REPORT OF GEOTECHNICAL INVESTIGATION

33.5-ACRE BORROW AREA
KINGSTON FOSSIL PLANT
KINGSTON, TENNESSEE

Prepared For:

TENNESSEE VALLEY AUTHORITY

Chattanooga, Tennessee

Prepared By:

MACTEC ENGINEERING AND CONSULTING, INC.

Knoxville, Tennessee

MACTEC Project 3043051064.02

April 4, 2006

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April 4, 2006

Mr. Ron Purkey
Tennessee Valley Authority
1101 Market Street, LP-2G
Chattanooga, TN 37402

Subject: **Report of Geotechnical Investigation**
33.5-Acre Borrow Area
TVA Kingston Fossil Plant
Kingston, Tennessee
MACTEC Project 3043051064.02

Dear Mr. Purkey:

We at MACTEC Engineering and Consulting, Inc., (MACTEC) are pleased to submit this Report of Geotechnical Investigation for your project. Our services, as authorized through TAO No. MAC-0738-00096, were provided in general accordance with our proposal number Prop05Knox/329, Revision 1, dated October 25, 2005.

This report reviews the information provided to us, discusses the site and subsurface conditions, and presents the results of our laboratory testing for the materials at the 33.5-Acre Borrow Area. The Appendices contain a brief description of the Field Exploratory Procedures, Observation Trench Logs, Photographs, the Laboratory Test Procedures, and the Laboratory Test Results.

We anticipate further dialog and interaction with the designers as the design proceeds and will be happy to provide any additional information or interpretation of the data presented here in which may be necessary.

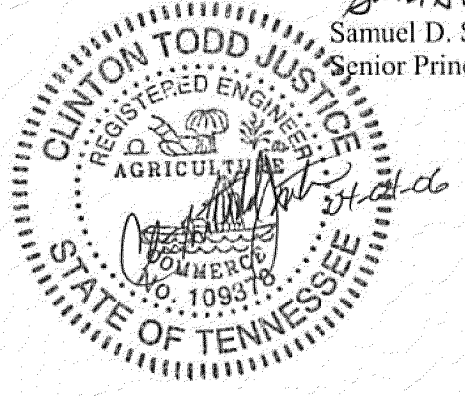
We will be pleased to discuss our data with you and would welcome the opportunity to provide the engineering and material testing services needed to successfully complete your project.

Sincerely,

MACTEC ENGINEERING AND CONSULTING, INC.

C. Todd Justice, P.E.
Project Engineer

Samuel D. Stone, P.E.
Senior Principal Engineer



CTJ/SDS:sjm

cc: Mr. Lynn Petty
TVA Chattanooga

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EXECUTIVE SUMMARY

MACTEC was selected by the Tennessee Valley Authority (TVA) to perform a geotechnical investigation for the KIF 33.5-Acre Borrow Area at the Kingston Fossil Plant in Kingston, Tennessee. The objectives of our exploration were to determine general subsurface conditions in the borrow area and to perform geotechnical laboratory testing in order to evaluate the engineering characteristics of the potential borrow soils.

The exploration consisted of excavating 11 observation trenches (OT-1 through OT-11) to depths varying from about 2 to 19 feet. The major findings of our geotechnical exploration are as follows:

- The observation trenches excavated in the KIF 33.5-Acre Borrow Area typically encountered residual soils underlying minor amounts of topsoil. The residuum typically consisted of elastic silt, fat clay and lean clays with varying amounts of roots, sand, and chert fragments. The observation trenches were terminated at depths varying from about 2 to 19 feet.

- Ground water was not encountered in the observation trenches during the time of our investigation. Long-term measurements for the presence or absence of ground water were not obtained during this exploration.

- Laboratory tests were performed on bulk soil samples obtained from all of the observation trenches excavated within the potential borrow area. A summary of the tests performed and the test results are presented in Section 3.0 and Section 7.0, respectively. The test results are presented in Appendix C and are summarized in Tables C-1 through C-6.

- Figures 5, 6, and 7 show graphical plots that can be used to assist the constructors in field control and quality assurance during the placement of the compacted engineered fill. Section 8.0 describes the procedures to implement the use of the graphical plots in the field.

This summary is only an overview and should not be used as a separate document or in place of reading the entire report, including the appendices.

1.0 INTRODUCTION

This report presents the findings of our subsurface exploration and laboratory testing recently performed for the KIF 33.5-Acre Borrow Area located at the TVA Kingston Fossil Plant. Our services were authorized by Mr. Ron Purkey of TVA.

2.0 OBJECTIVES OF EXPLORATION

The objectives of our exploration were to determine general subsurface conditions in the borrow area and to perform geotechnical laboratory testing in order to evaluate the engineering characteristics of the potential borrow soils. The results of the laboratory testing were used to develop graphical plots of compaction data points showing acceptable zones of hydraulic conductivity for the various soil types encountered (after Daniels). An assessment of site environmental conditions, or an assessment for the presence or absence of pollutants in the soil, bedrock, surface water, or ground water of the site was beyond the proposed objectives of our exploration.

3.0 SCOPE OF EXPLORATION

The scope of our exploration was based on our proposal number Prop05Knox/329 Revision 1, dated October 25, 2005 and the geotechnical scope of work outlined in the project's scope of work. It includes the following:

- Excavate 11observation trenches including logging the soil strata and collecting bulk samples within the KIF 33.5-Acre Borrow Area
- Locate each observation trench using GPS
- Conduct geotechnical laboratory testing on the potential borrow soils that include natural moisture content, Atterberg limits, grain size, specific gravity, moisture-density relationship (standard Proctor, modified Proctor, and reduced Proctor), and remolded permeability testing
- Develop moisture-density / hydraulic conductivity relationships for each soil type encountered
- Prepare a geotechnical report summarizing the field and laboratory test results with applicable recommendations

The field work was performed in accordance to the procedures included in Appendix A. The field work was performed on November 17 and 18, 2005. TVA provided the trackhoe equipment used to excavate 9 of the 11 observation trenches. The remaining two observation trenches, OT-10 and OT-11, were excavated by hand. A MACTEC geotechnical engineer was present to identify and log the various soil types encountered. Bulk soil samples were obtained of the soils excavated from the observation trenches. Photographs of the observation trenches and soils excavated from the trenches were made upon completion of sampling (see Appendix B). Upon completing the excavation of an observation trench, the trenches were backfilled with the excavated soils.

The bulk soil samples were transported to our laboratories in Charlotte, North Carolina where the soil samples were tested. The testing program for this project consisted of the following:

- 11 Plasticity Index (Atterberg Limits) Tests
- 11 Grain Size Distribution Tests
- 11 Natural Moisture Content Tests
- 11 Standard Proctor Compaction Tests
- 3 Modified Proctor Compaction Tests
- 3 Reduced Proctor Compaction Tests
- 11 Specific Gravity Tests
- 56 Hydraulic Conductivity Tests

Subsurface conditions encountered in the observation trenches are presented on the Observation Trench Logs in Appendix B. The laboratory test results are presented in Appendix C.

4.0 PROJECT INFORMATION AND SITE CONDITIONS

Project information was provided to MACTEC by TVA and Parsons E&C (PEC) in the form of a Geotechnical Investigation Scope of Work and a proposed Observation Trench location plan. The investigation was performed at the KIF 33.5-Acre Borrow Area. The KIF 33.5-Acre Borrow Area is located east of the proposed Gypsum Disposal Area and is shown in Figure 1- Site Location Map.

5.0 AREA AND SITE GEOLOGY

Kingston, Tennessee, is located in the Appalachian Valley and Ridge Physiographic Province. This province extends as a continuous belt from central Alabama, through Georgia and Tennessee,

northward into Pennsylvania. The formations that underlie this province consist primarily of limestone, dolostone, shale, and sandstone, which have been folded and faulted in the geologic past. These formations range in age from Cambrian to Pennsylvanian and have been subject to at least one extensive period of erosion since their structural deformation. The erosion has produced a series of subparallel, alternating ridges and valleys. The valleys are formed over more soluble bedrock (interbedded limestone and limestone), whereas bedrock more resistant to solution weathering forms ridges (sandstone, shale, and cherty dolostone).

In particular, the site is geologically mapped to be underlain by the Knox Group. The Knox Group is mainly composed of light gray to dark gray and olive-gray, siliceous dolomite with a few limestone layers in the upper part. The rock usually weathers to a reddish orange to reddish brown residuum containing varying amounts of sand and chert fragments.

6.0 SUBSURFACE CONDITIONS

Subsurface conditions were explored with 11 observation trenches excavated in general accordance with the procedures presented in Appendix A. The trench locations were selected by TVA and PEC. The trench locations were located by GPS by the MACTEC geotechnical engineer. The GPS coordinates are shown on the Observation Trench Logs. The trench locations are shown on Figure 2 - Observation Trench Location Plan.

Subsurface conditions encountered at the test locations are shown on the Observation Trench Logs. These logs represent our interpretation of the subsurface conditions, based on observations of the materials exposed in the trenches by our geotechnical engineer. The depth intervals designating the interfaces between various strata on the logs represent the approximate interface locations.

The observation trenches excavated at this site typically encountered topsoil and residual soils. However, a thin interval of fill soil was observed in OT-7 from about 0.5 to 3 feet (see Observation Trench Logs, Appendix B). Topsoil is the dark-colored organic soil that forms naturally at the ground surface. Residual soils are soils that have developed from the in-place weathering of the underlying parent bedrock. Fill soils are soils that have been transported to their present location by man. The observation trenches that were excavated with the trackhoe were terminated at depths varying from about 9.5 (OT-2 and OT-9) to 19 feet (OT-1, OT-4, OT-5, and OT-8), while the hand excavated trenches were terminated at depths of 2 (OT-10) and 2.5 feet (OT-11).

Topsoil was encountered in all of the observation trenches from depths of about 0.2 feet (OT-5) to about 1.5 feet (OT-4), with large diameter roots (up to ¾-inch) extending to depths of about 2.5 feet. Elastic silt, lean clay, and fat clay residuum was typically encountered underlying the topsoil to termination depths. The percentage of chert observed within the excavated soils was visually estimated and noted on the observation trench logs. Refer to the Observation Trench Logs in Appendix B for detailed descriptions of the soils encountered at each trench location.

7.0 LABORATORY TESTING METHODOLOGY AND DISCUSSION OF TEST RESULTS

Initial laboratory testing performed on the bulk soil samples obtained from each of the 11 observation trenches included the following:

- 1 natural moisture content
- 1 Plasticity Index (Atterberg Limits) Test
- 1 Grain Size Distribution Test
- 1 Specific Gravity Test
- 1 Standard Proctor Compaction Test
- 1 Remolded Hydraulic Conductivity Test

The initial laboratory testing was performed in order to classify the various soil types sampled across the borrow area, to obtain data regarding moisture-density relationships, and to determine the hydraulic conductivity characteristics of the soils. The data obtained from the standard Proctor compaction tests were used to prepare remolded specimens at relative compactions of 95 percent standard Proctor maximum dry density at moisture contents of +2 percent of optimum. The remolded specimens were then subjected to laboratory hydraulic conductivity testing. Table C-1 summarizes the results of the index property and moisture-density test results, while Table C-3 summarizes the results of the initial hydraulic conductivity testing.

Geotechnical laboratory classification testing of the bulk soil samples led to the identification of three distinct soil types based on the Unified Soil Classification System (USCS). The three soil types are designated as "MH", "CH", and "CL" based on their USCS classifications. Soil type MH (observed in OT-1, OT-2, OT-3, OT-4, OT-5, OT-7, and OT-8) consists of reddish brown, reddish orange, light orange brown, and brown elastic silt with varying amounts of sand and chert fragments. Soil type CH (observed in OT-9) consists of reddish orange fat clay with varying amounts of sand and chert fragments. Soil type CL (observed in OT-6, OT-10, and OT-11)

consists of light orange brown, tan, and light brown lean clay with varying amounts of sand and chert fragments.

Representative bulk soil samples of each soil type were selected from OT-4 (MH), OT-9 (CH), and OT-11 (CL) and were subjected to additional laboratory testing to develop moisture-density / hydraulic conductivity relationships for each soil type. The additional laboratory testing performed on each representative soil type included the following:

- 1 Reduced Proctor Compaction Test
- 1 Modified Proctor Compaction Test
- 15 Remolded Hydraulic Conductivity Tests

The reduced, standard, and modified Proctor compaction curves developed for the three soil types are shown in Figures 3A, 3B, and 3C. Exactly 5 different specimens (shown as compaction points on the curves) were compacted with each effort. Specimens remolded to these compaction conditions (dry density versus moisture content) were subjected to hydraulic conductivity testing. The results of the additional moisture-density laboratory testing are summarized in Table C-2, while the results of the hydraulic conductivity laboratory testing are shown in Tables C-4, C-5, and C-6. Figures 4A, 4B, and 4C show the relationship between hydraulic conductivity and molding moisture content for each of the representative soil types, respectively. Final graphical plots (Figures 5, 6, and 7), showing the compaction data points, were constructed in order to create an "acceptable zone" which includes data points for specimens with hydraulic conductivity values less than or equal to 1×10^{-6} cm/s.

The laboratory tests and test results are summarized below in the following paragraphs.

7.1 INDEX PROPERTIES

Natural moisture content, Atterberg limits, specific gravity, and grain size analysis tests were performed on the bulk samples obtained from the potential borrow soils at all 11 trench locations.

Natural moisture contents of the tested samples ranged from 11.3 percent (OT-10) to 32.2 percent boring (OT-7).

The Atterberg limits test results indicated that liquid limits for the on-site borrow soils tested ranged from 30 to 67, plastic limits ranged from 19 to 41, and plasticity indices ranged from 11 to 31. The tested on-site borrow soils were classified as MH, CL, and CH in accordance with the USCS. Refer to Table C-1 for the Index property test results.

The specific gravity of the tested samples ranged from 2.67 to 2.83.

7.2 MOISTURE-DENSITY RELATIONSHIP

Standard Proctor compaction tests were performed on bulk samples obtained from all 11 trench locations. The test results indicated that the standard Proctor maximum dry density for the soils tested ranged from 86.8 to 110.2 pcf, and the corresponding optimum moisture contents were 32.4 and 16.5, respectively.

Modified and reduced Proctor compaction tests were also performed on bulk samples of representative soils obtained from trench locations OT-4, OT-9, and OT-11. The test results indicated that the modified Proctor maximum dry density for the soils tested ranged from 107.4 to 119.0 pcf, and the corresponding optimum moisture contents were 17.8 and 13.6, respectively. The reduced Proctor maximum dry density for the soils tested ranged from 86.8 to 102.5 pcf, and the corresponding optimum moisture contents were 29.9 and 19.2, respectively. Refer to tables C-1 and C-2 for the moisture-density test results.

7.3 HYDRAULIC CONDUCTIVITY

Constant head permeability tests were performed on remolded bulk soil samples obtained from all 11 trench locations. The samples were remolded to at or near 95 percent of the standard Proctor maximum dry density and at or near +2 percent of optimum moisture content for a total of 11 tests. The permeability test results indicated that the permeability's ranged from 6.5×10^{-7} cm/s to 4.4×10^{-8} cm/s. Refer to Table C-3 for the hydraulic conductivity test results.

Additional permeability tests were performed on bulk soil samples of the representative soil types (MH, CH, and CL) obtained from trench locations OT-4, OT-9, and OT-11. Permeability tests were performed on specimens remolded to the compaction conditions (dry density versus molding moisture content) developed along the 5-point compaction curves (modified, standard, and reduced Proctors). A total of 45 additional permeability tests were performed. The additional permeability

test results indicated that the permeabilities ranged from 2.8 x 10^{-5} cm/s to 6.7 x 10^{-8} cm/s. Refer to tables C-4, C-5, and C-6 for the results of the hydraulic conductivity testing performed on the representative soil types.

8.0 RECOMMENDATIONS

The laboratory testing program just described was used to develop the graphical plots shown in Figures 5, 6, and 7. These graphical plots show compaction data points with respect to an "Acceptable Zone" which includes data points for specimens with hydraulic conductivity values approximately less than or equal to 1 x 10^{-6} cm/s. The lower limit of the Acceptable Zone is typically parallel to the zero air voids curve. Figures 5, 6, and 7 utilize an approximated specified degree of saturation as the lower boundary of the Acceptable Zone.

The graphical plots can be used to assist the constructors in field control and quality assurance during the placement of the compacted engineered fill. In order to implement the use of the graphical plots in the field, the soil technicians will have to first classify the soil types. Classification based on visual observations may not be conclusive, therefore one-point standard Proctor compaction tests can be occasionally performed in the field to aid in identification of questionable materials. After the materials have been placed and compacted in lifts, the technicians then measure the in-place dry density and moisture content in the field. The field dry density-moisture content point is then plotted on the appropriate graphical plot (Figures 5, 6, or 7). If the field measured dry density value exceeds the minimum required dry density (falls within the acceptable zone) then no further action is needed. If the field measured dry density was less than the minimum required dry density, then additional compaction is performed until the field measured dry density exceeds the minimum required value.

9.0 BASIS OF RESULTS

The results and recommendations provided herein are based on the encountered subsurface conditions and laboratory testing related to the specific project and site discussed in this report.

Regardless of the thoroughness of a field exploration, there is always a possibility that conditions between test locations will differ from those at specific test locations, and that conditions may not be anticipated. In addition, interpretation of the data is critical to the intended design and/or analysis. Therefore, experienced geotechnical engineers should interpret the field data and review

any site-specific analysis or design that incorporates the field data. We recommend that TVA retain MACTEC to provide this service, based upon our familiarity with the subsurface conditions, the field and laboratory data, and our geotechnical experience.

Our exploration services include storing the collected samples and making them available for inspection for a period of 30 days. The samples are then discarded unless you request otherwise.

TABLES

TABLE C-1
Index Property and Moisture-Density Test Results
TVA Kingston 33.5-Acre Borrow Area
MACTEC Project 3043051064/02

			Atterberg Limits						Compaction Tests	
Test Location Number	Sample Depth (Feet)	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Percent Finer Than No. 200 Sieve	USCS Classification	Specific Gravity	Standard Proctor Max. Dry Density, pcf	Optimum Moisture Content, %
OT-1	2.5 - 9	23.2	50	32	18	80.4	MH	2.71	97.1	23.2
OT-2	2.5 - 9	26.0	60	33	27	58.7	MH	2.73	91.7	26.6
OT-3	10 - 18.5	30.0	66	41	25	78.0	MH	2.81	89.8	29.4
OT-4	2.5 - 10	31.0	67	36	31	79.6	MH	2.83	87.9	28.6
OT-5	2 - 10	24.4	53	32	21	72.6	MH	2.75	98.0	24.2
OT-6	2.5 - 10	15.0	31	19	12	64.0	CL	2.69	110.2	16.5
OT-7	4 - 8	32.2	67	40	27	88.2	MH	2.75	86.8	32.4
OT-8	2 - 9.5	30.1	65	34	31	80.4	MH	2.69	97.7	22.4
OT-9	2 - 9.5	20.3	50	28	22	66.6	CH	2.72	97.7	22.4
OT-10	0.8 - 2	11.3	30	19	11	56.1	CL	2.67	106.7	16.3
OT-11	1.5 - 2.5	15.0	34	22	12	76.1	CL	2.68	106.2	18.0

Prepared/Date: CTJ 02/24/06
Checked/Date: SDS 04/03/06

TABLE C-2

Index Property and Additional Moisture-Density Test Results of Representative Soil Types - MH, CH, and CL

TVA Kingston 33.5-Acre Borrow Area

MACTEC Project 3043051064/02

			Atterberg Limits					Compaction Tests					
Test Location Number	Sample Depth (Feet)	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Percent Finer Than No. 200 Sieve	USCS Classification	Standard Proctor Max. Dry Density, pcf	Opt. Moisture Content, %	Modified Proctor Max. Dry Density, pcf	Opt. Moisture Content, %	Reduced* Proctor Max. Dry Density, pcf	Opt. Moisture Content, %
OT-4	2.5 - 10	31.0	67	36	31	79.6	MH	87.9	28.6	107.4	17.8	86.8	29.9
OT-9	2 - 9.5	20.3	50	28	22	66.6	CH	97.7	22.4	109.4	17.0	95.4	25.7
OT-11	1.5 - 2.5	15.0	34	22	12	76.1	CL	106.2	18.0	119.0	13.6	102.5	19.2

* The Reduced Proctor laboratory procedure follows the procedures for the standard Proctor except that 15 drops of the hammer per lift are used rather than the usual 25 drops.

Prepared/Date: CTJ 02/24/06

Checked/Date: SDS 04/03/06

TABLE C-3
Hydraulic Conductivity Laboratory Test Results of Borrow Soils
TVA Kingston 33.5-Acre Borrow Area
MACTEC Project 3043051064/02

Test Location Number	Sample Depth (Feet)	Sample Type	USCS Classification	Remolded Moisture Content (%)	Dry Density (pcf)	Effective Confining Pressure (psi)	Hydraulic Conductivity (cm/sec)
OT-1	2.5 - 9	Bulk	MH	25.6	91.7	5.0	3.1×10^{-7}
OT-2	2.5 - 9	Bulk	MH	28.5	87.5	5.0	3.1×10^{-7}
OT-3	10 - 18.5	Bulk	MH	31.6	85.0	5.0	5.8×10^{-7}
OT-4	2.5 - 10	Bulk	MH	30.8	83.9	5.0	1.0×10^{-7}
OT-5	2 - 10	Bulk	MH	26.3	93.1	5.0	2.1×10^{-7}
OT-6	2.5 - 10	Bulk	CL	18.1	105.2	5.0	6.5×10^{-7}
OT-7	2.5 - 10	Bulk	MH	34.0	82.7	5.0	4.4×10^{-8}
OT-8	2 - 10	Bulk	MH	32.1	84.2	5.0	3.6×10^{-7}
OT-9	2.5 - 10	Bulk	CL	24.7	93.3	5.0	8.3×10^{-8}
OT-10	4 - 8	Bulk	MH	18.5	101.9	5.0	1.5×10^{-7}
OT-11	2 - 9.5	Bulk	MH	20.6	101.1	5.0	5.5×10^{-8}

Note: Bulk soil samples were remolded to approximately 95% of their respective standard Proctor maximum dry densities and 2% over optimum moisture content.

Prepared/Date: CTJ 03/30/06
Checked/Date: SDS 04/03/06

Table C-4
Hydraulic Conductivity Test Results of Representative Soil Classification Type - "MH"
TVA Kingston 33.5-Acre Borrow Area
MACTEC Project 3043051064/02

Proctor	Point	Moisture (%)	Dry Unit wt (pcf)	Hydraulic Conductivity (cm/sec)
Modified	1	12.7	104.5	1.1×10^{-6}
	2	14.5	106.0	5.3×10^{-7}
	3	16.3	106.8	4.2×10^{-7}
	4	18.3	106.9	3.7×10^{-7}
	5	19.7	104.2	9.2×10^{-8}
Standard	1	24.2	84.6	2.9×10^{-6}
	2	26.7	86.7	4.5×10^{-7}
	3	28.4	87.8	1.6×10^{-7}
	4	29.8	87.4	1.3×10^{-7}
	5	32.5	85.8	1.5×10^{-7}
Reduced	1	25.3	84.8	8.0×10^{-7}
	2	27.8	86.0	3.9×10^{-7}
	3	28.9	86.9	1.3×10^{-7}
	4	32.1	86.0	2.7×10^{-7}
	5	34.2	83.7	8.7×10^{-8}

Note: "MH" soil samples obtained from OT-4 at depths of 2.5 to 10 feet

Prepared By: CTJ 03/28/06
Checked By: SDS 04/03/06

Table C-5
Hydraulic Conductivity Test Results of Representative Soil Classification Type -"CH"
TVA Kingston 33.5-Acre Borrow Area
MACTEC Project 3043051064/02

Proctor	Point	Moisture (%)	Dry Unit wt (pcf)	Hydraulic Conductivity (cm/sec)
Modified	1	11.7	103.9	7.1×10^{-6}
	2	13.8	106.7	2.0×10^{-6}
	3	15.7	109.2	6.2×10^{-7}
	4	17.3	109.6	8.1×10^{-8}
	5	19.2	108.1	8.8×10^{-8}
Standard	1	17.4	93.0	2.8×10^{-5}
	2	19.5	95.8	1.4×10^{-6}
	3	21.0	97.3	1.3×10^{-6}
	4	23.3	97.6	9.5×10^{-7}
	5	25.0	95.8	2.4×10^{-7}
Reduced	1	20.4	89.8	2.1×10^{-5}
	2	22.3	93.2	1.3×10^{-5}
	3	24.0	94.4	3.7×10^{-6}
	4	25.6	95.5	9.2×10^{-7}
	5	28.3	92.0	1.9×10^{-7}

Note: "CH" soil samples obtained from OT-9 at depths of 2 to 9.5 feet.

Prepared By: CTJ 03/28/06
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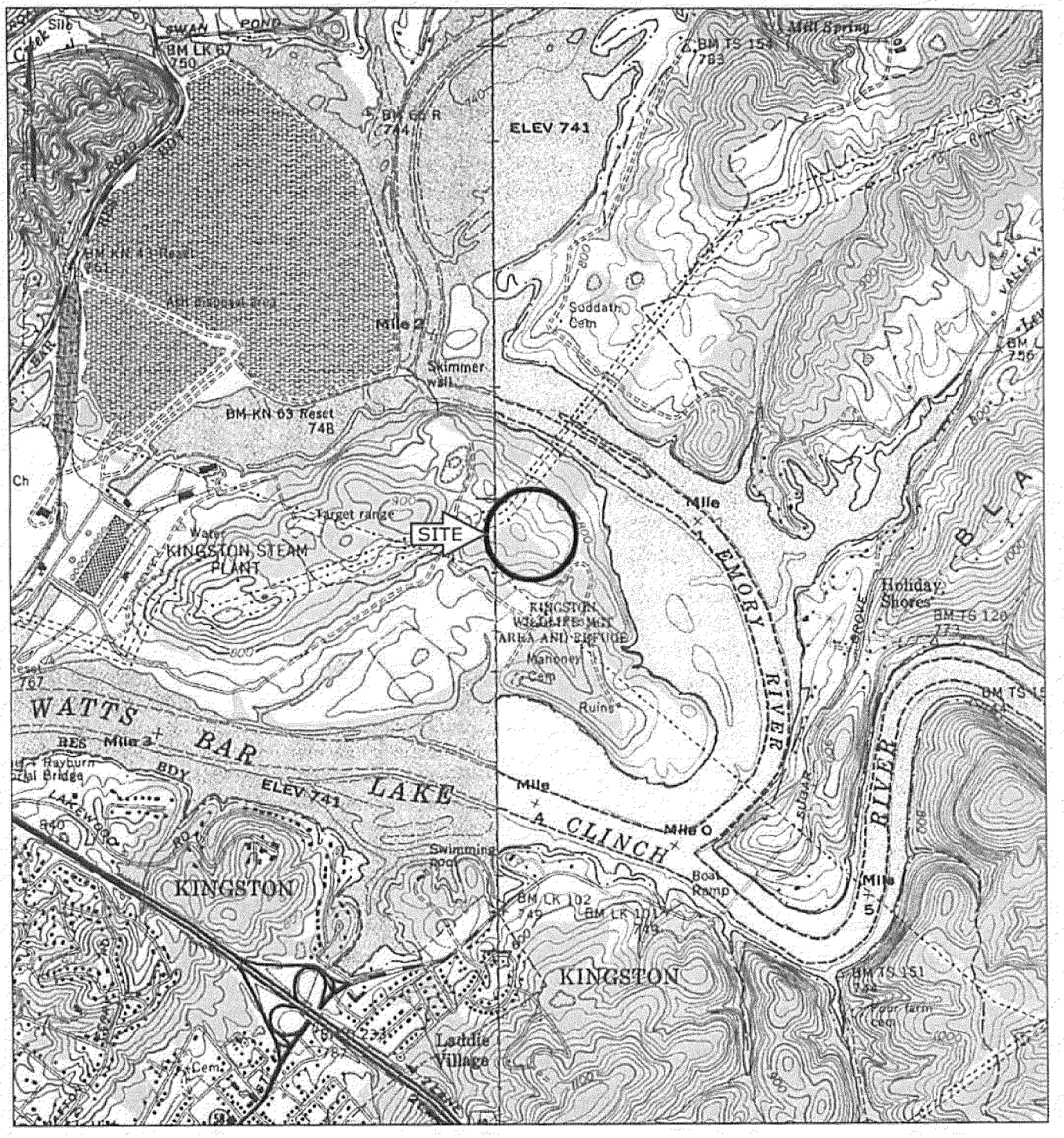
Table C-6
Hydraulic Conductivity Test Results of Representative Soil Classification Type - "CL"
TVA Kingston 33.5-Acre Borrow Area
MACTEC Project 3043051064/02

Proctor	Point	Moisture (%)	Dry Unit wt (pcf)	Hydraulic Conductivity (cm/sec)
Modified	1	11.5	117.3	1.5×10^{-7}
	2	13.1	118.9	6.7×10^{-8}
	3	15.3	114.5	7.7×10^{-8}
	4	16.8	110.5	6.7×10^{-8}
	5	19.0	108.0	1.2×10^{-7}
Standard	1	12.6	100.4	2.6×10^{-5}
	2	15.0	104.5	2.9×10^{-6}
	3	16.6	105.6	5.7×10^{-7}
	4	18.4	105.5	3.9×10^{-7}
	5	20.3	102.8	1.3×10^{-7}
Reduced	1	13.5	97.4	6.9×10^{-6}
	2	15.6	99.5	4.0×10^{-6}
	3	17.7	102.0	2.8×10^{-6}
	4	19.2	102.8	2.8×10^{-7}
	5	21.5	100.4	2.3×10^{-7}

Note: "CL" soil samples obtained from OT-11 at depths of 1.5 to 2 feet.

Prepared By: CTJ 03/28/06
Checked By: SDS 04/03/06

FIGURES



SOURCE: USGS TOPOGRAPHIC MAPS OF HARRIMAN AND ELVERTON, TN QUADRANGLES

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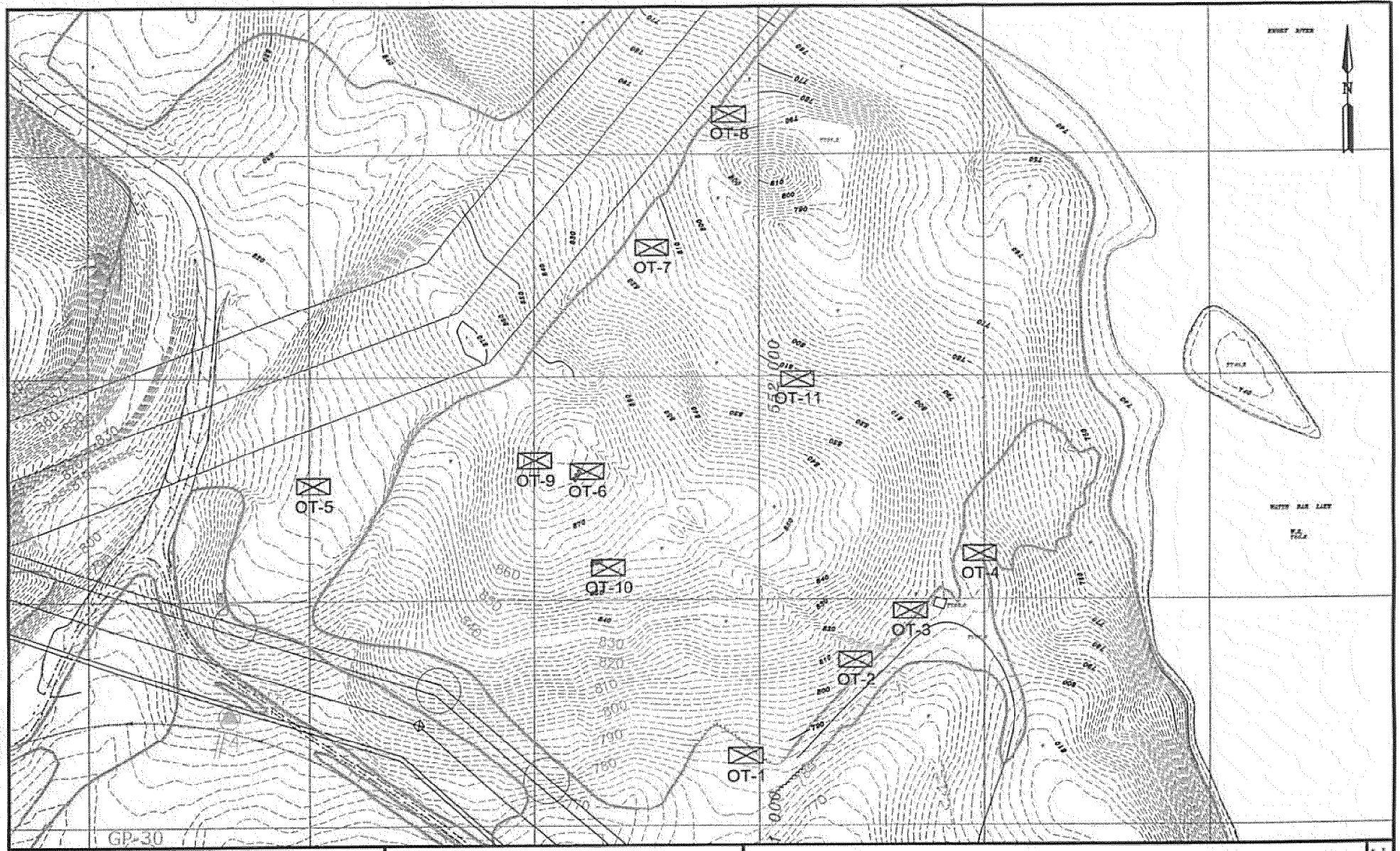
FIGURE 1: SITE LOCATION MAP
PROPOSED TVA KIF 33.5 ACRE BORROW AREA
KINGSTON, TENNESSEE

DRAFTING BY:	PREPARED BY: CTA	CHECKED BY:
JOB NUMBER: 3043051064/0002	DATE: DECEMBER 22, 2005	SCALE: 0 2000'

COORDINATES: N 35°53'39" W 84°31'13"

3043051064_02_FIG1.dwg Thu, 22 Dec 2005 - 3:59pm REVERENC



LEGEND

OT-1 ⊠ OBSERVATION TRENCH TEST LOCATION AND IDENTIFICATION

MACTEC

MACTEC Engineering and Consulting, Inc.
1725 Louisville Drive
Knoxville, Tennessee 37921-5904
865-588-8544 • Fax: 865-588-8026

FIGURE 2: OBSERVATION TRENCH TEST LOCATION PLAN TVA KINGSTON 33.5-ACRE BORROW AREA KINGSTON, TENNESSEE

DRAFTING BY:	PREPARED BY: CTJ	CHECKED BY: AD
JOB NUMBER: 3043051064/0002	DATE: DECEMBER 22, 2005	SCALE: 0 300'

COORDINATES: N 35°53'39" W 84°31'13"

3043051064_02_FIG2.dwg Fri, 23 Dec 2005 - 11:52am REVERENC

TVA-00008603

Soil Classification Type "MH" - Brown to Reddish Brown elastic SILT with sand and a few chert fragments

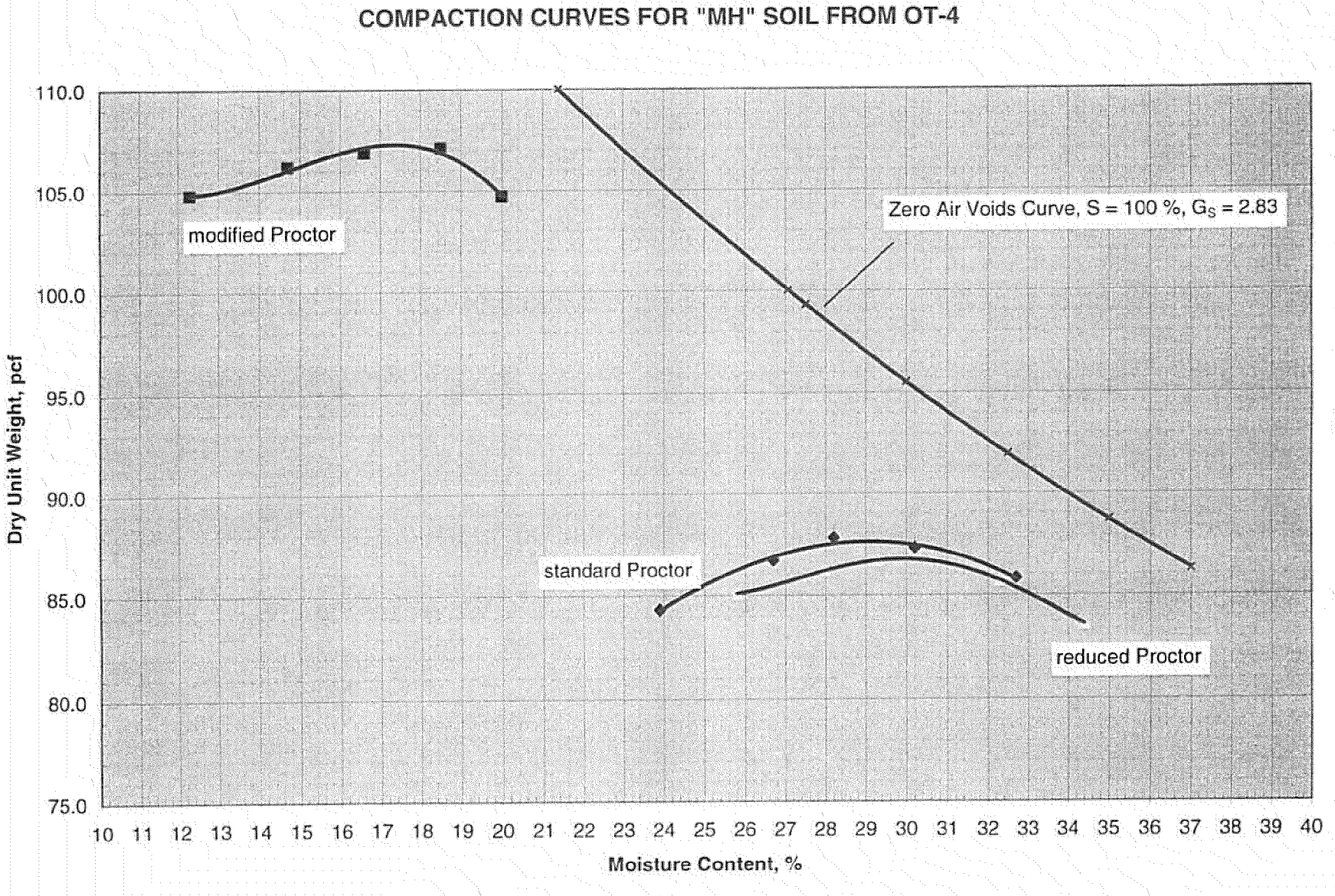


Figure 3A- Compaction Curves for Soil Classification Type "MH" from OT-4

Soil Classification Type "CH" - Reddish Orange sandy fat CLAY with chert fragments

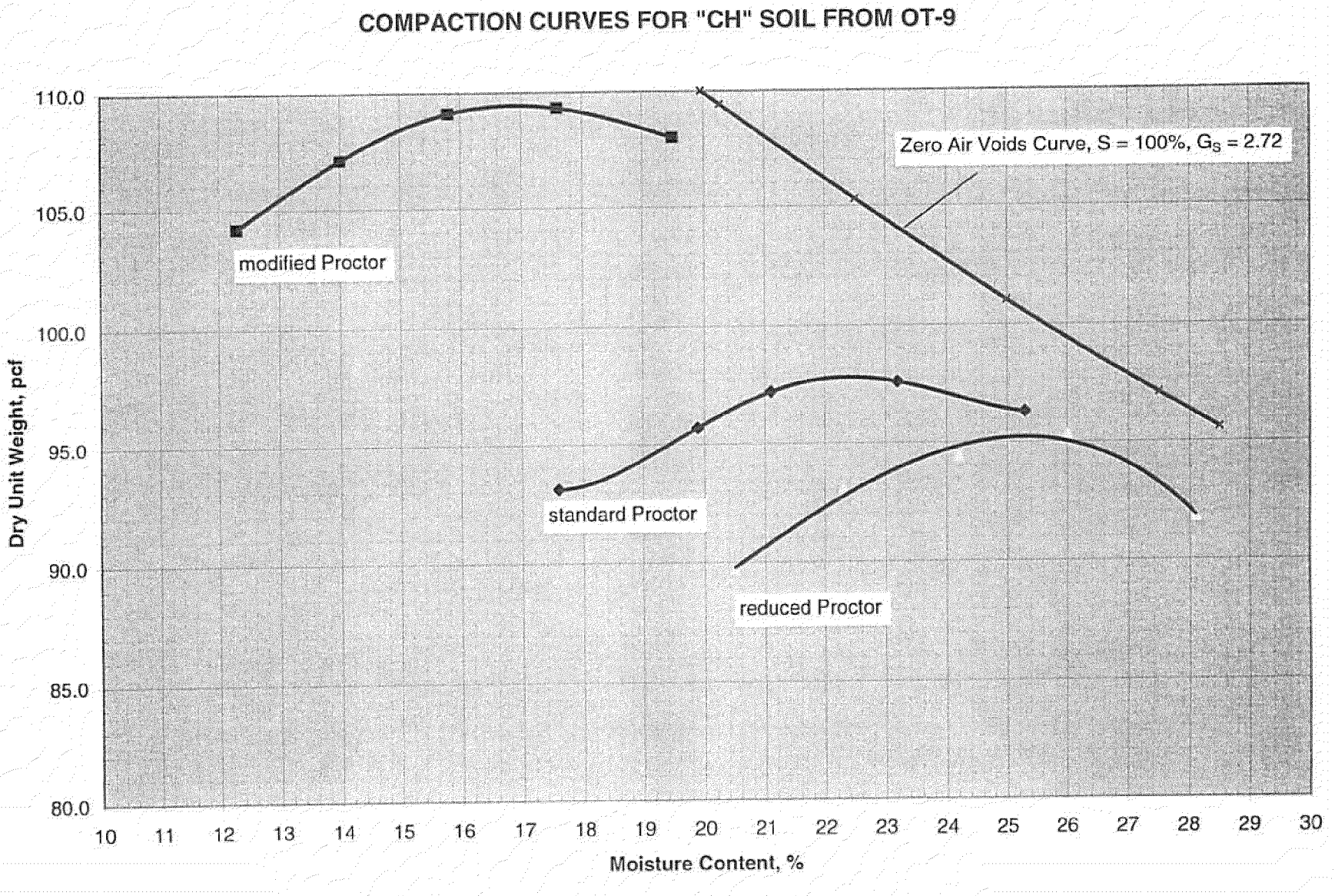


Figure 3B- Compaction Curves for Soil Classification Type "CH" from OT-9

Soil Classification Type "CL" - Light Brown lean CLAY with sand

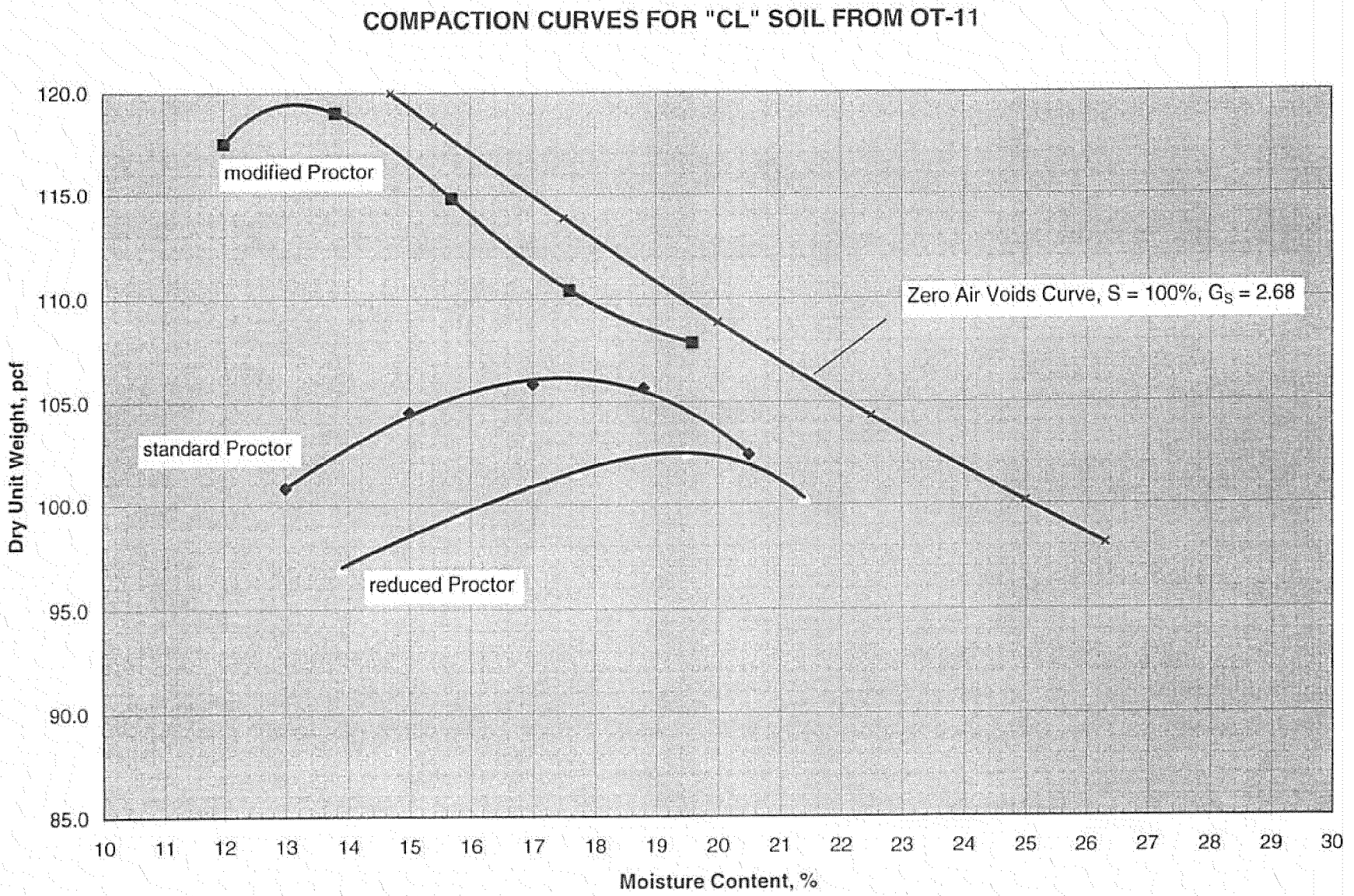


Figure 3C- Compaction Curves for Soil Classification Type "CL" from OT-11.

Soil Classification Type "MH" - Brown to Reddish Brown elastic SILT with sand and a few chert fragments

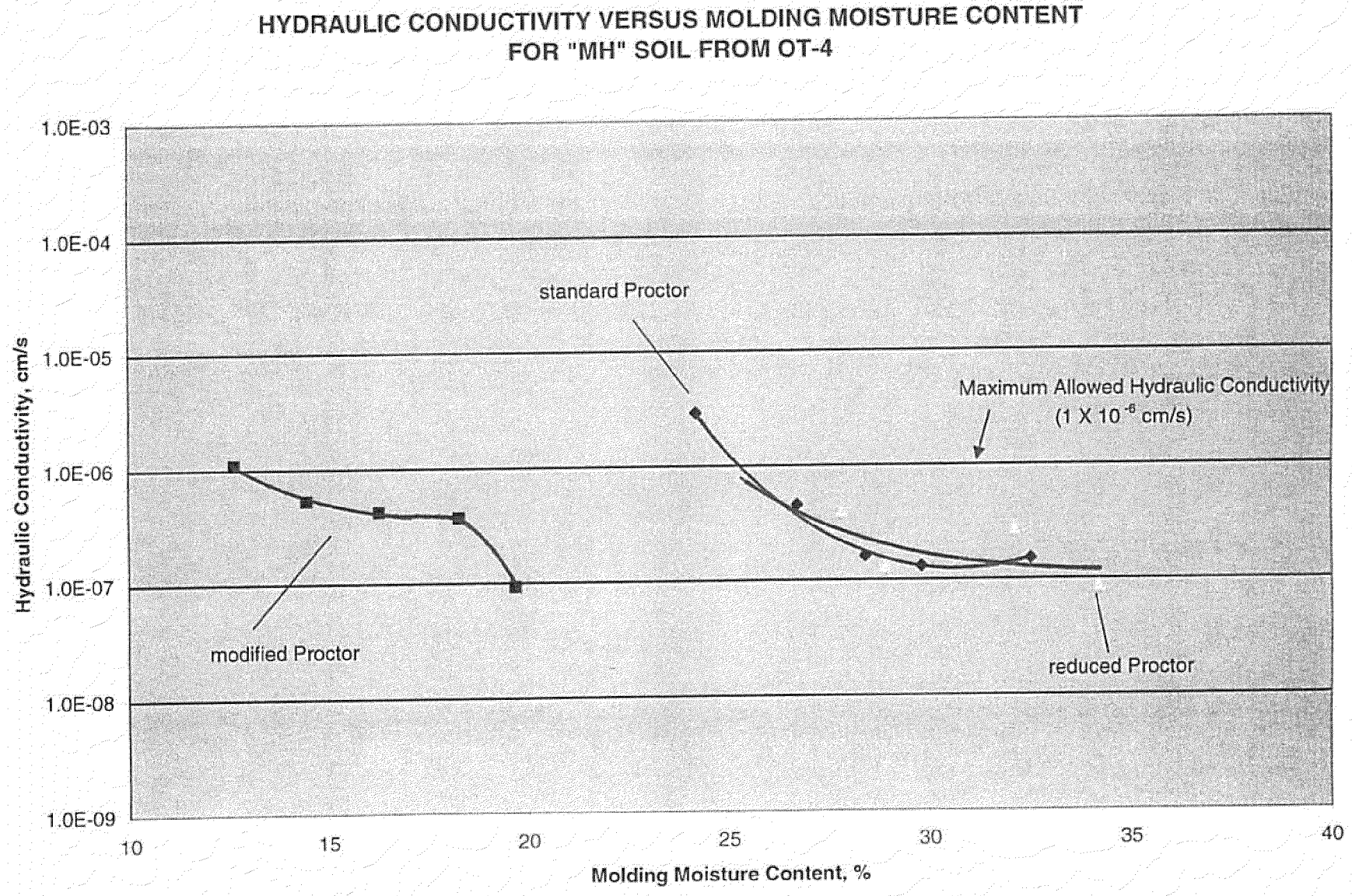


Figure 4A- Hydraulic Conductivity versus Molding Moisture Content for "MH" Soil from OT-4

Soil Classification Type "CH" - Reddish Orange sandy fat CLAY with chert fragments

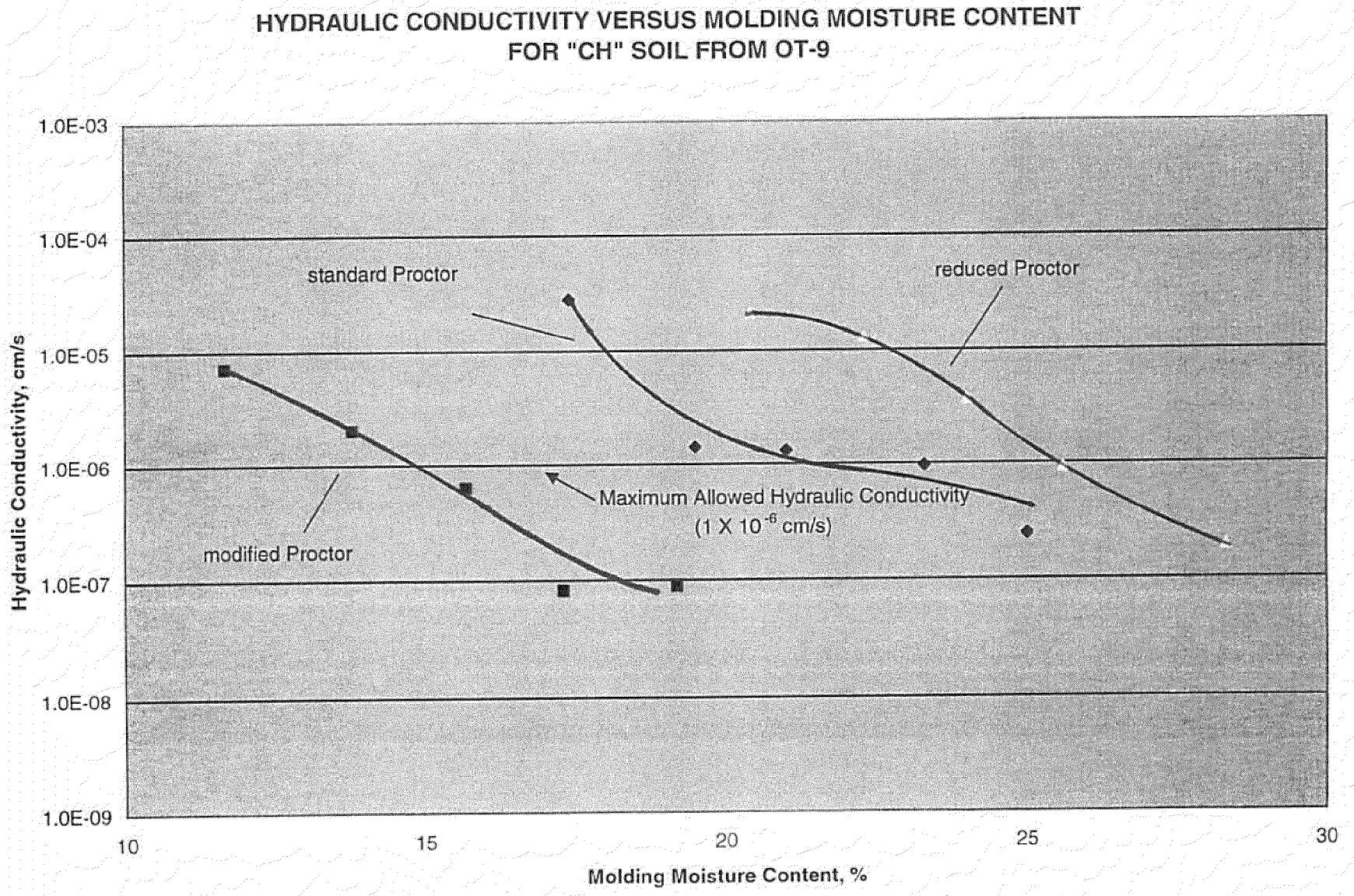


Figure 4B- Hydraulic Conductivity versus Molding Moisture Content for "CH" Soil from OT-9

Soil Classification Type "CL" - Light Brown lean CLAY with sand

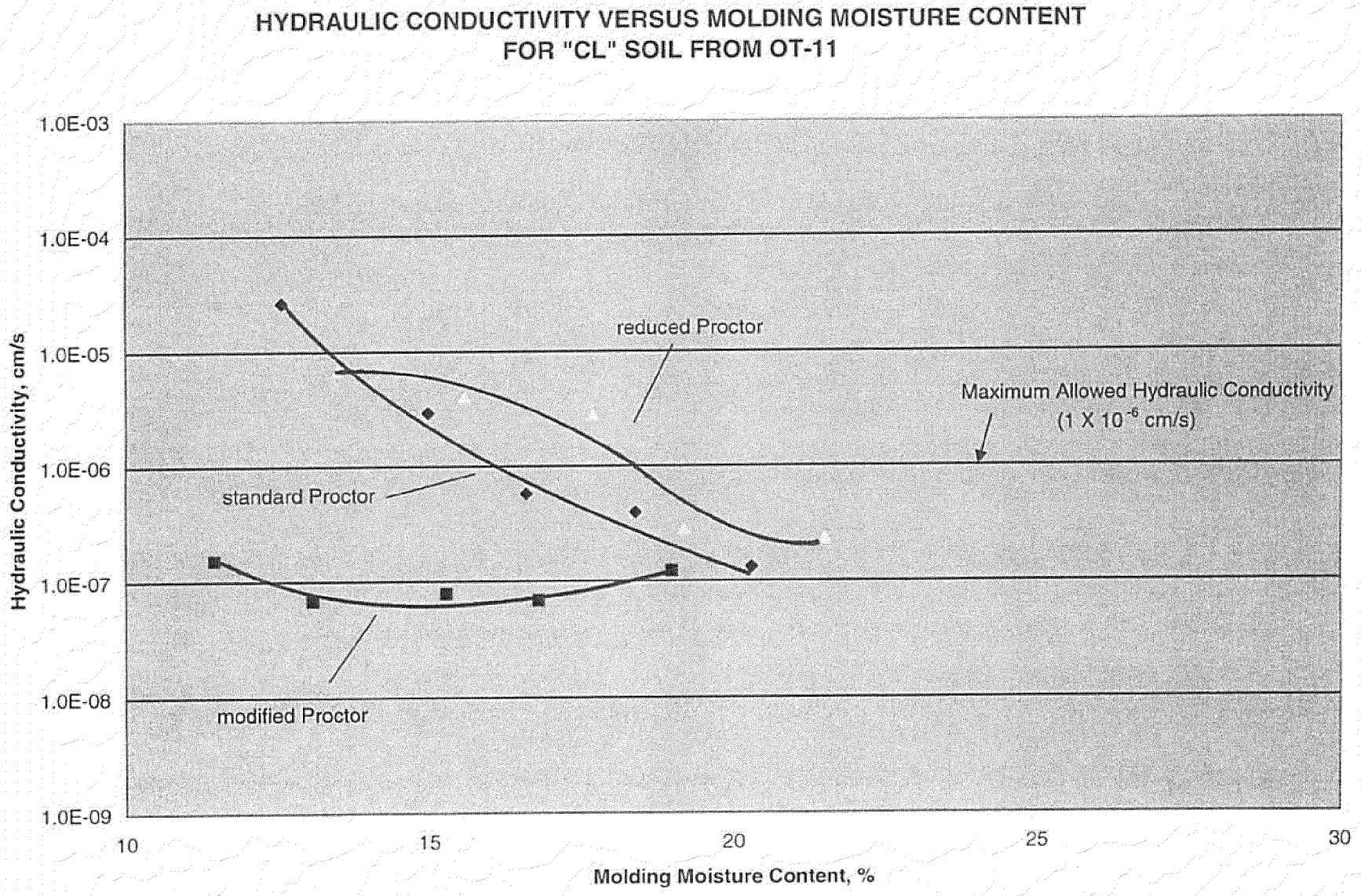


Figure 4C- Hydraulic Conductivity versus Molding Moisture Content for "CL" Soil from OT-11

Soil Classification Type "MH" - Brown to Reddish Brown elastic SILT with sand and a few chert fragments

COMPACTION DATA POINTS SHOWING ACCEPTABLE ZONE OF HYDRAULIC CONDUCTIVITY FOR "MH" SOIL FROM OT-4

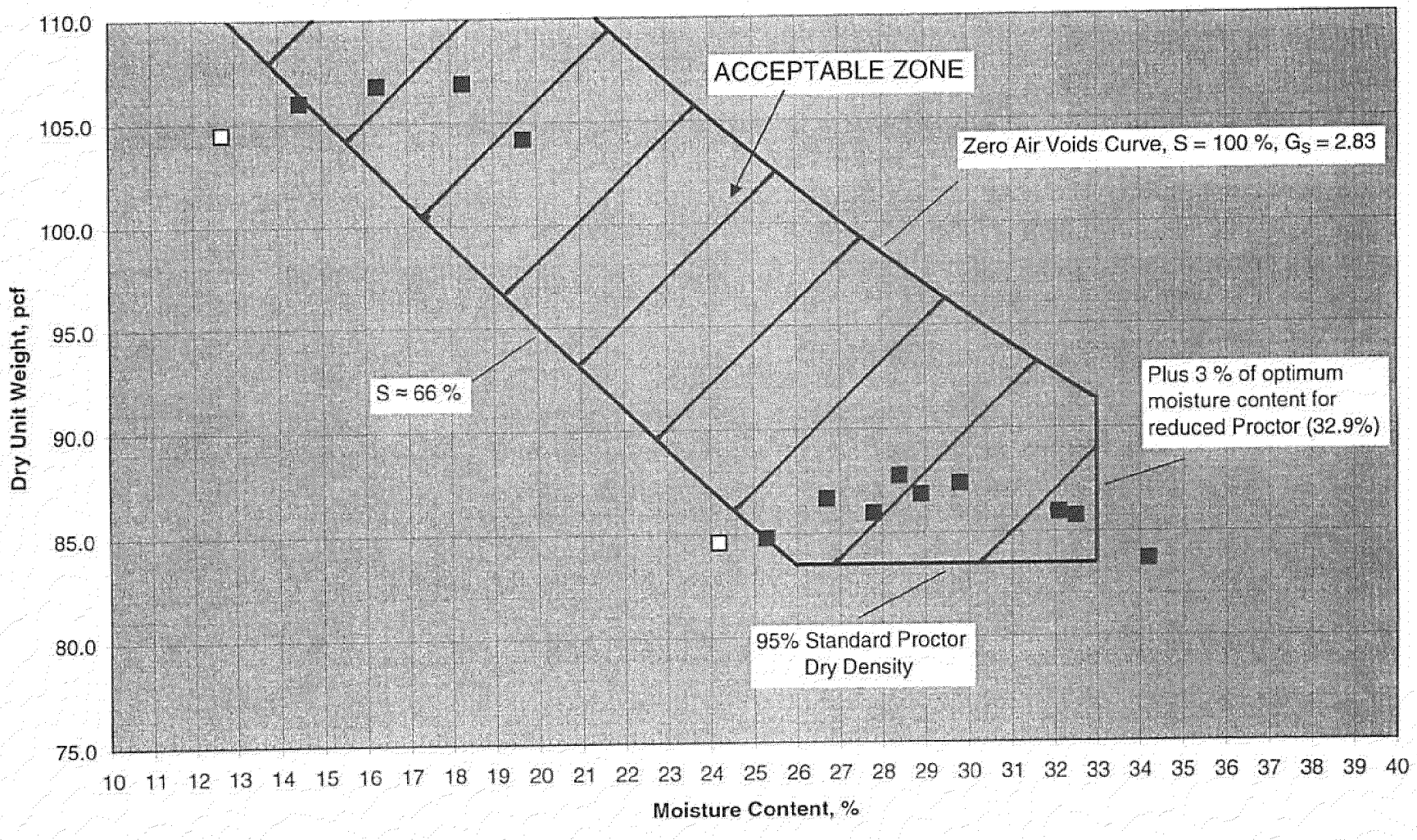


Figure 5- Compaction Data for "MH" Soil from OT-4 - Solid symbols are for compacted specimens with a hydraulic conductivity $\leq 1 \times 10^{-6}$ cm/s and open symbols for specimens with a hydraulic conductivity $> 1 \times 10^{-6}$ cm/s.

Soil ClassificationType "CH" - Reddish Orange sandy fat CLAY with chert fragments

COMPACTION DATA POINTS SHOWING ACCEPTABLE ZONE OF HYDRAULIC CONDUCTIVITY FOR "CH" SOIL FROM OT-9

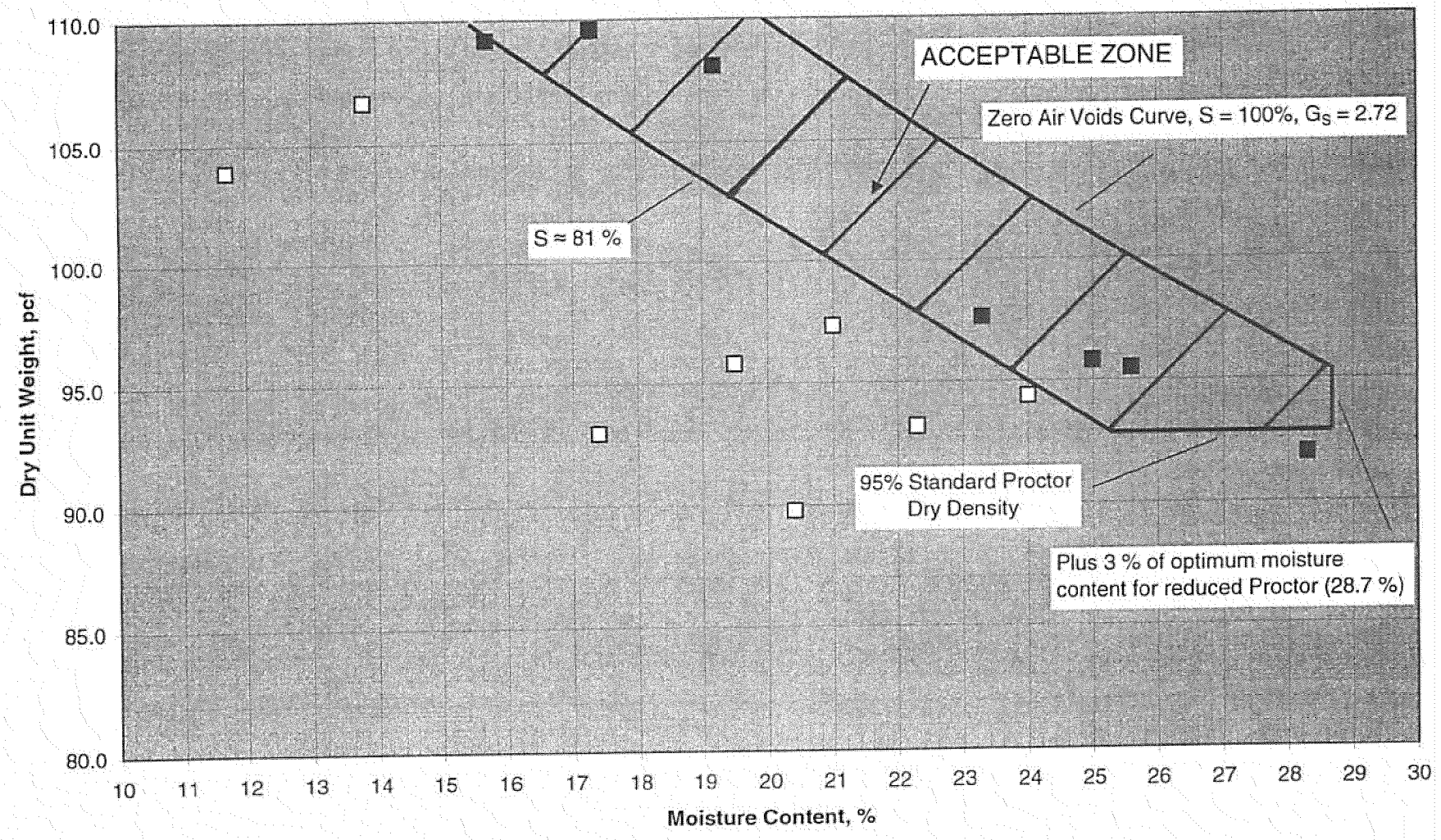


Figure 6- Compaction Data for "CH" Soil from OT-9 - Solid symbols are for compacted specimens with a hydraulic conductivity $\leq 1 \times 10^{-6}$ cm/s and open symbols for specimens with a hydraulic conductivity $> 1 \times 10^{-6}$ cm/s.

Soil Classification Type "CL" - Light Brown lean CLAY with sand

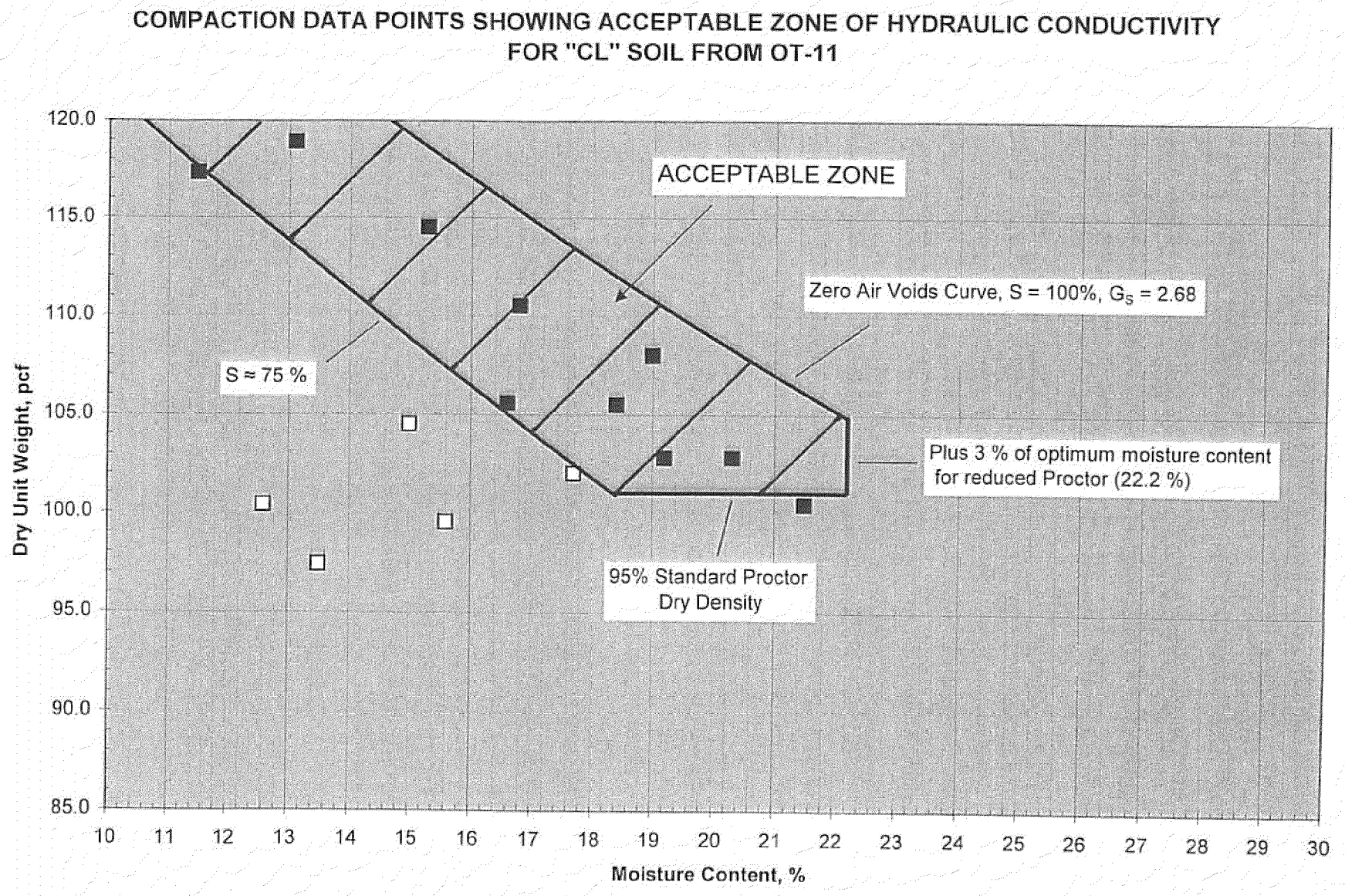


Figure 7- Compaction Data for "CL" Soil from OT-11 - Solid symbols are for compacted specimens with a hydraulic conductivity < 1 x 10^{-6} cm/s and open symbols for specimens with a hydraulic conductivity > 1 x 10^{-6} cm/s.

APPENDIX A

FIELD EXPLORATORY PROCEDURES

FIELD EXPLORATORY PROCEDURES

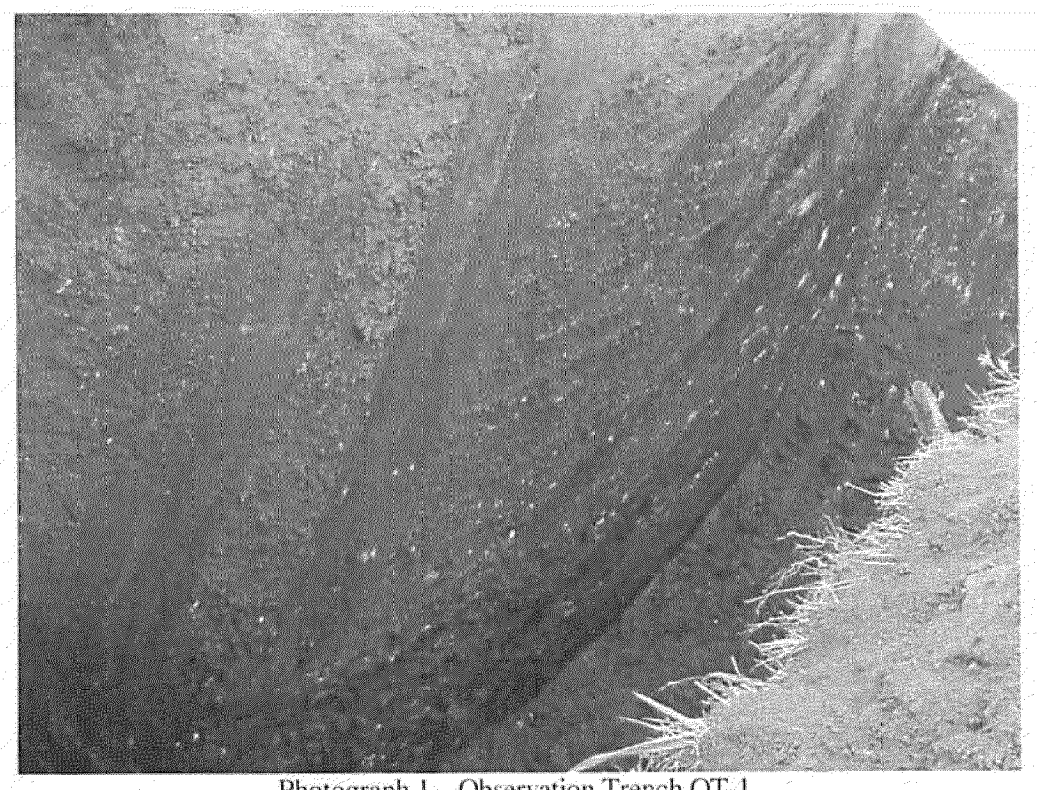
Observation Trenches

The observation trenches were excavated by TVA using a Ford backhoe excavator. One of our geotechnical engineers observed the excavation and documented the materials exposed. The observation trenches were backfilled immediately after excavation for safety purposes. The operator tamped the materials in place with the excavator bucket. You are advised there is the probability of future backfill subsidence depending on actual subsurface conditions, surface drainage, etc.

APPENDIX B

OBSERVATION TRENCH LOGS

OBSERVATION TRENCH LOG			
Project Name: TVA Kingston Fossil Plant - 33.5-Acre Borrow Area		**Logged By:** Todd Justice	
Project Number: 3043051064.02		**Date Logged:** 11/17/05	
Observation Trench I.D.: OT-1		**Degrees / Minutes (GPS):** N35°53.810' W84°29.858'	
Depth (Feet)		**Stratum Description**	**Chert %**
From	**To**		
0	0.6	Topsoil with fine roots	0
0.6	2.5	Brown, dry to slightly moist, clayey silt	0
2.5	9	Red-brown, slightly moist, elastic silt with sand and a few chert fragments	5
9	19	Red-brown, slightly moist to moist, sandy clayey silt with chert fragments	10-15
Remarks and Notes: Observation trench OT-1 was terminated at approximately 19.0 feet. Bulk sample was obtained from 2.5 to 9.0 feet.			

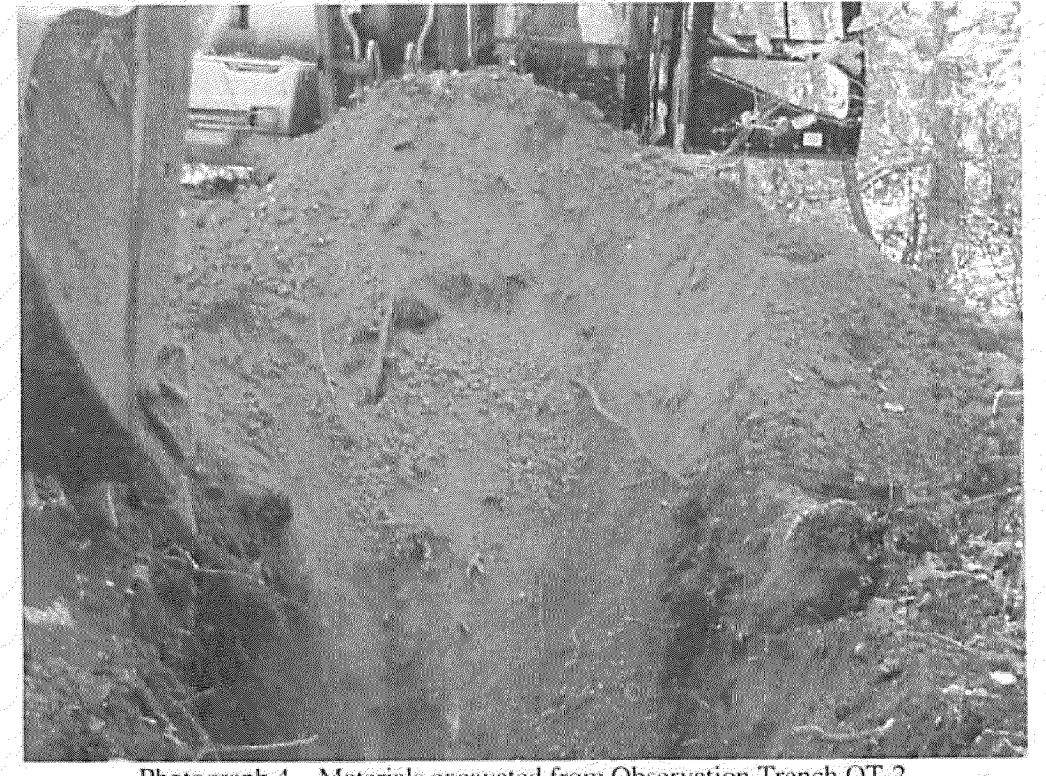


Photograph 1 – Observation Trench OT-1.

Photograph 2 – Materials excavated from Observation Trench OT-1

OBSERVATION TRENCH LOG			
Project Name: TVA Kingston Fossil Plant - 33.5-Acre Borrow Area		**Logged By:** Todd Justice	
Project Number: 3043051064.02		**Date Logged:** 11/17/05	
Observation Trench I.D.: OT-2		**Degrees / Minutes (GPS):** N35°53.841' W84°29.800'	
Depth (Feet)		**Stratum Description**	**Chert %**
From	**To**		
0	0.6	Topsoil with large diameter (3/4-inch) to fine roots	0
0.6	9.5	Reddish orange, slight moist, sandy elastic silt with weathered and unweathered chert fragments	10-15
Remarks and Notes: Observation trench OT-2 was terminated at approximately 9.5 feet. Bulk sample was obtained from 2.0 to 9.5 feet.			

Photograph 3 – Observation Trench OT-2.



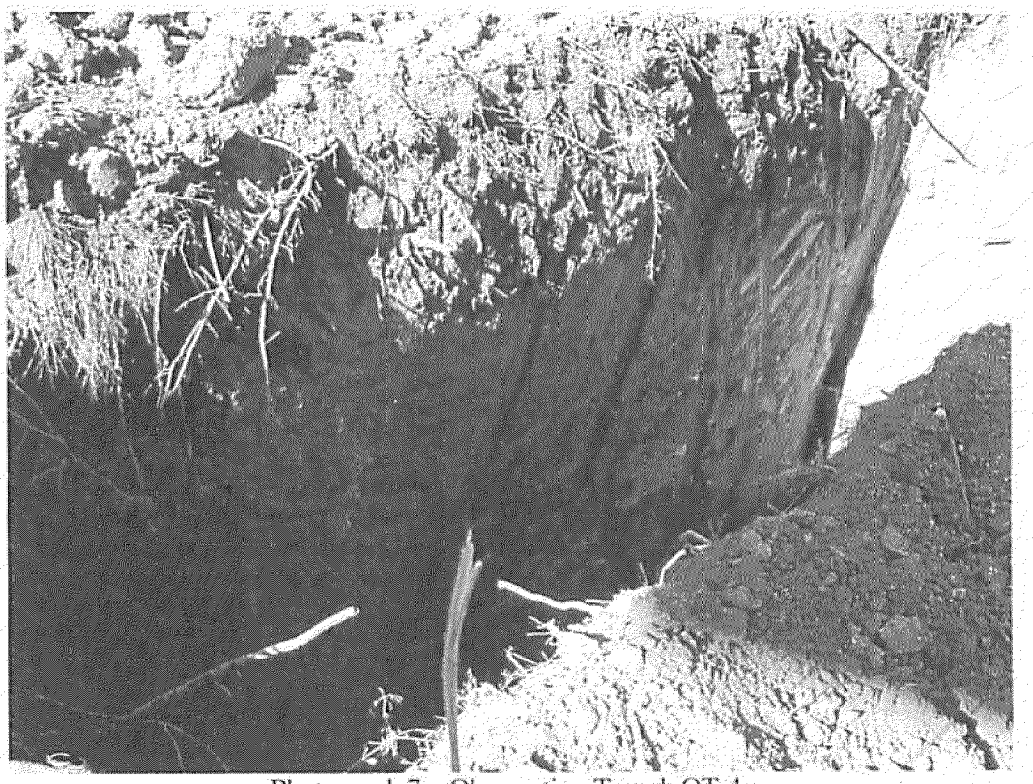
Photograph 4 – Materials excavated from Observation Trench OT-2.

OBSERVATION TRENCH LOG			
Project Name: TVA Kingston Fossil Plant - 33.5-Acre Borrow Area		**Logged By:** Todd Justice	
Project Number: 3043051064.02		**Date Logged:** 11/17/05	
Observation Trench I.D.: OT-3		**Degrees / Minutes (GPS):** N35°53.862' W84°29.789'	
Depth (Feet)		**Stratum Description**	**Chert %**
From	**To**		
0	1.0	Topsoil with large diameter (3/4-inch) to fine roots	0
1.0	10.0	Reddish orange, slightly moist, sandy, silty clay with weathered and unweathered chert fragments	10-15
10.0	18.5	Light orange-brown, slightly moist to moist, elastic silt with sand and a few chert fragments	5
Remarks and Notes: Observation trench OT-3 was terminated at approximately 18.5 feet. Bulk sample was obtained from 10.0 to 18.5 feet.			

Photograph 5 – Observation Trench OT-3.

Photograph 6 – Materials excavated from Observation Trench OT-3.

OBSERVATION TRENCH LOG			
Project Name: TVA Kingston Fossil Plant - 33.5-Acre Borrow Area		**Logged By:** Todd Justice	
Project Number: 3043051064.02		**Date Logged:** 11/17/05	
Observation Trench I.D.: OT-4		**Degrees / Minutes (GPS):** N35°53.875' W84°29.745'	
Depth (Feet)		**Stratum Description**	**Chert %**
From	**To**		
0	1.5	Topsoil with large diameter (3/4-inch) roots and fine roots	0
1.5	2.5	Brown, slightly moist, clayey silt with a few fine roots	0
2.5	19.0	Brown to reddish brown, elastic silt with sand and a few chert fragments	5-10
Remarks and Notes: Observation trench OT-4 was terminated at approximately 19.0 feet. Bulk sample was obtained from 2.5 to 10.0 feet.			

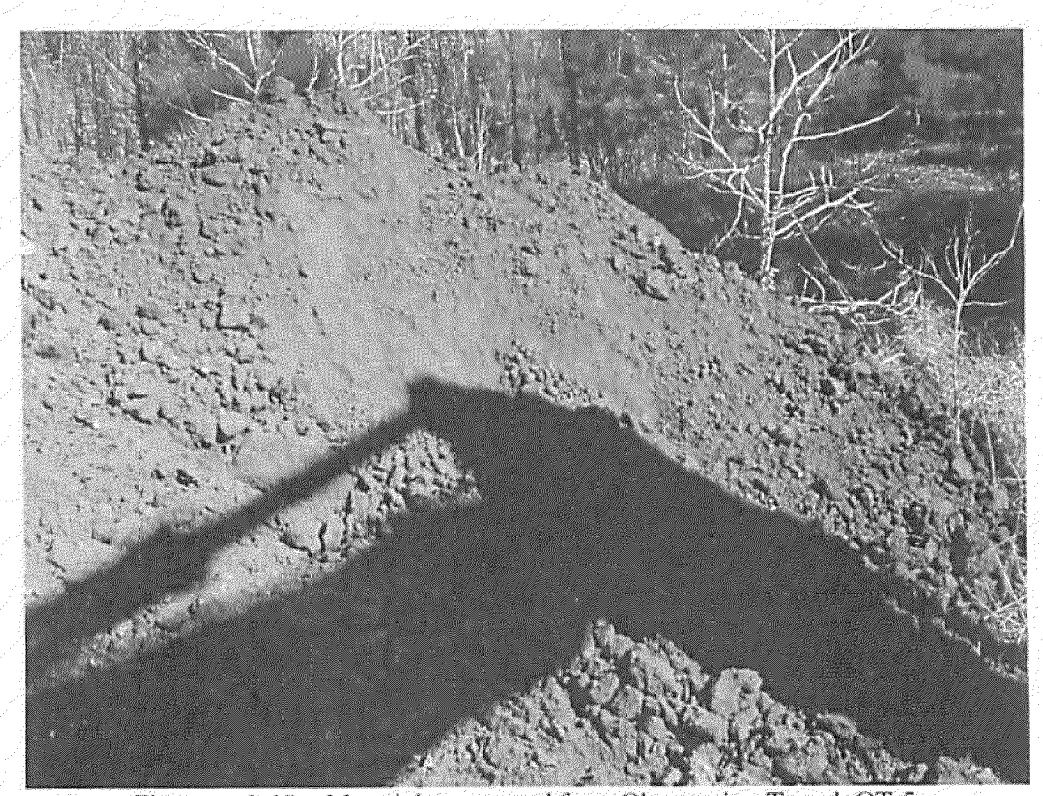


Photograph 7 – Observation Trench OT-4.

Photograph 8 – Materials excavated from Observation Trench OT-4.

OBSERVATION TRENCH LOG			
Project Name: TVA Kingston Fossil Plant - 33.5-Acre Borrow Area		**Logged By:** Todd Justice	
Project Number: 3043051064.02		**Date Logged:** 11/17/05	
Observation Trench I.D.: OT-5		**Degrees / Minutes (GPS):** N35°53.938' W84°29.989'	
Depth (Feet)		**Stratum Description**	**Chert %**
From	**To**		
0	0.2	Topsoil with fine roots	0
0.2	12.0	Reddish brown, slightly moist, elastic silt with sand	0
12.0	19.0	Light orange-brown, slight moist to moist, sandy, silty clay with a few chert fragments	5
Remarks and Notes: Observation trench OT-5 was terminated at approximately 19.0 feet. Bulk sample was obtained from 2.0 to 10.0 feet.			

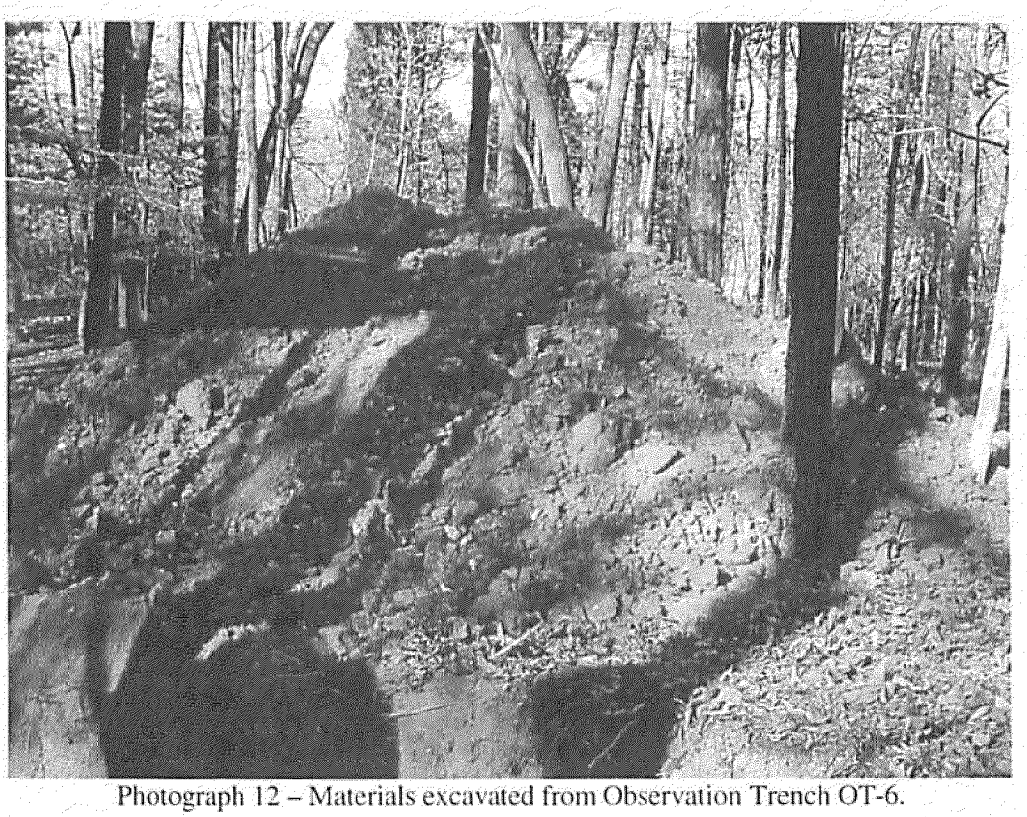
Photograph 9 – Observation Trench OT-5.



Photograph 10 – Materials excavated from Observation Trench OT-5.

OBSERVATION TRENCH LOG			
Project Name: TVA Kingston Fossil Plant - 33.5-Acre Borrow Area		**Logged By:** Todd Justice	
Project Number: 3043051064.02		**Date Logged:** 11/17/05	
Observation Trench I.D.: OT-6		**Degrees / Minutes (GPS):** N35°53.926' W84°29.945'	
Depth (Feet)		**Stratum Description**	**Chert %**
From	**To**		
0	0.8	Topsoil with large diameter (3/4-inch) roots and fine roots	0
0.8	1.5	Light brown, dry, clayey silt	0
1.5	2.5	Reddish orange to reddish brown, dry to slightly moist, sandy clay silt with chert fragments	20-25
2.5	18.0	Light orange-brown, dry to slightly moist, sandy lean clay with chert fragments	15-20
Remarks and Notes: Observation trench OT-6 was terminated at approximately 18.0 feet. Bulk sample was obtained from 2.5 to 10.0 feet.			

Photograph 11 – Observation Trench OT-6.



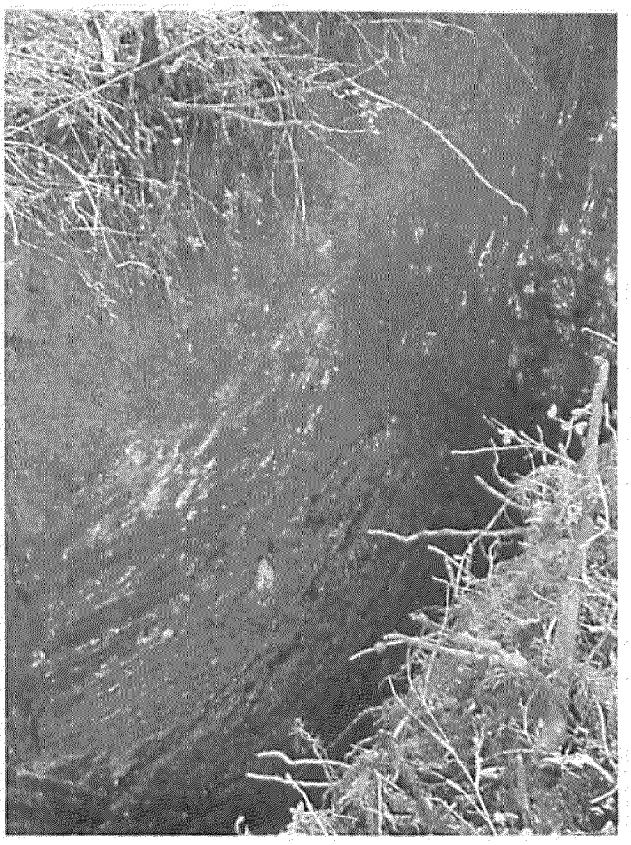
Photograph 12 – Materials excavated from Observation Trench OT-6.

OBSERVATION TRENCH LOG			
Project Name: TVA Kingston Fossil Plant - 33.5-Acre Borrow Area		**Logged By:** Todd Justice	
Project Number: 3043051064.02		**Date Logged:** 11/17/05	
Observation Trench I.D.: OT-7		**Degrees / Minutes (GPS):** N35°54.000' W84°29.905'	
Depth (Feet)		**Stratum Description**	**Chert %**
From	**To**		
0	0.5	Topsoil with large diameter roots (3/4-inch) and fine roots	0
0.5	3.0	Reddish brown, slightly moist, sandy, silty clay – fill	0
3.0	4.0	Topsoil with fine roots	0
4.0	8.0	Reddish brown, slightly moist, elastic silt with a few chert fragments	5
8.0	18.0	Reddish brown, slightly moist to moist, sandy, silty clay with chert fragments	25-30
Remarks and Notes: Observation trench OT-7 was terminated at approximately 18.0 feet. Bulk sample was obtained from 4.0 to 8.0 feet.			

Photograph 13 – Observation Trench OT-7.

Photograph 14 – Materials excavated from Observation Trench OT-7.

OBSERVATION TRENCH LOG			
Project Name: TVA Kingston Fossil Plant - 33.5-Acre Borrow Area		**Logged By:** Todd Justice	
Project Number: 3043051064.02		**Date Logged:** 11/17/05	
Observation Trench I.D.: OT-8		**Degrees / Minutes (GPS):** N35°53.973' W84°29.946'	
Depth (Feet)		**Stratum Description**	**Chert %**
From	**To**		
0	1.0	Topsoil with large diameter (3/4-inch) roots and fine roots	0
1.0	2.0	Brown, slightly moist, clayey silt	0
2.0	15.0	Reddish brown to reddish orange, slightly moist to moist, elastic silt with sand and a few chert fragments	25-30
15.0	19.0	Reddish orange, moist, sandy, silty clay with a few chert fragments	5
Remarks and Notes: Observation trench OT-8 was terminated at approximately 19.0 feet. Bulk sample was obtained from 2.0 to 10.0 feet.			

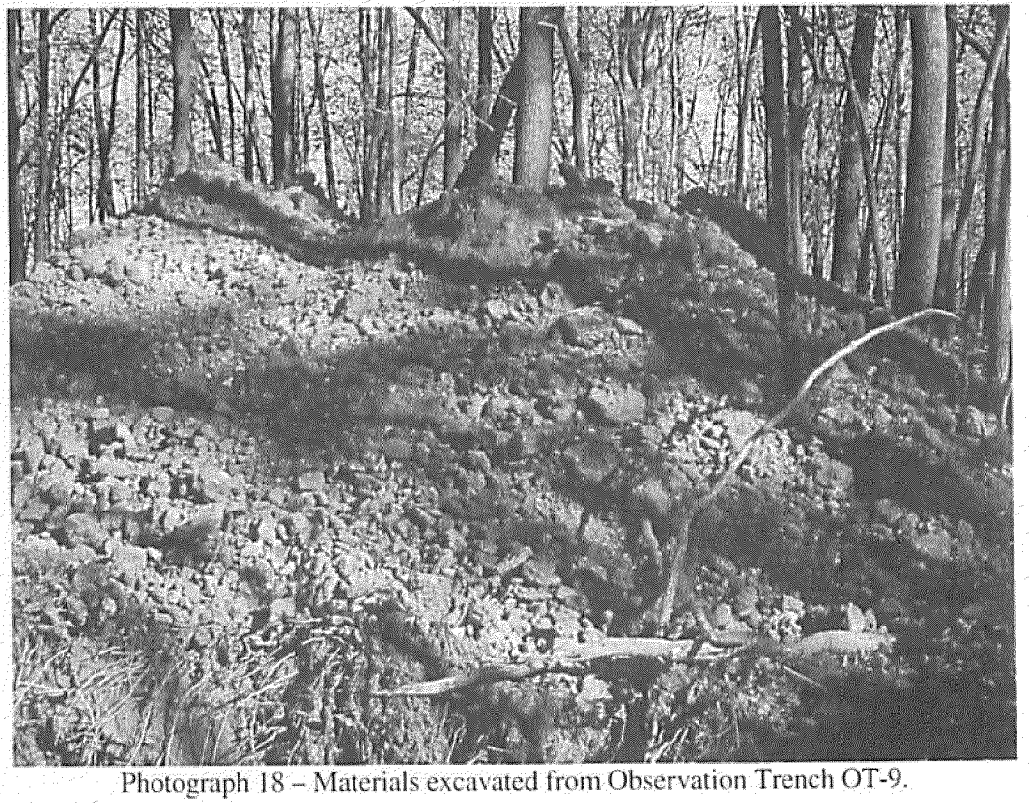


Photograph 15 – Observation Trench OT-8.

Photograph 16 – Materials excavated from Observation Trench OT-8.

OBSERVATION TRENCH LOG			
Project Name: TVA Kingston Fossil Plant - 33.5-Acre Borrow Area		**Logged By:** Todd Justice	
Project Number: 3043051064.02		**Date Logged:** 11/17/05	
Observation Trench I.D.: OT-9		**Degrees / Minutes (GPS):** N35°53.919' W84°29.952'	
Depth (Feet)		**Stratum Description**	**Chert %**
From	**To**		
0	1.0	Topsoil with large diameter (3/4-inch) roots and fine roots	0
1.0	9.5	Reddish orange, dry to slightly moist, sandy fat clay with chert fragments	25-30
Remarks and Notes: Observation trench OT-9 was terminated at approximately 9.5 feet. Bulk sample was obtained from 2.0 to 9.5 feet.			

Photograph 17 – Observation Trench OT-9.



Photograph 18 – Materials excavated from Observation Trench OT-9.

OBSERVATION TRENCH LOG			
Project Name: TVA Kingston Fossil Plant - 33.5-Acre Borrow Area		**Logged By:** Todd Justice	
Project Number: 3043051064.02		**Date Logged:** 11/18/05	
Observation Trench I.D.: OT-10		**Degrees / Minutes (GPS):** N35°53.877' W84°29.939'	
Depth (Feet)		**Stratum Description**	**Chert %**
From	**To**		
0	0.8	Topsoil with large diameter (3/4-inch) roots and fine roots	0
0.8	2.0	Tan, dry to slightly moist, sandy lean clay with chert fragments	25-30
Remarks and Notes: Observation trench OT-10 was hand excavated and terminated at approximately 2.0 feet. Bulk sample was obtained from 0.8 to 2.0 feet.			

Photograph 19 – Observation Trench OT-10.

Photograph 20 – Materials excavated from Observation Trench OT-10.

OBSERVATION TRENCH LOG			
Project Name: TVA Kingston Fossil Plant - 33.5-Acre Borrow Area		**Logged By:** Todd Justice	
Project Number: 3043051064.02		**Date Logged:** 11/18/05	
Observation Trench I.D.: OT-11		**Degrees / Minutes (GPS):** N35°53.955' W84°29.865'	
Depth (Feet)		**Stratum Description**	**Chert %**
From	**To**		
0	0.7	Topsoil with large diameter (3/4-inch) roots and fine roots	0
0.7	2.5	Light brown, dry to slightly moist, lean clay with sand	0
Remarks and Notes: Observation trench OT-11 was hand excavated and terminated at approximately 2.5 feet. Bulk sample was obtained from 1.5 to 2.5 feet.			

Photograph 21 – Observation Trench OT-11.

Photograph 22 – Materials excavated from Observation Trench OT-11.

APPENDIX C

LABORATORY TEST PROCEDURES

LABORATORY TEST RESULTS

LABORATORY TEST PROCEDURES

Moisture Content

The moisture content in a given mass of soil is the ratio, expressed as a percentage, of the weight of the water to the weight of the solid particles. This test was conducted in accordance with ASTM D-2216.

Atterberg Limits (Plasticity Index)

Originally, the Atterberg Limits consisted of seven "limits of consistency" of fine-grained soils. In current engineering usage, the term usually refers only to the liquid limit (LL) and plastic limit (PL). The LL (between the liquid and plastic states) is the water content at which a trapezoidal groove of specified shape, cut in moist soil held in a special cup, is closed after 25 taps on a hard rubber plate. The PL (between plastic and semi-solid states) is the water content at which the soil crumbles when rolled into threads of 1/8-inch in diameter.

The LL has been found to be proportional to the compressibility of the normally consolidated soil. The Plasticity Index (PI) is the calculated difference in water contents between the LL and PL. Together the LL and PI are used to classify silts and clays according to the Unified Soils Classification System (ASTM D 2487). The PI is used to predict the potential for volume changes in confined soils beneath foundations or grade slabs. The LL, PL, and PI are determined in accordance with ASTM D 4318.

Grain Size Distribution

Grain size tests are performed to aid in determining the soil classification and the grain size distribution. The soil samples are prepared for testing according to ASTM D 421 (dry preparation) or ASTM D 2217 (wet preparation). If only the grain size distribution of soils coarser than a number 200 sieve (0.074-mm opening) is desired, the grain size distribution is determined by washing the sample over a number 200 sieve and, after drying, passing the samples through a standard set of nested sieves. If the grain size distribution of the soils finer than the number 200 sieve is also desired, the grain size distribution of the soils coarser than the number 10 sieve is determined by passing the sample through a set of nested sieves. Materials passing the number 10 sieve are dispersed with a dispersing agent and suspended in water, and the grain size distribution calculated from the measured settlement rate of the

particles. These tests are conducted in accordance with ASTM D 422. The percentage of clay, silt, sand, and gravel which are given on the individual particle size analysis sheets presented later in this appendix, were obtained on particle size boundaries in accordance with AASHTO M145-94 (1995).

Specific Gravity

The specific gravity of soil solids is the ratio of the mass of a unit volume of a soil solids to the mass of the same volume of gas-free distilled water at 20C. The test method for determining the specific gravity of soil solids that passes the 4.75-mm (No. 4) sieve using a water pycnometer is described in ASTM D 854, Method B, "Test Methods for Specific Gravity of Soil Solids by Water Pycnometer".

Compaction Tests (Moisture-Density Relationship)

Compaction tests are performed on representative soil samples to determine the maximum dry density and optimum moisture content. The results of the tests are used in conjunction with other tests to determine engineering properties relating to settlement, bearing capacity, shear strength, and permeability. The results may also be used as a standard to determine the percent compaction of any soil embankment.

The two most commonly used compaction tests are the standard Proctor test and the modified Proctor test. They are performed in accordance with ASTM D 698 and D 1557, respectively. Generally, the standard Proctor compaction test is run on samples from building areas and areas where moderate loads are anticipated. The modified Proctor compaction test is generally used for analyses of highways and other areas where large building loads are expected. Both tests have three procedures, depending upon soil particle size. The reduced Proctor test follows the procedures for the standard Proctor test except that 15 drops of the hammer per lift are used rather than 25 drops.

Test	Procedure	Hammer Weight (Pounds)	Hammer Fall (Inches)	Mold Diameter (Inches)	Screen Size (Material Finer Than)	Number of Layers	Number of Blows per Layer
Standard (D 698)	A	5.5	12	4	No. 4 sieve	3	25
	B	5.5	12	4	No. 3/8" sieve	3	25
	C	5.5	12	6	3/4" sieve	3	56
Modified (D 1557)	A	10	18	4	No. 4 sieve	5	25
	B	10	18	4	No. 3/8" sieve	5	25
	C	10	18	6	3/4" sieve	5	56

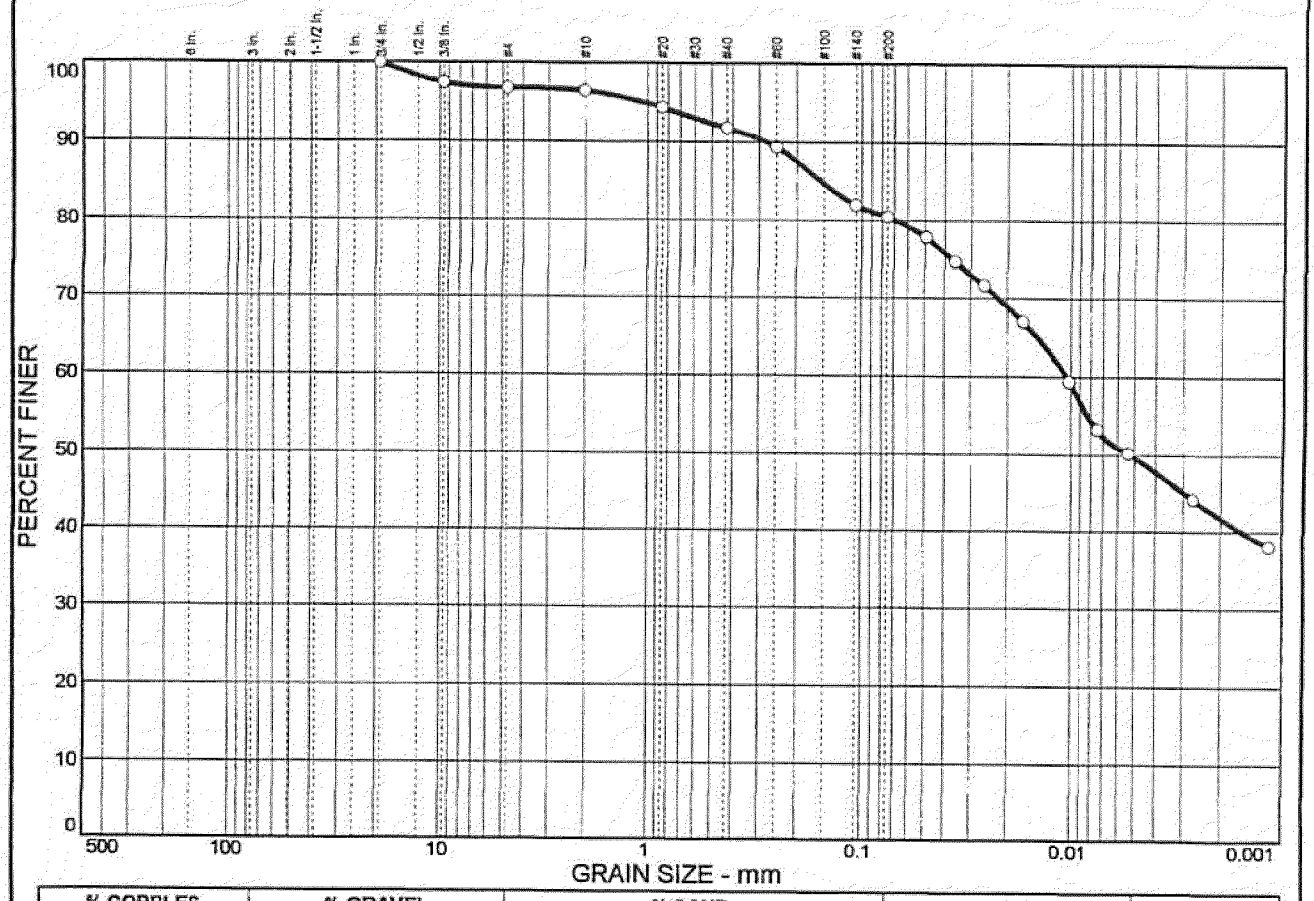
Test results are presented as a curve depicting dry unit weight versus moisture content. The compaction method used and any deviations from the recommended procedures are noted in the report.

Constant Head Permeability Test

The tests were performed on remolded samples (2.9 inch diameter and 3 inches in length). The physical dimensions and weight were obtained and the sample was encased in a rubber membrane and placed in a triaxial chamber. The sample was then back-pressure saturated until a B value of 0.95 or greater was reached. After saturation was obtained, the sample was consolidated under 5-psi confining stress. Upon completion of consolidation, a constant head permeability test was performed.

GRAIN SIZE ANALYSIS TEST RESULTS

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	3.2	16.4	30.7	49.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	97.5		
#4	96.8		
#10	96.5		
#20	94.4		
#40	91.8		
#60	89.4		
#140	81.9		
#200	80.4		

* (no specification provided)

Material Description

Elastic silt with sand

Atterberg Limits

PL= 32 LL= 50 PI= 18

Coefficients

D_{85}= 0.154 D_{60}= 0.0105 D_{50}= 0.0052
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= MH AASHTO=

Remarks

Sample No.: **Source of Sample:** **Date:** 12-23-05
Location: OT-1 **Elev./Depth:** 2.5'-9.0'

MACTEC, INC.
Charlotte, North Carolina

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project No: 3043-05-1064-02 **Figure**

GRAIN SIZE DISTRIBUTION TEST DATA

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project Number: 3043-05-1064-02

Sample Data

Source:
Sample No.:
Elev. or Depth: 2.5'-9.0' Sample Length(in./cm.):
Location: OT-1
Description: Elastic silt with sand
Date: 12-23-05 PL: 32 LL: 50 PI: 18
USCS Classification: MH AASHTO Classification:
Testing Remarks:

Mechanical Analysis Data

	Initial
Dry sample and tare=	452.08
Tare =	0.00
Dry sample weight =	452.08

Sample split on number 10 sieve
Split sample data:
Sample and tare = 62.20 Tare = .00 Sample weight = 62.20
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.75 inch	0.00	100.0
.375 inch	11.12	97.5
# 4	14.41	96.8
# 10	15.73	96.5
# 20	1.33	94.4
# 40	3.00	91.8
# 60	4.55	89.4
# 140	9.40	81.9
# 200	10.35	80.4

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 96.5
Weight of hydrometer sample: 63.01
Hygroscopic moisture correction:
Moist weight & tare = 40.24
Dry weight & tare = 39.85
Tare = 10.93
Hygroscopic moisture= 1.3 %
Calculated biased weight= 64.43
Table of composite correction values:

Temp, deg C:	10.7	23.1	40.2
Comp. corr:	-7.0	-4.0	0.0

Meniscus correction only= 1
Specific gravity of solids= 2.710
Specific gravity correction factor= 0.987

MACTEC, INC.

Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

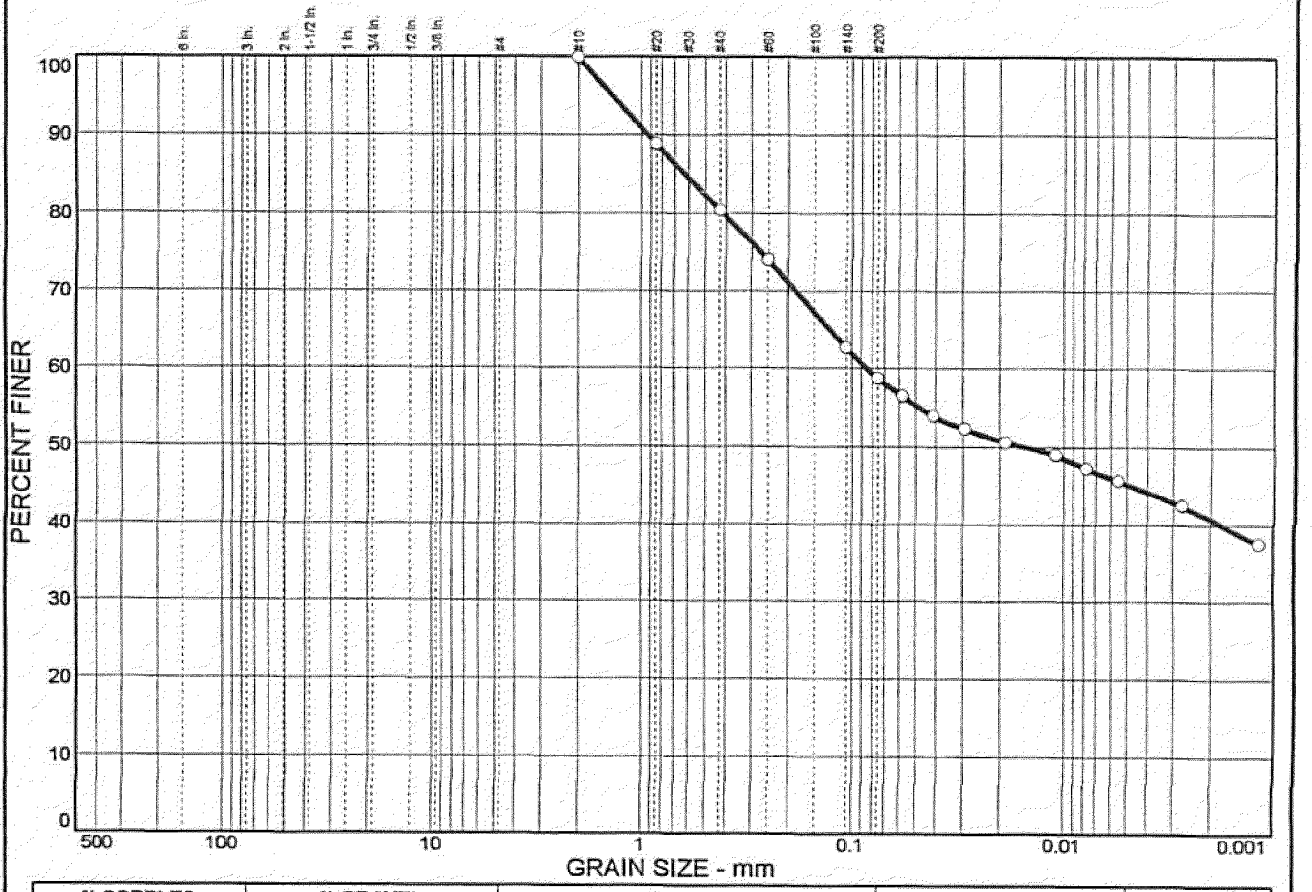
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	22.1	55.0	50.8	0.0131	56.0	7.1	0.0493	77.8
1.00	22.1	53.0	48.8	0.0131	54.0	7.4	0.0356	74.7
2.00	22.1	51.0	46.8	0.0131	52.0	7.8	0.0257	71.6
5.00	22.1	48.0	43.8	0.0131	49.0	8.3	0.0168	67.0
15.00	22.1	43.0	38.8	0.0131	44.0	9.1	0.0102	59.4
30.00	22.1	39.0	34.8	0.0131	40.0	9.7	0.0074	53.2
60.00	22.1	37.0	32.8	0.0131	38.0	10.1	0.0053	50.2
250.00	22.4	33.0	28.8	0.0130	34.0	10.7	0.0027	44.2
1440.00	22.2	29.0	24.8	0.0130	30.0	11.4	0.0012	38.0

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = % GRAVEL = 3.2 % SAND = 16.4
% SILT = 30.7 % CLAY = 49.7

D_{85}= 0.15 D_{60}= 0.01 D_{50}= 0.01

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	41.3	13.4	45.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	88.9		
#40	80.4		
#60	74.0		
#140	62.7		
#200	58.7		

* (no specification provided)

Material Description

Sandy elastic silt

Atterberg Limits

PL= 33 LL= 60 PI= 27

Coefficients

D_{85}= 0.622 D_{60}= 0.0848 D_{50}= 0.0150
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= MH AASHTO=

Remarks

Sample No.: **Source of Sample:** **Date:** 12-23-05
Location: OT-2 **Elev./Depth:** 2.5'-9.0'

MACTEC, INC.
Charlotte, North Carolina

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project No: 3043-05-1064-02 **Figure**

GRAIN SIZE DISTRIBUTION TEST DATA

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project Number: 3043-05-1064-02

Sample Data

Source:
Sample No.:
Elev. or Depth: 2.5'-9.0' Sample Length(in./cm.):
Location: OT-2
Description: Sandy elastic silt
Date: 12-23-05 PL: 33 LL: 60 PI: 27
USCS Classification: MH AASHTO Classification:
Testing Remarks:

Mechanical Analysis Data

	Initial
Dry sample and tare=	437.00
Tare =	0.00
Dry sample weight =	437.00

Sample split on number 10 sieve
Split sample data:
Sample and tare = 59.69 Tare = .00 Sample weight = 59.69
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
# 10	0.00	100.0
# 20	6.60	88.9
# 40	11.68	80.4
# 60	15.53	74.0
# 140	22.24	62.7
# 200	24.63	58.7

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 100.0
Weight of hydrometer sample: 60.35
Hygroscopic moisture correction:
Moist weight & tare = 50.61
Dry weight & tare = 50.16
Tare = 10.75
Hygroscopic moisture= 1.1 %
Calculated biased weight= 59.67
Table of composite correction values:

Temp, deg C:	10.7	23.1	40.2
Comp. corr:	-7.0	-4.0	0.0

Meniscus correction only= 1
Specific gravity of solids= 2.732
Specific gravity correction factor= 0.982
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

MACTEC, INC.

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	22.1	38.5	34.3	0.0130	39.5	9.8	0.0575	56.4
1.00	22.1	37.0	32.8	0.0130	38.0	10.1	0.0412	53.9
2.00	22.1	36.0	31.8	0.0130	37.0	10.2	0.0293	52.3
5.00	22.1	35.0	30.8	0.0130	36.0	10.4	0.0187	50.6
15.00	22.1	34.0	29.8	0.0130	35.0	10.6	0.0109	49.0
30.00	22.1	33.0	28.8	0.0130	34.0	10.7	0.0078	47.3
60.00	22.1	32.0	27.8	0.0130	33.0	10.9	0.0055	45.7
250.00	22.4	30.0	25.8	0.0129	31.0	11.2	0.0027	42.5
1440.00	22.2	27.0	22.8	0.0130	28.0	11.7	0.0012	37.5

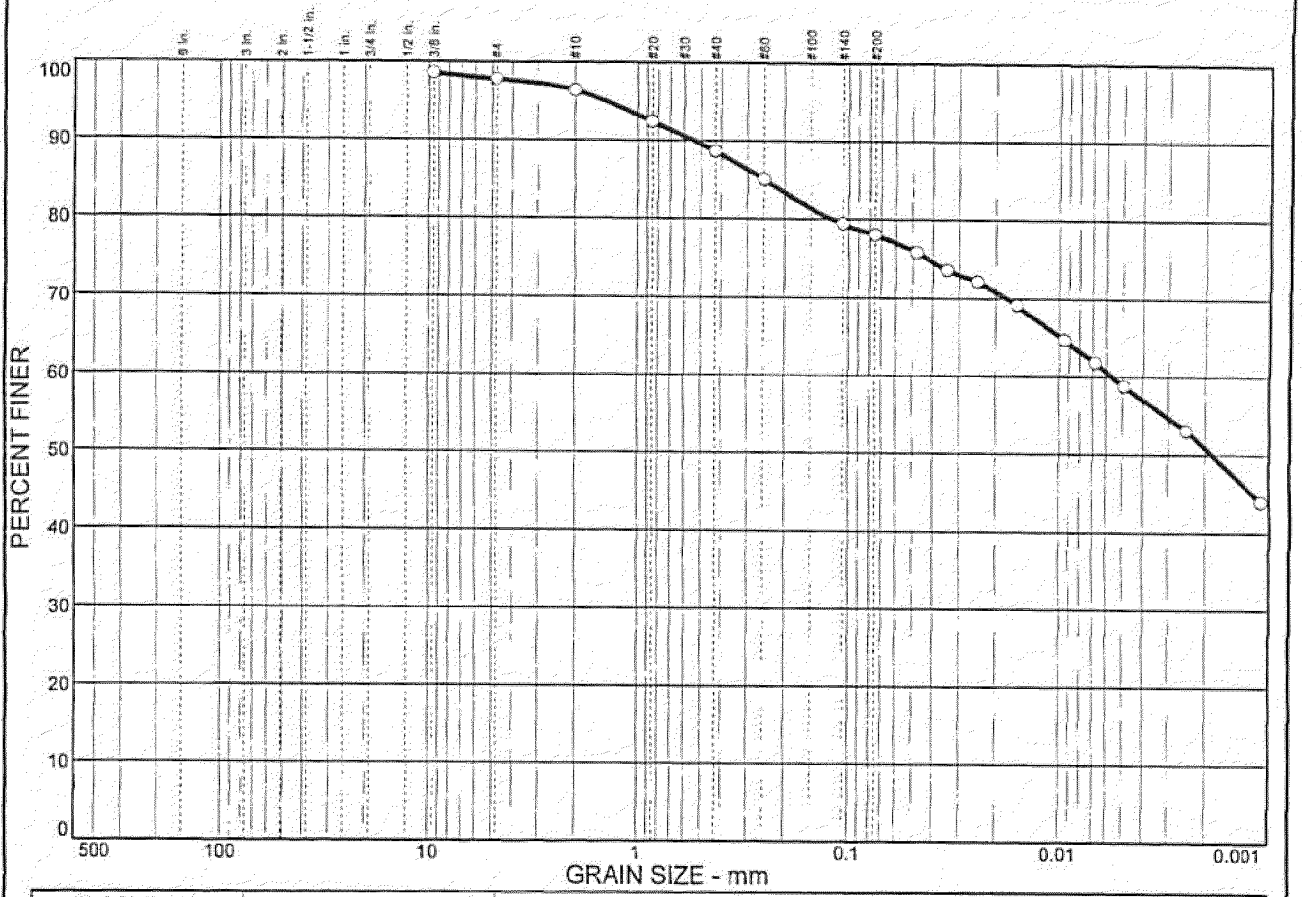
Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = % GRAVEL = % SAND = 41.3
% SILT = 13.4 % CLAY = 45.3

D_{85}= 0.62 D_{60}= 0.08 D_{50}= 0.01

MACTEC, INC.

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
		19.8	19.0	59.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	98.6		
#4	97.8		
#10	96.4		
#20	92.4		
#40	88.6		
#60	85.0		
#140	79.4		
#200	78.0		

* (no specification provided)

Material Description

Elastic silt with sand

Atterberg Limits

PL= 41 LL= 66 PI= 25

Coefficients

D_{85}= 0.250 D_{60}= 0.0056 D_{50}= 0.0018
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= MH AASHTO=

Remarks

Sample No.: Source of Sample: Date: 12-23-05
Location: OT-3 Elev./Depth: 10.0'-18.5'

MACTEC, INC.
Charlotte, North Carolina

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project No: 3043-05-1064-02 Figure

GRAIN SIZE DISTRIBUTION TEST DATA

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project Number: 3043-05-1064-02

Sample Data

Source:
Sample No.:
Elev. or Depth: 10.0'-18.5' Sample Length(in./cm.):
Location: OT-3
Description: Elastic silt with sand
Date: 12-23-05 PL: 41 LL: 66 PI: 25
USCS Classification: MH AASHTO Classification:
Testing Remarks:

Mechanical Analysis Data

	Initial
Dry sample and tare=	374.11
Tare =	0.00
Dry sample weight =	374.11

Sample split on number 10 sieve
Split sample data:
Sample and tare = 63.11 Tare = .00 Sample weight = 63.11
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.375 inch	5.10	98.6
# 4	8.06	97.8
# 10	13.50	96.4
# 20	2.60	92.4
# 40	5.09	88.6
# 60	7.48	85.0
# 140	11.16	79.4
# 200	12.06	78.0

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 96.4
Weight of hydrometer sample: 64.06
Hygroscopic moisture correction:
Moist weight & tare = 47.02
Dry weight & tare = 46.49
Tare = 11.46
Hygroscopic moisture= 1.5 %
Calculated biased weight= 65.46
Table of composite correction values:

Temp, deg C:	10.7	23.1	40.2
Comp. corr:	-7.0	-4.0	0.0

Meniscus correction only= 1
Specific gravity of solids= 2.805
Specific gravity correction factor= 0.968
Hydrometer type: 152H

MACTEC, INC.

Effective depth L= 16.294964 - 0.164 x Rm

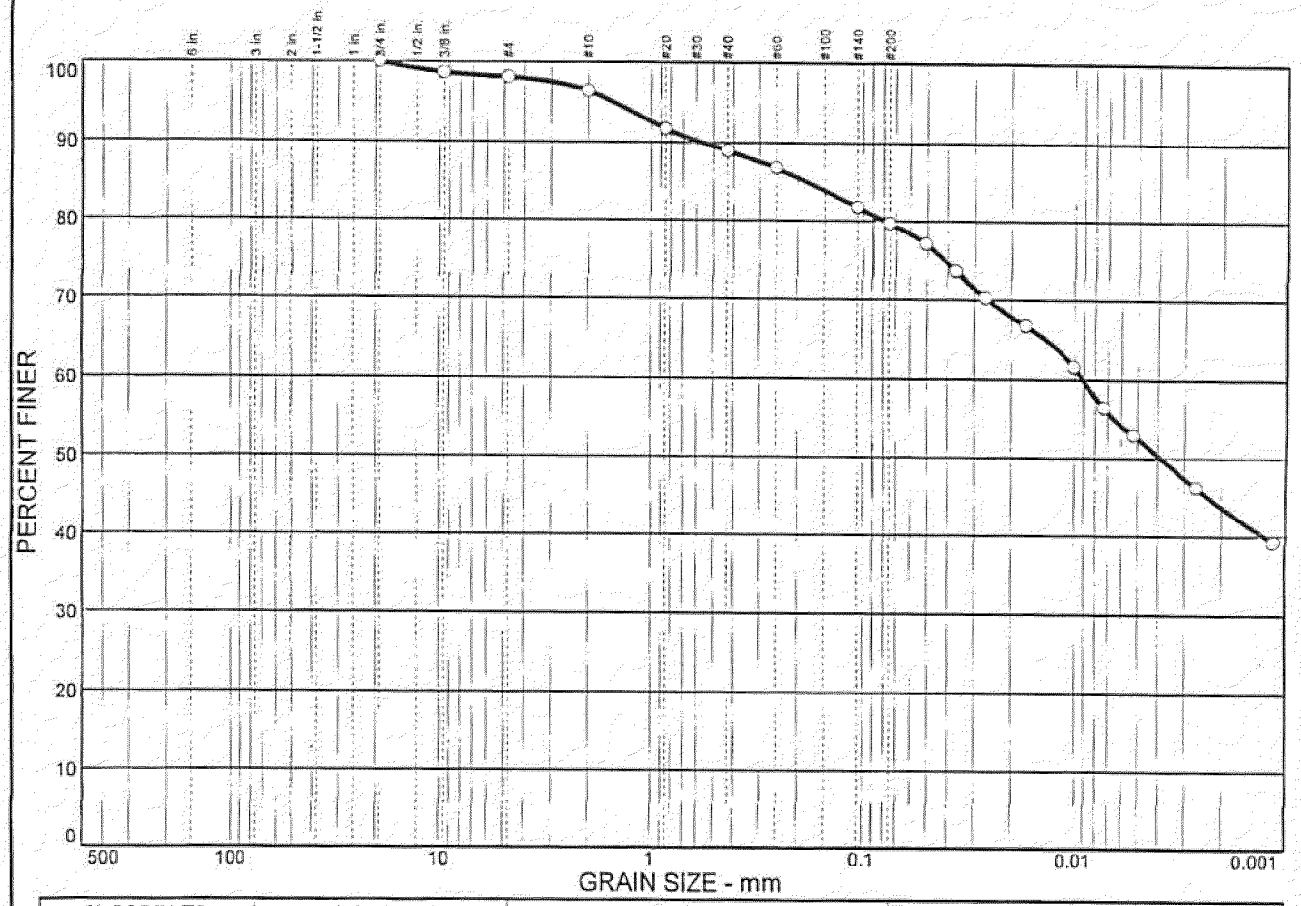
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	22.1	55.5	51.3	0.0127	56.5	7.0	0.0477	75.8
1.00	22.1	54.0	49.8	0.0127	55.0	7.3	0.0343	73.6
2.00	22.1	53.0	48.8	0.0127	54.0	7.4	0.0245	72.1
5.00	22.1	51.0	46.8	0.0127	52.0	7.8	0.0158	69.1
15.00	22.1	48.0	43.8	0.0127	49.0	8.3	0.0094	64.7
30.00	22.1	46.0	41.8	0.0127	47.0	8.6	0.0068	61.8
60.00	22.1	44.0	39.8	0.0127	45.0	8.9	0.0049	58.8
250.00	22.4	40.0	35.8	0.0127	41.0	9.6	0.0025	53.0
1440.00	22.2	34.0	29.8	0.0127	35.0	10.6	0.0011	44.0

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = % GRAVEL = % SAND = 19.8
% SILT = 19.0 % CLAY = 59.0

D_{85}= 0.25 D_{60}= 0.01 D_{50}= 0.00

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	1.9	18.5	27.2	52.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	98.7		
#4	98.1		
#10	96.4		
#20	91.7		
#40	88.9		
#60	86.7		
#140	81.7		
#200	79.6		

* (no specification provided)

Material Description

Elastic silt with sand

Atterberg Limits

PL= 36 LL= 67 PI= 31

Coefficients

D_{85}= 0.182 D_{60}= 0.0091 D_{50}= 0.0039
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= MH AASHTO=

Remarks

Sample No.: Source of Sample: Date: 12-23-05
Location: OT-4 Elev./Depth: 2.5'-10.0'

MACTEC, INC.
Charlotte, North Carolina

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project No: 3043-05-1064-02 Figure

GRAIN SIZE DISTRIBUTION TEST DATA

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project Number: 3043-05-1064-02

Sample Data

Source:
Sample No.:
Elev. or Depth: 2.5'-10.0' Sample Length(in./cm.):
Location: OT-4
Description: Elastic silt with sand
Date: 12-23-05 PL: 36 LL: 67 PI: 31
USCS Classification: MH AASHTO Classification:
Testing Remarks:

Mechanical Analysis Data

	Initial
Dry sample and tare=	342.06
Tare =	0.00
Dry sample weight =	342.06

Sample split on number 10 sieve
Split sample data:
Sample and tare = 53.95 Tare = .00 Sample weight = 53.95
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.75 inch	0.00	100.0
.375 inch	4.48	98.7
# 4	6.48	98.1
# 10	12.48	96.4
# 20	2.61	91.7
# 40	4.19	88.9
# 60	5.44	86.7
# 140	8.22	81.7
# 200	9.40	79.6

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 96.4
Weight of hydrometer sample: 54.97
Hygroscopic moisture correction:
Moist weight & tare = 48.86
Dry weight & tare = 48.14
Tare = 10.82
Hygroscopic moisture= 1.9 %
Calculated biased weight= 55.94
Table of composite correction values:

Temp, deg C:	10.7	23.1	40.2
Comp. corr:	-7.0	-4.0	0.0

Meniscus correction only= 1
Specific gravity of solids= 2.832
Specific gravity correction factor= 0.963

MACTEC, INC.

Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

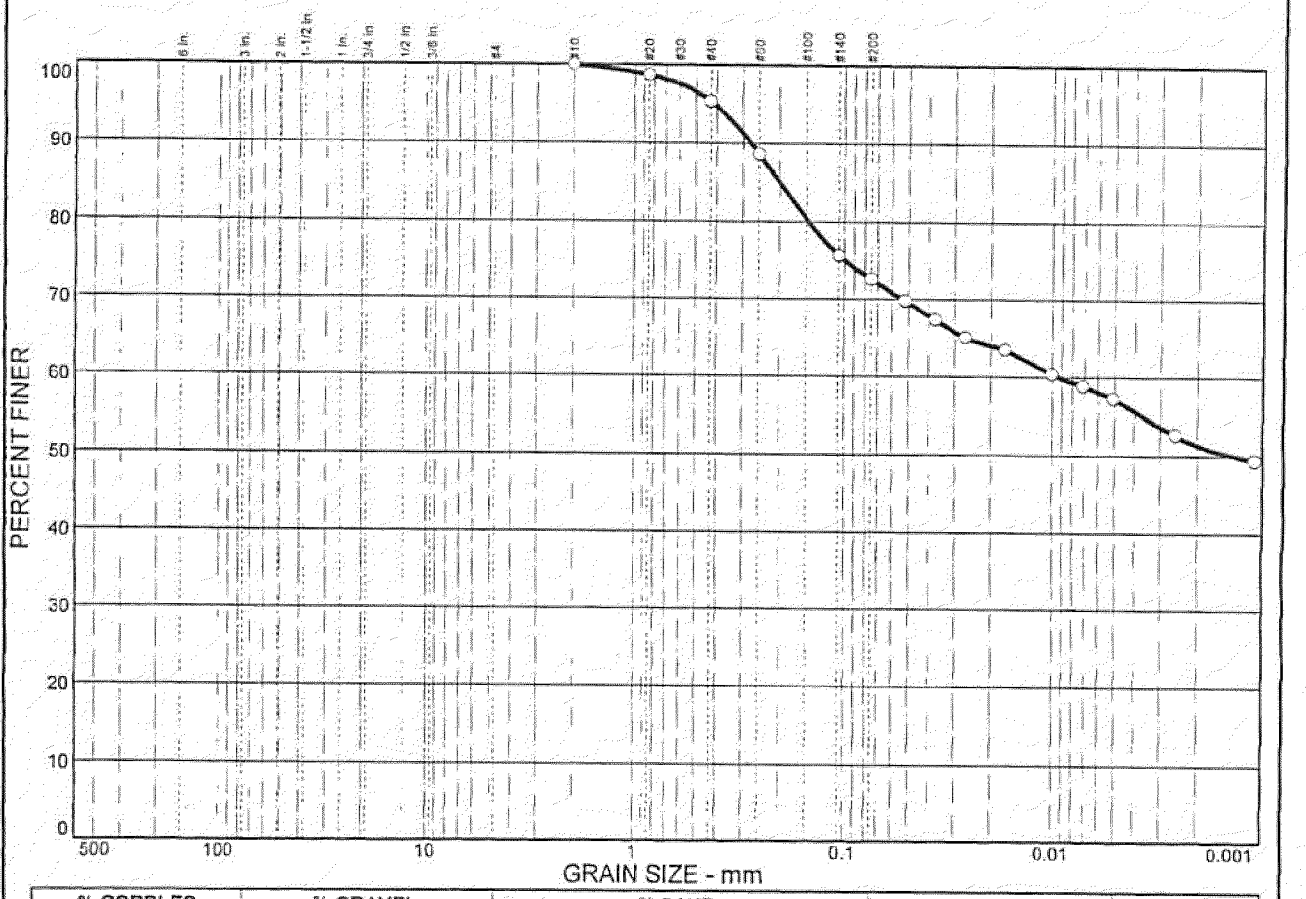
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	22.1	49.0	44.8	0.0126	50.0	8.1	0.0508	77.1
1.00	22.1	47.0	42.8	0.0126	48.0	8.4	0.0366	73.6
2.00	22.1	45.0	40.8	0.0126	46.0	8.8	0.0264	70.2
5.00	22.1	43.0	38.8	0.0126	44.0	9.1	0.0170	66.7
15.00	22.1	40.0	35.8	0.0126	41.0	9.6	0.0101	61.6
30.00	22.1	37.0	32.8	0.0126	38.0	10.1	0.0073	56.4
60.00	22.1	35.0	30.8	0.0126	36.0	10.4	0.0053	52.9
250.00	22.4	31.0	26.8	0.0126	32.0	11.0	0.0026	46.2
1440.00	22.2	27.0	22.8	0.0126	28.0	11.7	0.0011	39.2

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = % GRAVEL = 1.9 % SAND = 18.5
% SILT = 27.2 % CLAY = 52.4

D_{85}= 0.18 D_{60}= 0.01 D_{50}= 0.00

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	27.4	15.4	57.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	98.7		
#40	95.3		
#60	88.6		
#140	75.7		
#200	72.6		

* (no specification provided)

Material Description

Elastic silt with sand

Atterberg Limits

PL= 32 LL= 53 PI= 21

Coefficients

D_{85}= 0.200 D_{60}= 0.0093 D_{50}= 0.0013
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= MH AASHTO=

Remarks

Sample No.: **Source of Sample:** **Date:** 12-23-05
Location: OT-5 **Elev./Depth:** 2.0'-10.0'

MACTEC, INC.
Charlotte, North Carolina

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project No: 3043-05-1064-02 **Figure**

GRAIN SIZE DISTRIBUTION TEST DATA

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project Number: 3043-05-1064-02

Sample Data

Source:
Sample No.:
Elev. or Depth: 2.0'-10.0' Sample Length(in./cm.):
Location: OT-5
Description: Elastic silt with sand
Date: 12-23-05 PL: 32 LL: 53 PI: 21
USCS Classification: MH AASHTO Classification:
Testing Remarks:

Mechanical Analysis Data

	Initial
Dry sample and tare=	452.03
Tare =	0.00
Dry sample weight =	452.03

Sample split on number 10 sieve
Split sample data:
Sample and tare = 62.72 Tare = .00 Sample weight = 62.72
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
# 10	0.00	100.0
# 20	0.81	98.7
# 40	2.92	95.3
# 60	7.17	88.6
# 140	15.21	75.7
# 200	17.17	72.6

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 100.0
Weight of hydrometer sample: 63.60
Hygroscopic moisture correction:
Moist weight & tare = 48.57
Dry weight & tare = 48.06
Tare = 10.89
Hygroscopic moisture= 1.4 %
Calculated biased weight= 62.74
Table of composite correction values:

Temp, deg C:	10.7	23.1	40.2
Comp. corr:	-7.0	-4.0	0.0

Meniscus correction only= 1
Specific gravity of solids= 2.752
Specific gravity correction factor= 0.978
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

MACTEC, INC.

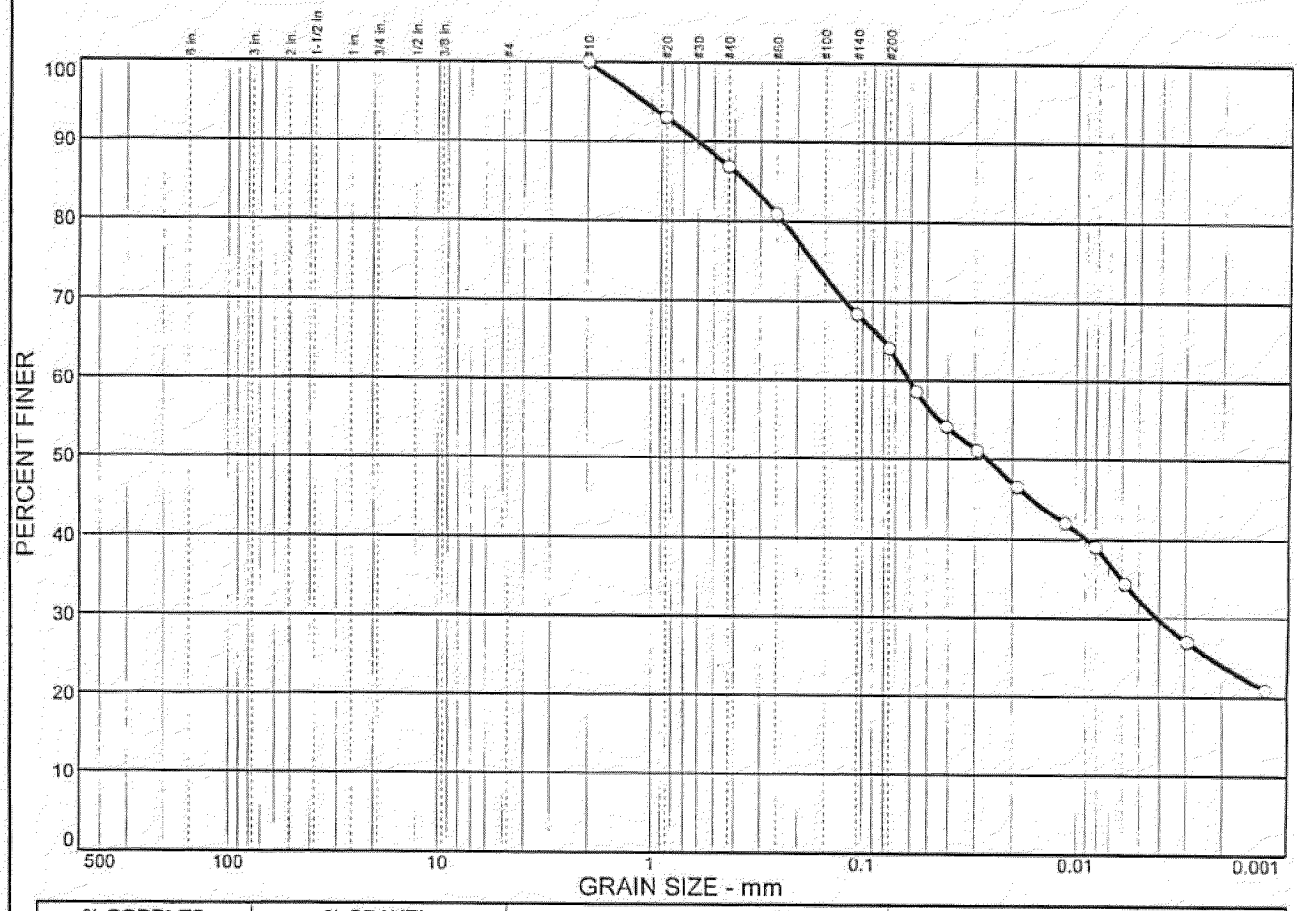
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	22.1	49.0	44.8	0.0129	50.0	8.1	0.0519	69.8
1.00	22.1	47.5	43.3	0.0129	48.5	8.3	0.0373	67.4
2.00	22.1	46.0	41.8	0.0129	47.0	8.6	0.0267	65.1
5.00	22.1	45.0	40.8	0.0129	46.0	8.8	0.0171	63.5
15.00	22.1	43.0	38.8	0.0129	44.0	9.1	0.0100	60.4
30.00	22.1	42.0	37.8	0.0129	43.0	9.2	0.0072	58.9
60.00	22.1	41.0	36.8	0.0129	42.0	9.4	0.0051	57.3
250.00	22.4	38.0	33.8	0.0129	39.0	9.9	0.0026	52.7
1440.00	22.2	36.0	31.8	0.0129	37.0	10.2	0.0011	49.5

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = % GRAVEL = % SAND = 27.4
% SILT = 15.4 % CLAY = 57.2

D_{85}= 0.20 D_{60}= 0.01 D_{50}= 0.00

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	36.0	31.7	32.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	93.0		
#40	86.8		
#60	80.8		
#140	68.3		
#200	64.0		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 19 LL= 31 PI= 12

Coefficients

D_{85}= 0.356 D_{60}= 0.0606 D_{50}= 0.0264
D_{30}= 0.0041 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

Sample No.: Source of Sample: Date: 12-27-05
Location: OT-6 Elev./Depth: 2.5'-10.0'

MACTEC, INC.
Charlotte, North Carolina

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project No: 3043-05-1064-02 Figure

GRAIN SIZE DISTRIBUTION TEST DATA

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project Number: 3043-05-1064-02

Sample Data

Source:
Sample No.:
Elev. or Depth: 2.5'-10.0' Sample Length(in./cm.):
Location: OT-6
Description: Sandy lean clay
Date: 12-27-05 PL: 19 LL: 31 PI: 12
USCS Classification: CL AASHTO Classification:
Testing Remarks:

Mechanical Analysis Data

	Initial
Dry sample and tare=	517.48
Tare =	0.00
Dry sample weight =	517.48

Sample split on number 10 sieve
Split sample data:
Sample and tare = 65.65 Tare = .00 Sample weight = 65.65
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
# 10	0.00	100.0
# 20	4.58	93.0
# 40	8.69	86.8
# 60	12.58	80.8
# 140	20.78	68.3
# 200	23.62	64.0

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 100.0
Weight of hydrometer sample: 66.24
Hygroscopic moisture correction:
Moist weight & tare = 53.03
Dry weight & tare = 52.66
Tare = 11.02
Hygroscopic moisture= 0.9 %
Calculated biased weight= 65.66
Table of composite correction values:

Temp, deg C:	10.7	23.1	40.2
Comp. corr:	-7.0	-4.0	0.0

Meniscus correction only= 1
Specific gravity of solids= 2.690
Specific gravity correction factor= 0.991
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

MACTEC, INC.

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	22.1	43.0	38.8	0.0131	44.0	9.1	0.0560	58.5
1.00	22.1	40.0	35.8	0.0131	41.0	9.6	0.0406	54.0
2.00	22.1	38.0	33.8	0.0131	39.0	9.9	0.0292	51.0
5.00	22.1	35.0	30.8	0.0131	36.0	10.4	0.0189	46.4
15.00	22.1	32.0	27.8	0.0131	33.0	10.9	0.0112	41.9
30.00	22.1	30.0	25.8	0.0131	31.0	11.2	0.0080	38.9
60.00	22.1	27.0	22.8	0.0131	28.0	11.7	0.0058	34.3
250.00	22.4	22.0	17.8	0.0131	23.0	12.5	0.0029	26.9
1440.00	22.2	18.0	13.8	0.0131	19.0	13.2	0.0013	20.8

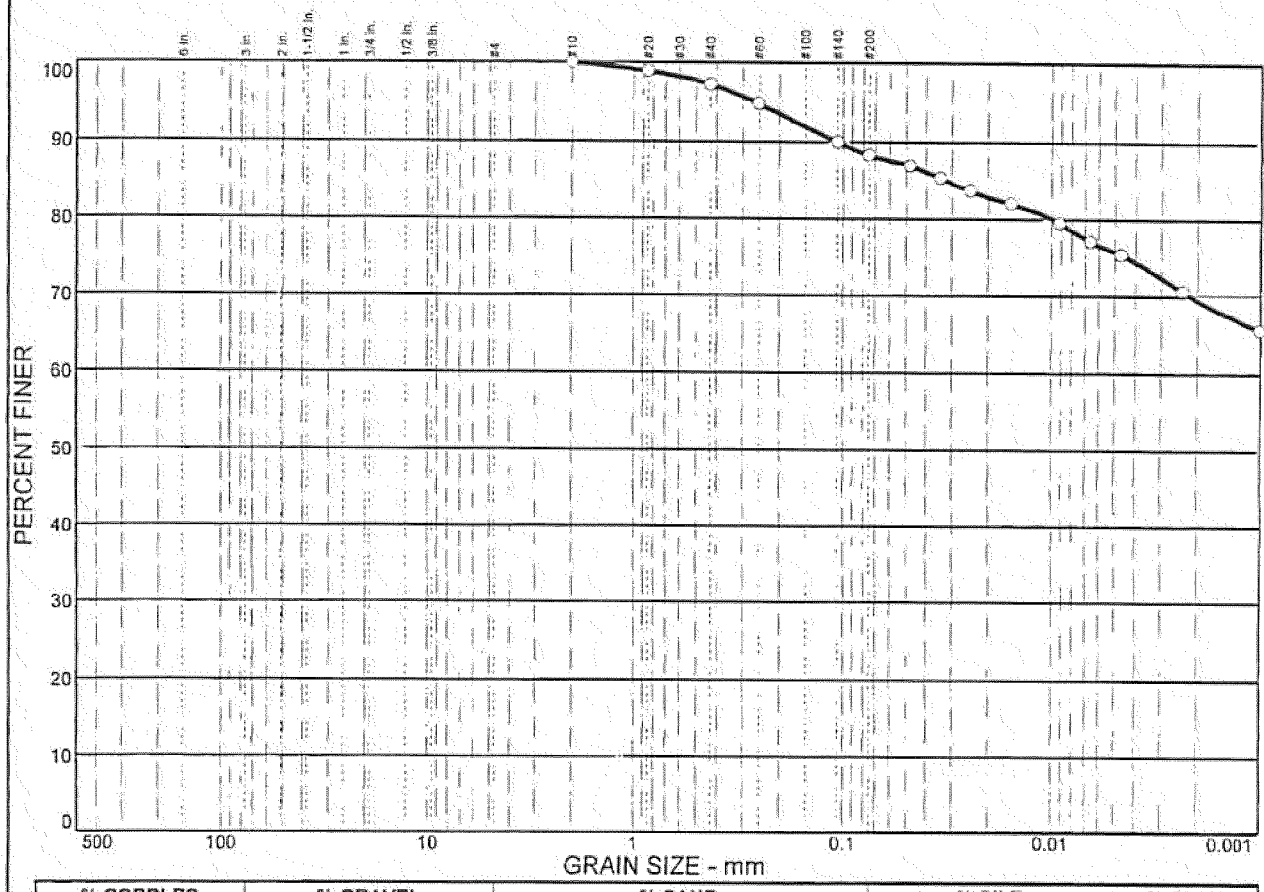
Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = % GRAVEL = % SAND = 36.0
% SILT = 31.7 % CLAY = 32.3

D_{85}= 0.36 D_{60}= 0.06 D_{50}= 0.03
D_{30}= 0.00

MACTEC, INC.

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	11.8	12.6	75.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	98.9		
#40	97.2		
#60	94.8		
#140	89.9		
#200	88.2		

* (no specification provided)

Material Description

Elastic silt

Atterberg Limits

PL= 40 LL= 67 PI= 27

Coefficients

D_{85}= 0.0327 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= MH AASHTO=

Remarks

Sample No.: Source of Sample: Date: 12-27-05
Location: OT-7 Elev./Depth: 4.0'-8.0'

MACTEC, INC.

Charlotte, North Carolina

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project No: 3043-05-1064-02 Figure

GRAIN SIZE DISTRIBUTION TEST DATA

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project Number: 3043-05-1064-02

Sample Data

Source:
Sample No.:
Elev. or Depth: 4.0'-8.0' Sample Length(in./cm.):
Location: OT-7
Description: Elastic silt
Date: 12-27-05 PL: 40 LL: 67 PI: 27
USCS Classification: MH AASHTO Classification:
Testing Remarks:

Mechanical Analysis Data

	Initial
Dry sample and tare=	427.82
Tare =	0.00
Dry sample weight =	427.82

Sample split on number 10 sieve
Split sample data:
Sample and tare = 59.41 Tare = .00 Sample weight = 59.41
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
# 10	0.00	100.0
# 20	0.66	98.9
# 40	1.65	97.2
# 60	3.07	94.8
# 140	5.99	89.9
# 200	7.03	88.2

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 100.0
Weight of hydrometer sample: 60.54
Hygroscopic moisture correction:
Moist weight & tare = 46.63
Dry weight & tare = 45.96
Tare = 10.89
Hygroscopic moisture= 1.9 %
Calculated biased weight= 59.41
Table of composite correction values:

Temp, deg C:	10.7	23.1	40.2
Comp. corr:	-7.0	-4.0	0.0

Meniscus correction only= 1
Specific gravity of solids= 2.750
Specific gravity correction factor= 0.978
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	22.1	57.0	52.8	0.0129	58.0	6.8	0.0476	86.8
1.00	22.1	56.0	51.8	0.0129	57.0	6.9	0.0340	85.2
2.00	22.1	55.0	50.8	0.0129	56.0	7.1	0.0243	83.6
5.00	22.1	54.0	49.8	0.0129	55.0	7.3	0.0156	81.9
15.00	22.1	52.5	48.3	0.0129	53.5	7.5	0.0091	79.4
30.00	22.1	51.0	46.8	0.0129	52.0	7.8	0.0066	77.0
60.00	22.1	50.0	45.8	0.0129	51.0	7.9	0.0047	75.3
250.00	22.4	47.0	42.8	0.0129	48.0	8.4	0.0024	70.5
1440.00	22.2	44.0	39.8	0.0129	45.0	8.9	0.0010	65.5

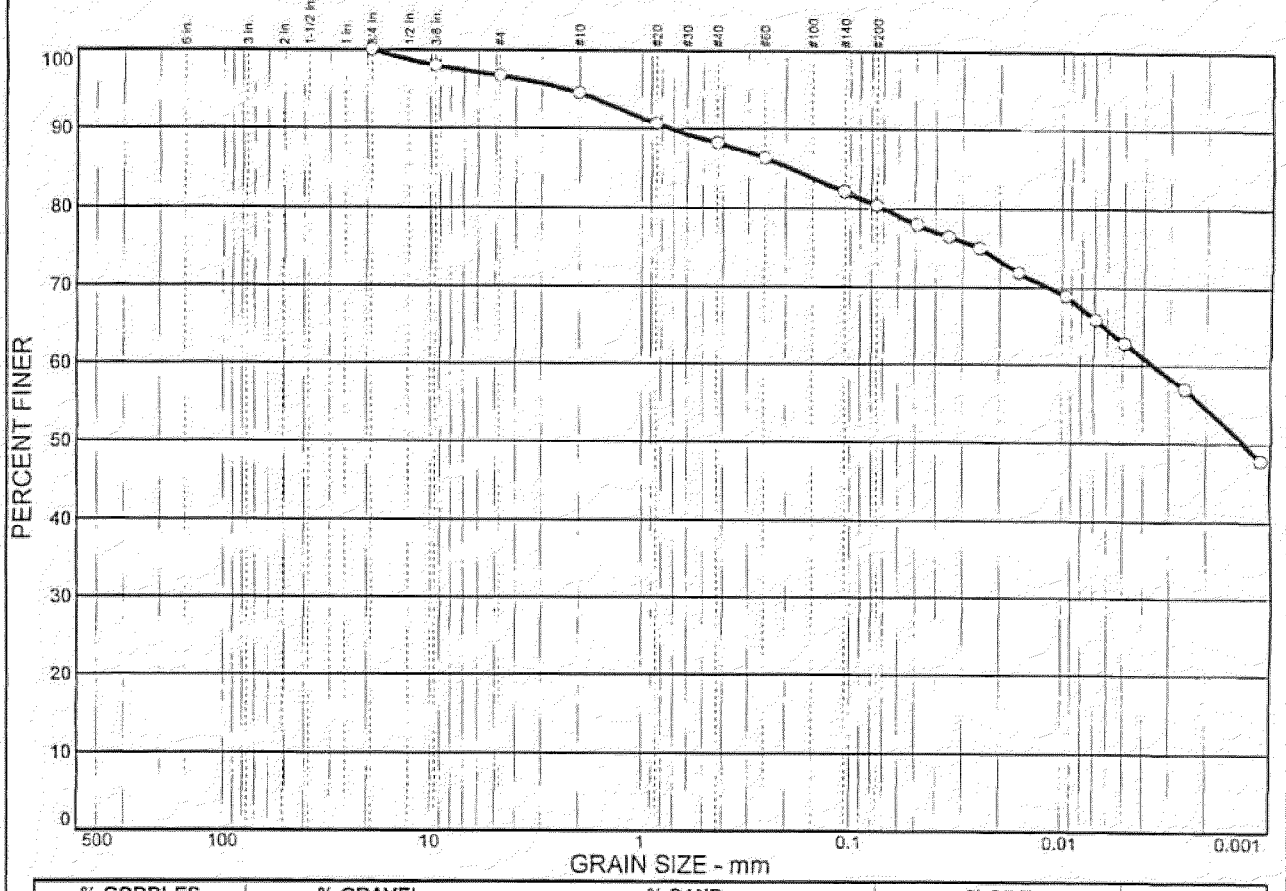
Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = % GRAVEL = % SAND = 11.8
% SILT = 12.6 % CLAY = 75.6

D_{85}= 0.03

MACTEC, INC.

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	3.3	16.3	17.4	63.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	98.0		
#4	96.7		
#10	94.5		
#20	90.6		
#40	88.2		
#60	86.3		
#140	82.1		
#200	80.4		

* (no specification provided)

Material Description

Elastic silt with sand

Atterberg Limits

PL= 34 LL= 65 PI= 31

Coefficients

D_{85}= 0.188 D_{60}= 0.0035 D_{50}= 0.0013
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= MH AASHTO=

Remarks

Sample No.: Source of Sample: Date: 12-27-05
Location: OT-8 Elev./Depth: 2.0'-9.5'

MACTEC, INC.
Charlotte, North Carolina

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project No: 3043-05-1064-02 Figure

GRAIN SIZE DISTRIBUTION TEST DATA

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project Number: 3043-05-1064-02

Sample Data

Source:
Sample No.:
Elev. or Depth: 2.0'-9.5' Sample Length(in./cm.):
Location: OT-8
Description: Elastic silt with sand
Date: 12-27-05 PL: 34 LL: 65 PI: 31
USCS Classification: MH AASHTO Classification:
Testing Remarks:

Mechanical Analysis Data

	Initial
Dry sample and tare=	465.87
Tare =	0.00
Dry sample weight =	465.87

Sample split on number 10 sieve
Split sample data:
Sample and tare = 62.11 Tare = .00 Sample weight = 62.11
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.75 inch	0.00	100.0
.375 inch	9.50	98.0
# 4	15.55	96.7
# 10	25.75	94.5
# 20	2.57	90.6
# 40	4.17	88.2
# 60	5.39	86.3
# 140	8.17	82.1
# 200	9.27	80.4

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 94.5
Weight of hydrometer sample: 63.17
Hygroscopic moisture correction:
Moist weight & tare = 47.73
Dry weight & tare = 47.12
Tare = 11.56
Hygroscopic moisture= 1.7 %
Calculated biased weight= 65.72
Table of composite correction values:

Temp, deg C:	10.7	23.1	40.2
Comp. corr:	-7.0	-4.0	0.0

Meniscus correction only= 1.0
Specific gravity of solids= 2.693
Specific gravity correction factor= 0.990

MACTEC, INC.

Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

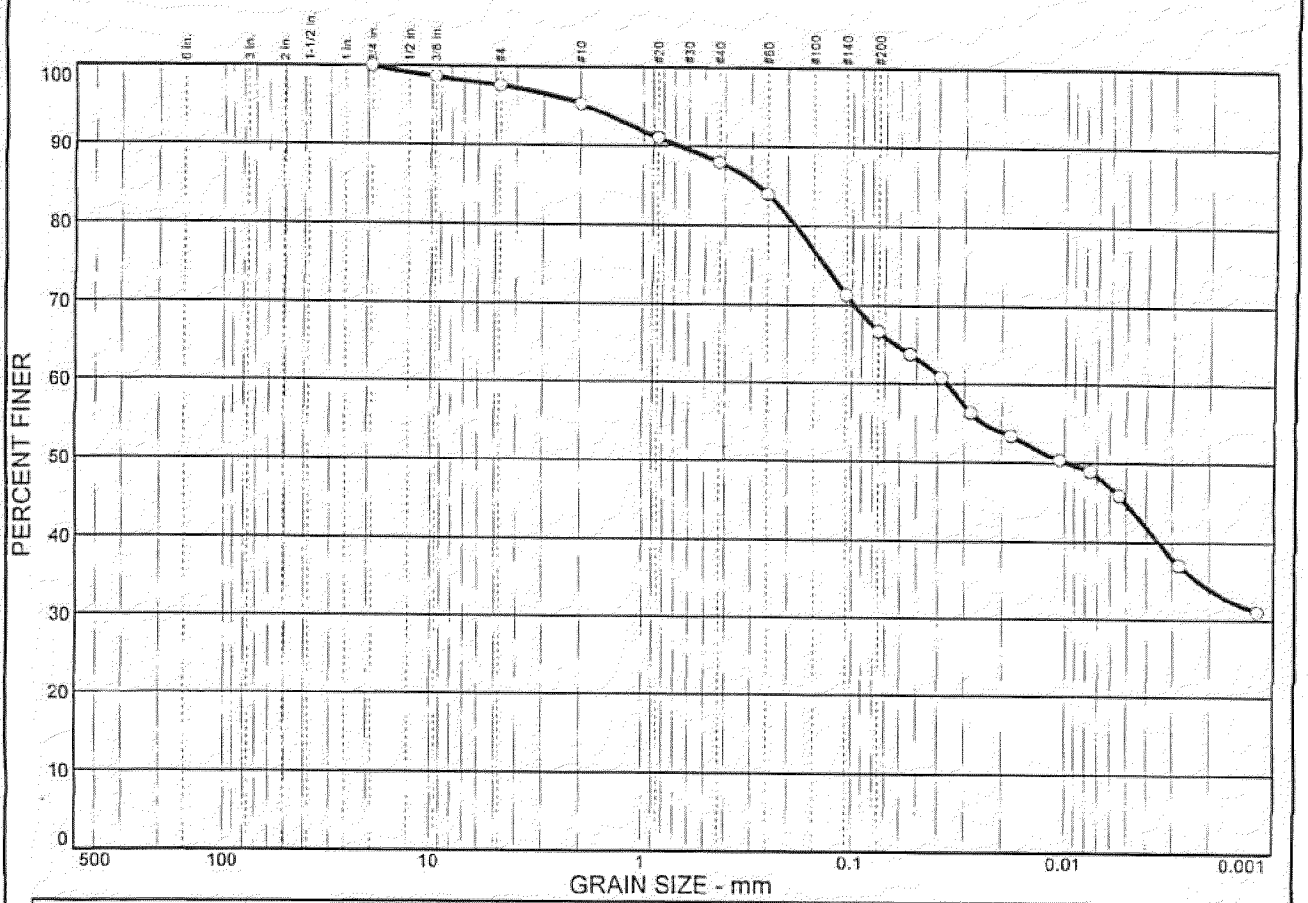
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	22.1	56.0	51.8	0.0131	57.0	6.9	0.0489	78.0
1.00	22.1	55.0	50.8	0.0131	56.0	7.1	0.0350	76.5
2.00	22.1	54.0	49.8	0.0131	55.0	7.3	0.0250	75.0
5.00	22.1	52.0	47.8	0.0131	53.0	7.6	0.0162	71.9
15.00	22.1	50.0	45.8	0.0131	51.0	7.9	0.0095	68.9
30.00	22.1	48.0	43.8	0.0131	49.0	8.3	0.0069	65.9
60.00	22.1	46.0	41.8	0.0131	47.0	8.6	0.0050	62.9
250.00	22.4	42.0	37.8	0.0131	43.0	9.2	0.0025	57.0
1440.00	22.2	36.0	31.8	0.0131	37.0	10.2	0.0011	47.9

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = % GRAVEL = 3.3 % SAND = 16.3
% SILT = 17.4 % CLAY = 63.0

D_{85}= 0.19 D_{60}= 0.00 D_{50}= 0.00

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	2.4	31.0	21.8	44.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	98.7		
#4	97.6		
#10	95.3		
#20	91.0		
#40	87.9		
#60	83.9		
#140	71.3		
#200	66.6		

* (no specification provided)

Material Description

Sandy fat clay

Atterberg Limits

PL= 28 LL= 50 PI= 22

Coefficients

D_{85}= 0.279 D_{60}= 0.0366 D_{50}= 0.0099
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CH AASHTO=

Remarks

Sample No.: **Source of Sample:** **Date:** 12-27-05
Location: OT-9 **Elev./Depth:** 2.0'-9.5'

MACTEC, INC. **Charlotte, North Carolina**	**Client:** TVA **Project:** TVA Kingston 33.5 Acre Borrow **Project No:** 3043-05-1064-02 Figure

GRAIN SIZE DISTRIBUTION TEST DATA

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project Number: 3043-05-1064-02

Sample Data

Source:
Sample No.:
Elev. or Depth: 2.0'-9.5' Sample Length(in./cm.):
Location: OT-9
Description: Sandy fat clay
Date: 12-27-05 PL: 28 LL: 50 PI: 22
USCS Classification: CH AASHTO Classification:
Testing Remarks:

Mechanical Analysis Data

	Initial
Dry sample and tare=	455.55
Tare =	0.00
Dry sample weight =	455.55

Sample split on number 10 sieve
Split sample data:
Sample and tare = 62.99 Tare = .00 Sample weight = 62.99
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.75 inch	0.00	100.0
.375 inch	5.82	98.7
# 4	11.09	97.6
# 10	21.25	95.3
# 20	2.86	91.0
# 40	4.91	87.9
# 60	7.53	83.9
# 140	15.85	71.3
# 200	19.00	66.6

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 95.3
Weight of hydrometer sample: 63.62
Hygroscopic moisture correction:
Moist weight & tare = 56.49
Dry weight & tare = 56.05
Tare = 11.60
Hygroscopic moisture= 1.0 %
Calculated biased weight= 66.10
Table of composite correction values:

Temp, deg C:	10.7	23.1	40.2
Comp. corr:	-7.0	-4.0	0.0

Meniscus correction only= 1
Specific gravity of solids= 2.718
Specific gravity correction factor= 0.985

Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

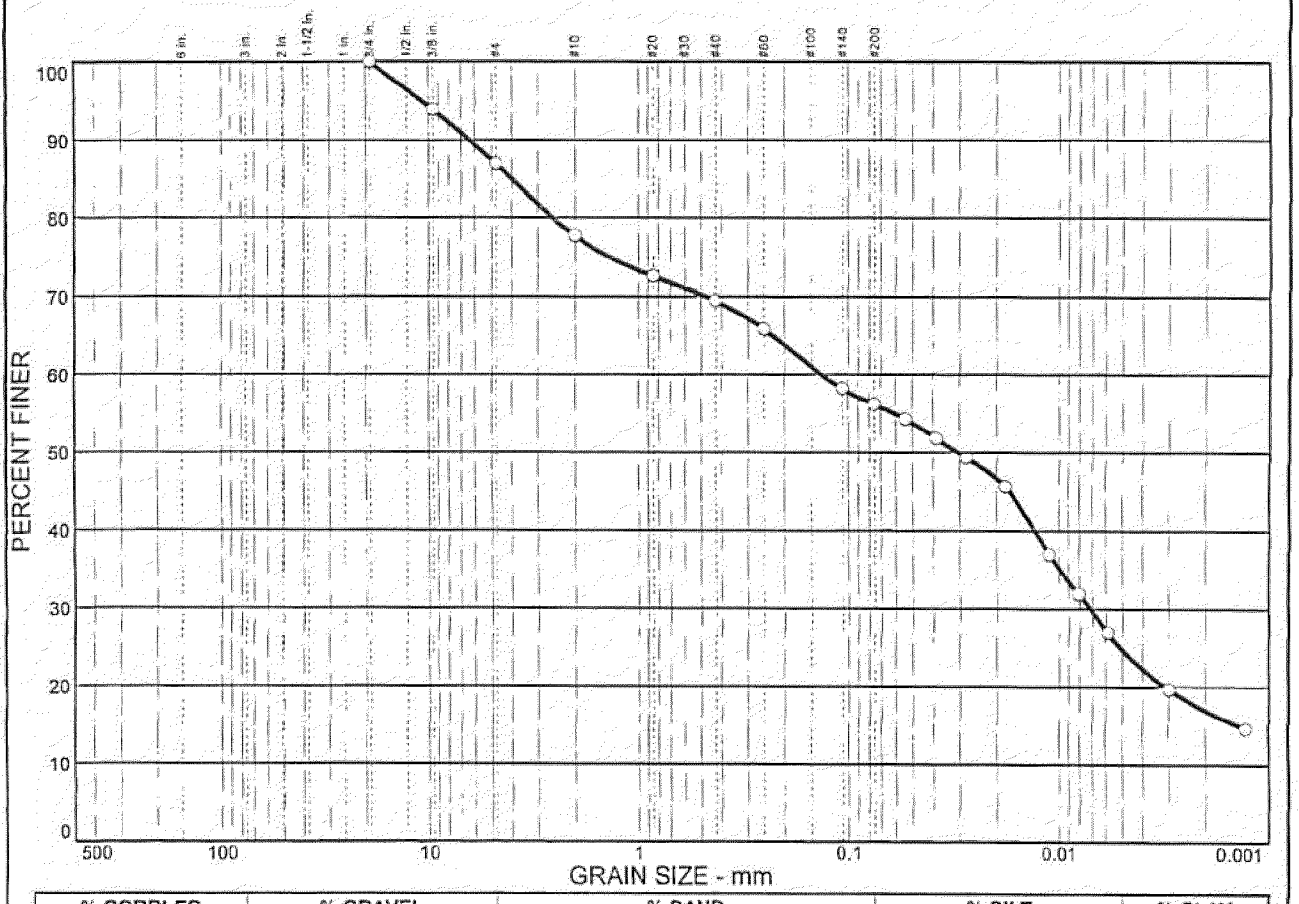
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	22.1	47.0	42.8	0.0130	48.0	8.4	0.0535	63.7
1.00	22.1	45.0	40.8	0.0130	46.0	8.8	0.0386	60.7
2.00	22.1	42.0	37.8	0.0130	43.0	9.2	0.0280	56.3
5.00	22.1	40.0	35.8	0.0130	41.0	9.6	0.0180	53.3
15.00	22.1	38.0	33.8	0.0130	39.0	9.9	0.0106	50.3
30.00	22.1	37.0	32.8	0.0130	38.0	10.1	0.0075	48.8
60.00	22.1	35.0	30.8	0.0130	36.0	10.4	0.0054	45.8
250.00	22.4	29.0	24.8	0.0130	30.0	11.4	0.0028	37.0
1440.00	22.2	25.0	20.8	0.0130	26.0	12.0	0.0012	31.0

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = % GRAVEL = 2.4 % SAND = 31.0
% SILT = 21.8 % CLAY = 44.8

D_{85}= 0.28 D_{60}= 0.04 D_{50}= 0.01

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	13.1	30.8	31.4	24.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	93.9		
#4	86.9		
#10	77.7		
#20	72.6		
#40	69.4		
#60	65.8		
#140	58.1		
#200	56.1		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 19 LL= 30 PI= 11

Coefficients

D_{85}= 4.01 D_{60}= 0.134 D_{50}= 0.0312
D_{30}= 0.0072 D_{15}= 0.0014 D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

Sample No.: **Source of Sample:** **Date:** 12-27-05
Location: OT-10 **Elev./Depth:** 0.8'-2.0'

MACTEC, INC.
Charlotte, North Carolina

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project No: 3043-05-1064-02 **Figure**

GRAIN SIZE DISTRIBUTION TEST DATA

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project Number: 3043-05-1064-02

Sample Data

Source:
Sample No.:
Elev. or Depth: 0.8'-2.0'
Sample Length(in./cm.):
Location: OT-10
Description: Sandy lean clay
Date: 12-27-05 PL: 19 LL: 30 PI: 11
USCS Classification: CL
AASHTO Classification:
Testing Remarks:

Mechanical Analysis Data

	Initial
Dry sample and tare=	562.51
Tare =	0.00
Dry sample weight =	562.51

Sample split on number 10 sieve
Split sample data:
Sample and tare = 62.51 Tare = .00 Sample weight = 62.51
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.75 inch	0.00	100.0
.375 inch	34.58	93.9
# 4	73.47	86.9
# 10	125.50	77.7
# 20	4.08	72.6
# 40	6.68	69.4
# 60	9.54	65.8
# 140	15.79	58.1
# 200	17.36	56.1

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 77.7
Weight of hydrometer sample: 63.14
Hygroscopic moisture correction:
Moist weight & tare = 51.85
Dry weight & tare = 51.43
Tare = 10.84
Hygroscopic moisture= 1.0 %
Calculated biased weight= 80.43
Table of composite correction values:

Temp, deg C:	10.7	23.1	40.2
Comp. corr:	-7.0	-4.0	0.0

Meniscus correction only= 1
Specific gravity of solids= 2.667
Specific gravity correction factor= 0.996

MACTEC, INC.

Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

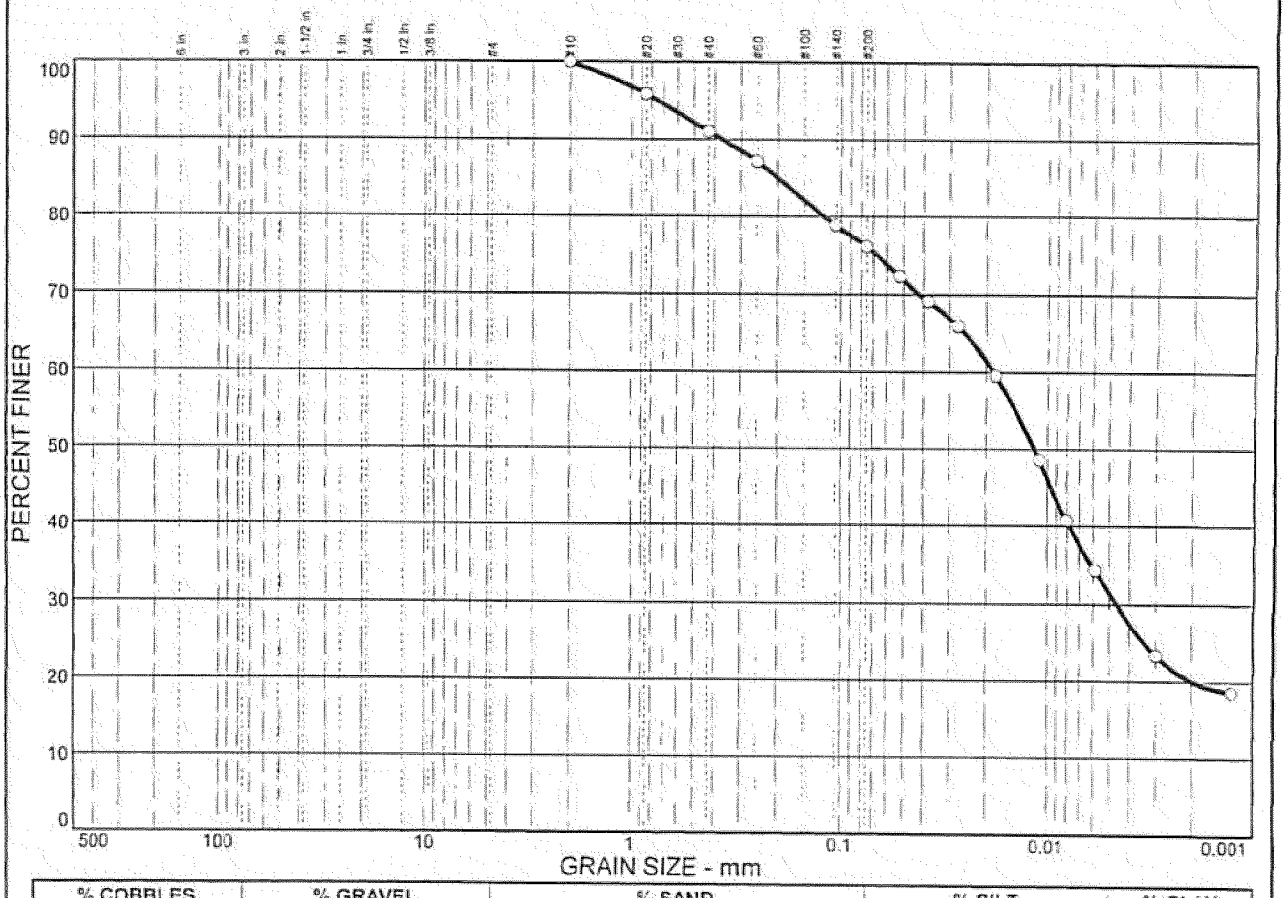
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	22.1	48.0	43.8	0.0132	49.0	8.3	0.0538	54.2
1.00	22.1	46.0	41.8	0.0132	47.0	8.6	0.0388	51.7
2.00	22.1	44.0	39.8	0.0132	45.0	8.9	0.0279	49.2
5.00	22.1	41.0	36.8	0.0132	42.0	9.4	0.0181	45.5
15.00	22.1	34.0	29.8	0.0132	35.0	10.6	0.0111	36.9
30.00	22.1	30.0	25.8	0.0132	31.0	11.2	0.0081	31.9
60.00	22.1	26.0	21.8	0.0132	27.0	11.9	0.0059	26.9
250.00	22.4	20.0	15.8	0.0132	21.0	12.9	0.0030	19.6
1440.00	22.2	16.0	11.8	0.0132	17.0	13.5	0.0013	14.6

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = % GRAVEL = 13.1 % SAND = 30.8
% SILT = 31.4 % CLAY = 24.7

D_{85}= 4.01 D_{60}= 0.13 D_{50}= 0.03
D_{30}= 0.01 D_{15}= 0.00

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	23.9	44.6	31.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	95.9		
#40	91.0		
#60	87.1		
#140	78.8		
#200	76.1		

* (no specification provided)

Material Description

Lean clay with sand

Atterberg Limits

PL= 22 LL= 34 PI= 12

Coefficients

D_{85}= 0.200 D_{60}= 0.0183 D_{50}= 0.0116
D_{30}= 0.0046 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

Sample No.: Source of Sample: Date: 12-27-05
Location: OT-11 Elev./Depth: 1.5'-2.5'

MACTEC, INC.

Charlotte, North Carolina

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow

Project No: 3043-05-1064-02 Figure

GRAIN SIZE DISTRIBUTION TEST DATA

Client: TVA
Project: TVA Kingston 33.5 Acre Borrow
Project Number: 3043-05-1064-02

Sample Data

Source:
Sample No.:
Elev. or Depth: 1.5'-2.5' Sample Length(in./cm.):
Location: OT-11
Description: Lean clay with sand
Date: 12-27-05 PL: 22 LL: 34 PI: 12
USCS Classification: CL AASHTO Classification:
Testing Remarks:

Mechanical Analysis Data

	Initial
Dry sample and tare=	472.74
Tare =	0.00
Dry sample weight =	472.74

Sample split on number 10 sieve
Split sample data:
Sample and tare = 62.79 Tare = .00 Sample weight = 62.79
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
# 10	0.00	100.0
# 20	2.58	95.9
# 40	5.68	91.0
# 60	8.08	87.1
# 140	13.34	78.8
# 200	15.03	76.1

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 100.0
Weight of hydrometer sample: 63.67
Hygroscopic moisture correction:
Moist weight & tare = 46.61
Dry weight & tare = 46.12
Tare = 10.80
Hygroscopic moisture= 1.4 %
Calculated biased weight= 62.80
Table of composite correction values:

Temp, deg C:	10.7	23.1	40.2
Comp. corr:	-7.0	-4.0	0.0

Meniscus correction only= 1
Specific gravity of solids= 2.684
Specific gravity correction factor= 0.992
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

MACTEC, INC.

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	22.1	50.0	45.8	0.0132	51.0	7.9	0.0524	72.3
1.00	22.1	48.0	43.8	0.0132	49.0	8.3	0.0378	69.1
2.00	22.1	46.0	41.8	0.0132	47.0	8.6	0.0273	66.0
5.00	22.1	42.0	37.8	0.0132	43.0	9.2	0.0179	59.6
15.00	22.1	35.0	30.8	0.0132	36.0	10.4	0.0110	48.6
30.00	22.1	30.0	25.8	0.0132	31.0	11.2	0.0080	40.7
60.00	22.1	26.0	21.8	0.0132	27.0	11.9	0.0059	34.4
250.00	22.4	19.0	14.8	0.0131	20.0	13.0	0.0030	23.4
1440.00	22.2	16.0	11.8	0.0131	17.0	13.5	0.0013	18.6

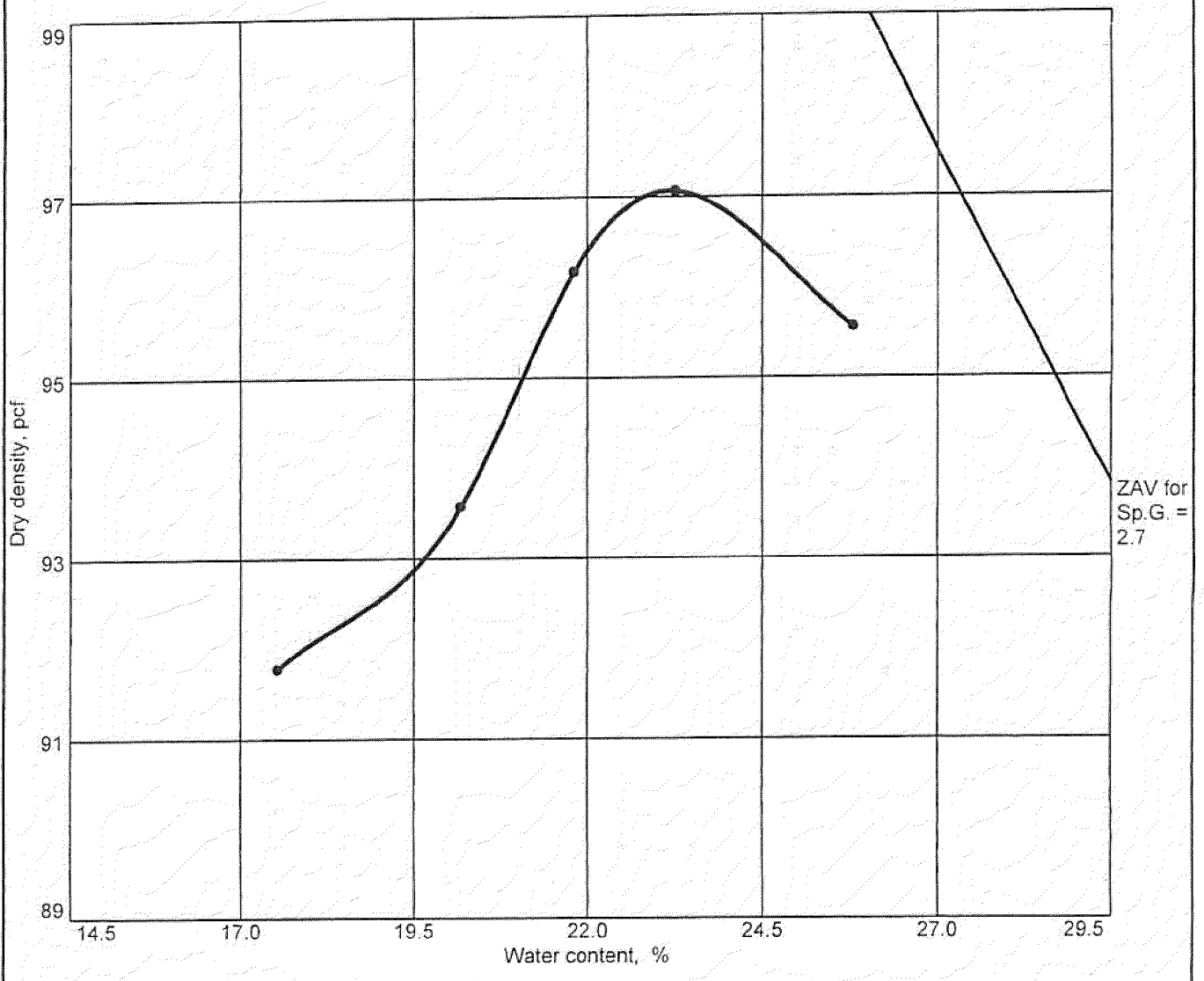
Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = % GRAVEL = % SAND = 23.9
% SILT = 44.6 % CLAY = 31.5

D_{85}= 0.20 D_{60}= 0.02 D_{50}= 0.01
D_{30}= 0.00

MOISTURE-DENSITY RELATIONSHIP TEST RESULTS

COMPACTION TEST REPORT

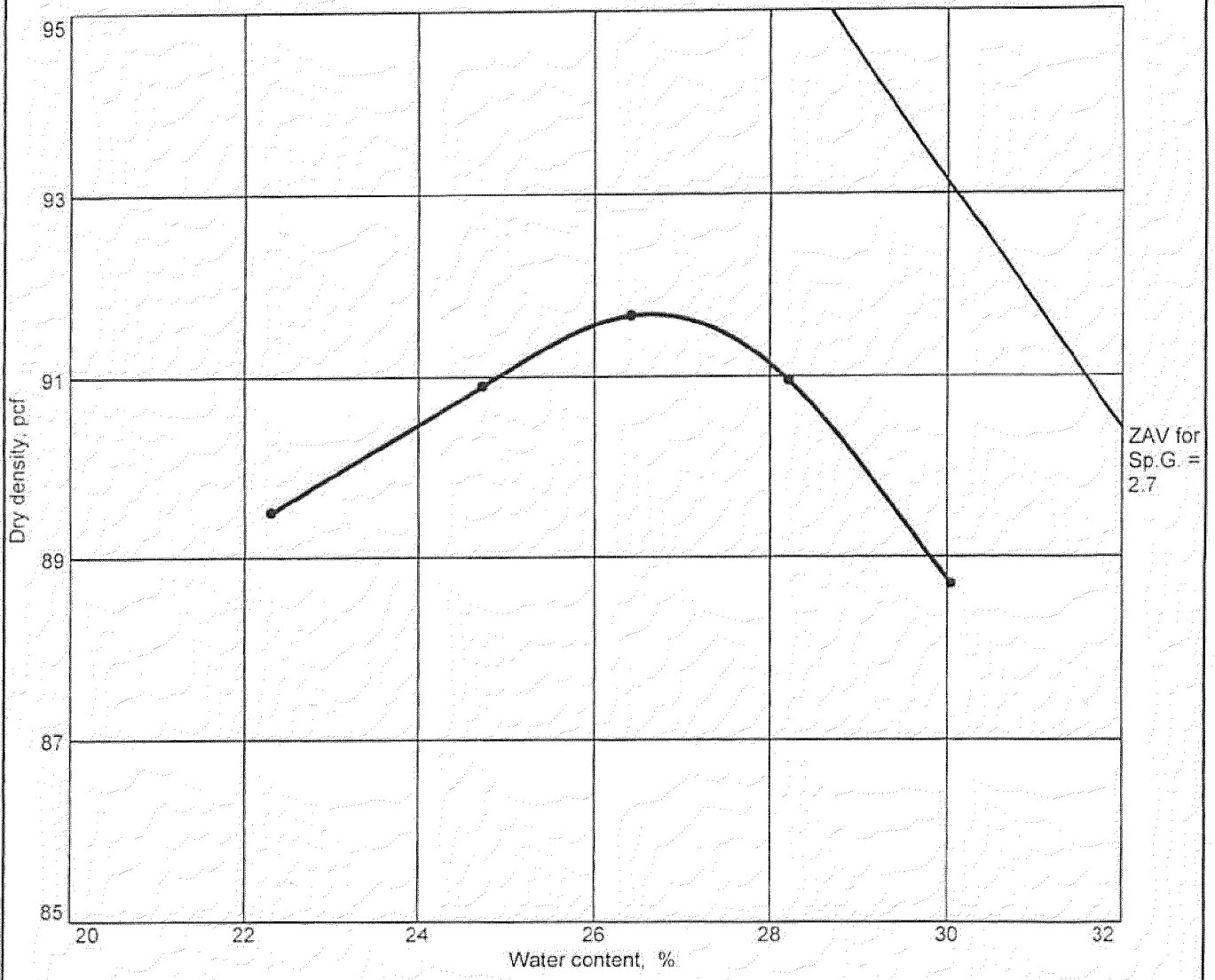


Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
2.5-9	MH		23.2	2.71	50	18	3.2	80.4

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 97.1 pcf Optimum moisture = 23.2 %	Red Brown Elastic Silt with Sand
Project No. 3043051064- **Client:** **Project:** TVA Kingston 33.5-Acre Borrow Area ● **Location:** OT-1	**Remarks:**
COMPACTION TEST REPORT **MACTEC, INC.**	Figure

COMPACTION TEST REPORT



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
2.5-9	MH		26.0	2.73	60	27	0.0	58.7

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 91.7 pcf Optimum moisture = 26.6 %	Reddish Orange Sandy Elastic Silt

Project No. 3043051064- **Client:**

Project: TVA Kingston 33.5-Acre Borrow Area

• **Location:** OT-2

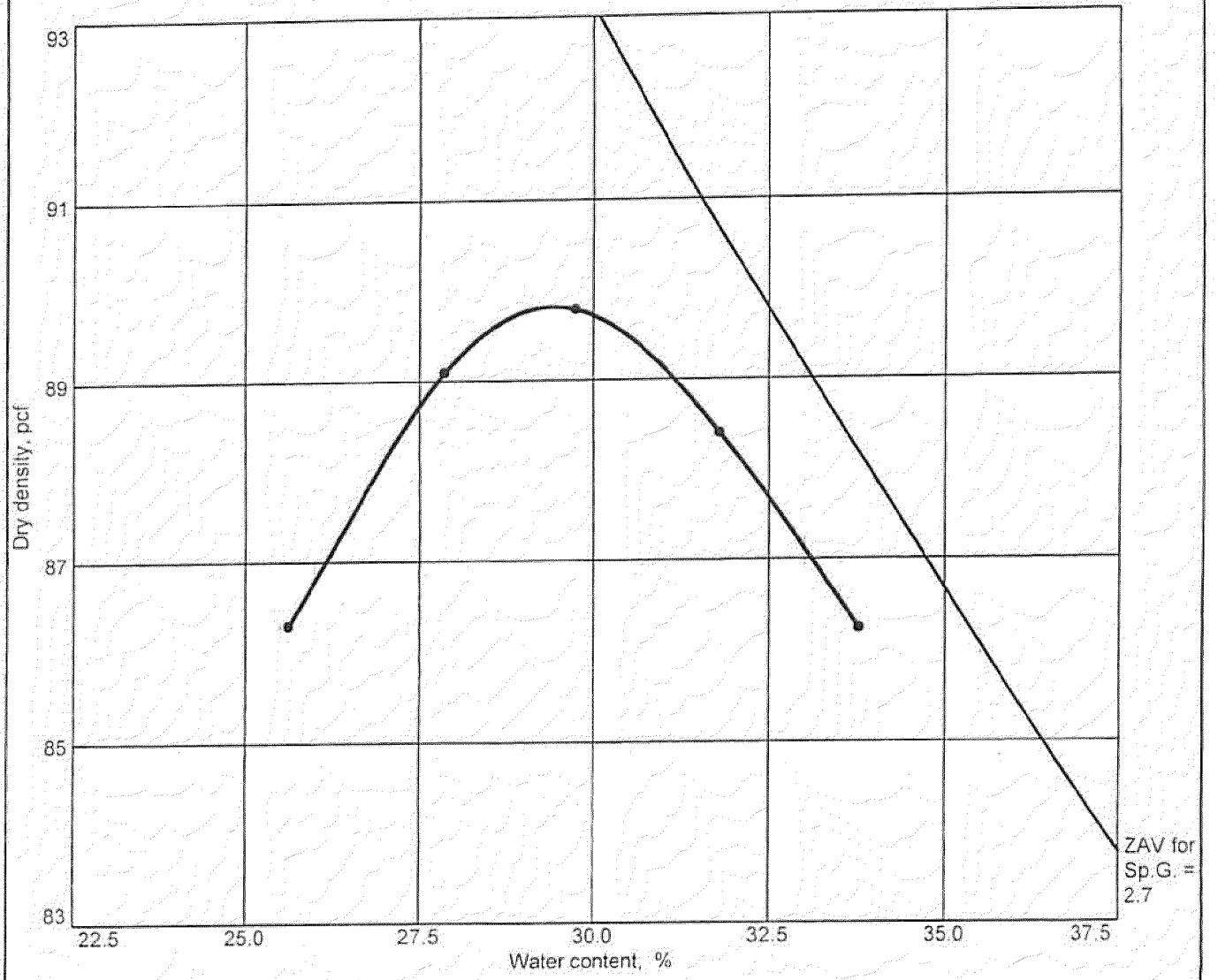
Remarks:

COMPACTION TEST REPORT

MACTEC, INC.

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
10-18.5	MH		30.0	2.81	66	25	2.2	78.0

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 89.8 pcf Optimum moisture = 29.4 %	Light Orange Brown Elastic Silt with Sand

Project No. 3043051064- **Client:**

Project: TVA Kingston 33.5-Acre Borrow Area

Remarks:

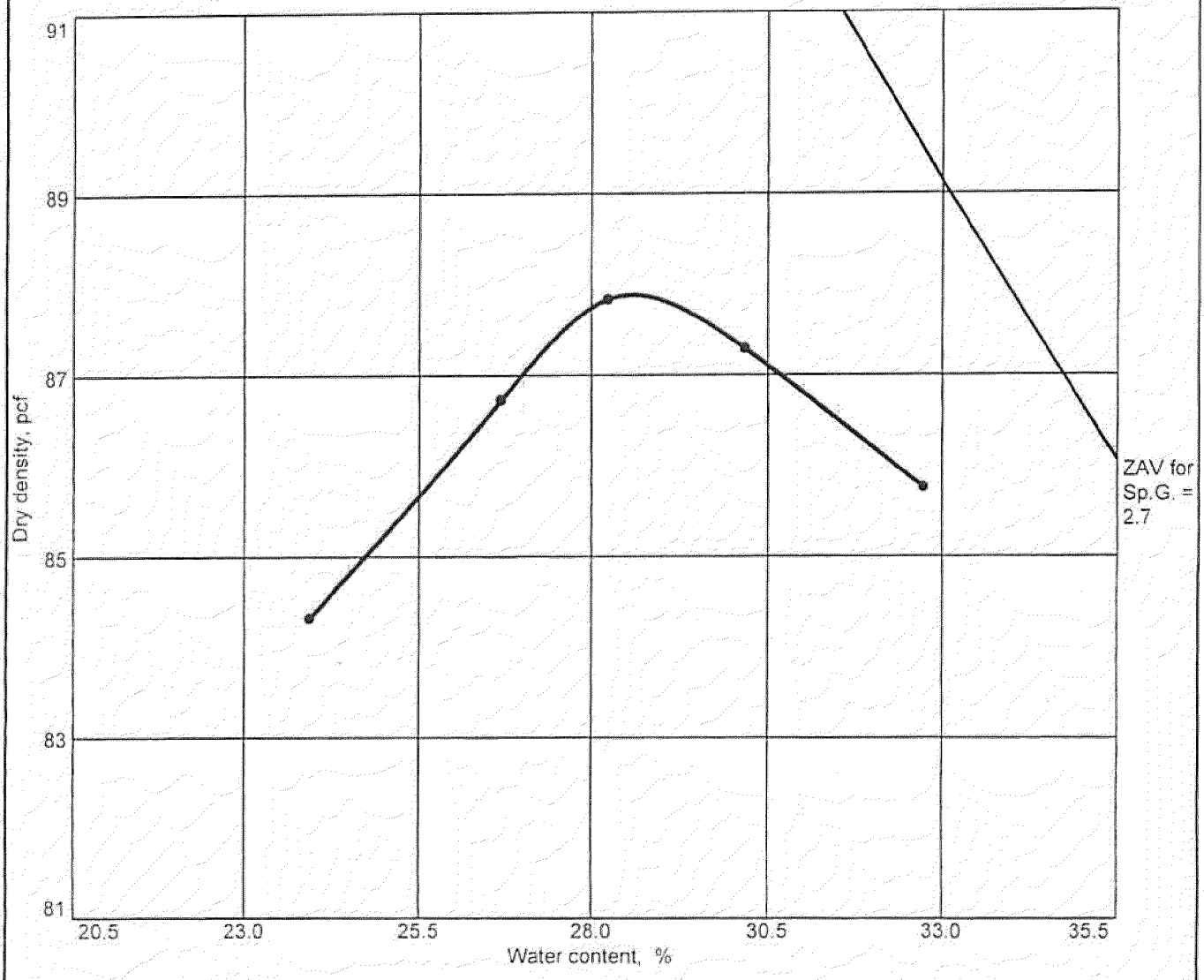
• **Location:** OT-3

COMPACTION TEST REPORT

MACTEC, INC.

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
2.5-10	MH		31.0	2.83	67	31	1.9	79.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 87.9 pcf Optimum moisture = 28.6 %	Brown to Reddish Brown Elastic Silt with Sand

Project No. 3043051064- **Client:**

Project: TVA Kingston 33.5-Acre Borrow Area

● **Location:** OT-4

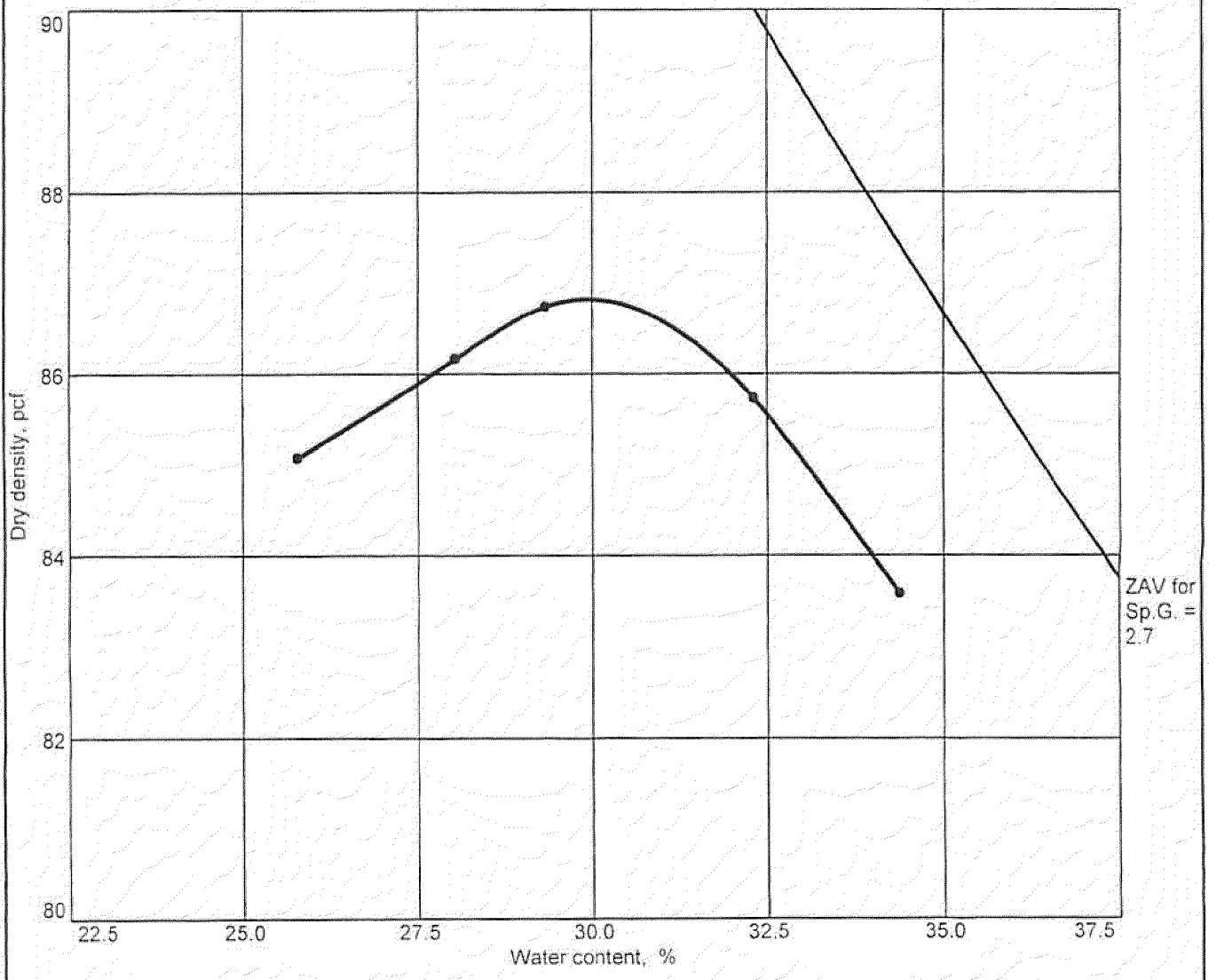
Remarks:

COMPACTION TEST REPORT

MACTEC, INC.

Figure

COMPACTION TEST REPORT

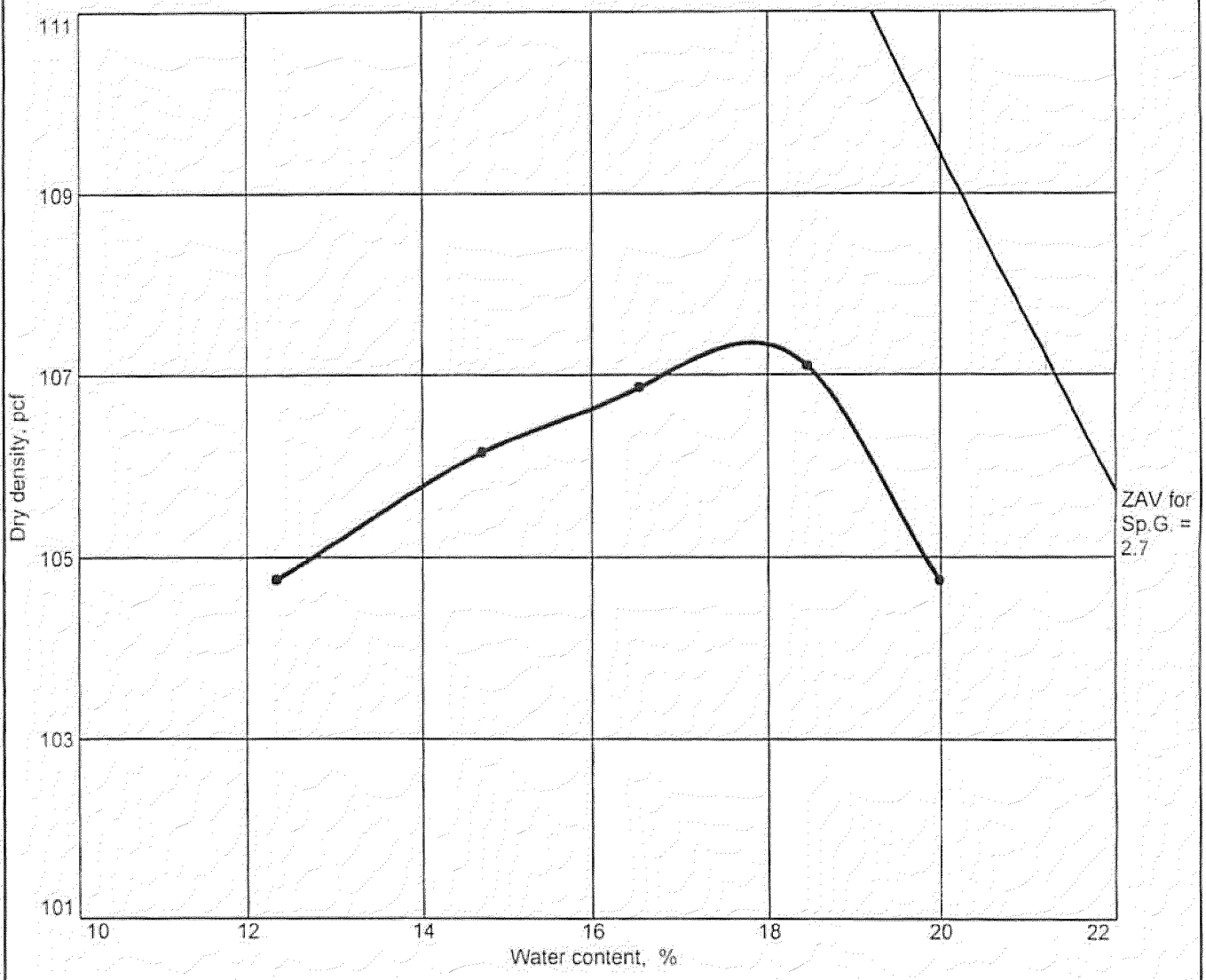


Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
2.5-10	MH		31.0	2.83	67	31	1.9	79.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 86.8 pcf Optimum moisture = 29.9 %	Brown to Reddish Brown Elastic Silt with Sand
Project No. 3043051064- **Client:** **Project:** TVA Kingston 33.5-Acre Borrow Area ● **Location:** OT-4	**Remarks:** Reduced Proctor
COMPACTION TEST REPORT **MACTEC, INC.**	Figure

COMPACTION TEST REPORT



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
2.5-10	MH		31.0	2.83	67	31	1.9	79.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 107.4 pcf Optimum moisture = 17.8 %	Brown to Reddish Brown Elastic Silt with Sand

Project No. 3043051064- **Client:**
Project: TVA Kingston 33.5-Acre Borrow Area

● **Location:** OT-4

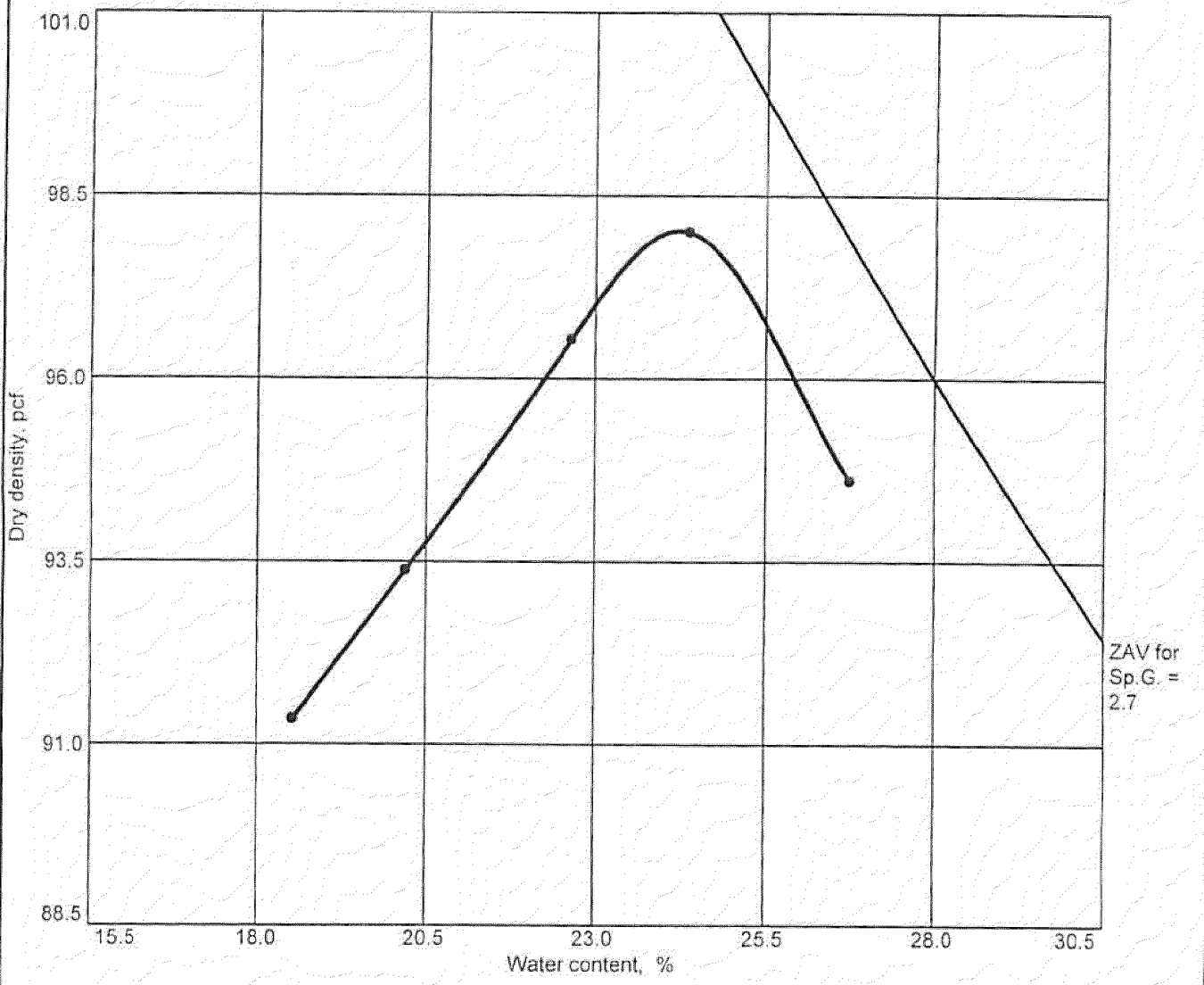
Remarks:
Modified Proctor

COMPACTION TEST REPORT

MACTEC, INC.

Figure

COMPACTION TEST REPORT

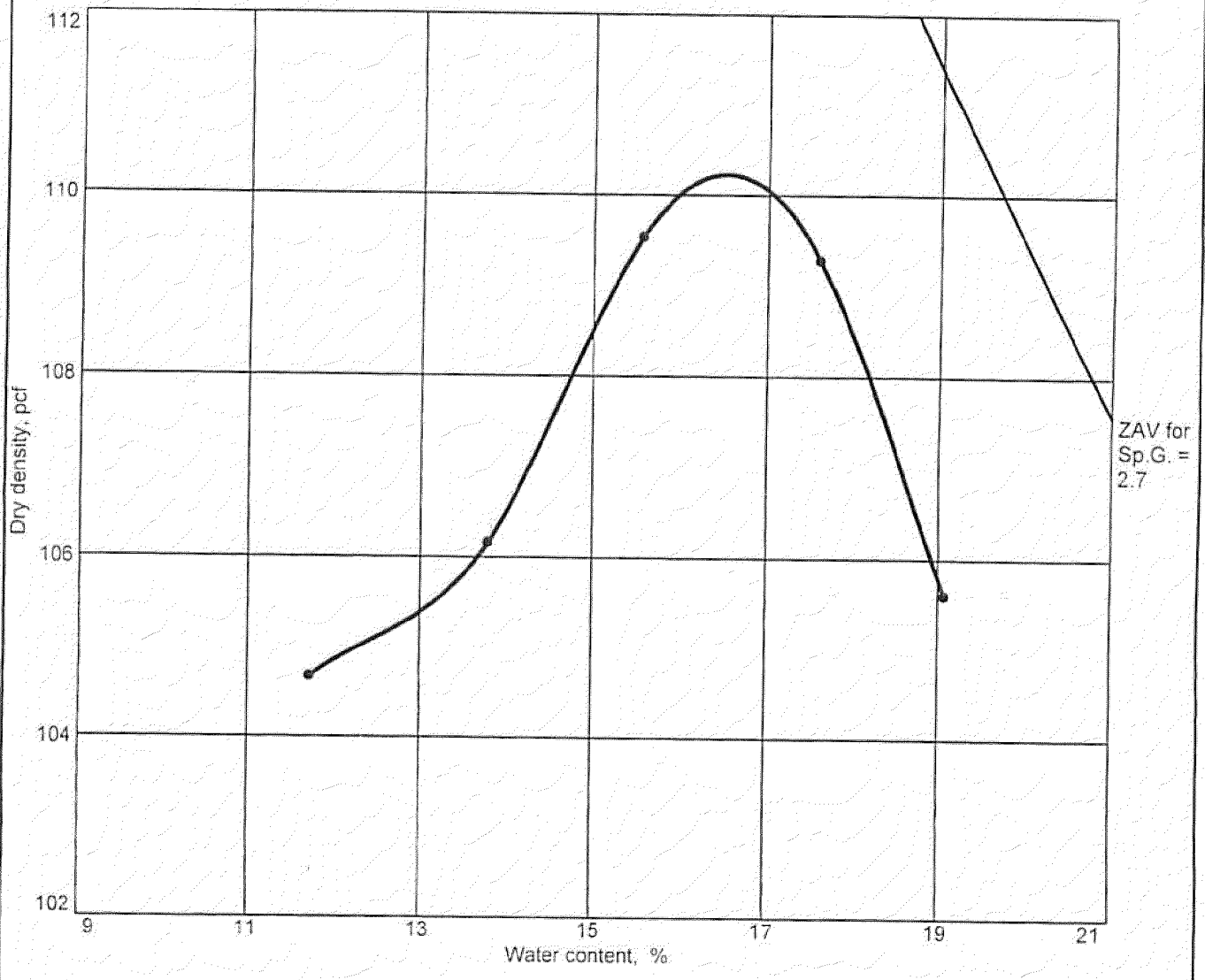


Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
2-10	MH		24.4	2.75	53	21	0.0	72.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 98.0 pcf Optimum moisture = 24.2 %	Reddish Brown Elastic Silt with Sand
Project No. 3043051064- **Client:** **Project:** TVA Kingston 33.5-Acre Borrow Area • **Location:** OT-5	**Remarks:**
COMPACTION TEST REPORT **MACTEC, INC.**	**Figure**

COMPACTION TEST REPORT

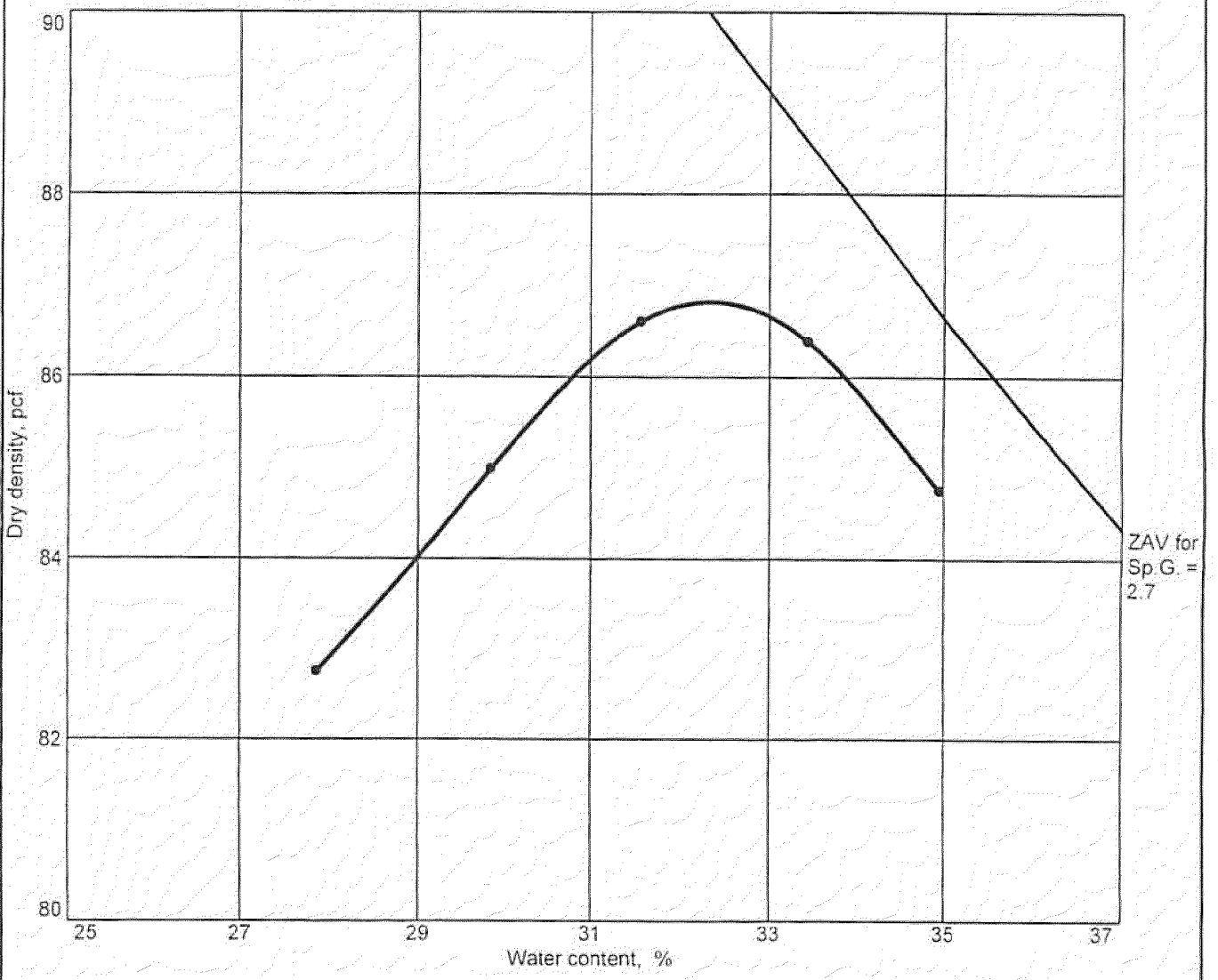


Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
2.5-10	CL		15.0	2.69	31	12	0.0	64.0

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 110.2 pcf Optimum moisture = 16.5 %	Light Orange Brown Sandy Lean Clay
Project No. 3043051064- **Client:** **Project:** TVA Kingston 33.5-Acre Borrow Area ● **Location:** OT-6	**Remarks:**
COMPACTION TEST REPORT **MACTEC, INC.**	Figure

COMPACTION TEST REPORT



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
4-8	MH		32.2	2.75	67	40	0.0	88.2

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 86.8 pcf Optimum moisture = 32.4 %	Reddish Brown Elastic Silt

Project No. 3043051064- **Client:**

Project: TVA Kingston 33.5-Acre Borrow Area

● **Location:** OT-7

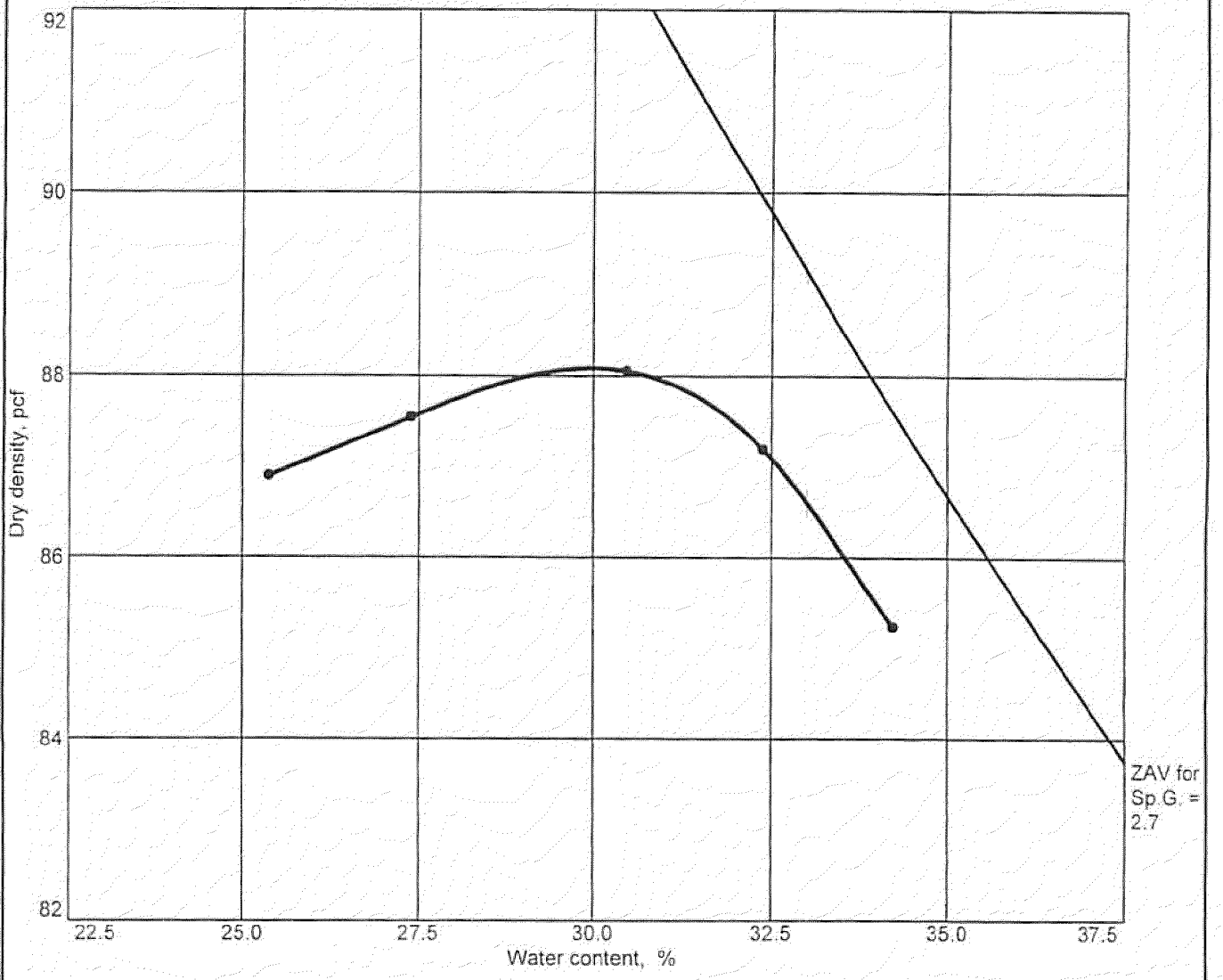
Remarks:

COMPACTION TEST REPORT

MACTEC, INC.

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
2-9.5	MH		30.1	2.69	65	31	3.3	80.4

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 88.1 pcf Optimum moisture = 30.0 %	Reddish Brown Elastic Silt with Sand

Project No. 3043051064- **Client:**

Project: TVA Kingston 33.5-Acre Borrow Area

• **Location:** OT-8

Remarks:

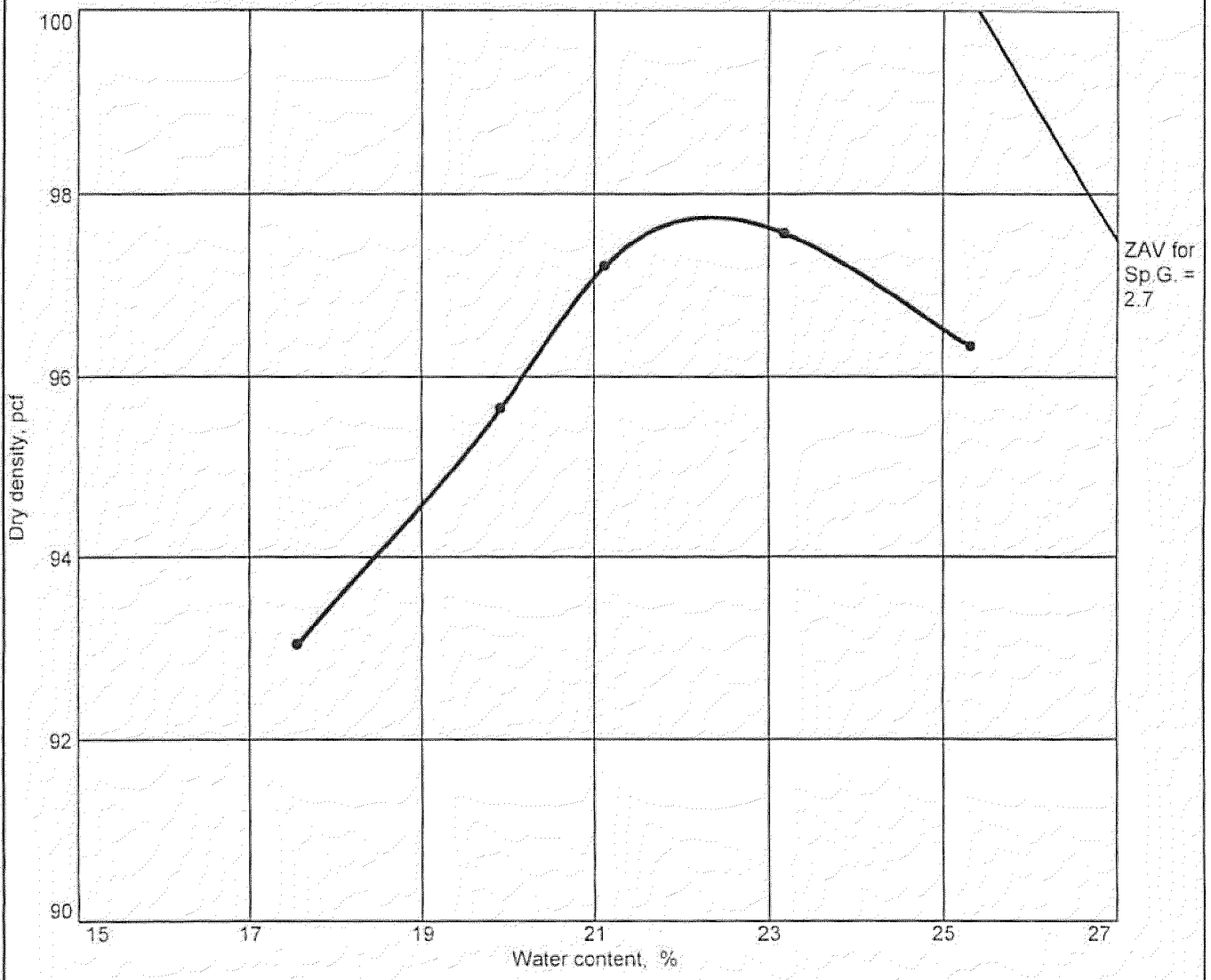
Modified Proctor

COMPACTION TEST REPORT

MACTEC, INC.

Figure

COMPACTION TEST REPORT

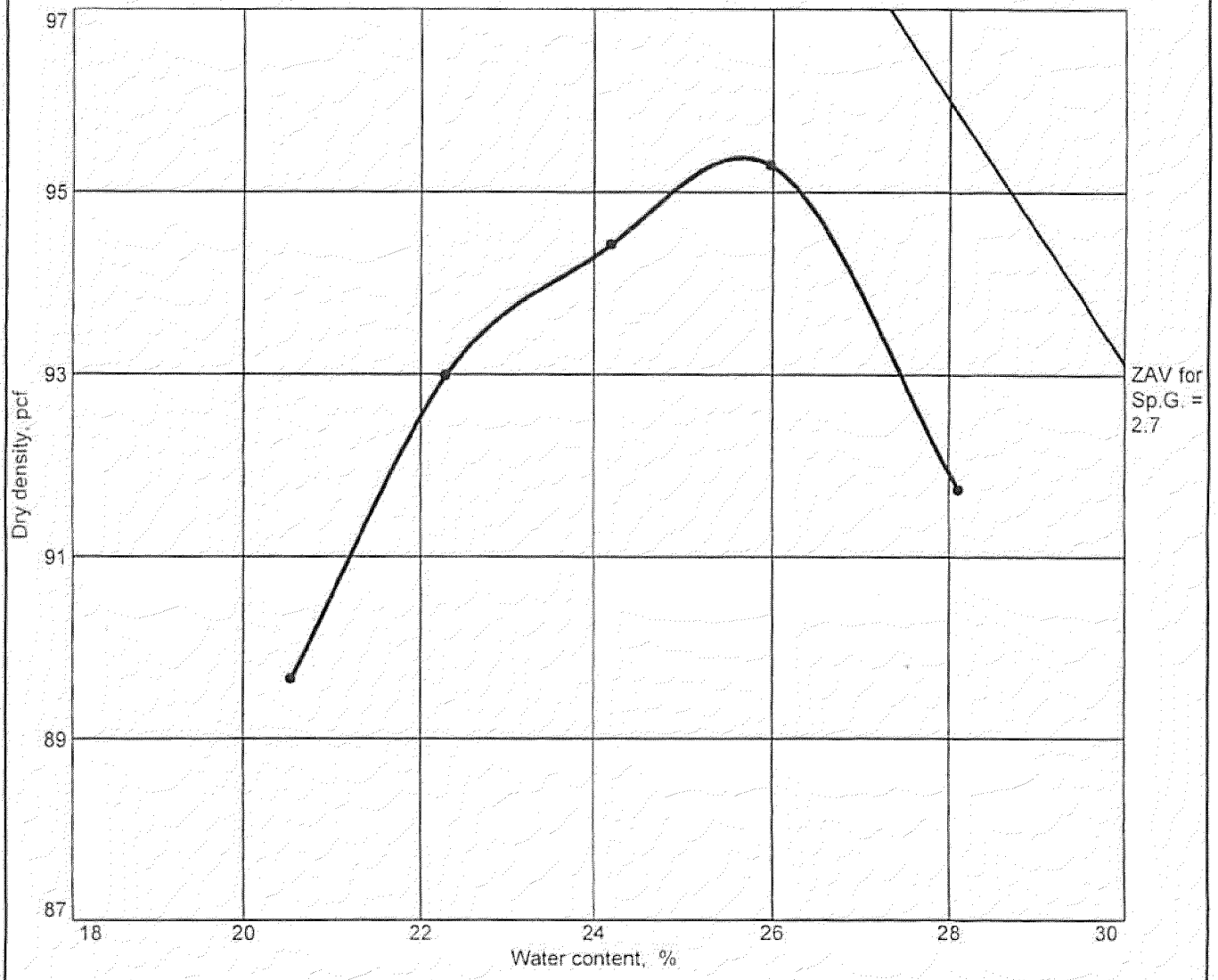


Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
2-9.5	CH		20.3	2.72	50	22	2.4	66.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 97.7 pcf Optimum moisture = 22.4 %	Reddish Orange Sandy Fat Clay
Project No. 3043051064- **Client:** **Project:** TVA Kingston 33.5-Acre Borrow Area • **Location:** OT-9	**Remarks:**
COMPACTION TEST REPORT **MACTEC, INC.**	Figure

COMPACTION TEST REPORT

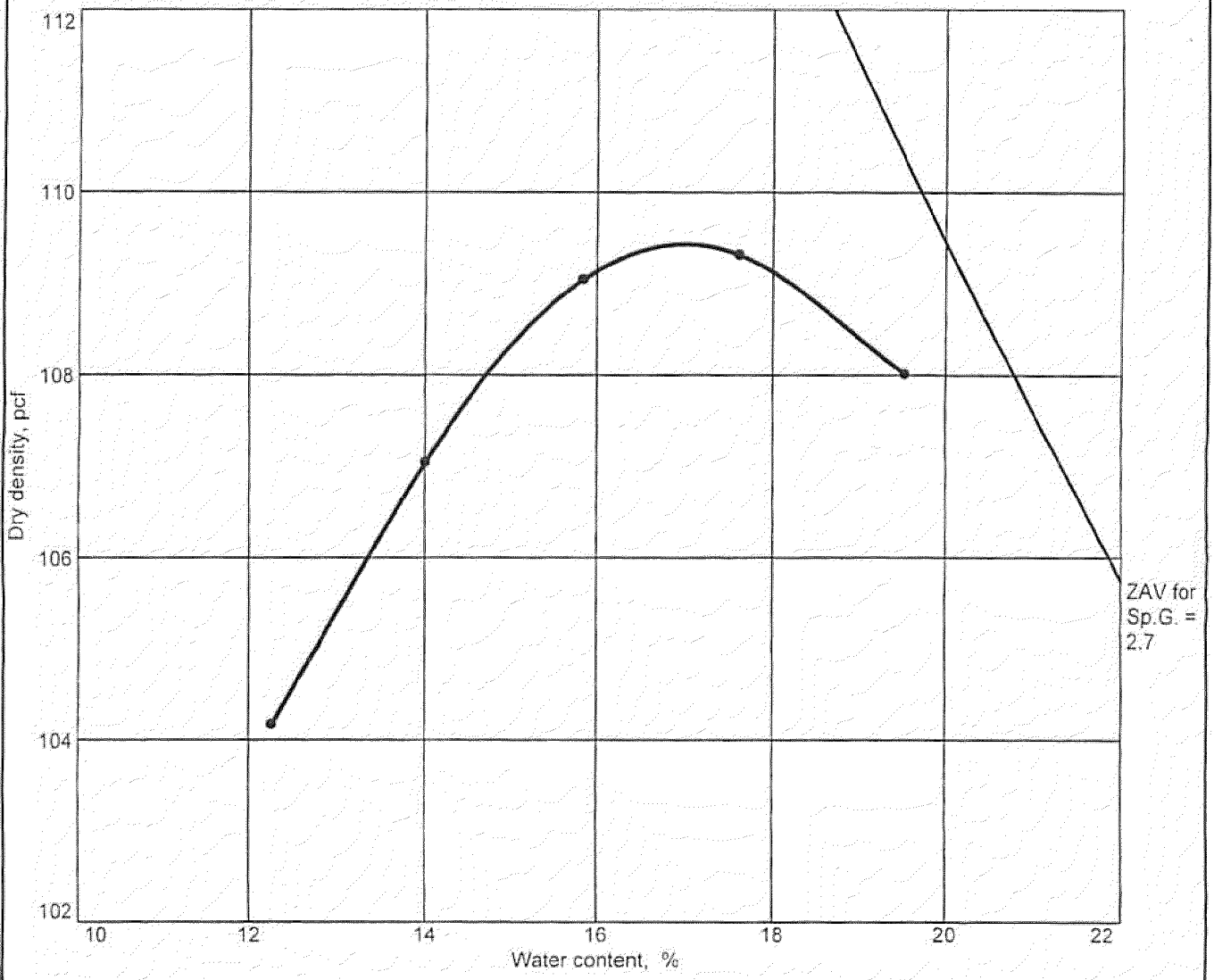


Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
2-9.5	CH		20.3	2.72	50	22	2.4	66.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 95.4 pcf Optimum moisture = 25.7 %	Reddish Orange Sandy Fat Clay
Project No. 3043051064- **Client:** **Project:** TVA Kingston 33.5-Acre Borrow Area ● **Location:** OT-9	**Remarks:** Reduced Proctor
COMPACTION TEST REPORT **MACTEC, INC.**	**Figure**

COMPACTION TEST REPORT

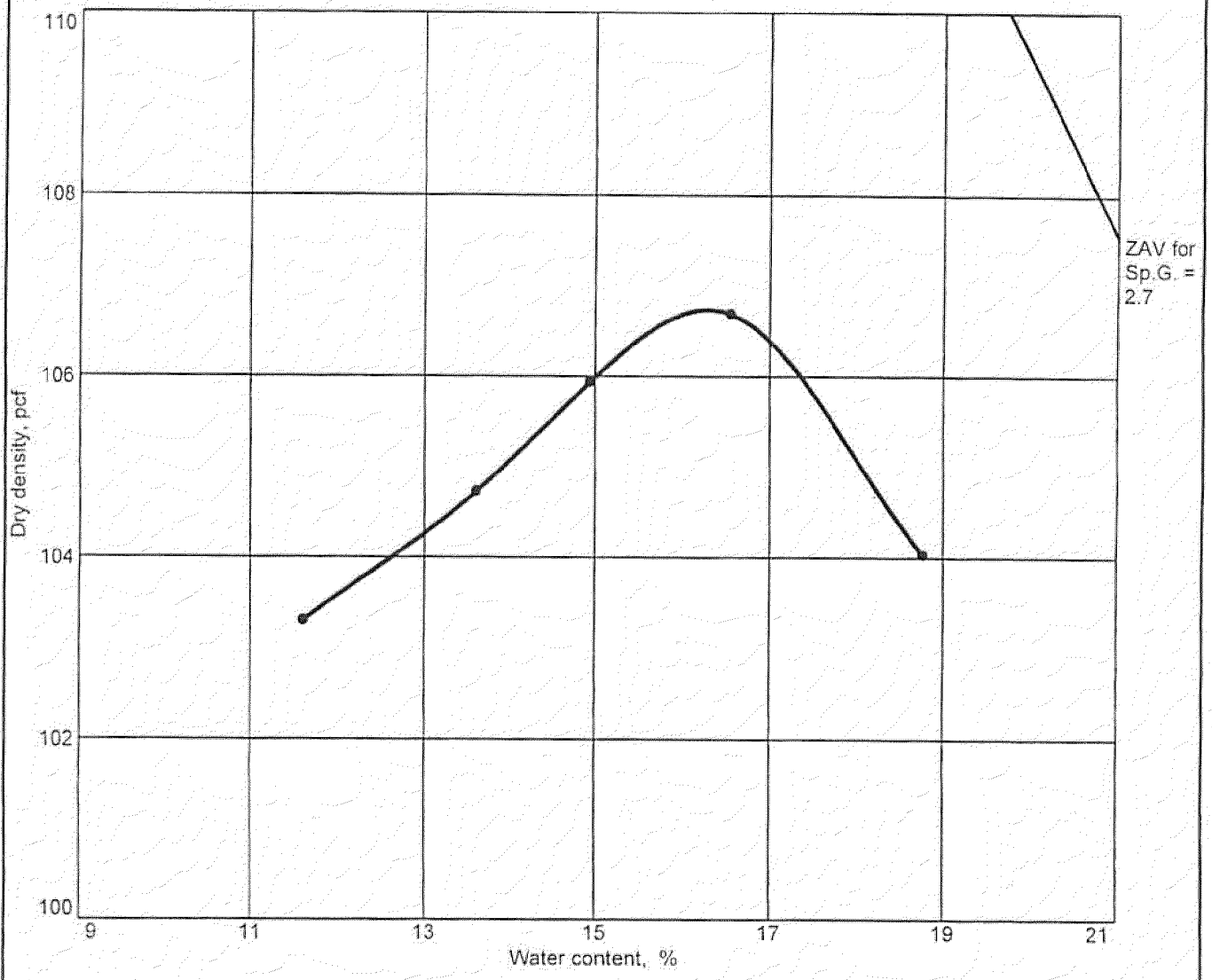


Test specification: ASTM D 1557-91 Procedure A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
2-9.5	CH		20.3	2.72	50	22	2.4	66.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 109.4 pcf Optimum moisture = 17.0 %	Reddish Orange Sandy Fat Clay
Project No. 3043051064- **Client:** **Project:** TVA Kingston 33.5-Acre Borrow Area • **Location:** OT-9	**Remarks:** Modified Proctor
COMPACTION TEST REPORT **MACTEC, INC.**	Figure

COMPACTION TEST REPORT

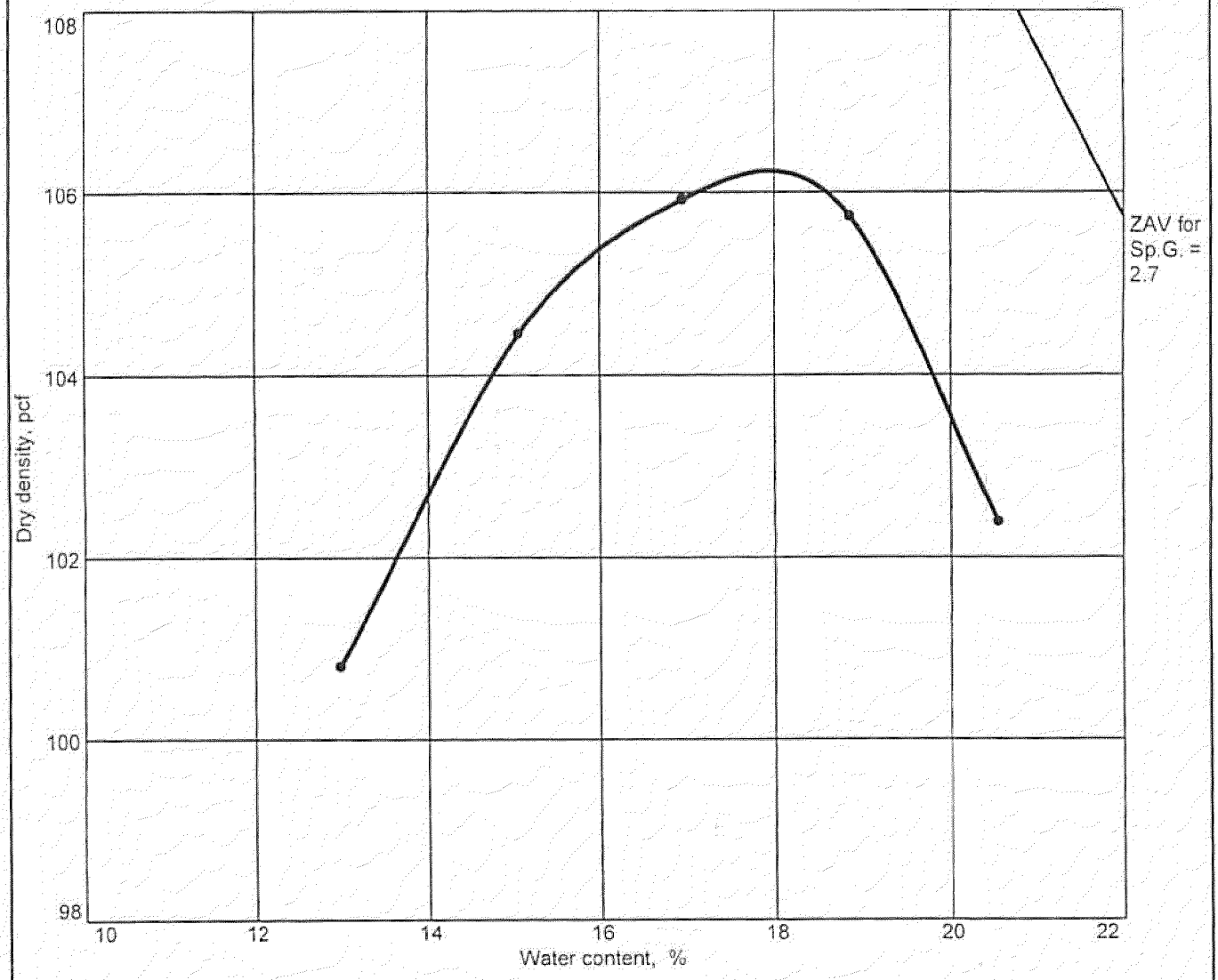


Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.8-2.0	CL		11.3	2.67	30	11	13.1	56.1

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 106.7 pcf Optimum moisture = 16.3 %	Tan Sandy Lean Clay
Project No. 3043051064- **Client:** **Project:** TVA Kingston 33.5-Acre Borrow Area • **Location:** OT-10	**Remarks:**
COMPACTION TEST REPORT **MACTEC, INC.**	**Figure**

COMPACTION TEST REPORT

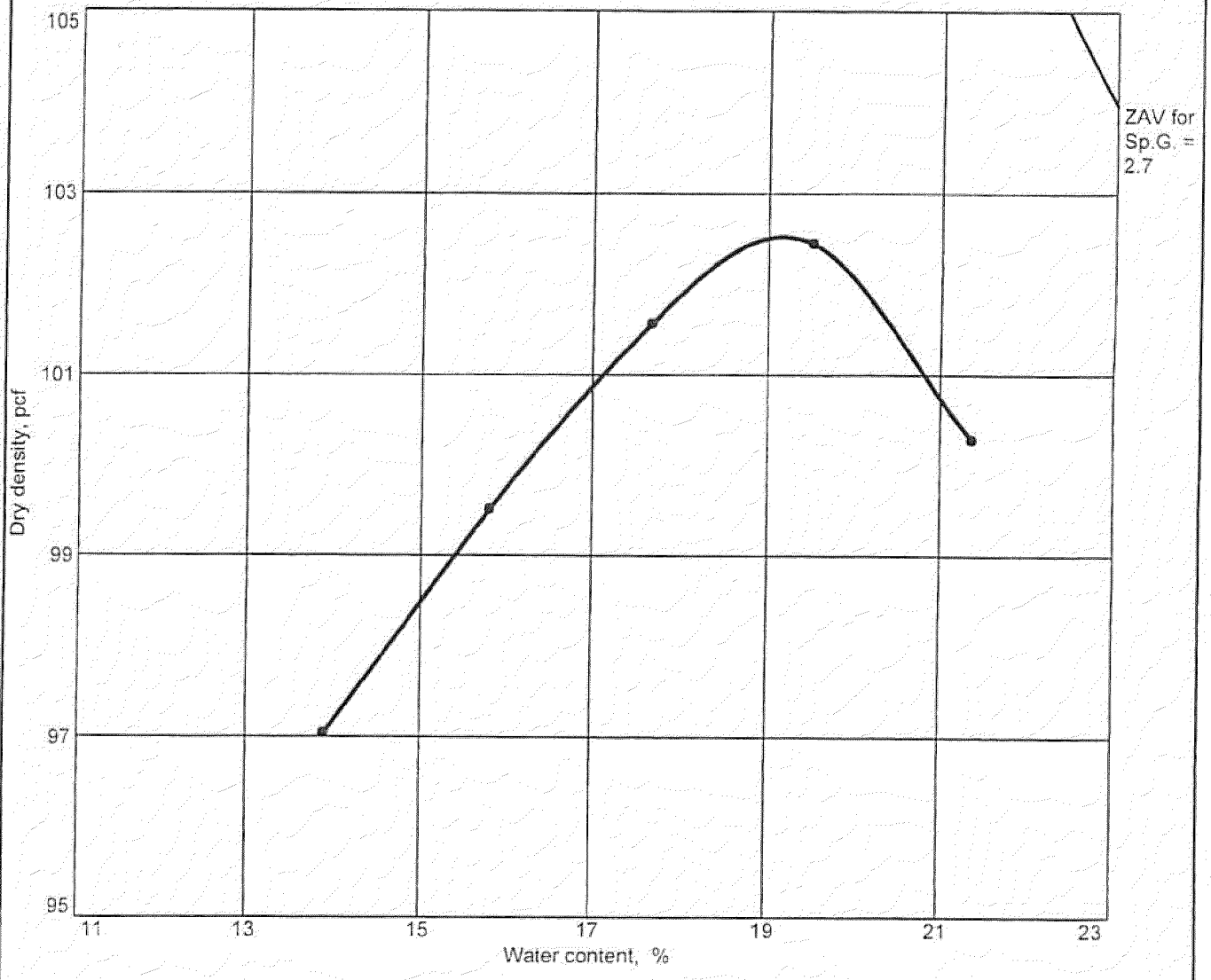


Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1.5-2.5	CL		15.0	2.68	34	12	0.0	76.1

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 106.2 pcf Optimum moisture = 18.0 %	Light Brown Lean Clay with Sand
Project No. 3043051064- **Client:** **Project:** TVA Kingston 33.5-Acre Borrow Area • **Location:** OT-11	**Remarks:**
COMPACTION TEST REPORT **MACTEC, INC.**	Figure

COMPACTION TEST REPORT

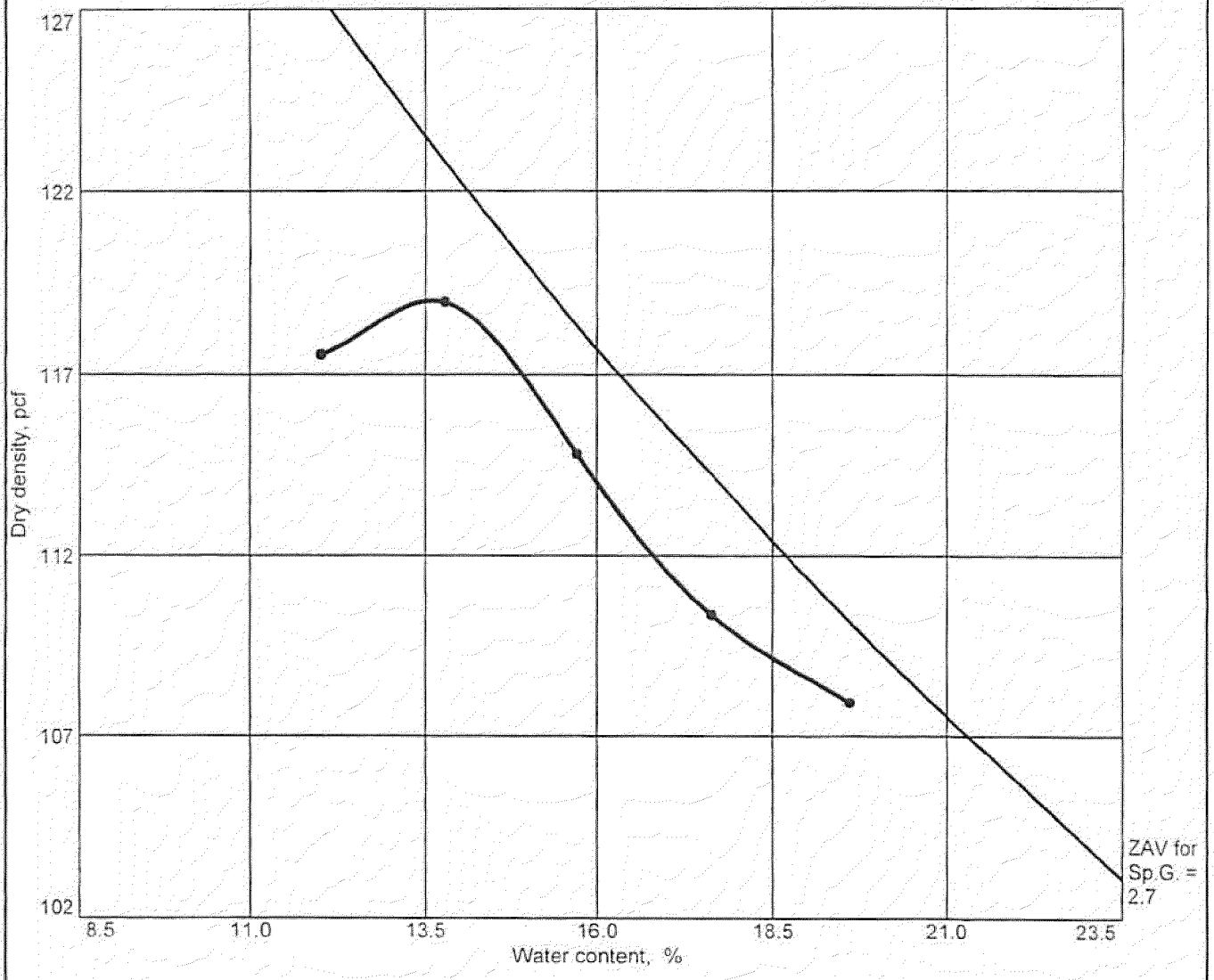


Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1.5-2.5	CL		15.0	2.68	34	12	0	76.1

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 102.5 pcf Optimum moisture = 19.2 %	Light Brown Lean Clay with Sand
Project No. 3043051064- **Client:** **Project:** TVA Kingston 33.5-Acre Borrow Area ● **Location:** OT-11	**Remarks:** Reduced Proctor
COMPACTION TEST REPORT **MACTEC, INC.**	Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Procedure A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1.5-2.5	CL		15.0	2.68	34	12	0.0	76.1

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 119.0 pcf Optimum moisture = 13.6 %	Light Brown Lean Clay with Sand
Project No. 3043051064- **Client:** **Project:** TVA Kingston 33.5-Acre Borrow Area • **Location:** OT-11	**Remarks:** Modified Proctor
COMPACTION TEST REPORT **MACTEC, INC.**	Figure

HYDRAULIC CONDUCTIVITY TEST RESULTS

MACTEC
CONSTANT HEAD PERMEABILITY TEST

Form No.: 9

(ASTM D5084)

JOB NAME: TVA Kingston Borrow
JOB NO.: 3643-05-1064
BORING NO.: OT 1
DEPTH:
SAMPLE: 95% STD @ +2% opt m.c.
DESCRIPTION:

TECHNICIAN: FM
DATE: 07 Mar 06
CHECKED BY: CTJ
CELL NO.: Love
SYSTEM NO.: 18

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 91.7
WET UNIT WEIGHT (pcf): 115.2

SAMPLE MEASUREMENTS: (INT.)
1) 2.992 2) 2.996 3) 2.987 : 1) 2.827 2) 2.879 3) 2.880

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 2.992 (in) 7.600 (cm)
SOIL DIAMETER: 2.879 (in) 7.313 (cm)
AREA(A): (in²) 42.00 (cm²)
SATURATION: 1.0 – 10.0 ; 1.0 – 12.9

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 588.9
FINAL WET WEIGHT (g): 612.02
FINAL DRY WEIGHT (g): 479.69
INITIAL MOISTURE (%): 25.6
FINAL MOISTURE (%):
PAN NAME: AE / 14.25

FINAL MEASUREMENTS:

	L	D
1)	2.985	2.87
2)	2.994	2.82
3)	2.995	2.84

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi: 18.5
TEMPERATURE (°F): 73
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H20
BURET CORRECTION FACTOR(C): L 0.99 R 0.99

B-VALUE	INT	FIN
	72	70.0
	82	79.6

EST. Sat.: 96 %

CONSOL*: INT: 9.6 FIN: 10.0 Δ 0.4

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (t) MINUTES	SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{in}	Δ_{out}	R	Q	K (cm/s) K(const)	h_1	h_2	K(Falling)
(F°)																		
73	3-9	3-9	3:29	3:46	17	1020	15.7	10.5	15.3	10.8	0.3	0.4	0.75	0.4	4.4×10^{-7}			
	3-9	3-9	3:46	4:16	30	1800	15.3	10.8	14.7	11.4	0.6	0.9	0.67	0.7	4.6×10^{-7}			
	3-9	3-9	4:16	6:36	140	8400	14.7	11.4	12.3	14.0	2.6	2.4	1.08	2.5	3.5×10^{-7}			
	3-10		9:25	10:19	66	3960	12.5	8.2	11.5	9	0.8	1.0	.800	0.9	2.7×10^{-7}			
			10:19	11:55	96	5760	11.5	9	10.1	10.5	1.5	1.4	1.07	1.5	3.1×10^{-7}			
			11:55	1:47	112	6720	10.1	10.5	8.5	12.2	1.7	1.6	1.06	1.6	2.8×10^{-7}			
			1:47	2:26	39	2340	8.5	12.2	8	12.7	0.5	0.5	1.00	0.5	2.5×10^{-7}			
			2:26				8	12.7										
TOTALS						t=27180								Q=7.0				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.600)(0.931)(0.99)}{(140.68)(42.00)} = 3.1 \times 10^{-7}$ cm/s

MACTEC Engineering and Consulting, Inc.
2801 Yorkmont Road, Suite 100 • Charlotte, NC 28208 • Phone: 704.357.8600 • 704.357.8638

Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

96980000-TVA

MACTEC
CONSTANT HEAD PERMEABILITY TEST
(ASTM D5084)

Form No.: 9

JOB NAME: TVA Kingston Borrow
JOB NO.: 3043-05-1064
BORING NO.: BT-2
DEPTH:
SAMPLE: 95% STD @ +2% opt m.c.
DESCRIPTION:

TECHNICIAN: FM/JA
DATE: 3-7-6
CHECKED BY: CTA
CELL NO.: 4
SYSTEM NO.: 19

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm³):
DRY UNIT WEIGHT (pcf): 87.5 pcf
WET UNIT WEIGHT (pcf): 112.5

SAMPLE MEASUREMENTS: (INT.)
D 1) 2.884 2) 2.883 3) 2.882
L 1) 2.982 2) 2.955 3) 2.973

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 2.970 (in) 7.544 (cm)
SOIL DIAMETER: 2.883 (in) 7.323 (cm)
AREA(A): (in²) 42.12 (cm²)
SATURATION: 0.9 - 18.0; 1.0 - 23.7

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 578.54
FINAL WET WEIGHT (g): 612.27
FINAL DRY WEIGHT (g): 460.79
INITIAL MOISTURE (%): 28.58
FINAL MOISTURE (%):
PAN NAME: AC / 17.04

FINAL MEASUREMENTS:

	L	D
1)	2.95	2.88
2)	2.94	2.86
3)	2.94	2.84

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi: 18.6
TEMPERATURE (°F): 73
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE

	INT	FIN
	72	20.0
	82	78.5

EST. SAT.: 95 %

CONSOL*
INT: 11.1
FIN: 12.0
Δ_{OUT}: 0.9

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	ELAPSED TIME (+) SECONDS	READING (L) START	READING (R) START	READING (L) END	READING (R) END	FLOW Δ_{IN}	FLOW Δ_{OUT}	FLOW R%	FLOW Q	K(cm/s) K(CONST)	h_1	h_2	K(FALL)
73	3-9	3-9	3:29	3:47	18	1080	15.6	10.6	15	10.9	0.3	0.6	0.50	0.4	4.3×10^{-7}			
	3-9	3-9	3:47	4:16	29	1740	15	10.9	14.2	11.5	0.6	0.8	0.75	0.7	4.7×10^{-7}			
	3-9	3-9	4:16	6:36	140	8400	14.2	11.5	10.7	14.3	2.8	3.5	0.80	3.1	4.3×10^{-7}			
	3-10		9:30	10:20	50	3000	12.2	8.2	11.3	9	0.8	0.9	0.89	0.8	3.7×10^{-7}			
			10:20	11:56	96	5760	11.3	9	10.4	10.6	1.6	0.9	1.78	1.2	2.4×10^{-7}			
			11:56	1:47	111	6660	10.4	10.6	7.7	12.4	1.8	2.7	0.67	2.2	3.9×10^{-7}			
			1:47	2:26	39	2340	7.7	12.4	7.2	12.9	0.5	0.5	1.00	0.5	2.5×10^{-7}			
			2:26				7.2	12.9										
TOTALS						t=17760								Q=4.7				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.544)(0.931)(0.99)}{(140.68)(42.12)} = 3.1 \times 10^{-7}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

Form No.: 9

JOB NAME: TVA Borrow
JOB NO.: # 3643-05-1064
BORING NO.: OT-3
DEPTH:
SAMPLE: 95% STD @ +2% opt m.c.
DESCRIPTION:

TECHNICIAN: DA / FM
DATE: 3-7-6
CHECKED BY: CTA
CELL NO.: Happy
SYSTEM NO.: 2

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 85.0 pcf
WET UNIT WEIGHT (pcf): 111.8

SAMPLE MEASUREMENTS: (INT.)
1) 3.035 2) 3.040 3) 3.040
1) 2.880 2) 2.880 3) 2.880

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.038 (in) 7.717 (cm)
SOIL DIAMETER: 2.880 (in) 7.315 (cm)
AREA(A): (in²) 42.03 (cm²)
SATURATION: 0.5 – 21.0; 0.0 – 14.0

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 580.82
FINAL WET WEIGHT: (g): 616.18
FINAL DRY WEIGHT (g): 455.12
INITIAL MOISTURE (%): 31.16
FINAL MOISTURE (%):
PAN NAME: RB / 13.56

FINAL MEASUREMENTS:

	L	D
1)	3.01	2.91
2)	3.02	2.87
3)	3.01	2.86

Scale: E9-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi =
TEMPERATURE (°F): 73
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE

	INT	FIN
	72	70.1
	82	79.8

EST. SAT.: 97 %

CONSOL* INT: 9.5 FIN: 10.1 Δ_{OUT}: 0.6

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE		TIME		ELASPED TIME (+)		READING				FLOW				K(cm/s)			
(F°)	S	E	START	END	MINUTES	SECONDS	(L) START	(R)	(L) END	(R)	Δ_{IN}	Δ_{OUT}	R/o	Q	K(const)	h_1	h_2	K(Falling)
73	3-9	3-9	3:30	3:47	17	1020	15.2	10.8	14.1	11.4								
	3-9	3-9	3:47	4:17	30	1800	14.1	11.4	12.6	12.5								
	3-9	3-9	4:17	6:37	140	8400	12.6	12.5	6.3	17.3								
	3-10		9:32 AM	10:20	72	4320	14.3	6.0	12.6	7.5	11.5	1.7	0.88	1.6	4.5×10^{-7}			
			10:20	11:57	97	5820	12.6	7.5	10.6	10.7	3.2	2.0	1.60	2.6	5.4×10^{-7}			
			11:57	1:48	111	6660	10.6	10.7	6	14	8.3	4.6	0.72	3.9	7.0×10^{-7}			
			1:48	2:27	39	2340	6	14	14.8	15.2	1.2	1.2	1.00	1.2	6.2×10^{-7}			
			2:27				14.8	15.2										
TOTALS						t=19140								Q=9.3				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.717)(0.931)(0.99)}{(140.68)(42.03)} = 5.8\times10^{-7}$ cm/s

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* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA Bellefonte
JOB NO.: 3043-05-1064
BORING NO.: OT-4
DEPTH:
SAMPLE: 95% STD @ +2% opt m.c.
DESCRIPTION:

TECHNICIAN: F.M
DATE: 3-7-06
CHECKED BY: CTJ
CELL NO.: #2
SYSTEM NO.: 3

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 83.9 PCF
WET UNIT WEIGHT (pcf): 109.8

SAMPLE MEASUREMENTS: (IN.)
1) 2.899 2) 2.880 3) 2.889
1) 2.898 2) 2.880 3) 2.888

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 2.899 (in) 7.338 (cm)
SOIL DIAMETER: 2.888 (in) 7.336 (cm)
AREA(A): (in²) 42.26 (cm²)
SATURATION: 0.1 – 24.0 ; 0.2 – 24.5

MOISTURE CONTENT

545.38

INITIAL WET WEIGHT (g):
FINAL WET WEIGHT (g): 596.29
FINAL DRY WEIGHT (g): 543.65
INITIAL MOISTURE (%): 30.8 %
FINAL MOISTURE (%):
PAN NAME: N / 14.31

FINAL MEASUREMENTS:

	L	D
1)	2.87	D 2.92
2)	2.86	2) 2.90
3)	2.86	3) 2.88

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi =
TEMPERATURE (°F): 73.
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H2O
BURET CORRECTION FACTOR(C): L0.99 R0.97

B-VALUE

INT	FIN
72	90.0
82	79.5

EST. SAT.: 95 %

CONSOL*:
INT: 10.5
FIN: 11.0
Δ_{out} 0.5

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE		TIME		ELASPED TIME (+)		READING				FLOW				K(cm/s)			
(F°)	S	E	START	END	MINUTES	SECONDS	(L) START	(R)	(L) END	(R)	Δ_{in}	Δ_{out}	R1/0	Q	K(const)	h_1	h_2	K(Falw)
73	3-9	3-9	3:30	3:48	19	1080	16.9	10.6	16.5	11.0	0.4	0.4	1.00	0.4	4.2×10^{-7}			
	3-9	3-9	3:48	4:18	30	1800	16.5	11.0	16.0	11.5	0.5	0.5	1.00	0.5	3.2×10^{-7}			
	3-9	3-9	4:18	6:38	140	8400	16.0	11.5	14.6	13.7	2.2	1.4	1.57	1.8	2.4×10^{-7}			
	3-9	3-10	6:38	9:33	955	57300	14.6	13.7	10.5	19.8	6.1	4.1	1.49	5.1	1.0×10^{-7}			
	3-10		9:39 AM	10:21	42	2520	14.0	6.1	13.7	6.4	0.3	0.3	1.00	0.3	1.4×10^{-7}			
			10:21	11:57	96	5760	13.7	6.4	13.2	6.9	0.5	0.5	1.00	0.5	9.9×10^{-8}			
			11:57	1:48	111	6660	13.2	6.9	12.6	7.6	0.7	0.6	1.17	0.7	1.2×10^{-7}			
			1:48	2:27	39	2340	12.6	7.6	12.4	7.8	0.2	0.2	1.00	0.2	3.7×10^{-8}			
			2:27				12.4	7.8										
TOTALS						t=74580								Q=6.8				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.338)(0.931)(0.98)}{(140.68)(42.26)} = 1.0\times10^{-7}$ cm/s

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* SEE CONSOLIDATION GRAPH.

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Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA - Bolton
JOB NO.:
BORING NO.: GT-5
DEPTH:
SAMPLE: 95% STD @ +2% opt. m.c.
DESCRIPTION: 95% MDD

TECHNICIAN: JA
DATE: 3/22/06
CHECKED BY: CTP
CELL NO.: LOVE
SYSTEM NO.: 18

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 93.1 pcf
WET UNIT WEIGHT (pcf): 117.6

SAMPLE MEASUREMENTS: (INT.)
1) 2.985 2) 2.980 3) 2.983
1) 2.879 2) 2.880 3) 2.881

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 2.983 (in) 7.577 (cm)
SOIL DIAMETER: 2.880 (in) 7.315 (cm)
AREA(A): (in²) 42.03 (cm)
SATURATION:

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 599.64
FINAL WET WEIGHT (g): 608.32
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 26.3 %
FINAL MOISTURE (%):
PAN NAME: AE

FINAL MEASUREMENTS:

	L	D
1)	2.938	D 2.842
2)	2.938	2) 2.858
3)	2.936	3) 2.858

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi: 8.6
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_w): 0.931
PERMEANT LIQUID USED: H2O
BURET CORRECTION FACTOR(C): L:0.99 R:0.99

B-VALUE

	INT	FIN
	72	70.0
	82	78.5

EST. SAT.: 95 %

CONSOL.*
INT: 21.5
FIN: 22.0
Δ: 0.5

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE		TIME		ELASPED TIME (+)		READING				FLOW			K(cm/s)				
(F°)	S	E	START	END	MINUTES	SECONDS	(L) START	(R)	(L) END	(R)	A_{in}	A_{out}	R%	Q	K(const)	h_1	h_2	K(Fall)
73	3/23	3/23	12:31	12:51	20	1200	12.0	8.1	11.8	8.3	0.2	3.7						
	3/23		12:51	1:27	36	2160	11.8	8.3	11.6	8.7	0.4	0.2	2.00	0.3	1.6×10^{-7}			
			1:27	1:54	27	1620	11.6	8.7	11.1	9.1	0.4	0.5	0.80	0.4	2.9×10^{-7}			
		3/23	1:54	2:50	56	3360	11.1	9.1	10.6	9.7	0.6	0.5	1.20	0.6	2.1×10^{-7}			
			2:50				10.6	9.7										
73	3.27		10:01 AM	11:08	67	4020	11.2	9.3	10.5	10.0	0.7	0.7	1.00	0.7	2.1×10^{-7}			
			11:08	12:24	66	3960	10.5	10.0	9.7	10.8	0.8	0.8	1.00	0.8	2.4×10^{-7}			
			12:24	12:54	30	1800	9.7	10.8	9.4	11	0.2	0.3	0.67	0.3	2.0×10^{-7}			
			12:54	3:14	140	8400	9.4	11	8	12.4	1.4	1.4	1.00	1.4	2.0×10^{-7}			
		3/27	3:14	4:31	77	4620	8	12.4	7.3	17.2	0.8	0.7	1.14	0.8	2.0×10^{-7}			
TOTALS						t=26160							Q= 4.6					

COEFFICIENT OF PERMEABILITY, $k=\frac{Q\times L\times R_T\times C}{h\times A\times t}$

$$=\frac{Q}{t}\times\frac{(7.577)(0.931)(0.99)}{(140.68)(42.03)}=$$

2.1×10^{-7} cm/s

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* See Consolidation Graph.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

Form No.: 9

(ASTM D5084)

JOB NAME: TVA - Borrow
JOB NO.:
BORING NO.: QT-6
DEPTH:
SAMPLE: 95% STD @ +2% opt m.c.
DESCRIPTION: 95% MDD

TECHNICIAN: JA
DATE: 3-22-06
CHECKED BY: CJ
CELL NO.: #4
SYSTEM NO.: 19

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm ft):
DRY UNIT WEIGHT (pcf): 105.2 PCF
WET UNIT WEIGHT (pcf): 124.3

SAMPLE MEASUREMENTS: (INT.)
1) 3.007 2) 3.010 3) 3.002
1) 2.872 2) 2.873 3) 2.874

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.006 (in) 7.635 (cm)
SOIL DIAMETER: 2.873 (in) 7.30 (cm)
AREA(A): (in²) 41.82 (cm)
SATURATION:

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 635.85
FINAL WET WEIGHT (g): 649.23
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 18.1 %
FINAL MOISTURE (%):
PAN NAME: 59

FINAL MEASUREMENTS:	L	D
1)	2.982	2.845
2)	2.980	2.852
3)	2.984	2.850

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi: 8.4
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H2O
BURET CORRECTION FACTOR(C): L-0.91 R-0.89

B-VALUE	INT	FIN
	72	70.0
	82	79.6

EST. SAT.: 96 %

CONSOL.*
INT: 29.1
FIN: 29.5
Δ 0.4

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	READING (B) START	READING (L) END	READING (B) END	FLOW Δ_{IN}	FLOW Δ_{OUT}	FLOW R%	FLOW Q	K(cm/s) K(CONST)	h_1	h_2	K(FALL)
73	3/23	3/23	12:31	12:51	20	1200	12.0	8.0	11.8	8.2	0.2	0.2	1.00	0.2	2.0×10^{-7}			
	3/23		12:51	1:27	36	2160	11.8	8.2	11.3	8.4	0.2	0.5	0.40	0.5	2.8×10^{-7}			
			1:27	2:16	49	2940	11.3	8.4	9.1	6.3	2.1	2.2	0.95	2.1	8.5×10^{-7}			
			2:16				9.1	6.3										
73	3/27		10:01 AM	11:08	67	4020	11.2	8.9	8.8	11.2	2.3	2.4	0.96	2.3	6.8×10^{-7}			
			11:08	11:15	15	900	8.8	11.2	8.5	11.5	0.3	0.3	1.00	0.3	4.0×10^{-7}			
			11:15	12:24	69	4140	8.5	11.5	6.2	13.8	2.3	2.3	1.00	2.3	6.6×10^{-7}			
			12:24	12:54	30	1800	6.2	13.2	5.3	14.7	1.5	0.9	1.67	1.2	8.0×10^{-7}			
			12:54	3:14	140	8400	5.3	14.7	1	19	4.3	4.3	1.00	4.3	6.1×10^{-7}			
			3:14															
TOTALS						t = 21260								Q = 10.4				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.635)(0.931)(0.99)}{(140.68)(41.82)} = 6.5 \times 10^{-7}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

TVA-00008701

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA – BORROW ADEA
JOB NO.:
BORING NO.: CT-7
DEPTH:
SAMPLE: 95% STD @ +2% opt. m.c.
DESCRIPTION: 95.2% NDD

TECHNICIAN: JL
DATE: 3/22/6
CHECKED BY: CT
CELL NO.: 21
SYSTEM NO.: 2

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 82.78CF
WET UNIT WEIGHT (pcf): 110.8

SAMPLE MEASUREMENTS: (INT.)
1) 2.947 2) 2.950 3) 2.941
1) 2.881 2) 2.881 3) 2.881

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 2.946 (in) 7.483 (cm)
SOIL DIAMETER: 2.881 (in) 7.318 (cm)
AREA(A): (in²) 42.06 (cm)
SATURATION:

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 558.34
FINAL WET WEIGHT (g): 577.49
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 34.0%
FINAL MOISTURE (%):
PAN NAME: EE

FINAL MEASUREMENTS:

L	D
1) 2.915	1) 2.853
2) 2.910	2) 2.855
3) 2.908	3) 2.859

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi = 18.8
TEMPERATURE (°F): 79°F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H20
BURET CORRECTION FACTOR(C): L=0.99 R=0.99

B-VALUE	INT	FIN
	72	69.9
	82	79.6

EST. SAT.: 97%

CONSOL*
INT: 12.9
FIN: 18.2
Δ_{OT}: 0.7

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{IN}	FLOW Δ_{OT}	R1/0	Q	K(cm/s) K(const)	h_1	h_2	K(Falling)
73	3/23	3/23	12:32	12:52	20	1200	12.1	8.1	12.0	8.2	0.1	0.1						
	3/23		12:52	1:54	62	3726	12.0	8.2	12	8.5	0.3	0.0						
			1:54				12	8.5										
73	3/27		10:02 am	11:08	66	3960	12.0	8.3	11.8	8.5	0.2	0.2	1.00	0.2	5.9×10^{-8}			
			11:08	12:25	77	4620	11.8	8.5	11.7	8.8	0.3	0.1	3.00	0.2	5.0×10^{-8}			
			12:25	12:55	30	1800	11.7	8.8	11.6	8.8	0.1	0.0	=	0.1	6.5×10^{-8}			
			12:55	3:15	140	8400	11.6	8.8	11.4	9.2	0.4	0.2	2.0	0.3	4.2×10^{-8}			
	"		3:15	4:32	77	4620	11.4	9.2	11.3	9.5	0.3	0.1	2.0	0.2	5.0×10^{-8}			
	3/27	3/28	4:32 pm	8:10 am	938	56280	11.3	9.5	10.0	12.3	2.8	1.3	2.2	2.0	4.1×10^{-8}			
TOTALS						t=79680								Q=3.0				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.483)(0.931)(0.99)}{(140.68)(42.06)} = 4.4 \times 10^{-8}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

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Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA Bardon
JOB NO.:
BORING NO.: CT-8
DEPTH:
SAMPLE: 95% STD @ +2% opt m.c.
DESCRIPTION: 95.3% MDD

TECHNICIAN: JA
DATE: 3/22/06
CHECKED BY: CTA
CELL NO.: HARD 4
SYSTEM NO.: 3

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 84.2 PCF
WET UNIT WEIGHT (pcf):

SAMPLE MEASUREMENTS: (INT.)
1) 2.999 2) 2.998 3) 3.000
1) 2.872 2) 2.877 3) 2.876

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 2.999 (in) 7.617 (cm)
SOIL DIAMETER: 2.872 (in) 7.295 (cm)
AREA(A): (in²) 41.80 (cm²)
SATURATION:

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 567.34
FINAL WET WEIGHT (g): 579.77
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 32.1%
FINAL MOISTURE (%):
PAN NAME: CC

FINAL MEASUREMENTS:

	L	D
1)	2.992	D 2.825
2)	2.998	2) 2.848
3)	2.994	3) 2.838

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi = 18.5
TEMPERATURE (°F): 73
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H2O
BURET CORRECTION FACTOR(C): L 0.98 K 0.87

B-VALUE

INT	FIN
72	70.0
62	79.5

Est. Sat.: 95%

Consol.*
INT: 9.3
FIN: 10.0
Δ_{out} 0.7

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE		TIME		ELASPED TIME (+)		READING				FLOW			K (cm/s)				
(F°)	S	E	START	END	MINUTES	SECONDS	(L) START	(R)	(L) END	(R)	Δ_{in}	Δ_{out}	R1/0	Q	K(const)	h_1	h_2	K(Falling)
73	3/23	3/23	12:32	12:52	20	1200	12.0	8.0	11.7	8.3	0.3	0.3	1.0	0.3	3.0×10^{-7}			
	3/23		12:52	1:41	69	4140	11.7	8.3	10.7	9.3	1.0	1.0	1.0	1.0	2.9×10^{-7}			
			1:41	1:55	14	840	10.7	9.3	10.5	9.6	0.3	0.2	1.5	0.2	2.8×10^{-7}			
			1:55	2:15	20	1200	10.5	9.6	10	10	0.4	0.5	0.8	0.4	4.0×10^{-7}			
			2:15	3:12	57	3420	10	10	9	11	1.0	1.0	1.0	1.0	3.5×10^{-7}			
			3:12				9	11										
73	3/27		10:03 AM	11:09	66	3960	11.7	9.0	10.6	10.1	1.1	2.2	0.5	1.6	4.8×10^{-7}			
			11:09	12:25	66	3960	10.6	10.1	9.3	11.4	1.3	1.3	1.0	1.3	3.9×10^{-7}			
			12:25	12:55	30	1800	9.3	11.4	8.7	11.9	0.5	0.5	0.8	0.7	4.6×10^{-7}			
			12:55	3:15	140	8400	8.7	11.9	6.4	14.2	2.3	2.3	1.0	2.3	3.3×10^{-7}			
			3:15	4:32	77	4620	6.4	14.2	5.2	15.6	1.4	1.2	1.2	1.3	3.4×10^{-7}			
TOTALS						t= 18780							Q= 5.6					

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.617)(0.931)(0.99)}{(140.68)(41.80)} = 3.6 \times 10^{-7}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

Form No.: 9

JOB NAME: TVA Bordon
JOB NO.: 3043-05-1080-4
BORING NO.:
DEPTH: 07-9
SAMPLE: 95% STD @ +2% opt. M.c.
DESCRIPTION: 95% MDD

TECHNICIAN: JA
DATE: 3/22/6
CHECKED BY: CTA
CELL NO.: TEST
SYSTEM NO.: 13

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 93.3 PCF
WET UNIT WEIGHT (pcf): 116.3

SAMPLE MEASUREMENTS: (IN.)
1) 2.914 2) 2.928 3) 2.942
1) 2.872 2) 2.873 3) 2.877

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 2.928 (in) 7.437 (cm)
SOIL DIAMETER: 2.874 (in) 7.300 (cm)
AREA(A): (in²) 41.85 (cm)
SATURATION:

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 580.08
FINAL WET WEIGHT (g): 509 1.90
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 24.78
FINAL MOISTURE (%):
PAN NAME: RR

FINAL MEASUREMENTS:

L	D
1) 2.834	1) 2.885
2) 2.837	2) 2.857
3) 2.843	3) 2.870

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 h: 18.9
TEMPERATURE (°F): 73
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H2O
BURET CORRECTION FACTOR(C): L:.99 R:.97

B-VALUE	
INT	FIN
72	70.1
82	79.7

EST. SAT.: 96%

CONSOL.*
INT: 13.6
FIN: 13.0
Δ_{OUT}: 0.6

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING START (L)	READING START (R)	READING END (L)	READING END (R)	FLOW Δ_{in}	FLOW Δ_{out}	FLOW R/o	Q	K(CONST)	h_1	h_2	K(FALL)
73	3/23	3/23	12:33	12:53	20	1200	12.4	7.9	12.2	8.1	0.2	0.2	1.0	0.2	1.9×10^{-7}			
	3/23		12:53	1:42	49	2940	12.2	8.1	11.7	8.5	0.4	0.5	0.8	0.4	1.6×10^{-7}			
			1:42	2:50	68	4080	11.7	8.5	11	9.2	0.7	0.7	1.0	0.7	2.0×10^{-7}			
			2:50				11	9.2										
73	3/27		~~10:14~~ 11:14	12:26	72	4320	12.1	7.8	11.7	8.2	0.4	0.4	1.0	0.4	1.1×10^{-7}			
			12:26	12:56	30	1800	11.7	8.2	11.5	8.3	0.1	0.2	0.5	0.2	1.3×10^{-7}			
			12:56	3:16	140	8400	11.5	8.3	10.8	9	0.7	0.7	1.0	0.7	9.7×10^{-8}			
			3:16	4:33	77	4620	10.8	9	10.6	9.4	0.4	0.2	2.0	0.3	7.6×10^{-8}			
	3/27	3/28	4:33 PM	8:10 AM	937	56220	10.6	9.4	6.8	13.3	3.9	3.8	1.0	3.8	7.9×10^{-8}			
TOTALS						t = 75360						Q = 5.4						

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t}$ $= \frac{Q}{t} \times \frac{(7.437)(0.931)(0.99)}{(140.68)(41.85)} =$ 8.3×10^{-8} cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA - Bonrow
JOB NO.:
BORING NO.: GT-1D
DEPTH:
SAMPLE: 95% STD @ +2% opt. m.c.
DESCRIPTION: 95% MDD

TECHNICIAN: JA
DATE: 3/22/6
CHECKED BY: CTA
CELL NO.: B
SYSTEM NO.: 14

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 101.9 PCF
WET UNIT WEIGHT (pcf):

SAMPLE MEASUREMENTS: (INT.)
1) 2.977 2) 2.961 3) 2.980
1) 2.873 2) 2.863 3) 2.881

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 2.973 (in) 7.551 (cm)
SOIL DIAMETER: 2.872 (in) 7.295 (cm)
AREA(A): (in²) 41.80 (cm)
SATURATION:

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 610.52
FINAL WET WEIGHT (g): 602.72
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 18.5%
FINAL MOISTURE (%):
PAN NAME: AC

FINAL MEASUREMENTS:

	L	D
1)	2.913	2.841
2)	2.910	2.899
3)	2.908	2.890

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi =
TEMPERATURE (°F): 73
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H20
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE

	INT	FIN
	72	70.0
	82	79.5

Est. Sat.: 95%

Consol.* INT: 18.9 FIN: 19.7 Δ_{avg}: 0.8

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW A_{in}	A_{out}	R/o	Q	K(CONST)	h_1	h_2	K(FALL)
73	3/23	3/23	12:33	12:53	20	1200	12.2	7.9	12.0	8.1	0.2	0.2	1.0	0.2	2.0×10^{-7}			
	3/23		12:53	1:45	52	3120	12.0	8.1	11.5	8.5	0.4	0.5	0.8	0.4	1.5×10^{-7}			
			1:45	2:51	66	3960	11.5	8.5	11	9	0.5	0.5	1.0	0.5	1.5×10^{-7}			
			2:51				11	9										
73	3/27		10:05 AM	11:11	66	3960	11.1	8.7	10.6	9.2	0.5	0.5	1.0	(0.5)	1.5×10^{-7}			
			11:11	12:26	75	4500	10.6	9.2	10.0	9.8	0.6	0.6	1.0	(0.6)	1.6×10^{-7}			
			12:26	12:56	30	1800	10.0	9.8	9.7	10	0.2	0.3	0.7	(0.3)	2.0×10^{-7}			
			12:56	3:16	140	8400	9.7	10	8.7	10.1	1.0	1.0	1.0	(1.0)	1.4×10^{-7}			
			3:16	4:33	77	4620	8.7	11	8.2	11.6	0.6	0.5	1.2	(0.6)	1.5×10^{-7}			
TOTALS						t = 23280								Q = 3.0				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.551)(0.931)(0.99)}{(140.68)(41.80)} =$ 1.5×10^{-7} cm/s

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Form Date: 10-04-05

* See Consolidation Graph.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA - Barrow
JOB NO.:
BORING NO.:
DEPTH: OT - 11
SAMPLE: 95% STD @ +2% opt. m.c.
DESCRIPTION: 95% MDD

TECHNICIAN: JA
DATE: 3/22/06
CHECKED BY: CA
CELL NO.: 8
SYSTEM NO.: 5

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm³):
DRY UNIT WEIGHT (pcf): 101.1 PCF
WET UNIT WEIGHT (pcf): 121.9

SAMPLE MEASUREMENTS: (INT.)
1) 2.968 2) 2.968 3) 2.968
1) 2.878 2) 2.878 3) 2.878

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 2.968 (in) 7.539 (cm)
SOIL DIAMETER: 2.878 (in) 7.310 (cm)
AREA(A): (in²) 41.97 (cm²)
SATURATION:

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 618.05
FINAL WET WEIGHT (g): 632.54
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 20.6%
FINAL MOISTURE (%):
PAN NAME: NN

FINAL MEASUREMENTS:

	L	D
1)	2.943	D 2.934
2)	2.946	2) 2.891
3)	2.949	3) 2.840

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi = 18.7
TEMPERATURE (°F): 73
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE	INT	FIN
	72	70.9
	82	79.5

EST. SAT.: 95%

CONSOL*
INT: 15.5
FIN: 16.9
Δ auto 0.5

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	READING (R) START	READING (L) END	READING (R) END	FLOW Δ_m	FLOW Δ_{BT}	FLOW R/o	Q	K(cm/s) K(const)	h_1	h_2	K(Fact)
73	3/23	3/23	12:34	12:54	20	1200	12.2	7.9	12.1	8.0	0.1	0.1	1.0	0.1	9.8×10^{-8}			
	3/23		12:54	2:51	117	7020	12.1	8.0	12.2	8.4	0.4	0.1	4.0	0.3	5.0×10^{-8}			
							2.2	8.4										
73	3/27		10:05 AM	11:12	67	4020	11.5	8.7	11.3	8.9	0.2	0.2	1.0	0.3	5.6×10^{-8}			
			11:12	3:17	245	14700	11.3	8.9	10.7	9.5	0.6	0.6	1.0	0.6	4.8×10^{-8}			
			3:17	4:34	77	4620	10.7	9.5	10.5	9.8	0.3	0.2	1.5	0.3	7.6×10^{-8}			
	3/27	3/28	4:34 PM	8:11 AM	937	56220	10.5	9.8	8.3	12.2	2.4	2.2	1.1	2.3	4.0×10^{-8}			
TOTALS						86580								Q= 3.7				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.539)(0.931)(0.99)}{(140.68)(41.97)} = 5.0 \times 10^{-8}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

Form No.: 9

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-4
DEPTH: 2.5'-10'
SAMPLE: REDUCED
DESCRIPTION: POINT #1

TECHNICIAN: J. ALEX
DATE: 2-23-06
CHECKED BY: CT
CELL NO.: 4
SYSTEM NO.: 18

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 84.8 PCF
WET UNIT WEIGHT (pcf):

SAMPLE MEASUREMENTS: (INT.)
1) 3.040 2) 3.040 3) 3.040
1) 2.877 2) ~~2.8803~~ 2) 2.875

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.040 (in) 7.722 (cm) 7.722
SOIL DIAMETER: 2.877 (in) 7.308 (cm)
AREA(A): (in²) 41.94 (cm²)
SATURATION: @3 → 40.0

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 550.99
FINAL WET WEIGHT (g): 610.07
FINAL DRY WEIGHT (g): 455.31
INITIAL MOISTURE (%): 25.3%
FINAL MOISTURE (%):
PAN NAME: TT/1368

FINAL MEASUREMENTS:

	L	D
1)	3.09	D 2.88
2)	3.09	2) 2.86
3)	3.09	3) 2.85

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 h1 =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE

	INT	FIN
	92	2.10
	87	28.5

EST. SAT.: 95 %

CONSOL*
INT: 15.0
FIN: 14.0
Δ_{out}: 1.0

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{in}	FLOW Δ_{out}	R1/0	Q	K(cm/s) CONST	h_1	h_2	K(cm/s) FALL
73	2/27	2/27	8:45 AM	9:38 AM	53	(3180)	13.7	6.8	11.1	8.0	2.2	2.2	1.00	2.2	8.4×10^{-7}			
	2/27	2/27	9:38 AM	10:22 AM	44	(2640)	11.1	9.0	9.3	10.8	1.8	1.8	1.00	1.8	8.2×10^{-7}			
	2/27	2/27	10:22 AM	10:51	29	(1740)	9.3	10.8	8.1	12	1.2	1.2	1.00	1.2	8.3×10^{-7}			
	2/27	2/27	10:51	11:37	42	(2520)	8.1	12	6.5	13.6	1.6	1.6	1.00	1.6	7.7×10^{-7}			
	2/27	2/27	11:38 AM	1:28	115	(6900)	6.5	13.6	2.1	18.1	4.5	4.4	1.02	4.5	7.9×10^{-7}			
TOTALS						t=16980								Q=11.3				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.734)(0.931)(0.99)}{(140.68)(41.94)} = 8.0\times10^{-7}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

Form No.: 9

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: QT-4
DEPTH: 2.5'-10'
SAMPLE: REMOLDED
DESCRIPTION: POINT # 2

TECHNICIAN: J. ALEX
DATE: 2-23-06
CHECKED BY: CT
CELL NO.:
SYSTEM NO.: 19

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 86.0 pcf
WET UNIT WEIGHT (pcf): 109.9

SAMPLE MEASUREMENTS: (INT.)
1) 3.028 2) 3.033 3) 3.030 : SOIL LENGTH(L): 3.033 (in) 7.704 (cm)
1) 2.880 2) 2.877 3) 2.874 : SOIL DIAMETER: 2.877 (in) 7.308 (cm)

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
AREA(A): (in²) 41.94 (cm²)
SATURATION: 0.7 → 1.0

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 568.89
FINAL WET WEIGHT (g): 614.57
FINAL DRY WEIGHT (g): 459.47
INITIAL MOISTURE (%): 27.8 %
FINAL MOISTURE (%):
PAN NAME: NN/14.31

FINAL MEASUREMENTS:

	L	D
1)	3.08	2.86
2)	3.06	2.83
3)	3.07	2.83

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD, h (psi) = 70.34: 140.68 hi =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE	INT	FIN
	72	700
	82	79.5

EST. SAT.: 95 %

CONSOL* INT: 15.0 FIN: 14.1 Δ out 0.9

TABLE OF HYDRAULIC CONDUCTIVITY

10.3

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	SECONDS	READING (L) START	(B) START	(L) END	(B) END	FLOW A_{in}	A_{out}	R1/0	Q	K(cm/s) K(const)	h_1	h_2	K(Flow)
73	2/23	2/27	8:45 am	9:38 am	53	3180	13.7	6.7	12.6	7.9	1.0	1.1	0.91	1.1	4.2×10^{-7}			
	2/27	2/27	9:38 am	10:52	74	4440	12.6	7.9	11.1	9.4	1.5	1.5	1.00	1.5	4.1×10^{-7}			
			10:52	11:33	41	2460	11.1	9.4	10.3	10.2	0.8	0.8	1.00	0.8	3.9×10^{-7}			
			11:33	1:29 pm	116	6960	MB	10.2	8.1	12.5	2.3	2.2	1.05	2.2	3.9×10^{-7}			
			1:29 pm	2:29 pm	60	3600	8.1	12.5	7.0	13.7	1.2	1.1	1.09	1.2	4.0×10^{-7}			
	↓	↓	2:29 pm	4:37	128	7680	7.0	13.7	4.7	16.0	2.3	2.3	1.00	2.3	3.6×10^{-7}			
TOTALS						= 28320								Q = 9.1				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.704)(0.931)(0.99)}{(140.68)(41.94)} = 3.9 \times 10^{-7}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-4
DEPTH: 2.5-10'
SAMPLE: REDUCED
DESCRIPTION: POINT # 3

TECHNICIAN: J. ALEX
DATE: 2-23-06
CHECKED BY: CT
CELL NO.: 2N
SYSTEM NO.: 2

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 86.9 PCF
WET UNIT WEIGHT (pcf): 112.0

SAMPLE MEASUREMENTS: (INT.)
1) 3.029 2) 3.028 3) 3.016
1) 2.877 2) 2.876 3) 2.876

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.024 (in) 7.681 (cm)
SOIL DIAMETER: 2.877 (in) 7.308 (cm)
AREA(A): (in²) 41.95 (cm)
SATURATION: 0.2 → 27.2

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 578.88
FINAL WET WEIGHT (g): 520.10
FINAL DRY WEIGHT (g): 465.86
INITIAL MOISTURE (%): 28.9 %
FINAL MOISTURE (%):
PAN NAME: AC / 14.05

Scale: E9-1 Oven: SL00-1 Calipers: EC-1

PERM INFORMATION

FINAL MEASUREMENTS:
L: 1) 3.05 2) 3.05 3) 3.05
D: 1) 2.89 2) 2.88 3) 2.86

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE(psi): 70
HEAD,h (psi) x 70.34: 140.68 hi =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L 0.99 R 0.99

B-VALUE: INT 72, FIN 70.0 → 96 %
EST. SAT.:
CONSOL.*: INT: 12.9, FIN: 10.8, Δ_{OUT}: 1.2

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	ELAPSED TIME (+) SECONDS	READING (B) START	READING (L) START	READING (B) END	READING (L) END	FLOW Δ_{IN}	FLOW Δ_{OUT}	R%	Q	K(cm/s) K(CONST)	h_1	h_2	K(FALL)
73	2/27	2/27	8:45 AM	9:38 AM	53	3180	13.2	7.0	12.9	7.4	0.4	0.3	1.33	10.4	1.5×10^{-7}			
	2/27	2/27	9:38 AM	10:52	74	4440	12.9	7.4	12.3	9.9	0.5	0.6	0.83	0.5	1.4×10^{-7}			
	2/27	2/27	10:52	11:34	42	2520	12.3	7.9	12	8.1	0.2	0.3	0.67	0.3	1.4×10^{-7}			
	2/27	2/27	11:38	1:30	116	6960	12	8.1	11.3	8.9	0.8	0.7	1.14	0.8	1.4×10^{-7}			
	2/27	2/27	1:30	4:37 PM	187	11220	11.3	8.9	10.2	10.2	1.3	1.1	1.18	1.2	1.3×10^{-7}			
	2/27	2/28	4:37 PM	7:31 AM	894	~~10440~~ 53640	10.2	10.2	4.9	15.9	5.7	5.3	1.08	5.9	1.2×10^{-7}			
TOTALS						t = 8960								Q = 8.7				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.681)(0.931)(0.99)}{(140.68)(41.95)} = 1.3 \times 10^{-7}$ cm/s

Form Date: 10-04-05

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* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

Form No.: 9

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-4
DEPTH: 25'-10'
SAMPLE: REDUCED
DESCRIPTION: POINT # 4

TECHNICIAN: J. ALEX
DATE: 2-23-06
CHECKED BY: CTJ
CELL NO.: 3
SYSTEM NO.: 3

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 106.0 pcf
WET UNIT WEIGHT (pcf): 113.6

SAMPLE MEASUREMENTS: (INT.)	
1) 3.00	2) 3.009 3) 3.007
1) 2.874	2) 2.865 3) 2.870

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.006 (in) 7.635 (cm)
SOIL DIAMETER: 2.870 (in) 7.290 (cm)
AREA(A): (in²) 41.74 (cm)
SATURATION: 0.5 + 21.2

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 580.08
FINAL WET WEIGHT (g): 620.64
FINAL DRY WEIGHT (g): 461.59
INITIAL MOISTURE (%): 32.1 2
FINAL MOISTURE (%):
PAN NAME: LW/ 13.50

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

FINAL MEASUREMENTS:		
	L	D 2.99
1)	3.05	2) 2.99
2)	3.03	2) 2.90
3)	3.03	3)

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L 0.99 R 0.99

B-VALUE	INT	FIN
	72	69.9
	72	82
	70	79.5

Est. Sat.: 96 %

CONSOL* INT: 10.0 FIN: 9.3 Δ_{avg}: 0.7

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE		TIME		ELASPED TIME (+)		READING				FLOW			K(cm/s)			
(F°)	S	E	START	END	MINUTES	SECONDS	(L) START	(B)	(L) END	(B)	Δ_m	Δ_{avg}	R/o	Q	K(const h)	h_1	h_2	K(Falling)
73°	2/27	2/27	8:45 am	9:38 am	53	3180	11.4	8.4	10.6	9.1	0.7	0.8	0.88	0.8	3.0×10^{-7}			
	2/27	2/27	9:38 am	10:53	25	4509	10.6	9.1	9.5	10.1	1.0	1.1	0.9	1.0	2.7×10^{-7}			
	2/27	2/27	10:53	11:34	41	2460	9.5	10.1	9	10.6	0.5	0.5	1.00	0.5	2.4×10^{-7}			
	2/27	2/27	11:34	1:31 pm	117	7020	9	10.6	7.4	12.2	1.6	1.6	1.00	1.6	2.7×10^{-7}			
	2/27	2/27	1:31 pm	2:08 pm	37	2220	7.4	12.2	7.0	12.8	0.6	0.4	1.50	0.5	2.7×10^{-7}			
	~~2/27~~	2/27	~~2:09 pm~~				12.4	8.2										
TOTALS						t=14380								Q=4.4				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.635)(0.931)(0.99)}{(140.68)(41.74)} = 2.7 \times 10^{-7}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

TVA-00008710

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: QT-4
DEPTH: REDUCED
SAMPLE: 2.5-10'
DESCRIPTION: POINT # 5

TECHNICIAN: J. ALEX
DATE: 2-23-06
CHECKED BY: CT
CELL NO.: 20
SYSTEM NO.: 13

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 83.7 PCF
WET UNIT WEIGHT (pcf): 112.4

SAMPLE MEASUREMENTS: (INT.)
1) 2.984 2) 2.843) 2.984
1) 2.980 2) 2.8763) 2.997

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 2.984 (in) 7.579 (cm)
SOIL DIAMETER: 2.879 (in) 7.313 (cm)
AREA(A): (in²) 42.00 (cm²)
SATURATION: 0.6 → 15.0

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 573.84
FINAL WET WEIGHT (g): 685.97
FINAL DRY WEIGHT (g): 529.66
INITIAL MOISTURE (%): 34.2%
FINAL MOISTURE (%):
PAN NAME: EMS / 94.07

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

FINAL MEASUREMENTS:	L	D
1)	3.00	D 2.88
2)	2.96	2) 2.87
3)	2.97	3) 2.86

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi:
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): 1: 0.99 $R_{0.99}$

B-VALUE

	INT	FIN
	72	70.1
	82	79.7

EST. SAT.: 96 %

CONSOL*
INIT: 11.0
FIN: 10.5
Δ: 0.5

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	READING (B) START	READING (L) END	READING (B) END	FLOW A_m	FLOW A_{BT}	R%	Q	K(CONST)	h_1	h_2	K(FALL)
70	2/27	2/27	8:45 AM	9:38 AM			12.2	8.5	12.2	8.4								
	2/27	2/27	9:38 AM	4:39			12.2	8.4	12.0	8.6								
	2/27	2/28	4:39 PM	7:39 AM			12.0	8.6	11.8	8.8								
	2/28		7:39 AM				11.8	8.8										
73	2/28	2/28	7:39 AM	8:24 AM	45	2700	12.2	8.0	12.9	8.2	0.2	0.2	1.00	0.2	8.8×10^{-8}			
	2/28	2/28	8:24 AM	9:12 AM	48	2880	12.0	8.2	11.8	8.4	0.2	0.2	1.00	0.2	8.2×10^{-8}			
	2/28	2/29	9:12 AM	9:34 AM	22	1320	11.8	8.4	11.7	8.5	0.1	0.1	1.00	0.1	7.8×10^{-8}			
	2/29		9:34 AM	11:04 AM	90	5400	11.7	8.5	11.3	8.9	0.4	0.4	1.00	0.4	8.0×10^{-8}			
TOTALS						≈12300								Q = 0.9				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t}$

$= \frac{Q}{t} \times \frac{(7.579)(0.931)(0.99)}{(140.68)(42.00)} = 8.7 \times 10^{-8}$ cm/s

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* SEE CONSOLIDATION GRAPH.

1:38

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: QT-4
DEPTH: 7.5-10'
SAMPLE: STANDARD
DESCRIPTION: POINT #1

TECHNICIAN: J. ALEX
DATE: 2-24-06
CHECKED BY: CTJ
CELL NO.: 25
SYSTEM NO.: 4

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 84.6 PCF
WET UNIT WEIGHT (pcf): 105.4

SAMPLE MEASUREMENTS: (INT.)
1) 3.010 2) 2.996 3) 3.000
1) 2.878 2) 2.876 3) 2.874

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.002 (in) 7.625 (cm)
SOIL DIAMETER: 2.876 (in) 7.305 (cm)
AREA(A): (in²) 41.91 (cm²)
SATURATION: 1.5 → 23.7 · 0.8 → 23.2 0.8 → 11.1

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 538.00
FINAL WET WEIGHT (g): 682.58
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 24.2%
FINAL MOISTURE (%):
PAN NAME: BC 121 / 97.13

Scale: ES-1 Oven: SLDO-1 Calipers: EA-1

PERM INFORMATION

FINAL MEASUREMENTS:
L
1) 3.08 D 2.85
2) 3.07 2) 2.88
3) 3.06 3)

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) = 70.34: 140.68 hi:
TEMPERATURE (°F): 73°F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L 0.99 K 0.99

B-VALUE	INT	FIN
	72	69.9
	82	79.4

Est. Sat.: 95 %

Consol*
INT: 2.0
FIN: 2.5
Δ OUT: 0.5

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE		TIME		ELASPED TIME (+)		READING				FLOW			K(cm/s)				
(F°)	S	E	START	END	MINUTES	SECONDS	(L) START	(B)	(L) END	(B)	Δ_{IN}	Δ_{OUT}	R%	Q	K(CONST)	h_1	h_2	K(FALL)
73	2/27	2/27	8:45 AM	9:38 AM			14.7	5.4	13.7	6.5								
	2/27		9:38 AM	10:54			13.7	6.5	12.2	7.8								
			10:54	1:32			12.2	7.8	10.2	9.9								
			1:32	4:40			10.2	9.9	8.5	11.8								
73	2/28	2/28	7:39 AM	8:19 AM	40	2400	16.6	8.4	5.6	14.3	5.9	6.0	0.98	6.0	3.0×10^{-6}			
	2/28	2/28	8:23 AM	9:11 AM	48	2880	16.1	4.8	8.4	12.5	7.7	7.7	1.00	7.7	3.2×10^{-6}			
	2/28	2/28	9:11 AM	9:21 AM	10	600	8.4	12.5	7.0	13.9	1.4	1.4	1.00	1.4	2.8×10^{-6}			
	2/28	2/28	9:21 AM	9:50 AM	29	1740	7.0	13.9	3.3	12.7	3.8	3.7	1.03	3.7	2.5×10^{-6}			
TOTALS						+7620							Q= 18.8					

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.625)(0.931)(0.99)}{(140.68)(41.91)} = 2.9 \times 10^{-6}$ CM/S

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

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Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: QT-4
DEPTH: 2.5-10'
SAMPLE: STANDARD
DESCRIPTION: POINT # 2

TECHNICIAN: J. ALEX.
DATE: 2-24-06
CHECKED BY: CTA
CELL NO.: 16
SYSTEM NO.: 15

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft): 1) 2.8762 2) ~~2.8783~~ 3) 2.877
DRY UNIT WEIGHT (pcf): 86.7 pcf
WET UNIT WEIGHT (pcf): 109.8

SAMPLE MEASUREMENTS: (INT.)
1) 3.015 2) 3.032 3) 3.010

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.019 (in) 7.668 (cm)
SOIL DIAMETER: 2.877 (in) ~~7.308~~ (cm)
AREA(A): (in²) 4.194 (cm²)
SATURATION: 0.7 → 23.6 | 0.6 → 21.1

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 565.87
FINAL WET WEIGHT (g): 606.58
Pan + FINAL DRY WEIGHT (g): 549.19
INITIAL MOISTURE (%): 26.7%
FINAL MOISTURE (%):
PAN NAME: WALLACE

FINAL MEASUREMENTS:

	L	D
1)	3.074	D 2.884
2)	3.072	2) 2.882
3)	3.076	3) 2.880

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) = 70.34: 140.68 hi =
TEMPERATURE (°F): 73°F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE

	INT	FIN
1		70.0
2		79.5

EST. SAT.: 95 %

CONSOL.*
INT: 2.0
FIN: 6.6
Δ_{out}: 0.4

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	READING (R) START	READING (L) END	READING (R) END	FLOW Δ_{in}	FLOW Δ_{out}	FLOW R%	FLOW Q	K(cm/s) K(const)	h_1	h_2	K(Flow)
73	2/27	2/27	8:45 AM	9:38 AM			13.8	6.4	13.4	6.8								
	2/27	2/27	9:38 AM	10:55			13.4	6.8	12.7	7.4								
	2/27	2/27	10:55	1:33			12.7	7.4	11.7	8.5								
	2/27	2/27	1:33	4:40			11.7	8.5	10.8	9.6								
	2/27	2/27	4:40 PM				10.8	9.6										
73	2/28	2/28	7:40 AM	8:24 AM	44	2640	12.4	8.1	11.3	8.9	.08	1.1	0.73	2.9	4.1×10^{-7}			
	2/28	2/28	8:24 AM	9:13 AM	49	2940	11.3	8.9	10.2	10.1	1.2	1.1	1.09	1.1	4.5×10^{-7}			
	2/28	2/28	9:13 AM	9:50 AM	37	2220	10.2	10.1	9.4	11.1	1.0	0.8	1.25	0.9	4.9×10^{-7}			
	2/28	2/28	9:50 AM	10:03 AM	13	~~780~~	9.4	11.1	~~9.0~~	~~11.5~~	~~0.3~~	~~0.3~~	~~1.00~~	~~0.3~~	4.6×10^{-7}			
									9.1	11.4	0.3	0.3	1.00	0.3				
	2/28		8:19				14.3	6.3										
TOTALS						t=8580								Q= 3.2				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.668)(0.931)(0.99)}{(140.68)(41.94)} =$ **4.5×10^{-7} cm/s**

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

REQUEST

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-4
DEPTH:
SAMPLE: STANDARD
DESCRIPTION: POINT # 3

TECHNICIAN: J. ALEX
DATE: 3-9-6
CHECKED BY: CTA
CELL NO.: test
SYSTEM NO.: 13

SAMPLE INFORMATION

All 2.0

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 87.8 PCF
WET UNIT WEIGHT (pcf): 112.7

SAMPLE MEASUREMENTS: (INT.) 1) 3.010 2) 3.008 3) 3.001
1) 883 2) 8753 3) 874

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.009 (in) 7.643 (cm)
SOIL DIAMETER: 2.877 (in) 7.308 (cm)
AREA(A): (in²) 41.94 (cm)
SATURATION:

MOISTURE CONTENT

570.88

INITIAL WET WEIGHT (g):
FINAL WET WEIGHT (g): 695.91
PAN + FINAL DRY WEIGHT (g): 573.98
INITIAL MOISTURE (%): 28.4 %
FINAL MOISTURE (%):
PAN NAME: PAN / 92.95

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

FINAL MEASUREMENTS:	
L	D
1) 3.08	D 2.86
2) 3.10	2) 2.81
3) 3.06	3) 2.80

CELL PRESSURE (psi): 77
FORE PRESSURE (psi): 72
BACK PRESSURE (psi): 70
HEAD, h (psi) x 70.34: 140.68 hi =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION (R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE	INT	FIN
	78	69.9
	82	79.6

EST. SAT.: 97 %

CONSOL*
INIT: 15.7
FIN: 15.0
Δ_{OUT}: 0.7

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (t) MINUTES	ELAPSED TIME (t) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW A_{IN}	FLOW A_{OUT}	$R_{T/0}$	Q	K (cm/s) K(const)	h_1	h_2	K(Falling)
(F°)																		
73	3-9	3-9	4:30 PM	6:40 PM	130	7800	13.4	7.0	12.4	7.8	2.8	1.0	2.80	1.9	2.4×10^{-7}			
	3-9	3-10	6:42 PM	9:34 AM	894	53640	19.1	4.6	11.1	14.4	9.8	8.0	1.22	8.9	2.0×10^{-7}			
	3-10		9:34 AM	10:22	48	2880	11.1	14.4	10.7	14.7	0.3	0.4	0.75	0.3	1.2×10^{-7}			
			10:22	11:58	96	5760	10.7	14.7	10	15.6	0.9	0.7	1.29	0.8	1.7×10^{-7}			
			11:58	1:48	110	6600	10	15.6	9.1	16.5	0.9	0.9	1.00	0.9	1.6×10^{-7}			
			1:48	2:28	40	2400	9.1	16.5	8.9	16.9	0.4	0.2	2.00	0.3	1.5×10^{-7}			
			2:24				8.9	16.9										
TOTALS						t = 17640								Q = 2.3				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.643)(0.931)(0.99)}{(140.68)(41.94)} = 1.64\times10^{-7}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-4
DEPTH: 2.5 - 10
SAMPLE: STANDARD
DESCRIPTION: POINT # 4

TECHNICIAN: J. ALEX
DATE: 2-24-06
CHECKED BY: CT
CELL NO.:
SYSTEM NO.: 8

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm³/ft³):
DRY UNIT WEIGHT (pcf): 87.4 PCF
WET UNIT WEIGHT (pcf): 113.4 PCF

SAMPLE MEASUREMENTS: (INT.)
1) 3.018 2) 3.016 3) 3.029
1) 2.878 2) 2.877 3) 2.878

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.021 (in) 7.672 (cm)
SOIL DIAMETER: 2.878 (in) 7.310 (cm)
AREA(A): (in²) 41.97 (cm²)
SATURATION: 59.5 > 35.2

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 584.93
FINAL WET WEIGHT (g): 611.65
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 29.8 %
FINAL MOISTURE (%):
PAN NAME:

FINAL MEASUREMENTS: L D
1) 3.086 D 2.882
2) 3.084 2) 2.880
3) 3.082 3) 2.882

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 h₁ =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H₂O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE: INT 77 / FIN 69.9
EST. SAT.: 96 %
CONSOL*: INT: 40.8 / FIN: 39.7 / Δ_OUT: 0.3

Scale: ES-1 Oven: SLOO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (t) MINUTES	ELASPED TIME (t) SECONDS	READING L START	READING R START	READING L END	READING R END	FLOW Δ_IN	FLOW Δ_OUT	FLOW R_V/O	FLOW Q	K (cm/s) K(const)	h₁	h₂	K(Falling)
73	2/27	2/27	8:45 AM	9:38 AM	53	3180	35.2	45.0	35.6	44.6	0.4	0.4	1.00	0.4	1.5×10^{-7}			
	2/27	2/27	9:38 AM	10:57	79	~~4740~~	35.6	44.6	36.3	43.8	0.8	0.7	1.14	(0.8)	2.0×10^{-7}			
	2/27	2/27	10:57	1:34	157	9420	36.3	43.8	37.6	~~42.5~~ 43.0	~~0.5~~ 0.3	~~0.3~~ 0.4	1.00	(1.2)	1.7×10^{-7}			
	2/27	2/27	1:34	4:44 PM	190	11400	37.6	43.5	38.2	43.0	0.6	0.5	1.20	0.6	6.3×10^{-8}			
	2/27	2/28	4:44 PM	7:44 AM	900	54000	38.2	43.0	43.2	~~38.2~~ 40.2	~~4.8~~ 4.8	~~5.8~~ 3.8	~~0.96~~ 0.96	~~4.8~~ 4.8	1.1×10^{-7}			
	2/28	2/28	7:44 AM	10:44 AM	180	12800	43.2	38.2	44.8	39.6	1.4	1.6	0.88	(1.5)	1.7×10^{-7}			
	2/28	2/28	10:44 AM	11:51 AM	67	4020	44.8	39.6	44.5	39.4	0.2	0.3	0.67	0.25	7.4×10^{-8}			
	2/28	2/28	11:51 AM	8:15 PM	504	30240	44.5	39.4	47.1	37.8	1.6	2.6	0.62	2.1	8.3×10^{-8}			
						82140								8.9				
						~~77440~~								8.1				
TOTALS						~~t=82140~~								Q=~~8.9~~				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.673)(0.931)(0.99)}{(140.68)(41.97)} = 1.3\times10^{-7}$ cm/s

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* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

Form No.: 9

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-4
DEPTH: 2.5 - 12.0'
SAMPLE: STANDARD
DESCRIPTION: POINT # 5

TECHNICIAN: J. ALEX
DATE: 2-24-06
CHECKED BY: CTK
CELL NO.: L6
SYSTEM NO.: 9

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 85.8 pcf
WET UNIT WEIGHT (pcf): 113.7

SAMPLE MEASUREMENTS: (INT.) 1) 3.028 2) 3.040 3) 3.0216
1) 2.874 2) 2.8673 3) 2.869

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.031 (in) 7.699 (cm)
SOIL DIAMETER: 2.870 (in) 7.290 (cm)
AREA(A): (in²) 41.74 (cm)
SATURATION: 56.3 → 47.5

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 585.37
FINAL WET WEIGHT (g): 602.15
PAN + FINAL DRY WEIGHT (g): 538.19
INITIAL MOISTURE (%): 32.5 %
FINAL MOISTURE (%):
PAN NAME: BOT

FINAL MEASUREMENTS:

	L	D
1)	3.040	2.872
2)	3.038	2.874
3)	3.042	2.870

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD h (psi) x 70.34: 140.68 hi =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE

	INT	FIN
	72	70.1
	70	82
		79.6

EST. SAT.: 95 %

CONSOL.*: INT: FIN: Δ_{avg}:

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	SECONDS	READING (L) START	(R)	(L) END	(R)	FLOW Δ_{in}	Δ_{out}	R½	Q	K(cm/s) K(const)	h_1	h_2	K(Falling)
73	2/27	2/27	8:45 AM	9:38 AM	53	3180	34.7	45.6	35.1	44.9	0.7	0.4	1.7	0.4	1.5×10^{-7}			
	2/27	2/27	9:38 AM	10:55	77	4620	35.1	44.9	35.6	44.6	0.3	0.5	0.6	0.5	1.5×10^{-7}			
	2/27	2/27	10:55	1:35	160	9600	35.6	44.6	36.8	43.4	1.2	1.2	1.00	1.2	1.5×10^{-7}			
	2/27	2/27	1:35	4:45 PM	190	11400	36.8	43.4	38.1	42.9	1.5	1.3	1.15	1.4	1.5×10^{-7}			
	2/27	2/28	4:45 PM	7:45 AM	900	54000	38.1	42.9	44.7	32.8	6.6	10.0						
	2/28	2/28	11:35 AM	11:48	13	780	46.4	36.4	46.5	36.3	0.1	0.1	1.00	0.1	1.5×10^{-7}			
	2/28																	
TOTALS						t = 29580								Q = 3.6				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.699)(0.931)(0.99)}{(140.68)(41.74)} =$ **1.5×10^{-7} cm/s**

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* SEE CONSOLIDATION GRAPH.

Form No.: 9

MACTEC
CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: QT-4
DEPTH: 2.5-10
SAMPLE: MODIFIED
DESCRIPTION: POINT #1

TECHNICIAN: J. ALEX
DATE: 2-28-06
CHECKED BY: CTA
CELL NO.: 2-N
SYSTEM NO.: 18

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): ~~117.7~~ 104.5pcf
WET UNIT WEIGHT (pcf): 117.7

SAMPLE MEASUREMENTS: (INT.)
1) 3.065 2) 3.160 3) 3.050
1) 2.898 2) 2.8083 2) 2.869

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.050 (in) 7.747 (cm)
SOIL DIAMETER: 2.870 (in) 7.285 (cm)
AREA(A): (in²) 41.68 (cm²)
SATURATION: 1.5 → 47.5; 1.5 → 111.4 → 1.2 → 16.1

MOISTURE CONTENT

		FINAL MEASUREMENTS:	
INITIAL WET WEIGHT (g):	~~600.59~~ 608.89	L	D
PAN + FINAL WET WEIGHT (g):	722.44	1) 3.39	1) 3.00
PAN + FINAL DRY WEIGHT (g):	648.02	2) 3.41	2) 3.02
INITIAL MOISTURE (%):	12.72	3) 3.39	3) 3.00
FINAL MOISTURE (%):			
PAN NAME: NN / 14134			

Scale: ES-1 Oven: SL00-1 Calipers: EC-1

PERM INFORMATION

		B-VALUE INT	B-VALUE FIN
CELL PRESSURE(psi):	77		
FORE PRESSURE(psi):	72	72	70.9
BACK PRESSURE (psi):	70	82	71.5
HEAD,h (psi) x 70.34:	140.68	h_1 =	
TEMPERATURE (°F):	73 °F		
VISCOSITY CORRECTION(R_T):	0.931		
PERMEANT LIQUID USED:	H_2O		
BURET CORRECTION FACTOR(C):	0.99	0.99	

EST. SAT.: 95 %

CONSOL* INIT: 20.0 FIN: 19.6 Δ_{OUT}: 0.4

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	ELAPSED TIME (+) SECONDS	READING (B) START	READING (A) START	READING (B) END	READING (A) END	FLOW Δ_{in}	FLOW Δ_{out}	FLOW R%	FLOW Q	K(cm/s) K(CONST)	h_1	h_2	K(FALL)
73	3-2	3-2	9:26 AM	10:03 AM	37	2220	7.2	1.1	5.2	3.1	2.0	2.0	1.00	2.0	1.1×10^{-6}			
	3-2	3-2	10:03 AM	10:26	23	1380	5.2	3.1	4.0	4.3	1.2	1.2	1.00	1.2	1.1×10^{-6}			
	3-2	3-2	10:26	10:56	30	1800	4.0	4.3	2.4	5.9	1.6	1.6	1.00	1.6	1.1×10^{-6}			
	3-2	3-2	10:56	11:26	30	1800	2.4	5.9	0.8	7.5	1.6	1.6	1.00	1.6	1.1×10^{-6}			
TOTALS						≈7200								Q= 6.4				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.747)(0.931)(0.99)}{(140.68)(41.68)} = 1.1 \times 10^{-6}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: QT-4
DEPTH: 2.5-10'
SAMPLE: MODIFIED
DESCRIPTION: POINT #2

TECHNICIAN: J. ALEX
DATE: 2-28-06
CHECKED BY: CTJ
CELL NO.: 4
SYSTEM NO.: 19

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm³ ft):
DRY UNIT WEIGHT (pcf): 106.0 PCF
WET UNIT WEIGHT (pcf): 121.4

SAMPLE MEASUREMENTS: (INT.)
1) 3.050 2) 3.050 3) 3.050
1) 2.870 2) 2.870 3) 2.870

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.050 (in) 7.747 (cm)
SOIL DIAMETER: 2.870 (in) 7.290 (cm)
AREA(A): (in²) 41.74 (cm)
SATURATION: 0.8 → 44.9 0.3-7 39.

MOISTURE CONTENT

Pan + pan

INITIAL WET WEIGHT (g): 620.88
FINAL WET WEIGHT (g): 716.77
FINAL DRY WEIGHT (g): 567.58
INITIAL MOISTURE (%): 14.5 %
FINAL MOISTURE (%):
PAN NAME: AC / 14.06

FINAL MEASUREMENTS:

	L	D
1)	3.415	D 3.05
2)	3.49	2) 3.00
3)	3.414	3) 2.99

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi:
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L 0.99 K 0.99

B-VALUE

	INT	FIN	Est. Sat.:
	72	70.0	95 %
	82	79.5	

CONSOL* INIT: 20.5 FIN: 20.0 Δ OUT: 0.5

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	ELAPSED TIME (+) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{in}	FLOW Δ_{out}	R1/0	Q	K (cm/s) K(const)	h_1	h_2	K(Falling)
(F°)																		
23	3-2	3-2	9:26 AM	10:03 AM			7.2	1.0	5.9	1.3	0.3	0.3	~~Equal~~					
	3-2	3-2	10:03 AM	10:27 AM			5.9	1.3	5.3	1.4	0.6	0.6	=	=	=			
	3-2	3-2	10:27 AM	12:02 PM			5.3	1.4	2.2	2.3	0.9	3.1	=	=	=			
	3-2	3-2	12:02 PM	12:18 PM			2.2	2.3	1.8	2.4	0.4	0.4	=	=	=			
	3-2	3-2	12:18 PM	12:32 PM	14	840	1.8	2.4	1.3	2.6	0.2	0.5	0.49	0.4	5.8×10^{-7}			
	3-2	3-2	12:35 PM	1:12 PM	37	2220	12.8	7.2	11.5	7.6	0.4	1.3	0.3	0.9	4.9×10^{-7}			
	3-2	3-2	1:12 PM	1:36			11.5	7.6	11.7	10.1	+0.2	—	=	=	=			
	3-2	3-2	1:36	2:03	27	1620	11.7	10.1	10.8	10.5	0.4	0.9	0.44	0.7	5.8×10^{-7}			
	3-2	3-2	2:03 PM	2:52	49	2940	10.8	10.5	9.1	11.4	0.9	1.7	0.53	1.3	5.4×10^{-7}			
TOTALS						t = 7620								Q = 33				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.747)(0.931)(0.99)}{(140.68)(41.74)} = 5.3 \times 10^{-7}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

Form No.: 9

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-4
DEPTH: 2.5-10'
SAMPLE: MODIFIED
DESCRIPTION: POINT # 3

TECHNICIAN: J. ALEX
DATE: 2-28-06
CHECKED BY: CTA
CELL NO.: 3
SYSTEM NO.: 2

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm³/ft³):
DRY UNIT WEIGHT (pcf): 106.8 pcf
WET UNIT WEIGHT (pcf): 124.2

SAMPLE MEASUREMENTS: (IN.)
1) 3.038 2) 3.038 3) 3.038
1) 2.871 2) 2.871 3) 2.871

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.038 (in) 7.717 (cm)
SOIL DIAMETER: 2.871 (in) 7.292 (cm)
AREA(A): (in²) 41.77 (cm²)
SATURATION: 1.7 → 43.0, 57 5.1 — 49.5

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 641.06
FINAL WET WEIGHT (g): 734.83
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 16.3 %
FINAL MOISTURE (%):
PAN NAME:

PERM INFORMATION

FINAL MEASUREMENTS:
L D
1) 3.389 D 2.994
2) 3.380 2) 2.996
3) 3.370 3) 3.000

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD, h (psi) x 70.34: 140.68 h₁ =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_w): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L 0.99 R 0.99

B-VALUE

	INT	FIN
	72	70.1
	82	79.7

EST. SAT.: 96 %

CONSOL.*
INT: 18.6
FIN: 17.8
Δ_{cons}: 0.8

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	ELAPSED TIME (+) SECONDS	READING (L) START	READING (R) START	READING (L) END	READING (R) END	FLOW A_{in}	FLOW A_{out}	FLOW R%	FLOW Q	K (cm/s) K(Const)	h_1	h_2	K(Fall)
73	3-2	3-2	9:26 AM	10:04	38	2280	7.2	1.2	6.7	1.8	0.6	0.6	1.00	0.6	3.2×10^{-7}			
	3-2	3-2	10:04	10:29	25	1500	6.7	1.8	6.4	2.2	0.3	0.4	0.75	0.4	3.2×10^{-7}			
	3-2	3-2	10:29	12:03	94	5640	6.4	2.2	5.2	3.5	1.3	1.2	1.08	1.3	2.8×10^{-7}			
	3-2	3-2	12:03	12:44	41	2460	5.2	3.5	4.7	4.1	0.7	0.5	1.40	0.6	3.0×10^{-7}			
~~3-2~~		~~12:44~~	~~2:07~~				4.7	4.1	6.3	6.3								
	3-2	3-2	2:08 PM	3:00	52	3120	9.6	6.3	8.8	7.3	1.0	0.8	1.25	0.9	3.4×10^{-7}			
	3-2	3-2	3:00	3:33	33	1980	8.8	7.3	8.2	7.9	0.6	0.6	1.00	0.6	3.7×10^{-7}			
	3-2	3-2	3:33	3:52	19	1140	8.2	7.9	7.8	8.3	0.4	0.4	1.00	0.4	4.2×10^{-7}			
	3-2	3-2	3:52	4:09	17	1020	7.8	8.3	7.6	8.4	0.4	0.4	1.00	0.4				
	3-2	3-2	3:52	4:15	23	1380	7.8	8.3	7.3	8.8	0.5	0.5	1.00	0.5	4.4×10^{-7}			
				4:15	23	1380			7.3	8.8	0.5	0.5		0.5				
	3-2	3-2	4:15	4:45 1/2	30	1800	7.3	8.8	6.6	9.5	0.7	0.7	1.00	0.7	4.7×10^{-7}			
TOTALS						t = ~~11880~~	6300						Q = ~~2.9~~	2.2				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_w \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.717)(0.931)(0.99)}{(140.68)(41.77)} =$ ~~5.2×10^{-7}~~ 4.2×10^{-7} cm/s

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* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

Form No.: 9

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: QT-4
DEPTH: 2.5-10'
SAMPLE: MODIFIED
DESCRIPTION: POINT #4

TECHNICIAN: J. ALEX
DATE: 2-28-06
CHECKED BY: CTA
CELL NO.: 20
SYSTEM NO.: 3

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 106.9 pcf
WET UNIT WEIGHT (pcf): 126.5

SAMPLE MEASUREMENTS: (INT.)
1) 3.010 2) 3.003 3) 3.010
1) 2.876 2) 2.876 3) 2.876

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.040 (in) 7.722 (cm)
SOIL DIAMETER: 2.876 (in) 7.305 (cm)
AREA(A): (in²) 41.91 (cm²)
SATURATION: 0.5 — 49.0 ; 3.4 — 28.8

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 655.87
FINAL WET WEIGHT (g): 743.43
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 18.3 %
FINAL MOISTURE (%):
PAN NAME:

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

FINAL MEASUREMENTS:

	L	D
1)	3.020	D 2.990
2)	3.022	2) 2.989
3)	3.026	3) 2.992

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi:
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): 0.99 R 0.99

B-VALUE

	INT	FIN
	72	69.9
	82	94.6

EST. SAT.: 97 %

CONSOL.*
INIT: 20.5
FIN: 19.6
Δ_{out}: 0.9

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	(B) START	(L) END	(B) END	FLOW Δ_{in}	FLOW Δ_{out}	FLOW R/o	FLOW Q	K(cm/s) K(const)	h_1	h_2	K(Falling)
(F°)																		
73	3-2	3-2	9:26 AM	10:08 AM	42	~~2520~~	6.9	1.2	5.9	2.1	0.9	1.0	~~0.9~~	~~1.0~~	~~1.8×10⁻⁷~~			
	3-2	3-2	10:08 AM	10:30 AM	22	~~1320~~	5.9	2.1	5.4	2.6	0.5	0.5	1.00	~~0.5~~	~~4.6×10⁻⁷~~			
	3-2	3-2	10:30 AM	12:03 PM	93	~~5580~~	5.4	2.6	3.4	4.7	2.1	2.0	1.05	~~2.0~~	~~4.3×10⁻⁷~~			
	3-2	3-2	12:03 PM	12:21	18	~~1080~~	3.4	4.7	3.0	5.1	0.4	0.4	1.00	~~0.4~~	~~1.5×10⁻⁷~~			
	3-2	3-2	2:02	3:02	60	~~3600~~	7.5	4.7	6.3	6.2	1.5	1.2	1.25	~~1.3~~	4.4×10^{-7}			
	3-2	3-2	3:02	3:38	36	~~2160~~	6.3	6.2	5.6	7.1	0.9	0.7	1.29	~~0.8~~	~~3.9×10⁻⁷~~			
	3-2	3-2	3:38	3.55	17	~~1020~~	5.6	7.1	5.2	7.5	0.4	0.3	1.33	~~0.3~~	~~3.6×10⁻⁷~~			
	3-2	3-2	3:55	4:16	~~4:16~~ 21	~~12600~~ 1260	5.2	7.4	4.8	7.8	0.4	0.4	1.00	~~0.4~~	3.8×10^{-7}			
	3-2	3-2	4:16	4:39	23	~~1380~~	4.8	7.8	~~4.4~~	8.2	0.4	~~0.4~~	1.00	~~0.4~~	3.5×10^{-7}			
						5820									1.8			
					~~27400~~	~~41580~~												
TOTALS						~~t=10500~~							~~2=3.9~~					

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.722)(0.931)(0.99)}{(140.68)(41.91)} =$ ~~4.5×10⁻⁷~~ ~~4.4×10⁻⁷~~ CM/S

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3.7×10^{-7} CM/S

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-4
DEPTH: 2.5-10'
SAMPLE: MODIFIED
DESCRIPTION: POINT # 5

TECHNICIAN: J. ALEX
DATE: 2-28-06
CHECKED BY: CTX
CELL NO.: 20
SYSTEM NO.: 13

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 104.7 PCF
WET UNIT WEIGHT (pcf): 124.8

SAMPLE MEASUREMENTS: (INT.)
1) 3.080 2) 3.093 3) 3.089
1) 2.867 2) 2.867 3) 2.867

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.089 (in) 7.823 (cm)
SOIL DIAMETER: 2.867 (in) 7.282 (cm)
AREA(A): (in²) 41.65 (cm²)
SATURATION: 0.2 → 23.2 / 1.5 → 23.8 → .9-21.0

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 651.22
Pan 4 FINAL WET WEIGHT (g): 723.27
Pan 4 FINAL DRY WEIGHT (g): 566.63
INITIAL MOISTURE (%): 19.79
FINAL MOISTURE (%):
PAN NAME: 2C / 8.05

FINAL MEASUREMENTS:

	L	D
1)	3.30	D 3.00
2)	3.32	2) 2.98
3)	3.30	3) 2.96

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L 0.99 K 0.99

B-VALUE	INT	FIN
	72	69.8
	82	79.3

EST. SAT.: 95 %

CONSOL*
INT: 21.0
FIN: 20.2
Δ_{out} 0.8

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{in}	Δ_{out}	R%	Q	K(cm/s) K(const)	h_1	h_2	K(Flow)
73	3-2	3-2	9:26 AM	10:09 AM	43	2580	7.4	0.9	7.1	1.2	0.3	0.3	1.00	0.3	1.4×10^{-7}			
	3-2	3-2	10:09 AM	10:31 AM	22	1320	7.1	1.2	7.0	1.3	0.1	0.1	1.00	0.1	9.3×10^{-8}			
	3-2	3-2	10:31 AM	12:04 PM	93	5580	7.0	1.3	6.7	1.8	0.3	0.5	0.60	0.4	8.8×10^{-8}			
	3-2	3-2	12:04 PM	1:09 PM	65	3900	6.7	1.8	6.4	2.1	0.3	0.3	1.00	0.3	9.5×10^{-8}			
	3-2		1:09	5:42	153	9180	6.4	2.1	5.7	2.8	0.7	0.7	1.00	0.7	9.4×10^{-8}			
TOTALS						t=19980								Q=1.5				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.823)(0.931)(0.99)}{(140.68)(41.165)} = 9.2 \times 10^{-8}$ CM/S

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

Form No.: 9

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: QT-9
DEPTH: 2-9.5'
SAMPLE: REDUCED
DESCRIPTION: POINT #1

TECHNICIAN: J. ALEX
DATE:
CHECKED BY: CTJ
CELL NO.: 3
SYSTEM NO.: 18

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm³):
DRY UNIT WEIGHT (pcf): 89.8 PCF
WET UNIT WEIGHT (pcf): 108.1

SAMPLE MEASUREMENTS: (INT.)
1) 3.037 2) 3.035 3) 3.033
1) 2.870 2) 2.868 3) 2.868

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.035 (in) 7.709 (cm)
SOIL DIAMETER: 2.869 (in) 7.287 (cm)
AREA(A): (in²) 41.71 (cm²)
SATURATION: 0.5 → 32.3

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 556.51
FINAL WET WEIGHT (g): 611.29
FINAL DRY WEIGHT (g): 478.05
INITIAL MOISTURE (%): 20.49%
FINAL MOISTURE (%):
PAN NAME: NN/14.30

FINAL MEASUREMENTS:

	L	D
1)		1) 2.81
2)		2) 2.83
3)		3) 2.83

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 h₁ =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L 0.99 R 0.99

B-VALUE	INT	FIN	EST. SAT.:
	72	70.1	95 %
	70	82	79.6

CONSOL*
INT: 29.5
FIN: 28.7
Δ_{avg} 10.8

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{in}	Δ_{out}	R1/0	Q	K(cm/s) K(CONST)	h_1	h_2	K(FALL)
73°F	2/23	2/23	9:31 AM	9:37 AM	6	360	16.7	4.2	10.3	10.7	6.5	6.4	1.02	6.5	2.2×10^{-5}			
	2/23	2/23	9:37 AM	9:38 AM	1	60	10.3	10.7	9.2	11.8	1.1	1.1	1.00	1.1	2.2×10^{-5}			
	2/23	2/23	9:38 AM	9:39 AM	1	60	9.2	11.8	8.2	12.8	1.0	1.0	1.00	1.0	2.0×10^{-5}			
	2/23	2/23	9:39 AM	9:40 AM	1	60	8.2	12.8	7.2	13.8	1.0	1.0	1.00	1.0	2.0×10^{-5}			
	2/23	2/23	9:40 AM	9:43 AM	3	180	7.2	13.8	4.2	16.7	2.9	3.0	0.97	2.9	2.0×10^{-5}			
TOTALS						t=720								Q=12.5				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.709)(0.931)(0.99)}{(140.68)(41.71)} = 2.1 \times 10^{-5}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-9
DEPTH: 29.5'
SAMPLE: REMOLDED
DESCRIPTION: POINT #2

TECHNICIAN: J. ALEX
DATE:
CHECKED BY: CTJ
CELL NO.: A
SYSTEM NO.: 19

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 93.2 PCF
WET UNIT WEIGHT (pcf): 114.0 PCF

SAMPLE MEASUREMENTS: (INT.)
1) 3.013 2) 3.003 3) 3.007
1) 2.876 2) 2.878 3) 2.880

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.007 (in) 7.638 (cm)
SOIL DIAMETER: 2.878 (in) 7.310 (cm)
AREA(A): (in²) 41.97 (cm²)
SATURATION: 0.5 → 28.0

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 585.55
FINAL WET WEIGHT (g): 631.78
FINAL DRY WEIGHT (g): 494.74
INITIAL MOISTURE (%): 22.3%
FINAL MOISTURE (%):
PAN NAME: WW/13.46

FINAL MEASUREMENTS:	L	D
	1) 3.05	1) 2.89
	2) 3.05	2) 2.84
	3) 3.05	3) 2.86

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi =
TEMPERATURE (°F): 73°F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 S: 0.99

B-VALUE

	INT	FIN
	72	70.0
	82	79.5

EST. SAT.: 95 %

CONSOL.*
INT: 31.7
FIN: 30.8
Δ_{OUT}: 0.9

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{IN}	Δ_{OUT}	R%	Q	K(CONST)	h_1	h_2	K(FALL)
73°	2/23	2/23	9:32 AM	9:41 AM	9	540	15.1	5.5	9.2	11.4	5.9	5.9	1.00	5.9	1.3×10^{-5}			
	2/23	2/23	9:41 AM	9:44 AM	3	180	9.2	11.4	12.3	13.3	1.9	1.9	1.00	1.9	1.3×10^{-5}			
	2/23	2/23	9:44 AM	9:46 AM	2	120	7.3	13.3	5.9	14.7	1.4	1.4	1.00	1.4	1.4×10^{-5}			
	2/23	2/23	9:46 AM	9:47 AM	1	60	5.9	14.7	5.4	15.3	0.6	0.5	1.20	0.6	1.2×10^{-5}			
	2/23	2/23	9:47 AM	9:48 AM	1	60	5.4	15.3	4.8	15.9	0.6	0.6	1.00	0.6	1.2×10^{-5}			
TOTALS						t = 960								Q = 10.4				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.638)(0.931)(0.99)}{(140.68)(41.97)} = 1.3 \times 10^{-5}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-9
DEPTH: 2.9.5'
SAMPLE: REDUCED
DESCRIPTION: POINT # 3

TECHNICIAN: J. ALEX
DATE:
CHECKED BY: CTA
CELL NO.: 10
SYSTEM NO.: 2

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm³/ft³):
DRY UNIT WEIGHT (pcf): 94.4 PCF
WET UNIT WEIGHT (pcf): 117.1 PCF

SAMPLE MEASUREMENTS: (INT.)
1) 3.022 2) 3.023 3) 3.034
1) 2.874 2) 2.876 3) 2.868

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.026 (in) 7.686 (cm)
SOIL DIAMETER: 2.873 (in) 7.298 (cm)
AREA(A): (in²) 41.83 (cm²)
SATURATION: 0.2 → 23.4

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 602.78
FINAL WET WEIGHT (g): 637.11
FINAL DRY WEIGHT (g): 503.83
INITIAL MOISTURE (%): 24.09
FINAL MOISTURE (%):
PAN NAME: AC/14.01

FINAL MEASUREMENTS:

	L	D
1)	3.04	D 2.84
2)	3.04	2) 2.86
3)	3.04	3) 2.86

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) = 70.34: 140.68 hi:
TEMPERATURE (°F): 73°F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE

	INT	FIN	EST. SAT.:
	72	69.9	95 %
	82	79.4	

CONSOL*

INT: 31.0
FIN: 29.9
Δ_{OUT}: 1.1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (t) MINUTES	ELAPSED TIME (t) SECONDS	READING (L) START	READING (R) START	READING (L) END	READING (R) END	FLOW Δ_{IN}	FLOW Δ_{OUT}	R%	Q	K (cm/s)	h_1	h_2	K (Flow)
73°	2/23	2/23	9:33 AM	9:42 AM	9	540	13.1	6.9	11.4	8.6	1.7	1.7	100	1.7	3.8×10^{-6}			
	2/23	2/23	9:42 AM	9:49 AM	7	420	11.4	8.6	10.1	9.9	1.3	1.3	100	1.3	3.7×10^{-6}			
	2/23	2/23	9:49 AM	9:55 AM	6	360	10.1	9.9	9.1	11.0	1.1	1.0	110	1.1	3.7×10^{-6}			
	2/23	2/23	9:55 AM	9:58 AM	3	180	9.1	11.0	8.6	11.5	0.5	0.5	100	0.5	3.3×10^{-6}			
	2/23	2/23	9:58 AM	10:07 AM	9	540	8.6	11.5	7.0	13.1	1.6	1.6	100	1.6	3.6×10^{-6}			
TOTALS						t = 2040								Q = 6.2				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.686)(0.931)(0.99)}{(140.68)(41.83)} = 3.7 \times 10^{-6}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

Form No.: 9

MACTEC

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-9
DEPTH: 2-9.5'
SAMPLE: REDUCED
DESCRIPTION: POINT #4

TECHNICIAN: J. ALEX
DATE:
CHECKED BY: CJA
CELL NO.: [illegible]
SYSTEM NO.: 3

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g): SAMPLE MEASUREMENTS: (INT.)
WEIGHT SOIL (g): 1) 3.031 2) 3.028 3) 3.033
VOLUME SOIL (cu ft): 1) 2.871 2) 2.872 3) 2.874
DRY UNIT WEIGHT (pcf): 95.5 PCF
WET UNIT WEIGHT (pcf): 119.9

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.031 (in) 7.699 (cm)
SOIL DIAMETER: 2.872 (in) 7.295 (cm)
AREA(A): (in²) 41.795 (cm)
SATURATION: 0.8 → 14.2

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 617.91
FINAL WET WEIGHT (g): 724.84
FINAL DRY WEIGHT (g): 586.71
INITIAL MOISTURE (%): 25.6
FINAL MOISTURE (%):
PAN NAME: CMS / 93.98

FINAL MEASUREMENTS: L	D
1) 3.04	1)
2) 3.04	2)
3) 3.04	3)

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
PORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi=
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE	
INT	FIN
72	70.0
82	4.5

EST. SAT.: 85 %

CONSOL.*: INT: 29.5; FIN: 28.1; Δ_{out}: 1.4

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (÷) MINUTES	SECONDS	READING (L) START	(R)	(L) END	(R)	FLOW Δ_{in}	Δ_{out}	R I/O	Q	K(cm/s) K(CONST)	h_1	h_2	K(FALL)
73	2/23	2/23	9:34 AM	9:45 AM	11	660	12.1	8.3	11.5	9.0	0.7	0.6	1.17	0.6	1.1×10^{-6}			
	2/23	2/23	9:45 AM	10:00 AM	15	900	11.5	9.0	10.9	9.8	0.8	0.6	1.33	0.7	9.4×10^{-7}			
	2/23	2/23	10:00 AM	11:39 AM	99	5940	10.9	9.8	6.2	14.6	4.8	4.7	1.02	4.7	9.5×10^{-7}			
	2/23	2/23	11:39 AM	2:00 PM	141	8460	6.2	14.6	0.0	20.9	6.3	6.2	1.02	6.2	8.8×10^{-7}			
	2/23		2:07 PM	2:45	38	2280	11.4	8.7	9.6	10.5	1.8	1.8	1.00	1.8	9.5×10^{-7}			
TOTALS						t=17580					Q=13.4							

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t}$

$$= \frac{Q}{t} \times \frac{(7.699)(0.931)(0.99)}{(140.68)(41.795)} = 9.2\times10^{-7}\ \text{cm/s}$$

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-9
DEPTH: 2-9.5'
SAMPLE: REDUCED
DESCRIPTION: POINT # 5

TECHNICIAN: J. ALEX
DATE:
CHECKED BY: CTA
CELL NO.: 13
SYSTEM NO.: 13

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm³):
DRY UNIT WEIGHT (pcf): 72.0 PCF
WET UNIT WEIGHT (pcf): 118.1

SAMPLE MEASUREMENTS: (INT.)
1) 2.997 2) 2.994 3) 2.999 : SOIL LENGTH(L): 2.997 (in) 7.612 (cm)
1) 2.882 2) 2.882 3) 2.877 : SOIL DIAMETER: 2.980 (in) 2.315 (cm)

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
AREA(A): (in²) 42.03 (cm)
SATURATION: 0.5 → 6.2

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 605.39
FINAL WET WEIGHT (g): 698.82
FINAL DRY WEIGHT (g): 562.52
INITIAL MOISTURE (%): 28.3 %
FINAL MOISTURE (%):
PAN NAME: BC-14/87.13

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

FINAL MEASUREMENTS:

	L	D
1)	2.99	2.89
2)	2.98	2.86
3)	2.98	2.88

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) = 70.34: 140.68 hi:
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE	INT	FIN	EST. SAT.:
	72	76.1	96 %
	82	79.7	

Consol*:
INIT: 22.0
FIN: 20.9
Δ_{OUT}: 1.1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	READING (R) START	READING (L) END	READING (R) END	FLOW Δ_{IN}	FLOW Δ_{OUT}	FLOW R%	FLOW Q	K (cm/s) K(CONST)	h_1	h_2	K (cm/s) K(FALL)
73	2/23	2/23	9:35 AM	10:01 AM	26	1560	12.3	8.0	12.0	8.3	0.3	0.3	1.00	0.3	2.3×10^{-7}			
	2/23	2/23	10:01 AM	11:38 AM	97	5820	12.0	8.3	11.2	9.3	0.8	1.0	0.80	0.9	1.8×10^{-7}			
	2/23	2/23	11:38 AM	2:00 PM	142	8520	11.2	9.3	9.9	10.6	1.3	1.3	1.00	1.3	1.8×10^{-7}			
	2/23	2/23	2:00 PM	2:40 PM	40	2400	9.9	10.6	9.5	11.0	0.4	0.4	1.00	0.4	2.0×10^{-7}			
~~2/23~~	~~2/23~~	~~2:40 PM~~					~~9.5~~	~~11.0~~										
TOTALS						t = 18300								Q = 2.9				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.612)(0.931)(0.99)}{(140.68)(42.03)} = 1.9 \times 10^{-7}$ cm/s

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* SEE CONSOLIDATION GRAPH.

Form No.: 9

MACTEC
CONSTANT HEAD PERMEABILITY TEST
(ASTM D5084)

JOB NAME: TVA KINGSTON BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: CT-9
DEPTH: 2-9.5'
SAMPLE: STANDARD - POINT #1
DESCRIPTION:

TECHNICIAN: JA
DATE: 2-9-6
CHECKED BY: CTA
CELL NO.: 4
SYSTEM NO.: 14

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm³):
DRY UNIT WEIGHT (pcf): 93.0
WET UNIT WEIGHT (pcf): 109.2

SAMPLE MEASUREMENTS: (INT.)
1) 3.036 2) 3.038 3) 3.026
1) 2.863 2) 2.864 3) 2.865

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.283 (in) 7.704 (cm)
SOIL DIAMETER: 2.804 (in) 7.276 (cm)
AREA(A): (in²) 41.56 (cm²)
SATURATION: 0.0 → 23.5; 0.7 → 23.5; 0.4 → 15.7

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 560.01
FINAL WET WEIGHT (g): 708.73
FINAL DRY WEIGHT (g): 571.01
INITIAL MOISTURE (%): 17.4
FINAL MOISTURE (%):
PAN NAME: CMS / 93.94

FINAL MEASUREMENTS:

	L	D
1)	3.08	2.86
2)	3.08	2.82
3)	3.08	2.83

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) = 70.34: 140.68 hi = 18.3
TEMPERATURE (°F): 73
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): 0.99 Rioff

B-VALUE	INT	FIN
	72	70.9
	82	74.5

Est. Sat.: 95 %

CONSOL.*
INIT: 15.7
FIN: 14.9
Δ_{OUT}:

Scale: E9-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW A_{in}	FLOW A_{out}	FLOW R1/0	Q	K(cm/s) K(const)	h_1	h_2	K(Fall)
73°	2/14		8:29 AM	8:30	1	60	18.8	1.5	16.7	3.7	2.1	2.2	0.95	2.1	4.3×10^{-5}			
			8:30	8:34	4	240	16.7	3.7	10.8	9.5	5.9	5.8	1.02	5.8	2.9×10^{-5}			
			8:34	8:36	2	120	10.8	9.5	8.0	12.2	2.8	2.7	1.04	2.7	2.7×10^{-5}			
			8:36	8:40	4	240	8.0	12.2	3.1	17.2	4.9	5.0	0.98	4.9	2.5×10^{-5}			
			8:41	8:42 AM	1	60	3.1	17.2	1.9	18.5	1.2	1.3	0.92	1.2	2.4×10^{-5}			
TOTALS						t = 720								Q = 16.7				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.704)(0.931)(0.99)}{(140.68)(41.56)} = 2.8\times10^{-5}$ cm/s

Form Date: 10-04-05

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MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: QT-9
DEPTH: 2-9.5'
SAMPLE: STANDARD - POINT #2
DESCRIPTION:

TECHNICIAN: JA
DATE: 2-9-6
CHECKED BY: CTA
CELL NO.: 1-6
SYSTEM NO.: 15

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 95.8 PCF
WET UNIT WEIGHT (pcf):

SAMPLE MEASUREMENTS: (INT.)
1) 3.003 2) 3.013 3) 3.007
1) 2.866 2) 2.864 3) 2.862

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.008 (in) 7.640 (cm)
SOIL DIAMETER: 2.864 (in) 7.275 (cm)
AREA(A): (in²) 41.56 (cm²)
SATURATION: 0.1 → 24.4; 0.2 → 12.2

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 582.5
FINAL WET WEIGHT (g): 713.85
FINAL DRY WEIGHT (g): 574.85
INITIAL MOISTURE (%): 19.5 %
FINAL MOISTURE (%):
PAN NAME: B-6 / 89.29

FINAL MEASUREMENTS:

	L	D
1)	3.05	2.87
2)	3.05	2.86
3)	3.05	2.84

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi: 18.4
TEMPERATURE (°F): 73
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): Li 0.99 Ro 0.99

B-VALUE

	INT	FIN
	72	70.0
B2	70	75.6

Est. Sat.: 96 %

Consol.*
INT: 12.2
FIN: 11.0
Δ_{OUT}:

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	READING (B) START	READING (L) END	READING (B) END	FLOW Δ_{IN}	FLOW Δ_{OUT}	$R_{1/0}$	Q	K(cm/s) (const)	h_1	h_2	K(Falling)
73°F	2/14	2/14	8:32 AM	8:35	3	180	15.4	5.5	15.2	15.7	0.2	0.2	1.00	0.2	1.3×10^{-6}			
			8:35	8:44	9	540	15.2	5.7	14.4	6.3	0.8	0.6	1.33	0.7	1.6×10^{-6}			
			8:44	9:20	36	2160	14.4	6.3	11.3	9.2	3.1	2.9	1.07	3.9	1.7×10^{-6}			
			9:20	9:55	35	2100	11.3	9.2	9.1	11.7	2.5	2.2	1.14	2.3	1.3×10^{-6}			
			9:55	10:17	22	1320	9.2	11.7	7.6	13.1	1.6	1.4	1.14	1.5	1.4×10^{-6}			
			10:17 AM	10:37	20	1200	7.6	13.1	6.4	14.1	1.0	1.2	0.83	1.1	1.1×10^{-6}			
			~~10:37~~	~~11:29~~	52	5120	6.4	14.1	4.1	16.7	2.6	2.3	1.13	2.45				
TOTALS						≈ 7500							Q = 8.8				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t}$

$$= \frac{Q}{t} \times \frac{(7.640)(0.931)(0.99)}{(140.68)(41.56)} = 1.4\times10^{-6}\ cm/s$$

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

Form No.: 9

JOB NAME: TVA KINGSTON BARROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-9
DEPTH: 2-9.5'
SAMPLE: STANDARD #3
DESCRIPTION:

TECHNICIAN: JA
DATE: 2-9-6
CHECKED BY: CT
CELL NO.: 2-N
SYSTEM NO.: 7

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm³/ft³):
DRY UNIT WEIGHT (pcf): 97.3 PCF
WET UNIT WEIGHT (pcf): 117.7

SAMPLE MEASUREMENTS: (INT.)
1) 3.042 2) 3.043 3) 3.031 : SOIL LENGTH(L): 3.039 (in) 7.718 (cm)
1) 2.864 2) 2.864 3) 2.864 : SOIL DIAMETER: 2.864 (in) 7.275 (cm)

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
AREA(A): (in²) 41.56 (cm²)
SATURATION: 55.6 → 29.2 → 97

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 604.91
FINAL WET WEIGHT (g): 524.66
FINAL DRY WEIGHT (g): 489.69
INITIAL MOISTURE (%): 21.0 %
FINAL MOISTURE (%):
PAN NAME: B-3 / 87.07

FINAL MEASUREMENTS:

	L	D
1)	3.09	2.89
2)	3.09	2.84
3)	3.05	2.83

PERM INFORMATION

CELL PRESSURE(psi):
FORE PRESSURE(psi):
BACK PRESSURE (psi):
HEAD,h (psi) x 70.34: hi =
TEMPERATURE (°F):
VISCOSITY CORRECTION(R_T):
PERMEANT LIQUID USED:
BURET CORRECTION FACTOR(C): L: R:

B-VALUE

	INT	FIN
	72	69.8
	82	79.3

Est. Sat.: 75 %

CONSOL*
INT: 50.3
FIN: 51.8
Δ cor:

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	READING (R) START	READING (L) END	READING (R) END	FLOW Δ_{in}	FLOW Δ_{out}	FLOW R/0	Q	K(cm/s) K(CONST)	h_1	h_2	K(FALL)
73°F	2/14		9:16 AM	9:37	21	1260	22.7	48.4	25.4	46.3	2.1	2.7	0.78	2.4	2.3×10^{-6}			
			9:37	9:56	19	1140	25.4	46.3	26.1	45.6	0.7	0.7	1.00	0.7	7.5×10^{-7}			
			9:56	10:17	21	1260	26.1	45.6	27.7	43.4	2.2	1.6	1.37	1.9	1.8×10^{-6}			
			10:17 AM	10:37	20	1200	27.7	43.4	29.2	41.9	1.5	1.5	1.00	1.5	1.5×10^{-6}			
			10:37	11:28	51	3060	29.2	41.9	33.0	38.0	3.9	3.8	1.03	3.8	1.5×10^{-6}			
			11:28	12:43	75	4500	33.0	38.0	38.0	32.8	5.2	5.0	1.04	5.1	1.4×10^{-6}			
			12:43	3:03	140	8400	38.0	32.8	46.9	24.7	8.1	8.0	1.01	8.0	1.2×10^{-6}			
TOTALS						Σ 18420							Q = 20.3				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.718)(0.931)(0.99)}{(140.68)(41.56)} = 1.3 \times 10^{-6}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

Form No.: 9

JOB NAME: TVA KINGSTON BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-9
DEPTH: 7-9.5'
SAMPLE: STANDARD-POINT #4
DESCRIPTION:

TECHNICIAN: JA
DATE: 2-9-6
CHECKED BY: CTA
CELL NO.: 1/3
SYSTEM NO.: 8

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 97.6
WET UNIT WEIGHT (pcf):

SAMPLE MEASUREMENTS: (INT.)
1) 3.045 2) 3.0443) 3.020
1) 2.863 2) 2.862 3) 2.863

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.036 (in) 7.712 (cm)
SOIL DIAMETER: 2.863 (in) 7.271 (cm)
AREA(A): (in²) 41.52 (cm)
SATURATION: 55.7 - 22.6

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 617.65
FINAL WET WEIGHT (g): 733.69
FINAL DRY WEIGHT (g): 596.34
INITIAL MOISTURE (%): 23.36
FINAL MOISTURE (%):
PAN NAME: Bot/91.86

FINAL MEASUREMENTS:

	L	D
1)	3.09	2.86
2)	3.08	2.86
3)	3.09	2.85

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi = 96.2
TEMPERATURE (°F): 73.
VISCOSITY CORRECTION(f_T): 0.931
PERMEANT LIQUID USED: H20
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE

	INT	FIN	EST. SAT.:
	72	89.9	95 %
	82	79.4	

CONSOL*
INT: 22.2
FIN: 23.0
Δ_{OUT}:

Scale: E9-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	ELAPSED TIME (+) SECONDS	READING (L) START	READING (R) START	READING (L) END	READING (R) END	FLOW Δ_{in}	FLOW Δ_{out}	R%	Q	K(cm/s) K(const)	h_1	h_2	K(Fall)
73°F	7/14		9:16 AM	9:38 AM	22	1320	24.5	38.6	25.7	37.4	1.2	1.2	1.00	1.2	1.1×10^{-6}			
			9:38	9:57	19	1140	25.7	37.4	26.6	36.5	0.9	0.9	1.00	0.9	9.6×10^{-7}			
			9:57	10:16	19	1140	26.6	36.5	27.5	35.5	1.0	0.9	1.11	0.9	9.6×10^{-7}			
			10:16 AM	10:36	20	1200	27.5	35.5	28.5	34.5	1.0	1.0	1.00	1.0	1.0×10^{-6}			
			10:36	11:28	52	3120	28.5	34.5	31.1	31.9	2.6	2.6	1.00	2.6	1.0×10^{-6}			
			11:28	12:42	74	4440	31.1	31.9	34.5	28.3	3.6	3.4	1.06	3.5	9.6×10^{-7}			
			12:42	3:02	140	8400	34.5	28.3	40.5	22.1	6.2	6.0	1.03	6.1	8.8×10^{-7}			
TOTALS						20760								Q = 16.2				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.712)(0.931)(0.99)}{(140.68)(41.52)} = 9.5\times10^{-7}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

Form No.: 9

MACTEC
CONSTANT HEAD PERMEABILITY TEST
(ASTM D5084)

RETEST

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: QT-9
DEPTH:
SAMPLE: STANDARD
DESCRIPTION: POINT #5

TECHNICIAN: J. ALEX
DATE: 3-9-06
CHECKED BY: CTA
CELL NO.: 13
SYSTEM NO.: 14

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 95.8 PCF
WET UNIT WEIGHT (pcf): 119.8

SAMPLE MEASUREMENTS: (INT.)
1) 3.019 2) 3.0223) 3.0416
1) 2.874 2) 2.879 3) 2.873

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.029 (in) 7.694 (cm)
SOIL DIAMETER: 2.874 (in) ~~7.299~~ (cm) 7.299 96
AREA(A): (in²) 4.185 (cm) 41.85
SATURATION:

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 618.81
FINAL WET WEIGHT (g): 712.85
FINAL DRY WEIGHT (g): 580.99
INITIAL MOISTURE (%): 25.0%
FINAL MOISTURE (%):
PAN NAME: BC-14 787.12

Pan +

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

FINAL MEASUREMENTS:
L D
1) 3.00 D 2.87
2) 3.01 2) 2.83
3) 3.00 3) 2.82

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) = 70.34: 140.68 hi =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE	INT	FIN
	72	90.0
	82	96.6

Est. Sat.: 96%

Consol.*
INT: 17.2
FIN: 20.1
Δ_{out} 0.6

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE		TIME		ELASPED TIME (+)		READING				FLOW			Q	K(cm/s)			
(F°)	S	E	START	END	MINUTES	SECONDS	(L) START	(B)	(L) END	(B)	Δ_{IN}	Δ_{OUT}	$R_{1/0}$		K(CONST)	h_1	h_2	K(FALL)
73	3-9	3-9	4:30 PM	6:30 PM	120	7200	13.0	6.9	11.5	8.7	1.8	1.5	1.28	1.69	2.7×10^{-7}			1.6
	3-9	3-10	6:~~30~~ PM	9:35 AM	893	53580	7.8 ~~11.6~~	4.8	7.4	15.6	10.8	10.4	1.04	1.06	2.4×10^{-7}			10.6
	3-10		9:35 AM	10:22	47	2820	7.4	15.6	6.8	16.1	0.5	0.6	0.83	0.86	2.6×10^{-6}			0.6
			10:22	11:58	96	5760	6.8	16.1	5.9	17.1	1.0	0.9	1.11	1.0	2.9×10^{-7}			1.0
			11:58	1:48	110	6600	5.9	17.1	4.7	18.4	1.3	1.2	1.08	1.2	2.8×10^{-7}			1.2
			1:48	2:28	40	2400	4.7	18.4	4.4	18.8	0.4	0.3	1.33	0.3	1.5×10^{-7}			
			2:28				4.4	18.8										
TOTALS						75960								Q = 15.0				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.694)(0.931)(0.99)}{(140.68)(41.85)} = 2.4 \times 10^{-7}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

Form No.: 9

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-9
DEPTH: 2-9.5'
SAMPLE: MODIFIED - PONT #1
DESCRIPTION:

TECHNICIAN: JA. LFM
DATE: 2-8-6
CHECKED BY: JA CT
CELL NO.: A
SYSTEM NO.: 10

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 103.9
WET UNIT WEIGHT (pcf): 116.0

SAMPLE MEASUREMENTS: (INT.)
1) 3.080 2) 3.080 3) 3.080
1) 2.853 2) 2.858 3) 2.858

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.080 (in) 7.82 (cm)
SOIL DIAMETER: 2.854 (in) 7.25 (cm)
AREA(A): (in²) 41.27 (cm)
SATURATION: 0.3 → 48.0; 0.5 → 29.3

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 598.99
FINAL WET WEIGHT (g): 684.44
FINAL DRY WEIGHT (g): 543.9
INITIAL MOISTURE (%): 11.7%
FINAL MOISTURE (%):
PAN NAME: 00 / 14.27

FINAL MEASUREMENTS:

	L	D
1)	32.1	2.91
2)	32.5	2.93
3)	32.4	2.91

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

77

CELL PRESSURE(psi):
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi=
TEMPERATURE (°F):
VISCOSITY CORRECTION(R_T):
PERMEANT LIQUID USED:
BURET CORRECTION FACTOR(C): L:0.99 R:0.99

B-VALUE	INT	FIN
	72	70.0
	70	69.6

EST. SAT.: 96 90

CONSOL*
INT: 30.4
FIN: 29.4
Δ_{OUT}: 1.0

11:49 AM 2/9

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{IN}	FLOW Δ_{OUT}	FLOW R/O	Q	K(cm/s) K(CONST)	h_1	h_2	K(FLEX)
73°	2/13	2/13	8:57 AM	9:04 AM	7 mins	420	15.9	5.7	13.6	8.2	2.3	2.5	0.92	2.4	7.1×10^{-6}			
	2/13	2/13	9:04 AM	9:12 AM	8	480	13.6	8.2	10.8	11.0	2.8	2.8	1.00	2.8	7.2×10^{-6}			
	2/13		9:12 AM	9:20	8	480	10.8	11.0	7.9	13.9	2.9	2.9	1.00	2.9	7.5×10^{-6}			
			9:20	9:26	6	360	13.5	9.9	5.8	15.9	2.1	2.0	1.05	2.0	6.9×10^{-6}			
			9:26	9:31	5	300	5.8	15.9	4.3	17.4	1.5	1.5	1.00	1.5	6.2×10^{-6}			
TOTALS						t = 2040								Q = 11.6				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.82)(0.931)(0.99)}{(140.68)(41.27)} = 7.1 \times 10^{-6}$ cm/s

Form Date: 10-04-05

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* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

Form No.: 9

JOB NAME: TVA KINGSTON – DARROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-9
DEPTH: 2-9.5'
SAMPLE: MODIFIED – PLANT #2
DESCRIPTION:

TECHNICIAN: J.A.
DATE: 2-8-6
CHECKED BY: CTA
CELL NO.: 1
SYSTEM NO.: 19

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf):
WET UNIT WEIGHT (pcf): 120.6 (116.7)

SAMPLE MEASUREMENTS: (INT.)
1) 3.083 2) 3.082 3) 3.090
1) 2.859 2) 2.852 3) 2.855

TUBE LENGTH: ____ (in) ____ (cm)
TUBE DIAMETER: ____ (in) ____ (cm)
SOIL LENGTH(L): 3.082 (in) 7.828 (cm)
SOIL DIAMETER: 2.855 (in) 7.252 (cm)
AREA(A): ____ (in²) 41.30 (cm)
SATURATION: 0.4 → 48.0 ; 0.5 → (5.7)

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 628.99
FINAL WET WEIGHT (g): 708.59
FINAL DRY WEIGHT (g): 561.65
INITIAL MOISTURE (%): 13.8 %
FINAL MOISTURE (%): ____
PAN NAME: AE / 1420

FINAL MEASUREMENTS:

	L	D
1)	3.21	2.91
2)	3.22	2.91
3)	3.20	2.91

Scale: E9-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi =
TEMPERATURE (°F): 73°F
VISCOSITY CORRECTION(R_T): 0.991
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE

	INT	FIN
	92	70.0
	82	79.5

EST. SAT.: 95 %

CONSOL*
INT: 30.7
FIN: 29.7
Δ_{OUT}: ____

11:49AM 2/9

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW A_{IN}	A_{OUT}	R	Q	K(cm/s) K(CONST)	h_1	h_2	K(FALL)
73°F	2/13		8:57AM	9:14AM	17	1020	13.2	7.6	11.5	9.2	1.7	1.6	1.06	1.6	1.9×10^{-6}			
	2/13		9:14	9:27	13	780	11.5	9.2	10.2	10.4	1.3	1.2	1.08	1.3	2.1×10^{-6}			
			9:27	9:40	13	780	10.2	10.4	8.9	11.8	1.4	1.3	1.08	1.3	2.1×10^{-6}			
			9:40	9:55	15	900	8.9	11.8	7.5	13.2	1.4	1.4	1.00	1.4	1.9×10^{-6}			
			9:55	10:13	18	1080	7.5	13.2	6	14.7	1.5	1.5	1.00	1.5	1.7×10^{-6}			
			10:13	10:19	6	360	6	12.7	5.4	15.3	0.6	0.6	1.00	0.6	2.1×10^{-6}			
			10:19	10:26	7	420	5.4	15.3	4.7	16	0.7	0.7	1.00	0.7	2.1×10^{-6}			
TOTALS						= 5340								Q = 8.4				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.828)(0.931)(0.99)}{(140.68)(41.30)} = 2.0\times10^{-6}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

Form No.: 9

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064
BORING NO.: ST-9
DEPTH: 2-9.5'
SAMPLE: MODIFIED - POINT #3
DESCRIPTION:

TECHNICIAN: JA
DATE: 2-8-6
CHECKED BY: CTA
CELL NO.: 3
SYSTEM NO.: 2

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 109.2
WET UNIT WEIGHT (pcf):

SAMPLE MEASUREMENTS: (IN.)
1) 3.931 2) 3.921 3) 3.941
1) 2.868 2) 2.868 3) 2.868

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.931 (in) 7.699 (cm)
SOIL DIAMETER: 2.868 (in) 7.285 (cm)
AREA(A): (in²) 41.68 (cm²) 41.68
SATURATION: 0.4 → 42.5 ; 3.0 → 19.1

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 649.33
FINAL WET WEIGHT (g): 712.83
FINAL DRY WEIGHT (g): 623.12
INITIAL MOISTURE (%): 15.7
FINAL MOISTURE (%):
PAN NAME: TT / 13.66

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

FINAL MEASUREMENTS:	L	D
1)	3.21	2.91
2)	3.21	2.91
3)	3.21	2.91

CELL PRESSURE(psi):
FORE PRESSURE(psi):
BACK PRESSURE (psi):
HEAD,h (psi) x 70.34: hi =
TEMPERATURE (°F):
VISCOSITY CORRECTION(R_T):
PERMEANT LIQUID USED:
BURET CORRECTION FACTOR(C): L: R:

B-VALUE	INT	FIN	Est. Sat.:
	72	70.0	97.0%
	82	79.7	

CONSOL*
INT: 30.5
FIN:
Δ out:

11:49 AM 2/9

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{in}	FLOW Δ_{out}	R/6	Q	K (cm/s) (CONST)	h_1	h_2	K (cm/s) (FALL)
73°F	2/13		8:58 AM	9:15 AM	17	1020	13.4	6.4	12.8	7.2	0.6	0.6	1.33	0.7	8.8×10^{-7}			
			9:15 AM	9:28	13	780	12.8	7.2	12.3	7.6	0.4	0.5	0.80	0.5	7.8×10^{-7}			
			9:28	9:42	14	840	12.3	7.6	11.8	8.1	0.5	0.5	1.00	0.5	7.2×10^{-7}			
			9:42	9:56	14	840	11.8	8.1	11.4	8.6	0.5	0.4	1.25	0.5	7.8×10^{-7}			
			9:56	10:20	24	1440	11.4	8.6	10.7	9.4	0.8	0.7	1.14	0.7	5.9×10^{-7}			
			10:20	10:39	19	1140	10.7	9.4	10.1	10.0	0.6	0.6	1.00	0.6	6.4×10^{-7}			
			10:39	11:10	31	1860	10.1	10	9.1	11	1.0	1.0	1.00	1.0	6.5×10^{-7}			
			11:10	12:23	373	4780	9.1	11	7	13.3	2.3	2.1	1.10	2.2	6.7×10^{-7}			
			12:23	12:44	21	~~1260~~	7	13.3	6.3	14	0.7	0.7	1.00	0.7	6.7×10^{-7}			
			12:44	1:08	24	1440	6.3	14	5.6	14.7	0.7	0.7	1.00	0.7	6.9×10^{-7}			
			1:08				5.6	14.7										
TOTALS						11520								Q = 5.9				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.699)(0.931)(0.99)}{(140.68 \times 41.68)} = 6.2 \times 10^{-7}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

31
60
1860

MACTEC
CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

Form No.: 9

JOB NAME: TVA - KINGSTON - FLY ASH
JOB NO.: 3043-05-1964-02
BORING NO.: OT-9
DEPTH: MODIFIED Point #4
SAMPLE: RED
DESCRIPTION:

TECHNICIAN: JA
DATE: 2-21-06
CHECKED BY: CTA
CELL NO.: 1.06
SYSTEM NO.: 14

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 109.6 ~~109.0~~ PCF
WET UNIT WEIGHT (pcf): 129

SAMPLE MEASUREMENTS: (INT.) 1) 3.038 2) 3.0303) 3.030
~~1) 2.880 2) 2.880 3) 2.880~~

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.030 (in) 7.696 (cm)
SOIL DIAMETER: 2.880 (in) 7.315 (cm)
AREA(A): (in²) 42.03 (cm)
SATURATION: 0.5 → 21.9 ; 0.4 → 7.6

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 665.84
FINAL WET WEIGHT (g):
FINAL DRY WEIGHT (g): 647.91
INITIAL MOISTURE (%): 7.3%
FINAL MOISTURE (%):
PAN NAME: TT / 13.76

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

FINAL MEASUREMENTS:

	L	D
1)	3.12	2.93
2)	3.11	2.93
3)	3.12	2.93

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD (psi) = 70.34: 40.68 hi:
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.731
PERMEANT LIQUID USED: H20
BURET CORRECTION FACTOR(C): L 0.99 R 0.99

B-VALUE

	INT	FIN
	72	70.3
	82	79.8

EST. SAT.: 95 %

CONSOL*
INT: 24.0
FIN: 23.0
Δ_{out}: 1.0

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	ELAPSED TIME (+) SECONDS	READING (L) START	READING (R) START	READING (L) END	READING (R) END	FLOW Δ_{in}	FLOW Δ_{out}	FLOW R/O	Q	K(cm/s) K(CONST)	h_1	h_2	K(FALL)
73	2/22	2/22	9:10 AM	11:10 AM	120	7200	15.6	4.7	15.0	5.2	0.5	0.6	0.83	0.5	8.3×10^{-8}			
	2/22	2/22	11:14 AM	2:14 PM	180	10800	12.0	8.0	11.3	8.8	0.8	0.7	1.14	0.7	7.8×10^{-8}			
	2/22	2/22	2:14 PM	3:11 PM	57	3420	11.3	8.8	11.0	9.0	.2	.3	0.67	.2	7.0×10^{-8}			
	2/22	2/22	3:11 PM	7:01 PM	230	13800	11.0	9.0	10.2	10.2	1.2	0.8	1.50	1.0	8.7×10^{-8}			
	2/22	2/23	7:01 PM	8:22 AM	801	48060	10.2	10.2	7.2	13.6	3.4	3.0	1.13	3.2	8.0×10^{-8}			
	2/23	2/23	8:22 AM	11:37 AM	195	11700	7.2	13.6	6.5	14.4	0.8	0.7	1.14	0.8	8.2×10^{-8}			
TOTALS						$t = 94980$								$Q = 6.4$				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.696)(0.731)(0.99)}{(40.68)(42.03)} = 8.1\times10^{-8}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA - KINGSTON BORROW
JOB NO.: 3943-05-16104-02
BORING NO.: OT-9
DEPTH: 2 - 9.5'
SAMPLE: MODIFIED - PART #5
DESCRIPTION:

TECHNICIAN: JA
DATE: 2-8-6
CHECKED BY: CTA
CELL NO.: 13 (4/10)
SYSTEM NO.: 13

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm³ ft³):
DRY UNIT WEIGHT (pcf): 108.1
WET UNIT WEIGHT (pcf): 128.9

SAMPLE MEASUREMENTS: (INT.)
1) 3.040 2) 3.044 3) 3.046 : SOIL LENGTH(L): 3.042 (in) 7.727 (cm)
1) 2.872 2) 2.869 3) 2.870 : SOIL DIAMETER: 2.870 (in) 7.290 (cm)

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
AREA(A): (in²) 41.74 (cm²)
SATURATION: 0.2 → 20.0 ; 1.5 → 9.1

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 665.8
FINAL WET WEIGHT (g): 696.4
FINAL DRY WEIGHT (g): 569.38
INITIAL MOISTURE (%): 19.2 %
FINAL MOISTURE (%):
PAN NAME: LL | 4.04

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

FINAL MEASUREMENTS:

	L	D
1)	3.08	2.89
2)	3.10	2.88
3)	3.09	2.88

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi: 18.21
TEMPERATURE (°F): 73° F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE	INT	FIN	Est. Sat.:
	72	70.0	85 %
	82	79.5	

CONSOL.*: 11:49 AM 2/9
INT: 23.9
FIN: 22.7
Δ_{OUT}:

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{IN}	FLOW Δ_{OUT}	R½	Q	K (cm/s) K(const)	h₁	h₂	K(Falling)
73°F	2/13		8:59 AM	9:30 AM	31	1860	13.1	6.8	12.9	6.8	0.2	0.2	0.50	0.2	1.3×10^{-7}			
			9:30 AM	10:14	44	2640	12.9	6.9	12.7	7.1	0.2	0.2	1.06	0.2	9.2×10^{-8}			
			10:14	12:24	130	7800	12.7	7.1	12.0	7.7	0.7	0.6	1.17	0.6	9.3×10^{-8}			
			12:24	2:24	120	7200	12.0	7.7	11.7	8.3	0.3	0.6	0.50	0.5	8.4×10^{-8}			
	2/13 2/14		2:24 PM	8:14 AM	~~1170~~ 1070	~~84~~ 7800	11.7	8.3	7.2	13.9	4.5	4.7	0.96	4.6	8.7×10^{-8}			
			8:14 AM	10:18 AM	124	7,440	7.2	13.0	6.7	13.8	0.8	0.5	1.60	0.6	9.8×10^{-8}			
			10:18 AM	12:44	146	8,760	6.7	13.8	6.2	14.5	0.7	0.5	1.40	0.6	8.3×10^{-8}			
TOTALS						~~t~~ 98040								Q = 7.1				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.727)(0.931)(0.99)}{(140.68)(41.74)} = 8.8\times10^{-8}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

6 50 mm

MACTEC
CONSTANT HEAD PERMEABILITY TEST

Form No.: 9

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-11
DEPTH: 1.5-2.5'
SAMPLE: REMOLDED
DESCRIPTION: POINT #1

TECHNICIAN: J. ALEX
DATE: 3-2-6
CHECKED BY:
CELL NO.: B
SYSTEM NO.: 14

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm³):
DRY UNIT WEIGHT (pcf):
WET UNIT WEIGHT (pcf): 110.5

SAMPLE MEASUREMENTS: (IN.)
1) 3.018 2) 3.016 3) 3.014
1) 2.875 2) 2.876 3) 2.874
97.4 pcf

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.016 (in) 7.661 (cm)
SOIL DIAMETER: 2.875 (in) 7.303 (cm)
AREA(A): (in²) 41.88 (cm²)
SATURATION: 0.6 → 23.5; 0.7 → 21.2

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 567.68
FINAL WET WEIGHT (g): 714.11
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 13.5%
FINAL MOISTURE (%):
PAN NAME: CMS 11.08

FINAL MEASUREMENTS:	L	D
1)	1)	1) 2.90
2)	2)	2) 2.86
3)	3)	3) 2.83

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD, h (psi) x 70.34: 140.68 h₁ =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE	INT	FIN	EST. SAT.:
	72	70.9	95 %
	82	79.5	

CONSOL*
INT: 20.9
FIN: 19.9
Δ: 1.0

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{in}	FLOW Δ_{out}	R%	Q	K (cm/s) K(const)	h_1	h_2	K(Falling)
~~73~~	~~3-2~~		~~6:01 PM~~				15.4	4.9										
73	3-2	3-2	6:41 PM	6:51 PM	10	600	15.8	4.6	12.2	8.2	3.6	3.6	1.00	3.6	7.2×10^{-6}			
	3-2	3-2	6:51 PM	6:57 PM	6	360	12.2	8.2	10.0	10.3	2.1	2.2	0.95	2.1	7.0×10^{-6}			
	3-2	3-2	6:57 PM	7:06 PM	9	540	10.0	10.3	7.0	13.4	3.1	3.0	1.03	3.1	6.9×10^{-6}			
	3-2	3-2	7:06 PM	7:14 PM	8	480	7.0	13.4	4.4	16.1	2.7	2.6	1.04	2.6	6.5×10^{-6}			
TOTALS						t = 1980						Q = 11.4						

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.661)(0.931)(0.99)}{(140.68)(41.88)} = 6.9 \times 10^{-6}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-11
DEPTH: 1.5-2.5'
SAMPLE: REDUCED
DESCRIPTION: POINT # 2

TECHNICIAN: J. ALEX
DATE: 3-2-6
CHECKED BY:
CELL NO.: 1-8
SYSTEM NO.: 15

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm³/ft³):
DRY UNIT WEIGHT (pcf): (99.5 pcf)
WET UNIT WEIGHT (pcf): 115.0

SAMPLE MEASUREMENTS: (IN.)
1) 3.022 2) 3.004 3) 3.020
1) 2.877 2) 2.878 3) 2.879

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.022 (in) 7.676 (cm)
SOIL DIAMETER: 2.878 (in) 7.310 (cm)
AREA(A): (in²) 41.97 (cm²)
SATURATION: Q.6 @ 27.6; Q.1 @ 12.0

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 593.67
FINAL WET WEIGHT (g): 720.17
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 15.6 %
FINAL MOISTURE (%):
PAN NAME: BOT / 91.16

FINAL MEASUREMENTS:

	L	D
1)	3.03	2.884
2)	3.04	2.883
3)	3.04	2.881

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 h₁ =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE	INT	FIN
	78	70.3
	82	79.8

EST. SAT.: 95 %

CONSOL.*
INT: 15.0
FIN: 14.3
Δ_{OUT}: 0.7

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	ELAPSED TIME (+) SECONDS	READING (L) START	READING (R) START	READING (L) END	READING (R) END	FLOW Δ_{IN}	FLOW Δ_{OUT}	R/Q	Q	K(CONST)	h_1	h_2	K(FLOW)
~~73~~	~~3-2~~		~~6:02 PM~~				15.7	4.5										
73	3-2	3-2	6:41 PM	6:51 PM	10	600	16.0	4.2	13.6	6.6	2.4	2.4	1.00	2.4	4.8×10^{-6}			
	3-2	3-2	6:51 PM	6:57 PM	6	360	13.6	6.6	12.3	7.8	1.2	1.3	0.92	1.2	4.0×10^{-6}			
	3-2	3-2	6:57 PM	7:15 PM	18	1080	12.3	7.8	8.8	11.5	3.7	3.5	1.06	3.6	4.0×10^{-6}			
	3-2	3-2	7:15 PM	7:30 PM	15	900	8.8	11.5	6.2	14.2	2.7	2.6	1.04	2.7	3.6×10^{-6}			
TOTALS						t = 2940								Q = 9.9				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.676)(0.931)(0.99)}{(140.68)(41.97)} = 4.0 \times 10^{-6}$ cm/s

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* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

Form No.: 9

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-11
DEPTH: 1.5-2.5
SAMPLE: REDUCED
DESCRIPTION: POINT #3

TECHNICIAN: J. ALEX
DATE: 3-2-6
CHECKED BY: CTA
CELL NO.: 4
SYSTEM NO.: 7

MPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 109.0PCF
WET UNIT WEIGHT (pcf): 120.0

SAMPLE MEASUREMENTS: (INT.)
1) 2.994 2) 2.993 3) 2.995
1) 2.884 2) 2.8843 3) 2.8841

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 2.994 (in) 7.605 (cm)
SOIL DIAMETER: 2.884 (in) 7.325 (cm)
AREA(A): (in²) 42.15 (cm)
SATURATION: 58.9 — 45.9

OISTURE CONTENT

PAN + INITIAL WET WEIGHT (g): 616.03
FINAL WET WEIGHT (g): 737.60
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 17.7%
FINAL MOISTURE (%):
PAN NAME: Vallure 193.15

PERM INFORMATION

FINAL MEASUREMENTS:
L D 2.996
1) 3.03 D 2.880
2) 3.01 2) 2.89
3) 3.03 3)

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD, h (psi) x 70.34: 140.68 h_i:
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L 0.99 R 0.99

B-VALUE	INT	FIN	Est. Sat.:
	70	70.1	95 %
	82	79.6	

CONSOL*
INIT: 25.0
FIN: 29.5
Δ_{out}: 4.5

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

BLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{in}	FLOW Δ_{out}	R%	Q	K(cm/s) K(const)	h_i
~~73~~	3-2		~~6:03 PM~~				~~33.9~~	~~42.1~~								
73	3-2	3-2	6:39 PM	6:53 PM	14	840	29.6	36.9	31.7	34.9	2.0	2.1	0.95	2.0	2.8×10^{-6}	
	3-2	3-2	6:53 PM	7:00 PM	7	420	31.7	34.9	32.8	34.0	1.9	1.1	0.82	1.1	3.1×10^{-6}	
	3-2	3-2	7:00 PM	7:16 PM	16	960	32.8	34.0	35.1	31.8	2.2	2.3	0.96	2.2	2.7×10^{-6}	
	3-2	3-2	7:16 PM	7:38 PM	22	1320	35.1	31.8	38.3	28.9	2.9	3.2	0.91	3.0	2.7×10^{-6}	
						t=3540								Q=8.3		

TOTALS

OEFFICIENT OF PERMEABILITY, $K = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.605)(0.931)(0.99)}{(140.68)(42.15)} = 2.8\times10^{-6}$ CM/S

Form Date: 10-04-05

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Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-11
DEPTH: 1.5-2.5
SAMPLE: REDUCED
DESCRIPTION: POINT #4

TECHNICIAN: J. ALEX
DATE: 3-2-6
CHECKED BY: CTJ
CELL NO.: 6
SYSTEM NO.: 8

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g): SAMPLE MEASUREMENTS: (IN.)
WEIGHT SOIL (g): 1) 3.020 2) 3.012 3) 3.016
VOLUME SOIL (cu ft): 1) 2.874 2) 2.876 3) 2.874
DRY UNIT WEIGHT (pcf): 102.8 PCF
WET UNIT WEIGHT (pcf): 122.5

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.016 (in) 7.661 (cm)
SOIL DIAMETER: 2.875 (in) 7.303 (cm)
AREA(A): (in²) 41.88 (cm)
SATURATION: 59.4 → 77.1

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 629.68
FINAL WET WEIGHT (g): (3230)
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 19.2%
FINAL MOISTURE (%):
PAN NAME: PCM / 92.43

FINAL MEASUREMENTS: L / D: 1) 3.05 D) 2.87; 2) 3.02 2) 2.85; 3) 3.00 3) 2.84

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi=
TEMPERATURE (°F): 73°F
VISCOSITY CORRECTION(R_t): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L:0.99 R:0.99

B-VALUE	
INT	FAL
72	70.0
84	79.6

Est. Sat.: 96%

Consol.*: INT: 45.0; FAL: 44.0; Δ out: 1.0

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (t) MINUTES	ELAPSED TIME (t) SECONDS	READING (L) START	READING (R) START	READING (L) END	READING (R) END	FLOW Δ_{in}	FLOW Δ_{out}	R i/o	Q	K (CONST)	h_1	h_2	K (FALL)
73	3-2	3-2	6:03pm	6:37pm	34	2040	38.6	46.1	39.1	45.5	0.5	0.6	1.00	0.5	2.9x10⁻⁷			
	3-2	3-2	6:37pm	7:17pm	40	2400	39.1	45.3	39.5	44.8	0.7	0.4	1.76	0.6	3.0x10⁻⁷			
	3-2	3-2	7:17pm	8:03pm	46	2760	39.5	44.8	40.1	44.2	0.6	0.6	1.00	0.6	2.6x10⁻⁷			
	3-2	3-2	8:03pm	8:21	18	1080	40.1	44.2	40.3	43.9	0.3	0.2	1.56	0.25	2.8x10⁻⁷			
TOTALS						t=8280					Q= 1.95							

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_t \times C}{h \times A \times t}$

$$= \frac{Q}{t} \times \frac{(7.661)(0.931)(0.99)}{(140.68)(41.88)} = 2.8 \times 10^{-7} \text{ cm/s}$$

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-11
DEPTH: 1.5-2.5
SAMPLE: REDUCED
DESCRIPTION: POINT # 5

TECHNICIAN: J. ALEX
DATE: 3-2-6
CHECKED BY: CJ
CELL NO.: 13
SYSTEM NO.: 9

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g): SAMPLE MEASUREMENTS: (IN.)
WEIGHT SOIL (g): 1) 3.022 2) 3.019 3) 3.020
VOLUME SOIL (cu ft): 1) 2.870 2) 2.868 3) 2.869
DRY UNIT WEIGHT (pcf): 100.4 PCF
WET UNIT WEIGHT (pcf): 122.0

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.020 (in) 7.671 (cm)
SOIL DIAMETER: 2.869 (in) 7.287 (cm)
AREA(A): (in²) 41.71 (cm)
SATURATION: 58.1 → 52.2

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 625.82
FINAL WET WEIGHT (g): 720.74
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 21.5%
FINAL MOISTURE (%):
PAN NAME: B-9 /8801

FINAL MEASUREMENTS: L	D
1) 2.99	1) 2.84
2) 2.98	2) 2.82
3) 2.99	3) 2.86

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi=
TEMPERATURE (°F): 73°F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L:0.99 R:0.99

B-VALUE	
INT	FIN
72	69.8
82	79.3

EST. SAT.: 95 %

CONSOL*
INT: 45.9
FIN: 44.8
Δ out: 0.2

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE		TIME		ELASPED TIME (t)		READING				FLOW				K (cm/s)			
(F°)	S	E	START	END	MINUTES	SECONDS	L START	R START	L END	R END	Δ_{in}	Δ_{out}	R/o	Q	K(CONST)	h_1	h_2	K(FALL)
73	3-2	3-2	6:04 PM	6:38 PM	34	2040	32.9	43.9	33.3	43.3	0.6	0.4	1.50	0.4	2.4×10^{-7}			
	3-2	3-2	6:38 PM	7:19 PM	41	2460	33.3	43.3	33.8	42.3	1.0	0.5	2.20	0.5	2.4×10^{-7}			
	3-2	3-2	7:19 PM	8:04 PM	45	2700	33.8	42.3	34.4	42.0	0.3	0.6	0.50	0.5	2.2×10^{-7}			
	3-2	3-2	8:04 PM	8:22 PM	18	1080	34.4	42.0	34.6	41.8	0.2	0.2	1.00	0.2	2.2×10^{-7}			
TOTALS						t= 8280						Q= 1.6						

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t}$ $= \frac{Q}{t} \times \frac{(7.671)(0.931)(0.99)}{(140.68)(41.71)} =$ **2.3×10^{-7} cm/s**

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

Form No.: 9

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-11
DEPTH: 1.5-2.5
SAMPLE: STANDARD
DESCRIPTION: POINT # 1

TECHNICIAN: J. ALEX
DATE: 3-2-6
CHECKED BY: CTA
CELL NO.: 2
SYSTEM NO.: 18

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 100.4 PCF
WET UNIT WEIGHT (pcf): 113.0

SAMPLE MEASUREMENTS: (INT.)
1) 3.041 2) 3.040 3) 3.039 : SOIL LENGTH(L): 3.040 (in) 7.722 (cm)
1) 2.883 2) 2.883 3) 2.883 : SOIL DIAMETER: 2.883 (in) 7.323 (cm)

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
AREA(A): (in²) 42.12 (cm²)
SATURATION: 0.7 → 49.0 : 0.9 → 7.4

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 528.86
FINAL WET WEIGHT (g): 729.44
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 12.6
FINAL MOISTURE (%):
PAN NAME: B-9 No pan weight

FINAL MEASUREMENTS:

	L	D
1)	3.07	2.88
2)	3.07	2.87
3)	3.07	2.87

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) = 70.34: 140.68 h_1 =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L 0.99 R 0.99

B-VALUE	INT	FIN	EST. SAT.:
	72	70.1	95 %
	82	79.6	

CONSOL* INT: 35.0 FIN: 34.5 Δ_{OUT}: 0.5

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{IN}	FLOW Δ_{OUT}	R%	Q	K(cm/s) K(const)	h_1	h_2	K(Falling)
73	3-3	3-3	11:22 AM	11:25 AM	3	180	19.5	0.7	15.4	4.8	4.1	4.1	1.00	4.1	2.9×10^{-5}			
	3-3	3-3	11:25 AM	11:29 AM	4	240	15.4	4.8	10.0	10.2	5.4	5.4	1.00	5.4	2.7×10^{-5}			
	3-3	3-3	11:29 AM	11:33 AM	4	240	10.0	10.2	5.1	15.1	4.9	4.9	1.00	4.9	2.5×10^{-5}			
	3-3	3-3	11:33 AM	11:36	3	180	5.1	15.1	1.4	18.8	3.7	3.7	1.00	3.7	2.5×10^{-5}			
TOTALS						t = 840								Q = 18.1				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.722)(0.931)(0.99)}{(140.68)(42.12)} = 2.6 \times 10^{-5}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-11
DEPTH: 1.5-2.5
SAMPLE: STANDARD
DESCRIPTION: POINT #2

TECHNICIAN: J. ALEX
DATE: 3-2-6
CHECKED BY: CTA
CELL NO.: 40
SYSTEM NO.: 19

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): (104.5 PCF)
WET UNIT WEIGHT (pcf): 120.2

SAMPLE MEASUREMENTS: (INT.)
1) 3.025 2) 2.909 3) 3.013
1) 2.882 2) 2.88 3) 2.878

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.016 (in) 7.661 (cm)
SOIL DIAMETER: 2.880 (in) 7.315 (cm)
AREA(A): (in²) 42.03 (cm²)
SATURATION: 0.2 → 36.0

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 619.88
FINAL WET WEIGHT (g): 752.89
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 15.0
FINAL MOISTURE (%):
PAN NAME: CMS 94.14

Pan 1
Pan 1

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

FINAL MEASUREMENTS:	L	D
1)		D 2.89
2)		2) 2.88
3)		3) 2.89

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L 0.99 R 0.99

B-VALUE	INT	FIN
	72	79.2
	82	79.7

EST. SAT.: 95 %

CONSOL.* INIT: 29.0 FIN: 28.7 Δ_{OUT}: 0.3

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	ELAPSED TIME (+) SECONDS	READING (L) START	READING (R) START	READING (L) END	READING (R) END	FLOW Δ_{IN}	FLOW Δ_{OUT}	FLOW R%	Q	K(cm/s) K(CONST)	h_1	h_2	K(FALL)
(F°)																		
73	3-3	3-3	11:23 AM	11:36 AM	13	780	15.1	5.6	13.0	7.7	2.1	2.1	1.00	2.1	3.2×10^{-6}			
	3-3		11:36 AM	11:41 AM	5	300	13.0	7.7	12	8.5	0.8	1.00	0.80	0.9	2.8×10^{-6}			
			11:41	12:40	59	3540	12	8.5	4.5	17.1	8.6	7.5	1.15	8.0	2.7×10^{-6}			
			12:40	1:02	22	1320	4.5	17.1	.5	20.3	3.2	4.0	0.80	3.6	3.3×10^{-6}			
			1:02															
TOTALS						5940							Q=	14.6				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.661)(0.931)(0.99)}{(140.68)(42.03)} = 2.9 \times 10^{-6}$ CM/S

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* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: QT-11
DEPTH: 1.5-2.5
SAMPLE: STANDARD
DESCRIPTION: POINT #3

TECHNICIAN: J. ALEX
DATE:
CHECKED BY: CTX
CELL NO.: 1/B
SYSTEM NO.: 2

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 105.6
WET UNIT WEIGHT (pcf): 129.1

SAMPLE MEASUREMENTS: (INT.)
1) 3.032 2) 3.044 3) 3.046 : 2.880
1) 2.880 2) 2.880 3) 2.872 : 2.877

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.041 (in) 7.724 (cm)
SOIL DIAMETER: (in) 7.308 (cm)
AREA(A): 2.877 (in²) 41.94 (cm²)
SATURATION: 0.5 → 20.6

MOISTURE CONTENT

Pan 1
INITIAL WET WEIGHT (g): 638.85
FINAL WET WEIGHT (g): 736.32
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 16.6
FINAL MOISTURE (%):
PAN NAME: Waller

FINAL MEASUREMENTS:

	L	D
1)	3.09	D2.88
2)	3.06	2) 2.85
3)	3.08	3) 2.84

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
PORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) = 70.34: 140.68 hi =
TEMPERATURE (°F): 73°F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE

	INT	FIN
	72	70.0
	87	79.5

Est. Sat.: 95 %

CONSOL.*
INT: 29.9 29.0
FIN: 29.4
Δ OUT: 0.6

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	ELAPSED TIME (+) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{IN}	FLOW Δ_{OUT}	R%	Q	K (cm/s)	h_1	h_2	K (Falling)
73	3-3		11:23AM	12:40	87	5220	14.4	5.9	12	8.3	2.4	2.4	1.00	2.9	5.5×10^{-7}			
			12:40	1:04	24	1440	12	8.3	11.8	9	.7	.7	1.00	10.7	5.9×10^{-7}			
			1:04	1:52	48	2880	11.3	9	10	10.5	1.3	1.5	0.87	11.9	5.9×10^{-7}			
			1:52	2:30	38	2280	10	10.5	8.9	11.6	1.1	1.1	1.00	1.1	5.8×10^{-7}			
			2:30	4:26	116	6960	8.9	11.6	5.8	15.0	3.4	3.1	1.10	3.2	5.5×10^{-7}			
TOTALS						t=18780								Q= 8.8				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.724)(0.931)(0.99)}{(140.68)(41.94)} = 5.7 \times 10^{-7}$ cm/s

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MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-11
DEPTH: 1.5-2.5
SAMPLE: STANDARD
DESCRIPTION: POINT # 4

TECHNICIAN: J. ALEX
DATE: 3-2-6
CHECKED BY: CTA
CELL NO.: 31
SYSTEM NO.: 3

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 105.5 PCF
WET UNIT WEIGHT (pcf): 124.9

SAMPLE MEASUREMENTS: (INT.) 1) 3.052 2) 3.046 3) 3.024

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.037 (in) 7.714 (cm)
SOIL DIAMETER: 2.878 (in) 7.310 (cm)
AREA(A): (in²) 41.97 (cm²)
SATURATION: 0.5-17.0

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 647.87
FINAL WET WEIGHT (g): 754.41
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 18.4%
FINAL MOISTURE (%):
PAN NAME: Pam / 92.93

FINAL MEASUREMENTS: L D
1) 3.07 D 2.86
2) 3.06 2) 2.84
3) 3.06 3) 2.85

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD h (psi) x 70.34: 140.68 hi:
TEMPERATURE (°F): 73°F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE: INT | FIN
INT: 70.9
FIN: 79.5

EST. SAT.: 95 %

CONSOL.* INT: 21.0 FIN: 28.6 Δ_{OUT}: 0.4

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	ELAPSED TIME (+) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{IN}	FLOW Δ_{OUT}	R1/2	Q	K(cm/s) K(const)	h_1	h_2	K(Falling)
(F°)																		
73	3-3		11:24am	12:41	77	4620	13.3	7.0	12.2	8.5	1.1	1.1	1.36	11.3	3.4×10^{-7}			
			12:41	1:05	24	1440	12.2	8.5	11.3	9	0.9	0.9	0.516	0.8	5.9×10^{-7}			
			1:05	1:53	48	2880	11.3	9	11.6	9.9	.9	.3	3.00	0.6	2.5×10^{-7}			
			1:53	2:31	38	2280	11.6	9.9	9.8	10.6	1.8	1.8	0.39	1.2	6.3×10^{-7}			
		3-3	2:31	4:27	116	6960	9.8	10.6	7.8	12.8	2.2	2.0	1.19	2.1	3.6×10^{-7}			
	3-6	3-6	3:33pm	3:46	13	780	11.2	9.4	11.0	9.3	0.2	0.2	1.00	0.2	3.0×10^{-7}			
						198960								6.1				
TOTALS						t=70180							Q=5.9					

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.714)(0.931)(0.99)}{(140.68)(41.97)} = 3.9\times10^{-7}$ CM/S

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* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: QT-11
DEPTH: 1.5-2.5
SAMPLE: STANDARD
DESCRIPTION: POINT # 5

TECHNICIAN: J. ALEX
DATE: 3-2-6
CHECKED BY: CTA
CELL NO.: 2
SYSTEM NO.: 13

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 102.8
WET UNIT WEIGHT (pcf): 123.6

SAMPLE MEASUREMENTS: (INT.) 1) 3.006 2) 3.011 3) 3.018 : 1) 2.877 2) 2.8748 3) 2.8716

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.012 (in) 7.650 (cm)
SOIL DIAMETER: 2.876 (in) 7.305 (cm)
AREA(A): (in²) 4191 (cm)
SATURATION: 1.3 → 11.2

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 635.00
FINAL WET WEIGHT (g): 733.22
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 20.3 %
FINAL MOISTURE (%):
PAN NAME: BOT-9118

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

FINAL MEASUREMENTS:

	L	D
1)	2.93	D 2.85
2)	2.99	2) 2.84
3)	2.98	3) 2.86

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi:
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(□): L: 0.99 K: 0.99

B-VALUE: INT | FIN

EST. SAT.: %

CONSOL*: INIT: FIN: Δ_{out}:

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	ELAPSED TIME (+) SECONDS	READING (L) START	READING (R) START	READING (L) END	READING (R) END	FLOW Δ_{in}	FLOW Δ_{out}	FLOW R%	FLOW Q	K(cm/s) K(CONST)	K(cm/s) h_1	K(cm/s) h_2	K(cm/s) K(FALL)
63	3-3		11:24 AM	12:41			13.2	7.0	13	7.8								
			12:41	1:54			13	7.8										
73	3-3	3-3	3:12 PM	4:27	75	4500	13.1	7.6	12.5	8.2	0.6	0.6	1.00	0.6	1.6×10^{-7}			
	3-3	3-3	4:27	6:57	150	9000	12.5	8.2	11.6	9.4	1.2	0.9	1.33	1.1	1.5×10^{-7}			
	3-6	3-6	8:04 AM	1:29 PM	325	19500	13.6	9.5	11.7	11.5	1.9	2.0	0.95	2.0	1.2×10^{-7}			
	3-6	3-6	1:29 PM	3:34 PM	125	7500	11.7	11.5	11.0	12.3	0.8	0.7	1.14	0.8	1.3×10^{-7}			
	3-6	3-6	3:34 PM	4:21	47	2820	11.0	12.3	10.8	12.6	0.3	0.2	1.50	0.3	1.3×10^{-7}			
TOTALS						~~43320~~								Q = 4.8				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.650)(0.931)(0.99)}{(140.68)(4191)} = 1.3 \times 10^{-7}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

Form No.: 9

MACTEC
CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-11
DEPTH: 1.5-2.5
SAMPLE: MODIFIED
DESCRIPTION: POINT # 1

TECHNICIAN: J. ALEX
DATE: 3-2-6
CHECKED BY: CTK
CELL NO.: 13
SYSTEM NO.: 64

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 117.3 PCF
WET UNIT WEIGHT (pcf): 130.8

SAMPLE MEASUREMENTS: (INT.)
1) 3.037 2) 3.050 3) 3.042
1) 2.883 2) 2.885 3) 2.886

TUBE LENGTH: ____ (in) ____ (cm)
TUBE DIAMETER: ____ (in) ____ (cm)
SOIL LENGTH(L): 3.043 (in) 7.729 (cm)
SOIL DIAMETER: 2.885 (in) 7.328 (cm)
AREA(A): ____ (in²) 42.17 (cm)
SATURATION: 0.2 → 25.0; 0.5 → 11.5

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 682.09
FINAL WET WEIGHT (g): 804.07
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 11.5 %
FINAL MOISTURE (%):
PAN NAME: B-3

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

FINAL MEASUREMENTS:

	L	D
1)	3.15	2.91
2)	3.14	2.97
3)	3.14	2.92

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 h₁ =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 K: 0.99

B-VALUE

	INT	FIN	EST. SAT.:
	72	70.0	95 %
	82	79.3	

CONSOL*
INT: 11.5
FIN: 10.0
Δ_{OUT}: 0.5

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (t) MINUTES	ELAPSED TIME (t) SECONDS	READING (L) START	(R) START	(L) END	(R) END	FLOW Δ_{IN}	FLOW Δ_{OUT}	$R_{1/0}$	Q	K(cm/s) K(CONST)	h_1	h_2	K(FALL)
(F°)																		
73	3-6	3-6	8:04AM	9:47AM	103	6188	14.8	5.3	14.0	6.1	0.8	0.8	1.00	0.8	1.6×10^{-7}			
	3-6	3-6	9:47AM	12:14PM	147	8820	14.0	6.1	12.9	7.3	1.2	1.1	1.09	1.1	1.5×10^{-7}			
	3-6	3-6	12:14PM	3:35PM	201	12060	12.9	7.3	11.3	8.8	1.5	1.5	0.94	1.6	1.6×10^{-7}			
	3-6	3-6	3:35PM	4:27PM	52	3120	11.3	8.8	11.0	9.2	0.4	0.3	1.33	0.4	1.5×10^{-7}			
	3-6	3-7	4:27PM	7:16AM	889	53340	11.0	9.2	4.9	15.5	6.3	6.1	1.03	6.2	1.4×10^{-7}			
TOTALS						t = 83520								Q = 10.1				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.729)(0.931)(0.99)}{(140.68)(42.17)} = 1.5\times10^{-7}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION SHEET.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: QT-1
DEPTH: 1.5-2.5
SAMPLE: MODIFIED
DESCRIPTION: POINT #2

TECHNICIAN: J. ALEX
DATE: 3-2-6
CHECKED BY: CTA
CELL NO.: A
SYSTEM NO.: 15

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 118.9 PCF
WET UNIT WEIGHT (pcf): 134.5

SAMPLE MEASUREMENTS: (INT.)
1) 3.070 2) 3.070 3) 3.070
1) 2.878 2) 2.878 3) 2.874

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.070 (in) 7.798 (cm)
SOIL DIAMETER: 2.877 (in) 7.308 (cm)
AREA(A): (in²) 41.94 (cm²)
SATURATION: 9.8 → 20.0 / 2.0 → 5.1

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 704.46
FINAL WET WEIGHT (g): 809.37
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 13.18
FINAL MOISTURE (%):
PAN NAME: BC-14 / 87.12

FINAL MEASUREMENTS:

	L	D
1)	3.15	2.90
2)	3.14	2.92
3)	3.15	2.91

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD, h (psi) x 70.34: 140.68 hi:
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L-0.99 R-0.99

B-VALUE	INT	FIN	EST. SAT.
	72	70.1	96 %

CONSOL*
INT: 15.0
FIN: 14.5
Δ_{cons}: 0.5

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE S	DATE E	TIME START	TIME END	ELAPSED TIME (+) MINUTES	ELAPSED TIME (+) SECONDS	READING (L) START	READING (R) START	READING (L) END	READING (R) END	FLOW Δ_{in}	FLOW Δ_{out}	FLOW R1/0	Q	K(cm/s) K(const)	h_1	h_2	K(Falling)
(F°)																		
73	3-6	3-6	8:05 AM	7:47 AM	102	6120	14.7	5.7	14.3	6.1	0.4	0.4	1.00	0.4	8.0×10^{-8}			
	3-6	3-6	9:47 AM	12:14 PM	147	8820	14.3	6.1	13.8	6.5	0.4	0.5	0.80	0.5	6.9×10^{-8}			
	3-6	3-6	12:14 PM	3:36 PM	202	12120	13.8	6.5	13.2	7.3	0.6	0.6	1.33	0.7	7.0×10^{-8}			
	3-6	3-6	3:36 PM	4:29 PM	53	3180	13.2	7.3	13.0	7.4	0.1	0.2	0.50	0.2	7.7×10^{-8}			
	3-6	3-7	4:29 PM	7:16 AM	887	53220	13.0	7.4	10.5	10.1	2.7	2.5	1.08	2.6	6.0×10^{-8}			
TOTALS						+ 80280								Q = 4.4				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.798)(0.931)(0.99)}{(140.68)(41.94)} = 6.7 \times 10^{-8}$ CM/S

Form Date: 10-04-05

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* SEE CONSOLIDATION GRAPH.

MACTEC

Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-11
DEPTH: 1.5-2.5
SAMPLE: MODIFIED
DESCRIPTION: POINT #3

TECHNICIAN: J. ALEX
DATE: 3-2-6
CHECKED BY: CTX
CELL NO.: 6
SYSTEM NO.: 7

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 114.5 PCF
WET UNIT WEIGHT (pcf): 132.0

SAMPLE MEASUREMENTS: (INT.)
1) 3.049 2) 3.068 3) 3.051
1) 2.882 2) 2.878 3) 2.874

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.056 (in) 7.762 (cm)
SOIL DIAMETER: 2.878 (in) 7.310 (cm)
AREA(A): (in²) 41.97 (cm²)
SATURATION: 52.0 → 18.6

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 688.84
FINAL WET WEIGHT (g): 796.52
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 15.3 %
FINAL MOISTURE (%):
PAN NAME: B-9 / 88106

FINAL MEASUREMENTS:

	L	D
1)		2.91
2)		2.93
3)		2.92

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE(psi): 70
HEAD,h (psi) x 70.34: 140.68 hi =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE

	INT	FIN
	82	79.5
	72	70.0

Est. Sat.: 95 %

CONSOL* AT
INT: 19.7
FIN: 20.0
Δ_{OUT}: 0.3

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP (F°)	DATE S	DATE E	TIME START	TIME END	ELASPED TIME (+) MINUTES	ELASPED TIME (+) SECONDS	READING L START	READING R START	READING L END	READING R END	FLOW Δ_{in}	FLOW Δ_{out}	FLOW R/Q	FLOW Q	K(cm/s) K(const)	h_1	h_2	K(Falling)
73	3-6	3-6	8:05 AM	9:48 AM	103	6180	34.7	45.5	35.1	44.9	0.6	0.4	1.5	0.5	9.8×10^{-8}			
	3-6	3-6	9:48 AM	12:15 PM	147	8820	35.1	44.9	35.6	44.3	0.6	0.5	1.2	0.6	8.3×10^{-8}			
	3-6	3-6	12:15 PM	3:37 AM	202	12120	35.6	44.3	36.2	43.4	0.9	0.6	1.5	0.8	8.0×10^{-8}			
	3-6	3-6	3:37 PM	4:30 PM	53	3180	36.2	43.4	36.4	43.1	0.2	0.2	1.0	0.2	7.6×10^{-8}			
~	3-6	3-7	4:30 PM	7:17 AM	887	~~40020~~	36.4	43.1	39.3	39.5	3.6	2.9	1.24	3.2	7.7×10^{-8}			
						53220												
TOTALS						t=83520								Q=5.3				

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t}$

$= \frac{Q}{t} \times \frac{(7.762)(0.931)(0.99)}{(140.68)(41.92)} = 7.7 \times 10^{-8}$ cm/s

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Form Date: 10-04-05

* SEE CONSOLIDATION GRAPH.

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Form No.: 9

CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-11
DEPTH: 1.5-2.5
SAMPLE: MODIFIED
DESCRIPTION: POINT #4

TECHNICIAN: J. ALEX
DATE: 3-2-06
CHECKED BY: CTA
CELL NO.: 10
SYSTEM NO.: #8

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cu ft):
DRY UNIT WEIGHT (pcf): 110.5 pcf
WET UNIT WEIGHT (pcf): 129.1

SAMPLE MEASUREMENTS: (INT.)
1) 3.024 2) 3.026 3) 3.010
1) 2.883 2) 2.884 3) 2.887

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.020 (in) 7.671 (cm)
SOIL DIAMETER: 2.885 (in) 7.328 (cm)
AREA(A): (in²) 42.17 (cm²)
SATURATION: 58.7 → 46.4

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 668.80
FINAL WET WEIGHT (g): 773.61
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 16.8 %
FINAL MOISTURE (%):
PAN NAME: CMS/94.05

FINAL MEASUREMENTS: (INT.)

	L	D
1)	3.01	2.89
2)	3.02	2.88
3)	3.01	2.88

PERM INFORMATION

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) x 70.34: 140.68 hi =
TEMPERATURE (°F): 73 °F
VISCOSITY CORRECTION(T_x): 0.931
PERMEANT LIQUID USED: H2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE

	INT	FIN
	72	70.1
	62	79.6

EST. SAT.: 95 %

CONSOL*
INIT: 29.9
FIN: 29.6
Δ 0.3

Scale: ES-1 Oven: SLDO-1 Calipers: EC-1

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE		TIME		ELASPED TIME (t)		READING				FLOW			K (cm/s)				
(F°)	S	E	START	END	MINUTES	SECONDS	(L) START	(R)	(L) END	(R)	Δ_{in}	Δ_{out}	R/O	Q	K (CONST)	h_1	h_2	K (FALL)
73	3-6	3-6	8:06 AM	9:49 AM	103	6180	35.4	45.7	35.7	45.3	0.4	0.3	1.33	4.4	7.7×10^{-8}			
	3-6	3-6	9:49 AM	12:16 PM	147	8820	35.7	45.3	36.2	44.8	0.5	0.6	0.83	0.6	8.1×10^{-8}			
	3-6	3-6	12:16 PM	3:38 PM	202	12120	36.2	44.8	36.8	44.1	0.7	0.6	1.17	0.7	6.2×10^{-8}			
	3-6	3-6	3:38 PM	4:31 PM	53	3180	36.8	44.1	37.0	43.9	0.2	0.2	1.00	0.2	7.5×10^{-8}			
	3-6	3-7	4:31 PM	7:17 AM	886	53160	37.0	43.9	37.8	41.0	2.9	2.8	1.04	2.8	6.3×10^{-8}			
TOTALS						83460							Q = 4.7					

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.671)(0.931)(0.99)}{(140.68)(42.17)} = 6.7 \times 10^{-8}$ cm/s

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* SEE CONSOLIDATION GRAPH.

MACTEC
CONSTANT HEAD PERMEABILITY TEST

(ASTM D5084)

Form No.: 9

JOB NAME: TVA KINGSTON - BORROW
JOB NO.: 3043-05-1064-02
BORING NO.: OT-11
DEPTH: 1.5-2.5
SAMPLE: MODIFIED
DESCRIPTION: POINT #5

TECHNICIAN: J. ALEX
DATE: 3-2-6
CHECKED BY: CTA
CELL NO.: 2015
SYSTEM NO.: 4

SAMPLE INFORMATION

WEIGHT TUBE & SOIL (g):
WEIGHT TUBE (g):
WEIGHT SOIL (g):
VOLUME SOIL (cm³/ft³):
DRY UNIT WEIGHT (pcf): 108.0 PCF
WET UNIT WEIGHT (pcf): 128.5

SAMPLE MEASUREMENTS: (INT.)
1) 3.046 2) 3.056 3) 3.050
1) 2.877 2) ~~2.876~~ 3) ~~2.875~~

TUBE LENGTH: (in) (cm)
TUBE DIAMETER: (in) (cm)
SOIL LENGTH(L): 3.061 (in) ~~7.7795~~ (cm) 7.750
SOIL DIAMETER: 2.876 (in) 7.305 (cm)
AREA(A): (in²) 41.91 (cm²)
SATURATION: 57.2 → 43.8

MOISTURE CONTENT

INITIAL WET WEIGHT (g): 660.35
FINAL WET WEIGHT (g): 767.30
FINAL DRY WEIGHT (g):
INITIAL MOISTURE (%): 19.0 %
FINAL MOISTURE (%):
PAN NAME: Vallure / 93.17

Scale: E9-1 Oven: SLDO-1 Calipers: EC-1

PERM INFORMATION

FINAL MEASUREMENTS:

	L	D
1)	3.06	2.88
2)	3.06	2.89
3)	3.06	3) 2.87

CELL PRESSURE(psi): 77
FORE PRESSURE(psi): 72
BACK PRESSURE (psi): 70
HEAD,h (psi) = 70.34: 140.68 hi =
TEMPERATURE (°F): 73°F
VISCOSITY CORRECTION(R_T): 0.931
PERMEANT LIQUID USED: H_2O
BURET CORRECTION FACTOR(C): L: 0.99 R: 0.99

B-VALUE

	INT	FIN
	72	69.9
	82	79.6

EST. SAT.: 97 %

CONSOL*
INT: 30.1
FIN: 29.5
Δ_{OUT}: 0.6

TABLE OF HYDRAULIC CONDUCTIVITY

TEMP	DATE		TIME		ELASPED TIME (+)		READING				FLOW			K(cm/s)				
(F°)	S	E	START	END	MINUTES	SECONDS	(L) START	(R) START	(L) END	(R) END	Δ_{IN}	Δ_{OUT}	R1/0	Q	K(const)	h_1	h_2	K(Falling)
73	3-6	3-6	8:06 am	9:50 am	104	6240	34.8	43.2	34.9	42.6	0.6	0.1	0.60	0.3	5.8×10^{-8}			
	3-6	3-6	9:50 am	12:16 pm	146	(8760)	34.9	42.6	35.8	41.7	0.9	0.9	1.00	(10.9)	1.2×10^{-7}			
	3-6	3-6	12:16 pm	3:39 pm	203	(12180)	35.8	41.7	36.9	40.4	1.3	1.1	1.18	(1.2)	1.2×10^{-7}			
	3-6	3-6	3:39 pm	4:31 pm	52	(3120)	36.9	40.4	37.2	40.1	0.3	0.3	1.00	(0.3)	1.2×10^{-7}			
	3-6	3-7	4:31 pm	7:18 am	887	(53220)	37.2	40.1	42.3	34.9	5.2	5.1	1.02	(5.1)	1.2×10^{-7}			
TOTALS						t=77280							Q= 7.5					

COEFFICIENT OF PERMEABILITY, $k = \frac{Q \times L \times R_T \times C}{h \times A \times t} = \frac{Q}{t} \times \frac{(7.750)(0.931)(0.99)}{(140.68)(41.91)} = 1.2\times10^{-7}$ cm/s

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