REPORT

OF

SUBSURFACE INVESTIGATION

FOR

EMBANKMENTS (STATION 537+50 to 904+80)

PROJECT SCI-823-10.13

PHASE 2 – STAGE I

SCIOTO COUNTY, OHIO

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1.0 INTRODUCTION

Phase 2 of this project consists of the construction of approximately seven miles of new interstate roadway situated in Scioto County, Ohio. The findings and recommendations presented in this document pertain to Phase 2 mainline embankments and soil cuts from station 537+50 to 904+80 of the SCI-823-10.13, Portsmouth Bypass project. The findings and recommendations for the rock cut sections and the Phase 1 and 3 of this project will be submitted in separate documents.

The Phase 2 alignment begins at station 537+50. However, the evaluations and recommendations for the roadway embankments from station 537+50 to 543+00 are contained in the Lucasville-Minford Road Interchange report, submitted separately. Additionally, the evaluations and recommendations for the roadway embankments from station 883+39 to 904+80 are contained in the US 23 / SR 823 Interchange report, submitted separately. The evaluations of the Lucasville-Minford Road and US 23 Interchange embankments were submitted separately due to the poor soil conditions encountered and the complexity of the analyses.

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 the rock cut slopes, roadway embankments and pavements.

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

Phase 2 of this project consists of constructing 6.96 miles of new interstate roadway. Of the 6.96 miles, approximately 2.57 miles of side hill fill or embankment fill areas are planned. The remainder of the alignment will be in soil or rock cuts. For information pertaining to the rock cut slopes, please refer to the Report of Rock Cut Slopes for Project SCI-823-10.13, Phase 2-Stage I, dated November 16, 2007.

Along the Phase 2 alignment, the maximum embankment height is anticipated to be approximately 150 feet near station 693+00. Similarly, the maximum depth of the soil and rock cuts is anticipated to be approximately 251 feet near station 831+50.

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

3.0 SUBSURFACE INVESTIGATION

Excluding borings drilled for the interchanges, the subsurface investigation for the Phase 2 embankments (stations 537+50 to 904+79) and soil cuts consisted of drilling a total of 169 borings. Of the 169 borings, 113 of the borings (R-XX) were drilled for the roadway embankment and soil cut sections. Additionally, 40 borings (C-XX) were drilled for the proposed culverts contained in the Phase 2 area. Lastly, 9 borings (TR-XX) drilled for preliminary structure configurations, and 8 borings (B-XX) drilled for the currently proposed structures were considered in the Phase 2 embankment evaluations.

The borings were drilled between March 11, 2005 and May 2, 2007. The borings were extended to depths of 14.0 to 105.0 feet and were drilled using both ATV-mounted and truck-mounted drill rigs. Individual boring logs are shown in Appendix A. The locations of the borings are shown on the Boring Plan in Appendix A. Information concerning the drilling procedures and the boring log terminology is also presented in Appendix A.

Representatives of both DLZ and Lockwood, Lanier, Mathias and Noland Inc (2LMN) staked the locations of the borings in the Phase 2 area. Representatives of 2LMN also determined the as-drilled ground surface elevations and locations of most of the boring locations. Boring locations which could not be determined with the survey equipment due to the dense vegetation were estimated from plans. The as-drilled boring locations and ground surface elevations are shown on the individual boring logs, as well as on the Boring Location Plan, presented in Appendix A.

4.0 FINDINGS

4.1 General Information

The project is located in the Shawnee-Mississippian Plateau of the unglaciated portion of the Appalachian Plateau Physiographic Region. The project area is relatively underdeveloped, and contains limited secondary roadways. The area is characterized by rough, steep, broken, and severely dissected topography. The natural slopes are generally very steep, rising abruptly from the valley bottoms. The maximum topographic relief along the Phase 2 project centerline is approximately 502 feet and occurs between a high point near station 777+75 at elevation 1031.5, and a low point near station 904+00, at approximately elevation 529.1. The maximum vertical relief along the proposed finished grade is approximately 380 feet,

with the lowest point at approximately station 904+00, at approximately elevation 559.6 and the highest point near station 782+00, at approximately elevation 939.1.

4.2 Geology of the Site

The genesis of the soils varies across the project location. Residual and colluvial soils are found on the ridge tops and the hillsides across the site. These soils are generally thin to moderately deep, covering moderate to steep slopes. Lacustrine soils, found in the deeper valleys, are commonly known as "Minford Silts" or the Minford Complex. These deposits were formed during the early to middle Pleistocene age when the northward flowing Teays River system was blocked by the southward advance of the Kansan aged ice sheets. As the glaciers advanced, the course of the Teays River was blocked south of Chillicothe and a large lake was formed from the impoundment of the waterways. As a result of the impoundment, vast quantities of sediments were deposited ranging from 10 to 80 feet in thickness, thinning towards the margins. In this area, the Minford Complex is characterized by clays of high plasticity and high compressibility.

Bedrock within the Phase 2 area is primarily sandstone and sandstone with interbedded shale of the Logan and Cuyahoga Formations that is of Mississippian age. Bedrock of the Pennsylvanian aged Breathitt Formation can be found at the top of the slopes, generally above elevation 980. In the area of the US 23 / SR 823 Interchange, bedrock consisting of Sunbury Shale and Berea Sandstone was encountered generally below elevation 530.

4.3 Soil Conditions

At the surface, all borings except three encountered topsoil ranging in thickness from 0.5 to 14 inches, with an average thickness of approximately 4.5 inches.

Beneath the topsoil layers, borings located on the slopes and drilled for the roadway generally encountered soils ranging from gravel with sand (A-1-b) to silty clay (A-6b) to depths of 5.0 to 43.5 feet below the ground surface, at the top of bedrock. General soil conditions for the Phase 2 embankment fill and soil cut sections are outlined below. Refer to the boring logs presented in Appendix A for additional information.

Station 575+00 to 580+50

In this area, borings R-494, and R-495 generally encountered very stiff silt (A-4b) below the topsoil layers to depths ranging from 18.5 to 38.5 feet below the ground surface. Below this layer, sandstone was encountered by the borings.

Borings R-497, R-498, and R-500 generally encountered very stiff to hard silty clay (A-6b) or silt and clay (A-6a) to depths ranging from 5.5 to 8.0 feet below ground surface. Below these soil layers, bedrock consisting of sandstone was encountered by the borings.

Boring R-499 encountered severely weathered sandstone below the topsoil.

Station 597+00 to 603+00

In this area, boring R-516, which was drilled in the valley bottom, generally encountered very stiff sandy silt (A-4a) and hard silt (A-4b) to a depth of 16.0 feet below the ground surface, at the top of weathered bedrock. Below the soil layers, sandstone bedrock was encountered.

Borings R-521 and R-522, which were drilled on the slopes, generally encountered very stiff silt and clay (A-6a) and sandy silt (A-4a) to a depth of 3.5 feet below ground surface, at the top of weathered bedrock. Below the soil layers, sandstone bedrock was generally encountered.

Boring R-512 encountered severely weathered sandstone below the topsoil.

Station 609+00 to 611+50

In this area, borings R-526 and R-528 generally encountered stiff to hard sandy silt (A-4a) to a depth of 29.0 feet below the ground surface, at the top of rock. R-526 encountered shale with interbedded sandstone, while boring R-528 encountered sandstone bedrock.

Borings R-529 and R-530 generally encountered soils consisting of very stiff silt and clay (A-6a) or sandy silt (A-4a) to a depth of 6.0 feet below ground surface, at the top of weathered bedrock. Bedrock encountered in these borings consisted of sandstone. Competent bedrock was generally beneath a 3.0-foot layer of severely weathered sandstone bedrock.

Station 616+00 to 625+50

In this area, borings R-537, R-541 through R-543, R-547, R-548, and R-553 generally encountered 3.5 to 18.5 feet of medium stiff to hard sandy silt (A-4a). Below the soil layers, bedrock consisted of sandstone, shale and shale interbedded with sandstone. Borings R-537, R-541, R-543, R-548, and R-553 encountered a layer of severely weathered bedrock above more competent rock. Where present, this layer ranged from 1.5 to 7.5 feet in thickness.

Borings R-535, R-549, R-550, and R-556 generally encountered soils consisting of very stiff silt and clay (A-6a) & silty clay (A-6b) to depths ranging from 3.5 to 8.5 feet below the ground surface. Below the soil layers, borings generally encountered a layer of severely weathered sandstone and shale bedrock, which was found to range in from 1.0 to 6.6 feet in thickness. Below the weathered bedrock, sandstone was generally encountered by the borings.

Boring R-554 generally encountered soils consisting of stiff to very stiff silt and clay (A-6a) and sandy silt (A-4a) to a depth of 28.5 feet below the ground surface. Below

these soil layers, sandstone bedrock was encountered.

Boring R-538 generally encountered soil consisting of very stiff silt (A-4b) and sandy silt (A-4a) to a depth of 16.0 feet below the ground surface. Below the soil layers, bedrock consisted of shale interbedded with sandstone.

Station 633+50 to 637+50
In this area, borings R-565 and R-568 generally encountered soils consisting of very stiff sandy silt (A-4a) and silt (A-4b) to a depths ranging from 13.5 to 16.6 feet below the ground surface. Below the soil layers, a layer of severely weathered shale and sandstone bedrock was encountered. This layer ranged in thickness from 3.4 to 4.0 feet. Sandstone was encountered below the weathered bedrock.

Station 657+00 to 661+00
In this area, borings R-598, R-602, R-605, and R-606 generally encountered very stiff to hard sandy silt (A-4a) to depths ranging from 8.5 to 21.0 feet below the ground surface. Below the soil layers, these borings encountered bedrock consisting of shale, shale interbedded with sandstone, and sandstone.

Station 670+50 to 674+50
In this area, boring R-617 encountered very stiff sandy silt (A-4a) and silt and clay (A-6a) to a depth of 18.0 feet below the ground surface, at the top of bedrock. Below the soil layers, this boring encountered sandstone bedrock

Boring R-618 encountered 25.0 feet of very stiff sandy silt (A-4a) and silt (A-4b). Below these layers, this borings encountered hard silty clay (A-6b) to a depth of 33.5 feet below the ground surface, at the top of bedrock. Bedrock consisting of sandstone and shale was encountered beneath the soil layers.

Station 680+50 to 683+00
In this area, borings R-624, and R-627 through R-630 generally encountered cohesive and cohesionless soils consisting of medium dense/hard silt (A-4b) to sandy silt (A-4a) to depths ranging from 3.5 to 20.5 feet below the ground surface. Below these soil layers, borings R-627 and R-630 encountered a layer of severely weathered siltstone or sandstone bedrock that ranged from 3.5 to 6.0 feet in thickness. Sandstone bedrock was encountered below the soil and severely weathered rock layers in all borings.

Station 689+50 to 702+00
In this area, borings R-636, R-639, R-640, R-645, R-648, and R-650 generally encountered cohesive and cohesionless soils consisting of very stiff /medium dense silt (A-4b) to silt and clay (A-6a) to depths ranging from 5.5 to 21.0 feet below the ground surface. Below the soil layers, borings generally encountered severely weathered shale and sandstone bedrock that ranged from 7.0 to 10.5 feet in thickness.

Sandstone and sandstone with interbedded shale were encountered below the soil and weathered bedrock layers.

Boring R-652 encountered soils consisting of hard silt (A-4b) to sandy silt (A-4a) to a depth of 23.0 feet below the ground surface. Below this soil layer, a layer of severely weathered shale was encountered to a depth of 31.0 feet, at the top of more competent shale and sandstone bedrock.

Station 714+50 to 725+00
In this area, borings R-668, TR-5, and TR-6 generally encountered soils consisting of very stiff sandy silt (A-4a) to silty clay (A-6b) to depths ranging from 5.0 to 5.5 feet below the ground surface. Below the soil layers, borings R-668 and TR-5 encountered a layer of severely weathered bedrock to a depth of 10.0 feet, at the top of more competent bedrock. Boring TR-6 encountered sandstone bedrock below the soil layers.

Station 745+50 to 753+00
In this area, borings R-686, R-689, R-690, and R-694 generally encountered soils consisting hard/medium dense sandy silt (A-4a) to silt and clay (A-6a) to depths ranging from 5.0 to 10.5 feet below the ground surface. BoringsR-686 and R-689 encountered a layer of severely weathered bedrock ranging in thickness from 2.5 to 4.5 feet. Below the soil and weathered rock layers, borings R-686 and R-689 encountered shale bedrock. Similarly, borings R-690 and R-694 encountered sandstone bedrock.

Station 761+00 to 775+00
In this area, borings R-707, R-710, R-711, and R-712 generally encountered soils consisting of hard silt (A-4b) to silty and clay (A-6a) to depths ranging from 10.0 to 21.0 feet below the ground surface, at the top of rock.

Borings R-708, R-710, R-715, R-717 and R-719 encountered cohesionless soils consisting of medium dense gravel with sand and silt (A-2-4) to sandy silt (A-4a) to depths ranging from 3.5 feet to 16 feet below the ground surface. In borings R-708 and R-715, below these layers, these boring encountered silt and clay (A-6a) to depths of 7.0 and 17.5 feet, respectively.

Borings R-707, R-710, R-711, R-712, R-717 and R-719 encountered sandstone bedrock, while borings R-708 and R-715 encountered shale bedrock.

Station 790+00 to 798+75
In this area, borings R-736 and R-739 generally encountered medium dense sandy silt (A-4a) to depths ranging from 5.0 to 18.0 feet below ground surface. Boring R-737 encountered soils consisting of very stiff silt (A-4b) and sandy silt (A-4a) to a depth of 23.0 feet below the ground surface, at the top of bedrock.

Borings R-741 and R-742 generally encountered soils consisting of hard silt (A-4b) and silt and clay (A-6a) to depths ranging form 10.0 to 22.5 feet below the ground surface, at the top of bedrock.

Borings R-736, R-737 and R-739 encountered sandstone bedrock, while shale bedrock was encountered in borings R-741 and R-742.

Station 810+50 to 825+50

In this area, borings R-766, R-756, R-759, R-762, R-763, and R-764, generally encountered soils consisting of medium dense sandy silt (A-4a) to silty clay (A-6b) to depths ranging from 3.0 to 18.0 feet below ground surface, at the top of severely weathered bedrock. The borings encountered a layer of severely weathered shale bedrock ranging in thickness from 2.0 to 15.5 feet. Below the soil and weathered rock layers, borings R-766, R-756, and R-759 encountered shale bedrock. Similarly, below these layers, borings R-762, R-763, and R-764 encountered sandstone with interbedded shale.

Station 847+50 to 859+50

In this area, borings R-784 and R-793 generally encountered soils consisting of hard silt and clay (A-6a) to clay (A-7-6) to depths ranging from 8.0 to 16.5 feet below the ground surface. Below the soil layers, these borings encountered a layer of severely weathered bedrock ranging in thickness from 2.5 to 3.0 feet. Below the soil and severely weathered rock layers, borings R-784 and R-793 encountered sandstone and shale bedrock, respectively.

Borings R-786 and R-791 generally encountered soils consisting of hard silt (A-4b) to clay (A-7-6) to depths ranging from 7.5 to 8.0 feet below the ground surface. Below the soil layers, these borings encountered a layer of severely weathered shale bedrock ranging in thickness from 1.5 to 2.0 feet. Below the soil and severely weathered rock layers, borings R-786 and R-791 encountered sandstone and shale bedrock, respectively.

Station 867+00 to 872+00

In this area, boring R-796 encountered soils consisting of stiff to hard silt (A-4b) and sandy silt (A-4a) to a depth of 10.0 feet below the ground surface, at the top of bedrock. Boring R-796 encountered shale bedrock.

Boring R-798 encountered soils consisting of stiff to hard silt and clay (A-6a) and silty clay (A-6b) to a depth of 5.5 feet below the ground surface, at the top of weathered bedrock. Below the soil layers, this boring encountered a layer of severely weathered sandstone to a depth of 10.0 feet. Below the soil and weathered bedrock, this boring encountered sandstone.

4.4 Bedrock Conditions

Bedrock was encountered in all of the borings and confirmed by coring a minimum of 5 feet of bedrock. Overburden in the Phase 2 area was generally thin. Bedrock was typically encountered in the borings at depths ranging from 3.5 to 38.5 feet below the ground surface. Bedrock encountered in the borings correlates well with the available geologic references. The cores obtained consisted primarily of sandstone and shale with occasionally siltstone and clayshale. A layer of severely weathered to decomposed bedrock was generally encountered immediately above the higher quality rock encountered in the rock cores. The layer of severely weathered rock generally ranged in thickness from 1 to 5 feet. Refer to the boring logs presented in Appendix A for more detailed information.

4.5 Groundwater Conditions

Seepage was observed in 36 of the borings considered for the Phase 2 embankments at depths ranging from 1.0 to 32.5 feet below the ground surface. In general, groundwater was not encountered prior to the introduction of water for coring operations. Only 20 of the borings noted water levels prior to beginning rock coring operations. Where borings did encounter water levels prior to coring, depths ranged from 1.3 to 42.6 feet below the existing ground surface. Similarly, 145 borings encountered final water levels ranging from 0.5 to 34.0 feet below the ground surface. Refer to the boring logs presented in Appendix A for more detailed information.

It should be noted that groundwater levels may fluctuate with seasonal variations and following periods of heavy or prolonged precipitation, and therefore, the readings indicated on the boring logs may not be representative of the long-term groundwater levels. The final water levels included water used during rock coring operations and consequently may not be representative of actual groundwater conditions

4.6 Laboratory Testing

In the laboratory, all samples were examined and visually classified by a soils engineer. The moisture contents, grain size analyses, and plasticity characteristics of samples considered representative of the subsurface materials were determined. Due to the very stiff to hard consistency of the soils encountered in this area, undisturbed Shelby Tube samples were not obtained. Consequently, no shear strength or consolidation testing was completed for Phase 2 embankment fill and soil cut sections. Index test results are included on the borings logs in Appendix A.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 General

At the surface, 166 of the 169 borings encountered topsoil ranging in thickness from 0.5 to 14 inches. Where encountered, the average thickness of topsoil was approximately 4.5 inches. All topsoil should be removed prior to placing fill or pavement materials.

Subgrades and embankments should be constructed in accordance with Ohio Department of Transportation Construction and Material Specification (ODOT-CMS) Item 203, "Roadway Excavation and Embankment."

5.2 Pavement Design and Group Index

5.2.1 General

The results of the borings and the subgrade evaluations for Phase 2 of this project have been submitted in separate documents. However, the conclusions from the proposed State Route 823 Mainline evaluations are presented below. It should be noted that unsuitable soils, consisting of silt (A-4b), were encountered in the Phase 2 area. Restrictions for the use of these materials should conform to ODOT CMS Item 203.03. Similarly, all subgrade treatments should conform to ODOT CMS Item 206. More information concerning the suitability of soils for use as fill material can be found in section 5.6 of this report.

5.2.2 State Route 823 Mainline

The method used to calculate the CBR value was essentially the same as that used by the Office of Geotechnical Engineering (OGE) to determine the design CBR value for the Nelsonville Bypass project. The alignment for that project was similar to the Portsmouth Bypass alignment in that most of it will also be in rock cuts or on embankments. In Phase 2, 395 samples were tested for particle size and plasticity.

Existing laboratory test results performed as of June 6, 2006 were evaluated to estimate a recommended CBR value for Phase 2 mainline roadway pavement design. For the proposed Phase 2 mainline alignment and the ramps, it is recommended that the pavements be designed based on a CBR value of 9. However, the entire project average may be considered for the design of the pavement. The entire project average CBR is 7, and if desired, pavements may be designed based upon this value. Areas where it is anticipated that the subgrade will be in soil (existing soil) are listed in the following table. Variations in the station limits should be anticipated where the bedrock slopes in the transverse direction, such as side hill fill/cut areas.

Sections of State Route 823 - Mainline Subgrade in Soil (Phase 2) Station 537+50 to 904+80

Begin Station	End Station	Begin Station	End Station
661+25	662+25	825+00	826+00
702+00	703+00	845+00	852+00
714+00	715+00	862+00	867+00
760+00	761+00		

Approximately 4.10 miles of the 6.96 Phase 2 alignment will be constructed in cuts where the subgrade will be in rock. The approximate station limits of these sections are listed in the following table. The station limits are approximate, and are based upon the profile encountered along the centerline of construction. Variations in the station limits should be anticipated where the bedrock slopes in the transverse direction, such as side hill fill/cut areas.

Sections of State Route 823 - Mainline Subgrade in Rock (Phase 2) Station 537+50 to 904+80

Begin Station	End Station	Begin Station	End Station
543+00	571+50	682+50	689+50
573+50	574+50	695+25	696+25
580+50	596+75	703+00	714+00
603+75	608+50	725+50	745+00
612+00	615+25	753+25	760+00
619+75	621+25	775+00	790+00
625+25	633+00	798+75	809+75
637+75	648+00	826+00	845+00
649+00	656+75	860+00	862+00
662+25	670+25	873+25	899+25
674+50	680+75		

For the sections of the alignments with subgrades in rock, excavations 2 feet below the proposed pavement materials will be required for the subgrade preparation in accordance with ODOT CMS Item 204.05.

5.3 Culverts

As discussed earlier in this report, 19 culverts are presently planned within the limits of the Phase 2 area. Foundation recommendations and settlement analyses for the culverts have been presented for each culvert in separate reports.

5.4 Embankment Evaluations

5.4.1 Slope/Embankment Stability – State Route 823 Mainline

The two interchange areas located within Phase 2 contained soft, compressible soils and presented challenges with slope stability. However, due to the thin nature of the soil encountered on the slopes, stability is not a concern for most of the remaining Phase 2 embankment fill sections. The following table outlines the station locations and approximate embankment heights for the proposed Phase 2 mainline embankments.

Soil parameters used for the stability and settlement analyses were based on laboratory test results (grain-size and plasticity), visual examination of the preserved samples, hand penetrometer readings, and typical correlations. Due to the very stiff to hard consistency of the soils encountered in this area, undisturbed, Shelby Tube samples were not obtained for laboratory testing. Global stability analyses and settlement calculations are presented in Appendix C.

Sidehill Fill / Fill Embankments
(STA. 575+00 to 872+00)

Begin Station	End Station	Approximate Maximum Fill (ft.)
575+50	580+50	49
597+00	603+00	91
609+00	611+50	68
616+00	625+50	90
633+50	637+50	86
657+00	661+00	103
670+50	674+50	100
680+50	683+00	77
689+50	702+00	150
714+50	725+00	78
745+50	753+00	94
761+00	775+00	117
790+00	798+75	122
810+50	825+50	89
847+50	859+50	65
867+00	872+00	24

In accordance with ODOT guidelines, a unit weight of 120 pcf was used for the embankment fill materials. Due to the nature of the project, it is anticipated that the embankment fill will consist of cohesionless material ranging in size from fine granular material to rock but will generally be rock fill from adjacent cuts. Friction angles for the anticipated fill materials will likely range from 28 degrees to over 40 degrees. We would anticipate that more of the rock fill would exhibit friction angles in excess of 40 degrees. As per discussions with ODOT's Office of Geotechnical

Engineering (OGE), we have selected a friction angle of 35 degrees for the analyses of large embankments (greater than 40 feet), such as the embankment found within the Phase 2 area. 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.

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 Simplified Bishop procedure was used for all of the analyses and only circular failure surfaces were considered. All of the procedures use an iterative approach to investigate many failure surfaces until a critical surface is found. The results of the stability analyses are included in Appendix B.

5.4.1.1 Phase 2 Mainline Embankments – General Information

The Phase 2 mainline roadway is comprised of approximately 16 fill sections. All fill sections in Phase 2 were considered for stability. The analyses and recommendations for the embankment slopes contained in the interchange areas are found within the respective interchange reports, presented separately.

A comprehensive review of subsurface conditions and the results of stability analyses indicate that the Phase 2 embankments may be built using slopes listed in the following table.

Sidehill Fill / Fill Embankments
(STA. 575+00 to 872+00)

Begin Station	End Station	Recommended Design Side Slopes
575+00	580+50	2H:1V
597+00	603+00	2H:1V
609+00	611+50	2H:1V
616+00	625+50	2H:1V
633+50	637+50	2.5H:1V
657+00	661+00	2H:1V
670+50	674+50	2H:1V
680+50	683+00	2H:1V
689+50	702+00	2H:1V
714+50	725+00	2H:1V
745+50	753+00	2H:1V
761+00	775+00	2H:1V
790+00	798+75	2H:1V
810+50	825+50	2H:1V
847+50	859+50	2H:1V
867+00	872+00	2H:1V

5.4.1.2 Phase 2 Mainline Embankments (Station 575+00 to 872+00)

The Phase 2 alignment from station 575+00 to 872+00 contains 16 sections, which will be constructed using fill embankments. In accordance with AASHTO and ODOT guidelines, the embankment sections were analyzed for global stability. The undrained, drained, and seismic conditions of the proposed embankments were evaluated.

The subsurface profile assumed for each section represented the most critical soil characteristics (strength, depth, and slope geometry) with respect to stability. Within these fill sections, the most critical soil profile was generally coupled with the maximum embankment height encountered in that section.

The results of these global stability analyses indicate that all but one section may be built using 2H:1V or flatter side slopes. The results of these analyses indicate that from approximate station 633+50 to 637+50, the proposed roadway embankment should be built using 2.5H:1V or flatter side slopes. This analysis utilized a profile based upon boring R-565 and an embankment height of 86 feet.

Based upon the results of these analyses, it is not anticipated that staged construction, wick drains, or other special construction techniques should be required to construct the embankments in the Phase 2 area.

Therefore, based upon the analyses, it is recommended that roadway embankments be built using a 2.5H:1V side slopes for the fill section between station 633+50 and 637+50. All other fill sections within approximate stations 597+00 to 872+00 can be constructed using 2H:1V side slopes.

5.4.2 Settlement – State Route 823 Mainline

5.4.2.1 Phase 2 Mainline Embankments (Station 537+50 to 872+00)

Settlement has been evaluated for each of the Phase 2 embankment fill sections. The following table summarizes the results of the calculations for the settlement of the foundation soils.

The settlement evaluations indicate that embankment settlement is not considered a significant concern for Phase 2 embankments outside of the interchange areas. Based upon a comprehensive review of subsurface conditions, a critical soil profile and embankment height was selected for

each fill section for the purposes of performing settlement calculations. In addition, time-rate of settlement calculations have also been performed for fill sections with consolidation settlements of approximately 3 inches or more. The analyses and results are briefly discussed in the following sections. Settlement calculations are presented in Appendix C.

The elastic settlement of the embankment fill material itself should also be considered. Consolidation within an embankment will generally range from one to four percent of the embankment height. Assuming one percent consolidation, for a well-compacted fill, approximately 1.2 inches of settlement can be expected for every 10 feet of embankment fill. However, it is anticipated that most of this settlement will occur during construction.

Based upon the result of the settlement analyses, four embankment sections will have primary consolidation settlements of approximately 3 inches or more. A brief discussion of these analyses is presented in the following sections.

Summary of Settlement Analyses

Station	Boring	Approximate Maximum Fill (ft.)	Immediate Settlement (in.)	Consolidation Settlement (in.)
578+00	TR-9	49	3/4	1
600+00	R-516	91	2 1/2	5/8
610+00	R-526	68	2 5/8	1 3/4
617+50	R-538	90	2 1/2	5/8
623+50	R-553	77	3 1/4	Negligible
635+50	R-565	86	2	3/4
659+50	R-602	103	2 1/4	Negligible
672+00	R-618	100	3 1/4	1 3/4
681+50	R-628	77	Negligible	Negligible
693+00	R-640	150	3 7/8	Negligible
699+00	R-652	123	3 3/4	Negligible
717+50	TR-5	78	Negligible	1 3/4
749+00	R-694	94	1 1/2	Negligible
766+00	R-711	113	Negligible	4 1/2
771+00	R-715	117	3	2 7/8
795+50	R-742	122	Negligible	3
815+00	R-760	89	Negligible	3
854+50	R-788	65	Negligible	2
869+00	N/A	24	Negligible	Negligible

Settlement – Mainline Embankments, Station 766+00
The soil profile encountered by boring R-711 was assumed for the settlement analyses of this embankment section. An embankment height of 113.0 feet was also assumed for the analyses.

Settlement due to primary consolidation of the foundation soil is expected to be approximately 4 1/2 inches. In addition, the time needed to reach 90 percent of primary consolidation is expected to take an estimated 22 months. The elastic settlement of the foundation soils is expected to be negligible. Due to the relatively small magnitude of settlement, the use of wick drains or other means of accelerating the consolidation were not explored.

Settlement due to consolidation of the fill material itself was also considered. Consolidation within an embankment will generally range from one to four percent of the embankment height. Assuming one percent consolidation for a well-compacted fill, approximately 14 inches of settlement can be expected for a 113-foot high embankment. However, it is anticipated that most of this settlement will occur during construction.

Settlement – Mainline Embankments, Station 771+00
The soil profile encountered by boring R-715 was assumed for the settlement analyses of this embankment section. An embankment height of 116.5 feet was also assumed for the analyses.

Settlement due to primary consolidation of the foundation soil is expected to be approximately 2 7/8 inches. In addition, the time needed to reach 90 percent of primary consolidation is expected to take an estimated 17 months. In addition to consolidation settlement, the immediate (elastic) settlement of the foundation soil is estimated to be approximately 3 inches. Due to the relatively small magnitude of settlement, the use of wick drains or other means of accelerating the consolidation were not explored.

Settlement due to consolidation of the fill material itself was also considered. Consolidation within an embankment will generally range from one to four percent of the embankment height. Assuming one percent consolidation for a well-compacted fill, approximately 14 inches of settlement can be expected for a 116.5-foot high embankment. However, it is anticipated that most of this settlement will occur during construction.

Settlement – Mainline Embankments, Station 795+50
The soil profile encountered by boring C-80 was assumed for the settlement analyses of this embankment section. An embankment height of 122.0 feet was also assumed for the analyses.

Settlement due to primary consolidation of the foundation soil is expected to be approximately 3 inches. In addition, the time needed to reach 90 percent of primary consolidation is expected to take an estimated 13 months. The elastic settlement of the foundation soils is expected to be negligible. Due to the relatively small magnitude of settlement, the use of wick drains or other means of accelerating the consolidation were not explored.

Settlement due to consolidation of the fill material itself was also considered. Consolidation within an embankment will generally range from one to four percent of the embankment height. Assuming one percent consolidation for a well-compacted fill, approximately 15 inches of settlement can be expected for a 122-foot high embankment. However, it is anticipated that most of this settlement will occur during construction.

Settlement – Mainline Embankments, Station 815+00
The soil profile encountered by boring R-760 was assumed for the settlement analyses of this embankment section. An embankment height of 89.0 feet was also assumed for the analyses.

Settlement due to primary consolidation of the foundation soil is expected to be approximately 3 inches. In addition, the time needed to reach 90 percent of primary consolidation is expected to take an estimated 11 months. The elastic settlement of the foundation soils is expected to be negligible. Due to the relatively small magnitude of settlement, the use of wick drains or other means of accelerating the consolidation were not explored.

Settlement due to consolidation of the fill material itself was also considered. Consolidation within an embankment will generally range from one to four percent of the embankment height. Assuming one percent consolidation for a well-compacted fill, approximately 11 inches of settlement can be expected for a 89-foot high embankment. However, it is anticipated that most of this settlement will occur during construction.

5.4.2.2 Additional Settlement Recommendations

It should be emphasized that the time of consolidation estimates are based on the assumption that the initial embankment construction will consist of at least 6 feet of free-draining granular material placed over the entire fill foundation area as previously discussed. Groundwater seepage, overexcavation, and removal of unsuitable soils should be anticipated within the interchange areas. Consequently, it may be necessary to utilize additional granular material or end-dumped rock in order to establish a dry and stable fill foundation.

Based on the results of calculations outlined above, excessive settlements are not anticipated for the Phase 2 embankments from station 575+00 to 872+00. Although settlement is not a significant concern in this area, general recommendations are included for accelerating or mitigating settlements.

The most cost effective method for dealing with the potentially excessive settlement would be to surcharge the embankment foundations prior to construction. Monitoring equipment should be installed to measure the rate/amount of settlement and normal fill operations should begin when an acceptable degree of consolidation is achieved. However, given the anticipated construction schedule, it will likely be necessary or desirable to either reduce the amount of settlement in these areas or to accelerate the time of consolidation within the embankment foundation. One option that exists to reduce the amount of settlement would be to consider additional overexcavation and replacement of the existing soft and/or organic soils. Alternately, wick drains could be considered in order to accelerate the time of consolidation of the embankment foundation.

Even if wick drains are to be considered, it is still recommended that the initial embankment construction consist of at least 6 feet of free-draining granular material placed over the entire fill foundation area. This will allow better dissipation of excess pore pressures that may occur and will also provide drainage for the outflow from the wick drains. In addition, the wick drain installation should be performed by a contractor who specializes in their installation.

5.4.3 Potential Areas of Instability – State Route 823 Mainline

The hillsides and natural slopes along the Phase 2 alignment range from very steep with thin soil cover and colluvium to hummocky, undulating hills with varying depths of overburden. Generally, the dominant rock type along the proposed Phase 2 alignment is sandstone of the Mississippian aged Logan Formation. However, in several locations siltstone and shale are commonly found interbedded with the sandstone. These siltstones and shales generally weather to clays with low shear strengths. The low shear strengths of the residual and colluvial soils combined with the steep topography makes some of the hillsides within the proposed limits of construction prone to landslides.

Thirteen inactive landslides were observed along the proposed Phase 2 alignment. Inclinometers were installed at four of the thirteen locations and monitored throughout the duration of the investigation. These four locations were considered to be the most critical areas, based upon observations noted during field reconnaissance. None of the inclinometers showed movement throughout the duration of the two-year investigation. The locations of the inclinometers can be

found on the land use and reconnaissance notes plans in Appendix A of the Report of Geology and Field Reconnaissance, dated November 16, 2006, submitted separately.

Field indicators of instability included displaced or misshapen trees, debris piles on lower portions of the slope, and visible scarps. Most slope instability appeared to be relatively shallow soil creep contained within the overburden, in most cases less than 10 feet of colluvial soil. However, drilling in several of these landslides indicated significantly more overburden.

In the steep terrain of Scioto County, soil creep is common and is often exacerbated by construction of side hill logging roads and the erosion associated with logging activities. Also, in many of the hollows and valleys that the alignment crosses, small streams gradually undercutting the toe of the steep slopes further destabilize the soil. In the areas where slope instability was observed, the unstable mass will be stabilized by special benching during embankment construction or removed during excavation for cut slopes.

Areas of slope instability were first identified using survey grade contour mapping and aerial photography. Areas of slope instability were then verified during the fieldwork by identification of surface features. All areas of slope instability are shown on the land use and reconnaissance notes in Appendix A of the Report of Geology and Field Reconnaissance. The following paragraphs discuss each area of slope instability in greater detail.

Station 616+80 to 618+00
This area is steep and hummocky, and is likely a shallow landslide. An intermittent stream has undercut the toe of the slope. There is considerable erosion from past logging operations.

Station 623+50
This area has slopes of 2H:1V or steeper and is likely a shallow landslide. Two intermittent streams have eroded the slope. There is also erosion from past logging operations.

Station 646+75 to Station 650+00
This area is likely a shallow landslide. A small intermittent stream has eroded the slope. Logging operations have contributed to the slope movement in this area.

Station 656+00 to Station 664+00
This is a large area of instability, encompassing most of a steep valley. The valley has slopes of 2H:1V or steeper. A perennial stream drains the valley and has undercut the slopes on both sides in several places. Several intermittent streams and logging activities have also eroded the slopes on both sides of the valley. Two inclinometers were installed in this valley when drilling showed the overburden to be

up to 30 feet at mid slope locations. Monitoring of the inclinometers during the investigation showed no measurable movement at these locations.

Station 670+50 to Station 673+50
This area is steep and hummocky. The area of instability encompasses most of a small drainage basin. An intermittent stream has eroded the toe of the slopes in this area. An inclinometer was installed at station 673+36.1, 44.1 feet left of the proposed centerline, but showed no movement during monitoring.

Station 680+00 to Station 682+00
This area has slopes steeper than 2H:1V. Two small intermittent streams have eroded the slope. There is also erosion from past logging operations. An inclinometer was installed at station 680+71.2, 152.5 feet left of the proposed centerline, but showed no movement during monitoring.

Station 689+00 to Station 695+00
This area is also steep and hummocky. The area of instability encompasses most of a small drainage basin. An intermittent stream has eroded the toe of the slopes in this area. There is also erosion from past logging operations.

Station 696+50 to Station 702+75
This area has slopes of steeper than 2H:1V and includes a relatively large drainage basin. A perennial stream has eroded the toe of the slopes in the area. There is also extensive erosion from past logging operations. Inclinometers were installed at station 698+30, 214 feet left of the proposed centerline and at station 700+67.2, 80.3 feet left of the proposed centerline. No movement was detected during monitoring of the inclinometers.

Station 760+50 to Station 766+10 and Station 760+50 to Station 766+10
This is a large area of instability that was possibly caused by construction of extensive logging roads and the resulting erosion. The areas of instability are likely shallow and contained in the relatively thin overburden in the area.

Station 779+00 to Station 786+50
This area of instability may have also been caused by construction of extensive logging roads and the resulting erosion. The areas of instability are probably shallow and contained in the relatively thin overburden in the area.

Station 790+75 to Station 796+75
This steep area of instability was likely caused by construction of extensive logging roads, clear cutting, and the resulting erosion. The areas of instability are also probably shallow and contained in the relatively thin overburden in the area.

Station 808+75 to Station 828+25
This large area of instability has slopes of 3H:1V or steeper and is likely a shallow landslide. Construction of extensive logging roads and the resulting erosion were likely contributing factors to the instability in this area. There is also a perennial stream that has undercut the toe of the slopes in the area.

Station 834+50 to Station 848+75
This large area of instability has slopes of 2H:1V or steeper and is likely a shallow landslide. Several small intermittent streams have eroded the slope. In addition, erosion from past logging operations was also probably a contributing factor to the instability in this area.

5.5 Soil Cuts

Within the Phase 2 area, several cut sections will be required to construct the proposed roadway. Most of the proposed cuts will be in rock. However, several of the cut slopes will be in soil.

Based upon the results of borings drilled for the Phase 2 project area, it is anticipated that soils in a majority of the cut sections will be only a few feet thick and not likely to become unstable. In addition, a few feet of soil will likely be encountered at the transition zones from cut to fill sections. The soils at most of these transitions are also not likely to be unstable. However, four cut sections were analyzed for stability using the recommended slopes for the analyzed cut sections. These sections were chosen for analysis based upon the depth of the soil cut, the strength characteristics of the soil, and the slope geometry.

It should be noted that the analysis of the drained condition resulted in an infinite slope-type failure. Consequently, specified failure surfaces were assumed. The analyses assuming the specified surfaces resulted in factors of safety of 1.3 or greater. A brief discussion of the results of these analyses is presented in the following paragraphs. The results of the slope stability analyses are provided in Appendix B.

Station 662+00
In the area of station 662+00, cross sections indicate that a soil cut up to 20 feet deep will be required for the construction of the proposed roadway. This section was analyzed assuming that 2H:1V slopes would be used in the soil cut.

Boring R-606 encountered very stiff to hard sandy silt (A-4a) to a depth of 13.5 feet below the ground surface. Below this layer, cohesionless, medium dense sandy silt (A-4a) was generally encountered to a depth of 21.0 feet below the ground surface, at the top of sandstone bedrock.

The results of the analyses indicate the factors of safety for the soil cut slopes in the are above the minimum required values, provided that they are constructed using 2H:1V or flatter slopes.

Station 826+50

In the area of station 826+50, cross sections indicate that a soil cut up to 44 feet deep will be required for the construction of the proposed roadway. This section was analyzed assuming that 2H:1V slopes would be used in the soil cut.

Boring R-765 encountered very stiff to hard sandy silt (A-4a) to a depth of 15.5 feet below the ground surface. Below this layer, very stiff to hard silt and clay (A-6a) was generally encountered to a depth of 28.0 feet below the ground surface, at the top of shale and sandstone bedrock.

The results of the analyses indicate the factors of safety for the soil cut slopes in the are above the minimum required values, provided that they are constructed using 2H:1V or flatter slopes.

Station 861+00

In the area of station 861+00, cross sections indicate that a soil cut up to 24 feet deep will be required for the construction of the proposed roadway. This section was analyzed assuming that 2H:1V slopes would be used in the soil cut.

Boring R-794 encountered soils consisting of hard sandy silt (A-4a) to clay (A-7-6) to a depth of 10.5 feet below the ground surface. Below this layer, stiff silt (A-4b) was generally encountered to a depth of 18.5 feet below the ground surface, at the top of shale and sandstone bedrock.

The results of the analyses indicate the factors of safety for the soil cut slopes in the are above the minimum required values, provided that they are constructed using 2H:1V or flatter slopes.

Station 884+00

In the area of station 884+50, cross sections indicate that a soil cut up to 43 feet deep will be required for the construction of the proposed roadway. This section was analyzed assuming that 2H:1V slopes would be used in the soil cut.

Boring R-806 encountered soils consisting of stiff silt and clay (A-6a) to hard silty clay (A-6b) to a depth of 18.0 feet below the ground surface. Below this layer, medium dense sandy silt (A-4a) and silt (A-4b) was generally encountered to a depth of 37.0 feet below the ground surface, at the top of shale and sandstone bedrock.

The results of the analyses indicate the factors of safety for the soil cut slopes in the are above the minimum required values, provided that they are constructed using 2H:1V or flatter slopes.

5.6 Rock Cuts

Approximately 4.1 miles of the Phase 2 mainline alignment is anticipated to be located in cuts. The vast majority of these cuts will be in rock. As currently planned, cuts up to 251 feet deep fill be required to construct the proposed roadway. In accordance with ODOT's Geotechnical Bulletin Number 3 (GB-3) "Rock Cut Slope & "Catchment Design", Phase 2 rock cuts have been evaluated. For information pertaining to the rock cut slopes, please refer to our Report of Rock Cut Slopes for Project SCI-823-10.13, dated November 16, 2007.

5.7 Construction Considerations

5.6.1 General

Based on the provided plans, profiles, and cross section drawings, the new roadway will consist of several cuts as well as embankment fills. All work should be performed in accordance with ODOT CMS, (Current Edition). Special care should be taken to ensure that the requirements of the CMS are met so that stable embankments are constructed.

5.6.2 Subgrade Preparation

Silt (A-4b) was encountered at the existing ground surface at several boring locations in the Phase 2 area. Whenever silt is encountered at the subgrade level, it should be overexcavated to at least three feet below subgrade and replaced with suitable, compacted fill. Additionally, no silt (A-4b) should be placed within three feet of subgrade in embankment fill sections.

Although no borings considered for this report encountered elastic silt (A-7-5), it was encountered in a boring drilled for the Lucasville-Minford Road Interchange. Consequently, the contractor should be prepared to overexcavate and replace any unsuitable material with compacted granular fill.

5.6.3 New Embankment Construction

ODOT CMS Item 201 "Clearing and Grubbing" should be completed across the entire portion of the embankment foundation. The foundation should be compacted to at least 95% of the Standard Proctor value as outlined in ODOT CMS section 203.05. Also, it is recommended that the foundation soils be proof rolled (ODOT Item 204.06) prior to placement of any embankment materials. Any soft, yielding areas should be undercut to firm material and replaced with controlled, engineered

fill. If seeps are encountered, spring drains should be installed to reduce the potential for the fill to become saturated in the future.

Prior to beginning normal embankment fill operations, it is recommended that the initial embankment construction consist of at least 6 feet of free-draining granular material placed over the entire fill foundation area. This material will allow the drainage of the foundation soils, not inhibit the time-rate of consolidation, and will also provide a stable surface upon which normal fill operations can begin.

At the time this report was prepared, it was not known if borrow sources outside of the durable rock from the cut sections would be used as fill material. If glacial outwash materials are utilized as the fill, any large durable cobbles or boulders greater than 8 inches in any dimension that cannot be broken down should be segregated and not be incorporated into the lift. In addition, any soil classified as silt (A-4b) should not be used as fill.

5.6.4 Embankment Drainage

All embankments and side hill fills should have a drainage layer in the lower portion of the fill, at the foundation soil-fill interface. This drainage layer should consist of a minimum of six feet of free-draining, durable, rock fill as defined in ODOT CMS, Item 203.6.C and Item 703.16.C.

If springs or seeps are encountered during construction, the flow should be collected within the embankment drainage layer or directed to the embankment drainage layer with a ditch or a trench drain. A typical trench drain should be a minimum of one foot in width, with a depth and grade suitable for positive drainage. Six inches of concrete sand (ODOT Item 703.02) should be placed in the bottom of the trench, then a six-inch diameter, fabric-wrapped, perforated PVC pipe should be placed on top of the sand layer. The trench should then be backfilled to the surface with concrete sand.

All ponds that lie within the footprint of a planned embankment should be drained, and all "muck" and unsuitable material removed. Ponds may require benching as set forth in ODOT CMS Item 203.05 or placement of a spring or seep drain prior to embankment fill placement. Ponds known to have a spring and requiring a spring drain are indicated as spring-fed ponds on the plans.

5.6.5 Rock Excavation

It is anticipated that rock excavation will be required for the roadway construction as indicated in Section 5.5. In addition, sandstone and shale bedrock was encountered at the subgrade elevations indicated in Section 5.2.2. Due to the hardness of the rock and the length of the proposed alignment, blasting will likely be needed to excavate

the rock. Rock encountered at the subgrade elevation should be undercut and replaced by controlled, engineered fill as outlined by ODOT CMS Item 204.05.

5.6.6 GB-2 Special Benching

The roadway cross-sections were analyzed in accordance with Ohio Department of Transportation's Office of Geotechnical Engineering, Geotechnical Bulletin 2 (GB-2), released February 7, 2006. ODOT specifications require that any sidehill fill on an existing slope steeper than 8H:1V be benched according to the ODOT Construction and Material Specifications, Item 203.05 (2005). The ODOT Office of Geotechnical Engineering recommends special benching on existing slopes 4H:1V or steeper. Special benching is used to improve the constructibility and stability of the proposed embankment. Special benching is always shown on the cross-sections in the project plans and never on a typical cross-section. Whenever special benching is used, Plan Note G110 from the ODOT Location and Design Manual, Volume 3, needs to be included in the general notes.

Construction along the proposed phase 2 alignment will consist of sidehill fills of more than 60 feet. The existing slopes range from nearly flat to steeper than 2H:1V. In some cases, the existing ground surface is steeper than 4H:1V and relatively thin sliver fills will be placed. In order to increase the performance of the embankments in these areas, special benching recommended at the locations listed in the table below.

Areas Requiring GB-2 Special Benching

Beginning Station	End Station
617+50	619+50
621+00	622+00
637+50	637+50
648+00	648+00
690+50	700+00
725+00	725+00
744+50	749+00
760+50	760+50
763+50	765+50
767+00	770+00
795+00	796+50
812+00	813+50
817+00	822+50
850+50	851+00
853+00	854+00
856+50	857+00

All embankment fill should be placed in accordance with ODOT CMS Items 203.6: Spreading and Compacting and 203.7: Compaction and Moisture Requirements. The majority of the material to be excavated from the benching operation should be acceptable material for embankment fill. However, the material may have excessive moisture contents and may require moisture adjustments prior to compaction.

5.8 Excavation and Groundwater Considerations

Seepage and groundwater conditions are variable across the Phase 2 location. The Contractor should be prepared to keep excavations reasonably dry, such as with sumping and pumping. The Contractor should also be prepared to deal with unexpected seepage and precipitation that enters any excavations. Please refer to section 4.5 of this document, and the boring logs in Appendix A, for more information concerning seepage and groundwater levels.

Excavations deeper than 4 feet must be laid back or braced to protect workers entering the excavations. All excavations should be constructed in accordance with applicable local, state, and federal safety regulations including the current OSHA Excavation and Trench Safety Standards (29 CFR Part 1926). Slopes or bracing for excavations 20 feet or more in depth must be designed by a registered professional engineer.

5.9 Geotechnical Design Checklists

The geotechnical design checklist applicable to this report is included in Appendix D.

6.0 CLOSING REMARKS

You are encouraged to discuss with us any questions you may have concerning the findings, conclusions, and recommendations presented in this report. Please do not hesitate to call if we can be of further assistance.

Sincerely,

DLZ OHIO, INC.

Steven J. Riedy
Geotechnical Engineer

Pete Nix, P.E.
Geotechnical Division Manager

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APPENDIX A

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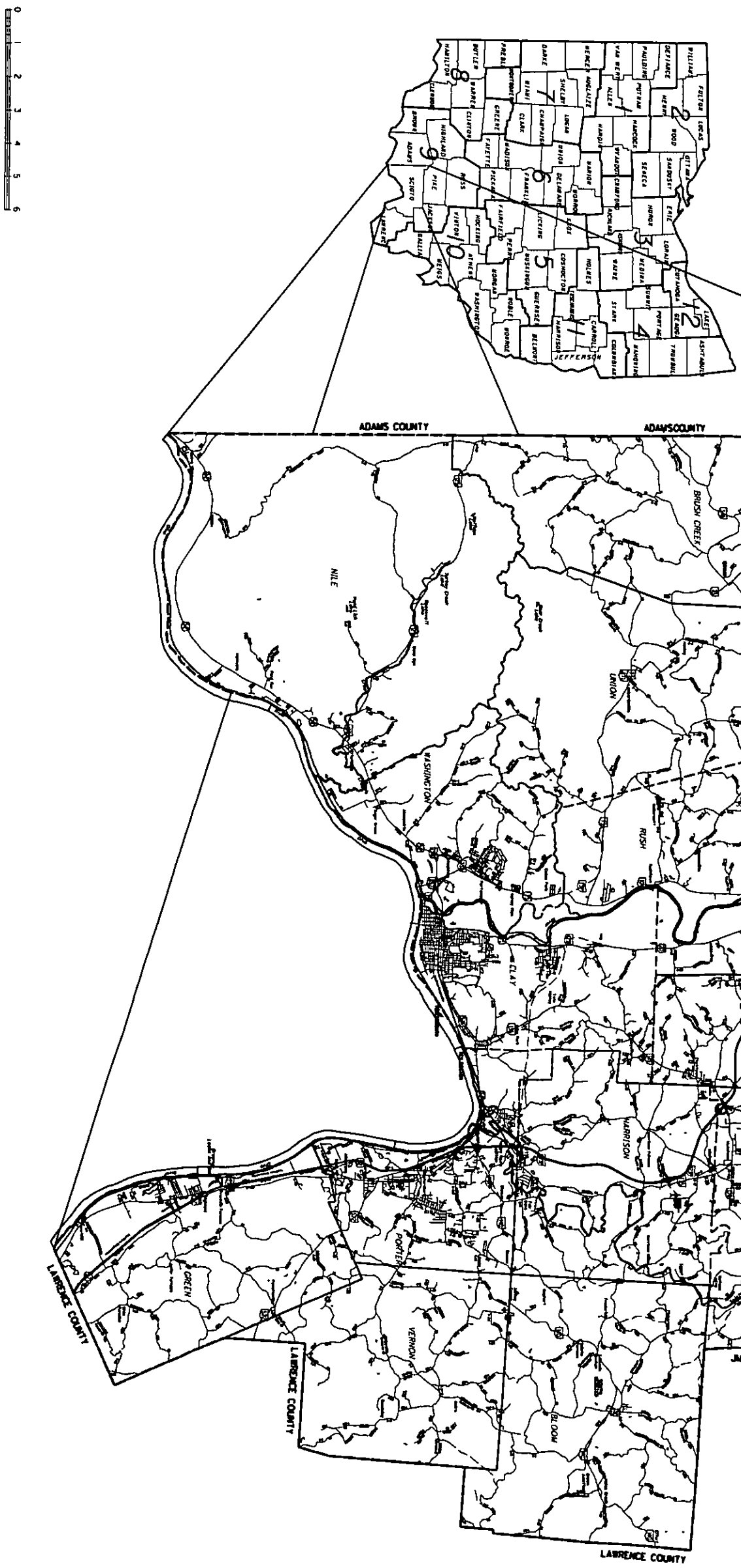
APPENDIX A

Project Location Plan
Boring Location Plan
General Information – Drilling Procedures and Logs of Borings
Legend – Boring Log Terminology
Boring Logs –One Hundred Sixty-nine (169) Borings



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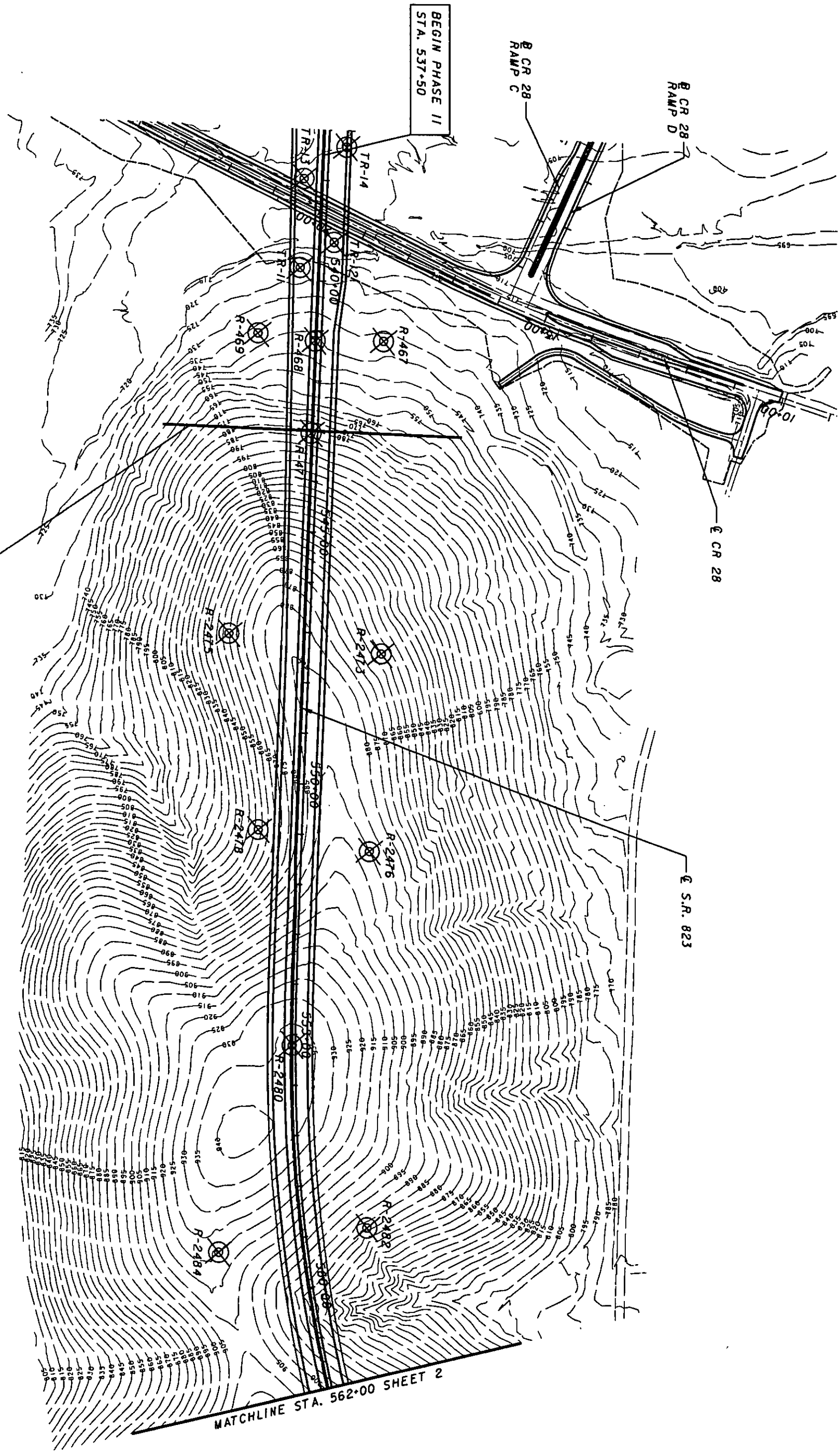
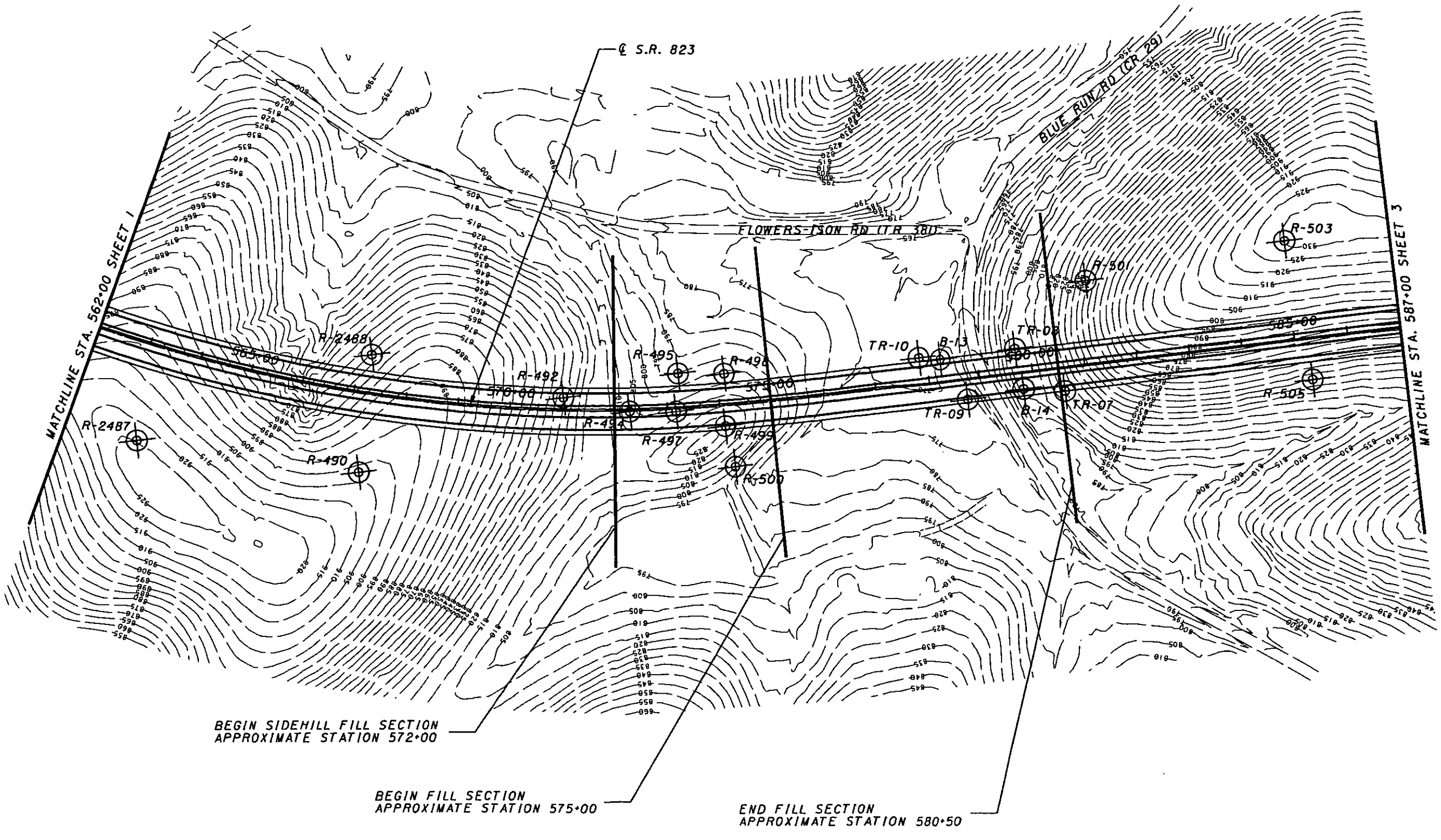


7 of 15	SCI-823-10.13	PHASE 2 - BORING PLAN S.R. 823 STA. 537+50 TO STA. 562+00	CALCULATED RLS CHECKED SJR	0 100 50 200 SCALE IN FEET



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CALCULATED RLS
CHECKED SJR

PHASE 2 - BORING PLAN
S.R. 823 STA. 562+00 TO STA. 587+00

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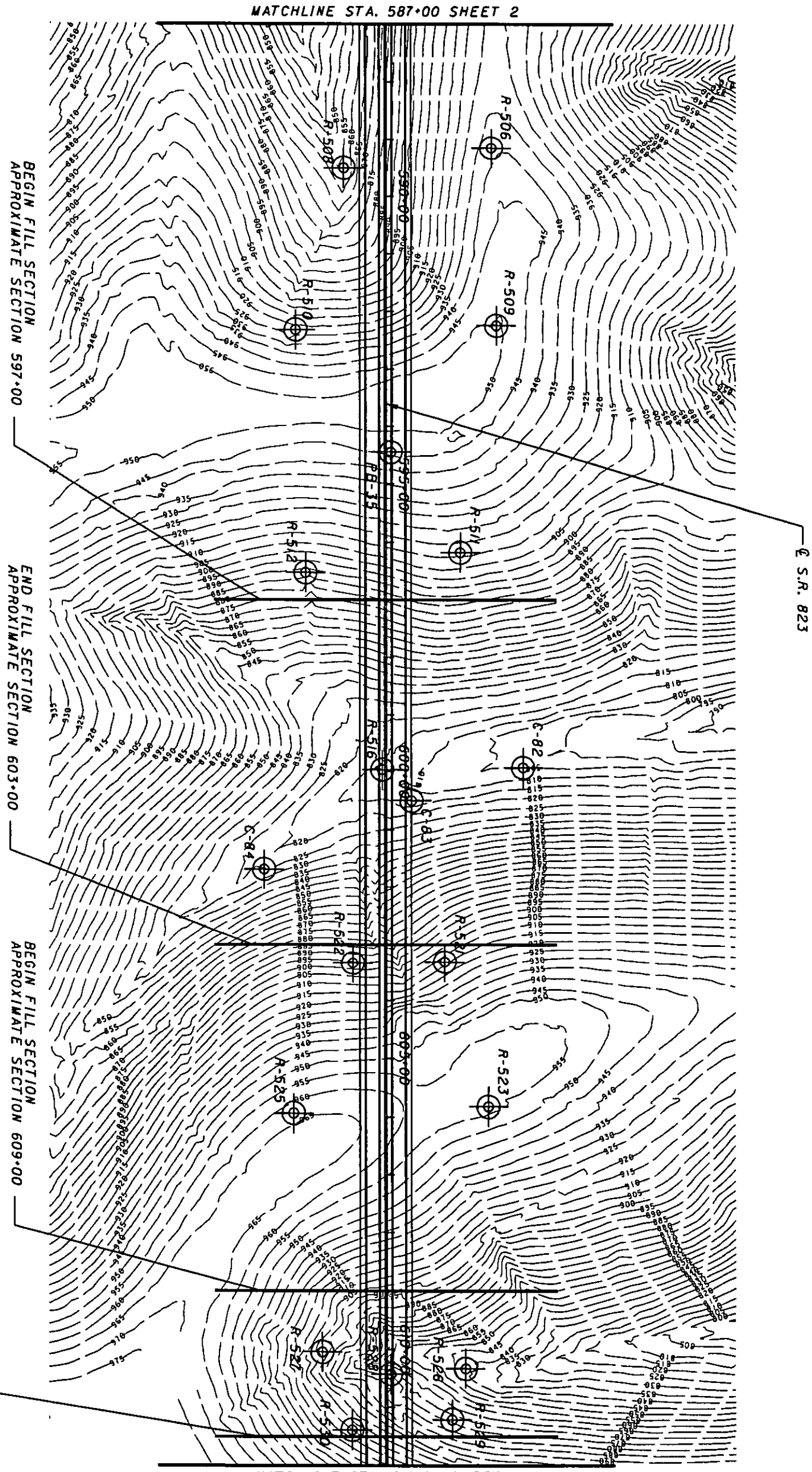

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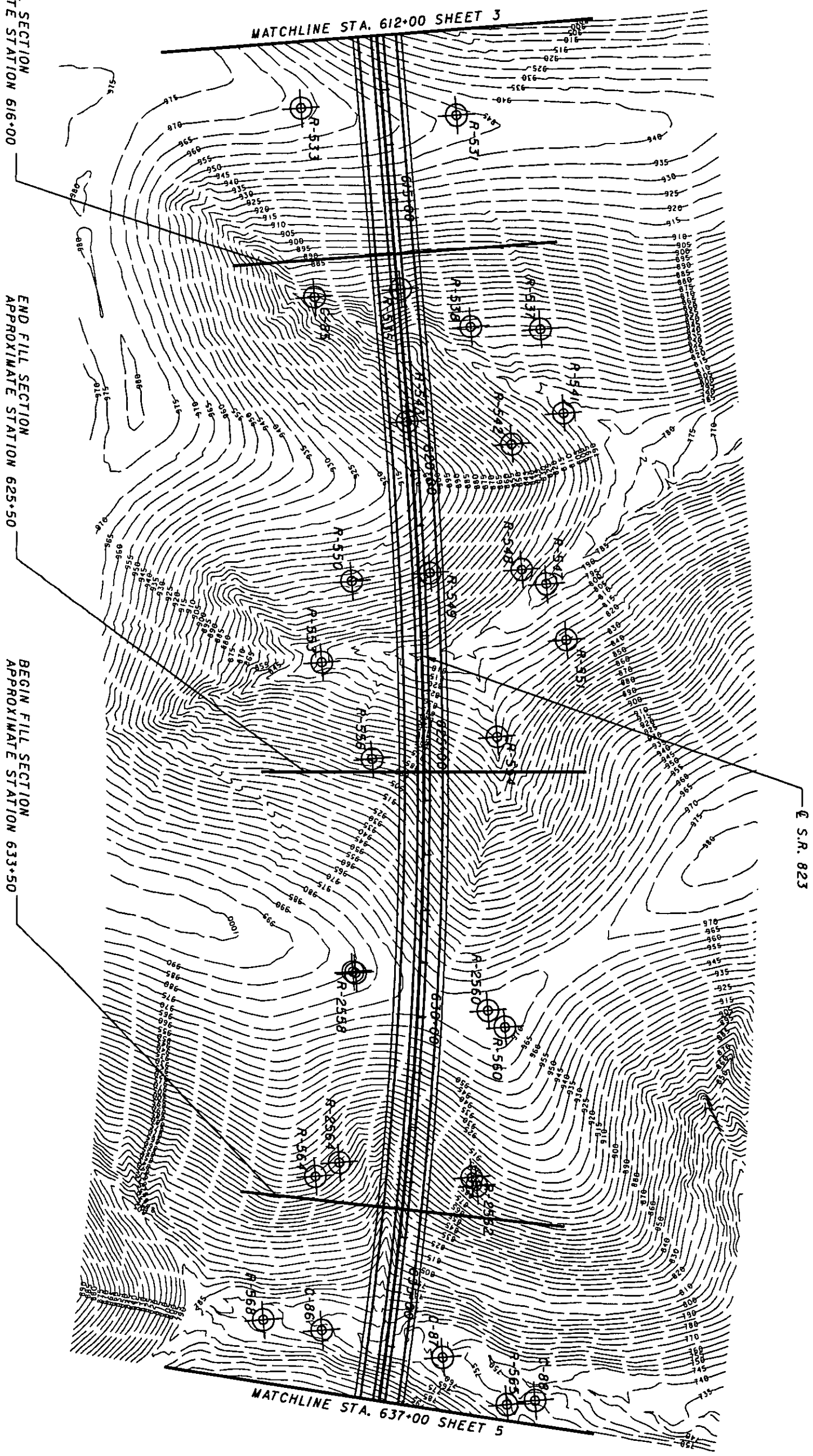

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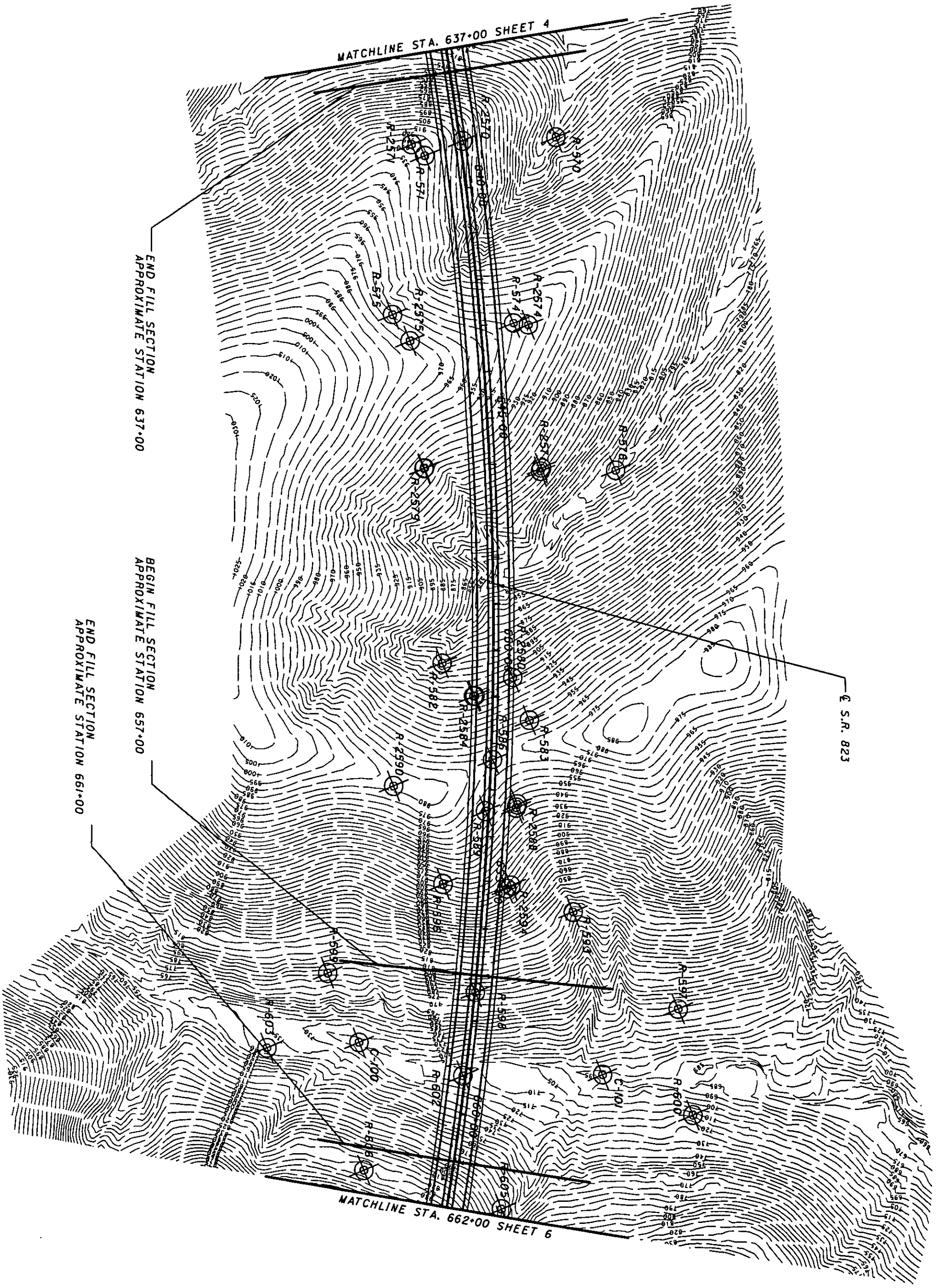

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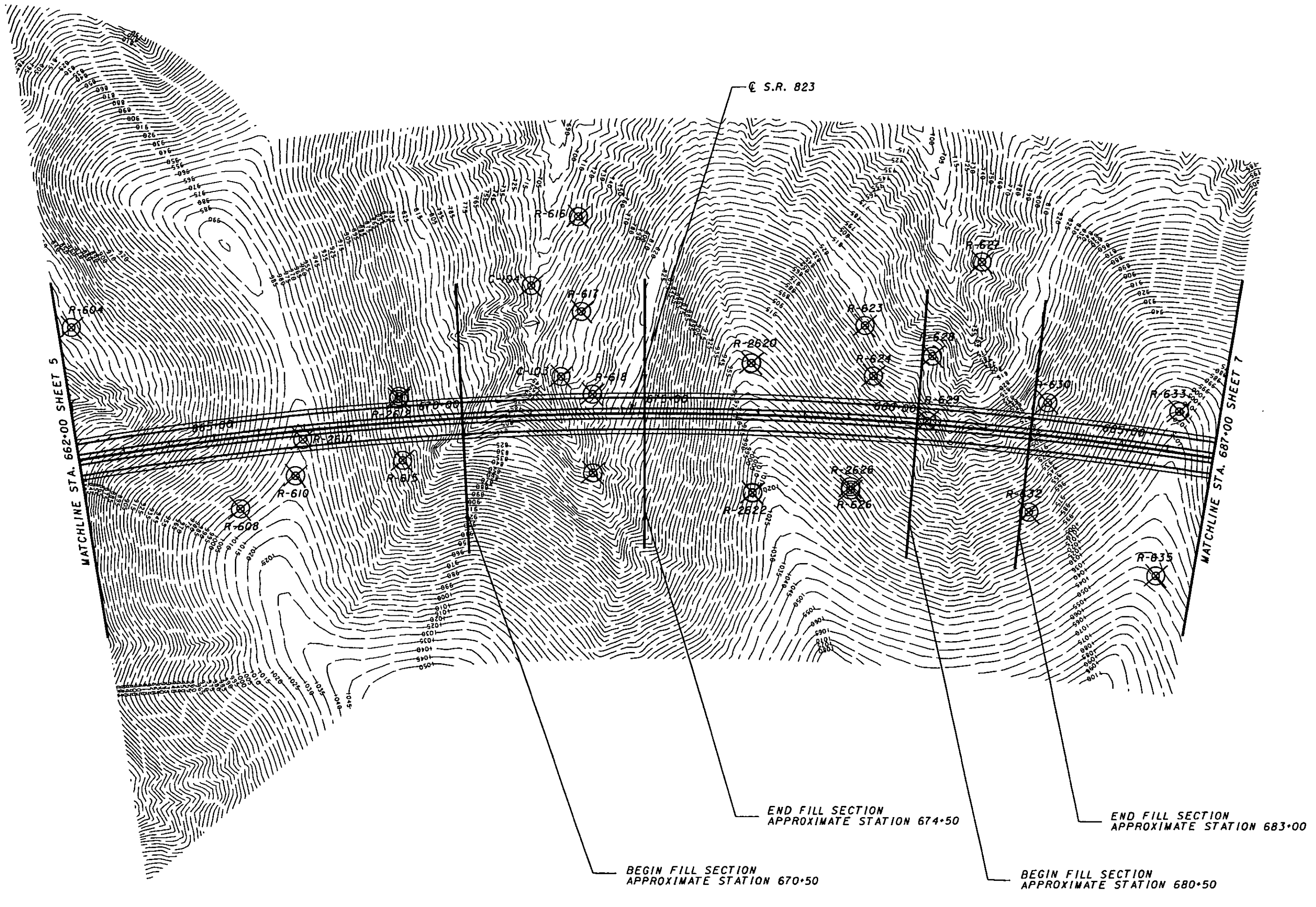

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SCALE IN FEET

PHASE 2 - BORING PLAN
S.R. 823 STA. 662+00 TO STA. 687+00

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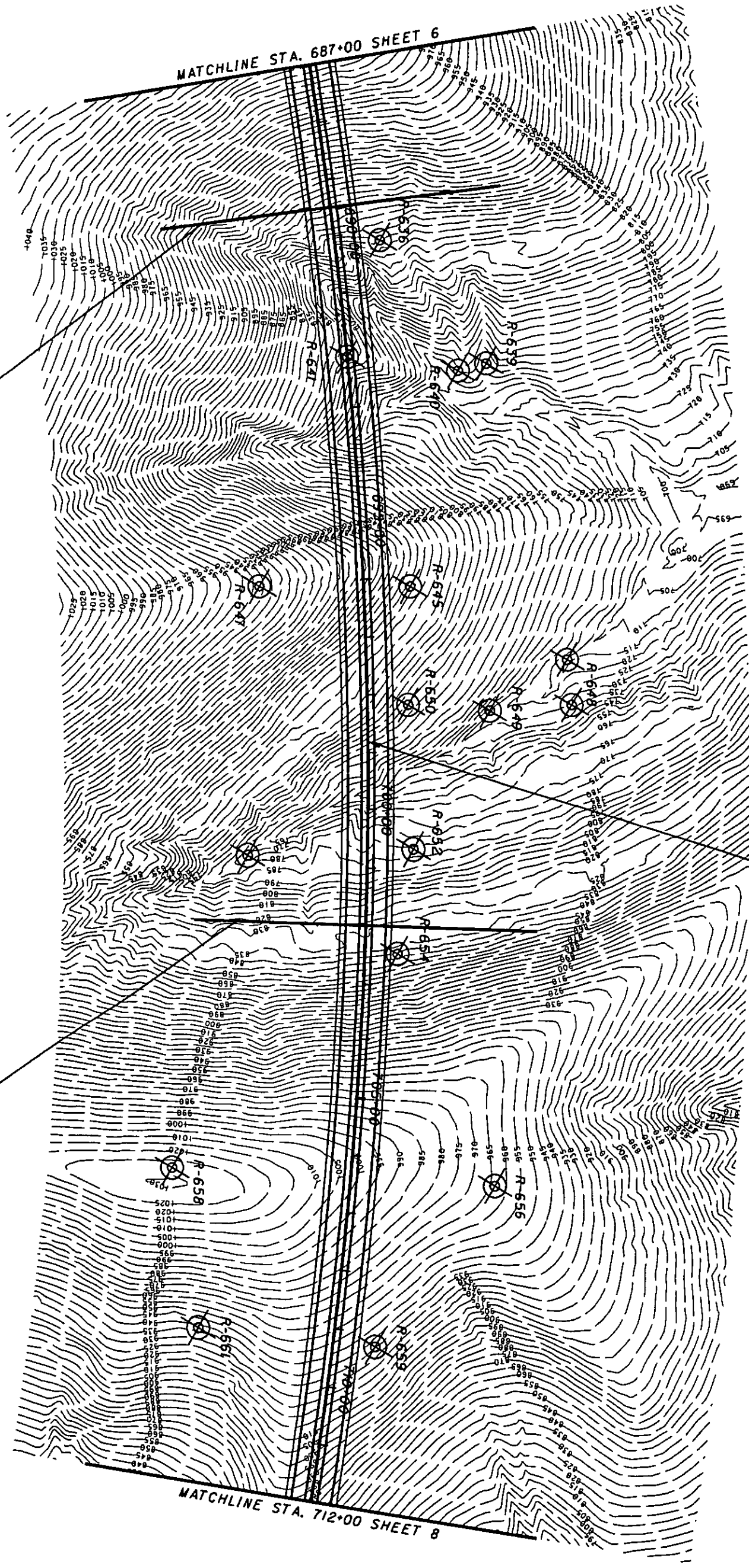

7/15	SCI-823-10.13	PHASE 2 - BORING PLAN S.R. 823 STA. 687+00 TO STA. 712+00	CALCULATED RLS CHECKED SJR	0 100 50 200 SCALE IN FEET

MORRIS LANE-
BLUE RUN RD (CR 54)

℄ S.R. 823

MATCHLINE STA. 712+00 SHEET 7

MATCHLINE STA. 737+00 SHEET 9

R-662 B-18 TR-06 B-21 B-23 R-668 R-671 R-674 R-677

R-666 B-19 B-20 B-22 TR-04 R-672 R-675

R-661 TR-05 R-679

725+00 730+00 735+00

BEGIN FILL SECTION
APPROXIMATE STATION 714+50

END FILL SECTION
APPROXIMATE STATION 725+00

SCALE IN FEET
0 50 100 200

CALCULATED RLS
CHECKED SJR

PHASE 2 - BORING PLAN
S.R. 823 STA. 712+00 TO STA. 737+00

SCI-823-10.13

8 / 15

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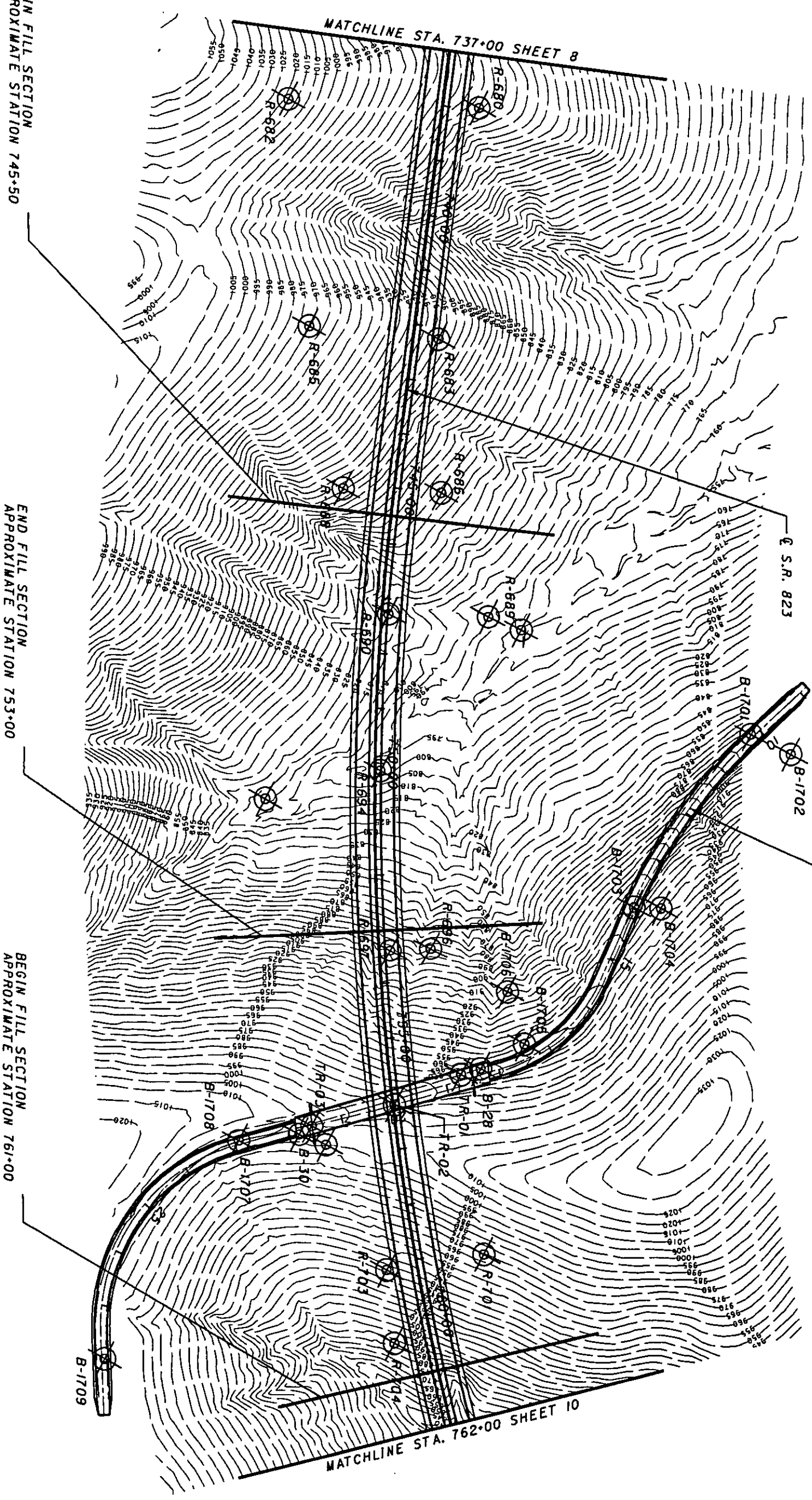

9 / 15	SCI-823-10.13	PHASE 2 - BORING PLAN S.R. 823 STA. 737+00 TO STA. 762+00	CALCULATED RLS CHECKED SJR	0 100 50 200 SCALE IN FEET

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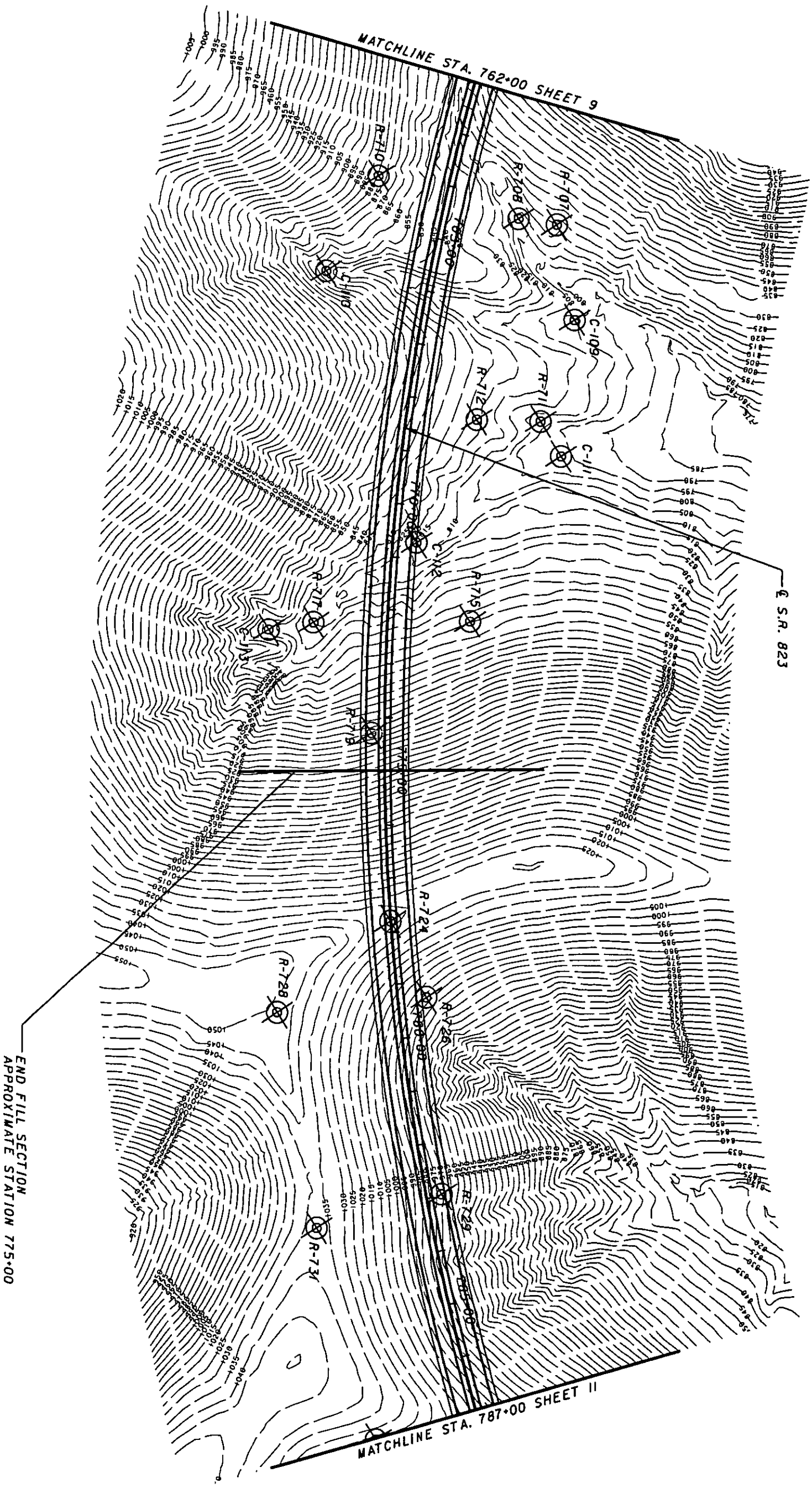
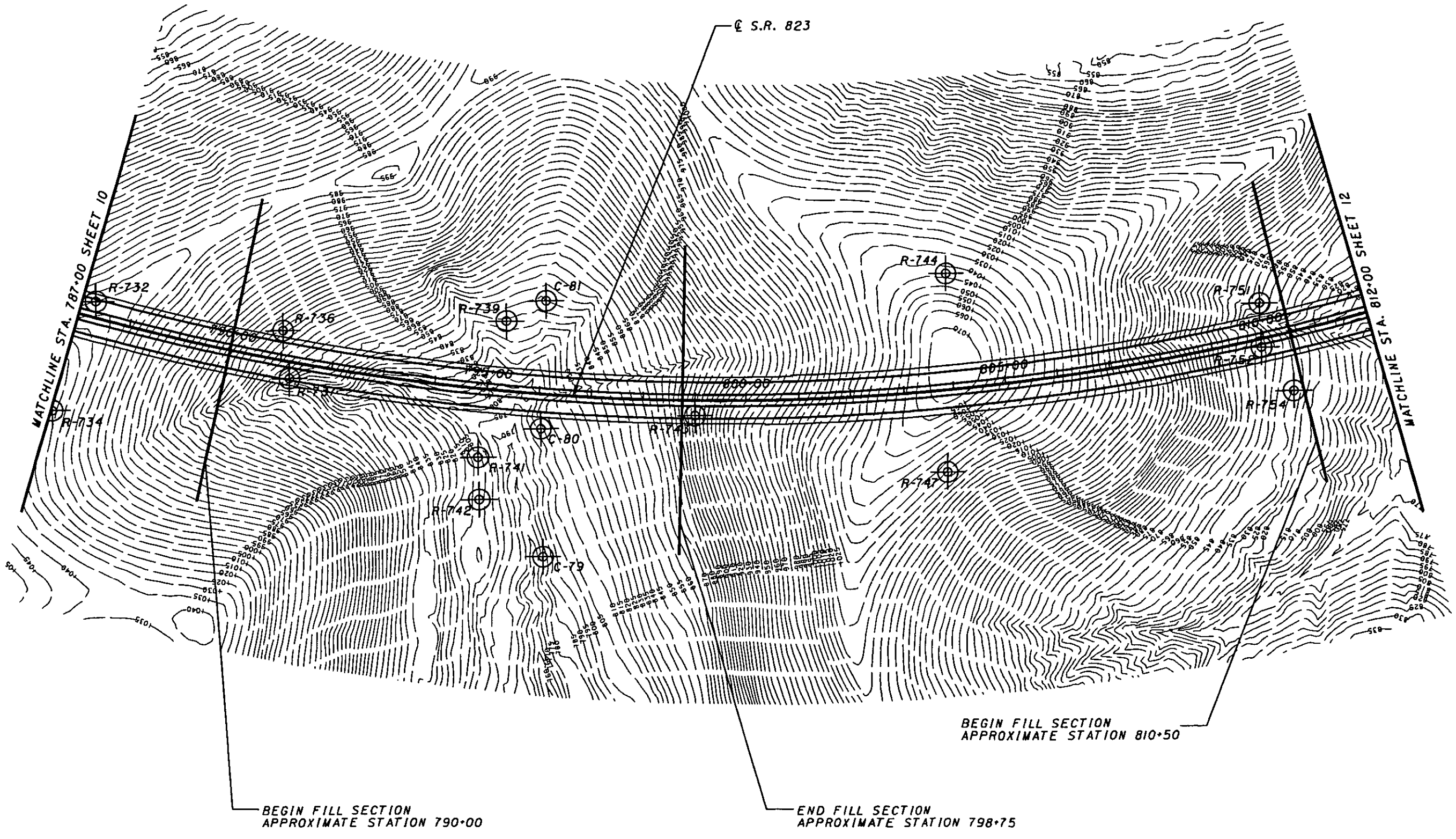


10/15	SCI-823-10.13	PHASE 2 - BORING PLAN S.R. 823 STA. 762+00 TO STA. 787+00	CALCULATED RLS CHECKED SJR	0 100 50 200 SCALE IN FEET



PHASE 2 - BORING PLAN
S.R. 823 STA. 787+00 TO STA. 812+00

SCALE IN FEET
0 50 100 200

CALCULATED RLS
CHECKED SJR

SCI-823-10.13

11 / 15

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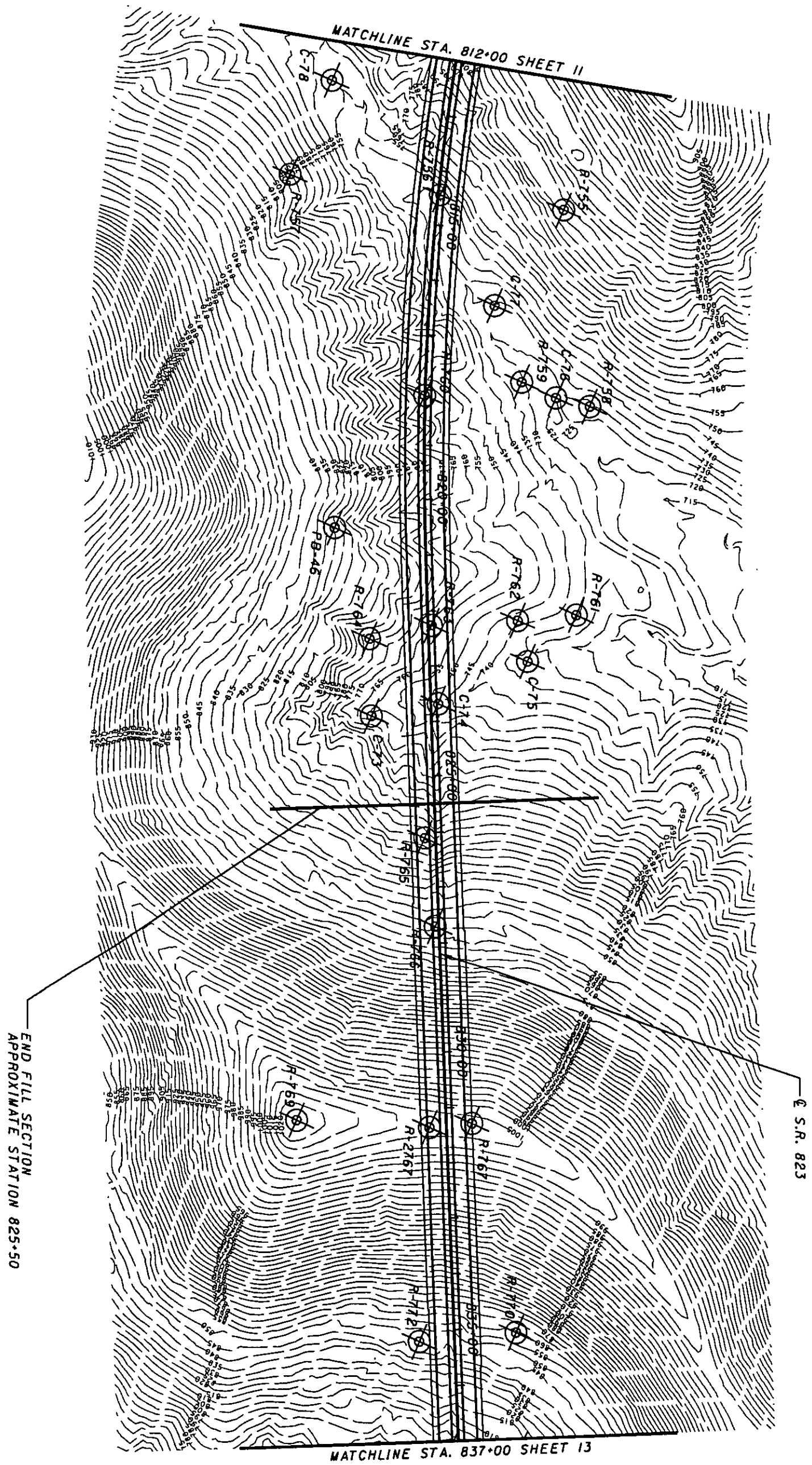
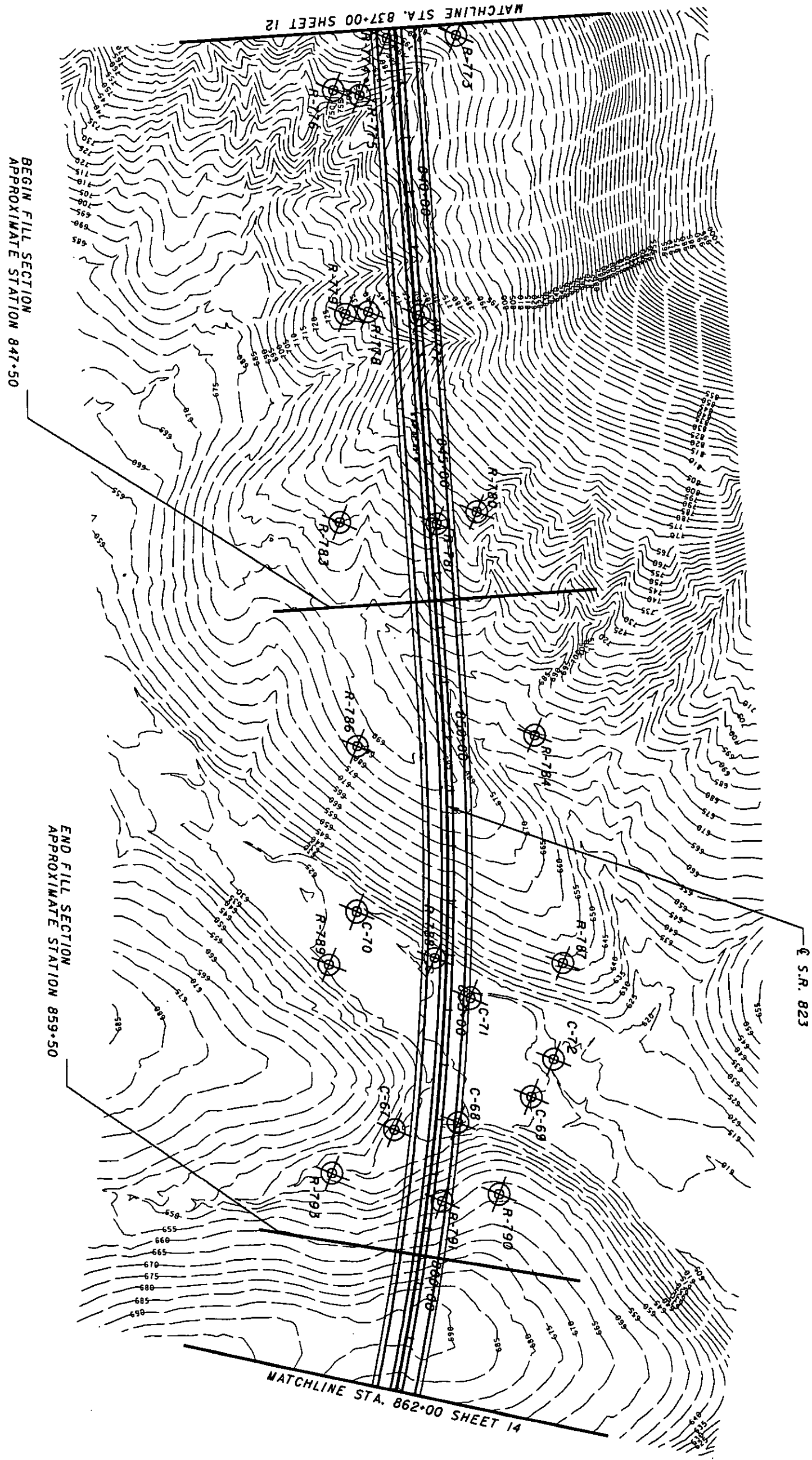


12/15	SCI-823-10.13	PHASE 2 - BORING PLAN S.R. 823 STA. 812+00 TO STA. 837+00	CALCULATED RLS CHECKED SJR	0 100 50 200 SCALE IN FEET



13/15	SCI-823-10.13	PHASE 2 - BORING PLAN S.R. 823 STA. 837+00 TO STA. 862+00	CALCULATED RLS CHECKED SJR	0 100 50 200 SCALE IN FEET

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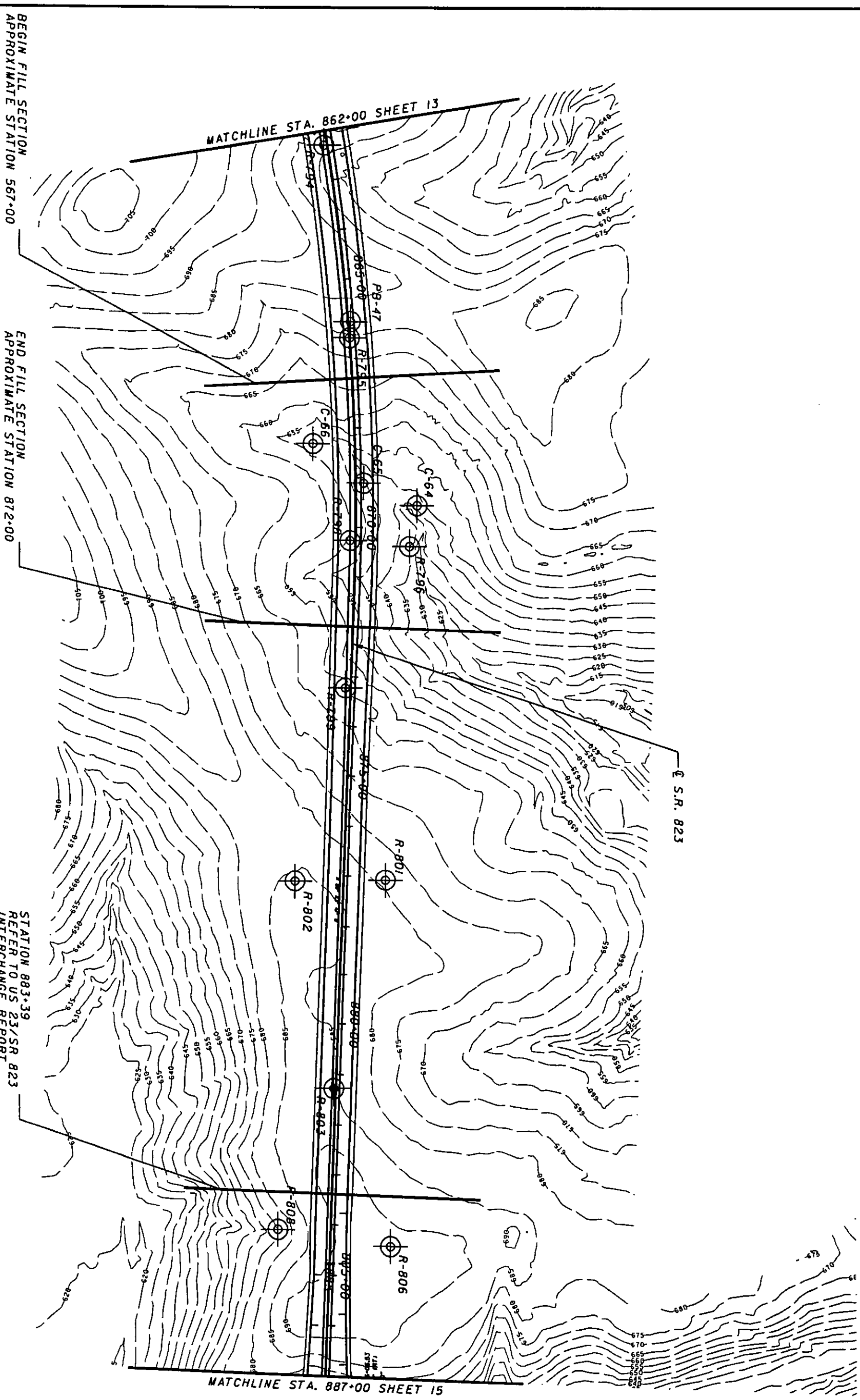

14/15	SCI-823-10.13	PHASE 2 - BORING PLAN S.R. 823 STA. 862+00 TO STA. 887+00	CALCULATED RLS CHECKED SJR	0 100 50 200 SCALE IN FEET

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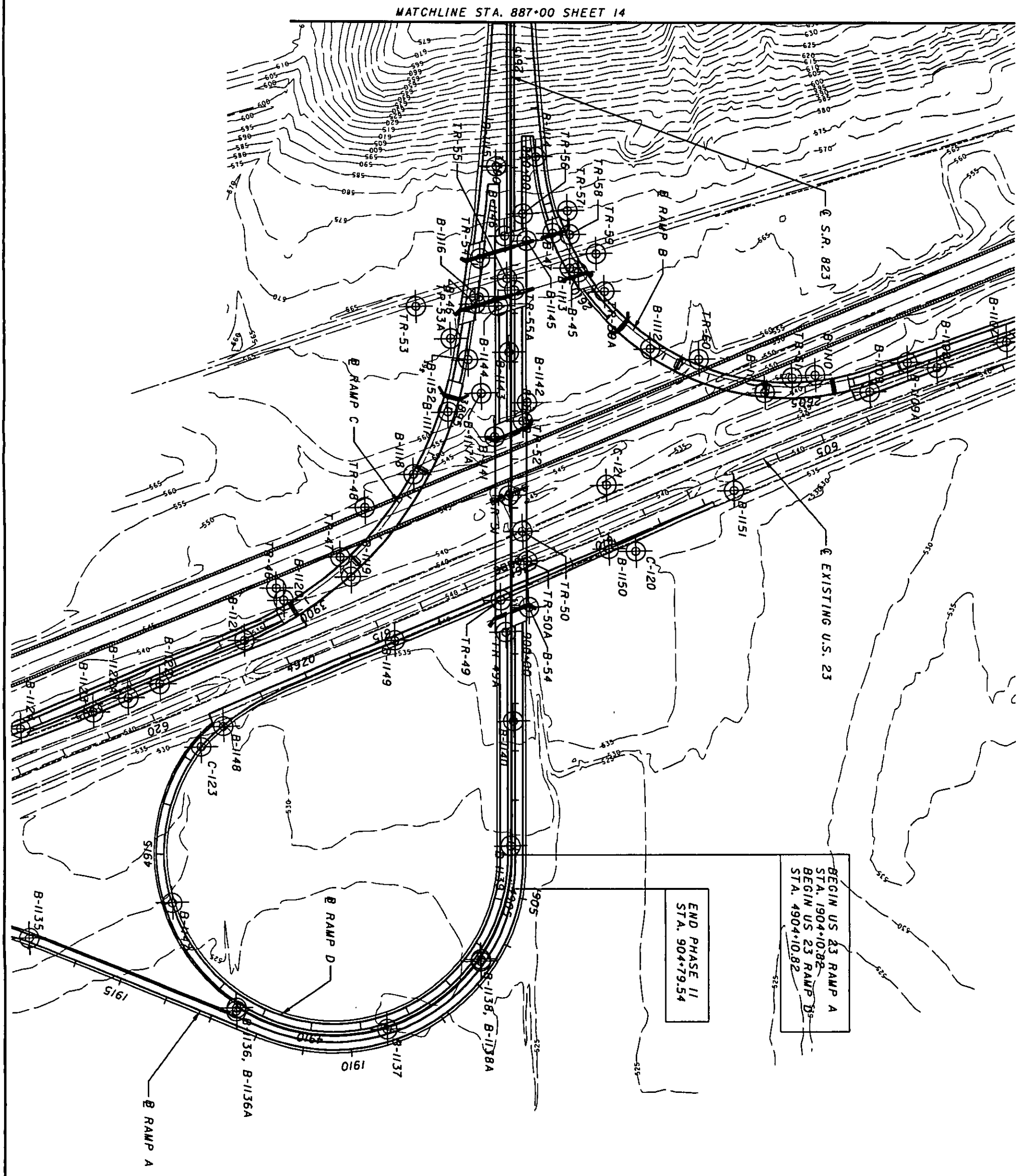
MATCHLINE STA. 887+00 SHEET 14



15/15	SCI-823-10.13	PHASE 2 - BORING PLAN S.R. 823 STA. 887+00 TO STA. 904+79.54	CALCULATED RLS CHECKED SJR	0 100 50 200 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, COLUMBUS, OHIO 43229 * (614)888-0040

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

LOG OF: Boring B-13 | Location: Sta. 578+27.4, 43.8 ft. LT of SR 823 CL | Date Drilled: 06/30/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring rock)
7.0' (Includes drilling water, 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
0	770.0												
0.3	769.7						Topsoil - 4"						
		4 5 8	17	1		3.0	Very stiff brown SILT (A-4b), some clay, trace fine to coarse sand; damp.	0	3	–	4	68	25
3.5	766.5	28 50/2	7	2			Severely weathered gray SANDSTONE.						
5.0	765.0	Core 120"	Rec 114"	RQD 76%	R-1		Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, laminated to thinly bedded, moderately fractured. @ 10.7', qu=11,952 psi.						
15.0	755.0						Bottom of Boring - 15.0'						
20													
25													
30													

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

FILE: 0121-3070-03 [11/13/2007 8:57 PM]

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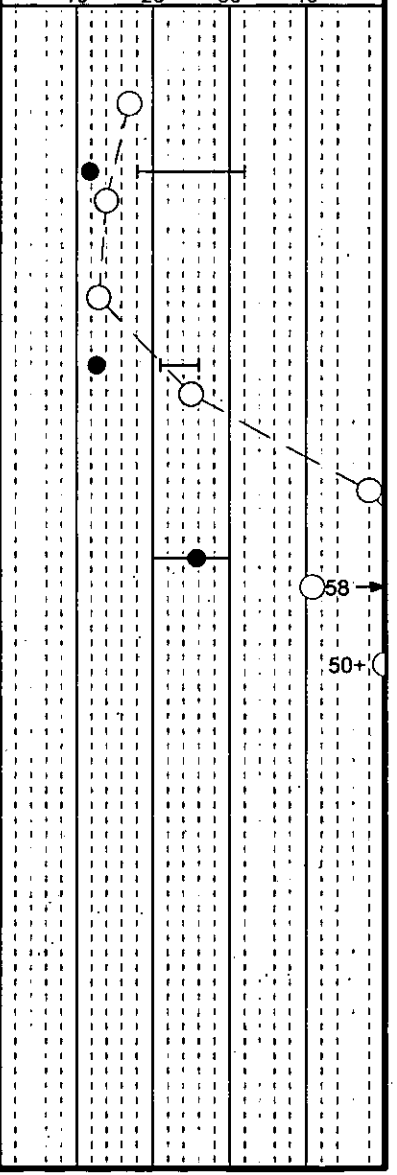
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-14 | Location: Sta. 579+80.2, 31.8 ft. RT of SR 823 CL | Date Drilled: 06/30/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
13.5' (Includes drilling water, 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
0.1	801.7 / 801.6						Topsoil - 1"						
		7 9 8	15	1		4.5+	Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.						
		7 8 6	14	2		4.5+		10	8	--	8	49	25
5		9 6 7	3	3		4.5+	@ 8.0', some gravel (rock fragments).						
8.5	793.2												
		6 8 17	13	4		4.0	Hard brown SANDY SILT (A-4a), little gravel, little clay; damp.	17	12	--	11	45	15
10		18 21 27	18	5		4.5+							
14.0	787.7												
		7 18 40	18	6		4.5+	Hard mottled brown and gray SILT (A-4b), some clay, trace fine to coarse sand; moist.	0	1	--	5	70	24
15		21 50/3	8	7		4.5+							
18.5	783.2						Medium hard to hard brown SANDSTONE; fine to medium grained, moderately weathered, argillaceous, laminated to thinly bedded, moderately fractured.						
20							@ 20.0', 21.4', iron stained, high angle fractures.						
21.5	780.2						Medium hard to hard gray SANDSTONE interbedded with SILTSTONE; very fine to fine grained, moderately weathered, pyritic (halos), thinly bedded, highly to moderately fractured.						
		Core 120"	Rec 116"	RQD 61%	R-1								
25							@ 26.8'-27.3', qu=5,840 psi, Er=627,457 psi.						
28.5	773.2						Bottom of Boring - 28.5'						
30													

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



FILE: 0121-3070-03 [11/13/2007 8:57 PM]

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

LOG OF: Boring B-18 | Location: Sta. 716+41.2, 59.8 ft. LT of SR 823 CL | Date Drilled: 09/13/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
0.5' (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	718.7												
0.4	718.3						Topsoil - 5"						
		7 12 17		1		4.5+	Hard mottled brown and gray SILT (A-4b), some fine to coarse sand, trace gravel; dry to damp.	5	15	--	8	50	22
3.0	715.7												
		9 7 15		2		4.5+	Hard mottled brown and gray SILT AND CLAY (A-6a), little to some fine to coarse sand, little gravel; dry to damp.	14	13	--	7	43	23
5													
6.5	712.2	6 13 21		3		-	Severely weathered light brown and gray SILTSTONE, arenaceous.						
		20 49 50/3		4		-							
10.0	708.7						Medium hard gray SANDSTONE; very fine to fine grained, highly weathered to decomposed, argillaceous, broken, contains abundant argillaceous laminations.						
11.9	706.8	Core 60"	Rec 59"	RQD 85%	R-1		@ 10.1', 10.6', 10.8', 10.9', iron stained, low angle fractures. @ 11.3'-11.6', iron stained, high angle fracture.						
15.0	703.7						Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, highly fractured, contains abundant argillaceous laminations.						
							Bottom of Boring - 15.0'						
20													
25													
30													

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

FILE: 0121-3070-03 [11/13/2007 8:57 PM]

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

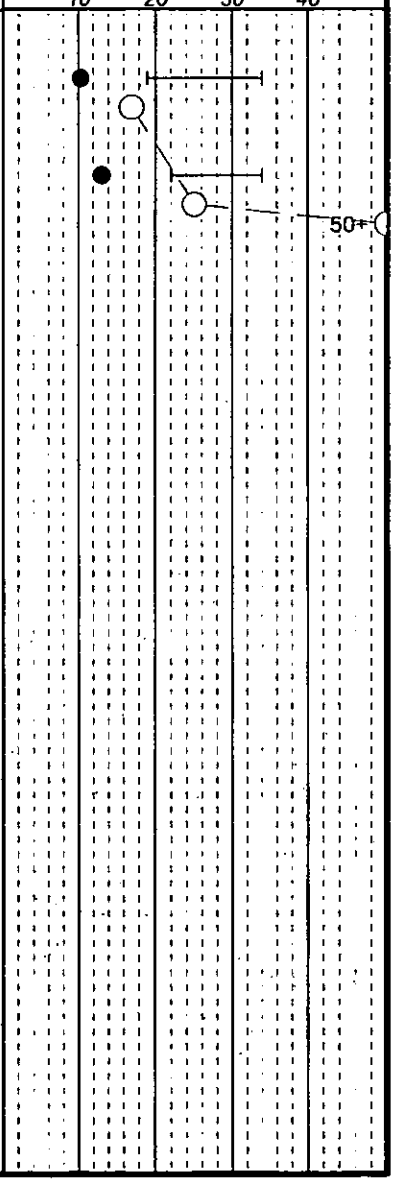
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-19 | Location: Sta. 716+34.0, 52.5 ft. RT of SR 823 CL | Date Drilled: 09/08/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (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	722.1												
0.3	721.8						Topsoil - 3"						
		5 6 11	18	1		4.5+	Hard mottled brown and gray SILT AND CLAY (A-6a), some gravel, little to some fine to coarse sand; dry to damp.	32	15	--	9	26	18
		4 10 15	15	2		4.5+		0	12	--	6	54	28
5.0	717.1	50/2	2	3		-	Severely weathered brown SANDSTONE, micaceous.						
6.0	716.1						Very soft to soft light brown gray SANDSTONE; very fine to fine grained, decomposed, arenaceous, highly fractured to broken, contains abundant argillaceous laminations.						
		Core 60"	Rec 16"	RQD 15%	R-1		@ 7.3'-11.0', possible core loss.						
10													
							@ 11.7'-12.8', typical iron stained, low angle fractures.						
		Core 60"	Rec 60"	RQD 63%	R-2								
13.9	708.2						Medium hard gray SANDSTONE; very fine to fine grained, highly weathered to decomposed, micaceous, highly fractured to broken, contains abundant argillaceous laminations.						
15													
16.0	706.1						@ 15.0'-15.4', qu=2,963 psi.						
							Bottom of Boring - 16.0'						
20													
25													
30													

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



FILE: 0121-3070-03 [11/13/2007 8:57 PM]

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

LOG OF: Boring B-20 | Location: Sta. 717+76.8, 36.4 ft. RT of SR 823 CL | Date Drilled: 09/14/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
7.0' (Includes drilling water, with augers removed)

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	715.7												
0.2	715.5						Topsoil - 2"						
		2 1 1	12	1		0.75	Medium stiff brown SILT (A-4b), little fine to coarse sand, trace gravel; dry to damp.	5	6	–	8	62	19
3.0	712.7												
		2 7 10	13	2		-	Medium dense brown SANDY SILT (A-4a), some gravel, trace to little clay; dry to damp. @ 4.5'-5.0', trace to little gravel.	30	18	–	13	29	10
5													
6.5	709.2	9 24 32	15	3		-	Severely weathered gray SILTSTONE, arenaceous.						
		17 50/5	10	4		-							
10.0	705.7	Core 48"	Rec 43"	RQD 85%	R-1		Medium hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, highly fractured, contains abundant argillaceous laminations.						
15							@ 14.2', 15.3', high angle fractures.						
15.6	700.1	Core 60"	Rec 60"	RQD 96%	R-2		Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, highly fractured, contains abundant argillaceous laminations.						
20		Core 60"	Rec 58"	RQD 96%	R-3		@ 19.5'-19.9', qu=7,386 psi.						
25		Core 60"	Rec 60"	RQD 95%	R-4								
30.0	685.7	Core	Rec	RQD	R-5		Bottom of Boring - 30.0'						

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢ LL
Blows per foot - ○
10 20 30 40
56
50+

FILE: 0121-3070-03 [11/13/2007 8:57 PM]

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-20 | Location: Sta. 717+76.8, 36.4 ft. RT of SR 823 CL | Date Drilled: 09/14/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
7.0' (Includes drilling water, with augers removed)

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
30	685.7	12"	12"	100%										
35														
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 8:57 PM]

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-21 | Location: Sta. 719+06.4, 32.6 ft. LT of SR 823 CL | Date Drilled: 9/6/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
23.0' (Includes drilling water, with augers removed.

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	725.2												
0.3	724.9	2 5 15	10	1		4.5+	Topsoil - 4" Hard brown SILT (A-4b), little clay, little fine to coarse sand, little gravel; damp.	18	9	–	4	55	14
3.0	722.2	12 24 27	18	2		-	Severely weathered brown SANDSTONE; argillaceous.						
4.5	720.7												
5		11 13 22	18	3		4.5+	Hard mottled brown and gray CLAY (A-7-6), "and" silt, trace fine to coarse sand; dry to damp.	0	1	–	2	56	41
7.0	718.2												
		13 20 50	14	4		-	Severely weathered brown SILTSTONE.						
10		22 35 50/4	12	5		-							
15.0	710.2												
		Core 54"	Rec 52"	RQD 67%	R-1		Medium hard gray SANDSTONE; very fine to fine grained, highly weathered to decomposed, micaceous, highly fractured to broken, contains abundant argillaceous laminations. @ 16.5'-16.8', brown, clay filled fractures.						
20		Core 60"	Rec 60"	RQD 75%	R-2		@ 20.1'-22.0', highly weathered.						
24.9	700.3												
		Core 60"	Rec 56"	RQD 87%	R-3		Medium hard gray SANDSTONE; very fine to fine grained, highly weathered to decomposed, micaceous, moderatly to highly fractured, contains abundant argillaceous laminations.						
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
51
70
50+

FILE: 0121-3070-03 [11/13/2007 8:57 PM]

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-21 | Location: Sta. 719+06.4, 32.6 ft. LT of SR 823 CL | Date Drilled: 9/6/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
23.0' (Includes drilling water, with augers removed.

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
30	695.2	Core 60"	Rec 56"	RQD 83%	R-4		Medium hard gray SANDSTONE; very fine to fine grained, highly weathered to decomposed, micaceous, moderatly to highly fractured, contains abundant argillaceous laminations. @ 32.6'-33.0', qu=2,218 psi.							
							@ 33.9'-34.1', broken.							
34.5	690.7						Bottom of Boring - 34.5'							
35														
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 8:57 PM]

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-22 | Location: Sta. 719+09.4, 41.9 ft. RT of SR 823 CL | Date Drilled: 09/15/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
2.5' (Includes drilling water, with augers removed)

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	726.3												
0.3	726.0						Topsoil - 4"						
		5 5 6	15	1		-	Stiff brown SILT AND CLAY (A-6a), little to some fine to coarse sand, little gravel; dry to damp.	12	10	--	9	40	29
4.0	722.3	7 14 20	14	2		-	Hard mottled brown and gray SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; damp to moist.	3	1	--	5	51	40
6.5	719.8	12 25 25	18	3		-	Severely weathered brown SANDSTONE, argillaceous.						
7.5	718.8												
7.9	718.4	Core 24"	Rec 21"	RQD 54%	R-1		Medium hard to hard SANDSTONE; fine to medium grained moderately weathered, micaceous, highly fractured.						
10							Soft brown SILTSTONE; decomposed, highly fractured.						
		Core 60"	Rec 60"	RQD 58%	R-2		@ 13.8'-14.0', iron stained, high angle fractures, broken.						
15.1	711.2						Medium hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, highly fractured, contains abundant argillaceous laminations.						
		Core 60"	Rec 60"	RQD 70%	R-3								
20		Core 60"	Rec 60"	RQD 96%	R-4		@ 20.6'-21.0', qu=3,056 psi.						
							@ 23.1'-23.6', high angle fractures.						
25		Core 36"	Rec 36"	RQD 83%	R-5								
27.5	698.8						Bottom of Boring - 27.5'						
30													

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

FILE: 0121-3070-03 [11/13/2007 8:57 PM]

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

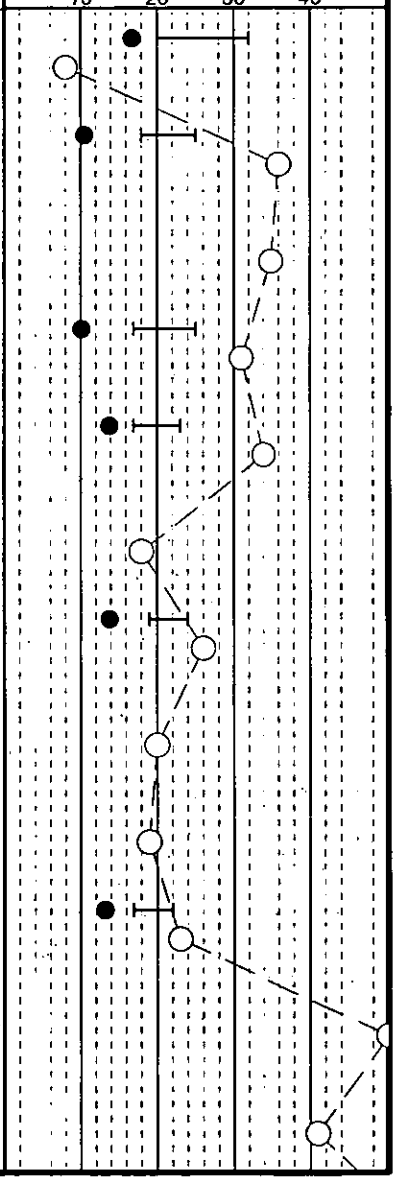
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-23 | Location: Sta. 719+88.3, 53.4 ft. LT of SR 823 CL | Date Drilled: 9/6/06

WATER OBSERVATIONS: Water seepage at: 20.7'
Water level at completion: 30.5' (Prior to coring)
10.0' (Includes drilling water, 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
0.1	729.3	1 2 6	14	1		2.0	Topsoil - 0.5"	16	11	–	7	41	25
2.0	727.4						Stiff to very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, little gravel; damp.						
		11 15 21	18	2		-	Hard mottled brown and gray SANDY SILT (A-4a), some clay, little gravel; damp.	18	7	–	5	48	22
5		11 12 23	18	3		-							
7.5	721.9	15 14 17	18	4		-	Medium dense brown GRAVEL WITH SAND AND SILT (A-2-4), little clay; damp.	49	11	–	12	16	12
9.5	719.9												
10		12 15 19	18	5		1.75	Stiff to very stiff mottled brown and gray SANDY SILT (A-4a), little to some clay, little to some fine to coarse sand, trace to little gravel; damp.	7	8	–	16	49	20
		5 6 12	18	6		3.0							
15		4 8 18	18	7		3.0		11	12	–	20	42	15
		6 9 11	18	8		3.0							
20		5 7 12	18	9		2.0							
		4 8 15	18	10		-	@ 20.0'-29.0', brown, some to "and" gravel.	31	18	–	12	28	11
25		12 23 27	18	11		-	@ 25.0'-30.0', hard.						
		13 20 21	18	12		-							
30													

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



FILE: 0121-3070-03 [11/13/2007 8:57 PM]

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-23 | Location: Sta. 719+88.3, 53.4 ft. LT of SR 823 CL | Date Drilled: 9/6/06

WATER OBSERVATIONS: Water seepage at: 20.7'
Water level at completion: 30.5' (Prior to coring)
10.0' (Includes drilling water, 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
30	699.4	15 25 29	15	13		-	Stiff to very stiff brown SANDY SILT (A-4a), little clay, some gravel; damp to moist.							
32.0	697.4						Severely weathered brown SILTSTONE, arenaceous.							
		10 15 20	18	14		-								
35														
35.5	693.9	50/5	5	15		-								
		Core 60"	Rec 60"	RQD 53%	R-1		Medium hard gray SANDSTONE; very fine to fine grained, decomposed, argillaceous, micaceous, highly fractured, contains abundant argillaceous laminations. @ 37.5', 39.8', 40.0', 40.2', clay filled, low angle fractures. @ 38.3'-38.5', high angle fracture.							
40														
40.5	688.9						Bottom of Boring - 40.5'							
45														
50														
55														
60														

STANDARD PENETRATION (N): 54 →, 50+

FILE: 0121-3070-03 [11/13/2007 8:57 PM]

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

LOG OF: Boring C-100 | Location: Approx. Sta. 658+75.3, 237.6 ft. RT of SR 823 CL | Date Drilled: 04/23/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 5.3' (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 - ○
0	721.7													10 20 30 40
0.3	721.4	3 5 7	10	1		4.5+	Topsoil - 3" Hard brown SANDY SILT (A-4a), little clay, little gravel; damp.							
		5 10 12	14	2		4.5+	@ 3.5', contains sandstone fragments.	14	33	–	10	25	18	
5														
5.5	716.2						Hard brown SILT AND CLAY (A-6a), little fine to coarse sand; contains rock fragments; damp.							
6.5	715.2	8 14 50/3	15	3A 3B		4.5+	Severely weathered brown and gray SHALE							50+
8.0	713.7						Soft to medium hard gray SHALE interbedded with SILTSTONE; highly weathered to decomposed, arenaceous, thinly laminated to thickly bedded, moderately fractured. @ 8.0'-9.4', brown, decomposed.							
10		Core 60"	Rec 60"	RQD 76%	R-1									
13.0	708.7						Bottom of Boring - 13.0'							
15														
20														
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-101 | Location: Approx. Sta. 658+78.6, 295.1 ft. LT of SR 823 CL | Date Drilled: 04/23/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 2.8' (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	691.4												
0.2	691.2						Topsoil - 2"						
1.7	689.7	4 7 21	12	1A 1B		3.0	Very stiff brown SANDY SILT (A-4a), some clay, trace gravel; contains rock fragments; damp.	7	22	–	14	36	21
							Severely weathered gray SHALE.						
4.5	686.9	14 50/3	8	2									
5		Core 60"	Rec 57"	RQD 86%	R-1		Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, massive, slightly to moderately fractured.						
9.5	681.9						Bottom of Boring - 9.5'						
10													
15													
20													
25													
30													

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

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-102 | Location: Approx. Sta. 673+34.6, 130.8 ft. RT of SR 823 CL | Date Drilled: 04/23/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 7.0' (prior to coring)
2.8' (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)
0	798.5													Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ (10 20 30 40)
0.3	798.2						Topsoil - 3"							
		3 1 21	8	1		1.0	POSSIBLE FILL: Medium stiff brown SANDY SILT (A-4a), some gravel, trace to little clay; contains cobbles; damp.	28	21	–	8	31	12	●
		50/0	0	2										50+
5														
5.5	793.0						Severely weathered gray SILTSTONE.							
		17 26 50/4	13	3										50+
7.5	791.0						Medium hard to hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, thinly to medium bedded, highly fractured, contains moderate argillaceous laminations. @ 7.5'-8.2', brown.							
10		Core 60"	Rec 59"	RQD 80%	R-1									
12.5	786.0						Bottom of Boring - 12.5'							
15														
20														
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-103 | Location: Approx. Sta. 672+67.8, 84.7 ft. LT of SR 823 CL | Date Drilled: 04/24/07 to 04/26/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 6.2' (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	771.2												
0.4	770.8						Topsoil - 5"						
		4 3 2	10	1		–	Very stiff to hard brown SANDY SILT (A-4a), little to some gravel, trace to little clay; contains rust stains; damp.						
		1 1 4	8	2		2.5		20	13	--	8	43	16
5		2 2 3	9	3		4.5+							
		10 8 9	10	4		2.25	@ 8.5'-10.0', contains rock fragments.						
10		2 4 7	16	5		4.5+							
		2 3 4	13	6		1.25	@ 13.5'-15.0', stiff.	12	16	--	7	49	16
15													
16.0	755.2	3 4 8	18	7		4.5+	Hard brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp to moist. @ 16.0'-20.0', contains rust stains.	1	13	--	5	44	37
		4 5 7	18	8		4.5+							
20													
21.5	749.7	6 21 50/5	17	9A 9B		4.5	Severely weathered brownish gray SILTSTONE.						
23.0	748.2	Core 26"	Rec 26"	RQD 69%	R-1		Medium hard to hard brown SILTSTONE; highly weathered, arenaceous, micaceous, medium bedded, moderately fractured.						
25		Core 60"	Rec 60"	RQD 80%	R-2		@ 27.7', gray. @ 29.4'-30.2', hard gray SANDSTONE.						
30													

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

FILE: 0121-3070-03 (11/13/2007 9:03 PM)

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 C-103 | Location: Approx. Sta. 672+67.8, 84.7 ft. LT of SR 823 CL | Date Drilled: 04/24/07 to 04/26/07

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)
	741.2													
30.2	741.0						Bottom of Boring - 30.2'							

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 6.2' (includes drilling water)

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

35 40 45 50 55 60

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-104 | Location: Approx. Sta. 672+09.0, 289.2 ft. LT of SR 823 CL | Date Drilled: 04/24/07

WATER OBSERVATIONS: Water seepage at: 0.0' (in creek bed)
Water level at completion: 1.3' (prior to coring)
8.7' (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	715.0						Sand & Gravel - 12" (creek bed)						
1.0	714.0	2 1 5	6	1		--	Very soft to soft brown SANDY SILT (A-4a), some gravel, little clay; damp.	25	22	--	12	31	10
5		4 8 9	10	2		<0.25		24	20	--	9	32	15
		5 26 10	8	3		--	@ 6.0'-7.5', hard, contains sandstone fragments.						
8.5	706.5	17 31 28	12	4			Severely weathered gray SILTSTONE.						
10.0	705.0	Core 60"	Rec 59"	RQD 90%	R-1		Medium hard gray SILTSTONE interbedded with SHALE; highly weathered, arenaceous, thinly laminated to thinly bedded, moderately fractured.						
15.0	700.0						Bottom of Boring - 15.0'						
20													
25													
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
59

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-105 | Location: Approx. Sta. 700+83.1, 209.6 ft. RT of SR 823 CL | Date Drilled: 04/27/06

WATER OBSERVATIONS: Water seepage at: 3.5'
Water level at completion: 7.2' (prior to coring)
8.1' (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	770.8	1 2 1		1			FILL: Loose grayish brown SANDY SILT (A-4a), "and" gravel, trace clay; moist. (placed for drilling pad)	38	13	–	7	33	9
3.0	767.8	4 6 7	10	2			Brown SANDSTONE fragments, little silty clay; wet.						
5													
6.0	764.8	10 36 10	12	3		2.25	Very stiff brown and gray SILT (A-4b), some clay, little fine to coarse sand; contains rock fragments; moist.						
		4 6 10	14	4		3.75		0	8	–	6	60	26
10													
11.5	759.3	12 47 50/3	12	5A 5B		4.5+	Severely weathered gray SILTSTONE.						
12.5	758.3						Medium hard gray SILTSTONE interbedded with SHALE; highly weathered, arenaceous, thinly laminated to thinly bedded, moderately fractured.						
15		Core 60"	Rec 58"	RQD 78%	R-1								
17.5	753.3						Bottom of Boring - 17.5'						
20													
25													
30													

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

Non-Plastic

50+

FILE: 0121-3070-03 (11/13/2007 9:03 PM)

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 C-106 | Location: Approx. Sta. 697+47.7, 351.7 ft. LT of SR 823 CL | Date Drilled: 04/26/07

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
0	714.3						WATER OBSERVATIONS: Water seepage at: None Water level at completion: 1.5' (includes drilling water)						
0.4	713.9						Topsoil - 5"						
		2 1 2	12	1		0.75	Very stiff to hard brown SANDY SILT (A-4a), trace to little gravel, little clay; damp. @ 1.0'-2.5', medium stiff, contains roots.	19	16	--	8	41	16
5		2 5 4	14	2		3.25	@ 3.5'-5.0', contains rust stains.						
		10 9 10	18	3		4.5+		5	31	--	15	32	17
8.0	706.3						Soft to medium hard gray SILTSTONE interbedded with SHALE; highly weathered to decomposed, arenaceous, thinly laminated to thinly bedded. @ 8.0'-8.4', sandstone seam. @ 8.0'-9.7', brown, decomposed.						
10		Core 60"	Rec 54"	RQD 65%	R-1								
15		Core 30"	Rec 29"	RQD 96%	R-2								
15.5	698.8						Bottom of Boring - 15.5'						
20													
25													
30													

GRADATION

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

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-107 | Location: Approx. Sta. 747+38.0, 255.7 ft. LT of SR 823 CL | Date Drilled: 04/30/07 to 05/01/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 6.5' (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	777.1												
0.4	776.7						Topsoil - 5"						
		2 4 5	11	1		1.75	Stiff brown SANDY SILT (A-4a), little clay, trace gravel; contains rock fragments; damp to moist.	4	20	–	14	46	16
3.0	774.1												
		9 14 15	18	2		–	Hard brown SANDY SILT (A-4a), little clay; contains sandstone fragments; damp.						
5													
		6 11 14	18	3		4.5+	@ 6.0', trace to little gravel.	14	18	–	18	36	14
		3 9 16	18	4		4.5+							
10													
		7 12 14	18	5		4.5+		6	13	–	19	45	17
		13 21 19	18	6		4.5+							
15													
		8 10 14	18	7		4.25							
		7 15 14	18	8A		4.5+							
19.5	757.6			8B		4.5+							
20							Hard brown SILT AND CLAY (A-6a), little gravel, trace to little fine to coarse sand; contains rock fragments; damp.						
21.0	756.1	6 8 13	16	9		4.25	Hard brownish red SILTY CLAY (A-6b), trace fine to coarse sand; damp.	0	4	–	2	47	47
23.5	753.6	10 23 44	17	10			Severely weathered brownish gray SILTSTONE.						
25													
		27 50/4	9	11									
27.0	750.1						Soft to medium hard gray SILTSTONE interbedded with SHALE; highly weathered to decomposed, arenaceous, thinly laminated to thinly bedded, moderately fractured.						
30		Core	Rec	RQD	R-1								

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
67 →
50+

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-107 | Location: Approx. Sta. 747+38.0, 255.7 ft. LT of SR 823 CL | Date Drilled: 04/30/07 to 05/01/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 6.5' (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
30	747.1	60"	60"	86%			Soft to medium hard gray SILTSTONE interbedded with SHALE; highly weathered to decomposed, arenaceous, thinly laminated to thinly bedded, moderately fractured.							
32.0	745.1						Bottom of Boring - 32.0'							
35														
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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

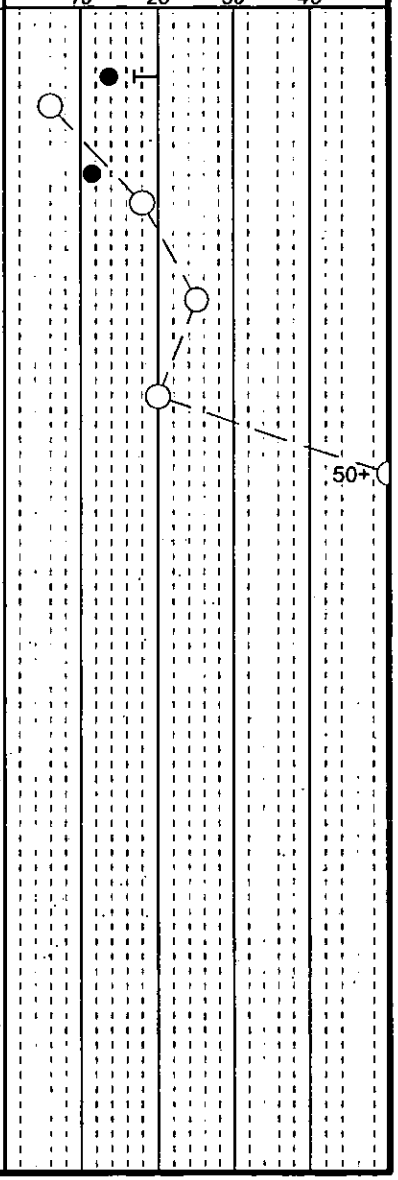
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-108 | Location: Approx. Sta. 750+64.5, 200.2 ft. RT of SR 823 CL | Date Drilled: 04/30/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 5.2' (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	817.4												
0.4	817.0						Topsoil - 5"						
		3 3 3	15	1		4.5+	Very stiff to hard brown SANDY SILT (A-4a), some gravel, little clay; damp. @ 1.0'-7.5', contains rust stains.	21	22	--	8	36	13
		4 7 11	16	2		3.5							
5		8 10 15	16	3		2.75	@ 6.0'-10.0', contains rock fragments.						
		9 7 13	18	4		3.75							
10													
11.0	806.4	25 50/4	7	5			Severely weathered brown SANDSTONE.						
12.5	804.9						Soft to hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, thinly to medium bedded, moderately to highly fractured. @ 12.5'-14.5', contains rust stains on fractures.						
		Core 60"	Rec 60"	RQD 85%	R-1								
15													
17.5	799.9						Bottom of Boring - 17.5'						
20													
25													
30													

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



FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-109 | Location: Approx. Sta. 766+00.9, 284.1 ft. LT of SR 823 CL | Date Drilled: 05/01/07

WATER OBSERVATIONS: Water seepage at: 17.5' - 18.5'
Water level at completion: 3.4' (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)
0	800.6													
0.5	800.1	2 3 4	18	1			Topsoil - 6" Loose brown SANDY SILT (A-4a), some gravel, little clay; contains rock fragments; moist.	25	16	–	21	26	12	Non-Plastic
3.5	797.1	4 12 16	18	2		4.5+	Very stiff to hard brown SANDY SILT (A-4a), little to some clay, trace to little gravel; contains sandstone fragments; damp.							
5		8 14 23	15	3		2.5								
10		12 16 16	16	4		3.75		2	10	–	25	43	20	
		8 8 19	18	5		4.0								
15		7 10 19	5	6		–								
		8 13 18	18	7		4.5+								
20		9 16 17	18	8		4.5+		19	8	–	8	45	20	
		5 7 15	16	9		4.5+								
24.0	776.6	7 20 50/3	15	10A 10B		4.5+ –	Severely weathered brownish gray SILTSTONE.							50+
25.0	775.6						Soft to medium hard gray SHALE interbedded with SILTSTONE; highly weathered to decomposed, arenaceous, thinly laminated to thinly bedded.							
30		Core 60"	Rec 60"	RQD 86%	R-1									

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

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-109 | Location: Approx. Sta. 766+00.9, 284.1 ft. LT of SR 823 CL | Date Drilled: 05/01/07

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	770.6	Core 24"	Rec 24"	RQD 100%	R-2		Soft to medium hard gray SHALE interbedded with SILTSTONE; highly weathered to decomposed, arenaceous, thinly laminated to thinly bedded.						
32.0	768.6						Bottom of Boring - 32.0'						
35													
40													
45													
50													
55													
60													

WATER OBSERVATIONS: Water seepage at: 17.5' - 18.5'
Water level at completion: 3.4' (includes drilling water)

GRADATION

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

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-110 | Location: Approx. Sta. 765+98.3, 191.9 ft. RT of SR 823 CL | Date Drilled: 05/02/07

WATER OBSERVATIONS: Water seepage at: 7.0'
Water level at completion: 6.0' (prior to coring)
5.8' (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)
0	848.9													Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ 10 20 30 40
0.3	848.6						Topsoil - 4"							
		2 50/3	7	1		0.75	Medium stiff gray SANDY SILT (A-4a), little to some gravel, little clay; damp to moist. @ 1.0'-1.5', slightly organic, contains twig fragments. @ 1.5'-4.0', possible sandstone boulder, fine sand in auger cuttings.							50+
		50/0	0	2										50+
5														
		5 14 39	18	3A 3B		–	@ 6.0'-7.0', contains rust stains.	21	15	–	21	29	14	●
7.0	841.9						Severely weathered grayish brown SANDSTONE, argillaceous.							53 →
8.0	840.9						Soft to hard gray SANDSTONE interbedded with SHALE and SILTSTONE; very fine to fine grained, highly weathered, argillaceous, thinly laminated to thinly bedded, moderately fractured, contains abundant argillaceous laminations.							
10		Core 60"	Rec 56"	RQD 56%	R-1									
13.0	835.9						Bottom of Boring - 13.0'							
15														
20														
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-111 | Location: Approx. Sta. 768+73.0, 298.4 ft. LT of SR 823 CL | Date Drilled: 05/02/07

WATER OBSERVATIONS: Water seepage at: 4.0' - 4.5'
Water level at completion: 6.5' (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	796.1												
0.6	795.5						Topsoil - 7"						
		1 2 3	15	1		3.25	Very stiff to hard brown SANDY SILT (A-4a), little to some clay, trace to little gravel; contains sandstone fragments; damp.	12	12	--	12	47	17
		2 1 1	10	2		--							
5		4 8 12	17	3		4.0		3	15	--	17	49	16
		5 9 13	18	4		3.75							
10		9 14 17	18	5		4.5+							
		5 21 46	16	6		4.5+		1	12	--	15	47	25
15		5 21 17	18	7		2.5							
		4 6 8	18	8		3.5		1	8	--	21	49	21
20		4 4 6	18	9		2.0							
23.5	772.6												
		5 6 8	14	10		3.75	Very stiff brownish gray SILT AND CLAY (A-6a), little sand, trace gravel; damp to moist.						
25													
26.0	770.1												
		6 12 25	18	11		4.0	Hard brown SANDY SILT (A-4a), little gravel, little clay; contains sandstone fragments; damp.						
		27 19 21	14	12		4.5+							
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
67 →

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-111 | Location: Approx. Sta. 768+73.0, 298.4 ft. LT of SR 823 CL | Date Drilled: 05/02/07

WATER OBSERVATIONS: Water seepage at: 4.0' - 4.5'
Water level at completion: 6.5' (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)
30	766.1						Hard brown SANDY SILT (A-4a), little gravel, little clay; contains sandstone fragments; damp.							
33.5	762.6	50/5	5	13			Severely weathered gray SHALE.							50+
34.0	762.1	Core 60"	Rec 59"	RQD 98%	R-1		Medium hard gray SILTSTONE interbedded with SHALE; highly weathered, arenaceous, thinly laminated to laminated, moderately fractured.							
39.0	757.1						Bottom of Boring - 39.0'							
40														
45														
50														
55														
60														

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

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-112 | Location: Approx. Sta. 770+68.8, 44.8 ft. LT of SR 823 CL | Date Drilled: 05/02/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 3.8' (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
0	814.5												
0.4	814.1						Topsoil - 5"						
		3 4 4	9	1		3.5	Very stiff brown SANDY SILT (A-4a), little gravel, little clay; damp.	17	8	--	14	46	15
		5 7 10	7	2		--	@ 4.5'-5.0', brown SANDSTONE fragments.						
5.0	809.5						Medium dense brown SANDY SILT (A-4a), some gravel; moist.						
		5 8 12	14	3									
8.5	806.0												
		6 11 18	16	4		4.5+	Hard brown SANDY SILT (A-4a), some clay, trace to little gravel; damp.	7	20	--	20	32	21
10													
		18 22 30	17	5		4.5+	@ 11.0'-12.5', brownish gray.						
							@ 13.5'-13.7', gray SANDSTONE fragments, argillaceous.						
13.7	800.8	50/1	1	6			Medium hard to hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, thinly bedded to medium bedded, contains moderate argillaceous laminations.						
15		Core 60"	Rec 60"	RQD 80%	R-1								
18.7	795.8						Bottom of Boring - 18.7'						
20													
25													
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
52 →
50+ ○

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-113 | Location: Approx. Sta. 772+47.7, 222.4 ft. RT of SR 823 CL | Date Drilled: 05/02/07

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
0	842.3						WATER OBSERVATIONS: Water seepage at: None Water level at completion: 4.0' (includes drilling water)						
0.5	841.8						Topsoil - 6"						
		2 2 4	13	1		2.25	Very stiff brown SANDY SILT (A-4a), some to "and" gravel, trace clay; contains rust stains; damp to moist.	46	9	–	10	28	8
		1 2 3	13	2		0.75	@ 3.5'-5.0', medium stiff.						
5		6 13 9	12	3		–							
8.5	833.8	12 24 32	15	4			Severely weathered brown and gray SHALE.						
10		13 19 32	16	5									
14.0	828.3	50/6	5	6									
15		Core 60"	Rec 59"	RQD 88%	R-1		Medium hard to hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, thinly bedded to medium bedded, contains moderate to abundant argillaceous laminations.						
19.0	823.3						Bottom of Boring - 19.0'						
20													
25													
30													

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

○56 →
○51 →
50+ ○

FILE: 0121-3070-03 [11/13/2007 9:03 PM]

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 C-62 | Location: Sta. 22+01.0, 47.7 ft LT of SR 728 CL | Date Drilled: 08/31/06

WATER OBSERVATIONS: Water seepage at: 29.5'-35.0'
Water level at completion: 42.6' (prior to coring)
10.6' (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	715.9												
0.6	715.3						Topsoil - 7"						
		2 2 3	16	1			Loose brown SANDY SILT (A-4a), little to some gravel, little clay; damp.	19	12	--	13	40	16
5		6 7 9	18	2				28	12	--	13	32	15
6.0	709.9	4 4 5	16	3		2.5	Stiff to very stiff brown and gray CLAY (A-7-6); contains organic material; damp.						
		2 3 4	15	4		2.0		0	0	--	1	3	96
10		2 4 4	18	5		2.5							
		1 2 2	18	6		1.5							
15		1 2 2	18	7		1.5							
		2 3 3	18	8		1.5							
20		1 2 3	18	9		1.5							
		WOH 3 4	18	10		1.5							
25		WOH 3 3	18	11		--							
29.0	686.9	WOH 6 9	18	12A		1.25	Medium dense gray COARSE AND FINE SAND (A-3a).						
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
66

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-62 | Location: Sta. 22+01.0, 47.7 ft LT of SR 728 CL | Date Drilled: 08/31/06

WATER OBSERVATIONS: Water seepage at: 29.5'-35.0'
Water level at completion: 42.6' (prior to coring)
10.6' (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)
30	685.9			12B			Medium dense gray COARSE AND FINE SAND (A-3a); contains organic material; moist to wet.							Natural Moisture Content, % - ● PL — LL; Blows per foot - ○ (10, 20, 30, 40)
35		12 11 7	14	13										
40		5 7 12	18	14										
43.5	672.4	50/5	5	15			Severely weathered gray SANDSTONE.							50+
45.0	670.9						Soft to medium hard gray SILTSTONE interbedded with SANDSTONE; highly weathered to decomposed.							
47.3	668.6	Core 60"	Rec 46"	RQD 58%	R-1		Soft to medium hard gray SILTSTONE; highly weathered to decomposed, argillaceous, thinly bedded, highly fractured. @ 49.8'-49.9', clay seam.							
50.0	665.9						Bottom of Boring - 50.0'							
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-64 | Location: Sta. 869+55.5, 124.8 ft. LT of SR 823 CL | Date Drilled: 10/10/06

WATER OBSERVATIONS: Water seepage at: None; Water level at completion: 8.9'

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	640.9												
0.3	640.5						Topsoil - 4"						
		1 1 1	18	1		–	Very soft brown SILT (A-4b) trace fine to coarse sand trace gravel; contains organic material; moist to wet.	3	2	–	3	70	22
3.0	637.9						Stiff brown SILT AND CLAY (A-6a), trace to little fine to coarse sand, trace gravel; damp.(Decomposed SHALE).						
		3 6 6	18	2		–							
5													
5.5	635.4						Medium dense brown GRAVEL WITH SAND (A-1-b), some silty clay; damp. (Decomposed SANDSTONE)	52	8	–	15	25	
		6 12 12	18	3									
		2 6 7	18	4									
10													
		6 10 18	18	5									
13.5	627.4						Very stiff brown SILT (A-4b), little fine to coarse sand, trace gravel; damp.	4	8	–	9	56	23
		6 12 12	18	6		–							
15													
16.0	624.9						Medium dense brown GRAVEL WITH SAND (A-1-b), some silty clay; damp. (Decomposed SANDSTONE)						
		6 17 21	18	7									
		2 15 30	18	8									
20													
		6 15 50/3	15	9									
22.5	618.4						Medium hard gray SHALE; slightly to moderately weathered, micaceous, thinly laminated, slightly fractured.						
		Core 60"	Rec 60"	RQD 98%	R1								
25													
27.5	613.4						Bottom of Boring - 27.5'						
30													

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

50+

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-65 | Location: Sta. 869+10.9, 17.0 ft. LT of SR 823 CL | Date Drilled: 10/10/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 2.2'

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	646.1												
0.2	645.9						Topsoil - 2"						
		WOH 1 1	6	1		–	Very soft to soft brown SILT (A-4b), trace fine to coarse sand; contains organic material; wet.	0	2	--	3	75	20
3.0	643.1												
		4 5 11	18	2		--	Very stiff brown SANDY SILT (A-4a), little to some fine to coarse sand, trace to little gravel; damp. (Decomposed SHALE)						
5													
		8 12 13	18	3		–		12	10	--	8	48	22
8.0	638.1												
		8 9 50/3	15	4		4.5+	Hard brown and gray SILT AND CLAY (A-6a), trace to little fine to coarse sand, trace gravel; damp. (Decomposed SHALE)						
10													
11.0	635.1	50/5	3	5			Severely weathered brown SANDSTONE.						
11.5	634.6						Medium hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, laminated to thinly bedded, slightly fractured. @ 11.5'-11.9',12.9'-13.2',14.7' clay seams.						
		Core 60"	Rec 60"	RQD 96%	R1								
15													
16.5	629.6						Bottom of Boring - 16.5'						
20													
25													
30													

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

50+
50+

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-66 | Location: Sta. 868+30.1, 84.4 ft. RT of SR 823 CL | Date Drilled: 10/10/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 3.3'

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
0.2	652.5						Topsoil - 2"						
	652.3	WOH WOH 1	18	1		1.75	Stiff brown SILT (A-4b), little clay, trace gravel; moist to wet.	6	9	--	6	62	17
3.0	649.5												
		1 2 40	6	2		--	Very stiff to hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp. (Decomposed SHALE)						
5													
6.0	646.5	10 50/5	4	3			Very dense brown and gray GRAVEL WITH SAND AND SILT (A-2-4); damp. (Decomposed SANDSTONE)	80	5	--	4	11	
		50/3	3	4									
9.0	643.5						Hard gray SANDSTONE; fine grained, unweathered to slightly weathered, micaceous, thinly bedded, unfractured.						
10		Core 60"	Rec 60"	RQD 100%	R1								
14.0	638.5						Bottom of Boring - 14.0'						
15													
20													
25													
30													

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

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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

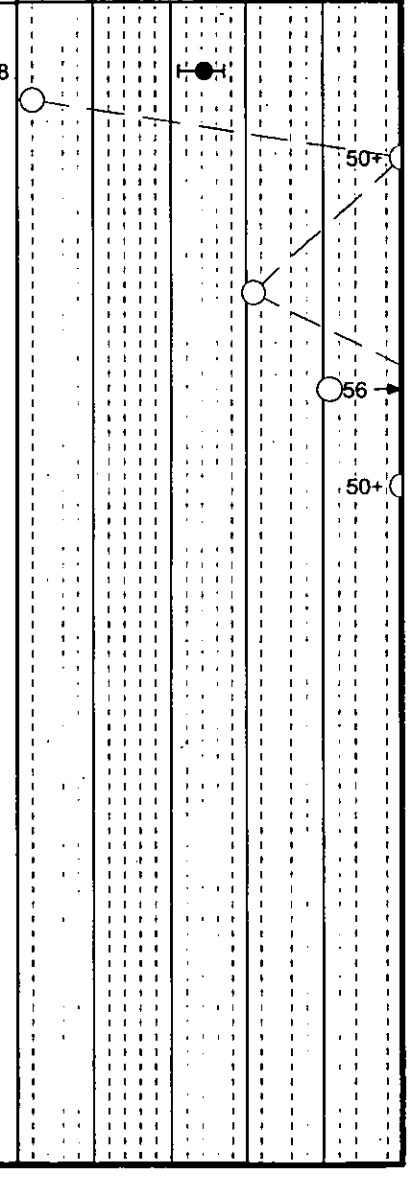
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-67 | Location: Sta. 857+27.6, 74.7 ft. RT of SR 823 CL | Date Drilled: 10/10/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 4.3' (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	626.5												
0.6	625.9						Topsoil - 7"						
		WOH WOH 2	18	1		0.75	Medium stiff brown SANDY SILT (A-4a), some fine to coarse sand, little gravel; moist.	12	19	–	8	43	18
3.0	623.5												
		50/5	2	2			Severely weathered brown SANDSTONE, argillaceous.						
5.0	621.5												
		6 11 20	18	3			Severely weathered brown and gray SHALE, arenaceous.						
		5 17 39	18	4									
10													
		13 28 50/5	17	5									
12.5	614.0						Medium hard gray SHALE; moderately to highly weathered, micaceous, thinly laminated, slightly fractured.						
14.2	612.3												
15		Core 60"	Rec 60"	RQD 81%	R1		Medium hard gray SHALE; slightly weathered, micaceous, thinly laminated, moderately to highly fractured. @ 15.0'-15.4', broken.						
17.5	609.0						Bottom of Boring - 17.5'						
20													
25													
30													

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



FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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

LOG OF: Boring C-68 | Location: Sta. 857+02.4, 40.4 ft. LT of SR 823 CL | Date Drilled: 10/10/06

WATER OBSERVATIONS: Water seepage at: None; Water level at completion: 4.5'

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)
0	620.9													Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ (10 20 30 40)
0.3	620.6						Topsoil - 3"							
		2 3 4	18	1		--	Medium stiff brown SANDY SILT (A-4a), some fine to coarse sand, some gravel; damp. (Decomposed SHALE)	21	21	--	9	32	17	
3.0	617.9													
		8 12 14	18	2			Medium dense brown COARSE AND FINE SAND (A-3a), trace to little gravel; damp.(Decomposed SANDSTONE).							
5														
5.5	615.4						Hard brown and gray SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp. (Highly weathered to decomposed SHALE)							
		9 11 48	18	3										59 →
		4 21 38	18	4										
10														59 →
		12 38 50/5	17	5										
12.5	608.4						Soft gray SHALE; highly weathered, micaceous, thinly laminated, slightly fractured.							50+ ○
		Core 60"	Rec 60"	RQD 100%	R1									
15														
17.5	603.4						Bottom of Boring - 17.5'							
20														
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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

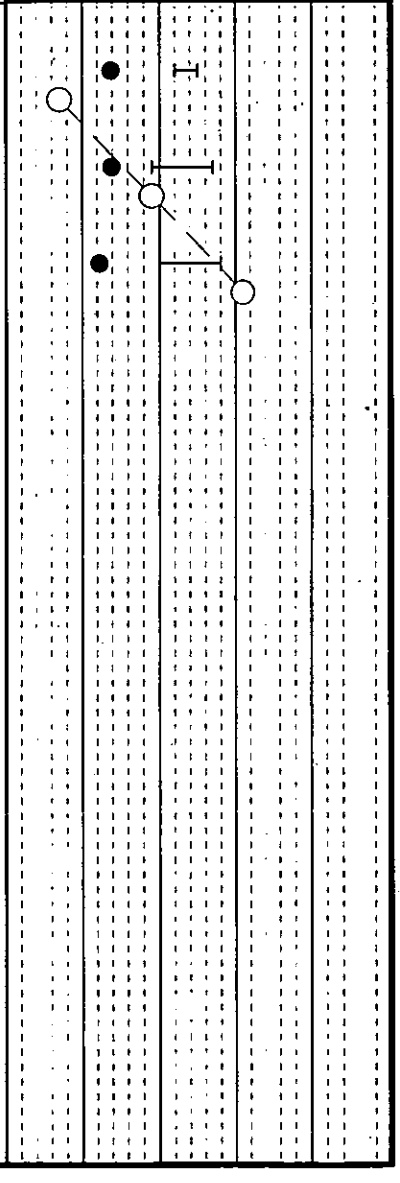
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-69 | Location: Sta. 856+43.9, 171.5 ft. LT of SR 823 CL | Date Drilled: 10/09/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 3.1' (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	614.5												
0.6	613.9						Topsoil - 7"						
		2 3 4	18	1			Loose brown GRAVEL WITH SILT (A-1-b), little silt, trace clay; damp.	48	20	--	7	18	7
3.0	611.5												
		4 7 12	18	2		3.0	Very stiff brown and gray SANDY SILT (A-4a), some gravel, little clay; contains sandstone fragments; damp.	21	21	--	10	30	18
5													
		5 15 16	18	3		4.0		33	13	--	8	30	16
7.5	607.0						Soft to medium hard brown SANDSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, laminated to thinly bedded, highly fractured to broken.						
10													
12.5	602.0	Core 120"	Rec 120"	RQD 48%	R1		Medium hard gray SHALE; slightly weathered, micaceous, laminated, slightly fractured.						
15													
17.5	597.0						Bottom of Boring - 17.5'						
20													
25													
30													

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



FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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

LOG OF: Boring C-70 | Location: Sta. 853+22.0, 167.8 ft. RT of SR 823 CL | Date Drilled: 10/09/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 3.8' (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	622.1												
0.3	621.8						Topsoil - 3"						
		4 8 8	18	1			Severely weathered brown SANDSTONE.	12	29	--	18	41	
3.0	619.1						Severely weathered brown and gray SHALE, arenaceous.						
		4 9 10	14	2									
5													
		5 20 29	18	3			@ 6.0', gray.						
		50/3	2	4									
10													
11.0	611.1						Medium hard gray SHALE; slightly weathered, micaceous, laminated, slightly fractured.						
		Core 60"	Rec 60"	RQD 91%	R1								
15													
16.0	606.1						Bottom of Boring - 16.0'						
20													
25													
30													

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

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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

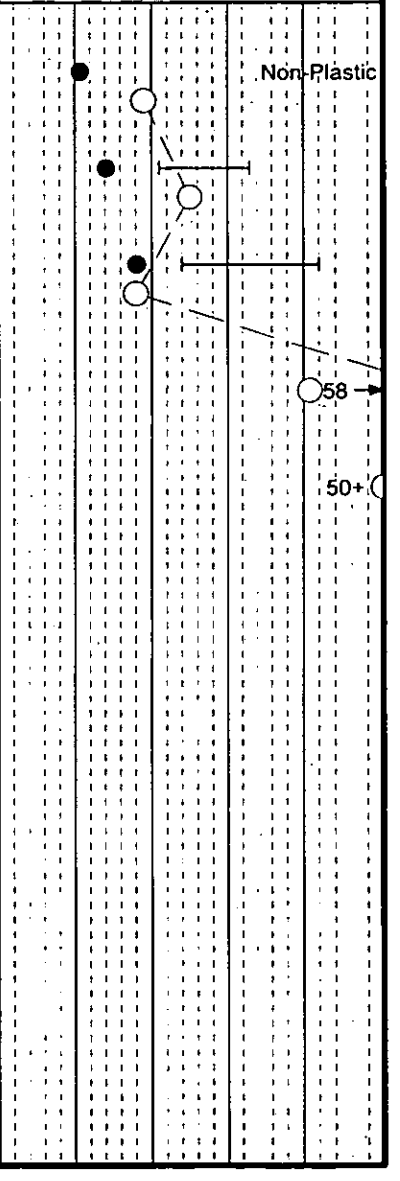
LOG OF: Boring C-71 | Location: Sta. 854+76.6, 46.8 ft. LT of SR 823 CL | Date Drilled: 10/09/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 5.0' (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
0	616.9												
0.3	616.6						Topsoil - 4"						
		4 11 8	18	1			Medium dense brown SANDY SILT (A-4a), little gravel, trace clay; damp.	18	27	--	12	34	9
3.0	613.9												
		5 12 13	18	2		4.5+	Hard brown SILT AND CLAY (A-6a), some gravel, some fine to coarse sand; contains sandstone fragments; damp.	32	18	--	7	23	20
5													
6.0	610.9	4 7 11	18	3		4.5+	Hard brown CLAY (A-7-6), trace fine to coarse sand; damp.	0	1	--	3	42	54
8.5	608.4												
		7 20 38	18	4			Severely weathered brown and gray SHALE.						
10													
		12 24 50/5	17	5									
12.5	604.4												
		Core 60"	Rec 60"	RQD 100%	R1		Soft to medium hard gray SHALE; slightly weathered, micaceous, thinly laminated to very thinly bedded, slightly fractured.						
15													
17.5	599.4						Bottom of Boring - 17.5'						
20													
25													
30													

GRADATION

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



FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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

LOG OF: Boring C-72 | Location: Sta. 855+75.4, 207.5 ft. LT of SR 823 CL | Date Drilled: 10/04/06 to 10/06/06

WATER OBSERVATIONS: Water seepage at: 11.0' - 12.5'
Water level at completion: 11.6'

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	612.3						Topsoil - 2"						
		3 4 6	18	1		3.25	Stiff to very stiff brown SILT (A-4b), some fine to coarse sand, trace gravel; damp to moist.	5	15	–	7	52	21
		3 6 6	18	2									
6.0	606.5	1 1 2	18	3		1.75	Stiff to very stiff brown and gray SILT AND CLAY (A-6a), trace to little fine to coarse sand, trace gravel; damp to moist. (Decomposed SHALE)	0	3	–	3	67	27
		8 12 13	18	4									
		2 5 5	18	5		3.0							
13.5	599.0	25 50/5	11	6			Severely weathered gray SHALE.						
15.0	597.5	Core 60"	Rec 60"	RQD 85%	R-1		Medium hard gray SHALE; moderately weathered, micaceous, laminated, slightly fractured.						
20.0	592.5						Bottom of Boring - 20.0'						

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

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-73 | Location: Sta. 823+86.8, 109.2 ft. RT of SR 823 CL | Date Drilled: 10/03/06

WATER OBSERVATIONS: Water seepage at: Not reported
Water level at completion: 11.0'

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	761.0												
0.3	760.7						Topsoil - 4"						
		3 2 2	16	1		--	Soft to medium stiff brown SANDY SILT (A-4a), little clay, little gravel; damp.	13	23	--	8	43	13
3.0	758.0												
		3 8 11	18	2		--	Very stiff to hard brown and gray SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp to moist. (Decomposed SHALE)						
5		4 8 10	18	3		4.25		5	12	--	6	48	29
		4 8 13	17	4		4.5+							
10		6 10 14	18	5		4.5+							
		8 36 50/5	18	6		4.5+							
15													
16.0	745.0	Core 60"	Rec 60"	RQD 80%	R-1		Soft brown SHALE; highly weathered, very thinly bedded, moderately fractured. @ 18.7'. gray.						
20													
21.0	740.0						Bottom of Boring - 21.0'						
25													
30													

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

50+

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-74 | Location: Sta. 823+68.5, 13.0 ft. LT of SR 823 CL | Date Drilled: 10/03/06

WATER OBSERVATIONS: Water seepage at: Not reported
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	745.3												
0.3	745.0						Topsoil - 3"						
		2 3 3	15	1		2.5	Very stiff brown SILT (A-4b), little fine to coarse sand, little gravel; damp.	12	10	--	4	51	23
3.0	742.3						Very stiff brown SANDY SILT (A-4a), little clay, little gravel; damp. (Decomposed SANDSTONE)						
		2 8 12	18	2		--							
5		3 13 23	18	3		--		16	21	--	10	37	16
		7 10 11	18	4		--							
10													
10.5	734.8						Very stiff to hard brown and gray SANDY SILT (A-4a), some clay, little gravel; damp. (Weathered to decomposed SHALE)						
		8 11 15	18	5		4.5+							
		5 8 10		6		3.5		17	7	--	5	43	28
15		5 7 11	18	7		4.5+							
		7 17 31	18	8		4.5+							
20		17 50/4	14	9									
22.5	722.8						Soft to medium hard gray SHALE; slightly weathered, very thinly bedded, slightly fractured.						
		Core 60"	Rec 55"	RQD 51%	R-1								
25													
27.5	717.8						Bottom of Boring - 27.5'						
30													

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

50+

FILE: 0121-3070-03 (11/13/2007 9:05 PM)

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 C-75 | Location: Sta. 822+97.9, 179.0 ft. LT of SR 823 CL | Date Drilled: 10/04/06

WATER OBSERVATIONS: Water seepage at: Not reported; Water level at completion: 13.3'

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	732.0													
0.3	731.7						Topsoil - 4"							
		3 4 6	15	1		--	Medium dense brown and gray SANDY SILT (A-4a), some gravel, little gravel; damp. (Decomposed SHALE)	25	17	--	12	34	12	Non-Plastic
		8 12 12	18	2		--								
5														
6.0	726.0	6 8 13	18	3		4.5+	Stiff to very stiff brown and gray SANDY SILT (A-4a), some clay, trace to little gravel; damp. (Decomposed SHALE)							
		3 6 11	18	4		3.75		10	10	--	7	49	24	
10		3 7 12	17	5		3.75								
		3 7 31	18	6		--								
15														
		25 50/3	12	7		--	@ 17.5'-17.8', clay seam.							50+
17.5	714.5						Soft to medium hard gray SHALE; very fine grained, slightly weathered, very thinly bedded, slightly fractured. @ 18.5'-18.7', clay seam.							
		Core 60"	Rec 58"	RQD 56%	R-1									
20														
22.5	709.5						Bottom of Boring - 22.5'							
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-76 | Location: Sta. 818+07.8, 239.4 ft. LT of SR 823 CL | Date Drilled: 10/03/06

WATER OBSERVATIONS: Water seepage at: Not reported; 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
0	723.7												
0.4	723.3						Topsoil - 5"						
		4 6 8	18	1			Medium dense brown SANDY SILT (A-4a), little clay; damp. (Decomposed SANDSTONE)	29	24	--	7	21	19
3.0	720.7												
		6 14 12	14	2			Medium dense brown COARSE AND FINE SAND (A-3a), trace gravel; damp. (Decomposed SANDSTONE)						
5													
5.5	718.2						Hard gray SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; damp. (Weathered to decomposed SHALE)	6	4	--	3	47	40
		5 6 13	17.5	3		4.5+							
		23 50/4	10	4		--							
10.0	713.7						Soft gray SILTSTONE; moderately weathered, very thinly bedded, highly fractured. @ 11.5'-11.8', hard SANDSTONE.						
		Core 60"	Rec 54"	RQD 51%	R-1								
15.0	708.7						Bottom of Boring - 15.0'						
20													
25													
30													

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

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-77 | Location: Sta. 816+38.8, 120.0 ft. LT of SR 823 CL | Date Drilled: 10/03/06

WATER OBSERVATIONS: Water seepage at: Not reported
Water level at completion: 2.3'

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	735.0												
0.4	734.6						Topsoil - 5"						
		3 4 5	18	1		--	Stiff brown SANDY SILT (A-4a), some gravel, little clay; damp.	29	18	--	11	29	13
3.0	732.0												
		5 6 9	18	2		4.5+	Hard brown SILTY CLAY (A-6b), trace to little fine to coarse sand, trace gravel; damp. (Weathered to decomposed SHALE)						
5													
		5 10 15	18	3		4.5+		1	5	--	2	47	45
		4 11 23	18	4		4.5+							
10													
		15 42 50		5		--							
12.5	722.5						Soft gray SHALE; very fine grained, slightly weathered, micaceous, laminated, slightly fractured.						
15		Core 60"	Rec 50"	RQD 60%	R-1								
17.5	717.5						Bottom of Boring - 17.5'						
20													
25													
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
92

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-78 | Location: Approx. Sta. 812+67.9, 218.6 ft. RT of SR 823 CL | Date Drilled: 10/02/06 to 10/03/06

WATER OBSERVATIONS: Water seepage at: Not reported
Water level at completion: 13.5'

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	756.2												
0.3	755.9						Topsoil - 4"						
		2 3 5	12	1		--	Stiff brown SANDY SILT (A-4a), some gravel, trace clay; moist. (Decomposed SANDSTONE).	26	26	--	11	28	9
3.0	753.2						Very stiff to hard brown and gray SILT AND CLAY (A-6a), trace to little fine to coarse sand, trace gravel; damp to moist.						
		2 4 5	18	2		4.25							
5		3 7 8	17	3		3.25							
		3 6 9	18	4		4.5		3	6	--	4	48	39
10		3 6 12	17	5		4.0							
		26 29 30	17	6		--							
15		50/5	5	7		--							
17.5	738.7						Soft to medium hard gray SHALE; slightly to moderately weathered, micaceous, very thinly bedded, slightly fractured.						
20		Core 60"	Rec 48"	RQD 8%	R-1								
22.5	733.7						Bottom of Boring - 22.5'						
25													
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
59 →
50+ ○

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-79 | Location: Sta. 796+30.7, 314.3 ft. RT of SR 823 CL | Date Drilled: 1/18/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
20.1' (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	782.4												
0.4	782.0						Topsoil - 5" / 6" soil removed before drilling						
		4 5 4	10	1			Loose to medium dense brown SANDY SILT (A-4a), "and" gravel; contains sandstone fragments; damp.						
		5 5 6	18	2				39	9	--	5	47	
5.5	776.9						Very stiff to hard brown and gray SILT (A-4b), trace to little fine to coarse sand, trace gravel; contains sandstone fragments; damp to moist .						
		7 14 12	18	3		4.25							
		7 10 13	18	4		4.25		3	11	--	6	53	27
10		7 10 11	13	5		3.25							
		2 7 9	18	6		3.0							
15		4 5 6	18	7		1.5	@ 16.0'-17.5', stiff.						
		4 5 6	18	8		2.0		0	2	--	6	63	29
20		5 5 7	18	9		2.5							
23.0	759.4						Very stiff to hard gray and brown SANDY SILT (A-4a), little to some fine to coarse sand, trace to little gravel; contains sandstone fragments; damp.						
		3 7 11	18	10		4.5+							
25		5 14 14	18	11		4.25		1	15	--	4	44	36
		5 7 9	18	12		2.5		16	24	--	7	36	17
30													

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

Non-Plastic

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-79 | Location: Sta. 796+30.7, 314.3 ft. RT of SR 823 CL | Date Drilled: 1/18/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
20.1' (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	STANDARD PENETRATION (N)
30.0	752.4						Severely weathered gray SHALE, arenaceous.							
		25 32 50/5	17	13										50+
35.5	746.9	Core 60"	Rec 60"	RQD 93%	R1		Soft to medium hard gray SHALE; slightly weathered, arenaceous, micaceous, thinly bedded, slightly fractured. @ 35.5'-36.0', clay seam. @ 37.0'-37.5', qu = 2,866 psi.							
40.5	741.9						Bottom of Boring - 40.5'							

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

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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

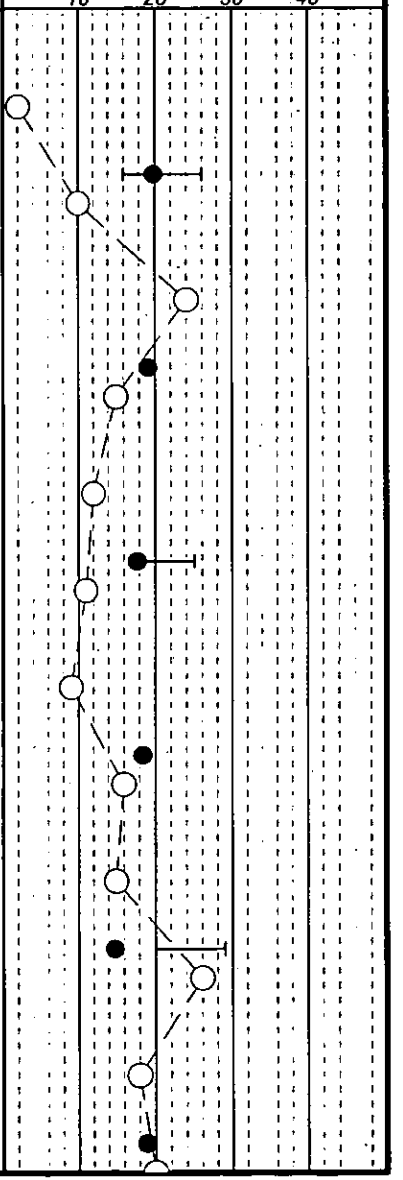
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-80 | Location: Sta. 796+08.3, 67.3 ft. RT of SR 823 CL | Date Drilled: 01/18/07 to 01/22/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 11.7' (prior to coring)
5.6' (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	809.0												
0.4	808.6						Topsoil - 5"						
		WOH 1 1	18	1		–	Very stiff to hard brown SILT (A-4b), some clay, trace to little fine to coarse sand; damp to moist.						
		4 4 6	18	2		2.5		0	1	–	8	61	30
5		6 10 14	18	3		4.5+							
		5 7 8	18	4		3.0							
10		4 5 7	18	5		4.5+							
		3 4 7	18	6		4.5+	@ 13.5', contains sandstone fragments.	0	0	–	2	66	32
15		4 4 5	18	7		3.0							
		5 5 11	18	8		3.5							
20													
21.0	788.0	6 6 9	18	9		4.5+	Very stiff to hard brown SANDY SILT (A-4a), little clay, trace gravel; damp.						
		6 10 16	18	10		4.5+		6	22	–	9	46	17
25		5 8 10	18	11		4.5+							
		6 8 12	18	12		3.0							
30													

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



FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-80 | Location: Sta. 796+08.3, 67.3 ft. RT of SR 823 CL | Date Drilled: 01/18/07 to 01/22/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 11.7' (prior to coring)
5.6' (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)
30	779.0						Very stiff to hard brown SANDY SILT (A-4a), little clay, trace gravel; damp.							
33.5	775.5	19 25 33	18	13			Severely weathered brown SANDSTONE, argillaceous.							58
35														
37.0	772.0	Core 60"	Rec 60"	RQD 91%	R1		Soft to medium hard gray SILTSTONE interbedded with SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, thinly laminated to laminated, slightly fractured. @ 37.0'-37.2', brown. @ 38.7', 40.6'-40.8', clay seams.							
40														
42.0	767.0						Bottom of Boring - 42.0'							
45														
50														
55														
60														

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

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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

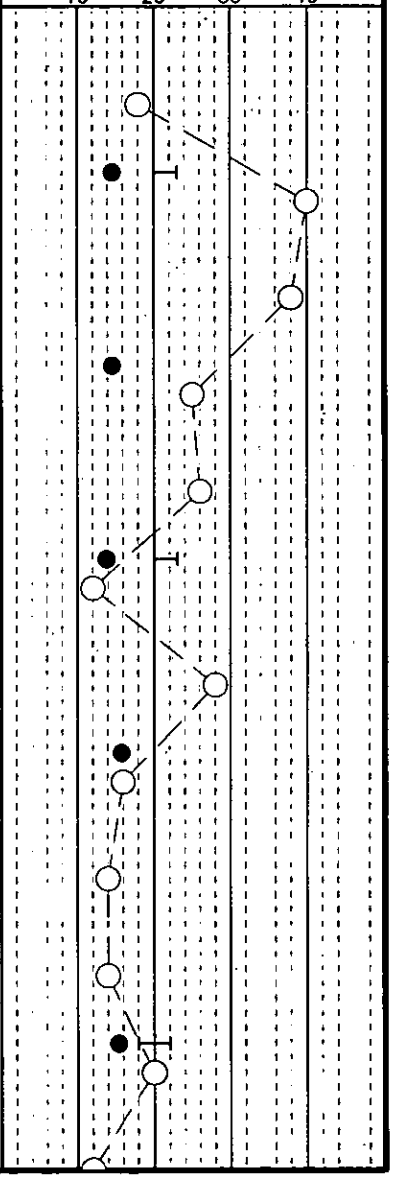
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-81 | Location: Sta. 795+98.7, 180.5 ft. LT of SR 823 CL | Date Drilled: 01/22/07 to 01/23/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 21.5' (prior to coring)
8.5' (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
0	844.6												
0.7	843.9						Topsoil - 8"						
		2 5 13	18	1		2.75	Very stiff to hard brown SANDY SILT (A-4a), little clay, trace to little gravel; contains sandstone fragments; dry to damp.						
5		11 17 23	18	2		3.5		9	21	–	10	49	11
		11 18 20	18	3		4.5+							
		7 12 13	18	4		4.5							
10		9 13 13	18	5		4.5+							
		3 5 7	18	6		4.25	@ 13.5'-15.0', some gravel.	28	17	–	9	35	11
15		8 12 16	18	7		4.5+							
		5 7 9	18	8		3.5							
20		4 6 8	11	9		3.5							
23.5	821.1												
		5 6 8	18	10		4.0	Hard brown SILT (A-4b), little to some fine to coarse sand, trace gravel; contains sandstone fragments; damp.						
25		5 8 12	18	11		4.5+		8	15	–	7	52	18
		4 5 7	18	12		4.0							
30													

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



FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-81 | Location: Sta. 795+98.7, 180.5 ft. LT of SR 823 CL | Date Drilled: 01/22/07 to 01/23/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 21.5' (prior to coring)
8.5' (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 - ○
30	814.6						Hard brown SILT (A-4b), little to some fine to coarse sand, trace gravel; contains sandstone fragments; damp.							10 20 30 40
35		4 5 8	18	13		--								
		4 6 12	18	14A 14B		--	@ 38.5', gray.							
39.8	804.8						Severely weathered gray SILTSTONE, argillaceous.							
42.0	802.6	Core 60"	Rec 60"	RQD 96%	R1		Medium hard gray SILTSTONE interbedded with SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, thinly laminated, slightly fractured. @ 42.5'-42.8', high angle fracture.							
45														
47.0	797.6						Bottom of Boring - 47.0'							
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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

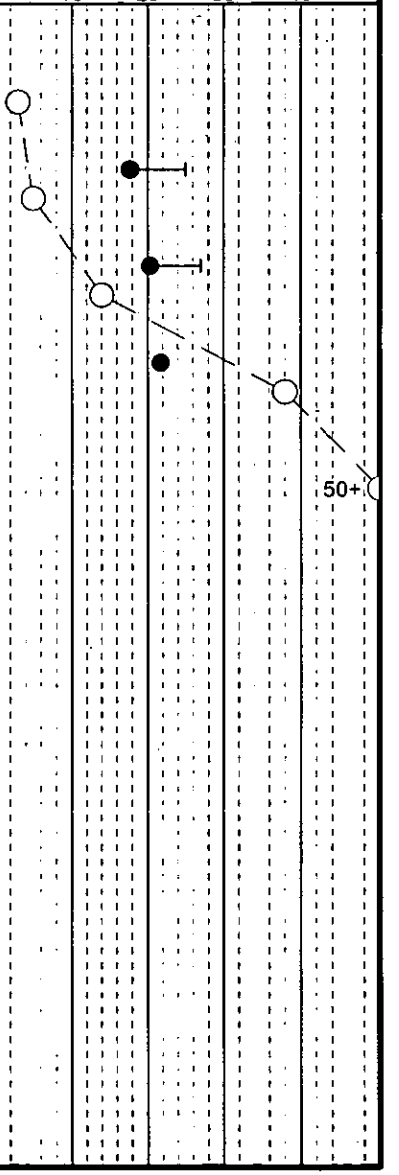
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-82 | Location: Sta. 599+93.7, 241.4 ft. LT of SR 823 CL | Date Drilled: 01/25/07

WATER OBSERVATIONS: Water seepage at: 5.0'-6.0'
Water level at completion: None (prior to coring)
7.5' (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	803.9												
0.3	803.6						Topsoil - 4"						
		1 1 2	9	1			Very loose dark brown SANDY SILT (A-4a); organic; moist.						
3.0	800.9												
		2 2 3	18	2		0.5	Soft brown SANDY SILT (A-4a), some gravel, little clay; contains sandstone fragments; damp to moist.	23	14	--	6	41	16
5													
6.0	797.9	5 7 7	18	3		--	Stiff to very stiff brown SILT (A-4b), little clay, little gravel; contains sandstone fragments; damp to moist.	16	7	--	6	55	16
		10 14 24	4	4		--							
10													
11.0	792.9	15 47 50/4	16	5			Severely weathered grayish brown SANDSTONE, argillaceous.						
13.0	790.9						Medium hard gray SILTSTONE; slightly to moderately weathered, arenaceous, micaceous, argillaceous, very thinly bedded, slightly fractured.						
15		Core 60"	Rec 60"	RQD 93%	R1								
18.0	785.9						Bottom of Boring - 18.0'						
20													
25													
30													

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



FILE: 0121-3070-03 (11/13/2007 9:05 PM)

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

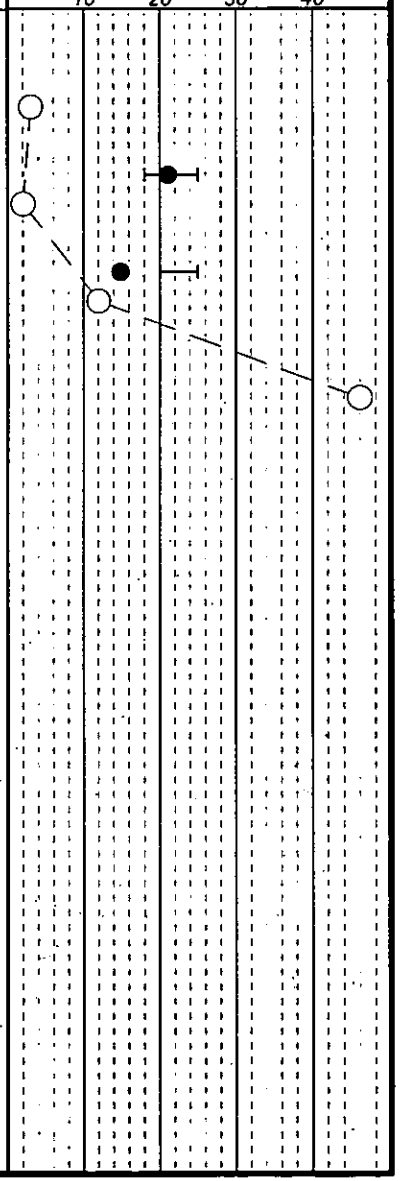
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-83 | Location: Sta. 600+49.4, 45.8 ft. LT of SR 823 CL | Date Drilled: 01/25/07 to 01/25/07

WATER OBSERVATIONS: Water seepage at: 5.0'-6.0'
Water level at completion: None (prior to coring)
4.9' (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	811.8												
0.5	811.3						Topsoil - 6"						
		1 2 1	18	1			Very loose dark brown SANDY SILT (A-4a); organic; moist.						
3.0	808.8												
		WOH 1 1	18	2		0.75	Medium stiff brown SILT (A-4b), little clay, little gravel; contains sandstone fragments; moist.	16	10	--	5	51	18
5													
5.5	806.3												
		2 5 7	9	3			Medium dense to dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; contains sandstone fragments; damp to moist.	51	11	--	7	24	7
		8 17 29	18	4									
10.0	801.8						Soft gray SILTSTONE interbedded with SANDSTONE; very fine to fine grained, highly weathered, micaceous, argillaceous, thinly bedded, slightly to moderately fractured. @ 11.2'-11.7', qu = 920 psi.						
		Core 60"	Rec 60"	RQD 68%	R1								
15.0	796.8						Bottom of Boring - 15.0'						
20													
25													
30													

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



FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-84 | Location: Sta. 601+69.4, 212.5 ft. RT of SR 823 CL | Date Drilled: 01/25/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
4.5' (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	824.3												
0.6	823.7						Topsoil - 7"						
		2 22 1	18	1			Medium dense dark brown SANDY SILT (A-4a); organic; moist.						
3.0	821.3												
		4 5 7	18	2			Medium dense to dense brown SANDY SILT (A-4a), little to some gravel, little clay; contains sandstone fragments; damp to moist.	20	11	–	7	45	17
5													
		18 19 23	18	3									
8.0	816.3												
		17 29 50/2	14	4			Severely weathered gray SILTSTONE, argillaceous.						
10.0	814.3												
		Core 60"	Rec 60"	RQD 65%	R1		Soft to medium hard gray SILTSTONE interbedded with SANDSTONE; very fine to fine grained, highly weathered, micaceous, argillaceous, laminated, highly fractured.						
15.0	809.3						Bottom of Boring - 15.0'						
20													
25													
30													

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

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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

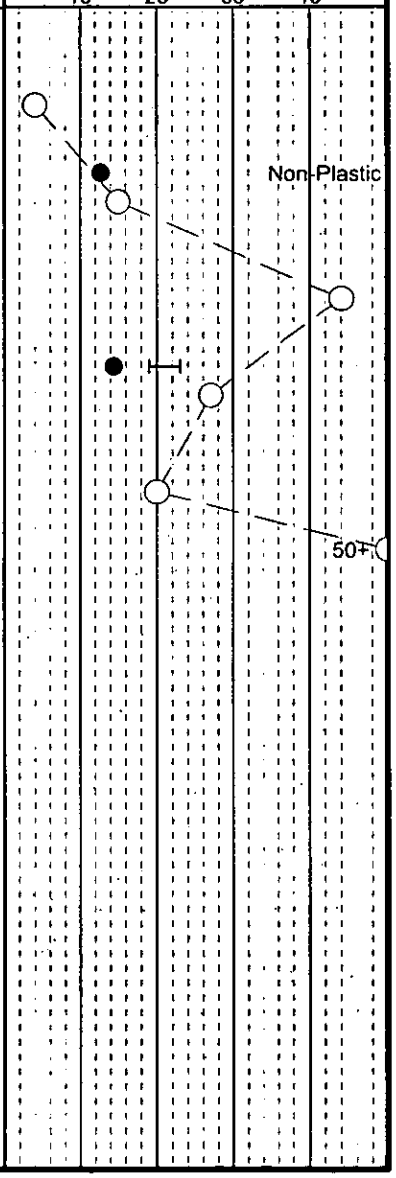
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-85 | Location: Sta. 616+68.6, 154.5 ft. RT of SR 823 CL | Date Drilled: 01/24/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
9.0' (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	856.1												
0.7	855.4	1 2 2	4	1			Topsoil - 8" / 6" soil removed before drilling FILL: Very loose brown SANDY SILT (A-4a), trace clay, trace gravel; contains roots; moist.						
3.0	853.1	3 6 9	12	2			Medium dense to dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace to little clay; contains sandstone fragments; damp to moist.	45	20	--	8	23	4
5		7 24 20	18	3									
8.5	847.6	8 12 15	18	4		–	Very stiff brown SILT (A-4b), some fine to coarse sand, trace gravel; contains sandstone fragments; damp.	2	21	--	8	55	14
10		6 8 12	18	5		–							
13.0	843.1	50/3	3	6			Severely weathered brown SANDSTONE, argillaceous.						
15.0	841.1	Core 60"	Rec 60"	RQD 98%	R1		Hard brown SANDSTONE; fine grained, slightly weathered, micaceous, laminated to very thinly bedded, slightly fractured. @ 16.6'-17.0', qu = 7,280 psi.						
20.0	836.1						Bottom of Boring - 20.0'						
25													
30													

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



FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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

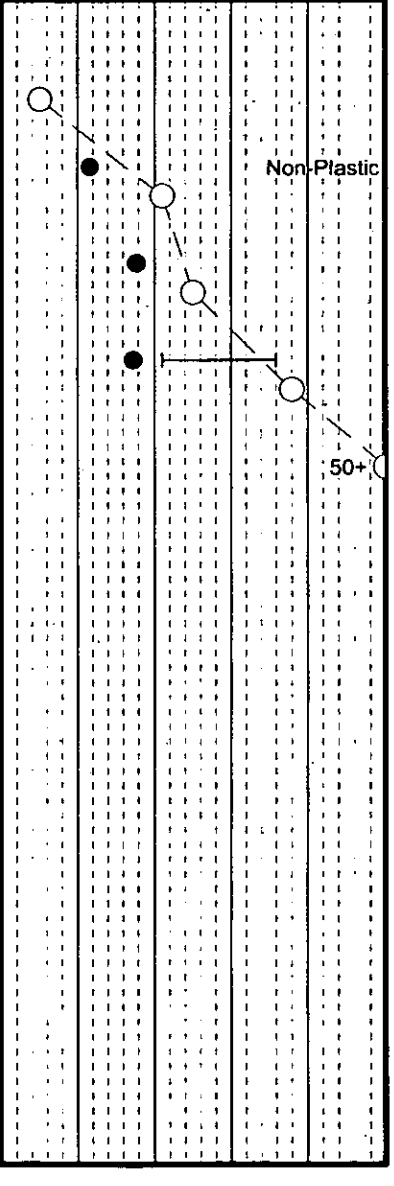
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-86 | Location: Sta. 635+88.0, 122.4 ft. RT of SR 823 CL | Date Drilled: 01/23/07

WATER OBSERVATIONS: Water seepage at: 5.0' - 6.0'
Water level at completion: 11.1' (prior to coring)
7.7' (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	772.5												
0.7	771.8	2 2 3	18	1			Topsoil - 8" Loose to dense brown GRAVEL WITH SAND (A-1-b), trace to little silty clay; contains sandstone fragments; damp to moist.	59	12	--	11	13	6
5		3 7 14	18	2									
		5 10 15	18	3									
8.5	764.0	8 16 22	18	4		1.0	Medium stiff to stiff brown SILT AND CLAY (A-6a), trace to little fine to coarse sand, trace gravel; contains sandstone fragments; damp to moist.	5	8	--	5	50	32
10													
		38 50/3	9	5		1.0							
12.0	760.5	Core 84"	Rec 84"	RQD 72%	R1		Hard gray SILTSTONE interbedded with SANDSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, laminated to very thinly bedded, slightly fractured. @ 12.0'-13.8', medium hard, brown, broken zone. @ 17.0'-18.0', broken zone.						
15													
19.0	753.5						Bottom of Boring - 19.0'						
20													
25													
30													

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



FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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 C-87 | Location: Sta. 636+05.9, 105.2 ft. LT of SR 823 CL | Date Drilled: 01/24/07

WATER OBSERVATIONS: Water seepage at: 5.0'-6.0'
Water level at completion: 10.9' (prior to coring)
5.6' (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
0	757.5													
0.6	756.9						Topsoil - 7"							
		2 3 4	18	1		–	Very stiff to hard brown SANDY SILT (A-4a), some to "and" gravel, trace to little clay; contains sandstone fragments; damp to moist. @ 1.0'-2.5', medium stiff.							
		5 7 9	18	2		–		29	16	--	10	31	14	
5		9 15 16	18	3		--		45	11	--	8	28	8	
		6 11 15	18	4		--								
10		10 14 50/3	15	5A 5B		–								50+
12.0	745.5						Severely weathered brown SANDSTONE, argillaceous.							
12.5	745.0						Hard gray SILTSTONE interbedded with SANDSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, laminated to very thinly bedded, slightly fractured. @ 13.0'-13.3', iron stained high angle fracture. @ 17.1'-17.2', high angle fracture.							
15		Core 60"	Rec 60"	RQD 83%	R1									
17.5	740.0						Bottom of Boring - 17.5'							
20														
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:05 PM]

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

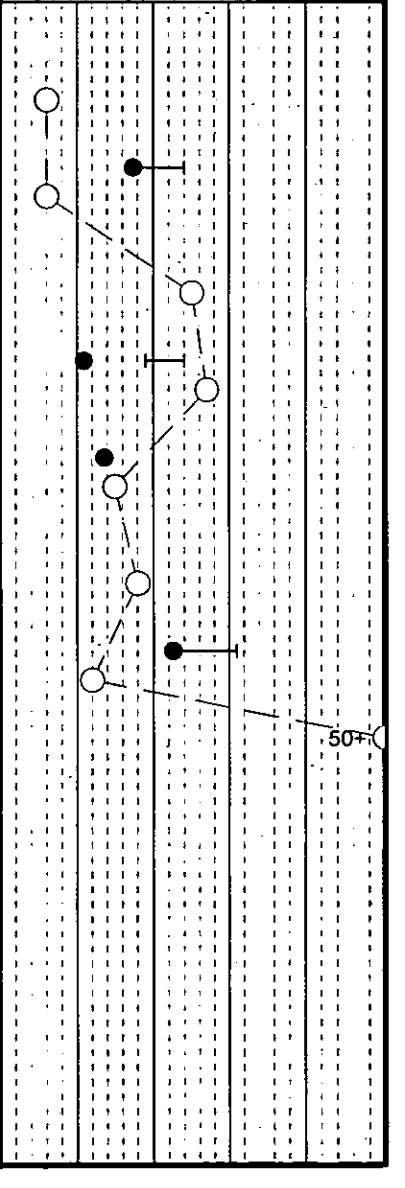
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-88 | Location: Sta. 636+57.7, 284.3 ft. LT of SR 823 CL | Date Drilled: 01/24/07

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
6.0' (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	754.0												
0.8	753.2	2 3 3	18	1		--	Topsoil - 9" Stiff brown SILT (A-4b), little to some clay, little gravel, little fine to coarse sand; contains rock fragments; damp to moist.						
5		2 3 3	18	2		1.75		15	10	--	4	51	20
5.5	748.5	4 10 15	18	3		--	Very stiff brown SANDY SILT (A-4a), little to some gravel, trace to little clay; contains sandstone fragments; damp.						
		7 13 14	18	4		--		34	20	--	10	27	10
10		8 8 7	18	5		--							
		6 8 10	18	6		--							
15													
16.0	738.0	4 5 7	18	7		--	Stiff brown SILT (A-4b), some clay, little fine to coarse sand, trace gravel; damp to moist.	1	5	--	7	67	21
18.0	736.0	50/4	4	8			Severely weathered gray SANDSTONE, argillaceous.						
19.5	734.5	Core 60"	Rec 60"	RQD 96%	R1		Medium hard gray SILTSTONE interbedded with SANDSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, thinly laminated to laminated, moderately to highly fractured.						
20													
24.5	729.5						Bottom of Boring - 24.5'						
25													
30													

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



FILE: 0121-3070-03 | 11/13/2007 9:05 PM |

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-2562 | Location: Sta. 632+79.7, 121.3 ft. LT of SR 823 CL | Date Drilled: 1/26/06

WATER OBSERVATIONS: Water seepage at: None; Water level at completion: None; 11.2' (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	896.7													
0.4	896.3						Topsoil - 5"/6" soil removed before drilling							
		2 7 12	9	1			Medium dense to very dense brown SANDY SILT (A-4a), some gravel, little clay; contains sandstone fragments; damp.	29	10	–	5	44	12	
		30 32 35	18	2										67
5.0	891.7						Severely weathered brown SANDSTONE, argillaceous.							
6.5	890.2	50/1	1	3			Medium hard to hard brown SANDSTONE; very fine to fine grained, highly weathered to decomposed, argillaceous, massive, highly fractured. @ 7.2'-7.4', 10.5'-11.1', high angle fractures.							50+
10		Core 102"	Rec 102"	RQD 76%	R1	*708								
14.0	882.7						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, massive, slightly fractured. @ 14.8'-15.3', 16.2', 16.9'- 17.3', 19.5'-20.3', iron stained. @ 15.2', 16.2', 17.1', 19.9', 20.1', 21.6', low angle fractures.							
15														
20		Core 120"	Rec 120"	RQD 100%	R2	*540	@ 19.6'-19.7', high angle fracture.							
25														
30		Core 120"	Rec 120"	RQD 97%	R3		@ 28.0'.28.2',28.3', low angle fractures. @ 28.0'-28.2', clay seam.							

FILE: 0121-3070-03 [11/13/2007 9:06 PM]

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-2562 | Location: Sta. 632+79.7, 121.3 ft. LT of SR 823 CL | Date Drilled: 1/26/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None
11.2' (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	866.7					*1334	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, unfractured to slightly fractured.						
35													
40		Core 120"	Rec 120"	RQD 100%	R4	*1253							
45							@ 43.7', low angle fracture.						
50		Core 120"	Rec 120"	RQD 100%	R5	*1271	@ 47.2'-49.5', iron stained. @ 47.3', low angle rust stained fracture. @ 49.1', low angle fracture.						
55													
60		Core 120"	Rec 120"	RQD 100%	R6								

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

FILE: 0121-3070-03 [11/13/2007 9:06 PM]

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-2562 | Location: Sta. 632+79.7, 121.3 ft. LT of SR 823 CL | Date Drilled: 1/26/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None
11.2' (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
60	836.7					*821	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, unfractured to slightly fractured.							
65		Core 60"	Rec 60"	RQD 100%	R7	*1166								
70.0	826.7						Bottom of Boring - 70.0'							
75														
80														
85														
90														

FILE: 0121-3070-03 [11/13/2007 9:06 PM]

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-2564 | Location: Sta. 632+76.6, 124.3 ft. RT of SR 823 CL | Date Drilled: 1/27/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
14.3' (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	886.1												
0.3	885.8	3 4 5	18	1			Topsoil - 3"/6" soil removed before drilling Loose brown SANDY SILT (A-4a), little gravel, trace clay; contains sandstone fragments; dry to damp.						
3.0	883.1	18 36 50/5	17	2			Severely weathered brown SANDSTONE, argillaceous.						
5.0	881.1	Core 108"	Rec 108"	RQD 41%	R1		Medium hard to hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, massive, highly fractured to broken. @ 5.0'-5.5', 6.1'-6.5', 6.7'- 6.8', 7.8', 8.1', 8.7'-9.2', 12.3'-12.5', 11.2'-11.4', 12.5'-12.8', 13.0'-13.2', high angle fractures.						
10													
15							@ 14.5'-14.7', 15.2'-15.4', high angle fractures.						
15.7	870.4	Core 120"	Rec 120"	RQD 85%	R2	*1378	Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, pyritic, massive, unfractured to slightly fractured.						
20													
25							@ 24.0'-24.9', 33.0'-34.0', iron stained.						
30		Core 120"	Rec 120"	RQD 100%	R3	*1421							

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

FILE: 0121-3070-03 [11/13/2007 9:06 PM]

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-2564 | Location: Sta. 632+76.6, 124.3 ft. RT of SR 823 CL | Date Drilled: 1/27/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
14.3' (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
30	856.1						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, pyritic, massive, unfractured to slightly fractured.							
35							@ 34.7', iron stained fracture.							
40		Core 120"	Rec 120"	RQD 100%	R4	*1447								
45		Core 72"	Rec 72"	RQD 100%	R5	*1743								
50.0	836.1						@ 49.3', low angle fracture. Bottom of Boring - 50.0'							
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:06 PM]

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-2626 | Location: Sta. 679+14.1, 149.1 ft. RT of SR 823 CL | Date Drilled: 08/21/06 to 08/22/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
115.1' (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
0	978.3												
0.3	978.0						Topsoil - 3" / 6" soil removed before drilling						
		7 5 7	18	1		4.5+	Hard brown SILTY CLAY (A-6b), little fine to coarse sand; dry to damp.	0	9	–	5	50	36
		8 9 11	18	2		4.5+							
5													
5.5	972.8						Hard brown SANDY SILT (A-4a), little clay; dry.						
		9 10 12	18	3		4.5+		0	26	–	12	45	17
		6 15 19	18	4		4.5+							
10													
		11 35 42	18	5		4.5+							
13.5	964.8	27 50/5	9	6			Severely weathered brown SILTSTONE, arenaceous.						
15.0	963.3						Soft to medium hard brown and gray SILTSTONE; very fine grained, highly weathered, arenaceous, very thinly bedded, highly fractured.						
17.6	960.7						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, laminated to very thinly bedded, slightly fractured, contains moderate argillaceous laminations.						
20		Core 108"	Rec 108"	RQD 75%	R1								
							@ 23.6', gray and brown.						
24.8	953.5						Hard light brown SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, medium bedded to massive, slightly fractured.						
30		Core 120"	Rec 120"	RQD 97%	R2								

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
77
50+

FILE: 0121-3070-03 [11/13/2007 9:23 PM]

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-2626 | Location: Sta. 679+14.1, 149.1 ft. RT of SR 823 CL | Date Drilled: 08/21/06 to 08/22/06

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)
30	948.3						Hard light brown SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, medium bedded to massive, slightly fractured, contains few argillaceous laminations. @ 32.1', gray.							
35		Core 120"	Rec 120"	RQD 100%	R3									
40														
45		Core 120"	Rec 120"	RQD 100%	R4									
50														
55		Core 120"	Rec 120"	RQD 100%	R5									
60														

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

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

FILE: 0121-3070-03 [11/13/2007 9:23 PM]

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-2626 | Location: Sta. 679+14.1, 149.1 ft. RT of SR 823 CL | Date Drilled: 08/21/06 to 08/22/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
115.1' (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	918.3						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, medium bedded to massive, slightly fractured, contains few argillaceous laminations..							
65		Core 120"	Rec 120"	RQD 100%	R6		@ 68.5'-68.7', high angle fracture.							
70														
75		Core 120"	Rec 120"	RQD 100%	R7									
80														
85		Core 120"	Rec 120"	RQD 100%	R8									
90														

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

FILE: 0121-3070-03 [11/13/2007 9:23 PM]

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-2626 | Location: Sta. 679+14.1, 149.1 ft. RT of SR 823 CL | Date Drilled: 08/21/06 to 08/22/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
115.1' (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	888.3						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, medium bedded to massive, slightly fractured, contains few argillaceous laminations.							
95		Core 120"	Rec 120"	RQD 100%	R9		@ 95.5'-123.2', contains iron staining.							
100							@ 101.3'-111.9', pyritic.							
105		Core 120"	Rec 120"	RQD 100%	R10		@ 104.3', turbidity							
110														
115		Core 120"	Rec 120"	RQD 100%	R11		@ 118.6'-127.2', pyritic.							
120														

FILE: 0121-3070-03 [11/13/2007 9:23 PM]

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-2626 | Location: Sta. 679+14.1, 149.1 ft. RT of SR 823 CL | Date Drilled: 08/21/06 to 08/22/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
115.1' (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
120.0	858.3						Very hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, medium bedded to massive, slightly fractured; turbidity.							
125		Core 120"	Rec 120"	RQD 100%	R12									
130														
135		Core 72"	Rec 72"	RQD 100%	R13		@ 137.3', contains few to abundant argillaceous laminations. @ 139.0'-140.0', fissile along argillaceous beds when dessicated.							
140.0	838.3						Bottom of Boring - 140.0'							
145														
150														

FILE: 0121-3070-03 [11/13/2007 9:23 PM]

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-467 | Location: Sta. 541+15.1, 135.6 ft. LT of SR 823 CL | Date Drilled: 04/20/05 to 04/21/05

WATER OBSERVATIONS: Water seepage at: 6.0'
Water level at completion: 4.3' (prior to coring)
12.1' (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)
0	737.5													Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0.3	737.2						Topsoil - 3"							
		1 1 2	12	1		3.5	Very stiff brown with gray mottling SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; moist.							
		3 3 3	10	2		3.0								
5														
6.0	731.5	WOH 2 2	11	3		2.0	Stiff to very stiff brown CLAY (A-7-6), little fine to coarse sand; moist.							
		3 3 4	13	4		3.0								
10														
		3 3 4	18	5		1.25		1	0	–	1	21	77	57
		3 4 4	18	6		2.5								
15														
		2 3 4	18	7		1.75								
		1 3 4	18	8		3.5								
20														
		3 3 5	18	9A 9B		2.5 2.0								
22.0	715.5						Stiff brown SILTY CLAY (A-6b), little fine to coarse sand; contains interbedded silt seams; contains sandstone fragments; moist.							
		3 4 3	18	10		1.75								
25														
		2 4 5	18	11		1.25		2	1	–	2	45	50	
							@ 28.5'-30.0', very soft.							
		2 2 4	18	12		<0.25								
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-467 | Location: Sta. 541+15.1, 135.6 ft. LT of SR 823 CL | Date Drilled: 04/20/05 to 04/21/05

WATER OBSERVATIONS: Water seepage at: 6.0'
Water level at completion: 4.3' (prior to coring)
12.1' (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	707.5						Very stiff to hard brown and gray SILT AND CLAY (A-6a), little to some fine to coarse sand, trace gravel; contains sandstone fragments; damp.						
35		7 8 16	18	13		2.0							
40		5 9 13	18	14		3.75							
45		9 12 15	18	15		4.5+							
50		7 9 15	16	16		--	@ 48.5'-50.0', soft, orangish brown, moist.						
51.5	686.0												
52.1	685.4						Medium hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, medium bedded, highly fractured.						
55		Core 90"	Rec 58"	RQD 53%	R-1		Soft to medium hard gray SHALE; very fine to fine grained, highly weathered to decomposed, arenaceous, laminated, moderately to highly fractured. Loss of 32" in run due to blockage after first half of run.						
59.0	678.5						Bottom of Boring - 59.0'						
60													

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-468 | Location: Sta. 541+19.8, 1.4 ft. RT of SR 823 CL | Date Drilled: 04/15/05 to 04/18/05

WATER OBSERVATIONS: Water seepage at: 10.0'
Water level at completion: 10.2 (prior to coring)
8.6' (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)
0	741.4													Natural Moisture Content, % - ● PL — LL; Blows per foot - ○ (10 20 30 40)
0.4	741.0						Topsoil - 2"							
		2 2 2	7	1		3.5	Very stiff to hard brown SILT AND CLAY (A-6a), little fine sand; damp.							
		2 3 3	16	2		4.5+								
5														
6.0	735.4	2 3 5	18	3		3.75	Stiff to very stiff brown CLAY (A-7-6), trace gravel, fine sand; damp to moist.							
		2 3 3	18	4		2.0								
10							@ 9.9'-10.0', silt seam.							
		WOH 2 3	18	5		2.5		0	0	--	1	31	68	
		2 2 4	18	6		1.5								
15														
		2 3 5	18	7		1.25		1	0	--	0	22	77	52
		1 3 6	15	8		4.0								
20														
		1 3 3	18	9		1.75								
		2 3 4	18	10		1.25								
25														
		2 3 4	18	11A 11B		1.0 --	@ 26.0'-26.5', SILT AND CLAY (A-6a) seam, highly laminated.							
		5 12 30	16	12		3.0								
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-468 | Location: Sta. 541+19.8, 1.4 ft. RT of SR 823 CL | Date Drilled: 04/15/05 to 04/18/05

WATER OBSERVATIONS: Water seepage at: 10.0'
Water level at completion: 10.2 (prior to coring)
8.6' (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	711.4						Medium dense to dense brown SANDY SILT (A-4a), little gravel, trace clay; contains sandstone fragments; damp.						
35		12 16 23	18	13									
40		9 12 19	17	14									
43.5	697.9	6 5 7	18	15		--	Stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; moist.						
45													
50		4 6 9	18	16		--		6	3	--	4	60	27
55		11 19 33	18	17		--							
57.0	684.4	Core	Rec	RQD	R-1		Medium hard dark gray SANDSTONE; very fine to fine grained, hightly to moderately weathered, argillaceous, micaceous, thinly laminated to medium bedded, moderately						
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
52 →

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-468 | Location: Sta. 541+19.8, 1.4 ft. RT of SR 823 CL | Date Drilled: 04/15/05 to 04/18/05

WATER OBSERVATIONS: Water seepage at: 10.0'
Water level at completion: 10.2 (prior to coring)
8.6' (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
60	681.4	60"	60"	100%			fractured to broken. Medium hard dark gray SANDSTONE; very fine to fine grained.							
62.0	679.4						Bottom of Boring - 62.0'							
65														
70														
75														
80														
85														
90														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-469 | Location: Sta. 541+09.5, 116.7 ft. RT of SR 823 CL | Date Drilled: 04/19/05 to 04/20/05

WATER OBSERVATIONS: Water seepage at: 1.0'
Water level at completion: 25.5' (prior to coring)
2.7' (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	736.1												
0.2	735.9						Topsoil - 2"						
		1 1 1	16	1		1.0	Medium stiff to stiff brown SANDY SILT (A-4a), trace gravel; moist.						
3.5	732.6	1 3 3	18	2		4.25	Very stiff to hard brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp.						
5		1 3 3	16	3		3.25							
8.5	727.6	2 3 3	18	4		3.25	Stiff to very stiff brown CLAY (A-7-6), little fine to coarse sand, trace gravel; damp.						
10		2 3 3	18	5		1.75		0	0	–	0	24	76
		1 3 3	18	6		3.0							
15													
16.0	720.1	14 10 11	18	7		1.0	Stiff to very stiff brown SILT (A-4b), some clay, trace fine sand; moist.						
		3 7 10	18	8		3.0	@ 17.0'-17.5', medium stiff to stiff.	0	3	–	6	68	23
20													
20.5	715.6	7 8 16	18	9		4.5+	Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp to moist.						
		8 16 19	17	10		4.5							
25		7 11 20	18	11		--							
		7 11 13	18	12		--							
30													

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

59

FILE: 0121-3070-03 (11/13/2007 9:09 PM)

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-469 | Location: Sta. 541+09.5, 116.7 ft. RT of SR 823 CL | Date Drilled: 04/19/05 to 04/20/05

WATER OBSERVATIONS: Water seepage at: 1.0'
Water level at completion: 25.5' (prior to coring)
2.7' (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)
30	706.1						Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp to moist.							Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ (10 20 30 40)
35		11 17 22	16	13		4.5+								
40		10 17 19	18	14		4.5+								
45		11 13 14	18	15		4.25								
49.0	687.1	50/6	3	16		–	@ 48.5'-49.0', contains sandstone fragments.							50+
50		Core 60"	Rec 52"	RQD 72%	R-1		Hard dark gray SHALE, very fine grained, moderately weathered, micaceous, very thin bedded, moderately fractured; contains few to moderate arenaceous laminations.							
54.0	682.1						Bottom of Boring - 54.0'							
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-494 | Location: Sta. 572+28.8, 0.6 ft. RT of SR 823 CL | Date Drilled: 05/02/05 to 05/03/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
2.8' (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)
0	807.0													Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ (10 20 30 40)
0.3	806.7						Topsoil - 3"							
		3 5 15	18	1		3.75	Very stiff to hard brown SILT (A-4b), little to some clay, trace to little fine to coarse sand, trace to little gravel; contains sandstone fragments; damp.							
		14 21 25	18	2		4.5+	@ 3.5'-7.5', contains pockets of rusty material.							
5		10 30 21	18	3		4.5+		16	9	--	6	52	17	○ 51
		4 8 10	18	4		4.25								
10		7 7 9	18	5		3.0								
		6 20 21	18	6		2.75								
15		3 10 11	18	7		4.0		9	2	--	6	63	20	
		11 19 35	18	8		4.5+	@ 18.5', reddish brown.							○ 54
20		25 27 31	18	9		4.5+								○ 58
		22 50/2	8	10		4.5+								○ 50+
25		Core 60"	Rec 8"	RQD 0%	R-X		@ 25.0'-25.7', sandstone boulder. @ 25.7'-30.0', washed out clay.							
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-494 | Location: Sta. 572+28.8, 0.6 ft. RT of SR 823 CL | Date Drilled: 05/02/05 to 05/03/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
2.8' (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	777.0	50/3	3	11		4.5+	Hard brown SILT (A-4b), little to some clay, trace to little fine to coarse sand, trace to little gravel; contains sandstone fragments; damp.							50+
		25 50/2	8	12		4.5+								50+
35														
38.5	768.5	50/2	2	13			Severely weathered gray SHALE, arenaceous.							50+
40.0	767.0	Core 60"	Rec 60"	RQD 100%	R-1		Medium hard dark gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thinly bedded to thickly bedded, slightly fractured, contains few to moderate argillaceous laminations.							
45.0	762.0						Bottom of Boring - 45.0'							
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-495 | Location: Sta. 573+23.8, 69.5 ft. LT of SR 823 CL | Date Drilled: 05/03/05

WATER OBSERVATIONS: Water seepage at: 10.5'
Water level at completion: 22.2' (prior to coring)
22.2' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	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 - ○
0	795.2													
0.3	794.9						Topsoil - 4"							
		3 3 5	18	1		2.25	Very stiff to hard brown and gray SILT (A-4b), little to some clay, trace to little fine to coarse sand, trace gravel; contains sandstone fragments; contains rust stains; damp.							
		4 8 12	18	2		3.75								
5		6 9 10	18	3		4.5+								
		6 8 8	18	4		2.25		0	1	--	3	79	17	
10		12 35 37	11	5		3.75								72 →
		10 14 18	18	6		4.0								
15		11 15 16	18	7		4.25								
18.5	776.7	15 50/2	8	8			Severely weathered brown SANDSTONE, argillaceous.							50+
20		50/2	2	9										50+
		14 50/2	8	10										50+
25		50/5	5	11			@ 26.0', gray.							50+
		50/5	5	12										50+
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-495 | Location: Sta. 573+23.8, 69.5 ft. LT of SR 823 CL | Date Drilled: 05/03/05

WATER OBSERVATIONS: Water seepage at: 10.5'
Water level at completion: 22.2' (prior to coring)
22.2' (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)
30	765.2						Severely weathered gray SANDSTONE, argillaceous.							
33.8	761.4	50/4	4	13			Bottom of Boring - 33.8'							50+
35														
40														
45														
50														
55														
60														

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-497 | Location: Sta. 573+16.6, 3.8 ft. RT of SR 823 CL | Date Drilled: 05/03/05 to 05/04/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
5.3' (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)
0	808.0													Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ 10 20 30 40
0.3	807.7						Topsoil - 3"							
		4 7 7	18	1		2.5	Very stiff to hard brown SILTY CLAY (A-6b), trace gravel, trace fine to coarse sand; contains sandstone fragments; contains rust stains; damp.							
		8 14 16	18	2		4.5		7	1	--	5	56	31	
5														
5.5	802.5						Severely weathered reddish brown SANDSTONE, argillaceous.							
		15 26 34	18	3										60 →
		12 19 24	18	4										
10														
		19 24 27	18	5										51 →
		14 50/5	11	6										50+
15														
		35 50/2	8	7										50+
		25 50/3	9	8										50+
20														
		50/1	1	9			@ 21.0', gray.							50+
22.0	786.0						Medium hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, thinly bedded to thickly bedded, slightly to moderately fractured, contains few argillaceous laminations.							
		Core 60"	Rec 60"	RQD 98%	R-1									
25														
27.0	781.0						Bottom of Boring - 27.0'							
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-498 | Location: Sta. 574+13.5, 63.6 ft. LT of SR 823 CL | Date Drilled: 05/04/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to adding water)
3.6' (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	801.1												
0.4	800.7						Topsoil - 5"						
		3 3 4	18	1		2.0	Very stiff to hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp to moist.						
		9 13 16	18	2		4.5+		.1	9	–	10	48	32
5													
6.0	795.1	27 50/2	8	3		4.5+	Severely weathered brown SANDSTONE, argillaceous. @ 8.5', water added.						
		20 40 50/5	17	4									
10													
		43 50/3	9	5									
12.0	789.1						Soft to medium hard brown SANDSTONE; very fine to fine grained, highly weathered to decomposed, argillaceous, micaceous, moderately to highly weathered, thickly bedded, highly fractured to broken.						
15		Core 96"	Rec 96"	RQD 86%	R-1								
20.0	781.1						Bottom of Boring - 20.0'						
25													
30													

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-499 | Location: Sta. 574+08.3, 38.3 ft. RT of SR 823 CL | Date Drilled: 05/04/05 to 05/05/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
3.9' (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
0	822.9													
0.5	822.4	6 6 17	18	1			Topsoil - 6" Severely weathered brown SANDSTONE, argillaceous, rust stained.							
		18 46 50/5	17	2										50+
5.0	817.9						Medium hard light gray/orange SANDSTONE; fine grained, highly weathered to decomposed, slightly fractured.							
6.2	816.7	Core 84"	Rec 84"	RQD 62%	R-1		Medium hard light brown SANDSTONE; very fine to fine grained, slightly to highly weathered to decomposed, argillaceous, micaceous, thinly bedded to thickly bedded, moderately fractured to broken. @ 10.6', contains moderate argillaceous laminations.							
10														
12.0	810.9	Core 96"	Rec 22"	RQD 6%	R-2		Very soft to medium hard brownish yellow SANDSTONE; fine grained, decomposed, broken, argillaceous, micaceous. @ 19.0', lost recovery.							
15														
20.0	802.9	Core 120"	Rec 90"	RQD 75%	R-3		Medium hard dark gray SANDSTONE interbedded with SHALE; fine grained, moderately to highly weathered, argillaceous, micaceous, laminated, slightly to moderately fractured.							
25														
30.0	792.9						Bottom of Boring - 30.0'							

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-500 | Location: Sta. 574+21.7, 117.8 ft. RT of SR 823 CL | Date Drilled: 05/04/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
4.5' (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	801.5												
0.8	800.7	3 6 7	18	1		4.5	Topsoil - 10" Hard brown SILTY CLAY (A-6b), little to some fine to coarse sand, trace gravel; contains rust stains; damp.						
5		10 16 21	18	2		4.5+		9	12	--	9	40	30
		15 50/3	9	3		4.5+							
8.0	793.5	50/5	2	4			Severely weathered brownish gray SANDSTONE argillaceous.						
10.0	791.5	Core 120"	Rec 107"	RQD 87%	R-1		Medium hard brown and gray SANDSTONE, very fine to fine grained, thinly to medium bedded, fractured along bedding planes, decomposed to highly weathered, contains few to moderate argillaceous laminations. @ 10.0'-10.1', broken zone. @ 10.4',10.5', low angle rust stained fractures. @ 11.9'-13.4', core loss; washed out clay. @ 13.9',16.5',16.9', low angle clay filled fractures.						
15													
17.9	783.6						Medium hard to hard brown and gray SANDSTONE, very fine to fine grained, argillaceous, micaceous, highly to moderately weathered. @ 19.1',19.4', low angle clay filled fractures.						
20.0	781.5						Bottom of Boring - 20.0'						
25													
30													

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-512 | Location: Sta. 596+52.6, 139.4 ft. RT of SR 823 CL | Date Drilled: 5/16/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
4.2' (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 - ○
0	892.4													10 20 30 40
0.4	892.0						Topsoil - 5"							
		8 20 22	18	1			Severely weathered brown SANDSTONE, argillaceous.							
		39 45 50/2	14	2										50+
5.0	887.4						Medium hard brown SANDSTONE, very fine to fine grained, micaceous, argillaceous, moderately to highly weathered, broken to highly fractured.							
		Core 84"	Rec 84"	RQD 64%	R-1	*351	@ 5.6',10.4',10.7', high angle fractures. @ 7.1'-7.4', broken zone. @ 9.2',9.5', clay filled fractures.							
10														
11.0	881.4						Medium hard to hard gray SANDSTONE; very fine to fine grained, micaceous, argillaceous, moderately to slightly fractured, moderately to slightly weathered, massive.							
15		Core 120"	Rec 120"	RQD 100%	R-2	*113	@ 16.0', low angle fracture.							
20														
25		Core 120"	Rec 120"	RQD 100%	R-3	*109	@ 22.9'-23.1', ferric/ironstone bands.							
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-512 | Location: Sta. 596+52.6, 139.4 ft. RT of SR 823 CL | Date Drilled: 5/16/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
4.2' (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
30	862.4						Medium hard to hard gray SANDSTONE; very fine to fine grained, micaceous, argillaceous, moderately to slightly fractured, moderately to slightly weathered, massive.							
35		Core 120"	Rec 120"	RQD 100%	R-4	*623	@ 36.8'-45.0', bluish gray.							
40														
45.0	847.4	Core 36"	Rec 36"	RQD 100%	R-5	*494								
							Bottom of Boring - 45.0'							
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-516 | Location: Sta. 599+97.3, 5.8 ft. RT of SR 823 CL | Date Drilled: 05/12/05 to 05/13/05

WATER OBSERVATIONS: Water seepage at: 1.0'
Water level at completion: None (prior to coring)
8.7' (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)
0	813.3													Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ (10 20 30 40)
0.4	812.9	2 2 2	7	1		2.75	Topsoil - 5" Very stiff to hard brown SANDY SILT (A-4a), little gravel, little clay; damp.							
		2 3 8	14	2		3.75		11	13	--	12	48	16	
5		5 12 12	18	3		4.5+								
8.5	804.8	3 5 8	18	4		2.75	Very stiff to hard brown SILT (A-4b), some fine to coarse sand, little clay, trace gravel; contains sandstone fragments; damp.	3	12	--	16	54	15	Non-Plastic
10		5 5 10	17	5		3.5								
		13 19 25	18	6		4.5+								
15														
16.0	797.3	11 19 50/3	15	7			Severely weathered dark gray SANDSTONE, fine grained, argillaceous.							50+
17.5	795.8						Medium hard dark gray SANDSTONE, very fine grained, highly to moderately weathered, micaceous, very thinly bedded, moderately fractured; contains moderate argillaceous laminations.							
20		Core 60"	Rec 57"	RQD 88%	R-1									
22.5	790.8						Bottom of Boring - 22.5'							
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-521 | Location: Sta. 603+32.7, 103.4 ft. LT of SR 823 CL | Date Drilled: 05/18/05 to 05/19/05

WATER OBSERVATIONS: Water seepage at: 1.0'
Water level at completion: None (prior to coring)
16.2' (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	912.5													
0.5	912.0	1 1 2	15	1		2.5	Topsoil - 6" Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand; moist.							
3.5	909.0	8 21 24	15	2			Severely weathered gray and brown SANDSTONE, argillaceous; contains occational rust stains.							
5														
7.0	905.5	31 50/2	18	3										50+
10		Core 36"	Rec 36"	RQD 28%	R-1	*298	Medium hard brown SANDSTONE interbedded with SILTSTONE; fine grained, slightly weathered, argillaceous, micaceous, thinly bedded to thickly bedded, slightly fractured. @ 8.0', rust stained high angle fracture.							
12.5	900.0													
15		Core 120"	Rec 118"	RQD 75%	R-2	*383	Medium hard gray SANDSTONE ; fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, slightly fractured. @ 15.3'-17.5', highly weathered, rust stained.							
17.5	895.0													
20							Medium hard to hard gray to dark gray SANDSTONE ; very fine to fine grained, slightly weathered, argillaceous, micaceous, massive, slightly fractured to unfractured; contains turbidity bedding.							
25		Core 120"	Rec 120"	RQD 100%	R-3	*1493								
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-521 | Location: Sta. 603+32.7, 103.4 ft. LT of SR 823 CL | Date Drilled: 05/18/05 to 05/19/05

WATER OBSERVATIONS: Water seepage at: 1.0'
Water level at completion: None (prior to coring)
16.2' (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
30	882.5						Medium hard to hard gray to dark gray SANDSTONE ; very fine to fine grained, slightly weathered, argillaceous, micaceous, massive, slightly fractured to unfractured; contains turbidity bedding. @ 32.5',32.7', ferric bands.							
35		Core 120"	Rec 120"	RQD 100%	R-4	*383								
40														
45		Core 120"	Rec 120"	RQD 100%	R-5	*487								
50.0	862.5						Bottom of Boring - 50.0'							
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-522 | Location: Sta. 603+34.2, 57.2 ft. RT of SR 823 CL | Date Drilled: 05/18/05

WATER OBSERVATIONS: Water seepage at: 1.0'
Water level at completion: 5.0' (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)
0	897.9													Natural Moisture Content, % - ● PL ⊢——⊣ LL Blows per foot - ○ 10 20 30 40
0.7	897.2	1 3 3	11	1		2.25	Topsoil - 8" Very stiff brown SANDY SILT (A-4a), little clay, trace gravel; damp.							
3.5	894.4	7 17 50/1	12	2			Severely weathered brown SANDSTONE, argillaceous.							50+
5.0	892.9	Core 120"	Rec 114"	RQD 56%	R-1		Medium hard to hard brown SANDSTONE; fine grained, moderately to highly weathered, argillaceous, micaceous, thickly bedded to massive, moderately fractured, iron staining in fractures. @ 6.9',8.4',10.8', high angle fractures.							
13.0	884.9						Medium hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massive, unfractured to slightly fractured.							
15														
20		Core 120"	Rec 120"	RQD 100%	R-2									
25.0	872.9						Bottom of Boring - 25.0'							
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-526 | Location: Sta. 610+33.0, 138.8 ft. LT of SR 823 CL | Date Drilled: 05/19/05

WATER OBSERVATIONS: Water seepage at: 6.0'
Water level at completion: 6.5' (Prior to coring)
4.7' (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	841.5												
0.4	841.1						Topsoil - 5"						
		3 3 3	18	1		1.25	Stiff to very stiff brown SANDY SILT (A-4a), little clay, little gravel; contains few sandstone fragments; moist.						
		WOH 3 2	14	2		1.5							
5		2 3 6	18	3		2.5							
		4 12 17	18	4		3.75	@ 8.5'-15.0', brown and gray; contains sandstone fragments.						
10		10 20 26	18	5		4.5+	@ 11.0'-12.5', hard.						
		4 11 15	18	6		3.0							
15													
16.0	825.5	4 5 8	18	7		1.75	Stiff brown SILT (A-4b), some fine sand, little gravel; contains gravel fragments; damp.						
18.5	823.0	7 16 9	15	8		--	Stiff brown SILT AND CLAY (A-6a), some gravel, little fine to coarse sand; contains rock fragments; moist.						
20													
21.0	820.5	3 9 12	17	9		1.75	Stiff to very stiff brown SILT (A-4b), some fine sand, some gravel; contains sandstone fragments; damp.						
		20 21 22	18	10		3.25							
25													
26.0	815.5	41 50/2	8	11		--	Stiff brown SILTY CLAY (A-6b), some fine to coarse sand, little gravel; contains rock fragments; moist to wet.						
							@ 28.5'-29.0', severely weathered gray SHALE.						
29.0	812.5	50/6	6	12			Soft to medium hard gray SHALE.						
30													

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-526 | Location: Sta. 610+33.0, 138.8 ft. LT of SR 823 CL | Date Drilled: 05/19/05

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	811.5	Core 120"	Rec 110"	RQD 62%	R-1		Soft to medium hard gray SHALE interbedded with SANDSTONE; very fine to fine grained, highly weathered, micaceous, pyritic, laminated to very thinly bedded, moderately fractured.						
35													
39.0	802.5						Bottom of Boring - 39.0'						
40													
45													
50													
55													
60													

WATER OBSERVATIONS: Water seepage at: 6.0'
Water level at completion: 6.5' (Prior to coring)
4.7' (Includes drilling water)

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-527 | Location: Sta. 610+04.3, 111.9 ft. RT of SR 823 CL | Date Drilled: 5/19/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
4.4' (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)
0	904.0													Natural Moisture Content, % - ● PL — LL; Blows per foot - ○ 10 20 30 40
0.6	903.4	3 12 15	18	1			Topsoil - 7" Severely weathered brown SANDSTONE, argillaceous.							
		50/5	2	2										50+
4.5	899.5						Medium hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, massive, slightly fractured.							
8.2	895.8	Core 84"	Rec 84"	RQD 100%	R-1	*536	Medium hard gray to dark gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, massive, unfractured to slightly fractured.							
15		Core 102"	Rec 102"	RQD 100%	R-2	*444	@ 12.7'-13.2', calcareous.							
20.0	884.0						Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-528 | Location: Sta. 610+42.7, 8.3 ft. LT of SR 823 CL | Date Drilled: 05/23/05

WATER OBSERVATIONS: Water seepage at: 1.0', 11.0,' 21.0', 23.5'
Water level at completion: 27.2' (Prior to coring)
4.9' (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	872.5												
0.5	872.0						Topsoil - 6"						
		2 2 3	18	1		1.5	Very stiff to hard brown SANDY SILT (A-4a), little clay, little gravel; damp to moist.						
		6 18 24	17	2		4.5+	@ 1.0'-2.5', 23.5'-25.0', stiff.						
5		20 28 20	18	3		4.5+							
		9 13 17	18	4		3.0							
10		6 9 15	18	5		3.0							
		8 10 8	16	6		3.0							
15		14 19 14	18	7		2.0							
		4 7 10	18	8		4.5+							
20		6 6 9	16	9		4.5+							
		4 4 5	18	10		1.0							
25		7 6 8	18	11		--	@ 26.0'-27.5', some gravel.						
							@ 28.5'-28.7', severely weathered gray SILTSTONE, micaceous.						
29.0	843.5	50/2	2	12			Medium hard gray to dark gray SANDSTONE.						
30													

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-528 | Location: Sta. 610+42.7, 8.3 ft. LT of SR 823 CL | Date Drilled: 05/23/05

WATER OBSERVATIONS: Water seepage at: 1.0', 11.0,' 21.0', 23.5'
Water level at completion: 27.2' (Prior to coring)
4.9' (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
30	842.5	Core 120"	Rec 115"	RQD 94%	R-1		Medium hard gray to dark gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, massive, slightly fractured.							
35														
39.0	833.5						Bottom of Boring - 39.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 (11/13/2007 9:09 PM)

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-529 | Location: Sta. 611+21.4, 114.9 ft. LT of SR 823 CL | Date Drilled: 05/23/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
4.6' (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)
0	873.3													Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0.5	872.8						Topsoil - 6"							
		1 1 1	14	1		1.5	Stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, little gravel; moist.							
		7 7 20	18	2		4.5+	@ 3.5'-5.0', hard, slightly rust stained.							
5														
6.0	867.3	12 27 50/4	16	3			Severely weathered brown SANDSTONE fragments and SHALE.							50+
		50/4	4	4										50+
9.0	864.3						Medium hard brown SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, thickly bedded, highly fractured. @ 10.9'-11.3', clay seams.							
10														
12.9	860.4						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, pyritic, very thickly bedded, unfractured; contains turbidity bedding. @ 13.9'-14.2', iron stained zone.							
		Core 120"	Rec 120"	RQD 69%	R-1	*130								
15														
		Core 12"	Rec 12"	RQD 100%	R-2	*629								
20.0	853.3						Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 (11/13/2007 9:09 PM)

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

LOG OF: Boring R-530 | Location: Sta. 611+38.6, 59.6 ft. RT of SR 823 CL | Date Drilled: 05/24/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
4.1' (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	910.8												
0.5	910.3						Topsoil - 6"						
		1 3 2	15	1		2.75	Very stiff to hard brown SANDY SILT (A-4a), litlle clay, little gravel; damp.						
							@ 3.5'-5.0', contains sandstone fragments.						
5		3 6 14	17	2		4.5+							
6.0	904.8	22 39 50/3	14	3			Severely weathered brown SANDSTONE fragments with SHALE.						
8.0	902.8	Core 24"	Rec 20"	RQD 23%	R-1	*325	Medium hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, thinly bedded to thickly bedded, slightly fractured.						
10							@ 9.2', 10.8', high angle fractures.						
12.0	898.8						@ 11.1', 11.3', low angle fractures.						
							Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, calcareous, thickly bedded, slightly fractured, iron staining in fractures.						
15		Core 120"	Rec 120"	RQD 81%	R-2	*293							
							@ 15.9'-16.4', vertical fracture.						
20.0	890.8						Hard dark gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, thickly bedded, slightly fractured to unfractured.						
							@ 20.6', low angle fracture.						
25		Core 120"	Rec 120"	RQD 100%	R-3	*513							
30													

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-530 | Location: Sta. 611+38.6, 59.6 ft. RT of SR 823 CL | Date Drilled: 05/24/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
4.1' (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)
30	880.8						Hard dark gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, thickly bedded, slightly fractured to unfractured.							Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
35		Core 120"	Rec 120"	RQD 99%	R-4	*480	@ 37.6', low angle fracture.							
40.0	870.8						Bottom of Boring - 40.0'							
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-535 | Location: Sta. 616+66.4, 5.0 ft. LT of SR 823 CL | Date Drilled: 05/25/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
3.0' (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
0	859.9						
0.3	859.6						Topsoil - 3" / 2' soil removed before drilling
		5 7 8	11	1		4.5+	Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.
3.5	856.4	17 27 50/4	15	2			Severely weathered brown SANDSTONE fragments, argillaceous.
5		50/4	3	3			
8.5	851.4						Hard brown SANDSTONE; fine grained, highly weathered, argillaceous, pyritic, micaceous, thickly bedded, slightly to moderately fractured.
10		Core 120"	Rec 120"	RQD 88%	R-1		@ 13.5'-13.8', very hard medium to fine grained gray sandstone with iron staining.
15.2	844.7						Medium hard to hard gray SANDSTONE; fine grained, slightly to moderately weathered, argillaceous, pyritic, micaceous, medium bedded, slightly fractured.
		Core 18"	Rec 16"	RQD 89%	R-2		
20.0	839.9						Bottom of Boring - 20.0'
25							
30							

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
50+
50+

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-537 | Location: Sta. 617+59.3, 256.5 ft. LT of SR 823 CL | Date Drilled: 05/24/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
9.5' (Including drill 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)
0	827.7													Natural Moisture Content, % - ● PL — LL; Blows per foot - ○ (10 20 30 40)
0.3	827.4						Topsoil - 4" / 12" soil removed before drilling							
		2 3 5	14	1		3.0	Very stiff to hard brown SANDY SILT (A-4a), little gravel, trace clay; damp.							
		8 19 25	18	2		4.5								
5		12 17 20	18	3		4.5+								
8.5	819.2	11 19 40	18	4			Severely weathered brown SHALE.							
10		24 50/5	11	5										59 →
		21 50/4	10	6			@ 13.5'-14.3', gray.							50+
15.0	812.7						Soft to medium hard gray SHALE; very fine grained, highly weathered, micaceous, pyritic, laminated to very thinly bedded, moderately fractured, contains ferric bands; contains moderate arenaceous laminations.							50+
20		Core 120"	Rec 120"	RQD 68%	R-1									
							@ 23.8'-25.0', light gray claystone.							
25.0	802.7						Bottom of Boring - 25.0'							
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-538 | Location: Sta. 617+44.9, 128.8 ft. LT of SR 823 CL | Date Drilled: 05/25/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
4.0' (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	830.5												
0.4	830.1						Topsoil - 5" / 6" soil removed before drilling						
		2 4 7	18	1		3.0	Very stiff to hard brown SANDY SILT (A-4a), little to some gravel, little clay; contains sandstone fragments and occasional rust stains; damp.						
		6 19 24	18	2		4.5+							
5													
6.0	824.5	18 25 22	17	3			Medium dense to dense brown SILT (A-4b), little to some fine to coarse sand, trace gravel; damp.	6	11	--	9	61	13
		6 14 17	18	4									
10													
11.0	819.5	12 16 20	18	5		4.5+	Hard brown SANDY SILT (A-4a), little clay, little gravel; damp.						
		5 9 16	18	6		4.5+							
15													
16.0	814.5	10 30 50/5	17	7			Severely weathered brown SHALE, rust stained.						
19.5	811.0	38 50/4	10	8									
20		Core 120"	Rec 120"	RQD 38%	R-1		Medium hard gray SHALE interbedded with medium hard gray fine grained SANDSTONE; highly weathered, micaceous, fossiliferous, pyritic, laminated to very thinly bedded, highly fractured. @ 19.5'-20.2', brown.						
25													
29.5	801.0						Bottom of Boring - 29.5'						

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

Non-Plastic

50+

50+

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-541 | Location: Sta. 619+15.5, 286.2 ft. LT of SR 823 CL | Date Drilled: 05/24/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
1.5' (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
0	792.7													
0.3	792.4						Topsoil - 4"							
		3 3 4	15	1		--	Medium stiff to stiff brown SANDY SILT (A-4a), little fine to coarse sand, little to some gravel; contains sandstone fragments; damp.							
		3 5 4	16	2		2.0								
5														
		3 6 10	18	3		4.5+	@ 6.0'-7.5', hard.							
8.5	784.2													
		18 27 50	18	4			Severely weathered brown SANDSTONE interbedded with SHALE; contains occasional rust stains.							77
10.0	782.7						Soft to medium hard brown SANDSTONE interbedded with SHALE; highly weathered to decomposed, argillaceous, micaceous, laminated to thinly bedded, highly fractured to broken, iron stained fractures.							
15		Core 120"	Rec 30"	RQD 0%	R-1									
20.0	772.7						Medium hard gray SANDSTONE; very fine to fine grained, highly to moderately weathered, argillaceous, micaceous, laminated to thinly bedded, moderately fractured, contains moderate argillaceous laminations, contains numerous ferric bands.							
		Core 64"	Rec 64"	RQD 66%	R-2									
25.3	767.4						Bottom of Boring - 25.3'							
30														

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-542 | Location: Sta. 619+64.3, 186.3 ft. LT of SR 823 CL | Date Drilled: 05/24/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
4.7' (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
0	837.4						
0.5	836.9						Topsoil - 6"
		1 50/0	0	1			Very stiff brown SANDY SILT (A-4a), little clay, little gravel; contains rust stains; damp.
		10 18 32	18	2		2.75	
5							
		19 29 50/4	15	3		4.0	@ 6.0'-7.5', contains sandstone fragments.
8.0	829.4						Medium hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, thinly bedded to medium bedded, slightly to moderately fractured.
10							
10.9	826.5	Core 78"	Rec 78"	RQD 47%	R-1		Soft to medium hard light grayish brown SHALE; very fine grained, decomposed, micaceous, thinly bedded, highly fractured.
13.0	824.4						Medium hard brown SANDSTONE; fine grained, highly weathered to decomposed, argillaceous, micaceous, thinly bedded to thickly bedded, broken, iron stained fractures.
15.0	822.4	Core 66"	Rec 66"	RQD 0%	R-2		Soft to medium hard gray SHALE; highly weathered to decomposed, micaceous, thinly laminated to thinly bedded, highly fractured to broken, iron stained fractures.
20							@ 20.0'-29.5', moderately to highly weathered, arenaceous, moderately to highly fractured.
25		Core 114"	Rec 114"	RQD 56%	R-3		@ 25.7'-27.3', qu = 1,888 psi, SDI = 35.7%.
29.5	807.9						Bottom of Boring - 29.5'

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
50+
50+

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-543 | Location: Sta. 619+09.5, 2.6 ft. RT of SR 823 CL | Date Drilled: 05/24/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
3.6' (Includes drilling water)

Depth (ft)	Elev. (ft)	Sample No.	Blows per 6"	Recovery (in)	Drive	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 - ○
0	881.1														
0.6	880.5	1	3 8 15	15	1			Topsoil - 7" Very stiff brown SANDY SILT (A-4a), little clay, little gravel; damp.							
3.5	877.6	2	7 28 28	18	2			Severely weathered brown SANDSTONE, argillaceous, slightly rust stained.							56
5		3	50/5	5	3										50+
7.0	874.1	Core 78"		Rec 78"	RQD 51%	R-1	*266	Medium hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, pyritic, medium bedded to thickly bedded, highly fractured. @ 7.8',10.2',10.9',11.6', 12.9',13.1', rust stained fractures.							
14.0	867.1	Core 84"		Rec 84"	RQD 87%	R-2	*345	Medium hard dark gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, thickly bedded, moderately fractured, iron stained fractures. @ 16.9', high angle fracture.							
20.5	860.6							Bottom of Boring - 20.5'							
30															

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-547 | Location: Sta. 622+16.1, 234.8 ft. LT of SR 823 CL | Date Drilled: 05/25/05

WATER OBSERVATIONS: Water seepage at: 1.0'
Water level at completion: None (Prior to coring)
4.1' (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	792.2													
0.3	791.9						Topsoil - 3"							
		1 1 2	18	1		2.75	Very stiff to hard brown SANDY SILT (A-4a), little gravel, trace clay; moist.							
		1 4 5	18	2		2.75								
5		6 10 13	18	3		4.5+								
		8 26 50/3	15	4		4.5+	@ 8.5'-9.8', contains sandstone fragments and rust stains.							50+
10.0	782.2						Medium hard brown SANDSTONE interbedded with SHALE; very fine to fine grained, decomposed to highly weathered, argillaceous, micaceous, thinly bedded to thickly bedded, moderately to highly fractured.							
		Core 120"	Rec 120"	RQD 57%	R-1		@ 11.8'-13.8', shale layer.							
15														
20.0	772.2						Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-548 | Location: Sta. 621+88.7, 190.4 ft. LT of SR 823 CL | Date Drilled: 05/25/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
7.6' (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	813.4													
0.6	812.8	2 3 2	18	1		4.5+	Topsoil - 7" Hard brown SANDY SILT (A-4a), little fine to coarse sand, little gravel; damp.							
		2 3 5	14	2		--								
5		2 4 5	15	3		4.5+								
		5 8 11	13	4		4.5+								
10		5 8 12	18	5		--								
		5 7 12	18	6		4.5+								
15														
16.0	797.4	14 40 50/5	17	7			Severely weathered brownish gray SHALE.							50+
		12 16 50/3	15	8										
20.0	793.4						Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, thickly bedded, slightly fractured to broken, iron staining in fractures, contains moderate argillaceous laminations.							50+
25		Core 120"	Rec 117"	RQD 71%	R-1		@ 22.0',22.8',23.0', high angle fractures.							
30.0	783.4						Bottom of Boring - 30.0'							

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-549 | Location: Sta. 621+86.8, 21.0 ft. LT of SR 823 CL | Date Drilled: 05/25/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
8.5' (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 - ○
0	867.3													
0.3	867.0	4 8 7	16	1		3.75	Topsoil - 3" Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.							
3.5	863.8	18 50/3	9	2			Severely weathered brown SANDSTONE fragments, argillaceous.							50+
5.0	862.3	Core 120"	Rec 118"	RQD 80%	R-1		Medium hard to hard brownish gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, thinly bedded to thickly bedded, slightly to moderately fractured. @ 6.7', high angle rust stained fracture.							
15		Core 60"	Rec 60"	RQD 87%	R-2		@ 13.6'-20.0', gray, moderately to highly weathered, argillaceous, thinly laminated to thickly bedded, highly to moderately fractured, contains few argillaceous laminations. @ 17.0'-18.0', brown. @ 18.0'-20.0', pyritic.							
20.0	847.3						Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 (11/13/2007 9:09 PM)

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-550 | Location: Sta. 621+95.3, 124.3 ft. RT of SR 823 CL | Date Drilled: 05/25/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
2.7' (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	879.5												
0.7	878.8	2 2 8	15	1		2.75	Topsoil - 8" Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, little gravel; contains sandstone fragments; damp.						
3.5	876.0	20 50/4	9	2			Severely weathered brownish gray SHALE.						
4.5	875.0						Medium hard brown SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, pyritic, thickly to massively bedded, broken to moderately fractured, iron stained fractures.						
5		Core 114"	Rec 110"	RQD 72%	R-1		@ 5.5', 8.3', high angle fractures.						
10							@ 9.6'-20.5', gray						
15		Core 78"	Rec 75"	RQD 96%	R-2		@ 13.5'-20.5', pyritic.						
20													
20.5	859.0						Bottom of Boring - 20.5'						
25													
30													

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-551 | Location: Sta. 623+15.5, 267.5 ft. LT of SR 823 CL | Date Drilled: 05/26/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
5.5' (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)
0	819.7													Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0.4	819.3						Topsoil - 5"							
		4 5 5	15	1		3.25	Very stiff to hard brown SANDY SILT (A-4a), trace to little clay, little gravel; contains rock fragments; damp.							
		9 22 31	18	2		4.5+								53 →
5		18 35 36	18	3		–								71 →
		9 10 11	18	4		4.5+								
10														
11.0	808.7	6 13 21	18	5			Severely weathered brownish gray SHALE.							
		16 43 43	18	6										86 →
15														
		12 34 50/3	15	7			@ 16.0'-17.5', gray.							
17.5	802.2						Soft gray SHALE interbedded with SANDSTONE; very fine grained, decomposed to highly weathered, micaceous, laminated to very thinly bedded, highly fractured.							50+ ○
20														
21.2	798.5	Core 120"	Rec 120"	RQD 54%	R-1		Medium hard gray SANDSTONE interbedded with SHALE; fine grained, highly weathered, argillaceous, micaceous, pyritic, very thinly bedded to thinly bedded, moderately fractured.							
25														
27.5	792.2						Bottom of Boring - 27.5'							
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-553 | Location: Sta. 623+43.5, 184.9 ft. RT of SR 823 CL | Date Drilled: 05/25/05

WATER OBSERVATIONS: Water seepage at: 15.0', 20.0'
Water level at completion: None (Prior to coring)
4.0' (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	829.2												
0.3	828.9						Topsoil - 3"						
		2 2 2	13	1		3.75	Stiff to very stiff brown SANDY SILT (A-4a), little clay, trace to little gravel; contains rock fragments and rust stains; damp to moist.						
		3 1 2	8	2		1.75							
5		1 4 8	15	3		4.5+	@ 6.0'-10.0', hard, some gravel.						
		6 12 21	18	4		4.5+							
10		4 9 12	18	5		3.5							
		2 4 5	14	6		3.0							
15		5 6 8	16	7		3.5							
18.5	810.7	6 18 20	16	8			Brown SANDSTONE fragments with severely weathered SHALE; rust stained; moist to wet.						
20		9 12 20	15	9									
23.5	805.7	42 50/2	6	10			Severely weathered gray SHALE.						
25.0	804.2						Soft to medium hard gray SANDSTONE interbedded with SHALE; very fine to fine grained, highly weathered, argillaceous, micaceous, laminated to medium bedded, highly to moderately fractured.						
30		Core 120"	Rec 120"	RQD 67%	R-1								

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-553 | Location: Sta. 623+43.5, 184.9 ft. RT of SR 823 CL | Date Drilled: 05/25/05

WATER OBSERVATIONS: Water seepage at: 15.0', 20.0'
Water level at completion: None (Prior to coring)
4.0' (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
30	799.2						Soft to medium hard gray SANDSTONE interbedded with SHALE; very fine to fine grained, highly weathered, argillaceous, micaceous, laminated to medium bedded, highly to moderately fractured.							
35.0	794.2						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-554 | Location: Sta. 624+86.4, 135.6 ft. LT of SR 823 CL | Date Drilled: 05/26/05

WATER OBSERVATIONS: Water seepage at: 16.0
Water level at completion: None (Prior to coring)
10.7' (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	830.2												
1.1	829.1	1 1 1	18	1		2.25	Topsoil - 13" Very stiff to hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; contains roots and grass; moist.						
		2 8 11	18	2		2.25							
5		6 11 18	18	3		3.75							
		9 14 16	18	4		4.0							
10		8 9 10	18	5		2.5							
		4 5 6	18	6		2.75							
15		3 7 6	18	7		1.75	@ 16.0'-17.5', stiff.						
		1 3 4	18	8		2.0							
20													
21.0	809.2	2 4 5	18	9		2.0	Stiff brown SANDY SILT (A-4a), some gravel, trace clay; contains rock fragments; damp.						
		5 7 20	14	10		1.5							
25		3 8 18	18	11		--							
28.5	801.7	32 50/3	8	12			Severely weathered gray SANDSTONE, argillaceous.						
30													

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-554 | Location: Sta. 624+86.4, 135.6 ft. LT of SR 823 CL | Date Drilled: 05/26/05

WATER OBSERVATIONS: Water seepage at: 16.0
Water level at completion: None (Prior to coring)
10.7' (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)
30.0	800.2													Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
	800.2	Core 120"	Rec 120"	RQD 84%	R-1		Medium hard dark gray SANDSTONE ; very fine to fine grained, moderately weathered, argillaceous, micaceous, thickly bedded, slightly to moderately fractured, contains moderate argillaceous laminations, fissile.							
40.0	790.2						Bottom of Boring - 40.0'							

FILE: 0121-3070-03 (11/13/2007 9:09 PM)

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-556 | Location: STa. 625+226.2, 95.2 ft. RT of SR 823 CL | Date Drilled: 05/25/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
10.0' (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	889.7												
0.3	889.4						Topsoil - 3"						
		2 3 3	10	1		1.5	Stiff brown SILTY CLAY (A-6b), little fine to coarse sand, little gravel; damp.						
		3 11 20	14	2		4.5+	@ 3.5'-5.0', hard.						
5		35 50/3	9	3		4.5+							
8.5	881.2	37 50/2	8	4			Severely weathered brown SANDSTONE and SHALE fragments.						
10		50/5	5	5									
13.5	876.2	50/4	3	6			Severely weathered gray SHALE fragments.						
15.0	874.7	Core 84"	Rec 81"	RQD 68%	R-1		Medium hard grayish brown SANDSTONE; very fine to fine grained, highly to moderately weathered, argillaceous, micaceous, medium to thickly bedded, slightly to moderately fractured. @ 18.0'-20.0', brown. @ 18.3',19.0', high angle rust stained fractures. @ 20.0'-22.0', gray, moderately to highly fractured, rust stained fractures.						
20													
22.0	867.7						Bottom of Boring - 22.0'						
25													
30													

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-562 | Location: Sta.632+94.1, 132.2 ft. LT of SR 823 CL | Date Drilled: 6/2/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
4.5' (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	895.8													
0.3	895.5						Topsoil - 4" / 2.0' soil removed before drilling							
		9 8 9	7	1			Stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, little gravel; contains rock fragments and roots; dry to damp.							
3.5	892.3	42 50/5	9	2			Severely weathered brown SANDSTONE fragments; argillaceous.							50+
5		37 42 50/2	10	3										50+
9.0	886.8	50/2	2	4										50+
10							Medium hard brownish gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, thinly bedded to thickly bedded, moderately fractured, rust staining on fracture surfaces, contains few argillaceous laminations. @ 9.4'-9.7',16.1'-16.2', high angle fractures. @ 11.1'-11.5', broken.							
15		Core 120"	Rec 120"	RQD 53%	R-1									
20.0	875.8	Core 12"	Rec 12"	RQD 100%	R-2									
							Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-564 | Location: Sta. 633+06.5, 165.6 ft. RT of SR 823 CL | Date Drilled: 06/09/05 to 06/10/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
25.7' (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
0	889.0													
0.3	888.7						Topsoil - 3"							
		23 50/5	11	1			Severely weathered brown SANDSTONE fragments, argillaceous.							50+
		38 50/5	4	2										50+
4.5	884.5						Very soft to soft brown SANDSTONE interbedded with SHALE; very fine grained, highly weathered to decomposed, argillaceous, micaceous, very thinly bedded to thinly laminated, highly fractured, iron staining on some fracture surfaces.							
5		Core 114"	Rec 114"	RQD 54%	R-1	*34	@ 6.0'-6.6',13.0'-13.8', broken.							
10														
15														
		Core 120"	Rec 112"	RQD 54%	R-2	*344	@ 19.0', lost recovery.							
19.9	869.1						Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, medium bedded to massive, moderately fractured.							
							@ 19.9'-21.1', few to moderate argillaceous laminations.							
							@ 20.8'-21.3', high angle fracture.							
							@ 22.1'-22.5', 23.1'-24.0', rust staining.							
25							@ 24.0'-27.0', brown.							
							@ 25.9'-26.2', high angle rust stained fracture.							
		Core 120"	Rec 120"	RQD 96%	R-3	*424								
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-564 | Location: Sta. 633+06.5, 165.6 ft. RT of SR 823 CL | Date Drilled: 06/09/05 to 06/10/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
25.7' (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	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	859.0						Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, medium bedded to massive, moderately fractured. @ 30.7', pyritic.						
34.0	855.0						Bottom of Boring - 34.0'						
35													
40													
45													
50													
55													
60													

GRADATION

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-565 | Location: Sta. 636+71.8, 233.8 ft. LT of SR 823 CL | Date Drilled: 06/01/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
3.5' (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	757.9												
0.4	757.5	2 3 2	12	1		4.25	Topsoil - 5" Hard brown SANDY SILT (A-4a), little clay, trace gravel; damp.						
3.5	754.4	2 2 3	13	2		2.5	Very stiff to hard brown SILT (A-4b), little to some clay, trace to little gravel; damp.						
5		1 2 2	14	3		2.25		13	9	–	6	51	21
10		2 6 9	14	4		4.5+							
11.0	746.9	5 6 10	18	5		4.5+	Very stiff to hard brown SANDY SILT (A-4a), little clay, trace gravel; contains rock fragments; damp.						
13.5	744.4	6 18 20	15	6			Severely weathered gray SILTSTONE, arenaceous, fissile.						
15		10 38 50/5	15	7									
17.5	740.4	Core 120"	Rec 120"	RQD 63%	R-1		Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, pyritic (halos), thickly bedded, moderately fractured, contains few to moderate argillaceous laminations. @ 19.0'-19.2', 22.9', 26.1', rust stained. @ 21.5'-21.8', high angle fracture. @ 22.5'-22.8',23.6'-23.7', 24.8'-26.3', very fine SANDSTONE beds, fissile.						
20													
25													
27.5	730.4						Bottom of Boring - 27.5'						
30													

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

FILE: 0121-3070-03 (11/13/2007 9:09 PM)

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-568 | Location: Sta. 635+84.2, 231.7 ft. RT of SR 823 CL | Date Drilled: 06/01/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
5.0' (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	785.4												
0.3	785.1						Topsoil - 4"						
		3 2 2	4	1		4.25	Very stiff to hard brown SANDY SILT (A-4a), little to some fine to coarse sand, little clay, trace gravel; damp.						
		4 10 14	16	2		4.5+	@ 3.5'-7.5', some gravel, contains rust stains.	21	18	–	12	36	13
5		4 11 14	18	3		4.5							
		2 2 5	14	4		3.75	@ 8.5'-15.0', gray.						
10		5 8 6	17	5		4.25							
		4 12 11	12	6		4.5+							
15													
16.6	768.8	11 15 25	18	7			Severely weathered gray SHALE.						
		50/1	1	8									
20.0	765.4						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, argillaceous, micaceous, thickly bedded, slightly fractured.						
25		Core 120"	Rec 120"	RQD 82%	R-1								
30.0	755.4						Bottom of Boring - 30.0'						

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-597 | Location: Sta. 657+27.9, 443.5 ft. LT of SR 823 CL | Date Drilled: 06/13/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
8.2' (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
0	737.3						
0.3	737.0						Topsoil - 3"
		7 6 6	14	1		–	Very stiff to hard brown SILT AND CLAY (A-6a), little fine to coarse sand, little gravel; (decomposed shale); damp.
		4 6 8	18	2		4.5	
5		4 8 11	18	3		4.5+	
		2 9 13	14	4		4.5+	
10							
11.0	726.3	6 12 13	18	5			Severely weathered brown and gray SHALE.
		6 13 19	16	6			@ 13.5'-15.0', decomposed to silty clay.
15		15 32 38	18	7			@ 16.0'-19.3'; brown and gray SHALE fragments.
		20 50/4	8	8			
20.0	717.3						Medium hard grayish black SHALE interbedded with SANDSTONE; very fine grained, slightly to moderately weathered, micaceous, laminated to thinly bedded, highly fractured to broken, rust stained fractures.
25		Core 120"	Rec 120"	RQD 67%	R-1		@ 20.0',21.3',23.0'-23.5', 25.0',26.7', high angle fractures.
30.0	707.3						Bottom of Boring - 30.0'

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
70 →
50+

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-598 | Location: Sta. 657+37.3, 1.0 ft. LT of SR 823 CL | Date Drilled: 6/21/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
12.2' (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	782.0													
0.4	781.6	13 14 18	15	1		--	Topsoil - 5" Very stiff brown SANDY SILT (A-4a), little gravel, trace clay; contains rock fragments; damp.							
5		8 9 11	13	2		--								
		6 8 8	7	3		--	@ 8.5'-8.9', severely weathered brown and gray SHALE fragments.							
9.0	773.0	50/5	5	4			Soft brown SHALE; very fine grained, decomposed weathered, highly fractured.							50+
13.5	768.5	Core 120"	Rec 120"	RQD 47%	R-1		Medium hard gray SHALE interbedded with gray fine grained SANDSTONE; very fine to fine grained, decomposed to highly weathered, micaceous, laminated to thinly bedded, highly fractured.							
20		Core 120"	Rec 120"	RQD 66%	R-2									
26.5	755.5						Hard gray SANDSTONE; fine grained, highly to moderately weathered, argillaceous, micaceous, laminated to thickly bedded, slightly fractured.							
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-598 | Location: Sta. 657+37.3, 1.0 ft. LT of SR 823 CL | Date Drilled: 6/21/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
12.2' (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
30	752.0	Core 54"	Rec 54"	RQD 94%	R-3		Hard gray SANDSTONE; fine grained, highly to moderately weathered, argillaceous, micaceous, laminated to thickly bedded, slightly fractured.							
33.5	748.5						Bottom of Boring - 33.5'							
35														
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-599 | Location: Sta. 657+30.0, 322.1 ft. RT of SR 823 | Date Drilled: 6/20/05

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
0.2	784.7 / 784.5	5 7 8	18	1		4.5+	Topsoil - 2" Hard brown SANDY SILT (A-4a), little to some gravel; contains rock fragments and rust stains; damp.							
		8 6 7	18	2		4.5								
5		10 10 7	15	3		4.5								
8.5	776.2	49		4			Severely weathered brown SHALE.							
9.1	775.6	50/ 1	7				Soft grayish brown SHALE; very fine grained, highly weathered to decomposed, argillaceous, thinly bedded to very thinly bedded, highly fractured to broken.							50+
10														
		Core 119"	Rec 119"	RQD 65%	R1		@ 9.7'-9.9', 10.2'-10.7', 12.1'-12.2', 14.2'-14.5', 14.8'-15.7', low angle fractures.							
15							@ 16.5'-17.1', rust stained vertical fracture.							
19.0	765.7						Soft gray SHALE, highly weathered to decomposed, micaceous, laminated to very thinly laminated, slightly fractured.							
20														
		Core 120"	Rec 120"	RQD 59%	R2		@ 26.5', interbedded with medium hard gray sandstone.							
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-599 | Location: Sta. 657+30.0, 322.1 ft. RT of SR 823 | Date Drilled: 6/20/05

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
	754.7													
30.0	754.7	Core 60"	Rec 60"	RQD 93%	R3		Hard gray SANDSTONE interbedded with SHALE (turbidites); fine grained, slightly weathered, argillaceous, micaceous, medium bedded to laminated, slightly fractured.							
34.0	750.7						Bottom of Boring - 34.0'							
35														
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-600 | Location: Sta. 659+36.0, 500.5 ft. LT of SR 823 CL | Date Drilled: 06/10/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
14.9' (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
0.2	711.8						Topsoil - 2" / 4.0' soil removed before drilling.						
	711.6	2 2 3	18	1		3.25	Very stiff brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp to moist.						
		1 1 1	8	2		2.75		3	9	--	5	52	31
5		1 2 2	18	3		3.5							
8.5	703.3	5 8 14	16	4		4.5+	Very stiff to hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.						
10		6 19 10	18	5		4.5+	@ 11.0'-12.5', contains rock fragments.						
13.5	698.3	6 12 15	11	6			Severely weathered grayish brown SHALE, occasional rust stains.						
15		10 33 50/4	16	7									
		20 50/5	11	8									
20.0	691.8						Medium hard to hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, very thinly bedded to laminated, moderately fractured, iron stains on all fracture surfaces.						
25		Core 120"	Rec 120"	RQD 81%	R1		@ 20.3'-20.4', 21.6'-21.8', 22.1'-22.2', high angle fractures. @ 23.0' gray @ 23.8'-23.9', iron staining. @ 28.7'-29.6', hard gray claystone layer.						
30.0	681.8						Bottom of Boring - 30.0'						

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-602 | Location: Sta. 659+17.8, 5.1 ft. RT of SR 823 CL | Date Drilled: 6/16/05

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	Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	712.0													
0.8	711.2							Topsoil - 9"						
		3 3 5	8	1			3.0	Very stiff to hard brown SANDY SILT (A-4a), some gravel, little clay; contains rust stains and brick fragments; moist.						
		5 6 10	12	2			4.5		23	22	--	11	27	17
5		9 10 11	12	3			4.5+	@ 6.0', contains rock fragments.	26	19	--	9	31	15
8.5	703.5	33 50/3	9	4				Severely weathered brown SHALE; contains iron stains.						
10.0	702.0							Soft gray SHALE interbedded with medium hard gray SANDSTONE; very fine grained, moderately to highly weathered, micaceous, pyritic, thinly laminated, moderately fractured.						
15.3	696.7	Core 120"	Rec 120"	RQD 68%	R1			Medium hard to hard gray SANDSTONE interbedded with SHALE; very fine to fine grained, moderately weathered, argillaceous, micaceous, thinly bedded, slightly fractured. @ 16.8', vertical fracture.						
20.0	692.0							Bottom of Boring - 20.0'						
25														
30														

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

FILE: 0121-3070-03 (11/13/2007 9:09 PM)

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

LOG OF: Boring R-603 | Location: Sta. 659+14.0, 434.7 ft. RT of SR 823 CL | Date Drilled: 6/10/05 to 6/16/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
9.6' (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	737.1													
0.7	736.4	3 5 7	12	1		4.5+	Topsoil - 8" Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.							
		3 5 9	10	2		4.5+								
5		7 12 11	15	3		4.5+								
8.5	728.6	20 50/4	9	4			Severely weathered gray SHALE.							50+
10.0	727.1	Core 120"	Rec 120"	RQD 93%	R1		Soft to medium hard gray SHALE interbedded with SANDSTONE; very fine grained, moderately to highly weathered, pyritic, micaceous, laminated to very thinly bedded, moderately fractured, iron staining in interbedded sandstone, hard, fine grained.							
15														
20.0	717.1						Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-605 | Location: Sta. 661+84.4, 117.3 ft. LT of SR 823 CL | Date Drilled: 06/14/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
3.3' (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	779.2												
0.3	778.9						Topsoil - 4" / 3.0' soil removed before drilling.						
		3 3 6	14	1		2.5	Very stiff to hard brown SANDY SILT (A-4a), some clay, little gravel; contains sandstone fragments; damp.	13	10	--	7	49	21
		6 6 9	18	2		2.5							
5		8 9 7	18	3		3.5							
		6 9 12	16	4		4.5							
10													
10.5	768.7	8 19 50/5	18	5			Severely weathered brown SANDSTONE argillaceous.						
13.0	766.2						Medium hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, thinly bedded to thickly bedded, highly fractured, contains few argillaceous laminations. @ 13.4', 13.9', 14.4', 14.7', 15.3', 15.8', high angle fractures.						
15													
18.0	761.2	Core 120"	Rec 120"	RQD 49%	R1		Soft to medium hard gray SHALE interbedded with SANDSTONE; highly weathered, micaceous, laminted to thinly bedded, moderately fractured.						
20													
23.0	756.2						Bottom of Boring - 23.0'						
25													
30													

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-606 | Location: Sta. 661+49.9, 190.3 ft. RT of SR 823 CL | Date Drilled: 06/14/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
8.7' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Sample No.	Blows per 6"	Recovery (in)	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	827.3											
0.3	827.0					Topsoil - 3" / 1.0' soil removed before drilling.						
		1	8 4 5	12	3.75	Very stiff to hard brown SANDY SILT (A-4a), some gravel, little clay; contains sandstone fragments; damp.						
		2	6 6 6	17	–							
5		3	2 3 28	14	3.5							
		4	3 4 7	18	3.25		34	13	--	5	34	14
10		5	8 6 6	14	4.5+		23	16	--	6	39	16
13.5	813.8	6	3 6 7	18		Medium dense brown SANDY SILT (A-4a), little clay, trace to little gravel; damp.						
15		7	8 6 6	12		@ 16.0', possible sandstone boulder						
18.5	808.8	8	3 5 8	18	3.5	Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.						
20												
21.0	806.3	9	40 50/3	8		Severely weathered gray SANDSTONE.						
23.0	804.3	R1	Core 24"	Rec 24"	RQD 60%	Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, laminated to thickly bedded, moderately fractured, contains few to moderate argillaceous laminations.						
25		R2	Core 120"	Rec 93"	RQD 63%							
30												

GRADATION

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-606 | Location: Sta. 661+49.9, 190.3 ft. RT of SR 823 CL | Date Drilled: 06/14/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
8.7' (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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	797.3						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, laminated to thickly bedded, moderately fractured, contains few to moderate argillaceous laminations. @ 30.2', 31.7' iron staining on vertical fractures. @ 30.5'-31.9', soft brown shale layer							
35.0	792.3						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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

LOG OF: Boring R-616 | Location: Sta. 673+12.7, 439.8 ft. LT of SR 823 CL | Date Drilled: 6/28/05 to 6/29/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
6.1' (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
0	722.8						
0.3	722.5						Topsoil - 3"
		10 15 18	10	1		4.5+	Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; contains shale fragments; damp.
		9 11 12	7	2		4.5+	
5		8 9 13	10	3		4.5+	
8.0	714.8						Severely weathered brown SHALE.
		10 17 20	4	4			
10		12 45 50/ 4	9	5			
12.5	710.3						Soft brown SHALE; very fine grained, decomposed, arenaceous, micaceous, thinly laminated to very thinly bedded, broken, moderate arenaceous laminae. @ 12.9', 13.9', 14.4', iron staining on fracture surface.
15		Core 120"	Rec 120"	RQD 57%	R1		
20							
20.6	702.2						Medium hard gray SHALE; very fine grained, moderately to highly weathered, arenaceous, thinly laminated to very thinly bedded, highly fractured, few argillaceous laminae.
25		Core 120"	Rec 120"	RQD 83%	R2		@ 24.1', 24.3', 24.5', 25.4' 25.8', 26.2'-26.4', 26.9'-27.0', 27.9', 28.0', 28.6', fractures.
30							

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
50+

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-616 | Location: Sta. 673+12.7, 439.8 ft. LT of SR 823 CL | Date Drilled: 6/28/05 to 6/29/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
6.1' (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)
30	692.8						Medium hard gray SHALE; very fine grained, moderately to highly weathered, arenaceous, thinly laminated to very thinly bedded, highly fractured, few argillaceous laminae. @ 30.1', 30.2', 31.4'-31.5', 32.0', fractures.							Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
35.0	687.8	Core 96"	Rec 96"	RQD 92%	R3		Medium hard gray SANDSTONE; very fine grained, slightly to moderately weathered, very thinly to medium bedded, highly fractured, contains few to moderate argillaceous laminations.							
40														
40.5	682.3						Bottom of Boring - 40.5'							
45														
50														
55														
60														

FILE: 0121-3070-03 (11/13/2007 9:09 PM)

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

LOG OF: Boring R-617 | Location: Sta. 673+15.2, 228.5 ft. LT of SR 823 CL | Date Drilled: 6/27/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
5.8' (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	768.8												
0.4	768.4						Topsoil - 5"						
		4 4 4	4	1		2.0	Very stiff brown SANDY SILT (A-4a), trace clay, trace gravel; damp.						
		8 5 5	6	2		3.0							
5		6 7 8	7	3		3.0							
8.0	760.8						Very stiff to hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp to moist.						
		6 7 14	6	4		4.0							
10		11 17 23	12	5		4.5							
		12 13 15	11	6		2.5							
15		11 15 26	13	7		2.0							
18.0	750.8						Severely weathered brown SANDSTONE.						
19.0	749.8	50/ 1	1	8			Soft to medium hard brown SANDSTONE; very fine to fine grained, decomposed, argillaceous, micaceous, thinly laminated to medium bedded, highly fractured to broken, few argillaceous laminae.						
20							@ 19.5'-19.6', iron stained, broken zone.						
		Core 114"	Rec 114"	RQD 75%	R1		@ 20.0', 20.3', 20.5', iron stained low angle fracture.						
							@ 20.5', gray:						
25							@ 22.0'-22.1', 24.4'-24.6', 24.8'-25.0', 25.1'-25.2', shale layers.						
							@ 26.7', 26.9', low angle fracture.						
28.5	740.3						Bottom of Boring - 28.5'						
30													

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-618 | Location: Sta. 673+36.1, 44.1 ft. LT of SR 823 CL | Date Drilled: 6/23/05 to 6/24/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
13.2' (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
0	799.3												
0.3	799.0						Topsoil - 4"						
		14 17 18	4	1		–	Very stiff to hard brown SANDY SILT (A-4a), little gravel; contains rock fragments and rust stains; damp.						
		9 11 12	9	2		4.5+							
5		10 10 12	12	3		4.5+							
		13 11 11	9	4		3.25							
10													
10.5	788.8	7 11 14	14	5		4.5+	Hard brown SILT (A-4b), little clay, little fine to coarse sand, trace gravel; contains sandstone fragments; dry to damp.	2	16	--	8	53	21
13.0	786.3	5 5 11	11	6		2.25	Very stiff to hard brown SANDY SILT (A-4a), some gravel, little clay; contains rust stains and rock fragments; damp.	26	16	--	7	39	12
15		5 10 11	16	7		4.5+							
		6 8 10	0	8			@ 18.5'-20.0', auger sample was wet.						
20													
20.5	778.8	4 6 10	18	9		3.0	Very stiff brown SILT (A-4b), some fine to coarse sand, little clay, trace gravel; damp.	6	17	--	7	52	18
		8 12 15	0	10			@ 23.5'-25.0', auger sample was wet.						
25													
25.5	773.8	7 13 21	18	11		4.5+	Hard brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; contains sandstone fragments; damp.	8	12	--	6	45	29
		5 11 16	12	12		4.25							
30													

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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-618 | Location: Sta. 673+36.1, 44.1 ft. LT of SR 823 CL | Date Drilled: 6/23/05 to 6/24/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
13.2' (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)
30	769.3						Hard brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; contains sandstone fragments; damp.							
33.5	765.8	50/4	4	13			Severely weathered brownish gray SANDSTONE argillaceous.							50+
34.0	765.3						Soft to medium hard brown SANDSTONE; medium grained, decomposed, argillaceous, very thinly bedded to medium bedded, highly fractured, iron staining.							
35							@ 34.4'-34.6', fracture zone.							
37.0	762.3						@ 35.7', 36.2', 36.6', 37.1, low angle fractures.							
		Core 120"	Rec 105"	RQD 73%	R1		@ 35.7'-36.0', high angle fractures.							
40							Soft to medium hard gray SHALE; very fine grained, highly weathered, arenaceous, very thinly bedded, highly fractured.							
							@ 37.7', 37.8', 38.0'-38.2', 38.4'-38.6', 40.0', 41.5', 43.2', low angle fractures.							
							@ 40.2'-41.4', lost recovery.							
44.0	755.3						Medium hard gray SANDSTONE; very fine grained, moderately weathered, argillaceous, medium bedded to thickly bedded, highly fractured; contains moderate argillaceous laminations.							
45		Core 48"	Rec 48"	RQD 54%	R2		@ 44.1', 44.4', 44.6', 45.3', 45.7', 46.1', 46.4', 47.5', 47.6', low angle fractures.							
48.0	751.3						@ 46.1'-46.4', high angle fracture, interbedded sandstone.							
							Bottom of Boring - 48.0'							
50														
55														
60														

GRADATION

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

FILE: 0121-3070-03 [11/13/2007 9:09 PM]

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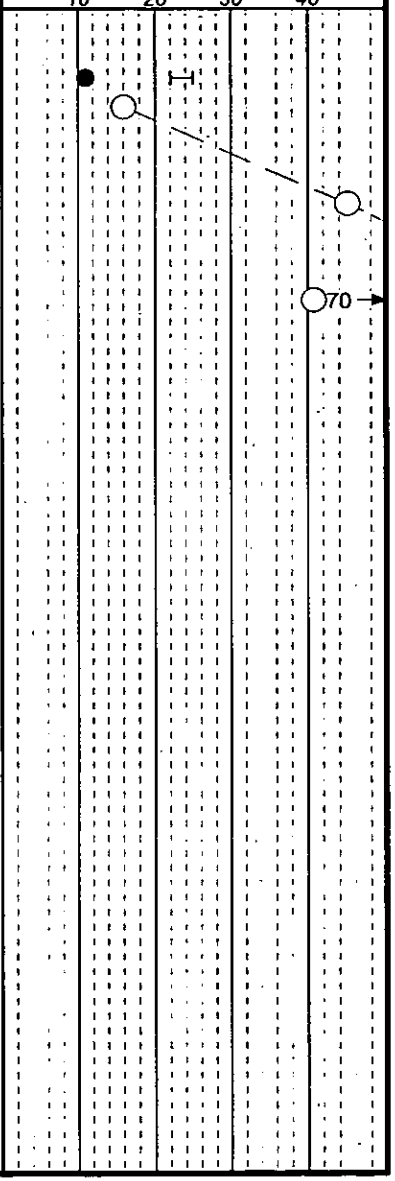
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-624 | Location: Sta. 679+48.0, 98.8 ft. LT of SR 823 CL | Date Drilled: 07/06/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
2.1' (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
0	861.6												
0.3	861.3						Topsoil - 3"						
		6 7 9	15	1			Medium dense brown SILT (A-4b), some fine to coarse sand, little gravel, trace clay; contains sandstone fragments; dry.	17	17	–	8	50	8
		38 21 24	9	2									
5		19 26 44	14	3									
7.5	854.1						Severely weathered brown SANDSTONE.						
10		Core 120"	Rec 72"	RQD 3%	R1		@ 10.0'-14.0', lost recovery.						
15.0	846.6						Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, micaceous, argillaceous, thinly bedded to medium bedded; contains moderate argillaceous laminations.						
20		Core 120"	Rec 120"	RQD 58%	R2		@ 18.2'-18.6', 27.7', high angle fracture. @ 19.3', 19.5'-19.8', iron stained fracture. @ 20.0'-21.4', qu = 2,142 psi, SDI = 75.4%. @ 20.4'-20.6', 20.9', 21.1', 22.6', 22.8', 23.2', 24.0', low angle fracture. @ 22.0'-22.3', 25.7'-25.8', 26.9'-27.2', broken zone. @ 22.8'-23.2', 25.0'-27.5', interbedded siltstones. @ 23.2'-25.0', calcareous layer. @ 24.2'-24.6', high angle fracture with calcite deposit on surface.						
25							@ 27.5'-28.4', SDI = 64.6%. @ 28.0', 28.4', 28.6', 29.0', 29.05', 29.2', 29.7', low angle fractures.						
30													

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



FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-624 | Location: Sta. 679+48.0, 98.8 ft. LT of SR 823 CL | Date Drilled: 07/06/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
2.1' (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
30	831.6	Core 120"	Rec 120"	RQD 66%	R3		Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, micaceous, argillaceous, thinly bedded to medium bedded; contains moderate argillaceous laminations. @ 30.4'-31.0', 31.1'-31.5', 31.7', 31.9', 33.1', 33.7', 34.0', 34.7'-34.8', 35.4', low angle fractures. @ 30.5', calcareous layer. @ 32.5'-33.1', qu = 3,731 psi. @ 35.2'-36.3', qu = 2,469 psi, SDI = 79.8%.							
37.5	824.1						Bottom of Boring - 37.5'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-626 | Location: Sta. 679+14.4, 156.2 ft. RT of SR 823 CL | Date Drilled: 06/28/05 to 06/29/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
23.5' (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)
0	978.6													
0.3	978.3						Topsoil - 3"							
		5 7 6	14	1		4.0	Hard brown SANDY SILT (A-4a), trace clay, trace gravel; contains sandstone fragments; dry to damp.							
		6 10 11	12	2		4.5								
5														
6.0	972.6	6 10 19	18	3			Severely weathered brown SANDSTONE argillaceous.							
		5 11 19	12	4										
10														
11.0	967.6	11 24 43	18	5			Severely weathered brown SILTSTONE arenaceous.							67
		19 50/5	8	6										50+
15														
		18 43 50/5	18	7										50+
18.5	960.1	50/3	3	8			Severely weathered gray SANDSTONE.							50+
19.5	959.1						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, fossiliferous, micaceous, thickly bedded, moderately fractured. @ 21.9', 23.2', 23.6', low angle fractures.							
20														
24.0	954.6	Core 120"	Rec 120"	RQD 82%	R1	*289	Hard light brown SANDSTONE; fine grained, highly weathered, fossiliferous, pyritic, micaceous, thickly bedded, moderately fractured, contains calcareous bands. @ 24.0', 24.3', 24.4', 24.7', 24.8', 24.9', 27.2', 27.6', 28.6', low angle fractures. @ 27.2'-28.5', qu = 7,133 psi, SDI = 98.6%.							
25														
30														

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-626 | Location: Sta. 679+14.4, 156.2 ft. RT of SR 823 CL | Date Drilled: 06/28/05 to 06/29/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
23.5' (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
30	948.6													
32.0	946.6						Hard light brown SANDSTONE; fine grained, highly weathered, fossiliferous, pyritic, thickly bedded, moderately fractured, micaceous. @ 31.4', 31.7', low angle fractures.							
35		Core 120"	Rec 120"	RQD 94%	R2	*362	Hard light gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, thickly bedded to massive, unfractured to slightly fractured, turbidites, iron staining. @ 33.9', 34.0', 34.4', 36.5', low angle fractures.							
40							@ 41.8', 43.4', low angle fractures.							
45		Core 120"	Rec 119"	RQD 99%	R3	*403								
50							@ 50.4'-51.9', qu = 10,850 psi, SDI = 97.9%.							
55		Core 120"	Rec 117"	RQD 98%	R4	*395								
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-626 | Location: Sta. 679+14.4, 156.2 ft. RT of SR 823 CL | Date Drilled: 06/28/05 to 06/29/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
23.5' (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
60	918.6						Hard light gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, thickly bedded to massive, unfractured to slightly fractured, turbidites, iron staining.							
65		Core 120"	Rec 120"	RQD 100%	R5	*5314								
70														
75		Core 120"	Rec 120"	RQD 100%	R6	*408	@ 75.0', low angle fractures.							
80														
85		Core 120"	Rec 120"	RQD 100%	R7	*505								
90														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-626 | Location: Sta. 679+14.4, 156.2 ft. RT of SR 823 CL | Date Drilled: 06/28/05 to 06/29/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
23.5' (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	888.6	Core	Rec	RQD	R8	*278	Hard light gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, thickly bedded to massive, unfractured to slightly fractured, turbidites, iron staining.							
90.9	887.7	16"	16"	100%			Bottom of Boring - 90.9'							
95														
100														
105														
110														
115														
120														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-627 | Location: Sta. 681+58.3, 370.0 ft. LT of SR 823 CL | Date Drilled: 06/23/05

WATER OBSERVATIONS: Water seepage at: None; 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	STANDARD PENETRATION (N)
0	764.7													Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0.3	764.4						Topsoil - 3"							
		5 11 14	8	1		4.5+	Hard brown SANDY SILT (A-4a), trace to little gravel, trace clay; dry to damp.							
		7 5 4	13	2		4.5								
5		3 3 4	12	3		4.5+								
		3 3 7	10	4		4.5+	@ 8.5', little clay.							
10														
11.0	753.7	3 4 22	13	5			Severely weathered gray SILTSTONE.							
		31 50/5	11	6										50+
15														
		50/4	2	7										50+
17.0	747.7						Medium hard to hard gray SANDSTONE interbedded with SILTSTONE (turbidites); fine grained, slightly to moderately weathered, argillaceous, micaceous, medium bedded to laminated, moderately fractured.							
20		Core 120"	Rec 107"	RQD 58%	R1		@ 20.2'-20.8', rust stained high angle fracture.							
25														
27.0	737.7						Bottom of Boring - 27.0'							
30														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-628 | Location: Sta. 680+71.2, 152.5 ft. LT of SR 823 CL | Date Drilled: 06/30/05 to 07/05/05

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	819.6												
0.4	819.2	7 7 6	10	1		--	Topsoil - 5" Stiff gray SANDY SILT (A-4a), little clay, little gravel; damp.	11	8	--	17	45	19
3.0	816.6	25 28 25	16	2		3.5	Very stiff brown SILT (A-4b), some fine to coarse sand, little clay, trace gravel; contains sandstone fragments; dry to damp.	6	14	--	8	57	15
5.5	814.1	20 21 23	14	3		4.5+	Very stiff to hard brown SANDY SILT (A-4a), little clay; contains sandstone fragments; dry.						
		22 21 21	12	4		4.0							
10		18 20 26	7	5		3.0							
		16 21 24	8	6		4.5+							
15		15 18 14	6	7		4.0	@ 16.0'-17.5', moist.						
		17 19 26	15	8		--	@ 18.5', little gravel.						
20													
21.0	798.6	45 50/3	9	9			Severely weathered brown SHALE.						
22.0	797.6						Soft light brown SANDSTONE; very fine grained, highly weathered to decomposed, argillaceous, micaceous, thickly bedded, moderately to highly fractured, iron staining. @ 22.2'-22.5', 23.7'-24.0', broken zones. @ 22.7', 23.0', 23.5', 24.4', low angle fractures.						
25													
26.5	793.1	Core 120"	Rec 120"	RQD 55%	R1		Soft to medium hard gray SANDSTONE; very fine grained, moderately weathered, argillaceous, micaceous, thickly bedded, highly fractured to broken, iron staining. @ 29.2', 29.7', 29.8', low angle fractures.						
30													

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

53

50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-628 | Location: Sta. 680+71.2, 152.5 ft. LT of SR 823 CL | Date Drilled: 06/30/05 to 07/05/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
6.7' (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 - ○
30	789.6						Soft to medium hard gray SANDSTONE; very fine grained, moderately weathered, argillaceous, micaceous, thickly bedded, highly fractured to broken, iron staining, contains few argillaceous laminations.							10 20 30 40
35		Core 54"	Rec 54"	RQD 100%	R2		@ 30.6', 31.5', 33.1', 33.4', 35.4'-36.1', 36.6', low angle fractures. @ 32.2'-32.9', 34.5'-35.1', broken zone.							
36.5	783.1						Bottom of Boring - 36.5'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-629 | Location: Sta. 680+71.1, 7.9 ft. LT of SR 823 CL | Date Drilled: 07/06/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
2.5' (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
0	864.0												
0.3	863.7						Topsoil - 3" / 6" soil removed before drilling.						
		18 21 35	14	1		4.5+	Hard brown SILT (A-4b), little fine to coarse sand, little clay, trace gravel; contains sandstone fragments; dry to damp.	6	15	–	5	55	19
		20 31 50/4	14	2		4.5+							
5.0	859.0						Hard grayish brown SANDSTONE; very fine to fine grained, moderately to highly weathered, micaceous, medium bedded to thickly bedded, moderately fractured to broken. @ 6.1', 9.4', low angle fractures. @ 6.8', 7.3', 7.9', 8.5', 9.5', 13.7' iron stained high angle fractures. @ 6.9', 7.9, 14.1', low angle fractures.						
10		Core 120"	Rec 113"	RQD 55%	R1								
15							@ 17.2'-17.6', 22.4', 22.8', 22.9', 23.2'-23.3', 23.9'- 24.3', argillaceous bands.						
20		Core 120"	Rec 120"	RQD 78%	R2								
25							@ 27.3'-27.7', high angle fracture. @ 28.5'-32.2', moderate to abundant argillaceous laminations.						
30		Core 120"	Rec 120"	RQD 38%	R3								

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
56
50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-629 | Location: Sta. 680+71.1, 7.9 ft. LT of SR 823 CL | Date Drilled: 07/06/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
2.5' (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
30	834.0						Hard grayish brown SANDSTONE; very fine to fine grained, moderately to highly weathered, micaceous, medium bedded to thickly bedded, moderately fractured to broken.						
35		Core 60"	Rec 60"	RQD 88%	R4		@ 32.2'-33.3', broken. @ 32.2', pyritic. @ 32.3'-40', few to moderate argillaceous laminations.						
40.0	824.0						Bottom of Boring - 40.0'						
45													
50													
55													
60													

GRADATION

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-630 | Location: Sta. 683+28.9, 73.3 ft. LT of SR 823 CL | Date Drilled: 06/24/05

WATER OBSERVATIONS: Water seepage at: None; 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	STANDARD PENETRATION (N)
0	886.3													Natural Moisture Content, % - ●
0.2	886.1						Topsoil - 2"							PL ⊢——⊣ LL
		3 6 9	14	1			Medium dense brown SANDY SILT (A-4a), trace clay, trace gravel; contains sandstone fragments; dry..							Blows per foot - ○ 10 20 30 40
3.5	882.8	4 20 50/1	13	2			Severely weathered brown SANDSTONE argillaceous.							50+
5														
		14 50/3	5	3										50+
7.0	879.3						Medium hard to hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, medium bedded to massive, highly fractured, few argillaceous laminations. @ 7.0' - 7.8', lost recovery. @ 8.5'-8.7', 10.3'-10.5', 11.0'-11.2', 13.2'-13.3', 14.0'-14.1', 14.3'-14.4', 15.4', iron stained high angle fractures. @ 10.7', 11.7', 12.6', 14.4', 15.3', 15.6', low angle fracture.							
10		Core 120"	Rec 105"	RQD 43%	R1									
15														
20		Core 42"	Rec 41"	RQD 74%	R2		@ 19.0'-20.4', gray hard sandstone with interbedded siltstones (turbidites).							
20.5	865.8						Bottom of Boring - 20.5'							
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-632 | Location: Sta. 683+15.8, 172.1 ft. RT of SR 823 CL | Date Drilled: 06/27/05 to 06/29/05

WATER OBSERVATIONS: Water seepage at: 17.0'-22.0'
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	STANDARD PENETRATION (N)
0	964.8						No Topsoil							
		8 7 8	14	1		4.5+	Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; dry.							
3.5	961.3	9 50/5	9	2			Severely weathered brown SANDSTONE argillaceous.							50+
5		28 50/3	9	3										50+
		35 50/8	9	4										50+
10														
10.5	954.3	Core 78"	Rec 78"	RQD 95%	R1		Hard brown SANDSTONE; fine grained, highly weathered, argillaceous, micaceous, thickly bedded to massive, slightly fractured, contains calcareous zone.							
15							@ 16.35', low angle fracture.							
		Core 60"	Rec 60"	RQD 100%	R2									
20														
22.0	942.8	Core 60"	Rec 60"	RQD 100%	R3		Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, unfractured to slightly fractured.							
25														
		Core	Rec	RQD	R4									
30														

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-632 | Location: Sta. 683+15.8, 172.1 ft. RT of SR 823 CL | Date Drilled: 06/27/05 to 06/29/05

WATER OBSERVATIONS: Water seepage at: 17.0'-22.0'
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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢——⊣ LL Blows per foot - ○ 10 20 30 40
30	934.8	60"	60"	100%			Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, unfractured to slightly fractured.							
35		Core 60"	Rec 59"	RQD 95%	R5									
40		Core 60"	Rec 56"	RQD 88%	R6									
45		Core 60"	Rec 60"	RQD 87%	R7									
50		Core 60"	Rec 60"	RQD 46%	R8									
55		Core 60"	Rec 56"	RQD 93%	R9									
60		Core	Rec	RQD	R10									

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-632 | Location: Sta. 683+15.8, 172.1 ft. RT of SR 823 CL | Date Drilled: 06/27/05 to 06/29/05

WATER OBSERVATIONS: Water seepage at: 17.0'-22.0'
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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
60	904.8	60"	60"	100%			Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, unfractured to slightly fractured.							
65		Core 60"	Rec 59"	RQD 98%	R11									
70		Core 60"	Rec 60"	RQD 100%	R12		@ 68.0', shale seam. @ 70.6', low angle fracture.							
75		Core 60"	Rec 59"	RQD 100%	R13		@ 72.3'-79.2', contains few to moderate argillaceous laminations. @ 73.1', 73.5', low angle fractures.							
80.0	884.8	Core 36"	Rec 36"	RQD 100%	R14		@ 76.9'-77.0', broken zone.							
							Bottom of Boring - 80.0'							
85														
90														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-636 | Location: Sta. 690+16.7, 79.0 ft. LT of SR 823 CL | Date Drilled: 06/21/05

WATER OBSERVATIONS: Water seepage at: None; 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	845.5												
0.4	845.1						Topsoil - 5" / 1.0' soil removed before drilling.						
		4 3 4	12	1		4.0	Hard brown SANDY SILT (A-4a), little gravel, trace clay; contains sandstone fragments; damp.						
		7 14 21	18	2		4.5+							
5		7 16 18	18	3		4.0	@ 6.0', Contains sandstone fragments.						
		7 21 22	18	4		4.5+		13	22	--	11	45	10
10													
10.5	835.0						Medium dense to dense brown SILT (A-4b), some fine to coarse sand, little clay, trace gravel; contains sandstone fragments; damp to moist.						
		6 15 16	18	5				7	18	--	9	52	14
		7 14 14	18	6									
15		14 6 6	18	7									
		5 6 6	18	8									
20		50/5	4	9									
		Core 36"	Rec 18"	RQD 25%	R1								
25		Core 18"	Rec 0"	RQD 0%	R2								
		5 7 10	18	10									
		5 5 5	18	11									
30													

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-636 | Location: Sta. 690+16.7, 79.0 ft. LT of SR 823 CL | Date Drilled: 06/21/05

WATER OBSERVATIONS: Water seepage at: None; 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
30.0	815.5						Severely weathered grayish brown SANDSTONE argillaceous.						
		12 15 30	18	12									
35													
40													
		18 50/3	8	13			@ 41.0', gray.						
43.5	802.0						Medium hard gray SANDSTONE interbedded with SILTSTONE (turbidites) and SHALE; fine grained, highly weathered, argillaceous, micaceous, thinly bedded to laminated, moderately fractured.						
45		Core 90"	Rec 65"	RQD 27%	R3								
50													
51.0	794.5						Bottom of Boring - 51.0'						
55													
60													

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-639 | Location: Sta. 692+44.5, 241.0 ft. LT of SR 823 CL | Date Drilled: 06/22/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None; Water level at completion: None — 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	748.0													
0.3	747.7						Topsoil - 3" / 1.5' soil removed before drilling.							
		4 8 7	15	1		4.5+	Hard brown SANDY SILT (A-4a), little gravel, trace clay; contains sandstone fragments; dry to damp.							
		17 15 23	13	2		4.5+								
5														
		8 21 30	18	3		4.5+								51
8.0	740.0						Severely weathered brownish gray SHALE arenaceous.							
		8 50/5	10	4										50+
10														
		8 50/4	9	5										50+
		16 50/5	10	6										50+
14.5	733.5						Soft to medium hard gray SHALE interbedded with very fine SANDSTONE; moderately weathered, micaceous, thinly bedded to thinly laminated, moderately fractured.							
15														
		Core 108"	Rec 94"	RQD 55%	R1									
20														
23.5	724.5						Bottom of Boring - 23.5'							
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-640 | Location: Sta. 692+52.4, 190.3 ft. LT of SR 823 CL | Date Drilled:

WATER OBSERVATIONS: Water seepage at: None; 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	754.1						Topsoil - 14" / 2.0' soil removed before drilling.						
1.2	752.9	7 14 14	14	1			Medium dense to dense brown SANDY SILT (A-4a), some gravel, trace clay; contains sandstone fragments; damp.						
		8 22 25	18	2									
5		10 14 19	17	3									
		12 18 9	14	4									
10													
10.5	743.6	5 10 12	16	5		4.25	Hard brown SANDY SILT (A-4a), little clay, trace gravel; contains sandstone fragments; damp to moist.						
		6 10 11	18	6		4.5							
15		5 10 8	18	7		4.0							
		6 16 31	18	8		4.0							
20													
21.0	733.1	50/2	0	9			Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, pyritic, micaceous, thinly bedded to thinly laminated, moderately fractured, contains few to moderate argillaceous laminations.						
25		Core 120"	Rec 104"	RQD 77%	R1								
30													

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

50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-640 | Location: Sta. 692+52.4, 190.3 ft. LT of SR 823 CL | Date Drilled:

WATER OBSERVATIONS: Water seepage at: None
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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢ LL Blows per foot - ○ 10 20 30 40
30	724.1													
31.0	723.1						Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, pyritic, micaceous, thinly bedded to thinly laminated, moderately fractured, contains few to moderate argillaceous laminations.							
							Bottom of Boring - 31.0'							
35														
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-641 | Location: Sta. 692+11.1, 0.3 ft. RT of SR 823 CL | Date Drilled: 06/23/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
28.7' (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
0.2	815.5						Topsoil - 2"						
	815.3	6 5 6	14	1		--	Hard brown SILT AND CLAY (A-6a), some fine to coarse sand, little gravel; contains siltstone fragments; damp.						
		5 7 8	16	2		4.5+							
5		5 6 8	17	3		4.5+		11	14	–	6	48	21
		5 6 10	16	4		4.0							
10													
10.5	805.0	8 18 30	18	5			Severely weathered brown SILTSTONE.						
		13 36 50/2	13	6									
15		7 38 50/2	12	7									
		30 50/5	11	8									
20.0	795.5						Soft brown SILTSHALE interbedded with SILTSTONE; very fine grained, highly weathered to decomposed, micaceous, very thinly bedded, completely broken, iron staining.						
22.5	793.0						Medium hard gray SANDSTONE; very fine grained, highly weathered, micaceous, medium bedded to thinly laminated, highly fractured, contains few to moderate argillaceous laminations.						
25		Core 120"	Rec 103"	RQD 33%	R1		@ 24.0'-24.3', high angle fracture with iron staining.						
							@ 26.3'-27.6', soft, gray shale layer.						
30.0	785.5						Bottom of Boring - 30.0'						

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

50+
50+
50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-645 | Location: Sta. 696+15.5, 81.2 ft. LT of SR 823 CL | Date Drilled: 07/14/05

WATER OBSERVATIONS: Water seepage at: None; 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	832.4												
0.3	832.1						Topsoil - 4" / 1.5' soil removed before drilling.						
		3 6 7	13	1			Medium dense brown SANDY SILT (A-4a), little clay, little gravel; contains sandstone fragments; damp.	17	15	--	6	43	19
		7 10 11	16	2									
5													
5.5	826.9						Severely weathered grayish brown SHALE arenaceous.						
		6 16 30	17	3									
		30 50/3	8	4									
10													
		20 50/3	6	5									
		20 50/4	9	6			@ 13.5' gray						
15.0	817.4						Soft gray SANDSTONE; very fine grained, decomposed, argillaceous, micaceous, very thinly bedded to thinly laminated, broken.						
		Core 60"	Rec 12"	RQD 0%	R1		@ 15.9'-20.0', lost recovery.						
20.0	812.4						Soft to medium hard gray SANDSTONE interbedded with SHALE; very fine grained, highly weathered to decomposed, argillaceous, micaceous, thinly bedded to thinly laminated, highly fractured.						
		Core 60"	Rec 48"	RQD 53%	R2		@ 22.7'-22.8', 23.1'-23.2', high angle iron stained fractures. @ 22.9', 23.5', 23.9', low angle fractures.						
25.0	807.4						Bottom of Boring - 25.0'						
30													

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-647 | Location: Sta. 696+04.3, 182.5 ft. RT of SR 823 CL | Date Drilled: 07/07/05 to 07/13/05

WATER OBSERVATIONS: Water seepage at: None; 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	STANDARD PENETRATION (N) / Natural Moisture Content, % / PL — LL / Blows per foot
0	937.1													
0.7	936.4						Topsoil - 8"							
		3 4 3	15	1			Medium stiff brown SILT AND CLAY (A-6a), little gravel, trace fine to coarse sand; dry.							
3.0	934.1						Severely weathered brown SANDSTONE.							
		24 50/3	7	2										50+
5		29 50/2	5	3										50+
		22 50/2	4	4										50+
10														
11.0	926.1						Hard brown SANDSTONE; fine grained, highly weathered, argillaceous, micaceous, medium bedded to thinly laminated, moderately fractured. @ 11.3', 11.5', high angle fractures.							
14.6	922.5						Hard gray SANDSTONE; fine grained, slightly weathered, argillaceous, pyritic, micaceous, thickly bedded to massive, slightly fractured.							
15		Core 120"	Rec 120"	RQD 88%	R1	*187								
20							@ 20.0'-20.2', iron staining. @ 20.9'-21.0', high angle fracture with iron staining. @ 21.0', 21.4', high angle fracture.							
25		Core 120"	Rec 120"	RQD 94%	R2	*347								
30														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-647 | Location: Sta. 696+04.3, 182.5 ft. RT of SR 823 CL | Date Drilled: 07/07/05 to 07/13/05

WATER OBSERVATIONS: Water seepage at: None
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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢⊣ LL Blows per foot - ○ 10 20 30 40
30	907.1						Hard gray SANDSTONE; fine grained, slightly weathered, argillaceous, pyritic, micaceous, thickly bedded to massive, slightly fractured.							
35		Core 120"	Rec 105"	RQD 83%	R3	*324								
40							@ 41.0', interbedded shale.							
45		Core 120"	Rec 120"	RQD 90%	R4	*295								
50														
55		Core 120"	Rec 113"	RQD 86%	R5	*426	@ 54.2'-56.0', brown calcareous layer.							
60							@ 58.0'-58.2', shale layer. @ 58.5'-60.0', iron staining.							

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-647 | Location: Sta. 696+04.3, 182.5 ft. RT of SR 823 CL | Date Drilled: 07/07/05 to 07/13/05

WATER OBSERVATIONS: Water seepage at: None
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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢——⊣ LL Blows per foot - ○ 10 20 30 40
60	877.1						Hard gray SANDSTONE; fine grained, slightly weathered, argillaceous, pyritic, micaceous, thickly bedded to massive, slightly fractured. @ 62.0'-63.5', 66.7'-69.0', brown sandstone layer.							
65		Core 120"	Rec 116"	RQD 93%	R6	*361	@ 65.3'-65.6', high angle fracture.							
70														
75		Core 120"	Rec 120"	RQD 99%	R7	*373								
80														
85		Core 120"	Rec 120"	RQD 100%	R8	*262								
90														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-647 | Location: Sta. 696+04.3, 182.5 ft. RT of SR 823 CL | Date Drilled: 07/07/05 to 07/13/05

WATER OBSERVATIONS: Water seepage at: None
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
90	847.1						Hard gray SANDSTONE; fine grained, slightly weathered, argillaceous, pyritic, micaceous, thickly bedded to massive, slightly fractured.						
95.2	841.9	Core 120"	Rec 117"	RQD 90%	R9	*278	Medium hard gray SHALE interbedded with gray SANDSTONE; very fine grained, moderately weathered, argillaceous, micaceous, pyritic, thinly bedded to thinly laminated.						
100													
101.0	836.1	Core 48"	Rec 30"	RQD 31%	R10	*257	Medium hard gray SHALE; moderately weathered, micaceous, thinly bedded to thinly laminated, contains moderate to abundant argillaceous laminations.						
105.0	832.1						Bottom of Boring - 105.0'						
110													
115													
120													

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-648 | Location: Sta. 698.23.1, 357.9 ft. LT of SR 823 CL | Date Drilled: 07/06/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
16.5' (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
0.2	723.4						Topsoil - 2"							
	723.2	5 4 8	13	1		3.75	Very stiff to hard brown SANDY SILT (A-4a), trace clay, trace gravel; contains sandstone fragments; damp.							
		5 9 9	16	2		4.5+								
5							@ 5.5'-6.0', cored through cobble.							
		Core 54"	Rec 14"	RQD 13%	R1									
8.0	715.4						Brown SANDSTONE interbedded with SILTSTONE and CLAY; very fine grained, highly weathered to decomposed, broken.							
10							@ 10.0'-11.5', iron stained high angle fracture.							
11.5	711.9						Medium hard gray SANDSTONE interbedded with SHALE; very fine grained, moderately to highly weathered, thinly laminated to thinly bedded, slightly to moderately fractured, fissile, fractures along bedding with infilling of silty clay.							
15		Core 120"	Rec 113"	RQD 63%	R2									
20.0	703.4						Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-649 | Location: Sta. 698+30.7, 214.0 ft. LT of SR 823 CL | Date Drilled: 07/06/05

WATER OBSERVATIONS: Water seepage at: 22.5'
Water level at completion: 19.5' (prior to coring)
19.5' (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)
0	769.7													Natural Moisture Content, % - ● PL — LL; Blows per foot - ○ (10 20 30 40)
0.3	769.4						Topsoil - 3"							
		4 7 8	15	1		--	Stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; contains sandstone fragments; damp.	10	8	--	6	46	30	
3.0	766.7													
		4 4 5	14	2		4.5+	Stiff brown SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; contains sandstone fragments; damp to moist.	2	3	--	3	53	39	
5														
		3 6 5	14	3		4.5+	@ 6.0' contains shale fragments							
		4 10 12	16	4		4.5+								
10														
		11 37 40	12	5		4.5+								77
		5 10 10	18	6		4.5+								
15														
15.5	754.2						Severely weathered gray SHALE argillaceous.							
		29 50/3	8	7										50+
		28 50/2	5	8										50+
20														
20.5	749.2	Core 54"	Rec 32"	RQD 0%	R1		Very soft gray SILTSHALE interbedded with SANDSTONE; very fine grained, decomposed, argillaceous, micaceous, laminated to thinly laminated, broken, rust stained.							
25.0	744.7						Bottom of Boring - 25.0'							
30														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-650 | Location: Sta. 698+18.9, 70.9 ft. LT of SR 823 CL | Date Drilled: 07/07/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None; Water level at completion: None — DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
0	815.7													
0.5	815.2	4 4 7	16	1		4.5+	Topsoil - 6" / 1.0' soil removed before drilling. Hard brown SANDY SILT (A-4a), "and" gravel, little clay; contains sandstone fragments; dry to damp.	31	9	--	5	40	15	
3.0	812.7	5 7 10	17	2		4.5+	Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; contains sandstone fragments; dry to damp.	6	13	--	6	42	33	
5		5 10 16	18	3		4.5+								
8.0	807.7	8 30 50/5	18	4			Severely weathered brown SANDSTONE.							50+
10		7 21 50/3	14	5										50+
		28 50/1	6	6										50+
15.0	800.7	Core 60"	Rec 30"	RQD 0%	R1		Medium hard brown SANDSTONE; very fine grained, decomposed, argillaceous, micaceous, laminated, broken, iron staining. @ 17.5'-20.0', lost recovery.							
20.0	795.7	Core 60"	Rec 50"	RQD 33%	R2		Hard gray SANDSTONE; very fine grained, highly weathered, argillaceous, micaceous, medium bedded to laminated, moderately fractured to broken, contains few to moderate argillaceous laminations. @ 20.0'-22.5', broken. @ 22.7'-23.1', 23.9'-24.1', iron stained layers. @ 23.4', 24.0', low angle fractures.							
25.0	790.7						Bottom of Boring - 25.0'							
30														

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-652 | Location: Sta. 700+67.2, 80.3 ft. LT of SR 823 CL | Date Drilled: 07/05/05

WATER OBSERVATIONS: Water seepage at: None; 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	779.1												
0.3	778.8						Topsoil - 3"						
		4 4 6	12	1		4.0	Hard brown SANDY SILT (A-4a), little clay, little gravel; contains sandstone fragments; damp.						
		7 6 4	14	2		3.75		11	19	--	9	45	16
5		4 7 10	15	3		4.5+							
		9 14 14	17	4		4.5+							
10		9 12 12	15	5		4.5+							
13.0	766.1						Hard brown SILT (A-4b), some fine to coarse sand, little clay, little gravel; damp.						
		7 10 20	17	6		4.5+		13	14	--	6	51	16
15		7 10 11	15	7		4.5+							
		6 12 16	16	8		4.5+							
20		7 10 10	18	9		4.5+							
23.0	756.1						Severely weathered brown SHALE argillaceous.						
		7 10 50/5	17	10									
25		28 50/4	9	11									
		21 50/5	8	12									
30													

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-652 | Location: Sta. 700+67.2, 80.3 ft. LT of SR 823 CL | Date Drilled: 07/05/05

WATER OBSERVATIONS: Water seepage at: None
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
30	749.1												
31.0	748.1						Severely weathered brown SHALE argillaceous.						
		Core 60"	Rec 50"	RQD 22%	R1		Soft to medium hard gray SHALE interbedded with SANDSTONE; very fine to fine grained, highly weathered, argillaceous; micaceous, thinly laminated to thinly bedded, highly fractured, arenaceous. @ 31.7'-32.4', 32.5'-33.5', 34.3'-34.7', broken zones. @ 33.9', 35.2', low angle fractures.						
35													
36.0	743.1						Bottom of Boring - 36.0'						
40													
45													
50													
55													
60													

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

FILE: 0121-3070-03 [11/13/2007 9:13 AM]

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

LOG OF: Boring R-654 | Location: Sta. 702+46.7, 57.1 ft. LT of SR 823 CL | Date Drilled: 06/30/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
34.0' (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
0	830.4												
0.4	830.0						Topsoil - 5"						
		3 4 5	10	1		3.5	Very stiff brown SILT (A-4b), some clay, little gravel, little fine to coarse sand; contains sandstone fragments; damp.	14	9	--	3	51	23
3.0	827.4												
3.7	826.7						Very stiff gray SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; contains odor; moist.						
		4 2 3	7	2A		3.0							
5				2B		3.0	Very stiff to hard brown SANDY SILT (A-4a), "and" gravel, little clay; contains sandstone fragments; damp.	31	7	--	3	40	19
		4 2 4	10	3		4.0							
		4 5 5	14	4		4.0							
10													
11.0	819.4						Very stiff to hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace to little gravel; damp. @ 12.0'-13.5', contains sandstone fragments.						
		3 4 6	11	5A		4.0							
				5B		4.0							
		6 6 11	15	6		3.5		3	7	--	5	47	38
15													
		6 8 12	16	7		4.5+							
18.5	811.9	50/4	3	8			Severely weathered gray SHALE.						
20.0	810.4						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, thinly bedded to thickly bedded, highly fractured. @ 20.2'-20.3', broken zone. @ 21.8', 22. 8', 23.0', 23.8', 24.7', 24.8', low angle fractures.						
		Core 60"	Rec 60"	RQD 62%	R1								
25		Core 60"	Rec 59"	RQD 86%	R2								
30													

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

50+

FILE: 0121-3070-03 (11/13/2007 9:13 PM)

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

LOG OF: Boring R-654 | Location: Sta. 702+46.7, 57.1 ft. LT of SR 823 CL | Date Drilled: 06/30/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
34.0' (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
30	800.4	Core 60"	Rec 58"	RQD 74%	R3		Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, thickly bedded, moderately fractured, iron staining.							
35.0	795.4						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-666 | Location: Sta. 715+06.6, 5.0 ft. RT of SR 823 CL | Date Drilled: 07/19/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
4.2' (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	769.3												
0.3	769.0						Topsoil - 3"						
		10 10 11	13	1		3.5	Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.	7	10	--	9	47	27
		8 9 11	18	2		--							
5													
5.5	763.8						Hard brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp.	1	8	--	6	52	33
		8 11 16	14	3		4.5							
8.5	760.8						Hard brown SILT AND CLAY (A-6a), trace to little fine to coarse sand, trace to little gravel; dry to damp.	29	21	--	9	41	
		7 17 30	18	4		--							
10													
		11 19 27	13	5		4.5+		0	3	--	4	58	35
		6 13 19	18	6		--							
15													
		6 12 21	10	7		4.5+							
18.0	751.3						Severely weathered gray SILTSTONE.						
		9 18 20	15	8									
20													
		11 27 50/5	14	9									
23.0	746.3						Soft gray SILTSTONE; very fine to fine grained, moderately weathered, micaceous, thickly bedded, moderately fractured, contains moderate argillaceous laminations. @ 25.1'-25.3', 32.2'-32.4', 32.5'-32.6', iron stained high angle fractures.						
25													
		Core 120"	Rec 120"	RQD 92%	R1								
30													

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

50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-666 | Location: Sta. 715+06.6, 5.0 ft. RT of SR 823 CL | Date Drilled: 07/19/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
4.2' (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	% Cley	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	739.3						Soft gray SILTSTONE; very fine to fine grained, moderately weathered, micaceous, thickly bedded, moderately fractured, contains moderate argillaceous laminations.							
33.0	736.3						Bottom of Boring - 33.0'							
35														
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-668 | Location: Sta. 723+09.9, 0.1 ft. RT of SR 823 CL | Date Drilled: 07/14/05 to 07/15/05

WATER OBSERVATIONS: Water seepage at: 15.0'
Water level at completion: 9.6' (prior to coring)
24.6' (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 - ○
0	746.4													10 20 30 40
0.3	746.1						Topsoil - 4" / 6" soil removed before drilling.							
		3 6 8	18	1		4.0	Very stiff to hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp.							
		5 8 5	16	2		3.5								
5														
5.5	740.9						Severely weathered grayish brown SANDSTONE argillaceous.							
		10 16 50/5	15	3										50+
		25 50/3	8	4										50+
10.0	736.4						Hard gray SANDSTONE; very fine grained, moderately to highly weathered, argillaceous, pyritic, thickly bedded, highly fractured to broken.							
		Core 120"	Rec 78"	RQD 48%	R1		@ 10.0'-12.5', lost recovery. @ 10.1', 10.2', 10.7', 11.0', 12.3', 18.2', 18.4', 18.6', low angle iron stained fractures. @ 14.0'-15.0', highly fractured. @ 15.0'-15.9', lost recovery. @ 15.9'-20.0', highly fractured.							
15														
20.0	726.4						Medium hard gray SANDSTONE; very fine grained, moderately weathered, argillaceous, thickly bedded to massive, slightly to moderately fractured.							
		Core 60"	Rec 54"	RQD 90%	R2									
25.0	721.4						Bottom of Boring - 25.0'							
30														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-686 | Location: Sta. 744+98.3, 86.3 ft. LT of SR 823 CL | Date Drilled: 07/26/05 to 07/28/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
11.6' (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	842.6												
0.3	842.3						Topsoil - 4"						
		5 5 5	13	1		3.0	Very stiff brown SILT (A-4b), little to some fine to coarse sand, little clay, trace gravel; damp.						
		4 5 6	14	2		4.0		3	10	--	10	61	16
5													
5.5	837.1						Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; dry to damp.						
		10 13 21	3	3		4.5+							
		9 20 31	10	4		4.5+		3	6	--	6	48	37
10													
10.5	832.1						Severely weathered grayish brown SHALE argillaceous.						
		10 20 25	8	5									
		50/5	5	6									
15.0	827.6						Very soft to soft brownish gray SHALE; very fine grained, decomposed, argillaceous, thinly laminated to laminated, moderately fractured. @ 16.8'-20.2', lost recovery.						
20		Core 120"	Rec 70"	RQD 45%	R1		@ 21.2', low angle fracture.						
25.0	817.6						Medium hard gray SHALE; highly weathered, arenaceous, thinly laminated to laminated, contains few arenaceous laminations.						
30		Core 120"	Rec 120"	RQD 85%	R2								

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
51
50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-686 | Location: Sta. 744+98.3, 86.3 ft. LT of SR 823 CL | Date Drilled: 07/26/05 to 07/28/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
11.6' (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)
30	812.6						Medium hard gray SHALE; highly weathered, arenaceous, thinly laminated to laminated, contains few arenaceous laminations.							
35		Core 60"	Rec 60"	RQD 100%	R3		@ 35', interbedded with SANDSTONE.							
40.0	802.6						Bottom of Boring - 40.0'							
45														
50														
55														
60														

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-688 | Location: Sta. 745+12.0, 92.4 ft. RT of SR 823 CL | Date Drilled: 07/28/05 to 07/29/05

WATER OBSERVATIONS: Water seepage at: None; 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	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
0	908.6													
0.3	908.3	6 18 40	16	1		4.5+	Topsoil - 4" / 2.0' soil removed before drilling. Hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; contains sandstone fragments; damp.							58
3.0	905.6	50/5	2	2			Severely weathered brown SANDSTONE argillaceous.							50+
8.0	900.6						Medium hard gray SANDSTONE; very fine grained, moderately weathered, argillaceous, micaceous, thinly bedded to very thinly bedded, highly fractured, fissile.							
9.3	899.3	Core 120"	Rec 110"	RQD 60%	R1	*225	Hard brownish orange SANDSTONE; fine grained, highly weathered, argillaceous, micaceous, medium bedded to thinly bedded, moderately fractured. @ 9.8', 10.3', 10.8', 11.1'-11.2', 11.8', 12.4', 13.0', 13.1', 14.3', 14.6', 15.9', low angle fracture. @ 10.5'-10.6', 11.6'-11.7', 12.0'-12.2', 12.6'-12.7', 14.9'-15.0', high angle fracture. @ 16.1'-16.6', broken zone. @ 16.6', gray.							
18.0	890.6	Core 120"	Rec 108"	RQD 83%	R2	*213	Hard gray SANDSTONE; fine grained, slightly to moderately weathered, argillaceous, micaceous, thickly bedded, moderately fractured. @ 19.4'-21.1', iron stained. @ 19.6', 20.8', 21.0', 26.1', 26.2', iron stained low angle fracture. @ 27.0'-28.5', lost recovery. @ 29.0', 29.5', 30.3', 30.8', 31.6', 34.1', low angle fracture.							
30														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-688 | Location: Sta. 745+12.0, 92.4 ft. RT of SR 823 CL | Date Drilled: 07/28/05 to 07/29/05

WATER OBSERVATIONS: Water seepage at: None; 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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	878.6													
		Core 120"	Rec 102"	RQD 71%	R3	*361	Hard gray SANDSTONE; fine grained, slightly to moderately weathered, argillaceous, micaceous, thickly bedded, moderately fractured.							
33.8	874.8													
35							Hard gray SANDSTONE; very fine grained, moderately weathered, micaceous, argillaceous, thinly laminated to medium bedded, highly fractured, contains few to moderate argillaceous laminations. @ 34.4'-34.9', calcareous. @ 36.3'-36.5', vertical fracture. @ 36.5'-38.0', lost recovery. @ 38.0'-40.0', broken zone.							
		Core 24"	Rec 20"	RQD 0%	R4									
40.0	868.6						Bottom of Boring - 40.0'							
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-689 | Location: Sta. 747+17.5, 194.4 ft. LT of SR 823 CL | Date Drilled: 07/28/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
5.7' (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	STANDARD PENETRATION (N)
0	789.9													
0.3	789.6						Topsoil - 4"							
		3 5 7	10	1		–	Stiff brown SANDY SILT (A-4a), little clay; contains organic odor; damp.							
3.5	786.4													
		25 23 19	9	2		3.25	Very stiff to hard brown SANDY SILT (A-4a), trace to little clay; dry to damp.							
5														
		16 22 24	11	3		4.5+								
9.0	780.9	13 26 50/5	17	4A 4B		4.5+	Severely weathered brown SILTSTONE.							
10														
11.5	778.4	50/2	2	5										
							Very soft to soft brownish gray SHALE; very fine grained, decomposed, arenaceous, very thinly bedded to medium bedded, highly fractured to broken, iron staining. @ 11.7', 11.9', 12.5', 13.7', 14.2', 14.5', 14.7', 14.9', 15.7', 17.5', low angle fractures.							
15		Core 102"	Rec 102"	RQD 51%	R1		@ 17.7'-17.9', 18.0'-18.2', 18.4'-20.0', broken zones.							
20.0	769.9						@ 20.0'-20.1', 20.6'-21.7', 24.7'-24.8', high angle fractures.							
							Soft to medium hard gray SHALE; very fine grained, highly weathered to decomposed, arenaceous, micaceous, thinly laminated to laminated, moderately fractured, moderate argillaceous laminae. @ 20.6'-21.7', iron stained fracture. @ 22.8', 22.9', 23.9', 27.4', 20.6', low angle fractures.							
25		Core 120"	Rec 120"	RQD 62%	R2									
30														

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-689 | Location: Sta. 747+17.5, 194.4 ft. LT of SR 823 CL | Date Drilled: 07/28/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
5.7' (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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
30	759.9	Core 60"	Rec 60"	RQD 100%	R3		Soft to medium hard gray SHALE; very fine grained, highly weathered to decomposed, arenaceous, micaceous, thinly laminated to laminated, moderately fractured, moderate argillaceous laminae.							
35.0	754.9						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-690 | Location: Sta. 747+26.8, 12.6 ft. LT of SR 823 CL | Date Drilled: 07/28/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
2.4' (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	819.3												
0.3	819.0						Topsoil - 4"						
		12 17 45	15	1			Very dense brown SANDY SILT (A-4a), little gravel, little clay; contains rock fragments; dry to damp.	12	16	–	7	49	16
		40 50/3	9	2				18	16	–	8	45	13
5.0	814.3						Hard brown SANDSTONE; fine grained, moderately weathered, micaceous, medium bedded, moderately fractured; red sandstone cobbles within top foot of run. @ 5.9'-6.4', high angle fracture. @ 6.4',6.5',15.0'-15.7',16.2', low angle fractures. @ 6.8'-15.0',16.7'-21.2', lost recovery.						
10		Core 120"	Rec 20"	RQD 0%	R1								
15													
20		Core 120"	Rec 67"	RQD 34%	R2								
21.2	798.1						Soft to hard brownish gray SANDSTONE interbedded with SHALE; very fine to fine grained, highly weathered to decomposed, micaceous, argillaceous, medium bedded, broken.						
25													
30		Core 120"	Rec 112"	RQD 79%	R3								

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
62
50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-690 | Location: Sta. 747+26.8, 12.6 ft. LT of SR 823 CL | Date Drilled: 07/28/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
2.4' (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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢——⊣ LL Blows per foot - ○ 10 20 30 40
30	789.3						Soft to hard brownish gray SANDSTONE interbedded with SHALE; very fine to fine grained, highly weathered to decomposed, micaceous, argillaceous, medium bedded, broken.							
35.0	784.3						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-694 | Location: Sta. 750+13.1, 9.8 ft. LT of SR 823 CL | Date Drilled: 07/28/05 to 07/29/05

WATER OBSERVATIONS: Water seepage at: 2.5'-3.5'
Water level at completion: None (prior to coring)
6.8' (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
0	798.1													
0.5	797.6						Topsoil - 6"							
		3 8 9	3	1			Medium dense brown SANDY SILT (A-4a), trace clay; contains sandstone fragments; dry to damp.							
3.0	795.1													
		21 25 28	8	2		4.5+	Hard brown SANDY SILT (A-4a), little clay; contains sandstone fragments; dry to damp.							53 →
5														
		28 32 34	11	3		4.5+								66 →
		7 16 50/2	14	4		4.5+								
10.0	788.1						Soft to hard brown SANDSTONE interbedded with SHALE; very fine to fine grained, highly weathered to decomposed, argillaceous, micaceous, laminated to medium bedded, highly fractured to broken, iron staining.							50+
		Core 120"	Rec 101"	RQD 58%	R1		@ 10.8', 11.4', 11.6', 12.1', 14.8', 16.2', 16.8', 17.1', 17.7', 18.4', 18.6', 19.1', low angle fractures.							
15							@ 11.9'-12.0', high angle fracture.							
16.2	781.9						@ 13.7'-14.4', 15.6'-15.9', broken zones.							
							Hard gray SANDSTONE interbedded with SHALE; very fine to fine grained, moderately to highly weathered, argillaceous, thinly laminated to thinly bedded, moderately fractured.							
20														
							@ 20.6', 20.3', 22.3', 24.2', 24.4', low angle fractures.							
25		Core 120"	Rec 120"	RQD 98%	R2									
30														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-694 | Location: Sta. 750+13.1, 9.8 ft. LT of SR 823 CL | Date Drilled: 07/28/05 to 07/29/05

WATER OBSERVATIONS: Water seepage at: 2.5'-3.5'
Water level at completion: None (prior to coring)
6.8' (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
30	768.1	Core 60"	Rec 60"	RQD 93%	R3		Hard gray SANDSTONE interbedded with SHALE; very fine to fine grained, moderately to highly weathered, argillaceous, thinly laminated to thinly bedded, moderately fractured. @ 30.6', 31.3', 34.0', 34.3', 34.7', low angle fractures. @ 34.8'-35.0', broken zone.							
35.0	763.1						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-704 | Location: Sta. 760+36.1, 67.7 ft. RT of SR 823 CL | Date Drilled: 8/03/05

WATER OBSERVATIONS: Water seepage at: None
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
0	888.4												
0.5	887.9						Topsoil - 6" / 6" soil removed before drilling.						
		5 6 7	6	1			Stiff to very stiff brown SANDY SILT (A-4a), "and" gravel; damp.						
		7 12 15	16	2				41	13	–	6	40	
5		8 15 13	17	3									
8.5	879.9												
		7 35 23	7	4			Dense to very dense brown SANDY SILT (A-4a), some gravel, trace to little clay; damp.	25	11	–	10	44	10
10		7 23 25	14	5									
		50/4	1	6									
15.0	873.4												
		Core 60"	Rec 14"	RQD 0%	R1		Medium hard to hard gray SANDSTONE; fine grained, moderately to highly weathered, argillaceous, micaceous, thinly bedded to medium bedded, highly fractured to broken, 46" of core loss, decomposed rock.						
20		Core 60"	Rec 55"	RQD 83%	R2		@ 21.1', 21.5', 21.9', 23.1', 23.7', 24.0', low angle fractures. @ 21.6'-25.5', brown.						
25.0	863.4						Bottom of Boring - 25.0'						
30													

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

Non-Plastic
58 →
50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-707 | Location: Sta. 764+24.8, 214.5 ft. LT of SR 823 CL | Date Drilled: 8/04/05 to 8/05/05

WATER OBSERVATIONS: Water seepage at: None; 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
0	819.9												
0.5	819.4						Topsoil - 6" / 6" soil removed before drilling.						
		7 17 21	16	1		--	Very stiff to hard brown SILT (A-4b), some fine to coarse sand, little to some clay, trace gravel; contains shale fragments; damp.						
		10 22 25	17	2		4.5+							
5		5 12 14	14	3		3.75		5	13	--	9	53	20
8.5	811.4	3 7 9	18	4		4.5+	Very stiff to hard brown SANDY SILT (A-4a), some clay, trace to little gravel; contains shale fragments; damp.						
10		4 11 15	18	5		4.0							
		4 6 6	16	6		4.5+		10	19	--	9	40	22
15		4 5 8	18	7		3.75	@ 16.0'-17.5' little gravel						
		7 9 34	15	8			@ 18.5'-20.0', gray, contains shale fragments. @ 18.5'-20.0', gray.						
20													
21.0	798.9	43 50/3	7	9			Severely weathered brown SANDSTONE.						
23.5	796.4	30 50/4	10	10			Severely weathered gray SHALE.						
25.0	794.9	Core 60"	Rec 60"	RQD 65%	R1		Medium hard gray SANDSTONE interbedded with SHALE; very fine grained, slightly weathered, argillaceous, micaceous, thinly laminated to thinly bedded, moderately fractured. @ 25.2'-25.5', 29.8', high angle fractures. @ 25.5', 26.1', 28.2'-29.0', 29.3', low angle fractures.						
30.0	789.9						Bottom of Boring - 30.0'						

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

50+
50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-708 | Location: Sta. 764+30.1, 142.1 ft. LT of SR 823 CL | Date Drilled: 8/05/05

WATER OBSERVATIONS: Water seepage at: 11.5'-12.5', 19.0'
Water level at completion: None (prior to coring)
19.0' (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	811.8												
0.4	811.4						Topsoil - 5"						
		7 14 15	12	1			Dense to very dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; dry.						
		11 18 34	15	2				50	6	–	9	35	
5													
6.0	805.8	8 15 18	18	3		4.5+	Hard brown SILT AND CLAY (A-6a), some fine to coarse sand, trace gravel; dry.						
		4 7 15	16	4		4.5+							
10													
		5 10 14	17	5		4.5+	@ 11.0' contains rock fragments						
13.5	798.3	50/4	3	6			Severely weathered brown SANDSTONE.						
15.0	796.8	Core 60"	Rec 37"	RQD 20%	R1		Soft gray SHALE interbedded with few SANDSTONE layers; very fine grained, highly weathered, argillaceous, micaceous, thinly laminated to thinly bedded, moderately fractured. @ 15.0'-16.6', lost recovery. @ 16.6'-17.0', broken zone. @ 17.0, 17.2', 18.0', 18.6', low angle fractures.						
20.0	791.8						Bottom of Boring - 20.0'						
25													
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
52
50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-710 | Location: Sta. 764+11.9, 132.1 ft. RT of SR 823 CL | Date Drilled: 8/04/05

WATER OBSERVATIONS: Water seepage at: 20.0'-25.0'
Water level at completion: None (prior to coring)
21.5' (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, % / Blows per foot
0	878.2													
0.3	877.9						Topsoil - 4" / 1.0' soil removed before drilling.							
		2 9 16	14	1			Very stiff to hard brown SILT (A-4b), some fine to coarse sand, trace gravel, trace clay; damp.	6	13	--	11	56	14	Non-Plastic
		13 50/5	9	2				7	13	--	12	58	10	Non-Plastic 50+
5		7 50/5	7	3			@ 6.0'-7.0', brown and gray.							50+
		40 50/3	5	4										50+
10.0	868.2						Medium hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, medium bedded to thickly bedded, highly fractured, iron staining in fractured zones.							
15		Core 120"	Rec 60"	RQD 3%	R1									
20														
23.0	855.2	Core 60"	Rec 48"	RQD 40%	R2		Soft to medium hard gray SHALE; very fine grained, decomposed, arenaceous, micaceous, thickly bedded, highly fractured to broken, loss of recovery.							
25.0	853.2						Bottom of Boring - 25.0'							
30														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-711 | Location: Sta. 768+10.3, 251.7 ft. LT of SR 823 CL | Date Drilled: 8/08/05

WATER OBSERVATIONS: Water seepage at: Not Reported
Water level at completion: None (prior to coring)
17.0' (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	STANDARD PENETRATION (N)
0	799.9													
0.3	799.6						Topsoil - 3"							
		4 4 5	16	1		4.5+	Hard brown SILT AND CLAY (A-6a), trace fine sand, trace gravel; dry.							
3.5	796.4	5 5 7	16	2		4.5+	Hard brown SILTY CLAY (A-6b), trace fine sand; dry.							
5		3 8 7	18	3		4.5+	@ 6.0, dry to damp.							
8.5	791.4	30 42 50/5	12	4			Hard brown SILT AND CLAY (A-6a), trace fine sand; contains shale fragments; dry.							
10		23 50/4	10	5		4.5+								
		18 50/5	10	6		4.5+	@ 13.5'-15.0', contains sandstone fragments.							
15		13 50/4	10	7		4.5+								
		25 32 29	16	8		4.5+								
20.0	779.9	Core 60"	Rec 30"	RQD 0%	R1		Medium hard brownish gray SANDSTONE; fine grained, highly weathered to decomposed, argillaceous, micaceous, thickly bedded, broken. @ 20.0'-22.5', lost recovery. @ 22.5'-25.0', high and low angle fractures.							
25.0	774.9						Bottom of Boring - 25.0'							
30														

GRADATION

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
50+
50+
50+
50+
61

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-712 | Location: Sta. 768+23.9, 132.1 ft. LT of SR 823 CL | Date Drilled: 8/08/05

WATER OBSERVATIONS: Water seepage at: Not Reported
Water level at completion: None (prior to coring)
None (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	STANDARD PENETRATION (N)
0	820.1													
0.3	819.8	4 8 11	16	1		4.5+	Topsoil - 3" / 6" soil removed before drilling. Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; dry.							
3.5	816.6	7 12 12	18	2		4.5+	Hard brown SILTY CLAY (A-6b), trace fine to coarse sand; dry to damp.							
5		5 5 7	18	3		4.5+								
8.5	811.6	5 9 18	17	4		4.5+	Hard brown SILT AND CLAY (A-6a), trace to little fine to coarse sand, trace gravel; dry.							
10		10 15 36	15	5		4.5+								
13.5	806.6	50/5	4	6			Severely weathered brown SANDSTONE argillaceous.							
15		50/4	3	7										
		50/5	3	8										
20.0	800.1						Medium hard gray SANDSTONE; very fine grained, highly weathered, argillaceous, micaceous, very thinly bedded, highly fractured to broken.							
22.5	797.6	Core 60"	Rec 60"	RQD 53%	R1		@ 20.3'-20.6', 20.9'-21.0', 22.9'-23.2', high angle fracture, iron stained. @ 22.0', 22.6', 23.1', 24.2', low angle fracture, iron stained.							
25.0	795.1						Medium hard gray SHALE; highly weathered, arenaceous, thinly laminated to laminated.							
30							Bottom of Boring - 25.0'							

GRADATION

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
51
50+
50+
50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-715 | Location: Sta. 772+13.7, 154.9 ft. LT of SR 823 CL | Date Drilled: 8/09/05 to 8/10/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: / DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	852.8						WATER OBSERVATIONS: Water seepage at: 32.5'; Water level at completion: 22.5' (prior to coring); 30.0' (after coring - no water added)						
0.4	852.4	3 4 3	7	1			Topsoil - 5" Loose brown SANDY SILT (A-4a), some to "and" gravel; damp.	35	6	--	9	50	
3.5	849.3	4 6 7	12	2		4.5+	Very stiff to hard brown SANDY SILT (A-4a), some clay, little gravel; damp.	17	6	--	18	38	21
5		4 6 6	14	3		3.0							
8.5	844.3	4 9 9	18	4		4.5	Very stiff to hard brown and gray SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.	1	10	--	7	46	36
10		6 16 24	17	5		4.5+							
15		6 14 17	18	6		4.5+							
		11 16 24	14	7		4.5+	@ 16.0'-17.5', contains shale fragments.						
		18 22 29	14	8		4.5+							
20		15 19 26	17	9		4.5+							
		5 7 12	18	10		3.0	@ 23.5' to 25.0', damp to moist.						
25													
26.0	826.8	23 50/5	10	11			Severely weathered dark gray SHALE.						
		36 50/3	9	12									
30													

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

Non-Plastic
51
50+
50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-715 | Location: Sta. 772+13.7, 154.9 ft. LT of SR 823 CL | Date Drilled: 8/09/05 to 8/10/05

WATER OBSERVATIONS: Water seepage at: 32.5'
Water level at completion: 22.5' (prior to coring)
30.0' (after coring - no water added)

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
30.0	822.8						Medium hard gray SHALE; very fine grained, highly weathered, arenaceous, thinly laminated to laminated, highly fractured to broken, contains few arenaceous layers.							
35		Core 120"	Rec 75"	RQD 27%	R1									
40.0	812.8						Bottom of Boring - 40.0'							
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-717 | Location: Sta. 772+30.5, 139.0 ft. RT of SR 823 CL | Date Drilled: 8/09/05

WATER OBSERVATIONS: Water seepage at: Not Reported
Water level at completion: None (prior to coring)
None (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Sample No.	Blows per 6"	Recovery (in)	Drive	Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
0	828.7														
0.5	828.2		4 8 8	18	1			Topsoil - 6" / 1.0' soil removed before drilling. Medium dense brown GRAVEL WITH SAND AND SILT (A-2-4), some silty clay; damp.	49	11	--	9	32		Non-Plastic
2.5	826.2		9 11 10	13	2			Medium dense brown SANDY SILT (A-4a), little clay, little gravel; damp.	17	13	--	19	34	17	Non-Plastic
5			6 13 15	16	3										
8.5	820.2		17 14 15	2	4			Medium dense brown GRAVEL (A-1-a), trace fine to coarse sand, trace silty clay; damp.	95	1	--	1	3		Non-Plastic
10															
11.0	817.7		4 5 16	18	5			Medium dense to dense brown SANDY SILT (A-4a), some gravel, little clay; damp.	27	6	--	28	28	11	Non-Plastic
15			10 17 30	18	6										
16.0	812.7		20 50/3	7	7			Severely weathered gray SHALE.							50+
			50/5	0	8										50+
19.5	809.2														
20			Core 66"	Rec 66"	RQD 56%	R1	*202	Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, thickly bedded, moderately fractured, contains moderate to abundant argillaceous laminations.							
25.0	803.7							Bottom of Boring - 25.0'							
30															

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-719 | Location: Sta. 774+29.0, 24.4 ft. RT of SR 823 CL | Date Drilled: 8/10/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
None (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)
0	899.6													Natural Moisture Content, % - ● PL — LL; Blows per foot - ○ 10 20 30 40
0.4	899.2						Topsoil - 5" / 1.0' soil removed before drilling.							
		4 5 25	13	1			Medium dense to dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; damp.	55	6	–	5	26	8	● Non-Plastic
3.0	896.6													
		6 50/5	10	2			Very dense brown SANDY SILT (A-4a), "and" gravel, trace clay; damp.	46	2	–	11	36	5	● Non-Plastic 50+
5														
8.0	891.6													
10		Core 120"	Rec 51"	RQD 8%	R1	*102	Medium hard to hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, thickly bedded, slightly fractured. @ 8.0'-9.5', 16.1'-18.0', loss of recovery most likely in iron stained sections (Loss of recovery due to weak cementation and blow-out of boring hole by the air compressor).							
15														
20		Core 84"	Rec 80"	RQD 67%	R2	*188	@ 18.0'-19.3, 21.3'-22.0', iron stained. @ 22.4'-22.6', shale bed.							
25.0	874.6						Bottom of Boring - 25.0'							
30														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-736 | Location: Sta. 790+93.9, 56.6 ft. LT of SR 823 CL | Date Drilled: 08/05/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
5.1' (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
0.2	902.0 / 901.8						Topsoil - 2"						
		3 5 6	4	1			Medium dense to dense brown SANDY SILT (A-4a), some gravel, trace clay; contains sandstone fragments; dry to damp.						
		9 8 5	12	2				23	21	--	10	39	7
5		14 22 23	18	3									
		3 4 6	9	4									
10		6 7 8	12	5									
		13 15 22	18	6									
15		27 34 40	18	7									
18.0	884.0	50/1	1	8			Severely weathered brown SANDSTONE, argillaceous, micaceous.						
20		50/5	4	9									
		50/3	2	10									
25		50/1	0	11									
28.0	874.0						Medium hard gray SANDSTONE; fine grained, highly weathered, argillaceous, micaceous.						
30													

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

Non-Plastic
74
50+
50+
50+
50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-736 | Location: Sta. 790+93.9, 56.6 ft. LT of SR 823 CL | Date Drilled: 08/05/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
5.1' (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
30	872.0	Core 72"	Rec 72"	RQD 21%	R1	*479	Medium hard gray SANDSTONE; fine grained, highly weathered, argillaceous, micaceous, thinly laminated to laminated, highly fractured to broken, contains few argillaceous laminations. @ 28.3'-28.9', 29.3'-29.5', 30.1'-31.0', 31.6'-31.9', 32.6'-32.8', iron stained layers. @ 28.0'-28.3', 31.6'-31.7', 32.5'-32.7', broken. @ 28.5'-29.3', calcareous layer. @ 33.2'-32.7', iron stained vertical fracture. @ 33.2', pyritic.						
35		Core 60"	Rec 60"	RQD 82%	R2	*281							
39.0	863.0						Bottom of Boring - 39.0'						
40													
45													
50													
55													
60													

GRADATION

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

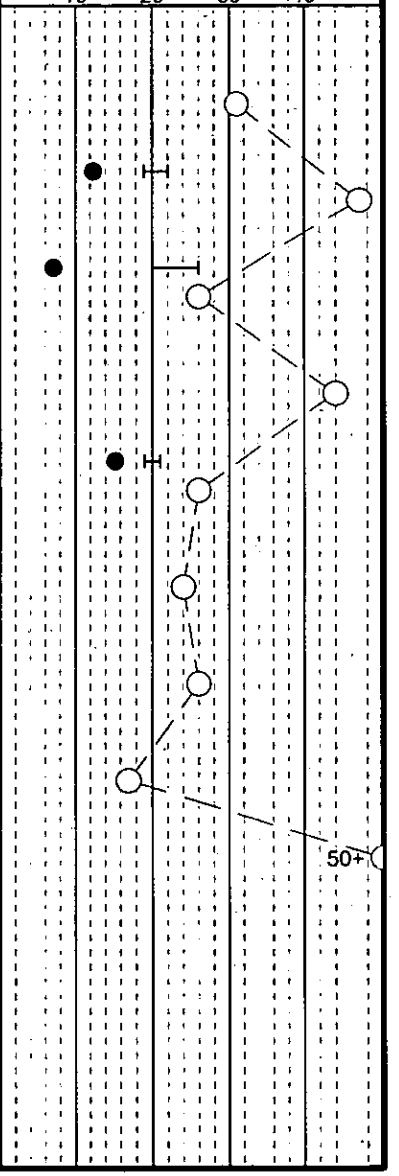
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-737 | Location: Sta. 791+23.8, 32.3 ft. RT of SR 823 CL | Date Drilled: 08/04/05

WATER OBSERVATIONS: Water seepage at: 18.5'-20.0', 21.0'-22.0'
Water level at completion: None (prior to coring)
8.0' (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	862.4												
0.2	862.2						Topsoil - 2"						
		7 15 16	12	1			Dense brown SANDY SILT (A-4a), little gravel, little clay; contains sandstone fragments; damp. @ 1.0'-2.5', contains organic material.						
		6 23 24	18	2				18	17	--	11	41	13
5													
5.5	856.9						Very stiff brown and gray SANDY SILT (A-4a), little clay, trace gravel; contains sandstone fragments; damp.						
		8 14 12	18	3		3.5		8	21	--	14	42	15
		16 19 25	18	4		--							
10													
10.5	851.9						Very stiff to hard brown and gray SILT (A-4b), some fine to coarse sand, little clay, trace gravel; contains sandstone fragments; damp.						
		10 10 16	15	5		4.0		3	12	--	12	58	15
13.0	849.4						Very stiff to hard brown and gray SANDY SILT (A-4a), little clay, trace gravel; contains sandstone fragments; damp.						
		9 9 15	15	6		--							
15													
		11 10 16	16	7		4.0							
							@ 18.5', gray.						
		7 7 10	10	8		--							
20													
		4 50/6	7	9		--							
23.0	839.4						Hard to very hard tan SANDSTONE; fine to medium grained, moderately weathered, micaceous, medium bedded to thickly bedded, highly fractured to broken, iron stained. @ 23.7'-23.8', 24.2'-24.3', iron stained high angle fracture.						
24.5	837.9						Very soft to soft brown SHALE; very fine grained, highly weathered to decomposed, micaceous, laminated to thinly bedded, highly fractured to broken. @ 28.0'-29.5', loss of recovery.						
25		Core 78"	Rec 45"	RQD 10%	R1	*177							
30													

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



FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-737 | Location: Sta. 791+23.8, 32.3 ft. RT of SR 823 CL | Date Drilled: 08/04/05

WATER OBSERVATIONS: Water seepage at: 18.5'-20.0', 21.0'-22.0'
Water level at completion: None (prior to coring)
8.0' (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
30.0	832.4	Core 72"	Rec 31"	RQD 6%	R2		Soft gray to medium hard, SANDSTONE interbedded with SHALE; very fine grained, highly weathered to decomposed, argillaceous, micaceous, laminated to medium bedded, highly fractured. @ 34.5-35.0, core loss.							
35		Core 60"	Rec 60"	RQD 75%	R3									
40														
40.5	821.9						Bottom of Boring - 40.5'							
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-739 | Location: Sta. 795+23.6, 134.7 ft. LT of SR 823 CL | Date Drilled: 08/08/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
4.9' (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
0.2	838.3 / 838.1						Topsoil - 2"							
		11 15 17	8	1			Dense to very dense brown SANDY SILT (A-4a), trace gravel, trace clay; damp.							
		33 36 50/4	1	2										50+
5.0	833.3						Severely weathered brown SANDSTONE. @ 5.0', possible boulder. @ 6.3'-13.6' lost recovery.							
10		Core 120"	Rec 30"	RQD 0%	R1									
15.0	823.3						Very soft to soft brown SHALE; very fine grained, decomposed, moderately fractured.							
20.3	818.0	Core 120"	Rec 81"	RQD 68%	R2		Soft to medium hard gray SHALE; very fine grained, highly weathered to decomposed, micaceous, thickly bedded, highly fractured to broken, iron stained in some areas.							
25														
30		Core 120"	Rec 120"	RQD 92%	R3									

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-739 | Location: Sta. 795+23.6, 134.7 ft. LT of SR 823 CL | Date Drilled: 08/08/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
4.9' (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
30	808.3						Soft gray SHALE; very fine grained, highly weathered to decomposed, micaceous, thickly bedded, highly fractured to broken, iron stained in some areas.							
35.0	803.3						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-741 | Location: Sta. 794+96.9, 133.0 ft. RT of SR 823 CL | Date Drilled: 08/05/05 to 08/08/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
5.4' (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	STANDARD PENETRATION (N)
0	805.7													Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0.2	805.5						Topsoil - 2"							
		7 5 3	11	1			FILL: Loose gray SILT (A-4b), some clay, some fine to coarse sand, trace gravel; damp.	6	14	--	7	50	23	Non-Plastic
2.5	803.2						Hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp.							
		11 15 17	10	2		--								
5														
		15 17 24	10	3		--								
		25 50/4	10	4		4.5+		0	4	--	5	60	31	50+
10.0	795.7						Medium hard brown SHALE; very fine grained, decomposed, argillaceous, thinly bedded, broken. @ 10.6'-10.8', 11.1', 13.6', 14.1', 15.3', 15.7', 18.2', 19.2', low angle fractures. @ 13.6'-13.9', 14.25'-14.5', high angle fractures. @ 14.5'-14.8', 19.5'-19.9', broken zone, low angle fractures. @ 16.2'-16.8', lost recovery.							
15		Core 120"	Rec 110"	RQD 71%	R1									
20.0	785.7						Medium hard grayish brown SHALE; very fine grained, highly weathered to decomposed, argillaceous, thinly laminated to thinly bedded, moderately to highly fractured, iron staining; contains few to moderate argillaceous laminations. @ 20.1'-20.2', 20.83'-20.5', 20.7'-21.6', 21.9'-22.1', 22.2'-22.3', high angle fractures. @ 20.3', 21.9', 22.3', 22.9', 25.5', 28.4', low angle fractures. @ 21.3'-21.6', broken zones. @ 27.3'-27.5', high angle fracture evident.							
25		Core 120"	Rec 120"	RQD 76%	R2									
30														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-741 | Location: Sta. 794+96.9, 133.0 ft. RT of SR 823 CL | Date Drilled: 08/05/05 to 08/08/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
5.4' (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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
30	775.7	Core 60"	Rec 60"	RQD 100%	R3		Medium hard grayish brown SHALE; very fine grained, highly weathered to decomposed, argillaceous, thinly laminated to thinly bedded, moderately to highly fractured, iron staining; contains few to moderate argillaceous laminations. @ 30.6', 21.2', 21.6', 33.2', low angle fracures.							
35.0	770.7						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-742 | Location: Sta. 795+06.9, 214.2 ft. RT of SR 823 CL | Date Drilled: 08/04/05 to 08/05/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
6.5' (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	806.7												
0.4	806.3						Topsoil - 5"						
		9 9 8	10	1		–	Very stiff to hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp.						
		3 5 5	9	2		3.25							
5		6 9 10	9	3		4.5+							
		9 12 15	10	4		4.5+							
10		12 15 18	8	5		–							
		8 35 50/4	16	6		–							
15.0	791.7						Stiff gray SILTY CLAY (A-6b), little fine to coarse sand; damp. @ 15.0', possible boulder. @ 17.5'-22.5', lost recovery.						
20		Core 120"	Rec 56"	RQD 22%	R1								
22.5	784.2						Very soft gray SHALE; very fine grained, decomposed, micaceous, medium bedded, broken.						
25							@ 26.0', lost recovery. @ 27.6'-28.1', sandstone bed.						
27.5	779.2						Soft gray SHALE; very fine grained, highly weathered to decomposed, arenaceous, micaceous, medium bedded, highly fractured to broken.						
30		Core 120"	Rec 103"	RQD 74%	R2								

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-742 | Location: Sta. 795+06.9, 214.2 ft. RT of SR 823 CL | Date Drilled: 08/04/05 to 08/05/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
6.5' (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
30	776.7						Soft gray SHALE; very fine grained, highly weathered to decomposed, arenaceous, micaceous, medium bedded, highly fractured to broken.							
35.0	771.7						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

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

LOG OF: Boring R-743 | Location: Sta. 799+00.0, 29.3 ft. RT of SR 823 CL | Date Drilled: 08/08/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
17.2' (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	STANDARD PENETRATION (N)
0	904.5													
0.3	904.2						Topsoil - 4" / 6.0' soil removed before drilling.							
		50/5	4	1			Very dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; damp.	47	12	–	7	27	7	Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ (10 20 30 40); 50+; Non-Plastic
2.5	902.0						Severely weathered brown SANDSTONE argillaceous.							
		50/0	0	2										50+
4.7	899.8						Medium hard gray SANDSTONE; fine grained, moderately weathered, micaceous, argillaceous, medium bedded, moderately fractured. @ 4.9'-5.1', 7.0'-7.1', iron stained. @ 5.4', 6.9', 7.8', iron stained low angle fractures.							
7.8	896.7	Core 112"	Rec 112"	RQD 80%	R1		Medium hard brown SANDSTONE; fine grained, highly weathered, argillaceous, micaceous, thickly bedded, slightly to moderately fractured. @ 8.7'-9.0', 10.3'-10.4', iron stained high angle fracture. @ 9.9'-10.1', 7.8'-8.7', broken zones. @ 10.9', iron stained low angle fracture.							
14.0	890.5	Core 72"	Rec 64"	RQD 82%	R2		Medium hard brown SANDSTONE; fine grained, highly weathered, argillaceous, micaceous, thickly bedded, slightly to moderately fractured. @ 14.0'-14.8', 19.3'-20.0', hard gray sandstone, fine grained interbedded with siltstone (turbidites). @ 15.5'-15.7', 17.2'-17.4', high angle fractures. @ 15.9', 19.3', iron stained low angle fractures. @ 19.6'-20.0', pitted, highly weathered.							
20.0	884.5						Bottom of Boring - 20.0'							

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

LOG OF: Boring R-751 | Location: Sta. 810+06.9, 67.9 ft. LT of SR 823 CL | Date Drilled: 08/10/05

WATER OBSERVATIONS: Water seepage at: 21.0' - 22.5'
Water level at completion: None (prior to coring)
5.2' (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	STANDARD PENETRATION (N)
0	860.9													
0.3	860.6						Topsoil - 3"							
		8 13 12	9	1		--	Very stiff to hard brown SILT AND CLAY (A-6a), trace to little gravel, trace to little fine to coarse sand; damp.	12	4	--	5	79		
		14 19 28	18	2		4.5+		3	6	--	7	60	24	
5														
5.5	855.4													
		28 50/6	11	3		1.75	Stiff brown SILT (A-4b), some fine to coarse sand, little gravel, little clay; damp.	12	12	--	10	50	16	50+
8.0	852.9													
		19 37 30	18	4		4.25	Very stiff to hard brown SILT AND CLAY (A-6a), little to some fine to coarse sand, trace gravel; damp.							
10														67
		13 18 25	18	5		2.75		5	10	--	18	46	21	
		17 17 13	16	6		3.0								
15														
		17 25 32	18	7		4.0								57
		13 23 28	18	8		4.25								
20														51
		7 6 8	18	9		0.5		4	10	--	8	57	21	
		8 10 16	17	10		3.5		4	11	--	5	47	33	
25														
26.0	834.9													
		8 18 40	18	11		--	Dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; contains sandstone fragments; dry.							58
28.0	832.9						Severely weathered gray SHALE, arenaceous.							
		23 50/3	9	12										50+
30														

Natural Moisture Content, % - ●
PL ⊢ LL
Blows per foot - ○
10 20 30 40

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

LOG OF: Boring R-751 | Location: Sta. 810+06.9, 67.9 ft. LT of SR 823 CL | Date Drilled: 08/10/05

WATER OBSERVATIONS: Water seepage at: 21.0' - 22.5'
Water level at completion: None (prior to coring)
5.2' (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)
30	830.9	50/2	2	13			Severely weathered gray SHALE, arenaceous.							50+
34.5	826.4	Core 51"	Rec 51"	RQD 100%	R1		Medium hard gray SANDSTONE interbedded with SHALE; very fine to fine grained, highly weathered, argillaceous, micaceous, thinly laminated to thinly bedded, slightly fractured.							
39.5	821.4	Core 9"	Rec 9"	RQD 100%	R2		Bottom of Boring - 39.5'							

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-752 | Location: Sta. 809+91.2, 16.0 ft. RT of SR 823 CL | Date Drilled: 08/11/05 to 08/15/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
13.8' (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)
0	855.2													Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0.3	854.9						Topsoil - 4"							
		9 13 21	18	1			Dense to very dense brown SANDY SILT (A-4a), little clay, little gravel; contains sandstone fragments; damp.	17	15	--	8	41	19	
		13 25 26	18	2										51 →
5		25 27 32	18	3										59 →
8.0	847.2													
		10 15 18	14	4		4.5+	Hard brown and gray SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; contains shale fragments; damp.	10	11	--	5	42	32	
10		15 25 32	18	5		--								57 →
13.0	842.2						Severely weathered gray SHALE.							
		35 38 43	15	6										81 →
15		38 50/5	9	7										50+
		46 50/4	10	8										50+
20		18 50/4	3	9										50+
		50/3	3	10										50+
24.0	831.2						Medium hard gray SHALE; highly weathered, laminated, moderately fractured to broken. @ 24.0'-24.8', broken. @ 24.9', 25.2'-25.6', 26.3', 26.9', 27.3', 28.0', low angle fractures.							
25		Core 60"	Rec 60"	RQD 68%	R1									
29.0	826.2						Bottom of Boring - 29.0'							
30														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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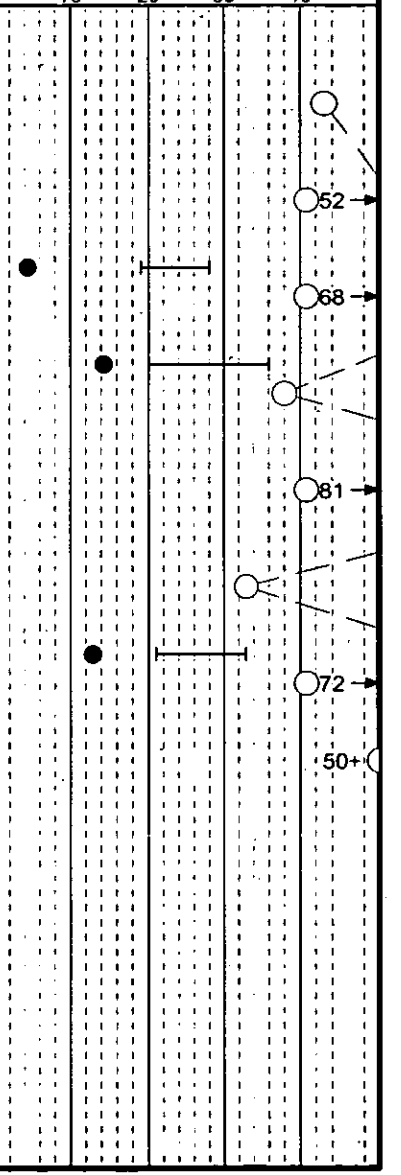
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-754 | Location: Sta. 810+31.1, 111.7 ft. RT of SR 823 CL | Date Drilled: 08/10/05 to 08/11/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
7.6' (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
0.2	838.6						Topsoil - 2"						
		21 21 22	12	1			Dense to very dense brown SANDY SILT (A-4a), some clay, trace gravel; contains sandstone fragments; damp.						
		20 22 30	11	2									
5		20 33 35	18	3				9	13	--	8	47	23
8.0	830.8												
		12 13 25	14	4		4.5+	Hard brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp.	4	10	--	6	46	34
10		33 39 42	18	5		4.5+							
		8 16 17	9	6		4.5+							
15													
15.5	823.3												
		15 32 40	18	7		4.5+	Hard brownish gray SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; contains shale fragments; damp.	5	12	--	6	44	33
		48 50/1	7	8		4.5+							
20.0	818.8						Medium hard to hard gray SHALE; very fine grained, highly weathered, micaceous, arenaceous, laminated to very thinly bedded, moderately fractured.						
25		Core 120"	Rec 120"	RQD 95%	R1								
30													

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



FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-754 | Location: Sta. 810+31.1, 111.7 ft. RT of SR 823 CL | Date Drilled: 08/10/05 to 08/11/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
7.6' (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
30	808.8						Medium hard to hard gray SHALE; very fine grained, highly weathered, micaceous, arenaceous, laminated to very thinly bedded, moderately fractured.							
35		Core 120"	Rec 120"	RQD 98%	R2									
40.0	798.8						Bottom of Boring - 40.0'							
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-755 | Location: Sta. 814+47.4, 231.2 ft. LT of SR 823 CL | Date Drilled: 08/11/05

WATER OBSERVATIONS: Water seepage at: Not reported
Water level at completion: None (prior to coring)
6.2' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Sample No.	Blows per 6"	Recovery (in)	Drive	Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	811.1													
0.3	810.8							Topsoil - 3"						
			11 29 41	12	1			Dense to very dense brown SANDY SILT (A-4a), little to some clay, trace to little gravel; damp.	19	13	--	6	45	17
			11 19 25	14	2				7	17	--	8	48	20
5			11 14 22	18	3									
8.0	803.1													
			10 13 19	14	4		--	Hard gray SILTY CLAY (A-6b), little fine to coarse sand; damp.	0	13	--	7	43	37
10														
10.5	800.6							Very stiff gray SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.	4	10	--	6	48	32
			5 7 19	18	5		--							
13.0	798.1							Severely weathered brown SHALE, arenaceous.						
			26 50/3	6	6									
15														
			50/6	5	7			@ 16.0', Gray.						
			50/4	4	8									
20														
21.5	789.6		50/5	5	9									
			Core 90"	Rec 90"	RQD 88%	R1		Very soft to soft gray SHALE; very fine to fine grained, moderately to highly weathered, micaceous, pyritic, thickly bedded, highly fractured to broken, contains sandstone bands, fissile.						
25														
30														

GRADATION

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
70
50+
50+
50+
50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-755 | Location: Sta. 814+47.4, 231.2 ft. LT of SR 823 CL | Date Drilled: 08/11/05

WATER OBSERVATIONS: Water seepage at: Not reported
Water level at completion: None (prior to coring)
6.2' (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
30	781.1	Core 72"	Rec 72".	RQD 82%	R2		Very soft to soft gray SHALE; very fine to fine grained, moderately to highly weathered, micaceous, pyritic, thickly bedded, highly fractured to broken, contains sandstone bands, fissile.							
35.0	776.1						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

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

LOG OF: Boring R-756 | Location: Sta. 814+44.1, 3.9 ft. LT of SR 823 CL | Date Drilled: 8/10/05

WATER OBSERVATIONS: Water seepage at: Not reported
Water level at completion: None (prior to coring)
None (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)
0	744.2													Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0.3	743.9						Topsoil - 4"							
		6 8 6	6	1			Medium dense brown SANDY SILT (A-4a), some gravel, little clay; damp.	23	15	–	9	36	17	
3.0	741.2													
		7 6 6	10	2		4.5	Hard brown and gray SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp.	2	13	–	7	39	39	
5														
5.5	738.7						Severely weathered brownish gray SHALE.							
		12 44 50/4	11	3										50+
		12 50/5	11	4										50+
10														
		28 50/2	9	5										50+
		5 50/4	10	6			@ 13.0', gray.							50+
15.0	729.2						Soft to medium hard gray SHALE; very fine grained, highly weathered to decomposed, micaceous, thinly bedded to medium bedded, highly fractured, contains moderate argillaceous and arenaceous laminations.							
		Core 60"	Rec 60"	RQD 42%	R1									
20		Core 60"	Rec 58"	RQD 70%	R2									
25		Core 60"	Rec 58"	RQD 65%	R3									
30														

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

LOG OF: Boring R-756 | Location: Sta. 814+44.1, 3.9 ft. LT of SR 823 CL | Date Drilled: 8/10/05

WATER OBSERVATIONS: Water seepage at: Not reported
Water level at completion: None (prior to coring)
None (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)
30	714.2													Natural Moisture Content, % - ● PL — LL; Blows per foot - ○ 10 20 30 40
32.3	711.9	Core 60"	Rec 60"	RQD 97%	R4		Soft to medium hard gray SHALE; very fine grained, highly weathered to decomposed, micaceous, thinly bedded to medium bedded, highly fractured, contains moderate argillaceous and arenaceous laminations.							
35.0	709.2						Medium hard gray SANDSTONE; very fine grained, moderately weathered, argillaceous, micaceous, medium bedded to thickly bedded, slightly fractured, moderate argillaceous laminations.							
							Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-757 | Location: Sta. 814+37.2, 273.1 ft. RT of SR 823 CL | Date Drilled: 8/11/05

WATER OBSERVATIONS: Water seepage at: None; 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
0	793.9												
0.5	793.4						Topsoil - 6" / 1.0' soil removed before drilling.						
		6 5 5	14	1		--	Stiff to very stiff brown SANDY SILT (A-4a), some clay; damp. @ 0.5'-2.0', Contains organic material.	0	8	--	6	52	34
		6 10 10	15	2		--		0	12	--	8	51	29
5		7 7 7	16	3		--							
		7 9 10	18	4		--							
10													
10.5	783.4	6 18 27	16	5		4.5+	Hard brown and gray SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; contains shale fragments; damp.	5	5	--	4	53	33
		22 44 50/3	15	6		4.5+							
15		50/5	3	7		4.5+							
17.0	776.9						Severely weathered gray SHALE, arenaceous.						
		23 50/4	4	8									
20		21 50/3	2	9									
		60 50/3	7	10									
25		50/4	3	11									
		50/5	0	12									
30													

GRADATION

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-757 | Location: Sta. 814+37.2, 273.1 ft. RT of SR 823 CL | Date Drilled: 8/11/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None; Water level at completion: None — 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
	763.9													
30.0	763.9	Core 60"	Rec 49"	RQD 13%	R1		Soft gray SHALE; very fine grained, highly weathered to decomposed, argillaceous, laminated, highly fractured to broken. @ 31.4', 32.7', 33.6', 33.9', 34.2', 34.5', low angle fractures. @ 31.5'-31.9', broken layer. @ 33.2'-33.4', high angle fractures.							
35.0	758.9						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-758 | Location: Sta. 818+22.0, 301.5 ft. LT of SR 823 CL | Date Drilled: 8/10/05

WATER OBSERVATIONS: Water seepage at: Not reported
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	728.4												
0.3	728.1	4 6 4	10	1		4.5+	Topsoil - 4" Hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp.	2	9	–	4	46	39
5		3 5 7	10	2		4.5+							
5.5	722.9	12 30 36	11	3			Severely weathered gray SHALE.						
10		8 32 45	12	4									
		41 50/2	8	5									
		50/4	4	6									
15.0	713.4						Soft to medium hard gray SHALE interbedded with SANDSTONE; very fine grained, highly weathered to decomposed, micaceous, thinly bedded to medium bedded, moderately to highly fractured, abundant argillaceous laminae. @ 15.9', 18.1', 18.9', 20.5', low angle fractures. @ 16.4'-16.6', 22.2'-22.5', broken zones.						
20		Core 120"	Rec 120"	RQD 65%	R1								
25		Core 60"	Rec 60"	RQD 38%	R2								
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
66
77
50+
50+

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-758 | Location: Sta. 818+22.0, 301.5 ft. LT of SR 823 CL | Date Drilled: 8/10/05

WATER OBSERVATIONS: Water seepage at: Not reported
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	STANDARD PENETRATION (N)
30	698.4	Core 60"	Rec 54"	RQD 57%	R3		Soft to medium hard gray SHALE interbedded with SANDSTONE; very fine grained, highly weathered to decomposed, micaceous, thinly bedded to medium bedded, moderately fractured.							
35.0	693.4						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

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

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-759 | Location: Sta. 817+79.6, 176.0 ft. LT of SR 823 CL | Date Drilled: 8/11/05

WATER OBSERVATIONS: Water seepage at: Not reported; 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	STANDARD PENETRATION (N)
0	730.0													Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ (10 20 30 40)
0.3	729.7						Topsoil - 4"							
		12 13 11	7	1			Medium dense brown SILT (A-4b), some clay, little fine to coarse sand, trace gravel; damp.	2	4	--	12	55	27	
3.0	727.0													
		4 6 7	10	2		4.5+	Hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp.	1	4	--	6	51	38	
5														
5.5	724.5													
		12 50/5	11	3			Severely weathered brownish gray SHALE, arenaceous.							50+
		17 50/5	9	4										
10														50+
		27 50/2	8	5			@ 11.0', gray.							50+
15.0	715.0													
		Core 60"	Rec 60"	RQD 53%	R1		Soft gray SHALE interbedded with SILTSTONE; very fine grained, highly weathered, micaceous, thinly bedded to medium bedded, moderately fractured, abundant siltstone laminae.							
20		Core 60"	Rec 60"	RQD 47%	R2									
25.0	705.0													
		Core 60"	Rec 60"	RQD 87%	R3	*91	Medium hard gray SANDSTONE; very fine grained, highly weathered to decomposed, micaceous, argillaceous, thinly bedded to thickly bedded, slightly fractured, few siltstone laminae; few shale laminae. @ 28.1', 29.7', iron stained low angle fractures.							
30														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-759 | Location: Sta. 817+79.6, 176.0 ft. LT of SR 823 CL | Date Drilled: 8/11/05

WATER OBSERVATIONS: Water seepage at: Not reported
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
30	700.0	Core 60"	Rec. 56"	RQD 77%	R4	*91	Medium hard gray SANDSTONE; very fine grained, highly weathered to decomposed, micaceous, argillaceous, thinly bedded to thickly bedded, slightly fractured, few siltstone laminae; few shale laminae. @ 34.0', iron stained low angle fractures. @ 34.6'-35.0', lost recovery.						
35.0	695.0						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 [11/13/2007 9:13 PM]

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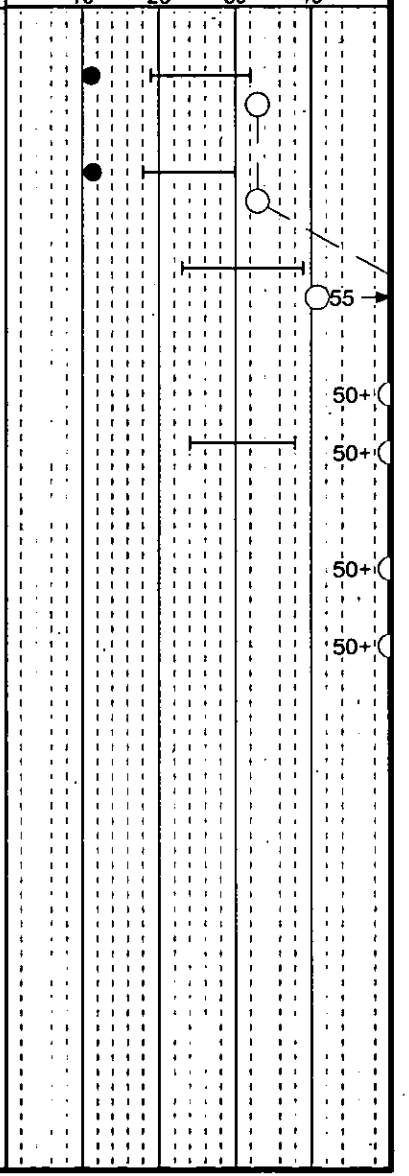
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-760 | Location: Sta. 818+10.1, 0.6 ft. RT of SR 823 CL | Date Drilled: 08/11/05 to 08/12/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
3.1' (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	766.1												
0.3	765.8						Topsoil - 3" / 1.0' soil removed before drilling.						
		5 14 19	12	1		--	Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.	3	12	--	6	44	36
		10 14 19	16	2		--		0	7	--	5	48	40
5													
5.5	760.6						Hard brown SILTY CLAY (A-6b), trace to little fine to coarse sand, trace gravel; contains sandstone fragments; damp.						
		17 25 30	18	3		4.5+		0	7	--	3	47	43
		19 39 50/3	12	4		--							
10													
		50/6	6	5		--		4	12	--	6	47	31
12.5	753.6						Severely weathered brown SANDSTONE, argillaceous.						
		39 50/6	10	6									
15													
		50/5	5	7			@ 16.0', gray.						
17.0	749.1						Medium hard to hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, thickly bedded, moderately fractured, contains moderate argillaceous laminations.						
20		Core 96"	Rec 96"	RQD 45%	R1	*122	@ 17.0'-17.5', 18.3'-18.4', 19.3'-19.5', 20.5'-20.7', 21.4'-21.8', iron stained siltstone interbedded layers.						
25							@ 25.0'-25.6', high angle fracture.						
26.4	739.7						Medium hard gray SHALE; very fine grained, highly weathered to decomposed, micaceous, thinly laminated, moderately fractured, contains moderate argillaceous laminations.						
30		Core 120"	Rec 120"	RQD 79%	R2								

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



FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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

LOG OF: Boring R-760 | Location: Sta. 818+10.1, 0.6 ft. RT of SR 823 CL | Date Drilled: 08/11/05 to 08/12/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
3.1' (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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
30	736.1					*127	Medium hard gray SHALE; very fine grained, highly weathered to decomposed, micaceous, thinly laminated, moderately fractured, contains moderate argillaceous laminations. @ 27.6'-27.9', 28.3'-28.5', sandstone beds.							
35.0	731.1						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:13 PM]

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-761 | Location: Sta. 822+16.3, 271.6 ft. LT of SR 823 CL | Date Drilled: 08/12/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
5.1' (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	STANDARD PENETRATION (N)
0	734.3													Natural Moisture Content, % - ● PL — LL; Blows per foot - ○ 10 20 30 40
0.2	734.1						Topsoil - 2"							
		6 8 10	12	1		--	Very stiff brown CLAY (A-7-6), trace fine to coarse sand, trace gravel; damp.	1	6	--	3	35	55	
3.0	731.3													
		6 19 25	18	2		--	Very stiff to hard brown SILT AND CLAY (A-6a), trace to little fine to coarse sand, trace gravel; damp.	4	10	--	4	43	39	
5														
		20 30 39	15	3		--		0	5	--	6	53	36	69 →
		29 39 48	18	4		--								
10														87 →
		33 50/5	9	5		--		0	2	--	3	57	38	50+
12.0	722.3						Severely weathered brown SANDSTONE argillaceous.							
		31 50/3	7	6										50+
15														
		40 50/3	8	7										50+
		50/5	5	8										50+
20.0	714.3						Medium hard gray SANDSTONE; very fine grained, moderately to highly weathered, argillaceous, very thinly bedded to medium bedded, moderately fractured, contains few to moderate argillaceous laminations. @ 20.2', 21.2', 22.2', low angle fractures. @ 20.3'-21.1', high angle fracture.							
		Core 102"	Rec 102"	RQD 77%	R1									
25														
							@ 28.7'-29.0', 31.8', 32.8', 33.1'-33.3', low angle fractures.							
30														

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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

LOG OF: Boring R-761 | Location: Sta. 822+16.3, 271.6 ft. LT of SR 823 CL | Date Drilled: 08/12/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
5.1' (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
30	704.3	Core 78"	Rec 78"	RQD 82%	R2		Medium hard gray SANDSTONE; very fine grained, moderately to highly weathered, argillaceous, very thinly bedded to medium bedded, moderately fractured, contains few to moderate argillaceous laminations.						
35.0	699.3						Bottom of Boring - 35.0'						
40													
45													
50													
55													
60													

GRADATION

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

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-762 | Location: Sta. 822+22.5, 164.0 ft. LT of SR 823 CL | Date Drilled: 08/15/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0.2	742.3 / 742.1						Topsoil - 2"							
		7 9 13	14	1			Medium dense brown SILT (A-4b), little clay, trace fine to coarse sand, trace gravel; dry to damp.							
3.0	739.3						Severely weathered brown and gray SANDSTONE, argillaceous.							
		20 26 40	16	2										66
5		19 50/6	10	3										50+
		19 50/5	7	4										50+
10		39 50/3	8	5										50+
		39 50/2	6	6			@ 13.5', gray.							50+
15		50/3	3	7										50+
18.5	723.8						Medium hard gray SANDSTONE interbedded with SHALE; very fine grained, moderately to highly weathered, argillaceous, arenaceous, micaceous, thinly laminated to thinly bedded, moderately fractured.							
20		Core 78"	Rec 78"	RQD 87%	R1		@ 19.0'-19.2', 20.5', 21.0'-21.2', 26.7'-26.9', high angle fractures.							
							@ 20.4', 21.2', 22.0', 23.7', iron stained low angle fractures.							
25														
							@ 27.9', 28.1', low angle fractures.							
30		Core 120"	Rec 120"	RQD 76%	R2		@ 28.2'-28.3', 28.5'-28.7', broken zones.							

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-762 | Location: Sta. 822+22.5, 164.0 ft. LT of SR 823 CL | Date Drilled: 08/15/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
30	712.3						Medium hard gray SANDSTONE interbedded with SHALE; very fine grained, moderately to highly weathered, argillaceous, arenaceous, micaceous, thinly laminated to thinly bedded, moderately fractured. @ 31.5', 32.3', low angle fractures. @ 32.5'-32.7', high angle fractures.							
35.0	707.3						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-763 | Location: Sta. 822+26.1, 6.4 ft. LT of SR 823 CL | Date Drilled: 08/15/05 to 08/16/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
6.7' (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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢ LL Blows per foot - ○ 10 20 30 40
0	762.0													
0.3	761.7						Topsoil - 3"							
		15 16 22	9	1			Dense brown SILT (A-4b), little clay, trace fine sand; contains sandstone fragments; damp.							
3.0	759.0						Severely weathered brown SHALE.							
		12 24 50/5	17	2										50+
5.0	757.0						Soft brown SHALE interbedded with SANDSTONE; very fine grained, decomposed, medium bedded, highly fractured to broken. @ 5.5', 8.5', 18.9', 19.1', low angle fractures.							
		Core 120"	Rec 120"	RQD 72%	R1		@ 8.8'-9.3', 10.3'-11.0', broken zone. @ 9.3'-10.0', 14.4', 14.7', high angle fractures.							
15														
		Core 120"	Rec 82"	RQD 42%	R2		@ 17.1'-17.4', 19.3', 19.6', 20.3'-20.5', iron stained high angle fractures. @ 20.8'-23.8', lost recovery.							
20														
25.0	737.0						Soft gray SHALE interbedded with SANDSTONE; very fine grained, highly weathered, thinly laminated to thinly bedded, moderately fractured. @ 25.3'-25.6', 26.2', 29.1', 29.6', low angle fractures.							
		Core 120"	Rec 120"	RQD 88%	R3									
30														

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-763 | Location: Sta. 822+26.1, 6.4 ft. LT of SR 823 CL | Date Drilled: 08/15/05 to 08/16/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
6.7' (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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢⊣ LL Blows per foot - ○ 10 20 30 40
30	732.0						Soft gray SHALE interbedded with SANDSTONE; very fine grained, highly weathered, thinly laminated to thinly bedded, moderately fractured. @ 30.8', 31.4', 32.4'-32.8', low angle fractures. @ 32.2'-32.4'; high angle fractures.							
35.0	727.0						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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

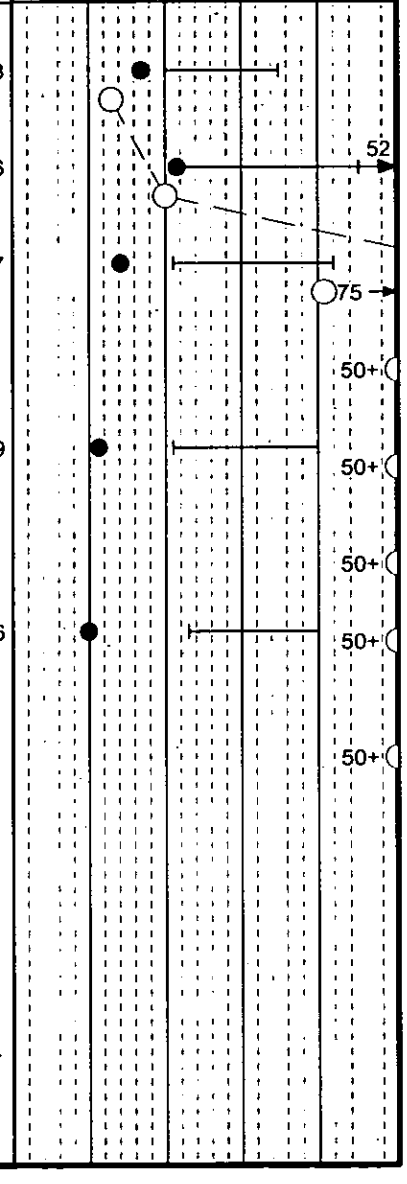
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-784 | Location: Sta. 850+04.9, 167.6 ft. LT of SR 823 CL | Date Drilled: 08/25/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
5.3' (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	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	673.7												
0.3	673.4						Topsoil - 3" / 1.5' soil removed before drilling.						
		7 5 8	10	1		4.0	Hard brown and gray SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.	9	10	--	4	49	28
3.0	670.7												
		8 8 12	16	2		4.5+	Hard brown CLAY (A-7-6), some silt, trace fine to coarse sand; damp.	0	1	--	2	31	66
5													
		10 30 45	18	3		4.5+	@ 6.0', some gravel.	24	1	--	2	36	37
8.0	665.7												
		23 50/4	10	4		--	Hard brown SILTY CLAY (A-6b), trace fine to coarse sand; damp.						
10													
		33 50/1	5	5		4.5+		0	3	--	2	56	39
		20 50/3	8	6		--							
15													
16.5	657.2	50/6	5	7		--		0	4	--	3	57	36
							Severely weathered brown SANDSTONE, argillaceous.						
		38 50/3	3	8			@ 18.5', brown and gray.						
19.5	654.2						Medium hard gray SANDSTONE interbedded with SHALE; very fine to fine grained, slightly weathered, argillaceous, micaceous, pyritic, medium bedded, slightly fractured.						
20		Core 66"	Rec 64"	RQD 97%	R1		@ 20.4'-20.6', 21.4'-21.5', high angle fractures.						
25		Core 120"	Rec 120"	RQD 100%	R2								
30													

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



FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-784 | Location: Sta. 850+04.9, 167.6 ft. LT of SR 823 CL | Date Drilled: 08/25/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
5.3' (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 - ○ 10 20 30 40
30.0	643.7						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, laminated to thickly bedded, slightly fractured. @ 30.0'-30.7', contains few to moderate argillaceous laminations.							
35.0	638.7						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-786 | Location: Sta. 850+08.9, 161.1 ft. RT of SR 823 CL | Date Drilled: 08/25/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
3.5' (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
0	683.0												
0.4	682.6						Topsoil - 5"						
		11 10 9	5	1		–	Medium dense to dense brown SILT (A-4b), some clay, trace fine to coarse sand; damp.	0	1	–	2	73	24
3.0	680.0												
		18 35 28	12	2		–	Hard brown CLAY (A-7-6), trace gravel, trace fine sand; damp.	4	3	–	1	46	46
5													
		35 48 50/3	15	3		4.5+		0	0	–	1	41	58
8.0	675.0												
		26 44 50/2	14	4			Severely weathered brown SHALE.						
10.0	673.0						Medium hard brown SHALE ; very fine grained, highly weathered, arenaceous, thinly laminated to laminated, moderately fractured, contains few sandstone bands. @ 10.9', 11.1', 11.8', 12.2', 12.3', 12.9', 14.5', 14.8', 15.3', low angle fractures.						
15		Core 120"	Rec 120"	RQD 50%	R1								
							@ 18.7'-19.1', high angle fractures.						
20							@ 20.3', 20.7', 23.4', 24.7', 25.4', low angle fractures. @ 21.4'-21.7', 26.2'-26.5', broken zones.						
25		Core 120"	Rec 120"	RQD 73%	R2		@ 23.9'-24.1', 27.0'-27.3', 28.4'-28.6', 29.1'-29.5', high angle fractures. @ 25.4'-27.1', fine to very fine grained SANDSTONE bed. @ 27.1', gray. @ 27.5'-28.5', very fine SANDSTONE bed.						
30													

GRADATION

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

Non-Plastic
63 →
50+
50+

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-786 | Location: Sta. 850+08.9, 161.1 ft. RT of SR 823 CL | Date Drilled: 08/25/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
3.5' (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)
30.0	653.0	Core 60"	Rec 60"	RQD 95%	R3		Medium hard gray SHALE ;very fine grained, moderately weathered, arenaceous, micaceous, laminated to very thinly bedded, moderately fractured, contains few to moderate arenaceous laminations. @ 30.0'-30.3', high angle fracture. @ 34.3', low angle fracture.							
35.0	648.0						Bottom of Boring - 35.0'							

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

40 45 50 55 60

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-787 | Location: Sta. 854+07.9, 215.6 ft. LT of SR 823 CL | Date Drilled: 08/25/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
4.8' (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	646.6												
0.4	646.2	12 12 15	7	1		–	Topsoil - 5" Very stiff to hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp.						
3.0	643.6	31 50/3	9	2			Severely weathered brown SANDSTONE, argillaceous.						
5		50/1	1	3									
8.0	638.6	Core 84"	Rec 70"	RQD 64%	R1		Medium hard to hard brown SANDSTONE interbedded with SILTSTONE; fine grained, highly weathered, argillaceous, micaceous, medium bedded to thickly bedded, highly fractured. @ 8.3', 8.8', 10.3', 10.6', 11.0', 12.0', 12.5', 13.2', low angle fractures (iron stained). @ 9.3'-9.4', 13.3'-13.7', 14.8'-15.0', high angle fractures (iron stained). @ 13.7'-14.8', lost recovery. @ 15.0'-15.5', broken zone.						
10													
15.1	631.5						Medium hard to hard gray SANDSTONE interbedded with SHALE; very fine to fine grained, highly weathered to decomposed, argillaceous, micaceous, medium bedded to thickly bedded, slightly fractured, abundant siltstones. @ 16.8'-17.1', high angle fracture.						
17.5	629.1												
20		Core 120"	Rec 120"	RQD 73%	R2		Medium hard brownish gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, thinly bedded, moderately to highly fractured. @ 18.0', 18.6', 18.8', 19.8', 20.1', 20.7', low angle fractures. @ 21.7'-21.9', 22.5'-22.8', 23.1'-23.0', 23.5'-23.7', high angle fractures.						
25.0	621.6						Soft gray SHALE; very fine grained, moderately to highly weathered, micaceous, laminated, moderately to highly fractured. @ 25.6', 26.9', 27.1', 28.8', 29.1'-29.2', low angle fractures. @ 27.5' - 27.6', 27.7' - 27.9', 29.4' - 29.8', high angle fractures.						
30		Core 120"	Rec 120"	RQD 59%	R3								

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

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-787 | Location: Sta. 854+07.9, 215.6 ft. LT of SR 823 CL | Date Drilled: 08/25/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
4.8' (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
30	616.6						Soft gray SHALE; very fine grained, moderately to highly weathered, micaceous, laminated, moderately to highly fractured. @ 30.7', 34.7', low angle fracture. @ 31.7'-32.7', high angle fracture. @ 34.0'-34.4', Very fine grained sandstone bed.							
35.0	611.6						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-788 | Location: Sta. 854+06.5, 22.2 ft. RT of SR 823 CL | Date Drilled: 08/25/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
5.8' (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	620.1												
0.4	619.7						Topsoil - 5"						
		5 11 17	10	1		--	Very stiff brown SILT (A-4b), some clay, trace fine to coarse sand, trace gravel; damp.	1	3	–	2	71	23
3.0	617.1												
		12 13 18	12	2		4.5+	Hard brown SILT AND CLAY (A-6a), "and" fine to coarse sand, little gravel; damp.	17	22	–	10	31	20
5													
		16 35 40	13	3		4.5+							
8.0	612.1												
		50/5	5	4			Severely weathered gray SHALE.						
10.0	610.1						Soft to medium hard gray SHALE; very fine grained, highly to moderately weathered, arenaceous, massive, moderately fractured.						
15		Core 120"	Rec 120"	RQD 100%	R1								
20													
25		Core 120"	Rec 110"	RQD 89%	R2								
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
75 →
50+

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-788 | Location: Sta. 854+06.5, 22.2 ft. RT of SR 823 CL | Date Drilled: 08/25/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
5.8' (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
30	590.1													
30.4	589.7	Core 60"	Rec 60"	RQD 97%	R3		Soft to medium hard gray SHALE; very fine grained, highly to moderately weathered, arenaceous, massive, moderately fractured.							
34.0	586.1						Medium hard gray SANDSTONE; very fine grained, argillaceous, micacious, moderately to highly weathered, contains moderate to abundant argillaceous laminations.							
35.0	585.1						Hard gray SANDSTONE; medium grained, slightly weathered, micaceous, medium bedded, unfractured.							
							Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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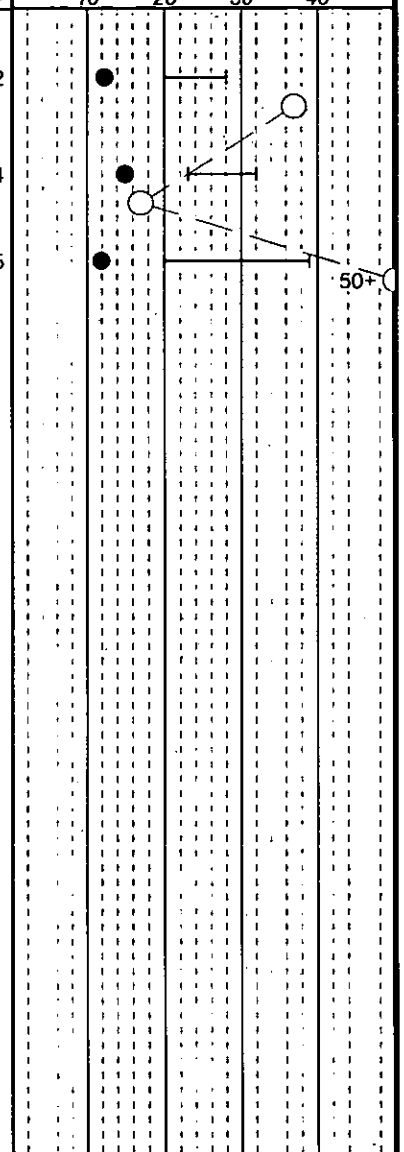
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-789 | Location: Sta. 854+27.1, 216.7 ft. RT of SR 823 CL | Date Drilled: 08/26/05 to 08/29/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
6.9' (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	624.1												
0.3	623.8						Topsoil - 4"						
		10 16 21	9	1		4.5+	Very stiff to hard brown SILT (A-4b), some clay, little fine to coarse sand, trace gravel; damp.	1	5	--	6	56	32
		8 9 8	5	2		--		2	11	--	8	55	24
5.5	618.6						Hard grayish brown SILTY CLAY (A-6b), trace fine to coarse sand; contains sandstone fragments; damp.						
		26 50/5	11	3		4.5+		0	1	--	2	42	55
7.0	617.1						Soft gray SHALE; very fine grained, decomposed, argillaceous, micaceous, laminated to very thinly bedded, moderately fractured.						
7.8	616.3						Hard gray SANDSTONE; very fine to fine grained, highly weathered, thinly bedded, moderately fractured. @ 7.8', 8.7', 10.0', low angle fractures.						
10.4	613.7	Core 96"	Rec 96"	RQD 90%	R1		Soft to medium hard gray SHALE; very fine grained, highly weathered, micaceous, laminated to thinly bedded, slightly fractured. @ 14.5'-15.0', broken zone. @ 15.1', 15.3', 15.5', 16.3', 17.0', 17.8', 18.7', 19.5', 19.9', 20.3', 22.4', 22.6', 23.9', low angle fractures.						
20		Core 120"	Rec 120"	RQD 88%	R2								
25							@ 24.3'-24.5', high angle fracture. @ 26.1', 26.2', 27.4', 29.1', 29.4', low angle fractures.						
30		Core 120"	Rec 120"	RQD 93%	R3								

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



FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-789 | Location: Sta. 854+27.1, 216.7 ft. RT of SR 823 CL | Date Drilled: 08/26/05 to 08/29/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
6.9' (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
30	594.1													
31.1	593.0						Medium hard gray SHALE; very fine grained, moderately to highly weathered, arenaceous, micaceous, laminated to very thinly bedded, slightly fractured. @ 31.1', 34.5', low angle fractures.							
35.0	589.1						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-791 | Location: Sta. 858+46.9, 27.5 ft. LT of SR 823 CL | Date Drilled: 08/30/05 to 08/31/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
4.8' (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	652.2												
0.3	651.9						Topsoil - 4"						
		4 7 4	10	1		4.25	Hard brown CLAY (A-7-6), "and" silt, little fine to coarse sand, trace gravel; damp.	1	7	–	4	38	50
3.0	649.2												
		7 14 40	14	2			Hard brown SANDY SILT (A-4a), "and" clay, trace gravel; damp.	4	7	–	5	38	46
5													
5.5	646.7												
		12 24 50/5	12	3			Hard brown CLAY (A-7-6), "and" silt, trace fine to coarse sand; damp.	0	2	–	5	42	51
7.5	644.7						Severely weathered brown SANDSTONE.						
9.0	643.2	50/1	1	4									
10		Core 120"	Rec 120"	RQD 58%	R1		Hard brown SANDSTONE; medium to coarse grained, moderately to highly weathered, micaceous, thickly bedded, highly fractured. @ 9.0'-9.8', 11.2'-12.0', 14.6'-14.9', 15.7'-15.8', 16.5'-16.7', 18.6'-18.7', high angle fracture. @ 10.0', 10.7', 11.2', 12.1', 13.2', 14.4', 16.4', 16.9', low angle fractures. @ 10.3'-10.6', argillaceous gray layer.						
15													
19.0	633.2												
20		Core 120"	Rec 120"	RQD 83%	R2		Medium to hard gray and brown SANDSTONE; very fine to fine grained, highly to moderately weathered, argillaceous, micaceous, medium bedded to thickly bedded, moderately fractured. @ 19.6'-20.3', 20.9'-21.5', agrillaceous sandstone bands. @ 22.3', 22.7', 23.9', 24.3', low angle fracture. @ 23.8'-24.7', high angle fracture. @ 25.2', 25.9', 26.6', 28.6', low angle fracture.						
25													
28.6	623.6						Medium hard gray SHALE; highly weathered, arenaceous.						
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
54
50+
50+

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-791 | Location: Sta. 858+46.9, 27.5 ft. LT of SR 823 CL | Date Drilled: 08/30/05 to 08/31/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
4.8' (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
30	622.2	Core 72"	Rec 72",	RQD 83%	R3		Medium hard gray SHALE; highly weathered, arenaceous, thinly laminated to laminated, moderately fractured to broken, contains moderate arenaceous laminations. @ 29.6', 29.7', 29.9', 30.4', 31.3', 32.9', 34.6', low angle fractures. @ 29.9'-30.3', broken, decomposed zone.							
35.0	617.2						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-793 | Location: Sta. 858+23.1, 180.6 ft. RT of SR 823 CL | Date Drilled: 08/29/05 to 08/30/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
2.5' (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
0	633.5													
0.3	633.2						Topsoil - 4"							
		4 7 9	16	1		2.5	Very stiff brown SILT AND CLAY (A-6a), "and" fine to coarse sand, little gravel; damp.	14	26	--	11	30	19	
3.0	630.5													
		10 23 50/1	6	2		--	Hard brown SILTY CLAY (A-6b), some fine to coarse sand, some gravel; damp.	21	21	--	10	27	21	50+
6.0	627.5	50/6	5	3			Very dense brown SANDY SILT (A-4a), some gravel, little clay; damp.	25	10	--	10	55		Non-Plastic 50+
8.0	625.5						Severely weathered gray SHALE.							
		50/5	5	4										50+
10.5	623.0	Core 54"	Rec 54"	RQD 60%	R1		Soft gray SHALE; very fine grained, highly weathered to decomposed, micaceous, thickly bedded, moderately fractured. @ 10.5', 11.4', 12.0', 12.7', low angle fracture (iron stain). @ 11.2'-11.9', high angle fracture (iron stain). @ 14.5'-15.0', lost recovery. @ 17.3'-18.4', very fine to fine sandstone seam.							
19.5	614.0	Core 120"	Rec 120"	RQD 74%	R2		Medium hard to hard gray SANDSTONE; very fine grained, moderately to highly weathered, argillaceous, micaceous, laminated to thickly bedded, unfractured . @ 22.0'-27.8', contains moderate to argillaceous laminations.							
30		Core 120"	Rec 120"	RQD 97%	R3		@ 28.8'-35.0', contains moderate argillaceous laminations.							

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-793 | Location: Sta. 858+23.1, 180.6 ft. RT of SR 823 CL | Date Drilled: 08/29/05 to 08/30/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
2.5' (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
30	603.5						Medium hard to hard gray SANDSTONE; very fine grained, moderately to highly weathered, argillaceous, micaceous, laminated to thickly bedded, unfractured; contains moderate argillaceous laminations.							
35.0	598.5						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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

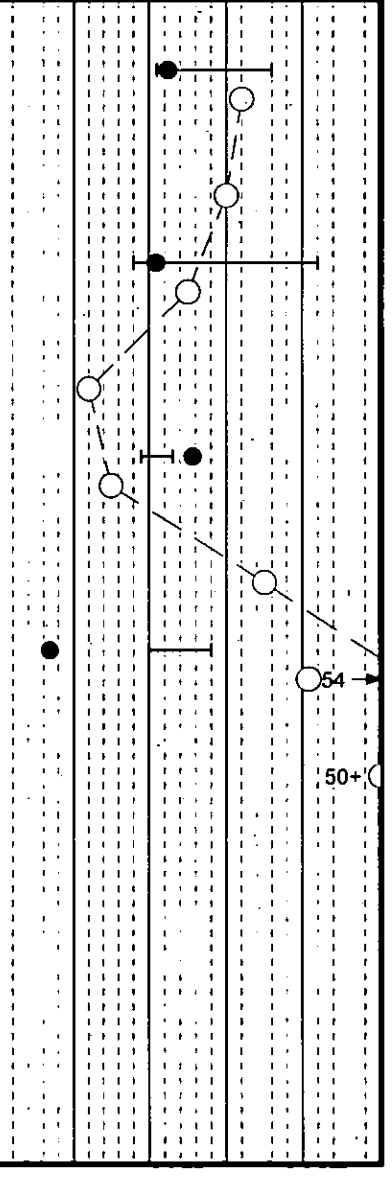
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-795 | Location: Sta. 866+19.3, 0.3 ft. LT of SR 823 CL | Date Drilled: 09/01/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
4.4' (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	674.8												
0.6	674.2						Topsoil - 7"						
		8 15 17	15	1		2.75	Very stiff to hard brown SILT AND CLAY (A-6a), trace fine sand; damp.	0	0	--	2	66	32
		11 12 18	9	2		4.25							
5													
5.5	669.3						Stiff brown CLAY (A-7-6), "and" silt, little fine sand; damp to moist.						
		10 11 14	18	3		2.0		0	0	--	17	43	40
		5 5 7	18	4		1.0							
10													
10.5	664.3						Medium stiff brown SILT (A-4b), little clay, trace fine sand; moist to wet.						
		4 7 8	18	5		0.75		0	0	--	6	75	19
13.0	661.8						Dense to very dense brown SANDY SILT (A-4a), little clay, trace gravel; damp.						
		15 17 18	18	6									
15													
		15 20 34	12	7				8	16	--	14	45	17
18.5	656.3												
		8 14 50/3	15	8		--	Hard gray SILT AND CLAY (A-6a), trace fine sand; damp.						
20.0	654.8						Soft gray SHALE; decomposed to highly weathered, slightly fractured, thinly laminated to laminated. @ 20.6', 25.5', 27.6', 29.7', low angle fractures, iron staining.						
25		Core 120"	Rec 120"	RQD 94%	R1								
27.0	647.8						Medium hard to hard gray and brown SANDSTONE; highly weathered to moderately weathered, very fine grained to fine grained, argillaceous, micaceous, slightly fractured. @ 28.8'-29.0', broken zone						
30													

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



FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-795 | Location: Sta. 866+19.3, 0.3 ft. LT of SR 823 CL | Date Drilled: 09/01/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
4.4' (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	644.8	Core 60"	Rec 60"	RQD 83%	R2		Medium hard to hard gray and brown SANDSTONE; highly weathered to moderately weathered, very fine grained to fine grained, argillaceous, micaceous, slightly fractured. @ 30.0'-30.4', high angle fracture. @ 30.6', 30.8', 33.0', low angle fractures.						
35.0	639.8						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 [11/13/2007 9:17 PM]

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-796 | Location: Sta. 870+36.2, 110.4 ft. LT of SR 823 CL | Date Drilled: 9/01/06

WATER OBSERVATIONS: Water seepage at: Not reported; 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
0	636.8												
0.3	636.5						Topsoil - 4"						
		4 7 10	18	1		1.25	Stiff brown SILT (A-4b), trace fine to coarse sand; contains organic material, petroleum odor; wet.	0	1	–	4	75	20
3.0	633.8												
		11 50/3	9	2		4.0	Hard brown SANDY SILT (A-4a), some gravel, little clay; damp.	21	8	–	10	46	15
5													
10.0	626.8						Soft to medium hard grayish brown SHALE; very fine grained, highly weathered to decomposed, arenaceous, thinly laminated, moderately fractured.						
15		Core 120"	Rec 120"	RQD 73%	R1		@ 16.5'-17.1', medium hard, gray, very fine grained, sandstone seam.						
20													
25		Core 120"	Rec 120"	RQD 82%	R2								
25.7	611.1						Medium hard gray SANDSTONE interbedded with SHALE; moderately to highly weathered, micaceous, thinly laminated to thickly bedded, moderately fractured.						
30													

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

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-796 | Location: Sta. 870+36.2, 110.4 ft. LT of SR 823 CL | Date Drilled: 9/01/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: Not reported; Water level at completion: None — DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) — Natural Moisture Content, % - ● PL ⊢ LL — Blows per foot - ○
30	606.8	Core 60"	Rec 60"	RQD 100%	R3		Medium hard gray SANDSTONE interbedded with SHALE; moderately to highly weathered, micaceous, thinly laminated to thickly bedded, moderately fractured.							
35.0	601.8						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

STANDARD PENETRATION (N) scale: 10 20 30 40

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-798 | Location: Sta. 870+26.8, 10.4 ft. RT of SR 823 CL | Date Drilled: 09/01/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
6.9' (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	654.8												
0.8	654.0	2 7 10	3	1		--	Topsoil - 10" Very stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp.	2	4	--	3	62	29
3.0	651.8	5 22 29	6	2		--	Hard brown SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; damp.	1	3	--	4	51	41
5													
5.5	649.3	50/2	2	3			Severely weathered brown SANDSTONE, argillaceous.						
		50/2	2	4									
10.0	644.8	Core 120"	Rec 120"	RQD 53%	R1	*315	Hard brownish gray SANDSTONE; very fine to fine grained, highly weathered, micaceous, argillaceous, thinly bedded, highly fractured to broken, contains few to moderate argillaceous laminations. @ 10.0'-10.4', 11.3'-11.5'; broken zone. @ 10.6', 11.0', 11.1', 11.5', 13.3', 13.5', 13.7', 13.9', 14.1', 14.3', 15.9', 13.5', 19.6', low angle fractures. @ 11.8'-11.9', 15.0'-15.3', high angle fracture. @ 12.2'-12.5', 14.7'-15.0', 15.3'-15.5', 16.1'-16.6', high angle fractures. @ 16.9'-17.6', shale bed.						
15													
20							@ 21.5'-21.8'; broken zone (high angle fractures). @ 21.5', 21.9', 23.1', 23.7', 24.0', 24.3', 26.4', 26.7', low angle fractures.						
24.3	630.5	Core 120"	Rec 120"	RQD 89%	R2	*423	Medium hard gray SHALE; very fine grained, highly weathered to decomposed, arenaceous, micaceous, thinly laminated to laminated, moderately fractured, contains moderate arenaceous laminations.						
25													
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
51
50+
50+

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-798 | Location: Sta. 870+26.8, 10.4 ft. RT of SR 823 CL | Date Drilled: 09/01/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
6.9' (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	624.8	Core 60"	Rec 60"	RQD 93%	R3	*318	Medium hard gray SHALE; very fine grained, highly weathered to decomposed, arenaceous, micaceous, thinly laminated to laminated, moderately fractured, contains moderate arenaceous laminations. @ 30.7', 30.9', 33.0', 34.6', low angle fractures. @ 31.4'-31.6', high angle fracture. @ 31.6', interbedded with very fine sandstone.						
35.0	619.8						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 [11/13/2007 9:17 PM]

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-4 | Location: Sta. 719+83.4, 53.9 ft. RT of SR 823 CL | Date Drilled: 03/16/05

WATER OBSERVATIONS: Water seepage at: 2.5'
Water level at completion: 9.4' (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	733.0												
0.3	732.7						Topsoil - 3"						
		1 2 4	18	1		0.75	Medium stiff brown SILTY CLAY (A-6b), trace fine sand; damp.						
3.0	730.0												
		4 10 17	18	2		1.5	Stiff brown and red SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.						
5													
5.5	727.5												
		7 13 17	18	3		--	Very stiff to hard reddish brown SANDY SILT (A-4a), little clay, trace to little gravel; damp.	10	6	--	21	48	15
		9 35 33	18	4		--							
10													
		7 13 17	17	5		--							
13.0	720.0												
		6 7 9	16	6		--	Very stiff brown and gray SILT (A-4b), some fine to coarse sand, little clay; damp.	0	6	--	18	60	16
15													
		12 12 8	18	7A 7B		4.5+							
17.0	716.0												
18.0	715.0						Hard brown SILT AND CLAY (A-6a), some fine to coarse sand, trace to little gravel; damp.						
		7 12 15	8	8		--	Very stiff brown SANDY SILT (A-4a), little clay, trace gravel; damp.	4	21	--	23	36	16
20													
		16 25 50/5	16	9		--	@ 21.5', possible decomposed boulder.						
23.0	710.0												
		5 11 12	18	10		2.75	Very stiff brown and gray SILTY CLAY (A-6b), trace to little fine to coarse sand; damp.						
25													
		8 9 9	18	11		3.25							
28.0	705.0												
		12 28 33	18	12			Severely weathered gray SHALE.						
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
68
50+
61

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-4 | Location: Sta. 719+83.4, 53.9 ft. RT of SR 823 CL | Date Drilled: 03/16/05

WATER OBSERVATIONS: Water seepage at: 2.5'
Water level at completion: 9.4' (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	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
30	703.0						Severely weathered gray SHALE.							
		16 37 50/4	16	13										61
35.0	698.0						Soft to medium hard gray SHALE; thinly laminated to laminated, moderately to highly weathered, moderately fractured to broken, contains ferric bands. @ 35.8'-36.1',37.3'-37.6', decomposed zones. @ 37.6'-38.0', high angle fracture.							50+
40		Core 120"	Rec 120"	RQD 63%	R-1		@ 39.6', high angle fracture. @ 42.3', thin clay seam.							
45.0	688.0						Bottom of Boring - 45.0'							
50														
55														
60														

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

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-5 | Location: Sta. 718+40.7, 5.1 ft. LT of SR 823 CL | Date Drilled: 3/15/05

WATER OBSERVATIONS: Water seepage at: 2.5'-3.5'
Water level at completion: None (prior to coring)
3.2' (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	721.0												
0.3	720.7						Topsoil - 3"						
		5 6 8	18	1		4.5+	Hard brown and gray SILT AND CLAY (A-6a), trace fine to coarse sand; damp.						
		3 5 4	16	2		1.0	@ 3.5', medium stiff.	0	3	--	3	56	38
5													
5.5	715.5						Severely weathered brown and gray SHALE.						
		5 11 20	18	3									
		20 33 50/1	10	4									
10.0	711.0						Soft brown and gray SHALE; highly weathered to decomposed, broken.						
		Core 36"	Rec 36"	RQD 89%	R-1								
12.4	708.6						Soft to medium hard gray SHALE; moderately to highly weathered, arenaceous, thinly laminated to laminated, slightly to moderately fractured.						
15													
		Core 120"	Rec 120"	RQD 100%	R-2								
20							@ 19.8'-19.9', decomposed.						
23.0	698.0						Bottom of Boring - 23.0'						
25													
30													

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

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-6 | Location: Sta. 717+67.1, 46.6 ft. LT of SR 823 CL | Date Drilled: 03/15/05 to 03/16/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
9.5' (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
0.2	710.4						Topsoil - 2"							
	710.2	1 3 4	18	1			Loose brown SANDY SILT (A-4a), some gravel, trace clay; contains sandstone fragments; damp.							
3.0	707.4													
		4 8 18	16	2			Very stiff gray SILTY CLAY (A-6b), trace to little fine sand; dry to damp.							
5.0	705.4	Core 48"	Rec 48"	RQD 54%	R-1		Soft to medium hard brownish gray SANDSTONE; very fine to fine grained, decomposed, slightly fractured.							
9.0	701.4													
10		Core 120"	Rec 120"	RQD 83%	R-2		Medium hard gray SANDSTONE; very fine grained, moderately weathered, argillaceous, micaceous, laminated to thinly bedded, slightly to highly fractured. @ 9.2'-9.4', 15.4'-15.9', clay seams @ 11.9', high angle fracture. @ 12.5'-12.7', decomposed zone.							
15														
19.0	691.4						Bottom of Boring - 19.0'							
20														
25														
30														

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

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-7 | Location: Sta. 580+57.2, 44.9 ft. RT of SR 823 CL | Date Drilled: 03/15/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
4.1' (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	814.1						Topsoil - 2"						
		1 1 2	5	1			Soft dark gray SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; organic; damp.						
3.0	811.3												
		4 5 5	17	2		2.0	Stiff light brown SILT AND CLAY (A-6a), some fine to coarse sand, trace gravel; contains relic rock structure; damp.	3	14	–	7	48	28
5													
6.5	807.8	8 20 22	18	3			Severely weathered light brown SANDSTONE.						
		18 30 46	12	4		4.5+							
10.0	804.3	Core 54"	Rec 52"	RQD 17%	R-1		Soft light brown SANDSTONE; very fine grained, highly weathered to decomposed, thinly laminated to thinly bedded, highly fractured, contains several healed fractures.						
13.0	801.3						Soft to medium hard gray SANDSTONE; very fine to fine grained, highly weathered, thinly laminated, argillaceous, highly fractured.						
15													
18.0	796.3	Core 120"	Rec 120"	RQD 60%	R-2		Medium hard gray SANDSTONE; highly to moderately weathered, argillaceous, micacious, thinly laminated to medium bedded, slightly fractured.						
20							@ 21.0'-21.2', decomposed.						
24.5	789.8						Bottom of Boring - 24.5'						
25													
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
76

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-8 | Location: Sta. 579+73.0, 46.7 ft. LT of SR 823 CL | Date Drilled: 03/11/05 to 03/14/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
17.4' (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	802.4												
0.1	802.3						Topsoil - 1"						
		2 3 2	14	1		2.0	Stiff dark gray SANDY SILT (A-4a), little clay, some gravel, contains organic material; damp.						
		2 2 3	11	2		1.0		22	10	--	7	46	15
5													
6.5	795.9	1 1 2	9	3		1.5	Stiff to very stiff brown SILT (A-4b), little to some clay, little to some fine to coarse sand, trace gravel; damp to moist.	1	11	--	7	60	21
		3 7 8	10	4		2.0		5	13	--	12	50	20
10													
		4 10 19	18	5		3.5							
13.5	788.9	13 31 46	18	6		4.5	Severely weathered light brown SANDSTONE.						
15.0	787.4						Soft light brown SANDSTONE; highly weathered to decomposed, highly fractured.						
19.3	783.1	Core 114"	Rec 107"	RQD 46%	R-1		Soft to medium hard gray SANDSTONE; very fine grained, highly weathered, micaceous, argillaceous, thinly laminated to thinly bedded, highly fractured, contains ferric bands.						
20													
25							@ 27.7'-27.9', decomposed zone.						
30		Core	Rec	RQD	R-2								

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

77 →

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-8 | Location: Sta. 579+73.0, 46.7 ft. LT of SR 823 CL | Date Drilled: 03/11/05 to 03/14/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
17.4' (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, % - ● PL — LL Blows per foot - ○ 10 20 30 40
30	772.4	120"	120"	81%			Soft to medium hard gray SANDSTONE; very fine grained, highly weathered, micaceous, argillaceous, thinly laminated to thinly bedded, highly fractured, contains ferric bands.							
34.5	767.9						Bottom of Boring - 34.5'							
35														
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-9 | Location: Sta. 578+73.6, 39.1 ft. RT of SR 823 CL | Date Drilled: 03/15/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
3.5' (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	772.8												
0.3	772.5						Topsoil - 3"						
		WOH WOH 2	7	1		0.25	Soft dark brown SILTY CLAY (A-6b), trace to little fine to coarse sand; contains shale fragments; damp.	0	5	–	5	52	38
3.0	769.8												
		4 5 5	18	2		2.5	Very stiff brown SANDY SILT (A-4a), trace clay, trace gravel; damp.						
5													
6.0	766.8												
		19 50/3	8	3		4.5+	Severely weathered light brown SANDSTONE, argillaceous.						
7.0	765.8						Medium hard gray SANDSTONE; slightly weathered, micaceous, argillaceous, massive, slightly fractured. @ 7.0'-7.3', broken.						
10		Core 120"	Rec 120"	RQD 83%	R-1								
15													
17.0	755.8						Bottom of Boring - 17.0'						
20													
25													
30													

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

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-10 | Location: Sta. 577+84.9, 51.8 ft. LT of SR 823 CL | Date Drilled: 03/15/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
1.3' (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	768.1												
0.3	767.8						Topsoil - 3"						
		1 2 2	8	1		1.0	Medium stiff dark brown SANDY SILT (A-4a), some gravel, little clay; damp to moist.	29	12	–	7	38	14
3.0	765.1						Severely weathered light grayish brown SANDSTONE.						
		12 11 41	18	2									
5.0	763.1						Medium hard light brown SANDSTONE; highly weathered, thickly bedded, broken, contains high angle healed fractures.						
7.1	761.0	Core 54"	Rec 54"	RQD 33%	R-1		Medium hard to hard gray SANDSTONE; slightly to moderately weathered, micaceous, argillaceous, massive, moderately to slightly fractured.						
10													
15		Core 120"	Rec 120"	RQD 87%	R-2								
19.5	748.6						Bottom of Boring - 19.5'						
20													
25													
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
52

FILE: 0121-3070-03 (11/13/2007 9:17 PM)

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-11 | Location: Sta. 539+75.3, 37.2 ft. RT of SR 823 CL | Date Drilled: 3/16/05 to 3/17/05

WATER OBSERVATIONS: Water seepage at: 23.5'
Water level at completion: 21.9' (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	722.5												
0.3	722.2						Topsoil - 4"						
		1 3 3	18	1		2.5	Stiff to very stiff light brown CLAY (A-7-6), little to some silt, trace fine sand; damp.						
		2 3 4	18	2		2.5							
5		3 4 5	18	3		1.5							
		2 2 3	18	4		2.0		0	0	–	1	20	79
10		4 4 5	18	5		2.5	@ 11.0', gray.						
13.0	709.5												
		2 2 3	18	6		0.75	Medium stiff gray CLAY (A-7-6); moist.						
15		2 2 3	18	7		0.75							
		WOH 2 3	18	8		0.5							
20		1 2 2	18	9		0.5							
		WOH WOH 3	18	10		0.5		0	0	–	0	14	86
25		1 2 3	18	11		0.5							
		WOH WOH 3	18	12		0.5	@ 28.5', contains sandstone fragments.						
30													

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

56

58

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-11 | Location: Sta. 539+75.3, 37.2 ft. RT of SR 823 CL | Date Drilled: 3/16/05 to 3/17/05

WATER OBSERVATIONS: Water seepage at: 23.5'
Water level at completion: 21.9' (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	STANDARD PENETRATION (N)
30	692.5	1 2 4	18	13		0.5	Medium stiff light brown CLAY (A-7-6); moist.							Natural Moisture Content, % - ● PL ⊢ LL Blows per foot - ○ 10 20 30 40
35		8 6 9	18	14		0.75								
37.0	685.5						Very stiff gray SILT AND CLAY (A-6a), trace fine sand; damp to moist.							
40		7 8 15	18	15		2.5		0	0	--	1	50	49	
43.0	679.5						Severely weathered gray SHALE.							
45		50/5	5	16										50+
47.0	675.5						Medium hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, thinly laminated to very thinly bedded, slightly fractured, contains abundant argillaceous laminations.							
50		Core 120"	Rec 120"	RQD 91%	R1									
55														
57.0	665.5						Bottom of Boring - 57.0'							
60														

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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-12 | Location: Sta. 539+22.5, 28.9 ft. LT of SR 823 CL | Date Drilled: 3/17/05

WATER OBSERVATIONS: Water seepage at: 10.5'-30.5'
Water level at completion: 10.1' (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	713.0												
0.4	712.6						Topsoil - 5"						
		1 1 2	18	1		0.75	POSSIBLE FILL: Medium stiff brown SANDY SILT (A-4a), some gravel, little clay; damp to moist.						
		WOH 1 2	16	2		--		30	15	--	11	27	17
5													
5.5	707.5						Very stiff brown and gray CLAY (A-7-6); varved; moist.						
		3 3 4	18	3		2.5							
		1 2 4	18	4		2.25		0	0	--	0	11	89
10													
		WOH 2 3	18	5		0.75	@ 11.0'-30.0', soft to medium stiff, brownish gray.						
		WOH 2 3	18	6		0.75		0	0	--	0	10	90
15													
		WOH 2 2	18	7		0.5							
		WOH 2 2	18	8		0.5							
20													
		WOH 2 3	18	9		0.5							
		1 2 3	18	10		0.75							
25													
		1 2 3	18	11		0.5							
		3 3 4	18	12		0.5							
30													

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

66
66

FILE: 0121-3070-03 [11/13/2007 9:17 PM]

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

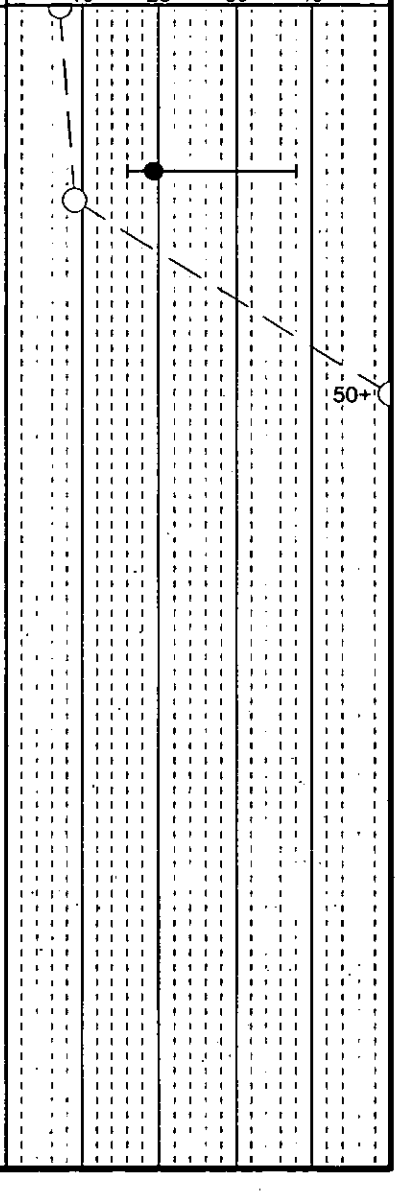
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring TR-12 | Location: Sta. 539+22.5, 28.9 ft. LT of SR 823 CL | Date Drilled: 3/17/05

WATER OBSERVATIONS: Water seepage at: 10.5'-30.5'
Water level at completion: 10.1' (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	683.0						Stiff gray and brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; varved; damp to moist.						
		2 3 6	18	13		1.5		1	5	–	8	59	28
35													
37.0	676.0						Severely weathered gray SHALE.						
		12 38 50/4	16	14									
40.0	673.0						Medium hard gray SANDSTONE; very fine grained, highly weathered to decomposed, argillaceous, micaceous, slightly fractured, contains ferric bands and abundant argillaceous laminations, fissile after desiccation.						
45		Core 120"	Rec 120"	RQD 92%	R1		@ 45.9'-48.2', light brown siltstone layer.						
50.0	663.0						Bottom of Boring - 50.0'						
55													
60													

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



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APPENDIX B

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APPENDIX B

Summary of Analyses
Results of Global Stability Analyses

Evaluate the slope stability for all cross-section.

A total of 20 cross-section with embankment fills.

Fill Section Location		X-section Analyzed	X-section Contains	Maximum Fill Height	Foundation Thickness	Cohesive Soil Thickness		Factor of Safety		
Beginning	Ending	(Station)	Culvert	(feet)	(feet)	(feet)	Slope	Undrained	Drained	Seismic
537+50	543+00	See Lucasville-Minford Road Interchange Report								
575+00	580+50	578+00	No	49.0	6.0	3.0	2H:1V	1.4	1.8	1.6
597+00	603+00	600+00	Yes	90.6	16.0	7.5	2H:1V	1.7	1.6	1.5
609+00	611+50	610+00	Yes	68.0	28.5	12.5	2H:1V	1.4	1.7	1.6
616+00	---	617+50	Yes	89.5	16.0	5.0	2H:1V	1.4	1.6	1.5
---	625+50	623+50	No	77.0	18.5	0.0	2H:1V	1.5	1.7	1.6
633+50	637+50	635+50	Yes	86.0	13.5	7.5	2.5H:1V	1.4	1.8	1.7
657+00	661+00	659+50	Yes	103.0	8.5	0.0	2H:1V	1.8	1.6	1.5
670+50	674+50	672+00	Yes	100.0	33.5	26.0	2H:1V	1.5	1.6	1.5
680+50	683+00	681+50	No	76.5	21.0	5.0	2H:1V	2.1	1.4	1.3
689+50	---	693+00	No	150.0	21.0	0.0	2H:1V	1.5	1.6	1.5
---	702+00	699+00	Yes	122.5	23.0	0.0	2H:1V	1.5	1.6	1.5
714+50	725+00	717+50	No	78.0	5.5	5.5	2H:1V	1.4	1.7	1.6
745+50	753+00	749+00	Yes	94.0	10.0	0.0	2H:1V	1.5	1.6	1.5
761+00	---	766+00	Yes	113.0	20.0	20.0	2H:1V	1.9	1.6	1.5
---	775+00	771+00	Yes	116.5	26.0	17.5	2H:1V	1.8	1.8	1.7
790+00	798+75	795+50	No	122.0	15.0	15.0	2H:1V	1.3	1.6	1.5
810+50	825+50	815+00	No	89.0	12.5	12.5	2H:1V	1.6	1.6	1.5
847+50	859+50	854+50	No	65.0	10.0	10.0	2H:1V	1.9	1.9	1.8
867+00	872+00	869+00	No	24.0	10.0	3.0	2H:1V	OK by inspection		
889+00	904+80	See US 23 / SR 823 Interchange Report								

Use UTEXAS3 slope stability program by S.G. Wright, Ver 1.204, 10/22/1993.

Analyze for undrained, drained and seismic loading condition.

Use a pseudo-static seismic coefficient of 0.03.

Conservatively, use a ground water table of 5 feet below the ground surface.

It is assumed for embankments over 40 feet in height that durable rock from adjacent cuts will be used as fill material.

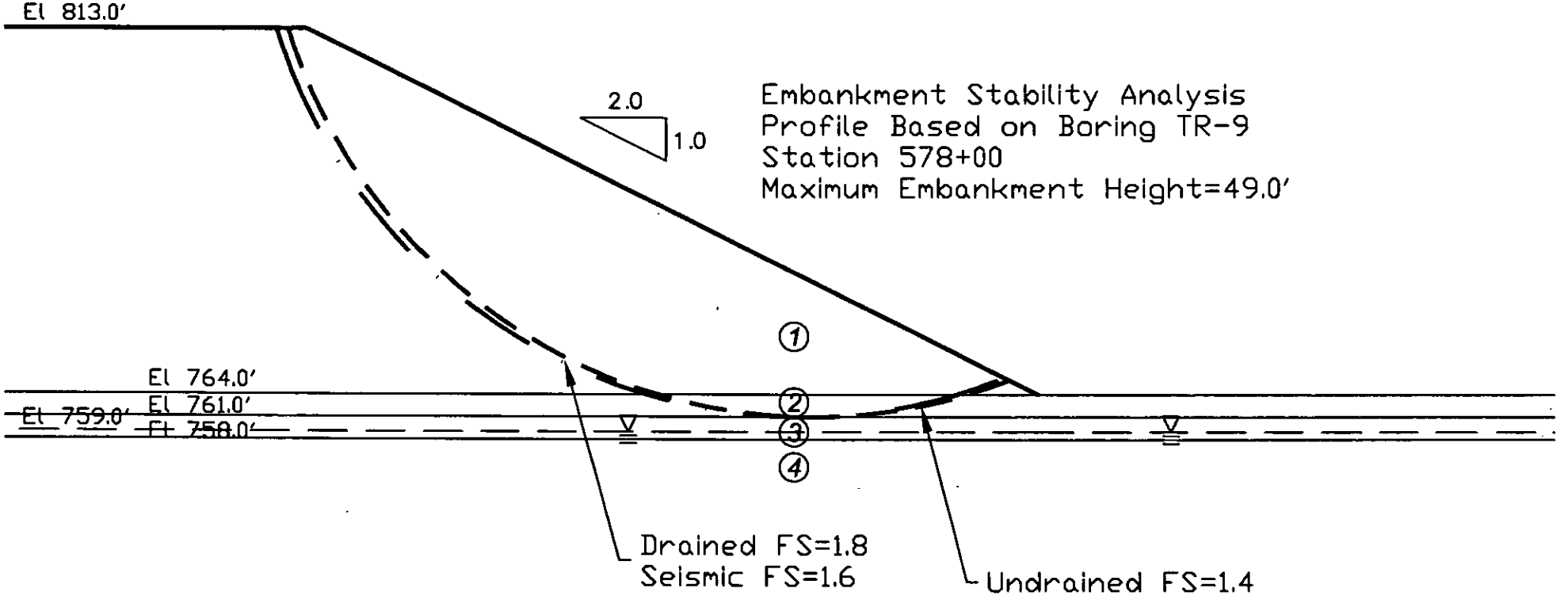
Use the following shear strength parameters for compacted fill for embankments under 40 feet in height.

c =	2,000	psf	c' =	300	psf
ø =	0	degrees	ø' =	28	degrees

Use the following shear strength parameters for compacted fill for embankments over 40 feet in height.

c =	0	psf	c' =	0	psf
ø =	35	degrees	ø' =	35	degrees

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	Soft	Silty Clay	500	0	0	28	120
Material 3	Stiff	Sandy Silt	1000	0	0	29	120
Material 4		Bedrock	5000	45	5000	0	145



Embankment Global Stability
Station 578+00 Mainline Embankment
Profile based upon boring TR-9

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC: JTH	DATE 02-05-07

Vid SAL 11-14-07

Sheet 2 of 19

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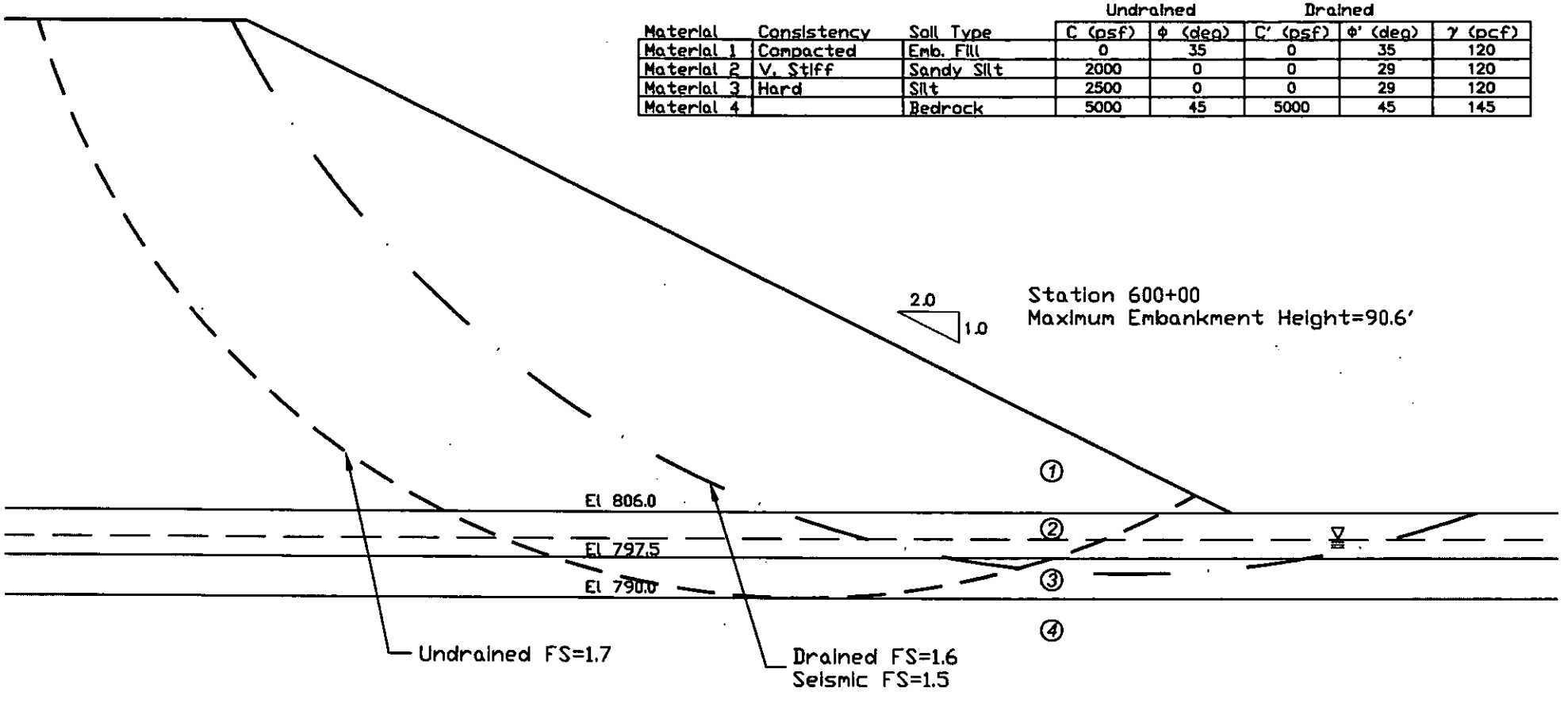
Material	Consistency	Soil Type	Undrained C (psf)	Undrained φ (deg)	Drained C' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	V. Stiff	Sandy Silt	2000	0	0	29	120
Material 3	Hard	Silt	2500	0	0	29	120
Material 4		Bedrock	5000	45	5000	45	145



Embankment Global Stability
Station 600+00 Mainline Embankment
Profile based upon boring R-516

EMBANKMENT STABILITY ANALYSIS

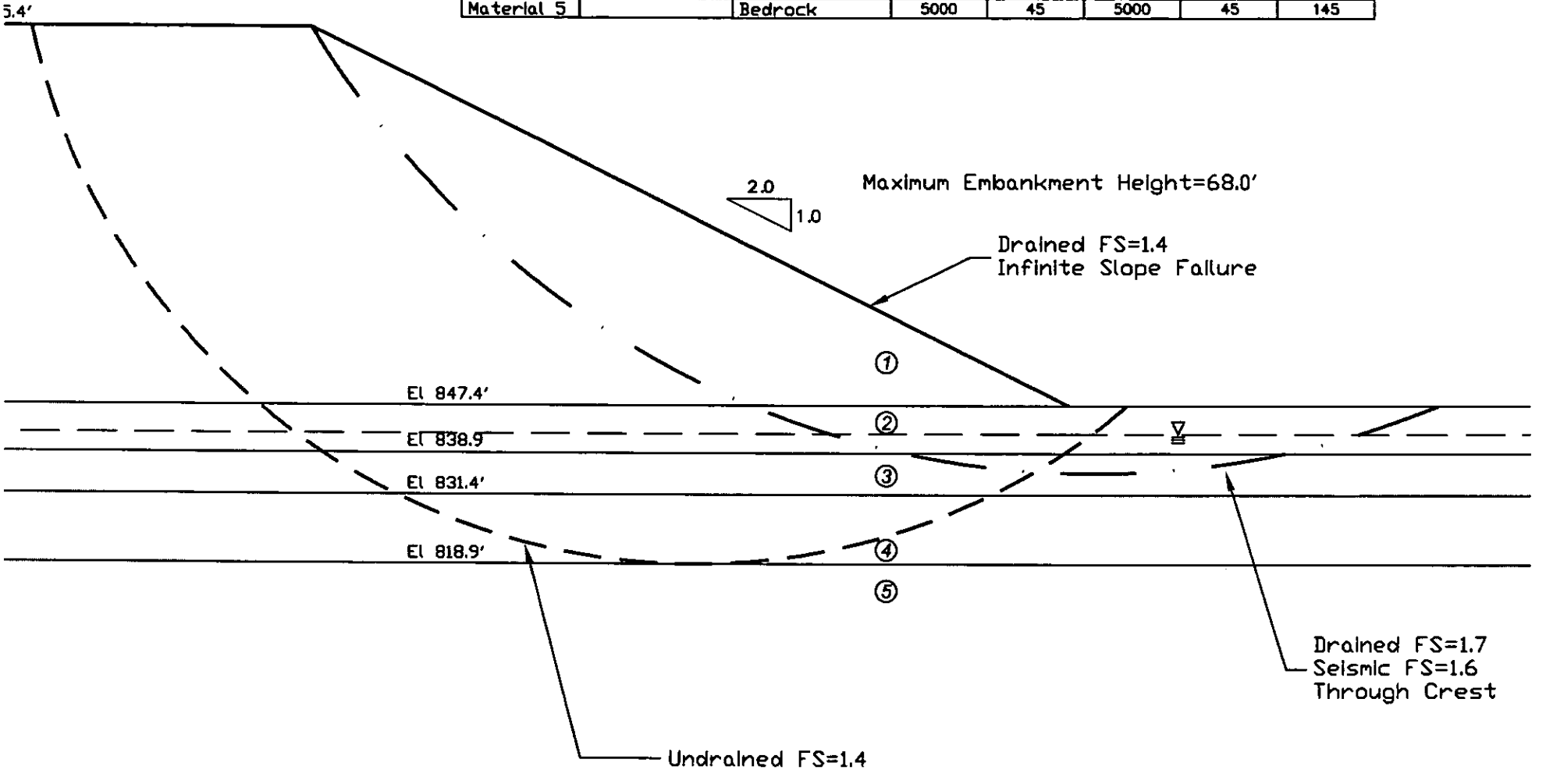
SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC: JTH	DATE 02-01-07

Rec'd SAK 11.14-07

Sheet 3 of 19

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	V. Stiff	Sandy Silt	750	0	0	29	120
Material 3	Hard	Sandy Silt	2000	0	0	29	120
Material 4	Stiff	Silt	1750	0	0	29	120
Material 5		Bedrock	5000	45	5000	45	145



Embankment Global Stability
Station 610+00 Mainline Embankment
Profile based upon boring R-526

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC JTH	DATE 01-25-07

Vid SJR 11-14-07

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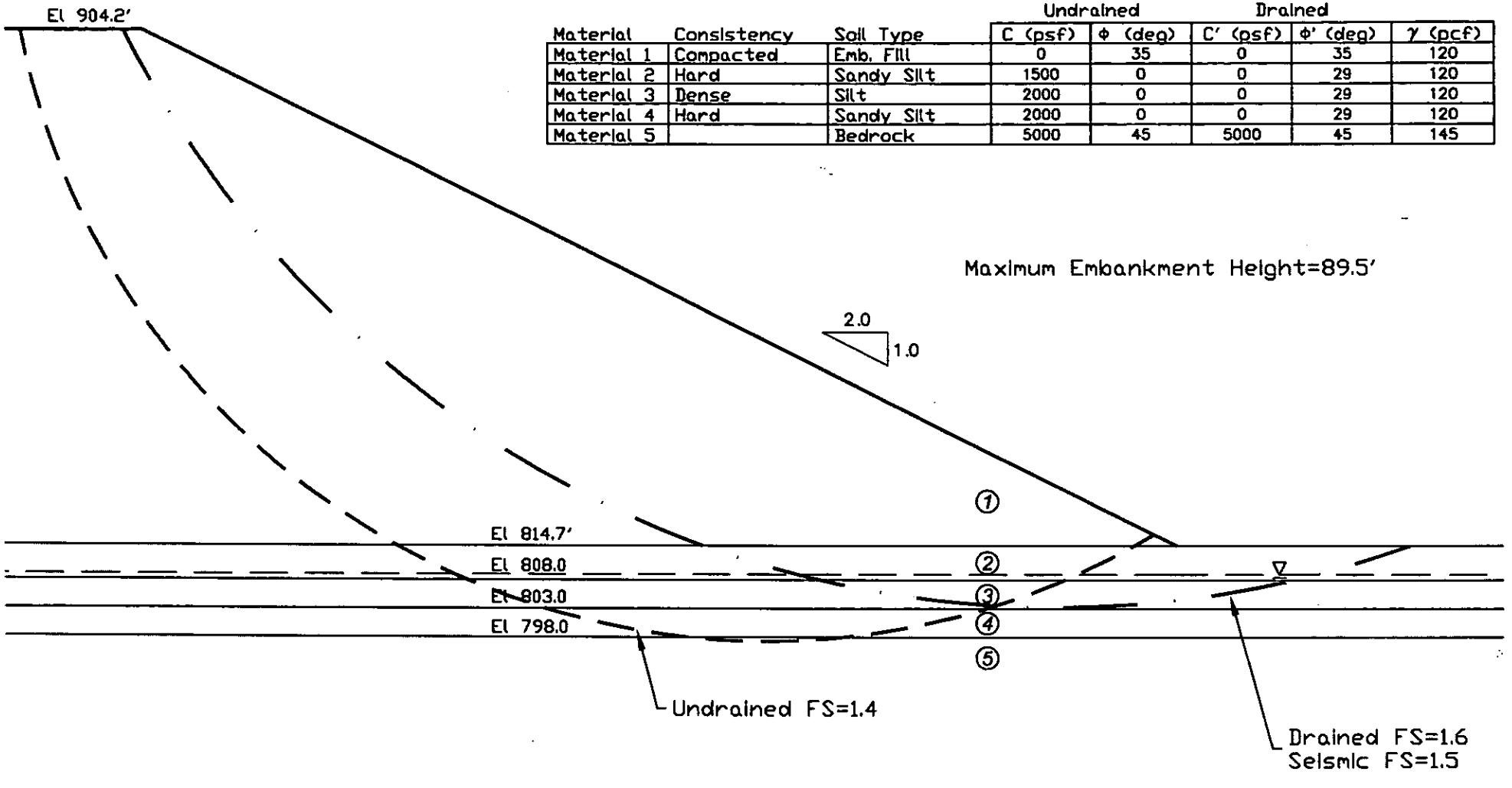
Material	Consistency	Soil Type	Undrained C (psf)	Undrained Φ (deg)	Drained C' (psf)	Drained Φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Hard	Sandy Silt	1500	0	0	29	120
Material 3	Dense	Silt	2000	0	0	29	120
Material 4	Hard	Sandy Silt	2000	0	0	29	120
Material 5		Bedrock	5000	45	5000	45	145



Embankment Global Stability
Station 617+50 Mainline Embankment
Profile based upon boring R-538

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC JTH	DATE 01-25-07

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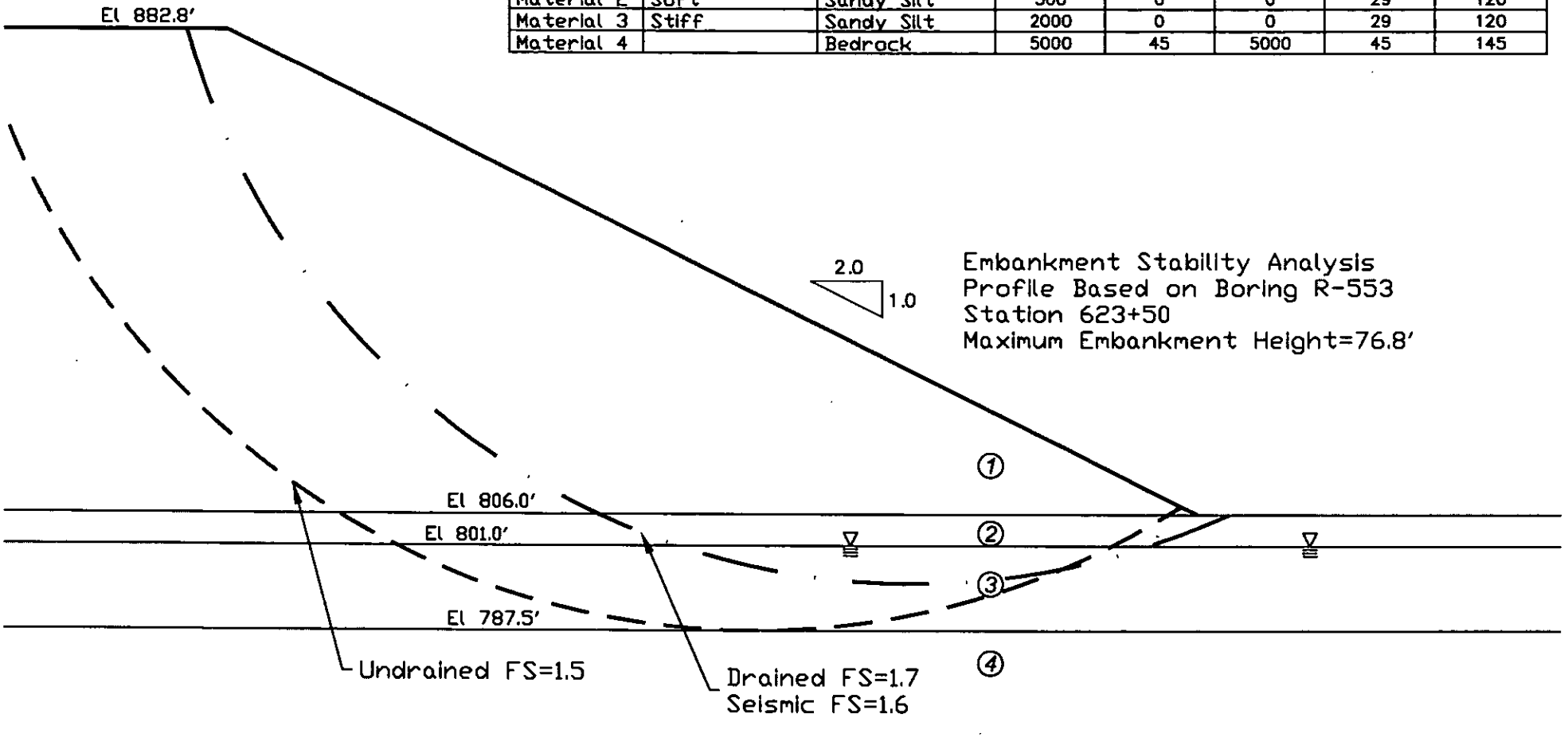
Material	Consistency	Soil Type	Undrained C (psf)	Undrained ϕ (deg)	Drained C' (psf)	Drained ϕ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Soft	Sandy Silt	500	0	0	29	120
Material 3	Stiff	Sandy Silt	2000	0	0	29	120
Material 4		Bedrock	5000	45	5000	45	145



Embankment Global Stability
Station 623+50 Mainline Embankment
Profile based upon boring R-553

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC: JTH	DATE 02-05-07

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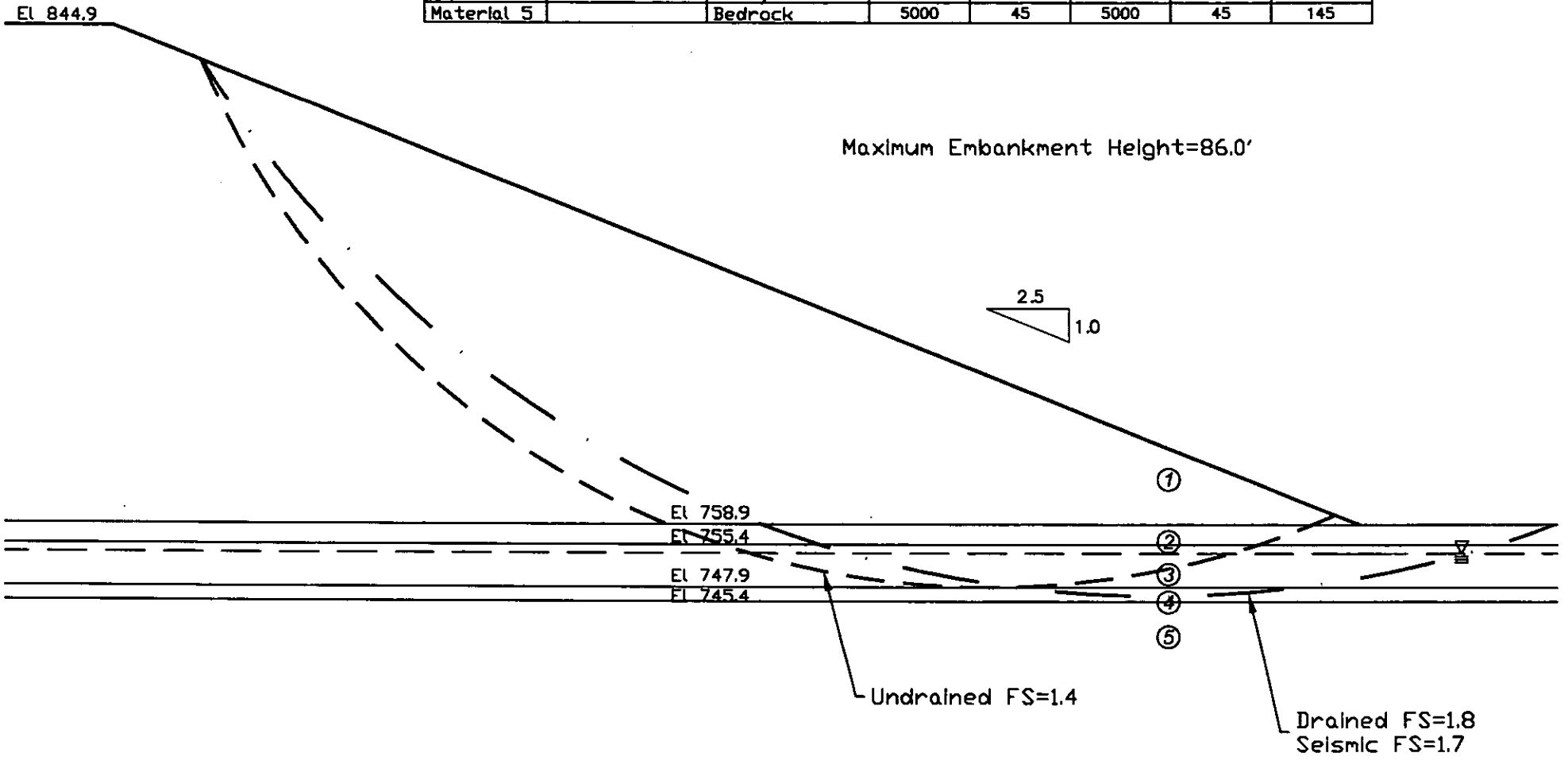
Sheet 6 of 19

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	M. Stiff	Sandy Silt	1000	0	0	29	120
Material 3	Stiff	Silt	1000	0	0	29	120
Material 4	V. Stiff	Sandy Silt	2000	0	0	29	120
Material 5		Bedrock	5000	45	5000	45	145



Embankment Global Stability
Station 635+50 Mainline Embankment
Profile based upon boring R-565

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC JTH	DATE 01-26-07

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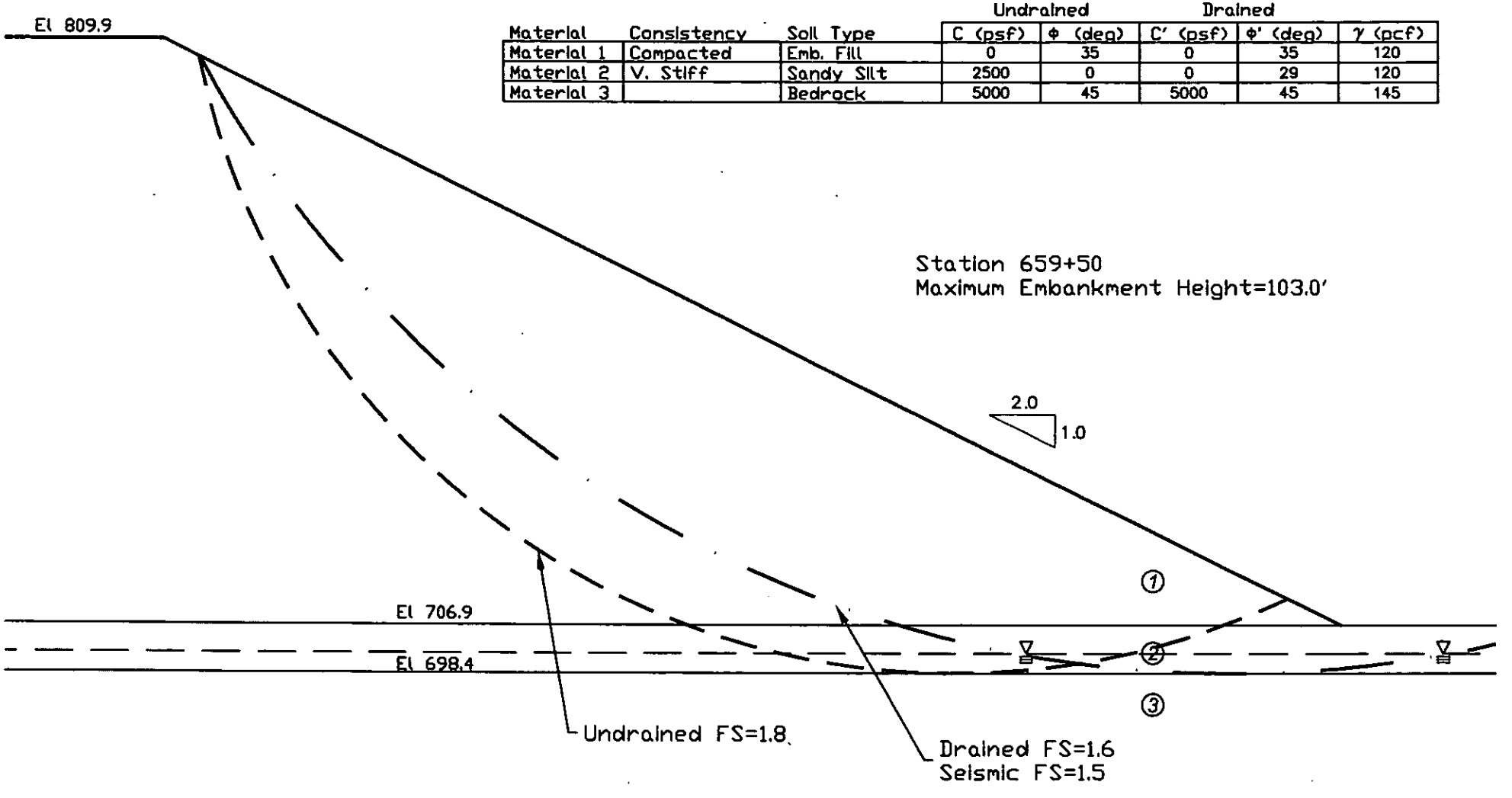
Material	Consistency	Soil Type	Undrained C (psf)	Undrained Φ (deg)	Drained C' (psf)	Drained Φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	V. Stiff	Sandy Silt	2500	0	0	29	120
Material 3		Bedrock	5000	45	5000	45	145



Embankment Global Stability
Station 659+50 Mainline Embankment
Profile based upon boring R-602

EMBANKMENT STABILITY ANALYSIS

SCI-823-10, 13

PROJECT NO. 0121-3070.03 | CALC: JTH | DATE 01-26-07

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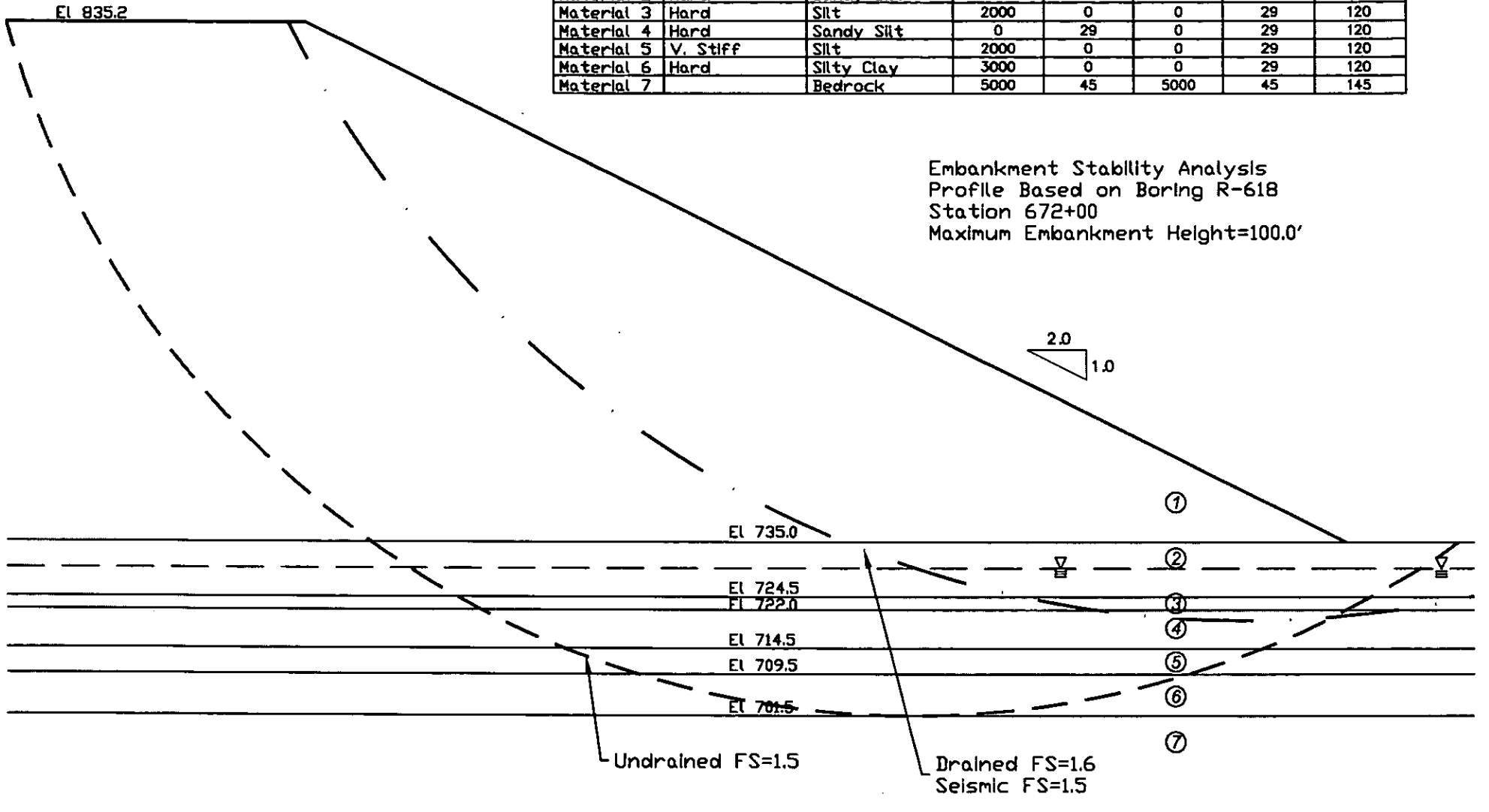
Material	Consistency	Soil Type	Undrained C (psf)	Undrained φ (deg)	Drained C' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Hard	Sandy Silt	2000	0	0	29	120
Material 3	Hard	Silt	2000	0	0	29	120
Material 4	Hard	Sandy Silt	0	29	0	29	120
Material 5	V. Stiff	Silt	2000	0	0	29	120
Material 6	Hard	Silty Clay	3000	0	0	29	120
Material 7		Bedrock	5000	45	5000	45	145



Embankment Stability Analysis
Profile Based on Boring R-618
Station 672+00
Maximum Embankment Height=100.0'

Embankment Global Stability
Station 672+00 Mainline Embankment
Profile based upon boring R-618

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC: JTH	DATE 01-26-07

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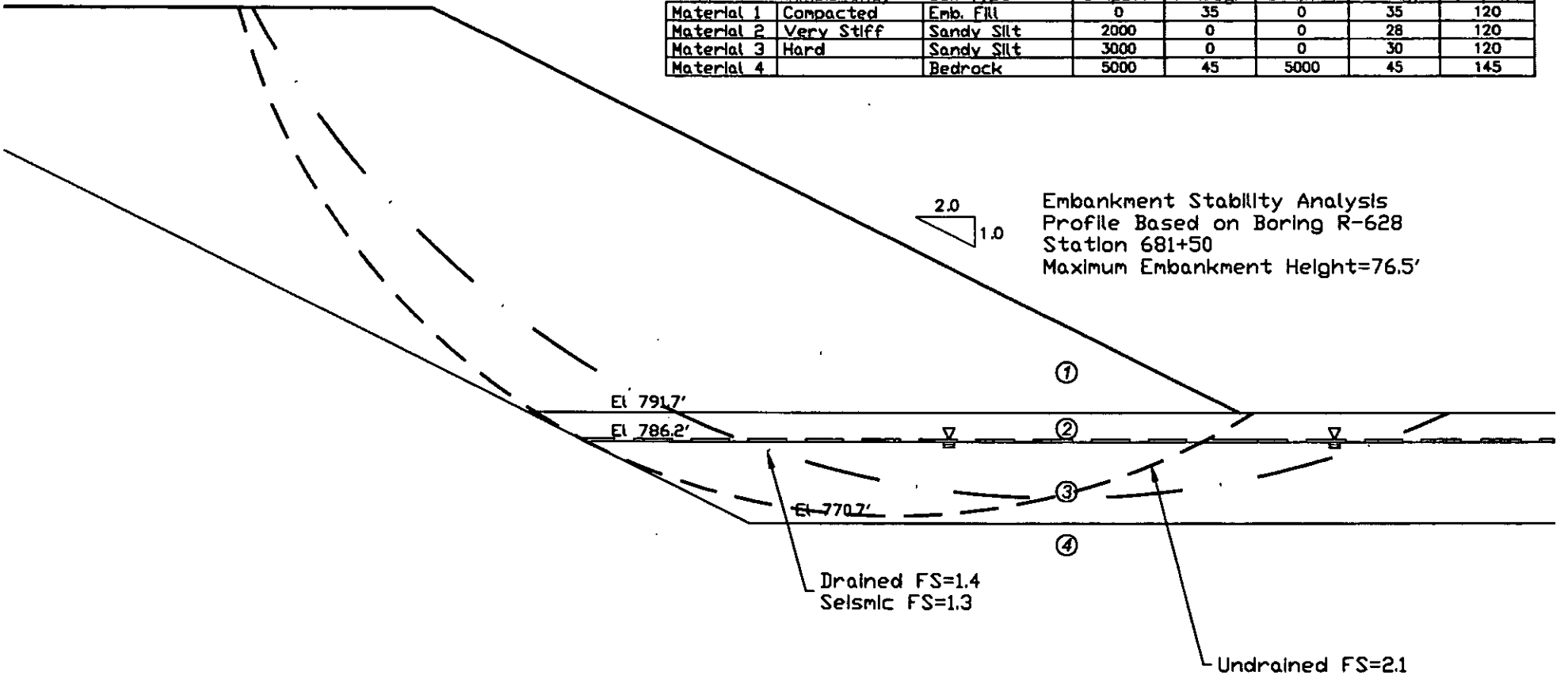
Material	Consistency	Soil Type	Undrained C (psf)	Undrained φ (deg)	Drained C' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Very Stiff	Sandy Silt	2000	0	0	28	120
Material 3	Hard	Sandy Silt	3000	0	0	30	120
Material 4		Bedrock	5000	45	5000	45	145



Embankment Global Stability
Station 681+50 Mainline Embankment
Profile based upon boring R-628

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC: JTH	DATE 02-07-07

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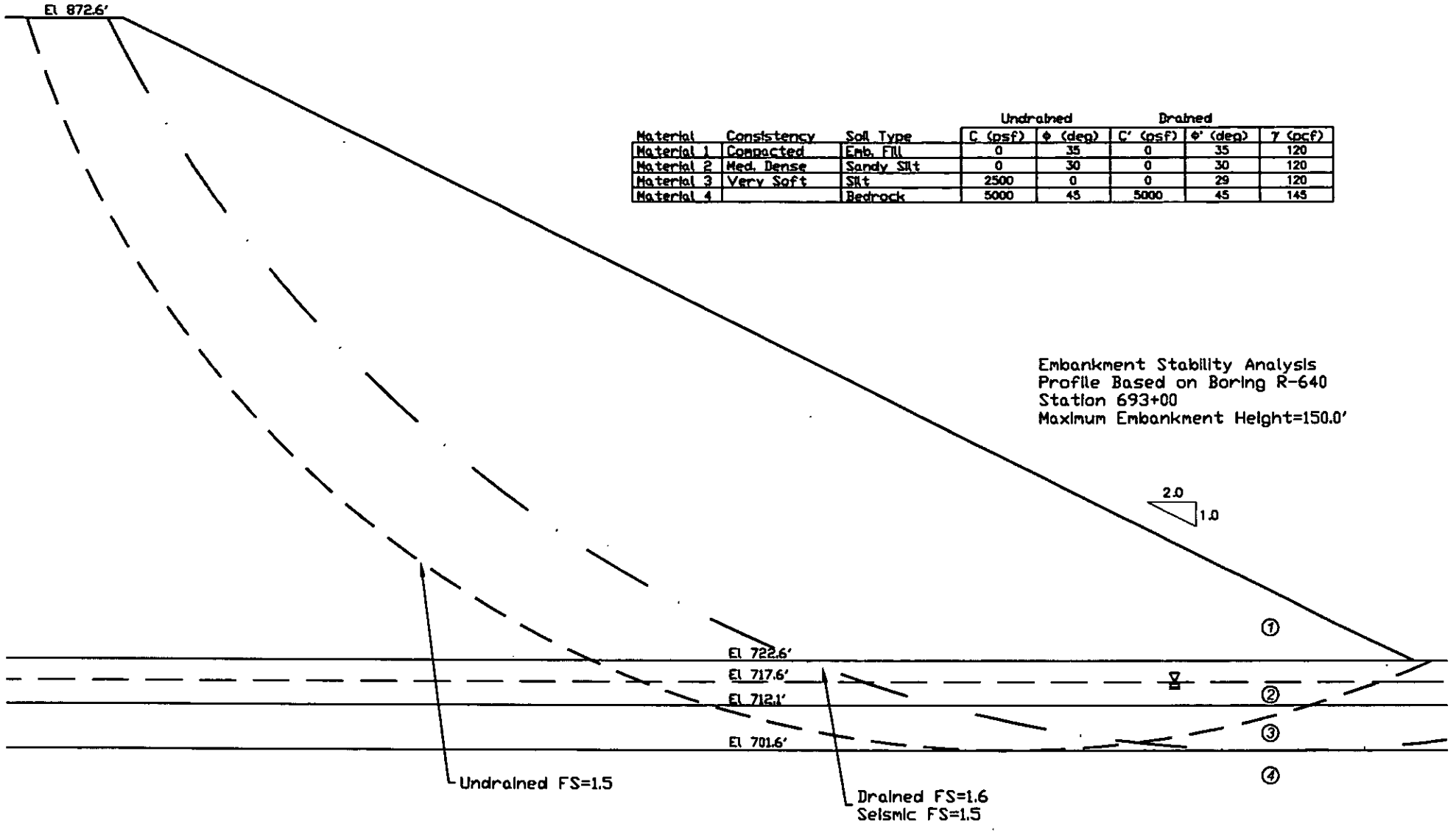

Material	Consistency	Soil Type	Undrained C (psf)	Undrained φ (deg)	Drained C' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Med. Dense	Sandy Silt	0	30	0	30	120
Material 3	Very Soft	Silt	2500	0	0	29	120
Material 4		Bedrock	5000	45	5000	45	145

Embankment Stability Analysis
Profile Based on Boring R-640
Station 693+00
Maximum Embankment Height=150.0'

Embankment Global Stability
Station 693+00 Mainline Embankment
Profile based upon boring R-640

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC: JTH	DATE 02-07-07

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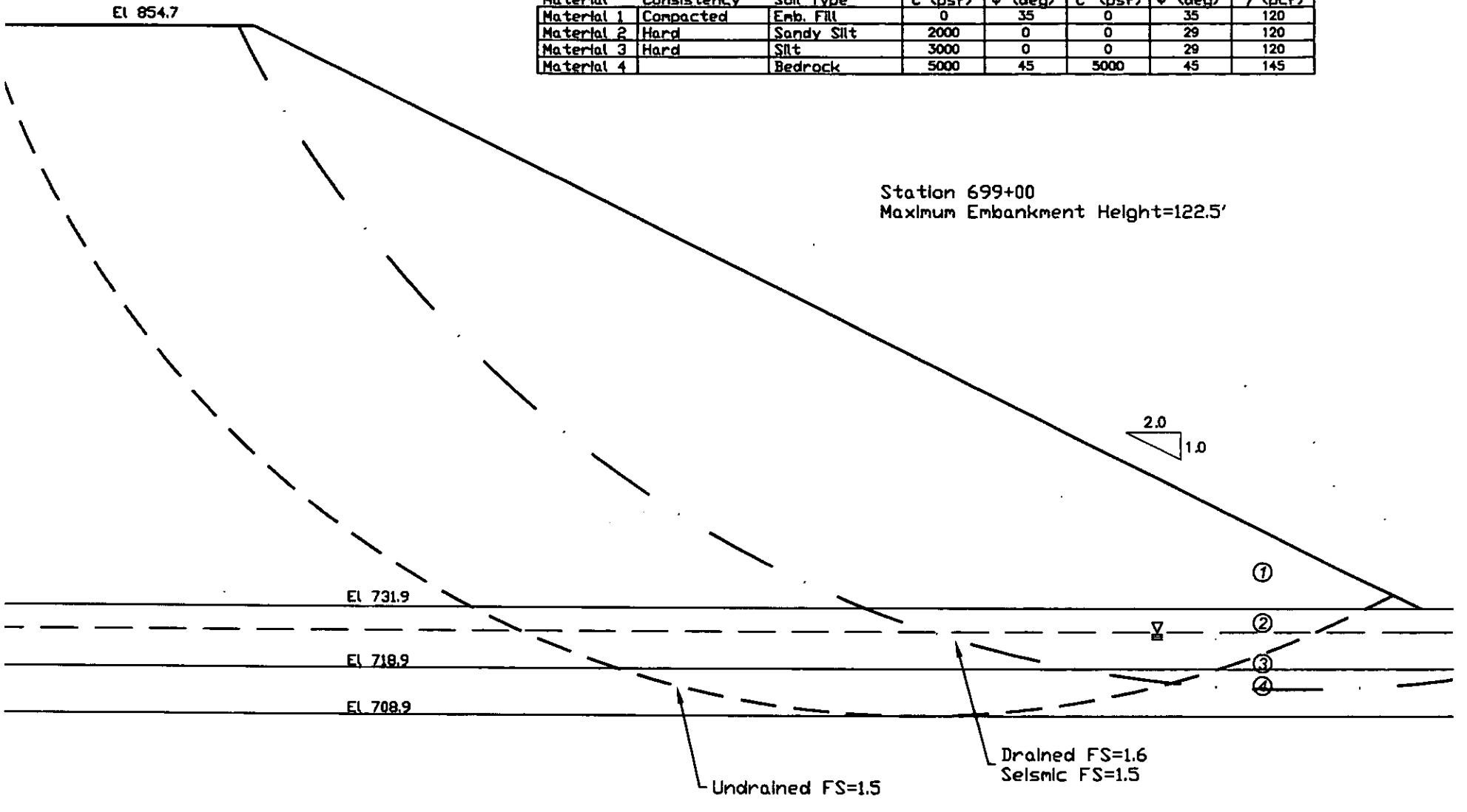
Material	Consistency	Soil Type	Undrained C (psf)	Undrained ϕ (deg)	Drained C' (psf)	Drained ϕ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Hard	Sandy Silt	2000	0	0	29	120
Material 3	Hard	Silt	3000	0	0	29	120
Material 4		Bedrock	5000	45	5000	45	145



Embankment Global Stability
Station 699+00 Mainline Embankment
Profile based upon boring R-652

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC: JTH	DATE 01-26-07

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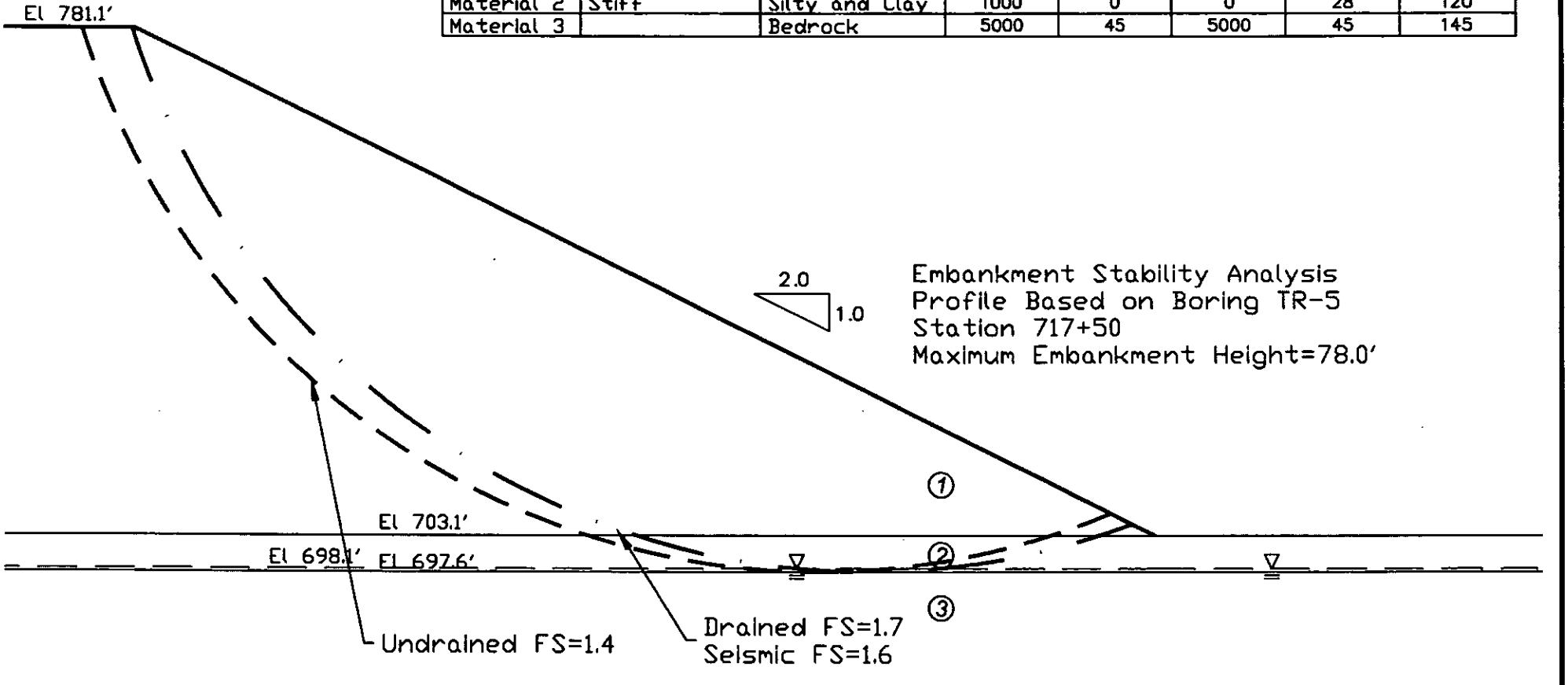
Material	Consistency	Soil Type	Undrained C (psf)	Undrained ϕ (deg)	Drained C' (psf)	Drained ϕ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Stiff	Silty and Clay	1000	0	0	28	120
Material 3		Bedrock	5000	45	5000	45	145



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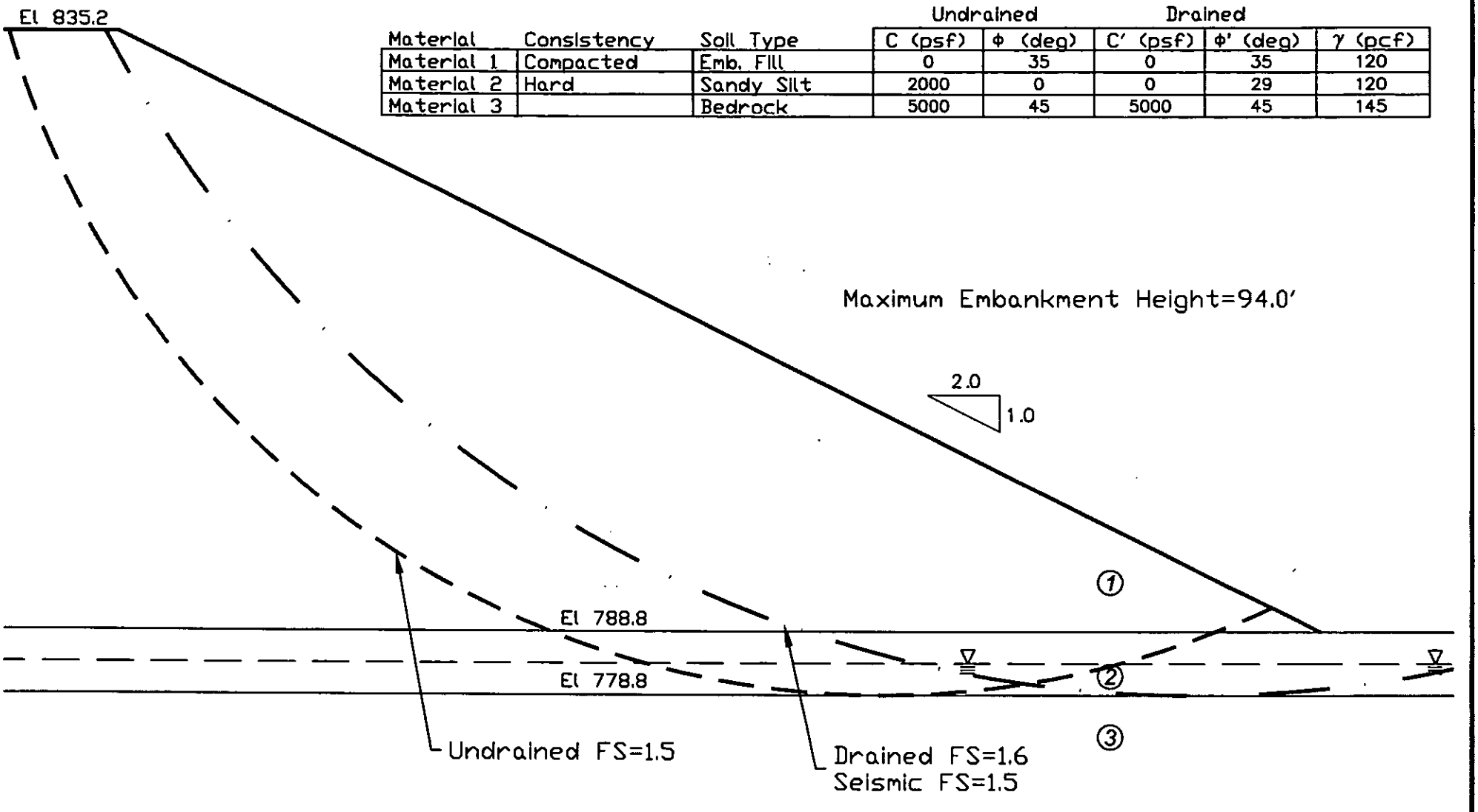
Embankment Global Stability Station 717+50 Mainline Embankment Profile based upon boring TR-5		
EMBANKMENT STABILITY ANALYSIS SCI-823-10.13		
PROJECT NO. 0121-3070.03	CALC: JTH	DATE 02-06-07



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	Hard	Sandy Silt	2000	0	0	29	120
Material 3		Bedrock	5000	45	5000	45	145

Embankment Global Stability
Station 749+00 Mainline Embankment
Profile based upon boring R-694

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC: JTH	DATE 01-29-07

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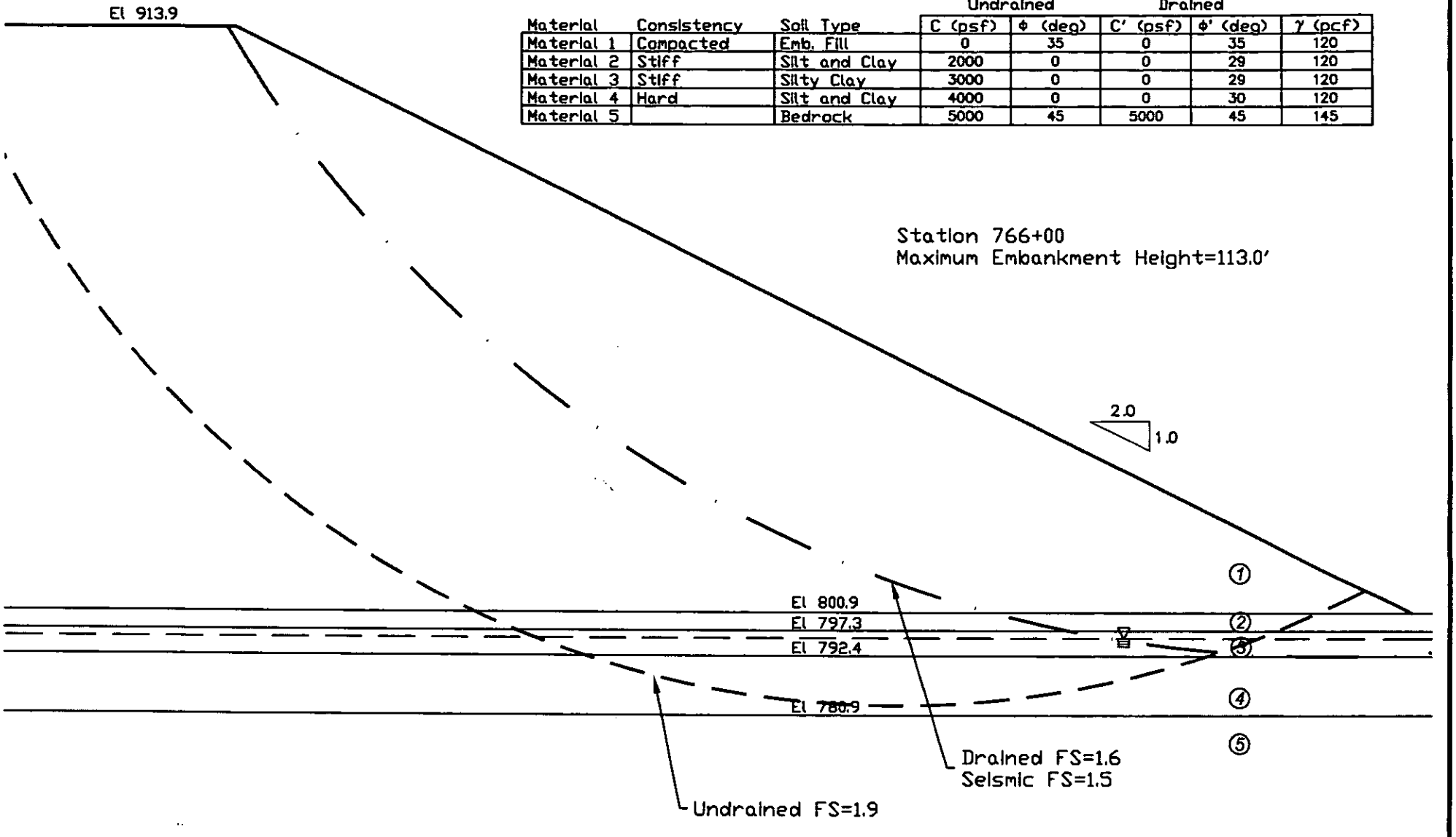
Material	Consistency	Soil Type	Undrained C (psf)	Undrained φ (deg)	Drained C' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Stiff	Silt and Clay	2000	0	0	29	120
Material 3	Stiff	Silty Clay	3000	0	0	29	120
Material 4	Hard	Silt and Clay	4000	0	0	30	120
Material 5		Bedrock	5000	45	5000	45	145



Embankment Global Stability
Station 766+00 Mainline Embankment
Profile based upon boring R-711

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC: JTH	DATE 01-29-07

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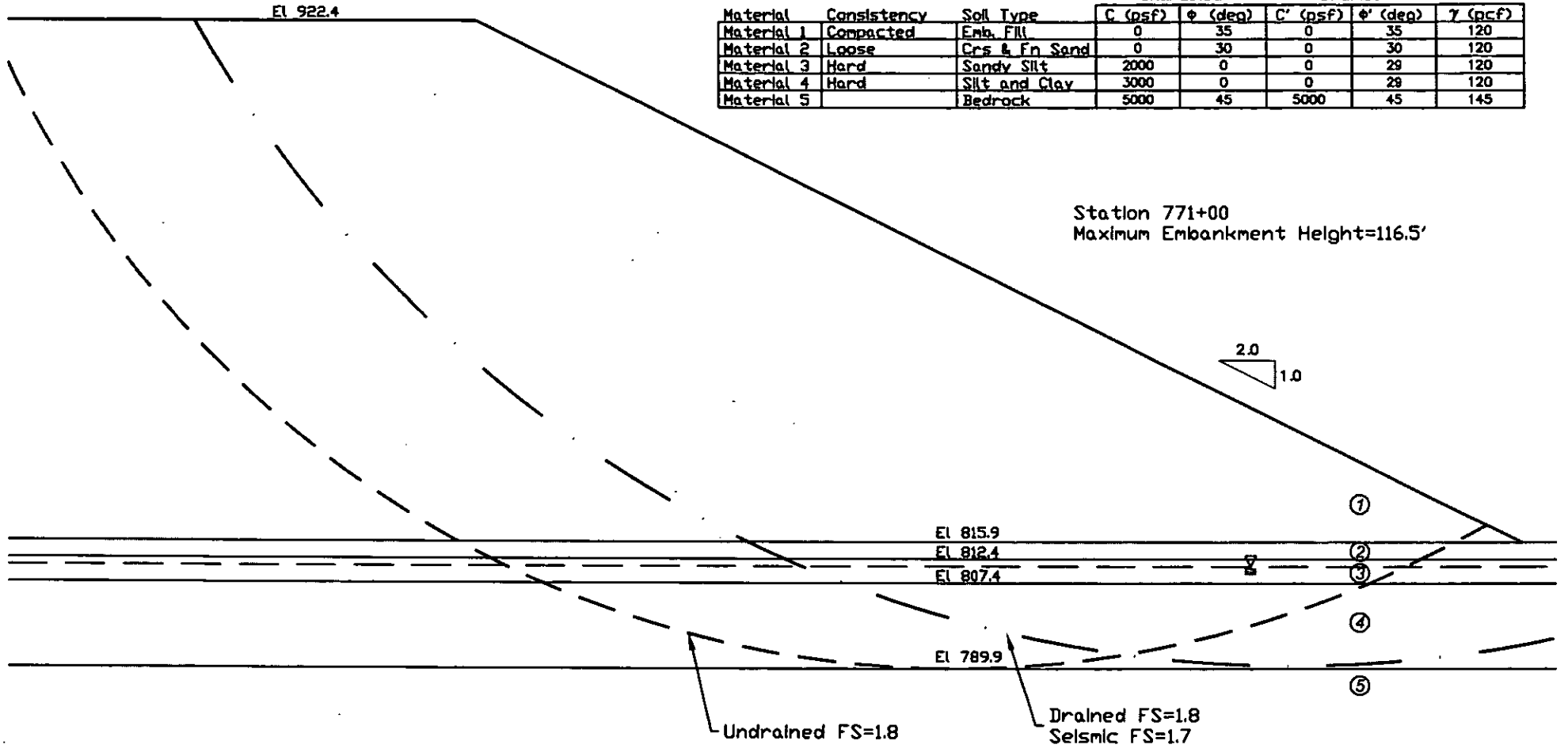
Material	Consistency	Soil Type	Undrained C (psf)	Undrained φ (deg)	Drained C' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Loose	Crs & Fn Sand	0	30	0	30	120
Material 3	Hard	Sandy Silt	2000	0	0	29	120
Material 4	Hard	Silt and Clay	3000	0	0	29	120
Material 5		Bedrock	5000	45	5000	45	145



Embankment Global Stability
Station 771+00 Mainline Embankment
Profile based upon boring R-715

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC: JTH	DATE 01-31-07

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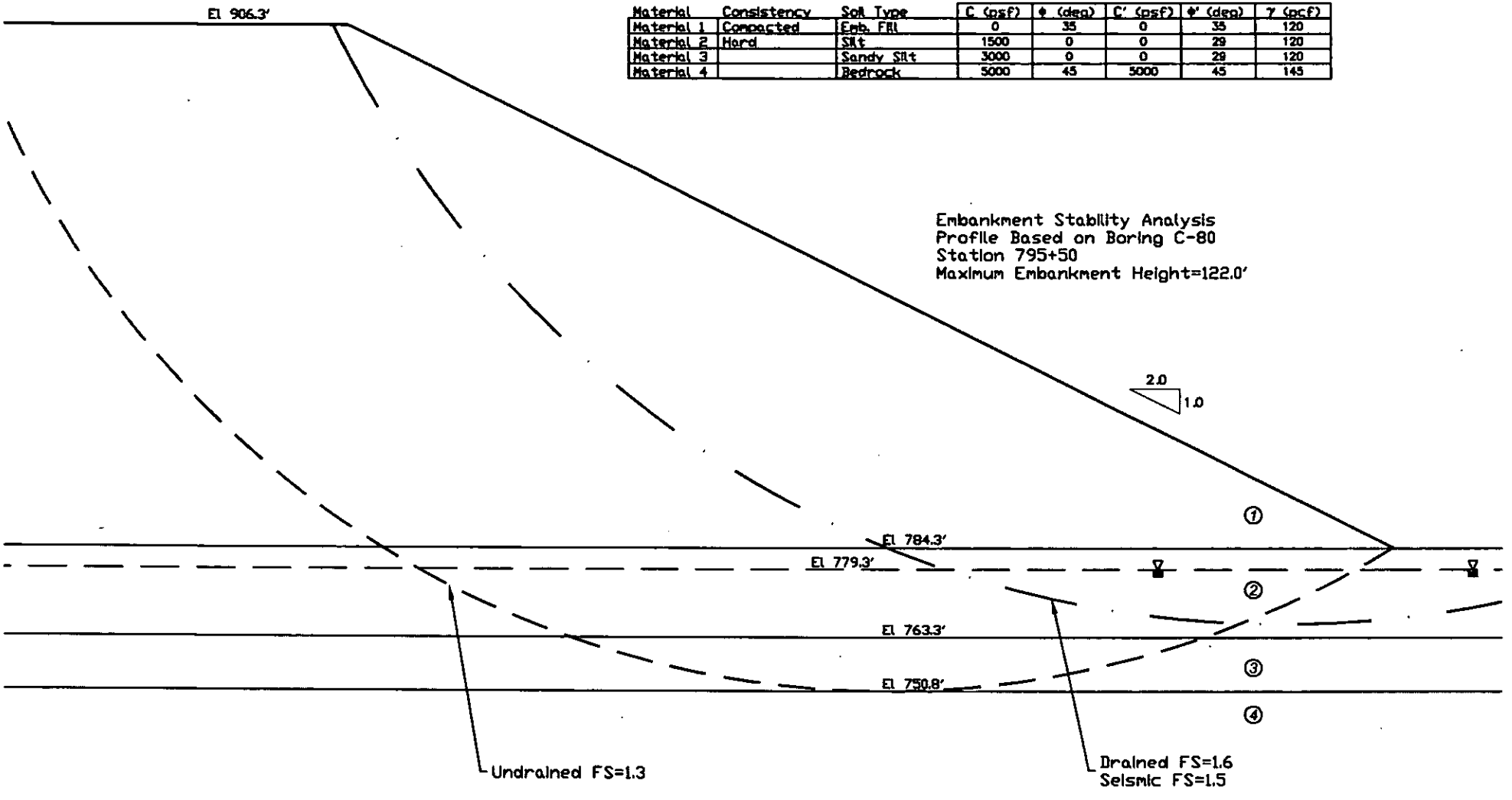
Material	Consistency	Soil Type	Undrained C (psf)	Undrained φ (deg)	Drained C' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Hard	Silt	1500	0	0	29	120
Material 3		Sandy Silt	3000	0	0	29	120
Material 4		Bedrock	5000	45	5000	45	145



Embankment Global Stability
Station 795+50 Mainline Embankment
Profile based upon boring C-80

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC: JTH	DATE 05-22-07

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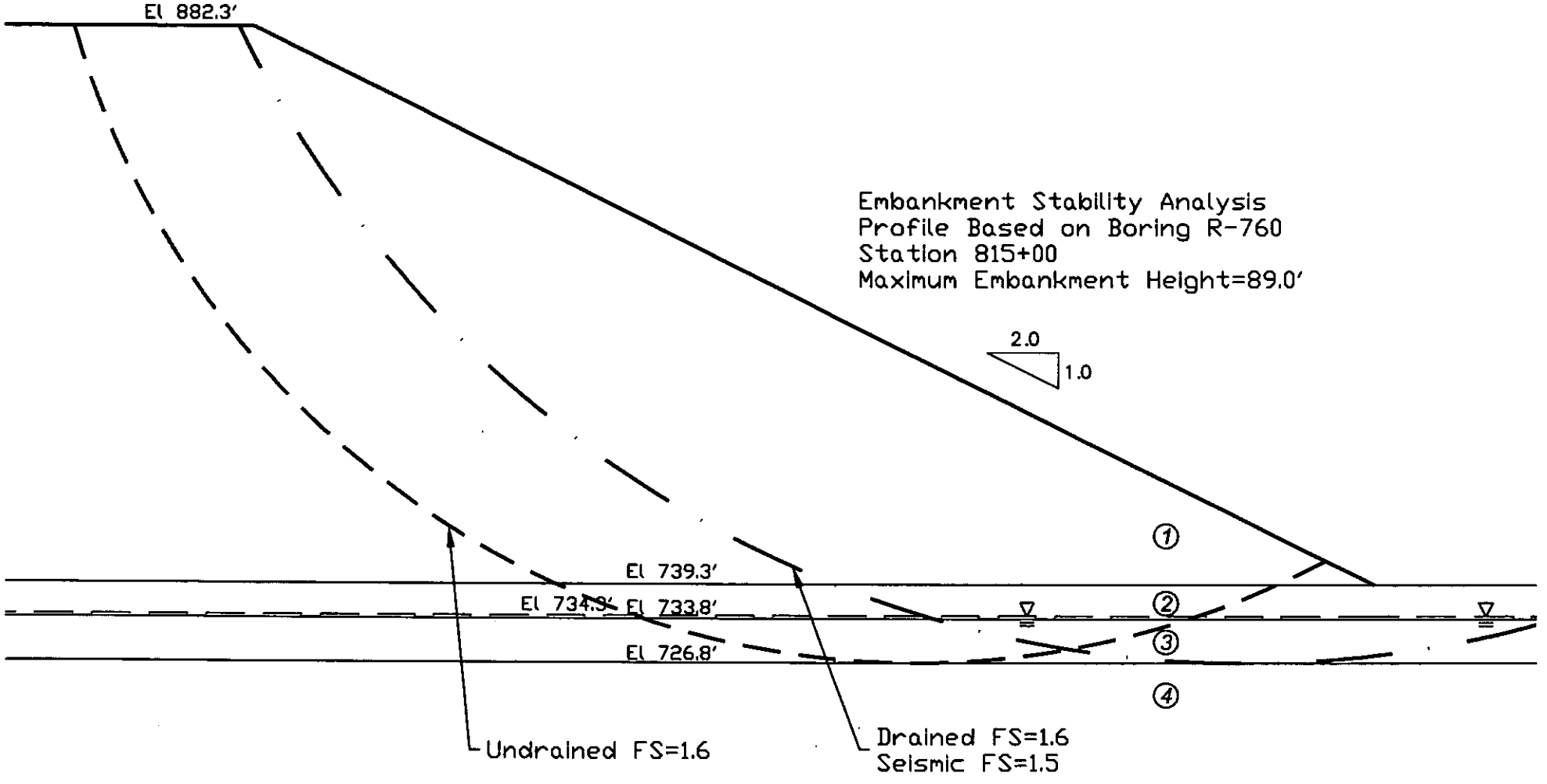
Material	Consistency	Soil Type	Undrained C (psf)	Undrained φ (deg)	Drained C' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Hard	Silt and Clay	2000	0	0	28	120
Material 3	Hard	Silty Clay	2000	0	0	28	120
Material 4		Bedrock	5000	45	5000	45	145



Embankment Global Stability
Station 815+00 Mainline Embankment
Profile based upon boring R-760

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC: JTH	DATE 02-07-07

Vid SJK 11-14-07

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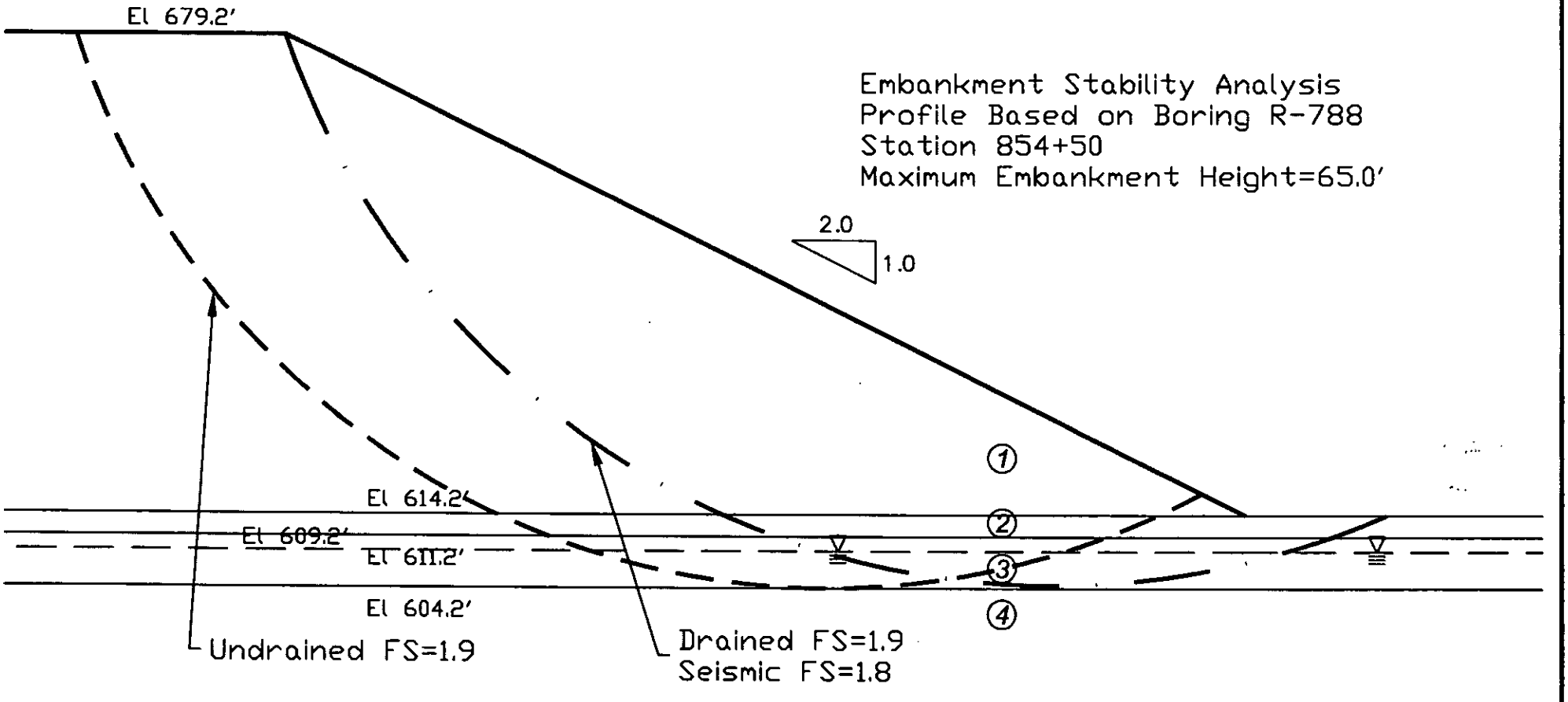
Material	Consistency	Soil Type	Undrained C (psf)	Undrained φ (deg)	Drained C' (psf)	Drained φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Very Stiff	Silt	2000	0	0	29	120
Material 3	Hard	Silt and Clay	2000	0	0	28	120
Material 4		Bedrock	5000	45	5000	45	145



Embankment Global Stability
Station 854+50 Mainline Embankment
Profile based upon boring R-788

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC JTH	DATE 02-06-07

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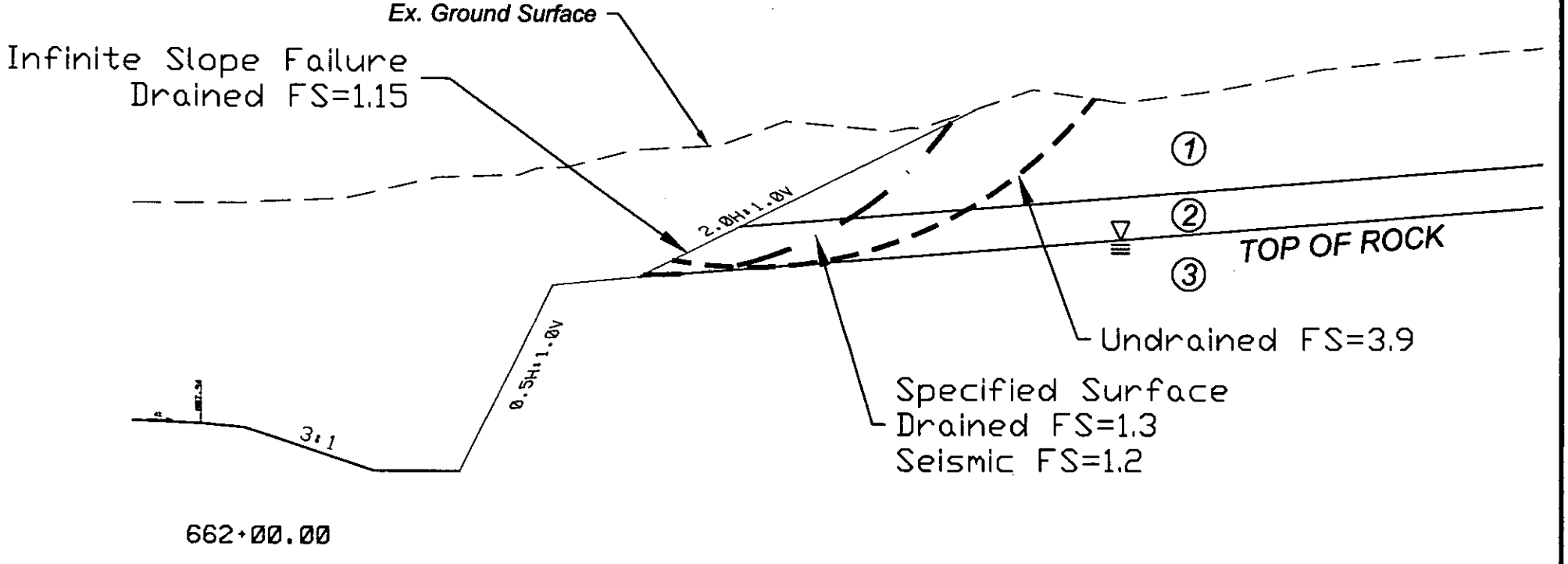
Material	Consistency	Soil Type	Undrained C (psf)	Undrained ϕ (deg)	Drained C' (psf)	Drained ϕ' (deg)	γ (pcf)
Material 1	V. Stiff	Sandy Silt	2000	0	0	29	120
Material 2	Medium Dense	Sandy Silt	0	30	0	30	120
Material 3		Sandstone	5000	45	5000	45	145

Station 662+00
Based on boring R-606
Soil Cut Slope Stability
H= 20 ft



Soil Cut Slope Stability
Station 662+00 Mainline Embankment
Profile based upon boring R-606

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03 | CALC. SJR | DATE 11-09-07

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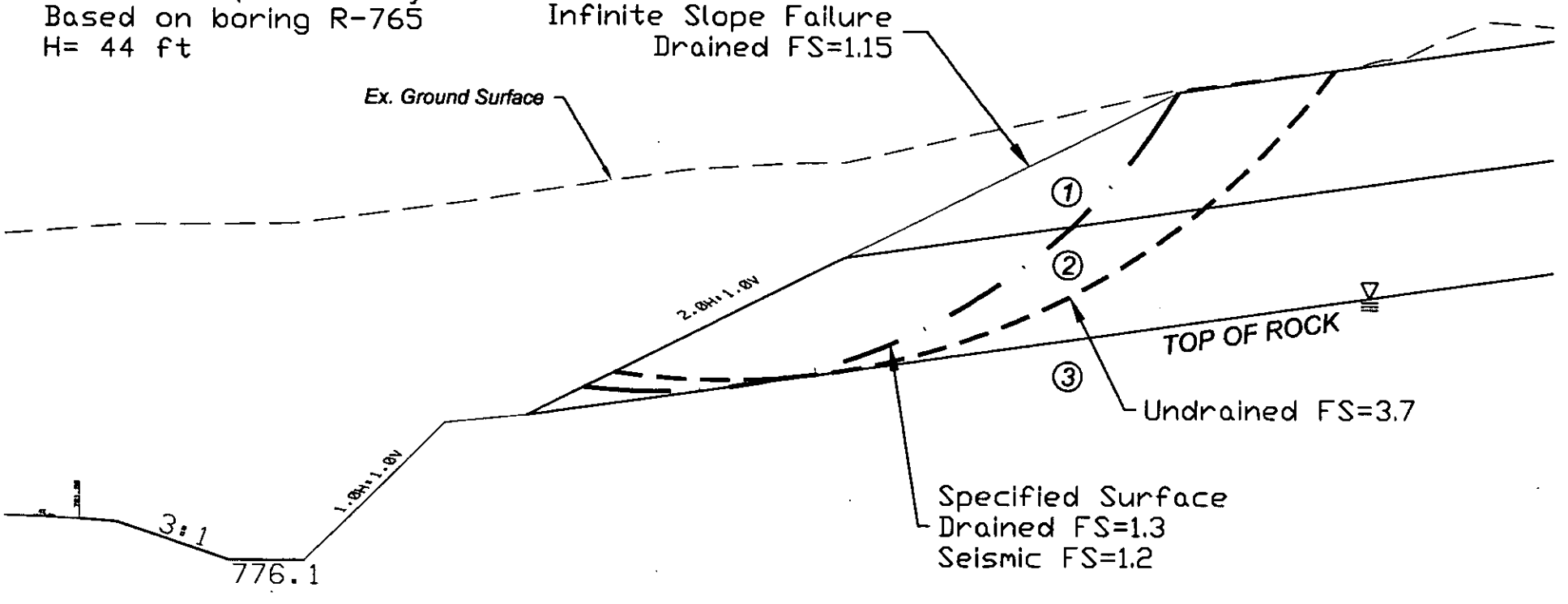
Material	Consistency	Soil Type	Undrained C (psf)	Undrained ϕ (deg)	Drained C' (psf)	Drained ϕ' (deg)	γ (pcf)
Material 1	V. Stiff	Sandy Silt	2000	0	0	30	120
Material 2	Very Stiff	Silt and Clay	2000	0	0	29	120
Material 3		Sandstone	5000	45	5000	45	145

Station 826+50
Soil Cut Slope Stability
Based on boring R-765
H= 44 ft



826+50.00

Soil Cut Slope Stability Station 826+50 Mainline Embankment Profile based upon boring R-765		
EMBANKMENT STABILITY ANALYSIS SCI-823-10.13		
PROJECT NO. 0121-3070.03	CALC: SJR	DATE 11-09-07

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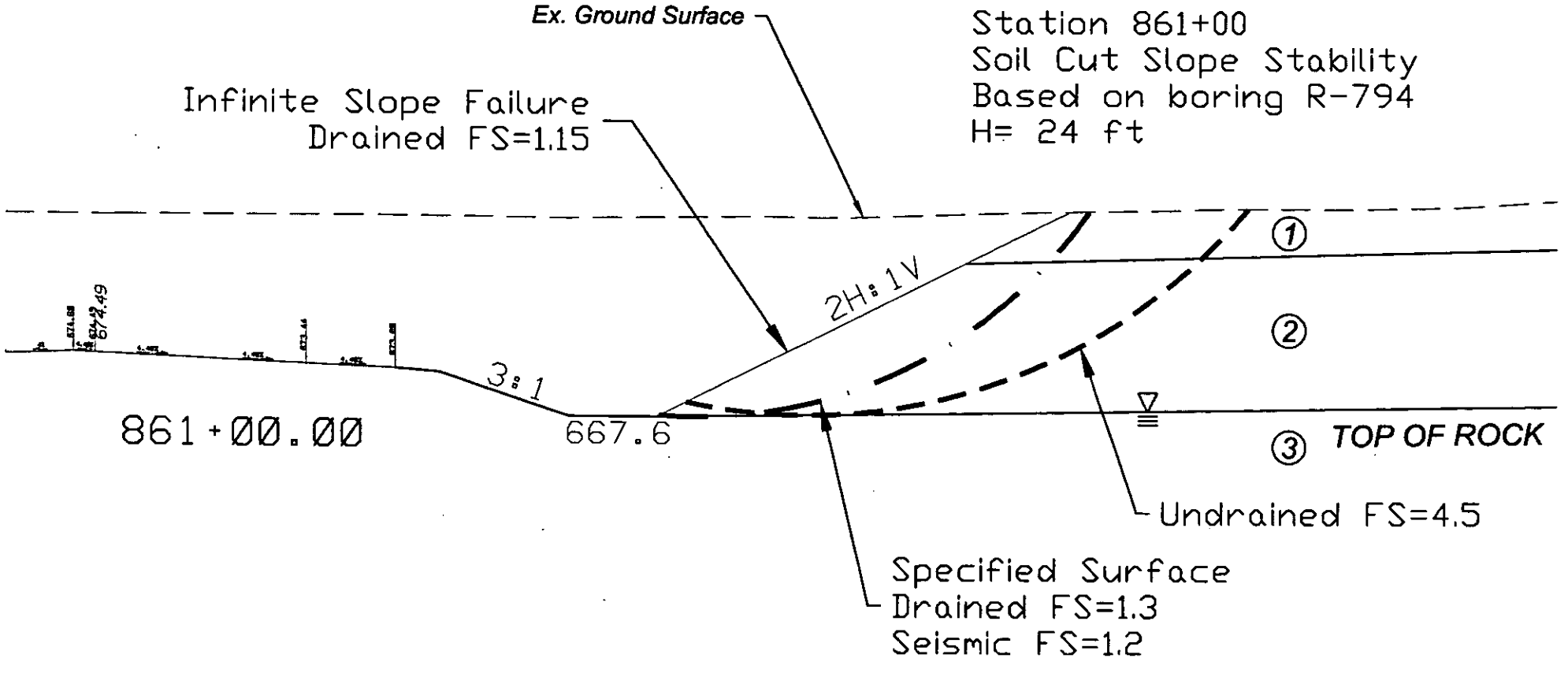
Material	Consistency	Soil Type	Undrained C (psf)	Undrained Φ (deg)	Drained C′ (psf)	Drained Φ′ (deg)	γ (pcf)
Material 1	V. Stiff	Silt and Clay	2000	0	0	30	120
Material 2	Medium Dense	Sandy Silt	1500	0	0	29	120
Material 3		Sandstone	5000	45	5000	45	145



Soil Cut Slope Stability
Station 861+00 Mainline Embankment
Profile based upon boring R-794

EMBANKMENT STABILITY ANALYSIS

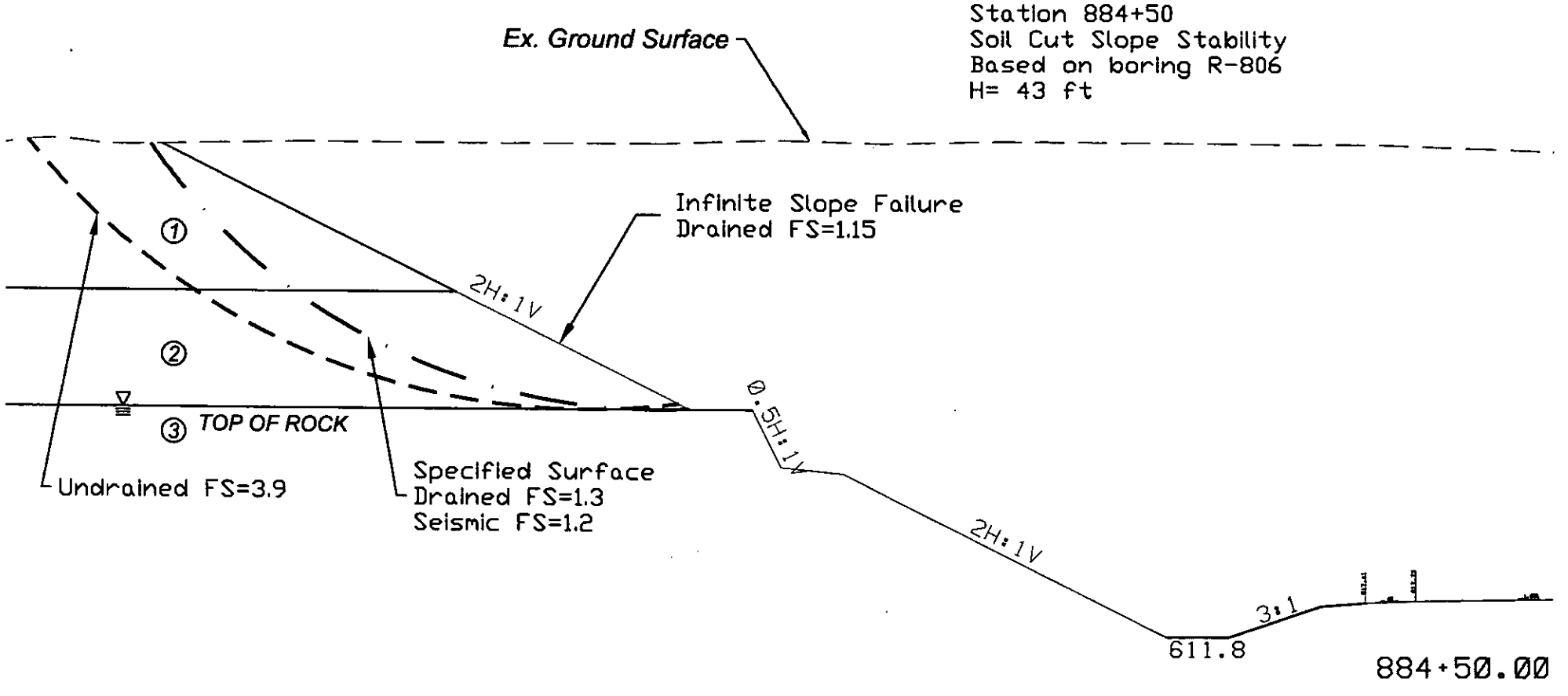
SCI-823-10.13

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 11-09-07

✓DAA 11-15-07

Sheet 3 of 4 SJR 11-15-07

Material	Consistency	Soil Type	Undrained C (psf)	Undrained Φ (deg)	Drained C' (psf)	Drained Φ' (deg)	γ (pcf)
Material 1	V. Stiff	Silt and Clay	2000	0	0	29	120
Material 2	Medium Dense	Sandy Silt	0	30	0	30	120
Material 3		Sandstone	5000	45	5000	45	145



Soil Cut Slope Stability
Station 884+50 Mainline Embankment
Profile based upon boring R-806

EMBANKMENT STABILITY ANALYSIS

SCI-823-10.13

PROJECT NO. 0121-3070.03 | CALC. SJR | DATE 11-09-07

✓DAA 11-15-07

Sheet 4 of 4 SJR 11-15-07

APPENDIX C

DLZ

APPENDIX C

Settlement Calculations
Time-Rate of Consolidation Calculations

Summary of Settlement Calculations

Fill Section Location		X-section Analyzed	Maximum Fill Height	Foundation Thickness	Cohesive Soil Thickness	Immediate Settlement	Consolidation Settlement
Beginning	Ending	(Station)	(feet)	(feet)	(feet)	(inch)	(inch)
537+50	543+00	See Lucasville-Minford Road Interchange Report					
575+00	580+50	578+00	49.0	6.0	3.0	3/4	1
597+00	603+00	600+00	90.6	16.0	7.5	2 1/2	5/8
609+00	611+50	610+00	68.0	28.5	12.5	2 5/8	1 3/4
616+00	---	617+50	89.5	16.0	5.0	2 1/2	5/8
---	625+50	623+50	77.0	18.5	0.0	3 1/4	negligible
633+50	637+50	635+50	86.0	13.5	7.5	2	3/4
657+00	661+00	659+50	103.0	8.5	0.0	2 1/4	negligible
670+50	674+50	672+00	100.0	33.5	15.5	3 1/4	1 3/4
680+50	683+00	681+50	76.5	21.0	5.0	Settlement negligible by inspection	
689+50	---	693+00	150.0	21.0	0.0	3 7/8	negligible
---	702+00	699+00	122.5	23.0	0.0	3 3/4	negligible
714+50	725+00	717+50	78.0	5.5	5.5	negligible	1 3/4
745+50	753+00	749+00	94.0	10.0	0.0	1 1/2	negligible
761+00	---	766+00	113.0	20.0	20.0	negligible	4 1/2
---	775+00	771+00	116.5	26.0	17.5	3	2 7/8
790+00	798+75	795+50	122.0	15.0	15.0	negligible	3
810+50	825+50	815+00	89.0	12.5	12.5	negligible	3
847+50	859+50	854+50	65.0	10.0	10.0	negligible	2
867+00	872+00	869+00	24.0	10.0	3.0	Settlement negligible by inspection	
889+00	904+80	See US 23 / SR 823 Interchange Report					

Cross-section geomerty and soil properties.

$$e_o = \frac{Gs \times wc}{100}$$

Assume $G_s = 2.70$ for clayey soils.

Therefore, $$e_o = \frac{2.70 \times wc}{100}$$

In lieu of consolidation testing, settlement parameters were estimated based upon the equations presented to the left.
Reference: Terzaghi, K., and Peck, R. (1967),
Soil Mechanics in Engineering Practice

$C_c = 0.009\ (LL-10)$

If no laboratory testing (particle-size, PI, moisture) was performed on the referenced boring, settlement parameters were taken from adjacent borings from similar soil types depths and consistencies.

$$C_r = \frac{C_c}{10}$$

C' (Hough Coef.) is from the chart on page 25 of 26

X-section	Fill Height (feet)	Foundation Thickness (feet)	
578+00	49	6.0	Based upon boring TR-9

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	3.0	Silty Clay	11.5	34	17	0.311	0.216	0.022	---	n/a
2	3.0	Sandy Silt	No Lab	No Lab	No Lab	No Lab	No Lab	No Lab	10	55

X-section	Fill Height (feet)	Foundation Thickness (feet)	
600+00	91	16.0	Based upon boring R-516

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	8.5	Sandy Silt	15.0	21	2	0.405	0.099	0.010	11	55
2	7.5	Silt	21.0	No Lab	No Lab	0.567	0.117	0.012	---	---

X-section	Fill Height (feet)	Foundation Thickness (feet)	
610+00	68	28.5	Based upon boring R-526

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	16.0	Sandy Silt	No Lab	No Lab	No Lab	No Lab	No Lab	No Lab	20	75
2	2.5	Silt	No Lab	No Lab	No Lab	0.351	0.135	0.014	---	---
3	2.5	Silt & Clay	No Lab	No Lab	No Lab	0.392	0.243	0.024	---	---
4	5	Silt	No Lab	No Lab	No Lab	0.392	0.243	0.024	---	---
5	2.5	Silty Clay	No Lab	No Lab	No Lab	0.311	0.216	0.022	---	---

DLZ

CLIENT	TransSystems / ODOT Dist 9	JOB NUMBER	0121-3070.03
PROJECT	SCI - 823 - 10.13	SHEET NO.	3 OF 26
SUBJECT	Mainline Embankment - Phase 2	COMP. BY	JTH DATE 2/9/07
	Settlement - Quantity	CHECKED BY	SAK DATE 11-14-07

X-section	Fill Height (feet)	Foundation Thickness (feet)
617+50	89.5	16.0

Based upon boring R-538

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	6.0	Sandy Silt	No Lab	No Lab	No Lab	No Lab	No Lab	No Lab	11	55
2	5.0	Silt	12.5	NP	NP	0.338	0.135	0.014	---	---
3	5.0	Sandy Silt	No Lab	No Lab	No Lab	No Lab	No Lab	No Lab	25	90

X-section	Fill Height (feet)	Foundation Thickness (feet)
623+50	77	18.5

Based upon boring R-553

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	18.5	Sandy Silt	No Lab	No Lab	No Lab	No Lab	No Lab	No Lab	15	65

X-section	Fill Height (feet)	Foundation Thickness (feet)
635+50	86	13.5

Based upon boring R-565

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	3.5	Sandy Silt	No Lab	No Lab	No Lab	No Lab	No Lab	No Lab	5	45
2	7.5	Silt	19.0	23	4	0.513	0.117	0.012	---	---
3	2.5	Sandy Silt	No Lab	No Lab	No Lab	No Lab	No Lab	No Lab	16	66

X-section	Fill Height (feet)	Foundation Thickness (feet)
659+00	103	8.5

Based upon boring R-602

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	8.5	Sandy Silt	13.0	27	9	0.351	0.153	0.015	16	66

X-section	Fill Height (feet)	Foundation Thickness (feet)
672+00	100	33.5

Based upon boring R-618

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	10.5	Sandy Silt	No Lab	No Lab	No Lab	No Lab	No Lab	No Lab	20	77
2	2.5	Silt	13.0	25	6	0.351	0.135	0.014	---	---
3	7.5	Sandy Silt	12.0	21	3.0	0.324	0.099	0.010	16	66
4	5.0	Silt	16.0	26	7	0.432	0.144	0.014	---	---
5	8.0	Silty Clay	12.0	35	16	0.324	0.225	0.023	---	---

DLZ

CLIENT	TransSystems / ODOT Dist 9	JOB NUMBER	0121-3070.03
PROJECT	SCI - 823 - 10.13	SHEET NO.	4 OF 26
SUBJECT	Mainline Embankment - Phase 2	COMP. BY	JTH DATE 2/9/07
	Settlement - Quantity	CHECKED BY	SJK DATE 11-14-07

X-section	Fill Height (feet)	Foundation Thickness (feet)
681+50	113	5.0

Based upon boring R-628

Settlement OK by inspection

X-section	Fill Height (feet)	Foundation Thickness (feet)
693+00	150	21.0

Based upon boring R-640

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	21.0	Sandy Silt	No Lab	No Lab	No Lab	No Lab	No Lab	No Lab	20	77

X-section	Fill Height (feet)	Foundation Thickness (feet)
699+00	122.5	23.0

Based upon boring R-652

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	23.0	Sandy Silt	12.0	27	8	0.324	0.153	0.015	20	77

X-section	Fill Height (feet)	Foundation Thickness (feet)
717+50	8	5.5

Based upon boring TR-5

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	5.5	Silt & Clay	14.5	37	14	0.392	0.243	0.024	---	---

X-section	Fill Height (feet)	Foundation Thickness (feet)
749+00	94	10.0

Based upon boring R-694

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	3.5	Sandy Silt	No Lab	No Lab	No Lab	No Lab	No Lab	No Lab	17	75
2	6.5	Sandy Silt	No Lab	No Lab	No Lab	No Lab	No Lab	No Lab	50	170

X-section	Fill Height (feet)	Foundation Thickness (feet)
766+00	113	20.0

Based upon boring R-711

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	3.5	Silt & Clay	No Lab	No Lab	No Lab	0.459	0.225	0.023	---	---
2	5.0	Silty Clay	No Lab	No Lab	No Lab	0.311	0.216	0.022	---	---
3	11.5	Silt & Clay	No Lab	No Lab	No Lab	0.459	0.225	0.023	---	---

X-section	Fill Height (feet)	Foundation Thickness (feet)
771+00	116.5	26.0

Based upon boring R-715

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	3.5	Crs & Fn Sa	7.0	NP	NP	No Lab	No Lab	No Lab	7	42
2	5.0	Sandy Silt	8.0	21	8	0.216	0.099	0.010	13	62
3	17.5	Silt & Clay	17	35	15	0.459	0.225	0.023	---	---

X-section	Fill Height (feet)	Foundation Thickness (feet)
795+50	122	15.0

Based upon boring C-80

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	15.0	Silt & Clay	No Lab	No Lab	No Lab	0.300	0.18	0.018	---	---

X-section	Fill Height (feet)	Foundation Thickness (feet)
815+00	89	12.5

Based upon boring R-760

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	5.5	Silt & Clay	11	32	13	0.297	0.198	0.020	---	---
2	7.0	Silty Clay	No Lab	39	14	0.385	0.252	0.025	---	---

X-section	Fill Height (feet)	Foundation Thickness (feet)
854+50	65	10.0

Based upon boring R-788

Soil Layer	Thickness	Soil Type	WC	LL	PI	e_o	C_c	C_r	N	C'
1	3.0	Silt	11.0	29	9	0.297	0.171	0.017	---	---
2	7.0	Silt & Clay	14.5	32	14	0.392	0.198	0.020	---	---

X-section	Fill Height (feet)	Foundation Thickness (feet)
869+00	24	10.0

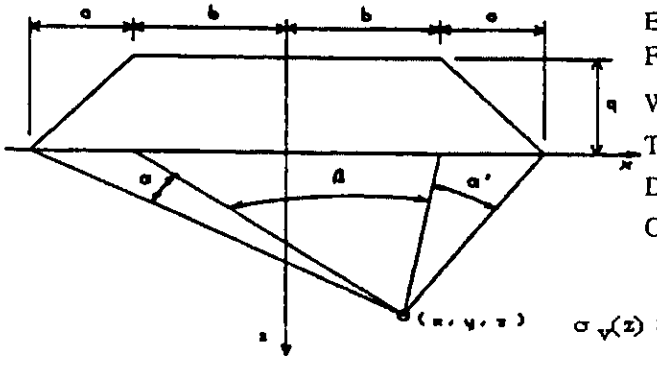
Settlement OK by inspection

DLZ SUBJECT

Client	TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
Project	SCI-823-10.13	SHEET NO.	10 OF 20
Item	Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 578+00	CHECKED BY	SJK DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	6.0	ft		
Embankment Height:	H =	49	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	5,880 psf
Width of Slope:	a =	98			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	6	ft

**See Data output Attached*

$$\sigma_v(z) := \left(\frac{q}{\pi \cdot a}\right)\cdot\left(a\cdot(\alpha(z)+\beta(z)+\alpha'(z)) + b\cdot(\alpha(z)+\alpha'(z)) + x\cdot(\alpha(z)-\alpha'(z))\right)$$

$$\beta(z) := \operatorname{atan}\left[\frac{(b-x)}{z}\right] + \operatorname{atan}\left[\frac{(b+x)}{z}\right] \qquad \alpha'(z) := \operatorname{atan}\left[\frac{(a+b-x)}{z}\right] - \operatorname{atan}\left[\frac{(b-x)}{z}\right] \qquad \alpha(z) := \operatorname{atan}\left[\frac{(a+b+x)}{z}\right] - \operatorname{atan}\left[\frac{(b+x)}{z}\right]$$

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	3.0	ft	Silty Clay	120	6,060	180	5,880	6,060	0.0	0.02	0.22	0.311
2	6.0	ft	Sandy Silt	120	6,419	540	5,879	6,419	55.0	0.00	0.00	0.000
3	0.0			0	0							
4	0.0			0	0							
5	0.0			0	0							
6	0.0			0	0							
7	0.0			0	0							
8	0.0			0	0							
9	0.0			0	0							
10	0.0			0	0							

No.	Settlement:		Total Settlement
1	0.075	ft	
2	0.059	ft	0.134 ft
3			
4			
5			1.6 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 ($\sigma'_0=\sigma'_c$)

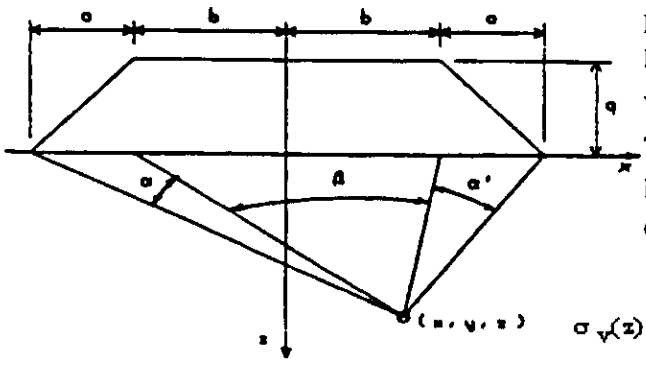
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ

SUBJECT	Client TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
	Project SCI-823-10.13	SHEET NO.	7 OF 20
	Item Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 600+00	CHECKED BY	SJK DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	16.0	ft		
Embankment Height:	H =	90.6	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	10,872 psf
Width of Slope:	a =	181.2			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	16	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

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	8.5	ft	Sandy Silt	120	11,382	510	10,872	11,382	55.0	0.00	0.00	0.000
2	16.0	ft	Silt	120	12,334	1,470	10,862	12,332	0.0	0.01	0.12	0.567
3	0.0			0	0							
4	0.0			0	0							
5	0.0			0	0							
6	0.0			0	0							
7	0.0			0	0							
8	0.0			0	0							
9	0.0			0	0							
10	0.0			0	0							

No.	Settlement:		Total Settlement
1	0.208	ft	
2	0.052	ft	0.260 ft
3			
4			
5			3.1 in
6			
7			
8			
9			
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 ($\sigma'_0=\sigma'_c$)

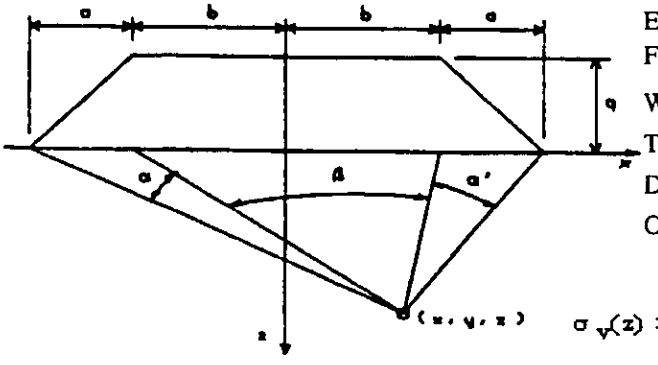
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ

SUBJECT	Client TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
	Project SCI-823-10.13	SHEET NO.	8 OF 26
	Item Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement -- Station 610+00	CHECKED BY	SJK DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	6.5	ft		
Embankment Height:	H =	68	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	8,160 psf
Width of Slope:	a =	136			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	29	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	16.0	ft	Sandy Silt	120	9,023	866	8,157	9,023	75.0	0.00	0.00	0.000
2	18.5	ft	Silt	120	9,532	1,399	8,133	9,532	0.0	0.01	0.14	0.351
3	21.0	ft	Silt and Clay	120	9,663	1,543	8,120	9,663	0.0	0.02	0.24	0.392
4	26.0	ft	Silt	120	9,855	1,759	8,096	9,855	0.0	0.02	0.24	0.392
5	28.5	ft	Silty Clay	120	10,040	1,975	8,064	10,040	0.0	0.02	0.22	0.311
6	0.0			0	0							
7	0.0			0	0							
8	0.0			0	0							
9	0.0			0	0							
10	0.0			0	0							

No.	Settlement:		Total Settlement
1	0.217	ft	
2	0.021	ft	0.356 ft
3	0.035	ft	
4	0.054	ft	
5	0.029	ft	4.3 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 ($\sigma'_0=\sigma'_c$)

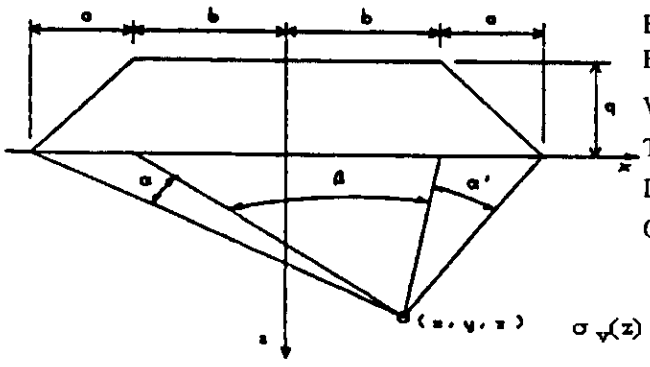
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ SUBJECT

Client	TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
Project	SCI-823-10.13	SHEET NO.	9 OF 26
Item	Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 617+50	CHECKED BY	SJK DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	16.0	ft		
Embankment Height:	H =	89.5	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	10,740 psf
Width of Slope:	a =	179			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	16	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	6.0	ft	Sandy Silt	120	11,100	360	10,740	11,100	55.0	0.00	0.00	0.000
2	11.0	ft	Silt	120	11,756	1,020	10,736	11,756	0.0	0.01	0.14	0.338
3	16.0	ft	Sandy Silt	120	12,346	1,620	10,726	12,346	90.0	0.00	0.00	0.000
4	0.0			0	0							
5	0.0			0	0							
6	0.0			0	0							
7	0.0			0	0							
8	0.0			0	0							
9	0.0			0	0							
10	0.0			0	0							

No.	Settlement:		Total Settlement
1	0.162	ft	
2	0.054	ft	0.265 ft
3	0.049	ft	
4			
5			3.2 in
6			
7			
8			
9			
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 ($\sigma'_0=\sigma'_c$)

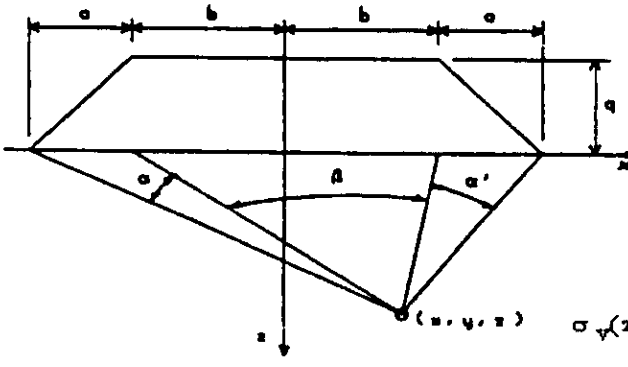
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ

SUBJECT	Client TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
	Project SCI-823-10.13	SHEET NO.	10 OF 26
	Item Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 623+50	CHECKED BY	SJK DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	18.5	ft		
Embankment Height:	H =	76.8	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	9,216 psf
Width of Slope:	a =	153.6			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	19	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	18.5 ft	Sandy Silt	120	10,322	1,110	9,211	10,321	65.0	0.00	0.00	0.000
2	0.0		0	0							
3	0.0		0	0							
4	0.0		0	0							
5	0.0		0	0							
6	0.0		0	0							
7	0.0		0	0							
8	0.0		0	0							
9	0.0		0	0							
10	0.0		0	0							

No.	Settlement:	Total Settlement
1	0.276 ft	
2		**0.276 ft**
3		
4		
5		**3.3 in**
6		
7		
8		
9		
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 ($\sigma'_0=\sigma'_c$)

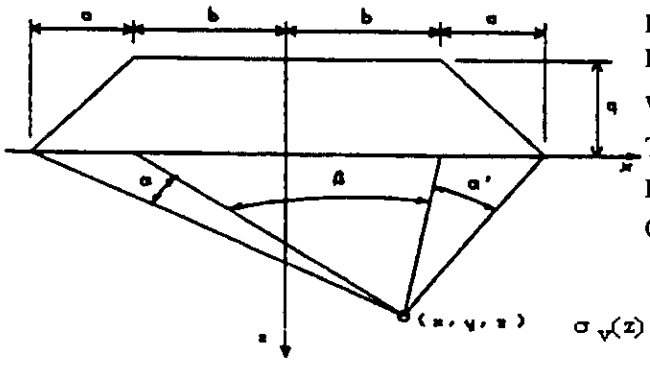
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ

SUBJECT	Client TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
	Project SCI-823-10.13	SHEET NO.	11 OF 26
	Item Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 635+50	CHECKED BY	SJK DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	13.5	ft		
Embankment Height:	H =	86	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	10,320 psf
Width of Slope:	a =	215			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	14	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

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	3.5	ft	Sandy Silt	120	10,530	210	10,320	10,530	45.0	0.00	0.00	0.000
2	11.0	ft	Silt	120	11,188	870	10,318	11,188	0.0	0.01	0.12	0.513
3	13.5	ft	Sandy Silt	120	11,782	1,470	10,312	11,782	66.0	0.00	0.00	0.000
4	0.0			0	0							
5	0.0			0	0							
6	0.0			0	0							
7	0.0			0	0							
8	0.0			0	0							
9	0.0			0	0							
10	0.0			0	0							

No.	Settlement:		Total Settlement
1	0.132	ft	
2	0.064	ft	0.231 ft
3	0.034	ft	
4			
5			2.8 in
6			
7			
8			
9			
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 ($\sigma'_0=\sigma'_c$)

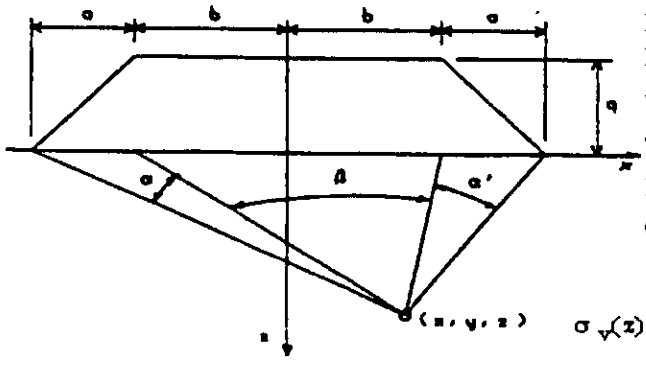
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ

SUBJECT	Client TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
	Project SCI-823-10.13	SHEET NO.	12 OF 26
	Item Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 659+00	CHECKED BY	SAK DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	8.5	ft		
Embankment Height:	H =	103	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	12,360 psf
Width of Slope:	a =	206			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	9	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	8.5 ft	Sandy Silt	120	12,870	510	12,360	12,870	66.0	0.00	0.00	0.000
2	0.0		0	0							
3	0.0		0	0							
4	0.0		0	0							
5	0.0		0	0							
6	0.0		0	0							
7	0.0		0	0							
8	0.0		0	0							
9	0.0		0	0							
10	0.0		0	0							

No.	Settlement:	Total Settlement
1	0.181 ft	
2		0.181 ft
3		
4		
5		2.2 in
6		
7		
8		
9		
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 ($\sigma'_0=\sigma'_c$)

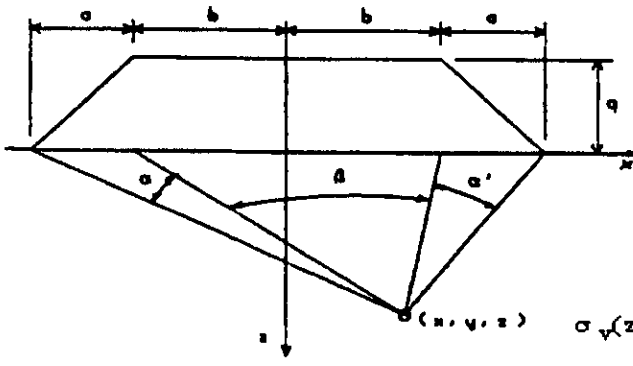
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ SUBJECT

Client	TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
Project	SCI-823-10.13	SHEET NO.	13 OF 26
Item	Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 672+00	CHECKED BY	SAH DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	33.5	ft		
Embankment Height:	H =	100	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	12,000 psf
Width of Slope:	a =	200			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	34	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	10.5	ft	Sandy Silt	120	12,629	630	11,999	12,629	77.0	0.00	0.00	0.000
2	13.0	ft	Silt	120	13,402	1,410	11,991	13,401	0.0	0.01	0.14	0.351
3	20.5	ft	Sandy Silt	120	13,990	2,010	11,975	13,985	66.0	0.00	0.00	0.000
4	25.5	ft	Silt	120	14,710	2,760	11,938	14,698	0.0	0.01	0.14	0.432
5	33.5	ft	Silty Clay	120	15,440	3,540	11,876	15,416	0.0	0.02	0.23	0.324
6	0.0			0	0							
7	0.0			0	0							
8	0.0			0	0							
9	0.0			0	0							
10	0.0			0	0							

No.	Settlement:		Total Settlement
1	0.178	ft	
2	0.024	ft	**0.421 ft**
3	0.096	ft	
4	0.037	ft	
5	0.087	ft	**5.1 in**
6			
7			
8			
9			
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 ($\sigma'_0=\sigma'_c$)

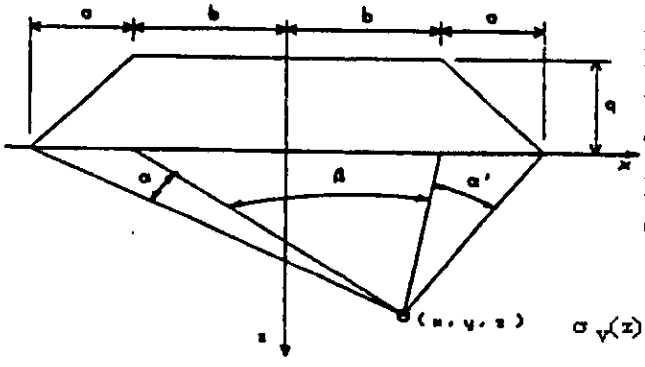
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ

SUBJECT	Client TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
	Project SCI-823-10.13	SHEET NO.	14 OF 26
	Item Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 693+00	CHECKED BY	SAK DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	21.0	ft		
Embankment Height:	H =	150	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	18,000 psf
Width of Slope:	a =	300			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	21	ft

**See Data output Attached*

$$\sigma_v(z) := \left(\frac{q}{\pi \cdot a}\right)\cdot\left(a\cdot(\alpha(z)+\beta(z)+\alpha'(z)) + b\cdot(\alpha(z)+\alpha'(z)) + x\cdot(\alpha(z)-\alpha'(z))\right)$$

$$\beta(z) := \operatorname{atan}\left[\frac{(b-x)}{z}\right] + \operatorname{atan}\left[\frac{(b+x)}{z}\right] \qquad \alpha'(z) := \operatorname{atan}\left[\frac{(a+b-x)}{z}\right] - \operatorname{atan}\left[\frac{(b-x)}{z}\right] \qquad \alpha(z) := \operatorname{atan}\left[\frac{(a+b+x)}{z}\right] - \operatorname{atan}\left[\frac{(b+x)}{z}\right]$$

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	21.0 ft	Sandy Silt	120	18,629	1,260	17,993	19,253	77.0			
2	0.0		0	0							
3	0.0		0	0							
4	0.0		0	0							
5	0.0		0	0							
6	0.0		0	0							
7	0.0		0	0							
8	0.0		0	0							
9	0.0		0	0							
10	0.0		0	0							

No.	Settlement:	Total Settlement
1	0.323 ft	
2		0.323 ft
3		
4		
5		3.9 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 ($\sigma'_0=\sigma'_c$)

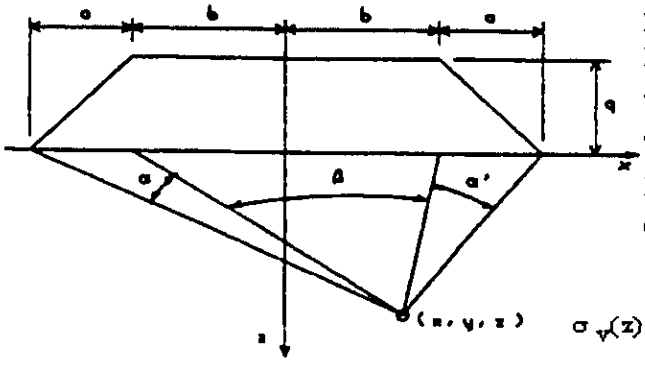
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ SUBJECT

Client TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03	
Project SCI-823-10.13	SHEET NO.	15	OF 26
Item Mainline Embankment - Phase 2	COMP. BY	JTH	DATE 02/12/07
Settlement - Station 699+00	CHECKED BY	SAK	DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	23.0	ft		
Embankment Height:	H =	122.5	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	14,700 psf
Width of Slope:	a =	245			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	23	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

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	23.0 ft	Sandy Silt	120	10,000	1,380	14,692	16,072	77.0	0.00	0.00	0.000
2	0.0		0	0							
3	0.0		0	0							
4	0.0		0	0							
5	0.0		0	0							
6	0.0		0	0							
7	0.0		0	0							
8	0.0		0	0							
9	0.0		0	0							
10	0.0		0	0							

No.	Settlement:	Total Settlement
1	0.318 ft	
2		0.318 ft
3		
4		
5		3.8 in
6		
7		
8		
9		
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 ($\sigma'_0=\sigma'_c$)

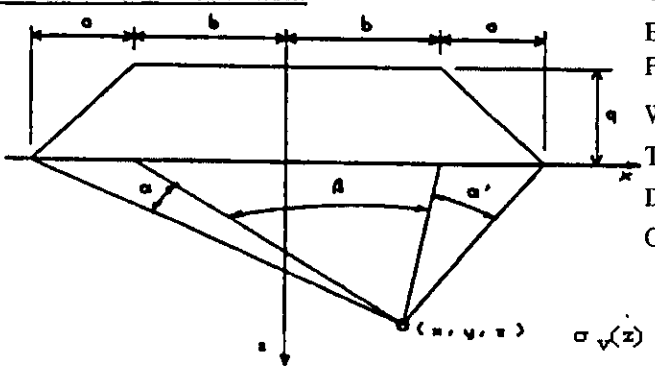
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ SUBJECT

Client	TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
Project	SCI-823-10.13	SHEET NO.	16 OF 26
Item	Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 717+50	CHECKED BY	SAK DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	5.5	ft		
Embankment Height:	H =	78	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	9,360 psf
Width of Slope:	a =	156			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	6	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

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	5.5 ft	Silt and Clay	120	9,690	330	9,360	9,690	0.0	0.02	0.24	0.392
2	0.0		0	0							
3	0.0		0	0							
4	0.0		0	0							
5	0.0		0	0							
6	0.0		0	0							
7	0.0		0	0							
8	0.0		0	0							
9	0.0		0	0							
10	0.0		0	0							

No.	Settlement:	Total Settlement
1	0.139 ft	
2		0.139 ft
3		
4		
5		1.7 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 ($\sigma'_0=\sigma'_c$)

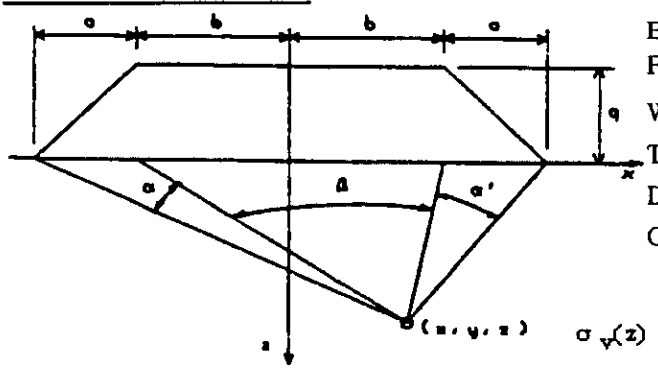
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ SUBJECT

Client	TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
Project	SCI-823-10.13	SHEET NO.	17 OF 26
Item	Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 749+00	CHECKED BY	SJK DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	2.5	ft		
Embankment Height:	H =	94	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	11,280 psf
Width of Slope:	a =	188			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	10	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

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	3.5 ft	Sandy Silt	120	11,490	210	11,280	11,490	75.0	0.00	0.00	0.000
2	10.0 ft	Sandy Silt	120	11,823	545	11,278	11,823	170.0	0.00	0.00	0.000
3	0.0		0	0							
4	0.0		0	0							
5	0.0		0	0							
6	0.0		0	0							
7	0.0		0	0							
8	0.0		0	0							
9	0.0		0	0							
10	0.0		0	0							

No.	Settlement:	Total Settlement
1	0.081 ft	
2	0.051 ft	**0.132 ft**
3		
4		
5		**1.6 in**
6		
7		
8		
9		
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 ($\sigma'_o=\sigma'_c$)

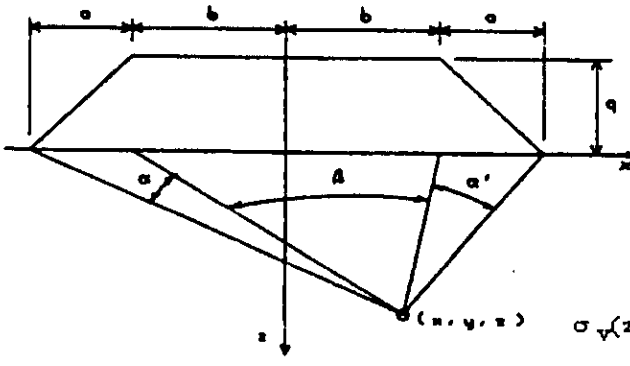
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ SUBJECT

Client	TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
Project	SCI-823-10.13	SHEET NO.	18 OF 26
Item	Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 766+00	CHECKED BY	SJK DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	20.0	ft		
Embankment Height:	H =	113	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	13,560 psf
Width of Slope:	a =	226			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	20	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	3.5	ft	Silt & Clay	120	13,770	210	13,560	13,770	0.0	0.02	0.23	0.459
2	8.5	ft	Sity Clay	120	14,279	720	13,559	14,279	0.0	0.02	0.22	0.311
3	20.0	ft	Silt & Clay	120	15,257	1,710	13,543	15,253	0.0	0.02	0.23	0.459
4	0.0			0	0							
5	0.0			0	0							
6	0.0			0	0							
7	0.0			0	0							
8	0.0			0	0							
9	0.0			0	0							
10	0.0			0	0							

No.	Settlement:		Total Settlement
1	0.098	ft	
2	0.107	ft	0.373 ft
3	0.169	ft	
4			
5			4.5 in
6			
7			
8			
9			
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 ($\sigma'_0=\sigma'_c$)

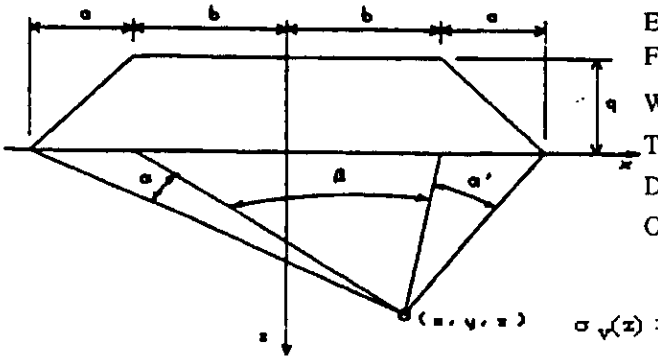
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ

SUBJECT	Client TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
	Project SCI-823-10.13	SHEET NO.	19 OF 26
	Item Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 771+00	CHECKED BY	SJK DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	26.0	ft		
Embankment Height:	H =	116.5	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	13,980 psf
Width of Slope:	a =	233			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	26	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	3.5	ft	Crs & Fn Sand	125	14,199	219	13,980	14,199	42.0	0.00	0.00	0.000
2	8.5	ft	Sandy Silt	120	14,716	738	13,979	14,716	62.0	0.00	0.00	0.000
3	26.0	ft	Silt & Clay	120	16,045	2,088	13,952	16,039	0.0	0.02	0.23	0.459
4	0.0			0	0							
5	0.0			0	0							
6	0.0			0	0							
7	0.0			0	0							
8	0.0			0	0							
9	0.0			0	0							
10	0.0			0	0							

No.	Settlement:		Total Settlement
1	0.151	ft	
2	0.105	ft	**0.495 ft**
3	0.239	ft	
4			
5			**5.9 in**
6			
7			
8			
9			
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 ($\sigma'_o=\sigma'_c$)

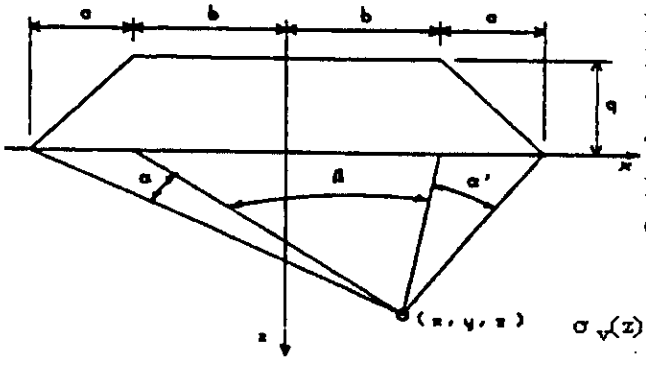
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ

SUBJECT	Client TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
	Project SCI-823-10.13	SHEET NO.	20 OF 26
	Item Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 795+50	CHECKED BY	SAK DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	15.0	ft		
Embankment Height:	H =	122	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	14,640 psf
Width of Slope:	a =	144			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	15	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

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	15.0 ft	Silt and Clay	120	15,538	900	14,636	15,536	0.0	0.02	0.18	0.300
2	0.0		0	0							
3	0.0		0	0							
4	0.0		0	0							
5	0.0		0	0							
6	0.0		0	0							
7	0.0		0	0							
8	0.0		0	0							
9	0.0		0	0							
10	0.0		0	0							

No.	Settlement:	Total Settlement
1	0.257 ft	
2		0.257 ft
3		
4		
5		3.1 in
6		
7		
8		
9		
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 ($\sigma'_0=\sigma'_c$)

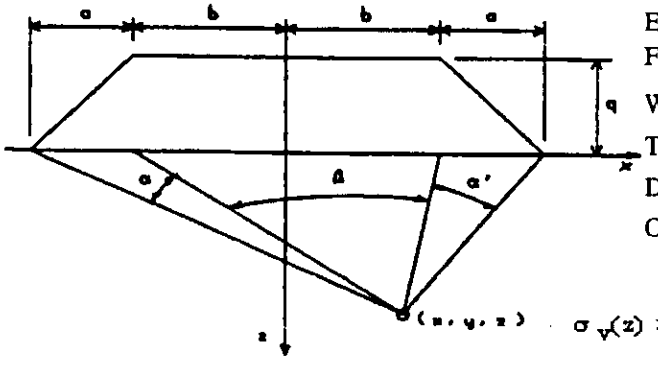
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ

SUBJECT	Client TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
	Project SCI-823-10.13	SHEET NO.	21 OF 26
	Item Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 815+00	CHECKED BY	SJL DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	12.5	ft		
Embankment Height:	H =	89	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	10,680 psf
Width of Slope:	a =	178			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	13	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	5.5	ft	Silt and Clay	120	11,010	330	10,680	11,010	0.0	0.02	0.20	0.300
2	12.5	ft	Silty Clay	120	11,756	1,080	10,676	11,756	0.0	0.03	0.25	0.385
3	0.0			0	0							
4	0.0			0	0							
5	0.0			0	0							
6	0.0			0	0							
7	0.0			0	0							
8	0.0			0	0							
9	0.0			0	0							
10	0.0			0	0							

No.	Settlement:		Total Settlement
1	0.116	ft	
2	0.132	ft	0.248 ft
3			
4			
5			3.0 in
6			
7			
8			
9			
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 ($\sigma'_0=\sigma'_c$)

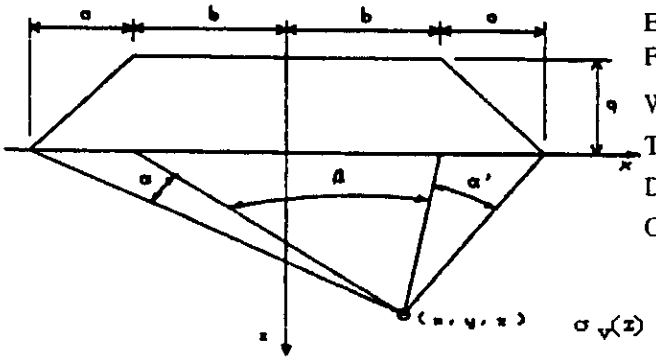
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

DLZ SUBJECT

Client	TranSystem / ODOT Dist. 9	JOB NUMBER	0121-3070.03
Project	SCI-823-10.13	SHEET NO.	22 OF 26
Item	Mainline Embankment - Phase 2	COMP. BY	JTH DATE 02/12/07
	Settlement - Station 854+50	CHECKED BY	SJK DATE 11-14-07

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	10.0	ft		
Embankment Height:	H =	65	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	7,800 psf
Width of Slope:	a =	130			
Top half-width of Emb:	b =	45			
Distance from CL:	x =	0			
Output Range:	z =	0	to	10	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	3.0	ft	Silt	120	7,980	180	7,800	7,980	0.0	0.02	0.17	0.297
2	10.0	ft	Silt and Clay	120	8,578	780	7,798	8,578	0.0	0.02	0.20	0.392
3	0.0			0	0							
4	0.0			0	0							
5	0.0			0	0							
6	0.0			0	0							
7	0.0			0	0							
8	0.0			0	0							
9	0.0			0	0							
10	0.0			0	0							

No.	Settlement:		Total Settlement
1	0.065	ft	
2	0.104	ft	**0.168 ft**
3			
4			
5			**2.0 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 ($\sigma'_0=\sigma'_c$)

$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Evaluate the time rate of settlement for cross-section with greater than 3 inches of consolidation settlement.

The following cross-sections have consolidation settlement of approximately 3 inches or greater

766+00
771+00
795+50
815+00

Assume single drainage

C_v estimated from correlations with LL, see reference on page 26 of 26

Determine time to reach 90 percent consolidation, therefore $T_v = 0.85$.

$$t_{90} = \frac{T_v \times H^2}{C_v}$$

Assumed Values of C_v

Station	Reference Boring	LL (avg)	C_v (ft^2/day)
766+00	C-111	21	0.5
771+00	R-715	28	0.5
795+50	C-80	27	0.5
815+00	R-760	35	0.4

For X-section 766+00, H = 20.0 ft.

$$t_{90} = \frac{0.85 \times 20.0^2}{0.5}$$

t_{90} = 680 days or 22 months

For X-section 771+00, H = 17.5 ft.

$$t_{90} = \frac{0.85 \times 17.5^2}{0.5}$$

t_{90} = 521 days or 17 months

For X-section 795+50, H = 15.0 ft.

$$t_{90} = \frac{0.85 \times 15.0^2}{0.5}$$

t_{90} = 383 days or 13 months

For X-section 815+00, H = 12.5 ft.

$$t_{90} = \frac{0.85 \times 12.5^2}{0.4}$$

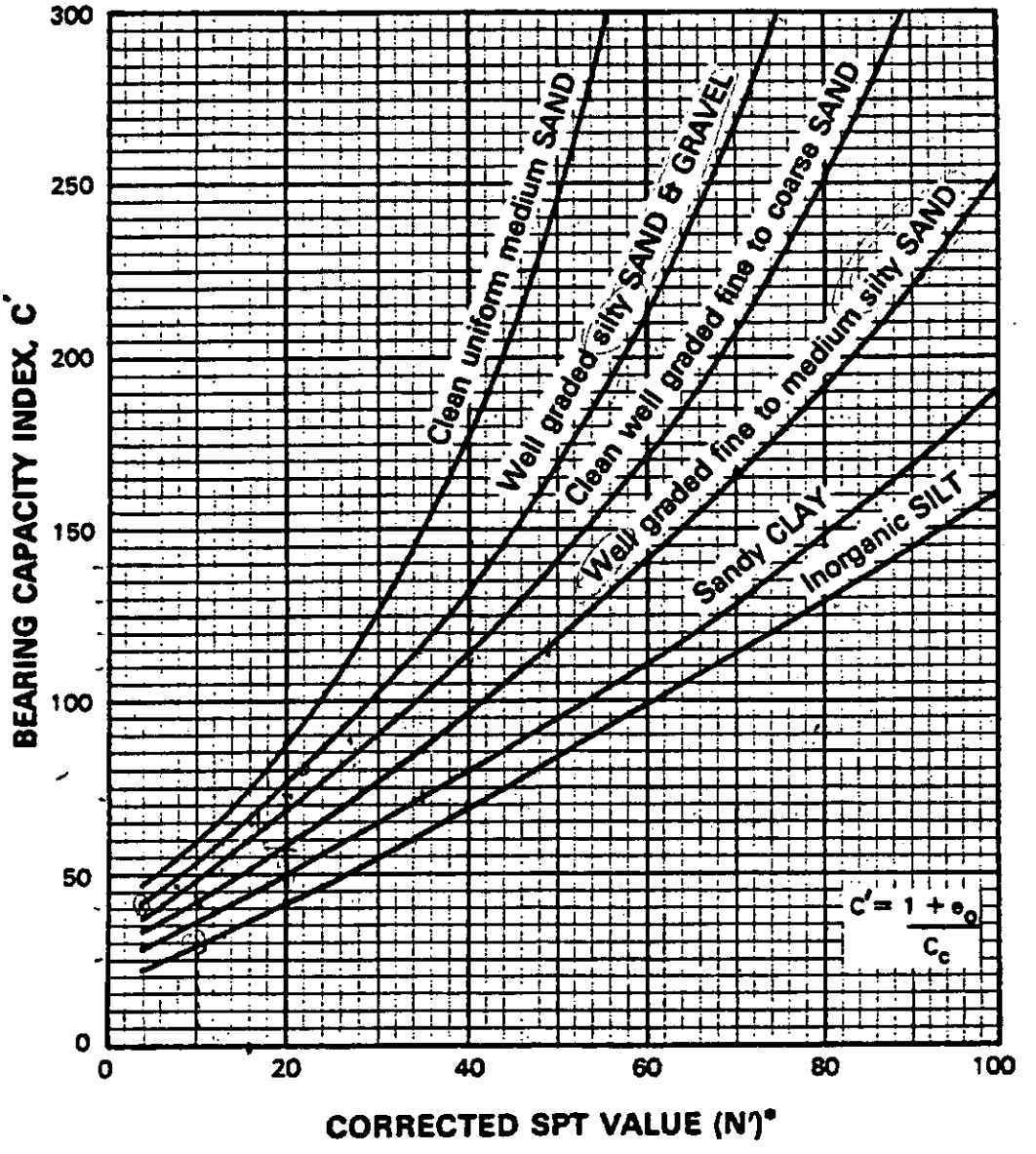
t_{90} = 332 days or 11 months

shallow surface deposits, a minimum value of 200 psf must be used to prevent unrealistic computation of settlement.

ΔP = Distributed embankment pressure (psf) at center of considered layer

P_F = Final pressure felt by foundation subsoil (psf)

Note: $P_F = P_o + \Delta P$



'N'—SPT (N) Value Corrected for Overburden Pressure.

Reference: Hough, "Compressibility as a Basis for Soil Bearing Value" ASCE 1959

Figure 6-6: Bearing capacity index (C') values for granular soils

Ref: NAVFAC DM 7.01 "Soil Mechanics"

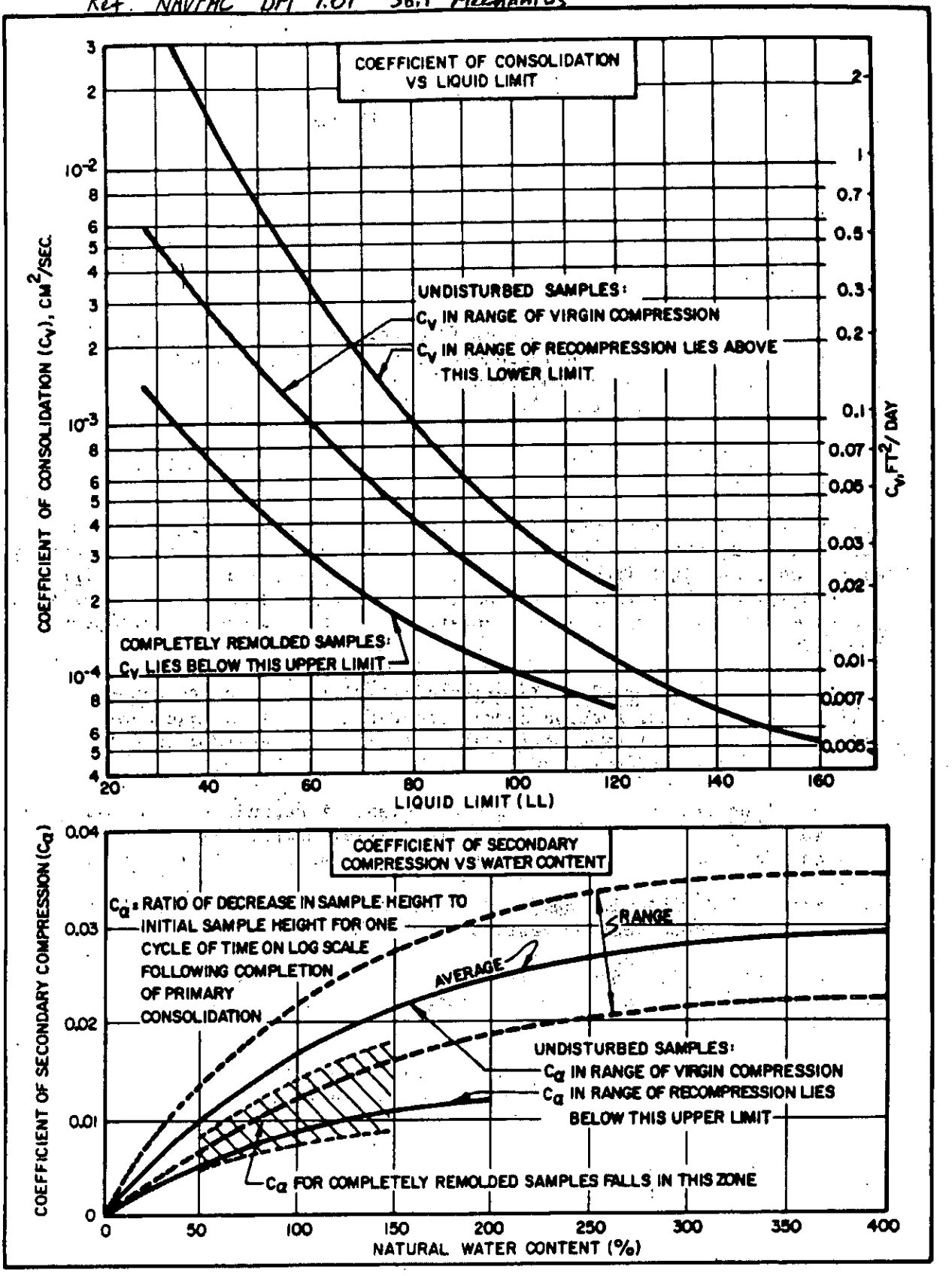


FIGURE 4
Approximate Correlations for Consolidation Characteristics of Silts and Clays

DLZ

APPENDIX D

Geotechnical Design Checklist

III.B. Embankments Checklist

C-R-S: SCI-823-10.13 Phase 2 Mainline Embankments	PID: 79977	Reviewer: SJR	Date: 11-15-07

Settlement

(Y) N X	1	If soil conditions and project requirements warrant, have settlement issues been addressed? If not applicable (X), go to Question **14**	
(Y) N X	2	Have consolidation properties of the foundation soils been determined? Check methods used: laboratory consolidation tests X empirical correlations with moisture content and Atterberg values other	
(Y) N X	3	Have calculations been performed to estimate the total expected embankment settlement and the time of consolidation? Check method used: EMBANK or equivalent software X hand calculations	
(Y) N X	4	If differing foundation soil and/or loading conditions occur throughout the embankment area, have sufficient analyses been completed to evaluate consolidation at locations representative of the most critical conditions?	
(Y) N X	5	Have the total settlement and the time of consolidation analyses indicated acceptable values at all locations for the scope of the embankment work?	
Y N (X)	6	If total settlement or time of consolidation is unacceptable, have the stations and lateral extent of the problem areas been defined?	
Y N (X)	7	Has a method been chosen as a solution to the settlement issues? Check methods used: waiting periods with monitoring drainage blanket and wick drains surcharge (preloading) removal and replacement of weak soil lowering proposed grade / change alignment lightweight fill	

III.B. Embankments Checklist

		9 other	List Other items:
Y	N (X)	8	Based on accepted design practices, and where applicable, adhering to published guidelines and design recommendations from FHWA, have calculations been performed to evaluate the effectiveness of the chosen solution(s)?
Y	N (X)	9	Has an economic analysis been performed to evaluate the cost benefits of the recommended solution compared to others?
Y	N (X)	10	Have all necessary notes, specifications, and details for the chosen solution been determined?
Y	N (X)	11	Have the need, locations, type, plan notes, and reading schedule for settlement platforms been determined?
Y	N (X)	12	Have the effects of the predicted settlement and the chosen solution been determined and accounted for on the construction schedule?
Y	N (X)	13	Has the effect of any foundation soil consolidation (including differential settlement) been evaluated with regard to adjacent structures (e.g., bridges, buildings, culverts, utilities) which will also undergo settlement and be subject to stresses induced by the consolidation of the surrounding soil?

Notes :

Stage 1:

III.B. Embankments Checklist

Stability				
(Y) N X	14	If soil conditions and project requirements warrant, have stability issues been addressed?		
		If not applicable (X), go to Question **27**		
(Y) N X	15	Has the total (short term) and effective (long term) shear strength of the foundation soils been determined?		
		Check method used:		
		laboratory shear tests		
		X estimation from SPT or field tests		
Y (N) X	16	Have the OGE's recommended values of shear strength for proposed embankment fill material (total: c = 2000 psf, phi = 0; effective: c = 300 psf, phi = 28) been used in the stability analyses?	Given the likely fill material (durable rock from adjacent cuts), we have selected a friction angle of 35 degrees for the embankment fill material in embankments over 40 feet high.	
(Y) N X	17	Have calculations been performed to determine the F.S. for stability?		
		Check method used:		
		X STABL, XSTABL, or equivalent software		
		hand calculations		
	18	Have the following F.S. been met or exceeded, as determined by the calculations, for the given stability conditions:		
(Y) N X		a 1.30 for short term condition		
(Y) N X		b 1.30 for long term condition		
(Y) N X		c 1.10 for rapid drawdown, flood condition	For Seismic Condition	
Y N X		d 1.50 for embankment supporting bridge abutments (not on deep foundations)		
(Y) N X	19	When differing soil or loading conditions occur throughout the embankment area, have sufficient analyses been completed to evaluate the stability at locations representative of the most critical conditions?		
Y N (X)	20	If the F.S. was not met or exceeded, have the stations and lateral extent of the problem areas been defined?		
Y N (X)	21	Has a method been chosen as a solution to the stability issues?		
		Check the method(s) used:		
		flattening slopes		
		counterberm		
		lightweight embankment		

	reinforced soil slope	
	soil nailing	
	drainage blanket and wick drains	
	removal of soft soil, adding shear key	
	reduced grade / change alignment	
	stage construction	
	controlled rate of fill placement	
	drilled shaft slope stabilization	
	other List Other items:	
Y N(X) 22	Based on accepted design practices, and where applicable, adhering to published guidelines and design recommendations from FHWA, have calculations been performed to evaluate the effectiveness of the chosen solution(s)?	
Y N(X) 23	Has an economic analysis been performed to evaluate the cost benefits of the recommended solution compared to others?	
Y N(X) 24	Have all necessary notes, specifications, and details for the chosen solution been determined?	
Y N(X) 25	Have the need, location, type, plan notes, and reading schedule for piezometers and inclinometers been determined?	
Y N(X) 26	If piezometers will be used, has the critical pressure value been determined and the appropriate information included in the plans?	
Y N(X) 27	Have the effects of the stability solution been determined and accounted for on the construction schedule?	
Y N(X) 28	Has the effect of the stability solution been evaluated with regard to structures (e.g., bridges, buildings, culverts, utilities) which may be subject to unusual stresses or require special construction considerations?	

Notes:

Stage 1:

III.B. Embankments Checklist

Sidehill Fills			
(Y) N X	29	If soil conditions and project requirements warrant, have sidehill fill issues been addressed? If not applicable (X), go to Question **34**	Special Benching has been provided where necessary.
(Y) N X	30	In accordance with Geotechnical Bulletin 2: Special Benching and Sidehill Embankment Fills (GB 2), have sidehill fills been evaluated to determine if special benching or shear keys are needed?	
	31	In accordance with GB 2, if special benching or shear keys are required, has	
(Y) N X		a Plan Note G110 from L&D3 been included in the General Notes?	It was recommended that this note be included in the plans.
Y N (X)		b quantities for both excavation and embankment been calculated for the benched areas and added to the plan General Quantities?	
Y N (X)		c the special benching or shear keys been indicated on the appropriate cross sections?	Information was provided to Client.
Y N (X)	32	Have water bearing zones been identified and their impact addressed?	
Y N (X)	33	Have subsurface drainage controls been adequately addressed?	

Notes:

Stage 1:

III.B. Embankments Checklist

Special			
Y N (X)	34	Have all of the environmental factors, including wetlands, stream mitigation, and landfills, been considered and incorporated prior to design and analysis of embankment settlement and stability, including EPA or other government agencies' involvement, mitigation, or special design or construction considerations?	
	35	If an embankment is to be placed through standing water or over weak, wet soils (with or without a fabric separator), the fill should be placed by the method of end dumping to a given height above the standing water or until compaction is achievable over the soft soil. If end dumping is to be specified,	
Y N (X)		a has the material type for the fill to be end dumped been specified?	
Y N (X)		b has the need for a fabric separator or filter layer been determined?	
Y N (X)		c has the height of fill to be end dumped been determined?	
Y N (X)		d have all notes and specifications for end dumping been developed?	

Notes:

Stage 1: