Report of:

Subsurface Exploration
Proposed Highland Bend Roadway Embankments
(Station 105+75 to 130+73)
Project SCI-823-0.00 Portsmouth Bypass (PID 77366)
Scioto County, Ohio

Prepared for:

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Ohio Department of Transportation
District 9

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DLZ Job No. 0121-3070.03

August 2, 2007

Prepared by

DLZ

REPORT

OF

SUBSURFACE EXPLORATION

FOR

PROPOSED HIGHLAND BEND ROADWAY EMBANKMENTS

(STATION 105+75 TO 130+73)

PROJECT SCI-823-0.00 PORTSMOUTH BYPASS (PID 77366)

SCIOTO COUNTY, OHIO

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REPORT
OF
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FOR
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(STATION 105+75 TO 130+73)
PROJECT SCI-823-0.00 PORTSMOUTH BYPASS (PID 77366)
SCIOTO COUNTY, OHIO

1.0 INTRODUCTION

The SCI-823 project consists of constructing approximately sixteen miles of new roadway, including several new interchanges and bridges. The analyses and recommendations outlined in this report pertain to the embankments in the Highland Bend area only. To construct the proposed roadway in this area, three embankment sections will be constructed from approximate station 105+75 to station 130+73. Three bridges will also be constructed in this area. The recommendations for the structures are presented in separate documents.

This report supercedes the report for the Proposed Highland Bend Embankments, dated June 8, 2006. Analyses and recommendations have been revised based upon the findings of additional borings drilled for the proposed bridges throughout the valley.

The exploration presented in this report has been performed essentially in accordance with DLZ Ohio, Inc.'s proposal for the project. The subsurface explorations and embankment recommendations for the three roadway embankments are presented in this report.

The purpose of this exploration was to 1) determine the subsurface conditions to the depths of the borings, 2) evaluate the engineering characteristics of the subsurface materials, and 3) provide information to assist in designing and constructing the roadway embankments.

The geotechnical engineer has planned and supervised the performance of the geotechnical engineering services, has considered the findings, and has prepared this report in accordance with generally accepted geotechnical engineering practices. No other warranties, either expressed or implied, are made as to the professional advice included in this report.

2.0 GENERAL PROJECT INFORMATION

It is understood that the embankments heights for proposed SR-823 in the Highland Bend area will range from approximately 108 feet, near station 109+00 to 48 feet, near station 127+00. Three bridge structures will also be constructed in the Highland Bend area, crossing the CSXT Railroad, Slocum and Pershing Avenues, and the Little Scioto River/SR 335. At this time it is understood that at least one bridge will utilize spread footings to support the abutments. All roadway embankments were analyzed for global stability and settlement.

The analyses and recommendations presented in this report have been made on the basis of the foregoing information. If the proposed embankment locations, heights or concept is changed or differs from that assumed, DLZ Ohio, Inc. should be informed of the changes so that recommendations and conclusions presented in this report may be revised as necessary.

3.0 FIELD EXPLORATION

An original subsurface exploration was performed between the dates January 27 and May 17, 2005 and consisted of ten preliminary structural borings as well as seven roadway borings. Supplemental explorations were performed to obtain additional information for the design of roadway embankments and structures. Between January 10 and January 12, 2006, one roadway boring and two structure borings were drilled for the proposed embankments. Similarly, between January 11 and May 9, 2007, five borings for proposed culverts and five borings for the final structure configurations were drilled. Borings were drilled with either a truck-mounted or track-mounted, rotary-type drill rig. All borings were advanced to bedrock, with total depths ranging from 21.0 to 108.2 feet.

The results of these evaluations are based upon the results of all borings drilled throughout the valley for the proposed roadway embankments, bridges, and culverts. Boring logs are presented in Appendix A. A boring location plan can also be found in Appendix A.

4.0 FINDINGS

4.1 Geology of the Site

The project area in Highland Bend has generally gently rolling terrain and is bounded on either end by steep slopes. The main drainage feature in the valley is the Little Scioto River, located at approximately station 136+00. The ordinary high water elevation is reported to be 498.6 feet. The soil consists primarily of alluvial and lacustrine deposits. The overburden in this area is generally fine-grained soil, which is seventy to ninety feet deep. The area is located in the Shawnee-Mississippian Plateau, and can be found on the Minford 7.5-minute Quadrangle.

Bedrock is of the Mississippian Logan Formation. Generally, this formation consists of primarily sandstone or sandy siltstone with occasional areas of interbedded shale. However, the lithology of the sandstones varies both laterally and vertically. Within this area the Logan Formation typically consists of thick, massive sandstone units.

4.2 Subsurface Conditions

4.2.1 Subsurface Conditions, Station 105+75 to 112+84

In the area of this proposed roadway embankment, borings R-55, R-56, R-57, R-58, TR-41, TR-42, C-91, C-92 and B-37 were drilled. The soil properties and

subsurface profile at boring TR-41 was considered more critical that the other borings. Therefore, a soil profile based upon boring TR-41 was used to evaluate embankment stability and settlement for this roadway embankment.

Boring TR-41 generally encountered nine inches of topsoil at the surface. Below the topsoil layer, primarily very stiff clay (A-7-6) was encountered to a depth of 21 feet below the ground surface. Below 21 feet, primarily stiff to very stiff silt (A-4b) was encountered to a depth of 70 feet. Below 70 feet, primarily stiff to very stiff silt and clay (A-6a) was encountered to a depth of 83 feet. Below 83 feet, primarily loose to medium dense coarse and fine sand (A-3a) was encountered to a depth of 93 feet, at the top of bedrock. Underlying the soil, this boring encountered medium hard to hard, slightly to moderately weathered sandstone to the bottom of the boring at 113 feet.

4.2.2 Subsurface Conditions, Station 117+64 to 120+98

In the area of this proposed roadway embankment, borings R-61, TR-37, TR-38, TR-38A, TR-39, TR-40, and B-38, were drilled. The soil properties and subsurface profile at boring TR-38A was considered more critical that the other borings. Therefore, a soil profile based upon boring TR-38A was used to evaluate embankment stability and settlement for this roadway embankment.

Boring TR-38A generally encountered nine inches of topsoil at the surface. Below the topsoil layer, primarily medium stiff to stiff silt and clay (A-6a) was encountered to a depth of 25 feet below the ground surface. Below 25 feet, primarily medium stiff silt (A-4b) was encountered to a depth of 45 feet. Below 45 feet, primarily stiff to very stiff silty clay (A-6b) was encountered to a depth of 62 feet. Below 62 feet, primarily loose sandy silt (A-4a) was encountered to a depth of 81 feet, at the top of bedrock. Underlying the soil, this boring encountered medium hard to hard, slightly to moderately weathered sandstone to the bottom of the boring at 86 feet.

4.2.3 Subsurface Conditions, Station 124+24 to 130+73

In the area of this proposed roadway embankment, borings R-64, R-64A, R-68, TR-35A, TR-36, B-32, B-31, C-93, C-94, and C-95 were drilled. Borings TR-35, TR-34, TR-33, and B-39 were also considered in these evaluations. The soil properties and subsurface profile at boring TR-35A was considered more critical than the other borings. Therefore, a soil profile based upon boring TR-35A was used to evaluate embankment stability and settlement for this roadway embankment.

Boring TR-35A generally encountered three inches of gravel at the surface. Below the topsoil layer, primarily stiff to very stiff clay (A-7-6) was encountered to a depth of 5 feet below the ground surface. Below 5 feet, primarily very soft to medium stiff silt (A-4b) was encountered to a depth of 32 feet. Below 32 feet,

primarily very stiff to hard clay (A-7-6) was encountered to a depth of 65 feet. Below 65 feet, primarily stiff silt (A-4b) was encountered to a depth of 72 feet. Below 72 feet, primarily loose to medium dense coarse and fine sand (A-3a) was encountered to a depth of 81 feet, at the top of bedrock. Underlying the soil, this boring encountered medium hard, moderately to highly weathered sandstone to the bottom of the boring at 86 feet.

4.3 Groundwater Conditions

Most of the borings encountered water seepage, which was first observed at depths between 4.0 and 79.0 feet. Generally, these depths correspond approximately with depths where silty or sandy layers were first encountered in the borings. Water level readings taken at the completion of soil sampling (prior to adding core water) ranged between depths of 7.0 and 67.8 feet. It is anticipated that groundwater conditions will vary with the level of the Little Scioto River throughout the Highland Bend area.

A piezometer was installed in boring R-57, at station 109+17. Readings in the piezometer have shown that the water level is consistently 60 feet below the ground surface, corresponding to an elevation of approximately 501 feet, which is near the ordinary high water elevation in the Little Scioto River, which is reported to be 498.6 feet. However, it should be noted that the water bearing silt (A-4b) layer that was observed throughout much of the valley was not encountered in boring R-57. Therefore the water levels measured in the piezometer may not be representative of other locations throughout the valley.

4.4 Laboratory Testing

All of the soil and rock samples collected were visually identified in the laboratory. Index tests (grain size and plasticity tests) were performed on representative soil samples. Shear strength and consolidation tests were also performed on representative soil samples. The results of index testing are presented on the boring logs. For the results of the shear strength and consolidation test and additional testing information, refer to Appendix B. Additionally, a summary of laboratory shear and consolidation testing is presented in Appendix D.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 General Information

At the time this document was prepared, it was assumed that the project alignment and profile for proposed 823 through Highland Bend was as shown on the Soil Profile Drawings presented in Appendix C. It is understood that the maximum embankment height for the embankment constructed from station 105+75 to 112+84 is approximately 108 feet. Similarly, it is understood that the approximate maximum embankment heights

for embankments constructed between stations 117+64 to 120+98 and 124+24 to 130+73 are approximately 72 and 80 feet, respectively.

A global stability analysis and settlement analysis were performed for each embankment location in accordance with ODOT and AASHTO guidelines. The stability analyses were performed using UTEXAS3 Version 1.204, a slope stability computer program using variations of the method of slices. UTEXAS3 was developed by Dr. Stephen Wright at the University of Texas for the U.S. Army Corps of Engineers. The results of stability analyses and settlement calculations are included in Appendix D.

5.2 Shear Strength Parameter Selection

Shear strength values for use in stability analyses were based on laboratory strength testing, in-situ moisture content and hand penetrometer values, typical values, and engineering judgment. Note that some of these parameters are different than those presented in the previous Highland Bend Embankment report, dated June 8, 2006, based on additional laboratory testing. Plots of shear strength values from laboratory testing and hand penetrometer values verses depth are presented in Appendix D. Table 1 outlines the strength parameters assumed in analyses for the respective embankments. A more comprehensive summary of soil properties is included in Appendix D. Also, the results of laboratory testing are included in Appendix B.

Table 1 - Selected Shear Strengths*

Embankment Sta. 105+75 to 112+84		Undrained		Drained	
Depth (ft)	Primary Soil Type	c (psf)	Φ (deg)	c' (psf)	Φ' (deg)
0-20	Clay	1700	0	0	30
20-68	Silt	1100	0	0	29
68-83	Silt and Clay	1500	0	0	29
83+	Coarse and Fine Sand	0	32	0	32
Embankment Sta. 117+64 to 120+98		Undrained		Drained	
Depth (ft)	Primary Soil Type	c (psf)	Φ (deg)	c' (psf)	Φ' (deg)
0-10	Clay	1700	0	0	30
10-46	Silt	1100	0	0	29
46-61	Silty Clay	2700	0	0	29
61+	Sandy Silt	0	29	0	30
Embankment Sta. 124+24 to 130+73		Undrained		Drained	
Depth (ft)	Primary Soil Type	c (psf)	Φ (deg)	c' (psf)	Φ' (deg)
0-5	Clay	1700	0	0	30
5-32	Silt	900	0	0	29
32-57	Silty Clay	2700	0	0	29
57+	Sandy Silt	0	29	0	29

*For more information please refer to the summary table in Appendix D.

It is anticipated that the embankment fill will consist of either cohesionless material ranging in size from fine granular material to rock, generally from adjacent cuts, or of weaker cohesionless material. The anticipated friction angle of the backfill material will likely range from 28 to over 40 degrees. As per discussions with ODOT's Office of

analyses of large embankments such as these. However, because there is a possibility that weaker material may be used to construct the roadway embankments, the global stability of the proposed embankments were analyzed using friction angles of both 30 and 35 degrees for the embankment fill material.

In accordance with ODOT guidelines, a unit weight of 120 pcf was used for the proposed fill material. If the embankment fill material for the roadway embankments has properties significantly different from the values assumed, DLZ should be informed so that the analyses may be revised as necessary.

5.3 Roadway Embankments - Stability Analyses

Generally, the required minimum factor of safety assumed for embankment stability is 1.3 (undrained and drained conditions). However, it is understood that at least one of the proposed structures in the Highland Bend valley will utilize spread footings to support the abutments. Based upon the use of spread footings, the level of complexity involved in the analyses, the highly compressible and potentially unstable foundation soils, and the risk associated with constructing such high embankments, the required minimum factor of safety for drained and undrained global stability was assumed to be 1.5.

The maximum roadway embankment height from station 105+75 to 112+84 is understood to be approximately 108 feet. Similarly, the maximum roadway embankment heights from stations 117+64 to 120+98, and 124+24 to 130+73 are approximately 72 and 80 feet, respectively. The maximum heights are based upon inspection of provided profiles, cross sections, and structure drawings.

Initially, global stability analyses were performed for all three embankment sections assuming a friction angle of 30 degrees for the embankment fill material. Assuming cross sections characterized by 2H:1V slopes, the analyses indicate that the factors of safety for the drained (long term) condition ranged from 1.39 to 1.43, which were below the minimum required factor of safety of 1.5. Consequently, analyses were performed assuming flatter slopes for increased stability. Assuming cross sections characterized by 2.5H:1V slopes, the analyses indicate that drained (long term) stability is adequate. However, undrained (end of construction) global stability analyses indicated that the factors of safety ranged from 0.69 to 0.92, which are well below the required minimum value of 1.5. Although undrained global stability was found to be inadequate for the full height embankment, analyses indicate that the embankments can still be built using staged construction. To provide a reasonable construction timeline, the use of prefabricated vertical drains (wick drains) is recommended. Details of wick drain spacing and staged construction are presented in Section 5.5.

Additional global stability analyses were performed for all three embankment sections assuming a friction angle of 35 degrees for the embankment fill material. Assuming cross sections characterized by 2H:1V slopes, the analyses indicate that drained (long term) stability is adequate. However, undrained (end of construction) global stability analyses indicate that the factors of safety ranged from 0.66 to 0.88, which are well below

the required minimum value of 1.5. Although embankments with 2H:1V slopes using the higher embankment strength values could be built using staged construction, there is a possibility that weaker embankment material could be used. Consequently, it is recommended that the embankments be built with 2.5H:1V slopes with staged construction.

5.4 Roadway Embankments – Settlement / Consolidation Analyses

Settlement calculations were performed for each of the embankment sections assuming the maximum embankment height in the respective embankment section. The maximum assumed height for the embankment from station 105+75 to 112+84 was assumed to be approximately 108 feet. The estimated total primary consolidation for this embankment was found to be 59 inches. Similarly, the maximum assumed heights for the embankments from stations 117+64 to 120+98 and 124+24 to 130+73 were assumed to be approximately 72 and 80 feet, respectively. The estimated total primary consolidation for these embankments was 37 and 38 inches, respectively. It should be noted that at approximate station 129+00, the embankment traverses a small ravine, which is approximately 30 feet deep. The embankment height at this location is approximately 80 feet. However, with respect to settlement, the settlement for the embankment from station 124+24 to 130+73 was more critical at a location away from the ravine where the embankment height was approximately 50 feet.

Time-rate of consolidation calculations were also performed. The calculations indicated that the time to ninety percent consolidation of the foundation soils without using wick drains ranged from approximately 1,793 to 3,562 days. In order to reduce the consolidation time, it is recommended that wick drains be used. Details on wick drains and staged construction are presented in Section 5.5.

5.5 Staged Construction and Wick Drains

Stability analyses indicate that it will be necessary to use staged construction to build the proposed embankments. The proposed embankments from stations 105+75 to 112+84 and 117+64 to 120+98 should be built using 35-foot high stages. Similarly, the proposed embankment from station 124+24 to 130+73 should be built using 30-foot high stages. A waiting period will be required prior to adding the subsequent stages. Analyses determined that at least ninety percent (U=90%) of the excess pore pressures should be allowed to dissipate prior to adding subsequent stages.

In addition to observing the waiting period, pore pressures in the foundation soils should not be allowed to rise above a critical level. For the proposed embankments from stations 105+75 to 112+84 and 117+64 to 120+98, the maximum allowable pore pressure during construction was found to be at a level of 15 feet above the existing ground surface. Similarly, for the proposed embankment from station 124+24 to 130+73, the maximum allowable pore pressure during construction was found to be at a level of 13 feet above the existing ground surface. If pore pressures rise above these levels, the placement of

fill should halt immediately. Fill placement may resume after pore pressures have been allowed to dissipate.

In conjunction with staged construction, it is also recommended that wick drains be used to expedite the consolidation of the foundation soils. The duration of the waiting period between construction stages will be dependent upon the selected spacing of the wick drains. Several spacing options have been developed, each providing a different time to ninety percent consolidation. It should be noted that the spacing assumes a triangular distribution. Estimated waiting times to ninety percent consolidation (U=90%) using wick drains are presented in Table 2.

Table 2 - Wick Drain Spacing and Consolidation Periods Between Construction Stages

Embankment Sta. 105+75 to 112+84		
Spacing (ft)	Time to U=90% (days)	Approximate Depth of Wick Drains (ft)
5	30	80
7	60	80
9	90	80
Embankment Sta. 117+64 to 120+98		
Spacing (ft)	Time to U=90% (days)	Approximate Depth of Wick Drains (ft)
5	30	70-80
7	55	70-80
9	85	70-80
Embankment Sta. 124+24 to 130+73		
Spacing (ft)	Time to U=90% (days)	Approximate Depth of Wick Drains (ft)
5	35	65-70
7	60	65-70
9	95	65-70

It is recommended that wick drains be installed within and to 15 feet beyond the limits of the proposed roadway embankments, including the spill through slopes under the bridges using a triangular spacing pattern. Three feet of sand (ODOT Item 703.02) should be placed over the treated area prior to construction of the embankment. This layer will provide a free draining layer beneath any embankment fill, allowing pore water to be expelled. Additional recommendations for the wick drains and instrumentation are presented in Appendix E.

5.6 Little Scioto River Structure – Rear Abutment Spill Through Slope Stability

In this area, the terrain slopes into the riverbed of the Little Scioto River. Previous configurations consisted of a 44-foot embankment with 2:1 slopes. The previously proposed rear abutment would be placed at approximately station 132+20. The proposed toe of the roadway embankment would be at approximately station 132+80. This would place the toe of the proposed embankment at the crest of the existing riverbank, which could create instability. Analyses performed previously determined that the initial configuration will have a factor of safety below the recommended minimum value for

global stability. Options have been presented previously to remedy the potential instability of the embankment and existing slope.

It is understood that the preferred remedy was to position the rear abutment of the structure further away from the river. This will keep the proposed embankment from "loading" the existing slope and inducing instability.

5.7 Groundwater Considerations

Water seepage was first encountered in the borings between depths of 4.0 and 79.0 feet. Water level readings taken at the completion soil sampling (prior to adding core water) ranged between depths of 7.0 and 67.8 feet. It is anticipated that groundwater conditions will vary with the level of the Little Scioto River throughout the Highland Bend area.

If it is necessary to make excavations, it is likely that seepage will be encountered. Consequently, pumps may be required to maintain reasonably dry excavations if water from seepage or precipitation enters the culvert excavations. Please refer to the individual boring logs for additional groundwater or seepage observations.

6.0 CLOSING REMARKS

We appreciate having the opportunity to be of service to you on this project. Please do not hesitate to call if you have any questions concerning our report.

Respectfully submitted,

DLZ OHIO, INC.

Steven J. Riedy
Geotechnical Engineer

Dorothy A. Adams, P.E.
Senior Geotechnical Engineer

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sjr: sjr

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APPENDIX A

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APPENDIX A

Boring Location Plan
General Information – Drilling Procedures and Logs of Borings
Legend – Boring Log Terminology
Boring Logs – Thirty (30) Borings

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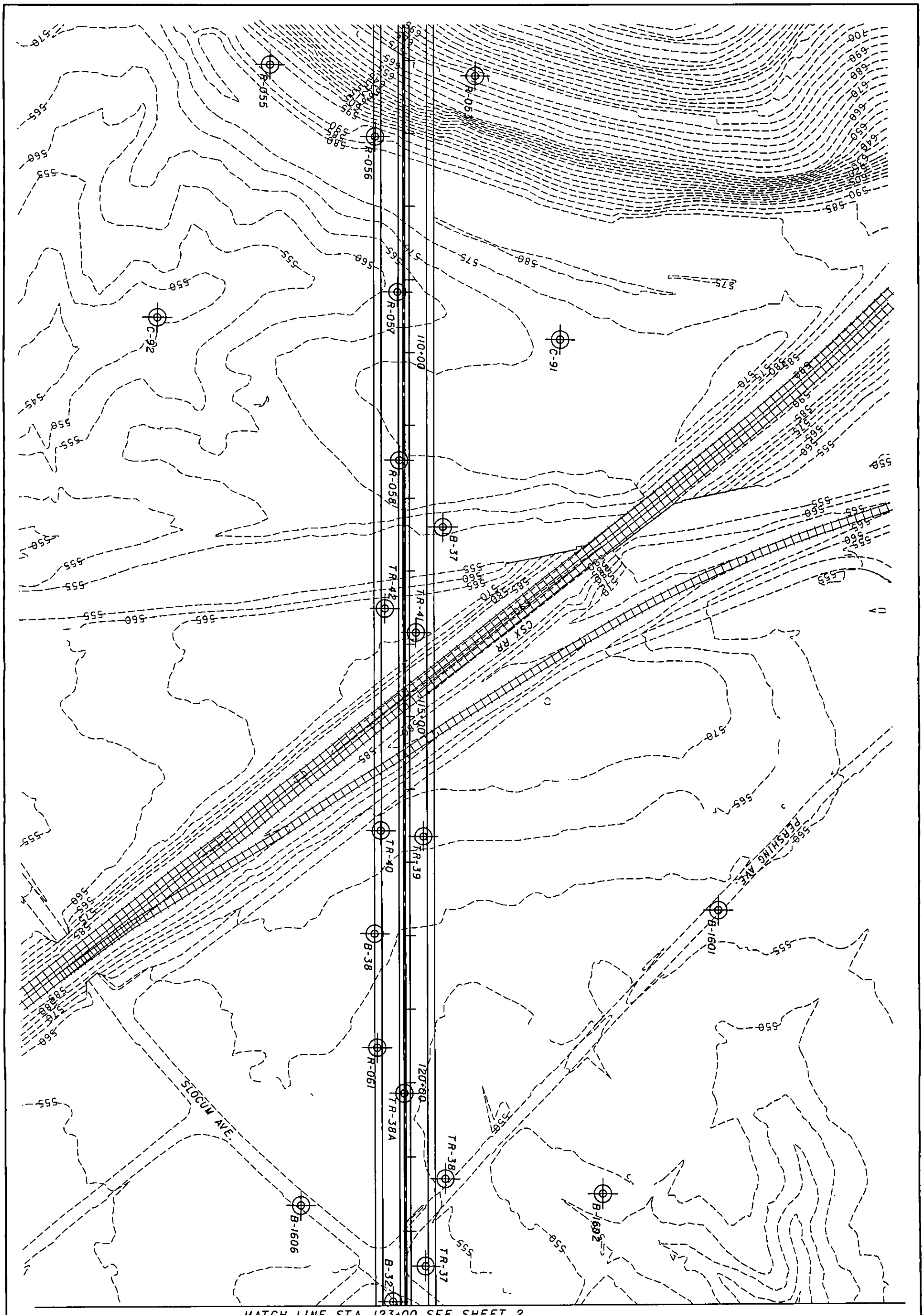

2 / 1	SCI-823-0.00	BORING LOCATION PLAN HIGHLAND BEND EMBANKMENTS	CALCULATED SJR CHECKED DAA	0 60 30 120 HORIZONTAL SCALE IN FEET

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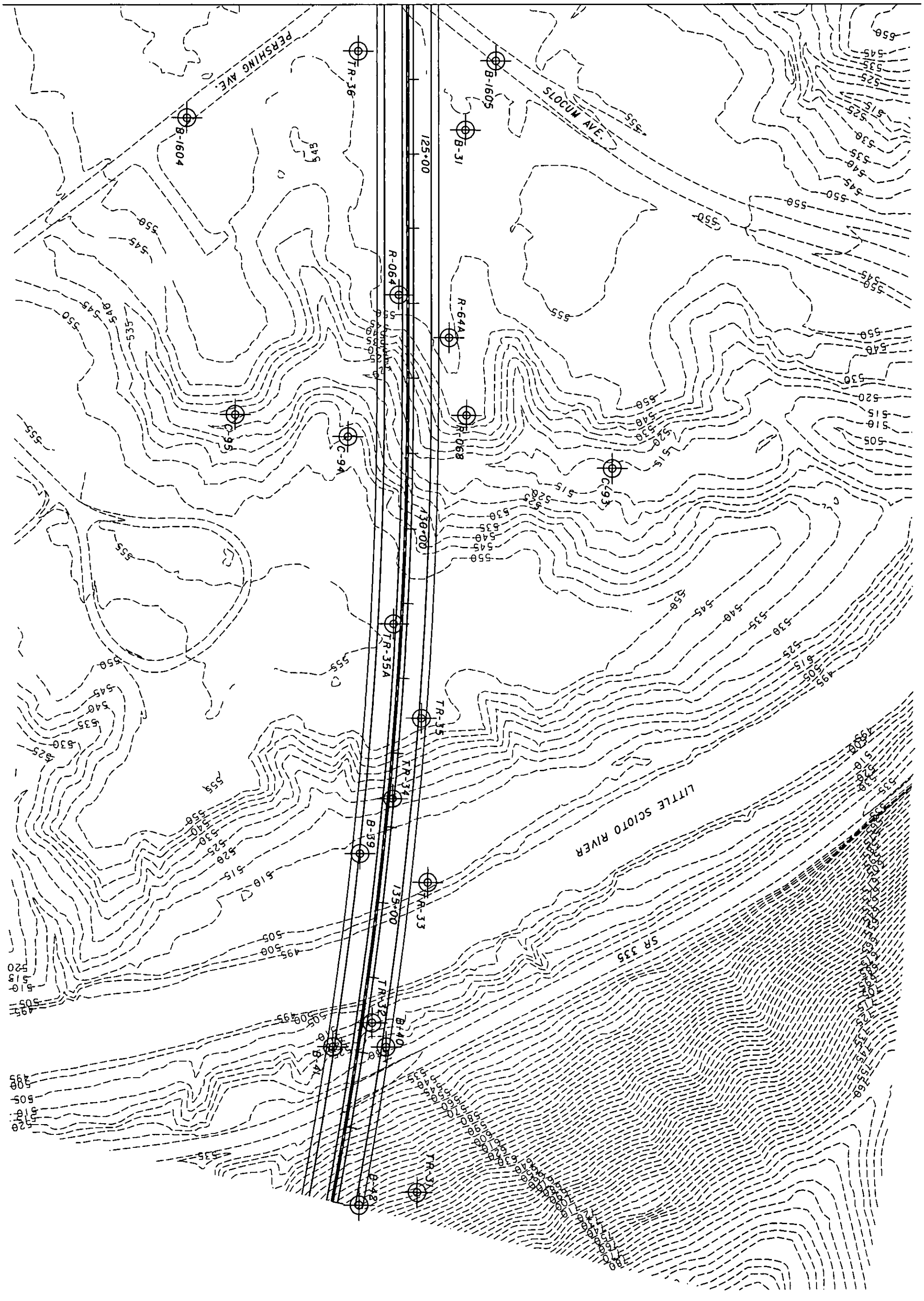


2/2	SCI-823-0.00	BORING LOCATION PLAN HIGHLAND BEND EMBANKMENTS	CALCULATED SJR CHECKED DAA	0 60 30 120 HORIZONTAL SCALE IN FEET

GENERAL INFORMATION
DRILLING PROCEDURES AND LOGS OF BORINGS

Drilling and sampling were conducted in accordance with procedures generally recognized and accepted as standardized methods of investigation of subsurface conditions concerning geotechnical engineering considerations. Borings were drilled with either a truck-mounted or ATV-mounted drill rig.

Drive split-barrel sampling was performed in 1.5 foot increments at intervals not exceeding 5 feet. In the event the sampler encountered resistance to penetration of 6 inches or less after 50 blows of the drop hammer, the sampling increment was discontinued. Standard penetration data were recorded and one or more representative samples were preserved from each sampling increment.

In borings where rock was cored, NXM or NQ size diamond coring tools were used.

In the laboratory all samples were visually classified by a geotechnical engineer. Moisture contents of representative fine-grained soil samples were determined. A limited number of samples, considered representative of foundation materials present, were selected for performance of grain-size analyses and plasticity characteristics tests. The results of these tests are shown on the boring logs.

The boring logs included in the Appendix have been prepared on the basis of the field record of drilling and sampling, and the results of the laboratory examination and testing of samples. Stratification lines on the boring logs indicating changes in soil stratigraphy represent depths of changes approximated by the driller, by sampling effort and recovery, and by laboratory test results. Actual depths to changes may differ somewhat from the estimated depths, or transitions may occur gradually and not be sharply defined. The boring logs presented in this report therefore contain both factual and interpretative information and are not an exact copy of the field log.

Although it is considered that the borings have disclosed information generally representative of site conditions, it should be expected that between borings conditions may occur which are not precisely represented by any one of the borings. Soil deposition processes and natural geologic forces are such that soil and rock types and conditions may change in short vertical intervals and horizontal distances.

Soil/rock samples will be stored at our laboratory for a period of six months. After this period of time, they will be discarded, unless notified to the contrary by the client.

LEGEND – BORING LOG TERMINOLOGY

Explanation of each column, progressing from left to right

1. Depth (in feet) – refers to distance below the ground surface.

2. Elevation (in feet) – is referenced to mean sea level, unless otherwise noted.

3. Standard Penetration (N) – the number of blows required to drive a 2-inch O.D., 1-3/8 inch I.D., split-barrel sampler, using a 140-pound hammer with a 30-inch free fall. The blows are recorded in 6-inch drive increments. Standard penetration resistance is determined from the total number of blows required for one foot of penetration by summing the second and third 6-inch increments of an 18-inch drive.

   50/n – indicates number of blows (50) to drive a split-barrel sampler a certain number of inches (n) other than the normal 6-inch increment.

4. The length of the sampler drive is indicated graphically by horizontal lines across the "Standard Penetration" and "Recovery" columns.

5. Sample recovery from each drive is indicated numerically in the column headed "Recovery".

6. The drive sample location is designated by the heavy vertical bar in the "Sample No., Drive" column.

7. The length of hydraulically pressed "Undisturbed" samples is indicated graphically by horizontal lines across the "Press" column.

8. Sample numbers are designated consecutively, increasing in depth.

9. Soil Description

   a. The following terms are used to describe the relative compactness and consistency of soils:

   Granular Soils – Compactness

Term	Blows/Foot Standard Penetration
Very Loose	0 – 4
Loose	4 – 10
Medium Dense	10 – 30
Dense	30 – 50
Very Dense	over 50

   Cohesive Soils – Consistency

Term	Unconfined Compression tons/sq.ft.	Blows/Foot Standard Penetration	Hand Manipulation
Very Soft	less than 0.25	below 2	Easily penetrated by fist
Soft	0.25 – 0.50	2 – 4	Easily penetrated by thumb
Medium Stiff	0.50 – 1.0	4 – 8	Penetrated by thumb with moderate pressure
Stiff	1.0 – 2.0	8 – 15	Readily indented by thumb but not penetrated
Very Stiff	2.0 – 4.0	15 – 30	Readily indented by thumb nail
Hard	over 4.0	over 30	Indented with difficulty by thumb nail

   b. Color – If a soil is a uniform color throughout, the term is single, modified by such adjective as light and dark. If the predominant color is shaded by a secondary color, the secondary color precedes the primary color. If two major and distinct colors are swirled throughout the soil, the colors are modified by the term "mottled".

   c. Texture is based on the Ohio Department of Transportation Classification System. Soil particle size definitions are as follows:

Description		Size	Description		Size
Boulders		Larger than 8"	Sand	– Coarse	2.0 mm to 0.42 mm
Cobbles		8" to 3"		– Fine	0.42 mm to 0.074 mm
Gravel	– Coarse	3" to ¾"	Silt		0.074 mm to 0.005 mm
	– Fine	¾" to 2.0 mm	Clay		smaller than 0.005 mm

d. The main soil component is listed first. The minor components are listed in order of decreasing percentage of particle size.

e. Modifiers to main soil descriptions are indicated as a percentage by weight of particle sizes.

trace	0 to 10%
little	10 to 20%
some	20 to 35%
"and"	35 to 50%

f. Moisture content of **cohesionless soils** (sands and gravels) is described as follows:

Term	Relative Moisture or Appearance
Dry	No moisture present
Damp	Internal moisture, but none to little surface moisture
Moist	Free water on surface
Wet	Voids filled with free water

g. The moisture content of **cohesive soils** (silts and clays) is expressed relative to plastic properties.

Term	Relative Moisture or Appearance
Dry	Powdery
Damp	Moisture content slightly below plastic limit
Moist	Moisture content above plastic limit but below liquid limit
Wet	Moisture content above liquid limit

10. Rock Hardness and Rock Quality Designation

a. The following terms are used to describe the relative hardness of the **bedrock**.

Term	Description
Very Soft	Permits denting by moderate pressure of the fingers. Resembles hard soil but has rock structure. (Crushes under pressure of fingers and/or thumb)
Soft	Resists denting by fingers, but can be abraded and pierced to shallow depth by a pencil point. (Crushes under pressure of pressed hammer)
Medium Hard	Resists pencil point, but can be scratched with a knife blade. (Breaks easily under single hammer blow, but with crumbly edges.)
Hard	Can be deformed or broken by light to moderate hammer blows. (Breaks under one or two strong hammer blow, but with resistant sharp edges.)
Very Hard	Can be broken only by heavy and in some rocks repeated hammer blows.

b. Rock Quality Designation, RQD – This value is expressed in percent and is an indirect measure of rock soundness. It is obtained by summing the total length of all core pieces which are at least four inches long, and then dividing this sum by the total length of the core run.

11. Gradation – when tests are performed, the percentage of each particle size is listed in the appropriate column (defined in Item 9c).

12. When a test is performed to determine the natural moisture content, liquid limit moisture content, or plastic limit moisture content, the moisture content is indicated graphically.

13. The standard penetration (N) value in blows per foot is indicated graphically.

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]IBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-31 | Location: Sta. 124+68.2, 74.1 ft. LT of SR 823 CL | Date Drilled: 1/11/07 to 1/12/07

WATER OBSERVATIONS: Water seepage at: 14.8', 19.6'
Water level at completion: 30.2' (prior to coring)
24.6' (with augers removed, includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.2	555.4 / 555.2						Topsoil - 2"						
		3 4 4	11	1		2.75	Very stiff brown and gray SILT AND CLAY (A-6a), trace to little fine to coarse sand, trace gravel; damp to moist. @ 0.2'-5.0', contains trace organic material.						
		4 5 5	18	2		2.75							
5.5	549.9												
		3 5 7	18	3		3.75	Very stiff brown and gray CLAY (A-7-6), some silt, trace fine sand; moist.	0	0	--	6	29	65
8.0	547.4												
		4 6 8	18	4		3.5	Very stiff brown and gray SILTY CLAY (A-6b), trace fine to coarse sand; moist.						
10					P1	2.5		0	1	--	6	37	56
13.0	542.4												
		3 4 6	18	5		3.25	Very stiff to hard brown and gray SILT AND CLAY (A-6a), trace fine to coarse sand; moist.						
15					P2	4.5+		0	0	--	2	53	45
		5 5 8	18	6		3.5							
20													
		3 5 8	18	7		2.25		0	2	--	2	31	65
		4 4 8	18	8		2.5							
25													
25.5	529.9												
		3 4 5	18	9		1.5	Stiff brown and gray SILT (A-4b), some clay, trace fine sand; damp to moist.	0	0	--	6	65	29
28.0	527.4												
		4 5 8	18	10			Medium dense brown COARSE AND FINE SAND (A-3a), trace silty clay; moist.						
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-31 | Location: Sta. 124+68.2, 74.1 ft. LT of SR 823 CL | Date Drilled: 1/11/07 to 1/12/07

WATER OBSERVATIONS: Water seepage at: 14.8', 19.6'
Water level at completion: 30.2' (prior to coring)
24.6' (with augers removed, includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	525.4						Medium dense brown COARSE AND FINE SAND (A-3a), trace silty clay; moist.						
32.0	523.4						Very stiff to hard gray SILT AND CLAY (A-6a), trace fine to coarse sand; damp to moist.						
35		2 3 3	18	11		1.0		0	0	--	3	47	50
40		4 7 11	18	12		3.0							
45		5 8 13	18	13		4.25							
50		6 9 14	18	14		3.0		0	2	--	7	34	57
55		8 12 15	17	15		4.5+							
60		6 9 12	18	16		3.75							

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-31 | Location: Sta. 124+68.2, 74.1 ft. LT of SR 823 CL | Date Drilled: 1/11/07 to 1/12/07

WATER OBSERVATIONS: Water seepage at: 14.8', 19.6'
Water level at completion: 30.2' (prior to coring)
24.6' (with augers removed, includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	495.4						Stiff gray SILT AND CLAY (A-6a), little fine to coarse sand; moist to wet.						
		6 8 10	18	17									
65													
67.0	488.4						Loose gray COARSE AND FINE SAND (A-3a), little silt; wet.						
		3 5 3	15	18									
70													
		5 3 6	13	19									
75													
79.0	476.4						Hard gray SILTSTONE; fine grained, slightly weathered, arenaceous, medium to thickly bedded. @ 79.4', 83.8', clay seams.						
80		Core 63"	Rec 63"	RQD 97%	R1								
84.3	471.2						Bottom of Boring - 84.3'						
85													
90													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢—⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-32 | Location: Sta. 122+95.4, 21.3 ft. RT of SR 823 CL | Date Drilled: 1/15/07 to 1/16/07

WATER OBSERVATIONS: Water seepage at: 28.0'-32.0', 68.0'-78.5'
Water level at completion: 59.5' (prior to coring)
21.1' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	555.0												
0.3	554.7						Topsoil - 3"						
		1 2 3	18	1		1.5	Stiff brown SILTY CLAY (A-6b), trace to little fine to coarse sand, trace gravel; damp.						
3.0	552.0												
		4 7 9	18	2		3.5	Stiff to very stiff brown CLAY (A-7-6), some silt, trace fine sand; damp to moist.	0	0	--	1	29	70
5													
		2 2 3	18	3		1.5							
8.0	547.0												
		2 4 5	18	4		3.0	Stiff to very stiff brown SILT AND CLAY (A-6a), trace fine sand; damp.						
10					P1	1.25	@ 10.1', torvane=0.40 tsf	0	0	--	2	53	45
						3.0	@ 11.8', torvane=0.5 tsf						
12.5	542.5						Stiff to very stiff brown SILT (A-4b), little to some clay, trace fine to coarse sand; damp to moist.						
		3 3 4	18	5		1.75							
15					P2	1.0	@ 15.1', torvane=0.25 tsf	0	1	--	1	58	40
						3.5	@ 16.8', torvane=0.35 tsf						
		3 4 7	18	6		2.5							
20													
		3 4 7	18	7		1.25		0	0	--	1	80	19
		3 3 6	18	8		1.0							
25													
		3 5 5	18	9		2.0		0	0	--	1	68	31
		2 4 6	18	10		0.25							
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-32 | Location: Sta. 122+95.4, 21.3 ft. RT of SR 823 CL | Date Drilled: 1/15/07 to 1/16/07

WATER OBSERVATIONS: Water seepage at: 28.0'-32.0', 68.0'-78.5'
Water level at completion: 59.5' (prior to coring)
21.1' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.0	525.0												
30.0	525.0						Stiff gray SILTY CLAY (A-6b), little fine to coarse sand; moist.						
35		3 3 4	18	11		1.0							
40		4 7 9	18	12		1.25							
42.0	513.0						Very stiff to hard gray CLAY (A-7-6), little to some silt, trace fine sand; damp.						
45		5 7 11	18	13		4.0							
50		10 11 16	18	14		3.5							
55		10 11 17	18	15		2.75							
60		5 7 9	18	16		2.25							

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-32 | Location: Sta. 122+95.4, 21.3 ft. RT of SR 823 CL | Date Drilled: 1/15/07 to 1/16/07

WATER OBSERVATIONS: Water seepage at: 28.0'-32.0', 68.0'-78.5'
Water level at completion: 59.5' (prior to coring)
21.1' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
	495.0												
60.0	495.0						Medium dense gray COARSE AND FINE SAND (A-3a), little to some silt, trace gravel, trace clay; contains sandstone fragments; damp to moist.						
65		6 7 9	18	17									
70		4 4 6	18	18			@ 78.5', auger refusal, sand heave, washed out.						
75		3 7 9	18	19			@ 78.5', auger refusal, sand heave, washed out.						
78.5	476.5						Medium hard to hard gray SANDSTONE interbedded with SHALE; fine grained, slightly weathered, micaceous, medium bedded, slightly fractured. @ 78.8'-78.9', clay seam.						
80		Core 66"	Rec 66"	RQD 93%	R1								
84.0	471.0						Bottom of Boring - 84.0'						
85													
90													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-37 | Location: Sta. 112+40.5, 50.1 ft. LT of SR 823 CL | Date Drilled: 5/7/07 to 5/8/07

WATER OBSERVATIONS: Water seepage at: 17.0', 59.0', 68.5'
Water level at completion: 55.9' (prior to coring)
32.9' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	556.2												
0.3	555.9						Topsoil - 4"						
		5 5 11	13	1			Medium dense brown SANDY SILT (A-4a), little gravel, trace clay; damp.						
3.0	553.2												
		2 3 3	18	2		1.0	Stiff to very stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand; moist.	0	2	--	5	55	38
5		5 7 10	8	3		3.5							
					ST-1	3.25	@ 7.5'-9.5', torvane = 0.58-0. 80 tsf.	0	1	--	2	32	65
10		3 4 7	18	4		1.5		0	0	--	1	52	47
		3 4 5	18	5		2.0							
15							@ 15.5', varved.						
		3 4 6	18	6		1.5							
18.0	538.2				ST-2	1.75	Stiff brown SILT (A-4b), "and" clay, trace fine sand; torvane = 0.30-0.40 tsf; moist.	0	0	--	1	61	38
20													
21.5	534.7	3 5 7	18	7		1.75	Stiff to very stiff brown SILT AND CLAY (A-6a), trace fine sand; moist.	0	0	--	1	56	43
		4 5 7	18	8		2.0							
25		4 5 10	18	9		2.5		0	0	--	2	44	54
							@ 28.5'-30.0', brownish gray, contains silt and fine sand seams.						
30		4 8 11	18	10		3.0		0	0	--	1	36	63

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-37 | Location: Sta. 112+40.5, 50.1 ft. LT of SR 823 CL | Date Drilled: 5/7/07 to 5/8/07

WATER OBSERVATIONS: Water seepage at: 17.0', 59.0', 68.5'
Water level at completion: 55.9' (prior to coring)
32.9' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	526.2						Stiff to very stiff brownish gray SILT AND CLAY (A-6a), trace fine sand; contains silt and fine sand seams; moist.						
		5 7 10	18	11		3.0							
35							@ 37.0', gray.						
		4 6 9	18	12		2.75		0	0	--	1	43	56
40													
43.5	512.7				ST-3	1.75	Stiff to very stiff gray SANDY SILT (A-4a), "and" clay; moist.	0	0	--	3	47	50
45							@ 43.5'-45.5', torvane = 0.15-0.45 tsf.						
							@ 47.0', contains trace organics.						
		4 6 9	18	13		2.5							
50													
52.0	504.2						Stiff gray SILT AND CLAY (A-6a), trace fine sand; moist.						
		4 5 8	18	14		1.25		0	0	--	3	58	39
55													
57.0	499.2						Very loose brown FINE SAND (A-3), trace silty clay; moist to wet.						
		WOR WOH 5	18	15A		-							
59.5	496.7												

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-37 | Location: Sta. 112+40.5, 50.1 ft. LT of SR 823 CL | Date Drilled: 5/7/07 to 5/8/07

WATER OBSERVATIONS: Water seepage at: 17.0', 59.0', 68.5'
Water level at completion: 55.9' (prior to coring)
32.9' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	496.2			15B		-	Stiff gray SILT (A-4b), trace to little fine sand, trace clay; moist.						
							@ 62.0', trace to little clay, moist to wet.						
65		WOR 3 5	18	16		1.5							
67.0	489.2						Stiff to very stiff brown SANDY SILT (A-4a), trace to little clay; moist to wet.						
70		1 2 9	18	17		-							
							@ 72.0', little gravel.						
75		3 7 10	18	18		2.0							
							@ 77.0', wet.						
80		4 8 12	18	19		-							
							@ 82.0', little to some fine to coarse sand, little to some gravel, wet.						
84.0	472.2	13 50/5	11	20A 20B			Severely weathered SANDSTONE.						
85.0	471.2						Medium hard gray SANDSTONE; fine grained, moderately to highly weathered, broken.						
		Core 63"	Rec 63"	RQD 52%	R-1		@ 86.6', highly fractured.						
90													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
50+

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-37 | Location: Sta. 112+40.5, 50.1 ft. LT of SR 823 CL | Date Drilled: 5/7/07 to 5/8/07

WATER OBSERVATIONS: Water seepage at: 17.0', 59.0', 68.5'
Water level at completion: 55.9' (prior to coring)
32.9' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90	466.2													
90.3	465.9						Bottom of Boring - 90.3'							
95														
100														
105														
110														
115														
120														

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-38 | Location: Sta. 117+97.8, 45.2 ft. RT of SR 823 CL | Date Drilled: 05/03/07 to 05/04/07

WATER OBSERVATIONS: Water seepage at: 18.3', 33.9', 78.5'
Water level at completion: 60.5' (at end of day 5/03/07)
43.7' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	561.7												
0.8	560.9						Topsoil - 9"						
		2 3 4	17	1		2.0	Very stiff brown CLAY (A-7-6), trace fine sand; damp to moist.						
		4 9 11	16	2		3.5		0	0	--	1	40	59
5													
5.5	556.2						Stiff brown SILT (A-4b), trace fine sand; moist.						
		4 4 6	18	3		1.25		0	0	--	1	52	47
8.0	553.7						Stiff brown SILT AND CLAY (A-6a), trace fine sand; moist.						
		3 3 6	18	4A		1.0							
10				4B		2.0		0	0	--	8	35	57
					ST-1	1.0-1.5	@ 10.0'-12.0', torvane = 0.5 tsf	0	0	--	9	41	50
12.0	549.7						Medium stiff brown SILTY CLAY (A-6b), trace fine sand; contains thin fine sand seams; moist.						
		2 5 9	15	5		0.5		0	0	--	2	28	70
		2 4 7	18	6		3.0	@ 13.5'-15.0', very stiff.	0	0	--	2	39	59
15													
		1 2 3	16	7		1.0							
17.5	544.2						Medium stiff brown SILT (A-4b), trace fine sand; contains thin fine sand seams; moist.						
		2 3 3	17	8		0.75		0	0	--	1	54	45
19.0	542.7						Stiff to very stiff brown SILT AND CLAY (A-6a), trace fine sand; contains thin fine sand seams; moist.						
20					ST-2	1.0-1.5	@ 19.0', torvane = 0.30 tsf	0	0	--	1	50	49
		3 4 7	18	9		1.0	@ 21.0', torvane = 0.38 tsf						
		3 4 4	18	10		1.0							
25													
		2 5 7	18	11		2.5							
		3 5 7	18	12		1.75		1	3	--	3	39	54
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-38 | Location: Sta. 117+97.8, 45.2 ft. RT of SR 823 CL | Date Drilled: 05/03/07 to 05/04/07

WATER OBSERVATIONS: Water seepage at: 18.3', 33.9', 78.5'
Water level at completion: 60.5' (at end of day 5/03/07)
43.7' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	531.7						Stiff to very stiff brown SILT AND CLAY (A-6a), trace fine sand; moist.						
32.0	529.7						Soft to medium stiff gray SILT (A-4b), little to some clay, trace fine sand; contains thin fine sand seams; moist to wet.						
35		2 3 6	18	13		0.5		0	0	--	1	69	30
		2 2 5	18	14		0.25-0.5		0	0	--	0	78	22
					ST-3	0.5-0.75	@ 37.0'-39.0', torvane = 0.14 tsf.	0	0	--	2	73	25
40		2 4 4	18	15		0.25-0.5							
		WOH 3 3	14	16		0.25-0.5							
45													
46.5	515.2						Very stiff gray SILT AND CLAY (A-6a), trace fine sand; moist.						
50		5 10 16	18	17		3.0							
							@ 52.0', brownish-gray.						
55		7 11 14	18	18		3.0		0	0	--	1	30	69
60		5 10 12	18	19		2.0							

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. • 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 • (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-38 | Location: Sta. 117+97.8, 45.2 ft. RT of SR 823 CL | Date Drilled: 05/03/07 to 05/04/07

WATER OBSERVATIONS: Water seepage at: 18.3', 33.9', 78.5'
Water level at completion: 60.5' (at end of day 5/03/07)
43.7' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
60	501.7						Stiff to very stiff gray SILT AND CLAY (A-6a), trace fine sand; moist.							
65		6 11 16	18	20		2.0		0	0	--	4	32	64	
70		3 5 9	18	21		1.75								
72.0	489.7						Medium dense to dense gray SANDY SILT (A-4a), little clay; moist to wet.							
75		3 5 8	18	22										
80		W O H	18	23			@ 80.0', 10.0' sand heave accumulated overnight; washed out.	0	2	--	42	45	11	Non-Plastic
85		11 13 23	18	24A 24B										
85.5	476.2						Medium hard gray SANDSTONE; fine to medium grained, slightly to moderately weathered, moderately to highly fractured. @ 85.6'-85.9', iron stained fractures.							
90		Core 60"	Rec 60"	RQD 85%	R-1									

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-38 | Location: Sta. 117+97.8, 45.2 ft. RT of SR 823 CL | Date Drilled: 05/03/07 to 05/04/07

WATER OBSERVATIONS:
Water seepage at: 18.3', 33.9', 78.5'
Water level at completion: 60.5' (at end of day 5/03/07)
43.7' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90	471.7												
90.5	471.2						Bottom of Boring - 90.5'						

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

95 100 105 110 115 120

FILE: 0121-3070-03 | 8/2/2007 8:37 AM |

DLZ OHIO INC. * 6121 HUNTLEY ROAD, [illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-39 | Location: Sta. 134+39.9, 34.2 ft. RT of SR 823 CL | Date Drilled: 5/9/07

WATER OBSERVATIONS: Water seepage at: 16.0', 19.5', 23.5'
Water level at completion: 32.4' (prior to coring)
12.9' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
0	508.0													
0.4	507.6						Topsoil - 5"							
		2 2 2	18	1		1.25	Stiff brown SILTY CLAY (A-6b), trace fine sand; moist.							
		2 2 2	18	2		1.25		0	0	--	2	67	31	
5														
5.5	502.5						Medium stiff brown SILT AND CLAY (A-6a), trace fine sand; moist.							
		WOH 2 2	18	3		1.0								
		2 3 2	18	4		0.75		0	0	--	8	55	37	
10.0	498.0				ST-1	1.0-1.25	Stiff brown SILT (A-4b), some clay, little fine sand; moist.	0	0	--	11	57	32	
13.0	495.0						Very soft to soft brown SANDY SILT (A-4a), little to some clay; moist to wet.							
		W O H	18	5		-		0	0	--	39	40	21	
15														
		WOH WOH 3	18	6		-								
18.0	490.0						Medium stiff to stiff mottled brown and gray SILTY CLAY (A-6b), trace fine sand; moist.							
19.5	488.5	2 2 2	18	7A 7B		1.0	Loose gray SILT (A-4b), little clay, some to "and" fine to coarse sand; moist to wet.							
20														
		1 3 5	18	8			@ 19.5'-20.5', brown.	0	2	--	20	58	20	Non-Plastic
		2 1 2	16	9										
25														
		1 2 2	18	10			@ 26.0', attempted to press Shelby Tube, no recovery.	0	0	--	37	53	10	Non-Plastic
		2 3 3	14	11			@ 28.5', attempted to press Shelby Tube, no recovery.							
30														

STANDARD PENETRATION (N) / Natural Moisture Content, % - ● / PL ⊢ LL / Blows per foot - ○ (10 20 30 40)

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-39 | Location: Sta. 134+39.9, 34.2 ft. RT of SR 823 CL | Date Drilled: 5/9/07

WATER OBSERVATIONS: Water seepage at: 16.0', 19.5', 23.5'
Water level at completion: 32.4' (prior to coring)
12.9' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	478.0						Loose brown SILT (A-4b), some fine to coarse sand, trace to little clay; contains rock fragments; wet.						
33.7	474.3	50/2	1	12			Medium hard gray SANDSTONE; fine grained, moderately to highly weathered, arenaceous, highly fractured.						
35		Core 67"	Rec 67"	RQD 58%	R-1								
40		Core 60"	Rec 59"	RQD 98%	R-2		@ 38.8', slightly weathered, slightly arenaceous, slightly to moderately fractured.						
45													
50		Core 120"	Rec 120"	RQD 99%	R-3		@ 48.0'-48.6', 49.6'-50.2', fine to medium grained.						
54.3	453.7						Bottom of Boring - 54.3'						
55													
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
50+

FILE: 0121-3070-03 (8/2/2007 8:37 AM)

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-91 | Location: Sta. 109+83.2, 212.7 ft. LT of SR 823 CL | Date Drilled: 2/12/07 to 2/14/07

WATER OBSERVATIONS: Water seepage at: 88.5'-100.0'
Water level at completion: 62.8' (prior to coring)
32.3' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	571.5												
0.4	571.1	2 2 3	12	1		1.0	Topsoil - 5" Medium stiff brown SILT AND CLAY (A-6a), trace to little fine to coarse sand; moist.						
3.5	568.0	4 6 8	16	2		4.0	Very stiff to hard brown CLAY (A-7-6), trace fine to coarse sand; moist.	0	1	--	3	41	55
6.0	565.5	3 4 5	18	3		2.5	Very stiff brown SANDY SILT (A-4a), little to some clay; damp.						
8.5	563.0	4 5 8	18	4		3.75	Very stiff to hard brown CLAY (A-7-6), trace fine sand; moist.						
10					P1	2.75	@ 10.0', torvane= 0.35 tsf.	0	0	--	1	33	66
		5 6 10	18	5		4.5							
15		4 6 9	18	6		3.25							
		3 5 8	18	7		4.5+							
20		5 9 14	18	8		4.5+							
		4 6 8	16	9		2.5	@ 23.0'-30.0', moist.						
25													
26.0	545.5				P2	3.0	Very stiff brown SILTY CLAY (A-6b), trace fine to coarse sand; damp to moist. @ 26.0', torvane = 0.44 tsf.	0	0	--	1	44	55
30		4 7 10	18	10		3.75							

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

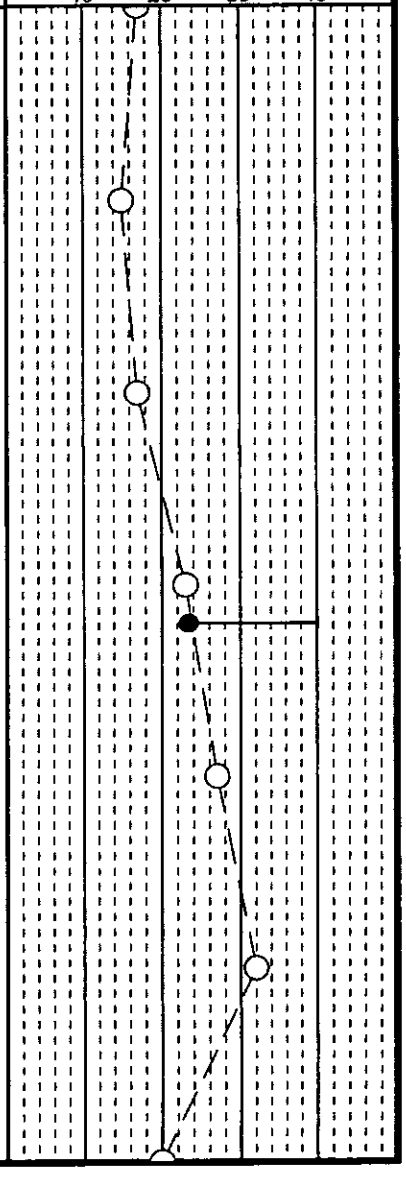
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-91 | Location: Sta. 109+83.2, 212.7 ft. LT of SR 823 CL | Date Drilled: 2/12/07 to 2/14/07

WATER OBSERVATIONS: Water seepage at: 88.5'-100.0'
Water level at completion: 62.8' (prior to coring)
32.3' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	541.5						Very stiff to hard brown SILTY CLAY (A-6b), trace fine sand; damp to moist.						
		5 6 9	18	11		4.5+							
35													
		4 7 10	18	12		4.0							
40													
		5 8 15	18	13		4.5+							
45					P3	4.5+		0	0	--	1	22	77
		6 10 17	18	14		4.5							
50													
		9 12 20	18	15		4.5+							
55													
		5 8 12	18	16		3.0							
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢—⊣ LL
Blows per foot - ○
10 20 30 40



FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-91 | Location: Sta. 109+83.2, 212.7 ft. LT of SR 823 CL | Date Drilled: 2/12/07 to 2/14/07

WATER OBSERVATIONS: Water seepage at: 88.5'-100.0'
Water level at completion: 62.8' (prior to coring)
32.3' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	511.5						Very stiff to hard brown SILTY CLAY (A-6b), trace fine sand; moist.						
63.5	508.0	6 9 11	18	17		3.75	Very stiff grayish brown SANDY SILT (A-4a), little clay; damp to moist.						
65													
70		5 6 7	18	18		3.0							
75		6 8 11	18	19		2.25							
80		4 7 8	18	20		3.0							
85		6 10 11	18	21		2.0							
88.5	483.0	7 7 14	15	22			Medium dense to very dense brown GRAVEL WITH SAND AND SILT (A-2-4), little clay; moist to wet						
90													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-91 | Location: Sta. 109+83.2, 212.7 ft. LT of SR 823 CL | Date Drilled: 2/12/07 to 2/14/07

WATER OBSERVATIONS: Water seepage at: 88.5'-100.0'
Water level at completion: 62.8' (prior to coring)
32.3' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90	481.5						Medium dense to very dense brown GRAVEL WITH SAND AND SILT (A-2-4), little clay; moist to wet.							
		13 26 40	8	23										66
95														
		10 13 30	13	24										
100														
103.0	468.5													
103.2	468.3	50/2	2	25			Severely weathered gray SILTSTONE.							50+
							Medium hard gray SANDSTONE interbedded with SILTSTONE; fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, slightly fractured.							
105		Core 60"	Rec 57"	RQD 88%	R1									
108.2	463.3						Bottom of Boring - 108.2'							
110														
115														
120														

FILE: 0121-3070-03 | 8/2/2007 8:37 AM |

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-92 | Location: Sta. 109+52.0, 343.4 ft. RT of SR 823 CL | Date Drilled: 2/7/07 to 2/10/07

WATER OBSERVATIONS: Water seepage at: 58.5'-75.0'
Water level at completion: Not Reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	547.8												
0.3	547.5						Topsoil - 4"						
		2 1 2	18	1		1.75	Very stiff to hard brown SILT AND CLAY (A-6a), trace fine to coarse sand; moist. @ 1.0'-2.5', stiff.						
		1 2 4	18	2		2.25		0	1	--	4	54	41
5		3 4 7	18	3		4.25							
		4 5 8	18	4		4.5+							
10					P1	2.75	@ 10.0', torvane = 0.39 tsf.	0	0	--	2	40	58
		4 6 7	17	5		4.25							
15													
16.0	531.8	3 5 6	18	6		3.5	Very stiff brown SANDY SILT (A-4a), little to some clay; damp.						
		3 5 8	18	7		3.75							
20		8 8 11	18	8		3.75							
23.5	524.3	7 11 15	18	9		4.5+	Hard brown SILT AND CLAY (A-6a), trace fine to coarse sand; damp to moist.						
25					P2	4.0	@ 26.0', torvane = 0.55 tsf.	0	0	--	1	63	36
		7 9 12	18	10		4.5+	@ 28.5', gray.						
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-92 | Location: Sta. 109+52.0, 343.4 ft. RT of SR 823 CL | Date Drilled: 2/7/07 to 2/10/07

WATER OBSERVATIONS: Water seepage at: 58.5'-75.0'
Water level at completion: Not Reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	517.8						Hard brown SILT AND CLAY (A-6a), trace fine to coarse sand; damp to moist.						
33.5	514.3	5 7 9	15	11		2.75	Very stiff gray SILT (A-4b), trace fine sand; damp to moist.						
40		3 7 9	17	12		3.75							
45		3 5 8	16	13		3.25							
50					P3	2.75		0	0	--	2	54	44
55		4 6 9	17	14		2.0							
58.5	489.3	7 14 13	18	15			Medium dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; moist						
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢—⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 | 8/2/2007 8:37 AM |

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-92 | Location: Sta. 109+52.0, 343.4 ft. RT of SR 823 CL | Date Drilled: 2/7/07 to 2/10/07

WATER OBSERVATIONS: Water seepage at: 58.5'-75.0'
Water level at completion: Not Reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
60	487.8						Medium dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; moist.							
63.5	484.3	6 13 21	12	16			Dense grayish brown SANDY SILT (A-4a), trace clay; wet.							
68.5	479.3	18 31 50/5	17	17			Very dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; moist.							50+
75		4 27 28	15	18			@ 73.5', wet, contains sandstone fragments.							55
79.0	468.8	Core 60"	Rec 60"	RQD 100%	R1		Medium hard gray SANDSTONE interbedded with SILTSTONE; fine grained, moderately weathered, argillaceous, micaceous, thinly bedded, slightly to moderately fractured. @ 79.3'-79.7', low angle fracture.							
84.0	463.8						Bottom of Boring - 84.0'							
90														

GRADATION

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-93 | Location: Sta. 129+16.0, 272.6 ft. LT of SR 823 CL | Date Drilled: 2/14/07 to 2/15/07

WATER OBSERVATIONS: Water seepage at: 28.5'-35.0'
Water level at completion: 32.2' (prior to coring)
13.7' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	514.3												
0.5	513.8						Topsoil - 6"						
		1 1 1	8	1		0.5	Soft to medium stiff dark gray to black SILTY CLAY (A-6b), trace fine sand; slightly organic; moist.						
3.0	511.3												
		WOH 1 2	6	2		1.25	Stiff gray and brown SILTY CLAY (A-6b), trace fine to coarse sand; moist.	0	0	--	2	33	65
5													
		1 2 4	12	3		1.5							
8.0	506.3												
		4 7 10	16	4		3.75	Stiff to very stiff brown CLAY (A-7-6), trace to little silt, trace fine to coarse sand; damp to moist.						
10					P1	3.0	@ 10.0', torvane = 0.53 tsf.	0	3	--	3	26	68
		1 3 3	18	5		1.0	@ 13.5', gray.						
15													
		3 4 7	18	6		2.5							
		3 4 7	18	7		1.5							
20													
20.5	493.8												
		3 6 8	18	8		4.5+	Very stiff to hard gray SILT (A-4b), some clay, trace fine to coarse sand; damp.						
25					P2	2.0	@ 24.0', torvane = 0.48 tsf.	0	2	--	13	56	29
		3 5 9	18	9		3.0							
		5 4 3	8	10		2.0	@ 28.5', contains sandstone fragments.						
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢—⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-93 | Location: Sta. 129+16.0, 272.6 ft. LT of SR 823 CL | Date Drilled: 2/14/07 to 2/15/07

WATER OBSERVATIONS: Water seepage at: 28.5'-35.0'
Water level at completion: 32.2' (prior to coring)
13.7' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	484.3						Very stiff to hard gray SILT (A-4b), some clay, trace fine to coarse sand; contains sandstone fragments; damp.						
		2 3 9	12	11		2.0							
35													
38.5	475.8	10 18 50/3	12	12			Severely weathered gray SANDSTONE.						
40													
40.5	473.8	Core 60"	Rec 60"	RQD 50%	R1		Medium hard gray SANDSTONE interbedded with SILTSTONE; fine grained, moderately weathered, argillaceous, micaceous, medium bedded to thickly bedded, slightly to moderately fractured. @ 41.1'-41.4', broken zone.						
45													
45.5	468.8						Bottom of Boring - 45.5'						
50													
55													
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
50+

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

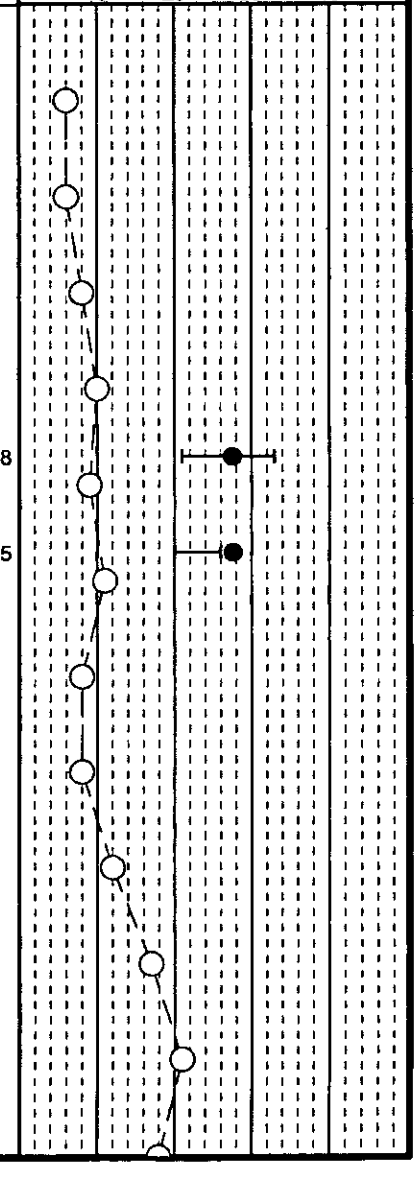
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-94 | Location: Sta. 128+79.3, 83.9 ft. RT of SR 823 CL | Date Drilled: 2/19/07

WATER OBSERVATIONS: Water seepage at: 6.2', 19.0'
Water level at completion: None

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	545.0												
0.7	544.3	2 3 3	10	1		1.75	Topsoil - 8" Stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand; contains silt seams; damp to moist.						
		1 3 3	14	2		1.25							
5		3 3 5	18	3		1.5							
		3 4 6	18	4		2.0							
10		2 4 5	18	5		1.0		1	2	--	2	57	38
13.0	532.0	3 4 7	18	6		2.0	Stiff brown SILT (A-4b), little to some clay, trace fine sand; moist to wet.	0	0	--	1	84	15
15		2 3 5	18	7		1.5							
		2 3 5	18	8		2.0							
20													
20.5	524.5	3 7 5	18	9			Medium dense brown FINE SAND (A-3), little to some silt; moist to wet.						
23.0	522.0	3 7 10	15	10		2.5	Very stiff to hard gray CLAY (A-7-6), trace silt; damp.						
25		5 8 13	16	11		4.5+							
		5 7 11	17	12		4.0							
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40



FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-94 | Location: Sta. 128+79.3, 83.9 ft. RT of SR 823 CL | Date Drilled: 2/19/07

WATER OBSERVATIONS: Water seepage at: 6.2', 19.0'
Water level at completion: None

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	515.0						Very stiff to hard gray CLAY (A-7-6), trace silt; damp.						
		5 9 12	18	13		4.0							
35.0	510.0						Bottom of Boring - 35.0'						
40													
45													
50													
55													
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-95 | Location: Sta. 128+50.5, 235.5 ft. RT of SR 823 CL | Date Drilled: 2/15/07 to 2/16/07

WATER OBSERVATIONS: Water seepage at: 43.5'-45.0'
Water level at completion: 43.3' (prior to coring)
7.4' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	525.6												
0.5	525.1						Topsoil - 6"						
		1 2 2	10	1		0.75	Medium stiff grayish brown SANDY SILT (A-4a), little clay, trace gravel; moist.						
3.0	522.6												
		2 2 3	16	2		1.25	Stiff gray CLAY (A-7-6), little fine to coarse sand; moist.	0	5	--	8	37	50
5													
6.0	519.6	5 6 12	16	3		4.5+	Hard gray SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; moist.						
		7 8 12	18	4		4.0							
10					P1			0	0	--	4	68	28
13.5	512.1												
		4 6 10	14	5		4.25	Very stiff to hard brownish gray CLAY (A-7-6), some silt, trace fine sand; damp to moist.						
15													
		4 8 11	18	6		4.5							
		4 7 10	18	7		4.0							
20													
		2 5 6	18	8		2.25	@ 21.0'-22.5', some silt, moist.						
					P2			0	0	--	0	25	75
25													
		5 9 13	16	9		4.25							
		3 6 9	18	10		3.75							
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-95 | Location: Sta. 128+50.5, 235.5 ft. RT of SR 823 CL | Date Drilled: 2/15/07 to 2/16/07

WATER OBSERVATIONS: Water seepage at: 43.5'-45.0'
Water level at completion: 43.3' (prior to coring)
7.4' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	495.6						Stiff to very stiff dark gray to black CLAY (A-7-6), little silt, trace fine sand; slightly organic; damp to moist.						
		2 3 5	18	11		2.0							
35													
37.0	488.6						Loose to medium dense gray GRAVEL WITH SAND (A-1-b); contains siltstone fragments; moist.						
		4 3 7	3	12									
40													
42.0	483.6						Loose brownish gray COARSE AND FINE SAND (A-3a), some gravel, trace clay; wet.						
		WOH WOH 5	13	13									
45													
48.5	477.1												
		36 50/3	6	14			Severely weathered gray SANDSTONE, argillaceous.						
49.5	476.1												
50		Core 60"	Rec 60"	RQD 88%	R1		Medium hard gray SANDSTONE; fine grained, slightly to moderately weathered, argillaceous, micaceous, medium bedded to thickly bedded, slightly fractured. @ 53.8'-54.2', decomposed zone.						
54.5	471.1						Bottom of Boring - 54.5'						
55													
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
50+

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-55 | Location: Sta. 106+05.7, 188.4 ft. RT of SR 823 CL | Date Drilled: 5/11/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
2.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	591.7	15 27 50/3	11	1			No Topsoil / 2"-4" soil removed before drilling Severely weathered brown SANDSTONE, argillaceous.							50+
		36 50/3	7	2										50+
5														
6.0	585.7	Core 60"	Rec 60"	RQD 63%	R-1		Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, medium bedded, moderately fractured, discolored infilling. @ 9.1'-9.3', high angle fracture.							
10														
11.0	580.7						Bottom of Boring - 11.0'							
15														
20														
25														
30														

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-56 | Location: Sta. 107+04.9, 43.4 ft. RT of SR 823 CL | Date Drilled: 5/11/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
6.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	585.0						No Topsoil / Drilled on logging road							
		1 3 5	5	1			Loose brown SANDY SILT (A-4a), little gravel; contains coal fragments; damp.							
3.5	581.5						Severely weathered brown SANDSTONE, argillaceous.							
5		11 25 21	15	2										
		12 28 31	14	3										59
		4 6 9	16	4			@ 8.5'-10.0', brown and gray.							
10		27 50/3	8	5										50+
13.0	572.0						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, medium bedded, moderately fractured, discoloration on fractures with little clay infilling; friable in very fine grained sandstone zones.							
15		Core 96"	Rec 92"	RQD 93%	R-1		@ 14.8'-14.9',15.7'-15.9', high angle fractures.							
20							@ 19.5', ≡ 2/10" clay seam.							
21.0	564.0						Bottom of Boring - 21.0'							
25														
30														

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-57 | Location: Sta. 109+17.2, 12.6 ft. RT of SR 823 CL | Date Drilled: 5/9/05 to 5/11/05

WATER OBSERVATIONS: Water seepage at: 58.5', 77.5', 78.0'-92.0'
Water level at completion: 54.0' (prior to coring)
57.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Pass / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	561.3												
0.8	560.5						Topsoil - 9"						
		WOH WOH 1	9	1		1.0	Very stiff to hard brown SILT AND CLAY (A-6a), trace fine to coarse sand; damp to moist. @ 1.0'-2.5', stiff, contains trace organic material.						
		WOH 1 3	12	2		3.25	@ 3.5'-7.5', mottled light brown, brown, and gray.						
5		2 5 7	16	3		3.5							
		3 7 11	18	4		4.0							
10		3 6 10	18	5		4.5							
		3 4 7	17	6		4.5+		0	0	--	0	40	60
15		3 6 8	18	7		4.5+							
		2 3 5	18	8		3.5							
20		3 4 6	18	9		3.5							
		5 6 9	17	10		3.5	@ 23.5', gray.						
25		6 9 11	18	11		4.5							
		3 5 9	16	12		4.5+							
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-57 | Location: Sta. 109+17.2, 12.6 ft. RT of SR 823 CL | Date Drilled: 5/9/05 to 5/11/05

WATER OBSERVATIONS:
Water seepage at: 58.5', 77.5', 78.0'-92.0'
Water level at completion: 54.0' (prior to coring)
57.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30.0	531.3						Hard gray SILTY CLAY (A-6b), little fine to coarse sand; damp.						
		3 6 10	18	13		4.5+							
35													
		4 7 15	15	14		4.5+							
40													
		3 9 14	18	15		4.5+		0	0	--	1	33	66
45													
		4 8 10	18	16		4.5+							
50													
52.5	508.8						Very stiff to hard gray SILT AND CLAY (A-6a), little fine to coarse sand; damp.						
		5 7 10	18	17		4.5+							
55													
		4 5 7	18	18		3.25	@ 58.5', wet spoon.						
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-57 | Location: Sta. 109+17.2, 12.6 ft. RT of SR 823 CL | Date Drilled: 5/9/05 to 5/11/05

WATER OBSERVATIONS: Water seepage at: 58.5', 77.5', 78.0'-92.0'
Water level at completion: 54.0' (prior to coring)
57.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	501.3						Very stiff to hard gray SILT AND CLAY (A-6a), little fine to coarse sand; damp.						
65		3 6 10	18	19		4.5+							
70		4 6 7	18	20		2.25	@ 68.5', moist.						
75		1 2 4	18	21		2.75							
77.5	483.8						Medium dense to dense brown SANDY SILT (A-4a), some gravel, little clay; wet.						
80		8 9 10	12	22									
85		17 17 17	16	23									
90		4 9 12	14	24			@ 88.5'-90.0', contains sandstone fragments.						

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-57 | Location: Sta. 109+17.2, 12.6 ft. RT of SR 823 CL | Date Drilled: 5/9/05 to 5/11/05

WATER OBSERVATIONS: Water seepage at: 58.5', 77.5', 78.0'-92.0'
Water level at completion: 54.0' (prior to coring)
57.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90.0	471.3						Severely weathered SANDSTONE.						
93.0	468.3	Core 67"	Rec 67"	RQD 79%	R-1		Hard gray SANDSTONE; very fine to fine grained, slightly weathered, medium bedded, slightly to moderately fractured, clay infilling along bedding planes. @ 96.7', contains turbidity bedding.						
98.6	462.7						Bottom of Boring - 98.6'						

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢—⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

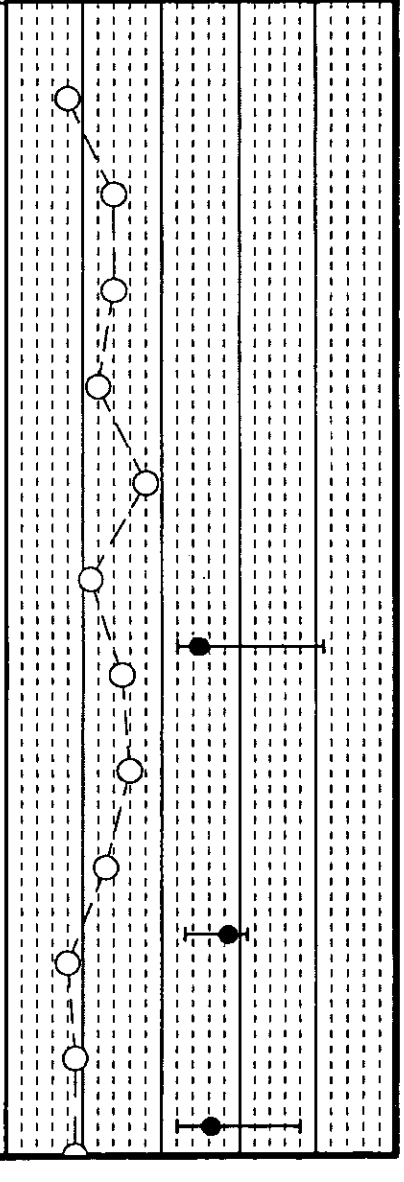
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-58 | Location: Sta. 111+48.8, 10.3 ft. RT of SR 823 CL | Date Drilled: 3/31/05 to 4/1/05

WATER OBSERVATIONS: Water seepage at: 79.0'-85.0'
Water level at completion: 59.0' (prior to coring)
60.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.2	568.5 / 568.3						Topsoil - 2"						
		2 3 5	11	1		3.5	Very stiff to hard brown CLAY (A-7-6), little fine to coarse sand; damp.						
		3 5 9	15	2		4.5+							
5		4 6 8	18	3		3.0							
		2 5 7	16	4		4.25							
10		4 8 10	17	5		4.5+							
		2 5 6	15	6		4.5+							
15		4 6 9	17	7		4.5+		0	0	--	1	30	69
		3 6 10	18	8		4.5							
20		3 6 7	18	9		4.5							
23.5	545.0	1 3 5	17	10		2.25	Very stiff brown SILT (A-4b), some to "and" clay; moist.	0	0	--	0	64	36
25		2 4 5	18	11		3.25							
28.0	540.5						Very stiff brown SILTY CLAY (A-6b), trace fine sand; damp to moist.						
30		3 4 5	18	12		3.75		0	0	--	2	45	53

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40



FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, [illegible]MBUS, OHIO 43229 * (614)888-0040

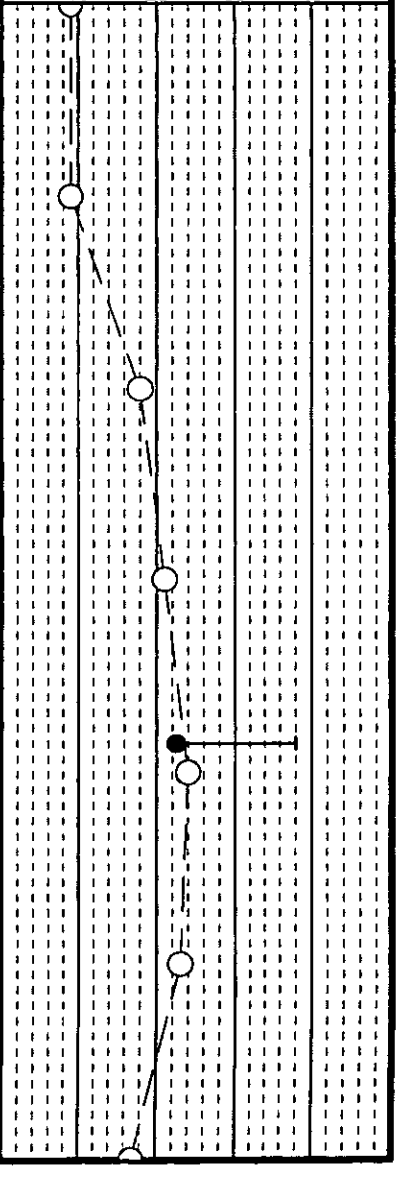
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-58 | Location: Sta. 111+48.8, 10.3 ft. RT of SR 823 CL | Date Drilled: 3/31/05 to 4/1/05

WATER OBSERVATIONS:
Water seepage at: 79.0'-85.0'
Water level at completion: 59.0' (prior to coring)
60.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30.0	538.5						Very stiff to hard brown SILT AND CLAY (A-6a), trace fine to coarse sand; moist.						
35		1 4 5	18	13		2.5							
40		4 8 10	18	14		4.5	@ 38.5', gray.						
45		6 10 11	18	15		4.5+							
50		4 11 13	18	16		4.5+		0	0	–	1	33	66
55		5 10 13	18	17		4.5+							
60		4 8 9	18	18		4.5+							

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40



FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-58 | Location: Sta. 111+48.8, 10.3 ft. RT of SR 823 CL | Date Drilled: 3/31/05 to 4/1/05

WATER OBSERVATIONS: Water seepage at: 79.0'-85.0'
Water level at completion: 59.0' (prior to coring)
60.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60.0	508.5						Stiff to very stiff gray SILT (A-4b), little fine to coarse sand; damp.						
65		4 6 7	18	19		3.0							
70		2 5 6	18	20		2.25		0	1	--	10	57	32
75		1 2 3	18	21		1.25	@ 73.5', thin sand seam. @ 75.0' 4.0' heaving sand.						
78.5	490.0												
80		4 7 11	17	22			Medium dense brown and gray COARSE AND FINE SAND (A-3a), little silt, little gravel; contains rock fragments; wet.						
82.0	486.5						Loose to medium dense gray SANDY SILT (A-4a), little clay, little gravel; contains rock fragments; moist.						
85		WOH WOH 10	18	23			@ 88.5', very dense.						
90		23 50/5	10	24									

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢—⊣ LL
Blows per foot - ○
10 20 30 40 50+

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-58 | Location: Sta. 111+48.8, 10.3 ft. RT of SR 823 CL | Date Drilled: 3/31/05 to 4/1/05

WATER OBSERVATIONS: Water seepage at: 79.0'-85.0'
Water level at completion: 59.0' (prior to coring)
60.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90.0	478.5						Dense to very dense brown GRAVEL WITH SAND (A-1-b), some fine to coarse sand, little silt; contains sandstone fragments; wet.							
		2 6 24	5	25										
95														
97.0	471.5						Severely weathered gray SANDSTONE.							
98.6	469.9	50/1	1	26			Medium hard gray to dark gray SANDSTONE; very fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, slightly fractured, contains moderate argillaceous laminations.							50+
100		Core 60"	Rec 60"	RQD 100%	R-1									
103.6	464.9						Bottom of Boring - 103.6'							
105														
110														
115														
120														

FILE: 0121-3070-03 | 8/2/2007 8:37 AM |

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-61 | Location: Sta. 119+53.0, 41.9 ft. RT of SR 823 CL | Date Drilled: 3/23/05 to 3/29/05

WATER OBSERVATIONS: Water seepage at: 37.0', 67.0'
Water level at completion: 35.0' (prior to coring, 3/29/05 AM)
19.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	558.3												
0.3	558.0						Topsoil - 3"						
		2 3 3	14	1		4.5+	Very stiff to hard brown CLAY (A-7-6), trace fine sand; damp to moist.						
		3 5 6	16	2		3.0							
5					P-1	3.0, 2.0		0	0	--	2	28	70
8.5	549.8												
		1 4 6	15	3		4.5+	Very Stiff to hard brown SILT (A-4b), trace fine sand, some clay; moist to wet.						
10		5 7 9	16	4		4.5+							
		2 2 4	17	5		2.75							
15													
15.5	542.8												
		2 4 5	18	6		2.25	Very stiff brown SILT AND CLAY (A-6a), trace fine sand; moist.	0	0	--	1	58	41
18.0	540.3				P-2	2.25, 4.25	Very stiff to hard brown SILT (A-4b), some clay, trace fine sand; wet.	0	0	--	1	72	27
20													
20.5	537.8												
		3 5 6	18	7		3.25	Very stiff brown SILT AND CLAY (A-6a), trace fine sand; moist.	0	0	--	1	50	49
		2 4 7	15	8		3.75							
25		5 7 8	18	9		2.25							
		3 5 7	18	10		2.75							
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢—⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 (8/2/2007 8:37 AM)

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-61 | Location: Sta. 119+53.0, 41.9 ft. RT of SR 823 CL | Date Drilled: 3/23/05 to 3/29/05

WATER OBSERVATIONS: Water seepage at: 37.0', 67.0'
Water level at completion: 35.0' (prior to coring, 3/29/05 AM)
19.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30.0	528.3						Very stiff gray SILT (A-4b), trace fine sand; moist to wet.						
					P-3	2.75, 3.25		0	0	--	1	62	37
35													
		4 3 4	18	11		--							
40													
42.0	516.3						Very stiff to hard gray SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp to moist.						
		6 9 14	18	12		2.75		3	1	--	8	32	56
45													
					P-4								
50													
		3 9 11	18	13		4.5							
55													
		6 10 11	18	14		4.5+							
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 (8/2/2007 8:37 AM)

DLZ OHIO INC. * 6121 HUNTLEY ROAD, [redacted]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-61 | Location: Sta. 119+53.0, 41.9 ft. RT of SR 823 CL | Date Drilled: 3/23/05 to 3/29/05

WATER OBSERVATIONS: Water seepage at: 37.0', 67.0'
Water level at completion: 35.0' (prior to coring, 3/29/05 AM)
19.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	498.3						Soft to medium stiff gray SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp to moist.						
		2 4 3	18	15		0.5							
65													
67.0	491.3						Medium dense gray SANDY SILT (A-4a), trace gravel; moist to wet.						
		8 13 6	15	16									
70													
		W O H	18	17			@ 73.5'-75.0', very loose.						
75													
77.0	481.3						Very dense brown GRAVEL WITH SAND (A-1-b), trace clay; contains sandstone fragments; wet.						
		18 34 50	18	18			@ 80.0', resumed augering on 3/29/05.						
80													
82.0	476.3						Severely weathered gray SANDSTONE, argillaceous.						
83.7	474.6	50/2	2	19			Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, thinly to medium bedded, slightly fractured, iron stains; contains argillaceous laminations.						
85		Core 78"	Rec 78"	RQD 88%	R-1								
90													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢—⊣ LL
Blows per foot - ○
10 20 30 40
84
50+

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, [redacted]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-61 | Location: Sta. 119+53.0, 41.9 ft. RT of SR 823 CL | Date Drilled: 3/23/05 to 3/29/05

WATER OBSERVATIONS:
Water seepage at: 37.0', 67.0'
Water level at completion: 35.0' (prior to coring, 3/29/05 AM)
19.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
	468.3													
90.2	468.1						Bottom of Boring - 90.2'							
95														
100														
105														
110														
115														
120														

FILE: 0121-3070-03 | 8/2/2007 8:37 AM |

DLZ OHIO INC. * 6121 HUNTLEY ROAD, [redacted]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-64 | Location: Sta. 126+88.7, 16.0 ft. RT of SR 823 CL | Date Drilled: 05/16/05 to 05/17/05

WATER OBSERVATIONS: Water seepage at: 63.5'
Water level at completion: 65.5' (prior to coring)
2.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	551.6												
0.3	551.3						Topsoil - 3"						
		4 4 4	11	1		4.5	Very stiff to hard brown SILT AND CLAY (A-6a), little fine to coarse sand; damp.						
		2 4 7	15	2		4.25							
5		4 5 7	17	3		3.0							
					P1								
10		3 4 6	18	4		3.75							
		1 3 4	17	5		3.0	@ 13.5', very stiff, trace fine to coarse sand, moist to wet.						
15		2 4 4	18	6		2.5							
					P2			0	5	--	2	51	42
20		3 4 4	18	7		3.0	@ 21.0', little fine to coarse sand, moist to wet.						
23.5	528.1	3 4 5	18	8		1.75	Stiff brown and gray SILT (A-4b), little fine sand, little clay; moist.						
25		2 2 4	18	9		1.75							
30		3 6 10	18	10		4.5+	@ 28.5'-30.0', hard.						

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-64 | Location: Sta. 126+88.7, 16.0 ft. RT of SR 823 CL | Date Drilled: 05/16/05 to 05/17/05

WATER OBSERVATIONS: Water seepage at: 63.5'
Water level at completion: 65.5' (prior to coring)
2.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30.0	521.6						Very stiff to hard gray CLAY (A-7-6); damp.						
		5 9 12	16	11		4.5+							
35													
		3 7 11	18	12		4.5		0	0	--	0	23	77
40													
		4 8 12	16	13		4.5+							
45													
		3 7 9	18	14		4.5							
50													
		5 7 10	18	15		3.5							
55													
57.0	494.6						Hard gray SILTY CLAY (A-6b), some fine to coarse sand, trace gravel; damp.						
		3 7 7	18	16		4.25							
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, [redacted]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-64 | Location: Sta. 126+88.7, 16.0 ft. RT of SR 823 CL | Date Drilled: 05/16/05 to 05/17/05

WATER OBSERVATIONS: Water seepage at: 63.5'
Water level at completion: 65.5' (prior to coring)
2.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
60.0	491.6						Loose to medium dense gray COARSE AND FINE SAND (A-3a), some silt, little gravel; wet.							Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ 10 20 30 40
		5 6 8	14	17										
65														
		WOH 1 7	18	18										
70														
73.5	478.1	50/5	5	19			Severely weathered gray SANDSTONE, argillaceous.							50+
75														
75.5	476.1	Core 65"	Rec 65"	RQD 83%	R-1		Medium hard to hard gray to dark gray SANDSTONE; fine grained, slightly weathered, argillaceous, thickly bedded, highly fractured.							
80							@ 79.4'-79.5', clay seam.							
80.9	470.7						Bottom of Boring - 80.9'							
85														
90														

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-64A | Location: Sta. 127+46.6, 51.6 ft. LT of SR 823 CL | Date Drilled: 1/11/06

WATER OBSERVATIONS: Water seepage at: 68.5'-70.0'
Water level at completion: 64.8' (prior to coring)
13.9' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	550.8												
0.3	550.5						Topsoil - 4"						
		2 2 5	13	1		2.25	Very stiff brown SILTY CLAY (A-6b), trace fine to coarse sand; damp.	0	1	--	5	43	51
		4 5 8	18	2		4.5+	@ 3.0'-5.0', hard, trace organic soil.						
5.0	545.8				P1A	2.0/<0.25	Soft brown CLAY (A-7-6), "and" silt, trace fine to coarse sand;	0	1	--	2	49	48
5.9	544.9				P1B		damp to moist.	0	1	--	1	48	50
							Very stiff brown SILT AND CLAY (A-6a), trace fine sand; damp to moist.						
		3 3 6	18	3		2.5		0	0	--	1	47	52
10													
		4 4 6	18	4		2.5							
		2 5 5	18	5		2.5							
15													
					P2A	0.5 / 2.0		0	0	--	1	52	47
15.8	535.0				P2B			0	0	--	2	67	31
							Soft to medium stiff brown SILT (A-4b), some to "and" clay, trace fine sand; moist to wet.						
		2 5 6	18	6		0.5		0	0	--	1	70	29
20													
		3 3 6	18	7		0.25	@ 21.0', little clay.	0	0	--	1	81	18
23.0	527.8												
		2 3 4	18	8		0.75	Medium stiff brownish gray CLAY (A-7-6), "and" silt, trace fine to coarse sand; moist.	0	1	--	2	43	54
25		4 6 8	16	9		2.5	@ 25.0'-30.0', very stiff.						
		4 5 9	18	10		2.5	@ 28.5', little silt.	0	0	--	1	17	82
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢—⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [9/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-64A | Location: Sta. 127+46.6, 51.6 ft. LT of SR 823 CL | Date Drilled: 1/11/06

WATER OBSERVATIONS: Water seepage at: 68.5'-70.0'
Water level at completion: 64.8' (prior to coring)
13.9' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	520.8						Hard gray CLAY (A-7-6), little silt, trace coarse sand; damp.						
		5 7 11	18	11		4.5+							
35													
37.0	513.8						Very stiff to hard gray SILTY CLAY (A-6b), trace fine sand; damp to moist.						
		6 10 11	18	12		4.5+							
40					P4	4.0		0	0	--	1	26	73
		6 9 12	18	13		4.5+							
45							@ 47.0', trace organic clay.						
		5 7 10	18	14		4.0							
50													
		4 7 9	18	15		2.5							
55													
57.0	493.8						Medium stiff to stiff gray SILT (A-4b), some clay, little fine to coarse sand; damp to moist.						
60		WOH 2 5	18	16		1.0		0	1	--	14	58	27

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-64A | Location: Sta. 127+46.6, 51.6 ft. LT of SR 823 CL | Date Drilled: 1/11/06

WATER OBSERVATIONS: Water seepage at: 68.5'-70.0'
Water level at completion: 64.8' (prior to coring)
13.9' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Atterberg Limits
60	490.8													
		3 4 5	18	17		1.0	Medium stiff to stiff gray SILT (A-4b), little to some fine to coarse sand, trace to little clay, trace to little gravel; damp to moist.							
65														
67.0	483.8													
		3 6 9	18	18			Medium dense gray SANDY SILT (A-4a), trace clay, trace gravel; moist to wet.	1	6	--	53	31	9	Non-Plastic
70														
72.0	478.8													
		50/5	4	19			Severely weathered gray SANDSTONE, argillaceous, micaceous.							50+
75.0	475.8													
		Core 60"	Rec 60"	RQD 100%	R-1	*1239	Medium hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, thickly bedded, slightly fractured.							
							@ 78.8'-79.3', very fine grained interbed, soft.							
80.0	470.8						Bottom of Boring - 80.0'							
85														
90														

STANDARD PENETRATION (N) / Natural Moisture Content, % - ● / PL ⊢—⊣ LL / Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 (8/2/2007 8:37 AM)

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-68 | Location: Sta. 128+49.3, 75.5 ft. LT of SR 823 CL | Date Drilled: 5/12/05

WATER OBSERVATIONS: Water seepage at: 63.0'
Water level at completion: 65.4' (prior to coring)
25.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.2	548.8						Topsoil - 2"						
	548.6	3 3 3	15	1		3.5	Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand; damp.						
3.0	545.8												
		3 4 4	14	2		3.5	Very stiff brown CLAY (A-7-6), "and" silt, trace fine sand; damp to moist.						
5		2 3 4	15	3		3.25		0	0	--	4	35	61
		2 4 4	17	4		3.75							
10													
11.0	537.8	2 3 4	17	5		3.0	Stiff to very stiff brown SILT (A-4b), some clay, trace fine to coarse sand; moist.						
		1 4 4	18	6		2.0		0	2	--	1	65	32
15		2 2 4	18	7		2.75							
		2 3 5	18	8		2.5							
20		2 5 7	18	9		3.0							
		3 4 6	18	10		1.75	@ 23.5'-25.0', contains sand seams.						
25													
26.0	522.8	4 7 11	18	11		4.5	Hard gray CLAY (A-7-6), some silt, trace fine sand; damp.	0	0	--	1	26	73
		4 6 9	16	12		4.5							
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-68 | Location: Sta. 128+49.3, 75.5 ft. LT of SR 823 CL | Date Drilled: 5/12/05

WATER OBSERVATIONS: Water seepage at: 63.0'
Water level at completion: 65.4' (prior to coring)
25.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	518.8						Very stiff to hard gray CLAY (A-7-6), some silt, trace fine sand; damp.						
35		2 4 8	16	13		4.5+							
40		7 8 12	0	14									
45		4 8 11	18	15		4.5+							
50		5 7 12	15	16		4.5+		0	0	--	0	29	71
55		4 5 7	18	17		3.0							
57.0	491.8						Very stiff gray SILTY CLAY (A-6b), trace to little fine to coarse sand; damp.						
60		1 6 10	18	18		2.25							

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 | 8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-68 | Location: Sta. 128+49.3, 75.5 ft. LT of SR 823 CL | Date Drilled: 5/12/05

WATER OBSERVATIONS: Water seepage at: 63.0'
Water level at completion: 65.4' (prior to coring)
25.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
	488.8													Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ 10 20 30 40
60.0	488.8						Very loose gray SANDY SILT (A-4a), trace clay; wet.							
		1 2 1	18	19				0	1	–	44	46	9	Non-Plastic ●
65														
		10 16 15	18	20			@ 68.5'-70.0', dense, some gravel, contains sandstone fragments.							
70.0	478.8						Severely weathered gray SANDSTONE.							
73.6	475.2	50/1	1	21			Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered to decomposed, argillaceous, micaceous, thickly bedded, highly fractured.							50+
75		Core 66"	Rec 66"	RQD 26%	R-1									
79.1	469.7						Bottom of Boring - 79.1'							
80														
85														
90														

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-33 | Location: Sta. 134+67.6, 60.6 ft. LT of SR 823 CL | Date Drilled: 2/23/05 to 2/24/05

WATER OBSERVATIONS: Water seepage at: 5.5'-34.0'
Water level at completion: 15.0' (Prior to coring)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Atterberg Limits
0	502.7													
0.4	502.3						Topsoil - 5"							
		WOH WOH 1	12	1		0.25	Very soft to soft brown SILT (A-4b), little fine sand; wet.	0	0	--	18	62	20	
3.0	499.7						Very soft to soft brown SANDY SILT (A-4a), little to some clay; wet.							
		1 WOH 1	16	2		0.25		0	1	--	32	47	20	
5.5	497.2						Very soft to soft brown SILT (A-4b), trace to little fine sand; wet.							
		W O H	3	3		0.25		0	0	--	17	60	23	
							@ 8.5'-10.0', very loose.							
10		WOH WOH 1	18	4				0	0	--	16	66	18	Non-Plastic
		WOH WOH 1	18	5		0.25		0	0	--	14	59	27	
15		WOH 1 2	18	6		0.5		0	0	--	4	73	23	
							@ 16.0'-20.0', some fine sand.							
		WOH WOH 1	18	7		0.25		0	0	--	32	51	17	
							@ 18.5'-20.0', very loose to loose.							
20		WOH 2 2	18	8				0	0	--	36	50	14	Non-Plastic
21.0	481.7						Medium dense gray COARSE AND FINE SAND (A-3a), some silt, trace gravel, trace clay; wet.							
		2 9 7	18	9				8	10	--	54	22	6	Non-Plastic
23.5	479.2						Loose gray FINE SAND (A-3), little to some silt; wet.							
25		2 2 2	18	10										
		1 2 3	18	11										
28.5	474.2						Loose gray SANDY SILT (A-4a); moist to wet.							
30		2 4		12										

FILE: 0121-3070-03 (8/2/2007 8:37 AM)

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-33 | Location: Sta. 134+67.6, 60.6 ft. LT of SR 823 CL | Date Drilled: 2/23/05 to 2/24/05

WATER OBSERVATIONS: Water seepage at: 5.5'-34.0'
Water level at completion: 15.0' (Prior to coring)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	472.7	6					Loose gray SANDY SILT (A-4a); moist to wet.						
34.1	468.6	50/1	0	13			Medium hard to hard gray SANDSTONE; very fine grained, slightly to moderately weathered, argillaceous, micaceous, thinly to thickly bedded.						
35		Core 42"	Rec 42"	RQD 100%	R-1		@ 34.6', high angle fracture.						
36.1	466.6						@ 34.7'-36.1', contains moderate argillaceous laminations.						
40		Core 60"	Rec 60"	RQD 93%	R-2		Hard gray SANDSTONE; very fine grained, slighty weathered, argillaceous, micaceous, thinly to thickly bedded. @ 38.3', qu = 11,676 psi.						
45		Core 60"	Rec 60"	RQD 100%	R-3		@ 41.6'-42.4', contains few to moderate argillaceous laminations. @ 41.9', clay seam. @ 42.4', low angle fracture.						
50		Core 60"	Rec 60"	RQD 100%	R-4								
54.1	448.6	Core 18"	Rec 18"	RQD 100%	R-5		@ 53.3', iron staining.						
55							Bottom of Boring - 54.1'						
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
50+

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-34 | Location: Sta. 133+61.1, 2.0 ft. LT of SR 823 CL | Date Drilled: 2/24/05 to 3/2/05

WATER OBSERVATIONS: Water seepage at: 30.0'-38.0'
Water level at completion: 20.0' (Prior to coring)
6.0' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	516.4												
0.6	515.8	1 2 2	16	1		2.5	Topsoil - 7" / 2-3' soil removed before drilling Very stiff brown SILT AND CLAY (A-6a); damp.						
2.0	514.4	4 5 7	18	2		4.0	Very stiff to hard brown CLAY (A-7-6), trace fine to coarse sand; varved; damp to moist.	0	0	--	1	21	78
5		4 5 8	18	3		4.5	@ 6.0', contains occasional very thin gray seams with desiccation cracking.						
		3 6 8	18	4		4.5+							
10		3 6 9	18	5		4.5+	@ 10.0', gray.						
		2 3 4	18	6		2.25							
15		2 5 7	18	7		3.25		0	0	--	1	22	77
		2 5 7	18	8		2.25	@ 17.5'-19.0', slightly organic.						
20		2 4 6	0	9		--							
		3 6 8	18	10		3.75							
25							@ 25.0', grayish brown; moist.						
		4 6 8	18	11		2.25		0	1	--	4	56	39
		3 6 9	0	12		--							
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-34 | Location: Sta. 133+61.1, 2.0 ft. LT of SR 823 CL | Date Drilled: 2/24/05 to 3/2/05

WATER OBSERVATIONS: Water seepage at: 30.0'-38.0'
Water level at completion: 20.0' (Prior to coring)
6.0' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % - ● / PL ⊢ LL / Blows per foot - ○
30.0	486.4	2 1 2	0	13			Very loose gray SILT (A-4b), some fine sand, trace clay; wet.							
35		0 1 2	18	14				0	0	--	31	60	9	Non-Plastic
38.0	478.4						Medium dense gray GRAVEL WITH SAND AND SILT (A-2-4), trace clay; moist.							
40		10 12 50/4	14	15				23	26	--	19	27	5	Non-Plastic 50+
42.0	474.4	Core 12"	Rec 12"	RQD 75%	R-1		Soft to medium hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, thinly to thickly bedded, moderately to highly fractured.							
45		Core 60"	Rec 60"	RQD 70%	R-2		@ 43.3', qu = 9,993 psi. @ 44.5'-45.4', 46.6'-48.0', very fine grained, fissile after desiccation. @ 42.2',43.6',44.7',47.1',47.2' 47.6', low angle clay filled fractures. @ 44.2'-44.4',45.0'- 45.1',46.7', high angle clay filled fractures.							
48.0	468.4						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massive, unfractured to slightly fractured.							
50		Core 60"	Rec 60"	RQD 100%	R-3									
55		Core 60"	Rec 60"	RQD 97%	R-4		@ 53.4'-54.3', very fine grained. @ 53.5', low angle clay filled fractures.							
60		Core 48"	Rec 48"	RQD 100%	R-5		@ 59.1'-59.5', red iron staining.							

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-34 | Location: Sta. 133+61.1, 2.0 ft. LT of SR 823 CL | Date Drilled: 2/24/05 to 3/2/05

WATER OBSERVATIONS:
Water seepage at: 30.0'-38.0'
Water level at completion: 20.0' (Prior to coring)
6.0' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % - ● / PL — LL / Blows per foot - ○
60	456.4						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massive, unfractured.							
62.0	454.4						Bottom of Boring - 62.0'							
65														
70														
75														
80														
85														
90														

STANDARD PENETRATION (N) scale: 10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

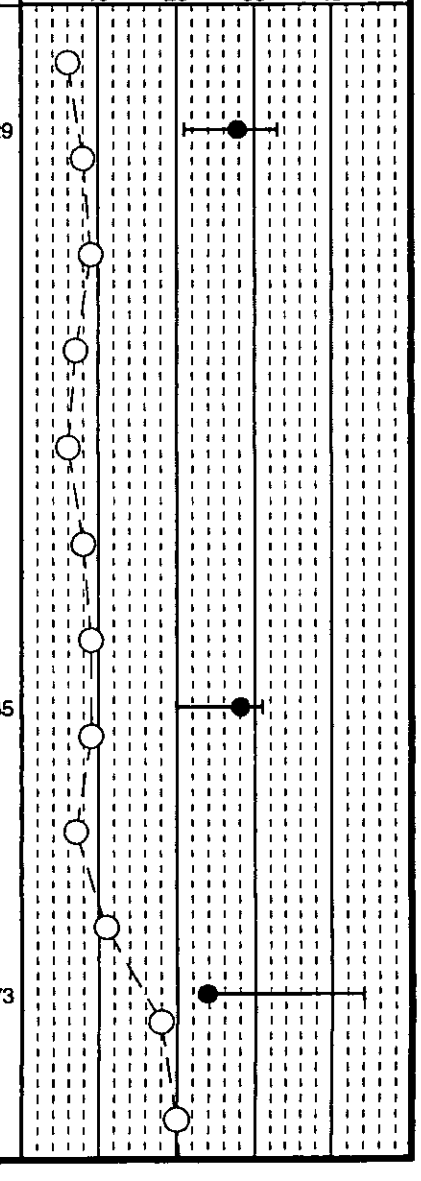
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-35 | Location: Sta. 132+52.2, 31.5 ft. LT of SR 823 CL | Date Drilled: 2/22/05 to 2/23/05

WATER OBSERVATIONS: Water seepage at: 7.0'-22.0', 63.0'-76.5'
Water level at completion: 50.0' (Prior to coring)
7.4' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	552.8												
0.3	552.5	1 2 4	18	1		3.75	Topsoil - 4" Stiff to very stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand, contains roots; damp to moist.						
		3 3 5	18	2		2.0	@ 3.5', wet.	0	0	--	1	70	29
5		3 5 4	18	3		1.75							
		2 3 4	18	4		0.75	@ 7.5'-9.0', medium stiff.						
10		1 2 4	18	5		1.75							
		2 4 4	18	6		1.0							
15		2 3 6	18	7		3.0							
		1 3 6	18	8		1.25		0	2	--	5	58	35
20		2 3 4	18	9		1.25							
22.0	530.8												
		2 4 7	18	10		2.75	Very stiff to hard gray CLAY (A-7-6), trace fine sand; varved; damp.						
25		4 8 10	18	11		4.25		0	0	--	1	26	73
		5 8 12	18	12		4.0							
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40



FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

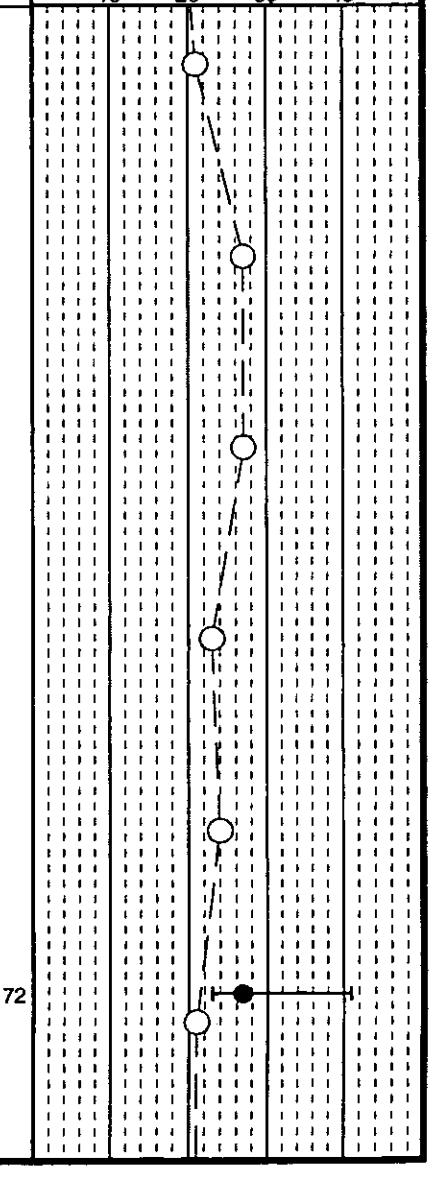
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-35 | Location: Sta. 132+52.2, 31.5 ft. LT of SR 823 CL | Date Drilled: 2/22/05 to 2/23/05

WATER OBSERVATIONS: Water seepage at: 7.0'-22.0', 63.0'-76.5'
Water level at completion: 50.0' (Prior to coring)
7.4' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	522.8	6 8 13	18	13		4.5+	Very stiff to hard gray CLAY (A-7-6), trace fine sand; varved; damp.						
35		7 11 16	18	14		4.5+							
40		4 12 15	18	15		4.5+							
45		7 9 14	18	16		4.5+							
50		7 10 14	18	17		4.5+							
55		5 8 13	18	18		3.75	@ 55.0', slightly organic, contains very thin fine grained sand seams; damp to moist.	0	0	--	1	27	72
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40



FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-35 | Location: Sta. 132+52.2, 31.5 ft. LT of SR 823 CL | Date Drilled: 2/22/05 to 2/23/05

WATER OBSERVATIONS: Water seepage at: 7.0'-22.0', 63.0'-76.5'
Water level at completion: 50.0' (Prior to coring)
7.4' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Atterberg Limits
60	492.8	4 9 12	18	19		2.75	Very stiff to hard gray CLAY (A-7-6), trace fine sand; varved; damp to moist.							
63.0	489.8						Medium dense gray SILT (A-4b), little clay, some fine to coarse sand; moist to wet.							
65		5 8 8	18	20				0	1	--	21	59	19	Non-Plastic
70		0 6 8	18	21										
73.0	479.8						Dense gray SANDY SILT (A-4a), trace gravel, trace clay; moist.							
75		11 16 16	12	22				6	26	--	24	37	7	Non-Plastic
80.0	472.8	Core 30"	Rec 24"	RQD 80%	R-1		Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, thinly to thickly bedded. @ 82.8',84.7',84.8', low angle clay filled fractures. @ 83.8'-83.9', high angle clay filled fracture. @ 83.2', qu = 6,952 psi. @ 83.9'-84.8', few to moderate argillaceous laminations. @ 84.8'-85.0', vuggy zone.							
84.8	468.0	Core 60"	Rec 60"	RQD 90%	R-2									
		Core 60"	Rec 60"	RQD 100%	R-3		Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thinly to thickly bedded.							
90														

STANDARD PENETRATION (N) / Natural Moisture Content, % - ● / PL ⊢—⊣ LL / Blows per foot - ○ (10 20 30 40)

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-35 | Location: Sta. 132+52.2, 31.5 ft. LT of SR 823 CL | Date Drilled: 2/22/05 to 2/23/05

WATER OBSERVATIONS: Water seepage at: 7.0'-22.0', 63.0'-76.5'
Water level at completion: 50.0' (Prior to coring)
7.4' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90	462.8						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, slightly fractured.						
95		Core 60"	Rec 60"	RQD 100%	R-4		@ 91.1', low angle clay filled fracture.						
100		Core 36"	Rec 36"	RQD 100%	R-5								
100.5	452.3						Bottom of Boring - 100.5'						
105													
110													
115													
120													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-35A | Location: Sta. 131+29.4, 14.1 ft. RT of SR 823 CL | Date Drilled: 1/12/06

WATER OBSERVATIONS: Water seepage at: 24.5'-25.0', 68.5'-79.0'
Water level at completion: 67.8' (prior to coring)
13.4' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
0	554.6													
0.3	554.3						Limestone gravel (driveway) - 3"							
		3 4 6	12	1		3.0	Very stiff yellowish brown CLAY (A-7-6), some silt, trace fine sand; damp to moist.	0	0	--	2	32	66	
		6 6 8	13	2		2.25								
5.0	549.6				P-1 P-1	1.0	Stiff brown SILT (A-4b), little fine sand, little to some clay; contains thin clay seams; moist.	0	0	--	4	63	33	
		2 2 3	18	3		1.5		0	0	--	1	71	28	
10														
11.0	543.6						Medium stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand; moist.							
12.4	542.2				P-2A	0.75		0	1	--	1	51	47	
					P-2B	0.75	Medium stiff to stiff brown SILT (A-4b), some clay, trace fine to coarse sand; moist to wet.	0	2	--	2	66	30	
15														
		2 4 5	18	4		1.25								
		12 3 4	18	5		1.00								
20														
20.5	534.1						Stiff gray CLAY (A-7-6), little to some silt, trace fine sand; damp.							
		3 5 6	18	6		1.5								
23.5	531.1						Very loose gray SILT (A-4b); moist to wet.							
		WOH 1 1	18	7				0	0	--	0	75	25	Non-Plastic
25														
					P-3			0	0	--	1	77	22	Non-Plastic
30														

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-35A | Location: Sta. 131+29.4, 14.1 ft. RT of SR 823 CL | Date Drilled: 1/12/06

WATER OBSERVATIONS: Water seepage at: 24.5'-25.0', 68.5'-79.0'
Water level at completion: 67.8' (prior to coring)
13.4' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	524.6						Loose gray SILT (A-4b); moist to wet.						
32.0	522.6						Very stiff to hard grayish brown CLAY (A-7-6), trace fine sand; damp to moist.						
35		5 9 13	18	8		4.5+							
40		4 6 9	18	9		4.5+		0	0	–	1	20	79
45		5 9 11	18	10		3.0							
50		5 10 14	18	11		4.5+							
55		5 9 13	18	12		4.5+							
60		4 7 7	18	13		2.75							

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-35A | Location: Sta. 131+29.4, 14.1 ft. RT of SR 823 CL | Date Drilled: 1/12/06

WATER OBSERVATIONS: Water seepage at: 24.5'-25.0', 68.5'-79.0'
Water level at completion: 67.8' (prior to coring)
13.4' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	494.6						Very stiff to hard grayish brown CLAY (A-7-6), trace fine sand; damp to moist.						
62.0	492.6						Stiff mottled dark brown and black ORGANIC SILT (A-4b), trace fine to coarse sand, trace gravel; moist.						
65		4 5 6	18	14		1.5		1	2	--	2	66	29
65.5	489.1				P-4A	1.0	Medium stiff to stiff dark brown CLAY (A-7-6), trace fine to coarse sand; moist.	0	6	--	3	64	27
66.9	487.7				P-4B	1.75	Stiff gray SILT (A-4b), little to some fine to coarse sand; damp to moist.	0	1	--	20	63	16
70		3 4 4	18	15									
72.0	482.6						Loose gray FINE SAND (A-3), trace silty clay; moist to wet.						
75		WOH 3 5	18	16									
77.0	477.6						Loose to medium dense brown COARSE AND FINE SAND (A-3a), trace to little silty clay, trace gravel; moist.						
80		5 50/5	10	17a 17b			@ 79.5', some silt, trace clay.						
81.0	473.6						Medium hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, medium to thickly bedded, moderately fractured.						
85		Core 60"	Rec 60"	RQD 71%	R-1		@ 81.7', 82.6', 83.7', low angle fractures. @ 84.1'-84.7',84.3'-84.5', high angle fractures. @ 85.1', qu = 341 psi.						
86.0	468.6						Bottom of Boring - 86.0'						
90													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

Non-Plastic
Non-Plastic
50+

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-36 | Location: Sta. 123+62.2, 70.4 ft. RT of SR 823 CL | Date Drilled: 01/31/05 to 02/01/05

WATER OBSERVATIONS: Water seepage at: 62.0'-73.0'
Water level at completion: 12.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	552.6												
0.3	552.3						Topsoil - 4"						
		2 3 4	17	1		2.0	Very stiff brown and gray CLAY (A-7-6), trace fine sand; moist. @ 0.3'-1.8', contains root fragments.						
		6 7 8	16	2		3.0		0	0	--	1	31	68
5													
5.5	547.1						Very stiff brown CLAY (A-7-6), trace fine sand; varved; moist.						
		3 3 4	18	3		3.0							
		2 3 5	16	4		3.0		0	0	--	1	38	61
10													
		3 4 6	18	5		2.5							
		2 4 5	18	6		3.25							
15													
		3 4 5	18	7		3.0							
		4 5 6	18	8		3.0							
20													
20.5	532.1						Very stiff brown SILT AND CLAY (A-6a); varved; moist.						
		3 4 5	18	9		3.25		0	0	--	1	65	34
		3 4 4	18	10		3.0							
25													
26.0	526.6						Very stiff brown SILT (A-4b); varved; moist.						
		2 4 4	18	11		3.5		0	0	--	2	67	31
28.5	524.1						Very stiff gray CLAY (A-7-6); varved; damp to moist.						
		2 2 2	18	12		2.75							
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 | 8/2/2007 8:37 AM |

DLZ OHIO INC. * 6121 HUNTLEY ROAD, [redacted]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-36 | Location: Sta. 123+62.2, 70.4 ft. RT of SR 823 CL | Date Drilled: 01/31/05 to 02/01/05

WATER OBSERVATIONS: Water seepage at: 62.0'-73.0'
Water level at completion: 12.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	522.6						Very stiff gray CLAY (A-7-6); varved; damp to moist.						
35		5 8 10	11	13		3.75							
							@ 38.0', brownish gray.						
40		7 8 10	18	14		3.75		0	0	--	0	33	67
							@ 42.0'-47.0', hard.						
45		4 9 12	18	15		4.5+							
							@ 47.0', gray, damp to moist.						
50		7 10 10	18	16		2.75							
55		5 9 9	18	17		3.0							
57.0	495.6						Hard gray SILT (A-4b); damp.						
60		5 10 11	18	18		4.5+		0	1	--	9	53	37

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 | 8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-36 | Location: Sta. 123+62.2, 70.4 ft. RT of SR 823 CL | Date Drilled: 01/31/05 to 02/01/05

WATER OBSERVATIONS: Water seepage at: 62.0'-73.0'
Water level at completion: 12.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
60	492.6						Hard gray SILT (A-4b); damp.							
62.0	490.6						Very loose gray SANDY SILT (A-4a); wet.							
65		5 1 2	18	19										
70		0 4 7	18	20			@ 69.0', medium dense.	0	1	--	60	31	8	Non-Plastic
72.0	480.6						Severely weathered gray SANDSTONE, argillaceous.							
74.0	478.6	50/1	1	21			Hard light gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, slightly fractured. @ 76.0', 76.3', 77.6', 77.7', low angle fractures.							
75														
80		Core 120"	Rec 116"	RQD 70%	R-1									
85							@ 83.4'-84.9', medium hard, very fine grained.							
90		Core 120"	Rec 119"	RQD 93%	R-2									

STANDARD PENETRATION (N) — Natural Moisture Content, % - ● — PL ⊢—⊣ LL — Blows per foot - ○ (10, 20, 30, 40)

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-36 | Location: Sta. 123+62.2, 70.4 ft. RT of SR 823 CL | Date Drilled: 01/31/05 to 02/01/05

WATER OBSERVATIONS: Water seepage at: 62.0'-73.0'
Water level at completion: 12.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
90	462.6						Hard light gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, slightly fractured. @ 90.2'-90.5', 92.6'-97.1', calcareous.							
94.0	458.6						Bottom of Boring - 94.0'							
95														
100														
105														
110														
115														
120														

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, [redacted]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-37 | Location: Sta. 122+47.3, 23.9 ft. LT of SR 823 CL | Date Drilled: 01/27/05 to 01/31/05

WATER OBSERVATIONS: Water seepage at: 16.0'-18.0', 28.5'-37.5', 68.0'
Water level at completion: Not Reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	556.1												
0.3	555.8						Topsoil - 3"						
		2 3 3	14	1		2.25	Very stiff brown CLAY (A-7-6); trace fine to coarse sand; moist.	0	1	--	4	41	54
							@ 3.5'-5.0', brown and gray.						
		3 4 5	18	2		2.0							
5													
5.5	550.6						Stiff brown SILT CLAY (A-6b), trace fine to coarse sand; moist.						
		3 4 5	18	3		1.5		0	1	--	6	38	55
							@ 8.5'-10.0', hard; damp.						
		3 6 8	17	4		4.5+							
10													
10.5	545.6						Very stiff brown SILT (A-4b), "and" clay, trace fine sand; varved; damp to moist.						
		3 4 5	10	5		2.25							
		2 3 5	18	6		3.0		0	0	--	1	61	38
15													
		2 4 4	18	7		0.5	@ 16.0'-18.0', soft to medium stiff; wet.						
		3 4 5	18	8		2.0							
20													
		2 3 5	18	9		2.25							
		2 4 5	18	10		2.0							
25													
25.5	530.6						Stiff brown SILT (A-4b), some clay, trace fine sand; moist to wet.						
		3 5 5	18	11		--		0	0	--	0	79	21
		3 4 6	18	12		--		0	0	--	2	77	21
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

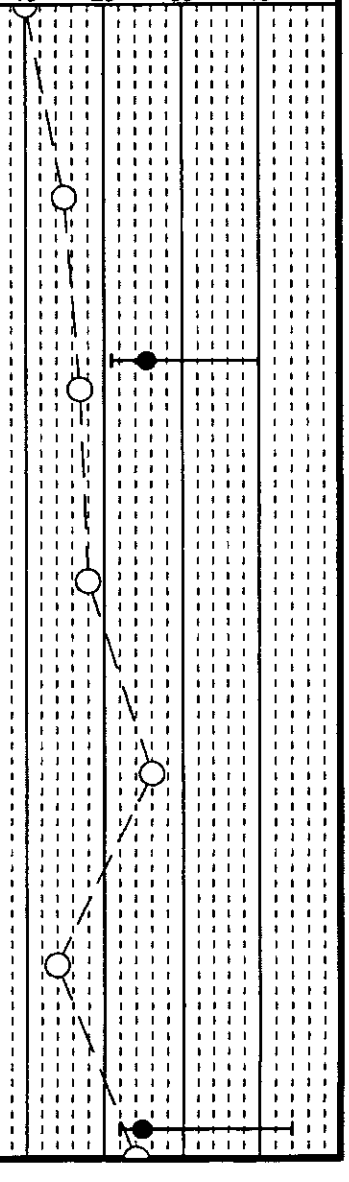
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-37 | Location: Sta. 122+47.3, 23.9 ft. LT of SR 823 CL | Date Drilled: 01/27/05 to 01/31/05

WATER OBSERVATIONS: Water seepage at: 16.0'-18.0', 28.5'-37.5', 68.0'
Water level at completion: Not Reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	526.1						Stiff brown SILT (A-4b); moist to wet.						
32.0	524.1						Hard brownish gray SILTY CLAY (A-6b), trace fine sand; moist.						
35		4 6 9	18	13		4.5+							
40		6 8 9	18	14		4.25		0	0	--	1	38	61
42.0	514.1						Hard gray CLAY (A-7-6); damp to moist.						
45		4 7 11	18	15		4.25							
50		8 13 13	18	16		4.5+							
55		4 7 7	18	17		4.0							
60		8 12 12	18	18		4.5+		0	0	--	0	21	79

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40



FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, [illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-37 | Location: Sta. 122+47.3, 23.9 ft. LT of SR 823 CL | Date Drilled: 01/27/05 to 01/31/05

WATER OBSERVATIONS: Water seepage at: 16.0'-18.0', 28.5'-37.5', 68.0'
Water level at completion: Not Reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / PL — LL / Blows per foot
60	496.1						Hard gray CLAY (A-7-6); damp to moist.							
62.0	494.1						Medium dense light gray SILT (A-4b), some fine to coarse sand, little clay, trace gravel; moist.							
		7 10 10	18	19										
65														
							@ 68.0', loose, wet.							
		3 3 4	18	20				1	2	--	30	57	10	Non-Plastic
70														
72.0	484.1						Loose gray COARSE AND FINE SAND (A-3a), little gravel, trace clay; wet.							
		0 1 4	18	21				17	3	--	53	21	6	Non-Plastic
75														
77.0	479.1						Severely weathered gray SANDSTONE, argillaceous.							
79.0	477.1	50/2	1	22			Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, thinly to thickly bedded, slightly fractured.							
80							@ 79.0'-80.2', broken.							
							@ 79.3'-79.4', 79.8'-80.1', iron stained bands.							
							@ 80.8',86.0', low angle fractures.							
		Core 120"	Rec 117"	RQD 74%	R-1									
85														
							@ 87.5'-89.2', contains moderate argillaceous laminations.							
							@ 88.3'-88.6', decomposed argillaceous band.							
90														

FILE: 0121-3070-03 | 8/2/2007 8:37 AM |

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-37 | Location: Sta. 122+47.3, 23.9 ft. LT of SR 823 CL | Date Drilled: 01/27/05 to 01/31/05

WATER OBSERVATIONS: Water seepage at: 16.0'-18.0', 28.5'-37.5', 68.0'
Water level at completion: Not Reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
90	466.1													
		Core 120"	Rec 119"	RQD 99%	R-2		Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, thinly to thickly bedded, slightly fractured. @ 91.9'-92.0', 94.4'-94.7', 96.9'-97.4', calcareous.							
95														
99.0	457.1						Bottom of Boring - 99.0'							
100														
105														
110														
115														
120														

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

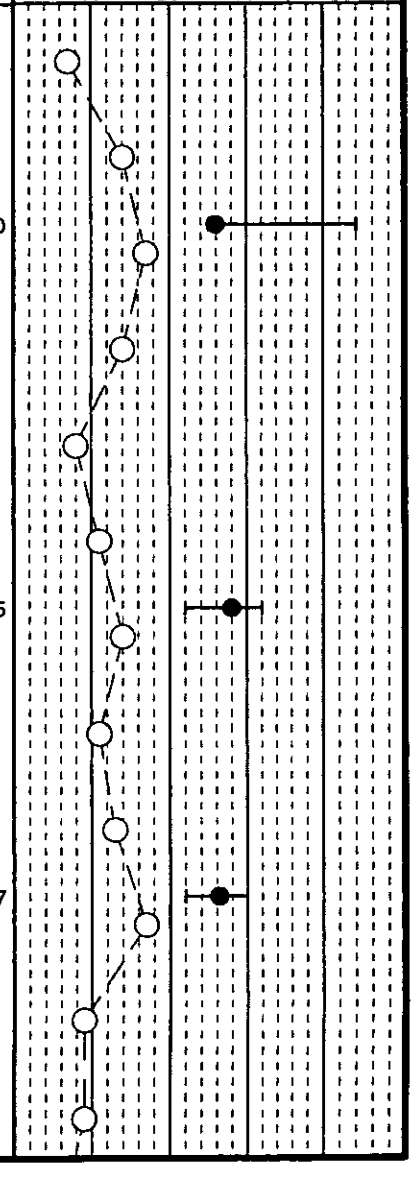
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-38 | Location: Sta. 121+30.1, 51.7 ft. LT of SR 823 CL | Date Drilled: 02/09/05 to 02/10/05

WATER OBSERVATIONS: Water seepage at: 10.0'-21.5' 33.0'-38.5', 65.0'-80.0'
Water level at completion: 9.8' (Prior to coring)
7.3' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	554.0												
0.3	553.7	WOH 3 4	18	1		2.5	Topsoil - 4" / Very stiff CLAY (A-7-6), brown, trace fine sand; damp.						
		3 5 9	18	2		3.25							
5		4 6 11	18	3		3.5		0	0	--	1	29	70
		4 6 8	18	4		2.0							
10.0	544.0	2 3 5	18	5		1.5	Stiff brown SILT (A-4b), little to some clay, trace fine to coarse sand; moist.						
		3 5 6	18	6		1.5							
15		3 5 9	18	7		1.25		0	1	--	1	63	35
		2 5 6	18	8		1.25							
20		3 5 8	18	9		1.5							
		4 8 9	16	10		1.5		0	0	--	1	72	27
25		2 4 5	18	11		1.5							
		3 4 5	18	12		1.0							
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40



FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-38 | Location: Sta. 121+30.1, 51.7 ft. LT of SR 823 CL | Date Drilled: 02/09/05 to 02/10/05

WATER OBSERVATIONS: Water seepage at: 10.0'-21.5' 33.0'-38.5', 65.0'-80.0'
Water level at completion: 9.8' (Prior to coring)
7.3' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / PL / LL / Blows per foot
30.0	524.0	3 2 4	16	13		1.0	Stiff brown SILT AND CLAY (A-6a), little fine sand; moist.	0	0	--	5	59	36	
33.0	521.0						Medium dense gray COARSE AND FINE SAND (A-3a); moist.							
35		4 7 11	18	14				0	21	--	49	20	10	Non-Plastic
38.0	516.0						Very stiff gray SILTY CLAY (A-6b), little fine sand; damp to moist.							
40		7 12 14	18	15		3.5								
45		10 13 17	18	16		3.0		0	0	--	1	31	68	
50		5 9 13	18	17		4.0								
55.0	499.0	7 9 10	18	18		3.5	Very stiff gray SILT (A-4b), little fine sand, little silty clay; moist.							
60														

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-38 | Location: Sta. 121+30.1, 51.7 ft. LT of SR 823 CL | Date Drilled: 02/09/05 to 02/10/05

WATER OBSERVATIONS: Water seepage at: 10.0'-21.5' 33.0'-38.5', 65.0'-80.0'
Water level at completion: 9.8' (Prior to coring)
7.3' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
60.0	494.0	4 8 9	18	19			Medium dense gray COARSE AND FINE SAND (A-3a), some silt, little clay; moist.							
65		6 6 7	18	20			@ 65.0', wet.							
68.0	486.0						Loose gray SANDY SILT (A-4a); wet.							
70		WOH 5 5	15	21				0	1	--	54	45		Non-Plastic
73.0	481.0						Very dense gray GRAVEL WITH SAND (A-1-b); wet.							
75		9 20 50/3	13	22				50	19	--	12	19		Non-Plastic 50+
80.0	474.0						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, thinly to thickly bedded.							
		Core 60"	Rec 60"	RQD 90%	R-1									
85							@ 80.0'-80.2', argillaceous zone, broken.							
		Core 60"	Rec 60"	RQD 80%	R-2		@ 85.9',86.2',86.7', low angle clay filled fractures.							
90														

STANDARD PENETRATION (N) / Natural Moisture Content, % - ● / PL ⊢—⊣ LL / Blows per foot - ○ (10 20 30 40)

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-38 | Location: Sta. 121+30.1, 51.7 ft. LT of SR 823 CL | Date Drilled: 02/09/05 to 02/10/05

WATER OBSERVATIONS: Water seepage at: 10.0'-21.5' 33.0'-38.5', 65.0'-80.0'
Water level at completion: 9.8' (Prior to coring)
7.3' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90	464.0	Core 60"	Rec 33"	RQD 55%	R-3		Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, slightly fractured.						
							@ 92.8'-95.0', lost recovery.						
95		Core 60"	Rec 0"	RQD 0%	R-4		@ 95.0'-100.0', sample lodged in core barrel; unable to recover.						
100.0	454.0						Bottom of Boring - 100.0'						
105													
110													
115													
120													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-38A | Location: Sta. 120+14.5, 4.7 ft. RT of SR 823 CL | Date Drilled: 1/9/06 to 1/10/06

WATER OBSERVATIONS: Water seepage at: 43.5', 73.5'
Water level at completion: 43.0' (prior to coring)
13.6' (includes drilling water)
41.5' (after 15 hours)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	556.0												
0.8	555.2	2 4 8	13	1		4.5+	Topsoil - 9" Very stiff to hard mottled brown and gray CLAY (A-7-6), some to "and" silt, trace fine sand; damp to moist.	0	0	--	4	43	53
		6 7 9	18	2		2.75							
5.0	551.0				P-1	2.0	Stiff to very stiff mottled brown and gray SILT AND CLAY (A-6a), trace fine sand; moist.	0	0	--	4	47	49
7.5	548.5	4 6 8	16	3		4.0	Hard brown CLAY (A-7-6), trace fine sand, some silt; damp to moist.	0	0	--	1	27	72
10													
10.5	545.5	3 4 5	18	4		1.25	Stiff brown SILT (A-4b), "and" clay, trace fine sand; moist.	0	0	--	3	54	43
13.0	543.0	3 3 5	18	5		2.0	Stiff to very stiff brown SILT AND CLAY (A-6a), trace fine sand; moist.	0	0	--	1	48	51
15.0	541.0				P-2A	1.5	Stiff brown SILTY CLAY (A-6b), trace fine sand; moist.	0	0	--	1	44	55
15.7	540.3				P-2B	1.0	Stiff brown SILT (A-4b), trace fine sand; moist.	0	0	--	1	74	25
		3 4 4	18	6		1.75							
20.0	536.0				P-3	1.0	Stiff brown SILT AND CLAY (A-6a), trace to little fine to coarse sand; moist.	0	7	--	4	53	36
		3 5 7	18	7		2.0							
25													
25.5	530.5	5 6 9	18	8		0.75	Medium stiff brown SILT (A-4b), little clay; wet.	0	0	--	0	82	18
		3 4 6	18	9		0.75							
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-38A | Location: Sta. 120+14.5, 4.7 ft. RT of SR 823 CL | Date Drilled: 1/9/06 to 1/10/06

WATER OBSERVATIONS: Water seepage at: 43.5', 73.5'
Water level at completion: 43.0' (prior to coring)
13.6' (includes drilling water)
41.5' (after 15 hours)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	526.0						Medium stiff brown SILT (A-4b), little clay; wet.						
		WOH 2 3	18	10		0.75		0	0	--	0	69	31
35													
		1 1 4	18	11		0.75							
40													
42.0	514.0						Loose to medium dense brown FINE SAND (A-3), trace silty clay, trace coarse sand; wet.						
		4 10 13	18	12a		2.75							
44.5	511.5			12b	P-4A		Very stiff brownish gray SILT AND CLAY (A-6a), some silt, trace fine sand; moist.	0	0	--	3	24	73
45.0	511.0							0	0	--	91	9	Non-Plastic
45.8	510.2				P-4B		Loose to medium dense brown FINE SAND (A-3), trace silty clay; wet.	0	0	--	1	31	68
		5 8 11	18	13		4.0	Very stiff to hard dark brown SILTY CLAY (A-6b), trace fine sand; damp to moist.						
50													
		7 10 14	15	14		2.75							
55													
57.0	499.0						Stiff dark brown CLAY (A-7-6), little to some silt, trace fine sand; moist.						
		6 8 10	18	15		1.5		0	0	--	1	23	76
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢—⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 | 8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-38A | Location: Sta. 120+14.5, 4.7 ft. RT of SR 823 CL | Date Drilled: 1/9/06 to 1/10/06

WATER OBSERVATIONS: Water seepage at: 43.5', 73.5'
Water level at completion: 43.0' (prior to coring)
13.6' (includes drilling water)
41.5' (after 15 hours)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	496.0						Stiff dark brown CLAY (A-7-6), little to some silt, trace fine sand; moist.						
62.0	494.0						Soft to medium stiff bluish gray SANDY SILT (A-4a), some fine sand, some clay; moist to wet.						
65		4 7 6	18	16		0.5		0	0	--	29	48	23
67.0	489.0						Loose gray SILT (A-4b), trace to little fine sand, trace clay; moist to wet.						
70		2 4 4	12	17									
72.0	484.0						Loose brown COARSE AND FINE SAND (A-3a), little silty clay, trace gravel; moist to wet.						
75		2 6 3	18	18									
77.0	479.0						Hard gray SILT AND CLAY (A-6a), trace to little fine sand; damp.						
80		50/3	2	19		4.0							
81.0	475.0						Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, medium bedded, moderately to highly fractured.						
85		Core 60"	Rec 60"	RQD 65%	R-1		@ 91.4', 91.9', 92.2', low angle fractures.						
86.0	470.0						Bottom of Boring - 86.0'						
90													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
50+

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, [illegible]MBUS, OHIO 43229 * (614)888-0040

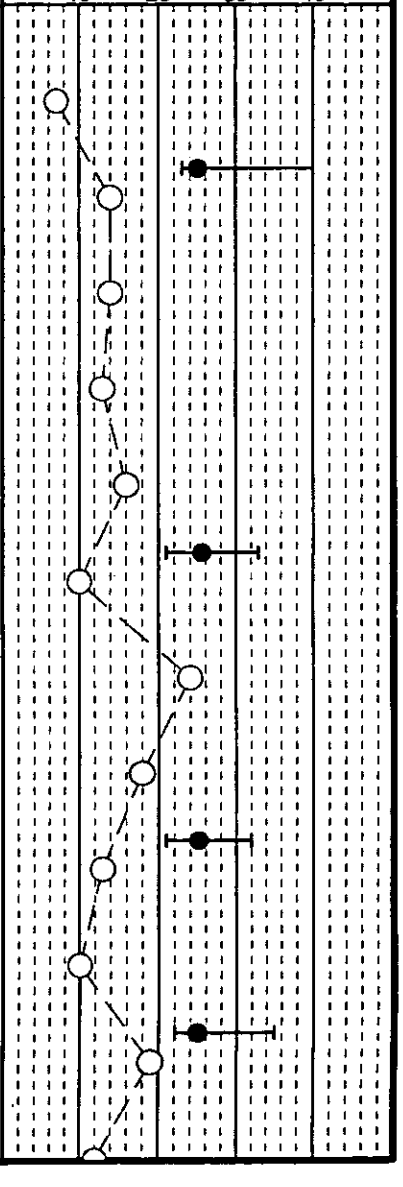
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-39 | Location: Sta. 116+63.5, 22.4 ft. LT of SR 823 CL | Date Drilled: 02/02/05 to 02/03/05

WATER OBSERVATIONS: Water seepage at: 33.5'-50.0', 73.5'-80.0'
Water level at completion: 36.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	566.2												
0.3	565.9						Topsoil - 4"						
		1 3 4	16	1		2.25	Very stiff brown SILTY CLAY (A-6b); damp. @ 0.0'-1.5', contains organics.						
		3 6 8	18	2		3.5		0	0	--	1	47	52
5													
5.5	560.7						Very stiff to hard brown SILT AND CLAY (A-6a), trace fine to coarse sand; damp.						
		3 5 9	18	3		2.25							
		3 5 8	18	4		3.25							
10													
		4 7 9	16	5		2.75							
		3 5 5	18	6		2.75		0	0	--	1	53	46
15													
		5 10 14	16	7		4.0							
		4 8 10	15	8		3.75							
20													
		4 6 7	18	9		3.25		0	0	--	1	59	40
		4 4 6	16	10		3.0							
25													
		6 8 11	18	11		3.0		0	0	--	1	46	53
28.0	538.2						Very stiff brown SILTY CLAY (A-6b), trace fine sand; wet.						
		4 6 6	18	12		3.25							
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢⊣ LL
Blows per foot - ○
10 20 30 40



FILE: 0121-3070-03 | 8/2/2007 8:37 AM |

DLZ OHIO INC. * 6121 HUNTLEY ROAD, MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-39 | Location: Sta. 116+63.5, 22.4 ft. LT of SR 823 CL | Date Drilled: 02/02/05 to 02/03/05

WATER OBSERVATIONS: Water seepage at: 33.5'-50.0', 73.5'-80.0'
Water level at completion: 36.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	536.2						Very stiff brown SILTY CLAY (A-6b), trace fine sand; wet.						
		6 8 10	18	13		2.25		0	0	--	1	80	19
35													
37.0	529.2						Loose gray SILT (A-4b), trace fine sand; wet.						
		5 3 5	15	14				0	0	--	1	81	18
40													
		3 3 5	16	15									
45													
47.0	519.2						Medium stiff to stiff gray SILT AND CLAY (A-6a); damp to wet.						
		3 3 4	18	16		0.5		0	0	--	1	57	42
50													
		4 5 9	18	17		1.0							
55													
57.0	509.2						Hard brownish gray CLAY (A-7-6), trace to little fine sand; damp to moist.						
		9 16 25	18	18		4.5+							
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

Non-Plastic

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-39 | Location: Sta. 116+63.5, 22.4 ft. LT of SR 823 CL | Date Drilled: 02/02/05 to 02/03/05

WATER OBSERVATIONS: Water seepage at: 33.5'-50.0', 73.5'-80.0'
Water level at completion: 36.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
60	506.2						Hard brownish gray CLAY (A-7-6), trace fine sand; moist.							
		12 15 23	16	19		4.5+		0	0	--	3	32	65	
65														
		11 18 24	15	20		2.5								
70														
72.0	494.2						Very stiff gray SILT (A-4b), trace fine sand; slightly organic; damp.							
		5 10 16	16	21		3.5		0	0	--	9	60	31	
75														
77.0	489.2						Medium dense brown SANDY SILT (A-4a), trace gravel; slightly organic; wet.							
		7 8 9	18	22				0	3	--	38	48	11	Non-Plastic
80														
82.0	484.2						Medium dense gray FINE SAND (A-3), trace gravel, trace silt; moist.							
		12 10 12	18	23										
85														
87.0	479.2						Severely weathered brown and gray SANDSTONE, argillaceous.							
		27 23 17	14	24				41	11	--	13	27	8	Non-Plastic
90														

STANDARD PENETRATION (N) / Natural Moisture Content, % - ● / PL ⊢—⊣ LL / Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-39 | Location: Sta. 116+63.5, 22.4 ft. LT of SR 823 CL | Date Drilled: 02/02/05 to 02/03/05

WATER OBSERVATIONS: Water seepage at: 33.5'-50.0', 73.5'-80.0'
Water level at completion: 36.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90	476.2						Severely weathered brown and gray SANDSTONE, argillaceous.						
92.0	474.2						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, thinly bedded to massive, slightly fractured, contains few argillaceous laminations.						
95		Core 60"	Rec 60"	RQD 90%	R-1		@ 92.0'-92.2', 92.3'-92.5', filled fractures.						
							@ 97.7',97.8', low angle fractures.						
100		Core 60"	Rec 56"	RQD 93%	R-2		@ 100.7'-101.1', highly weathered and broken.						
							@ 101.7'-101.9', decomposed shale layer.						
105		Core 60"	Rec 60"	RQD 100%	R-3								
110		Core 60"	Rec 60"	RQD 100%	R-4								
112.0	454.2						@ 111.0'-111.3', calcareous layer. @ 111.3'-112.0', fine to medium grained clean sandstone.						
							Bottom of Boring - 112.0'						
115													
120													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-40 | Location: Sta. 116+55.2, 36.5 ft. RT of SR 823 CL | Date Drilled: 02/04/05 to 02/09/05

WATER OBSERVATIONS: Water seepage at: 30.0'-46.5', 75.0'-95.0'
Water level at completion: 26.7' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	567.9												
0.5	567.4	1 2 4	18	1		1.5	Topsoil - 6" Stiff to very stiff brown SILTY CLAY (A-6b), trace fine sand; damp to moist.						
		2 6 6	16	2		3.5							
5		3 5 6	18	3		1.5		0	0	--	1	48	51
		4 4 5	16	4		1.5							
10		6 8 10	18	5		2.5	@ 10.0', very stiff.						
		4 6 10	18	6		2.5							
15		2 5 7	18	7		2.5							
17.0	550.9												
		5 8 10	18	8		4.0	Hard brown CLAY (A-7-6), some to "and" silt, trace fine sand; damp to moist.						
20		3 7 12	16	9		4.5+							
		5 7 10	18	10		4.0							
25		4 6 8	16	11		4.5							
27.5	540.4												
		5 8 8	18	12		2.25	Stiff to very stiff brown SILT (A-4b),"and" clay, trace fine sand, moist.	0	0	--	2	56	42
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. • 6121 HUNTLEY ROAD, [redacted]MBUS, OHIO 43229 • (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-40 | Location: Sta. 116+55.2, 36.5 ft. RT of SR 823 CL | Date Drilled: 02/04/05 to 02/09/05

WATER OBSERVATIONS: Water seepage at: 30.0'-46.5', 75.0'-95.0'
Water level at completion: 26.7' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	537.9	5 5 7	15	13		2.0	Stiff to very stiff brown SILT (A-4b), some to "and" clay, trace fine to coarse sand; moist to wet.						
35		6 7 6	17	14		1.5		0	2	--	2	74	22
40		4 5 8	18	15		2.0							
45		4 4 5	18	16		1.5							
50		WOH WOH 3	18	17		1.5	@ 50.0', trace gravel.	1	1	--	4	56	38
55		4 8 8	18	18		3.5							
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, [redacted]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-40 | Location: Sta. 116+55.2, 36.5 ft. RT of SR 823 CL | Date Drilled: 02/04/05 to 02/09/05

WATER OBSERVATIONS: Water seepage at: 30.0'-46.5', 75.0'-95.0'
Water level at completion: 26.7' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / PL — LL / Blows per foot
60.0	507.9	8 15 19	18	19		3.0	Very stiff to hard gray CLAY (A-7-6), some silt, trace fine sand; damp to moist.							
65		5 15 19	18	20		3.0								
70		11 16 20	16	21		4.5+								
75		4 7 10	18	22		3.5								
78.0	489.9						Medium dense gray and brown SILT (A-4b), some fine to coarse sand, little clay, trace gravel; wet.							
80		WOH WOH 16	15	23				1	2	--	25	58	14	Non-Plastic
85		9 11 14	18	24										
88.0	479.9						Very dense gray COARSE AND FINE SAND (A-3a), little silty clay, trace fine gravel; wet.							
90														

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, [illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-40 | Location: Sta. 116+55.2, 36.5 ft. RT of SR 823 CL | Date Drilled: 02/04/05 to 02/09/05

WATER OBSERVATIONS: Water seepage at: 30.0'-46.5', 75.0'-95.0'
Water level at completion: 26.7' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90	477.9	50/5	5	25			Very dense gray COARSE AND FINE SAND (A-3a), little silty clay, trace fine gravel; wet.							50+
95.0	472.9	Core 60"	Rec 58"	RQD 67%	R-1		Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, arenaceous, thickly bedded to massive, slightly to moderately fractured.							
100		Core 60"	Rec 60"	RQD 93%	R-2		@ 95.5',95.8',99.6', low angle clay filled fractures.							
105		Core 60"	Rec 49"	RQD 75%	R-3		@ 100.8',102.7',103.0', low angle clay filled fractures.							
110		Core 60"	Rec 60"	RQD 90%	R-4		@ 106.7',112.5', low angle clay filled fractures.							
115.0	452.9						Bottom of Boring - 115.0'							
120														

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

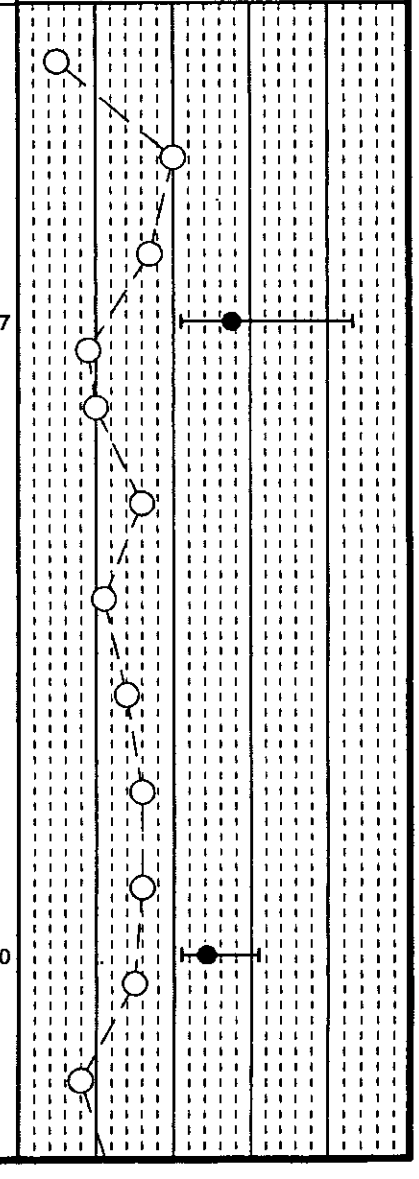
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-41 | Location: Sta. 113+84.4, 12.6 ft. LT of SR 823 CL | Date Drilled: 2/15/05 to 2/16/05

WATER OBSERVATIONS: Water seepage at: 21.8'-29.5', 69.0'-71.0', 84.0'-93.0'
Water level at completion: 20.2' (Start of Shift 2/16/05 @ 80')
23.5' (prior to coring)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	569.4												
0.8	568.6	2 3 2	15	1		2.0	Topsoil - 9"						
							Very stiff brown CLAY (A-7-6), "and" silt, trace fine sand; moist.						
		4 9 11	18	2		4.0							
5		4 7 10	18	3		2.5							
		3 4 5	18	4		2.25		0	0	--	1	42	57
10		2 4 6	18	5		2.5							
		4 7 9	18	6		3.5							
15		3 4 7	18	7		3.25							
		2 6 8	18	8		3.5							
20		2 6 10	18	9		4.0							
21.0	548.4												
		6 7 9	18	10		3.75	Very stiff brown SILT (A-4b), "and" clay, trace fine sand; moist.						
25		6 7 8	18	11		2.5		0	1	--	4	55	40
		2 3 5	18	12		2.5							
30		2 5		13		2.5							

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40



FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-41 | Location: Sta. 113+84.4, 12.6 ft. LT of SR 823 CL | Date Drilled: 2/15/05 to 2/16/05

WATER OBSERVATIONS: Water seepage at: 21.8'-29.5', 69.0'-71.0', 84.0'-93.0'
Water level at completion: 20.2' (Start of Shift 2/16/05 @ 80')
23.5' (prior to coring)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	539.4	7	18				Stiff to very stiff gray SILT (A-4b), some to "and" clay, trace fine sand, moist.						
35		3 6 9	18	14		2.25							
40		5 6 7	18	15		2.5	@ 39.5', becomes gray.						
45		3 7 9	18	16		1.5							
50		3 5 7	18	17		2.0		0	0	--	2	63	35
55		4 5 7	18	18		2.5							
60		2 5		19		1.75							

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢—⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-41 | Location: Sta. 113+84.4, 12.6 ft. LT of SR 823 CL | Date Drilled: 2/15/05 to 2/16/05

WATER OBSERVATIONS: Water seepage at: 21.8'-29.5', 69.0'-71.0', 84.0'-93.0'
Water level at completion: 20.2' (Start of Shift 2/16/05 @ 80')
23.5' (prior to coring)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	509.4	6	18				Stiff to very stiff gray SILT (A-4b), some to "and" clay, trace fine sand, moist.						
65		7 7 10	18	20		2.0	@ 64.0'-65.5', trace organics.						
68.0	501.4						Loose to medium dense brownish gray FINE SAND (A-3), little silty clay; wet.						
70.0	499.4	10 7 8	18	21			Stiff to very stiff gray SILT AND CLAY (A-6a), trace fine to coarse sand; damp to moist.						
75		5 9 14	18	22		3.0		0	1	--	4	55	40
80		3 9 12	18	23		1.5							
83.0	486.4						Loose to medium dense gray SANDY SILT (A-4a), little clay, trace gravel; wet.						
85		10 9 14	18	24				7	7	--	27	48	11
87.0	482.4						Severely weathered brown SANDSTONE.						
90		10 12		25				36	9	--	35	16	4

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

Non-Plastic

Non-Plastic

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-41 | Location: Sta. 113+84.4, 12.6 ft. LT of SR 823 CL | Date Drilled: 2/15/05 to 2/16/05

WATER OBSERVATIONS: Water seepage at: 21.8'-29.5', 69.0'-71.0', 84.0'-93.0'
Water level at completion: 20.2' (Start of Shift 2/16/05 @ 80')
23.5' (prior to coring)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90	479.4	21	17				Severely weathered brown SANDSTONE.						
93.0	476.4												
95		Core 60"	Rec 48"	RQD 50%	R-1		Medium hard to hard brown and gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, thinly to thickly bedded, highly fractured, with typically low angle rust stained fractures. @ 95.1'-95.5', broken zone. @ 93.0'-93.7', lost recovery.						
95.6	473.8												
100		Core 60"	Rec 60"	RQD 85%	R-2		Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, thinly to thickly bedded, moderately fractured, with typically low angle clay filled fractures.						
105		Core 60"	Rec 54"	RQD 67%	R-3		@ 103.0'-103.5', lost recovery. @ 103.5'-104.0',106.7'- 107.7', broken zones.						
110		Core 60"	Rec 60"	RQD 90%	R-4								
113.0	456.4						Bottom of Boring - 113.0'						
115													
120													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

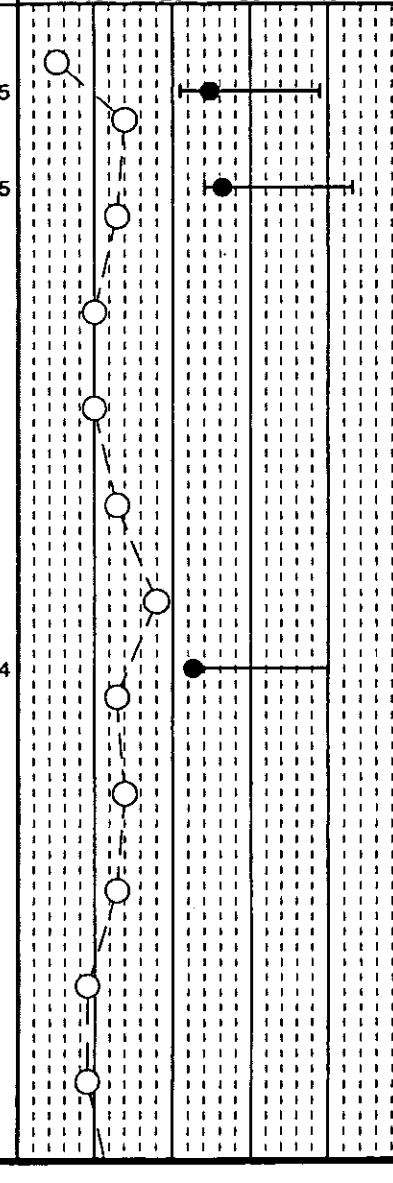
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-42 | Location: Sta. 113+51.7, 30.3 ft. RT of SR 823 CL | Date Drilled: 2/18/05 to 2/22/05

WATER OBSERVATIONS: Water seepage at: 27.6', 33'-37', 50'-58', 67'-72', 84'-92'
Water level at completion: 25.5' (start of shift 2/22/05)
25.5' (Prior to coring)
25.3' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	568.0												
0.4	567.6	1 3 2	13	1		1.75	Topsoil - 5"						
		4 4 10	18	2		2.0	Stiff dark brown SILT AND CLAY (A-6b), trace fine sand; damp to moist. @ 1.5', brown.	0	1	--	3	51	45
3.5	564.5												
5		4 5 8	18	3		3.5	Very stiff brown CLAY (A-7 6), trace fine to coarse sand; damp to moist.	0	0	--	1	44	55
		2 4 6	18	4		3.5	@ 6.5', varved.						
10		2 4 6	18	5		3.75							
		2 6 7	18	6		3.25							
13.5	554.5												
15		4 7 11	18	7		4.0	Very stiff to hard brown SILTY CLAY (A-6b), trace fine sand; damp to moist.						
		4 6 7	18	8		4.5+		0	0	--	1	35	64
20		4 5 9	18	9		4.5+							
		3 5 8	18	10		3.5							
25		3 4 5	18	11		2.75							
		3 4 5	18	12		3.0	@ 27.6', thin sandy silt seam; wet.						
30		4 5		13		3.0							

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40



FILE: 0121-3070-03 [8/2/2007 8:37 AM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-42 | Location: Sta. 113+51.7, 30.3 ft. RT of SR 823 CL | Date Drilled: 2/18/05 to 2/22/05

WATER OBSERVATIONS:
Water seepage at: 27.6', 33'-37', 50'-58', 67'-72', 84'-92'
Water level at completion: 25.5' (start of shift 2/22/05)
25.5' (Prior to coring)
25.3' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	538.0	7	18				Very stiff to hard brown SILTY CLAY (A-6b), trace fine sand; moist.						
35		4 7 8	18	14		2.0							
37.0	531.0						Very stiff to hard gray SILT (A-4b), "and" clay, trace fine to coarse sand; moist.						
40		6 5 11	18	15		4.5+		0	0	--	0	53	47
45		5 6 10	18	16		3.5							
50		3 4 6	18	17		2.5	@ 49.0', stiff to very stiff; wet.						
55		3 3 5	18	18		1.5							
60		4 5		19		3.25							

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40

FILE: 0121-3070-03 [8/2/2007 8:37 AM]

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-42 | Location: Sta. 113+51.7, 30.3 ft. RT of SR 823 CL | Date Drilled: 2/18/05 to 2/22/05

WATER OBSERVATIONS:
Water seepage at: 27.6', 33'-37', 50'-58', 67'-72', 84'-92'
Water level at completion: 25.5' (start of shift 2/22/05)
25.5' (Prior to coring)
25.3' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	508.0	7	18				Very stiff to hard gray SILT (A-4b), some to "and" clay, trace fine to coarse sand; wet.						
65		4 7 8	18	20		2.0		0	0	--	0	74	26
67.0	501.0						Medium dense brown SANDY SILT (A-4a), trace gravel, trace clay; wet.						
70		4 10 10	18	21				3	11	--	50	36	
72.0	496.0						Very stiff brownish gray SILT AND CLAY (A-6a), trace fine sand; moist to wet.						
75		7 14 20	18	22		2.25		0	0	--	8	57	35
77.0	491.0						Medium dense to dense brownish gray SILT (A-4b), "and" clay, trace gravel; moist to wet.						
80		5 7 16	18	23									
85		8 6 9	18	24			@ 84.0', wet.						
88.0	480.0						Dense brown GRAVEL WITH SAND (A-1-b), trace silt; wet.						
90		10 14		25									

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ⊙
10 20 30 40

Non-Plastic

FILE: 0121-3070-03 (8/2/2007 8:37 AM)

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-42 | Location: Sta. 113+51.7, 30.3 ft. RT of SR 823 CL | Date Drilled: 2/18/05 to 2/22/05

WATER OBSERVATIONS:
Water seepage at: 27.6', 33'-37', 50'-58', 67'-72', 84'-92'
Water level at completion: 25.5' (start of shift 2/22/05)
25.5' (Prior to coring)
25.3' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90	478.0	23	18				Dense brown GRAVEL WITH SAND (A-1-b), trace silt; wet.						
92.0	476.0						Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, thickly bedded to massive, highly fractured.						
94.0	474.0	Core 60"	Rec 48"	RQD 75%	R1		Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massive, moderately to highly fractured. @ 94.1',94.6',95.1',96.1', 97.4',97.8',100.8',101.4', fractured. @ 104.0', high angle fracture. @ 102.2',105.8',108.9' clay filled fractures.						
95													
100		Core 60"	Rec 58"	RQD 88%	R2								
105		Core 60"	Rec 55"	RQD 60%	R3		@ 104.3'-104.5', high angle fracture. @ 104.5'-105.1', broken.						
110		Core 60"	Rec 59"	RQD 85%	R4								
112.0	456.0						Bottom of Boring - 112.0'						
115													
120													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢ LL
Blows per foot - ○
10 20 30 40

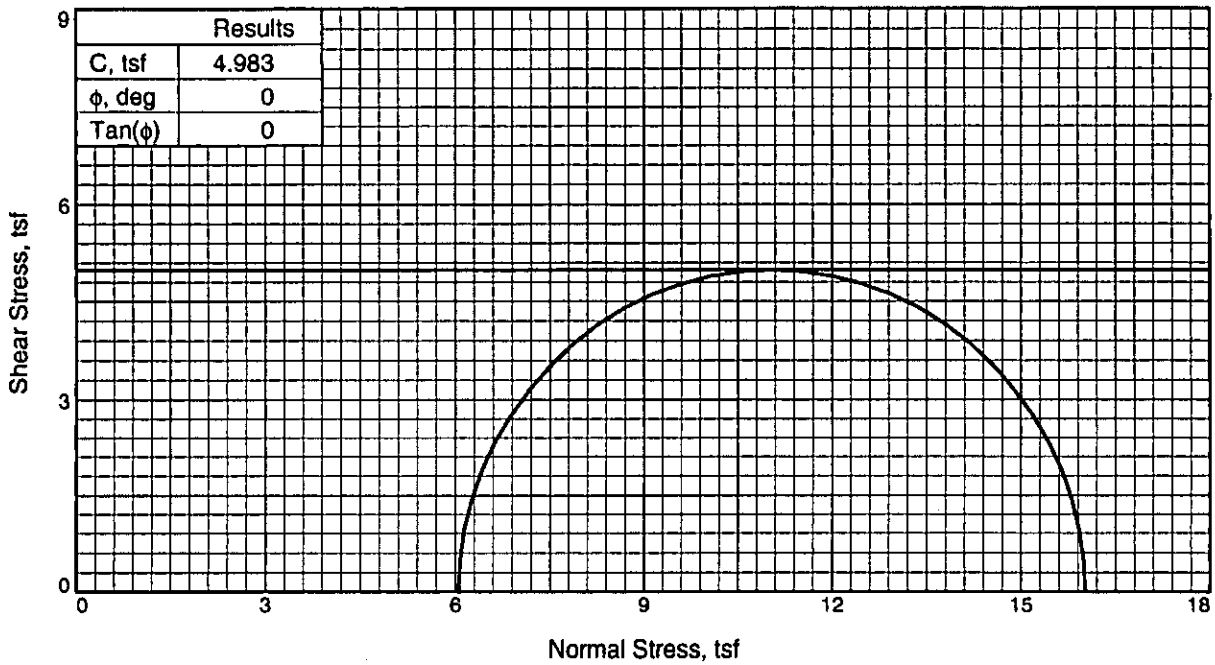
FILE: 0121-3070-03 (8/2/2007 8:37 AM)

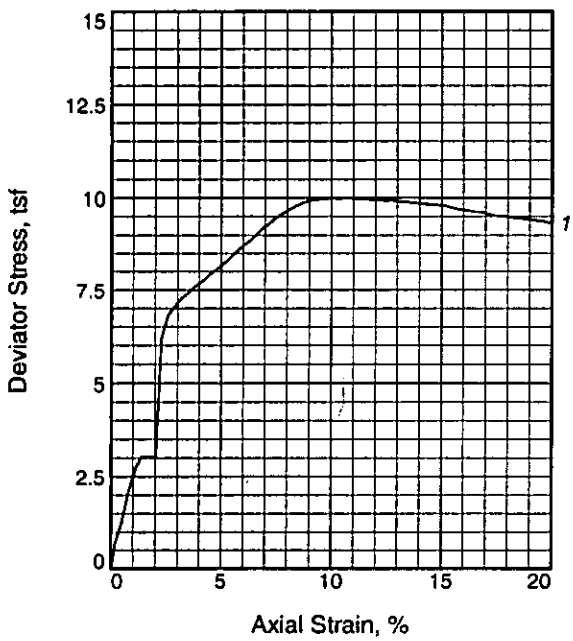
APPENDIX B

DLZ

APPENDIX B

Shear Strength Test Results
Consolidation Test Results





Sample No.		1
Initial	Water Content,	24.9
	Dry Density, pcf	98.3
	Saturation,	94.1
	Void Ratio	0.7143
	Diameter, in.	2.77
	Height, in.	4.35
At Test	Water Content,	25.5
	Dry Density, pcf	98.3
	Saturation,	96.3
	Void Ratio	0.7143
	Diameter, in.	2.77
	Height, in.	4.35
Strain rate, in./min.		0.06
Back Pressure, tsf		0.0
Cell Pressure, tsf		6.0
Fail. Stress, tsf		10.0
Ult. Stress, tsf		10.0
σ_1 Failure, tsf		16.0
σ_3 Failure, tsf		6.0

Type of Test:
Unconsolidated Undrained
Sample Type: 3" press tube
Description: Lean clay

LL= 37 **PL=** 21 **PI=** 16
Assumed Specific Gravity= 2.7
Remarks:

Client: TranSystems, Inc.

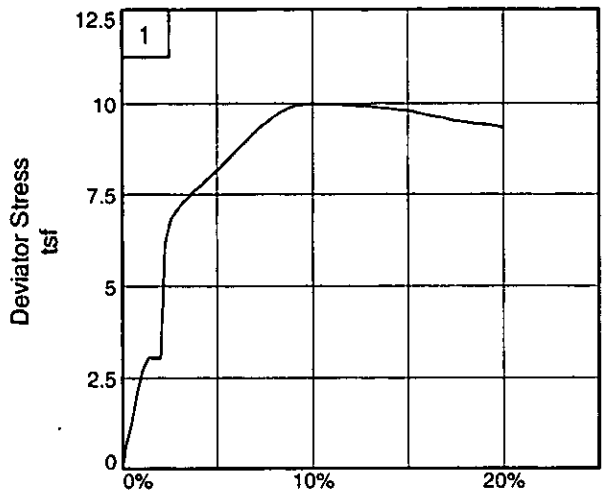
Project: SCI-823-0.00

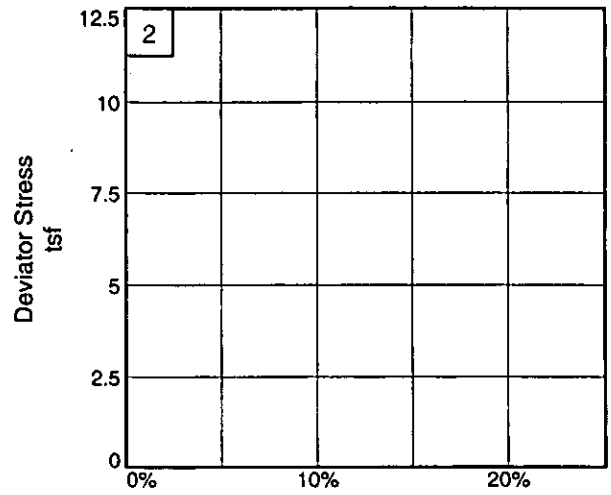
Source of Sample: B-31 **Depth:** 10.0
Sample Number: P1

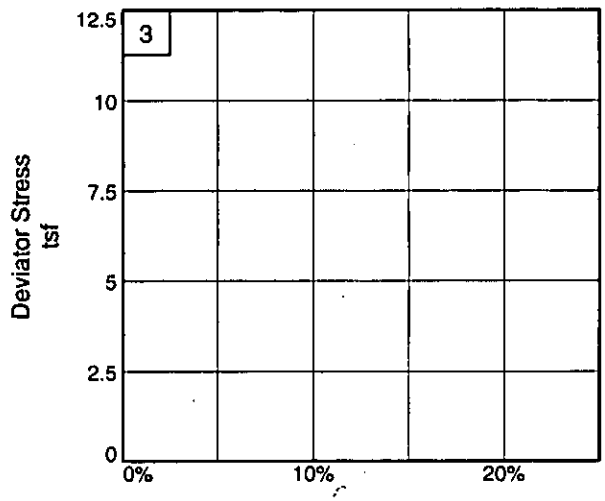
Proj. No.: 0121-3070.03 **Date:** 2/6/07

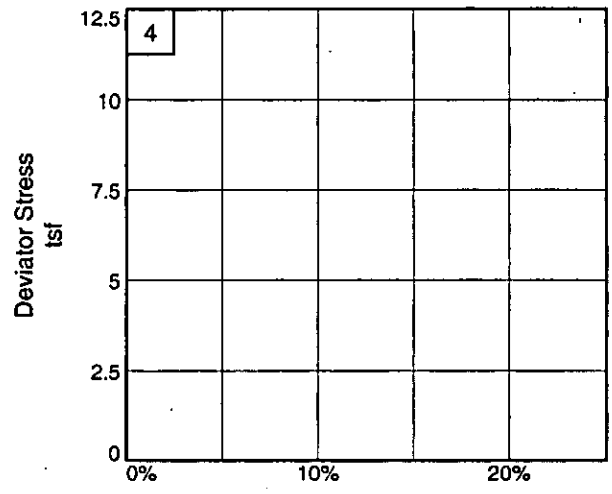
DLZ

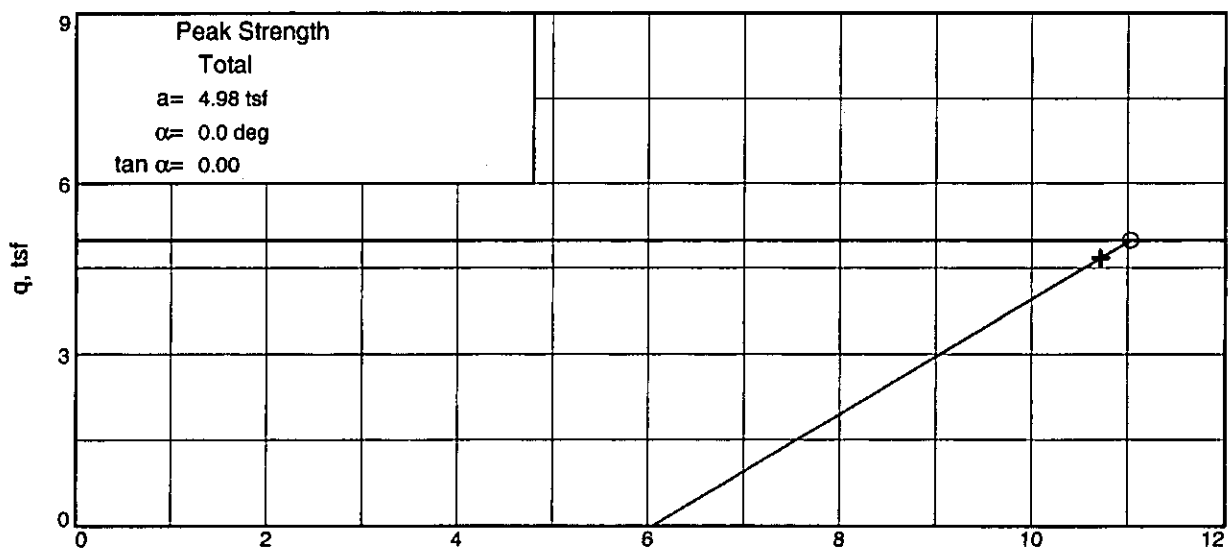
Figure _____







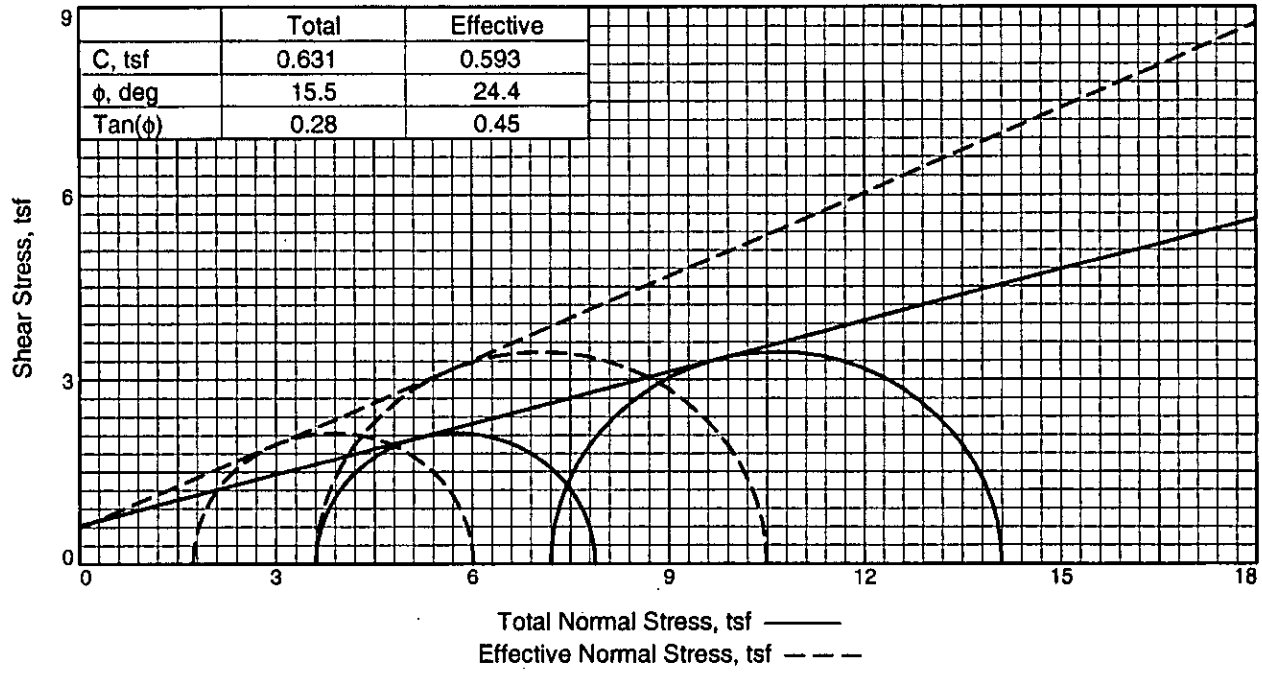


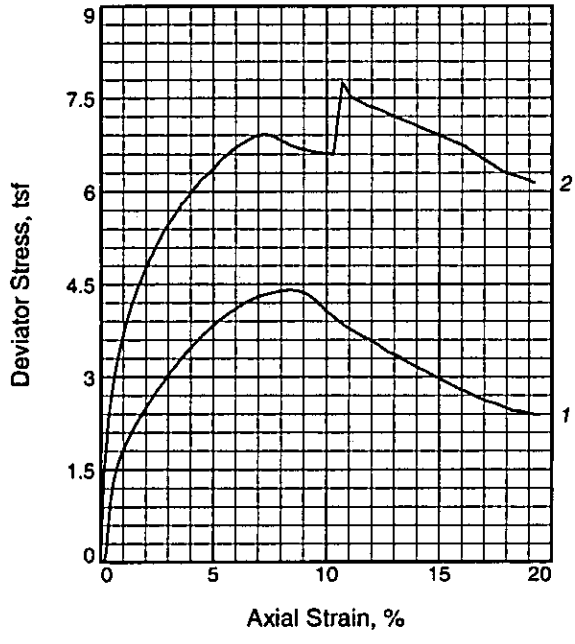


Stress Paths: o indicates peak + indicates end

Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: B-31 **Depth:** 10.0 **Sample Number:** P1
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1	2
Initial	Water Content,	25.1	27.4
	Dry Density, pcf	99.3	97.9
	Saturation,	97.3	102.6
	Void Ratio	0.6967	0.7218
	Diameter, in.	2.79	2.79
	Height, in.	5.59	5.59
At Test	Water Content,	26.9	25.7
	Dry Density, pcf	97.6	99.5
	Saturation,	100.0	100.0
	Void Ratio	0.7267	0.6935
	Diameter, in.	2.81	2.76
	Height, in.	5.59	5.59
Strain rate, in./min.		0.01	0.01
Back Pressure, tsf		1.2	1.2
Cell Pressure, tsf		4.8	8.4
Fail. Stress, tsf		4.3	6.9
Total Pore Pr., tsf		3.0	4.8
Ult. Stress, tsf		4.3	6.9
Total Pore Pr., tsf		3.0	4.8
$\bar{\sigma}_1$ Failure, tsf		6.0	10.5
$\bar{\sigma}_3$ Failure, tsf		1.7	3.6

Type of Test:
CU with Pore Pressures

Sample Type: 3" press tube

Description:

LL= 34 **PL=** 21 **PI=** 13

Assumed Specific Gravity= 2.7

Remarks:

Figure _____

Client: TranSystems, Inc.

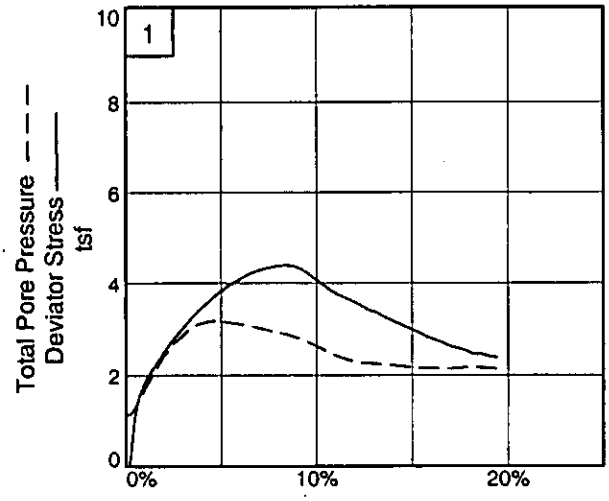
Project: SCI-823-0.00

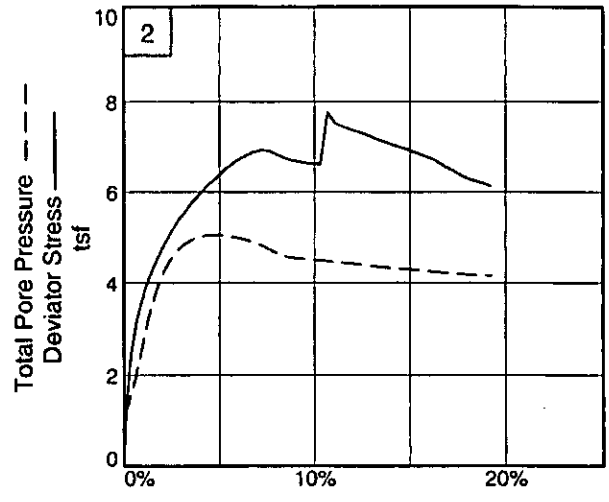
Source of Sample: B-31 **Depth:** 15.0

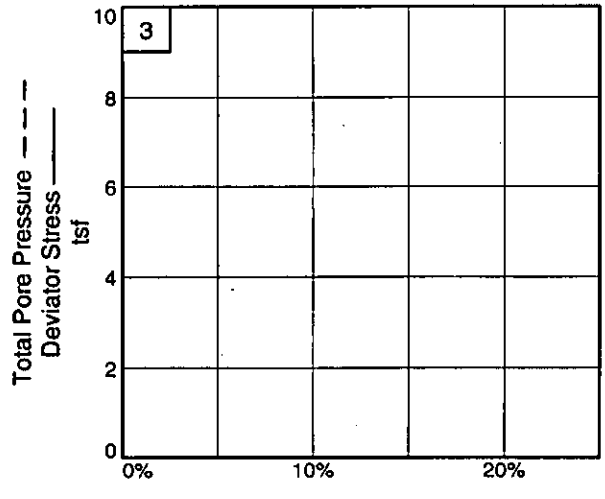
Sample Number: P2

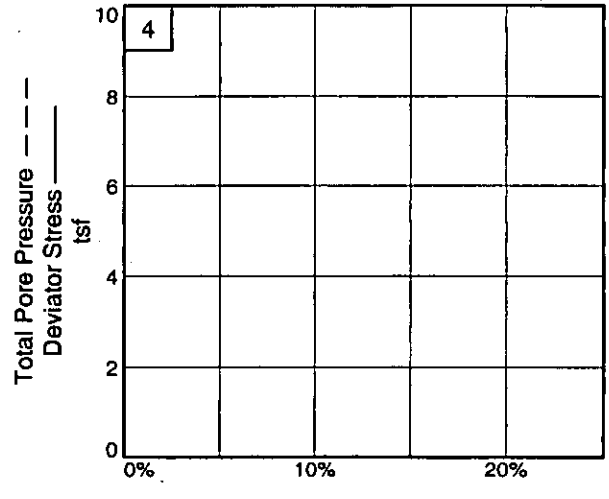
Proj. No.: 0121-3070.03 **Date:** 2/6/07

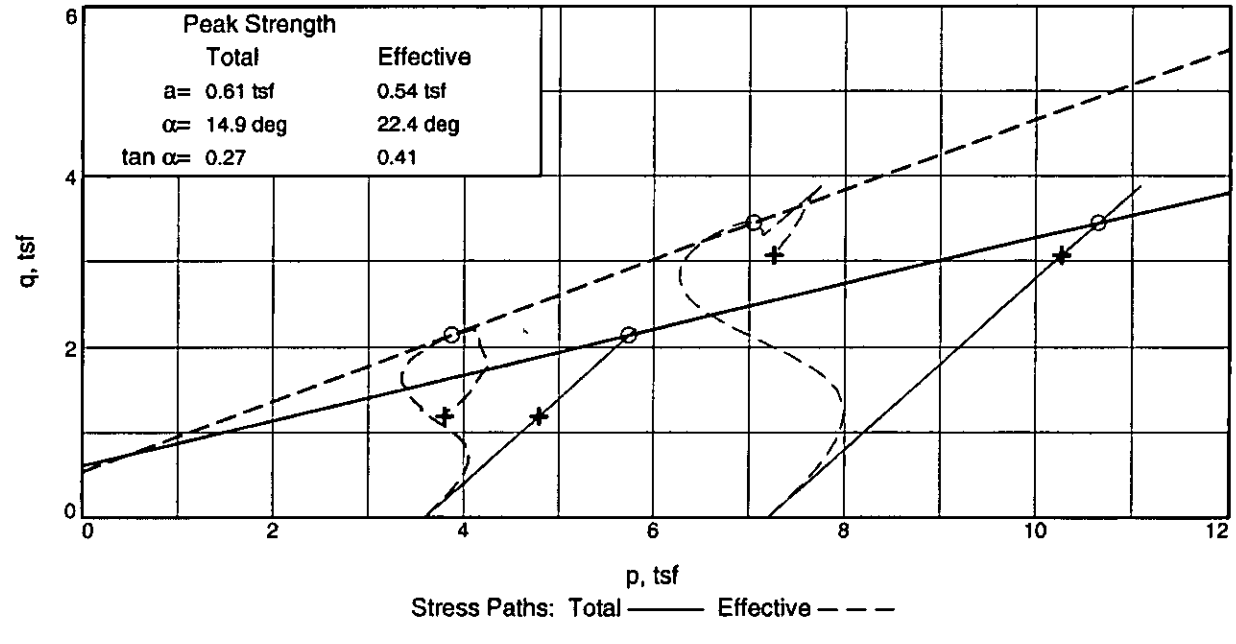
DLZ





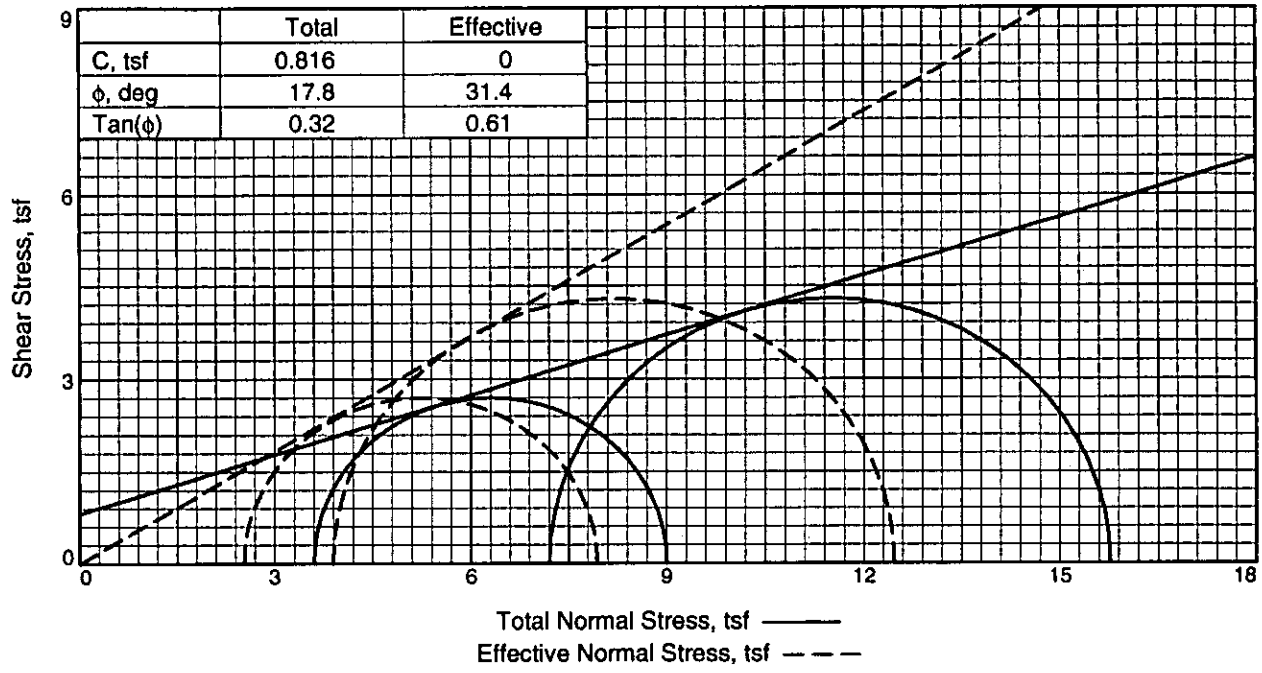


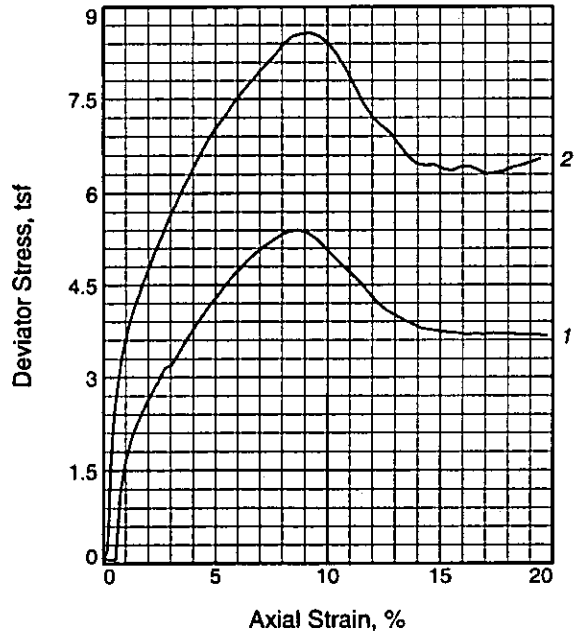




Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: B-31 **Depth:** 15.0 **Sample Number:** P2
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1	2
Initial	Water Content,	25.3	26.0
	Dry Density, pcf	100.9	100.0
	Saturation,	101.6	102.4
	Void Ratio	0.6712	0.6854
	Diameter, in.	2.80	2.80
	Height, in.	5.57	5.50
At Test	Water Content,	24.0	25.0
	Dry Density, pcf	102.3	100.7
	Saturation,	100.0	100.0
	Void Ratio	0.6482	0.6740
	Diameter, in.	2.78	2.79
	Height, in.	5.57	5.50
Strain rate, in./min.		0.01	0.01
Back Pressure, tsf		1.2	1.2
Cell Pressure, tsf		4.8	8.4
Fail. Stress, tsf		5.4	8.6
Total Pore Pr., tsf		2.2	4.5
Ult. Stress, tsf			
Total Pore Pr., tsf			
$\bar{\sigma}_1$ Failure, tsf		7.9	12.5
$\bar{\sigma}_3$ Failure, tsf		2.5	3.9

Type of Test:
CU with Pore Pressures
Sample Type: 3" press tube
Description: Lean clay

LL= 33 **PL=** 20 **PI=** 13
Assumed Specific Gravity= 2.7
Remarks:

Client: TranSystems, Inc.

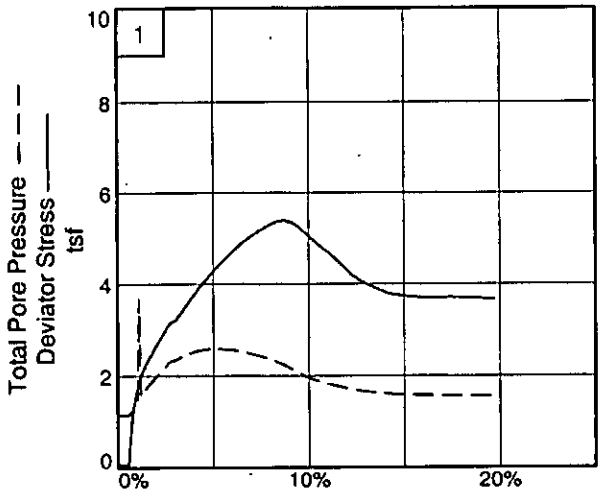
Project: SCI-823-0.00

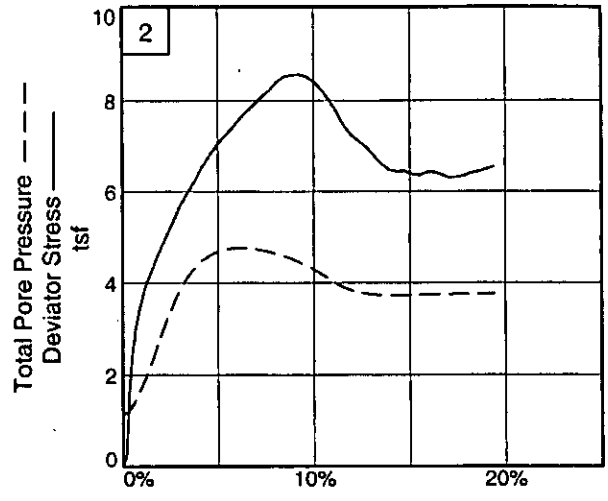
Source of Sample: B-32 **Depth:** 10.0
Sample Number: P1

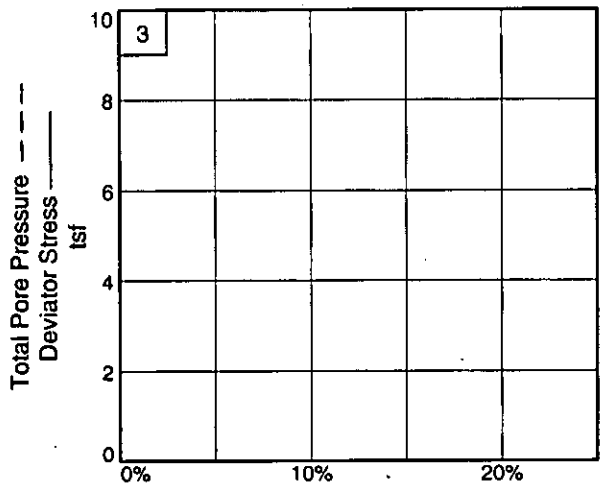
Proj. No.: 0121-3070.03 **Date:** 2/6/07

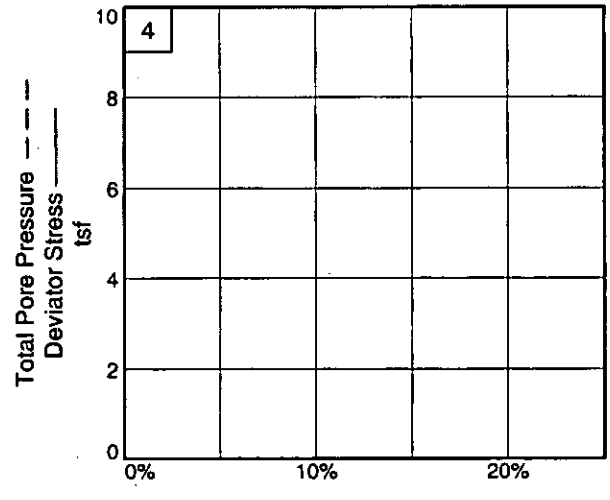
DLZ

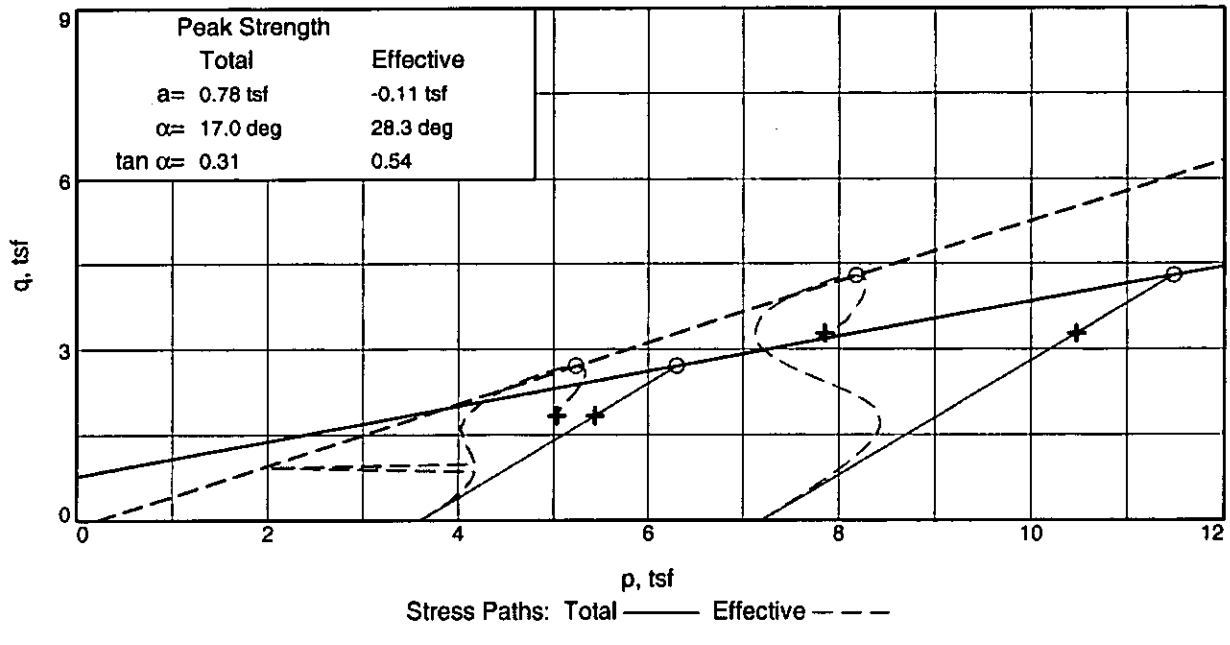
Figure _____





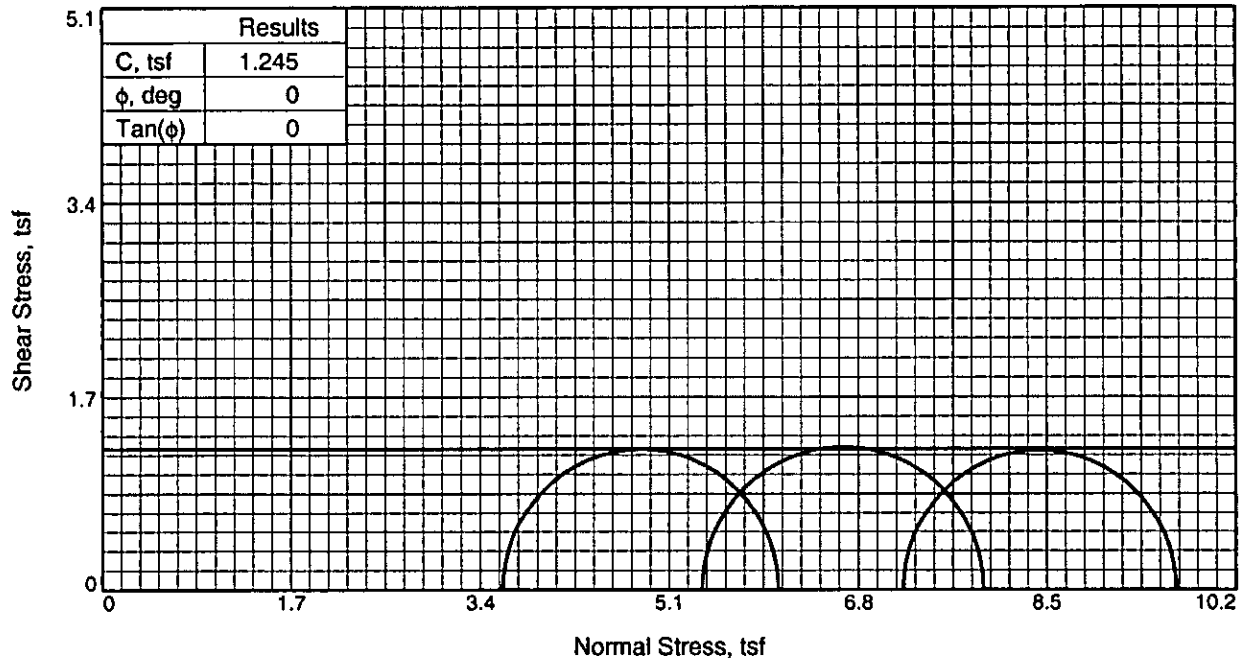


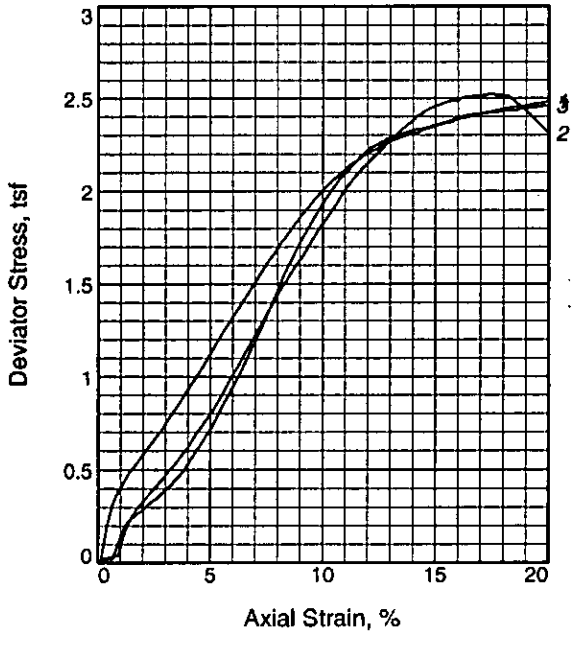




Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: B-32 **Depth:** 10.0 **Sample Number:** P1
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1	2	3
Initial	Water Content,	26.1	28.3	26.6
	Dry Density, pcf	98.1	94.4	96.5
	Saturation,	98.1	97.4	96.2
	Void Ratio	0.7191	0.7854	0.7458
	Diameter, in.	2.77	2.78	2.77
	Height, in.	5.38	5.35	5.30
At Test	Water Content,	27.8	20.0	29.9
	Dry Density, pcf	98.1	94.4	96.5
	Saturation,	104.2	68.8	108.4
	Void Ratio	0.7191	0.7854	0.7458
	Diameter, in.	2.77	2.78	2.77
	Height, in.	5.38	5.35	5.30
Strain rate, in./min.		0.06	0.06	0.01
Back Pressure, tsf		0.00	0.00	0.00
Cell Pressure, tsf		3.60	5.40	7.20
Fail. Stress, tsf		2.48	2.52	2.46
Ult. Stress, tsf				
σ_1 Failure, tsf		6.08	7.92	9.66
σ_3 Failure, tsf		3.60	5.40	7.20

Type of Test:
Unconsolidated Undrained

Sample Type: 3" press tube

Description: Lean clay

LL= 30 **PL=** 22 **PI=** 8

Assumed Specific Gravity= 2.7

Remarks:

Client: TranSystems, Inc.

Project: SCI-823-0.00

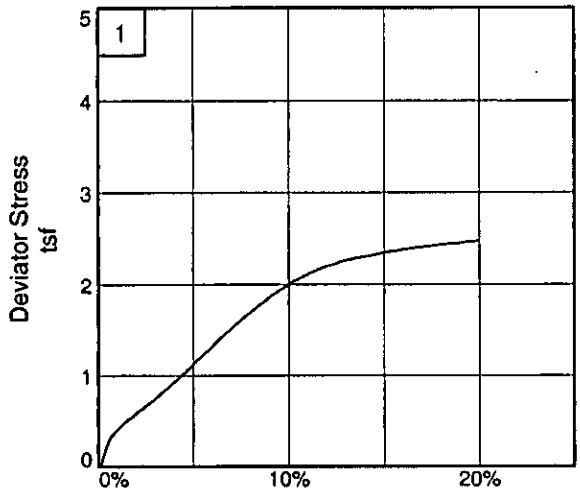
Source of Sample: B-32 **Depth:** 15.0

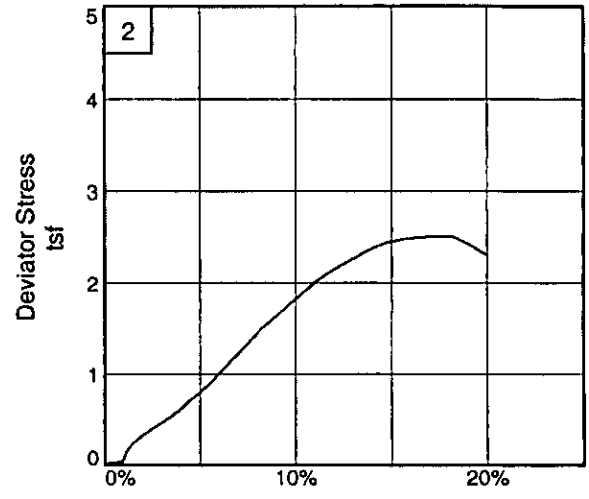
Sample Number: P2

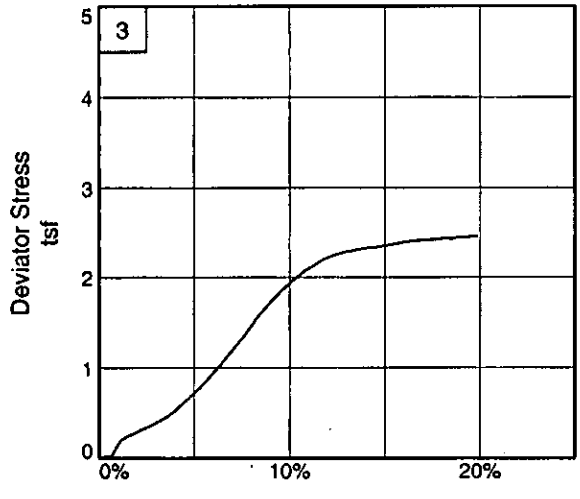
Proj. No.: 0121-3070.03 **Date:** 2/6/07

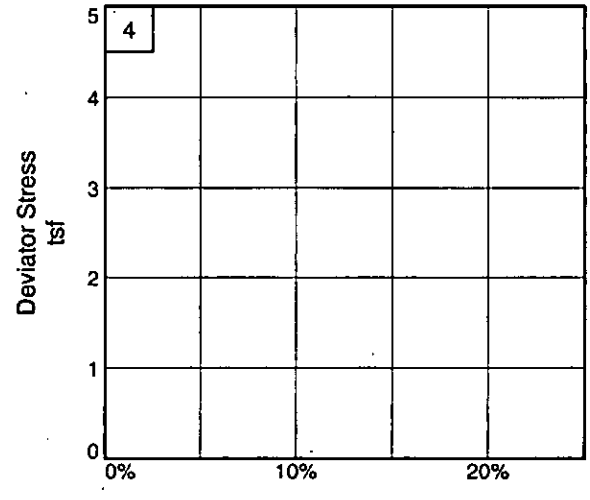
DLZ

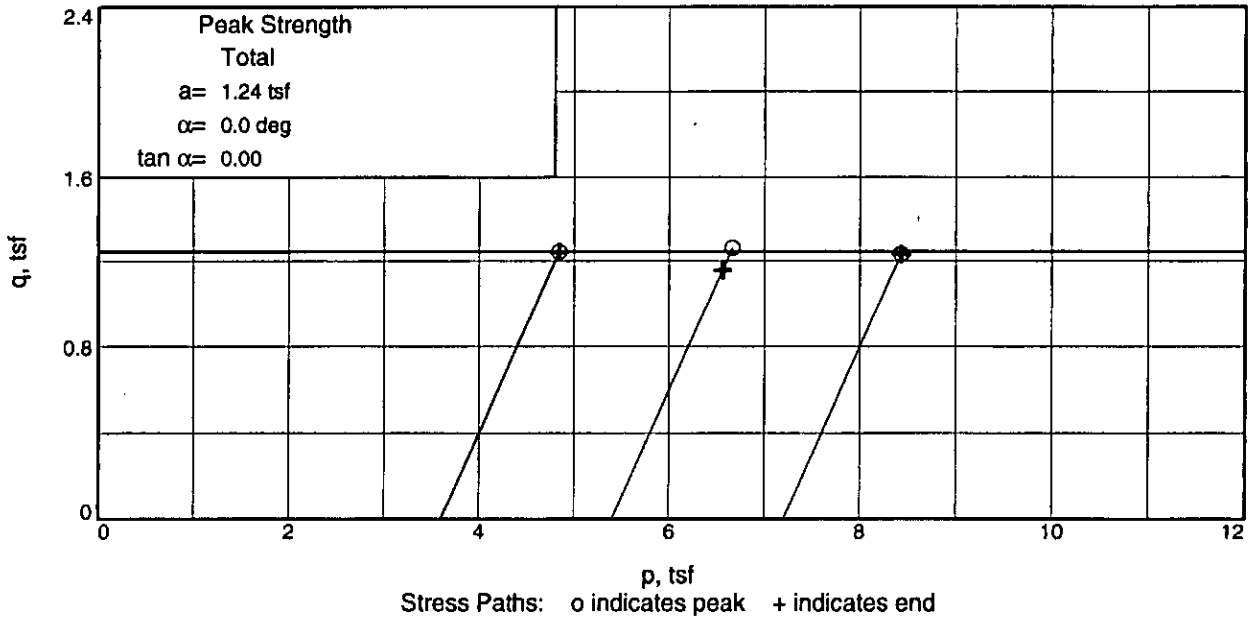
Figure _____







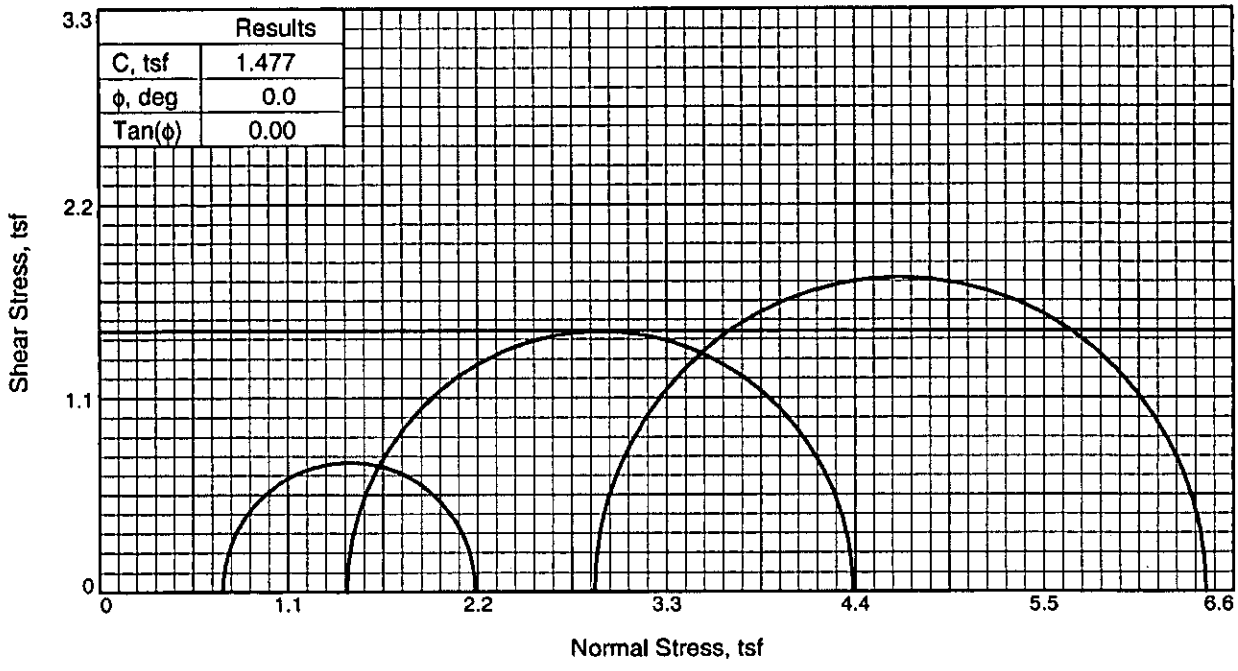


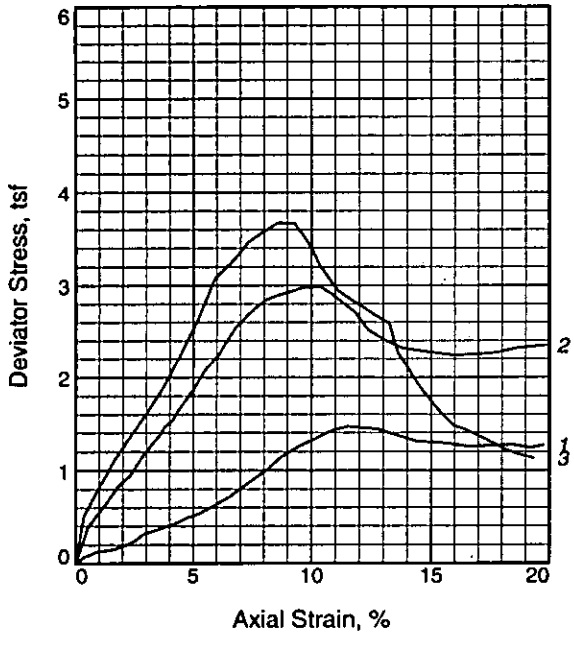


Stress Paths: o indicates peak + indicates end

Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: B-32 **Depth:** 15.0 **Sample Number:** P2
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1	2	3
Initial	Water Content,	23.8	22.8	21.1
	Dry Density, pcf	97.9	98.9	103.1
	Saturation,	86.9	85.1	87.5
	Void Ratio	0.7542	0.7365	0.6649
	Diameter, in.	2.79	2.80	2.79
	Height, in.	5.47	5.58	5.59
At Test	Water Content,	23.4	22.1	23.2
	Dry Density, pcf	97.9	98.9	103.1
	Saturation,	85.3	82.5	95.9
	Void Ratio	0.7542	0.7365	0.6649
	Diameter, in.	2.79	2.80	2.79
	Height, in.	5.47	5.58	5.59
Strain rate, in./min.		0.06	0.06	0.06
Back Pressure, tsf		0.00	0.00	0.00
Cell Pressure, tsf		0.72	1.44	2.88
Fail. Stress, tsf		1.47	2.95	3.56
Ult. Stress, tsf		1.45	2.98	3.66
σ_1 Failure, tsf		2.19	4.39	6.44
σ_3 Failure, tsf		0.72	1.44	2.88

Type of Test:
Unconsolidated Undrained

Sample Type: 3" press tube

Description: Lean clay

LL= 36 **PL=** 22 **PI=** 14

Specific Gravity= 2.75

Remarks:

Client: TranSystems, Inc.

Project: SCI-823-0.00

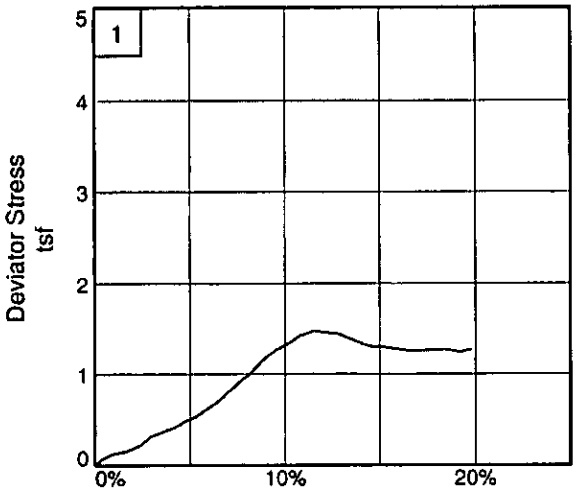
Source of Sample: B-37 **Depth:** 8.0

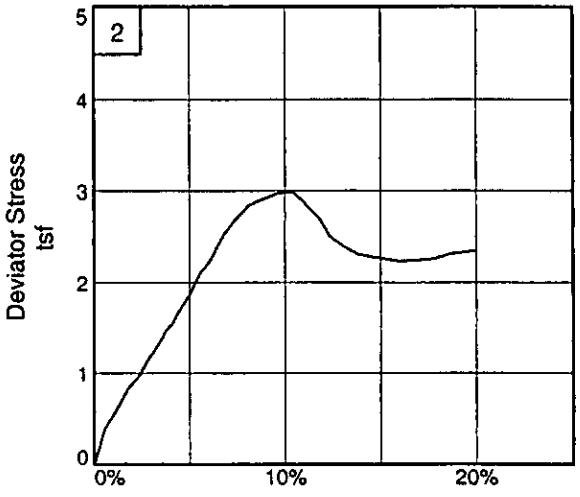
Sample Number: ST-1

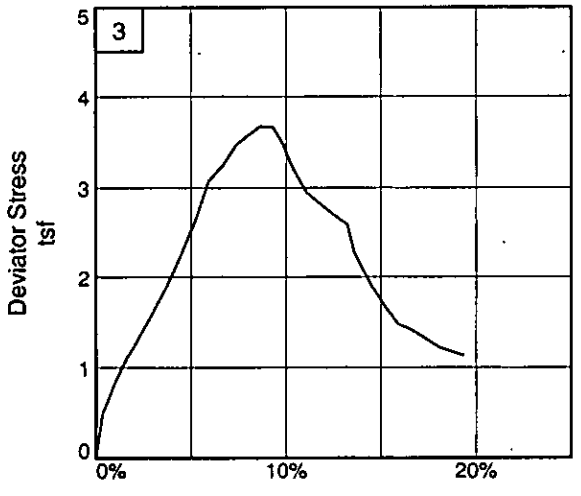
Proj. No.: 0121-3070.03 **Date:** 6/6/07

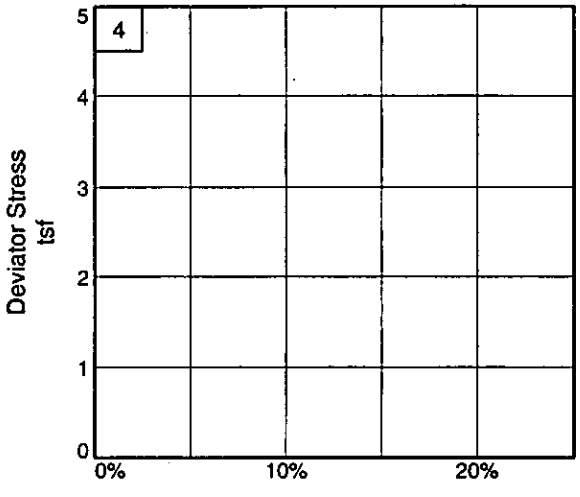
DLZ

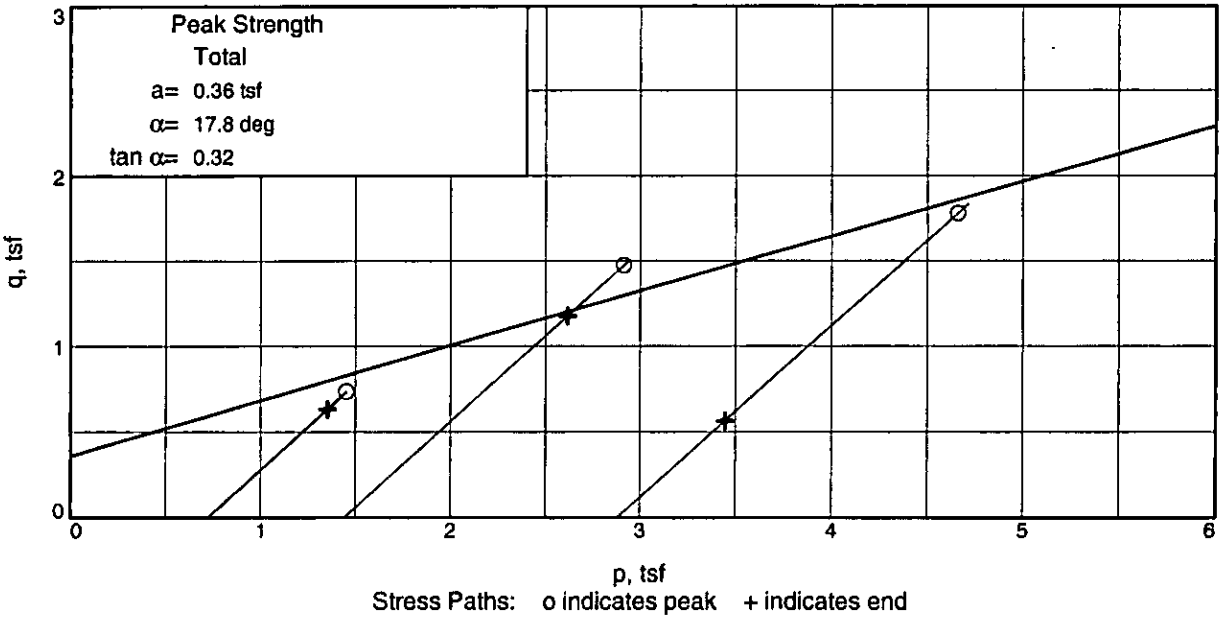
Figure _____







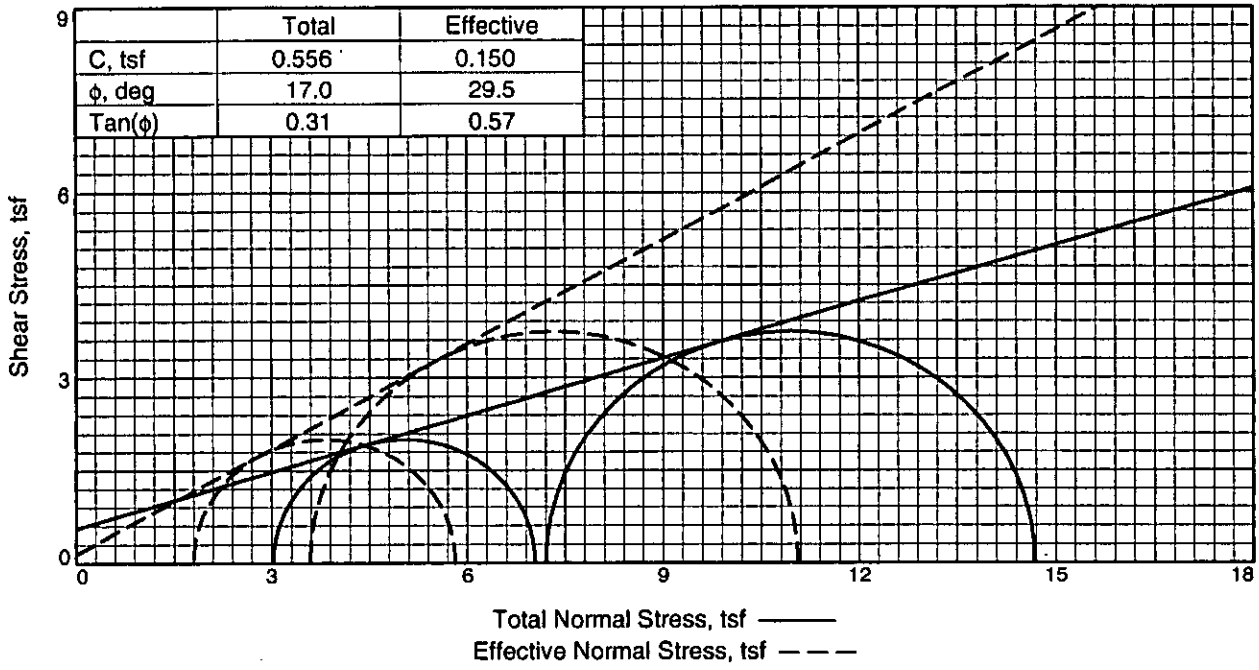




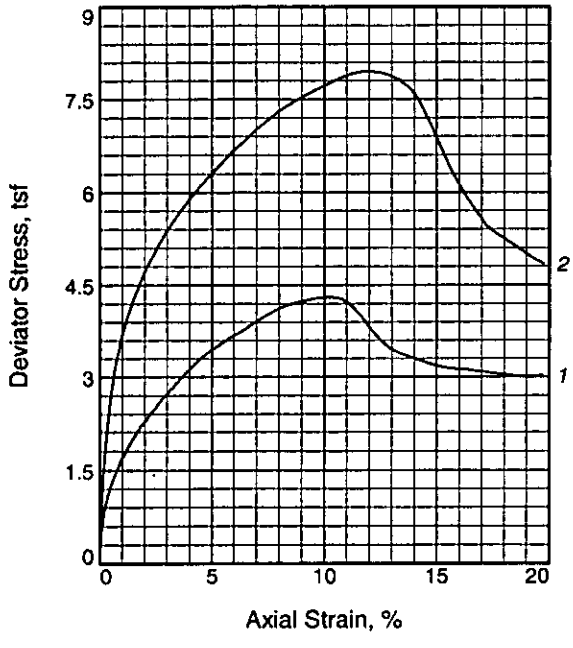
Stress Paths: o indicates peak + indicates end

Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: B-37 **Depth:** 8.0 **Sample Number:** ST-1
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.



	Total	Effective
C, tsf	0.556	0.150
ϕ, deg	17.0	29.5
Tan(ϕ)	0.31	0.57



Sample No.		1	2
Initial	Water Content,	25.9	25.6
	Dry Density, pcf	96.9	98.0
	Saturation,	94.6	96.0
	Void Ratio	0.7395	0.7196
	Diameter, in.	2.79	2.81
	Height, in.	5.60	5.58
At Test	Water Content,	25.6	24.4
	Dry Density, pcf	96.9	98.0
	Saturation,	93.6	91.5
	Void Ratio	0.7395	0.7196
	Diameter, in.	2.79	2.81
	Height, in.	5.60	5.58
Strain rate, in./min.		0.01	0.01
Back Pressure, tsf		1.2	1.2
Cell Pressure, tsf		4.2	8.4
Fail. Stress, tsf		4.0	7.5
Total Pore Pr., tsf		2.4	4.8
Ult. Stress, tsf		4.0	7.5
Total Pore Pr., tsf		2.4	4.8
$\bar{\sigma}_1$ Failure, tsf		5.8	11.1
$\bar{\sigma}_3$ Failure, tsf		1.8	3.6

Type of Test:
CU with Pore Pressures
Sample Type: Press Tube
Description: Silty clay

LL= 29 **PL=** 22 **PI=** 7
Assumed Specific Gravity= 2.7
Remarks:

Figure _____

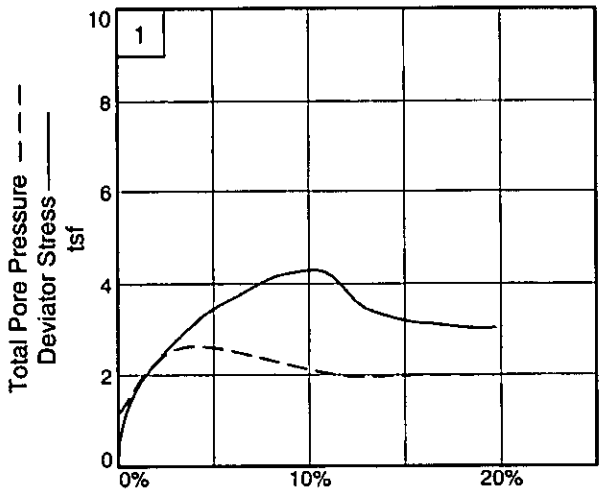
Client: TranSystems, Inc.

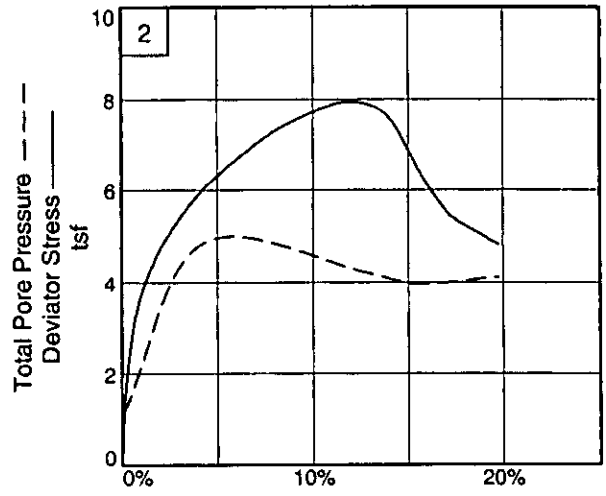
Project: SCI-823-0.00

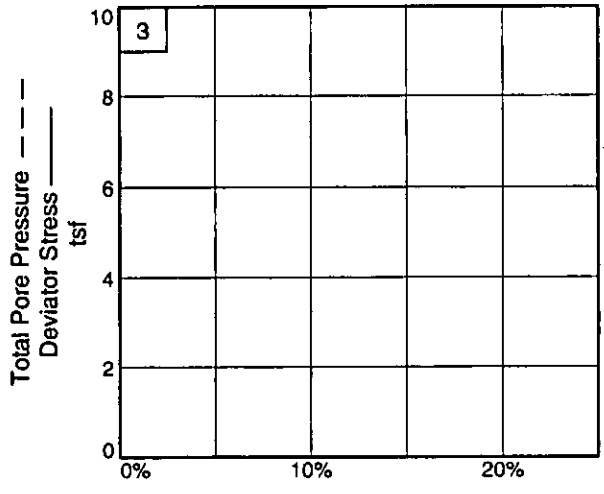
Source of Sample: B-37 **Depth:** 18
Sample Number: ST-2

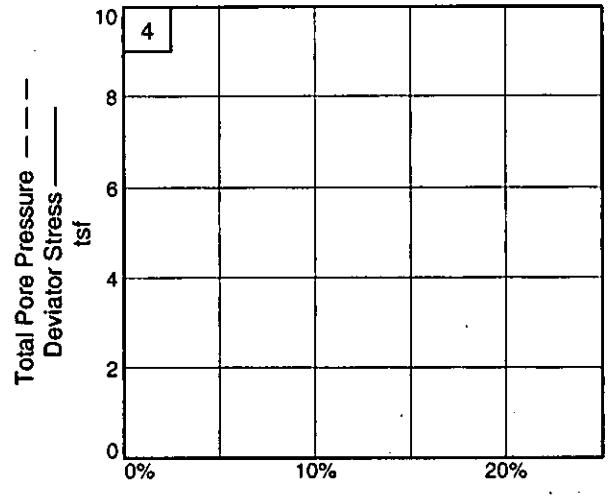
Proj. No.: 0121-3070.03 **Date:** 6/6/07

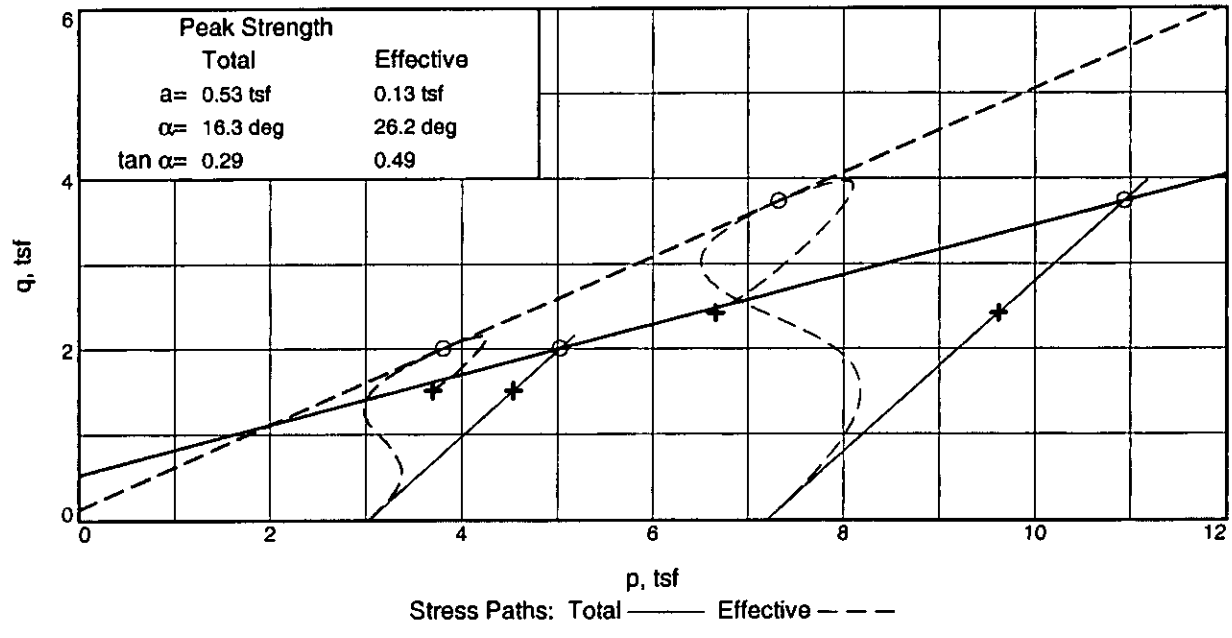
DLZ





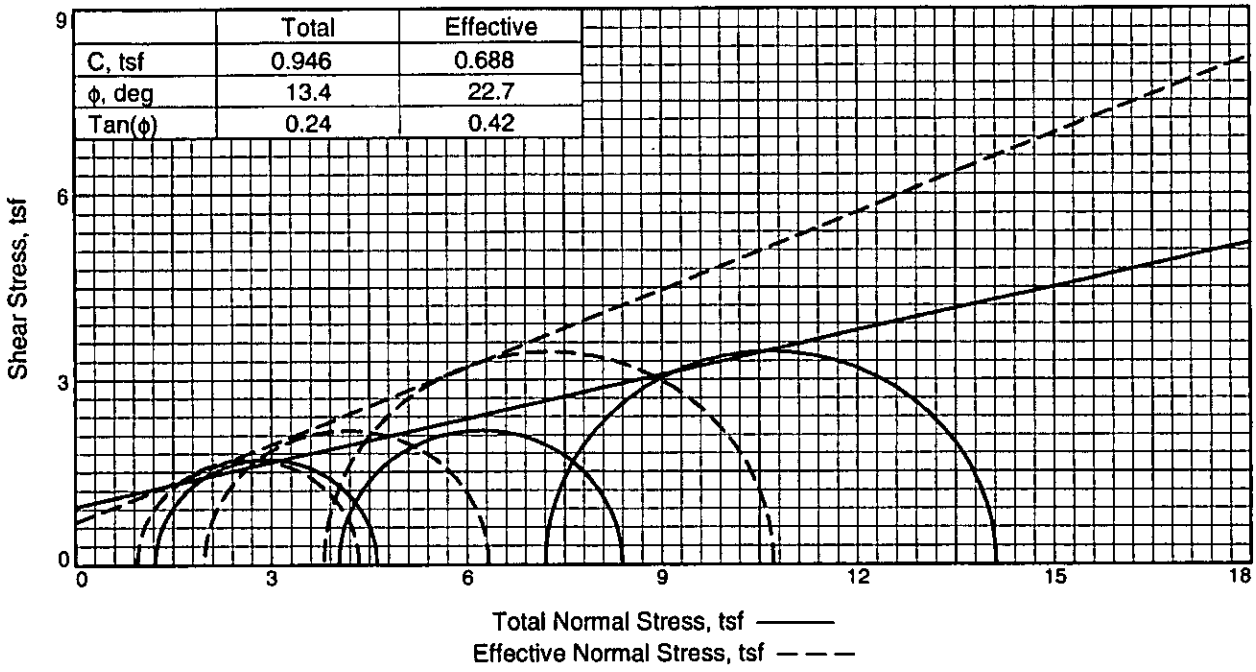


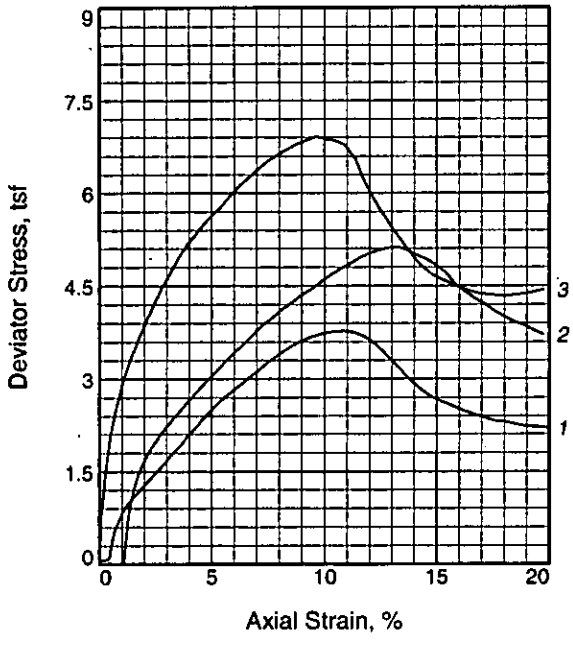




Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: B-37 **Depth:** 18 **Sample Number:** ST-2
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1	2	3
Initial	Water Content,	20.9	22.3	26.0
	Dry Density, pcf	102.6	99.9	98.7
	Saturation,	87.8	87.7	99.1
	Void Ratio	0.6433	0.6866	0.7086
	Diameter, in.	2.80	2.80	2.80
	Height, in.	4.96	5.56	5.60
At Test	Water Content,	27.1	24.5	24.1
	Dry Density, pcf	97.4	101.4	102.2
	Saturation,	100.0	100.0	100.0
	Void Ratio	0.7311	0.6622	0.6494
	Diameter, in.	2.88	2.78	2.76
	Height, in.	4.96	5.56	5.60
Strain rate, in./min.		0.01	0.01	0.01
Back Pressure, tsf		1.2	1.2	1.2
Cell Pressure, tsf		2.4	5.2	8.4
Fail. Stress, tsf		3.4	4.4	6.9
Total Pore Pr., tsf		1.4	3.2	4.6
Ult. Stress, tsf		3.4	4.4	6.9
Total Pore Pr., tsf		1.4	3.2	4.6
$\bar{\sigma}_1$ Failure, tsf		4.3	6.3	10.7
$\bar{\sigma}_3$ Failure, tsf		0.9	2.0	3.8

Type of Test:
CU with Pore Pressures
Sample Type: Press Tube
Description: Lean clay

LL= 29 **PL=** 20 **PI=** 9
Assumed Specific Gravity= 2.7
Remarks:

Figure _____

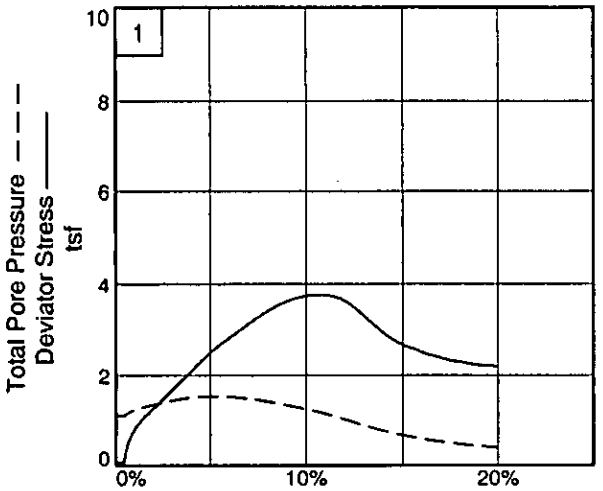
Client: TranSystems, Inc.

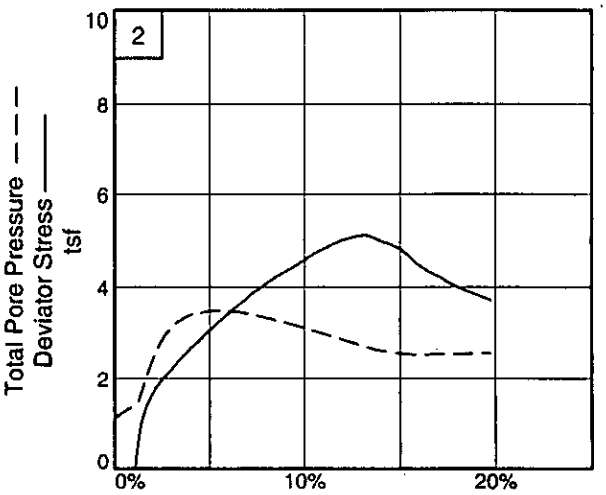
Project: SCI-823-0.00

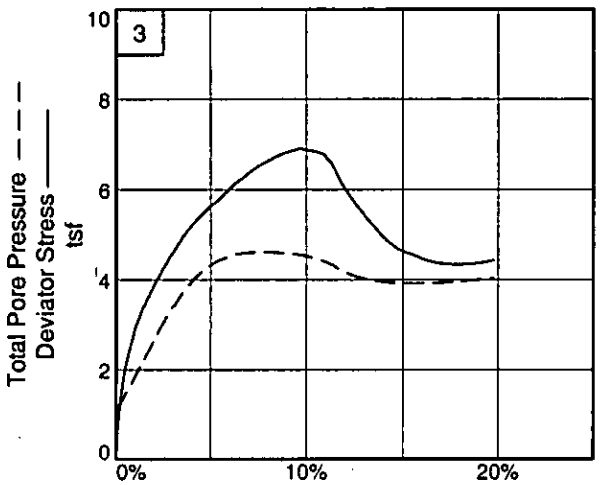
Source of Sample: B-37 **Depth:** 43.5
Sample Number: ST-3

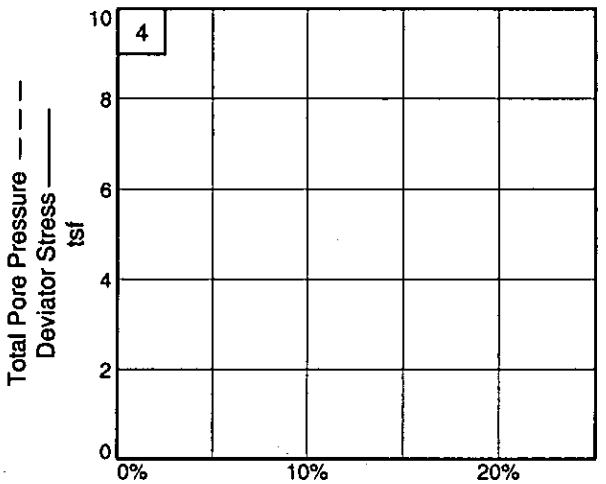
Proj. No.: 0121-3070.03 **Date:** 6/6/07

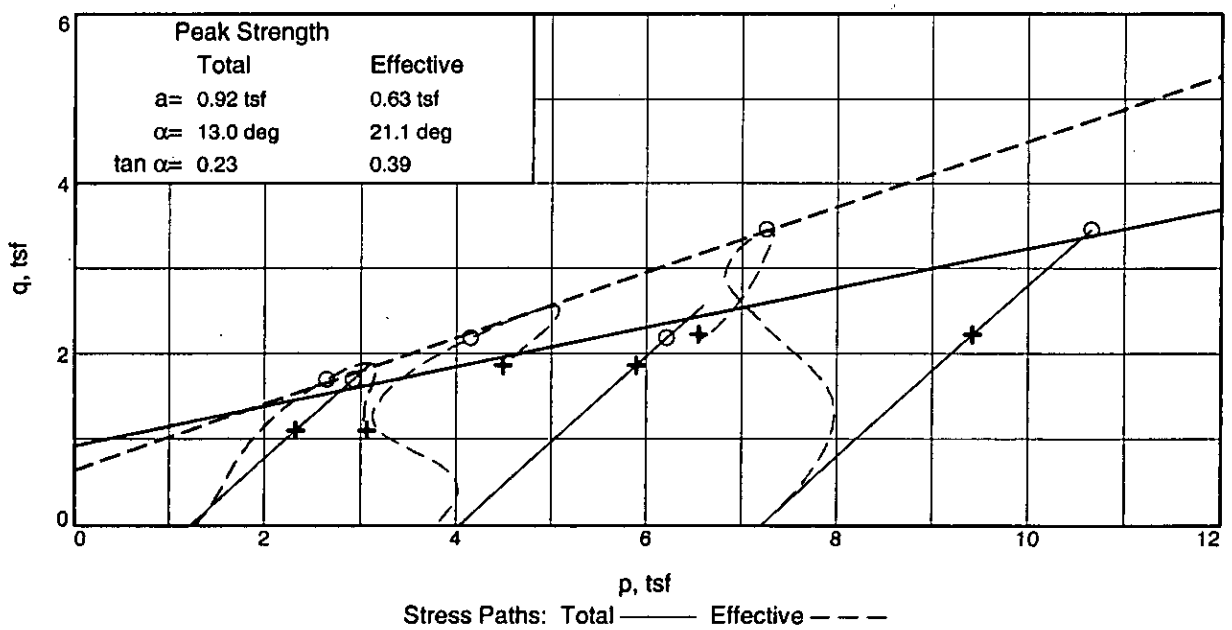
DLZ





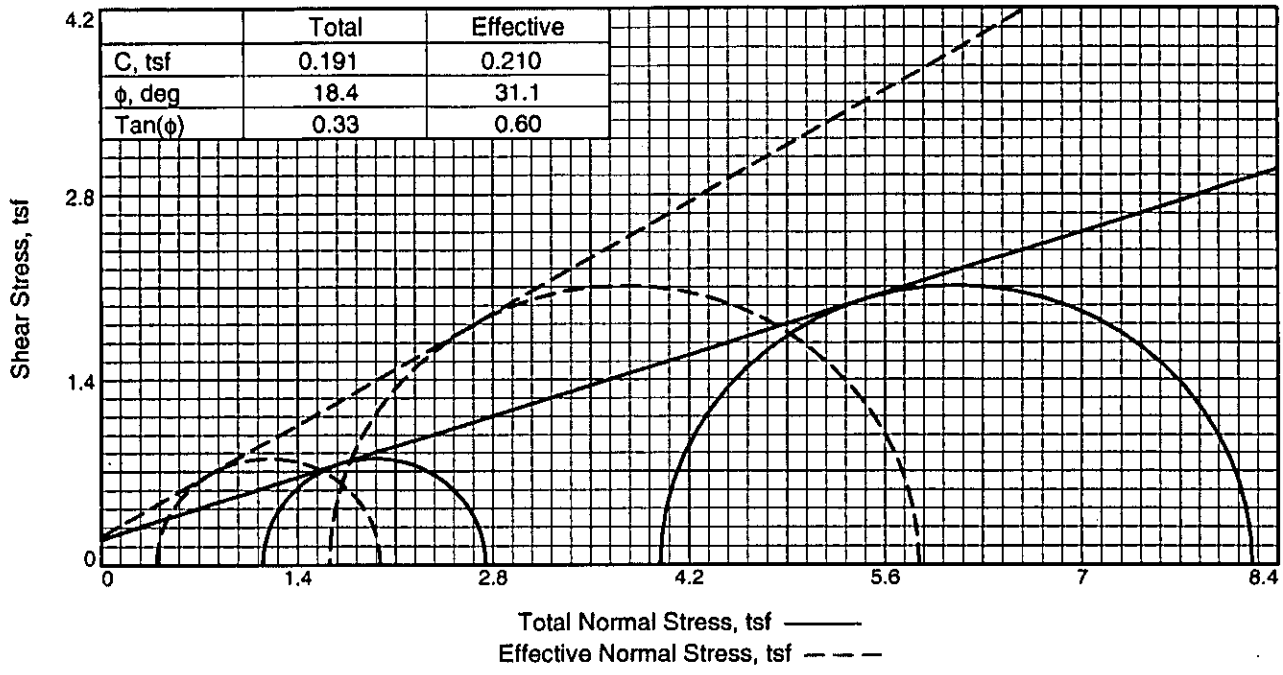


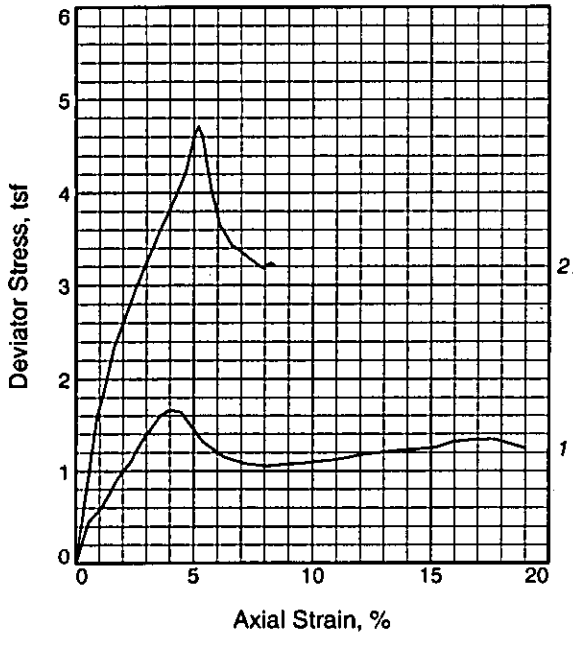




Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: B-37 **Depth:** 43.5 **Sample Number:** ST-3
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1	2
Initial	Water Content,	26.6	26.0
	Dry Density, pcf	98.2	98.2
	Saturation,	97.8	95.5
	Void Ratio	0.7490	0.7491
	Diameter, in.	2.82	2.82
	Height, in.	5.59	5.58
At Test	Water Content,	27.8	27.0
	Dry Density, pcf	97.3	98.5
	Saturation,	100.0	100.0
	Void Ratio	0.7639	0.7422
	Diameter, in.	2.84	2.82
	Height, in.	5.59	5.58
Strain rate, in./min.		0.06	0.01
Back Pressure, tsf		1.00	1.15
Cell Pressure, tsf		2.15	5.15
Fail. Stress, tsf		1.59	4.22
Total Pore Pr., tsf		1.76	3.52
Ult. Stress, tsf		1.59	4.22
Total Pore Pr., tsf		1.76	3.52
$\bar{\sigma}_1$ Failure, tsf		1.99	5.84
$\bar{\sigma}_3$ Failure, tsf		0.40	1.62

Type of Test:
CU with Pore Pressures
Sample Type: 3" press tube
Description: Lean clay

LL= 27 **PL=** 16 **PI=** 11
Specific Gravity= 2.75
Remarks:

Client: TranSystems, Inc.

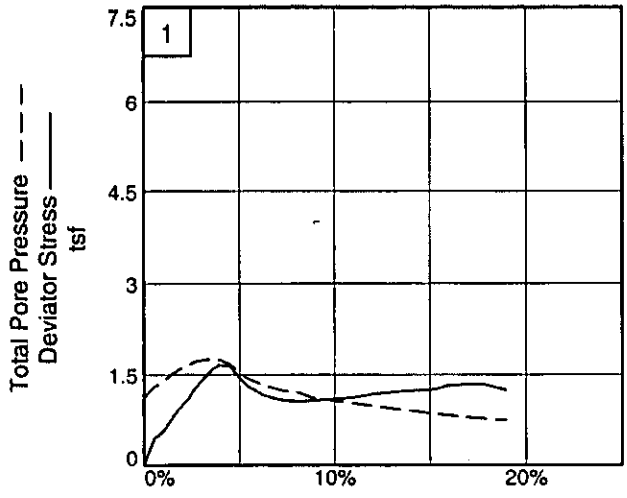
Project: SCI-823-0.00

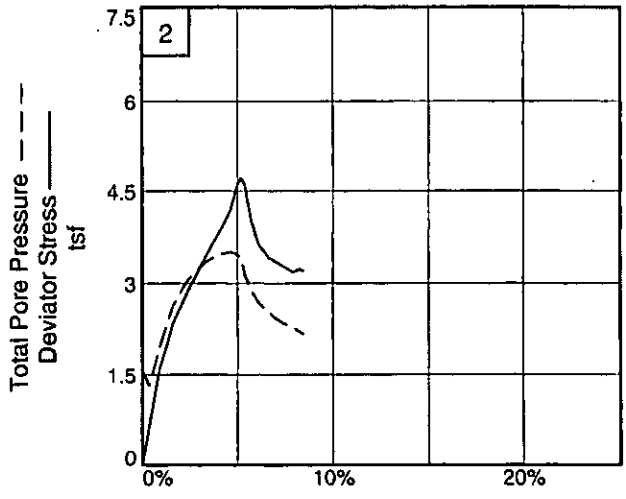
Source of Sample: B-38 **Depth:** 10.0
Sample Number: ST-1

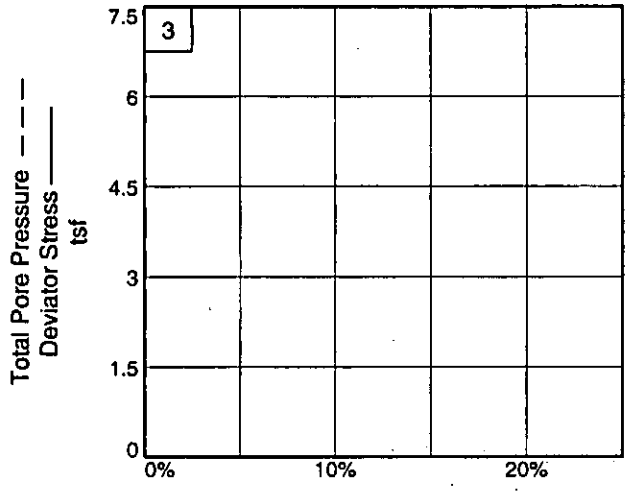
Proj. No.: 0121-3070.03 **Date:** 5/22/07

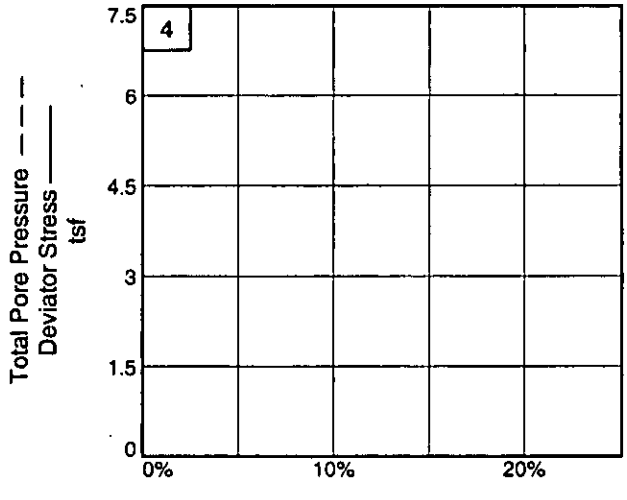
DLZ

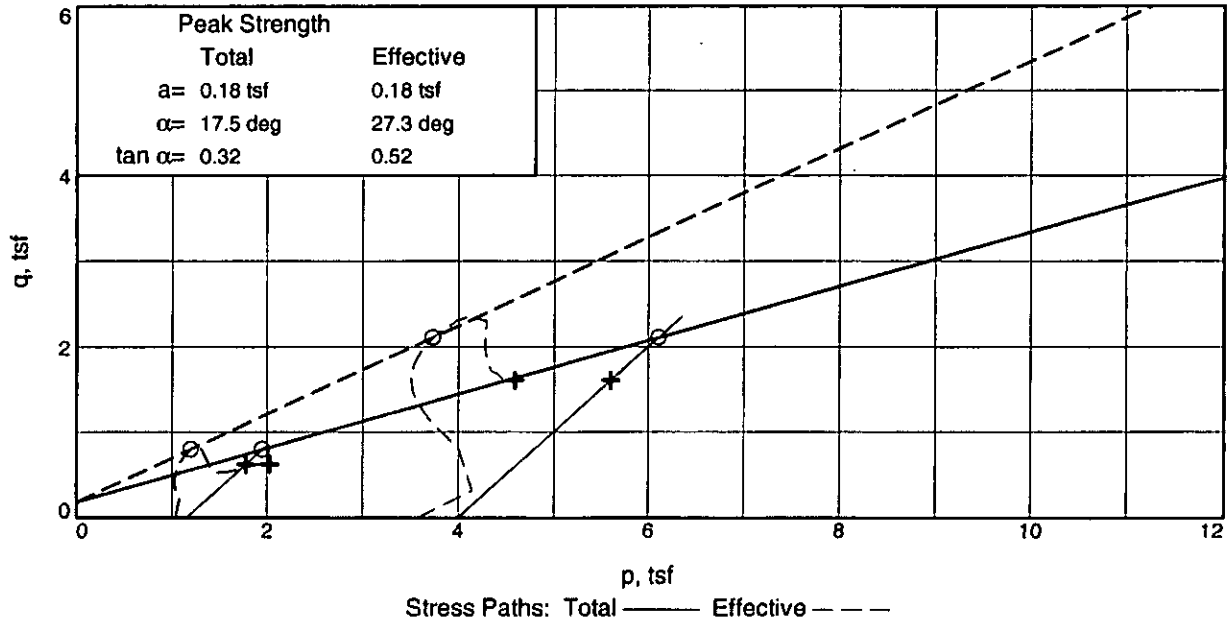
Figure _____











Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: B-38 **Depth:** 10.0 **Sample Number:** ST-1
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.

Vane Shear Test Report

Project	SCI-823	Date	5/3/2007
Project No.	0121-3070.03	Boring Number	B-38
Client	Transystems	Depth	19'
Drill Rig & Crew	Doug / CME 850		
Tested By	Mott / Riedy		
Weather / Temp.	Rain / 60 degrees		
Soil Type	A-6a		

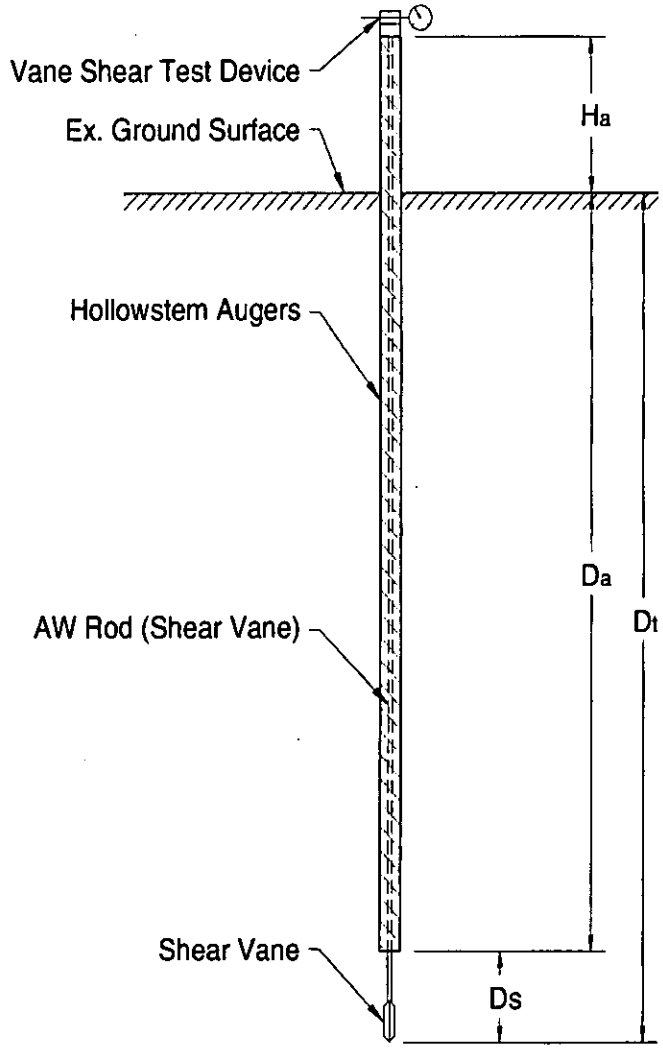
DRILLING

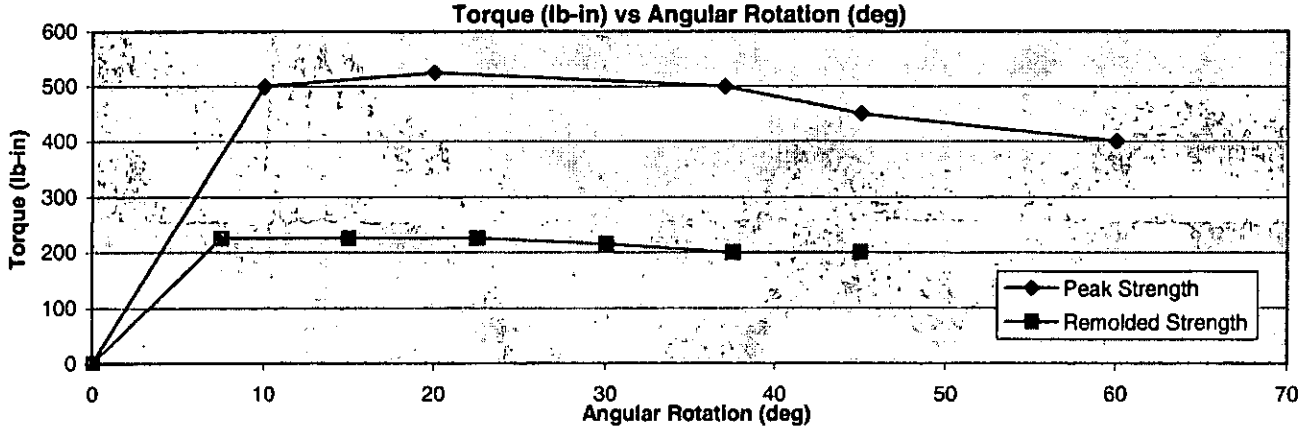
Hollowstem augers to depth	D_a	17.5'
Vane Depth below bottom of augers	D_s	1.5
Augers above ground surface	H_a	2.5
Depth to vane tip	D_t	19

SHEAR VANE

Vane Used	(2.0")	2.5"	3.625"
Vane constant, k (lb-in to psf)	(5.17)	2.59	0.905
Masurement by	Mott		
Max Torque		525	lb-in
Max UD Shear Strength		***2714***	***psf***

Test Setup





Vane Shear Test Report

Time Begin _____
End _____

Boring Number B-38 Depth 19'

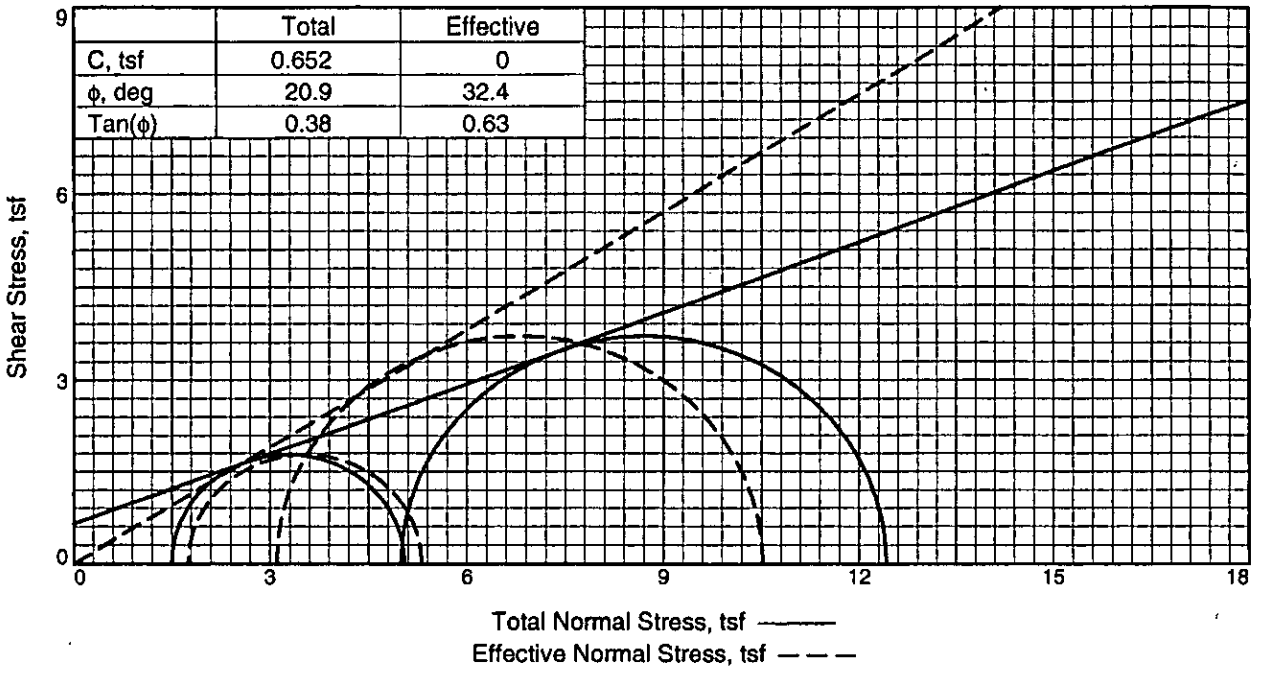
Undisturbed Condition			Remolded Condition		
Time (min)	Tourqe (lb-in)	Angular Rotation (deg)	Time (min)	Tourqe (lb-in)	Angular Rotation (deg)
0.0	0	0	0.0	0	0
0.5	500	10	0.5	225	8
1.0	525	20	1.0	225	15
1.5	500	37	1.5	225	23
2.0	450	45	2.0	215	30
2.5	400	60	2.5	200	38
3.0			3.0	200	45
3.5			3.5		
4.0			4.0		
4.5			4.5		
5.0			5.0		
5.5			5.5		
6.0			6.0		
6.5			6.5		
7.0			7.0		
7.5			7.5		
8.0			8.0		
8.5			8.5		
9.0			9.0		
9.5			9.5		
10.0			10.0		
10.5			10.5		
11.0			11.0		
11.5			11.5		
12.0			12.0		
12.5			12.5		
13.0			13.0		
13.5			13.5		
14.0			14.0		
14.5			14.5		
15.0			15.0		
15.5			15.5		
16.0			16.0		
16.5			16.5		
17.0			17.0		
17.5			17.5		
18.0			18.0		

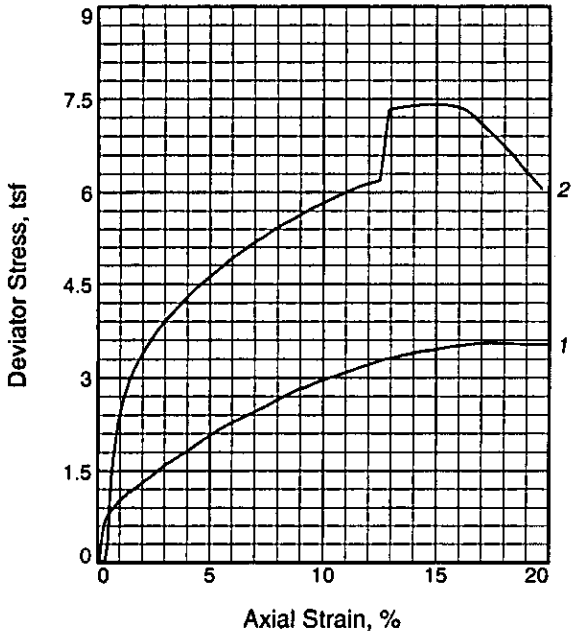
Peak Torque 525 (lb-in) k= 5.170 Peak Remolded Torque 225 (lb-in)

Peak Undrained Shear Strength 2714 psf Peak Remolded Shear Strength 1163 psf
Sensitivity 2.3

DLZ

DLZ Ohio, Inc.
ENGINEERS • ARCHITECTS • SCIENTISTS
PLANNERS • SURVEYORS





Sample No.		1	2
Initial	Water Content,	26.8	27.4
	Dry Density, pcf	98.3	99.1
	Saturation,	101.3	105.6
	Void Ratio	0.7141	0.7000
	Diameter, in.	2.80	2.81
	Height, in.	5.57	5.57
At Test	Water Content,	0.0	24.9
	Dry Density, pcf	0.0	99.1
	Saturation,	0.0	96.1
	Void Ratio	N/A	0.7000
	Diameter, in.	2.80	2.81
	Height, in.	5.57	5.57
Strain rate, in./min.		0.11	0.01
Back Pressure, tsf		1.2	1.2
Cell Pressure, tsf		2.6	6.1
Fail. Stress, tsf		3.5	7.4
Total Pore Pr., tsf		0.9	3.0
Ult. Stress, tsf			
Total Pore Pr., tsf			
$\bar{\sigma}_1$ Failure, tsf		5.3	10.5
$\bar{\sigma}_3$ Failure, tsf		1.8	3.1

Type of Test:
CU with Pore Pressures

Sample Type:

Description:

Assumed Specific Gravity= 2.7

Remarks:

Figure _____

Client: TranSystems, Inc.

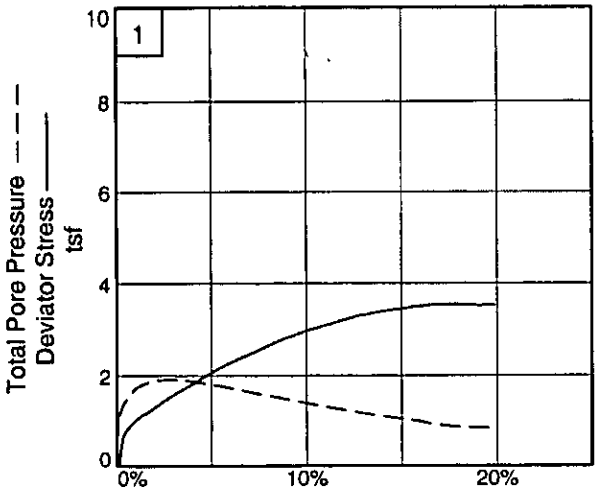
Project: SCI-823-0.00

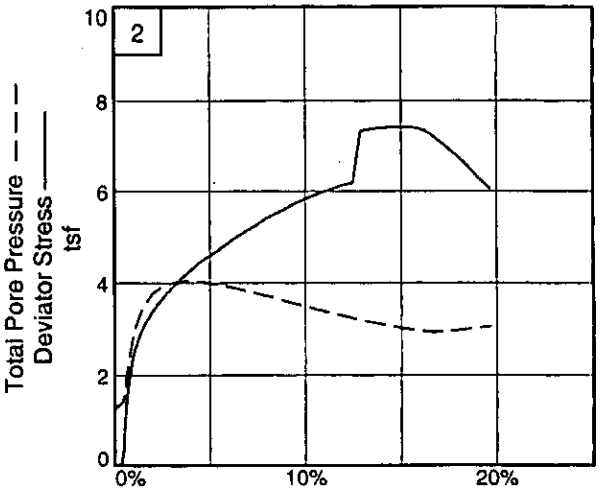
Source of Sample: B-38 **Depth:** 19.0

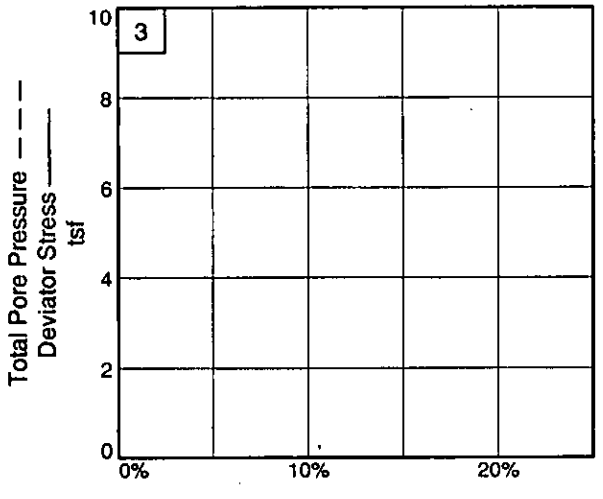
Sample Number: ST-2

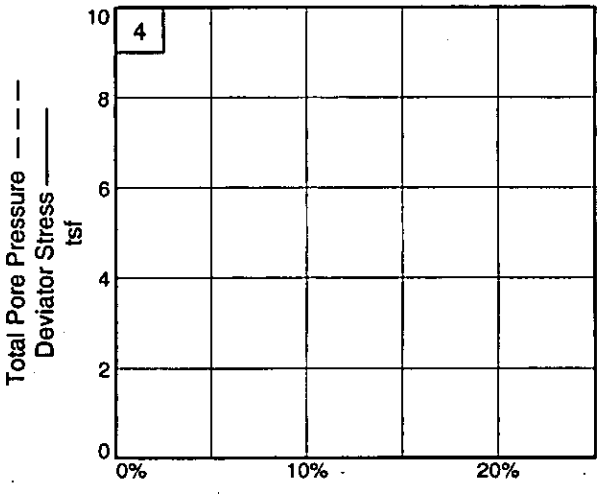
Proj. No.: 0121-3070.03 **Date:**

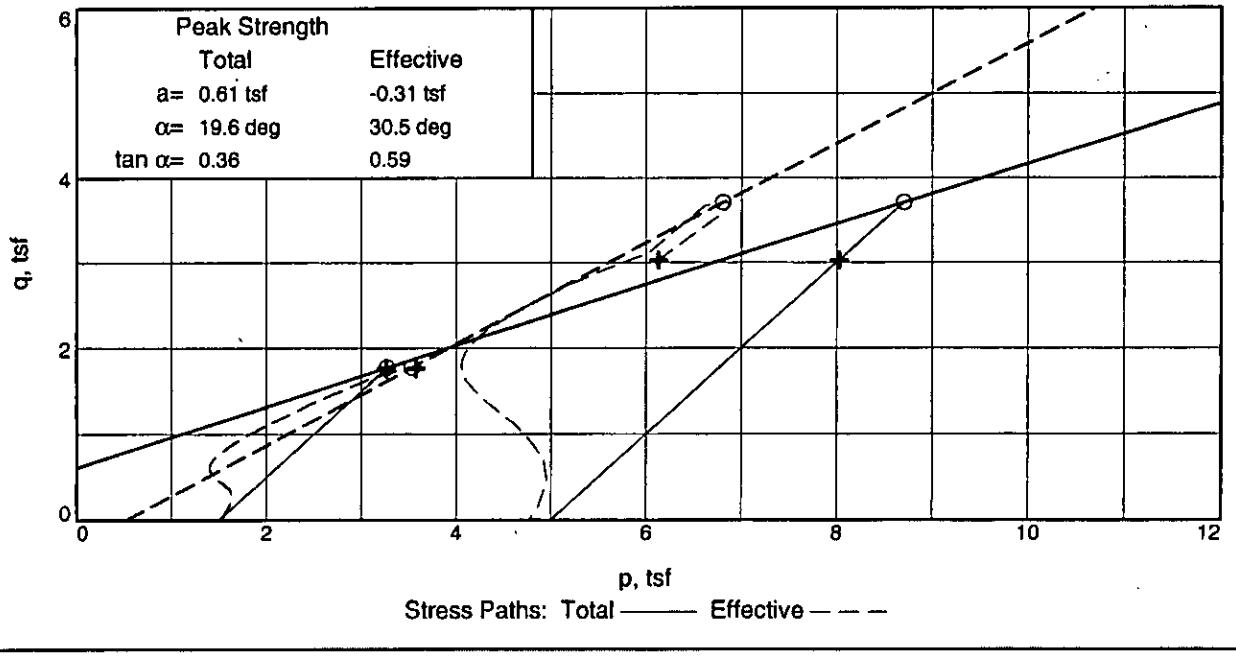
DLZ





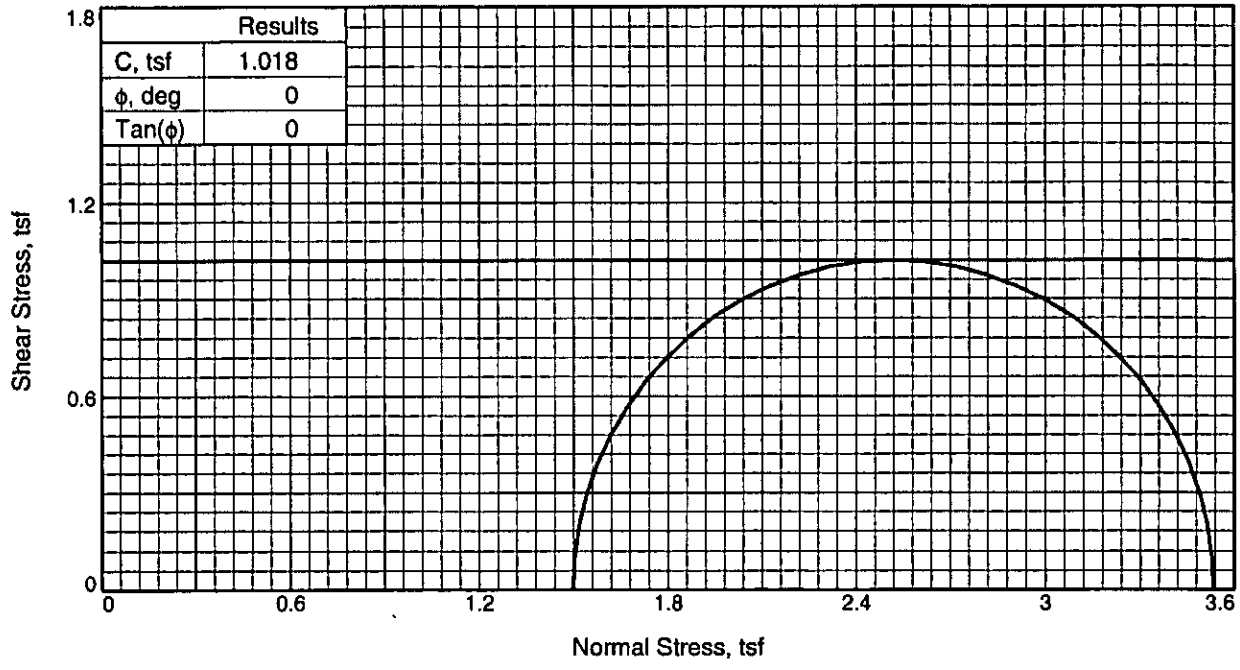


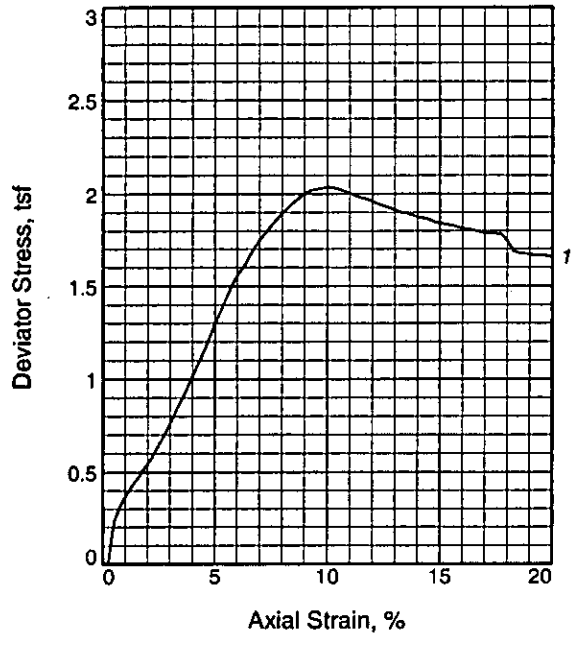




Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: B-38 **Depth:** 19.0 **Sample Number:** ST-2
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1
Initial	Water Content,	23.6
	Dry Density, pcf	101.3
	Saturation,	93.0
	Void Ratio	0.7004
	Diameter, in.	2.79
	Height, in.	5.09
At Test	Water Content,	26.4
	Dry Density, pcf	101.3
	Saturation,	104.1
	Void Ratio	0.7004
	Diameter, in.	2.79
	Height, in.	5.09
Strain rate, in./min.		0.06
Back Pressure, tsf		0.00
Cell Pressure, tsf		1.50
Fail. Stress, tsf		2.04
Ult. Stress, tsf		
σ_1 Failure, tsf		3.53
σ_3 Failure, tsf		1.50

Type of Test:
Unconsolidated Undrained
Sample Type: 3" press tube
Description:

LL= 33 **PL=** 21 **PI=** 12
Assumed Specific Gravity= 2.76
Remarks: Specific Gravity (Actual)= 2.76

Client: TranSystems, Inc.

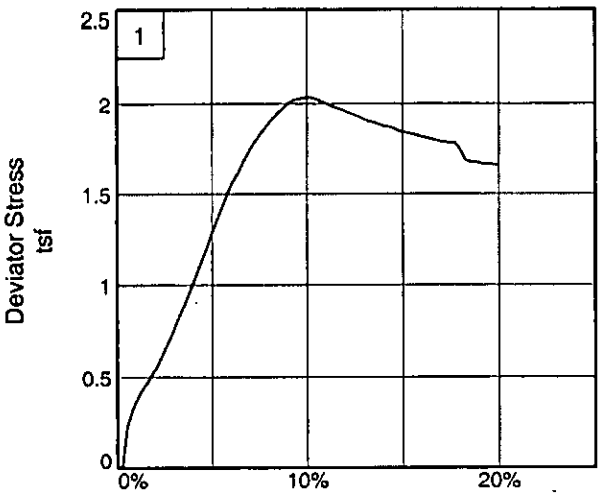
Project: SCI-823-0.00

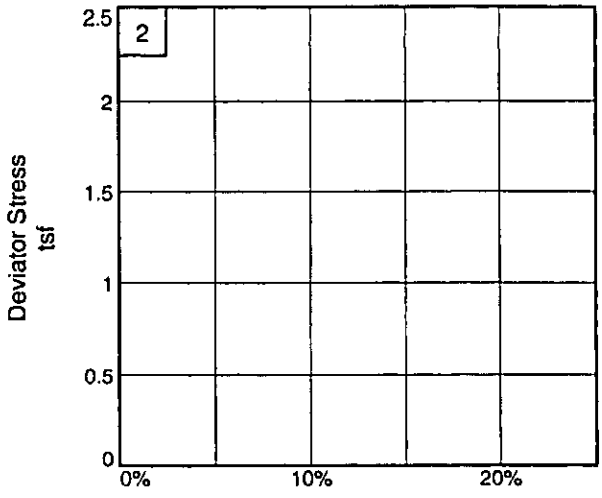
Source of Sample: B-38 **Depth:** 19.0
Sample Number: ST-2

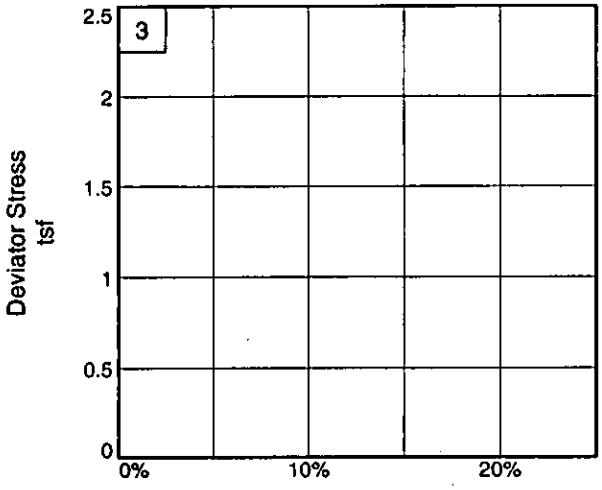
Proj. No.: 0121-3070.03 **Date:** 5/22/07

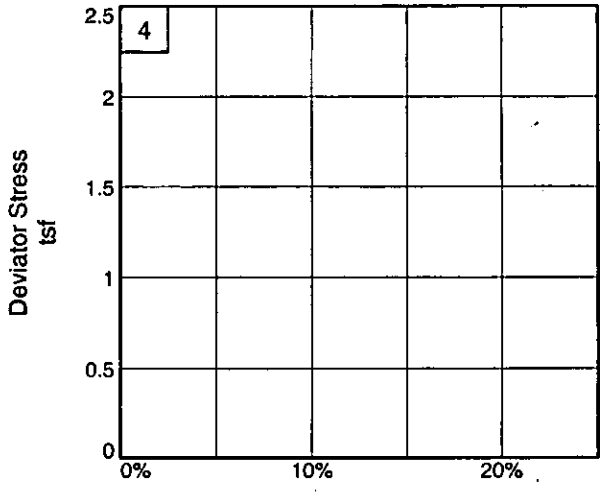
DLZ

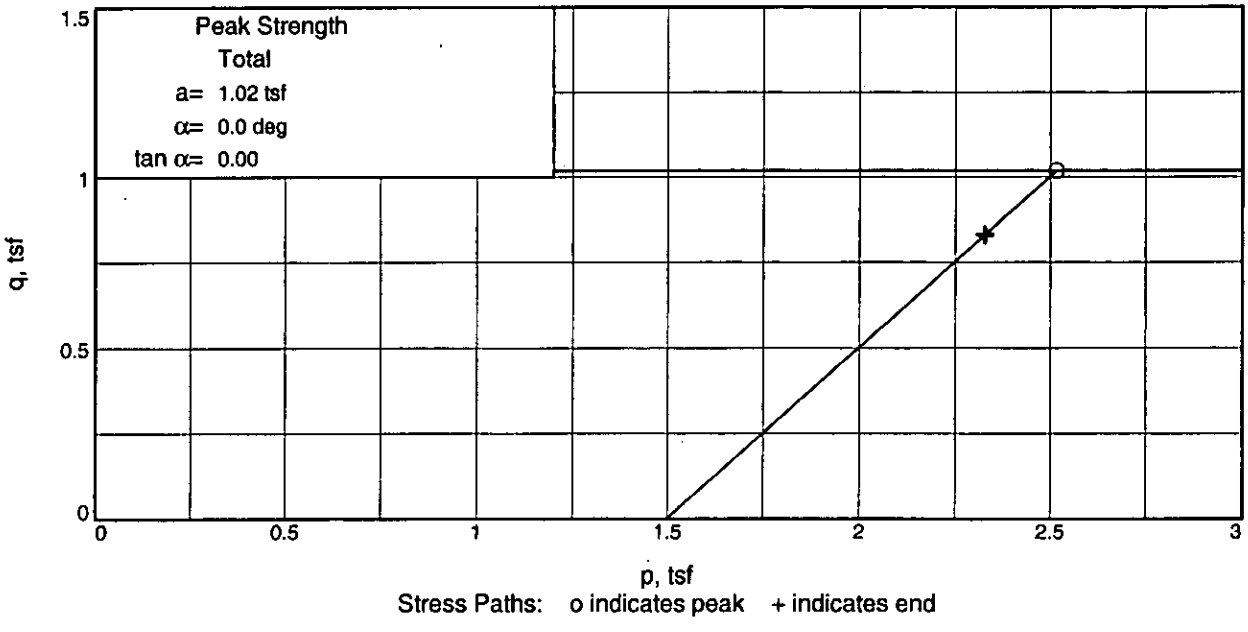
Figure _____







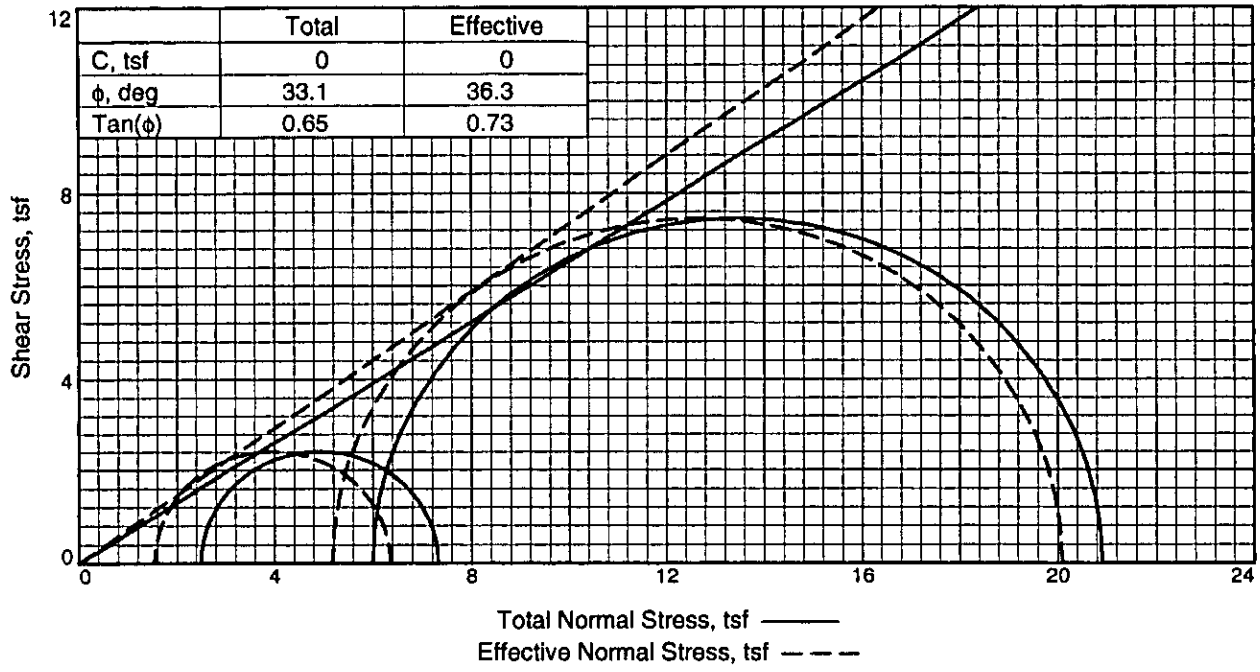


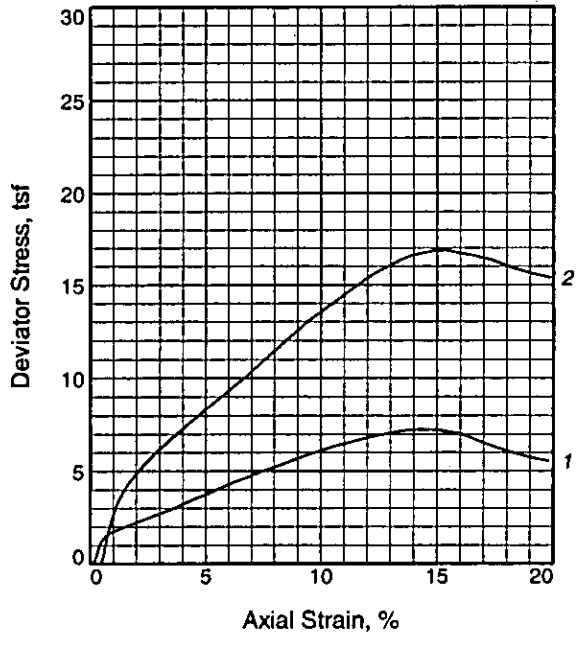


Stress Paths: o indicates peak + indicates end

Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: B-38 **Depth:** 19.0 **Sample Number:** ST-2
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1	2
Initial	Water Content,	28.6	26.9
	Dry Density, pcf	96.9	102.3
	Saturation,	104.5	112.1
	Void Ratio	0.7401	0.6481
	Diameter, in.	2.91	2.99
	Height, in.	5.21	4.77
At Test	Water Content,	24.3	22.5
	Dry Density, pcf	96.9	102.3
	Saturation,	88.6	93.6
	Void Ratio	0.7401	0.6481
	Diameter, in.	2.91	2.99
	Height, in.	5.21	4.77
Strain rate, in./min.		0.01	0.01
Back Pressure, tsf		1.2	1.2
Cell Pressure, tsf		3.7	7.1
Fail. Stress, tsf		4.8	14.9
Total Pore Pr., tsf		2.1	2.0
Ult. Stress, tsf		4.8	14.9
Total Pore Pr., tsf		2.1	2.0
$\bar{\sigma}_1$ Failure, tsf		6.4	20.1
$\bar{\sigma}_3$ Failure, tsf		1.5	5.2

Type of Test:
CU with Pore Pressures
Sample Type: Press Tube
Description:

LL= 29 **PL=** 20 **PI=** 9
Assumed Specific Gravity= 2.7
Remarks:

Client: TranSystems, Inc.

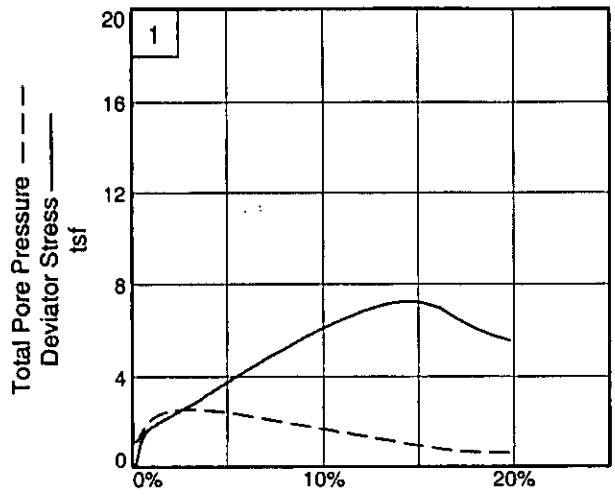
Project: SCI-823-0.00

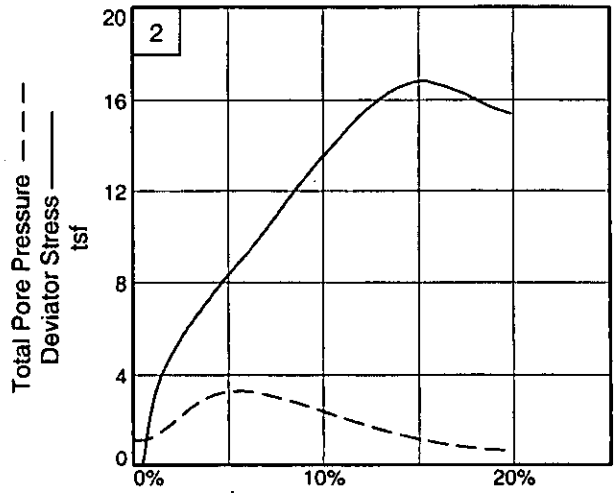
Source of Sample: B-38 **Depth:** 37.0
Sample Number: ST-3

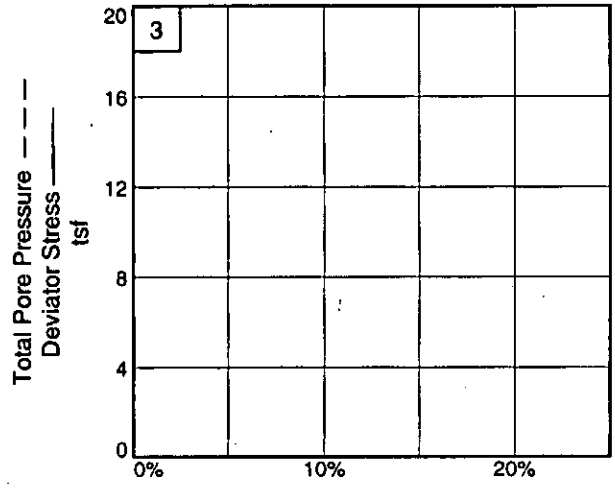
Proj. No.: 0121-3070.03 **Date:** 7/12/07

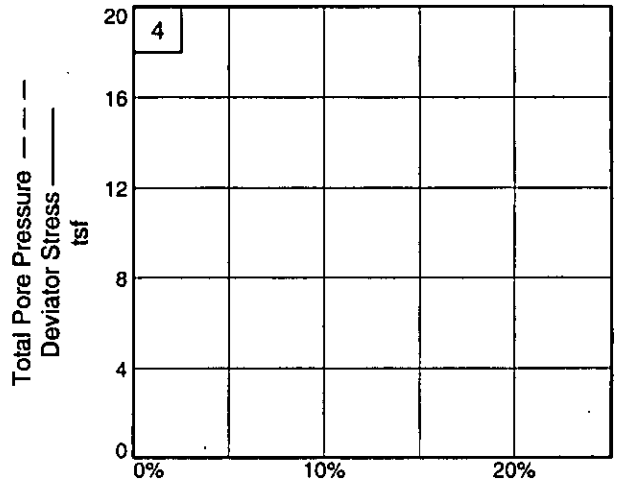
DLZ

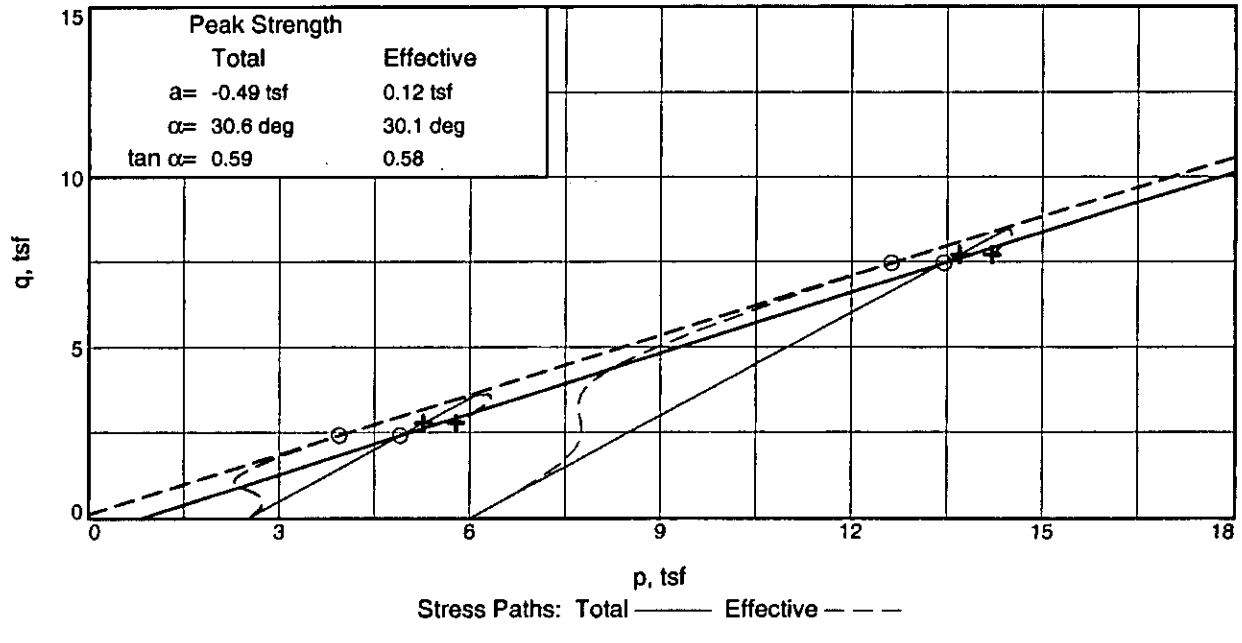
Figure _____





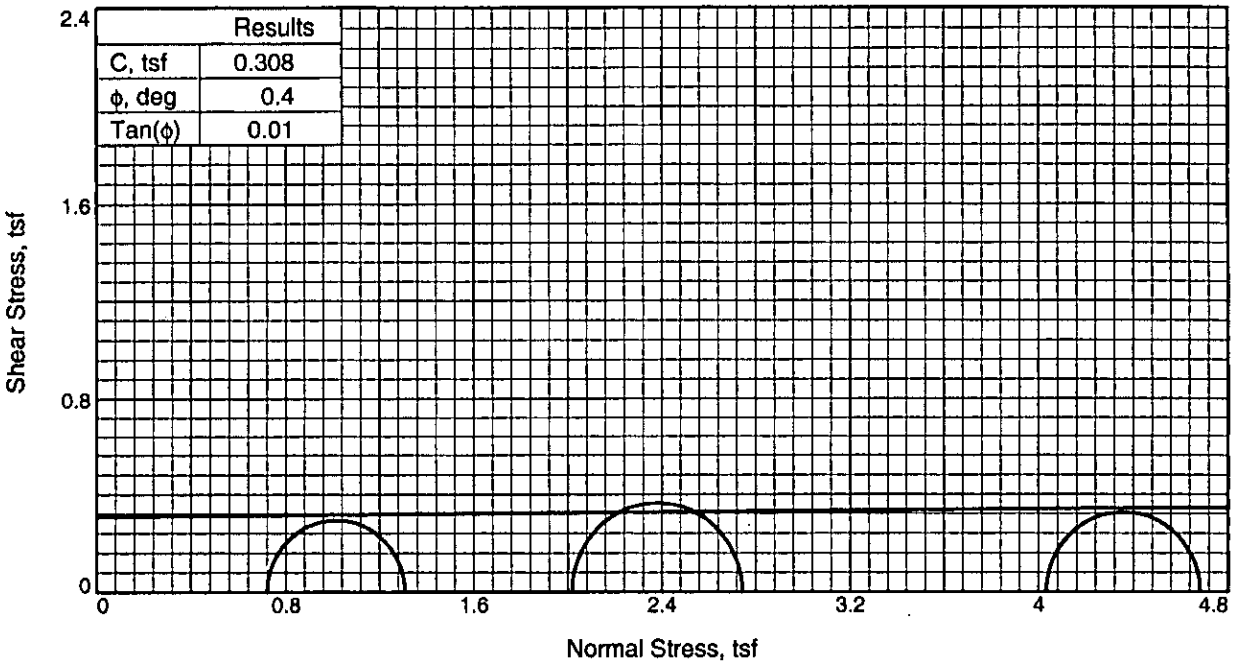


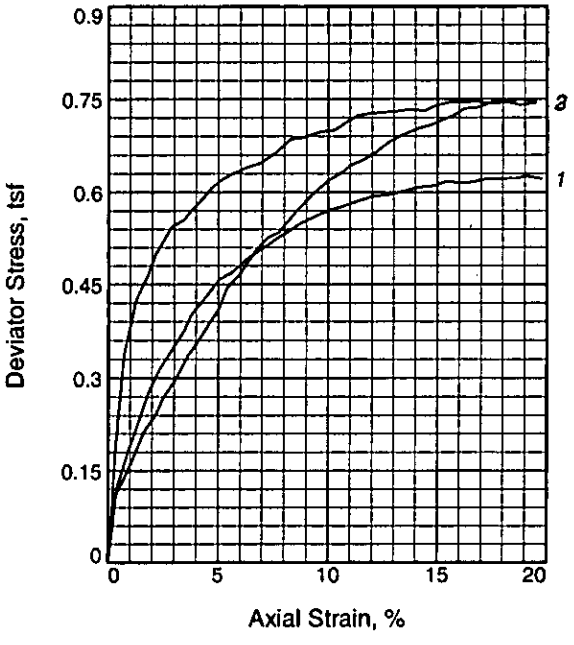




Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: B-38 **Depth:** 37.0 **Sample Number:** ST-3
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1	2	3
Initial	Water Content,	28.0	28.2	27.1
	Dry Density, pcf	95.5	94.2	97.1
	Saturation,	96.5	94.5	96.8
	Void Ratio	0.7980	0.8215	0.7687
	Diameter, in.	2.81	2.81	2.79
	Height, in.	5.52	5.55	5.54
At Test	Water Content,	28.3	27.8	27.5
	Dry Density, pcf	95.5	94.2	97.1
	Saturation,	97.4	93.2	98.5
	Void Ratio	0.7980	0.8215	0.7687
	Diameter, in.	2.81	2.81	2.79
	Height, in.	5.52	5.55	5.54
Strain rate, in./min.		0.06	0.06	0.06
Back Pressure, tsf		0.00	0.00	0.00
Cell Pressure, tsf		0.72	2.02	4.03
Fail. Stress, tsf		0.59	0.73	0.65
Ult. Stress, tsf		0.59	0.73	0.65
σ_1 Failure, tsf		1.31	2.74	4.68
σ_3 Failure, tsf		0.72	2.02	4.03

Type of Test:
Unconsolidated Undrained

Sample Type: 3" press tube

Description: Lean clay

LL= 29 **PL=** 19 **PI=** 10

Assumed Specific Gravity= 2.75

Remarks:

Client: TranSystems, Inc.

Project: SCI-823-0.00

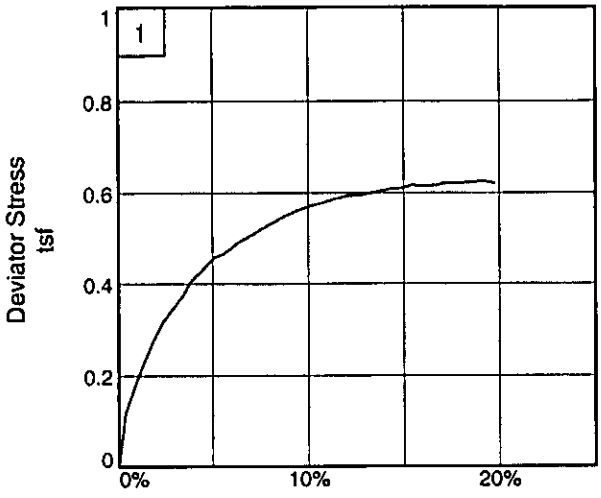
Source of Sample: B-39 **Depth:** 10.0

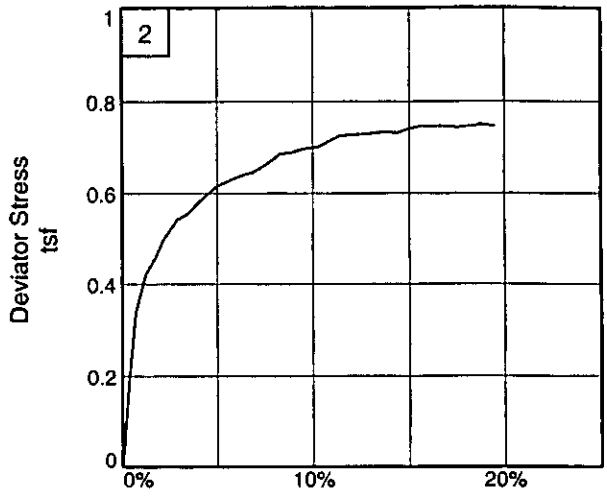
Sample Number: ST-1

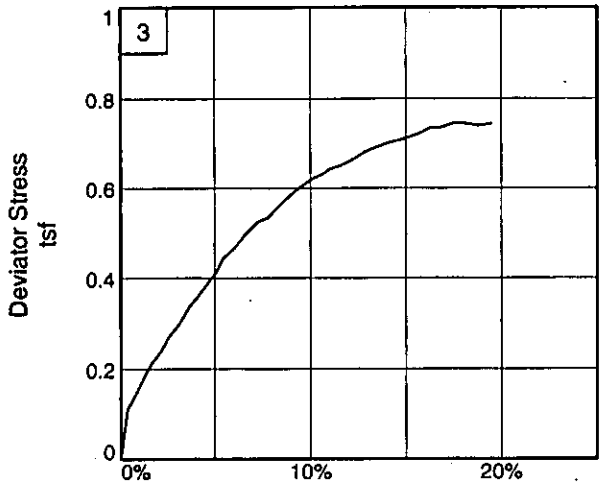
Proj. No.: 0121-3070.03 **Date:** 6/7/07

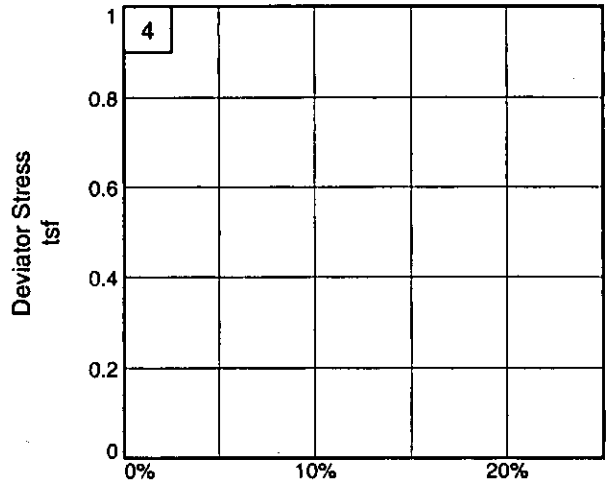
DLZ

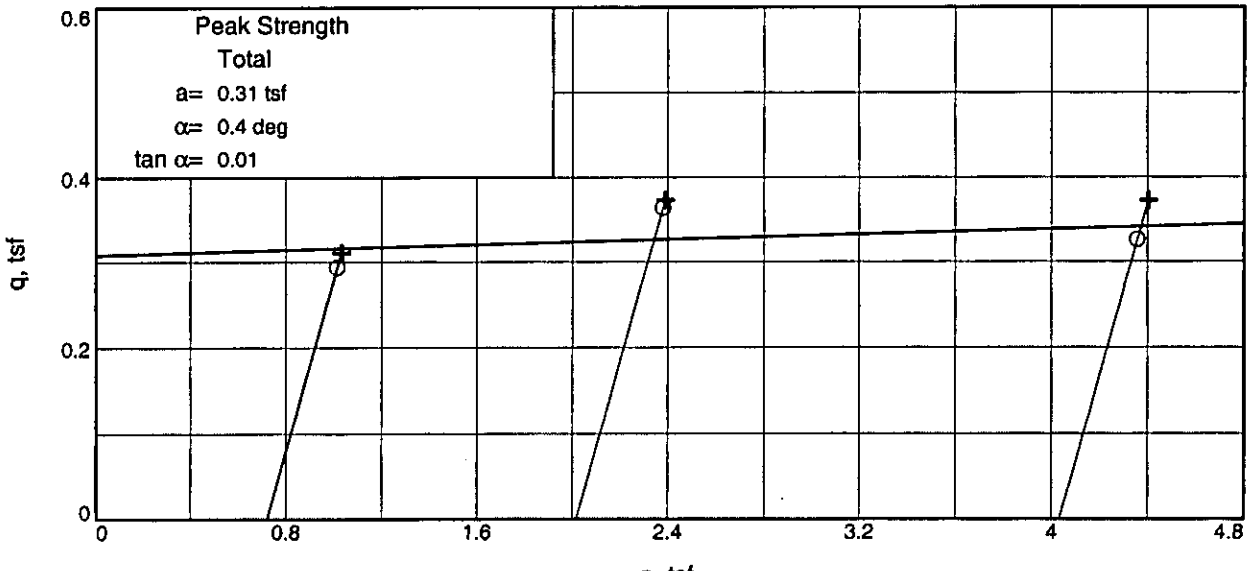
Figure _____







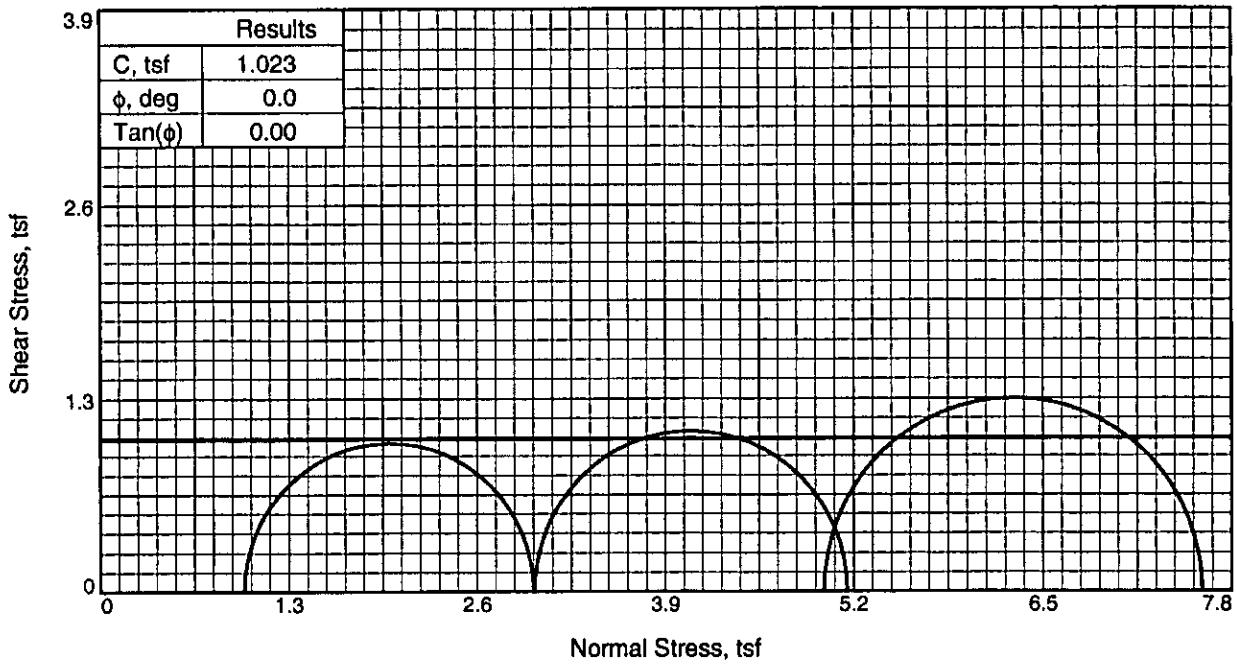


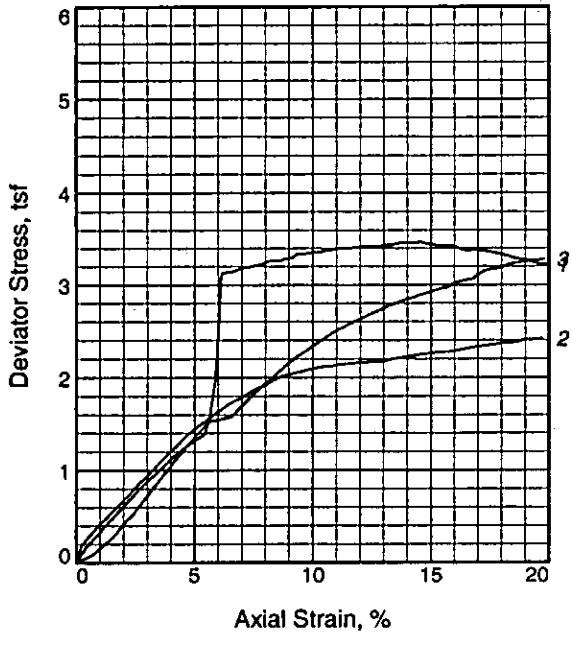


Stress Paths: o indicates peak + indicates end

Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: B-39 **Depth:** 10.0 **Sample Number:** ST-1
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1	2	3
Initial	Water Content,	23.0	23.0	23.0
	Dry Density, pcf	107.8	105.3	106.9
	Saturation,	109.9	103.1	107.4
	Void Ratio	0.5641	0.6012	0.5774
	Diameter, in.	2.79	2.81	2.81
	Height, in.	5.43	5.41	5.48
At Test	Water Content,	23.7	25.6	23.0
	Dry Density, pcf	107.8	105.3	106.9
	Saturation,	113.6	115.2	107.5
	Void Ratio	0.5641	0.6012	0.5774
	Diameter, in.	2.79	2.81	2.81
	Height, in.	5.43	5.41	5.48
Strain rate, in./min.		0.06	0.06	0.06
Back Pressure, tsf		0.00	0.00	0.00
Cell Pressure, tsf		0.99	3.00	5.00
Fail. Stress, tsf		2.00	2.16	2.60
Ult. Stress, tsf		2.00	2.16	2.60
σ_1 Failure, tsf		2.99	5.16	7.60
σ_3 Failure, tsf		0.99	3.00	5.00

Type of Test:
Unconsolidated Undrained
Sample Type: 3" press tube
Description: Silty clay

LL= 25 **PL=** 20 **PI=** 5
Assumed Specific Gravity= 2.7
Remarks:

Client: TranSystems, Inc.

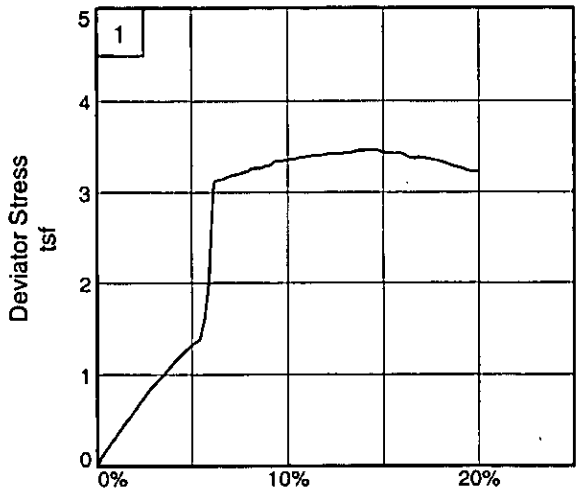
Project: SCI-823-0.00

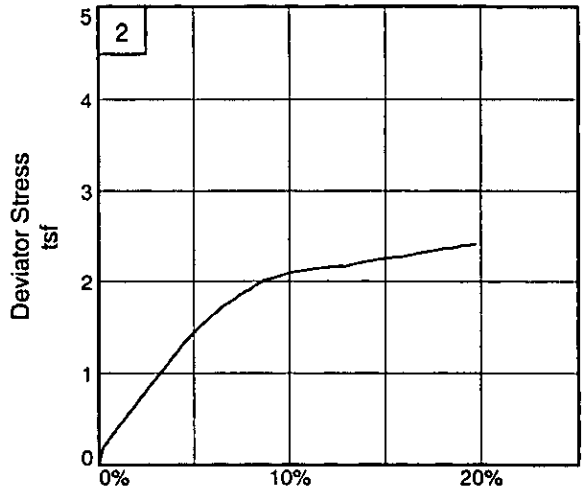
Source of Sample: B-40 **Depth:** 20.0
Sample Number: ST-4

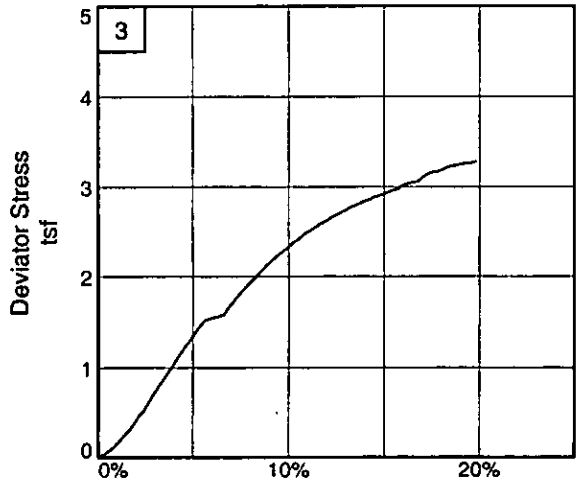
Proj. No.: 0121-3070.03 **Date:** 6/12/07

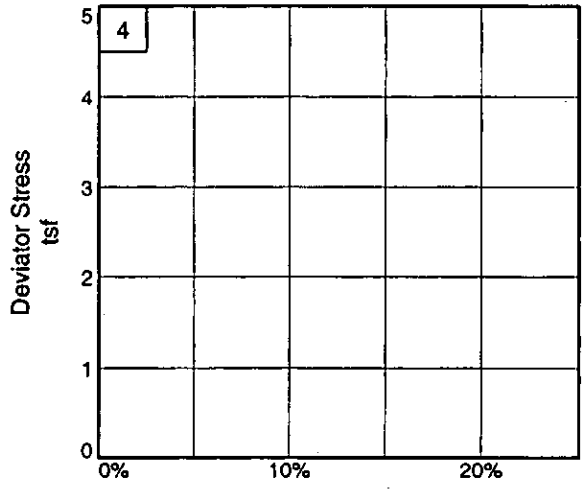
DLZ

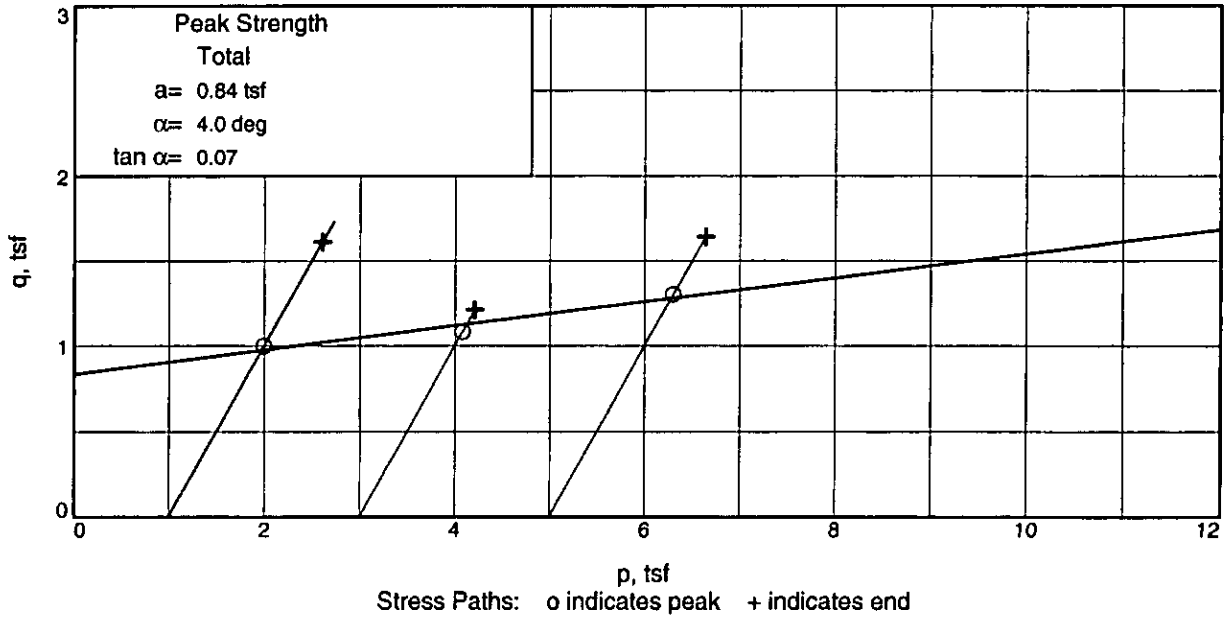
Figure _____









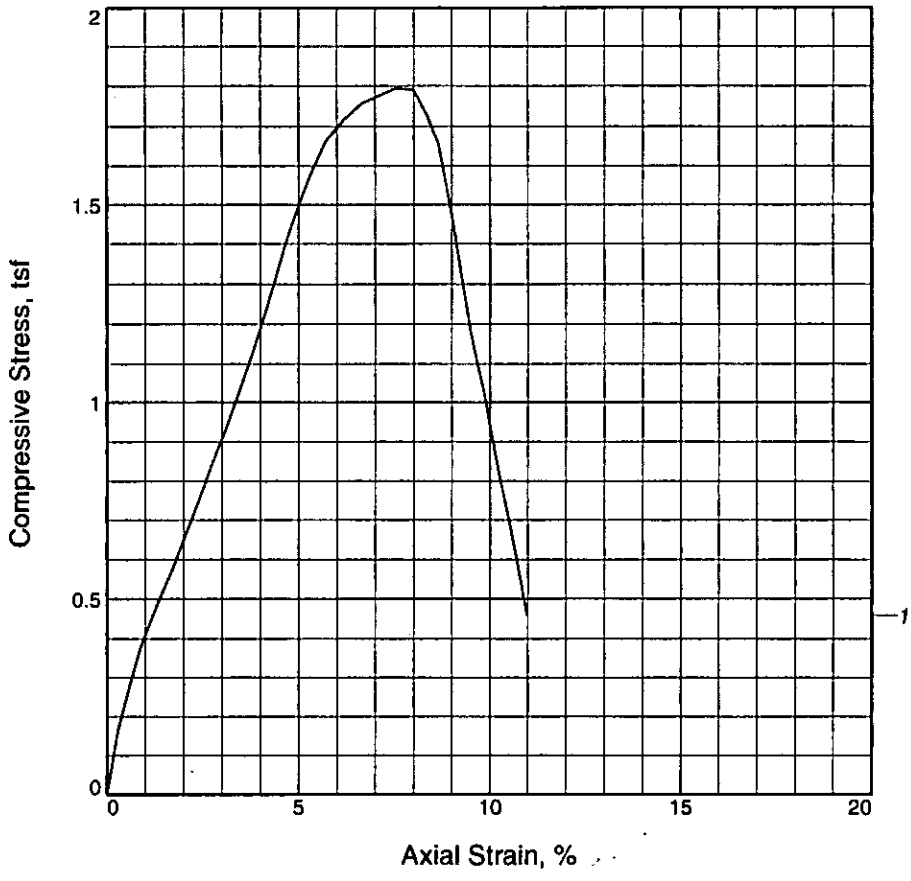


Stress Paths: o indicates peak + indicates end

Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: B-40 **Depth:** 20.0 **Sample Number:** ST-4
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, tsf	1.795			
Undrained shear strength, tsf	0.897			
Failure strain,	7.5			
Strain rate, in./min.	0.06			
Water content, %	26.6			
Wet density, pcf	125.7			
Dry density, pcf	99.3			
Saturation, %	99.0			
Void ratio	0.7484			
Specimen diameter, in.	2.80			
Specimen height, in.	5.55			
Height/diameter ratio	1.98			

Description: Lean clay

LL = 49	**PL** = 23	**PI** = 26	**GS**= 2.78	**Type:** 3" press tube

Project No.: 0121-3070.03

Date: 8/5/05

Remarks:

Figure _____

Client: TranSystems, Inc.

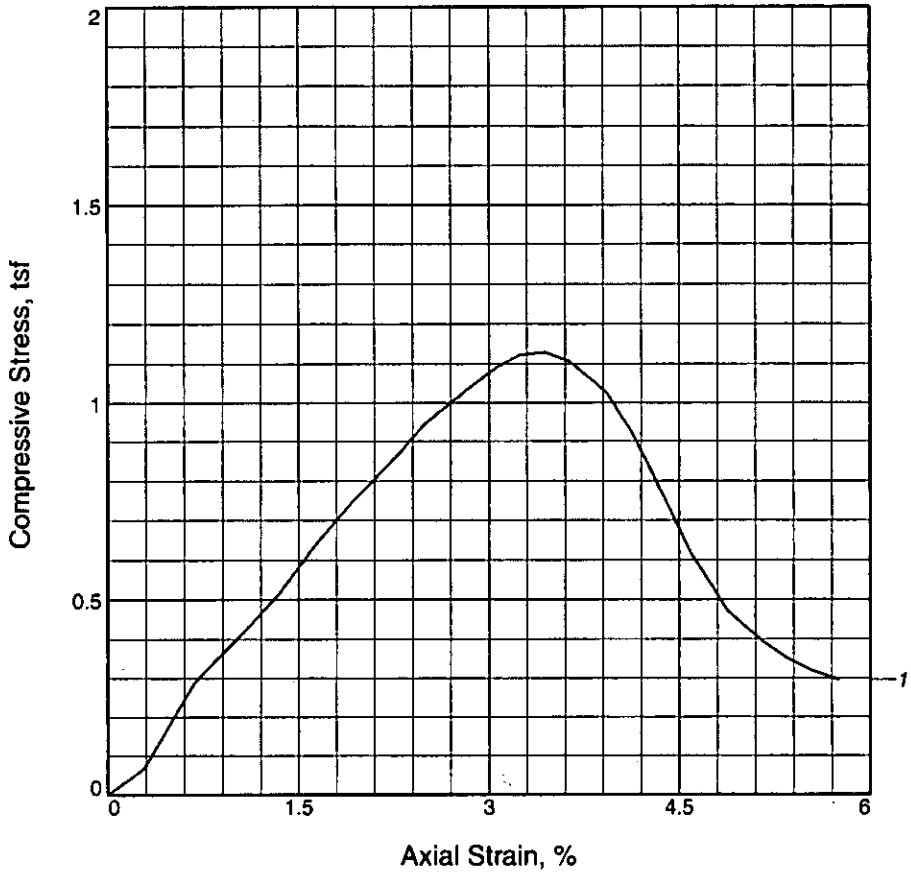
Project: SCI-823-0.00

Source of Sample: R-61 **Depth:** 6.0

Sample Number: P-1

DLZ

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, tsf	1.129			
Undrained shear strength, tsf	0.565			
Failure strain,	3.4			
Strain rate, in./min.	0.06			
Water content, %	26.9			
Wet density, pcf	126.1			
Dry density, pcf	99.3			
Saturation, %	99.7			
Void ratio	0.7533			
Specimen diameter, in.	2.83			
Specimen height, in.	5.52			
Height/diameter ratio	1.95			

Description: Silt

LL = 24	**PL** = 21	**PI** = 3	**GS**= 2.79	**Type:** 3" Press Tube

Project No.: 0121-3070.03

Date: 8/6/05

Remarks:

Figure _____

Client: TranSystems, Inc.

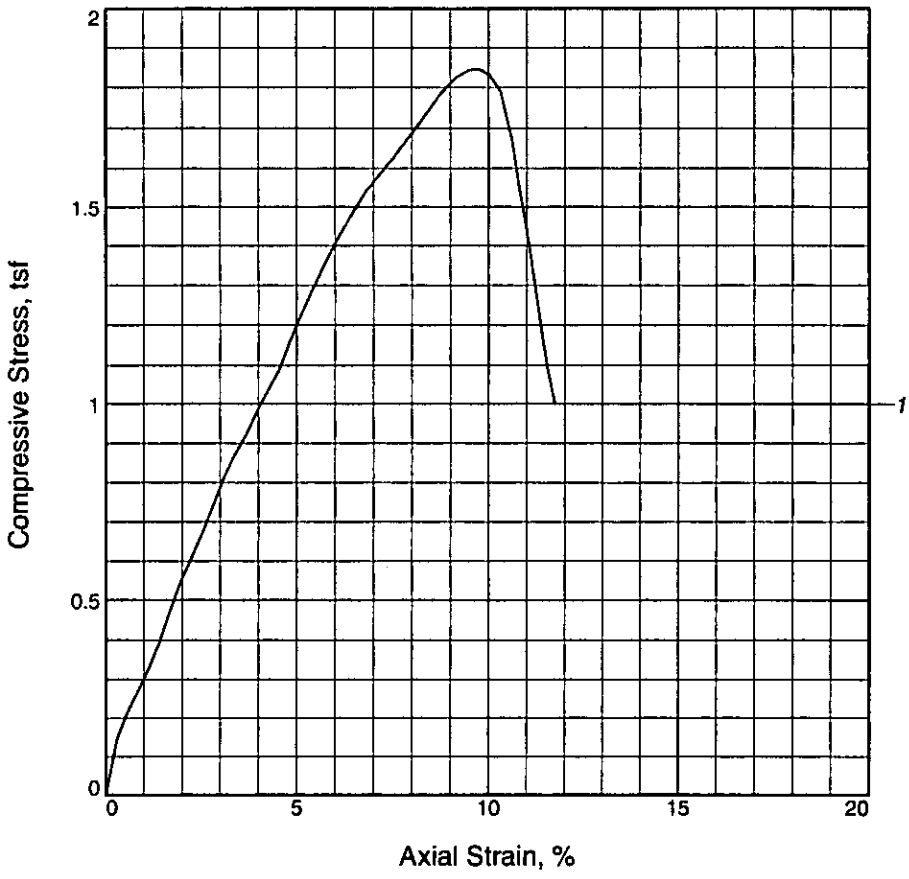
Project: SCI-823-0.00

Source of Sample: R-61 **Depth:** 18.0

Sample Number: P-2

DLZ

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, tsf	1.847			
Undrained shear strength, tsf	0.924			
Failure strain,	9.7			
Strain rate, in./min.	0.06			
Water content, %	25.1			
Wet density, pcf	127.9			
Dry density, pcf	102.2			
Saturation, %	100.0			
Void ratio	0.6974			
Specimen diameter, in.	2.81			
Specimen height, in.	5.55			
Height/diameter ratio	1.97			

Description: Lean clay

LL = 29	**PL** = 19	**PI** = 10	**GS**= 2.78	**Type:** 3' Press Tube

Project No.: 0121-3070.03

Date: 8/6/05

Remarks:

Figure _____

Client: TranSystems, Inc.

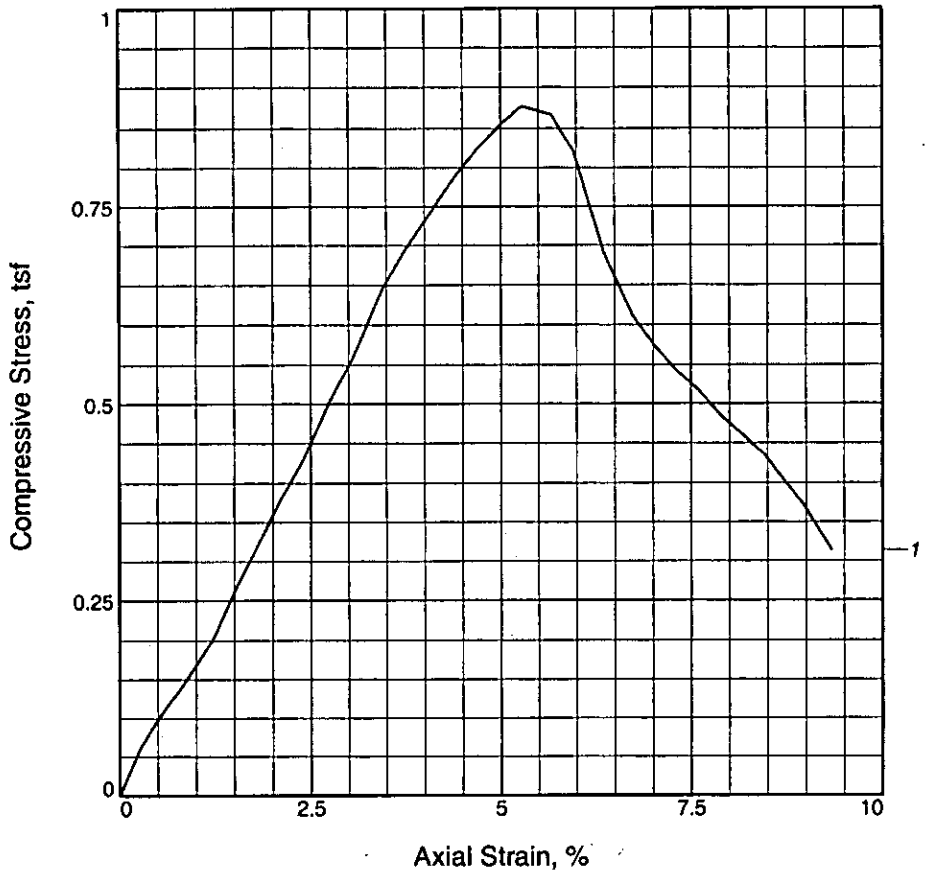
Project: SCI-823-0.00

Source of Sample: R-61 **Depth:** 33.5

Sample Number: P-3

DLZ

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, tsf	0.876			
Undrained shear strength, tsf	0.438			
Failure strain,	5.3			
Strain rate, in./min.	0.06			
Water content, %	27.5			
Wet density, pcf	124.3			
Dry density, pcf	97.5			
Saturation, %	99.8			
Void ratio	0.7539			
Specimen diameter, in.	2.83			
Specimen height, in.	5.52			
Height/diameter ratio	1.95			

Description: Lean clay

LL = 34	**PL** = 22	**PI** = 12	**GS**= 2.74	**Type:** 3" Press Tube

Project No.: 0121-3070.03

Date: 8/6/05

Remarks:

Client: TranSystems, Inc.

Project: SCI-823-0.00

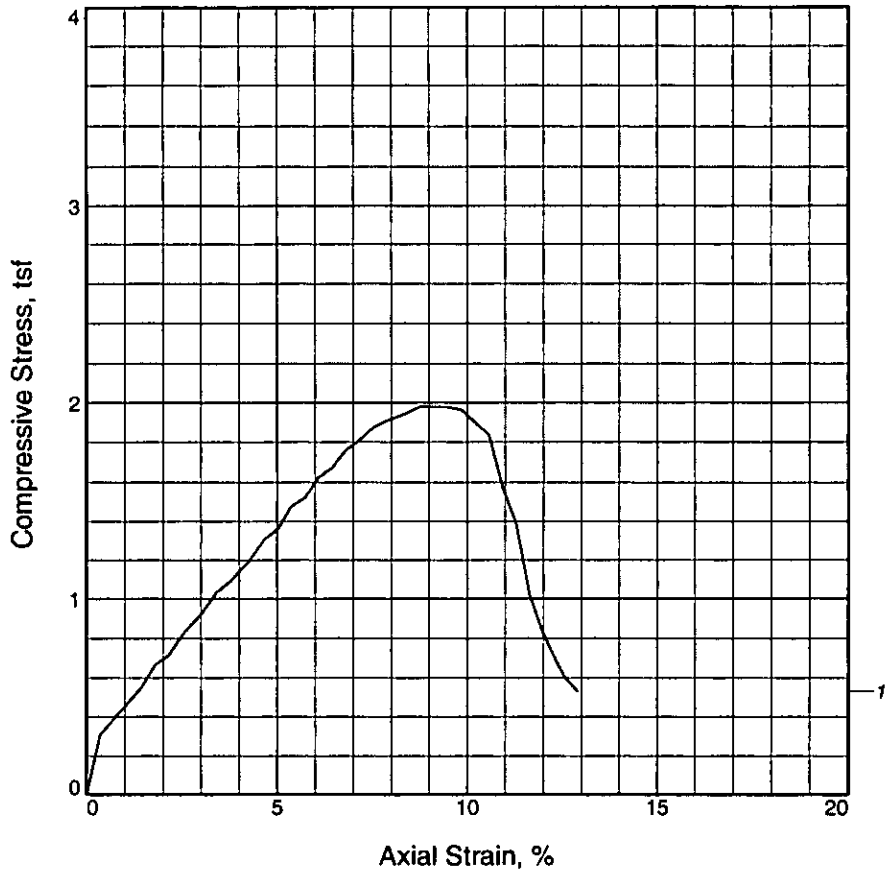
Source of Sample: R-64 **Depth:** 18.0

Sample Number: P2

Figure _____

DLZ

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, tsf	1.979			
Undrained shear strength, tsf	0.989			
Failure strain,	9.1			
Strain rate, in./min.	0.06			
Water content, %	21.3			
Wet density, pcf	124.2			
Dry density, pcf	102.4			
Saturation, %	88.9			
Void ratio	0.6460			
Specimen diameter, in.	2.84			
Specimen height, in.	5.59			
Height/diameter ratio	1.97			

Description: Lean clay

LL = 45	**PL** = 22	**PI** = 23	**Assumed GS**= 2.7	**Type:** 3" Press Tube

Project No.: 0121-3070.03

Date: 2/8/06

Remarks:
Sample S1 - 5.0' to 5.9'

Figure _____

Client: TranSystems, Inc.

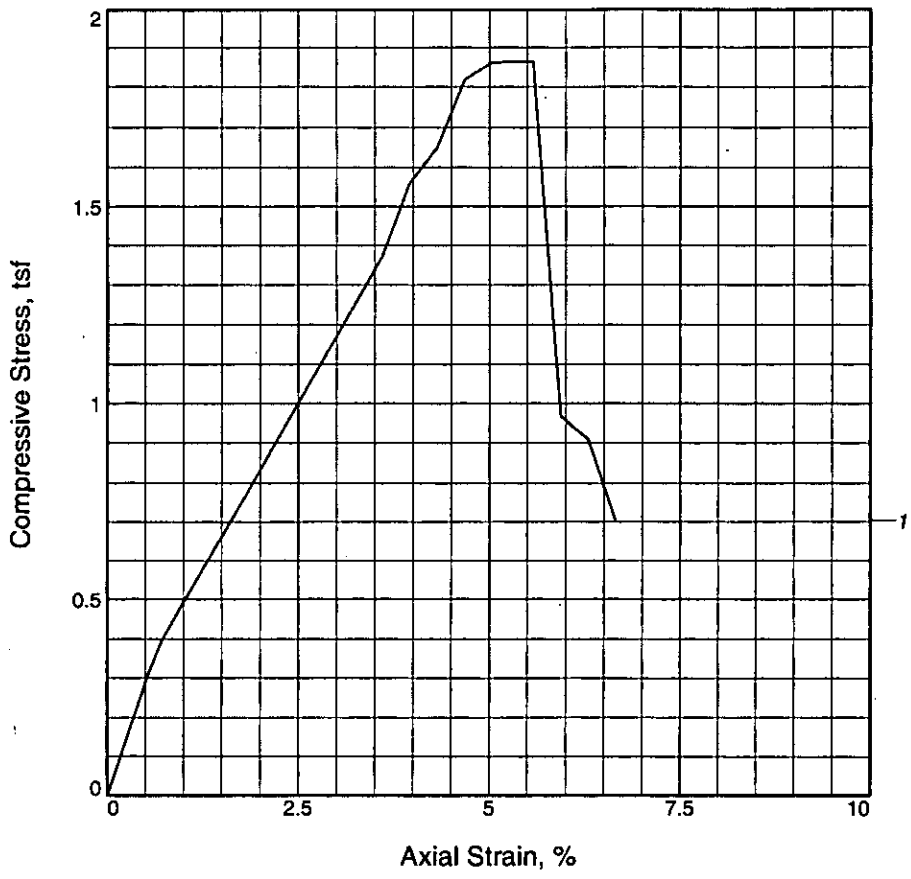
Project: SCI-823-0.00

Source of Sample: R-64A **Depth:** 5.0

Sample Number: P1A

DLZ

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, tsf	1.864			
Undrained shear strength, tsf	0.932			
Failure strain,	5.6			
Strain rate, in./min.	0.06			
Water content, %	22.6			
Wet density, pcf	120.2			
Dry density, pcf	98.1			
Saturation, %	82.8			
Void ratio	0.7499			
Specimen diameter, in.	2.84			
Specimen height, in.	5.56			
Height/diameter ratio	1.96			

Description: Lean clay

LL = 35	**PL** = 23	**PI** = 12	**Assumed GS=** 2.75	**Type:** 3" Press Tube

Project No.: 0121-3070.03

Date: 2/8/06

Remarks:

Client: TranSystems, Inc.

Project: SCI-823-0.00

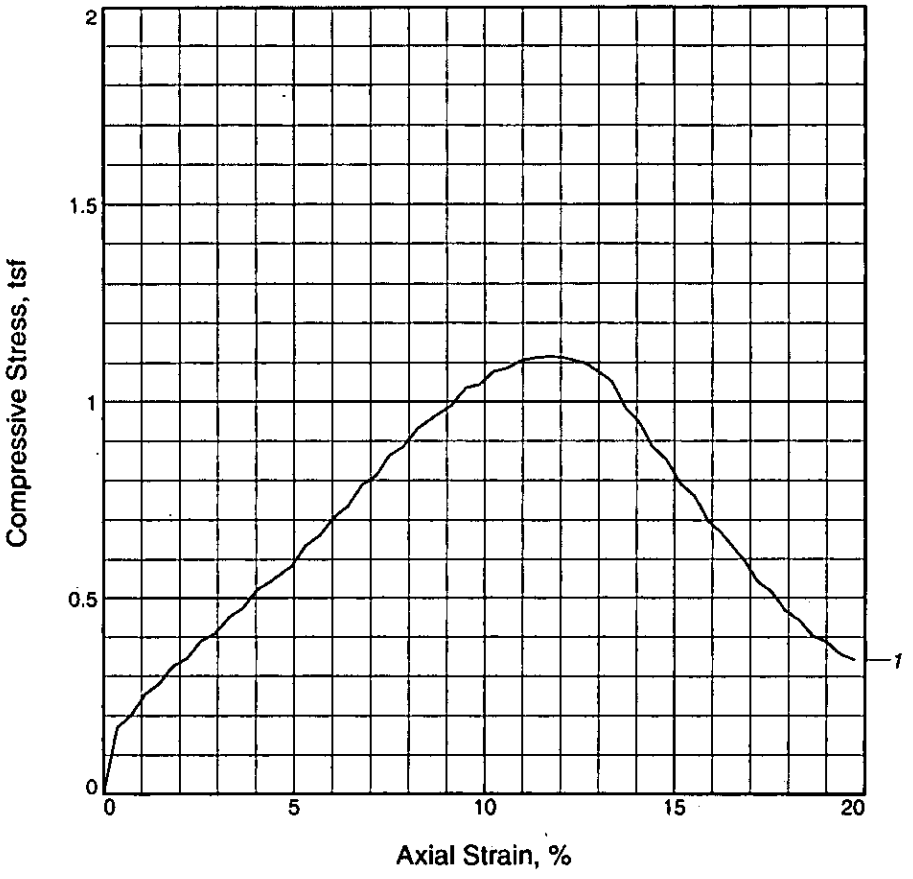
Source of Sample: R-64A **Depth:** 5.9

Sample Number: P1B

Figure _____

DLZ

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, tsf	1.116			
Undrained shear strength, tsf	0.558			
Failure strain,	11.7			
Strain rate, in./min.	0.06			
Water content, %	25.0			
Wet density, pcf	124.7			
Dry density, pcf	99.7			
Saturation, %	97.9			
Void ratio	0.6902			
Specimen diameter, in.	2.88			
Specimen height, in.	5.47			
Height/diameter ratio	1.90			

Description: Lean clay

LL = 35	**PL** = 21	**PI** = 14	**Assumed GS=** 2.7	**Type:** 3" Press Tube

Project No.: 0121-3070.03

Date: 2/8/06

Remarks:
Sample S1 - 15.0' to 15.8'

Figure _____

Client: TranSystems, Inc.

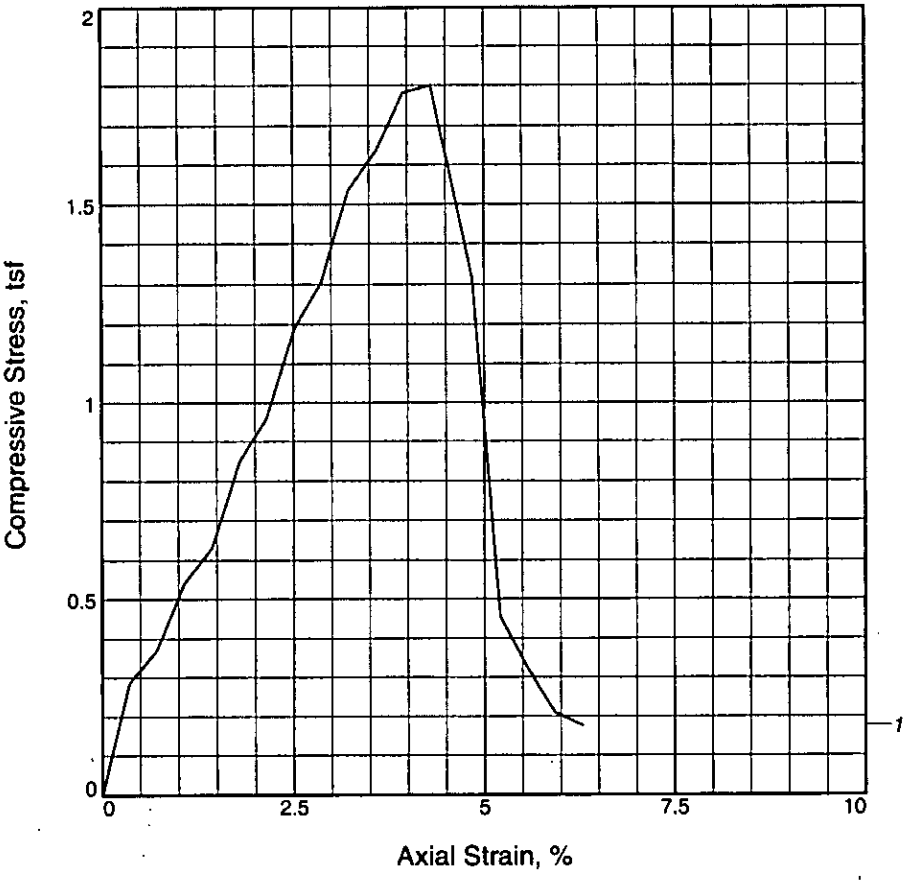
Project: SCI-823-0.00

Source of Sample: R-64A **Depth:** 15.0

Sample Number: P2A

DLZ

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, tsf	1.800			
Undrained shear strength, tsf	0.900			
Failure strain,	4.3			
Strain rate, in./min.	0.06			
Water content, %	22.0			
Wet density, pcf	122.2			
Dry density, pcf	100.1			
Saturation, %	84.6			
Void ratio	0.7143			
Specimen diameter, in.	2.85			
Specimen height, in.	5.57			
Height/diameter ratio	1.95			

Description:

LL =	**PL =**	**PI =**	**Assumed GS=** 2.75	**Type:** 3" Press Tube

Project No.: 0121-3070.03

Date:

Remarks:

Figure _____

Client: TranSystems, Inc.

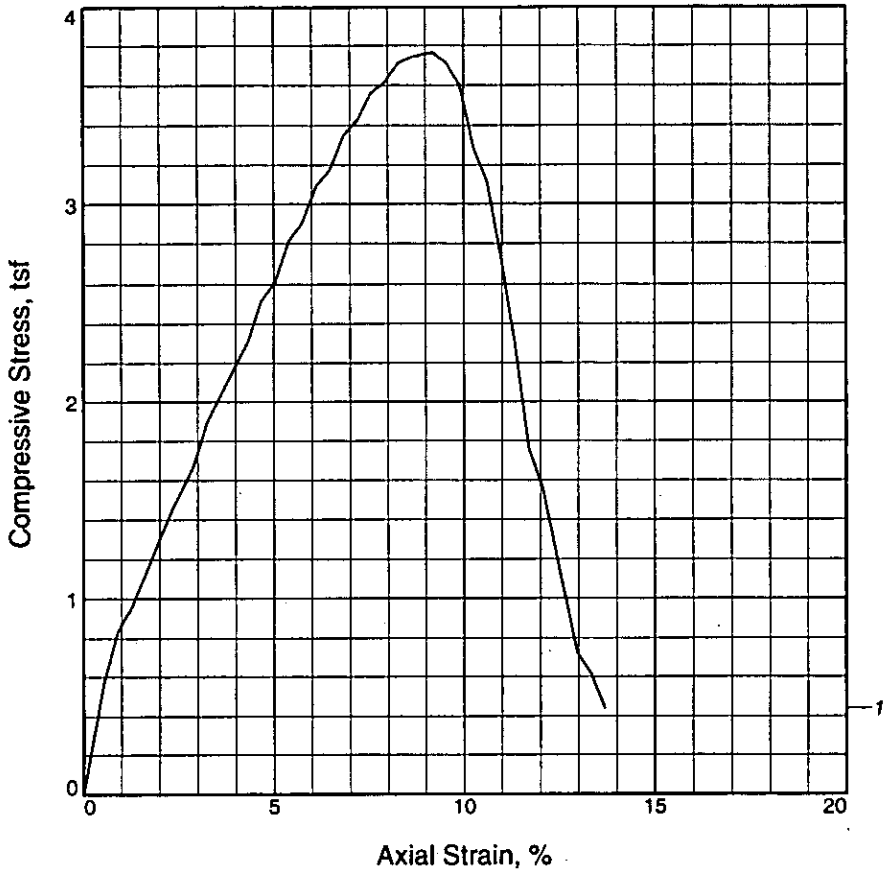
Project: SCI-823-0.00

Source of Sample: R-64A **Depth:** 15.8

Sample Number: P-2B

DLZ

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, tsf	3.766			
Undrained shear strength, tsf	1.883			
Failure strain,	9.2			
Strain rate, in./min.	0.06			
Water content, %	24.4			
Wet density, pcf	127.6			
Dry density, pcf	102.6			
Saturation, %	102.5			
Void ratio	0.6434			
Specimen diameter, in.	2.85			
Specimen height, in.	5.55			
Height/diameter ratio	1.95			

Description:

LL =	**PL =**	**PI =**	**Assumed GS=** 2.7	**Type:** 3" press tube

Project No.: 0121-3070.03

Date:

Remarks:

Figure _____

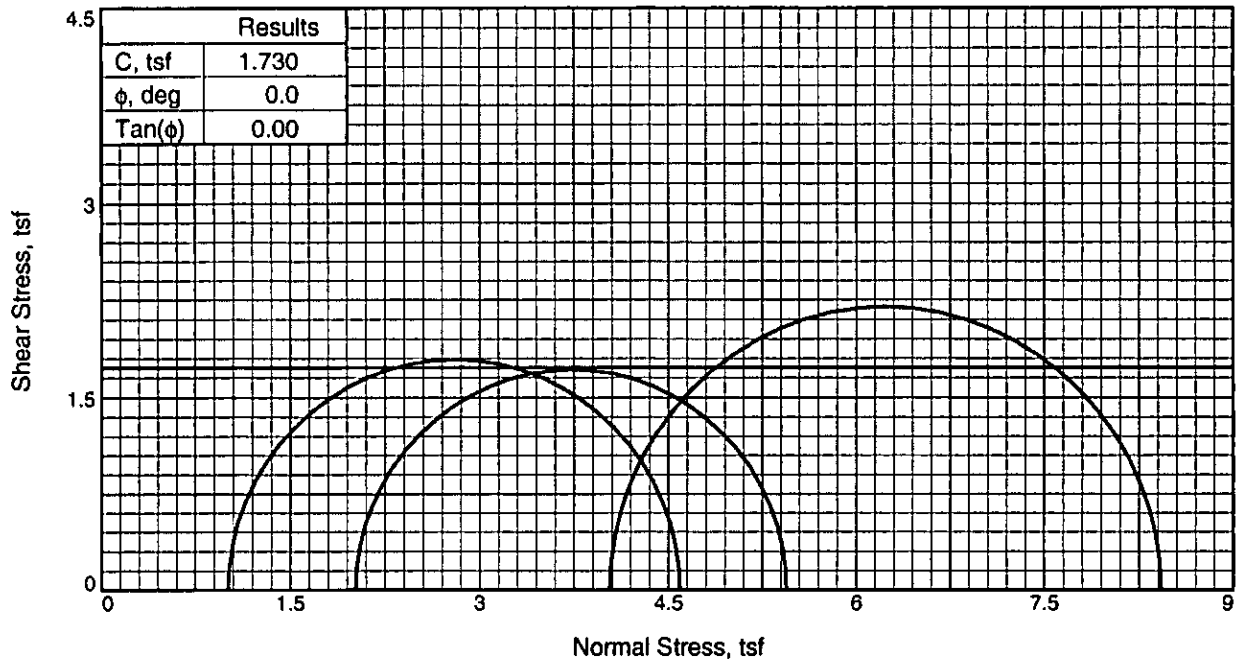
Client: TranSystems, Inc.

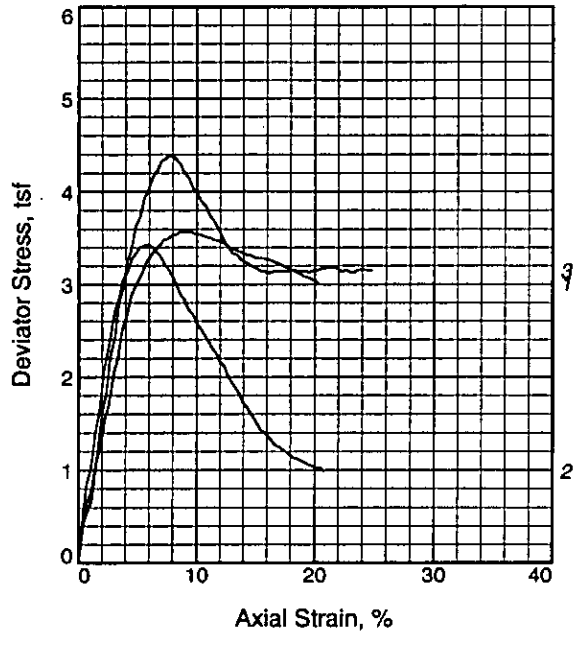
Project: SCI-823-0.00

Source of Sample: R-64A **Depth:** 40.0

Sample Number: P4

DLZ





Sample No.		1	2	3
Initial	Water Content,	25.6	24.8	24.9
	Dry Density, pcf	100.4	101.5	100.6
	Saturation,	101.8	101.4	99.5
	Void Ratio	0.6782	0.6605	0.6762
	Diameter, in.	2.85	2.85	2.86
	Height, in.	5.43	5.58	5.57
At Test	Water Content,	24.7	28.0	24.8
	Dry Density, pcf	100.4	101.5	100.6
	Saturation,	98.3	114.6	99.1
	Void Ratio	0.6782	0.6605	0.6762
	Diameter, in.	2.85	2.85	2.86
	Height, in.	5.43	5.58	5.57
Strain rate, in./min.		0.06	0.06	0.06
Back Pressure, tsf		0.00	0.00	0.00
Cell Pressure, tsf		1.01	2.02	4.03
Fail. Stress, tsf		3.58	3.43	4.39
Ult. Stress, tsf		3.58	3.43	4.39
σ_1 Failure, tsf		4.59	5.44	8.42
σ_3 Failure, tsf		1.01	2.02	4.03

Type of Test:
Unconsolidated Undrained
Sample Type: 3" Press Tube
Description:

LL= 39 **PL=** 22 **PI=** 17
Assumed Specific Gravity= 2.7
Remarks:

Figure _____

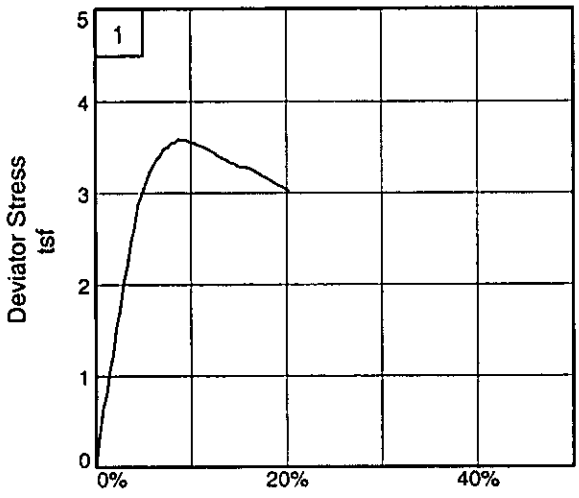
Client: TranSystems, Inc.

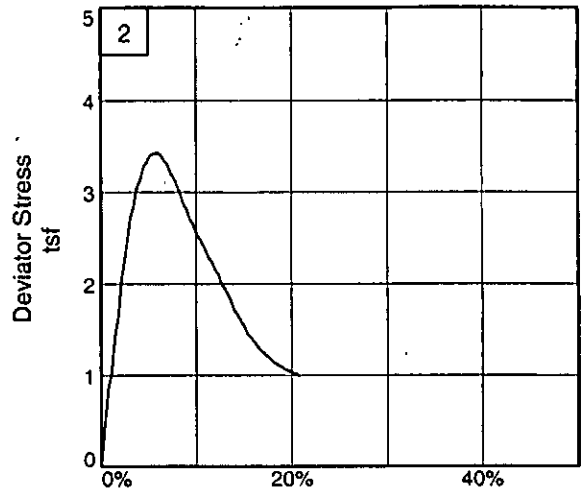
Project: SCI-823-0.00

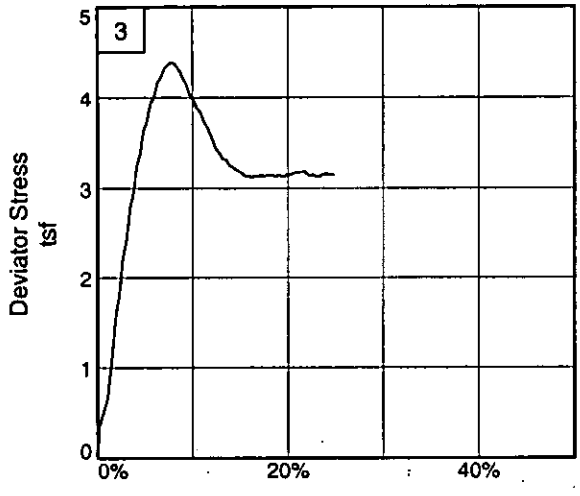
Source of Sample: R-64A **Depth:** 40.0
Sample Number: P4

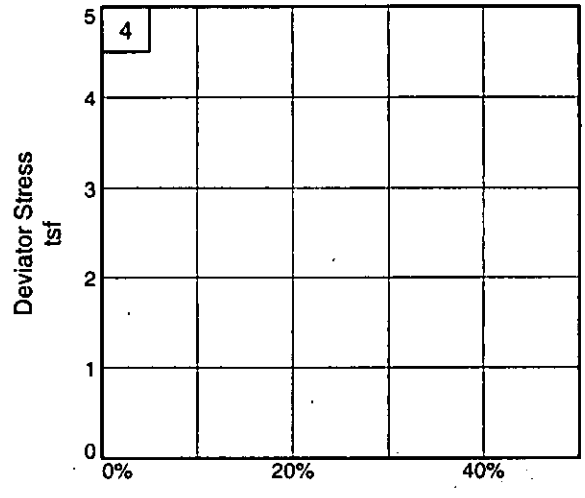
Proj. No.: 0121-3070.03 **Date:** 2/8/06

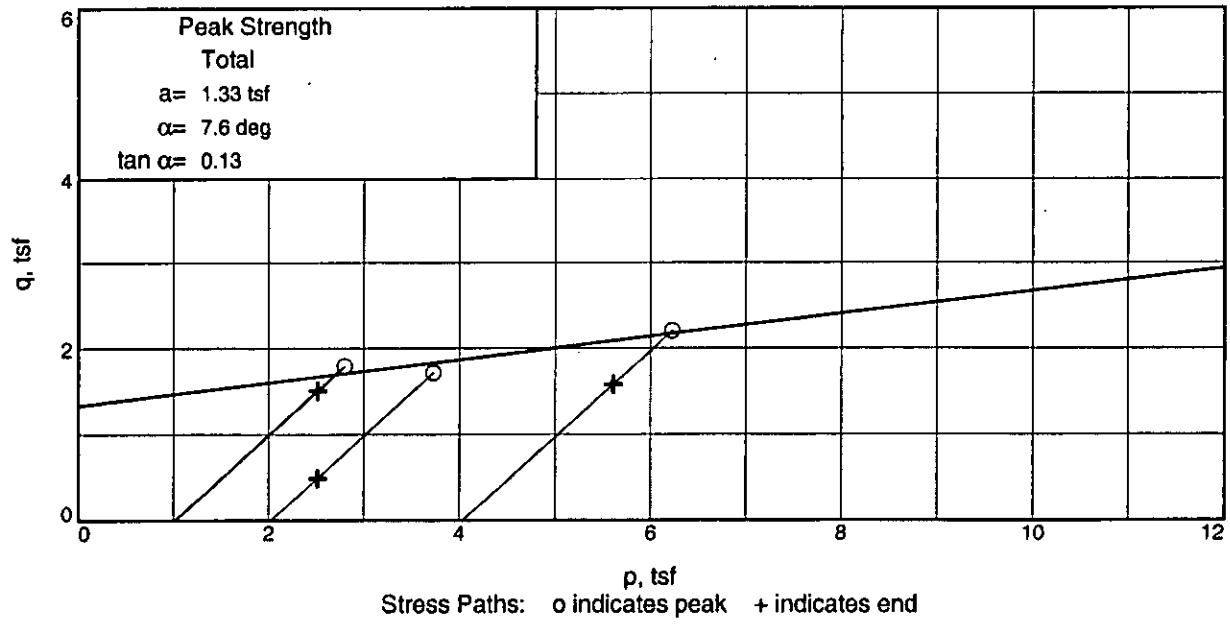
DLZ







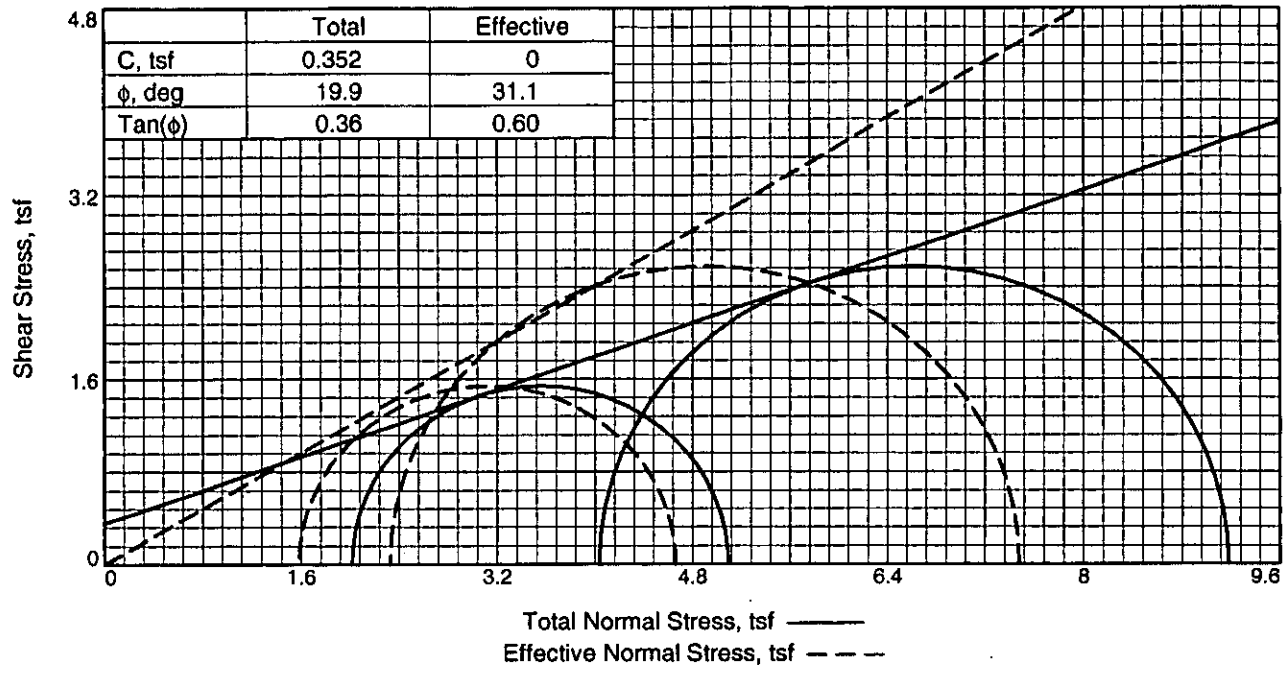


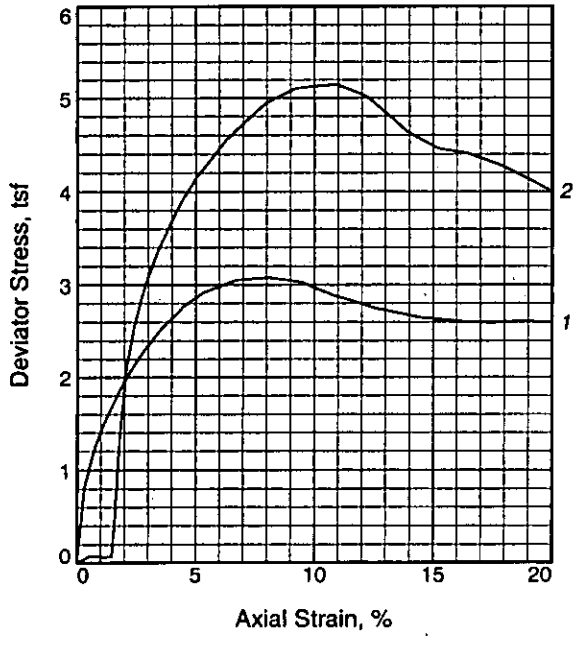


Stress Paths: o indicates peak + indicates end

Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: R-64A **Depth:** 40.0 **Sample Number:** P4
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1	2
Initial	Water Content,	22.6	22.9
	Dry Density, pcf	101.1	99.8
	Saturation,	91.2	89.8
	Void Ratio	0.6679	0.6885
	Diameter, in.	2.85	2.87
	Height, in.	5.21	5.57
At Test	Water Content,	26.7	24.9
	Dry Density, pcf	97.9	100.8
	Saturation,	100.0	100.0
	Void Ratio	0.7220	0.6729
	Diameter, in.	2.89	2.85
	Height, in.	5.21	5.57
Strain rate, in./min.		0.01	0.01
Back Pressure, tsf		4.03	4.03
Cell Pressure, tsf		6.05	8.06
Fail. Stress, tsf		3.08	5.15
Total Pore Pr., tsf		4.47	5.74
Ult. Stress, tsf			
Total Pore Pr., tsf			
$\bar{\sigma}_1$ Failure, tsf		4.66	7.48
$\bar{\sigma}_3$ Failure, tsf		1.58	2.33

Type of Test:
CU with Pore Pressures
Sample Type: 3" Press Tube
Description:

Specific Gravity= 2.7
Remarks:

Figure _____

Client: TranSystems, Inc.

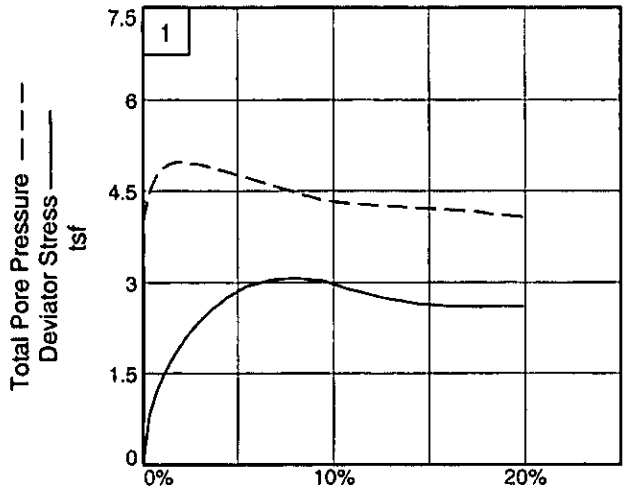
Project: SCI-823-0.00

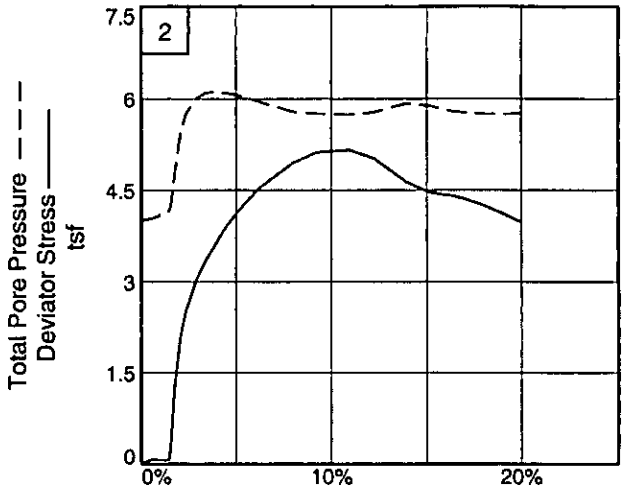
Source of Sample: TR-35A **Depth:** 5.0

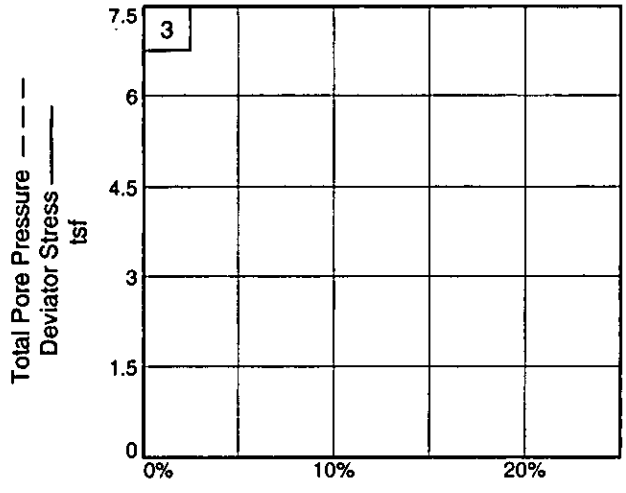
Sample Number: P-1

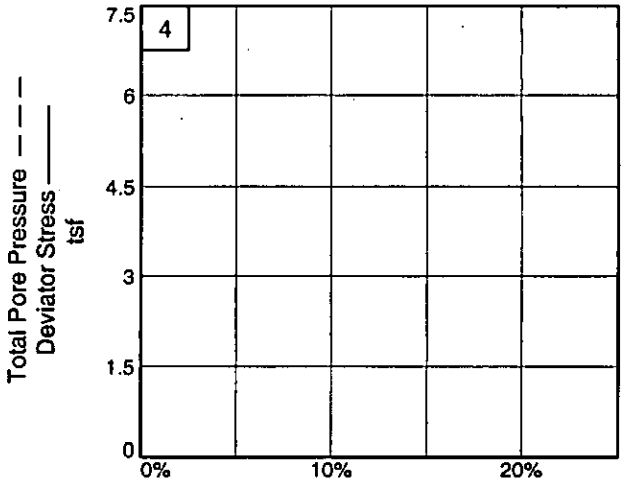
Proj. No.: 0121-3070.03 **Date:**

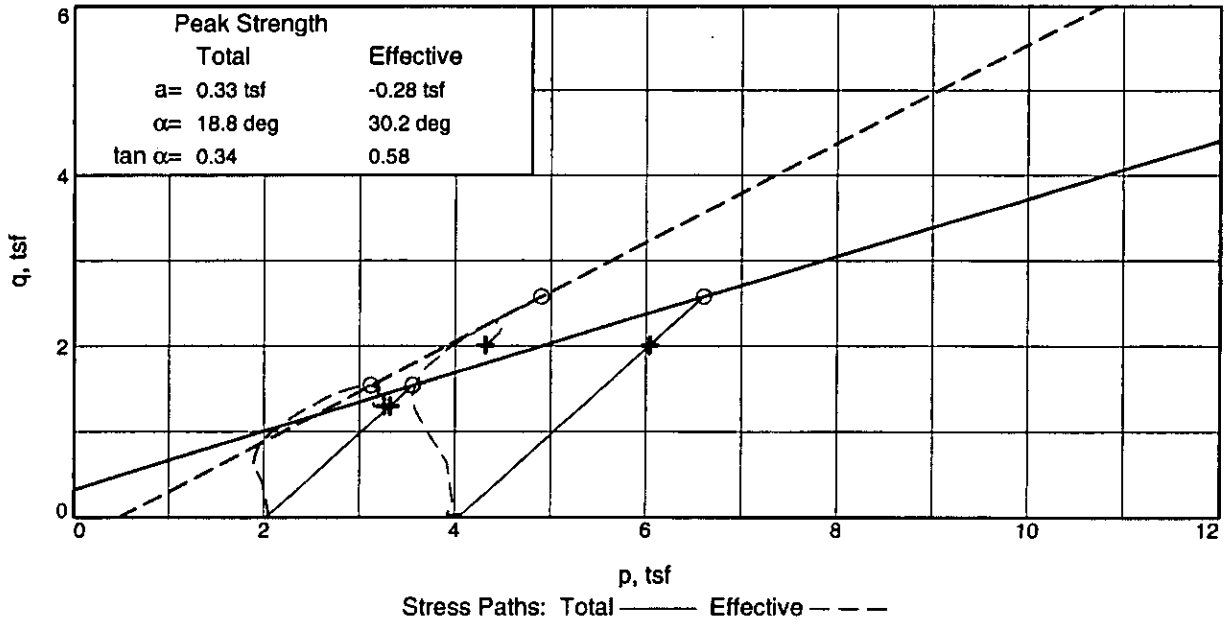
DLZ





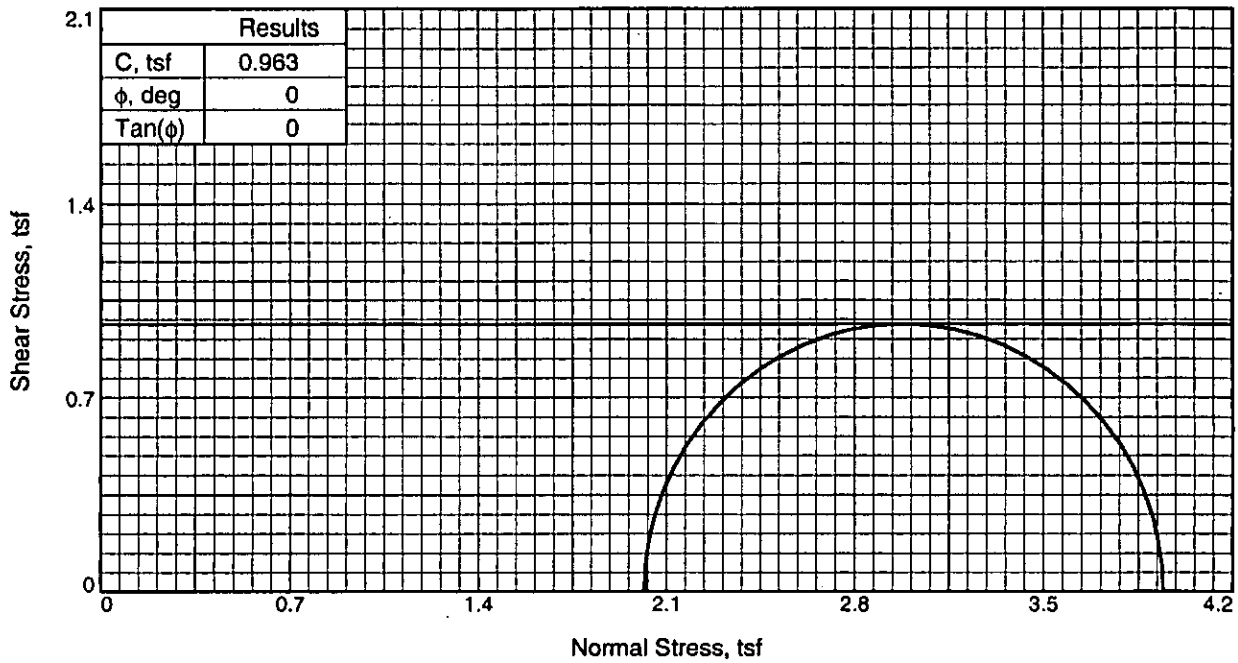


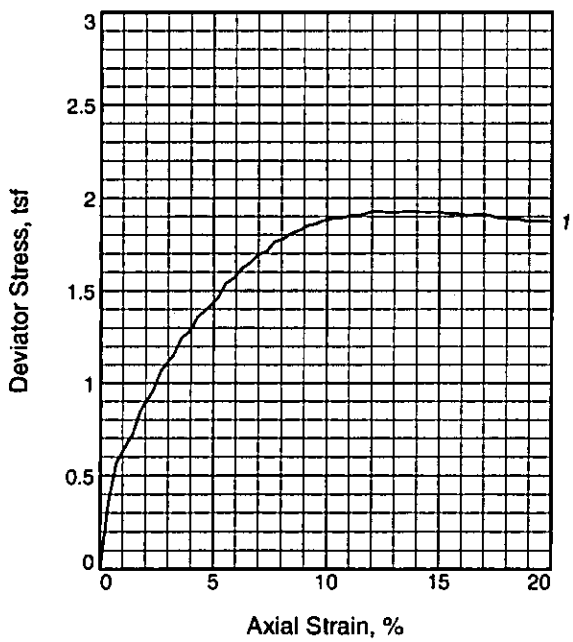




Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: TR-35A **Depth:** 5.0 **Sample Number:** P-1
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1
Initial	Water Content,	25.6
	Dry Density, pcf	97.5
	Saturation,	92.6
	Void Ratio	0.7611
	Diameter, in.	2.85
	Height, in.	5.59
At Test	Water Content,	27.7
	Dry Density, pcf	97.5
	Saturation,	100.0
	Void Ratio	0.7611
	Diameter, in.	2.85
	Height, in.	5.59
Strain rate, in./min.		0.06
Back Pressure, tsf		0.00
Cell Pressure, tsf		2.02
Fail. Stress, tsf		1.93
Ult. Stress, tsf		
σ_1 Failure, tsf		3.94
σ_3 Failure, tsf		2.02

Type of Test:
Unconsolidated Undrained
Sample Type: 3" Press Tube
Description: Lean clay

LL= 27 **PL=** 19 **PI=** 8
Assumed Specific Gravity= 2.75
Remarks:

Figure _____

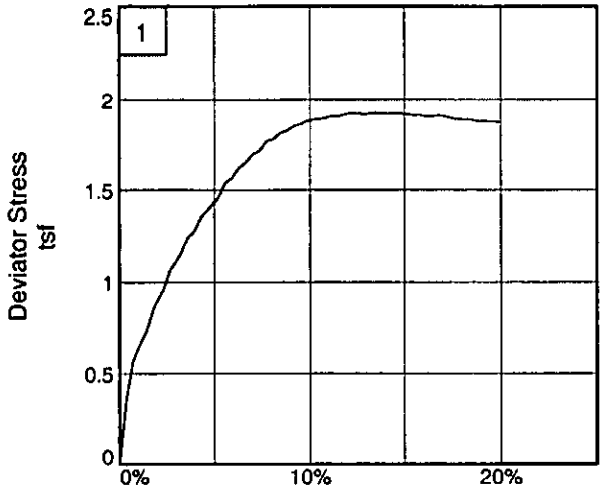
Client: TranSystems, Inc.

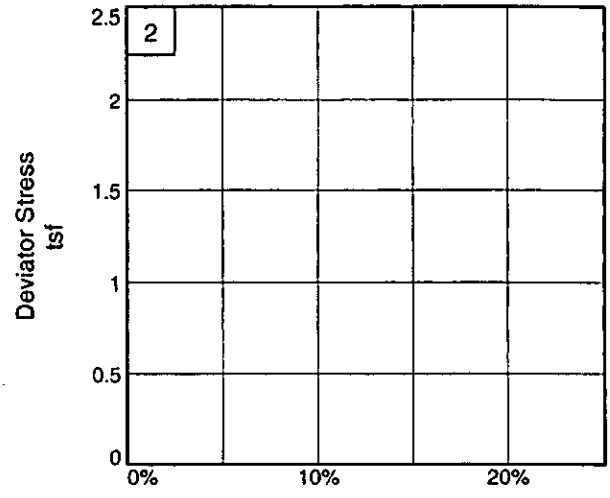
Project: SCI-823-0.00

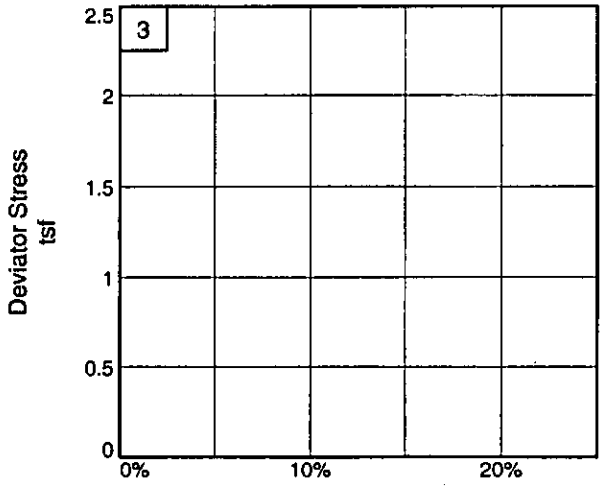
Source of Sample: TR-35A **Depth:** 5.0
Sample Number: P-1

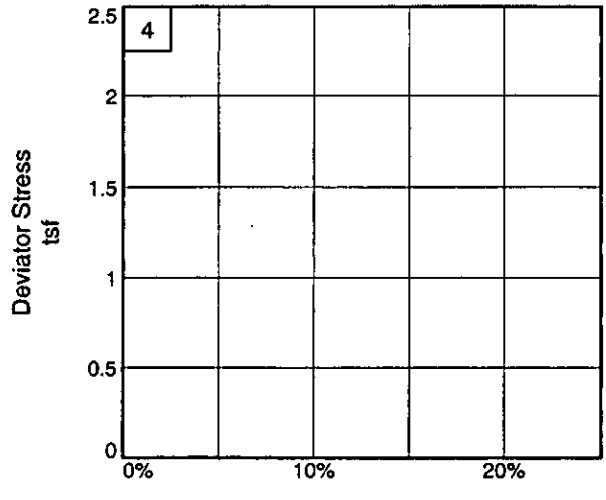
Proj. No.: 0121-3070.03 **Date:** 2/6/06

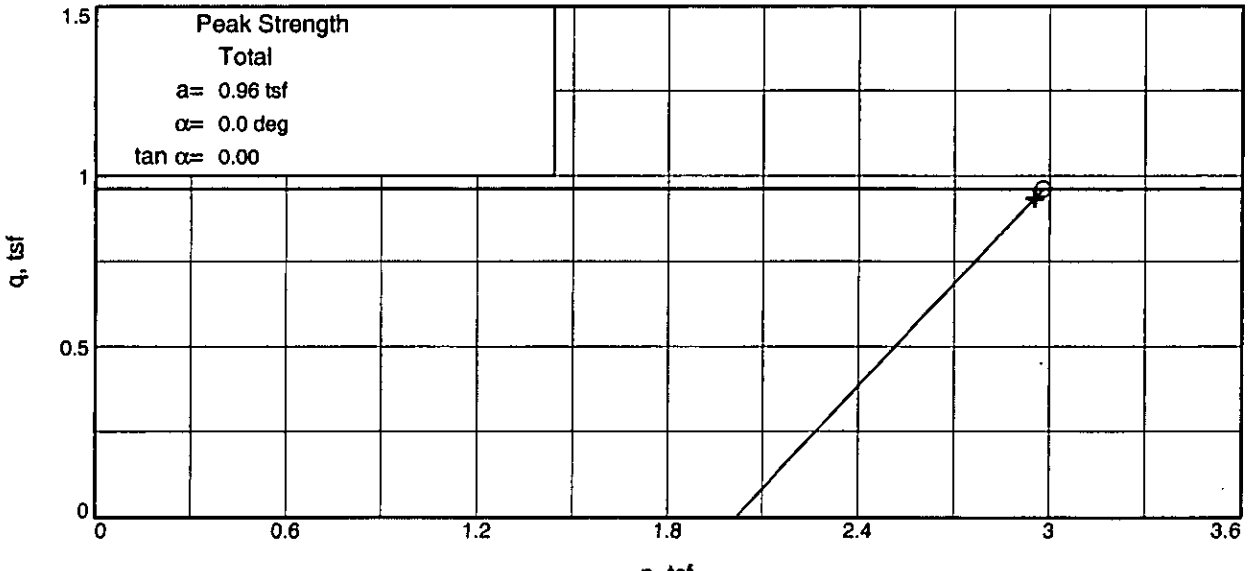
DLZ







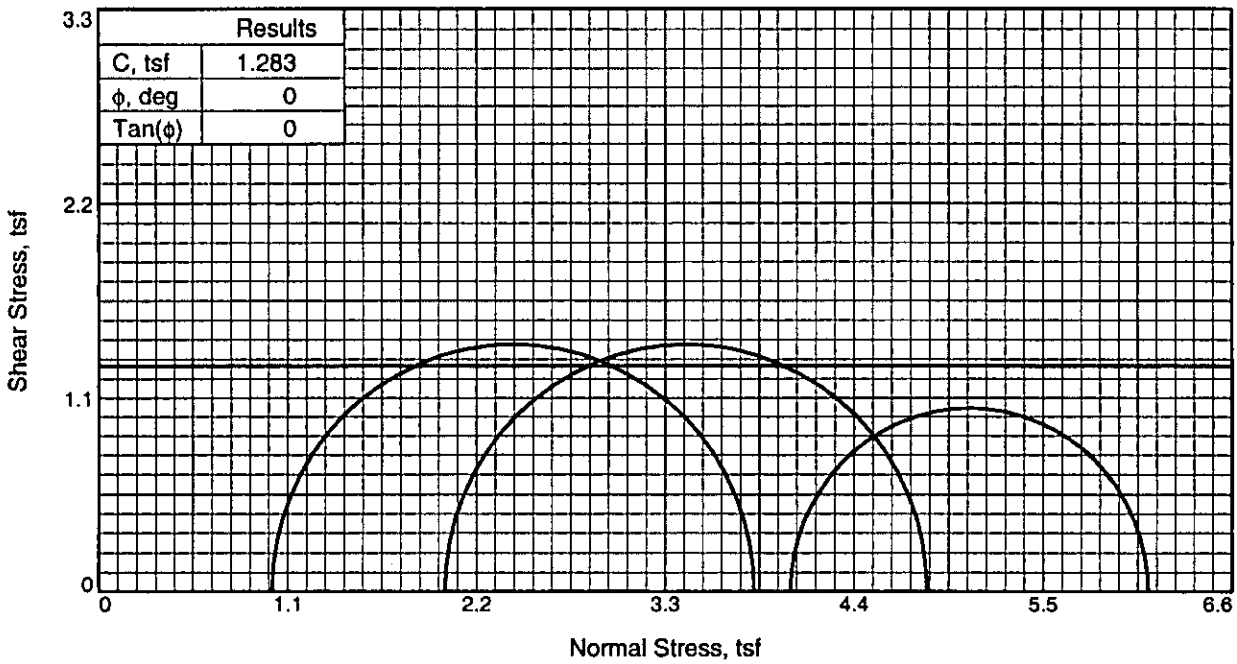


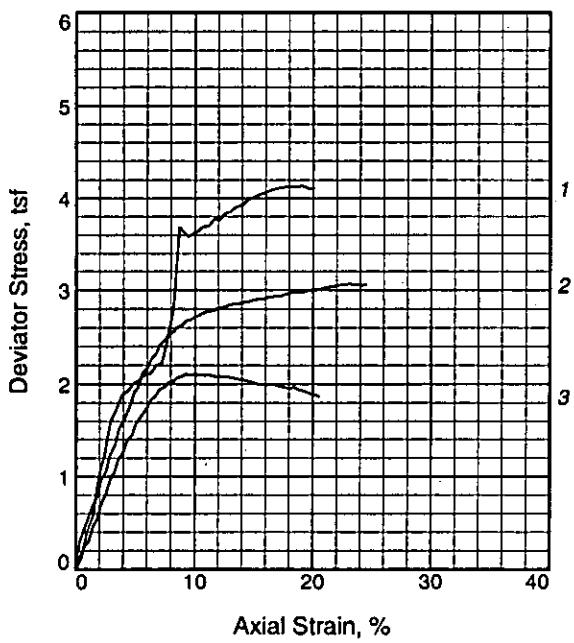


Stress Paths: o indicates peak + indicates end

Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: TR-35A **Depth:** 5.0 **Sample Number:** P-1
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1	2	3
Initial	Water Content,	28.6	27.9	30.9
	Dry Density, pcf	97.4	96.2	92.4
	Saturation,	105.8	100.1	101.2
	Void Ratio	0.7300	0.7522	0.8243
	Diameter, in.	2.83	2.86	2.85
	Height, in.	4.14	5.51	5.55
At Test	Water Content,	27.0	27.9	30.5
	Dry Density, pcf	97.4	96.2	92.4
	Saturation,	100.0	100.0	100.0
	Void Ratio	0.7300	0.7522	0.8243
	Diameter, in.	2.83	2.86	2.85
	Height, in.	4.14	5.51	5.55
Strain rate, in./min.		0.06	0.06	0.06
Back Pressure, tsf		0.00	0.00	0.00
Cell Pressure, tsf		1.01	2.02	4.03
Fail. Stress, tsf		2.81	2.81	2.08
Ult. Stress, tsf		2.81	2.81	2.08
σ_1 Failure, tsf		3.82	4.83	6.11
σ_3 Failure, tsf		1.01	2.02	4.03

Type of Test:
Unconsolidated Undrained
Sample Type: 3" Press Tube
Description: Silt

LL= 27 **PL=** 22 **PI=** 5
Assumed Specific Gravity= 2.7
Remarks:

Figure _____

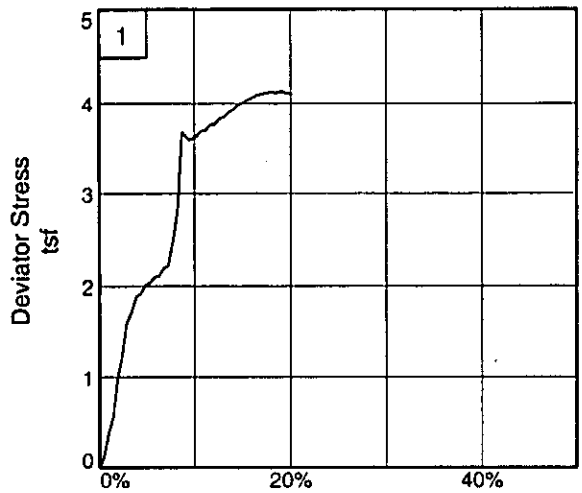
Client: TranSystems, Inc.

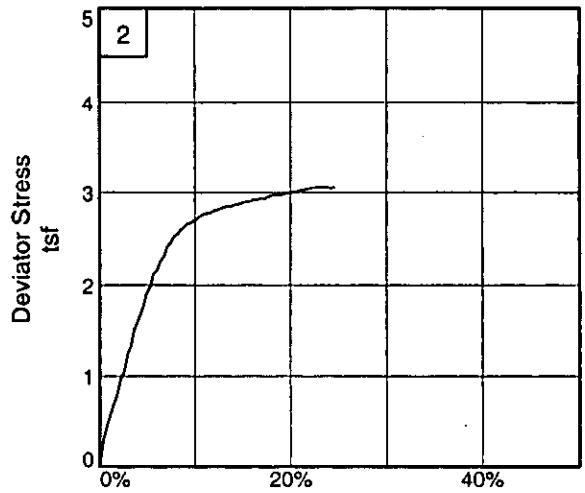
Project: SCI-823-0.00

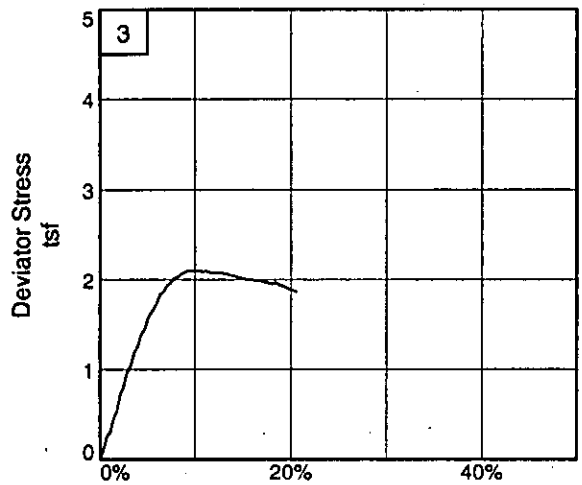
Source of Sample: TR-35A **Depth:** 12.4
Sample Number: P-2B

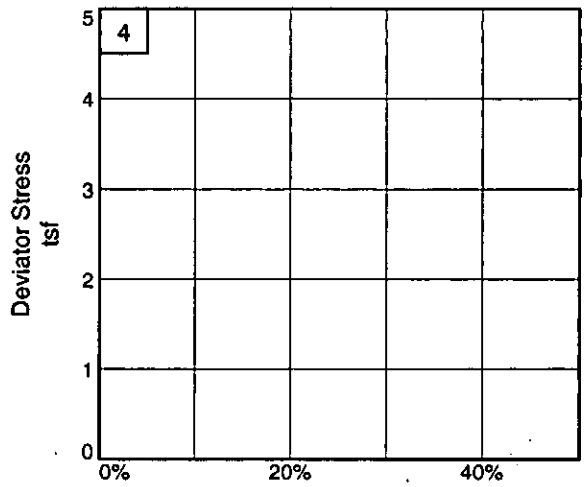
Proj. No.: 0121-3070.03 **Date:** 2/6/06

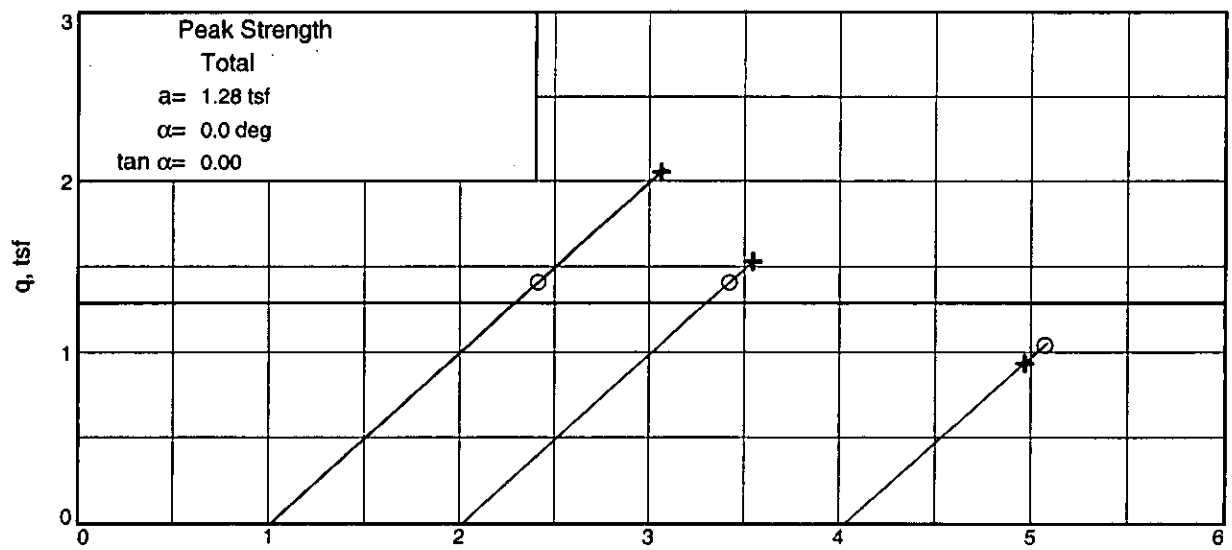
DLZ







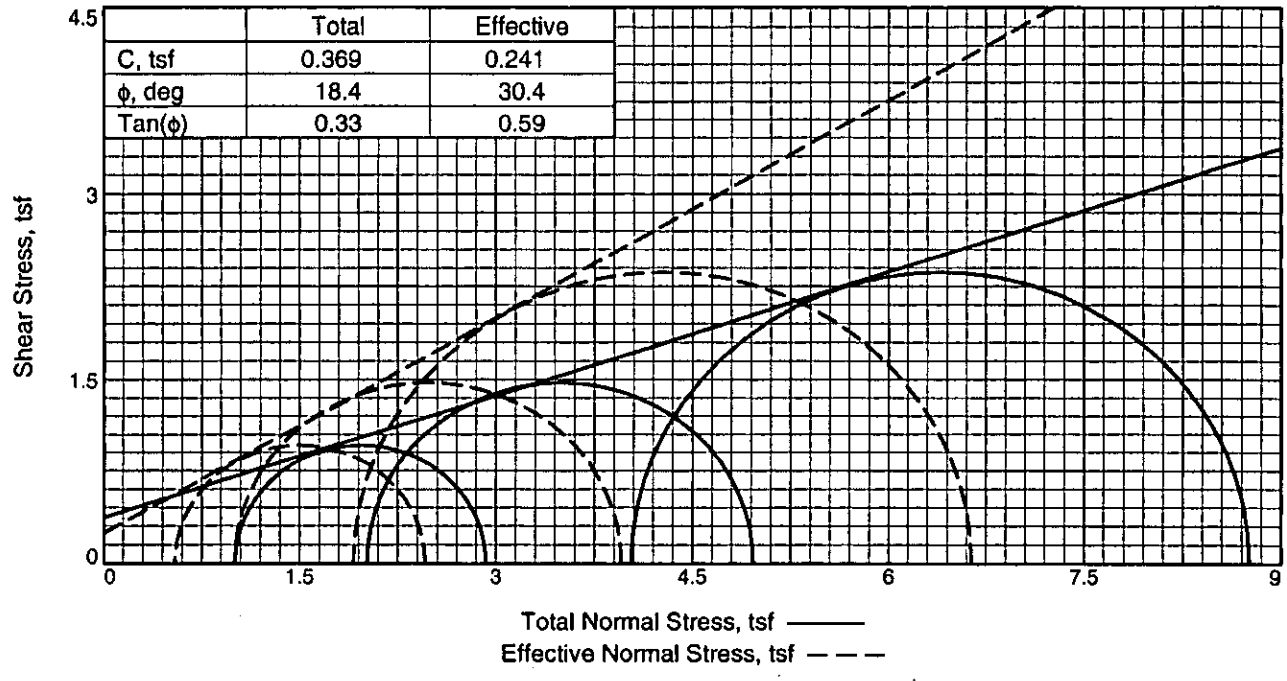


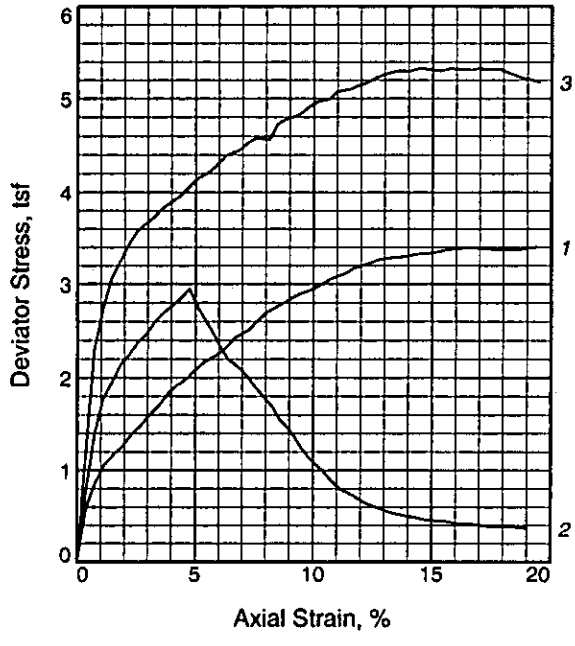


Stress Paths: o indicates peak + indicates end

Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: TR-35A **Depth:** 12.4 **Sample Number:** P-2B
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1	2	3
Initial	Water Content,	27.6	27.6	27.6
	Dry Density, pcf	97.1	96.2	95.1
	Saturation,	98.8	96.7	94.3
	Void Ratio	0.7685	0.7852	0.8048
	Diameter, in.	2.85	2.83	2.83
	Height, in.	5.21	5.47	5.54
At Test	Water Content,	27.9	28.6	29.3
	Dry Density, pcf	97.1	96.2	95.1
	Saturation,	100.0	100.0	100.0
	Void Ratio	0.7685	0.7852	0.8048
	Diameter, in.	2.85	2.83	2.83
	Height, in.	5.21	5.47	5.54
Strain rate, in./min.		0.06	0.06	0.06
Back Pressure, tsf		4.03	4.03	4.03
Cell Pressure, tsf		5.04	6.05	8.06
Fail. Stress, tsf		1.91	2.95	4.73
Total Pore Pr., tsf		4.50	5.04	6.15
Ult. Stress, tsf		1.91	2.95	4.73
Total Pore Pr., tsf		4.50	5.04	6.15
$\bar{\sigma}_1$ Failure, tsf		2.46	3.95	6.64
$\bar{\sigma}_3$ Failure, tsf		0.54	1.00	1.91

Type of Test:
CU with Pore Pressures
Sample Type: 3" Press Tube
Description:

Assumed Specific Gravity= 2.75
Remarks:

Figure _____

Client: TranSystems, Inc.

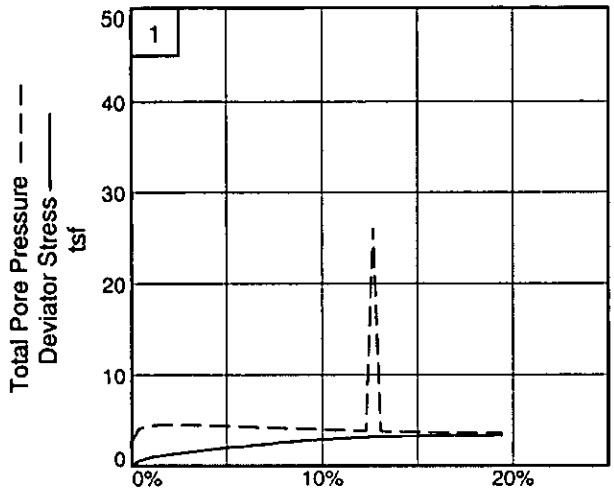
Project: SCI-823-0.00

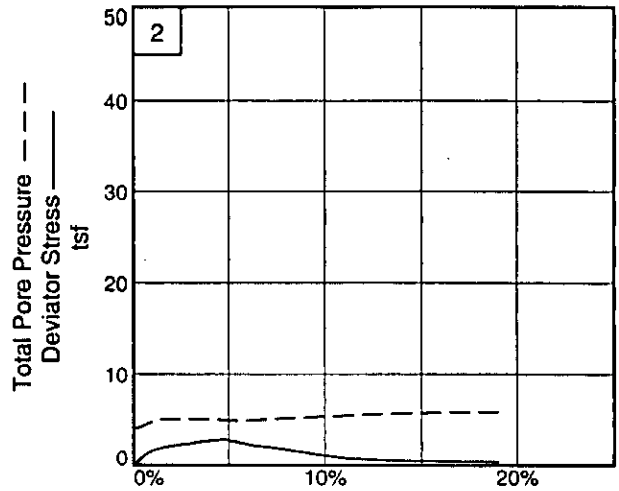
Source of Sample: TR-35A **Depth:** 27.0

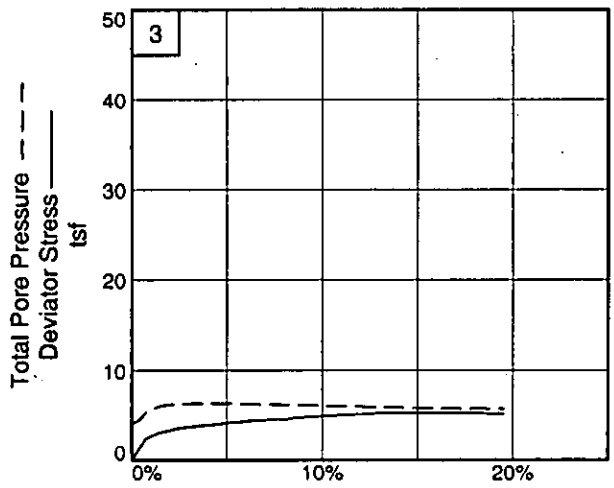
Sample Number: P-3

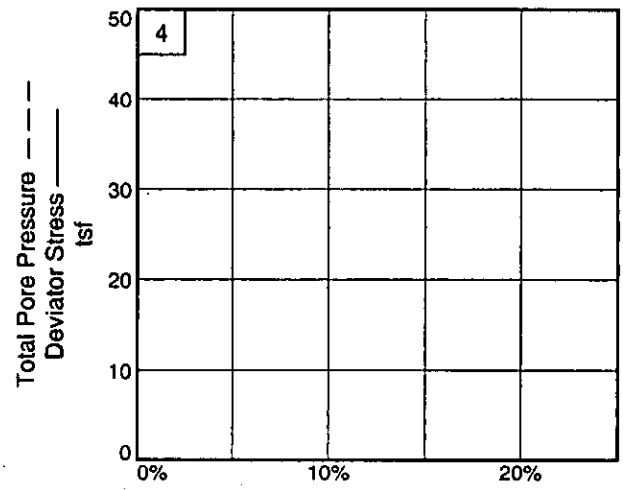
Proj. No.: 0121-3070.03 **Date:**

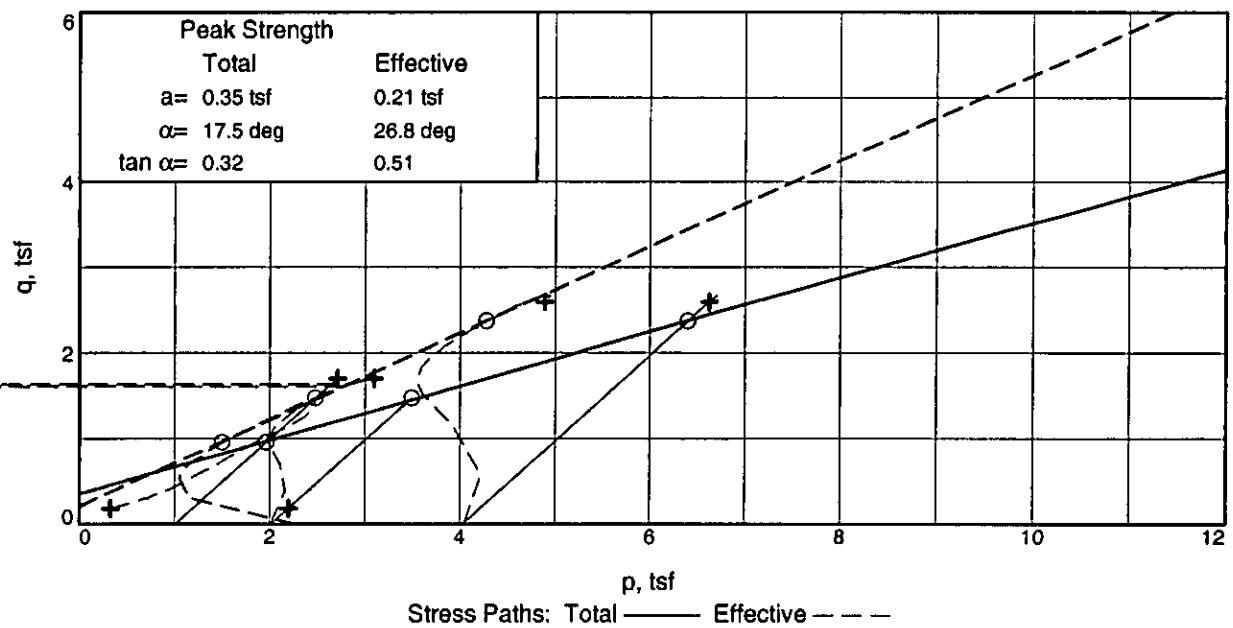
DLZ







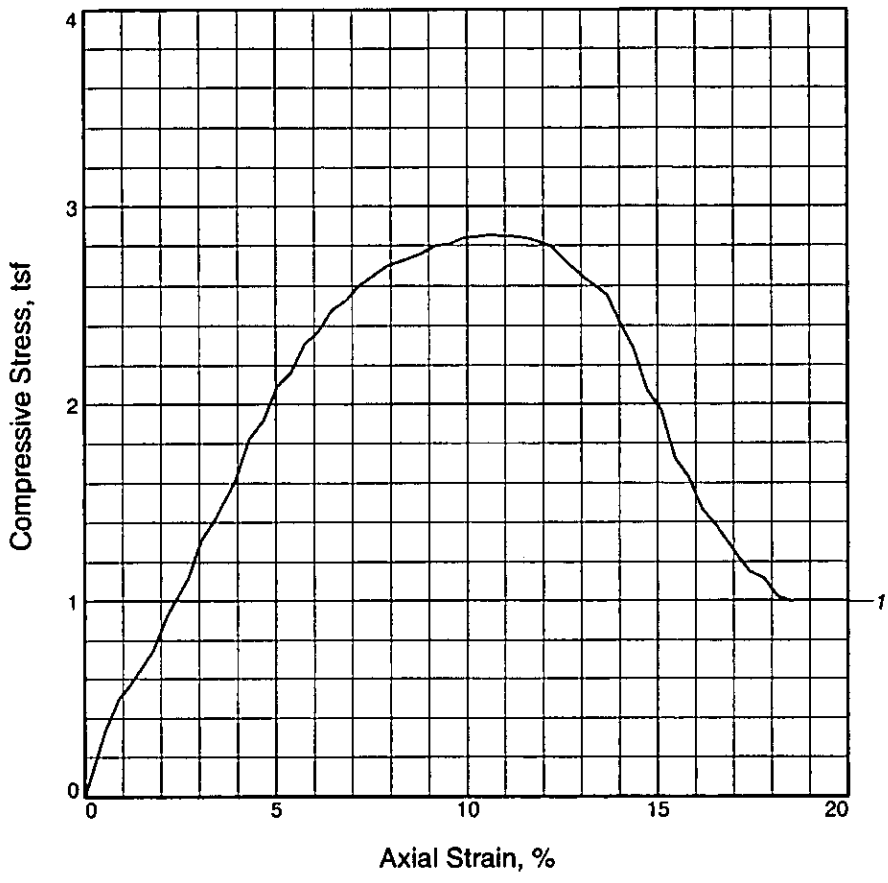




Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: TR-35A **Depth:** 27.0 **Sample Number:** P-3
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, tsf	2.854			
Undrained shear strength, tsf	1.427			
Failure strain,	10.6			
Strain rate, in./min.	0.06			
Water content, %	25.5			
Wet density, pcf	118.2			
Dry density, pcf	94.2			
Saturation, %	87.3			
Void ratio	0.7894			
Specimen diameter, in.	2.85			
Specimen height, in.	5.56			
Height/diameter ratio	1.95			

Description: Lean clay

LL = 44	**PL** = 26	**PI** = 18	**Assumed GS**= 2.7	**Type:** 3" Press Tube

Project No.: 0121-3070.03

Date: 2/6/06

Remarks:

Figure _____

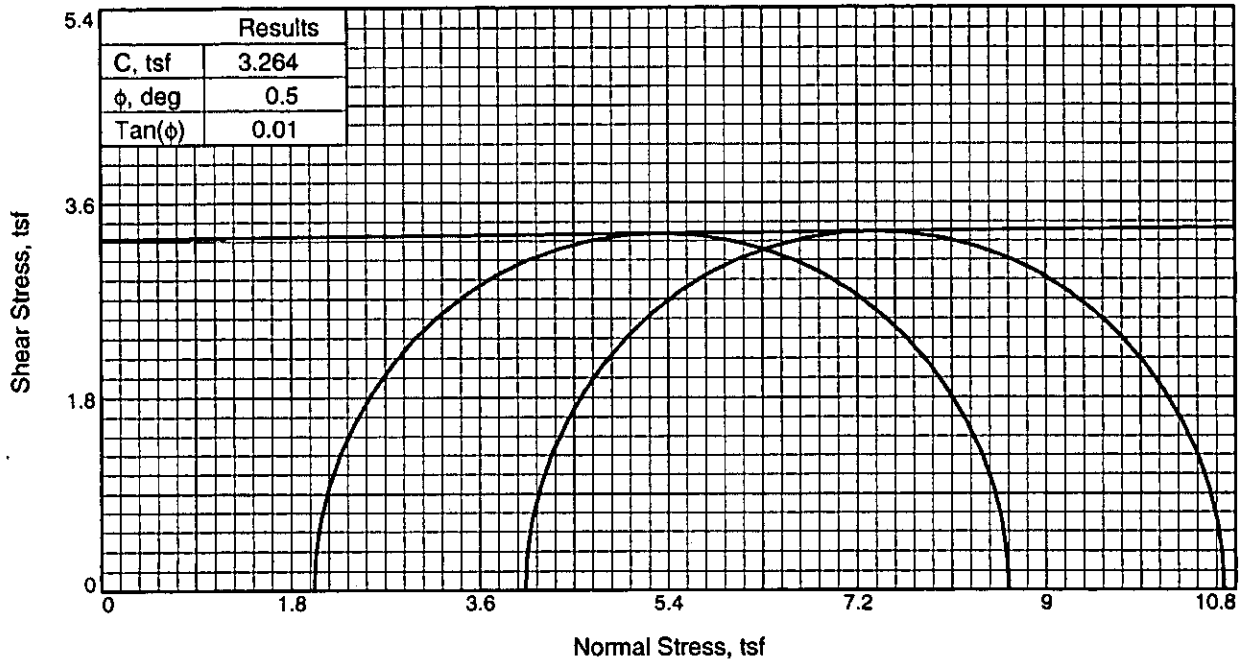
Client: TranSystems, Inc.

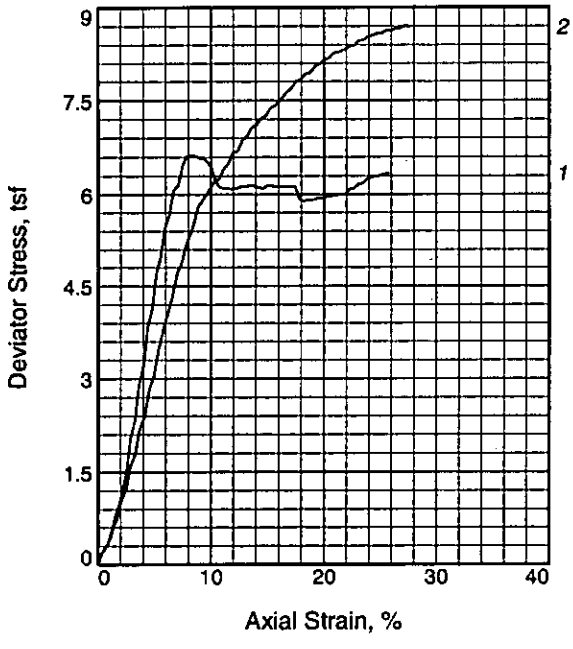
Project: SCI-823-0.00

Source of Sample: TR-35A **Depth:** 66.0

Sample Number: P-4A

DLZ





Sample No.		1	2
Initial	Water Content,	18.8	18.8
	Dry Density, pcf	112.6	113.5
	Saturation,	101.9	104.4
	Void Ratio	0.4971	0.4855
	Diameter, in.	2.83	2.80
	Height, in.	5.21	4.85
At Test	Water Content,	18.4	18.0
	Dry Density, pcf	112.6	113.5
	Saturation,	100.0	100.0
	Void Ratio	0.4971	0.4855
	Diameter, in.	2.83	2.80
	Height, in.	5.21	4.85
Strain rate, in./min.		0.06	0.06
Back Pressure, tsf		0.0	0.0
Cell Pressure, tsf		2.0	4.0
Fail. Stress, tsf		6.6	6.7
Ult. Stress, tsf		6.6	6.7
σ_1 Failure, tsf		8.6	10.7
σ_3 Failure, tsf		2.0	4.0

Type of Test:
Unconsolidated Undrained
Sample Type: 3" Press Tube
Description: Silt with sand

LL= NP **PI=** NP
Assumed Specific Gravity= 2.7
Remarks: Sample S3 - 66.0' - 66.9'

Client: TranSystems, Inc.

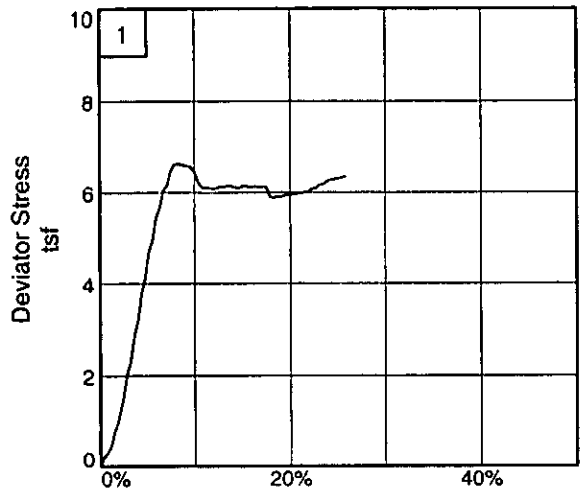
Project: SCI-823-0.00

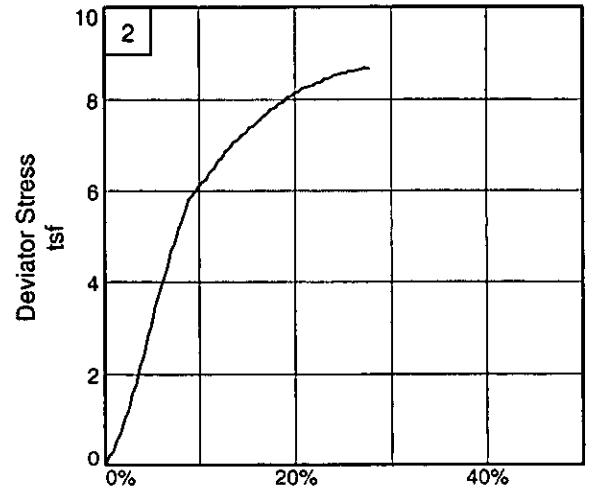
Source of Sample: TR-35A **Depth:** 66.9
Sample Number: P-4B

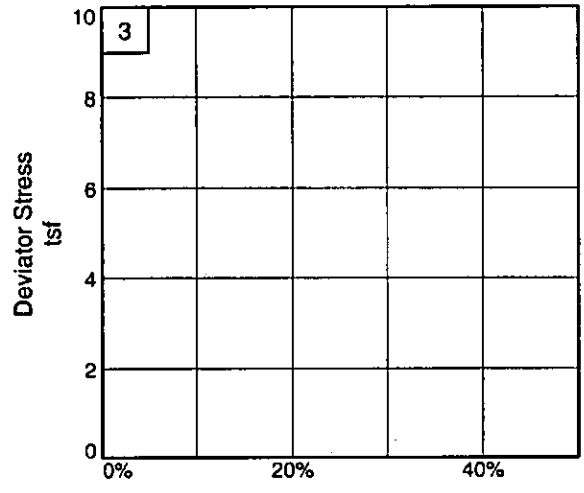
Proj. No.: 0121-3070.03 **Date:** 2/6/06

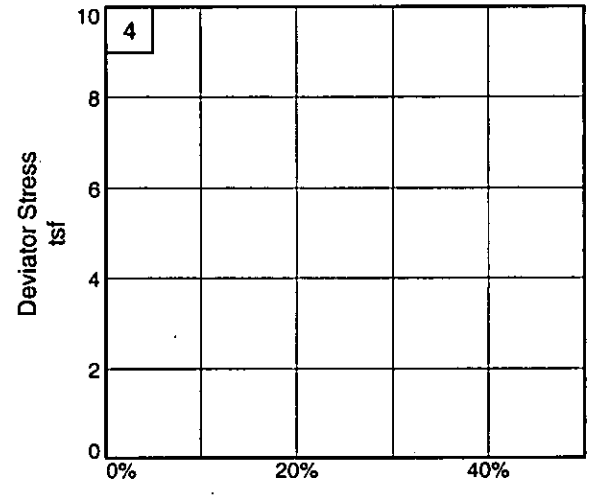
DLZ

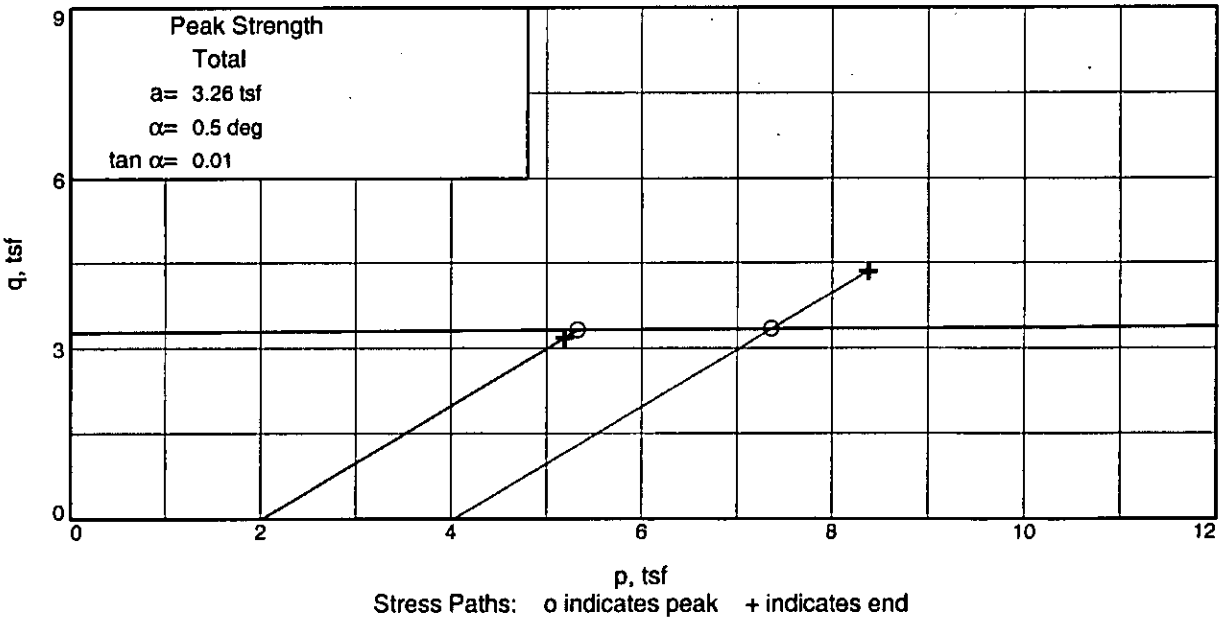
Figure _____







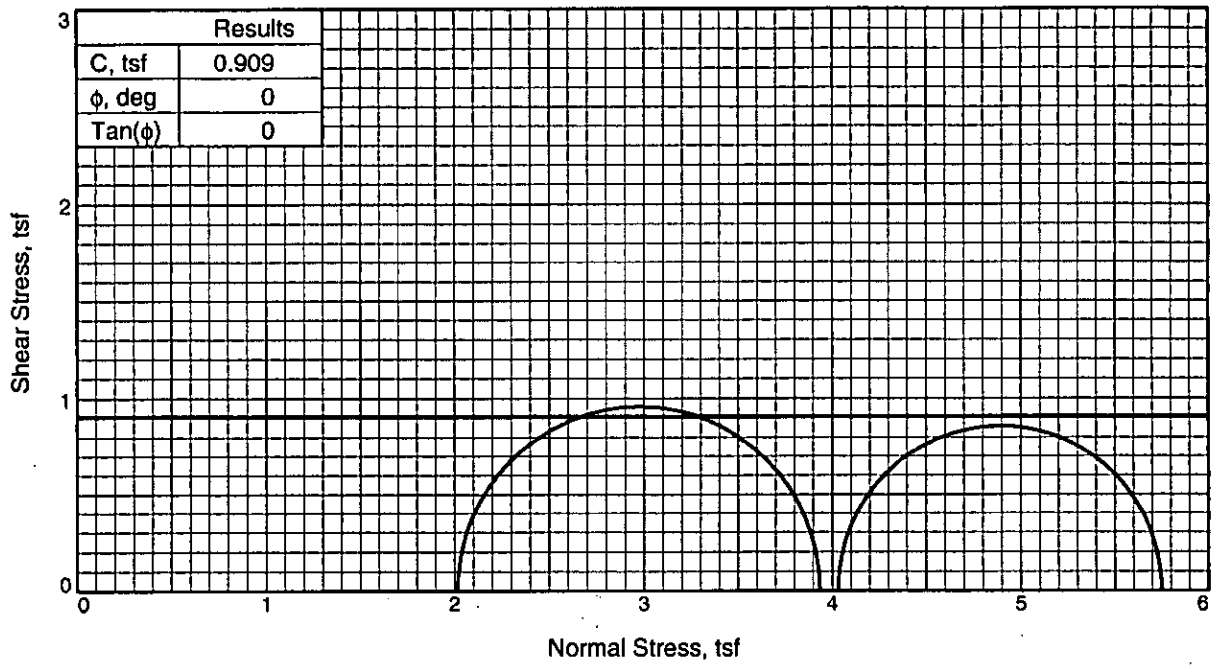


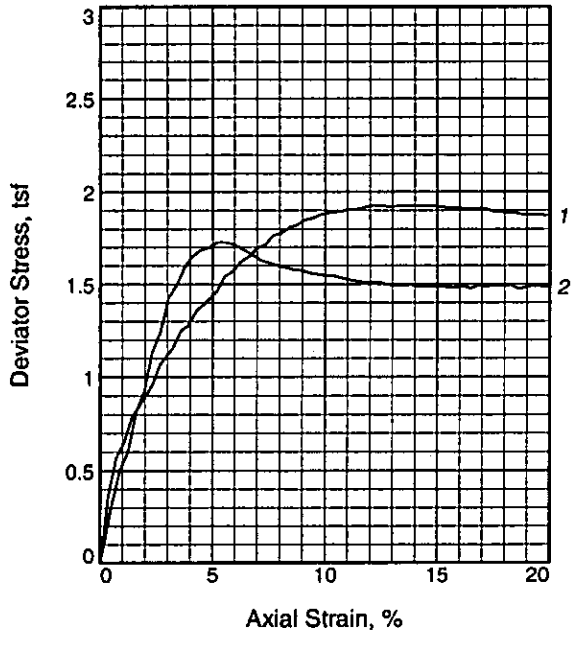


Stress Paths: o indicates peak + indicates end

Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: TR-35A
Depth: 66.9
Sample Number: P-4B
Project No.: 0121-3070.03
Figure _____

DLZ, INC.





Sample No.		1	2
Initial	Water Content,	25.6	25.5
	Dry Density, pcf	97.5	97.3
	Saturation,	94.9	93.9
	Void Ratio	0.7291	0.7330
	Diameter, in.	2.85	2.85
	Height, in.	5.59	5.58
At Test	Water Content,	27.0	27.1
	Dry Density, pcf	97.5	97.3
	Saturation,	100.0	100.0
	Void Ratio	0.7291	0.7330
	Diameter, in.	2.85	2.85
	Height, in.	5.59	5.58
Strain rate, in./min.			0.06
Back Pressure, tsf		0.00	0.00
Cell Pressure, tsf		2.02	4.03
Fail. Stress, tsf		1.92	1.72
Ult. Stress, tsf		1.92	1.72
σ_1 Failure, tsf		3.93	5.75
σ_3 Failure, tsf		2.02	4.03

Type of Test:
Unconsolidated Undrained
Sample Type: Press Tube
Description: Lean clay

LL= 35 **PL=** 22 **PI=** 13
Assumed Specific Gravity= 2.7
Remarks:

Figure _____

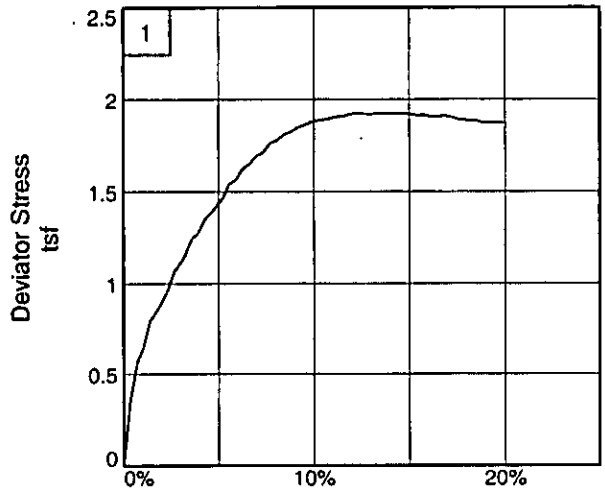
Client: TranSystems, Inc.

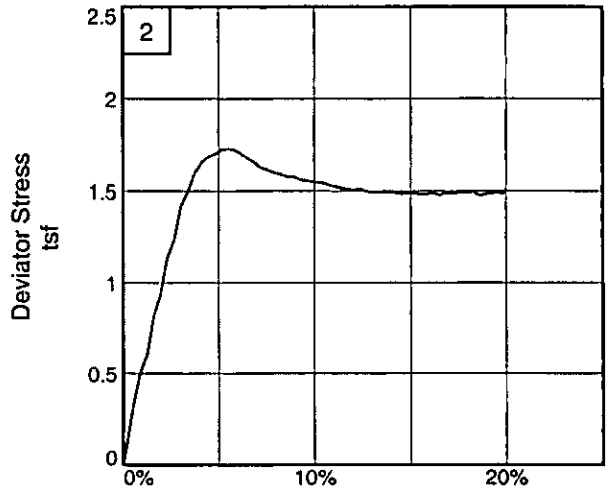
Project: SCI-823-0.00

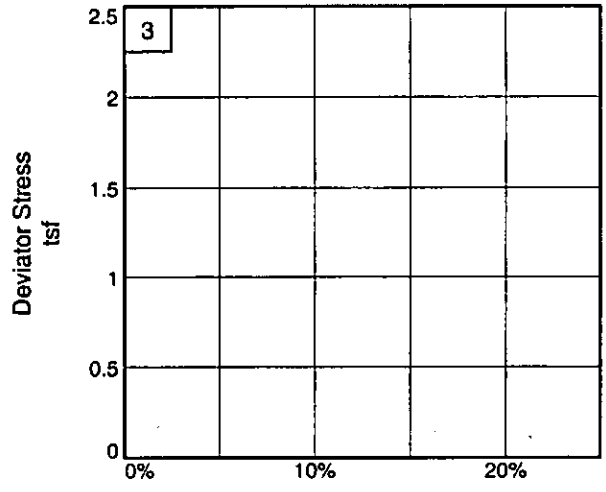
Source of Sample: TR-38A **Depth:** 5.0
Sample Number: P-1

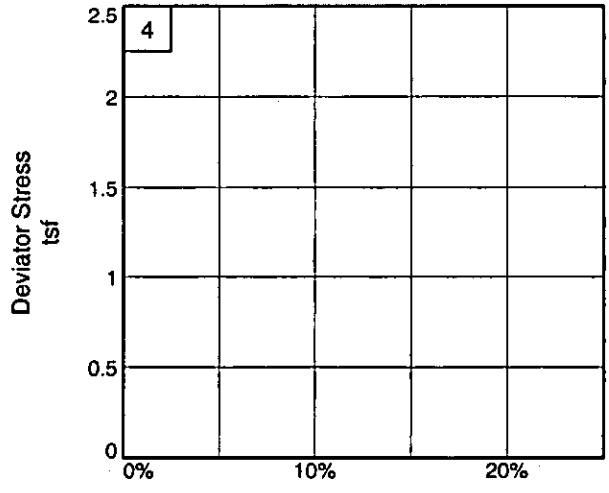
Proj. No.: 0121-3070.03 **Date:** 1/31/06

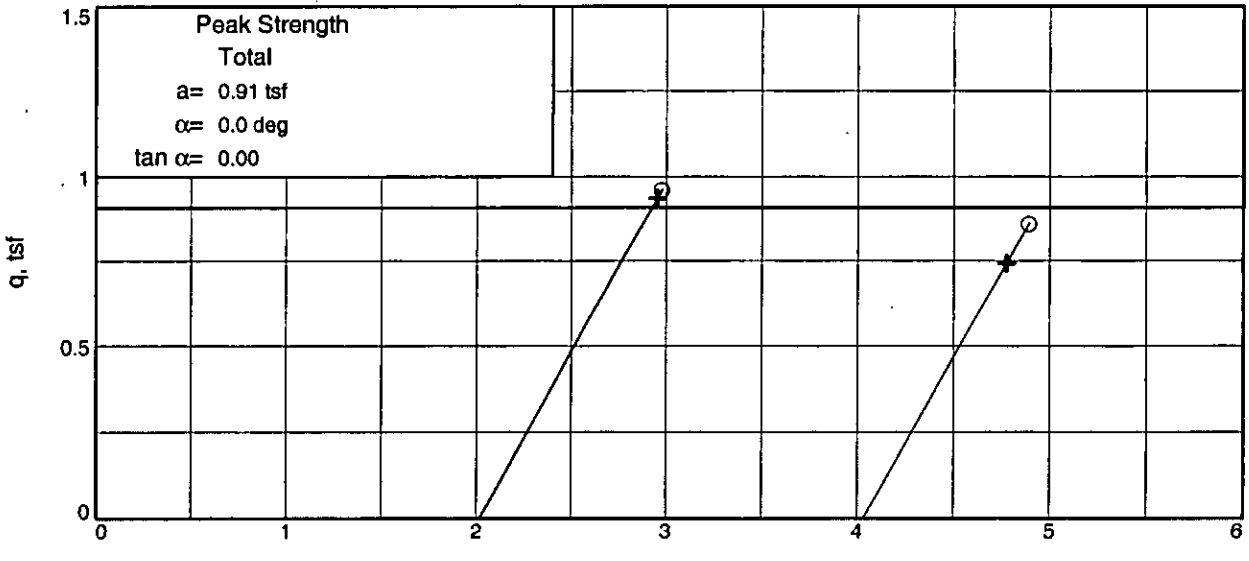
DLZ







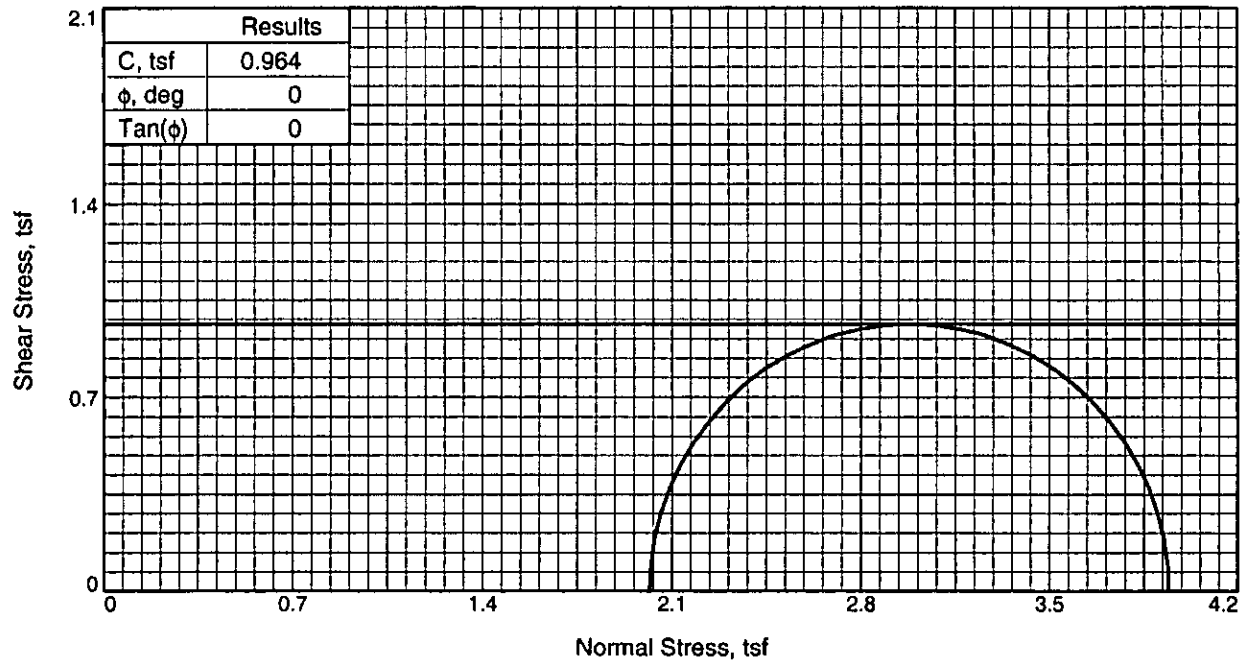


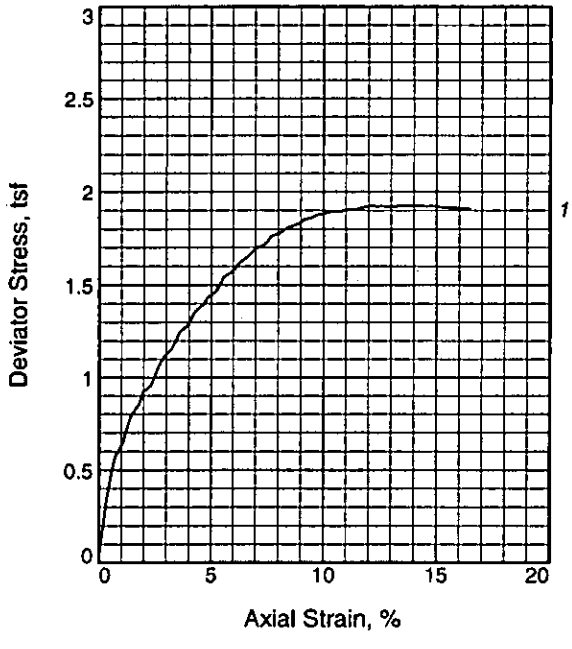


Stress Paths: o indicates peak + indicates end

Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: TR-38A **Depth:** 5.0 **Sample Number:** P-1
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.





Sample No.		1
Initial	Water Content,	25.6
	Dry Density, pcf	97.5
	Saturation,	92.6
	Void Ratio	0.7611
	Diameter, in.	2.85
	Height, in.	5.59
At Test	Water Content,	27.7
	Dry Density, pcf	97.5
	Saturation,	100.0
	Void Ratio	0.7611
	Diameter, in.	2.85
	Height, in.	5.59
Strain rate, in./min.		0.06
Back Pressure, tsf		0.00
Cell Pressure, tsf		2.02
Fail. Stress, tsf		1.93
Ult. Stress, tsf		
σ_1 Failure, tsf		3.94
σ_3 Failure, tsf		2.02

Type of Test:
Unconsolidated Undrained
Sample Type: 3" press tube
Description: Lean clay

LL= 43 **PL=** 24 **PI=** 19
Assumed Specific Gravity= 2.75
Remarks:

Figure _____

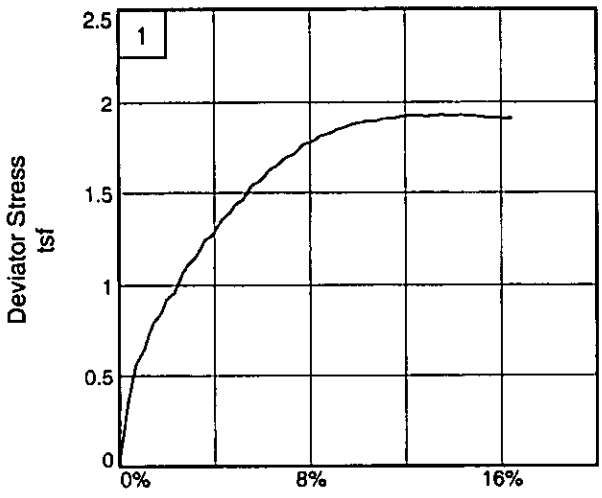
Client: TranSystems, Inc.

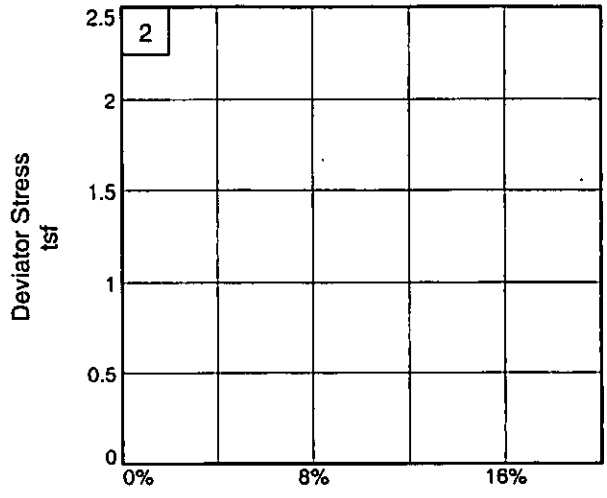
Project: SCI-823-0.00

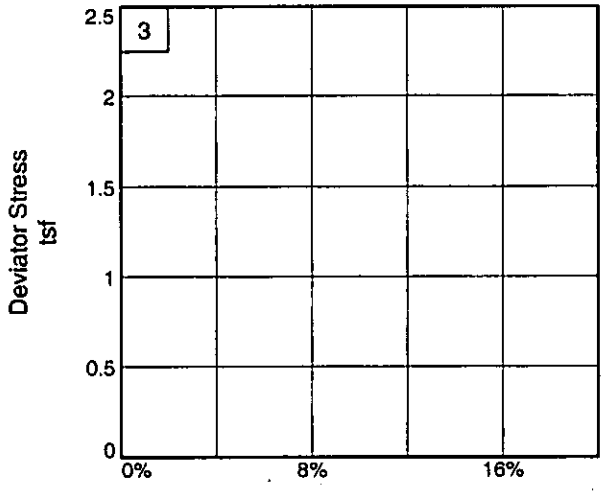
Source of Sample: TR-38A **Depth:** 8.5
Sample Number: 3

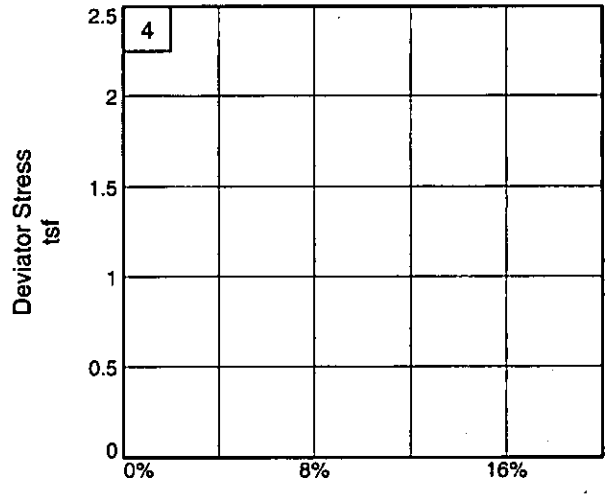
Proj. No.: 0121-3070.03 **Date:** 2/8/06

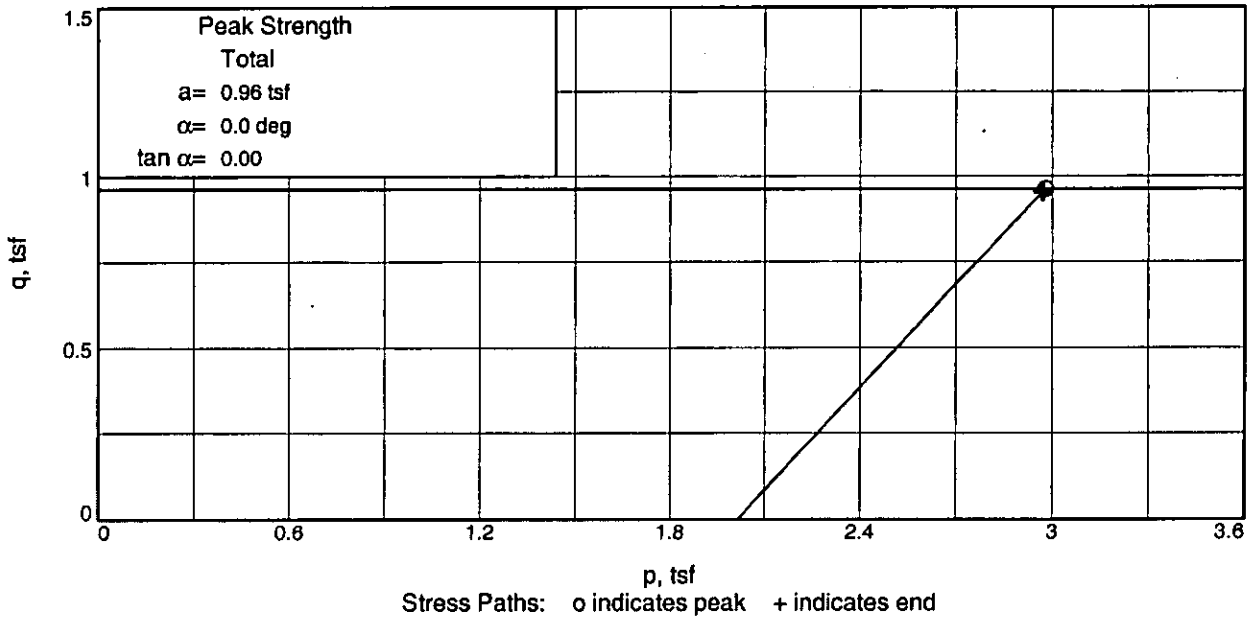
DLZ









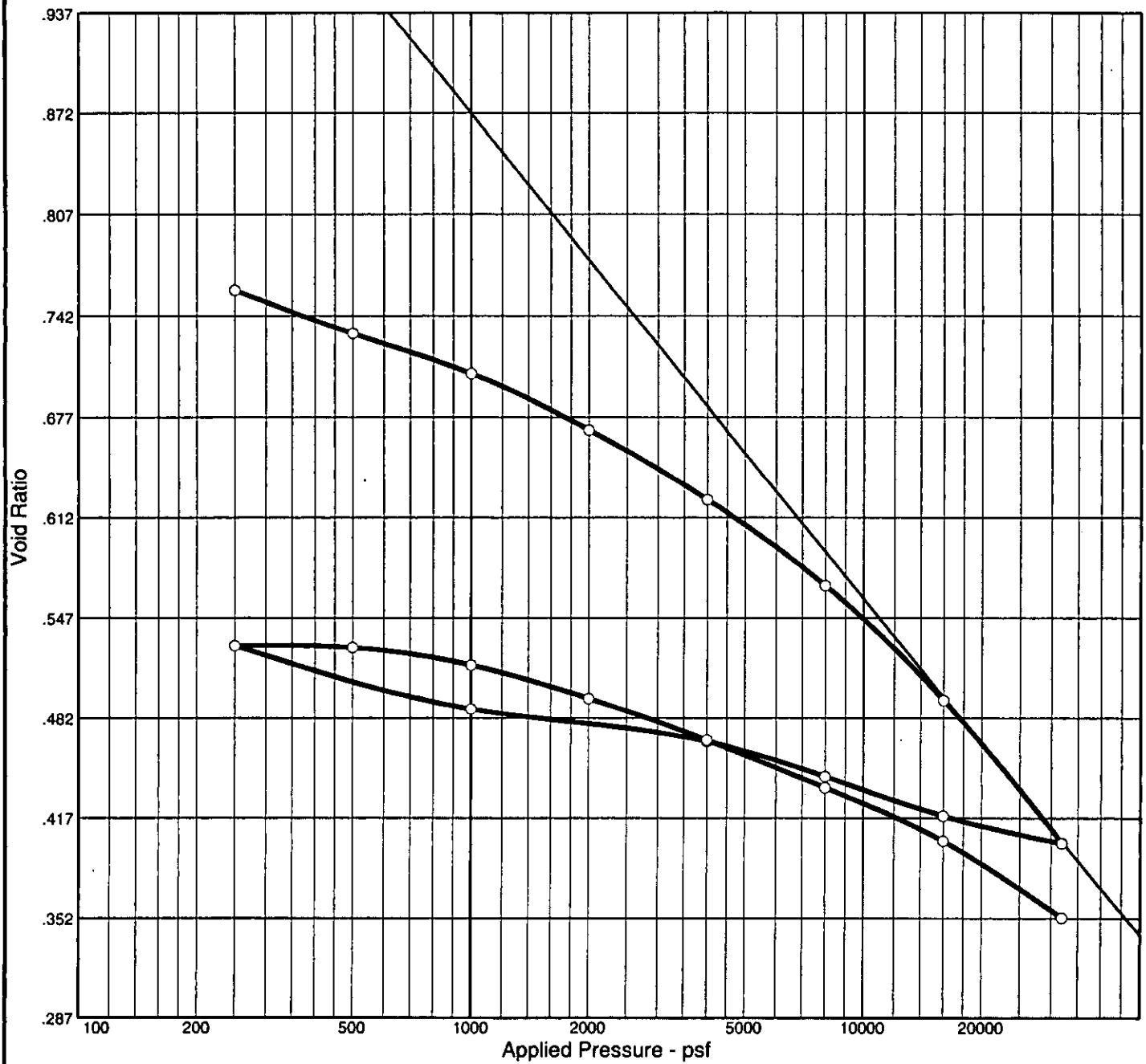


Stress Paths: o indicates peak + indicates end

Client: TranSystems, Inc.
Project: SCI-823-0.00
Source of Sample: TR-38A **Depth:** 8.5 **Sample Number:** 3
Project No.: 0121-3070.03 **Figure** _____

DLZ, INC.

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
88.4 %	24.3 %	98.7	37	16	2.8	CL	A-6(15)	0.771

MATERIAL DESCRIPTION

Lean clay

Project No. 0121- **Client:** TranSystems, Inc.

Project: SCI-823-0.00

Source: B-31 **Sample No.:** P1 **Elev./Depth:** 10.0

Remarks:

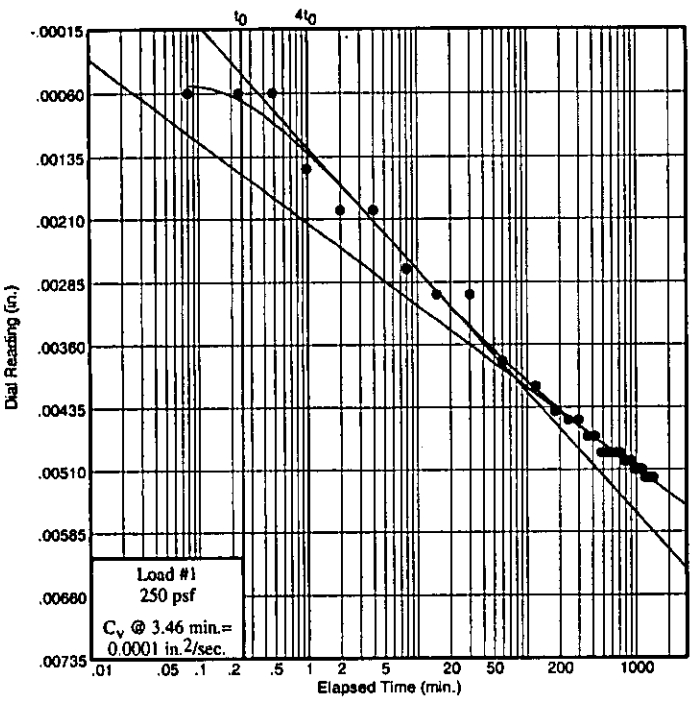
DLZ

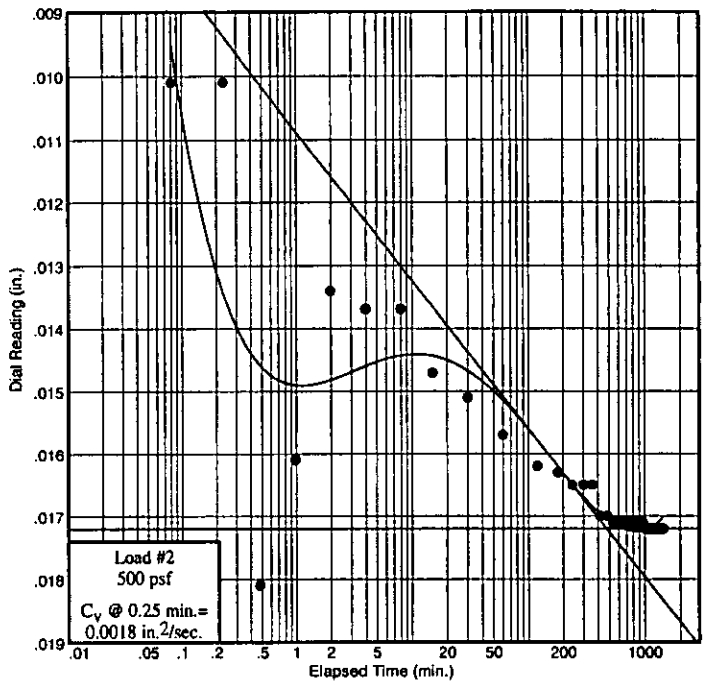
Figure

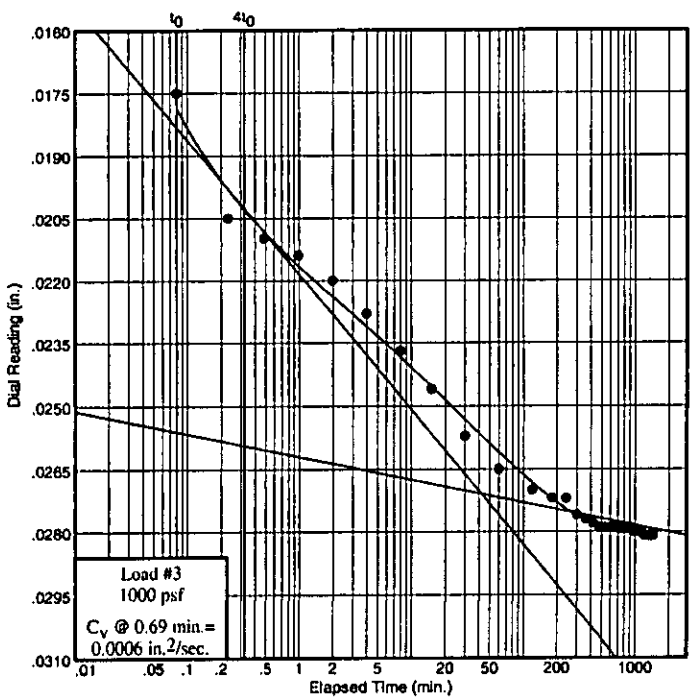
Dial Reading vs. Time

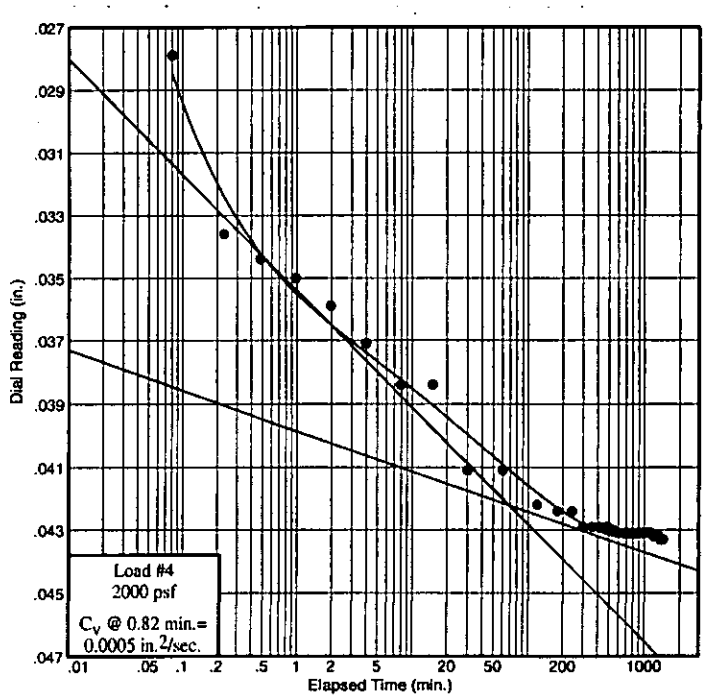
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-31 Sample No.: P1 Elev./Depth: 10.0









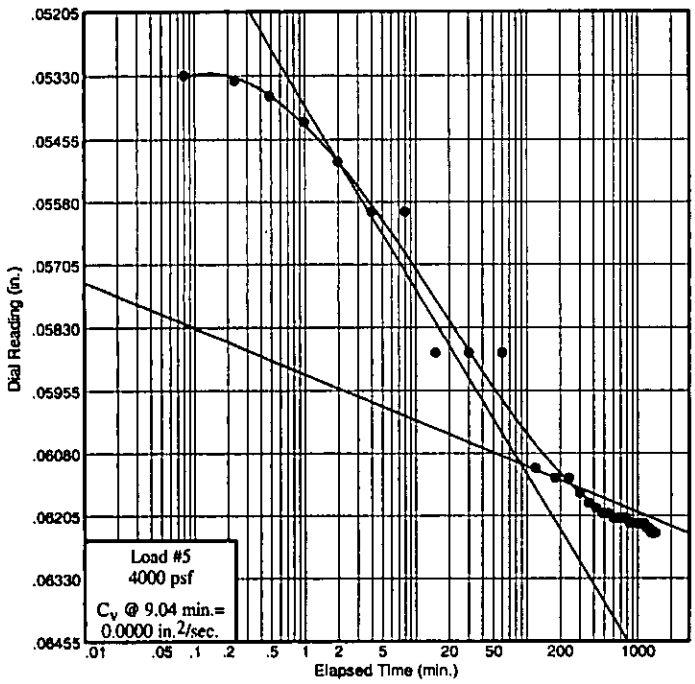
DLZ

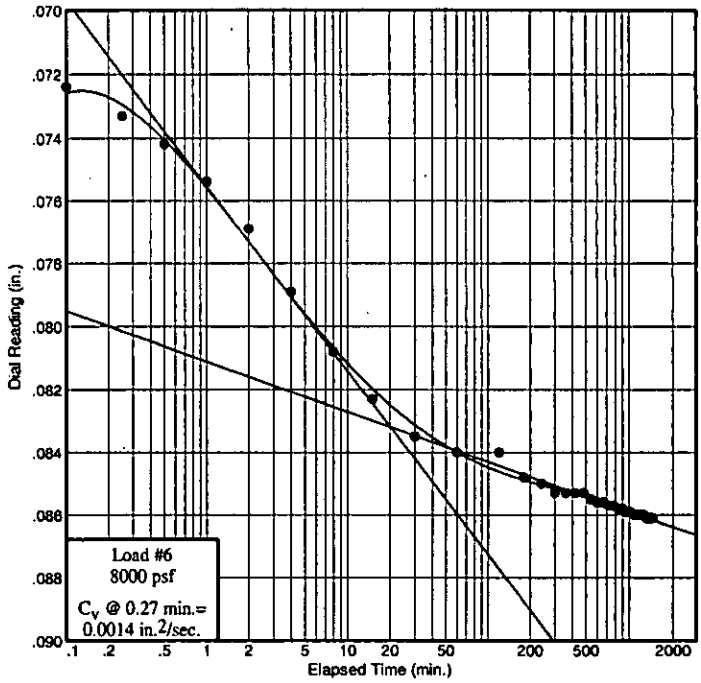
Figure

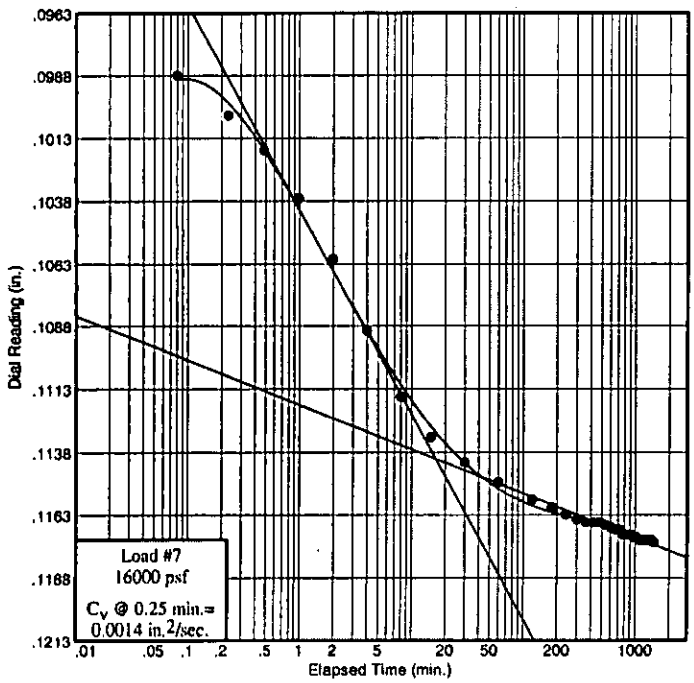
Dial Reading vs. Time

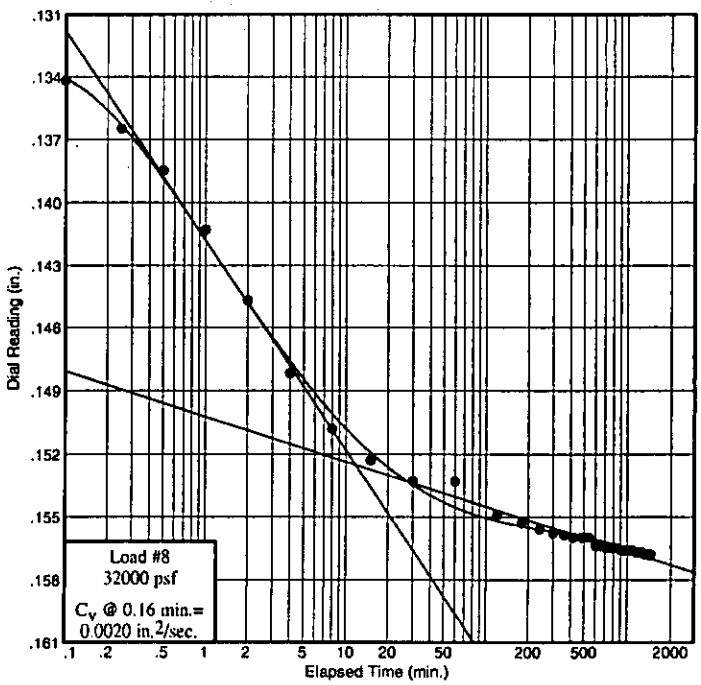
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-31 Sample No.: P1 Elev./Depth: 10.0









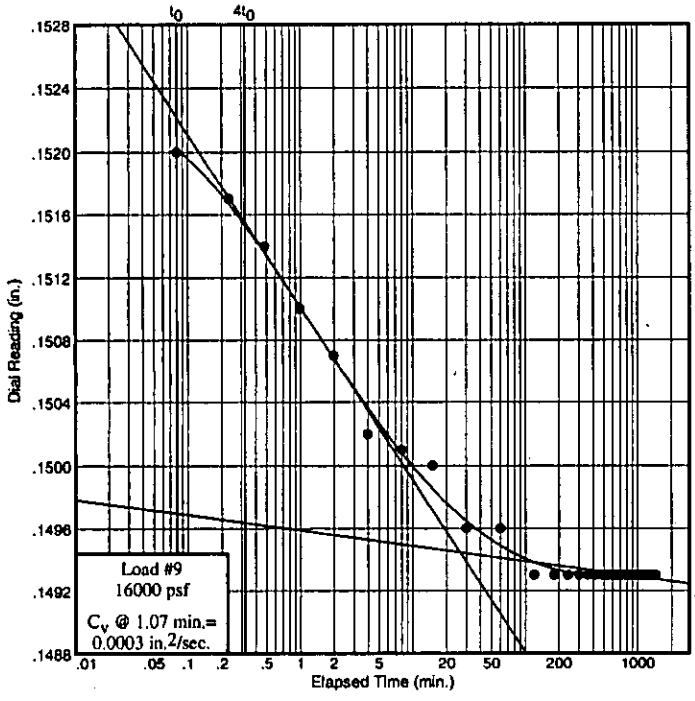
DLZ

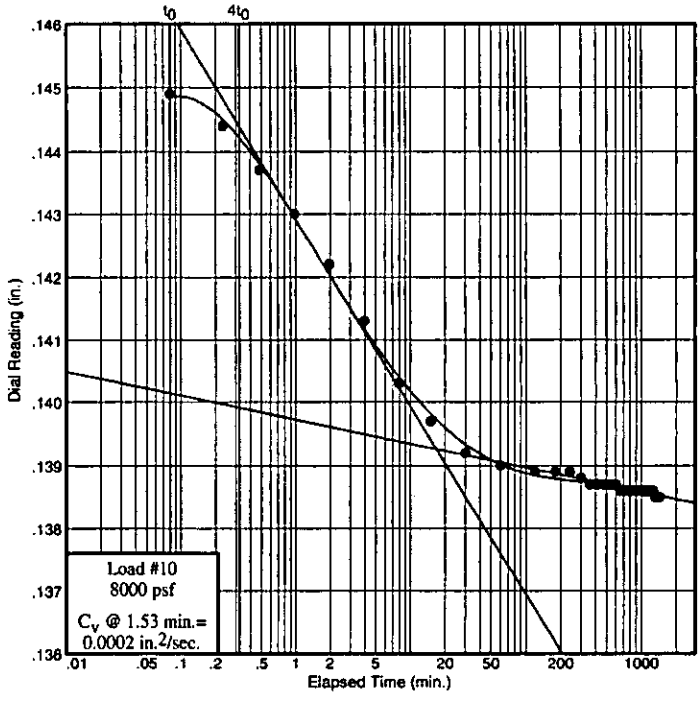
Figure

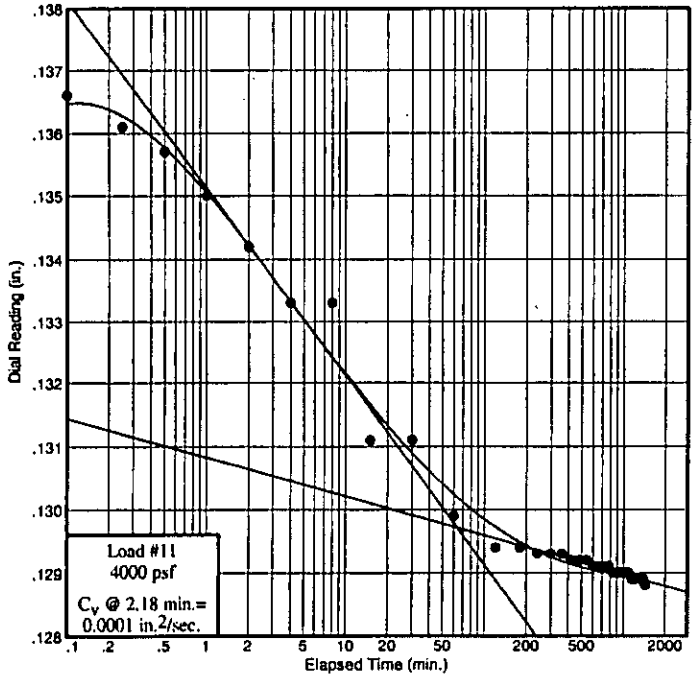
Dial Reading vs. Time

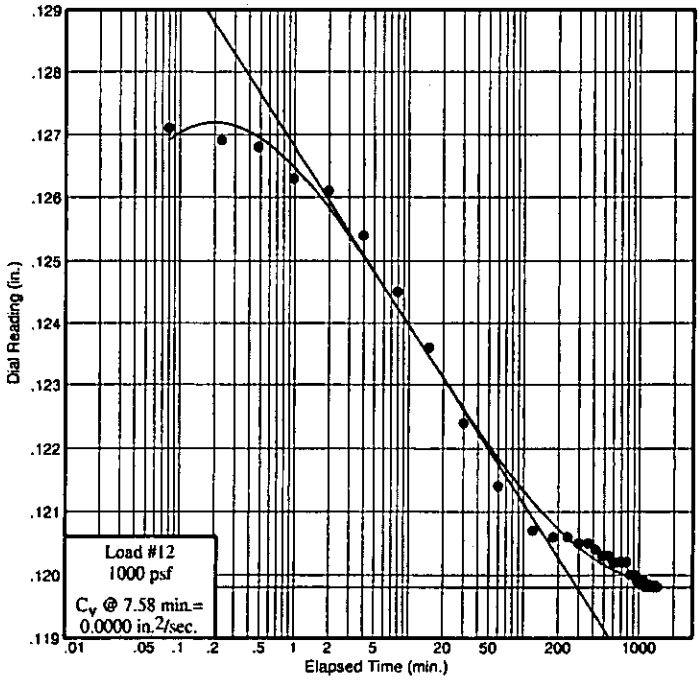
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-31 Sample No.: P1 Elev./Depth: 10.0









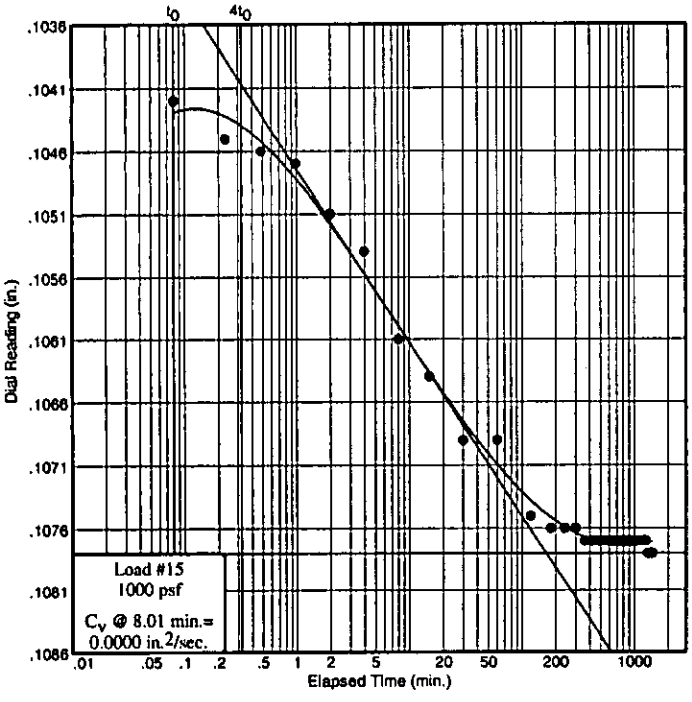
DLZ

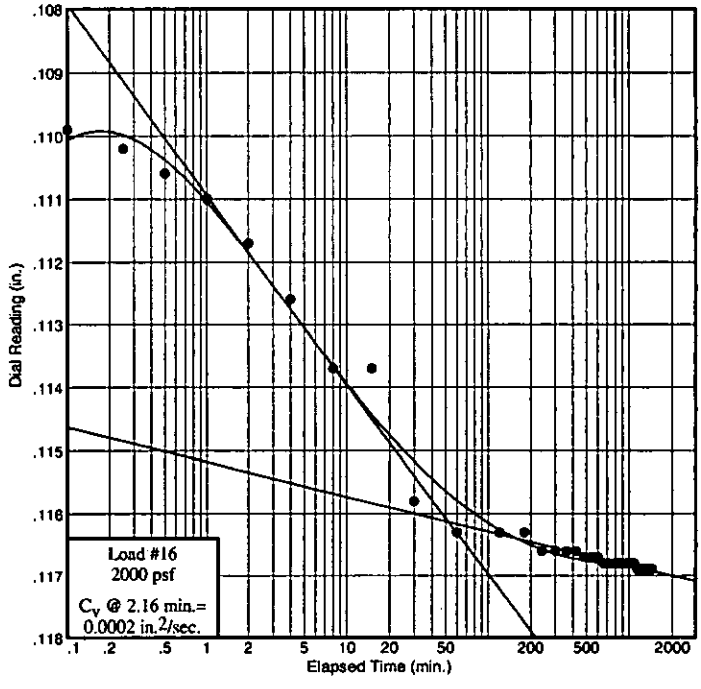
Figure

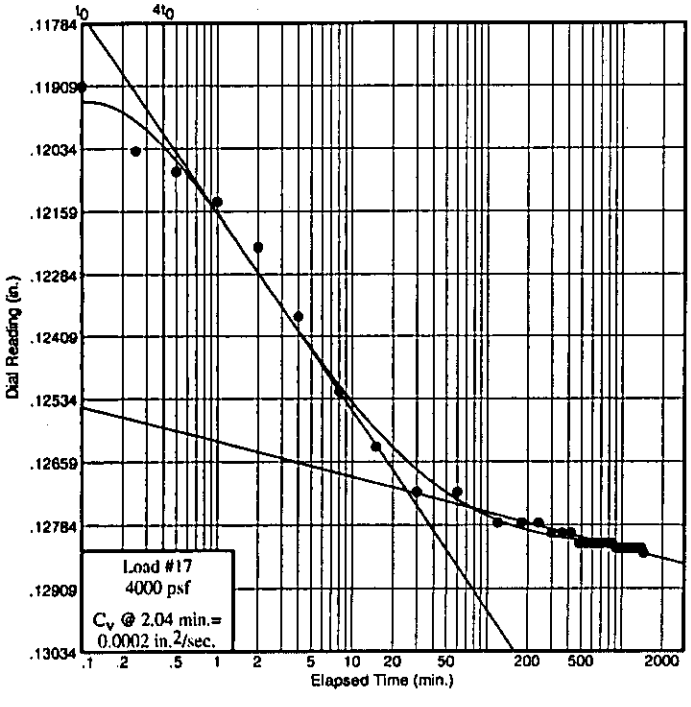
Dial Reading vs. Time

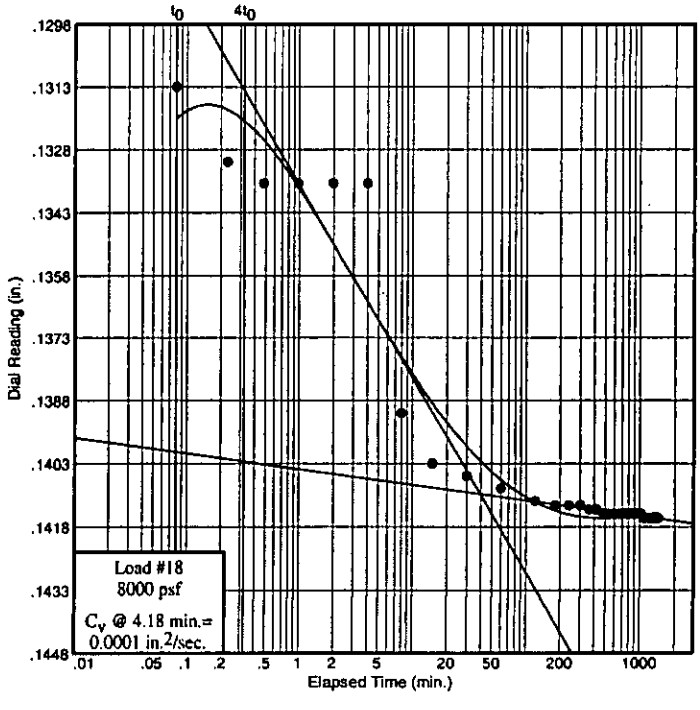
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-31 Sample No.: P1 Elev./Depth: 10.0









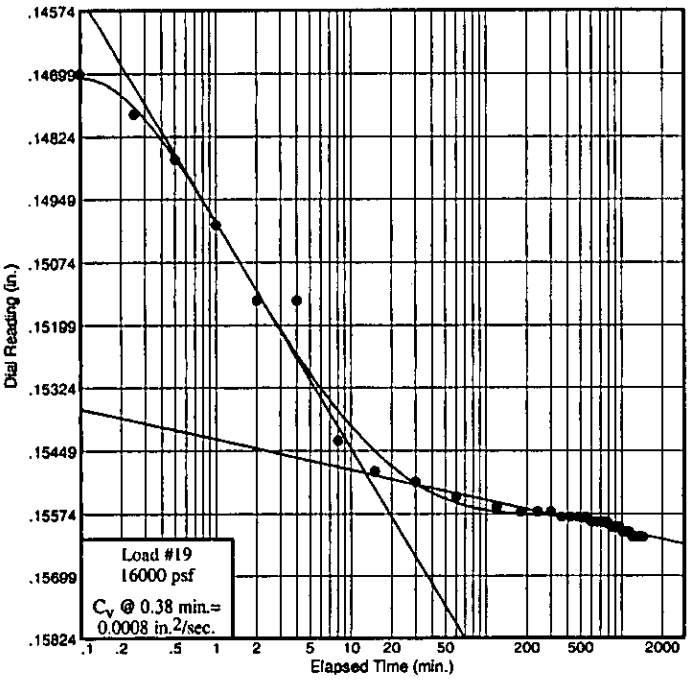
DLZ

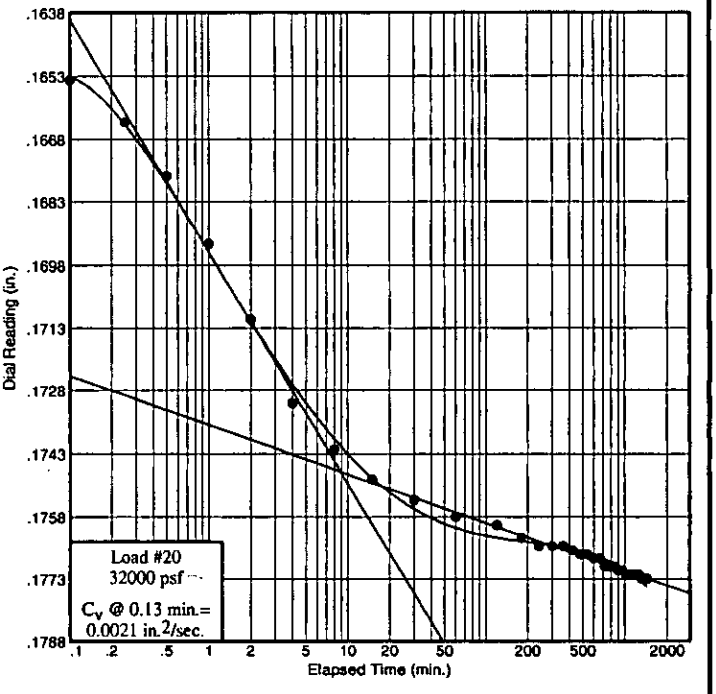
Figure

Dial Reading vs. Time

Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-31 Sample No.: P1 Elev./Depth: 10.0

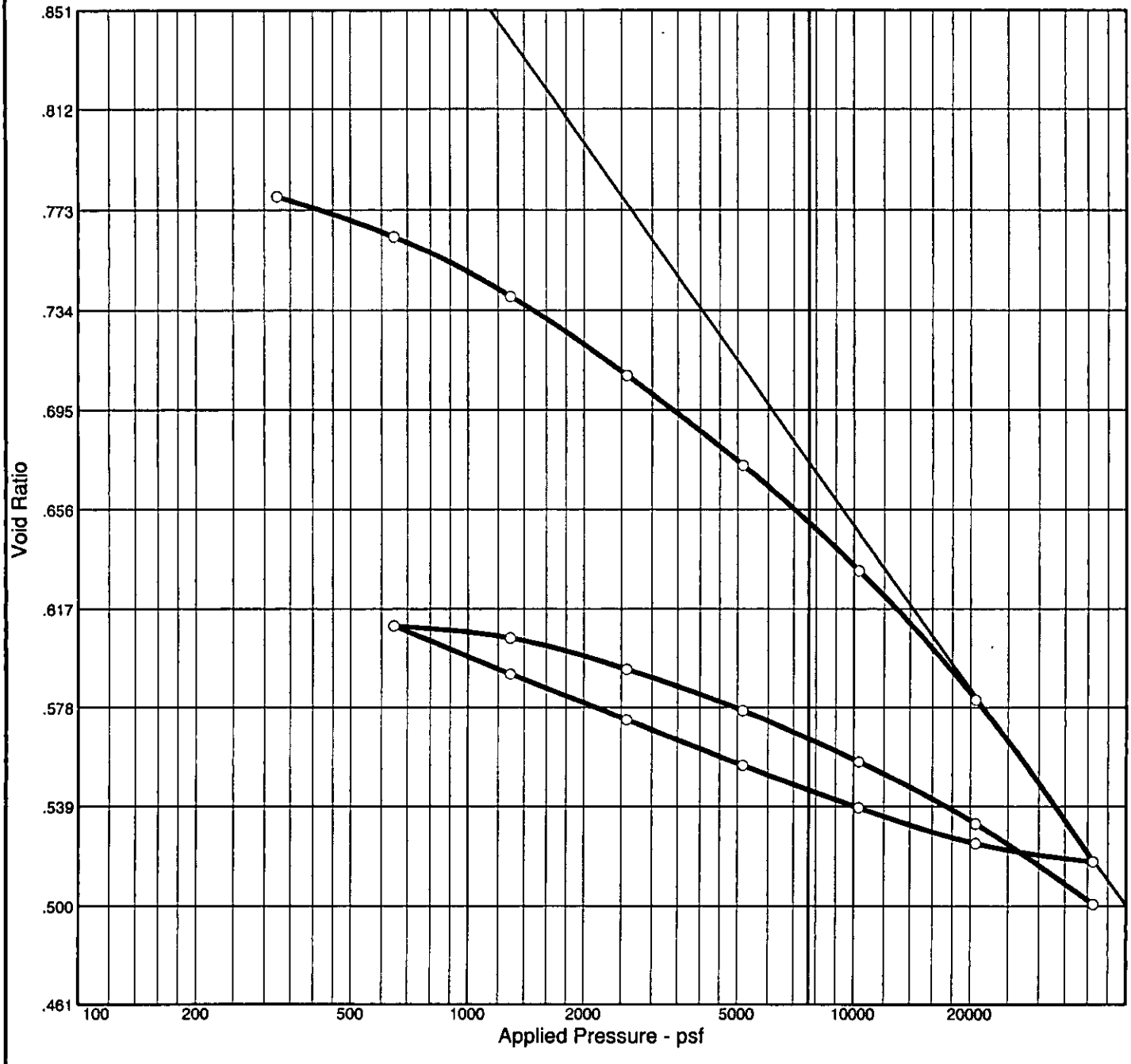




DLZ

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
86.9 %	24.9 %	96.4	33	13	2.77	CL	A-6(13)	0.793

MATERIAL DESCRIPTION

Lean clay

Project No. 0121- **Client:** TranSystems, Inc.

Project: SCI-823-0.00

Source: B-32 **Sample No.:** P1 **Elev./Depth:** 10.0

DLZ

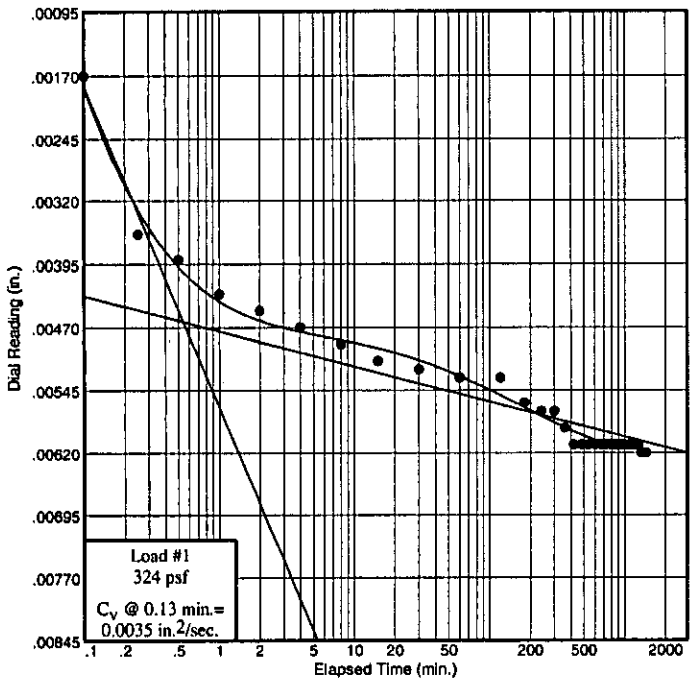
Remarks:

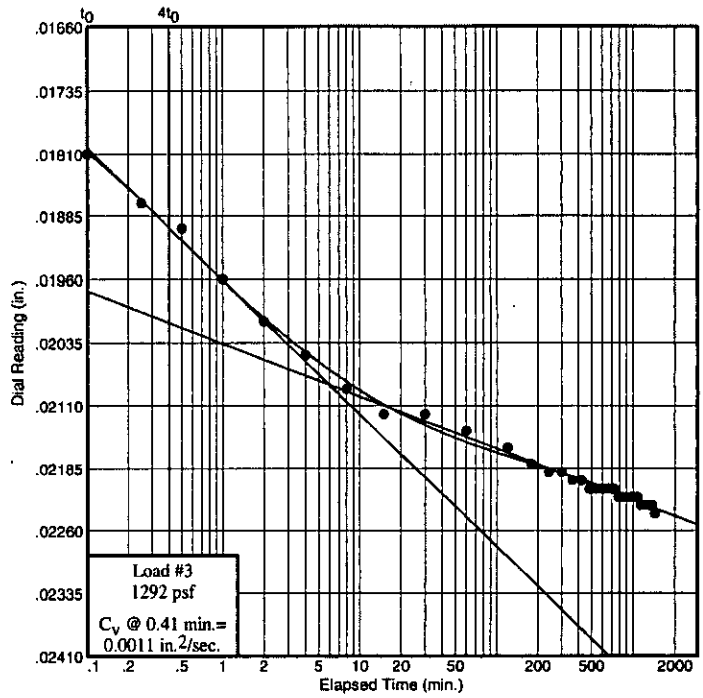
Figure

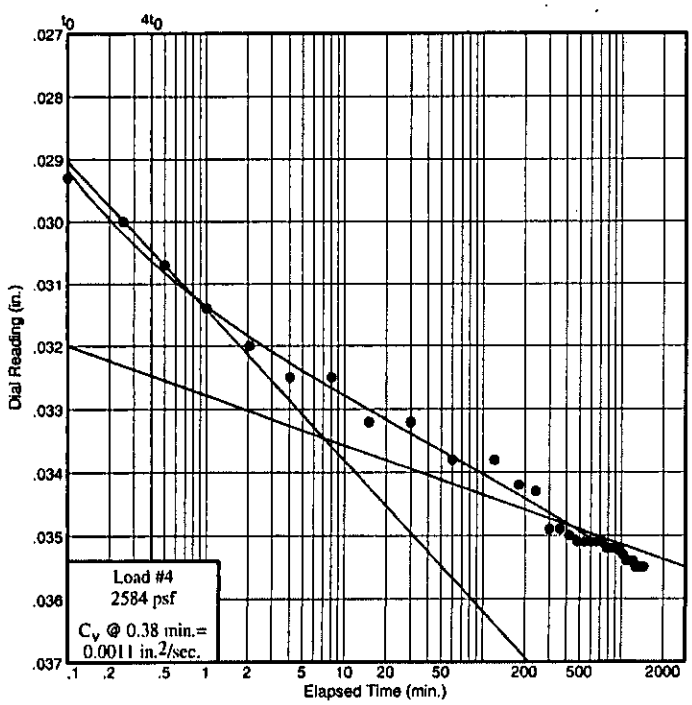
Dial Reading vs. Time

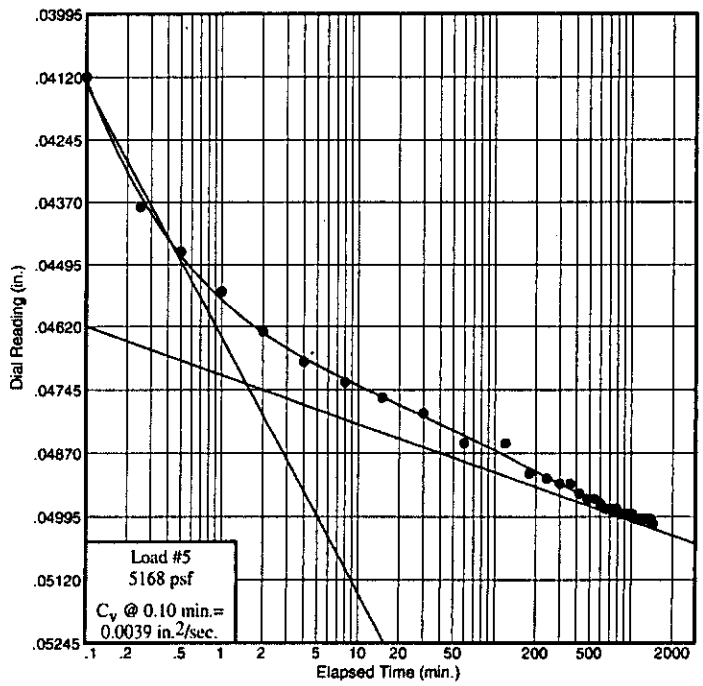
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-32 Sample No.: P1 Elev./Depth: 10.0









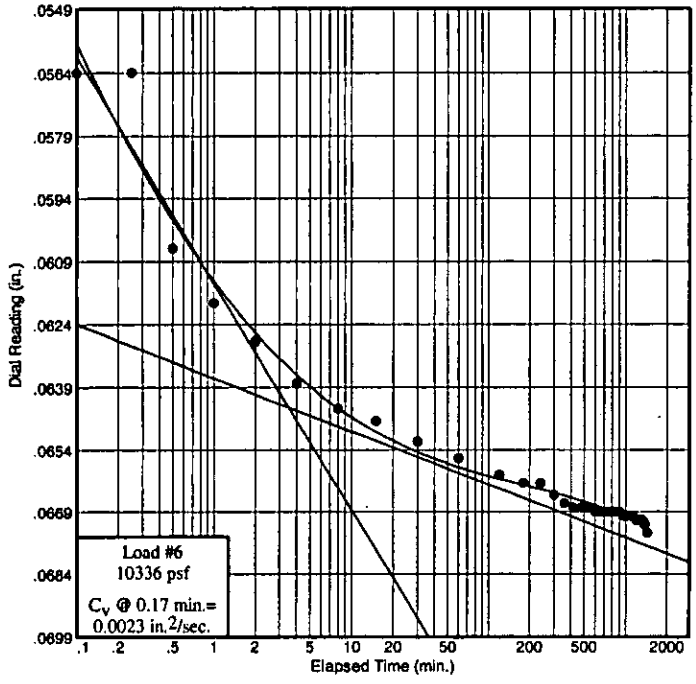
DLZ

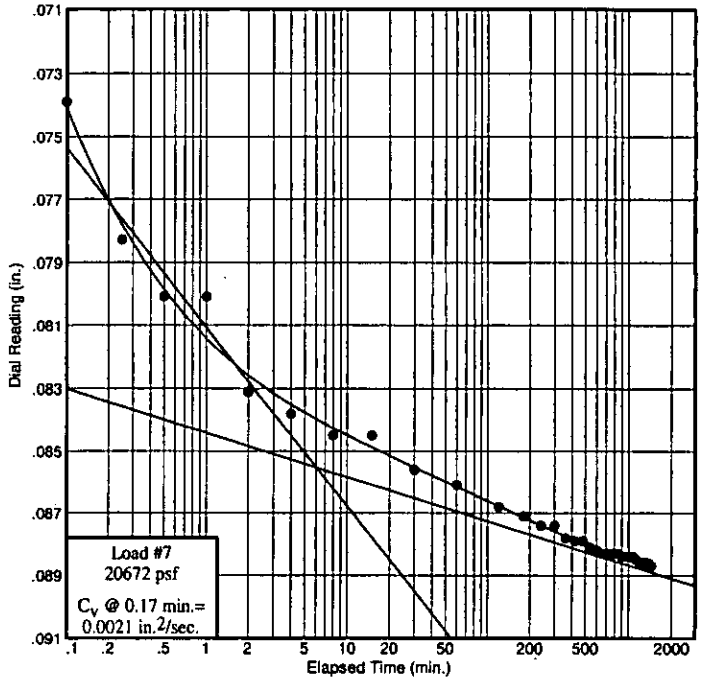
Figure

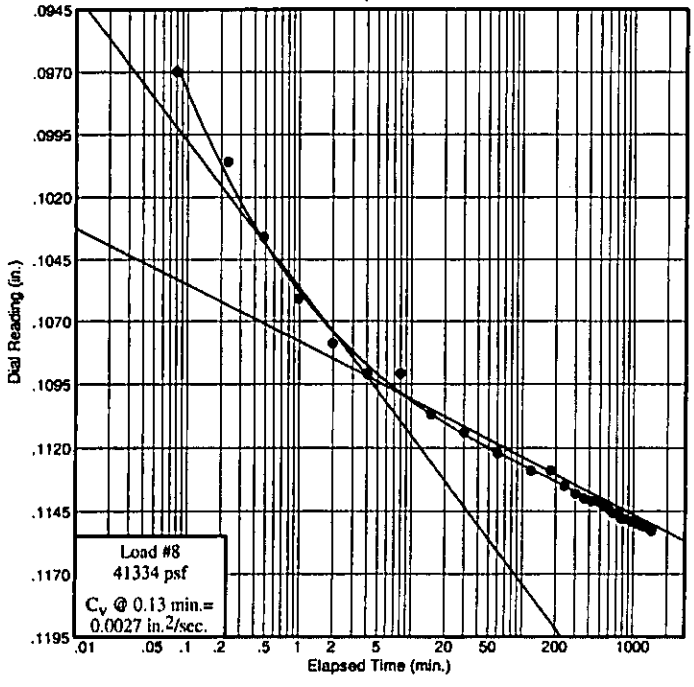
Dial Reading vs. Time

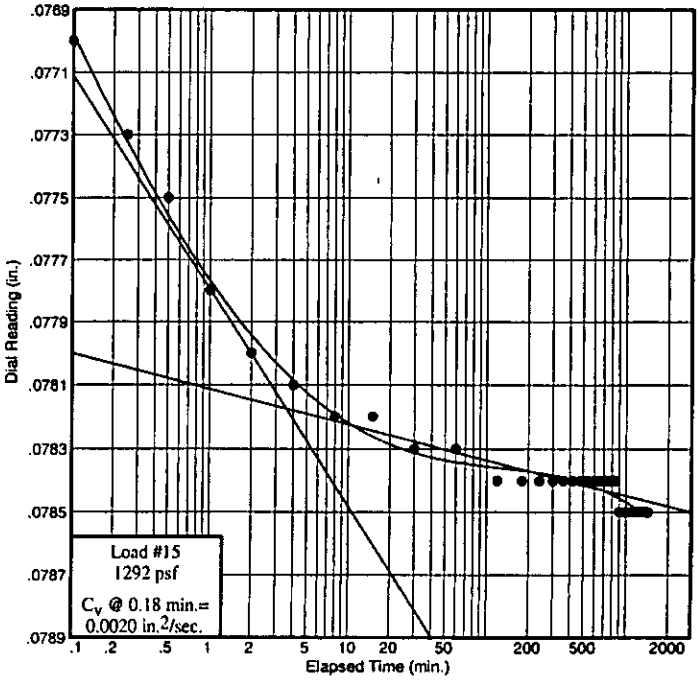
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-32 Sample No.: P1 Elev./Depth: 10.0









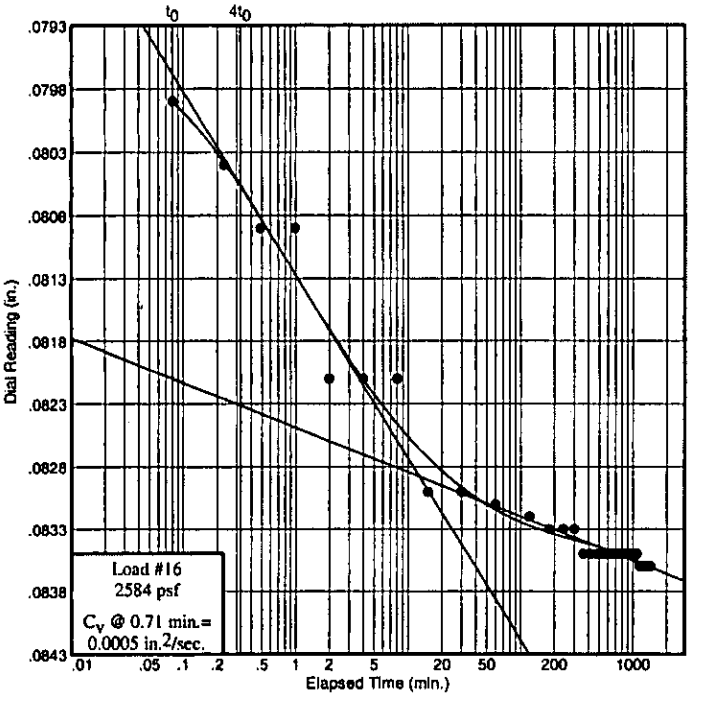
DLZ

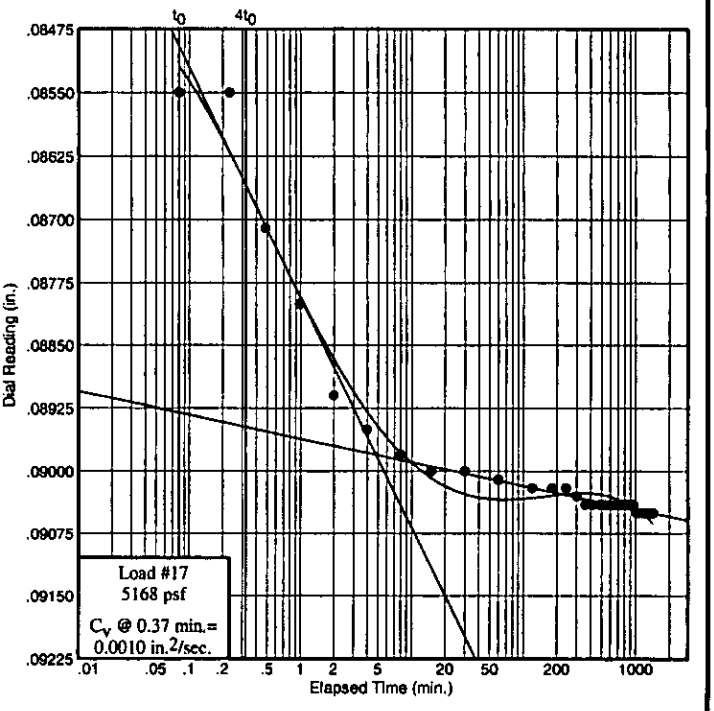
Figure

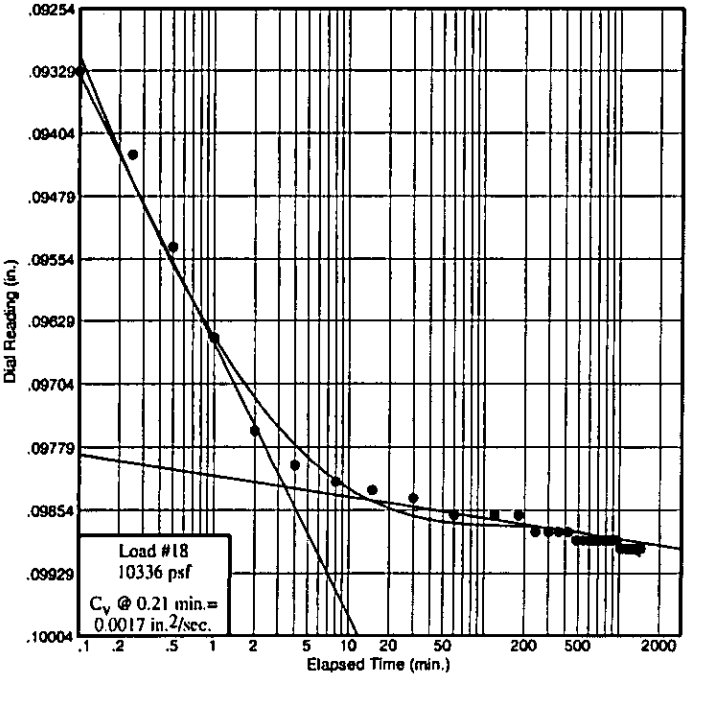
Dial Reading vs. Time

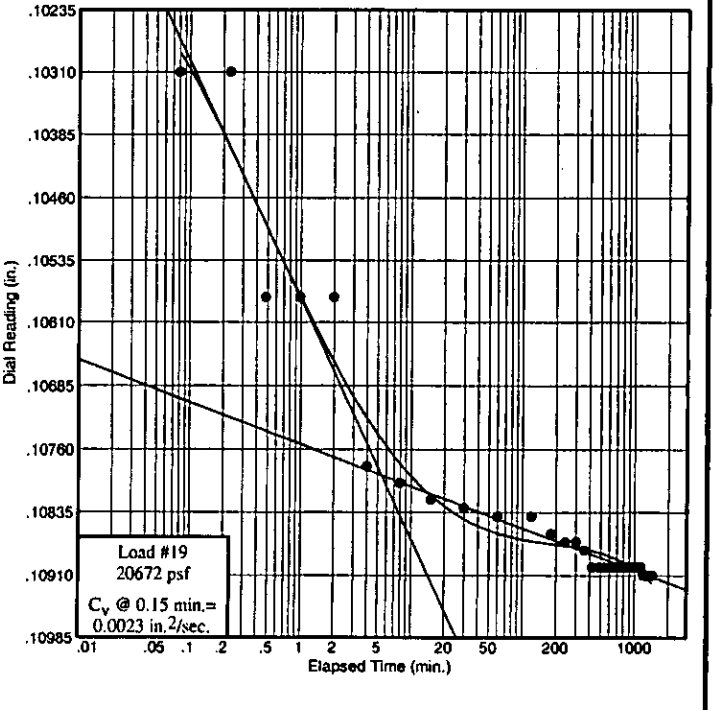
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-32 Sample No.: P1 Elev./Depth: 10.0





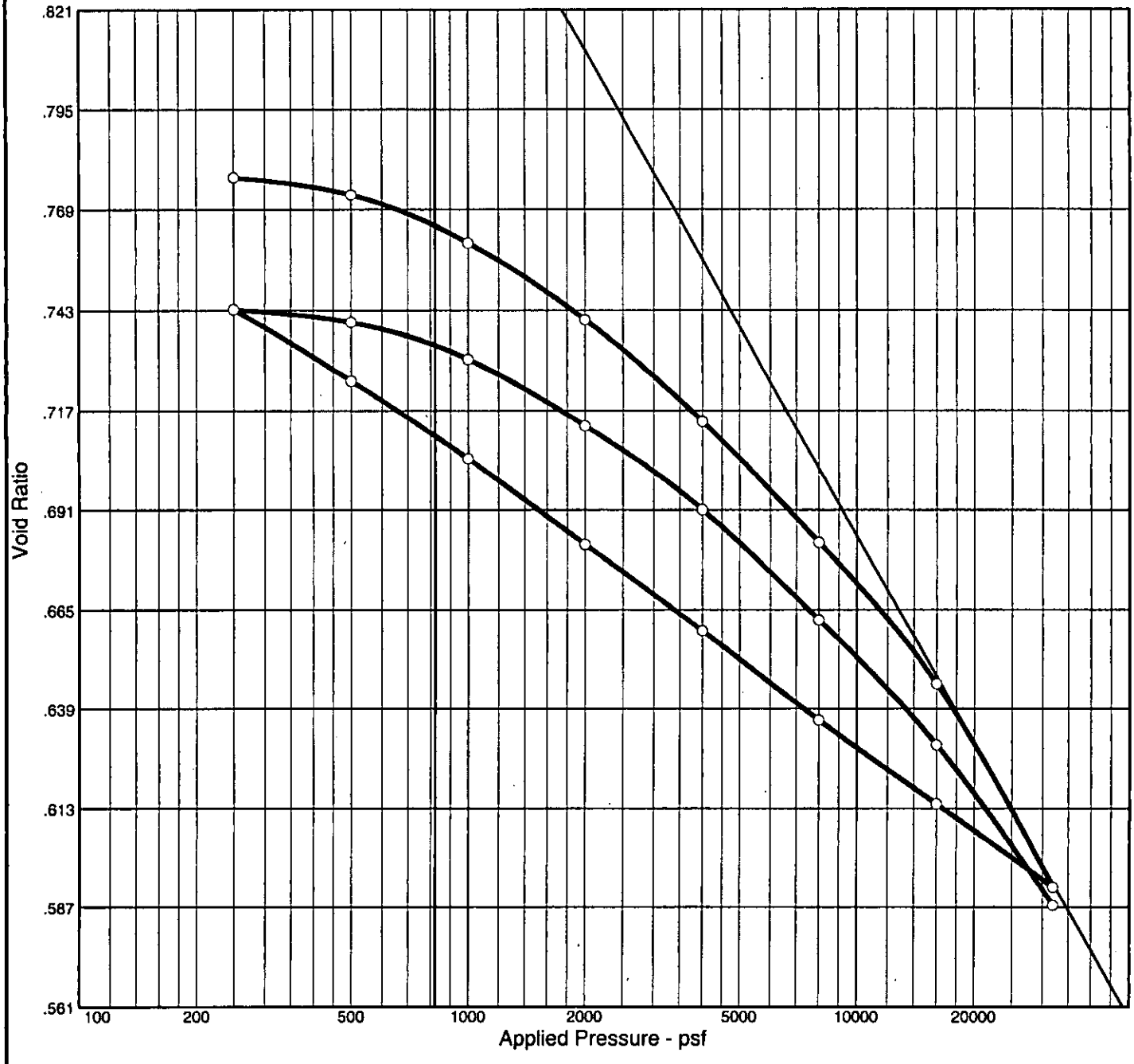




DLZ

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
96.6 %	24.6 %	102.5	36	14	2.82	CL	A-6(14)	0.718

MATERIAL DESCRIPTION

Lean clay

Project No. 0121- **Client:** TranSystems, Inc.

Project: SCI-823-0.00

Source: B-37 **Sample No.:** ST-1 **Elev./Depth:** 8.0

DLZ

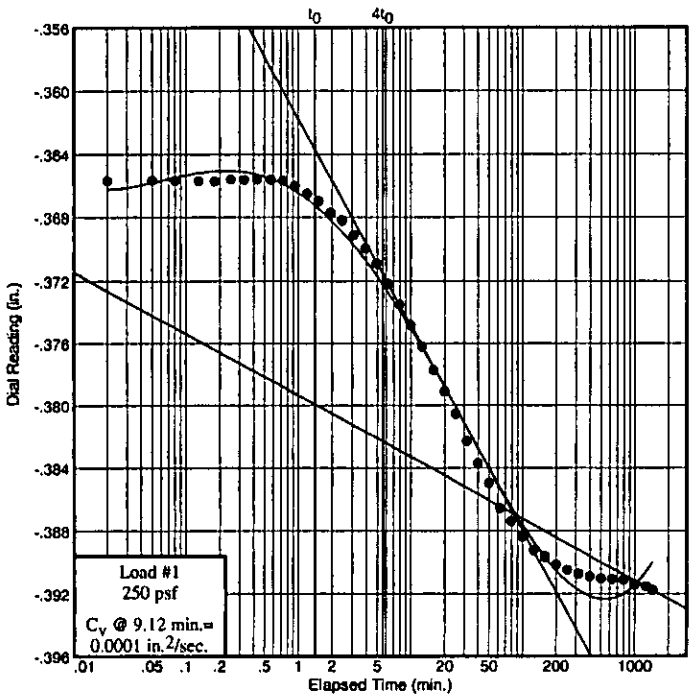
Remarks:

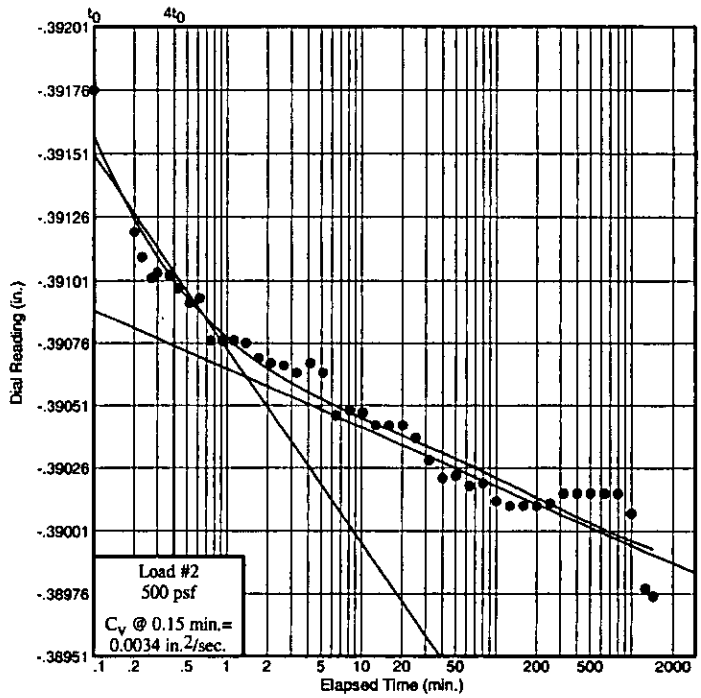
Figure

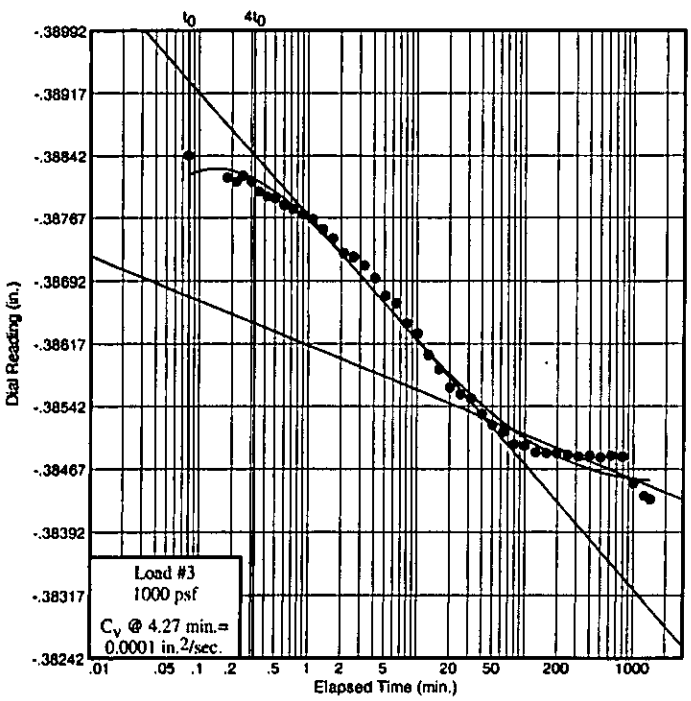
Dial Reading vs. Time

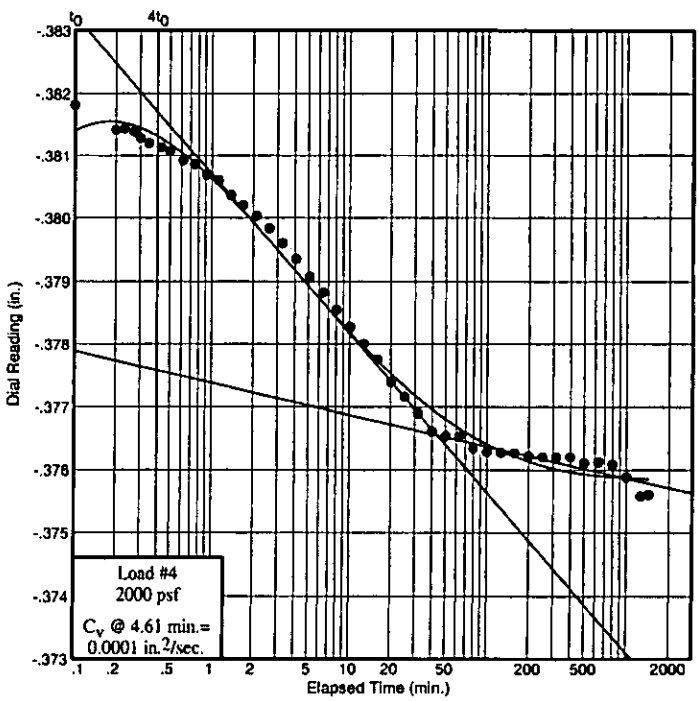
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-37 Sample No.: ST-1 Elev./Depth: 8.0









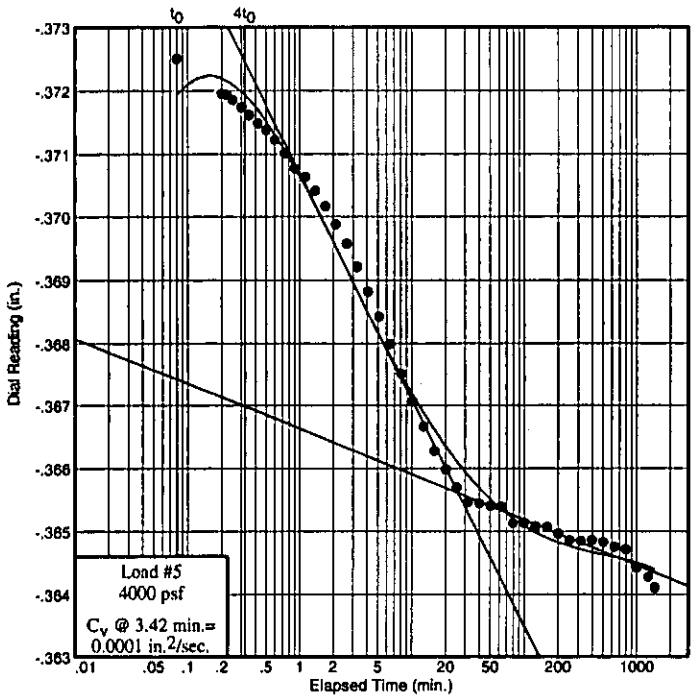
DLZ

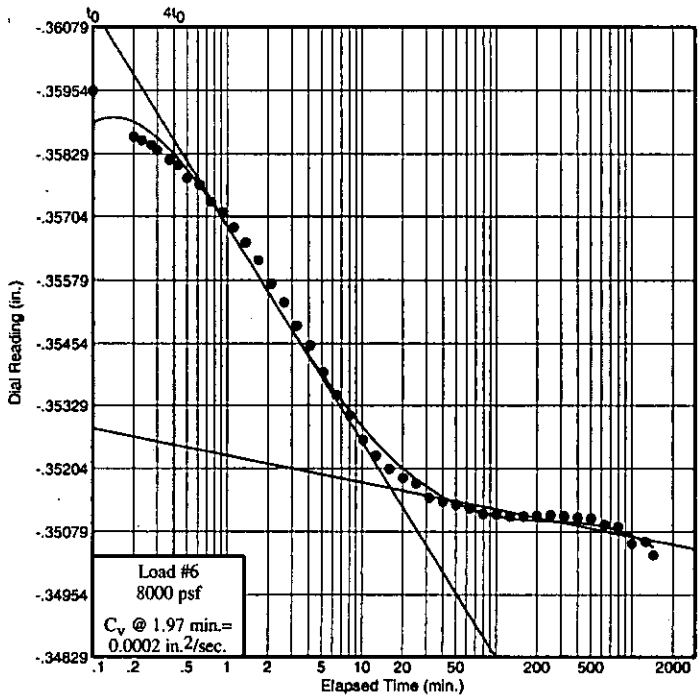
Figure

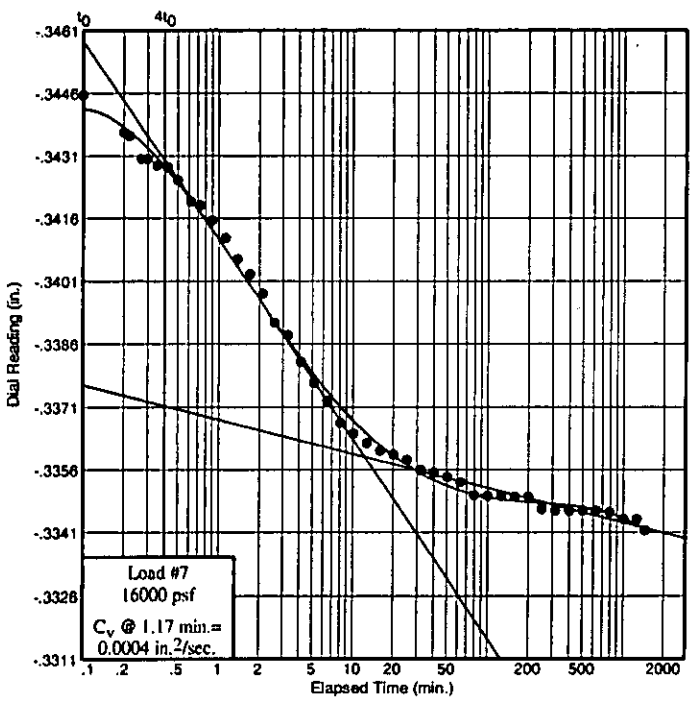
Dial Reading vs. Time

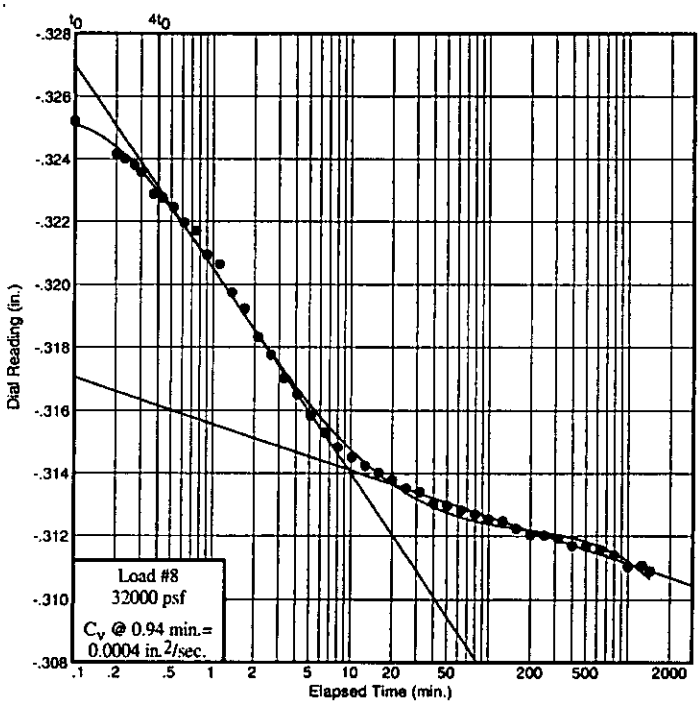
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-37 Sample No.: ST-1 Elev./Depth: 8.0









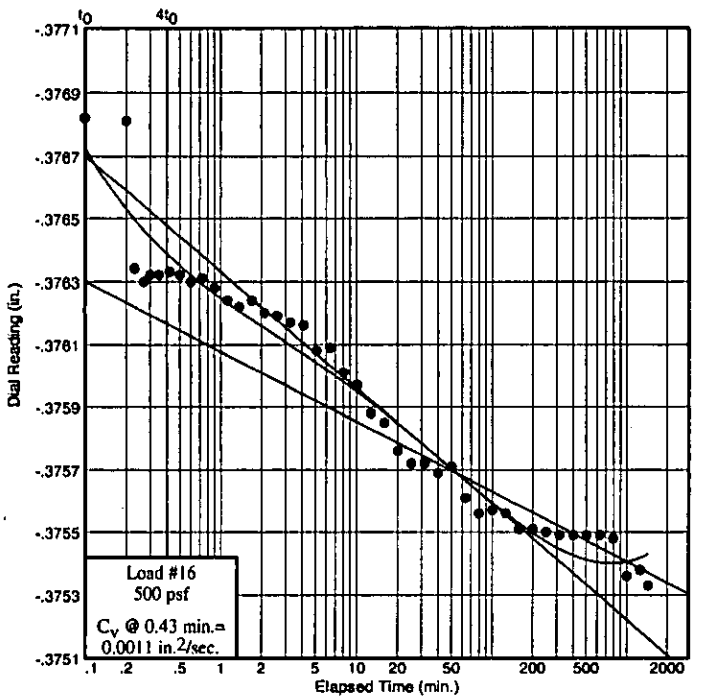
DLZ

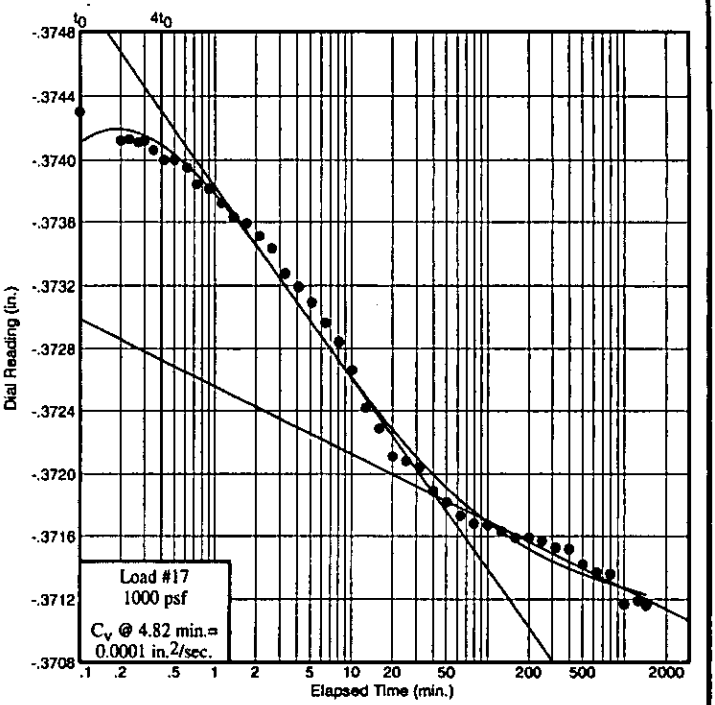
Figure

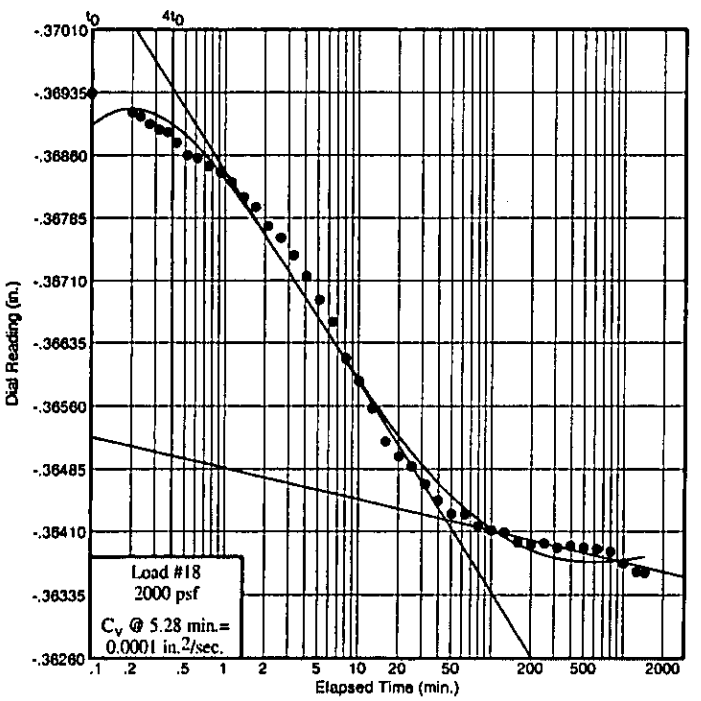
Dial Reading vs. Time

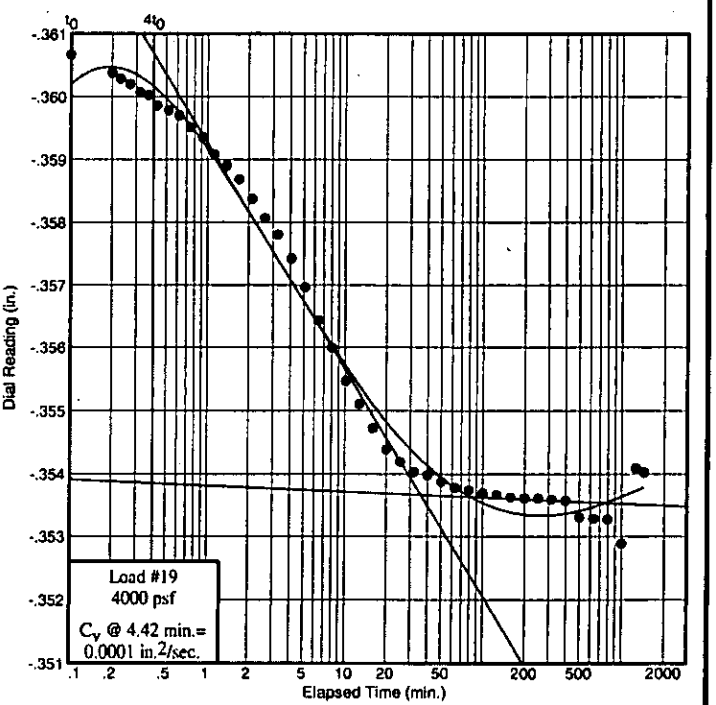
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-37 Sample No.: ST-1 Elev./Depth: 8.0









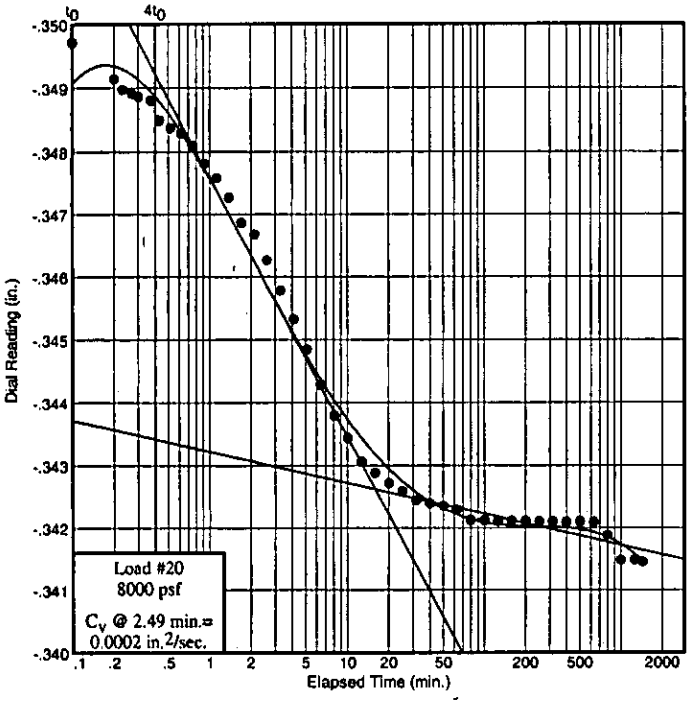
DLZ

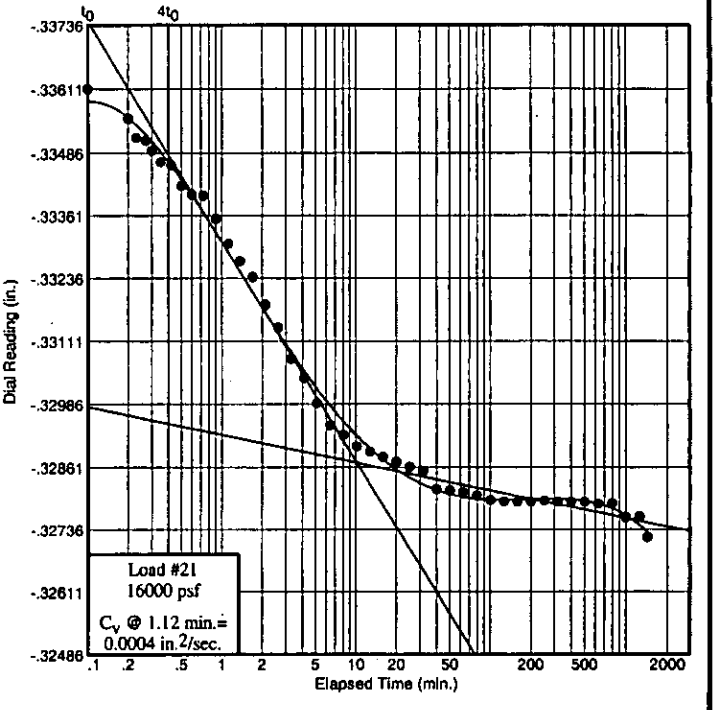
Figure

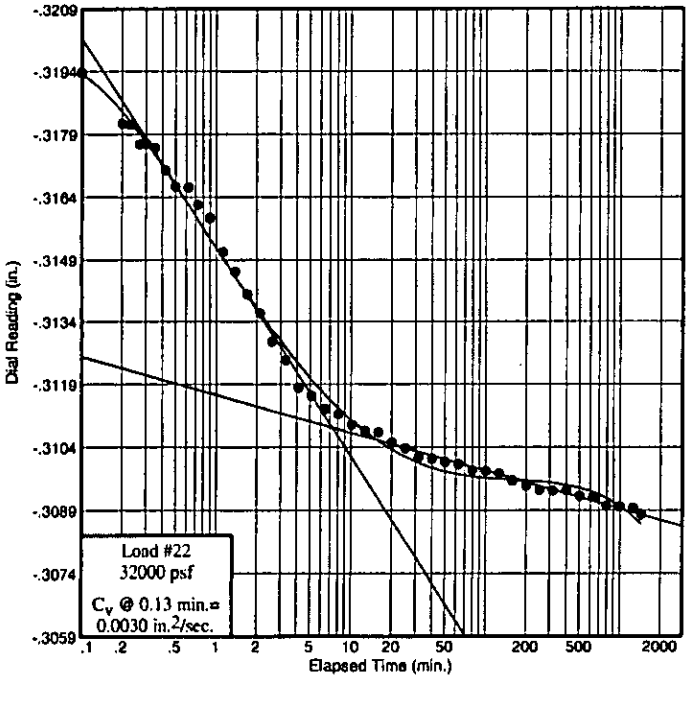
Dial Reading vs. Time

Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-37 Sample No.: ST-1 Elev./Depth: 8.0



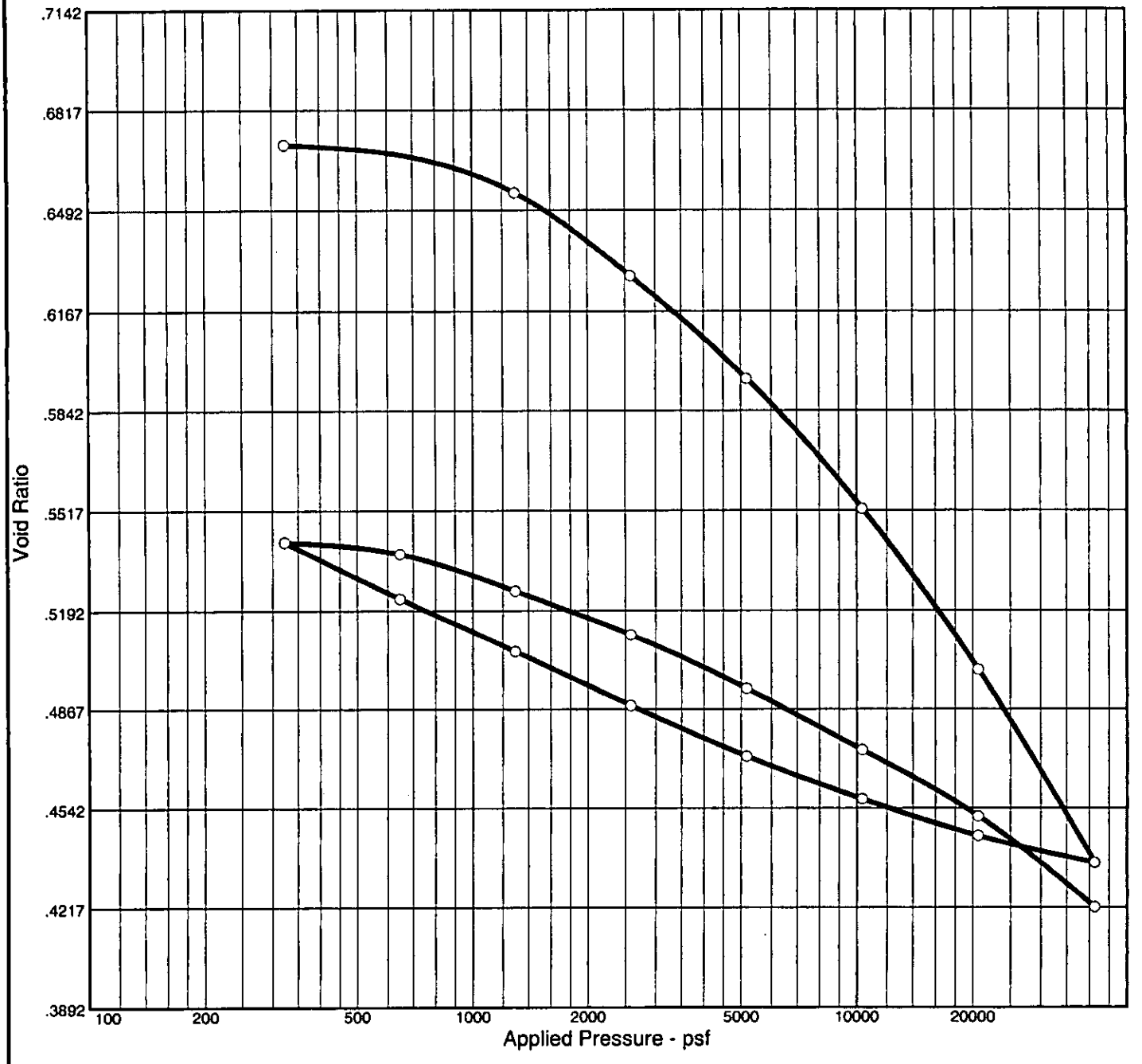




DLZ

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
108.0 %	27.7 %	95.5	29	9	2.75	CL	A-4(8)	0.705

MATERIAL DESCRIPTION

Lean clay

Project No. 0121- **Client:** TranSystems, Inc.

Project: SCI-823-0.00

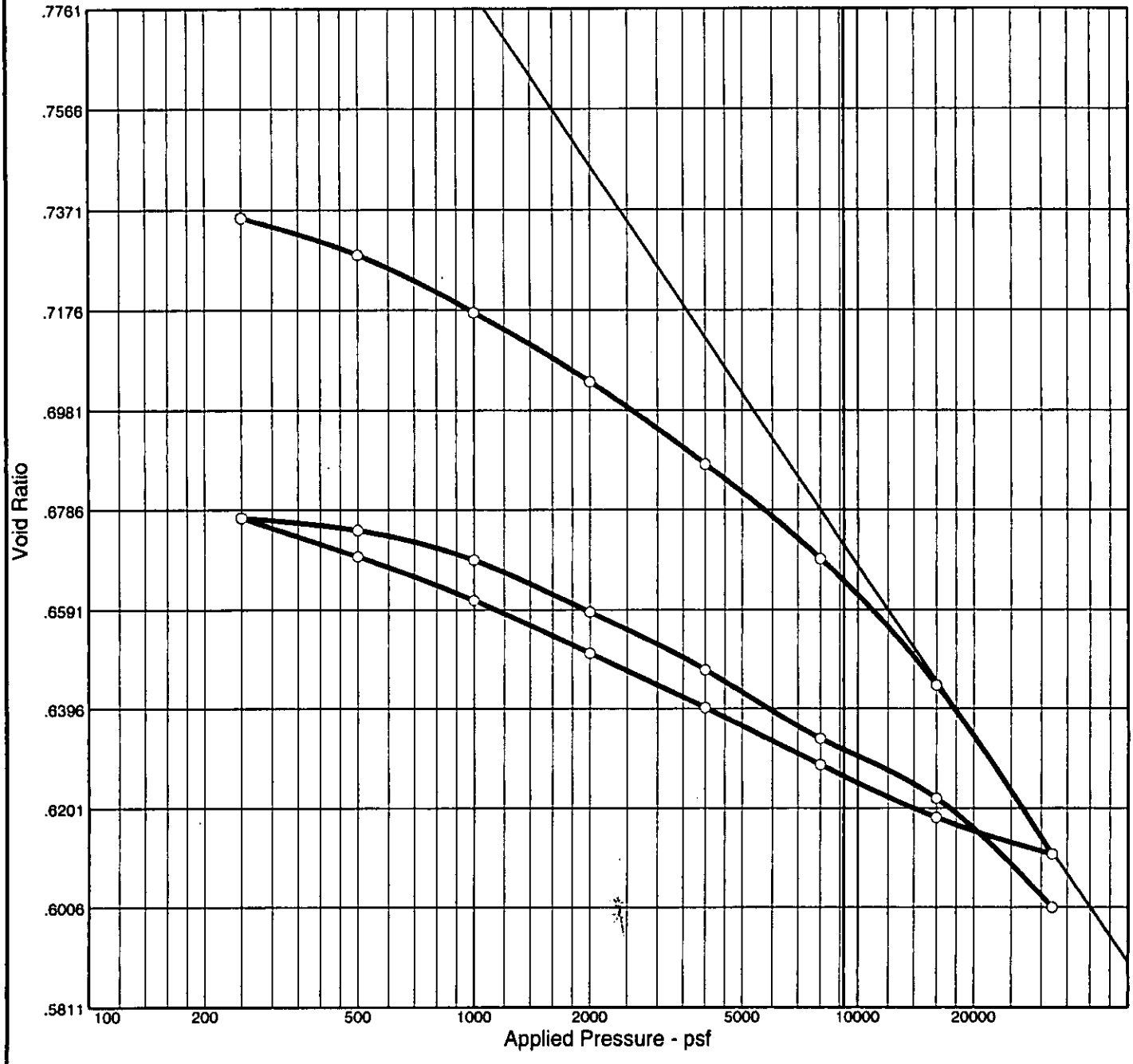
Source: B-37 **Sample No.:** ST-3 **Elev./Depth:** 43.5

DLZ

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
99.9 %	27.7 %	96.4	27	11	2.7	CL	A-6(8)	0.748

MATERIAL DESCRIPTION

Lean clay

Project No. 0121- **Client:** TranSystems, Inc.

Project: SCI-823-0.00

Source: B-38 **Sample No.:** ST-1 **Elev./Depth:** 10.0

DLZ

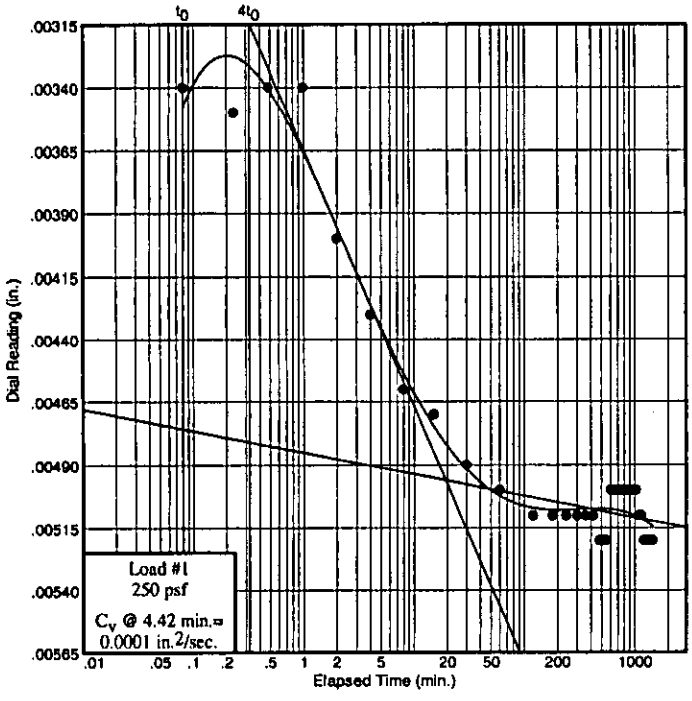
Remarks:

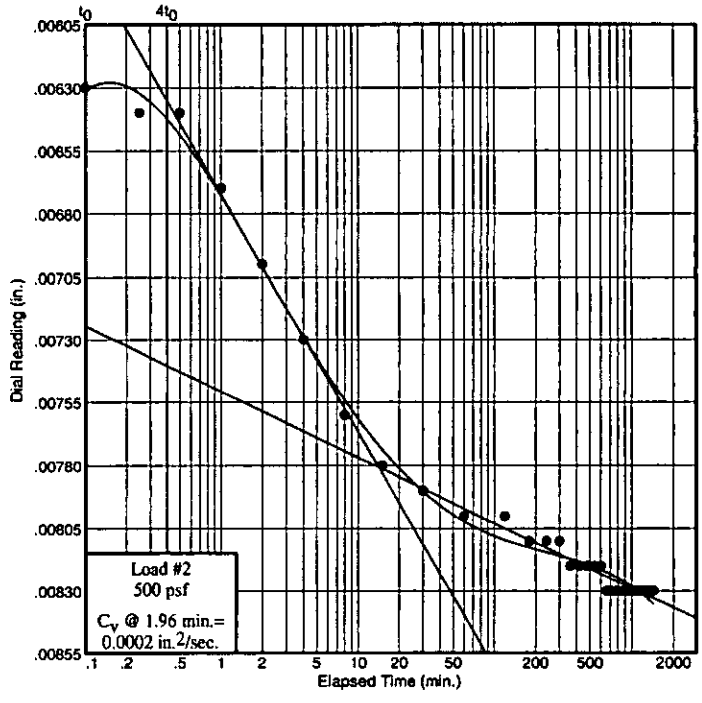
Figure

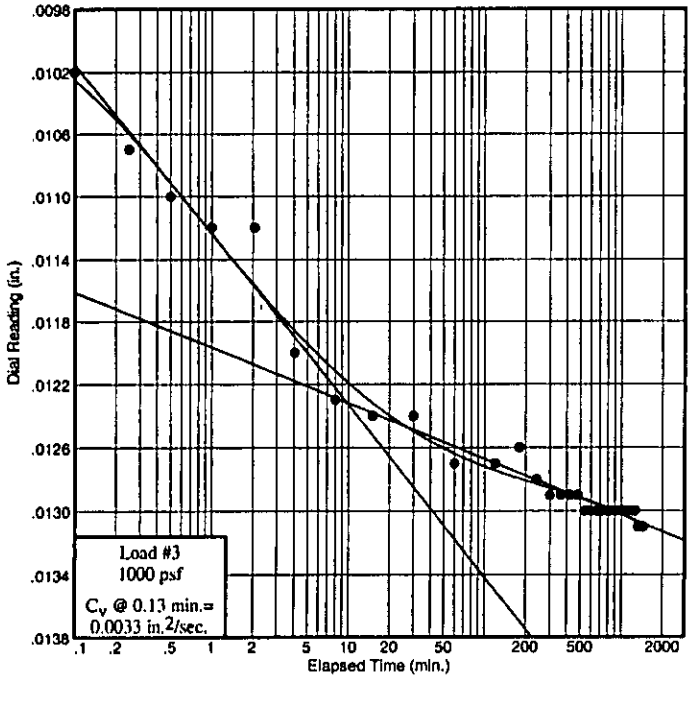
Dial Reading vs. Time

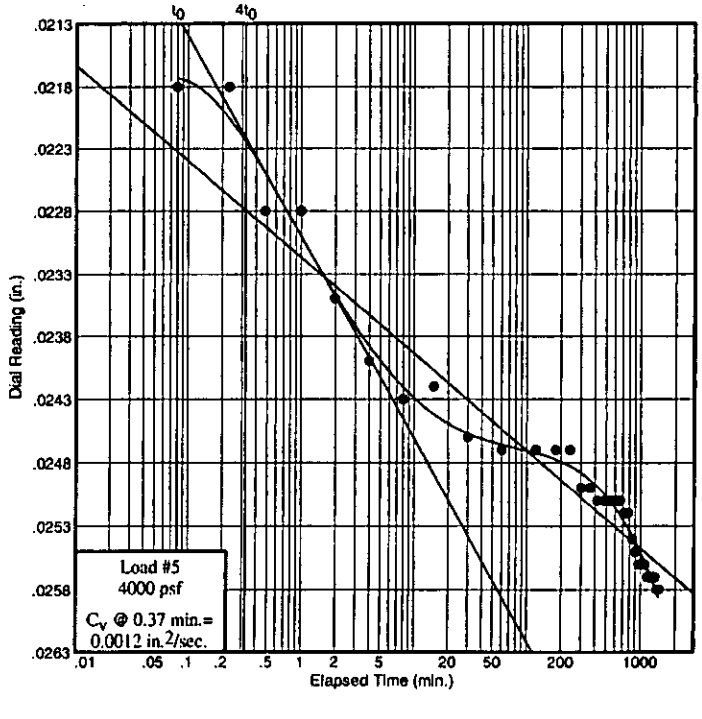
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-38 Sample No.: ST-1 Elev./Depth: 10.0









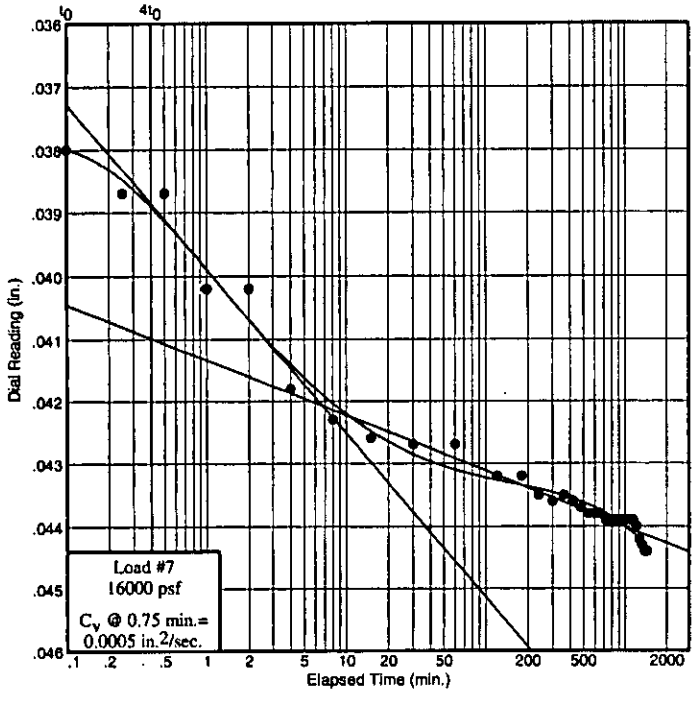
DLZ

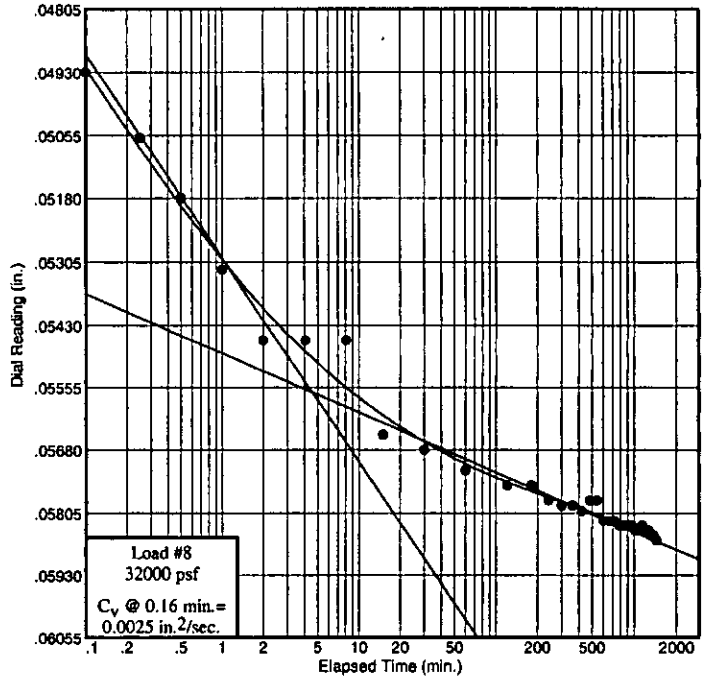
Figure

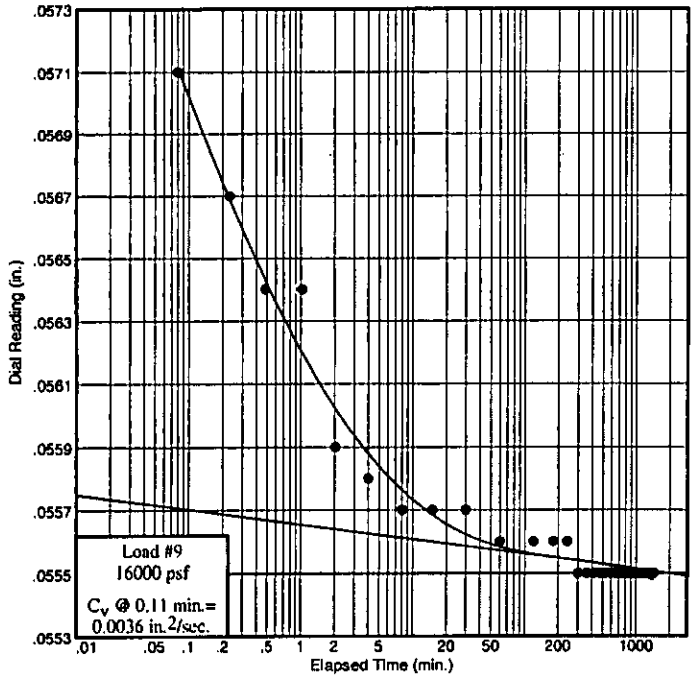
Dial Reading vs. Time

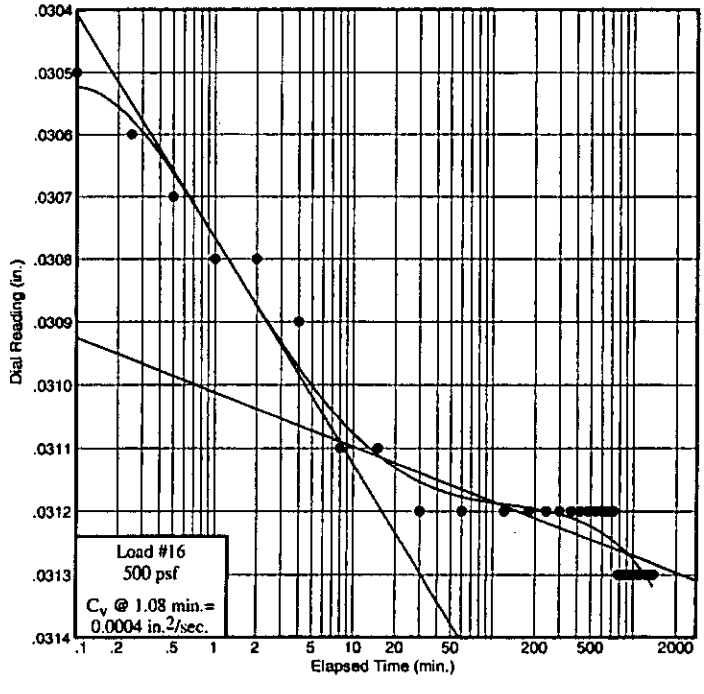
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-38 Sample No.: ST-1 Elev./Depth: 10.0









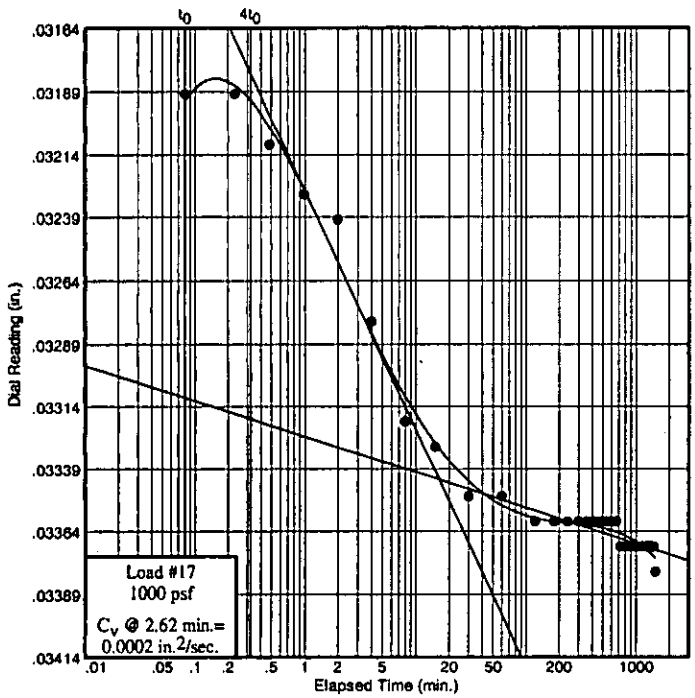
DLZ

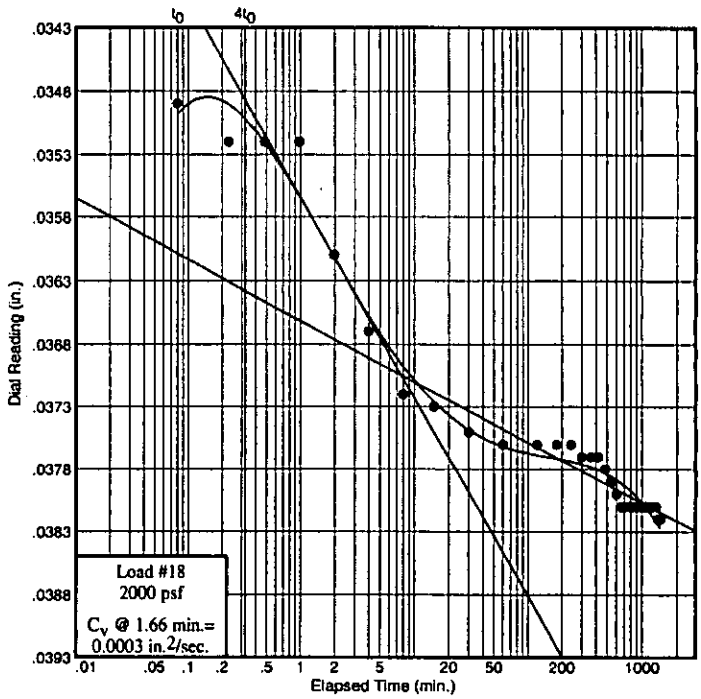
Figure

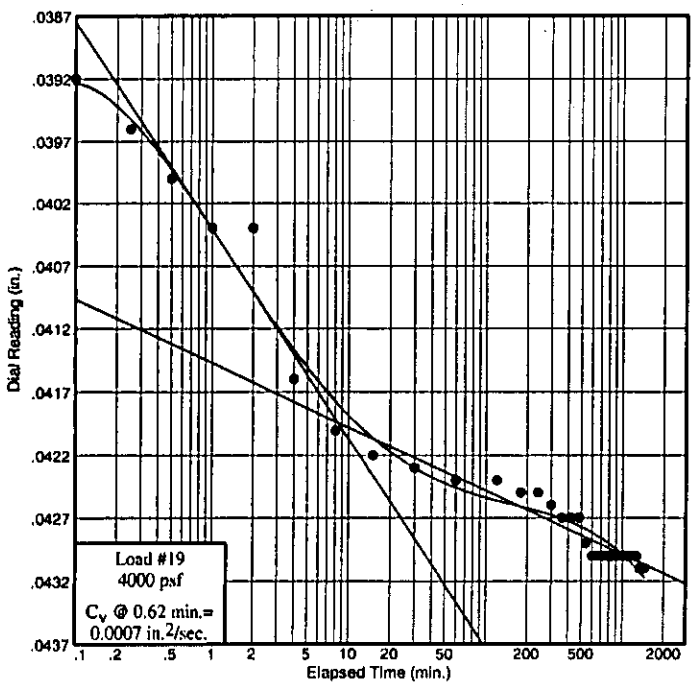
Dial Reading vs. Time

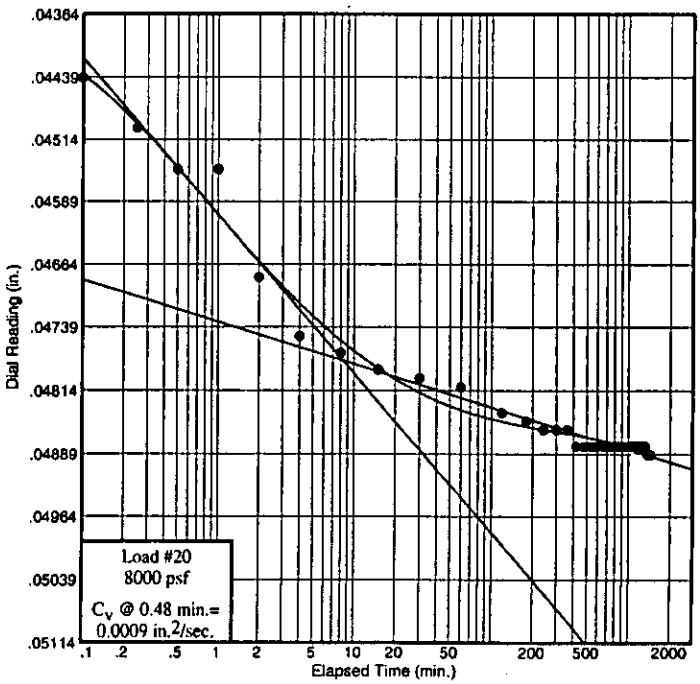
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-38 Sample No.: ST-1 Elev./Depth: 10.0









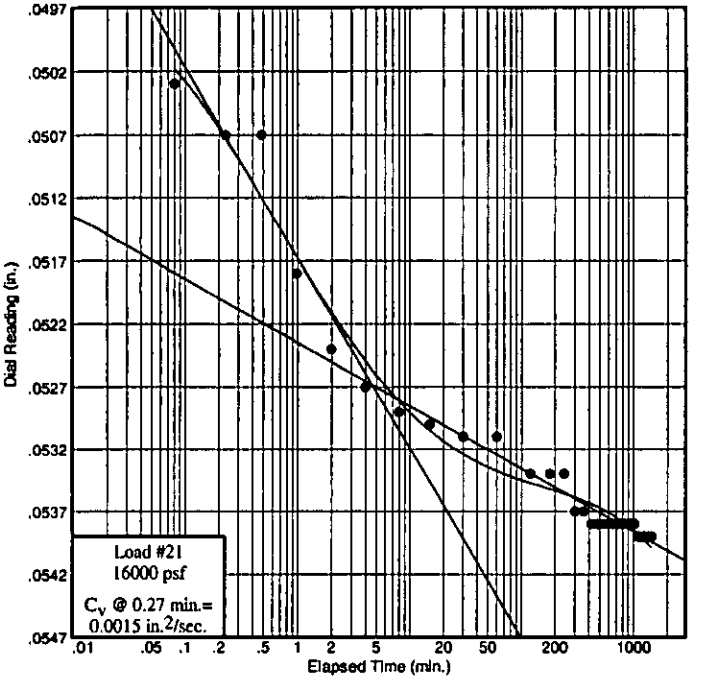
DLZ

Figure

Dial Reading vs. Time

Project No.: 0121-3070.03
Project: SCI-823-0.00

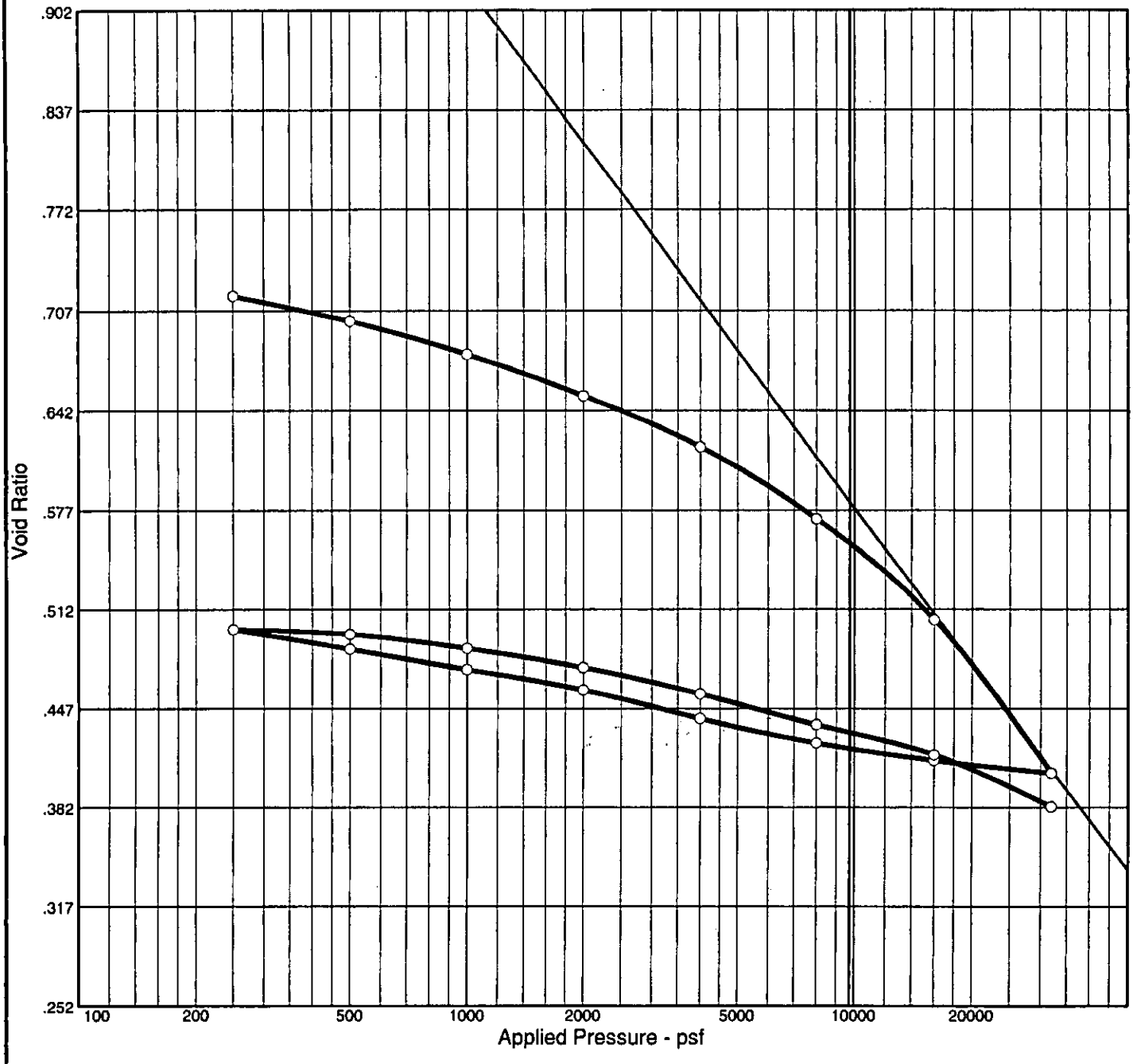
Source: B-38 Sample No.: ST-1 Elev./Depth: 10.0



DLZ

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
95.6 %	26.1 %	97.0	33	12	2.7	CL	A-6(12)	0.738

MATERIAL DESCRIPTION

Lean clay

Project No. 0121- **Client:** TranSystems, Inc.

Project: SCI-823-0.00

Source: B-38 **Sample No.:** ST-2 **Elev./Depth:** 19.0

Remarks:

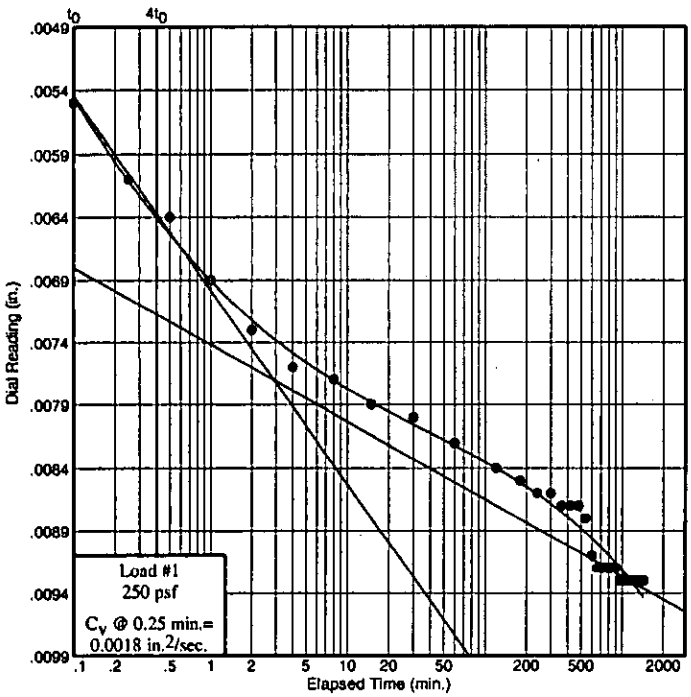
DLZ

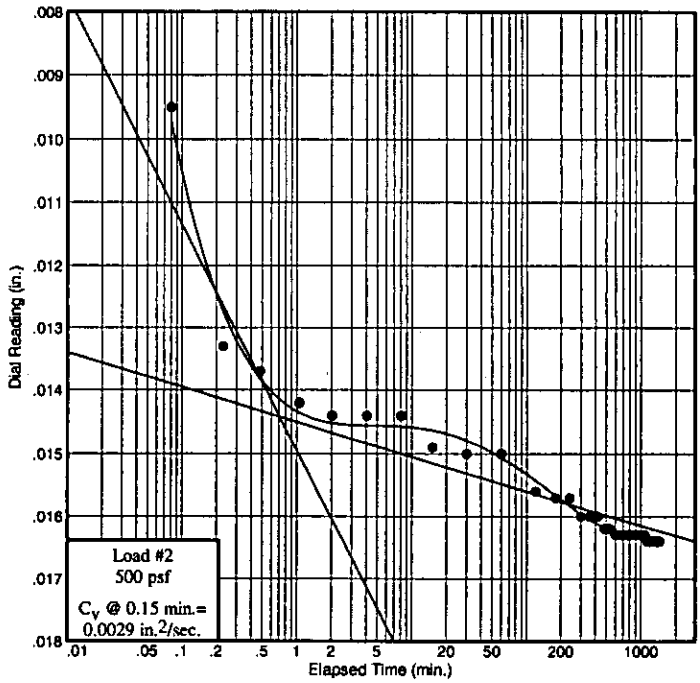
Figure

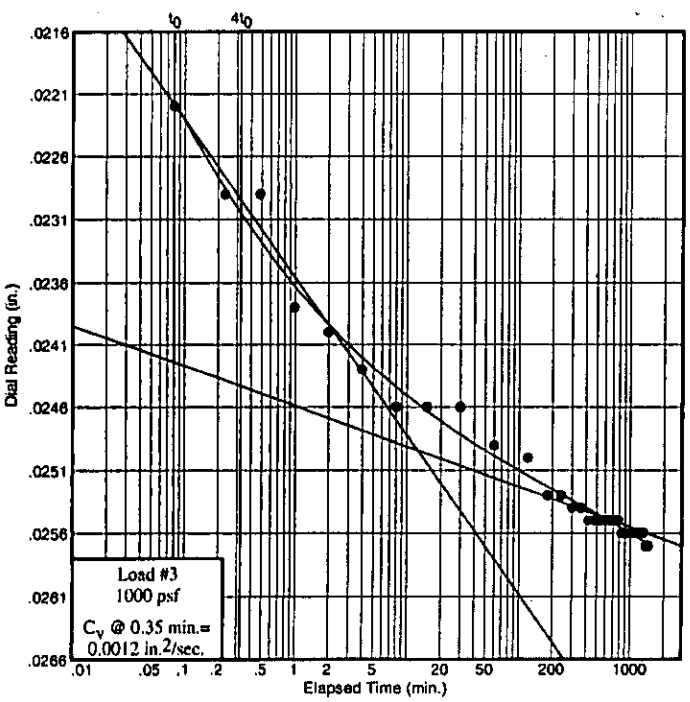
Dial Reading vs. Time

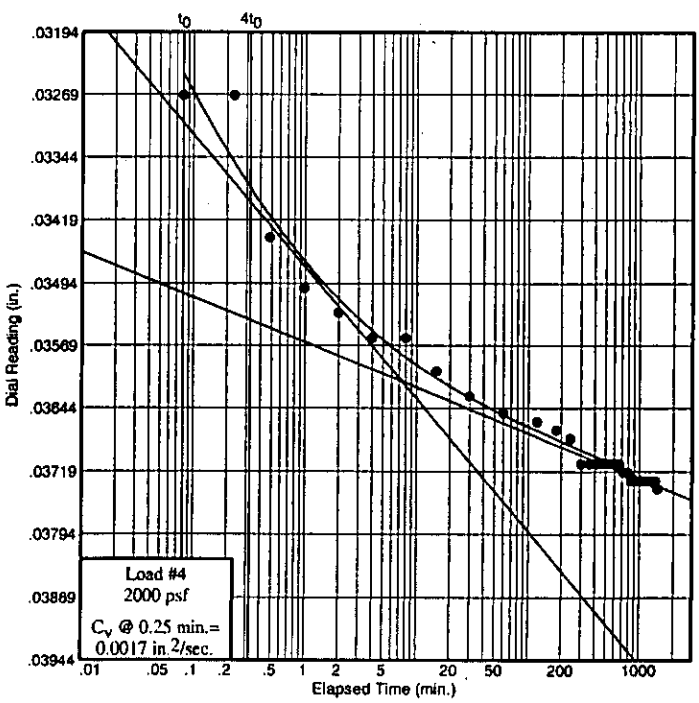
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-38 Sample No.: ST-2 Elev./Depth: 19.0









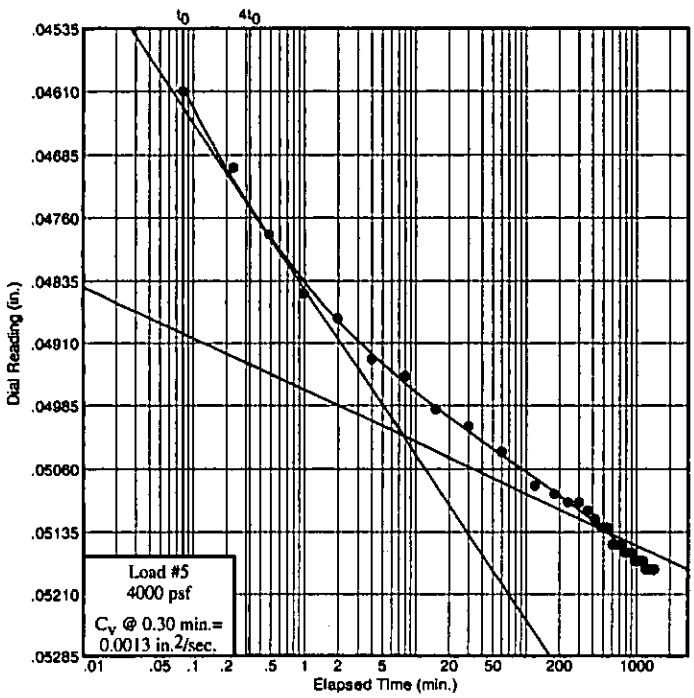
DLZ

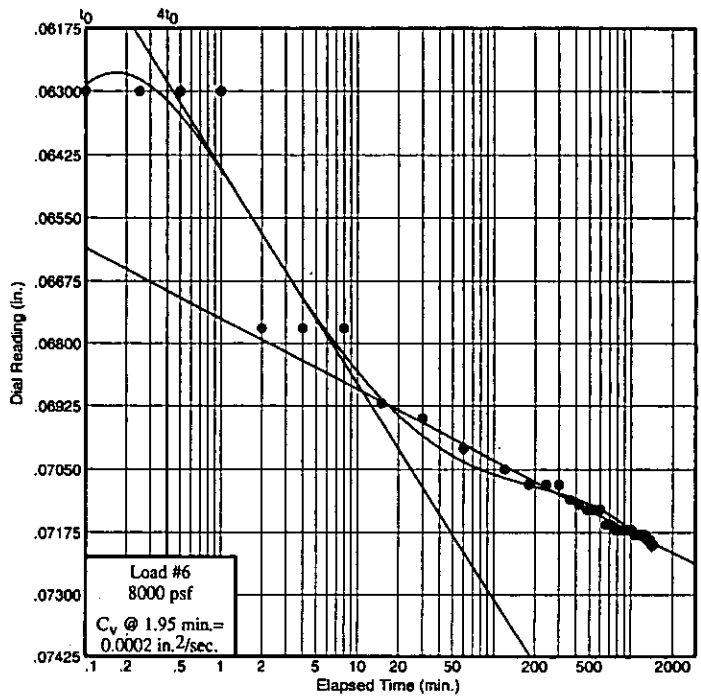
Figure

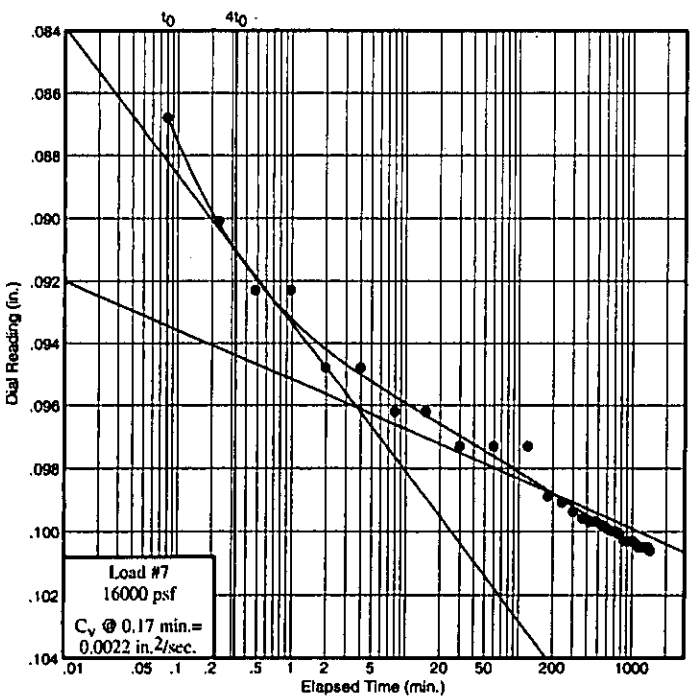
Dial Reading vs. Time

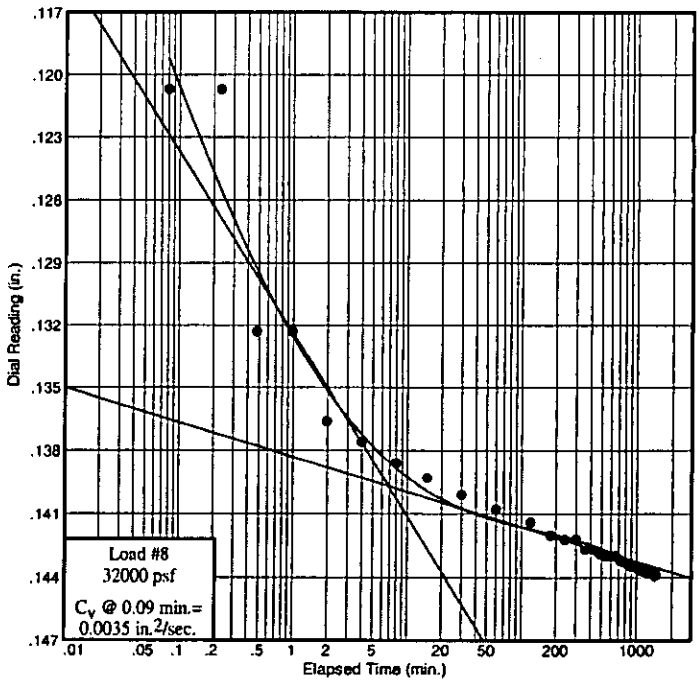
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-38 Sample No.: ST-2 Elev./Depth: 19.0









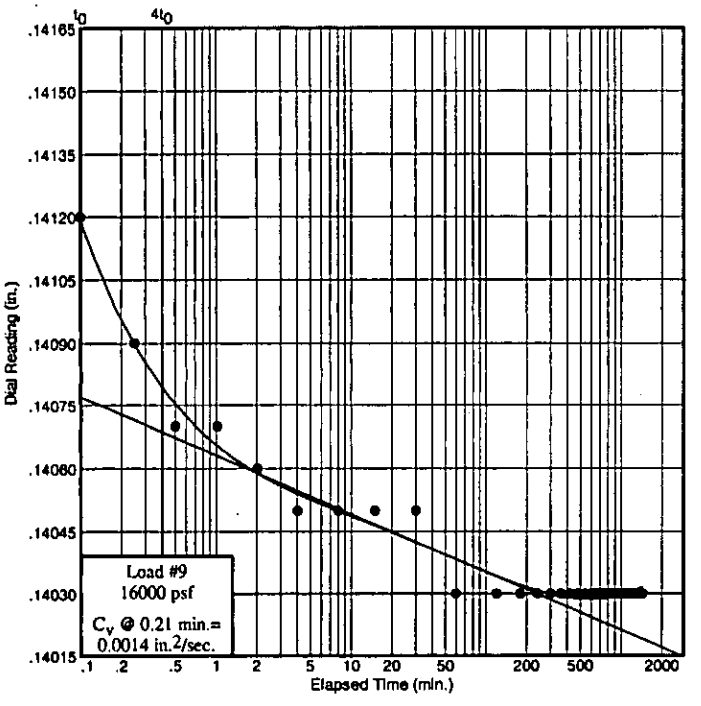
DLZ

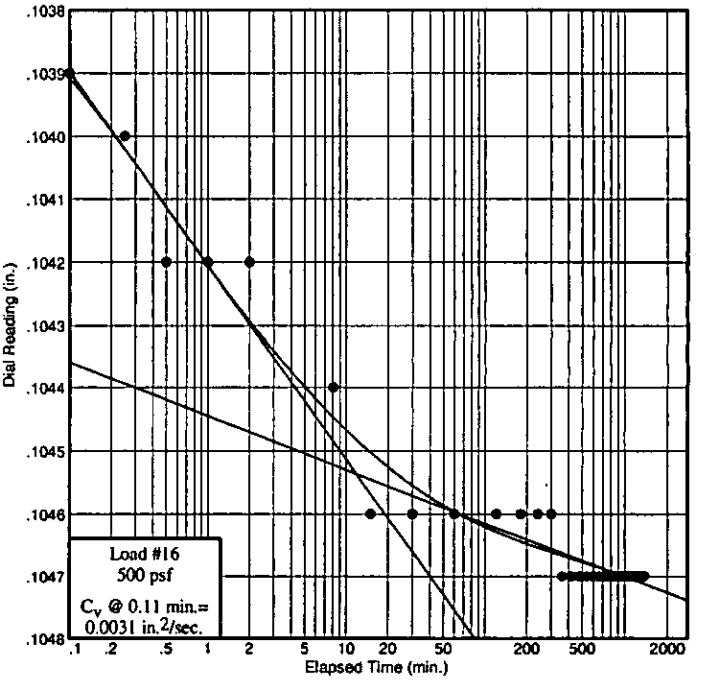
Figure

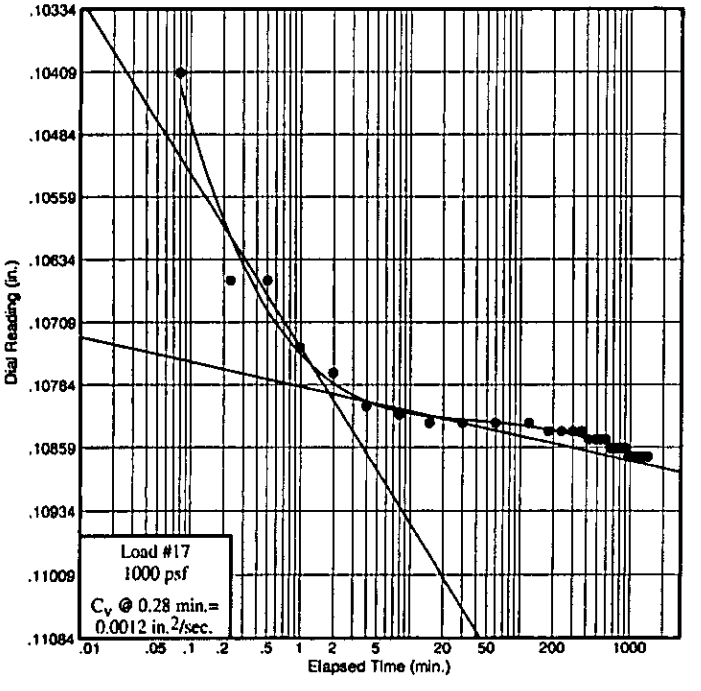
Dial Reading vs. Time

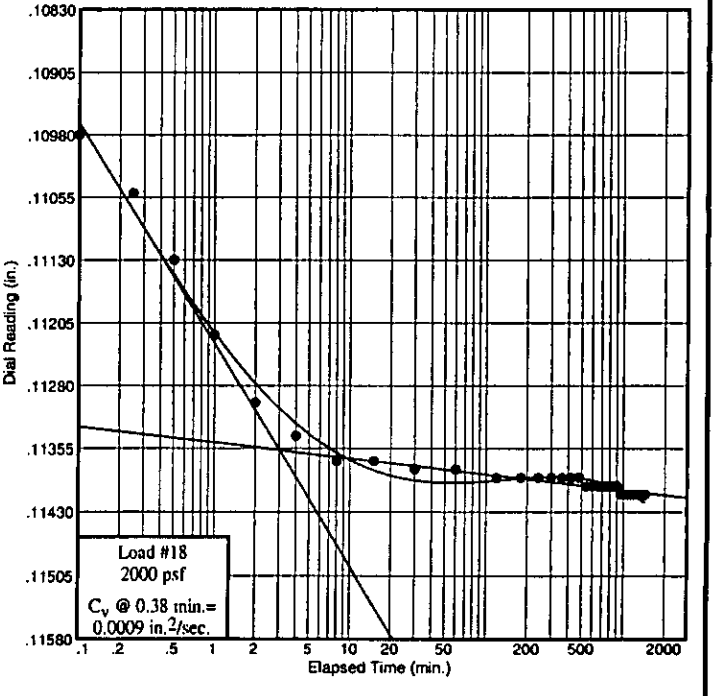
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-38 Sample No.: ST-2 Elev./Depth: 19.0









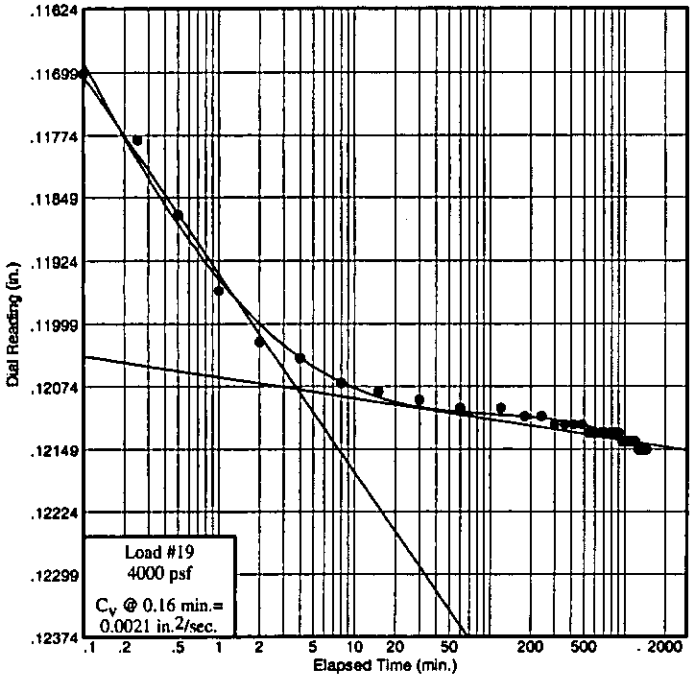
DLZ

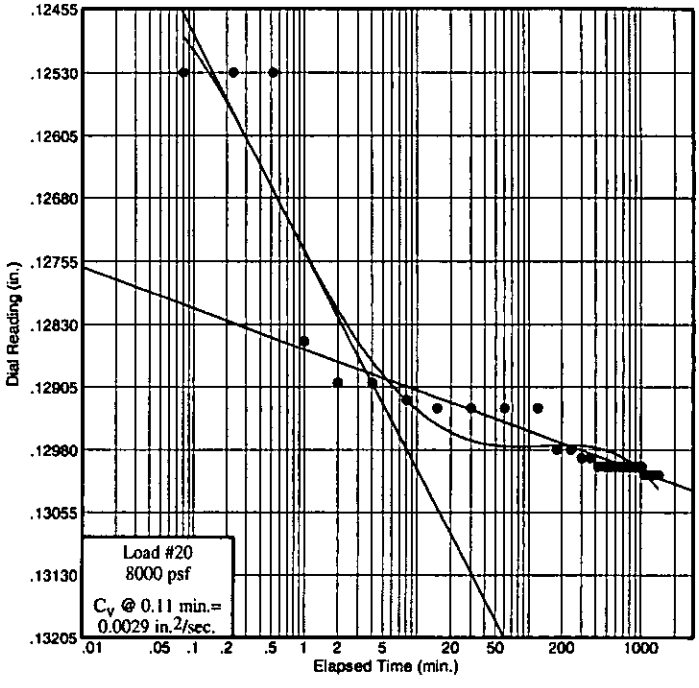
Figure

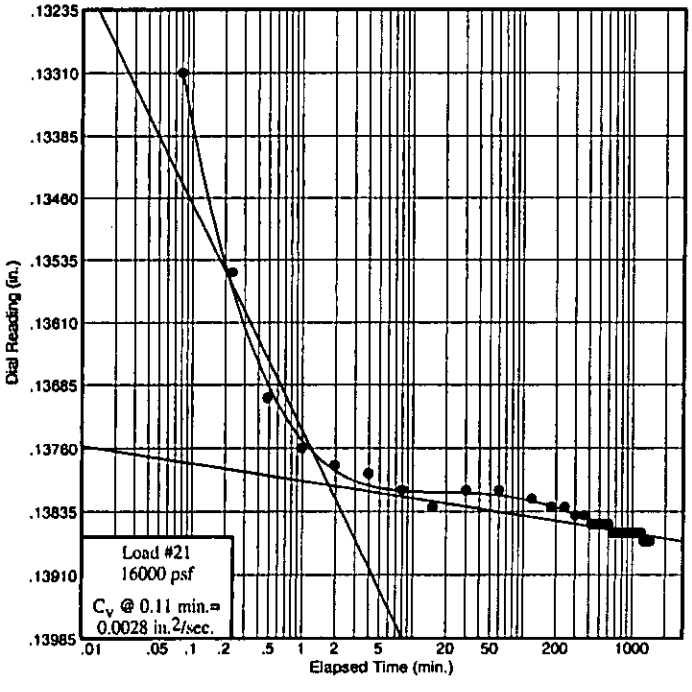
Dial Reading vs. Time

Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-38 Sample No.: ST-2 Elev./Depth: 19.0



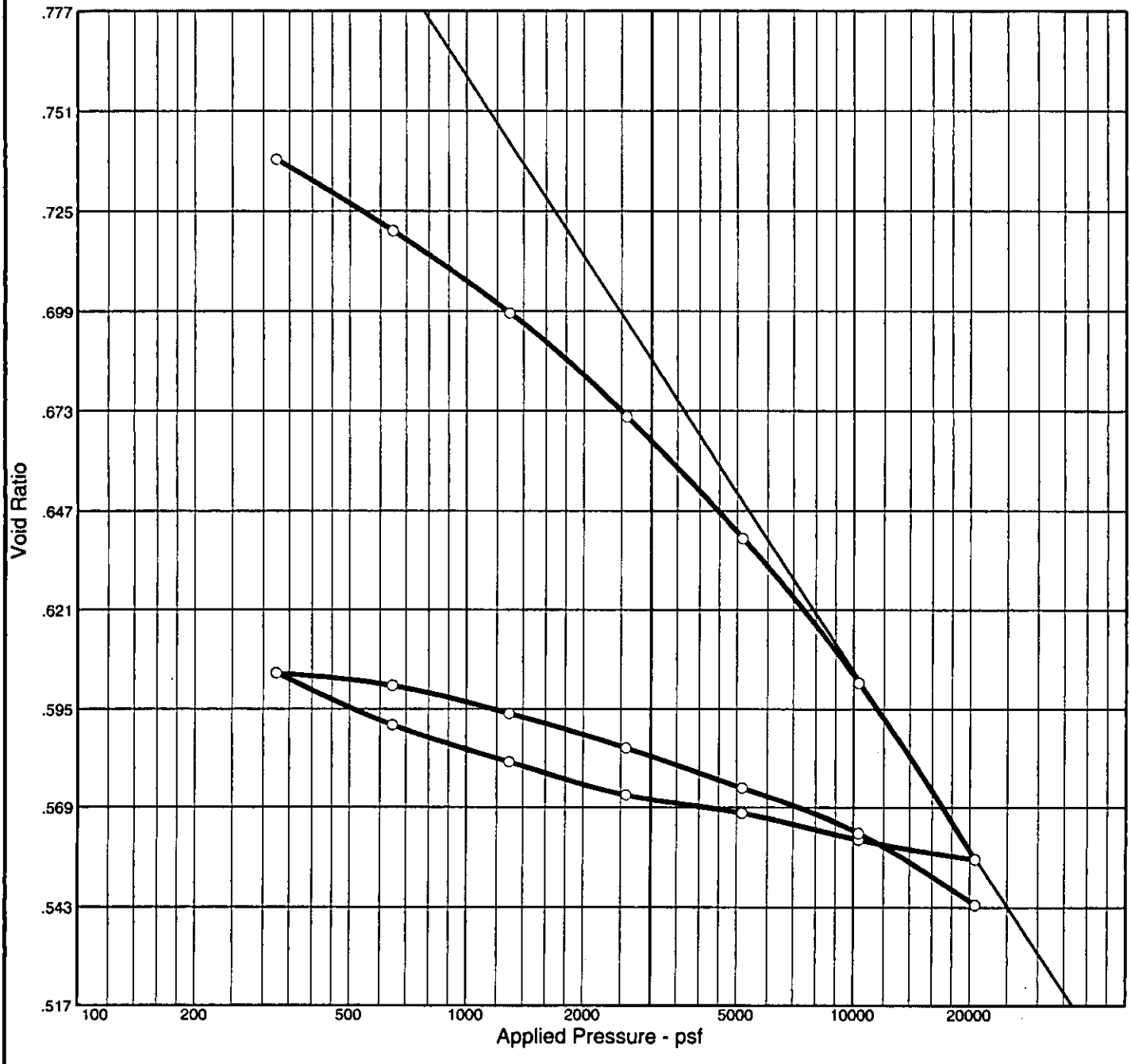




DLZ

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
98.5 %	27.7 %	95.8	29	9	2.7	CL	A-6(10)	0.760

MATERIAL DESCRIPTION

Lean clay

Project No. 0121- **Client:** TranSystems, Inc.

Project: SCI-823-0.00

Source: B-38 **Sample No.:** ST-3 **Elev./Depth:** 37.0

DLZ

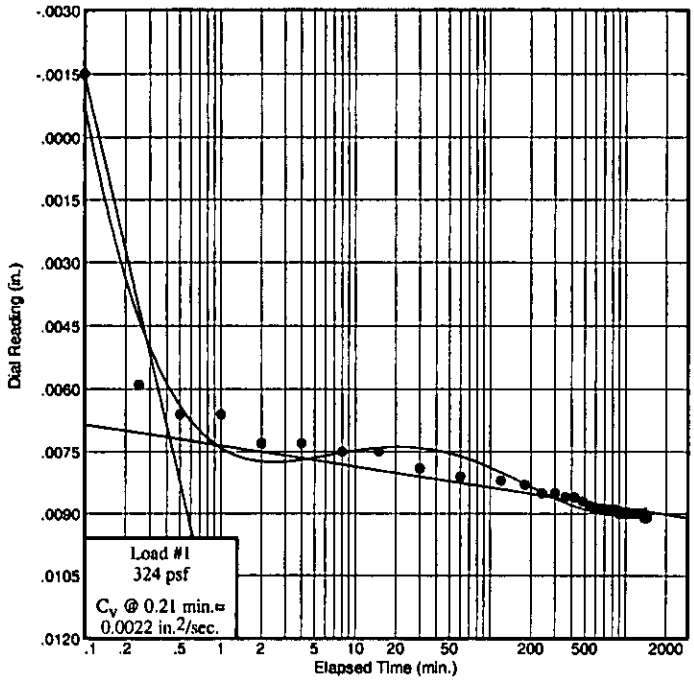
Remarks:

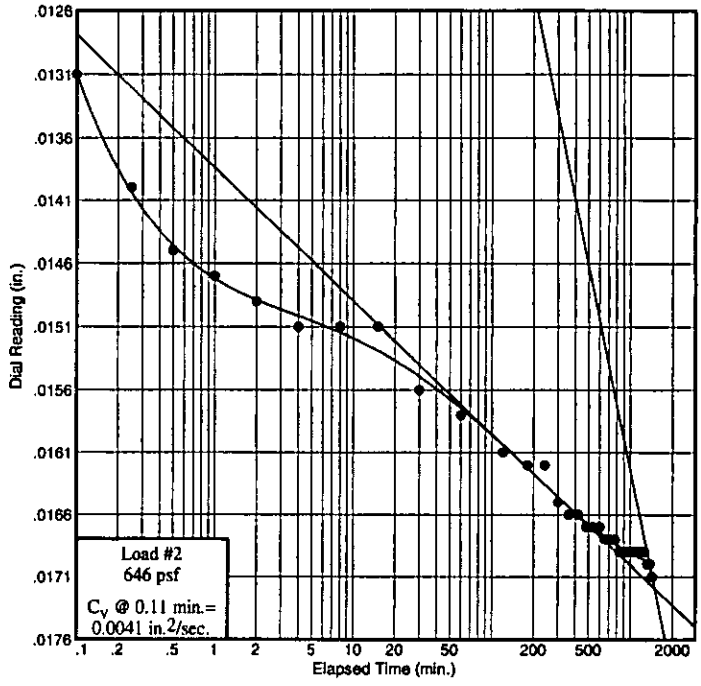
Figure

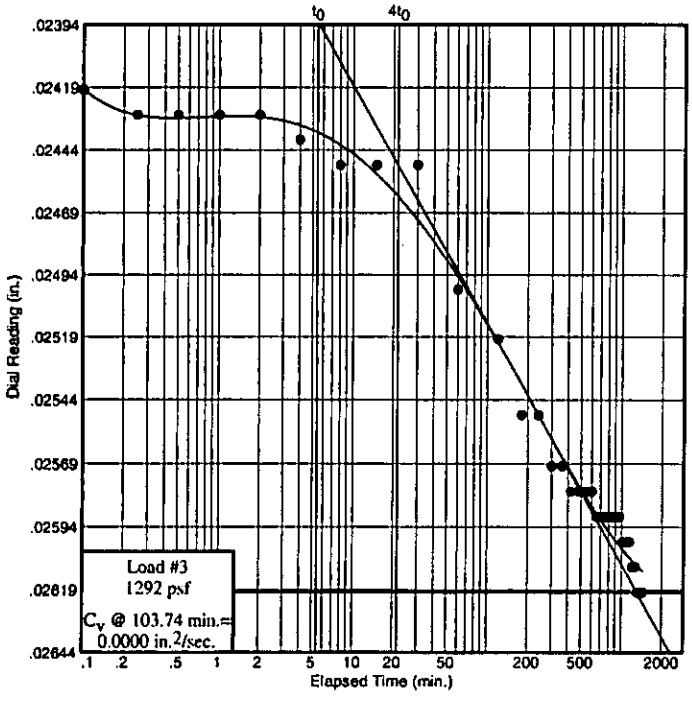
Dial Reading vs. Time

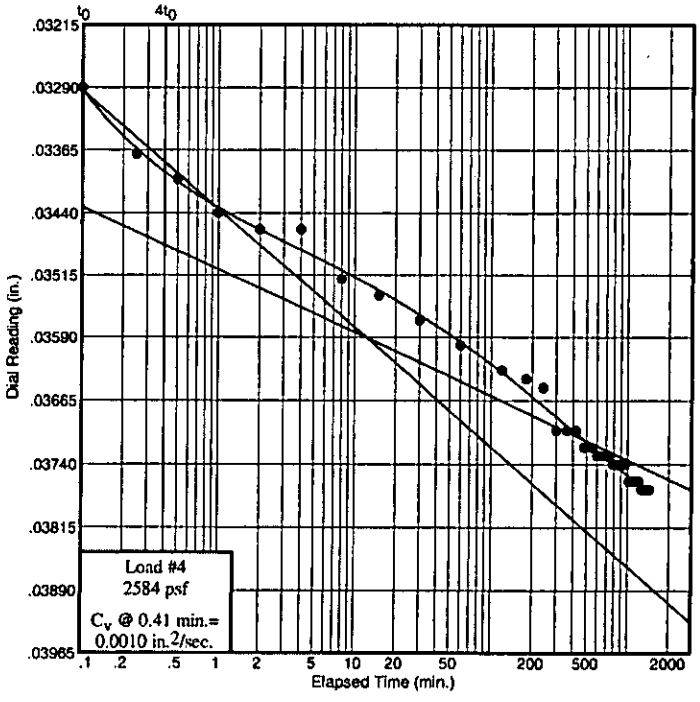
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-38 Sample No.: ST-3 Elev./Depth: 37.0









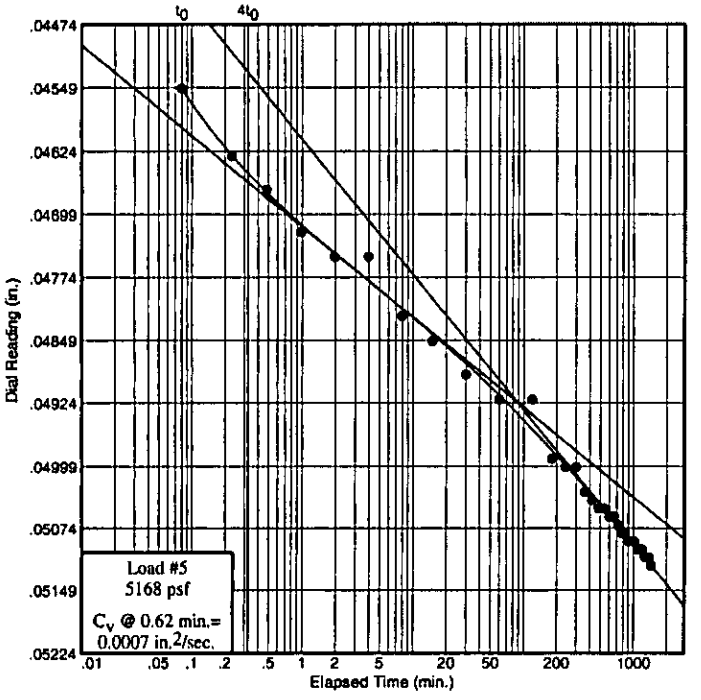
DLZ

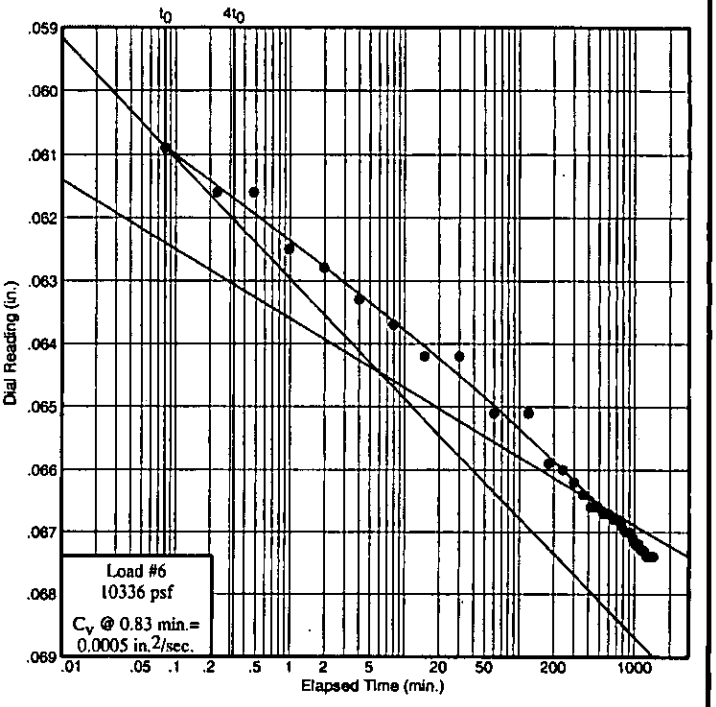
Figure

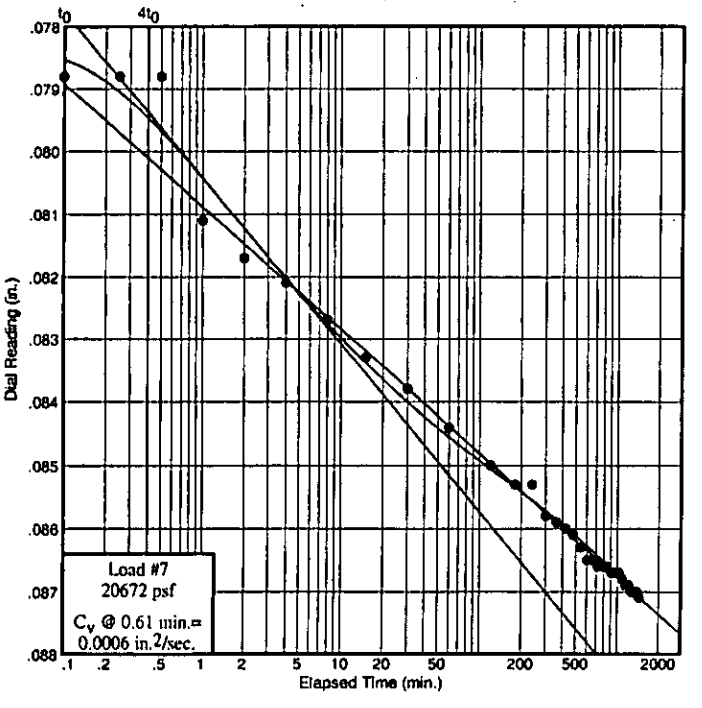
Dial Reading vs. Time

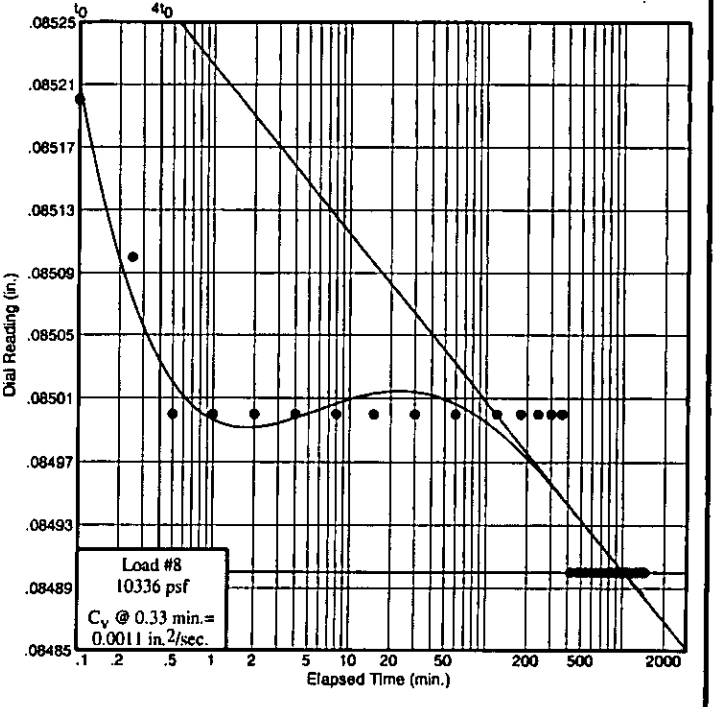
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-38 Sample No.: ST-3 Elev./Depth: 37.0









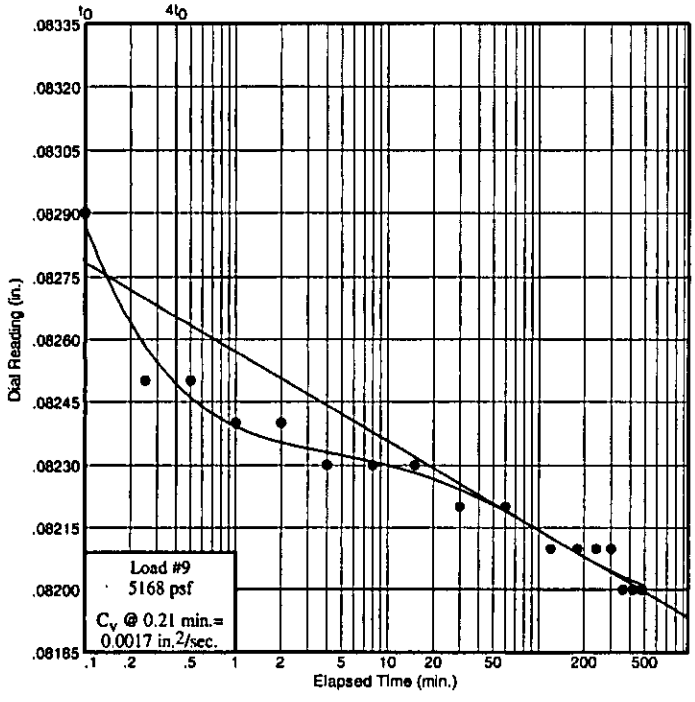
DLZ

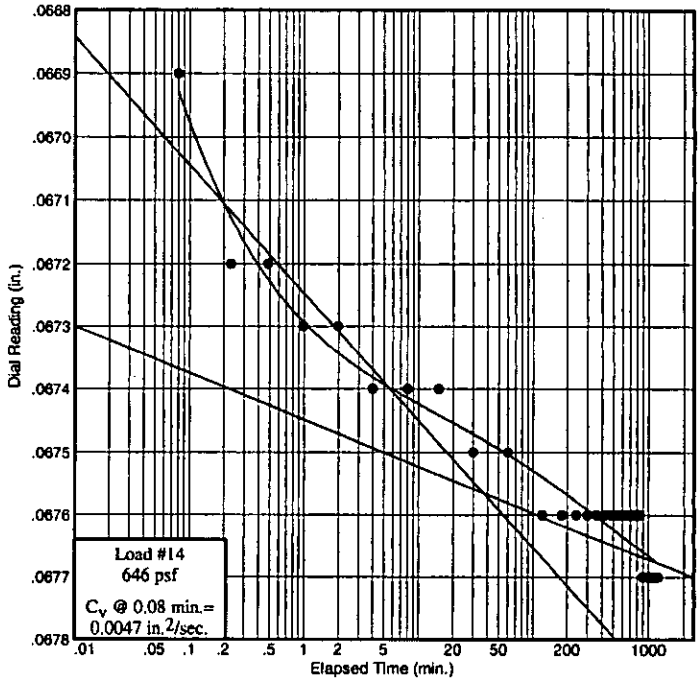
Figure

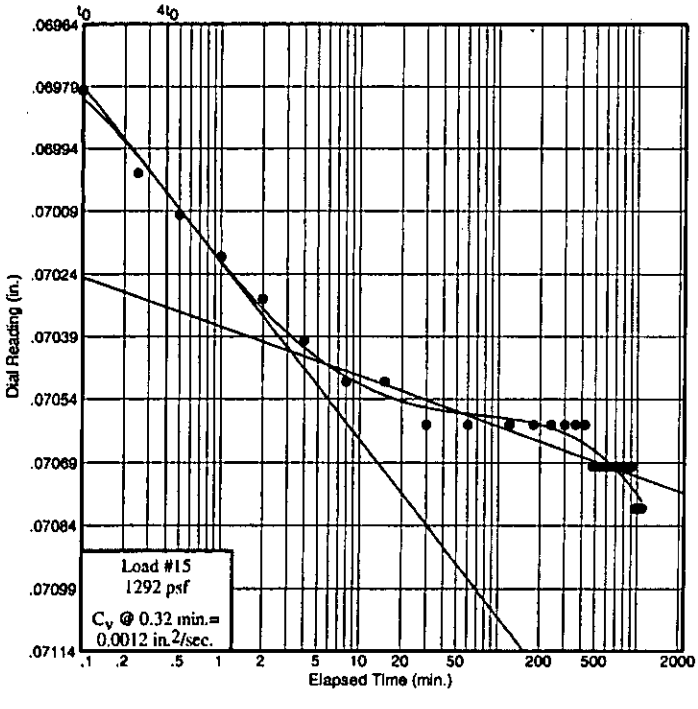
Dial Reading vs. Time

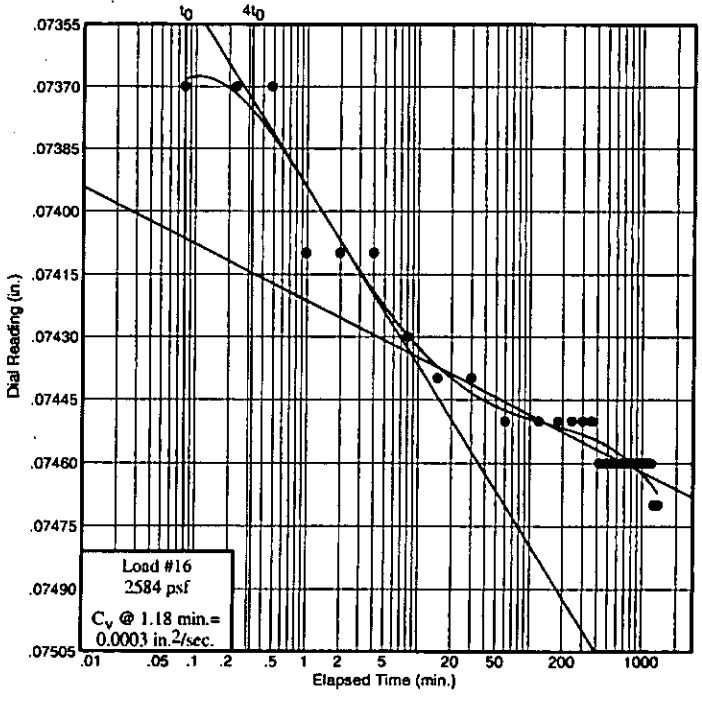
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-38 Sample No.: ST-3 Elev./Depth: 37.0









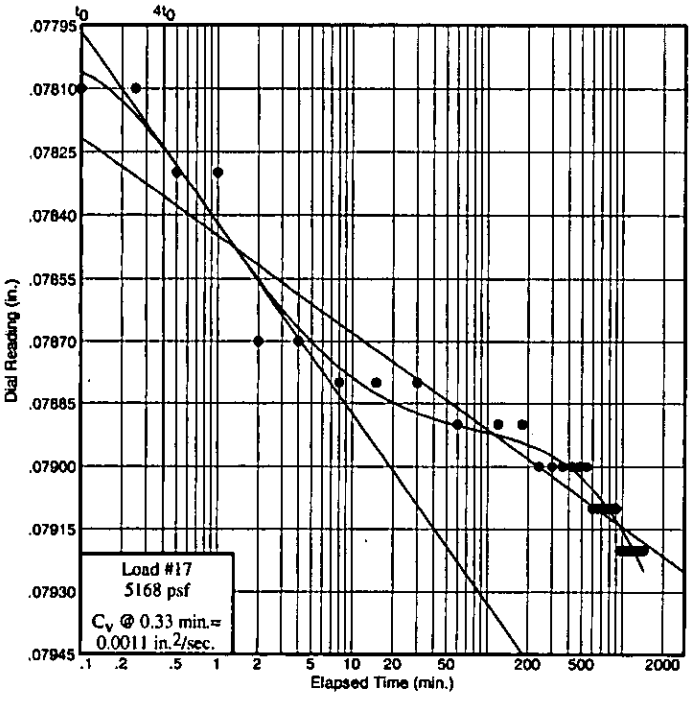
DLZ

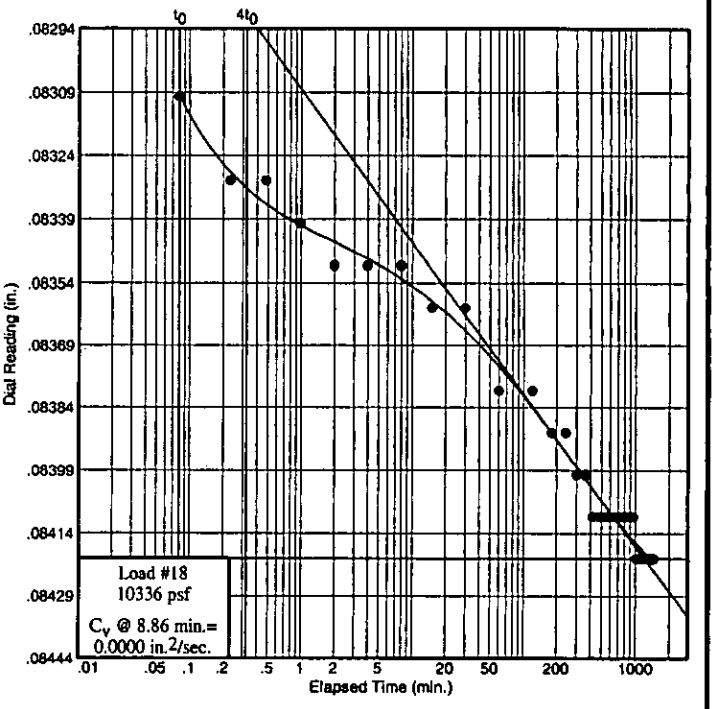
Figure

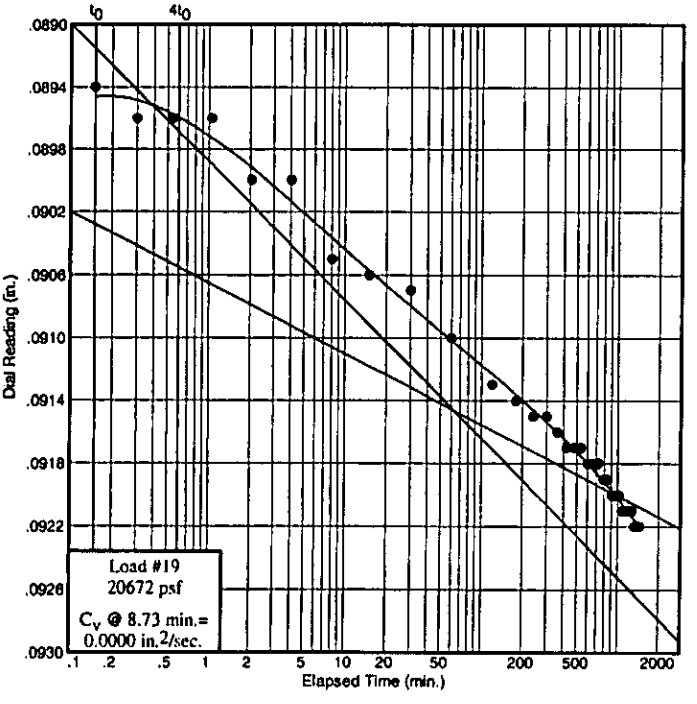
Dial Reading vs. Time

Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: B-38 Sample No.: ST-3 Elev./Depth: 37.0



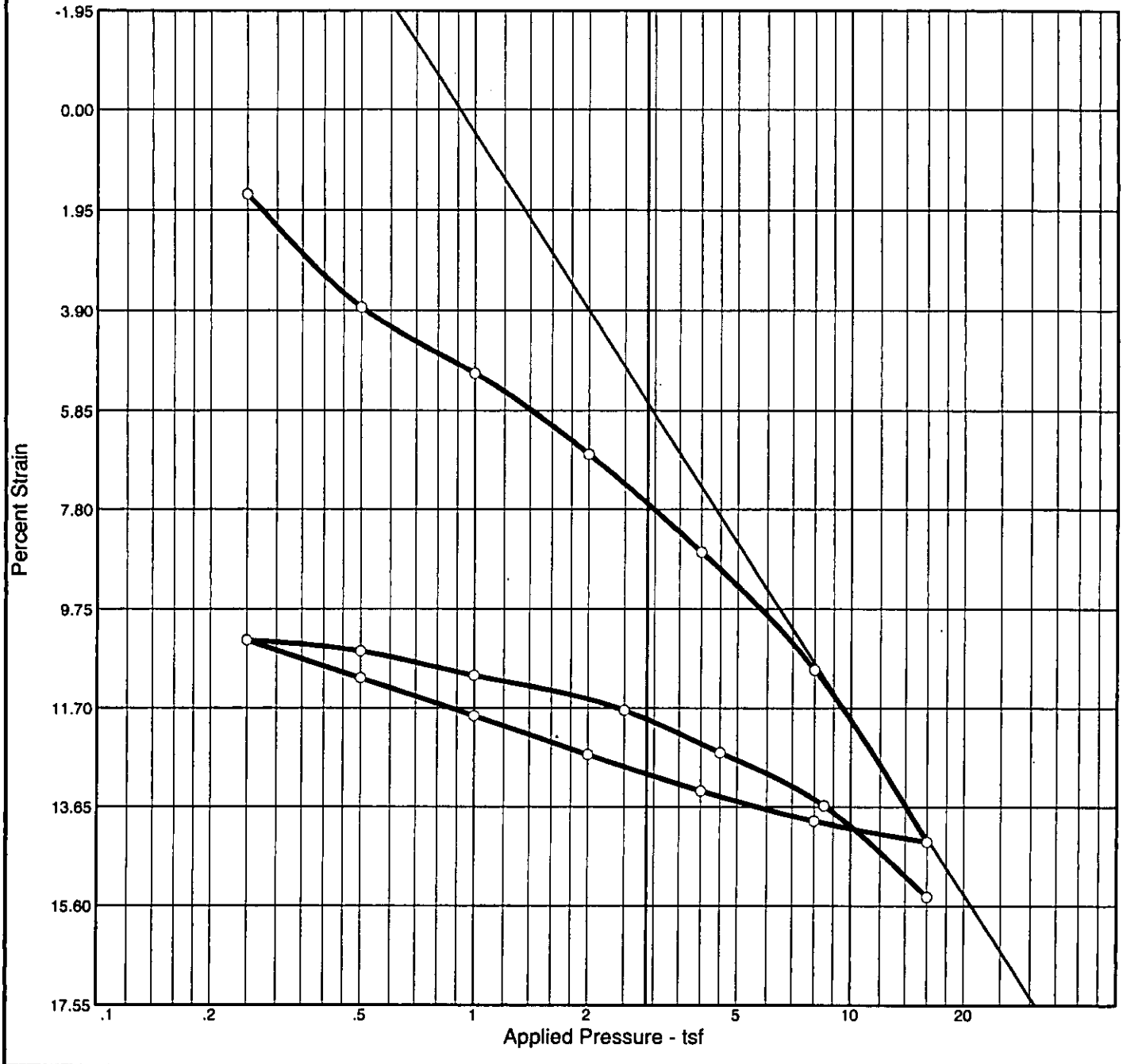




DLZ

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
93.4 %	26.6 %	96.8	49	26	2.78	CL	A-7-6(28	0.793

MATERIAL DESCRIPTION

Lean clay

Project No. 0121- **Client:** TranSystems, Inc.

Project: SCI-823-0.00

Source: R-61 **Sample No.:** P-1 **Elev./Depth:** 6.0

Remarks:

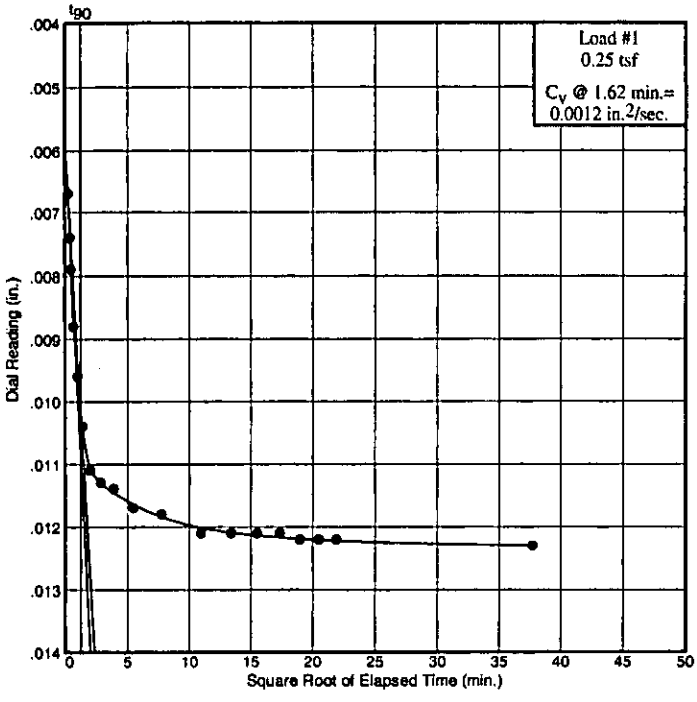
DLZ

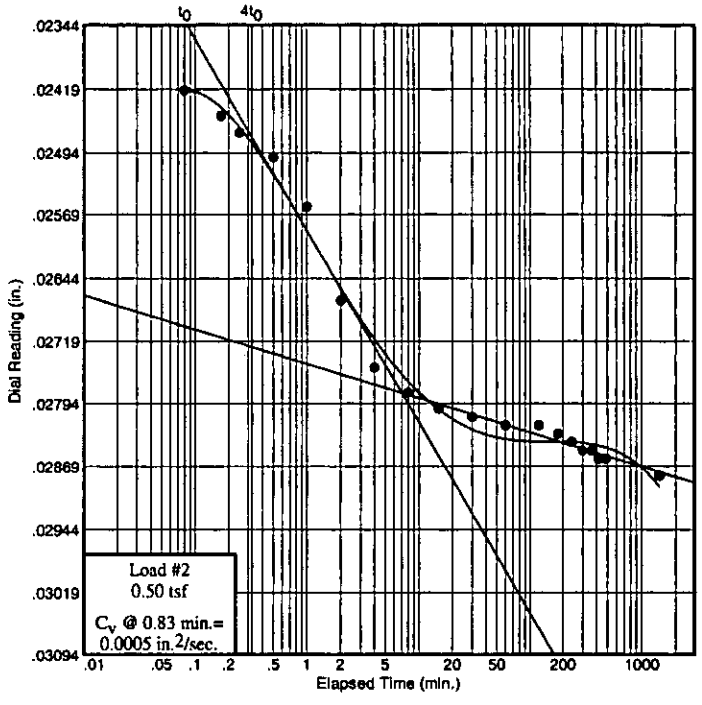
Figure

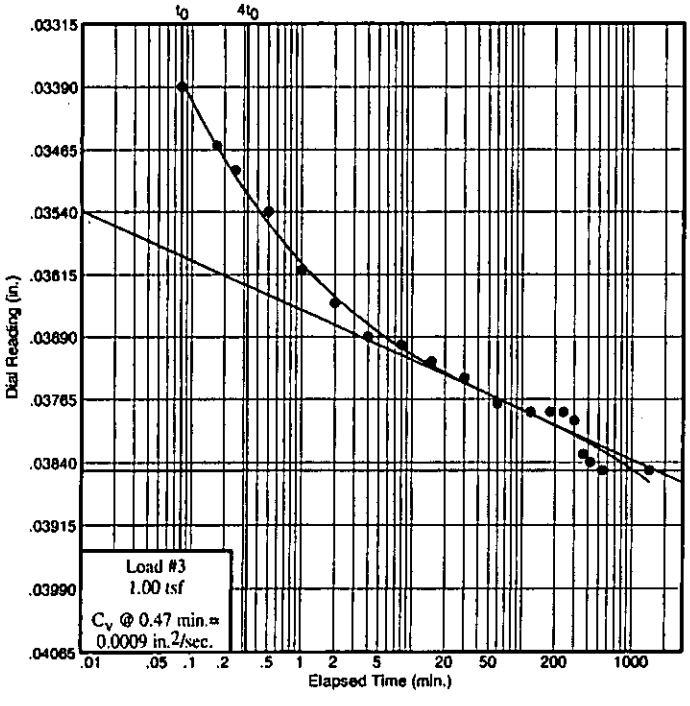
Dial Reading vs. Time

Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: R-61 Sample No.: P-1 Elev./Depth: 6.0



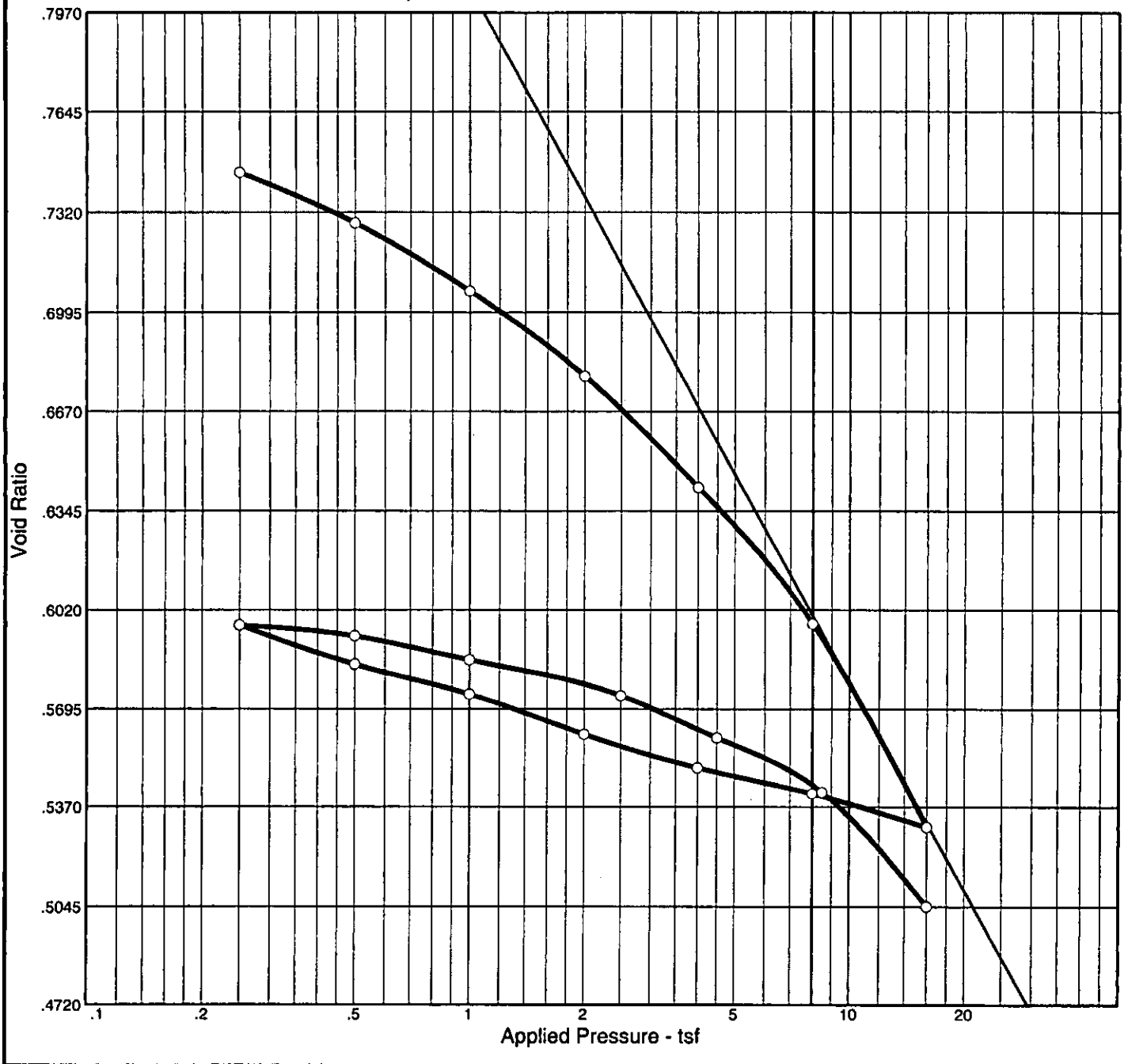




DLZ

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
96.5 %	27.5 %	96.0	34	12	2.74	CL	A-6(11)	0.781

MATERIAL DESCRIPTION

Lean clay

Project No. 0121- **Client:** TranSystems, Inc.

Project: SCI-823-0.00

Source: R-64 **Sample No.:** P2 **Elev./Depth:** 18.0

Remarks:

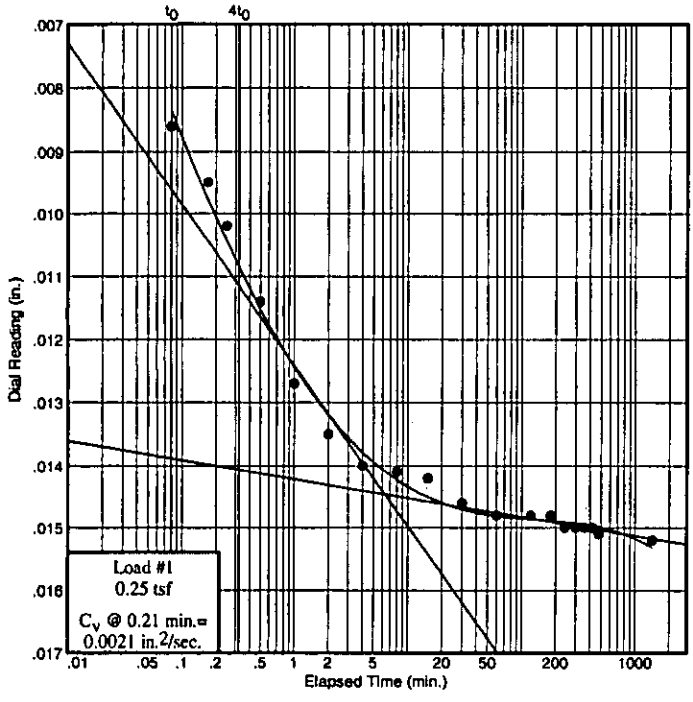
DLZ

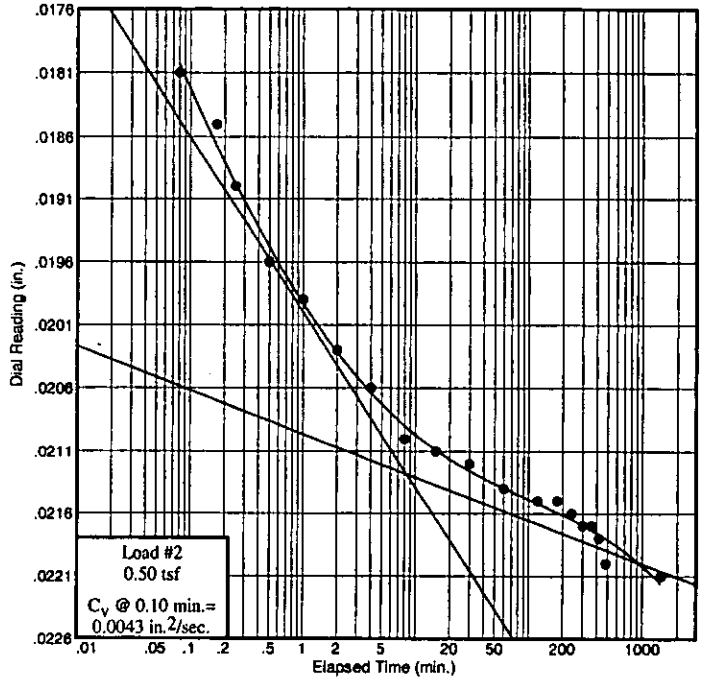
Figure

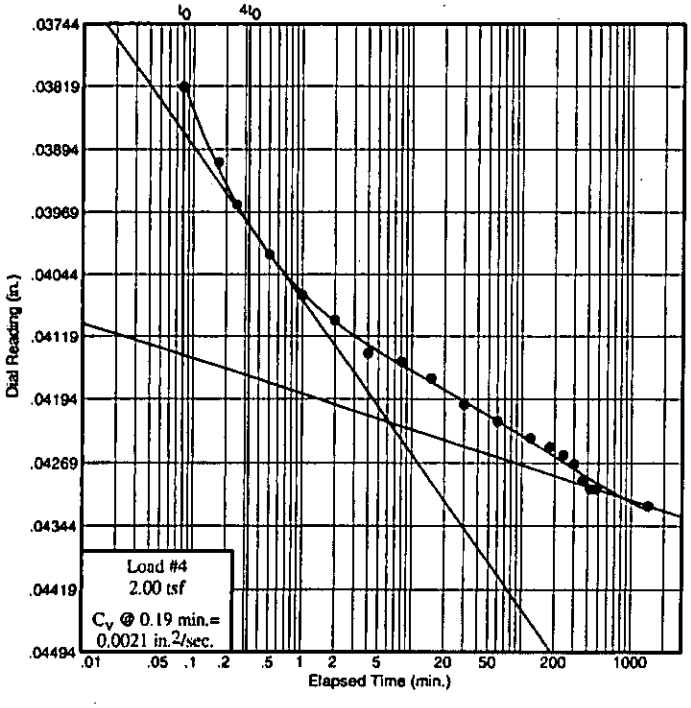
Dial Reading vs. Time

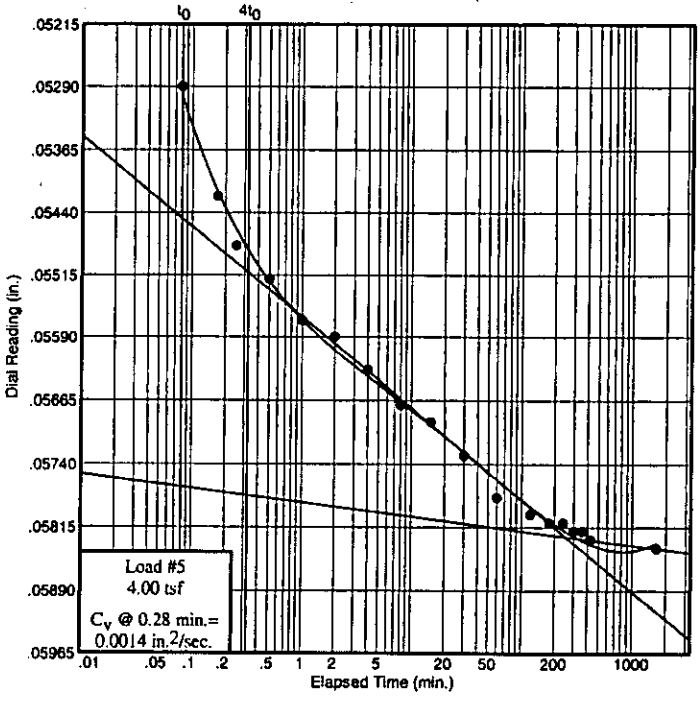
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: R-64 Sample No.: P2 Elev./Depth: 18.0









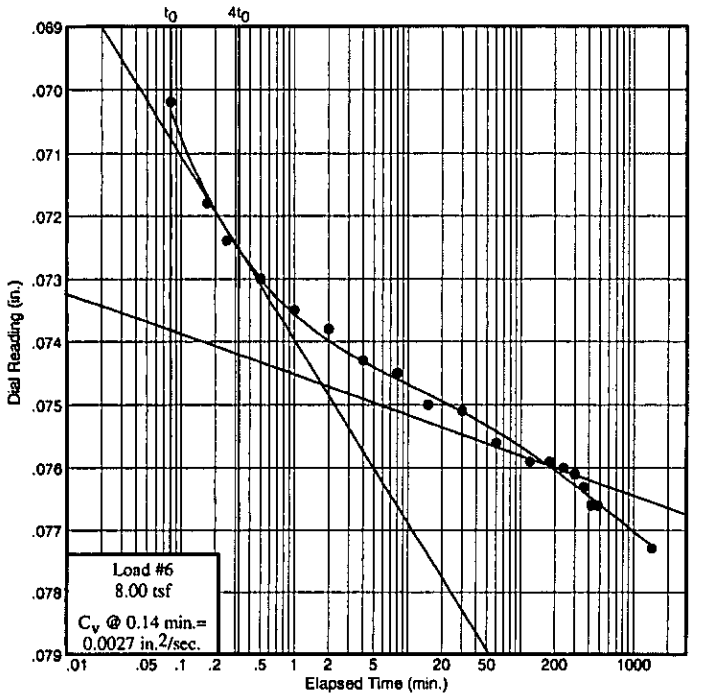
DLZ

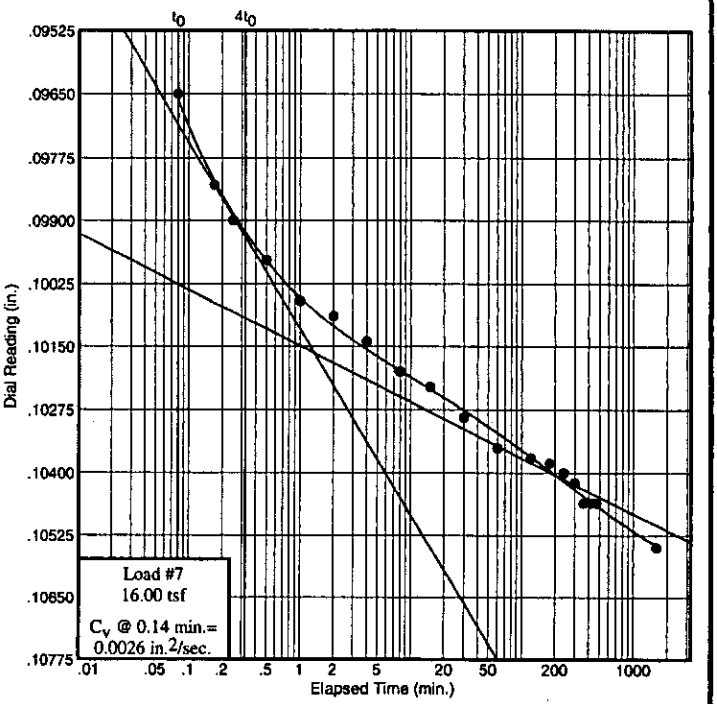
Figure

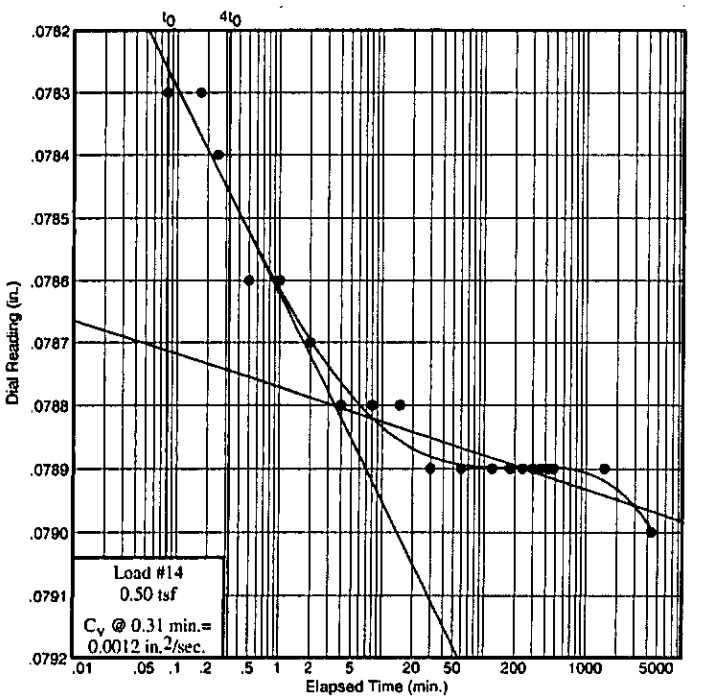
Dial Reading vs. Time

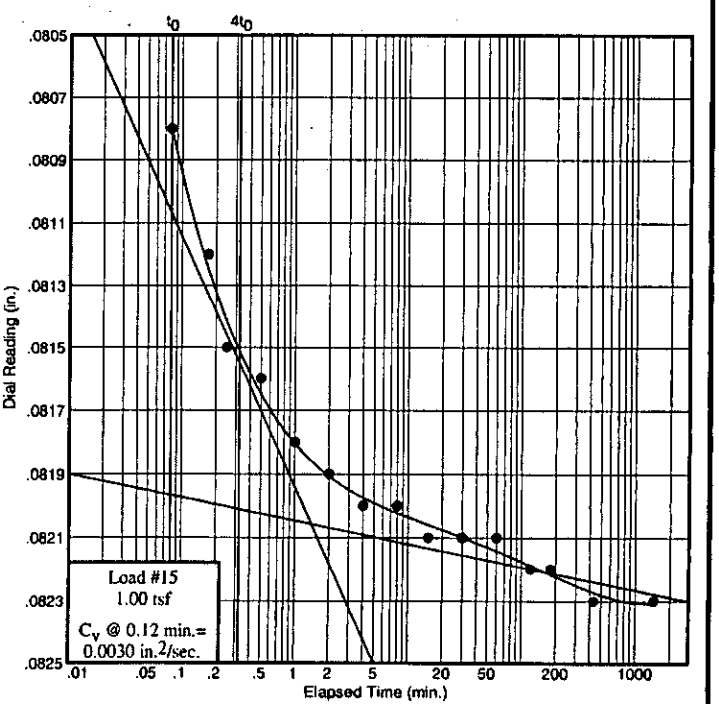
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: R-64 Sample No.: P2 Elev./Depth: 18.0









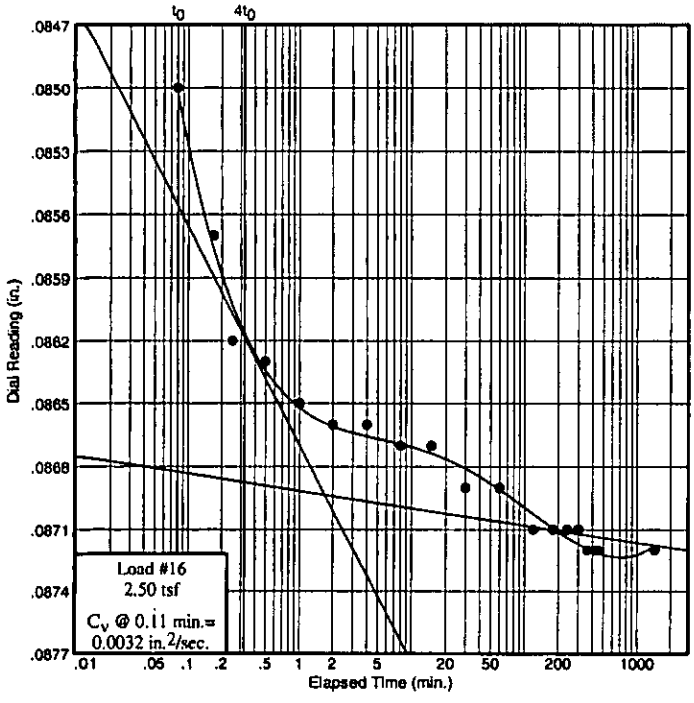
DLZ

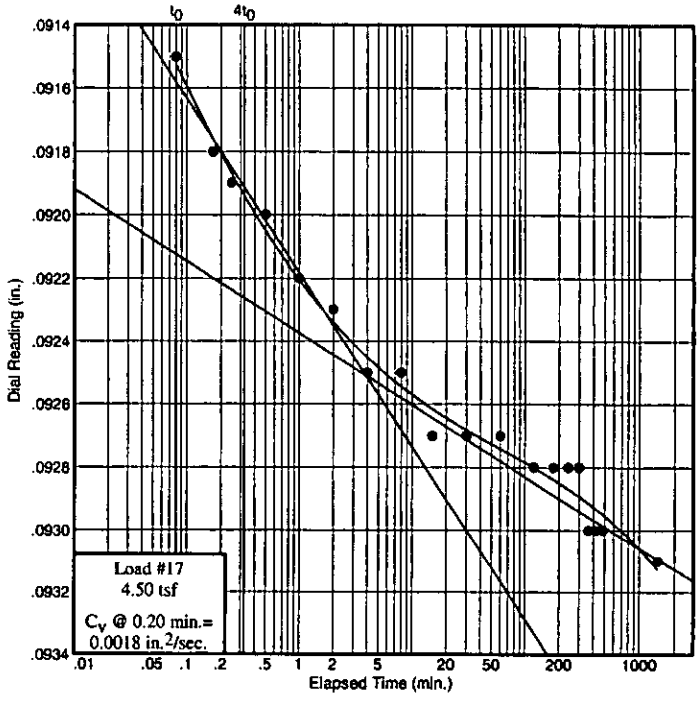
Figure

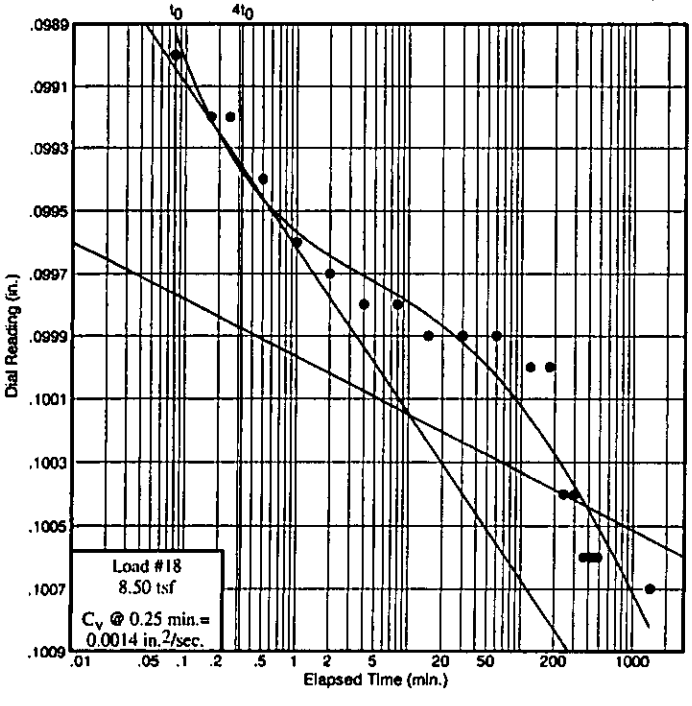
Dial Reading vs. Time

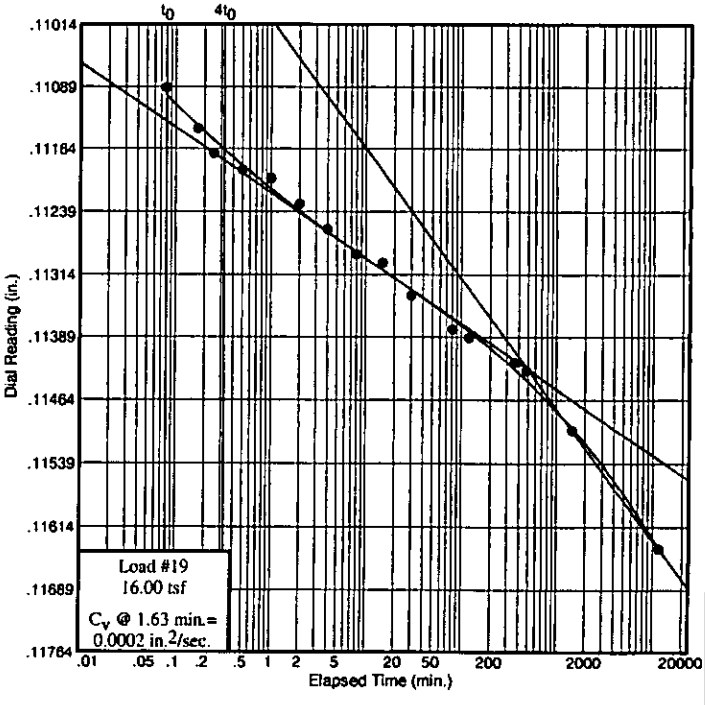
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: R-64 Sample No.: P2 Elev./Depth: 18.0





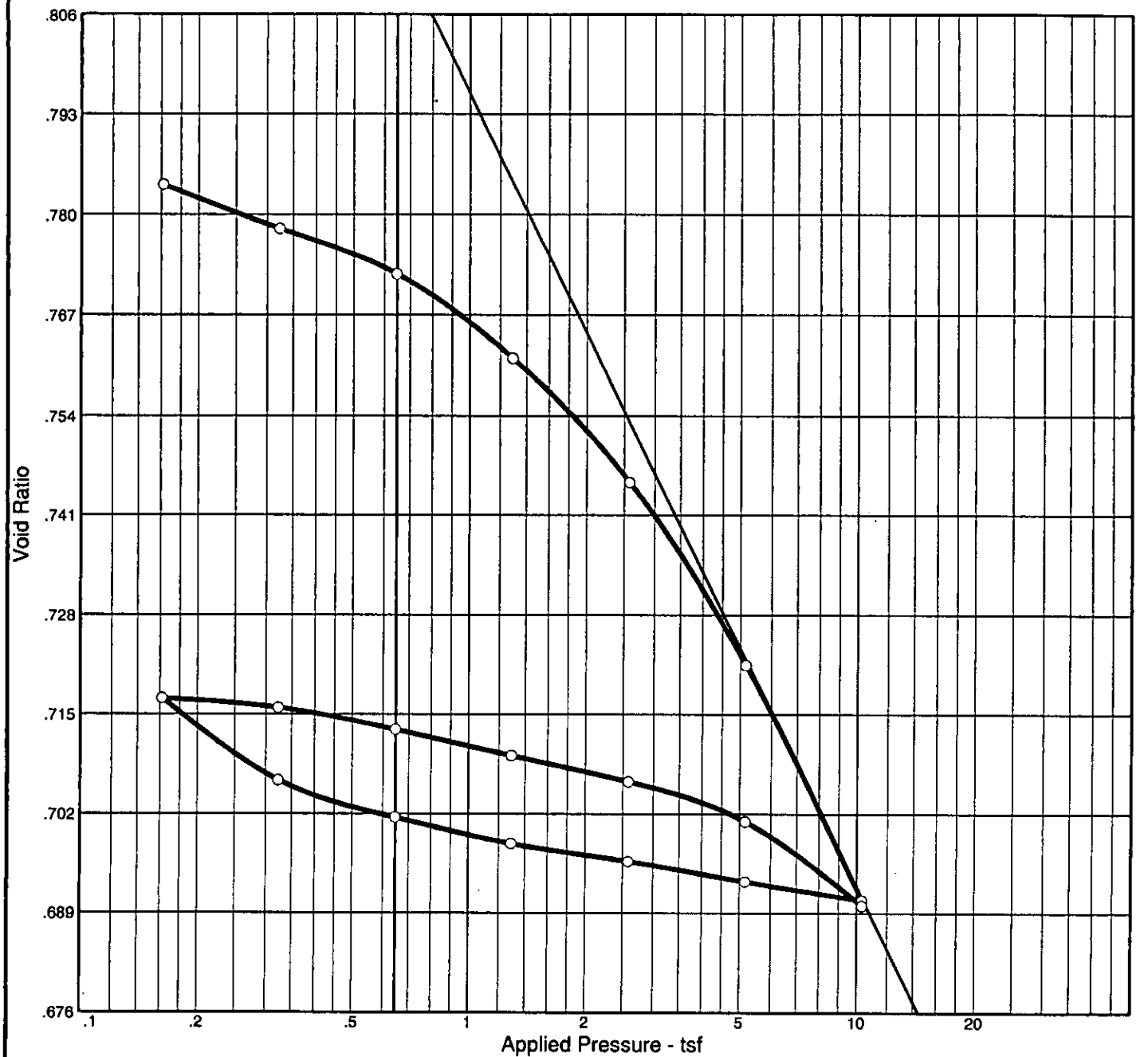




DLZ

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
94.9 %	27.0 %	96.5	27	5	2.76	ML	A-4(4)	0.786

MATERIAL DESCRIPTION

Silt

Project No. 0121- **Client:** TranSystems, Inc.

Project: SCI-823-0.00

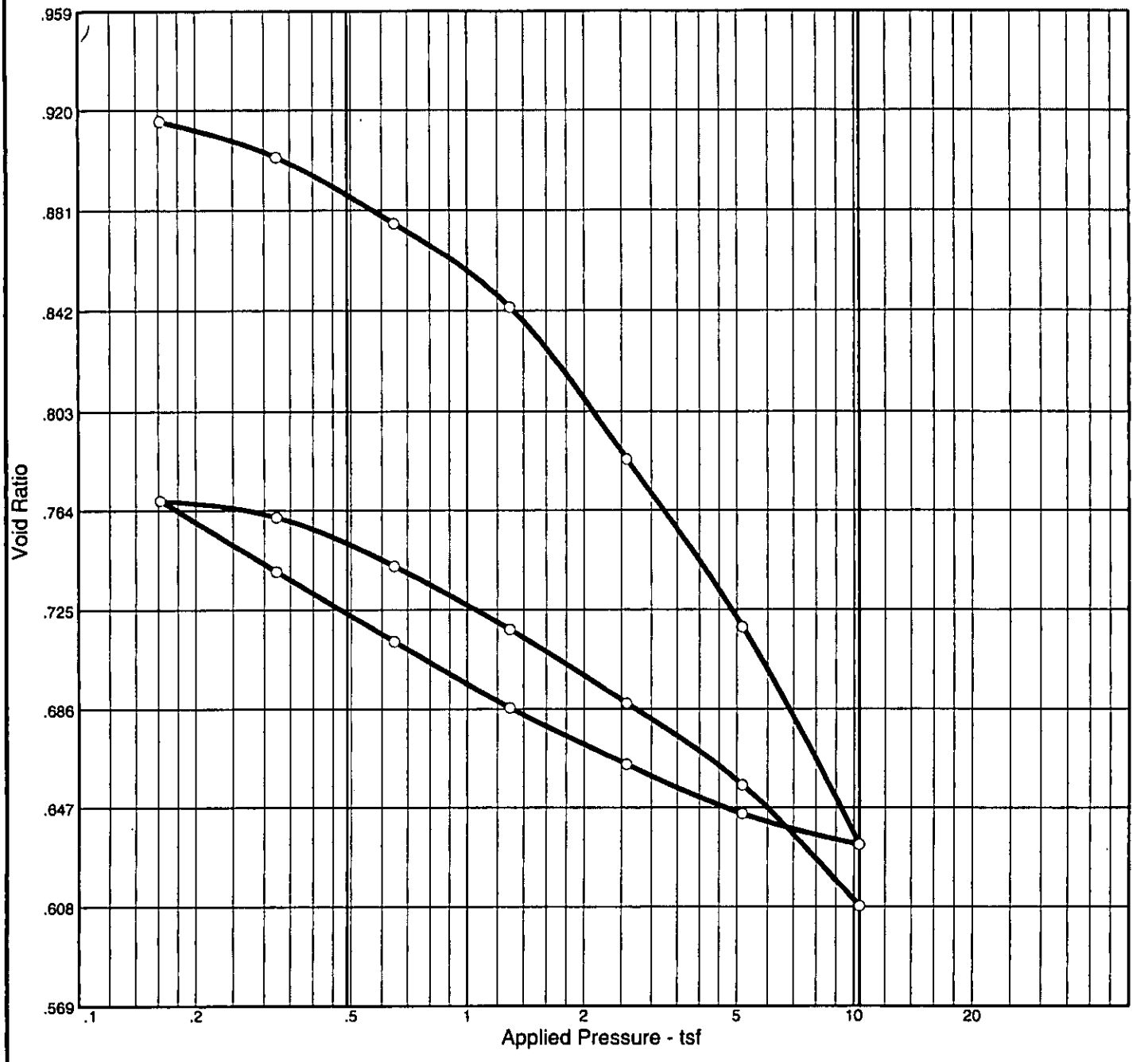
Source: TR-35A **Sample No.:** P-2B **Elev./Depth:** 12.4

Remarks:

DLZ

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
91.8 %	30.9 %	89.4	NP	NP	2.76	ML	A-4(0)	0.928

MATERIAL DESCRIPTION

Silt

Project No. 0121- **Client:** TranSystems, Inc.

Project: SCI-823-0.00

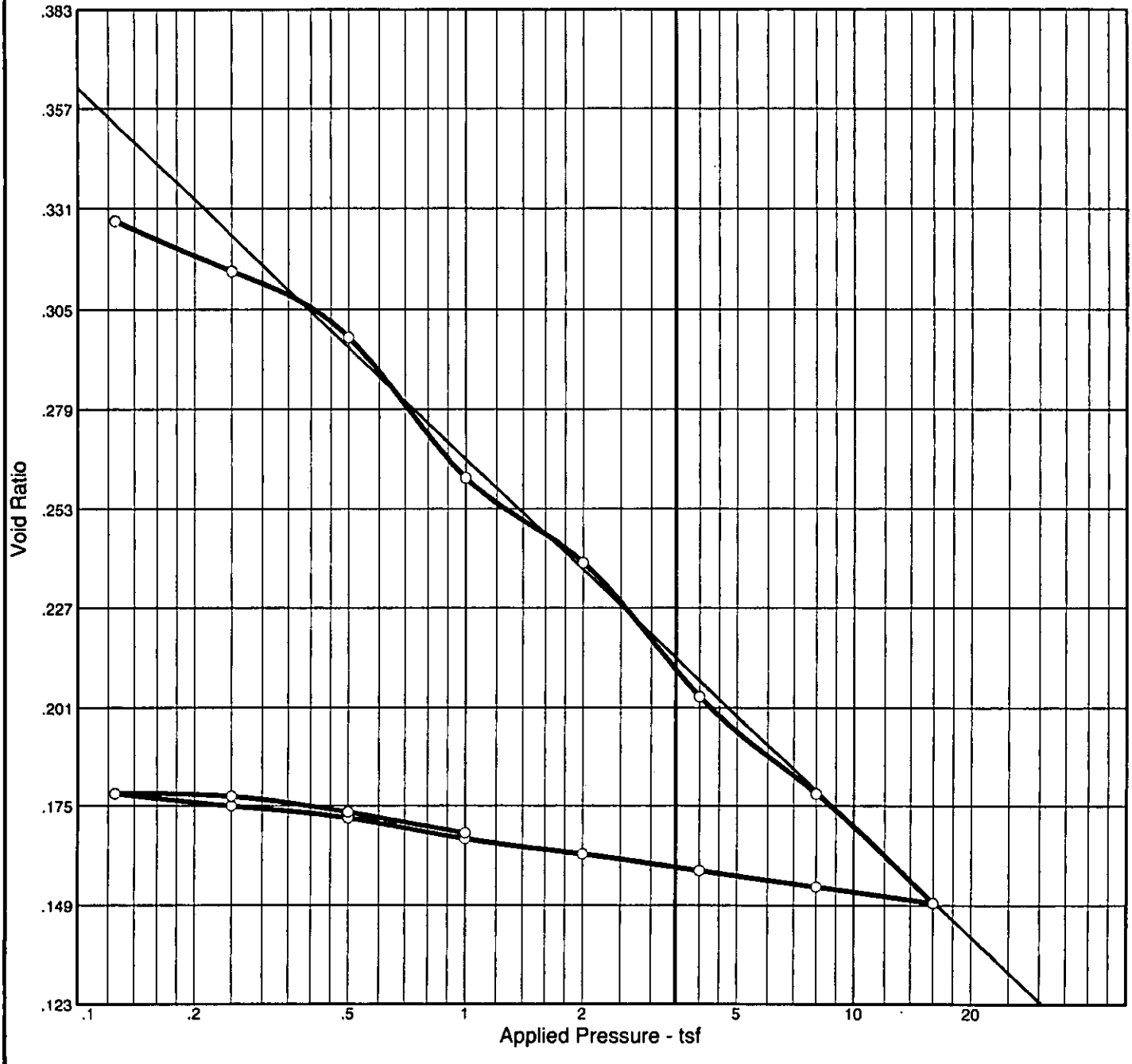
Source: TR-35A **Sample No.:** P-3 **Elev./Depth:** 27.0

DLZ

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
108.9 %	13.8 %	127.4	NP	NP	2.75	ML	A-4(0)	0.347

MATERIAL DESCRIPTION

Silt with sand

Project No. 0121- **Client:** TranSystems, Inc.

Project: SCI-823-0.00

Source: TR-35A **Sample No.:** P-4B **Elev./Depth:** 66.9

DLZ

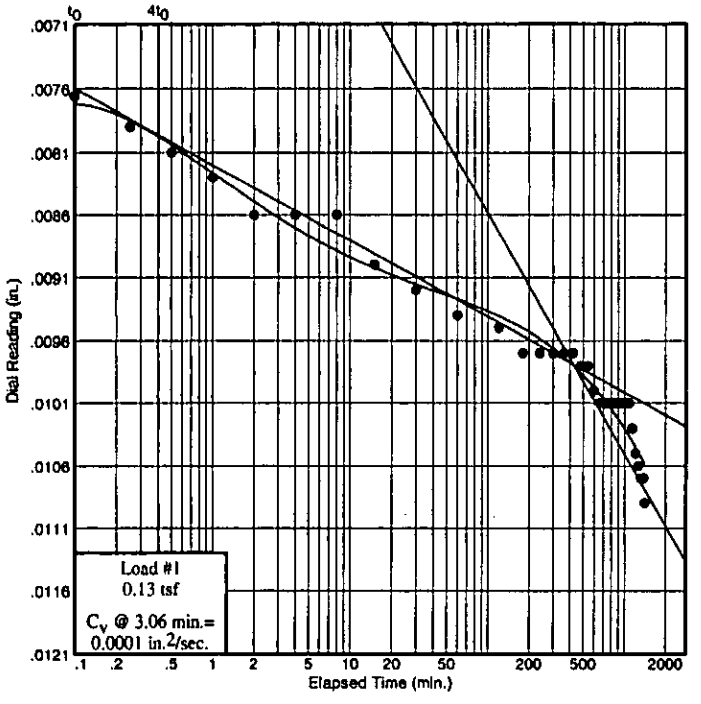
Remarks:

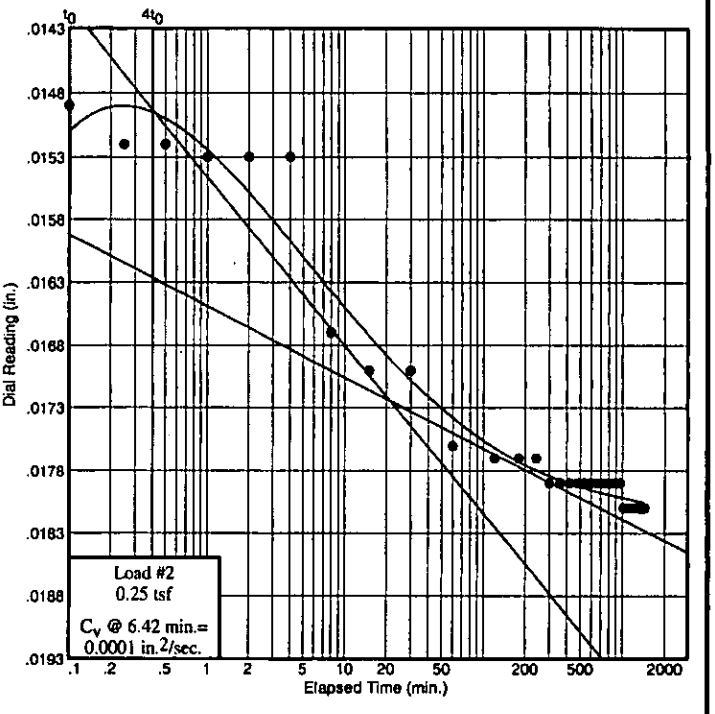
Figure

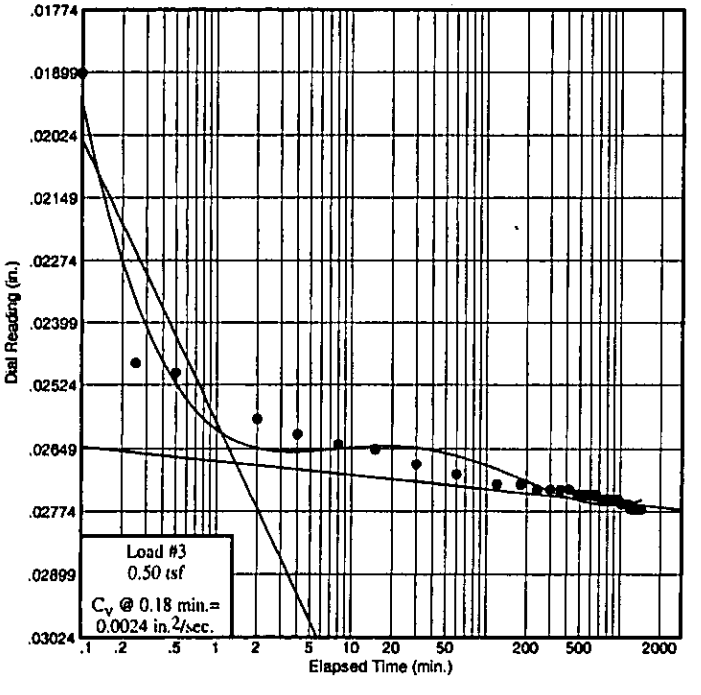
Dial Reading vs. Time

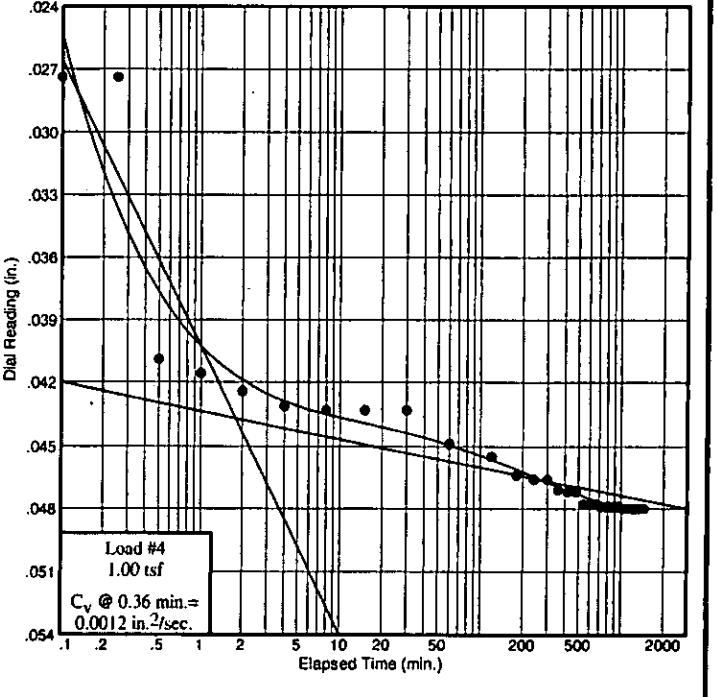
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: TR-35A Sample No.: P-4B Elev./Depth: 66.9









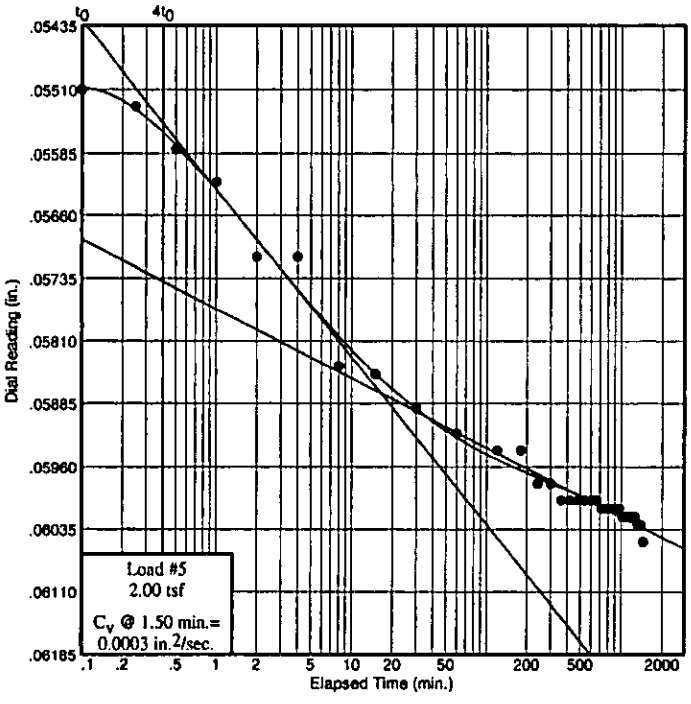
DLZ

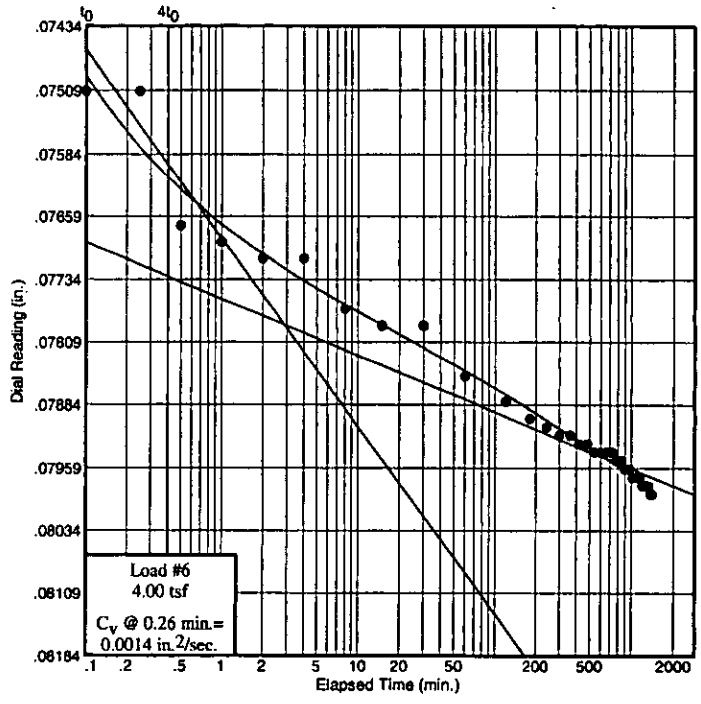
Figure

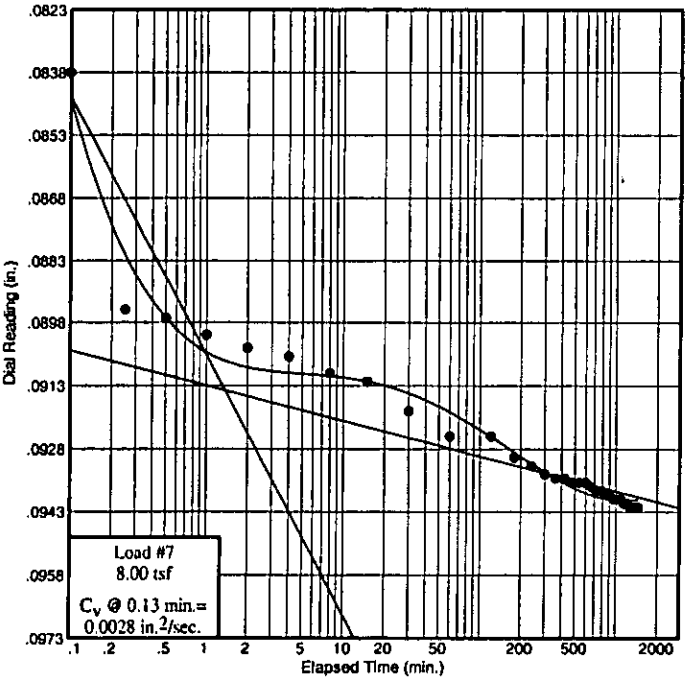
Dial Reading vs. Time

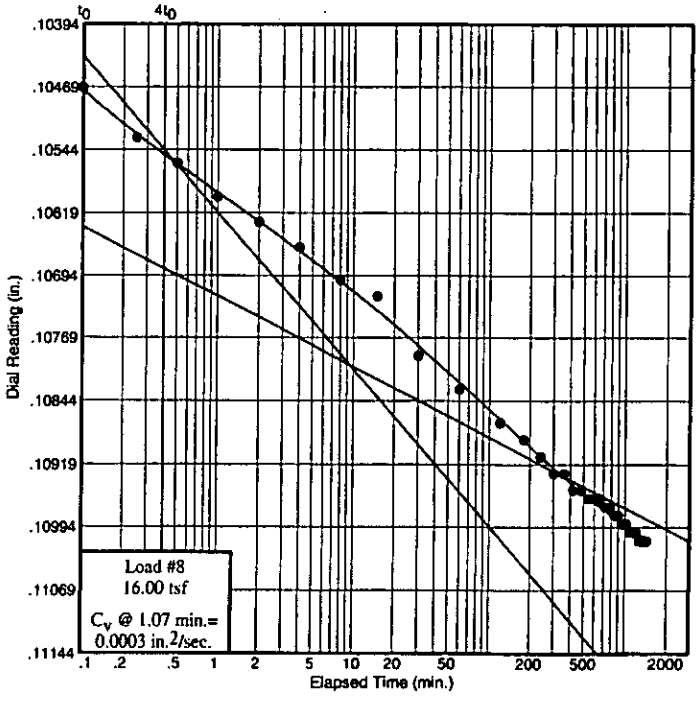
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: TR-35A Sample No.: P-4B Elev./Depth: 66.9









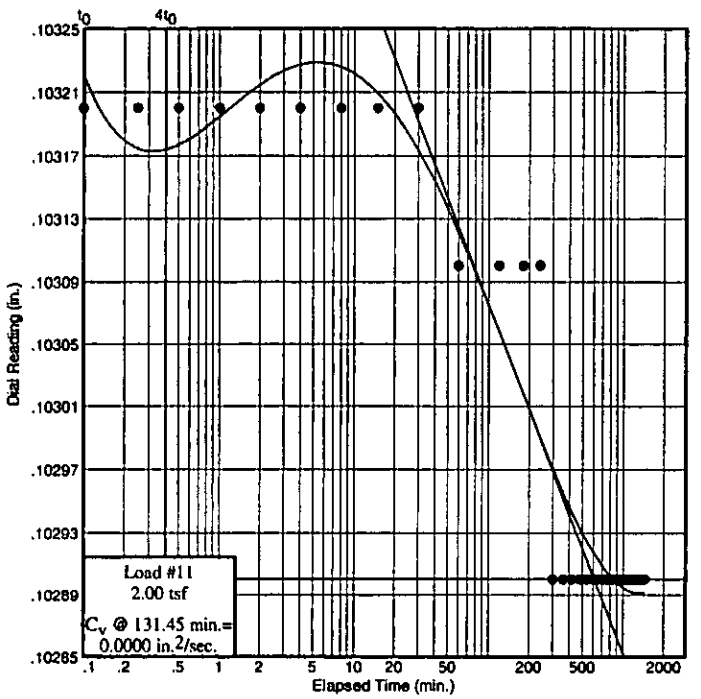
DLZ

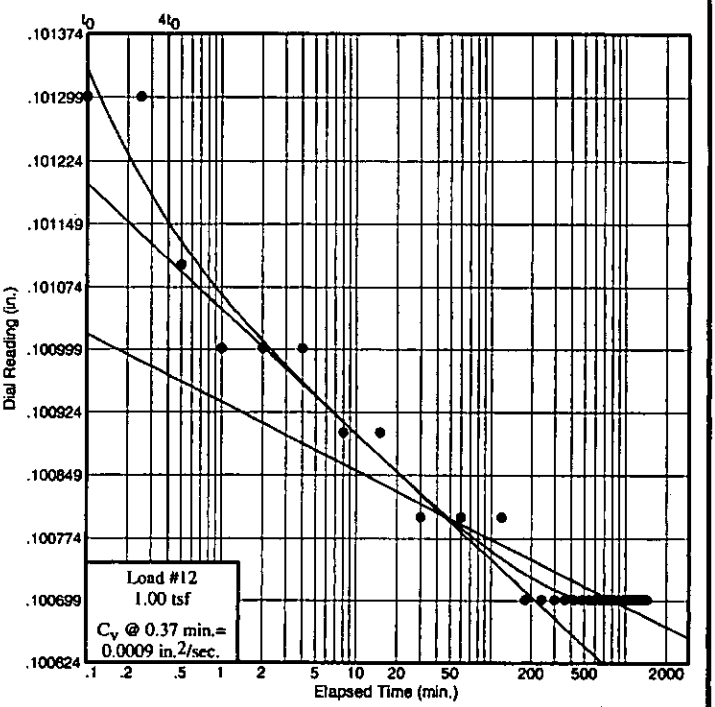
Figure

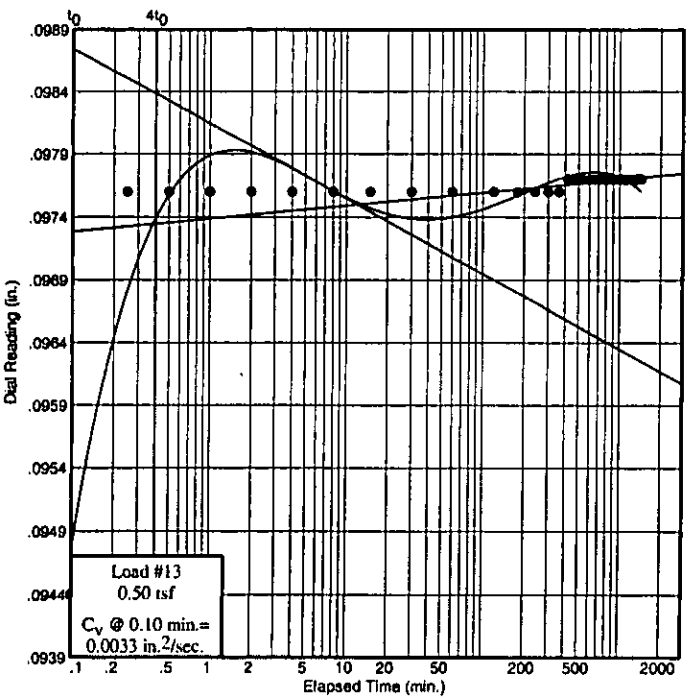
Dial Reading vs. Time

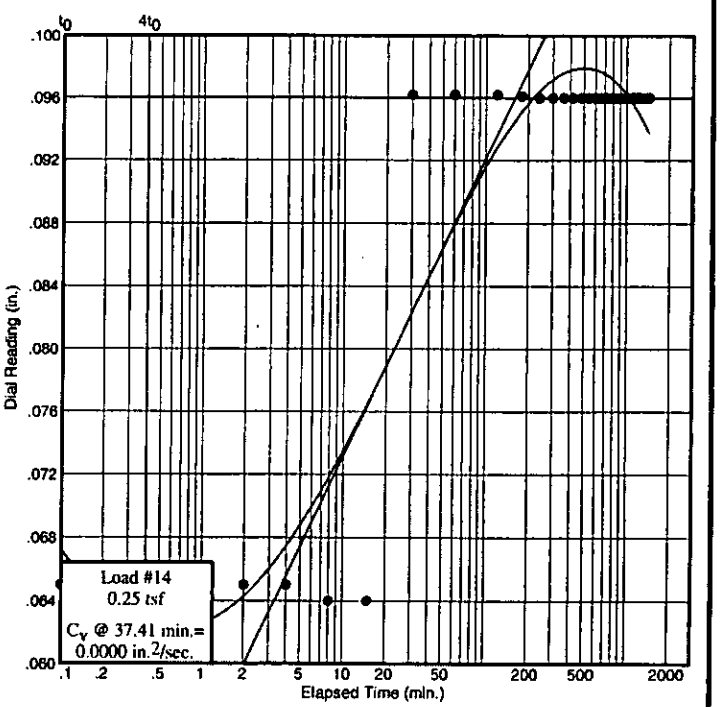
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: TR-35A Sample No.: P-4B Elev./Depth: 66.9









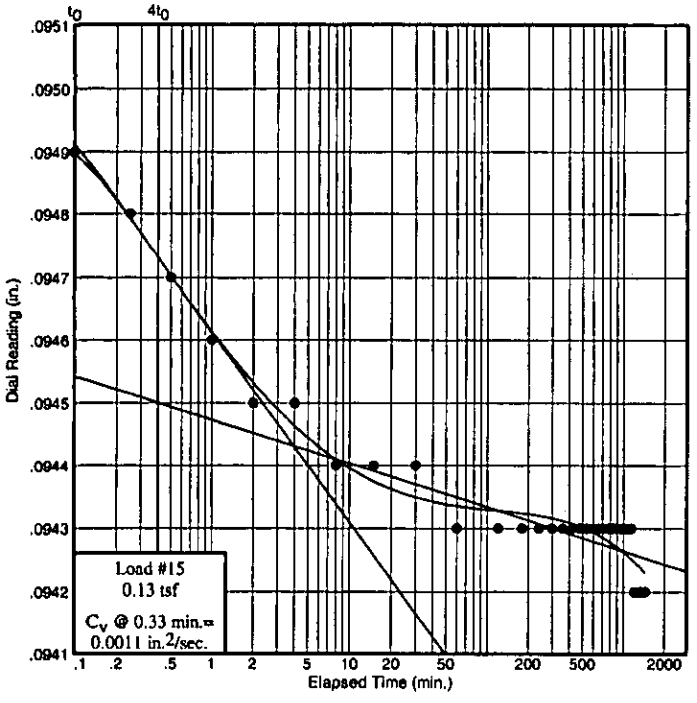
DLZ

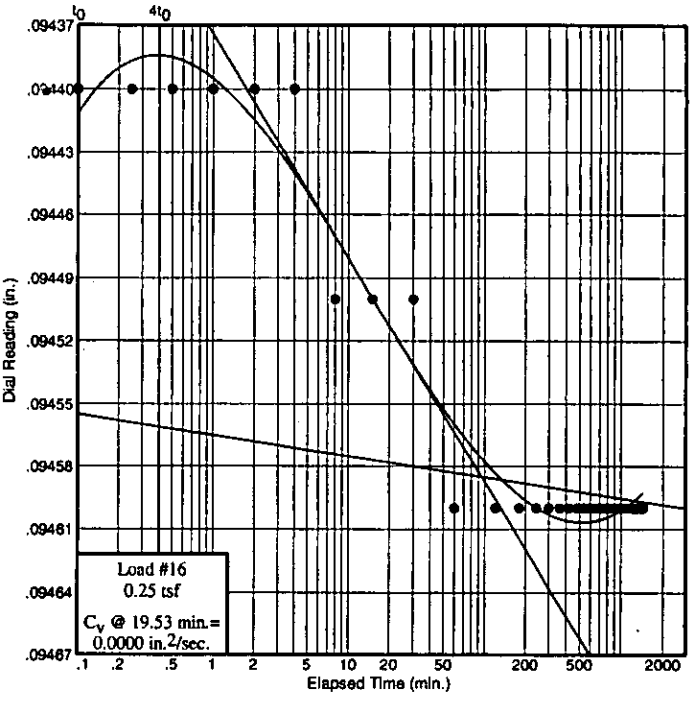
Figure

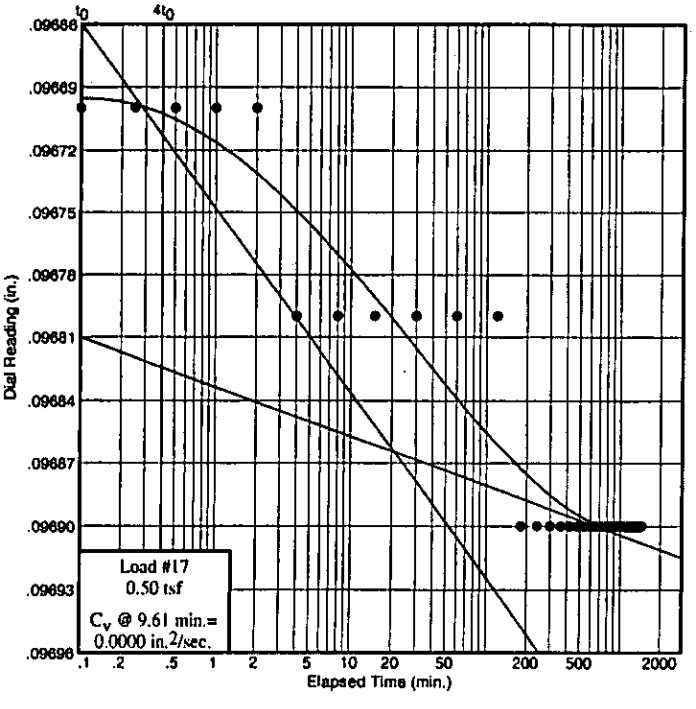
Dial Reading vs. Time

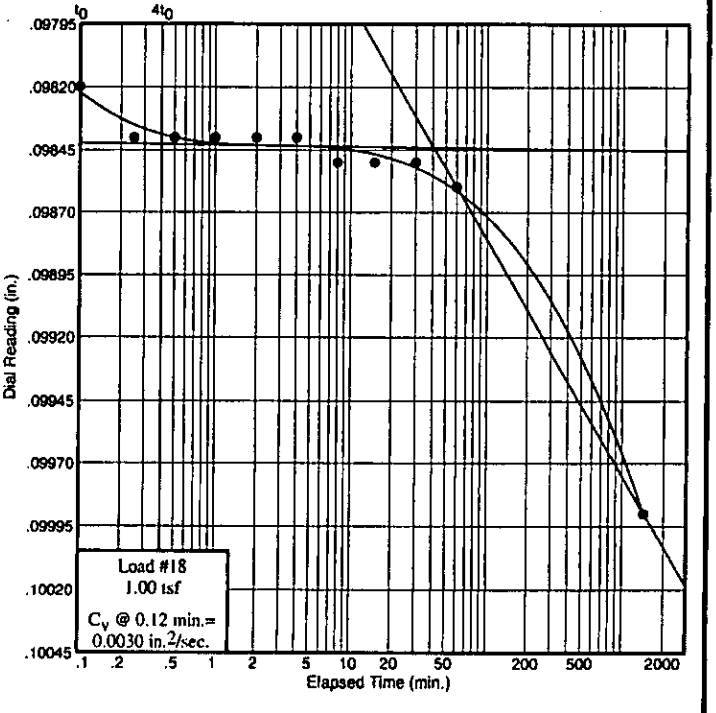
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: TR-35A Sample No.: P-4B Elev./Depth: 66.9





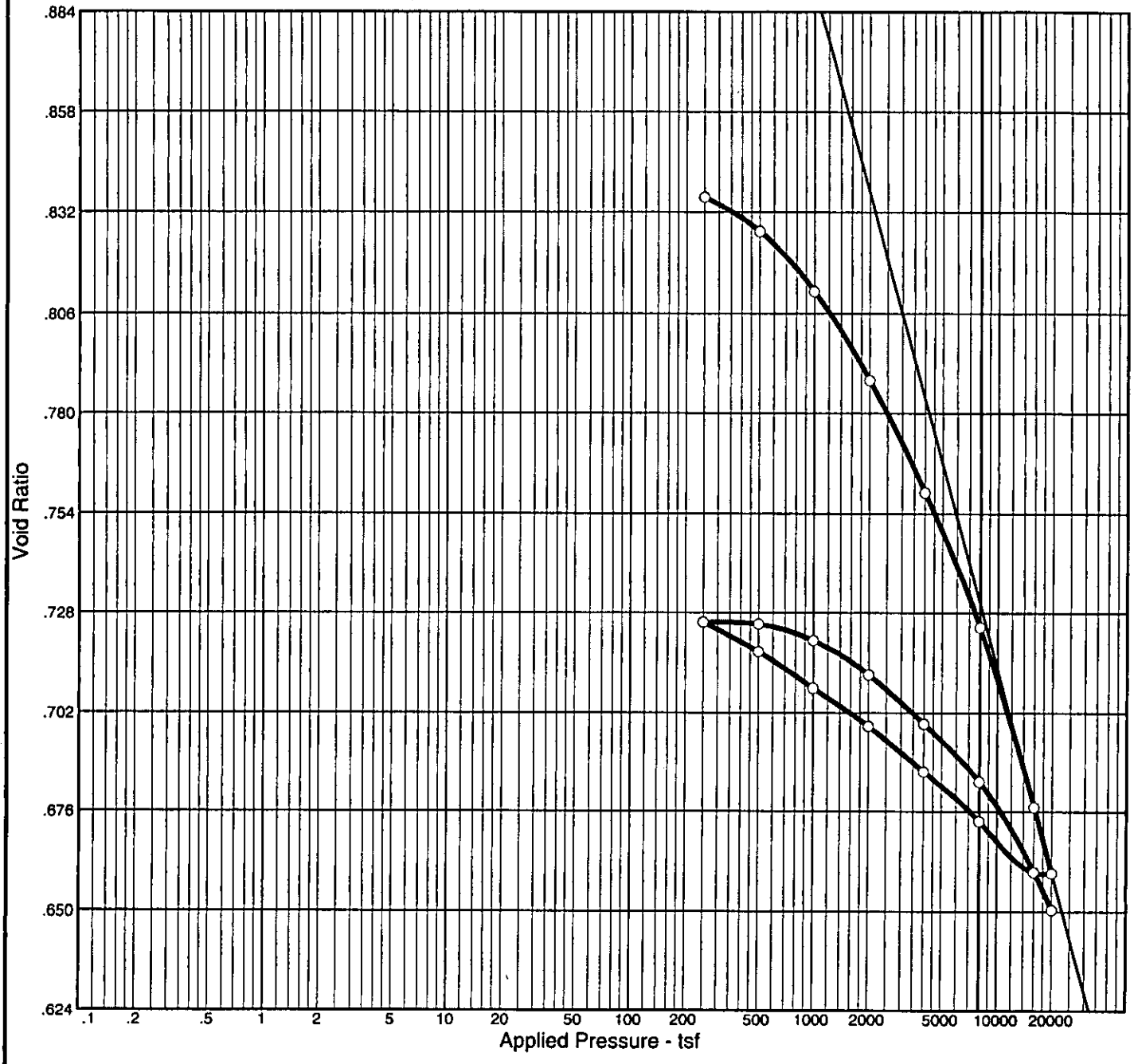




DLZ

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
88.6 %	26.8 %	94.1	30	8	2.77	CL	A-4(8)	0.838

MATERIAL DESCRIPTION

Lean clay

Project No. 0121- **Client:** TranSystems, Inc.

Project: SCI-823-0.00

Source: TR-38A **Sample No.:** P-2B **Elev./Depth:** 15.7

DLZ

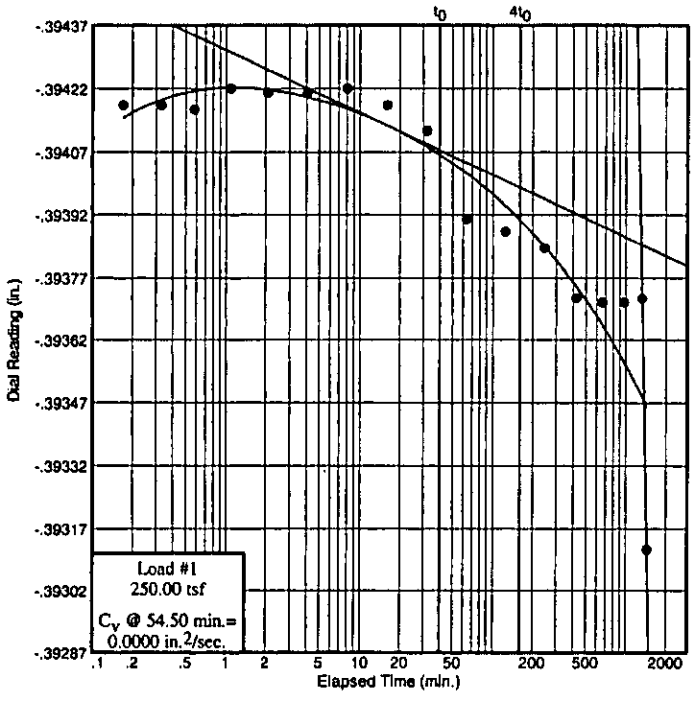
Remarks:

Figure

Dial Reading vs. Time

Project No.: 0121-3070.03
Project: SCI-823-0.00

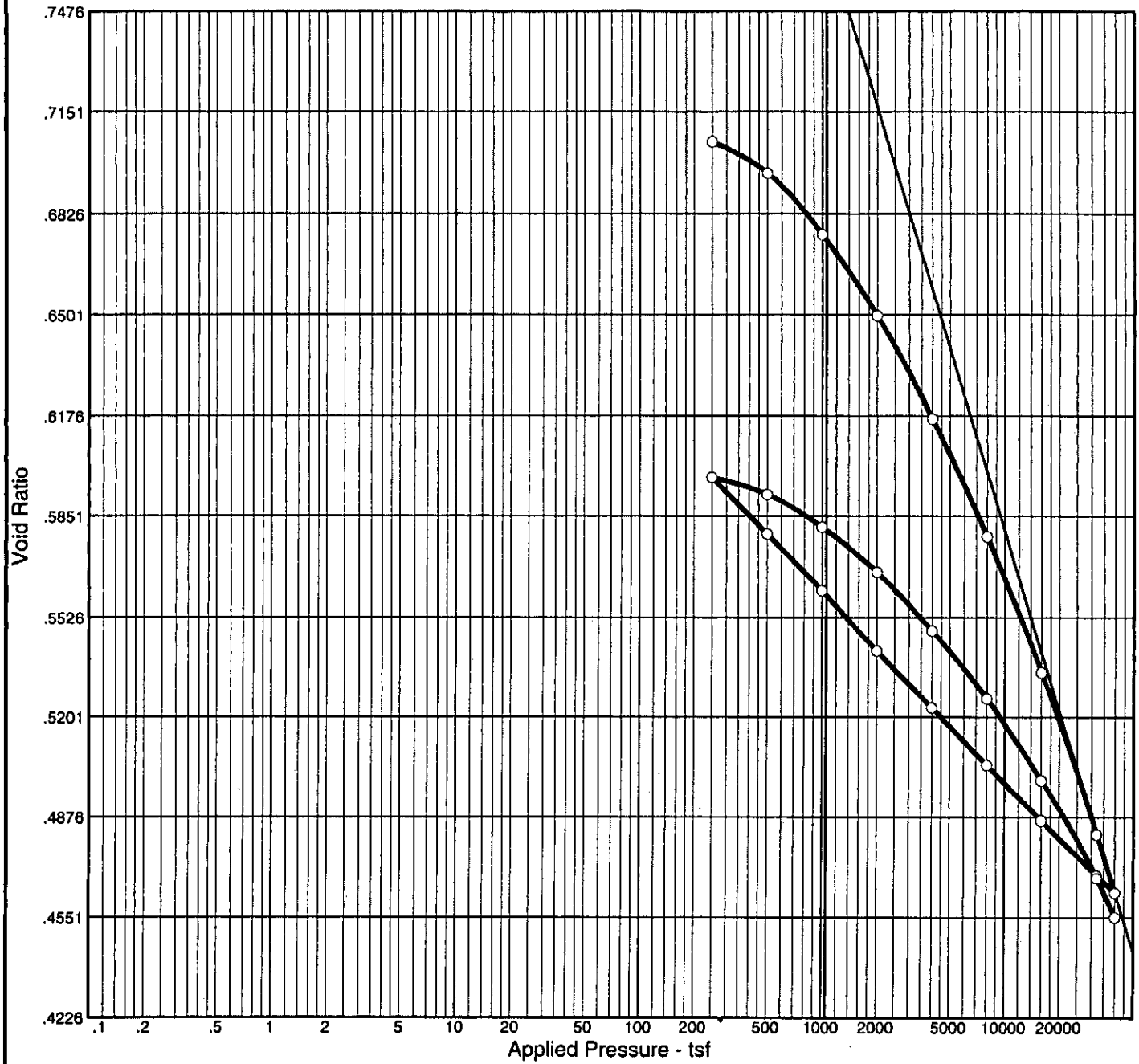
Source: TR-38A Sample No.: P-2B Elev./Depth: 15.7



DLZ

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
88.1 %	22.5 %	101.0	38	15	2.76	CL	A-6(17)	0.706

MATERIAL DESCRIPTION

Project No. 0121- **Client:** TranSystems, Inc.

Project: SCI-823-0.00

Source: TR-38A **Sample No.:** P-4B **Elev./Depth:** 45.8

Remarks:

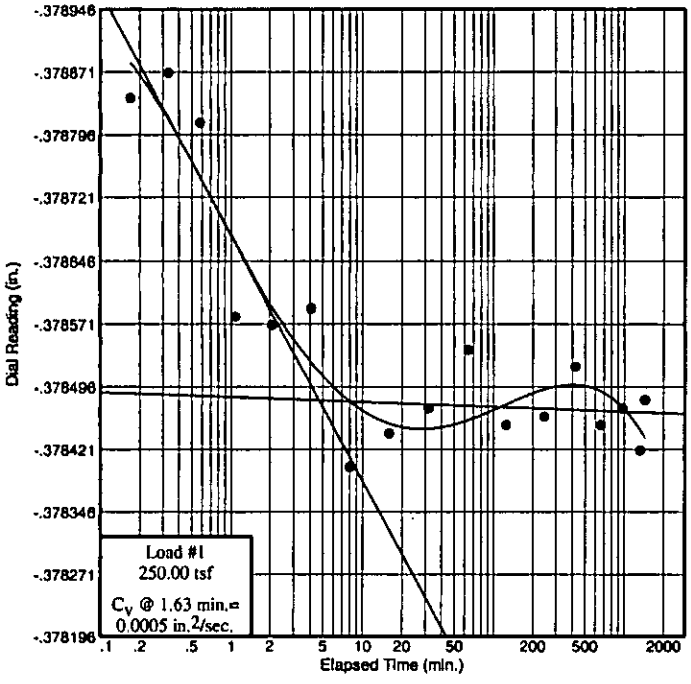
DLZ

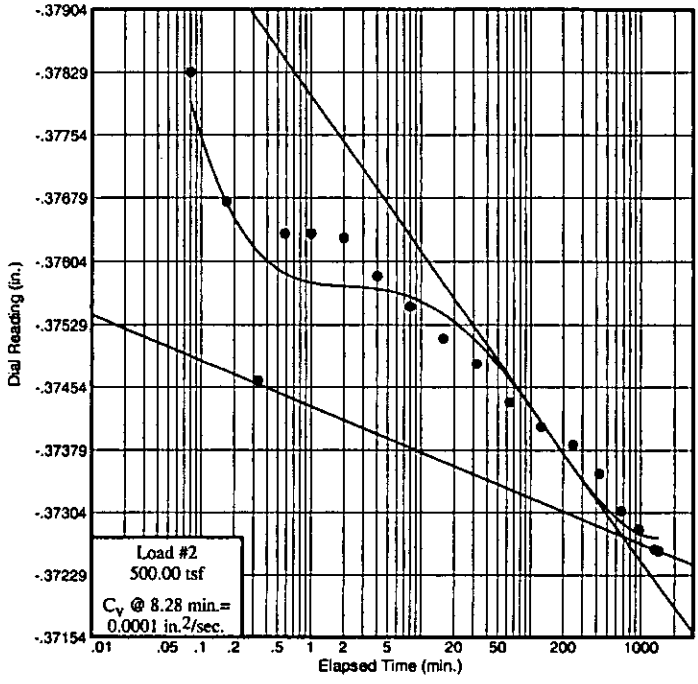
Figure

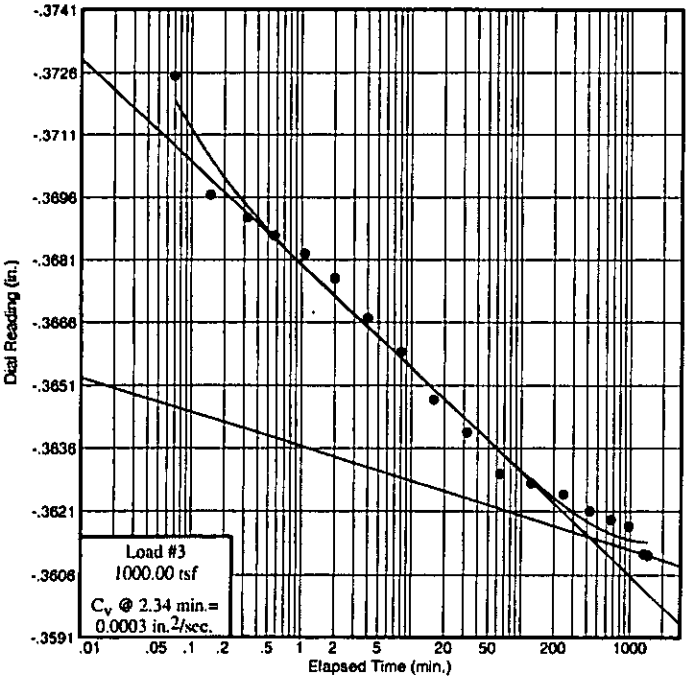
Dial Reading vs. Time

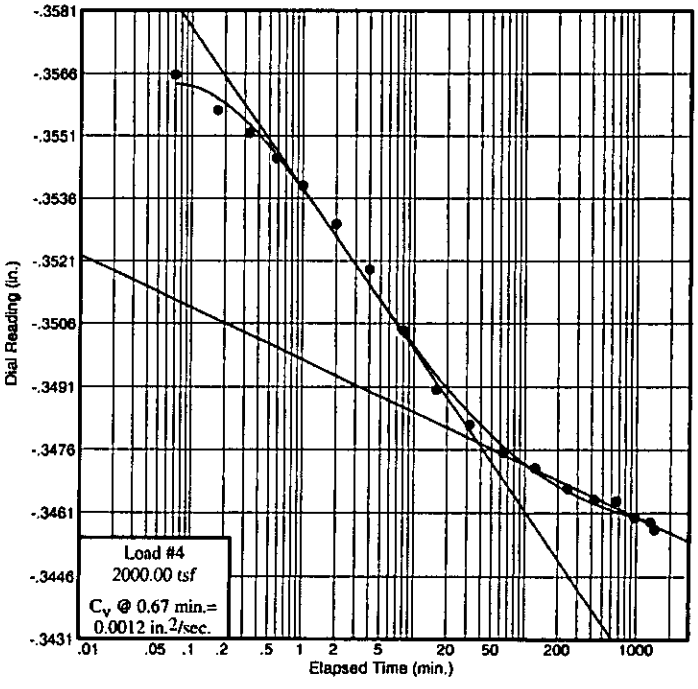
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: TR-38A Sample No.: P-4B Elev./Depth: 45.8









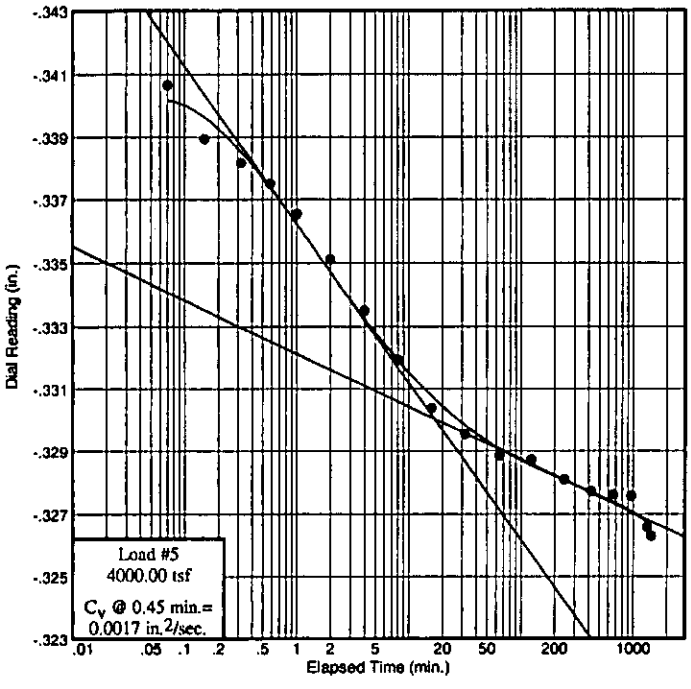
DLZ

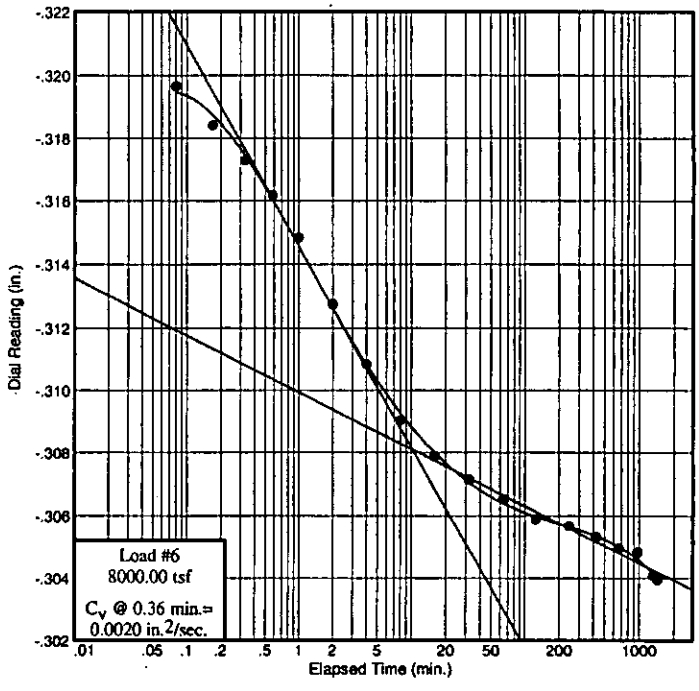
Figure

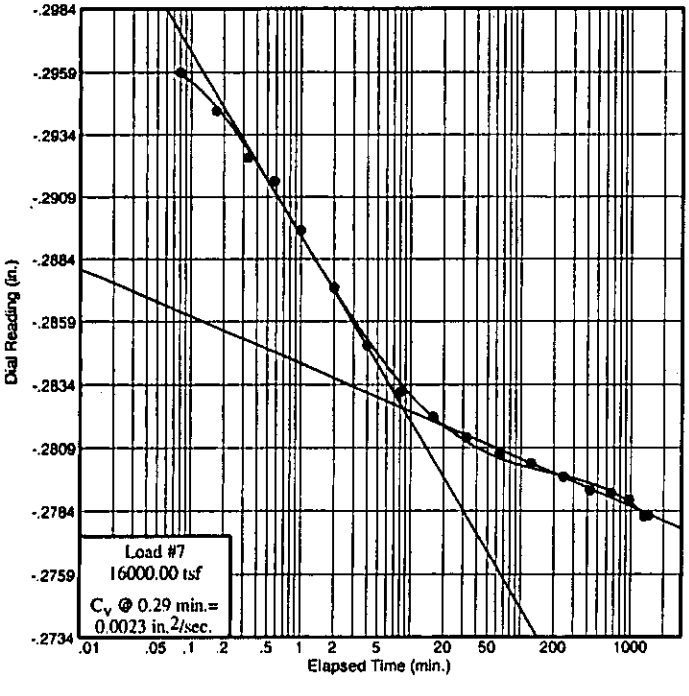
Dial Reading vs. Time

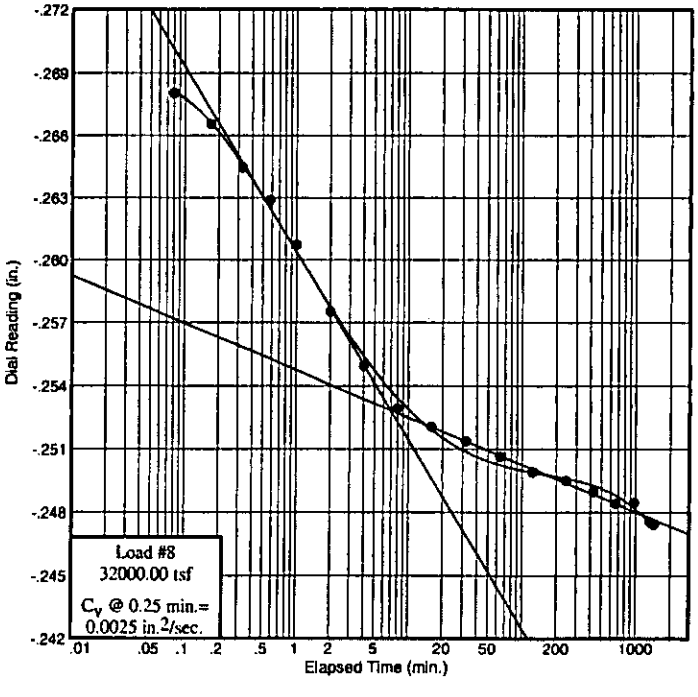
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: TR-38A Sample No.: P-4B Elev./Depth: 45.8









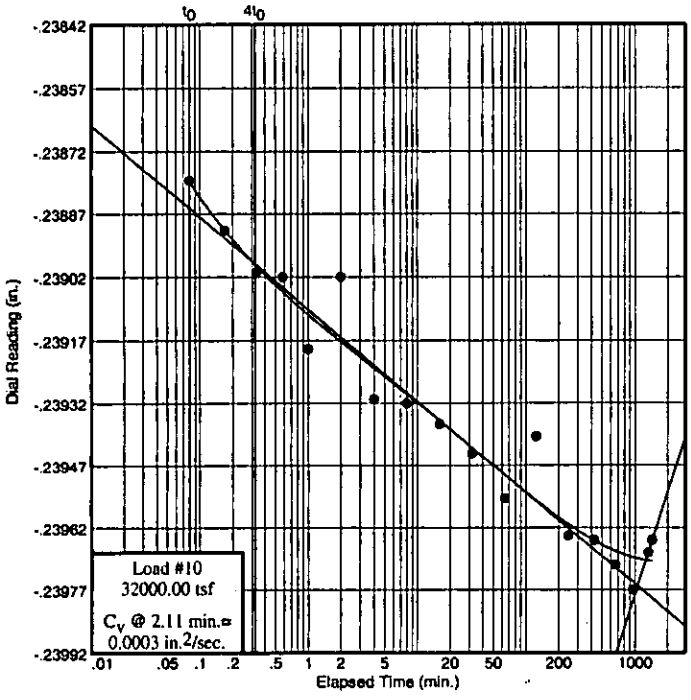
DLZ

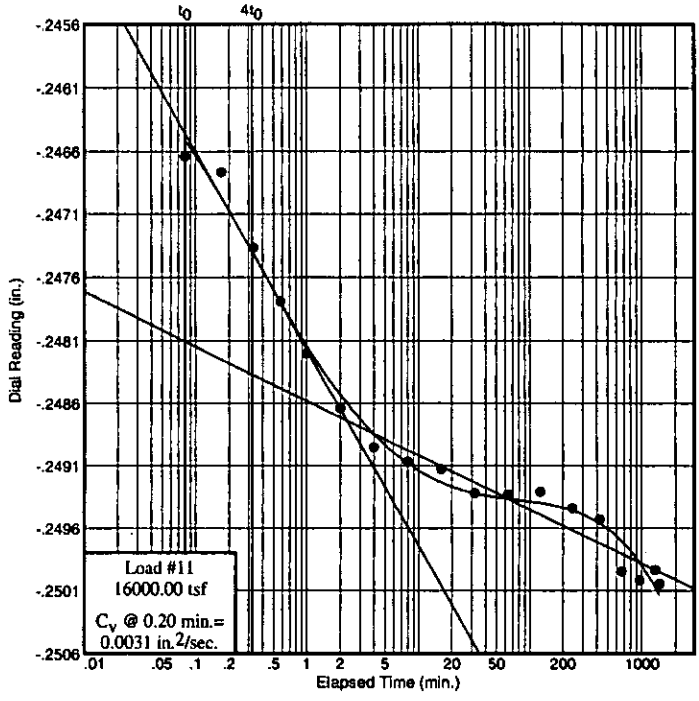
Figure

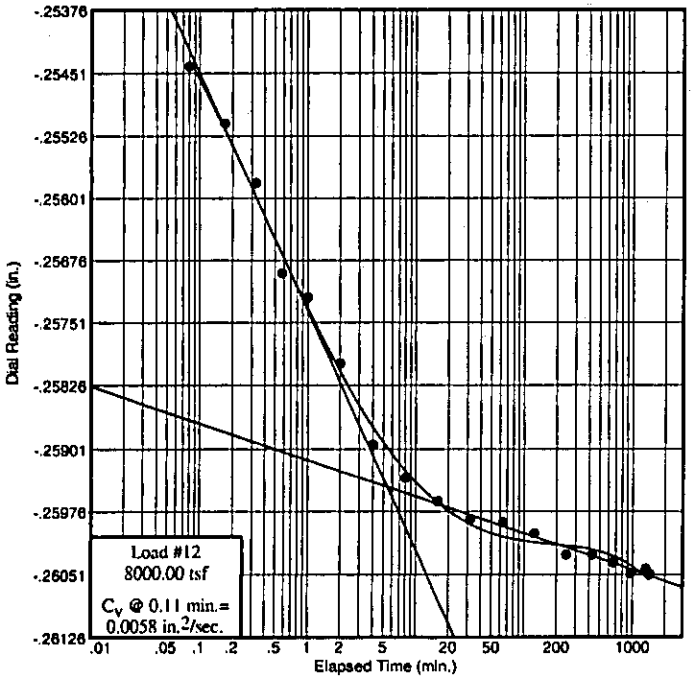
Dial Reading vs. Time

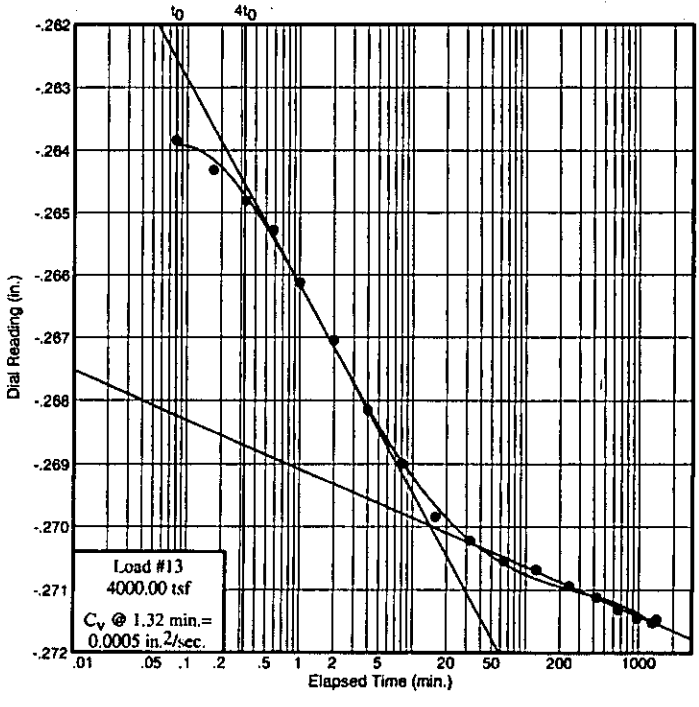
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: TR-38A Sample No.: P-4B Elev./Depth: 45.8









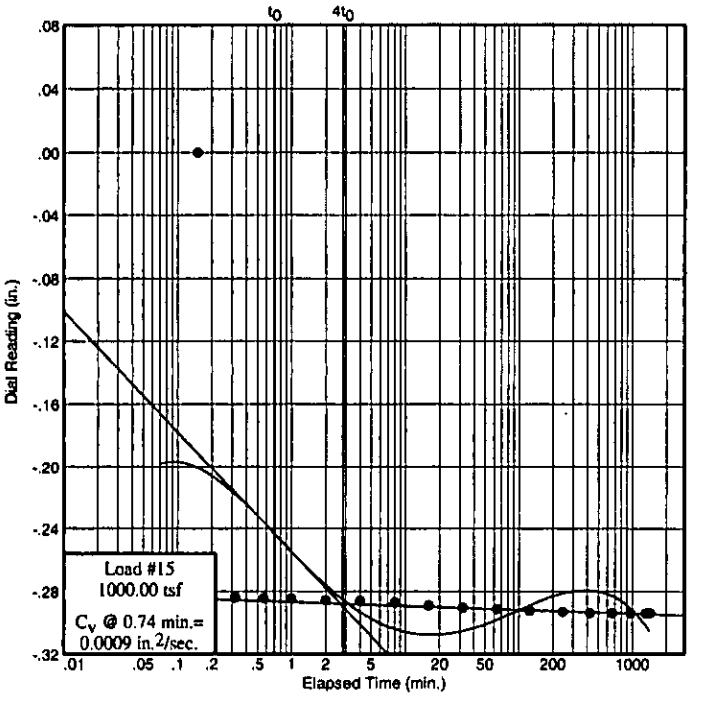
DLZ

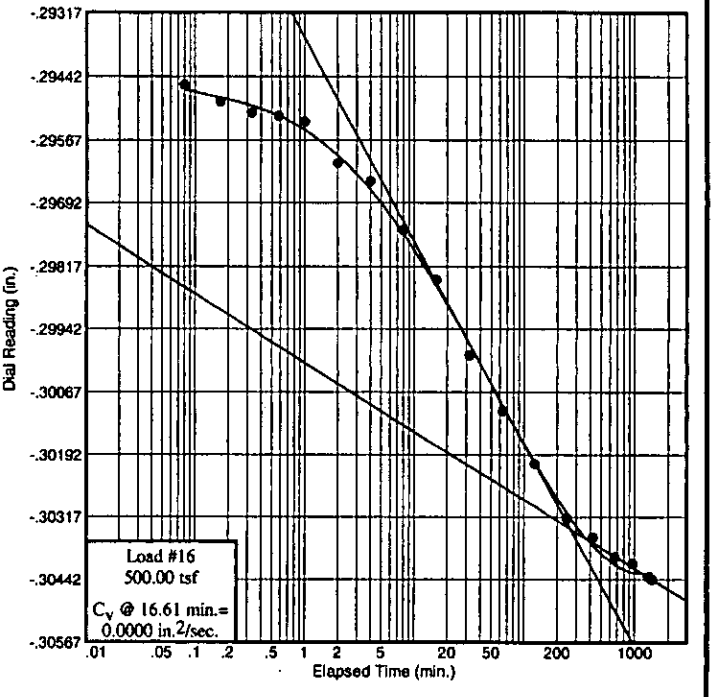
Figure

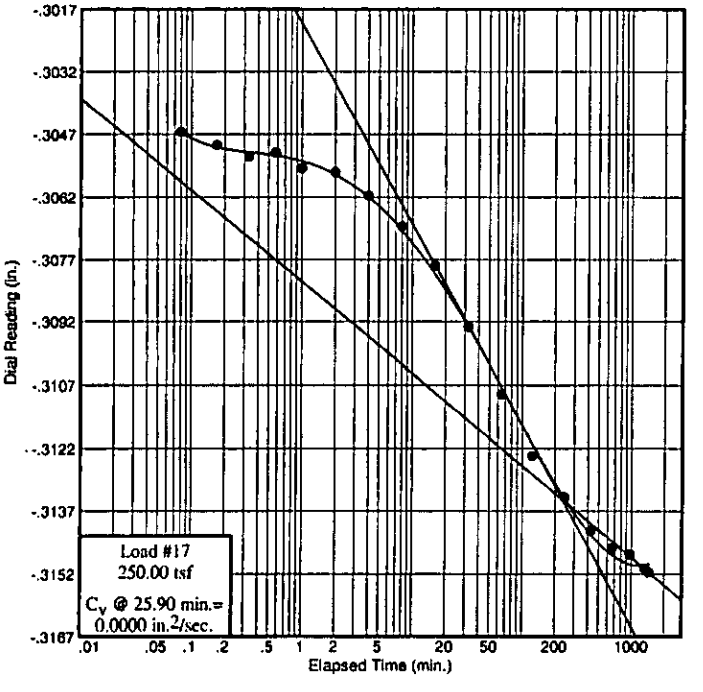
Dial Reading vs. Time

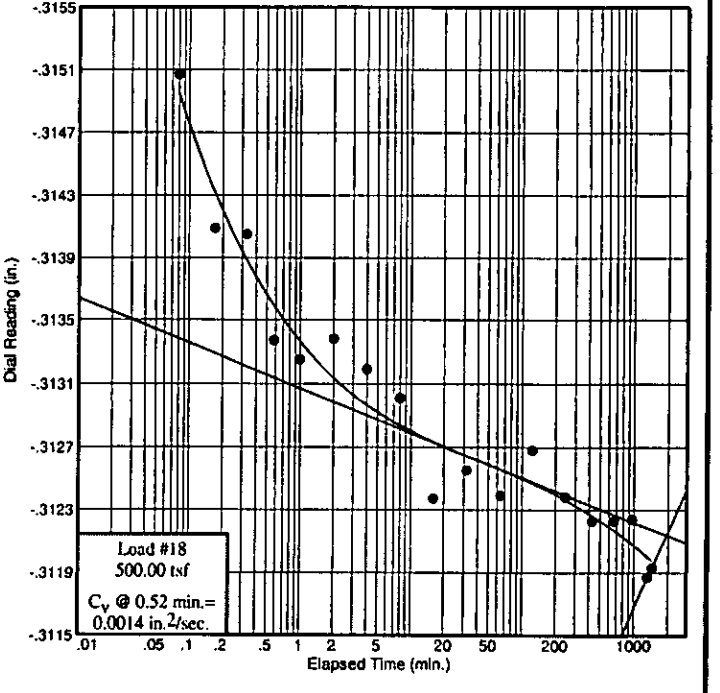
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: TR-38A Sample No.: P-4B Elev./Depth: 45.8









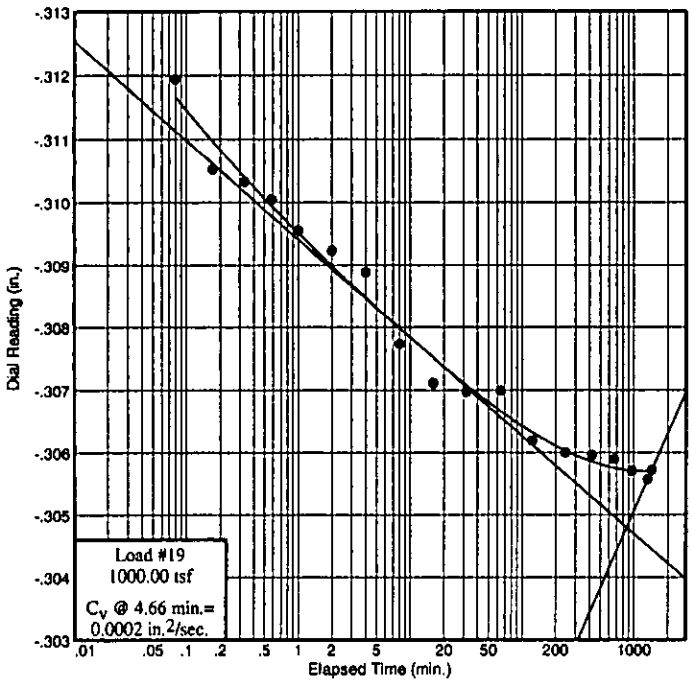
DLZ

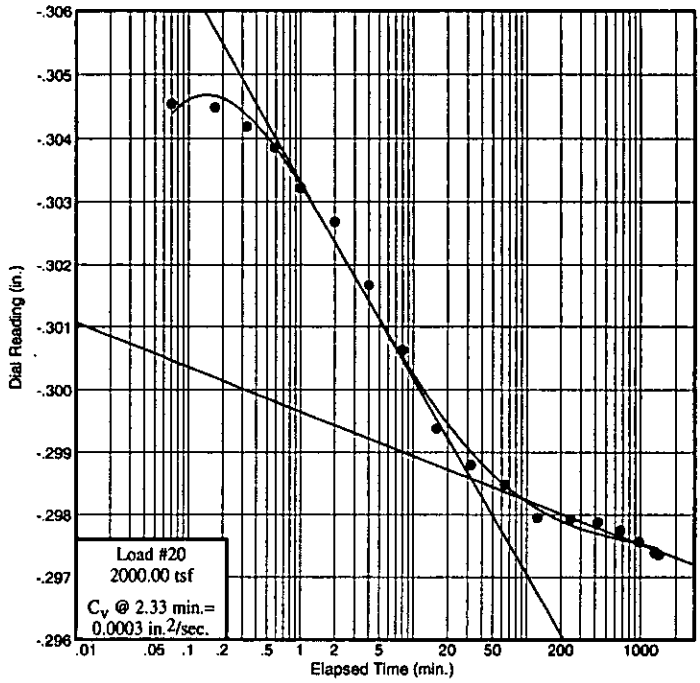
Figure

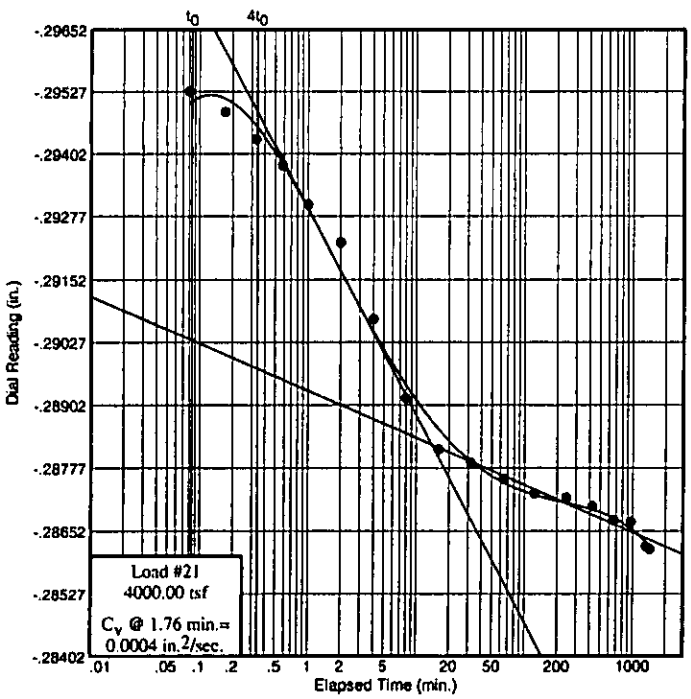
Dial Reading vs. Time

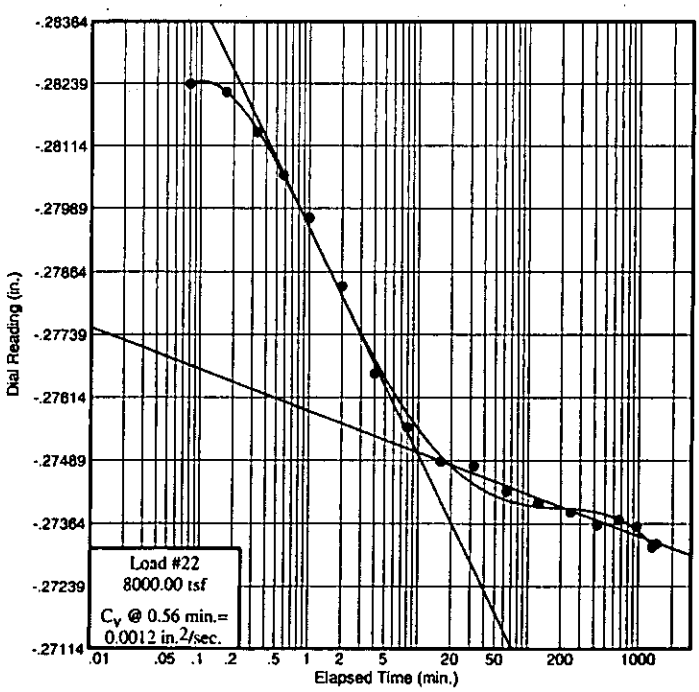
Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: TR-38A Sample No.: P-4B Elev./Depth: 45.8









DLZ

Figure

Dial Reading vs. Time

Project No.: 0121-3070.03
Project: SCI-823-0.00

Source: TR-38A Sample No.: P-4B Elev./Depth: 45.8

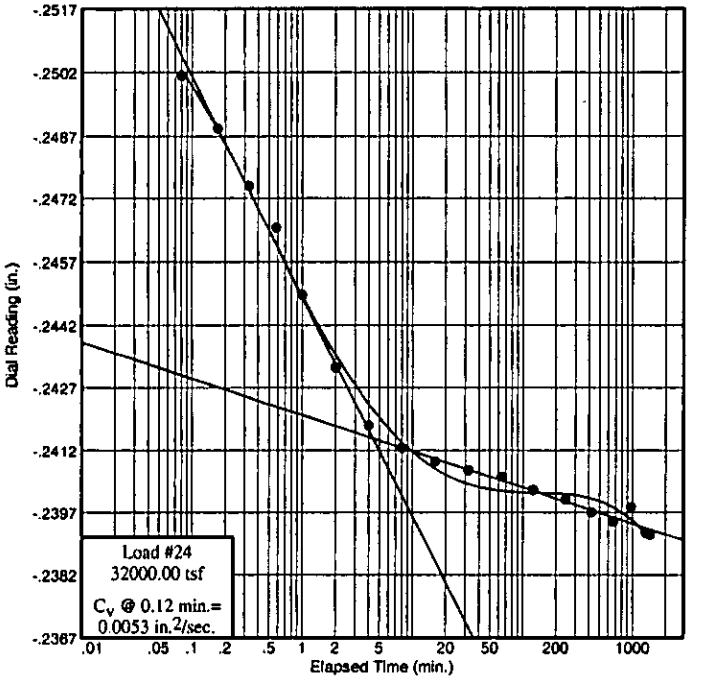


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Figure

APPENDIX C

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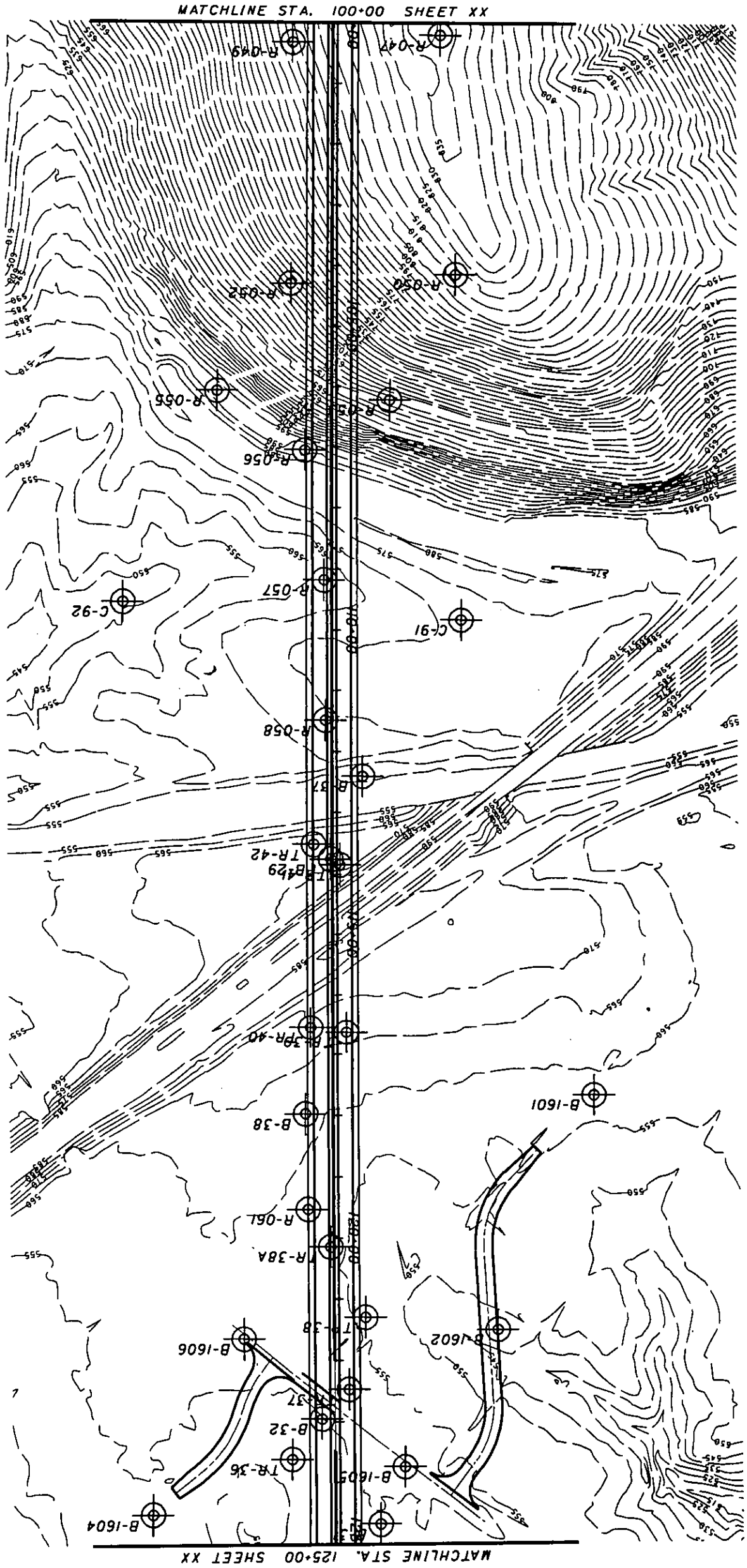
APPENDIX C

Soil Profile Drawings (Highland Bend)



SCI-823-X.XX

SOIL PROFILE

DRAWN BLS
CHECKED BEN

HORIZONTAL SCALE IN FEET
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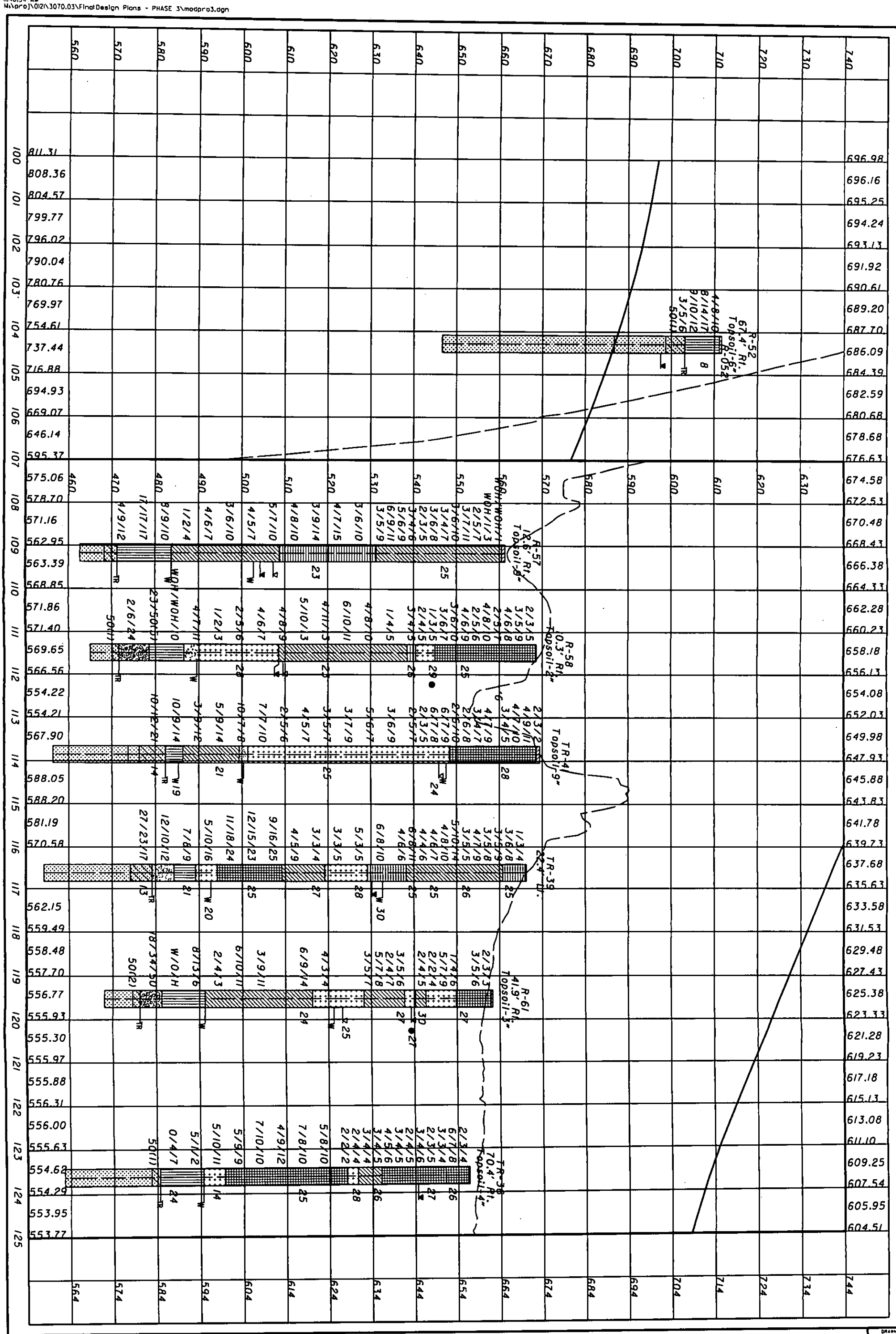

SCI-823-X.XX

SOIL PROFILE

SR 823 STA. 100+00 TO STA. 125+00

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CHECKED AEN

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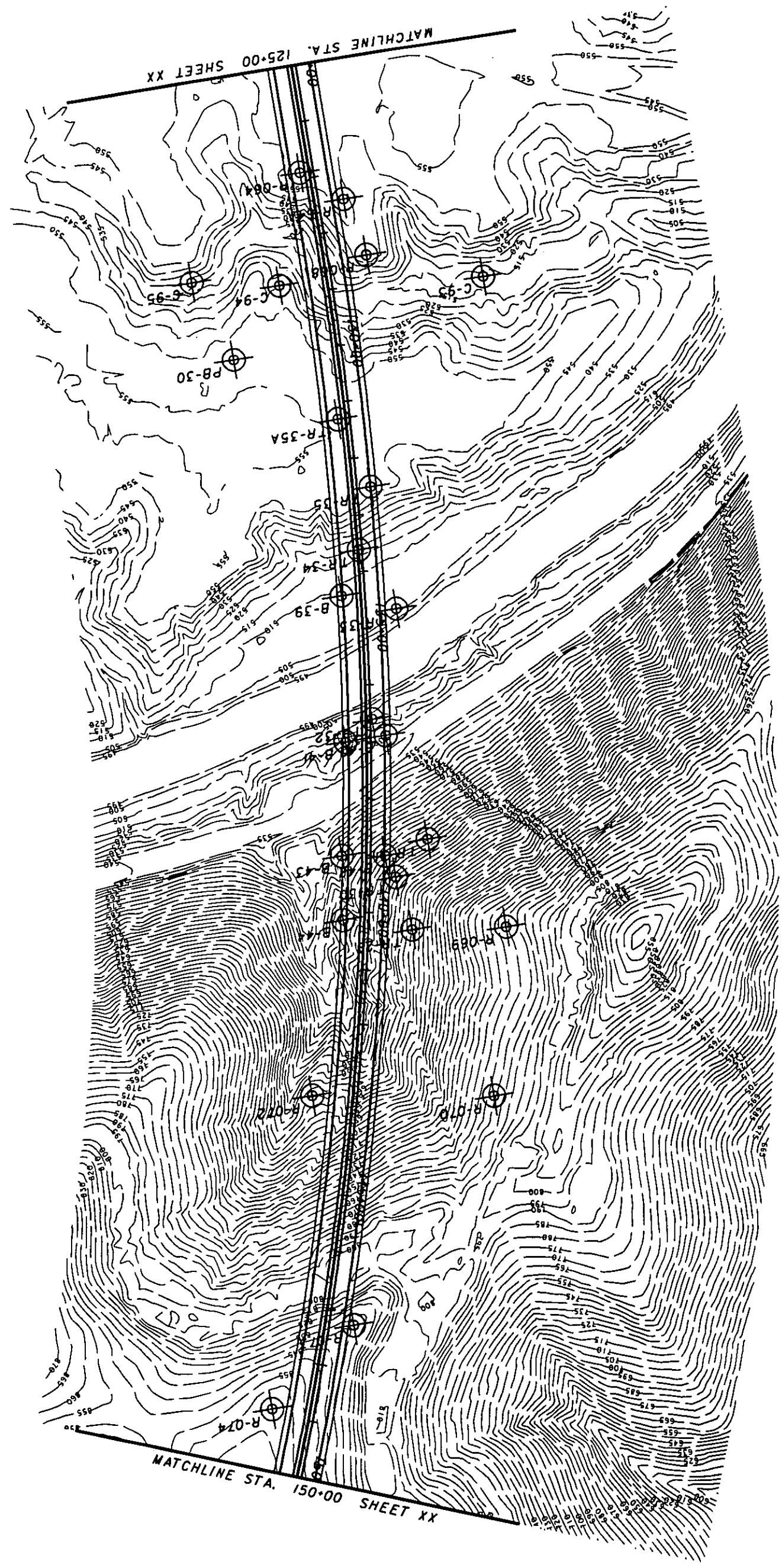

SCI-823-X.XX

SOIL PROFILE

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CHECKED AEN

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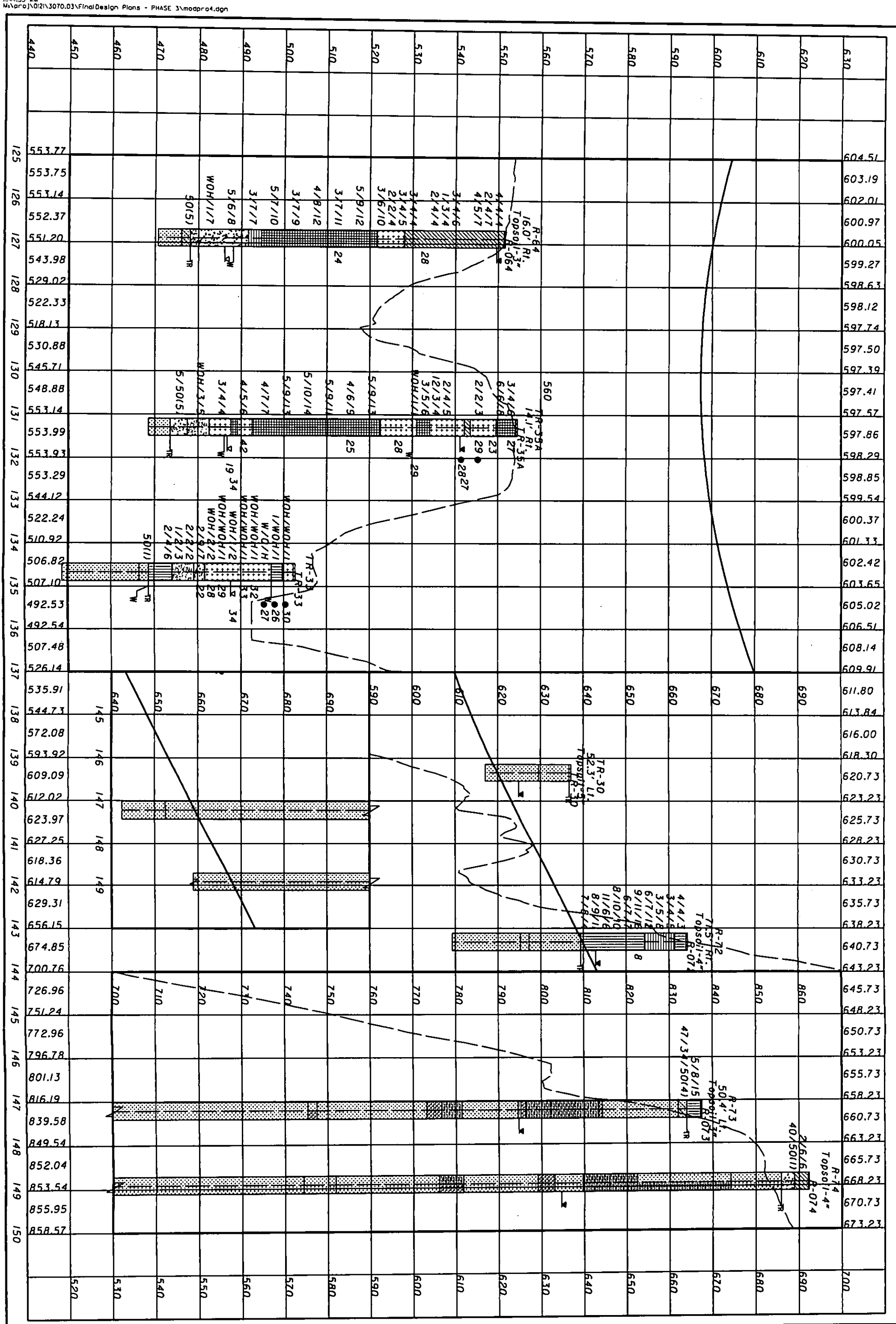

SCI-823-X.XX

SOIL PROFILE
SR 823 STA. 125+00 TO STA 150+00

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APPENDIX D

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APPENDIX D

Summary of Results
Summary of Soil Strength and Consolidation Testing
Plot of Assumed Soil Strength Values
Results of Stability Analyses
Settlement Calculations
Time-Rate of Consolidation Calculations (Using Wick Drains)

DLZ

CLIENT	TranSystems Corporation	JOB NO.	0121-3070.03
PROJECT	SCI-823 Portsmouth Bypass	SHEET NO.	1 OF 45
ITEM	Summary of Results	COMP BY	SJK DATE 8-2-07

Results Using Φ'=35 degrees for Embankment Fill

Summary of Results — Highland Bend Embankment Analyses

Final

EMBANKMENT STA. **Begin: 105+75** **End 112+84** **Maximum Height** **108.3'**

Global Stability	Calculated	Required	Wick Drain Spacing	Approx. 90% Consolidation Time
Undrained Global Stability	**0.66**	**1.5**	5' spacing (triangular)	30 days
Drained Global Stability	1.58	1.5	7' spacing (triangular)	60 days
Seismic Global Stability	1.45	1.1	9' spacing (triangular)	90 days

Slopes Evaluated **2H:1V** ***Using Φ'=35 for Embankment Fill*** Total Primary Consolidation 59"

Max. Construction Stage 35' *Using FS=1.50 (ODOT) Consolidation without wick drains (U=90%) 3,562 days

Max. Pore Pressure (head) Level During Construction+ 15' Above Existing Ground Surface

EMBANKMENT STA. **Begin: 117+64** **End 120+98** **Maximum Height** **72.0'**

Global Stability	Calculated	Required	Wick Drain Spacing	Approx. 90% Consolidation Time
Undrained Global Stability	**0.88**	**1.5**	5' spacing (triangular)	30 days
Drained Global Stability	1.64	1.5	7' spacing (triangular)	55 days
Seismic Global Stability	1.50	1.1	9' spacing (triangular)	85 days

Slopes Evaluated **2H:1V** ***Using Φ'=35 for Embankment Fill*** Total Primary Consolidation 37"

Max. Construction Stage 35' *Using FS=1.50 (ODOT) Consolidation without wick drains (U=90%) 1,793 days

Max. Pore Pressure (head) Level During Construction+ 15' Above Existing Ground Surface

EMBANKMENT STA. **Begin: 124+24** **End 130+73** **Maximum Height** **80.3', 50.3'**

Global Stability	Calculated	Required	Wick Drain Spacing	Approx. 90% Consolidation Time
Undrained Global Stability	**0.82**	**1.5**	5' spacing (triangular)	35 days
Drained Global Stability	1.60	1.5	7' spacing (triangular)	60 days
Seismic Global Stability	1.46	1.1	9' spacing (triangular)	95 days

Slopes Evaluated **2H:1V** ***Using Φ'=35 for Embankment Fill*** Total Primary Consolidation 38"

Max. Construction Stage 30' *Using FS=1.50 (ODOT) Consolidation without wick drains (U=90%) 1,862 days

Max. Pore Pressure (head) Level During Construction+ 13' Above Existing Ground Surface

**It is anticipated that spread footings may be considered for the sturctures contained in the Highland Bend Valley*

+ Pore water pressures and settlements to be monitored in the field during construction with piezometers and settlement plates

DLZ

CLIENT	TranSystems Corporation	JOB NO.	0121-3070.03			
PROJECT	SCI-823 Portsmouth Bypass	SHEET NO.	2	OF	45	
ITEM	Summary of Results	COMP BY	SJA	DATE	8-2-07	✓ 8-2-07

Results Using Φ'=30 degrees for Embankment Fill

Summary of Results **Highland Bend Embankment Analyses**

Final

EMBANKMENT STA. **Begin: 105+75** **End 112+84** **Maximum Height** **108.3'**

Global Stability	Calculated 2H:1V	Calculated 2.5H:1V	Required
Undrained Global Stability	**0.64**	**0.69**	**1.5**
Drained Global Stability	**1.43**	1.63	1.5
Seismic Global Stability	NA	1.50	1.1

Wick Drain Spacing	Approx. 90% Consolidation Time
5' spacing (triangular)	30 days
7' spacing (triangular)	60 days
9' spacing (triangular)	90 days

Using Φ'=30 for Embankment Fill

Max. Construction Stage 35' *Using FS=1.50 (ODOT)

Max. Pore Pressure (head) Level During Construction+ 15' Above Existing Ground Surface

Total Primary Consolidation 59"

Consolidation without wick drains (U=90%) 3,562 days

EMBANKMENT STA. **Begin: 117+64** **End 120+98** **Maximum Height** **72.0'**

Global Stability	Calculated 2H:1V	Calculated 2.5H:1V	Required
Undrained Global Stability	**0.86**	**0.92**	**1.5**
Drained Global Stability	**1.42**	1.61	1.5
Seismic Global Stability	NA	1.47	1.1

Wick Drain Spacing	Approx. 90% Consolidation Time
5' spacing (triangular)	30 days
7' spacing (triangular)	55 days
9' spacing (triangular)	85 days

Using Φ'=30 for Embankment Fill

Max. Construction Stage 35' *Using FS=1.50 (ODOT)

Max. Pore Pressure (head) Level During Construction+ 15' Above Existing Ground Surface

Total Primary Consolidation 37"

Consolidation without wick drains (U=90%) 1,793 days

EMBANKMENT STA. **Begin: 124+24** **End 130+73** **Maximum Height** **80.3', 50.3'**

Global Stability	Calculated 2H:1V	Calculated 2.5H:1V	Required
Undrained Global Stability	**0.78**	**0.87**	**1.5**
Drained Global Stability	**1.39**	1.58	1.5
Seismic Global Stability	NA	1.44	1.1

Wick Drain Spacing	Approx. 90% Consolidation Time
5' spacing (triangular)	35 days
7' spacing (triangular)	60 days
9' spacing (triangular)	95 days

Using Φ'=30 for Embankment Fill

Max. Construction Stage 30' *Using FS=1.50 (ODOT)

Max. Pore Pressure (head) Level During Construction+ 13' Above Existing Ground Surface

Total Primary Consolidation 38"

Consolidation without wick drains (U=90%) 1,862 days

**It is anticipated that spread footings may be considered for the sturctures contained in the Highland Bend valley*

+ Pore water pressures and settlements to be monitored in the field during construction with piezometers and settlement plates

PROJECT SCI-823-0.00
Highland Bend Embankments
SUMMARY OF STRENGTH TESTING

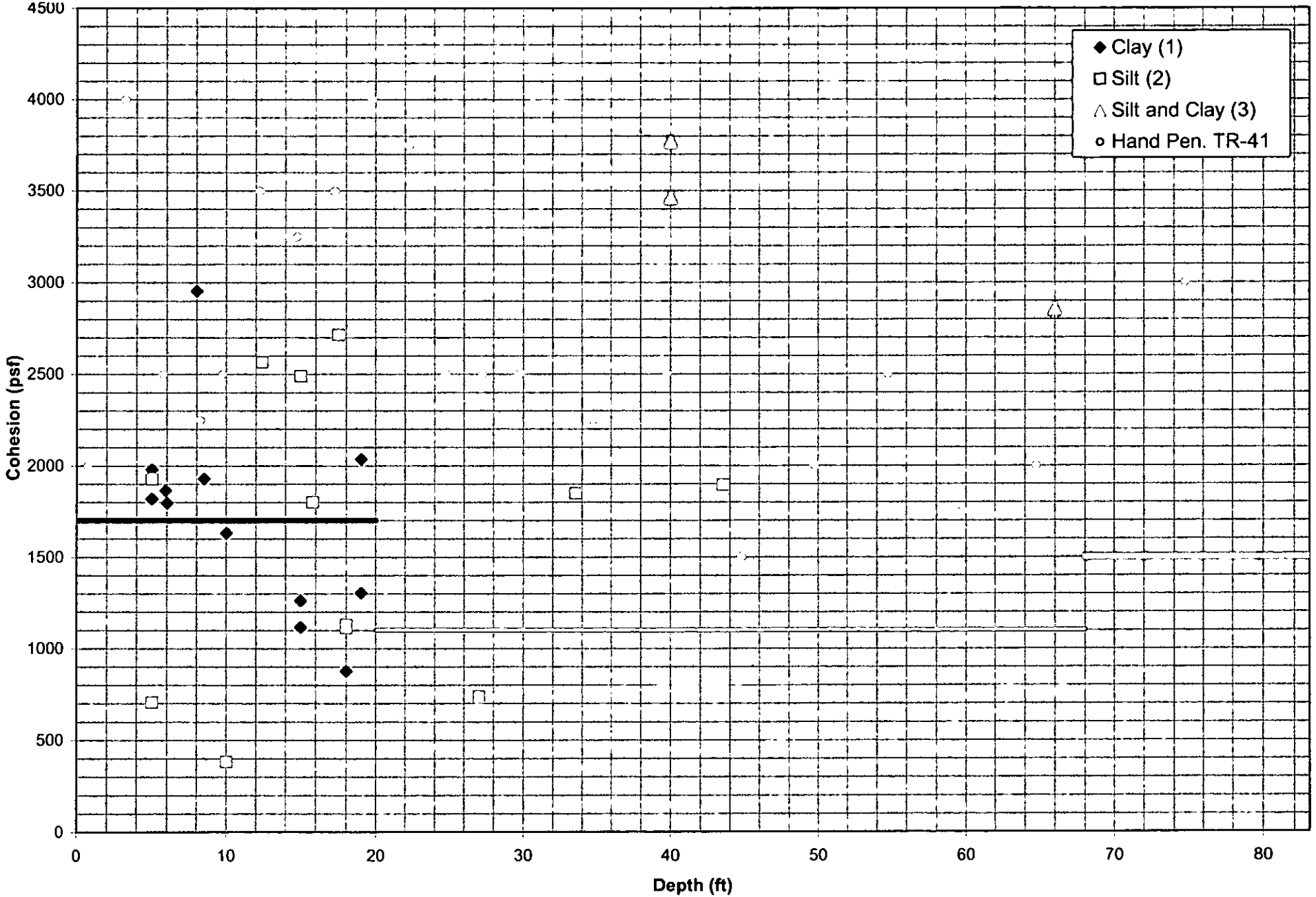
Boring	Sample	Depth (ft.)	Test Performed	Results											
				ODOT Classification	γ_D (pcf)	WC (%)	e_o	Cc	Cr	p_c (tsf)	c (psf)	c' (psf)	φ (deg)	φ' (deg)	q_u (tsf)
B-31	P1	10.0	UU, CONS	A-6b	98.3	24.9	0.771	0.310	0.080	2.159	9966				
B-31	P2	15.0	CIU	A-6a	99.3	25.1					1262	1186	15.5	24.4	
B-32	P1	10.0	CIU, CONS	A-6a	100.9	25.3	0.793	0.210	0.060	5.599	1632	0	17.8	31.4	
B-32	P2	15.0	UU	A-4b	98.1	26.1					2490				
B-37	ST-1	8.0	UU, CONS	A-6a	97.9	23.8	0.718	0.180	0.070	2.240	2954				
B-37	ST-2	18.0	CIU	A-4b	96.9	25.9					1112	300	17.0	29.5	
B-37	ST-3	43.5	CIU	A-4a	102.6	20.9					1892	1376	13.4	22.7	
B-38	ST-1	10.0	CIU, CONS	A-4a	98.2	26.6	0.748	0.110	0.030	5.726	382	420	18.4	31.1	
B-38	In-Situ	17.5	FVS Test*	A-4b							2714*				
B-38	ST-2	19.0	UU , CONS	A-6a	101.3	23.6	0.738	0.340	0.050	6.294	2036				
B-38	ST-2	19.0	CIU	A-6a	98.3	26.8					1304	0	20.9	32.4	
B-38	ST-3	37.0	CIU, CONS	A-4b	96.9	28.6	0.760	0.160	0.030	2.373	0	0	33.1	36.3	
B-39	ST-1	10.0	UU	A-4b	95.5	28.0					616				
B-40	ST-4	20.0	UU	A-4b	107.8	23.0					2046				
R-61	P-1	6.0	UC, CONS	A-7-6	96.8	26.6	0.793	0.210	0.050	5.000					1.795
R-61	P-2B	18.0	UC	A-4b											1.129
R-61	P-3	33.5	UC	A-4b											1.847
R-64	P2	18.0	UC, CONS	A-6a	97.5	27.5	0.781	0.230	0.050	5.000					0.876
R-64A	P1A	5.0	UC	A-7-6	102.4	21.3									1.979
R-64A	P1B	5.9	UC	A-6a	98.1	22.6									1.864
R-64A	P2A	15.0	UC	A-6a	99.7	25.0									1.116
R-64A	P2B	15.8	UC	A-4b	100.1	22.0									1.800
R-64A	P4	40.0	UC	A-6b	102.6	24.4									3.766
R-64A	P4	40.0	UU	A-6b	100.4	25.6					3460				
TR-35A	P-1	5.0	CIU	A-4b	100.9	22.7					704	0	19.9	31.1	

PROJECT SCI-823-0.00
Highland Bend Embankments
SUMMARY OF STRENGTH TESTING

Boring	Sample	Depth (ft.)	Test Performed	Results											
				ODOT Classification	γ_D (pcf)	WC (%)	e_o	Cc	Cr	p_c (tsf)	c (psf)	c' (psf)	φ (deg)	φ' (deg)	q_u (tsf)
TR-35A	P-1	5.0	UU	A-4b	97.5	25.6					1926				
TR-35A	P-2B	12.4	UU, CONS	A-4b	97.4	28.6	0.786	0.100	0.010	2.760	2566				
TR-35A	P-3	27.0	CIU, CONS	A-4b	97.1	27.6	0.928	0.270	0.080	1.340	738	482	18.4	30.4	
TR-35A	P-4A	66.0	UC	A-7-6	94.2	25.5									2.854
TR-35A	P-4B	66.9	UU, CONS	A-4b	112.6	18.8	0.347	0.100	0.010	4.200	6528				
TR-38A	P-1	5.0	UU	A-6a							1818				
TR-38A	P-3	8.5	UU	A-7-6							1928				
TR-38A	P-2B	15.7	CONS	A-6b	94.1	26.8	0.838	0.180	0.040	3.058					
TR-38A	P-4B	45.8	CONS	A-6b	101.0	22.5	0.706	0.190	0.070	2.214					

DLZ

Selected Strength Values Plotted with Laboratory Results
Embankment Sta. 105+75 to 112+84



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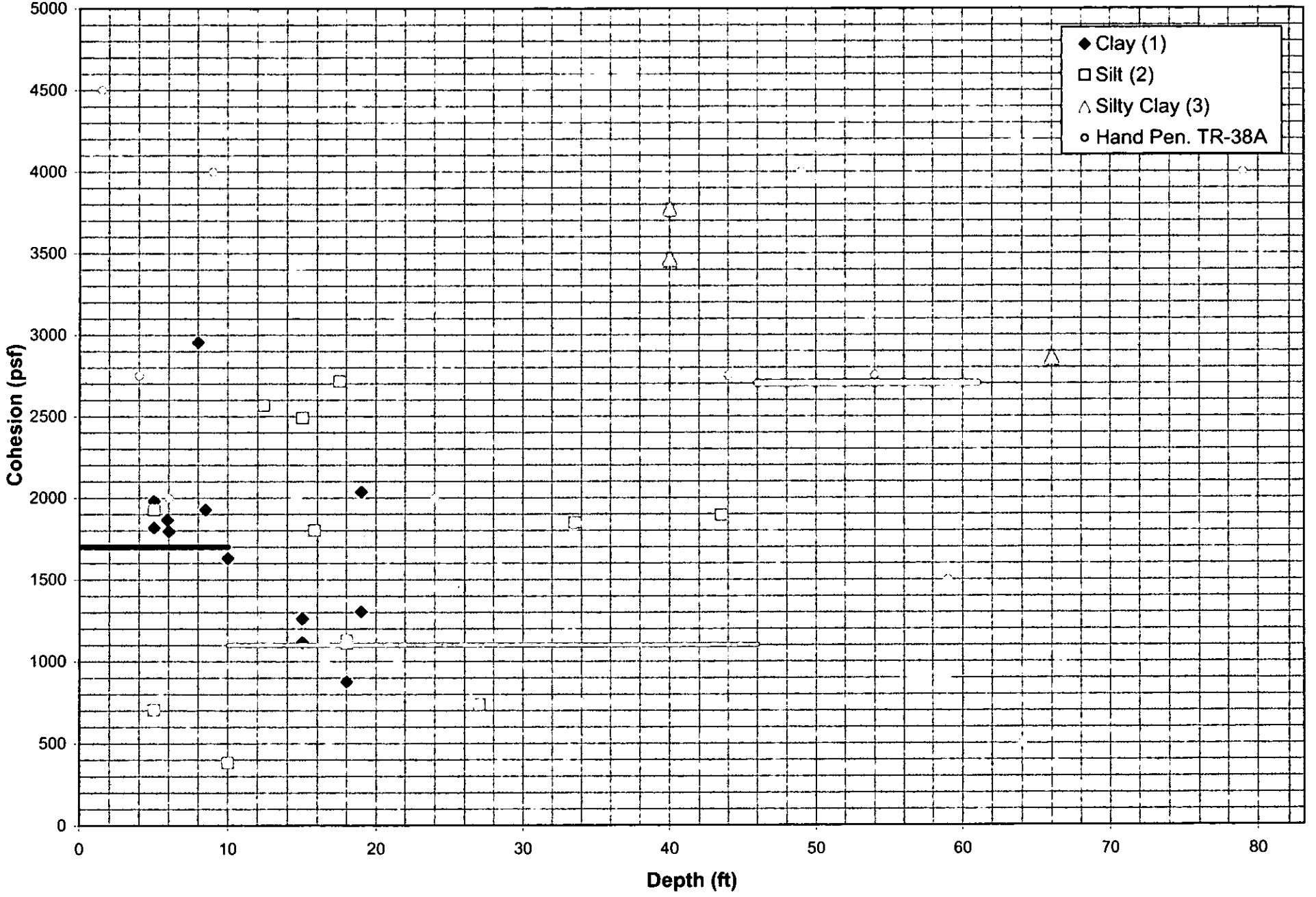
Selected Strength Values Plotted with Laboratory Results
Embankment Sta. 117+64 to 120+98



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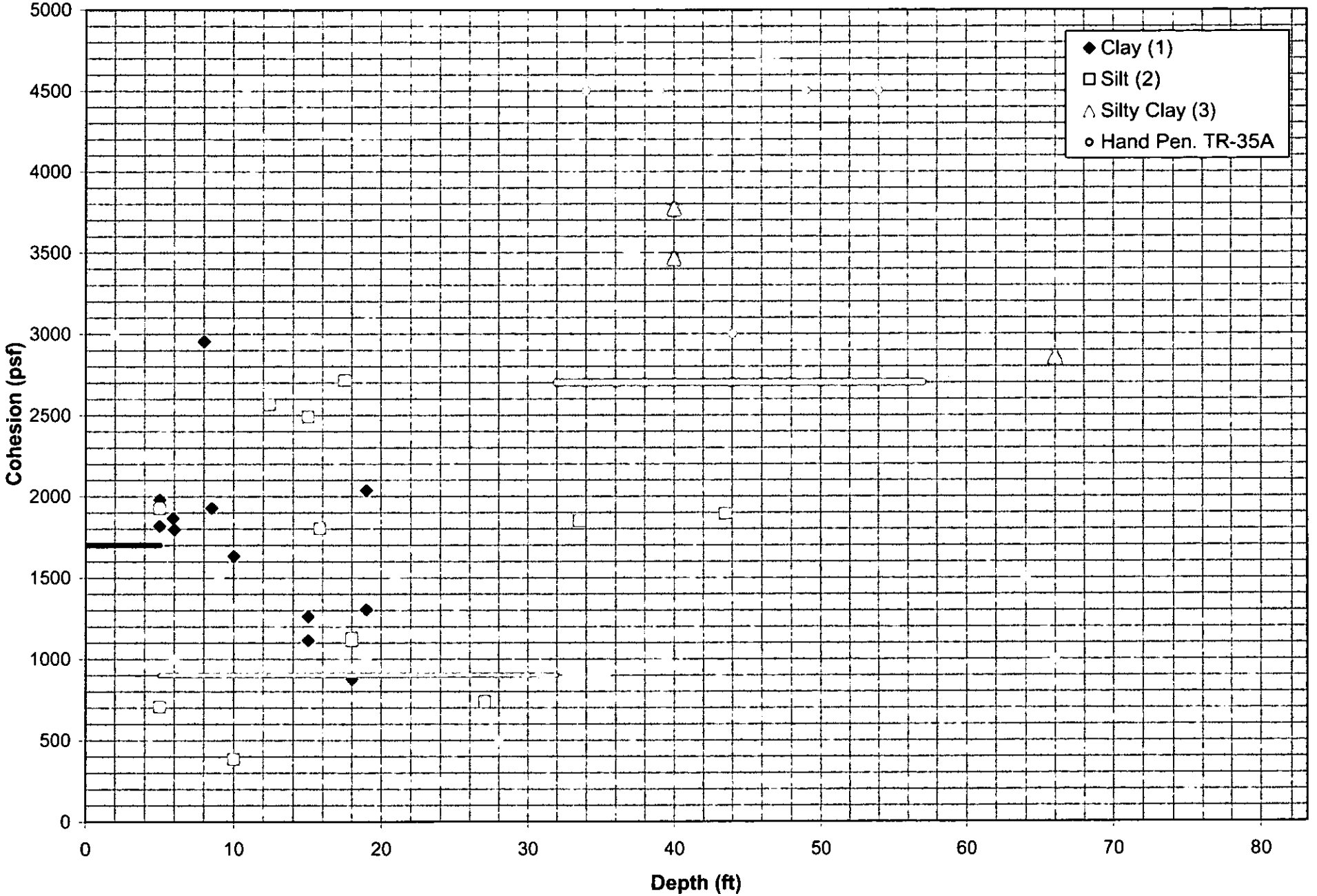
Selected Strength Values Plotted with Laboratory Results
Embankment Sta. 124+24 to 130+73



DLZ

CLIENT	TranSystems / ODOT D-9	JOB NUMBER		0121-3070.03	
PROJECT	SCI-823 Portsmouth Bypass	SHEET NO.		5 OF 45	
ITEM	Soil Properties and analysis parameters	COMP. BY	SJR	DATE	06/28/07

Highland Bend Embankments: Soil Properites

Embankment Stations **Begin: 105+75** **End: 112+84** H_{max} = 108.3'

Profile Based on Boring TR-41

Depth (ft)	Soil Type	c (psf)	Φ'(deg)	C'	C_c	C_r	P_c(psf)	e_0	c_v (ft²/day)
0-20	Clay	1700	30		0.18	0.07	4,480	0.718	0.25
20-68	Silt	1100	29		0.16	0.03	4,746	0.760	0.50
68-83	Silt and Clay	1500	29		0.19	0.07	4,428	0.706	0.35
83-92	C&F Sand	0	32	60					
92+	Bedrock								

Embankment Stations **Begin: 117+64** **End: 120+98** H_{max} = 72.0'

Profile Based on Boring TR-38A

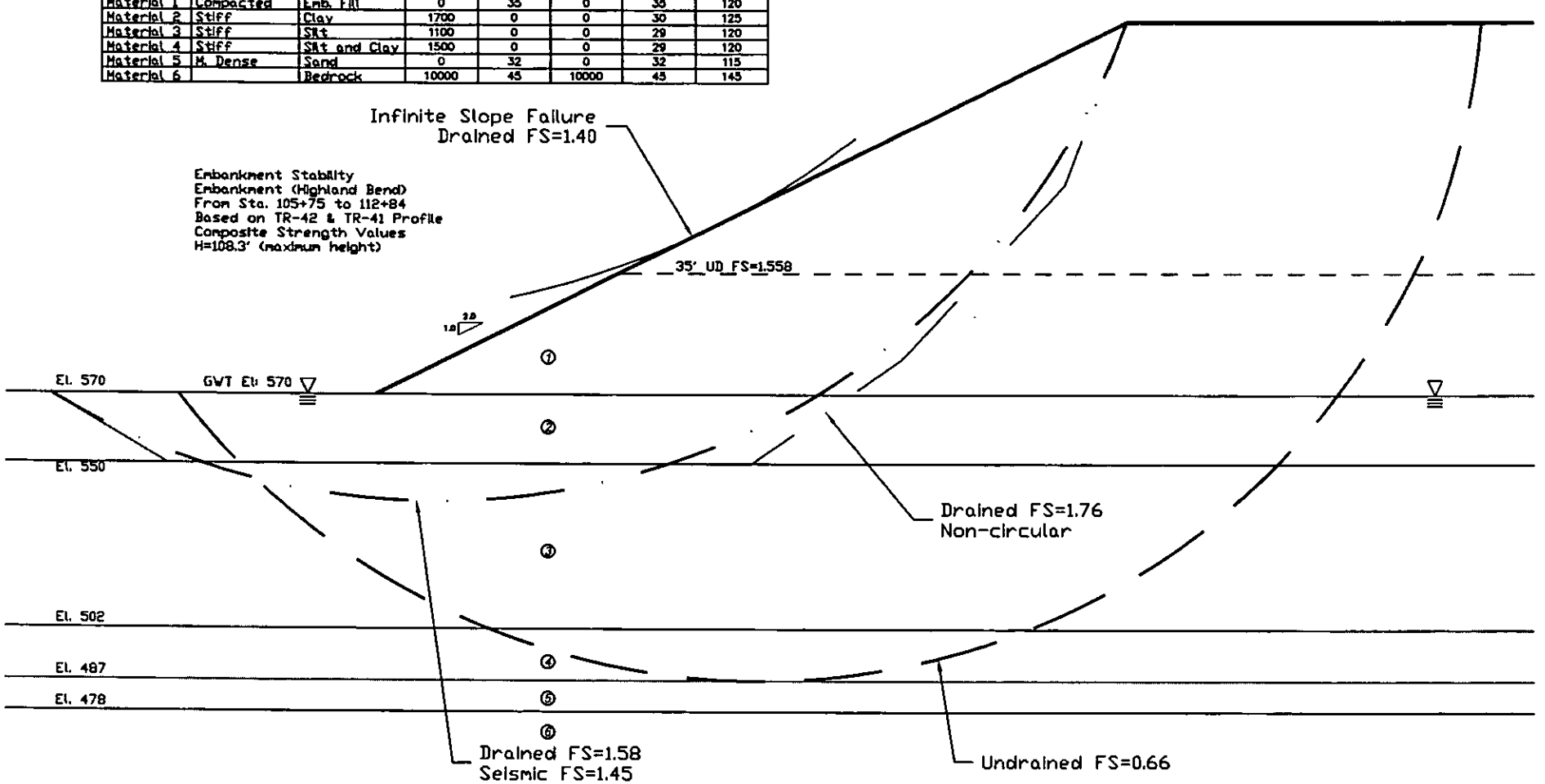
Depth (ft)	Soil Type	c (psf)	Φ'(deg)	C'	C_c	C_r	P_c(psf)	e_0	c_v (ft²/day)
0-10	Clay	1700	30		0.18	0.07	4,480	0.718	0.27
10-46	Silt	1100	29		0.16	0.03	4,746	0.760	0.55
46-61	Silty Clay	2700	29		0.19	0.07	4,428	0.706	0.27
61-77	Sandy Silt	0	30	40					
77+	Bedrock								

Embankment Stations **Begin: 124+24** **End: 130+73** H_{max} = 80.3' (Ravine), 50.3'

Profile Based on Boring TR-35A

Depth (ft)	Soil Type	c (psf)	Φ'(deg)	C'	C_c	C_r	P_c(psf)	e_0	c_v (ft²/day)
0-5	Clay	1700	30		0.31	0.08	4,318	0.771	0.20
5-32	Silt	900	29		0.27	0.08	4,000	0.928	0.50
32-57	Silty Clay	2700	29		0.19	0.07	4,428	0.706	0.27
57-74	Sandy Silt	0	30	42.5					
74+	Bedrock								

Material	Consistency	Soil Type	Undrained c (psf)	Undrained φ (deg)	Drained c' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	1100	0	0	29	120
Material 4	Stiff	Silt and Clay	1500	0	0	29	120
Material 5	M. Dense	Sand	0	32	0	32	115
Material 6		Bedrock	10000	45	10000	45	145



EMBANKMENT FILL MATERIAL; φ'=35 DEG

Highland Bend Embankments
Station 105+75 to 112+84
Undrained and Drained Analyses

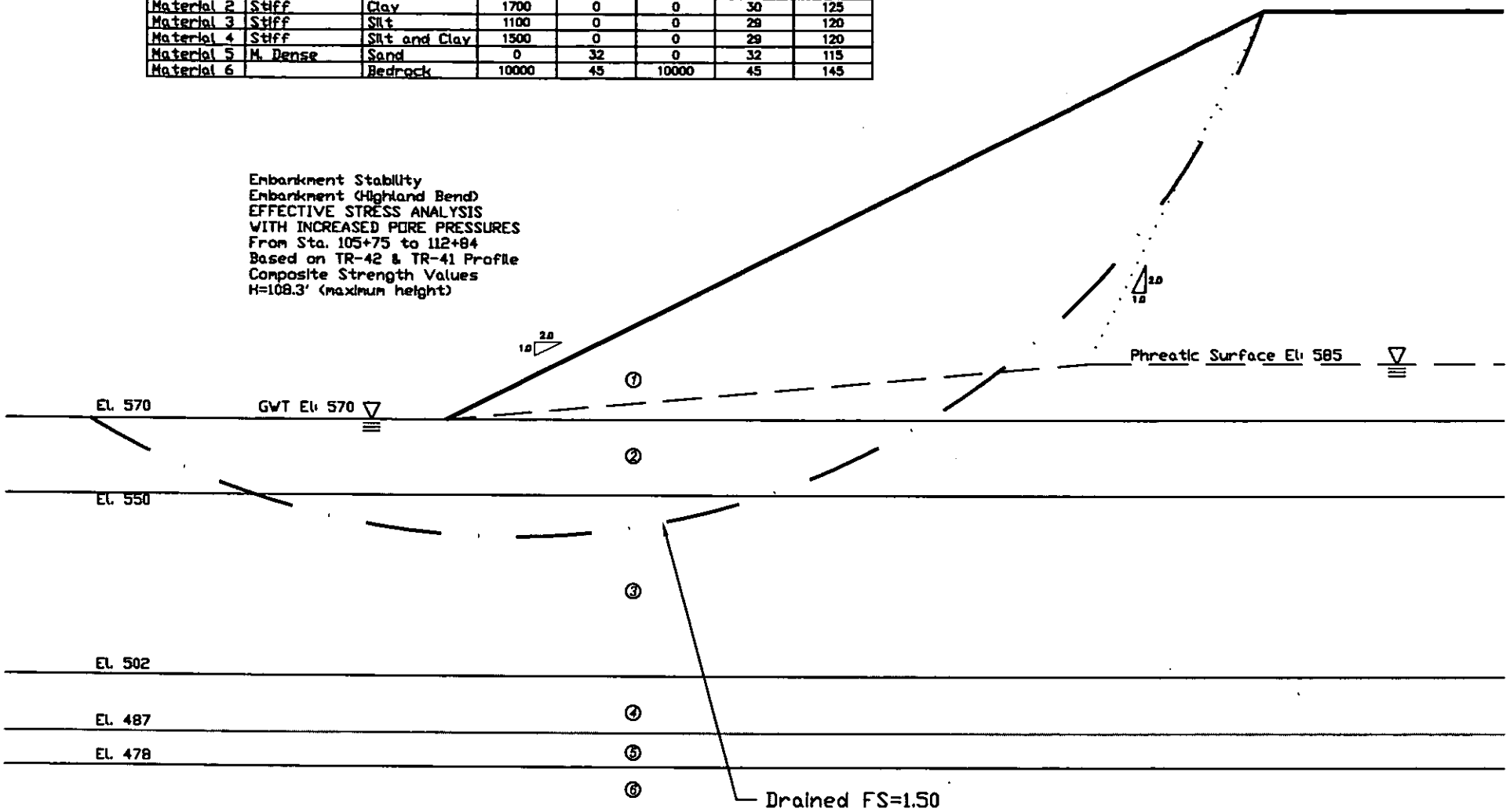
EMBANKMENT STABILITY ANALYSIS

SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 7/3/07

Material	Consistency	Soil Type	Undrained c (psf)	Undrained φ (deg)	Drained c' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	1100	0	0	29	120
Material 4	Stiff	Silt and Clay	1500	0	0	29	120
Material 5	M. Dense	Sand	0	32	0	32	115
Material 6		Bedrock	10000	45	10000	45	145

Embankment Stability
Embankment (Highland Bend)
EFFECTIVE STRESS ANALYSIS
WITH INCREASED PORE PRESSURES
From Sta. 105+75 to 112+84
Based on TR-42 & TR-41 Profile
Composite Strength Values
H=108.3' (maximum height)



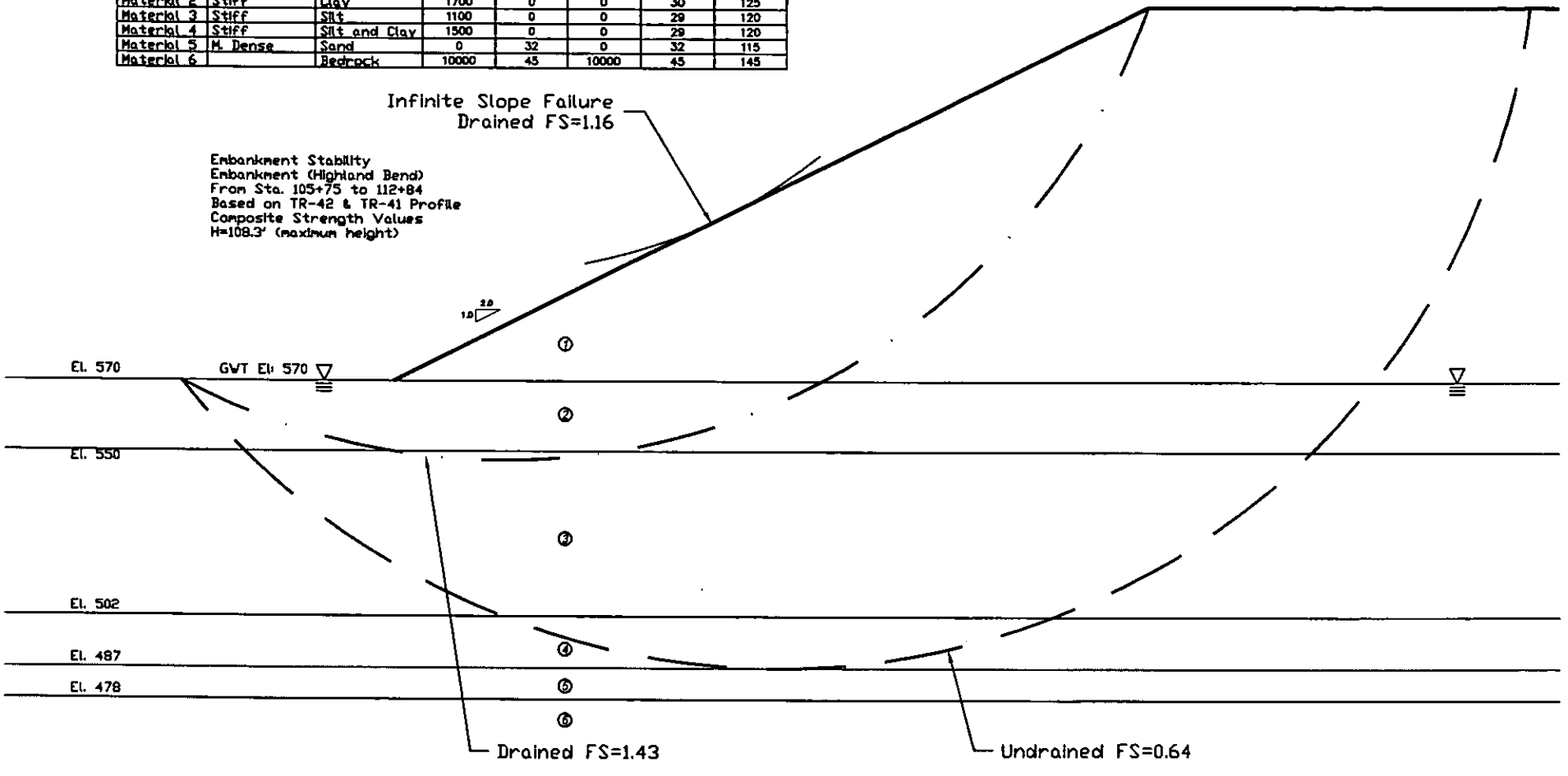
EMBANKMENT FILL MATERIAL, φ'=35 DEG

Highland Bend Embankments
Station 105+75 to 112+84
STAGED CONSTRUCTION ANALYSIS

EFFECTIVE STRESS ANALYSIS WITH
INCREASED PORE WATER PRESSURES
SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 7/3/07

			Undrained		Drained		
Material	Consistency	Soil Type	c (psf)	φ (deg)	c' (psf)	φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	30	0	30	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	1100	0	0	29	120
Material 4	Stiff	Silt and Clay	1500	0	0	29	120
Material 5	M. Dense	Sand	0	32	0	32	115
Material 6		Bedrock	10000	45	10000	45	145



EMBANKMENT FILL MATERIAL; φ'=30 DEG

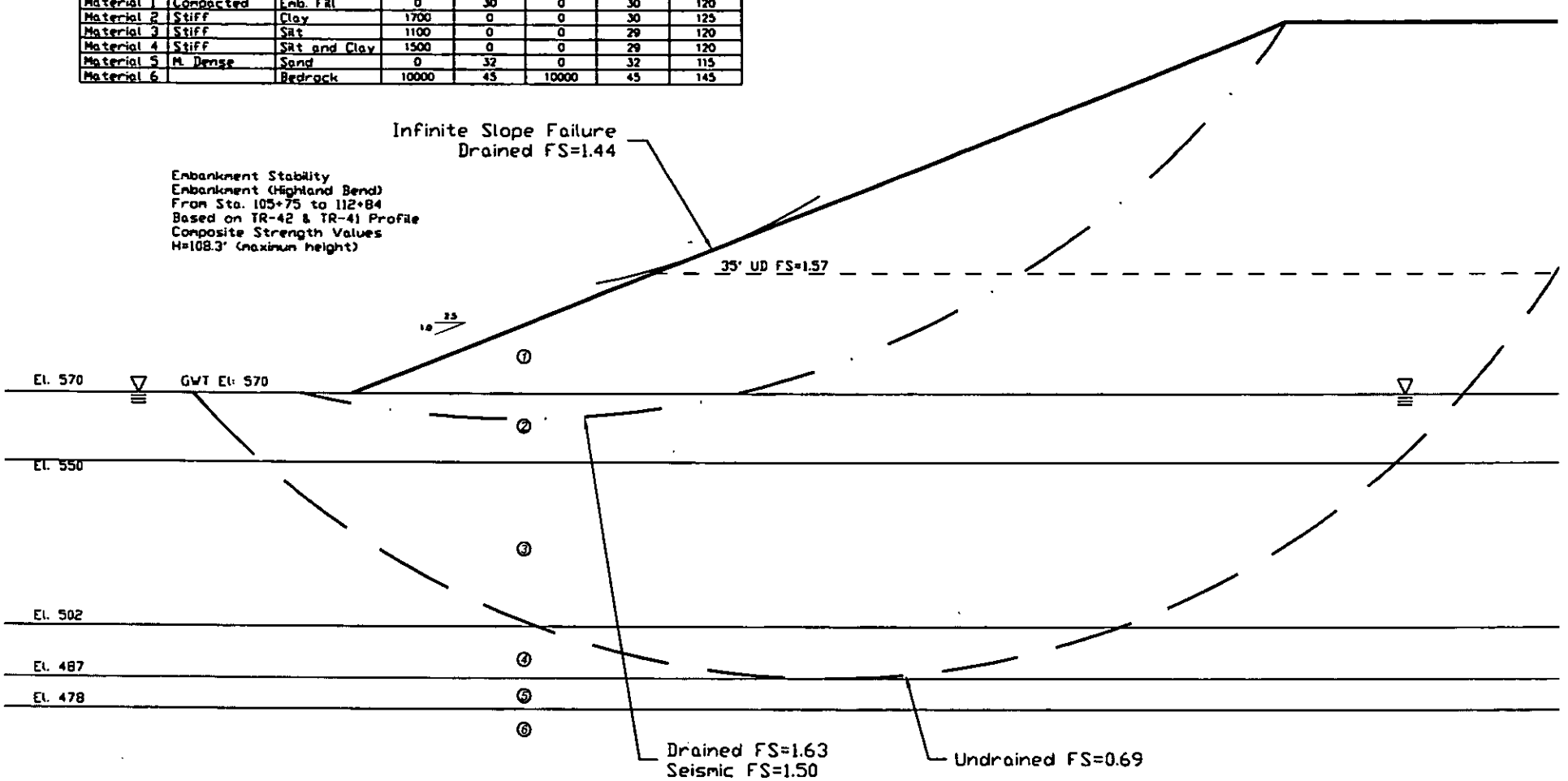
Highland Bend Embankments
Station 105+75 to 112+84
Undrained and Drained Analyses

EMBANKMENT STABILITY ANALYSIS

SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 7/3/07

Material	Consistency	Soil Type	Undrained c (psf)	Undrained φ (deg)	Drained c' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	30	0	30	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	1100	0	0	29	120
Material 4	Stiff	Silt and Clay	1500	0	0	29	120
Material 5	M. Dense	Sand	0	32	0	32	115
Material 6		Bedrock	10000	45	10000	45	145



EMBANKMENT FILL MATERIAL; Φ'=30 DEG

Highland Bend Embankments
Station 105+75 to 112+84
Undrained and Drained Analyses

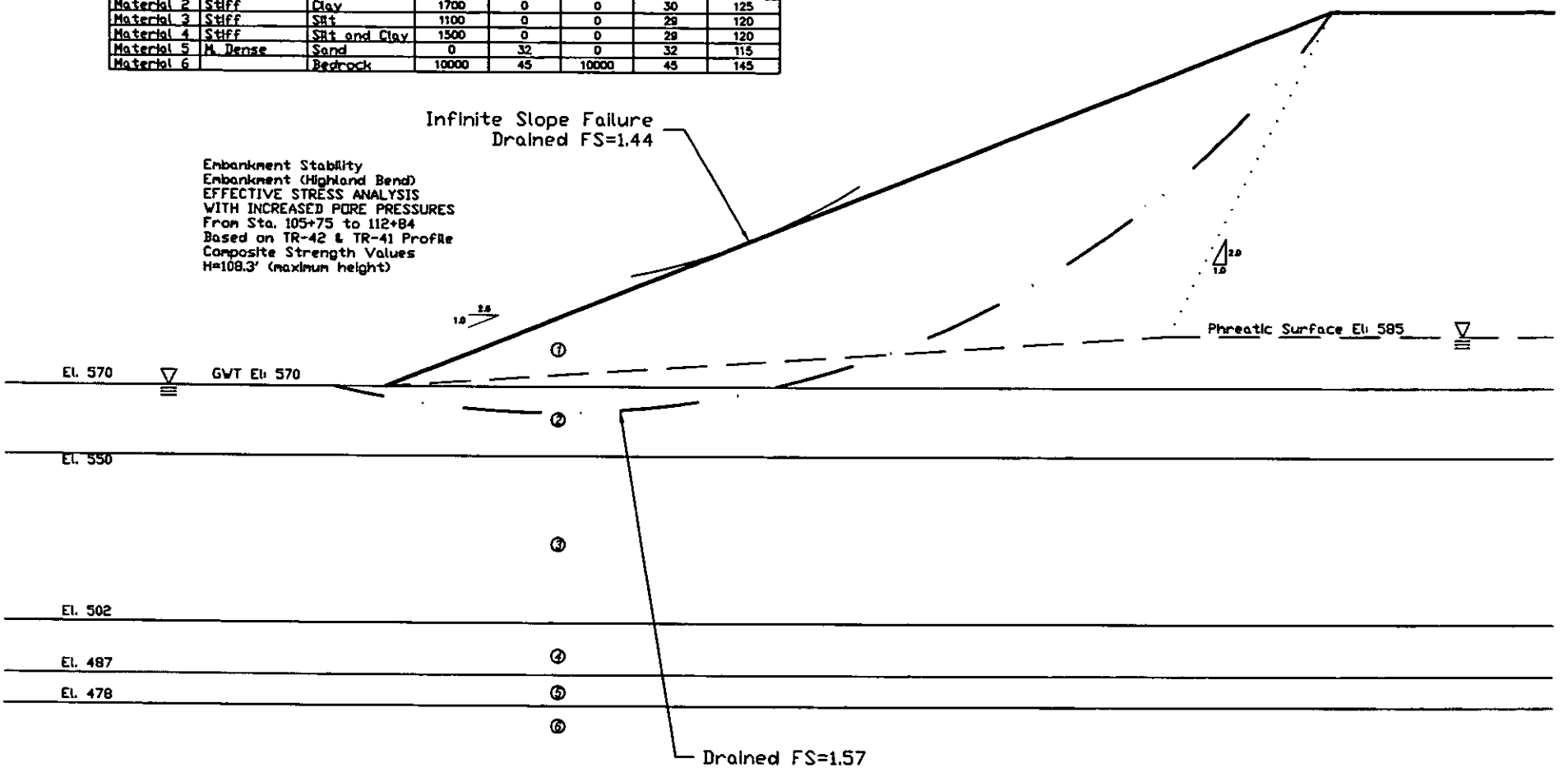
EMBANKMENT STABILITY ANALYSIS

SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 7/3/07

Material	Consistency	Soil Type	Undrained c (psf)	Undrained φ (deg)	Drained c' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. FRI	0	30	0	30	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	1100	0	0	29	120
Material 4	Stiff	Silt and Clay	1500	0	0	29	120
Material 5	M. Dense	Sand	0	32	0	32	115
Material 6		Bedrock	10000	45	10000	45	145

Embankment Stability
Embankment (Highland Bend)
EFFECTIVE STRESS ANALYSIS
WITH INCREASED PORE PRESSURES
From Sta. 105+75 to 112+84
Based on TR-42 & TR-41 Profile
Composite Strength Values
H=108.3' (maximum height)



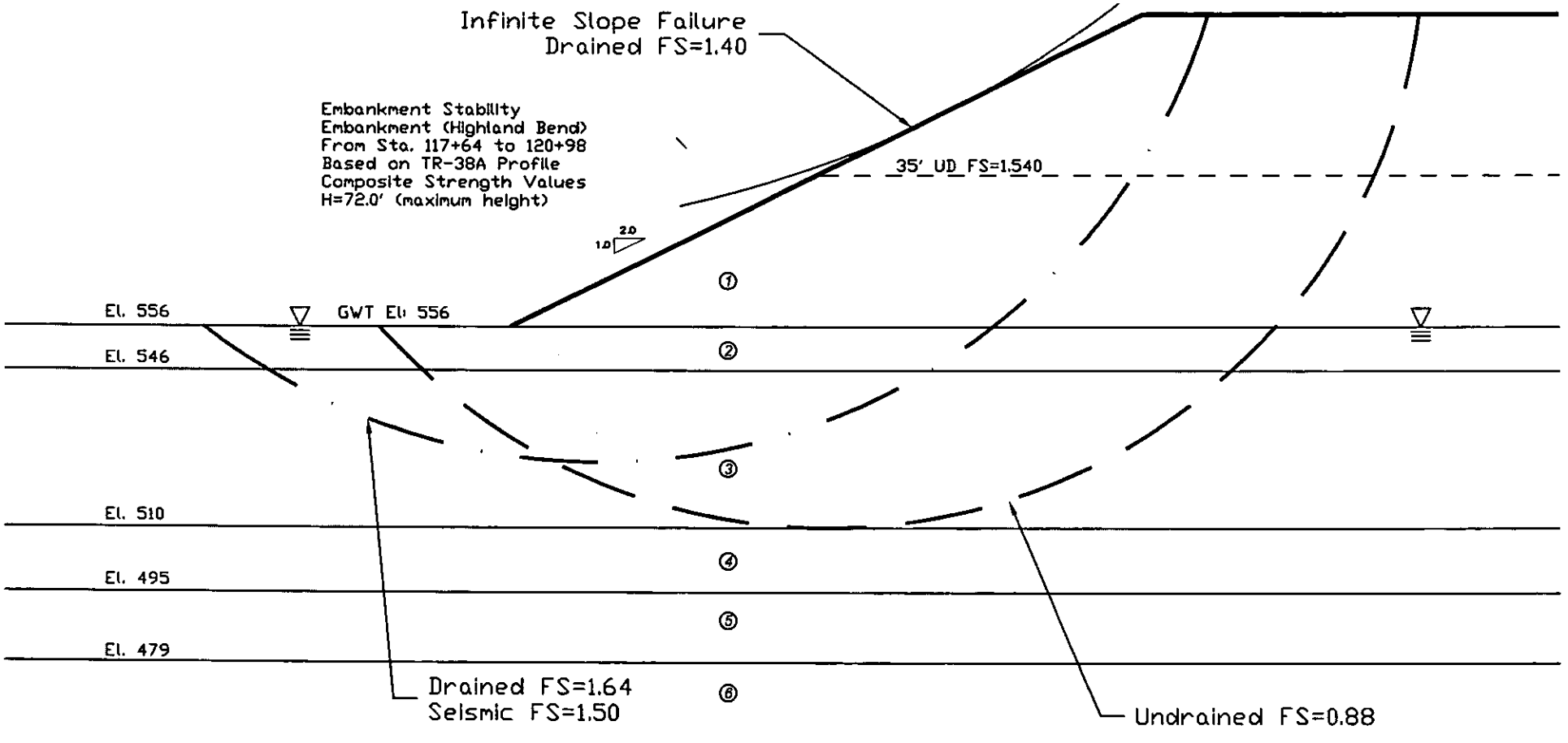
EMBANKMENT FILL MATERIAL; φ'=30 DEG

Highland Bend Embankments
Station 105+75 to 112+84
STAGED CONSTRUCTION ANALYSIS

EFFECTIVE STRESS ANALYSIS WITH
INCREASED PORE WATER PRESSURES
SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 7/3/07

			Undrained		Drained		
Material	Consistency	Soil Type	c (psf)	Φ (deg)	c' (psf)	Φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	1100	0	0	29	120
Material 4	Stiff	Silty Clay	2700	0	0	29	120
Material 5	M. Dense	Sandy Silt	0	30	0	30	115
Material 6		Bedrock	10000	45	10000	45	145



EMBANKMENT FILL MATERIAL; Φ'=35 DEG

Highland Bend Embankments
Station 117+64 to 120+98
Undrained and Drained Analyses

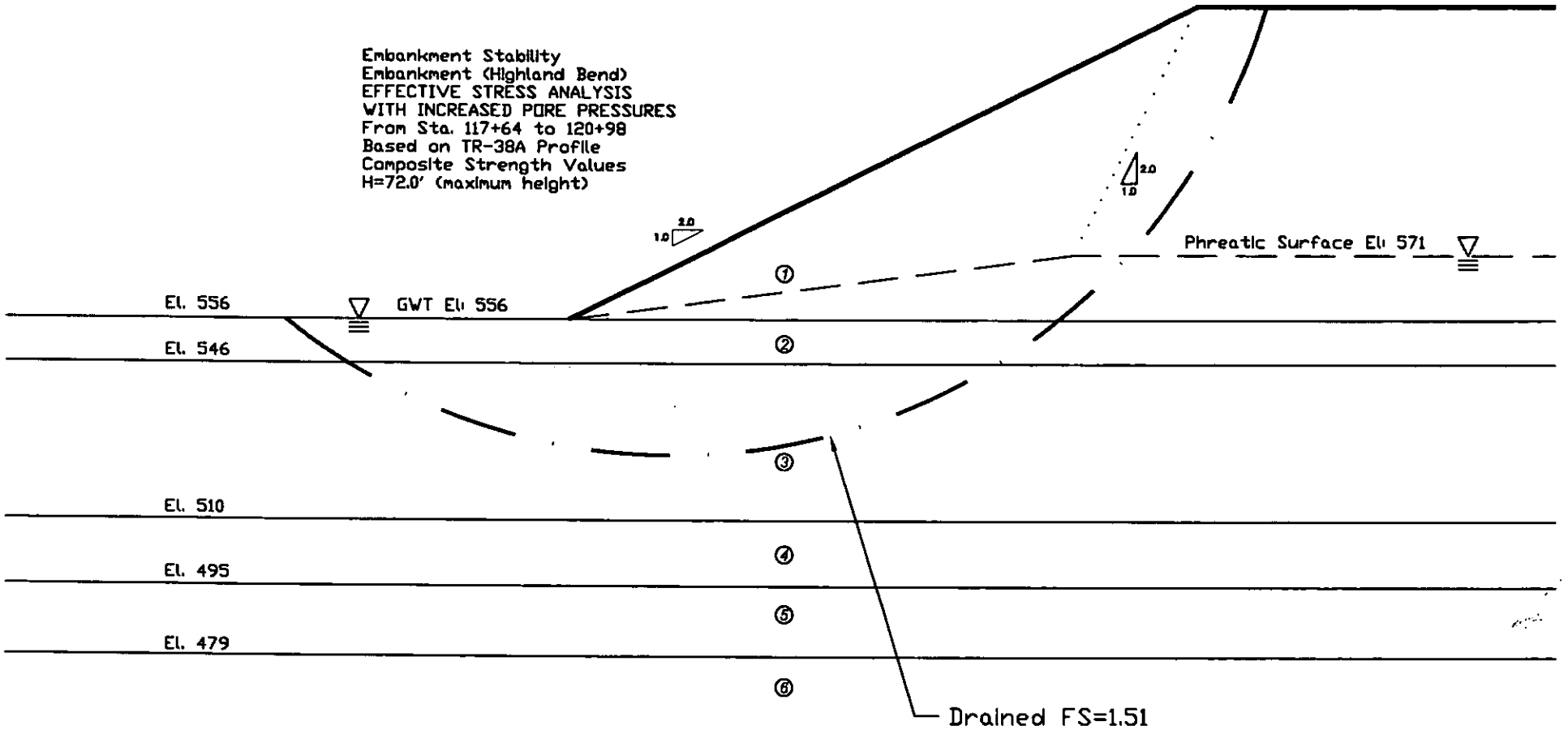
EMBANKMENT STABILITY ANALYSIS

SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 7/3/07

Material	Consistency	Soil Type	Undrained c (psf)	Undrained ϕ (deg)	Drained c' (psf)	Drained ϕ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	1100	0	0	29	120
Material 4	Stiff	Silty Clay	2700	0	0	29	120
Material 5	M. Dense	Sandy Silt	0	30	0	30	115
Material 6		Bedrock	10000	45	10000	45	145

Embankment Stability
Embankment (Highland Bend)
EFFECTIVE STRESS ANALYSIS
WITH INCREASED PORE PRESSURES
From Sta. 117+64 to 120+98
Based on TR-38A Profile
Composite Strength Values
H=72.0' (maximum height)



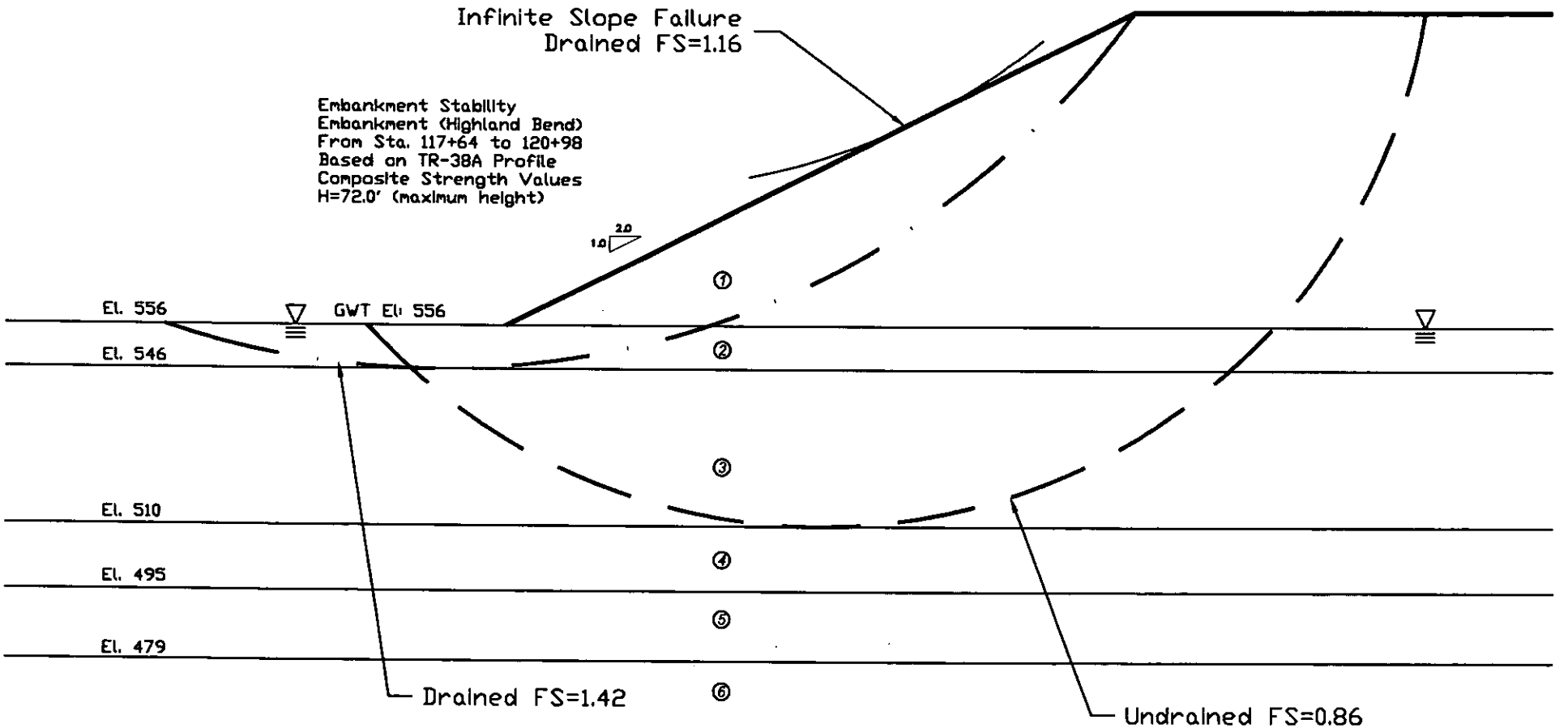
EMBANKMENT FILL MATERIAL; ϕ'=35 DEG

Highland Bend Embankments
Station 117+64 to 120+98
STAGED CONSTRUCTION ANALYSIS

EFFECTIVE STRESS ANALYSIS WITH
INCREASED PORE WATER PRESSURES
SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC. SJR	DATE 7/3/07

Material	Consistency	Soil Type	Undrained c (psf)	Undrained φ (deg)	Drained c' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	30	0	30	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	1100	0	0	29	120
Material 4	Stiff	Silty Clay	2700	0	0	29	120
Material 5	M. Dense	Sandy Silt	0	30	0	30	115
Material 6		Bedrock	10000	45	10000	45	145



EMBANKMENT FILL MATERIAL, φ'=30 DEG

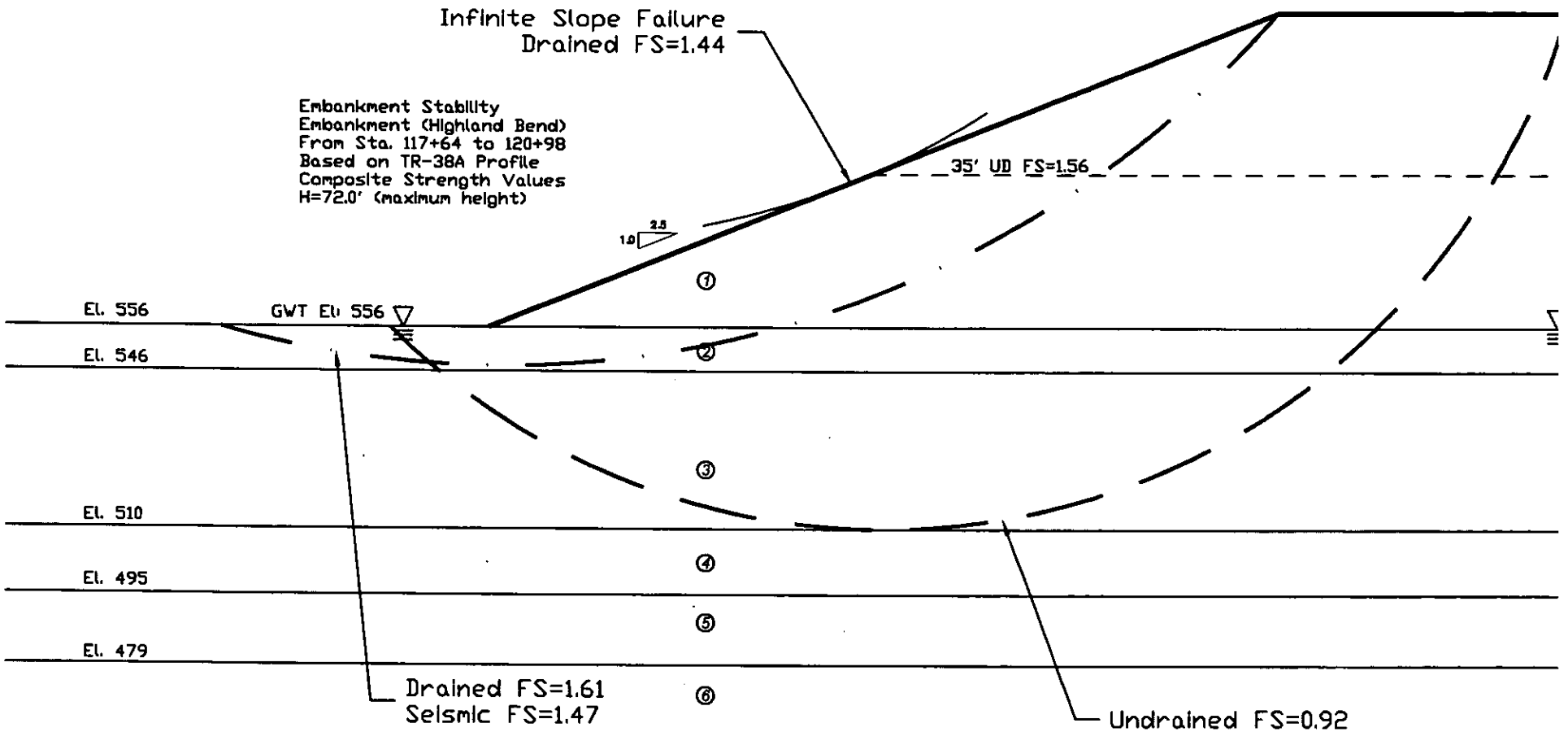
Highland Bend Embankments
Station 117+64 to 120+98
Undrained and Drained Analyses

EMBANKMENT STABILITY ANALYSIS

SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 7/3/07

Material	Consistency	Soil Type	Undrained c (psf)	Undrained φ (deg)	Drained c' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	30	0	30	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	1100	0	0	29	120
Material 4	Stiff	Silty Clay	2700	0	0	29	120
Material 5	M. Dense	Sandy Silt	0	30	0	30	115
Material 6		Bedrock	10000	45	10000	45	145



EMBANKMENT FILL MATERIAL; φ'=30 DEG

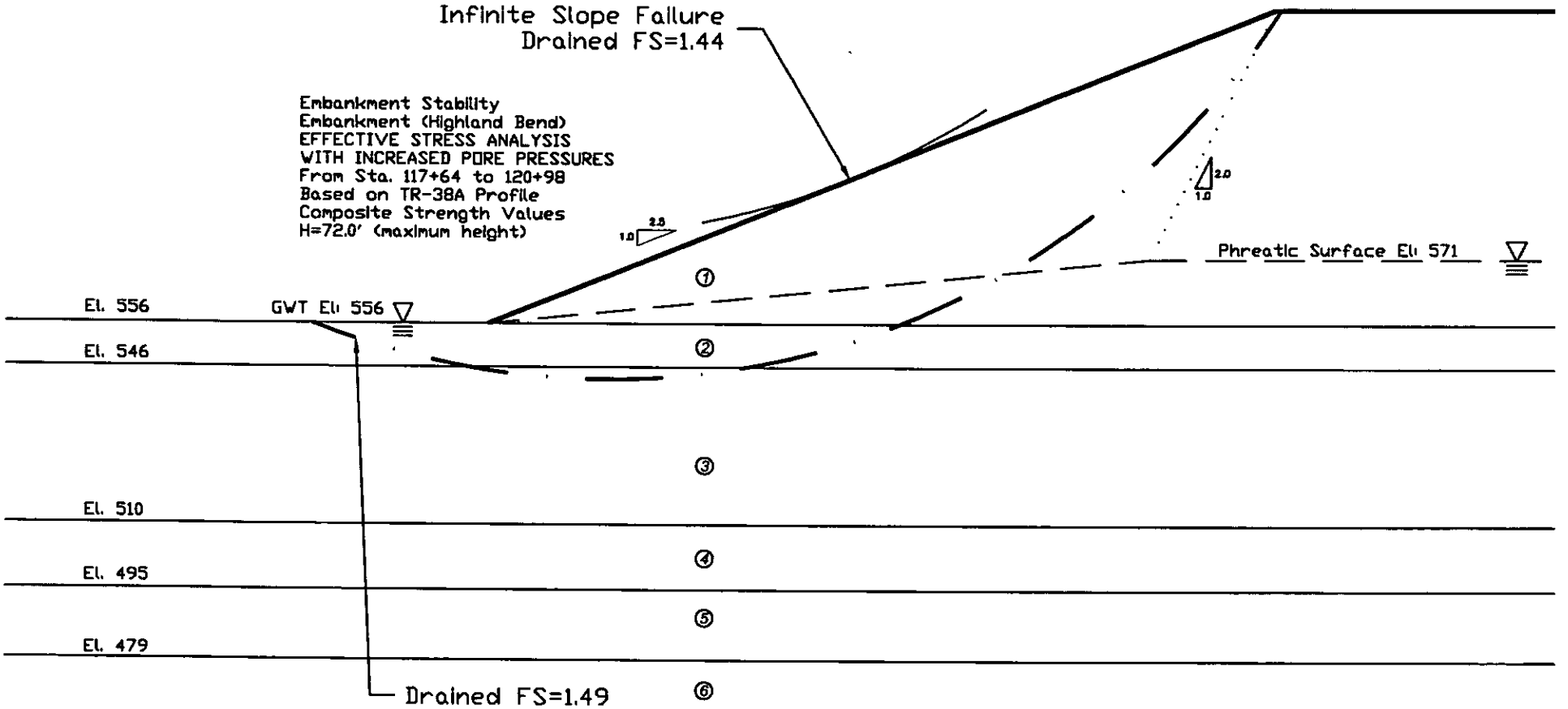
Highland Bend Embankments
Station 117+64 to 120+98
Undrained and Drained Analyses

EMBANKMENT STABILITY ANALYSIS

SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 7/3/07

Material	Consistency	Soil Type	Undrained c (psf)	Undrained φ (deg)	Drained c' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	30	0	30	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	1100	0	0	29	120
Material 4	Stiff	Silty Clay	2700	0	0	29	120
Material 5	M. Dense	Sandy Silt	0	30	0	30	115
Material 6		Bedrock	10000	45	10000	45	145



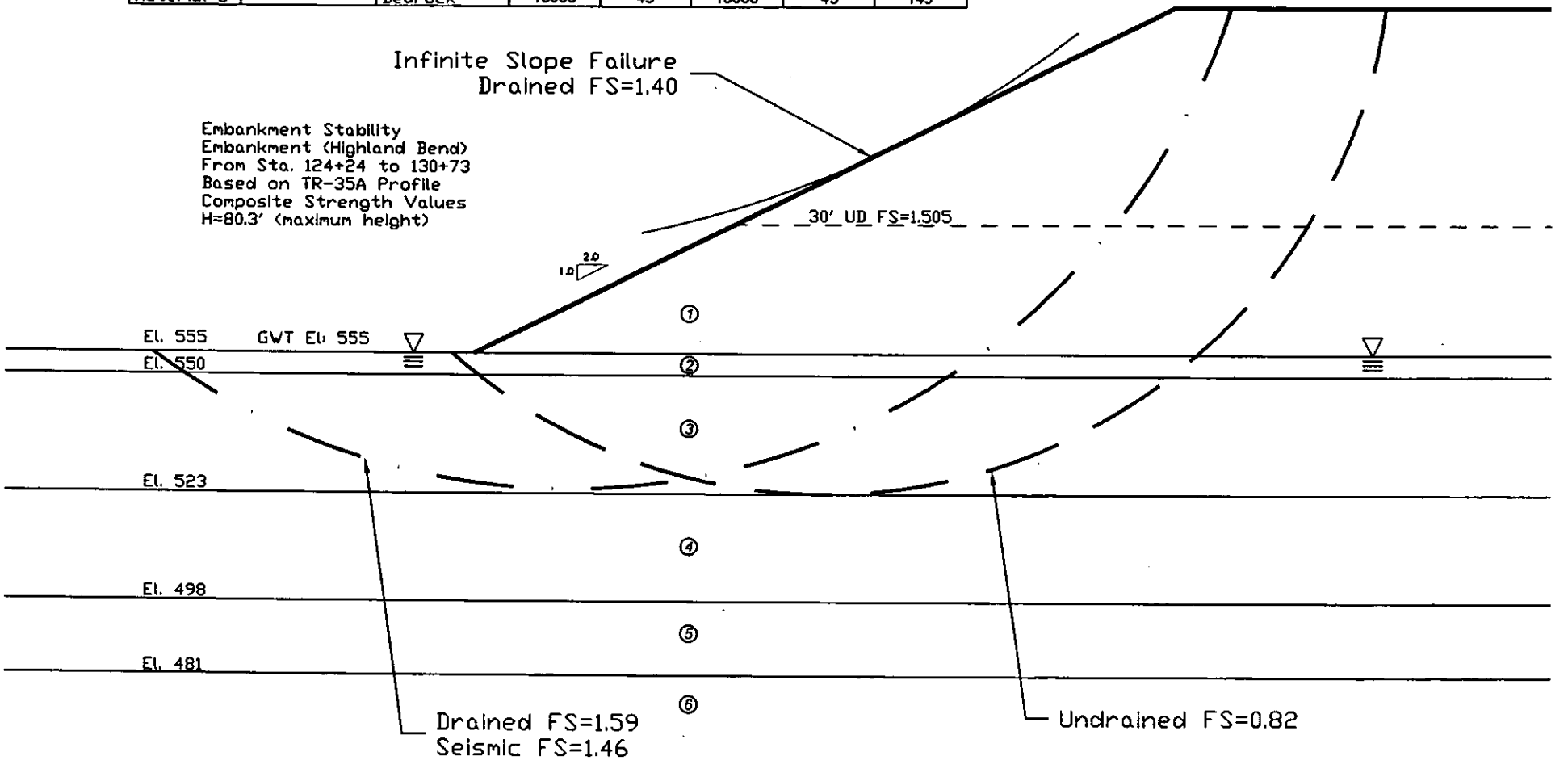
EMBANKMENT FILL MATERIAL; φ'=30 DEG

Highland Bend Embankments
Station 117+64 to 120+98
STAGED CONSTRUCTION ANALYSIS

EFFECTIVE STRESS ANALYSIS WITH
INCREASED PORE WATER PRESSURES
SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 7/3/07

Material	Consistency	Soil Type	Undrained c (psf)	Undrained φ (deg)	Drained c' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	900	0	0	29	120
Material 4	Stiff	Silty Clay	2700	0	0	29	120
Material 5	M. Dense	Sandy Silt	0	30	0	30	115
Material 6		Bedrock	10000	45	10000	45	145



EMBANKMENT FILL MATERIAL; φ'=35 DEG

Highland Bend Embankments
Station 124+24 to 130+73
Undrained and Drained Analyses

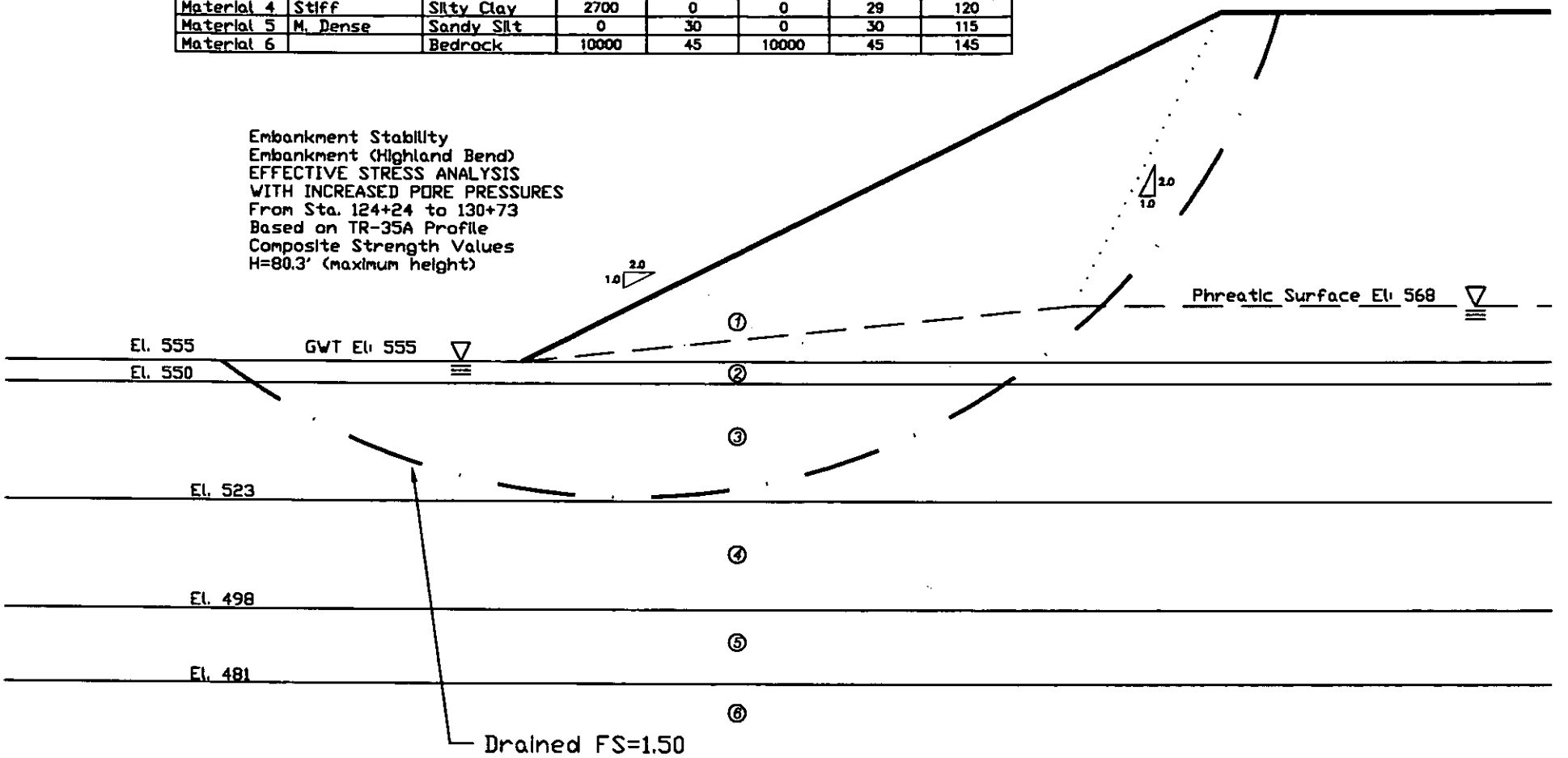
EMBANKMENT STABILITY ANALYSIS

SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 7/3/07

			Undrained		Drained		
Material	Consistency	Soil Type	c (psf)	ϕ (deg)	c' (psf)	ϕ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	900	0	0	29	120
Material 4	Stiff	Silty Clay	2700	0	0	29	120
Material 5	M. Dense	Sandy Silt	0	30	0	30	115
Material 6		Bedrock	10000	45	10000	45	145

Embankment Stability
Embankment (Highland Bend)
EFFECTIVE STRESS ANALYSIS
WITH INCREASED PORE PRESSURES
From Sta. 124+24 to 130+73
Based on TR-35A Profile
Composite Strength Values
H=80.3' (maximum height)



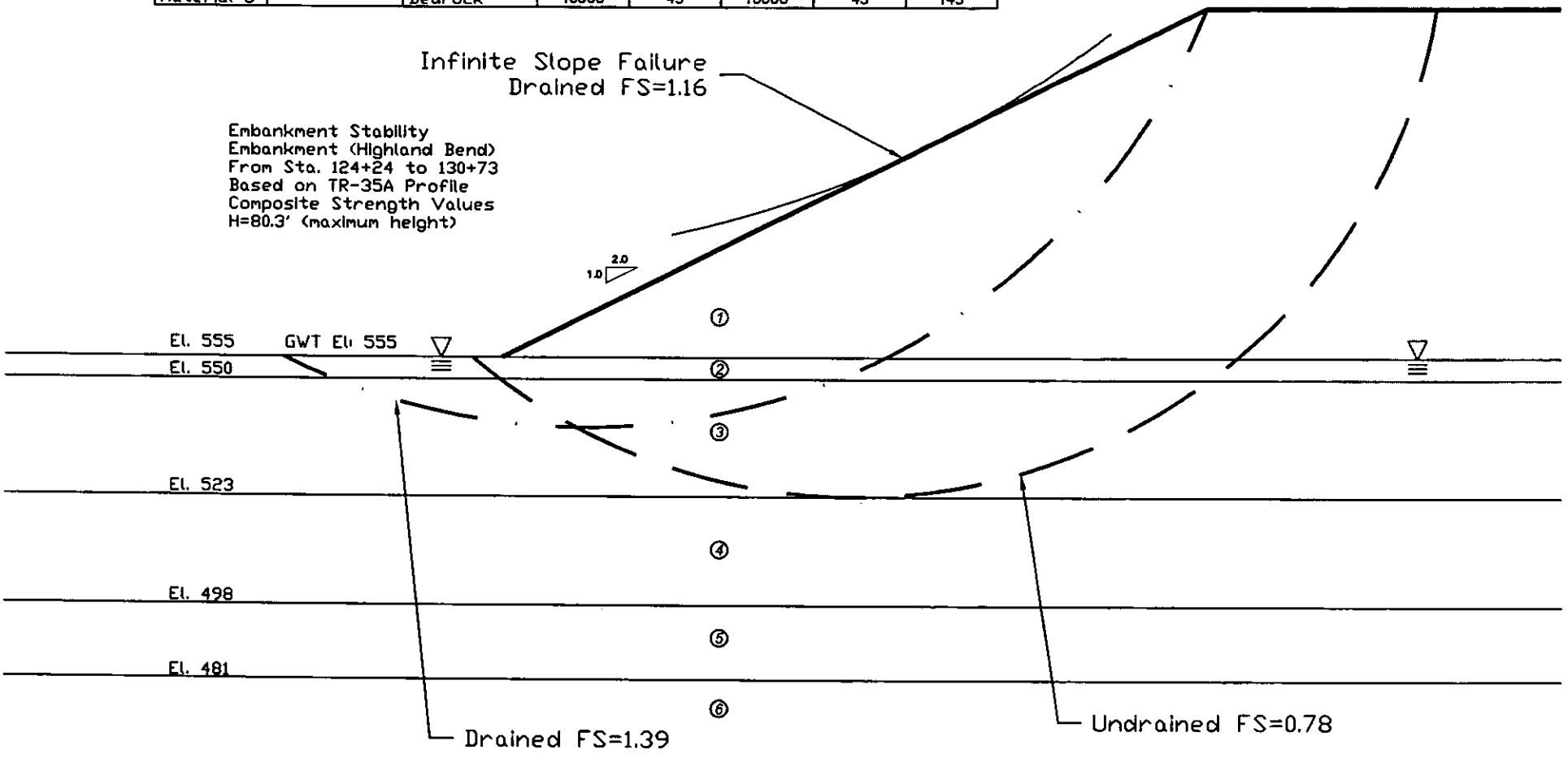
EMBANKMENT FILL MATERIAL, ϕ'=35 DEG

Highland Bend Embankments
Station 124+24 to 130+73
STAGED CONSTRUCTION ANALYSIS

EFFECTIVE STRESS ANALYSIS WITH
INCREASED PORE WATER PRESSURES
SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 7/3/07

			Undrained		Drained		
Material	Consistency	Soil Type	c (psf)	Φ (deg)	c' (psf)	Φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	30	0	30	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	900	0	0	29	120
Material 4	Stiff	Silty Clay	2700	0	0	29	120
Material 5	M. Dense	Sandy Silt	0	30	0	30	115
Material 6		Bedrock	10000	45	10000	45	145



EMBANKMENT FILL MATERIAL; Φ'=30 DEG

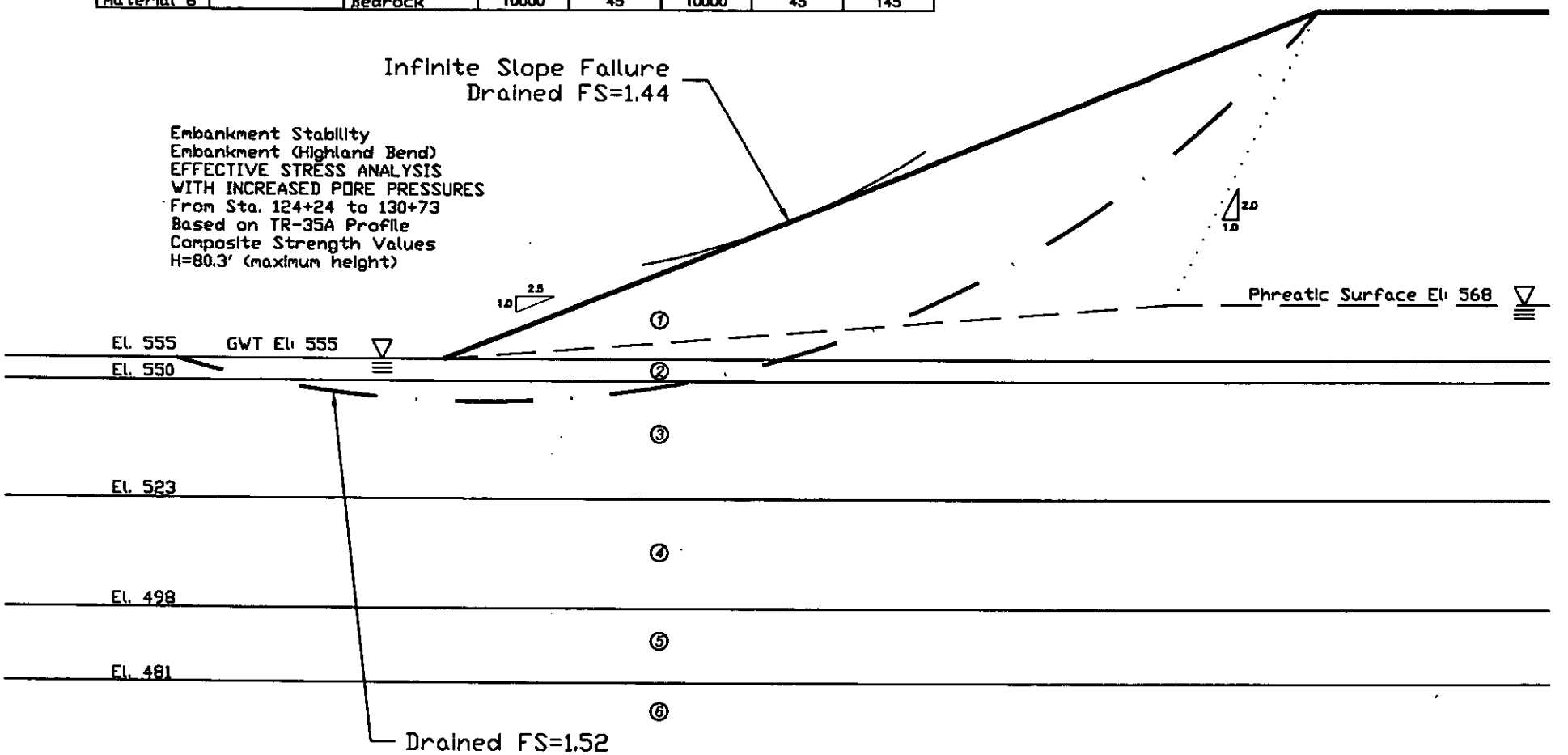
Highland Bend Embankments
Station 124+24 to 130+73
Undrained and Drained Analyses

EMBANKMENT STABILITY ANALYSIS

SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC. SJR	DATE 7/3/07

Material	Consistency	Soil Type	Undrained c (psf)	Undrained φ (deg)	Drained c' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	30	0	30	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	900	0	0	29	120
Material 4	Stiff	Silty Clay	2700	0	0	29	120
Material 5	M. Dense	Sandy Silt	0	30	0	30	115
Material 6		Bedrock	10000	45	10000	45	145



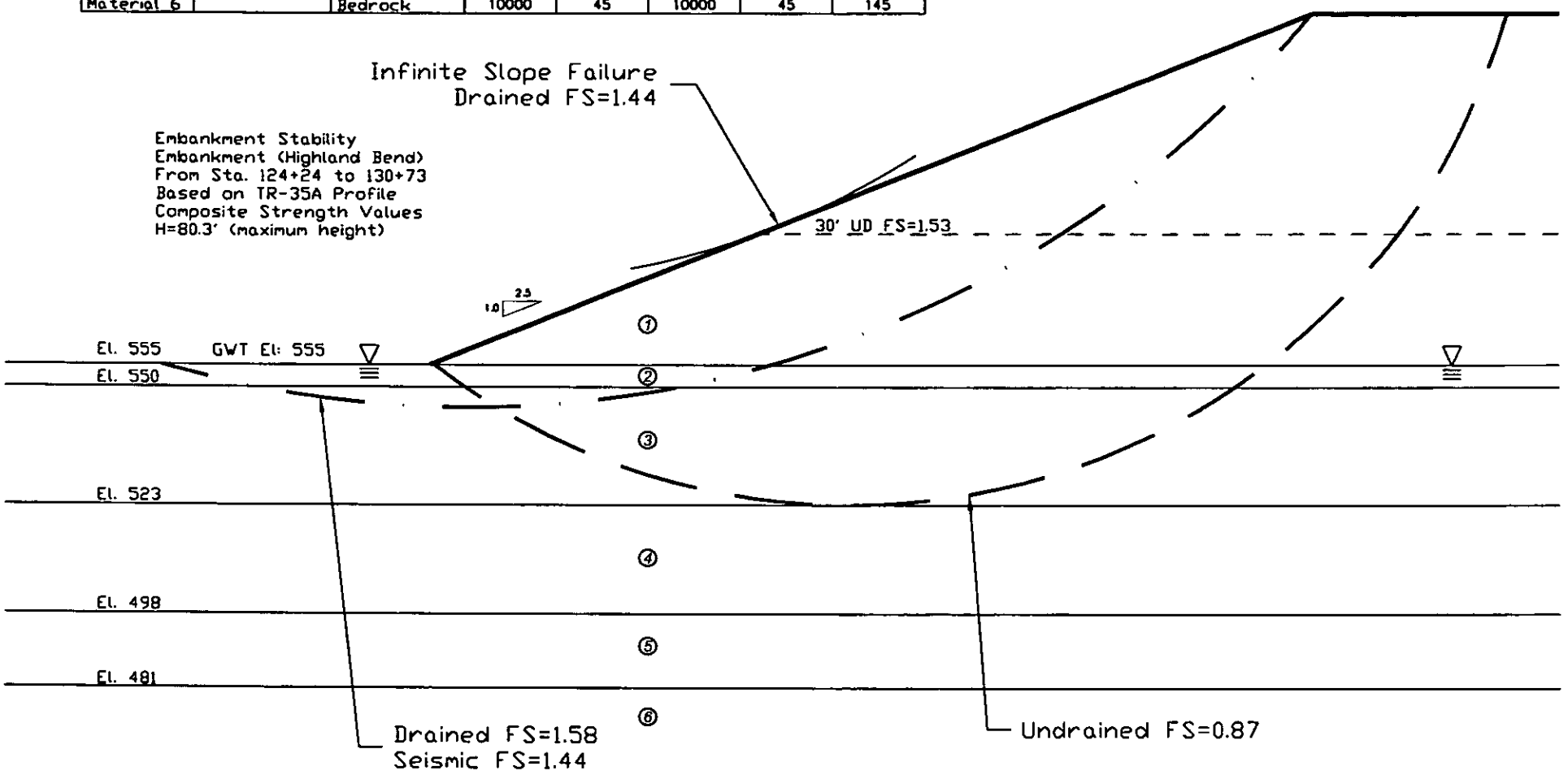
EMBANKMENT FILL MATERIAL; φ'=30 DEG

Highland Bend Embankments
Station 124+24 to 130+73
STAGED CONSTRUCTION ANALYSIS

EFFECTIVE STRESS ANALYSIS WITH
INCREASED PORE WATER PRESSURES
SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 7/3/07

Material	Consistency	Soil Type	Undrained c (psf)	Undrained Φ (deg)	Drained c' (psf)	Drained Φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	30	0	30	120
Material 2	Stiff	Clay	1700	0	0	30	125
Material 3	Stiff	Silt	900	0	0	29	120
Material 4	Stiff	Silty Clay	2700	0	0	29	120
Material 5	M. Dense	Sandy Silt	0	30	0	30	115
Material 6		Bedrock	10000	45	10000	45	145



EMBANKMENT FILL MATERIAL; Φ'=30 DEG

Highland Bend Embankments
Station 124+24 to 130+73
Undrained and Drained Analyses

EMBANKMENT STABILITY ANALYSIS

SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 7/3/07

DLZ
ENGINEERS • ARCHITECTS • SCIENTISTS
PLANNERS • SURVEYORS

CLIENT TranSystems / ODOT D-9 PROJECT NO. 0121-3070.03
PROJECT SCI-823 Portsmouth Bypass SHEET NO. 24 OF 45
SUBJECT Consolidation Parameters COMP. BY SJK DATE 8-2-07
CHECKED BY DAA DATE 8-2-07

*C_c and C_r were taken from the results of consolidation testing.

Embankment #1 Sta. 105+75 to 112+84

Depth	Soil Type	Boring	C_c	C_r	P_c (tsf)	e_o	*C_v (ft^2/day)	
0-20	Clay	B-37	.18	.07	2.24	.718	0.25	"weighted"
20-68	Silt	B-38	.16	.03	2.37	.760	0.50	C_v = 0.41
68-83	Silt & Clay	TR-38A	.19	.07	2.21	.706	0.35	
83-92	C&F Sand		C' = 60 → Estimated From SPT N-values					

Embankment #2 Sta. 117+64 to 120+98

Depth	Soil Type	Boring	C_c	C_r	P_c (tsf)	e_o	*C_v (ft^2/day)	
0-10	Clay	B-37	.18	.07	2.24	.718	0.25	"weighted"
10-46	Silt	B-38	.16	.03	2.37	.760	0.55	C_v = 0.44
46-61	Silty Clay	TR-38A	.19	.07	2.21	.706	0.27	
61-77	Sandy Silt		C' = 40 → Estimated From SPT N-values					

Embankment #3 Sta. 124+24 to 130+73

Depth	Soil Type	Boring	C_c	C_r	P_c (tsf)	e_o	*C_v (ft^2/day)	
0-5	Clay	B-31	0.31	0.08	2.16	0.771	0.20	"weighted"
5-32	Silt	TR-35A	0.27	0.08	2.0	0.928	0.50	C_v = 0.37
32-57	Silty Clay	TR-38A	0.19	0.07	2.21	0.706	0.27	
57-74	Sandy Silt		C' = 42.5 → Estimated From SPT N-values					

- *Coefficient of vertical consolidation, C_v: Estimated based upon LL.
  Ref: FHWA HI-97-021 (NAVFAC, DM-7.1, 1982) Fig 9-5, pg. 9-10
- For time-rate of consolidation calculations using wick drains it is assumed that $C_v = C_h$.
- Use "weighted" C_v value for entire soil profile.
  ↳ Example Calc: For Embankment #1

$$\tilde{C}_v = \frac{(0.25)(20-0) + (0.50)(68-20) + (0.35)(83-68)}{83} = 0.41$$

DLZ
ENGINEERS • ARCHITECTS • SCIENTISTS
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CLIENT TranSystems / ODOT D-9 PROJECT NO. 0121-3070.03
PROJECT SCI-823 Portsmouth Bypass SHEET NO. 25 OF 45
SUBJECT Highland Bend Embankments COMP. BY SJK DATE 8-2-07
Time-Rate of Consolidation (No PVDs) CHECKED BY DAA DATE 8-2-07

* Consolidation Without Wick Drains
  - Assume double drainage
  - Use "weighted" Cv values

$$t_{90} = \frac{T \cdot H_v^2}{C_v}$$

Embankment #1 Sta. 105+75 to 112+84

$H_v = 83'/2 = 41.5'$ $\quad \tilde{C}_v = 0.41$ ft²/day $\quad$ for $U = 90\% \rightarrow T = 0.848$

$$t_{90} = \frac{0.848\,(41.5)^2}{0.41 \text{ ft}^2/\text{day}} = 3{,}562 \text{ days} = 9.8 \text{ years}$$

Embankment #2 Station 117+64 to 120+98

$H_v = 61'/2 = 30.5'$ $\quad \tilde{C}_v = 0.44$ ft²/day

$$t_{90} = \frac{0.848\,(30.5)^2}{0.44 \text{ ft}^2/\text{day}} = 1{,}793 \text{ days} = 4.9 \text{ years}$$

Embankment #3 Station 124+24 to 130+73

$H_v = 57'/2 = 28.5'$ $\quad \tilde{C}_v = 0.37$ ft²/day

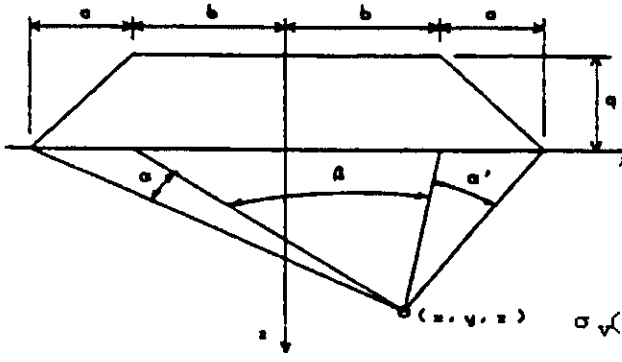
$$t_{90} = \frac{0.848\,(28.5)^2}{0.37 \text{ ft}^2/\text{day}} = 1{,}862 \text{ days} = 5.1 \text{ years}$$

DLZ SUBJECT

Client	TranSystems Corp. / ODOT D-9	JOB NUMBER	0121-3070.03
Project	SCI-823 Portsmouth Bypass	SHEET NO.	26 OF 45
Item	Consolidation under embankment loading	COMP. BY	SJK DATE 8-2-07
Station	105+75 to 112+84, Hmax=108.3'	CHECKED BY	DAA DATE 8-2-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	20.0	ft		
Embankment Height:	H =	108.3	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	12,996 psf
Width of Slope:	a =	216.6		**Assumes 2H:1V Side Slopes**	
Top half-width of Emb:	b =	50			
Distance from CL:	x =	0			
Output Range:	z =	0	to	92	ft

**See Data output Attached*

$$\sigma_v(z) := \left(\frac{q}{\pi}\right)\left(a\cdot(\alpha(z)+\beta(z)+\alpha'(z)) + b\cdot(\alpha(z)+\alpha'(z)) + x\cdot(\alpha(z)-\alpha'(z))\right)$$

$$\beta(z) := \operatorname{atan}\left[\frac{(b-x)}{z}\right] + \operatorname{atan}\left[\frac{(b+x)}{z}\right] \qquad \alpha'(z) := \operatorname{atan}\left[\frac{(a+b-x)}{z}\right] - \operatorname{atan}\left[\frac{(b-x)}{z}\right] \qquad \alpha(z) := \operatorname{atan}\left[\frac{(a+b+x)}{z}\right] - \operatorname{atan}\left[\frac{(b+x)}{z}\right]$$

Reference: US Army Corps of Engineers EM 1110-1-1904 "Settlement Analysis", Table C-1

Soil Properites: *Settlement is calculated at mid-point of layer*

No.	Bot. of Laye		Soil Type	γ_{soil} (pcf)	σ'_c (psf)	σ'_o (psf)	$\Delta\sigma z$ (psf)	σ'_f (psf)	Cohesionless Soils C'	Cohesive Soils C_r	C_c	e_o
1	10.0	ft	Clay	125	4,480	625	12,996	13,621	0.0	0.07	0.18	0.718
2	20.0	ft	Clay	125	4,480	1,875	12,981	14,856	0.0	0.07	0.18	0.718
3	30.0	ft	Silt	120	4,746	2,788	12,931	15,719	0.0	0.03	0.16	0.760
4	40.0	ft	Silt	120	4,746	3,364	12,834	16,198	0.0	0.03	0.16	0.760
5	50.0	ft	Silt	120	4,746	3,940	12,706	16,646	0.0	0.03	0.16	0.760
6	60.0	ft	Silt	120	4,746	4,516	12,529	17,045	0.0	0.03	0.16	0.760
7	68.0	ft	Silt	120	5,034	5,034	12,341	17,376	0.0	0.03	0.16	0.760
8	75.0	ft	Silt and Clay	115	5,449	5,449	12,177	17,626	0.0	0.07	0.19	0.706
9	83.0	ft	Silt and Clay	115	5,843	5,843	12,004	17,847	0.0	0.07	0.19	0.706
10	92.0	ft	C&F Sand	115	6,291	6,291	11,778	18,068	60.0	0.00	0.00	0.000

No.	**Settlement:**		**Total Settlement**
1	0.854	ft	
2	0.700	ft	**4.884 ft**
3	0.512	ft	
4	0.510	ft	
5	0.509	ft	**58.6 in**
6	0.508	ft	
7	0.391	ft	
8	0.397	ft	
9	0.432	ft	
10	0.069	ft	

Reference: Geotechnical Engineering Principles and Practices; Coduto, 1999

Overconsolidated Soils - Case I ($\sigma'_o<\sigma'_c$) Eqn:11.24

$$(\delta_c)_{ult} = \sum \frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Overconsolidated Soils - Case II ($\sigma'_o<\sigma'_c<\sigma_f$) Eqn:11.25

$$(\delta_c)_{ult} = \sum\left[\frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_c}{\sigma'_0}\right) + \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_c}\right)\right]$$

Normally Consolidated Soils ($\sigma'_o=\sigma'_c$) Eqn: 11.23

$$(\delta_c)_{ult} = \sum \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Reference: FHWA NHI-00-045

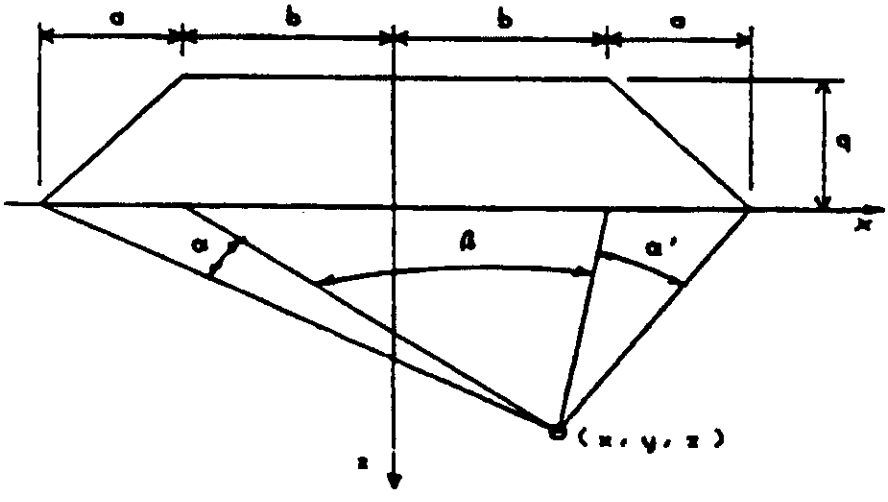
Cohesionless Soils ($\sigma'_o=\sigma'_c$)

$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ

SUBJECT	Client TranSystems Corp / ODOT D-9	JOB NUMBER	0121-3070.03
	Project SCI-823 Portsmouth Bypass	SHEET NO.	27 OF 45
	Item	COMP. BY	SAK DATE 8-2-07
		CHECKED BY	DAA DATE 8-2-07

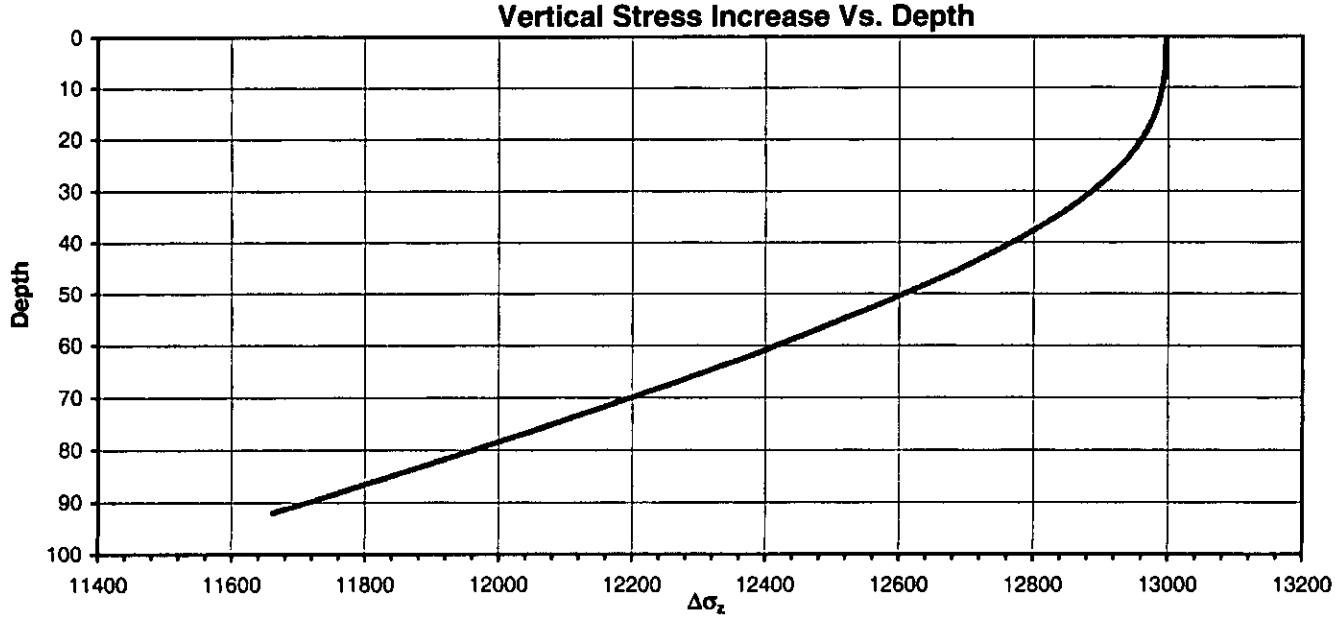
INCREASE IN VERTICAL STRESS DUE TO EMBANKMENT LOADING



q =	12996		load
a =	216.6		width of slope
b =	50		top half-width of embankment
x =	0		distance from CL
z =	0	to 92	depth range

$$\sigma_v(z) := \left(\frac{q}{\pi a}\right)\left(a\cdot(\alpha(z)+\beta(z)+\alpha'(z)) + b\cdot(\alpha(z)+\alpha'(z)) + x\cdot(\alpha(z)-\alpha'(z))\right)$$

$$\beta(z) := \operatorname{atan}\left[\frac{(b-x)}{z}\right] + \operatorname{atan}\left[\frac{(b+x)}{z}\right] \quad ; \quad \alpha'(z) := \operatorname{atan}\left[\frac{(a+b-x)}{z}\right] - \operatorname{atan}\left[\frac{(b-x)}{z}\right] \quad \alpha(z) := \operatorname{atan}\left[\frac{(a+b+x)}{z}\right] - \operatorname{atan}\left[\frac{(b+x)}{z}\right]$$



Reference: US Army Corps of Engineers EM 1110-1-1904 "Settlement Analysis", Table C-1

DLZ

Time Rate of Consolidation of Foundation Soils with Wick Drians SJK 8-2-07
Highland Bend Embankments **Based upon boring TR-41** DAA 8-2-07
Reference: FHWA-RD-86-168 Station 105+75 to 112+84

Wick Drain Spacing **5.0** feet Use $\eta = 10$ *Remaining*

t (days)	T_R	T_V	U_R	U_V	U_C	δ(inches)	δ(inches)	d_e	c_v	H_v	δ_{max}
0	0.0000	0.0000	0.00	0.00	0.0	0.0	58.6	5.25	0.41	41.5	58.6
5	0.0744	0.0012	0.33	0.09	38.3	22.5	36.1				
10	0.1488	0.0024	0.54	0.09	58.3	34.1	24.5				
15	0.2231	0.0036	0.69	0.09	71.9	42.1	16.5	*Assumes double drainage*			
20	0.2975	0.0048	0.79	0.10	81.0	47.4	11.2	*Spacing = 5 ft (triangular)*			
25	0.3719	0.0060	0.85	0.10	86.7	50.8	7.8				
30	0.4463	0.0071	0.89	0.11	90.3	52.9	5.7				
35	0.5206	0.0083	0.92	0.11	92.6	54.3	4.3				
40	0.5950	0.0095	0.94	0.11	94.3	55.3	3.3				
45	0.6694	0.0107	0.95	0.12	95.7	56.1	2.5				
50	0.7438	0.0119	0.97	0.12	97.0	56.8	1.8				
55	0.8181	0.0131	0.98	0.12	98.2	57.5	1.1				
60	0.8925	0.0143	0.99	0.13	99.0	58.0	0.6				
65	0.9669	0.0155	0.99	0.13	99.0	58.0	0.6				

SJK 8-2-07
DAA 8-2-07

DLZ

Time Rate of Consolidation of Foundation Soils with Wick Drians
Highland Bend Embankments **Based upon boring TR-41**
Reference: FHWA-RD-86-168 Station 105+75 to 112+84

Wick Drain Spacing 7.0 feet Use η = 10

t (days)	T_R	T_V	U_R	U_V	U_C	δ(inches)	*Remaining* δ(inches)	d_e	c_v	H_v	δ_{max}
0	0.0000	0.0000	0.00	0.00	0.0	0.0	58.6	7.35	0.41	41.5	58.6
5	0.0379	0.0012	0.19	0.09	25.9	15.2	43.4				
10	0.0759	0.0024	0.33	0.09	39.1	22.9	35.7				
15	0.1138	0.0036	0.45	0.09	50.1	29.4	29.2	*Assumes double drainage*			
20	0.1518	0.0048	0.55	0.10	59.3	34.7	23.9	*Spacing = 7 ft (triangular)*			
25	0.1897	0.0060	0.63	0.10	66.8	39.2	19.4				
30	0.2277	0.0071	0.70	0.11	72.9	42.7	15.9				
35	0.2656	0.0083	0.75	0.11	77.9	45.7	12.9				
40	0.3036	0.0095	0.80	0.11	81.9	48.0	10.6				
45	0.3415	0.0107	0.83	0.12	85.0	49.8	8.8				
50	0.3795	0.0119	0.86	0.12	87.5	51.3	7.3				
55	0.4174	0.0131	0.88	0.12	89.4	52.4	6.2				
60	0.4554	0.0143	0.90	0.13	90.9	53.3	5.3				
65	0.4933	0.0155	0.91	0.13	92.1	54.0	4.6				
70	0.5313	0.0167	0.92	0.14	93.1	54.6	4.0				
75	0.5692	0.0179	0.93	0.14	94.0	55.1	3.5				
80	0.6072	0.0190	0.94	0.14	94.7	55.5	3.1				
85	0.6451	0.0202	0.95	0.15	95.4	55.9	2.7				
90	0.6830	0.0214	0.95	0.15	96.1	56.3	2.3				
95	0.7210	0.0226	0.96	0.15	96.7	56.7	1.9				
100	0.7589	0.0238	0.97	0.16	97.4	57.1	1.5				
105	0.7969	0.0250	0.98	0.16	98.0	57.4	1.2				
110	0.8348	0.0262	0.98	0.17	98.5	57.7	0.9				
115	0.8728	0.0274	0.99	0.17	98.9	58.0	0.6				
120	0.9107	0.0286	0.99	0.17	99.2	58.1	0.5				
125	0.9487	0.0298	0.99	0.18	99.2	58.1	0.5				

DLZ

Time Rate of Consolidation of Foundation Soils with Wick Drians
Highland Bend Embankments **Based upon boring TR-41**
Reference: FHWA-RD-86-168 Station 105+75 to 112+84

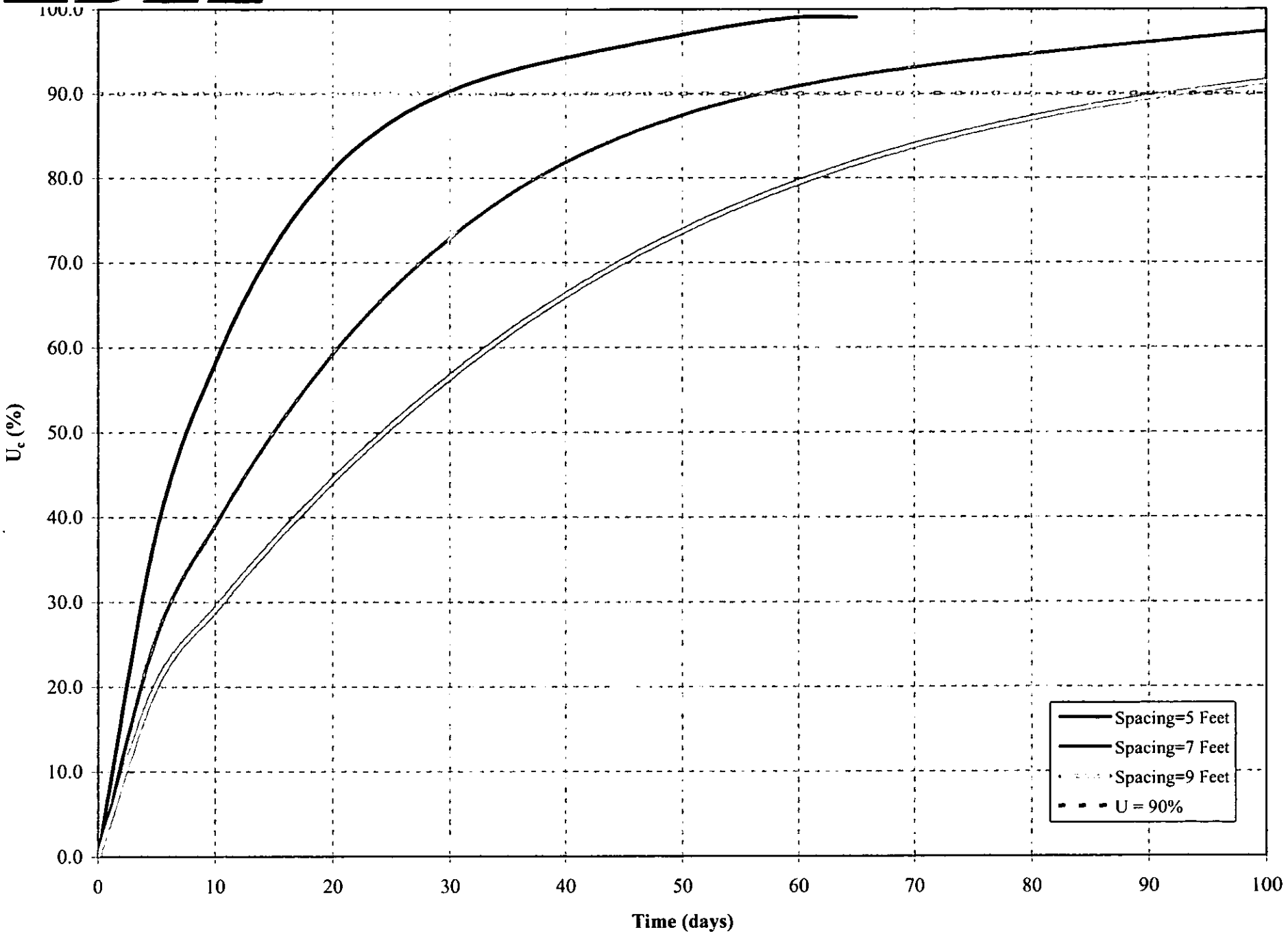
SAK 8-2-07
DAA 8-2-07

Wick Drain Spacing **9.0** feet Use η = 10

t (days)	T_R	T_V	U_R	U_V	U_C	δ(inches)	*Remaining* δ(inches)	d_e	c_v	H_v	δ_{max}
0	0.0000	0.0000	0.00	0.00	0.0	0.0	58.6	9.45	0.41	41.5	58.6
5	0.0230	0.0012	0.13	0.09	20.2	11.8	46.8				
10	0.0459	0.0024	0.22	0.09	29.1	17.1	41.5				
15	0.0689	0.0036	0.31	0.09	37.1	21.8	36.8	*Assumes double drainage*			
20	0.0918	0.0048	0.38	0.10	44.4	26.0	32.6	*Spacing = 9 ft (triangular)*			
25	0.1148	0.0060	0.45	0.10	50.8	29.8	28.8				
30	0.1377	0.0071	0.51	0.11	56.5	33.1	25.5				
35	0.1607	0.0083	0.57	0.11	61.6	36.1	22.5				
40	0.1836	0.0095	0.62	0.11	66.2	38.8	19.8				
45	0.2066	0.0107	0.66	0.12	70.2	41.1	17.5				
50	0.2296	0.0119	0.70	0.12	73.7	43.2	15.4				
55	0.2525	0.0131	0.73	0.12	76.8	45.0	13.6				
60	0.2755	0.0143	0.76	0.13	79.5	46.6	12.0				
65	0.2984	0.0155	0.79	0.13	81.8	47.9	10.7				
70	0.3214	0.0167	0.81	0.14	83.8	49.1	9.5				
75	0.3443	0.0179	0.83	0.14	85.6	50.1	8.5				
80	0.3673	0.0190	0.85	0.14	87.1	51.0	7.6				
85	0.3902	0.0202	0.86	0.15	88.4	51.8	6.8				
90	0.4132	0.0214	0.88	0.15	89.5	52.5	6.1				
95	0.4362	0.0226	0.89	0.15	90.5	53.0	5.6				
100	0.4591	0.0238	0.90	0.16	91.3	53.5	5.1				
105	0.4821	0.0250	0.91	0.16	92.1	54.0	4.6				
110	0.5050	0.0262	0.91	0.17	92.7	54.3	4.3				
115	0.5280	0.0274	0.92	0.17	93.3	54.7	3.9				
120	0.5509	0.0286	0.93	0.17	93.8	55.0	3.6				
125	0.5739	0.0298	0.93	0.18	94.3	55.3	3.3				
130	0.5968	0.0309	0.94	0.18	94.8	55.5	3.1				
135	0.6198	0.0321	0.94	0.18	95.2	55.8	2.8				
140	0.6428	0.0333	0.95	0.19	95.6	56.0	2.6				
145	0.6657	0.0345	0.95	0.19	96.0	56.2	2.4				
150	0.6887	0.0357	0.95	0.19	96.4	56.5	2.1				
155	0.7116	0.0369	0.96	0.20	96.8	56.7	1.9				
160	0.7346	0.0381	0.96	0.20	97.1	56.9	1.7				
165	0.7575	0.0393	0.97	0.20	97.5	57.1	1.5				
170	0.7805	0.0405	0.97	0.21	97.8	57.3	1.3				
175	0.8034	0.0417	0.98	0.21	98.2	57.5	1.1				
180	0.8264	0.0429	0.98	0.21	98.5	57.7	0.9				
185	0.8494	0.0440	0.98	0.22	98.8	57.9	0.7				
190	0.8723	0.0452	0.99	0.22	99.0	58.0	0.6				
195	0.8953	0.0464	0.99	0.22	99.2	58.1	0.5				
200	0.9182	0.0476	0.99	0.23	99.3	58.2	0.4				

DLZ

Percent Consolidation (combined radial and vertical) vs Time
Highland Bend Embankments (Station 105+75 to 112+84)

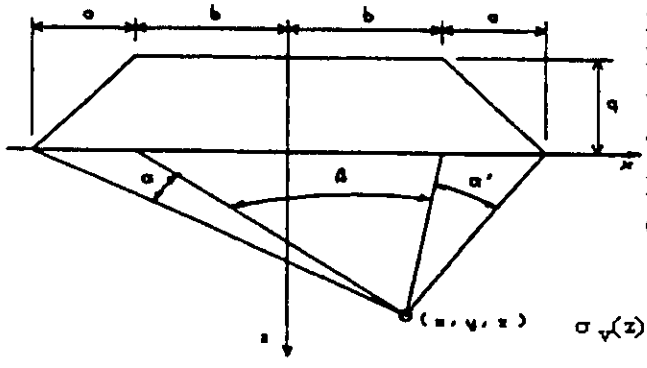


DLZ SUBJECT

Client	TranSystems Corp. / ODOT D-9	JOB NUMBER	0121-3070.03
Project	SCI-823 Portsmouth Bypass	SHEET NO.	32 OF 45
Item	Consolidation under embankment loading	COMP. BY	SM DATE 8-2-07
Station	117+64 to 120+98, Hmax=72.0'	CHECKED BY	DAA DATE 8-2-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	20.0	ft		
Embankment Height:	H =	72	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q = 8,640	psf
Width of Slope:	a =	144		**Assumes 2H:1V Side Slopes**	
Top half-width of Emb:	b =	50			
Distance from CL:	x =	0			
Output Range:	z =	0	to 77	ft	

**See Data output Attached*

$$\sigma_v(z) := \left(\frac{q}{\pi}\right)\left(a\cdot(\alpha(z)+\beta(z)+\alpha'(z)) + b\cdot(\alpha(z)+\alpha'(z)) + x\cdot(\alpha(z)-\alpha'(z))\right)$$

$$\beta(z) := \operatorname{atan}\left[\frac{(b-x)}{z}\right] + \operatorname{atan}\left[\frac{(b+x)}{z}\right] \qquad \alpha'(z) := \operatorname{atan}\left[\frac{(a+b-x)}{z}\right] - \operatorname{atan}\left[\frac{(b-x)}{z}\right] \qquad \alpha(z) := \operatorname{atan}\left[\frac{(a+b+x)}{z}\right] - \operatorname{atan}\left[\frac{(b+x)}{z}\right]$$

Reference: US Army Corps of Engineers EM 1110-1-1904 "Settlement Analysis", Table C-1

Soil Properites: *Settlement is calculated at mid-point of layer*

No.	Bot. of Laye		Soil Type	γ_{soil} (pcf)	σ'_c (psf)	σ'_o (psf)	$\Delta\sigma z$ (psf)	σ'_f (psf)	Cohesionless Soils C'	Cohesive Soils C_r	Cohesive Soils C_c	Cohesive Soils e_o
1	10.0	ft	Clay	125	4,480	625	8,640	9,265	0.0	0.07	0.18	0.718
2	20.0	ft	Silt	120	4,480	1,850	8,626	10,476	0.0	0.03	0.16	0.760
3	30.0	ft	Silt	120	4,746	2,738	8,578	11,316	0.0	0.03	0.16	0.760
4	40.0	ft	Silt	120	4,746	3,314	8,488	11,802	0.0	0.03	0.16	0.760
5	46.0	ft	Silty Clay	120	4,428	3,775	8,389	12,164	0.0	0.07	0.19	0.706
6	55.0	ft	Silty Clay	120	4,428	4,207	8,270	12,477	0.0	0.07	0.19	0.706
7	61.0	ft	Silty Clay	120	4,639	4,639	8,133	12,772	0.0	0.07	0.19	0.706
8	70.0	ft	Sandy Silt	115	0	5,048	7,983	13,031	40.0	0.00	0.00	0.000
9	77.0	ft	Sandy Silt	115	0	5,469	7,823	13,292	40.0	0.00	0.00	0.000
10												

No.	Settlement:		Total Settlement
1	0.679	ft	
2	0.401	ft	**3.074 ft**
3	0.384	ft	
4	0.386	ft	
5	0.310	ft	**36.9 in**
6	0.459	ft	
7	0.294	ft	
8	0.093	ft	
9	0.067	ft	
10			

Reference: Geotechnical Engineering Principles and Practices; Coduto, 1999

Overconsolidated Soils - Case I ($\sigma'_0<\sigma'_c$) Eqn:11.24

$$(\delta_c)_{ult} = \sum \frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Overconsolidated Soils - Case II ($\sigma'_0<\sigma'_c<\sigma_f$) Eqn:11.25

$$(\delta_c)_{ult} = \sum\left[\frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_c}{\sigma'_0}\right) + \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_c}\right)\right]$$

Normally Consolidated Soils ($\sigma'_0=\sigma'_c$) Eqn: 11.23

$$(\delta_c)_{ult} = \sum \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Reference: FHWA NHI-00-045

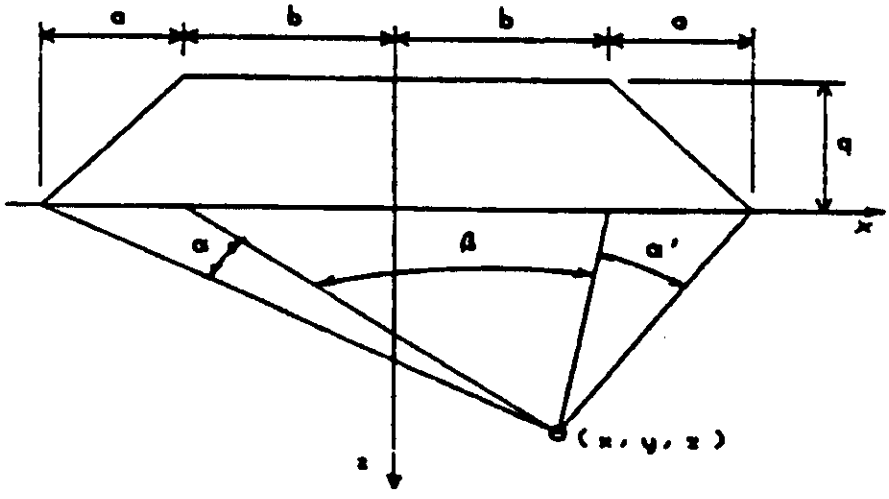
Cohesionless Soils ($\sigma'_0=\sigma'_c$)

$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ SUBJECT

Client	TranSystems Corp / ODOT D-9	JOB NUMBER	0121-3070.03
Project	SCI-823 Portsmouth Bypass	SHEET NO.	33 OF 45
Item		COMP. BY	SJK DATE 8-2-07
		CHECKED BY	DAA DATE 8-2-07

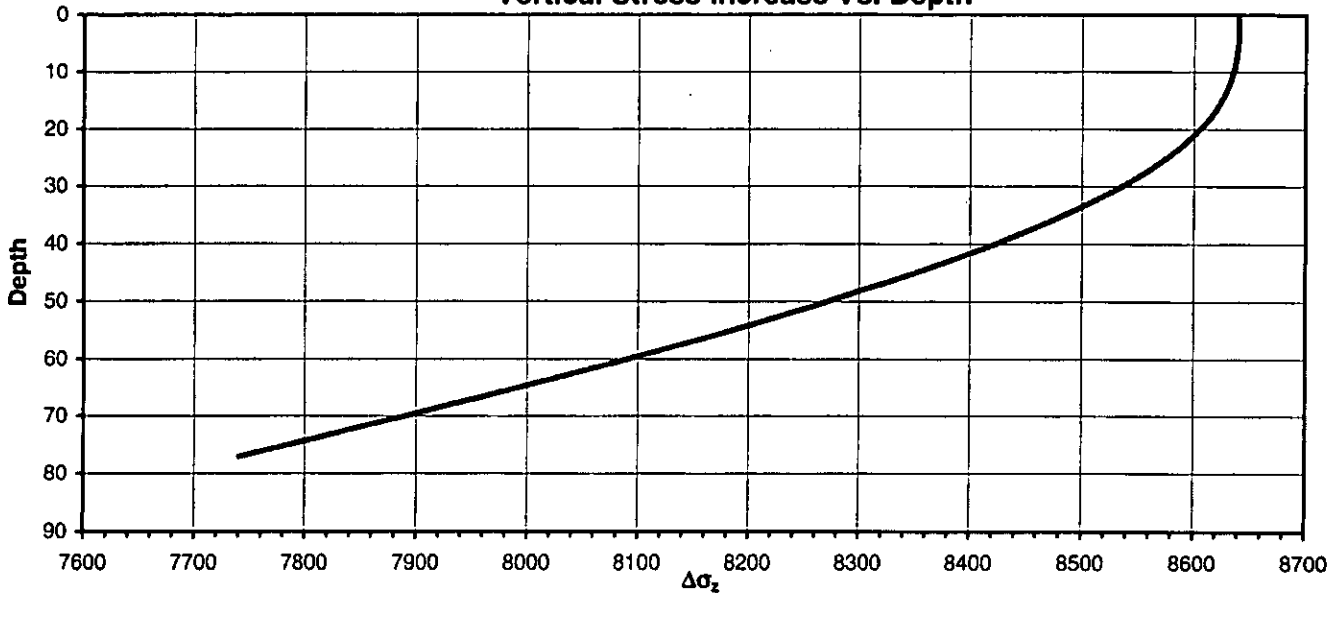
INCREASE IN VERTICAL STRESS DUE TO EMBANKMENT LOADING



q =	8640	load
a =	144	width of slope
b =	50	top half-width of embankment
x =	0	distance from CL
z =	0 to 77	depth range

$$\sigma_v(z) := \left(\frac{q}{\pi a}\right)\left(a\cdot(\alpha(z)+\beta(z)+\alpha'(z)) + b\cdot(\alpha(z)+\alpha'(z)) + x\cdot(\alpha(z)-\alpha'(z))\right)$$

$$\beta(z) := \operatorname{atan}\left[\frac{(b-x)}{z}\right] + \operatorname{atan}\left[\frac{(b+x)}{z}\right] \quad \alpha'(z) := \operatorname{atan}\left[\frac{(a+b-x)}{z}\right] - \operatorname{atan}\left[\frac{(b-x)}{z}\right] \quad \alpha(z) := \operatorname{atan}\left[\frac{(a+b+x)}{z}\right] - \operatorname{atan}\left[\frac{(b+x)}{z}\right]$$



Reference: US Army Corps of Engineers EM 1110-1-1904 "Settlement Analysis", Table C-1

DLZ

Time Rate of Consolidation of Foundation Soils with Wick Drians
Highland Bend Embankments **Based upon boring TR-38A**
Reference: FHWA-RD-86-168 Station 117+64 to 120+98

SJK 8-2-07
DAA 8-2-07

Wick Drain Spacing 5.0 feet Use η = 10

t (days)	T_R	T_V	U_R	U_V	U_C	δ(inches)	*Remaining* δ(inches)	d_e	c_v	H_v	δ_{max}
0	0.0000	0.0000	0.00	0.00	0.0	0.0	36.9	5.25	0.44	30.5	36.9
5	0.0798	0.0024	0.34	0.09	40.3	14.9	22.0				
10	0.1596	0.0047	0.57	0.10	60.9	22.5	14.4				
15	0.2395	0.0071	0.72	0.11	74.6	27.5	9.4	*Assumes double drainage*			
20	0.3193	0.0095	0.81	0.11	83.2	30.7	6.2	*Spacing = 5 ft (triangular)*			
25	0.3991	0.0118	0.87	0.12	88.5	32.7	4.2				
30	0.4789	0.0142	0.90	0.13	91.7	33.8	3.1				
35	0.5587	0.0166	0.93	0.14	93.7	34.6	2.3				
40	0.6385	0.0189	0.94	0.14	95.3	35.2	1.7				
45	0.7184	0.0213	0.96	0.15	96.7	35.7	1.2				
50	0.7982	0.0236	0.98	0.16	98.0	36.2	0.7				
55	0.8780	0.0260	0.99	0.17	99.0	36.5	0.4				
60	0.9578	0.0284	0.99	0.17	99.1	36.6	0.3				

SJK 8-2-07
DAA 8-2-07

DLZ

Time Rate of Consolidation of Foundation Soils with Wick Drians
Highland Bend Embankments **Based upon boring TR-38A**
Reference: FHWA-RD-86-168 Station 117+64 to 120+98

Wick Drain Spacing 7.0 feet Use η = 10

t (days)	T_R	T_V	U_R	U_V	U_C	δ(inches)	*Remaining* δ(inches)	d_e	c_v	H_v	δ_{max}
0	0.0000	0.0000	0.00	0.00	0.0	0.0	36.9	7.35	**0.44**	**30.5**	**36.9**
5	0.0407	0.0024	0.20	0.09	27.3	10.1	26.8				
10	0.0814	0.0047	0.35	0.10	41.3	15.2	21.7				
15	0.1222	0.0071	0.47	0.11	52.9	19.5	17.4	*Assumes double drainage*			
20	0.1629	0.0095	0.57	0.11	62.2	23.0	13.9	*Spacing = 7 ft (triangular)*			
25	0.2036	0.0118	0.66	0.12	69.8	25.8	11.1				
30	0.2443	0.0142	0.72	0.13	75.8	28.0	8.9				
35	0.2851	0.0166	0.78	0.14	80.6	29.7	7.2				
40	0.3258	0.0189	0.82	0.14	84.3	31.1	5.8				
45	0.3665	0.0213	0.85	0.15	87.2	32.2	4.7				
50	0.4072	0.0236	0.87	0.16	89.4	33.0	3.9				
55	0.4480	0.0260	0.89	0.17	91.0	33.6	3.3				
60	0.4887	0.0284	0.91	0.17	92.4	34.1	2.8				
65	0.5294	0.0307	0.92	0.18	93.4	34.5	2.4				
70	0.5701	0.0331	0.93	0.19	94.3	34.8	2.1				
75	0.6109	0.0355	0.94	0.19	95.1	35.1	1.8				
80	0.6516	0.0378	0.95	0.20	95.8	35.4	1.5				
85	0.6923	0.0402	0.96	0.21	96.5	35.6	1.3				
90	0.7330	0.0426	0.96	0.21	97.2	35.8	1.1				
95	0.7738	0.0449	0.97	0.22	97.8	36.1	0.8				
100	0.8145	0.0473	0.98	0.23	98.4	36.3	0.6				
105	0.8552	0.0497	0.98	0.23	98.8	36.5	0.4				
110	0.8959	0.0520	0.99	0.24	99.2	36.6	0.3				
115	0.9366	0.0544	0.99	0.25	99.3	36.6	0.3				

SJK 8-2-07
DAA 8-2-07

DLZ

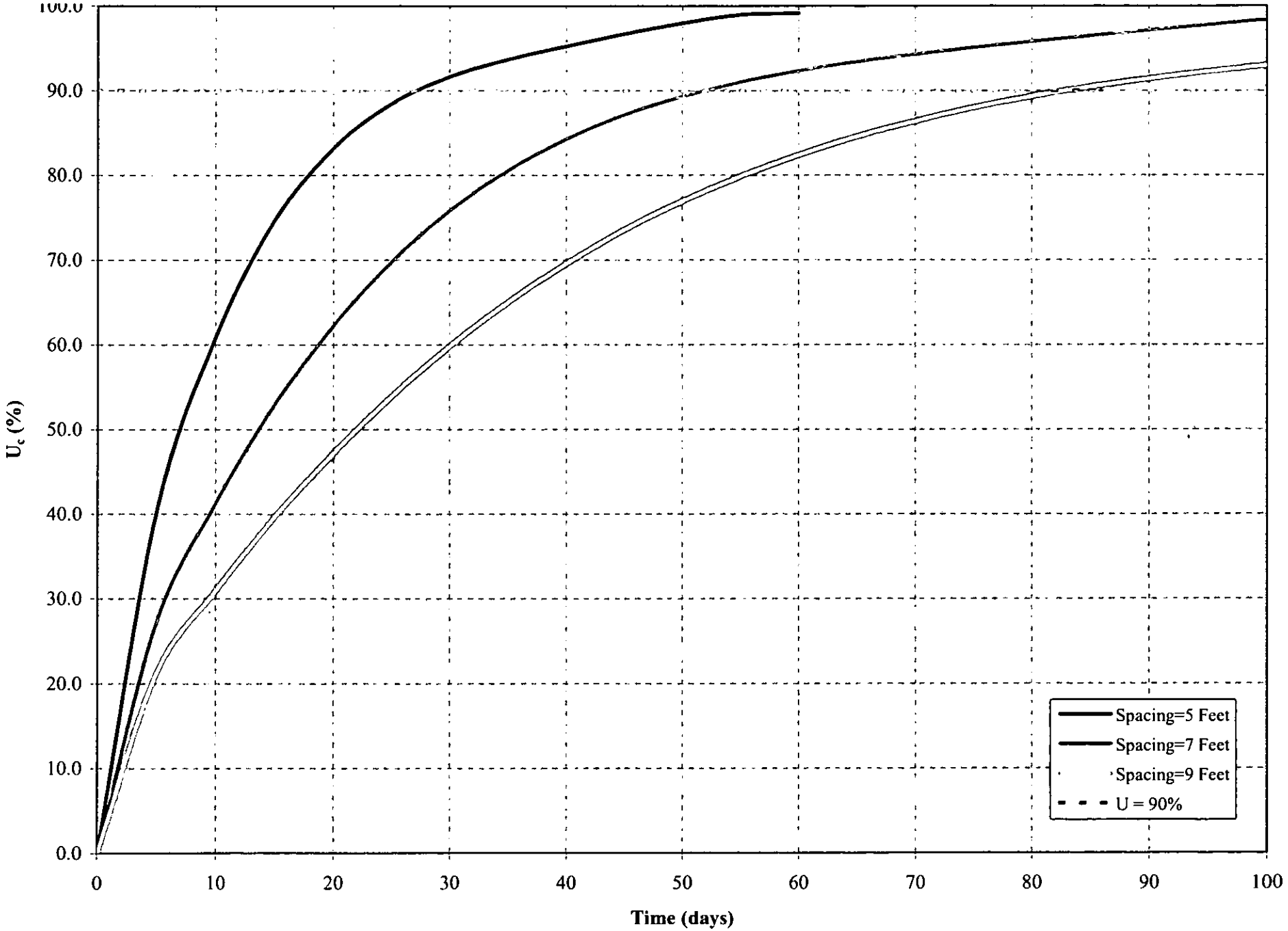
Time Rate of Consolidation of Foundation Soils with Wick Drians
Highland Bend Embankments **Based upon boring TR-38A**
Reference: FHWA-RD-86-168 Station 117+64 to 120+98

Wick Drain Spacing **9.0** feet Use $n = 10$ *Remaining*

t (days)	T_R	T_V	U_R	U_V	U_C	δ(inches)	δ(inches)	d_e	c_v	H_v	δ_{max}
0	0.0000	0.0000	0.00	0.00	0.0	0.0	36.9	9.45	0.44	30.5	36.9
5	0.0246	0.0024	0.13	0.09	21.2	7.8	29.1				
10	0.0493	0.0047	0.23	0.10	30.9	11.4	25.5				
15	0.0739	0.0071	0.32	0.11	39.5	14.6	22.3	*Assumes double drainage*			
20	0.0985	0.0095	0.40	0.11	47.2	17.4	19.5	*Spacing = 9 ft (triangular)*			
25	0.1232	0.0118	0.48	0.12	53.9	19.9	17.0				
30	0.1478	0.0142	0.54	0.13	59.8	22.1	14.8				
35	0.1724	0.0166	0.60	0.14	65.0	24.0	12.9				
40	0.1971	0.0189	0.64	0.14	69.6	25.7	11.2				
45	0.2217	0.0213	0.69	0.15	73.5	27.1	9.8				
50	0.2464	0.0236	0.73	0.16	76.9	28.4	8.5				
55	0.2710	0.0260	0.76	0.17	79.9	29.5	7.4				
60	0.2956	0.0284	0.79	0.17	82.4	30.4	6.5				
65	0.3203	0.0307	0.81	0.18	84.5	31.2	5.7				
70	0.3449	0.0331	0.83	0.19	86.4	31.9	5.0				
75	0.3695	0.0355	0.85	0.19	88.0	32.5	4.4				
80	0.3942	0.0378	0.87	0.20	89.3	33.0	3.9				
85	0.4188	0.0402	0.88	0.21	90.4	33.4	3.5				
90	0.4434	0.0426	0.89	0.21	91.4	33.7	3.2				
95	0.4681	0.0449	0.90	0.22	92.3	34.0	2.9				
100	0.4927	0.0473	0.91	0.23	93.0	34.3	2.6				
105	0.5173	0.0497	0.92	0.23	93.6	34.5	2.4				
110	0.5420	0.0520	0.92	0.24	94.2	34.7	2.2				
115	0.5666	0.0544	0.93	0.25	94.7	34.9	2.0				
120	0.5912	0.0568	0.93	0.25	95.1	35.1	1.8				
125	0.6159	0.0591	0.94	0.26	95.6	35.3	1.6				
130	0.6405	0.0615	0.95	0.27	96.0	35.4	1.5				
135	0.6652	0.0639	0.95	0.27	96.4	35.6	1.3				
140	0.6898	0.0662	0.96	0.28	96.8	35.7	1.2				
145	0.7144	0.0686	0.96	0.28	97.1	35.8	1.1				
150	0.7391	0.0709	0.96	0.29	97.5	36.0	0.9				
155	0.7637	0.0733	0.97	0.30	97.9	36.1	0.8				
160	0.7883	0.0757	0.97	0.30	98.2	36.2	0.7				
165	0.8130	0.0780	0.98	0.31	98.5	36.4	0.5				
170	0.8376	0.0804	0.98	0.31	98.8	36.5	0.4				
175	0.8622	0.0828	0.99	0.32	99.0	36.5	0.4				
180	0.8869	0.0851	0.99	0.32	99.2	36.6	0.3				
185	0.9115	0.0875	0.99	0.33	99.3	36.7	0.2				
190	0.9361	0.0899	0.99	0.33	99.4	36.7	0.2				

DLZ

Percent Consolidation (combined radial and vertical) vs Time
Highland Bend Embankments (Station 117+64 to 120+98)



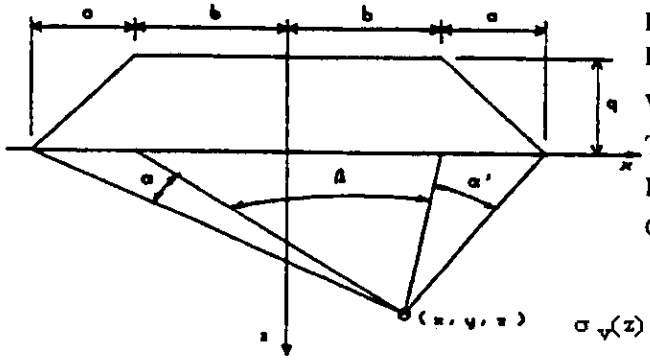
DLZ

SUBJECT	Client TranSystems Corp. / ODOT D-9	JOB NUMBER	0121-3070.03
	Project SCI-823 Portsmouth Bypass	SHEET NO.	38 OF 45
	Item Consolidation under embankment loading	COMP. BY	SJK DATE 8-2-07
	Station 124+24 to 130+73, Hmax=50.3'	CHECKED BY	DAA DATE 8-2-07

H=50.3', not in 30' ravine

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table: D= 20.0 ft

Embankment Height: H = 50.3 ft

Fill Unit Weight: γ_{emb} = 120 pcf q = 6,036 psf

Width of Slope: a = 100.6 **Assumes 2H:1V Side Slopes**

Top half-width of Emb: b = 50

Distance from CL: x = 0

Output Range: z = 0 to 74 ft

**See Data output Attached*

$$\sigma_v(z) := \left(\frac{q}{\pi}\right)\left(a\cdot(\alpha(z)+\beta(z)+\alpha'(z)) + b\cdot(\alpha(z)+\alpha'(z)) + x\cdot(\alpha(z)-\alpha'(z))\right)$$

$$\beta(z) := \operatorname{atan}\left[\frac{(b-x)}{z}\right] + \operatorname{atan}\left[\frac{(b+x)}{z}\right] \qquad \alpha'(z) := \operatorname{atan}\left[\frac{(a+b-x)}{z}\right] - \operatorname{atan}\left[\frac{(b-x)}{z}\right] \qquad \alpha(z) := \operatorname{atan}\left[\frac{(a+b+x)}{z}\right] - \operatorname{atan}\left[\frac{(b+x)}{z}\right]$$

Reference: US Army Corps of Engineers EM 1110-1-1904 "Settlement Analysis", Table C-1

Soil Properites: *Settlement is calculated at mid-point of layer*

No.	Bot. of Laye		Soil Type	γ_{soil} (pcf)	σ'_c (psf)	σ'_o (psf)	$\Delta\sigma z$ (psf)	σ'_f (psf)	Cohesionless Soils C'	Cohesive Soils C_r	C_c	e_o
1	5.0	ft	Clay	125	4,318	313	6,036	6,348	0.0	0.08	0.31	0.771
2	15.0	ft	Silt	120	4,000	1,225	6,032	7,257	0.0	0.08	0.27	0.760
3	25.0	ft	Silt	120	4,000	2,425	6,003	8,428	0.0	0.08	0.27	0.760
4	32.0	ft	Silt	120	4,000	2,915	5,953	8,867	0.0	0.08	0.27	0.760
5	42.0	ft	Silty Clay	120	4,428	3,404	5,867	9,271	0.0	0.07	0.19	0.706
6	50.0	ft	Silty Clay	120	4,428	3,923	5,753	9,675	0.0	0.07	0.19	0.706
7	57.0	ft	Silty Clay	120	4,428	4,355	5,641	9,995	0.0	0.07	0.19	0.706
8	67.0	ft	Sandy Silt	115	0	4,819	5,503	10,323	42.5	0.00	0.00	0.000
9	74.0	ft	Sandy Silt	115	0	5,266	5,343	10,609	42.5	0.00	0.00	0.000
10			Bedrock									

No.	Settlement:		Total Settlement
1	0.404	ft	
2	0.630	ft	3.175 ft
3	0.595	ft	
4	0.415	ft	
5	0.404	ft	38.1 in
6	0.320	ft	
7	0.278	ft	
8	0.078	ft	
9	0.050	ft	
10			

Reference: Geotechnical Engineering Principles and Practices; Coduto, 1999

Overconsolidated Soils - Case I ($\sigma'_o<\sigma'_c$) Eqn:11.24

$$(\delta_c)_{ult} = \sum \frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Overconsolidated Soils - Case II ($\sigma'_o<\sigma'_c<\sigma_f$) Eqn:11.25

$$(\delta_c)_{ult} = \sum\left[\frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_c}{\sigma'_0}\right) + \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_c}\right)\right]$$

Normally Consolidated Soils ($\sigma'_o=\sigma'_c$) Eqn: 11.23

$$(\delta_c)_{ult} = \sum \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Reference: FHWA NHI-00-045

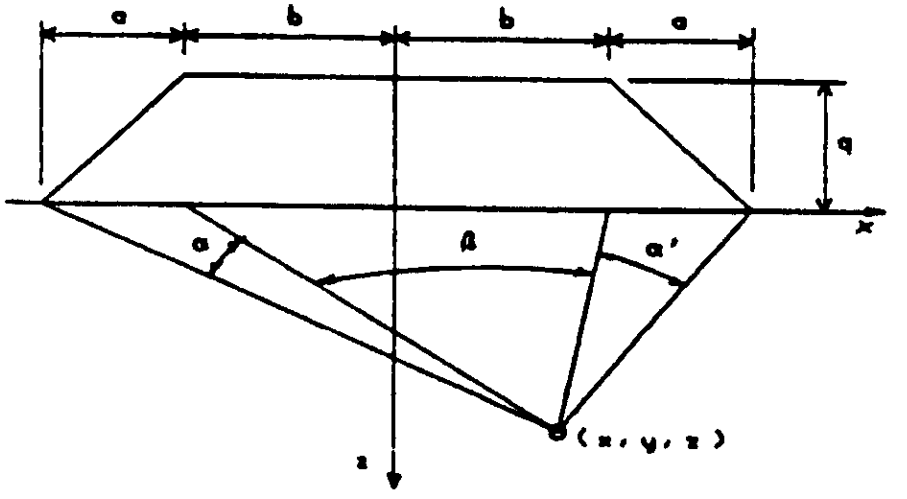
Cohesionless Soils ($\sigma'_o=\sigma'_c$)

$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ SUBJECT

Client	TranSystems Corp / ODOT D-9	JOB NUMBER	0121-3070.03
Project	SCI-823 Portsmouth Bypass	SHEET NO.	39 OF 45
Item		COMP. BY	SJK DATE 8-2-07
		CHECKED BY	DAA DATE 8-2-07

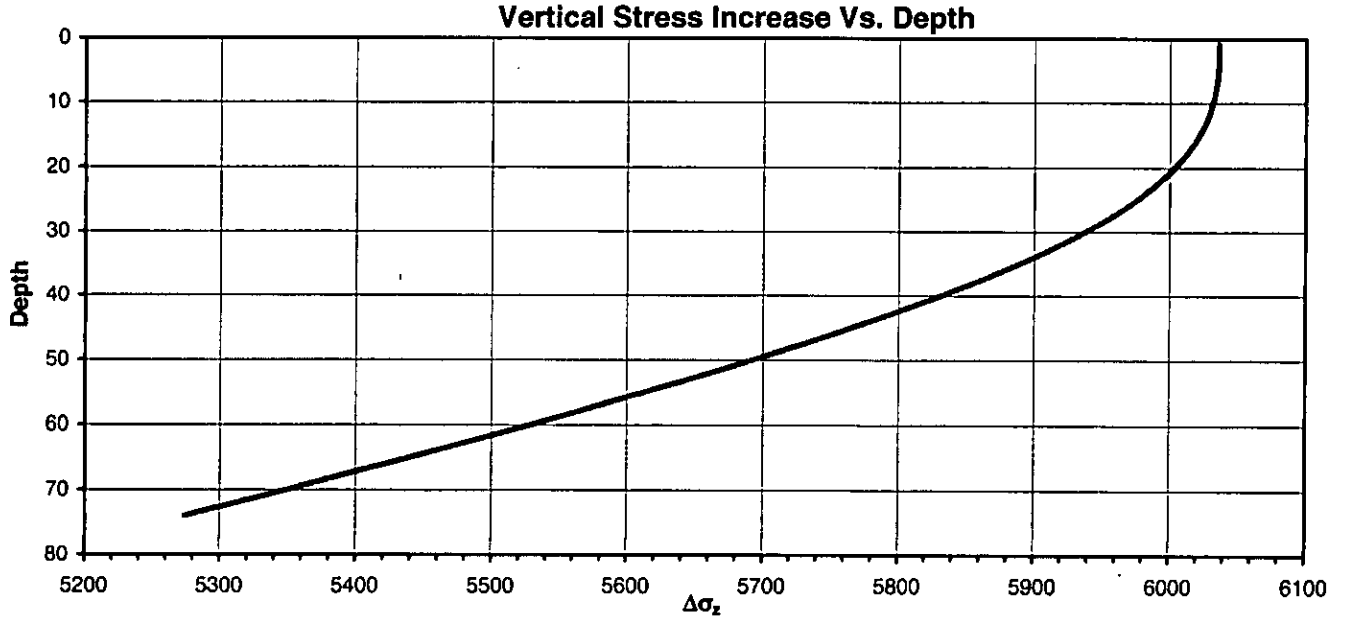
INCREASE IN VERTICAL STRESS DUE TO EMBANKMENT LOADING



q =	6036		load
a =	100.6		width of slope
b =	50		top half-width of embankment
x =	0		distance from CL
z =	0	to 74	depth range

$$\sigma_v(z) := \left(\frac{q}{\pi}\right)\left(a\cdot(\alpha(z)+\beta(z)+\alpha'(z))+b\cdot(\alpha(z)+\alpha'(z))+x\cdot(\alpha(z)-\alpha'(z))\right)$$

$$\beta(z) := \operatorname{atan}\left[\frac{(b-x)}{z}\right]+\operatorname{atan}\left[\frac{(b+x)}{z}\right] \quad ; \quad \alpha'(z) := \operatorname{atan}\left[\frac{(a+b-x)}{z}\right]-\operatorname{atan}\left[\frac{(b-x)}{z}\right] \quad \alpha(z) := \operatorname{atan}\left[\frac{(a+b+x)}{z}\right]-\operatorname{atan}\left[\frac{(b+x)}{z}\right]$$



Reference: US Army Corps of Engineers EM 1110-1-1904 "Settlement Analysis", Table C-1

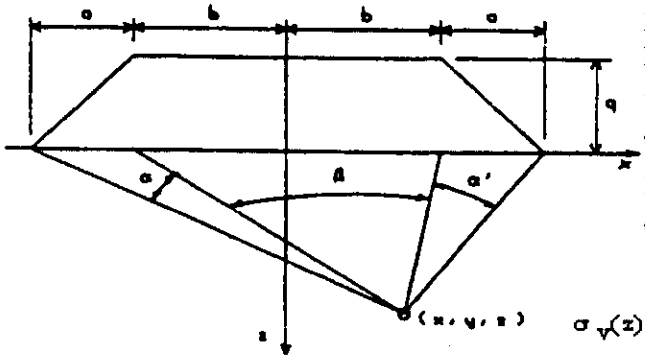
DLZ SUBJECT

Client	TranSystems Corp. / ODOT D-9	JOB NUMBER	0121-3070.03
Project	SCI-823 Portsmouth Bypass	SHEET NO.	40 OF 45
Item	Consolidation under embankment loading	COMP. BY	SAK DATE 8-2-07
Station	124+24 to 130+73, Hmax=80.3'	CHECKED BY	DAA DATE 8-2-07

H=80.3 near station 129+00, 30' deep ravine in this location

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	20.0	ft		
Embankment Height:	H =	80.3	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q = 9,636	psf
Width of Slope:	a =	160.6		**Assumes 2H:1V Side Slopes**	
Top half-width of Emb:	b =	50			
Distance from CL:	x =	0			
Output Range:	z =	0	to 74	ft	

**See Data output Attached*

$$\sigma_v(z) := \left(\frac{q}{\pi\, a}\right)\left(a\cdot(\alpha(z)+\beta(z)+\alpha'(z)) + b\cdot(\alpha(z)+\alpha'(z)) + x\cdot(\alpha(z)-\alpha'(z))\right)$$

$$\beta(z) := \operatorname{atan}\left[\frac{(b-x)}{z}\right] + \operatorname{atan}\left[\frac{(b+x)}{z}\right] \qquad \alpha'(z) := \operatorname{atan}\left[\frac{(a+b-x)}{z}\right] - \operatorname{atan}\left[\frac{(b-x)}{z}\right] \qquad \alpha(z) := \operatorname{atan}\left[\frac{(a+b+x)}{z}\right] - \operatorname{atan}\left[\frac{(b+x)}{z}\right]$$

Reference: US Army Corps of Engineers EM 1110-1-1904 "Settlement Analysis", Table C-1

Use profile based upon boring TR-35A, starting at a depth of 32 feet

Soil Properites: *Settlement is calculated at mid-point of layer*

No.	Bot. of Laye	Soil Type	γ_{soil} (pcf)	σ'_c (psf)	σ'_o (psf)	$\Delta\sigma z$ (psf)	σ'_f (psf)	Cohesionless Soils C'	Cohesive Soils C_r	C_c	e_o
1	10.0 ft	Silty Clay	120	4,428	600	9,636	10,236	0.0	0.07	0.19	0.706
2	20.0 ft	Silty Clay	120	4,428	1,800	9,621	11,421	0.0	0.07	0.19	0.706
3	25.0 ft	Silty Clay	120	4,428	2,544	9,589	12,133	0.0	0.07	0.19	0.706
4	35.0 ft	Sandy Silt	120	0	2,976	9,534	12,510	42.5	0.00	0.00	0.000
5	42.0 ft	Sandy Silt	120	0	3,466	9,435	12,901	42.5	0.00	0.00	0.000
6	0.0	Bedrock	0	0				0.0	0.00	0.00	0.000
7	0.0		0	0				0.0	0.00	0.00	0.000
8	0.0		0	0				0.0	0.00	0.00	0.000
9	0.0		0	0				0.0	0.00	0.00	0.000
10											

No.	Settlement:		Total Settlement
1	0.761	ft	
2	0.619	ft	**1.914 ft**
3	0.293	ft	
4	0.147	ft	
5	0.094	ft	**23.0 in**
6			
7			
8			
10			

Reference: Geotechnical Engineering Principles and Practices; Coduto, 1999

Overconsolidated Soils - Case I ($\sigma'_0<\sigma'_c$) Eqn:11.24

$$(\delta_c)_{ult} = \sum \frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Overconsolidated Soils - Case II ($\sigma'_0<\sigma'_c<\sigma_f$) Eqn:11.25

$$(\delta_c)_{ult} = \sum\left[\frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_c}{\sigma'_0}\right) + \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_c}\right)\right]$$

Normally Consolidated Soils ($\sigma'_0=\sigma'_c$) Eqn: 11.23

$$(\delta_c)_{ult} = \sum \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Reference: FHWA NHI-00-045

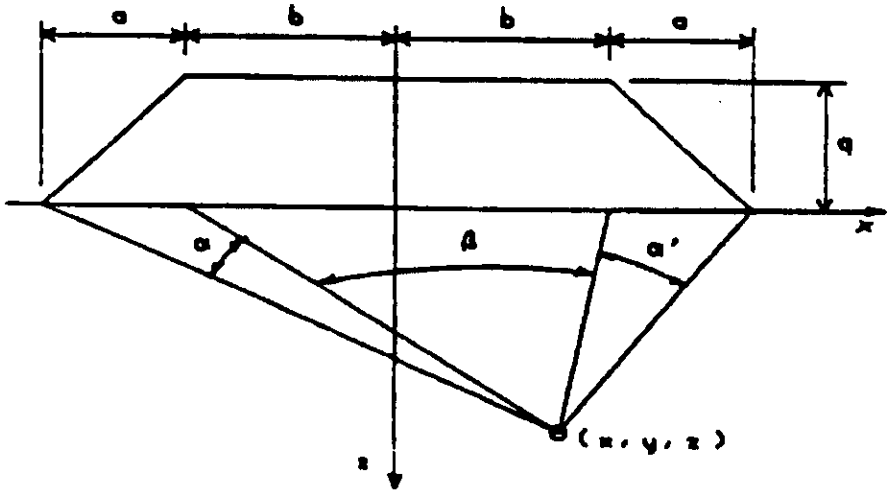
Cohesionless Soils ($\sigma'_0=\sigma'_c$)

$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ SUBJECT

Client	TranSystems Corp / ODOT D-9	JOB NUMBER	0121-3070.03
Project	SCI-823 Portsmouth Bypass	SHEET NO.	41 OF 45
Item		COMP. BY	SJK DATE 8-2-07
		CHECKED BY	DAA DATE 8-2-07

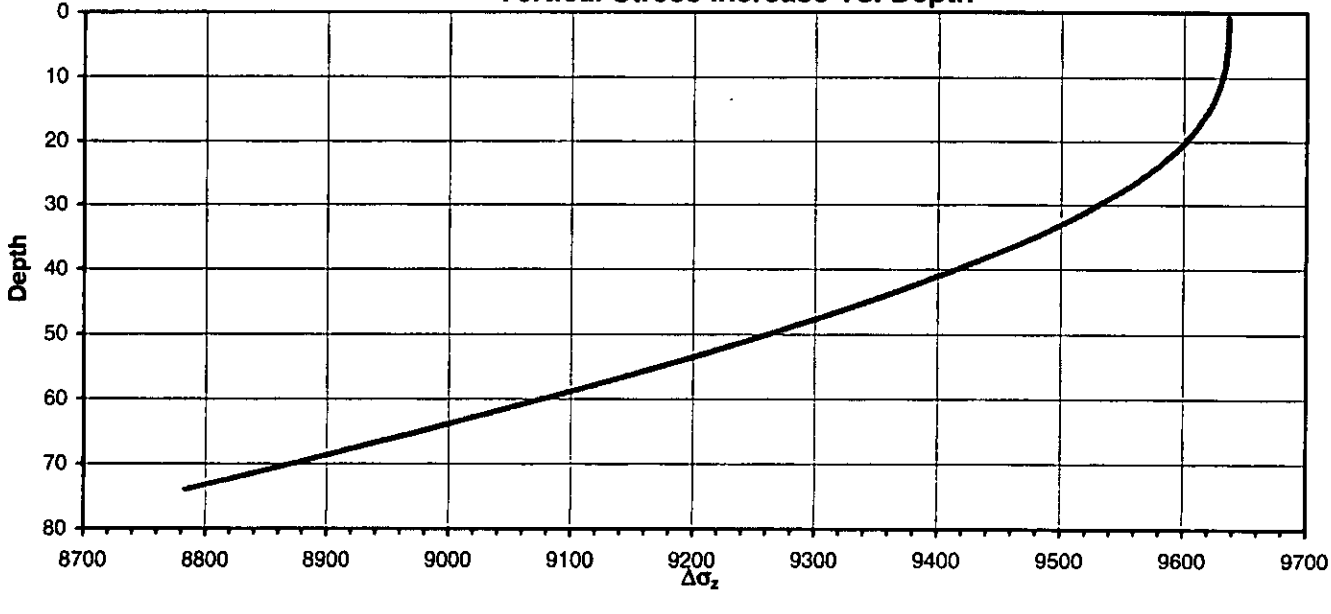
INCREASE IN VERTICAL STRESS DUE TO EMBANKMENT LOADING



q =	9636	load
a =	160.6	width of slope
b =	50	top half-width of embankment
x =	0	distance from CL
z =	0 to 74	depth range

$$\sigma_v(z) := \left[\frac{q}{\pi a}\right]\left(a\cdot(\alpha(z)+\beta(z)+\alpha'(z)) + b\cdot(\alpha(z)+\alpha'(z)) + x\cdot(\alpha(z)-\alpha'(z))\right)$$

$$\beta(z) := \operatorname{atan}\left[\frac{(b-x)}{z}\right] + \operatorname{atan}\left[\frac{(b+x)}{z}\right] \quad ; \quad \alpha'(z) := \operatorname{atan}\left[\frac{(a+b-x)}{z}\right] - \operatorname{atan}\left[\frac{(b-x)}{z}\right] \quad \alpha(z) := \operatorname{atan}\left[\frac{(a+b+x)}{z}\right] - \operatorname{atan}\left[\frac{(b+x)}{z}\right]$$



Reference: US Army Corps of Engineers EM 1110-1-1904 "Settlement Analysis", Table C-1

DLZ

Time Rate of Consolidation of Foundation Soils with Wick Drians
Highland Bend Embankments **Based upon boring TR-35A**
Reference: FHWA-RD-86-168 Station 124+24 to 130+73

SJK 8-2-07
DAA 8-2-07

Wick Drain Spacing **5.0** feet Use $n = 10$ *Remaining*

t (days)	T_R	T_V	U_R	U_V	U_C	δ(inches)	δ(inches)	d_e	c_v	H_v	δ_{max}
0	0.0000	0.0000	0.00	0.00	0.0	0.0	38.1	5.25	**0.37**	**28.5**	**38.1**
5	0.0671	0.0023	0.30	0.09	36.3	13.8	24.3				
10	0.1342	0.0046	0.51	0.10	55.3	21.1	17.0				
15	0.2014	0.0068	0.65	0.10	68.9	26.2	11.9	*Assumes double drainage*			
20	0.2685	0.0091	0.76	0.11	78.3	29.8	8.3	*Spacing = 5 ft (triangular)*			
25	0.3356	0.0114	0.83	0.12	84.6	32.2	5.9				
30	0.4027	0.0137	0.87	0.13	88.7	33.8	4.3				
35	0.4698	0.0159	0.90	0.13	91.4	34.8	3.3				
40	0.5370	0.0182	0.92	0.14	93.3	35.5	2.6				
45	0.6041	0.0205	0.94	0.15	94.7	36.1	2.0				
50	0.6712	0.0228	0.95	0.16	95.9	36.5	1.6				
55	0.7383	0.0251	0.96	0.16	97.1	37.0	1.1				
60	0.8054	0.0273	0.98	0.17	98.1	37.4	0.7				
65	0.8726	0.0296	0.99	0.18	98.9	37.7	0.4				
70	0.9397	0.0319	0.99	0.18	99.2	37.8	0.3				

DLZ

Time Rate of Consolidation of Foundation Soils with Wick Drians
Highland Bend Embankments **Based upon boring TR-35A**
Reference: FHWA-RD-86-168 Station 124+24 to 130+73

SAK 8-2-07
DAA 8-2-07

Wick Drain Spacing **7.0** feet Use η = 10 *Remaining*

t (days)	T_R	T_V	U_R	U_V	U_C	δ(inches)	δ(inches)	d_e	c_v	H_v	δ_{max}
0	0.0000	0.0000	0.00	0.00	0.0	0.0	38.1	7.35	0.37	28.5	38.1
5	0.0342	0.0023	0.18	0.09	24.9	9.5	28.6				
10	0.0685	0.0046	0.31	0.10	37.3	14.2	23.9				
15	0.1027	0.0068	0.42	0.10	47.8	18.2	19.9	*Assumes double drainage*			
20	0.1370	0.0091	0.51	0.11	56.7	21.6	16.5	*Spacing = 7 ft (triangular)*			
25	0.1712	0.0114	0.59	0.12	64.1	24.4	13.7				
30	0.2055	0.0137	0.66	0.13	70.3	26.8	11.3				
35	0.2397	0.0159	0.72	0.13	75.4	28.7	9.4				
40	0.2740	0.0182	0.76	0.14	79.6	30.3	7.8				
45	0.3082	0.0205	0.80	0.15	83.0	31.6	6.5				
50	0.3424	0.0228	0.83	0.16	85.7	32.7	5.4				
55	0.3767	0.0251	0.86	0.16	87.9	33.5	4.6				
60	0.4109	0.0273	0.88	0.17	89.7	34.2	3.9				
65	0.4452	0.0296	0.89	0.18	91.1	34.7	3.4				
70	0.4794	0.0319	0.90	0.18	92.2	35.1	3.0				
75	0.5137	0.0342	0.92	0.19	93.1	35.5	2.6				
80	0.5479	0.0364	0.92	0.20	93.9	35.8	2.3				
85	0.5822	0.0387	0.93	0.20	94.6	36.1	2.0				
90	0.6164	0.0410	0.94	0.21	95.3	36.3	1.8				
95	0.6507	0.0433	0.95	0.22	95.9	36.5	1.6				
100	0.6849	0.0456	0.95	0.22	96.4	36.7	1.4				
105	0.7191	0.0478	0.96	0.23	97.0	37.0	1.1				
110	0.7534	0.0501	0.97	0.23	97.5	37.2	0.9				
115	0.7876	0.0524	0.97	0.24	98.0	37.4	0.7				
120	0.8219	0.0547	0.98	0.25	98.5	37.5	0.6				
125	0.8561	0.0569	0.99	0.25	98.9	37.7	0.4				

SJM 8-2-07
DAA 8-2-07

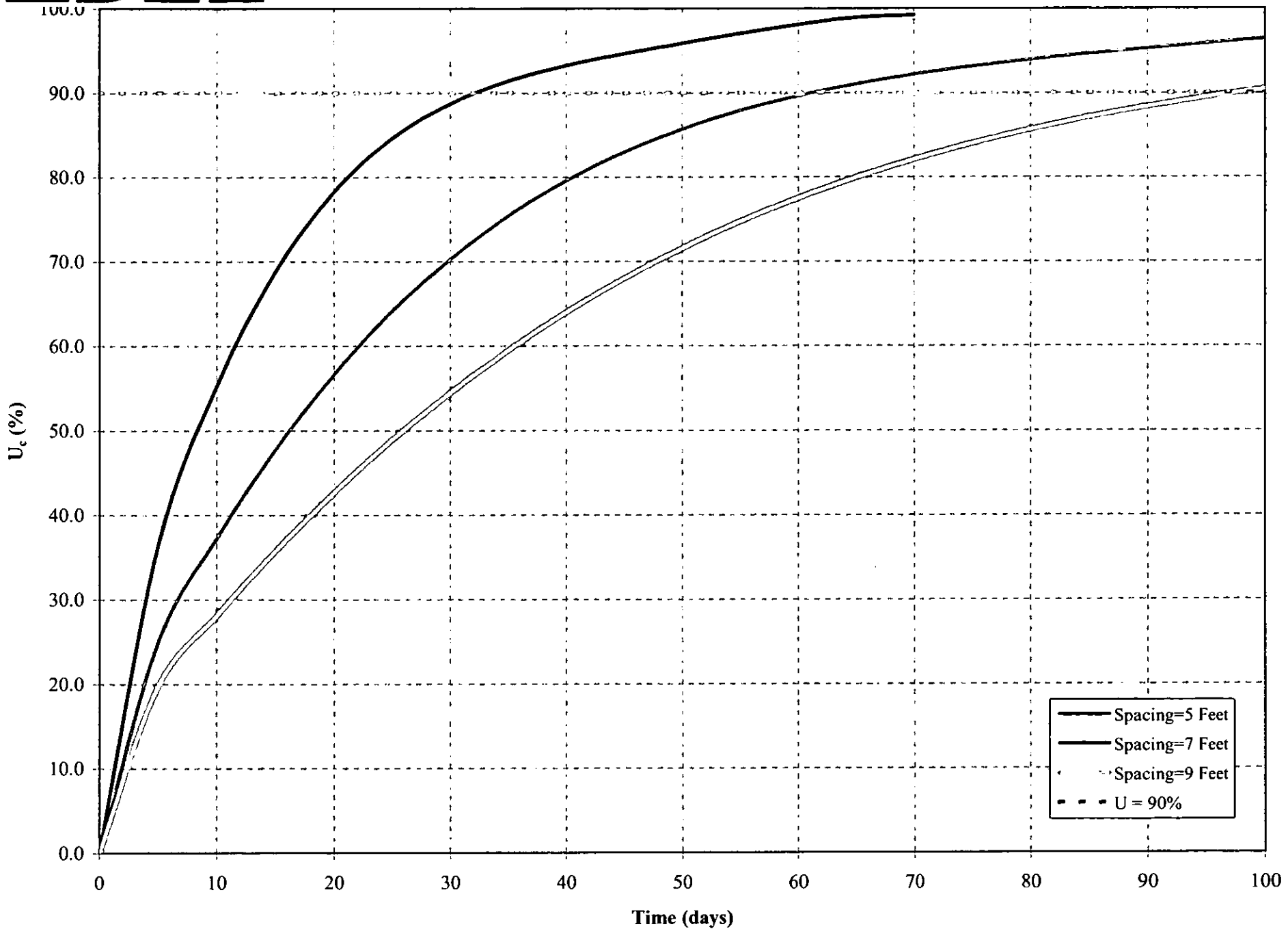
Time Rate of Consolidation of Foundation Soils with Wick Drians
Highland Bend Embankments **Based upon boring TR-35A**
Reference: FHWA-RD-86-168 Station 124+24 to 130+73

Wick Drain Spacing 9.0 feet Use η = 10

t (days)	T_R	T_V	U_R	U_V	U_C	δ(inches)	*Remaining* δ(inches)	d_e	c_v	H_v	δ_{max}
0	0.0000	0.0000	0.00	0.00	0.0	0.0	38.1	9.45	0.37	28.5	38.1
5	0.0207	0.0023	0.12	0.09	19.7	7.5	30.6				
10	0.0414	0.0046	0.20	0.10	28.1	10.7	27.4				
15	0.0621	0.0068	0.28	0.10	35.8	13.6	24.5	*Assumes double drainage*			
20	0.0829	0.0091	0.35	0.11	42.7	16.3	21.8	*Spacing = 9 ft (triangular)*			
25	0.1036	0.0114	0.42	0.12	48.9	18.6	19.5				
30	0.1243	0.0137	0.48	0.13	54.5	20.8	17.3				
35	0.1450	0.0159	0.53	0.13	59.5	22.7	15.4				
40	0.1657	0.0182	0.58	0.14	64.0	24.4	13.7				
45	0.1864	0.0205	0.62	0.15	68.0	25.9	12.2				
50	0.2072	0.0228	0.66	0.16	71.5	27.3	10.8				
55	0.2279	0.0251	0.70	0.16	74.7	28.5	9.6				
60	0.2486	0.0273	0.73	0.17	77.5	29.5	8.6				
65	0.2693	0.0296	0.76	0.18	79.9	30.5	7.6				
70	0.2900	0.0319	0.78	0.18	82.1	31.3	6.8				
75	0.3107	0.0342	0.80	0.19	84.0	32.0	6.1				
80	0.3315	0.0364	0.82	0.20	85.7	32.6	5.5				
85	0.3522	0.0387	0.84	0.20	87.1	33.2	4.9				
90	0.3729	0.0410	0.85	0.21	88.4	33.7	4.4				
95	0.3936	0.0433	0.87	0.22	89.5	34.1	4.0				
100	0.4143	0.0456	0.88	0.22	90.5	34.5	3.6				
105	0.4350	0.0478	0.89	0.23	91.3	34.8	3.3				
110	0.4558	0.0501	0.90	0.23	92.0	35.1	3.0				
115	0.4765	0.0524	0.90	0.24	92.7	35.3	2.8				
120	0.4972	0.0547	0.91	0.25	93.3	35.5	2.6				
125	0.5179	0.0569	0.92	0.25	93.8	35.7	2.4				
130	0.5386	0.0592	0.92	0.26	94.2	35.9	2.2				
135	0.5593	0.0615	0.93	0.27	94.7	36.1	2.0				
140	0.5801	0.0638	0.93	0.27	95.1	36.2	1.9				
145	0.6008	0.0661	0.94	0.28	95.4	36.4	1.7				
150	0.6215	0.0683	0.94	0.28	95.8	36.5	1.6				
155	0.6422	0.0706	0.95	0.29	96.1	36.6	1.5				
160	0.6629	0.0729	0.95	0.29	96.5	36.7	1.4				
165	0.6836	0.0752	0.95	0.30	96.8	36.9	1.2				
170	0.7043	0.0774	0.96	0.31	97.1	37.0	1.1				
175	0.7251	0.0797	0.96	0.31	97.4	37.1	1.0				
180	0.7458	0.0820	0.97	0.32	97.7	37.2	0.9				
185	0.7665	0.0843	0.97	0.32	98.0	37.3	0.8				
190	0.7872	0.0865	0.97	0.33	98.3	37.4	0.7				
195	0.8079	0.0888	0.98	0.33	98.5	37.5	0.6				
200	0.8286	0.0911	0.98	0.34	98.7	37.6	0.5				
205	0.8494	0.0934	0.98	0.34	99.0	37.7	0.4				
210	0.8701	0.0957	0.99	0.35	99.1	37.8	0.3				

DLZ

Percent Consolidation (combined radial and vertical) vs Time
Highland Bend Embankments (Station 124+24 to 130+73)



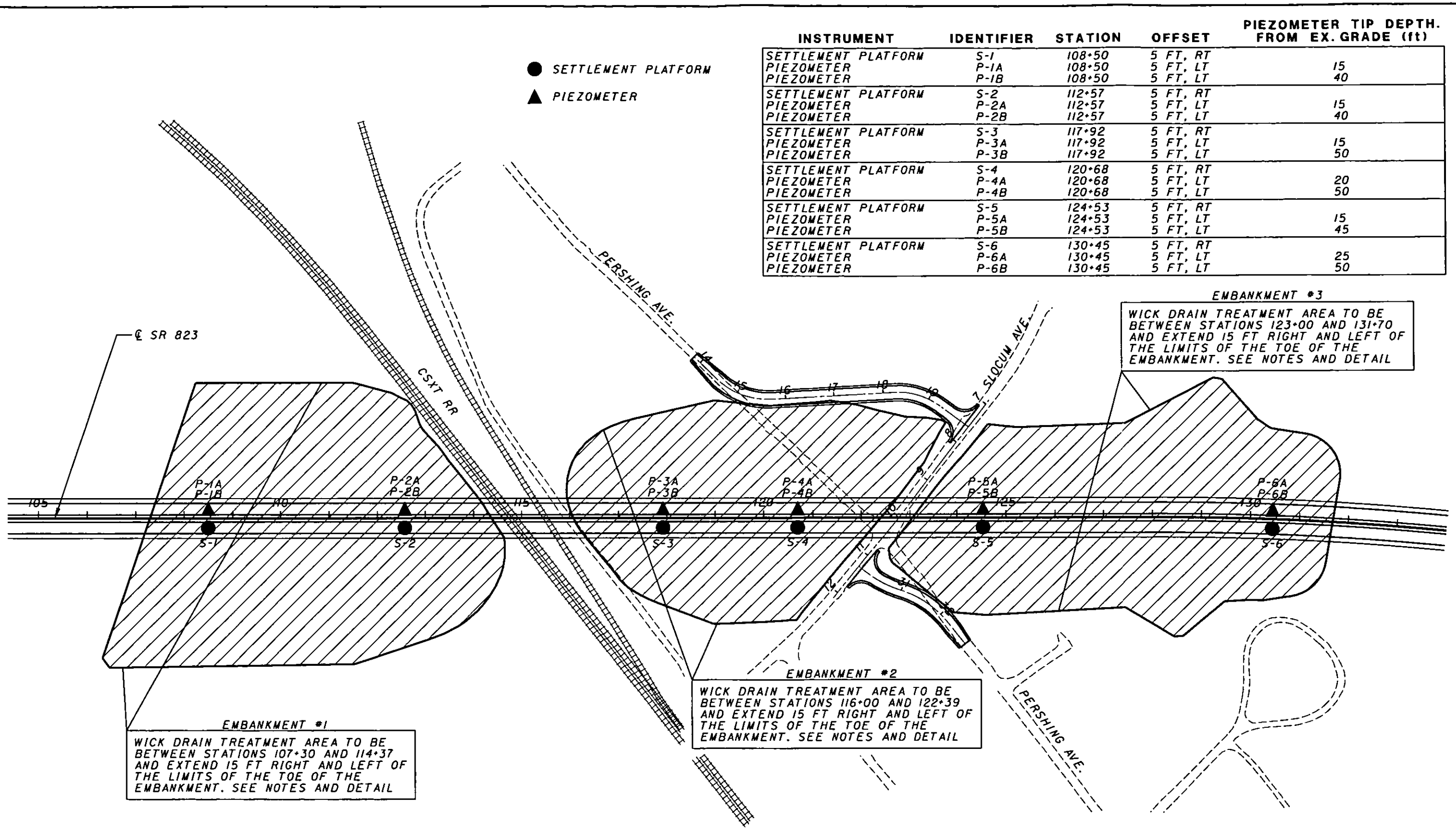
APPENDIX E

DLZ

APPENDIX E

Instrumentation Plan, Notes and Details (Wick Drains and Settlement Platforms)

INSTRUMENT	IDENTIFIER	STATION	OFFSET	PIEZOMETER TIP DEPTH. FROM EX. GRADE (ft)
SETTLEMENT PLATFORM	S-1	108+50	5 FT, RT	
PIEZOMETER	P-1A	108+50	5 FT, LT	15
PIEZOMETER	P-1B	108+50	5 FT, LT	40
SETTLEMENT PLATFORM	S-2	112+57	5 FT, RT	
PIEZOMETER	P-2A	112+57	5 FT, LT	15
PIEZOMETER	P-2B	112+57	5 FT, LT	40
SETTLEMENT PLATFORM	S-3	117+92	5 FT, RT	
PIEZOMETER	P-3A	117+92	5 FT, LT	15
PIEZOMETER	P-3B	117+92	5 FT, LT	50
SETTLEMENT PLATFORM	S-4	120+68	5 FT, RT	
PIEZOMETER	P-4A	120+68	5 FT, LT	20
PIEZOMETER	P-4B	120+68	5 FT, LT	50
SETTLEMENT PLATFORM	S-5	124+53	5 FT, RT	
PIEZOMETER	P-5A	124+53	5 FT, LT	15
PIEZOMETER	P-5B	124+53	5 FT, LT	45
SETTLEMENT PLATFORM	S-6	130+45	5 FT, RT	
PIEZOMETER	P-6A	130+45	5 FT, LT	25
PIEZOMETER	P-6B	130+45	5 FT, LT	50



	TREATMENT AREA			
	EMBANKMENT #1	EMBANKMENT #2	EMBANKMENT #3	TOTAL
TOTAL AREA (ft^2)	376,204	255,315	330,302	961,821
AVERAGE INSTALLED DEPTH (ft)	80	75	65	
WICK DRAIN SPACING OPTION (ft)	TOTAL LINEAR FEET			TOTAL
5	1,390,160	884,475	991,640	3,266,275
7	709,120	451,200	505,895	1,666,215
9	429,040	273,000	306,085	1,008,125

N

0 50 100 200 HORIZONTAL SCALE IN FEET

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WICK DRAIN AND INSTRUMENTATION PLAN
EMBANKMENT STA. 107+30 TO 131+70

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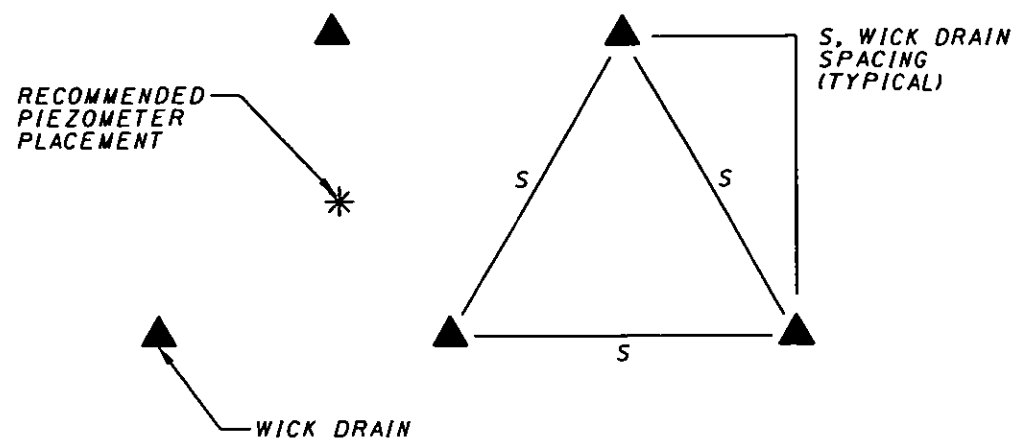
NOTES

1. PLACE 3 FEET OF ODOT ITEM 703.02 BEFORE THE INSTALLATION OF THE WICK DRAINS. WICK DRAINS TO BE INSTALLED PRIOR TO EMBANKMENT CONSTRUCTION.
2. THE SAND SHALL CONSIST OF CLEAN, FREE-DRAINING, COARSE NATURAL SAND, OR SAND AND PEA GRAVEL, SHALL BE GRADED UNIFORMLY FROM COARSE TO FINE, AND SHALL BE OF SUCH SIZE THAT, WHEN TESTING ON U.S. STANDARD SIEVES IN ACCORDANCE WITH AASHTO T27 AND WASHING THE SAMPLE IN ACCORDANCE WITH AASHTO T11, SHALL CONFORM TO THE GRADING REQUIREMENTS OF ODOT CMS 703.02.
3. THE SAND SHALL NOT CONTAIN ANY ORGANIC OR OTHER DELETERIOUS MATERIALS AND SHALL NOT BE FROZEN WHEN PLACED.
4. IF DENSE SAND, GRAVEL OR HARD SOIL LAYERS ARE ENCOUNTERED BELOW THE GROUND SURFACE AND CANNOT BE PENETRATED WITH REASONABLE EFFORT, THE CONTRACTOR SHALL BE REQUIRED TO PRE-DRILL THE WICK DRAIN LOCATIONS.
5. WICK DRAINS SHALL BE INSTALLED FROM THE WORKING SURFACE TO THE DEPTH SHOWN IN THE PLANS, OR TOCOMPLETELY PENETRATE THE COMPRESSIBLE FOUNDATION SOILS AT SUCH A DEPTH EITHER SHALLOWER OR DEEPER THAN PLAN DEPTH WHERE THE SOIL RESISTS A REASONABLE EFFORT AT FURTHER PENETRATION.
6. SETTLEMENT PLATES SHALL BE GEOKON MODEL 4600 OR EQUIVALENT.
7. VIBRATING WIRE PIEZOMETERS SHALL BE SLOPE INDICATOR MODEL 52611099 OR EQUIVALENT.
8. THE MAINLINE EMBANKMENTS FROM STATION 105+75 TO 131+54 MUST BE BUILT USING STAGED CONSTRUCTION. THE FOUNDATION PORE WATER PRESSURES AND SETTLEMENTS SHALL BE MONITORED. THE MAXIMUM HEIGHT OF THE INITIAL STAGES SHALL FOLLOW THE HEIGHTS OUTLINED IN TABLE 1. IF AT ANY TIME, THE FOUNDATION PORE WATER PRESSURE HEAD IS EQUIVALENT TO OR HIGHER THAN THE MAXIMUM LEVEL CITED IN TABLE 1, THEN EMBANKMENT CONSTRUCTION SHALL HALT IMMEDIATELY. CONSTRUCTION MAY RESUME AFTER PORE WATER PRESSURES HAVE DISSIPATED. A WAITING PERIOD WILL BE REQUIRED BETWEEN STAGES TO ALLOW PORE PRESSURES TO DISSIPATE PRIOR TO PLACING SUBSEQUENT STAGES. THE REQUIRED WAITING PERIOD FOR SELECTED WICK DRAIN SPACING OPTIONS IS OUTLINED IN TABLE 1.
9. THE ACTUAL WICK DRAIN TREATMENT AREA AND DEPTH MIGHT DIFFER FROM THE PROPOSED LIMITS DUE TO SOIL VARIATIONS AT THE SITE AND THEREFORE SHOULD BE CONFIRMED IN THE FIELD BY THE ODOT CONSTRUCTION REPRESENTATIVE.
10. IT IS RECOMMENDED THAT WICK DRAINS BE INSTALLED PROIR TO THE INSTALLATION OF SETTLEMENT PLATFORMS OR PIEZOMETERS. PIEZOMETERS SHOULD BE PLACED EQUAL DISTANCES FROM ADJACENT WICK DRAINS TO PREVENT PORE PRESSURE DISSIPATION NEAR THE DRAINS FROM SKEWING MEASUREMENTS, SEE DETAIL "A". THE ODOT CONSTRUCTION REPRESENTATIVE MAY MODIFY THE INSTRUMENTATION PLAN BASED UPON FIELD CONDITIONS.

DETAIL "A"
WICK DRAIN TYPICAL LAYOUT-PLAN VIEW
(NOT TO SCALE)



DETAIL "B"
INSTRUMENTATION DETAILS
(NOT TO SCALE)

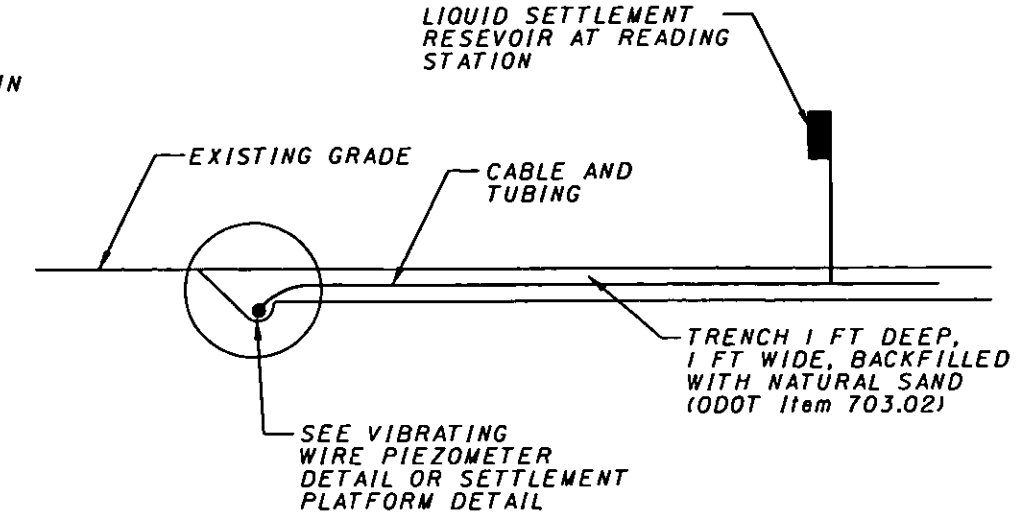
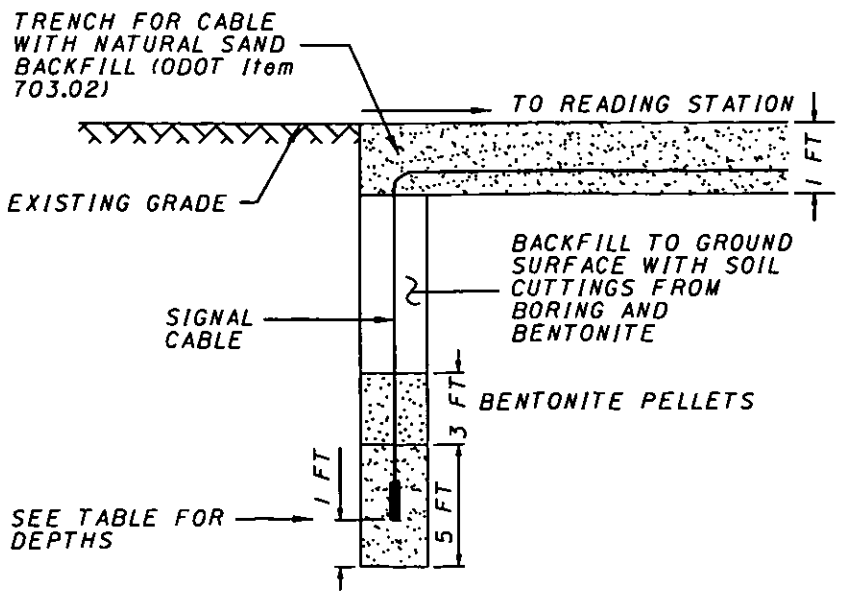


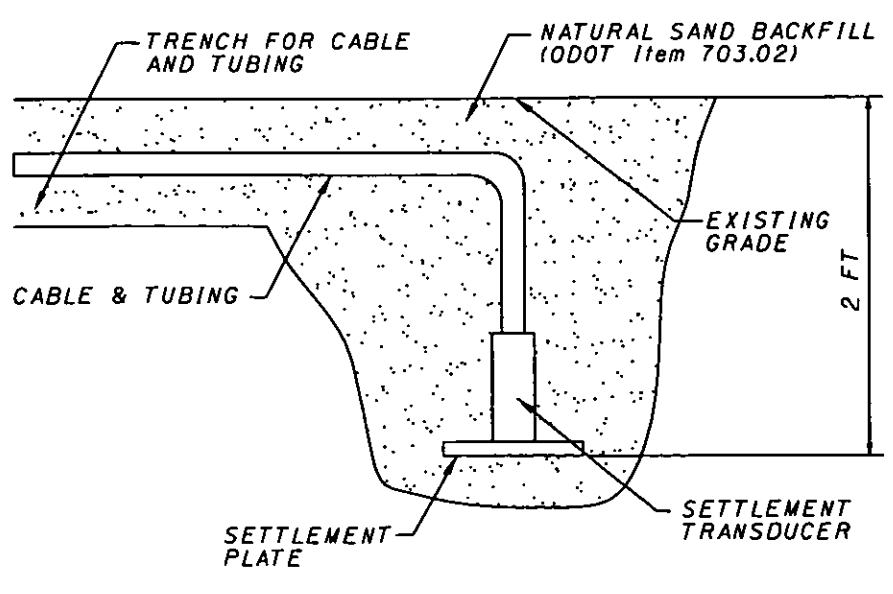
TABLE 1 -STAGED CONSTRUCTION DETAILS

EMBANKMENT SECTION, APPROXIMATE STATIONS	MAX CONSTRUCTION STAGE	MAX. PORE PRESSURE, ABOVE EXISTING GROUND SURFACE	REQUIRED WAITING PERIOD WICK DRAIN SPACING		
			5 FT	7 FT	9 FT
105+75 TO 114+34	35 FT	15 FT	30 DAYS	60 DAYS	90 DAYS
116+23 TO 122+42	35 FT	15 FT	30 DAYS	55 DAYS	85 DAYS
123+09 TO 131+54	30 FT	13 FT	35 DAYS	60 DAYS	95 DAYS

VIBRATING WIRE PIEZOMETER
(NOT TO SCALE)



SETTLEMENT PLATFORM DETAIL
(NOT TO SCALE)



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WICK DRAIN AND INSTRUMENTATION NOTES

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