

**REPORT OF GEOTECHNICAL  
EXPLORATION**

**Section 1 Expansion  
Southeast Landfill**

**For  
Hillsborough County  
Solid Waste Department**



**Ardaman & Associates, Inc.**

**OFFICES**

**Orlando**, 8008 S. Orange Avenue, Orlando, Florida 32809, Phone (407) 855-3860  
**Bartow**, 1525 Centennial Drive, Bartow, Florida 33831, Phone (813) 533-0858  
**Cocoa**, 1300 N. Cocoa Blvd., Cocoa, Florida 32922, Phone (407) 632-2503  
**Fort Lauderdale**, 3665 Park Central Boulevard, North, Pompano Beach, Florida 33064, Phone (305) 969-8788  
**Fort Myers**, 9970 Bavaria Road, Fort Myers, Florida 33913, Phone (813) 768-6600  
**Miami**, 2608 W. 84th Street, Hialeah, Florida 33016, Phone (305) 825-2683  
**Port Charlotte**, 740 Tamiami Trail, Unit 3, Port Charlotte, Florida 33954, Phone (813) 624-3393  
**Port St. Lucie**, 1017 S.E. Holbrook Ct., Port St. Lucie, Florida 34952, Phone (407) 337-1200  
**Sarasota**, 2500 Bee Ridge Road, Sarasota, Florida 34239, Phone (813) 922-3526  
**Tallahassee**, 3175 West Tharpe Street, Tallahassee, Florida 32303, Phone (904) 576-6131  
**Tampa**, 1406 Tech Boulevard, Tampa, Florida 33619, Phone (813) 620-3389  
**West Palm Beach**, 2511 Westgate Avenue, Suite 10, West Palm Beach, Florida 33409, Phone (407) 687-8200

**MEMBERS:**

A.S.F.E.  
American Concrete Institute  
American Society for Testing and Materials  
American Consulting Engineers Council  
Florida Institute of Consulting Engineers  
American Council of Independent Laboratories



## Ardaman & Associates, Inc.

Geotechnical, Environmental and  
Materials Consultants

June 25, 1997  
File Number 97-9628

Hillsborough County  
Solid Waste Department  
P.O. Box 1110  
Tampa, Florida 33601

Attention: Mr. John W. Johnson

Subject: Geotechnical Services, Proposed Section 1 Landfill Expansion, Hillsborough County  
Southeast Landfill, Picnic, Florida

Dear Mr. Johnson:

As authorized, Ardaman & Associates, Inc. has completed geotechnical services related to the proposed Section 1 Expansion of the Southeast Landfill, Hillsborough County, Florida

The scope of our services consisted of providing geotechnical field and laboratory support services for use by the project design consultants, SCS Engineers and BFA, Inc. More specifically, the services consisted of the following:

- Met with County representatives and consultant representatives to generally scope site access.
- Performed eight (8) Standard Penetration Test (SPT) borings at locations selected by BFA, Inc.
- Collected 19 "undisturbed" Shelby tube samples.
- Performed thirteen (13) Cone Penetration Test Soundings (CPT) with pore pressure dissipation at locations selected by BFA, Inc.
- Installed ten (10) shallow and deep piezometers at locations selected by BFA, Inc. to monitor groundwater fluctuations.
- Performed index and classification testing of soils as directed by BFA, Inc. consisting of natural moisture content, grain size distribution, percent finer than -200 Sieve, Atterberg limits, organic content, and cation exchange.
- Performed strength testing of selected 'undisturbed' samples as directed by BFA, Inc. which

included seven (7) consolidated, undrained triaxial compression tests and three (3) unconfined compression tests.

- Performed four (4) permeability tests on "undisturbed" samples as directed by BFA, Inc.

### **SITE LOCATION AND DESCRIPTION**

The site is located in an unfilled portion of the landfill. A general site location is presented in Figure 1. The site elevations vary from about +125 ft. NGVD to +145 ft. NGVD.

### **FIELD EXPLORATION AND FINDINGS**

#### **Standard Penetration Test Borings (SPT)**

A total of eight (8) SPT borings were advanced at the locations noted on Figure 1. The boring locations and depths were selected by BFA, Inc. field personnel. Boring depths varied from 37 feet to 58.8 feet below existing grade. The soils encountered in the borings are depicted on the Boring Profiles, Figures 2 and 3. The borings generally found 5 to 30 feet of fill materials consisting of sands, tailing sands, and waste phosphatic clays above native sands and clayey sands. The fill soils were generally very loose to loose. The underlying native granular soils were very loose to near refusal, however, the density of these materials did not increase linearly with depth but was somewhat random due to intermittent cementation.

We refer the reader to the boring profiles (Figures 2 and 3) for specific descriptions and blow count information as well as groundwater level readings at each boring location. Soil stratigraphy at locations other than these eight (8) borings would be expected to differ from that disclosed by the borings.

### **Cone Penetration Test Soundings**

A total of thirteen (13) Cone Penetration Test Soundings (CPT) were performed at locations directed by BFA, Inc. The depths of the CPT borings varied from 13 feet to 31 feet below present site grades. The CPT results are presented in Figures 4 and 16. During the CPT testing, pore pressure distribution readings were obtained through the use of a piezocone tip in place of the standard cone tip. The piezocone monitors pore pressure dissipation by transducer. In this way, the piezometric water level in the soil stratum can be estimated. The data can be used to gain insight into the state of consolidation of fine-grained deposits, permeability characteristics of a soil stratum and presence of water-bearing zones within the subsurface. The pore pressure dissipation results are presented in Figures 17 through 42.

### **Piezometer Installation**

A total of ten (10) piezometers were installed at locations and to depths selected by BFA, Inc. The depths of piezometers varied from 4 feet to 45 feet below land surface. The piezometers are constructed of 2 inch diameter PVC pipe with protective casings. The piezometer well installation records and completion reports are presented in Appendix D.

## **LABORATORY TESTING**

Laboratory testing requested was related to index and classification tests on SPT jar samples as well as strength and permeability testing of 'undisturbed' Shelby tube samples. The index and classification tests were performed in our Tampa laboratory while the undisturbed samples were tested in our Orlando Corporate laboratory. The index and classification test results are summarized in Table 1, Appendix E. The laboratory testing performed on 'undisturbed' samples was reported directly to the project geotechnical consultant, Remedial Engineering and Science, Inc. It is reproduced herein and presented in Appendix F.



Hillsborough County  
Solid Waste Department  
File Number 97-9628  
June 25, 1997

-4-


## CLOSURE

The information presented herein is for the exclusive use of Hillsborough County Solid Waste Department and their project consultants for the design and permitting of the proposed expansion of Section 1, Hillsborough County Southeast Landfill. The field and laboratory data presented is only applicable to the locations where the data was obtained. Any interpretation of soil stratigraphy or properties between SPT or CPT is at the discretion of the County and their consultants. Ardaman & Associates, Inc. is not responsible for such interpretations.

The recovered soil samples will be retained for a period of 90 days following completion of this report and then discarded unless otherwise directed by Hillsborough County Solid Waste Department.

It has been a pleasure assisting you with this phase of your project. If there are any questions or when we may be of further assistance, please contact the undersigned at (813) 620-3389.

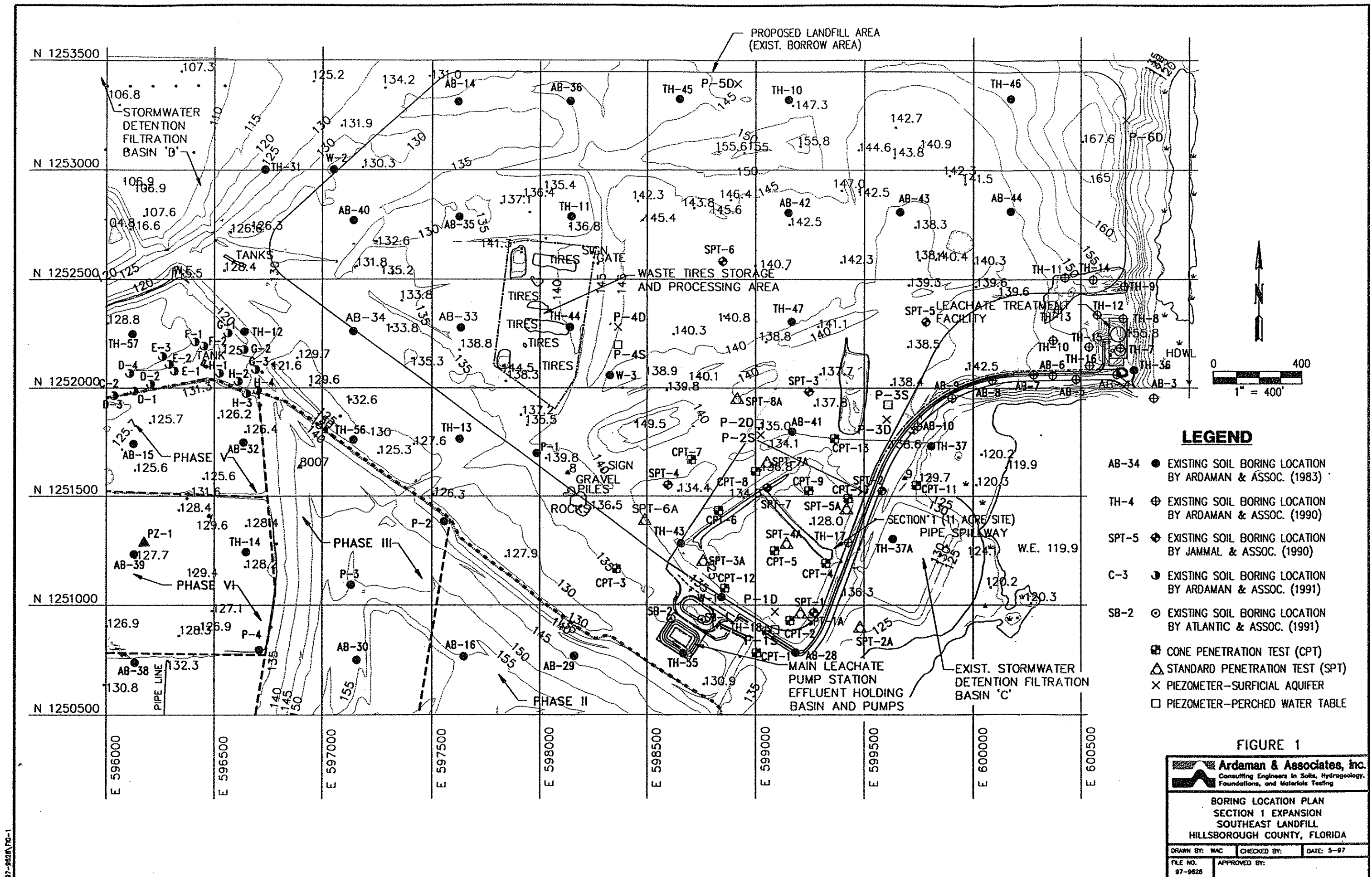
Respectfully,  
**ARDAMAN & ASSOCIATES, INC.**

  
Wayne Pandorf, P.E.  
Branch Manager  
Florida Registration No. 30254

  
Thomas J. Leto, P.E.  
Principal  
Florida Registration No. 12458

TJL/WP:lt  
Enclosure  
sse#597-9628report.wpd

## FIGURES



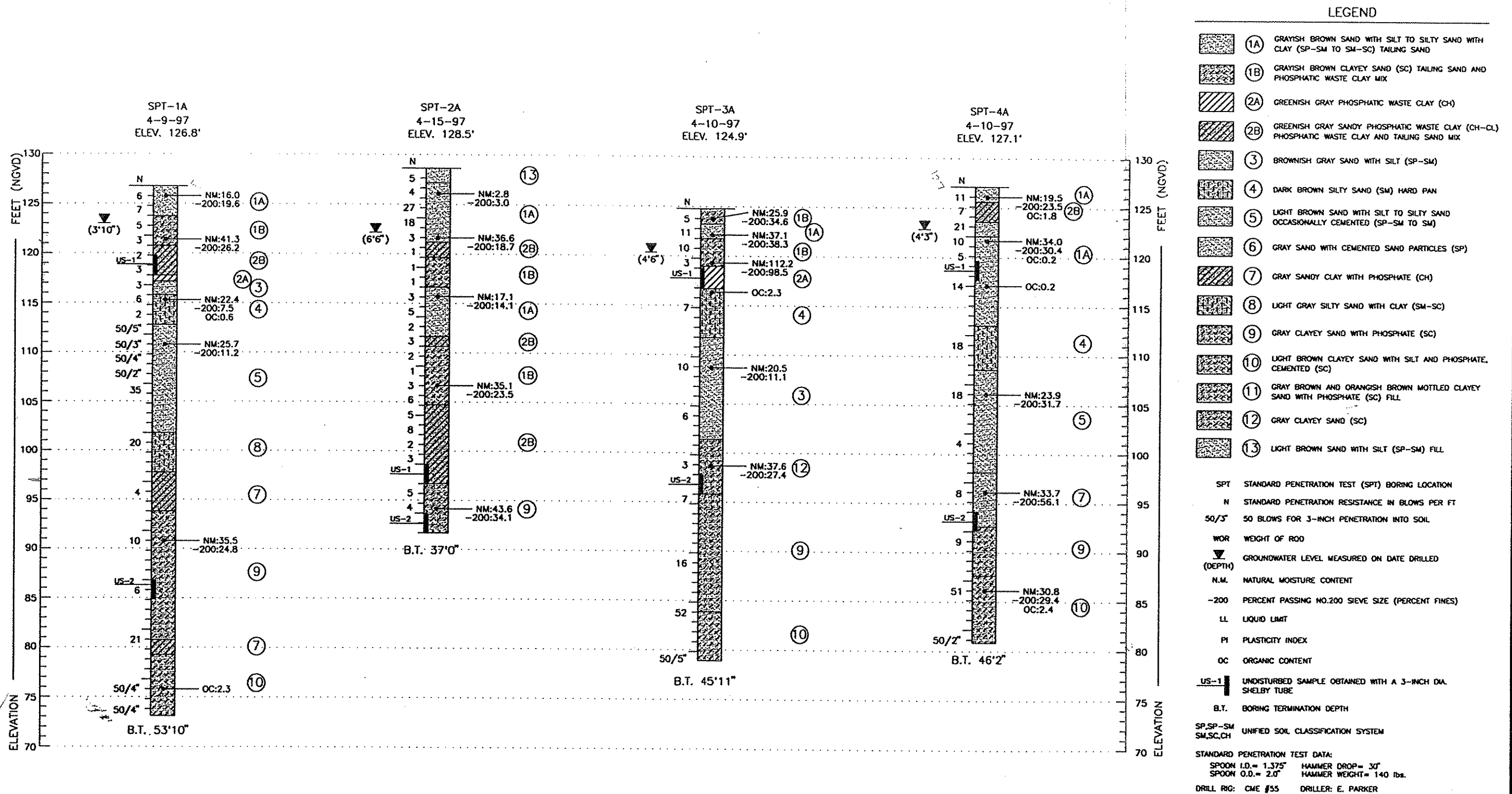


FIGURE 2

GENERAL NOTES		ENGINEERING CLASSIFICATION			
UPON COMPLETION OF EACH BORING, THE BOREHOLE WAS GROUTED WITH CEMENT-BENTONITE SLURRY	WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTICS OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES AT THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATIONS ON THE PARTICULAR DATE DRILLED.	COHESIONLESS		COHESIVE	
		DESCRIPTION	BLOW COUNT "N"	DESCRIPTION	UNCONSOLIDATED COMPRESSION STRENGTH T.S.F.    BLOW COUNT "N"
		VERY LOOSE	0 TO 4	VERY SOFT	BELOW .25    0 TO 2
		LOOSE	4 TO 10	SOFT	.25 TO .50    2 TO 4
		MEDIUM DENSE	10 TO 30	MEDIUM STIFF	.50 TO 1.0    4 TO 8
		DENSE	30 TO 50	STIFF	1 TO 2    8 TO 15
		VERY DENSE	ABOVE 50	VERY STIFF	2 TO 4    15 TO 30
				HARD	ABOVE 4    ABOVE 30

<b>Ardaman &amp; Associates, Inc.</b> Consulting Engineers in Soils, Hydrogeology, Foundations, and Materials Testing	
<b>BORING PROFILES</b> SECTION 1 EXPANSION SOUTHEAST LANDFILL HILLSBOROUGH COUNTY, FLORIDA	
DRAWN BY: WAC	CHECKED BY:
FILE NO. 97-9628	DATE: 5-97
APPROVED BY:	

97-9628/FIG-2

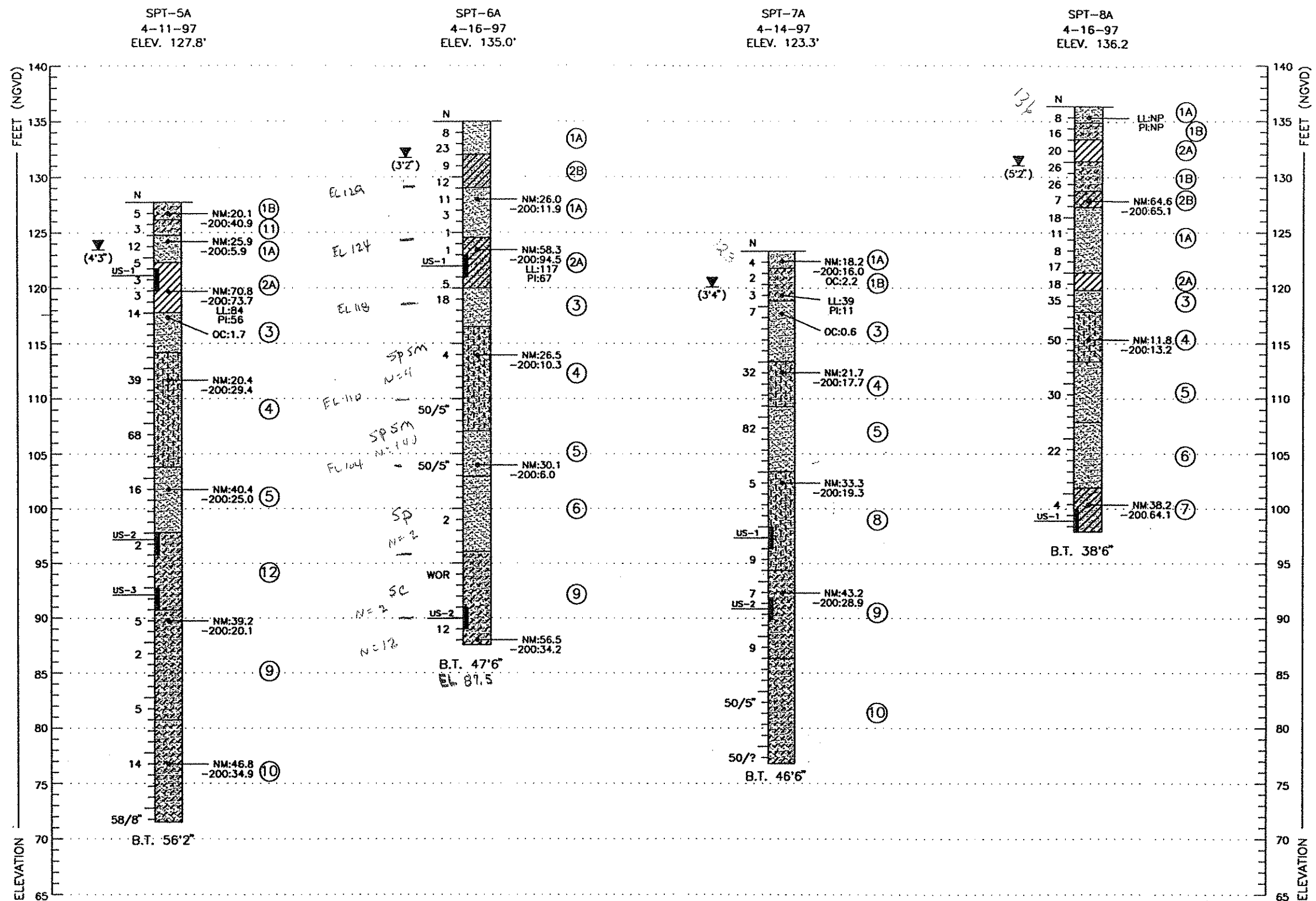


FIGURE 3

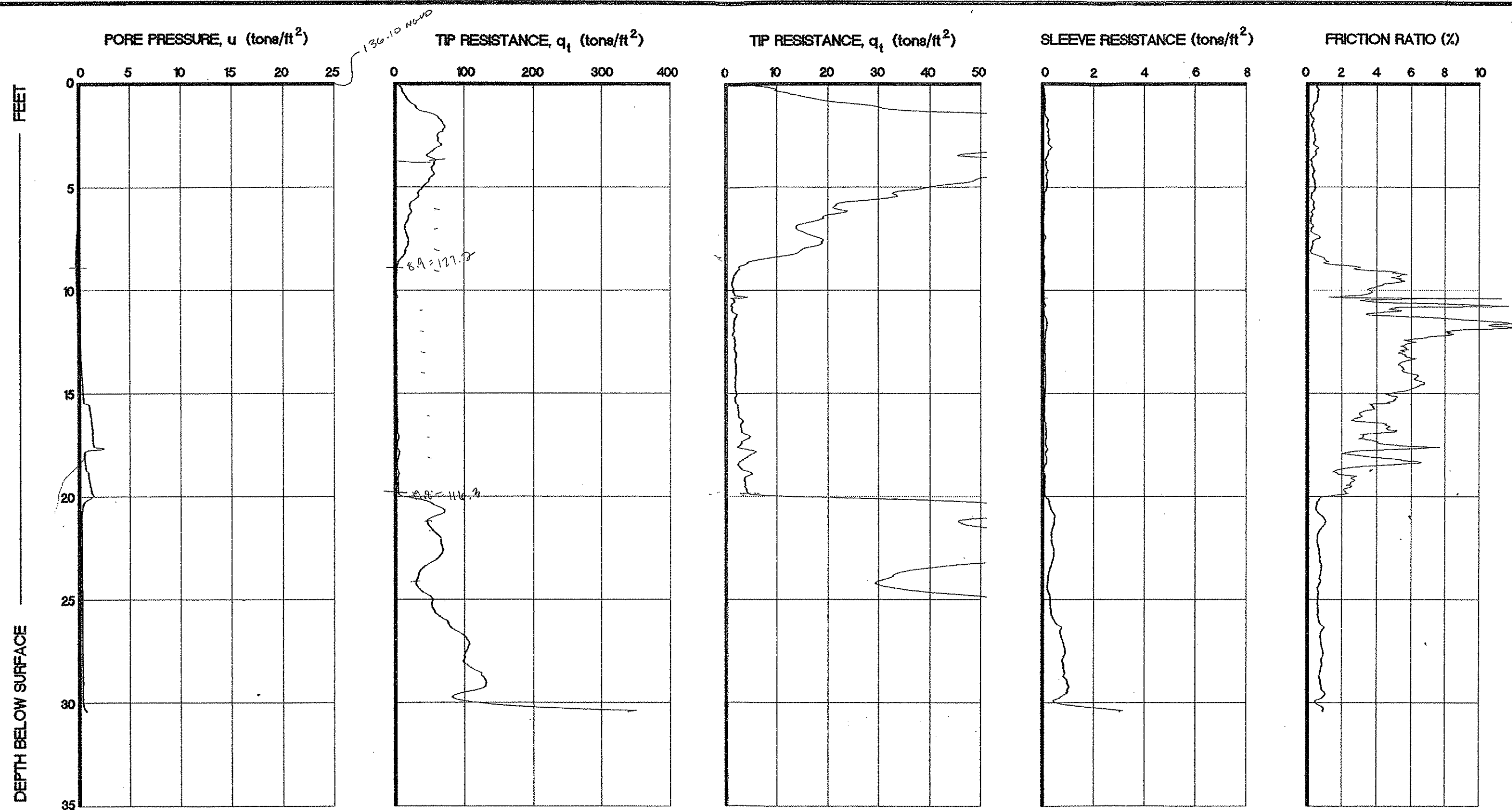
GENERAL NOTES		ENGINEERING CLASSIFICATION			
<p>WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTICS OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES AT THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATIONS ON THE PARTICULAR DATE DRILLED.</p>		COHESIONLESS		COHESIVE	
		DESCRIPTION	BLOW COUNT "N"	DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH, T.S.F.
		VERY LOOSE	0 TO 4	VERY SOFT	BELOW .25
		LOOSE	4 TO 10	SOFT	.25 TO .50
		MEDIUM DENSE	10 TO 30	MEDIUM STIFF	.50 TO 1.0
		DENSE	30 TO 50	STIFF	1 TO 2
		VERY DENSE	ABOVE 50	VERY STIFF	2 TO 4
				HARD	ABOVE 4
					BLOW COUNT "N"
					0 TO 2
					2 TO 4
					4 TO 8
					8 TO 15
					15 TO 30
					ABOVE 30

**Ardaman & Associates, Inc.**  
Consulting Engineers in Soils, Hydrogeology, Foundations, and Materials Testing

**BORING PROFILES  
SECTION 1 EXPANSION  
SOUTHEAST LANDFILL  
HILLSBOROUGH COUNTY, FLORIDA**

DRAWN BY: WAC    CHECKED BY:    DATE: 5-97

FILE NO. 97-9828    APPROVED BY:



**FIGURE 4**  
**PENETRATION DATA FOR**  
**SOUNDING NO. CPTU-1**

**Ardaman & Associates, Inc.**  
 Geotechnical, Environmental and  
 Materials Consultants

**SOUTHEAST LANDFILL**  
**PIEZOCONE TEST SOUNDINGS**  
**APRIL 21-22, 1997**

DRAWN BY: RW	CHECKED BY:	DATE: 4/30/97
FILE NO.: 97-9628	APPROVED BY:	FIGURE:

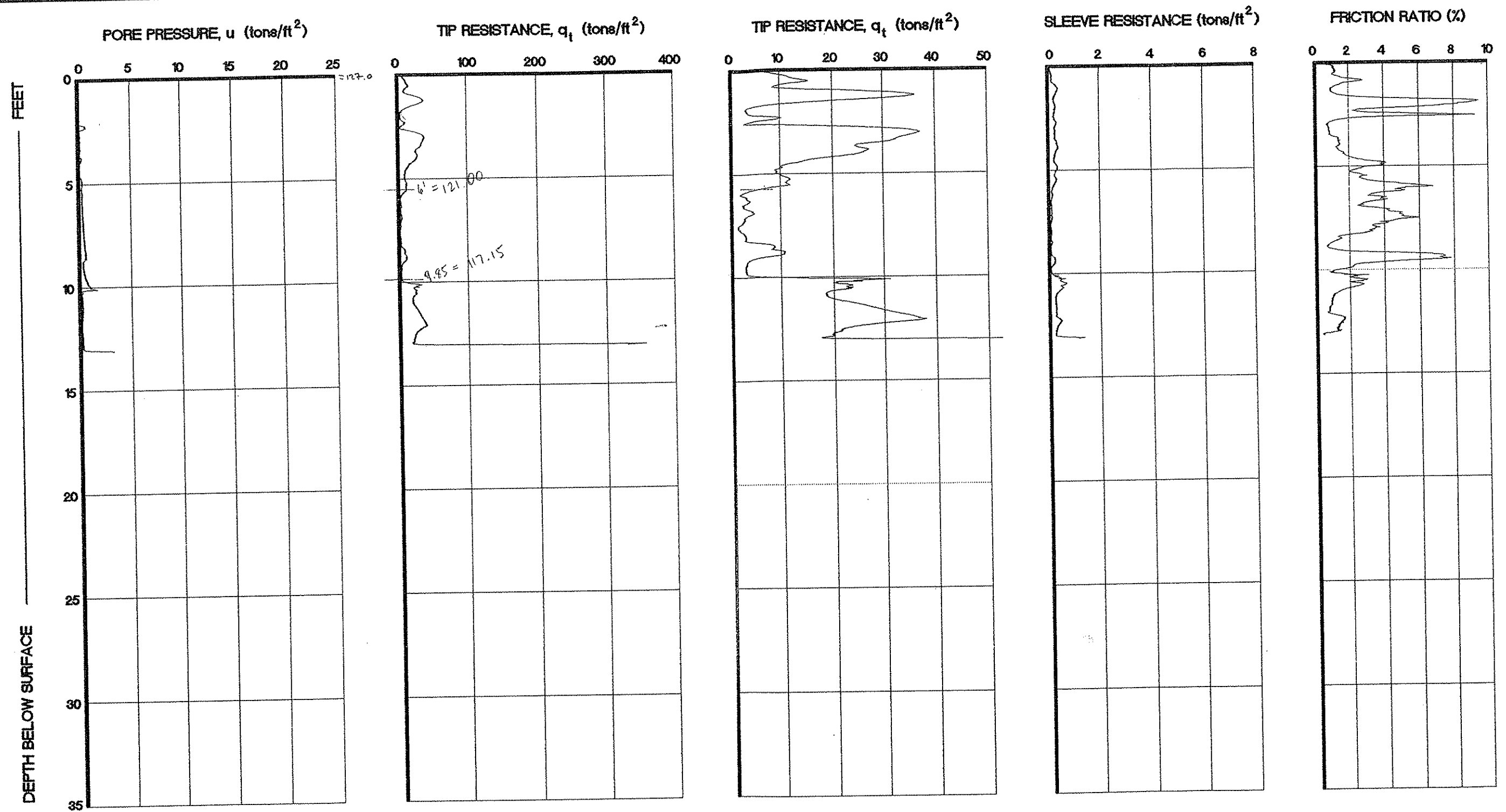


FIGURE 5  
PENETRATION DATA FOR  
SOUNDING NO. CPTU-2

**Ardaman & Associates, Inc.**  
Geotechnical, Environmental and  
Materials Consultants

SOUTHEAST LANDFILL  
PIEZOCONE TEST SOUNDINGS  
APRIL 21-22, 1997

DESIGNED BY: RW	CHECKED BY:	DATE: 4/30/97
FILE NO.: 97-9628	APPROVED BY:	FIGURE:

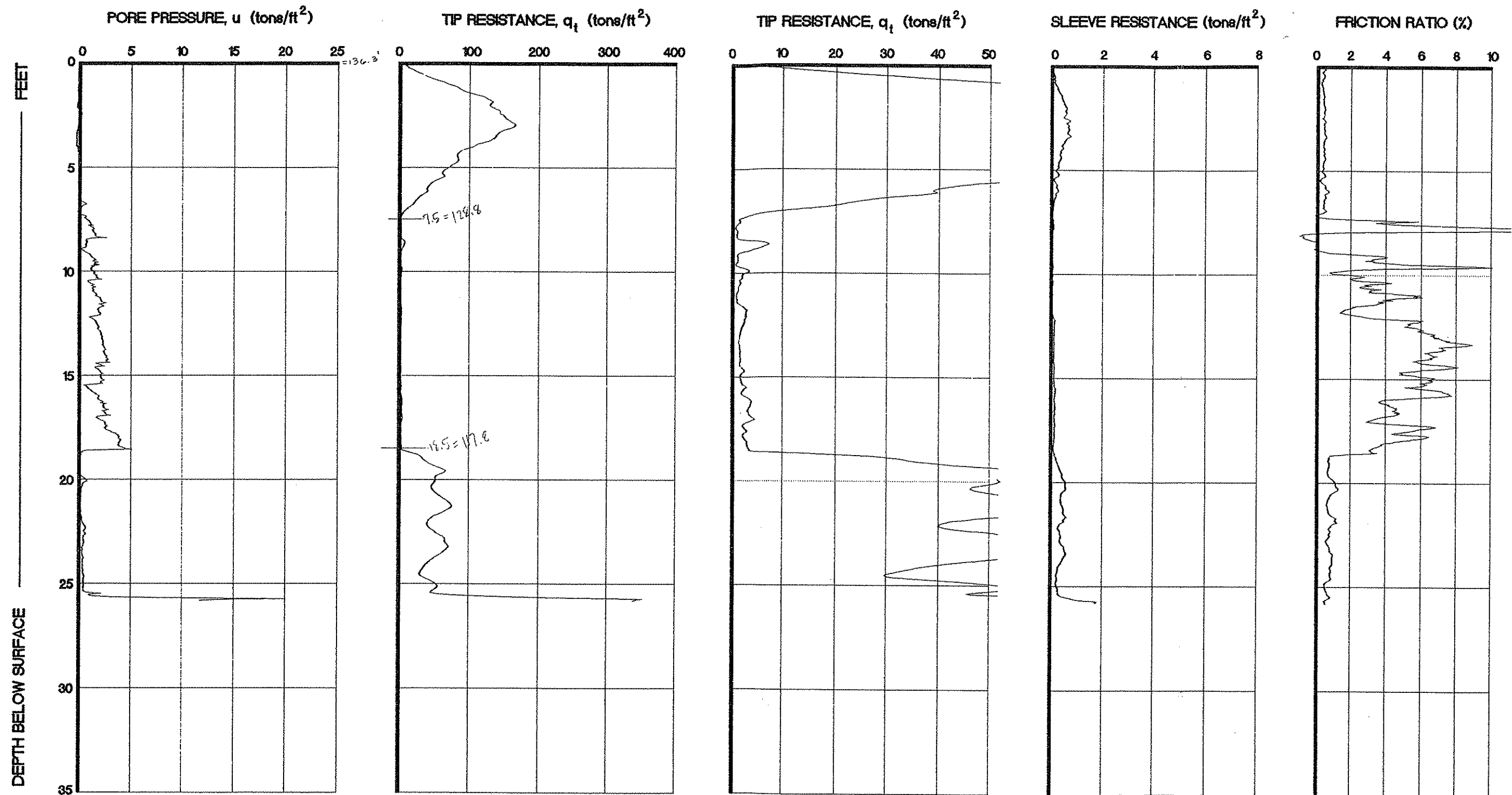


FIGURE 6  
PENETRATION DATA FOR  
SOUNDING NO. CPTU-3

**Ardaman & Associates, Inc.**  
Geotechnical, Environmental and  
Materials Consultants

**SOUTHEAST LANDFILL  
PIEZOCONE TEST SOUNDINGS  
APRIL 21-22, 1997**

DRAWN BY: RW	CHECKED BY:	DATE: 4/30/97
FILE NO.: 97-9628	APPROVED BY:	FIGURE:



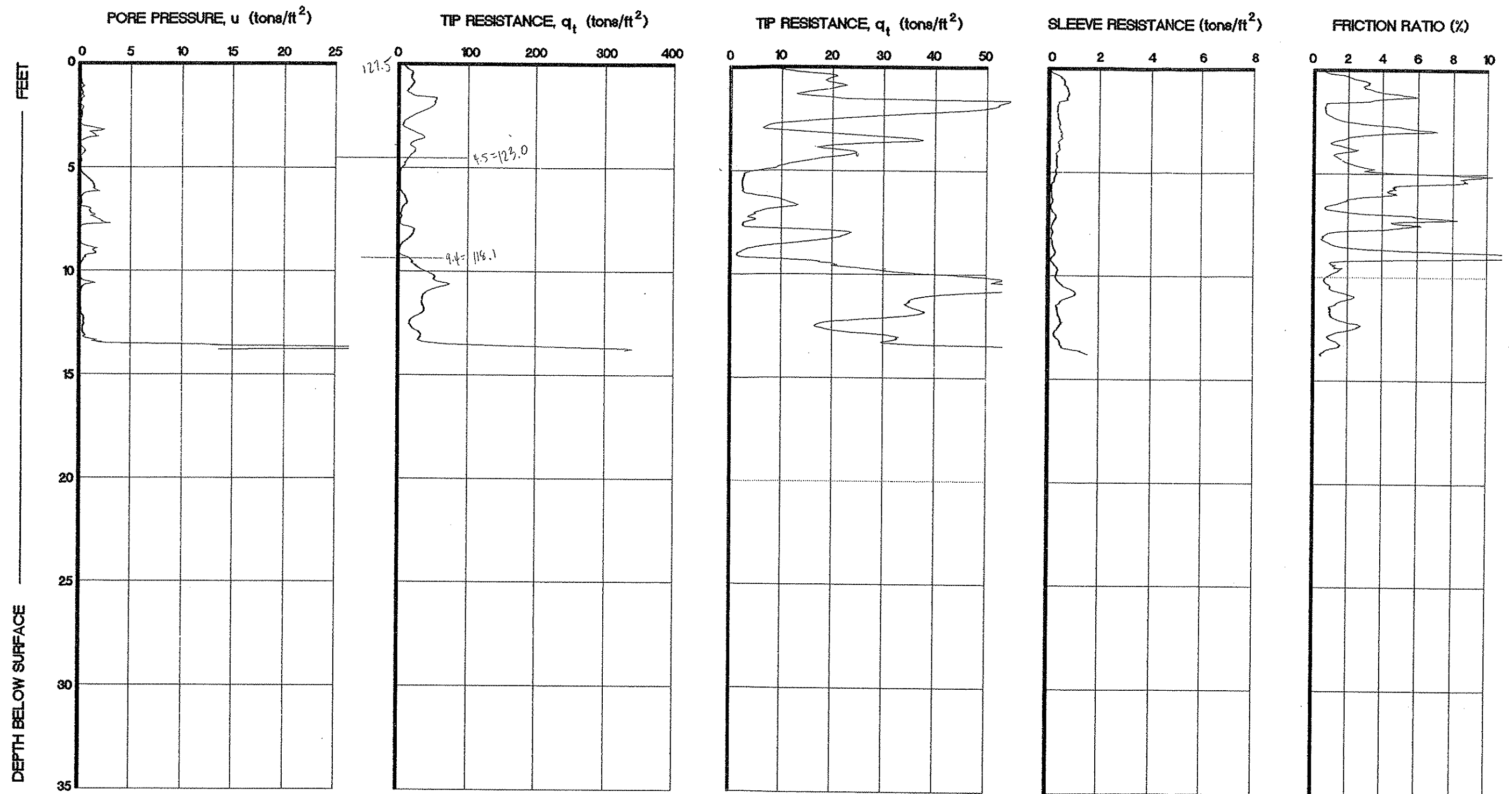



FIGURE 7  
PENETRATION DATA FOR  
SOUNDING NO. CPTU-4

 Ardaman & Associates, Inc. Geotechnical, Environmental and Materials Consultants			
SOUTHEAST LANDFILL PIEZOCONE TEST SOUNDINGS APRIL 21-22, 1997			
DRAWN BY: RW	CHECKED BY:	DATE: 4/30/97	FIGURE:
FILE NO.: 97-9628	APPROVED BY:		

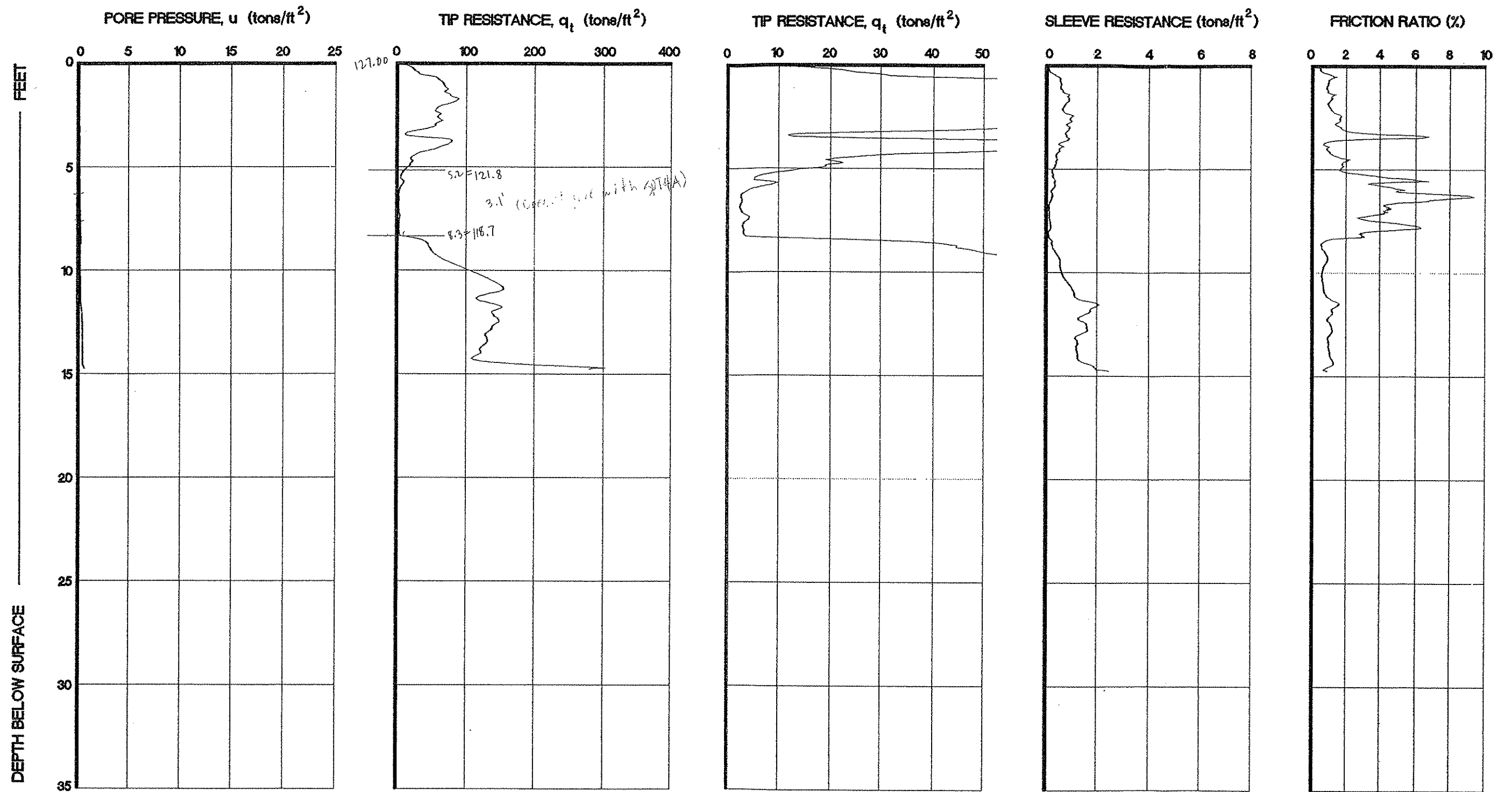


FIGURE 8  
PENETRATION DATA FOR  
SOUNDING NO. CPTU-5

**Ardaman & Associates, Inc.**  
Geotechnical, Environmental and  
Materials Consultants

**SOUTHEAST LANDFILL  
PEZOCONE TEST SOUNDINGS  
APRIL 21-22, 1997**

DRAWN BY: RW	CHECKED BY:	DATE: 4/30/97
FILE NO.: 97-9628	APPROVED BY:	FIGURE:

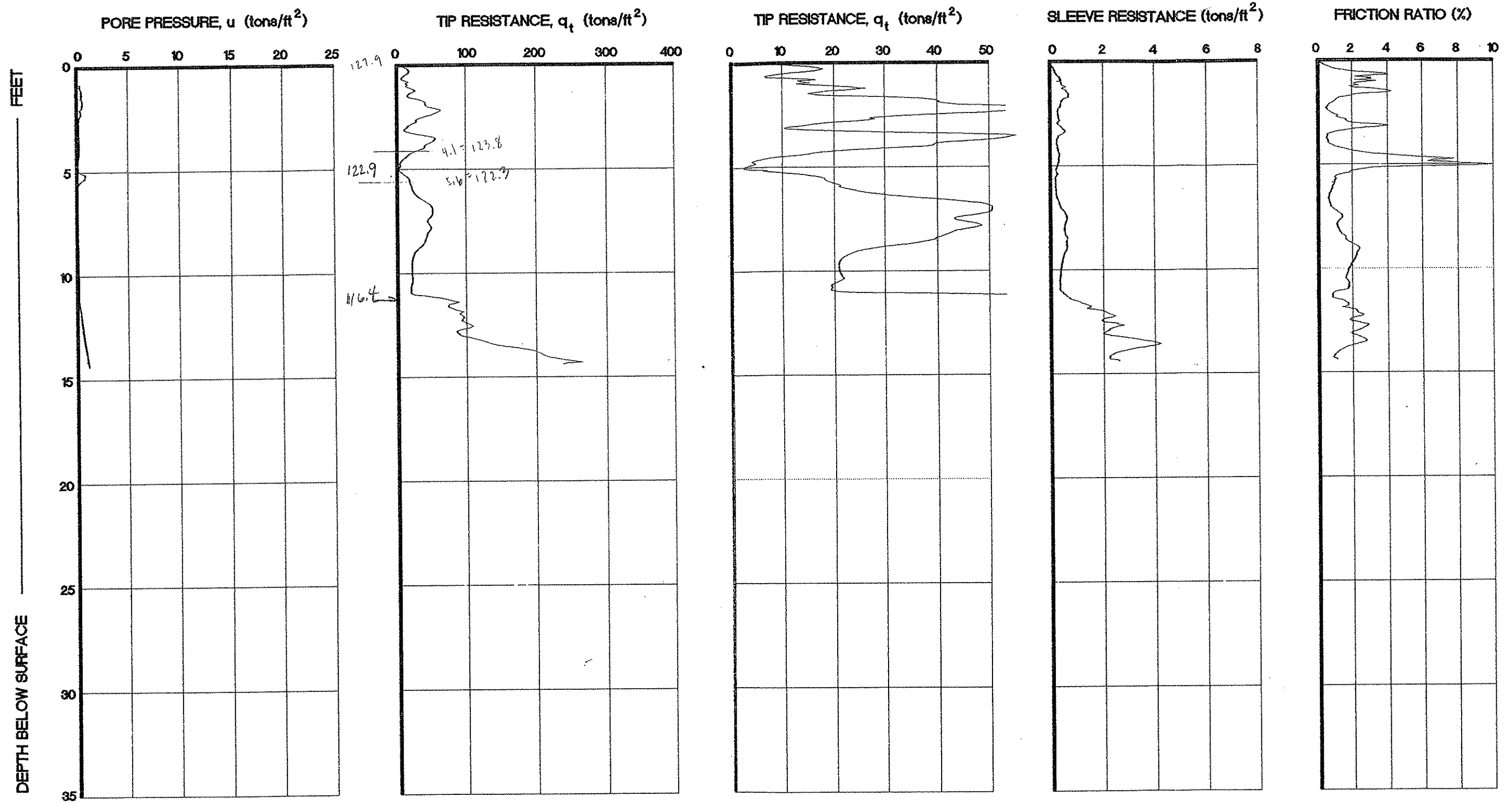
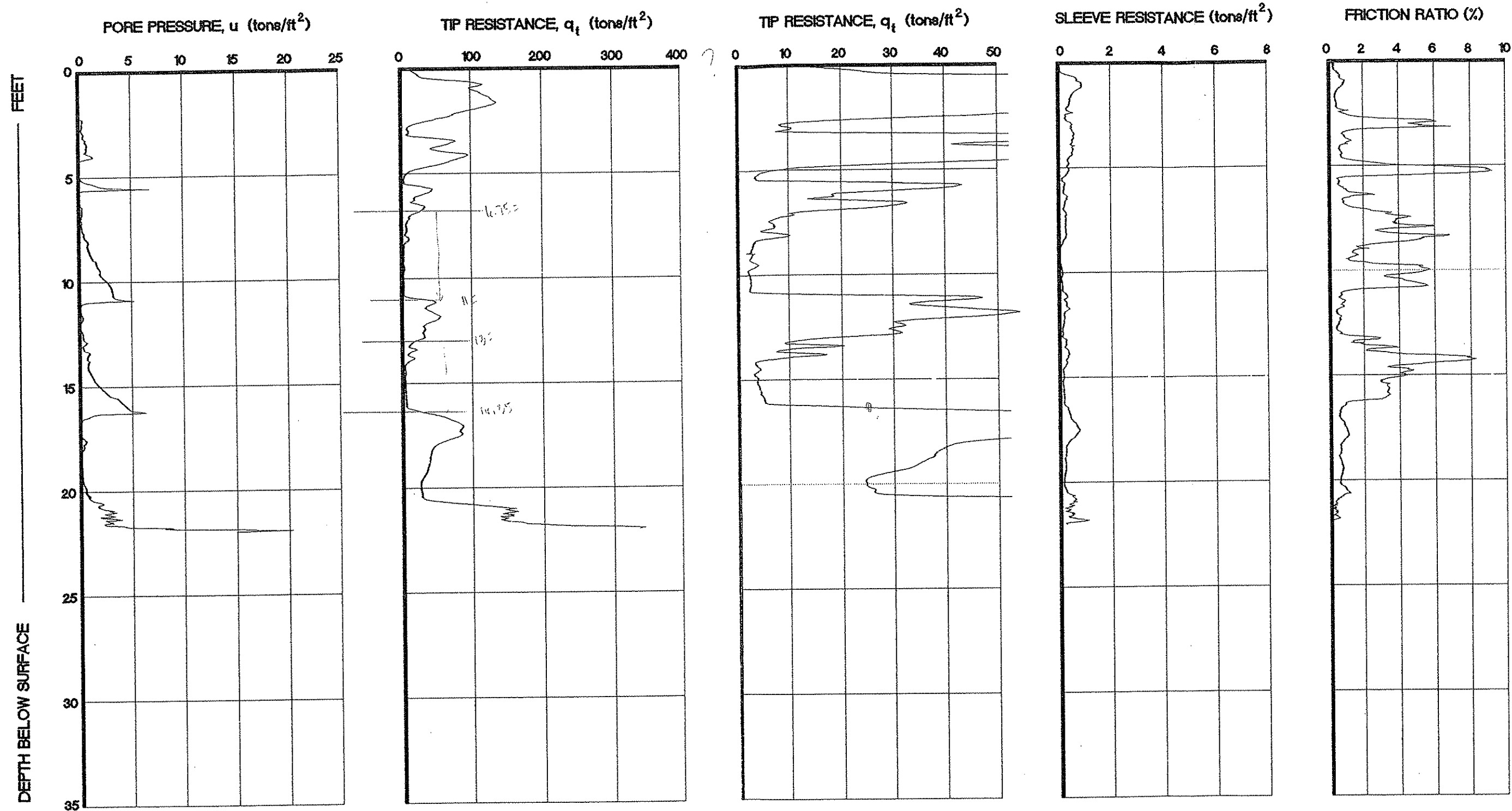


FIGURE 9  
PENETRATION DATA FOR  
SOUNDING NO. CPTU-6

**Ardaman & Associates, Inc.**  
Geotechnical, Environmental and  
Materials Consultants

**SOUTHEAST LANDFILL  
PIEZOCONE TEST SOUNDINGS  
APRIL 21-22, 1997**

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FILE NO.: 97-9628	APPROVED BY:	FIGURE:



DEPTH BELOW SURFACE

FEET

*Did not use,  
could not  
locate vertical*

**FIGURE 10**  
**PENETRATION DATA FOR**  
**SOUNDING NO. CPTU-7**

**Ardaman & Associates, Inc.**  
Geotechnical, Environmental and  
Materials Consultants

**SOUTHEAST LANDFILL**  
**PIEZOCONE TEST SOUNDINGS**  
**APRIL 21-22, 1997**

DRAWN BY: RW	CHECKED BY:	DATE: 4/30/97
FILE NO: 97-9628	APPROVED BY:	FIGURE:

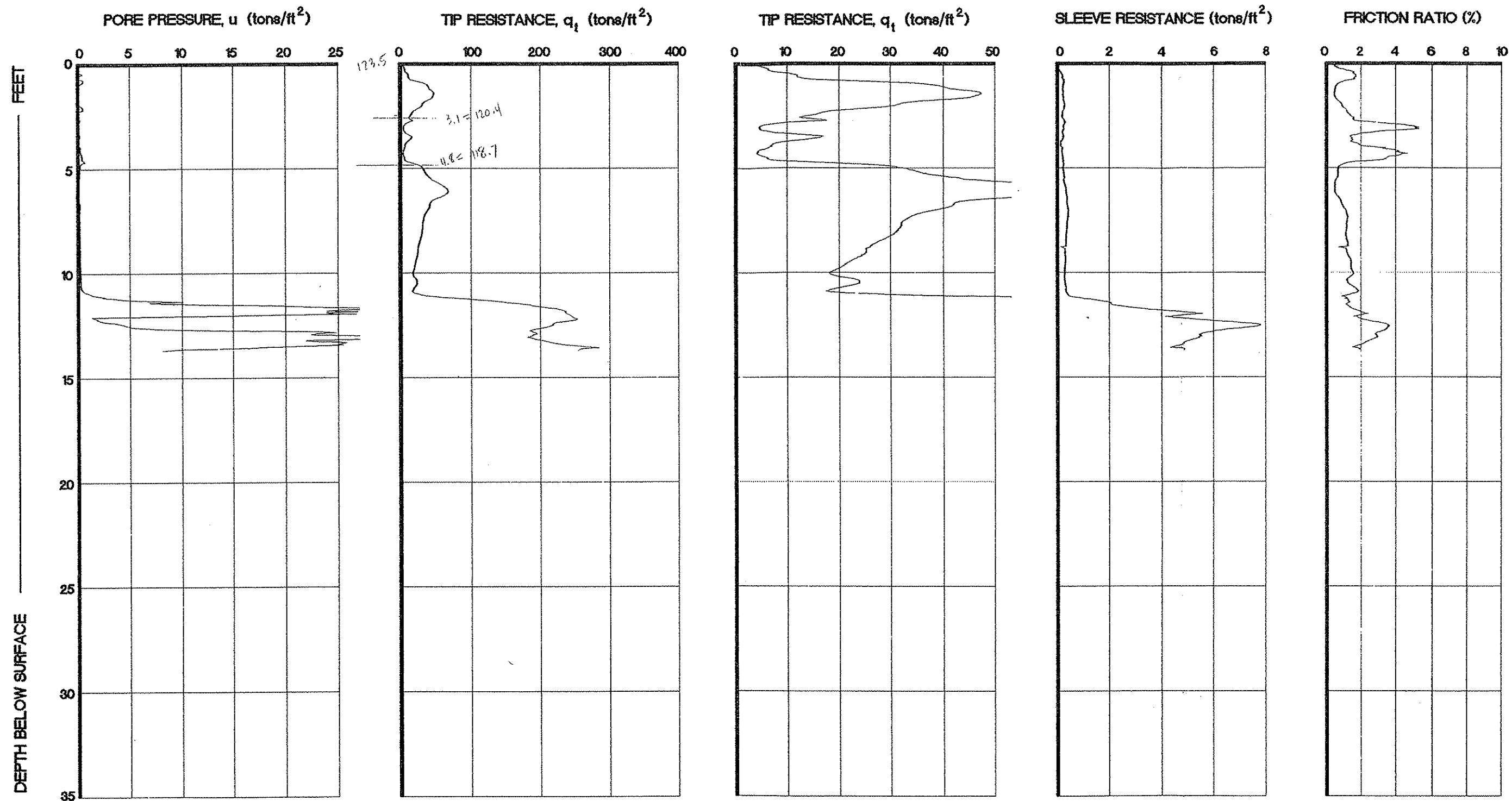



FIGURE 11  
PENETRATION DATA FOR  
SOUNDING NO. CPTU-8

 **Ardaman & Associates, Inc.**  
Geotechnical, Environmental and  
Materials Consultants

**SOUTHEAST LANDFILL  
PIEZOCONE TEST SOUNDINGS  
APRIL 21-22, 1997**

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FILE NO.: 97-0628	APPROVED BY:	FIGURE:

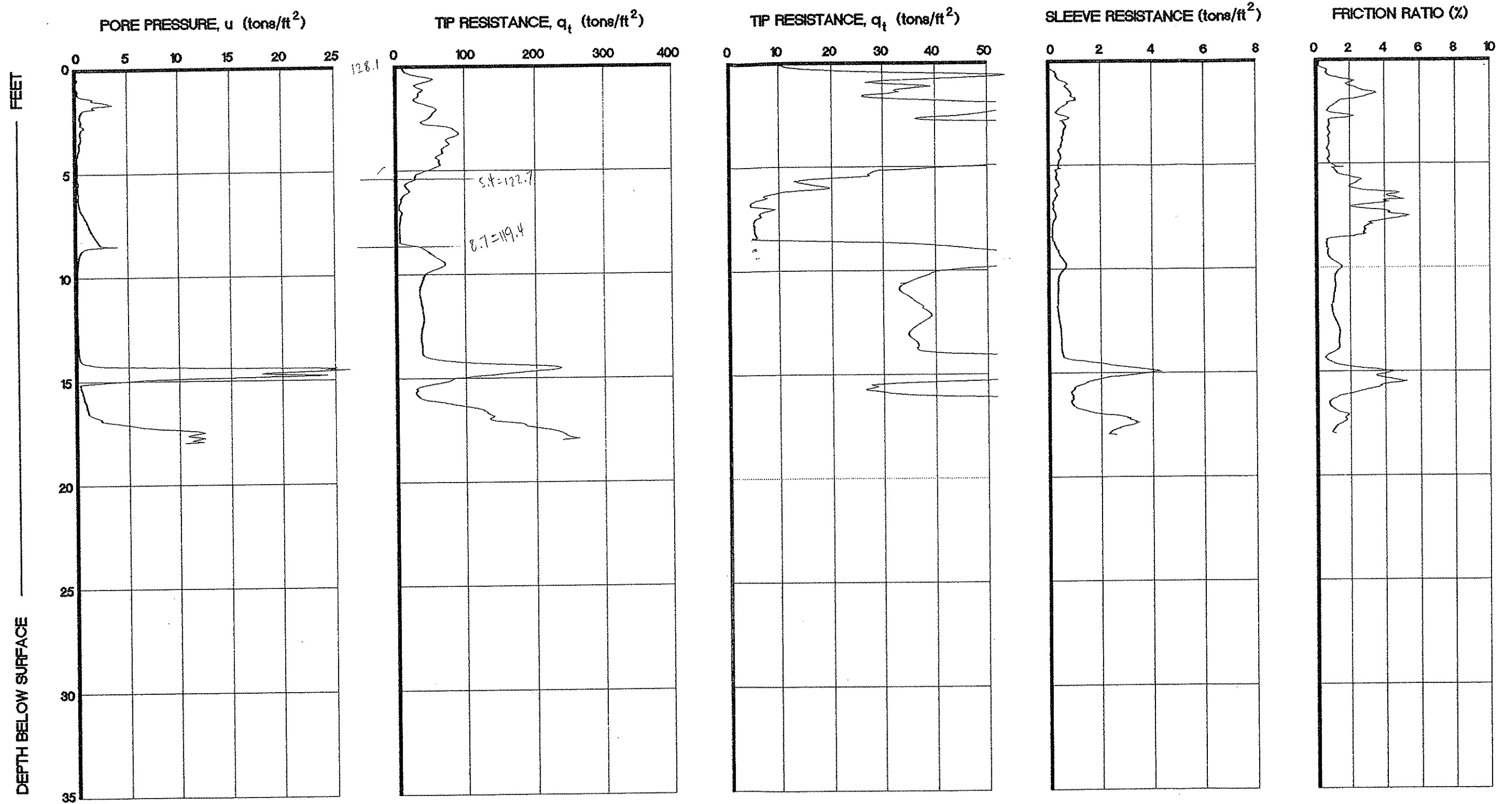


FIGURE 12  
PENETRATION DATA FOR  
SOUNDING NO. CPTU-9

**Ardaman & Associates, Inc.**  
Geotechnical, Environmental and  
Materials Consultants

SOUTHEAST LANDFILL  
PIEZOCONE TEST SOUNDINGS  
APRIL 21-22, 1997

DRAWN BY: RW	CHECKED BY:	DATE: 4/30/97
FILE NO: 97-9628	APPROVED BY:	FIGURE:

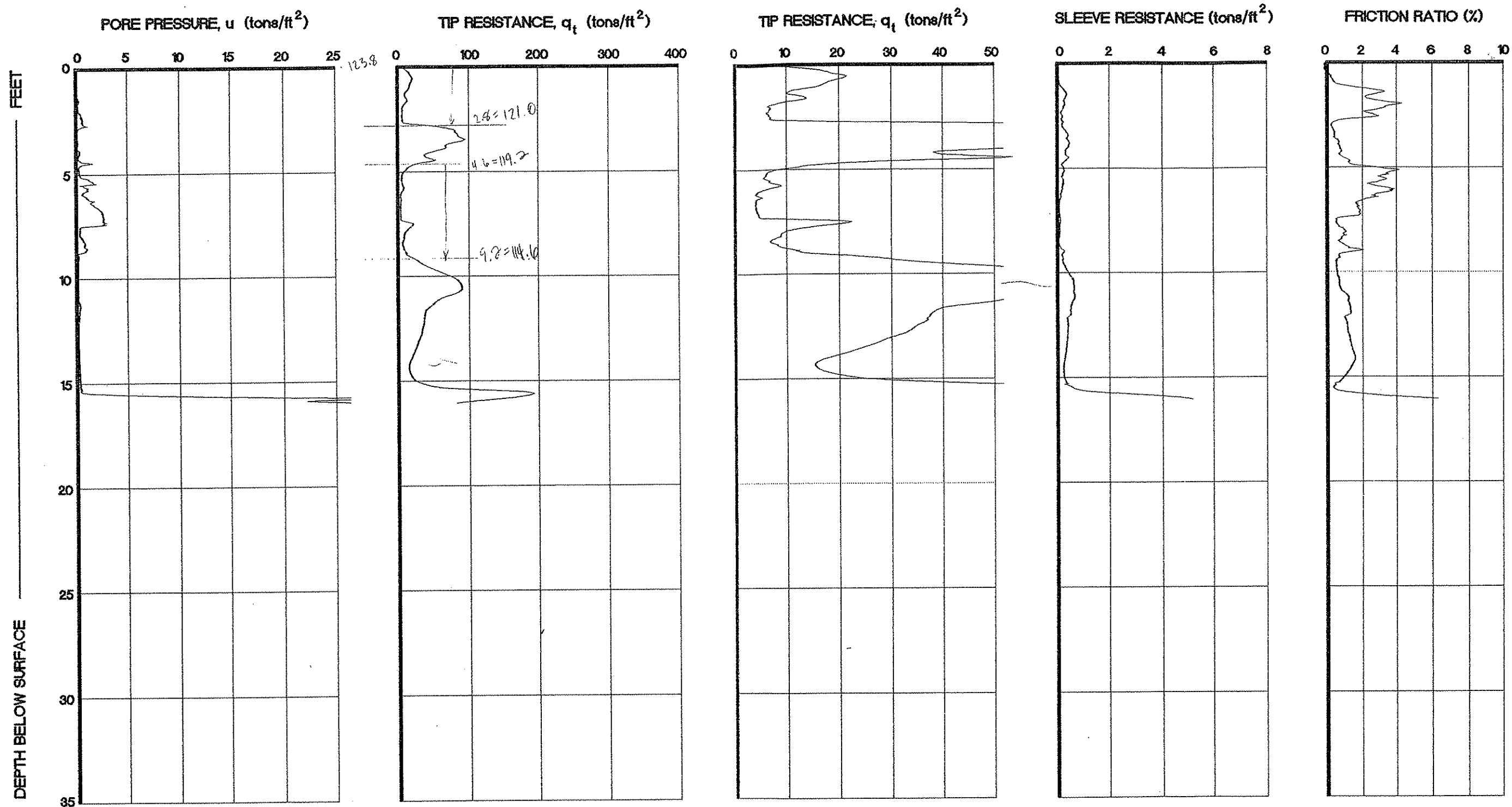


FIGURE 13  
PENETRATION DATA FOR  
SOUNDING NO. CPTU-10

**Ardaman & Associates, Inc.**  
Geotechnical, Environmental and  
Materials Consultants

**SOUTHEAST LANDFILL  
PIEZOCONE TEST SOUNDINGS  
APRIL 21-22, 1997**

DRAWN BY: RW	CHECKED BY:	DATE: 4/30/97
FILE NO.: 97-9628	APPROVED BY:	FIGURE:

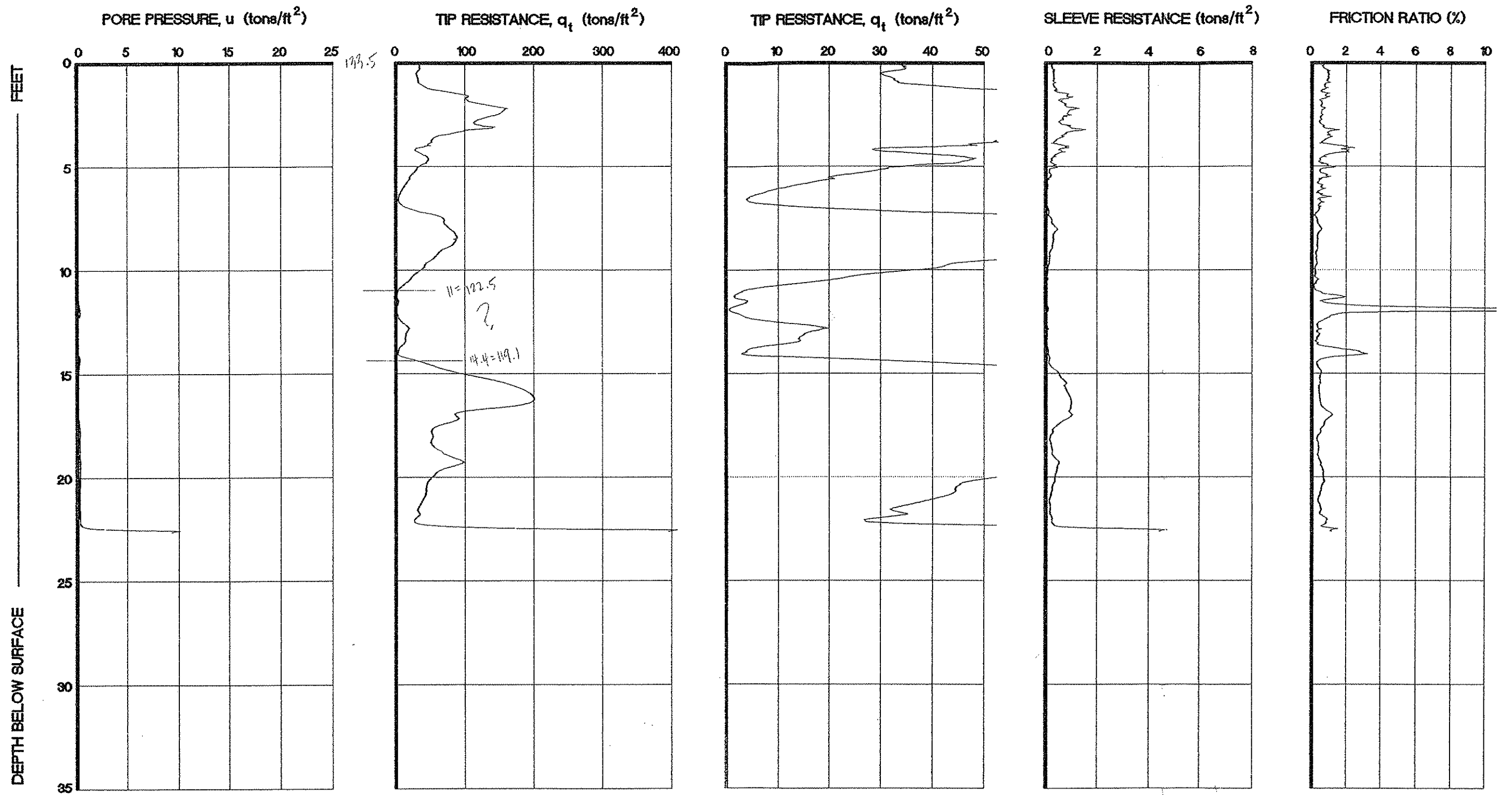


FIGURE 14  
PENETRATION DATA FOR  
SOUNDING NO. CPTU-11

**Ardaman & Associates, Inc.**  
Geotechnical, Environmental and  
Materials Consultants

**SOUTHEAST LANDFILL  
PIEZOCONE TEST SOUNDINGS  
APRIL 21-22, 1997**

DRAWN BY: RW	CHECKED BY:	DATE: 4/30/97
FILE NO.: 97-9628	APPROVED BY:	FOURD



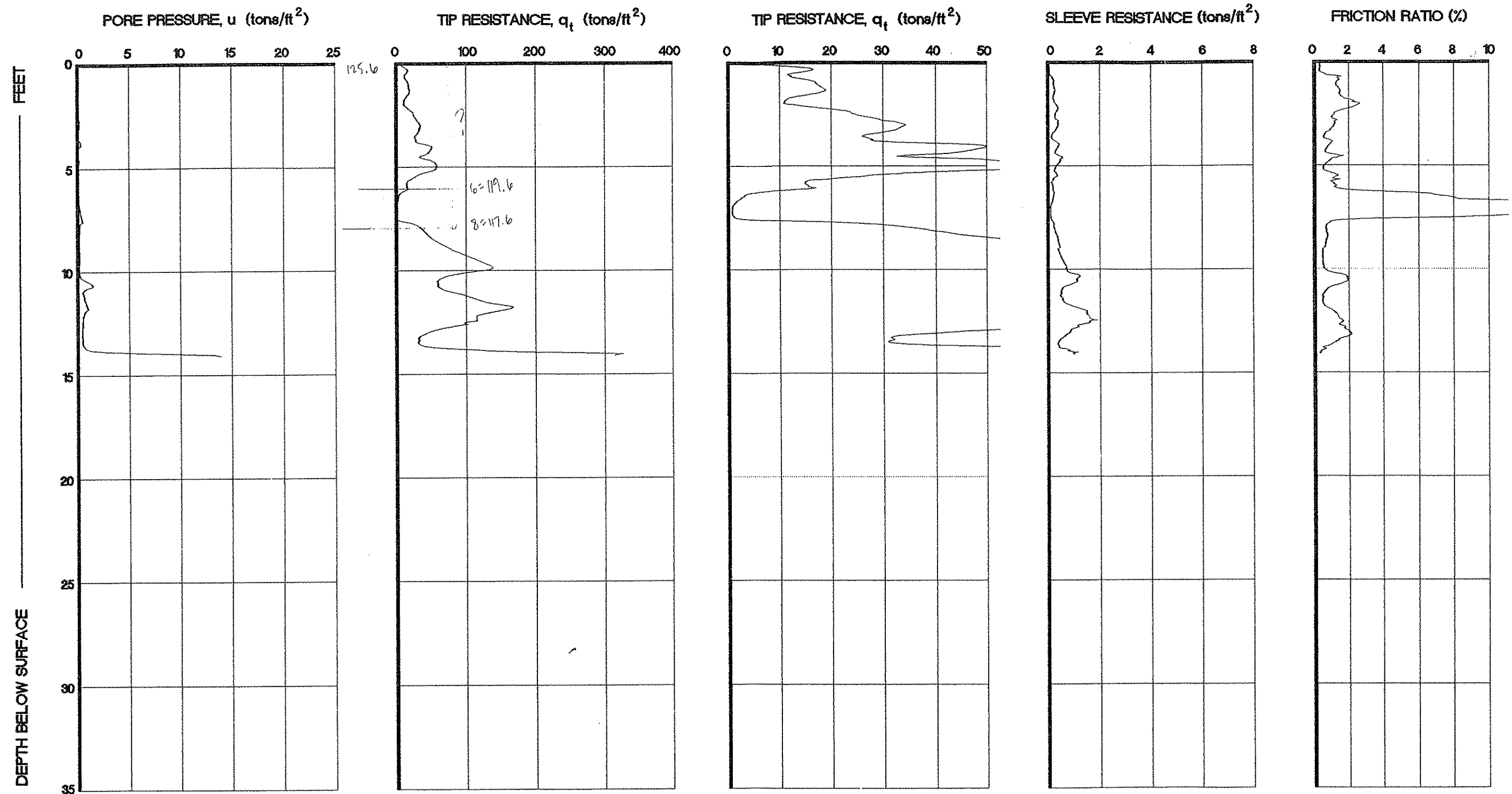


FIGURE 15  
PENETRATION DATA FOR  
SOUNDING NO. CPTU-12

 **Ardaman & Associates, Inc.**  
Geotechnical, Environmental and  
Materials Consultants

**SOUTHEAST LANDFILL  
PIEZOCONE TEST SOUNDINGS  
APRIL 21-22, 1997**

DRAWN BY: RW	CHECKED BY:	DATE: 4/30/97
FILE NO.: 97-9628	APPROVED BY:	FIGURE:

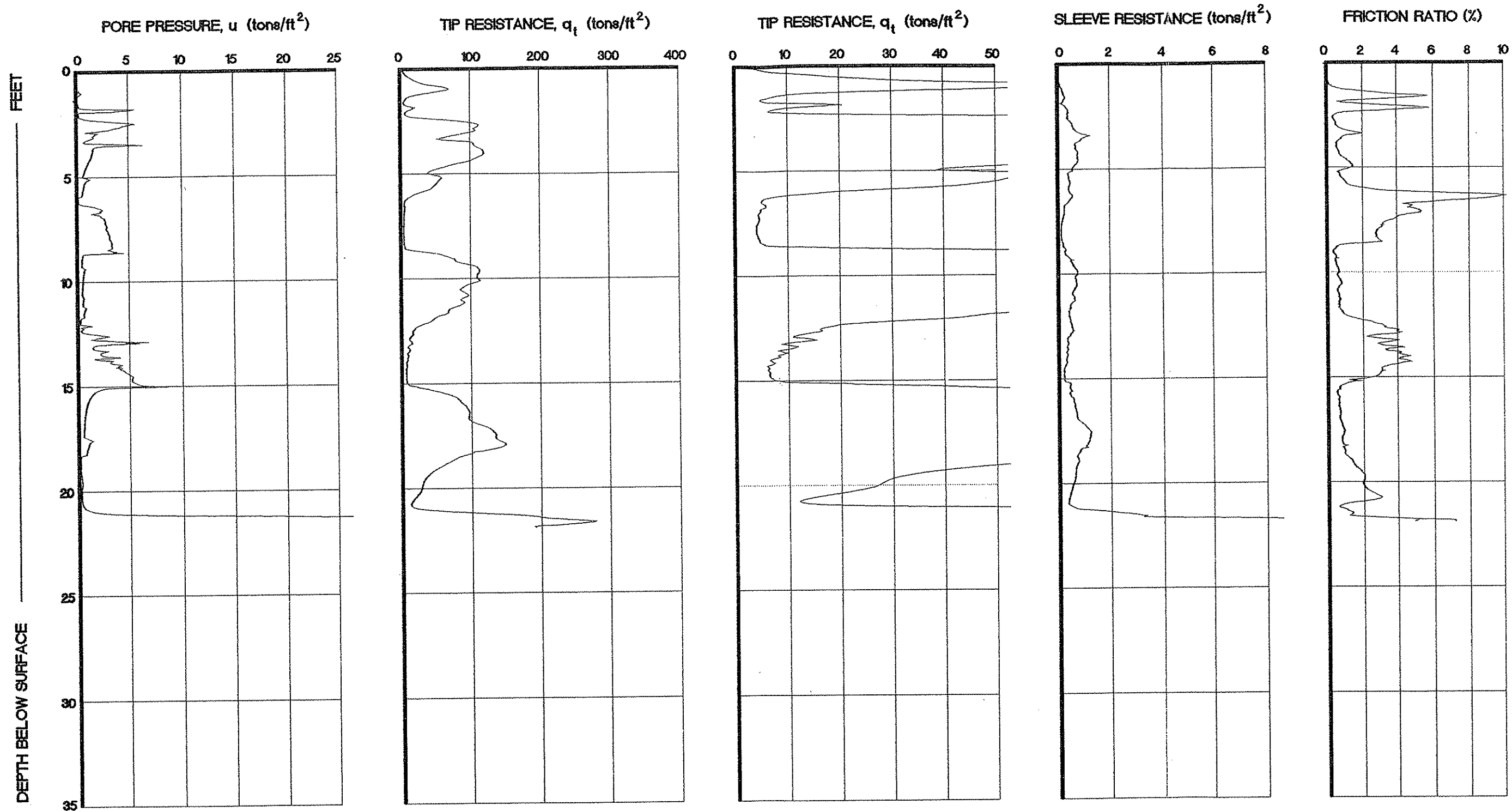

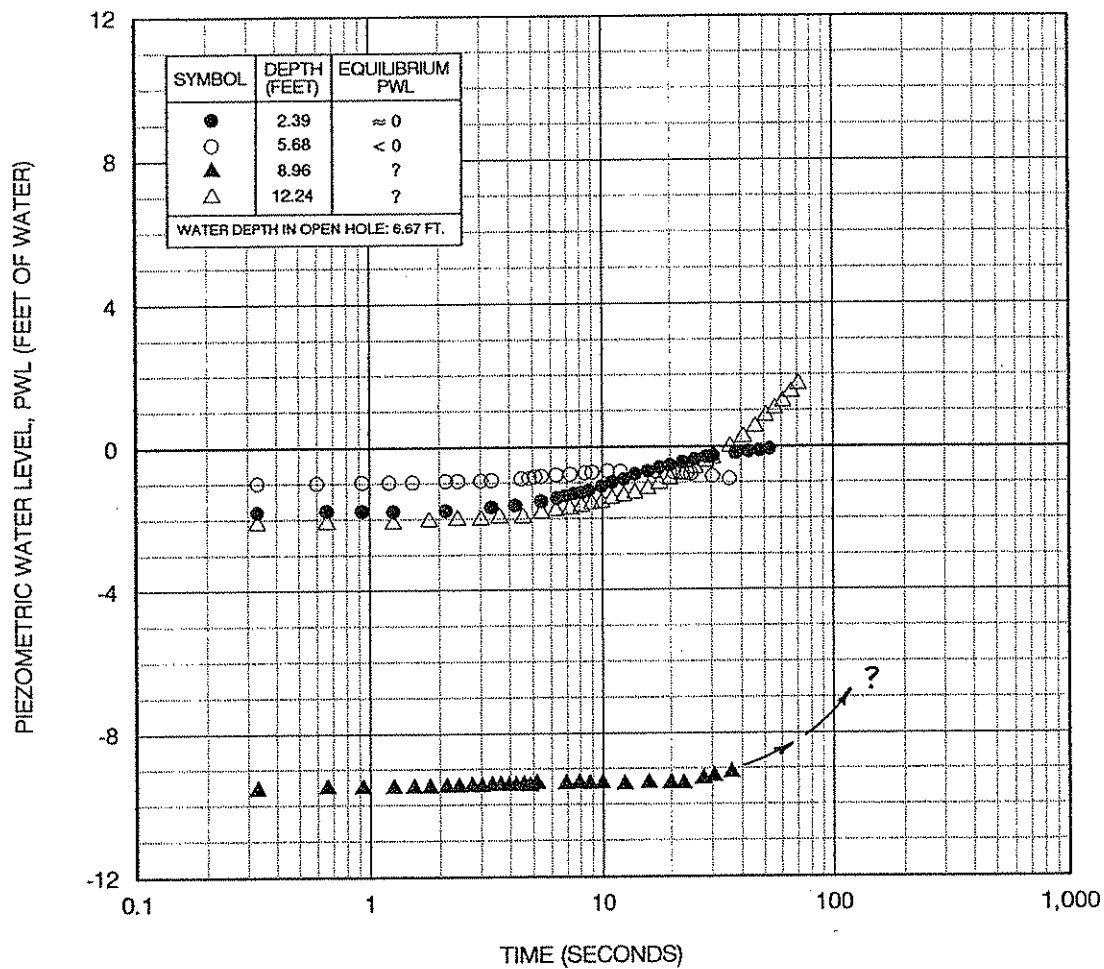



FIGURE 16  
PENETRATION DATA FOR  
SOUNDING NO. CPTU-13

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants			
<b>SOUTHEAST LANDFILL PIEZOCONE TEST SOUNDINGS APRIL 21-22, 1997</b>			
GRAPH BY: RW	CHECKED BY:	DATE: 4/30/97	FIGURE:
FILE NO.: 97-9828	APPROVED BY:		



# PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-1

FIGURE 17

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:

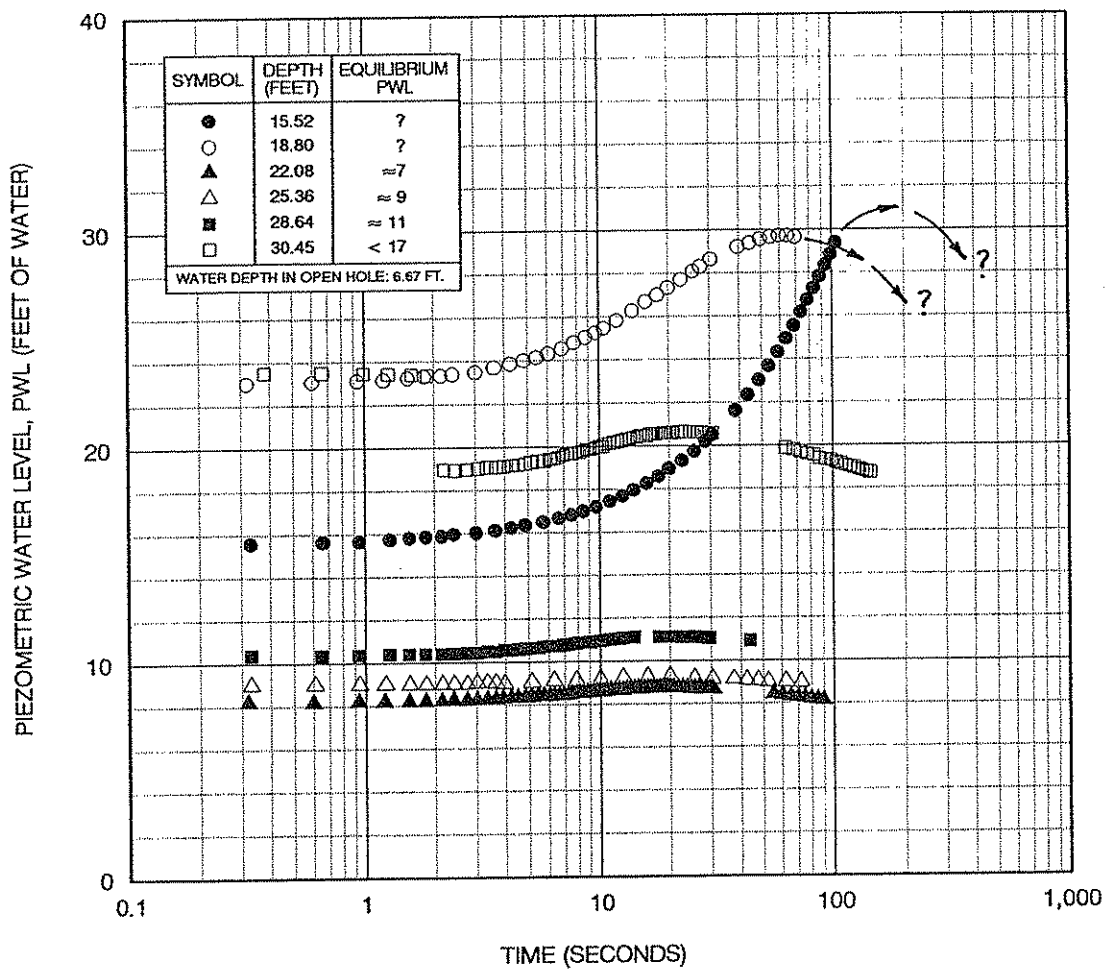



FIGURE 18

**PORE PRESSURE DISSIPATION RESULTS  
FOR PIEZOCONE SOUNDING NO. CPTU-1**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL PIEZOCONE TEST SOUNDINGS APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:

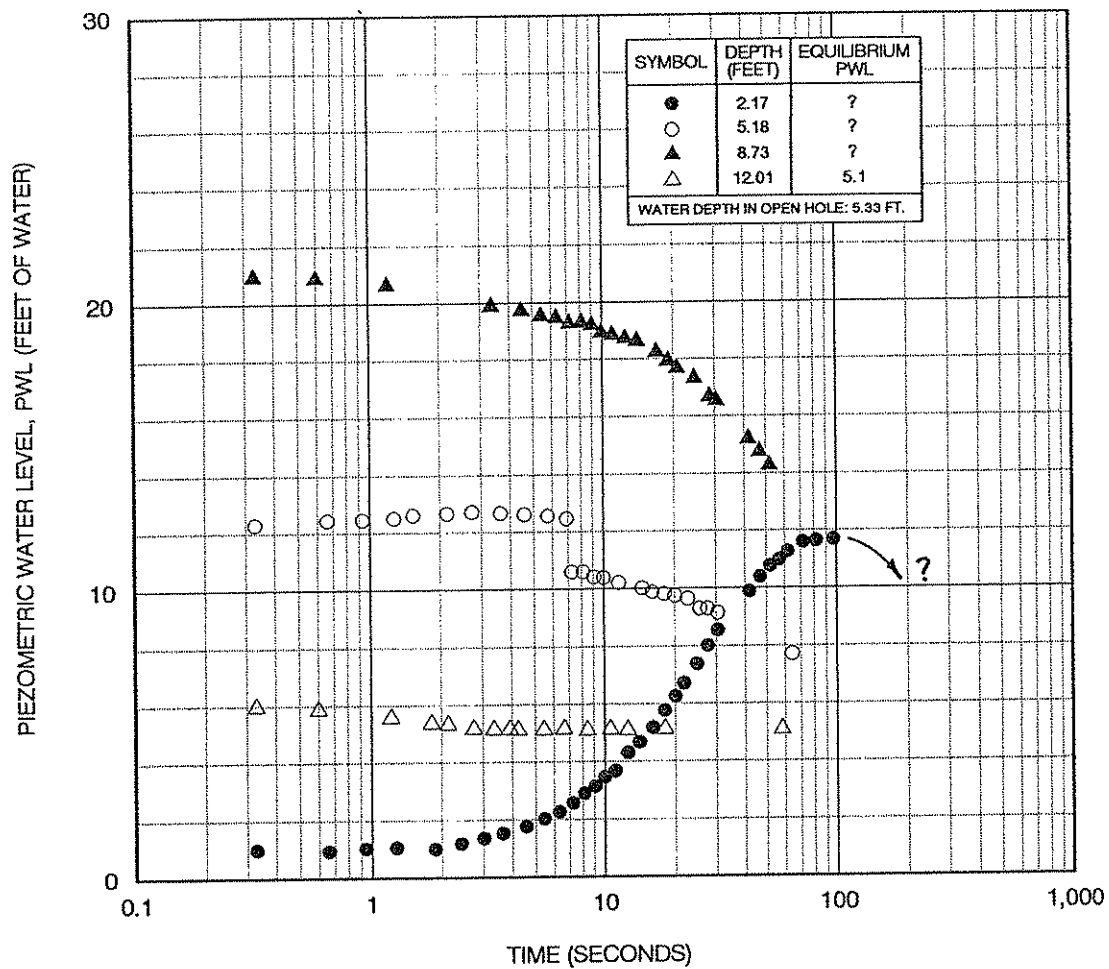

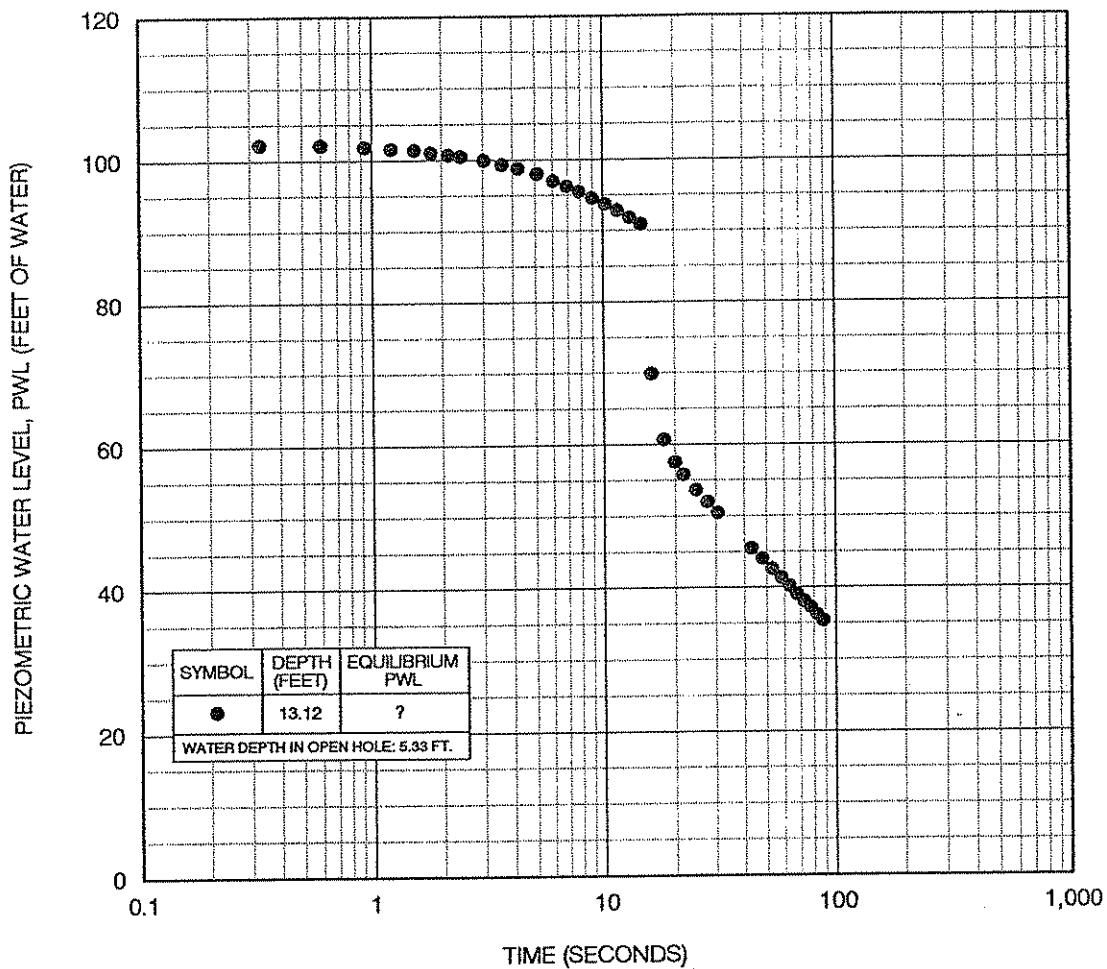


FIGURE 19


# PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-2

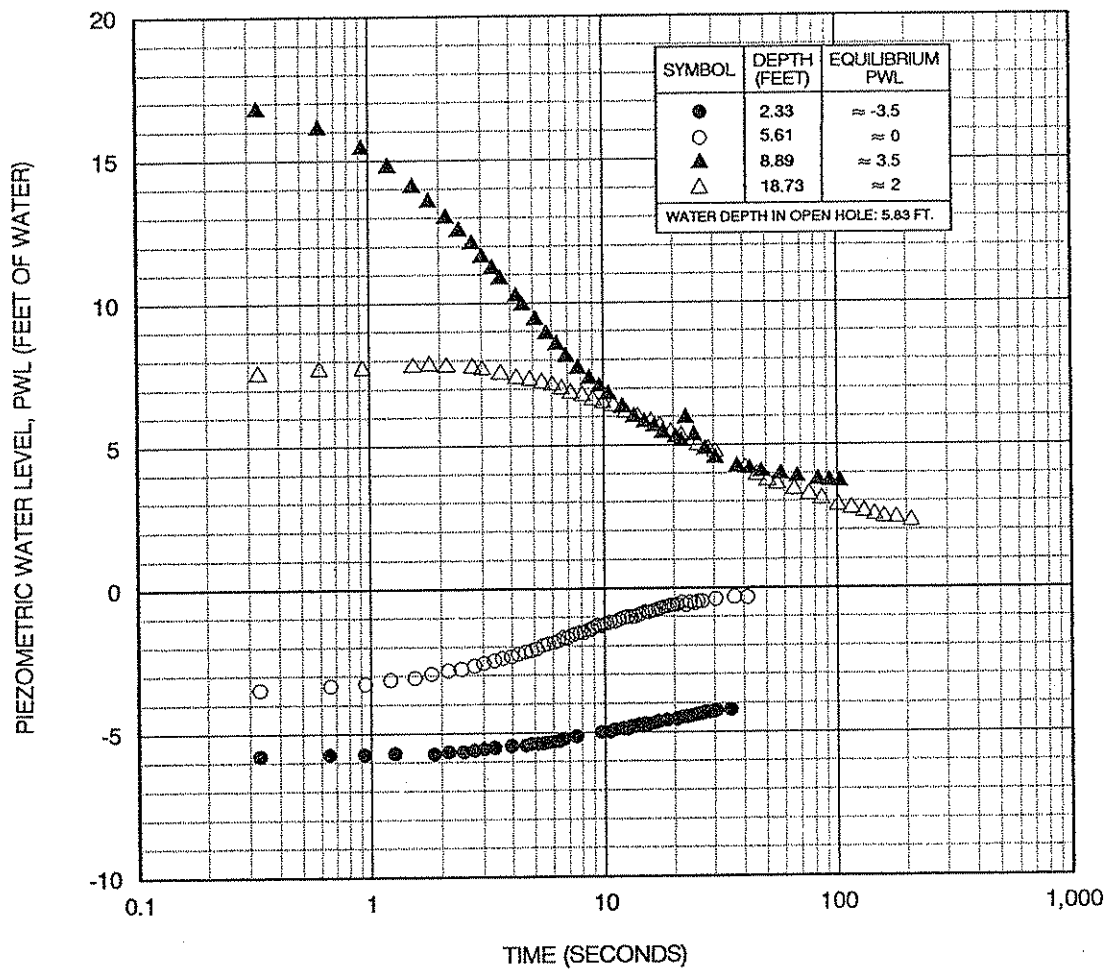
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



**PORE PRESSURE DISSIPATION RESULTS  
FOR PIEZOCONC SOUNING NO. CPTU-2**


**FIGURE 20**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONC TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/23/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



# **PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-3**

**FIGURE 21**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:

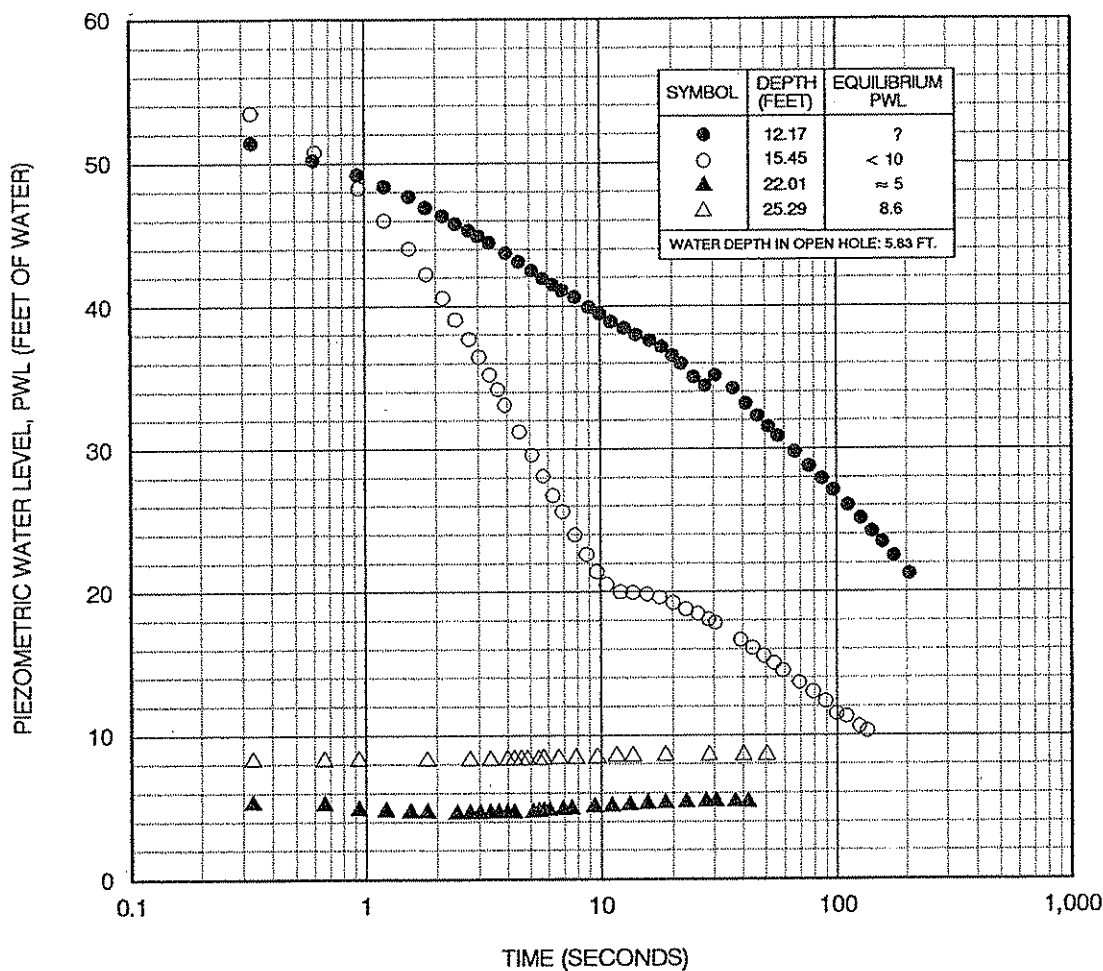

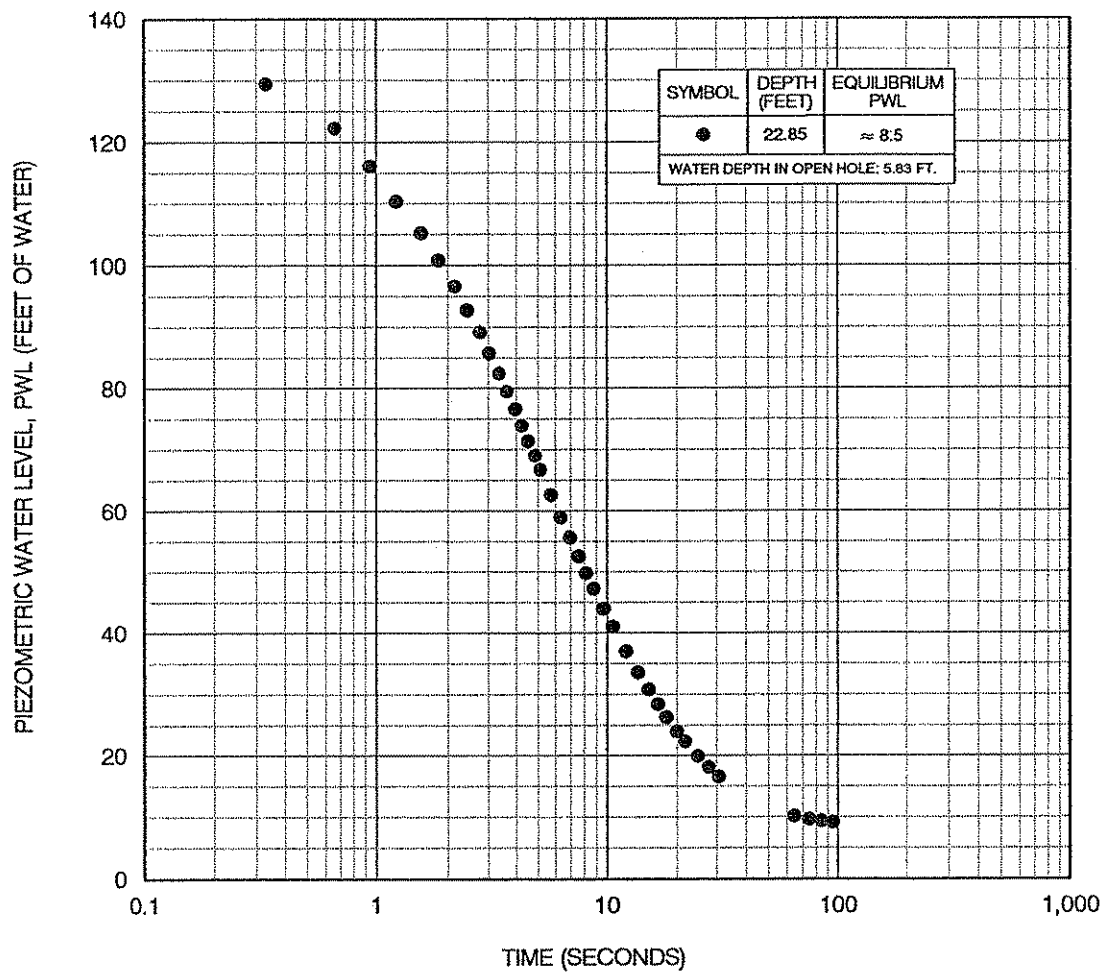


FIGURE 22

**PORE PRESSURE DISSIPATION RESULTS  
FOR PIEZOCONE SOUNDING NO. CPTU-3**

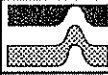
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:

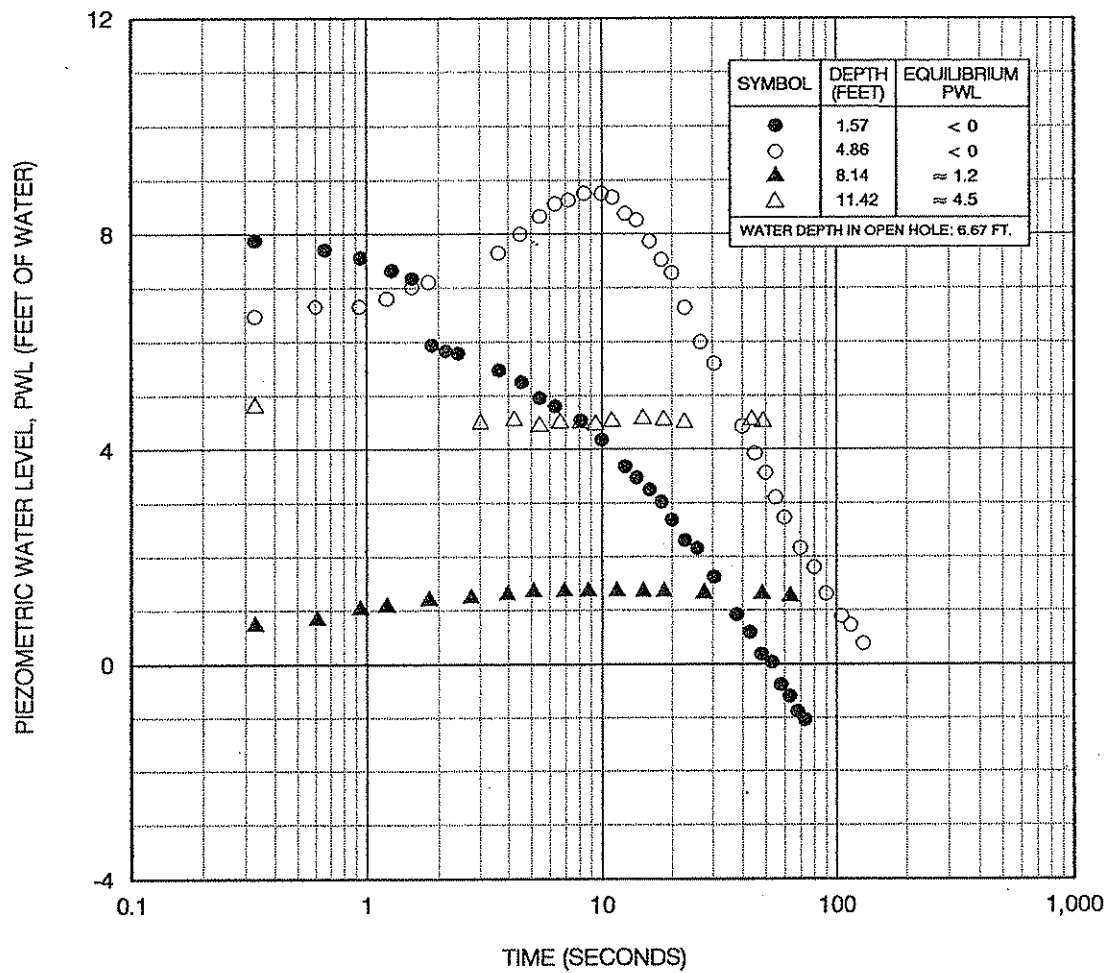




**FIGURE 23**


**PORE PRESSURE DISSIPATION RESULTS  
FOR PIEZOCONESOUNDING NO. CPTU-3**

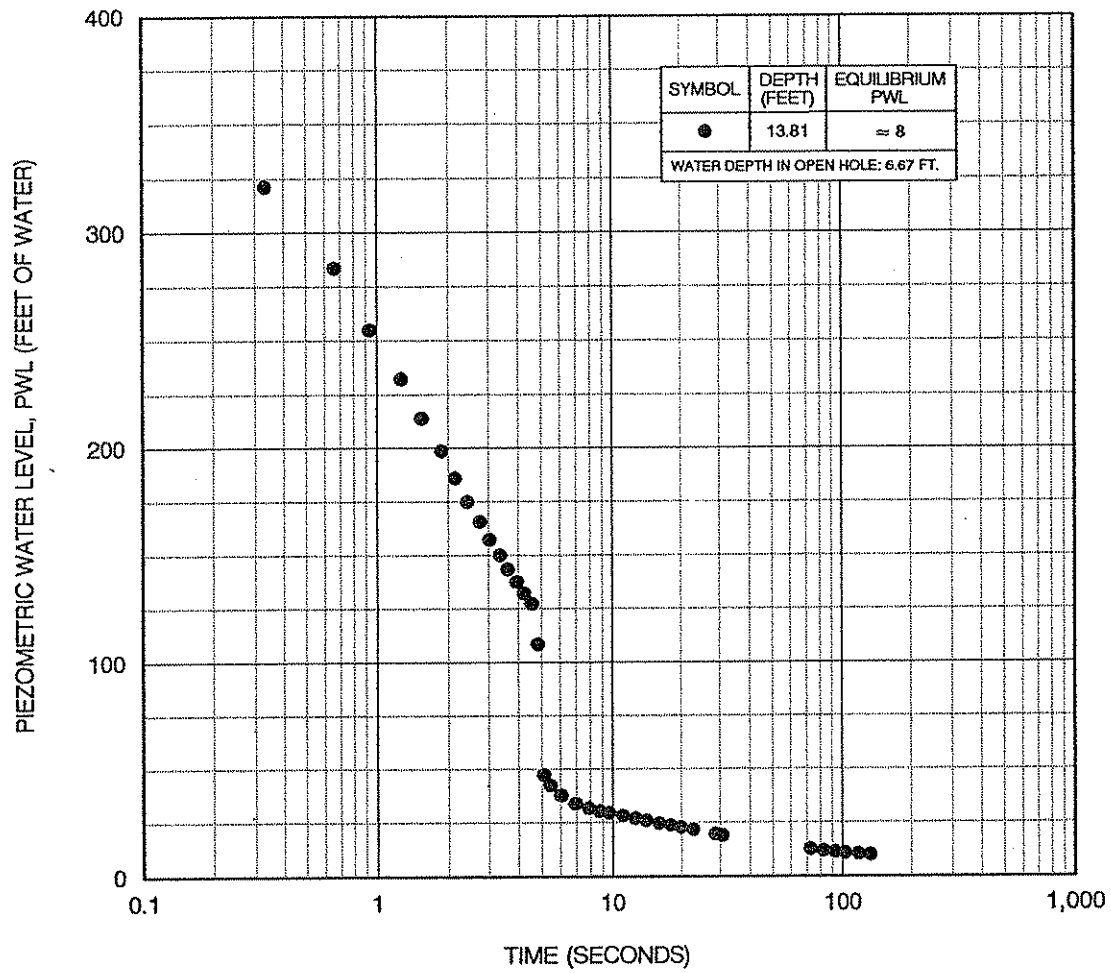
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONESOUNDING TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



# **PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONESOUNDING NO. CPTU-4**


**FIGURE 24**

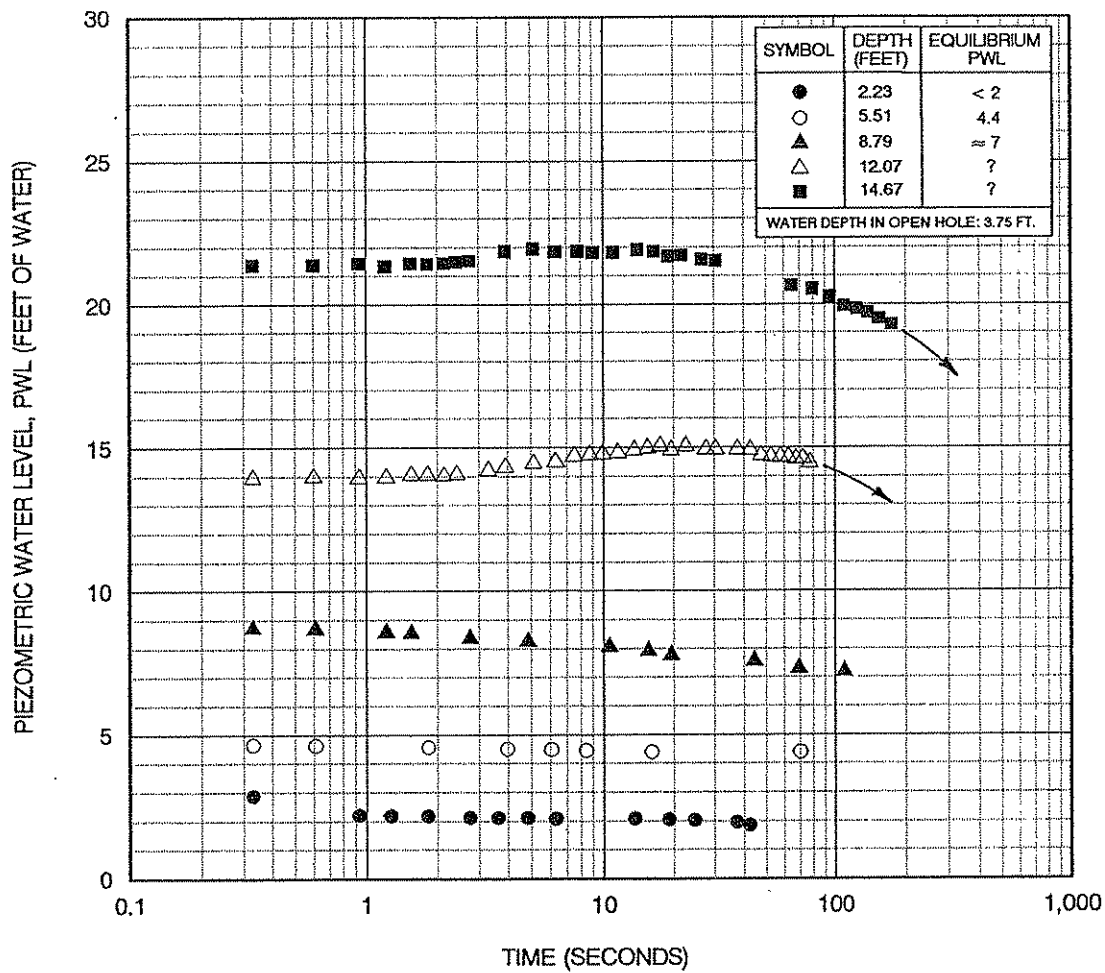
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONESOUNDING TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



**PORE PRESSURE DISSIPATION RESULTS  
FOR PIEZOCONE SOUNDING NO. CPTU-4**


**FIGURE 25**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



# **PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-5**

**FIGURE 26**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:

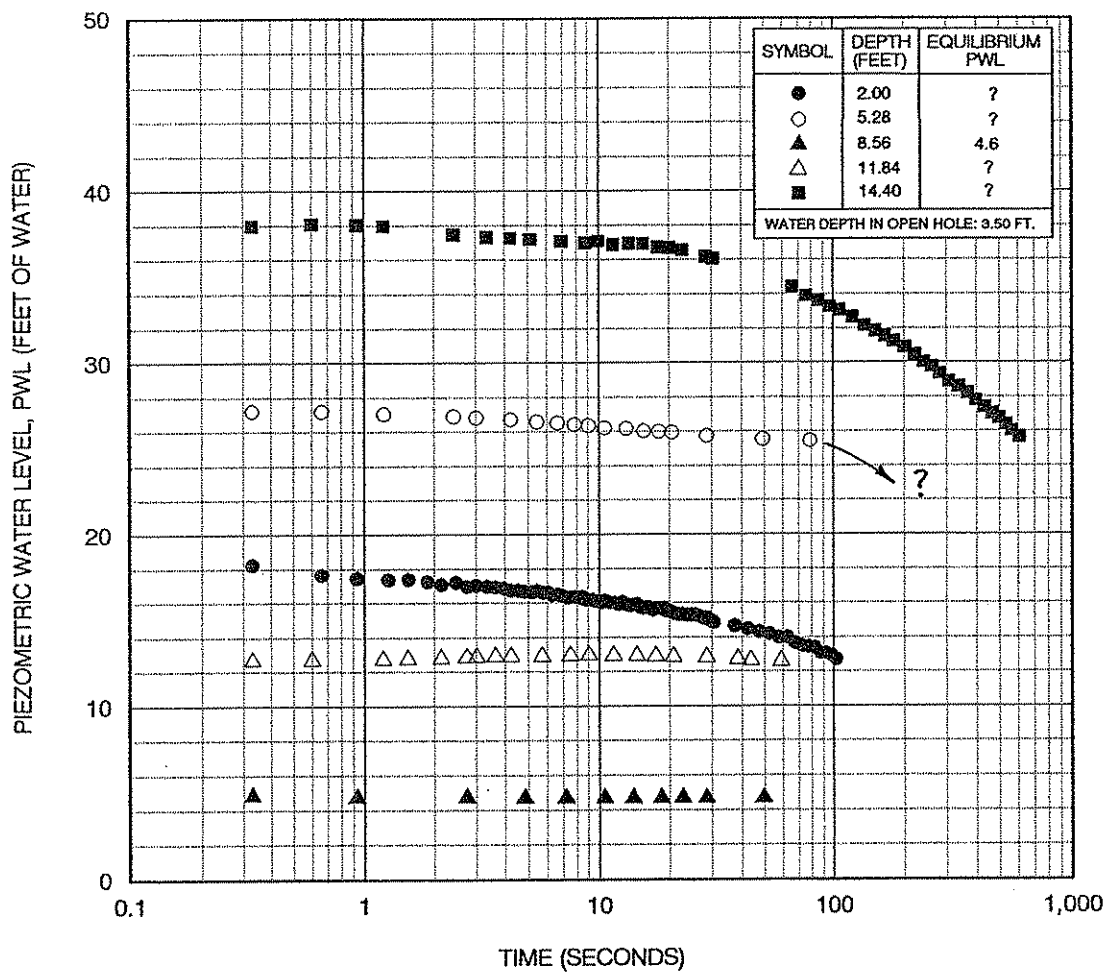

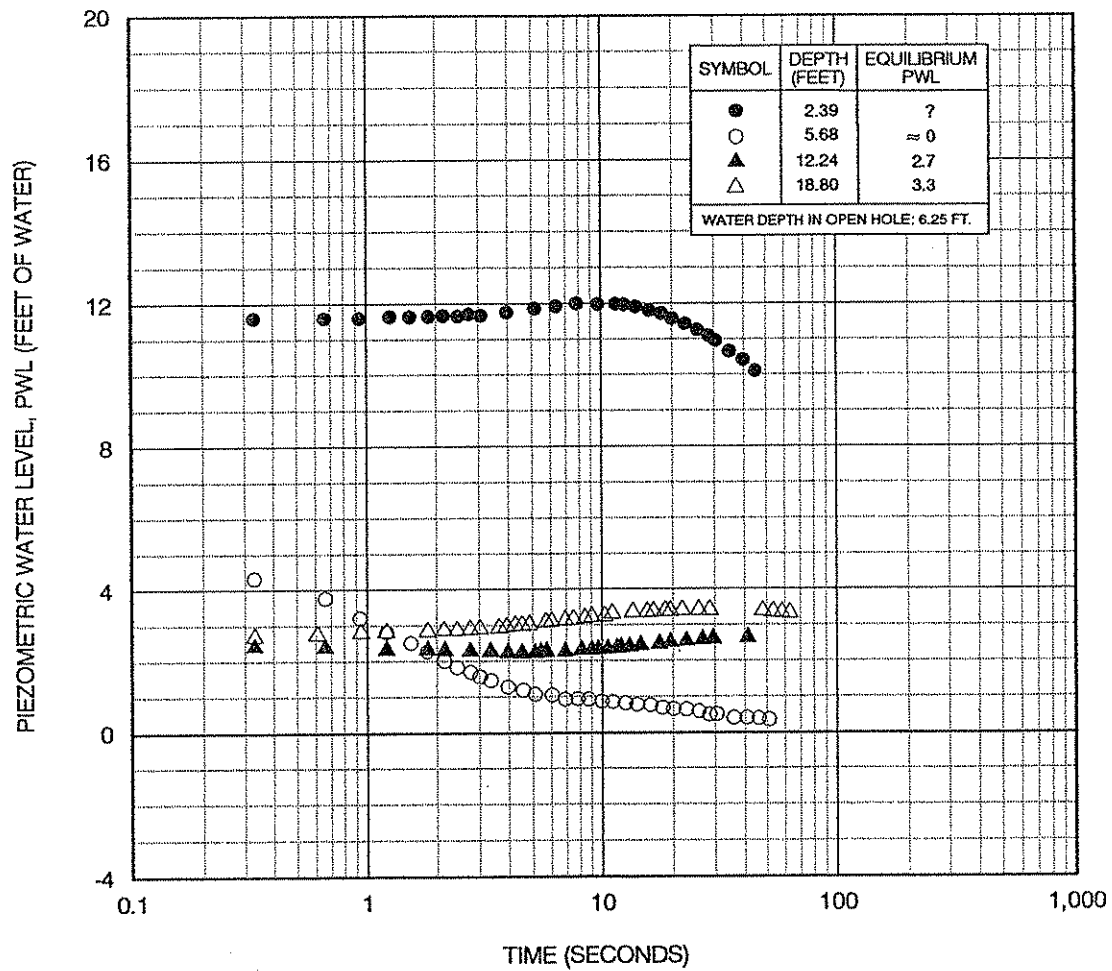


FIGURE 27


# PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-6

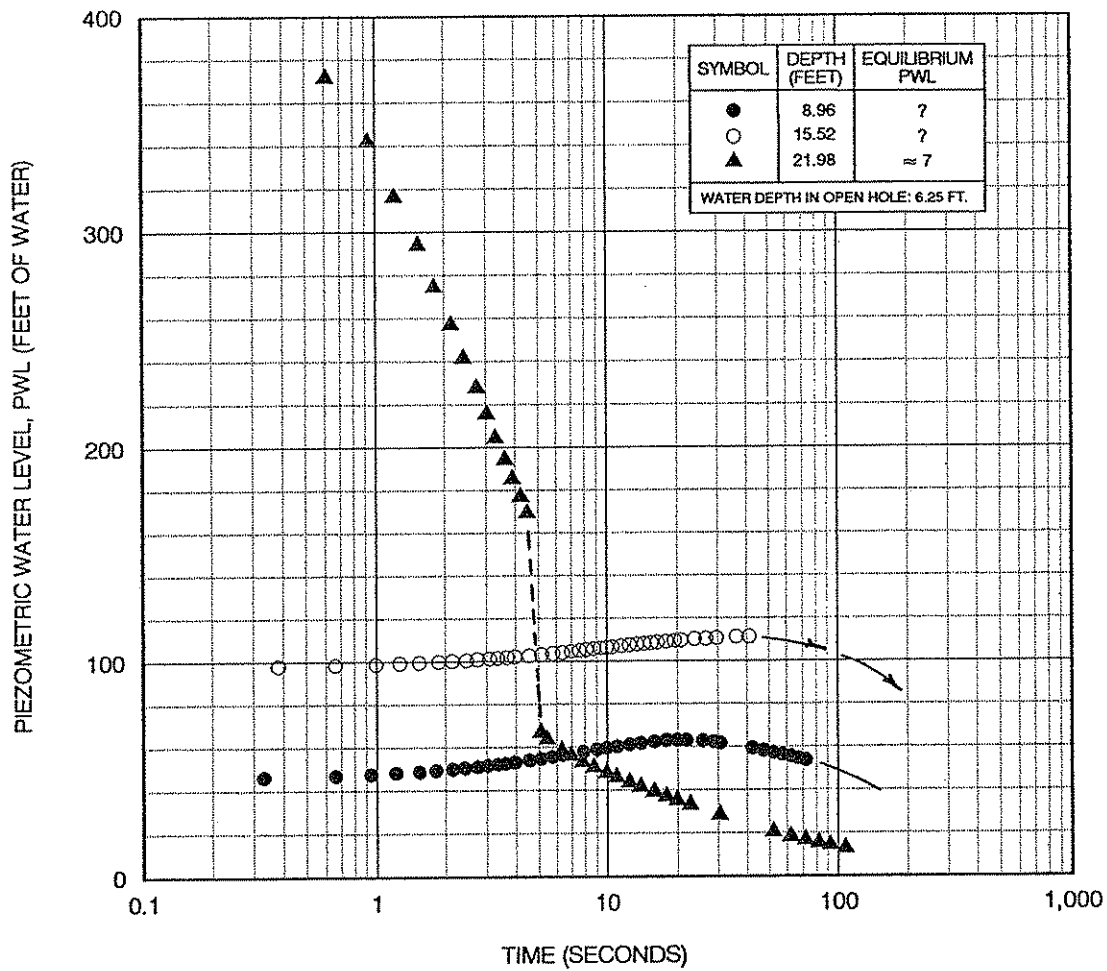
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



# **PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-7**


**FIGURE 28**

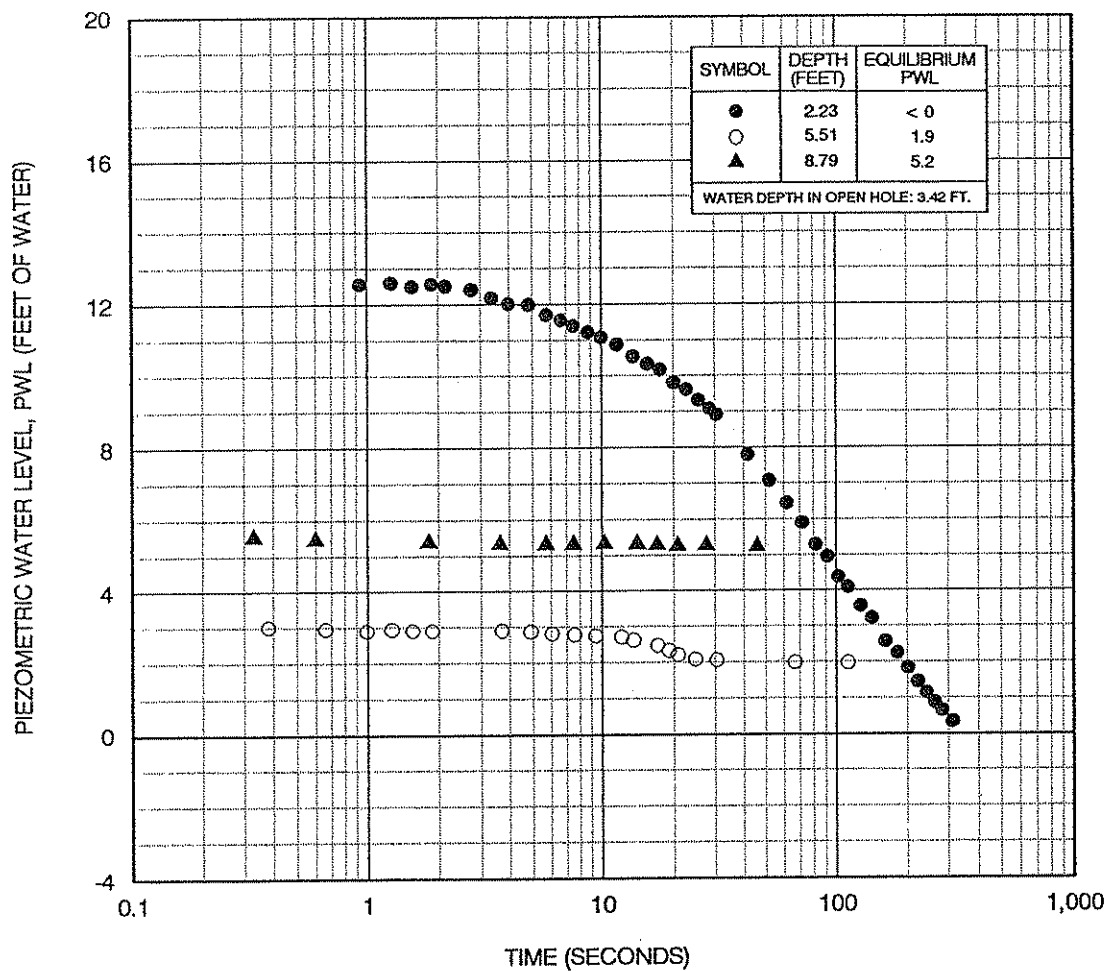
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



# **PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-7**


**FIGURE 29**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:

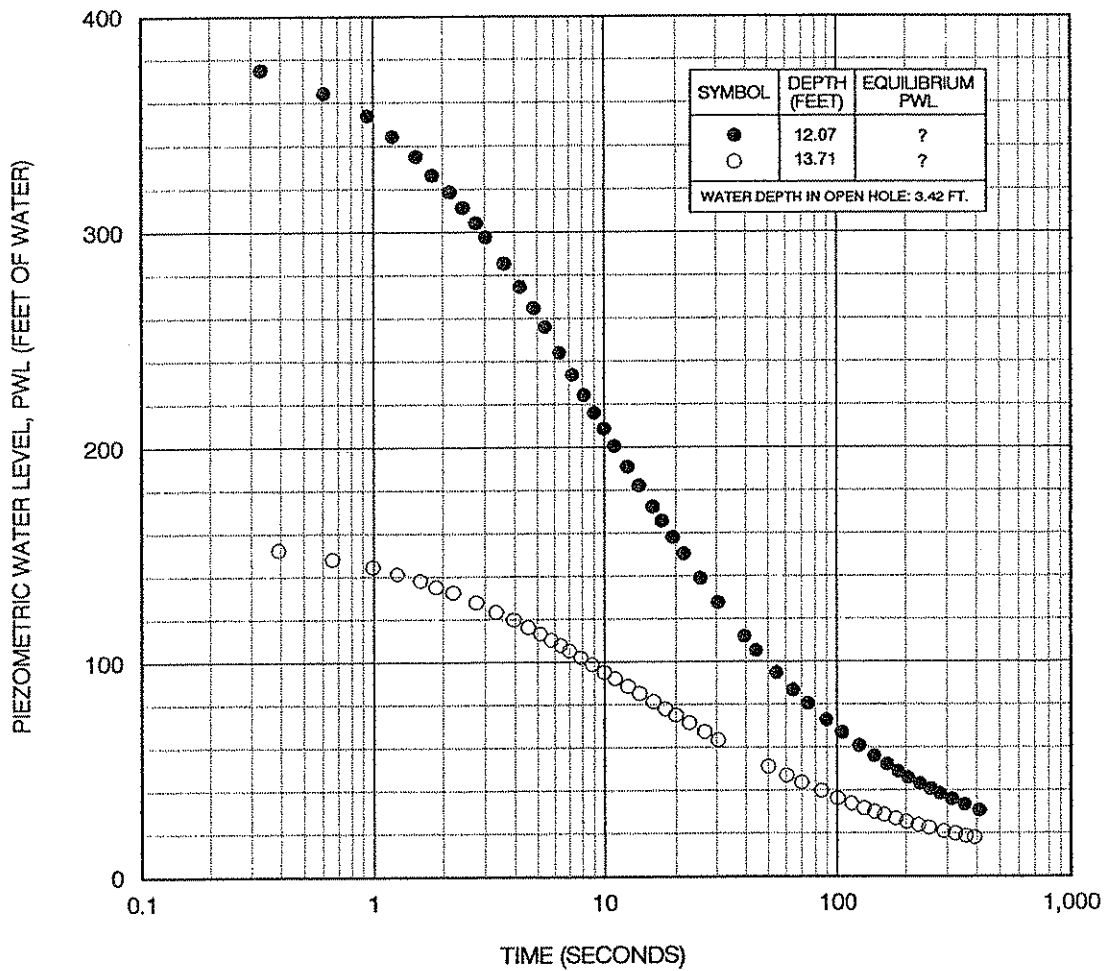


# **PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-8**

**FIGURE 30**


 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL PIEZOCONE TEST SOUNDINGS APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:

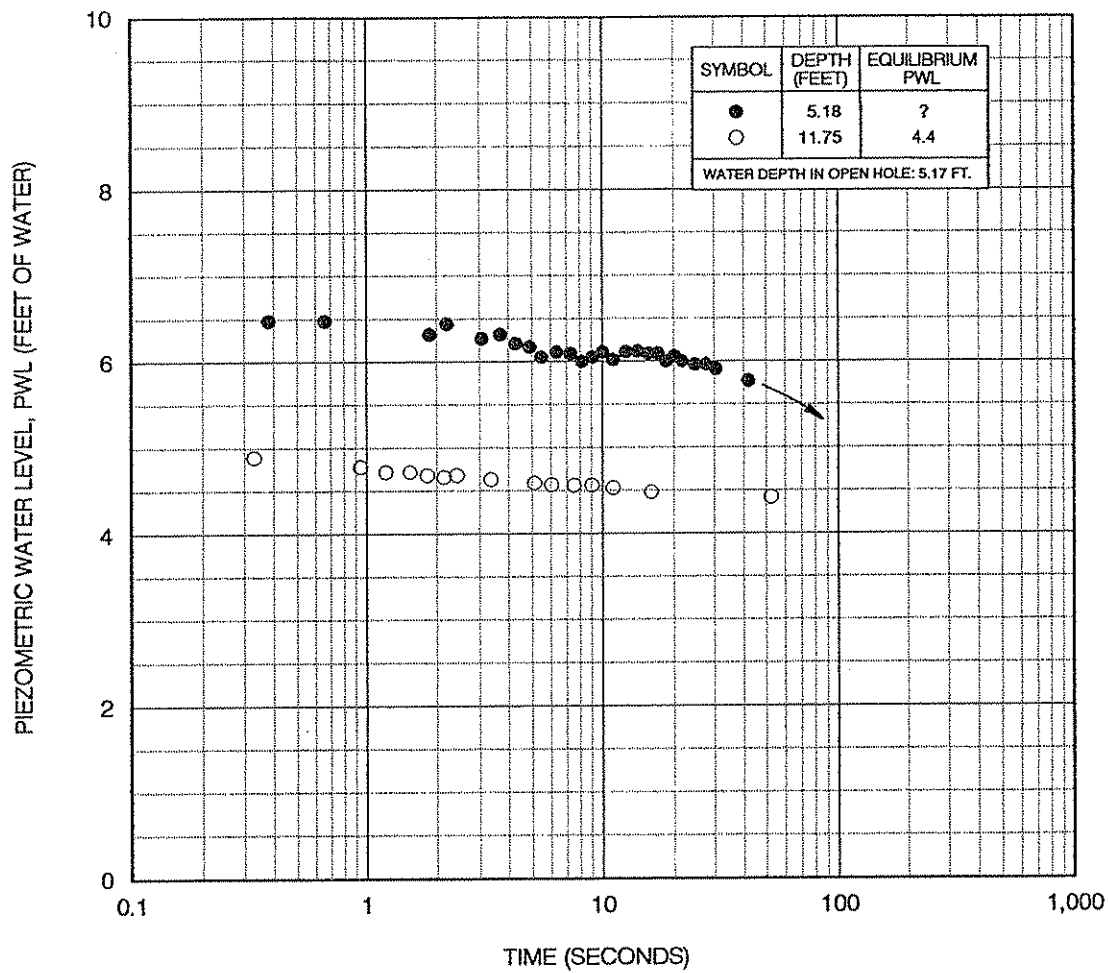




# **PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONESOUNDING NO. CPTU-8**


**FIGURE 31**

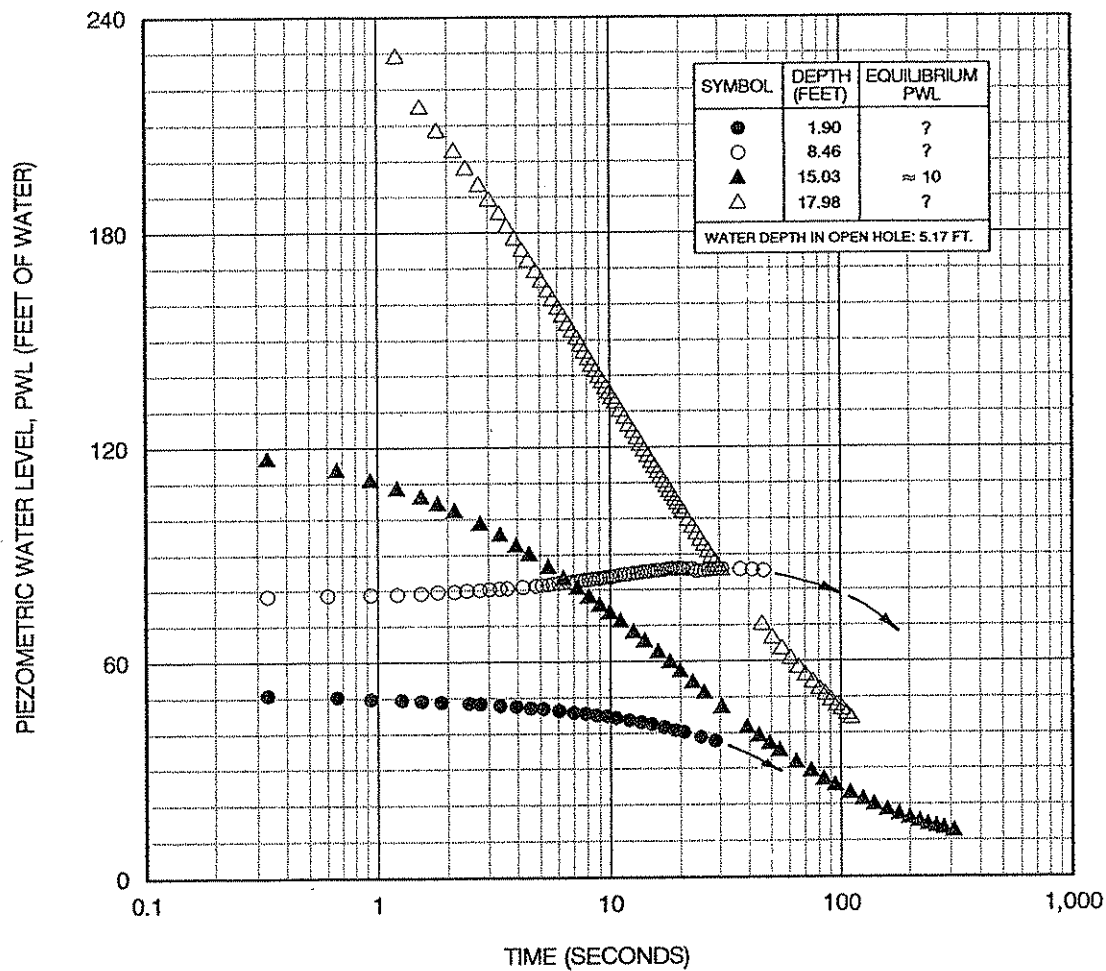
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONESOUNDING TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



**PORE PRESSURE DISSIPATION RESULTS  
FOR PIEZOCONE SOUNDING NO. CPTU-9**


**FIGURE 32**

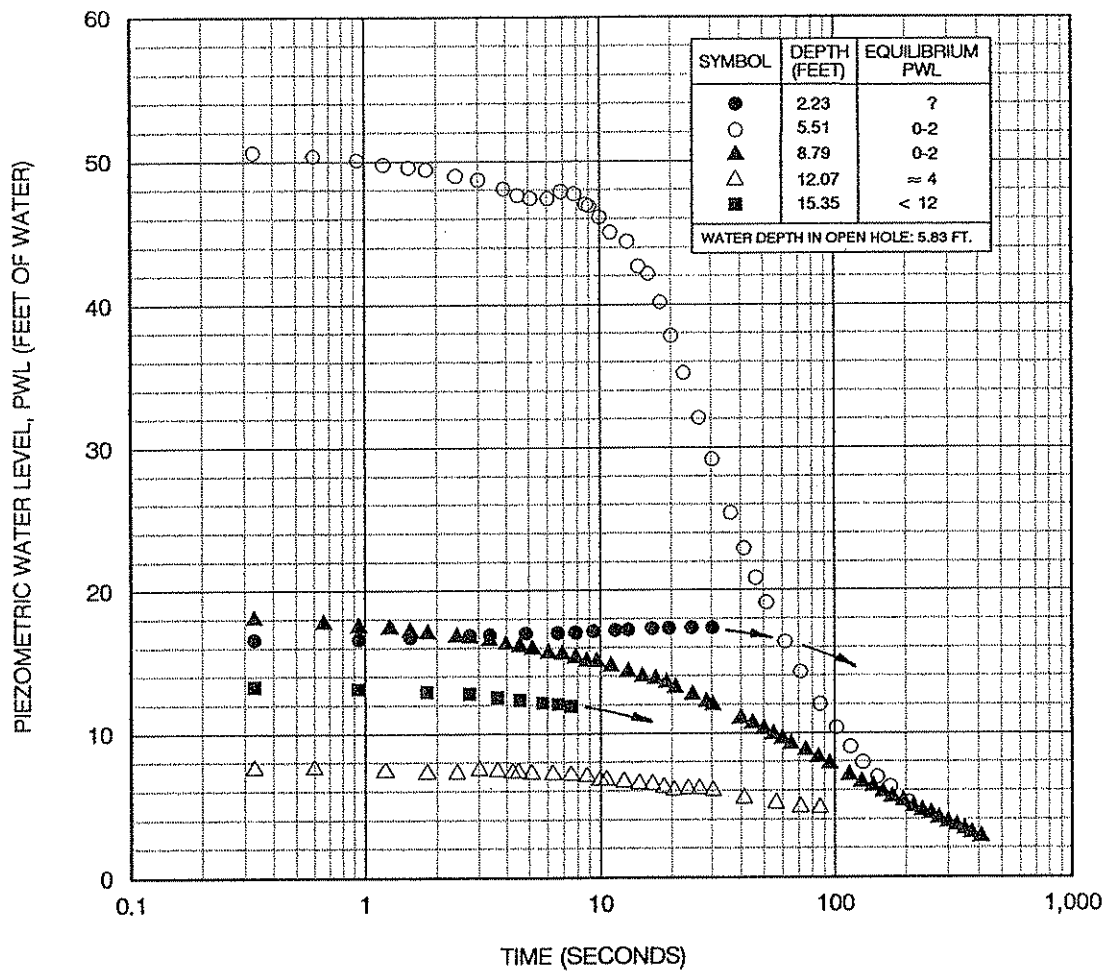
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



# **PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-9**


**FIGURE 33**

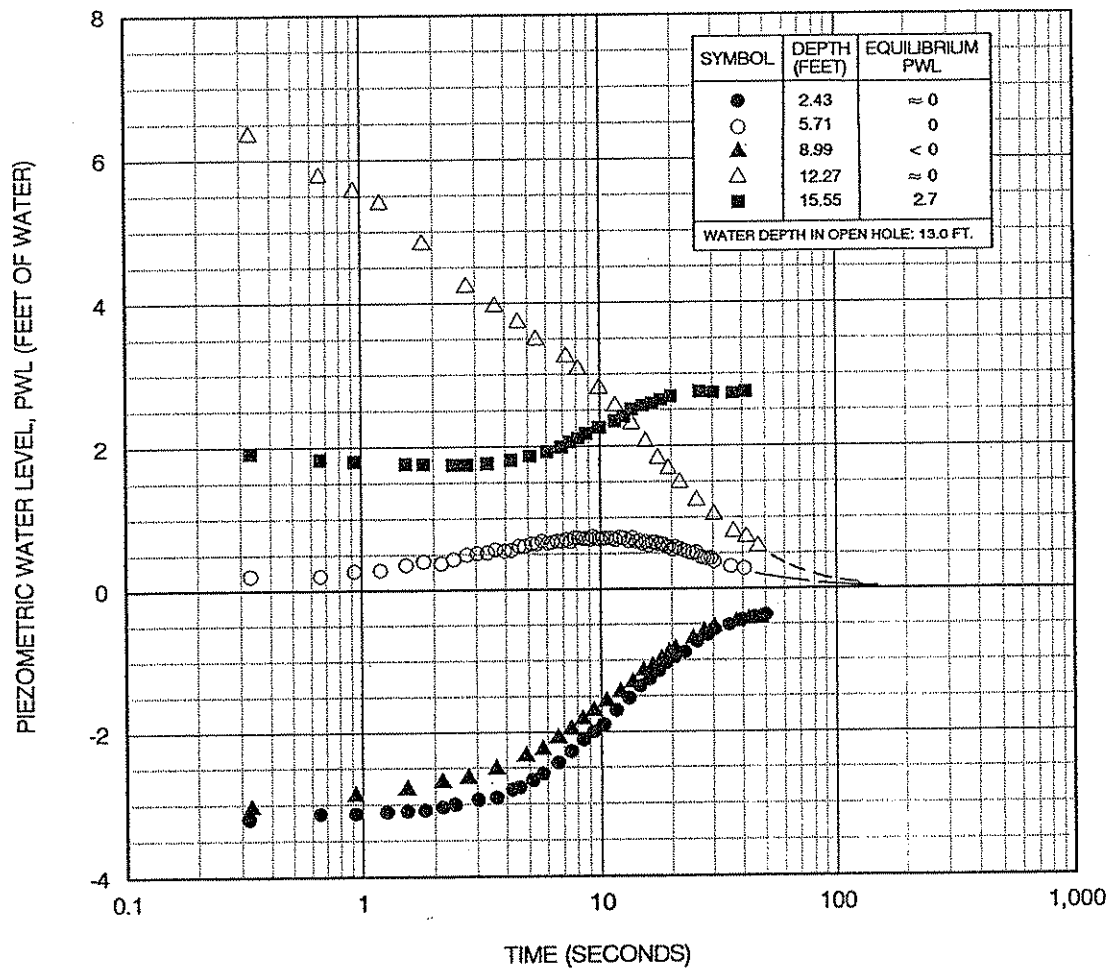
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



# **PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-10**


**FIGURE 34**

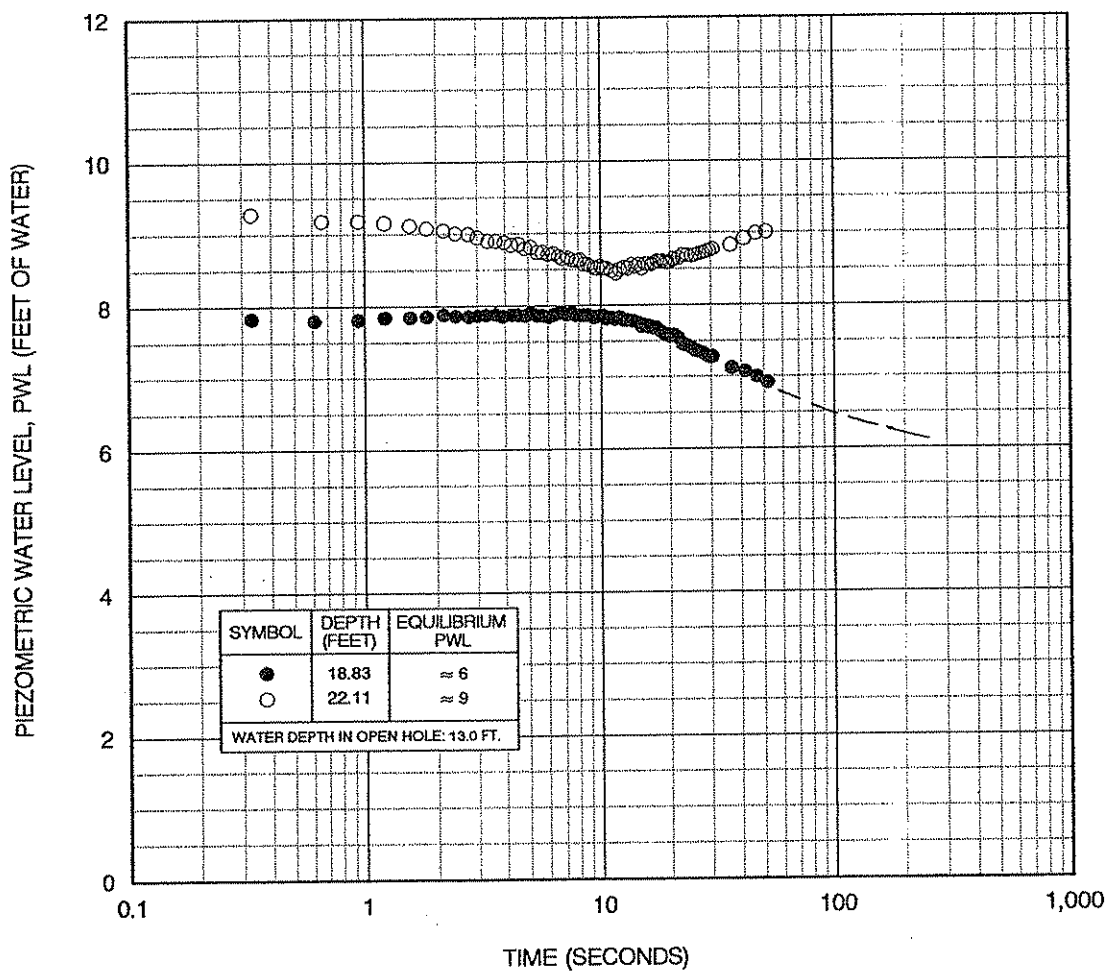
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



# **PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-11**


**FIGURE 35**

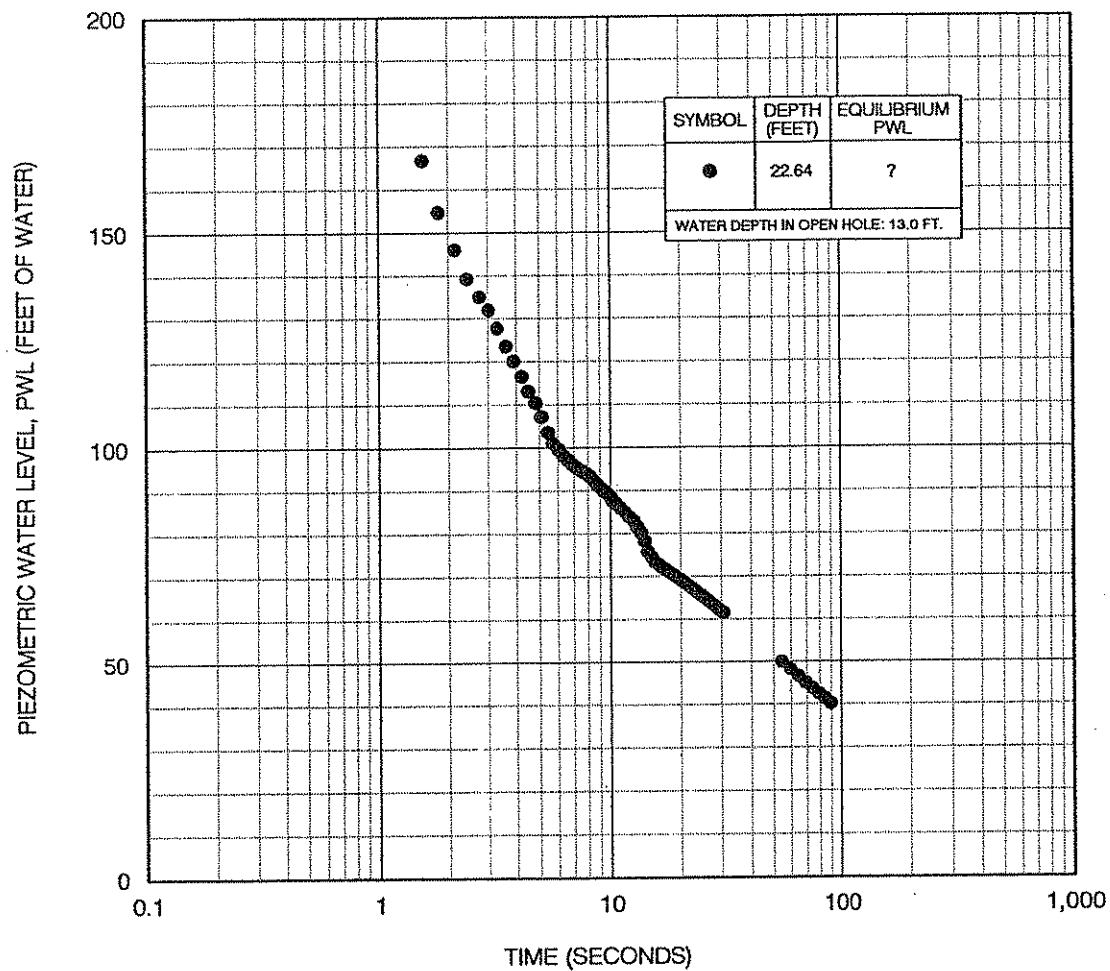
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



# **PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-11**


**FIGURE 36**

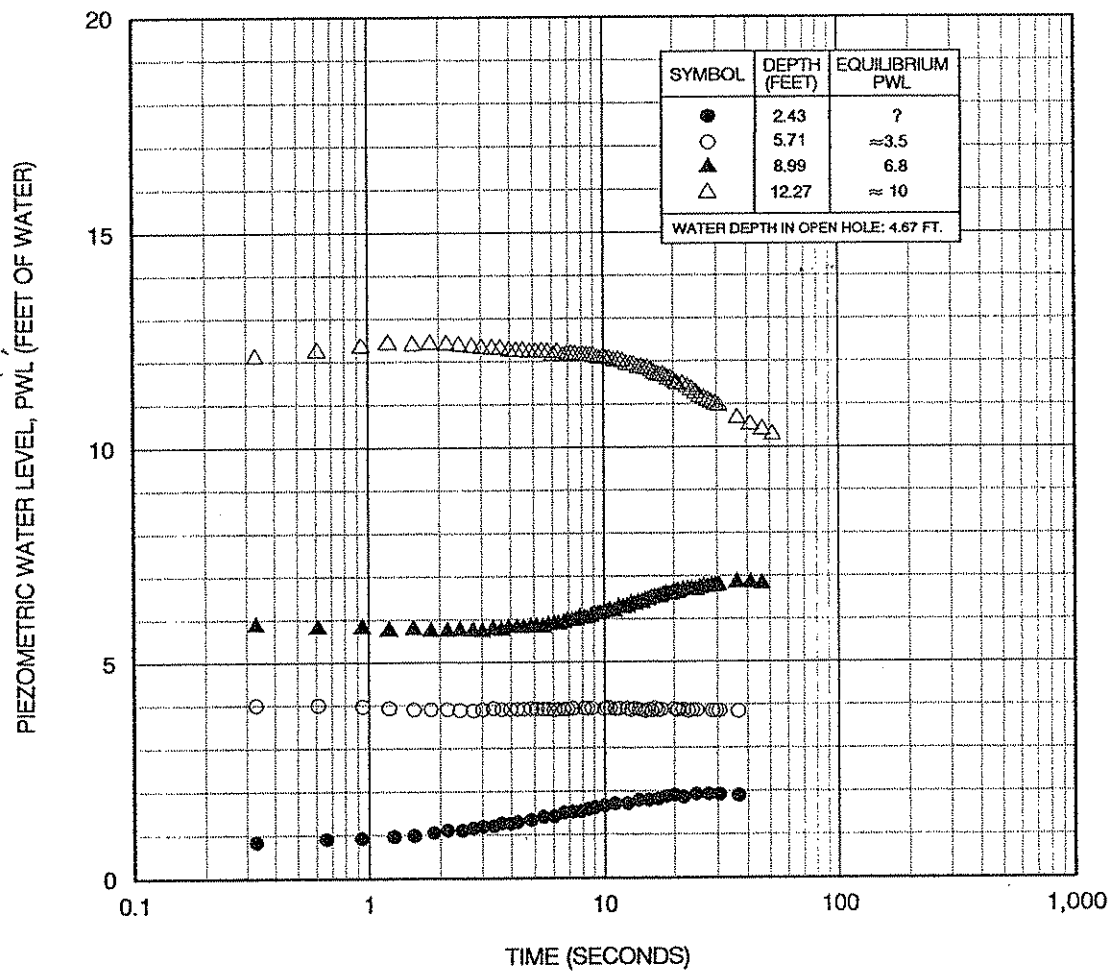
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL PIEZOCONE TEST SOUNDINGS APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



**FIGURE 37**


**PORE PRESSURE DISSIPATION RESULTS  
FOR PIEZOCONE SOUNDING NO. CPTU-11**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:

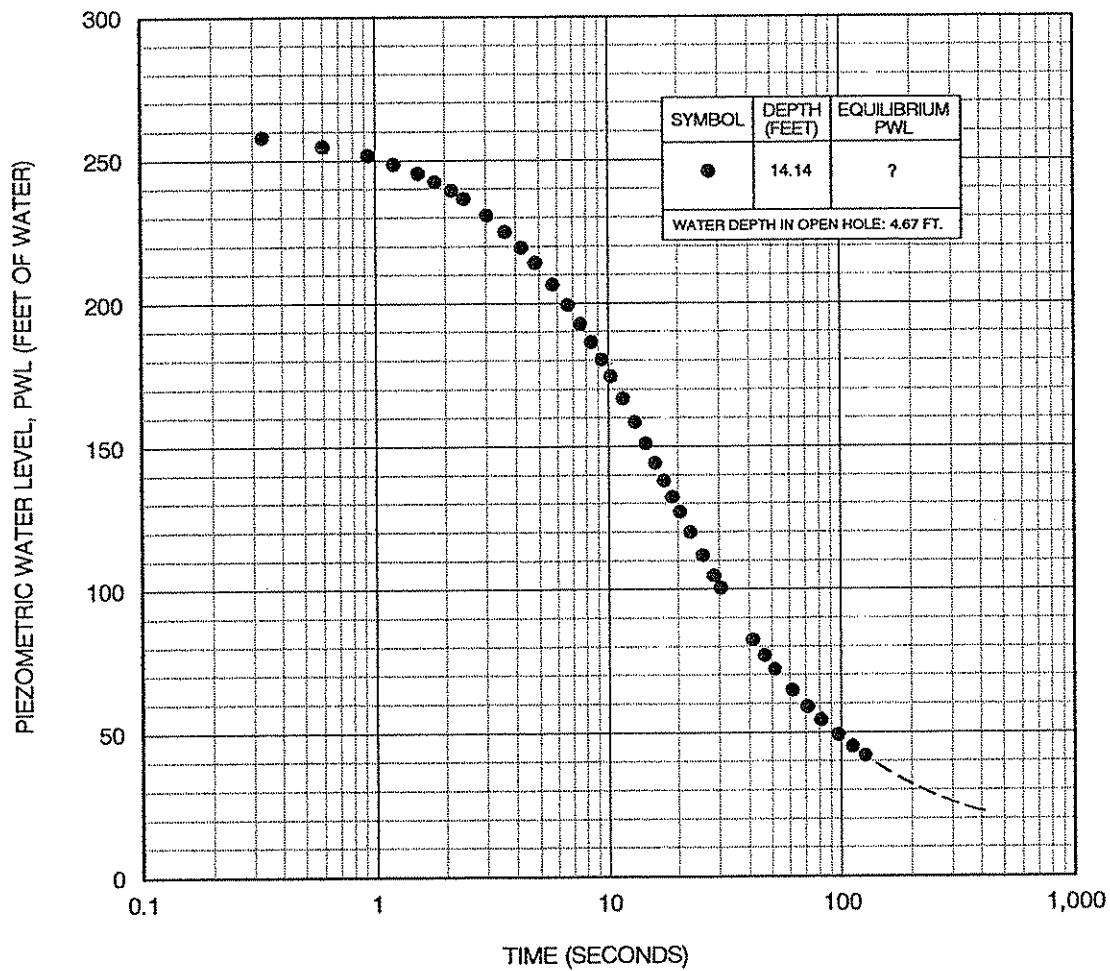


# **PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-12**

**FIGURE 38**


 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:

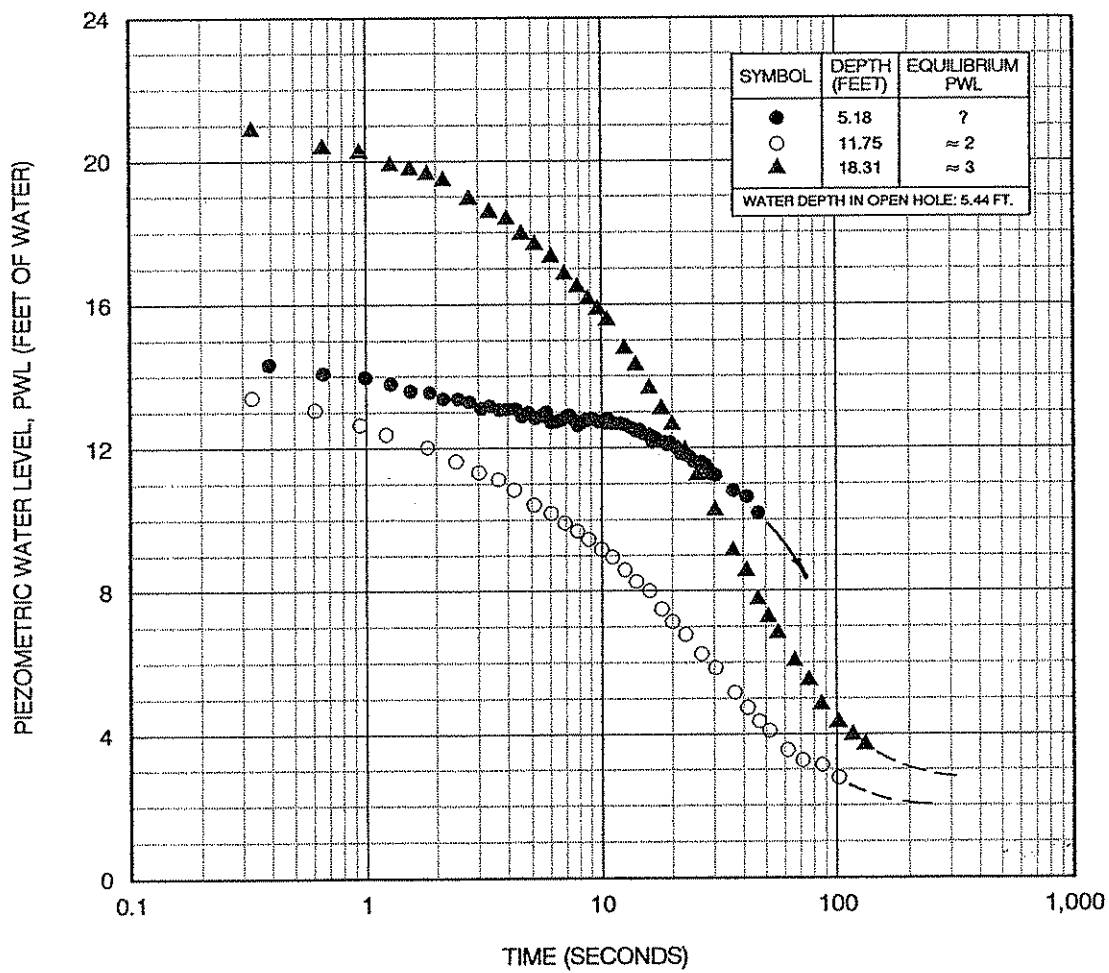




**PORE PRESSURE DISSIPATION RESULTS  
FOR PIEZOCONE SOUNDING NO. CPTU-12**


**FIGURE 39**

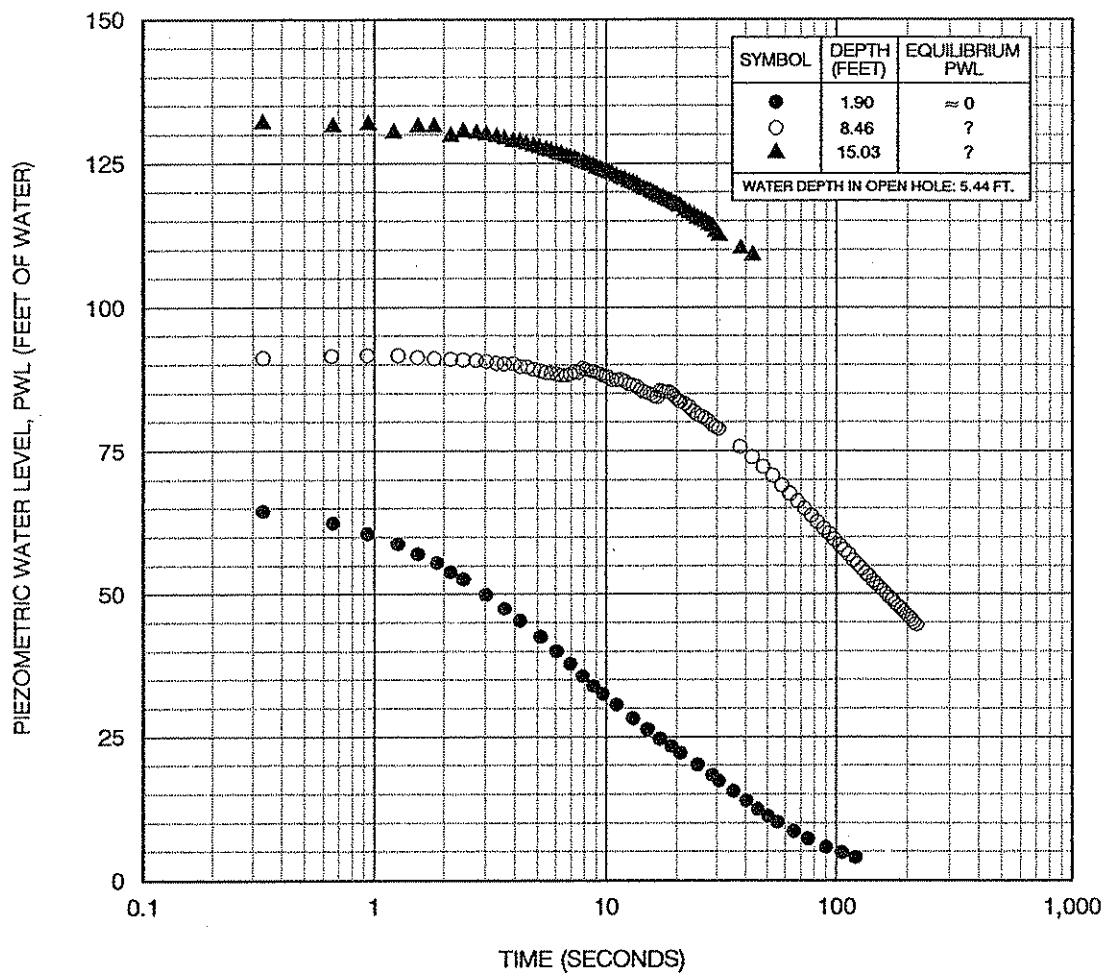
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



# **PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-13**


**FIGURE 40**

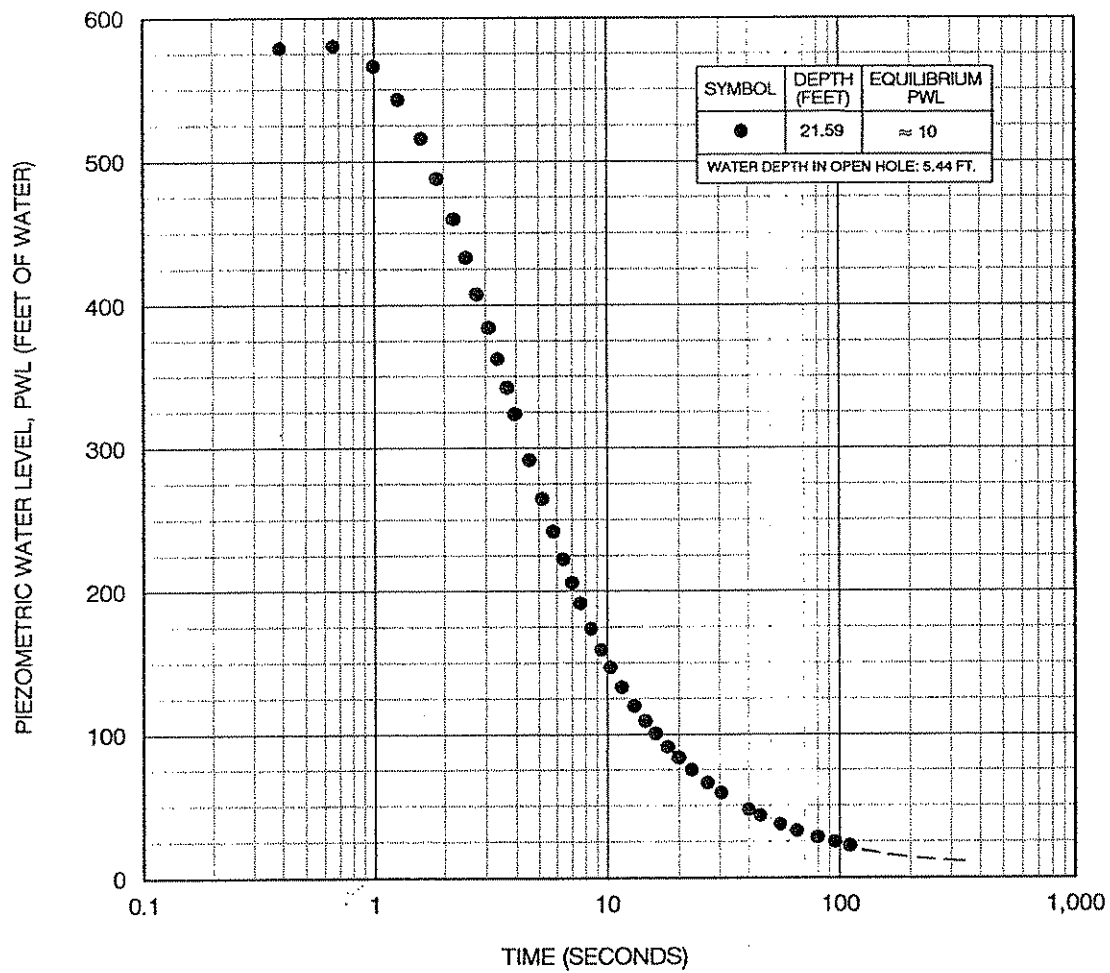
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



# **PORE PRESSURE DISSIPATION RESULTS FOR PIEZOCONE SOUNDING NO. CPTU-13**


**FIGURE 41**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL          PIEZOCONE TEST SOUNDINGS          APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:



**PORE PRESSURE DISSIPATION RESULTS  
FOR PIEZOCONESOUNDING NO. CPTU-13**

**FIGURE 42**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL PIEZOCONESOUNDING TEST SOUNDINGS APRIL 21-22, 1997</b>		
DRAWN BY: <b>RW</b>	CHECKED BY:	DATE: <b>4/28/97</b>
FILE NO.: <b>97-9628</b>	APPROVED BY:	FIGURE:

**APPENDIX A**  
**FIELD TEST PROCEDURES FOR**  
**STANDARD PENETRATION TESTS (SPT)**

## STANDARD PENETRATION TEST

The Standard Penetration Test is a widely accepted method of in-situ testing of foundation soils (ASTM D-1586). A 2-foot long, 2-inch outside diameter, split-barrel ("spoon") sampler, attached to the end of drilling rods, is driven 18 inches into the ground by successive blows of a 140-pound hammer freely dropping 30 inches. The number of blows needed for each six inches of penetration is recorded. The sum of the blows required for penetration of the second and third 6-inch increments of penetration constitutes the test result or N-value. After the test, the sampler is extracted from the ground and opened to allow visual examination and classification of the retained soil sample. The N-value has been empirically correlated with various soil properties allowing a conservative estimate of the behavior of soils under load.

The tests are usually performed at 5-foot intervals. However, more frequent or continuous testing is done by our firm through depths where a more accurate definition of the soils is required. The test holes are advanced to the test elevations by rotary drilling with a cutting bit, using circulating fluid to remove the cuttings and hold the fine grains in suspension. Usually, the circulating fluid, which is a bentonite drilling mud, also serves to keep the hole open below the water table by maintaining an excess hydrostatic pressure inside the hole. In some soil deposits, particularly highly pervious ones, flush-coupled casing must be driven to just above the testing depth to keep the hole open and/or to prevent the loss of circulating fluid.

Representative split-spoon samples from soils at every 5 feet of drilled depth and from every different stratum are brought to our laboratory in air-tight jars for further evaluation and testing, if necessary. Samples not used in testing are stored for at least sixty (60) days prior to being discarded. After completion of a test boring, the hole is kept open until a steady state groundwater level is recorded. The hole is then sealed if necessary, and backfilled.

**APPENDIX B**  
**FIELD TEST PROCEDURES FOR**  
**CONE PENETRATION TEST SOUNDINGS (CPT)**

## CONE PENETROMETER TESTS

The Dutch Cone Penetrometer is an in-situ deep-testing device utilized to obtain information concerning the strength and compressibility of foundation soils. In the test a shaft with a conical point is pushed into the soil. The resistance to penetration of the point and the friction developed on the circumference of the shaft are measured. The measured values constitute the test result. The cone apparatus does not recover soil samples. Originally developed and extensively used in Europe, the Dutch Cone has recently been accepted in the United States as a valuable geotechnical engineering tool (ASTM Special Technical Publication 479). Similar portable hand-operated penetrometers have been used extensively by our firm for many years as an alternate means for compaction control work and shallow subsurface soil exploration.

The Dutch Cone or Begemann penetrometer employs a 60-degree, hardened-steel cone point with a projected area of 10 square centimeters. The point is located at the end of a smooth cylindrical shaft which is free to move ahead of a second slightly larger cylindrical shaft of friction sleeve. The testing assembly is attached to the end of a string of concentric inner and outer rods which connect it to the surface. The outer rods are used to push the testing assembly and the inner rods to the desired testing depth where they are disengaged and remain stationary while the test is being performed.

During the test, the inner rods are engaged and a hydraulic jack is used to push the cone point ahead of the friction sleeve. After a free travel of 1.5 inches, the friction sleeve engages and together with the cone tip they are pushed an additional 1.7 inches. Penetration speed is one to two centimeters per second. The thrust required to push the cone tip alone, and that required to push it and the friction sleeve are measured by the sensitive pressure gauges. After the completion of the test, the outer rods are reengaged and pushed, collapsing the telescoped testing device and carrying it to the next testing depth which is usually 20 centimeters deeper and the test is repeated. The value of the bearing pressure exerted by the cone point ( $q_{\text{cone}}$ ) has been empirically correlated to various soil properties. The ratio of this value,  $q_{\text{cone}}$ , to the value of the frictional resistance of the disturbed soils surrounding the friction sleeve gives an indication of type of soil penetrated.

The mantle cone, which we occasionally use, is essentially a Dutch Cone without the friction sleeve. The conical tip which bears directly upon the soil is like that of the Dutch Cone and the procedure of testing is similar to that described above, except that only the cone bearing value,  $q_{\text{cone}}$ , is obtained.



**APPENDIX C**  
**FIELD TEST PROCEDURES FOR**  
**THIN-WALLED TUBE SAMPLING OF SOILS**

## THIN-WALLED TUBE SAMPLING OF SOILS

Thin-walled tube sampling of soils is performed, when it is necessary to secure a relatively undisturbed sample of soil, for subsequent use in the soils laboratory. Undisturbed samples are used to provide test specimens for laboratory shear tests, permeability tests, consolidation tests, and other tests where minimum sample disturbance is desired.

The procedure for obtaining thin-walled tube samples is described in ASTM Standard D-1587. Tube samples can be obtained at any desired depth, using appropriate exploration equipment and sampling equipment. Suitable tube sizes and dimensions are shown in Table I of ASTM D-1587. Variations in the sampling technique described in ASTM D-1587 may include using an inner piston to create a suction on the sample (useful in retrieving very soft or loose saturated soils), using a spring loaded mechanism to allow advancement of the tube using a constant pressure, and the use of a water-flushed exterior core barrel to allow penetration of very stiff clay soils or of very sensitive soils.

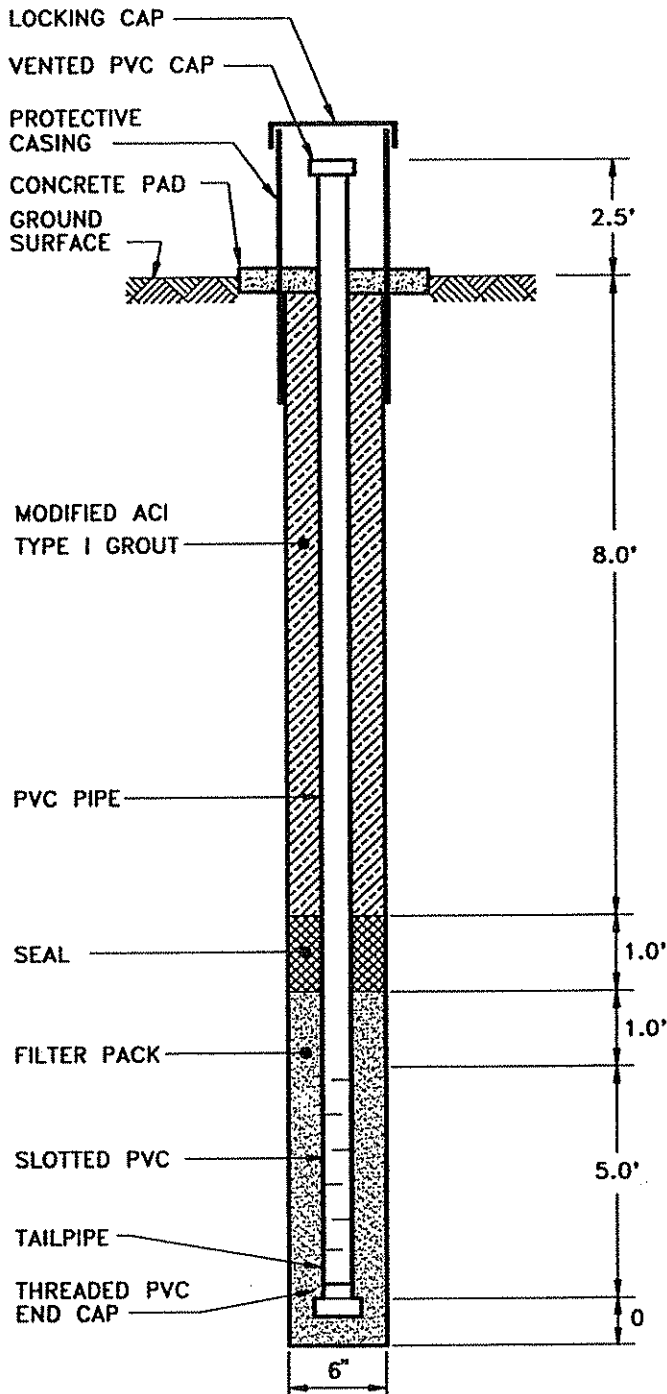
The above sampling variations are commonly referred to as Shelby Tube, Piston, and Pitcher or Dennison sampling methods. The most common method of sampling is the Shelby Tube method. The Shelby Tube method is used when sampling soft to stiff cohesive soils, above or below the water table or medium dense, fine to medium grained sandy soils above the water table. The sample is obtained by pushing a 3-inch diameter, 30-inch long, thin-walled tube through the soil, at the desired depth, a distance of 24 inches.

Following a short "resting period", to allow dissipation of excess pore water pressure in the soil, the sampler is rotated, to shear the soil at the base, and withdrawn to the surface. Excess hydrostatic pressure, if the sample is below the water table, is dissipated by means of a check valve at the top of the sampler.

After the sample has been retrieved, the ends of the tube are sealed to prevent the loss of moisture. Preparation for transportation of the sample to the laboratory includes cushioning the tube to prevent impacts which might disturb the sample, and transporting it in the upright orientation, in which it existed in the ground. The sample tube is then transported to the laboratory for visual examination and specified testing.

**APPENDIX D**  
**PIEZOMETER INSTALLATION RECORDS/COMPLETION REPORTS**

# PIEZOMETER WELL INSTALLATION RECORD P1-D



File No.: 97-9628  
 Project: SOUTH EAST LANDFILL  
 Client: HILLSBOROUGH COUNTY SOLID WASTE DEPT.

Well No.: P1-D  
 Date Installed: 4-24-97  
 Crew Supervisor: E. PARKER  
 Well Location: N 1250752.913  
 E 442931.011  
 TOC (MSL): 129.35

Protective Casing: (size and type)  
 4" ALUMINUM  
 Concrete Pad: (size) 2' x 2' x 4"  
 PVC Pipe: (size and type)  
 2" SCHEDULE 40, THREADED  
 Seal: (type) BENTONITE  
 Filter Pack: (type) 30/65 SILICA SAND  
 Slotted PVC: (size and type)  
 2"  $\phi$  0.01" SLOTTED WELL SCREEN

Total Length of PVC Pipe: 12.5 ft(BLS)  
 Total Length of Slotted PVC: 5 ft(BLS)  
 Total Length of End Point: 0 ft  
 Total Depth of Well: 15 ft(BLS)

No. Bags of Cement: 2  
 No. Bags of Filter Pack: 8  
 Amount of Seal: 25 lbs.

Water Level Readings:  
 Date: 4-24-97  
 Depth BTOC: 9'0" Depth BLS: 6'6"  
 Date: \_\_\_\_\_  
 Depth BTOC: \_\_\_\_\_ Depth BLS: \_\_\_\_\_

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



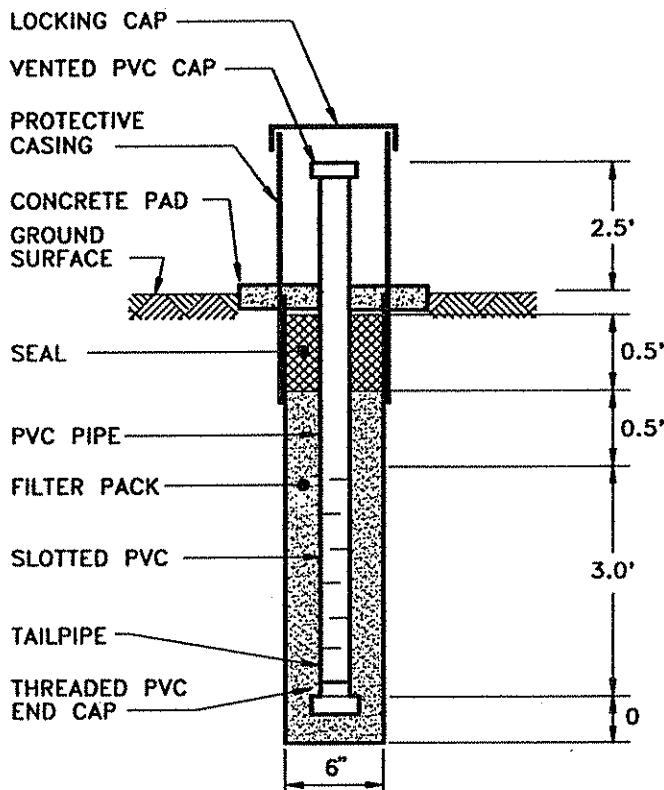
**Ardaman & Associates, Inc.**  
 Consulting Engineers in Soils, Hydrogeology,  
 Foundations, and Materials Testing

BLS: = Below Land Surface  
 BTOC: = Below Top of Casing  
 TOC: = Top of Casing  
 MSL: = Mean Sea Level

# PIEZOMETER WELL INSTALLATION RECORD P1-S

File No.: 97-9628  
 Project: SOUTH EAST LANDFILL  
 Client: HILLSBOROUGH COUNTY SOLID WASTE DEPT.

Well No.: P1-S  
 Date Installed: 4-24-97  
 Crew Supervisor: E. PARKER  
 Well Location: N 1250744.422  
E 442937.500  
 TOC (MSL): 129.76



Protective Casing: (size and type)  
4" ALUMINUM  
 Concrete Pad: (size) 2' x 2' x 4"  
 PVC Pipe: (size and type)  
2" SCHEDULE 40, THREADED  
 Seal: (type) BENTONITE  
 Filter Pack: (type) 30/65 SILICA SAND  
 Slotted PVC: (size and type)  
2"Ø 0.01" SLOTTED WELL SCREEN

Total Length of PVC Pipe: 3.5 ft(BLS)  
 Total Length of Slotted PVC: 3 ft(BLS)  
 Total Length of End Point: 0 ft  
 Total Depth of Well: 4 ft(BLS)

No. Bags of Cement: NA  
 No. Bags of Filter Pack: 3  
 Amount of Seal: 25 lbs.

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

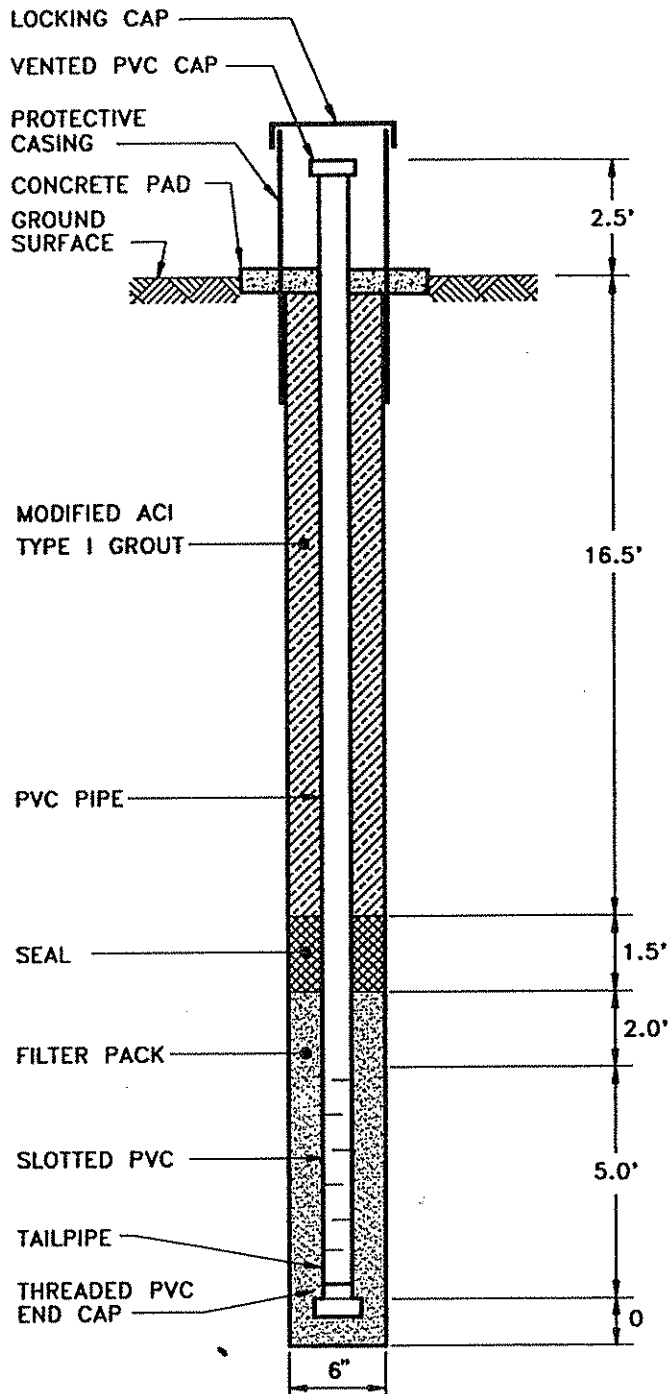
Water Level Readings:  
 Date: 4-24-97  
 Depth BTOC: 5'9" Depth BLS: 3'6"  
 Date: \_\_\_\_\_  
 Depth BTOC: \_\_\_\_\_ Depth BLS: \_\_\_\_\_



**Ardaman & Associates, Inc.**  
 Consulting Engineers in Soils, Hydrogeology,  
 Foundations, and Materials Testing

BLS = Below Land Surface  
 BTOC = Below Top of Casing  
 TOC = Top of Casing  
 MSL = Mean Sea Level

# PIEZOMETER WELL INSTALLATION RECORD P-2D



File No.: 97-9628

Project: SOUTH EAST LANDFILL

Client: HILLSBOROUGH COUNTY SOLID WASTE DEPT.

Well No.: P-2D

Date Installed: 4-24-97

Crew Supervisor: E. PARKER

Well Location: N 1251708.752  
E 442844.414

TOC (MSL): 138.59

Protective Casing: (size and type)  
4" ALUMINUM

Concrete Pad: (size) 2' x 2' x 4"

PVC Pipe: (size and type)  
2" SCHEDULE 40, THREADED

Seal: (type) BENTONITE

Filter Pack: (type) 30/65 SILICA SAND

Slotted PVC: (size and type)  
2"ø 0.01" SLOTTED WELL SCREEN

Total Length of PVC Pipe: 22.5 ft(BLS)

Total Length of Slotted PVC: 5 ft(BLS)

Total Length of End Point: 0 ft

Total Depth of Well: 25 ft(BLS)

No. Bags of Cement: 4

No. Bags of Filter Pack: 9

Amount of Seal: 50 lbs.

Remarks:

Water Level Readings:

Date: 4-24-97

Depth BTOC: 21'4" Depth BLS: 18'10"

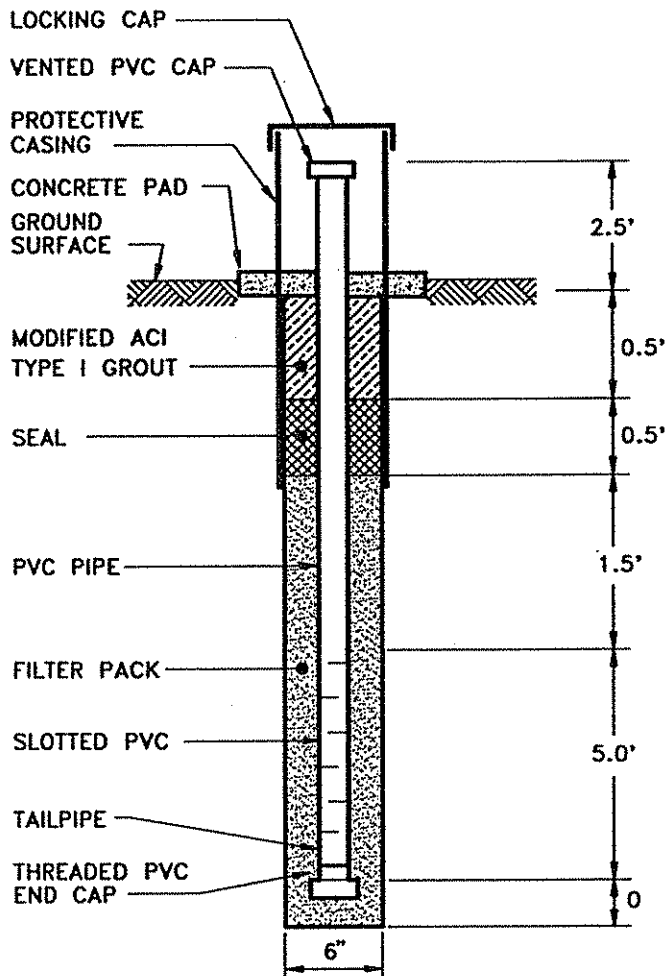
Date:

Depth BTOC: Depth BLS:

# PIEZOMETER WELL INSTALLATION RECORD P-2S

File No.: 97-9628  
 Project: SOUTH EAST LANDFILL  
 Client: HILLSBOROUGH COUNTY SOLID WASTE DEPT.

Well No.: P-2S  
 Date Installed: 4-24-97  
 Crew Supervisor: E. PARKER  
 Well Location: N 1251700.153  
 E 442849.597  
 TOC (MSL): 138.76



Protective Casing: (size and type)  
 4" ALUMINUM  
 Concrete Pad: (size) 2' x 2' x 4"  
 PVC Pipe: (size and type)  
 2" SCHEDULE 40, THREADED  
 Seal: (type) BENTONITE  
 Filter Pack: (type) 30/65 SILICA SAND  
 Slotted PVC: (size and type)  
 2"ø 0.01" SLOTTED WELL SCREEN

Total Length of PVC Pipe: 5 ft(BLS)  
 Total Length of Slotted PVC: 5 ft(BLS)  
 Total Length of End Point: 0 ft  
 Total Depth of Well: 7.5 ft(BLS)

No. Bags of Cement: <1  
 No. Bags of Filter Pack: 3  
 Amount of Seal: 25 lbs.

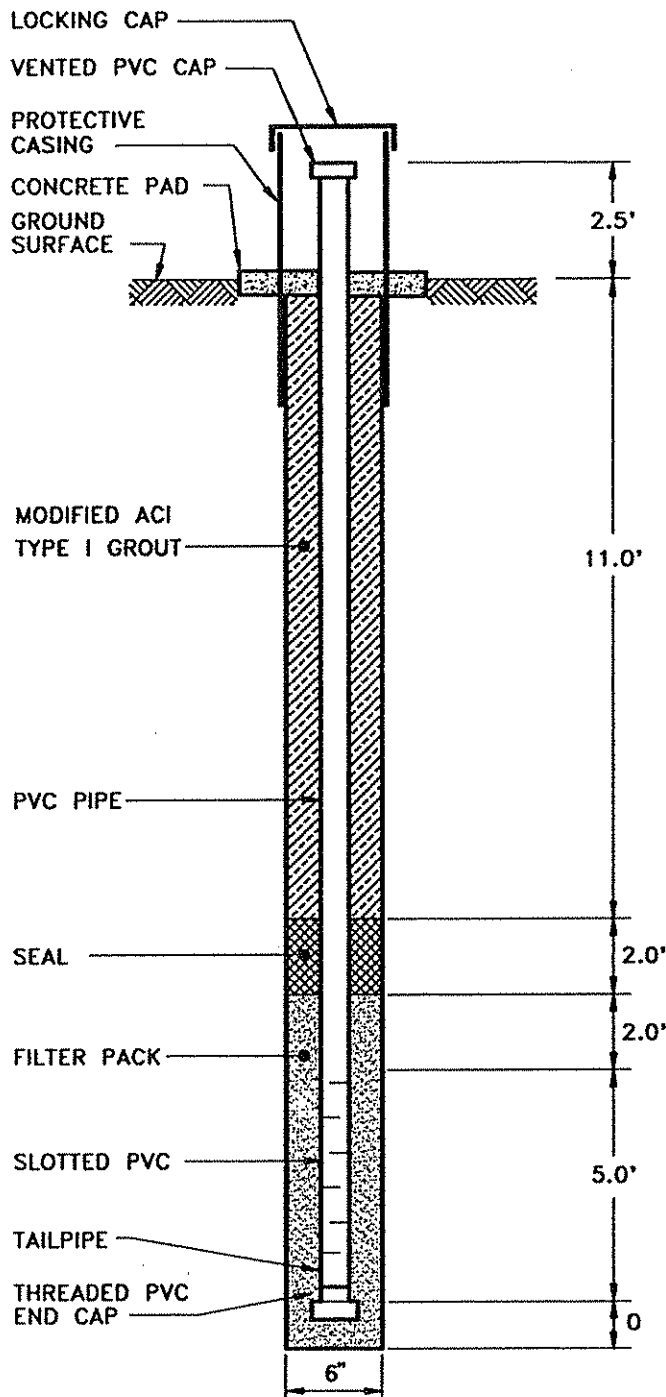
Remarks:

Water Level Readings:  
 Date: 4-24-97  
 Depth BTOC: 8'10" Depth BLS: 6'4"  
 Date:  
 Depth BTOC: Depth BLS:

**Ardaman & Associates, Inc.**  
 Consulting Engineers in Soils, Hydrogeology,  
 Foundations, and Materials Testing

BLS = Below Land Surface  
 BTOC = Below Top of Casing  
 TOC = Top of Casing  
 MSL = Mean Sea Level

# PIEZOMETER WELL INSTALLATION RECORD P-3D



File No.: 97-9628

Project: SOUTH EAST LANDFILL

Client: HILLSBOROUGH COUNTY SOLID WASTE DEPT.

Well No.: P-3D

Date Installed: 4-24-97

Crew Supervisor: E. PARKER

Well Location: N 1251884.384

E 443578.301

TOC (MSL): 143.10

Protective Casing: (size and type)

4" ALUMINUM

Concrete Pad: (size) 2' x 2' x 4'

PVC Pipe: (size and type)

2" SCHEDULE 40, THREADED

Seal: (type) BENTONITE

Filter Pack: (type) 30/65 SILICA SAND

Slotted PVC: (size and type)

2" x 0.01" SLOTTED WELL SCREEN

Total Length of PVC Pipe: 17.5 ft(BLS)

Total Length of Slotted PVC: 5 ft(BLS)

Total Length of End Point: 0 ft

Total Depth of Well: 20 ft(BLS)

No. Bags of Cement: 3

No. Bags of Filter Pack: 3

Amount of Seal: 50 lbs.

Remarks:

Water Level Readings:

Date: 4-24-97

Depth BTOC: 21'6" Depth BLS: 19'0"

Date:

Depth BTOC: Depth BLS:

**Ardaman & Associates, Inc.**

Consulting Engineers in Soils, Hydrogeology, Foundations, and Materials Testing

BLS = Below Land Surface

BTOC = Below Top of Casing

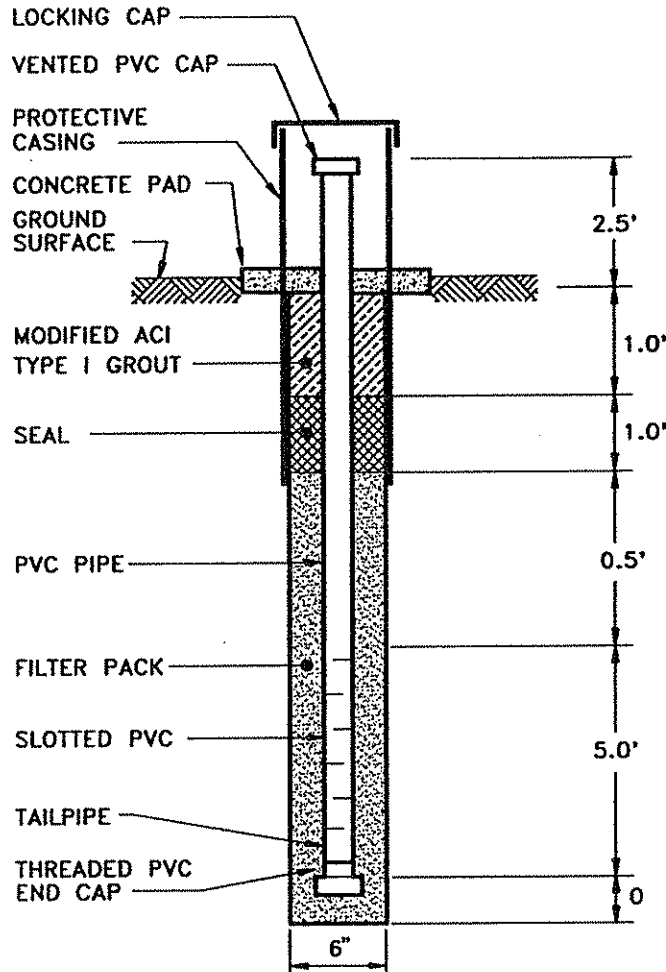
TOC = Top of Casing

MSL = Mean Sea Level



# PIEZOMETER WELL INSTALLATION RECORD P-3S

File No.: 97-9628  
 Project: SOUTH EAST LANDFILL  
 Client: HILLSBOROUGH COUNTY SOLID WASTE DEPT.



Well No.: P-3S  
 Date Installed: 4-24-97  
 Crew Supervisor: E. PARKER  
 Well Location: N 1251896.462  
 E 443580.830  
 TOC (MSL): 143.20

Protective Casing: (size and type)  
 4" ALUMINUM  
 Concrete Pad: (size) 2' x 2' x 4"  
 PVC Pipe: (size and type)  
 2" SCHEDULE 40, THREADED  
 Seal: (type) BENTONITE  
 Filter Pack: (type) 30/65 SILICA SAND  
 Slotted PVC: (size and type)  
 2"ø 0.01" SLOTTED WELL SCREEN

Total Length of PVC Pipe: 5 ft(BLS)  
 Total Length of Slotted PVC: 5 ft(BLS)  
 Total Length of End Point: 0 ft  
 Total Depth of Well: 7.5 ft(BLS)

No. Bags of Cement: <1  
 No. Bags of Filter Pack: 3  
 Amount of Seal: 25 lbs.

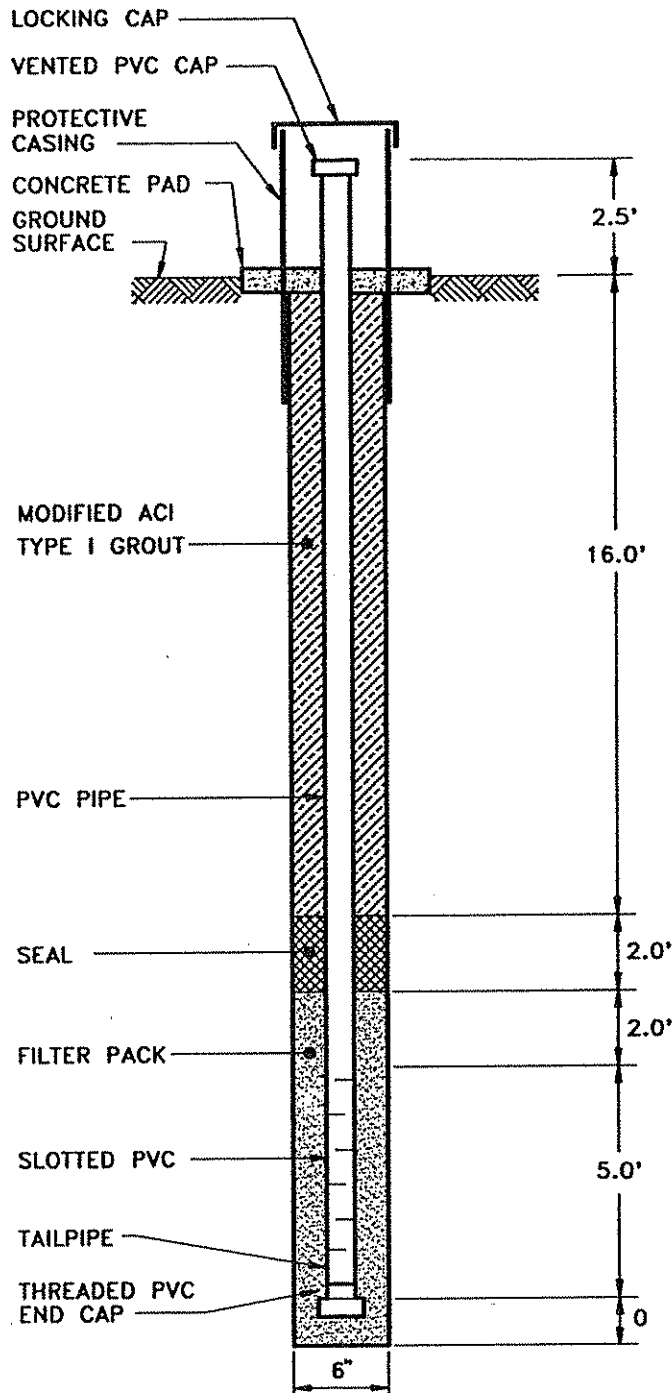
Remarks:

Water Level Readings:  
 Date: 4-24-97  
 Depth BTOC: 0'0" (DRY) Depth BLS: DRY  
 Date:  
 Depth BTOC: Depth BLS:

**Ardaman & Associates, Inc.**  
 Consulting Engineers in Soils, Hydrogeology,  
 Foundations, and Materials Testing

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 BTOC = Below Top of Casing  
 TOC = Top of Casing  
 MSL = Mean Sea Level

# PIEZOMETER WELL INSTALLATION RECORD P-4D



File No.: 97-9628  
 Project: SOUTH EAST LANDFILL  
 Client: HILLSBOROUGH COUNTY SOLID WASTE DEPT.

Well No.: P-4D  
 Date Installed: 4-25-97  
 Crew Supervisor: E. PARKER  
 Well Location: N 1252160.687  
 E 442204.283  
 TOC (MSL): 141.68

Protective Casing: (size and type)  
 4" ALUMINUM  
 Concrete Pad: (size) 2' x 2' x 4"  
 PVC Pipe: (size and type)  
 2" SCHEDULE 40, THREADED  
 Seal: (type) BENTONITE  
 Filter Pack: (type) 30/65 SILICA SAND  
 Slotted PVC: (size and type)  
 2" 0.01" SLOTTED WELL SCREEN

Total Length of PVC Pipe: 22.5 ft(BLS)  
 Total Length of Slotted PVC: 5 ft(BLS)  
 Total Length of End Point: 0 ft  
 Total Depth of Well: 25 ft(BLS)

No. Bags of Cement: 3  
 No. Bags of Filter Pack: 3  
 Amount of Seal: 50 lbs.

Water Level Readings:  
 Date: 4-25-97  
 Depth BTOC: 18'2" Depth BLS: 15'8"  
 Date: \_\_\_\_\_  
 Depth BTOC: \_\_\_\_\_ Depth BLS: \_\_\_\_\_

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



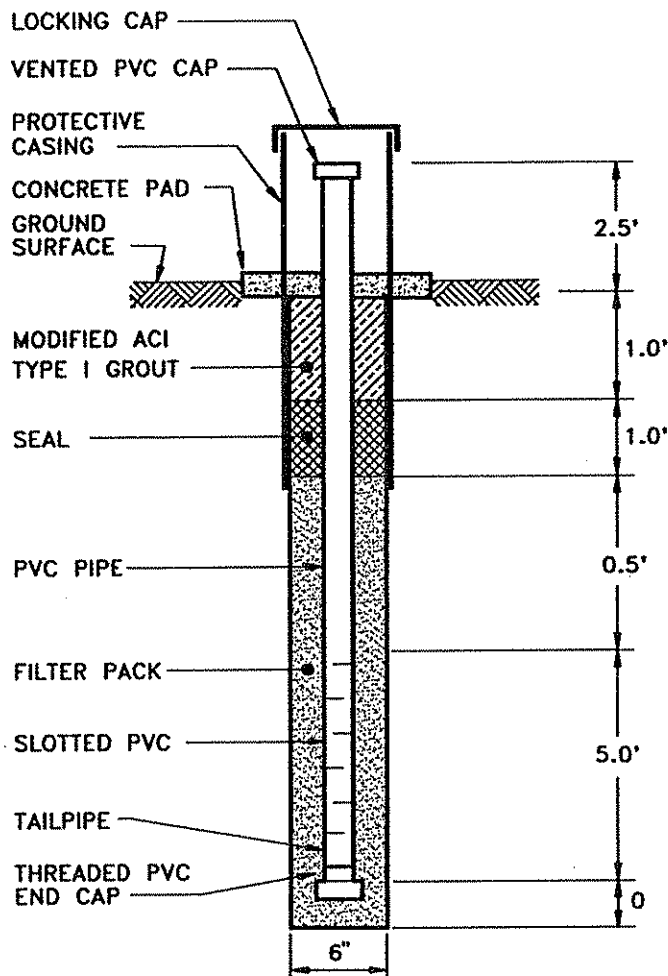
**Ardaman & Associates, Inc.**  
 Consulting Engineers in Soils, Hydrogeology,  
 Foundations, and Materials Testing

BLS = Below Land Surface  
 BTOC = Below Top of Casing  
 TOC = Top of Casing  
 MSL = Mean Sea Level

# PIEZOMETER WELL INSTALLATION RECORD P-4S

File No.: 97-9628  
 Project: SOUTH EAST LANDFILL  
 Client: HILLSBOROUGH COUNTY SOLID WASTE DEPT.

Well No.: P-4S  
 Date Installed: 4-25-97  
 Crew Supervisor: E. PARKER  
 Well Location: N 1252153.106  
 E 442200.956  
 TOC (MSL): 141.86



Protective Casing: (size and type)  
 4" ALUMINUM  
 Concrete Pad: (size) 2' x 2' x 4"  
 PVC Pipe: (size and type)  
 2" SCHEDULE 40, THREADED  
 Seal: (type) BENTONITE  
 Filter Pack: (type) 30/65 SILICA SAND  
 Slotted PVC: (size and type)  
 2"Ø 0.01" SLOTTED WELL SCREEN

Total Length of PVC Pipe: 5 ft(BLS)  
 Total Length of Slotted PVC: 5 ft(BLS)  
 Total Length of End Point: 0 ft  
 Total Depth of Well: 7.5 ft(BLS)

No. Bags of Cement: 1  
 No. Bags of Filter Pack: <1  
 Amount of Seal: 25 lbs.

Remarks:

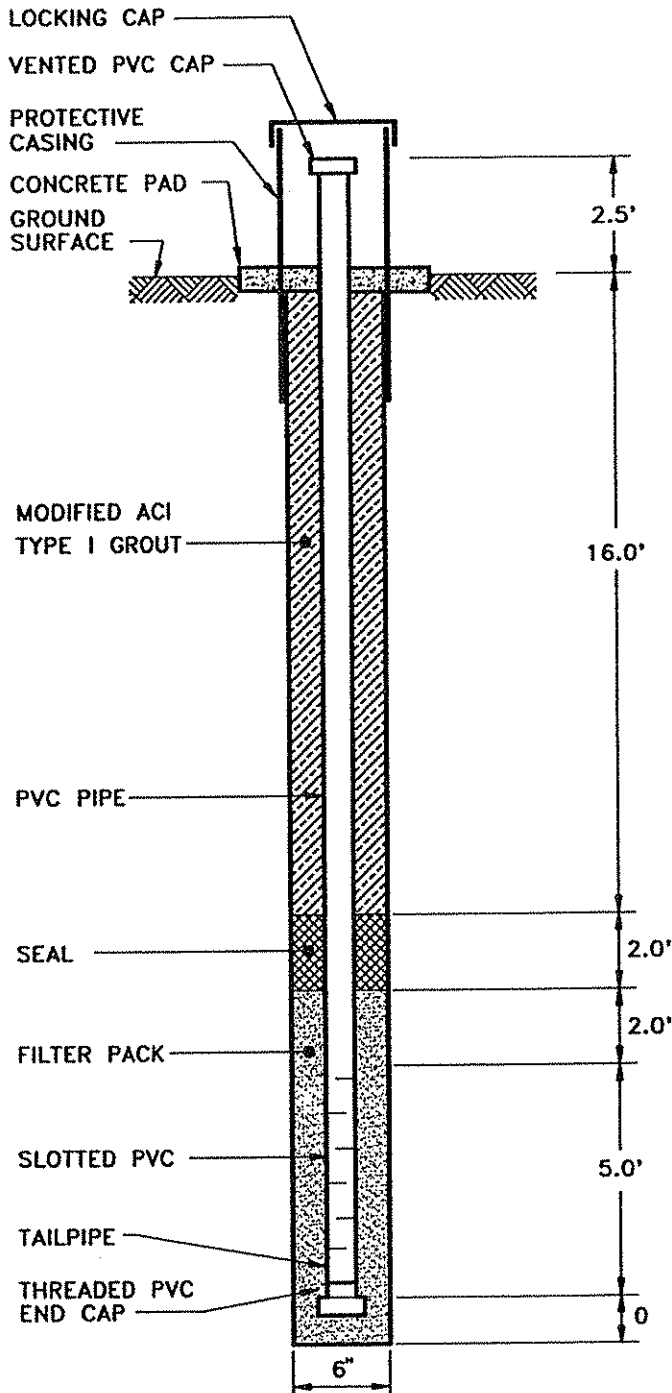
Water Level Readings:  
 Date: 4-25-97  
 Depth BTOC: 3'8" Depth BLS: 1'2"  
 Date:  
 Depth BTOC: Depth BLS:



**Ardaman & Associates, Inc.**  
 Consulting Engineers in Soils, Hydrogeology,  
 Foundations, and Materials Testing

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 BTOC = Below Top of Casing  
 TOC = Top of Casing  
 MSL = Mean Sea Level

# PIEZOMETER WELL INSTALLATION RECORD P-5D



File No.: 97-9628  
Project: SOUTH EAST LANDFILL  
Client: HILLSBOROUGH COUNTY SOLID WASTE DEPT.

Well No.: P-5D  
Date Installed: 4-29-97  
Crew Supervisor: E. PARKER  
Well Location: N 123584.016  
E 443356.615  
TOC (MSL): 156.75

Protective Casing: (size and type)  
4" ALUMINUM  
Concrete Pad: (size) 2' x 2' x 4"  
PVC Pipe: (size and type)  
2" SCHEDULE 40, THREADED  
Seal: (type) BENTONITE  
Filter Pack: (type) 30/65 SILICA SAND  
Slotted PVC: (size and type)  
2"  $\phi$  0.01" SLOTTED WELL SCREEN

Total Length of PVC Pipe: 22.5 ft(BLS)  
Total Length of Slotted PVC: 5 ft(BLS)  
Total Length of End Point: 0 ft  
Total Depth of Well: 25 ft(BLS)

No. Bags of Cement: 4  
No. Bags of Filter Pack: 5  
Amount of Seal: 50 lbs.

Water Level Readings:  
Date: 4-29-97  
Depth BTOC: 18'2" Depth BLS: 15'8"  
Date: \_\_\_\_\_  
Depth BTOC: \_\_\_\_\_ Depth BLS: \_\_\_\_\_

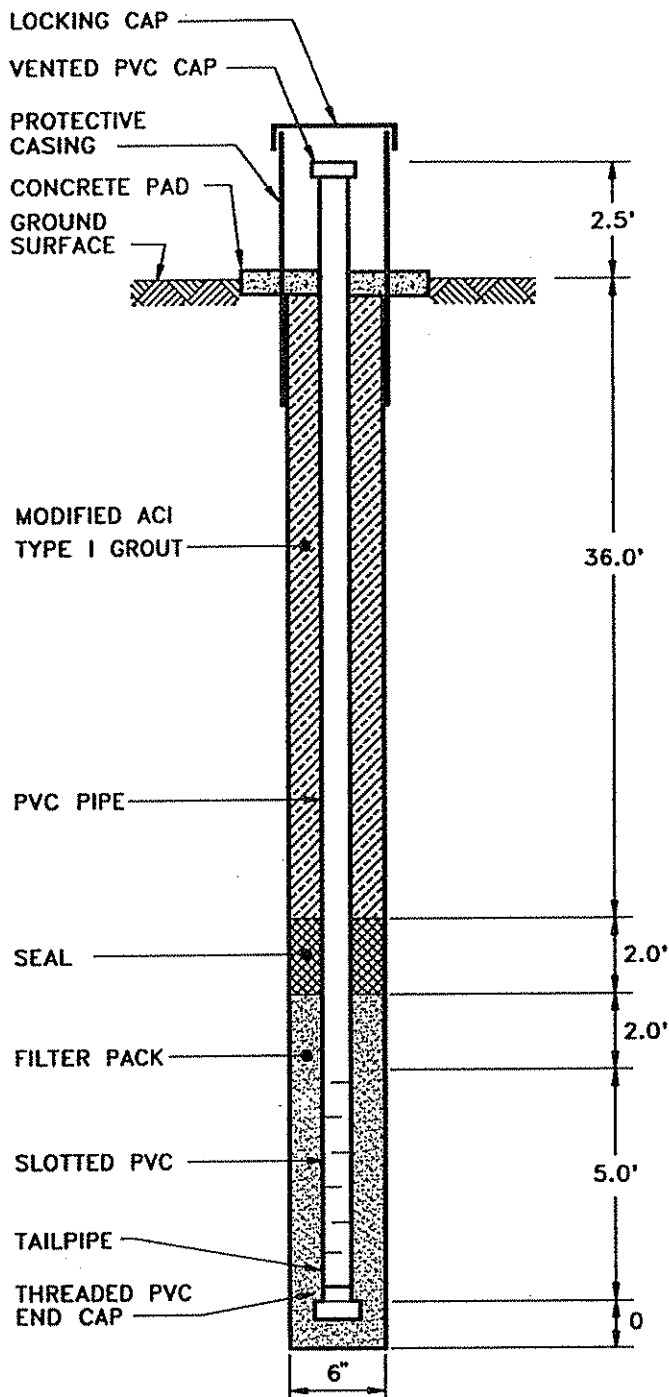
Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**Ardaman & Associates, Inc.**  
Consulting Engineers in Soils, Hydrogeology,  
Foundations, and Materials Testing

BLS: = Below Land Surface  
BTOC: = Below Top of Casing  
TOC: = Top of Casing  
MSL: = Mean Sea Level

# PIEZOMETER WELL INSTALLATION RECORD P-6D



File No.: 97-9628  
 Project: SOUTH EAST LANDFILL  
 Client: HILLSBOROUGH COUNTY SOLID WASTE DEPT.

Well No.: P-6D  
 Date Installed: 5-1-97  
 Crew Supervisor: E. PARKER  
 Well Location: N 1253248.997  
E 444329.166  
 TOC (MSL): 159.03

Protective Casing: (size and type)  
4" ALUMINUM  
 Concrete Pad: (size) 2' x 2' x 4"  
 PVC Pipe: (size and type)  
2" SCHEDULE 40, THREADED  
 Seal: (type) BENTONITE  
 Filter Pack: (type) 30/65 SILICA SAND  
 Slotted PVC: (size and type)  
2"  $\phi$  0.01" SLOTTED WELL SCREEN

Total Length of PVC Pipe: 42.5 ft(BLS)  
 Total Length of Slotted PVC: 5 ft(BLS)  
 Total Length of End Point: 0 ft  
 Total Depth of Well: 45 ft(BLS)

No. Bags of Cement: 7  
 No. Bags of Filter Pack: 3  
 Amount of Seal: 50 lbs.

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Water Level Readings:  
 Date: 5-1-97  
 Depth BTOC: 35'7" Depth BLS: 33'1"  
 Date: \_\_\_\_\_  
 Depth BTOC: \_\_\_\_\_ Depth BLS: \_\_\_\_\_

**Ardaman & Associates, Inc.**  
 Consulting Engineers in Soils, Hydrogeology,  
 Foundations, and Materials Testing

BLS: = Below Land Surface  
 BTOC: = Below Top of Casing  
 TOC: = Top of Casing  
 MSL: = Mean Sea Level



STATE OF FLORIDA PERMIT APPLICATION TO CONSTRUCT,  
REPAIR, MODIFY, OR ABANDON A WELL

- ☐ Southwest  
☐ Northwest  
☐ St. Johns River  
☐ South Florida  
☐ Suwannee River

THIS FORM **MUST** BE FILLED OUT COMPLETELY.

The water well contractor is responsible for completing this form and forwarding the permit to the appropriate delegated county where applicable.

CHECK BOX FOR APPROPRIATE DISTRICT. ADDRESS ON BACK OF PERMIT FORM.

Permit No. 591588-03  
Florida Unique I.D. \_\_\_\_\_  
Permit Stipulations Required (See attached)  
(#39)(#8)  
62524 well ☐  
CUP/ WUP Application No. \_\_\_\_\_

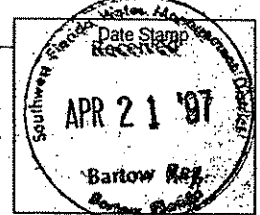
ABOVE THIS LINE FOR OFFICIAL USE ONLY

1. Hillsborough County Solid Waste Dept. P.O. Box 1110, Tampa, FL 33601 813 276-2927  
Owner, Legal Name of Entity if Corporation Address City State Zip Telephone Number  
2. Southwest Landfill, CR 672, Piccola, Hillsborough County, FL  
Well Location — Address, Road Name or Number, City  
3. ARDAMAN & ASSOCIATES, INC. 2368 941 533-0858  
Well Drilling Contractor License No. Telephone No.  
P.O. Box 812  
Address  
Bartow, FL 33831  
City State Zip  
4. 1/4 of 14  
(smallest) (biggest) (Indicate Well on Chart)  
5. Township 31 S Range 21 E  
6. Hillsborough  
County Subdivision Name Lot Block Unit

NW	NE
X	
X	X
SW	SE

7. Number of proposed wells 5 Check the use of well: (See back of permit for additional choices) Domestic Monitor (type) Piezometer  
Irrigation (type) Public Water Supply (type) List Other \_\_\_\_\_  
(See Back) (See Back)  
Distance from septic system NA ft. Description of facility Landfill Estimated start of construction date 4-28-97

8. Application for: X New Construction Repair/Modify Abandonment  
(Reason for Abandonment) \_\_\_\_\_  
9. Estimated: Well Depth 25' Casing Depth 10' Screen Interval from 10' to 25'  
Casing Material: Blk-Steel / Gal / PVC Casing Diameter 2" inch Seal Material \_\_\_\_\_



10. If applicable: Proposed Grouting Interval From 0' to 6' Seal Material Cement Grout  
From 6' to 8' Seal Material Bentonite  
From 8' to 25' Seal Material 30/65 Sand

11. Telescope Casing or Liner (check one) Diameter \_\_\_\_\_  
Blk-Steel / Galvanized / PVC Other (specify: \_\_\_\_\_)

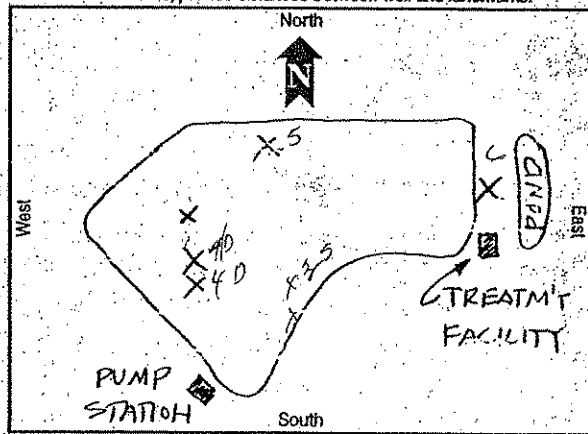
12. Method of Construction: Rotary Cable Tool Combination  
X Auger Other (specify: \_\_\_\_\_)

13. Indicate total No. of wells on site 25 List number of unused wells on site 6

14. Is this well or any other well or water withdrawal on the owner's contiguous property covered under a Consumptive Water Use Permit (CUP/WUP) or CUP/WUP Application? X No Yes  
(If yes, complete the following) CUP/WUP No. \_\_\_\_\_

District well I.D. No. \_\_\_\_\_  
Latitude \_\_\_\_\_ Longitude \_\_\_\_\_  
Data obtained from GPS or map or survey (map datum NAD 27 NAD 83)

Draw a map of well location and indicate well site with an "X". Identify known roads and landmarks; provide distances between well and landmarks.



15. I hereby certify that I will comply with the applicable rules of Title 40, Florida Administrative Code, and that a water use permit or artificial recharge permit, if needed, has been or will be obtained prior to commencement of well construction. I further certify that all information provided on this application is accurate and that I will obtain necessary approval from other federal, state, or local governments, if applicable. I agree to provide a well completion report to the District within 30 days after drilling or the permit expiration, whichever occurs first.  
Signature of Contractor Arden A. Guler License No. 2368  
I certify that I am the owner of the property, that the information provided is accurate, and that I am aware of my responsibilities under Chapter 373, Florida Statutes, to maintain or properly abandon this well; or, I certify that I am the agent for the owner, that the information provided is accurate, and that I have informed the owner of his responsibilities as stated above. Owner consents to personnel of the WMD or a representative access to the well site.  
Owner's or Agent's Signature Tom C. Smith Date 4-8-97

DO NOT WRITE BELOW THIS LINE — FOR OFFICIAL USE ONLY

Approval Granted By: \_\_\_\_\_ Issue Date: 4-21-97 Hydrologist Approval \_\_\_\_\_  
Owner Number: 6996 Fee Received: \$0 Receipt No.: 67-01287A Check No.: 942

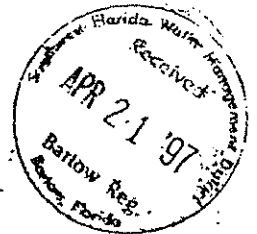
THIS PERMIT NOT VALID UNTIL PROPERLY SIGNED BY AN AUTHORIZED OFFICER OR REPRESENTATIVE OF THE WMD. IT SHALL BE AVAILABLE AT THE WELL SITE DURING ALL DRILLING OPERATIONS. This permit is valid for 90 days from date of issue.

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

SERVICE OFFICE

STIPULATION # 8 - TEST/MONITOR WELL

- A. This well is to be used as a test/monitor well. If it is to be converted into a production well, an additional permit shall be obtained prior to conversion.
- B. There shall be no injection of fluids into the monitor well without prior written approval from the District. This includes, but is not limited to treated ground water, or the introduction of microbes for In-Situ aquifer restoration.
- C. While drilling the well, if confining beds (i.e. clay or hardpan intervals) are encountered, then the well shall be constructed in such a manner as to prevent the unauthorized interchange of water between different water bearing zones as per Chapter 17-532.500(2)(C), Florida Administrative Code, (F.A.C.). This includes, but is not limited to the screened or open hole interval and the annular space.
- D. Prior written approval from the District shall be required if the monitor well will be pumped for use in hydrodynamic control and/or contaminant plume management.
- E. In the event the well needs to be abandoned, an abandonment permit shall be obtained prior to commencing with abandonment procedures.
- F. An observer from our Enforcement Department is required on all abandonments to ensure compliance with Chapter 17-532, F.A.C. Please contact the Enforcement Coordinator, Jim Calandra, in our Bartow Office at (813) 534- 1448 for additional information.



1-800-492-7862

Approved by: [Signature]

Permit # 591582-02, 591583-05,

Date: 4-21-97

591587-01, 591588, 05

Stip #8  
(2/93)

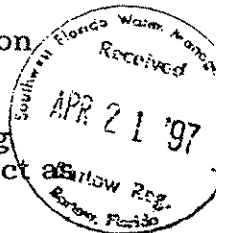
COPY TO OWNER

STIPULATION NUMBER 39 - WELL AND DRILLHOLE ABANDONMENT

It will be the **water well contractor's** responsibility to have any incomplete well or drillhole attempted under this permit properly abandoned.

Any incomplete or abandoned well or drillhole as described in 40D-3, F.A.C., shall be abandoned as follows:

- A. The well examined from land surface to the original depth of construction for debris or obstructions (any debris or obstruction shall be removed prior to abandonment).
- B. The well plugged from bottom to top by an approved method of grouting with either Portland neat cement grout or an approved Bentonite product specified in 40D-3.517 2. (b), F.A.C.



It will be the **owner's** responsibility to have any well completed under this permit, or any existing well on this property, which meets the definition of an abandoned well as defined in Chapter 40D-3, Florida Administrative Code (F.A.C.), properly abandoned.

It will be the **owner's** responsibility to have any inactive well which does not meet the above criteria and is no threat to the water resource properly capped in an air and water tight manner with a threaded, welded or bolted cover or valve. If the pump and well seal are water tight, the pump may be left in place. If practical, a protective cover two (2) feet in height shall be placed around the well casing.

- A. Wells with a diameter of six (6) inches or more without pumping equipment shall have the casing extended a minimum of two(2) ft. above land surface.
- B. Wells with a diameter of less than six (6) inches without pumping equipment shall be securely set in a concrete slab and have either the well casing extended a minimum height of two (2) feet above land surface or a protective cover centered over the well casing. The concrete slab shall be a minimum of four (4) inches in thickness by two (2) feet by two (2) feet square. The protective cover shall be set in the concrete slab and extend a minimum of two (2) feet above land surface.

In flood prone areas all wells shall extend a minimum of one (1) foot above the 100 year flood elevation, if practical.

Any plugging operations shall be permitted separately from this permit by the Southwest Florida Water Management District and be witnessed by a designated District representative. Arrangement for a District representative shall be made with the local District Field Services office a minimum of twenty four (24) hours in advance of these operations. A District representative will be available for assignment during normal working hours (8:00 AM - 4:30 PM), Monday through Friday. Travel time must be taken into consideration. Exemptions may be made for extenuating circumstances. For scheduling, please contact the Field Service Coordinator, **Jim Calandra**, in our **BARTOW** office at 1-800-492-7862.

Approved by: \_\_\_\_\_

Permit Number: \_\_\_\_\_

Date: \_\_\_\_\_

Stip#39  
(1/31/97)

COPY TO OWNER



**P-45**  
**WELL COMPLETION REPORT** (Please complete in black ink or type.)

PERMIT # 591588.01 CUP/WUP # \_\_\_\_\_ DID # \_\_\_\_\_

If permit is for multiple wells indicate the number of wells drilled \_\_\_\_\_

Indicate remaining wells to be cancelled \_\_\_\_\_

WATER WELL CONTRACTOR'S

SIGNATURE [Signature] License # 2368

I certify that the information provided in this report is accurate and true.

Grout	No. of Bags	From (Ft.)	To (Ft.)
Neat Cement:	<u>1</u>	<u>0.0</u>	<u>1.0</u>
Bentonite:	<u>1/2 / 25 lbs</u>	<u>1.0</u>	<u>2.0</u>

WELL LOCATION: County Hillsborough

SW 1/4 of SW 1/4 of Section 14 Twp: 31S Rge: 21E

Latitude \_\_\_\_\_ Longitude \_\_\_\_\_

DATE STAMP

Official Use Only

Sketch of well location on property

Give distances from septic tank and house or other reference points

**CHEMICAL ANALYSIS WHEN REQUIRED**

Iron: \_\_\_\_\_ ppm Sulfate: \_\_\_\_\_ ppm

Chloride: \_\_\_\_\_ ppm

☐ Lab Test ☐ Field Test Kit

Pump Type

☐ Centrifugal ☐ Jet ☐ Submersible ☐ Turbine

Horsepower \_\_\_\_\_ Capacity \_\_\_\_\_ G.P.M. \_\_\_\_\_

Pump Depth \_\_\_\_\_ Ft. Intake Depth \_\_\_\_\_ Ft.

Form 41.10-410(2) Rev. 6/95

OWNER'S NAME Hillsborough Co. Solid Waste Dept

COMPLETION DATE 5-1-97 Florida Unique I.D. \_\_\_\_\_

WELL USE: DEP/Public \_\_\_\_\_ Irrigation \_\_\_\_\_ Domestic \_\_\_\_\_ Monitor ☒

HRS Limited \_\_\_\_\_ 62-524 \_\_\_\_\_ Other \_\_\_\_\_

DRILL METHOD ☐ Rotary ☐ Cable Tool ☐ Combination

☐ Jet ☒ Auger Other \_\_\_\_\_

Measured Static Water Level <u>3.8</u>		Measured Pumping Water Level _____	
After _____ Hours at _____ G.P.M. Measuring Pt. (Describe): <u>Top of Pvc</u>			
Which is <u>2.5</u> Ft. <input checked="" type="checkbox"/> Above <input type="checkbox"/> Below Land Surface			
Casing: <input type="checkbox"/> Black Steel <input type="checkbox"/> Galv. <input checked="" type="checkbox"/> PVC Other _____			
<input type="checkbox"/> Open Hole	Depth (Ft.)		DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones.
<input checked="" type="checkbox"/> Screen			
Casing Diameter & Depth (Ft.)	From	To	Color   Grain Size   Type of Material
Diameter <u>2"</u>	<u>0.0</u>	<u>7.5</u>	<u>LL. BR. SA w/ LL. BR.</u>
From <u>0.0</u>			<u>CL. &amp; PHOS.</u>
To <u>2.5</u>			<u>(Tailing)</u>
Diameter _____			<u>7.5 EOB</u>
From _____			
To _____			
Liner <input type="checkbox"/> or			
Casing <input type="checkbox"/>			
Diameter _____			
From _____			
To _____			

Driller's Name: Edward J. Parker

P-4-D  
**WELL COMPLETION REPORT** (Please complete in black ink or type.)

PERMIT # 591588.02 CUP/WUP # \_\_\_\_\_ DID # \_\_\_\_\_

If permit is for multiple wells indicate the number of wells drilled \_\_\_\_\_

Indicate remaining wells to be cancelled \_\_\_\_\_

WATER WELL CONTRACTOR'S  
 SIGNATURE Edward J. Parker License # 2368

I certify that the information provided in this report is accurate and true.

Grout	No. of Bags	From (Ft.)	To (Ft.)
Neat Cement:	<u>3</u>	<u>0.0</u>	<u>16.0</u>
Bentonite:	<u>1</u>	<u>16.0</u>	<u>18.0</u>

V LOCATION: County Hillsborough  
 S 1/4 of SW 1/4 of Section 14 Twp: 30S Rge: 21E

Latitude \_\_\_\_\_ Longitude \_\_\_\_\_

DATE STAMP	Sketch of well location on property <div style="text-align: right;">N A</div>
Official Use Only	

CHEMICAL ANALYSIS WHEN REQUIRED

Iron: \_\_\_\_\_ ppm Sulfate: \_\_\_\_\_ ppm

Chloride: \_\_\_\_\_ ppm

[ ] Lab Test [ ] Field Test Kit

Pump Type

[ ] Centrifugal [ ] Jet [ ] Submersible [ ] Turbine

Horsepower \_\_\_\_\_ Capacity \_\_\_\_\_ G.P.M. \_\_\_\_\_

Pump Depth \_\_\_\_\_ Ft. Intake Depth \_\_\_\_\_ Ft.

Form 41.10-410(2) Rev. 6/95

OWNER'S NAME Hillsborough Co. Solid Waste Dept.

COMPLETION DATE 5-1-97 Florida Unique I.D. \_\_\_\_\_

WELL USE: DEP/Public \_\_\_\_\_ Irrigation \_\_\_\_\_ Domestic \_\_\_\_\_ Monitor ☒

HRS Limited \_\_\_\_\_ 62-524 \_\_\_\_\_ Other \_\_\_\_\_

DRILL METHOD [ ] Rotary [ ] Cable Tool [ ] Combination

[ ] Jet [ ] Auger Other \_\_\_\_\_

Measured Static Water Level 18.1 Measured Pumping Water Level \_\_\_\_\_  
 After \_\_\_\_\_ Hours at \_\_\_\_\_ G.P.M. Measuring Pt. (Describe): TOP OF WELL  
 Which is 2.5 Ft. ☒ Above [ ] Below Land Surface  
 Casing: [ ] Black Steel [ ] Galv. ☒ PVC Other \_\_\_\_\_

Casing Diameter & Depth (Ft.)	Depth (Ft.)		DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. Color   Grain Size   Type of Material
	From	To	
Diameter <u>2</u>	<u>0.0</u>	<u>11.0</u>	<u>BL. SAND / U. BL. CL. &amp;</u>
From <u>0.0</u>			<u>PNDS (TO 11.0)</u>
To <u>20.0</u>	<u>11.0</u>	<u>25.0</u>	<u>DK. BR - BL S. 1/4 SN</u>
Diameter _____			<u>25.0 EDB</u>
From _____			
To _____			
Liner [ ] or Casing [ ]			
Diameter _____			
From _____			
To _____			

Driller's Name: Edward J. Parker  
 (print or type)

**WELL COMPLETION REPORT** (Please complete in black ink or type.)

PERMIT # 591588.03 CUP/WUP # \_\_\_\_\_ DID # \_\_\_\_\_

If permit is for multiple wells indicate the number of wells drilled \_\_\_\_\_

Indicate remaining wells to be cancelled \_\_\_\_\_

WATER WELL CONTRACTOR'S

SIGNATURE [Signature] License # 2368

I certify that the information provided in this report is accurate and true.

Grout	No. of Bags	From (Ft.)	To (Ft.)
Neat Cement:	<u>4</u>	<u>0.0</u>	<u>16.0</u>
Bentonite:	<u>1</u>	<u>16.0</u>	<u>18.0</u>

WELL LOCATION: County Hillsborough

1/4 of 14 Section 14 Twp: 31S Rge: 21E

Side NW Longitude \_\_\_\_\_

DATE STAMP	Sketch of well location on property <u>N</u> <u>A</u>
Official Use Only	

**CHEMICAL ANALYSIS WHEN REQUIRED**

Iron: \_\_\_\_\_ ppm Sulfate: \_\_\_\_\_ ppm

Chloride: \_\_\_\_\_ ppm

☐ Lab Test ☐ Field Test Kit

Pump Type

☐ Centrifugal ☐ Jet ☐ Submersible ☐ Turbine

Horsepower \_\_\_\_\_ Capacity \_\_\_\_\_ G.P.M. \_\_\_\_\_

Pump Depth \_\_\_\_\_ Ft. Intake Depth \_\_\_\_\_ Ft.

Form 41.10-410(2) Rev. 6/95

OWNER'S NAME Hillsborough Co. Solid Waste Dep

COMPLETION DATE 5-1-97 Florida Unique I.D. \_\_\_\_\_

WELL USE: DEP/Public \_\_\_\_\_ Irrigation \_\_\_\_\_ Domestic \_\_\_\_\_ Monitor ☒

HRS Limited \_\_\_\_\_ 62-524 \_\_\_\_\_ Other \_\_\_\_\_

DRILL METHOD ☐ Rotary ☐ Cable Tool ☐ Combination

☐ Jet ☒ Auger Other \_\_\_\_\_

Measured Static Water Level 27.1 Measured Pumping Water Level \_\_\_\_\_  
After \_\_\_\_\_ Hours at \_\_\_\_\_ G.P.M. Measuring Pt. (Describe): TOP OF WELL  
Which is 2.5 Ft. ☒ Above ☐ Below Land Surface  
Casing: ☐ Black Steel ☐ Galv. ☒ PVC Other \_\_\_\_\_

Casing Diameter & Depth (Ft.)	Depth (Ft.)		DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. Color   Grain Size   Type of Material
	From	To	
Diameter <u>2"</u>	<u>0.0</u>	<u>13.0</u>	<u>BR. SP. W/LL. BRCI.</u>
From <u>0.0</u>			<u>2 PHOS (To, 1 in)</u>
To <u>20.0</u>	<u>13.0</u>	<u>25.0</u>	<u>DBR.-BR. SILY, SA</u>
Diameter _____			<u>25.0 EOB</u>
From _____			
To _____			
Liner <input type="checkbox"/> or Casing <input type="checkbox"/>			
Diameter _____			
From _____			
To _____			

Driller's Name: Edward J PARKER  
(print or type)

# **WELL COMPLETION REPORT** (Please complete in black ink or type.)

ERMIT # 591588.04 CUP/WUP # \_\_\_\_\_ DID # \_\_\_\_\_

permit is for multiple wells indicate the number of wells drilled \_\_\_\_\_

indicate remaining wells to be cancelled \_\_\_\_\_

WATER WELL CONTRACTOR'S SIGNATURE George A. Parker License # 2368

I certify that the information provided in this report is accurate and true.

Grout	No. of Bags	From (Ft.)	To (Ft.)
Neat Cement:	<u>7</u>	<u>0.0</u>	<u>38.0</u>
Bentonite:	<u>1</u>	<u>38.0</u>	<u>38.0</u>

WELL LOCATION: County Hillsborough  
 of SE 1/4 of Section 14 Twp: 31S Rge: 21E

Lat. \_\_\_\_\_ Longitude \_\_\_\_\_

DATE STAMP	Sketch of well location on property N A
Official Use Only	
CHEMICAL ANALYSIS WHEN REQUIRED Iron: _____ ppm Sulfate: _____ ppm Chloride: _____ ppm <input type="checkbox"/> Lab Test <input type="checkbox"/> Field Test Kit Pump Type <input type="checkbox"/> Centrifugal <input type="checkbox"/> Jet <input type="checkbox"/> Submersible <input type="checkbox"/> Turbine Horsepower _____ Capacity _____ G.P.M. _____ Pump Depth _____ Ft. Intake Depth _____ Ft. Give distances from septic tank and house or other reference points	

Form 41.10-410(2) Rev. 6/95

OWNER'S NAME Hillsborough Co. Solid Waste Dept.

COMPLETION DATE \_\_\_\_\_ Florida Unique I.D. \_\_\_\_\_

WELL USE: DEP/Public \_\_\_\_\_ Irrigation \_\_\_\_\_ Domestic \_\_\_\_\_ Monitor ☒

HRS Limited \_\_\_\_\_ 62-524 \_\_\_\_\_ Other \_\_\_\_\_

DRILL METHOD ☐ Rotary ☐ Cable Tool ☐ Combination

☐ Jet ☒ Auger Other \_\_\_\_\_

Measured Static Water Level <u>35.6'</u>		Measured Pumping Water Level _____	
After _____ Hours at _____ G.P.M. Measuring Pt. (Describe): <u>Top of Well</u>			
Which is <u>2.5</u> Ft. <input type="checkbox"/> Above <input type="checkbox"/> Below Land Surface			
Casing: <input type="checkbox"/> Black Steel <input type="checkbox"/> Galv. <input checked="" type="checkbox"/> PVC Other _____			
<input type="checkbox"/> Open Hole <input checked="" type="checkbox"/> Screen	Depth (Ft.)		DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. Color   Grain Size   Type of Material
Casing Diameter & Depth (Ft.)	From	To	
Diameter <u>2"</u>	<u>0.0</u>	<u>20.0</u>	<u>BR. SA w/ Phos (Tailings)</u>
From <u>0.0</u>	<u>20.0</u>	<u>35.0</u>	<u>BR. SA w/ Phos (Tailings)</u>
To <u>40.0</u>	<u>35.0</u>	<u>45.0</u>	<u>DK. BR. BR. Silty SA</u>
Diameter _____			<u>45.0 EOB</u>
From _____			
To _____			
Liner <input type="checkbox"/> or Casing <input type="checkbox"/>			
Diameter _____			
From _____			
To _____			

Driller's Name: Edward J Parker  
 (print or type)

P-35

**WELL COMPLETION REPORT** (Please complete in black ink or type.)PERMIT # 591588.05 CUP# WUP DID # \_\_\_\_\_

If permit is for multiple wells indicate the number of wells drilled \_\_\_\_\_

Indicate remaining wells to be cancelled \_\_\_\_\_

WATER WELL CONTRACTOR'S

SIGNATURE Edward J. Parker License # 2368

I certify that the information provided in this report is accurate and true.

Grout	No. of Bags	From (Ft.)	To (Ft.)
Neat Cement:	<u>1</u>	<u>0.0</u>	<u>1.0</u>
Bentonite:	<u>1/2 / 25 lbs</u>	<u>1.0</u>	<u>2.0</u>

WELL LOCATION: County HILLSBOROUGH  
SE 1/4 of SE 1/4 of Section 14 Twp: 31S Rge: 21E

Longitude \_\_\_\_\_

DATE STAMP

Sketch of well location on property N  
A

Official Use Only

## CHEMICAL ANALYSIS WHEN REQUIRED

Iron: \_\_\_\_\_ ppm Sulfate: \_\_\_\_\_ ppm

Chloride: \_\_\_\_\_ ppm

[ ] Lab Test [ ] Field Test Kit

Pump Type

[ ] Centrifugal [ ] Jet [ ] Submersible [ ] Turbine

Horsepower \_\_\_\_\_ Capacity \_\_\_\_\_ G.P.M. \_\_\_\_\_

Pump Depth \_\_\_\_\_ Ft. Intake Depth \_\_\_\_\_ Ft.

Form 41.10-410(2) Rev. 6/95

OWNER'S NAME Hillsborough Co. Solid Waste Dept  
COMPLETION DATE 5-1-97 Florida Unique I.D. \_\_\_\_\_WELL USE: DEP/Public \_\_\_\_\_ Irrigation \_\_\_\_\_ Domestic \_\_\_\_\_ Monitor ☒  
HRS Limited \_\_\_\_\_ 62-524 \_\_\_\_\_ Other \_\_\_\_\_DRILL METHOD [ ] Rotary [ ] Cable Tool [ ] Combination  
[ ] Jet ☒ Auger Other \_\_\_\_\_

Measured Static Water Level <u>Not Enough</u>		Measured Pumping Water Level	
After _____ Hours at _____ G.P.M. Measuring Pt. (Describe): <u>Top of Well</u>			
Which is <u>2.5</u> Ft. <input checked="" type="checkbox"/> Above [ ] Below Land Surface			
Casing: [ ] Black Steel [ ] Galv. <input checked="" type="checkbox"/> PVC Other _____			
[ ] Open Hole	Depth (Ft.)		DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. Color   Grain Size   Type of Material
<input checked="" type="checkbox"/> Screen	From	To	
Casing Diameter & Depth (Ft.)			
Diameter <u>2"</u>	<u>0.0</u>	<u>7.5</u>	<u>LL, BL, SA w/ U. BACI.</u>
From <u>0.0</u>			<u>9. Phos (To 1 in)</u>
To <u>2.5</u>			
			<u>7.5 EOB</u>
Diameter _____			
From _____			<u>Water level not enough</u>
To _____			<u>at this depth</u>
Liner [ ] or			
Casing [ ]			
Diameter _____			
From _____			
To _____			

Driller's Name: Edward J. Parker  
(print or type)



# STATE OF FLORIDA PERMIT APPLICATION TO CONSTRUCT, REPAIR, MODIFY, OR ABANDON A WELL

- ☐ Southwest  
☐ Northwest  
☐ St. Johns River  
☐ South Florida  
☐ Suwannee River

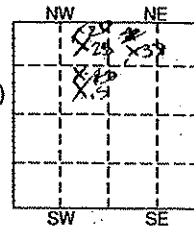
THIS FORM **MUST** BE FILLED OUT COMPLETELY.

The water well contractor is responsible for completing this form and forwarding the permit to the appropriate delegated county where applicable.

CHECK BOX FOR APPROPRIATE DISTRICT. ADDRESS ON BACK OF PERMIT FORM.

Permit No. 591583-05  
 Florida Unique I.D. \_\_\_\_\_  
 Permit Stipulations Required (See attached)  
23 8  
 62-524 well ☐  
 CUP/ WUP Application No. \_\_\_\_\_  
 ABOVE THIS LINE FOR OFFICIAL USE ONLY

1. Hillsborough County Solid Waste Dept. P.O. Box 1110 Tampa FL 32601 913-276-2927  
 Owner, Legal Name of Entity if Corporation Address City Zip Telephone Number  
 2. South East Landfill, CR 672, Picnic, FL  
 Well Location — Address, Road Name or Number, City  
 3. ARCHMAN & ASSOCIATES, INC. 2368 941-533-0858  
 Well Drilling Contractor License No. Telephone No.  
P.O. Box 812  
 Address  
Bartow, FL 33831  
 City State Zip  
 4. N 1/2 of 1/4 of 1/4 of Section 23  
 (smallest) (biggest) (Indicate Well on Chart)  
 5. Township 31S Range 21E  
 6. Hillsborough Subdivision Name Lot Block Unit  
 County



7. Number of proposed wells 5 Check the use of well: (See back of permit for additional choices) \_\_\_\_\_ Domestic \_\_\_\_\_ Monitor (type) Piezometer  
 (See Back) Irrigation (type) \_\_\_\_\_ Public Water Supply (type) \_\_\_\_\_ List Other \_\_\_\_\_  
 Distance from septic system NA ft. Description of facility Landfill Estimated start of construction date 4-28-97

8. Application for: ☒ New Construction \_\_\_\_\_ Repair/Modify \_\_\_\_\_ Abandonment \_\_\_\_\_  
 (Reason for Abandonment) \_\_\_\_\_  
 9. Estimated: Well Depth 25 Casing Depth 10 Screen Interval from 10 to 25  
 Casing Material: Blk-Steel / Gal (PVC) Casing Diameter 2 inch Seal Material \_\_\_\_\_

10. If applicable: Proposed Grouting Interval From 0 to 6 Seal Material Cement Grout  
 From 6 to 8 Seal Material Bentonite  
 From 8 to 25 Seal Material 30/65 Sand

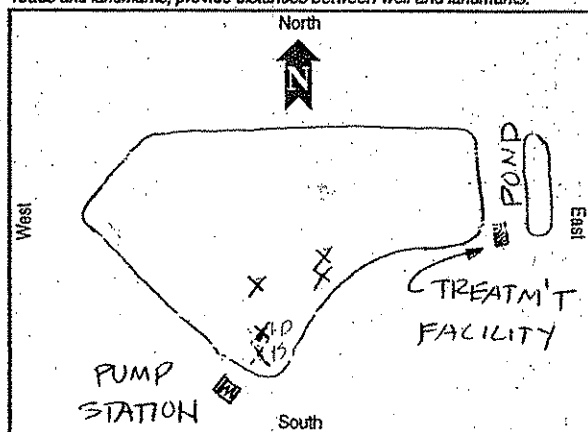
11. Telescope Casing \_\_\_\_\_ or Liner \_\_\_\_\_ (check one) Diameter \_\_\_\_\_  
 Blk-Steel / Galvanized / PVC Other (specify): \_\_\_\_\_

12. Method of Construction: \_\_\_\_\_ Rotary \_\_\_\_\_ Cable Tool \_\_\_\_\_ Combination \_\_\_\_\_  
☒ Auger \_\_\_\_\_ Other (specify): \_\_\_\_\_

13. Indicate total No. of wells on site 25 List number of unused wells on site 6

14. Is this well or any other well or water withdrawal on the owner's contiguous property covered under a Consumptive/Water Use Permit (CUP/WUP) or CUP/WUP Application? ☒ No \_\_\_\_\_ Yes  
 (If yes, complete the following) CUP/WUP No. \_\_\_\_\_  
 District well I.D. No. \_\_\_\_\_  
 Latitude \_\_\_\_\_ Longitude \_\_\_\_\_  
 Data obtained from GPS \_\_\_\_\_ or map \_\_\_\_\_ or survey \_\_\_\_\_ (map datum NAD 27 \_\_\_\_\_ NAD 83 \_\_\_\_\_)

Draw a map of well location and indicate well site with an "X". Identify known roads and landmarks; provide distances between well and landmarks.



15. I hereby certify that I will comply with the applicable rules of Title 40, Florida Administrative Code, and that a water use permit or artificial recharge permit, if needed, has been or will be obtained prior to commencement of well construction. I further certify that all information provided on this application is accurate and that I will obtain necessary approval from other federal, state, or local governments, if applicable. I agree to provide a well completion report to the District within 30 days after drilling or the permit expiration, whichever occurs first.  
 Signature of Contractor [Signature] License No. 2368  
 I certify that I am the owner of the property, that the information provided is accurate, and that I am aware of my responsibilities under Chapter 373, Florida Statutes, to maintain or properly abandon this well or, I certify that I am the agent for the owner, that the information provided is accurate, and that I have informed the owner of his responsibilities as stated above. Owner consents to personnel of the WMD or a representative access to the well site.  
 Owner's or Agent's Signature [Signature] Date 4-8-97

DO NOT WRITE BELOW THIS LINE — FOR OFFICIAL USE ONLY

Approval Granted By: [Signature] Issue Date: 4-21-97 Hydrologist Approval \_\_\_\_\_  
 Owner Number: 6996 Fee Received: \$0 Receipt No. 97-01287A Check No.: 942

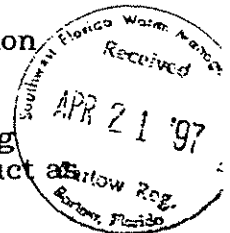
THIS PERMIT NOT VALID UNTIL PROPERLY SIGNED BY AN AUTHORIZED OFFICER OR REPRESENTATIVE OF THE WMD. IT SHALL BE AVAILABLE AT THE WELL SITE DURING ALL DRILLING OPERATIONS. This permit is valid for 90 days from date of issue.

STIPULATION NUMBER 39 - WELL AND DRILLHOLE ABANDONMENT

It will be the **water well contractor's** responsibility to have any incomplete well or drillhole attempted under this permit properly abandoned.

Any incomplete or abandoned well or drillhole as described in 40D-3, F.A.C., shall be abandoned as follows:

- A. The well examined from land surface to the original depth of construction for debris or obstructions (any debris or obstruction shall be removed prior to abandonment).
- B. The well plugged from bottom to top by an approved method of grouting with either Portland neat cement grout or an approved Bentonite product specified in 40D-3.517 2. (b), F.A.C.



It will be the **owner's** responsibility to have any well completed under this permit, or any existing well on this property, which meets the definition of an abandoned well as defined in Chapter 40D-3, Florida Administrative Code (F.A.C.), properly abandoned.

It will be the **owner's** responsibility to have any inactive well which does not meet the above criteria and is no threat to the water resource properly capped in an air and water tight manner with a threaded, welded or bolted cover or valve. If the pump and well seal are water tight, the pump may be left in place. If practical, a protective cover two (2) feet in height shall be placed around the well casing.

- A. Wells with a diameter of six (6) inches or more without pumping equipment shall have the casing extended a minimum of two(2) ft. above land surface.
- B. Wells with a diameter of less than six (6) inches without pumping equipment shall be securely set in a concrete slab and have either the well casing extended a minimum height of two (2) feet above land surface or a protective cover centered over the well casing. The concrete slab shall be a minimum of four (4) inches in thickness by two (2) feet by two (2) feet square. The protective cover shall be set in the concrete slab and extend a minimum of two (2) feet above land surface.

In flood prone areas all wells shall extend a minimum of one (1) foot above the 100 year flood elevation, if practical.

Any plugging operations shall be permitted separately from this permit by the Southwest Florida Water Management District and be witnessed by a designated District representative. Arrangement for a District representative shall be made with the local District Field Services office a minimum of twenty four (24) hours in advance of these operations. A District representative will be available for assignment during normal working hours (8:00 AM - 4:30 PM), Monday through Friday. Travel time must be taken into consideration. Exemptions may be made for extenuating circumstances. For scheduling, please contact the Field Service Coordinator, **Jim Calandra**, in our **BARTOW** office at 1-800-492-7862.

Approved by: \_\_\_\_\_

Permit Number: \_\_\_\_\_

Date: \_\_\_\_\_

Stip#39  
(1/31/97)

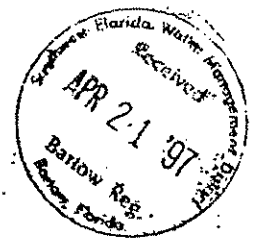
COPY TO OWNER

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

SERVICE OFFICE

STIPULATION # 8 - TEST/MONITOR WELL

- A. This well is to be used as a test/monitor well. If it is to be converted into a production well, an additional permit shall be obtained prior to conversion.
- B. There shall be no injection of fluids into the monitor well without prior written approval from the District. This includes, but is not limited to treated ground water, or the introduction of microbes for In-Situ aquifer restoration.
- C. While drilling the well, if confining beds (i.e. clay or hardpan intervals) are encountered, then the well shall be constructed in such a manner as to prevent the unauthorized interchange of water between different water bearing zones as per Chapter 17-532.500(2)(C), Florida Administrative Code, (F.A.C.). This includes, but is not limited to the screened or open hole interval and the annular space.
- D. Prior written approval from the District shall be required if the monitor well will be pumped for use in hydrodynamic control and/or contaminant plume management.
- E. In the event the well needs to be abandoned, an abandonment permit shall be obtained prior to commencing with abandonment procedures.
- F. An observer from our Enforcement Department is required on all abandonments to ensure compliance with Chapter 17-532, F.A.C. Please contact the Enforcement Coordinator, Jim Calandra, in our Bartow Office at (813) 534- 1448 for additional information.



1-800-492-7862

Approved by: [Signature]

Permit # 591582-02, 591583-05,

Date: 4-21-97

591587-01, 591588, 05

Stip #8  
(2/93)

COPY TO OWNER



# **WELL COMPLETION REPORT** (Please complete in black ink or type.)

PERMIT # 591583.05 CUPJ # \_\_\_\_\_ DID # \_\_\_\_\_

If permit is for multiple wells indicate the number of wells drilled \_\_\_\_\_.

Indicate remaining wells to be cancelled \_\_\_\_\_.

WATER WELL CONTRACTOR'S

SIGNATURE [Signature] License # 2360

I certify that the information provided in this report is accurate and true.

Grout	No. of Bags	From (Ft.)	To (Ft.)
Neat Cement:	<u>3</u>	<u>0.0</u>	<u>11.0</u>
Bentonite:	<u>1</u>	<u>11.0</u>	<u>13.0</u>

LOCATION: County Hillsborough  
NE 1/4 of NE 1/4 of Section 23 Twp: 31S Rge: 21E

Latitude \_\_\_\_\_ Longitude \_\_\_\_\_

DATE STAMP

Sketch of well location on property

N  
A

Official Use Only

CHEMICAL ANALYSIS WHEN REQUIRED

Iron: \_\_\_\_\_ ppm Sulfate: \_\_\_\_\_ ppm

Chloride: \_\_\_\_\_ ppm

[ ] Lab Test [ ] Field Test Kit

Pump Type

[ ] Centrifugal [ ] Jet [ ] Submersible [ ] Turbine

Horsepower \_\_\_\_\_ Capacity \_\_\_\_\_ G.P.M. \_\_\_\_\_

Pump Depth \_\_\_\_\_ Ft. Intake Depth \_\_\_\_\_ Ft.

Form 41.10-410(2) Rev. 6/95

OWNER'S NAME Hillsborough Co. Solid Waste Dept.

COMPLETION DATE \_\_\_\_\_ Florida Unique I.D. \_\_\_\_\_

WELL USE: DEP/Public \_\_\_\_\_ Irrigation \_\_\_\_\_ Domestic \_\_\_\_\_ Monitor \_\_\_\_\_

HRS Limited \_\_\_\_\_ 62-524 \_\_\_\_\_ Other \_\_\_\_\_

DRILL METHOD [ ] Rotary [ ] Cable Tool [ ] Combination

[ ] Jet ☒ Auger Other \_\_\_\_\_

Measured Static Water Level 21.5 Measured Pumping Water Level \_\_\_\_\_  
 After \_\_\_\_\_ Hours at \_\_\_\_\_ G.P.M. Measuring Pt. (Describe): Top of Well  
 Which is 2.5 Ft. ☒ Above [ ] Below Land Surface  
 Casing: [ ] Black Steel [ ] Galv. ☒ PVC Other \_\_\_\_\_

Casing Diameter & Depth (Ft.)	Depth (Ft.)		DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. Color   Grain Size   Type of Material
	From	To	
Diameter <u>2"</u> From <u>0.0</u> To <u>15.0</u>	<u>0.0</u>	<u>12.0</u>	<u>LT. BR. SAND / LT. BR. CL.</u> <u># Phos To. lining</u>
	<u>12.0</u>	<u>19.5</u>	<u>BR. S. / L. SA</u>
Diameter _____ From _____ To _____	<u>19.5</u>	<u>20.0</u>	<u>GR. BR. SANDY CL.</u> <u>20.0 FEET</u>
Liner [ ] or Casing [ ] Diameter _____ From _____ To _____			

Driller's Name: Edward J Parker  
 (print or type)

# **WELL COMPLETION REPORT** (Please complete in black ink or type.)

PERMIT # 591583.01 CUP/WUP # \_\_\_\_\_ DID # \_\_\_\_\_

Permit is for multiple wells indicate the number of wells drilled \_\_\_\_\_

Indicate remaining wells to be cancelled \_\_\_\_\_

WATER WELL CONTRACTOR'S

SIGNATURE Edward J. Parker License # 2368

I certify that the information provided in this report is accurate and true.

Grout	No. of Bags	From (Ft.)	To (Ft.)
Neat Cement:	<u>1/2</u>	<u>0.0</u>	<u>0.5</u>
Bentonite:	<u>1/4 12.5 lbs</u>	<u>0.5</u>	<u>1.0</u>

WELL LOCATION: County HILLSBOROUGH  
 Section 23 Twp: 31S Rge: 21E

Longitude \_\_\_\_\_

DATE STAMP

Sketch of well location on property

N  
A

Official Use Only

CHEMICAL ANALYSIS WHEN REQUIRED

Iron: \_\_\_\_\_ ppm Sulfate: \_\_\_\_\_ ppm

Chloride: \_\_\_\_\_ ppm

[ ] Lab Test [ ] Field Test Kit

Pump Type

[ ] Centrifugal [ ] Jet [ ] Submersible [ ] Turbine

Horsepower \_\_\_\_\_ Capacity \_\_\_\_\_ G.P.M. \_\_\_\_\_

Pump Depth \_\_\_\_\_ Ft. Intake Depth \_\_\_\_\_ Ft.

Form 41.10-410(2) Rev. 6/95

OWNER'S NAME Hillsborough Co. Solid Waste Dept

COMPLETION DATE \_\_\_\_\_ Florida Unique I.D. \_\_\_\_\_

WELL USE: DEP/Public \_\_\_\_\_ Irrigation \_\_\_\_\_ Domestic \_\_\_\_\_ Monitor ☒

HRS Limited \_\_\_\_\_ 62-524 \_\_\_\_\_ Other \_\_\_\_\_

DRILL METHOD [ ] Rotary [ ] Cable Tool [ ] Combination

[ ] Jet [X] Auger Other \_\_\_\_\_

Measured Static Water Level <u>8.8</u>		Measured Pumping Water Level _____	
After _____ Hours at _____ G.P.M. Measuring Pt. (Describe): <u>TOP OF WELL</u>			
Which is <u>2.5</u> Ft. [X] Above [ ] Below Land Surface			
Casing: [ ] Black Steel [ ] Galv. [X] PVC Other _____			
[ ] Open Hole [X] Screen	Depth (Ft.)		DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. Color   Grain Size   Type of Material
Casing Diameter & Depth (Ft.)	From	To	
Diameter <u>2"</u>	<u>0.0</u>	<u>7.5</u>	<u>BR. SO (TA. 1 in)</u>
From <u>0.0</u>			
To <u>2.5</u>			
Diameter _____			
From _____			
To _____			
Liner [ ] or Casing [ ]			
Diameter _____			
From _____			
To _____			

Driller's Name: Edward J Parker  
 (print or type)

# WELL COMPLETION REPORT (Please complete in black ink or type.)

PERMIT # 591583.02 CUP/WUP # \_\_\_\_\_ DID # \_\_\_\_\_

If permit is for multiple wells indicate the number of wells drilled \_\_\_\_\_.

Indicate remaining wells to be cancelled \_\_\_\_\_.

WATER WELL CONTRACTOR'S

SIGNATURE Wayne D. Duda License # 2368

I certify that the information provided in this report is accurate and true.

Grout	No. of Bags	From (Ft.)	To (Ft.)
Neat Cement:	<u>4</u>	<u>0.0</u>	<u>16.5</u>
Bentonite:	<u>1</u>	<u>16.5</u>	<u>18.5</u>

WELL LOCATION: County HILLSBOROUGH  
 NE 1/4 of NW 1/4 of Section 23 Twp: 31S Rge: 21E

Latitude \_\_\_\_\_ Longitude \_\_\_\_\_

DATE STAMP

Sketch of well location on property

N  
A

Official Use Only

## CHEMICAL ANALYSIS WHEN REQUIRED

Iron: \_\_\_\_\_ ppm Sulfate: \_\_\_\_\_ ppm

Chloride: \_\_\_\_\_ ppm

[ ] Lab Test [ ] Field Test Kit

Pump Type

[ ] Centrifugal [ ] Jet [ ] Submersible [ ] Turbine

Horsepower \_\_\_\_\_ Capacity \_\_\_\_\_ G.P.M. \_\_\_\_\_

Pump Depth \_\_\_\_\_ Ft. Intake Depth \_\_\_\_\_ Ft.

Form 41.10-410(2) Rev. 6/95

OWNER'S NAME Hillsborough Co. Solid Waste Dept

COMPLETION DATE 5-1-97 Florida Unique I.D. \_\_\_\_\_

WELL USE: DEP/Public \_\_\_\_\_ Irrigation \_\_\_\_\_ Domestic \_\_\_\_\_ Monitor ✓

HRS Limited \_\_\_\_\_ 62-524 \_\_\_\_\_ Other \_\_\_\_\_

DRILL METHOD [ ] Rotary [ ] Cable Tool [ ] Combination

[ ] Jet ✓ Auger Other \_\_\_\_\_

Measured Static Water Level <u>21.2'</u>		Measured Pumping Water Level _____	
After _____ Hours at _____ G.P.M. Measuring Pt. (Describe): <u>top of well</u>			
Which is <u>2.5</u> Ft. <input checked="" type="checkbox"/> Above [ ] Below Land Surface			
Casing: [ ] Black Steel [ ] Galv. <u>✓</u> MPVC Other _____			
[ ] Open Hole <input checked="" type="checkbox"/> Screen	Depth (Ft.)		DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones.
Casing Diameter & Depth (Ft.)	From	To	Color   Grain Size   Type of Material
Diameter <u>2"</u>	<u>0.0</u>	<u>9.0</u>	<u>U. BR. SA W/ U. BR C. 1.8</u>
From <u>0.0</u>			<u>P. NDS (to lining)</u>
To <u>20.0</u>	<u>9.0</u>	<u>25.0</u>	<u>DK. BR. BR. 5.14 SA</u>
Diameter _____			<u>25.0 EOB</u>
From _____			
To _____			
Liner [ ] or			
Casing [ ]			
Diameter _____			
From _____			
To _____			

Driller's Name:

(print or type) Edward J. Paeker

**WELL COMPLETION REPORT** (Please complete in black ink or type.)

ERMIT # 591583.03 CUP/WUP # \_\_\_\_\_ DID # \_\_\_\_\_

permit is for multiple wells indicate the number of wells drilled \_\_\_\_\_

Indicate remaining wells to be cancelled \_\_\_\_\_

WATER WELL CONTRACTOR'S  
SIGNATURE Edgar J. Paellen License # 2368

I certify that the information provided in this report is accurate and true.

Grout	No. of Bags	From (Ft.)	To (Ft.)
Neat Cement:			
Bentonite:	<u>1 1/2</u>	<u>0.0</u>	<u>0.5</u>

WELL LOCATION: County Hillsborough  
SE 1/4 of NW 1/4 of Section 23 Twp: 31S Rge: 21E

Latitude \_\_\_\_\_ Longitude \_\_\_\_\_

DATE STAMP	Sketch of well location on property <span style="float: right;">N A</span>
Official Use Only	
CHEMICAL ANALYSIS WHEN REQUIRED	
Iron: _____ ppm	Sulfate: _____ ppm
Chloride: _____ ppm	
<input type="checkbox"/> Lab Test <input type="checkbox"/> Field Test Kit	
Pump Type	
<input type="checkbox"/> Centrifugal <input type="checkbox"/> Jet <input type="checkbox"/> Submersible <input type="checkbox"/> Turbine	
Horsepower _____ Capacity _____ G.P.M. _____	
Pump Depth _____ Ft. Intake Depth _____ Ft.	

Give distances from septic tank and house or other reference points

OWNER'S NAME Hillsborough Co. Solid Waste Dept.  
COMPLETION DATE 5-1-97 Florida Unique I.D. \_\_\_\_\_

WELL USE: DEP/Public \_\_\_\_\_ Irrigation \_\_\_\_\_ Domestic \_\_\_\_\_ Monitor ☒  
HRS Limited \_\_\_\_\_ 62-524 \_\_\_\_\_ Other \_\_\_\_\_

DRILL METHOD ☐ Rotary ☐ Cable Tool ☐ Combination  
☐ Jet ☒ Auger Other \_\_\_\_\_

Measured Static Water Level <u>5.7</u>		Measured Pumping Water Level _____	
After _____ Hours at _____ G.P.M. Measuring Pt. (Describe): <u>Top of Well</u>			
Which is <u>2.5</u> Ft. <input checked="" type="checkbox"/> Above <input type="checkbox"/> Below Land Surface			
Casing: <input type="checkbox"/> Black Steel <input type="checkbox"/> Galv. <input checked="" type="checkbox"/> PVC Other _____			
<input type="checkbox"/> Open Hole <input checked="" type="checkbox"/> Screen	Depth (Ft.)		DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. Color   Grain Size   Type of Material
Casing Diameter & Depth (Ft.)	From	To	
Diameter <u>2"</u>	<u>0.0</u>	<u>4.0</u>	<u>4.0' Bl. Saw/Phos</u> <u>(TA. 1.1.9)</u>
From <u>0.0</u>			
To <u>1.0</u>			<u>4.0' EOB</u>
Diameter _____			
From _____			
To _____			
Liner <input type="checkbox"/> or Casing <input type="checkbox"/>			
Diameter _____			
From _____			
To _____			

Driller's Name: Edward J Paellen  
(print or type)

PI-D  
**WELL COMPLETION REPORT** (Please complete in black ink or type.)  
 PERMIT # 591583.04 CUP/WUP # \_\_\_\_\_ DID # \_\_\_\_\_  
 If permit is for multiple wells indicate the number of wells drilled \_\_\_\_\_  
 Indicate remaining wells to be cancelled \_\_\_\_\_  
 WATER WELL CONTRACTOR'S  
 SIGNATURE Edward J. Parker License # 2368  
 I certify that the information provided in this report is accurate and true.

Grout	No. of Bags	From (Ft.)	To (Ft.)
Neat Cement:	<u>2</u>	<u>0.0</u>	<u>8.0</u>
Bentonite:	<u>1/2 / 25 lbs</u>	<u>8.0</u>	<u>9.0</u>

WELL LOCATION: County Hillsborough  
 SE 1/4 of NW 1/4 of Section 23 Twp: 31S Rge: 21E

Latitude _____	Longitude _____
DATE STAMP	Sketch of well location on property N A
Official Use Only	
CHEMICAL ANALYSIS WHEN REQUIRED	
Iron: _____ ppm	Sulfate: _____ ppm
Chloride: _____ ppm	
[ ] Lab Test [ ] Field Test Kit	Give distances from septic tank and house or other reference points
Pump Type	
[ ] Centrifugal [ ] Jet [ ] Submersible [ ] Turbine	
Horsepower _____ Capacity _____ G.P.M. _____	
Pump Depth _____ Ft. Intake Depth _____ Ft.	

Form 41.10-410(2) Rev. 6/95

OWNER'S NAME Hillsborough Co. Solid Waste Dept  
 COMPLETION DATE 5-1-97 Florida Unique I.D. \_\_\_\_\_  
 WELL USE: DEP/Public \_\_\_\_\_ Irrigation \_\_\_\_\_ Domestic \_\_\_\_\_ Monitor ☒  
 HRS Limited \_\_\_\_\_ 62-524 \_\_\_\_\_ Other \_\_\_\_\_  
 DRILL METHOD [ ] Rotary [ ] Cable Tool [ ] Combination  
 [ ] Jet ☒ Auger Other \_\_\_\_\_

Measured Static Water Level <u>9.0</u>	Measured Pumping Water Level _____
After _____ Hours at _____ G.P.M. Measuring Pt. (Describe): <u>Top of Well</u>	
Which is <u>2.5</u> Ft. [ ] Above [ ] Below Land Surface	
Casing: [ ] Black Steel [ ] Galv. <input checked="" type="checkbox"/> PVC Other _____	
[ ] Open Hole <input checked="" type="checkbox"/> Screen	Depth (Ft.)
Casing Diameter & Depth (Ft.)	From To
Diameter <u>2"</u>	<u>0.0</u> <u>9.0</u>
From <u>0.0</u>	
To <u>10.0</u>	<u>9.0</u> <u>15.0</u>
Diameter _____	
From _____	
To _____	
Liner [ ] or Casing [ ]	
Diameter _____	
From _____	
To _____	

Driller's Name: Edward J Parker  
 (print or type)

**APPENDIX E**  
**INDEX/CLASSIFICATION LABORATORY TEST SUMMARY**

**TABLE 1**  
**LABORATORY TEST SUMMARY**  
**STANDARD PENETRATION TEST SAMPLES**

Boring Number	Sample Number	Soil Type	Sample Depth (ft.)	Natural Moisture Content (%)	Passing No. 200 Sieve (%)	Passing No. 100 Sieve (%)	Passing No. 60 Sieve (%)	Passing No. 40 Sieve (%)	Passing No. 10 Sieve (%)	Passing No. 4 Sieve (%)	Liquid Limit (%)	Plasticity Index (%)	Organic Content (%)
TH - 1A	1	1	1.0	16.0	19.6	38.6	62.9	83.1	100.0	100.0			
TH - 1A	4	2	5.5	41.3	26.2	79.1	98.1	99.6	100.0	100.0			
TH - 1A	8	2	11.5	22.4	7.5	33.1	66.3	97.4	100.0	100.0			0.6
TH - 1A	11	4	16.0	25.7	11.2	35.1	68.9	99.9	99.9	100.0			
TH - 1A	17	7	36.0	35.5	24.8	62.8	77.4	86.5	96.4	99.4			
TH - 1A	20	9	51.0										2.3
TH - 2A	2	10	2.5	2.8	3.0	14.8	45.5	79.6	99.9	100.0			
TH - 2A	5	1	7.0	36.6	18.7	66.8	87.4	96.4	100.0	100.0			
TH - 2A	9	1	13.0	17.1	14.1	39.4	74.5	92.7	100.0	100.0			
TH - 2A	15	2	22.0	35.1	23.5	71.1	86.6	95.2	99.7	100.0			
TH - 2A	22	4	34.5	43.6	34.1	71.5	84.7	91.6	97.9	100.0			
TH - 3A	1	1	1.0	25.9	34.6	61.0	83.6	94.0	99.8	100.0			
TH - 3A	2	1	2.5	37.1	38.3	53.0	73.4	88.2	99.9	100.0			
TH - 3A	4	2	5.5	112.2	98.5	99.1	99.6	99.9	100.0	100.0			
TH - 3A	5	4	8.5										2.3
TH - 3A	6	1	16.0	20.5	11.1	21.2	65.0	91.8	100.0	100.0			
TH - 3A	8	9	26.0	37.6	27.4	87.7	94.9	98.6	100.0	100.0			2.3
TH - 4A	1	1	1.0	19.5	23.5	40.3	60.9	79.3	99.8	100.0			1.8

**TABLE 1 Cont'd**  
**LABORATORY TEST SUMMARY**  
**STANDARD PENETRATION TEST SAMPLES**

Boring Number	Sample Number	Soil Type	Sample Depth (ft.)	Natural Moisture Content (%)	Passing No. 200 Sieve (%)	Passing No. 100 Sieve (%)	Passing No. 60 Sieve (%)	Passing No. 40 Sieve (%)	Passing No. 10 Sieve (%)	Passing No. 4 Sieve (%)	Liquid Limit (%)	Plasticity Index (%)	Organic Content (%)
TH - 4A	4	1	5.5	34.0	30.4	88.2	98.8	99.8	100.0	100.0			0.2
TH - 4A	6	10	10.0										0.2
TH - 4A	8	6	21.0	23.9	31.7	61.5	77.3	86.7	99.3	100.0			
TH - 4A	10	9	31.0	33.7	56.1	78.6	89.5	94.6	99.4	100.0			
TH - 4A	12	9	41.0	30.8	29.4	50.1	61.7	71.4	87.7	97.9			2.4
TH - 5A	1	1	1.0	20.1	40.9	71.8	90.4	95.9	99.5				
TH - 5A	3	10	3.5	25.9	5.9	32.4	92.3	99.3	99.9	100.0			
TH - 5A	6	9	8.0	70.8	73.7	90.6	96.9	99.1	100.0	100.0	84.0	56.0	
TH - 5A	7	3	10.5										1.7
TH - 5A	8	5	16.0	20.4	29.4	50.8	79.1	94.2	100.0	100.0			
TH - 5A	10	4	26.0	40.4	25.0	84.0	92.6	96.0	99.0	100.0			
TH - 5A	12	8	38.0	39.2	20.1	44.8	71.9	82.1	92.2	97.9			
TH - 5A	15	9	51.0	46.8	34.9	37.6	46.8	89.8	95.3	96.9			
TH - 6A	5	10	7.0	26.0	11.9	43.4	89.0	99.2	100.0	100.0			
TH - 6A	8	2	11.5	58.3	94.5	95.7	96.8	97.6	98.8	99.6	117	67	
TH - 6A	11	1	21.0	26.5	10.3	32.6	68.4	93.2	100.0	100.0			
TH - 6A	13	3	31.0	30.1	6.0	10.4	42.5	90.5	99.9	100.0			
TH - 6A	16	9	47.0	56.5	34.2	87.3	95.3	98.6	100.0	100.0			
TH - 7A	1	1	1.0	18.2	16.0	50.2	78.0	91.6	99.6	99.8			2.23



**TABLE 1 Cont'd**  
**LABORATORY TEST SUMMARY**  
**STANDARD PENETRATION TEST SAMPLES**

Boring Number	Sample Number	Soil Type	Sample Depth (ft.)	Natural Moisture Content (%)	Passing No. 200 Sieve (%)	Passing No. 100 Sieve (%)	Passing No. 60 Sieve (%)	Passing No. 40 Sieve (%)	Passing No. 10 Sieve (%)	Passing No. 4 Sieve (%)	Liquid Limit (%)	Plasticity Index (%)	Organic Content (%)
TH - 7A	3	1	4.0								39	11	
TH - 7A	4	3	5.5										0.6
TH - 7A	5	3	11.0	21.7	17.7	40.7	72.1	92.7	99.9	100.0			
TH - 7A	7	11	21.0	33.3	19.3	50.7	75.1	87.1	100.0	100.0			
TH - 7A	9	8	31.0	43.2	28.9	78.1	88.3	93.0	98.4	99.6			
TH - 8A	1	1	1.0								NP	NP	
TH - 8A	6	12	8.5	64.6	65.1	87.8	99.2	99.9	100.0	100.0			
TH - 8A	13	4	21.0	11.8	13.2	39.5	71.1	92.4	100.0	100.0			
TH - 8A	16	11	36.0	38.2	64.1	85.0	94.2	97.5	99.9	100.0			

Boring Number	Sample Number	Cation Exchange (meg EC/100grams)
TH - 1A	5	508
TH - 1A	15	259
TH - 2A	4	99
TH - 5A	15	426
TH - 8A	16	55

**APPENDIX F**  
**REPORT OF LABORATORY TESTING ON**  
**UNDISTURBED SAMPLINGS AS REPORTED TO**  
**REMEDIAL ENGINEERING & SCIENCE, INC. (6/19/97)**



Ardaman & Associates, Inc.

Geotechnical, Environmental and  
Materials Consultants

June 19, 1997  
File Number 97-9628

Remedial Engineering & Science, Inc.  
206 White Marsh Circle  
Orlando, Florida 32859-3322

Attention: Dr. Bijay Panigrahi

Subject: Laboratory Testing of Soil Samples, Southeast Landfill, Hillsborough County

Gentlemen:

As requested, consolidated undrained triaxial compression tests, unconfined compression tests and permeability tests have been completed on the nine Shelby tube soil samples provided for testing by your firm. The samples were labeled: SPT-1A/US-1 (7' - 9'); SPT-2A/US-1 (30' - 32'); SPT-3A/US-1 (6' - 8'); SPT-3A/US-2 (27' - 29'); SPT-4A/US-1 (7.5' - 9.5'); SPT-5A/US-1 (6' - 8'); SPT-6A/US-1 (12' - 14'); SPT-7A/US-1 (25' - 27'); and SPT-7A/US-2 (31.5' - 33.5').

#### Index Tests and Classification

The soils were extruded from the Shelby tubes, and representative portions of each sample were selected for the requested tests. The visual description of the soil samples, recovered lengths, individual measured moisture contents on 3 to 6 specimens per sample, and average moisture contents, total unit weights and dry densities on the samples are presented in Table 1. The fines contents (i.e., percent soil by dry weight finer than the U.S. Standard No. 200 sieve) measured on each permeability and strength test specimen are also presented in Table 1.

#### Permeability Tests

The permeability tests were performed in general accordance with ASTM Standard D 5084. The permeability test results are summarized in Table 2. The cylindrical test specimens were maintained at the as-received diameter of the Shelby tube and trimmed to heights of 5.3 to 11.7 cm. Each permeability test specimen was mounted in a triaxial-type permeameter and encased within a latex membrane. The specimens were confined using average isotropic effective confining stresses of 6 to 15 lb/in<sup>2</sup>, and permeated with deaired tap water under back-pressures of 174 to 183 lb/in<sup>2</sup>. Satisfactory saturation of each specimen was verified by a B-factor greater than 95%. The inflow to and outflow from each specimen were monitored with time, and the hydraulic conductivity was calculated for each recorded flow increment. The tests were continued until steady-state flow rates were achieved, as evidenced by an outflow/inflow ratio between 0.75 and 1.25, and until stable values of hydraulic conductivity were measured. The final degree of saturation of each specimen was calculated upon completion of testing using the final measured dry mass, moisture content and volume, and assuming a specific gravity of 2.70 for clayey sand specimens and 2.75 for clay specimens. Upon completion of permeability testing, the particle-size distributions of the clayey sand specimens were determined in general accordance with ASTM Standard D 422, and the fines contents of the clay specimens were determined in general accordance with ASTM Standard D 1140. The results of the particle-size analyses are plotted in Figure 1, and the fines content of each specimen is presented in Table 2.

### Consolidated Undrained Triaxial Compression Tests

Consolidated undrained triaxial compression tests with pore pressure measurements ( $\overline{CIUC}$  tests) were performed in general accordance with ASTM Standard D 4767. Cylindrical test specimens 3.5 cm in diameter and 7.1 cm in height were trimmed from the requested Shelby tube samples. The specimens were mounted in triaxial cells, fitted with filter strips, and encased in thin latex membranes. The cell pressure and back-pressure were increased together in increments until the back-pressure equalled the test values of 8.0 to 12.0 kg/cm<sup>2</sup>. The specimens were then isotropically consolidated in one, two or three increments under the requested effective stresses of 0.39 to 5.58 kg/cm<sup>2</sup>. The volume change during consolidation was monitored. Consolidation under the applied effective stress was allowed to continue until primary consolidation was complete and then for an additional period of at least 12 hours. The specimens were sheared undrained at a constant rate of axial deformation of 0.0012 cm/minute (a strain rate of about 1%/hour), and the load, axial deformation, shear induced excess pore pressure and cell pressure were monitored with time.

The initial and pre-shear moisture contents and dry densities of the specimens, and a summary of the triaxial test results are presented in Table 3. Photographs of four of the triaxial test specimens after shearing are shown in Figures 2, 3 and 4. The effective stress paths, stress difference versus axial strain, excess pore pressure versus axial strain, and stress ratio versus axial strain for the nine individual tests are presented in Figures 5 through 13. The effective stress paths for the five clay specimens and four clayey sand specimens are presented together in Figures 14 and 15, respectively. Upon completion of testing, the fines content of each specimen was determined in general accordance with ASTM Standard D 1140. The fines contents are presented in Table 3.

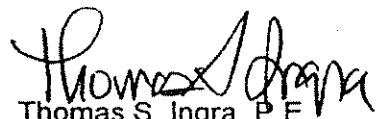
### Unconfined Compression Tests

The unconfined compression tests were performed in general accordance with ASTM Standard D 2166. Sufficient intact sample was not available from either SPT-1A/US-1 (7' - 9') or SPT-6A/US-1 (12' - 14') to perform the requested unconfined compression tests. Cylindrical test specimens were trimmed to a diameter of 3.5 cm and a height of 7.1 cm. The specimens were loaded at a constant rate of axial deformation of 0.076 cm/minute (strain rate of about 1.0%/minute). The moisture content and dry density of the specimens, unconfined compressive strength, and axial strain at failure are presented in Table 4. The stress-strain curves are presented in Figures 16 through 18. Upon completion of testing, the fines content of each specimen was determined in general accordance with ASTM Standard D 1140. The fines contents are presented in Table 4.

If you have questions about the test results or require additional testing services, please contact us.

Very truly yours,  
ARDAMAN & ASSOCIATES, INC.

  
Shawkat Ali, Ph.D.  
Geotechnical Engineer

  
Thomas S. Ingra, P.E.  
Senior Project Engineer  
Florida Registration No. 31987

SA/TSI/jo

cc: John Watson  
Wayne Pandorf

## Table 1

## SHELBY TUBE SOIL SAMPLE DESCRIPTIONS

Boring	Sample	Depth (feet)	Description	Tests	Recovery (inches)	-200 (%)	w <sub>c</sub> (%)	Tube Average		
								w <sub>c</sub> (%)	γ <sub>t</sub> (pcf)	γ <sub>d</sub> (pcf)
SPT-1A	US-1	7-9	Brown clayey sand with lenses of brown clay	None	15.75	-	47.6 56.9 41.7	62.6	103.0	63.3
			Brown and gray (laminated) clay	CU KC	8.50	100 100				
SPT-2A	US-1	30-32	Lt. brown clayey sand with lenses of brown sand and brown cemented sand fragments	KC	12.75	24	25.0 25.4 29.2	29.1	117.7	91.2
			Brown sand with lenses of clayey sand	None	5.0	-				
			Lt. greenish-gray clayey sand with some cemented sand fragments	CU	6.0	35 28.8 37.2				
SPT-3A	US-1	6-8	Gray clay	CU	10.0	100	99.3 116.7 111.3	62.2	96.5	59.5
			Dark gray sand with trace organics	None	7.0	-				
			Grayish-brown sand	None	7.0	-				
SPT-3A	US-2	27-29	Light gray to gray clayey sand	CU CU QU	22.5	25 26 21	34.2 38.1 36.6 36.4 30.2	35.1	113.6	84.0
SPT-4A	US-1	7.5-9.5	Gray and light gray (laminated) clay	CU QU KC	11.25	100 100 99	94.2 107.0 102.0	70.9	101.6	59.4
			Gray to dark gray sand	None	7.25	-	24.1			
Where: -200 = Fines content (i.e., amount of material finer than the U.S. Standard No. 200 sieve); w <sub>c</sub> = Moisture content; γ <sub>t</sub> = Total unit weight; γ <sub>d</sub> = Dry density; CU = CUUC triaxial test (ASTM D 4767); QU = Unconfined compression test (ASTM D 2166); and KC = Permeability test (ASTM D 5084).										

Table 1 (Continued)

SHELBY TUBE SOIL SAMPLE DESCRIPTIONS

Boring	Sample	Depth (feet)	Description	Tests	Recovery (inches)	-200 (%)	w <sub>c</sub> (%)	Tube Average		
								w <sub>c</sub> (%)	γ <sub>t</sub> (pcf)	γ <sub>d</sub> (pcf)
SPT-5A	US-1	6-8	Gray slightly clayey sand	None	3.25	-	-	-	-	-
			Laminated gray sandy clay, grayish-brown clayey sand and light brown silty sand	None	5.50	-	76.7 69.5	-	-	-
			Gray and light gray (laminated) clay	CU QU	8.00	99 100	101.4 102.5	-	100.0	-
			Gray sand with trace clay	None	2.00	-	22.6	-	-	-
			Gray clay	None	1.50	-	-	-	-	-
SPT-6A	US-1	12-14	Brown slightly clayey sand	None	4.00	-	21.0	-	-	-
			Drilling disturbed soil	None	4.00	-	-	-	-	-
			Brown silty sand laminated with gray clay	None	10.50	-	74.1 54.1	68.2	97.1	57.7
			Gray clay with trace sand lenses	CU	9.25	96	72.4 72.1	-	-	-
			Greenish-gray clayey sand	CU	23.25	31	38.7 45.4 42.7 40.0	41.7	111.3	78.5
SPT-7A	US-2	31.5-33.5	Greenish-gray clayey sand with phosphate	KC	25.50	17	34.0 34.6 29.5 34.5	33.2	117.8	88.5

Where: -200 = Fines content (i.e., amount of material finer than the U.S. Standard No. 200 sieve); w<sub>c</sub> = Moisture content; γ<sub>t</sub> = Total unit weight; γ<sub>d</sub> = Dry density; CU = CIUC triaxial test (ASTM D 4767); QU = Unconfined compression test (ASTM D 2166); and KC = Permeability test (ASTM D 5084).

Table 2

PERMEABILITY TEST RESULTS

Boring	Sample	Depth (feet)	Initial Conditions				Test Conditions					Final Conditions				$k_{20}$ (cm/sec)	-200 (%)
			$w_c$ (%)	$\gamma_d$ (pcf)	S (%)	L (cm)	D (cm)	$\bar{\sigma}_c$ (psi)	$u_b$ (psi)	$i_{avg}$	B (%)	$w_c$ (%)	$\gamma_d$ (pcf)	S (%)	$\Delta V/V_o$ (%)		
SPT-1A	US-1	7-9	105.4	44.6	102	5.30	7.12	6	183	24	99	104.0	45.0	102	-0.9	$2.6 \times 10^{-8}$	100
SPT-2A	US-1	30-32	25.3	100.1	100	11.74	6.94	15	174	11	97	22.0	105.7	100	-5.3	$1.1 \times 10^{-7}$	24
SPT-4A	US-1	7.5-9.5	95.2	47.0	99	5.79	7.29	6	183	24	100	92.2	48.8	101	-3.7	$3.5 \times 10^{-8}$	99
SPT-7A	US-2	31.5-33.5	30.7	89.4	94	11.62	7.37	15	174	14	100	31.2	92.4	102	-3.3	$2.1 \times 10^{-7}$	17

Where:  $w_c$  = Moisture content;  $\gamma_d$  = Dry density; S = Calculated degree of saturation using an assumed specific gravity of 2.70 or 2.75; L = Specimen length; D = Specimen diameter;  $\bar{\sigma}_c$  = Average isotropic effective consolidation stress;  $u_b$  = Back-pressure;  $i_{avg}$  = Average hydraulic gradient; B = B factor;  $\Delta V/V_o$  = Volume change (+ denotes swell; - denotes consolidation);  $k_{20}$  = Saturated hydraulic conductivity at 20°C; and -200 = Fines content.

Where:  $w_c$  = Moisture content;  $\gamma_d$  = Dry density; S = Calculated degree of saturation using an assumed specific gravity of 2.70 or 2.75; L = Specimen length;  
 D = Specimen diameter;  $\bar{\sigma}_c$  = Average isotropic effective consolidation stress;  $u_b$  = Back-pressure;  $i_{avg}$  = Average hydraulic gradient; B = B factor;  $\Delta V/V_o$  = Volume change (+ denotes swell; - denotes consolidation);  $k_{20}$  = Saturated hydraulic conductivity at 20°C; and -200 = Fines content.

Table 3

ISOTROPICALLY CONSOLIDATED  
UNDRAINED TRIAXIAL COMPRESSION (CIUC) TEST RESULTS

Boring	Sample	Depth (feet)	Initial Conditions						$\sigma'_1$ (kg/cm <sup>2</sup> )	$u_a$ (kg/cm <sup>2</sup> )	B Factor (%)	Pre-Shear Conditions			-200 (%)	Stresses and Strains at $(\sigma_1 - \sigma_3)_{max}$ and $(\sigma'_1/\sigma'_3)_{max}$				
			H (cm)	D (cm)	w <sub>c</sub> (%)	V <sub>d</sub> (lb/ft <sup>3</sup> )	G <sub>s</sub>	S (%)				$\epsilon_{ax}$ (%)	V <sub>d</sub> (lb/ft <sup>3</sup> )	w <sub>c</sub> (%)		Criteria	$\epsilon_s$ (%)	$\Delta u$ (kg/cm <sup>2</sup> )	$\sigma'_1$ (kg/cm <sup>2</sup> )	$\sigma'_3$ (kg/cm <sup>2</sup> )
SPT-1A	US-1	7-9	7.13	3.55	109.5	42.8	2.75	100	4.29	9.0	99	-26.3	58.0	71.2	100	$(\sigma_1 - \sigma_3)_{max}$ $(\sigma'_1/\sigma'_3)_{max}$	12.2 12.5	2.83 2.84	3.64 3.63	1.50 1.49
SPT-2A	US-1	30-32	7.11	3.53	37.2	83.7	2.70	99	5.58	8.0	93*	-9.5	92.5	30.4	35	$(\sigma_1 - \sigma_3)_{max}$ $(\sigma'_1/\sigma'_3)_{max}$	10.0 8.9	3.88 3.88	5.93 5.92	1.71 1.70
SPT-3A	US-1	6-8	7.10	3.54	104.2	44.5	2.75	100	0.39	12.0	100	-0.5	44.8	103.1	100	$(\sigma_1 - \sigma_3)_{max}$ $(\sigma'_1/\sigma'_3)_{max}$	2.7 2.3	0.27 0.27	0.68 0.67	0.12 0.12
	US-2	27-29	7.06	3.52	40.7	80.3	2.70	100	1.46	12.0	98	-9.5	88.7	33.3	26	$(\sigma_1 - \sigma_3)_{max}$ $(\sigma'_1/\sigma'_3)_{max}$	4.9 10.7	1.14 1.10	1.80 1.75	0.44 0.42
	US-2	27-29	7.07	3.53	37.8	83.6	2.70	100	5.32	7.5	93	-10.0	92.9	30.2	25	$(\sigma_1 - \sigma_3)_{max}$ $(\sigma'_1/\sigma'_3)_{max}$	17.3 9.8	3.93 3.96	5.27 5.13	1.44 1.39
SPT-4A	US-1	7.5-9.5	7.11	3.55	102.3	45.1	2.75	100	2.34	10.5	100	-17.5	54.7	77.8	100	$(\sigma_1 - \sigma_3)_{max}$ $(\sigma'_1/\sigma'_3)_{max}$	6.8 14.0	1.36 1.57	2.36 2.12	1.00 0.81
SPT-5A	US-1	6-8	7.12	3.55	101.4	45.3	2.75	100	1.85	12.0	100	-15.4	53.6	80.1	99	$(\sigma_1 - \sigma_3)_{max}$ $(\sigma'_1/\sigma'_3)_{max}$	7.8 14.5	1.22 1.34	2.16 2.03	0.65 0.54
SPT-6A	US-1	12-14	7.10	3.54	68.3	59.8	2.75	100	3.32	10.0	95	-13.2	68.9	54.3	96	$(\sigma_1 - \sigma_3)_{max}$ $(\sigma'_1/\sigma'_3)_{max}$	3.4 5.8	2.26 2.40	3.31 3.11	1.05 0.94
SPT-7A	US-1	25-27	7.11	3.52	45.2	75.2	2.70	98	1.46	12.0	98	-3.3	77.7	43.2	31	$(\sigma_1 - \sigma_3)_{max}$ $(\sigma'_1/\sigma'_3)_{max}$	5.1 10.1	0.83 0.85	2.66 2.64	0.66 0.65

Where: H = Specimen height; D = Specimen diameter; w<sub>c</sub> = Moisture content; γ<sub>d</sub> = Dry density; G<sub>s</sub> = Specific gravity (assumed); S = Calculated degree of saturation using the assumed specific gravity; σ'<sub>1</sub> = Isotropic effective consolidation stress; u<sub>a</sub> = Back-pressure; ε<sub>ax</sub> = Volumetric strain (negative denotes consolidation and positive denotes swelling) during isotropic consolidation; -200 = Amount of material finer than the U.S. Standard No. 200 sieve; ε<sub>s</sub> = Axial strain; Δu = Excess pore pressure; σ'<sub>1</sub> = Effective major principal stress; σ'<sub>3</sub> = Effective minor principal stress.

\* B factor remained relatively constant for two consecutive increments of applied cell pressure.

Where: H = Specimen height; D = Specimen diameter; w<sub>c</sub> = Moisture content; Y<sub>d</sub> = Dry density; G<sub>s</sub> = Specific gravity (assumed); S = Calculated degree of saturation using the assumed specific gravity; σ<sub>1</sub>' = Isotropic effective consolidation stress; u<sub>a</sub> = Back-pressure; ε<sub>ax</sub> = Volumetric strain (negative denotes consolidation and positive denotes swelling) during isotropic consolidation; -200 = Amount of material finer than the U.S. Standard No. 200 sieve; ε<sub>s</sub> = Excess strain; Δu = Excess pore pressure; σ<sub>1</sub>' = Effective major principal stress; σ<sub>3</sub>' = Effective minor principal stress.

\* B factor remained relatively constant for two consecutive increments of applied cell pressure.

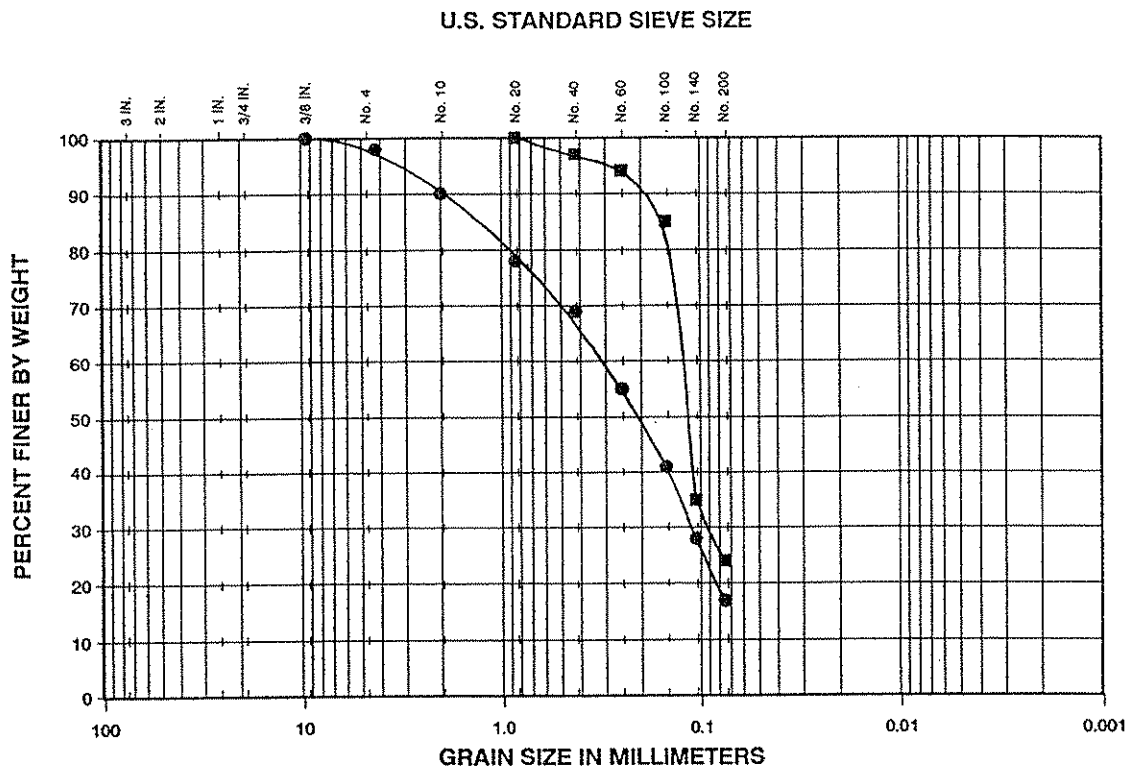


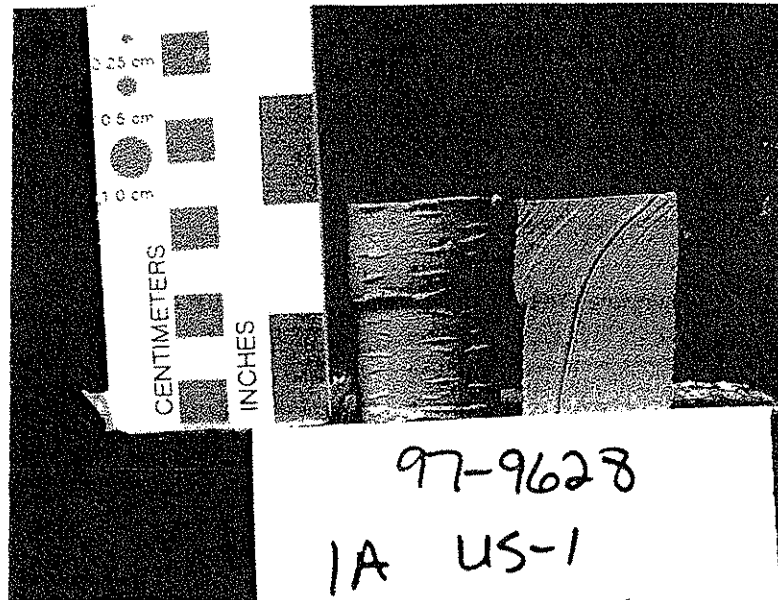
Table 4

UNCONFINED COMPRESSION TEST RESULTS

Boring	Sample	Depth (feet)	Specimen Dimensions			$w_c$ (%)	$Y_d$ (lb/ft <sup>3</sup> )	-200 (%)	$\dot{\epsilon}$ (cm/min)	$\epsilon_t$ (%)	Maximum Load (kg)	Unconfined Compressive Strength (kg/cm <sup>2</sup> )
			Height H (cm)	Diameter D (cm)	H/D							
SPT-3A	US-2	27 - 29	7.10	3.53	2.01	34.6	87.2	21	0.076	2.9	5.88	0.58
SPT-4A	US-1	7.5 - 9.5	7.11	3.52	2.02	107.0	44.3	100	0.076	4.8	3.52	0.34
SPT-5A	US-1	6 - 8	7.12	3.53	2.02	102.5	45.6	100	0.076	4.8	4.00	0.39
Where: $w_c$ = Moisture content measured at end of test; $Y_d$ = Dry density; -200 = Fines content (Amount of material finer than the U.S. Standard No. 200 sieve); $\dot{\epsilon}$ = Vertical displacement rate; and $\epsilon_t$ = Axial strain at maximum load.												

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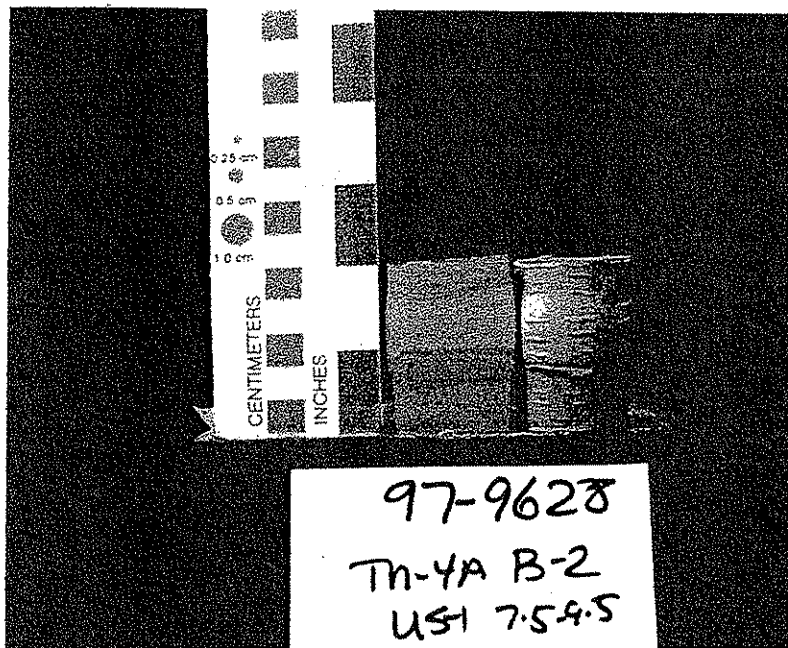
A) SPECIMEN FROM BORING SPT-1A, SAMPLE US-1



B) SPECIMEN FROM BORING SPT-5A, SAMPLE US-1


PHOTOGRAPHS OF TRIAXIAL TEST SPECIMENS  
FROM BORINGS SPT-1A AND SPT-5A

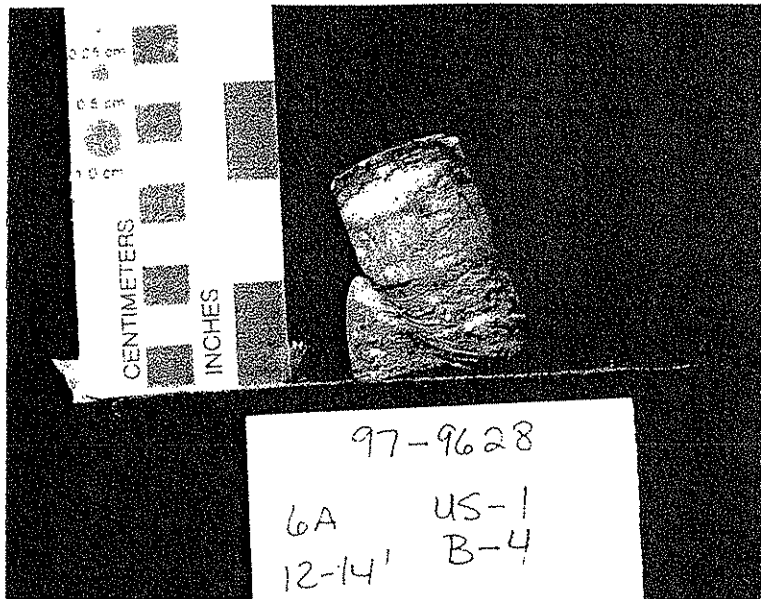
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants			
SOUTHEAST LANDFILL HILLSBOROUGH COUNTY REMEDIAL ENGINEERING & SCIENCE, INC. ORLANDO, FLORIDA			
DRAWN BY: SA	CHECKED BY: SA	DATE: 06-18-97	
FILE NO.: 97-9628	APPROVED BY: <i>Thomas J. Ardan</i>	FIGURE: 2	



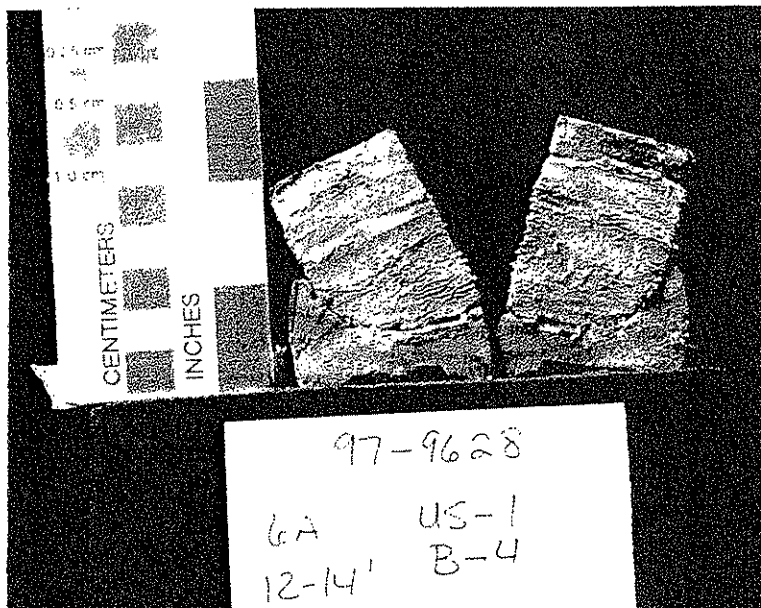
SPECIMEN FROM BORING SPT-4A, SAMPLE US-1

PHOTOGRAPH OF TRIAXIAL TEST SPECIMEN  
FROM BORING SPT-4A

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FILE NO.: 97-9628	APPROVED BY: <i>Thomas Ardaman</i>	FIGURE: 3	




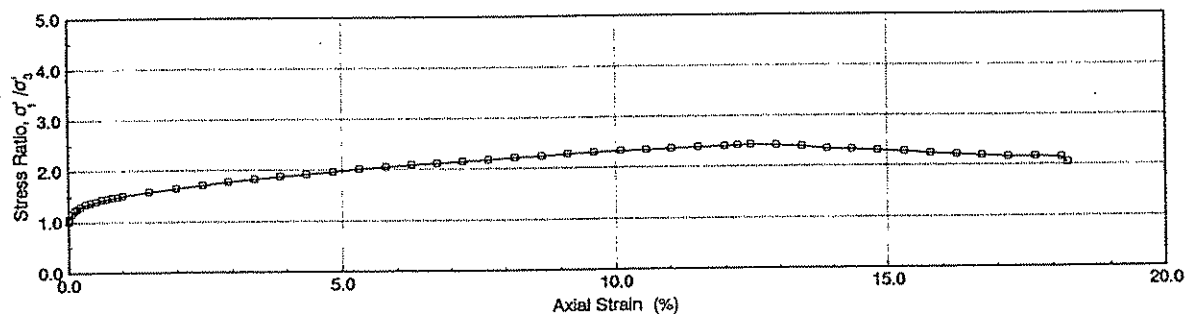
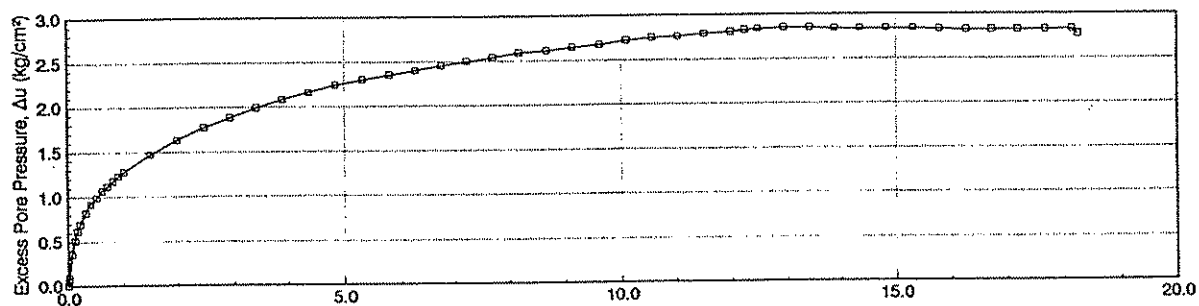
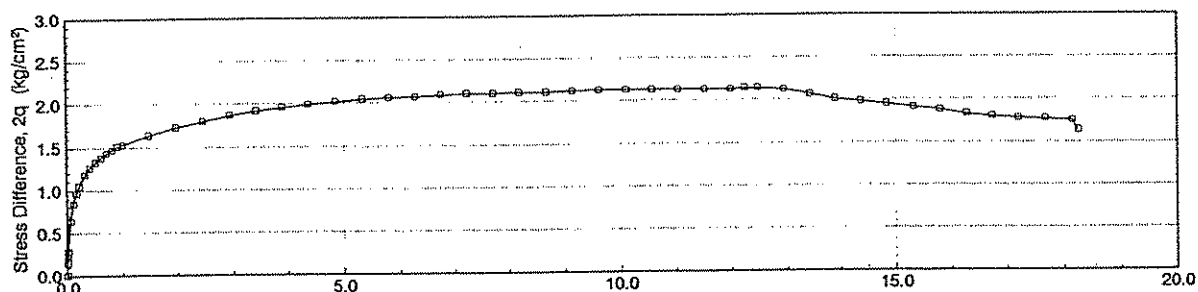
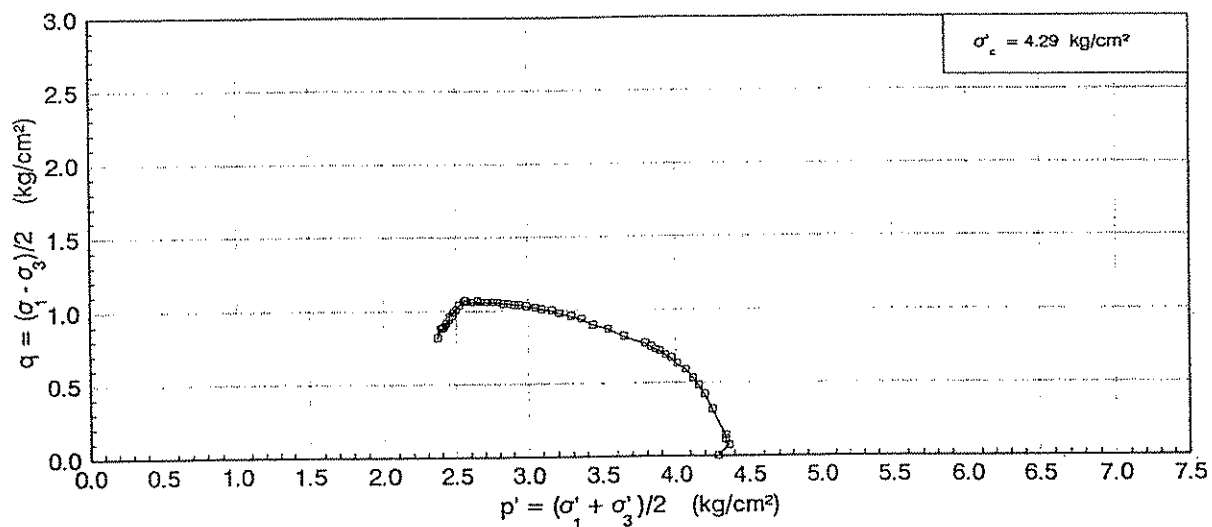
A) VIEW OF SPECIMEN AT END OF TEST



B) VIEW OF LAMINATED STRUCTURE OF SPECIMEN

**PHOTOGRAPHS OF TRIAXIAL TEST SPECIMEN  
FROM BORING SPT-6A, SAMPLE US-1**

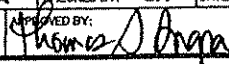
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants			
<b>SOUTHEAST LANDFILL HILLSBOROUGH COUNTY</b>			
<b>REMEDIATION ENGINEERING &amp; SCIENCE, INC. ORLANDO, FLORIDA</b>			
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FILE NO.: 97-9628	APPROVED BY: <i>Thomas Arga</i>	FIGURE:	4

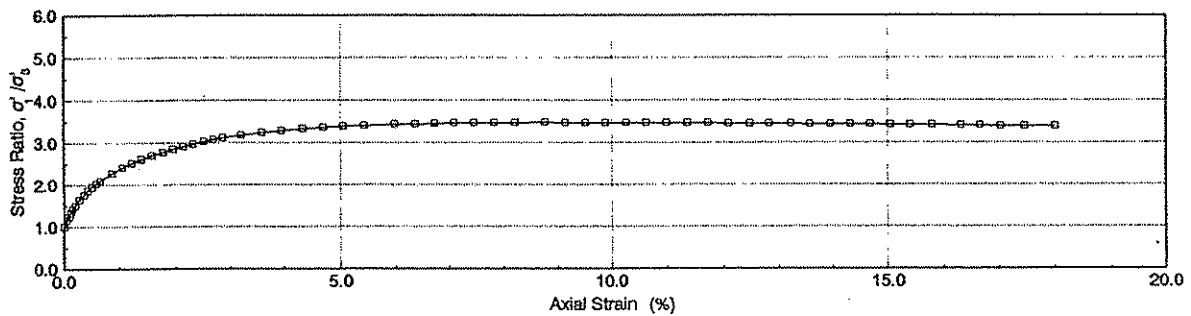
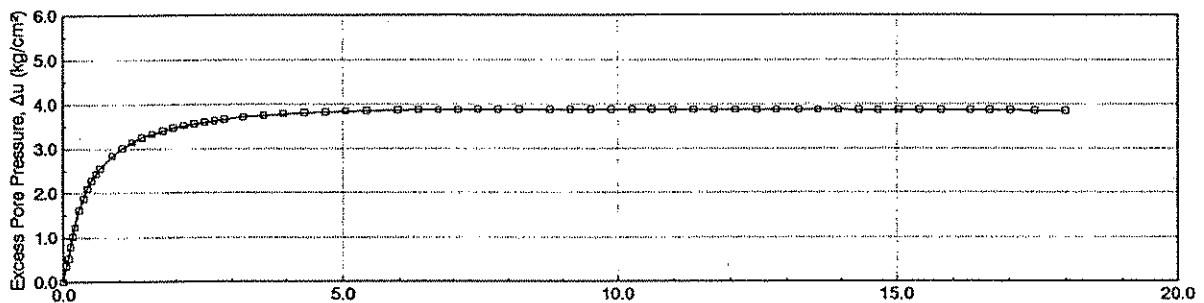
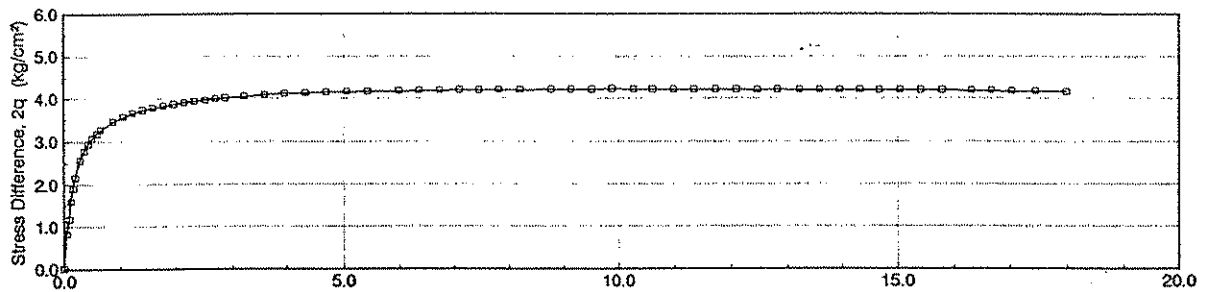
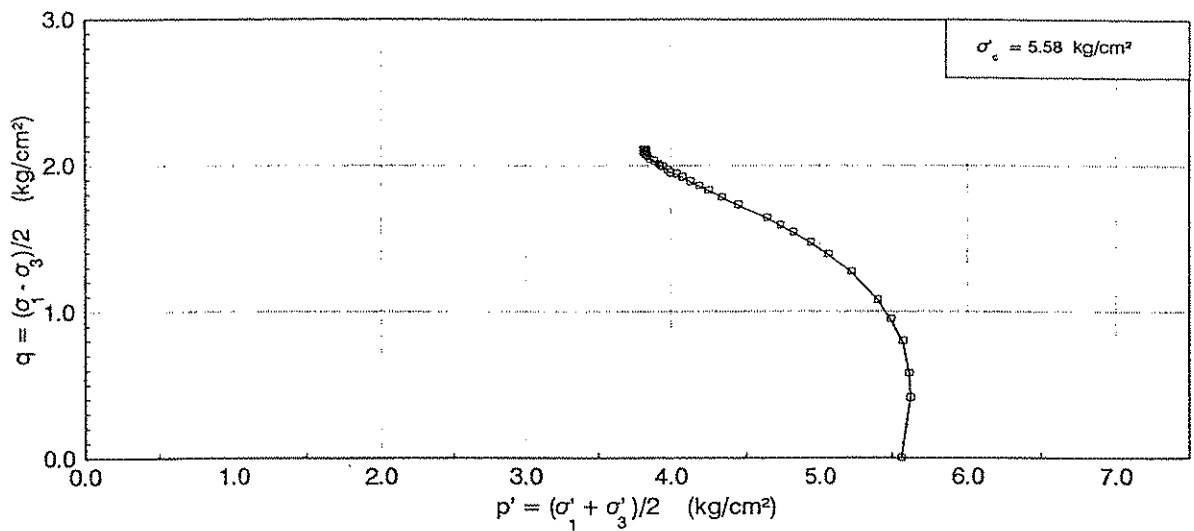


# CONSOLIDATED UNDRAINED (CIUC) TRIAXIAL TEST ON BORING SPT-1A, SAMPLE US-1



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 Geotechnical, Environmental and  
 Materials Consultants

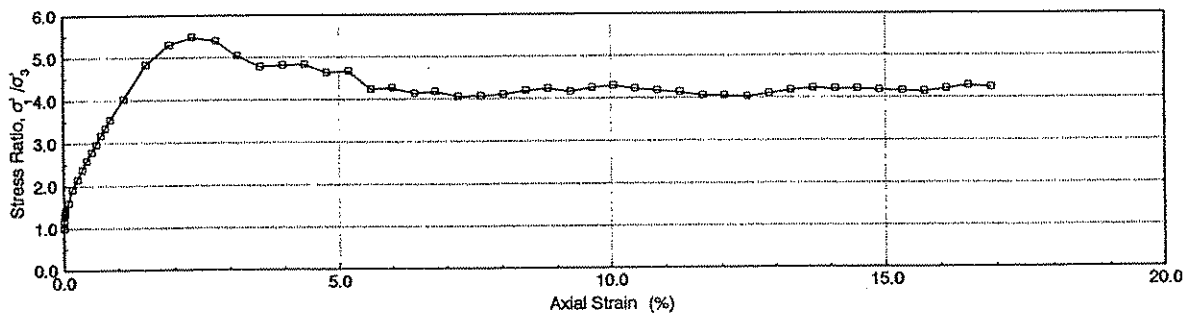
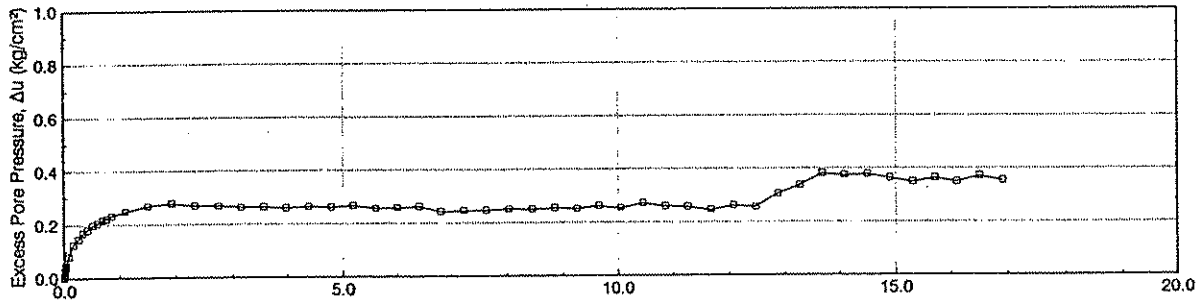
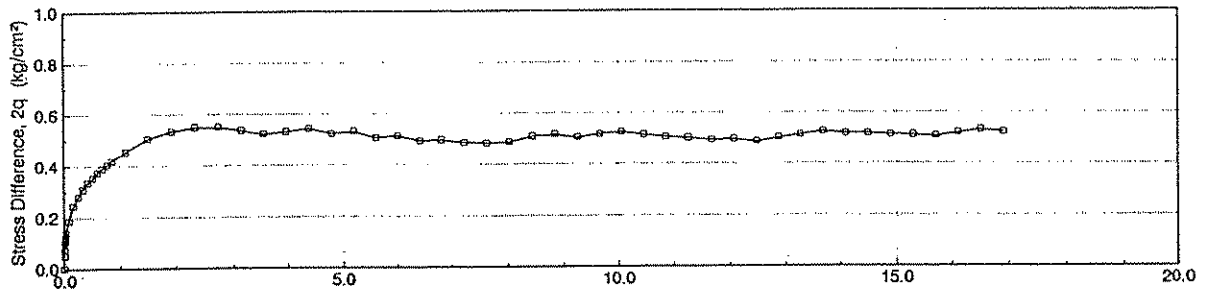
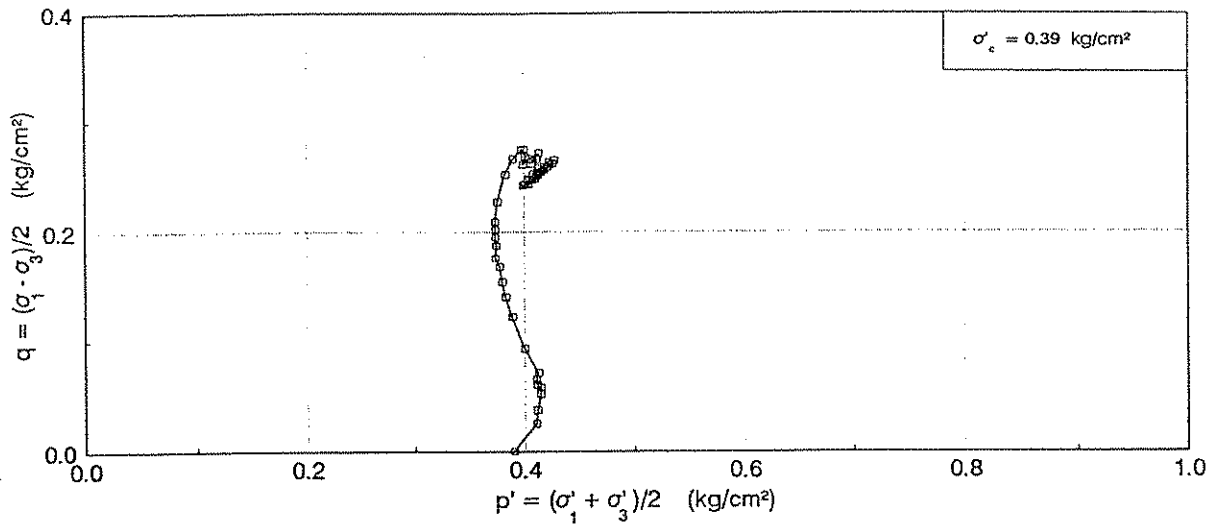
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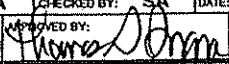


**CONSOLIDATED UNDRAINED (CIUC) TRIAXIAL TEST ON  
BORING SPT-2A, SAMPLE US-1**

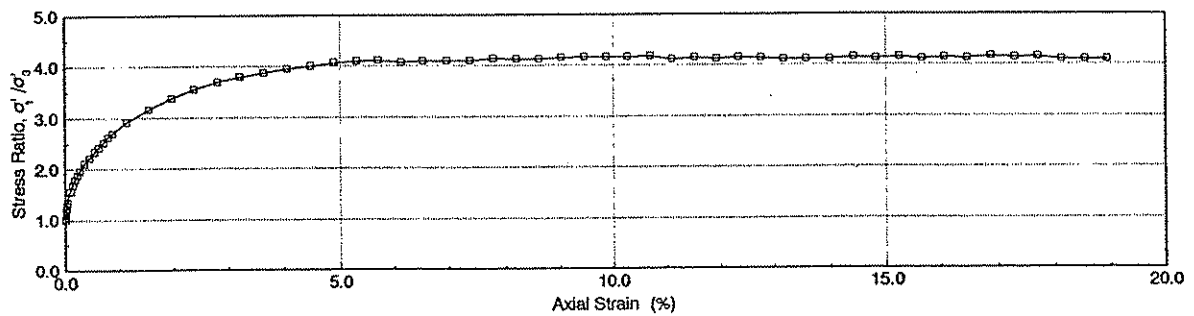
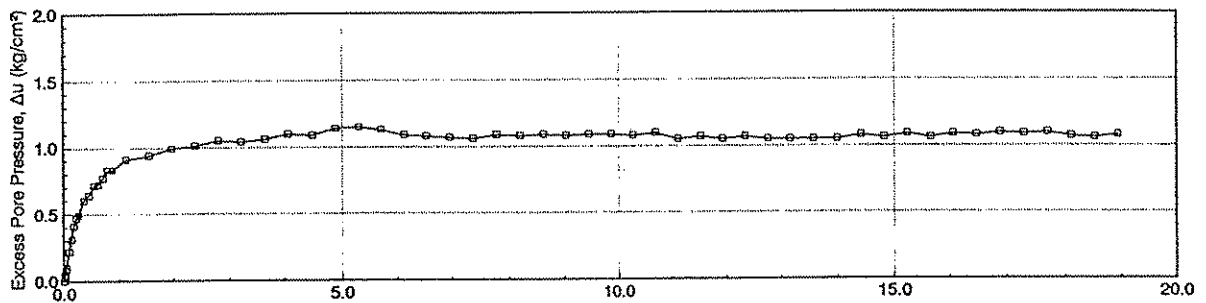
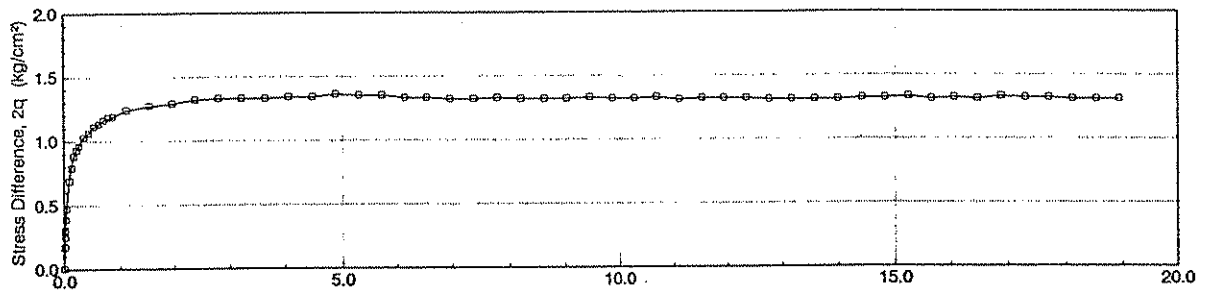
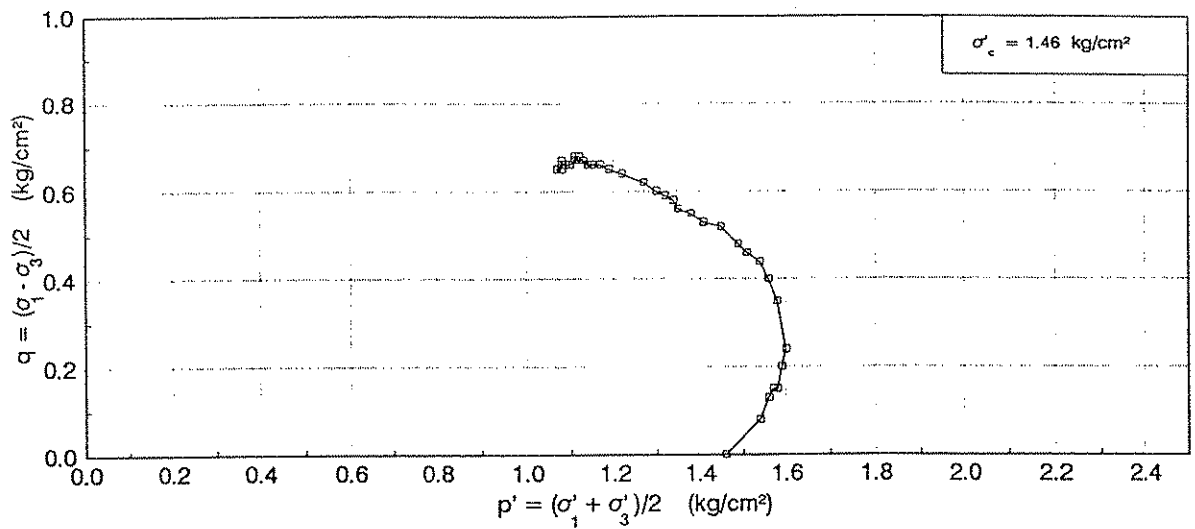
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FILE NO.: 97-9628	APPROVED BY: <i>[Signature]</i>	FIGURE: 6	




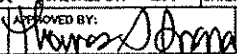
**CONSOLIDATED UNDRAINED (CIUC) TRIAXIAL TEST ON  
BORING SPT-3A, SAMPLE US-1**

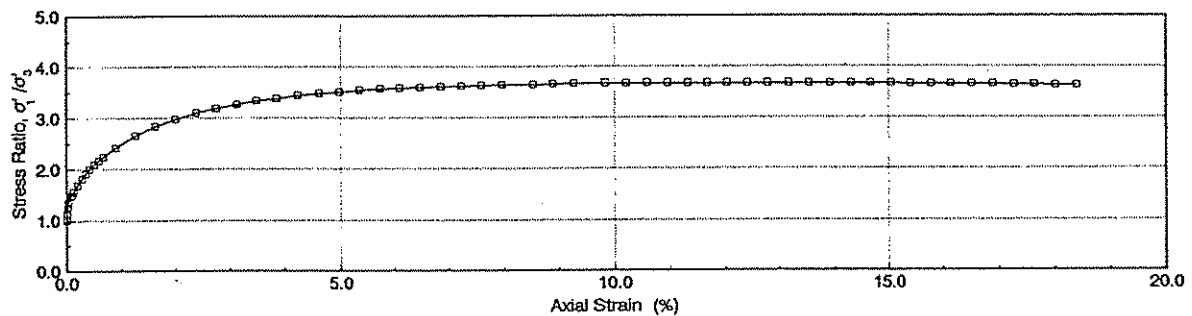
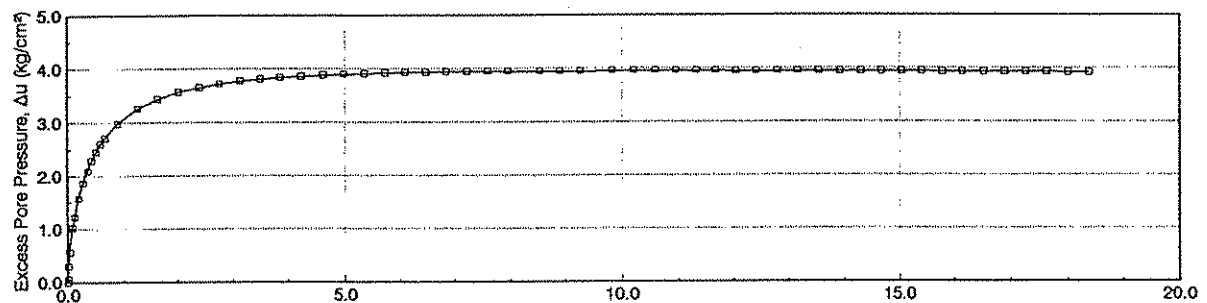
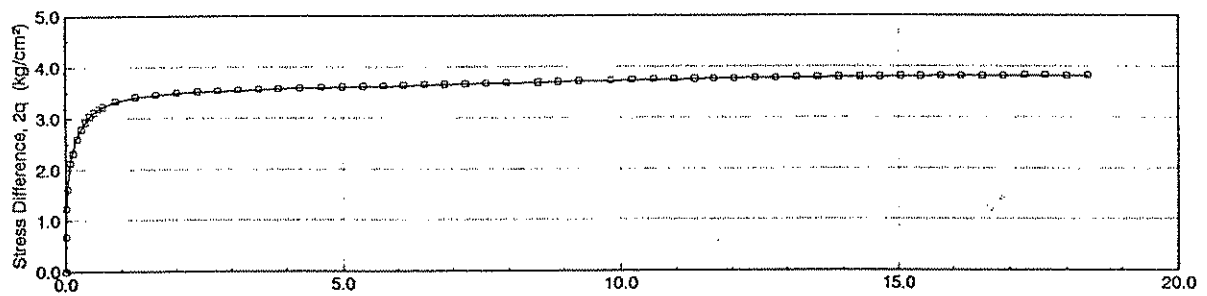
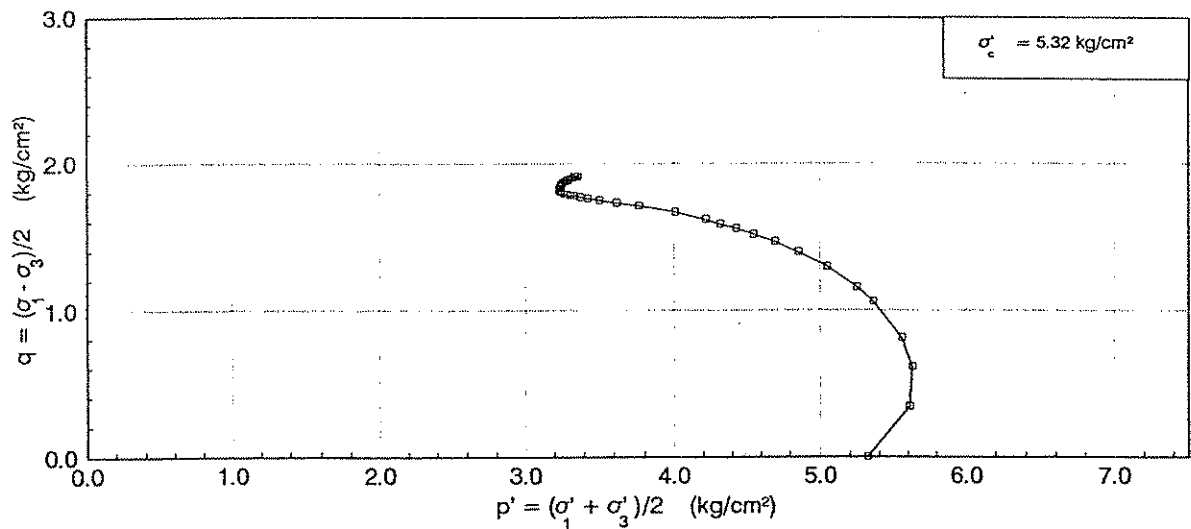
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<b>SOUTHEAST LANDFILL HILLSBOROUGH COUNTY</b>			
<b>REMEDIAL ENGINEERING &amp; SCIENCE, INC. ORLANDO, FLORIDA</b>			
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FILE NO.: 97-9628	APPROVED BY: 	FIGURE: 7	







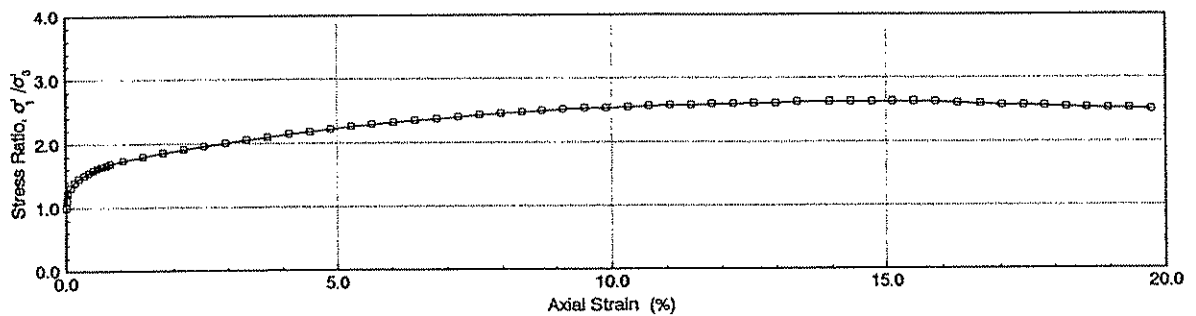
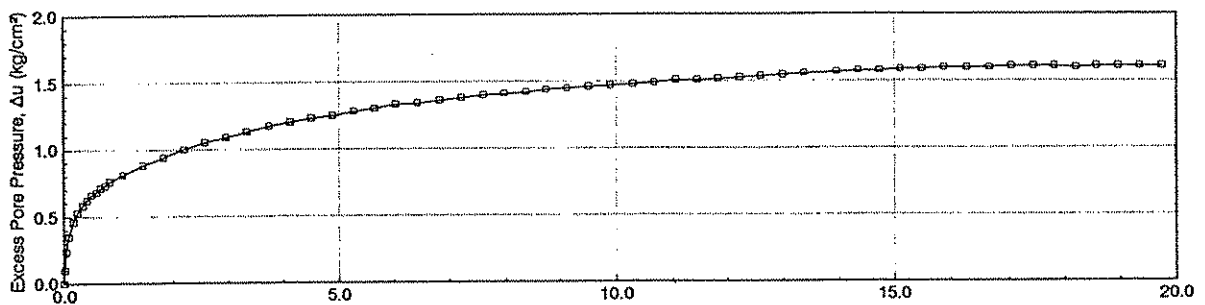
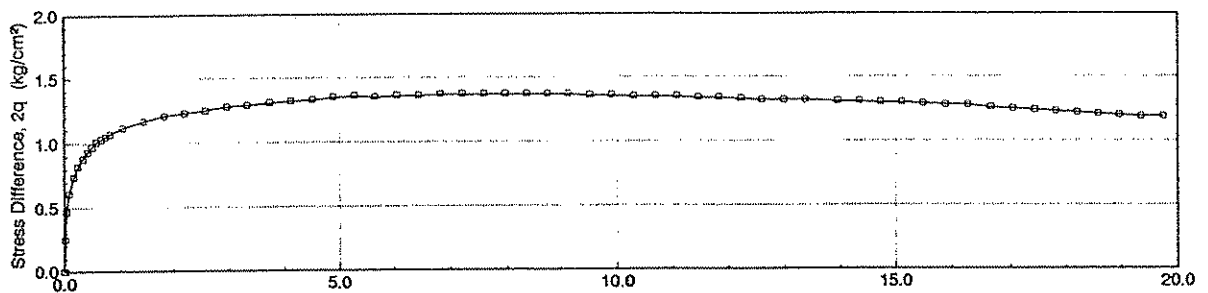
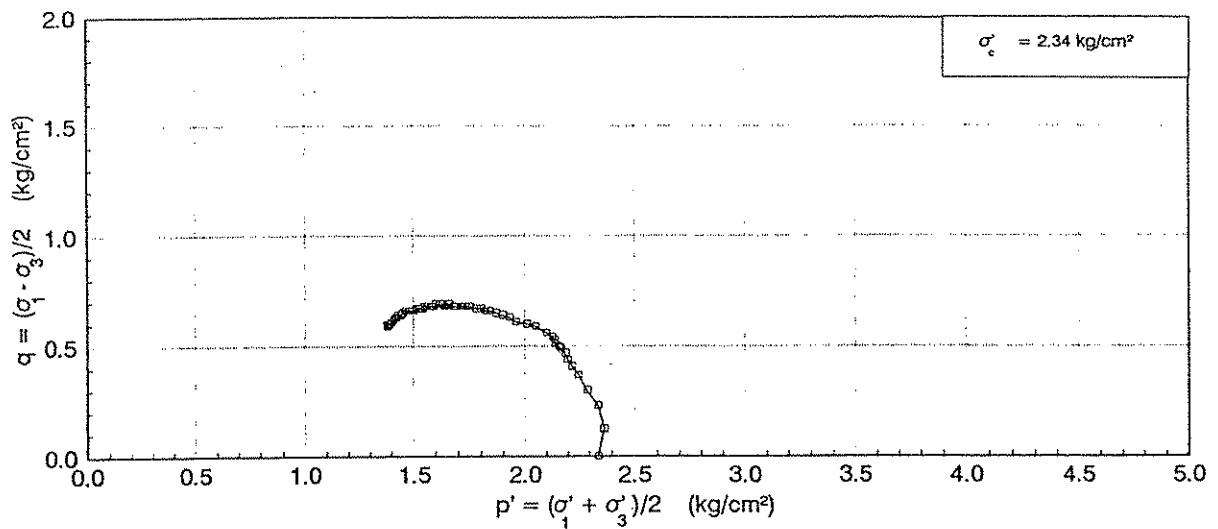
**CONSOLIDATED UNDRAINED (CIUC) TRIAXIAL TEST ON  
BORING SPT-3A, SAMPLE US-2**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants			
SOUTHEAST LANDFILL HILLSBOROUGH COUNTY REMEDIAL ENGINEERING & SCIENCE, INC. ORLANDO, FLORIDA			
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FILE NO.: 97-9628	APPROVED BY: 	FIGURE: 8	


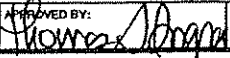


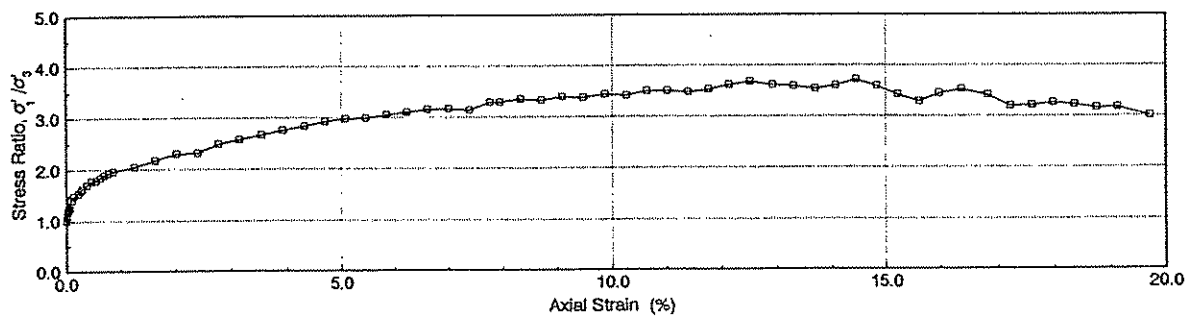
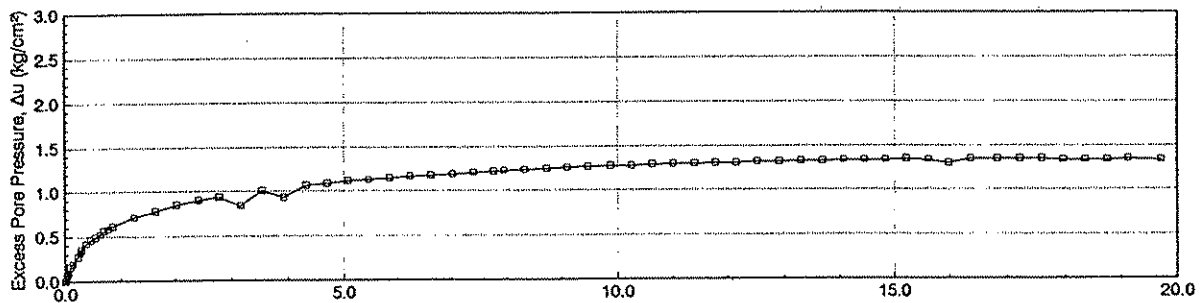
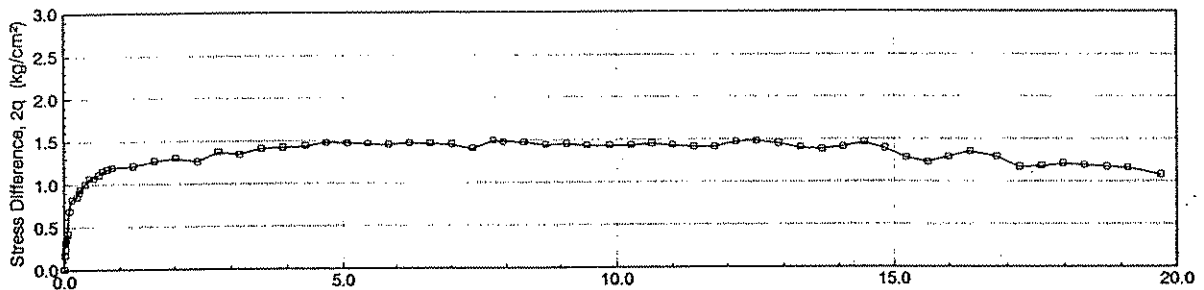
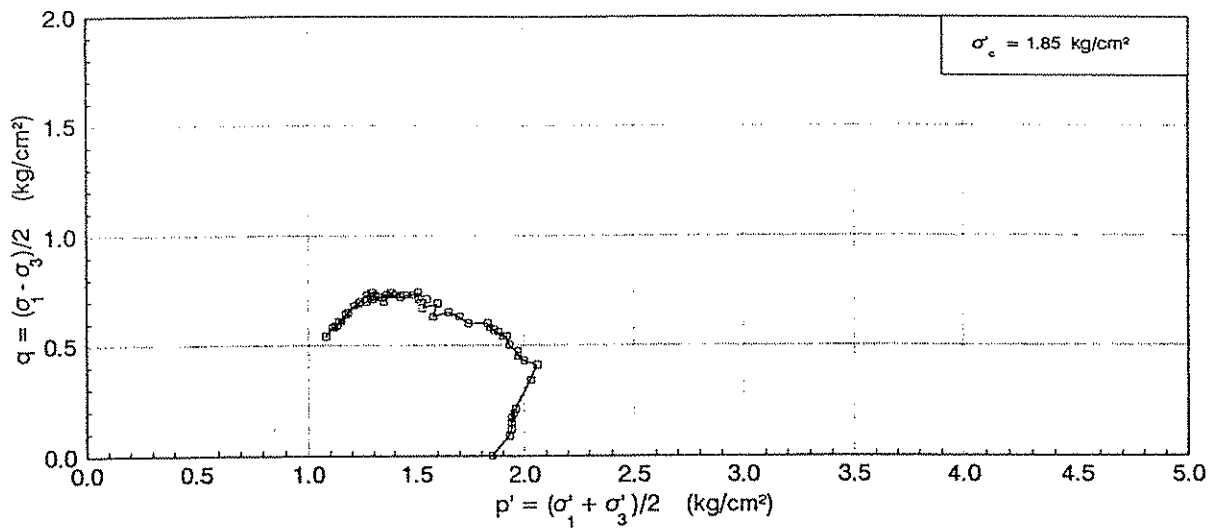
**CONSOLIDATED UNDRAINED (CIUC) TRIAXIAL TEST ON  
BORING SPT-3A, SAMPLE US-2**

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DRAWN BY: SA	CHECKED BY: SA	DATE: 06-18-97	
FILE NO: 97-9628	APPROVED BY: 	FIGURE: 9	




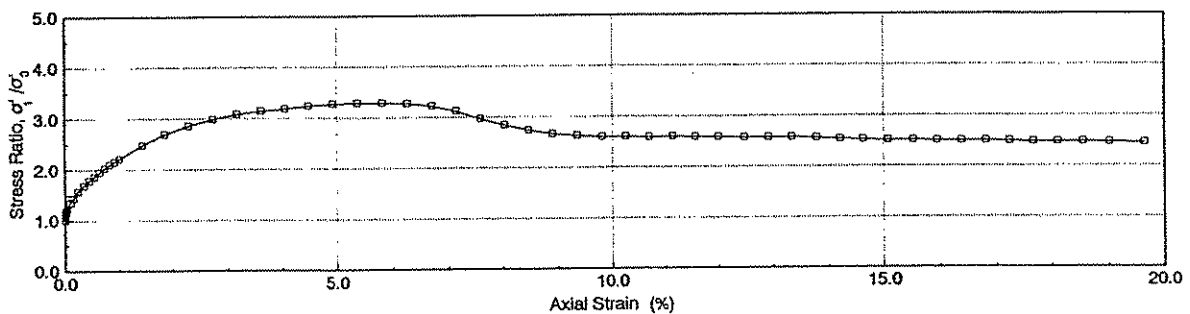
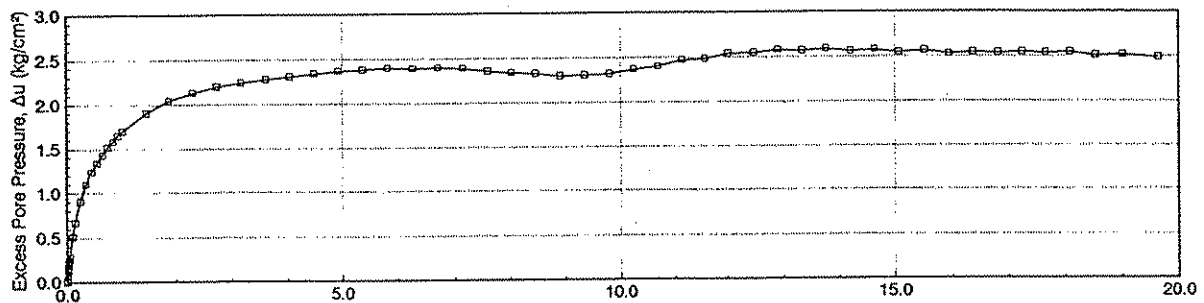
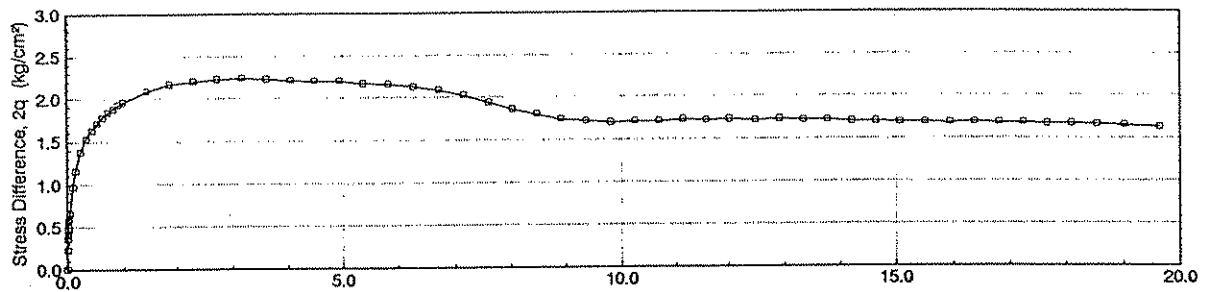
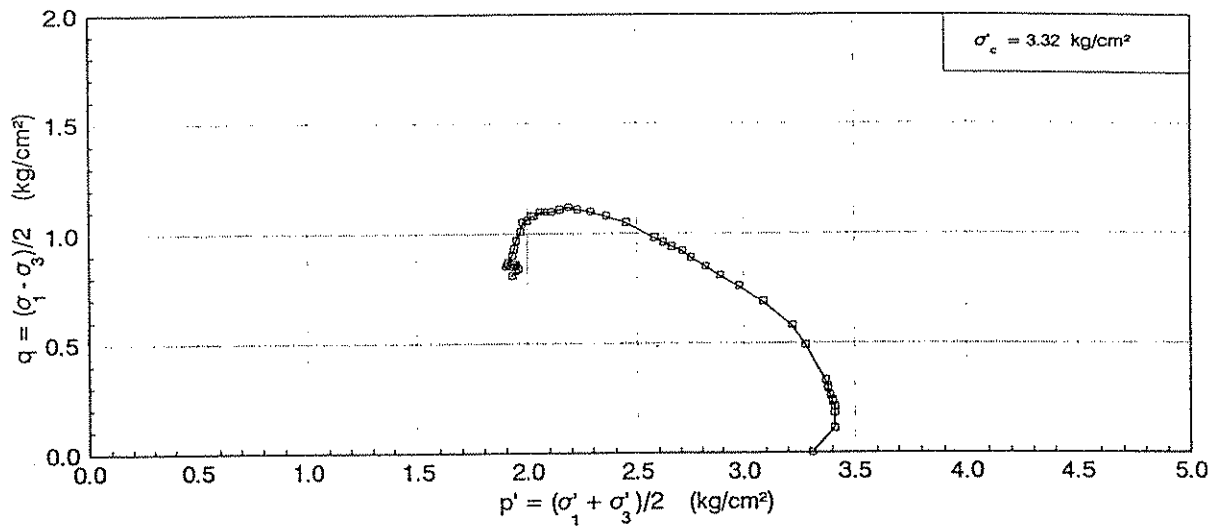
**CONSOLIDATED UNDRAINED (CIUC) TRIAXIAL TEST ON  
BORING SPT-4A, SAMPLE US-1**

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<b>REMEDIAL ENGINEERING &amp; SCIENCE, INC.</b> <b>ORLANDO, FLORIDA</b>		
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FILE NO.: 97-9628	APPROVED BY: 	FIGURE: 10


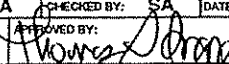


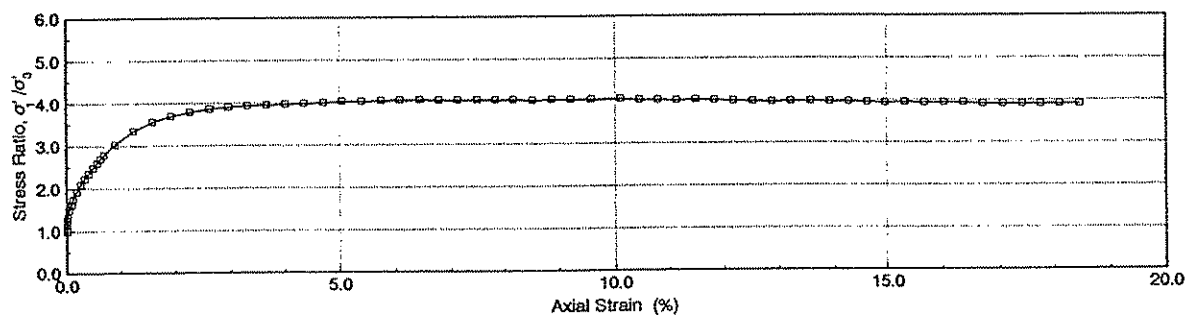
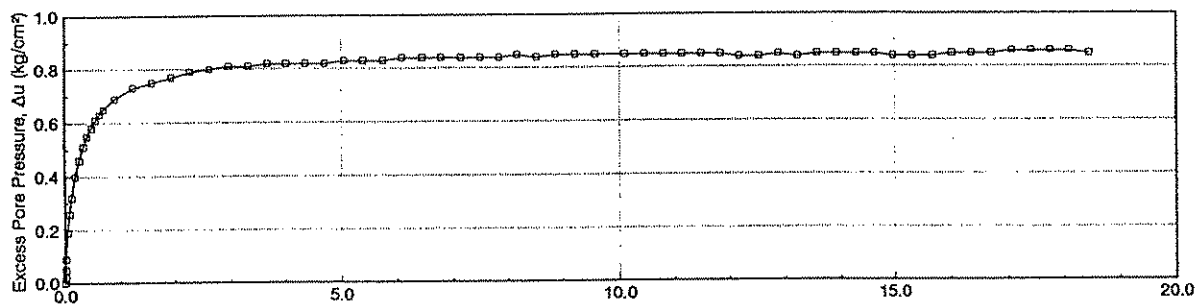
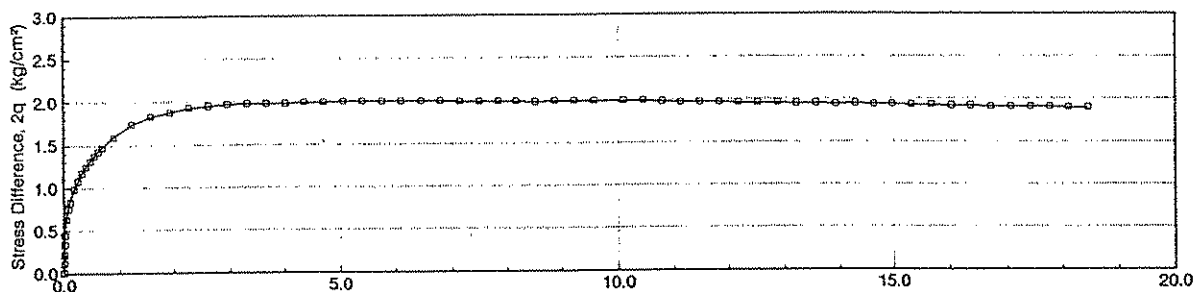
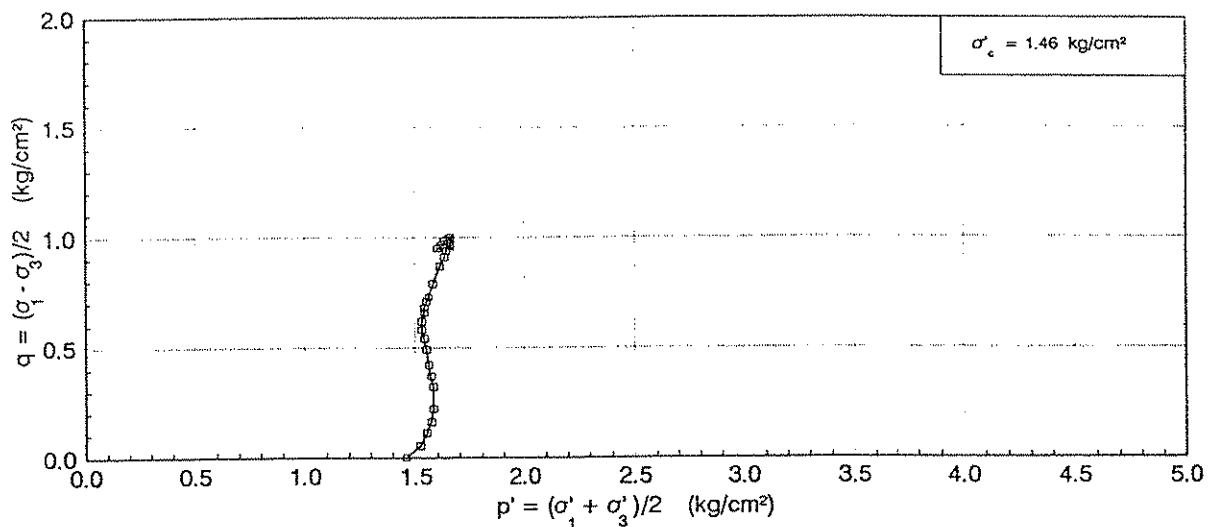
**CONSOLIDATED UNDRAINED (CIUC) TRIAXIAL TEST ON  
BORING SPT-5A, SAMPLE US-1**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants			
SOUTHEAST LANDFILL HILLSBOROUGH COUNTY REMEDIAL ENGINEERING & SCIENCE, INC. ORLANDO, FLORIDA			
DRAWN BY: SA	CHECKED BY: SA	DATE: 06-18-97	
FILE NO.: 97-9628	APPROVED BY: <i>Thomas J. Ardan</i>	FIGURE:	11


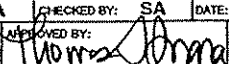


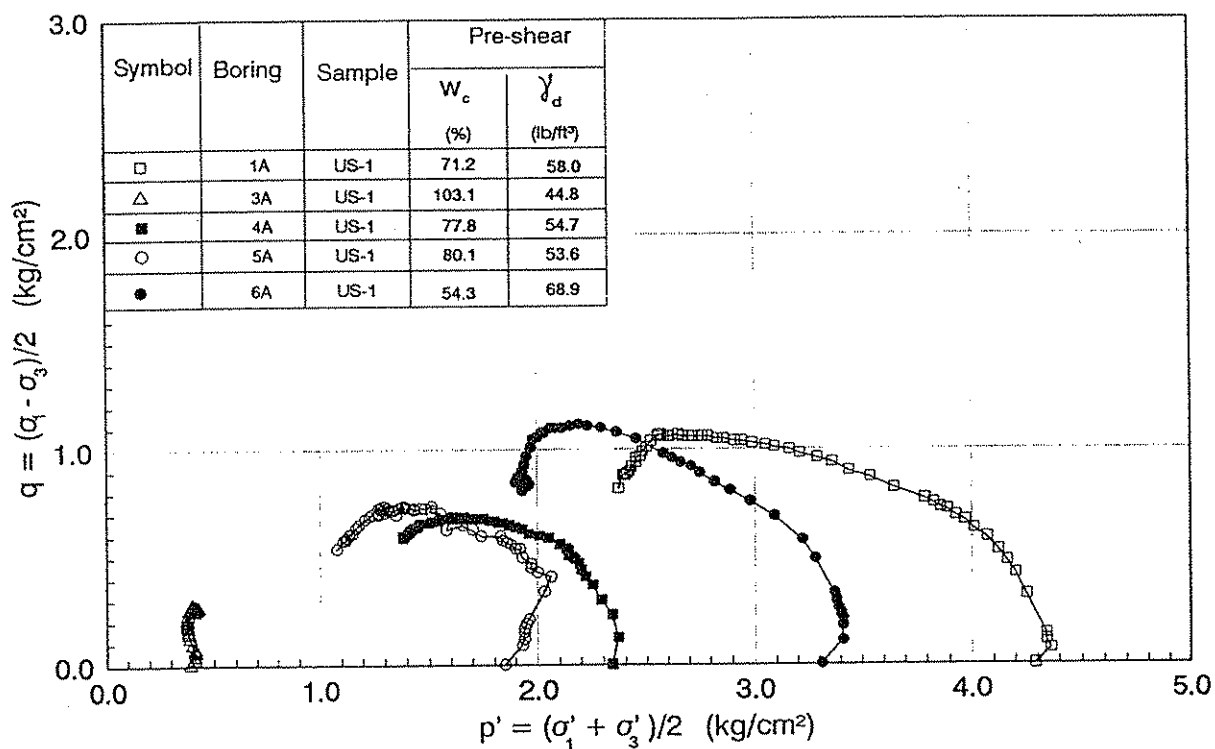
**CONSOLIDATED UNDRAINED (CIUC) TRIAXIAL TEST ON  
BORING SPT-6A, SAMPLE US-1**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants			
<b>SOUTHEAST LANDFILL HILLSBOROUGH COUNTY</b>			
<b>REMEDIAL ENGINEERING &amp; SCIENCE, INC.</b> ORLANDO, FLORIDA			
DRAWN BY: SA	CHECKED BY: SA	DATE: 06-18-97	
FILE NO.: 97-9628	APPROVED BY: 	FIGURE: 12	




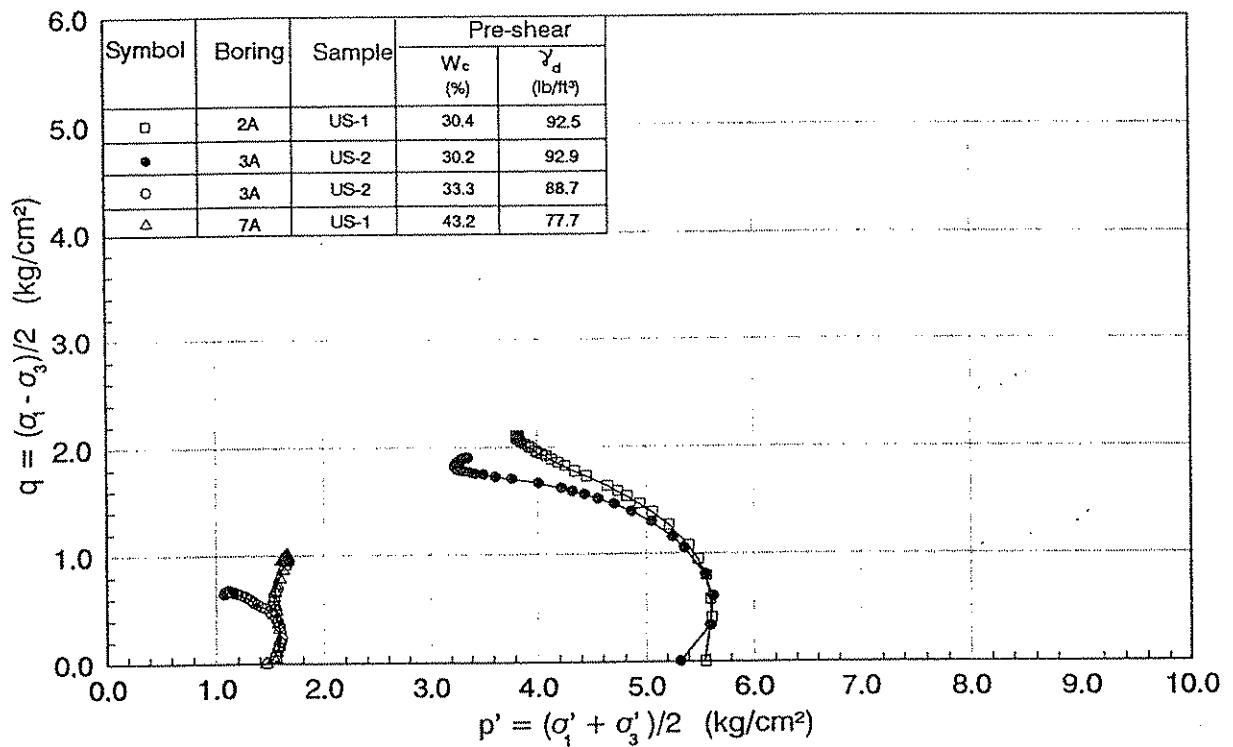
**CONSOLIDATED UNDRAINED (CIUC) TRIAXIAL TEST ON  
BORING SPT-7A, SAMPLE US-1**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants			
SOUTHEAST LANDFILL HILLSBOROUGH COUNTY REMEDIAL ENGINEERING & SCIENCE, INC. ORLANDO, FLORIDA			
DRAWN BY: SA	CHECKED BY: SA	DATE: 06-18-97	
FILE NO.: 97-9628	APPROVED BY: 	FIGURE: 13	


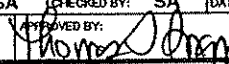


**EFFECTIVE STRESS PATHS FROM  
CONSOLIDATED UNDRAINED (CIUC) TRIAXIAL TESTS ON CLAY SPECIMENS**

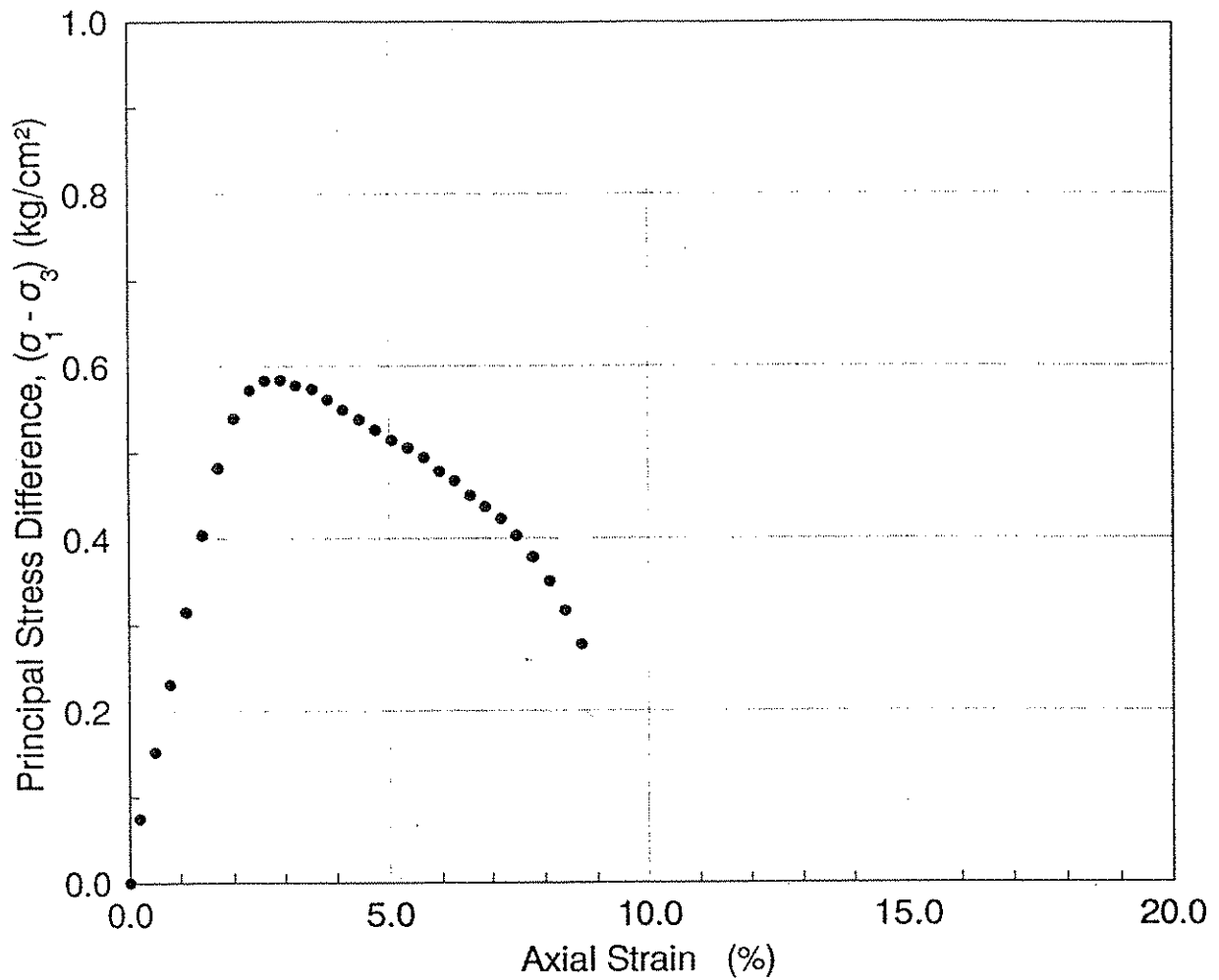
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL HILLSBOROUGH COUNTY</b>		
<b>REMEDIATION ENGINEERING &amp; SCIENCE, INC. ORLANDO, FLORIDA</b>		
DRAWN BY: SA	CHECKED BY: SA	DATE: 06-18-97
FILE NO.: 97-9628	APPROVED BY: <i>Thomas J. Brown</i>	FIGURE: 14




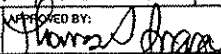
EFFECTIVE STRESS PATHS FROM  
CONSOLIDATED UNDRAINED (CIUC) TRIAXIAL TESTS ON  
CLAYEY SAND SPECIMENS

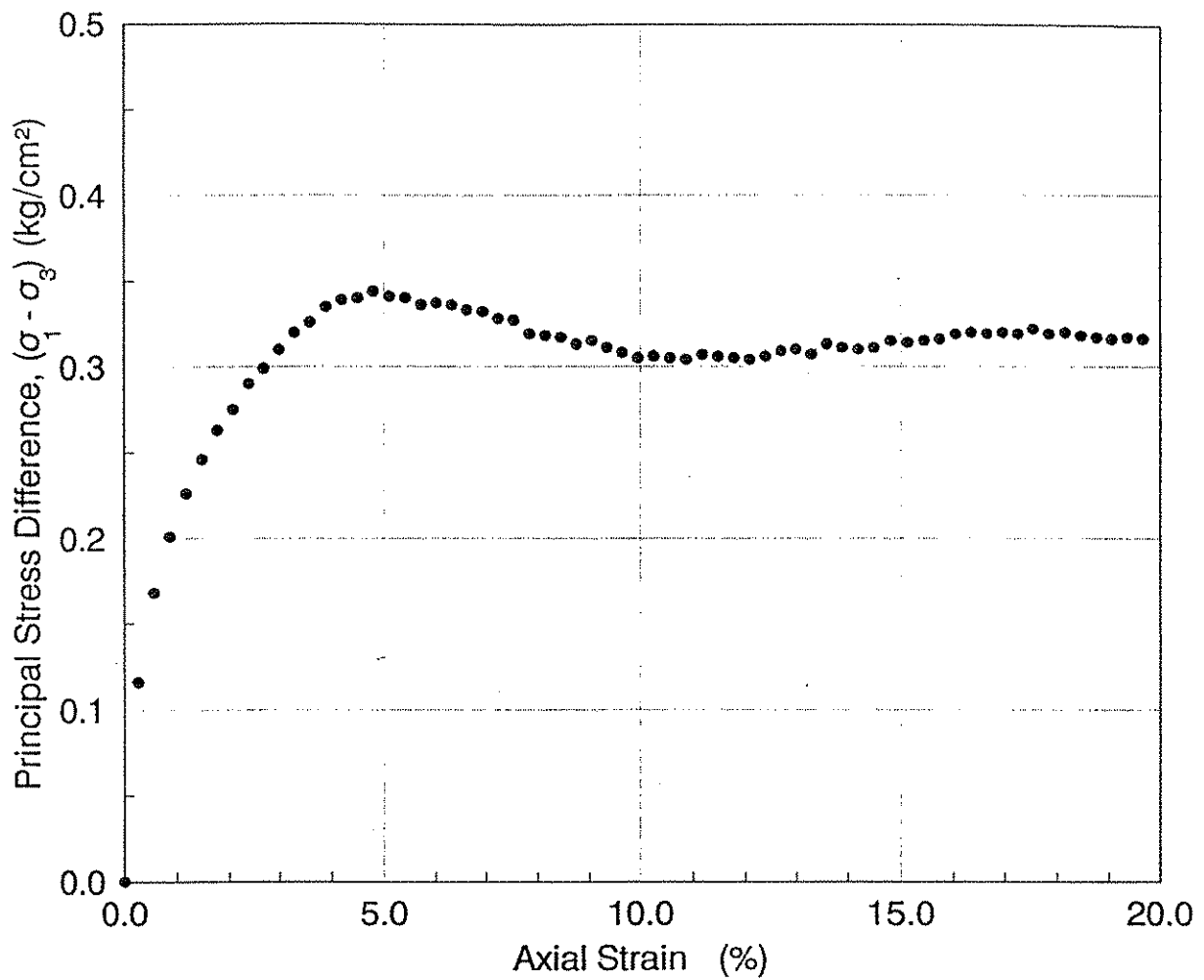
 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL</b> <b>HILLSBOROUGH COUNTY</b> <b>REMEDIAL ENGINEERING &amp; SCIENCE, INC.</b> <b>ORLANDO, FLORIDA</b>		
DRAWN BY: SA	CHECKED BY: SA	DATE: 06-18-97
FILE NO.: 97-9628	APPROVED BY: 	FIGURE: 15




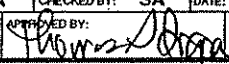


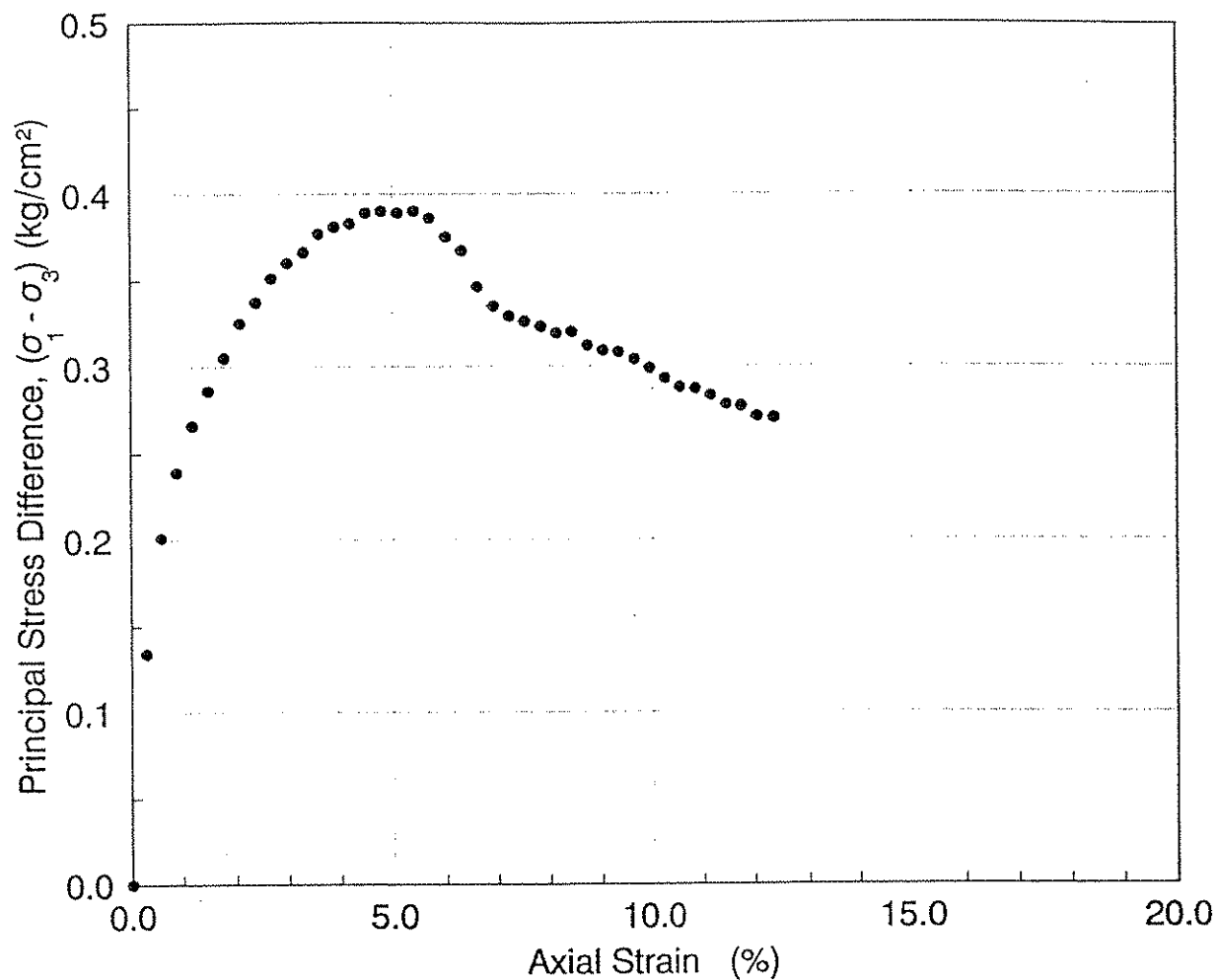
**UNCONFINED COMPRESSION TEST ON  
SPECIMEN FROM BORING SPT-3A, SAMPLE US-2**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
SOUTHEAST LANDFILL HILLSBOROUGH COUNTY REMEDIAL ENGINEERING & SCIENCE, INC. ORLANDO, FLORIDA		
DRAWN BY: SA	CHECKED BY: SA	DATE: 06-18-97
FILE NO.: 97-9628	APPROVED BY: 	FIGURE: 16





**UNCONFINED COMPRESSION TEST ON  
SPECIMEN FROM BORING SPT-4A, SAMPLE US-1**

 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants			
SOUTHEAST LANDFILL HILLSBOROUGH COUNTY REMEDIAL ENGINEERING & SCIENCE, INC. ORLANDO, FLORIDA			
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FILE NO.: 97-9628	APPROVED BY: 	FIGURE: 17	



**UNCONFINED COMPRESSION TEST ON  
SPECIMEN FROM BORING SPT-5A, SAMPLE US-1**

			<b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants		
<b>SOUTHEAST LANDFILL HILLSBOROUGH COUNTY</b>					
<b>REMEDIAL ENGINEERING &amp; SCIENCE, INC. ORLANDO, FLORIDA</b>					
DRAWN BY: SA		CHECKED BY: SA		DATE: 06-18-97	
FILE NO.: 97-9628		APPROVED BY: 		FIGURE: 18	