

INITIAL SAFETY FACTOR ASSESSMENT
40 C.F.R. PART 257.73
PLANT HAMMOND ASH POND 2 (AP-2)
GEORGIA 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 an initial and periodic safety factor assessments. The owner or operator of the CCR unit must conduct an assessment and 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 Georgia Power Company's Plant Hammond also referred to as the Plant Hammond Ash Pond 2 (AP-2) is located on Plant Hammond property, in Coosa Georgia, 1 mile west of the Rome, Georgia city limits in Floyd County. 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 northwest side of the perimeter embankment.

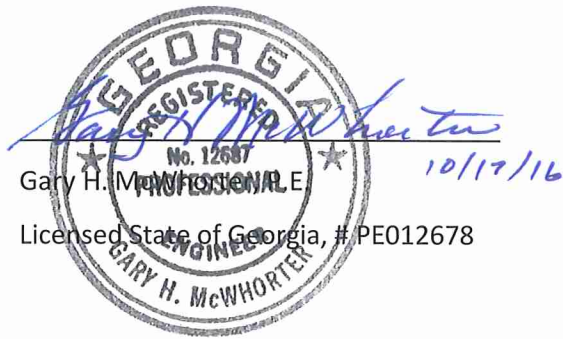
The analyses used to determine the minimum safety factor for the critical section resulted in the following minimum safety factors:

Loading Condition	Minimum Calculated Safety Factor	Minimum Required Safety Factor
Long-term Maximum Storage Pool (Static)	1.9	1.5
Maximum Surcharge Pool (Static)	1.9	1.4
Seismic	1.7	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.

This assessment is supported by appropriate engineering calculations which are attached.

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



Gary H. McWhorter
Licensed State of Georgia, # PE012678



Engineering and Construction Services Calculation

Calculation Number:
TV-HM-GPC607582-002

Project/Plant: Plant Hammond Ash Pond 2	Unit(s): Units 1-4	Discipline/Area: ES&FS
Title/Subject: Slope Stability Analyses of Ash Pond Dike		
Purpose/Objective: Analyze slope stability of Ash Pond Dike		
System or Equipment Tag Numbers: NA	Originator: Rajendra S. Gondhalekar	

Contents

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Total # of pages including cover sheet & attachments:	52		

Revision Record

Rev. No.	Description	Originator Initial / Date	Reviewer Initial / Date	Approver Initial / Date
0	Issued for Information	RSG/10-03-16	JAL/10-03-16	JCP/10-03-16

Notes:

Purpose of Calculation

Georgia Power Company's Plant Hammond has 4 ash ponds, 1, 2, 3, and 4. Ash Pond 2 was originally constructed in the late 1960s and a divider dike was installed in approximately 1998 to 2000. Currently, Ash Pond 2 is used as an ash dewatering pond. Ash is sluiced to Ash Pond 2, excavated and dry stacked on Ash Pond 4 and/or at the Huffaker Road permitted solid waste disposal facility.

The purpose of this calculation is to check the stability of the dike of Ash Pond 2 using current software.

Methodology

The calculation was performed using the following methods and software:

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 and utilizing random vibration theory. The input motion consisted of the USGS published 2008 Uniform Hazard Response Spectrum (UHS) for Site Class B/C at a 2% Probability of Exceedance in 50 years. The UHS 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 Tavasrou (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 0.052g 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 triaxial shear testing performed on UD samples of the fill and foundation soils obtained during drilling in March 2010. The testing was performed according to ASTM D 4767.
- Properties for ash were based on laboratory testing performed on undisturbed and remolded samples of ash from various plants and on engineering judgment.
- In March 2010, piezometers were installed in the dike fill, the foundation soils and in the ash. These piezometers, in conjunction with survey data, were used to obtain current water elevations within the dike and the foundation soils.
- 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.
- According to the NOAA website, the flood elevation for the Coosa River at Plant Hammond is elevation 570 feet. This elevation is well below the toe of all ash pond dikes. Therefore, flood cases were not evaluated.

Ash Pond 2

- The cross-section of Ash Pond 2 was obtained using the following sources:
 - 1) March 2010 survey for the top of the dike and downstream surface of the dike, the width of the ash “platform” on the upstream side of the dike, and the elevations of water within the pond and in the discharge canal at the toe of the pond.
 - 2) Original design Drawing No. H-401 for the upstream surface of the dike.
 - 3) Drawing No. E8544, Excavation Plan, for the elevation of the ash on the interior of the pond.
- Groundwater elevations through the dike were determined from piezometers installed in March 2010.

Input Data

The following soil properties were used in the analyses. This data was obtained from laboratory triaxial testing performed in March 2010 by S&ME. The laboratory testing consisted of classification testing as well as consolidated undrained triaxial tests with pore pressure measurements in order to provide total as well as effective shear strength parameters of the embankment and foundation soils. Sample disturbance during the sampling effort as well as variations in the soil specimens (wide range of void ratios, initial saturation conditions, gravel content, and dry unit weights) resulted in inconsistencies in the test results. This prevented S&ME from reporting the total stresses for five of the tests and to suggest that these inconsistencies be taken into account when interpreting and applying the data. The laboratory data for the five tests were reviewed in order to arrive at total stress parameters that would conservatively represent the soil types indicated by the classification tests. Failure criteria were established at lower strains occurring near the maximum pore pressures developed during the test procedures. These parameters have been added to the following table and are consistent with the remaining total stress parameters reported by S&ME. The effective stress interpretations provided by S&ME were used in the analyses.

Soil Description	Dry Unit Weight, pcf	Moist Unit Weight, pcf	Effective Stress Parameters		Total Stress Parameters	
			Cohesion, psf	Phi Angle, degrees	Cohesion, psf	Phi Angle, degrees
Clayey Sand Dike Fill	112.4	129	140	37.3	300	21
Sandy Clay Fdn Soil	98.8	124	280	29.9	850	18.9
Sluiced Ash		80	0	10	0	10

Hydrologic Considerations

Currently Ash Pond 2 is used as a dewatering pond. The maximum surcharge condition was analyzed using a water elevation of 597.2 in the pond.

Load Conditions

The impoundment dike at Plant Hammond Ash Pond 2 was evaluated for the load cases 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.

Load Conditions	Computed Factor of Safety	Required Minimum Factor of Safety
Long-term Maximum Storage (Static)	1.9	1.5
Maximum Surcharge Pool (Static)	1.9	1.4
Seismic	1.7	1.0

The analyses indicate that in all cases the ash pond dike, for Ash Pond 2, the factors of safety are above the required minimums.

Design Inputs/References

USGS Earthquake Hazards website, <http://earthquake.usgs.gov/hazards/hazmaps/>.

NOAA website, <http://www.srh.noaa.gov/ffc/html/rva.php>.

GPC Drawing H-35, Plant Hammond Units 1 & 2 Ash Basin Area – Excavation and Drainage

GPC Drawing H-30, Plant Hammond Plot Plan of Drill Holes

Metro Topographic Map, Georgia Power Company, Plant Hammond, February 29, 2000

GPC Drawing H-401, Plant Hammond Unit 4 Cross Sections and Volume Calculations for New Ash Pond West of Powerhouse

SCS Drawing E8544, Plant Hammond Ash Pond #2 Excavation Plan for Northern Cell

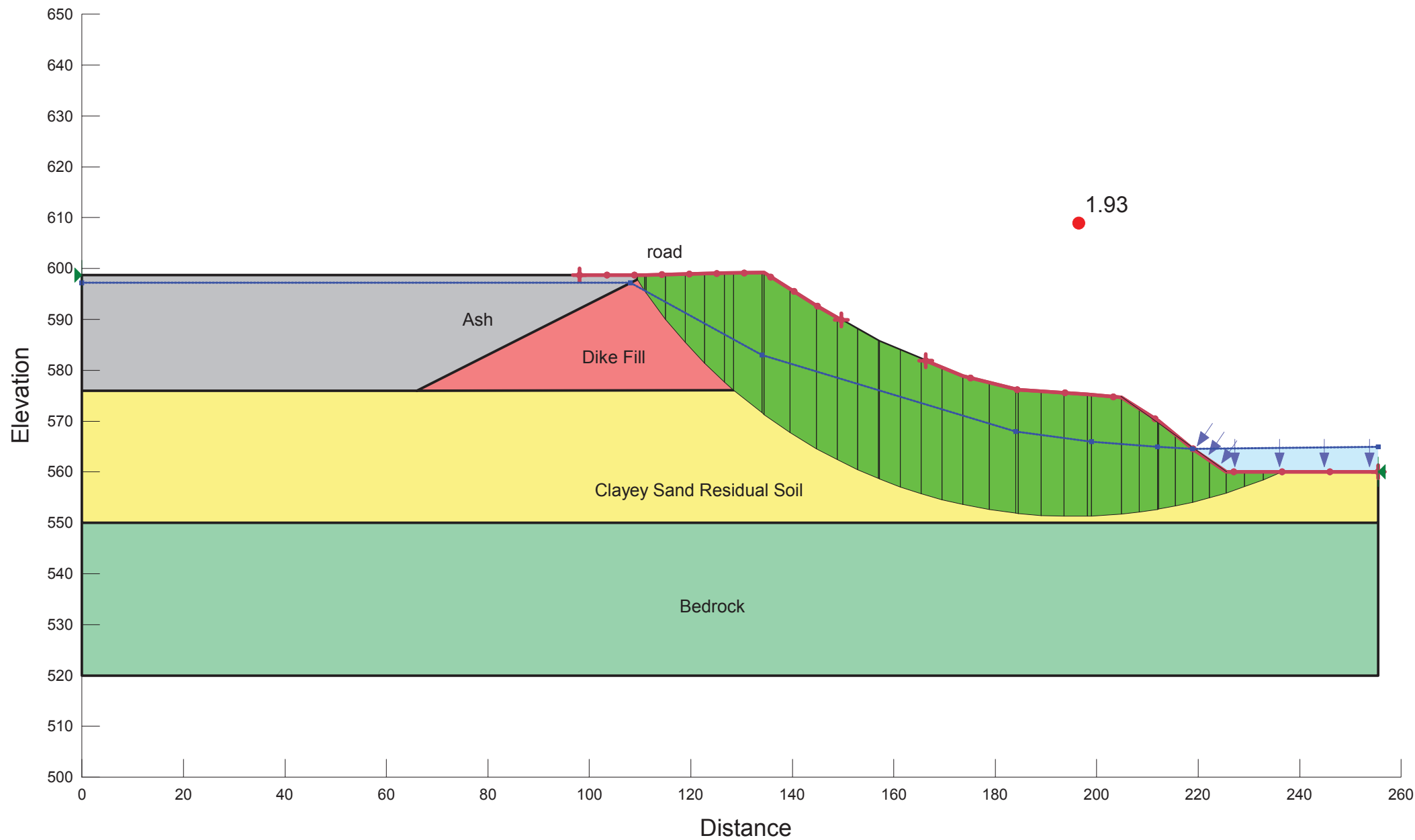
GPC Drawing H-436, Plant Hammond 1973 Ash Pond Plan and Sections

Bray, J. D. and Travarasrou, T., *Pseudostatic Coefficient for Use in Simplified Seismic Slope Stability Evaluation*, Journal of Geotechnical and Environmental Engineering, American Society of Civil Engineers, September 2009

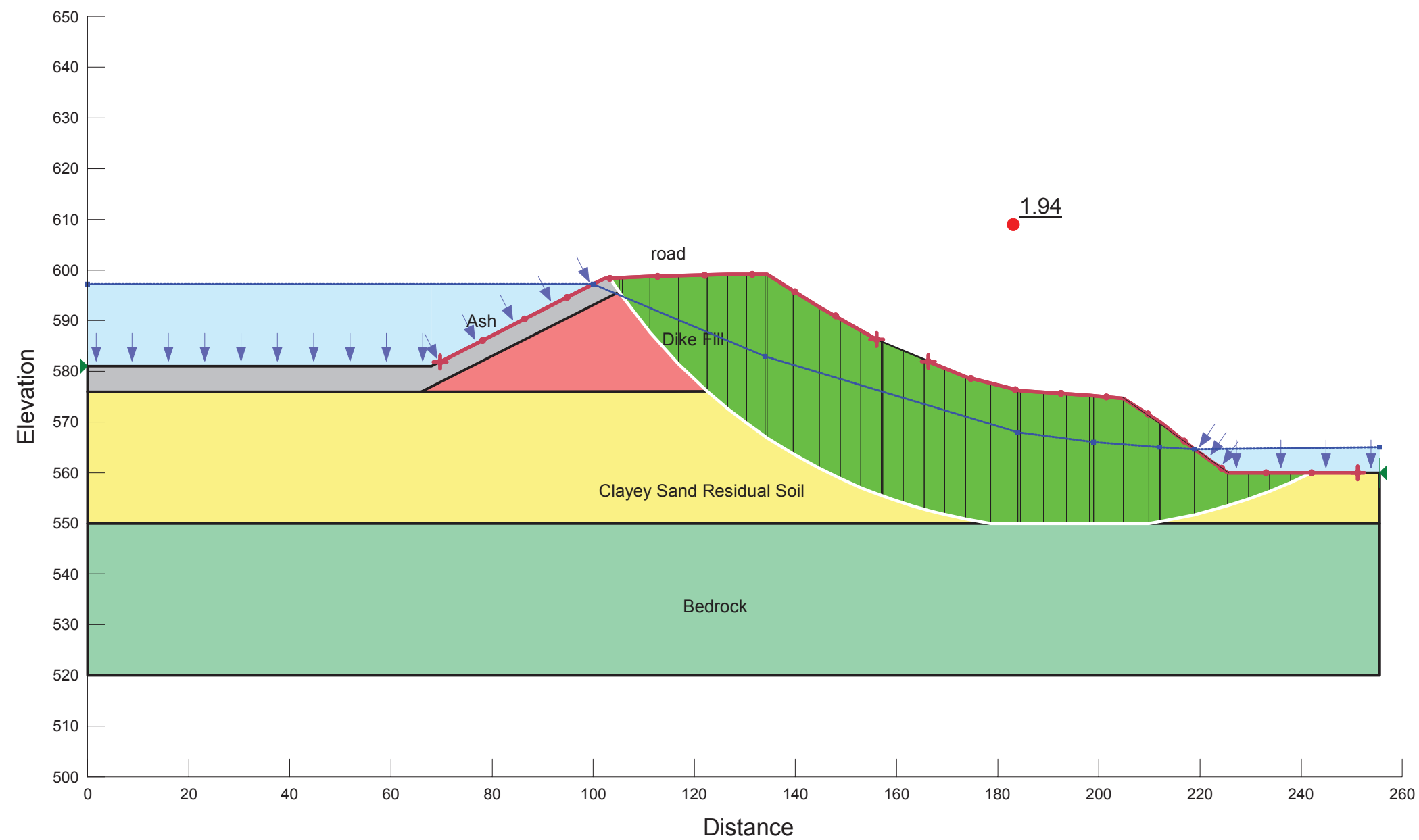
Body of Calculation

Calculation consists of Slope-W modeling attached.

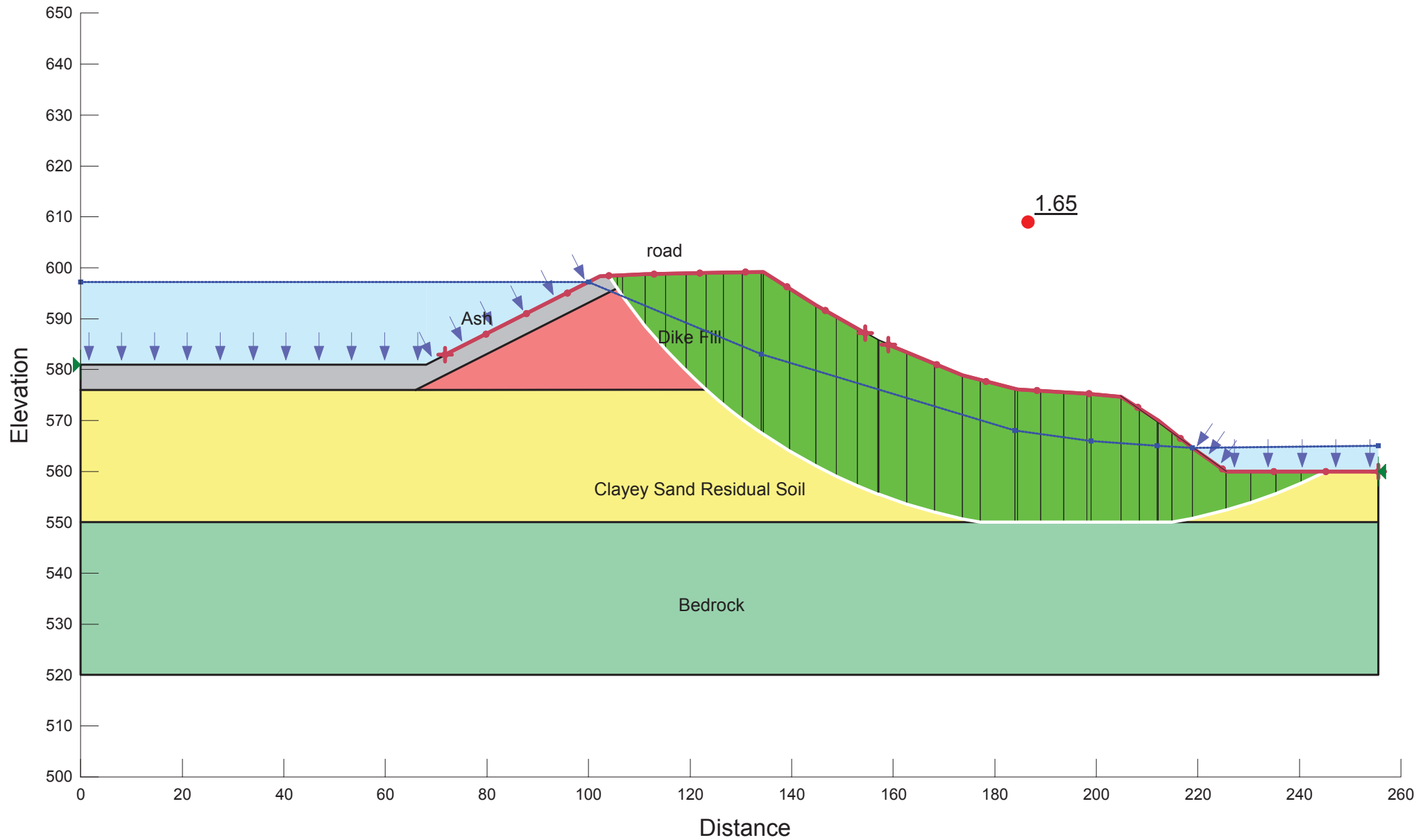
Plant Hammond
Ash Pond 2
Downstream - Max Storage
West Dike
Section B-B'
Morgenstern-Price



Plant Hammond
Ash Pond 2
Downstream - Max Surcharge
Section B-B'
Morgenstern-Price

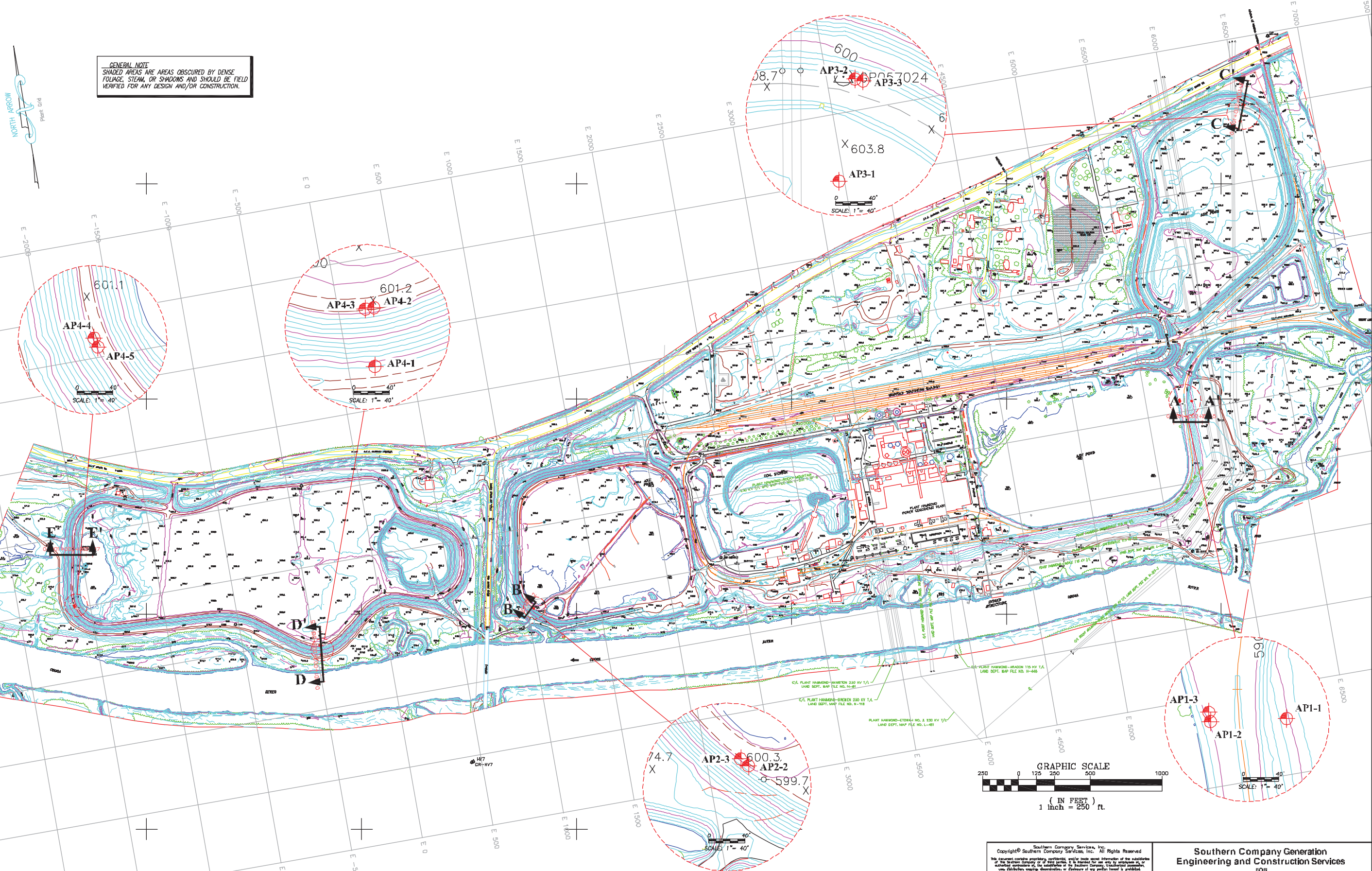


Plant Hammond
Ash Pond 2
Downstream - Seismic
Section B-B'
Morgenstern-Price



Attachment A

Figures - Boring Location Plans



REVISION	DATE	REVISION	DATE	REVISION	DATE	REVISION	DATE	REVISION	DATE	REVISION	DATE	REVISION	DATE
BY	CHK'D	CNL APPR	ELECT APPR	U/C APPR	MECH APPR	DISC MGR	BY	CHK'D	CNL APPR	ELECT APPR	U/C APPR	MECH APPR	DISC MGR

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Southern Company Generation
Engineering and Construction Services
FOR

Georgia Power Company

PLANT HAMMOND
FIGURE 1
ATTACHMENT A
BORING LOCATIONS AND CROSS SECTIONS
CALC # TV-HM-ECS3201-001

SCALE	DRAWING NUMBER	SHEET	COUNT	REV
AS SHOWN	ES1844S1	1	FINAL	0

Attachment B

Boring Logs

SOUTHERN COMPANY Energy to Serve Your World™		DRILLING LOG GEOLOGICAL SERVICES				Hole No. AP2-2			
Sheet 1 of 2									
SITE Plant Hammond		HOLE DEPTH 25 ft		SURF. ELEV. 599.50					
LOCATION Rome, GA		COORDINATES N E 							
ANGLE Vertical		BEARING 		CONTRACTOR Ranger Consulting, Inc		DRILL NO. CME 550X			
DRILLING METHOD Hollow stem auger		NO. SAMPLES 0		NO. U.D. SAMPLES 0					
CASING SIZE 		LENGTH 		CORE SIZE 		TOTAL % REC. 			
WATER TABLE DEPTH Dry		ELEV. 		TIME AFTER COMP. 		DATE TAKEN 			
TYPE GROUT Bentonite		QUANTITY 		MIX 		DRILLING START DATE 3/16/2010			
DRILLER Justin		RECORDER J Pugh		APPROVED 		DRILLING COMP. DATE 3/16/2010			
Depth	Elev	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
0	599.50	~10 feet from AP2-3 on dike crest					Logged from AP2-3 No samples		
1	598.50						Post hole to 3 ft		
2	597.50								
3	596.50								
4	595.50	Red, orange and tan very silty fine sand with clay and small rock fragments							
5	594.50								
6	593.50								
7	592.50								
8	591.50								
9	590.50	Light brown and orange very silty fine sand with minor clay and abundant small rock fragments							
10	589.50								
11	588.50								
12	587.50								
13	586.50								
14	585.50	Orange and gray silty fine to medium grained sand with rock fragments							
15	584.50								
16	583.50								
17	582.50								
18	581.50								
19	580.50	Brown very silty fine sand with rock fragments							
20	579.50								
21	578.50								
22	577.50								
23	576.50						Dry at T.O.B.		
24	575.50	Brown and tan very silty fine sand with rock fragments					Dry at 24-hr		

Form GS9901 7-26-2004

Form GS9901 7-26-2004

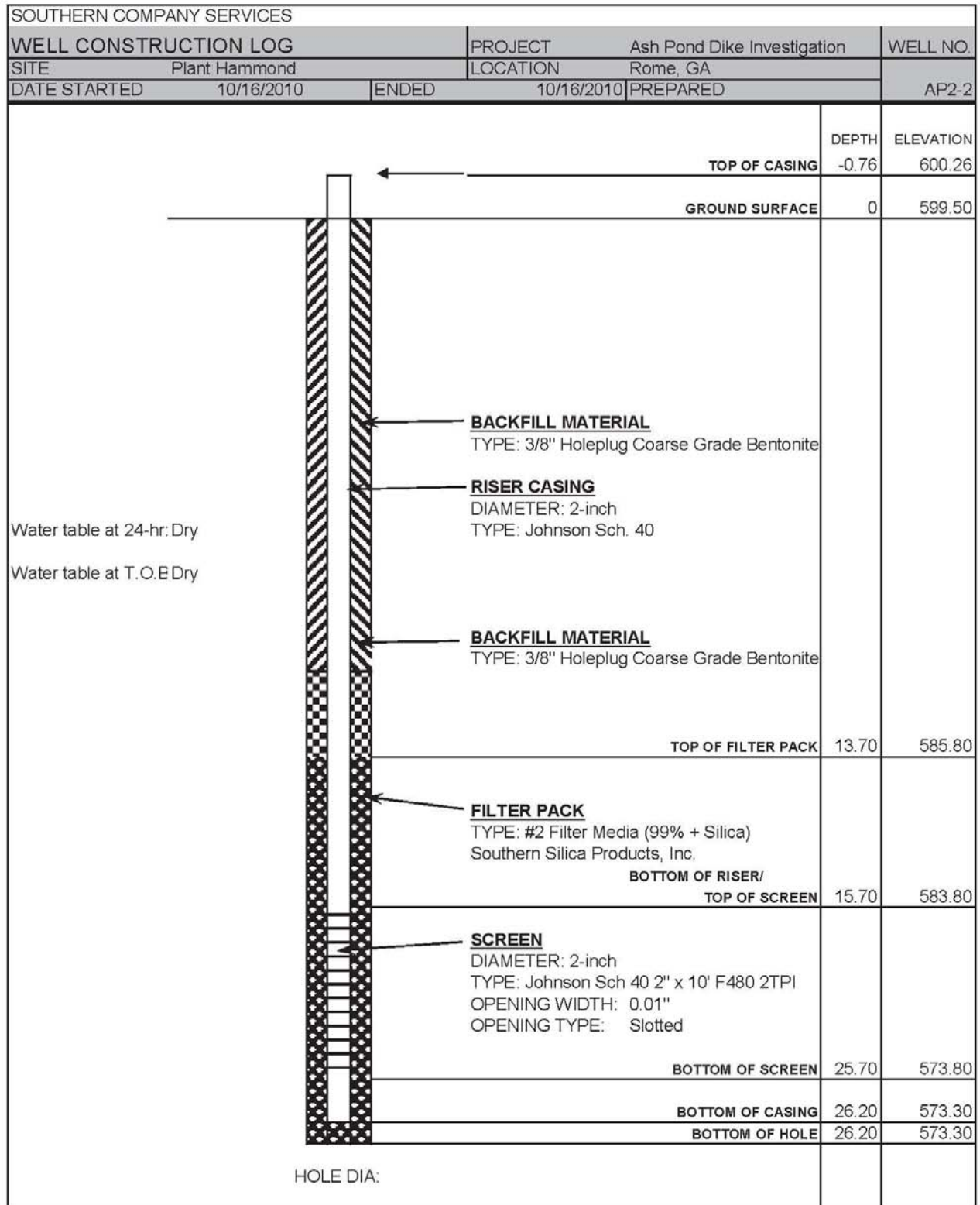
SOUTHERN COMPANY Energy to Serve Your World™		DRILLING LOG GEOLOGICAL SERVICES				Hole No. AP2-3			
						Sheet 1 of 2			
SITE Plant Hammond		HOLE DEPTH 40 ft		SURF ELEV. 599.87					
LOCATION Rome, GA		COORDINATES N E 							
ANGLE Vertical BEARING 		CONTRACTOR Ranger Consulting, Inc		DRILL NO. CME 550X					
DRILLING METHOD Hollow stem auger		NO. SAMPLES 8		NO. U.D. SAMPLES 3					
CASING SIZE LENGTH 		CORE SIZE 		TOTAL % REC. 					
WATER TABLE DEPTH ELEV. 		TIME AFTER COMP. 		DATE TAKEN 3/16/2010					
TYPE GROUT Bentonite		QUANTITY MIX 		DRILLING COMP. DATE 3/16/2010					
DRILLER Justin		RECORDER J Pugh		APPROVED 		DRILLING COMP. DATE 3/16/2010			
Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec.	ROD
				From To	Blows	N			
0	599.87	Drilled from dike crest							
1	598.87						Post hole to 3 ft		
2	597.87								
3	596.87								
4	595.87	Red, orange and tan very silty fine sand with clay and small rock fragments	1	3.5-5	5-8-9	17			
5	594.87								
6	593.87								
7	592.87								
8	591.87								
9	590.87	Light brown and orange very silty fine sand with minor clay and abundant small rock fragments	2	8.5-10	4-5-7	12			
10	589.87								
11	588.87						UD #1 (10" rec.)		
12	587.87								
13	586.87								
14	585.87	Orange and gray silty fine to medium grained sand with rock fragments	3	13.5-15	5-5-8	13			
15	584.87								
16	583.87						UD #2 (16" rec.)		
17	582.87								
18	581.87								
19	580.87	Brown very silty fine sand with rock fragments	4	18.5-20	6-11-15	26			
20	579.87								
21	578.87								
22	577.87								
23	576.87								
24	575.87	Brown and tan very silty fine sand with rock fragments	5	23.5-25	3-7-7	14			

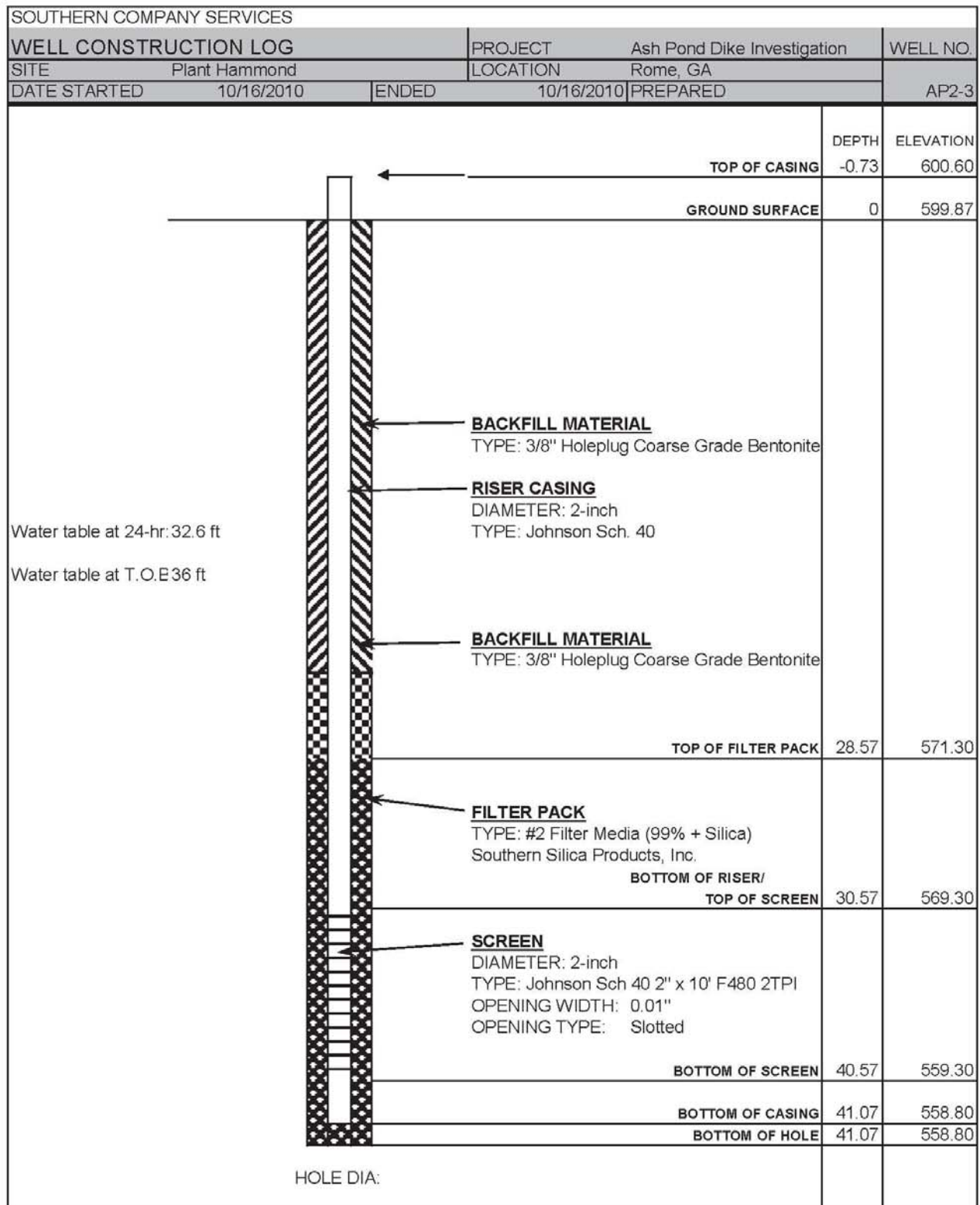
Form GS9901 7-26-2004

Form GS9901 7-26-2004

Attachment C

Piezometer Logs





Attachment D

Soil Laboratory Analysis

April 21, 2010

Southern Company Services
241 Ralph McGill Boulevard
16th Floor, Bin 10185
Atlanta, Georgia 30308

Attention: Mr. Gary H. McWhorter

Subject: Plant Hammond Ash Pond Dikes
S&ME Job No. 28900

Gentlemen:

S&ME, Inc. has completed the laboratory testing on the soil samples sent by your office. The following tests were performed:

- ◆ Atterberg Limits
- ◆ Sieve Analysis
- ◆ Triaxial Shear

S&ME, Inc. performs soil tests in general accordance with the applicable American Society for Testing and Materials (ASTM) or AASHTO procedures. These procedures are generally recognized as the basis for uniformity and consistency of test results in the geotechnical engineering profession. All the work is supervised by a qualified engineer. Attached are test results for your review. While S&ME is not responsible for the use or interpretation of these data we note that the test results do not appear to be consistent with our expectations for materials with these unified soil classifications.

S&ME, Inc. appreciates the opportunity to provide these laboratory services. Please contact us if you have any questions concerning this report or if we may be of further service.

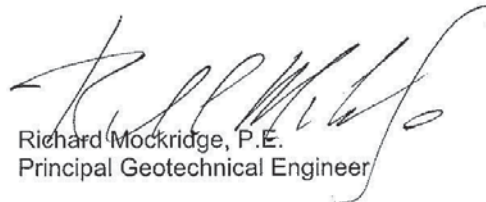
Respectfully submitted,

S&ME, Inc.


Ashok K. Mangla
Geotechnical Laboratory Manager

AKM/RM/pg

Attachment


Richard Mockridge, P.E.
Principal Geotechnical Engineer

		TRIAXIAL SHEAR TEST REPORT (ASTM D 4767)					
		REV5,3/05/07					
JOB NAME: Plant Hammond Ash Pond Dikes							
JOB NO.: 28900		REPORT NO.: N/A		REVIEWED BY: <i>[Signature]</i>		DATE: 4/20/10	
BORING / PIT NO.: N/A		DEPTH / ELEV.: N/A		SAMPLE NO.: N/A		TYPE: UD	
SAMPLE LOCATION: AP1 @ 5'-7', Foundation							
SOIL DESCRIPTION: Yellowish brown lean clay with sand (CL)							
LL, %: 47		PI, %: 26		FINES, %: 87		G_s: 2.71	

SPECIMEN PROPERTIES								TEST PARAMETERS, TEST TYPE : CU/PP					
SPECIMEN NO.	INITIAL			AFTER CONSOLIDATION			SPECIMEN NO.	1	2	3			
		1	2	3		1					2	3	
DIAMETER, INCHES	D _o	2.89	2.89	2.88	D _c	2.87	2.88	2.86	B Value	0.95	0.95	0.95	
HEIGHT, INCHES	H _o	6.20	6.07	6.07	H _c	6.16	6.04	6.02	BACK PRESSURE, ksf	U _o	10.1	10.1	10.2
WATER CONTENT, %	W _o	25.0	25.2	25.9	W _c	26.1	25.8	25.1	CONFINING PRESSURE, ksf	σ ₃	0.5	1.0	2.0
DRY DENSITY, PCF	γ _{dryo}	97.2	98.2	98.3	γ _{dryc}	99.1	99.5	100.7	MAX. DEVIATOR STRESS, ksf	σ ₁ -σ ₃	2.0	3.0	3.8
SATURATION, %	S _o	91.7	94.4	97.6	S _c	100	100	100	ULT. DEVIATOR STRESS, ksf	σ ₁ -σ ₃	2.0	3.0	3.8
VOID RATIO	e _o	0.741	0.724	0.721	e _c	0.709	0.701	0.682	Specimen Shape @ Failure	Bulged			
Strain 0.2 % per minute								T50, Minutes = 2					

N/A

N/A

SHEAR STRENGTH PARAMETERS	TOTAL		EFFECTIVE	
	COHESION, C (ksf) :		APPARENT COHESION, (ksf) :	
	ANGLE OF INTER. FRICTION, Φ (DEGREES) :		ANGLE OF INTER. FRICTION, Φ' (DEGREES) :	
	0.50		0.04	
	21.6		35.1	

		PARTICLE-SIZE DISTRIBUTION TEST REPORT SIEVE AND HYDROMETER					
JOB NAME : Plant Hammond Ash Pond Dikes		REPORT NO. : 28900		DATE : 4/20/10		REVIEWED BY :	
BORING / PIT NO. : N/A		DEPTH / ELEV. : N/A		SAMPLE NO. : N/A		SAMPLE TYPE : UD	
SAMPLE LOCATION : AP1 @ 5'-7' foundation							
SOIL DESCRIPTION : Yellowish brown, lean clay with sand.							
LIQUID LIMIT, % : 47		PLASTICITY INDEX, % : 26		MOISTURE, % : N/A		SP. GRAVITY, Gs : N/A	
D10, MM : N/A		D30, MM : N/A		D60, MM : N/A		COEFF. OF CURVATURE, C_c : N/A	
CLASSIFICATION		UNIFIED : CL		AASHTO : N/A		COEFF. OF UNIFORMITY, C_u : N/A	
GRAVEL		SAND		SILT		CLAY	
COARSE		MEDIUM		FINE		FINES	

% FINER BY WEIGHT

GRAIN SIZE IN MILLIMETERS

Grain Size (mm)	% Finer (%)
3" Sieve	100
3/4" Sieve	100
#4 Sieve	100
#10 Sieve	100
#40 Sieve	100
#60 Sieve	100
#100 Sieve	100
#200 Sieve	100
#425 Sieve	100
#600 Sieve	100
#840 Sieve	100
#1060 Sieve	100
#1490 Sieve	100
#2000 Sieve	100
#2800 Sieve	100
#3550 Sieve	100
#4750 Sieve	100
#6000 Sieve	100
#7500 Sieve	100
#9500 Sieve	100
#11900 Sieve	100
#14900 Sieve	100
#18800 Sieve	100
#23500 Sieve	100
#29500 Sieve	100
#37000 Sieve	100
#45000 Sieve	100
#55000 Sieve	100
#67000 Sieve	100
#80000 Sieve	100
#95000 Sieve	100
#112000 Sieve	100
#132000 Sieve	100
#155000 Sieve	100
#180000 Sieve	100
#208000 Sieve	100
#238000 Sieve	100
#270000 Sieve	100
#305000 Sieve	100
#342000 Sieve	100
#382000 Sieve	100
#425000 Sieve	100
#470000 Sieve	100
#518000 Sieve	100
#568000 Sieve	100
#620000 Sieve	100
#675000 Sieve	100
#732000 Sieve	100
#792000 Sieve	100
#855000 Sieve	100
#920000 Sieve	100
#988000 Sieve	100
#1058000 Sieve	100
#1130000 Sieve	100
#1205000 Sieve	100
#1282000 Sieve	100
#1362000 Sieve	100
#1445000 Sieve	100
#1530000 Sieve	100
#1618000 Sieve	100
#1708000 Sieve	100
#1800000 Sieve	100
#1895000 Sieve	100
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#3105000 Sieve	100
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#6080000 Sieve	100
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#6980000 Sieve	100
#7168000 Sieve	100
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#8345000 Sieve	100
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#13955000 Sieve	100
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#14758000 Sieve	100
#15030000 Sieve	100
#15305000 Sieve	100
#15582000 Sieve	100
#15862000 Sieve	100
#16145000 Sieve	100
#16430000 Sieve	100
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#20020000 Sieve	100
#20335000 Sieve	100
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#21295000 Sieve	100
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ATTERBERG LIMITS (ASTM D 4318)



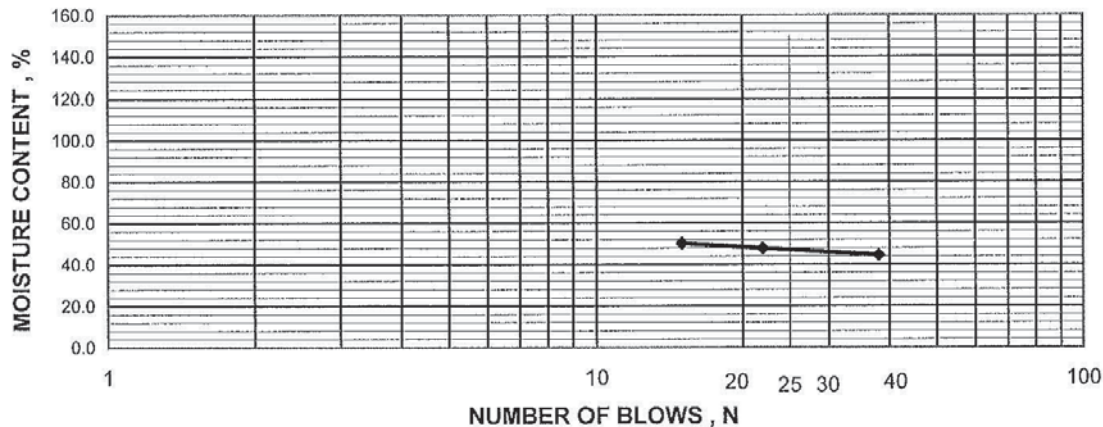
REV. 5/10/06

JOB NAME : Plant Hammond Ash Pond Dikes		REPORT NO. : -		DATE : 04/20/10	REVIEWED BY :
JOB NO. : 28900	DEPTH / ELEV. : N/A	SAMPLE NO. : N/A	SAMPLE TYPE : UD		
SAMPLE LOCATION : AP1 @ 5'-7' foundation					
SOIL DESCRIPTION : Yellowish brown lean clay with sand.					
LIQUID LIMIT, % : 47	PLASTIC LIMIT, % : 21	PLASTICITY INDEX, % : 26	MOISTURE, % : 25		
CLASSIFICATION :	UNIFIED : CL	AASHTO : -	FINES, % : 87		

LIQUID LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN LIQUID & PLASTIC STATES --

% MOISTURE AT WHICH SOIL FLOWS FOR A DISTANCE OF 13 MM (1/2 ") AT THE BASE OF GROOVE WHEN SUBJECTED TO 25 BLOWS

TEST NO. :	1	2	3	4	5
CONTAINER NO.	1	2	3	BRAND	MODEL
NUMBER OF BLOWS	38	22	15	BALANCE	PRECISA
WT. WET SOIL + CAN (GRAMS)	32.20	31.59	32.70	LL MACHINE	HUMBOLT
WT. DRY SOIL + CAN (GRAMS)	26.92	26.31	26.88	BALANCE	OHAUS-3100 G
WT. OF WATER (GRAMS)	5.28	5.28	5.82	OVEN	DESPATCH-3426
WT. OF CONTAINER (GRAMS)	15.06	15.27	15.27		1650032533
WT. OF DRY SOIL (GRAMS)	11.86	11.04	11.61		
WATER CONTENT, (%)	44.52	47.83	50.13		



PLASTIC LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN PLASTIC & BRITTLE STATES --

% MOISTURE AT WHICH SOIL CAN NO LONGER BE DEFORMED BY ROLLING INTO 3.2 MM (1/8 ") IN DIAMETER THREADS WITHOUT CRUMBLING

TEST NO. :	1	2	3	4	5
CONTAINER NO.	4	5			
WT. WET SOIL + CAN (GRAMS)	21.81	21.61			
WT. DRY SOIL + CAN (GRAMS)	20.63	20.54			
WT. OF WATER (GRAMS)	1.18	1.07			
WT. OF CONTAINER (GRAMS)	15.06	15.55			
WT. OF DRY SOIL (GRAMS)	5.57	4.99			
WATER CONTENT, (%)	21.18	21.44			

PLASTICITY INDEX - THE RANGE OF % MOISTURE CONTENT OVER WHICH SOIL BEHAVES PLASTICALLY -

THE DIFFERENCE BETWEEN LIQUID LIMIT & PLASTIC LIMIT $PI = LL - PL$



TRIAXIAL SHEAR TEST REPORT (ASTM D 4767)



REV5,3/05/07

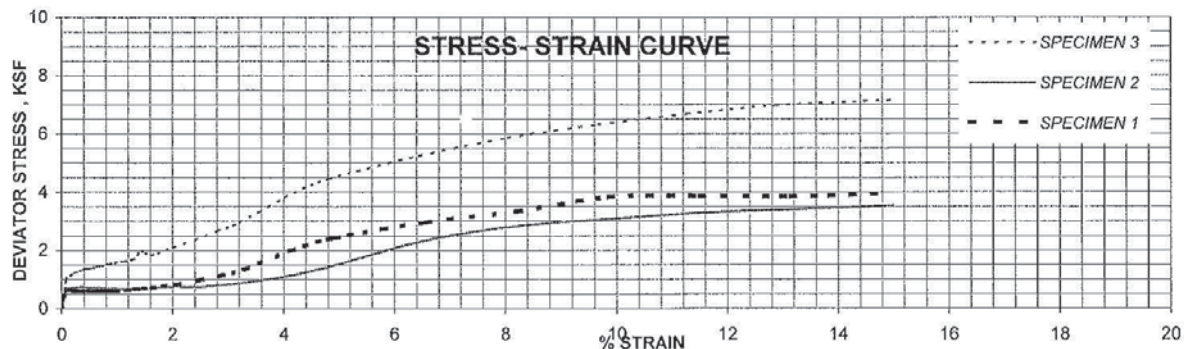
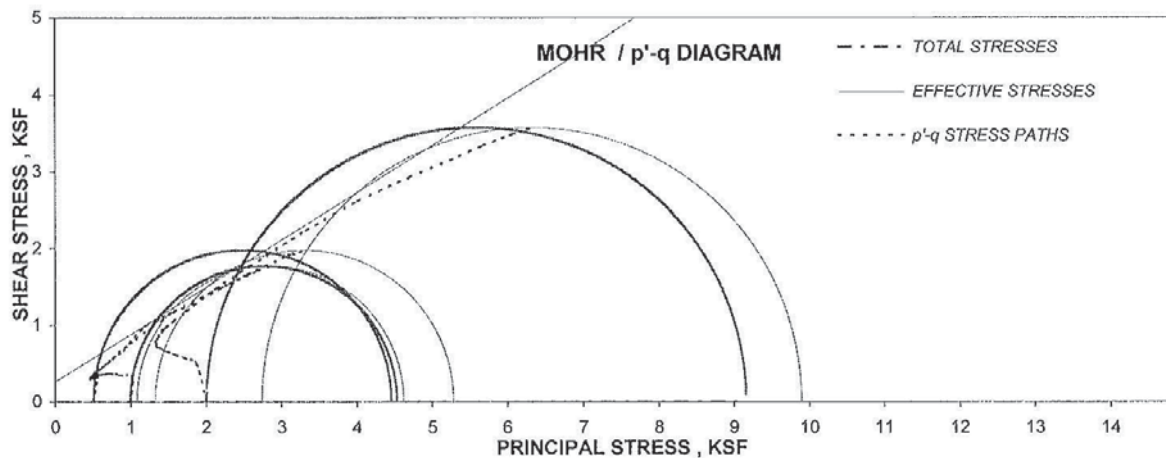
JOB NAME:	Plant Hammond Ash Pond Dikes				
JOB NO.:	28900	REPORT NO.:	N/A	REVIEWED BY:	<i>[Signature]</i>
BORING / PIT NO.:	N/A	DEPTH / ELEV.:	N/A	SAMPLE NO.:	N/A
SAMPLE LOCATION:	AP3 @ 6'-8", foundation				
SOIL DESCRIPTION:	Yellowish red lean clay with sand (CL)				
LL, %:	35	PI, %:	17	FINES, %:	80
				G _s :	2.71


SPECIMEN PROPERTIES								TEST PARAMETERS, TEST TYPE : CU/PP			
SPECIMEN NO.	INITIAL			AFTER CONSOLIDATION			SPECIMEN NO.				
	1	2	3	1	2	3		1	2	3	
DIAMETER, INCHES	D _o	2.88	2.88	2.89	D _c	2.86	2.85	2.86	BACK PRESSURE, ksf	U _o	0.95
HEIGHT, INCHES	H _o	6.13	6.11	6.26	H _c	6.09	6.05	6.20	CONFINING PRESSURE, ksf	σ ₃	0.5
WATER CONTENT, %	W _o	17.4	18.4	17.2	W _c	18.9	20.6	18.8	MAX. DEVIATOR STRESS, ksf	σ ₁ -σ ₃	4.0
DRY DENSITY, PCF	γ _{dryo}	109.5	105.4	108.7	γ _{dryc}	111.7	108.4	111.9	ULT. DEVIATOR STRESS, ksf	σ ₁ -σ ₃	4.0
SATURATION, %	S _o	87.0	82.5	84.0	S _c	100	100	100	Specimen Shape @	Bulged	
VOID RATIO	e _o	0.542	0.603	0.554	e _c	0.513	0.558	0.510	Failure		
								Strain	0.2	% per minute	T50, Minutes = 0.7

N/A

N/A

SHEAR STRENGTH PARAMETERS	TOTAL		EFFECTIVE	
	COHESION,	C (ksf) : N/A	APPARENT COHESION,	(ksf) : 0.26
	ANGLE OF INTER. FRICTION, Φ (DEGREES)	N/A	ANGLE OF INTER. FRICTION, Φ' (DEGREES)	: 31.7






PARTICLE-SIZE DISTRIBUTION TEST REPORT

SIEVE AND HYDROMETER

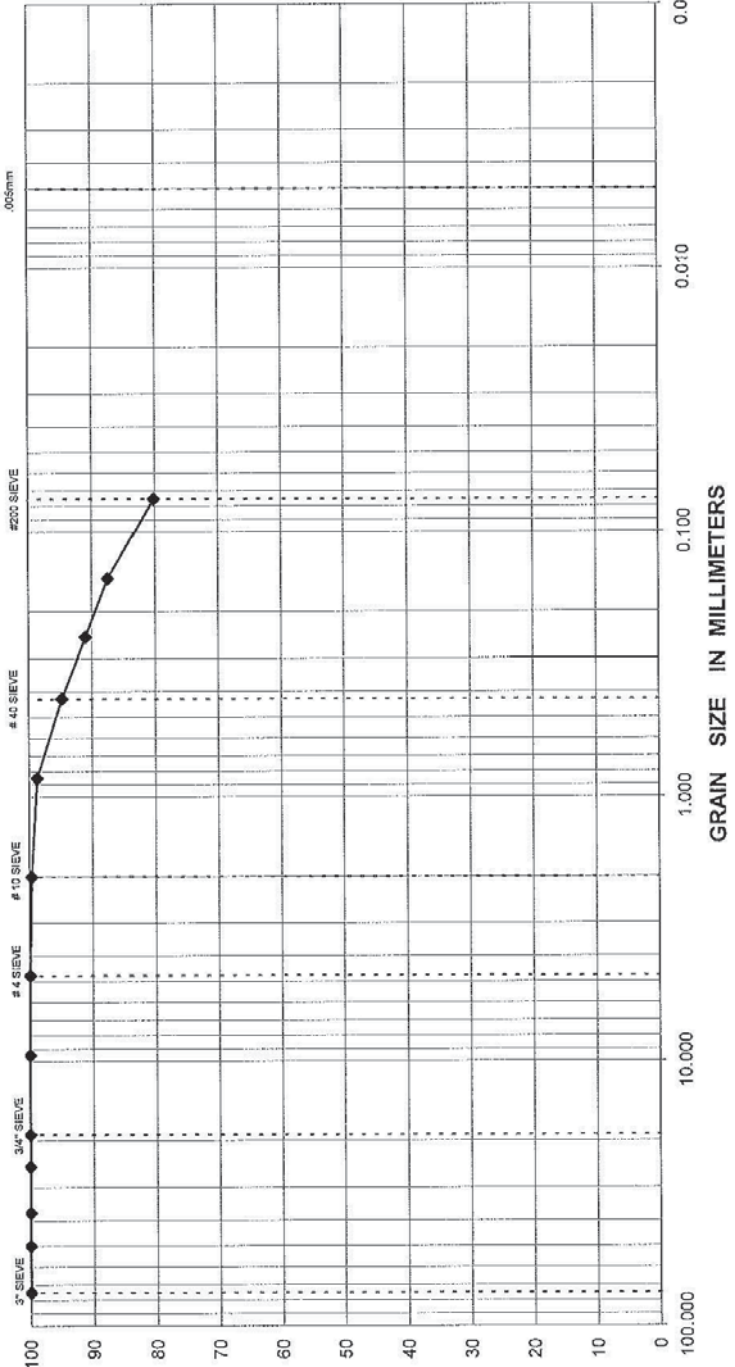
ASTM D422 0



REV2.03/07/06

JOB NAME: Plant Hammond Ash Pond Dikes		DATE: 4/20/10	REVIEWED BY: <i>[Signature]</i>
JOB NO.: 28900	REPORT NO.: N/A	SAMPLE NO.: -	SAMPLE TYPE: UD
BORING / PIT NO.: N/A	DEPTH / ELEV.: N/A		
SAMPLE LOCATION: AP3 @ 6'-8" foundation			
SOIL DESCRIPTION: Yellowish red, lean clay with sand.			
LIQUID LIMIT, %: 35	PLASTICITY INDEX, %: 17	MOISTURE, %: N/A	SP. GRAVITY, G _s : N/A
D ₁₀ , MM: N/A	D ₃₀ , MM: N/A	D ₆₀ , MM: N/A	FINES, %: 80
UNIFIED: N/A	CL	AASHTO: N/A	COEFF. OF CURVATURE, C _c : N/A
			COEFF. OF UNIFORMITY, C _u : N/A

GRAVEL		SAND		FINES	
COARSE	FINE	COARSE	FINE	SILT	CLAY



The graph plots % Finer by Weight (0 to 100) against Grain Size in Millimeters (log scale from 0.001 to 100.000). The curve starts at 100% finer for 0.075 mm and remains at 100% until approximately 0.075 mm, then drops to about 95% at 0.15 mm, 85% at 0.3 mm, 75% at 0.6 mm, 65% at 1.18 mm, 55% at 2.0 mm, 45% at 3.75 mm, 35% at 7.5 mm, 25% at 15 mm, 15% at 30 mm, 10% at 60 mm, and 5% at 100 mm. The curve then levels off at 5% finer for sizes greater than 100 mm.

		ATTERBERG LIMITS (ASTM D 4318)					
		REV. 5/10/06					
JOB NAME : Plant Hammond Ash Pond Dikes							
JOB NO. : 28900		REPORT NO. : -		DATE : 04/20/10		REVIEWED BY :	
BORING / PIT NO. : N/A		DEPTH / ELEV. : N/A		SAMPLE NO. : N/A		SAMPLE TYPE : UD	
SAMPLE LOCATION : AP3 @ 6'-8' foundation							
SOIL DESCRIPTION : Yellowish red lean clay with sand.							
LIQUID LIMIT , % : 35		PLASTIC LIMIT , % : 18		PLASTICITY INDEX , % : 17		MOISTURE , % : 17	
CLASSIFICATION :		UNIFIED : CL		AASHTO : -		FINES , % : 80	
LIQUID LIMIT , % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN LIQUID & PLASTIC STATES -- % MOISTURE AT WHICH SOIL FLOWS FOR A DISTANCE OF 13 MM (1/2") AT THE BASE OF GROOVE WHEN SUBJECTED TO 25 BLOWS							
TEST NO. :	1		2		3		5
CONTAINER NO.	18		19		20	BRAND	SERIAL
NUMBER OF BLOWS	39		20		12	BALANCE	PRECISA
WT. WET SOIL + CAN (GRAMS)	33.32		34.64		35.29	LL MACHINE	HUMBOLT
WT. DRY SOIL + CAN (GRAMS)	28.77		29.52		29.81	BALANCE	OHAUS-3100 G
WT. OF WATER (GRAMS)	4.55		5.12		5.48	OVEN	DESPATCH-3436
WT. OF CONTAINER (GRAMS)	15.31		15.07		15.48		ARC120
WT. OF DRY SOIL (GRAMS)	13.46		14.45		14.33		
WATER CONTENT, (%)	33.80		35.43		38.24		
PLASTIC LIMIT , % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN PLASTIC & BRITTLE STATES -- % MOISTURE AT WHICH SOIL CAN NO LONGER BE DEFORMED BY ROLLING INTO 3.2 MM (1/8") IN DIAMETER THREADS WITHOUT CRUMBLING							
TEST NO. :	1		2		3		5
CONTAINER NO.	42		43				
WT. WET SOIL + CAN (GRAMS)	21.59		22.58				
WT. DRY SOIL + CAN (GRAMS)	20.58		21.40				
WT. OF WATER (GRAMS)	1.01		1.18				
WT. OF CONTAINER (GRAMS)	15.05		14.98				
WT. OF DRY SOIL (GRAMS)	5.53		6.42				
WATER CONTENT, (%)	18.26		18.38				
PLASTICITY INDEX - THE RANGE OF % MOISTURE CONTENT OVER WHICH SOIL BEHAVES PLASTICALLY - THE DIFFERENCE BETWEEN LIQUID LIMIT & PLASTIC LIMIT PI = LL - PL							






TRIAXIAL SHEAR TEST REPORT (ASTM D 4767)



REV5,3/05/07

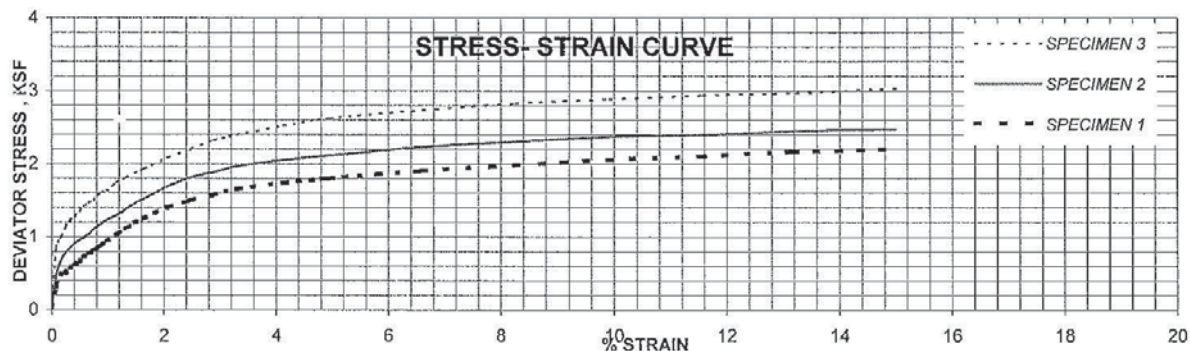
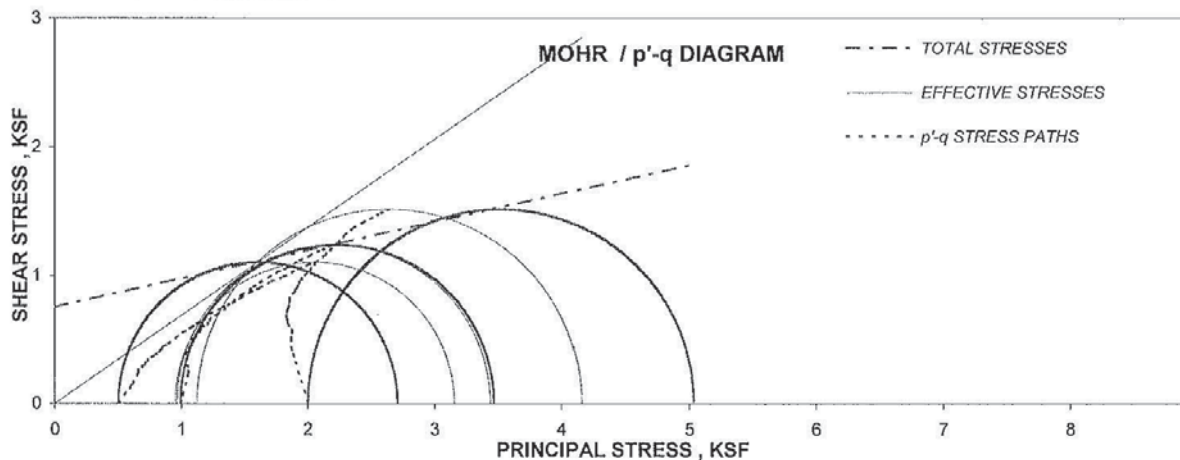
JOB NAME:	Plant Hammond Ash Pond Dikes					
JOB NO.:	28900	REPORT NO.:	N/A	REVIEWED BY:	✓	DATE: 4/20/10
BORING / PIT NO.:	N/A	DEPTH / ELEV.:	N/A	SAMPLE NO.:	N/A	TYPE: UD
SAMPLE LOCATION: AP 4 @ 4'-6', Foundation						
SOIL DESCRIPTION: Gray brown lean clay with sand (CL)						
LL, %:	42	PI, %:	17	FINES, %:	87	G _s : 2.69


SPECIMEN PROPERTIES									TEST PARAMETERS , TEST TYPE : CU/PP					
	INITIAL				AFTER CONSOLIDATION				SPECIMEN NO.		1	2	3	
SPECIMEN NO.		1	2	3		1	2	3	B Value		0.95	0.95	0.95	
DIAMETER , INCHES	D _o	2.89	2.88	2.88	D _c	2.88	2.86	2.84	BACK PRESSURE, ksf	U _o	10.2	10.1	10.1	
HEIGHT , INCHES	H _o	6.09	6.02	6.13	H _c	6.07	5.98	6.05	CONFINING PRESSURE , ksf	σ ₃	0.5	1.0	2.0	
WATER CONTENT, %	W _o	29.0	28.9	33.2	W _c	31.1	30.0	32.8	MAX. DEVIATOR STRESS ,ksf	σ ₁ -σ ₃	2.2	2.5	3.0	
DRY DENSITY, PCF	γ _{dryo}	90.5	91.1	85.7	γ _{dryc}	91.5	93.0	89.2	ULT. DEVIATOR STRESS , ksf	σ ₁ -σ ₃	2.2	2.5	3.0	
SATURATION ,%	S _o	91.1	92.2	93.1	S _c	100	100	100	Specimen Shape @		Bulged   			
VOID RATIO	e _o	0.856	0.844	0.961	e _c	0.837	0.808	0.884	Failure					
----- ,									Strain	0.2	% per minute	T50, Minutes =		0.7

N/A

N/A

SHEAR STRENGTH PARAMETERS	TOTAL		EFFECTIVE	
	COHESION, C (ksf)	0.75	APPARENT COHESION, (ksf)	0.00
	ANGLE OF INTER. FRICTION, Φ (DEGREES)	12.5	ANGLE OF INTER. FRICTION, Φ' (DEGREES)	34.5






PARTICLE-SIZE DISTRIBUTION TEST REPORT

SIEVE AND HYDROMETER

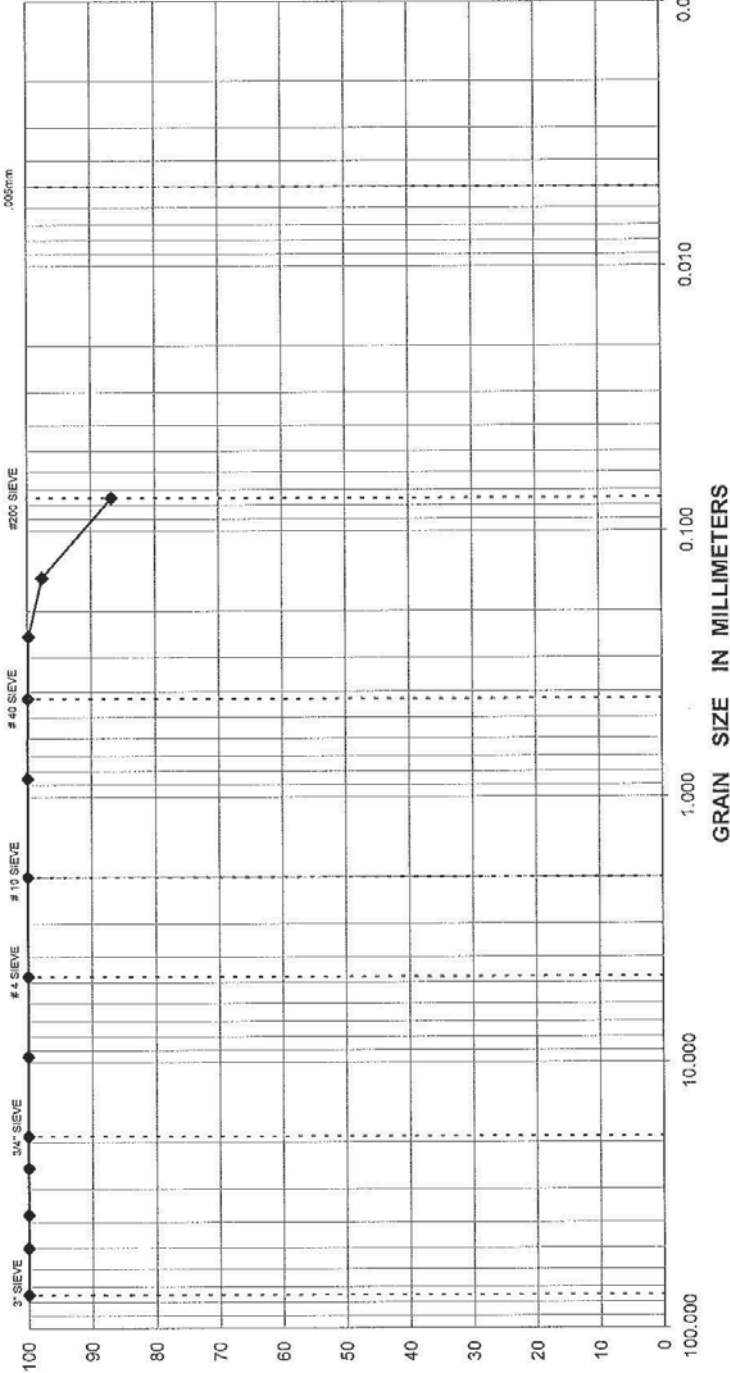
ASTM D422 0



REV 2.08/07/06
AASHTO R16

JOB NAME : <i>Plant Hammond Ash Pond Dikes</i>		DATE : <i>4/20/10</i>	REVIEWED BY : <i>[Signature]</i>
JOB NO. : <i>28900</i>	REPORT NO. : <i>N/A</i>	SAMPLE NO. : <i>N/A</i>	SAMPLE TYPE : <i>UD</i>
BORING / PIT NO. : <i>N/A</i>		DEPTH / ELEV. : <i>N/A</i>	
SAMPLE LOCATION : <i>AP4 @ 4'-6" foundation</i>			
SOIL DESCRIPTION : <i>Gray brown lean clay with sand.</i>			
LIQUID LIMIT, % : <i>42</i>	PLASTICITY INDEX, % : <i>17</i>	SP. GRAVITY, G _s : <i>N/A</i>	
D ₁₀ , MM : <i>N/A</i>	D ₃₀ , MM : <i>N/A</i>	FINES, % : <i>87</i>	
UNIFIED : <i>CL</i>		COEFF. OF CURVATURE, C _c : <i>N/A</i>	
CLASSIFICATION		COEFF. OF UNIFORMITY, C _u : <i>N/A</i>	

GRAVEL		SAND		FINES	
COARSE	FINE	COARSE	FINE	SILT	CLAY



The graph plots % Finer by Weight (0 to 100) against Grain Size in Millimeters (log scale from 100.000 to 0.001). The curve shows 100% finer for sizes down to approximately 0.075 mm, then drops to about 87% finer at 0.075 mm, and remains constant at 87% for all smaller sizes.

Grain Size (mm)	% Finer
100.000	100
75.000	100
60.000	100
47.500	100
37.500	100
30.000	100
25.000	100
20.000	100
15.000	100
12.500	100
10.000	100
7.500	100
6.000	100
4.750	100
3.750	100
3.000	100
2.500	100
2.000	100
1.500	100
1.180	100
0.850	100
0.750	100
0.600	100
0.425	100
0.300	100
0.250	100
0.200	100
0.150	100
0.106	100
0.075	87
0.060	87
0.050	87
0.0425	87
0.0375	87
0.0300	87
0.0250	87
0.0200	87
0.0150	87
0.0106	87
0.0085	87
0.0075	87
0.0060	87
0.0050	87
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0.000250	87
0.000200	87
0.000150	87
0.000106	87
0.000085	87
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ATTERBERG LIMITS (ASTM D 4318)



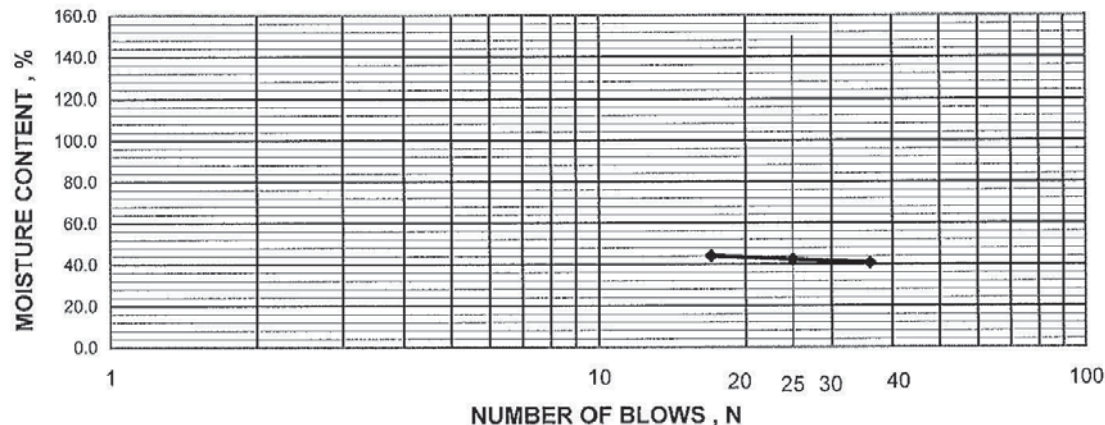
REV. 5/10/06

JOB NAME : Plant Hammond Ash Pond Dikes				
JOB NO. : 28900	REPORT NO. : -	DATE : 04/20/10	REVIEWED BY :	
BORING / PIT NO. : N/A	DEPTH / ELEV. : N/A	SAMPLE NO. : N/A	SAMPLE TYPE : UD	
SAMPLE LOCATION : AP4 @ 4'-6' foundation				
SOIL DESCRIPTION : Gray brown lean clay with sand.				
LIQUID LIMIT, % : 42	PLASTIC LIMIT, % : 25	PLASTICITY INDEX, % : 17	MOISTURE, % : 30	
CLASSIFICATION :	UNIFIED : CL	AASHTO : -	FINES, % : 87	

LIQUID LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN LIQUID & PLASTIC STATES --

% MOISTURE AT WHICH SOIL FLOWS FOR A DISTANCE OF 13 MM (1/2 ") AT THE BASE OF GROOVE WHEN SUBJECTED TO 25 BLOWS

TEST NO. :	1	2	3	4	5
CONTAINER NO.	91	92	93	BRAND	MODEL
NUMBER OF BLOWS	36	25	17	BALANCE	PRECISA
WT. WET SOIL + CAN (GRAMS)	31.84	35.25	34.15	LL MACHINE	HUMBOLT
WT. DRY SOIL + CAN (GRAMS)	27.02	29.27	28.32	BALANCE	OHAUS-3100 G
WT. OF WATER (GRAMS)	4.82	5.98	5.83	OVEN	DESPATCH-3436
WT. OF CONTAINER (GRAMS)	15.18	15.13	15.09		1650032593
WT. OF DRY SOIL (GRAMS)	11.84	14.14	13.23		
WATER CONTENT, (%)	40.71	42.29	44.07		



PLASTIC LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN PLASTIC & BRITTLE STATES --

% MOISTURE AT WHICH SOIL CAN NO LONGER BE DEFORMED BY ROLLING INTO 3.2 MM (1/8 ") IN DIAMETER THREADS WITHOUT CRUMBLING

TEST NO. :	1	2	3	4	5
CONTAINER NO.	44	54			
WT. WET SOIL + CAN (GRAMS)	21.58	23.22			
WT. DRY SOIL + CAN (GRAMS)	20.31	21.62			
WT. OF WATER (GRAMS)	1.27	1.60			
WT. OF CONTAINER (GRAMS)	15.12	15.43			
WT. OF DRY SOIL (GRAMS)	5.19	6.19			
WATER CONTENT, (%)	24.47	25.85			

PLASTICITY INDEX - THE RANGE OF % MOISTURE CONTENT OVER WHICH SOIL BEHAVES PLASTICALLY -
THE DIFFERENCE BETWEEN LIQUID LIMIT & PLASTIC LIMIT $PI = LL - PL$






TRIAXIAL SHEAR TEST REPORT (ASTM D 4767)



REV5.3/05/07

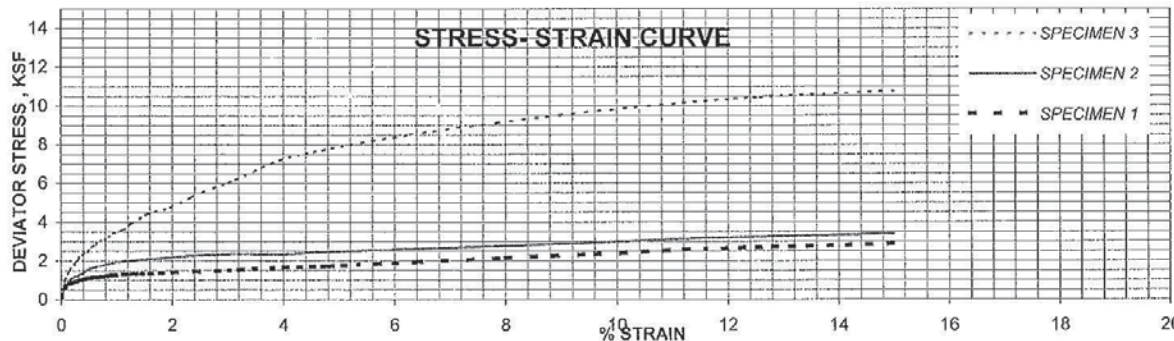
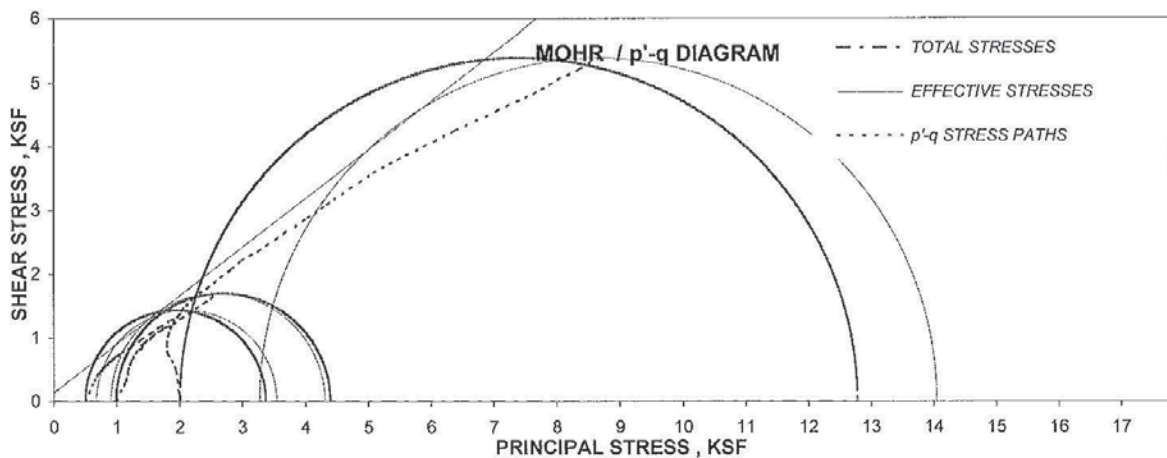
JOB NAME: Plant Hammond Ash Pond Dikes
 JOB NO.: 28900 REPORT NO.: N/A REVIEWED BY: *[Signature]* DATE: 4/20/10
 BORING / PIT NO.: N/A DEPTH / ELEV.: N/A SAMPLE NO.: N/A TYPE: UD
 SAMPLE LOCATION: AP2 @ 4'-6' & 6'-8' fill
 SOIL DESCRIPTION: Yellowish red clayey sand with gravel (SC)
 LL, %: 52 PI, %: 26 FINES, %: 34 G_s: 2.72

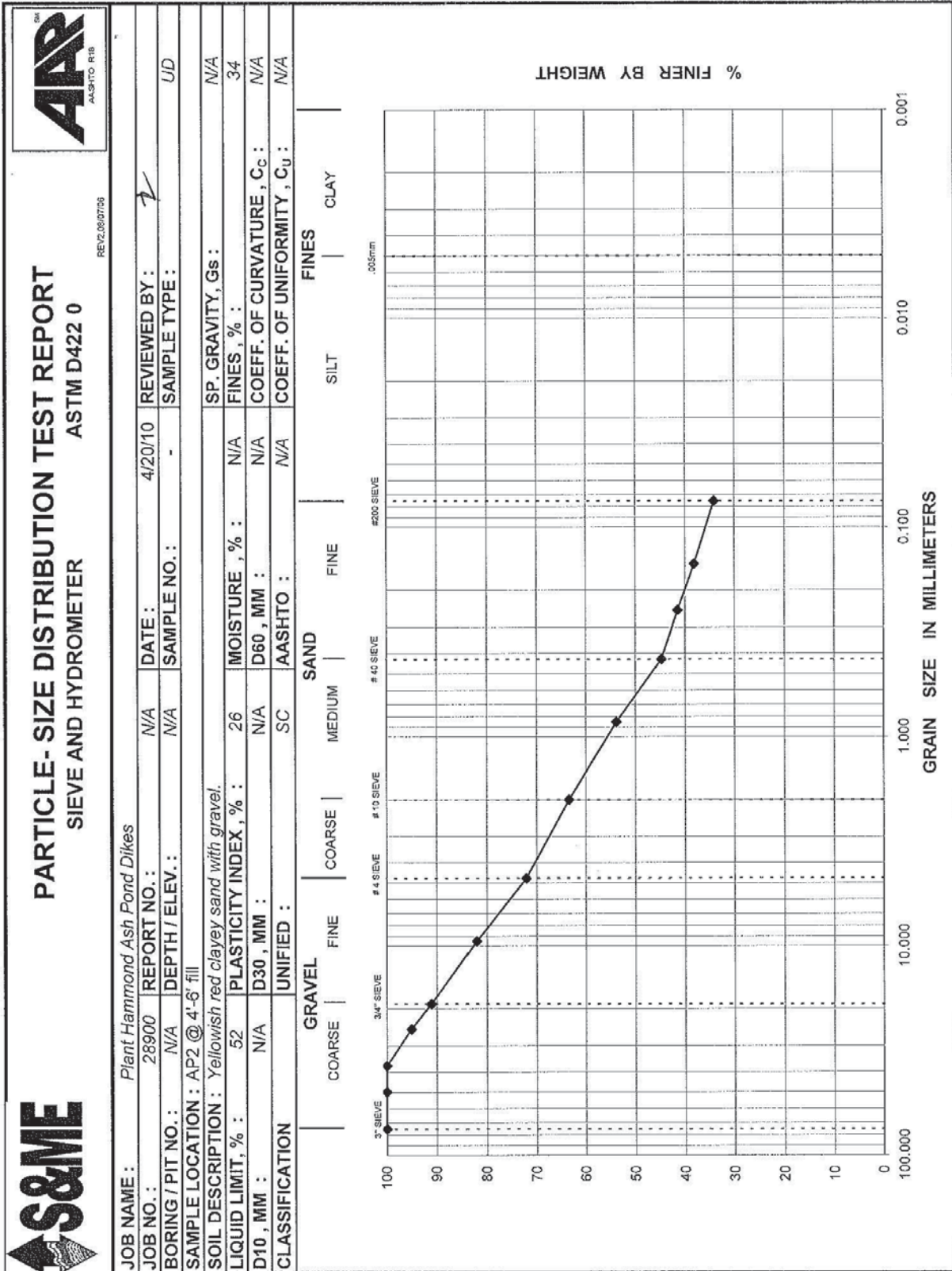
SPECIMEN PROPERTIES									TEST PARAMETERS , TEST TYPE : CU/PP					
	INITIAL				AFTER CONSOLIDATION				SPECIMEN NO.		1	2	3	
SPECIMEN NO.		1	2	3		1	2	3	B Value		0.95	0.95	0.95	
DIAMETER , INCHES	D _o	2.88	2.90	2.90	D _c	2.87	2.89	2.88	BACK PRESSURE, ksf	U _o	10.2	10.2	10.1	
HEIGHT , INCHES	H _o	6.25	6.32	6.39	H _c	6.24	6.29	6.36	CONFINING PRESSURE , ksf	σ ₃	0.5	1.0	2.0	
WATER CONTENT, %	W _o	12.7	15.0	15.7	W _c	18.1	19.7	16.8	MAX. DEVIATOR STRESS ,ksf	σ ₁ -σ ₃	2.9	3.4	10.8	
DRY DENSITY, PCF	γ _{dryo}	113.1	109.4	114.8	γ _{dryc}	113.7	110.6	116.5	ULT. DEVIATOR STRESS , ksf	σ ₁ -σ ₃	2.9	3.4	10.8	
SATURATION ,%	S _o	69.0	74.0	89.4	S _c	100	100	100	Specimen Shape @					
VOID RATIO	e _o	0.501	0.551	0.479	e _c	0.493	0.535	0.458	Failure		Bulged			
----- , Strain 0.2									% per minute		T50, Minutes =		0.6	

N/A

N/A

SHEAR STRENGTH PARAMETERS	TOTAL		EFFECTIVE	
	COHESION, C (ksf)	N/A	APPARENT COHESION, (ksf)	0.14
	ANGLE OF INTER. FRICTION, Φ (DEGREES)	N/A	ANGLE OF INTER. FRICTION, Φ' (DEGREES)	37.3







ATTERBERG LIMITS (ASTM D 4318)



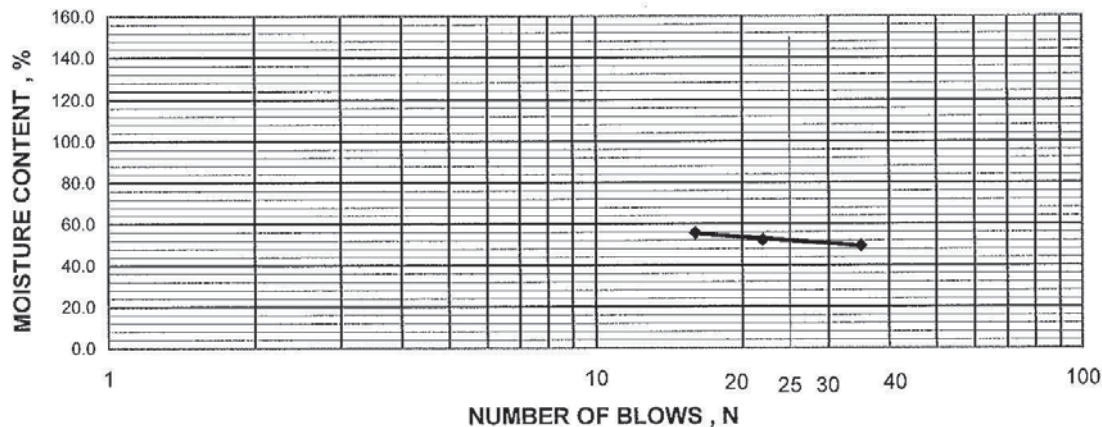
REV. 5/10/06

JOB NAME :	Plant Hammond Ash Pond Dikes				
JOB NO. :	28900	REPORT NO. :	-	DATE :	04/20/10
BORING / PIT NO. :	N/A	DEPTH / ELEV. :	N/A	SAMPLE NO. :	N/A
SAMPLE LOCATION :	AP2 Fill @ 4'-6' & 6'-8'				
SOIL DESCRIPTION :	Yellowish red clayey sand with gravel.				
LIQUID LIMIT, % :	52	PLASTIC LIMIT, % :	26	PLASTICITY INDEX, % :	26
CLASSIFICATION :		UNIFIED :	SC	AASHTO :	-
				MOISTURE, % :	15
				FINES, % :	34

LIQUID LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN LIQUID & PLASTIC STATES --

% MOISTURE AT WHICH SOIL FLOWS FOR A DISTANCE OF 13 MM (1/2 ") AT THE BASE OF GROOVE WHEN SUBJECTED TO 25 BLOWS

TEST NO. :	1		2		3		4		5
CONTAINER NO.	18		19		20	BRAND	MODEL	SERIAL	
NUMBER OF BLOWS	35		22		16	BALANCE	PRECISA	2200 C	
WT. WET SOIL + CAN (GRAMS)	31.51		30.35		30.84	LL MACHINE	HUMBOLT	1	
WT. DRY SOIL + CAN (GRAMS)	26.13		25.12		25.35	BALANCE	OHAUS-3100 G	ARC120	
WT. OF WATER (GRAMS)	5.38		5.23		5.49	OVEN	DESPATCH 3438	1650032533	
WT. OF CONTAINER (GRAMS)	15.27		15.11		15.47				
WT. OF DRY SOIL (GRAMS)	10.86		10.01		9.88				
WATER CONTENT, (%)	49.54		52.25		55.57				



PLASTIC LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN PLASTIC & BRITTLE STATES --

% MOISTURE AT WHICH SOIL CAN NO LONGER BE DEFORMED BY ROLLING INTO 3.2 MM (1/8 ") IN DIAMETER THREADS WITHOUT CRUMBLING

TEST NO. :	1		2		3		4		5
CONTAINER NO.	42		43						
WT. WET SOIL + CAN (GRAMS)	23.42		23.5						
WT. DRY SOIL + CAN (GRAMS)	21.66		21.74						
WT. OF WATER (GRAMS)	1.76		1.76						
WT. OF CONTAINER (GRAMS)	15.03		14.96						
WT. OF DRY SOIL (GRAMS)	6.63		6.78						
WATER CONTENT, (%)	26.55		25.96						

PLASTICITY INDEX - THE RANGE OF % MOISTURE CONTENT OVER WHICH SOIL BEHAVES PLASTICALLY -

THE DIFFERENCE BETWEEN LIQUID LIMIT & PLASTIC LIMIT $PI = LL - PL$



TRIAxIAL SHEAR TEST REPORT (ASTM D 4767)



REV5,3/05/07

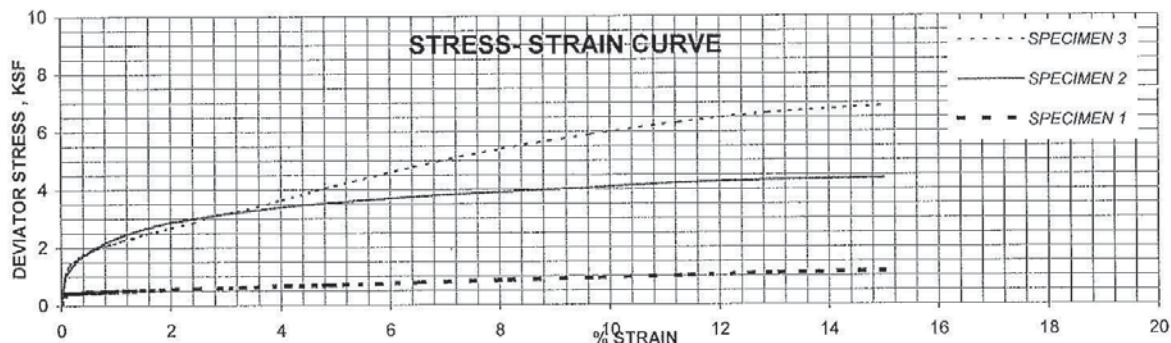
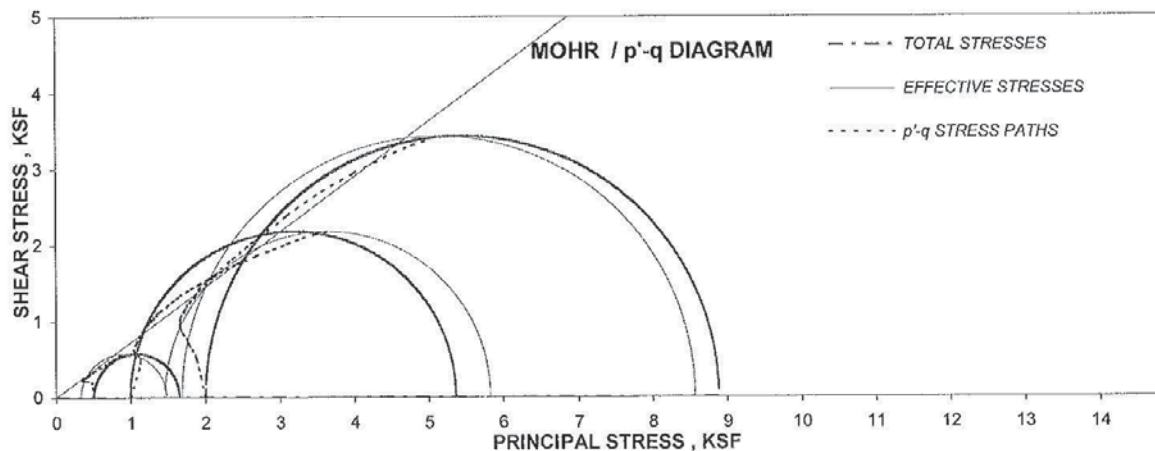
JOB NAME: Plant Hammond Ash Pond Dikes
 JOB NO.: 28900 REPORT NO.: N/A REVIEWED BY: [Signature] DATE: 3/12/10
 BORING / PIT NO.: N/A DEPTH / ELEV.: N/A SAMPLE NO.: N/A TYPE: UD
 SAMPLE LOCATION: AP3 @ 8'-10' & 10'-12' fill
 SOIL DESCRIPTION: Reddish yellow sandy fat clay with gravel (CH)
 LL, %: 53 PI, %: 36 FINES, %: 63 G_s: 2.70

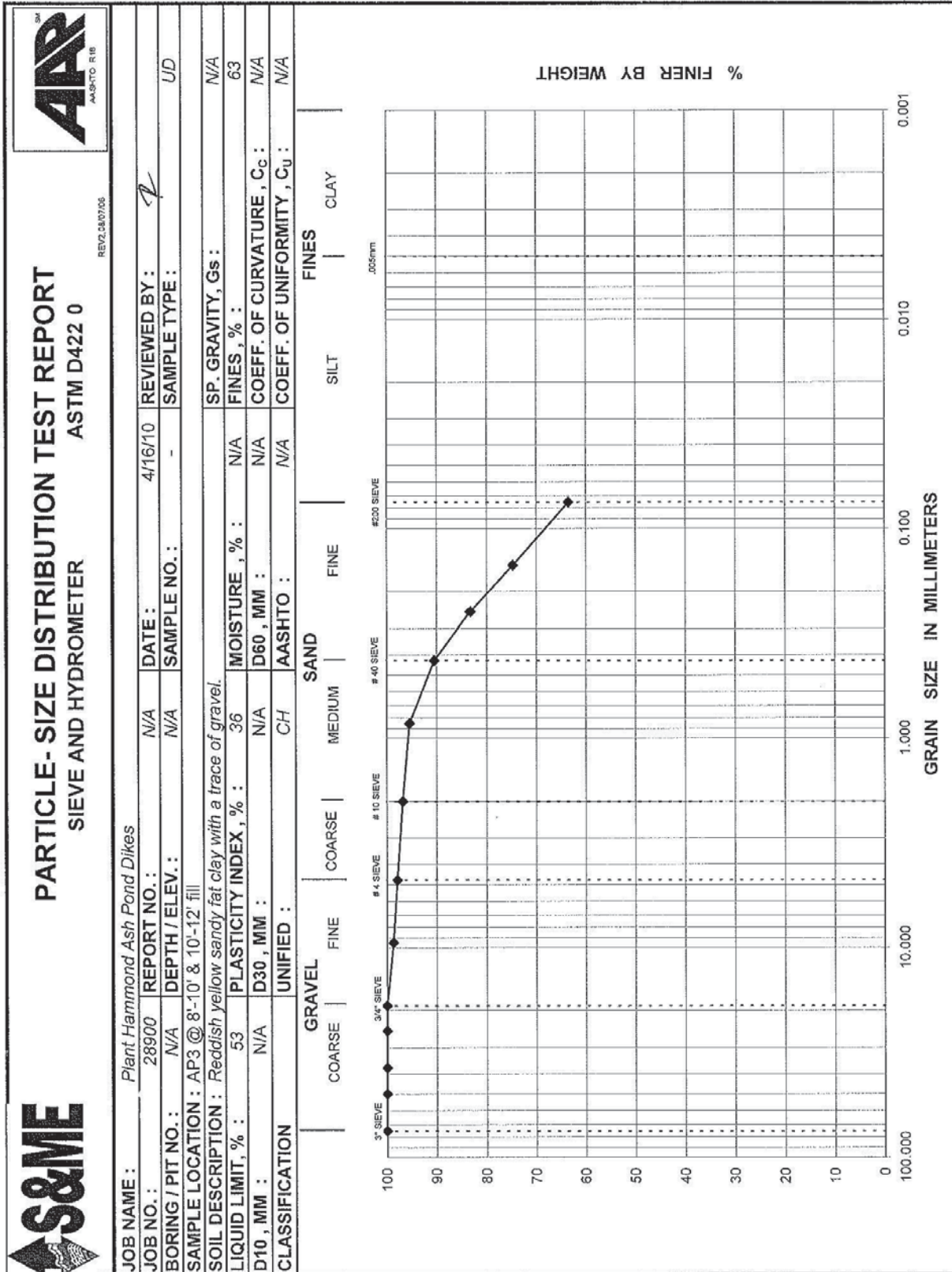
SPECIMEN PROPERTIES									TEST PARAMETERS , TEST TYPE : CU/PP					
	INITIAL				AFTER CONSOLIDATION				SPECIMEN NO.		1	2	3	
SPECIMEN NO.		1	2	3		1	2	3	B Value		0.95	0.95	0.95	
DIAMETER , INCHES	D _o	2.87	2.90	2.88	D _c	2.85	2.90	2.86	BACK PRESSURE, ksf	U _o	10.1	10.2	10.1	
HEIGHT , INCHES	H _o	6.13	6.35	6.23	H _c	6.11	6.34	6.21	CONFINING PRESSURE , ksf	σ ₃	0.5	1.0	2.0	
WATER CONTENT, %	W _o	15.1	15.3	17.3	W _c	19.2	17.7	18.0	MAX. DEVIATOR STRESS ,ksf	σ ₁ -σ ₃	1.1	4.4	6.9	
DRY DENSITY, PCF	γ _{dryo}	109.8	113.4	112.1	γ _{dryc}	111.0	113.9	113.3	ULT. DEVIATOR STRESS , ksf	σ ₁ -σ ₃	1.1	4.4	6.9	
SATURATION ,%	S _o	76.3	85.3	92.8	S _c	100	100	100	Specimen Shape @ Failure		Bulged			
VOID RATIO	e _o	0.534	0.485	0.502	e _c	0.517	0.479	0.487						
-----									Strain	0.02	% per minute	T50, Minutes = 20		

N/A

N/A

SHEAR STRENGTH PARAMETERS	TOTAL		EFFECTIVE	
	COHESION, C (ksf) :	N/A	APPARENT COHESION, (ksf) :	0.00
	ANGLE OF INTER. FRICTION, Φ (DEGREES) :	N/A	ANGLE OF INTER. FRICTION, Φ' (DEGREES) :	36.0








ATTERBERG LIMITS (ASTM D 4318)



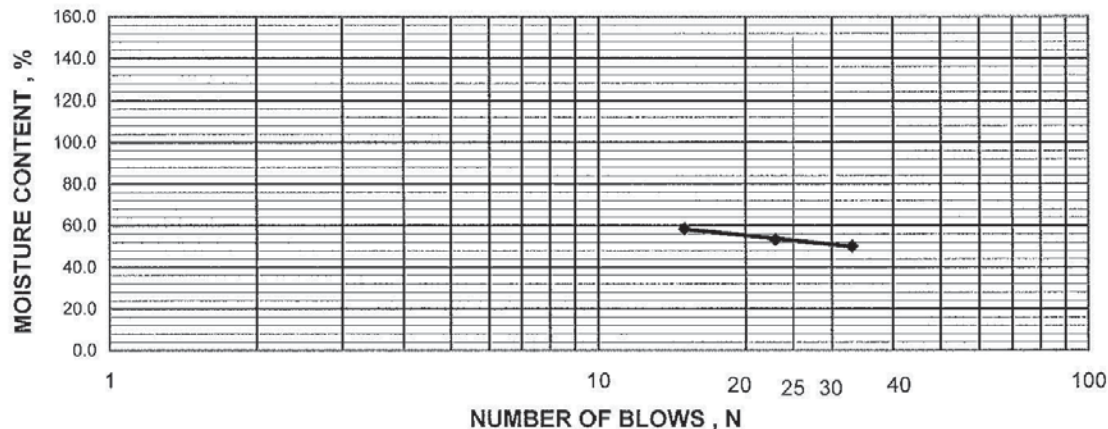
REV. 5/10/06

JOB NAME : Plant Hammond Ash Pond Dikes				
JOB NO. : 28900	REPORT NO. : -	DATE : 04/13/10	REVIEWED BY : 	
BORING / PIT NO. : N/A	DEPTH / ELEV. : N/A	SAMPLE NO. : N/A	SAMPLE TYPE : UD	
SAMPLE LOCATION : AP3 @ 8'-10' & 10'-12' fill				
SOIL DESCRIPTION : Reddish yellow sandy fat clay with gravel.				
LIQUID LIMIT , % : 53	PLASTIC LIMIT ,% : 17	PLASTICITY INDEX ,% : 36	MOISTURE , % : 15	
CLASSIFICATION :	UNIFIED : CH	AASHTO : -	FINES , % : 63	

LIQUID LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN LIQUID & PLASTIC STATES --

% MOISTURE AT WHICH SOIL FLOWS FOR A DISTANCE OF 13 MM (1/2 ") AT THE BASE OF GROOVE WHEN SUBJECTED TO 25 BLOWS

TEST NO. :	1	2	3		4		5
CONTAINER NO.	1	2	3	BRAND	MODEL	SERIAL	
NUMBER OF BLOWS	33	23	15	BALANCE	PRECISA	2200 C	
WT. WET SOIL + CAN (GRAMS)	29.96	29.97	29.01	LL MACHINE	HUMBOLT	1	
WT. DRY SOIL + CAN (GRAMS)	24.98	24.85	23.93	BALANCE	OHAUS-3100 G	ARC120	
WT. OF WATER (GRAMS)	4.98	5.12	5.08	OVEN	DESPATCH-3436	1650032533	
WT. OF CONTAINER (GRAMS)	15.04	15.24	15.24				
WT. OF DRY SOIL (GRAMS)	9.94	9.61	8.69				
WATER CONTENT, (%)	50.10	53.28	58.46				



PLASTIC LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN PLASTIC & BRITTLE STATES --

% MOISTURE AT WHICH SOIL CAN NO LONGER BE DEFORMED BY ROLLING INTO 3.2 MM (1/8") IN DIAMETER THREADS WITHOUT CRUMBLING

TEST NO. :	1	2	3	4	5
CONTAINER NO.	4	5			
WT. WET SOIL + CAN (GRAMS)	24.45	24.1			
WT. DRY SOIL + CAN (GRAMS)	23.13	22.80			
WT. OF WATER (GRAMS)	1.32	1.30			
WT. OF CONTAINER (GRAMS)	15.01	15.42			
WT. OF DRY SOIL (GRAMS)	8.12	7.38			
WATER CONTENT, (%)	16.26	17.62			

PLASTICITY INDEX - THE RANGE OF % MOISTURE CONTENT OVER WHICH SOIL BEHAVES PLASTICALLY -

THE DIFFERENCE BETWEEN LIQUID LIMIT & PLASTIC LIMIT $PI = LL - PL$



TRIAXIAL SHEAR TEST REPORT (ASTM D 4767)



REV5,3/05/07

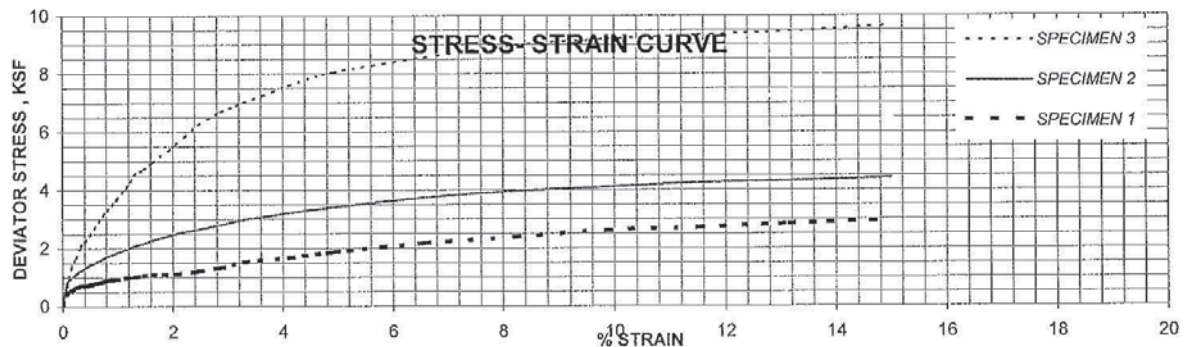
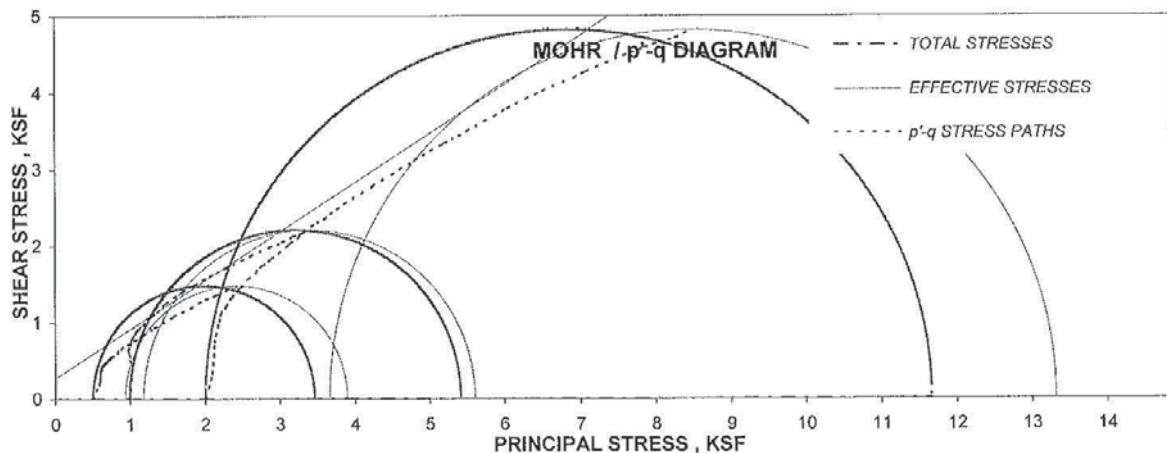
JOB NAME: Plant Hammond Ash Pond Dikes
JOB NO.: 28900 **REPORT NO.:** N/A **REVIEWED BY:** *P* **DATE:** 3/24/10
BORING / PIT NO.: N/A **DEPTH / ELEV.:** N/A **SAMPLE NO.:** N/A **TYPE:** UD
SAMPLE LOCATION: AP1-2 @ 10'-12.5'
SOIL DESCRIPTION: Yellowish brown lean clay with sand (CL)
LL, %: 25 **PI, %:** 12 **FINES, %:** 82 **G_s:** 2.65

SPECIMEN PROPERTIES									TEST PARAMETERS , TEST TYPE : CU/PP				
	INITIAL				AFTER CONSOLIDATION				SPECIMEN NO.		1	2	3
SPECIMEN NO.		1	2	3		1	2	3	B Value		0.95	0.95	0.95
DIAMETER , INCHES	D _o	2.87	2.88	2.88	D _c	2.86	2.87	2.87	BACK PRESSURE, ksf	U _o	10.1	10.2	10.1
HEIGHT , INCHES	H _o	6.10	6.09	6.11	H _c	6.08	6.07	6.08	CONFINING PRESSURE , ksf	σ ₃	0.5	1.0	2.0
WATER CONTENT, %	W _o	14.8	14.5	12.4	W _c	16.9	14.3	13.3	MAX. DEVIATOR STRESS ,ksf	σ ₁ -σ ₃	3.0	4.4	9.7
DRY DENSITY, PCF	γ _{dryo}	113.3	118.9	120.5	γ _{dryc}	114.3	119.9	122.2	ULT. DEVIATOR STRESS , ksf	σ ₁ -σ ₃	3.0	4.4	9.7
SATURATION ,%	S _o	85.1	98.4	88.4	S _c	100	100	100	Specimen Shape @	Sheared			
VOID RATIO	e _o	0.460	0.391	0.372	e _c	0.447	0.380	0.353	Failure				
									Strain	0.2	% per minute	T50, Minutes =	2

N/A

N/A

SHEAR STRENGTH PARAMETERS	TOTAL		EFFECTIVE	
	COHESION, C (ksf) :		APPARENT COHESION, (ksf) :	
	ANGLE OF INTER. FRICTION, Φ (DEGREES) :		ANGLE OF INTER. FRICTION, Φ' (DEGREES) :	
	N/A		0.27	
	N/A		32.6	



		PARTICLE-SIZE DISTRIBUTION TEST REPORT SIEVE AND HYDROMETER					
JOB NAME : Plant Hammond Ash Pond Dikes		DATE : 3/26/10		REVIEWED BY : <i>[Signature]</i>		ASTM D422 0	
JOB NO. : 28900		REPORT NO. : N/A		SAMPLE NO. : N/A		SAMPLE TYPE : UD	
BORING / PIT NO. : N/A		DEPTH / ELEV. : N/A		SAMPLE NO. : N/A		SAMPLE TYPE : UD	
SAMPLE LOCATION : AP1-2 @ 10'-12.5'							
SOIL DESCRIPTION : Yellowish brown, lean clay with sand.							
LIQUID LIMIT, % : 25		PLASTICITY INDEX, % : 12		SP. GRAVITY, Gs : N/A		FINES, % : 82	
D10, MM : N/A		D30, MM : N/A		MOISTURE, % : N/A		COEFF. OF CURVATURE, C _c : N/A	
CLASSIFICATION : UNIFIED : -		AASHTO : -		COEFF. OF UNIFORMITY, C _u : N/A		FINES : N/A	

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
#4 Sieve	#10 Sieve	#40 Sieve	#60 Sieve	#200 Sieve		

% FINER BY WEIGHT

GRAIN SIZE IN MILLIMETERS

Grain Size (mm)	% Finer (%)
3.0	100
2.0	100
1.5	100
1.0	100
0.75	100
0.6	100
0.425	100
0.3	100
0.25	100
0.2	100
0.15	100
0.106	100
0.075	82
0.06	80
0.05	78
0.0425	75
0.03	70
0.025	65
0.02	60
0.015	55
0.0106	50
0.0075	45
0.006	40
0.005	35
0.00425	30
0.003	25
0.0025	20
0.002	15
0.0015	10
0.00106	5
0.00075	0



ATTERBERG LIMITS (ASTM D 4318)



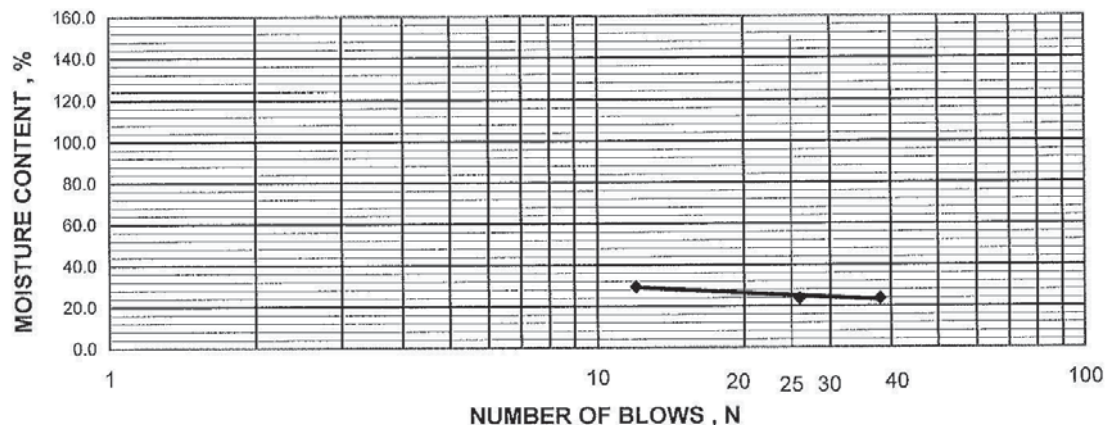
REV. 5/10/06

JOB NAME : Plant Hammond Ash Pond Dikes			
JOB NO. : 28900	REPORT NO. : -	DATE : 03/24/10	REVIEWED BY : <i>[Signature]</i>
BORING / PIT NO. : N/A	DEPTH / ELEV. : N/A	SAMPLE NO. : N/A	SAMPLE TYPE : UD
SAMPLE LOCATION : AP1-2 @ 10'-12.5'			
SOIL DESCRIPTION : Yellowish brown lean clay with sand.			
LIQUID LIMIT, % : 25	PLASTIC LIMIT, % : 13	PLASTICITY INDEX, % : 12	MOISTURE, % : 14
CLASSIFICATION :	UNIFIED : CL	AASHTO : -	FINES, % : 82

LIQUID LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN LIQUID & PLASTIC STATES --

% MOISTURE AT WHICH SOIL FLOWS FOR A DISTANCE OF 13 MM (1/2 ") AT THE BASE OF GROOVE WHEN SUBJECTED TO 25 BLOWS

TEST NO. :	1	2	3	4	5
CONTAINER NO.	42	43	44	BRAND	MODEL
NUMBER OF BLOWS	38	26	12	BALANCE	PRECISA
WT. WET SOIL + CAN (GRAMS)	32.55	28.73	30.87	LL MACHINE	HUMBOLT
WT. DRY SOIL + CAN (GRAMS)	29.19	26.09	27.28	BALANCE	OHAUS-3100 G
WT. OF WATER (GRAMS)	3.36	2.64	3.59	OVEN	DESPATCH-3436
WT. OF CONTAINER (GRAMS)	15.03	14.96	15.10		1650032533
WT. OF DRY SOIL (GRAMS)	14.16	11.13	12.18		
WATER CONTENT, (%)	23.73	23.72	29.47		



PLASTIC LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN PLASTIC & BRITTLE STATES --

% MOISTURE AT WHICH SOIL CAN NO LONGER BE DEFORMED BY ROLLING INTO 3.2 MM (1/8") IN DIAMETER THREADS WITHOUT CRUMBLING

TEST NO. :	1	2	3	4	5
CONTAINER NO.	53	54			
WT. WET SOIL + CAN (GRAMS)	23.27	23.88			
WT. DRY SOIL + CAN (GRAMS)	22.40	22.90			
WT. OF WATER (GRAMS)	0.87	0.98			
WT. OF CONTAINER (GRAMS)	15.50	15.14			
WT. OF DRY SOIL (GRAMS)	6.90	7.76			
WATER CONTENT, (%)	12.61	12.63			

PLASTICITY INDEX - THE RANGE OF % MOISTURE CONTENT OVER WHICH SOIL BEHAVES PLASTICALLY -
THE DIFFERENCE BETWEEN LIQUID LIMIT & PLASTIC LIMIT $PI = LL - PL$






TRIAXIAL SHEAR TEST REPORT (ASTM D 4767)



REV5,3/05/07

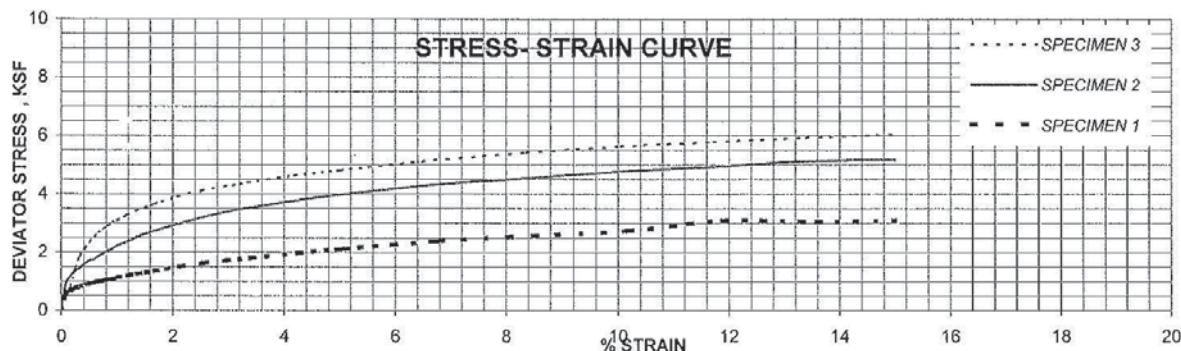
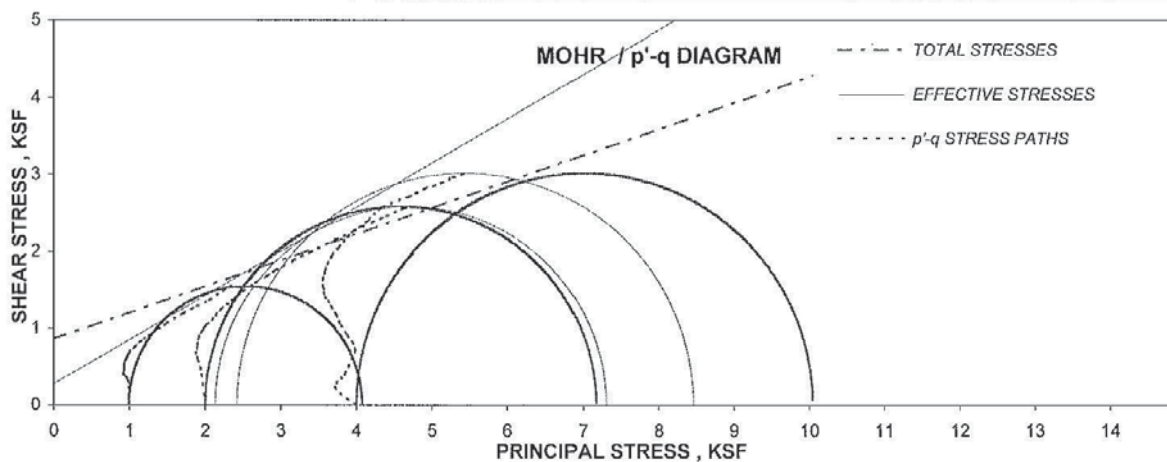
JOB NAME: Plant Hammond Ash Pond Dikes
 JOB NO.: 28900 REPORT NO.: N/A REVIEWED BY: *[Signature]* DATE: 3/24/10
 BORING / PIT NO.: N/A DEPTH / ELEV.: N/A SAMPLE NO.: N/A TYPE: UD
 SAMPLE LOCATION: AP2-3 @ 35'-37'
 SOIL DESCRIPTION: Olive brown sandy lean clay (CL)
 LL, %: 40 PI, %: 15 FINES, %: 60 G_s: 2.66

SPECIMEN PROPERTIES									TEST PARAMETERS , TEST TYPE : CU/PP					
	INITIAL				AFTER CONSOLIDATION				SPECIMEN NO.		1	2	3	
SPECIMEN NO.		1	2	3		1	2	3	B Value		0.95	0.95	0.95	
DIAMETER , INCHES	D _o	2.88	2.88	2.88	D _c	2.86	2.86	2.86	BACK PRESSURE, ksf	U _o	10.2	10.2	10.1	
HEIGHT , INCHES	H _o	5.93	6.03	6.02	H _c	5.89	5.99	5.97	CONFINING PRESSURE , ksf	σ ₃	1.0	2.0	4.0	
WATER CONTENT, %	W _o	25.0	25.4	26.5	W _c	24.0	24.1	24.9	MAX. DEVIATOR STRESS ,ksf	σ ₁ -σ ₃	3.1	5.2	6.0	
DRY DENSITY, PCF	γ _{dryo}	99.6	99.4	97.5	γ _{dryc}	101.4	101.2	99.9	ULT. DEVIATOR STRESS , ksf	σ ₁ -σ ₃	3.1	5.2	6.0	
SATURATION , %	S _o	99.6	100.7	100.1	S _c	100	100	100	Specimen Shape @					
VOID RATIO	e _o	0.667	0.671	0.704	e _c	0.638	0.641	0.663	Failure		Sheared			
									Strain	0.2	% per minute	T50, Minutes = 2		

N/A

N/A

SHEAR STRENGTH PARAMETERS	TOTAL				EFFECTIVE			
	COHESION, C (ksf) :				APPARENT COHESION, (ksf) :			
	ANGLE OF INTER. FRICTION, Φ (DEGREES) :				ANGLE OF INTER. FRICTION, Φ' (DEGREES) :			
	0.85				0.28			
	18.9				29.9			



S&ME		PARTICLE-SIZE DISTRIBUTION TEST REPORT				ASTM D422 0		SIEVE AND HYDROMETER		REV 2.08/07/08		AASHTO R18	
JOB NAME: Plant Hammond Ash Pond Dikes													
JOB NO.: 28900		REPORT NO.: N/A		DATE: 3/26/10		REVIEWED BY: [Signature]		SAMPLE NO.: N/A		SAMPLE TYPE: UD		SP. GRAVITY, G _s : N/A	
BORING / PIT NO.: N/A		DEPTH / ELEV.: N/A		SAMPLE NO.: N/A		SAMPLE TYPE: UD		SAMPLE NO.: N/A		SAMPLE TYPE: UD		FINES, %: 60	
SAMPLE LOCATION: AP2-3 @ 35'-37'													
SOIL DESCRIPTION: Olive brown sandy lean clay.													
LIQUID LIMIT, %: 40		PLASTICITY INDEX, %: 15		MOISTURE, %: N/A		COEFF. OF CURVATURE, C _c : N/A		COEFF. OF UNIFORMITY, C _u : N/A		FINES, %: 60		FINES, %: 60	
D ₁₀ , MM: N/A		D ₃₀ , MM: N/A		D ₆₀ , MM: N/A		COEFF. OF CURVATURE, C _c : N/A		COEFF. OF UNIFORMITY, C _u : N/A		FINES, %: 60		FINES, %: 60	
CLASSIFICATION		UNIFIED: CL		AASHTO: N/A		COEFF. OF CURVATURE, C _c : N/A		COEFF. OF UNIFORMITY, C _u : N/A		FINES, %: 60		FINES, %: 60	

GRAVEL		SAND		FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	CLAY
3" SIEVE	3/4" SIEVE	#4 SIEVE	#10 SIEVE	#40 SIEVE	#200 SIEVE

Grain Size (mm)	% Finer
3	100
7.5	95
20	90
47.5	85
75	75
250	60



ATTERBERG LIMITS (ASTM D 4318)



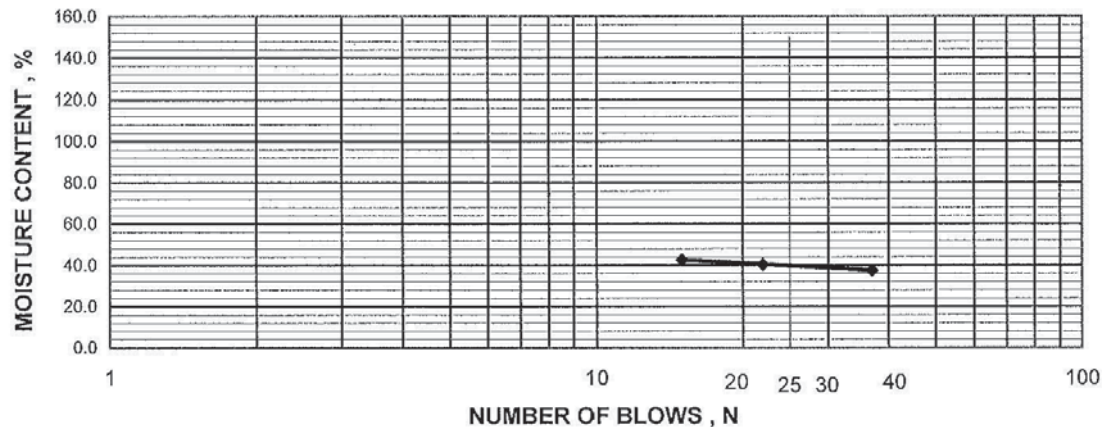
REV. 5/10/06

JOB NAME : Plant Hammond Ash Pond Dikes			
JOB NO. : 28900	REPORT NO. : -	DATE : 03/24/10	REVIEWED BY :
BORING / PIT NO. : N/A	DEPTH / ELEV. : N/A	SAMPLE NO. : N/A	SAMPLE TYPE : UD
SAMPLE LOCATION : AP2-3 @ 35'-37'			
SOIL DESCRIPTION : Olive brown sandy lean clay.			
LIQUID LIMIT, % : 40	PLASTIC LIMIT, % : 25	PLASTICITY INDEX, % : 15	MOISTURE, % : 25
CLASSIFICATION :	UNIFIED : CL	AASHTO : -	FINES, % : 60

LIQUID LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN LIQUID & PLASTIC STATES --

% MOISTURE AT WHICH SOIL FLOWS FOR A DISTANCE OF 13 MM (1/2 ") AT THE BASE OF GROOVE WHEN SUBJECTED TO 25 BLOWS

TEST NO. :	1	2	3	4	5
CONTAINER NO.	91	92	93		
NUMBER OF BLOWS	37	22	15		
WT. WET SOIL + CAN (GRAMS)	28.49	29.57	32.23	BRAND	MODEL
WT. DRY SOIL + CAN (GRAMS)	24.84	25.42	27.09	BALANCE	PRECISA
WT. OF WATER (GRAMS)	3.65	4.15	5.14	LL MACHINE	HUMBOLT
WT. OF CONTAINER (GRAMS)	15.10	15.12	15.05	BALANCE	OHAUS-3100 G
WT. OF DRY SOIL (GRAMS)	9.74	10.30	12.04	OVEN	DESPATCH-3436
WATER CONTENT, (%)	37.47	40.29	42.69		1650032533



PLASTIC LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN PLASTIC & BRITTLE STATES --

% MOISTURE AT WHICH SOIL CAN NO LONGER BE DEFORMED BY ROLLING INTO 3.2 MM (1/8 ") IN DIAMETER THREADS WITHOUT CRUMBLING

TEST NO. :	1	2	3	4	5
CONTAINER NO.	94	95			
WT. WET SOIL + CAN (GRAMS)	23.52	22.94			
WT. DRY SOIL + CAN (GRAMS)	21.84	21.39			
WT. OF WATER (GRAMS)	1.68	1.55			
WT. OF CONTAINER (GRAMS)	15.05	15.06			
WT. OF DRY SOIL (GRAMS)	6.79	6.33			
WATER CONTENT, (%)	24.74	24.49			

PLASTICITY INDEX - THE RANGE OF % MOISTURE CONTENT OVER WHICH SOIL BEHAVES PLASTICALLY -

THE DIFFERENCE BETWEEN LIQUID LIMIT & PLASTIC LIMIT $PI = LL - PL$

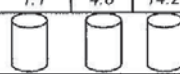
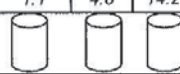
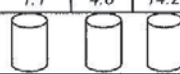


TRIAXIAL SHEAR TEST REPORT (ASTM D 4767)



REV5.3/05/07

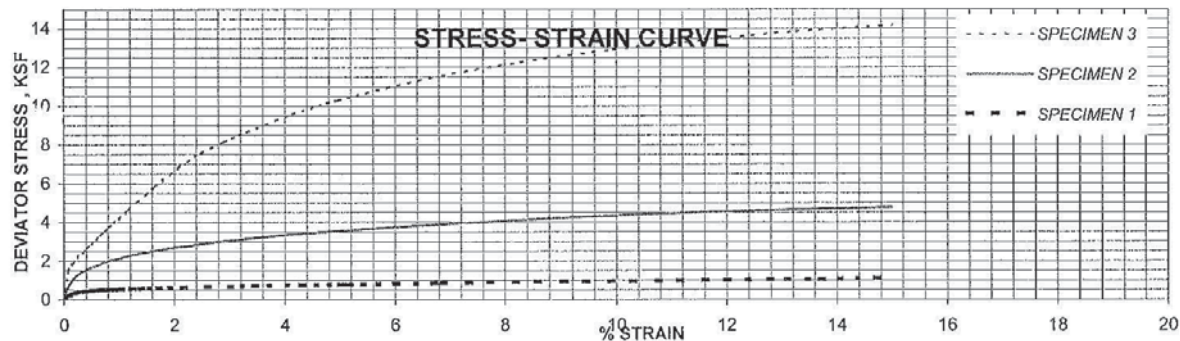
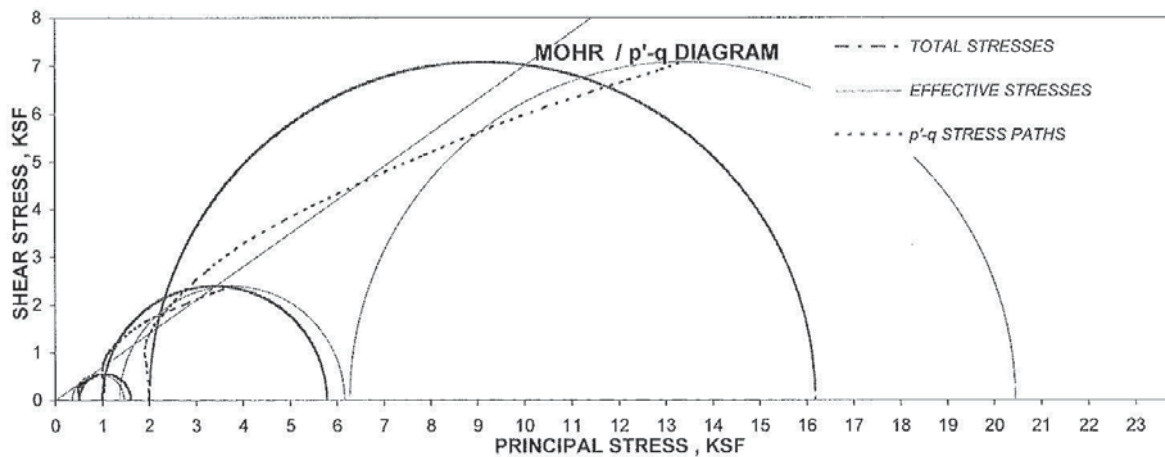
JOB NAME: Plant Hammond Ash Pond Dikes
 JOB NO.: 28900 REPORT NO.: N/A REVIEWED BY: *[Signature]* DATE: 3/24/10
 BORING / PIT NO.: N/A DEPTH / ELEV.: N/A SAMPLE NO.: N/A TYPE: UD
 SAMPLE LOCATION: AP3-1 @ 8'-10'
 SOIL DESCRIPTION: Specimen 1 & 2: yellow & brown sandy lean clay with gravel, specimen 3: yellow sandy clay.
 LL, %: 33 PI, %: 17 FINES, %: 67 G_s: 2.66

SPECIMEN PROPERTIES									TEST PARAMETERS , TEST TYPE : CU/PP					
	INITIAL				AFTER CONSOLIDATION				SPECIMEN NO.		1	2	3	
SPECIMEN NO.		1	2	3		1	2	3	B Value		0.95	0.95	0.95	
DIAMETER , INCHES	D _o	2.89	2.89	2.88	D _c	2.86	2.88	2.87	BACK PRESSURE, ksf	U _o	11.6	11.5	11.6	
HEIGHT , INCHES	H _o	5.89	6.29	6.06	H _c	5.85	6.28	6.03	CONFINING PRESSURE , ksf	σ ₃	0.5	1.0	2.0	
WATER CONTENT, %	W _o	21.8	14.5	18.4	W _c	22.2	15.4	17.4	MAX. DEVIATOR STRESS ,ksf	σ ₁ -σ ₃	1.1	4.8	14.2	
DRY DENSITY, PCF	γ _{dryo}	102.0	117.1	111.9	γ _{dryc}	104.4	117.7	113.5	ULT. DEVIATOR STRESS , ksf	σ ₁ -σ ₃	1.1	4.8	14.2	
SATURATION ,%	S _o	92.5	92.4	101.4	S _c	100	100	100	Specimen Shape @ Failure					
VOID RATIO	e _o	0.627	0.417	0.483	e _c	0.590	0.409	0.462						
----- , Strain 0.04									% per minute		T50, Minutes =		10	

N/A

N/A

SHEAR STRENGTH PARAMETERS	TOTAL		EFFECTIVE	
	COHESION, C (ksf) :	N/A	APPARENT COHESION, (ksf) :	0.00
	ANGLE OF INTER. FRICTION, Φ (DEGREES) :	N/A	ANGLE OF INTER. FRICTION, Φ' (DEGREES) :	35.0



[illegible]



ATTERBERG LIMITS (ASTM D 4318)



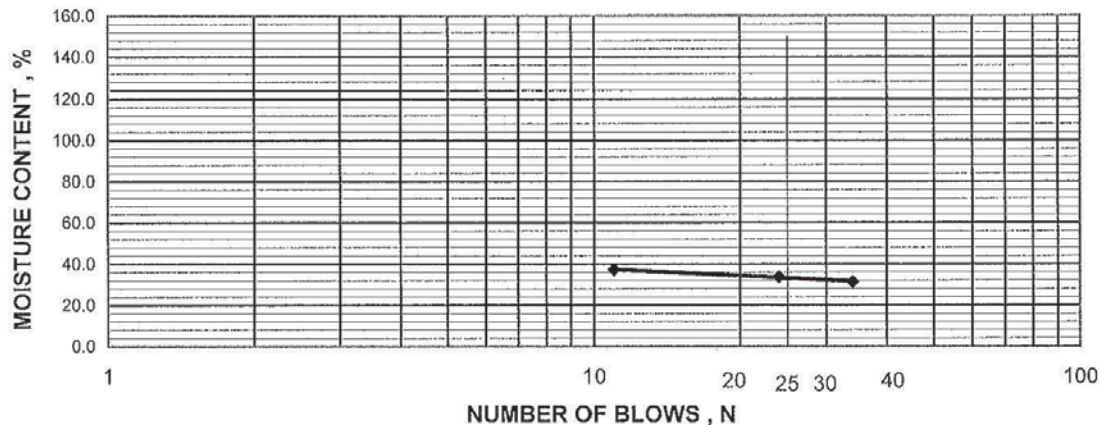
REV. 5/10/06

JOB NAME :	Plant Hammond Ash Pond Dikes				
JOB NO. :	28900	REPORT NO. :	-	DATE :	03/31/10
BORING / PIT NO. :	AP3-1	DEPTH / ELEV. :	8'-10'	SAMPLE NO. :	N/A
SAMPLE LOCATION :	-				
SOIL DESCRIPTION :	-				
LIQUID LIMIT, % :	33	PLASTIC LIMIT, % :	16	PLASTICITY INDEX, % :	17
CLASSIFICATION :		UNIFIED :	CL	AASHTO :	-
				MOISTURE, % :	18
				FINES, % :	67

LIQUID LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN LIQUID & PLASTIC STATES --

% MOISTURE AT WHICH SOIL FLOWS FOR A DISTANCE OF 13 MM (1/2 ") AT THE BASE OF GROOVE WHEN SUBJECTED TO 25 BLOWS

TEST NO. :	1	2	3	4	5
CONTAINER NO.	42	43	44	BRAND	MODEL
NUMBER OF BLOWS	34	24	11	BALANCE	PRECISA
WT. WET SOIL + CAN (GRAMS)	29.83	29.12	30.57	LL MACHINE	HUMBOLT
WT. DRY SOIL + CAN (GRAMS)	26.29	25.54	26.37	BALANCE	OHAUS-3100 G
WT. OF WATER (GRAMS)	3.54	3.58	4.20	OVEN	DESPATCH-3438
WT. OF CONTAINER (GRAMS)	15.00	14.93	15.07		1650032533
WT. OF DRY SOIL (GRAMS)	11.29	10.61	11.30		
WATER CONTENT, (%)	31.36	33.74	37.17		



PLASTIC LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN PLASTIC & BRITTLE STATES --

% MOISTURE AT WHICH SOIL CAN NO LONGER BE DEFORMED BY ROLLING INTO 3.2 MM (1/8 ") IN DIAMETER THREADS WITHOUT CRUMBLING

TEST NO. :	1	2	3	4	5
CONTAINER NO.	54	56			
WT. WET SOIL + CAN (GRAMS)	22.5	21.75			
WT. DRY SOIL + CAN (GRAMS)	21.46	20.83			
WT. OF WATER (GRAMS)	1.04	0.92			
WT. OF CONTAINER (GRAMS)	15.11	15.19			
WT. OF DRY SOIL (GRAMS)	6.35	5.64			
WATER CONTENT, (%)	16.38	16.31			

PLASTICITY INDEX - THE RANGE OF % MOISTURE CONTENT OVER WHICH SOIL BEHAVES PLASTICALLY -

THE DIFFERENCE BETWEEN LIQUID LIMIT & PLASTIC LIMIT $PI = LL - PL$



ATTERBERG LIMITS (ASTM D 4318)



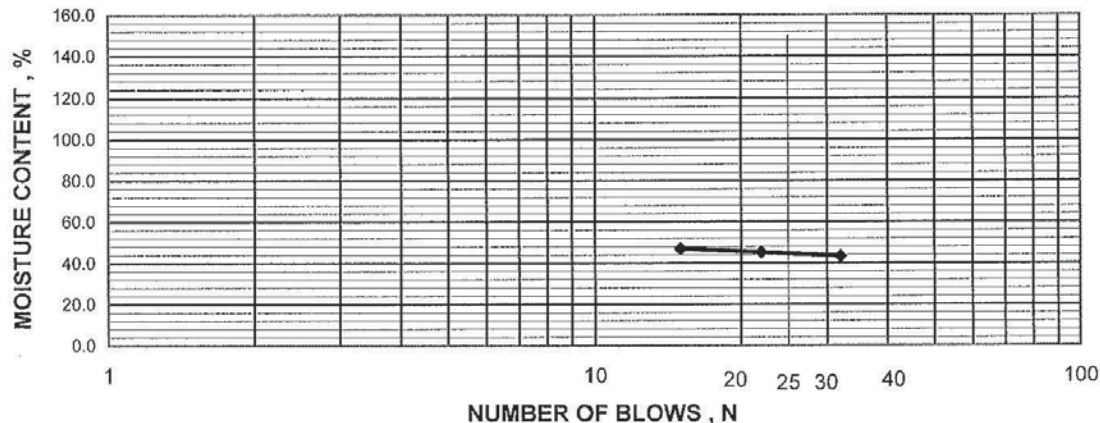
REV., 5/10/06

JOB NAME : Plant Hammond Ash Pond Dikes			
JOB NO. : 28900	REPORT NO. : N/A	DATE : 03/26/10	REVIEWED BY : <i>1</i>
BORING / PIT NO. : N/A	DEPTH / ELEV. : N/A	SAMPLE NO. : N/A	SAMPLE TYPE : UD
SAMPLE LOCATION : AP4-1 @ 10'-12.5'			
SOIL DESCRIPTION : -			
LIQUID LIMIT, % : 45	PLASTIC LIMIT, % : 25	PLASTICITY INDEX, % : 20	MOISTURE, % : 30
CLASSIFICATION :	UNIFIED : CL	AASHTO : -	FINES, % : 87

LIQUID LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN LIQUID & PLASTIC STATES --

% MOISTURE AT WHICH SOIL FLOWS FOR A DISTANCE OF 13 MM (1/2 ") AT THE BASE OF GROOVE WHEN SUBJECTED TO 25 BLOWS

TEST NO. :	1	2	3	4	5
CONTAINER NO.	6	7	9		
NUMBER OF BLOWS	32	22	15		
WT. WET SOIL + CAN (GRAMS)	29.18	29.88	30.36	BRAND	MODEL
WT. DRY SOIL + CAN (GRAMS)	25.04	25.56	25.64	BALANCE	PRECISA
WT. OF WATER (GRAMS)	4.14	4.32	4.72	LL MACHINE	HUMBOLT
WT. OF CONTAINER (GRAMS)	15.49	16.00	15.58	BALANCE	OHAUS-3100 G
WT. OF DRY SOIL (GRAMS)	9.55	9.56	10.06	OVEN	DESPATCH-3436
WATER CONTENT, (%)	43.35	45.19	46.92		1650032533



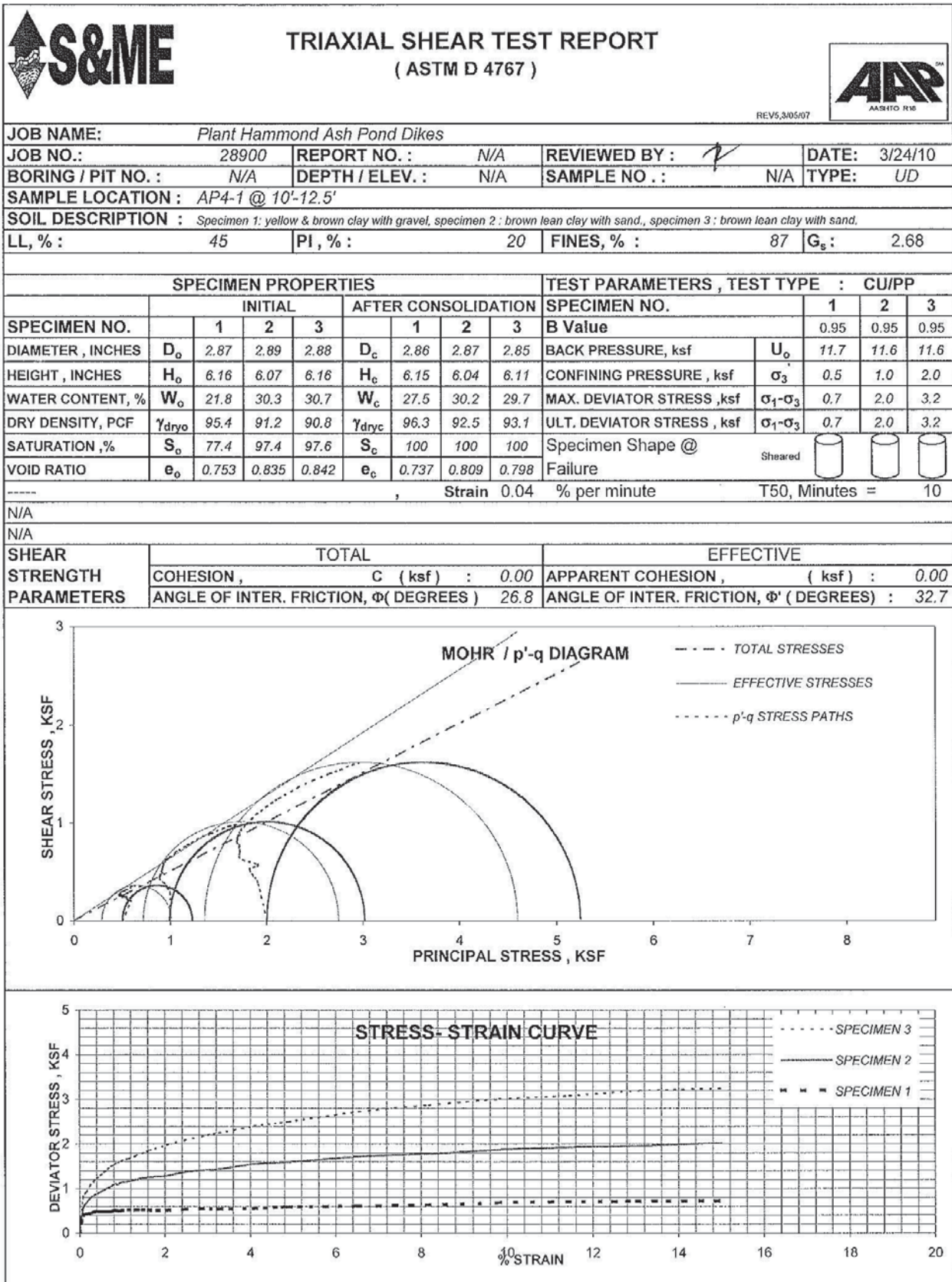
PLASTIC LIMIT, % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN PLASTIC & BRITTLE STATES --

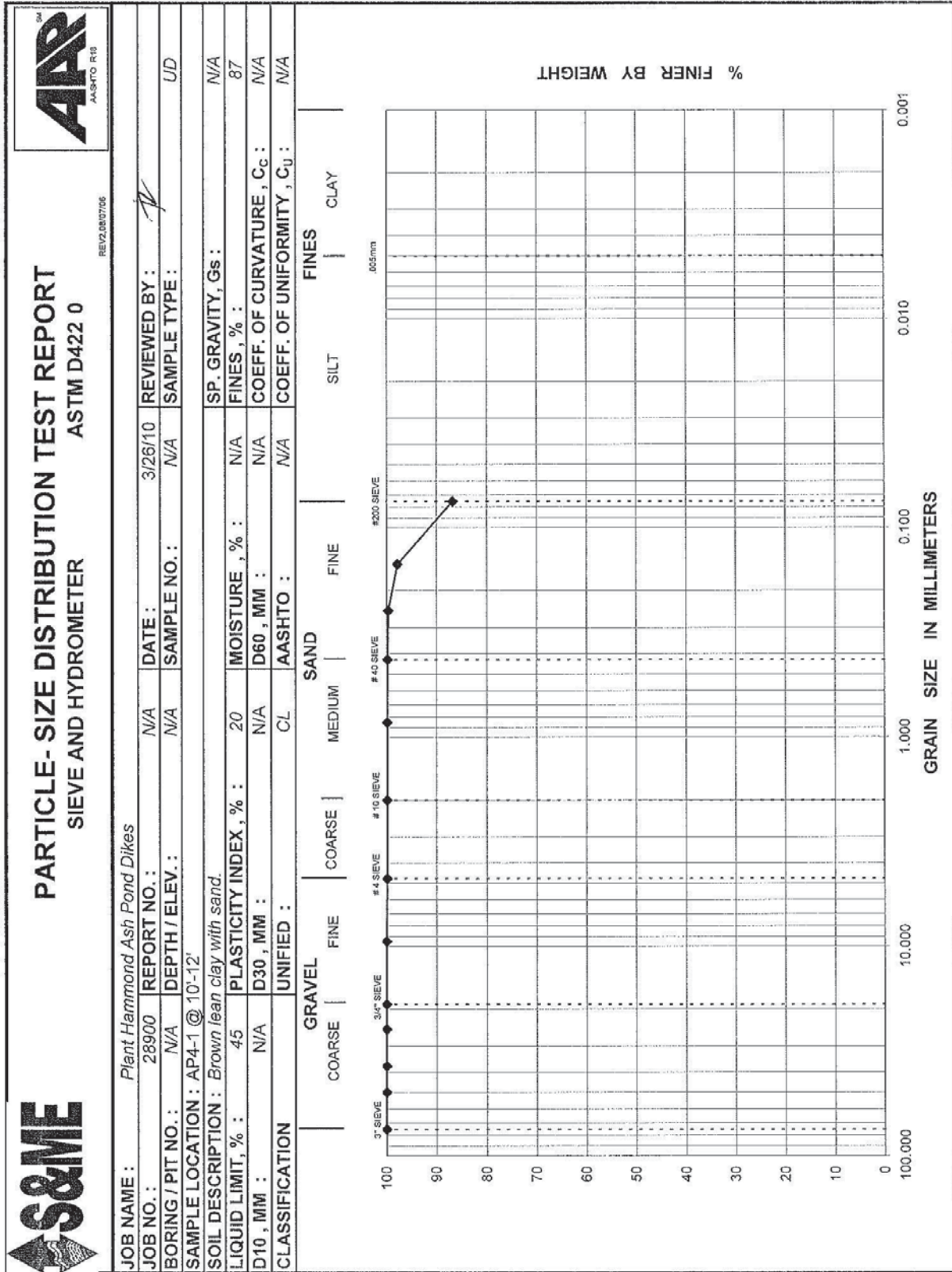
% MOISTURE AT WHICH SOIL CAN NO LONGER BE DEFORMED BY ROLLING INTO 3.2 MM (1/8 ") IN DIAMETER THREADS WITHOUT CRUMBLING

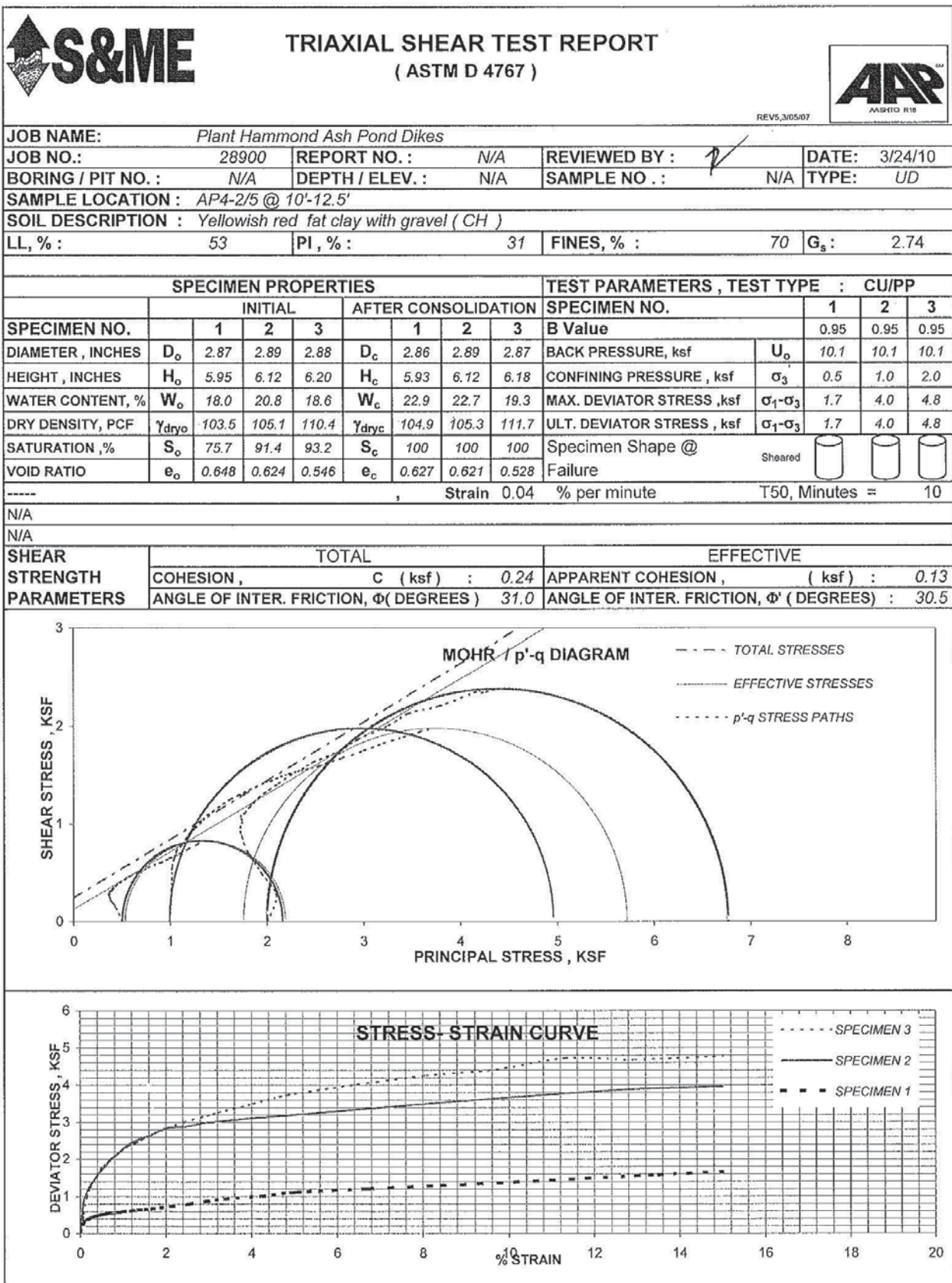
TEST NO. :	1	2	3	4	5
CONTAINER NO.	28	53			
WT. WET SOIL + CAN (GRAMS)	28.13	26.55			
WT. DRY SOIL + CAN (GRAMS)	25.72	24.29			
WT. OF WATER (GRAMS)	2.41	2.26			
WT. OF CONTAINER (GRAMS)	16.08	15.49			
WT. OF DRY SOIL (GRAMS)	9.64	8.80			
WATER CONTENT, (%)	25.00	25.68			

PLASTICITY INDEX - THE RANGE OF % MOISTURE CONTENT OVER WHICH SOIL BEHAVES PLASTICALLY -

THE DIFFERENCE BETWEEN LIQUID LIMIT & PLASTIC LIMIT $PI = LL - PL$







S&ME		PARTICLE-SIZE DISTRIBUTION TEST REPORT				ASTM D422 0		REV 2.0 6/7/05		AAS-TO R15	
JOB NAME : Plant Hammond Ash Pond Dikes											
JOB NO. :	28900	REPORT NO. :	N/A	DATE :	3/26/10	REVIEWED BY :	7				
BORING / PIT NO. :	N/A	DEPTH / ELEV. :	N/A	SAMPLE NO. :	N/A	SAMPLE TYPE :	UD				
SAMPLE LOCATION : AP4-2 @ 10'-12'											
SOIL DESCRIPTION : Yellowish red, sandy fat clay with gravel.											
LIQUID LIMIT, % :	53	PLASTICITY INDEX, % :	31	MOISTURE, % :	N/A	SP. GRAVITY, G _s :	N/A				
D ₁₀ , MM :	N/A	D ₃₀ , MM :	N/A	D ₆₀ , MM :	N/A	COEFF. OF CURVATURE, C _c :	70				
UNIFIED :	CH	AASHTO :	N/A	COEFF. OF UNIFORMITY, C _u :	N/A						
CLASSIFICATION											
GRAVEL			SAND			SILT			FINES		
COARSE	FINE	COARSE	MEDIUM	FINE	COARSE	FINE	COARSE	FINE	COARSE	FINE	CLAY

GRAIN SIZE IN MILLIMETERS

% FINER BY WEIGHT

Grain Size (mm)	% Finer
3"	100
3/4"	100
#4	100
#10	95
#20	90
#40	85
#60	80
#100	75
#200	70
#425	70
#600	70
#840	70
#1060	70
#1490	70
#2000	70
#2800	70
#3550	70
#4750	70
#6300	70
#8500	70
#11200	70
#14900	70
#19750	70
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#6251750	70
#6475750	70
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#6935750	70
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		ATTERBERG LIMITS (ASTM D 4318)					
		REV. 5/10/05					
JOB NAME : Plant Hammond Ash Pond Dikes							
JOB NO. : 28900		REPORT NO. : -		DATE : 03/25/10		REVIEWED BY :	
BORING / PIT NO. : N/A		DEPTH / ELEV. : N/A		SAMPLE NO. : N/A		SAMPLE TYPE : UD	
SAMPLE LOCATION : AP4-2 @ 10'-12.5'							
SOIL DESCRIPTION : -							
LIQUID LIMIT , % : 53		PLASTIC LIMIT , % : 22		PLASTICITY INDEX , % : 31		MOISTURE , % : 18	
CLASSIFICATION :		UNIFIED : CH		AASHTO : -		FINES , % : 70	
LIQUID LIMIT , % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN LIQUID & PLASTIC STATES -- % MOISTURE AT WHICH SOIL FLOWS FOR A DISTANCE OF 13 MM (1/2 ") AT THE BASE OF GROOVE WHEN SUBJECTED TO 25 BLOWS							
TEST NO. :	1	2	3	4	5		
CONTAINER NO.	25	26	27	BRAND		MODEL	SERIAL
NUMBER OF BLOWS	33	26	14	BALANCE		PRECISA	2200 C
WT. WET SOIL + CAN (GRAMS)	28.47	29.15	29.20	LL MACHINE		HUMBOLT	1
WT. DRY SOIL + CAN (GRAMS)	24.04	24.66	24.33	BALANCE		OHAUS-3100 G	ARC120
WT. OF WATER (GRAMS)	4.43	4.49	4.87	OVEN		DESPATCH-3436	1650032533
WT. OF CONTAINER (GRAMS)	15.20	16.00	15.96				
WT. OF DRY SOIL (GRAMS)	8.84	8.66	8.37				
WATER CONTENT , (%)	50.11	51.85	58.18				
PLASTIC LIMIT , % MOISTURE AT THE ARBITRARY DEFINED BOUNDARY BETWEEN PLASTIC & BRITTLE STATES -- % MOISTURE AT WHICH SOIL CAN NO LONGER BE DEFORMED BY ROLLING INTO 3.2 MM (1/8") IN DIAMETER THREADS WITHOUT CRUMBLING							
TEST NO. :	1	2	3	4	5		
CONTAINER NO.	18	19					
WT. WET SOIL + CAN (GRAMS)	22.72	23.04					
WT. DRY SOIL + CAN (GRAMS)	21.37	21.64					
WT. OF WATER (GRAMS)	1.35	1.40					
WT. OF CONTAINER (GRAMS)	15.24	15.06					
WT. OF DRY SOIL (GRAMS)	6.13	6.58					
WATER CONTENT , (%)	22.02	21.28					
PLASTICITY INDEX - THE RANGE OF % MOISTURE CONTENT OVER WHICH SOIL BEHAVES PLASTICALLY - THE DIFFERENCE BETWEEN LIQUID LIMIT & PLASTIC LIMIT PI = LL - PL							

Attachment E

Groundwater Levels

Plant Hammond - Ash Ponds 1, 2, 3 and 4

Monthly Piezometer/Weir Measurement Log

[illegible]

NOTE: AP3-1/AP3-2/AP3-3 ABANDONED