**INITIAL SAFETY FACTOR ASSESSMENT**
**PLANT BARRY ASH POND**
**ALABAMA POWER COMPANY**

EPA's "Disposal of Coal Combustion Residuals from Electric Utilities" Final Rule (40 C.F.R. Part 257 and Part 261), §257.73(e), requires the owner or operator of an existing CCR surface impoundment to conduct periodic safety factor assessments. The owner or operator must document that the minimum safety factors outlined in §257.73(e)(1)(i) through (iv) for the critical embankment section are achieved.

The CCR surface impoundment located at Alabama Power Company's Plant Barry also referred to as the Plant Ash Pond is located on Plant Barry property, near Bucks, Alabama. The CCR surface impoundment is formed by an engineered perimeter embankment. The critical section of this CCR unit has been determined to be located on the east side of the northern portion of the ash pond embankment.

The analyses used to determine the minimum safety factor for the critical section resulted in the following minimum safety factors:

| Loading Condition | Minimum Calculated Safety Factor | Minimum Required Safety Factor |
|---|---|---|
| Long-term Maximum Storage Pool (Static) | 1.6 | 1.5 |
| Maximum Surcharge Pool (Static) | 1.5 | 1.4 |
| Seismic | 1.5 | 1.0 |

The embankments are constructed of clays and clayey sands that are not susceptible to liquefaction. Therefore, a minimum liquefaction safety factor determination was not required.

I hereby certify that the safety factor assessment was conducted in accordance with 40 C.F.R. Part 257.73 (e)(1).

12/1

James C. Pegues, P.E.
Licensed State of Alabama, PE No. 16516

SOUTHERN COMPANY

**Engineering and Construction Services Calculation**

| **Calculation Number:** TV-BA-APC387586-591-001 |
|---|

| **Project/Plant:** Plant Barry Ash Pond Dikes | **Unit(s):** Units 1-5 | **Discipline/Area:** ES&FS |
|---|---|---|
| **Title/Subject:** Factor of Safety Assessment for CCR Rule | | |
| **Purpose/Objective:** Analyze slope stability of Main Ash Pond Dike | | |
| **System or Equipment Tag Numbers:** NA | **Originator:** Rajendra S. Gondhalekar | |

**Contents**



**Revision Record**

| Rev. No. | Description | Originator Initial / Date | Reviewer Initial / Date | Approver Initial / Date |
|---|---|---|---|---|
| 0 | Issued for Information | RSG/10-04-16 | JAL/10-04-16 | JCP/10-04-16 |
| | | | | |
| | | | | |
| | | | | |

**Notes:**

## Purpose of Calculation

Barry Steam Plant is owned and operated by Alabama Power Company and located 30 miles north of Mobile, Alabama, off of Hwy 43 near Bucks, Alabama. Plant Barry is a seven unit generating facility, including two natural gas fired combined cycle units and five coal fired units. The five coal units produce approximately 220,000 tons of coal combustion products per year, including bottom ash and fly ash. The ash is sluiced to the on-site ash pond for storage.

In 1992, the east and west dikes were raised three feet to obtain additional storage capacity. Again, in 1998, the portions of these dikes that are located north of the existing diversion dike were raised an additional four feet on the inboard side. During this modification, the diversion dike was also added to the pond. The diversion dike acts as a buffer by creating an additional stilling basin for the ash before water is discharged. It was constructed on top of the existing fly ash deposits using bottom ash as the dike fill. In 2004, the South main dike was raised approximately three feet, again with inboard construction methods, to its current geometry and elevation.

Stability analyses were previously performed to support the embankment modifications in 1998, and 2004, and in conjunction with the EPA site inspection in 2010. The purpose of this calculation is to evaluate the stability of Plant Barry's main ash pond dike at the critical analysis section using current software.

## Methodology

GeoStudio 2012 (Version 8.15, Build 11777), Copyright 1991-2016, GEO-SLOPE International, Ltd.

Strata (Version alpha, Revision 0.2.0), Geotechnical Engineering Center, Department of Civil, Architectural, and Environmental Engineering, University of Texas.

Morgenstern-Price analytical method was run and reported.

## Criteria and Assumptions

The slope stability models were run using the following assumptions and design criteria:

- Seismic site response was determined using a one-dimensional equivalent linear site response analysis. The analysis was performed using Strata, utilizing random vibration theory. The input motion consisted of the USGS published 2008 Uniform Hazard Response Spectrum (UHRS) for Site Class B/C at a 2% Probability of Exceedance in 50 years. The UHRS was converted to a Fourier Amplitude Spectrum, and propagated through a representative one dimensional soil column using linear wave propagation with strain-dependent dynamic soil properties. The input soil properties and layer thickness were randomized based on defined statistical distributions to perform Monte

Carlo simulations for 100 realizations, which were used to generate a median estimate of the surface ground motions.

- The median surface ground motions were then used to calculate a pseudostatic seismic coefficient for utilization in the stability analysis using the approach suggested by Bray and Tavasarou (2009). The procedure calculates the seismic coefficient for an allowable seismic displacement and a probability exceedance of the displacement. For this analysis, an allowable displacement of 0.5 ft, and a probability of exceedance of 16% were conservatively selected, providing a seismic coefficient of 0.012g for use as a horizontal acceleration in the stability analysis.
- The current required minimum criteria (factors of safety) were taken from the Structural Integrity Criteria for existing CCR surface impoundment from 40 CFR 257.73, published April 17, 2015.
- The soil properties of unit weight, phi angle, and cohesion were obtained from historical laboratory and in-situ test results.
- Soil stratigraphy and piezometric data was estimated from the historical boring logs.
- Properties for ash were based on laboratory testing performed on undisturbed and remolded samples of ash from various plants and on engineering judgment.
- The COE EM 1110-2-1902, October 2003, allows the use of the phreatic surface established for the maximum storage condition (normal pool) in the analysis for the maximum surcharge loading condition. This is based on the short term duration of the surcharge loading relative to the permeability of the embankment and the foundation materials. This method is used in the analysis for the impoundments at this facility with surcharge loading.

The Cross-Section and materials used in this survey calculation were generally gathered from historical Barry ash pond stability reports: Ash pond south dike and diversion dike slope stability report, September 2004 Plant Barry Report of ash pond dike proposed modifications, January 1998, and Slope Stability Analysis of Main Ash Pond Dike, July 2010. The critical section for Barry was identified to be located along the North East Main Dike.

<u>North East Main Dike</u>

- Cross-section 5 was used for the NEMD analysis and obtained from Figure 3 of the *Plant Barry Report of Ash Pond Dike Proposed Modification, January 1998.*
- Soil properties were obtained from the Dilatometer test No. BA-19 from the *Plant Barry Report of Ash Pond Dike Proposed Modification, January 1998.*

Listed below are the soil properties used in the analyses:

### Input Data

The following soil properties were used in the analyses.

| North East Main Dike | | | |
|---|---|---|---|
| | γ (pcf) | c (psf) | ϕ (deg) |
| **Bottom Ash** | 95 | 0 | 35 |
| **Fly Ash** | 90 | 90 | 2 |
| **Dike Clayey Sand** | 102.9 | 0 | 30 |
| **Dike Clay** | 102 | 500 | 0 |
| **Organic Clay** | 90 | 444 | 0 |
| **Sand** | 107 | 0 | 35 |

### Hydrologic Considerations

The following hydraulic information is based on the calculation package Inflow Design Control System Plan: Hydrologic and Hydraulic Calculation Summary for Plant Barry Ash Pond by Southern Company Services, was used in the analyses. This calculation states that the Ash Pond is capable of handling the 1000-year 24-hour storm event with a maximum surcharge pool elevation of 20.26. The stability calculations conservative use a maximum surcharge pool elevation of 24 to match the top of the dike cross section.

### Load Conditions

The impoundment dike at Plant Barry Ash Pond was evaluated for the load conditions indicated in the following table. When appropriate, cases were run both in the ash and the dike.

## Summary of Conclusions

The following table lists the factors of safety for various slope stability failure conditions. All conditions are steady state except where noted. Construction cases were not considered. Based on the results of these analyses all structures are stable.

| North East Main Dike | | |
|---|---|---|
| **Case** | **Computed Factor of Safety** | **Typical Minimum Factor of Safety** |
| Long-term Maximum Storage Pool (Static) | 1.6 | 1.5 |
| Maximum Surcharge Pool (Static) | 1.5 | 1.4 |
| Seismic | 1.5 | 1.0 |

The analyses indicate that in all cases the ash pond dike, the factors of safety are above the required minimums.

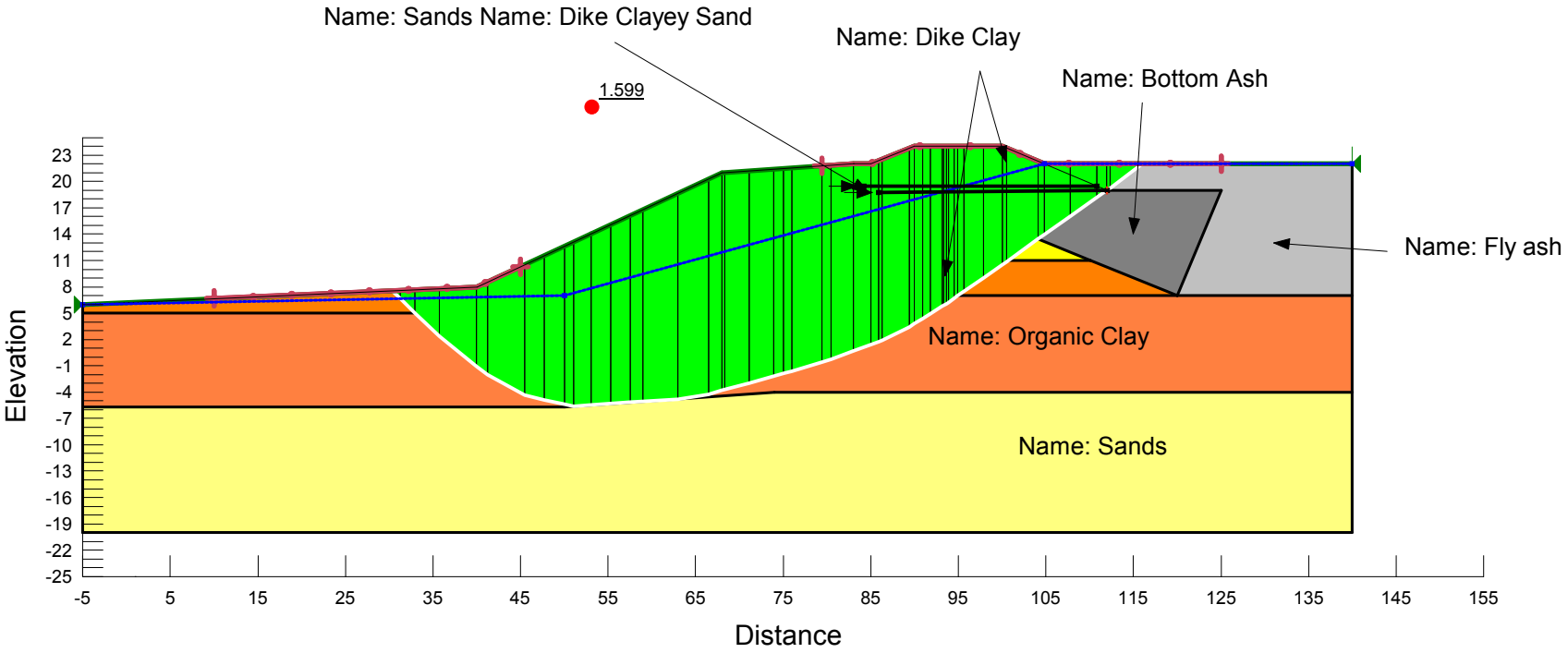
## Design Inputs/References

- USGS Earthquake Hazards website, http://www.usgs.gov/hazards/earthquakes/.
- US Corps of Engineers Manual EM 1110-2-1902, October 2003
- Sothern Company Services, Inflow Design Control System Plan: Hydrologic and Hydraulic Calculation Summary for Plant Barry Ash Pond, October, 2016
- Southern Company Services, Slope Stability Analysis of Main Ash Pond Dike, July 2010
- Southern Company Services, Ash Pond South Dike and Diversion Dike Slope Stability Report, September 2004
- Southern Company Services, Plant Barry Report of Ash Pond Dike Proposed Modifications, January 1998.
- Bray, J. D. and Travasarou, T., *Pseudostatic Coefficient for Use in Simplified Seismic Slope Stability Evaluation*, Journal of Geotechnical and Environmental Engineering, American Society of Civil Engineers, September 2009

## Body of Calculation

Calculation consists of Slope-W modeling attached.

Barry North East dike




Unit Weight: 102 pcf
Cohesion': 500 psf
Phi': 0 °Name: Bottom Ash
Model: Mohr-Coulomb
Unit Weight: 95 pcf
Cohesion': 0 psf
Phi': 35 °

Name: Fly ash
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion': 90 psf
Phi': 2 °

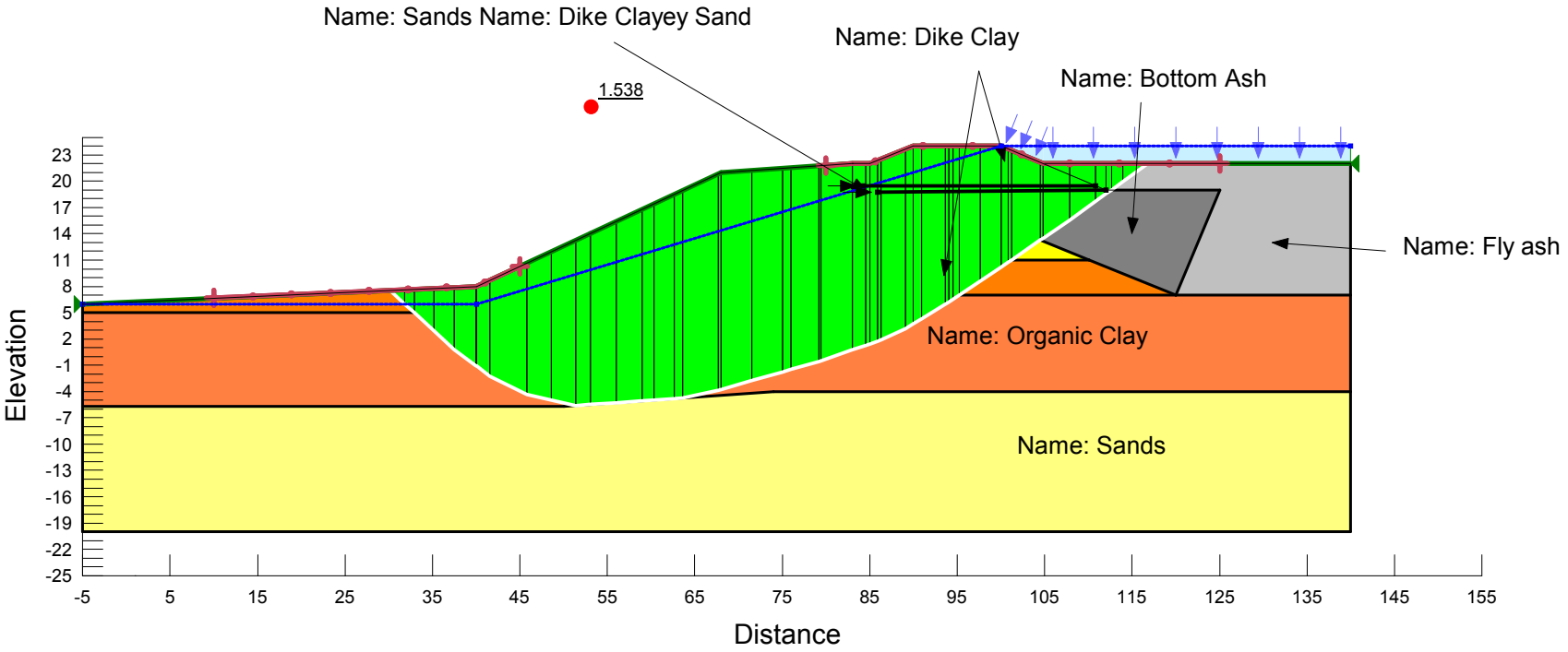
Name: Dike Clayey Sand
Model: Mohr-Coulomb
Unit Weight: 102.9 pcf
Cohesion': 0 psf
Phi': 30 °

Name: Organic Clay
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion': 444 psf
Phi': 0 °

Name: Dike Clay
Model: Mohr-Coulomb
Unit Weight: 102 pcf
Cohesion': 500 psf
Phi': 0 °

Name: Sands
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Cohesion': 0 psf
Phi': 35 °

Barry North East dike




Unit Weight: 102 pcf
Cohesion': 500 psf
Phi': 0 °Name: Bottom Ash
Model: Mohr-Coulomb
Unit Weight: 95 pcf
Cohesion': 0 psf
Phi': 35 °

Name: Fly ash
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion': 90 psf
Phi': 2 °

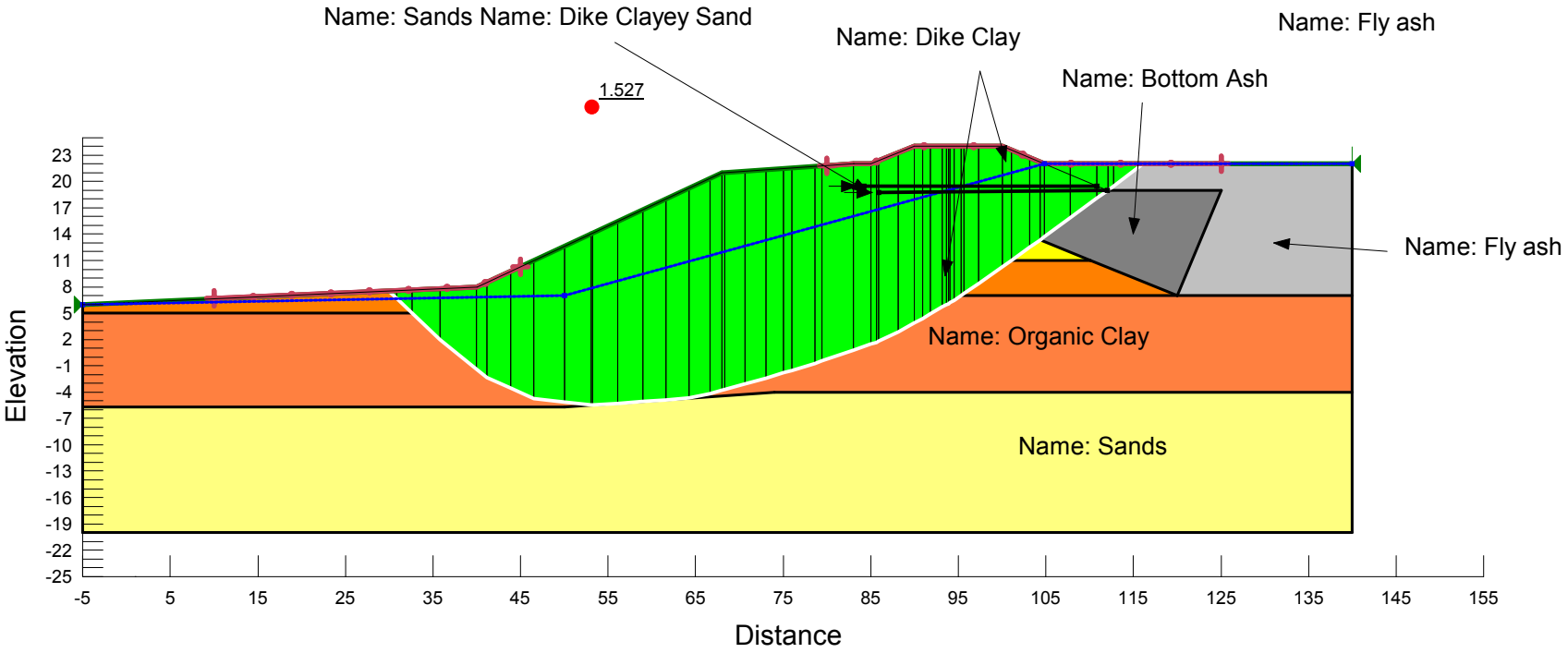
Name: Dike Clayey Sand
Model: Mohr-Coulomb
Unit Weight: 102.9 pcf
Cohesion': 0 psf
Phi': 30 °

Name: Organic Clay
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion': 444 psf
Phi': 0 °

Name: Dike Clay
Model: Mohr-Coulomb
Unit Weight: 102 pcf
Cohesion': 500 psf
Phi': 0 °

Name: Sands
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Cohesion': 0 psf
Phi': 35 °

Barry North East Dike and seismic




Unit Weight: 102 pcf
Cohesion': 500 psf
Phi': 0 °Name: Bottom Ash
Model: Mohr-Coulomb
Unit Weight: 95 pcf
Cohesion': 0 psf
Phi': 35 °

Name: Fly ash
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion': 90 psf
Phi': 2 °

Name: Dike Clayey Sand
Model: Mohr-Coulomb
Unit Weight: 102.9 pcf
Cohesion': 0 psf
Phi': 30 °

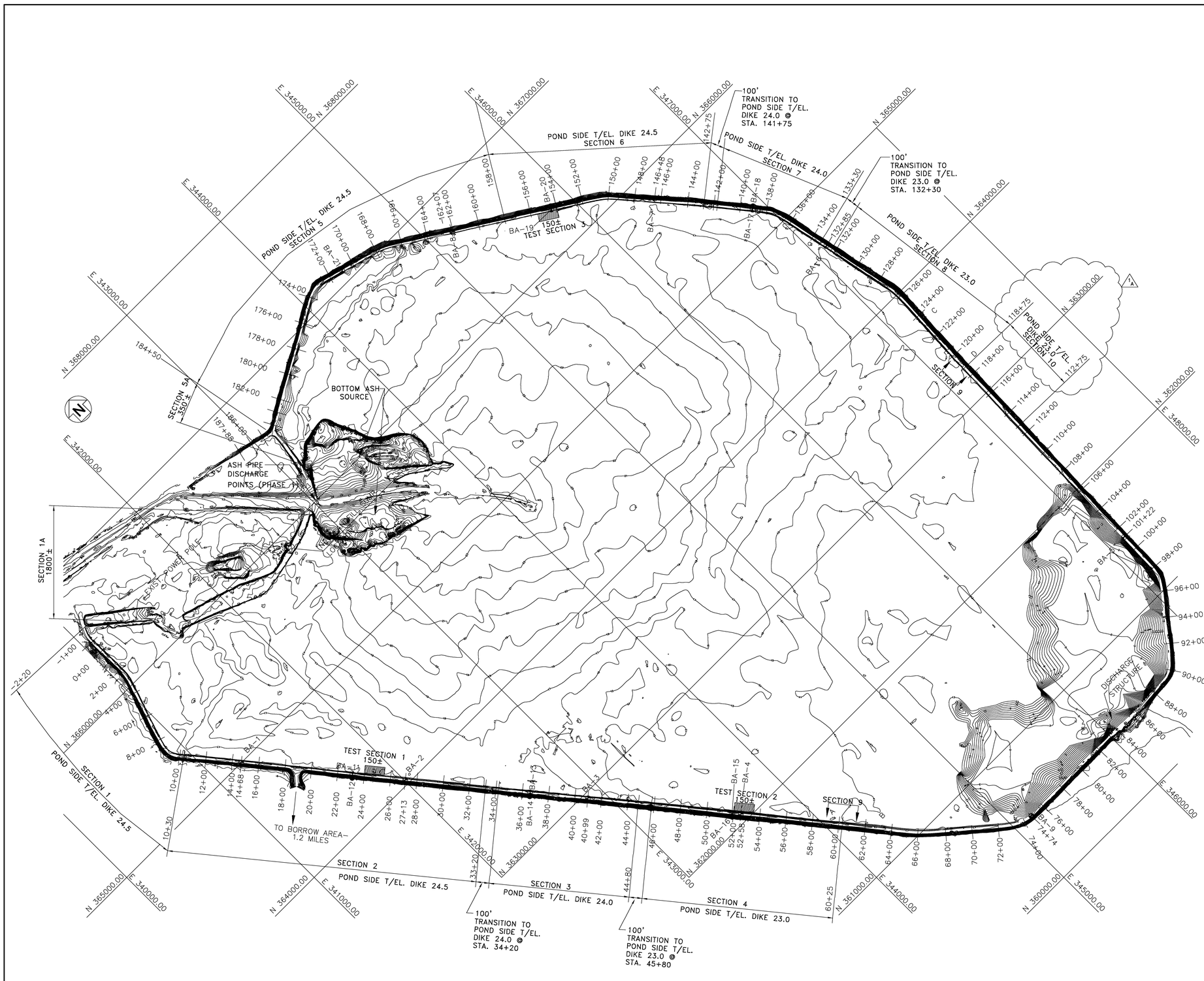
Name: Organic Clay
Model: Mohr-Coulomb
Unit Weight: 90 pcf
Cohesion': 444 psf
Phi': 0 °

Name: Dike Clay
Model: Mohr-Coulomb
Unit Weight: 102 pcf
Cohesion': 500 psf
Phi': 0 °

Name: Sands
Model: Mohr-Coulomb
Unit Weight: 107 pcf
Cohesion': 0 psf
Phi': 35 °

# Attachment A

Figure – Site Plan




| BORINGS | COORDINATES | |
|---|---|---|
| **BORINGS TAKEN IN 1992** | | |
| BORING LABEL | N | E |
| BA-1 | 364999.880 | 341219.875 |
| BA-2 | 364031.549 | 342004.128 |
| BA-3 | 362956.461 | 342880.725 |
| BA-4 | 362057.826 | 343612.863 |
| BA-5 | 361495.708 | 347138.361 |
| BA-6 | 364639.958 | 347102.821 |
| BA-7 | 365796.094 | 346427.798 |
| BA-8 | 364999.880 | 341219.875 |
| BA-9 | 360500.824 | 345152.338 |
| **BORINGS TAKEN IN 1998** | | |
| BORING LABEL | N | E |
| BA-11 | 364345.412 | 341755.029 |
| BA-12 | 364327.948 | 341734.096 |
| BA-13 | 363301.329 | 342606.115 |
| BA-14 | 363282.545 | 342582.682 |
| BA-15 | 362111.456 | 343573.883 |
| BA-16 | 362092.553 | 343553.482 |
| BA-17 | 365223.403 | 346902.569 |
| BA-18 | 365240.613 | 346922.842 |
| BA-19 | 366298.340 | 345828.767 |
| BA-20 | 366319.529 | 345844.607 |
| BA-21 | 367088.602 | 344388.258 |

NOTES:

1. STATIONS WERE TAPED OFF OF THE 1992 BORING LOCATIONS BA-1 THRU BA-9. SEE TABLES FOR COORDINATES OF THE BORINGS.
2. FOR ELEVATIONS OF NEW DIKE SECTIONS SEE DWGS. D-521372, D-521373, AND D-521374 DIKE CREST MODIFICATION SECTIONS.
3. TEST SECTIONS NO. 1, 2, AND 3 SHALL STAY IN PLACE. TIE NEW DIKE MODIFICATIONS TO THE TEST SECTIONS.

REFERENCES:

D-521370 – MECHANICAL PIPING-REVISIONS TO ASH SLUICE LINES

D-521371 – MECHANICAL PIPING-REVISIONS TO UNITS 1-5 BLDG. , DEMIN. SUMP AND LAGOON POND B DISCHARGE PIPES

D-521372 – DIKE CREST MODIFICATIONS SECTIONS - WEST SIDE

D-521373 – DIKE CREST MODIFICATIONS SECTIONS - EAST SIDE

D-521374– PLAN AND SECTIONS 1A & 5A

D-521380 – BORROW PIT AREA



| CMF | FDB | RMP |
|---|---|---|

| REV. | DATE | |
|---|---|---|
| 1 | 8/16/99 | 1A, ADDED SECTION 10 |
| 0 | 7/23/98 | ISSUED FOR CONSTRUCTION<br>RJN FB-98001 |

CAD D521369 | ACAD14 | CAS-14

Southern Company Services, Inc.
for
ALABAMA POWER COMPANY

JOB BARRY ASH POND
DETAIL DIKE EXTENSION-PHASE 1 (1998)
GENERAL ARRANGEMENT

DRAWN CAS | CHECKED FDB | DESIGNED ~~TRACED~~ RCB
APPROVED FDB | DATE
APPROVED RMP | DATE

SCALE 1"=300' | B/M
SHEET OF SHEETS
SUPERSEDES
D-521369

# Attachment B

Figure – Cross Section Geometry

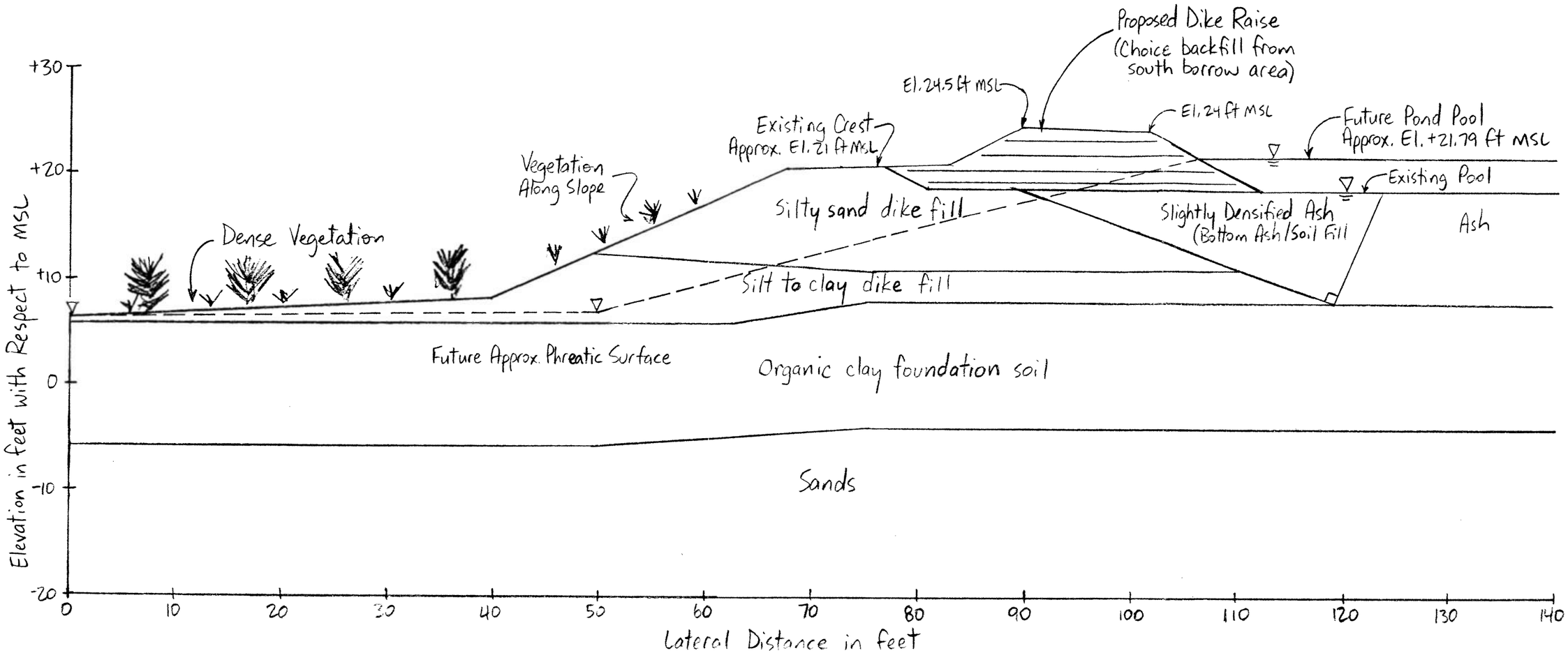
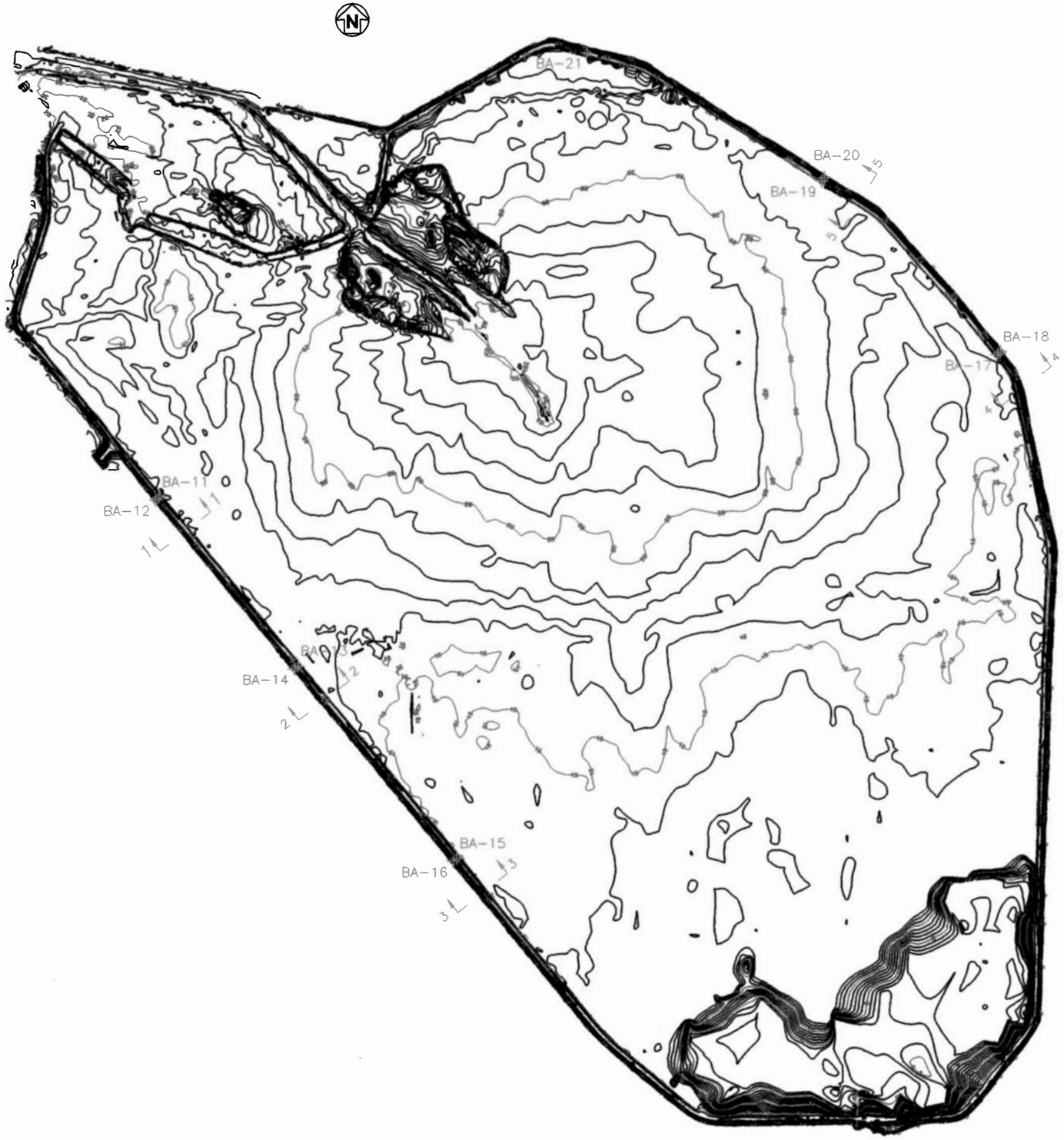



Figure 3
Cross-Section #5
Modified for Dike Raise
Upstream of Crest

# Attachment C

Figure – Boring Location Plan




Legend

⌖ – Boring location

0 720

Scale: 1 in. = 720 ft.



**FIGURE 1**
**BARRY STEAM PLANT**
**ASH POND DIKE**
**BORING LOCATIONS**

APDIKE

# Attachment D

Main Dike Borings and Dilatometers

# SOUTHERN COMPANY SERVICES

PAGE 1 OF 1

PROJECT NO: _____ SITE NO: BAR BORING NO: BA-13 PROJECT NAME: Barry Steam Plant

ATE BEGAN: 10-27-97 DATE FINISHED: 10-27-97 FIELD GEOLOGIST: DeAnna Fields

DRILLER: R Hill NORTH: NA EAST: NA

GROUND SURFACE ELEV.: NA GWL DATE/TIME: _____ GWL DEPTH: _____

DRILLING METHOD: Hollow augers DRILL EQUIP: CME-75 GWL ELEV: NA

CONTRACTOR: APCo AREA: ASH POND/SW Leg of Dike Near Centerline CHECKED BY: WBG

| ELEV (FT) | DEPTH (FT) | SAMPLE NO. | SPT BLOWS PER (0.5') | REC (FT) | PROFILE | DESCRIPTION | ROD |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | | | | | Reddish-brown to light-gray, firm to very firm, CLAYEY SAND (SC) Fill to 8.0' | |
| | | S-1 | N=11 | | | | |
| 5.0 | 5.00 | S-2 | N=21 | | | | |
| | | S-3 | N=23 | | | | |
| 10.0 | 10.00 | S-4 | N=8 | | | Light-brown, fine to medium-grained, very firm, SILTY SAND (SM) Fill to 10.0' | |
| | | | | | | Reddish-brown, clayey to silty, fine to medium-grain, SAND Fill with small amounts of scattered gravel to 19.5' | |
| 15.0 | 15.00 | S-5 | N=9 | | | | |
| 20.0 | 20.00 | S-6 | N=4 | | | Reddish-brown SILTY CLAY Fill to 21.0' | |
| | | | | | | Dark brown, soft, SILTY CLAY (CL) Fill to 27.5' Root at contact 21.0' | |
| 25.0 | 25.00 | S-7 | N=2 | | | | |
| 30.0 | 30.00 | S-8 | N=12 | | | Light brown, firm, fine to medium-grained quartz SAND (SM-SP) with wood fragments to 34.0' | |
| 35.0 | 35.00 | S-9 | N=19 | | | Gray to light gray, fine to medium-grained, firm, SAND (SM-SP) to 36.0' | |
| | | | | | | Gray to light gray, soft to very soft SILTY CLAY (CL) (Pen. 0.25 TSF) to 43.5' | |
| 40.0 | 40.00 | S-10 | N=1 | | | | |
| 45.0 | 45.00 | S-11 | N=14 | | | Light brown to light gray, medium-grained, firm, quartz SAND to 51.0' | |
| 50.0 | 50.00 | S-12 | N=13 | | | | |
| 55.0 | 55.00 | | | | | Bottom Of Hole. | |
| 60.0 | 60.00 | | | | | Standard Penetration Test<br>S-1 2.5 to 4.0 4-4-7 N=11<br>S-2 5.0 to 6.5 3-8-13 N=21<br>S-3 7.5 to 9.0 6-11-12 N=23<br>S-4 10.0 to 11.5 4-4-4 N=8<br>S-5 14.5 to 16.0 3-3-3 N=6<br>S-6 19.5 to 21.0 0-1-3 N=4<br>S-7 24.5 to 26.0 0-1-1 N=2<br>S-8 29.5 to 31.0 6-8-4 N=12<br>S-9 34.5 to 36.0 6-11-8 N=19<br>S-10 39.5 to 41.0 0-0-1 N=1<br>S-11 44.5 to 46.0 6-6-8 N=14<br>S-12 49.5 to 51.0 5-6-7 N=13 | |
| 65.0 | 65.00 | | | | | | |
| 0 | 70.00 | | | | | | |
| | 75.00 | | | | | | |

# SOUTHERN COMPANY SERVICES

PAGE 1 OF 1

PROJECT NO: _____ SITE NO: BAR BORING NO: BA-14 PROJECT NAME: Barry Steam Plant

DATE BEGAN: 10-29-97 DATE FINISHED: 10-29-97 FIELD GEOLOGIST: W B Gilliam

DRILLER: R Hill NORTH: NA EAST: NA

GROUND SURFACE ELEV.: NA GWL DATE/TIME: GWL DEPTH:

DRILLING METHOD: Hollow augers DRILL EQUIP: CME-75 GWL ELEV: NA

CONTRACTOR: APCo AREA: ASH POND/21' from edge of dike CHECKED BY: WBG

| ELEV (FT) | DEPTH (FT) | SAMPLE NO. | SPT BLOWS PER (0.5') | REC (FT) | PROFILE | DESCRIPTION | ROD |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | | | | | Light grayish-brown, SILTY SAND to 10.8' | |
| 5.0 | 5.00 | | | | | | |
| 10.0 | 10.00 | S-1 | N=5 | | | Bottom of berm Top of dike fill | |
| | | S-2 | N=5 | | | Reddish yellow to light gray, loose, CLAYEY SAND fill to 15.5' | |
| 15.0 | 15.00 | S-3 | N=5 | | | | |
| | | S-4 | N=2 | | | Gray, loose, CLAYEY SAND fill to 18.5' | |
| 20.0 | 20.00 | S-5 | N=4 | | | Gray to dark gray, CLAYEY SAND to CLAYEY SILT with roots and organic to 20.4' | |
| | | | | | | Dark gray to dark grayish-brown, highly organic CLAYEY SILT to 24.0' | |
| 25.0 | 25.00 | S-6 | N=1 | | | Dark brown, very soft, plastic, organic CLAY 15 TSF to 29.5' Some scattered wood fragments | |
| 30.0 | 30.00 | S-7 | N=2 | | | Grayish-brown, fine to medium-grained loose SAND to ~~29.5'~~ 34' | |
| 35.0 | 35.00 | S-8 | N=5 | | | Medium gray, fine to medium-grained, loose quartz SAND with scattered thin clay layers Thin clay layers 35.8 to 36.0. | |
| 40.0 | 40.00 | S-9 | N=3 | | | Medium gray, soft, plastic SILTY CLAY with wood fragments .05 TSF to 42.0' | |
| 45.0 | 45.00 | S-10 | N=12 | | | Light gray, fine-grained, firm, silty, quartz SAND to 51.0' | |
| 50.0 | 50.00 | S-11 | N=11 | | | | |
| | | | | | | Bottom Of Hole. | |
| 55.0 | 55.00 | | | | | | |
| 60.0 | 60.00 | | | | | | |
| 65.0 | 65.00 | | | | | | |
| 70.0 | 70.00 | | | | | | |
| | 75.00 | | | | | | |

Standard Penetration Test
S-1 9.5 to 11.0 2-2-3 N=5
S-2 12.0 to 13.5 3-3-2 N=5
S-3 14.5 to 16.0 2-3-2 N=5
S-4 17.0 to 18.5 2-1-1 N=2
S-5 19.5 to 21.0 1-2-2 N=4
S-6 24.5 to 26.0 0-0-1 N=1
S-7 29.5 to 31.0 2-1-1 N=2
S-8 34.5 to 36.0 7-3-2 N=5
S-9 39.5 to 41.0 0-1-2 N=3
S-10 44.5 to 46.0 4-6-6 N=12
S-11 49.5 to 51.0 4-5-6 N=11

# SOUTHERN COMPANY SERVICES

PAGE 1 OF 1

PROJECT NO: _____ SITE NO: BAR BORING NO: BA-17 PROJECT NAME: Barry Steam Plant

JATE BEGAN: 10-28-97 DATE FINISHED: 10-28-97 FIELD GEOLOGIST: W B Gilliam

DRILLER: R Hill NORTH: NA EAST: NA

GROUND SURFACE ELEV.: NA GWL DATE/TIME: _____ GWL DEPTH: _____

DRILLING METHOD: Hollow augers DRILL EQUIP: CME-75 GWL ELEV: NA

CONTRACTOR: APCo AREA: Centerline of Dike CHECKED BY: WBG

| ELEV (FT) | DEPTH (FT) | SAMPLE NO. | SPT BLOWS PER (0.5') | REC (FT) | PROFILE | DESCRIPTION | ROD |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | | | | | GRAVEL fill to 0.5' | |
| | | S-1 | N=13 | | | Reddish-yellow, stiff, SANDY CLAY to CLAYEY SAND fill to 4 5' | |
| 5.0 | 5.00 | S-2 | N=15 | | | Yellow-brown, stiff, SILTY CLAY fill to 10 0' | |
| | | S-3 | N=12 | | | 3.3-3.5 TSF | |
| 10.0 | 10.00 | S-4 | N=10 | | | Reddish-yellow to light-gray, loose, CLAYEY SAND fill to 18 0' | |
| 15.0 | 15.00 | S-5 | N=13 | | | | |
| | | S-6 | N=3 | | | Bottom of Fill | |
| 20.0 | 20.00 | S-6 | ~~N=3~~ | | | Dark-gray, soft, SILTY CLAY to clay silt with scattered organic debris to 29.7' | |
| 25.0 | 25.00 | S-7 | N=3 | | | | |
| 30.0 | 30.00 | S-8 | N=11 | | | Medium-gray, firm, clayey, medium-grained, SAND, scattered soft zones to 51.0' | |
| 35.0 | 35.00 | S-9 | N=10 | | | 0.2' Gray soft silty clay layer at 35 0-35 2 | |
| 40.0 | 40.00 | S-10 | N=15 | | | | |
| 45.0 | 45.00 | S-11 | N=10 | | | | |
| 50.0 | 50.00 | S-12 | N=8 | | | | |
| | | | | | | Bottom Of Hole | |
| 55.0 | 55.00 | | | | | Standard Penetration Test | |
| 60.0 | 60.00 | | | | | S-1 2.5 to 4 0 4-6-7 N=13 | |
| 65.0 | 65.00 | | | | | S-2 5.0 to 6.5 4-6-9 N=15 | |
| | | | | | | S-3 7.5 to 9.0 4-6-6 N=12 | |
| 70.0 | 70.00 | | | | | S-4 10.0 to 11.5 2-4-6 N=10 | |
| | | | | | | S-5 14 5 to 16.0 5-6-7 N=13 | |
| | | | | | | S-6 19.5 to 21.0 0-1-2 N=3 | |
| | | | | | | S-7 24.5 to 26.0 0-1-2 N=3 | |
| | | | | | | S-8 29.5 to 31.0 5-5-6 N=11 | |
| | | | | | | S-9 34.5 to 36.0 6-3-7 N=10 | |
| | | | | | | S-10 39.5 to 41.0 5-7-8 N=15 | |
| | | | | | | S-11 44 5 to 46.0 6-3-7 N=10 | |
| | | | | | | S-12 49.5 to 51.0 3-4-4 N=8 | |
| | 75.00 | | | | | | |

# SOUTHERN COMPANY SERVICES

PROJECT NO: _____ SITE NO: BAR BORING NO: BA-18 PAGE 1 OF 1

JATE BEGAN: 10-28-97 DATE FINISHED: _____ PROJECT NAME: Barry Steam Plant

DRILLER: R Hill NORTH: NA FIELD GEOLOGIST: W B Gilliam

GROUND SURFACE ELEV.: NA GWL DATE/TIME: _____ EAST: NA

DRILLING METHOD: Hollow augers GWL DEPTH: _____

CONTRACTOR: APCo AREA: Ash Pond/On Berm 25' from Edge of Dike DRILL EQUIP: CME-75 GWL ELEV: NA

CHECKED BY: WBG

| ELEV (FT) | DEPTH (FT) | SAMPLE NO. | SPT BLOWS PER (0.5') | REC (FT) | PROFILE | DESCRIPTION | ROD |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | | | | | Berm Fill Light-gray SILTY SAND TO 10.0' | |
| 5.0 | 5.00 | | | | | | |
| 10.0 | 10.00 | S-1 | N=4 | | | Reddish-yellow to light-gray, loose, CLAYEY SAND Fill to 18.0' | |
| | | S-2 | N=5 | | | | |
| 15.0 | 15.00 | S-3 | N=9 | | | | |
| | | S-4 | N=3 | | | Bottom of Fill | |
| 20.0 | 20.00 | | | | | Dark-gray, soft, SILTY CLAY to clay silt with scattered organic debris to 29.0' | |
| 25.0 | 25.00 | S-5 | N=1 | | | | |
| 30.0 | 30.00 | S-6 | N=10 | | | Medium-gray, loose to firm, ~~clayey,~~ medium-grained, quartz SAND, with thin layers of soft silty ~~sand~~ clay to 51.0' | |
| 35.0 | 35.00 | S-7 | N=14 | | | | |
| 40.0 | 40.00 | S-8 | N=13 | | | | |
| 45.0 | 45.00 | S-9 | N=12 | | | | |
| 50.0 | 50.00 | S-10 | N=11 | | | Some pea gravel at 50.0'. | |
| 55.0 | 55.00 | | | | | Bottom Of Hole. | |
| 60.0 | 60.00 | | | | | | |
| 65.0 | 65.00 | | | | | | |
| 70.0 | 70.00 | | | | | | |
| | 75.00 | | | | | | |

Standard Penetration Test
S-1 9.5 to 11.0 2-2-2 N=4
S-2 12.0 to 13.5 3-2-3 N=5
S-3 14.5 to 16.0 3-4-5 N=9
S-4 17.0 to 18.5 1-1-2 N=3
S-5 24.5 to 26.0 0-0-1 N=1
S-6 29.5 to 31.0 4-5-5 N=10
S-7 34.5 to 36.0 5-7-7 N=14
S-8 39.5 to 41.0 6-6-7 N=13
S-9 44.5 to 46.0 5-6-6 N=12
S-10 49.5 to 51.0 4-5-6 N=11

Surface El. 21.29

SOUTHERN COMPANY
FILE NAME: PLANT BARRY ASH POND STUDY
FILE NUMBER: BA-11.DAT

TEST NO. BA11

RECORD OF DILATOMETER TEST NO. BA11
USING DATA REDUCTION PROCEDURES IN MARCHETTI (ASCE,J-GED,MARCH 80)
KO IN SANDS DETERMINED USING SCHMERTMANN METHOD (1983)
PHI ANGLE CALCULATION BASED ON DURGUNOGLU AND MITCHELL (ASCE,RALEIGH CONF,JUNE 75)
PHI ANGLE NORMALIZED TO 2.72 BARS USING BALIGH'S EXPRESSION (ASCE,J-GED,NOV 76)
MODIFIED MAYNE AND KULHAWY FORMULA USED FOR OCR IN SANDS (ASCE,J-GED,JUNE 82)

LOCATION: SOUNDING PUSHED BY CME 75
PERFORMED - DATE: 11 3 1997
BY: W. BARRY GILLIAM

CALIBRATION INFORMATION:
DELTA A = .15 BARS DELTA B = 1.75 BARS GAGE O = .10 BARS GWT DEPTH= 3.57 M = 11.71'
ROD DIA.= 3.60 CM FR.RED.DIA.= 5.40 CM ROD WT.= 6.50 KG/M DELTA/PHI= .50 BLADE T=15.00 MM

1 BAR = 1.019 KG/CM2 = 1.044 TSF = 14.51 PSI ANALYSIS USES H2O UNIT WEIGHT = 1.000 T/M3

| Z (M) | THRUST (KG) | A (BAR) | B (BAR) | ED (BAR) | ID | KD | UO (BAR) | GAMMA (T/M3) | SV (BAR) | PC (BAR) | OCR | KO | CU (BAR) | PHI (DEG) | M (BAR) | SOIL TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.64' | .50 | 1250. | 7.50 | 19.00 | 350. | 1.43 | 78.56 | .000 | 1.950 | .090 | 89.88 | ***** | 9.70 | | 29.5 | 1557.0 | SANDY SILT |
| 3.28' | 1.00 | 1925. | 8.50 | 18.50 | 295. | 1.04 | 43.87 | .000 | 1.950 | .186 | 22.95 | ***** | 4.29 | | | 1150.9 | SILT |
| 4.92' | 1.50 | 1650. | 9.50 | 24.00 | 459. | 1.48 | 31.70 | .000 | 1.950 | .281 | 42.64 | ***** | 4.09 | | 30.5 | 1649.2 | SANDY SILT |
| 6.56' | 2.00 | 1550. | 9.00 | 14.80 | 142. | .46 | 23.56 | .000 | 1.900 | .376 | 17.62 | 46.89 | 3.05 | 1.805 | | 470.5 | SILTY CLAY |
| 8.20' | 2.50 | 1150. | 4.80 | 7.25 | 20. | .12 | 10.39 | .000 | 1.700 | .464 | 6.07 | 13.07 | 1.88 | .801 | | 50.8 | CLAY |
| 9.84' | 3.00 | 3600. | 11.00 | 29.50 | 605. | 1.71 | 18.34 | .000 | 2.100 | .557 | 22.73 | 40.79 | 2.37 | | 37.0 | 1859.2 | SANDY SILT |
| 11.48' | 3.50 | 1625. | 12.50 | 19.00 | 168. | .39 | 18.79 | .000 | 1.900 | .656 | 21.60 | 32.95 | 2.68 | 2.373 | | 519.1 | SILTY CLAY |
| 13.12' | 4.00 | 1600. | 10.20 | 17.80 | 208. | .60 | 14.02 | .042 | 1.950 | .708 | 14.76 | 20.86 | 2.26 | 1.776 | | 585.6 | CLAYEY SILT |
| 14.76' | 4.50 | 1450. | 8.50 | 14.20 | 138. | .48 | 10.98 | .091 | 1.900 | .753 | 10.73 | 14.25 | 1.95 | 1.392 | | 358.4 | SILTY CLAY |
| 16.40' | 5.00 | 750. | 5.20 | 10.00 | 106. | .61 | 6.25 | .140 | 1.800 | .795 | 4.70 | 5.91 | 1.36 | .726 | | 213.2 | CLAYEY SILT |
| 18.04' | 5.50 | 700. | 2.80 | 5.30 | 22. | .24 | 3.17 | .189 | 1.600 | .829 | 1.70 | 2.05 | .82 | .325 | | 28.9 | CLAY |
| 19.68' | 6.00 | 200. | 1.50 | 3.40 | 0. | .00 | 1.53 | .238 | 1.500 | .856 | .56 | .66 | .41 | .135 | | .0 | MUD |
| 21.32' | 6.50 | 425. | 1.80 | 5.25 | 56. | 1.10 | 1.68 | .288 | 1.600 | .883 | .67 | .76 | .46 | | | 48.0 | SILT |
| 22.96' | 7.00 | 300. | 1.65 | 4.40 | 31. | .68 | 1.45 | .337 | 1.600 | .913 | .55 | .60 | .38 | .134 | | 26.3 | CLAYEY SILT |
| 24.60' | 7.50 | 400. | 1.90 | 4.75 | 35. | .66 | 1.61 | .386 | 1.600 | .942 | .67 | .71 | .43 | .158 | | 29.4 | CLAYEY SILT |
| 26.24' | 8.00 | 400. | 1.80 | 4.50 | 29. | .61 | 1.42 | .435 | 1.600 | .972 | .57 | .58 | .37 | .139 | | 24.8 | CLAYEY SILT |
| 27.88' | 8.50 | 300. | 1.60 | 4.35 | 31. | .79 | 1.12 | .484 | 1.600 | 1.001 | .41 | .41 | .27 | .107 | | 26.3 | CLAYEY SILT |
| 29.52' | 9.00 | 275. | 1.75 | 4.39 | 27. | .63 | 1.19 | .533 | 1.600 | 1.030 | .46 | .45 | .30 | .119 | | 22.9 | CLAYEY SILT |
| 31.16' | 9.50 | 300. | 2.30 | 4.30 | 4. | .06 | 1.67 | .582 | 1.500 | 1.057 | .80 | .75 | .45 | .185 | | 3.1 | MUD |
| 32.80' | 10.00 | 240. | 2.30 | 4.35 | 5. | .09 | 1.58 | .631 | 1.500 | 1.082 | .75 | .69 | .43 | .178 | | 4.6 | MUD |
| 34.44' | 10.50 | 400. | 1.90 | 4.50 | 26. | .60 | 1.11 | .680 | 1.600 | 1.109 | .44 | .40 | .27 | .117 | | 21.7 | SILTY CLAY |
| 36.08' | 11.00 | 2200. | 5.50 | 19.00 | 423. | 2.87 | 3.69 | .729 | 2.000 | 1.148 | 3.14 | 2.73 | .68 | | 35.3 | 687.5 | SILTY SAND |
| 37.72' | 11.50 | 1500. | 3.95 | 11.30 | 199. | 1.94 | 2.47 | .778 | 1.900 | 1.195 | 2.16 | 1.81 | .59 | | 32.8 | 236.0 | SILTY SAND |
| 39.36' | 12.00 | 350. | 4.30 | 7.50 | 47. | .39 | 2.80 | .827 | 1.700 | 1.234 | 2.09 | 1.69 | .74 | .414 | | 56.7 | SILTY CLAY |

over

| | Z (M) | THRUST (KG) | A (BAR) | B (BAR) | ED (BAR) | ID | KD | UO (BAR) | GAMMA (T/M3) | SV (BAR) | PC (BAR) | OCR | KO | CU (BAR) | PHI (DEG) | M (BAR) | SOIL TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ***** | ****** | ***** | ***** | ***** | ***** | ***** | ****** | ****** | ****** | ***** | ***** | ***** | ***** | ***** | ****** | ********** |
| | 41' | 12.50 | 425. | 3.80 | 6.50 | 29. | .29 | 2.31 | .876 | 1.700 | 1.268 | 1.59 | 1.25 | .63 | .335 | 29.1 | CLAY |
| | 42.64' | 13.00 | 400. | 4.15 | 6.55 | 18. | .16 | 2.50 | .925 | 1.600 | 1.300 | 1.84 | 1.42 | .67 | .378 | 19.7 | CLAY |
| | 44.28' | 13.50 | 1200. | 4.20 | 6.50 | 15. | .13 | 2.45 | .974 | 1.600 | 1.330 | 1.82 | 1.37 | .66 | .377 | 15.4 | CLAY |
| | 45.92' | 14.00 | 500. | 3.50 | 6.25 | 31. | .36 | 1.82 | 1.024 | 1.700 | 1.362 | 1.18 | .87 | .50 | .267 | 26.3 | SILTY CLAY |
| | 47.56' | 14.50 | 2600. | 6.60 | 10.20 | 62. | .32 | 3.93 | 1.073 | 1.800 | 1.398 | 4.01 | 2.87 | .97 | .715 | 95.5 | CLAY |
| SP | 49.20' | 15.00 | 2500. | 6.00 | 21.00 | 477. | 3.22 | 2.96 | 1.122 | 2.000 | 1.443 | 2.94 | 2.04 | .60 | $\phi$=35° 35.4 | 688.9 | SILTY SAND |
| | | END OF SOUNDING | | | | | | | | | | | | | | | |

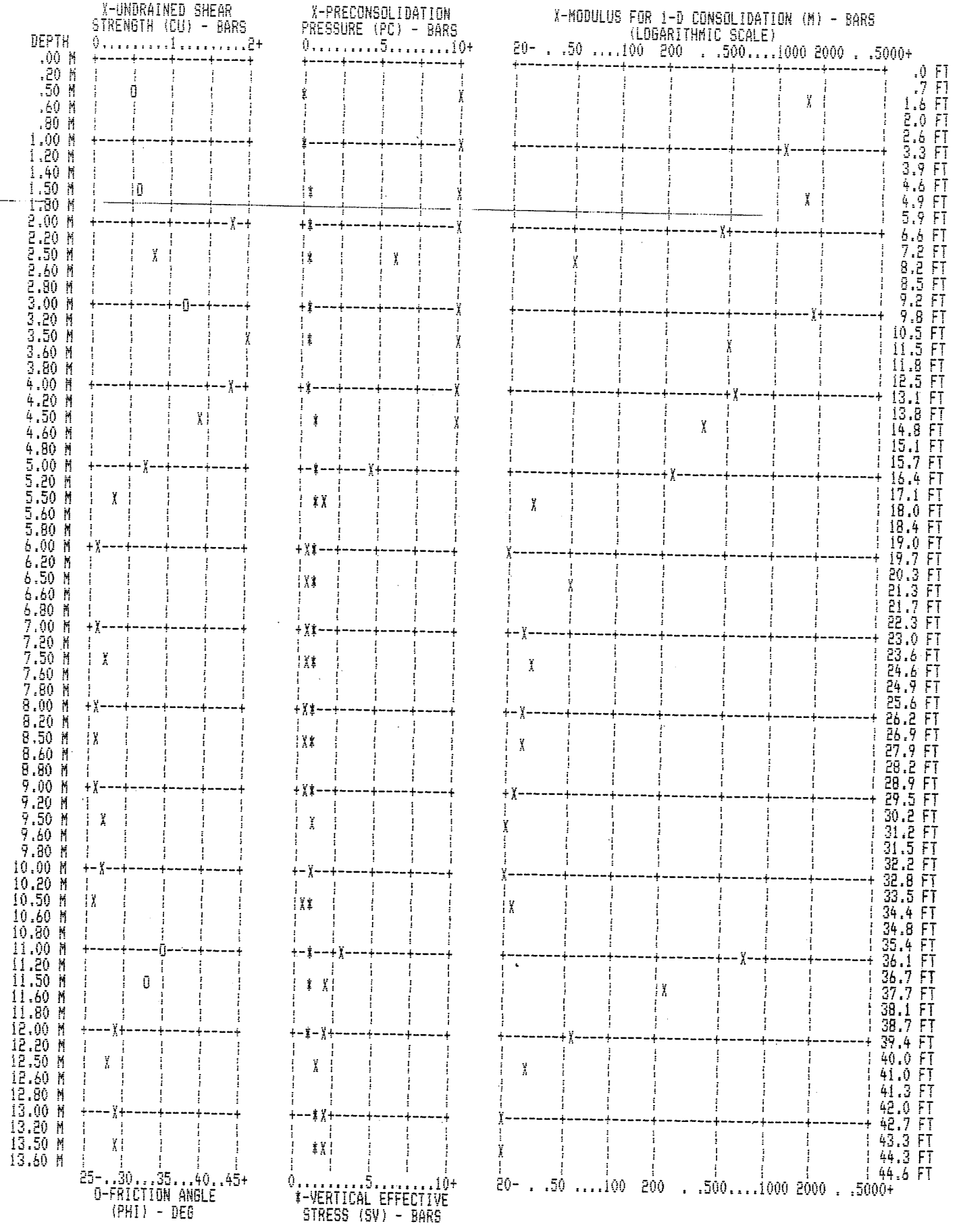
:0°
557 cf
=95 pcf
=35°
=0
m=113 pcf
s=118 pcf

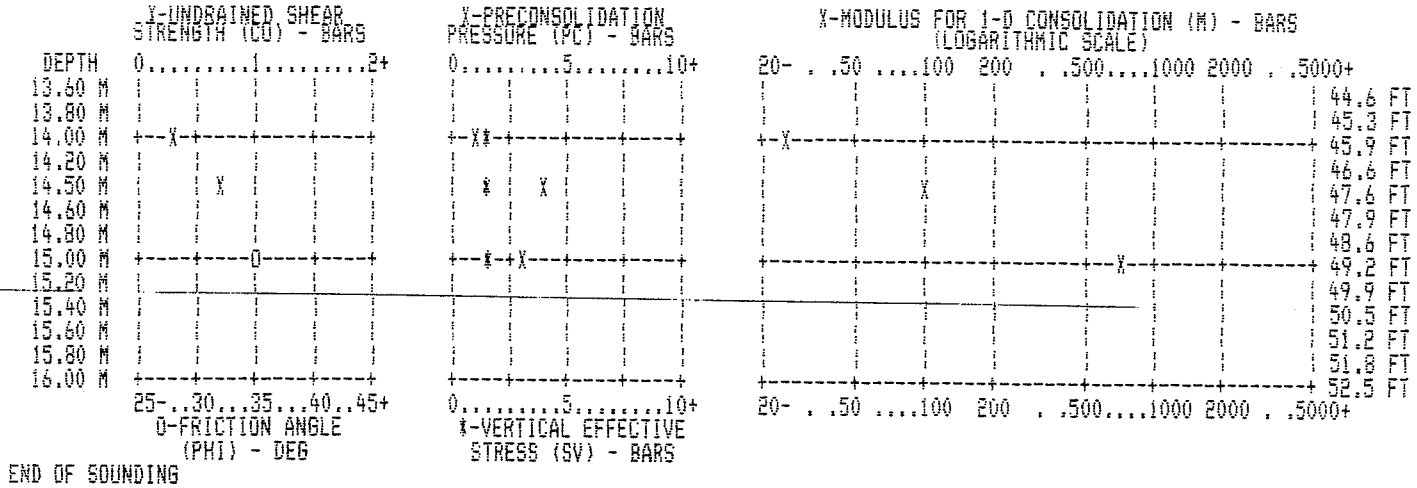
.361 lower 1/3 Cu

C=754 psf $\gamma_m$=90 pcf

48.5'

$\gamma_m$=113 pcf


X-UNDRAINED SHEAR STRENGTH (CU) - BARS
X-PRECONSOLIDATION PRESSURE (PC) - BARS
X-MODULUS FOR 1-D CONSOLIDATION (M) - BARS (LOGARITHMIC SCALE)
DEPTH
0-FRICTION ANGLE (PHI) - DEG
*-VERTICAL EFFECTIVE STRESS (SV) - BARS




END OF SOUNDING

Surface El. 18.7'

TEST NO. BA-12

SOUTHERN COMPANY
FILE NAME: PLANT BARRY ASH POND STUDY
FILE NUMBER: BA-12.DAT

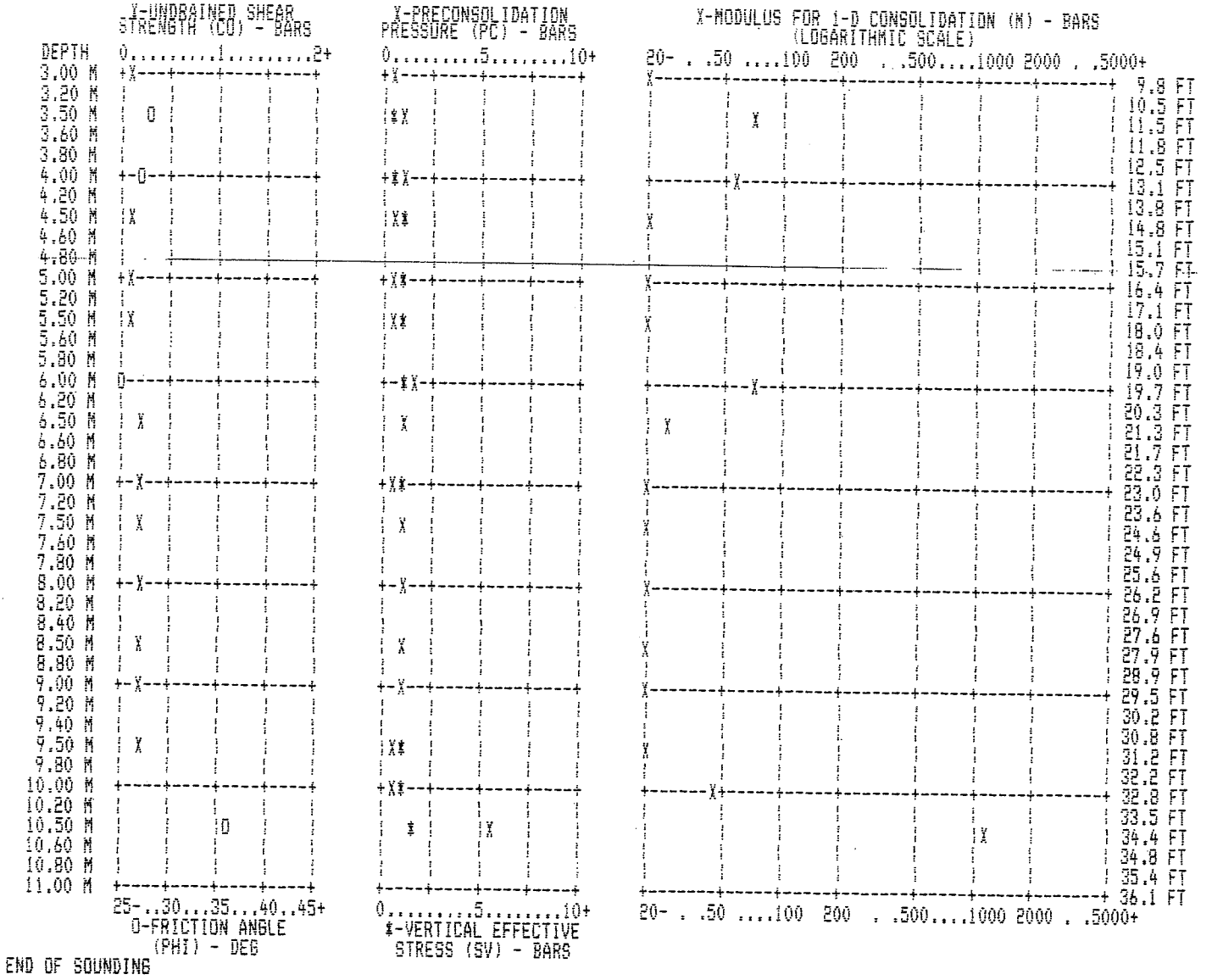
RECORD OF DILATOMETER TEST NO. BA-12
USING DATA REDUCTION PROCEDURES IN MARCHETTI (ASCE,J-GED,MARCH 80)
KO IN SANDS DETERMINED USING SCHMERTMANN METHOD (1983)
PHI ANGLE CALCULATION BASED ON DURGUNOGLU AND MITCHELL (ASCE,RALEIGH CONF,JUNE 75)
PHI ANGLE NORMALIZED TO 2.72 BARS USING BALIGH'S EXPRESSION (ASCE,J-GED,NOV 76)
MODIFIED MAYNE AND KULHAWY FORMULA USED FOR OCR IN SANDS (ASCE,J-GED,JUNE 82)

LOCATION: SOUNDING PUSHED BY CME 75 19'F/ EDGE OF DIKE
PERFORMED - DATE: 10-29-1997
BY: W. BARRY GILLIAM

CALIBRATION INFORMATION:
DELTA A = .10 BARS DELTA B = 1.01 BARS GAGE 0 = .10 BARS GWT DEPTH= 6.00 M=19.68'
ROD DIA.= 3.60 CM FR.RED.DIA.= 5.40 CM ROD WT.= 6.50 KG/M DELTA/PHI= .50 BLADE T=15.00 MM

1 BAR = 1.019 KG/CM2 = 1.044 TSF = 14.51 PSI ANALYSIS USES H2O UNIT WEIGHT = 1.000 T/M3

| | Z (M) | THRUST (KG) | A (BAR) | B (BAR) | ED (BAR) | ID | KD | UO (BAR) | GAMMA (T/M3) | SV (BAR) | PC (BAR) | OCR | KO | CU (BAR) | PHI (DEG) | M (BAR) | SOIL TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 9.84' | 3.00 | 300. | .75 | 2.20 | 12. | .49 | 1.35 | .000 | 1.600 | .542 | .29 | .54 | .35 | .073 | 10.5 | SILTY CLAY |
| | 11.48' | 3.50 | 450. | 1.05 | 4.35 | 80. | 2.44 | 1.51 | .000 | 1.700 | .623 | .84 | 1.34 | .56 | | 27.7 | 67.8 | SILTY SAND |
| | 13.12' | 4.00 | 475. | 1.20 | 4.20 | 69. | 1.80 | 1.57 | .000 | 1.600 | .704 | 1.01 | 1.44 | .59 | | 27.2 | 58.5 | SANDY SILT |
| | 14.76' | 4.50 | 275. | 1.30 | 2.85 | 16. | .36 | 1.63 | .000 | 1.600 | .782 | .57 | .73 | .44 | .134 | | 13.6 | SILTY CLAY |
| | 16.40' | 5.00 | 200. | 1.35 | 2.90 | 16. | .35 | 1.54 | .000 | 1.600 | .861 | .57 | .67 | .41 | .137 | | 13.6 | CLAY |
| | 18.04' | 5.50 | 175. | 1.05 | 2.20 | 1. | .04 | 1.12 | .000 | 1.500 | .937 | .38 | .40 | .27 | .100 | | 1.2 | MUD |
| | 19.68' | 6.00 | 350. | 1.55 | 5.05 | 87. | 1.75 | 1.41 | .000 | 1.700 | 1.016 | 1.67 | 1.65 | .71 | | 21.8 | 74.0 | SANDY SILT |
| | 21.32' | 6.50 | 325. | 1.80 | 3.70 | 29. | .48 | 1.63 | .049 | 1.600 | 1.047 | .76 | .73 | .44 | .179 | | 24.5 | SILTY CLAY |
| | 22.96' | 7.00 | 174. | 1.75 | 3.25 | 14. | .25 | 1.52 | .098 | 1.600 | 1.077 | .70 | .65 | .40 | .168 | | 12.1 | CLAY |
| | 24.60' | 7.50 | 150. | 1.90 | 3.50 | 18. | .30 | 1.56 | .147 | 1.600 | 1.106 | .75 | .68 | .42 | .179 | | 15.2367 | CLAY |
| | 26.24' | 8.00 | 150. | 2.15 | 3.55 | 11. | .16 | 1.71 | .196 | 1.500 | 1.133 | .89 | .78 | .46 | .205 | | 9.0 | MUD |
| | 27.88' | 8.50 | 150. | 2.25 | 3.80 | 16. | .23 | 1.71 | .245 | 1.600 | 1.160 | .91 | .78 | .46 | .210 | | 13.686 | CLAY |
| | 29.52' | 9.00 | 200. | 2.10 | 3.50 | 11. | .17 | 1.51 | .294 | 1.500 | 1.187 | .76 | .64 | .40 | .184 | | 9.0 | MUD |
| | 31.16' | 9.50 | 200. | 2.10 | 3.50 | 11. | .17 | 1.44 | .343 | 1.500 | 1.212 | .72 | .60 | .38 | .176 | | 9.0 | MUD |
| | 32.80' | 10.00 | 375. | 1.80 | 4.40 | 54. | 1.17 | 1.08 | .393 | 1.600 | 1.239 | .47 | .38 | .26 | | | 46.1 | SILT |
| | 34.44' | 10.50 | 3000. | 7.80 | 25.20 | 594. | 2.61 | 5.12 | .442 | 2.000 | 1.278 | 5.60 | 4.38 | .84 | | 36.0 | 1128.7 | SILTY SAND |
| | | END OF SOUNDING | | | | | | | | | | | | | | | | |




END OF SOUNDING

Surface El. 21.90'

SOUTHERN COMPANY
FILE NAME: PLANT BARRY ASH POND STUDY
FILE NUMBER: BA-15.DAT

TEST NO. BA-15

RECORD OF DILATOMETER TEST NO. BA-15
USING DATA REDUCTION PROCEDURES IN MARCHETTI (ASCE,J-GED,MARCH 80)
KO IN SANDS DETERMINED USING SCHMERTMANN METHOD (1983)
PHI ANGLE CALCULATION BASED ON DURGUNOGLU AND MITCHELL (ASCE,RALEIGH CONF,JUNE 75)
PHI ANGLE NORMALIZED TO 2.72 BARS USING BALIGH'S EXPRESSION (ASCE,J-GED,NOV 76)
MODIFIED MAYNE AND KULHAWY FORMULA USED FOR OCR IN SANDS (ASCE,J-GED,JUNE 82)

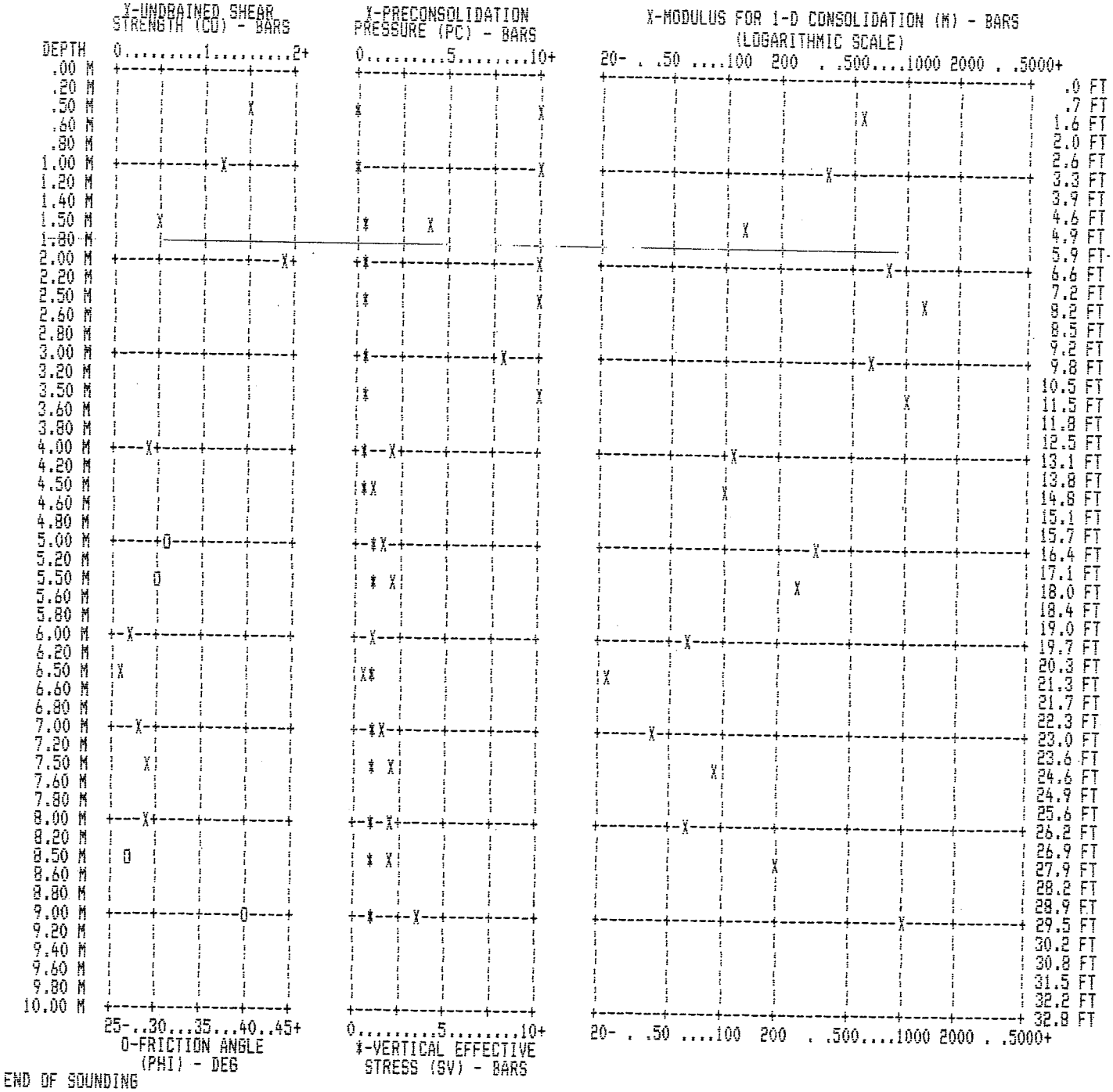
LOCATION: SOUNDING PUSHED BY CME 75
PERFORMED - DATE: 10-30-1997
BY: W. BARRY GILLIAM

CALIBRATION INFORMATION:
DELTA A = .05 BARS DELTA B = .35 BARS GAGE O = .10 BARS GWT DEPTH= 3.44 M = 11.28'
ROD DIA.= 3.60 CM FR.RED.DIA.= 5.40 CM ROD WT.= 6.50 KG/M DELTA/PHI= .50 BLADE T=15.00 MM

1 BAR = 1.019 KG/CM2 = 1.044 TSF = 14.51 PSI ANALYSIS USES H2O UNIT WEIGHT = 1.000 T/M3

| Z (M) | THRUST (KG) | A (BAR) | B (BAR) | ED (BAR) | ID | KD | UO (BAR) | GAMMA (T/M3) | SV (BAR) | PC (BAR) | OCR | KO | CU (BAR) | PHI (DEG) | M (BAR) | SOIL TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.64' | .50 | 1250. | 6.10 | 10.30 | 138. | .68 | 65.11 | .000 | 1.800 | .090 | 20.60 | ***** | 5.28 | 1.540 | | 591.7 | CLAYEY SILT |
| 3.28' | 1.00 | 1000. | 5.80 | 9.05 | 104. | .53 | 31.45 | .000 | 1.800 | .178 | 13.12 | 73.55 | 3.58 | 1.228 | .976 lower 1/3 Cu | 372.2 | SILTY CLAY |
| 4.92' | 1.50 | 525. | 3.20 | 4.95 | 49. | .46 | 11.67 | .000 | 1.700 | .264 | 4.14 | 15.66 | 2.02 | .527 | | 130.2 | SILTY CLAY |
| 6.56' | 2.00 | 1075. | 9.40 | 16.50 | 244. | .78 | 25.48 | .000 | 1.950 | .354 | 18.74 | 52.99 | 3.19 | 1.874 | 1.783 lower 1/3 | 826.5 | CLAYEY SILT |
| 8.20' | 2.50 | 2400. | 11.05 | 21.80 | 377. | 1.04 | 23.14 | .000 | 2.100 | .453 | 20.65 | 45.57 | 3.02 | | | 1242.2 | SILT |
| 9.84' | 3.00 | 3000. | 6.50 | 13.80 | 251. | 1.19 | 11.05 | .000 | 1.950 | .552 | 7.95 | 14.39 | 1.96 | | | 652.3 | SILT |
| 11.48' | 3.50 | 1650. | 11.50 | 21.50 | 350. | .92 | 16.97 | .006 | 2.100 | .646 | 18.16 | 28.11 | 2.53 | | | 1049.7 | SILT |
| 13.12' | 4.00 | 750. | 3.00 | 5.25 | 67. | .69 | 4.06 | .055 | 1.700 | .690 | 2.08 | 3.02 | 1.00 | .368 | C=768 psf | 106.6 | CLAYEY SILT |
| 14.76' | 4.50 | 400. | 2.25 | 4.90 | 82. | 1.19 | 2.74 | .104 | 1.700 | .724 | 1.18 | 1.63 | .73 | | | 100.2 | SILT |
| 16.40' | 5.00 | 850. | 2.50 | 9.35 | 235. | 3.43 | 2.59 | .153 | 1.900 | .764 | 1.53 | 2.00 | .63 | | | 311.4 | SAND |
| 18.04' | 5.50 | 850. | 2.95 | 8.05 | 171. | 2.00 | 3.05 | .202 | 1.900 | .808 | 2.07 | 2.56 | .71 | | | 238.2 | SILTY SAND |
| 19.68' | 6.00 | 600. | 2.50 | 4.40 | 55. | .74 | 2.51 | .251 | 1.700 | .847 | 1.21 | 1.42 | .67 | .247 | | 59.8 | CLAYEY SILT |
| 21.32' | 6.50 | 250. | 1.65 | 2.75 | 26. | .58 | 1.44 | .300 | 1.600 | .879 | .53 | .60 | .38 | .128 | .212 lower 1/3 Cu | 21.7 | SILTY CLAY |
| 22.96' | 7.00 | 300. | 2.70 | 4.10 | 36. | .47 | 2.47 | .349 | 1.700 | .911 | 1.27 | 1.39 | .66 | .261 | | 38.9 | SILTY CLAY |
| 24.60' | 7.50 | 375. | 3.60 | 5.75 | 64. | .60 | 3.24 | .398 | 1.700 | .945 | 2.01 | 2.12 | .84 | .380 | C=442 psf | 85.8 | SILTY CLAY |
| 26.24' | 8.00 | 375. | 3.50 | 5.30 | 51. | .50 | 2.99 | .447 | 1.700 | .980 | 1.84 | 1.88 | .78 | .357 | | 64.5 | SILTY CLAY |
| 27.88' | 8.50 | 700. | 3.10 | 8.50 | 182. | 2.28 | 2.26 | .497 | 1.900 | 1.019 | 2.12 | 2.08 | .69 | | | 207.4 | SILTY SAND |
| 29.52' | 9.00 | 4000. | 6.60 | 21.10 | 514. | 2.79 | 4.97 | .546 | 2.000 | 1.065 | 3.66 | 3.44 | .71 | | | 967.9 | SILTY SAND |

END OF SOUNDING




END OF SOUNDING

Surface El. 19.85'

SOUTHERN COMPANY
FILE NAME: PLANT BARRY ASH POND STUDY
FILE NUMBER: BA-16.DAT

TEST NO. BA-16

RECORD OF DILATOMETER TEST NO. BA-16
USING DATA REDUCTION PROCEDURES IN MARCHETTI (ASCE,J-GED,MARCH 80)
KO IN SANDS DETERMINED USING SCHMERTMANN METHOD (1983)
PHI ANGLE CALCULATION BASED ON DURGUNOGLU AND MITCHELL (ASCE,RALEIGH CONF,JUNE 75)
PHI ANGLE NORMALIZED TO 2.72 BARS USING BALIGH'S EXPRESSION (ASCE,J-GED,NOV 76)
MODIFIED MAYNE AND KULHAWY FORMULA USED FOR OCR IN SANDS (ASCE,J-GED,JUNE 82)

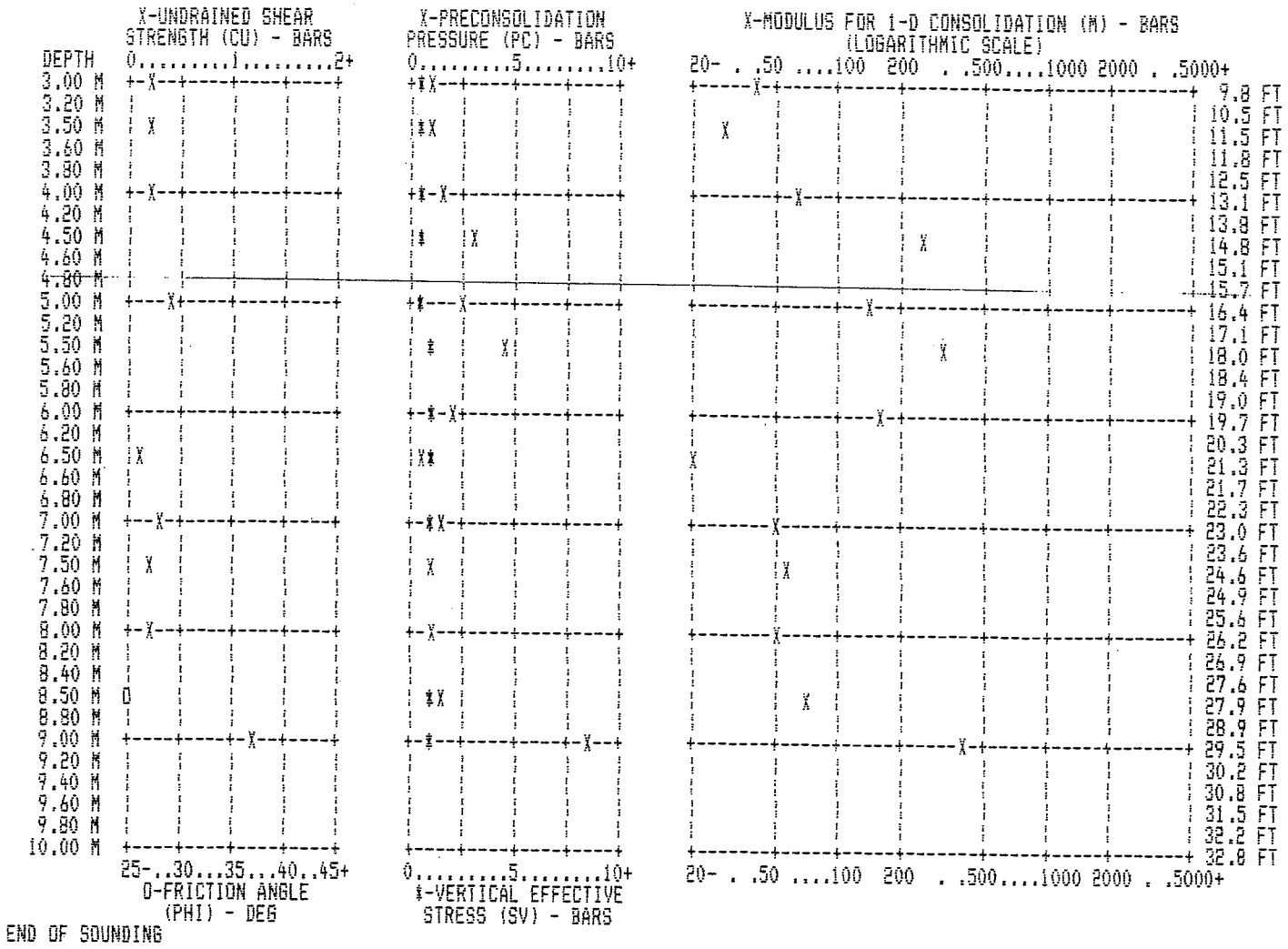
LOCATION: SOUNDING PUSHED BY CME 75 19'F/ EDGE OF DIKE
PERFORMED - DATE: 10-30-1997
BY: W. BARRY GILLIAM

CALIBRATION INFORMATION:
DELTA A = .05 BARS DELTA B = .35 BARS GAGE O = .10 BARS GWT DEPTH= 3.44 M=11.28'
ROD DIA.= 3.60 CM FR.RED.DIA.= 5.40 CM ROD WT.= 6.50 KG/M DELTA/PHI= .50 BLADE T=15.00 MM

1 BAR = 1.019 KG/CM2 = 1.044 TSF = 14.51 PSI ANALYSIS USES H2O UNIT WEIGHT = 1.000 T/M3

| | Z (M) | THRUST (KG) | A (BAR) | B (BAR) | ED (BAR) | ID | KD | UO (BAR) | GAMMA (T/M3) | SV (BAR) | PC (BAR) | OCR | KO | CU (BAR) | PHI (DEG) | M (BAR) | SOIL TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 9.84' | 3.00 | 325. | 1.50 | 2.85 | 35. | .71 | 2.59 | .000 | 1.600 | .542 | .81 | 1.49 | .69 | .165 | | 38.9 | CLAYEY SILT |
| | 11.48' | 3.50 | 275. | 1.50 | 2.70 | 29. | .60 | 2.28 | .006 | 1.600 | .615 | .76 | 1.23 | .62 | .160 | | 28.8 | SILTY CLAY |
| | 13.12' | 4.00 | 350. | 2.20 | 3.95 | 49. | .70 | 3.14 | .055 | 1.700 | .647 | 1.30 | 2.02 | .81 | .250 | | 64.9 | CLAYEY SILT |
| | 14.76' | 4.50 | 400. | 4.05 | 8.30 | 140. | 1.09 | 5.42 | .104 | 1.800 | .683 | 3.24 | 4.74 | 1.23 | | | 263.4 | SILT |
| | 16.40' | 5.00 | 560. | 3.55 | 6.15 | 80. | .71 | 4.49 | .153 | 1.700 | .720 | 2.55 | 3.54 | 1.08 | .406 | | 135.2 | CLAYEY SILT |
| | 18.04' | 5.50 | 800. | 5.20 | 9.90 | 157. | .95 | 6.25 | .202 | 1.800 | .757 | 4.48 | 5.92 | 1.36 | | | 318.0 | SILT |
| | 19.68' | 6.00 | 625. | 3.20 | 6.65 | 111. | 1.17 | 3.46 | .251 | 1.700 | .794 | 1.87 | 2.35 | .88 | | | 161.3 | SILT |
| | 21.32' | 6.50 | 250. | 1.70 | 2.60 | 18. | .40 | 1.60 | .300 | 1.600 | .826 | .59 | .71 | .43 | .138 | | 15.5 | SILTY CLAY |
| | 22.96' | 7.00 | 210. | 2.85 | 4.35 | 40. | .48 | 2.79 | .349 | 1.700 | .858 | 1.44 | 1.68 | .74 | .286 | | 47.8 | SILTY CLAY |
| | 24.60' | 7.50 | 275. | 2.45 | 4.40 | 56. | .85 | 2.16 | .398 | 1.700 | .892 | 1.00 | 1.13 | .59 | .216 | | 53.8 | CLAYEY SILT |
| | 26.24' | 8.00 | 275. | 2.60 | 4.40 | 51. | .72 | 2.19 | .447 | 1.700 | .926 | 1.07 | 1.16 | .60 | .229 | | 48.9 | CLAYEY SILT |
| | 27.88' | 8.50 | 450. | 2.10 | 4.75 | 82. | 1.64 | 1.50 | .497 | 1.700 | .961 | 1.50 | 1.56 | .65 | | | 69.7 | SANDY SILT |
| | 29.52' | 9.00 | 3200. | 8.80 | 14.10 | 179. | .65 | 7.95 | .546 | 1.950 | 1.001 | 8.62 | 8.61 | 1.59 | 1.236 | | 404.5 | CLAYEY SILT |

END OF SOUNDING




END OF SOUNDING

SOUTHERN COMPANY
FILE NAME: PLANT BARRY ASH POND STUDY
FILE NUMBER: BA-19.DAT

TEST NO. BA-19

RECORD OF DILATOMETER TEST NO. BA-19
USING DATA REDUCTION PROCEDURES IN MARCHETTI (ASCE,J-GED,MARCH 80)
KO IN SANDS DETERMINED USING SCHMERTMANN METHOD (1983)
PHI ANGLE CALCULATION BASED ON DURGUNOGLU AND MITCHELL (ASCE,RALEIGH CONF,JUNE 75)
PHI ANGLE NORMALIZED TO 2.72 BARS USING BALIGH'S EXPRESSION (ASCE,J-GED,NOV 76)
MODIFIED MAYNE AND KULHAWY FORMULA USED FOR OCR IN SANDS (ASCE,J-GED,JUNE 82)

LOCATION: SOUNDING PUSHED BY CME 75
PERFORMED - DATE: 11 3 1997
BY: W. BARRY GILLIAM

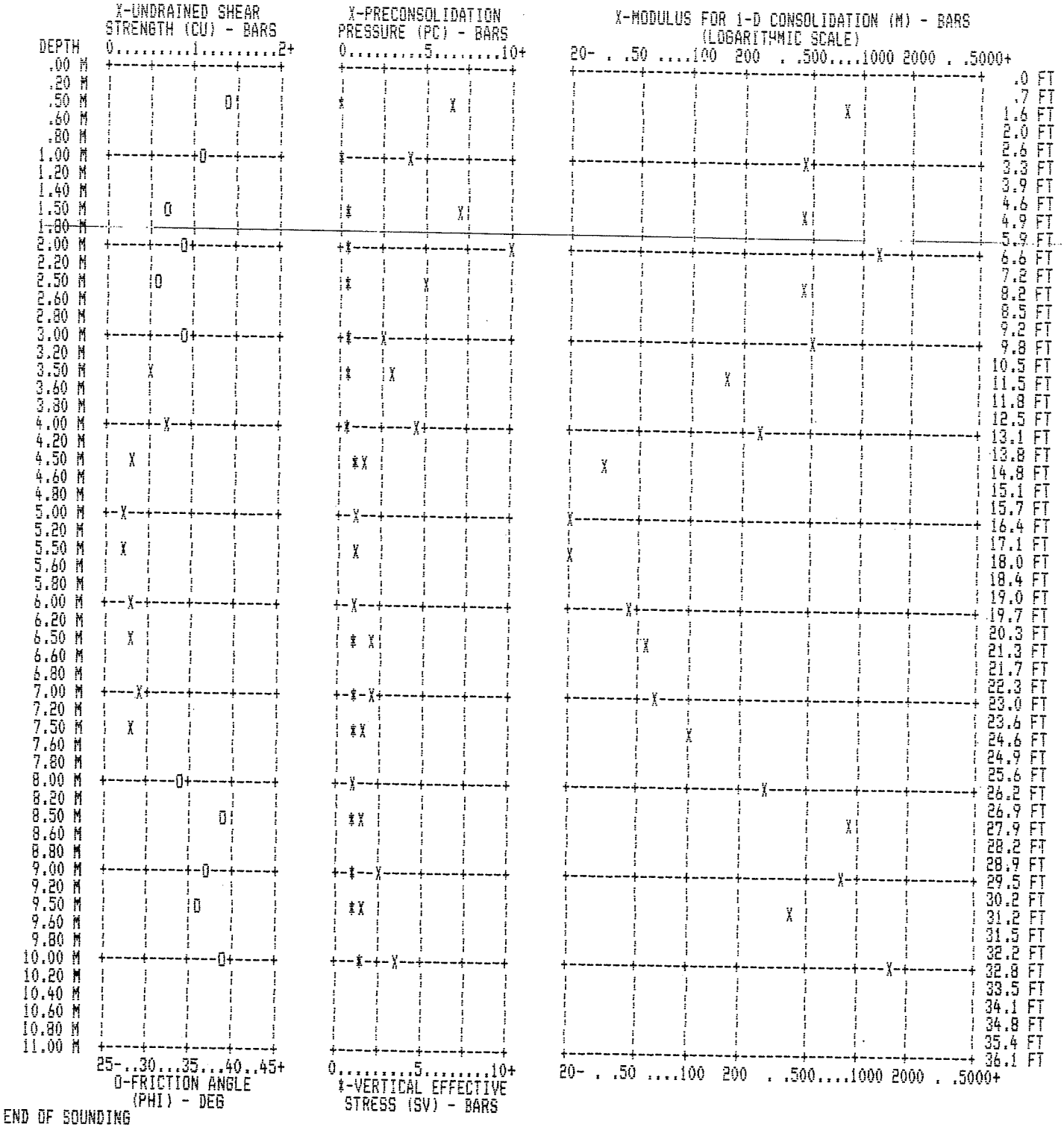
CALIBRATION INFORMATION:
DELTA A = .15 BARS DELTA B = 1.75 BARS GAGE 0 = .10 BARS GWT DEPTH= 4.90 M = 16.07'
ROD DIA.= 3.60 CM FR.RED.DIA.= 5.40 CM ROD WT.= 6.50 KG/M DELTA/PHI= .50 BLADE T=15.00

1 BAR = 1.019 KG/CM2 = 1.044 TSF = 14.51 PSI ANALYSIS USES H2O UNIT WEIGHT = 1.000 T/M3

| Z (M) | THRUST (KG) | A (BAR) | B (BAR) | ED (BAR) | ID | KD | UO (BAR) | GAMMA (T/M3) | SV (BAR) | PC (BAR) | OCR | KO | CU (BAR) | PHI (DEG) | M (BAR) | SOIL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.64' | .50 | 1150. | 2.65 | 10.80 | 228. | 2.75 | 26.53 | .000 | 1.900 | .090 | 6.41 | 71.20 | 3.19 | | 38.9 | 779.6 | SILTY SAND |
| 3.28' | 1.00 | 975. | 2.65 | 8.95 | 160. | 1.86 | 13.54 | .000 | 1.900 | .183 | 4.09 | 22.32 | 1.78 | | 35.6 | 446.7 | SILTY SAND |
| 4.92' | 1.50 | 925. | 3.80 | 10.00 | 157. | 1.24 | 13.27 | .000 | 1.800 | .274 | 6.76 | 24.66 | 1.85 | | 31.8 | 433.6 | SANDY SILT |
| 6.56' | 2.00 | 1775. | 6.50 | 19.50 | 404. | 1.94 | 16.32 | .000 | 2.000 | .367 | 12.67 | 34.50 | 2.17 | | 34.5 | 1198.7 | SILTY SAND |
| 8.20' | 2.50 | 950. | 4.05 | 11.40 | 199. | 1.50 | 8.31 | .000 | 1.800 | .460 | 5.10 | 11.07 | 1.30 | | 30.6 | 460.9 | SANDY SILT |
| 9.84' | 3.00 | 1200. | 3.10 | 12.50 | 273. | 2.84 | 5.03 | .000 | 1.900 | .551 | 2.40 | 4.35 | .84 | | 34.0 | 518.3 | SILTY SAND |
| 11.48' | 3.50 | 1000. | 3.35 | 7.75 | 91. | .80 | 5.10 | .000 | 1.800 | .642 | 2.77 | 4.31 | 1.18 | .455 | .536 lower 1/3 Cu | C=1119 psf 165.7 | CLAYEY SILT |
| 13.12' | 4.00 | 800. | 4.85 | 10.00 | 118. | .72 | 6.49 | .000 | 1.800 | .730 | 4.58 | 6.27 | 1.39 | .699 | | 243.9 | CLAYEY SILT |
| 14.76' | 4.50 | 400. | 2.25 | 4.90 | 27. | .35 | 2.78 | .000 | 1.600 | .814 | 1.36 | 1.67 | .74 | .270 | | 32.5 | CLAY |
| 16.40' | 5.00 | 200. | 1.65 | 3.60 | 2. | .03 | 1.92 | .010 | 1.500 | .880 | .82 | .94 | .52 | .184 | | 1.5 | MUD |
| 18.04' | 5.50 | 250. | 1.90 | 4.25 | 16. | .25 | 2.06 | .059 | 1.600 | .907 | .95 | 1.05 | .56 | .207 | | 14.4 | CLAY |
| 19.68' | 6.00 | 400. | 2.35 | 5.40 | 42. | .54 | 2.38 | .108 | 1.700 | .939 | 1.23 | 1.31 | .64 | .257 | | 43.1 | SILTY CLAY |
| 21.32' | 6.50 | 500. | 3.05 | 6.15 | 44. | .44 | 2.96 | .157 | 1.700 | .973 | 1.80 | 1.85 | .78 | .350 | .224 lower 1/3 Cu | C=467 psf 54.8 | SILTY CLAY |
| 22.96' | 7.00 | 750. | 3.35 | 6.60 | 49. | .45 | 3.10 | .206 | 1.700 | 1.008 | 2.00 | 1.98 | .81 | .384 | | 64.0 | SILTY CLAY |
| 24.60' | 7.50 | 725. | 3.15 | 7.35 | 84. | .85 | 2.72 | .255 | 1.700 | 1.042 | 1.68 | 1.61 | .72 | .336 | 1.6 lower 1/3 γm | 99.4 | CLAYEY SILT |
| 26.24' | 8.00 | 1475. | 2.45 | 12.10 | 282. | 4.50 | 1.67 | .304 | 1.900 | 1.081 | 1.20 | 1.11 | .46 | | 34.1 | 267.3 | SAND |
| 27.88' | 8.50 | 3000. | 4.35 | 23.20 | 618. | 5.56 | 2.84 | .353 | 2.000 | 1.128 | 1.73 | 1.53 | .49 | | 38.5 | 868.1 | SAND |
| 29.52' | 9.00 | 2700. | 4.90 | 22.00 | 554. | 4.21 | 3.22 | .402 | 2.000 | 1.177 | 2.40 | 2.04 | .58 | | 37.1 | 839.2 | SAND |
| 31.16' | 9.50 | 2125. | 3.50 | 15.30 | 361. | 3.99 | 2.13 | .451 | 1.900 | 1.223 | 1.59 | 1.30 | .48 | | 35.9 | 417.0 | SAND |
| 32.80' | 10.00 | 4100. | 7.25 | 33.55 | 889. | 4.59 | 4.39 | .500 | 2.000 | 1.270 | 3.73 | 2.94 | .67 | | 39.1 | 1587.4 | SAND |

END OF SOUNDING

φ = 33° (lower 1/3 value)
γm = 105 pcf
1.8666 lower 1/3 γm
10.5
13.5
25.5
φ = 35° (lower 1/3 value)
1.9233 lower 1/3 γm
γm = 107 pcf




END OF SOUNDING

SOUTHERN COMPANY
FILE NAME: PLANT BARRY ASH POND STUDY
FILE NUMBER: BA-20.DAT

TEST NO. BA-20

RECORD OF DILATOMETER TEST NO. BA-20
USING DATA REDUCTION PROCEDURES IN MARCHETTI (ASCE,J-GED,MARCH 80)
KO IN SANDS DETERMINED USING SCHMERTMANN METHOD (1983)
PHI ANGLE CALCULATION BASED ON DURGUNOGLU AND MITCHELL (ASCE,RALEIGH CONF,JUNE 75)
PHI ANGLE NORMALIZED TO 2.72 BARS USING BALIGH'S EXPRESSION (ASCE,J-GED,NOV 76)
MODIFIED MAYNE AND KULHAWY FORMULA USED FOR OCR IN SANDS (ASCE,J-GED,JUNE 82)

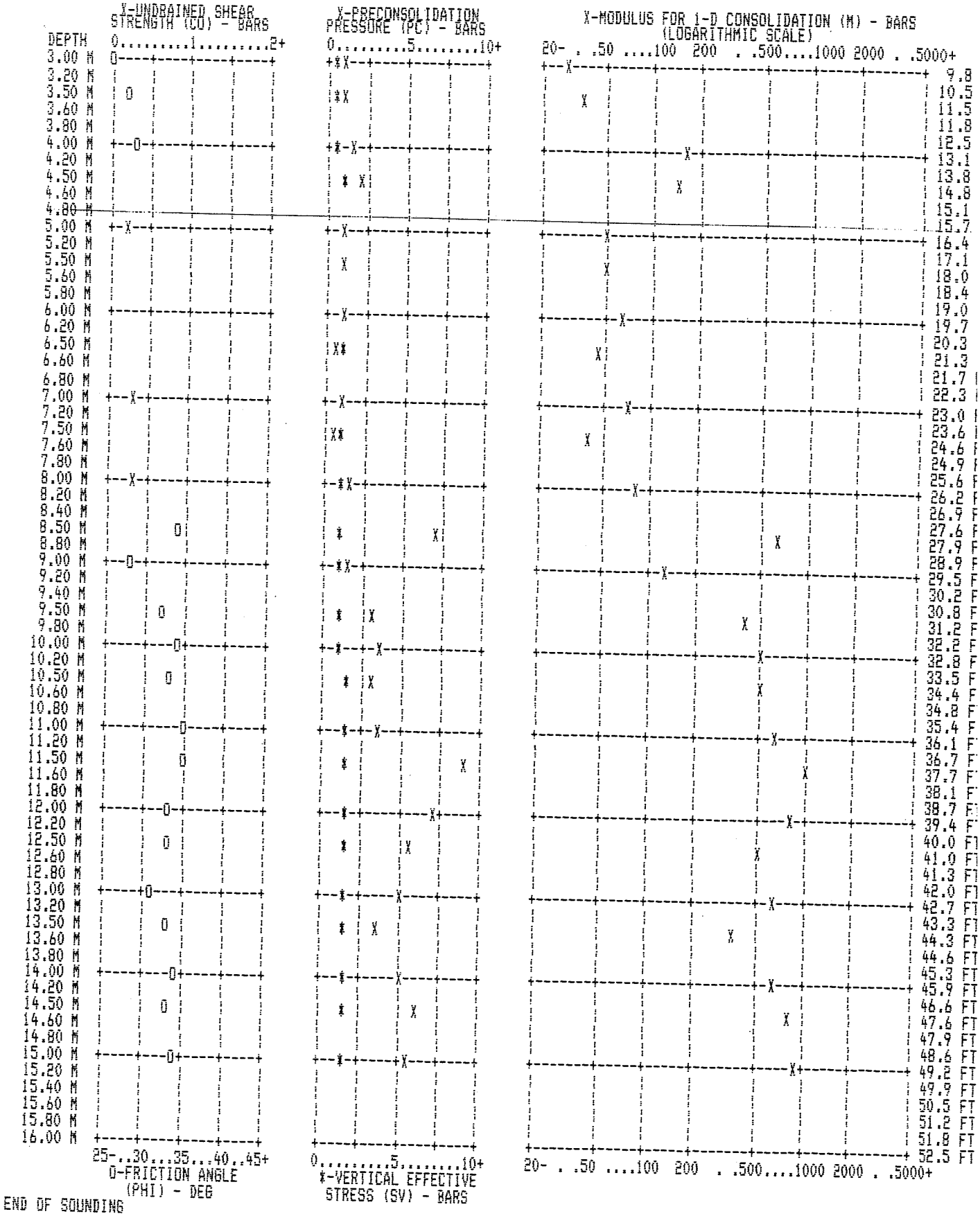
LOCATION: SOUNDING PUSHED BY CME 75 18.5'F/ EDGE OF DIKE
PERFORMED DATE: 10-30-1997
BY: W. BARRY GILLIAM

CALIBRATION INFORMATION:
DELTA A = .05 BARS DELTA B = .35 BARS GAGE O = .10 BARS GWT DEPTH= 4.91 M = 16.10'
ROD DIA.= 3.60 CM FR.RED.DIA.= 5.40 CM ROD WT.= 6.50 KG/M DELTA/PHI= .50 BLADE T=15.00 MM

1 BAR = 1.019 KG/CM2 = 1.044 TSF = 14.51 PSI ANALYSIS USES H2O UNIT WEIGHT = 1.000 T/M3

| Z (M) | THRUST (KG) | A (BAR) | B (BAR) | ED (BAR) | ID | KD | UO (BAR) | GAMMA (T/M3) | SV (BAR) | PC (BAR) | OCR | KO | CU (BAR) | PHI (DEG) | M (BAR) | SOIL TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.84' | 3.00 | 275. | .90 | 2.25 | 35. | 1.24 | 1.48 | .000 | 1.600 | .542 | .82 | 1.51 | .64 | | | |
| 11.48' | 3.50 | 390. | 1.00 | 2.50 | 40. | 1.29 | 1.44 | .000 | 1.600 | .621 | .85 | 1.37 | .59 | 24.2 | 29.4 | SANDY SILT |
| 13.12' | 4.00 | 600. | 2.00 | 6.10 | 135. | 2.20 | 2.51 | .000 | 1.800 | .704 | 1.52 | 2.17 | .68 | 26.5 | 34.1 | SANDY SILT |
| 14.76' | 4.50 | 650. | 3.10 | 6.15 | 97. | .95 | 3.69 | .000 | 1.700 | .790 | 2.06 | 2.60 | .93 | 28.1 | 165.3 | SILTY SAND |
| 16.40' | 5.00 | 500. | 1.95 | 3.85 | 55. | .87 | 2.10 | .009 | 1.700 | .864 | .93 | 1.08 | .57 | .202 | 92 | 145.0 | SILT |
| 18.04' | 5.50 | 350. | 1.80 | 3.80 | 58. | 1.04 | 1.79 | .058 | 1.700 | .899 | .76 | .84 | .49 | | | 50.7 | CLAYEY SILT |
| 19.68' | 6.00 | 350. | 2.25 | 4.45 | 66. | .94 | 2.15 | .107 | 1.700 | .933 | 1.04 | 1.12 | .58 | | | 49.6 | SILT |
| 21.32' | 6.50 | 350. | 1.80 | 3.60 | 51. | .96 | 1.58 | .156 | 1.600 | .965 | .67 | .69 | .42 | | | 62.8 | SILT |
| 22.96' | 7.00 | 400. | 2.65 | 4.95 | 69. | .87 | 2.31 | .205 | 1.700 | .997 | 1.25 | 1.25 | .62 | .262 | | 43.4 | SILT |
| 24.60' | 7.50 | 350. | 1.80 | 3.45 | 46. | .92 | 1.39 | .254 | 1.600 | 1.029 | .59 | .57 | .37 | | | 70.8 | CLAYEY SILT |
| 26.24' | 8.00 | 455. | 3.05 | 5.55 | 77. | .85 | 2.44 | .303 | 1.700 | 1.061 | 1.45 | 1.37 | .66 | .300 | | 38.7 | SILT |
| 27.88' | 8.50 | 2250. | 7.50 | 16.50 | 313. | 1.35 | 6.06 | .352 | 1.950 | 1.101 | 6.77 | 6.15 | 1.00 | | | 82.5 | CLAYEY SILT |
| 29.52' | 9.00 | 700. | 2.10 | 6.65 | 151. | 3.02 | 1.26 | .401 | 1.800 | 1.144 | 1.41 | 1.23 | .56 | | 33.8 | 630.0 | SANDY SIL |
| 31.16' | 9.50 | 1400. | 4.40 | 12.50 | 281. | 2.30 | 2.96 | .450 | 1.900 | 1.186 | 2.79 | 2.35 | .67 | | 27.9 | 128.5 | SILTY SAN |
| 32.80' | 10.00 | 2000. | 5.50 | 15.10 | 335. | 2.15 | 3.64 | .500 | 2.000 | 1.232 | 3.51 | 2.85 | .71 | | 31.7 | 389.5 | SILTY SAN |
| 34.44' | 10.50 | 1700. | 5.00 | 14.50 | 332. | 2.42 | 3.09 | .549 | 1.900 | 1.279 | 3.06 | 2.39 | .67 | | 34.0 | 525.4 | SILTY SAN |
| 36.08' | 11.00 | 2350. | 5.90 | 17.60 | 412. | 2.53 | 3.54 | .598 | 2.000 | 1.326 | 3.49 | 2.64 | .68 | | 32.8 | 475.6 | SILTY SAN |
| 37.72' | 11.50 | 3000. | 10.00 | 24.50 | 514. | 1.72 | 6.26 | .647 | 1.950 | 1.373 | 8.79 | 6.40 | 1.01 | | 34.9 | 644.5 | SILTY SAN |
| 39.36' | 12.00 | 2300. | 8.50 | 20.50 | 423. | 1.70 | 5.05 | .696 | 1.950 | 1.420 | 6.82 | 4.81 | .90 | | 34.7 | 1055.3 | SANDY SIL |
| 41' | 12.50 | 2100. | 7.50 | 16.00 | 295. | 1.35 | 4.30 | .745 | 1.950 | 1.467 | 5.61 | 3.82 | .82 | | 32.9 | 781.5 | SANDY SIL. |
| 42.64' | 13.00 | 1775. | 7.00 | 17.80 | 379. | 1.94 | 3.72 | .794 | 2.000 | 1.515 | 4.96 | 3.28 | .78 | | 32.5 | 494.4 | SANDY SILT |
| 44.28' | 13.50 | 1950. | 5.90 | 13.60 | 266. | 1.65 | 2.98 | .843 | 1.800 | 1.559 | 3.62 | 2.32 | .66 | | 31.3 | 596.0 | SILTY SAND |
| 45.92' | 14.00 | 2375. | 7.50 | 19.30 | 415. | 2.00 | 3.74 | .892 | 2.000 | 1.603 | 4.88 | 3.05 | .74 | | 32.7 | 356.8 | SANDY SILT |
| 47.56' | 14.50 | 2300. | 8.45 | 22.00 | 479. | 2.03 | 4.12 | .941 | 2.000 | 1.652 | 5.96 | 3.61 | .80 | | 33.5 | 656.5 | SILTY SAND |
| 49.20' | | | | | | | | | | | | | | | 32.7 | 801.6 | SILTY SAND |

| | Z (M) ***** | THRUST (KG) ****** | A (BAR) ***** | B (BAR) ***** | ED (BAR) ***** | ID ***** | KD ***** | UO (BAR) ****** | GAMMA (T/M3) ****** | SV (BAR) ****** | PC (BAR) ***** | OCR ***** | KO ***** | CU (BAR) ***** | PHI (DEG) ***** | M (BAR) ****** | SOIL TYPE ********** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 49.20' | 15.00 | 2800. | 8.50 | 23.70 | 539. | 2.31 | 3.95 | .990 | 2.000 | 1.701 | 5.46 | 3.21 | .75 | | 34.4 | 890.7 | SILTY SAN |
| | END OF SOUNDING | | | | | | | | | | | | | | | | |




END OF SOUNDING

SOUTHERN COMPANY
FILE NAME: PLANT BARRY ASH POND STUDY
FILE NUMBER: BA-21.DAT

TEST NO. BA-21

RECORD OF DILATOMETER TEST NO. BA-21
USING DATA REDUCTION PROCEDURES IN MARCHETTI (ASCE,J-GED,MARCH 80)
KO IN SANDS DETERMINED USING SCHMERTMANN METHOD (1983)
PHI ANGLE CALCULATION BASED ON DURGUNOGLU AND MITCHELL (ASCE,RALEIGH CONF,JUNE 75)
PHI ANGLE NORMALIZED TO 2.72 BARS USING BALIGH'S EXPRESSION (ASCE,J-GED,NOV 76)
MODIFIED MAYNE AND KULHAWY FORMULA USED FOR OCR IN SANDS (ASCE,J-GED,JUNE 82)

LOCATION: SOUNDING PUSHED BY CME 75
PERFORMED - DATE: 11 3 1997
BY: W. BARRY GILLIAM

CALIBRATION INFORMATION:
DELTA A = .15 BARS DELTA B = 1.75 BARS GAGE 0 = .10 BARS GWT DEPTH= 2.90 M = 9.51'
ROD DIA.= 3.60 CM FR.RED.DIA.= 5.40 CM ROD WT.= 6.50 KG/M DELTA/PHI= .50 BLADE T=15.00 MM

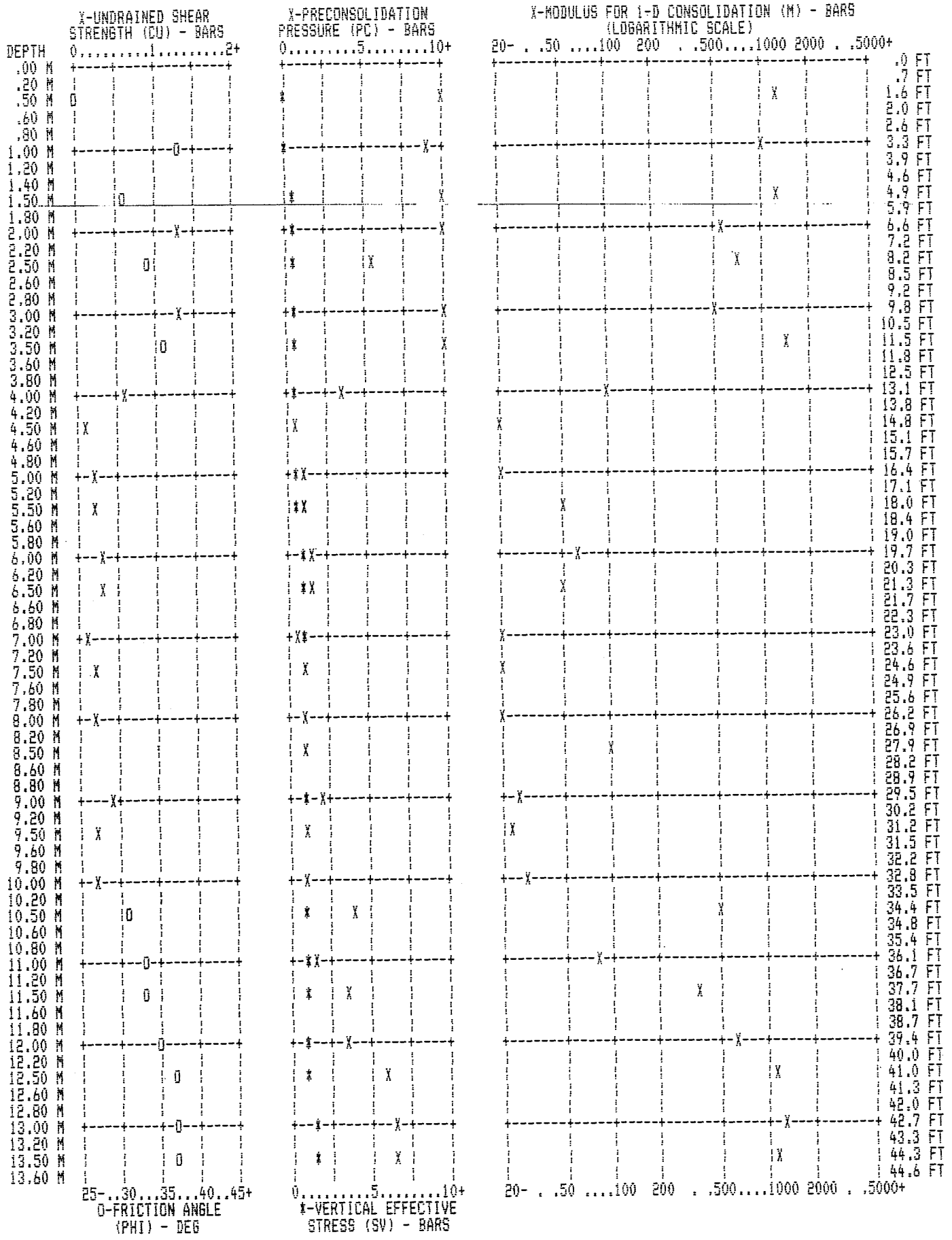
1 BAR = 1.019 KG/CM2 = 1.044 TSF = 14.51 PSI ANALYSIS USES H2O UNIT WEIGHT = 1.000 T/M3

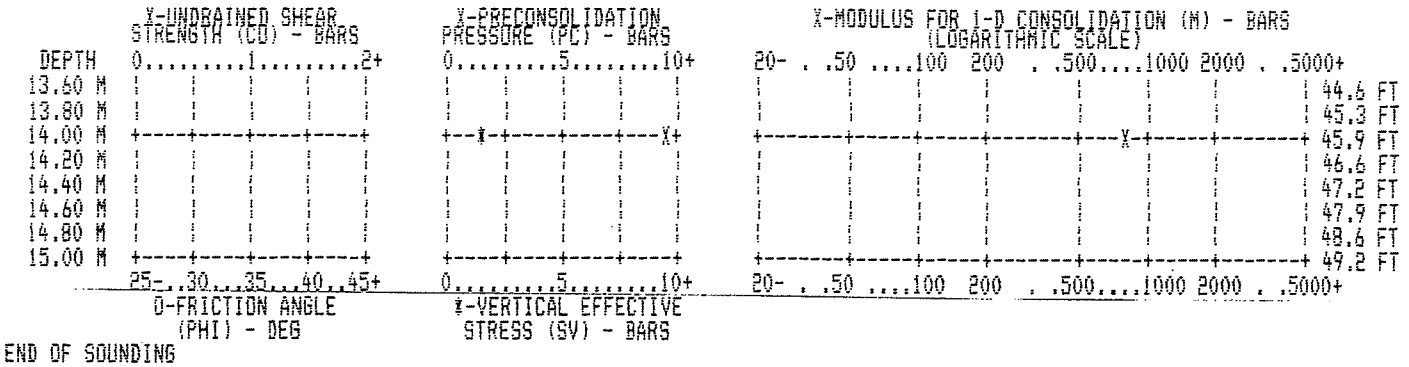
| Z (M) | THRUST (KG) | A (BAR) | B (BAR) | ED (BAR) | ID | KD | UO (BAR) | GAMMA (T/M3) | SV (BAR) | PC (BAR) | OCR | KO | CU (BAR) | PHI (DEG) | M (BAR) | SOIL TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .50 | 750. | 6.10 | 16.20 | 299. | 1.50 | 63.78 | .000 | 1.950 | .090 | 82.92 | ***** | 8.02 | | 24.7 | 1271.0 | SANDY SILT |
| 1.00 | 1650. | 4.25 | 15.10 | 326. | 2.44 | 20.89 | .000 | 1.900 | .184 | 8.97 | 48.62 | 2.60 | | 37.5 | 1042.6 | SILTY SAND |
| 1.50 | 1495. | 7.75 | 19.70 | 366. | 1.45 | 26.16 | .000 | 1.950 | .279 | 27.27 | 97.76 | 3.41 | | 31.4 | 1248.9 | SANDY SILT |
| 2.00 | 1100. | 7.00 | 14.00 | 186. | .79 | 18.14 | .000 | 1.950 | .375 | 11.68 | 31.18 | 2.63 | 1.297 | | 569.3 | CLAYEY SILT |
| 2.50 | 1400. | 4.50 | 14.20 | 284. | 1.97 | 8.87 | .000 | 1.900 | .469 | 5.28 | 11.26 | 1.30 | | 34.0 | 678.6 | SILTY SAND |
| 3.00 | 1100. | 7.40 | 14.60 | 193. | .78 | 12.96 | .010 | 1.950 | .554 | 10.22 | 18.45 | 2.16 | 1.259 | | 530.2 | CLAYEY SILT |
| 3.50 | 2600. | 8.50 | 24.80 | 525. | 1.95 | 12.92 | .059 | 2.000 | .602 | 13.08 | 21.74 | 1.75 | | 35.7 | 1438.9 | SILTY SAND |
| 4.00 | 600. | 4.10 | 7.40 | 51. | .37 | 6.18 | .108 | 1.700 | .643 | 3.73 | 5.80 | 1.34 | .579 | | 102.3 | SILTY CLAY |
| 4.50 | 200. | 1.10 | 3.45 | 16. | .49 | 1.44 | .157 | 1.600 | .675 | .40 | .60 | .38 | .098 | | 13.9 | SILTY CLAY |
| 5.00 | 400. | 2.05 | 4.00 | 2. | .03 | 2.69 | .206 | 1.500 | .702 | 1.12 | 1.59 | .72 | .224 | | 2.1 | MUD |
| 5.50 | 500. | 2.30 | 5.35 | 42. | .59 | 2.78 | .255 | 1.700 | .732 | 1.23 | 1.68 | .74 | .243 | | 49.9 | SILTY CLAY |
| 6.00 | 600. | 2.80 | 6.05 | 49. | .57 | 3.24 | .304 | 1.700 | .766 | 1.62 | 2.12 | .84 | .307 | | 66.1 | SILTY CLAY |
| 6.50 | 400. | 2.85 | 5.80 | 38. | .44 | 3.12 | .353 | 1.700 | .800 | 1.60 | 2.00 | .81 | .307 | | 49.9 | SILTY CLAY |
| 7.00 | 350. | 1.75 | 3.75 | 4. | .08 | 1.68 | .402 | 1.500 | .830 | .63 | .76 | .45 | .147 | | 3.1 | MUD |
| 7.50 | 425. | 2.15 | 4.45 | 15. | .24 | 2.02 | .451 | 1.600 | .857 | .87 | 1.01 | .55 | .191 | | 12.5 | CLAY |
| 8.00 | 500. | 2.60 | 5.00 | 18. | .25 | 2.40 | .500 | 1.600 | .886 | 1.18 | 1.33 | .65 | .245 | | 18.9 | CLAY |
| 8.50 | 700. | 2.85 | 7.20 | 89. | 1.15 | 2.43 | .550 | 1.700 | .918 | 1.24 | 1.35 | .65 | | | 98.2 | SILT |
| 9.00 | 550. | 3.50 | 5.96 | 20. | .20 | 3.08 | .599 | 1.600 | .950 | 1.86 | 1.96 | .80 | .358 | | 26.4 | CLAY |
| 9.50 | 500. | 2.40 | 5.00 | 26. | .42 | 1.80 | .648 | 1.600 | .979 | .83 | .85 | .49 | .189 | | 21.7 | SILTY CLAY |
| 10.00 | 850. | 2.55 | 5.35 | 33. | .51 | 1.84 | .697 | 1.600 | 1.009 | .89 | .88 | .50 | .200 | | 27.9 | SILTY CLAY |
| 10.50 | 1300. | 5.50 | 15.20 | 284. | 1.86 | 4.22 | .746 | 1.900 | 1.046 | 4.06 | 3.88 | .84 | | 30.7 | 479.3 | SILTY SAND |
| 11.00 | 1250. | 2.90 | 7.40 | 95. | 1.35 | 1.87 | .795 | 1.700 | 1.085 | 1.46 | 1.34 | .52 | | 32.6 | 81.6 | SANDY SILT |
| 11.50 | 1750. | 5.50 | 13.50 | 222. | 1.46 | 3.92 | .844 | 1.800 | 1.122 | 3.61 | 3.22 | .75 | | 33.2 | 354.1 | SANDY SILT |
| 12.00 | 2300. | 5.80 | 18.30 | 386. | 2.51 | 3.80 | .893 | 2.000 | 1.166 | 3.29 | 2.82 | .69 | | 35.5 | 628.9 | SILTY SAND |

SC
11.48'
13.12'
CL
32.80'
34.44'
SP

| Z (M) | THRUST (KG) | A (BAR) | B (BAR) | ED (BAR) | ID | KD | UO (BAR) | GAMMA (T/M3) | SV (BAR) | PC (BAR) | OCR | KO | CU (BAR) | PHI (DEG) | M (BAR) | SOIL TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12.50 | 3400. | 8.50 | 26.80 | 598. | 2.54 | 5.59 | .942 | 2.000 | 1.215 | 5.84 | 4.81 | .87 | | 37.1 | 1181.2 | SILTY SAND |
| 13.00 | 3550. | 9.00 | 27.60 | 608. | 2.43 | 5.72 | .991 | 2.000 | 1.264 | 6.33 | 5.01 | .88 | | 37.1 | 1212.8 | SILTY SAND |
| 13.50 | 3450. | 9.10 | 27.20 | 590. | 2.33 | 5.56 | 1.040 | 2.000 | 1.313 | 6.40 | 4.87 | .88 | | 36.7 | 1159.5 | SILTY SAND |
| 14.00 | 3400. | 11.00 | 23.50 | 386. | 1.18 | 6.93 | 1.089 | 1.950 | 1.361 | 9.46 | 6.95 | 1.45 | | | 825.7 | SILT |

END OF SOUNDING


X-UNDRAINED SHEAR STRENGTH (CU) - BARS
X-PRECONSOLIDATION PRESSURE (PC) - BARS
X-MODULUS FOR 1-D CONSOLIDATION (M) - BARS (LOGARITHMIC SCALE)
DEPTH
0.....1.....2+
0.....5.....10+
20- . .50 ....100 200 . .500....1000 2000 . .5000+
.00 M
.20 M
.50 M
.60 M
.80 M
1.00 M
1.20 M
1.40 M
1.50 M
1.80 M
2.00 M
2.20 M
2.50 M
2.60 M
2.80 M
3.00 M
3.20 M
3.50 M
3.60 M
3.80 M
4.00 M
4.20 M
4.50 M
4.60 M
4.80 M
5.00 M
5.20 M
5.50 M
5.60 M
5.80 M
6.00 M
6.20 M
6.50 M
6.60 M
6.80 M
7.00 M
7.20 M
7.50 M
7.60 M
7.80 M
8.00 M
8.20 M
8.50 M
8.60 M
8.80 M
9.00 M
9.20 M
9.50 M
9.60 M
9.80 M
10.00 M
10.20 M
10.50 M
10.60 M
10.80 M
11.00 M
11.20 M
11.50 M
11.60 M
11.80 M
12.00 M
12.20 M
12.50 M
12.60 M
12.80 M
13.00 M
13.20 M
13.50 M
13.60 M
.0 FT
.7 FT
1.6 FT
2.0 FT
2.6 FT
3.3 FT
3.9 FT
4.6 FT
4.9 FT
5.9 FT
6.6 FT
7.2 FT
8.2 FT
8.5 FT
9.2 FT
9.8 FT
10.5 FT
11.5 FT
11.8 FT
12.5 FT
13.1 FT
13.8 FT
14.8 FT
15.1 FT
15.7 FT
16.4 FT
17.1 FT
18.0 FT
18.4 FT
19.0 FT
19.7 FT
20.3 FT
21.3 FT
21.7 FT
22.3 FT
23.0 FT
23.6 FT
24.6 FT
24.9 FT
25.6 FT
26.2 FT
26.9 FT
27.9 FT
28.2 FT
28.9 FT
29.5 FT
30.2 FT
31.2 FT
31.5 FT
32.2 FT
32.8 FT
33.5 FT
34.4 FT
34.8 FT
35.4 FT
36.1 FT
36.7 FT
37.7 FT
38.1 FT
38.7 FT
39.4 FT
40.0 FT
41.0 FT
41.3 FT
42.0 FT
42.7 FT
43.3 FT
44.3 FT
44.6 FT
25-..30...35...40..45+
O-FRICTION ANGLE (PHI) - DEG
0.....5.....10+
*-VERTICAL EFFECTIVE STRESS (SV) - BARS
20- . .50 ....100 200 . .500....1000 2000 . .5000+




END OF SOUNDING