETROMETER READING

REVIEWED BY:[illegible]

COMMENTS Borehole advanced with CME-55 rig mounted on an ATV
using 3 1/4" ID HSA.

PROJECT NO.

05-35331-63

BORING NO.

SBP-4

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. PC-1

PROJECT: Pennsylvania Avenue Landfill GeoTech Invest.

SHEET NO. 1 OF 1

CLIENT: NYC DEP

JOB NO.: 05-35331-63

BORING CONTRACTOR: Warren George

BORING LOCATION: Pier Service Road

GROUND WATER:

CAS. SAMP CORE TUBE

GROUND ELEVATION: 8.1

DATE TIME LEV TYPE

TYPE HSA SS

DATE STARTED: 3/1/96

DIA. 3 1/4" 2"

DATE FINISHED: 3/1/96

WT. 140#

DRILLER: Sal D'Amico

FALL 30"

GEOLOGIST: Kevin Kearney

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION				REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	
		1	SS	18 26	60	Brown	medium Dense	Top 2" medium gravel Fine sand	SP-0	(Dry)
		2	SS	18 32	50	Redish Brown	medium Dense	MF sand slag at bottom	SW-0	(moist)
5		3	SS	14 30	70	Brown	medium Dense	Quartz and medium gravel 2" s.H / MF sand	GP-0	(moist)
		4	SS	18 30	50	Brown	medium Dense	MF sand / Rubber tire Fine sand and debris	SW-0	(wet)
10		5	SS	14 15	80	Brown Black	medium Dense	MF trace coarse sand	SW-0	(wet)
15										
20										
25										
30										
35										

COMMENTS Borehole advanced with CME-55 rig mounted on an ATV
using 3 1/4" ID HSA.

PROJECT NO.

05-35331-63

BORING NO.

PC-1

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. PC-2

PROJECT: Pennsylvania Avenue Landfill Geo Tech Invest.

SHEET NO. 1 OF 1

CLIENT: NYC DEP

JOB NO.: 05-35331-63

BORING CONTRACTOR: Warren George

BORING LOCATION: Pier Service Road

GROUND WATER:

CAS. SAMP CORE TUBE

GROUND ELEVATION: 7.5

DATE TIME LEV TYPE

TYPE HSA SS

DATE STARTED: 3/1/96

DIA. 3 1/2" 2"

DATE FINISHED: 3/1/96

WT. 140#

DRILLER: Sal D'Amico

FALL 30"

GEOLOGIST: Kevin Kearney

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION				CLASS USCS	H _{max} H _{min} H _{avg}	REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION				
		1	SS	12 20	60	Orange brown	Loose - Medium Dense	MF sand, med pebbles 12" 12-24" MF sand.	SW	0	(Dry)	
		2	SS	14 20 26 31	40	Brown	Medium Dense	MF trace coarse sand some gravel.	SW	0	(Dry)	
5		3	SS	13 22 24 25	90	light to Brown	Medium Dense	MF sand	SW	0	(Moist)	
		4	SS	10 12 14 20	60	Brown - Black	Medium Dense	MF trace coarse sand Debris at 7.5'	SW	0	(Moist)	
10		5	SS	24 24 28 28	90	Dark Brown	medium Dense	MF trace coarse sand	SW	0	(Moist)	
15												
20												
25												
30												
35												
40												
45												
50												
55												
60												
65												
70												
75												
80												
85												
90												
95												
100												

COMMENTS

Borehole advanced with CME-55 rig mounted on an ATV rig
using 3 1/2" ID HSA.

PROJECT NO.

05-35331-63

BORING NO.

PC-2

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. PC-3

PROJECT: Pennsylvania Avenue Landfill Cap Tech Invest.

SHEET NO. / OF /

CLIENT: NYCDP

JOB NO.: 05-35331-63

BORING CONTRACTOR: Warren George

BORING LOCATION: Pier Service Road

GROUND WATER:

GROUND ELEVATION: 7.0

DATE	TIME	LEV	TYPE

DATE STARTED: 3/1/96

DATE FINISHED: 3/1/96

DRILLER: Sal D'Amico

GEOLOGIST: Kevin Kearney

* POCKET PENETROMETER READING

REVIEWED BY:[illegible]

COMMENTS

COMMENTS Borehole advanced with CME-55 rig mounted on an ATV
using 3/4" ID HSA.

PROJECT NO.

05-35331-63

BORING NO.

PC-2

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. PB A-1

PROJECT: Penn Ave. Landfill-Geotech Invest.

SHEET NO. 1 OF 1

CLIENT:

JOB NO.:

BORING CONTRACTOR: Warren-George

BORING LOCATION:

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 9.3

DATE

TIME

LEV

TYPE

TYPE

HSA

SS

Shelby

DATE STARTED: 2/12/96

DIA.

3 1/4"

2"

3"

DATE FINISHED: 2/13/96

WT.

140#

(Brass)

DRILLER: Sal D'Amico

FALL

30"

GEOLOGIST: Robert Brossoie

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE					DESCRIPTION				REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	20' 19'	
0.5'								Asphalt Pavement			
		1	SS	15 19	60	Brown	Medium Dense	mf SAND; trace f gravel; trace silt (Fill)	SP	0	(Moist)
		2	SS	22 20	70		Dense			0	
		3	SS	13 14	66					0	
5											
		4	SS	14 15	45	Gray to Black	Medium Dense	mf SAND; trace silt (Fill)	SH	0	(Wet)
		5	SS	15 5	<5			Waste		0	(Wet)
10		6	SS	6 6	0				SH	0	
		7	SS	19 11	<5			Waste		0	(Wet)
		8	SS	5 9	100			Becoming f SAND below 14.0'	SH	0	
15											
		9	SS	6 15	100		Very Dense			0	tr Shells
		10	SS	1 2	66	Black	Medium Stiff Pgn	THD Organic SILT	CL	0	(Wet)
20										0	
		Shelby Tube			75					0	
		11	SS	3 10	90	Brown to Gray-Brown	Medium Dense	UGA f-c SAND	SP/SH	0	(Wet)
25								becoming f Sand w/ depth		0	
		12	SS	6 9	100					0	
30								Bottom of Boring @ 26.0'			Boring PEP-1 located @ staked location.
								Augers to 20'			
								SS Samples to 26'			
								Shelby Tube 20' to 22'			
								(1.5' Recovery)			
35											

COMMENTS Borehole advanced w/ CHE-55 rig mounted on an ATV using 3 1/4" I.D. HSA. Borehole grouted back to at least 16' w/ bentonite/cement slurry w/ cuttings to surface.

PROJECT NO.

BORING NO.

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. PBP-2

PROJECT: Penn Ave Landfill - Geotech Invest.

SHEET NO. 1 OF 1

CLIENT:

JOB NO.:

BORING CONTRACTOR: Warren George

BORING LOCATION: *

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 7.7

DATE

TIME

LEV

TYPE

TYPE

HSA

SS

Shelby

DATE STARTED: 2/13/96

DIA.

3 1/4"

2"

3"

DATE FINISHED: 2/15/96

WT.

140#

(Brass)

DRILLER: Sal D'Amico

FALL

36"

GEOLOGIST: Robert Brossoie

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE					DESCRIPTION				REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	33 22 19	
0.5'				20 25				Asphalt + Pencil			
		1	SS	20 20	66	Brown	Dense	mf SAND; trace F gravel; trace silt (Fill)	SP	0	(Moist)
		2	SS	14 20	66					0	
5		3	SS	10 30	50		Very * Dense	mf SAND; trace silt (Fill) Waste (Plastic, newspaper wood, etc.)	SH	0	(Moist) GWTE ± 5.0' (Wet)
		4	SS	10 14	<5	Grey	Medium Dense	F SAND & SILT	SH/ ML	0	(Wet)
10		5	SS	14 22	50	to Black				0	(Wet)
		6	SS	28 22	87		Dense	F SAND; trace silt	SP	0	(Wet)
		7	SS	3 4	100		Medium Dense	mf SAND	SH	0	(Wet)
15		8	SS	2 2	92		Loose	Becoming F SAND below 17.6'	SH	0	tr shells (Wet)
		9	SS	10 13	88		Medium Dense			0	numerous shells
	SS SS SS	Shelby Tube			44	Black	Medium Stiff pym	THD Organic SILT	CL	0	(Wet)
20		10	SS	4 7	100	Grey to Brown	Medium Dense	F SAND; little silt - Peat - (Wet)	SH/ ML	0	tr shells
		11	SS	18 18	100			mf SAND (Wet)	SH	0	(Wet)
25		12	SS	20 20	100		Dense	(Note: Sequence of layers suggests soils were previously disturbed)		0	
				18 22							
				23 25	100						
30								Bottom of Boring @ 26.0' Augers to 20' SS Samples to 26'			** Blow counts artificially high as a result of pushing wood in front of split spoon.
35								* Actual boring located 18' ENE from staked location due to rock pile. Shelby Tube 18 to 20'			

COMMENTS Borehole advanced w/CHE-55 rig mounted on an ATU, using 3 1/4" I.D. HSA. Borehole grouted back to at least 16' w/ bentonite/cement slurry w/ cuttings to surface.

PROJECT NO.

BORING NO.

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO.

PBP-3

PROJECT: PENNSYLVANIA AVE BRIDGE

SHEET NO. 1 OF 3

CLIENT: NYC DEP

JOB NO.: PBP-3

BORING CONTRACTOR: WARREN GEORGE LLC

BORING LOCATION:

GROUND WATER: ~ 7.5'

CAS.

SAMPLING CORE

TUBE

GROUND ELEVATION: 29' 7.0

DATE

TIME

LEV

TYPE

TYPE

DIA.

SPLUT

SHELBY

DATE STARTED: 2/12/96

DATE FINISHED: 2/14/96

DRILLER: R.V. GREGORY

GEOLOGIST: ALEX BORZILAK

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	DESCRIPTION		REMARKS
		NO.	TYPE	BLOWS PER 6"	PERCENT				MATERIAL DESCRIPTION	CLASS USCS	
1	S.S.	1	SS	6	16	42%	BR. RED	MEDIUM DENSE	BLACK TOP	DRY WET	
2				12	13				FILL GRAVEL, SAND		
3		2	SS	7	10	100%	YEL		F-M, UNIFORM BEACH		
4				18	23				SAND, CLEAN		
5		3	SS	10	15	71%	L				
				21	23		W				
			4	SS	13	11	66%	LT.	F-M, SAND, TR. COARSE SAND.		
				10	10		G				
10		5	SS	10	13	63%	R				
				23	32		A				
			6	SS	14	24	50%	Y	L LOOSE		
				26	25						
			7	SS	10	12	45%				
					12	10			SEA SHELL FRAGMENTS		
15			8	SS	8	10	33%				
					2	10					
		9	SS	3	2	75%	DK.	SOFT	TIDAL MARSH DEPOSIT		
				2	2		G				
20		SHE 134 #1				92%	R		CL	ORGANIC SILT	
		SHE 134 #2				96%	A				
		10	SS	2	10	71%	G R A Y	MEDIUM DENSE	F-M, UNIFORM SAND — TR. OF F. ROUNDED GRAVEL		
25				32	67						
		11	SS	4	7	33%					
				12	16						
		12	SS	5	10	50%					
				12	12						
30		13	SS	10	10	46%					
				16	22						
		14	SS	10	10	42%					
				13	10						
		15	SS	12	10	46%					
				14	10						
35		16	SS	10	10	50%					
				12	10						

COMMENTS

PROJECT NO.

BORING NO.

PBP-3

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. PEP-3

PROJECT: NEW YORK STATE TOLSON

SHEET NO. 2 OF 3

CLIENT: NYC DEP

JOB NO. :

DEPTH FT	STRATA	SAMPLE				DESCRIPTION				REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	
37		17	SS	12 13	100%	GRAY	MEDIUM DENSE	F-M UNIFORM SAND TR. OF SILT		
38				22 22						
39		18	SS	5 8	54%					
40				11 16						
41		19	SS	9 10	50%					
42				12 16						
43		20	SS	5 6	46%	GRAY	MEDIUM DENSE	F-M UNIFORM SAND TR. OF SILT		
44				11 12						
45		21	SS	7 11	42%					
46				12 12						
47		22	SS	9 12	54%					
48				14 21						
49		23	SS	10 12	83%	GRAY	MEDIUM DENSE	F-M UNIFORM SAND TR. OF SILT		
50				12 21						
51										
52										
53										
54										
55		24	SS	12 12	42%	GRAY	MEDIUM DENSE	F-M UNIFORM SAND TR. OF SILT		
56				14 26						
57										
58										
59		25	SS	10 20	50%					
60				22 22						
61						GRAY	MEDIUM DENSE	F-M UNIFORM SAND TR. OF SILT		
62										
63										
64		26	SS	10 14	46%					
65				24 23						
66										
67		27	SS	5 12	38%	GRAY	MEDIUM DENSE	F-M UNIFORM SAND TR. OF SILT		
68				12 13						
69										
70										
71										
72		28	SS	15 23	42%					
73				26 26						
74										

COMMENTS

PROJECT NO.
BORING NO.

PEP-3

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO.

PBP-3

PROJECT: N PENNSYLVANIA AVENUE LANDFILL

SHEET NO. 3 OF 3

CLIENT: NYC DEP

JOB NO. :

DEPTH FT	STRATA	SAMPLE				COLOR	CONSISTENCY HARDNESS	DESCRIPTION MATERIAL DESCRIPTION	CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 5"	RECOVERY RQD %					
80		20	SS	12 15	33%	G R A I	MEDIUM DENSE	F-M UNIFORM SAND.		
81				17 24						
85		30	SS	9 13	50%	G R A I	DENSE	F-M UNIFORM SAND TR. OF SILT, F. ROUNDED GRAVEL		
86				16 24						
90		31	SS	10 12	42%	G R A I	DENSE	F-M UNIFORM SAND TR. OF SILT, F. ROUNDED GRAVEL		
91				11 18						
95		32	SS	32 57	42%	G R A I	DENSE	F-M UNIFORM SAND TR. OF SILT, F. ROUNDED GRAVEL		
96				64 72						
98		33	SS	34 60	46%	G R A I	DENSE	F-M UNIFORM SAND TR. OF SILT, F. ROUNDED GRAVEL		
99				100 2"						
								BOTTOM OF BORING @ 100'		

REMARKS

BORING ADVANCED W/ FALLING HOLEHAMMER 2 1/2" DIA. RODS WITH 1/4" DIA. BIT
BORING GRouted BACK TO THE GRADE W/ PORTLAND-CEMENT GROUT

PROJECT NO.

BORING NO.

PBP-3

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. PBP-5

PIER

PROJECT: PAL Pre-design Geotechnical Investigation

SHEET NO. 1 OF 3

CLIENT: NYCDEP

JOB NO.: 0535331.63

BORING CONTRACTOR: Warren George Inc.

BORING LOCATION:

GROUND WATER:

GROUND ELEVATION: -25.20' - 25.3

DATE	TIME	LEV	TYPE	TYPE	CAS.	SAMP	CORE	TUBE
				DIA.	4"	2"		
				WT.		140#		
				FALL		30"		
* POCKET PENETROMETER READING								

DATE STARTED: 2-19-96

DATE FINISHED: 2-21-96

DRILLER: Ben Rivera

GEOLOGIST: Steven Moeller

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION			CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION		
		1	SS	WOR	25	BLACK	VERY SOFT	ORGANIC FINE SANDY SILT	ML	Sulferu, decomposing odor
3		2	SS	WOR	100	GRAY	VERY LOOSE	FINE SAND, trace medium sand	SP	SAND WAS PACKED INSIDE CASING
5		3	SS	9 11	90					
		4	SS	1 1	25					
10		5	SS	2 4	30		LOOSE			
		6	SS	3 3	30					
		7	SS	2 1	30					
15		8	SS	2 4	50					
		9	SS	1 3	85					
20		10	SS	2 3	80					
		11	SS	2 3	40		LOOSE TO MEDIUM DENSE			
		12	SS	3 6	50					
25		13	SS	3 4	15					
		14	SS	2 4	35					
30		15	SS	4 6	50					
		16	SS	3 6	60					
		17	SS	5 6	15					
35		18	SS	5 5	50					

COMMENTS BORING ADVANCED WITH A 3 7/8" ROLLER BIT AND ZEOGEL MUD
USING A FAILING 1500 RIG ON A SPUD BARGE.

PROJECT NO.
BORING NO.

0535331.63
PBP-5

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. PBP-5 PIERPROJECT: PAL Pre-design Geotechnical Investigation
CLIENT: NYCDEPSHEET NO. 2 OF 3
JOB NO.: 0535331.63

DEPTH FT	SOIL DATA	SAMPLE					COLOR	CONSISTENCY HARDNESS	DESCRIPTION		CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY RQD %				MATERIAL DESCRIPTION			
37		19	SS	10 6 6 10	50		GRAY	MEDIUM DENSE	FINE SAND, trace medium sand		SP	
40		20	SS	5 9 12 13	50							
		21	SS	7 8 8 10	15							
		22	SS	5 5 6 9	70							
45		23	SS	3 6 5 8	45							
		24	SS	6 7 11 12	65							
50		25	SS	6 8 17 21	60							
55												
		26	SS	8 8 6 11	65							
60												
		27	SS	15 19 22 25	70			DENSE TO VERY DENSE				
65												
66		28	SS	16 22 29 39	65				WELL GRADED FINE, MEDIUM, AND COARSE SAND		SW	
70												
71		29	SS	25 26 40 51	65				FINE SAND, trace medium sand		SP	
75												
76		30	SS	11 13 17 21	55		GRAY TO DARK GRAY		SILTY CLAYEY FINE SAND		SM/ SC	
	S/S											

COMMENTS

PROJECT NO.
BORING NO.0535331.63
PBP-5

BORING NO. PBP-5

SHEET NO. 3 OF 3

JOB NO. : 0535331.63

PROJECT: PAL Pre-design Geotechnical Investigation

CLIENT: NYCDPA

COMMENTS

PROJECT NO.
BORING NO.

0535331.63
PBP-5

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. PBP-7

PROJECT: PAL Pre-design Geotechnical Investigation

SHEET NO. 1 OF 3

CLIENT: NYC DEP

JOB NO.: 0535331.63

BORING CONTRACTOR: Warren George Inc.

BORING LOCATION:

GROUND WATER:

CAS. SAMP CORE TUBE

GROUND ELEVATION: -27.90

DATE TIME LEV TYPE

TYPE MUD ROTARY

SS

DATE STARTED: 2-14-96

DIA.

4"

2"

DATE FINISHED: 2-19-96

WT.

140#

DRILLER: Benny Rivera

FALL

30"

GEOLOGIST: Steven Moeller

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	DESCRIPTION	CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"							
		1	SS	WOR		15	BLACK	VERY SOFT	ORGANIC SILT trace sand and gravel	OL	sulfury, decomposing odor sticky, slightly plastic
		2	SS	WOR		30					
5		3	SS	WOR		50					
6		4	SS	5/5		60	GRAY TO DARK GRAY	LOOSE TO MEDIUM DENSE	FINE SAND, trace medium sand	SP	
		5	SS	4/4		50					
10		6	SS	3/2		40		LOOSE	-siltier seam		
		7	SS	2/2		35					
15		8	SS	2/3		60					
		9	SS	3/4		50					
		10	SS	2/3		50					
20		11	SS	3/7		60		MEDIUM DENSE			
		12	SS	4/6		28					
25		13	SS	6/8		55					
		14	SS	4/8		85					
30		15	SS	8/8		85					
		16	SS	4/5		65					
		17	SS	4/10		45					
35		18	SS	7/8		30					

COMMENTS BORING ADVANCED WITH A 3 7/8" ROLLER BIT AND 3FOGEL MUD USING A FAILING 1500 RIG ON A SPUD BARGE.

PROJECT NO.

0535331.63

BORING NO.

PBP-7

PROJECT: PAL Pre-design Geotechnical Investigation

SHEET NO. 2 OF 3

CLIENT: NYCDEP

JOB NO.: 0535331.63

DEPTH FT	STRATA	SAMPLE				COLOR	CONSISTENCY HARDNESS	DESCRIPTION MATERIAL DESCRIPTION	CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY RQD %					
37		19	SS	10 13 14 19	90	GRAY TO DARK GRAY	MEDIUM DENSE TO DENSE	FINE SAND, trace medium sand	SP	
40		20	SS	6 10 10 11	50					
		21	SS	4 6 7 9	65					
		22	SS	7 10 10 7	75					
45		23	SS	5 6 11 10	70					
		24	SS	4 7 9 10	65			(interbeds of trace to some med. sand; trace coarse sand 46'-62')	SP/ SW	
50		25	SS	6 10 13 19	65					
55		26	SS	2 4 11 19	55					
60										
		27	SS	12 18 21 32	65					
65										
		28	SS	17 21 22 26	95					
70		29	SS	21 24 25 36	70					
75		30	SS	16 40 21 16	65					

COMMENTS

PROJECT NO.
BORING NO.0535331.63
PBP-7

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. PBP-7

PROJECT: PAL Pre-design Geotechnical Investigation

SHEET NO. 3 OF 3

CLIENT: NYCDEP

JOB NO.: 0535331.63

DEPTH FT	STRATA	SAMPLE				COLOR	CONSISTENCY HARDNESS	DESCRIPTION MATERIAL DESCRIPTION	CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %					
80	SS	31	SS	18 21 19 18	85	GRAY TO DARK GRAY	MEDIUM DENSE TO DENSE	FINE SAND, trace medium sand	SP	
85		32	SS	7 12 15 14	95					
90		33	SS	17 13 13 13	15					
95		34	SS	5 8 15 17	85			- siltier layer		
100		35	SS	17 18 21 29	75					
102										
								BORING COMPLETED AT 102' depth (mud rotary drilling to 100', split spoon samples to 102' depth)		

COMMENTS

PROJECT NO.
BORING NO.0535331.63
PBP-7

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. PBP-9

PIER

PROJECT: PAL Pre-design Geotechnical Investigation

SHEET NO. 1 OF 3

CLIENT: NYCDEP

JOB NO.: 0535331.63

BORING CONTRACTOR: Warren George Inc.

BORING LOCATION:

GROUND WATER:

CAS. SAMP CCRE TUBE

GROUND ELEVATION: -31.4' - 31.5'

DATE TIME LEV TYPE

TYPE

MUD
ROTARY

SS

DATE STARTED: 2-26-96

DIA.

4"

2"

DATE FINISHED: 2-27-96

WT.

140#

DRILLER: Ben Rivera

FALL

30"

GEOLOGIST: Steven Moeller

POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION			REMARKS	
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION		CLASS USCS
		1	SS	WOR	50	BLACK ↓	VERY SOFT	ORGANIC FINE SANDY SILT	ML	sulfery, decomposing odor
		2	SS	8 13 16 23	85	GRAY	LOOSE TO MEDIUM DENSE	FINE SAND, trace medium sand	SP	
5		3	SS	9 17 10 7	60					
		4	SS	2 2 2 3	50					
	SS	5	SS	4 2 3 3	50			-siltier layer		
10		6	SS	4 5 7 7	70					
		7	SS	7 8 8 7	70					
15		8	SS	1 3 5 5	55					
		9	SS	2 2 6 4	45					
20		10	SS	2 4 12 12	65					
		11	SS	2 6 12 16	70					
		12	SS	4 8 14 17	60					
25		13	SS	8 8 14 14	80					
		14	SS	3 8 9 10	55					
30		15	SS	6 6 8 6	30					
		16	SS	6 11 10 8	75					
		17	SS	1 4 7 6	60					
35		18	SS	3 5 8 10	60					

COMMENTS BORING ADVANCED WITH A 3 7/8" ROLLER BIT AND ZEOGEL MUD USING A FAILING 1500 RIG ON A SPUD BARGE.

PROJECT NO.
BORING NO.

0535331.63
PBP-9

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. PBP-9

PIER

PROJECT: PAL Predesign Geotechnical Investigation

SHEET NO. 2 OF 3

CLIENT: NYCDEP

JOB NO.: 0535331.63

DEPTH FT	STRATA	SAMPLE				COLOR	CONSISTENCY HARDNESS	DESCRIPTION	CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %					
37		19	SS	5 13	10 11	75	GRAY	LOOSE TO MEDIUM DENSE	FINE SAND, Trace medium sand	SP
40		20	SS	5 16	8 11	45				
		21	SS	6 11	9 11	92				
		22	SS	5 15	10 18	80				
45		23	SS	2 7	2 13	60				
		24	SS	6 13	7 13	80				
50		25	SS	3 9	5 8	65				
55		26	SS	1 7	5 7	40				
60		27	SS	14 22	22 17	90	GRAY TO DARK GRAY	DENSE TO VERY DENSE	VARIOUSLY INTERLAYERED: ① FINE SAND, trace medium sand ② FINE SAND AND SILT ③ WELL GRADED F-M-C SAND	SP/ SW
65		28	SS	16 33	22 33	60				SW
70	SS	29	SS	17 27	20 22	85				SW SP SM
75	SS	30	SS	14 26	15 26	85				SP/ SW SP/ SM

COMMENTS

PROJECT NO.
BORING NO.0535331.63
PBP-9

PROJECT: PAL Pre-design Geotechnical Investigation

SHEET NO. 3 OF 3

CLIENT: NYCDEP

JOB NO.: 0535331.63

DEPTH FT	STRATA	SAMPLE				COLOR	CONSISTENCY HARDNESS	DESCRIPTION MATERIAL DESCRIPTION	CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %					
80	SS	31	SS	16 22 30 25	90	GRAY TO DARK GRAY	DENSE TO VERY DENSE	VARIOUSLY INTERLAYERED: ① FINE SAND, trace medium sand ② FINE SAND AND SILT ③ WELL GRADED F-M-C SAND	SP/SW SP/SM	
85	SS	32	SS	11 17 20 28	75				SP SM/ ML	
90		33	SS	23 21 17 17	85	GRAY		WELL GRADED FINE, MEDIUM, and COARSE SAND, trace gravel	SW	
95		34	SS	16 16 27 35	60					
100		35	SS	17 17 25 26	90	DARK GRAY		FINE SAND, trace medium sand	SP	
102										
								BORING COMPLETED AT 102' depth (mud rotary drilling to 100', split spoon samples to 102' depth)		

COMMENTS

PROJECT NO.

BORING NO.

0535331.63

PBP-9

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. PBP-10

PIER

PROJECT: PAL Pre-design Geotechnical Investigation

SHEET NO. 1 OF 3

CLIENT: NYCDEP

JOB NO.: 0535331.63

BORING CONTRACTOR: Warren Georae Inc.

BORING LOCATION:

GROUND WATER:

GROUND ELEVATION: -24.90' -25.0

DATE	TIME	LEV	TYPE	TYPE	CAS.	SAMP	CORE	TUBE
				DIA.	4"	2"		
				WT.		140#		
				FALL		30"		

DATE STARTED: 2-22-96

DATE FINISHED: 2-23-96

DRILLER: Ben Rivera

GEOLOGIST: Steven Moeller

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	DESCRIPTION MATERIAL DESCRIPTION	CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"							
		1	SS	WOR		15	BLACK	VERY SOFT TO SOFT	ORGANIC FINE SANDY TO CLAYEY SILT	ML	sulfery, decomposing odor
		2	SS	4	2	100	GRAY	LOOSE	FINE SAND, trace medium sand	SP	SAND WAS PACKED INSIDE CASING
5		3	SS	10	16	60					
				8	5						
		4	SS	2	3	30					shell fragments in sand
				4	5						
		5	SS	3	5	70					
10				5	6						
		6	SS	3	3	50					
				3	8						
		7	SS	4	4	45					
				4	3						
15		8	SS	2	4	40			trace to some medium sand, trace coarse sand	SP/ SW	
				6	9						
		9	SS	6	4	35					
				3	6						
20		10	SS	9	12	70		MEDIUM DENSE			
				11	14						
		11	SS	9	12	50					
				7	9						
		12	SS	4	6	45			trace medium sand	SP	
				9	13						
25		13	SS	6	7	55					
				12	20						
		14	SS	5	6	75					
				8	10						
30		15	SS	5	4	45					
				7	10						
		16	SS	5	6	45					
				9	13						
		17	SS	5	6	55					
				7	7						
35		18	SS	4	4	40					
				8	8						

COMMENTS BORING ADVANCED WITH A 3 7/8" ROLLER BIT AND ZEOGEL MUD USING
A FAILING 1500 RIG ON A SPUD BARGE.

PROJECT NO.
BORING NO.

0535331.63
PBP-10

PROJECT: PAL Pre-design Geotechnical Investigation
 CLIENT: NYCDEP

TEST BORING LOG
 BORING NO. PBP-10
 SHEET NO. 2 OF 3
 JOB NO. : 0535331.63

DEPTH FT	STRATA	NO.	TYPE	SAMPLE		RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	DESCRIPTION	CLASS USCS	REMARKS
				DEWS PER 6"	PER 12"						
37		19	SS	7	6	45	GRAY	LOOSE TO MEDIUM DENSE	FINE SAND, trace medium sand	SP	
40		20	SS	2	4						
		21	SS	3	4	50					
		22	SS	4	2	50					
45		23	SS	7	16	90					
		24	SS	8	9	90					
		25	SS	10	14	50					
		26	SS	3	4	85					
		27	SS	6	7						
		28	SS	5	10						
		29	SS	12	20						
		30	SS	8	10	65					
		31	SS	23	38						
		32	SS	20	26	90					
		33	SS	42	51						
		34	SS	8	20	85					
		35	SS	20	26						

GRAY
TO
DARK
GRAY

DENSE
TO
VERY
DENSE

VARIOUSLY
INTERLAYED:
 ① WELL GRADED
F-M-C SAND
 ② FINE SAND AND
SILT
 ③ FINE SAND,
trace medium sand

SW
ML

SW

SP
ML
SP

PROJECT NO.
BORING NO.

0535331.63
PBP-10

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. PBP-10

PRL

PROJECT: PAL Pre-design Geotechnical Investigation

SHEET NO. 3 OF 3

CLIENT: NYC DEP

JOB NO.: 0535331.63

DEPTH FT	STRATA	SAMPLE				RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	DESCRIPTION	CLASS USCS	REMARKS
		NO.	TYPE	BLOWS PER 6"							
80	SS	31	SS	13	21	80	GRAY TO DARK GRAY	MEDIUM DENSE TO DENSE	VARIOUSLY INTERLAYERED: ① WELL GRADED F-M-C SAND ② FINE SAND AND SILT ③ FINE SAND, trace medium sand	SM/ ML SP	
				21	18						
85	SS	32	SS	11	11	80				SW/ SM/ ML	
				9	12						
90	SS	33	SS	8	7	95				SP SM/ ML	
				7	10						
95		34	SS	13	18	60	GRAY		FINE and MEDIUM SAND, trace to some coarse sand, trace gravel	SW	
				23	38						
100		35	SS	11	11	60					
				15	18						
102											
		</									

COMMENTS

PROJECT NO.
BORING NO.0535331.63
PBP-10

Converse Consultants East, P.C.

TEST BORING LOG

BORING NO. ACF-3

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT. NO. 2 OF 4

CLIENT URS Consultants

PROJ. NO. 95-67109-02

DEPTH FT.	CASING BLOWS	SAMPLE NO.	SAMPLER BLOWS PER 6 IN.	SYMBOL	IDENTIFICATION	LAB % M.C.	FIELD PTD (ppm)	FIELD CBT (% LEL)	FIELD H2S (ppm)	SDP. UNIT WT. (lb/ft)	REMARKS
23					fire, carpet, rags, metal, soil		2.4	0	2	1250	1?
24					Bl sandy sl, wood fibers, metal					600	soil - Bl sandy sl
25					tile cabinet, wood, fibers, soil			0	2	380	
26					wood fibers, cobbles, soil		-			410	
27					tile cabinet, wood fibers, wood					450	found drilling 3 buckets @ 2'- 5" to 2'- 10" to 2'- 15"
28					wood, wood fibers Bl sandy sl					310	bucket riding on something
29					fire, wood fibers, wood fr plastic, Bl sandy sl		5	0	-	1050	
30					wood, wood fibers, Bl sandy sl, metal, foil plastic, fiber board, bricks					650	
31		29' 4"			D.O.					630	
32		30' 3"			Bricks, wood, wood fibers Bl sandy sl					-	
33					D.O.					630	
34					particle board, Bl sandy sl, cast iron sewer p.p.e., carpet					1040	
35		33' 2"			D.O.		3.8	0	2	470	
36		34' 2"			cobbles, rebar, wood fibers					480	
37					Black sand, clayey sl					390	
38					wood fibers, Bl sandy clayey sl					430	
39					D.O.					500	
40					Bl sandy gravelly clayey sl, wood, w brick					750	
41					D.O.		3.2	6	5	370	
42					wood, bricks, unknown,					980	Concrete block use auger to remove loose material
43					wood, wood fibers, Bl sandy sl, w metal					530	
44					Bl sandy gravelly sl, wood					350	
45					Bl sandy gravelly sl, wood, sheet metal					1070	
46					14 concrete blocks, wood sheet metal, Bl sandy sl		4.2	2	4	470	
47					Brick wall, Blk sandy sl					1050	

Converse Consultants East, P.C.

TEST BORING LOG

BORING NO. ABP-8

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT. NO. 3 OF 4

CLIENT URS Consultants

PROJ. NO. 95-87109-02

DEPTH FT.	CASING BLOWS	SAMPLE NO.	SAMPLER BLOWS PER 6 IN.	SYMBOL	IDENTIFICATION	LAB % M.C.	FIELD PTD (ppm)	FIELD CGI (% LEL)	FIELD H2S (ppm)	EST. UNIT WT. (lb/ft)	REMARKS
					D.O.					710	
48		48'2"			Mica shot cobble, gravel, Bl sandy sl. v. little wood		1.2	0	5	500	
49		49'2"			1 concrete block, Bl sandy sl.					900	
50					Wood, concrete block, Blk sandy sl					850	
51					Brick wall, pc of p-pc wood, Bl sandy sl					800	
52					Product coated wood, bricks, sand, silt		15	-	-	-	appearance of product heads piece 195 ppm
53											
54											
55					D.O.					1410	
56											
57					D.O.					1020	
58					Wood, cobbles, v little soil		40	0	2	840	
59					D.O.					650	
60					Wood, wood fibers, Bl sandy sl. trace wire					1060	
61					Wood, sandy sl, metal					960	
62					D.O.		19	0	2	1030	
63					metal, bricks, wood, sand, silt					1040	
64					3/4" gravel, Bl sandy sl, wood fibers					980	change to auger loose ft. try trash bucket then earth bucket
65											
66					D.O.					650	
67					D.O.					590	
68					Wood, gums, shoes, sandy sl.					1100	still product coated
69					Wood, rubber, wires, sandy sl		4.8	13	0	1070	2 buckets slag, no gain 1100 lb ea. mat. on teeth dry
70					Sandy clayey sl, wood, metal, newspaper					1030	
71					D.O.					1030	
72					Sandy silty clay, wood, plastic					1200	

BORING NO. *ABF 8*

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT NO. 4 OF 4

CLIENT URS Consultants

PROJNO. 95-67109-02

[illegible]

Converse Consultants East, P.C.

TEST BORING LOG

BORING NO. *ABP-9*

PROJECT Fountain/Pennsylvania Ave. Landfills

LOCATION Brooklyn, NY

SHT. NO. 1 OF 2

CLIENT URS Consultants

PROJ. NO. 95-67109-02

BORING CONTRACTOR *MOORETRENCH*

DRILLING RIG *WATSON*

ELEVATION *37.4*

GROUNDWATER DATA

DATE	TIME	DEPTH	CASING	TYPE
				DIA.
				WT.
				FALL

CASING	SAMPLE	CORE	TUBE
	<i>BUCKET</i>		
	<i>26"</i>		

DATUM *N6VD*
 DATE START *3-14-96*
 DATE FINISH *3-14-96*
 DRILLER *GEORGE SHAW*
 CONVERSE REP. *MLD*

DEPTH FT.	CASING BLOWS	SAMPLE NO.	SAMPLER BLOWS PER 6 IN.	SYMBOL	IDENTIFICATION	LAB % M.C.	FIELD PTD (ppm)	FIELD CGI (% LEL)	FIELD H2S (ppm)	EST. UNIT WT. (pcf)	REMARKS
1					LT Br med sa, bricks cobbles		0	0	0	870	
2					Br silty med sa, gravel					570	
3					wood, cobbles						
4					Br silty med sa, wood,					750	
5					bricks, concrete						
6											
7					D.O.					430	
8					wood, Br silty sa		0	0	0	300	
9										150	
10					wood concrete					320	
11					D.O.		0.4	6	0	370	O ₂ depleted
12					concrete, wood, Br silty sa					500	
13					D.O.					370	
14					Br sandy silty wood, cobbles, fire					750	
15					Br sandy silty concrete, wood						
16					Br sandy silty newspaper		0.4	44	1	870	O ₂ - 3.4 Paper Long Island Journal 7/24/61
17					concrete, wood, metal cans						
18					delaminated plywood					370	
19					Br/Black sandy silty plywood					650	
20					bricks, sheet metal					600	
21					Bl clayey med sa, wood,						
22					glass					820	O ₂ 5.7
23					Bl clayey sa, newspaper, wood		0.4	25	0	770	
24					PC or metal						
25					D.O.					630	foul odor
26					Black sandy clay, wood		0.8	13	0		
27					streamer paper, glass, plywood						

BORING NO. *ASP-5*

SHT.NO. 2 OF 2

PROJ. NO. 95-67109-02

[illegible]

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. GBP - 1PROJECT: PENNSYLVANIA AVE. LANDFILL

SHEET NO. 1 OF 1

CLIENT: NYC DEC

JOB NO. :

BORING CONTRACTOR: HARRIS GEORGE INC.

BORING LOCATION:

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 6.5

DATE

TIME

LEV

TYPE

TYPE

OPEN

SS

SHELBY

DATE STARTED: FEB 16 '96

DATE

TIME

LEV

TYPE

DIA.

3"Ø

2"

3"

DATE FINISHED: FEB. 16 '96

DATE

TIME

LEV

TYPE

WT.

MUD

140"

(BRASS)

DRILLER: R.V. GREGORY

DATE

TIME

LEV

TYPE

FALL

ROTARY

30"

GEOLOGIST: ALEX ZORZAKA

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE					DESCRIPTION				REMARKS	
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS		FINH	HES
2		1	SS	5 9	5 9	50%	DR. BROWN	LOOSE	TOP SOIL W. ORGANIC MATTER DK. BROWN, F-M SAND TRACE SILT, FILL MATERIAL		0	0
4		2	SS	8 11	10 11	58%	REDISH	MEDIUM			0	0
5		3	SS	5 10	11 11	83%		DENSE	F-M SAND, TRACE OF SMALL GRAVEL		0	0
		4	SS	6 5	6 5	66%	GRAY				0	0
10		5	SS	3 5	4 5	54%	DK GRAY	VERY LOOSE	VERY F-M WELL SORTED SAND		0	0
		6	SS	2 4	3 3	75%					0	0
15		7	SS	2 2	2 2	42%	GRAY TO BLACK	VERY SOFT	TMD, ORGANIC SILT INTERBEDDED WITH F-M SAND (APPROX 3"-4" THICK)		0	0
			SHELBY TUBE			0		VERY LOOSE			0	0
		3	SS	3 4	3 6	100%	BROWN TO BLACK	VERY SOFT	TMD, ORGANIC SILT INTERBEDDED WITH PEAT AND F-M SAND (APPROX 1" THICK)		0	0
20			SHELBY TUBE			100%	DK. GRAY				0	0
									UGD, F-M SAND TR. SMALL GRAVEL			
25									BORING TERMINATED @ 20'			
30												
35												

COMMENTS

PROJECT NO.

BORING NO.

GBP - 1

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO. GBP-2PROJECT: PENNSYLVANIA AVE. LANDFILL

SHEET NO. 1 OF 1

CLIENT: NYC DEC

JOB NO. :

BORING CONTRACTOR: HARRISON GEORGE INC

BORING LOCATION:

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 8.4

DATE TIME LEV TYPE

TYPE OPEN SS

SHELBY

DATE STARTED: FEB. 15 '962/15/968.0DIA. 3" Ø 2" Ø3"DATE FINISHED: FEB. 15 '96WT. MUD 140"(BRASS)DRILLER: R.Y. GREGORYFALL ROTARY 30"GEOLOGIST: ALEX SZRZALKA

* POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION				REMARKS	
		NO.	TYPE	BLOWS PER 5'	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	HN	W ₂
0		1	SS	1 2	42%	Dk BROWN	VERY LOOSE	TOP SOIL, ORGANIC MATTER, TR. SILT FILL		0	0
2		2	SS	14 17	83%	LT. YELLOW REDISH	MEDIUM DENSE	BEACH F-M SAND, TR. OF SMALL GRAVEL WELL ROUNDED.		0	0
4		3	SS	10 14	58%					0	0
5		4	SS	22 23	50%			SEA SHELLS FRAGMENTS		0	0
6		5	SS	16 19	54%	LT.		VERY F-M UNIFORM SAND		0	0
8		6	SS	5 6	58%	GRAY	LOOSE			0	0
10		7	SS	4 5	71%	DK. GRAY				0	0
12		8	SS	3 2	33%					0	0
14		9	SS	5 7	100%	DK. GRAY	VERY SOFT	TMD, ORGANIC SILT		0	0
15				4 7						0	0
16				4 3						0	0
18				1 2	100%	DK. GRAY				0	0
20				2 4	100%	BLACK		UGD, F-C SAND		0	0
22											
24											
26											
28											
30											
32											
34											
36											
38											
40											
42											
44											
46											
48											
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86											
88											
90											
92											
94											
96											
98											
100											

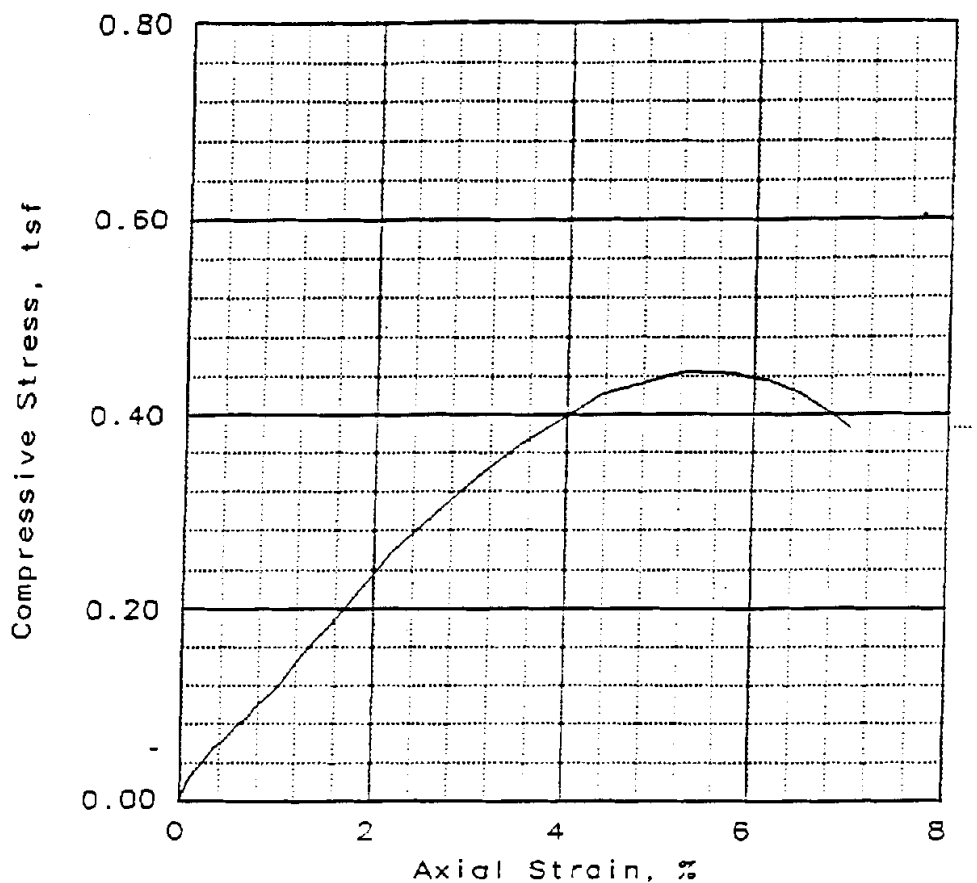
COMMENTS

PROJECT NO.

BORING NO.

GBP-2

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1		
Unconfined strength, tsf	0.44		
Undrained shear strength, tsf	0.22		
Failure strain, %	5.3		
Strain rate, %/min	1.00		
Water content, %	56.5		
Wet density, pcf	103.1		
Dry density, pcf	65.8		
Saturation, %			
Void ratio			
Specimen diameter, in	2.82		
Specimen height, in	5.71		
Height/diameter ratio	2.02		

Description: D.br fat clay

LL = 57 PL = 25 PI = 32 GS= Type: CH

Project No.: 95-67109-01/02

Date: 5-1-96

Remarks:

Client: URS

Project: Brooklyn, NY

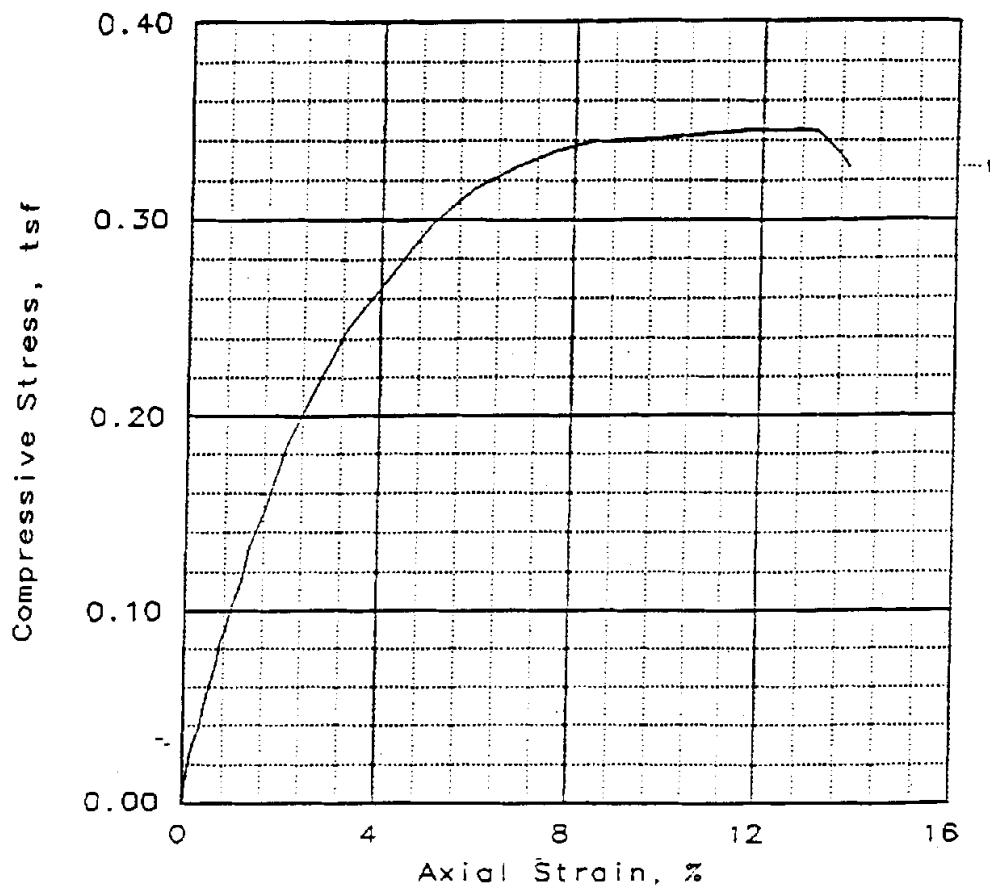
Location: GBF-2/13-15 ft.



Converse Consultants East

Fig. No.: _____

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1		
Unconfined strength, tsf	0.35		
Undrained shear strength, tsf	0.17		
Failure strain, %	12.8		
Strain rate, %/min	1.00		
Water content, %	74.5		
Wet density, pcf	97.8		
Dry density, pcf	56.1		
Saturation, %			
Void ratio			
Specimen diameter, in	2.84		
Specimen height, in	5.95		
Height/diameter ratio	2.10		

Description: D.br fat clay

LL = 94

PL = 39

PI = 55

GS=

Type: CH

Project No.: 95-67109-01/02

Date: 5/1/96

Remarks:

Client: URS

Project: Brooklyn, NY

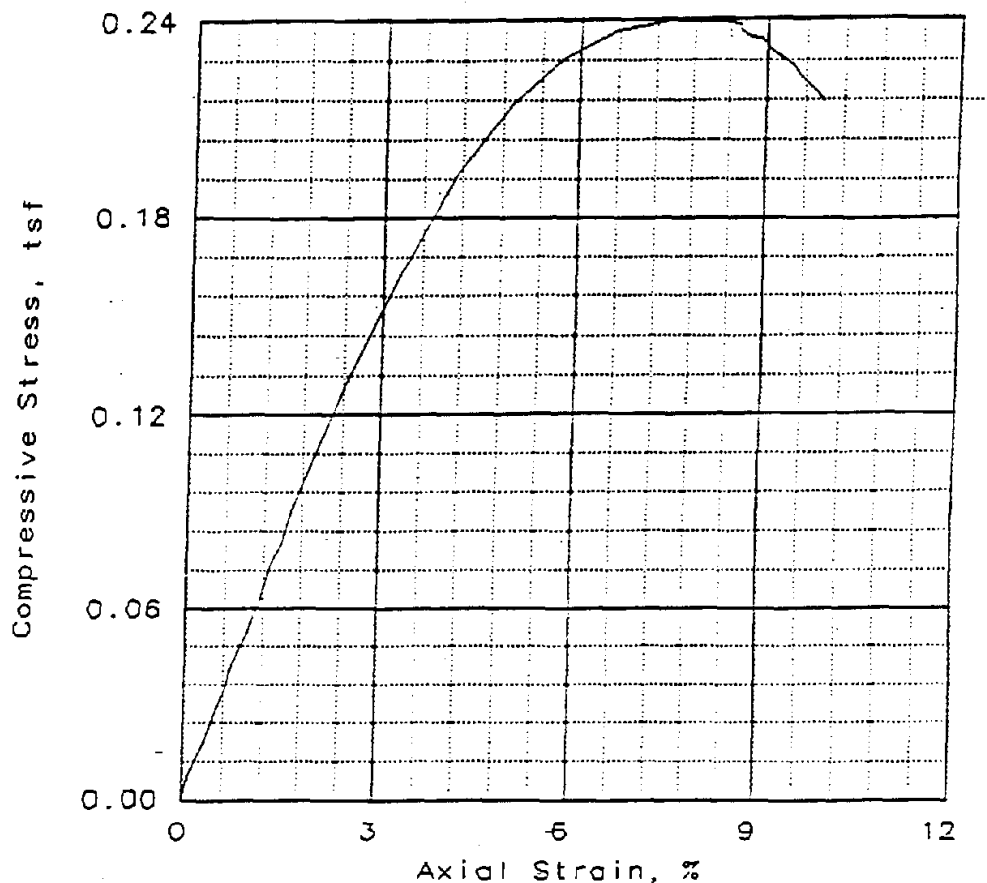
Location: GBF-3/18-20 ft.



Converse Consultants East

Fig. No.: _____

UNCONFINED COMPRESSION TEST



SAMPLE NO.:	1		
Unconfined strength, tsf	0.24		
Undrained shear strength, tsf	0.12		
Failure strain, %	7.4		
Strain rate, %/min	1.00		
Water content, %	109.5		
Wet density, pcf	82.8		
Dry density, pcf	39.5		
Saturation, %			
Void ratio			
Specimen diameter, in	2.88		
Specimen height, in	6.06		
Height/diameter ratio	2.10		

Description: Dark br. organic clay with peat & sand

GS=

Type: OH

Project No.: 95-67109-01/02

Date: 5-2-96

Remarks:

Client: URS

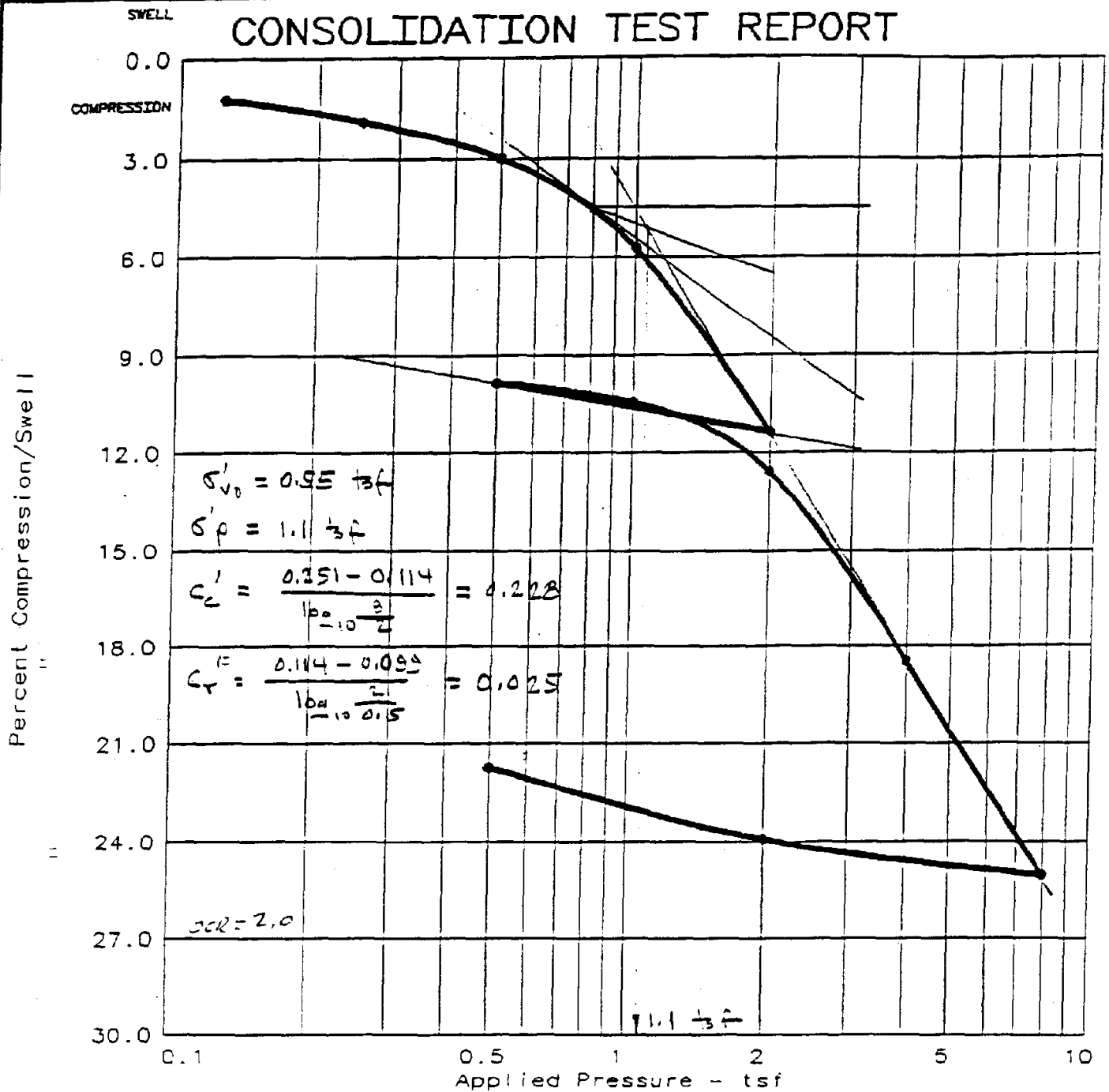
Project: Brooklyn, NY

Location: SBF-7/6-8 ft.



Converse Consultants East

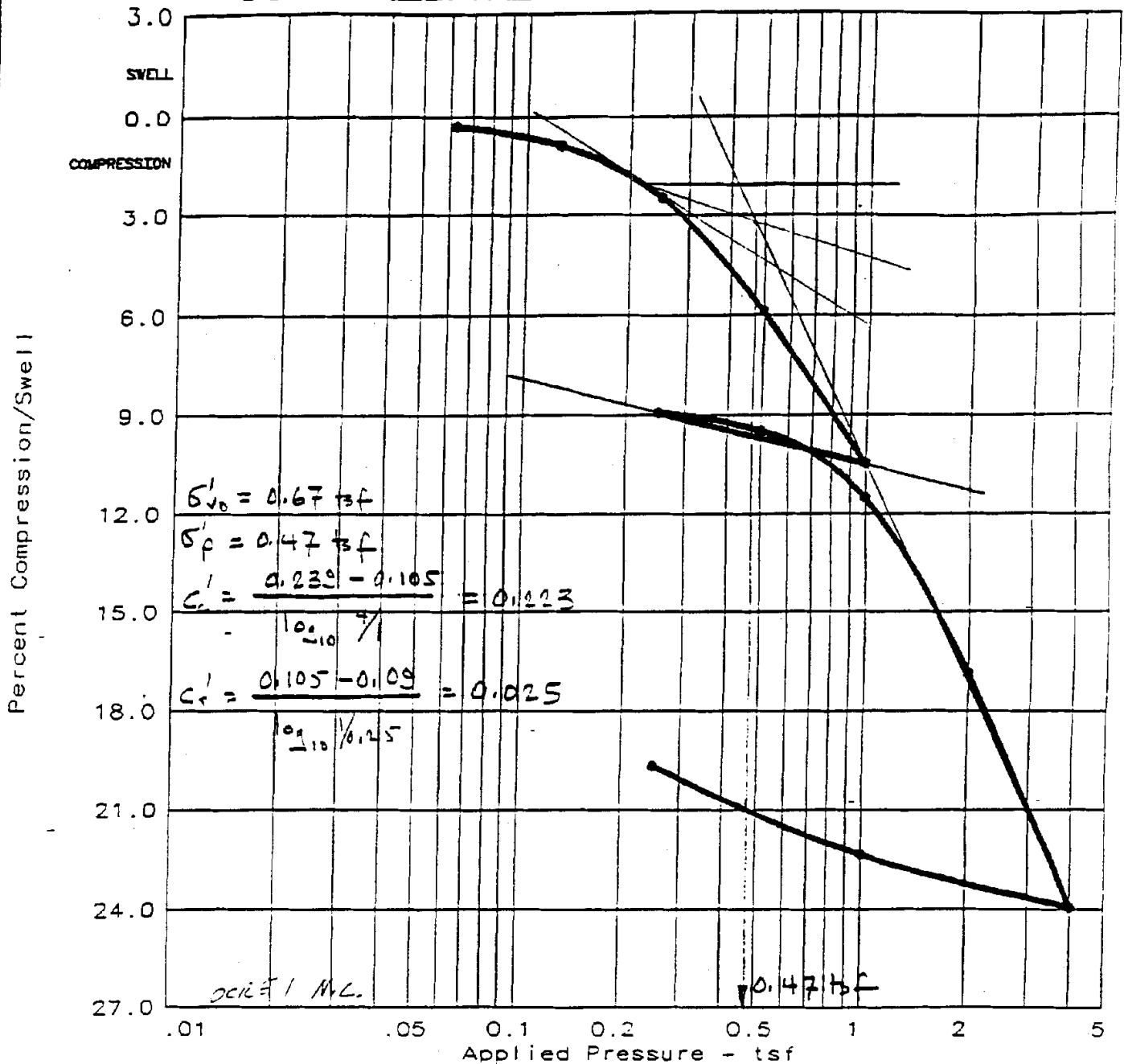
CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
	52.5 %	67.3	57	32		

TEST RESULTS	MATERIAL DESCRIPTION
C_v at 1.00 tsf applied = 0.022 sq. in./min. C_v at 2.00 tsf applied = 0.011 sq. in./min.	Dark Brown fat clay with sand & tr. shells.
Project No.: 95-67109-01/02 Project: Fountain Avenue Landfill Location: GBF-2/13-15 ft.	Class: CH
Date: 5-16-96	Remarks:
 Converse Consultants East	Fig. No. _____

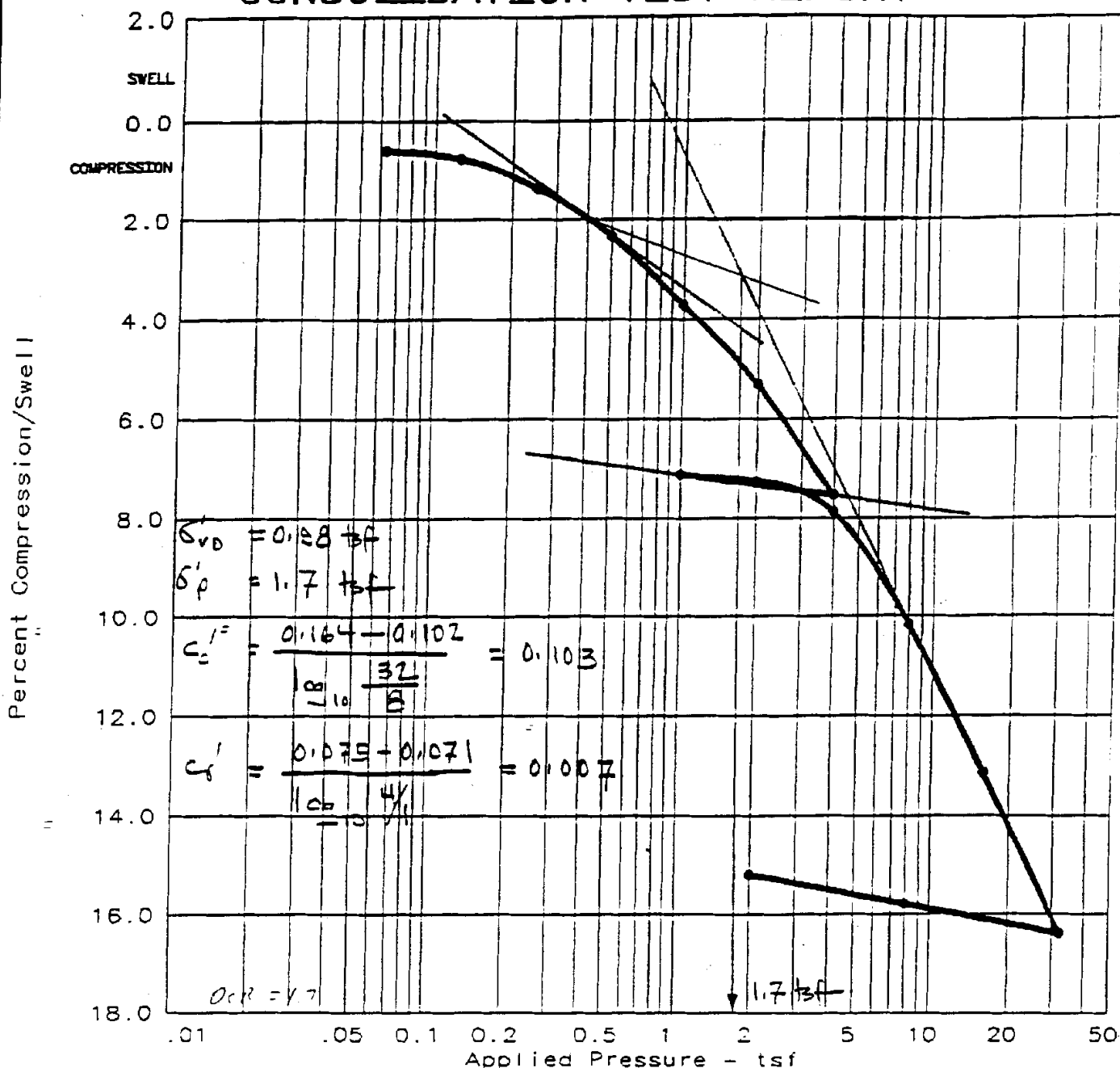
CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
	74.5 %	55.7	94	35		

TEST RESULTS	MATERIAL DESCRIPTION
Project No.: 95-67109-01/02 Project: Fountain Avenue Landfill Location: GBF-3/18-20 ft. Date: 5-14-96	Dark brown fat clay with trace shells Class: CH Remarks:
 Converse Consultants East	Fig. No. _____

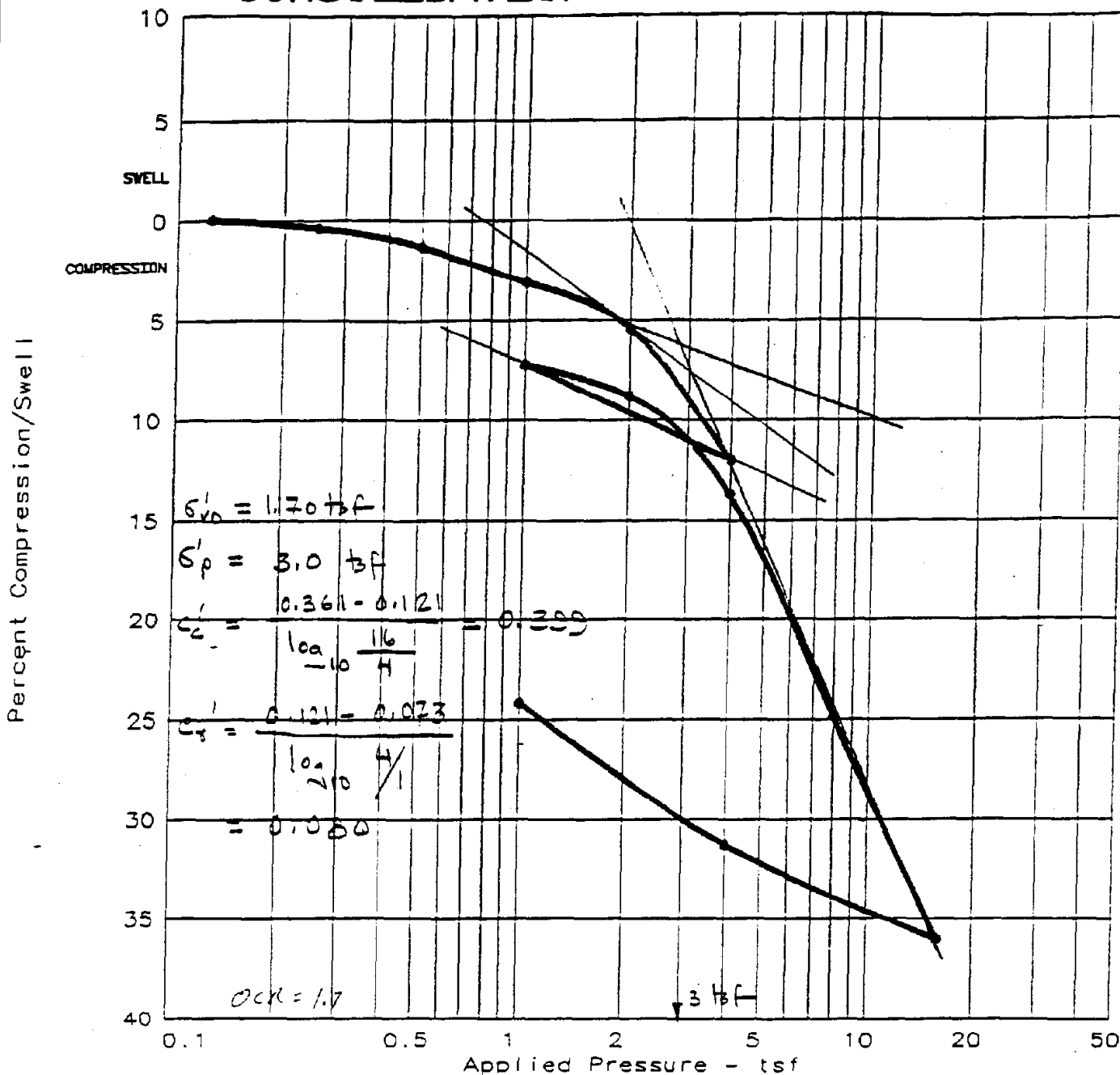
CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
	22.3 %	99.7	30	10		

TEST RESULTS			MATERIAL DESCRIPTION		
Project No.: 95-67109-01.02			Dark brown lean clay with sand		
Project: Fountain Avenue Landfill			Class: CL		
Location: GBF-9/97-99 ft.			Remarks:		
Date: 5-17-96					
 Converse Consultants East			Fig. No. _____		

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
	132.0 %	35.4	212	93		

TEST RESULTS

MATERIAL DESCRIPTION

Project No.: 95-67109-01/02
 Project: Fountain Avenue Landfill
 Location: GBP-9/ST-1/47-49 ft.

Date: 5-16-96



Converse Consultants East

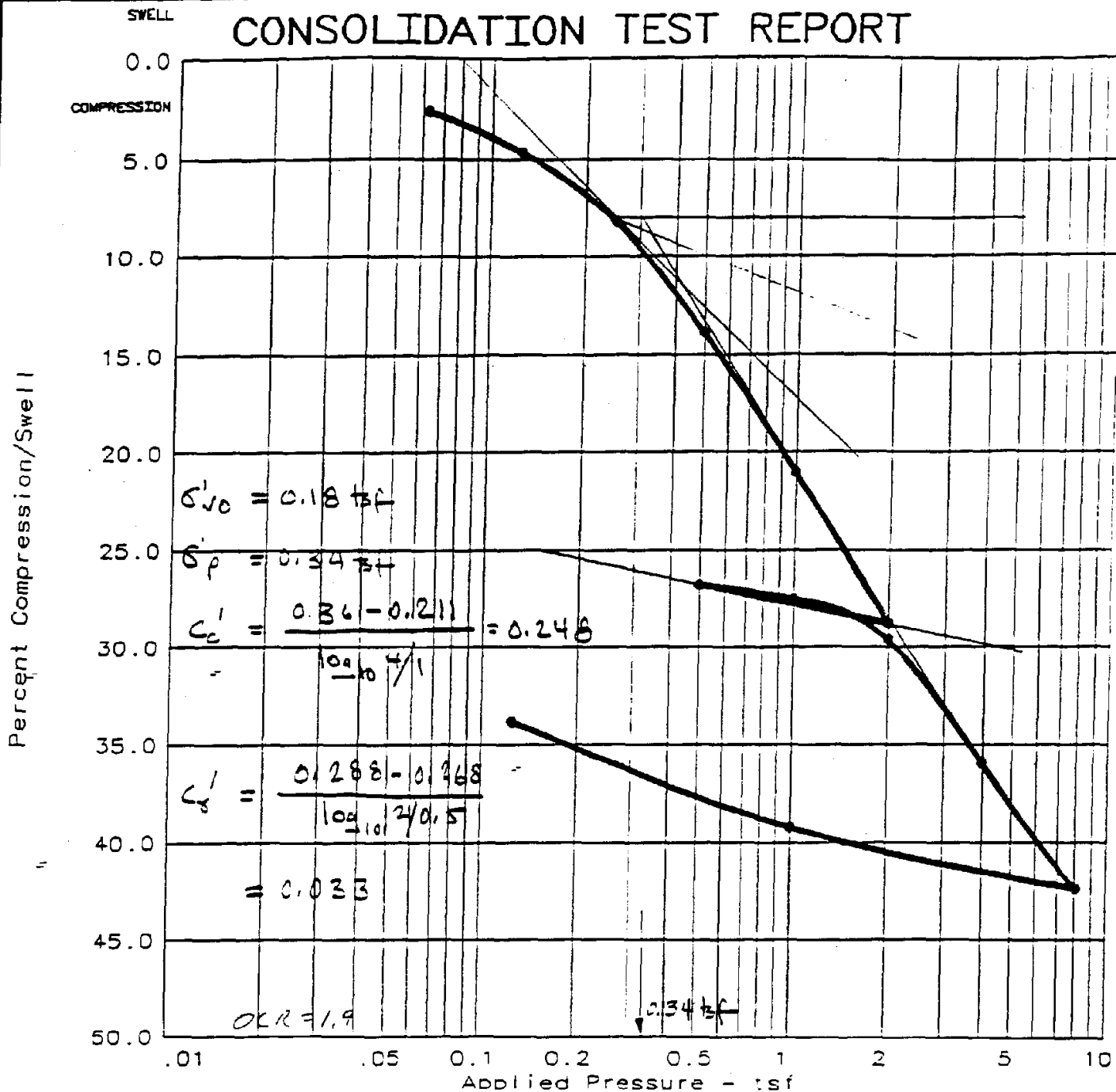
Dark brown organic silt with peat

Class: OH

Remarks:

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
	103.6 %	44.6	105	67		

TEST RESULTS

MATERIAL DESCRIPTION

Dark brown organic clay

Class: OH

Remarks:

Project No.: 95-67109-01/02
Project: Fountain Avenue Landfill
Location: SBP-2/7-9 ft.

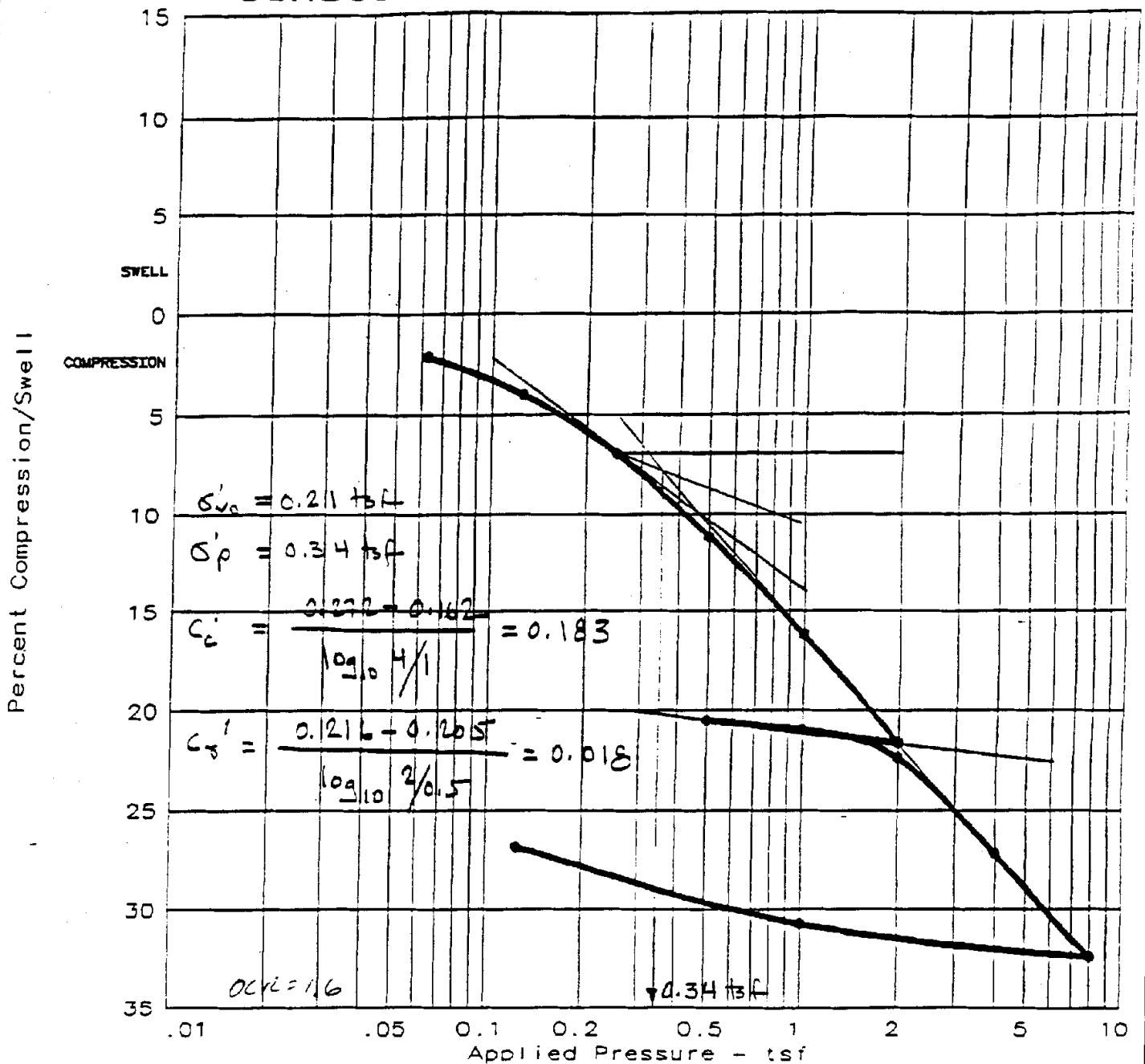
Date: 6-3-96



Converse Consultants East

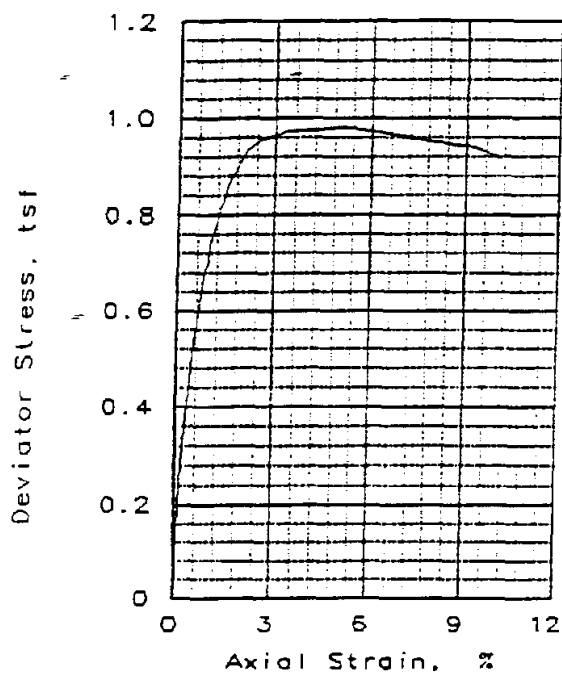
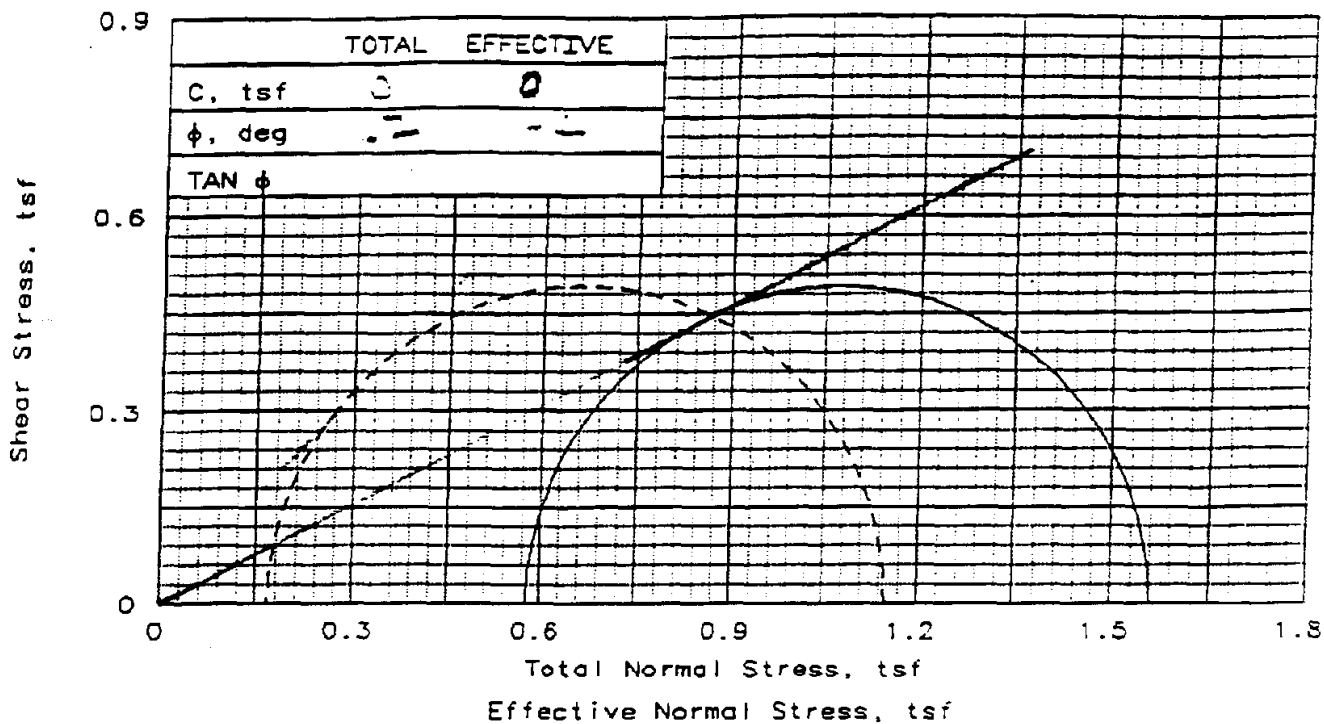
Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
	49.2 %	69.2	111	64		

TEST RESULTS	MATERIAL DESCRIPTION
Project No.: 95-67109-01/02 Project: Fountain Avenue Landfill Location: SBP-3/8-10 ft. Date: 6/3/96	Dark brown organic silt with sand Class: OH Remarks:
 Converse Consultants East	File No. _____



SAMPLE NO.: 1	
INITIAL	WATER CONTENT, % 67.9
	DRY DENSITY, pcf 58.0
	SATURATION, %
	VOID RATIO
	DIAMETER, in 2.86
AT TEST	HEIGHT, in 5.98
	WATER CONTENT, % 65.0
	DRY DENSITY, pcf 59.8
	SATURATION, % 96.5
	VOID RATIO 1.818
	DIAMETER, in 2.83
	HEIGHT, in 5.93
	Strain rate, in/min 0.0012
	BACK PRESSURE, tsf 6.95
	CELL PRESSURE, tsf 7.53
	FAILURE STRESS, tsf 0.98
	TOTAL PORE PR., tsf 7.36
	ULTIMATE STRESS, tsf
	TOTAL PORE PR., tsf
	$\bar{\sigma}_1$ FAILURE, tsf 1.15
	$\bar{\sigma}_3$ FAILURE, tsf 0.17

TYPE OF TEST:
CU with Pore Pressures

SAMPLE TYPE: CH

DESCRIPTION: Dark brown fat clay

LL= 82 PL= 34 PI= 48

ASSUMED SPECIFIC GRAVITY=

REMARKS:

CLIENT: URS

PROJECT: Fountain Avenue Landfill

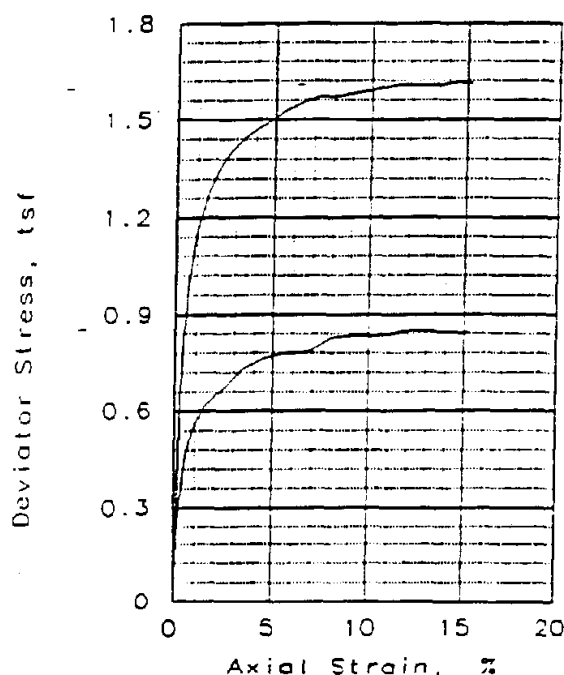
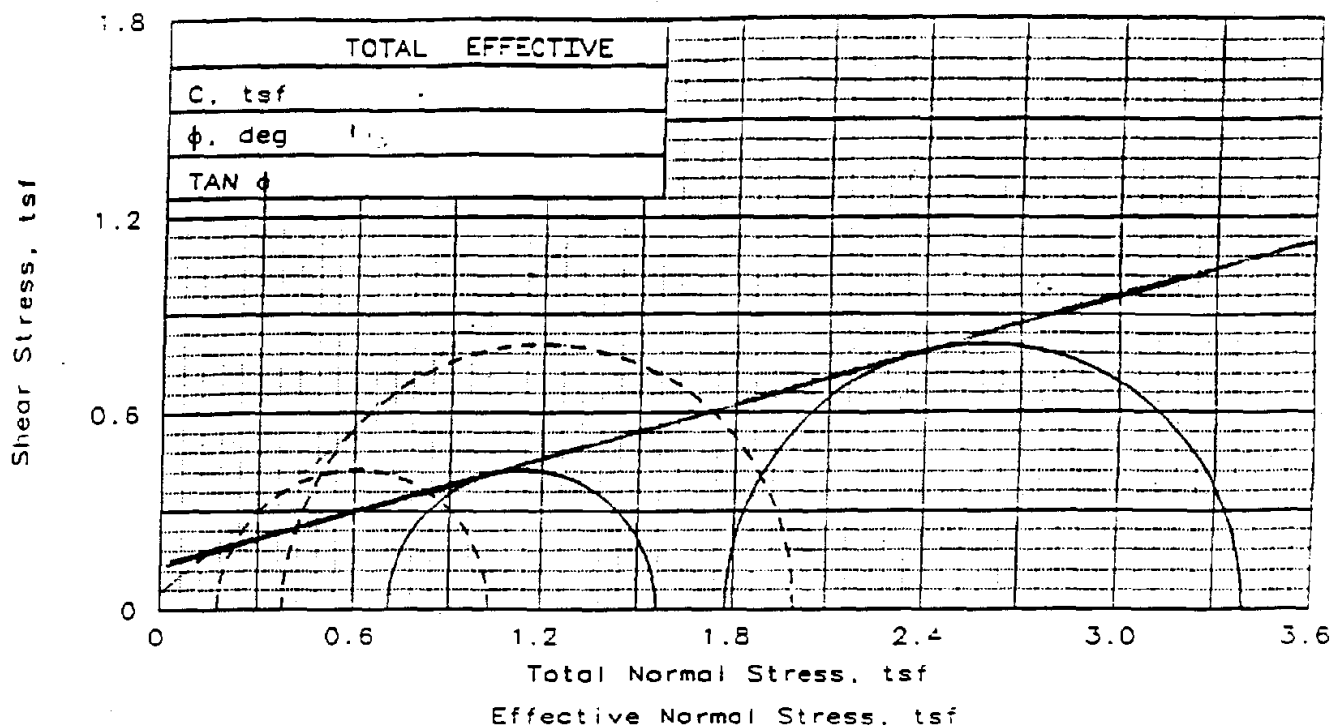
SAMPLE LOCATION: GBF-2/15-17 ft.

PROJ. NO.: 95-67109-01 DATE: 5/6/96



Converse Consultants East

Fig. No.: _____



SAMPLE NO.:		1	2
INITIAL	WATER CONTENT, %	72.5	61.3
	DRY DENSITY, pcf	55.3	59.0
	SATURATION, %		
	VOID RATIO		
	DIAMETER, in	2.88	2.86
	HEIGHT, in	5.98	6.02
AT TEST	WATER CONTENT, %	47.6	52.1
	DRY DENSITY, pcf	69.0	67.0
	SATURATION, %	97.4	101.0
	VOID RATIO	1.172	1.237
	DIAMETER, in	2.68	2.74
	HEIGHT, in	5.53	5.76
Strain rate, in/min		0.00200	0.0020
BACK PRESSURE, tsf		5.90	5.89
CELL PRESSURE, tsf		7.67	6.60
FAILURE STRESS, tsf		1.62	0.85
TOTAL PORE PR., tsf		7.29	6.42
ULTIMATE STRESS, tsf			
TOTAL PORE PR., tsf			
$\bar{\sigma}_1$ FAILURE, tsf		1.99	1.03
$\bar{\sigma}_3$ FAILURE, tsf		0.38	0.18

TYPE OF TEST:

CU with Pore Pressures

SAMPLE TYPE: CH

DESCRIPTION: Dark brown fat
clay

ASSUMED SPECIFIC GRAVITY=

REMARKS:

CLIENT: URS

PROJECT: Fountain Avenue Landfill

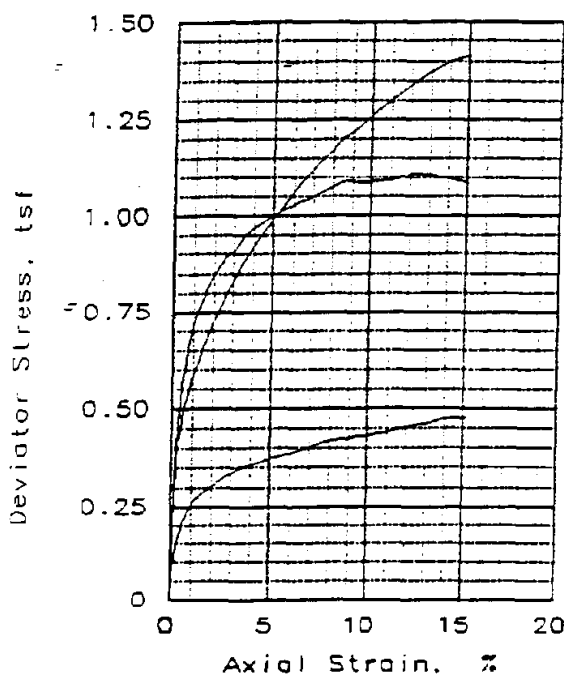
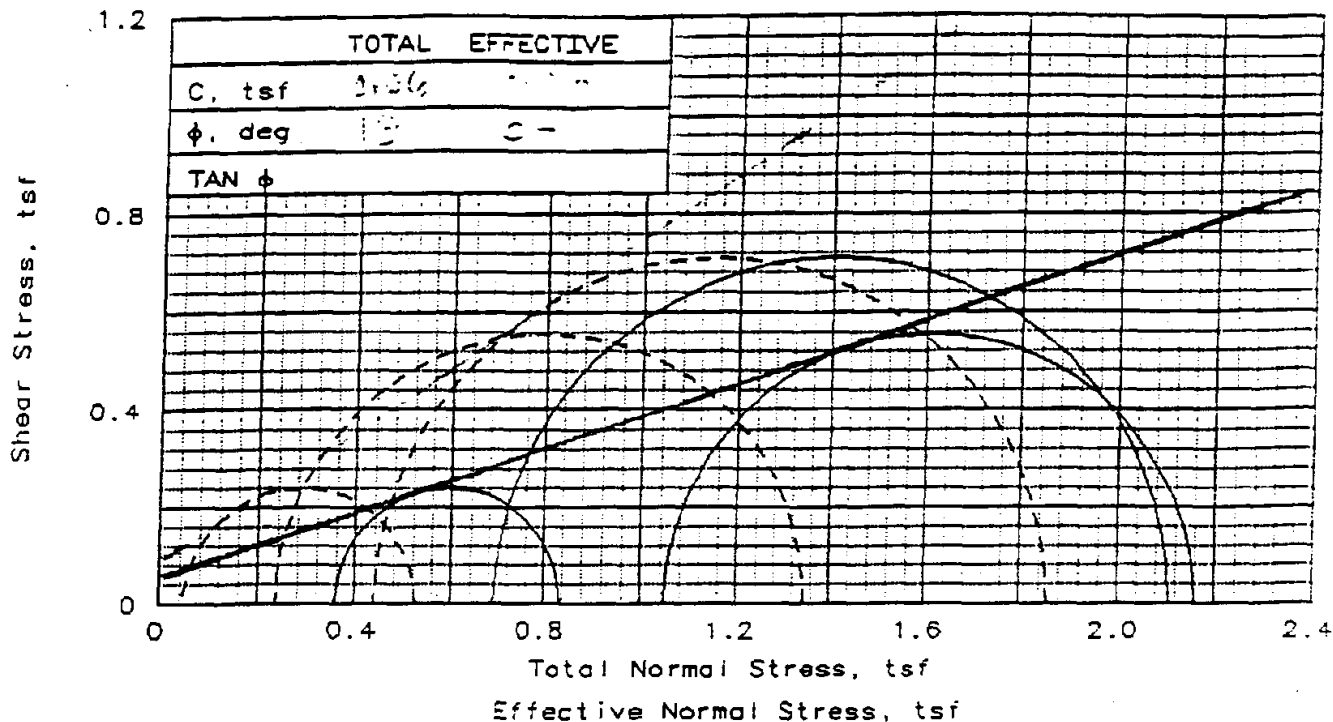
SAMPLE LOCATION: SBF-2/10-12 ft.

PROJ. NO.: 95-67109-01 DATE: 5-13-96



Converse Consultants East

Fig. No.: _____



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	89.7	59.7	40.8
	DRY DENSITY, pcf	48.7	63.3	86.5
	SATURATION, %			
	VOID RATIO			
	DIAMETER, in	2.84	2.84	2.83
	HEIGHT, in	5.99	5.99	5.90
AT TEST	WATER CONTENT, %	72.7	43.9	36.7
	DRY DENSITY, pcf	54.6	72.5	88.5
	SATURATION, %	95.8	95.2	102.7
	VOID RATIO	1.973	1.154	1.026
	DIAMETER, in	2.73	2.71	2.80
	HEIGHT, in	5.75	5.74	5.88
Strain rate, in/min		0.00200	0.00200	0.0020
BACK PRESSURE, tsf		5.88	5.82	6.56
CELL PRESSURE, tsf		6.24	6.88	7.25
FAILURE STRESS, tsf		0.48	1.11	1.42
TOTAL PORE PR., tsf		6.18	6.64	6.81
ULTIMATE STRESS, tsf				
TOTAL PORE PR., tsf				
$\bar{\sigma}_1$ FAILURE, tsf		0.53	1.35	1.86
$\bar{\sigma}_3$ FAILURE, tsf		0.05	0.24	0.44

TYPE OF TEST:

CU with Pore Pressures

SAMPLE TYPE:

DESCRIPTION: D.brown lean clay

LL= 29 PL= 24 PI= 5

ASSUMED SPECIFIC GRAVITY=

REMARKS:

CLIENT: URS

PROJECT: Fountain Avenue Landfill

SAMPLE LOCATION: SBP-4/7-9 ft.

PROJ. NO.: 95-67109-01/02

DATE: 5-16-96



Converse Consultants East

Fig. No.: _____

PROJECT NUMBER: 95-67109-01/02

PROJECT: Fountain Ave. / Pennsylvania Ave. Landfill

CLIENT: URS Consultants Inc.

CONVERSE CONSULTANTS EAST

BORING & SAMPLE NUMBER	DEPTH (FT)	CLASSIFICATION	NATURAL WATER CONTENT (%)	ATTERBERG LIMITS		UNCONFINED COMPRESSION		UNIT DRY WEIGHT (PCF)	SIEVE ANALYSIS	HYDROMETER	CONSOLIDATION	TRIAXIAL COMPRESSION	SPECIFIC GRAVITY	ORGANIC CONTENT (%)	SULPHATE CONTENT (%)	CHLORIDE CONTENT (%)	pH
				LIQUID LIMIT	PLASTIC LIMIT	STRESS (TSF)	STRAIN (%)										
GBF-2	13-15	Dark brown fat clay (CH)	36.6 56.5 52.5	57	25	0.44	5.3	65.8 67.3			*						
GBF-3 S-6	15-17	Dark brown fat clay (CH)	66.1 67.9	82	34			58.0				*					
	12-14 18-20	Gray poorly graded sand (SP) Dark brown fat clay (CH)	77.1 74.5 74.5	94	39	0.35	12.8	56.1 55.7	*		*						
GBF-9	97-99	Dark brown lean clay with sand (CL)	19.9 22.3	30	20			99.7			*						
CBP-2 S-7	12-14	Gray poorly graded sand (SP)															
GBP-4 S-11	20-22	Gray to gray-brown poorly graded sand (SP)							*								
GBP-9	47-49	Dark brown organic silt with peat (OH)	121.3 132.0	212	119				*								
SBF-2	10-12	Dark brown fat clay (CH)	72.5 61.3					35.4 55.3 59.0			*	*	*				
SBF-4 S-3	4-6 8-10	Gray poorly graded sand (SP) Dark brown organic clay with peat (OH)	187.5	236	68				*								
SBF-7	6-8	Dark brown lean clay (CL) Dark brown organic clay with peat and sand (OH)	41.0 109.6	48	25	0.24	7.4	39.5									
SBP-2	7-9	Dark brown organic clay (OH)	96.2 103.6	105	38						*						
SBP-3 S-3	4-6 8-10	Dark gray poorly graded sand (SP) Dark brown organic silt with sand (OH)	55.0 49.2	111	47			44.6	*		*						

* SEE TEST CURVES

9567109.dcl

SUMMARY OF LABORATORY TESTS

PROJECT NUMBER: 95-67109-01/02

PROJECT: Fountain Ave. / Pennsylvania Ave. Landfill

CONVERSE CONSULTANTS EAST

CLIENT: URS Consultants Inc.

BORING & SAMPLE NUMBER	DEPTH (FT)	CLASSIFICATION	NATURAL WATER CONTENT (%)	ATTERBERG LIMITS		UNCONFINED COMPRESSION		UNIT DRY WEIGHT (PCF)	SIEVE ANALYSIS	HYDROMETER	CONSOLIDATION	TRIAxIAL COMPRESSION	SPECIFIC GRAVITY	ORGANIC CONTENT (%)	SULPHATE CONTENT (%)	CHLORIDE CONTENT (%)	pH
				LIQUID LIMIT	PLASTIC LIMIT	STRESS (TSF)	STRAIN (%)										
GBP-4	7-9	Dark brown silt with sand (ML)	89.7 59.7 40.8	29	24			48.7 63.3 86.5				* * *					

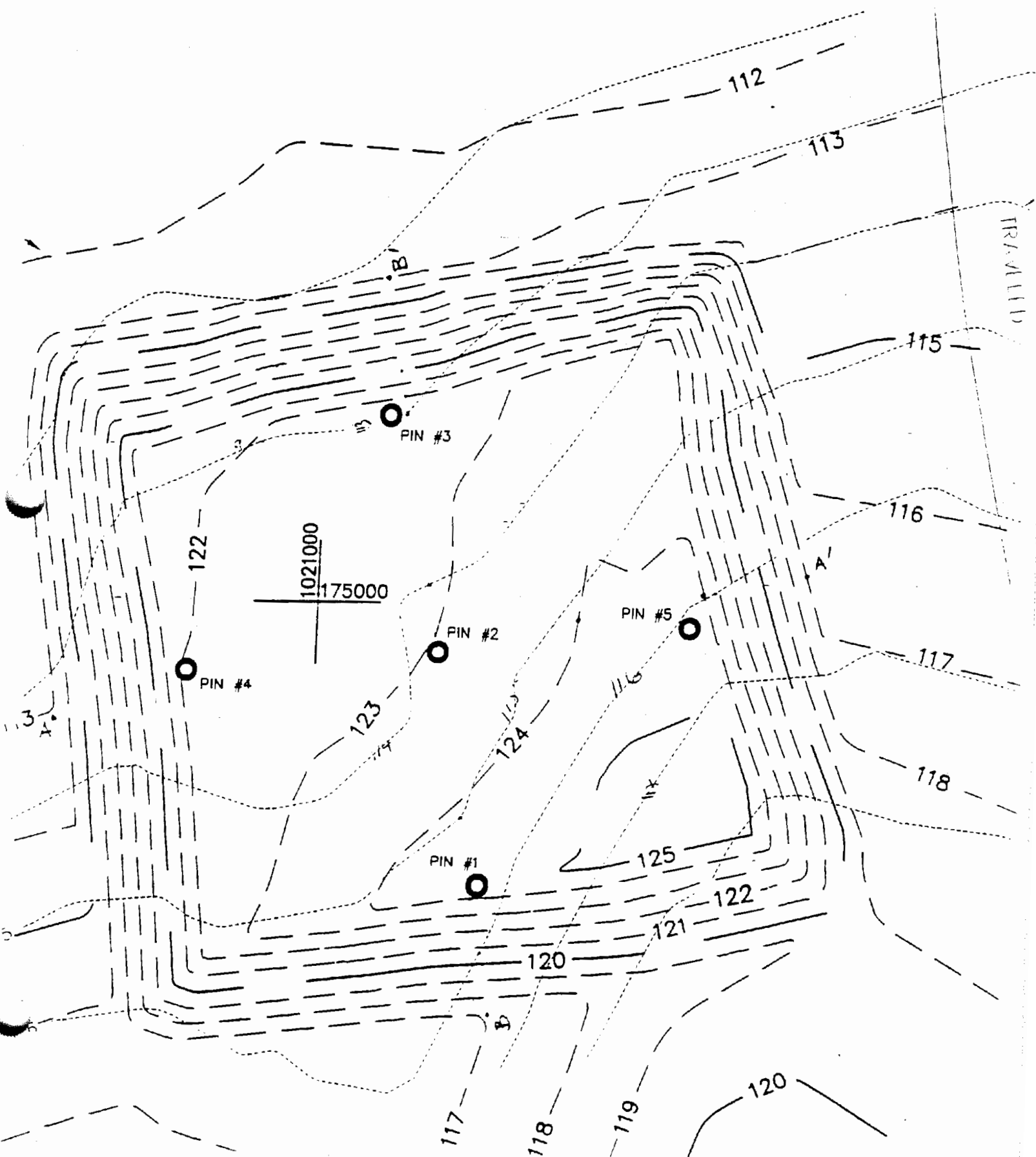
* SEE TEST CURVES

[9567109.dcl]



Appendix B

100



**FOUNTAIN AVENUE LANDFILL
BROOKLYN, NY
95-67109-01**

**TABLE NO.: B.1
SETTLEMENT PLATES DATA FOR FILL LOAD TEST**

DATE	ELAPSED TIME (days)	I.P. 1 (SOUTH)		I.P. 2 (CENTER)		I.P. 3 (NORTH)		I.P. 4 (WEST)		I.P. 5 (EAST)	
		REF. EL. (ft.)	SETTLE. (in.)	REF. EL. (ft.)	SETTLE. (in.)	REF. EL. (ft.)	SETTLE. (in.)	REF. EL. (ft.)	SETTLE. (in.)	REF. EL. (ft.)	SETTLE. (in.)
03/14/96	0	126.89	0.00	125.61	0.00	124.38	0.00	124.43	0.00	127.33	0.00
03/25/96	11	126.96	-0.84	125.57	0.48	124.40	-0.24	124.35	0.96	127.39	-0.72
03/26/96	12	126.97	-0.96	125.65	-0.48	124.44	-0.72	124.33	1.20	127.44	-1.32
03/27/96	13	127.04	-1.80	125.66	-0.60	124.49	-1.32	124.12	3.72	127.57	-2.88
03/28/96	14	126.99	-1.20	125.44	2.04	124.18	2.40	124.05	4.56	127.38	-0.60
03/29/96	15	126.93	-0.48	125.12	5.88	123.96	5.04	123.54	10.68	127.28	0.60
04/01/96	18	126.67	2.64	124.78	9.96	123.74	7.68	123.24	14.28	127.11	2.64
04/02/96	19	126.50	4.68	124.75	10.32	123.76	7.44	123.24	14.28	127.08	3.00
04/03/96	20	126.24	7.80	124.51	13.20	123.55	9.96	123.02	16.92	126.86	5.64
04/04/96	21	126.32	6.84	124.58	12.36	123.63	9.00	123.10	15.96	126.93	4.80
04/05/96	22	126.34	6.60	124.59	12.24	123.66	8.64	123.12	15.72	126.97	4.32
04/08/96	25	126.25	7.68	124.50	13.32	123.58	9.60	123.03	16.80	126.90	5.16
04/10/96	27	126.25	7.68	124.49	13.44	123.59	9.48	123.02	16.92	126.91	5.04
04/12/96	29	126.17	8.64	124.42	14.28	123.52	10.32	122.95	17.76	126.84	5.88
04/16/96	33	126.18	8.52	124.40	14.52	123.54	10.08	122.97	17.52	126.86	5.64
04/18/96	35	126.15	8.88	124.35	15.12	123.50	10.56	122.93	18.00	126.84	5.88
04/24/96	41	126.08	9.72	124.28	15.96	123.43	11.40	122.85	18.96	126.78	6.60
04/26/96	43	126.01	10.56	124.21	16.80	123.37	12.12	122.78	19.80	126.71	7.44
05/01/96	48	126.00	10.68	124.20	16.92	123.37	12.12	122.76	20.04	126.71	7.44
05/11/96	58	125.82	12.84	124.00	19.32	123.18	14.40	122.57	22.32	126.53	9.60
05/15/96	62	125.88	12.12	124.06	18.60	123.25	13.56	122.63	21.60	126.60	8.76
05/22/96	69	125.85	12.48	124.02	19.08	123.21	14.04	122.59	22.08	126.57	9.12
05/30/96	77	125.78	13.32	123.95	19.92	123.15	14.76	122.51	23.04	126.52	9.72

CONVERSE CONSULTANTS EAST

FOUNTAIN AVENUE LANDFILL
BROOKLYN, NY
PROJECT NO. 95-67109-01

SETTLEMENT PLATE I.P.-1

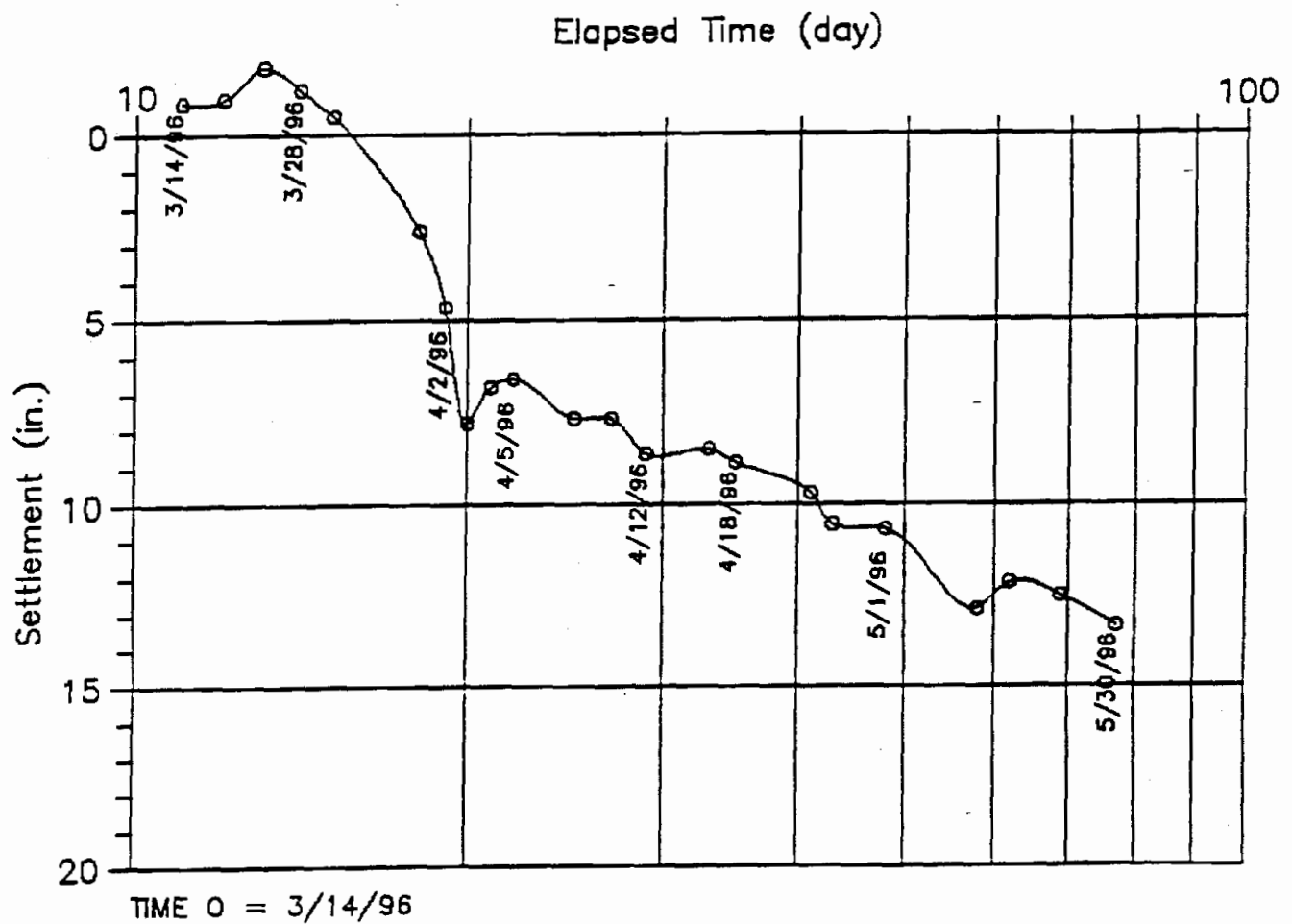


FIGURE NO. IP-1

CONVERSE CONSULTANTS EAST

FOUNTAIN AVENUE LANDFILL
BROOKLYN, NY
PROJECT NO. 95-67109-01

SETTLEMENT PLATE I.P.-2

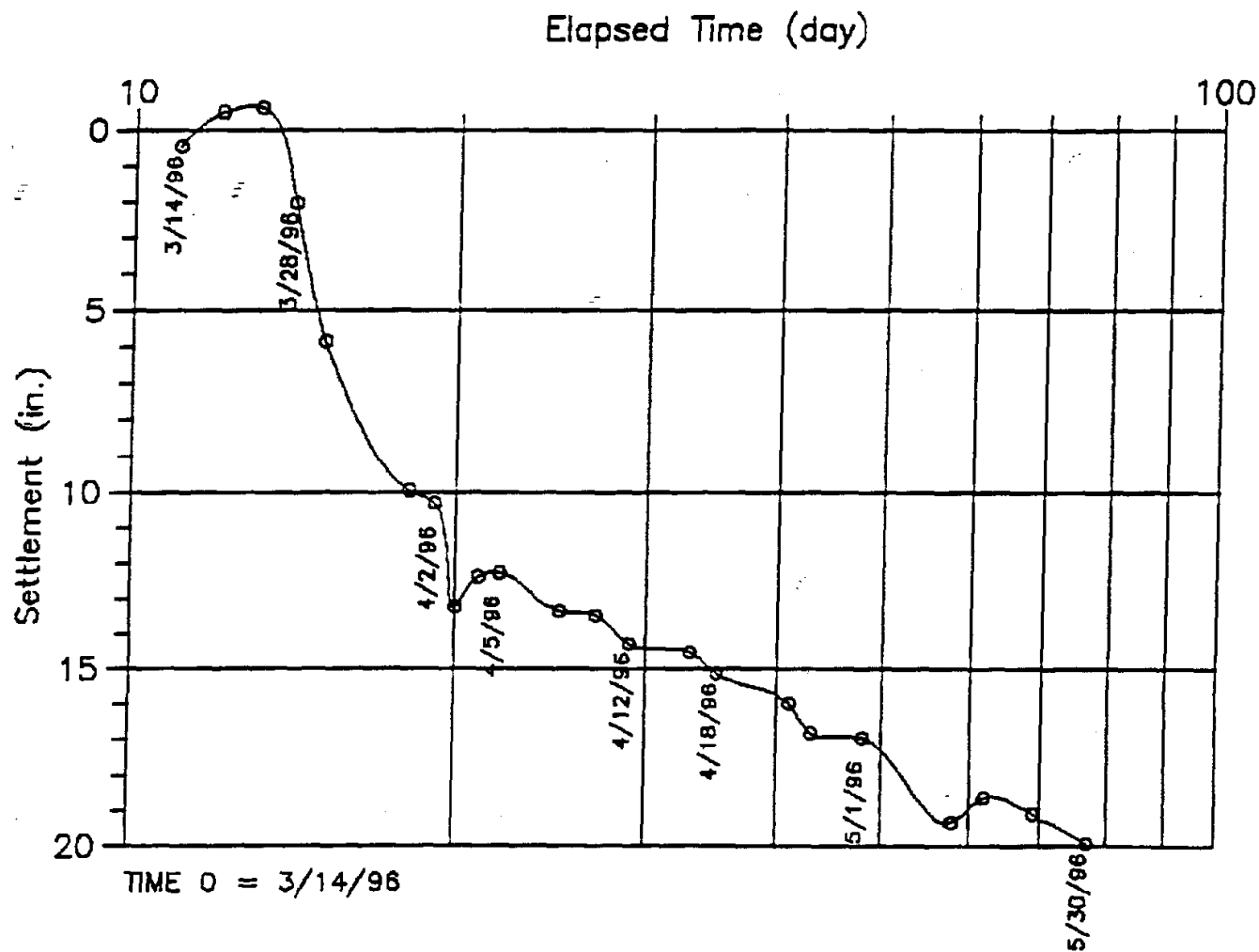


FIGURE NO. IP-2

CONVERSE CONSULTANTS EAST

FOUNTAIN AVENUE LANDFILL
BROOKLYN, NY
PROJECT NO. 95-67109-01

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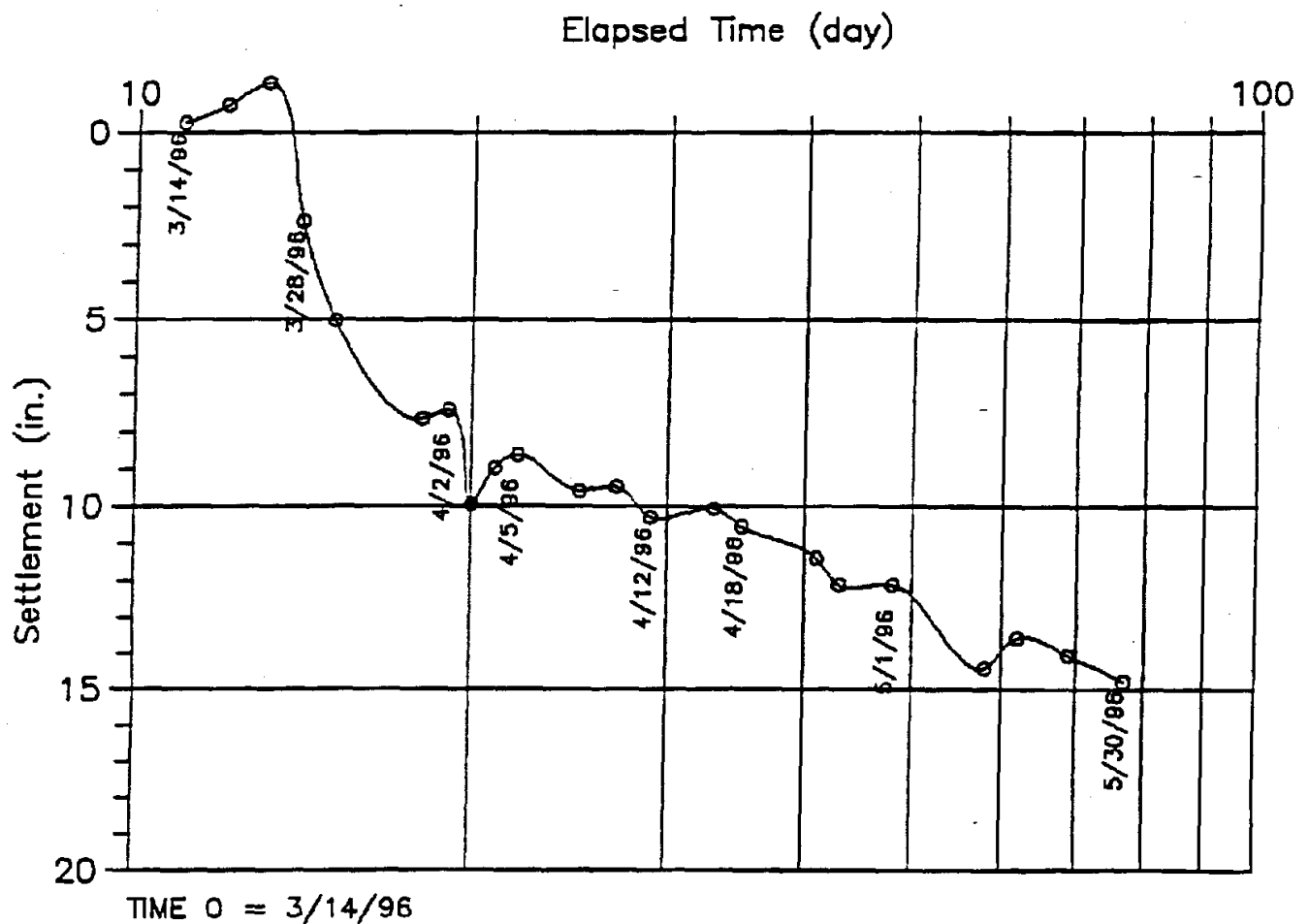


FIGURE NO. IP-3

CONVERSE CONSULTANTS EAST

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BROOKLYN, NY
PROJECT NO. 95-67109-01

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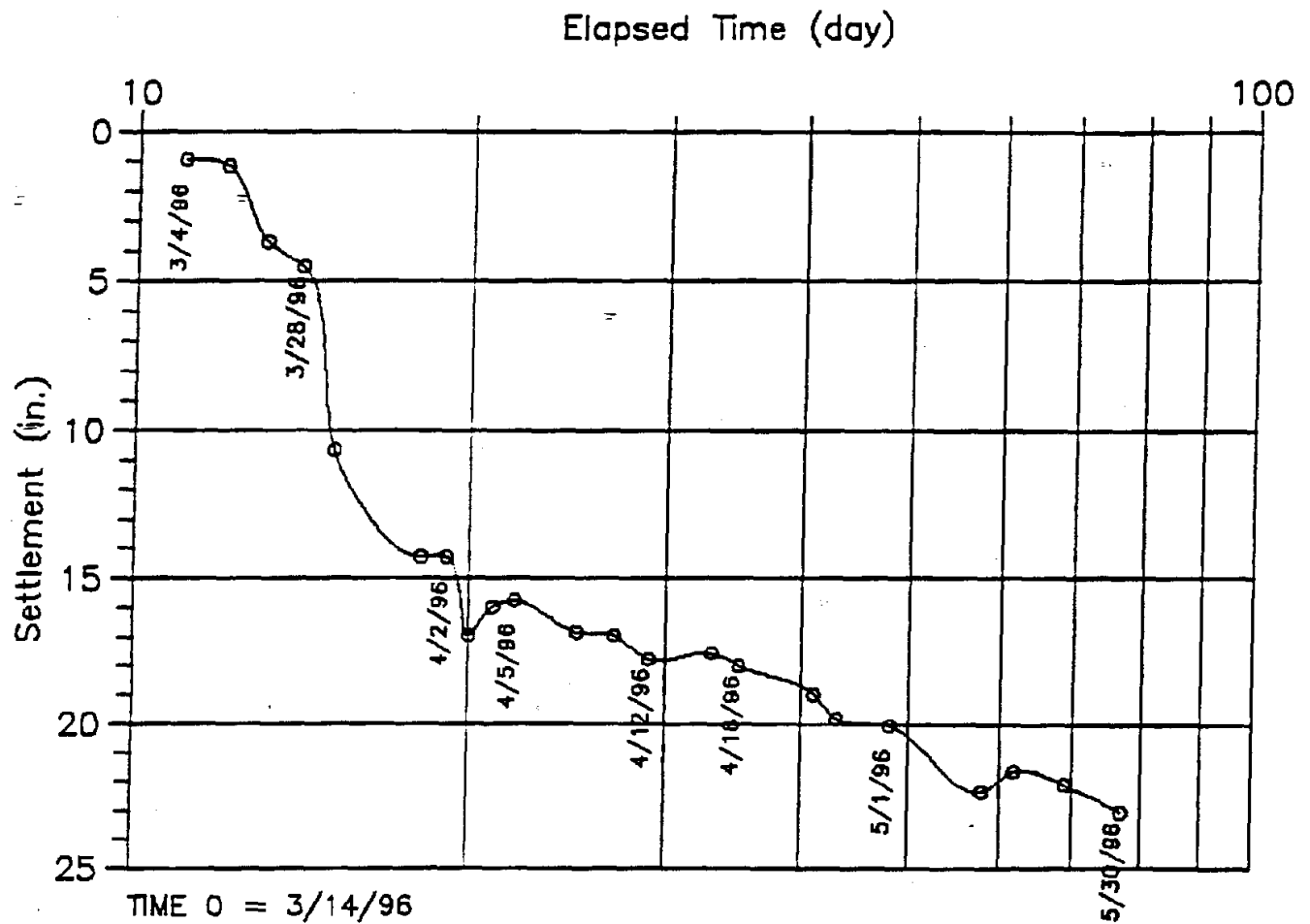


FIGURE NO. IP-4

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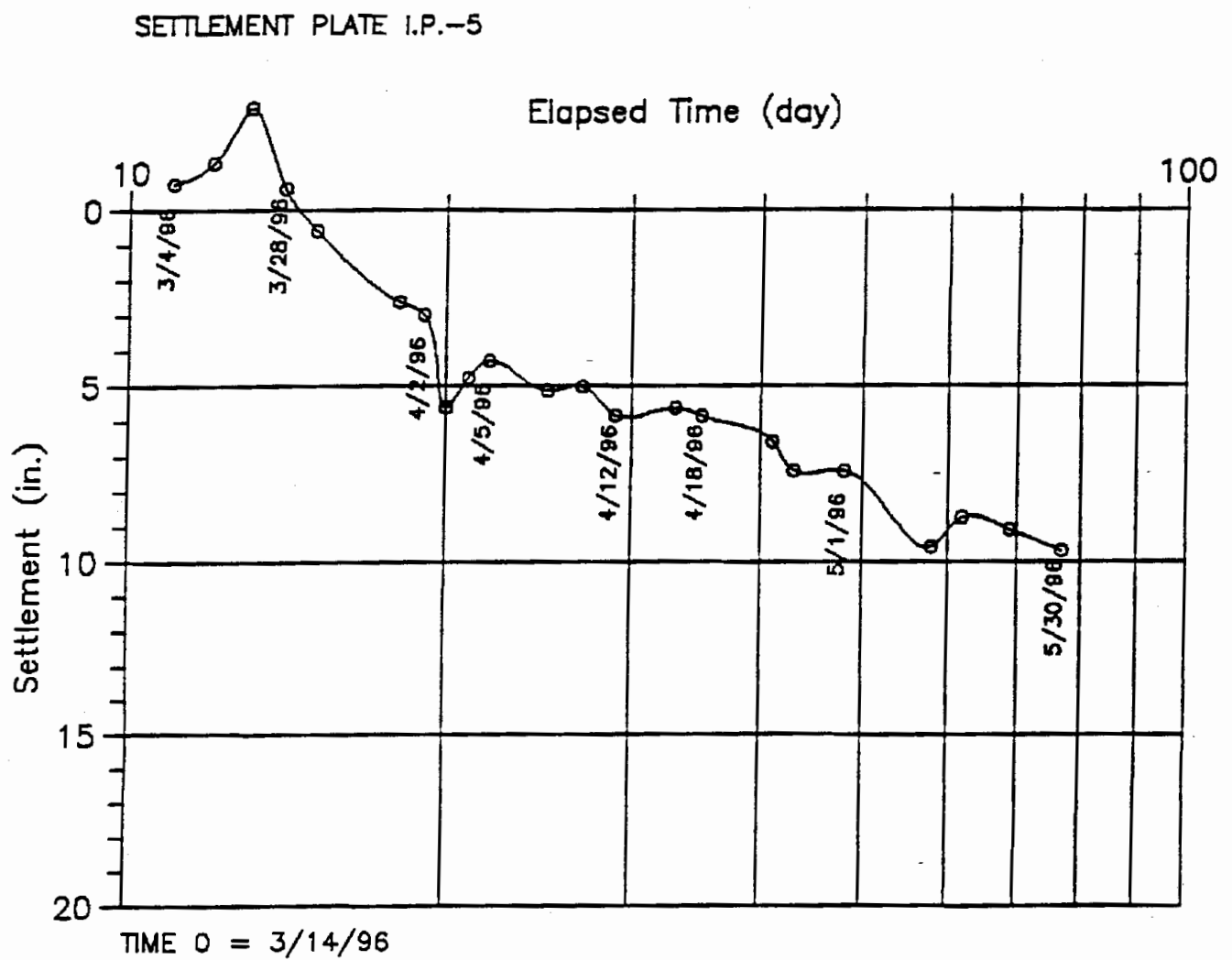
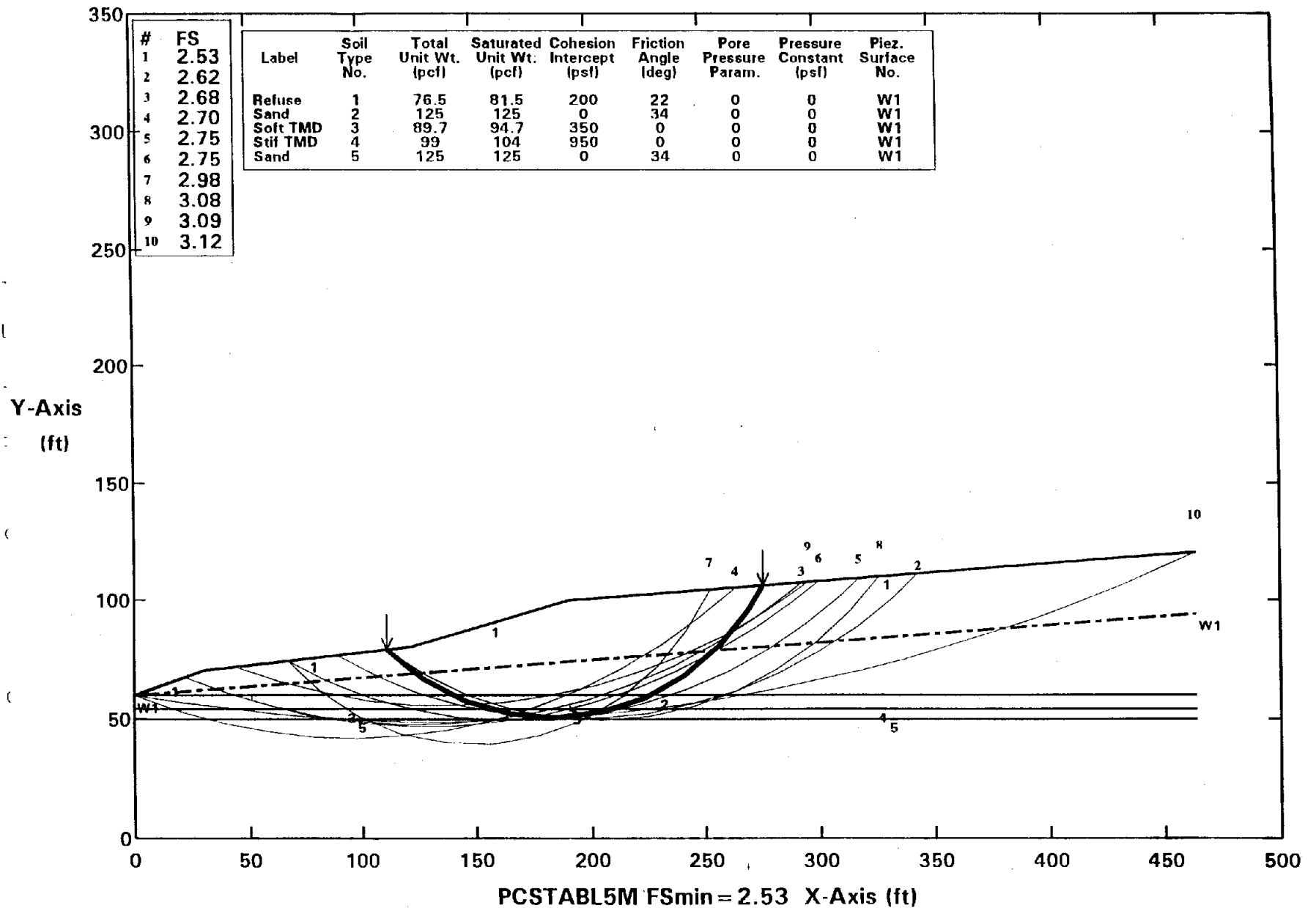
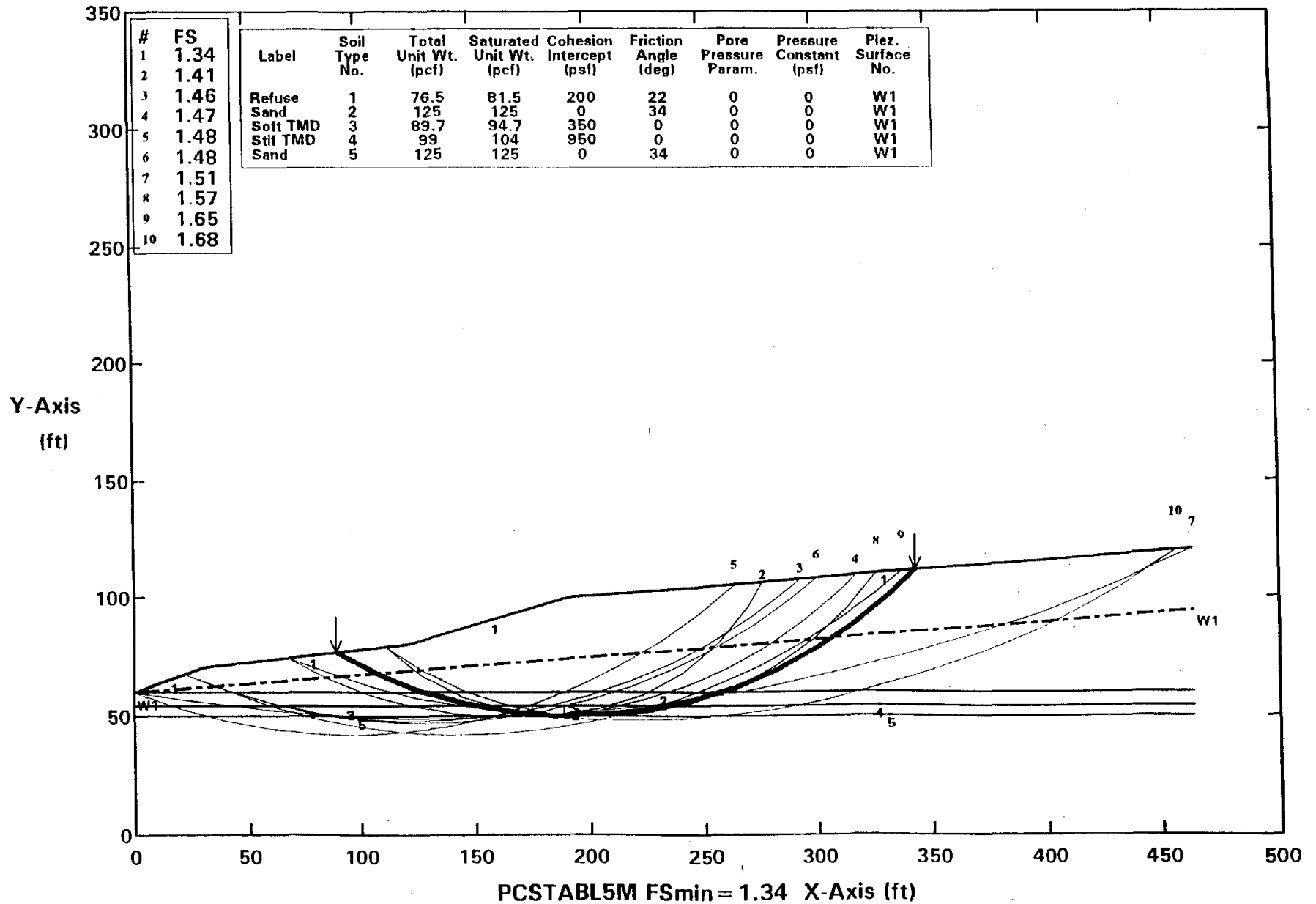


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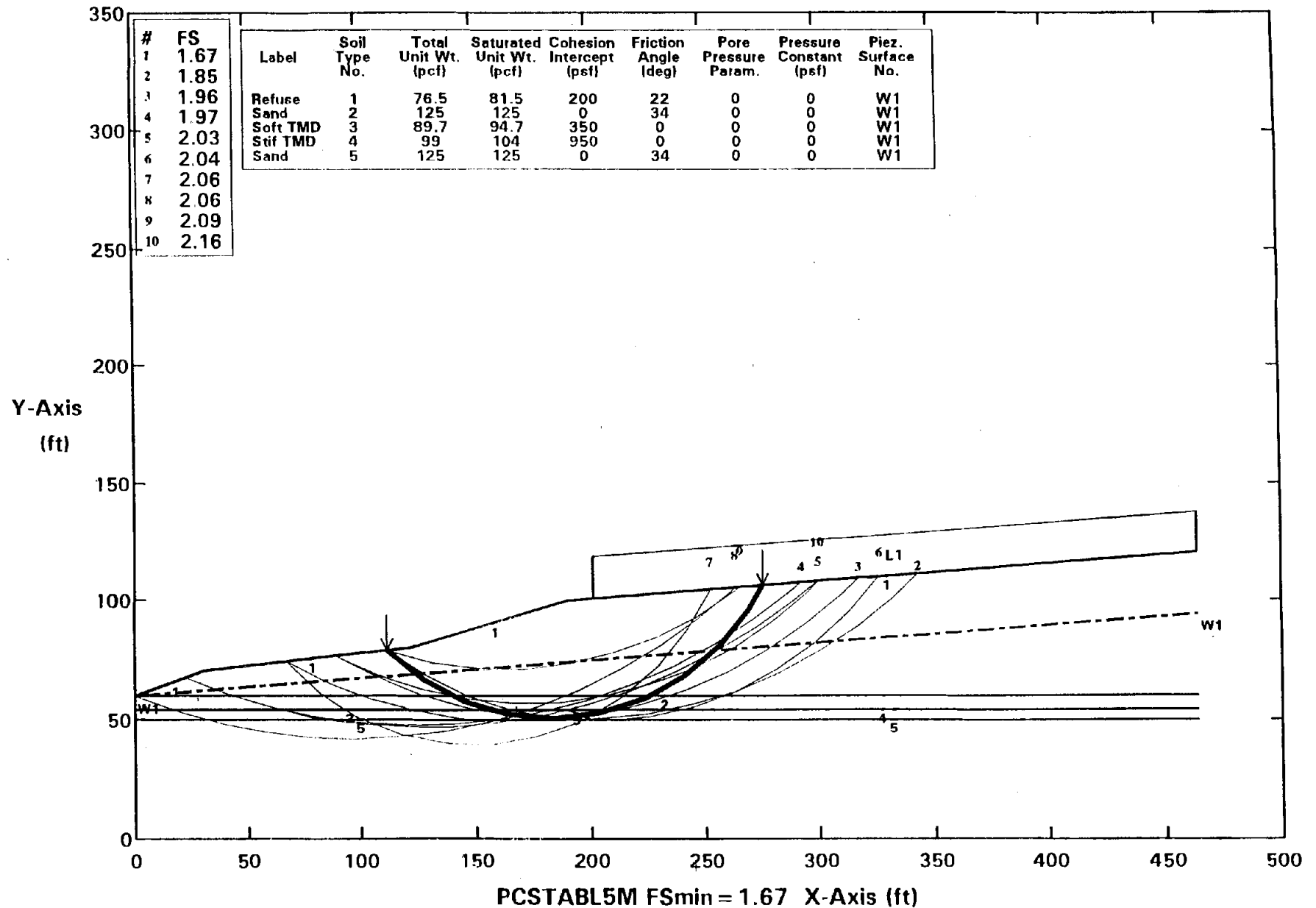
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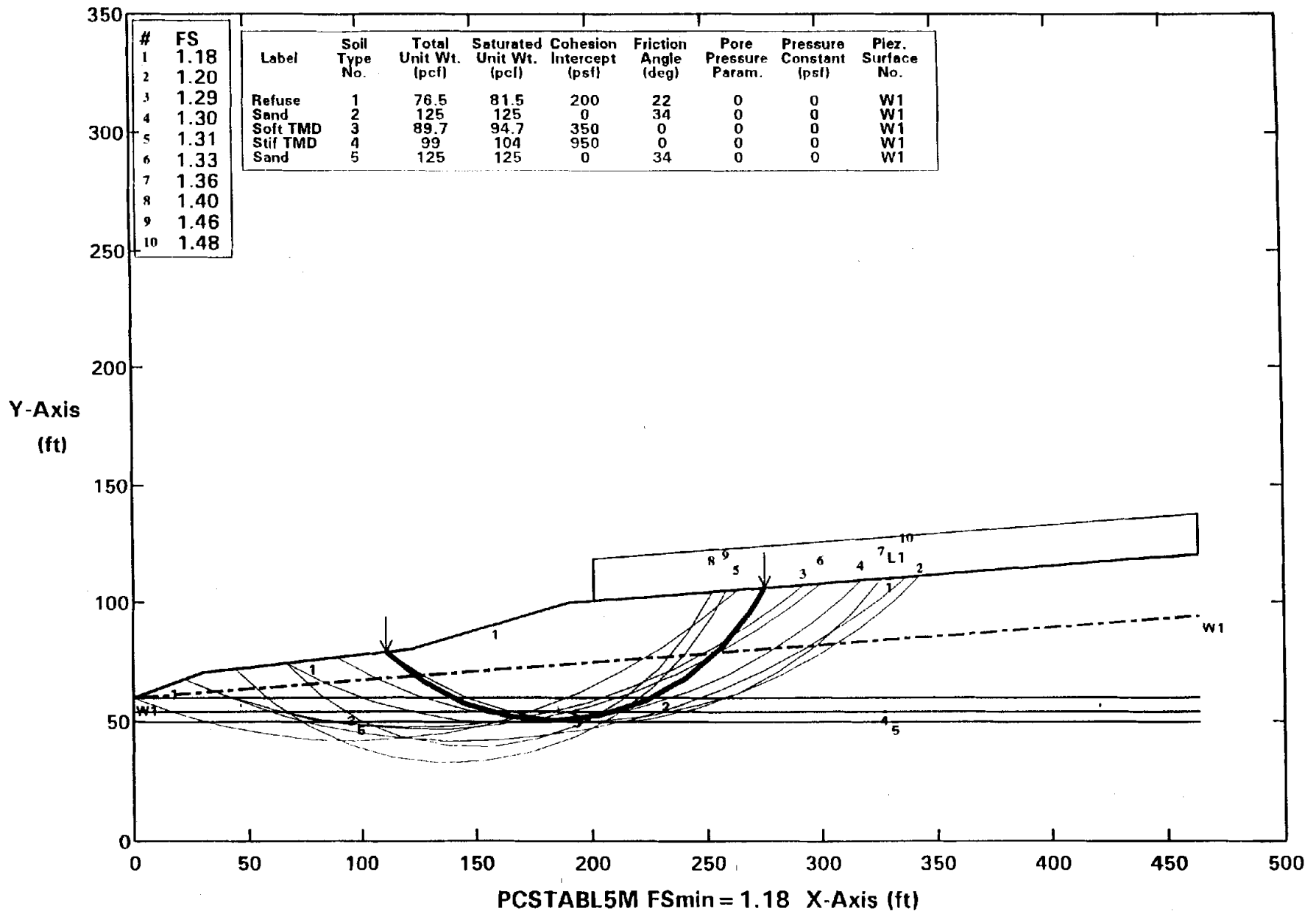
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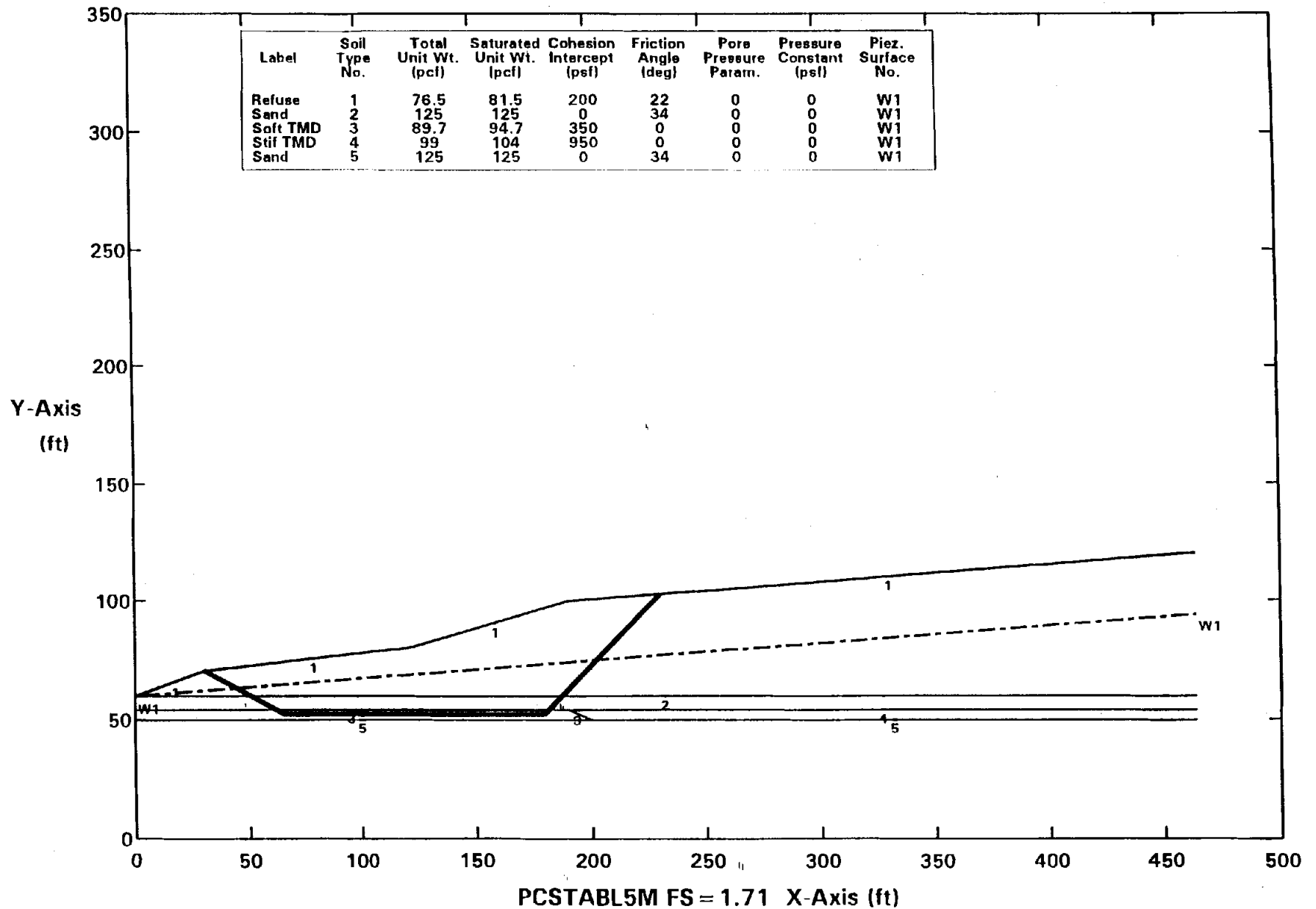
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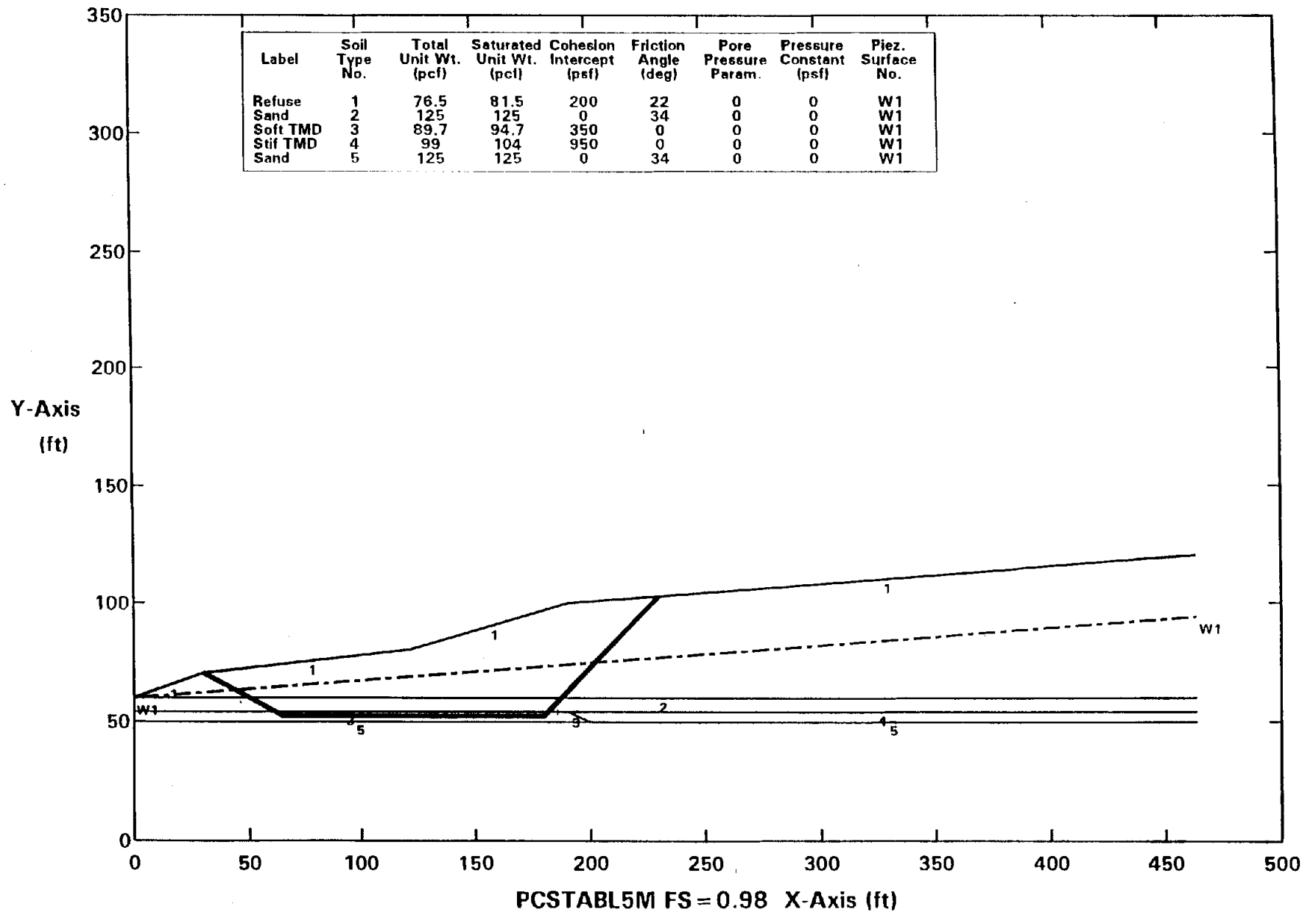
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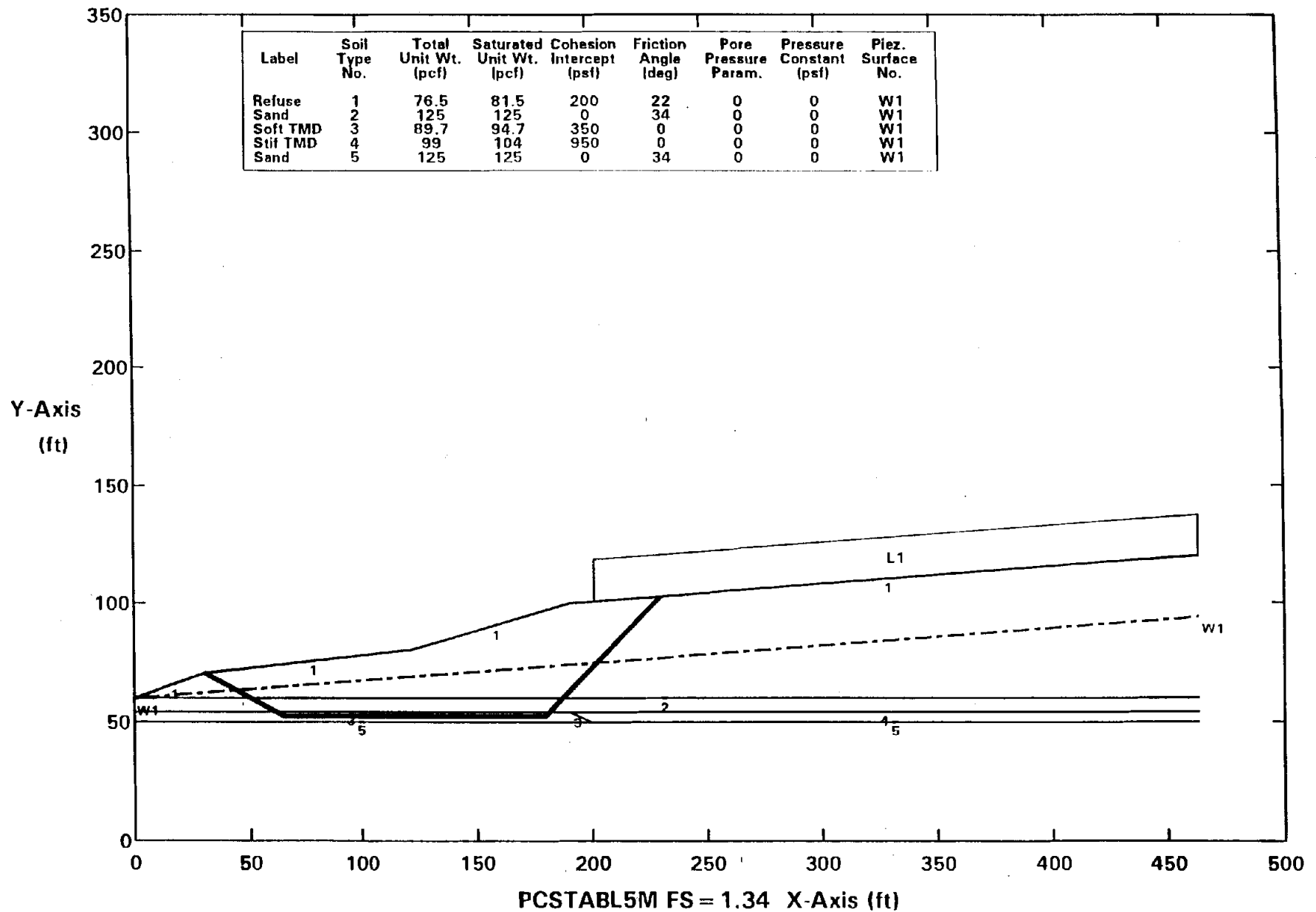
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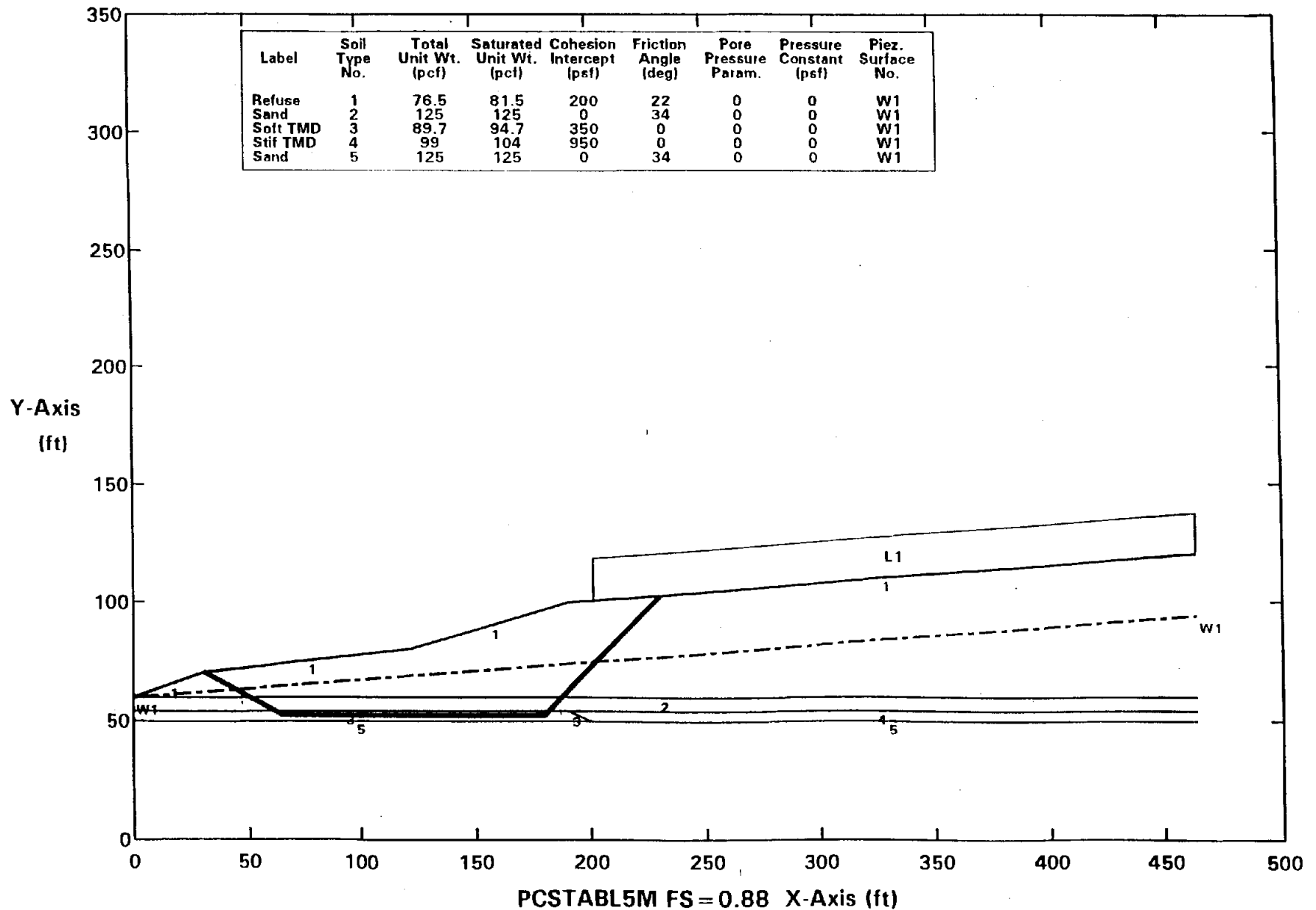
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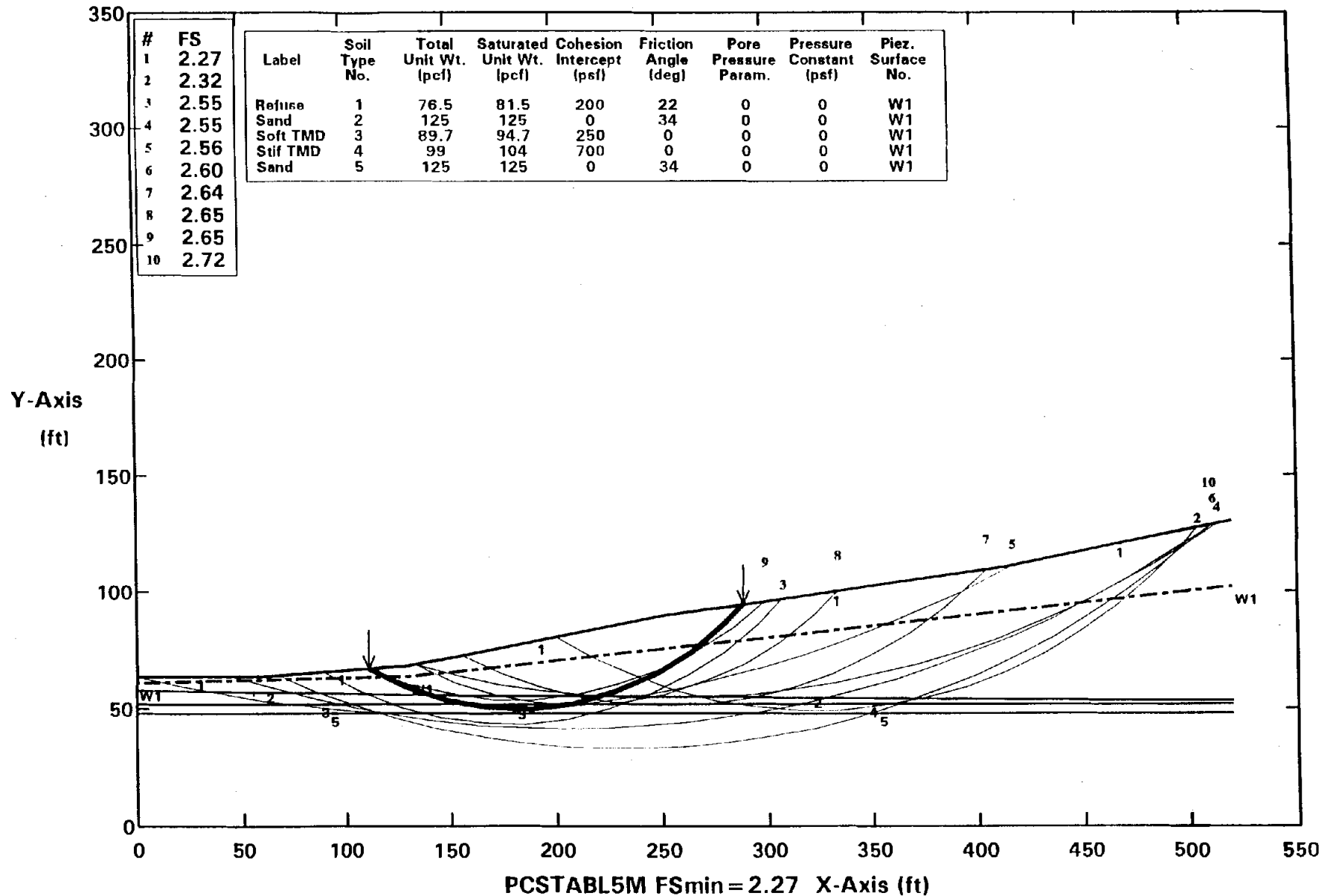


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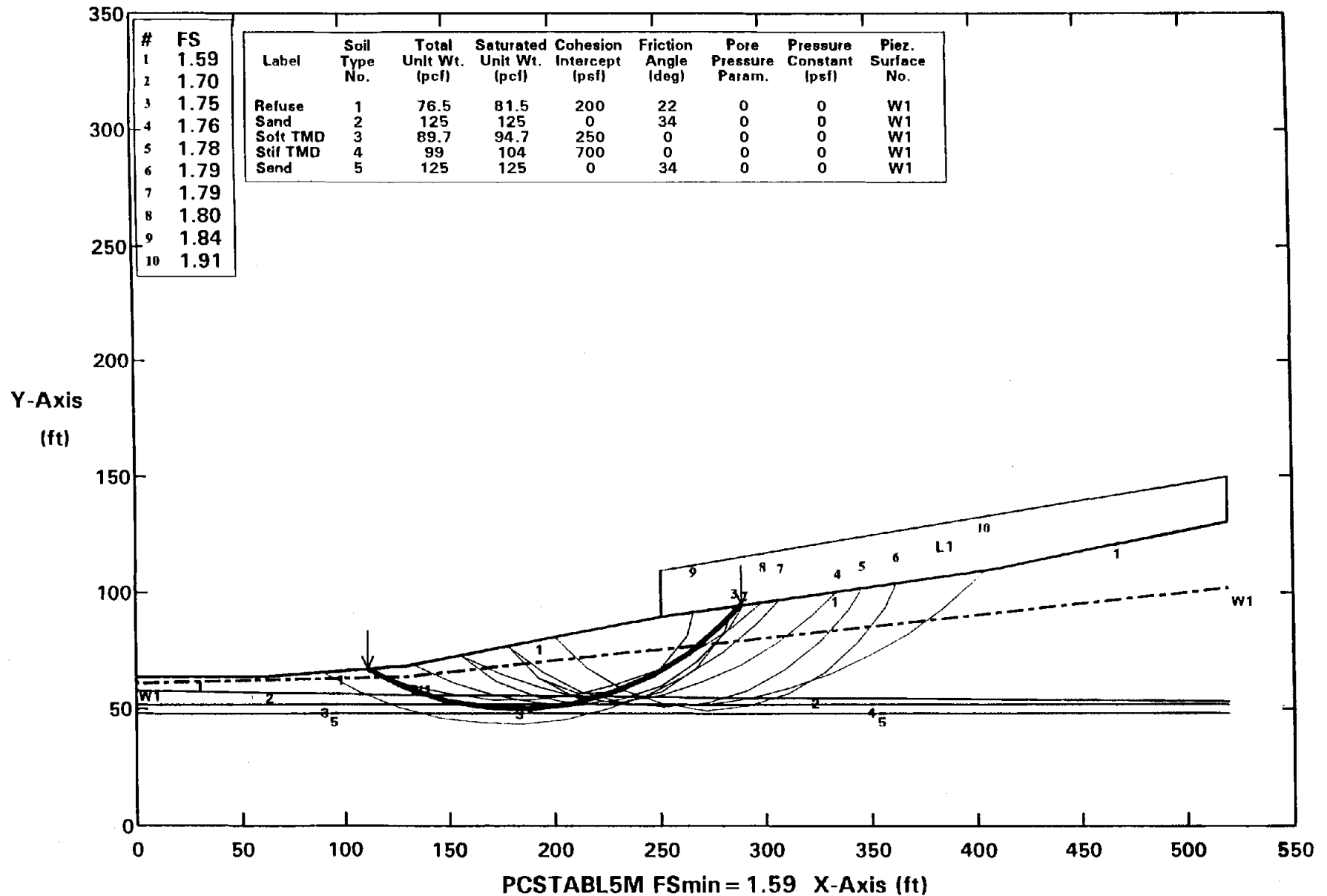
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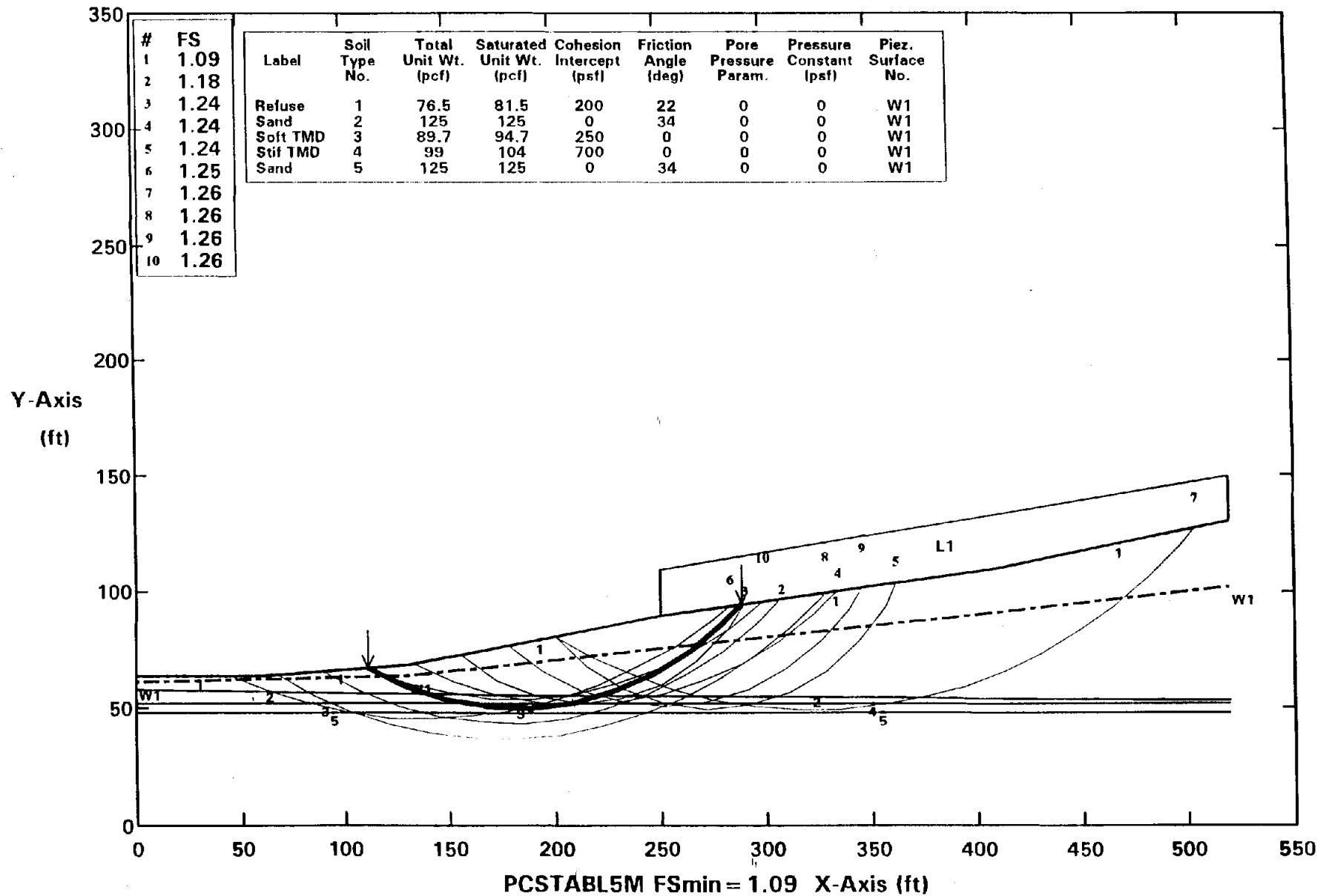
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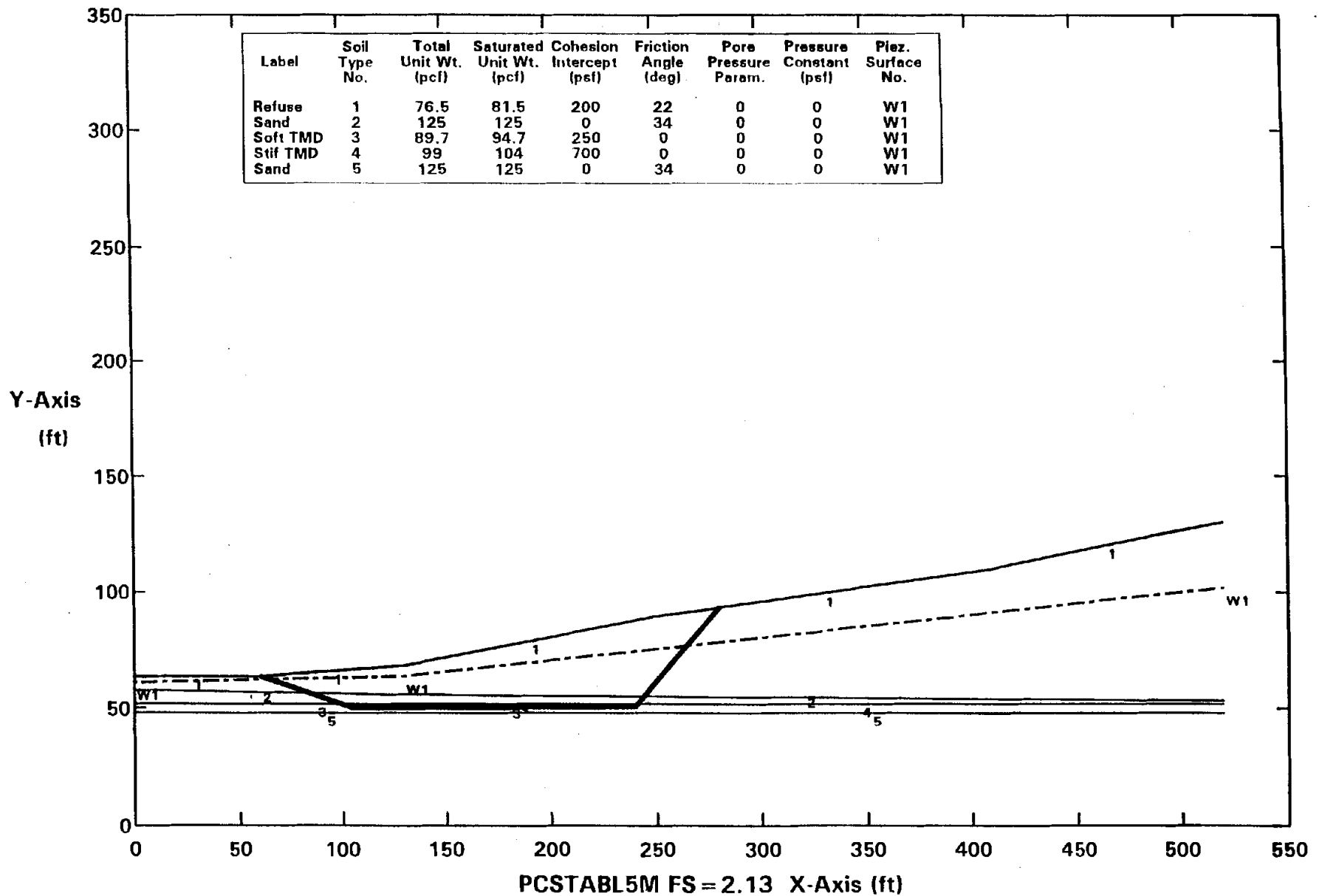
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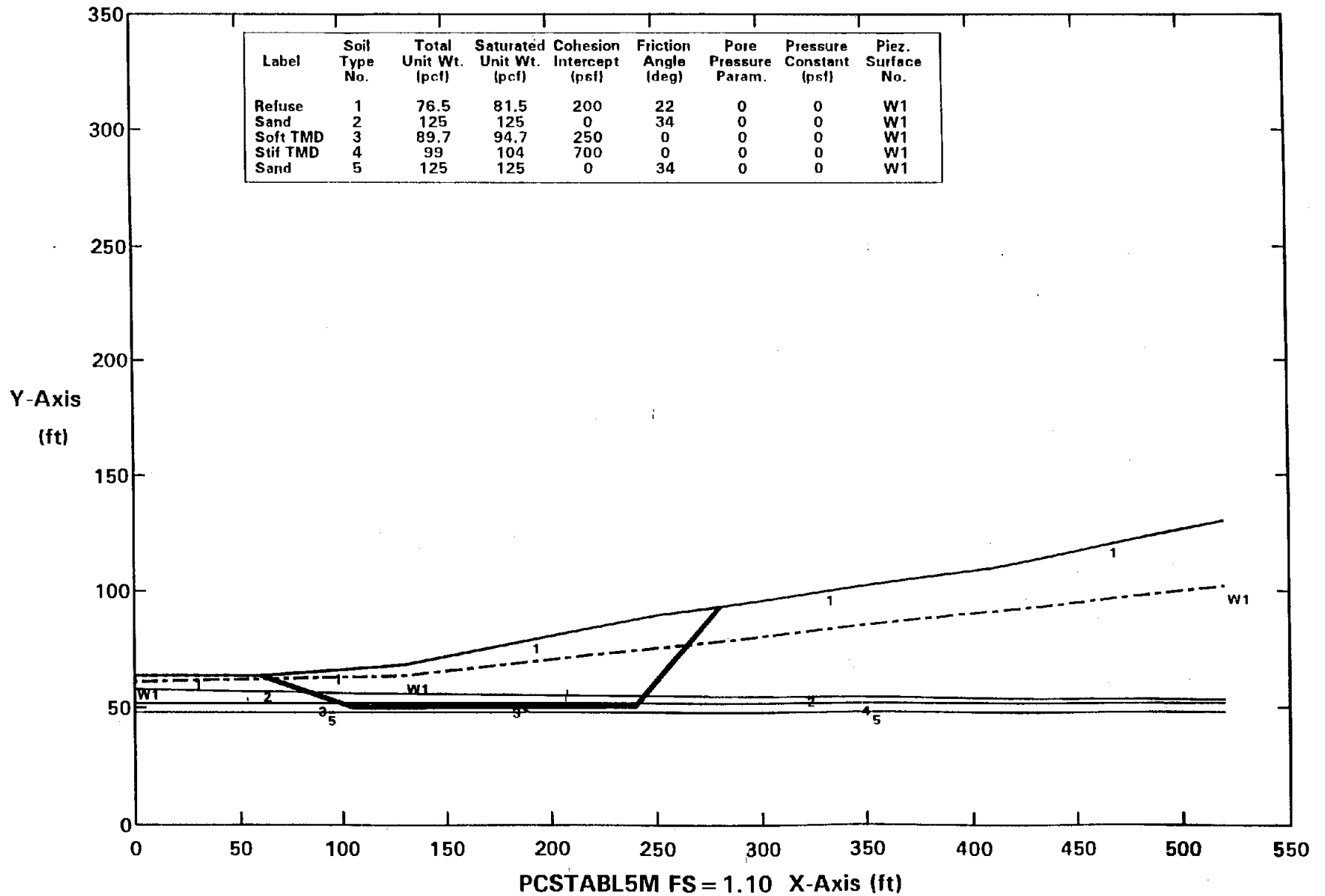
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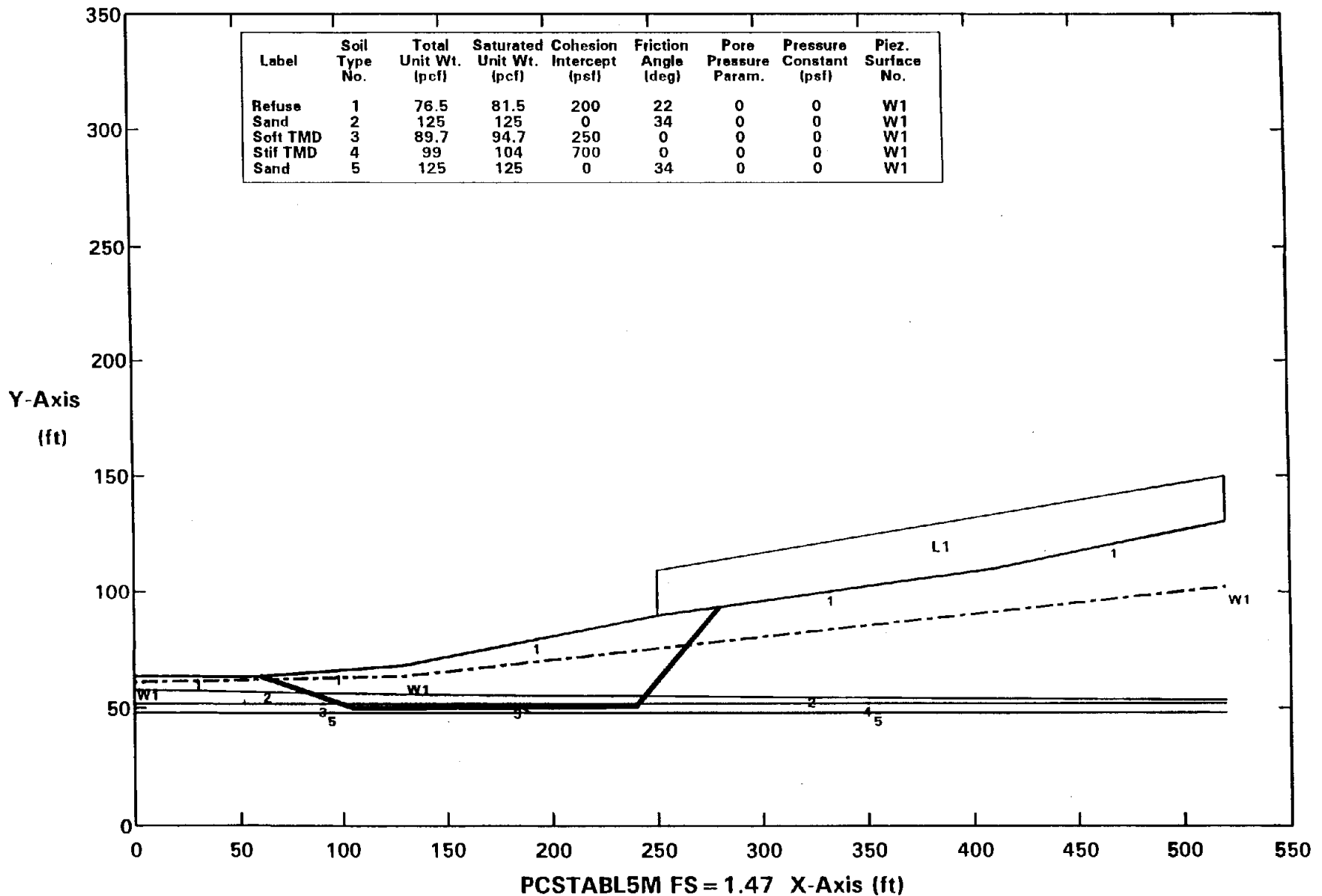
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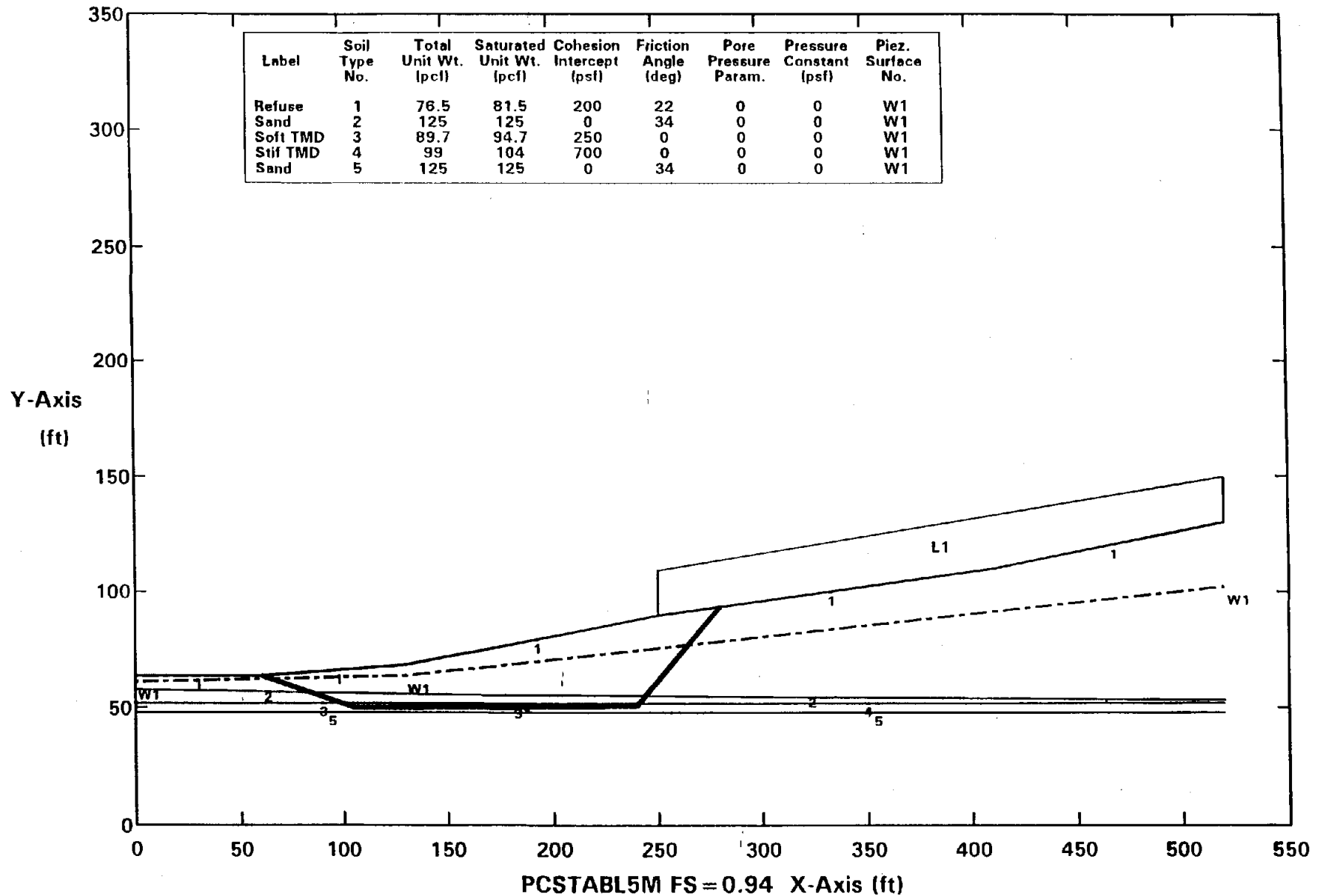
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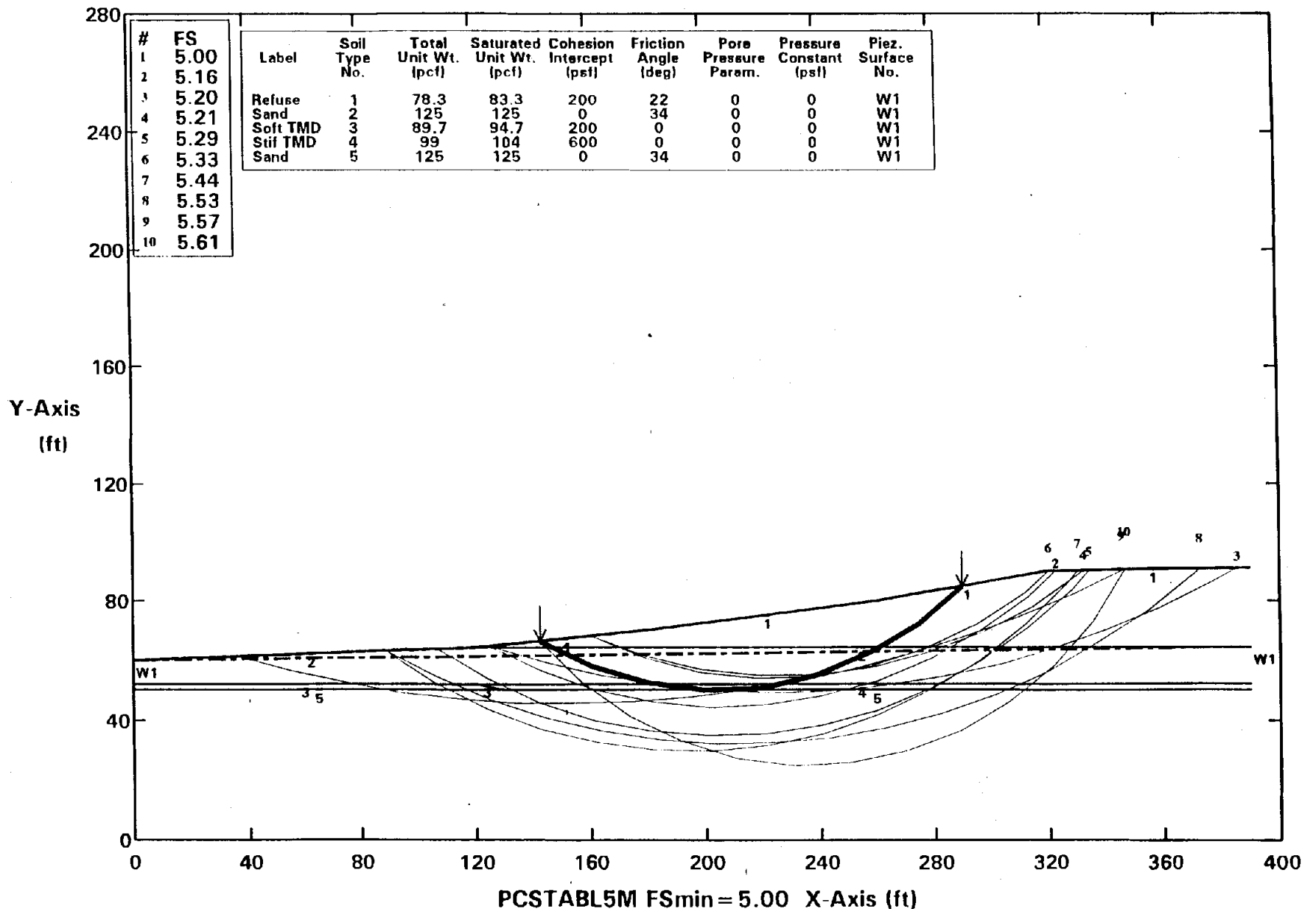


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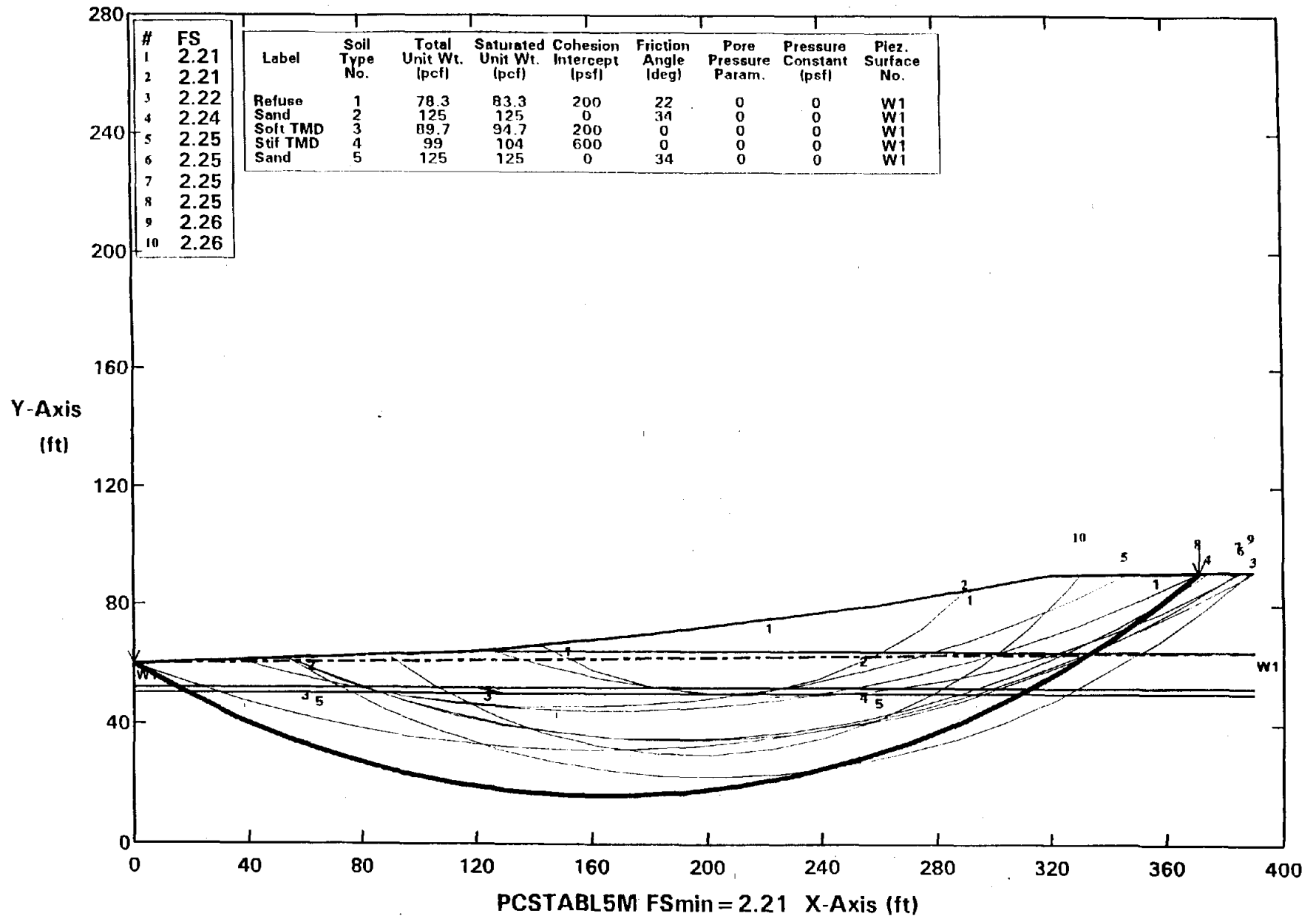




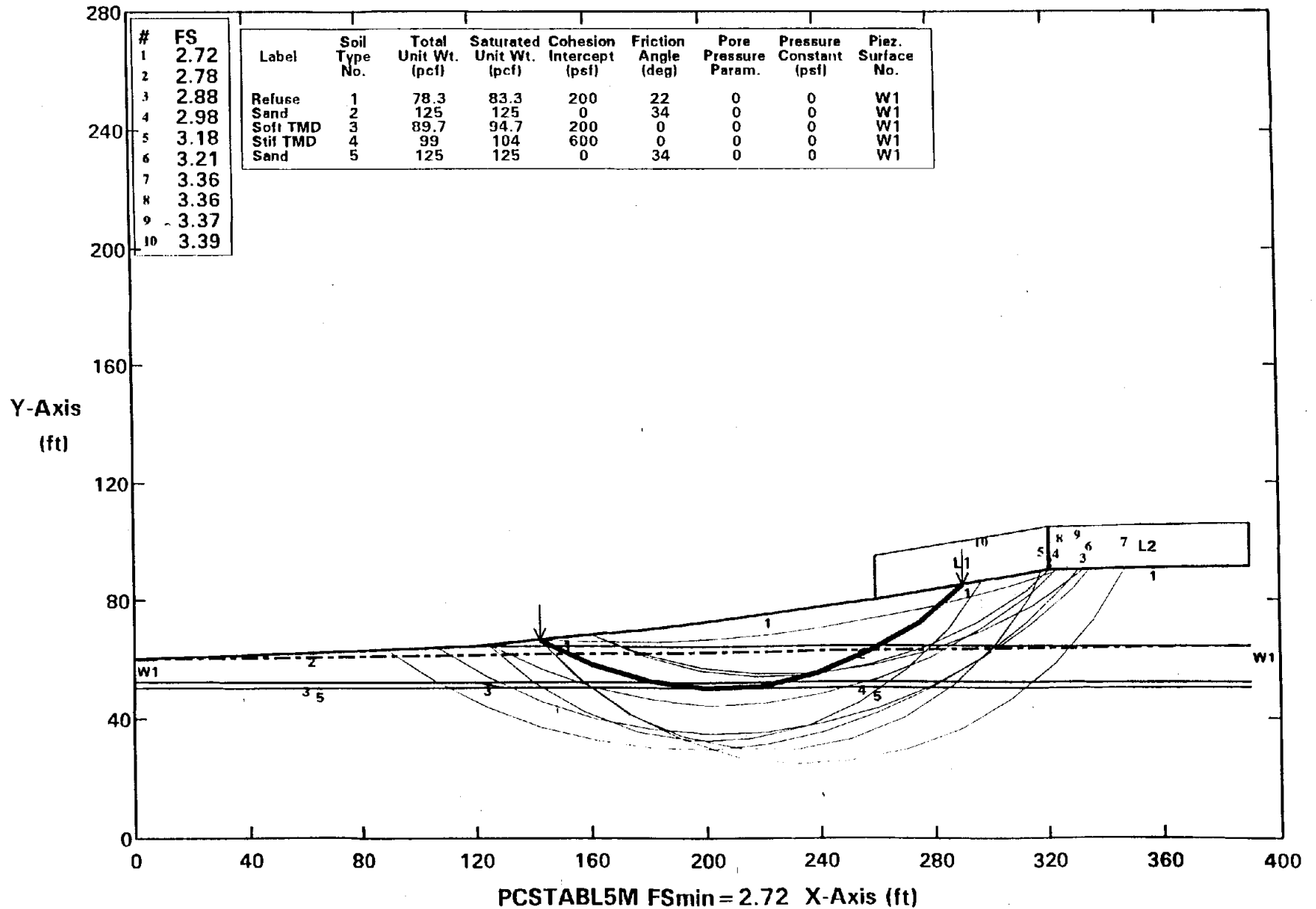
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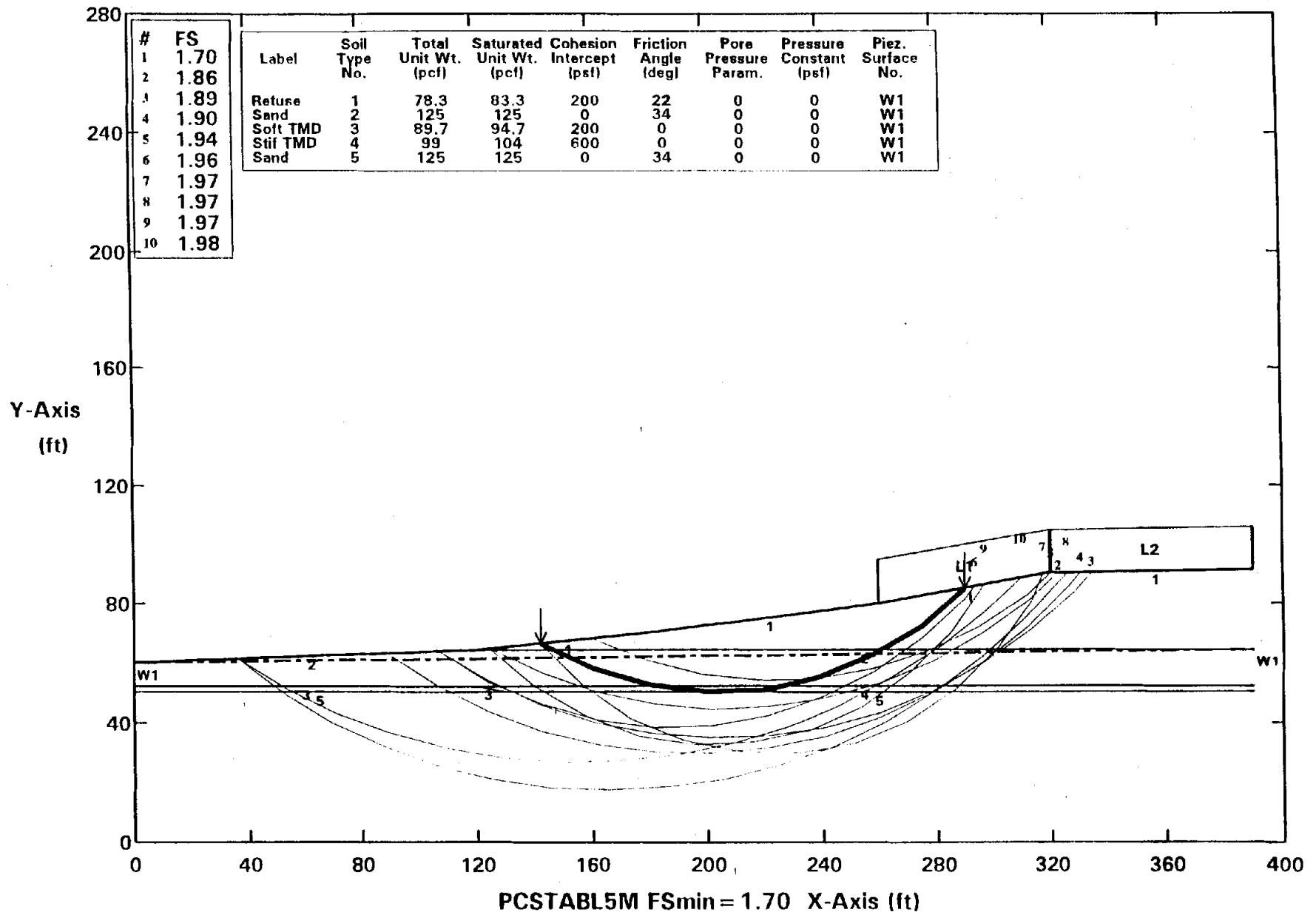
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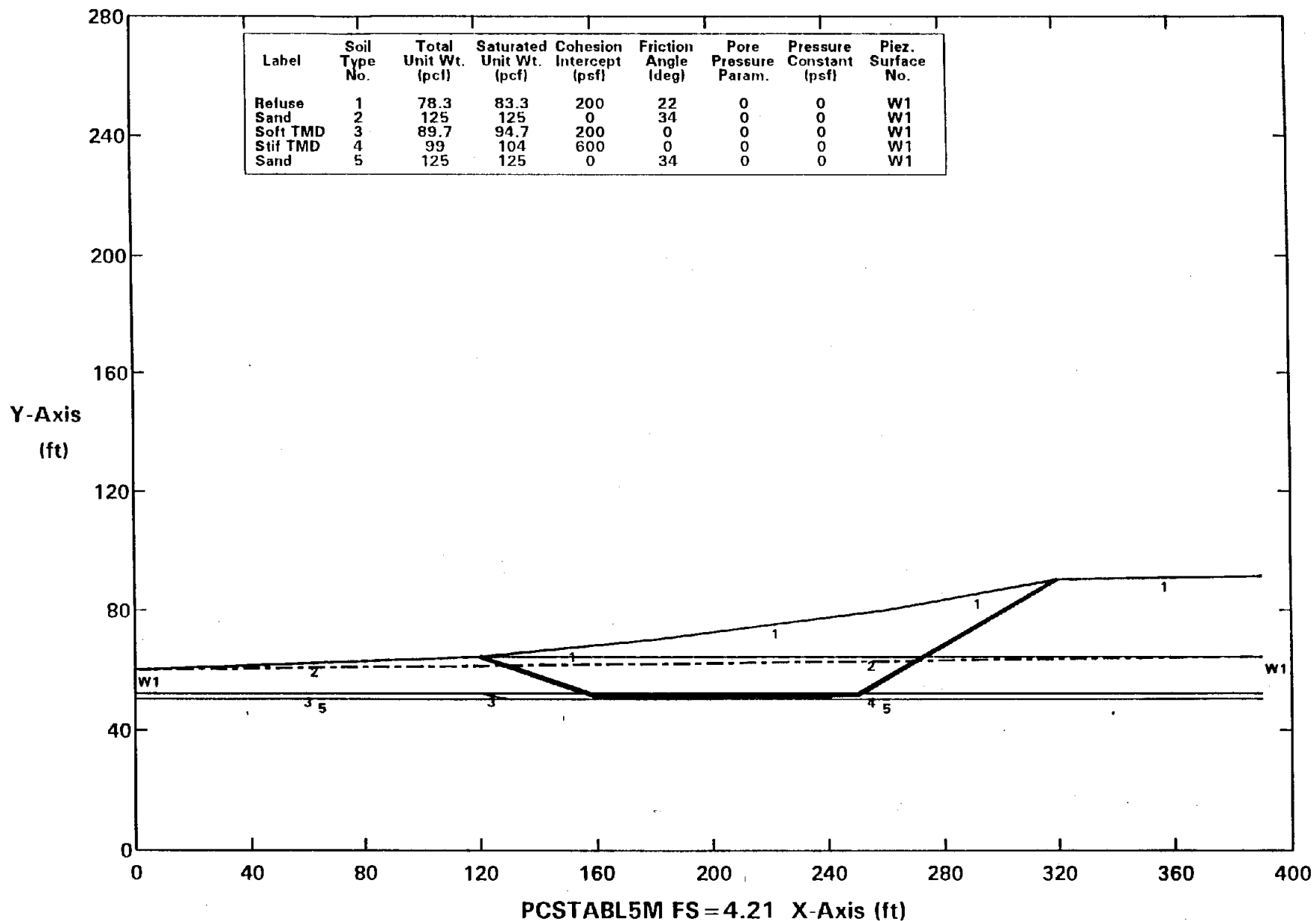
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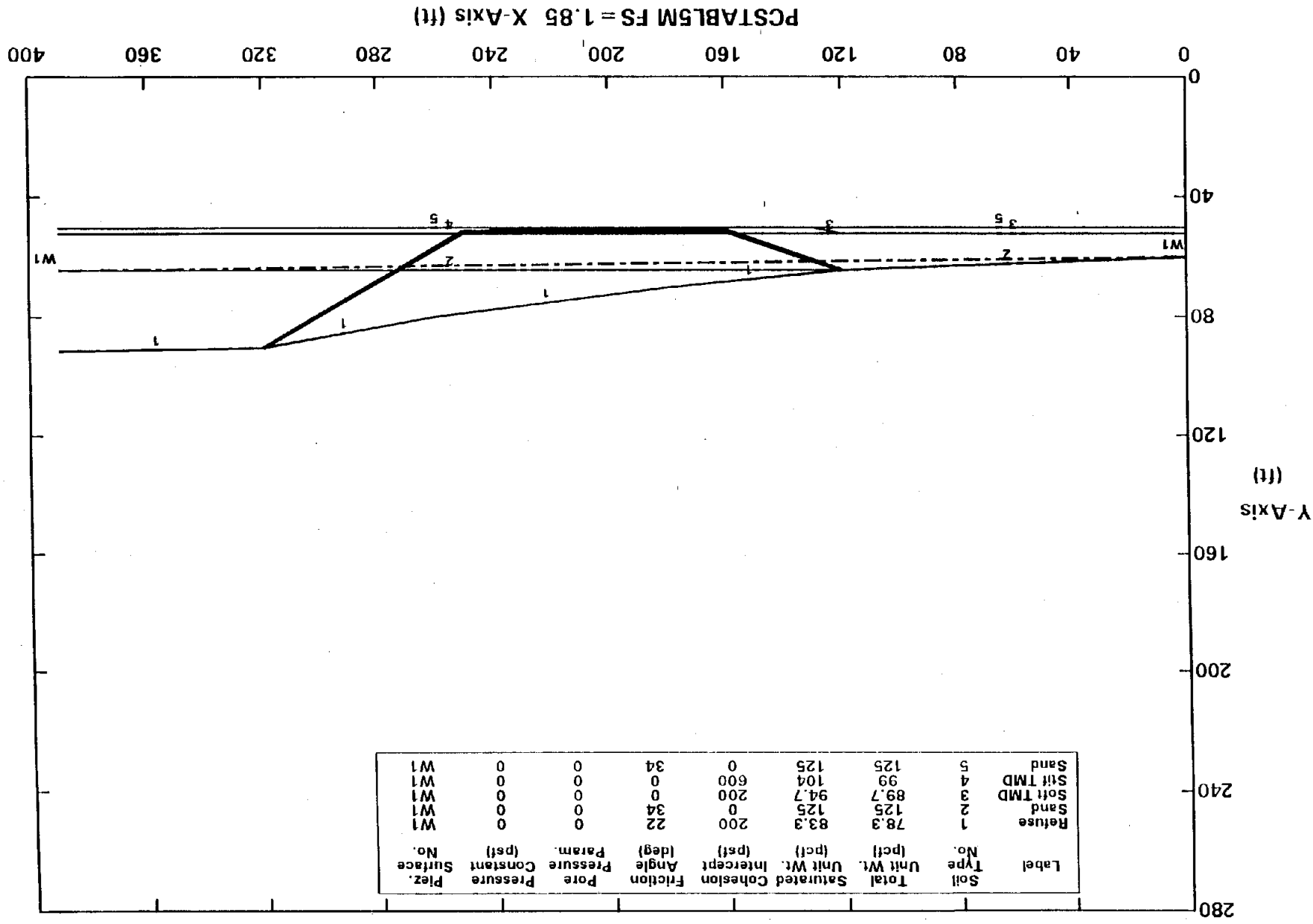
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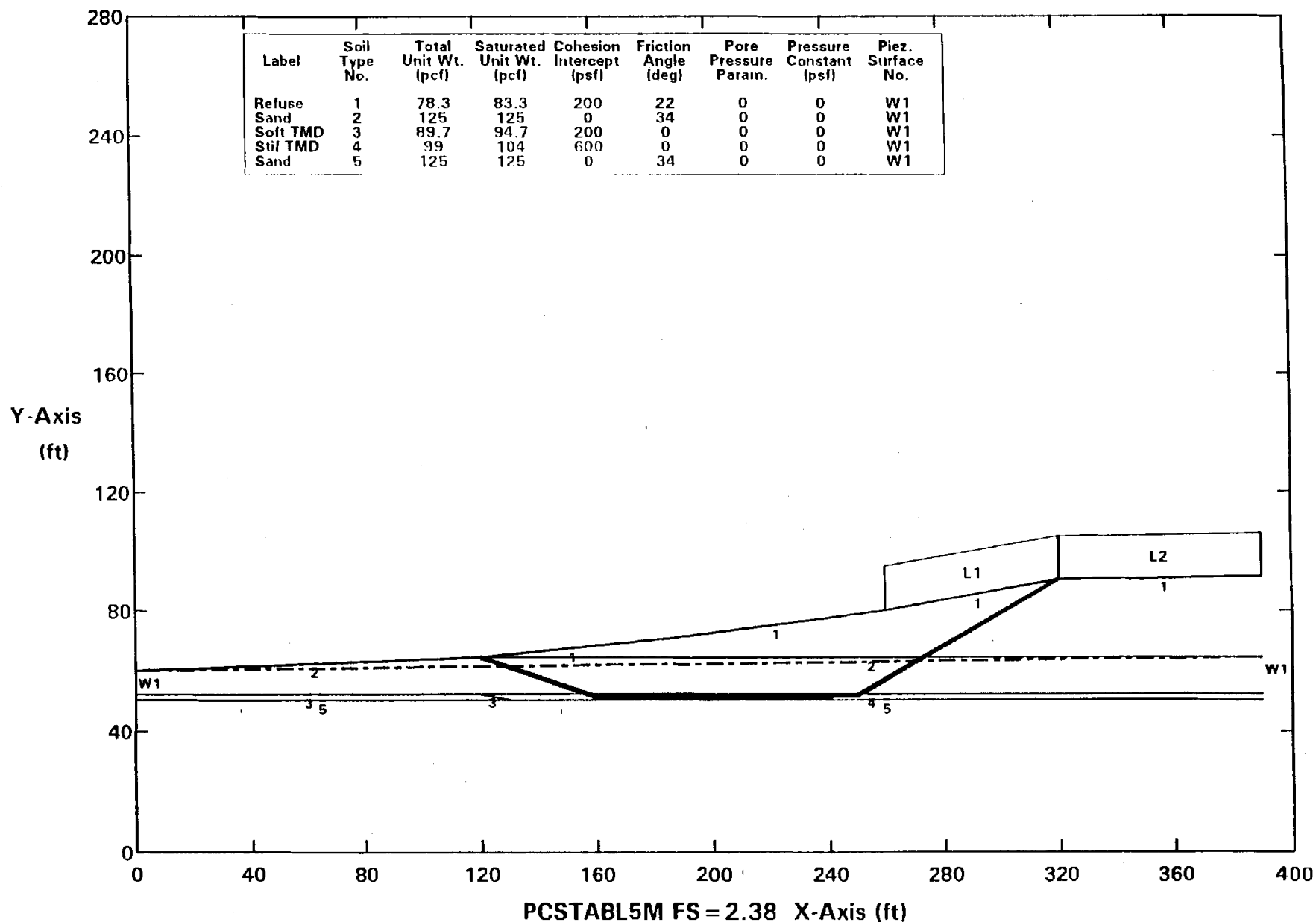
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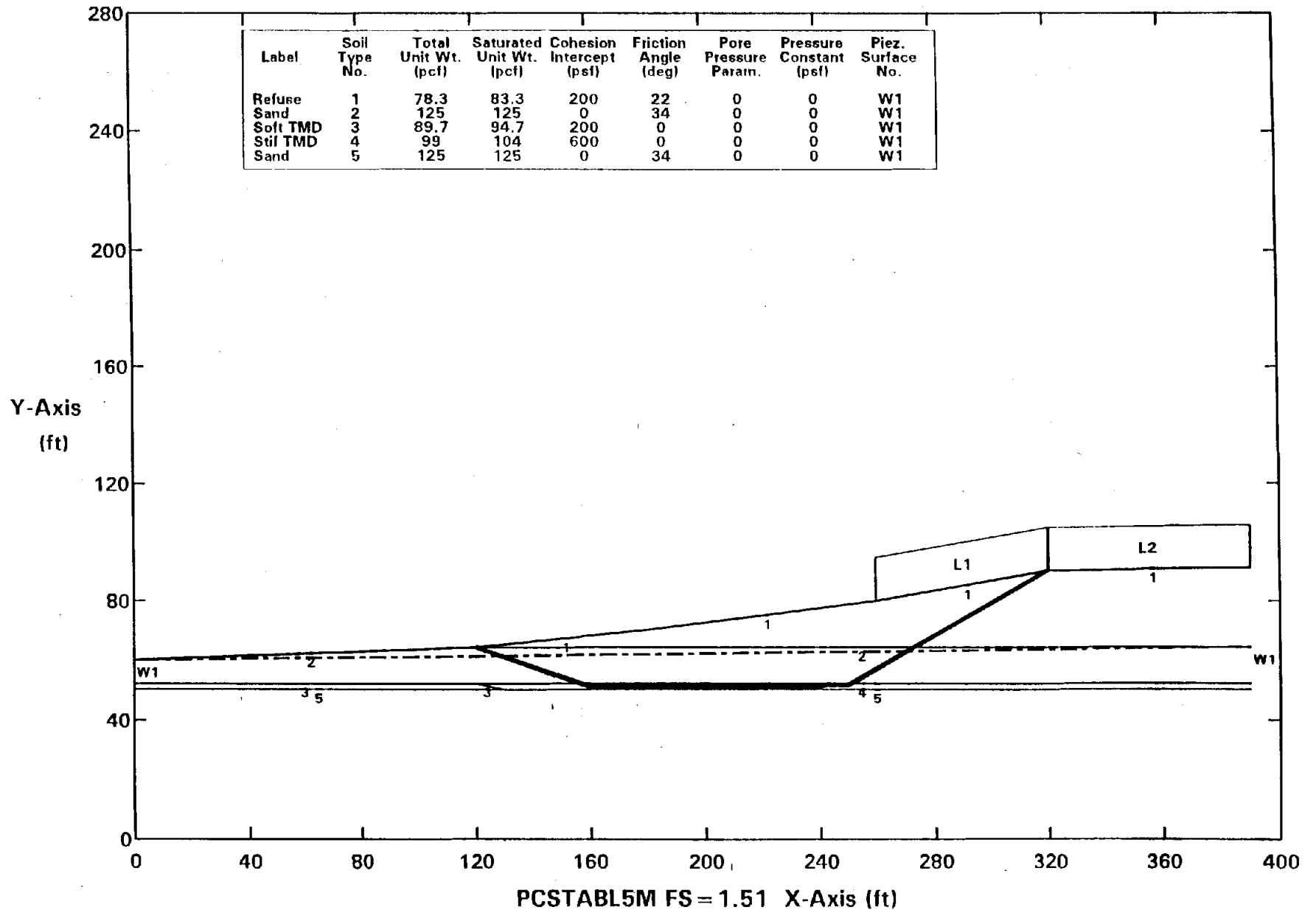
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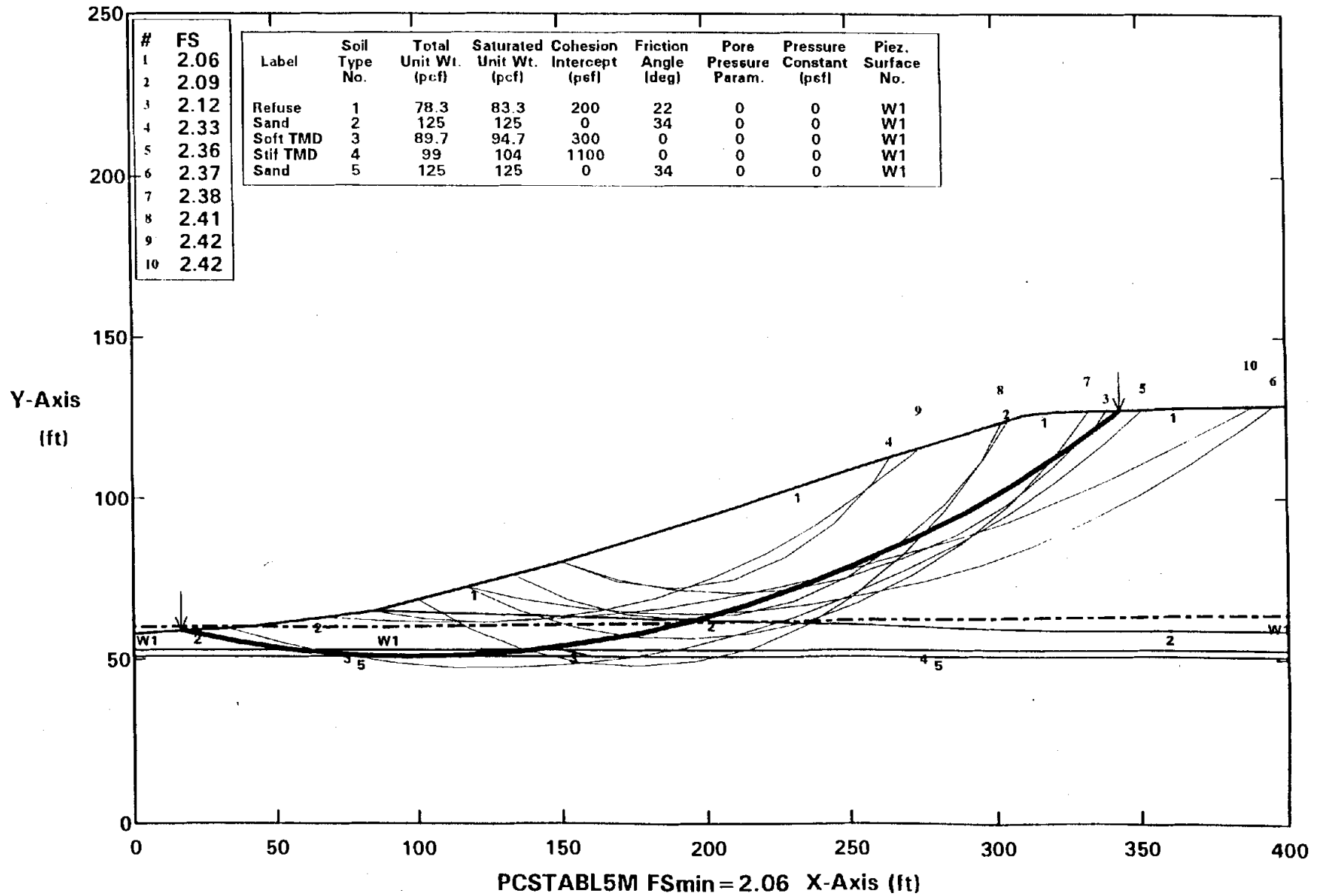
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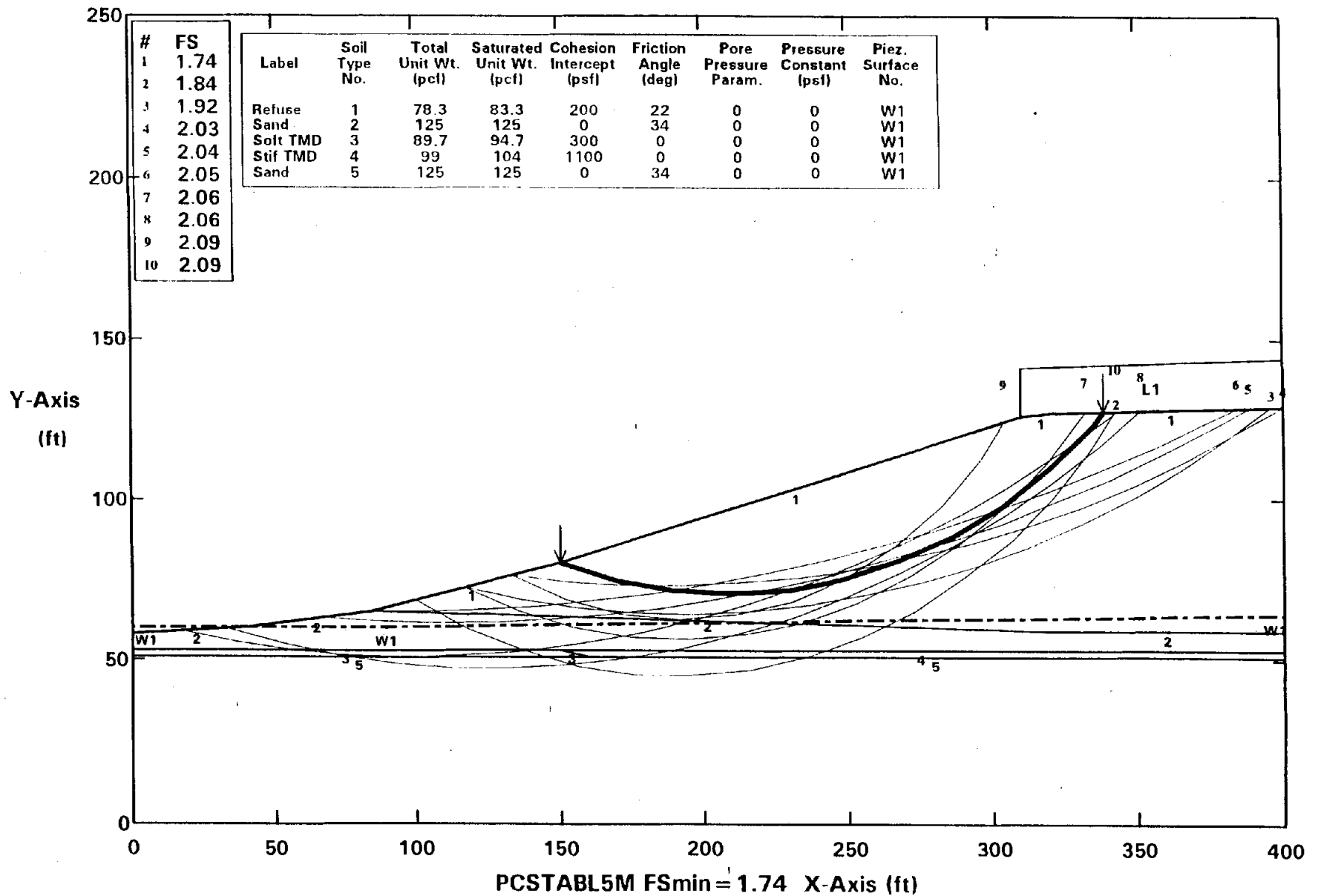
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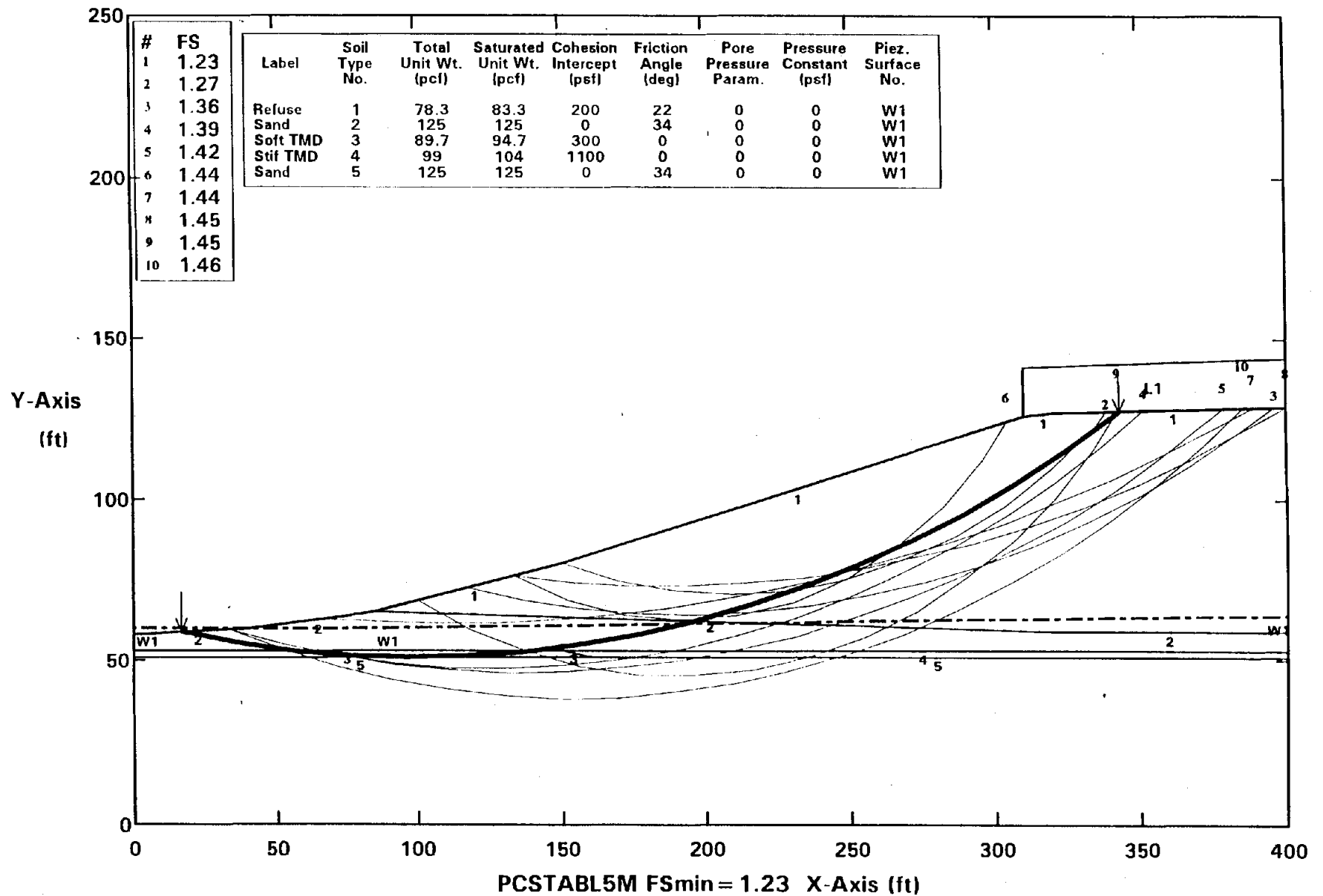
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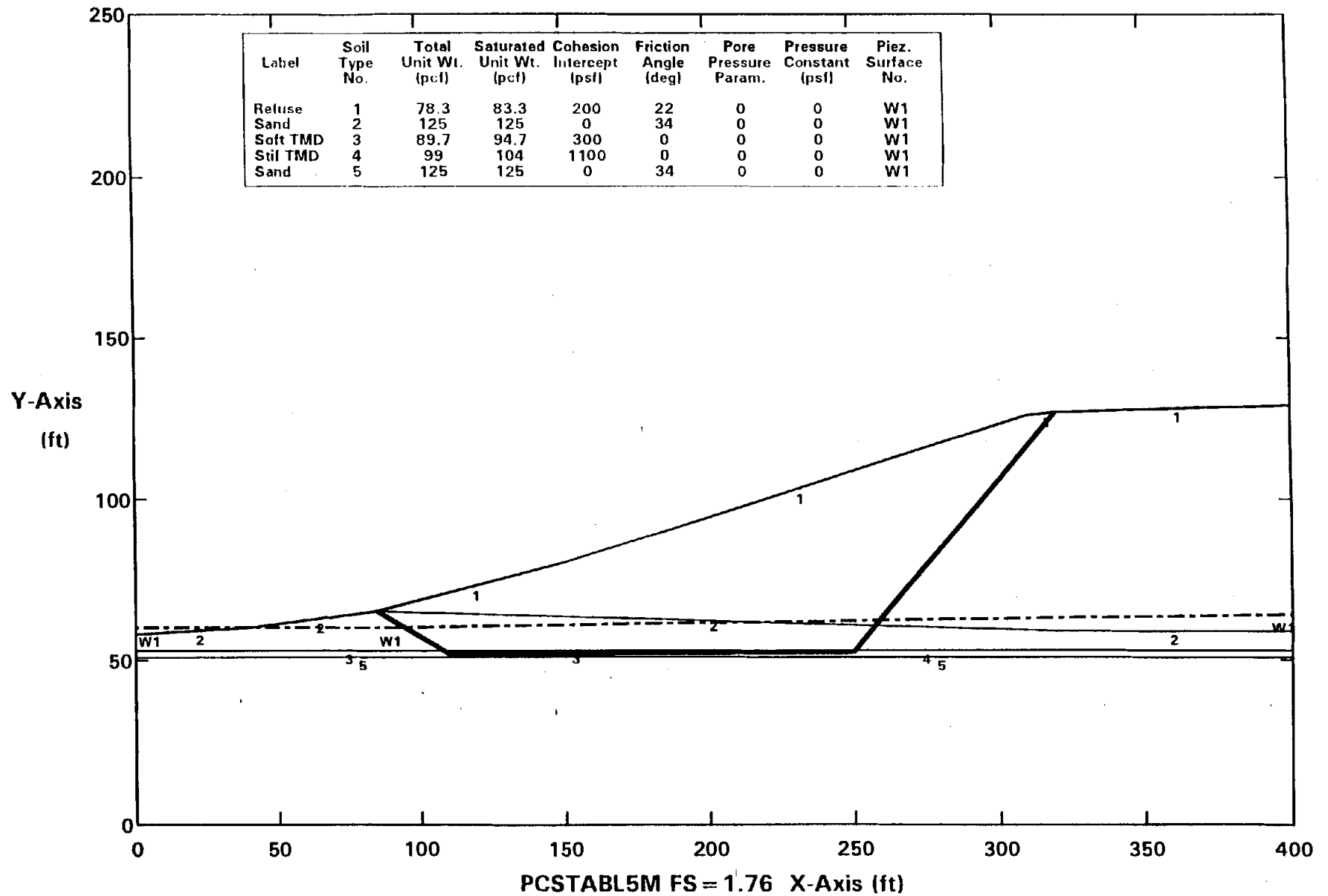
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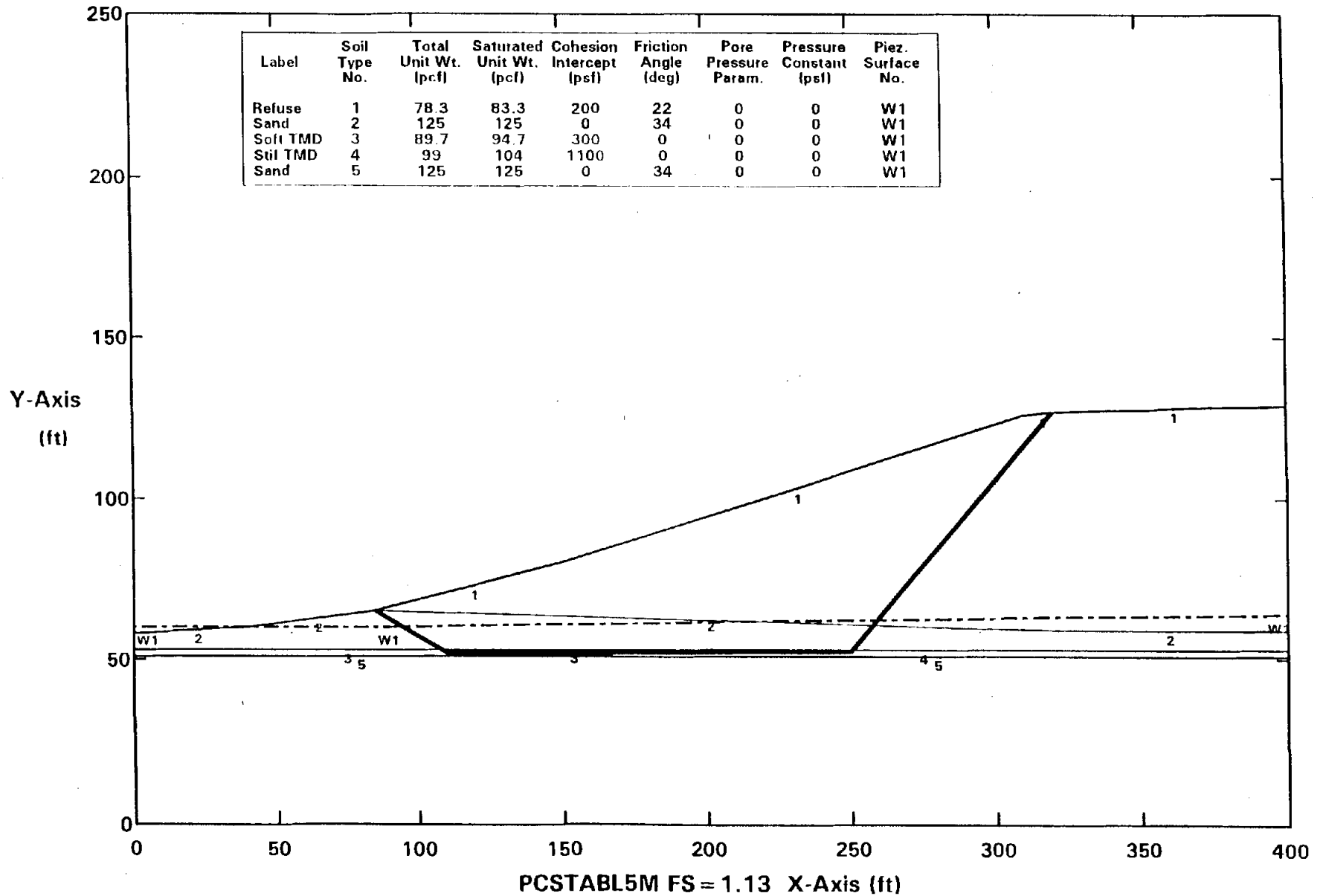
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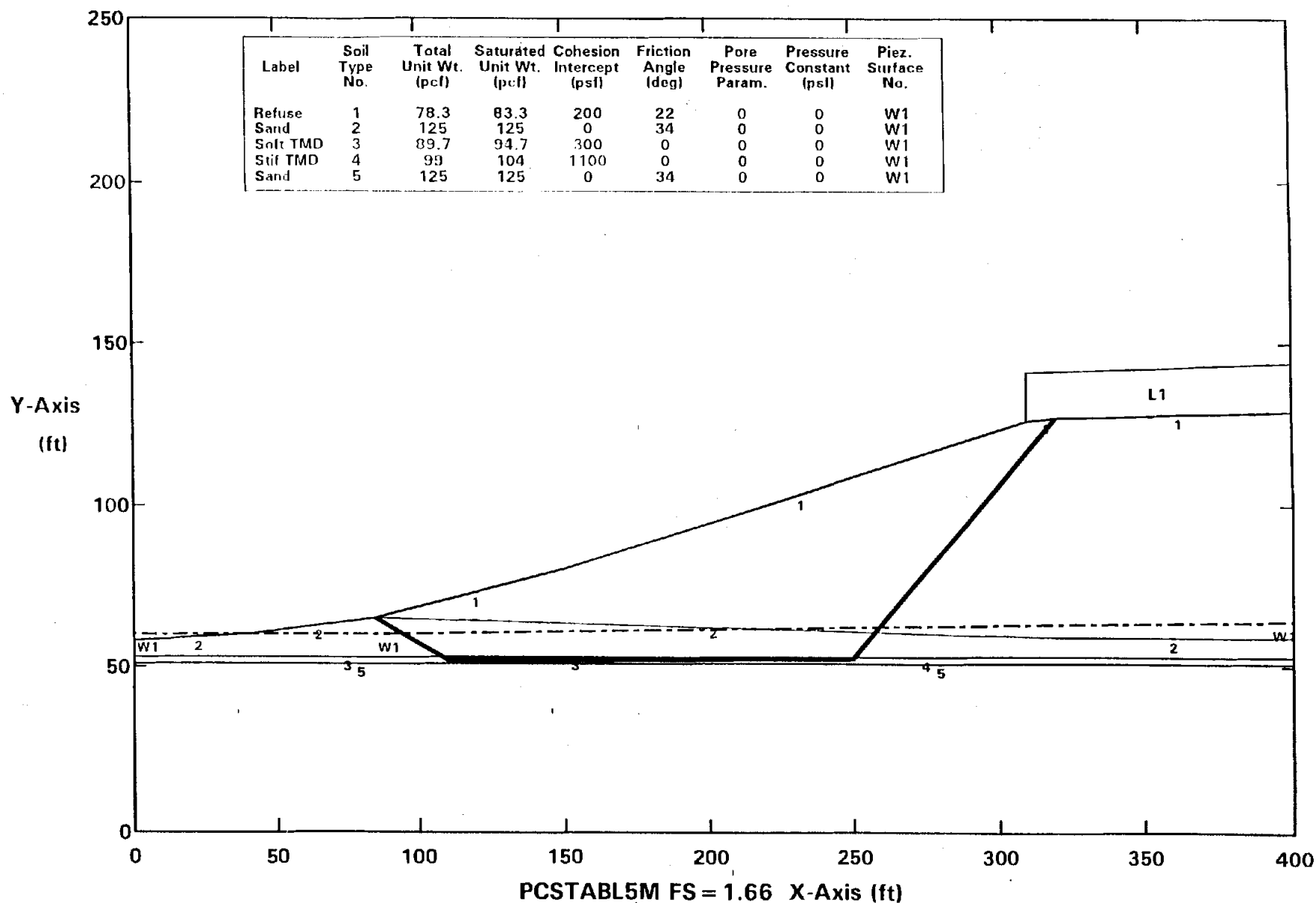
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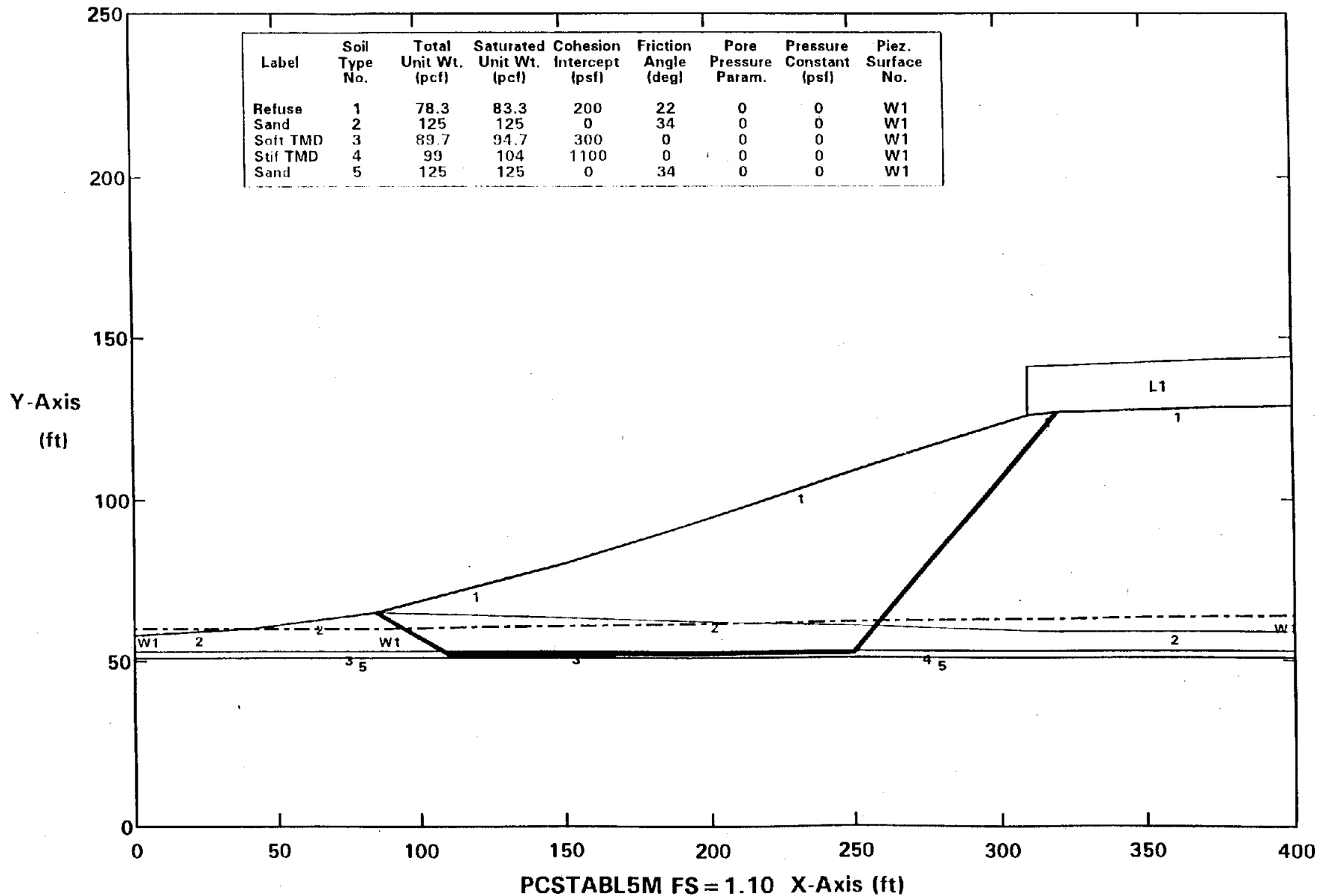
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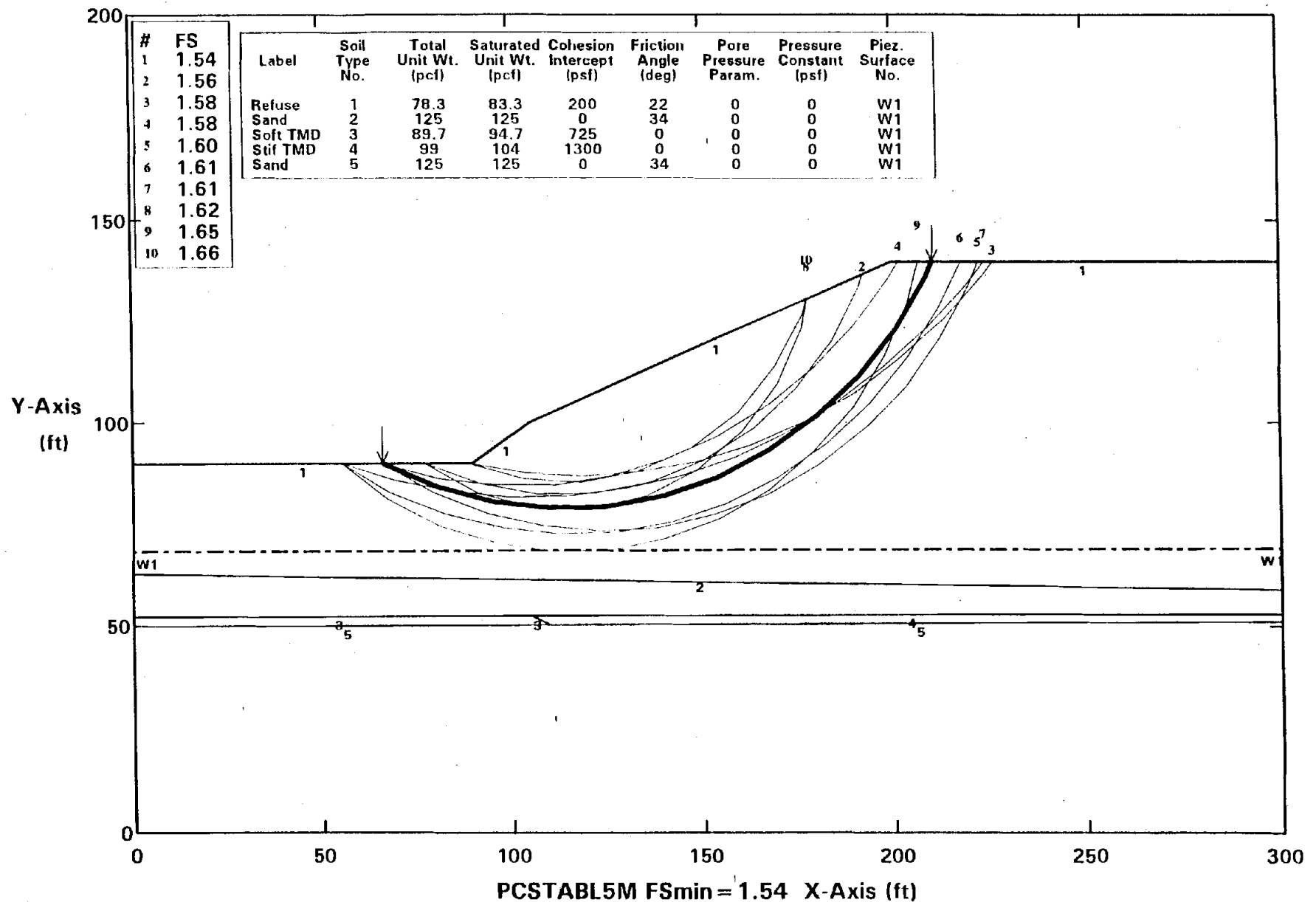
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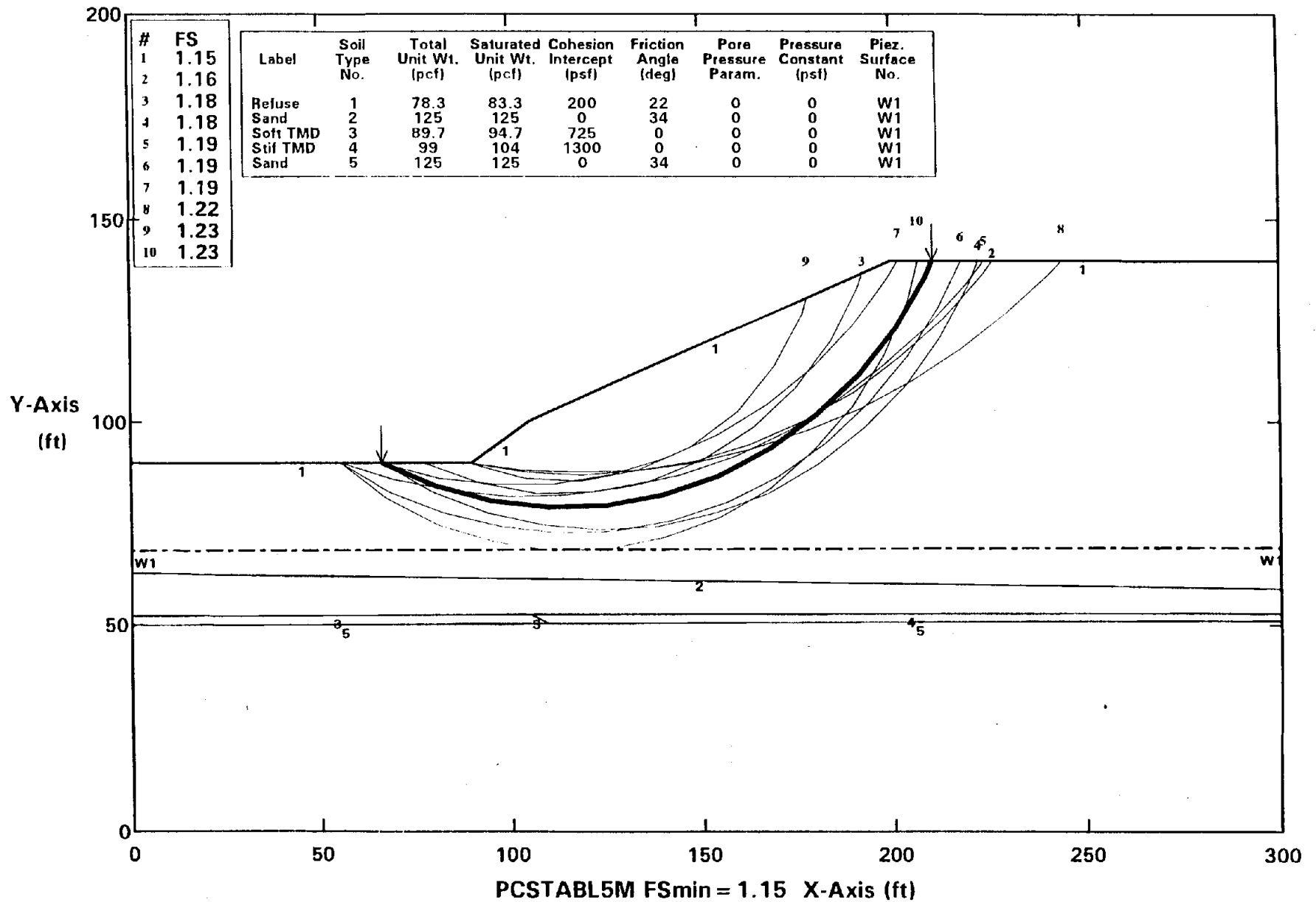
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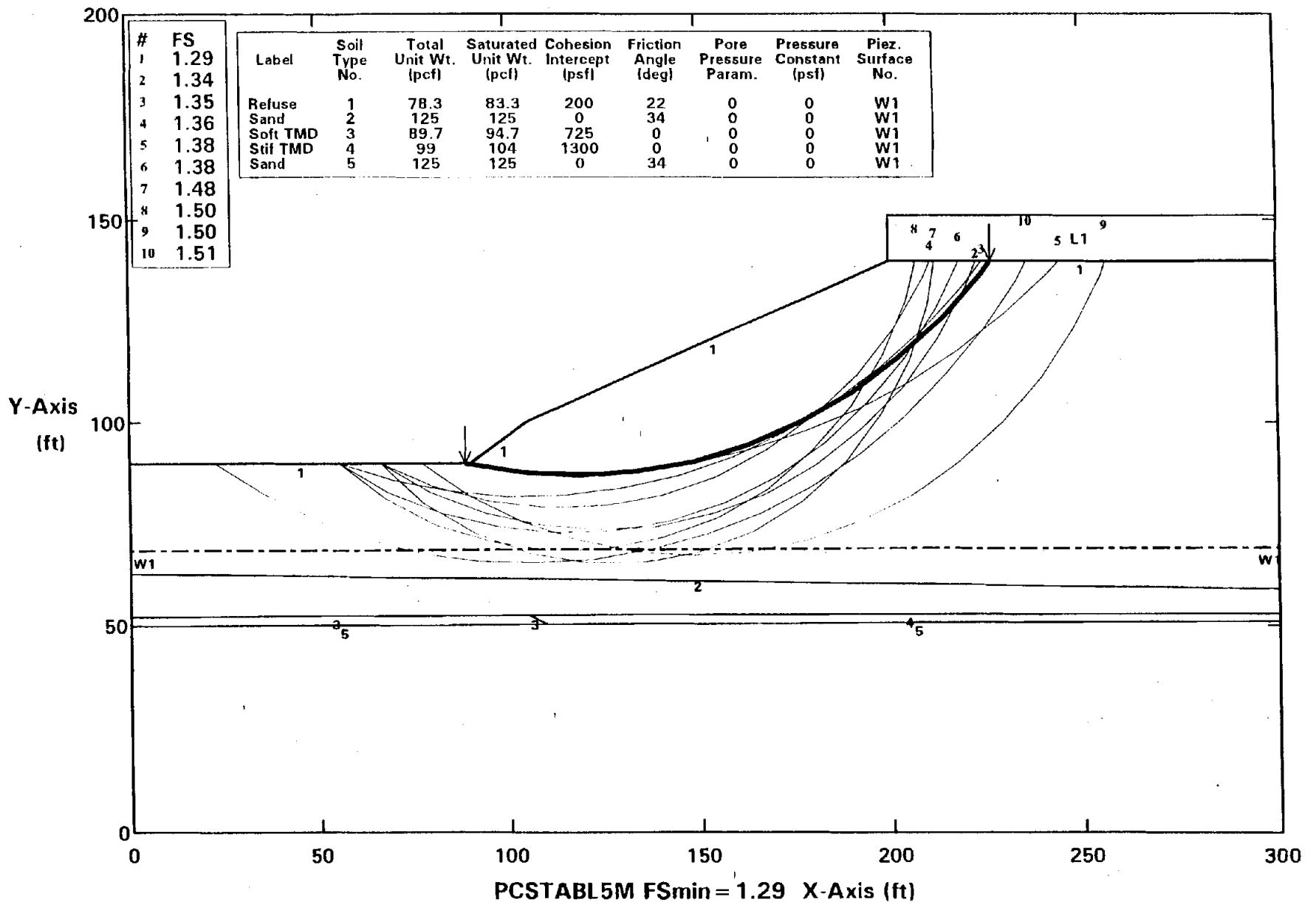
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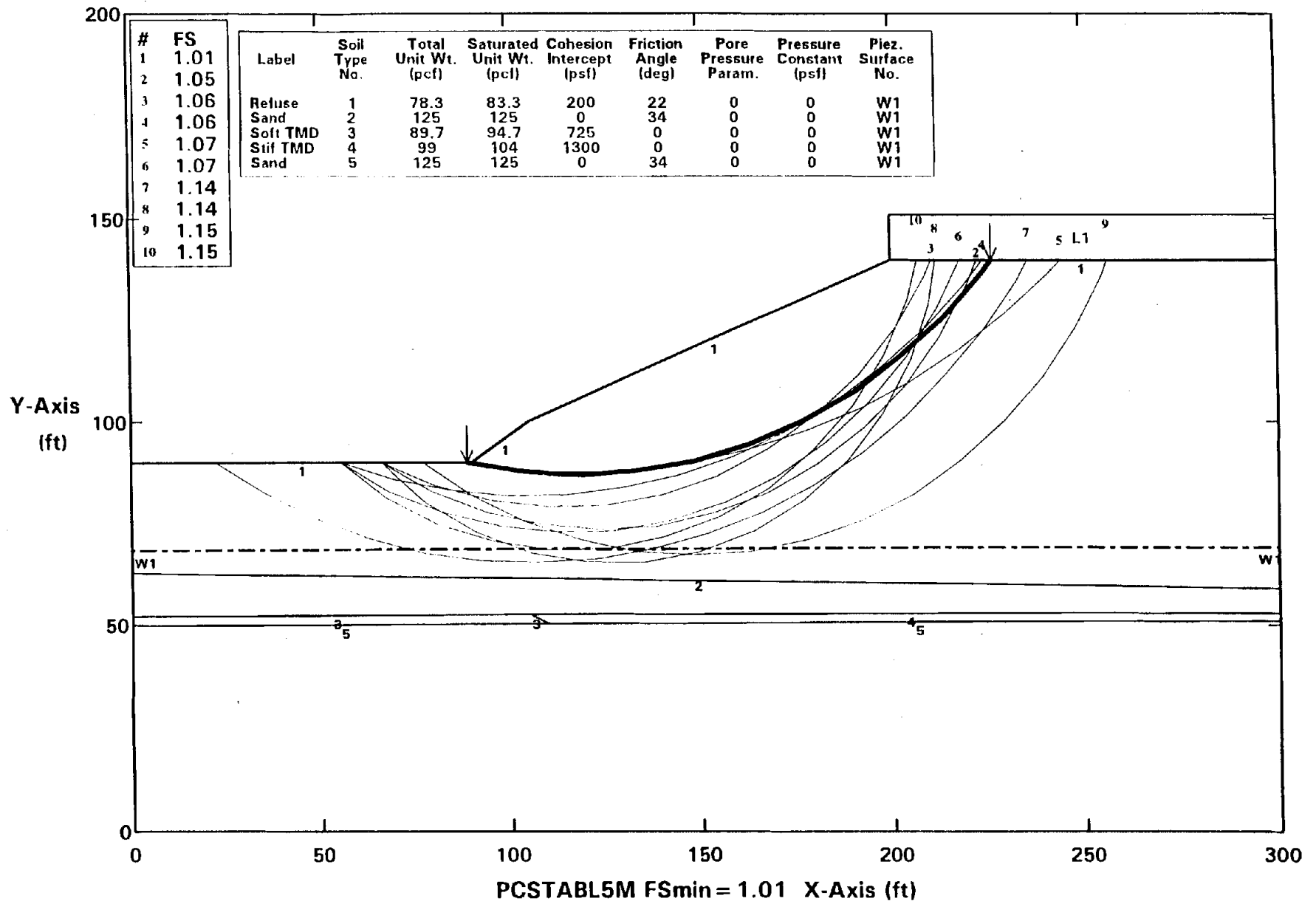
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PENNSYLVANIA AVE. LANDFILL, R SECT. C-C' 10 FT FILL (PAL-RSC1.DAT)
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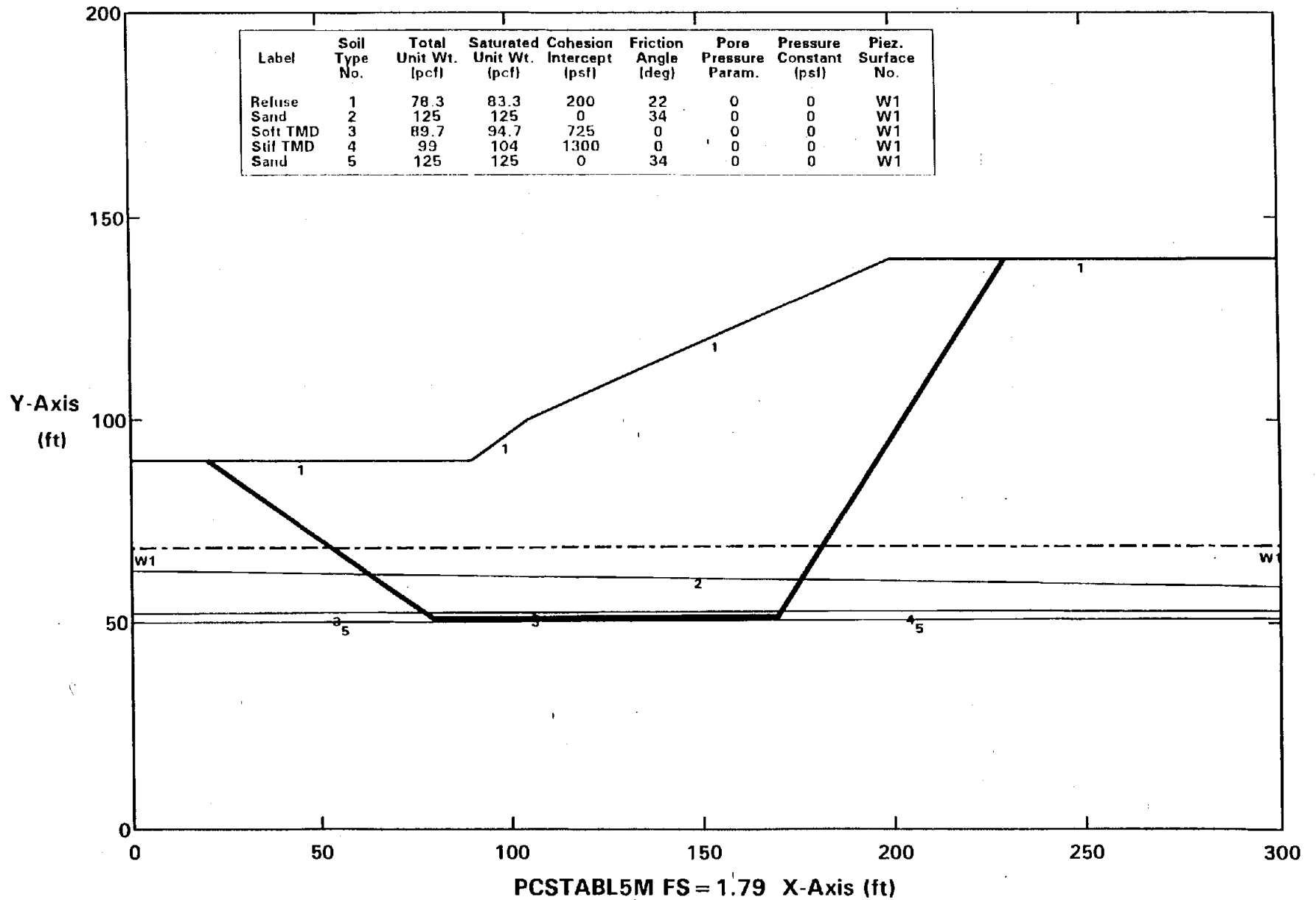


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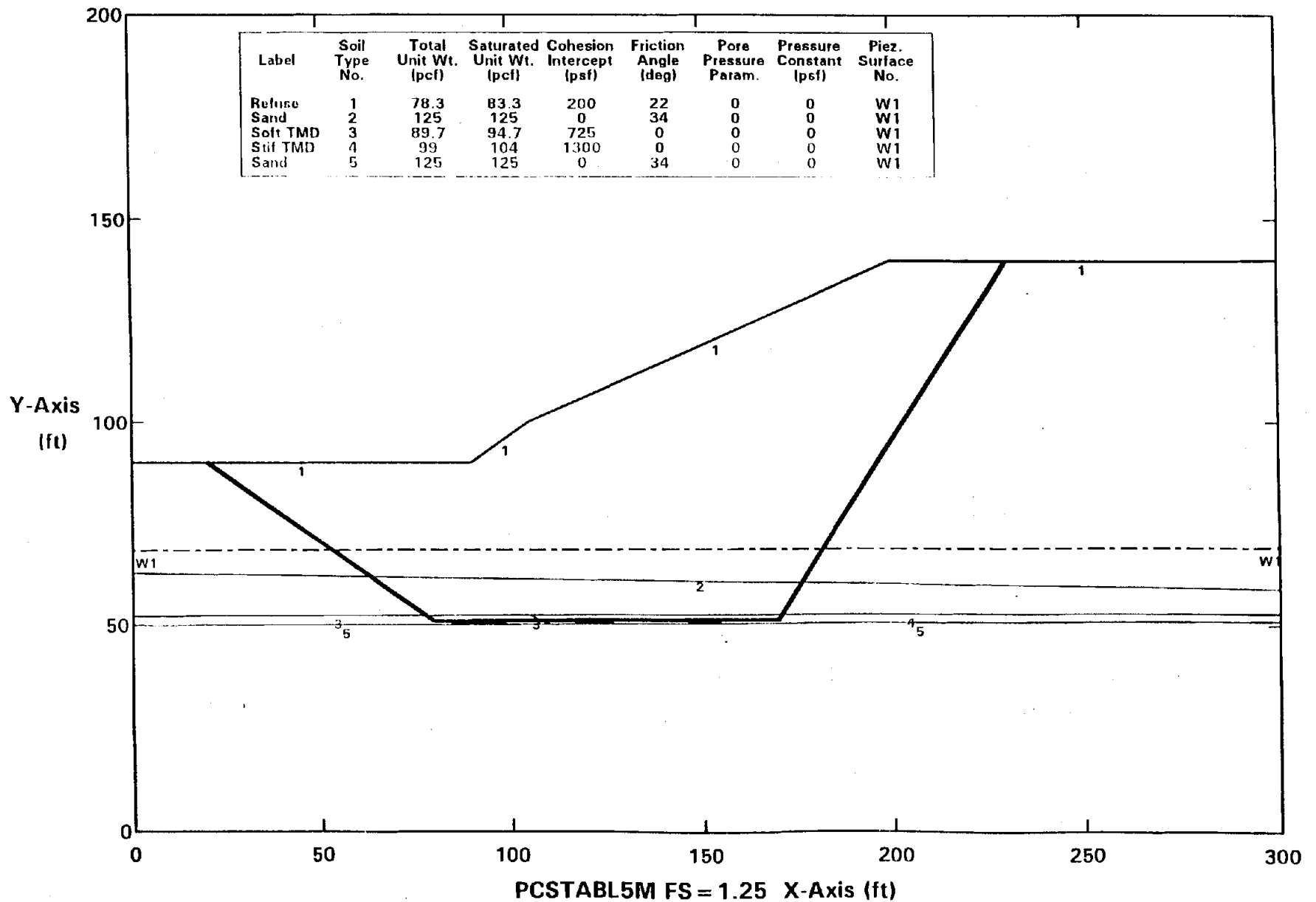


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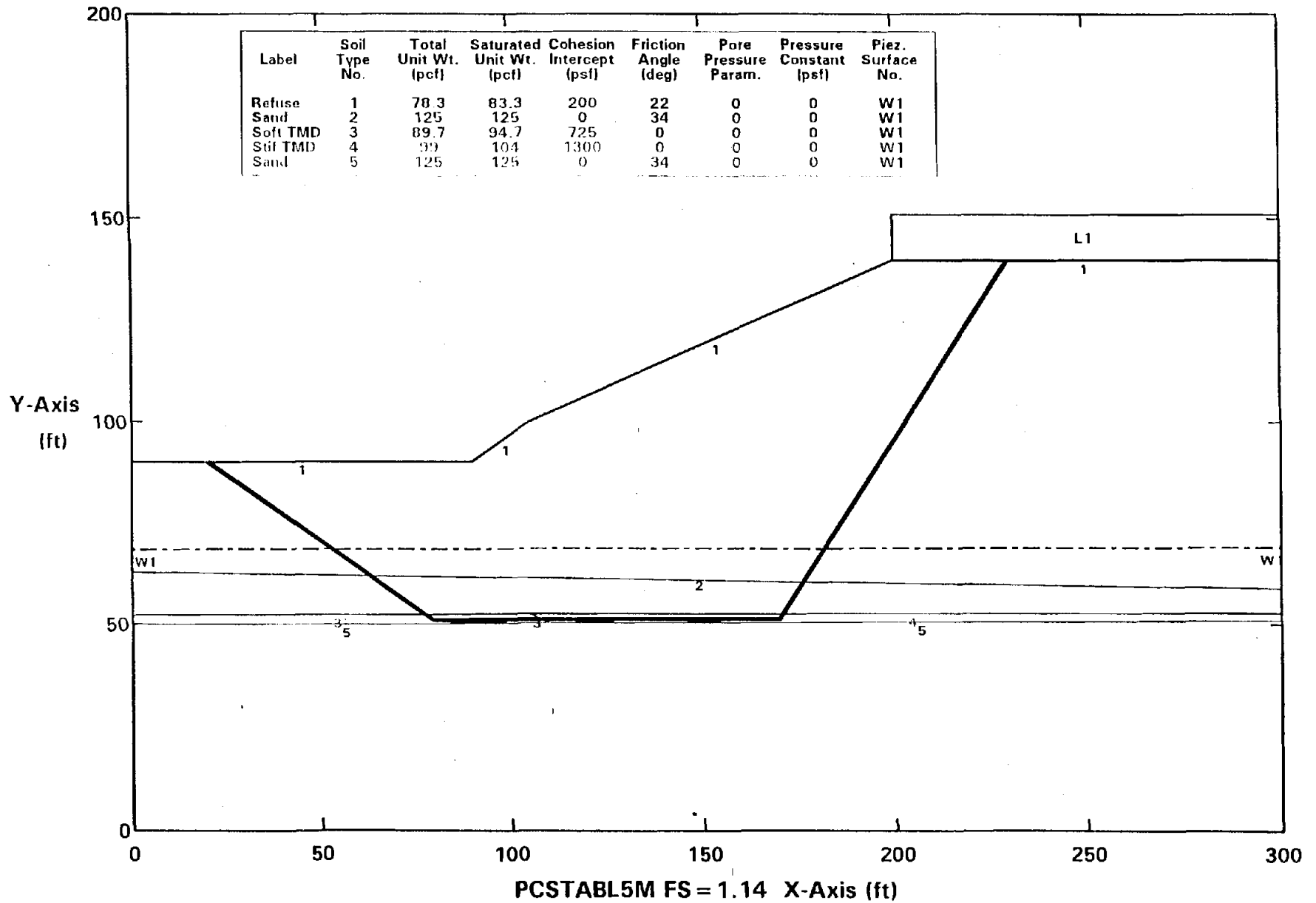
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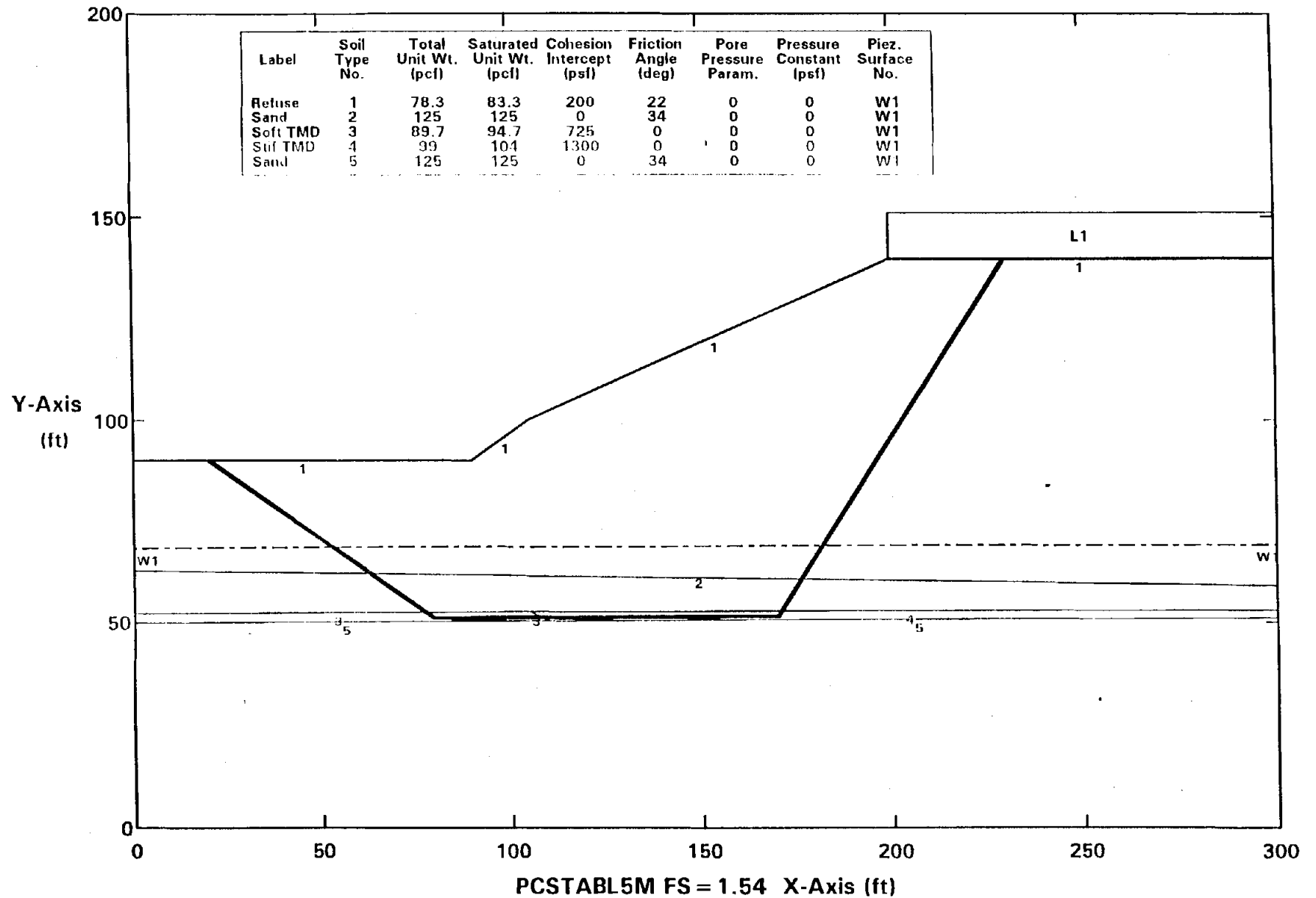
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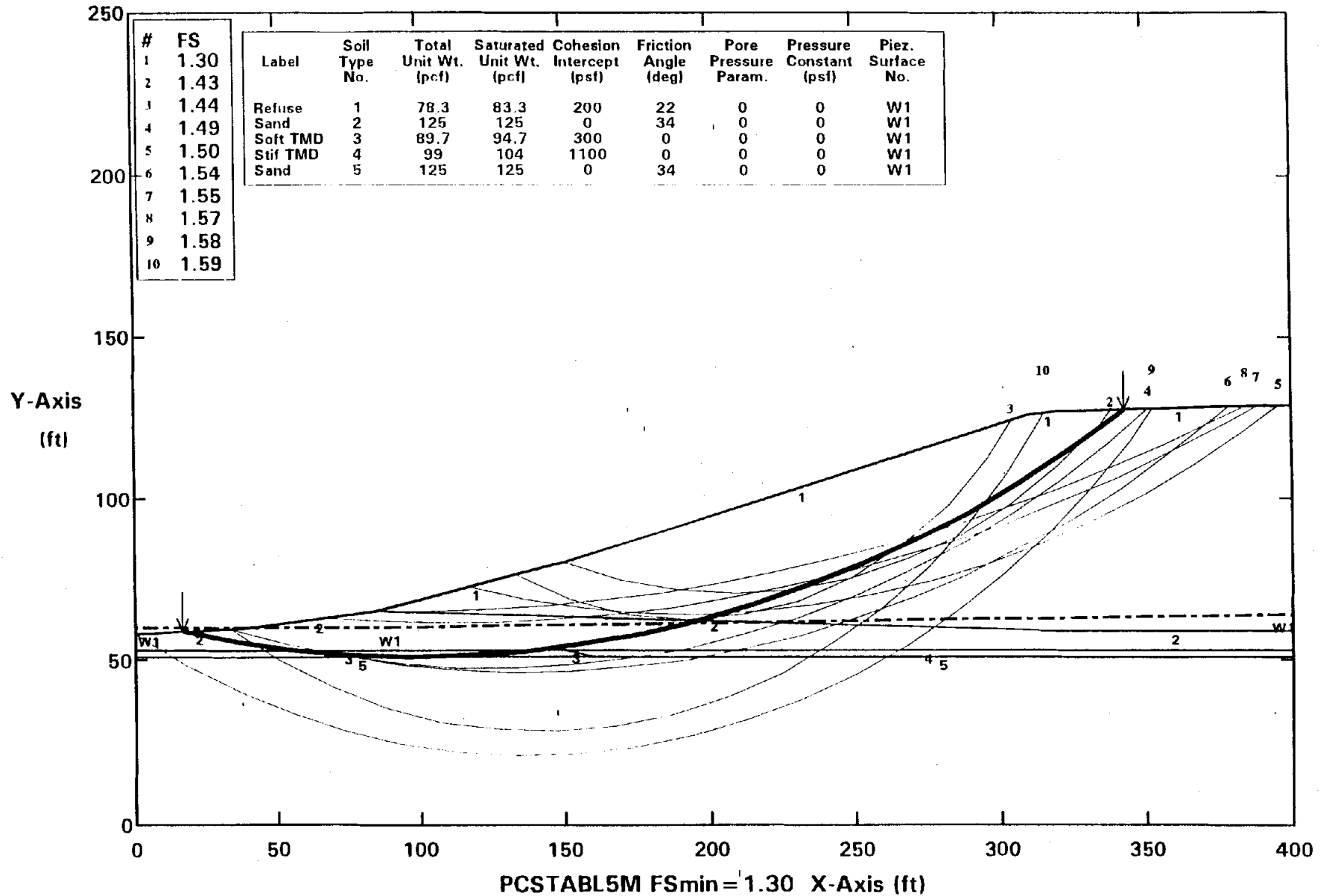
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PENNSYLVANIA AVE. LANDFILL, R SECT. C-C' 10 FT FILL, SFS (PAL-RSC2.DAT)
 Specified Surface. C:PAL-RSC2.PLT By: Converse Consultants East 06-27-96 1:04pm



PENNSYLVANIA AVE. LANDFILL, R SECT. B-B' EXISTING + EQUAKE (PAL-RSB1.DAT)
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3.0 LANDFILL CLOSURE GEOTECHNICAL INVESTIGATION

The PAL and FAL geotechnical borings were advanced using conventional auger and mud-rotary drilling techniques by Warren George, Inc. and Mooretrench Environmental Services, Inc. in accordance with the procedures described in the PAL and FAL Work Plans (URS, July 1995). The locations of the borings are shown in the drawings included in this section. A summary of the geotechnical drilling work is presented in the table included in this section. The geotechnical drilling program at both landfills is briefly described below.

3.1 Large Diameter Auger Borings

To characterize the waste materials in the highest areas of the landfills, two large diameter (30- to 36-inch diameter) auger boreholes (ABP-8 and ABP-9) were advanced at PAL, and five large diameter auger boreholes (ABF-8 through ABF-12) were advanced at FAL. The waste material was recovered for examination continuously at each boring location from the surface to the base of the waste pile. Samples of the waste material were brought to the surface by bucket auger, staged in a metal tub, and weighed with a portable scale mounted on a backhoe. The weights, volumes and descriptions of the waste material were recorded by a Converse Consultants field inspector. This information was then used to assess in-place waste densities and organic material content.

Upon completion, the large diameter boreholes were left open so that a conventional drill rig could be moved over the hole and begin sampling the underlying native soils. The boreholes were left open by inserting 8-inch diameter, schedule 80, slotted screen and riser into each boring and backfilling the annular space with 2-inch gravel. A bentonite seal was placed in the boring around the riser near the ground surface to seal the annular space. The slotted screen and bentonite seal allowed the borings to be used as gas monitoring points for the subsequent landfill gas sampling pre-design investigation. The PVC pipe provided an open conduit to the base of the waste pile so that the boring could be advanced deeper.

The Work Plan originally called for the insertion of non-slotted PVC casing into the borings and backfilling the annular space with the waste cuttings. The gas-monitoring borehole

modifications, approved by NYCDEP and NYSDEC, provided the opportunity to conduct the above referenced gas monitoring studies.

3.2 Interior Borings

Two interior geotechnical borings (GBP-8 and GBP-9) were advanced at PAL, and five borings (GBF-8 through GBF-12) were advanced at FAL within the large diameter borings to collect samples of the tidal marsh deposits (TMD) underlying the landfills. The borings were advanced to the TMD, undisturbed samples of the TMD were collected, and the borings were tremie-grouted up to the base of the 8-inch diameter, PVC gas monitoring point. Selected disturbed and undisturbed soil samples were tested by Converse Consultants for an evaluation of their geotechnical properties.

3.3 Perimeter Borings

Eleven geotechnical borings were advanced along the perimeter of the PAL to collect samples of the TMD. Seven borings were advanced on land (GBP-1 through GBP-7), and seven borings were advanced offshore in the tidal flats around the landfill (SBP-1 through SBP-4).

Fourteen geotechnical borings were advanced along the perimeter of the FAL to collect samples of the TMD. Seven borings were advanced on land (GBF-1 through GBF-7), and seven borings were advanced offshore in the tidal flats around the landfill (SBF-1 through SBF-7).

The borings were advanced to the TMD, undisturbed samples of the TMD were collected, and the GBP/GBF borings were tremie-grouted to the surface; the SBP/SBF borings were allowed to collapse naturally upon completion.

Selected disturbed and undisturbed soil samples were tested by Converse Consultants for an evaluation of their geotechnical properties.

3.4 Engineering Evaluation

As noted in the PAL and FAL Work Plans, Converse Consultants East (Converse) is a subconsultant to URS on this phase of the project. Converse's Scope of Work included assistance with the large diameter auger borings in the field, and the engineering evaluation of the settlement and stability of each landfill. The Converse Preliminary Geotechnical Investigation Report is included in this section. The referenced boring summaries and logs are presented in Appendix A. The referenced settlement evaluation analysis is presented in Appendix B.

**Summary of Drilling Activities
Pennsylvania Avenue Landfill
Brooklyn, New York**

Boring Number	Depth (ft)	Split-Spoons	Shelby Tubes	Start Date	End Date	Drill Rig	Inspector	Comments
PBP-1	26	12	1	02/12/96	02/13/96	ATV	BB	
PBP-2	26	12	1	02/13/96	02/15/96	ATV	BB	
PBP-3	100	33	2	02/12/96	02/15/96	Failing	AZ	
PBP-4	102	34	1	02/28/96	02/29/96	Barge	SM	no recovery of TMD in Shelby
PBP-5	102	35	0	02/19/96	02/21/96	Barge	SM	no TMD
PBP-6	102	32	0	03/06/96	03/07/96	Barge	SM	
PBP-7	102	35	0	02/14/96	02/19/96	Barge	SM	no TMD
PBP-8	--	--	--	--	--	--	--	boring removed from work scope
PBP-9	102	35	0	02/26/96	02/27/96	Barge	SM	
PBP-10	102	35	0	02/22/96	02/23/96	Barge	SM	no TMD
PBP-11	102	32	0	03/11/96	03/12/96	Barge	SM	new boring
PBP-12	102	35	0	03/01/96	03/04/96	Barge	SM	new boring
GBP-1	20	8	2	02/16/96	02/16/96	Failing	AZ	no recovery in 1st TMD tube
GBP-2	20	9	1	02/15/96	02/15/96	Failing	AZ	
GBP-3	16	8	1	02/15/96	02/15/96	ATV	BB	no recovery in TMD tube
GBP-4	28	13	1	02/16/96	02/19/96	ATV	KSK/BB	
GBP-5	14	6	1	02/19/96	02/20/96	ATV	BB	
GBP-6	18	8	1	02/20/96	02/21/96	ATV	BB	
GBP-7	18	8	1	02/21/96	02/21/96	ATV	BB	
ABP-8	77.5	--	--	03/13/96	03/14/96	Watson	MD	
ABP-9	34	--	--	03/14/96	03/14/96	Watson	MD	
GBP-8	14 (35-49)	5	1	03/28/96	03/28/96	Failing	PGN	
GBP-9	6 (83-89)	2	1	04/01/96	04/01/96	Acker	PGN	
SBP-1	10	4	1	02/22/96	02/22/96	ATV	BB	
SBP-2	9	3	1	02/29/96	02/29/96	ATV	KSK	
SBP-3	10	4	1	02/29/96	02/29/96	ATV	KSK	
SBP-4	9	3	1	02/29/96	02/29/96	ATV	KSK	
PC-1	10	5	0	03/01/96	03/01/96	ATV	KSK	Recovered 3" long, 4" dia asphalt core
PC-2	10	5	0	03/01/96	03/01/96	ATV	KSK	Recovered 3" long, 4" dia asphalt core
PC-3	10	5	0	03/01/96	03/01/96	ATV	KSK	Recovered 3" long, 4" dia asphalt core

**Summary of Drilling Activities
Fountain Avenue Landfill
Brooklyn, New York**

Boring number	Depth (ft)	Split-Spoons	Shelby Tubes	Start Date	End Date	Drill Rig	Inspector	Comments
GBF-1	22	8	2	02/19/96	02/19/96	Failing	KSK	
GBF-2	19	8	2	02/21/96	02/21/96	Failing	AZ	
GBF-3	20	9	1	02/21/96	02/21/96	Failing	AZ	
GBF-4	22	10	1	02/22/96	02/23/96	Failing	AZ	
GBF-5	20	8	2	02/22/96	02/22/96	Failing	AZ	
GBF-6	22	6	1	03/04/96	03/05/96	Bombardier	KSK	
GBF-7	24	6	1	03/04/96	03/04/96	Bombardier	KSK	
ABF-8	75	--	--	02/23/96	02/28/96	Watson	MD	
ABF-9	65	--	--	02/16/96	02/20/96	Watson	MD	
ABF-10	93	--	--	02/21/96	02/23/96	Watson	MD	
ABF-11	80	--	--	02/09/96	02/15/96	Watson	MD	
ABF-12	78	--	--	02/29/96	03/12/96	Watson	MD	
GBF-8	2 (75-77)	1	1	03/04/96	03/04/96	Failing	MD	
GBF-9	34 (65-99)	6	1	02/26/96	02/27/96	Failing	AZ	end of garbage at 96? ft based on driller
GBF-10	41 (93-134)	7	0	02/29/96	03/01/96	Failing	AZ	missed TMD - very thin
GBF-11	37 (80-122)	7	1	03/11/96	03/14/96	Failing	KSK	no recovery on Shelby tube
GBF-12	38 (78 to 116)	6	0	03/14/96	03/19/96	Failing	KSK/MD	missed the TMD
SBF-1	6	3	1	03/05/96	03/05/96	Bombardier	KSK	
SBF-2	12	4	2	02/27/96	02/27/96	ATV	KSK	
SBF-3	12	4	2	02/27/96	02/27/96	ATV	KSK	
SBF-4	10	4	1	02/27/96	02/27/96	ATV	KSK	
SBF-5	9	3	1	02/28/96	02/28/96	ATV	KSK	
SBF-6	19	4	2	02/28/96	02/28/96	ATV	KSK	missed TMD during drilling, offset hole and took another tube
SBF-7	8	3	1	02/28/96	02/28/96	ATV	KSK	will not resurvey since area is flat

Prepared by: pgn

Checked by: pgn

4.0 PENNSYLVANIA AVENUE LANDFILL PIER BORINGS

4.1 Existing Pier Investigation

An extension to the existing PAL Pier is proposed to provide a means for cap material to be brought to the site by barge. Geotechnical samples of soil and sediments in the area of the proposed pier extension were collected to provide design information for the necessary footings.

Eleven pier borings (PBP-1 through PBP-12) were advanced by Warren George, Inc. Three borings were advanced on land, and eight borings were advanced over water. Continuous split-spoon samples were collected from the borings to a depth of 50 feet. From a depth of 50 feet and deeper, samples were collected at 5-foot intervals. The boring locations are shown in the drawings included in Section 3.0.

The Work Plan originally called for advancing 10 pier borings. One boring, however, was deleted from the drilling program (PBP-8) due to access problems, and two borings were added (PBP-11 and PBP-12). These modifications were made, with the approval of NYCDEP and NYSDEC, to address slight changes made in the proposed design of the pier extension.

4.2 Pier Road Core Borings

In conjunction with the PAL pier borings, three borings (PC-1, PC-2 and PC-3) were advanced along the paved access road to the pier. Because the road is expected to experience extensive truck traffic as the cap material is transported from the pier to other areas of the landfill, the pier road core borings were advanced to evaluate whether the current road pavement/road base material is suitable to support the expected traffic flow.

From each of the three borings, a 4-inch diameter core of the road pavement was recovered, and continuous split-spoon samples of the road base were collected to a depth of 10 feet below ground surface.

5.0 FOUNTAIN AVENUE LANDFILL PIER/BRIDGE BORINGS

The construction of a bridge across Hendrix Creek was originally proposed to provide capping material access to FAL from the PAL pier. Subsequently, an evaluation of a separate pier at FAL was warranted. A decision to construct either structure has been deferred pending additional evaluation of cost, maintenance and permitting issues. Consequently, exploratory borings for either structure were not advanced during the Geotechnical Investigation as originally planned, but will be conducted once a decision regarding the method of material access to FAL is made.

ATTACHMENT A

GEOTECHNICAL INVESTIGATION WORK PLAN

New York City
Department of
Environmental
Protection

August 8, 1995

Bureau of
Environmental
Engineering

96-05 Horace Harding
Expressway
Corona, NY
11368-5107
718-595-6001

Mr. George Heitzman
Senior Environmental Engineer
Division of Hazardous Waste Remediation
NYS Department of Environmental Conservation
50 Wolf Road
Albany, NY 12233

Re: Pennsylvania/Fountain Avenue Landfills

Dear Mr. Heitzman:

We are enclosing for your review responses to your comments on the Geotechnical Work Plans for the above-captioned sites.

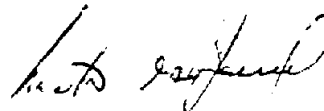
Comments have been prepared by URS Consultants, Inc., along with revised Work Plans incorporating these comments.

Along with your approval of these submittals, a finding of EQBA eligibility is requested.

We expect to authorize URS Consultants to proceed on bid specifications shortly to obtain competitive bids on the geotechnical work.

Should you have any questions please contact me.

Very truly yours,



Martin Gelfand, P.E., Chief
Facilities Design South

CC: George Dakes, URS Consultants



A PROFESSIONAL SERVICES ORGANIZATION

URS CONSULTANTS, INC.

MACK CENTRE II
MACK CENTRE DRIVE
PARAMUS, NEW JERSEY 07652-3905
(201) 262-7000
FAX: (201) 262-9199

ATLANTA
BOSTON
BUFFALO
CLEVELAND
COLUMBUS
DENVER
NEW YORK
NEW ORLEANS
PARAMUS, NJ
SAN FRANCISCO
SEATTLE

August 8, 1995

Mr. Martin Gelfand, P.E., Chief
Facilities Design South
Bureau of Environmental Engineering
NYC Department of Environmental Protection
96-05 Horace Harding Expressway, 5th Floor
Corona, NY 11373-5107

**RE: PENNSYLVANIA/FOUNTAIN AVENUE LANDFILLS (SITES 9224002/3)
PRE-DESIGN GEOTECHNICAL INVESTIGATION WORK PLAN**

Dear Mr. Gelfand:

This letter has been prepared in response to the NYSDEC comment letter of June 1, 1995 (Attachment 1) relative to the draft Pre-Design Geotechnical Investigation Work Plan for the above-referenced sites. For ease of review, we have presented our responses in the same order as the comments.

Limit of Waste Delineation

- The actual property boundaries based on recent surveys have been added to the test trench location plans (Attachment 2). The text has also been revised to reflect the location of the test trenches (Attachment 3). It is to be noted that all of the trenches with the exception of TTP-16 & 17 will be excavated in areas beyond the landfill property boundaries. Although, it is suspected that the State owns the property, this will have to be determined and access to these locations obtained prior to the start of any field activities.
- The proposed initial two-foot depth of excavation in the northern portion of the trenches, near the fenceline, should provide sufficient data for design of drainage structures and cap anchorage assuming these areas contain natural, insitu materials. If waste materials are encountered, the depth of the trenches will be increased until natural soils are encountered.
- If leachate/water is encountered, the equilibrium water level will be measured and recorded as appropriate. It should be noted that the infiltration rates may not be high enough to fill the trenches to the equilibrium level before they are backfilled. In these cases, the depth at which leachate/water is observed flowing into the trench will be measured and recorded.
- During trench excavation, the clean soil will be segregated where possible from the waste materials. For backfilling, the waste materials will be placed first,

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compacted, and then covered with clean soil. Material in the berm will be investigated prior to the trenching to determine its suitability for use as cover for the trenches and for use in filling the low-lying areas along the Belt Parkway. If additional clean fill is required from offsite sources, we will specify "clean soil (i.e., free of waste and/or other contaminants) comparable to the existing cover soils in the area of the trenches."

Bridge/Pier Investigations

- Pursuant to discussions during the meeting with NYCDEP, NYSDEC, URS and the National Park Service (NPS) on July 10, 1995 it was agreed that the best water access for closure of both sites would consist of a bridge located as close as possible to the Belt Parkway right-of-way and modifications to the existing Pennsylvania Avenue Pier. This will allow the site investigations as outlined in the Geotechnical Investigation Work Plan to proceed as shown.
- The PAL text has been revised to reflect the correct total of 10 soil borings (7 offshore and 3 onshore).
- The borings on the FAL drawing have been renumbered, and the table revised accordingly to reflect the correct locations and numbers.
- Engineering properties of the soils encountered during the bridge and pier investigations will be determined as part of Task 2. Table 4-3B provides a summary of the proposed lab testing for each site. The text has been revised to include a list of these tests, and to provide a discussion of the purpose of the tests and sampling strategy.
- The costs associated with the analyses in Table 4-3B are correctly allocated to Task 2 and should not be assigned to Converse's budget.

Stability Investigation

- In regards to NYSDEC's general concern that many of the geotechnical borings, especially the sediment (SB) and perimeter geotechnical (GB) borings may be unnecessary, it should be remembered that the main purpose of the new stability investigation borings is to collect undisturbed samples of the weak soil strata, e.g., the tidal marsh deposit (TMD) and other organic soils, which are expected to play a critical role in the overall stability of the waste mass. These samples will be subjected to standard identification test (grain size, Atterberg limits, moisture content) and physical tests for strength and compressibility (consolidation and CU triaxial tests). The latter tests are required to assess stability and settlement parameters of these soils. These data are currently lacking.

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We would agree, as shown in NYSDEC's table, that geotechnical data was obtained during the RI. However, the primary purpose of the soil samples collected during the RI was to determine the nature and extent of contamination. Consequently, this data is limited to grain size, Atterberg limits and permeability test results. These types of analyses do not provide the strength data needed to input to the computer program to evaluate the stability of the site. The critical parameters regarding the strength of the TMD materials are not available and all the original soil samples were disposed by the laboratory which has subsequently been sold.

As NYSDEC indicated, N-values obtained during the drilling can be correlated to various geotechnical parameters. However, in general usage, N-values are primarily used to provide "Empirical" estimates of strength in cohesionless soils (e.g. sand). For cohesive soils, the N-values should be used very cautiously, and only to provide very preliminary estimates of strength. In addition, when drilling is performed for RI-type projects, the primary intent is to drive the split-spoon to recover samples for chemical analysis. Consequently, the procedures may not be in strict accordance with ASTM D-1586 protocols. As a result, the N-values may not be truly representative of the formations, and will provide inaccurate estimates of the strength. For stability analysis of critical structures such as the landfills, it is imperative that actual strength values for the critical units (i.e., TMD) be obtained by direct sampling and laboratory testing.

The locations of the proposed borings were selected for a variety of reasons which include:

- Alignment with previous borings so geologic cross-sections can be prepared for use in the analyses
- Utilize information from previous borings to guide sampling during this investigation. In particular, the depth and thickness data for the TMD will be utilized to identify the top of the TMD so that undisturbed samples (Shelby tubes) can be collected in this unit without having to "find-it" by split spoon sampling first. This will be particularly critical in areas where the TMD is very thin.
- Allow correlation of new geotechnical data with previous geotechnical data.
- Located in areas where weak soils (TMD) are expected to be encountered and there is potential for deep-seated failure to occur. Additionally, because any instability would likely occur by shearing through the weak organic and/or TMD units, it is important to know the vertical and lateral

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extent and characteristics of these units especially at, and for some distance, beyond the perimeter.

- The overall distribution of the borings was intended to provide a good, representative sampling of the TMD site-wide (each landfill) so the full range of geotechnical parameters associated with this unit can be defined.
- In regard to the selection of samples for geotechnical testing, the samples will be selected after all borings are completed and the disturbed and undisturbed samples are examined in the laboratory. Until this occurs, the exact borings or units to be tested cannot be decided. Often, "undisturbed" samples of organic soils, soils with granular layers or seams, and soils with limited thickness will not be suitable for physical testing. Good quality disturbed samples are difficult to obtain.

So, although we plan to recover "undisturbed" samples from all borings, we considered that only a portion of these would be tested. The physical test results will be correlated with the other new borings and to the existing borings using the identification tests and N-value data.

- The detailed descriptions regarding drilling and sampling methodology will be addressed in the drilling specifications which are currently being prepared based on the proposed geotechnical investigation work plan. A draft copy of the solicitation package will be submitted to NYSDEC for review, prior to requesting quotations from potential subcontractors.
- In most cases, the thickness of the TMD in the vicinity of the proposed boring locations has previously been determined. The primary objective of the new borings is to obtain high quality samples for geotechnical testing. Consequently, it is not necessary to fully penetrate the TMD in these borings. Should it be necessary to determine the thickness of the TMD at selected locations, then appropriate precautions (e.g., casing the hole into the upper part of the TMD and sealing the TMD portion of the hole with bentonite) will be instituted. These procedures will be included in the drilling specifications.
- Borings GBP-10, -11, and -12 were added at the request of NYCDEP.
- With regard to the project budget, the actual cost estimated for Converse's services is \$81,708.00 total. This cost has been distributed appropriately to both sites (\$49,047 - Fountain/\$32,661 - Pennsylvania) and Table 4-4 of both work plans has been revised accordingly.
- Table 4-4A of the FAL work plan has been revised to reflect the correct unit rate for grouting.

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Additionally, all the tables have been checked and revised accordingly to reflect the correct per-diem rates for the drill crew. Other revisions to the tables have also been made to correct additional errors in the first draft submittal.

Settlement Evaluation

- Methodologies for piezocone soundings and pressure meter borings will be provided in the drilling specifications. A copy of the preliminary draft sections pertaining to these activities is attached for your information (Attachment 4). Additionally, a brief discussion of the pressuremeter testing is provided below.

The purpose of the prebored pressuremeter (PBPM) testing program is to obtain physical geotechnical properties of the refuse. The procedure for the pressuremeter test is described in the ASTM standard (ASTM D4719-87) entitled "Standard Test Method for Pressuremeter Testing in Soils". The pressuremeter is a cylindrical device designed to apply uniform pressure to the walls of a borehole by means of a flexible membrane. The pressuremeter is installed in a vertical pre-drilled hole, at predetermined depths, and is connected to a control unit at the ground surface. The membrane in the pressuremeter is expanded against the surrounding medium by means of fluid under pressure. Outward radial deformation of the medium being tested occurs as the membrane expands. The object of the pressuremeter test is to obtain the relationship between the applied pressure and deformation of the medium being tested. Deformation is determined by monitoring the volume by fluid injected into the measuring cell of the pressuremeter. Corrections are made to the measurements of pressure and volume to account for effects of system compressibility and membrane resistance. The pressure-volume measurements allow the determination of the stress-strain characteristics of the medium tested. The dimensions of the pressuremeter used are as follows:

Length of rubber membrane:	70 cm
Diameter of Probe:	70 mm

A preliminary draft regarding construction of the load test cell is attached (Attachment 4). The final version will be included in the drilling specifications.

In regards to monitoring of the test cell, the settlement plate monitoring should be done daily during the load test construction. Dimensions of the fill should also be measured on a daily basis. Once complete, the settlement plates should be monitored every two days until the decline in settlement rate suggests that less frequent monitoring is appropriate. We expect that a total of about 30 monitoring episodes will be sufficient.

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If C&D waste is used for construction of the load test cell, the average in-place unit weight can be determined by weighing incoming trucks and measuring the dimensions of the fill. A portable truck scale can be set up for this. Overall settlement which is indicated by the settlement plates is not sensitive to local variation in the unit weight of the applied fill, but rather reflects an overall loading of the compressible waste mass over the entire fill area.

If offsite materials are required for construction of the load test cell, quotes will be obtained for supply and placement of the materials. The \$28/yd³ was only utilized for estimating purposes. This price may be considerably lower if on-site sources, possibly the berm located along the Belt Parkway, or nearby sources of suitable material can be used.

Once the NYSDEC has reviewed and accepted the responses to their comments, we will complete revision of the pre-design Geotechnical Work Plans to incorporate any applicable changes. In particular, Converse's Scope of Work will be expanded to provide additional detail. Where appropriate, additional materials (e.g. draft drilling specifications) will be included as attachments.

The schedule for this work will also be revised accordingly.

We feel that these responses should adequately address the NYSDEC's comments. However, should you need additional information or clarifications please call.

Very truly yours,

URS CONSULTANTS, INC.

George Dakes, P.E.
Project Manager

encl

cc: T. Lawson
R. Henschel
I. Oweis

**ATTACHMENT 1
NYSDEC COMMENT LETTER
(JUNE 1, 1995)**

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-7010



June 1, 1995

RECEIVED Michael D. Zagata
URS CONSULTANTS Commissioner

JUN 8 1995

JOB # _____

Mr. Martin Gelfand, P.E., Chief
Facilities Design South
Bureau of Environmental Engineering
NYC Department of Environmental Protection
96-05 Horace Harding Expressway, 5th Floor
Corona, NY 11373-5107

Dear Mr. Gelfand:

Re: Pennsylvania/Fountain Avenue Landfills (Sites #224002/3)
Pre-Design Geotechnical Investigation Work Plan

Limit of Waste Delineation

The work plan for the test pit investigation is generally acceptable, except for the following minor comments. The location map is based on the April 1993 survey and references the "Assumed Property Limit" as the basis for the start of many of the perimeter trenches. Based on the December 1994 survey and recent Title survey, sufficient information should be available to define the property boundary on the location map and in the field. Also, does the initial two foot depth of the trench provide sufficient data for design of drainage structures and cap anchorage at the perimeter of waste? If leachate enters the open trench (pg 5, bottom), the equilibrium water level should be measured and recorded.

DEC will require that sufficient trench cover material is available before trenching begins. The material specifications, delivery and storage provisions should be included in draft specifications for our review and approval. In the note to FAL Table 4-2A, the existing berm along the Belt Parkway may contain a significant portion of waste and may not be suitable for grading materials.

Bridge/Pier Investigations

As we have discussed in previous coordination meetings, DEC will not approve proceeding with the pier and bridge boring investigation until the Materials Delivery Study is approved and the final configuration of transportation facilities is agreed upon.

The PAL text references 8 soil borings associated with the pier improvements (7 offshore + 1 onshore), yet the figure indicates 10 borings (7 offshore + 3 onshore). The PAL figure does not show a proposed location for boring SBF-4. In both the Pier Improvement and Hendrix Bridge Investigations, the text states that "Other engineering properties of the critical subsurface soil layers that may impact the design will be obtained as part of Task 3 of the Scope of Work." As discussed below, DEC questions whether the amount of laboratory analyses estimated in Task 3 is sufficient for the number of borings associated with the stability analysis. It is not clear that the additional needs of the bridge and pier investigations have been included in the Task 3 analytical scope. In Table 4-3B for both sites, the

analytical schedule lists the 6 grain size analyses discussed in the text, but the remaining analyses are not referenced in the text. The purpose of those tests and sampling strategy should be explained in the work plan. Are these the "other engineering properties" to be obtained as part of Task 3? If so, should the cost of these analyses be part of the Converse budget?

Stability Investigation

The Stability Investigation portion of the Work Plan contains insufficient detail and too many inconsistencies to be approved in its present form. The Converse letter was intended as a scope of work, and does not provide the level of detail required for a work plan. Generally, DEC continues to question the need for many of the geotechnical borings, especially the Sediment (SBP) and perimeter Geotechnical (GBP) borings, in light of the geotechnical information already available from the Remedial Investigation.

Appendix I of the RI contains grain size analyses from Offshore Boring TMD samples and grain size and Atterberg limits for TMD samples from on-site borings. The enclosed tables list the geotechnical data already available from the RI. In addition, RI Appendices B and C list Standard Penetration Test (SPT) results for all split spoon samples taken from RI borings. Because N-values from the SPT may be correlated to several geotechnical parameters, estimates of those parameters may be obtained from existing data. The location of many of the proposed borings are also close enough to previous borings to question their need, and others are located in areas with low potential for instability (GBP-1 through GBP-4, GBF-1). The Introduction to the settlement/stability investigation work plan should clearly justify the need for the proposed borings and summarize the perceived data gaps in the RI geotechnical data. The final boring locations and sampling intervals and analyses should be selected and justified to optimize the collection of data that may be missing from the RI.

Another concern is the lack of a clear description of where geotechnical samples will be taken and what they will be analyzed for. For the 25 perimeter borings and 7 interior borings to be taken at both sites, the scope of work calls for only 10 particle size analyses, 10 Atterberg Limit and 10 compressive strength tests. This suggests that borings will be drilled for which no laboratory analyses will be performed, raising questions as to their purpose. If the Standard Penetration Tests are the primary data to be collected in the borings, then the existing RI data should be sufficient for the stability evaluation.

The work plan contains no details regarding drilling and sampling methodology. These should be addressed in the draft drilling specifications submitted for our review. The scope of work states that the thickness of the TMD ("organic soils") is of concern (Section 2.A.1.), yet the borings will be terminated in the TMD, apparently preventing a measurement of the full thickness of the unit.

Also, borings GBP-10, GPB-11 and GBP-12 appear to be related to improvements to the access road to the 26th Ward POTW, and are off of the landfill property. Unless there is a closure-related purpose to these locations, the cost of the borings and consultant oversight will not be eligible for EQBA reimbursement.

With regard to the project budget, the cost estimate in Converse's letter (\$ 81,300 total) is inconsistent with subcontractor costs listed in Table 4-4 of both work plans (\$48,780 Fountain, \$18,120 Penn). In Table 4-4A, (pg 2) of the FAL work plan, the unit cost for grouting the piezocone borings (\$50/ft) is inconsistent with that listed in the PAL budget, resulting in an order of magnitude

overestimate of the total cost. Also the per diem cost estimate for the drill crew in the PAL piezocone estimate is inconsistent with the others.

Settlement Evaluation

This portion of the work plan also lacks sufficient detail for approval. Methodologies for piezocone soundings and pressuremeter testing should be provided, along with any other field monitoring and instrumentation programs. The test load program should include a specific description of the monitoring to be performed before, during and after the load is applied. Because the historic settlement data and projected thickness of grading fill are presently available, it would seem that a preliminary surcharge location could be selected and a more specific work plan could be provided. Construction debris, which is listed as a possible surcharge material, is not likely to have a uniform density and estimatable unit weight in an unprocessed state. DEC also believes that \$28/yd³ is an unrealistic cost estimate for surcharge material when topsoil has been placed at the site for \$20/yd³.

I look forward to meeting with you at your earliest convenience to discuss these issues further.

Sincerely,



George W. Heitzman, P.E.
Senior Environmental Engineer
Division of Hazardous Waste
Remediation

enclosures

cc: L. Klein, DEP
L. Kan, DEP
G. Dakes, URS
T. Lawson, URS

**FOUNTAIN AVENUE LANDFILL
SUMMARY OF RI GEOTECHNICAL DATABASE**

WELL No.	DEPTH OF SAMPLE FOR GRAIN SIZE DISTRIBUTION	ATTERBERG LIMITS	PERMEABILITY
TB-4 ST1	14'-16'	Y	Y
TB-12 ST1	20'-22'	Y	Y
TB-20 ST1	76'-78.5'	Y	Y
TB-22 ST1	40'-42'	Y	Y
HF-602U ST2	17'-19'	Y	Y
HF-602U	17'-19'		
HF-607U ST1	83'-85.5'	Y	Y
TB-1 S-4	9'-11'		
TB-2 S-5	13'-15'		
TB-3 S-7	20'-22'		
TB-5 S-11	85'-87'		
TB-6 S-10	75'-77'		
TB-7 S-7	34'-36'		
TB-10 S-11	65'-67'		
TB-13 S-12	100'-102'		
TB-14 S-13	98'-100'		
TB-14 S-9	88'-90'		
TB-5 S-10	80'-82'		
TB-18 S-11	108'-110'		
HF-113U S15	120'-122'		
HF-113U S18	126'-128'		
HF-115 S9	70'-72'		
HF-602U S3	7'-9'		
HF-603U S7	15'-17'		
HF-606U S13	84'-86'		
HF-109S	35'-37'		
HF-602S	30'-32'		

WELL No.	DEPTH OF SAMPLE FOR GRAIN SIZE DISTRIBUTION	ATTERBERG LIMITS	PERMEABILITY
HF-602D	68'-70'		
HF-603S	34'-36'		
HF-603D	68'-70'		
HF-608S	32'-36'		
HF-608D	70'-72'		
HF-25	50'-52'		
HF-608U	4'-6'	Y	Y
HF-2D	88'-90'		
HF-604S	35'-37'		
HF-604D	75'-77'		
HF-605S	150'-152'		
BFU	3.5'-5.5'		
BFD	67'-69'	Y	
HF-115S	87'-89'		
HF-115D	126'-128'		
BFS	27'-29'		
HF-605U	131'-133'		
HF-605D	181'-183'		
OSF-1A	2.5'-6.5'		
OSF-1A	6.5'-14.0'		
OSF-8	1.0'-6.5'		
OSF-8	6.5'-14.0'		
OSF-16	0.0'-2.0'		
OSF-16	2.0'-10'		
OSF-19A	0.0'-3.0'		
OSF-19A	3.0'-10.0'		
OSF-22A	0.0'-4.5'		

WELL No.	DEPTH OF SAMPLE FOR GRAIN SIZE DISTRIBUTION	ATTERBERG LIMITS	PERMEABILITY
OSF-22A	4.5'-7'		
OSF-27B	5.5'-8.0'		
OSF-27B	8.0'-13'		
OSF-31B	4.01'-8'		
OSF-31B	8.0'-13'		
HF-606S	105'-107'		
HF-606D	139'-141'		
TB-19	130'-132'		
HF-2 UST1	29'-31.5'		
HF-608 UST1	16'-18.5'		
BFD ST-1	10'-12.5'		
TB-15	104'-106'		
BUPTA	0"-3"		
SS-2	0"-3"		
SS-6	0"-6"		
SS-9	0"-3"		
SS-11	0"-3"		
SS-14	0"-3"		

**PENNSYLVANIA AVENUE LANDFILL
SUMMARY OF RI GEOTECHNICAL DATABASE**

WELL No.	DEPTH OF SAMPLE FOR GRAIN SIZE DISTRIBUTION	ATTERBERG LIMITS	PERMEABILITY
HP-407U	16'-18.5'	Y	Y
HP-308A	33'-35.5'	Y	Y
HP-307A	34'-36.5'	Y	Y
HP-409	40'-42.5'	Y	Y
HP-604	29'-31.5'	Y	Y
HP-104A	14.5'-17'	Y	Y
HP-502U	86'-88.5'	Y	
HP-603	16'-18.5'	Y	
HP-406D	26'-28.5'	Y	Y
HP-105D	41'-43.5'		
HP-104A	7'-9'		
HP-105A	35'-37'	Y	Y
HP-204A	45'-47'		
HP-307A	26'-28'		
HP-308A	31'-33'		
HP-406U	20'-22'		
HP-406S	44'-46'		
HP-407U	10'-12'		
HP-409U	34'-36'		
HP-502A	79'-81'		
HP-602	36'-38'		
HP-603	12'-14'		
HP-604	20'-22'	Y	
HP-407S	29'-31'		
HP-407D	63'-65'		
HP-406D	79'-81'		
HP-501S	103'-105'		

WELL No.	GRAIN SIZE DISTRIBUTION	ATTERBERG LIMITS	PERMEABILITY
HP-503S	101'-103'		
HP-401S	81'-83'		
HP-401D	117'-119'		
HP-503D	141'-143'		
HP-501D	141'-143'		
HP-409S	55'-57'		
HP-BPU	10'-12'		
HP-BPS	37'-39'		
HP-BPD	78'-80'		
OSP-3A	1.5'-4.5'		
OSP-3A	4.5'-12.5'		
OSP-7A	0.0'-5.0'		
OSP-7A	5.0'-9.5'		
OSP-13	0.0'-4.0'		
OSP-13	5.0'-7.0'		
OSP-15	0.0'-5.5'		
OSP-15	5.5'-9.0'		
OSP-17	0.0'-3.0'		
OSP-17	3.0'-9.0'		
OSP-19	1.5'-4.0'		
OSP-19	4.0'-6.0'		
OSP-12	2.0'-6.0'		
BPU ST1	18'-20.5'	Y	Y
SS-10	0"-3"		
SS-9	0"-6"		
SS-8	0"-3"		
SS-3	0"-3"		
SS-5	0"-3"		

ATTACHMENT 2
REVISED SITE INVESTIGATION PLANS

ATTACHMENT 3
REVISED PRE-DESIGN GEOTECHNICAL
INVESTIGATION WORK PLANS

**PRE-DESIGN
GEOTECHNICAL INVESTIGATION
WORK PLAN
FOR
PENNSYLVANIA AVENUE LANDFILL
BROOKLYN, NEW YORK**

PREPARED FOR

**THE NEW YORK CITY DEPARTMENT
OF ENVIRONMENTAL PROTECTION
BUREAU OF ENVIRONMENTAL ENGINEERING**

**PREPARED BY:
URS CONSULTANTS, INC.**

(REVISED)

JULY 1995

1.0 INTRODUCTION

1.1 Background

Section 6-4 of the Final Feasibility Study (FS) for Fountain Avenue dated September 1994 indicates that in order to proceed with a detailed design and implementation of the recommended remedial alternative, design specific supplemental investigations must be conducted.

The focus of this Work Plan is to outline the scope of work; schedule; and related costs associated with performing the following supplemental pre-design investigations:

- Limit of waste delineation,
- Existing Pier Improvements, and
- Landfill Settlement/Stability Investigation

The objective of this predesign investigation is to supplement the data obtained during the Remedial Investigation (RI) as necessary, and to adequately evaluate the following components of the recommended closure alternative:

- Overall (global) stability of the landfill under both short term and long term conditions
- Settlement of the landfill under both short term and long term conditions; and
- Stability of the landfill during construction activities.

In addition, the objective of this investigation is to obtain the necessary geotechnical data to adequately design the following components of the recommended closure system.

- Cap system,
- Surface drainage system,
- Gas migration system along the Belt Parkway,
- Gas recovery system,
- Shoreline protection system, and
- Existing pier improvements

This Work Plan addresses the NYSDEC's and NYCDEP's review comments on the Draft Predesign Geotechnical Investigation Work Plan, dated December 1994.

1.2 Overview of the Proposed Scope of Work

Section 2.0 of this Work Plan presents a detailed discussion of the proposed scope of work. In summary, the following three major tasks will be performed:

Task 1 - This task will involve activities related to the test trenching and limits of waste delineation along the Belt Parkway.

Task 2 - This task will involve activities related to the subsurface investigation and foundation design for the existing pier improvements.

Task 3 - This task will involve activities related to an evaluation of settlement and stability for the landfill. It will also involve activities related to the design of the landfill cap, surface drainage; gas recovery; gas migration; monitoring; and shoreline protection systems.

A proposed schedule and breakdown of costs are presented in Sections 3.0 and 4.0 respectively. This work will be provided under a modification to URS' current contract, dated January 1993 with the NYCDEP.

2.0 SCOPE OF WORK

2.1 General

The geotechnical investigations for this site have been grouped into three major tasks: Task 1 - Limit of Waste Delineation, Task 2 - Existing Pier Improvements, and Task 3 - Landfill Settlement/Stability Investigation. The following subsections provide a detailed description of the Scope of Work for each of these tasks.

2.2 Task 1 - Limit of Waste Delineation

The purpose of this field investigation is to define the lateral and vertical extent of waste within a minimum 25 foot wide corridor along the northern edge of the site parallel to the Belt Parkway. This information will be used to: determine the tie-in details for the northern boundary of the landfill cap; identify potential locations for the Contractor's staging and storing of materials and temporary facilities; and identify potential locations for surface drainage features and gas monitoring system. The limits of waste along the other three sides of the landfill have been adequately characterized during the RI phase of this project.

Drawing No. 1 presents the approximate location of the proposed test trenches. In general, a tracked backhoe with a minimum arm capability of 15 feet will be utilized to excavate the test trenches along the northern edge of the site. Trenches will be completed under the supervision of a URS geotechnical engineer/geologist.

For planning purposes, spacing of the test trenches is estimated to be approximately 100 feet as shown on Drawing No. 1. The distances between trench locations may be modified by URS field personnel based on accessibility and visual field observations. We anticipate that a total of 30 test trenches (TTP-1 to -30) will be completed during this study. Additional trenches will be added as necessary in areas requiring further delineation.

In order to facilitate access for the backhoe, preliminary site preparation of the proposed trenching area will be provided by means of a bulldozer. Additionally, the property boundary and a 25 foot wide corridor parallel to the fenceline (edge of the site) will be surveyed and located by URS prior to start of the trenching operation. Proceeding from the fenceline inward, the backhoe will excavate a 1 to 2 foot deep trench until continuous waste is encountered. If this point is less than 25 feet from the fenceline, the trench will be extended horizontally to the inside edge of the 25 foot wide corridor to obtain information about the continuity of the thickness of the waste. The points at which trace of waste or continuous waste were first noted will be marked and surveyed. The trench between the point where continuous waste was first detected and the inside edge of the 25-foot corridor will be extended vertically to the bottom of waste. The depth of the trenches in this zone is anticipated to be approximately 5 to 15 feet. Leachate/water is anticipated to enter the open trenches and may restrict the minimum anticipated depth of the trenches at certain locations. Excavated areas will be restored by backfilling the trenches with the excavated waste, compacting it with the backhoe bucket, and placing six inches of suitable cover soil material on top of backfilled trenches.

The test trenching activities will be conducted in accordance with the existing approved site Health and Safety Plan for field investigations. During the test trenching activities, particulate

monitoring will be conducted, hourly, in the work area as well as downwind and upwind of the work area. In addition, the test trenches will be screened with a Photoionization Detector (PID) and a LEL meter for volatile organic compounds and explosive atmospheres, respectively. Furthermore, during the test trenching activities gas/dust suppression controls such as exhaust fans and water trucks etc. will be utilized to control offsite migration of these elements.

2.3 Task 2 - Existing Pier Improvements

The purpose of this investigation is to obtain geotechnical data to be used for the foundation design of the existing pier extension.

Ten (10) soil borings (PBP-1 to -10) will be drilled to obtain subsurface information. Drawing No. 1 shows that approximate location of the proposed borings. Seven (7) standard geotechnical soil borings will be drilled offshore near the proposed pier extension location. Three (3) onshore soil borings will be taken at alternate pier locations. Boring depths are estimated at 100 feet.

All borings will be completed under the supervision of a URS engineer/geologist. The proposed boring locations shown on Drawing No. 1 may be modified by URS personnel depending upon field conditions. In addition, unexpected soil conditions may require consideration for additional borings or vertical extension of the proposed borings.

The boring will be advanced with a truck/barge mounted drill rig equipped with a 4-1/4" diameter Hollow Stem Augers (HSA)

At each boring location, Standard Penetration Tests (SPT) will be performed continuously from 0 to 50 feet and every 5-foot from 50 feet down to the termination depth of the borings. The SPT will be performed in accordance with ASTM D-1586 procedures. Soil samples will be collected where SPT's are being performed. Each sample will be classified by URS field personnel in accordance with the ASTM D-2487 or D-2488, and D-2607 where applicable. In addition, selected soil samples will be submitted for geotechnical laboratory testing to determine their grain size distribution curves, organic content, Atterberg limits, moisture contents, compressive strength, shear strength, consolidation curve, and to help the geologist in preparing the final soil boring logs. A summary of the type and approximate number of tests to be performed is presented in Table 4-3B.

Samples will be selected for laboratory testing by the geologist following completion of the boring program. A minimum of one sample from each of the different geologic units encountered will be analyzed for the routine geotechnical properties. In cases where soft or cohesive materials are encountered (i.e., TMD) a shelby tube sample will be collected in accordance with ASTM D-1587 procedures. A representative sample of the TMD will be submitted for strength testing. Additionally, geotechnical testing data obtained during Task 3 for the various soil units will be utilized to supplement the soils data gathered during Task 2, and increase the size of the database.

The soil boring activities will be conducted in accordance with the existing approved site Health and Safety Plan for field investigations. During the drilling activities, the boreholes will be screened with a PID and LEL meter for volatile organic compounds and explosive atmospheres respectively.

2.4 Task 3 - Settlement/Stability Investigation

The purpose of this investigation is to obtain supplemental data to adequately evaluate the overall stability of the landfill; to evaluate the settlement characteristics of the landfill under both short term and long term conditions, and to evaluate the stability of the landfill during the construction activities.

The attached scope of work (Attachment No. 1) developed by URS's proposed subconsultant Converse Consultants East (Converse) describes the proposed program for this task.

3.0 SCHEDULE

The anticipated schedule for the pre-design geotechnical investigation for this site is as follows:

Receipt of NYSDEC approval of Work Plan	- September 15, 1995
Advertise for bids	- October 9, 1995
Receipt of bids	- October 23, 1995
Contractor award	- November 17, 1995
Commence field work	- December 1, 1995
Complete field work	- February 9, 1996
Receipt of all laboratory results/summary of boring logs complete	- March 9, 1996
Final Report	- April 10, 1996

4.0 COST

Table 4-1 presents a summary of our estimated total cost to complete the tasks identified in this Work Plan. Tables 4-2 through 4-4 provide a detailed breakdown of the costs associated with each task.

As presented in Table 4-1, the total estimated cost is \$360,720.90.

TABLE 4-1**PRE-DESIGN GEOTECHNICAL INVESTIGATION
COST SUMMARY****PENNSYLVANIA AVENUE LANDFILL**

CLASSIFICATION	LABOR RATE	HOURS	COST
Principal (IX)	\$112.15	6	\$672.90
Project Manager (VIII)	\$112.15	100	\$11,215.00
Sr. Project Eng. (VII)	\$90.50	68	\$6,154.00
Geotechnical Eng. (VI)	\$73.90	404	\$29,855.60
Geologist (V)	\$61.75	578	\$35,691.50
Surveyor (III)	\$37.65	186	\$7,002.90
Technician (II)	\$37.25	130	\$4,842.50
Drafter (II)	\$37.25	58	\$2,160.50
Technician (I)	\$25.90	90	\$2,331.00
TOTAL LABOR			\$99,925.90
TRAVEL			\$3,000.00
EQUIPMENT AND MATERIAL COSTS			
ITEM	RATE (PER DAY)	DAYS	COST
Health & Safety (D&C)	\$40.00	41	\$1,640.00
PID	\$45.00	41	\$1,845.00
Explosimeter	\$44.00	41	\$1,804.00
Dust Meter	\$45.00	41	\$1,845.00
Miscellaneous	LS		\$300.00
TOTAL EQUIPMENT AND MATERIAL COSTS			\$7,434.00
TOTAL LABOR			\$99,925.90
TOTAL TRAVEL			\$3,000.00
TOTAL EQUIPMENT AND MATERIAL			\$7,434.00
TOTAL SUBCONTRACTOR COSTS			\$250,361.00
TOTAL TASK			\$360,720.90

TABLE 4-2

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 1 - LIMIT OF WASTE DELINEATION (SUMMARY)**

PENNSYLVANIA AVENUE LANDFILL

LABOR			
CLASSIFICATION	RATE	HOURS	COST
Principal (IX)	\$112.15	2	\$224.30
Project Manager (VIII)	\$112.15	4	\$448.60
Sr. Project Eng. (VII)	\$90.50	4	\$362.00
Geotechnical Eng. (VI)	\$73.90	54	\$3,990.60
Geologist (V)	\$61.75	104	\$6,422.00
Surveyor (III)	\$37.65	46	\$1,731.90
Technician (II)	\$37.25	30	\$1,117.50
Drafter (II)	\$37.25	10	\$372.50
Technician (I)	\$25.90	10	\$259.00
TOTAL LABOR			\$14,928.40
TRAVEL			\$1,000.00
EQUIPMENT AND MATERIAL COSTS			
ITEM	RATE (PER DAY)	DAYS	COST
Health & Safety (D&C)	\$40.00	8	\$320.00
PID	\$45.00	8	\$360.00
Explosimeter	\$44.00	8	\$352.00
Dust Meter	\$45.00	8	\$360.00
Miscellaneous	LS		\$100.00
TOTAL EQUIPMENT AND MATERIAL COSTS			\$1,492.00
SUBCONTRACTOR COSTS			
Test Trenching (Table 4-2A)			\$31,820.00
TOTAL SUBCONTRACTOR COSTS			\$31,820.00
TOTAL LABOR			\$14,928.40
TOTAL TRAVEL			\$1,000.00
TOTAL EQUIPMENT AND MATERIAL			\$1,492.00
TOTAL SUBCONTRACTOR COSTS			\$31,820.00
TOTAL TASK			\$49,240.40

TABLE 4-2A**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 1 - LIMIT OF WASTE DELINEATION****PENNSYLVANIA AVENUE LANDFILL****SUBCONTRACT TRENCHING COST ESTIMATE**

ITEM/ACTIVITY	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Mob/Demob Backhoe	LS	1	\$1,500.00	\$1,500.00
Backhoe & Operator	Hr	60	\$85.00	\$5,100.00
Per Diem (Operator)	Manday	8	\$140.00	\$1,120.00
Steam Cleaner	LS	1	\$100.00	\$100.00
Bulldozer & Labor	Hr	40	\$100.00	\$4,000.00
Mob/Demob Dozer	LS	1	\$1,500.00	\$1,500.00
Per Diem Operator	Manday	5	\$140.00	\$700.00
Clean Cover Soil	CY	100	\$28.00	\$2,800.00
Gas Control/Dust Suppression	LS	1	\$15,000.00	\$15,000.00
				\$31,820.00

TABLE 4-3

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 2 - EXISTING PIER IMPROVEMENTS (SUMMARY)**

PENNSYLVANIA AVENUE LANDFILL

CLASSIFICATION	LABOR RATE	HOURS	COST
Principal (IX)	\$112.15	2	\$224.30
Project Manager (VIII)	\$112.15	16	\$1,794.40
Sr. Project Eng. (VII)	\$90.50	24	\$2,172.00
Geotechnical Eng. (VI)	\$73.90	160	\$11,824.00
Geologist (V)	\$61.75	204	\$12,597.00
Surveyor (III)	\$37.65	40	\$1,506.00
Technician (II)	\$37.25	40	\$1,490.00
Drafter (II)	\$37.25	8	\$298.00
Technician (I)	\$25.90	20	\$518.00
TOTAL LABOR			\$32,423.70
TRAVEL			\$1,000.00
EQUIPMENT AND MATERIAL COSTS			
ITEM	RATE (PER DAY)	DAYS	COST
Health & Safety (D&C)	\$40.00	17	\$680.00
PID	\$45.00	17	\$765.00
Explosimeter	\$44.00	17	\$748.00
Dust Meter	\$45.00	17	\$765.00
Miscellaneous	LS		\$100.00
TOTAL EQUIPMENT AND MATERIAL COSTS			\$3,058.00
SUBCONTRACTOR COSTS			
Offshore Drilling (Table 4-3A)			\$82,670.00
On Shore Drilling (Table 4-3A)			\$10,340.00
Geotechnical Lab (Table 4-3B)			\$2,980.00
TOTAL SUBCONTRACTOR COSTS			\$95,990.00
TOTAL LABOR			\$32,423.70
TOTAL TRAVEL			\$1,000.00
TOTAL EQUIPMENT AND MATERIAL			\$3,058.00
TOTAL SUBCONTRACTOR COSTS			\$95,990.00
TOTAL TASK			\$132,471.70

TABLE 4-3A

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 2 - EXISTING PIER IMPROVEMENTS**

PENNSYLVANIA AVENUE LANDFILL

SUBCONTRACT DRILLING

OFFSHORE DRILLING ITEM	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Drilling 0-50'	LF	350	\$60.00	\$21,000.00
Drilling 50-100'	LF	350	\$75.00	\$26,250.00
SS 0-50' Sampling	Ea.	175	\$50.00	\$8,750.00
undist. ST. Sampling	Ea.	4	\$100.00	\$400.00
SS 50-100' Sampling	Ea.	70	\$75.00	\$5,250.00
Per Diem for Drill Crew	Crewday	14	\$280.00	\$3,920.00
Mob/Demob	LS	1	\$15,000.00	\$15,000.00
Standby Time	Hr.	14	\$150.00	\$2,100.00
				\$82,670.00

ONSHORE DRILLING ITEM	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Drilling 0-50'	LF	100	\$17.00	\$1,700.00
Drilling 50-100'	LF	50	\$19.00	\$950.00
SS 0-50' Sampling	Ea.	50	\$20.00	\$1,000.00
SS 50-100' Sampling	Ea.	10	\$30.00	\$300.00
Grouting Boreholes	LF	150	\$11.00	\$1,650.00
Standby Time	Hr.	2	\$150.00	\$300.00
Mob/Demob	LS	1	\$3,000.00	\$3,000.00
Per Diem for Drill Crew	Crewday	3	\$280.00	\$840.00
Steam Cleaner	Day	3	\$200.00	\$600.00
				\$10,340.00

TOTAL ESTIMATED DRILLING COST

\$93,010.00

Notes:

1. SS = Split Spoon Sampling
2. 0-50 ft Continuous Sampling
3. 50-100 ft 5' interval sampling
4. Off shore borings 7 @ 100LF/ea
5. On shore boring 1 @ 100LF and 2 @ 25LF/ea

TABLE 4-3B

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 2 - EXISTING PIER IMPROVEMENTS**

PENNSYLVANIA AVENUE LANDFILL

SUBCONTRACT GEOTECHNICAL TESTING COST ESTIMATE

ITEM/ACTIVITY	UNITS	ESTIMATED QUANTITY	LEVEL D UNIT COST	TOTAL
Grain Size Analysis	Ea.	6	\$100.00	\$600.00
Organic Content	Ea.	10	\$40.00	\$400.00
Compressive Strength	Ea.	4	\$200.00	\$800.00
Atterberg Limits	Ea.	4	\$75.00	\$300.00
Moisture Content	Ea.	16	\$5.00	\$80.00
1-D Consolidation	Ea.	1	\$400.00	\$400.00
Triaxial Shear Strength	Ea.	1	\$400.00	\$400.00
				\$2,980.00

TABLE 4-4

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 3 - SETTLEMENT/STABILITY INVESTIGATION (SUMMARY)**

PENNSYLVANIA AVENUE LANDFILL

CLASSIFICATION	LABOR RATE	HOURS	COST
Principal (IX)	\$112.15	2	\$224.30
Project Manager (VIII)	\$112.15	80	\$8,972.00
Sr. Project Eng. (VII)	\$90.50	40	\$3,620.00
Geotechnical Eng. (VI)	\$73.90	190	\$14,041.00
Geologist (V)	\$61.75	270	\$16,672.50
Surveyor (III)	\$37.65	100	\$3,765.00
Technician (II)	\$37.25	60	\$2,235.00
Drafter (II)	\$37.25	40	\$1,490.00
Technician (I)	\$25.90	60	\$1,554.00
TOTAL LABOR			\$52,573.80

TRAVEL	\$1,000.00

EQUIPMENT AND MATERIAL COSTS

ITEM	RATE (PER DAY)	DAYS	COST
Health & Safety (D&C)	\$40.00	16	\$640.00
PID	\$45.00	16	\$720.00
Explosimeter	\$44.00	16	\$704.00
Dust Meter	\$45.00	16	\$720.00
Miscellaneous	LS		\$100.00
TOTAL EQUIPMENT AND MATERIAL COSTS			\$2,884.00

SUBCONTRACTOR COSTS

Geotechnical Drilling (Table 4-4A)	\$27,490.00
Bucket Auger Drilling (Table 4-4A)	\$48,930.00
Piezcone Testing (Table 4-4A)	\$8,710.00
Pressure Meter Drilling/Testing (Table 4-4A)	\$4,760.00
Converse (Table 4-4B)	\$32,661.00
TOTAL SUBCONTRACTOR COSTS	\$122,551.00

TOTAL LABOR	\$52,573.80
TOTAL TRAVEL	\$1,000.00
TOTAL EQUIPMENT AND MATERIAL	\$2,884.00
TOTAL SUBCONTRACTOR COSTS	\$122,551.00
TOTAL TASK	<u>\$179,008.80</u>

TABLE 4-4A

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 3 - SETTLEMENT/STABILITY INVESTIGATION**

PENNSYLVANIA AVENUE LANDFILL

SUBCONTRACT DRILLING COST ESTIMATE

GEOTECHNICAL BORINGS	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Drilling 0-50' Onshore	LF	270	\$17.00	\$4,590.00
Drilling 50-100' Onshore	LF	20	\$19.00	\$380.00
SS 0-50' Sampling Onshore	Ea.	135	\$20.00	\$2,700.00
SS 50-100' Sampling Onshore	Ea.	4	\$30.00	\$120.00
Drilling 0-50' Offshore	LF	60	\$60.00	\$3,600.00
SS 0-50 Offshore	Ea.	30	\$50.00	\$1,500.00
Undisturb St. Sampling	Ea.	4	\$100.00	\$400.00
Grouting Onshore	LF	290	\$11.00	\$3,190.00
Per Diem for Drill Crew	Crewday	7	\$280.00	\$1,960.00
Mob/Demob	LS	1	\$3,000.00	\$3,000.00
Standby Time	Hr.	7	\$150.00	\$1,050.00
Barge Rental Offshore	LS	1	\$5,000.00	\$5,000.00
				\$27,490.00

BUCKET AUGER BORINGS	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Drilling 0-50'	LF	100	\$55.00	\$5,500.00
Drilling 50-100'	LF	40	\$65.00	\$2,600.00
Casing	LF	140	\$7.00	\$980.00
Grouting Boreholes	LF	140	\$50.00	\$7,000.00
Standby Time	Hr.	10	\$250.00	\$2,500.00
Laborer	Hr.	50	\$25.00	\$1,250.00
Mob/Demob Drill Rig	LS	1	\$5,000.00	\$5,000.00
Per Diem for Drill Crew	Crewday	5	\$280.00	\$1,400.00
Mob/Demob Backhoe	LS	1	\$1,500.00	\$1,500.00
Backhoe and Operator	Hr.	40	\$85.00	\$3,400.00
Per Diem Operator	Day	5	\$140.00	\$700.00
6" Cover Soil	CY	50	\$28.00	\$1,400.00
Per Diem Laborer	Day	5	\$140.00	\$700.00
Gas Cont/Dust Suppression	LS	1	\$15,000.00	\$15,000.00
				\$48,930.00

Notes:

1. SS = Split Spoon Sampling
2. 0-50 ft Continuous Sampling
3. 50-100 ft 5' interval sampling

TABLE 4-4A (Cont'd)

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 3 - SETTLEMENT/STABILITY INVESTIGATIONS**

PENNSYLVANIA AVENUE LANDFILL

SUBCONTRACT DRILLING COST EST. (con't)

PIEZOCONE	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Drilling 0-50'	LF	250	\$16.00	\$4,000.00
Per Diem for Drill Crew	Crewday	2	\$280.00	\$560.00
Mob/Demob	LS	1	\$1,400.00	\$1,400.00
Standby Time	Hr.	10	\$150.00	\$1,500.00
Grouting	LF	250	\$5.00	\$1,250.00
				\$8,710.00

PRESSURE METER DRILLING ITEM	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Drilling 0-50'	LF	50	\$17.00	\$850.00
Drilling 50-100'	LF	25	\$19.00	\$475.00
SS 0-50' Sampling	Ea.	10	\$20.00	\$200.00
SS 50-100' Sampling	Ea.	5	\$30.00	\$150.00
Grouting Boreholes	LF	75	\$11.00	\$825.00
Standby Time	Hr.	10	\$150.00	\$1,500.00
Mob/Demob		--	N/C	\$0.00
Per Diem for Drill Crew	Crewday	2	\$280.00	\$560.00
Steam Cleaner	Day	1	\$200.00	\$200.00
				\$4,760.00

TOTAL ESTIMATED DRILLING COST

\$89,890.00

Notes:

1. SS = Split Spoon Sampling
2. 0-50 ft Continuous Sampling
3. 50-100 ft 5' Interval Sampling

TABLE 4-4B

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 3 - SETTLEMENT/STABILITY INVESTIGATIONS**

PENNSYLVANIA AVENUE LANDFILL

SUBCONTRACT - GEOTECHNICAL EVALUATION

CONVERSE COST	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL
Engineering	LS	1	\$29,341.00	\$29,341.00
Direct Cost	LS	1	\$3,320.00	\$3,320.00
				\$32,661.00

**PRE-DESIGN
GEOTECHNICAL INVESTIGATION
WORK PLAN
FOR
FOUNTAIN AVENUE LANDFILL
BROOKLYN, NEW YORK**

PREPARED FOR

**THE NEW YORK CITY DEPARTMENT
OF ENVIRONMENTAL PROTECTION
BUREAU OF ENVIRONMENTAL ENGINEERING**

**PREPARED BY:
URS CONSULTANTS, INC.**

(REVISED)

JULY 1995

1.0 INTRODUCTION

1.1 Background

Section 6-4 of the Final Feasibility Study (FS) for Fountain Avenue dated September 1994 indicates that in order to proceed with a detailed design and implementation of the recommended remedial alternative, design specific supplemental investigations must be conducted.

The focus of this Work Plan is to outline the scope of work; schedule; and related costs associated with performing the following supplemental pre-design investigations:

- Limit of waste delineation,
- Hendrix Creek Bridge Investigation and,
- Landfill Settlement/Stability Investigation

The objective of this predesign investigation is to supplement the data obtained during the Remedial Investigation (RI) as necessary, and to adequately evaluate the following components of the recommended closure alternative:

- Overall (global) stability of the landfill under both short term and long term conditions
- Settlement of the landfill under both short term and long term conditions; and
- Stability of the landfill during construction activities.

In addition, the objective of this investigation is to obtain the necessary geotechnical data to adequately design the following components of the recommended closure system.

- Cap system,
- Surface drainage system,
- Gas migration system along the Belt Parkway,
- Gas recovery system,
- Shoreline protection system, and
- New bridge over the Hendrix Creek

This Work Plan addresses the NYSDEC's and NYCDEP's review comments on the Draft Predesign Geotechnical Investigation Work Plan, dated December 1994.

1.2 Overview of the Proposed Scope of Work

Section 2.0 of this Work Plan presents a detailed discussion of the proposed scope of work. In summary, the following three major tasks will be performed:

Task 1 - This task will involve activities related to the test trenching and limits of waste delineation along the Belt Parkway.

Task 2 - This task will involve activities related to the subsurface investigation and foundation design for the new bridge over Hendrix Creek.

Task 3 - This task will involve activities related to an evaluation of settlement and stability for the landfill. It will also involve activities related to the design of the landfill cap, surface drainage; gas recovery; gas migration; monitoring; and shoreline protection systems.

A proposed schedule and breakdown of costs are presented in Sections 3.0 and 4.0 respectively. This work will be provided under a modification to URS' current contract, dated January 1993 with the NYCDEP.

2.0 SCOPE OF WORK

2.1 General

The geotechnical investigations for this site have been grouped into three major tasks: Task 1 - Limit of Waste Delineation, Task 2 - Hendrix Creek Bridge Investigation, and Task 3 - Landfill Settlement/Stability Investigation. The following subsections provide a detailed description of the Scope of Work for each of these tasks.

2.2 Task 1 - Limit of Waste Delineation

The purpose of this field investigation is to define the lateral and vertical extent of waste within a minimum 25 foot wide corridor along the northern edge of the site parallel to the Belt Parkway. This information will be used to: determine the tie-in details for the northern boundary of the landfill cap; identify potential locations for the Contractor's staging and storing of materials and temporary facilities; and identify potential locations for surface drainage features and gas monitoring system. The limits of waste along the other three sides of the landfill have been adequately characterized during the RI phase of this project.

Drawing No. 1 presents the approximate location of the proposed test trenches. In general, a tracked backhoe with a minimum arm capability of 15 feet will be utilized to excavate the test trenches along the northern edge of the site. Since sufficient information from previous investigations exists to characterize the nature and extent of waste in the paved area near the site's

entrance, there will be no excavation along the northernmost edge of the site. Trenches will be completed under the supervision of a URS geotechnical engineer/geologist.

For planning purposes, spacing of the test trenches is estimated to be approximately 100 feet as shown on Drawing No. 1. The distances between trench locations may be modified by URS field personnel based on accessibility and visual field observations. We anticipate that a total of 35 test trenches (TTF-1 to 35) will be completed during this study. Additional trenches will be added as necessary in areas requiring further delineation.

In order to facilitate access for the backhoe, preliminary site preparation of the proposed trenching area will be provided by means of a bulldozer. Additionally, the property boundary and a 25 foot wide corridor parallel to the fenceline (edge of site) will be surveyed and located by URS prior to start of the trenching operation. Proceeding from the fenceline inward, the backhoe will excavate a 1 to 2 foot deep trench until continuous waste is encountered. If this point is less than 25 feet from the fenceline, the trench will be extended horizontally to the inside edge of the 25 foot wide corridor to obtain information about the continuity of the thickness of the waste. The points at which trace of waste or continuous waste were first noted will be marked and surveyed. The trench between the point where continuous waste was first detected and the inside edge of the 25-foot corridor will be extended vertically to the bottom of waste. The depth of the trenches in this zone is anticipated to be approximately 5 to 15 feet. Leachate/water is anticipated to enter the open trenches and may restrict the minimum anticipated depth of the trenches at certain locations. Excavated areas will be restored by backfilling the trenches with the excavated waste, compacting it with the backhoe bucket, and placing six inches of suitable cover soil material on top of backfilled trenches.

The test trenching activities will be conducted in accordance with the existing approved site Health and Safety Plan for field investigations. During the test trenching activities, particulate monitoring will be conducted, hourly, in the work area as well as downwind and upwind of the work area at the perimeter of the site. In addition, the test trenches will be screened with a Photoionization Detector (PID) and a LEL meter for volatile organic compounds and explosive atmospheres, respectively. Furthermore, during the trenching activities gas/dust suppression controls such as exhaust fans and water trucks, etc. will be utilized to control off-site migration of these elements.

In additionn to the trenching activities, as part of the pre-design field work, the low lying areas along Belt Parkway will be graded to establish positive drainage towards the Parkway.

2.3 Task 2 - Hendrix Creek Bridge Investigation

The purpose of this investigation is to obtain geotechnical data to be used for the foundation design of the new bridge over Hendrix Creek.

Twelve (12) soil borings (BBF-1 to -12) will be drilled to obtain subsurface information. Drawing No. 1 shows that approximate location of the proposed borings. Seven (7) standard geotechnical soil borings will be drilled onshore near the proposed bridge abutment locations. Five (5) offshore soil borings will be taken at alternate pier locations. Boring depths are estimated at 100 feet.

All borings will be completed under the supervision of a URS engineer/geologist. The proposed boring locations shown on Drawing No. 1 may be modified by URS personnel depending upon field conditions. In addition, unexpected soil conditions may require consideration for additional borings or vertical extension of the proposed borings.

The borings will be advanced with a truck/barge mounted drill rig equipped with a 4-1/4" diameter Hollow Stem Augers (HSA). At each boring location, Standard Penetration Tests (SPT) will be performed continuously from 0 to 50 feet and every 5-feet from 50 feet down to the termination depth of the borings. The SPT will be performed in accordance with ASTM D-1586 procedures. Soil samples will be collected where SPT's are being performed. Each sample will be classified by URS field personnel in accordance with the ASTM D-2487 or D-2488, and D-2607 where applicable. In addition, selected soil samples will be submitted for geotechnical laboratory testing to determine their grain size distribution curves, organic content, Atterberg limits, moisture content, compressive strength, shear strength, consolidation curves, and to help the geologist in preparing the final soil boring logs. A summary of the type and approximate number of tests to be performed is presented in Table 4-3B.

Samples will be selected for laboratory testing by the geologist following completion of the boring program. A minimum of one sample from each of the different geologic units encountered will be analyzed for the routine geotechnical properties. In cases where soft or cohesive materials are encountered (i.e., TMD) a shelby tube sample will be collected in accordance with ASTM D-1587 procedures. A representative sample of the TMD will be submitted for strength testing. Additionally, geotechnical testing data obtained during Task 3 for the various soil units will be utilized to supplement the soils data gathered during Task 2, and increase the size of the database.

The soil boring activities will be conducted in accordance with the existing approved site Health and Safety Plan for field investigations. During the drilling activities, the boreholes will be screened with a PID and LEL meter for volatile organic compounds and explosive atmospheres respectively.

2.4 Task 3 - Settlement/Stability Investigation

The purpose of this investigation is to obtain supplemental data to adequately evaluate the overall stability of the landfill; to evaluate the settlement characteristics of the landfill under both short term and long term conditions, and to evaluate the stability of the landfill during the construction activities.

The attached scope of work (Attachment No. 1) developed by URS's proposed subconsultant Converse Consultants East (Converse) describes the proposed program for the task.

3.0 SCHEDULE

The anticipated schedule for the pre-design geotechnical investigation for this site is as follows:

Receipt of NYSDEC approval of Work Plan	- September 15, 1995
Advertise for bids	- October 9, 1995
Receipt of bids	- October 23, 1995
Contractor award	- November 17, 1995
Commence field work	- December 1, 1995
Complete field work including the load test	- April 10, 1996
Receipt of all laboratory results/summary of boring logs complete	- April 10, 1996
Final Report	- May 10, 1996

4.0 COST

Table 4-1 presents a summary of our estimated total cost to complete the tasks identified in this Work Plan. Tables 4-2 through 4-4 provide a detailed breakdown of the costs associated with each task.

As presented in Table 4-1, the total estimated cost is \$607,566.90.

TABLE 4-1**PRE-DESIGN GEOTECHNICAL INVESTIGATION
COST SUMMARY****FOUNTAIN AVENUE LANDFILL**

CLASSIFICATION	LABOR RATE	HOURS	COST
Principal (IX)	\$112.15	6	\$672.90
Project Manager (VIII)	\$112.15	140	\$15,701.00
Sr. Project Eng. (VII)	\$90.50	72	\$6,516.00
Geotechnical Eng. (VI)	\$73.90	508	\$37,541.20
Geologist (V)	\$61.75	1078	\$66,566.50
Surveyor (III)	\$37.65	300	\$11,295.00
Technician (II)	\$37.25	234	\$8,716.50
Drafter (II)	\$37.25	92	\$3,427.00
Technician (I)	\$25.90	122	\$3,159.80
TOTAL LABOR			\$153,595.90

TRAVEL **\$3,000.00**

EQUIPMENT AND MATERIAL COSTS

ITEM	RATE (PER DAY)	DAYS	COST
Health & Safety (D&C)	\$40.00	66	\$2,640.00
PID	\$45.00	66	\$2,970.00
Explosimeter	\$44.00	66	\$2,904.00
Dust Meter	\$45.00	66	\$2,970.00
Miscellaneous	LS		\$300.00
TOTAL EQUIPMENT AND MATERIAL COSTS			\$11,784.00

TOTAL LABOR **\$153,595.90**
TOTAL TRAVEL **\$3,000.00**
TOTAL EQUIPMENT AND MATERIAL **\$11,784.00**
TOTAL SUBCONTRACTOR COSTS **\$439,187.00**

TOTAL TASK **\$607,566.90**

TABLE 4-2

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 1 - LIMIT OF WASTE DELINEATION (SUMMARY)**

FOUNTAIN AVENUE LANDFILL

LABOR			
CLASSIFICATION	RATE	HOURS	COST
Principal (IX)	\$112.15	2	\$224.30
Project Manager (VIII)	\$112.15	4	\$448.60
Sr. Project Eng. (VII)	\$90.50	4	\$362.00
Geotechnical Eng. (VI)	\$73.90	104	\$7,685.60
Geologist (V)	\$61.75	170	\$10,497.50
Surveyor (III)	\$37.65	80	\$3,012.00
Technician (II)	\$37.25	50	\$1,862.50
Drafter (II)	\$37.25	40	\$1,490.00
Technician (I)	\$25.90	10	\$259.00
TOTAL LABOR			\$25,841.50
TRAVEL			\$1,000.00
EQUIPMENT AND MATERIAL COSTS			
ITEM	RATE (PER DAY)	DAYS	COST
Health & Safety (D&C)	\$40.00	9	\$360.00
PID	\$45.00	9	\$405.00
Explosimeter	\$44.00	9	\$396.00
Dust Meter	\$45.00	9	\$405.00
Miscellaneous LS			\$100.00
TOTAL EQUIPMENT AND MATERIAL COSTS			\$1,666.00
SUBCONTRACTOR COSTS			
Test Trenching (Table 4-2A)			\$36,810.00
TOTAL SUBCONTRACTOR COSTS			\$36,810.00
TOTAL LABOR			\$25,841.50
TOTAL TRAVEL			\$1,000.00
TOTAL EQUIPMENT AND MATERIAL			\$1,666.00
TOTAL SUBCONTRACTOR COSTS			\$36,810.00
TOTAL TASK			\$65,317.50

TABLE 4-2A

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
TASK 1 - LIMIT OF WASTE DELINEATION**

FOUNTAIN AVENUE LANDFILL

SUBCONTRACT TRENCHING BID ESTIMATE

ITEM/ACTIVITY	UNITS	ESTIMATED QUANTITY	BID UNIT COST	AMOUNT BID
Mob/Demob Backhoe	LS	1	\$1,500.00	\$1,500.00
Backhoe & Operator	Hr	70	\$85.00	\$5,950.00
Per Diem (Operator)	Day	9	\$140.00	\$1,260.00
Steam Cleaner	LS	1	\$100.00	\$100.00
Bulldozer & Operator (1)	Hr	80	\$100.00	\$8,000.00
Mob/Demob Dozer	LS	1	\$1,500.00	\$1,500.00
Per Diem (Operator)	Day	5	\$140.00	\$700.00
Clean Cover Soil	CY	100	\$28.00	\$2,800.00
Gas Control/Dust Suppression	LS	1	\$15,000.00	\$15,000.00
				\$36,810.00

NOTES:

- 1) Includes 40 hrs of dozer and operator time to grade the low lying areas along the Belt Parkway.
Also assumes the existing berm along Belt Parkway to be used as grading materials.

TABLE 4-3

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 2 - HENDRIX CREEK BRIDGE INVESTIGATION (SUMMARY)**

FOUNTAIN AVENUE LANDFILL

CLASSIFICATION	LABOR		COST
	RATE	HOURS	
Principal (IX)	\$112.15	2	\$224.30
Project Manager (VIII)	\$112.15	40	\$4,486.00
Sr. Project Eng. (VII)	\$90.50	20	\$1,810.00
Geotechnical Eng. (VI)	\$73.90	160	\$11,824.00
Geologist (V)	\$61.75	308	\$19,019.00
Surveyor (III)	\$37.65	40	\$1,506.00
Technician (II)	\$37.25	40	\$1,490.00
Drafter (II)	\$37.25	4	\$149.00
Technician (I)	\$25.90	40	\$1,036.00
TOTAL LABOR			\$41,544.30
TRAVEL			\$1,000.00
EQUIPMENT AND MATERIAL COSTS			
ITEM	RATE (PER DAY)	DAYS	COST
Health & Safety (D&C)	\$40.00	22	\$880.00
PID	\$45.00	22	\$990.00
Explosimeter	\$44.00	22	\$968.00
Dust Meter	\$45.00	22	\$990.00
Miscellaneous	LS		\$100.00
TOTAL EQUIPMENT AND MATERIAL COSTS			\$3,928.00
SUBCONTRACTOR COSTS			
Offshore Drilling (Table 4-3A)			\$62,700.00
On Shore Drilling (Table 4-3A)			\$36,360.00
Geotechnical Lab (Table 4-3B)			\$2,980.00
TOTAL SUBCONTRACTOR COSTS			\$102,040.00
TOTAL LABOR			\$41,544.30
TOTAL TRAVEL			\$1,000.00
TOTAL EQUIPMENT AND MATERIAL			\$3,928.00
TOTAL SUBCONTRACTOR COSTS			\$102,040.00
TOTAL TASK			\$148,512.30

TABLE 4-3A

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 2 - HENDRIX CREEK BRIDGE INVESTIGATION**

FOUNTAIN AVENUE LANDFILL

SUBCONTRACT DRILLING COST ESTIMATE

OFFSHORE DRILLING ITEM	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Drilling 0-50'	LF	250	\$60.00	\$15,000.00
Drilling 50-100'	LF	250	\$75.00	\$18,750.00
SS 0-50' Sampling	Ea.	125	\$50.00	\$6,250.00
SS 50-100' Sampling	Ea.	50	\$75.00	\$3,750.00
Undist. ST. Sampling	Ea.	4	\$100.00	\$400.00
Per Diem (Drill Crew)	Crewday	10	\$280.00	\$2,800.00
Mob/Demob	LS	1	\$15,000.00	\$15,000.00
Standby Time	Hr.	5	\$150.00	\$750.00
				\$62,700.00

ONSHORE DRILLING ITEM	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Drilling 0-50'	LF	350	\$17.00	\$5,950.00
Drilling 50-100'	LF	350	\$19.00	\$6,650.00
SS 0-50' Sampling	Ea.	175	\$20.00	\$3,500.00
SS 50-100' Sampling	Ea.	70	\$30.00	\$2,100.00
Grouting Boreholes	LF	700	\$11.00	\$7,700.00
Standby Time	Hr.	14	\$150.00	\$2,100.00
Mob/Demob	LS	1	\$3,000.00	\$3,000.00
Per Diem (Drill Crew)	Crewday	12	\$280.00	\$3,360.00
Steam Cleaner	Day	10	\$200.00	\$2,000.00
				\$36,360.00

TOTAL ESTIMATED DRILLING COST \$99,060.00

Notes:

1. SS = Split Spoon Sampling
2. 0-50 ft Continuous Sampling
3. 50-100 ft 5' interval sampling
4. Drilling crew includes one driller and one helper

TABLE 4-3B

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 2 - HENDRIX CREEK BRIDGE INVESTIGATION**

FOUNTAIN AVENUE LANDFILL

SUBCONTRACT GEOTECHNICAL TESTING COST ESTIMATE

ITEM/ACTIVITY	UNITS	ESTIMATED QUANTITY	LEVEL D UNIT COST	TOTAL
Organic Content	Ea.	10	\$40.00	\$400.00
Compressive strength	Ea.	4	\$200.00	\$800.00
Atterberg Limits	Ea.	4	\$75.00	\$300.00
Moisture Content	Ea.	16	\$5.00	\$80.00
1-D Consolidation	Ea.	1	\$400.00	\$400.00
Triaxial Shear	Ea.	1	\$400.00	\$400.00
Grain Size Analysis	Ea.	6	\$100.00	\$600.00
				\$2,980.00

TABLE 4-4

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 3 - SETTLEMENT/STABILITY INVESTIGATION (SUMMARY)**

FOUNTAIN AVENUE LANDFILL

CLASSIFICATION	LABOR		COST
	RATE	HOURS	
Principal (IX)	\$112.15	2	\$224.30
Project Manager (VIII)	\$112.15	96	\$10,766.40
Sr. Project Eng. (VII)	\$90.50	48	\$4,344.00
Geotechnical Eng. (VI)	\$73.90	244	\$18,031.60
Geologist (V)	\$61.75	600	\$37,050.00
Surveyor (III)	\$37.65	180	\$6,777.00
Technician (II)	\$37.25	144	\$5,364.00
Drafter (II)	\$37.25	48	\$1,788.00
Technician (I)	\$25.90	72	\$1,864.80
TOTAL LABOR			\$86,210.10
TRAVEL			\$1,000.00
EQUIPMENT AND MATERIAL COSTS			
ITEM	RATE		COST
	(PER DAY)	DAYS	
Health & Safety (D&C)	\$40.00	35	\$1,400.00
PID	\$45.00	35	\$1,575.00
Explosimeter	\$44.00	35	\$1,540.00
Dust Meter	\$45.00	35	\$1,575.00
Miscellaneous	LS		\$100.00
TOTAL EQUIPMENT AND MATERIAL COSTS			\$6,190.00
SUBCONTRACTOR COSTS			
Geotechnical Drilling (Table 4-4A)			\$28,400.00
Bucket Auger Drilling (Table 4-4A)			\$95,420.00
Pressure Meter Drilling/Testing (Table 4-4A)			\$8,710.00
Piezocene Testing (Table 4-4A)			\$4,760.00
Test Load Construction (Table 4-4B)			\$114,000.00
Converse (Table 4-4C)			\$49,047.00
TOTAL SUBCONTRACTOR COSTS			\$300,337.00
TOTAL LABOR			\$86,210.10
TOTAL TRAVEL			\$1,000.00
TOTAL EQUIPMENT AND MATERIAL			\$6,190.00
TOTAL SUBCONTRACTOR COSTS			\$300,337.00
TOTAL TASK			\$393,737.10

TABLE 4-4A

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 3 - SETTLEMENT/STABILITY INVESTIGATION**

FOUNTAIN AVENUE LANDFILL

SUBCONTRACT DRILLING COST ESTIMATE

GEOTECHNICAL BORINGS	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Drilling 0-50' On Shore	LF	275	\$17.00	\$4,675.00
Drilling 50-100' Off Shore	LF	120	\$60.00	\$7,200.00
SS 0-50' Sampling On Shore	Ea.	138	\$20.00	\$2,760.00
SS 50-100' Sampling Off Shore	Ea.	60	\$50.00	\$3,000.00
Undist. St. Sampling	Ea.	4	\$100.00	\$400.00
Grouting	LF	275	\$11.00	\$3,025.00
Per Diem for Drill Crew	Crewday	8	\$280.00	\$2,240.00
Mob/Demob	LS	1	\$3,000.00	\$3,000.00
Standby Time	Hr.	14	\$150.00	\$2,100.00
				\$28,400.00

BUCKET AUGER BORINGS	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Drilling 0-50'	LF	250	\$55.00	\$13,750.00
Drilling 50-100'	LF	265	\$65.00	\$17,225.00
PVC Casing	LF	515	\$7.00	\$3,605.00
Grouting Boreholes	LF	515	\$50.00	\$25,750.00
Standby Time	Hr.	10	\$250.00	\$2,500.00
Laborer	Hr.	50	\$25.00	\$1,250.00
Mob/Demob	LS	1	\$5,000.00	\$5,000.00
Per Diem for Drill Crew	Crewday	13	\$280.00	\$3,640.00
Mob/Demob backhoe	LS	1	\$1,500.00	\$1,500.00
Backhoe and Operator	Hr.	40	\$85.00	\$3,400.00
Per Diem for Operator	Day	5	\$140.00	\$700.00
6" Cover foil to cover excess cutting	CY	50	\$28.00	\$1,400.00
Per Diem for the Laborer	Day	5	\$140.00	\$700.00
Gas Control/Dust Suppression	LS	1	\$15,000.00	\$15,000.00
				\$95,420.00

Notes:

1. SS = Split Spoon Sampling
2. 0-50 ft Continuous Sampling
3. 50-100 ft 5' interval sampling
4. Drilling crew includes one driller and one helper

TABLE 4-4A (CONT)

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 3 - SETTLEMENT/STABILITY INVESTIGATION**

FOUNTAIN AVENUE LANDFILL

SUBCONTRACT DRILLING COST ESTIMATE

PIEZOCONE	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Drilling 0-50'	LF	250	\$16.00	\$4,000.00
Per Diem for Drill Crew	Crewday	2	\$280.00	\$560.00
Grouting	LF	250	\$5.00	\$1,250.00
Mob/Demob	LS	1	\$1,400.00	\$1,400.00
Standby Time	Hr.	10	\$150.00	\$1,500.00
				\$8,710.00

PRESSURE METER	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Drilling 0-50'	LF	50	\$17.00	\$850.00
Drilling 50-100'	LF	25	\$19.00	\$475.00
SS 0-50' Sampling	Ea.	10	\$20.00	\$200.00
SS 50-100' Sampling	Ea.	5	\$30.00	\$150.00
Grouting Boreholes	LF	75	\$11.00	\$825.00
Standby Time	Hr.	10	\$150.00	\$1,500.00
Mob/Demob	LS	--	N/C	\$0.00
Per Diem for Drill Crew	Crewday	2	\$280.00	\$560.00
Steam Cleaner	Day	1	\$200.00	\$200.00
				\$4,760.00

TOTAL ESTIMATED DRILLING COST

\$137,290.00

Notes:

1. SS = Split Spoon Sampling
2. 0-50 ft Continuous Sampling
3. 50-100 ft 5' interval sampling
4. Drilling crew includes one driller and one helper

TABLE 4-4B

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 3 - SETTLEMENT/STABILITY INVESTIGATION**

FOUNTAIN AVENUE LANDFILL

SUBCONTRACT LOAD CELL CONSTRUCTION.

ITEM	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Furnish/Install Fill	CY	4000	\$28.00	\$112,000.00
Furnish/Install Settlement Plates	Ea.	10	\$200.00	\$2,000.00
				\$114,000.00

TABLE 4-4C

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
TASK 3 - SETTLEMENT/STABILITY INVESTIGATION**

FOUNTAIN AVENUE LANDFILL

SUBCONTRACT SETTLEMENT/STABILITY EVALUATION

ITEM	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
Converse - Engineering	LS	1	\$44,067.00	\$44,067.00
Converse - Expenses	LS	1	\$4,980.00	\$4,980.00
				\$49,047.00

**ATTACHMENT 4
EXCERPTS FROM "DRAFT"
DRILLING SPECIFICATIONS AND SOLICITATION
DOCUMENTS**

Task 3.4 - Piezocone Soundings

Six piezocone soundings are planned on Fountain Avenue Landfill. The Cone Penetration Test (CPT) shall be performed with a cone penetrometer in accordance with ASTM Standard D-3441 Standard Method for Deep, Quasi-static, Cone and Friction-Cone Penetration tests of Soil. The cone penetrometer shall be a electric friction one with piezometric measurement capabilities. The cone penetrometer shall have the capability to measure the following parameters continuously as the cone penetrates:

1. Bearing resistance on the cone tip.
2. Frictional resistance along the cylindrical friction sleeve.
3. Probe inclination.
4. Pore water pressure.

The CPT locations will be truck-accessible. Upon completion, probe holes shall be backfilled with granular bentonite. If after filling with bentonite, landfill gases are detected escaping from the hole, a one-foot deep hydosted bentonite seal shall be provided at the surface.

CPT's will be performed to refusal or a maximum depth of 150 feet at locations indicated by the URS field representative. Refusal criteria is as follows:

1. Required thrust exceeds available reaction force - the CPT rig lifts up off its supports.

2. Excessive bending of the push probes - while raising the rams in preparation of the next down-stroke, the top of the pipe string snaps upward because of the release of compression load. A portion of the rebound is due to the elasticity of the steel pipes, but the remainder is due to the bending of the pipes. A rebound of over 1 inch per 50 feet of pipe will constitute refusal.
3. Excessive probe inclination - a vertical deviation of 10 degrees or more caused by impact with a hard obstruction.
4. Excessive resistance to penetration - when the measured cone tip resistance, sleeve friction, or pore pressure exceeds the capacity of the CPT probe's load cells or transducers.

CPT reports shall include, at a minimum, scaled graphs of cone tip resistance (Q_c), friction sleeve resistance (F_s), friction ratio (F_s/Q_c), pore pressure (u), and pore pressure ratio (u/Q_c) or change in pore pressure ratio ($\Delta u/Q_c$). Data shall be presented in English units. Other reporting requirement shall be as per ASTM D3441 standards.

All data shall be provided as hardcopy and on 3 1/2 inch computer diskettes.

Task 3.5 - Pressuremeter Borings

One boring shall be drilled adjacent to one of the auger borings for the purpose of conducting borehole pressuremeter tests. The estimated depth of this boring is 75 feet and the location will be accessible with a truck or ATV-mounted rig.

Drilling, sampling and backfilling of the boring will be in accordance with the on-shore perimeter borings as described under Task 3.2.1. The casing or augers shall have minimum inside diameter of 4 inches. Pressuremeter testing will be conducted in an open (uncased) section of borehole. Pressuremeter testing will be generally conducted at 10-foot intervals. At the pressuremeter depths, the Contractor is to advance 3.0 to 3.6 inch diameter hole below the bottom of the casing or augers using a thin-walled sampler or rotary wash. The pressuremeter will be lowered into and extracted from the borehole by the Contractor as directed by the URS field representative. The Contract shall supply suitable adapters and rods to facilitate the testing. The Contractor shall be responsible for maintaining a stable borehole during pressuremeter testing work, and shall be liable for all replacement costs associated with the loss of pressuremeter equipment due to collapse of the borehole. The pressuremeter will be supplied and operated by others.

Task 3.6 - Load Test Fill Construction

One load test fill shall be constructed on the plateau area of the Fountain Avenue Landfill. The location will be determined based on results of the subsurface explorations.

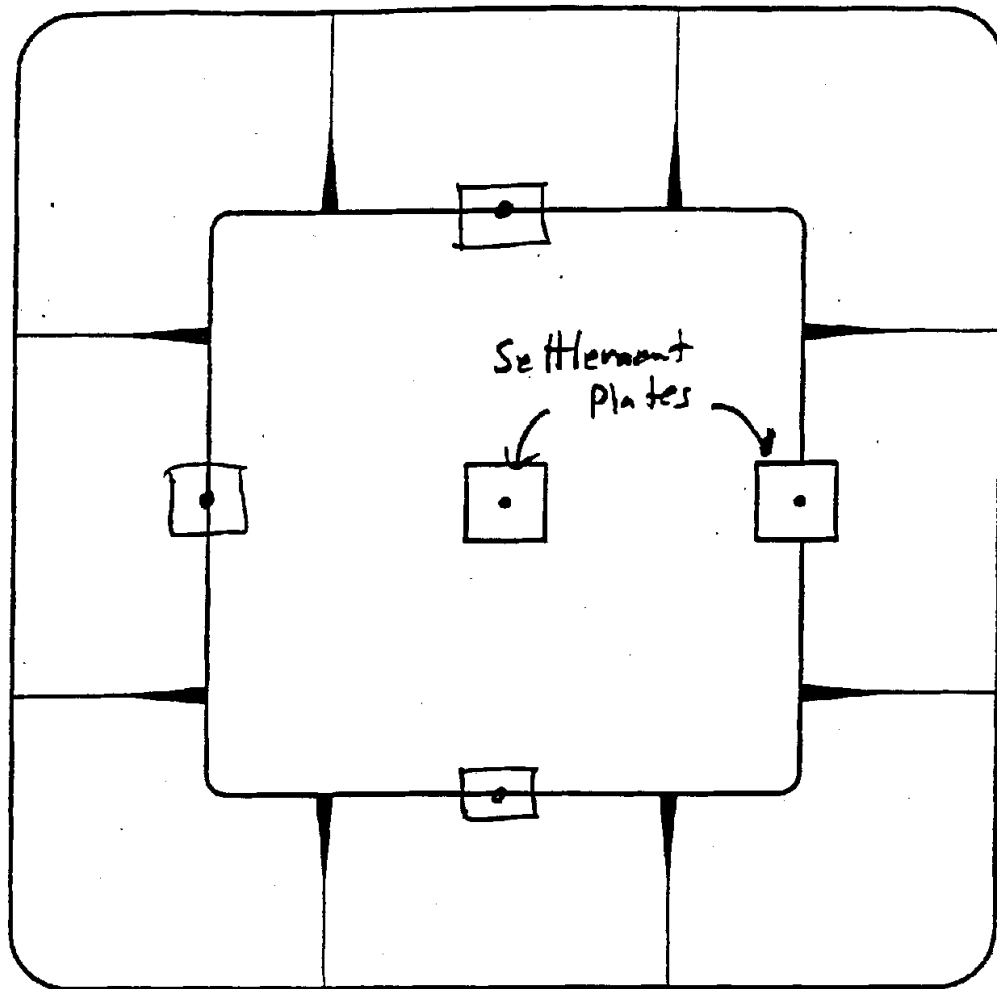
The quantity of fill material has been based on a unit weight of 120 pf. Adjustments to the fill height shall be made if the unit weight of the material used is less than 120 pcf so that the total load is at least as proposed. Compaction of the fill is not required but may be done if desired by the Contractor. The Contractor shall measure the in-place unit weight of the fill.

Figure No. __ shows settlement plate positioning relative to the fill and Figure No. __ shows the Settlement Plate details. The plates should be placed on a completely level surface about 1 foot below existing grade. The surface should be smoothed and tamped lightly during preparation. The plate backfill shall be placed by hand and in 6-inch levels lifts and tamped lightly. Care should be taken not to disturb the plate, extension rods, and extension rod sleeve during replacement of the surcharge material. The rod top shall be clearly marked and visible from all sites. The telltale rods and sleeves shall be plumb.

Exact dimensions of each plate and extension rod shall be documented by the Contractor and provided to the URS field representative.

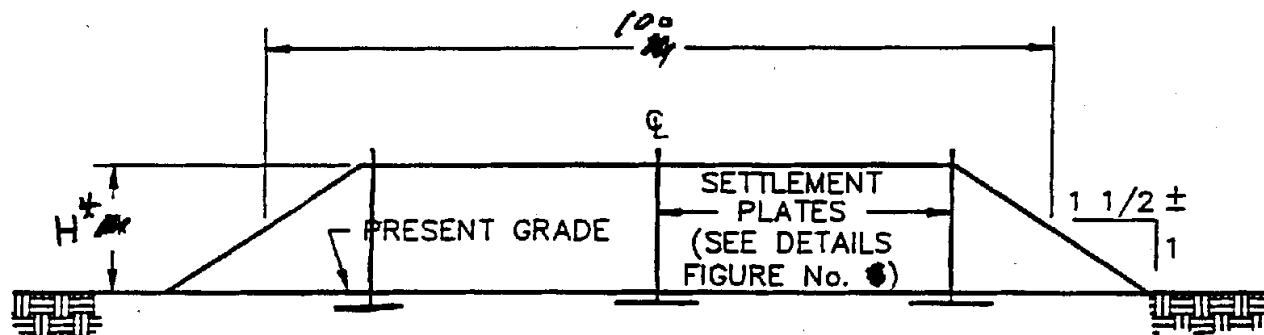
The Contractor shall submit for approval a full description of the material to be used and a proposed procedure to place the material to achieve the intended loading distribution.

The Contractor shall keep records of the weight of fill placed each day and the location. The fill load shall be completed within 14 calendar days.



*10' - Ftn.
7' - Penn.

PLAN
(NOT TO SCALE)



ELEVATION

NOTE

EXTENSION RODS SHALL EXTEND 6 in ABOVE
LOAD MATERIAL SURFACE AND 3 in ABOVE ROD
SLEEVE

FILL LOAD SCHEMATIC

FILL LOAD SETTLEMENT INVESTIGATION
SYOSSET LANDFILL FIRST OPERABLE UNIT REMEDIATION
TOWN OF OYSTER BAY DEPARTMENT OF PUBLIC WORKS
SYOSSET, NEW YORK

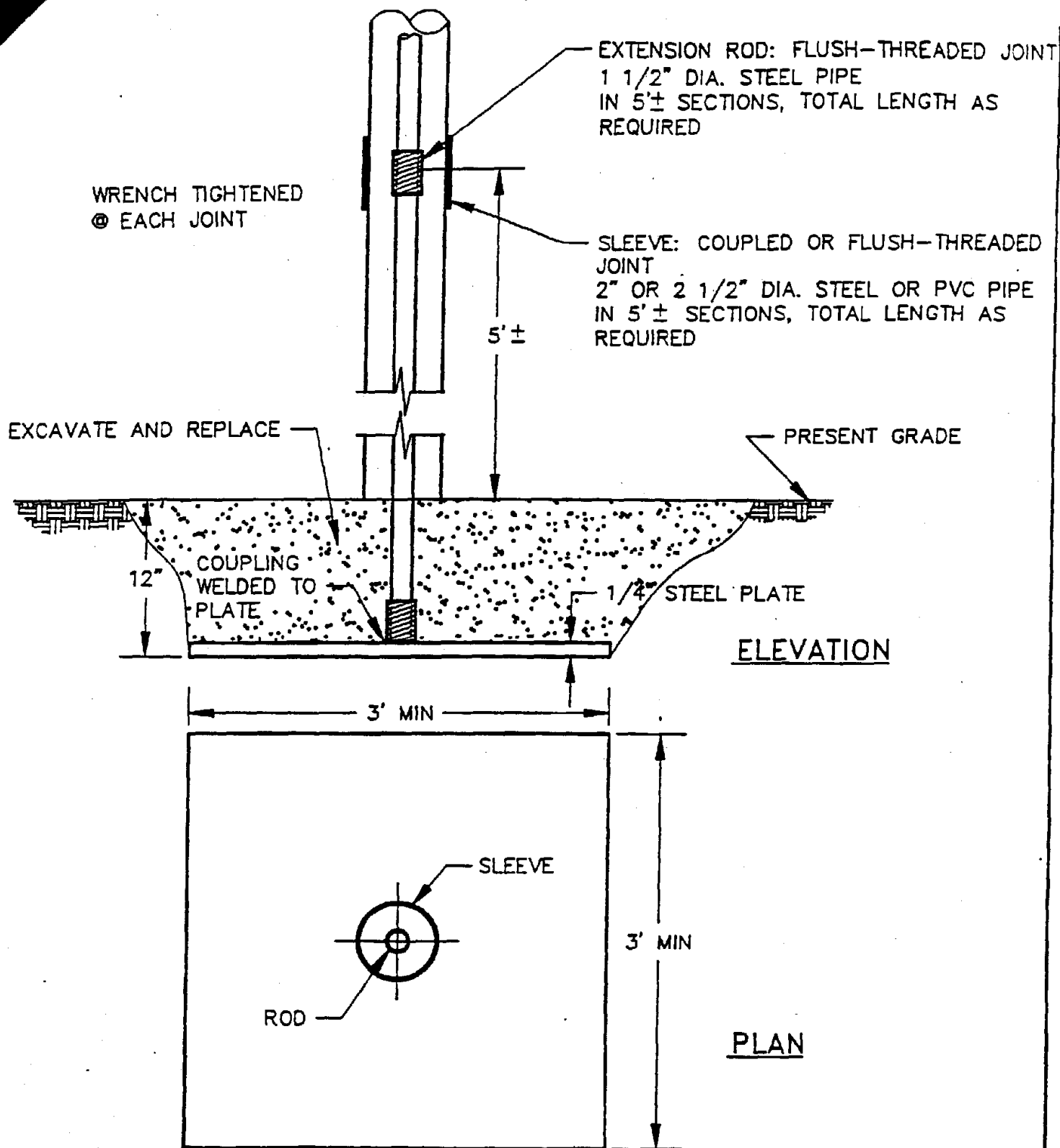
PROJECT No.

90-67139-01

FIGURE No.



Converse Engineering Consultants PC



SETTLEMENT PLATE DETAILS

NOT TO SCALE

SOIL LOAD SETTLEMENT INVESTIGATION
SYOSSET LANDFILL FIRST OPERABLE UNIT REMEDIATION
TOWN OF OYSTER BAY DEPARTMENT OF PUBLIC WORKS
SYOSSET, NEW YORK

PROJECT No.

90-67139-01

FIGURE No.



Converse Engineering Associates, Inc.

ATTACHMENT B

BID SPECIFICATION

PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES

SCOPE OF WORK

FOR

PENNSYLVANIA AVENUE LANDFILL

BROOKLYN, NEW YORK

PREPARED BY:

URS CONSULTANTS, INC.

DECEMBER 1995

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Figure 1-1	Pennsylvania Ave Site Location Map

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Drawing No. 1	Proposed Test Trenches & Boring Location Map

1.0 INTRODUCTION

1.1 General

New York City Department of Sanitation formerly owned and operated the Pennsylvania Ave Landfill (site) located in Brooklyn, NY (Figure 1-1). The site is currently listed on the New York State Department of Environmental Conservation's list of inactive hazardous waste sites. Several previous site investigations have been conducted to characterize the site and determine the type and extent of contamination present. However, prior to design of the remedial program for the site, certain additional geotechnical data are required. This document outlines the scope of work for the additional geotechnical investigation activities which are to be undertaken during the pre-design phase.

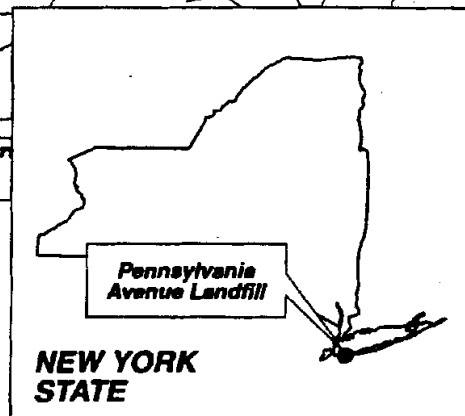
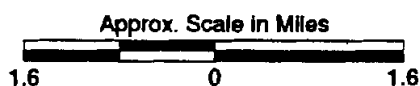
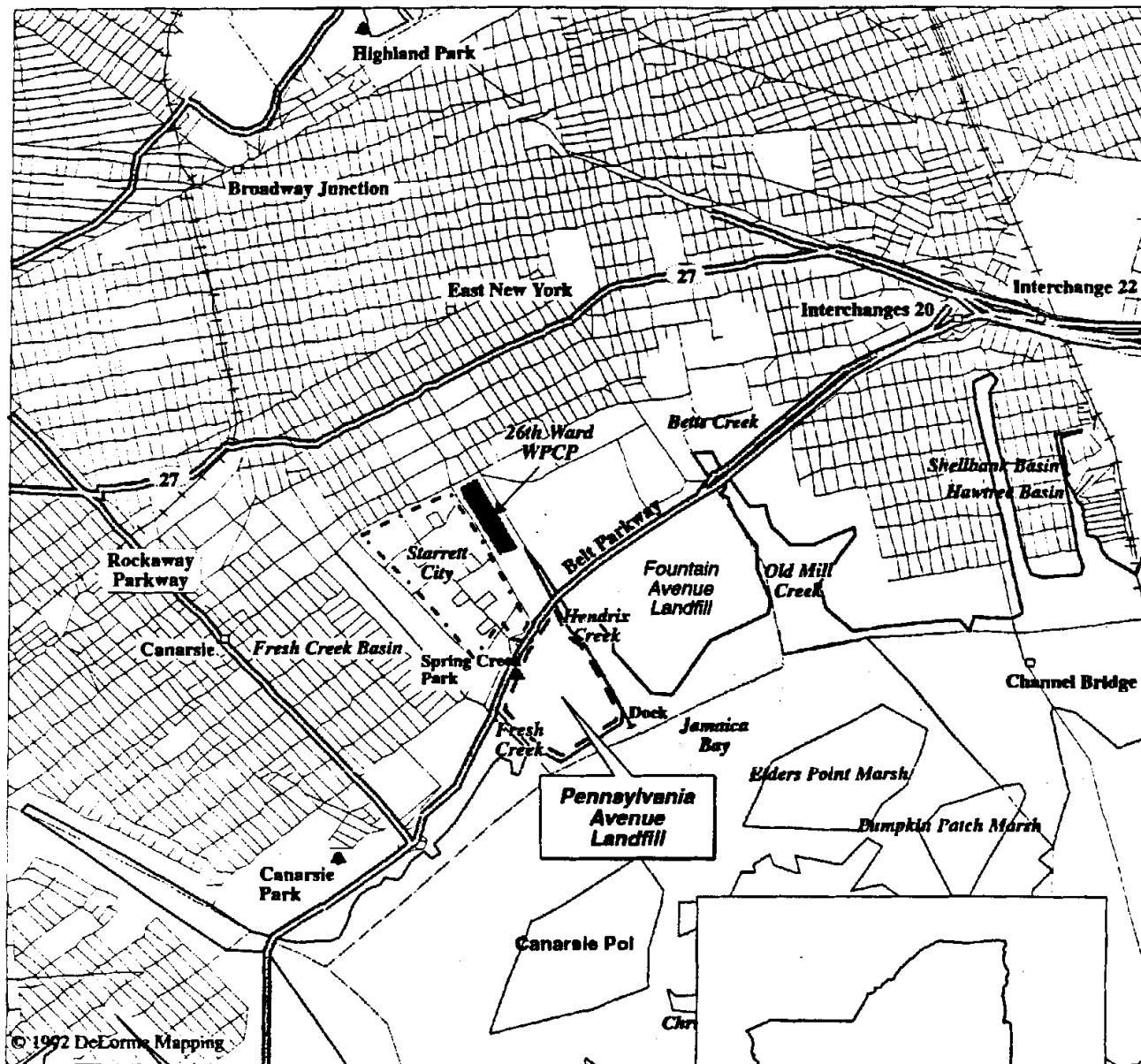
The objectives of these investigations will be to provide additional data on the limits of waste; the type, distribution and geotechnical properties of the onsite materials; and the continuity and geotechnical properties of the tidal marsh deposits (TMD) underlying the site, such that the overall stability and settlement of the landfill during and following closure can be estimated. In addition, the foundation conditions in the area of the proposed upgraded pier need to be investigated such that the required structure can be designed.

This Scope of Work (SOW) contains four (4) sections. Section 1.0 presents introductory information including a summary of the site description and history, and subsurface characterization. Section 2.0 describes the Scope of Work; Section 3.0 discusses the schedule; and Section 4.0 describes the bid quotation elements.

1.2 Site Description and History

The Pennsylvania Avenue Landfill (herein after referred to as PAL, the Landfill or the Site) is a 110-acre, inactive landfill located in Brooklyn, New York, as shown on Figure 1-1. The PAL on the New York State Registry of Inactive Hazardous Waste Sites as a Class 2A Site.

The PAL was opened in 1956 and received residential, commercial, incinerator, street cleanings, construction and demolition (C&D) wastes, and waste oil. By 1962, the landfill was



closed and filling activities had shifted to the adjacent Fountain Avenue Landfill (FAL). In 1968, the FAL was expanding more rapidly than anticipated and the dumping of C&D debris was shifted to the PAL site. The City of New York transferred ownership of the PAL to the United States Department of the Interior, National Park Service, in 1974. In 1979, all filling at the PAL ceased.

Situated over what was once a tidal marsh, the PAL is surrounded on three sides by water: Hendrix Creek to the east, Jamaica Bay on the south and Fresh Creek Basin to the west. On the north, the PAL is bounded by the Belt Parkway; farther north is Starrett City, a high-rise housing development.

There is one large main fill mound in the northwest half of the PAL which rises above Jamaica Bay to an elevation of approximately 85 feet (Borough of Brooklyn Datum). A round shaped mound in the central portion of the southeast half of the PAL rises to an elevation of approximately 40 feet. Other fill ridges (running around the perimeter of the Site) are between 10 and 20 feet in height. Soil cover is generally thin.

A paved road runs the length of the easterly side along Hendrix Creek, from the 26th Ward Water Pollution Control Plant (WPCP) under the Belt Parkway to a sludge loading dock that extends into the bay by about 400 feet. There are dirt roads around the PAL and to the top of the main (large) fill mound (See Drawing No. 1).

Normal access to the Site is through an entrance gate at the southerly end of Pennsylvania Avenue, which passes over the Belt Parkway. The main entrance gate is kept locked and site access is controlled 24 hours a day by a security company under contract to the City of New York. Security patrols are performed along the Site perimeter roads. The guard service occupies a trailer near the main gate. There is evidence of illegal vehicular access to the Site, most often by dirt-bikes.

1.3 Subsurface Characterization

Prior to fill placement in the Landfill, between 2 and 14 feet of dredged material from Jamaica Bay, primarily fine to medium sands, was placed over the existing TMD at the Site. The

TMD is a soft to medium stiff, organic clay silt that is up to 8 feet thick. Underlying the TMD is a medium dense to dense, fine to medium sand referred to as the Upper Glacial Aquifer (UGA). The thickness of the UGA is not known, but at the Fountain Avenue Landfill, it is in excess of 16 feet (URS, 1994a). Fill materials at the Site consist of municipal/industrial wastes and C & D materials that range in thickness from 30 to 85 feet.

Groundwater, referred to as leachate-mound-water, is present within the 30- to 85-foot fill. This leachate-mound-water is confined by the underlying TMD, which restricts transport of it into the UGA. The groundwater surface typically ranges between elevation 0 and 6 feet across the Site. Based on groundwater levels measured in monitoring wells during one tidal cycle, the leachate-mound-water is not strongly influenced by tidal fluctuation.

In contrast to the leachate-mound-water, the UGA is strongly influenced by tidal fluctuation. Regional flow in the UGA is south-southeast toward Jamaica Bay but reverses to a northerly direction at high tide.

The above subsurface description is provided as information only, and may not be representative of actual field conditions across the entire site.

Nature and Extent of Contamination

The results from the Remedial Investigation indicated a variety of contaminants in the various media at the Site. Surface soil and subsurface soil/fill samples around the southern half of the large fill areas exhibited the greatest number and highest concentrations of contaminants.

- Surface soil Standards, Criteria, and Guidance (SCG) exceedances occurred primarily for polycyclic aromatic hydrocarbons (PAHs), PCBs and metals.
- SCG exceedances in subsurface fill samples were primarily for benzene, toluene, ethyl benzene, and xylene (BTEX) compounds, PAHs and metals.
- The TMD appears to act as a barrier layer for migration of organic contaminants into the UGA and limits the migration of inorganic contaminants.
- Within the TMD exceedances were primarily for PAHs and metals; within the UGA SCGs were exceeded only for metals.

Groundwater samples collected from the leachate mound showed exceedances for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, PCBs and metals. Additionally there is a free product plume which originates in the west central portion of the landfill and migrates to the southwest towards Fresh Creek.

- The water in leachate mound underlying the floating product plume contains BTEX and PCB compounds which replicates those detected in the product plume.
- In the UGA, the number of contaminant exceedances were significantly lower.

Surface water and companion sediment samples were obtained from the three water bodies - Hendrix Creek, Fresh Creek, and Jamaica Bay - adjacent to the landfill. The most contaminated surface water sample came from Fresh Creek, where 9 VOC, 12 SVOC, 2 pesticides, and 2 PCB compounds were detected in a single sample. A few of those volatile and semivolatile compounds were also detected in Hendrix Creek and Jamaica Bay, but at lower concentrations. Similarly, the sediment concentrations were significantly higher in Fresh Creek than at the other locations.

The concentrations of compounds detected in surface water samples were significantly less than those detected in the nearby leachate mound. In general, VOC and SVOC concentrations in the surface water were diluted between 2-10 times while the concentrations of some metals (e.g., calcium, magnesium, potassium, and sodium) and pesticides tended to increase, reflecting probable regional contributions of these contaminants to Jamaica Bay.

Ambient air sampling detected many typically urban contaminants such as Freon and spent byproducts of petroleum combustion. Methane levels exceeding the lower explosive limit (5 percent) were detected across the Landfill.

2.0 SCOPE OF WORK

2.1 General

This geotechnical investigation is being conducted under the auspices of the New York City Department of Environmental Protection (NYCDEP). The geotechnical investigations for this site have been grouped into three major tasks: Task 1 - Limits of Waste Delineation, Task 2 - Existing Pier Investigation, and Task 3 - Landfill Settlement/Stability Investigation. Detailed descriptions of the specific elements of the scope of work for each of these tasks is presented in Section 2.2. Section 2.3 identifies additional elements of the scope of work that are common to the three tasks.

2.2 Specific Elements of the Scope of Work

2.2.1 Task 1 - Limits of Waste Delineation

The purpose of this field investigation is to define the lateral extent and depth of waste along the northern edge of the Site parallel to the Belt Parkway. This information will be used to: determine the tie-in details for the northern boundary of the landfill cap; identify potential locations for the capping contractor's staging and storing of materials and temporary facilities; and identify potential locations for surface drainage features and a gas collection system. The limits of waste along the other three sides of the Landfill have been adequately characterized during the RI phase of this project.

Drawing No. 1 presents the approximate location of Contractor's test trenches. A tracked backhoe with a minimum arm capability of 15 feet will be utilized by Contractor to excavate the test trenches along the northern edge of the Site. Contractor will provide access to trenching area using a bulldozer. Clearing and trenching will be completed under the supervision of a URS geotechnical engineer/geologist (hereinafter referred to as Engineer).

Engineer will provide field staking to indicate locations of the test trenches, estimated to be approximately 100 feet apart as shown on Drawing No. 1. The distances between trench locations may be modified by Engineer based on accessibility and visual field observations. A

total of 30 test trenches (TTP-1 to -30) will be completed by Contractor. Additional trenches will be excavated by Contractor, if determined to be necessary by Engineer, in areas requiring further delineation.

Commencing at the fenceline, the Contractor will excavate a 1- to 2-foot deep trench until continuous waste is encountered. The point at which continuous waste is first noted will be marked by Engineer. If this point is less than 25 feet from the fenceline, Contractor will continue trenching to the 25 foot point to obtain information about the continuity and thickness of the waste. The trench between the point where continuous waste is first detected and the inside edge of the 25-foot corridor will be extended deeper by Contractor to the bottom of waste. The depths of the trenches in this zone are anticipated to be approximately 5 to 15 feet. Leachate/water may enter the open trenches and restrict the minimum anticipated depth of the trenches at certain locations. Contractor is responsible for providing and operating pump of sufficient capacity to remove and dispose of leachate/water over berm so as not to delay trenching operations. Pumping water shall be included in the per trench pricing. Excavated areas will be restored by Contractor by backfilling the trenches with the excavated waste, compacting it with the backhoe bucket, and placing and compacting suitable berm material for housekeeping purposes, as directed by Engineer. "Fill material for soil cover" shall be available on-site in the event it is determined that the berm material is unsuitable for backfilled trenches.

"Fill material for soil cover" shall be imported by Contractor from sources outside the landfill. It shall be free from organic matter and garbage of any kind. It shall not consist of any particles with grain size larger than 2.5 inches. Fill material shall consist of mixtures of sand, silts and clays. The minimum amount of fines passing a No. 200 sieve shall not be less than 10 percent.

The test trenching activities will be conducted by Contractor in accordance with the existing approved Site Health and Safety Plan for field investigations (available from Engineer). During the test trenching activities, particulate monitoring will be conducted hourly by the Engineer in the work area as well as downwind and upwind of the work area. In addition, the test trenches will be screened by Engineer with a Photoionization Detector (PID) and a LEL meter for volatile organic compounds and explosive atmospheres, respectively. Furthermore, during the test trenching activities gas/dust suppression controls, including but not limited to

exhaust fans and trucks, will be provided and utilized by Contractor to control offsite migration of these elements (see Section 2.3.9).

The Contractor will be responsible for the side slope stability of the trenches. In addition, the Contractor will provide a portable observation bridge with railing on both sides such that the Engineer can safely observe the bottom of each trench and measure the trench depth.

2.2.2 Task 2 - Existing Pier Investigation

The purpose of this investigation is to obtain geotechnical data to be used for the foundation design of the existing pier extension.

Ten soil borings (PBP-1 to -10) will be drilled by Contractor to obtain subsurface information. Drawing No. 1 shows the approximate location of the proposed borings. Seven geotechnical soil borings will be drilled offshore near the proposed pier extension location. Three onshore soil borings will be taken at alternating pier locations. Offshore boring depths are estimated at 100 feet. Onshore boring depths should range from 25 to 100 feet (estimate 50 feet each for two borings and 100 feet deep for one boring). The borings will be advanced by Contractor with both truck and barge-mounted drill rigs equipped with 4-1/4" diameter Hollow Stem Augers (HSA).

All borings will be completed under the supervision of the Engineer. The proposed boring locations shown on Drawing No. 1 may be modified by the Engineer depending upon field conditions. In addition, unexpected soil conditions may require consideration for additional borings or vertical extension of the proposed borings.

At each boring location, Standard Penetration Tests (SPT) will be performed continuously by Contractor from 0 to 50 feet and then every five feet down to the termination depth of the borings. Contractor will record N values every six inches. The SPT will be performed in accordance with ASTM D-1586 procedures. Split spoon soil samples will be collected by Contractor where SPT's are being performed. Each sample will be classified by Engineer in accordance with the ASTM D-2487 or D-2488, and D-2607 where applicable.

Samples will be selected and submitted for geotechnical laboratory testing by the Engineer following completion of the boring program. A minimum of one sample from each of the different geologic units encountered will be analyzed for routine geotechnical properties. In cases where soft or cohesive materials are encountered (i.e., TMD) a shelby tube sample will be collected by Contractor in accordance with ASTM D-1587 procedures.

The soil boring activities will be conducted by Contractor in accordance with the existing approved site Health and Safety Plan for field investigations. During the drilling activities, the boreholes will be screened by Engineer with a PID and LEL meter for volatile organic compounds and explosive atmospheres respectively.

2.2.3 Task 3 - Settlement/Stability Investigation

All borings activities under Task 3 will be conducted by Contractor in accordance with the existing approved site Health and Safety Plan for field investigations. During the drilling activities, the boreholes will be screened by Engineer with a PID and LEL meter for volatile organic compounds and explosive atmospheres, respectively. If unacceptable levels are detected, Engineer will notify Contractor to stop work and when to proceed. Contractor will be paid standby time while stop work order is in effect.

Task 3.1 - LARGE DIAMETER AUGER BORINGS

Two (2) large diameter auger borings (ABP-8 and ABP-9) are to be drilled by Contractor at the plateau area of the Landfill. The purpose of these borings is to allow the composition and nature of the waste materials to be determined and to collect data on waste unit weight. These auger borings will be advanced by Contractor to the base of the landfilled material, the top of the leachate mound, or a depth of 100 feet, whichever occurs first. If refusal occurs first, Contractor will abandon hole and drill at a new location to be designated by Engineer. A caisson-type drilling rig of suitable size and capacity will be utilized by Contractor to auger the holes using 18-inch to 24-inch diameter solid stem augers, bucket augers, core buckets, or other tools as necessary to advance the borehole to the required depths. The drilling rig will be a stem auger rig having a Kelly bar system and the capability to exert downward pressure on the drilling tools.

The rig will have adequate weight, torque, and depth capabilities to advance the hole through the waste mass up to a depth of 100 feet.

Cuttings removed from the hole will be collected and weighed by the Contractor at intervals of five feet, or as otherwise directed by the Engineer. A portable scale, container(s) and labor will be provided by Contractor for the collection and weighing of the cuttings. The cuttings from each five-foot interval will be placed by Contractor into the container(s) and upon weighing them, the cumulative weight for the drilled interval will be recorded by Engineer. The cuttings are to be stockpiled by Contractor near the boring location for use in backfilling the hole upon completion. The stockpiled cuttings are to be covered by Contractor with a heavy tarp. The edges of the tarp will be secured by Contractor with ballast or other means. The auger hole will be covered at all times, except when drilling, with a Contractor-provided and installed solid steel road plate of adequate thickness and size. The ground around the collar of the hole is to be leveled by Contractor so that the steel plate fully contacts the ground surface, to prevent gas from escaping from the edges. Safety fencing shall be placed around the work area by the Contractor.

Once each auger hole is terminated, an "interior" geotechnical boring with a 6-inch diameter PVC casing shall be installed through the open augured hole, as described in Task 3.2.2.

Task 3.2 - GEOTECHNICAL BORINGS

The purpose of this exploration is to collect data and obtain samples of the various subsurface materials at the Site. The samples will be used for classification, composition evaluation, and soil mechanics laboratory testing.

Task 3.2.1 - Perimeter Borings

As part of this task, a total of eleven geotechnical borings will be drilled by Contractor at various locations around the Landfill. The boring depths as shown on Drawing No. 1 range from 15 to 30 feet below existing grade. Borings GBP-1 through 7 are to be drilled within the landfill footprint, from or near the landfill's perimeter access road or along the Belt Parkway at

the approximate locations shown on Drawing No. 1. Most of these locations should be accessible with a truck-mounted drilling rig, although some, including those near the Belt Parkway, may require an All Terrain Vehicle (ATV) mounted rig.

The remaining four borings, SBP-1 through SBP-4, are to be drilled in the tidal flat area adjacent to the Landfill at the approximate locations shown on Drawing No. 1. This area is generally flat and sandy. It is anticipated that these borings can be accessed with a tracked ATV mounted drilling rig during low tide periods. However, a platform or barge mounted rig is required to permit longer working periods. Contractor is required to inspect the area during the bid meeting to determine the appropriate equipment.

The borings will be advanced through landfilled materials using mud rotary methods with 4-1/4 inch I.D. steel casing. Drilling through natural materials will be performed with HSA's or mud rotary methods using 3-3/4-inch I.D. steel casing. In either case, a positive differential head of fluid or water must be kept in the borehole at all times to prevent caving or running sands. Soil samples will be obtained by Contractor with a standard 2-inch split spoon sampler at continuous intervals, starting at the ground/sediment surface in accordance with ASTM D-1586 procedures.

Additional soil samples will be obtained by Contractor as directed by the Engineer. Three-inch O.D. Shelby Tubes will be used to obtain undisturbed samples of fine-grained cohesive materials in accordance with ASTM D1587 as requested by the Engineer. The Contractor shall have a Shelby Tube drivehead on site for use. Brass tubes shall be used.

Based on existing site information and as directed by Engineer from field observations, the perimeter borings will be advanced by Contractor to just above the base of the TMD so as not to penetrate the TMD. Estimated hole depths are 25 to 30 feet for GBP borings and about 15 feet for SBP borings. Upon completion of the drilling activities all boreholes will be sealed/backfilled by Contractor as described in Section 2.3.6.

Task 3.2.2 - Interior Borings

Two (2) geotechnical borings (GBP-8 and GBP-9) will be drilled by Contractor in the interior (plateau area) of the Landfill. These boring locations are described below and are accessible with a truck mounted drilling rig. These borings will be advanced through the large diameter auger holes (Section 2.2.3), to be drilled by Contractor, once the Contractor has reached the required depth as described in Task 3.1. The geotechnical borings will be advanced from the base of the large diameter auger hole to just above the bottom of the TMD, a distance of approximately ten feet.

In order to facilitate drilling of the borings, Contractor will install a heavy gauge steel plate with a central hole for inserting the drill tools over the open auger hole. The area around the collar of the holes is to be leveled by Contractor prior to installing the plate. Compressible materials (e.g. blanket installation) are to be placed by Contractor between the plate and the ground to provide a positive seal. Additionally, Contractor will install a rubber collar in each hole to minimize the amount of gas escaping at the casing/auger opening in the plate.

Four-inch diameter casing and mud rotary methods shall be used to advance the boring. The 4-inch diameter casing shall be inserted within a 6-inch diameter PVC casing. The PVC casing shall then be removed. Samples of the waste (as applicable) are to be collected by Contractor every five feet with a 3-inch diameter split spoon sampler in accordance with ASTM D-1586 procedures. Once the underlying natural strata is encountered, continuous soil samples are to be collected by Contractor with a standard two-inch split spoon sampler to the top of the TMD. Undisturbed samples will be obtained by Contractor at the top of the TMD with three-inch Shelby tubes as requested by the Engineer. The borings are to be terminated by Contractor just above the base of the TMD, which is anticipated to range from approximately 60 to 100 feet below ground surface. Termination depth shall be established in consultation with Engineer based on latest available boring logs and observed field conditions. Upon completion of the exploration program, the geotechnical boreholes will be sealed/backfilled by Contractor as described in Section 2.3.6.

After the geotechnical boring is completed and grouted, Contractor will backfill the auger borehole using the waste cuttings and sand or other suitable granular material as necessary to fill

voids. Contractor shall use the auger rig tools to tamp the cuttings in the hole at maximum intervals of five feet. Contractor shall spread out any excess cuttings on the ground surface to a thickness of six inches or less, and covered with a six-inch thick (minimum) layer soil cover.

2.3 Additional Requirements

2.3.1 Pre-bid Meeting

A pre-bid meeting will be held at the Site trailer to familiarize contractors with the site and address questions regarding the bid proposal. A mandatory site walkthrough will be conducted to visit the drilling/trenching locations at the Site. Contractors will be notified of the date and time of the pre-bid meeting.

2.3.2 Mobilization/Demobilization

All equipment, tools, labor, and supplies necessary to excavate the trenches and drill the boreholes to the required sizes and specified depths will be mobilized to the Site by Contractor within two weeks following receipt of written notice to proceed.

All drill rigs, vehicles, and other heavy equipment (i.e., backhoe, bulldozer) will be steam cleaned by Contractor and the Engineer will inspect this equipment for hydraulic leaks and general condition upon site entry.

Sufficient equipment, tools, labor and supplies will be mobilized to the project site by Contractor such that the work for Tasks 1-3 can be performed concurrently. In addition, work hours and days may exceed 8 hours/day and 5 days/week respectively. It is anticipated that Contractor will work up to 12 hours/day during daylight hours, 6 days/week, Monday-Saturday.

2.3.3 Utility Clearance

All trenching and drilling locations are to be cleared for utilities by Contractor prior to any excavation activities. Any required permits and forms for the drilling and trenching work at this site will be obtained by Contractor.

2.3.4 Access and Setup

Access to all drillings and testing locations will be established and monitored as necessary for performance of the work.

Stripping of vegetation and nominal regrading to smooth uneven ground surface is permissible. However, Contractor is not permitted to cut or fill more than six inches deep. All cut areas where waste materials are exposed must be overlayed with a six-inch thick layer of fill material for soil cover within eight hours of disturbance.

2.3.5 Decontamination

A high pressure steam cleaner will be used by Contractor for equipment decontamination. If oil is identified during excavation or drilling operations, Contractor will clean equipment with Alconox and a scrub brush, followed by steam cleaning. Metal racks suitable for suspending and/or supporting various tools above the ground during decontamination will also be used by Contractor. Personnel independent of the drilling operations will be provided by Contractor to decontaminate drill rigs, tools, equipment, samplers, or other required items. Decontamination activities will be performed by Contractor only at the existing decon pad located near the front gate. All decontamination procedures must be approved by the Engineer prior to the commencement of such procedures. Drill water will be obtained by Contractor from an approved municipal source located at the site. Appropriate permits for the potable water will be obtained, as necessary, by Contractor.

All drill rigs, backhoe, bulldozers, support vehicles and associated equipment and tools, will be steam cleaned by Contractor prior to site departure. In addition, Contractor will steam clean backhoe, drill rigs and associated materials after completing work at any location where oil or other visible contaminant is present.

2.3.6 Drilling and Capping

When Engineer determines that muddy or otherwise contaminated drilling water might flow into any naturally occurring surface water bodies where such contamination is illegal or

undesirable, Contractor will re-circulate and/or clarify the returned water. Pumping supply lines provided by Contractor at such locations will be equipped with a bypass valve and discharge line so that when pumped clarified water is not being used for drilling, it may be discharged by Contractor at a suitable location away from the drilling units. Oil contaminated water and/or drilling fluids will be disposed in a shallow infiltration pit excavated by Contractor downgradient of the boring location to prevent surface water runoff. Engineer shall determine suitable location(s) for infiltration pit(s).

Contractor's field exploration activities will be completed under the supervision of the Engineer. The distances between the trenches/boreholes may be modified by the Engineer based on accessibility and visual field observations. In addition, the need for additional trenches/borings or vertical extension of the trenches or borings due to unexpected soil conditions will be evaluated by Engineer in the field.

Upon completion of the on-shore borings, Contractor will seal each borehole with a thick bentonite slurry to the top of the TMD. The remainder of the borehole will then be backfilled by Contractor with the drill cuttings. Any excess waste cuttings not returned to the borehole will be spread out by Contractor in the vicinity of the borehole and covered with a minimum of six inches of fill material for soil cover immediately upon completion of the exploration at that location.

Upon completion of the off-shore borings, Contractor will pull the HSAs and the boreholes allowed to collapse naturally.

All in-progress boreholes/trenches will be capped/covered overnight by Contractor to prevent access and minimize gas venting.

2.3.7 Health and Safety

Contractor shall develop and implement a Health & Safety Plan (HASP) for its own employees which is in conformance with OSHA and USEPA Health and Safety requirements for conduct of hazardous waste and confined space-related activities. Contractor's HASP, which shall be consistent with the existing site HASP, will be submitted to Engineer for review and

approval prior to start of work. As an alternative, the existing Site HASP may be adopted for use by the Contractor. The Contractor shall provide all safety equipment, e.g., respirator cartridges, tyvek, gloves, boots, and hard hats, etc. consistent with the level of personal protection (PPE) required by the approved HASP. The Contractor shall assure that its personnel are ready to conduct drilling services in Level D+ at all times with contingency provision for Level B or C, PPE if required.

During the field exploration activities, particulate monitoring will be performed by the Engineer in the work area as well as downwind and upwind of the work area to ensure appropriate personnel protection levels. In addition, the test trenches and boreholes will be screened by the Engineer with a photoionization detector (PID) and LEL meter for VOCs and explosive atmospheres, respectively.

2.3.8 Deliverables

Prior to the start of field work, Contractor will submit to Engineer for review and approval a report from a certified subcontracted laboratory indicating that the proposed sources of "fill material for soil cover" comply with the specifications appearing in Section 2.2.1.

Throughout the exploration activities pay items will be documented by Contractor for each trench/boring for approval by Engineer at the completion of each working day.

2.3.9 Gas/Odor/ Dust Control

An engineering gas/odor/dust control system will be implemented and maintained by Contractor throughout the field work. This system will include but not be limited to the following.

- a. Wind sock, one per bucket auger rig at breathing zone level.
- b. High volume exhaust fan with certified explosion-proof motor and 50 feet of 18" diameter (min.) flexible duct. Minimum 100-foot power cord to suitable generator.

c. Water truck for dust suppression.

d. Tarps for odor control.

2.3.10 Subcontracting

Contractors must submit a list of proposed subcontractors with their bids. Engineer will review and approve all subcontractors prior to the start of work.

Contractor will be responsible for coordinating the efforts of all its subcontractors such that field work can commence and be completed in accordance with the schedule presented in Section 3.0

2.3.11 M/WBE - EEO Utilization

Contractor is required to demonstrate good faith efforts to subcontract at least 15 percent and 5 percent of the contract price to NYS Certified Minority Business Enterprise(s) (MBE) and Women Business Enterprise(s), (WBE), respectively.

Contractor is required to provide equal opportunities to minorities and women with regard to all jobs necessary for the performance of work or subcontracts required by the project. Such good-faith efforts will be made by Contractor to employ minorities for at least 15 percent of, and women for at least five percent of, the work force hours required for the completion of the work.

3.0 SCHEDULE

The anticipated schedule for the pre-design geotechnical investigation for this site is as follows:

<u>Activity</u>	
Pre-bid site meeting date & time	December 18, 1995, 9 a.m. (Pennsylvania Avenue Landfill Entrance)
Bid due date & time	January 5, 1996, Noon
Notification of Contractor award	January 12, 1996
Commence field work	January 26, 1996
Complete field work	March 26, 1996

4.0 BID QUOTATION

4.1 General

Section 2.0 of this SOW describes the scope of work for this project. Bidders will utilize Table 4-1 to present Not-to-Exceed (NTE) quotations for the three major tasks identified in Section 2.0.

Bidders' NTE quotations will include all costs for materials and labor and is to include the items identified in Tables 4-2 through 4-4. These tables (without modification) will be utilized to present the backups for Bidders' quotations. However, if the Bidders wish to modify any of the specified quantities or, based on past experience, include additional cost items, a detailed description of the Bidder's proposed modifications along with a breakdown of the associated costs will be submitted to Engineer along with the bid quotation.

4.2 Cost for Alternative Drilling Methods

Table 4-5 will be utilized to provide costs associated with alternative drilling methods for Tasks 3.2.1 and 3.2.2.

TABLE 4-1

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
PENNSYLVANIA AVENUE LANDFILL**

BID QUOTATION SUMMARY

TASKS NUMBERS	NOT-TO-EXCEED BID AMOUNT
TASK 1 - Limits of Waste Delineation	
TASK 2 - Existing Pier Investigation	
TASK 3 - Settlement/Stability Investigation	
NOT-TO-EXCEED BID AMOUNT	

TABLE 4-2

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
PENNSYLVANIA AVENUE LANDFILL**

**BID QUOTATION BACK-UPS
FOR
TASK 1 - LIMITS OF WASTE DELINEATION**

ITEM #	TASK1 ITEM/ACTIVITY	UNITS	ESTIMATED QUANTITY	UNIT COST			BID AMOUNT (LEVEL D+)
				D+	LEVEL C	B	
1	Mob/Demob	LS	1				
2	Waste Trenches	each	30				
3	Furnish and Install Fill Material for Soil Cover	CY	80				
4	Material/Labor for Controls and Portable Bridge	LS	1				
Total Waste Delineation Cost							

Note:

Includes excavation to determine the limits of waste, dewatering as needed, and backfilling with suitable berm material.

TABLE 4-3

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
PENNSYLVANIA AVENUE LANDFILL**

**BID QUOTATION BACK-UPS
FOR
TASK 2 - EXISTING PIER INVESTIGATIONS**

ITEM #	TASK 2.1: OFF-SHORE DRILLING ITEM	UNITS	ESTIMATED QUANTITY	UNIT COST			BID AMOUNT (LEVEL D+)
				D+	LEVEL C	B	
1	HSA Drilling 0-50' (1)	LF	350				
2	HSA Drilling 50-100'	LF	350				
3	SS Sampling 0-50' (2) (5)	Ea.	175				
4	SS Sampling 50-100' (6)	Ea.	70				
5	ST Sampling (3) (4)	Ea.	14				
6	Per Diem for Drill Crew	Crew Day	14				
7	Mob/Demob incl. Barge	LS	1				
8	Standby Time	Hr.	16				
Total Off-shore Drilling Cost							

Notes:

1. HSA = Hollow Stem Auger Drilling
2. SS = Split Spoon Sampling
3. ST = Undisturbed Shelby Tube Sampling
4. Assume 2 ST/boring
5. Assume Continuous Sampling from 0-50'
6. Assume 5' interval SS Sampling from 50-100'

TABLE 4-3 (cont)

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
PENNSYLVANIA AVENUE LANDFILL**

**BID QUOTATION BACK-UPS
FOR
TASK 2 - EXISTING PIER INVESTIGATIONS**

ITEM #	TASK 2.2: ON-SHORE DRILLING ITEM	UNITS	ESTIMATED QUANTITY	UNIT COST			BID AMOUNT (LEVEL D+)
				D+	LEVEL C	B	
1	HSA Drilling 0-50' (1)	LF	150				
2	HSA Drilling 50-100'	LF	50				
3	SS Sampling 0-50' (2) (6)	Ea.	50				
4	SS Sampling 50-100' (7)	Ea.	10				
5	ST Sampling (3) (5)	Ea.	6				
6	Grouting Boreholes (4)	LF	100				
7	Standby Time	Hr.	4				
8	Mob/Demob	LS	1				
9	Per Diem for Drill Crew	Crew Day	3				
10	Steam Cleaner Rental	Day	3				
Total On-shore Drilling Cost							
TASK 2 - TOTAL DRILLING COST							

Notes:

1. HSA = Hollow Stem Auger Drilling
2. SS = Split Spoon Sampling
3. ST = Undisturbed Shelby Tube Sampling
4. Grout to top of TMD, Assume (ITEM 1 + ITEM 2)/2
5. Assume 2 ST/boring
6. Assume Continuous Sampling from 0-50'
7. Assume 5' interval SS Sampling from 50-100'

TABLE 4-4

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
PENNSYLVANIA AVENUE LANDFILL**

**BID QUOTATION BACK-UPS
FOR
TASK 3 - SETTLEMENT/STABILITY INVESTIGATION**

ITEM #	TASK 3.1: LARGE DIAMETER AUGER BORINGS	UNITS	ESTIMATED QUANTITY	UNIT COST			BID AMOUNT (LEVEL D+)
				D+	LEVEL C	B	
1	Bucket Auger Drilling 0-50'	LF	100				
2	Bucket Auger Drilling 50-100'	LF	100				
3	Six-inch PVC Casing (1)	LF	200				
4	Furnish and Install Supplemental Borehole Backfill Material (2)	CY	10				
5	Standby Time	Hr.	4				
6	Laborer	Hr.	40				
7	Mob/Demob (Drill Rig)	LS	1				
8	Per Diem for Drill Crew	Crew Day	4				
9	Mob/Demob (Backhoe) (3)	LS	1				
10	Backhoe and Operator	Hr.	20				
11	Per Diem for Backhoe Operator	Day	4				
12	Material and Labor for Gas/Odor/Dust Contro	LS	1				
Total Large Diameter Auger Drilling Cost							

Notes:

1. PVC will be installed to keep borehole open such that geotechnical borings described in Task 3.2 can be performed.
2. Sand or other suitable granular material.
3. Includes all items associated with the collection of cuttings (scale, tarp, containers, etc.) as noted in Task 3.1.

TABLE 4-4 (cont)

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
PENNSYLVANIA AVENUE LANDFILL**

**BID QUOTATION BACK-UPS
FOR
TASK 3 - SETTLEMENT/STABILITY INVESTIGATION**

ITEM #	TASK 3.2: GEOTECHNICAL BORINGS	UNITS	ESTIMATED QUANTITY	UNIT COST			BID AMOUNT (LEVEL D+)
				D+	LEVEL C	B	
1	Drilling 0-50' Perimeter Borings (On-shore) (	LF	210				
2	Drilling in Large Diameter Holes (80 to 120')	LF	40				
4	SS Sampling 0-50' (On-shore) (2) (3)	Ea.	105				
5	SS Sampling 50-120' (On-shore) (3)	Ea.	10				
6	HSA Drilling 0-50' (Off-shore) (4)	LF	60				
7	SS Sampling 0-50 (Off-shore) (3)	Ea.	30				
8	ST Sampling (5) (6)	Ea.	26				
9	Grouting On-shore Boreholes (7)	LF	125				
10	Per Diem for Drill Crew	Crew Day	7				
11	Mob/Demob for Rotary Rig	LS	1				
12	Standby Time	Hr.	6				
13	Mob/Demob for Barge	LS	1				
14	Mob/Demob for ATV	LS	1				
15	Steam Cleaner Rental	Day	7				
Total Geotechnical Drilling Cost							

Notes:

1. Mud Rotary Drilling
2. SS = Split Spoon Sampling
3. Assume Continuous Sampling
4. HSA = Hollow Stem Auger Drilling
5. ST = Undisturbed Shelby Tube Sampling
6. Assume 2 ST/boring
7. Grout to top of TMD, Assume (ITEM 1 + ITEM 2)/2

TABLE 4-5

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
PENNSYLVANIA AVENUE LANDFILL**

**BID QUOTATION FOR ALTERNATIVE DRILLING
METHODS FOR TASKS 3.2.1 AND 3.2.2**

ITEM #	DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT COST			ALTERNATE BID AMOUNT (LEVEL D+)
				D+	LEVEL C	B	
1	Mud Rotary Drilling						
	• Mob/Demob	LS	1				
	• Drilling 0-50'	LF	295				
	• Drilling 50-100'	LF	60				
2	Dual Rotary (Barber Type) Drilling						
	• Drilling 50-100'	LF	60				

PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES

SCOPE OF WORK

FOR

FOUNTAIN AVENUE LANDFILL

BROOKLYN, NEW YORK

PREPARED BY:

URS CONSULTANTS, INC.

DECEMBER 1995

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1.0 INTRODUCTION

1.1 General

The Department of Sanitation formerly owned and operated the Fountain Ave Landfill (herein referred to as the FAL, the Landfill or the Site). The Site is located in Brooklyn, NY (Figure 1-1) and is currently listed on the New York State Department of Environmental Conservation's list of inactive hazardous waste sites. Several previous site investigations have been conducted to characterize the site and determine the type and extent of contamination present. However, prior to design of the remedial program for the Site, certain additional geotechnical data are required. This document outlines the scope of work for the additional geotechnical investigation activities which are to be undertaken during the pre-design phase.

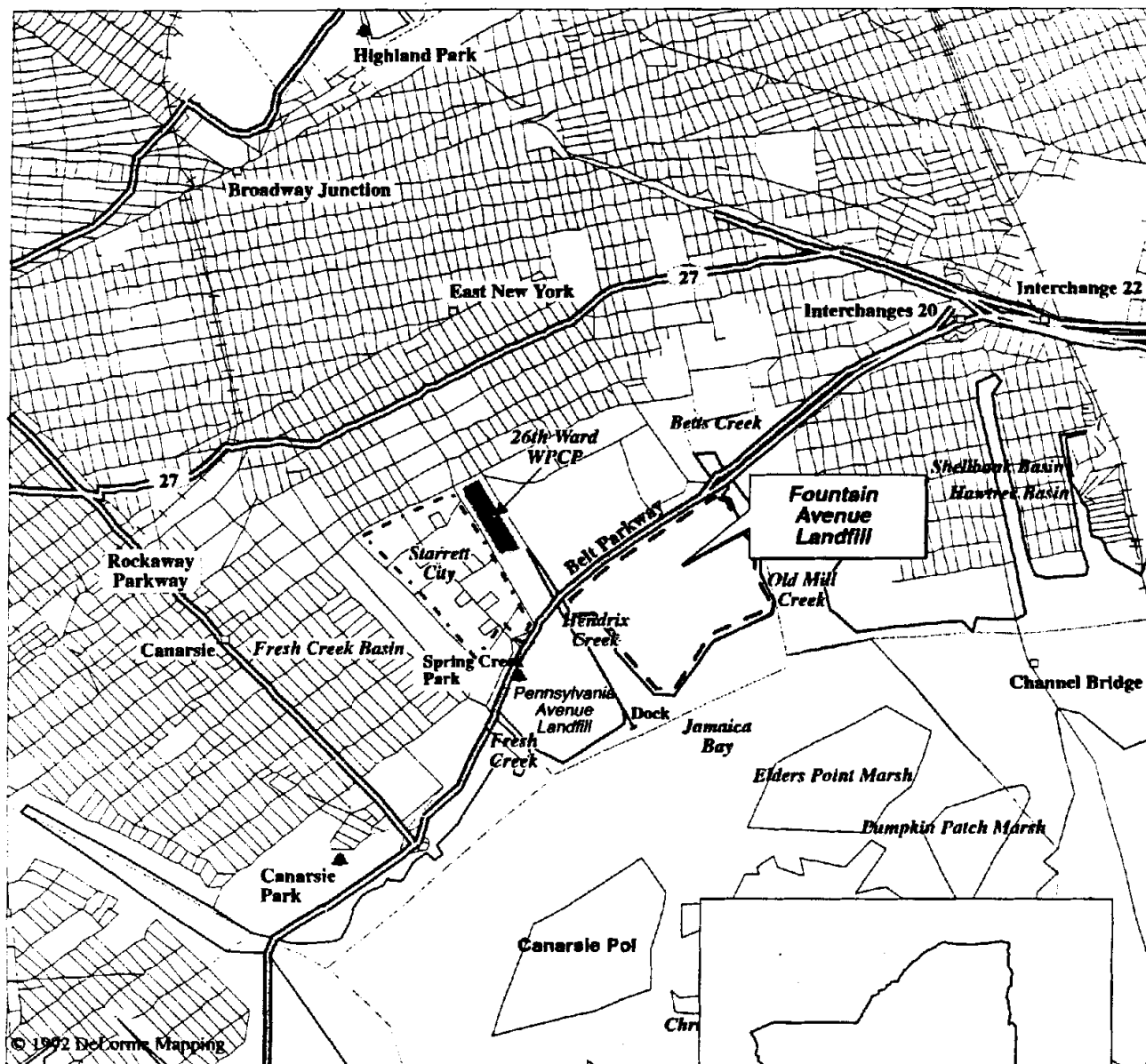
The objectives of these investigations will be to provide additional data on the limits of waste; the type, distribution and geotechnical properties of the onsite materials; and the continuity and geotechnical properties of the tidal marsh deposits (TMD) underlying the site, such that the overall stability and settlement of the landfill during the final closure can be estimated.

This Scope of Work (SOW) contains four sections. Section 1.0 presents introductory information including a summary of the site description and history, and subsurface characterization. Section 2.0 describes the Scope of Work; Section 3.0 discusses the schedule; and Section 4.0 describes the bid quotation elements.

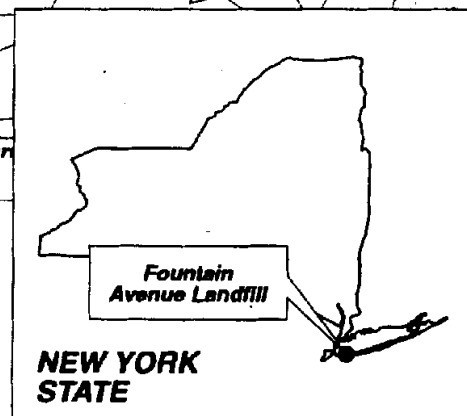
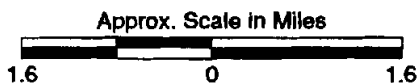
1.2 Site Description and History

The Landfill is 297 acres and located in Brooklyn, New York. (Figure 1-1) This Site is currently listed as a Class 2A site on the New York State Registry of Inactive Hazardous Waste Sites.

The FAL started receiving municipal, industrial and construction & demolition (C&D) wastes in February 1961. By 1968, FAL was expanding more rapidly than anticipated, therefore disposal of C&D debris was shifted to the adjacent closed Pennsylvania Avenue Landfill (PAL). Throughout the 1970's the Site received waste oil for control of roadway dust. This practice was



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**FOUNTAIN AVENUE LANDFILL
SITE LOCATION MAP**

FIGURE 1-1

discontinued in late 1979. The City of New York transferred ownership of the FAL to the United States Department of the Interior, National Park Service, in 1974. In 1985, all filling at the FAL ceased.

Situated over what was once a tidal marsh, the FAL is surrounded on three sides by water: Hendrix Creek to the west, Jamaica Bay on the south and Old Mill Creek Basin to the east. On the north, the FAL is bounded by the Belt Parkway; farther north is Starrett City, a high-rise housing development.

There is one large main fill mound at the Site which rises above Jamaica Bay to an elevation of approximately 130 feet (Borough of Brooklyn Datum). Other fill ridges (running around the perimeter of the Site) are between 10 and 20 feet in height. Soil cover is generally thin.

Normal access to the Site is through an entrance gate on Fountain Avenue, which passes under the Belt Parkway. There are dirt roads around the FAL and to the top of the fill mound (See Drawing No. 1). The main entrance gate is kept locked and site access is controlled 24 hours a day by a security company under contract to the City of New York. Security patrols are performed along the Site perimeter roads. The guard service occupies a trailer near the main gate. There is evidence of illegal vehicular access to the Site, most often by dirt-bikes.

1.3 Subsurface Characterization

Prior to fill placement in the Landfill, between 0 and 13 feet of dredged material from Jamaica Bay, primarily fine to medium sands, was placed over the existing TMD at the Site. The TMD is a soft to medium stiff, organic clay silt that is between 0 and 12 feet thick. Underlying the TMD is a medium dense to dense, fine to medium sand referred to as the Upper Glacial Aquifer (UGA). The thickness of the UGA is estimated to be in excess of 16 feet (URS, 1994a). Fill materials at the Site consist of municipal/industrial wastes and C & D materials that range in thickness from 20 to 130 feet.

Groundwater, referred to as leachate-mound-water, is present within the 20- to 130-foot fill. This leachate-mound-water is confined by the underlying TMD, which restricts transport

of it into the UGA. The groundwater surface typically ranges between elevation 0 and 6 feet across the Site. Based on groundwater levels measured in monitoring wells during one tidal cycle, the leachate-mound-water is not strongly influenced by tidal fluctuation.

In contrast to the leachate-mound-water, the UGA is strongly influenced by tidal fluctuation. Regional flow in the UGA is south-southeast toward Jamaica Bay but reverses to a northerly direction at high tide.

The above subsurface description is provided as information only, and may not be representative of actual field conditions across the entire Site.

Nature and Extent of Contamination

The results of the Remedial Investigations (RI) indicate a variety of contaminants in the various media at the Site. These results are summarized below:

- Surface soil Standards, Criteria, and Guidance (SCG) exceedances occurred primarily for semivolatile organic compounds (SVOCs), pesticides, PCBs and metals.
- SCG exceedances in subsurface fill samples were primarily for VOCs, SVOCs, pesticides, PCBs, and metals.
- The TMD appears to act as a barrier layer for migration of organic contaminants into the UGA and limits the migration of inorganic contaminants.
- Within the TMD and UGA slight exceedances were primarily for metals.

Groundwater samples collected from the leachate mound showed exceedances for VOC, SVOCs, pesticides, PCBs and metals.

The concentrations of compounds detected in surface water samples were significantly less than those detected in the nearby leachate mound. In general, VOC and SVOC concentrations in the surface water were diluted between 2-10 times while the concentration of some metals (e.g., calcium, magnesium, potassium, and sodium) and pesticides tended to increase, reflecting probable regional contributions of these contaminants to Jamaica Bay.

Ambient air sampling detected many typically urban contaminants such as Freon and spent byproducts of petroleum combustion. Methane levels exceeding the lower explosive limit (5 percent) were detected across the Landfill.

2.0 SCOPE OF WORK

2.1 General

This geotechnical investigation is being conducted under the auspices of the New York City Department of Environmental Protection (NYCDEP). The geotechnical investigations for this site have been grouped into three major tasks: Task 1 - Limits of Waste Delineation, Task 2 - Proposed Hendrix Creek Bridge Investigation, and Task 3 - Landfill Settlement/Stability Investigation. Detailed descriptions of the specific elements of the scope of work for each of these tasks is presented in Section 2.2. Section 2.3 identifies additional elements of the scope of work that are common to the three tasks.

2.2 Specific Elements of the Scope of Work

2.2.1 Task 1 - Limits of Waste Delineation

The purpose of this field investigation is to define the lateral extent and depth of waste along the northern edge of the Site parallel to the Belt Parkway. This information will be used to: determine the tie-in details for the northern boundary of the landfill cap; identify potential locations for the capping contractor's staging and storing of materials and temporary facilities; and identify potential locations for surface drainage features and a gas collection system. The limits of waste along the other three sides of the Landfill have been adequately characterized during the RI phase of this project.

Drawing No. 1 presents the approximate location of Contractor's test trenches. A tracked backhoe with a minimum arm capability of 15 feet will be utilized to excavate the test trenches along the northern edge of the Site. Contractor will provide access to trenching area using a bulldozer. Clearing and trenching will be completed under the supervision of a URS geotechnical engineer/geologist (hereinafter referred to as Engineer).

Engineer will provide field staking to indicate locations of the test trenches, estimated to be approximately 100 feet apart as shown on Drawing No. 1. The distances between trench locations may be modified by Engineer based on accessibility and visual field observations. A

total of 35 test trenches (TTF-1 to -35) will be completed by Contractor. Additional trenches will be excavated by Contractor, if determined to be necessary by Engineer, in areas requiring further delineation.

Commencing at the fenceline, Contractor will excavate a 1- to 2-foot deep trench until continuous waste is encountered. The point at which continuous waste is first noted will be marked by Engineer. If this point is less than 25 feet from the fenceline, the trench will be extended horizontally to the 25 foot point to obtain information about the continuity of the thickness of the waste. The trench between the point where continuous waste is first detected and the inside edge of the 25-foot corridor will be extended deeper by Contractor to the bottom of waste. The depths of the trenches in this zone are anticipated to be approximately 5 to 15 feet. Leachate/water may enter the open trenches and restrict the minimum anticipated depth of the trenches at certain locations. Contractor is responsible for providing and operating pump of sufficient capacity to remove and dispose of leachate/water over berm so as not to delay trenching operations. Pumping water shall be included in the per trench pricing. Excavated areas will be restored by Contractor by backfilling the trenches with the excavated waste, compacting it with the backhoe bucket, and placing and compacting suitable berm material for housekeeping purposes, as directed by the Engineer. "Fill material for soil cover" shall be available on-site in the event it is determined that the berm material is unsuitable for backfilled trenches.

"Fill material for soil cover" shall be imported by Contractor from sources outside the landfill. It shall be free from organic matter and garbage of any kind. It shall not consist of any particles with grain size larger than 2.5 inches. Fill material shall consist of mixtures of sand, silts and clays. The minimum amount of fines passing a No. 200 sieve shall not be less than 10 percent.

The test trenching activities will be conducted by Engineer in accordance with the existing approved site Health and Safety Plan for field investigations (available from Engineer). During the test trenching activities, particulate monitoring will be conducted hourly by Engineer in the work area as well as downwind and upwind of the work area. In addition, the test trenches will be screened by the Engineer with a Photoionization Detector (PID) and a LEL meter for volatile organic compounds and explosive atmospheres, respectively. Furthermore, during the test trenching activities gas/dust suppression controls including, but not limited to, exhaust fans and

water trucks will be provided and utilized by Contractor to control offsite migration of these elements (see Section 2.3.9).

The Contractor will be responsible for the side slope stability of the trenches. In addition, a portable observation bridge with railing on both sides will be provided such that Engineer can safely observe the bottom of each trench and measure the trench depth.

Any other areas of exposed waste which are caused by Contractor's waste delineation activities will be covered by Contractor with a minimum of 6 inches of fill material for soil cover.

In addition to the trenching activities as part of the pre-design field work, a trench will be excavated by backhoe along a drainage ditch adjacent to the Belt Parkway to establish positive drainage toward Hendrix Creek. Existing adjacent berm material may be used for site dressing as needed. This item is included in Table 4-2 as an additional backhoe task. A lump sum cost for this additional task will be required.

2.2.2 Task 2 - Proposed Hendrix Creek Bridge Investigation

The purpose of this investigation is to obtain geotechnical data to be used for the foundation design of the proposed bridge over Hendrix Creek. NYCDEP reserves the option to not conduct Task 2 as part of the geotechnical scope of work. However, contractors are required to submit a bid quotation for Task 2 on Tables 4-1 and 4-3.

Twelve soil borings (BBF-1 to -12) will be drilled by Contractor to obtain subsurface information. Drawing No. 1 shows the approximate location of the proposed borings. Five geotechnical soil borings will be drilled offshore near the proposed bridge abutments. Seven geotechnical soil borings will be drilled onshore at alternating pier locations. Boring depths are estimated at 100 feet. The borings will be advanced by Contractor with an ATV (onshore) and barge (offshore) mounted drill rigs equipped with 4-1/4" diameter Hollow Stem Augers (HSA).

All borings will be completed under the supervision of the Engineer. The proposed boring locations shown on Drawing No. 1 may be modified by the Engineer depending upon field

conditions. In addition, unexpected soil conditions may require consideration for additional borings or vertical extension of the proposed borings.

At each boring location, Standard Penetration Tests (SPT) will be performed continuously by Contractor from 0 to 50 feet and every 5-feet from 50 feet down to the termination depth of the borings. Contractor will record N-values every six inches. The SPT will be performed in accordance with ASTM D-1586 procedures. Split spoon soil samples will be collected by Contractor where SPT's are being performed. Each sample will be classified by Engineer in accordance with the ASTM D-2487 or D-2488, and D-2607 where applicable.

Samples will be selected and submitted for geotechnical laboratory testing by the Engineer following completion of the boring program. A minimum of one sample from each of the different geologic units encountered will be analyzed for routine geotechnical properties. In cases where soft or cohesive materials are encountered (i.e., TMD) a shelby tube sample will be collected by Contractor in accordance with ASTM D-1587 procedures.

The soil boring activities will be conducted by Contractor in accordance with the existing approved site Health and Safety Plan for field investigations. During the drilling activities, the boreholes will be screened by Engineer with a PID and LEL meter for volatile organic compounds and explosive atmospheres respectively.

2.2.3 Task 3 - Settlement/Stability Investigation

All boring activities under Task 3 will be conducted by Contractor in accordance with the existing approved Site Health and Safety Plan for field investigations. During the drilling activities, the boreholes will be screened by Engineer with a PID and LEL meter for volatile organic compounds and explosive atmospheres, respectively. If unacceptable levels are detected, Engineer will notify Contractor to stop work and when to proceed with work based on PID and LEL readings. Contractor will be paid standby time while stop work order is in effect.

Task 3.1 - LARGE DIAMETER AUGER BORINGS

Five large diameter auger borings (ABF-8 through ABF-12) are to be drilled by Contractor at the plateau area of the Landfill. The purpose of these borings is to allow the composition and nature of the waste materials to be determined and to collect data on waste unit weight. These auger borings will be advanced by Contractor to the base of the landfilled material, the top of the leachate mound, or a depth of 100 feet, whichever occurs first. If refusal occurs first, Contractor will abandon hole and drill at a new location to be designated by Engineer. A caisson-type drilling rig of suitable size and capacity will be utilized by Contractor to auger the holes using 18-inch to 24-inch diameter solid stem augers, bucket augers, core buckets, or other tools as necessary to advance the borehole to the required depths. The drilling rig will be a stem auger rig having a Kelly bar system and the capability to exert downward pressure on the drilling tools. The rig will have adequate weight, torque, and depth capabilities to advance the hole through the waste mass up to a depth of 100 feet.

Cuttings removed from the hole will be collected and weighed by the Contractor at intervals of five feet, or as otherwise directed by the Engineer. A portable scale, container(s) and labor will be provided by Contractor for the collection and weighing of the cuttings. The cuttings from each five-foot interval will be placed by Contractor into the container(s) and upon weighing them, the cumulative weight for the drilled interval will be recorded by Engineer. The cuttings are to be stockpiled by Contractor near the boring location for use in backfilling ABF-8 through ABF-12 upon completion. The stockpiled cuttings are to be covered by Contractor with a heavy tarp. The edges of the tarp will be secured by Contractor with ballast or other means. The auger hole will be covered at all times, except when drilling, with a Contractor-provided and installed solid steel road plate of adequate thickness and size. The ground around the collar of the hole is to be leveled by Contractor so that the steel plate fully contacts the ground surface to prevent gas from escaping from the edges. Safety fencing shall be placed around the work area by the Contractor.

ABF-12 is to be backfilled with two-inch crushed stone. The stone shall be durable and carbonate-free washed stone with minimal fines or dust.

Once each auger hole is terminated, an interior geotechnical boring with a 6-inch diameter PVC casing shall be installed in the open auger hole as described below in Task 3.2.2.

Task 3.2 - GEOTECHNICAL BORINGS

The purpose of this exploration is to collect data and obtain samples of the various subsurface materials at the Site. The samples will be used for classification, composition evaluation, and soil mechanics laboratory testing.

Task 3.2.1 - Perimeter Borings

As part of this task, a total of 14 geotechnical borings will be drilled by Contractor at various locations around the Landfill. The boring depths as shown on Drawing No. 1 range from 15 to 35 feet below existing grade. Borings GBF-1 through 7 are to be drilled within the landfill footprint, from or near the landfill's perimeter access road or along the Belt Parkway at the approximate locations shown on Drawing No. 1. Most of these locations should be accessible with a truck-mounted drilling rig, although some, including those near the Belt Parkway, will likely require an All Terrain Vehicle (ATV) mounted rig.

The remaining seven borings, SBF-1 through SBP-7, are to be drilled in the tidal flat area adjacent to the Landfill at the approximate locations shown on Drawing No. 1. This area is generally flat and sandy. It is anticipated that these borings can be accessed with a tracked ATV mounted drilling rig during low tide periods. However, a platform or barge mounted rig is required to permit longer working periods. Contractor is required to inspect the area during the bid meeting and to determine the appropriate equipment.

The borings will be advanced through landfilled materials using mud rotary methods with 4-1/4 inch I.D. steel casing. Drilling through natural materials will be performed with HSA's or mud rotary methods using 3-3/4-inch I.D. steel casing. In either case, a positive differential head of drilling fluid or water must be kept in the borehole at all times to prevent caving or running sands. Soil samples will be obtained by Contractor with a standard 2-inch split spoon sampler at continuous intervals, starting at the ground/sediment surface in accordance with ASTM D-1586 procedures.

Additional soil samples will be obtained by Contractor as directed by Engineer. Three-inch O.D. Shelby Tubes be used to obtain undisturbed samples of fine-grained cohesive materials in accordance with ASTM D1587 as requested by Engineer. A Shelby Tube drivehead will be provided by Contractor for use on site. Brass tubes shall be used.

Based on existing site information and as directed by Engineer from field observations, the perimeter borings will be advanced by Contractor to just above the base of the TMD. Estimated hole depths are 25 to 35 feet for GBF borings and about 15 feet for SBF borings. Upon completion of the drilling activities all boreholes will be sealed/backfilled by Contractor as described in Section 2.3.6.

Task 3.2.2 - Interior Borings

Five geotechnical borings (GBF-8 through GBF-12) will be drilled by Contractor in the interior (plateau area) of the Landfill. These boring locations are described below and are accessible with a truck mounted drilling rig. These borings will be advanced through the large diameter auger holes, to be drilled by Contractor once the required depths have been reached as described in Task 3.1. The borings will be advanced from the base of the large diameter auger hole to just above the bottom of the TMD, a distance of approximately 10 to 40 feet.

In order to facilitate drilling of the borings, Contractor will install a heavy gauge steel plate with a central hole for inserting the drill tools over the open auger hole. The area around the collar of the holes is to be leveled by Contractor prior to installing the plate. Compressible materials (e.g. blanket installation) are to be placed by Contractor between the plate and the ground to provide a positive seal. Additionally, Contractor will install a rubber collar in each hole to minimize the amount of gas escaping at the casing/auger opening in the plate.

Four-inch diameter casing and mud rotary methods shall be used to advance the boring. The 4-inch diameter casing shall be inserted within a 6-inch diameter PVC casing. The PVC casing shall then be removed. Samples of the waste (as applicable) are to be collected by Contractor every five feet with a 3-inch diameter split spoon sampler in accordance with ASTM D-1586 procedures. Once the underlying natural strata is encountered, continuous soil samples are to be collected by Contractor with a standard 2-inch split spoon sampler to the top of the

TMD. Undisturbed samples will be obtained by Contractor from the top of the TMD with 3-inch Shelby tubes as requested by the Engineer. The borings are to be terminated by the Contractor just above the base of the TMD, which is anticipated to range from approximately 85 to 140 feet below ground surface. Termination depth shall be established in consultation with Engineer, based on latest available boring logs and observed field conditions. Upon completion of the exploration program, the geotechnical boreholes will be sealed/backfilled by Contractor as described in Section 2.3.6.

After the geotechnical boring is completed and grouted, Contractor will backfill the auger borehole using the waste cuttings and sand or other suitable granular material (as necessary to fill voids). Contractor shall use the auger rig tools to tamp the cuttings in the hole at maximum intervals of five feet. Contractor shall spread-out any excess cuttings on the ground surface to a thickness of six inches or less, and covered with a 6-inch thick (minimum) layer soil cover.

Task 3.3 - CONE PENETRATION TESTS

Cone penetration tests (CPT) are planned at five truck-accessible locations at the Landfill. The CPTs will be performed with an electric friction-type cone penetrometer, provided by Contractor in accordance with ASTM D-3441 (a standard method for deep, quasi-static, cone and friction-cone penetration tests of soil).

The cone penetrometer is to be advanced by Contractor from the ground surface to refusal or a maximum depth of 150 feet at locations indicated by the Engineer. Refusal criteria are as follows:

1. Required thrust for advancement of the cone penetrometer exceeds the available reaction force (i.e. - the CPT rig lifts up off its supports).
2. Excessive bending of the push probes is observed (i.e. while raising the rams in preparation of the next down-stroke, the top of the pipe string snaps upward because of the release of compression load. A portion of the rebound is due to

the elasticity of the steel pipes, but the remainder is due to the bending of the pipes. A rebound of over 1 inch per 50 feet of pipe will constitute refusal).

3. Excessive probe inclination occurs during advancement (i.e., a vertical deviation of 10 degrees or more caused by impact with a hard obstruction).
4. Excessive resistance to penetration occurs during advancement - (i.e., when the measured cone tip resistance, sleeve friction, or pore pressure exceeds the capacity of the CPT probe's load cells or transducers).

Upon completion, the probe holes will be backfilled by Contractor with granular bentonite and monitored by Engineer with an O₂/LEL meter. If after filling with bentonite, landfill gases are detected escaping from the hole, a one-foot thick hydrated bentonite seal shall be provided by Contractor at the surface.

The CPT unit will be set up and operated in accordance with standard CPT practices and in a manner that will ensure the safe and effective operation of the equipment. A typical cone penetrometer apparatus (approximately 22 inches long, 1.4 inches in base diameter, with a 60 degree conical tip and a 1.4 inch by 5.25 inch long friction sleeve) attached with a string of hollow 1.4 inch diameter rods will be used during this site investigation. The CPT unit and its associated 20 ton pressure device will be truck mounted. CPT will involve the continuous advancement of the standard cone, using the pressure device, at a specified penetration rate of 2 to 4 feet per minute.

Piezocone attachments will be used at each CPT location to obtain information on groundwater conditions such as excess pore-water pressure as a function of depth and pore-water pressure dissipation as a function of time.

Standard CPT data providing soil descriptions, the correlated equivalent blow-count (STP-Value), relative density, angle of internal friction and undrained shear strength will be recorded. Definitions of the site stratigraphic and hydrologic conditions based on interpretations of the four piezocone parameters (cone tip resistance, friction sleeve resistance, friction ratio and pore water pressure) and the CPT data itself will be presented to URS in a report format. The report shall

include graphs of the variation of cone resistance with depth for each CPT sounding. All piezocone soundings shall include a parallel graph, to the same depth scale, of measured pore water pressure during the penetration versus depth.

All sampling equipment will be steam-cleaned upon arrival at the base. All equipment and tools that come in contact with soil during testing will be decontaminated between successive CPT locations and or when leaving the project site.

Task 3.4 - PRESSUREMETER BORINGS

One cased boring will be drilled by Contractor adjacent to one of the large diameter auger boring locations, as directed by the Engineer, for the purpose of conducting borehole pressuremeter tests. The location will be accessible with a truck mounted rig. The estimated depth of this boring is 100 feet. Pressuremeter testing will be performed only in the top 75 feet. Gas probe sampling (see Task 3.4.1) will be performed up to a depth of 100 feet. Drilling and backfilling of the boring by Contractor will be in accordance with procedures outlined for the on-shore perimeter borings in Section 2.3.6.

The casing used by Contractor to advance the boring will have a minimum inside diameter of 4 inches. Pressuremeter testing will generally be conducted by Engineer, with the assistance of Contractor, at 5-foot intervals in an open (uncased) section of the borehole. Once the casing has been advanced to the required test depth, a 3.0 inch diameter hole will be advanced by Contractor approximately 5 feet below the bottom of the casing using a thin-walled sampler, rotary wash, or other approved methods. The pressuremeter will be lowered into and extracted from the borehole by Contractor as directed by the Engineer. Suitable adapters and rods will be supplied by Contractor as necessary to facilitate the testing. A stable borehole will be maintained by Contractor during pressuremeter testing activities. The pressuremeter will be supplied and operated by the Engineer. In the event of borehole collapse and loss of the pressuremeter equipment, replacement will be by Contractor at no cost to the Engineer.

Task 3.4.1 - GAS SAMPLING AND MEASUREMENT

In addition to pressuremeter (PM) testing, landfill gas sampling and measurements shall be performed in the cased pressuremeter boreholes. A description of the gas probe and sampling and measuring procedures are as follows:

The gas vacuum probe is to be provided by the Engineer, and shall consist of a 24-inch long 1-3/4-inch diameter double stainless steel tube with a drive tip and drive head. The outer and inner tubes shall have machine-cut slots. The inner tube extends through the head of the probe and has a fitting for connection with 3/8 inch diameter Teflon tubing. The probe shall be compatible with AW drilling rods. A schematic of the probe is shown in Figure 2-1.

Pressuremeter testing shall generally be conducted at 5-foot intervals by the Contractor as described in this specification. The gas probe sampling shall be performed by the Contractor at the direction of the Engineer after the PM test is complete and the PM is removed from the borehole. At this point, the gas probe will be connected to sufficient length of Teflon tubing and drill rod and lowered into the borehole to the sampling depth. The tubing shall be strung through the rods or exit through a hole drilled in the side of the rods. Using a drivehead and the SPT method, the probe shall be driven by the Contractor for 3 feet or until refusal (≥ 50 blows/6 inches). The drivehead is removed and the sampling tubing is exposed. At this point, the Engineer will let the probe sit for about 5 minutes, will evacuate the tubing by pumping, and will take gas measurements and collect a sample.

The pressuremeter testing is limited to a depth of 75 feet. Below this depth, to a depth of no more than 100 feet, gas probing and sampling will be conducted at 10 foot intervals in the same manner as described herein. It is estimated that between 7 and 12 gas samples will be obtained.

Technical drawing of a probe assembly. The drawing shows a side view of the probe with various dimensions and labels. The dimensions are as follows:

- Overall length: 24"
- Section 1 (left): 4.5"
- Section 2: 4.5"
- Section 3: 1.5"
- Section 4: 4"
- Section 5: 1.5"
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**MATERIAL: 304 STAINLESS STEEL TUBE,
1-3/4" OD X 5/16" WALL**

Figure 7.7 Vacuum probe

Task 3.5 - LOAD TEST FILL CONSTRUCTION

One load-test fill will be constructed by Contractor on the plateau area of the Landfill. The location of the test fill will be determined by the Engineer based on results of the interior geotechnical borings and the large diameter auger borings as well as the historic settlement data.

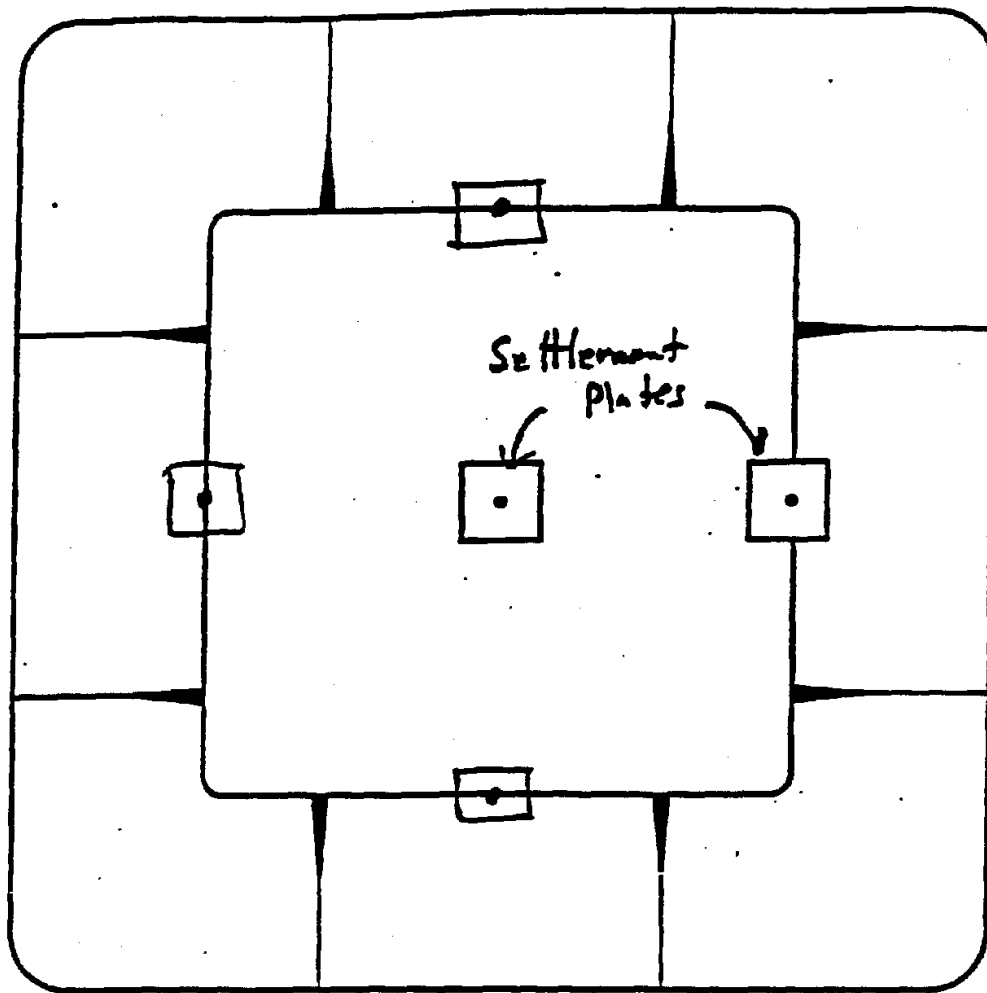
The test fill size will be based on the field data, and will depend on the proposed cap loading, unit weight of waste, thickness of waste, etc. However, it is anticipated that the test fill will be 100' x 100' in area and 10 feet in height.

The quantity of fill material included in Table 4-4 for this task is based on an in-place unit weight of 120 pcf. Compaction of the fill is not required but may be done if desired by the Contractor. The in-place unit weight of the fill will be measured and recorded by Contractor. If determined by Engineer to be required, the fill height will be adjusted by Contractor such that the minimum total load stated above is achieved.

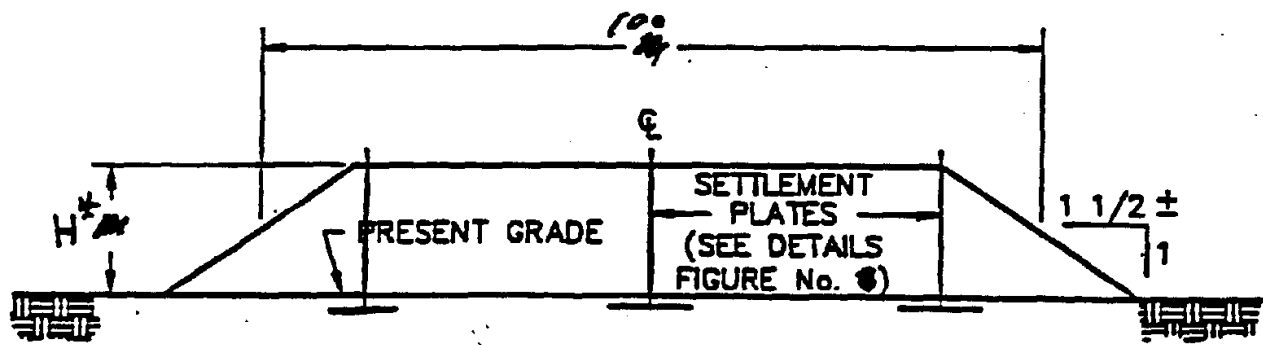
Figure No. 2-2 shows settlement plate positioning relative to the test load fill and Figure No. 2-3 shows the settlement plate details. The plates will be furnished and installed by Contractor on a completely level surface about 1 foot below existing grade. The surface will be smoothed and tamped lightly during installation. The plate backfill will be placed by Contractor by hand and in 6-inch level lifts and tamped lightly. Care will be taken by Contractor not to disturb the plate, extension rods, and extension rod sleeve during replacement of the surcharge material. The rod top will be clearly marked by Contractor and visible from all sides. The telltale rods and sleeves will be plumb. The exact dimensions of each plate and extension rod will be documented by Contractor.

Fill materials furnished and installed by Contractor must have a specified unit weight and be able to be placed in a controlled manner. Contractor shall perform testing of fill materials every 1000 cubic yards. A full description of the material to be used and a proposed procedure to place the material to achieve the intended loading distribution will be prepared by the Contractor and submitted to, and approved by, the Engineer prior to start of the field activities.

FIGURE 2-2



PLAN
(NOT TO SCALE)



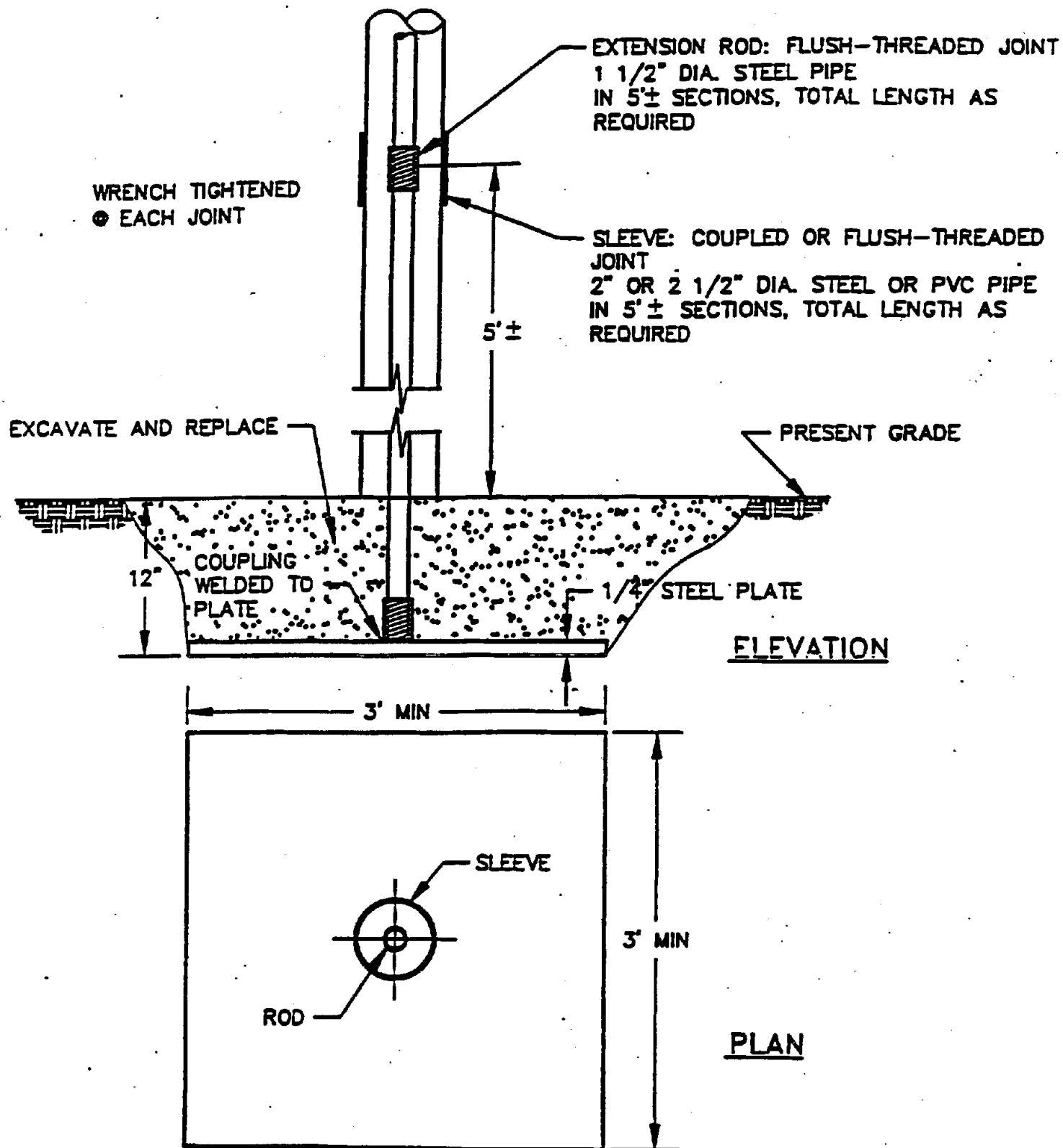
ELEVATION

FILL LOAD SCHEMATIC

NOTE

EXTENSION RODS SHALL EXTEND 6 in ABOVE
LOAD MATERIAL SURFACE AND 3 in ABOVE ROD
SLEEVE

FIGURE 2-3



SETTLEMENT PLATE DETAILS

NOT TO SCALE

Records of the weight of fill placed each day and the location will be maintained by Contractor. The fill load shall be completed by Contractor within 14 calendar days.

2.3 Additional Requirements

2.3.1 Pre-bid Meeting

A pre-bid meeting will be held at the Site trailer to familiarize contractors with the site and address questions regarding the bid proposal. A mandatory site walkthrough will be conducted to visit the drilling/trenching locations at the Site. Contractors will be notified of the date and time of the pre-bid meeting.

2.3.2 Mobilization/Demobilization

All equipment, tools, labor, and supplies necessary to excavate the trenches and drill the boreholes to the required sizes and specified depths will be mobilized to the Site by Contractor within two weeks following receipt of written notice to proceed.

All drill rigs, vehicles, and other heavy equipment (i.e. backhoe/bulldozer) will be steam cleaned by Contractor and the Engineer will inspect this equipment for hydraulic leaks and general condition upon site entry.

Sufficient equipment, tools, labor and supplies will be mobilized to the project site by Contractor such that the work for Tasks 1-3 can be performed concurrently. In addition, work hours and days may exceed 8 hours/day and 5 days/week respectively. It is anticipated that Contractor will work up to 12 hours/day during daylight hours, 6 days/week, Monday-Saturday.

2.3.3 Utility Clearance

All trenching and drilling locations are to be cleared for utilities by Contractor prior to any excavation activities. Any required permits and forms for the drilling and trenching work at this site will be obtained by Contractor.

2.3.4 Access and Setup

Access to all drillings and testing locations will be established and monitored as necessary for performance of the work.

Stripping of vegetation and nominal regrading to smooth uneven ground surface is permissible. However, Contractor is not permitted to cut or fill more than 6 inches deep. All cut areas where waste materials are exposed must be overlayed with a 6-inch thick layer of fill material for soil cover within 8 hours of disturbance.

2.3.5 Decontamination

A high pressure steam cleaner will be used by Contractor for equipment decontamination. If oil is identified during excavation or drilling operations, Contractor will clean equipment with Alconox and a scrub brush, followed by steam cleaning. Metal racks suitable for suspending and/or supporting various tools above the ground during decontamination will also be used by Contractor. Personnel independent of the drilling operations will be provided to decontaminate drill rigs, tools, equipment, samplers, or other required items. Decontamination activities will be performed by Contractor only at the existing decon pad located near the front gate. All decontamination procedures must be approved by Engineer prior to the commencement of such procedures. Drill water will be obtained by Contractor from an approved municipal source located at the site. Appropriate permits for the potable water will be obtained, as necessary, by Contractor.

All drill rigs backhoe, bulldozers, support vehicles and associated equipment and tools, will be steam cleaned by Contractor prior to site departure. In addition, Contractor will steam clean backhoe, drill rigs and associated materials after completing work at any location where oil or other visible contaminant is present.

2.3.6 Drilling and Capping

When Engineer determines that muddy or otherwise contaminated drilling water might flow into any naturally occurring surface water bodies where such contamination is illegal or

undesirable, Contractor will re-circulate and/or clarify the returned water. Pumping supply lines provided by Contractor at such locations will be equipped with a bypass valve and discharge line so that when pumped clarified water is not being used for drilling, it may be discharged by Contractor at a suitable location away from the drilling units. Oil contaminated water and/or drilling fluids will be disposed in a shallow infiltration pit excavated by Contractor downgradient of the boring location to prevent surface water runoff. Engineer shall determine suitable location(s) for infiltration pit(s).

Contractor's field exploration activities will be completed under the supervision of Engineer. The distances between the trenches/boreholes may be modified by Engineer based on accessibility and visual field observations. In addition, the need for additional trenches/borings or vertical extension of the trenches or borings due to unexpected soil conditions will be evaluated in the field by Engineer.

Upon completion of the on-shore borings Contractor will seal each borehole will be sealed with a thick bentonite slurry to the top of the TMD. The remainder of the borehole will then be backfilled by Contractor with the drill cuttings. Any excess waste cuttings not returned to the borehole will be spread out by Contractor in the vicinity of the borehole and covered with a minimum of 6 inches of fill material for soil cover immediately upon completion of the exploration at that location.

Upon completion of the off-shore borings, Contractor will pull the HSAs and the boreholes will be allowed to collapse naturally.

All in-progress boreholes/trenches will be capped/covered overnight by Contractor to prevent access and minimize gas venting.

2.3.7 Health and Safety

Contractor shall develop and implement a Health & Safety Plan (HASP) for its own employees which is in conformance with OSHA and USEPA Health and Safety requirements for conduct of hazardous waste and confined space-related activities. Contractor's HASP, which shall be consistent with the existing Site HASP, will be submitted to Engineer for review and

approval prior to start of work. As an alternative, the existing Site HASP may be adopted for use by the Contractor. The Contractor shall provide all safety equipment, e.g., respirator cartridges, tyvek, gloves, boots, and hard hats, etc. consistent with the level of personal protection (PPE) required by the approved HASP. The Contractor shall assure that its personnel are ready to conduct drilling services in Level D+ at all times with contingency provision for Level B or C, PPE if required.

During the field exploration activities, particulate monitoring will be performed by Engineer in the work area as well as downwind and upwind of the work area to ensure appropriate personal protection levels. In addition, the test trenches and boreholes will be screened by Engineer with a photoionization detector (PID) and LEL meter for VOCs and explosive atmospheres, respectively.

2.3.8 Deliverables

Prior to the start of field work, Contractor will submit to Engineer for review and approval a report from a certified subcontracted laboratory indicating that the proposed sources of "fill material for soil cover" comply with the specifications appearing in Section 2.2.1.

Throughout the exploration activities pay items will be documented by Contractor for each trench/boring for approval by Engineer at the completion of each working day.

2.3.9 Gas/Odor/ Dust Control

Gas/odor/dust control systems will be implemented and maintained by Contractor throughout the field work. This system will include but not be limited to the following.

- a. Wind sock, one per bucket auger rig at breathing zone level.
- b. High volume exhaust fan with certified explosion-proof motor and 50 feet of 18" diameter (min.) flexible duct. Minimum 100-foot power cord to suitable generator.

- c. Water truck for dust suppression.
- d. Tarps for odor control.

2.3.10 Subcontracting

Contractors must submit a list of proposed subcontractors with their bids. Engineer will review and approve all subcontractors prior to the start of work.

Contractor will be responsible for coordinating the efforts of all its subcontractors such that field work can commence and be completed in accordance with the schedule presented in Section 3.0.

2.3.11 M/WBE - EEO Utilization

Contractor is required to demonstrate good faith efforts to subcontract at least 15 percent and 5 percent of the contract price to NYS Certified Minority Business Enterprise(s) (MBE) and Women Business Enterprise(s), (WBE), respectively.

Contractor is required to provide equal opportunities to minorities and women with regard to all jobs necessary for the performance of work or subcontracts required by the project. Such good-faith efforts will be made by Contractor to employ minorities for at least 15 percent of, and women for at least 5 percent of, the work force hours required for the completion of the work.

3.0 SCHEDULE

The anticipated schedule for the pre-design geotechnical investigation for this site is as follows:

Activity

Pre-bid site meeting date & time	December 18, 1995, 9 a.m. (Pennsylvania Avenue Landfill Entrance)
Bid due date & time	January 5, 1996, Noon
Notification of Contractor award	January 12, 1996
Commence field work	January 26, 1996
Complete Task 3.5 (Load Test Fill Construction)	March 25, 1996
Complete Tasks 1, 2, 3.1, 3.2, 3.3 and 3.4	March 26, 1996

4.0 BID QUOTATION

4.1 General

Section 2.0 of this SOW describes the scope of work for this project. Bidders will utilize Table 4-1 to present Not-to-Exceed (NTE) quotations for the three major tasks identified in Section 2.0.

Bidders' NTE quotation will include all costs for materials and labor and is to include the items identified in Tables 4-2 through 4-4. These tables (without modification) will be utilized to present the backups for Bidders' quotations. However, if Bidders wish to modify any of the specified quantities or, based on past experience include additional cost items, a detailed description of the Bidder's proposed modifications along with a breakdown of the associated costs will be submitted to Engineer along with the bid quotation.

4.2 Cost for Alternative Drilling Methods

Table 4-5 will be utilized to provide costs associated with alternative drilling methods for Tasks 3.2.1 and 3.2.2.

TABLE 4-1

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
FOUNTAIN AVENUE LANDFILL**

BID QUOTATION SUMMARY

TASKS NUMBERS	NOT-TO-EXCEED BID AMOUNT
TASK 1 - Limits of Waste Delineation	
TASK 2 - Proposed Hendrix Creek Bridge Investigation	
TASK 3 - Settlement/Stability Investigation	
NOT-TO-EXCEED BID AMOUNT	

TABLE 4-2

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
FOUNTAIN AVENUE LANDFILL**

**BID QUOTATION BACK-UPS
FOR
TASK 1 - LIMITS OF WASTE DELINEATION**

ITEM #	TASK 1 ITEM/ACTIVITY	UNITS	ESTIMATED QUANTITY	UNIT COST			BID AMOUNT (LEVEL D+)
				D+	LEVEL C	B	
1	Mob/Demob	LS	1				
2	Waste Trenches (1)	each	35				
3	Drain Low Areas Along Belt Parkway (2)	LS	1				
4	Furnish/Install Fill Material for Soil Cover	CY	100				
5	Material/Labor for Leachate/Gas/Odor/Dust Controls / Portable Bridge	LS	1				
Total Limit of Waste Delineation Cost							

(1) Includes excavation to determine limits of waste, dewatering as needed, and backfilling with suitable berm material.

(2) Assumes existing berm along Belt Parkway will be used as grading material.

TABLE 4-3

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
FOUNTAIN AVENUE LANDFILL**

**BID QUOTATION BACK-UPS
FOR
TASK 2 - PROPOSED HENDRIX CREEK BRIDGE INVESTIGATION**

ITEM #	TASK 2.1: OFF-SHORE DRILLING ITEM	UNITS	ESTIMATED QUANTITY	UNIT COST			BID AMOUNT (LEVEL D+)
				LEVEL D+	LEVEL C	LEVEL B	
1	HSA Drilling 0-50' (1)	LF	250				
2	HSA Drilling 50-100'	LF	250				
3	SS Sampling 0-50' (2) (5)	Ea.	125				
4	SS Sampling 50-100' (6)	Ea.	50				
5	ST Sampling (3) (4)	Ea.	10				
6	Per Diem for Drill Crew	Crew Day	10				
7	Mob/Demob incl. Barge	LS	1				
8	Standby Time	Hr.	14				
Total Off-shore Drilling Cost for Task 2							

Notes:

1. HSA = Hollow Stem Auger Drilling
2. SS = Split Spoon Sampling
3. ST = Undisturbed Shelby Tube Sampling
4. Assume 2 ST/boring
5. Assume Continuous Sampling from 0-50'
6. Assume 5' interval SS Sampling from 50-100'

TABLE 4-3 (cont)

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
FOUNTAIN AVENUE LANDFILL**

**BID QUOTATION BACK-UPS
FOR
TASK 2 - PROPOSED HENDRIX CREEK BRIDGE INVESTIGATION**

ITEM #	TASK 2.2: ON-SHORE DRILLING ITEM	UNITS	ESTIMATED QUANTITY	UNIT COST			BID AMOUNT (LEVEL D+)
				D+	LEVEL C	B	
1	HSA Drilling 0-50' (1)	LF	350				
2	HSA Drilling 50-100'	LF	350				
3	SS Sampling 0-50' (2) (6)	Ea.	175				
4	SS Sampling 50-100' (7)	Ea.	70				
5	ST Sampling (3) (5)	Ea.	14				
6	Grouting Boreholes (4)	LF	350				
7	Standby Time	Hr.	14				
8	Mob/Demob	LS	1				
9	Per Diem for Drill Crew	Crew Day	12				
10	Steam Cleaner Rental	Day	10				
Total On-shore Drilling Cost for Task 2							
TOTAL COST FOR TASK 2							

(See sheets 1 and 2 of Table 4-3)

Notes:

1. HSA = Hollow Stem Auger Drilling
2. SS = Split Spoon Sampling
3. ST = Undisturbed Shelby Tube Sampling
4. Grout to top of TMD, Assume (ITEM 1 + ITEM 2)/2
5. Assume 2 ST/boring
6. Assume Continuous Sampling from 0-50'
7. Assume 5' interval SS Sampling from 50-100'

TABLE 4-4

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
FOUNTAIN AVENUE LANDFILL**

**BID QUOTATION BACK-UPS
FOR
TASK 3 - SETTLEMENT/STABILITY INVESTIGATION**

ITEM #	TASK 3.1: LARGE DIAMETER AUGER BORINGS	UNITS	ESTIMATED QUANTITY	UNIT COST			BID AMOUNT (LEVEL D+)
				D+	LEVEL C	B	
1	Bucket Auger Drilling 0-50'	LF	250				
2	Bucket Auger Drilling 50-100'	LF	250				
3	Bucket Auger Drilling 100-150' (if required)	LF	XXXXXX				XXXXXX
4	Six-inch PVC Casing (1)	LF	515				
5	Furnish and Install Supplemental Borehole Backfill Material (2)	CY	30				
6	Standby Time	Hr.	10				
7	Laborer	Hr.	100				
8	Mob/Demob (Drill Rig)	LS	1				
9	Per Diem for Drill Crew	Crew Day	10				
10	Mob/Demob (Backhoe) (3)	LS	1				
11	Backhoe and Operator	Hr.	100				
12	Per Diem for Backhoe Operator	Day	8				
13	Material and Labor for Gas/Odor/Dust Controls	LS	1				
14	2-inch Crushed Stone for ABF-12	CY	11				
Total Large Diameter Auger Drilling Cost for Task 3							

Notes:

1. PVC will be installed to keep the borehole open such that the proposed geotechnical borings described in Task 3.2 can be performed.
2. Sand or other suitable granular material.
3. Includes all items associated with the collection of cuttings (scale, tarp, containers, etc.) as noted in Task 3.1.

TABLE 4-4 (cont)

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
FOUNTAIN AVENUE LANDFILL**

**BID QUOTATION BACK-UPS
FOR
TASK 3 - SETTLEMENT/STABILITY INVESTIGATION**

ITEM #	TASK 3.2: GEOTECHNICAL BORINGS	UNITS	ESTIMATED QUANTITY	UNIT COST			BID AMOUNT (LEVEL D+)
				D+	LEVEL C	B	
1	DR Drilling 0-50' (On-shore) (1)	LF	245				
2	Drilling Offshore SBF Borings (0-15')	LF	105				
3	Drilling 100-140' (On-shore) (1)	LF	200				
4	SS Sampling 0-50' (On-shore) (2) (6)	Ea.	175				
5	SS Sampling 100-140' (On-shore) (7)	LF	40				
6	ST Sampling (3) (5)	Ea.	38				
7	Grouting On-shore Boreholes (4)	LF	138				
8	Per Diem for Drill Crew	Crew Day	7				
9	Mob/Demob for Rotary Rig	LS	1				
10	Standby Time	Hr.	4				
11	Mob/Demob for Barge	LS	1				
12	Mob/Demob for ATV	LS	1				
13	Steam Cleaner Rental	Day	7				
Total Geotechnical Drilling Cost for Task 3							

Notes:

1. Mud Rotary Drilling
2. SS = Split Spoon Sampling
3. ST = Undisturbed Shelby Tube Sampling
4. Grout to top of TMD, Assume (ITEM 1 + ITEM 3)/2
5. Assume 2 ST/boring
6. Assume Continuous Sampling from 0-50'
7. Assume 5' interval SS Sampling from 100-140'

TABLE 4-4 (cont)

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
FOUNTAIN AVENUE LANDFILL**

**BID QUOTATION BACK-UPS
FOR
TASK 3 - SETTLEMENT/STABILITY INVESTIGATION**

ITEM #	TASK 3.3: CONE PENETRATION	UNITS	ESTIMATED QUANTITY	UNIT COST			BID AMOUNT (LEVEL D+)
				D+	LEVEL C	B	
1	CPT Sounding (1) (3)	LF	750				
2	Per Diem for Drill Crew	Crew Day	3				
3	Standby Time	Hr	10				
4	Backfill (2)	LF	750				
5	Report of CPT Results	LS	1				
Total Cone Penetration Cost for Task 3							

Notes:

1. CPT = Cone Penetrometer Test
2. Backfill entire depth of the borehole.
3. Mob/Demob and Steam Cleaner Costs are included with Task 3.2.

TABLE 4-4 (cont)

PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
FOUNTAIN AVENUE LANDFILL

BID QUOTATION BACK-UPS
FOR
TASK 3 - SETTLEMENT/STABILITY INVESTIGATION

ITEM #	TASK 3.4: PRESSUREMETER BORINGS AND GAS SAMPLING	UNITS	ESTIMATED QUANTITY	UNIT COST			BID AMOUNT (LEVEL D+)
				D+	LEVEL C	B	
1	Drilling 0-50' (1) (2) (3)	LF	50				
2	Drilling 50-100'	LF	50				
3	Hourly Work and Standby Time	Hr.	10				
4	Per Diem for Drill Crew	Crew Day	2				
5	Gas Sampling (4)	LS	1				
Total Pressuremeter Drilling Cost for Task 3							

Notes:

1. Mud Rotary Drilling
2. Mob/Demob Costs are included with Task 3.2
3. Steam Cleaner Costs are included with Task 3.2
4. Per Task 3.4.1

TABLE 4-4 (cont)

**PRE-DESIGN GEOTECHNICAL INVESTIGATION COST ESTIMATE
FOUNTAIN AVENUE LANDFILL
BID QUOTATION BACK-UPS
FOR
TASK 3 - SETTLEMENT/STABILITY INVESTIGATIONS**

ITEM #	TASK 3.5: LOAD TEST FILL	UNITS	ESTIMATED	UNIT COST	TOTAL
	CONSTRUCTION		QUANITIY		
1	Furnish & Install (1)	LS	1		
2	Furnish & Install Settlement Plate	Ea	10		
Total Load Test Fill Construction Cost for Task 3					
TOTAL COST FOR TASK 3					
(See Sheets 1-5 of Table 4-4)					

Note:

1 - The cost includes QA/QC testing of fill materials.

TABLE 4-5

**PRE-DESIGN GEOTECHNICAL INVESTIGATION SERVICES
FOUNTAIN AVENUE LANDFILL**

**BID QUOTATION FOR ALTERNATIVE DRILLING
METHODS FOR TASKS 3.2.1 AND 3.2.2**

ITEM #	DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT COST			ALTERNATE BID AMOUNT (LEVEL D+)
				D+	LEVEL C	B	
1	Mud Rotary Drilling						
	• Mob/Demob	LS	1				
	• Drilling 0-50'	LF	475				
	• Drilling 50-100'	LF	235				
	• Drilling 100-150'	LF	80				
2	Dual Rotary (Barber-type) Drilling						
	• Drilling 50-100'	LF	20				
	• Drilling 100-150'	LF	30				