REPORT

OF

SUBSURFACE INVESTIGATION

FOR

LUCASVILLE-MINFORD ROAD INTERCHANGE

PROJECT SCI-823-6.81

PHASE 1-STAGE I

SCIOTO COUNTY, OHIO

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1.0 INTRODUCTION

The project consists of the construction of a new interchange where proposed State Route 823 will cross existing Lucasville-Minford Road (County Road 28) in Madison Township, Scioto County, Ohio. Approximately 1.7 miles of new ramps are planned and 0.5 miles of existing roadway will be improved as part of the project. The area considered for the interchange study begins at State Route 823 Station 509+50 and extends to Station 542+50. The project area can be found on the USGS New Boston Quadrangle and is part of the SCI-823-6.81 (Portsmouth Bypass) project. The exploration presented in this report has been performed essentially in accordance with DLZ Ohio, Inc.'s proposal for the project.

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 and the 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

It is understood that proposed State Route 823 will cross Lucasville-Minford Road (existing County Road 28) between Flowers-Ison Road and Roses Mountain Road. Four new ramps will be constructed and Lucasville-Minford Road will be improved as part of the project. Lucasville-Minford Road will also be redesignated as State Route 728. A maximum embankment height of 45.0 feet and a maximum cut of 120.0 feet is anticipated.

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

3.0 SUBSURFACE INVESTIGATION

The subsurface investigation consisted of drilling eight borings, B-1201 to B-1208, on Lucasville-Minford Road and 27 borings, B-1209 to B-1235, for the ramps between the dates of July 21 and September 30, 2005. The borings were extended to depths between 10.0 and 110.0 feet and were drilled with both ATV-mounted and truck-mounted drill rigs. An additional 22 borings, R-446 to R-469, were drilled for the mainline embankment; four borings, TR-11 to TR-14, were drilled for the proposed bridge over Lucasville-Minford Road; and 11 borings, C-22, C-23, and C-55 to C-63, were drilled for culverts in the interchange area between the dates of May 27, 2004 and September 6, 2006. These additional borings ranged in depth from 20.0 to 125.0 feet. The locations of the borings are shown on the Boring Location Plan in Appendix A.

Borings R-449, R-451, R-452, R-455, and R-457 were redrilled to greater depths of 120.0 to 155.0 feet between October 19 and October 31, 2005 due to a change in the profile grade. These borings were redesignated R-2449, R-2451, R-2452, R-2455, and R-2457, respectively.

Representatives of DLZ Ohio, Inc. (DLZ) planned and staked the interchange boring locations in the field. Representatives of Lockwood, Lanier, Mathias & Noland, Inc. (2LMN) determined the as-drilled ground surface elevations and locations of most of the boring locations. The as-drilled boring locations and ground surface elevations are shown on the individual boring logs in Appendix A. At the time this document was prepared, the as-drilled locations of several of the culvert boring locations had not been established. In lieu of survey information, the as-per-plan stations, offsets, and elevations were estimated and are included on the boring logs for boring locations that were not surveyed. Information concerning the drilling procedures and the boring log terminology is also presented in Appendix A.

4.0 FINDINGS

4.1 General

In the southern part of the interchange, between Stations 509+50 and 528+00, the soils consist of residual cohesive soils, generally no thicker than 15.0 feet. From Station 528+00 to Station 542+50, the soils are of the Minford Silt complex, generally compressible, highly plastic clays. At this site, the Minford deposits are relatively thick, extending to bedrock that was encountered at depths of 28.5 to 79.5 feet. More details regarding the subsurface conditions are presented in the following sections.

4.2 Geology

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 within the interchange

along project centerline is on the order of 175 feet and occurs between a high point at approximate Station 523+70, approximate elevation 890 feet, and a low point at Station 537+50, approximate elevation 715 feet. The maximum vertical relief along the proposed finished grade is approximately 23 feet, with the highest point at approximate Station 519+50 (elevation 776 feet) and the lowest point near Station 533+50 (elevation 753 feet).

The genesis of the soils varies across the site. Residual and colluvial soils are found on the ridge tops and the hillsides near the site. These soils are generally thin to moderately deep, covering moderate to steep slopes. Lacustrine soils, found in the 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 structure area is primarily sandstone of the Logan Formation that is of Mississippian Age. Bedrock of the Pennsylvanian Breathitt Formation can be found at the top of the slopes, roughly above elevation 870.

4.3 Soil Conditions

At the ground surface, the interchange borings encountered between 1 and 11 inches of topsoil. The average thickness of topsoil was 4 inches.

Below the topsoil the borings generally encountered stiff to very stiff sandy silt (A-4a), silt and clay (A-6a), and silty clay (A-6b) to depths of 1.5 to 15.0 feet overlying stiff to very stiff clay (A-7-6) to depths of 3.0 to 73.5 feet. The clay (A-7-6) was considered soft to medium stiff in approximately 20 of the borings, generally at depths below 15.0 feet. Most of the clay soils had liquid limits greater than 50, with eleven of the samples tested having liquid limits equal to or greater than 65. A medium dense to dense sandy silt (A-4a) or stiff to hard sandy silt (A-4a) and silt and clay (A-6a) were generally encountered below the clay (A-7-6). Medium dense to very dense granular layers were encountered in only seventeen of the borings, primarily those drilled at culvert locations. These granular layers were generally encountered at depths below 20.0 feet.

A medium stiff to very stiff elastic clay (A-7-5) was encountered in borings B-1203, B-1213, and C-57 at depths between 3.0 and 18.0 feet. A medium stiff to hard or medium dense to very dense silt (A-4b) was also encountered in several of the borings, but generally at least 5 feet above or below the proposed grade. Four borings along Lucasville-Minford Road, B-1203, B-1204, B-1207, and B-1208, encountered silt (A-4b) within 5 feet of subgrade.

4.4 Bedrock Conditions

A layer of weathered shale, siltstone, or sandstone was encountered above competent bedrock. The top of bedrock varied between 3.4 and 79.5 feet and was confirmed by coring in 47 of the 72 borings. The bedrock consisted primarily of medium hard to hard sandstone with a lesser amounts of soft to medium hard shale and siltstone. The Rock Quality Designation (RQD) varied between 25 and 100 percent but generally was greater than 80 percent.

4.5 Groundwater Considerations

Seepage was generally first encountered in the borings at depths between 10.5 and 68.5 feet, primarily in the areas where embankment fill will be placed at the interchange. Borings drilled in rock cut sections generally did not encounter seepage. In the borings where seepage was observed, the water level prior to coring was at depths between 4.3 and 74.0 feet. At the completion of drilling, the final water level was at depths between 0.5 and 78.4 feet. These final water level readings include water added during rock coring, and therefore, do not necessarily reflect actual groundwater conditions.

4.6 Lucasville-Minford Roadway Borings

Borings were also taken along Lucasville-Minford Road for improvements to the roadway. These borings were drilled to depths of 10.0 feet each. These borings encountered 3 to 5 inches of asphalt overlying 5 to 8 inches of aggregate base. Beneath the pavement layers, the borings encountered primarily stiff to very stiff sandy silt (A-4a) and silt and clay (A-6a) to the completion depths of the borings. A medium dense or medium stiff to very stiff silt (A-4b) was encountered in borings B-1203, B-1204, B-1207, and B-1208 within 5 feet of subgrade. Additional details on the findings and results of these borings are presented in the Phase 1-Stage I Subgrade Report, which is a separate submittal.

4.7 Laboratory Testing

In the laboratory, all samples were examined and visually classified by a soils engineer. The moisture content, grain size analysis, and plasticity characteristics of samples considered representative of the subsurface materials were determined. In addition, consolidation tests and triaxial tests (unconfined compression, unconsolidated-undrained, and consolidated-undrained tests) were performed on relatively undisturbed (shelby tube) samples. The results of the laboratory testing are presented on the boring logs in Appendix A and in summary form in Appendix B.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 General

The existing roadway alignment traverses a relatively flat to moderately hilly area. The improved Lucasville-Minford roadway will be relatively close to existing grade while the mainline and ramps will have significant amounts of fill placement and cut sections. The maximum fill anticipated on the State Route 823 alignment is 45.0 feet near Station 538+00 and the maximum fill anticipated on the ramps is 12 to 13 feet at various locations. The maximum cut anticipated on State Route 823 is approximately 120 feet near Station 513+00 and Station 523+00.

On Lucasville-Minford Road, the borings encountered between 3 and 5 inches of asphalt concrete pavement over 5 to 8 inches of aggregate base. Borings drilled off the road generally encountered between 1 and 11 inches of topsoil with an average of 4 inches of topsoil at the ground surface. All topsoil, vegetation, soft soils, organic soils and existing pavement should be removed prior to placing fill or new pavement materials. Although organic soils were not encountered in the borings, the contractor should be prepared to perform additional overexcavation and replacement as needed if organic soils are encountered.

Existing structures are located within the right-of-way. Refer to Ohio Department of Transportation Construction and Material Specification Item 202 for removal of the structures, their associated foundations, and for backfilling of excavations resulting from the removal of the structures.

Subgrades and embankments should be constructed in accordance with ODOT Item 203 "Roadway Excavation and Embankment" and ODOT Item 204 "Subgrade Compaction and Proof Rolling."

5.2 Pavement Design and Group Index

5.2.1 General

The results of the borings and the subgrade evaluations for the project have been submitted in a separate document. However, the conclusions from the evaluations are presented below.

5.2.2 Proposed SR 823 and Ramps

For the proposed mainline alignment and the ramps, it is recommended that the pavements be designed based on a CBR value of 6. The method used to calculate the CBR value was essentially the same as the one used by the ODOT 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 1, 242 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 1 mainline roadway pavement design. For the proposed Phase 1 mainline alignment and the ramps, it was recommended that the pavements be designed based on a CBR value of 6.

Approximately one half of the mainline and ramp alignments at the interchange will be constructed on embankment fill. It is anticipated that in a portion of the cut sections, between Station 528+00 and Station 530+00 on State Route 823 and adjacent sections of State Route 728 Ramps A and D, the subgrade will be in soil. However, some of the sections of the alignments will be in cuts where the subgrade will be in rock. The approximate station limits of these sections are listed in the following table.

Table 1 Anticipated Rock Cut in Subgrade

Alignment	Location
SR 823 (Mainline)	Sta. 509+50 to 528+00
SR 728 Ramp A	Sta. 514+00 to 528+00
SR 728 Ramp C	Sta. 522+00 to 528+00
SR 728 Ramp D	Sta. 517+00 to 528+00

For the sections of the alignments with subgrades in rock, excavations up to two feet below the proposed subgrade will be required for the subgrade preparation in accordance with ODOT Item 204.05.

5.2.3 Proposed Lucasville-Minford Road

It is recommended that the pavements for the improvements to Lucasville-Minford Road be designed based on a CBR of 6. In addition, the subgrade evaluation in accordance with ODOT Geotechnical Bulletin 1 (GB1) indicated that either cement stabilization or undercutting and replacement could be used to improve the subgrade soils. Additional details on the subgrade evaluation are presented in the Phase I Subgrade Report, which is a separate submittal.

5.3 Culverts

As discussed earlier in this report, several culverts are planned within the limits of the interchange. Foundation recommendations for the culverts are presented in a separate report.

5.4 Embankment Evaluations

5.4.1 Slope/Embankment Stability – General Information

Slope/embankment stability is not considered to be a significant concern for most areas of the State Route 823 interchange at Lucasville-Minford Road. However, a 45-foot high embankment is anticipated on State Route 823 just south of Lucasville-Minford Road. In addition, embankments as high as 12 and 13 feet are anticipated for Ramps A/B (east of State Route 823) and Ramps C/D (west of SR 823), respectively. The areas of the embankments are characterized by stiff to very stiff cohesive soils over relatively deep soft to medium stiff cohesive soils with relatively high moisture contents. Consequently, slope stability analyses were performed at the embankment locations.

At the time the analysis was performed, the existing and proposed grade elevations were used to establish the embankment locations and height. Soil parameters used for the analyses were based on laboratory test results, visual examination of the preserved samples, hand penetrometer readings, and typical values. The soil parameters were selected based on the most critical soil conditions that were encountered by the borings and tested in the lab. In addition, the soil parameters were selected to address the instability of the highest (most critical loading condition) embankment with the relatively weak foundation soils. Due to the variation of the soil parameters within each layer/deposit, those that address the most critical instability were selected from the testing data. However, soil parameters for few other layers (such as granular deposits) were selected based on common values/correlations for such soils and common engineering practice. The selected strengths are shown on the exhibits in Appendix C.

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 rockfill from adjacent cuts. The friction angles of the anticipated backfill materials will likely range from approximately 28 degrees to over 40 degrees. We would anticipate that more of the rockfill would exhibit friction angles in excess of 40 degrees, but we conservatively selected a friction angle of 35 degrees for the embankment fill with no cohesion.

The stability analyses were performed using the computer program STABL developed at Purdue University. The program is capable of analyzing circular as well as non-circular failure surfaces. Four procedures are available in the program to compute the factors of safety: the Modified Bishop procedure, Spencer's procedure, Janbu's procedure, and Block analysis procedure. All of the procedures use an iterative approach to investigate many failure surfaces until a critical surface is found. The Modified Bishop method was used for all of the analyses and only circular failure surfaces were considered. The results of the stability analyses are presented in Appendix C and summarized in the following paragraphs.

5.4.2 Slope/Embankment Stability – State Route 823 at Station 538+00

5.4.2.1 General

A preliminary slope stability analysis was performed for the proposed State Route 823 at Station 538+00 using the existing and proposed grade elevations provided by TranSystems Inc. The developed cross section was characterized by 2H:1V side slopes. Based on the soils typically encountered in the borings, the embankment foundation at this location would consist of 12.5 feet of stiff to hard silty clay (A-6b) and clay (A-7-6) underlain by up to 27 feet of soft to medium stiff clay (A-7-6) overlying stiff to very stiff silt and clay (A-6a) and decomposed sandstone. The critical factor of safety assuming end-of-construction (undrained) conditions was found to be 1.00. This critical factor of safety is less than the generally recommended minimum factor of safety of 1.25 for highway embankments. Based on these findings, it is assumed that remedial treatment of the existing foundation soils will be necessary. Remediation efforts which could be considered include pre-loading, staged construction, and wick drains.

5.4.2.2 Pre-Loading

The embankments in this region could be constructed to approximate grade and allowed to pre-load the soft foundation soils for as long as possible. However, settlement calculations indicate that the time needed for 80 percent consolidation of the foundation soils could be as long as 932 months (77.7 years). Therefore, pre-loading is not practical for the construction of the embankment at the site and should not be used in the construction of the embankment. Alternatively, wick drains can be used to accelerate the dissipation of the pore water pressure and hence the consolidation of the foundation soil. Recommendations regarding wick drains are presented in Section 5.4.9, "Additional Settlement Recommendations."

5.4.2.3 Staged Construction

Another option that can be considered to remediate this area is staged construction. Slope stability analyses were performed for the proposed State Route 823 at Station 538+00 in order to determine the height of embankment which could be initially constructed assuming no significant removal of existing poor soils. Undrained analysis were performed for a 32-foot high first staged construction embankment assuming a cross section characterized by 2H:1V side slopes. The critical factor of safety assuming end-of-construction (undrained) conditions was found to be 1.32. This critical factor

of safety meets the generally recommended minimum factor of safety of 1.25 for highway embankments.

Drained analyses were then performed for the 32-foot stage embankment assuming excess pore pressures in the soft foundation soils. This analysis would reflect the conditions during construction if excess pore pressures occur in the foundation soils. These excess pore pressures should be monitored during construction with instrumentation to verify the subsurface conditions. The pore water pressure head during Stage 1 and Stage 2 construction should not be above the ground surface. The waiting period time between Stage 1 (32 feet high embankment) and Stage 2 (45 feet high embankment) should be more than 60 days (with wick drains) to allow adequate dissipation of the excess pore water pressure. See Section 5.4.9 for additional information on wick drain installation.

The excess pore pressures will dissipate near the toe of the new embankment due to the decreasing embankment load. In the analyses, it was assumed that the excess pore pressures dissipated along the outside slope of the new embankment. The assumed excess pore pressure distribution is shown on the stability analyses results in Appendix C. Based on the findings of these analyses, it is recommended that at least 70 percent of the excess pore pressures be allowed to dissipate before the remainder of the embankment is constructed. Instrumentation equipment should be installed and monitored as discussed in Section 5.4.11, "Instrumentation," to ensure that the excess pore pressures have dissipated. As discussed in Sections 5.4.6 through 5.4.9, 80 percent of primary consolidation should occur in less than 932 months (77.7 years). However, this time period can be shortened to less than 120 days provided wick drains are installed as indicated in Section 5.4.9. Once the excess pore pressures have dissipated, construction of the remainder of the embankment can proceed provided that instrumentation equipment is installed and monitored as discussed in Section 5.4.11, "Instrumentation." The staged construction recommendation and analysis assumed the installation of wick drains before construction of the embankment.

5.4.3 Slope/Embankment Stability – Proposed Ramps A/B Station 518+00

A stability analysis was performed on the ramp embankments on the east side of the interchange (Ramps A/B) at Ramp B Station 518+00. Based on the provided existing and proposed grade elevations, the embankment at this location is assumed to be 12 feet high characterized by 2H:1V side slopes. The embankment foundation at this location generally would consist of approximately 16 feet of very soft to medium stiff silty clay (A-6b) and clay (A-7-6) overlying stiff to very stiff silty clay (A-6b) and clay (A-7-6). The critical factor of safety assuming end-of-construction (undrained) conditions was found to be 1.59. This critical factor of safety exceeds the generally

recommended minimum factor of safety of 1.25 for highway embankments. The long-term (drained) analysis resulted in a minimum factor of safety of 1.98 which exceeds the generally recommended minimum factor of safety of 1.25.

5.4.4 Slope/Embankment Stability – Proposed Ramps C/D Station 543+50

A stability analysis was performed on the ramp embankments on the west side of the interchange (Ramps C/D) at Ramp D Station 543+50. Based on the provided existing and proposed grade elevations, the embankment at this location is assumed to be 13 feet high characterized by 2H:1V side slopes. The embankment foundation at this location generally would consist of approximately 26 feet of soft to medium stiff clay (A-7-6) overlying stiff to very stiff silt and clay (A-6a). The critical factor of safety assuming end-of-construction (undrained) conditions was found to be 1.85. This critical factor of safety exceeds the generally recommended minimum factor of safety of 1.25 for highway embankments. The long term (drained) analysis resulted in a minimum factor of safety of 2.07 which exceeds the generally recommended minimum factor of safety of 1.25.

5.4.5 Settlement – General Information

Settlement analyses were performed for the proposed embankments at the same locations where the stability analyses were performed. Soil parameters used for the analyses were based on laboratory test results, visual examination of the preserved samples, hand penetrometer readings, and typical values. Settlement analysis calculations are presented in Appendix D.

5.4.6 Settlement – State Route 823 at Station 538+00

Settlement due to primary consolidation within the embankment foundation is expected to be approximately 30 inches. In addition, the time needed to reach 80 percent of primary consolidation is expected to take up to 932 months (77.7 years). However, this time period can be shortened to less than 120 days provided wick drains are installed as indicated in Section 5.4.9. It should be emphasized that these time of consolidation estimates are based on the assumption that at least 2 to 3 feet of free-draining granular material will be placed over the entire fill foundation as previously discussed.

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 6 inches of settlement can be expected for a 45 foot high embankment. However, it is anticipated that much of this settlement will occur during construction.

5.4.7 Settlement – Ramps A/B Station 518+00 Ramp B Baseline

Settlement due to primary consolidation within the embankment foundation at this location is expected to be approximately 22 inches. In addition, the time needed to reach 80 percent of primary consolidation is expected to take up to 107 months (8.9 years). However, this time period can be shortened to less than 112 days provided wick drains are installed as indicated in Section 5.4.9. It should be emphasized that these time of consolidation estimates are based on the assumption that the initial embankment construction will consist of at least 2 to 3 feet of free-draining granular material placed over the entire fill foundation as previously discussed.

Settlement due to consolidation of the fill material itself was also considered. Assuming one percent consolidation for a well-compacted fill, approximately 2 inches of settlement can be expected for a 12-foot high embankment. However, it is anticipated that much of this settlement will occur during construction.

5.4.8 Settlement – Ramps C/D Station 543+50 Ramp D Baseline

Settlement due to primary consolidation within the embankment foundation at this location is expected to be approximately 11 inches. In addition, the time needed to reach 80 percent of primary consolidation is expected to take up to 362 months (30.2 years). However, this time period can be shortened to less than 120 days provided wick drains are installed as indicated in Section 5.4.9. It should be emphasized that these time of consolidation estimates are based on the assumption that at least 2 to 3 feet of free-draining granular material will be placed over the entire fill foundation as previously discussed.

Settlement due to consolidation of the fill material itself was also considered. Assuming one percent consolidation for a well-compacted fill, approximately 2 inches of settlement can be expected for a 13-foot high embankment. However, it is anticipated that much of this settlement will occur during construction.

5.4.9 Additional Settlement Recommendations

The most cost effective method for dealing with the potentially excessive settlement anticipated for the embankment fill is to surcharge the embankment foundations prior to construction. Instrumentation 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 to reduce the amount of settlement is to perform additional overexcavation and replacement of the existing soft soils. However, because of the great depth to which these soils were encountered and the variable groundwater

conditions encountered at the site, this option will likely not be practical or possible. Alternately, wick drains could be considered to accelerate the time of consolidation of the embankment foundation. Settlement calculations indicate that in order to achieve 80 percent of primary consolidation in approximately 60 days, wick drains would need to be installed in a triangular grid-like pattern at 3 foot center-to-center spacing. If wick drains are to be utilized in these areas, it is recommended that they be installed within and to 15 feet beyond the limits of the proposed roadway embankments. Additional recommendations for the wick drains and instrumentation are shown on the plans in Appendix E.

If wick drains are used, it is recommended that at least 2 to 3 feet of free-draining granular material be placed over the entire fill foundation area before construction of the embankment. This material will serve to accelerate the time of consolidation of the embankment foundation soils by providing drainage for the outflow from the wick drains and will also provide a stable surface upon which normal fill operations can begin. In addition, the wick drain installation should be performed by a contractor who specializes in their installation.

Groundwater seepage, overexcavation, and removal of unsuitable soils is anticipated within the embankment areas. Consequently, it may be necessary to place additional granular material or end-dumped rock in order to establish a dry and stable fill foundation.

5.4.10 Cut Slopes

Rock cuts are anticipated in most of the cut sections. Anticipated areas of rock cut are presented in the table below. Rock cut slopes recommendations are presented in a separate submission.

Table 2 Areas of Anticipated Rock Cuts

Alignment	Locations
SR 823 (Mainline)	Sta. 509+50 to Sta. 528+00
SR 728 Ramp A	Sta. 518+53 to Sta. 529+00
SR 728 Ramp B	Sta. 522+50 to Sta. 529+50
SR 728 Ramp C	Sta. 522+50 to 529+50
SR 728 Ramp D	Sta. 519+51 to 527+50

A minor amount of soil cut is anticipated near the transitions from cut to embankment fill, approximately between SR 823 Station 528+00 to Station 530+00 and corresponding stations on the ramps. Cuts in soil should be at 2H:1V slopes.

5.4.11 Instrumentation

Regardless of the construction methods used to construct the embankments, instrumentation should be installed to monitor the condition of the new embankment fill and foundation during construction. It is recommended that the instrumentation include vibrating wire piezometers, settlement plates, and, if necessary, settlement points.

The purpose of the vibrating wire piezometers would be to monitor any excess pore pressures in the foundation soils. If at any time the excess pore pressure head is above the level of the existing ground surface, fill placement should stop until the excess pore pressures dissipate. Settlement plates should be installed to measure the actual consolidation of the foundation soils beneath the new embankment load. If the settlement plates indicate excessive settlement, fill placement should be stopped and the condition investigated. Settlement points could be installed in the embankment surface to measure horizontal and vertical movement of the embankment fill.

During construction it is recommended that the vibrating wire piezometers be read a minimum of two times each day during fill placement. More frequent readings should be taken if excess pore pressures exist in the foundation soils. Settlement plates should also be read at least twice each day unless excessive settlements occur and additional readings are warranted. During the consolidation period, both the piezometers and settlement plates should be read at least once daily. Subsequent embankment stages should be constructed only if there are no excessive pore pressures in the foundation soils.

5.5 Construction Considerations

5.5.1 General

Based on the provided plans, profiles, and cross sections, the new roadway and ramps at the interchange will consist of both cut and embankment fill areas. All work should be performed in accordance with the current edition of the ODOT Construction and Material Specifications (CMS). Special care should be taken to ensure that the requirements of the CMS are met so that stable embankments are constructed.

5.5.2 Subgrade Preparation

Silt (A-4b) was encountered in the subgrade soils in several boring locations on Lucasville-Minford Road. 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.

5.5.3 New Embankment Construction

ODOT 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 Item 203.05. Also, it is recommended that the foundation soils be proof rolled as per 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.

Locations of borrow areas are not known at this time. However, if glacial tills are utilized as the fill materials, 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 in to the lift. In addition, any soil classified as silt (A-4b) should not be used as fill.

It should be noted that three borings drilled for the Lucasville-Minford Road Interchange encountered soils classified as elastic clay (A-7-5). Additionally, several borings encountered soils with liquid limits above 65. Both soils classified as elastic clay (A-7-5) and soils having liquid limits in excess of 65 should not be used in embankment construction as per ODOT Item 703.16. Caution should be used while excavating in these soils to determine the type of soil and its suitability as fill material.

5.5.4 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 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.

It is understood that a portion of the roadway will be constructed over an existing pond, approximately between State Route 823 Station 530+50 and Station 531+50. This area should be drained prior to construction and any soft "muck" in the bottom removed prior to beginning the fill placement. A two-foot thick layer of durable Type D riprap should be placed in the bottom of the drained pond and within any abandoned stream channels, if any, being relocated from underneath the embankment. If soil fill is placed above the riprap, geotextile fabric should be placed between the soil and the rock to separate the layers. Ponds may require benching as set forth in ODOT 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.

5.5.5 Rock Excavation

It is anticipated that rock excavation will be required for the roadway and interchange construction as indicated in Section 5.4.10. In addition, sandstone bedrock was encountered at the subgrade as indicated in Table 1 in Section 5.2.2. Due to the hardness of the rock and the length of the proposed alignment, blasting may be needed to excavate the rock. Rock encountered at these and any other locations at the subgrade elevation should be undercut and replaced by controlled, engineered fill as outlined by ODOT Item 204.05.

5.5.6 Special Benching

The roadway cross-sections were evaluated 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 side hill fill on an existing slope steeper than 8:1 should be benched according to the ODOT Item 203.05. The ODOT Office of Geotechnical Engineering recommends special benching on existing slopes 4:1 or steeper. Special benching is used to improve the constructability 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.

The evaluation indicated that no sidehill fills were planned in the Lucasville-Minford Interchange area. Consequently, no special benching will be required. However, all embankment fill should be placed in accordance with ODOT Item 203.6, "Spreading and Compacting" and Item 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.

5.6 Excavation and Groundwater Considerations

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.

Seepage was first encountered in the borings at depths between 10.5 and 68.5 feet, primarily in areas where embankment fill will be placed. Borings drilled in cut sections generally did not encounter seepage. In the borings where seepage was observed, water levels prior to coring were at depths between 4.3 and 74.0 feet. Minor seepage is anticipated in excavations for culvert foundations. Therefore, it is anticipated that the excavations will encounter only minor seepage. However, groundwater conditions can change with time. The contractor should be prepared to maintain reasonably dry excavations, such as with sumping and pumping. The Contractor should also be prepared to deal with unexpected seepage and precipitation that enters any excavation.

5.7 Geotechnical Design Checklists

The geotechnical design checklists applicable to this report are included in Appendix F.

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.

Dorothy A. Adams

Dorothy A. Adams, P.E.
Geotechnical Engineer

Arthur E. Nix DAA

Pete Nix, P.E.
Geotechnical Division Manager

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APPENDIX A

DLZ

APPENDIX A

General Information - Drilling Procedures and Logs of Borings
Legend - Boring Log Terminology
Boring Location Plan
Boring Logs – Seventy-seven (77) Borings

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.

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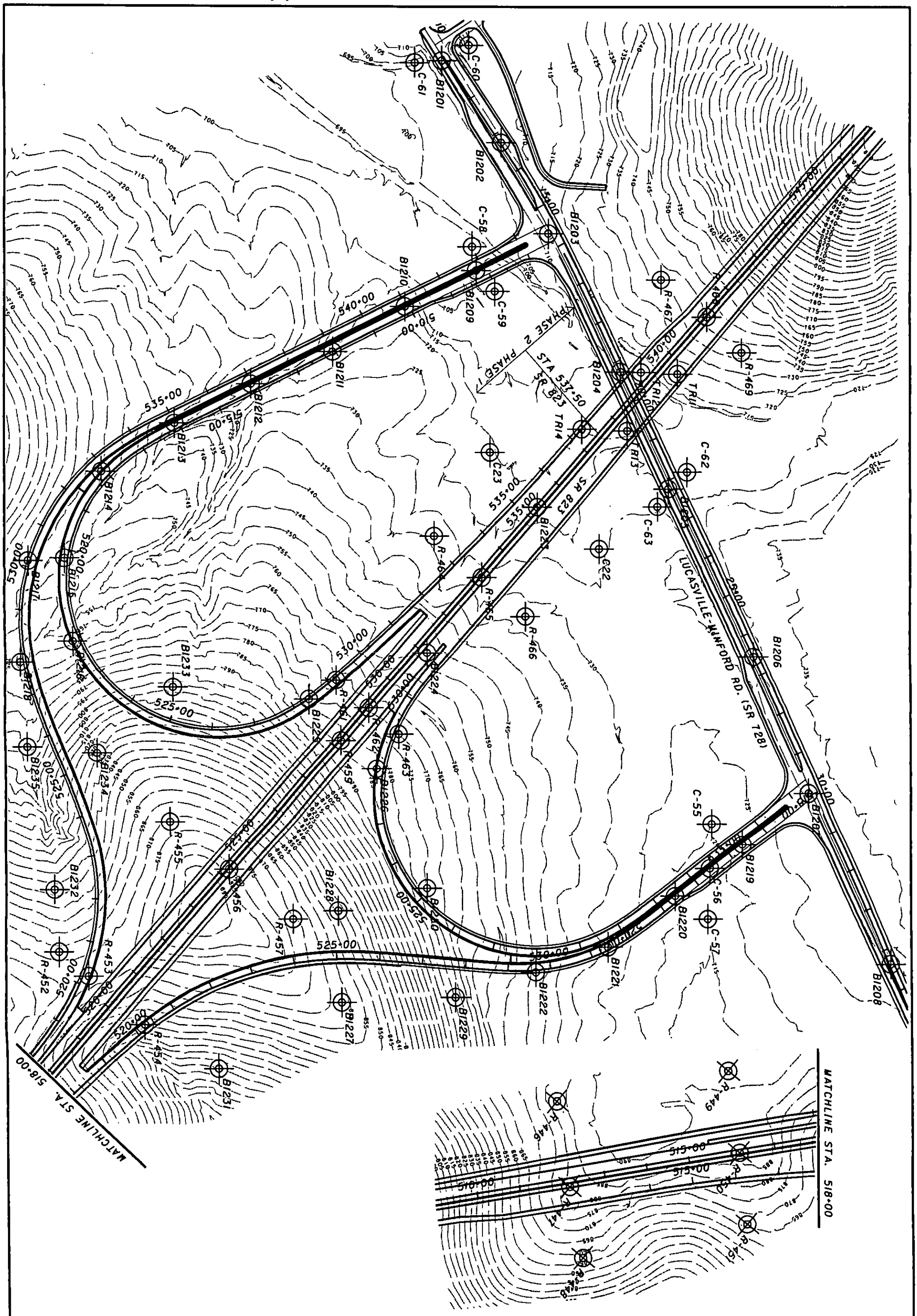


	SCI-823-0.00	BORING LOCATION PLAN LUCASVILLE MINFORD ROAD INTERCHANGE	CALCULATED RJH CHECKED DAA 0 100 50 200 HORIZONTAL SCALE IN FEET

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

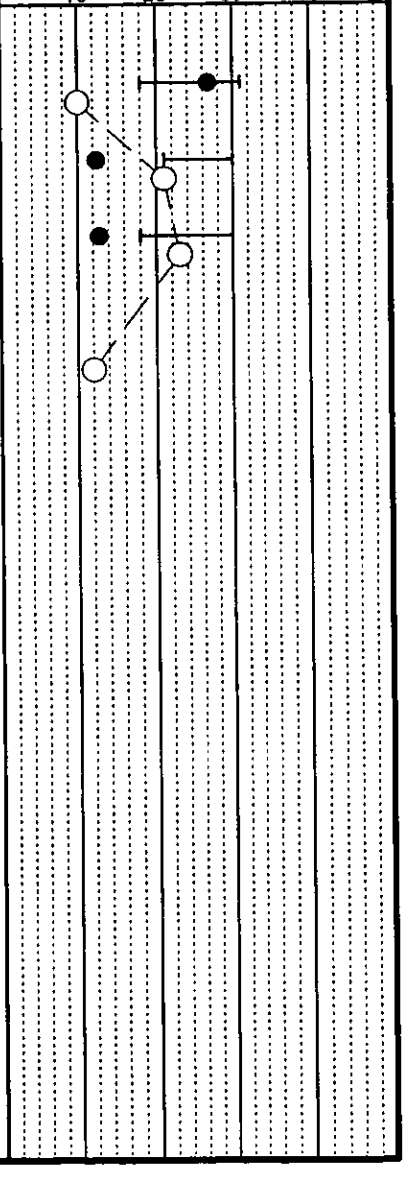
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-1201 | Location: Sta. 10+90.4, 6.9 ft. RT of Lucasville Minford Rd. CL | Date Drilled: 07/21/05

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	715.5												
0.8	714.7						Asphalt - 3" Aggregate Base - 7"						
		4 5 5 7	10	1		1.5	FILL: Stiff brown SILT AND CLAY (A-6a), some gravel, some fine to coarse sand; contains asphalt and glass fragments; moist.	25	9	--	12	36	18
3.5	712.0	6 10 11 10	15	2		4.5+	Hard brown SANDY SILT (A-4a), some gravel, little fine to coarse sand; damp.	24	4	--	11	41	20
5.0	710.5	10 13 10 13	24	3		4.0	Very stiff brown SILT AND CLAY (A-6a), some gravel, little fine to coarse sand; damp to moist.	24	4	--	11	42	19
		4 6 6 7	18	4		2.0							
10.0	705.5						Bottom of Boring - 10.0'						
15													
20													
25													
30													

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



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

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

LOG OF: Boring B-1202 | Location: Sta. 13+24.7, 7.6 ft. LT of Lucasville Minford Rd. CL | Date Drilled: 07/21/05

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	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	715.3												
0.8	714.5	6 5 5 6	19	1		3.0	Asphalt - 3" Aggregate Base - 7" FILL: Very stiff brown SILTY CLAY (A-6b), trace to little gravel, trace fine to coarse sand; contains asphalt fragments; moist.	11	3	--	5	46	35
5		1 3 5 4	20	2		2.0		5	4	--	4	38	49
5.5	709.8	3 5 5 5	18	3		2.0	Stiff mottled brown and gray CLAY (A-7-6), trace fine to coarse sand; moist. @ 8.0'-10.0', gray.	0	1	--	1	33	65
10.0	705.3	5 4 3 4	20	4		1.0							
							Bottom of Boring - 10.0'						

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

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

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

LOG OF: Boring B-1203 | Location: Sta. 15+63.3, 6.2 ft. RT of Lucasville Minford Rd. CL | Date Drilled: 07/21/05

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	715.0						Asphalt - 4" Aggregate Base - 6"						
0.8	714.1	8 7 5 5	17	1		3.0	FILL: Very stiff gray SILT (A-4b), trace gravel, trace fine to coarse sand; moist.	2	3	–	3	58	34
3.0	712.0	2 3 3 4	12	2		2.5	Very stiff mottled brown and gray CLAY (A-7-6), trace fine to coarse sand, trace gravel; moist.	3	2	–	2	22	71
5.0	710.0	2 4 3 4	11	3		1.5	Stiff brown ELASTIC CLAY (A-7-5), trace fine to coarse sand; moist.	0	0	–	1	3	96
		2 3 3 4	24	4		1.5							
10.0	705.0						Bottom of Boring - 10.0'						
15													
20													
25													
30													

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

52
65

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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-1204 | Location: Sta. 19+24.7, 6.1 ft. LT of Lucasville Minford Rd. CL | Date Drilled: 07/21/05

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	714.5												
0.8	713.6	12 18 15 12	20	1		4.5+	Asphalt - 4" Aggregate Base - 6" FILL: Dense gray SANDY SILT (A-4a), little fine to coarse sand, little gravel, little clay ; damp.	14	9	--	10	48	19
3.0	711.5	3 4 5 5	18	2		1.0	Medium stiff to stiff brown SILT (A-4b), little fine to coarse sand; moist.	0	1	--	13	68	18
5													
5.5	709.0	2 5 3 4	19	3		1.0	Medium stiff to stiff reddish brown SANDY SILT (A-4a), some fine to coarse sand, little gravel, little clay; damp to moist.	18	11	--	18	38	15
8.0	706.5	2 3 4 5	20	4		2.5	Very stiff gray CLAY (A-7-6), trace fine to coarse sand; laminated; moist.						
10.0	704.5						Bottom of Boring - 10.0'						
15													
20													
25													
30													

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

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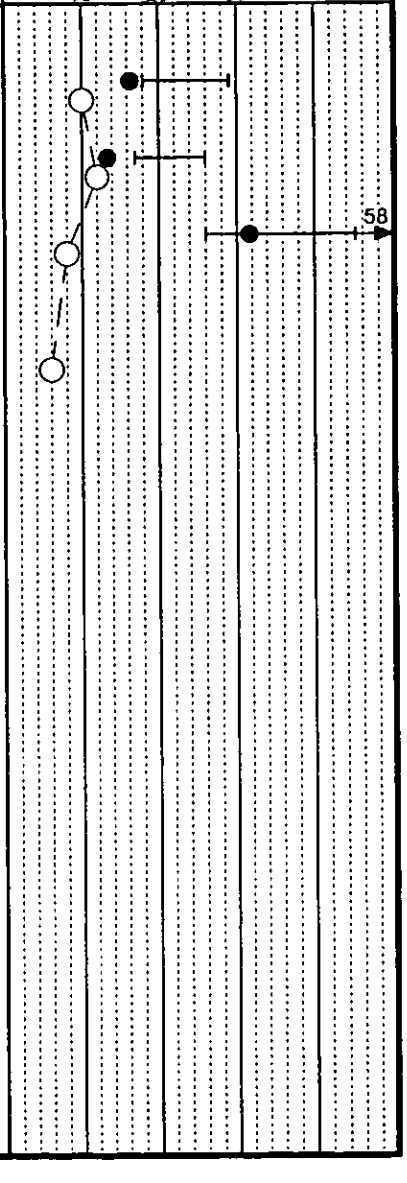
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-1205 | Location: Sta. 22+17.7, 7.9 ft. RT of Lucasville Minford Rd. CL | Date Drilled: 07/21/05

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	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	719.9						Asphalt - 4" Aggregate Base - 8"						
1.0	718.9	7 5 5 10	16	1		2.0	FILL: Stiff to very stiff mottled brown and gray SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.	5	7	--	8	48	32
3.0	716.9	7 7 5 5	14	2		3.5	Very stiff gray SANDY SILT (A-4a), some fine to coarse sand, little gravel; damp.	14	12	--	11	39	24
5.0	714.9	3 5 3 5	20	3		1.5	Stiff brown CLAY (A-7-6), trace fine to coarse sand; moist.	0	0	--	1	15	84
		2 3 3 3	21	4		1.0							
10.0	709.9						Bottom of Boring - 10.0'						

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



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

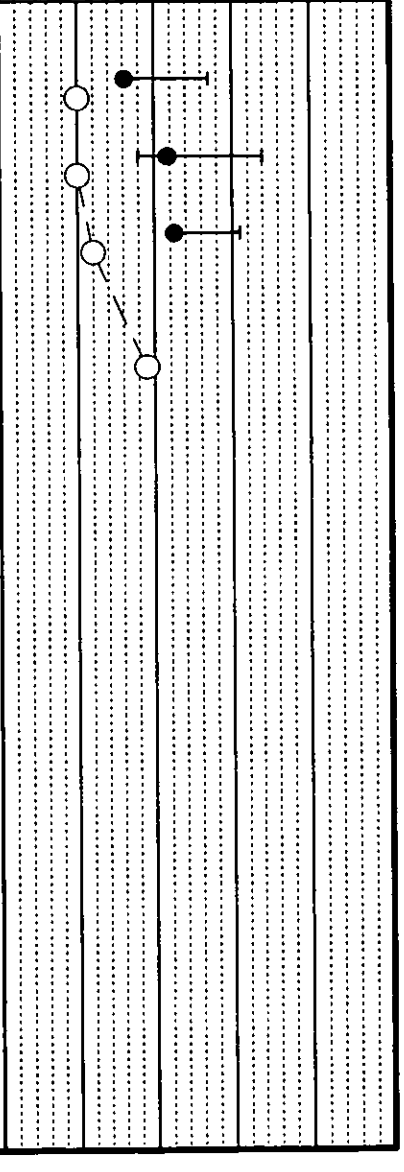
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-1206 | Location: Sta. 26+54.5, 7.1 ft. LT of Lucasville Minford Rd. CL | Date Drilled: 07/21/05

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	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	729.6						Asphalt - 4" Aggregate Base - 8"						
1.0	728.6	5 5 5	20	1		2.0	FILL: Stiff to very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp to moist.	4	6	–	8	58	24
3.0	726.6	3 4 6	22	2		2.5	Very stiff mottled brown and gray SILTY CLAY (A-6b), trace fine to coarse sand; moist.	0	1	–	7	60	32
5.0	724.6	4 5 7		3		2.0	Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.	5	13	–	19	39	24
		3 8 11	21	4		2.0							
10.0	719.6						Bottom of Boring - 10.0'						

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



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25
30

FILE: 0121-3070-03 (11/21/2006 2:17 PM)

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

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

LOG OF: Boring B-1207 | Location: Sta. 29+94.9, 7.1 ft. RT of Lucasville Minford Rd. CL | Date Drilled: 07/21/05

WATER OBSERVATIONS: Water seepage at: None Observed
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	732.3												
0.8	731.5						Asphalt - 3" Aggregate Base - 7"						
		13 12 8 5	17	1			Medium dense gray SILT (A-4b), little fine to coarse sand, trace gravel; damp to moist.	2	6	--	6	70	16
3.0	729.3	1 1 1 3	24	2		2.0	Very stiff mottled brown and gray SILT AND CLAY (A-6a), trace to little gravel, trace to little fine to coarse sand; moist.	3	3	--	4	58	32
5		4 6 7 7	24	3		2.0		11	5	--	5	54	25
		6 8 9 10	20	4		2.5							
10.0	722.3						Bottom of Boring - 10.0'						

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

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1208 | Location: Sta. 34+35.0, 6.8 ft. LT of Lucasville Minford Rd. CL | Date Drilled: 07/21/05

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	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	729.6												
0.8	728.8	15 9 4 7	18	1		2.0	Asphalt - 5" Aggregate Base - 5" Stiff to very stiff mottled brown and gray SILT (A-4b), trace gravel, trace fine to coarse sand; damp to moist.	4	3	--	4	63	26
3.0	726.6	9 13 10 5	19	2		2.5	Very stiff mottled brown and gray SILT AND CLAY (A-6a), little gravel, trace to little fine to coarse sand; damp.	16	5	--	5	46	28
5		7 11 10 12	20	3		2.5		12	9	--	11	47	21
7.5	722.1	3 5 7 7	24	4		3.0	Very stiff gray CLAY (A-7-6), trace fine to coarse sand; laminated; moist.						
10.0	719.6						Bottom of Boring - 10.0'						
15													
20													
25													
30													

GRADATION

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

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1209 | Location: Sta. 508+24.4, 19.7 ft. RT of SR 728 Ramp C BL | Date Drilled: 07/27/05

WATER OBSERVATIONS: Water seepage at: Not reported; Water level at completion: 20.0'

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	704.9												
0.3	704.6	1 2 3	16	1		--	Topsoil - 4" / Loose brown SILT (A-4b), some clay, trace to little fine to coarse sand, trace gravel; damp to moist.	0	3	--	7	68	22
		3 3 3	15	2		--		3	2	--	6	67	22
3.0	701.9	3 6 13	17	3		--	Medium dense brown SANDY SILT (A-4a), some gravel, little clay; damp.	26	18	--	16	29	11
5		5 10 9	14	4		--		34	12	--	12	30	12
6.0	698.9	3 4 5	16	5		2.0	Stiff gray SILTY CLAY (A-6b), trace to little fine to coarse sand, trace gravel; contains carbonaceous material; damp.						
8.5	696.4	2 4 7	17	6		1.75	Stiff brown and gray SILT AND CLAY (A-6a), some fine to coarse sand, trace gravel; contains occasional sand and gravel seams; moist.						
10													
11.0	693.9	1 3 3	16	7		1.25	Medium stiff to stiff gray CLAY (A-7-6), trace to little silt; moist.						
		0 1 1	18	8		0.75		0	0	--	0	10	90
15		0 0 1	18	9		0.75		0	0	--	0	18	82
					P10		@ 18.0', PSI - 50 → 75 max						
20													
21.0	683.9	8 9 11	18	11		3.5	Very stiff brown SILT (A-4b), some fine to coarse sand, trace clay; damp.						
23.5	681.4	4 3 3	18	12		0.75	Medium stiff gray SILT AND CLAY (A-6a), little to some fine to coarse sand, trace gravel; damp to moist.						
25													
		8 25 40	18	13		--							
28.5	676.4												
29.4	675.5	20 50/5	11	14			Decomposed gray SILTSTONE.						

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
55
54
65
50+

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1209 | Location: Sta. 508+24.4, 19.7 ft. RT of SR 728 Ramp C BL | Date Drilled: 07/27/05

WATER OBSERVATIONS: Water seepage at: Not reported
Water level at completion: 20.0'

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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
30	674.9						Bottom of Boring - 29.4'							
35														
40														
45														
50														
55														
60														

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1210 | Location: Sta. 540+98.2, 22.7 ft. RT of SR 728 Ramp D BL | Date Drilled: 07/27/05

WATER OBSERVATIONS: Water seepage at: Not reported
Water level at completion: 30.0' (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	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	716.5												
0.3	716.2	2 2 3	12	1		2.5	Topsoil - 3"	6	7	--	22	42	23
1.5	715.0	3 5 6	11	2		--	Very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; damp to moist.	12	3	--	19	39	27
3.0	713.5	2 4 3	15	3		3.0	Very stiff brown SILT AND CLAY (A-6a), some fine to coarse sand, little gravel; damp.	0	1	--	12	46	41
4.5	712.0	3 3 5	12	4		4.5	Very stiff light brown SILTY CLAY (A-6b), little fine to coarse sand; moist.	1	0	--	2	38	59
5		2 3 5	14	5		3.25	Very stiff to hard mottled brown and gray CLAY (A-7-6), trace fine to coarse sand, trace gravel; moist. @ 6.0'-7.5', contains trace carbonaceous material.						
		2 3 3	13	6		2.75							
10		2 3 4	16	7		2.0		0	0	--	1	5	94
		2 2 4	18	8		2.5	@ 13.5'-15.0', gray.						
15					P-9								
		1 3 3	18	10		1.25	@ 18.5'-30.0', medium stiff to stiff, gray.						
20		1 2 3	18	11		0.75	@ 22.4'-22.5', silt lens.						
		0 1 2	18	12		0.75							
25		1 1 2	18	13		1.0							
		1 2 3	18	14		1.25							
30													

GRADATION

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

65

FILE: 0121-3070-03 [11/28/2006 1:49 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-1210 | Location: Sta. 540+98.2, 22.7 ft. RT of SR 728 Ramp D BL | Date Drilled: 07/27/05

WATER OBSERVATIONS: Water seepage at: Not reported
Water level at completion: 30.0' (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	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	686.5						Stiff gray CLAY (A-7-6), trace fine to coarse sand, trace gravel; moist.						
33.5	683.0	2 11 19	18	15			Severely weathered gray SANDSTONE, contains few rust stains.						
35													
		19 22 33	18	16									
40													
43.5	673.0	50/2	2	17		--	Severely weathered gray SILTSTONE.						
45.0	671.5	Core 78"	Rec 78"	RQD 76%	R-1	*229	Medium hard gray SANDSTONE; very fine grained, moderately to highly weathered, argillaceous, laminated to thinly bedded, slightly fractured, contains moderate to abundant argillaceous laminations.						
50													
51.5	665.0						Bottom of Boring - 51.5'						
55													
60													

GRADATION

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
55
50+

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1211 | Location: Sta. 512+06.9, 0.5 ft. LT of SR 728 Ramp C BL | Date Drilled: 07/28/05

WATER OBSERVATIONS: Water seepage at: 37.0' (approx.)
Water level at completion: 40.5'

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)
0.2	715.3													Natural Moisture Content, % - ●
	715.1	2 3 4	14	1		--	Topsoil - 2"	4	4	--	19	52	21	PL ⊢——⊣ LL
1.5	713.8	3 3 4	15	2		--	Medium stiff brown SILT (A-4b), some fine to coarse sand, trace gravel; contains roots; damp.	0	1	--	5	21	73	Blows per foot - ○
		2 3 4	10	3		3.5	Stiff to very stiff brown CLAY (A-7-6), trace fine to coarse sand; damp to moist.	0	0	--	0	7	93	10 20 30 40
5		2 2 3	17	4		2.5		0	0	--	0	8	92	
		2 3 4	18	5		2.0	@ 6.0'-7.5', contains sand lenses.							
		1 3 3	18	6		2.5								
10		2 2 3	18	7		2.5		0	0	--	0	16	84	
		1 2 2	18	8		1.25								
15					P9									
		1 2 2	18	10		1.25								
20		1 2 3	18	11		1.0	@ 21.0'-22.5', contains silt lenses.							
		1 2 2	18	12		1.25								
25		2 2 2	18	13		1.25								
		1 3 3	18	14		1.25								
30														

GRADATION

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1211 | Location: Sta. 512+06.9, 0.5 ft. LT of SR 728 Ramp C BL | Date Drilled: 07/28/05

WATER OBSERVATIONS: Water seepage at: 37.0' (approx.)
Water level at completion: 40.5'

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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	685.3						Medium stiff to stiff brown CLAY (A-7-6), trace fine to coarse sand, moist.							
		1 3 4	18	15		1.5	@ 31.0'-32.5', contains silt lenses.							
		2 3 5	18	16		0.75	@ 33.5'-35.0', contains numerous silt lenses.							
35														
38.5	676.8	22 37 24	16	17			Dense gray SANDY SILT (A-4a), some fine to coarse sand, little to some gravel, trace clay; contains few rust stains; damp.							61
40														
43.5	671.8	50/3	3	18			Decomposed gray SILTSTONE.							50+
43.8	671.5						Bottom of Boring - 43.8'							
45														
50														
55														
60														

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1212 | Location: Sta. 536+98.4, 23.5 ft. RT of SR 728 Ramp D BL | Date Drilled: 07/28/05

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
	721.5												
0.1	721.4	3 5 8	14	1		--	Topsoil - 1"						
							Stiff brown SILT (A-4b), some clay, little fine to coarse sand; damp.	0	1	--	10	57	32
		8 10 11	13	2		--		0	1	--	13	60	26
3.0	718.5	5 7 8	14	3		--	Stiff brown SANDY SILT (A-4a), some fine to coarse sand, little gravel; damp.	14	6	--	17	43	20
4.7	716.8	3 5 7	13	4		4.5	@ 4.5'-4.7', hard silt layers.	0	0	--	0	8	92
		5 8 12	16	5		4.5+	Hard mottled brown and gray CLAY (A-7-6), trace fine sand, trace silt; contains trace carbonaceous material; damp to moist.						
		4 6 8	18	6		4.25							
10													
11.0	710.5	3 5 6	18	7		2.25	Stiff to very stiff gray CLAY (A-7-6), trace to little silt; damp to moist.	0	0	--	0	10	90
		3 3 4	18	8		1.75							
15													
		2 3 5	18	9		1.5	@ 16.0'-17.5', mottled brown and gray.						
		2 2 3	18	10		1.25							
20													
		1 8 3	18	11		1.5		0	0	--	0	13	87
		2 3 3	18	12		1.5							
25													
		2 3 3	18	13		1.25	@ 27.4'-27.5', silt layer.						
		1 3 3	18	14		1.0							
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
64
55
61

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1212 | Location: Sta. 536+98.4, 23.5 ft. RT of SR 728 Ramp D BL | Date Drilled: 07/28/05

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
30	691.5						Stiff gray CLAY (A-7-6); damp.						
		1 2 3	18	15		1.0							
35													
		1 2 2	18	16		1.0	@ 38.5'-40.0', contains few silt lenses.						
40													
43.5	678.0	7 8 10	18	17		--	Medium dense gray SANDY SILT (A-4a), some fine to coarse sand, little gravel, trace clay; damp to moist. (possible decomposed sandstone)						
45													
48.5	673.0	50/5	5	18			Decomposed Gray SILTSTONE.						
50.0	671.5	Core 78"	Rec 75"	RQD 91%	R-1	*164	Medium hard to hard gray SANDSTONE interbedded with SHALE; very fine to fine grained, highly weathered, micaceous, laminated, slightly fractured. @ 50.5', 51.7'; low angle fracture.						
55													
56.5	665.0						Bottom of Boring - 56.5'						
60													

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

50+

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1213 | Location: Sta. 516+09.5, 14.6 ft. RT of SR 728 Ramp C BL | Date Drilled: 07/28/05

WATER OBSERVATIONS: Water seepage at: Not reported
Water level at completion: 4.0'

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	733.6	2 2 2	15	1		2.5	No topsoil Very stiff light brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp to moist.	6	2	--	7	57	28
		2 3 4	13	2		3.5		7	4	--	6	51	32
3.0	730.6	3 3 6	16	3		3.25	Very stiff light brown ELASTIC CLAY (A-7-5); damp.	0	0	--	0	13	87
4.5	729.1	2 3 6	15	4		3.25	Stiff to very stiff light brown CLAY (A-7-6), trace fine to coarse sand; contains occasional silt lenses; moist.						
5		3 3 5	18	5		3.0							
		2 4 3	18	6		2.5							
10		2 3 4	18	7		2.75							
		3 4 5	18	8		2.25							
15		3 3 4	18	9		0.75	@ 16.0'-17.5', medium stiff, gray, no silt lenses.						
		2 2 2	18	10		1.0							
20					P-1			0	0	--	0	13	87
		1 2 3	18	12		1.0							
25													
26.0	707.6	1 2 3	18	13		1.25	Stiff brown and gray CLAY (A-7-6), trace to little silt, trace fine to coarse sand; damp.						
30		2 3 3	18	14		1.25							

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
62
57

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring B-1213 | Location: Sta. 516+09.5, 14.6 ft. RT of SR 728 Ramp C BL | Date Drilled: 07/28/05

WATER OBSERVATIONS: Water seepage at: Not reported
Water level at completion: 4.0'

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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	703.6						Medium stiff to stiff brown and gray CLAY (A-7-6), trace fine to coarse sand; damp.							
35		2 3 3	18	15		1.0								
40		2 3 4	18	16		1.0								
45		3 3 4	18	17		0.75								
50.0	683.6	2 3 3	18	18		1.0								
							Bottom of Boring - 50.0'							
55														
60														

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1214 | Location: Sta. 532+88.8, 30.5 ft. RT of SR 728 Ramp D BL | Date Drilled: 07/28/05 to 07/29/05

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
	755.3						WATER OBSERVATIONS: Water seepage at: None Water level at completion: 40.0' (Prior to coring) 4.0' (Includes drilling water)						
0.2	755.1	2 3 2	15	1		4.25	Topsoil - 2" Hard brown SILT (A-4b), little fine sand, trace gravel, trace clay; contains few rust stains and rock fragments; damp.						
		2 2 4	15	2		4.5+							
3.0	752.3	3 6 7	14	3		3.75	Very stiff to hard brown SANDY SILT (A-4a), little clay, trace gravel; contains few rust stains; damp.						
5		4 8 10	18	4		4.5							
		4 19 10	11	5		4.5+	@ 7.0'-7.1', clay seam.						
8.5	746.8	3 4 4	15	6		3.5	Very stiff to hard brown CLAY (A-7-6); moist.						
10		3 4 5	18	7		3.25							
		1 3 4	18	8		3.5	@ 13.5'-17.5', brown and gray mottled.						
15		2 4 4	18	9		4.25							
		1 3 3	18	10		2.5							
20		3 3 4	18	11		1.5	@ 21.0'-30.0', stiff, gray.						
					P-1			0	0	–	0	30	70
25		1 2 2	18	13		1.25							
30		1 2 3	18	14		1.0							

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

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1214 | Location: Sta. 532+88.8, 30.5 ft. RT of SR 728 Ramp D BL | Date Drilled: 07/28/05 to 07/29/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 40.0' (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
	725.3												
30.0	725.3						Hard brown SANDY SILT (A-4a), little clay, trace gravel; contains rust stains; damp.						
35		13 18 22	18	15		4.5+							
38.5	716.8												
		12 16 30	18	16			Severely weathered brownish-gray to gray SILTSTONE, arenaceous.						
40													
		50/4	4	17									
45.0	710.3						Medium hard to hard gray SANDSTONE;very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, massively bedded, moderately fractured to broken, iron staining throughout.						
50		Core 84"	Rec 83"	RQD 64%	R-1	*356	@ 45.0'-45.4', 45.8'-45.9', 47.8'-48.1', broken zones. @ 45.7', 46.3', low angle fractures. @ 48.7'-48.8', high angle fracture (partially healed).						
52.0	703.3						Bottom of Boring - 52.0'						
55													
60													

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

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1215 | Location: Sta. 520+18.8, 7.9 ft. RT of SR 728 Ramp C BL | Date Drilled: 9/28/05

WATER OBSERVATIONS: Water seepage at: 33.9'
Water level at completion: 8.3' (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	754.4												
0.4	754.0	3 4 4	18	1		2.75	Topsoil - 5" Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand; damp.						
		3 4 4 5	15	2		2.75							
4.0	750.4	3 4 5 5	24	3		2.0	Stiff to very stiff brown CLAY (A-7-6), trace fine to coarse sand; moist. @ 4.0'-6.0', gray and brown mottled.						
5		2 3 5	18	4		1.5	@ 7.0', thin sand seam.						
		2 3 6	16	5		2.25							
10		2 3 4	18	6		1.5							
		3 5 8	18	7		2.5							
15		2 3 4	18	8		0.75	@ 16.0', becomes gray.						
		2 3 4	18	9		1.5							
20		2 3 4	18	10		0.5							
		2 3 4	18	11		0.5							
25		2 3 6	18	12		<0.25	@ 26.0'-27.5', very soft.						
30					P-1								

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

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1215 | Location: Sta. 520+18.8, 7.9 ft. RT of SR 728 Ramp C BL | Date Drilled: 9/28/05

WATER OBSERVATIONS: Water seepage at: 33.9'
Water level at completion: 8.3' (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
30	724.4						Stiff brown CLAY (A-7-6), trace fine sand; moist.						
33.9	720.5	8 21 10	14	13b 13a		1.75	Dense brown FINE SAND (A-3), trace silt; moist.						
35													
38.5	715.9	8 12 13	18	14			Hard gray SANDY SILT (A-4a), little fine to coarse sand, little clay; damp. (DECOMPOSED SILTSTONE)						
40													
43.5	710.9	40					Gray SANDSTONE fragments						
44.2	710.2	50/1	2	15			Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, thickly bedded, highly fractured, broken fractures infilled with silty clay and sandstone fragments. @ 44.2' to 45.0', brown and gray; broken and high angle fracture.						
45		Core 60"	Rec 60"	RQD 50%	R-1	*440							
49.2	705.2						Bottom of Boring - 49.2'						
50													
55													
60													

GRADATION

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

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1216 | Location: Sta. 522+07.5, 16.1 ft. RT of SR 728 Ramp C BL | Date Drilled: 9/28/05 to 9/29/05

WATER OBSERVATIONS: Water seepage at: 10.5'
Water level at completion: None (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	763.8												
0.3	763.5	3 4 6 7	24	1		3.5	Topsoil - 4" Very stiff to hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp to moist.						
		6 7 9 11	20	2		4.5+							
5		4 3 6 6	19	3		2.25							
6.6	757.2	2 2 5	18	4A 4B		2.25 3.25	Very stiff to hard gray SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; contains few rock fragments; damp to moist.						
		12 18 20	18	5		4.25							
10													
11.0	752.8	16 38 50/5	15	6			Very dense brown and gray SILT (A-4b), some fine sand, trace gravel; damp.						
		50/5	5	7									
15													
16.0	747.8	50/5	5	8			Severely weathered brown and gray SILTSTONE, arenaceous, occasional rust stains.						
19.0	744.8	50/4	4	9			Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, thickly bedded, highly fractured.						
20		Core 60"	Rec 60"	RQD 41%	R-1	*136	@ 19.0' to 20.8', broken, highly weathered to decomposed, discolored fractures infilled with silty clay and sandstone fragments.						
24.0	739.8						Bottom of Boring - 24.0'						
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 [11/21/2006 2:17 PM]

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

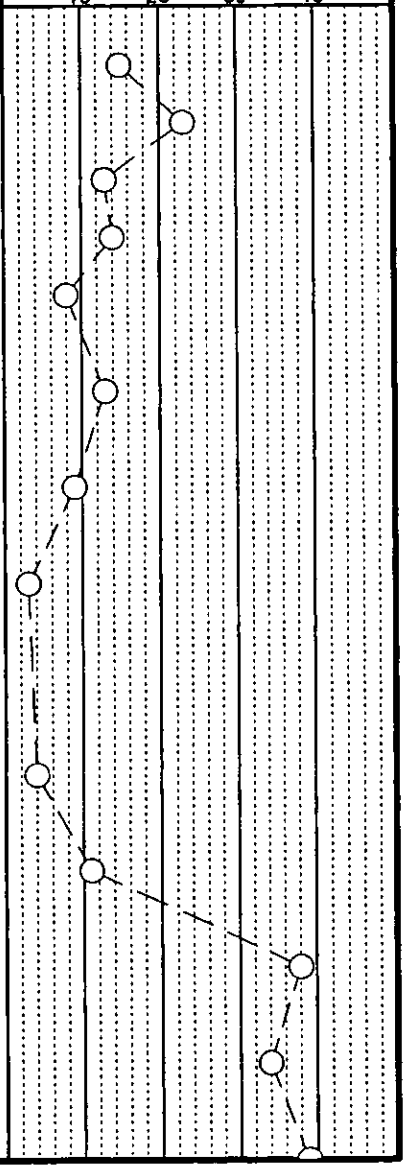
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-1217 | Location: Sta. 530+13.7, 4.8 ft. LT of SR 728 Ramp D BL | Date Drilled: 08/02/05

WATER OBSERVATIONS: Water seepage at: 18.0'
Water level at completion: 22.0' (prior to coring)
11.0' (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	764.4												
0.2	764.2	3 5 10	17	1		4.5+	Topsoil - 2"						
		5 11 12	18	2		--	Very stiff to hard brown SILT (A-4b), some fine sand, little clay; contains rust stains; damp.						
		5 6 7	13	3		3.75							
4.5	759.9	6 6 8	18	4		4.5	Hard brown SANDY SILT (A-4a), little clay; contains rust stains; damp.						
5													
7.0	757.4	3 3 5	11	5		3.5							
8.5	755.9						Very stiff gray SILTY CLAY (A-6b), little fine sand; contains rust stains; moist.						
		3 7 6	15	6		3.5	Very stiff brown SANDY SILT (A-4a), little gravel, trace to little clay; contains rust stains; damp.						
10													
		4 5 4	18	7		2.5	@ 11.0'-12.5', numerous interbedded sand seams.						
13.5	750.9	1 1 2	18	8		1.0	Stiff to very stiff gray SILT AND CLAY (A-6a), little to some fine to coarse sand; moist.						
15					9								
		1 2 2	18	10		<0.25	@ 18.5'-20.0', very soft, wet.						
20													
		2 7 4	15	11		2.75							
		12 19 19	18	12		4.5+							
25													
		19 14 20	18	13		4.5+	@ 23.5'-30.0', hard.						
		5 14 25	18	14		4.5+							
30													

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



FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring B-1217 | Location: Sta. 530+13.7, 4.8 ft. LT of SR 728 Ramp D BL | Date Drilled: 08/02/05

WATER OBSERVATIONS: Water seepage at: 18.0'
Water level at completion: 22.0' (prior to coring)
11.0' (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
	734.4												
30.0	734.4						Severely weathered gray SILTSTONE.						
		50/4	4	15									
35.0	729.4						Hard gray SANDSTONE interbedded with few MUDSTONE layers; very fine grained, argillaceous, thickly bedded, slightly fractured.						
		Core 72"	Rec 72"	RQD 86%	R-1	*429	@ 35.1', 35.3', low angle fractures, pyritic.						
40													
							@ 43.8'-43.9', argillaceous bands.						
45		Core 120"	Rec 120"	RQD 99%	R-2	*409							
50							@ 50.1'-50.5', fine grained sand layer.						
51.0	713.4						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 [11/21/2006 2:17 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 B-1218 | Location: Sta. 527+80.1, 13.7 ft. LT of SR 728 Ramp D BL | Date Drilled: 08/02/05

WATER OBSERVATIONS: Water seepage at: 26.0'
Water level at completion: 29.0' (prior to coring)
13.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.2	769.4 / 769.2	3 3 4 8	14	1		--	Topsoil - 2" / Very stiff to hard brown SANDY SILT (A-4a), trace gravel, trace clay; contains roots; damp.						
		9 11 10	17	2		4.5+							
		13 15 9	18	3		2.75							
5.0	764.4	5 5 3	18	4		3.25	Very stiff brown CLAY (A-7-6), trace to little fine to coarse sand, trace gravel; damp.	0	2	--	14	26	58
		3 4 6	18	5		4.0							
		3 3 4	12	6		2.5							
10													
		3 5 4	12	7		2.75	@ 11.0'-12.5', trace silt.						
		2 2 4	15	8		3.5							
15													
		2 2 3	18	9		2.0	@ 16.0'-17.5', contains fine to coarse sand seams.						
					10								
20													
21.0	748.4	0 1 2	18	11		1.0	Medium stiff grayish brown SILTY CLAY (A-6b), trace fine to coarse sand; contains sandstone fragments and sand seams; moist.	0	1	--	4	41	54
23.5	745.9	26 11 18	15	12		--	Medium dense light brown and red SILT (A-4b), some fine to coarse sand, little gravel; moist.	19	3	--	23	55	
25													
26.0	743.4	5 10 16	18	13		3.25	Very stiff brown SANDY SILT (A-4a), some fine to coarse sand, little clay, trace gravel; damp to moist.						
28.5	740.9	2 5 8	12	14		3.5	Medium dense brown SILT (A-4b), some fine sand; moist.						
30													

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

Non-Plastic

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1218 | Location: Sta. 527+80.1, 13.7 ft. LT of SR 728 Ramp D BL | Date Drilled: 08/02/05

WATER OBSERVATIONS: Water seepage at: 26.0'
Water level at completion: 29.0' (prior to coring)
13.0' (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
	739.4												
30.0	739.4						Stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace clay; moist.						
		3 4 5	17	15		1.5							
35							@ 34.5'-35.0', contains silt seams.						
38.5	730.9												
		4 12 18	13	16		4.5	Severely weathered gray SILTSTONE, arenaceous.						
40													
43.5	725.9												
45		Core 96"	Rec 94"	RQD 64%	R-1	*247	Medium hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, thickly bedded, moderately fractured. @ 45.6', 48.1', 50.6', low angle fractures.						
50													
51.5	717.9						Bottom of Boring - 51.5'						
55													
60													

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

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1219 | Location: Sta. 516+57.6, 28.5 ft. LT of SR 728 Ramp B BL | Date Drilled: 07/28/05

WATER OBSERVATIONS: Water seepage at: 41.0' (Prior to coring)
Water level at completion: 12.5' (Including 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	722.6												
0.3	722.3	3 4 4 5	15	1		3.0	Topsoil - 4" Very stiff brown to light brown SILT AND CLAY (A-6a), trace to little fine to coarse sand, trace gravel; moist.	0	3	--	5	65	27
		2 2 1 2	18	2		2.0		0	3	--	4	66	27
5		1 3 5 5	17	3		3.5							
6.0	716.6	3 6 6	18	4	P1	1.25	Stiff light gray SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; moist.	3	1	--	5	56	35
8.5	714.1	3 7 7	17	5		4.25	Hard mottled brown and gray SILT AND CLAY (A-6a), trace fine to coarse sand; damp.	0	1	--	7	64	28
10													
11.0	711.6	2 4 6	16	6		3.25	Stiff to very stiff brown and gray CLAY (A-7-6); damp.	0	0	--	0	10	90
		2 5 2	17	7		2.75	@ 13.5'-15.0', contains occasional silt lenses.						
15		2 3 5	17	8		2.5							
		2 2 3	18	9		1.5	@ 18.5', becomes gray.						
20		1 2 2	18	10		1.25							
		1 2 2	17	11		0.5	@ 23.5'-25.0', medium stiff.						
25		1 2 3	11	12		1.25							
		2 3 3	17	13		1.25							
30													

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

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

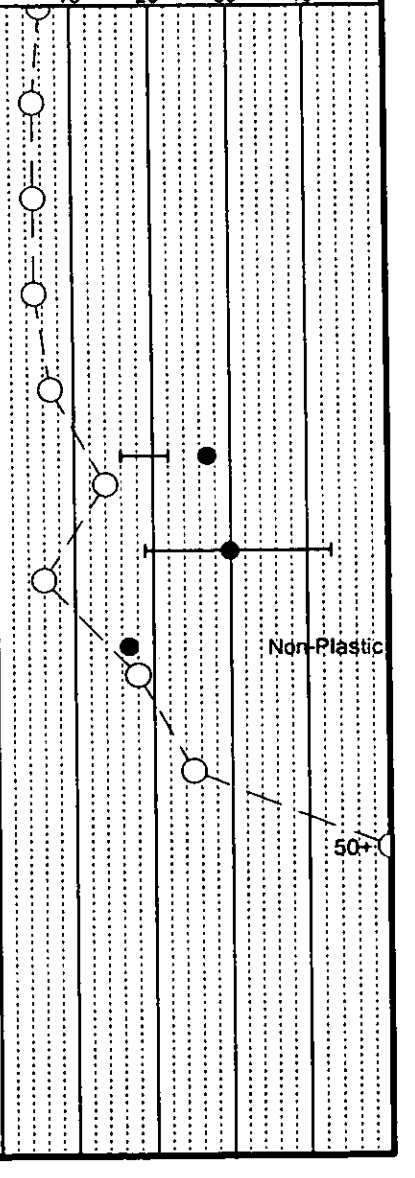
DLZ OHIO INC. * 6121 HUNTLEY ROAD, COLUMBUS, OHIO 43229 * (614)888-0040

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

LOG OF: Boring B-1219 | Location: Sta. 516+57.6, 28.5 ft. LT of SR 728 Ramp B BL | Date Drilled: 07/28/05

WATER OBSERVATIONS: Water seepage at: 41.0' (Prior to coring)
Water level at completion: 12.5' (Including 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	692.6	2 2 3	18	14		1.0	Medium stiff to stiff gray CLAY (A-7-6), damp to moist.						
		1 2 3	17	15		0.75							
35		1 3 2	18	16		0.75							
		1 3 4	18	17		1.25							
40													
41.0	681.6	3 6 8	17	18		0.75	Medium stiff gray SILT (A-4b), little clay; wet.	0	0	--	0	86	14
43.5	679.1	1 3 3	18	19		1.5	Stiff gray CLAY (A-7-6), trace fine sand; contains silt lenses; moist.	0	0	--	2	31	67
45													
46.0	676.6	9 9 9	20	20		--	Medium dense brown and gray SANDY SILT (A-4a), some gravel, some fine to coarse sand; damp to moist.	34	10	--	18	38	
		12 13 12	16	21		--	@ 48.5'-50.0', contains sandstone fragments.						
50													
51.0	671.6	48 50/5	12	22			Severely weathered gray SILTSTONE.						
53.5	669.1						Soft to medium hard gray SHALE interbedded with SANDSTONE; very fine to fine grained, highly weathered, laminated to thinly bedded, slightly fractured.						
55		Core 60"	Rec 60"	RQD 68%	R-1		@ 58.2'-58.3', sandstone seam.						
58.5	664.1						Bottom of Boring - 58.5'						
60													



FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1220 | Location: Sta. 533+41.2, 13.9 ft. LT of SR 728 Ramp A BL | Date Drilled: 7/29/05

WATER OBSERVATIONS: Water seepage at: 48.0'
Water level at completion: 48.0'

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	721.5												
0.3	721.2	6 7 9 10	14	1		2.5	Topsoil - 4" Very stiff light brown SILT AND CLAY (A-6a), trace to little fine to coarse sand, trace gravel; damp.	0	0	–	8	56	36
		9 10 10 10	13	2		2.75							
5		3 4 6 6	15	3		2.25		0	3	–	10	50	37
		3 5 5	16	4		3.5							
8.5	713.0	7 9 5	13	5		3.5	Very stiff light brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp to moist.	7	5	–	11	40	37
10													
11.0	710.5	2 4 6	16	6		2.75	Very stiff light brown CLAY (A-7-6), trace fine to coarse sand; moist.	0	0	–	5	33	62
		3 6 5	15	7		3.25							
15					P1		@ 14.9'-15.0', silt lens.						
		3 6 6	16	8		3.0							
18.5	703.0	4 6 8	17	9	P2	3.25	Very stiff light brown SILTY CLAY (A-6b), little to some fine to coarse sand, trace gravel; contains siltstone fragments; damp to moist.	1	4	–	15	30	50
20								0	3	–	25	28	44
		5 9 9	14	10		4.0	@ 21.0'-22.5', contains coal fragments.	7	8	–	22	63	
23.5	698.0	2 2 3	16	11		1.25	Stiff gray CLAY (A-7-6), trace fine to coarse sand; damp to moist.	0	0	–	0	11	89
25													
		1 2 2	17	12		1.25							
		1 2 2	18	13		1.5							
30													

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

64

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1220 | Location: Sta. 533+41.2, 13.9 ft. LT of SR 728 Ramp A BL | Date Drilled: 7/29/05

WATER OBSERVATIONS: Water seepage at: 48.0'
Water level at completion: 48.0'

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
30	691.5						Medium stiff to stiff gray CLAY (A-7-6), trace fine to coarse sand; damp to moist.							
35		1 2 2	15	14		1.75								
40		2 4 4	18	15		0.75	@ 38.5'-40.0', contains silt lenses.							
45		1 3 4	17	16		1.5								
48.5	673.0													
49.0	672.5	20 25 20	18	17A 17B		-- --	Dense brown and gray SANDY SILT (A-4a), some fine to coarse sand, trace to little gravel; contains rock fragments; damp.	10	13	--	20	40	17	Non-Plastic
50							Dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; wet. (possible heave)							
53.8	667.7	50/3	4	18		2.25	@ 53.5'-53.8', sandy silt seam.							50+
55							Bottom of Boring - 53.8'							
60														

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

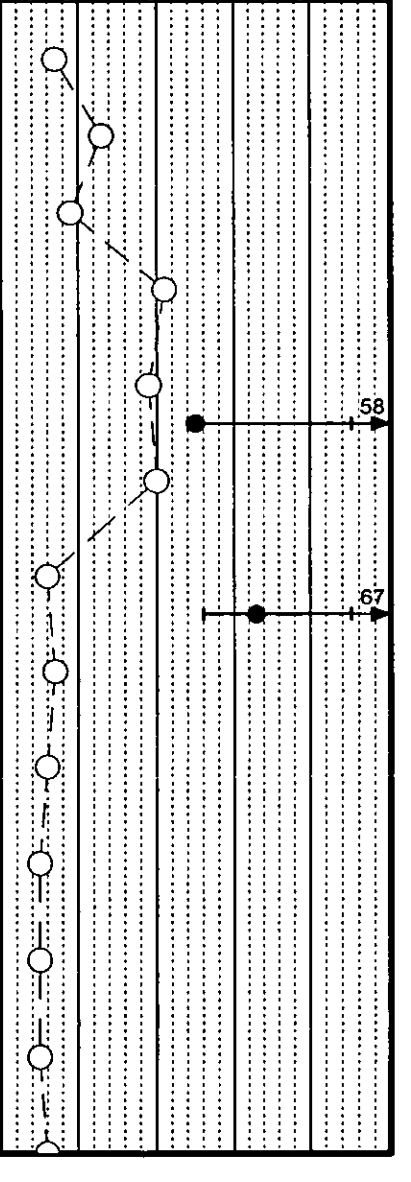
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-1221 | Location: Sta. 520+43.5, 35.1 ft. LT of SR 728 Ramp B BL | Date Drilled: 08/01/05

WATER OBSERVATIONS: Water seepage at: 58.5'
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	729.9												
0.3	729.6	2 3 4 4	16	1		3.75	Topsoil - 4" Very stiff to hard brown SILT AND CLAY (A-6a), little fine to coarse sand; damp to moist.						
		11 6 7 10	16	2		4.0	@ 2.0'-4.0', contains trace carbonaceous material.						
5		2 4 5 8	16	3		2.5							
		6 12 9	17	4		4.5							
8.5	721.4												
		7 9 10	15	5		4.5	Very stiff to hard mottled brown and gray CLAY (A-7-6), trace fine to coarse sand; moist.						
10					P-1	2.75		0	0	--	1	13	86
		4 9 11	16	6		3.75							
		2 2 4	17	7		2.5	@ 13.5'-22.5', brown.						
15					P-2	2.0		0	0	--	0	8	92
		2 3 4	17	8		3.5							
		2 3 3	16	9		3.0							
20		3 2 3	18	10		1.25	@ 21.0'-30.0', stiff.						
		1 2 3	18	11		1.5	@ 23.5'-30.0', gray.						
25		1 2 3	18	12		1.25							
		1 3 3	18	13		1.5							
30													

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



FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1221 | Location: Sta. 520+43.5, 35.1 ft. LT of SR 728 Ramp B BL | Date Drilled: 08/01/05

WATER OBSERVATIONS: Water seepage at: 58.5'
Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	699.9						Stiff gray CLAY (A-7-6); moist.						
35		1 3 2	18	14		1.25							
40		2 4 3	18	15		1.25							
45		2 2 3	18	16		1.25							
50		2 3 3	18	17		1.0	@ 48.5'-50.0', contains numerous silt laminations.						
53.5	676.4												
55		11 18 20	18	18		2.0	Stiff to very stiff gray SANDY SILT (A-4a); damp.						
59.0	670.9						@ 58.5'-59.0', very soft silty clay seam.						
60		12 21 46	15	19A		<0.25	Hard gray SILT (A-4b), trace clay; damp.						

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

87

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1221 | Location: Sta. 520+43.5, 35.1 ft. LT of SR 728 Ramp B BL | Date Drilled: 08/01/05

WATER OBSERVATIONS: Water seepage at: 58.5'
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
	669.9												
60.0	669.9	Core 60"	Rec 60"	198 RQD 62%	R-1	4.5+	Medium hard gray SHALE interbedded with SANDSTONE; very fine to fine grained, highly weathered, arenaceous, laminated to thinly bedded, highly fractured to broken.						
65.0	664.9						Bottom of Boring - 65.0'						
70													
75													
80													
85													
90													

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

FILE: 0121-3070-03 (11/21/2006 2:17 PM)

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

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

LOG OF: Boring B-1222 | Location: Sta. 529+64.0, 4.6 ft. RT of SR 728 Ramp A BL | Date Drilled: 8/01/05 to 8/02/05

WATER OBSERVATIONS: Water seepage at: 68.5'
Water level at completion: 74.0' (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	744.9												
0.5	744.4	2 2 4 5	13	1		–	Topsoil - 6"						
							Very stiff brown SANDY SILT (A-4a), some fine to coarse sand, little gravel; damp.	16	11	–	12	41	20
2.0	742.9	5 8 12 12	13	2		–	Very stiff brown SILT (A-4b), some fine to coarse sand, trace gravel; damp.	2	9	–	16	52	21
4.0	740.9	4 5 8 10	10	3		–	Stiff brown SILTY CLAY (A-6b), some fine to coarse sand, trace gravel; damp.	7	8	–	13	44	28
6.0	738.9	4 5 6	6	4		3.5	Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.						
7.4	737.5						Stiff to very stiff mottled brown and gray CLAY (A-7-6), little silt; damp.						
		2 3 4	15	5		1.5		0	0	–	0	12	88
10		1 2 3	18	6		2.0							
		1 3 3	18	7		2.5							
15		2 3 4	18	8		2.5							
		2 3 4	18	9		1.75	@ 18.5'-30.0', gray.						
20		1 2 3	18	10		1.0							
		1 2 3	18	11		1.5							
25		1 2 4	18	12		0.75		0	0	–	0	11	89
		2 2 3	18	13		1.5							
30													

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

59

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1222 | Location: Sta. 529+64.0, 4.6 ft. RT of SR 728 Ramp A BL | Date Drilled: 8/01/05 to 8/02/05

WATER OBSERVATIONS: Water seepage at: 68.5'
Water level at completion: 74.0' (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
30	714.9						Medium stiff to stiff gray CLAY (A-7-6), little silt; moist.						
		2 2 3	18	14		0.5							
35													
		2 3 3	18	15		1.25							
40													
		WOH 2 4	18	16		1.5							
45													
		2 3 4	18	17		1.0							
50													
		1 2 4	18	18		0.75							
55													
58.5	686.4						Medium stiff gray SILT AND CLAY (A-6a), little fine sand; contains occasional silt lenses; moist						
		2 8 9	18	19		0.5							
60													

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

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1222 | Location: Sta. 529+64.0, 4.6 ft. RT of SR 728 Ramp A BL | Date Drilled: 8/01/05 to 8/02/05

WATER OBSERVATIONS: Water seepage at: 68.5'
Water level at completion: 74.0' (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
60.0	684.9						Severely weathered gray SILTSTONE.							
65		10 43 24	18	20										67 →
70		2 6 9	18	21			@ 68.5'-70.0', wet.							
75		10 20 29	15	22			@ 73.5'-75.0', brown and gray, contains occasional rust stains.							
78.9	666.0	50/5	5	23			Bottom of Boring - 78.9'							50+
80														
85														
90														

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1223 | Location: Sta. 535+28.2, 7.1 ft. LT of SR 823 CL | Date Drilled: 8/03/05

WATER OBSERVATIONS: Water seepage at: 39.0'
Water level at completion: 44.0' (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	717.4												
0.5	716.9	2 2 4	8	1		2.75	Topsoil - 6" Very stiff brown SILTY CLAY (A-6b), little fine to coarse sand; moist.	0	1	--	10	46	43
3.5	713.9	1 4 6	8	2		4.5+	Hard brown CLAY (A-7-6), trace fine to coarse sand; contains roots; damp.	0	3	--	4	93	
6.0	711.4	2 3 4	18	3		2.75	Stiff to very stiff brown and gray CLAY (A-7-6), trace to little silt; moist.	0	0	--	0	7	93
		2 2 3	18	4	P1	2.5		0	0	--	0	17	83
10		2 4 4	18	5		2.0	@ 11.0'-12.5', contains few silt seams.						
		1 2 3	18	6		1.5	@ 13.5', becomes gray.						
15		1 2 2	18	7		0.75	@ 16.0'-17.5', medium stiff.						
		1 2 2	18	8	P2	1.25		0	0	--	0	5	95
20		1 2 3	18	9		1.0	@ 21.0'-22.5', 28.5'-30.0, contains few silt seams.						
		1 3 3	18	10		1.25							
25		2 2 3	18	11		1.0							
		2 2 4	18	12	P3	1.5		0	0	--	0	21	79
30													

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

58 60 57 67 58

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1223 | Location: Sta. 535+28.2, 7.1 ft. LT of SR 823 CL | Date Drilled: 8/03/05

WATER OBSERVATIONS: Water seepage at: 39.0'
Water level at completion: 44.0' (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
30	687.4						Medium stiff gray CLAY (A-7-6) , trace fine to coarse sand; moist.						
		1 3 9	18	13		0.5							
35							@ 34.9'-35.0', silt seam.						
38.5	678.9						Stiff to very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, little gravel; damp.						
		9 14 13	17	14		2.0							
40													
43.5	673.9						Decomposed gray SILTSTONE, arenaceous.						
		8 20 50/4	12	15									
45													
48.8	668.6	50/3	3	16			Bottom of Boring - 48.8'						
50													
55													
60													

GRADATION

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

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1224 | Location: Sta. 531+05.5, 39.2 ft. LT of SR 823 CL | Date Drilled: 07/28/05

WATER OBSERVATIONS: Water seepage at: None; 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	750.0												
0.3	749.7	2 3 4 6	14	1		3.5	Topsoil - 3" Very stiff brown SANDY SILT (A-4a), some fine to coarse sand, some gravel; damp to moist.	28	4	–	21	47	
2.0	748.0	4 5 5 8	12	2		2.75	Very stiff brown CLAY (A-7-6), trace fine to coarse sand, trace gravel; damp to moist.	1	2	–	7	27	63
5		4 4 7 8	14	3		4.0	@ 2.0'-4.0', light brown; contains roots.	1	0	–	0	10	89
		5 5 6	12	4		3.5							
		3 5 4	16	5		3.0							
10		3 4 5	15	6		2.5							
		3 4 5	16	7		2.75							
15		2 4 4	17	8		2.5							
18.5	731.5	2 3 5	16	9		2.5	Stiff to very stiff brown SILT AND CLAY (A-6a), trace fine sand; moist.	0	0	–	1	11	88
20		1 3 3	14	10		1.5							
23.5	726.5	2 5 9	15	11	P-1	1.25	Stiff gray CLAY (A-7-6), trace fine sand; moist.						
25		WOH 3 4	13	12		1.5							
		3 4 5	18	13		1.25							
30													

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

58

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1224 | Location: Sta. 531+05.5, 39.2 ft. LT of SR 823 CL | Date Drilled: 07/28/05

WATER OBSERVATIONS: Water seepage at: None; Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	720.0						Stiff gray CLAY (A-7-6); moist.						
		1 3 3	17	14		1.25							
		WOH 3 3	16	15		1.5							
35		2 3 4	17	16		1.5							
		2 3 5	17	17		1.5							
40		1 3 3	17	18		1.5							
		2 3 3	18	19		1.25	@ 43.5'-45.0', contains silt lenses.						
45		2 5 4	18	20		1.5	@ 47.0'-47.1', contains silt lenses.						
		3 4 5	18	21		2.0							
50		2 4 4	18	22		1.25							
		2 4 3	17	23		1.5							
55		3 5 5	18	24		1.25	@ 56.0'-57.5', contains silt lenses.						
		3 5 5	17	25		1.5							
60													

GRADATION

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

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1224 | Location: Sta. 531+05.5, 39.2 ft. LT of SR 823 CL | Date Drilled: 07/28/05

WATER OBSERVATIONS: Water seepage at: None; Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
60	690.0						Stiff gray CLAY (A-7-6), trace fine to coarse sand; moist.							
		2 4 4	18	26		1.25								
65														
		5 5 4	18	27		1.25	@ 68.5'-70.0', contains numerous interbedded silt lenses.							
70														
73.5	676.5	32 50/5	12	28		–	Very dense gray SANDY SILT (A- 4a), some fine to coarse sand, some gravel; moist.	26	14	–	14	46		Non-Plastic 50+
75														
79.5	670.5						Soft gray SANDSTONE interbedded with SHALE; very fine to fine grained, highly weathered to decomposed, micaceous, medium bedded to laminated, moderately fractured.							
80		Core 60"	Rec 60"	RQD 52%	R-1									
84.5	665.5						Bottom of Boring - 84.5'							
85														
90														

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

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

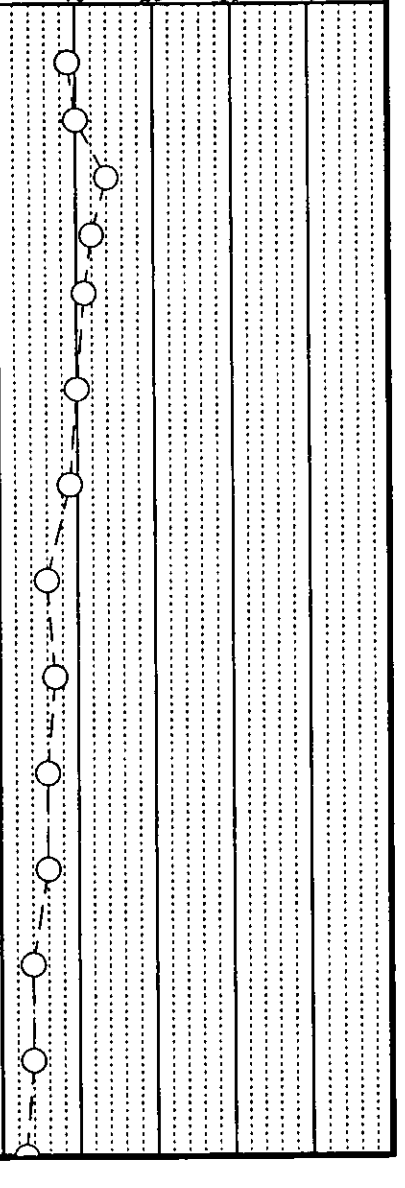
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-1225 | Location: Sta. 528+38.8, 1.3 ft. RT of SR 728 Ramp C BL | Date Drilled: 07/27/05

WATER OBSERVATIONS: Water seepage at: 39.0'
Water level at completion: 38.0'

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	780.1												
0.4	779.7	2 2 7	8	1		3.0	Topsoil - 5"						
1.5	778.6	4 5 5	15	2		3.75	Very stiff brown SILT AND CLAY (A-6a), some fine to coarse sand, trace gravel; contains roots, slight petroleum odor; damp.						
		6 6 8	13	3		4.5+	Very stiff to hard mottled brown and gray CLAY (A-7-6), trace fine to coarse sand; contains occasional silt lenses; damp.						
5		2 5 7	18	4		4.0	@ 1.5'-3.0', contains roots. @ 3.0'-10.0', brown.						
		2 4 7	16	5		4.5+							
		3 4 6	18	6		3.25							
10		3 4 5	18	7		2.5	@ 11.0', becomes gray.						
		2 2 4	18	8		2.0							
15		1 3 4	18	9		2.0							
		1 2 4	18	10		1.5	@ 18.5'-30.0', medium stiff to stiff.						
20		1 2 4	18	11		1.25							
		1 2 2	18	12		1.5							
25		1 2 2	18	13		1.25							
		1 1 2	18	14		0.5							
30													

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



FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1225 | Location: Sta. 528+38.8, 1.3 ft. RT of SR 728 Ramp C BL | Date Drilled: 07/27/05

WATER OBSERVATIONS: Water seepage at: 39.0'
Water level at completion: 38.0'

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
30	750.1												
		0 1 3	18	15		3.25	Very stiff brown CLAY (A-7-6), moist.						
35													
38.5	741.6	5 16 18	12	16			Severely weathered gray SANDSTONE, contains interbedded shale; moist to wet.						
40													
44.0	736.1	50/4	4	17			Bottom of Boring - 44.0'						
45													
50													
55													
60													

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

50+

FILE: 0121-3070-03 (11/21/2006 2:17 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 B-1226 | Location: Sta. 528+21.7, 15.1 ft. LT of SR 728 Ramp B BL | Date Drilled: 8/02/05

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	STANDARD PENETRATION (N)
0	784.3													Natural Moisture Content, % - ● PL — LL; Blows per foot - ○ 10 20 30 40
0.6	783.7						Topsoil - 7"							
		8 9 9	12	1		4.5+	Very stiff to hard brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; damp.	1	3	--	20	49	27	
		5 10 12	15	2		2.75		2	7	--	23	47	21	
5		4 6 7	18	3		4.0								
		2 5 7	18	4		3.0								
10.0	774.3						Stiff mottled light brown and gray CLAY (A-7-6), trace silt; damp to moist.	0	0	--	0	10	90	63
		3 6 6	18	5	P-1	2.25 3.75	@ 12.0'-12.5', sandy silt seam.	2	7	--	22	45	24	
		2 2 4	13	6		1.75		0	0	--	0	10	90	70
15														
16.0	768.3						Stiff gray CLAY (A-7-6), trace silt; damp to moist.	0	0	--	0	14	86	58
		1 1 2	18	7		1.0								
		1 2 2	18	8		1.0								
20		WOH 2 2	18	9		1.0								
					P-2	2.25	@ 22.0'-23.5', sandy silt seam.	9	4	--	21	44	22	
		WOH 1 2	18	10		1.0								
25		2 2 4	18	11		1.25								
		2 3 3	18	12		1.25								
30														

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring B-1226 | Location: Sta. 528+21.7, 15.1 ft. LT of SR 728 Ramp B BL | Date Drilled: 8/02/05

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	754.3						Stiff gray CLAY (A-7-6), trace fine to coarse sand; moist.						
		1 3 4	18	13		1.0							
35													
		3 3 4	18	14		1.25							
40													
		2 4 4	18	15		1.5							
45													
		2 3 4	18	16		1.5							
50.0	734.3						Bottom of Boring - 50.0'						
55													
60													

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

FILE: 0121-3070-03 (11/21/2006 2:17 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 B-1227 | Location: Sta. 525+10.3, 99.6 ft. RT of SR 728 Ramp A BL | Date Drilled: 8/03/05

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	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
0	863.0													Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ (10, 20, 30, 40)
0.7	862.3	4, 7, 8	9	1		4.0	Topsoil - 8" Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.							
3.5	859.5	8, 30, 50/6	14				Decomposed brown SANDSTONE, argillaceous.							50+
5		50/4	3	3										50+
		50/5	4	4										50+
10.0	853.0	Core 60"	Rec 56"	RQD 78%	R-1	*178	@ 10.0'-10.4', core loss likely, poor rock quality. Medium hard brown SANDSTONE; very fine to fine grained, highly weathered, micaceous, massively bedded, moderately fractured. @ 10.4'-10.8', broken zone. @ 12', 13.4', 14.3', filled fractures.							
15		Core 60"	Rec 59"	RQD 99%	R-2	*213	@ 16.4', low angle fractures. @ 18.5', 19.4', 20.5', 21.5', 22.8', low angle fractures.							
20		Core 60"	Rec 60"	RQD 100%	R-3	*258								
25.0	838.0	Core 60"	Rec 60"	RQD 100%	R-4	*303	Medium hard to hard brown SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, slightly fractured. @ 25.5', low angle fracture.							
30														

GRADATION

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring B-1227 | Location: Sta. 525+10.3, 99.6 ft. RT of SR 728 Ramp A BL | Date Drilled: 8/03/05

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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
30.0	833.0						Hard gray SANDSTONE, very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, slightly fractured to unfractured.							
	833.0	Core 60"	Rec 60"	RQD 88%	R-5	336	@ 33.9', 34.1', 34.2', 34.6', low angle fractures.							
35		Core 60"	Rec 60"	RQD 100%	R-6	*329								
40		Core 60"	Rec 60"	RQD 83%	R-7	*548								
45		Core 60"	Rec 60"	RQD 90%	R-8	*368								
50		Core 60"	Rec 60"	RQD 84%	R-9	*433	@ 53.3', low angle fractures.							
55		Core 60"	Rec 60"	RQD 83%	R-10	*266	@ 55.0', rust staining. @ 57.8', 59.5', low angle fractures. @ 58.0'-58.3' rust stained, with incomplete fracture. @ 58.3'-58.6', calcareous layer. @ 59.5'-60.8', brown, fine grained sandstone. @ 59.7'-60.5', high angle fracture. @ 60.0'-60.8', brown sandstone layer.							
60														

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1227 | Location: Sta. 525+10.3, 99.6 ft. RT of SR 728 Ramp A BL | Date Drilled: 8/03/05

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
60	803.0	Core 60"	Rec 60"	RQD 78%	R-11	*339	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, slightly fractured, iron staining.						
65		Core 60"	Rec 60"	RQD 100%	R-12	*406	@ 67.9', low angle fracture.						
70		Core 60"	Rec 60"	RQD 77%	R-13	*485	@ 70.0', rust staining.						
75.0	788.0	Core 60"	Rec 60"	RQD 30%	R-14	--	Medium hard gray SANDSTONE ; fine to very fine grained, moderately to slightly weathered, argillaceous, micaceous, laminated to thickly bedded, slightly fractured, contains few argillaceous laminations. @ 75.3', 75.7', 77.8', 78.5', low angle fractures. @ 77.9'-78.0', 78.3'-78.5', high angle fractures. @ 78.1'-78.5', broken zone.						
80		Core 60"	Rec 60"	RQD 42%	R-15	--	@ 81.2'-81.7', broken zone. @ 82.0'-83.1', 83.5'-84.0', 84.3'-85.6', rust stained.						
85		Core 60"	Rec 60"	RQD 41%	R-16	*363							
90													

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

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1227 | Location: Sta. 525+10.3, 99.6 ft. RT of SR 728 Ramp A BL | Date Drilled: 8/03/05

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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90.0	773.0	Core 60"	Rec 60"	RQD 32%	R-17	--	Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, argillaceous, micaceous, thickly bedded, slightly to moderately fractured. @ 90.0'-94.0', interbedded shale. @ 93.0'-98.4', laminated.							
95		Core 60"	Rec 60"	RQD 29%	R-18	*233	@ 98.5'-110.0', pyritic.							
100		Core 60"	Rec 60"	RQD 58%	R-19	*380								
105		Core 60"	Rec 60"	RQD 80%	R-20	--								
110.0	753.0						Bottom of Boring - 110.0'							
115														
120														

FILE: 0121-3070-03 (11/21/2006 2:17 PM)

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

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

LOG OF: Boring B-1228 | Location: Sta. 525+05.9, 110.2 ft. LT of SR 728 Ramp A BL | Date Drilled: 8/04/05

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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	848.6													
0.5	848.1	7 8 8	12	1		4.5+	Topsoil - 6" / 2' soil removed before drilling Medium dense brown SILT (A-4b), little to some clay, trace to little fine to coarse sand, trace gravel; damp.	1	1	--	9	69	20	
3.5	845.1	10 50/6	10	2			Decomposed brown and gray SANDSTONE, arenaceous.							50+
5		30 50/2	6	3										50+
		35 50/2	5	4										50+
10.0	838.6	Core 60"	Rec 55"	RQD 47%	R-1	*287	Medium hard to hard gray SANDSTONE; very fine grained, moderately weathered, argillaceous, micaceous, massively bedded, slightly fractured. @ 10.0'-12.6', brown, highly weathered. @ 10.4', 10.8', 12.0', 12.7', 14.2', 18.3', low angle fractures, rust stained on fracture surfaces.							
15		Core 60"	Rec 60"	RQD 68%	R-2	--	@ 15.0'-15.3', broken zone. @ 14.2'-14.4', high angle fracture, rust stained, decomposed. @ 15.9', rust stained low angle fracture.							
20		Core 60"	Rec 60"	RQD 75%	R-3	*313								
25		Core 60"	Rec 60"	RQD 55%	R-4	--	@ 25.3', 25.9', 26.5', 26.7', 29.6', low angle fractures.							
30														

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1228 | Location: Sta. 525+05.9, 110.2 ft. LT of SR 728 Ramp A BL | Date Drilled: 8/04/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION
30	818.6	Core 60"	Rec 60"	RQD 67%	R-5	*319	Hard gray SANDSTONE ; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, slightly fractured, few shale laminae. @ 30.4', 32.0', 34.0', 34.5', 38.5', low angle fractures. @ 30.9'-31.1', argillaceous band.
35		Core 60"	Rec 60"	RQD 82%	R-6	–	
40		Core 60"	Rec 60"	RQD 73%	R-7	*332	@ 43.2'-43.3', 45.9'-46.1', argillaceous bands.
45		Core 60"	Rec 60"	RQD 73%	R-8	–	
50							@ 49.2'-52.9', rust stained. @ 49.7'-51.1', high angle fracture, rust stained. @ 58.0'-59.3', rust stained sandstone.
55		Core 120"	Rec 120"	RQD 89%	R-9	*517	@ 55.3', 58.6', low angle fractures, rust stained.
60							

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

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1228 | Location: Sta. 525+05.9, 110.2 ft. LT of SR 728 Ramp A BL | Date Drilled: 8/04/05

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 (prior to coring) — DESCRIPTION
60	788.6						Hard gray SANDSTONE ; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, slightly fractured, few shale laminae. @ 61.0' to 66.0', brown, highly to moderately weathered. @ 61.1'-62.8', broken zone. @ 61.7'-61.8', low angle fracture.
65		Core 120"	Rec 120"	RQD 78%	R-10	*444	@ 65.0'-65.3', broken zone. @ 67.0', low angle fracture.
70							@ 71.7'-71.8', high angle fracture. @ 70.5'-70.6', 70.9'-71.2', argillaceous bands.
72.6	776.0						Soft to medium hard gray SANDSTONE interbedded with SHALE; very fine grained, moderately to highly weathered, micaceous, argillaceous, medium bedded to very thinly laminated, slightly fractured, fissile after dessication.
75		Core 120"	Rec 119"	RQD 52%	R-11	*389	@ 73.1'-73.2', argillaceous bands. @ 74.7'-75.0', calcareous layer.
80							@ 80.0'-82.3', siltstone layer. @ 81.5'-82.5', highly to moderately weathered, contains some rust staining.
82.3	766.3						Medium hard to hard gray SANDSTONE ; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, pyritic, laminated to thickly bedded, slightly fractured, contains few to moderate argillaceous laminataions.
85		Core 120"	Rec 116"	RQD 88%	R-12	*445/371	@ 84.1'-84.4', high angle fracture. @ 84.5'-85.0' calcareous layer. @ 85.0'-85.4', lost recovery fracture suspected.
90							

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

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1228 | Location: Sta. 525+05.9, 110.2 ft. LT of SR 728 Ramp A BL | Date Drilled: 8/04/05

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	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90	758.6												
		Core 120"	Rec 118"	RQD 77%	R-13	*374	Medium hard to hard gray SANDSTONE interbedded with SILTSTONE (turbidites); very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, pyritic, medium bedded to thickly bedded, slightly fractured.						
95							@ 94.5'-95.0', vertical fracture, calcareous. @ 95.0'-96.1', broken zone.						
100.0	748.6						Bottom of Boring - 100.0'						
105													
110													
115													
120													

GRADATION

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

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1229 | Location: Sta. 527+83.2, 70.7 ft. RT of SR 728 Ramp A BL | Date Drilled: 8/10/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	778.6													
0.3	778.3						Topsoil - 4"							
		13 15 7	12	1		4.5+	Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, little gravel; contains rock fragments and rust stains; damp.							
		8 21 16	12	2		4.5+								
5														
6.0	772.6	7 21 25	10	3			Severely weathered brown and gray SILTSTONE, arenaceous, occasional rust stains.							
		5 20 34	9	4										54
10		10 50/5	9	5										50+
		50/3	3	6										50+
15														
16.5	762.1	Core 60"	Rec 60"	RQD 70%	R-1	*217	Medium hard gray SANDSTONE ; very fine to fine grained, moderately weathered, argillaceous, micaceous, pyritic, moderately fractured, few to moderate agrillaceous laminae.							
20							@ 21.8'-21.9', 24.8'-25.1', high angle rust stained fractures. @ 22.2'-23.7', moderate to abundant argillaceous laminations. @ 23.7'-24.4', brown rust staining. @ 24.7'-24.8', broken zone. @ 24.8'-25.0', calcareous zone.							
25		Core 120"	Rec 120"	RQD 37%	R-2	*320								
30														

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1229 | Location: Sta. 527+83.2, 70.7 ft. RT of SR 728 Ramp A BL | Date Drilled: 8/10/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
30	748.6						Medium hard gray SANDSTONE.							
31.5	747.1						Bottom of Boring - 31.5'							

GRADATION

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 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1230 | Location: Sta. 525+09.2, 24.2 ft. RT of SR 728 Ramp B BL | Date Drilled: 8/02/05

WATER OBSERVATIONS: Water seepage at: 27.0'
Water level at completion: 17.0' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
0	775.6													
0.3	775.3	9 8 9	6	1		--	Topsoil - 4" Medium dense brown SANDY SILT (A-4a), little to some fine to coarse sand, little to some gravel; damp.							
5		10 8 8	6	2		--		25	11	--	23	41		Non-Plastic
6.0	769.6	5 13 13	12	3		--	Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.	1	2	--	11	62	24	
8.5	767.1	5 7 7	6	4		--	Very stiff to hard brown SILT AND CLAY (A-6a), little to some fine to coarse sand, trace gravel; damp.							
10		5 15 15	8	5		4.5+								
		5 10 14	18	6		4.5+								
15		5 10 15	8	7		3.25		2	5	--	13	47	33	
18.5	757.1	4 9 23	18	8		3.75	Very stiff to hard brown SANDY SILT (A-4a), little to some fine to coarse sand, little to some gravel; damp.	35	7	--	16	42		Non-Plastic
20		7 10 11	13	9		3.0								
		4 15 35	14	10		3.25								
25														
26.0	749.6	39 50/3	6	11		--	Very dense light brown GRAVEL WITH SAND AND SILT (A-2-4); wet.	45	11	--	9	35		Non-Plastic 50+
28.5	747.1	50/4	4	12		--	Hard brown SILT AND CLAY (A-6a), trace gravel, some fine to coarse sand; damp.							50+
30														

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1230 | Location: Sta. 525+09.2, 24.2 ft. RT of SR 728 Ramp B BL | Date Drilled: 8/02/05

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	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / PL — LL / Blows per foot
	745.6													
30.0	745.6	Core 60"	Rec 60"	RQD 23%	R-1	*795	Medium hard to hard gray to brown SANDSTONE, very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, massive, highly fractured, abundant iron staining. @ 30.2'-30.3', 30.6'-31.1', 32.4'-32.5', broken zones.							
35		Core 60"	Rec 60"	RQD 56%	R-2	*980	@ 34.4'-34.6', 35.7'-36.7', high angle fractures. @ 34.9'-35.0', 35.4'-35.6', broken zones.							
40.0	735.6						Bottom of Boring - 40.0'							
45														
50														
55														
60														

WATER OBSERVATIONS: Water seepage at: 27.0'
Water level at completion: 17.0' (inside hollowstem augers)

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

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1231 | Location: Sta. 521+18.3, 170.3 ft. RT of SR 728 Ramp A BL | Date Drilled: 09/01/05 to 09/02/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
35.7 (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	837.4													
0.3	837.1						Topsoil - 4"							
		4 8 20	14	1		4.0	Very stiff brown and gray SANDY SILT (A-4a), little fine to coarse sand, trace gravel; damp.							
		17 50/5	9	2		3.0								50+
5														
6.0	831.4	50/3	3	3			Severely weathered brown and gray SANDSTONE, argillaceous.							50+
		50/3	3	4										50+
10.0	827.4						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, massively bedded, slightly fractured. @ 11.8'-12.0', high angle fracture. @ 12.0'-12.5', broken zone. @ 12.1'-12.4', 13.8'-14.1', 14.8'-15.0', 15.2'-15.6', iron stained. @ 13.8', low angle fracture.							
15		Core 120"	Rec 120"	RQD 87%	R-1	*366								
20														
25		Core 120"	Rec 120"	RQD 100%	R-2	*384								
30														

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1231 | Location: Sta. 521+18.3, 170.3 ft. RT of SR 728 Ramp A BL | Date Drilled: 09/01/05 to 09/02/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
35.7 (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
30	807.4						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, slightly fractured to unfractured.							
35		Core 120"	Rec 120"	RQD 100%	R-3	*485								
40														
45		Core 120"	Rec 117"	RQD 98%	R-4	*415								
50														
55		Core 120"	Rec 120"	RQD 100%	R-5	*415								
60														

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1231 | Location: Sta. 521+18.3, 170.3 ft. RT of SR 728 Ramp A BL | Date Drilled: 09/01/05 to 09/02/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
35.7 (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
60	777.4						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded to very thickly bedded, slightly fractured.						
65		Core 120"	Rec 120"	RQD 100%	R-6	*354							
							@ 67.5'-70.0', moderate argillaceous laminations; laminated to thinly bedded.						
70							@ 70.0'-85.0', pyritic, laminated to thinly bedded.						
75		Core 120"	Rec 120"	RQD 100%	R-7	*495	@ 75.3' to 75.4', rust stained.						
80		Core 60"	Rec 60"	RQD 100%	R-8	*386							
85.0	752.4						Bottom of Boring - 85.0'						
90													

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

FILE: 0121-3070-03 (11/21/2006 2:17 PM)

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

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

LOG OF: Boring B-1232 | Location: Sta. 522+25.6, 100.6 ft. LT of SR 728 Ramp D BL | Date Drilled: 8/09/05

WATER OBSERVATIONS: Water seepage at: None
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	829.1												
0.3	828.8	2 3 2	10	1		3.5	Topsoil - 4" Very stiff brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp. @ 1.0'-2.5', contains roots. @ 3.5'-4.0', gray clay seam.						
4.0	825.1	13 15 13	8	2		0.75	Medium stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.						
5													
6.0	823.1	11 37 33	12	3			Severely weathered brown SILTSTONE, arenaceous.						
		11 50/5	10	4									
10													
11.0	818.1	50/4	4	5			Severely weathered gray SANDSTONE, argillaceous.						
		25 50/2	5	6									
15.0	814.1	Core 60"	Rec 60"	RQD 83%	R-1	*368	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded to thinly bedded, slightly fractured. @ 16.3'-16.4', low angle iron stained fracture.						
20		Core 60"	Rec 60"	RQD 65%	R-2	--	@ 20.6'-21.0', broken zone. @ 21.0'-21.5', rust stained, contains argillaceous laminations. @ 21.5'-21.6', argillaceous band. @ 23.0', argillaceous lamination.						
25		Core 120"	Rec 120"	RQD 86%	R-3		@ 25.6'-25.7', 34.3'-34.4', argillaceous laminations. @ 26.1', 26.4', 26.5', 26.7', 27.1', 31.0', 33.0', 33.1', 33.2', 33.9', 34.3', 34.5'; low angle fractures. @ 26.4'-26.5', 26.7'-28.2', argillaceous laminations.						
30													

GRADATION

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

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1232 | Location: Sta. 522+25.6, 100.6 ft. LT of SR 728 Ramp D BL | Date Drilled: 8/09/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	799.1					*378	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded to thinly bedded, slightly fractured.						
							@ 33.0'-33.1', 33.9'-34.3', 34.5', 41.5', argillaceous laminations.						
35							@ 35.0'-51.9', moderately weathered, moderately fractured.						
							@ 35.8', 36.7', low angle fractures.						
40		Core 120"	Rec 120"	RQD 84%	R-4	*373	@ 39.5'-39.9', rust staining.						
45													
							@ 48.0'-48.1', high angle fracture.						
50		Core 120"	Rec 120"	RQD 73%	R-5	*356	@ 49.2'-49.3', shale layer.						
51.9	777.2						Soft gray SHALE interbedded with SANDSTONE; very fine grained, highly weathered to decomposed, argillaceous, micaceous, thinly bedded to thinly laminated, highly fractured.						
55							@ 52.4'-53.2', calcareous layer.						
		Core 120"	Rec 120"	RQD 76%	R-6								
60													

GRADATION

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

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1232 | Location: Sta. 522+25.6, 100.6 ft. LT of SR 728 Ramp D BL | Date Drilled: 8/09/05

WATER OBSERVATIONS: Water seepage at: None
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
60	769.1					*124/741	Soft gray SHALE interbedded with SANDSTONE.						
61.8	767.3						Soft to medium hard gray SANDSTONE; fine to very fine grained, moderately to slightly weathered, argillaceous, micaceous, pyritic, massively bedded, moderately to highly fractured. @ 62.2'-62.3', argillaceous bands. @ 62.3'-62.7', calcareous.						
65													
70		Core 120"	Rec 120"	RQD 83%	R-7	*463							
75													
80		Core 120"	Rec 120"	RQD 83%	R-8	*401							
85.0	744.1						Bottom of Boring - 85.0'						
90													

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

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1233 | Location: Sta. 524+77.0, 76.8 ft. LT of SR 728 Ramp C BL | Date Drilled: 8/08/05

WATER OBSERVATIONS: Water seepage at: None; 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	803.7												
0.3	803.4						Topsoil - 4"						
		5 9 5	12	1		3.5	Very stiff to hard light brown SILT (A-4b), little to some fine to coarse sand, little to some clay, trace gravel; damp.	3	3	–	12	61	21
		17 30 40	12	2		4.5+		2	19	–	13	66	
5													
6.0	797.7	6 50/3	8	3		--	Decomposed brown SANDSTONE.						
		13 50/3	9	4		–							
10		9 50/4	3	5		–							
13.5	790.2	50/3	3	6		0.75	Medium stiff light brown SILT (A-4b), some fine to coarse sand, trace gravel; contains clayey seams; damp.	4	8	–	15	73	
15.0	788.7	Core 90"	Rec 90"	RQD 39%	R-1	*89	Soft to medium hard brownish gray SANDSTONE; fine to very fine grained, highly weathered, argillaceous, thin to medium bedded, highly fractured to broken.						
20							@ 19.6', becomes gray.						
23.0	780.7	Core 60"	Rec 58"	RQD 70%	R-2	*456	Soft to medium hard gray SANDSTONE interbedded with SHALE; decomposed to highly weathered, micaceous, pyritic, thinly laminated to medium bedded, broken to moderately fractured.						
25													
30		Core 60"	Rec 60"	RQD 55%	R-3	*338							

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

FILE: 0121-3070-03 (11/28/2006 11:30 AM)

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

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

LOG OF: Boring B-1233 | Location: Sta. 524+77.0, 76.8 ft. LT of SR 728 Ramp C BL | Date Drilled: 8/08/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	773.7						Soft to medium hard gray SANDSTONE interbedded with SHALE. @ 31.7', 34.4', 34.6', low angle fractures.						
33.4	770.3	Core 60"	Rec 57"	RQD 60%	R-4	*318	Medium hard to hard gray SANDSTONE; very fine to fined grained, slightly to moderately weathered, argillaceous, laminated to medium bedded, slightly to moderately fractured. @ 33.7', 33.8', 34.0'-34.3', calcareous layers. @ 34.0'-34.6', high angle fractures.						
36.5	767.2	Core 60"	Rec 58"	RQD 83%	R-5	*207	Hard to very hard gray SANDSTONE interbedded with few SHALE layers; very fine grained, slightly weathered, argillaceous, medium bedded, slightly to moderately fractured. @ 37.6', 37.7', 40.8', low angle fractures. @ 37.6', 40.2' to 40.8', calcareous layers. @ 41.2'-41.5.', high angle fracture.						
40		Core 60"	Rec 60"	RQD 35%	R-6	*839	@ 43.8'-44.0', 44.1'-44.2', 44.4'-45.0', 46.4', calcareous zones. @ 44.2'-44.9', broken zone.						
45		Core 60"	Rec 60"	RQD 63%	R-7	*187	@ 47.5', 47.8', 49.3', 50.2', 50.7', low angle fractures.						
50		Core 120"	Rec 120"	RQD 61%	R-8	*223	@ 52.6', 54.7', 59.2', low angle fractures.						
55							@ 57.5'-58.0', 58.4'-58.7', high angle fractures.						
60													

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

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring B-1233 | Location: Sta. 524+77.0, 76.8 ft. LT of SR 728 Ramp C BL | Date Drilled: 8/08/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
60	743.7						Medium hard gray SANDSTONE; fine to very fine grained, moderately to slightly weathered, argillaceous, micaceous, laminated to thickly bedded, slightly fractured to unfractured, contains few argillaceous laminations. @ 63.4', 67.2', low angle fractures.							
65		Core 120"	Rec 120"	RQD 67%	R-9	*452								
70							@ 71.5'-91.5', contains moderately argillaceous laminations, thinly bedded, contains rust stains. @ 72.8', 80.4', low angle fractures.							
75		Core 120"	Rec 120"	RQD 78%	R-10	*424								
80							@ 81.8', 83.2', 87.2', 90.2', 90.3', low angle fractures.							
85		Core 120"	Rec 112"	RQD 74%	R-11	*625								
90														

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1233 | Location: Sta. 524+77.0, 76.8 ft. LT of SR 728 Ramp C BL | Date Drilled: 8/08/05

WATER OBSERVATIONS: Water seepage at: None
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
90	713.7						Medium hard gray SANDSTONE.
91.5	712.2						Bottom of Boring - 91.5'

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

95 100 105 110 115 120

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1234 | Location: Sta. 525+21.2, 85.2 ft. RT of SR 728 Ramp D BL | Date Drilled: 8/04/05

WATER OBSERVATIONS: Water seepage at: None
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	828.2	11 15 7	16	1		4.5+	No topsoil Hard light brown SILT (A-4b), some clay, trace fine to coarse sand; damp.	0	2	--	4	68	26
3.5	824.7	8 18 50/4	10	2		--	Decomposed brown SANDSTONE						
5		31 50/3	9	3		--							
		27 50/2	1	4		--							
10.0	818.2	Core 120"	Rec 118"	RQD 39%	R-1	*199	Hard brown SANDSTONE ; very fine to fine grained, highly weathered, argillaceous, laminated to thickly bedded, highly to moderately fractured. @ 12.6'-12.9', high angle fracture. @ 13.6'-14.3', 19.7'-21. 3', 27.3'-28.4', gray, contains moderate to abundant argillaceous laminations. @ 15.3'-15.5', broken, decomposed zone.						
15													
20		Core 120"	Rec 119"	RQD 39%	R-2	*317	@ 22.0', 23.5', 23.9', 27.3', 28.9', 29.0', 29.8', low angle fractures. @ 23.4'-23.8', high angle fracture.						
25													
30							@ 29.4'-29.8', high angle fractures.						

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

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1234 | Location: Sta. 525+21.2, 85.2 ft. RT of SR 728 Ramp D BL | Date Drilled: 8/04/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	798.2						Soft to medium hard brown SANDSTONE; very fine to fine grained, highly weathered, micaceous, argillaceous, highly fractured to moderately fractured, laminated to thickly bedded. @ 30.7', 33.3'-33.6', 36.9'- 37.3', high angle fractures.							
35		Core 120"	Rec 119"	RQD 23%	R-3	*232	@ 34.2'-35.1', decomposed. @ 35.7'-36.0', 37.5'-38.1', broken zone.							
40							@ 38.1'-38.8', 43.1'-47.5', gray, contains moderate argillaceous laminations.							
45		Core 120"	Rec 117"	RQD 39%	R-4	*256	@ 46.4'-46.6', high angle fractures.							
47.5	780.7						Soft to hard gray SHALE interbedded with SANDSTONE; very fine to fine grained, moderately weathered, micaceous, laminated to medium bedded, highly to moderately fractured. @ 49.2'-49.6', calcareous layer. @ 50.5', 50.9', 51.6', 56.9', 57.0', low angle fractures.							
50							@ 52.5'-55.8', broken shale layer.							
55		Core 120"	Rec 118"	RQD 35%	R-5	*293								
58.5	769.7						Medium hard to hard gray SANDSTONE.							
60														

FILE: 0121-3070-03 [11/21/2006 2:17 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 B-1234 | Location: Sta. 525+21.2, 85.2 ft. RT of SR 728 Ramp D BL | Date Drilled: 8/04/05

WATER OBSERVATIONS: Water seepage at: None
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
60	768.2						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, argillaceous, micaceous, pyritic, slightly fractured, massively bedded. @ 60.7', 64.0', 65.6', 66.0', 66.2', low angle fractures. @ 58.8'-59.5', 65.6'-66.3' calcareous layers.						
65		Core 120"	Rec 120"	RQD 85%	R-6	*362							
70							@ 70.0'-70.6', argillaceous laminations.						
75		Core 120"	Rec 120"	RQD 75%	R-7	287							
80							@ 82.9', 83.9', 88.3', 88.5', low angle fractures. @ 83.7'-83.9', argillaceous zone.						
85		Core 120"	Rec 120"	RQD 81%	R-8	*254							
90							@ 88.3'-88.5', broken, argillaceous.						

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

FILE: 0121-3070-03 (11/21/2006 2:17 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 B-1234 | Location: Sta. 525+21.2, 85.2 ft. RT of SR 728 Ramp D BL | Date Drilled: 8/04/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90	738.2						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, argillaceous, micaceous, pyritic, slightly fractured, massively bedded. @ 91.1', 91.2', 93.2', 93.3', 97.2', 99.5', argillaceous laminations with potential fractures.							
95		Core 120"	Rec 120"	RQD 99%	R-9	*347								
100.0	728.2						Bottom of Boring - 100.0'							
105														
110														
115														
120														

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1235 | Location: Sta. 525+94.3, 58.9 ft. LT of SR 728 Ramp D BL | Date Drilled: 9/29/05 to 9/30/05

WATER OBSERVATIONS: Water seepage at: None; Water level at completion: 4.1'

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	786.7													Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ (10 20 30 40)
0.4	786.3	5 7 9	11	1		--	Topsoil - 5" / 6" soil removed before drilling Very stiff to hard brown SANDY SILT (A-4a), some fine to coarse sand, trace to little gravel; damp.							
		11 16 17	18	2		4.5+								
5														
6.0	780.7	19 31 45	18	3			Severely weathered brown and gray SANDSTONE, argillaceous.							○76 →
		19 24 44	18	4										○68 →
10		19 44 50/4	16	5										○94 →
		50/5	5	6										
15.0	771.7	Core 12"	Rec 2"	RQD 0%	R-1	--	Soft reddish brown SANDSTONE; very fine to fine grained, decomposed, broken, contains rock fragments.							
17.7	769.0						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, pyritic, massively bedded, highly fractured to broken. Note: fractures along the bedding planes are infilled with silty clay and sandstone fragments with trace pyrite inclusions.							
20		Core 120"	Rec 120"	RQD 85%	R-2	*266								
25							@ 26.0'-27.0', broken zone infilled with silty clay and sandstone fragments. @ 27.0', slightly fractured.							
30														

FILE: 0121-3070-03 [11/21/2006 2:17 PM]

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

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

LOG OF: Boring B-1235 | Location: Sta. 525+94.3, 58.9 ft. LT of SR 728 Ramp D BL | Date Drilled: 9/29/05 to 9/30/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 4.1'

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
30.0	756.7												
	756.7	Core 120"	Rec 116"	RQD 97%	R-3	*282	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, massively bedded, unfractured to slightly fractured.						
35							@ 34.5'-34.6', silty clay seam with sandstone fragments (medium to coarse and size).						
40		Core 120"	Rec 120"	RQD 100%	R-4	*531							
45													
50		Core 120"	Rec 120"	RQD 100%	R-5	*478							
55							@ 54.5', 1/2" zone of clay and sandstone fragments.						
60													

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

FILE: 0121-3070-03 [11/29/2006 11:30 AM]

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

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

LOG OF: Boring B-1235 | Location: Sta. 525+94.3, 58.9 ft. LT of SR 728 Ramp D BL | Date Drilled: 9/29/05 to 9/30/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 4.1'

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample 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	726.7	Core 120"	Rec 120"	RQD 100%	R-6	*427	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, massively bedded, unfractured to slightly fractured.							
65		Core 48"	Rec 48"	RQD 100%	R-7	*628								
70.0	716.7						Bottom of Boring - 70.0'							
75														
80														
85														
90														

FILE: 0121-3070-03 [11/29/2006 11:30 AM]

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

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

LOG OF: Boring R-446 | Location: Sta. 512+17.7, 189.3 ft. LT of SR 823 CL | Date Drilled: 7/7/04

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
0	883.8						No topsoil
1.5	882.3	7 44 36	18	1		4.5+	Hard brown SANDY SILT (A-4a); contains roots; damp.
							Soft light gray and brown SANDSTONE; very fine to fine grained, decomposed, argillaceous, broken.
		34 37 50/2	14	2			
5.0	878.8	Core 96"	Rec 96"	RQD 84%	R-1	*211	Medium hard light gray and brown SANDSTONE; fine to coarse grained medium bedded, highly fractured. @ 5.5', low angle fracture. @ 8.3'-9.6', qu = 7,920 psi, SDI = 96.1%. @ 9.6', low angle clean rough fracture. @ 10.3'-10.5', high angle clay filled fracture. @ 12.0'-12.2', high angle rust stained fracture. @ 12.3'-13.0', high angle partially healed rust stained fracture. @ 14.0', low angle clay filled fracture. @ 14.2', low angle rust stained fracture. @ 14.8'-16.6', gray slightly carbonaceous.
16.6	867.2	Core 120"	Rec 120"	RQD 63%	R-2	*128	@ 16.2'-17.3', qu = 2,428 psi, SDI = 28.5%. Soft black SHALE; moderately weathered, carbonaceous, laminated to thinly bedded, broken, contains ironstone nodules.
19.2	864.6						@ 18.9'-19.2', ironstone nodule.
		Core 120"	Rec 120"	RQD 77%	R-3	*216	Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thinly bedded to medium bedded, broken to highly fractured. @ 19.7',19.8',20.3', low angle clay filled fracture. @ 21.0',21.5',22.1', low angle clay filled fracture. @ 22.7',23.0', low angle clay filled fracture. @ 25.0', fine to coarse grained bed. @ 28.7'-30.0', highly argillaceous zone.
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
80
50+

FILE: 0121-3070-03 [11/29/2006 12:50 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-446 | Location: Sta. 512+17.7, 189.3 ft. LT of SR 823 CL | Date Drilled: 7/7/04

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
30	853.8						Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thinly bedded to medium bedded, broken to highly fractured.
35							
36.0	847.8						Medium hard gray SANDSTONE; medium to coarse grained, highly weathered, micaceous, contains gravel and cobble sized particles, poorly cemented.
38.4	845.4	Core 120"	Rec 120"	RQD 97%	R-4	*378	Hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thinly bedded to massive, slightly to moderately fractured, contains turbidite beds. @ 39.1', low angle fracture. @ 40.0',40.6', low angle fracture. @ 42.7'-43.2', pyritic zone. @ 43.1', high angle black shale laminae. @ 43.0', massive bedding with turbidites.
40							
45							@ 45.5'-46.1', pyritic zone.
		Core 120"	Rec 120"	RQD 100%	R-5	*442	
50							@ 49.5'-50.5', qu = 11,286 psi. @ 49.5'-50.9', pyritic zone.
55							
		Core 120"	Rec 120"	RQD 100%	R-6	*413	
60							

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

FILE: 0121-3070-03 [11/29/2006 12:50 PM]

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

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

LOG OF: Boring R-446 | Location: Sta. 512+17.7, 189.3 ft. LT of SR 823 CL | Date Drilled: 7/7/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION
60	823.8						WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 16.5' (Includes drilling water) Hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thinly bedded to massive, moderately fractured to unfractured, contains turbidite beds. @ 62.3'-62.7', qu = 10,371 psi.
65		Core 120"	Rec 120"	RQD 100%	R-7	*422	
70							
75		Core 120"	Rec 120"	RQD 100%	R-8	*387	@ 76.0', low angle smooth fracture.
80							@ 80.5'-81.7', qu = 11,660 psi.
85		Core 120"	Rec 120"	RQD 96%	R-9	*497	@ 85.9'-86.4', high angle fracture.
90							

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

FILE: 0121-3070-03 [11/29/2006 12:50 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-446 | Location: Sta. 512+17.7, 189.3 ft. LT of SR 823 CL | Date Drilled: 7/7/04

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
90	793.8						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thinly bedded to massive, moderately fractured to unfractured, contains turbidite beds.							
95		Core 120"	Rec 120"	RQD 100%	R10	*567	@ 98.2'-99.3', qu = 10,699 psi.							
100							@ 100.4', low angle clay filled fracture.							
105		Core 120"	Rec 120"	RQD 100%	R11	*563								
110														
115		Core 120"	Rec 120"	RQD 95%	R12	*333								
120														

FILE: 0121-3070-03 [11/29/2006 12:50 PM]

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

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

LOG OF: Boring R-446 | Location: Sta. 512+17.7, 189.3 ft. LT of SR 823 CL | Date Drilled: 7/7/04

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
120	763.8						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thinly bedded to massive, moderately fractured to unfractured, contains turbidite beds.							
		Core 24"	Rec 24"	RQD 100%	R13	348	@ 122.6', pyritic.							
125.0	758.8						Bottom of Boring - 125.0'							
130														
135														
140														
145														
150														

FILE: 0121-3070-03 (11/29/2006 12:50 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-447 | Location: Sta. 512+15.8, 8.5 ft. RT of SR 823 CL | Date Drilled: 7/2/04 to 7/6/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% 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	881.2													
0.4	880.8	3 3 3	18	1			Topsoil - 5" Loose brown SANDY SILT (A-4a); contains rootlet and roots; damp.							
3.0	878.2	50/3	3	2			Severely weathered brown SANDSTONE, argillaceous, micaceous.							50+
5.0	876.2	Core 96"	Rec 90"	RQD 78%	R-1		Medium hard brown and reddish brown SANDSTONE; fine to medium grained, highly weathered, micaceous, massive, broken. @ 6.6' to 7.8', very broken with clay seams and core loss. @ 8.5', low angle clean fracture. @ 11.3', 11.9', low angle clean fracture. @ 12.6', 45° clean fracture. @ 12.6', low angle clean fracture. @ 13.2', low angle clay coated fracture. @ 14.5', low angle clean fracture.							
16.0	865.2	Core 120"	Rec 120"	RQD 73%	R-2		Soft to medium hard dark gray CLAY SHALE; highly weathered, arenaceous, laminated to very thinly bedded, broken to moderately fractured. @ 17.0'-18.0', SDI = 0.0%. @ 18.1'-18.5', qu = 229 psi. @ 19.0', low angle clay coated fracture. @ 19.3', low angle rust stained fracture. @ 19.9' to 20.2', high angle clean fracture. @ 21.9', low angle rust stained fracture. @ 22.2' to 22.8', very broken. @ 23.7' to 25.5', broken.							
25.5	855.7	Core 120"	Rec 120"	RQD 87%	R-3		Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, thinly bedded to medium bedded, slightly fractured.							
30														

FILE: 0121-3070-03 [11/29/2006 12:50 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-447 | Location: Sta. 512+15.8, 8.5 ft. RT of SR 823 CL | Date Drilled: 7/2/04 to 7/6/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	851.2						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, massive, unfractured to slightly fractured. @ 32.3', near horizontal smooth fracture.							
35		Core 120"	Rec 120"	RQD 100%	R-4									
40							@ 40.0', near horizontal fracture.							
							@ 43.3', brown and gray, moderately to highly weathered.							
45							@ 44.6' to 46.6', high angle partially healed rust stained fracture.							
		Core 120"	Rec 120"	RQD 48%	R-5		@ 47.5' to 48.2', high angle partially healed rust stained fracture.							
50							@ 50.1' to 50.5', high angle partially healed rust stained fracture. @ 50.5' to 53.0', broken zone. @ 52.5' to 58.4', high angle partially healed rust stained fracture.							
55		Core 120"	Rec 120"	RQD 48%	R-6		@ 58.9' to 59.6', high angle partially healed rust stained fracture.							
60														

FILE: 0121-3070-03 [11/29/2006 12:50 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-447 | Location: Sta. 512+15.8, 8.5 ft. RT of SR 823 CL | Date Drilled: 7/2/04 to 7/6/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
60	821.2						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, slightly argillaceous, massive, unfractured to slightly fractured. @ 61.7' to 66.6', high angle partially healed rust stained fracture.							
65		Core 120"	Rec 120"	RQD 66%	R-7		@ 67.0', gray slightly to moderately weathered. @ 69.2', 69.5', low angle rust stained and partially clay filled fracture.							
70														
75		Core 120"	Rec 120"	RQD 100%	R-8		@ 74.9', low angle rust stained and partially clay filled fracture.							
80														
85		Core 120"	Rec 120"	RQD 100%	R-9									
90														

FILE: 0121-3070-03 [11/29/2006 12:50 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-447 | Location: Sta. 512+15.8, 8.5 ft. RT of SR 823 CL | Date Drilled: 7/2/04 to 7/6/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
90	791.2						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, slightly argillaceous, massive, unfractured to slightly fractured.							
95		Core 120"	Rec 120"	RQD 97%	R10									
100							@ 98.9', 99.0', 99.9', low angle partially clay filled fracture. contains dark gray siltstone laminae.							
105		Core 120"	Rec 120"	RQD 100%	R11									
110														
112.0	769.2						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, laminated to medium bedded, slightly fractured, contains few to moderate argillaceous laminations..							
115		Core 120"	Rec 120"	RQD 100%	R12									
120														

FILE: 0121-3070-03 [11/29/2006 12:50 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-447 | Location: Sta. 512+15.8, 8.5 ft. RT of SR 823 CL | Date Drilled: 7/2/04 to 7/6/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
119.9	761.2 761.3						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, pyritic, argillaceous, medium bedded to massive, unfractured to slightly fractured.							
		Core 24"	Rec 24"	RQD 100%	R13		@ 120.9', pyritic.							
125.0	756.2						Bottom of Boring - 125.0'							
130														
135														
140														
145														
150														

FILE: 0121-3070-03 [11/29/2006 12:50 PM]

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

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

LOG OF: Boring R-448 | Location: Sta. 512+19.5, 175.0 ft. RT of SR 823 CL | Date Drilled: 7/8/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
11.0' (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	857.5	7 9 21	18	1		4.5+	No topsoil Hard brown and gray SANDY SILT (A-4a); contains sandstone fragments; contains roots; damp.						
3.0	854.5	32 50/5	11	2			Soft to medium hard light gray SANDSTONE, decomposed.						
5.0	852.5	Core 96"	Rec 96"	RQD 46%	R-1	*196	Medium hard brown and gray SANDSTONE, fine grained, highly weathered, argillaceous, highly fractured to broken.						
14.2	843.3	Core 120"	Rec 120"	RQD 99%	R-2	*204	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, unfractured to slightly fractured. @ 14.5', contains small argillaceous clasts.						
							@ 23.2', low angle rust stained fracture.						
		Core 120"	Rec 120"	RQD 98%	R-3	*260							

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

FILE: 0121-3070-03 [11/21/2006 2:19 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-448 | Location: Sta. 512+19.5, 175.0 ft. RT of SR 823 CL | Date Drilled: 7/8/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
11.0' (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
30	827.5						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, unfractured to slightly fractured. @ 30.5'-32.2', qu = 5,814 psi, SDI = 95.7%.
35		Core 120"	Rec 120"	RQD 100%	R-4	*262	
40							@ 41.7', near horizonal fracture.
45		Core 120"	Rec 120"	RQD 100%	R-5	*260	
50							
55		Core 120"	Rec 120"	RQD 80%	R-6	*326	@ 54.8' to 54.9', argillaceous zone with horizontal fracture. @ 54.9' to 56.5', high angle rust stained partially healed fracture. @ 56.7', low angle fracture. @ 57.5' to 58.3', high angle rust stained fracture. @ 57.5' to 57.6', argillaceous zone with low angle fracture. @ 58.8', low angle clay coated fracture.
60							

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

FILE: 0121-3070-03 [11/21/2006 2:19 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-448 | Location: Sta. 512+19.5, 175.0 ft. RT of SR 823 CL | Date Drilled: 7/8/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	797.5						Hard to medium hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, unfractured to slightly fractured.						
65		Core 120"	Rec 120"	RQD 100%	R-7	*331	@ 64.6', low angle smooth fracture. @ 64.6' to 71.1', iron stained.						
70													
75		Core 120"	Rec 120"	RQD 100%	R-8	*317	@ 74.1' to 75.4' and 76.7' to 85.1', iron stains. @ 74.5', argillaceous zone with low angle fracture. @ 76.2', occasional fossils. @ 76.8', low angle fracture.						
80							@ 89.4' to 96.0', argillaceous interbedding. @ 85.3' to 86.0', rust stains, high angle fracture. @ 84.6' to 84.9', argillaceous zone, broken. @ 89.4' to 95.5', contains moderate to abundant argillaceous laminations.						
85		Core 120"	Rec 120"	RQD 65%	R-9	*323	@ 89.7', low angle CLAY coated fracture. @ 88.9' to 89.4', high angle fracture. @ 83.2' to 84.3', very broken with low and high angle fractures and highly weathered. @ 81.9'-82.3', qu = 6,999 psi. @ 82.9' to 83.2', high angle clean rough fracture. @ 89.8' to 90.5', pyritic.						
90													

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

FILE: 0121-3070-03 [11/21/2006 2:19 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-448 | Location: Sta. 512+19.5, 175.0 ft. RT of SR 823 CL | Date Drilled: 7/8/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90	767.5						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, contains occasional argillaceous laminations, slightly fractured.						
							@ 90.5' to 91.6', very argillaceous and broken.						
95		Core 120"	Rec 120"	RQD 92%	R10	*291	@ 96.5'-97.5', qu = 8,045 psi, SDI = 62.6%.						
100													
105							@ 98.4' to 108.0', pyritic.						
		Core 120"	Rec 120"	RQD 87%	R11	*295	@ 108.1' to 108.4', high angle argillaceous.						
110							@ 109.0' to 109.6', high angle fracture						
							@ 113.4' to 113.8', high angle fracture.						
115		Core 120"	Rec 120"	RQD 100%	R12	*623	@ 117.0', low angle CLAY coated fracture.						
120													

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

FILE: 0121-3070-03 | 11/21/2006 2:19 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-448 | Location: Sta. 512+19.5, 175.0 ft. RT of SR 823 CL | Date Drilled: 7/8/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
11.0' (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
120	737.5						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, contains occasional argillaceous laminations, slightly fractured.							
		Core 24"	Rec 24"	RQD 100%	R13	*482								
125.0	732.5						Bottom of Boring - 125.0'							
130														
135														
140														
145														
150														

FILE: 0121-3070-03 [11/21/2006 2:19 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-449 | Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL | Date Drilled: 7/1/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
78.4' (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
0	891.3						No topsoil							
		3 4 7	18	1		4.0	Hard light brown SILT AND CLAY (A-6a), trace gravel; damp.							
		7 9 9	18	2		4.5	@ 3.5', light gray and light brown.							
5														
		7 25 50/5	17	3		4.5+	@ 6.0', gray, trace organic.							
6.8	884.5						Soft brown and gray SANDSTONE; decomposed, broken.							50+
8.6	882.7						Medium hard light gray SANDSTONE; fine grained, moderately to highly weathered, micaceous, thickly bedded, moderately fractured.							
10		Core 60"	Rec 60"	RQD 93%	R-1	*258								
							@ 12.9', iron staining.							
							@ 13.8' to 15.5', argillaceous and dark gray layers.							
15														
18.0	873.3	Core 120"	Rec 120"	RQD 81%	R-2	*112	Medium hard black SANDSTONE interbedded with SHALE; very fine grained, moderately to highly weathered, carbonaceous, laminated to thinly bedded, contains argillaceous layers.							
20														
23.1	868.2						Very soft to soft dark gray CLAYSHALE; highly weathered to decomposed, carbonaceous, laminated to thinly bedded.							
24.7	866.6						Hard light gray SANDSTONE; very fine to fine grained, moderately weathered, thinly laminated, moderately fractured.							
26.0	865.3						Soft to medium hard gray SHALE; highly weathered to decomposed, slightly arenaceous, thinly bedded, slightly fractured.							
		Core 120"	Rec 120"	RQD 91%	R-3	*359	@ 27.6' to 28.2', contains iron.							
30														

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring R-449 | Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL | Date Drilled: 7/1/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
78.4' (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
	861.3						
30.0	861.3						Medium hard gray CLAYSTONE; highly weathered to decomposed, slightly arenaceous.
31.8	859.5						@ 31.3' to 31.8', carbonaceous with coal stringer.
35		Core 120"	Rec 120"	RQD 96%	R-4	*468	Hard gray SANDSTONE; very fine to fine grained, highly weathered, slightly argillaceous, thinly bedded to medium bedded, contains coal stringers, slightly to highly fractured. @ 33.9' to 34.2', fine to coarse grained. @ 35.6' to 36.6', fine to coarse grained, fossiliferous. @ 37.1' to 37.3', iron stains.
40							@ 39.2', slickensides fracture. @ 40.5' to 41.5', medium-grained, turbidity beds.
45							@ 44.1' to 45.0', fine to medium grained with coal blossoms, poorly cemented. @ 45.5' to 46.0', fine to medium grained, carbonaceous, pyritic inclusion, poorly cemented.
47.3	844.0	Core 120"	Rec 120"	RQD 100%	R-5	*140	@ 46.9' to 47.3', fine to medium grained, carbonaceous, poorly cemented.
50							Hard light gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, unfractured to slightly fractured, contains iron inclusions.
55		Core 120"	Rec 120"	RQD 100%	R-6	*460	
60							

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

FILE: 0121-3070-03 [11/21/2006 2:19 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-449 | Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL | Date Drilled: 7/1/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
78.4' (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
60	831.3						Hard light gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, unfractured to slightly fractured, contains iron inclusions.							
65		Core 120"	Rec 120"	RQD 100%	R-7	*417								
70														
75		Core 120"	Rec 120"	RQD 100%	R-8	*500								
80														
85		Core 120"	Rec 120"	RQD 100%	R-9	*575								
90														

FILE: 0121-3070-03 [11/21/2006 2:19 PM]

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

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

LOG OF: Boring R-449 | Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL | Date Drilled: 7/1/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90	801.3						Hard light gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, unfractured to slightly fractured, contains iron inclusions.						
95		Core 120"	Rec 120"	RQD 100%	R10	*524							
100													
105		Core 120"	Rec 120"	RQD 100%	R11	*433	@ 109.0' to 114.0', crossbedded.						
110													
115		Core 84"	Rec 84"	RQD 100%	R12	*560							
120.0	771.3						Bottom of Boring - 120.0'						

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

FILE: 0121-3070-03 [11/21/2006 2:19 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-450 | Location: Sta. 516+18.1, 3.7 ft. LT of SR 823 CL | Date Drilled: 6/29/04 to 6/30/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
18.1' (morning of 6/30/04)
22.2' (at completion, 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	886.7	10 20 22	15	1		4.5+	No topsoil Hard light brown SILT AND CLAY (A-6a), trace organics; damp.						
3.4	883.3	Core 115"	Rec 115"	RQD 63%	R-1		Medium hard brown and light gray SANDSTONE; fine to medium grained, highly weathered, broken, contains numerous low angle rust stained and clay filled fractures. @ 8.9' to 9.9', high angle partially rust healed fracture with clay infilling. @ 10.0' to 10.6', high angle clean fracture. @ 10.7', light brown and light gray, moderately weathered poorly cemented. @ 14.7' to 15.0', high angle rust stained. @ 16.6', low angle highly weathered rust stained fracture.						
17.0	869.7	Core 120"	Rec 120"	RQD 90%	R-2		Soft to medium hard dark gray and black SHALE; moderately to highly weathered, carbonaceous, moderately to highly fractured.						
20.5	866.2						Soft gray SHALE; highly weathered to decomposed, thinly laminated, arenaceous, moderately to highly fractured.						
23.6	863.1	Core 120"	Rec 120"	RQD 91%	R-3		Medium hard gray SANDSTONE; very fine to fine grained, highly weathered, broken to moderately fractured, argillaceous, contains moderate argillaceous laminations. @ 23.7' to 28.0' highly argillaceous zones. @ 24.1', 25.0', 25.2', low angle fractures. @ 25.5' to 25.8', ferric. @ 26.8', 27.4', 27.5', low angle fractures. @ 27.9', 29.2', 32.7', low angle fractures.						
30													

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

FILE: 0121-3070-03 [11/21/2006 2:19 PM]

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

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

LOG OF: Boring R-450 | Location: Sta. 516+18.1, 3.7 ft. LT of SR 823 CL | Date Drilled: 6/29/04 to 6/30/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
18.1' (morning of 6/30/04)
22.2' (at completion, 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	856.7						Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, contains few argillaceous laminations, broken to moderately fractured.							
							@ 33.0' and 39.1', low angle fractures. @ 33.4', 35.4', 39.2', low angle fractures.							
35		Core 120"	Rec 115"	RQD 86%	R-4									
40							@ 39.1' to 39.2' contains breccia/conglomerate interbed. @ 39.5' to 41.1' contains conglomerate interbed. @ 39.7', 41.3', 42.6', low angle fractures. @ 40.1' to 40.6' loss zone.							
							@ 42.6' to 42.9', ferric band.							
45							@ 46.2', dark gray and light gray argillaceous interbeds. @ 46.0', 46.5', 47.4', low angle fracture.							
47.8	838.9	Core 120"	Rec 120"	RQD 98%	R-5		Medium hard to hard light gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, thickly bedded to massive, unfractured to slightly fractured.							
50														
55							@ 56.1', low angle fracture.							
		Core 120"	Rec 120"	RQD 95%	R-6		@ 57.4' to 57.7', high angle fractures.							
60														

FILE: 0121-3070-03 [11/21/2006 2:19 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-450 | Location: Sta. 516+18.1, 3.7 ft. LT of SR 823 CL | Date Drilled: 6/29/04 to 6/30/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
18.1' (morning of 6/30/04)
22.2' (at completion, includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60.0	826.7						Medium hard to hard light gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, thickly bedded to massive, unfractured to slightly fractured.						
65		Core 120"	Rec 109"	RQD 82%	R-7		@ 67.0 to 67.3', high angle fractures. @ 67.8', high angle partially healed highly weathered fracture.						
70							@ 72.1' to 75.4', broken with core loss, contains multiple high angle fractures.						
75		Core 120"	Rec 120"	RQD 68%	R-8		@ 76.1' to 78.1', broken with core loss, contains multiple high angle fractures; possible drilling induced breakage.						
80													
85		Core 120"	Rec 120"	RQD 100%	R-9		@ 81.8' pyrite nodules.						
90													

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

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring R-450 | Location: Sta. 516+18.1, 3.7 ft. LT of SR 823 CL | Date Drilled: 6/29/04 to 6/30/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
18.1' (morning of 6/30/04)
22.2' (at completion, includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90.0	796.7						Medium hard to hard light gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, thickly bedded to massive, unfractured to slightly fractured.						
95		Core 120"	Rec 120"	RQD 100%	R10								
100													
105		Core 120"	Rec 120"	RQD 100%	R11								
110													
115		Core 84"	Rec 84"	RQD 93%	R12		@ 113.0', contains few argillaceous laminations. @ 113.3', dark gray SANDSTONE laminae evident. @ 117.4' to 118.1', contains moderate argillaceous laminations. @ 118.1' to 118.5', low angle fracture with abundant argillaceous laminations.						
120.0	766.7						Bottom of Boring - 120.0'						

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

FILE: 0121-3070-03 [11/21/2006 2:19 PM]

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

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

LOG OF: Boring R-451 | Location: Sta. 516+08.6, 160.8 ft. RT of SR 823 CL | Date Drilled: 6/30/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
14.2' (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	866.4												
0.3	866.1						Topsoil - 4"						
		6 9 13	18	1		2.0	Stiff to very stiff reddish brown SANDY SILT (A-4a), little sandstone fragments; damp						
3.0	863.4						Hard reddish brown SILT AND CLAY (A-6a), little fine to coarse sand; damp						
		13 17 23	18	2		4.5+							
5							@ 6.0', decomposed shale, trace fine to coarse sand.						
		11 11 21	18	3		4.5+							
							@ 8.5', red, brown and gray, trace gravel.						
		17 31 45	15	4		4.5+							
10													
10.5	855.9						Soft brown SHALE; highly weathered, thinly bedded, broken.						
		50/4	4	5									
11.7	854.7	Core 15"	Rec 15"	RQD 53%	R-1		Soft to medium hard light brown SANDSTONE; fine to medium grained, highly weathered, thinly bedded to massive, broken.						
15							@ 15.5'-16.6', SDI = 2.3%.						
		Core 120"	Rec 120"	RQD 68%	R-2	*187							
20							@ 21', IRONSTONE inclusion.						
22.5	843.9						Medium hard gray SANDSTONE; fine to medium grained, moderately to highly weathered, carbonacious, pyritic, thinly bedded to medium bedded, broken to moderately fractured, contains moderate argillaceous laminations.						
25													
		Core 120"	Rec 120"	RQD 78%	R-3	*295	@ 28.0'-29.0', qu = 9,850 psi, SDI = 95.6%.						
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
76
50+

FILE: 0121-3070-03 [11/21/2006 2:19 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-451 | Location: Sta. 516+08.6, 160.8 ft. RT of SR 823 CL | Date Drilled: 6/30/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
14.2' (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	836.4						Medium hard gray SANDSTONE; fine to medium grained, moderately to highly weathered, pyritic, thinly bedded to medium bedded, contains moderate coal laminae.						
33.5	832.9						Medium hard light gray and gray SANDSTONE; fine to coarse grained, moderately weathered, thinly bedded to medium bedded, contains argillaceous clasts, moderately fractured. @ 33.6' low angle fracture.						
35		Core 120"	Rec 120"	RQD 98%	R-4	*512							
39.1	827.3						Medium hard light gray and gray BRECCIA; highly weathered, poorly cemented.						
40													
40.8	825.6						Hard gray SANDSTONE; very fine to fine grained, unweathered to slightly weathered, micaceous, thinly bedded to thickly bedded, slightly fractured.						
45							@ 46.4'-46.8', high angle fracture.						
		Core 120"	Rec 120"	RQD 100%	R-5	*532							
50							@ 49.5', low angle fracture.						
55							@ 53.7', low angle fracture.						
		Core 120"	Rec 120"	RQD 100%	R-6	*564							
60													

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

FILE: 0121-3070-03 (11/21/2006 2:19 PM)

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

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

LOG OF: Boring R-451 | Location: Sta. 516+08.6, 160.8 ft. RT of SR 823 CL | Date Drilled: 6/30/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
14.2' (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
60	806.4						Hard gray SANDSTONE; very fine to fine grained, unweathered to slightly weathered, micaceous, thinly bedded to thickly bedded, slightly fractured to unfractured.						
65		Core 120"	Rec 120"	RQD 100%	R-7	*508	@ 66.5', pyritic.						
70													
75		Core 120"	Rec 120"	RQD 100%	R-8	*522							
80							@ 83.0', argillaceous beds with turbidity bedding and argillaceous clasts.						
85		Core 120"	Rec 120"	RQD 100%	R-9	*557	@ 86.6'-87.3' argillacious interbeds.						
90							@ 88.5'-88.8', argillaceous interbeds.						

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

FILE: 0121-3070-03 [11/21/2006 2:19 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-451 | Location: Sta. 516+08.6, 160.8 ft. RT of SR 823 CL | Date Drilled: 6/30/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
14.2' (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)
90.0	776.4						Hard gray SANDSTONE interbedded with SILTSTONE; very fine to fine grained, unweathered to slightly weathered, micaceous, pyritic, thinly bedded to thickly bedded, contains turbidite bedding with argillaceous beds, slightly fractured.							
		Core 24"	Rec 24"	RQD 100%	R10	*447								
95.0	771.4						Bottom of Boring - 95.0'							

100 105 110 115 120

FILE: 0121-3070-03 [11/21/2006 2:19 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-452 | Location: Sta. 520+21.3, 169.5 ft. LT of SR 823 CL | Date Drilled: 6/24/04 to 7/8/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	866.7												
0.3	866.4						Topsoil - 3"/6" soil removed before drilling						
		2 4 5	18	1		1.75	Stiff to very stiff brown SANDY SILT (A-4a), some clay, trace gravel; damp.						
		6 13 14	12	2		3.0							
5													
5.5	861.2						Hard light brown CLAY (A-7-6), trace fine to coarse sand; damp.	0	1	--	7	47	45
		2 7 8	16	3		4.5+							
8.0	858.7						Severely weathered brown and gray SANDSTONE.	0	0	--	9	65	26
		10 26 50/5	17	4									
10													
		24 50/4	8	5									
13.0	853.7						Soft to medium hard brown and gray SANDSTONE; fine to coarse grained, highly weathered, broken.						
15.0	851.7	Core 48"	Rec 42"	RQD 13%	R-1		Soft to medium hard brown and gray BRECCIA; highly weathered, arenaceous, broken, poorly cemented.						
17.0	849.7						Soft to medium hard brown and gray SANDSTONE; fine to coarse grained, highly weathered, broken.						
20		Core 60"	Rec 30"	RQD 0%	R-2		@ 22.0'-22.7', contains rust stains.						
22.5	844.2						Soft to medium hard gray SANDSTONE interbedded with SILTSHALE and CLAYSHALE; very fine to fine grained, highly weathered to decomposed, broken.						
25		Core 60"	Rec 52"	RQD 13%	R-3	*641							
28.5	838.2	Core	Rec	RQD	R-4	*641	Soft to medium hard gray BRECCIA; highly weathered, broken, poorly cemented.						
30													

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

50+
50+

FILE: 0121-3070-03 [11/21/2006 2:19 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-452 | Location: Sta. 520+21.3, 169.5 ft. LT of SR 823 CL | Date Drilled: 6/24/04 to 7/8/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	836.7	60"	55"	18%									
31.3	835.4						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, slightly argillaceous, moderately to slightly fractured.						
35		Core 60"	Rec 60"	RQD 100%	R-5	*511	@ 34.1',35.9',36.9', low angle fractures.						
40		Core 60"	Rec 60"	RQD 100%	R-6	*511	@ 37.0',40.7',42.4', low angle fractures.						
45		Core 60"	Rec 60"	RQD 100%	R-7	*468	@ 43.2',45.0',47.0', low angle fractures.						
50		Core 60"	Rec 60"	RQD 100%	R-8	*468							
55		Core 60"	Rec 60"	RQD 100%	R-9	*486							
60		Core	Rec	RQD	R10	*486	@ 56.8', low angle clean fracture. @ 57.0'-57.2', pitted surface, moderately weathered.						

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

FILE: 0121-3070-03 [11/21/2006 2:19 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-452 | Location: Sta. 520+21.3, 169.5 ft. LT of SR 823 CL | Date Drilled: 6/24/04 to 7/8/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	806.7	60"	58"	97%			Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, slightly argillaceous, moderately to slightly fractured. @ 62.6', low angle fractures. @ 62.9', low angle partially clay coated fracture.						
65		Core 60"	Rec 60"	RQD 100%	R11	*355							
70		Core 60"	Rec 60"	RQD 100%	R12	*355							
75		Core 60"	Rec 59"	RQD 98%	R13	*514	@ 76.0', contains turbidite beds with SILTSHALE laminae.						
80		Core 60"	Rec 58.5"	RQD 98%	R14	*355							
85		Core 60"	Rec 60"	RQD 97%	R15	*304							
90		Core	Rec	RQD	R16	*304							

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

FILE: 0121-3070-03 | 11/27/2006 2:19 PM |

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

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

LOG OF: Boring R-452 | Location: Sta. 520+21.3, 169.5 ft. LT of SR 823 CL | Date Drilled: 6/24/04 to 7/8/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90	776.7	60"	60"	97%			Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, contains turbidite beds with SILTSHALE laminae, moderate to slightly fractured.						
		Core 36"	Rec 36"	RQD 100%	R17								
95.0	771.7						Bottom of Boring - 95.0'						
100													
105													
110													
115													
120													

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

FILE: 0121-3070-03 [11/21/2006 2:19 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-453 | Location: Sta. 520+24.6, 82.1 ft. LT of SR 823 CL | Date Drilled: 6/21/04 to 6/23/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
45.2' (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	872.5						
0.3	872.2						Topsoil - 4"
		4 4 4	18	1			Loose brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); damp.
3.0	869.5						
		3 3 7	18	2		4.5+	Hard brown and gray CLAY (A-7-6), trace fine to coarse sand; damp.
5							
5.5	867.0						
		11 25 37	15	3			Severely weathered brown and gray CLAYSHALE.
9.0	863.5	22 50/3	9	4			Severely weathered brown SANDSTONE.
10							
		50/4	3	5			
13.0	859.5	Core 24"	Rec 24"	RQD 100%	R-1		Medium hard brown SANDSTONE; fine to coarse grained, moderately weathered, argillaceous, thinly bedded to medium bedded, highly fractured. @ 13.2',13.6', low angle rust filled fracture. @ 15.0'-15.4', high angle rust stained fracture. @ 15.6',16.5', low angle fracture. @ 17.5', low angle severely weathered fracture. @ 18.5', low angle severely weathered fracture.
15							
19.2	853.3	Core 120"	Rec 110"	RQD 77%	R-2		Medium hard brown and gray BRECCIA; highly weathered, broken.
20.2	852.3						Soft to medium hard gray SILTSTONE; highly weathered, broken to highly fractured, argillaceous.
23.7	848.8						Medium hard gray SANDSTONE; very fine to fine grained, highly weathered, micaceous, argillaceous, laminated to moderately bedded, highly fractured. @ 23.7'-25.0', contains abundant argillaceous laminae. @ 25.6'-26.3', high angle rust stained fracture.
25							
30		Core 120"	Rec 120"	RQD 83%	R-3		

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
62
50+
50+

FILE: 0121-3070-03 [11/21/2006 2:19 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-453 | Location: Sta. 520+24.6, 82.1 ft. LT of SR 823 CL | Date Drilled: 6/21/04 to 6/23/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
45.2' (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	842.5						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, laminated to thick bedded.						
35							@ 35.2',37.9',38.2', low angle fractures.						
40		Core 120"	Rec 120"	RQD 91%	R-4		@ 39.3',39.8',40.4', low angle fractures. @ 40.8'-42.0', occasional carbonaceous laminae, coal blossom and calcareous cobble or layer. @ 41.4',42.2',42.5', low angle fractures. @ 42.7',43.0',43.5', low angle fractures.						
45													
45.8	826.7						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, medium bedded to massively bedded.						
50		Core 120"	Rec 119"	RQD 91%	R-5		@ 48.2', 49.5', 53.0', 53.3', low angle fractures.						
55													
60		Core 120"	Rec 119"	RQD 99%	R-6		@ 57.7'-58.3', high angle fracture with calcite on face.						

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

FILE: 0121-3070-03 [11/21/2006 2:19 PM]

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

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

LOG OF: Boring R-453 | Location: Sta. 520+24.6, 82.1 ft. LT of SR 823 CL | Date Drilled: 6/21/04 to 6/23/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
45.2' (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
60.0	812.5						Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, laminated to thinly bedded.						
65							@ 66.5',67.5',68.6', low angle highly weathered fracture.						
70		Core 120"	Rec 120"	RQD 100%	R-7								
75							@ 76.5',80.5',81.3', low angle fractures.						
80		Core 120"	Rec 117"	RQD 97%	R-8		@ 82.5',82.6',83.0', low angle fractures. @ 83.4',84.3', low angle fractures.						
85							@ 85.1'-86.3', broken zone, high angle fracture.						
90		Core 120"	Rec 119"	RQD 84%	R-9								

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

FILE: 0121-3070-03 (11/21/2006 2:19 PM)

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

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

LOG OF: Boring R-453 | Location: Sta. 520+24.6, 82.1 ft. LT of SR 823 CL | Date Drilled: 6/21/04 to 6/23/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
45.2' (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
90	782.5						Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, laminated to thinly bedded. @ 90.1',92.4',92.8', low angle fractures. @ 93.8',94.2', low angle fractures. @ 94.4'-97.6, high angle fracture.							
95.0	777.5	Core 60"	Rec 59"	RQD 60%	R10		Medium hard gray SILTSTONE; moderately weathered, micaceous, laminated to thinly bedded. @ 95.6'-97.6', high angle fracture. @ 97.7', low angle fracture. @ 97.8'-105.0', contains abundant argillacious laminae. @ 98.3'-99.3', high angle fracture.							
100		Core 60"	Rec 60"	RQD 93%	R11		@ 103.5'-104.5', SDI = 85.9%.							
105.0	767.5						Bottom of Boring - 105.0'							
110														
115														
120														

FILE: 0121-3070-03 [11/21/2006 2:19 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-454 | Location: Sta. 520+24.4, 88.4 ft. RT of SR 823 CL | Date Drilled: 7/8/04 to 7/9/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
44.3' (Includes drilling water)
50.2' (10 minutes after completion)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample 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	841.3												
0.4	840.9						Topsoil - 5"/1.5' soil removed before drilling						
		3 5 7	16	1			Medium dense brown COARSE AND FINE SAND (A-3a); dry to damp.						
3.0	838.3												
		2 10 12	18	2		4.5+	Hard brown and gray SILT AND CLAY (A-6a), trace fine to coarse sand; damp.						
5													
5.5	835.8						Severely weathered brown and gray SANDSTONE.						
		26 49 50/4	14	3									
8.0	833.3												
		Core 36"	Rec 36"	RQD 86%	R-1	*348	Medium hard brown SANDSTONE; fine to medium grained, highly weathered, argillaceous, thinly bedded to medium bedded, broken. @ 8.2', iron stained fracture, medium bed thickness. @ 11.0'-11.5', broken, few pyrites.						
10													
		Core 60"	Rec 60"	RQD 50%	R-2	*348							
15							@ 16.3'-21.1', moderately weathered.						
		Core 60"	Rec 60"	RQD 95%	R-3	*503							
20													
21.1	820.2						Soft to medium hard gray SANDSTONE interbedded with SHALE; very fine to fine grained, moderately to highly weathered, thinly bedded to medium bedded, broken, contains clay seams.						
		Core 60"	Rec 60"	RQD 33%	R-4	*503							
25							@ 26.8-27.1, rust stained.						
		Core 60"	Rec 60"	RQD 18%	R-5	*419							
30													

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

FILE: 0121-3070-03 | 11/22/2006 1:43 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-454 | Location: Sta. 520+24.4, 88.4 ft. RT of SR 823 CL | Date Drilled: 7/8/04 to 7/9/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
44.3' (Includes drilling water)
50.2' (10 minutes after completion)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample 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	811.3						Soft to medium hard gray SANDSTONE interbedded with SHALE; very fine to fine grained, moderately to highly weathered, thinly bedded to medium bedded, broken, contains clay seams.							
		Core 60"	Rec 60"	RQD 37%	R-6	*419	@ 31.0'-32.0', SDI = 94.6%. @ 32.2'-32.3', limestone bed fossiliferous,. @ 32.9'-35.3', qu = 12,009 psi, SDI = 94.2%.							
35							@ 36.0'-37.0', abundant argillaceous interbeds.							
		Core 60"	Rec 60"	RQD 0%	R-7		@ 37.8'-37.2', abundant argillaceous interbeds.							
40							@ 39.2'-40.3', SDI = 89.7%. @ 40.0', occassional fossil evident. @ 41.0'-45.0', abundant argillaceous interbeds.							
		Core 60"	Rec 60"	RQD 0%	R-8									
45														
45.7	795.6						Medium hard gray SANDSTONE; very fine to fine grained, highly weathered, thinly bedded to medium bedded, broken, contains clay seams.							
		Core 60"	Rec 60"	RQD 0%	R-9	*321	@ 47.5'-51.0', abundant argillaceous interbeds, broken.							
50														
		Core 60"	Rec 60"	RQD 38%	R10	*321								
55														
		Core 60"	Rec 54"	RQD 0%	R11	*214	@ 59.5'-59.8', abundant argillaceous interbeds							
60														

FILE: 0121-3070-03 [11/22/2006 1:43 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-454 | Location: Sta. 520+24.4, 88.4 ft. RT of SR 823 CL | Date Drilled: 7/8/04 to 7/9/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
44.3' (Includes drilling water)
50.2' (10 minutes after completion)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60.0	781.3						Medium hard gray SANDSTONE interbedded with SHALE; very fine to fine grained, highly weathered, thinly bedded to medium bedded, broken, contains clay seams.						
		Core 60"	Rec 59"	RQD 32%	R12	*214	@ 60.7'-63.9', little shale interbeds.						
65							@ 64.3'-64.9', 65.4'-66.4', abundant argillaceous interbeds.						
		Core 48"	Rec 48"	RQD 0%	R13								
70.0	771.3						Bottom of Boring - 70.0'						
75													
80													
85													
90													

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

FILE: 0121-3070-03 [11/22/2006 1:43 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-455 | Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL | Date Drilled: 6/17/04 to 6/18/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
35.5' (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	871.2												
0.3	870.9	2 2 4	16	1		4.0	Topsoil - 4" Hard brown SILT AND CLAY (A-6a), little fine to coarse sand; damp.						
5		6 8 10	18	2		4.5+							
		5 12 24	18	3		4.5+							
		8 10 14	18	4		4.5+							
10		15 18 24	18	5		4.5+							
		50/3	2	6									
15.0	856.2						Medium hard brown and gray BRECCIA; medium to coarse grained, highly weathered, contains gravel, cobble and boulder sized particles.						
15.5	855.7	Core 60"	Rec 56"	RQD 73%	R-1	*237	Medium hard gray SANDSTONE; decomposed, argillaceous , thinly bedded to medium bedded. @ 16.3', gradational change begins.						
20													
20.4	850.8						Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, carbonaceous, argillaceous, thinly bedded to medium bedded. @ 22.5'-24.1', SDI = 73.9%.						
25		Core 120"	Rec 114"	RQD 76%	R-2	*297	@ 25.0'-25.9', Breccia zone, highly weathered to decomposed, broken. @ 26.2'-27.2', high-angle fracture.						
							@ 28.7'-29.0', low-angle fracture with clay infilling.						
30													

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

FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

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

LOG OF: Boring R-455 | Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL | Date Drilled: 6/17/04 to 6/18/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
35.5' (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	841.2						Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, thinly bedded to massive, slightly fractured. @ 30.8', 38.3', low-angle fracture.							
35		Core 120"	Rec 100"	RQD 82%	R-3	*381								
40														
45		Core 120"	Rec 119"	RQD 78%	R-4	*428								
50														
55		Core 120"	Rec 118"	RQD 97%	R-5	*340	@ 53.7', 55.3', 56.0', low-angle fractures. @ 56.2', 57.7', low-angle fractures.							
60														

FILE: 0121-3070-03 [11/22/2006 1:43 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-455 | Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL | Date Drilled: 6/17/04 to 6/18/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
35.5' (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 - ○
60	811.2						Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, thinly bedded to medium bedded, slightly to moderately fractured.							10 20 30 40
							@ 61.7'-63.3', brown.							
							@ 62.0'-63.3', high angle rust stained fracture.							
65		Core 120"	Rec 113"	RQD 78%	R-6	*447								
70							@ 71.3', low angle smooth fracture.							
75		Core 120"	Rec 120"	RQD 100%	R-7	*345	@ 76.3', low angle fracture.							
							@ 77.8', low angle smooth fracture.							
80							@ 79.7', low angle fracture.							
							@ 82.2', low angle fracture.							
							@ 82.4', low angle highly weathered fracture.							
							@ 82.8', low angle highly weathered fracture.							
85		Core 120"	Rec 120"	RQD 90%	R-8	*373	@ 83.9'-84.0', highly weathered, thinly laminated, broken.							
							@ 85.5'-85.6', low angle fracture.							
							@ 85.9'-86.1', highly weathered, broken.							
							@ 88.5'-88.6', low angle fracture.							
							@ 88.7'-88.9', broken.							
90														

FILE: 0121-3070-03 [11/22/2006 1:43 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-455 | Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL | Date Drilled: 6/17/04 to 6/18/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (Prior to coring)
35.5' (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
	781.2						
90.0	781.2	Core 60"	Rec 60"	RQD 100%	R-9	*349	Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, thinly bedded to medium bedded, argillaceous, micaceous, slightly fractured, contains argillaceous laminae. @ 90.0'-91.2', SDI = 57.5%. @ 92.5', plant fossils evident. @ 93.0', pyritic.
95							
		Core 120"	Rec 110"	RQD 78%	R10	*198	@ 97.5', very fine grained SANDSTONE interbeds, highly weathered, abundant argillaceous interbeds. @ 98.5'-99.5', SDI = 66.8%.
100							
105.0	766.2						Bottom of Boring - 105.0'
110							
115							
120							

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

FILE: 0121-3070-03 [11/22/2006 1:43 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-456 | Location: Sta. 524+22.5, 1.9 ft. RT of SR 823 CL | Date Drilled: 6/9/04 to 6/11/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
26.5' (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	882.4												
0.3	882.1	1 1 2	12	1		0.25	Topsoil - 3" Soft brown SANDY SILT (A-4a), trace clay; moist.						
3.0	879.4	5 7 10	14	2			Medium dense brown COARSE AND FINE SAND (A-3a); contains sandstone fragments; damp.						
5		3 6 4	16	3									
8.0	874.4	8 10 12	18	4		4.5+	Hard black CLAY (A-7-6); dry to damp.						
10													
10.5	871.9	12 18 30	18	5			Severely weathered gray SANDSTONE argillaceous.						
		50/4	4	6									
15.0	867.4	Core 60"	Rec 60"	RQD 97%	R-1		Medium hard to hard gray SANDSTONE, fine to coarse grained, micaceous, moderately weathered, medium to massive beds, slightly fractured . @ 19.4'-20.2', argillaceous.						
20													
21.1	861.3	Core 60"	Rec 59"	RQD 72%	R-2		Medium hard to hard brown and gray SANDSTONE, fine to coarse grained, highly weathered, broken to highly fractured, poorly cemented. @ 22.1'-22.5', breccia layer. @ 24.7', leached limestone layer and breccia.						
25.0	857.4	Core 120"	Rec 120"	RQD 100%	R-3		Hard gray SANDSTONE, very fine to medium grained, argillaceous, thin to thick bedded, moderately weathered, highly fractured.						
30													

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

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring R-456 | Location: Sta. 524+22.5, 1.9 ft. RT of SR 823 CL | Date Drilled: 6/9/04 to 6/11/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
26.5' (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
30	852.4						Hard gray SANDSTONE, very fine to medium grained, argillaceous, thin to thick bedded, slightly weathered(see previous description). @ 31.2'- 33.4', contains moderate argillaceous laminations.						
35							@ 36.7', 37.2', 37.8', 38.5', 39.1', low angle clean fractures.						
40		Core 120"	Rec 119"	RQD 99%	R-4		@ 40.2', 42.0', 43.1', 44.6', low angle clean fractures.						
45							@ 47.0', low angle fracture.						
50		Core 120"	Rec 120"	RQD 100%	R-5		@ 48.7', 50.2', low angle clean fractures.						
55							@ 54.5', low angle fracture.						
60		Core 120"	Rec 119"	RQD 98%	R-6		@ 56.2', low angle fracture. @ 56.8', 57.3', low angle clean fractures. @ 58.1', 58.8', 62.8', low angle clean fractures.						

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

FILE: 0121-3070-03 (11/22/2006 1:43 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-456 | Location: Sta. 524+22.5, 1.9 ft. RT of SR 823 CL | Date Drilled: 6/9/04 to 6/11/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
26.5' (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
60	822.4						Hard gray SANDSTONE, very fine to medium grained, argillaceous, thin to thick bedded, slightly weathered (see previous).							
65							@ 67.6', 67.7', low angle clean fractures.							
70		Core 120"	Rec 116"	RQD 95%	R-7		@ 70.4'-70.6', leached limestone layer. @ 70.5', low angle clean fracture. @ 72.7', low angle clean fracture.							
75							@ 74.6', low angle fracture.							
80		Core 120"	Rec 120"	RQD 100%	R-8									
85														
90		Core 120"	Rec 119"	RQD 97%	R-9		@ 88.1', argillaceous laminations, low angle fracture.							

FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

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

LOG OF: Boring R-456 | Location: Sta. 524+22.5, 1.9 ft. RT of SR 823 CL | Date Drilled: 6/9/04 to 6/11/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
26.5' (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
90	792.4						Hard gray SANDSTONE, very fine to medium grained, argillaceous, thin to thick bedded, slightly weathered. @ 91.6', low angle clean fracture. @ 92.1'-92.2', argillaceous laminations. @ 93.1', low angle clean fracture.							
95							@ 95.4'-95.7', high angle healed fracture. @ 96.1', 96.2', 96.6', 96.7', low angle clean fractures.							
100		Core 120"	Rec 120"	RQD 88%	R10		@ 98.0', low angle clean fracture, argillaceous lamination. @ 99.1', argillaceous lamination. @ 99.4', low angle clean fracture. @ 101.2'-101.4', contains numerous argillaceous laminations, broken.							
105							@ 103.4', argillaceous laminations, low angle clean fracture. @ 105.5'-110.6', pyritic, contains moderate argillaceous lamination.							
110		Core 120"	Rec 116"	RQD 87%	R11		@ 110.7', pyritic.							
115.0	767.4						Bottom of Boring - 115.0'							
120														

FILE: 0121-3070-03 [11/22/2006 1:43 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-457 | Location: Sta. 524+32.7, 189.2 ft. RT of SR 823 CL | Date Drilled: 6/11/04 to 6/17/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 38.5' (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	871.2													
0.4	870.8	2 4 8	18	1			Topsoil - 5"/6" soil removed before drilling Very dense brown SANDY SILT (A-4a); damp.							
		16 26 38	18	2										64
5		38 50/5	12	3										50+
8.0	863.2	Core 36"	Rec 26"	RQD 17%	R-1		Soft to medium hard light brown and brown SANDSTONE; very fine to fine grained, highly weathered to decomposed, thinly bedded to medium bedded.							
10														
15		Core 120"	Rec 120"	RQD 31%	R-2	*183								
19.5	851.7						Medium hard gray SANDSTONE, very fine to fine grained, argillaceous, moderately weathered, highly fractured, fractures contain slickensides. @ 20.8' to 21.1', breccia zone. @ 22.5' to 23.2', ferric. @ 23.6' to 29.2', contains coal stringers.							
20														
25		Core 120"	Rec 116"	RQD 86%	R-3	*547	@ 28.8' to 29.0', ferric.							
30														

FILE: 0121-3070-03 [11/22/2006 1:43 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-457 | Location: Sta. 524+32.7, 189.2 ft. RT of SR 823 CL | Date Drilled: 6/11/04 to 6/17/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 38.5' (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	841.2						Medium hard gray SANDSTONE, very fine to fine grained, argillaceous, micaceous, moderately weathered, unfractured to slightly fractured, contains few to moderate argillaceous laminations, fissile.							
34.0	837.2						@ 33.2' to 33.5', conglomerate/breccia zone. @ 33.5' to 34.0', high angle fracture. @ 33.9',high-angle, rust stained fracture.							
35		Core 120"	Rec 119"	RQD 93%	R-4	*372	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, unfractured to slightly fractured. @ 34.6', low angle fracture. @ 38.9', low angle fracture.							
40														
45		Core 120"	Rec 118"	RQD 98%	R-5	*393								
50							@ 51.6' low angle fracture. @ 53.8', 53.9', 54.1', low angle fractures.							
55		Core 120"	Rec 118"	RQD 98%	R-6	*452	@ 57.4', 57.7', 88.8', low angle fractures.							
60														

FILE: 0121-3070-03 [11/22/2006 1:43 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-457 | Location: Sta. 524+32.7, 189.2 ft. RT of SR 823 CL | Date Drilled: 6/11/04 to 6/17/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 38.5' (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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
60	811.2						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, unfractured to slightly fractured. @ 62.7', low angle fracture.							
65		Core 120"	Rec 120"	RQD 100%	R-7	*418	@ 65.2', low angle fracture. @ 67.7', 72.5', 80.2', 80.6', low angle fractures.							
70														
75		Core 120"	Rec 120"	RQD 100%	R-8	*365	@ 73.2' to 73.5', broken.							
80							@ 80.1' to 80.2', 80.5', 80.6', argillaceous laminations. @ 81.5', 83.6', low angle fracture.							
85		Core 120"	Rec 116"	RQD 91%	R-9	*434	@ 84.4' to 84.6', high angle fracture @ 85.5' to 90.4', brown, moderate to highly weathered. @ 86.6' to 87.7', 88.0' to 88.4', 88.5 to 89.1', high angle fractures.							
90														

FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

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

LOG OF: Boring R-457 | Location: Sta. 524+32.7, 189.2 ft. RT of SR 823 CL | Date Drilled: 6/11/04 to 6/17/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 38.5' (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
90	781.2						Medium hard gray SANDSTONE, very fine to fine grained, slightly weathered, thinly laminated to medium bedded, argillaceous, pyritic, slightly fractured, contains few to moderate argillaceous laminae.						
95		Core 120"	Rec 104"	RQD 78%	R10	*399	@ 94.5' to 101.0', contains moderate argillaceous laminae. @ 96.2', pyritic.						
100													
105		Core 60"	Rec 59"	RQD 99%	R11	*309	@ 102.0' to 106.0', contains few argillaceous laminae.						
106.0	765.2						Bottom of Boring - 106.0'						
110													
115													
120													

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

FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

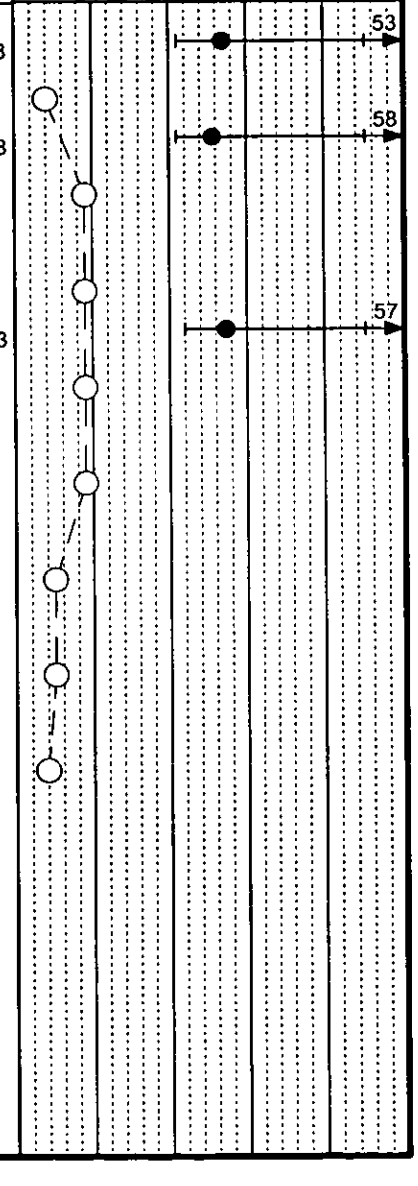
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-459 | Location: Sta. 528+20.4, 1.4 ft. RT of SR 823 CL | Date Drilled: 6/3/04

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	783.8												
0.3	783.5						Topsoil - 4"						
		1 1 3	12	1		1.5	Very stiff to hard brown and gray CLAY (A-7-6), trace fine to coarse sand; moist.	0	1	--	6	50	43
		2 4 5	18	2		2.5		0	0	--	1	51	48
5		4 4 5	18	3		2.5							
		2 4 5	18	4		4.5+		0	0	--	0	47	53
10		2 4 5	18	5		2.25							
		1 2 3	18	6		1.25	@ 13.5'-20.0', medium stiff to stiff, gray.						
15		1 2 3	18	7		0.75							
		1 2 2	18	8		1.25							
20.0	763.8						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 [11/22/2006 1:43 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-461 | Location: Sta. 529+17.9, 97.4 ft. LT of SR 823 CL | Date Drilled: 6/3/04

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	767.3												
0.4	766.9						Topsoil - 4"						
		1 3 4	15	1		2.0	Stiff to very stiff brown CLAY (A-7-6); damp to moist.	0	0	--	1	52	47
		2 2 4	16	2		1.75		0	0	--	0	51	49
5		2 3 6	18	3		3.0							
		2 4 7	18	4		4.5+	@ 8.5'-10.0', hard.						
10		3 5 8	18	5		3.0		0	0	--	0	48	52
		3 4 7	18	6		2.5							
15		4 4 7	18	7		2.0	@ 16.0', brown and gray.						
		3 3 5	18	8		2.5							
20		3 3 5	18	9		1.0							
		2 2 4	18	10		1.0							
25		2 3 4	18	11		1.5							
30.0	737.3	2 3 4	18	12		1.0	Bottom of Boring - 30.0'						

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

54 56 59

FILE: 0121-3070-03 [11/22/2006 1:43 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-462 | Location: Sta. 529+19.5, 2.0 ft. RT of SR 823 CL | Date Drilled: 6/3/04

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	769.1												
0.3	768.8						Topsoil - 3"						
		2 2 3	18	1		2.25	Stiff to very stiff brown CLAY (A-7-6); damp to moist.						
		2 4 4	16	2		3.5		0	0	--	0	69	31
5		2 3 5	18	3		2.5							
		2 2 4	18	4		2.0							
10		2 3 5	18	5		2.75		0	0	--	0	48	52
		1 4 4	18	6		2.5							
15		2 3 5	18	7		1.0							
		2 3 3	18	8		1.25							
20		2 3 5	18	9		3.0	@ 21.0', brown and gray.						
		2 3 4	18	10		4.5+	@ 23.5'-25.0', hard.						
25		3 4 5	18	11		1.0							
30.0	739.1	2 3 3	18	12		1.5	Bottom of Boring - 30.0'						

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

54

59

FILE: 0121-3070-03 (11/22/2006 1:43 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

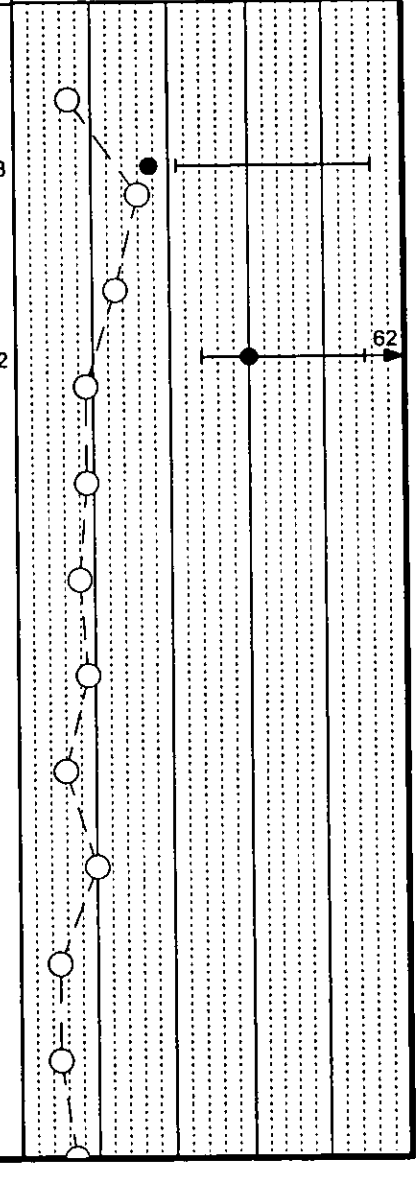
LOG OF: Boring R-463 | Location: Sta. 529+20.1, 93.2 ft. RT of SR 823 CL | Date Drilled: 6/3/04

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	770.6												
0.3	770.3						Topsoil - 3"						
		2 3 4	18	1		4.5+	Very stiff to hard moltted brown and light gray CLAY (A-7-6), trace to little fine to coarse sand, trace gravel; damp to moist.						
		4 7 9	18	2		4.5+		8	4	--	12	48	28
5		7 7 6	18	3		4.0							
		3 4 5	18	4		2.25		0	0	--	0	48	52
10		4 4 5	18	5		2.0							
		3 3 5	18	6		2.0							
15		3 4 5	18	7		2.0							
		2 3 3	18	8		1.25	@ 18.5'-22.5, stiff, gray.						
20		3 4 6	18	9		1.5							
		1 2 3	18	10		2.0							
25		1 2 3	18	11		0.5	@ 26.0'-30.0, medium stiff, moist.						
		2 3 4	18	12		0.5							
30.0	740.6						Bottom of Boring - 30.0'						

GRADATION

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



FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

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

LOG OF: Boring R-464 | Location: Sta. 533+20.3, 143.7 ft. LT of SR 823 CL | Date Drilled: 6/2/04 to 6/3/04

WATER OBSERVATIONS: Water seepage at: 48.5'; Water level at completion: 40.4'

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample 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	728.9												
0.3	728.6						Topsoil 4"						
		2 4 4	18	1		4.25	Hard brown SILT AND CLAY (A-6a), little fine to coarse sand; damp.						
		4 8 11	18	2		4.5+							
5													
5.5	723.4												
		4 7 11	18	3		3.0	Stiff to very stiff brown CLAY (A-7-6); damp to moist.	0	0	--	1	45	54
		2 5 5	18	4		3.0							
10													
		2 3 5	18	5		2.25							
		2 3 5	18	6		3.0		0	0	--	0	45	55
15													
		2 3 3	18	7		2.5	@ 16.0'-17.5', brown and gray.						
		1 2 3	18	8		1.0	@ 18.5'-30.0', gray.						
20													
		0 1 3	18	9	P1	1.25		0	1	--	1	11	87
		2 2 4	18	10		2.5							
25													
		2 2 3	18	11		0.75	@ 26.0'-27.5', medium stiff.						
		WOH 2 4	18	12		1.0							
30													

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

56 63 59

FILE: 0121-3070-03 [11/22/2006 1:43 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-464 | Location: Sta. 533+20.3, 143.7 ft. LT of SR 823 CL | Date Drilled: 6/2/04 to 6/3/04

WATER OBSERVATIONS: Water seepage at: 48.5'
Water level at completion: 40.4'

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample 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	698.9						Medium stiff to stiff gray CLAY (A-7-6); damp to moist.						
		2 2 4	18	13		0.75							
35													
		WOH 2 3	18	14		0.5							
40													
		2 3 4	18	15		2.5	@ 43.5'-45.0', very stiff.						
45													
46.5	682.4						Medium dense gray SILT (A-4b), trace clay; wet.						
		3 5 7	18	16				0	0	–	1	82	17
50													
52.0	676.9						Dense gray GRAVEL WITH SAND (A-1-b), trace silt; damp.						
		4 15 50/4	16	17									
55													
57.0	671.9						Severely weathered gray SHALE.						
58.8	670.1	50/4	4	18			Bottom of Boring - 58.8'						
60													

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

50+

50+

FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

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

LOG OF: Boring R-465 | Location: Sta. 533+20.9, 2.3 ft. RT of SR 823 CL | Date Drilled: 5/27/04 to 6/3/04

WATER OBSERVATIONS: Water seepage at: 53.5'
Water level at completion: 40.8' (inside 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	726.2												
0.3	725.9						Topsoil - 3"						
		1 3 3	18	1		2.5	Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand; damp to moist.						
		3 4 5	18	2		2.5							
5													
6.0	720.2	2 4 6	18	3		2.5	Very stiff brown CLAY (A-7-6), trace silt; damp to moist.						
		2 3 5	18	4		2.5							
10													
		2 2 4	18	5		2.5							
13.5	712.7	2 2 3	18	6		1.5	Stiff gray CLAY (A-7-6), little silt; damp to moist.						
15													
		2 2 4	18	7		1.0							
		1 2 3	18	8	P-1	1.0		0	0	–	0	18	82
20													
		1 3 3	18	9		1.0							
		2 2 3	18	10		1.5							
25													
		2 2 4	18	11		1.0							
		2 3 3	18	12		1.0							
30													

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

52

FILE: 0121-3070-03 [11/22/2006 1:43 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-465 | Location: Sta. 533+20.9, 2.3 ft. RT of SR 823 CL | Date Drilled: 5/27/04 to 6/3/04

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	696.2						WATER OBSERVATIONS: Water seepage at: 53.5' Water level at completion: 40.8' (inside augers)						
		1 2 4	18	13		1.5	Stiff gray CLAY (A-7-6), little silt; damp to moist.						
35													
		2 2 3	18	14		1.0							
40													
		1 4 5	18	15		1.5							
45													
		3 3 4	18	16		1.5							
50													
53.5	672.7	39 50/3	8	17			Very dense gray GRAVEL WITH SAND (A-1-b), trace to little silty clay; damp to moist.						
55													
57.0	669.2						Brown SANDSTONE fragments.						
58.6	667.6	50/1	0	18			Bottom of Boring - 58.6'						
60													

GRADATION

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

FILE: 0121-3070-03 (11/22/2006 1:43 PM)

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

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

LOG OF: Boring R-466 | Location: Sta 533+18.7, 138.2 ft. RT of SR 823 CL | Date Drilled: 5/27/04

WATER OBSERVATIONS: Water seepage at: 58.5'-60.0'
Water level at completion: 47.8' (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
0.2	732.6						Topsoil - 2"						
	732.4	2 3 5	18	1		3.0	Stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand; damp.						
4.0	728.6	14 20 21	18	2			Severely weathered brown SANDSTONE, possible boulder.						
5		18 31 20	18	3									
8.0	724.6						Stiff to very stiff brown CLAY (A-7-6), moist.						
		2 3 5	18	4		2.25		0	0	--	2	16	82
10		3 5 7	15	5		---							
		2 4 6	18	6		2.5							
15		3 5 7	18	7		2.0							
		1 3 5	18	8		1.5		0	0	--	1	9	90
20		3 3 5	18	9		1.25							
		WOH 1 3	18	10	P-2	0.5	@ 23.5', becomes gray. @ 23.5'-30.0', medium stiff.	0	0	--	0	3	97
25		1 3 4	18	11		0.75							
		2 3 5	18	12		0.5							
30													

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

51
55
59
63

FILE: 0121-3070-03 [11/22/2006 1:43 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-466 | Location: Sta 533+18.7, 138.2 ft. RT of SR 823 CL | Date Drilled: 5/27/04

WATER OBSERVATIONS: Water seepage at: 58.5'-60.0'
Water level at completion: 47.8' (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
30	702.6						Medium stiff gray CLAY (A-7-6); moist.						
		1 3 4	18	13		0.75							
35													
		WOH 1 3	18	14		0.75		0	0	--	0	9	91
40													
		WOH 2 3	18	15		0.5							
45													
		WOH 1 3	18	16		0.5							
50													
52.0	680.6						Medium stiff to stiff gray SILT AND CLAY (A-6a), trace fine to coarse sand; moist.						
		2 5 10	18	17		1.0							
55													
57.0	675.6						Very dense grayish brown GRAVEL (A-1-a); damp.						
		38 49 50/4	14	18A			@ 59.1'-59.8', sand seam.						
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
60
99

FILE: 0121-3070-03 [11/22/2006 1:43 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-466 | Location: Sta 533+18.7, 138.2 ft. RT of SR 823 CL | Date Drilled: 5/27/04

WATER OBSERVATIONS: Water seepage at: 58.5'-60.0'
Water level at completion: 47.8' (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
	672.6													
59.8	672.8			18B			Bottom of Boring - 59.8'							
65														
70														
75														
80														
85														
90														

FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

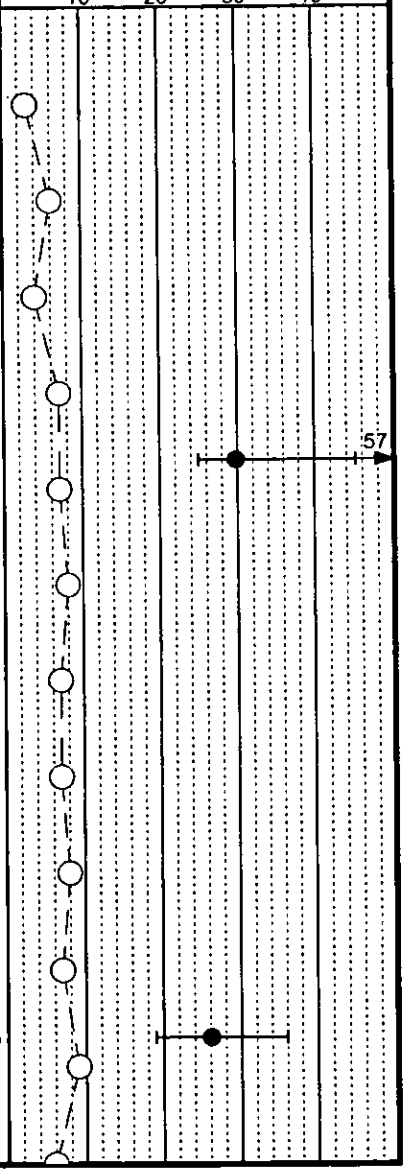
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

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
0	737.5												
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
		3 4 4	18	6		2.5							
15													
		2 3 4	18	7		1.75							
		1 3 4	18	8		3.5							
20													
22.0	715.5	3 3 5	18	9A 9B		2.5 2.0	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
		2 2 4	18	12		<0.25	@ 28.5'-30.0', very soft.						
30													

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



FILE: 0121-3070-03 [11/22/2005 1:43 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
	707.5						
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						Medium hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, medium bedded, highly fractured.
52.1	685.4						
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							

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

FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

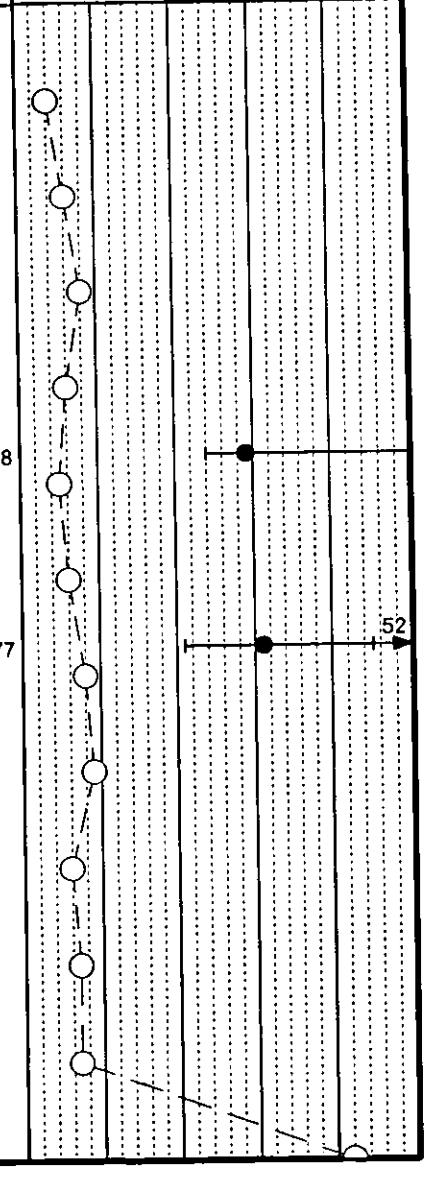
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

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
0	741.4												
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
		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													

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



FILE: 0121-3070-03 (11/22/2006 1:43 PM)

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

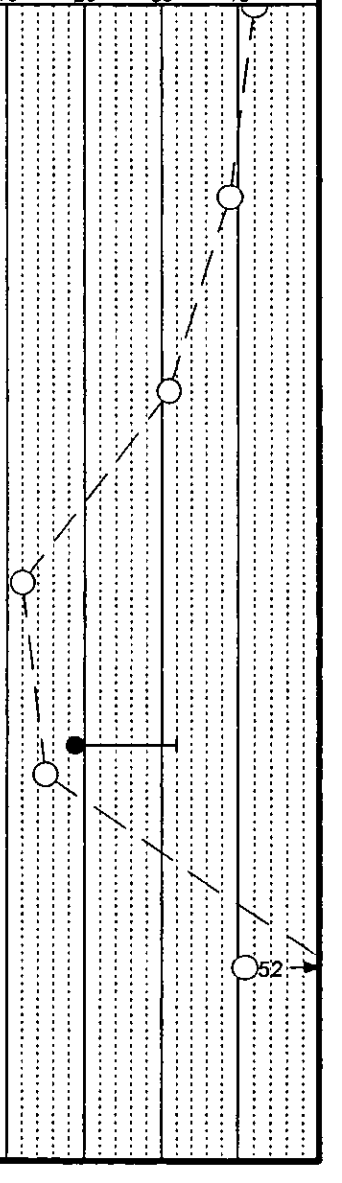
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

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.						
		12 16 23	18	13									
35													
		9 12 19	17	14									
40													
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													
		4 6 9	18	16		--		6	3	--	4	60	27
50													
		11 19 33	18	17		--							
55													
57.0	684.4						Medium hard dark gray SANDSTONE; very fine to fine grained, hightly to moderately weathered, argillaceous, micaceous, thinly laminated to medium bedded, moderately fractured to broken.						
60		Core	Rec	RQD	R-1								

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



FILE: 0121-3070-03 [11/22/2006 1:43 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%			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 [11/22/2006 1:43 PM]

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C[illegible]BUS, 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 [11/22/2006 1:43 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	% 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.							
		11 17 22	16	13		4.5+								
35														
		10 17 19	18	14		4.5+								
40														
		11 13 14	18	15		4.25								
45														
		50/6	3	16		--	@ 48.5'-49.0', contains sandstone fragments.							50+
49.0	687.1						Hard dark gray SHALE, very fine grained, moderately weathered, micaceous, very thin bedded, moderately fractured; contains few to moderate arenacious laminations.							
		Core 60"	Rec 52"	RQD 72%	R-1									
54.0	682.1						Bottom of Boring - 54.0'							
55														
60														

GRADATION

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

FILE: 0121-3070-03 [11/22/2006 1:13 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-2449 | Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL | Date Drilled: 10/27/05 to 10/27/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
28.1' (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	891.3						
0.7	890.6	8 10 18	18	1		4.5+	Topsoil - 8" Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; contains sandstone fragments; damp.
5		15 18 25	18	2		4.5+	
5.5	885.8	10 14 26	18	3			Severely weathered gray and light brown SANDSTONE.
		50/3	3	4			
10.0	881.3	Core 72"	Rec 72"	RQD 61%	R-1	*1543	Medium hard light brown SANDSTONE interbedded with SHALE; fine grained, highly weathered, micaceous, thickly bedded, moderately fractured. @ 13.2' to 15.5'; argillaceous and dark gray layers. @ 17.9', soft black shale, fine grained, moderately weathered, thin laminations, highly fractured.
15							
17.9	873.4						Soft to medium hard black SHALE; moderately to highly weathered, arenaceous, carbonaceous, micaceous, thinly laminated to laminated.
20							
21.0	870.3	Core 120"	Rec 113"	RQD 55%	R-2	*563	Very soft dark gray CLAYSHALE; highly weathered to decomposed, carbonaceous, laminated to thinly bedded. @ 22.2'; soft gray sandstone; fine to medium grained; highly weathered, no laminae, highly fractured. @ 25.8'-26.3', gray sandstone seam.
25							
26.3	865.0						Soft to medium hard gray SHALE; highly weathered to decomposed, arenaceous, thinly bedded. @ 27.1'-27.6', very hard, iron stained band. @ 27.7', pyritic.
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 [11/22/2006 1:43 PM]

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

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

LOG OF: Boring R-2449 | Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL | Date Drilled: 10/27/05 to 10/27/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
28.1' (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 - ○
30	861.3													10 20 30 40
30.7	860.6	Core 120"	Rec 120"	RQD 80%	R-3	*1030	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, laminated to medium bedded, unfractured to slightly fractured, contains coal stringers.							
35														
40		Core 120"	Rec 120"	RQD 98%	R-4	*1001	@ 44.0'-44.2', 45.2'-45.4', 46.0'-46.6'; conglomerate/breccia zone. @ 46.0'-46.6', highly fractured; coarse grained gravel sized.							
45														
46.6	844.7						Very hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, massively bedded, unfractured.							
50		Core 120"	Rec 120"	RQD 98%	R-5	*1491								
55							@ 54.3'-54.4', broken. @ 56.2'-56.8', vertical fracture.							
60														

FILE: 0121-3070-03 | 11/28/2006 2:26 PM |

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

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

LOG OF: Boring R-2449 | Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL | Date Drilled: 10/27/05 to 10/27/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
28.1' (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
60.0	831.3	Core 120"	Rec 120"	RQD 100%	R-6	*1476	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massive, unfractured to slightly fractured.							
65														
70		Core 120"	Rec 120"	RQD 100%	R-7	*1871								
75														
80		Core 120"	Rec 120"	RQD 100%	R-8	*1012								
85							@ 87.7'-87.8', carbonaceous clasts prevalent.							
90														

STANDARD PENETRATION (N) scale: 10 20 30 40

FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

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

LOG OF: Boring R-2449 | Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL | Date Drilled: 10/27/05 to 10/27/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
28.1' (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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90	801.3	Core 120"	Rec 120"	RQD 100%	R-9	*737	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, unfractured to slightly fractured.							
95														
100		Core 120"	Rec 120"	RQD 100%	R-10	*1677								
105														
110		Core 120"	Rec 120"	RQD 100%	R-11	*966	@ 118.3'-125.8', contains moderate to abundant argillaceous laminations. @ 119.2'-120.1', calcareous.							
115														
120														

FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

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

LOG OF: Boring R-2449 | Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL | Date Drilled: 10/27/05 to 10/27/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
28.1' (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	771.3	Core 120"	Rec 120"	RQD 27%	R-12	*348	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, unfractured to slightly fractured.							
125							@ 126.4'-128.2', argillaceous laminations.							
130		Core 120"	Rec 120"	RQD 100%	R-13	*1906								
135							@ 138.5'-140.8', calcareous. @ 139.1'-139.5', pyritic, vertical fracture.							
140		Core 120"	Rec 120"	RQD 100%	R-14	*169								
145														
150														

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring R-2449 | Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL | Date Drilled: 10/27/05 to 10/27/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
28.1' (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
150	741.3	Core 108"	Rec 108"	RQD 100%	R-15	*2025	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, unfractured to slightly fractured.						
155.0	736.3						Bottom of Boring - 155.0'						
160													
165													
170													
175													
180													

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

FILE: 0121-3070-03 [11/22/2006 1:43 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-2451 | Location: Sta. 516+08.6, 160.8 ft. RT of SR 823 CL | Date Drilled: 10/31/05 to 10/31/05

WATER OBSERVATIONS: Water seepage at: 22.0'
Water level at completion: None (prior to coring)
2.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
0	866.4													Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ 10 20 30 40
0.3	866.1						Topsoil - 3"							
		2 3 6	7	1		4.5+	Hard brown SANDY SILT (A-4a), trace to little clay; contains sandstone and rock fragments; damp.							
2.5	863.9						Hard reddish brown SILTY CLAY (A-6b), trace fine to coarse sand; contains sandstone and rock fragments; damp.							
		5 10 11	14	2		4.5+								
5		7 10 14	9	3		4.5+								
		6 15 29	15	4		4.5+								
10														
10.5	855.9						Severely weathered brown and gray SANDSTONE, argillaceous.							
		34 50/2	5	5										50+
		15 50/6	10	6										50+
15														
		17 50/5	8	7										50+
		12 29 16	18	8										
20														
		8 9 50/5	15	9										50+
		50/4	3	10										50+
25.0	841.4	Core 18"	Rec 18"	RQD 78%	R-1	*1143	Medium hard gray SANDSTONE; very fine to medium grained, moderately weathered, argillaceous, micaceous, slightly carbonaceous, laminated to medium bedded, slightly fractured. @ 26.4', low angle fracture.							
30														

FILE: 0121-3070-03 [11/22/2006 1:43 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-2451 | Location: Sta. 516+08.6, 160.8 ft. RT of SR 823 CL | Date Drilled: 10/31/05 to 10/31/05

WATER OBSERVATIONS: Water seepage at: 22.0'
Water level at completion: None (prior to coring)
2.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	836.4	Core 120"	Rec 120"	RQD 83%	R-2	*716	Medium hard gray SANDSTONE; very fine to medium grained, moderately weathered, argillaceous, micaceous, slightly carbonaceous, laminated to medium bedded, slightly fractured. @ 31.4'-31.7', 32.5'-32.7', high angle fractures. @ 32.7', low angle fracture, coal seams.							
32.7	833.7						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded to massive, unfractured to slightly fractured.							
35														
40		Core 120"	Rec 120"	RQD 92%	R-3	*1720	@ 39.3'-40.2'; brecciated zone. @ 39.4', 39.6', 40.0', 40.15', low angle fractures.							
45														
50		Core 120"	Rec 120"	RQD 100%	R-4	*737								
55														
60														

FILE: 0121-3070-03 [11/22/2006 1:43 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-2451 | Location: Sta. 516+08.6, 160.8 ft. RT of SR 823 CL | Date Drilled: 10/31/05 to 10/31/05

WATER OBSERVATIONS: Water seepage at: 22.0'
Water level at completion: None (prior to coring)
2.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION
60	806.4	Core 120"	Rec 120"	RQD 100%	R-5	*1642	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded to massive, unfractured to slightly fractured. @ 61.8', 65.9', low angle fracture.
65							
70		Core 120"	Rec 120"	RQD 100%	R-6	*1572	@ 71.4'; low angle fracture.
75							
80		Core 120"	Rec 120"	RQD 100%	R-7	*1320	
85							@ 85.0', calcareous zone. @ 86.7'-87.0', 89.4'-89.4', argillaceous zone.
90							

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

FILE: 0121-3070-03 [11/22/2006 1:43 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-2451 | Location: Sta. 516+08.6, 160.8 ft. RT of SR 823 CL | Date Drilled: 10/31/05 to 10/31/05

WATER OBSERVATIONS: Water seepage at: 22.0'
Water level at completion: None (prior to coring)
2.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90	776.4	Core 120"	Rec 120"	RQD 100%	R-8	*769	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded to massive, unfractured to slightly fractured.						
94.1	772.3						Medium hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, medium bedded to laminated, moderately fractured, contains few to moderate argillaceous laminations. @ 95.1', 96.1', 96.3', low angle fractures. @ 96.6', 96.6'; low angle fractures.						
95													
100		Core 120"	Rec 120"	RQD 100%	R-9	*980							
103.3	763.1						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, pyritic, laminated to thickly bedded, contains few argillaceous laminations. @ 103.8'-104.3', calcareous. @ 106.2'-106.1', pyritic, turbidic. @ 107.4'-111.5', pyritic.						
105													
110		Core 120"	Rec 120"	RQD 100%	R-10	*1743							
115							@ 113.5'-114.3', calcareous zone, turbidic. @ 116.5', pyritic, turbidic.						
120													

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

FILE: 0121-3070-03 [11/22/2006 1:43 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-2451 | Location: Sta. 516+08.6, 160.8 ft. RT of SR 823 CL | Date Drilled: 10/31/05 to 10/31/05

WATER OBSERVATIONS: Water seepage at: 22.0'
Water level at completion: None (prior to coring)
2.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION
120	746.4	Core 120"	Rec 120"	RQD 100%	R-11	*1915	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, pyritic, laminated to thickly bedded, contains few argillaceous laminations. @ 121.6', 122.2', 122.7', low angle fractures.
125							
126.5	739.9						Bottom of Boring - 126.5'
130							
135							
140							
145							
150							

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

FILE: 0121-3070-03 [11/22/2006 1:43 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-2452 | Location: Sta. 520+21.3, 169.5 ft. LT of SR 823 CL | Date Drilled: 10/19/2005 to 10/20/2005

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
45.8' (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
0	866.7	4 16 19	18	1		2.5	No topsoil Very stiff to hard brown SANDY SILT (A-4a), trace clay, trace gravel; contains sandstone fragments; damp.							
		9 11 18	18	2		4.5+								
5														
6.0	860.7	17 43 50/4	16	3			Severely weathered brown SANDSTONE.							50+
		31 50/3	9	4										50+
10.0	856.7	Core 72"	Rec 72"	RQD 25%	R-1	*853	Soft to medium hard brownish gray SANDSTONE; fine to medium grained, highly weathered, micaceous, medium bedded to thinly bedded, highly fractured.							
15							@ 16.6'-20.5' loss of recovery; possible void or fracture in poorly cemented zone.							
20														
20.5	846.2	Core 120"	Rec 73"	RQD 29%	R-2	*809	Medium hard to hard gray SANDSTONE; very fine to fine grained, grained, moderately to highly weathered, micaceous, argillaceous, medium bedded, highly fractured, contains few to moderate argillaceous laminations. @ 21.1', 21.4', 23.0'-23.3', rust stained.							
25														
28.5	838.2						Soft to medium hard gray SANDSTONE interbedded with CONGLOMERATE/BRECCIA							
30														

FILE: 0121-3070-03 [11/22/2006 1:43 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-2452 | Location: Sta. 520+21.3, 169.5 ft. LT of SR 823 CL | Date Drilled: 10/19/2005 to 10/20/2005

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
30	836.7	Core 120"	Rec 62"	RQD 29%	R-3	*1842	Soft to medium hard gray SANDSTONE interbedded with CONGLOMERATE/BRECCIA; fine to coarse grained, highly weathered to decomposed, argillaceous, micaceous, laminated to medium bedded, broken, poorly cemented. @ 30.0'-34.8' loss in recovery from washed; possible void in poorly cemented zone.
35.2	831.5						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, unfractured to slightly fractured. @ 37.6', low angle fracture.
40		Core 120"	Rec 120"	RQD 100%	R-4	*1363	
45							
50		Core 120"	Rec 120"	RQD 100%	R-5	*1827	
55							
60							

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

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

FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

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

LOG OF: Boring R-2452 | Location: Sta. 520+21.3, 169.5 ft. LT of SR 823 CL | Date Drilled: 10/19/2005 to 10/20/2005

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
45.8' (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
60	806.7	Core 120"	Rec 120"	RQD 100%	R-6	*1456	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, unfractured to slightly fractured. @ 61.0'-61.5', slightly calcareous.							
65														
70		Core 120"	Rec 120"	RQD 100%	R-7	*2367								
75														
80		Core 120"	Rec 120"	RQD 93%	R-8	*1219	@ 83.9'-85.2', slightly calcareous. @ 85.3'-86.0', broken zone with some clay seams.							
85														
90														

FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

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

LOG OF: Boring R-2452 | Location: Sta. 520+21.3, 169.5 ft. LT of SR 823 CL | Date Drilled: 10/19/2005 to 10/20/2005

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
45.8' (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
90	776.7	Core 120"	Rec 120"	RQD 92%	R-9	*1067	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, unfractured to slightly fractured. @ 92.0'-93.4', contains interbedded shale with low angle fractures. @ 93.4'-103.2', medium hard, moderately weathered, thinly bedded to medium bedded, moderately fractured, contains few to moderate argillaceous laminations. @ 95.7'-96.0', broken.						
95													
100		Core 120"	Rec 120"	RQD 97%	R-10	*1282	@ 101.0'-102.5', pyritic.						
105													
110		Core 120"	Rec 120"	RQD 100%	R-11	*1424	@ 113.3'-114.8', calcareous.						
115													
120.0	746.7	Core 48"	Rec 48"	RQD 90%	R-12	*1651	@ 117.5'-117.8' high angle fracture. @ 119.0', 119.1', low angle fractures. Bottom of Boring - 120.0'						

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

FILE: 0121-3070-03 [11/22/2006 1:43 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-2455 | Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL | Date Drilled: 10/26/05 to 10/27/05

WATER OBSERVATIONS: Water seepage at: None; Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % - ● / PL — LL / Blows per foot - ○
0	871.2													
0.2	871.0						Topsoil - 2"							
		10 15 17	5	1		3.0	Very stiff brown SANDY SILT (A-4a), trace clay, trace gravel; contains sandstone fragments; damp.							
3.0	868.2													
		10 20 31	18	2		4.5+	Hard mottled brown and gray SILTY CLAY (A-6b), trace fine to coarse sand; contains sandstone fragments; damp.							51
5														
5.5	865.7						Severely weathered brown SANDSTONE.							
		40 50/2	8	3										50+
		50/2	2	4										50+
10.0	861.2						Medium hard to hard brown SANDSTONE; very fine to medium grained, highly weathered to decomposed, argillaceous, micaceous, laminated to thickly bedded, moderately fractured to broken.							
		Core 72"	Rec 53"	RQD 74%	R-1	*592								
15							@ 16.5'-18.7', lost recovery; void suspected.							
20		Core 120"	Rec 50"	RQD 42%	R-2	*438	@ 20.5'-22.1', 22.6'-23.8', breccia/comglomerate zone.							
23.8	847.4						Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, laminated to thinly bedded, highly fractured to broken, contains few to abundant argillaceous laminations.							
25							@ 28.2'-28.4', 29.1'-29.6', 33.0'-33.5', decomposed shale bed.							
30														

FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

LOG OF: Boring R-2455 | Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL | Date Drilled: 10/26/05 to 10/27/05

WATER OBSERVATIONS: Water seepage at: None
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
30	841.2	Core 120"	Rec 79"	RQD 66%	R-3	*412	Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, laminated to thinly bedded, highly fractured to broken, contains few to abundant argillaceous laminations.
33.5	837.7						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, thickly bedded to massive, slightly fractured, contains few argillaceous laminations.
35							
40		Core 120"	Rec 117"	RQD 97%	R-4	*1314	
45							
50		Core 120"	Rec 117"	RQD 97%	R-5	*833	
55							@ 56.2', 57.9', 59.1', low angle fractures.
60							

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

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring R-2455 | Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL | Date Drilled: 10/26/05 to 10/27/05

WATER OBSERVATIONS: Water seepage at: None; 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
60	811.2	Core 120"	Rec 116"	RQD 97%	R-6	*1291	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, thickly bedded to massive, slightly fractured, contains few argillaceous laminations.						
65							@ 67.2', 68.6', 68.7', 69.4', 72.1', 73.9', 74.3', low angle fractures.						
70		Core 120"	Rec 120"	RQD 100%	R-7	*1468							
75													
80		Core 120"	Rec 120"	RQD 100%	R-8	*632	@ 81.6', 83.0', 85.6', low angle fractures.						
85							@ 87.0', low angle fracture @ 87.5'-87.6', rust stained high angle fracture. @ 87.0'-87.7', rust stained.						
90													

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

FILE: 0121-3070-03 [11/22/2006 1:43 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-2455 | Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL | Date Drilled: 10/26/05 to 10/27/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90	781.2	Core 120"	Rec 111"	RQD 92%	R-9	*722	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, thickly bedded to massive, unfractured to slightly fractured, contains few argillaceous laminations.							
95														
100		Core 120"	Rec 83"	RQD 69%	R-10	*1343	@ 98.5'-108.0', moderately to highly weathered, laminated to thinly bedded, moderately to highly fractured, contains abundant argillaceous laminations.							
105														
110		Core 120"	Rec 101"	RQD 84%	R-11	*1369	@ 108.0'-120.0', pyritic.							
115														
120														

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring R-2455 | Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL | Date Drilled: 10/26/05 to 10/27/05

WATER OBSERVATIONS: Water seepage at: None
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
120	751.2	Core 120"	Rec 115"	RQD 96%	R-12	*1642	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, pyritic, unfractured to slightly fractured.						
125		Core 48"	Rec 48"	RQD 100%	R-13	*1476	@ 127.4', 127.6', low angle fractures.						
130.0	741.2						Bottom of Boring - 130.0'						
135													
140													
145													
150													

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

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring R-2457 | Location: Sta. 524+32.7, 189.2 ft. RT of SR 823 CL | Date Drilled: 10/21/05 to 10/26/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
0	871.2													Natural Moisture Content, % - ●
0.1	871.1						Topsoil - 1"							PL ⊢ LL
		5 10 22	18	1		3.5	Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; contains sandstone fragments; damp.							Blows per foot - ○
3.5	867.7	11 50/5	11	2			Severely weathered brown and gray SANDSTONE.							50+
5		50/5	5	3										50+
		16 19 50/4	16	4			@ 8.5', gray.							50+
10														
11.5	859.7	50/2	2	5			Medium hard brownish gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, thickly bedded, moderately fractured, highly iron stained.							50+
15		Core 114"	Rec 74"	RQD 65%	R-1	*267	@ 16.2'-22.5', gray, moderately weathered, carbonaceous, thinly laminated to medium bedded, moderately to highly fractured, contains coal stringes and laminations.							
20							@ 19.2'-19.4', ferric band.							
22.5	848.7						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, thickly bedded to massive, slightly fractured.							
25		Core 120"	Rec 99"	RQD 82%	R-2	*751	@ 29.0'-29.4', 30.2'-31.6', rust staining.							
30							@ 29.2', high angle fracture.							

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring R-2457 | Location: Sta. 524+32.7, 189.2 ft. RT of SR 823 CL | Date Drilled: 10/21/05 to 10/26/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	841.2						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, thickly bedded to massive, slightly fractured.						
							@ 33.7', 34.6', pyritic.						
35		Core 120"	Rec 115"	RQD 96%	R-3	*1157							
40													
45		Core 120"	Rec 120"	RQD 100%	R-4	*731							
50													
55		Core 120"	Rec 120"	RQD 100%	R-5		@ 55.4'-55.6', ferric, vuggy, fossiliferous.						
60													

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

FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

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

LOG OF: Boring R-2457 | Location: Sta. 524+32.7, 189.2 ft. RT of SR 823 CL | Date Drilled: 10/21/05 to 10/26/05

WATER OBSERVATIONS: Water seepage at: None
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
60.0	811.2						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, thickly bedded to massive, slightly fractured.						
65		Core 120"	Rec 112"	RQD 93%	R-6	*1439	@ 66.0'-66.7', high angle fracture. @ 66.0'-67.3', rust staining.						
70													
75		Core 120"	Rec 120"	RQD 100%	R-7	*1282							
80							@ 81.4'-81.6', argillaceous zone. @ 81.8'-84.9', high angle rust stained fracture. @ 83.1'-89.5', rust stained.						
85		Core 120"	Rec 70"	RQD 58%	R-8	*267	@ 85.9'-86.3', broken zone.						
90													

GRADATION

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

FILE: 0121-3070-03 [11/22/2006 1:43 PM]

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

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

LOG OF: Boring R-2457 | Location: Sta. 524+32.7, 189.2 ft. RT of SR 823 CL | Date Drilled: 10/21/05 to 10/26/05

WATER OBSERVATIONS: Water seepage at: None
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
90	781.2						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, thickly bedded to massive, unfractured to slightly fractured.						
95		Core 120"	Rec 91"	RQD 76%	R-9	*1300	@ 94.2'-95.5', high angle fractures.						
							@ 96.4'-107.1', contains few to moderate argillaceous laminations.						
100							@ 97.5'-97.6', calcareous.						
105		Core 120"	Rec 120"	RQD 100%	R-10	*1372	@ 99.2', 120.0', pyritic.						
110													
115		Core 120"	Rec 111"	RQD 92%	R-11	*1302							
120													

GRADATION

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

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring R-2457 | Location: Sta. 524+32.7, 189.2 ft. RT of SR 823 CL | Date Drilled: 10/21/05 to 10/26/05

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
120	751.2						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, pyritic, massively bedded, unfractured to slightly fractured.							Natural Moisture Content, % - ● PL — LL; Blows per foot - ○ (10 20 30 40)
125		Core 120"	Rec 120"	RQD 100%	R-12	*528								
130		Core 48"	Rec 48"	RQD 100%	R-13	*1050								
135.0	736.2						Bottom of Boring - 135.0'							
140														
145														
150														

FILE: 0121-3070-03 [11/22/2006 1:43 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-22 | Location: Sta. 535+49.4, 165.7 ft. RT of SR 823 CL | Date Drilled: 7/25/2006

WATER OBSERVATIONS: Water seepage at: 11.0'-12.5', 43.5'-45.0'
Water level at completion: 37.4' (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	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
0	720.0													Natural Moisture Content, % - ● PL ⊢ LL; Blows per foot - ○ (10 20 30 40)
0.6	719.4	1 1 2	13	1		1.5	Topsoil - 7" Stiff to very stiff brown and gray SILTY CLAY (A-6b), trace fine sand; damp to moist.							
		7 11 12	18	2		4.5+	@ 3.5'-5.0', hard.							
5		6 7 8	16	3		1.25		0	0	–	8	48	44	
		4 4 6	12	4		2.25								
10														
11.0	709.0	4 7 7	13	5			Medium dense brown SANDY SILT (A-4a), little to some clay, trace gravel; moist.							
13.0	707.0	7 9 11	14	6		2.5	Stiff to very stiff brown and gray CLAY (A-7-6), trace to some silt, trace fine to coarse sand; damp to moist.	0	0	–	0	20	80	52
15		4 6 11	18	7		4.0								
		2 2 5	18	8		2.0								
20		3 4 4	18	9		1.5								
					P-1	2.25		0	0	–	0	10	90	59
		3 3 5	18	10		1.25								
25		3 3 4	17	11		1.25								
					P-2	1.0		0	0	–	0	31	69	
		3 4 5	18	12		1.5								
30														

FILE: 0121-3070-03 [11/29/2006 12:50 PM]

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

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

LOG OF: Boring C-22 | Location: Sta. 535+49.4, 165.7 ft. RT of SR 823 CL | Date Drilled: 7/25/2006

WATER OBSERVATIONS: Water seepage at: 11.0'-12.5', 43.5'-45.0'
Water level at completion: 37.4' (inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	690.0						Stiff brown and gray CLAY (A-7-6), trace to some silt, trace fine to coarse sand; damp to moist.						
					P-3	1.5		0	0	–	1	9	90
		3 3 4	18	13		1.5							
35													
		3 4 14	18	14		1.25							
40													
43.5	676.5	9 14 18	14	15			Dense gray SANDY SILT (A-4a), trace gravel; moist to wet.						
45													
48.5	671.5	22 28 50	15	16			Very dense gray GRAVEL WITH SAND AND SILT (A-2-4); (decomposed sandstone); moist to wet.						
50													
53.5	666.5	50+	6	17		2.75	Very stiff gray SILT AND CLAY (A-6a); (decomposed shale); damp.						
54.0	666.0						Bottom of Boring - 54.0'						
55													
60													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
78
50+

FILE: 0121-3070-03 [11/29/2006 12:50 PM]

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

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

LOG OF: Boring C-23 | Location: Sta. 535+51.6, 173.0 ft. LT of SR 823 CL | Date Drilled: 7/24/2006

WATER OBSERVATIONS: Water seepage at: 38.5'-39.0'
Water level at completion: 42.0' (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	714.0						Topsoil - 5"						
0.4	713.6	2 3 2	18	1		2.25	Stiff to very stiff brown and gray SILT AND CLAY (A-6a), trace fine to coarse sand; damp to moist.						
		WOH 1 1	14	2		1.25		0	2	–	7	55	36
5		4 6 9	15	3		4.5+	@ 6.0'-7.5', hard.						
		3 4 6	18	4		3.75							
10.0	704.0						Stiff to very stiff brown and gray CLAY (A-7-6), trace to "and" silt, trace fine sand, trace gravel; moist.						
		2 3 4	18	5		2.75		1	0	–	1	22	76
		4 4 5	18	6		2.5							
15		3 3 4	18	7		2.5							
		2 2 3	18	8	P-1	1.0 1.0		0	0	–	0	4	96
20		2 3 2	18	9		1.25							
		2 2 3	18	10	P-2	0.75 1.5	@ 23.0'-24.0', medium stiff.	0	0	–	0	40	60
25		2 3 3	18	11		1.25							
		2 3 3	18	12	P-3	1.0 1.5		0	0	–	0	25	75
30													

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

52
77

FILE: 0121-3070-03 (11/29/2006 12:50 PM)

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

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

LOG OF: Boring C-23 | Location: Sta. 535+51.6, 173.0 ft. LT of SR 823 CL | Date Drilled: 7/24/2006

WATER OBSERVATIONS: Water seepage at: 38.5'-39.0'
Water level at completion: 42.0' (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 - ○
30	684.0						Stiff brown and gray CLAY (A-7-6), trace to "and" silt, trace fine sand, trace gravel; moist.							
35		3 4 4	18	13		1.5								
38.5	675.5	23 49 50/4	13	14			Very dense gray GRAVEL WITH SAND AND SILT (A-2-4); (decomposed sandstone); damp.							50+
43.5	670.5	50/3	3	15		4.5+	Hard gray SILT AND CLAY (A-6a); (decomposed shale); damp.							50+
44.0	670.0						Bottom of Boring - 44.0'							
45														
50														
55														
60														

FILE: 0121-3070-03 [11/29/2006 12:50 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-55 | Location: Sta. 535+13.6, 95.8 ft. LT of SR 728 Ramp A BL | Date Drilled: 08/30/06

WATER OBSERVATIONS: Water seepage at: 47.0'-51.5'
Water level at completion: 39.7' (prior to coring)
22.3' (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	720.5												
0.3	720.2						Topsoil - 4"						
		2 2 3	18	1		1.0	Medium stiff to stiff light brown SILT (A-4b), trace to little clay, trace fine sand; damp to moist.						
		2 2 3	18	2		1.0							
5													
5.5	715.0	3 5 6	18	3		1.5	Stiff to very stiff mottled brown and gray SILTY CLAY (A-6b), trace fine to coarse sand; moist.						
		3 4 6	18	4		2.5		0	0	–	6	46	48
10							@ 10.5'-13.0', little fine to coarse sand, trace to little gravel; contains sandstone fragments.						
		8 9 8	18	5		3.0							
13.0	707.5						Stiff to very stiff brown CLAY (A-7-6), some silt, trace fine to coarse sand, trace gravel; moist.						
		2 4 6	18	6		2.25							
15							@ 15.5', mottled brown and gray, contains trace organic material.						
		2 4 5	18	7		1.5		4	2	–	6	25	63
		3 4 5	18	8		2.5							
20													
20.5	700.0						Soft to medium stiff brownish gray CLAY (A-7-6), trace silt, trace fine sand; moist.						
		1 2 2	18	9		0.25-0.5							
		2 2 2	18	10		0.25		0	0	–	0	1	99
25													
		WOH 2 2	18	11		0.5							
		1 3 3	18	12		0.75							
30													

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

83

FILE: 0121-3070-03 [11/29/2006 12:50 PM]

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

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

LOG OF: Boring C-55 | Location: Sta. 535+13.6, 95.8 ft. LT of SR 728 Ramp A BL | Date Drilled: 08/30/06

WATER OBSERVATIONS: Water seepage at: 47.0'-51.5'
Water level at completion: 39.7' (prior to coring)
22.3' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	690.5						Medium stiff brownish gray CLAY (A-7-6), trace silt, trace fine sand; moist.						
		1 2 2	18	13		0.5							
35													
		1 2 3	18	14		0.5							
40							@ 43.5'-45.0, little to some silt.						
		2 3 5	18	15		1.0							
45													
49.0	671.5	6 12 15	18	16		-	Medium dense gray SILT (A-4b), little clay, trace to little fine sand, some gravel; damp.						
50													
51.5	669.0	Core 60"	Rec 56"	RQD 86%	R-1		Medium hard gray SILTSTONE; moderately weathered, micaceous, argillaceous, thinly bedded to medium bedded, highly fractured. @ 51.5'-51.9', decomposed zone. @ 54.8'-55.2', clay seam.						
55													
56.5	664.0						Bottom of Boring - 56.5'						
60													

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

FILE: 0121-3070-03 [11/29/2006 12:50 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-56 | Location: Sta. 534+43.9, 14.6 ft. LT of SR 728 Ramp A BL | Date Drilled: 08/24/06 to 08/29/06

WATER OBSERVATIONS: Water seepage at: 14.5'-20.5', 41.0'-48.0'
Water level at completion: 37.6' (prior to coring)
23.3' (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	718.4												
0.3	718.1	1 2 3	18	1		2.0	Topsoil - 4" Very stiff brown SILT (A-4b), little clay, trace fine sand; damp to moist.						
		2 3 7	18	2		4.0	@ 3.5'-5.0', trace fine to coarse sand, contains trace organic material.						
5.5	712.9	10 15 21	18	3		4.5+	Hard reddish brown SILT AND CLAY (A-6a), trace fine sand, trace to little coarse sand, trace to little gravel; damp.						
8.0	710.4	5 8 14	18	4		4.5+	Very stiff to hard mottled brown and gray CLAY (A-7-6), "and" silt, trace fine sand; moist.						
		7 7 14	18	5		2.0		0	0	--	2	52	46
		3 6 9	18	6A 6B		2.0 -	@ 13.5'-14.5', reddish brown, little to some fine to coarse sand. @ 14.5'-15.0', moist to wet.						
		6 5 6	18	7		-	@ 18.5'-20.0', medium stiff to stiff; little to some gravel.						
		10 20 14	10	8		1.0							
20.5	697.9	3 6 11	18	9		1.75	Stiff gray CLAY (A-7-6), trace to little silt, trace fine sand; damp to moist. @ 23.5'-30.0', very soft, moist to wet.	4	0	--	0	4	92
		WOH 1 2	18	10		<0.25							
		WOH 1 2	18	11		<0.25							
		1 2 3	18	12		<0.25							

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

63

FILE: 0121-3070-03 [11/21/2006 2:19 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-56 | Location: Sta. 534+43.9, 14.6 ft. LT of SR 728 Ramp A BL | Date Drilled: 08/24/06 to 08/29/06

WATER OBSERVATIONS: Water seepage at: 14.5'-20.5', 41.0'-48.0'
Water level at completion: 37.6' (prior to coring)
23.3' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / PL — LL / Blows per foot
30	688.4						Medium stiff gray (A-7-6), trace to little silt, trace fine sand; moist.							
		1 2 3	18	13		0.5								
35														
		1 2 3	18	14		1.0								
40														
42.0	676.4						Very loose light gray SILT (A-4b), little to some fine sand, wet.							
		WOH 1 2	10	15		-								
45														
47.0	671.4						Hard gray SILT (A-4b), trace fine sand, little clay; damp.							
		7 20 50/3	15	16		4.5+								50+
50.0	668.4						Soft to medium hard gray SILTSTONE; moderately weathered, argillaceous, micaceous, thinly bedded to medium bedded, highly fractured. @ 50.0'-50.3', decomposed zone.							
		Core 60"	Rec 60"	RQD 91%	R-1									
55.0	663.4						Bottom of Boring - 55.0'							
60														

FILE: 0121-3070-03 [11/21/2006 2:19 PM]

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

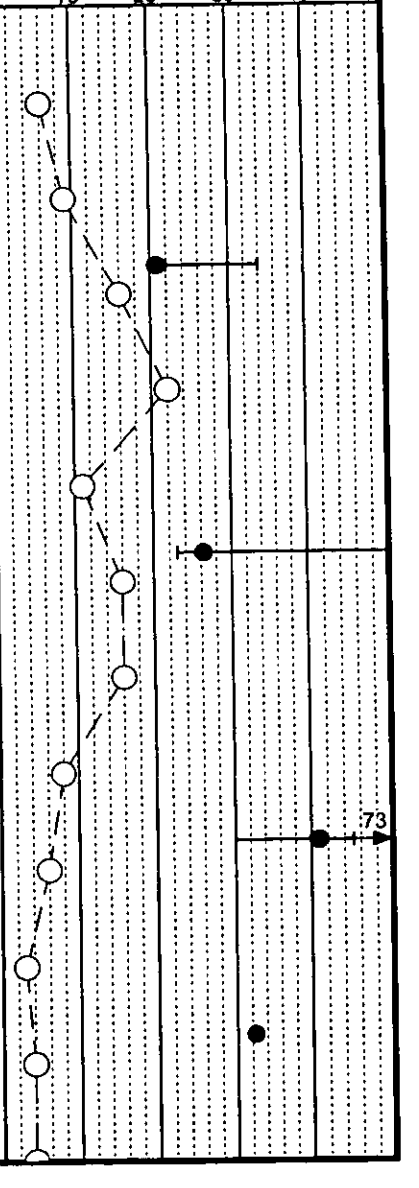
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-57 | Location: Sta. 533+67.7, 75.0 ft. RT of SR 728 Ramp A BL | Date Drilled: 08/29/06

WATER OBSERVATIONS: Water seepage at: 42.0'-47.0'
Water level at completion: 34.8' (prior to coring)
23.9' (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	716.3												
0.4	715.9						Topsoil - 5"						
		3 3 3	18	1		1.0	Stiff to very stiff brown SILT (A-4b), trace to little clay, trace fine to coarse sand, contains trace organic meterial; damp.						
		2 3 6	18	2		3.0							
5													
5.5	710.8						Very stiff mottled reddish brown and gray SILT AND CLAY (A-6a), trace to little fine to coarse sand; damp to moist .						
		3 6 10	18	3		2.5		0	1	--	9	65	25
		5 12 10	18	4		2.5							
10													
10.5	705.8						Very stiff mottled brown and gray CLAY (A-7-6), little to some silt, trace fine sand, contains trace organic material; moist.						
		3 4 7	18	5		2.25							
		4 6 10	18	6		3.0		0	0	--	4	17	79
15							@ 16.0'-17.5', little organic material.						
		4 6 10	18	7		2.5							
18.0	698.3						Medium stiff to stiff brownish gray ELASTIC CLAY (A-7-5), trace silt, (varved); moist.						
		3 3 5	18	8		1.5							
20													
		1 3 3	18	9		0.5		0	0	--	0	1	99
23.0	693.3						Soft to medium stiff brownish gray CLAY (A-7-6), trace silt, (varved); moist.						
		WOH 1 2	18	10		0.25-.05							
25													
		WOH 2 2	18	11		0.75							
		WOH 2 2	18	12		0.75							
30													

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



FILE: 0121-3070-03 [11/21/2006 2:19 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-57 | Location: Sta. 533+67.7, 75.0 ft. RT of SR 728 Ramp A BL | Date Drilled: 08/29/06

WATER OBSERVATIONS: Water seepage at: 42.0'-47.0'
Water level at completion: 34.8' (prior to coring)
23.9' (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	686.3						Soft to medium stiff brownish gray CLAY (A-7-6), trace silt, (varved); moist.						
		1 2 3	18	13		0.5							
35													
		1 3 4	18	14		0.5							
40													
42.0	674.3						Dense brown COARSE AND FINE SAND (A-3a), little to some silty clay, little gravel; damp.						
		4 13 31	18	15		-							
45													
47.5	668.8						Soft gray SILTSTONE; highly weathered to decomposed, arenacous.						
		30 50/3	9	16		-							
49.5	666.8						Medium hard gray SILTSTONE interbedded with SANDSTONE; very fine grained, moderately weathered, thinly bedded to medium bedded, highly fractured. @ 51.2', high angle fracture.						
50		Core 60"	Rec 60"	RQD 90%	R-1								
54.5	661.8						Bottom of Boring - 54.5'						
55													
60													

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

FILE: 0121-3070-03 (11/21/2006 2:19 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-58 | Location: Sta. 508+08.6, 72.8 ft. RT of SR 728 Ramp C BL | Date Drilled: 08/29/06

WATER OBSERVATIONS: Water seepage at: 18.7'-18.8, 22.2'-22.3', 23.5'-25.0'
Water level at completion: 28.8' (prior to coring)
7.0' (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	704.3						Topsoil - 10"						
0.8	703.5	6 5 4	18	1			Loose light brown SANDY SILT (A-4a), trace clay; contains roots; damp.						
3.5	700.8	5 5 12	14	2			Medium dense light brown SILT (A-4b), some clay, trace fine to coarse sand; contains roots; damp.	5	3	--	13	56	23
5		4 4 6	18	3			@ 6.0'-7.5', contains weathered SANDSTONE fragments.						
8.5	695.8	2 5 6	18	4		1.75	Stiff mottled brown and gray SILTY CLAY (A-6b), some fine to coarse sand; contains sandstone fragments; damp.	3	5	--	17	42	33
10													
11.0	693.3	2 3 4	18	5		2.5	Stiff to very stiff mottled brown and gray CLAY (A-7-6); contains organic material; damp to moist.	1	0	--	1	27	71
		1 2 2	18	6		--		0	0	--	1	15	84
15					P-1	--							
19.5	684.8	2 4 14	18	7A 7B		1.75	Medium dense reddish brown GRAVEL WITH SAND AND SILT (A-2-4), trace fine to coarse sand, trace silt; damp to moist.						
20		3 9 9	16	8									
23.5	680.8	3 7 8	14	9			Medium dense gray COARSE AND FINE SAND (A-3a); wet.						
25													
26.0	678.3	9 47 47	13	10			Very dense mottled brown and gray GRAVEL WITH SAND (A-1-b); damp.						
28.5	675.8	17 50/5	8	11			Soft gray SANDSTONE; very fine grained, decomposed.						
30													

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

59
64
94
50+

FILE: 0121-3070-03 [11/21/2006 2:19 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-58 | Location: Sta. 508+08.6, 72.8 ft. RT of SR 728 Ramp C BL | Date Drilled: 08/29/06

WATER OBSERVATIONS: Water seepage at: 18.7'-18.8, 22.2'-22.3', 23.5'-25.0'
Water level at completion: 28.8' (prior to coring)
7.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30.0	674.3	Core 60"	Rec 60"	RQD 86%	R-1		Soft to medium hard gray SILTSTONE interbedded with SANDSTONE; very fine to fine grained, highly weathered to decomposed, argillaceous, thinly bedded, highly fractured.						
35.0	669.3						Bottom of Boring - 35.0'						

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

FILE: 0121-3070-03 [11/21/2006 2:19 PM]

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

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

LOG OF: Boring C-59 | Location: Sta. 508+07.4, 43.3 ft. LT of SR 728 Ramp C BL | Date Drilled: 08/28/06 to 08/29/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 7.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	705.7												
0.8	704.9	6 4 4	18	1			Topsoil - 10"						
							Loose to medium dense light brown SILT (A-4b), little clay, little fine to coarse sand, trace gravel; damp to moist.						
		7 9 7	14	2				8	4	--	10	63	15
5													
6.0	699.7	3 9 9	12	3			Medium dense mottled brown and red SANDY SILT (A-4a), trace gravel; damp.						
8.5	697.2	6 11 16	12	4		2.0	Medium stiff to stiff brown and gray CLAY (A-7-6), trace fine sand; moist.						
10													
		2 3 4	18	5		1.0							
		WOH WOH 3	18	6		0.75		0	0	--	1	27	72
15													
		WOH WOH 1	18	7		1.0							
		WOH 2 2	18	8		1.0							
20													
		1 2 2	18	9		1.0							
23.5	682.2	8 8 11	18	10			Medium dense gray GRAVEL WITH SAND AND SILT (A-2-4); damp.						
25													
26.0	679.7	6 4 5	18	11			Loose gray SANDY SILT (A-4a); damp.						
28.5	677.2	24 30 45	16	12			Very dense brown and gray GRAVEL WITH SAND (A-1-b), trace silty clay; damp						
30													

GRADATION

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

52

76

FILE: 0121-3070-03 [11/21/2006 2:19 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-59 | Location: Sta. 508+07.4, 43.3 ft. LT of SR 728 Ramp C BL | Date Drilled: 08/28/06 to 08/29/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 7.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
30	675.7						Very dense brown and gray GRAVEL WITH SAND (A-1-b), trace silty clay; damp.							
33.5	672.2	50/3	3	13			Soft gray SANDSTONE; decomposed, thinly bedded.							50+
35.0	670.7	Core 60"	Rec 48"	RQD 80%	R-1		Soft to medium hard gray SILTSTONE interbedded with SANDSTONE; highly weathered, argillaceous, thinly bedded, highly fractured. @ 30.0'-35.0', 36.4'-36.9', lost recovery.							
40.0	665.7						Bottom of Boring - 40.0'							

STANDARD PENETRATION (N): Natural Moisture Content, % - ● PL ⊢——⊣ LL; Blows per foot - ○ (10, 20, 30, 40, 75)

45 50 55 60

FILE: 0121-3070-03 [11/21/2006 2:19 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-60 | Location: Sta. 10+93.5, 64.6 ft. LT of SR 728 CL | Date Drilled: 09/05/06 to 09/06/06

WATER OBSERVATIONS: Water seepage at: 7.5'-8.5'
Water level at completion: 3.0' (prior to coring)
2.4' (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)
0	706.4													
0.7	705.7	1 1 2	13	1		0.5	Topsoil - 8" Soft to medium stiff brown SILT (A-4b), little clay, trace fine sand, trace to little coarse sand; moist.							
3.0	703.4	4 6 9	8	2		–	Stiff to very stiff brown, SILT AND CLAY (A-6a), little to some fine to coarse sand, little gravel, damp.							
5.5	700.9	6 5 6	14	3		3.0	Stiff to very stiff brown CLAY (A-7-6), trace fine sand, some silt; damp to moist. @ 8.5'-12.5', varved.							
10		3 4 6	19	4	P-1	1.5		0	0	–	1	27	72	
		2 5 6	18	5		1.0								
13.0	693.4	8 14 16	15	6		-	Medium dense gray SILT (A-4b), little clay, some fine to coarse sand, trace gravel (highly weathered sandstone fragments) ; damp.							
15		9 9 10	14	7		-		7	11	–	13	53	16	
		4 8 9	13	8		-								
20		3 7 11	10	9		-	@ 21.0'-24.0', little to some gravel, little fine sand.							
24.0	682.4	19 39 50/3	11	10		-	Soft gray SILTSTONE, highly weathered to decomposed.							50+
25.0	681.4	Core 60"	Rec 49"	RQD 65%	R-1		Soft to medium hard gray SILTSTONE; moderately weathered, argillaceous, thinly bedded, broken. @ 25.8'-26.8', lost recovery.							
30.0	676.4						Bottom of Boring - 30.0'							

GRADATION

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

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

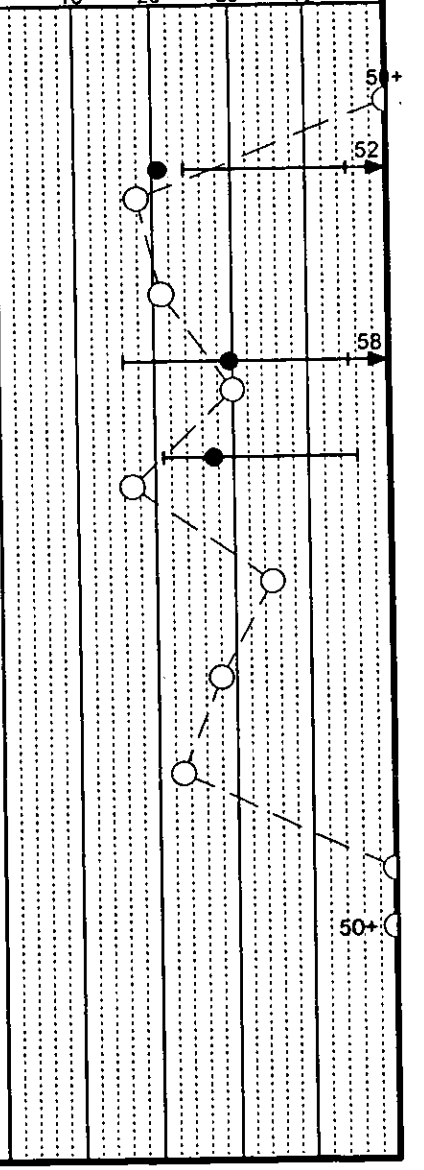
LOG OF: Boring C-61 | Location: Sta. 10+60.7, 62.5 ft. RT of SR 823 CL | Date Drilled: 08/30/06

WATER OBSERVATIONS: Water seepage at: 18.5'-20.0'
Water level at completion: None (prior to coring)
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	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	697.6												
0.9	696.7	6 33 50/3	9	1			Topsoil - 11"						
							Brown SANDSTONE fragments; slightly to moderately weathered.						
3.5	694.1	6 9 9	12	2		4.5	Very stiff brown and gray CLAY (A-7-6), trace fine to coarse sand, trace gravel; contains roots; damp.	4	1	--	1	20	74
5		5 10 11	14	3		4.5							
10		6 11 19	18	4		3.0		0	1	--	1	16	82
		3 8 9	18	5		2.0		1	0	--	1	28	70
13.5	684.1	9 13 22	16	6			Dense brown SANDY SILT (A-4a), trace gravel; damp.						
15													
16.0	681.6	10 14 14	15	7			Dense brown and gray GRAVEL WITH SAND (A-1-b), trace gravel; damp.						
18.5	679.1	5 9 14	18	8			Medium dense brown and gray COARSE AND FINE SAND (A-3a); wet.						
20													
21.0	676.6	13 22 28	18	9			Very dense brown GRAVEL WITH SAND AND SILT (A-2-4); damp.						
23.5	674.1	50/4	4	10			Soft to medium hard gray SANDSTONE; very fine grained, decomposed.						
25.0	672.6	Core 60"	Rec 60"	RQD 73%	R-1		Soft to medium hard gray SILTSTONE interbedded with SANDSTONE; highly weathered to decomposed, argillaceous, thinly bedded, highly fractured.						
30.0	667.6						Bottom of Boring - 30.0'						

GRADATION

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



FILE: 0121-3070-03 [11/21/2006 2:19 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	2 2 3	16	1			Topsoil - 7" 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 [11/21/2006 2:19 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) Natural Moisture Content, % - ● PL ⊢ LL Blows per foot - ○ 10 20 30 40
30	685.9			12B			Medium dense gray COARSE AND FINE SAND (A-3a); contains organic material; moist to wet.							
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 (11/21/2006 2:19 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-63 | Location: Sta. 22+44.3, 47.7 ft. RT of SR 728 CL | Date Drilled: 08/30/06 to 08/31/06

WATER OBSERVATIONS: Water seepage at: 38.5'-39.0'
Water level at completion: 42.2' (prior to corings)
7.7' (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	723.9												
0.8	723.1	6 7 8	11	1		3.5	Topsoil - 10" Very stiff light brown SILTY CLAY (A-6b), trace fine to coarse sand; contains roots; damp.	0	1	--	2	47	50
		5 6 7	9	2		3.5	@ 3.5'-5.0', mottled brown and gray.						
6.0	717.9	4 6 7	13	3		4.0	Stiff to very stiff brown and gray CLAY (A-7-6); moist.	0	0	--	0	9	91
		3 4 6	16	4		2.5							
		3 5 6	18	5		3.0							
		3 4 5	18	6		2.5	@ 13.5'-20.0', mottled brown and gray.						
		2 3 4	18	7		2.0							
		2 2 5	18	8		2.5		0	0	--	0	3	97
		2 3 3	18	9		1.0	@ 21.0'-30.0', gray.						
		2 3 4	18	10		1.5							
		1 2 3	18	11		1.0							
30		WOH WOH 3	18	12		1.0							

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

58

70

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070-03

LOG OF: Boring C-63 | Location: Sta. 22+44.3, 47.7 ft. RT of SR 728 CL | Date Drilled: 08/30/06 to 08/31/06

WATER OBSERVATIONS: Water seepage at: 38.5'-39.0'
Water level at completion: 42.2' (prior to corings)
7.7' (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	693.9						Stiff gray CLAY (A-7-6); damp.							
		2 3 3	18	13		1.5								
35														
38.5	685.4	2 4 11	18	14A 14B		2.0	Loose gray COARSE AND FINE SAND (A-3a); wet.							
39.5	684.4						Stiff to very stiff gray CLAY (A-7-6); damp.							
40														
43.5	680.4	3 18 15	18	15A 15B			Dense gray COARSE AND FINE SAND (A-3a); wet.							
44.5	679.4						Dense reddish brown and gray GRAVEL WITH SAND (A-1-b); damp. (Decomposed sandstone)							
45														
		26 32 21	14	16										53
50														
54.0	669.9	50/3	3	17			Soft to medium hard gray SANDSTONE; very fine grained, highly weathered to decomposed, thin bedded, broken. @ 54.1'-54.6', decomposed argillaceous zone.							50+
55														
56.8	667.1	Core 60"	Rec 56"	RQD 83%	R-1		Soft to medium hard gray SILTSTONE; fine grained, highly weathered to decomposed, argillaceous, thinly bedded, highly fractured.							
59.0	664.9						Bottom of Boring - 59.0'							
60														

FILE: 0121-3070-03 [11/21/2006 2:19 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: None (Prior to coring)
21.9' (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	STANDARD PENETRATION (N) / Natural Moisture Content, % / PL — LL / Blows per foot
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), some silt, trace fine sand; damp.							
		2 3 4	18	2			2.5								
5		3 4 5	18	3			1.5	@ 6.0', 45° fractures.							
		2 2 3	18	4			2.0		0	0	--	1	20	79	56
10		4 4 5	18	5			2.5	@ 11.0', gray.							
13.0	709.5							Medium stiff gray CLAY (A-7-6); moist.							
		2 2 3	18	6			0.75								
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	58
25		1 2 3	18	11			0.5								
		WOH WOH 3	18	12			0.5	@ 28.5', contains sandstone fragments.							
30															

FILE: 0121-3070-03 [11/6/2006 10:04 AM]

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

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

LOG OF: Boring TR-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: None (Prior to coring)
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
30	692.5	1 2 4	18	13		0.5	Medium stiff light brown CLAY (A-7-6); moist.						
		8 6 9	18	14		0.75							
37.0	685.5						Very stiff gray SILTY CLAY (A-6b), trace fine sand; damp to moist.	0	0	–	1	50	49
		7 8 15	18	15		2.5							
43.0	679.5	50/5	5	16			Severely weathered gray SHALE.						
47.0	675.5	Core 120"	Rec 120"	RQD 91%	R1		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.						
57.0	665.5						Bottom of Boring - 57.0'						
60													

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

FILE: 0121-3070-03 [11/6/2006 10:04 AM]

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

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

LOG OF: Boring TR-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: None (prior to coring)
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	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢ LL Blows per foot - ○
0	713.0													
0.4	712.6	1 1 2	18	1		0.75	Topsoil - 5" POSSIBLE FILL: Medium stiff to stiff brown SANDY SILT (A-4a), some gravel, little clay; damp to moist.							
5		WOH 1 2	16	2		–		30	15	–	11	27	17	
5.5	707.5	3 3 4	18	3		2.5	Very stiff brown and gray CLAY (A-7-6); varved; moist.							
		1 2 4	18	4		2.25		0	0	–	0	11	89	66
10		WOH 2 3	18	5		0.75	@ 11.0'-30.0', medium stiff, brownish gray.							
		WOH 2 3	18	6		0.75		0	0	–	0	10	90	66
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														

FILE: 0121-3070-03 [11/6/2006 10:20 AM]

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

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

LOG OF: Boring TR-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: None (prior to coring)
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	STANDARD PENETRATION (N)
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	58	28	
35														
37.0	676.0						Severely weathered gray SHALE.							
		12 38 50/4	16	14										50+
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' to 48.2', light brown siltstone layer.							
50.0	663.0						Bottom of Boring - 50.0'							
55														
60														

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

FILE: 0121-3070-03 [11/6/2006 10:20 AM]

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

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

LOG OF: Boring TR-13 | Location: Sta. 537+97.9, 36.5 ft. RT of SR 823 CL | Date Drilled: 6/8/04

WATER OBSERVATIONS: Water seepage at: 33.5'-35.0'
Water level at completion: None (prior to coring)
28.6' (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	713.5												
0.5	713.0	1 1 2	10	1		1.75	Topsoil - 6" Stiff gray SANDY SILT (A-4a), some clay, trace gravel; moist.						
3.0	710.5	1 2 2	16	2		1.25	Stiff to very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace to little gravel; moist.						
5		2 4 7	18	3		3.5	@ 6.0'-7.5', mottled brown and gray.						
8.5	705.0	3 5 7	18	4		3.25	Stiff to very stiff mottled brown and gray CLAY (A-7-6), trace fine to coarse sand; moist.						
10		2 3 6	18	5		2.25							
		1 2 3	18	6		1.25							
15		1 2 3	18	7		2.0	@ 16.0'-27.5', gray.						
		1 2 2	18	8		1.5							
20		1 2 3	18	9		0.75	@ 21.0'-22.5', medium stiff.	0	0	--	1	19	80
		1 2 3	18	10		1.0							
25		WOH 2 3	18	11		1.5	@ 26.0', contains sand seams.						
		2 2 4	18	12		1.5							
30													

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

53

FILE: 0121-3070-03 [11/28/2006 11:30 AM]

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

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

LOG OF: Boring TR-13 | Location: Sta. 537+97.9, 36.5 ft. RT of SR 823 CL | Date Drilled: 6/8/04

WATER OBSERVATIONS: Water seepage at: 33.5'-35.0'
Water level at completion: None (prior to coring)
28.6' (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
30.0	683.5						Very stiff to hard gray and brown SANDY SILT (A-4a), little clay, trace gravel; contains sandstone fragments; damp to moist.							
		8 24 32	18	13		3.0		5	10	--	25	48	12	Non-Plastic 56
35														
		27 49 50/2	16	14		4.5+								50+
40.0	673.5						Medium hard gray SILTSTONE; fissile.							
		Core 120"	Rec 61"	RQD 25%	R-1		@40.0' - 44.9', core loss.							
45							@46.6' - 46.8', clay seam.							
							@47.8' - 50.0', broken to highly fractured with occasional clay seams.							
50.0	663.5						Bottom of Boring - 50.0'							
55														
60														

FILE: 0121-3070-03 [11/6/2006 10:04 AM]

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

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

LOG OF: Boring TR-14 | Location: Sta. 537+32.3, 46.2 ft. LT of SR 823 CL | Date Drilled: 6/4/04 to 6/7/04

WATER OBSERVATIONS: Water seepage at: 33.5', 38.5'
Water level at completion: 24.8' (Prior to coring)
8.9' (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 - ○
0	713.6													
0.3	713.3						Topsoil - 4"							
		2 3 5	18	1		2.25	Very stiff brown and gray SILTY CLAY (A-6b), little fine to coarse sand; moist.							
		2 2 4	18	2		3.75								
5		2 4 6	18	3		2.75	@6.0' - 7.5', gray.							
8.5	705.1													
		2 3 4	18	4		2.75	Stiff to very stiff brown CLAY (A-7-6), trace to little fine to coarse sand; varved; damp to moist.							
10		2 3 4	18	5		2.25								
		WOH 2 2	18	6	ST-1	1.0	@13.5', gray.	0	0	–	0	7	93	65
15		WOH 2 3	18	7		1.5								
		1 2 3	18	8		1.25								
20		1 2 3	18	9		1.25								
		1 2 3	18	10		1.5	@ 23.5', gray and brown.							
25		2 2 3	18	11		1.25								
		2 2 3	18	12		2.0	@ 28.5', contains sand seams.							
30														

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

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

LOG OF: Boring TR-14 | Location: Sta. 537+32.3, 46.2 ft. LT of SR 823 CL | Date Drilled: 6/4/04 to 6/7/04

WATER OBSERVATIONS: Water seepage at: 33.5', 38.5'
Water level at completion: 24.8' (Prior to coring)
8.9' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
30	683.6						Stiff to very stiff gray and brown CLAY (A-7-6), trace to little fine to coarse sand; varved; contains sand seams; damp to moist.							
33.5	680.1	14 28 40	18	13			Severely weathered gray SILTSTONE.							68
40		40 50/4	12	14										50+
44.0	669.6	50/4	4	15										50+
45		Core 60"	Rec 54"	RQD 72%	R-1		Medium hard gray SILTSTONE; fissile. @ 45.7', 46.4', 49.3', 50.7', 53.0', clay seams. @ 46.1'-46.7', 49.0'-49.3', broken to highly fractured.							
50		Core 60"	Rec 56"	RQD 77%	R-2		@ 53.5'-53.7', vertical fracture.							
54.0	659.6						Bottom of Boring - 54.0'							
55														
60														

APPENDIX B

DLZ

APPENDIX B

Summaries of Laboratory Test Results

SUMMARY OF SHEAR STRENGTH TESTING
LUCASVILLE-MINFORD ROAD INTERCHANGE
PROJECT SCI-823-6.81

Boring	Sample	Depth (ft.)	Test Performed	Results											
				ODOT Classification	γd (pcf)	γm (pcf)	e_o	Cc	Cr	p_c (tsf)	c (psf)	c' (psf)	Φ	Φ'	qu (tsf)
B-1213	P1	21-23	CIU, UNC	A-7-6	86.7	117.6	--	--	--	--	556	678	12.6	17.5	2.241
B-1220	P2	18-20	UU, CONS	A-6b	106.2	128.0	0.687	0.260	0.090	1.660	2478	--	6.3	--	--
B-1221	P1	10-12	UNC; CONS	A-7-6	99.6	125.5	0.675	0.190	0.070	1.150	--	--	--	--	1.672
	P2	15-17	CIU	A-7-6	90.8	120.8	--	--	--	--	426	578	9.1	11.7	--
B-1223	P1	8-10	UNC, CONS	A-7-6	94.1	122.2	0.790	0.270	0.100	0.890	--	--	--	--	1.206
	P2	18-20	CIU, CONS	A-7-6	82.7	115.7	1.124	0.370	0.160	5.400	546	634	11.0	17.8	--
	P3	28-30	UU	A-7-6	85.8	116.6	--	--	--	--	1772	--	3.5	--	--
B-1226	P1	10-12	UNC	A-7-6	92.4	121.0	--	--	--	--	--	--	--	--	3.028
	P2	22-24	CIU	A-4a	109.1	128.4	--	--	--	--	1820	138	0.0	47.0	--
R-464	ST-1	21-23	UNC, CONS	A-7-6	88.2	118.7	1.074	0.47	0.15	20.22	--	--	--	--	1.354
R-465	ST-1	18-20	UNC, CONS	A-7-6	87.5	118	0.964	0.41	0.14	6.18	--	--	--	--	2.147
R-466	S-8	18.5-20.0	CONS	A-7-6	90.2	118.7	0.904	0.13	0.05	7.95	--	--	--	--	--
	ST-4	23-25	UNC, CONS	A-7-6	95.9	124	0.939	0.15	0.04	1.94	--	--	--	--	0.744
TR-14	ST-1	13-15	UNC, CONS	A-7-6	84.4	116.9	1.061	0.25	0.08	7.28	--	--	--	--	1.911

SUMMARY OF LABORATORY INDEX TEST DATA
LUCASVILLE MINFORD ROAD INTERCHANGE
PROJECT SCI-823-6.81

Boring	Sample Depth	%Agg	%Coarse Sand	% Fine Sand	%Silt	% Clay	LL	PL	PI	% MC	ODOT Class
Lucasville-Minford Road											
B-1201	1.0-3.0	25	9	12	36	18	31	18	13	27	A-6a
B-1201	3.0-5.0	24	4	11	41	20	30	21	9	12	A-4a
B-1201	5.0-7.0	24	4	11	42	19	30	18	12	13	A-6a
B-1202	1.0-3.0	11	3	5	46	35	33	17	16	18	A-6b
B-1202	3.0-5.0	5	4	4	38	49	39	18	21	22	A-6b
B-1202	5.0-7.0	0	1	1	33	65	50	21	29	23	A-7-6
B-1203	1.0-3.0	2	3	3	58	34	26	17	9	18	A-4b
B-1203	3.0-5.0	3	2	2	22	71	52	24	28	25	A-7-6
B-1203	5.0-7.0	0	0	1	3	96	65	31	34	35	A-7-5
B-1204	1.0-3.0	14	9	10	48	19	22	16	6	12	A-4a
B-1204	3.0-5.0	0	1	13	68	18	23	18	5	21	A-4b
B-1204	5.0-7.0	18	11	18	38	15	23	18	5	16	A-4a
B-1205	1.0-3.0	5	7	8	48	32	29	18	11	16	A-6a
B-1205	3.0-5.0	14	12	11	39	24	26	17	9	13	A-4a
B-1205	5.0-7.0	0	0	1	15	84	58	26	32	32	A-7-6
B-1206	1.0-3.0	4	6	8	58	24	27	16	11	16	A-6a
B-1206	3.0-5.0	0	1	7	60	32	34	18	16	22	A-6b
B-1206	5.0-7.0	5	13	19	39	24	31	23	8	22	A-4a
B-1207	1.0-3.0	2	6	6	70	16	21	19	2	19	A-4b
B-1207	3.0-5.0	3	3	4	58	32	35	20	15	22	A-6a
B-1207	5.0-7.0	11	5	5	54	25	32	19	13	19	A-6a
B-1208	1.0-3.0	4	3	4	63	26	28	18	10	18	A-4b
B-1208	3.0-5.0	16	5	5	46	28	30	18	12	17	A-6a
B-1208	5.0-7.0	12	9	11	47	21	31	20	11	17	A-6a
Ramps											
B-1209	0.0-1.5	0	3	7	68	22	24	18	6	18	A-4b
B-1209	1.5-3.0	3	2	6	67	22	25	21	4	17	A-4b
B-1209	3.0-4.5	26	18	16	29	11	25	21	4	12	A-4a
B-1209	4.5-6.0	34	12	12	30	12	25	21	4	13	A-4a
B-1209	13.5-15.0	0	0	0	10	90	55	26	29	39	A-7-6
B-1209	16.0-17.5	0	0	0	18	82	54	24	30	38	A-7-6
B-1210	0.0-1.5	6	7	22	42	23	24	14	10	14	A-4a
B-1210	1.5-3.0	12	3	19	39	27	32	17	15	13	A-6a
B-1210	3.0-4.5	0	1	12	46	41	38	16	22	21	A-6b
B-1210	4.5-6.0	1	0	2	38	59	46	19	27	23	A-7-6
B-1210	11.0-12.5	0	0	1	5	94	65	23	42	37	A-7-6
B-1211	0.0-1.5	4	4	19	52	21	23	16	7	15	A-4b
B-1211	1.5-3.0	0	1	5	21	73	52	19	33	22	A-7-6

SUMMARY OF LABORATORY INDEX TEST DATA
LUCASVILLE MINFORD ROAD INTERCHANGE
PROJECT SCI-823-6.81

Boring	Sample Depth	%Agg	%Coarse Sand	% Fine Sand	%Silt	% Clay	LL	PL	PI	% MC	ODOT Class
B-1211	3.0-4.5	0	0	0	7	93	50	27	23	29	A-7-6
B-1211	4.5-6.0	0	0	0	8	92	60	24	36	15	A-7-6
B-1211	11.0-12.5	0	0	0	16	84	55	22	33	33	A-7-6
B-1212	0.0-1.5	0	1	10	57	32	27	17	10	11	A-4b
B-1212	1.5-3.0	0	1	13	60	26	23	17	6	9	A-4b
B-1212	3.0-4.5	14	6	17	43	20	25	18	7	9	A-4a
B-1212	4.5-6.0	0	0	0	8	92	64	21	43	22	A-7-6
B-1212	11.0-12.5	0	0	0	10	90	55	24	31	30	A-7-6
B-1212	21.0-22.5	0	0	0	13	87	61	26	35	36	A-7-6
B-1213	0.0-1.5	6	2	7	57	28	25	12	13	17	A-6a
B-1213	1.5-3.0	7	4	6	51	32	30	17	13	16	A-6a
B-1213	3.0-4.5	0	0	0	13	87	62	34	28	26	A-7-5
B-1213	21.0-23.0	0	0	0	13	87	57	25	32	36	A-7-6
B-1214	23.0-25.0	0	0	0	30	70	49	22	27	30	A-7-6
B-1218	5.0-6.5	0	2	14	26	58	47	20	27	19	A-7-6
B-1218	21.0-22.5	0	1	4	41	54	39	18	21	30	A-6b
B-1218	23.5-25.0	19	3	23	55		NP	NP	NP	21	A-4b
B-1219	0.0-2.0	0	3	5	65	27	29	17	12	22	A-6a
B-1219	2.0-4.0	0	3	4	66	27	28	16	12	22	A-6a
B-1219	6.0-7.5	3	1	5	56	35	33	16	17	23	A-6b
B-1219	8.5-10.0	0	1	7	64	28	28	14	14	18	A-6a
B-1219	11.0-12.5	0	0	0	10	90	59	24	35	28	A-7-6
B-1219	41.0-42.5	0	0	0	86	14	22	16	6	27	A-4b
B-1219	43.5-45.0	0	0	2	31	67	43	19	24	30	A-7-6
B-1219	46.0-47.5	34	10	18	38		NP	NP	NP	17	A-4a
B-1220	0.0-2.0	0	0	8	56	36	30	17	13	15	A-6a
B-1220	4.0-6.0	0	3	10	50	37	30	16	14	20	A-6a
B-1220	8.5-10.0	7	5	11	40	37	39	20	19	21	A-6b
B-1220	11.0-12.5	0	0	5	33	62	46	18	28	22	A-7-6
B-1220	18.0-20.0	1	4	15	30	50	36	19	17	21	A-6b
B-1220	18.5-20.0	0	3	25	28	44	34	16	18	18	A-6b
B-1220	21.0-22.5	7	8	22	63		35	18	17	19	A-6b
B-1220	23.5-25.0	0	0	0	11	89	64	24	40	38	A-7-6
B-1220	48.5-49.0	10	13	20	40	17	NP	NP	NP	14	A-4a
B-1221	10.0-12.0	0	0	1	13	86	58	24	34	25	A-7-6
B-1221	15.0-17.0	0	0	0	8	92	67	26	41	33	A-7-6
B-1222	0.0-2.0	16	11	12	41	20	24	15	9	14	A-4a
B-1222	2.0-4.0	2	9	16	52	21	28	19	9	13	A-4b
B-1222	4.0-6.0	7	8	13	44	28	33	16	17	15	A-6b

SUMMARY OF LABORATORY INDEX TEST DATA
LUCASVILLE MINFORD ROAD INTERCHANGE
PROJECT SCI-823-6.81

Boring	Sample Depth	%Agg	%Coarse Sand	% Fine Sand	%Silt	% Clay	LL	PL	PI	% MC	ODOT Class
B-1222	8.5-10.0	0	0	0	12	88	59	23	36	30	A-7-6
B-1222	26.0-27.5	0	0	0	11	89	50	24	26	33	A-7-6
B-1223	1.0-2.5	0	1	10	46	43	34	16	18	20	A-6b
B-1223	3.5-5.0	0	3	4	93		58	25	33	21	A-7-6
B-1223	6.0-7.5	0	0	0	7	93	60	26	34	30	A-7-6
B-1223	8.5-10.0	0	0	0	17	83	57	26	31	31	A-7-6
B-1223	18.0-20.0	0	0	0	5	95	67	26	41	40	A-7-6
B-1223	28.0-30.0	0	0	0	21	79	58	24	34	36	A-7-6
B-1224	0.0-2.0	28	4	21	47		25	15	10	15	A-4a
B-1224	2.0-4.0	1	2	7	27	63	49	22	27	22	A-7-6
B-1224	4.0-6.0	1	0	0	10	89	58	24	34	23	A-7-6
B-1224	18.5-20.0	0	0	1	11	88	30	16	14	31	A-6a
B-1224	23.5-25.0	--	--	--	--	--	--	--	--	27	--
B-1224	73.5-75.0	26	14	14	46		NP	NP	NP	15	A-4a
B-1226	1.0-2.5	1	3	20	49	27	26	16	10	11	A-4a
B-1226	3.5-5.0	2	7	23	47	21	25	17	8	13	A-4a
B-1226	10.0-12.0	0	0	0	10	90	63	24	39	31	A-7-6
B-1226	11.0-12.5	2	7	22	45	24	28	25	3	17	A-4a
B-1226	13.5-15.0	0	0	0	10	90	70	23	47	34	A-7-6
B-1226	16.0-17.5	0	0	0	14	86	58	23	35	33	A-7-6
B-1226	22.0-24.0	9	4	21	44	22	26	17	9	18	A-4a
B-1228	1.0-2.5	1	1	9	69	20	28	20	8	10	A-4b
B-1230	3.5-5.0	25	11	23	41		NP	NP	NP	9	A-4a
B-1230	6.0-7.5	1	2	11	62	24	31	19	12	13	A-6a
B-1230	16.0-17.5	2	5	13	47	33	31	18	13	16	A-6a
B-1230	18.5-20.0	35	7	16	42		NP	NP	NP	12	A-4a
B-1230	26.0-26.8	45	11	9	35		NP	NP	NP	17	A-2-4
B-1233	1.0-2.5	3	3	12	61	21	29	20	9	15	A-4b
B-1233	3.5-5.0	2	19	13	66		27	19	8	11	A-4b
B-1233	13.5-13.8	4	8	15	73		23	18	5	26	A-4b
B-1234	1.0-2.5	0	2	4	68	26	30	20	10	13	A-4b
Mainline											
R-452	6.0-7.5	0	1	7	47	45	44	19	25	18	A-7-6
R-452	8.5-10.0	0	0	9	65	26	26	16	10	9	A-4b
R-459	1.0-2.5	0	1	6	50	43	53	21	32	27	A-7-6
R-459	3.5-5.0	0	0	1	51	48	58	21	37	26	A-7-6
R-459	8.5-10.0	0	0	0	47	53	57	22	35	27	A-7-6
R-461	1.0-2.5	0	0	1	52	47	54	22	32	25	A-7-6
R-461	3.5-5.0	0	0	0	51	49	56	21	35	27	A-7-6

SUMMARY OF LABORATORY INDEX TEST DATA
LUCASVILLE MINFORD ROAD INTERCHANGE
PROJECT SCI-823-6.81

Boring	Sample Depth	%Agg	%Coarse Sand	% Fine Sand	%Silt	% Clay	LL	PL	PI	% MC	ODOT Class
R-461	11.0-12.5	0	0	0	48	52	59	23	36	28	A-7-6
R-462	3.5-5.0	0	0	0	69	31	54	27	27	24	A-7-6
R-462	11.0-12.5	0	0	0	48	52	59	25	34	27	A-7-6
R-463	3.5-5.0	8	4	12	48	28	46	21	25	18	A-7-6
R-463	8.5-10.0	0	0	0	48	52	62	24	38	30	A-7-6
R-464	6.0-7.5	0	0	1	45	54	56	23	33	22	A-7-6
R-464	13.5-15.0	0	0	0	45	55	63	24	39	31	A-7-6
R-464	21.0-23.0	0	1	1	11	87	59	26	33	35	A-7-6
R-464	48.5-50.0	0	0	1	82	17	23	21	2	27	A-4b
R-465	18.0-20.0	0	0	0	18	82	52	23	29	26	A-7-6
R-466	8.5-10.0	0	0	2	16	82	55	23	32	28	A-7-6
R-466	18.5-20.0	0	0	1	9	90	59	27	32	34	A-7-6
R-466	23.5-25.0	0	0	0	3	97	62	25	37	29	A-7-6
R-466	38.5-40.0	0	0	0	9	91	60	26	34	36	A-7-6
R-467	11.0-12.5	1	0	1	21	77	57	25	32	30	A-7-6
R-467	26.0-27.5	2	1	2	45	50	36	19	17	26	A-6b
R-468	11.0-12.5	0	0	1	31	68	50	24	26	29	A-7-6
R-468	16.0-17.5	1	0	0	22	77	52	21	31	31	A-7-6
R-468	48.5-50.0	6	3	4	60	27	32	20	12	19	A-6a
R-469	11.0-12.5	0	0	0	24	76	59	20	39	29	A-7-6
R-469	18.5-20.0	0	3	6	68	23	24	18	6	29	A-4b
Culverts and Bridge											
C-22	6.0-7.5	0	0	8	48	44	39	15	24	25	A-6b
C-22	13.5-15.0	0	0	0	20	80	52	23	29	25	A-7-6
C-22	22.0-24.0	0	0	0	10	90	59	25	34	34	A-7-6
C-22	27.0-29.0	0	0	0	31	69	48	21	27	31	A-7-6
C-22	32.0-34.0	0	0	1	9	90	47	22	25	35	A-7-6
C-23	3.5-5.0	0	2	7	55	36	32	18	14	25	A-6a
C-23	11.0-12.5	1	0	1	22	76	52	23	29	30	A-7-6
C-23	18.0-20.0	0	0	0	4	96	77	27	50	39	A-7-6
C-23	23.0-25.0	0	0	0	40	60	43	20	23	29	A-7-6
C-23	28.0-30.0	0	0	0	25	75	50	23	27	35	A-7-6
C-55	8.5-10.0	0	0	6	46	48	36	16	20	21	A-6b
C-55	16.0-17.5	4	2	6	25	63	42	21	21	26	A-7-6
C-55	23.5-25.0	0	0	0	1	99	83	29	54	42	A-7-6
C-55	33.5-35.0	--	--	--	--	--	--	--	--	38	--
C-55	43.5-45.0	--	--	--	--	--	--	--	--	21	--
C-56	11.0-12.5	0	0	2	52	46	48	18	30	21	A-7-6
C-56	21.0-22.5	4	0	0	4	92	63	28	35	28	A-7-6

SUMMARY OF LABORATORY INDEX TEST DATA
LUCASVILLE MINFORD ROAD INTERCHANGE
PROJECT SCI-823-6.81

Boring	Sample Depth	%Agg	%Coarse Sand	% Fine Sand	%Silt	% Clay	LL	PL	PI	% MC	ODOT Class
C-56	38.5-40.0	--	--	--	--	--	--	--	--	36	--
C-57	6.0-7.5	0	1	9	65	25	34	22	12	21	A-6a
C-57	13.5-15.0	0	0	4	17	79	50	23	27	26	A-7-6
C-57	21.0-22.5	0	0	0	1	99	73	30	43	41	A-7-5
C-57	26.0-27.5	--	--	--	--	--	--	--	--	32	--
C-57	38.5-40.0	--	--	--	--	--	--	--	--	34	--
C-58	3.5-5.0	5	3	13	56	23	26	19	7	15	A-4b
C-58	8.5-10.0	3	5	17	42	33	32	16	16	21	A-6b
C-58	11.0-12.5	1	0	1	27	71	59	24	35	31	A-7-6
C-58	13.5-15.0	0	0	1	15	84	64	25	39	41	A-7-6
C-59	3.5-5.0	8	4	10	63	15	24	17	7	19	A-4b
C-59	13.5-15.0	0	0	1	27	72	52	23	29	34	A-7-6
C-60	8.5-10.0	0	0	1	27	72	47	23	24	30	A-7-6
C-60	16.0-17.5	7	11	13	53	16	27	22	5	16	A-4b
C-61	3.5-5.0	4	1	1	20	74	52	24	28	21	A-4b
C-61	8.5-10.0	0	1	1	16	82	58	16	42	30	A-7-6
C-61	11.0-12.5	1	0	1	28	70	46	21	25	27	A-7-6
C-62	1.0-2.5	19	12	13	40	16	23	18	5	18	A-4a
C-62	3.5-5.0	28	12	13	32	15	24	18	6	14	A-4a
C-62	8.5-10.0	0	0	1	3	96	66	27	39	37	A-7-6
C-63	1.0-2.5	0	1	2	47	50	38	19	19	18	A-6b
C-63	6.0-7.5	0	0	0	9	91	58	23	35	26	A-7-6
C-63	18.5-20.0	0	0	0	3	97	70	28	42	39	A-7-6
TR-11	8.5-10.0	0	0	1	20	79	56	19	37	30	A-7-6
TR-11	18.5-20.0	--	--	--	--	--	--	--	--	37	--
TR-11	23.5-25.0	0	0	0	14	86	58	25	33	37	A-7-6
TR-11	28.5-30.0	--	--	--	--	--	--	--	--	24	--
TR-11	38.5-40.0	0	0	1	50	49	37	22	15	23	A-6b
TR-12	3.5-5.0	30	15	11	27	17	28	19	9	17	A-4a
TR-12	8.5-10.0	0	0	0	11	89	66	27	39	34	A-7-6
TR-12	13.5-15.0	0	0	0	10	90	66	18	48	38	A-7-6
TR-12	18.5-20.0	--	--	--	--	--	--	--	--	37	--
TR-12	28.5-30.0	--	--	--	--	--	--	--	--	35	--
TR-12	33.5-35.0	1	5	8	58	28	38	16	22	19	A-6b
TR-13	21.0-22.5	0	0	1	19	80	53	25	28	35	A-7-6
TR-13	33.5-35.0	5	10	25	48	12	NP	NP	NP	17	A-4a
TR-14	13.0-15.0	0	0	0	7	93	65	28	37	28	A-7-6

APPENDIX C

DLZ

APPENDIX C

Stability Analyses

Portsmouth Bypass
Lucasville-Minford Embankment
Anlaysis Results Summary

Proj. No: 121-3070.03
By: WMA
Date: 11/1/2006

1) Main Alignment Analysis-No Stage Construction

Emb. Height(ft)	Condition	FS
45	Undrained	1.00
45	Drained	1.36

2) Main Alignment Analysis-Stage Construction

a) Undrained Analysis

Emb. Height at end of Stage(ft)	FS	Stage #	Time to next stage
32 ft	1.32	Stage 1-Und	60 days
45 ft	1.39	Stage 2-Und	--

Max. Settlement=30 inches

b) Drained Analysis

Emb. Height at end of Stage(ft)	FS	Stage #	Critical pore water pressure head (ft)*
32 ft	1.59	Stage 1-Drained	3 (above)
45 ft	1.53	Stage 2-Drained	-2 (below)

* Head measured from the ground surface.
Use ground surface for construction.

3) Ramps A/B Analysis

Emb. Height(ft)	Condition	FS
12	Undrained	1.59
12	Drained	1.98

Max. Settlement=21.8 inches

4) Ramps C/D Analysis

Emb. Height(ft)	Condition	FS
13	Undrained	1.85
13	Drained	2.07

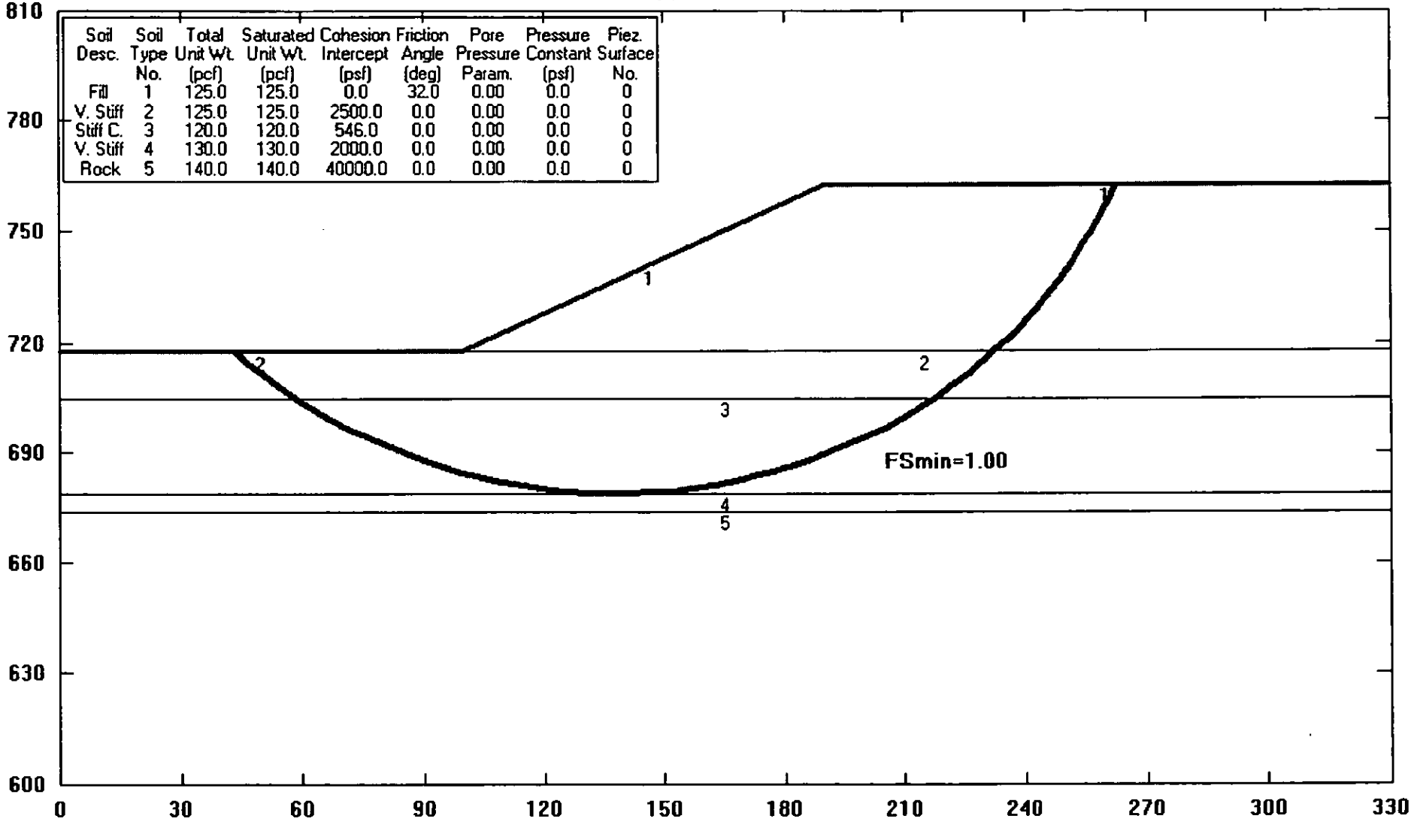
Max. Settlement=10.6 inches

Wick Drains Design Summary

Location	Configuration	Spacing (ft)	Wick Drain Dim.
Main Alignment	Triangular	3	4 in x 1/4 in
Ramps A/B	Triangular	3	4 in x 1/4 in
Ramps C/D	Triangular	3	4 in x 1/4 in

Lucasville Main Alignment-No Stage Const
Portsmouth Bypass

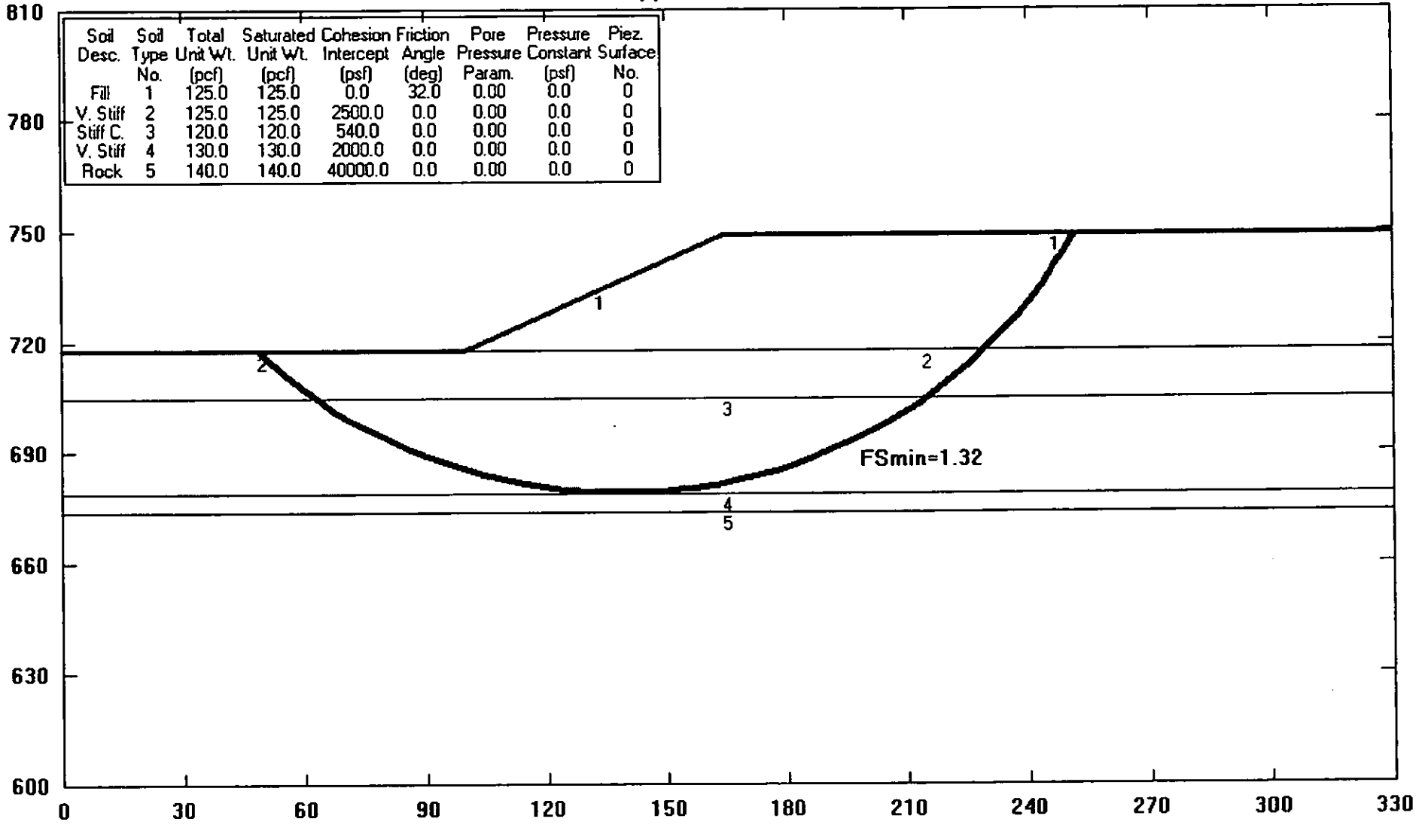
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Fill	1	125.0	125.0	0.0	32.0	0.00	0.0	0
V. Stiff	2	125.0	125.0	2500.0	0.0	0.00	0.0	0
Stiff C.	3	120.0	120.0	546.0	0.0	0.00	0.0	0
V. Stiff	4	130.0	130.0	2000.0	0.0	0.00	0.0	0
Rock	5	140.0	140.0	40000.0	0.0	0.00	0.0	0



Safety Factors Are Calculated By The Modified Bishop Method

Lucasville Main Alignment-Und Stage 1
Portsmouth Bypass

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Fill	1	125.0	125.0	0.0	32.0	0.00	0.0	0
V. Stiff	2	125.0	125.0	2500.0	0.0	0.00	0.0	0
Stiff C.	3	120.0	120.0	540.0	0.0	0.00	0.0	0
V. Stiff	4	130.0	130.0	2000.0	0.0	0.00	0.0	0
Rock	5	140.0	140.0	40000.0	0.0	0.00	0.0	0

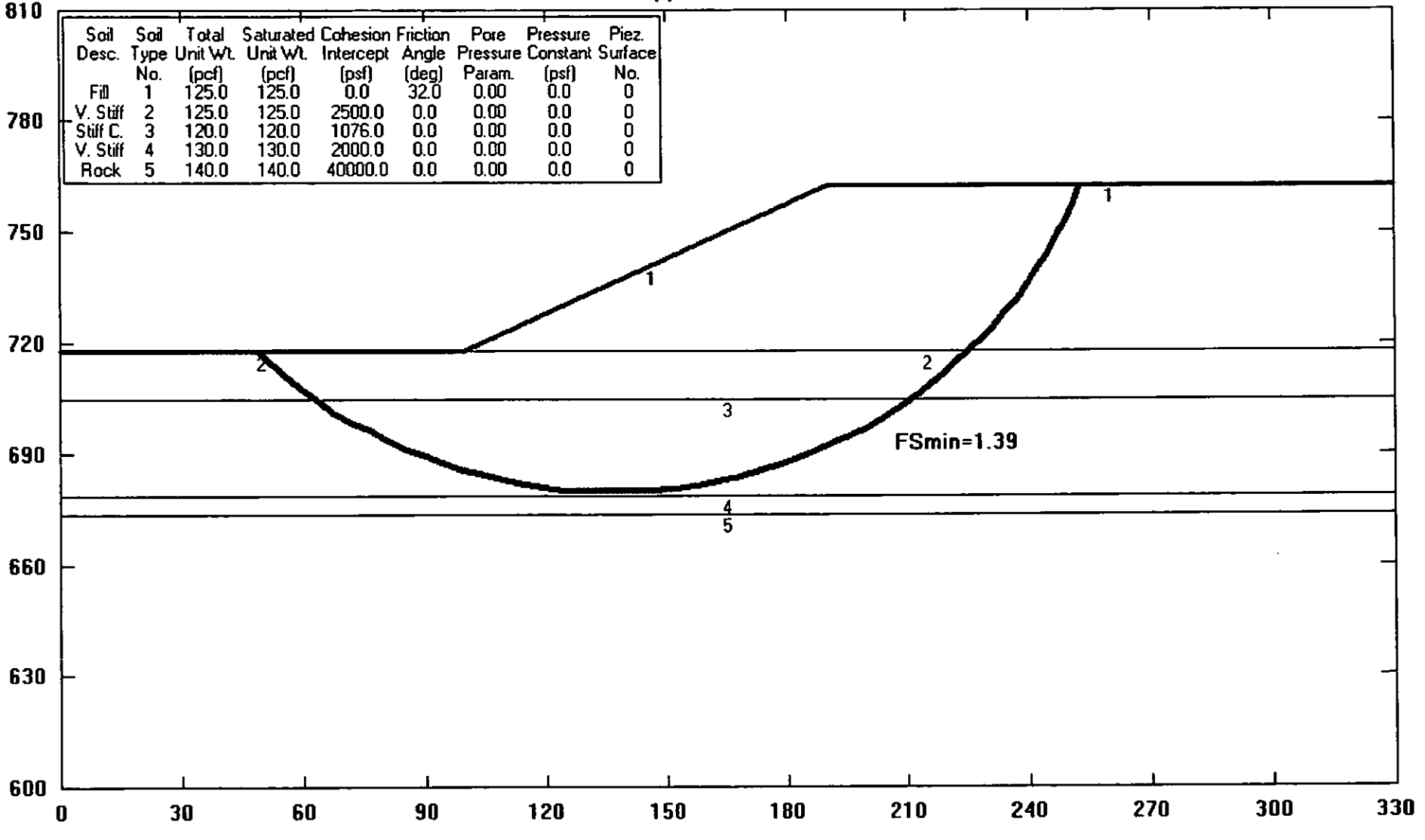


DLZ

Safety Factors Are Calculated By The Modified Bishop Method

Lucasville Main Alignment-Und Stage 2
Portsmouth Bypass

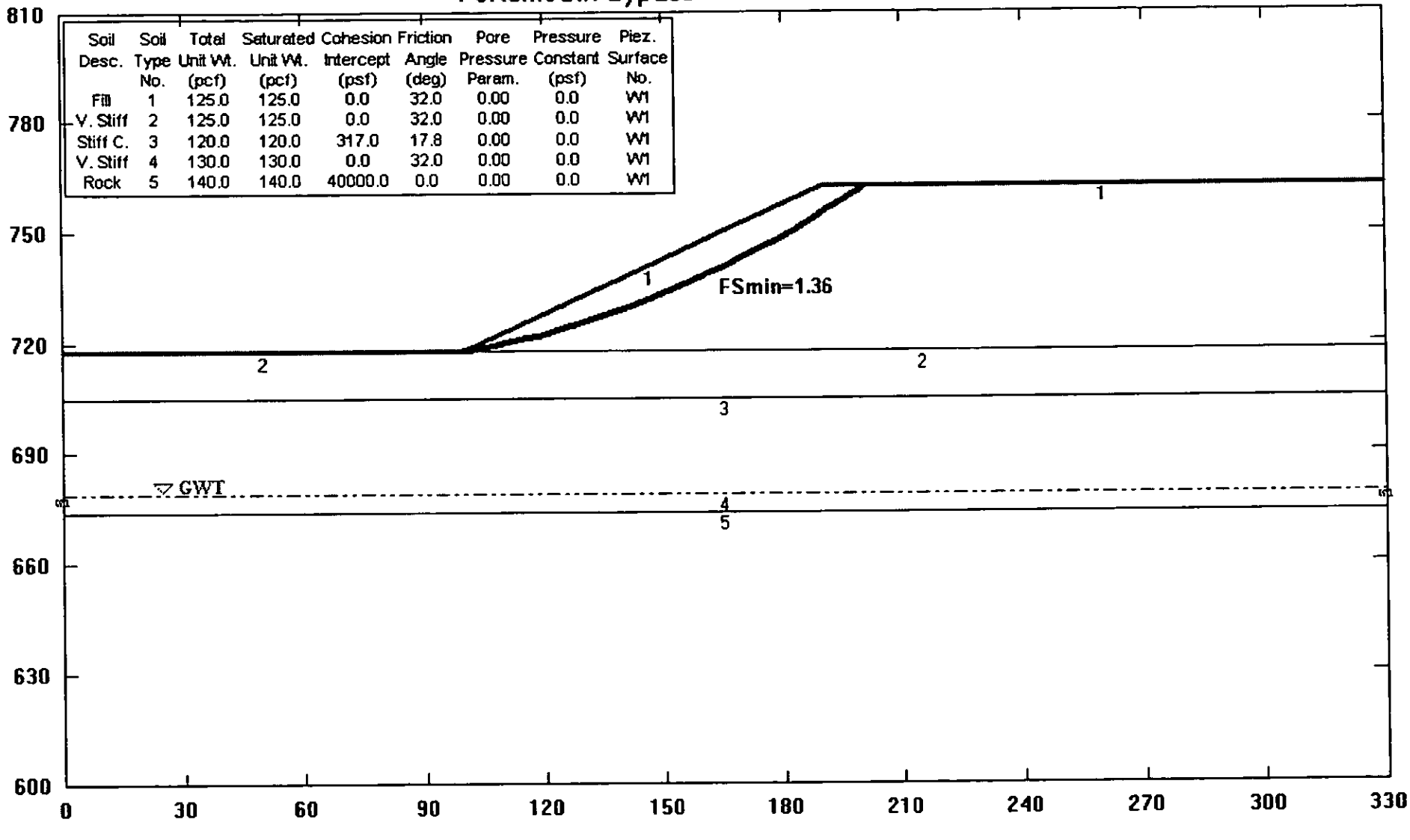
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Fill	1	125.0	125.0	0.0	32.0	0.00	0.0	0
V. Stiff	2	125.0	125.0	2500.0	0.0	0.00	0.0	0
Stiff C.	3	120.0	120.0	1076.0	0.0	0.00	0.0	0
V. Stiff	4	130.0	130.0	2000.0	0.0	0.00	0.0	0
Rock	5	140.0	140.0	40000.0	0.0	0.00	0.0	0



Safety Factors Are Calculated By The Modified Bishop Method

Lucasville Main Alignment-Dra. No Stage
Portsmouth Bypass

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Fill	1	125.0	125.0	0.0	32.0	0.00	0.0	W1
V. Stiff	2	125.0	125.0	0.0	32.0	0.00	0.0	W1
Stiff C.	3	120.0	120.0	317.0	17.8	0.00	0.0	W1
V. Stiff	4	130.0	130.0	0.0	32.0	0.00	0.0	W1
Rock	5	140.0	140.0	40000.0	0.0	0.00	0.0	W1

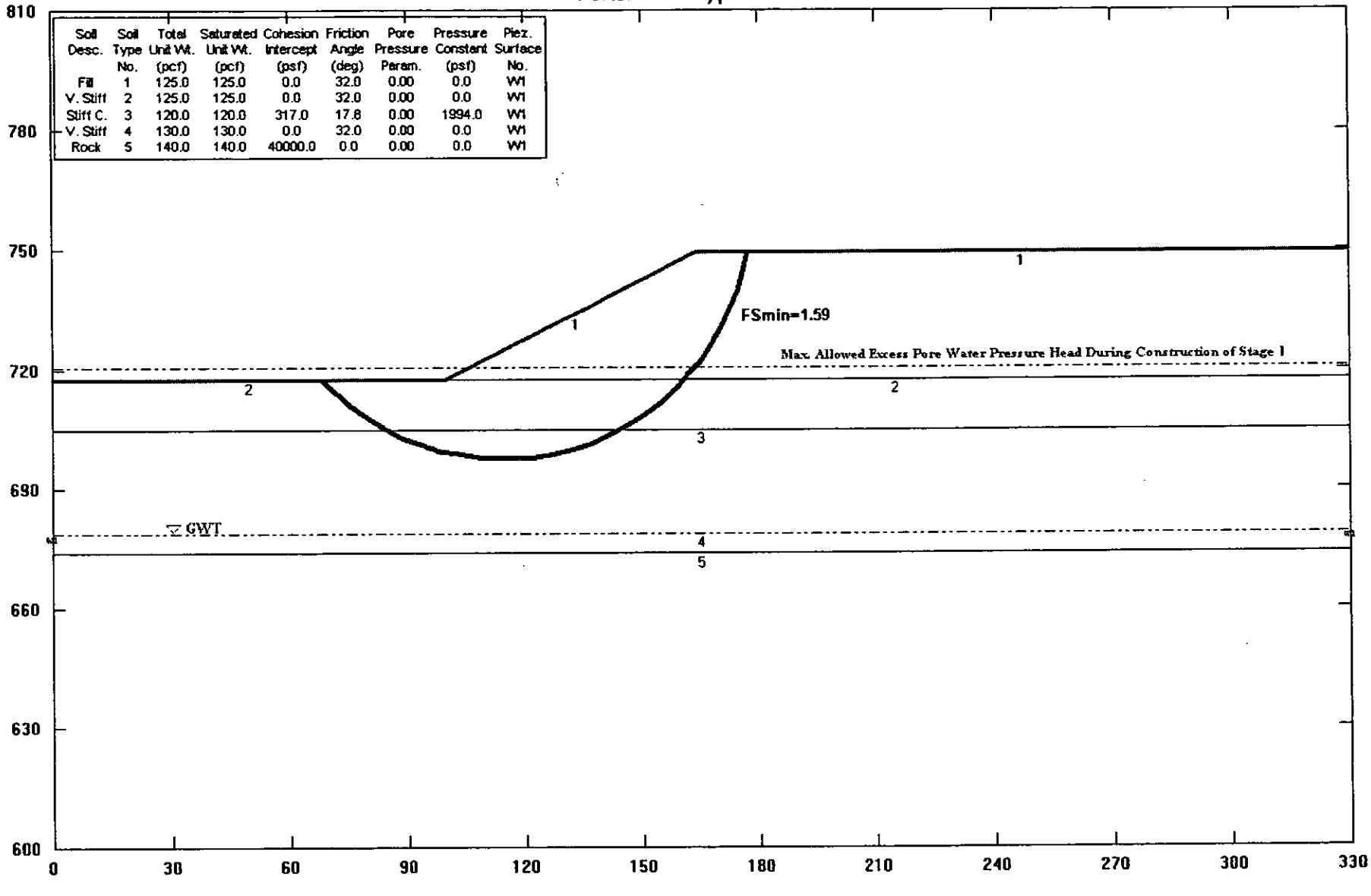


DLZ

Safety Factors Are Calculated By The Modified Bishop Method

Lucasville Main Alignment-Dra. Stage 1
Portsmouth Bypass

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Fill	1	125.0	125.0	0.0	32.0	0.00	0.0	W1
V. Stiff	2	125.0	125.0	0.0	32.0	0.00	0.0	W1
Stiff C.	3	120.0	120.0	317.0	17.8	0.00	1994.0	W1
V. Stiff	4	130.0	130.0	0.0	32.0	0.00	0.0	W1
Rock	5	140.0	140.0	40000.0	0.0	0.00	0.0	W1

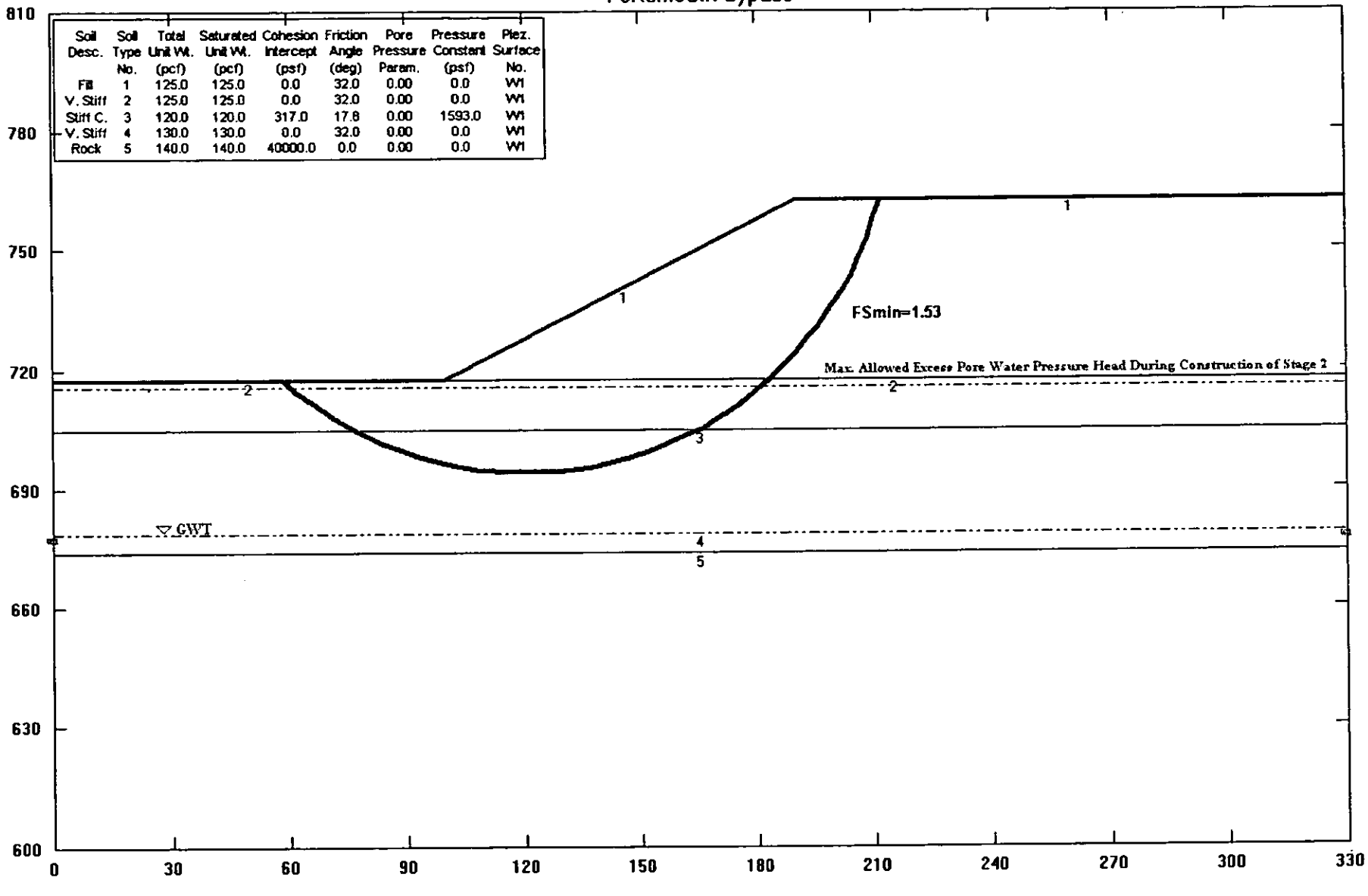


Safety Factors Are Calculated By The Modified Bishop Method

DLZ

Lucasville Main Alignment-Dra. Stage 2
Portsmouth Bypass

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Fill	1	125.0	125.0	0.0	32.0	0.00	0.0	W1
V. Stiff	2	125.0	125.0	0.0	32.0	0.00	0.0	W1
Stiff C.	3	120.0	120.0	317.0	17.8	0.00	1593.0	W1
V. Stiff	4	130.0	130.0	0.0	32.0	0.00	0.0	W1
Rock	5	140.0	140.0	40000.0	0.0	0.00	0.0	W1

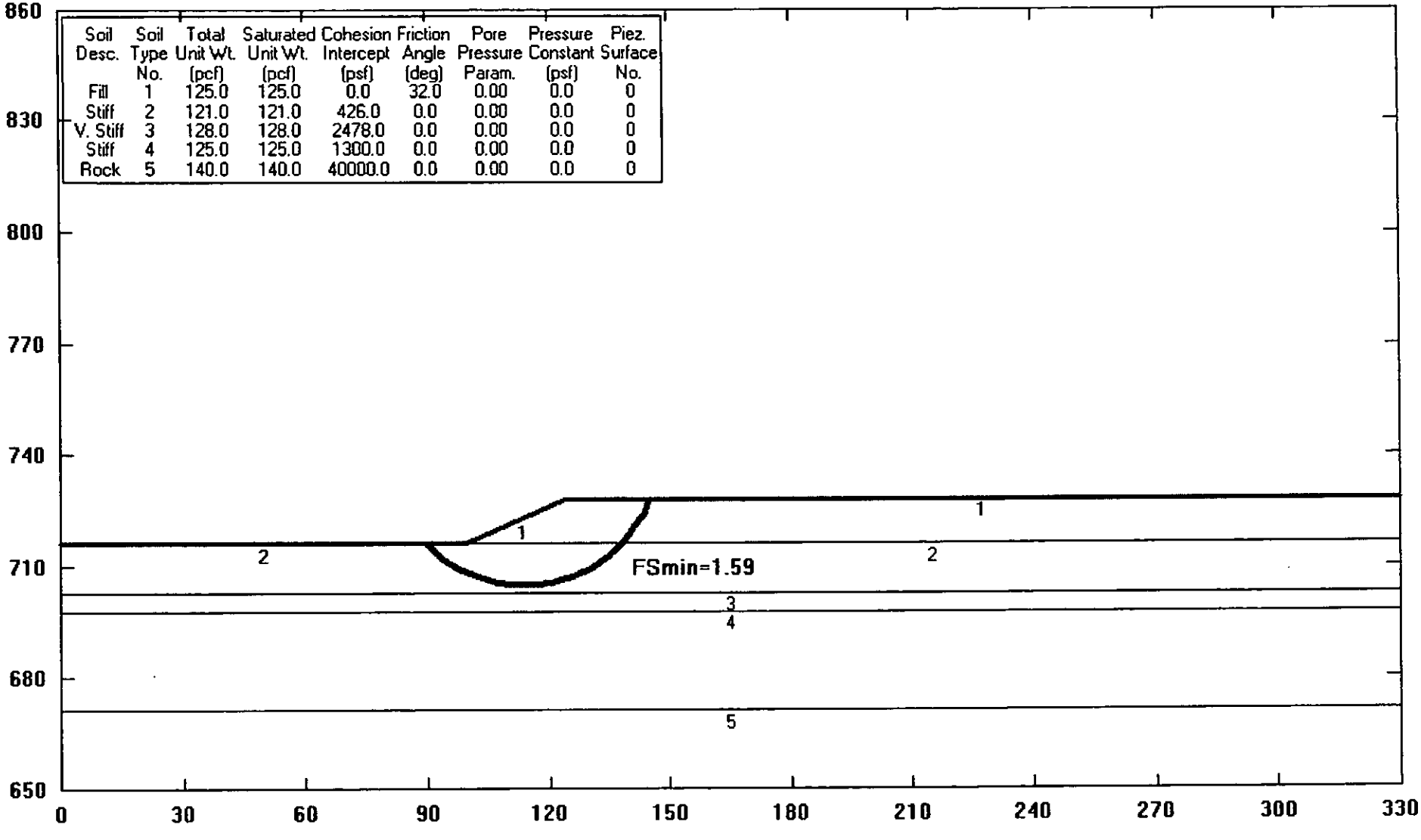


Safety Factors Are Calculated By The Modified Bishop Method

DLZ

Lucasville Ramp B-Undrained
Portsmouth Bypass

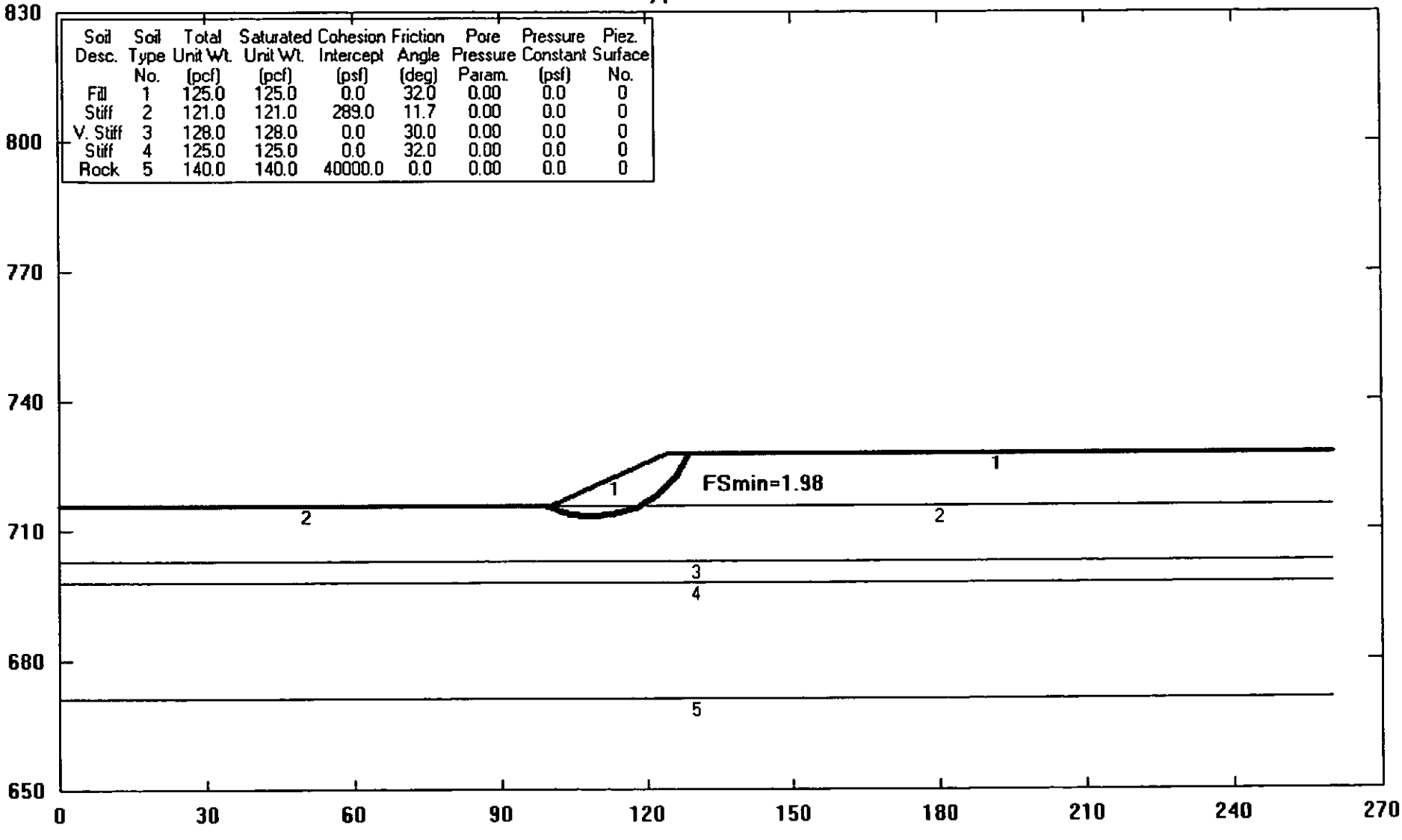
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Fill	1	125.0	125.0	0.0	32.0	0.00	0.0	0
Stiff	2	121.0	121.0	426.0	0.0	0.00	0.0	0
V. Stiff	3	128.0	128.0	2478.0	0.0	0.00	0.0	0
Stiff	4	125.0	125.0	1300.0	0.0	0.00	0.0	0
Rock	5	140.0	140.0	40000.0	0.0	0.00	0.0	0



Safety Factors Are Calculated By The Modified Bishop Method

Lucasville Ramp B-Drained
Portsmouth Bypass

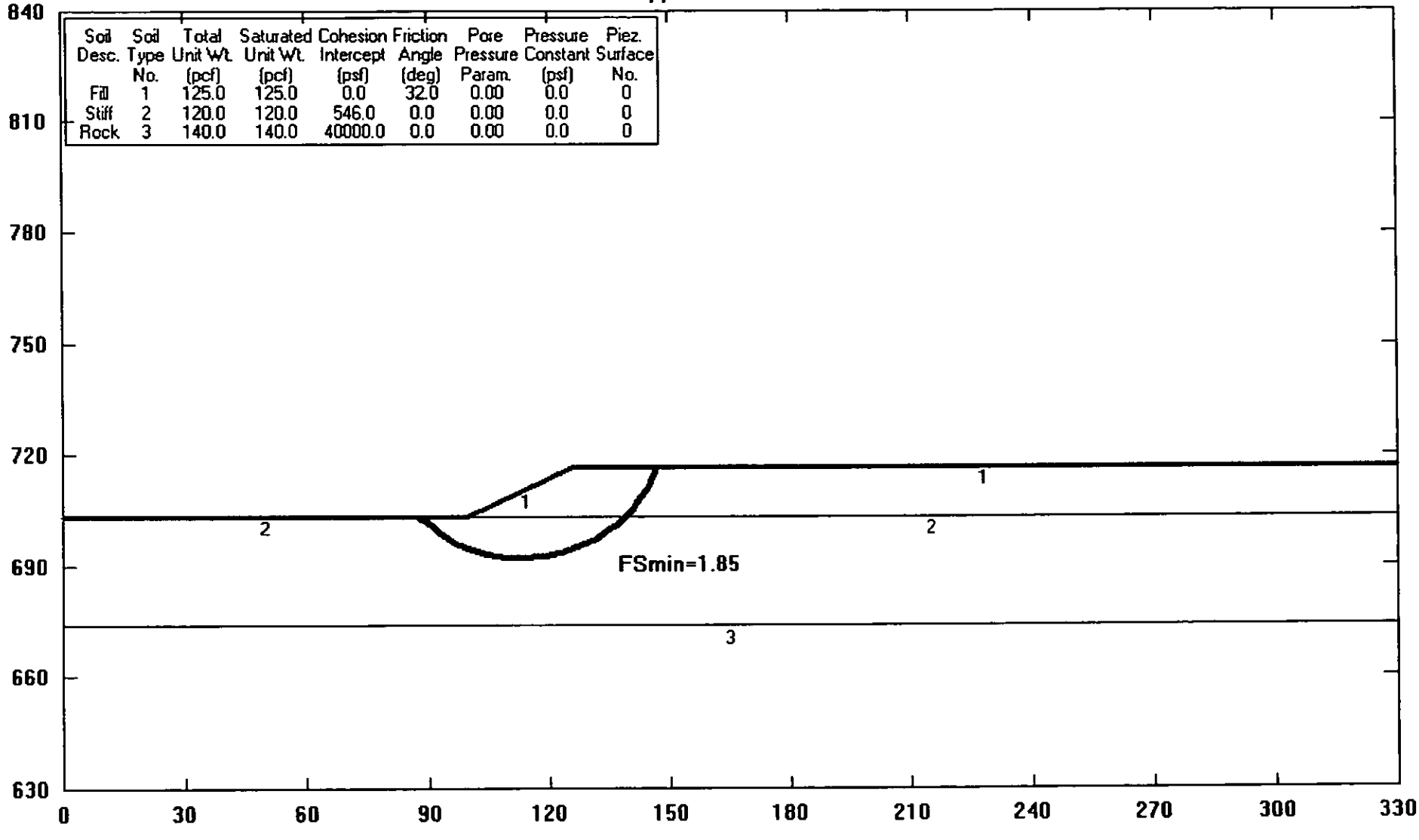
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Fill	1	125.0	125.0	0.0	32.0	0.00	0.0	0
Stiff	2	121.0	121.0	289.0	11.7	0.00	0.0	0
V. Stiff	3	128.0	128.0	0.0	30.0	0.00	0.0	0
Stiff	4	125.0	125.0	0.0	32.0	0.00	0.0	0
Rock	5	140.0	140.0	40000.0	0.0	0.00	0.0	0



Safety Factors Are Calculated By The Modified Bishop Method

Ramp C-Undrained
Portsmouth Bypass

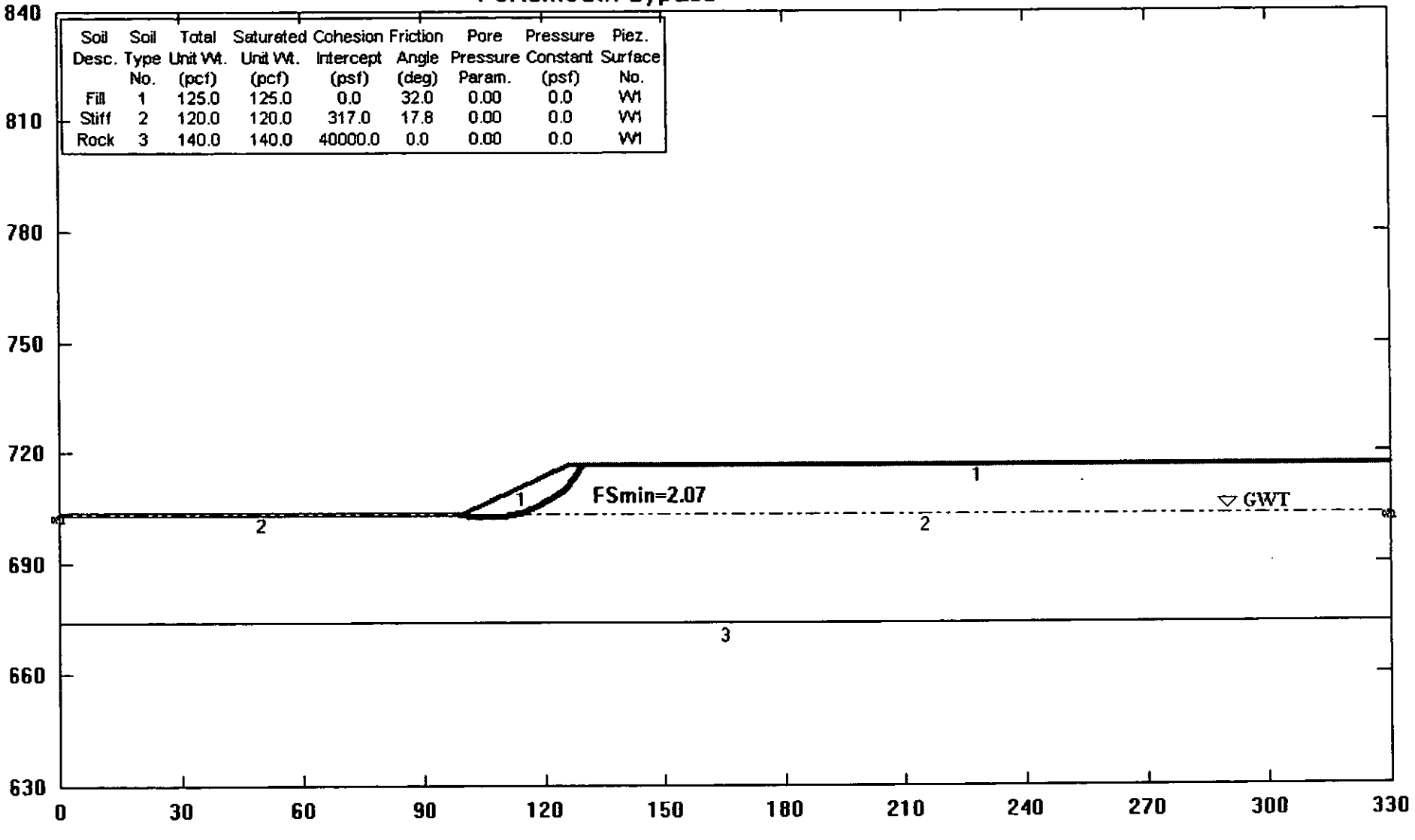
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Fill	1	125.0	125.0	0.0	32.0	0.00	0.0	0
Stiff	2	120.0	120.0	546.0	0.0	0.00	0.0	0
Rock	3	140.0	140.0	40000.0	0.0	0.00	0.0	0



Safety Factors Are Calculated By The Modified Bishop Method

Ramp C-Drained
Portsmouth Bypass

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Fill	1	125.0	125.0	0.0	32.0	0.00	0.0	W1
Stiff	2	120.0	120.0	317.0	17.8	0.00	0.0	W1
Rock	3	140.0	140.0	40000.0	0.0	0.00	0.0	W1



Safety Factors Are Calculated By The Modified Bishop Method

APPENDIX D

DLZ

APPENDIX D

Settlement Analysis

DLZ

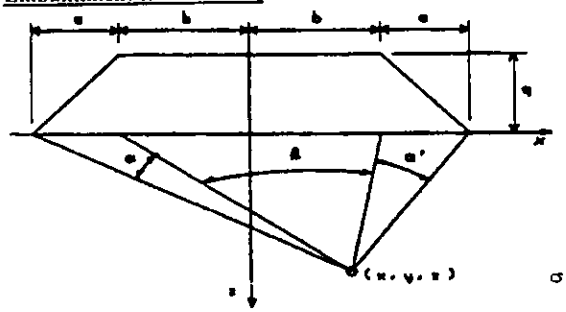
SUBJECT

Client	TranSystems, Inc.
Project	SCI-823-0.00
Item	Lucasville-Minford / Main Road Emb.
	Total Settlement

JOB NUMBE10121-3070.03
SHEET NO. 1 OF 1
COMP. BY WMA DATE 10/30/06
CHECKED BY DAA DATE 11/29/06

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	38.5	ft		
Embankment Height:	H =	45	ft		
Fill Unit Weight:	γ_{emb} =	125	pcf	q =	5,625 psf
Width of Slope:	a =	90			
Top half-width of Emb:	b =	130			
Distance from CL:	x =	0			
Output Range:	z =	0	to	45	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"

No	Elevation Top	Elevation Bott.	Soil Properties: Layer Bott.		Soil Type	g_{soil} (pcf)	s'_c (psf)	s'_o (psf)	Dsz (psf)	s'_f (psf)	Cohesionless Soils C'	Cohesive Soils C_r	C_c	e_o
	Stresses are calculated at mid-point of layer													
1	717.4	711.4	6.0	ft	Very Stiff Clay	125	1,780	375	5,625	6,000	0.0	0.10	0.27	0.790
2	711.4	704.9	12.5	ft	Very Stiff Clay	125	1,780	1,156	5,625	6,781	0.0	0.10	0.27	0.790
3	704.9	699.9	17.5	ft	Stiff Clay	120	10,800	1,863	5,623	7,486	0.0	0.16	0.37	1.124
4	699.9	694.9	22.5	ft	Stiff Clay	120	10,800	2,463	5,621	8,084		0.16	0.37	1.124
5	694.9	689.9	27.5	ft	Stiff Clay	120	10,800	3,063	5,617	8,680		0.16	0.37	1.124
6	689.9	684.9	32.5	ft	Stiff Clay	120	10,800	3,663	5,612	9,275		0.16	0.37	1.124
7	684.9	678.9	38.5	ft	Stiff Clay	120	10,800	4,323	5,604	9,927		0.16	0.37	1.124
8	678.9	673.9	43.5	ft	Very Stiff Clay	130	1,780	4,852	5,593	10,444		0.10	0.27	0.790
9						0	0							
10						0	0							

No.	Settlement:		Total Settlement
1	0.704	ft	
2	0.638	ft	**2.501 ft**
3	0.228	ft	
4	0.194	ft	
5	0.170	ft	**30.0 in**
6	0.152	ft	
7	0.163	ft	
8	0.251	ft	
9			
10			

Reference: Geotechnical Engineering Principles and Practices; Coduto, 1999

Overconsolidated Soils - Case I (s'_o<s'_c) Eqn:11.24

$$(\delta_c)_{ult} = \sum \frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_o}\right)$$

Overconsolidated Soils - Case II (s'_o<s'_c<s_f) Eqn:11.25

$$(\delta_c)_{ult} = \sum\left[\frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_c}{\sigma'_o}\right) + \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_c}\right)\right]$$

Normally Consolidated Soils (s'_o=s'_c) Eqn: 11.23

$$(\delta_c)_{ult} = \sum \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_o}\right)$$

Cohesionless Soils (s'_o=s'_c)

$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_o}\right)$$

DLZ

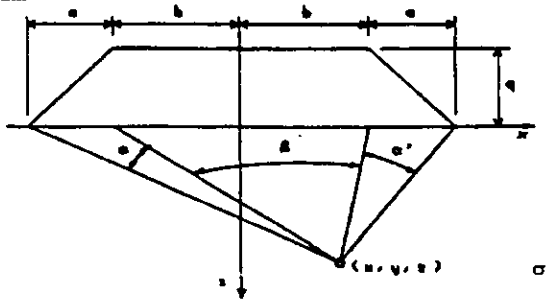
SUBJECT

Client	TranSystems, Inc.
Project	SCI-823-0.00
Item	Lucasville-Minford / Ramp A/B Emb.
	Total Settlement

JOB NUMBER 0121-3070.03
SHEET NO. 1 OF 1
COMP. BY WMA DATE 10/30/06
CHECKED BY DAA DATE 11/29/06

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	48.0	ft		
Embankment Height:	H =	12	ft		
Fill Unit Weight:	γ_{emb} =	125	pcf	q =	1.500 psf
Width of Slope:	a =	24			
Top half-width of Emb:	b =	130			
Distance from CL:	x =	0			
Output Range:	z =	0	to	45	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"

No.	Elevation Top	Bott.	**Soil Properties:** Layer Bott.		Soil Type	g_{soil} (pcf)	s'_c (psf)	s'_o (psf)	Dsz (psf)	s'_f (psf)	Cohesionless Soils C'	Cohesive Soils C_r	C_c	e_o
			Stresses are calculated at mid-point of layer											
1	716.0	710.0	6.0	ft	Stiff Clay	121	1,500	363	1,500	1,863	0.0	0.07	0.40	0.940
2	710.0	703.0	13.0	ft	Stiff Clay	121	1,500	1,150	1,500	2,649	0.0	0.07	0.40	0.940
3	703.0	698.0	18.0	ft	Very Stiff Clay	128	3,320	1,893	1,499	3,392	0.0	0.09	0.26	0.687
4	698.0	693.0	23.0	ft	Stiff Clay	125	1,500	2,526	1,498	4,024		0.05	0.54	0.940
5	693.0	688.0	28.0	ft	Stiff Clay	125	1,500	3,151	1,497	4,647		0.05	0.54	0.940
6	688.0	683.0	33.0	ft	Stiff Clay	125	1,500	3,776	1,494	5,270		0.05	0.54	0.940
7	683.0	678.0	38.0	ft	Stiff Clay	125	1,500	4,401	1,491	5,891		0.05	0.54	0.940
8	678.0	671.0	45.0	ft	Stiff Clay	125	1,500	5,151	1,486	6,636		0.05	0.54	0.940
9						0	0							
10						0	0							

No.	Settlement:		Total Settlement
1	0.250	ft	
2	0.386	ft	**1.817 ft**
3	0.072	ft	
4	0.282	ft	
5	0.235	ft	**21.8 in**
6	0.202	ft	
7	0.176	ft	
8	0.214	ft	
9			
10			

Reference: Geotechnical Engineering Principles and Practices; Coduto, 1999

Overconsolidated Soils - Case I ($s'_o<s'_c$) Eqn:11.24

$$(\delta_c)_{ult} = \sum \frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_o}\right)$$

Overconsolidated Soils - Case II ($s'_o<s'_c<s_f$) Eqn:11.25

$$(\delta_c)_{ult} = \sum\left[\frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_c}{\sigma'_o}\right) + \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_c}\right)\right]$$

Normally Consolidated Soils ($s'_o=s'_c$) Eqn: 11.23

$$(\delta_c)_{ult} = \sum \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_o}\right)$$

Cohesionless Soils ($s'_o=s'_c$)

$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_o}\right)$$

DLZ

SUBJECT

Client	TranSystems, Inc.
Project	SCI-823-0.00
Item	Lucasville-Minford / Ramps C/D Emb.
	Total Settlement

JOB NUMBEI0121-3070.03

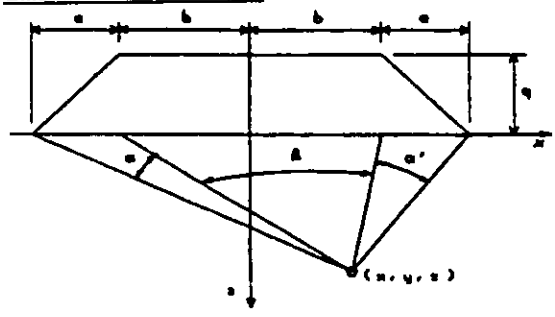
SHEET NO. 1 OF 1

COMP. BY WMA DATE 10/30/06

CHECKED BY DAA DATE 11/29/06

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	38.5	ft			
Embankment Height:	H =	13	ft			
Fill Unit Weight:	γ_{emb} =	125	pcf	q =	1.625	psf
Width of Slope:	a =	26				
Top half-width of Emb:	b =	130				
Distance from CL:	x =	0				
Output Range:	z =	0	to	35	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"

No	Elevation Top	Bott.	**Soil Properties:** Layer Bott.		Soil Type	g_{soil} (pcf)	s'c (psf)	s'o (psf)	Dsz (psf)	s'f (psf)	Cohesionless Soils C'	Cohesive Soils C_r	C_c	e_o
			Stresses are calculated at mid-point of layer											
1	703.6	698.6	5.0	ft	Stiff Clay	120	10,800	300	1,625	1,925	0.0	0.16	0.37	1.124
2	698.6	693.6	10.0	ft	Stiff Clay	120	10,800	900	1,625	2,525	0.0	0.16	0.37	1.245
3	693.6	688.6	15.0	ft	Stiff Clay	120	10,800	1,500	1,625	3,125	0.0	0.16	0.37	1.124
4	688.6	683.6	20.0	ft	Stiff Clay	120	10,800	2,100	1,624	3,724		0.16	0.37	1.124
5	683.6	678.9	24.7	ft	Stiff Clay	120	10,800	2,682	1,623	4,305		0.16	0.37	1.124
6	678.9	673.9	29.7	ft	Very Stiff Clay	130	1,780	3,289	1,621	4,910		0.10	0.27	0.790
7														
8														
9														
10														

No.	Settlement:		Total Settlement
1	0.304	ft	
2	0.160	ft	**0.881 ft**
3	0.120	ft	
4	0.094	ft	
5	0.073	ft	**10.6 in**
6	0.131	ft	
7			
8			
9			
10			

Reference: Geotechnical Engineering Principles and Practices; Coduto, 1999

Overconsolidated Soils - Case I ($s'_o<s'_c$) Eqn:11.24

$$(\delta_c)_{ult} = \sum \frac{C_r}{1+e_o} H \log\left(\frac{\sigma'_f}{\sigma'_o}\right)$$

Overconsolidated Soils - Case II ($s'_o<s'_c<s_f$) Eqn:11.25

$$(\delta_c)_{ult} = \sum\left[\frac{C_r}{1+e_o} H \log\left(\frac{\sigma'_c}{\sigma'_o}\right) + \frac{C_c}{1+e_o} H \log\left(\frac{\sigma'_f}{\sigma'_c}\right)\right]$$

Normally Consolidated Soils ($s'_o=s'_c$) Eqn: 11.23

$$(\delta_c)_{ult} = \sum \frac{C_c}{1+e_o} H \log\left(\frac{\sigma'_f}{\sigma'_o}\right)$$

Cohesionless Soils ($s'_o=s'_c$)

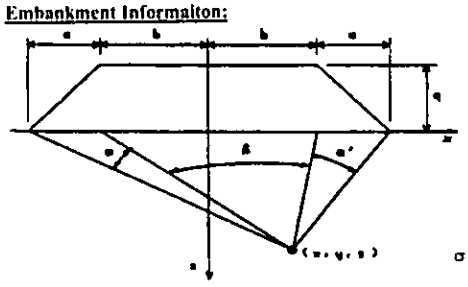
$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_o}\right)$$

DLZ

SUBJECT	Client	TranSystems, Inc.	JOB NUMBER	0121-3070.03	
	Project	SCI-823-0.00	SHEET NO.	1	OF 1
	Item	Lucasville-Minford / Main Road Embankment	COMP. BY	WMA	DATE 10/30/06
		STAGE 1 (Undrained)	CHECKED BY	DAA	DATE 11/29/06

STAGE CONSTRUCTION ANALYSIS - EMBANKMENT- Total Stress Analysis

Embankment Informaiton:



Groundwater Table:	D=	38.5	ft			
Embankment Height:	H =	32	ft			
Fill Unit Weight:	γ_{emb} =	125	pcf	q =	4,000	psf
Width of Slope:	a =	64				
Top half-width of Emb:	b =	54				
Distance from CL:	x =	0				
Output Range:	z =	0	to	45	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 1110-2-1902 "Slope Stability"

Wick Drains:

$$\ln\left(\frac{1}{1-U_r}\right) = \left(\frac{t}{D^2/8c_h}\right)\left(\ln\frac{D}{d_w} - 0.75\right)$$

t=	60	days	consolidation time
S=	3	ft	Spacing
D=	3.15	ft	diameter of wick drain influence zone (Rectangular D=1.13S; Triangular D=1.05S)
c_h=	0.03	ft^2/day	horizontal drainage coefficient
a=	4	in	width of drain (Assume for 4" wide x1/4" thick)
b=	0.25	in	thickness of drain (Assume for 4" wide x1/4" thick)
d_w=	0.23	ft	equivalent diameter
U_h=	0.54		Horizontal Average Degree of Consolidation

C_v=	5.E-05	in^2/sec	*(0.030)* ft^2/day
t=	60	days	0.16 year
H=	38.50	ft	
T=	0.00		$T=tCv/H^2$
U_v=	0.04	Vertical Average Degree of Consolidation	

Need Wick Drains to accelerate the settlement

U_{avg}= 0.55 Total Average Degree of Consolidation $U=1-(1-U_v)(1-U_h)$

C_{uu}= 546 psf $C_{uu}=C_{uu}+(U_{avg})(\Delta\sigma_z)(\tan\phi_{cons})$

ϕ_{cons}= 13.5

Total Settlement= 30 inches (See Settlement Calculation Sheet)

Stage Settlement= 17 inches

Soil Properties: *Stresses are calculated at mid-point of layer*

No.	Elevation Top	Elevation Bott.	Layer Bott.		Soil Type	g_{soil} (pcf)	s'u (psf)	Dsz (psf)	s'f (psf)	Change in Strength U_{avg}	ϕ_{cons}	C_{uu}
1	717.4	711.4	6.0	ft	Very Stiff Clay	125	375	4,000	4,375			
1	711.4	704.9	12.5	ft	Very Stiff Clay	125	1,156	3,997	5,154			
2	704.9	699.9	17.5	ft	Stiff Clay	120	1,863	3,989	5,851	0.55	13.5	1077
4	699.9	694.9	22.5	ft	Stiff Clay	120	2,463	3,975	6,437	0.55	13.5	1075
5	694.9	689.9	27.5	ft	Stiff Clay	120	3,063	3,953	7,015	0.55	13.5	1072
6	689.9	684.9	32.5	ft	Stiff Clay	120	3,663	3,923	7,585	0.55	13.5	1068
7	684.9	678.9	38.5	ft	Stiff Clay	120	4,323	3,881	8,203	0.55	13.5	1063
8	678.9	673.9	43.5	ft	Very Stiff Clay	130	4,852	3,826	8,677			
9						0						
10						0						

DLZ

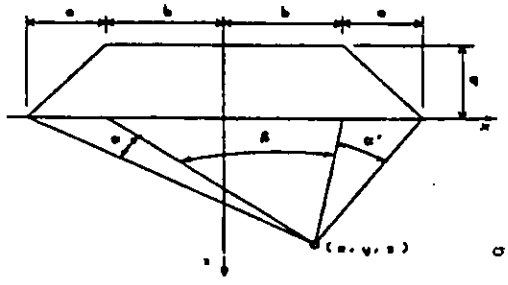
SUBJECT

Client	TranSystems, Inc.
Project	SCI-823-0.00
Item	Lucasville-Minford / Main Road Embankment
	STAGE 1 (Drained)

JOB NUMBE 0121-3070.03
SHEET NO. 1 OF 1
COMP. BY WMA DATE 10/30/06
CHECKED BY DAA DATE 11/29/06

STAGE CONSTRUCTION ANALYSIS - EMBANKMENT- Effective Stress Analysis

Embankment Informaiton:



Groundwater Table:	D=	38.5	ft			
Embankment Height:	H =	32	ft			
Fill Unit Weight:	γ_{emb} =	125	pcf	q =	4,000	psf
Width of Slope:	a =	64				
Top half-width of Emb:	b =	91				
Distance from CL:	x =	0				
Output Range:	z =	0	to	45	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 1110-2-1902 "Slope Stability"

Wick Drains:

$$\ln\left(\frac{1}{1-U_v}\right) = \left(\frac{t}{D^2/8c_h}\right)\left(\ln\frac{D}{d_w} - 0.75\right)$$

t=	80	days	consolidation time
S=	3	ft	Spacing
D=	3.15	ft	diameter of wick drain influence zone (Rectangular D=1.13S; Triangular D=1.05S)
c_h=	0.03	ft^2/day	horizontal drainage coefficient
a=	4	in	width of drain (Assume for 4" wide x1/4" thick)
b=	0.25	in	thickness of drain (Assume for 4" wide x1/4" thick)
d_w=	0.23	ft	equivalent diameter
U_h=	0.64		Horizontal Average Degree of Consolidation

C_v=	5.E-05	in^2/sec	*(0.030)* ft^2/day
t=	80	days	0.22 year
H=	38.50	ft	
T=	0.00		$T=tCv/H^2$
U_v=	0.05	Vertical Average Degree of Consolidation	

Need Wick Drains to accelerate the settlement

U_{avg}= 0.66 Total Average Degree of Consolidation $U=1-(1-U_v)(1-U_h)$
ϕ_{CD}= 17.8
K_o= 0.69 $K_o=1-\sin\phi_{CD}$
B= 1.00 Pore pressure parameter $\Delta u_p = B[(1+2K_o/3)\Delta\sigma_z(1-U_{avg})$ (Excess pore water pressure)

Soil Properties: *Stresses are calculated at mid-point of layer*

No.	Elevation Top	Bott.	Layer Bott.		Soil Type	g_{soil} (pcf)	s'_o (psf)	Dsz (psf)	s'_f (psf)	U_{avg}	ϕ_{CD}	Δu_p (psf)
1	717.4	711.4	6.0	ft	Very Stiff Clay	125	375	4,000	4,375			
1	711.4	704.9	12.5	ft	Very Stiff Clay	125	1,156	3,999	5,155			
2	704.9	699.9	17.5	ft	Stiff Clay	120	1,863	3,997	5,859	0.66	17.8	2002
4	699.9	694.9	22.5	ft	Stiff Clay	120	2,463	3,992	6,455	0.66	17.8	1999
5	694.9	689.9	27.5	ft	Stiff Clay	120	3,063	3,985	7,047	0.66	17.8	1996
6	689.9	684.9	32.5	ft	Stiff Clay	120	3,663	3,975	7,637	0.66	17.8	1991
7	684.9	678.9	38.5	ft	Stiff Clay	120	4,323	3,959	8,282	0.66	17.8	1983
8	678.9	673.9	43.5	ft	Very Stiff Clay	130	4,852	3,938	8,790			
9						0						
10						0						

Avg. 1994

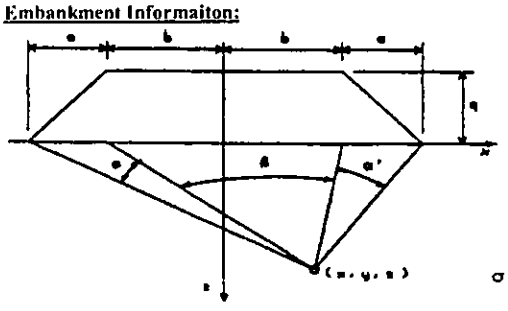
Total Settlement= 30 inches (See Settlement Calculation Sheet)
Stage Settlement= 20 inches

DLZ

SUBJECT	Client	TranSystems, Inc.	JOB NUMBE 0121-3070.03	
	Project	SCI-823-0.00	SHEET NO. 1 OF	1
	Item	Lucasville-Minford / Main Road Embankment	COMP. BY WMA DATE	10/30/06
		STAGE 2 (Drained)	CHECKED BY DJA DATE	11/29/06

STAGE CONSTRUCTION ANALYSIS - EMBANKMENT- Effective Stress Analysis

Embankment Informaiton:



Groundwater Table:	D=	38.5	ft			
Embankment Height:	H =	45	ft			
Fill Unit Weight:	γ_{emb} =	125	pcf	q =	5,625	psf
Width of Slope:	a =	90				
Top half-width of Emb:	b =	65				
Distance from CL:	x =	0				
Output Range:	z =	0	to	45	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 1110-2-1902 "Slope Stability"

Wick Drains:

$$\ln\left(\frac{1}{1-U_v}\right) = \left(\frac{t}{D^2/8c_h}\right)\left(\ln\frac{D}{d_w} - 0.75\right)$$

t=	123	days	consolidation time
S=	3	ft	Spacing
D=	3.15	ft	diameter of wick drain influence zone (Rectangular D=1.13S; Triangular D=1.05S)
c_h=	0.03	ft^2/day	horizontal drainage coefficient
a=	4	in	width of drain (Assume for 4" wide x1/4" thick)
b=	0.25	in	thickness of drain (Assume for 4" wide x1/4" thick)
d_w=	0.23	ft	equivalent diameter
U_h=	0.79		Horizontal Average Degree of Consolidation

C_v=	5.E-05	in^2/sec	*(0.030)*	ft^2/day	
t=	123	days	0.34	year	
H=	38.50	ft			
T=	0.00		$T=tCv/H^2$		
U_v=	0.06	Vertical Average Degree of Consolidation			

Need Wick Drains to accelerate the settlement

U_{avg}=	0.80	Total Average Degree of Consolidation	$U=1-(1-U_v)(1-U_h)$
ϕ_{CD}=	17.8		
K_o=	0.69	$K_o=1-\sin\phi_{CD}$	
B=	1.00	Pore pressure parameter	$\Delta u_p = B[(1+2K_o/3)\Delta\sigma_z(1-U_{avg})$ (Excess pore water pressure)

Soil Properties: *Stresses are calculated at mid-point of layer*

No.	Elevation Top	Bott.	Layer Bott.		Soil Type	g_{soil} (pcf)	s'_o (psf)	Dsz (psf)	s'_f (psf)	U_{avg}	ϕ_{CD}	Δu_p (psf)
1	717.4	711.4	6.0	ft	Very Stiff Clay	125	375	5,625	6,000			
1	711.4	704.9	12.5	ft	Very Stiff Clay	125	1,156	5,623	6,779			
2	704.9	699.9	17.5	ft	Stiff Clay	120	1,863	5,617	7,479	0.80	17.8	1603
4	699.9	694.9	22.5	ft	Stiff Clay	120	2,463	5,606	8,069	0.80	17.8	1599
5	694.9	689.9	27.5	ft	Stiff Clay	120	3,063	5,589	8,652	0.80	17.8	1595
6	689.9	684.9	32.5	ft	Stiff Clay	120	3,663	5,566	9,228	0.80	17.8	1588
7	684.9	678.9	38.5	ft	Stiff Clay	120	4,323	5,532	9,855	0.80	17.8	1578
8	678.9	673.9	43.5	ft	Very Stiff Clay	130	4,852	5,486	10,338			
9						0						
10						0						

Avg 1593

Total Settlement= 30 inches (See Settlement Calculation Sheet)

Stage Settlement= 24 inches

DLZ

SUBJECT	Client	TranSystems, Inc.	JOB NUMBER	0121-3070.03			
	Project	SCI-823-0.00	SHEET NO.	1	OF	1	
	Item	Lucasville-Minford / Ramps A/B	COMP. BY	WMA	DATE	11/01/06	
			CHECKED BY	DAA	DATE	11/29/06	

WICK DRAINS ANALYSIS

NO Wick Drains:

C_v=	5.E-05	in^2/sec	*(0.030)*	ft^2/day
t=	112	days	0.31 year	
H=	13.00	ft		
T=	0.02	$T=tCv/H^2$		
U_v=	0.159	Vertical Average Degree of Consolidation		

Need Wick Drains to accelerate the settlement

Wick Drains Only: $\ln\left(\frac{1}{1-U_v}\right)=\left(\frac{t}{D^2/8c_h}\right)\left(\ln\frac{D}{d_w}-0.75\right)$

t=	112	days	consolidation time
S=	3	ft	Spacing
D=	3.15	ft	diameter of wick drain influence zone (Rectangular D=1.13S; Triangular D=1.05S)
c_h=	0.03	ft^2/day	horizontal drainage coefficient
a=	4	in	width of drain (Assume for 4" wide x1/4" thick)
b=	0.25	in	thickness of drain (Assume for 4" wide x1/4" thick)
d_w=	0.23	ft	equivalent diameter
U_h=	0.76		Horizontal Average Degree of Consolidation

U_{avg}= 0.800 Total Average Degree of Consolidation $U=1-(1-U_v)(1-U_h)$

Total Settlement = 22 inches (settlement Calculation Sheet)

Settlement at U_{avg} = 17 inches

DLZ

SUBJECT	Client	TranSystems, Inc.	JOB NUMBER	0121-3070.03	
	Project	SCI-823-0.00	SHEET NO.	1	OF 1
	Item	Lucasville-Minford / Ramps C/D	COMP. BY	WMA	DATE 11/01/06
			CHECKED BY	DAA	DATE 11/29/06

WICK DRAINS ANALYSIS

NO Wick Drains:

C_v=	5.E-05	in^2/sec	*(0.030)*	ft^2/day
t=	120	days	0.33 year	
H=	24.00	ft		
T=	0.01	$T=tCv/H^2$		
U_v=	0.089	Vertical Average Degree of Consolidation		

Need Wick Drains to accelerate the settlement

Wick Drains Only: $\ln\left(\frac{1}{1-U_h}\right)=\left(\frac{t}{D^2/8c_h}\right)\left(\ln\frac{D}{d_w}-0.75\right)$

t=	120	days	consolidation time
S=	3	ft	Spacing
D=	3.15	ft	diameter of wick drain influence zone (Rectangular D=1.13S; Triangular D=1.05S)
c_h=	0.03	ft^2/day	horizontal drainage coefficient
a=	4	in	width of drain (Assume for 4" wide x1/4" thick)
b=	0.25	in	thickness of drain (Assume for 4" wide x1/4" thick)
d_w=	0.23	ft	equivalent diameter
U_h=	0.785		Horizontal Average Degree of Consolidation

U_{avg}= 0.80 Total Average Degree of Consolidation $U=1-(1-U_v)(1-U_h)$

Total Settlement= 11 inches (settlement Calculation Sheet)

Settlement at U_{avg} = 8.5 inches

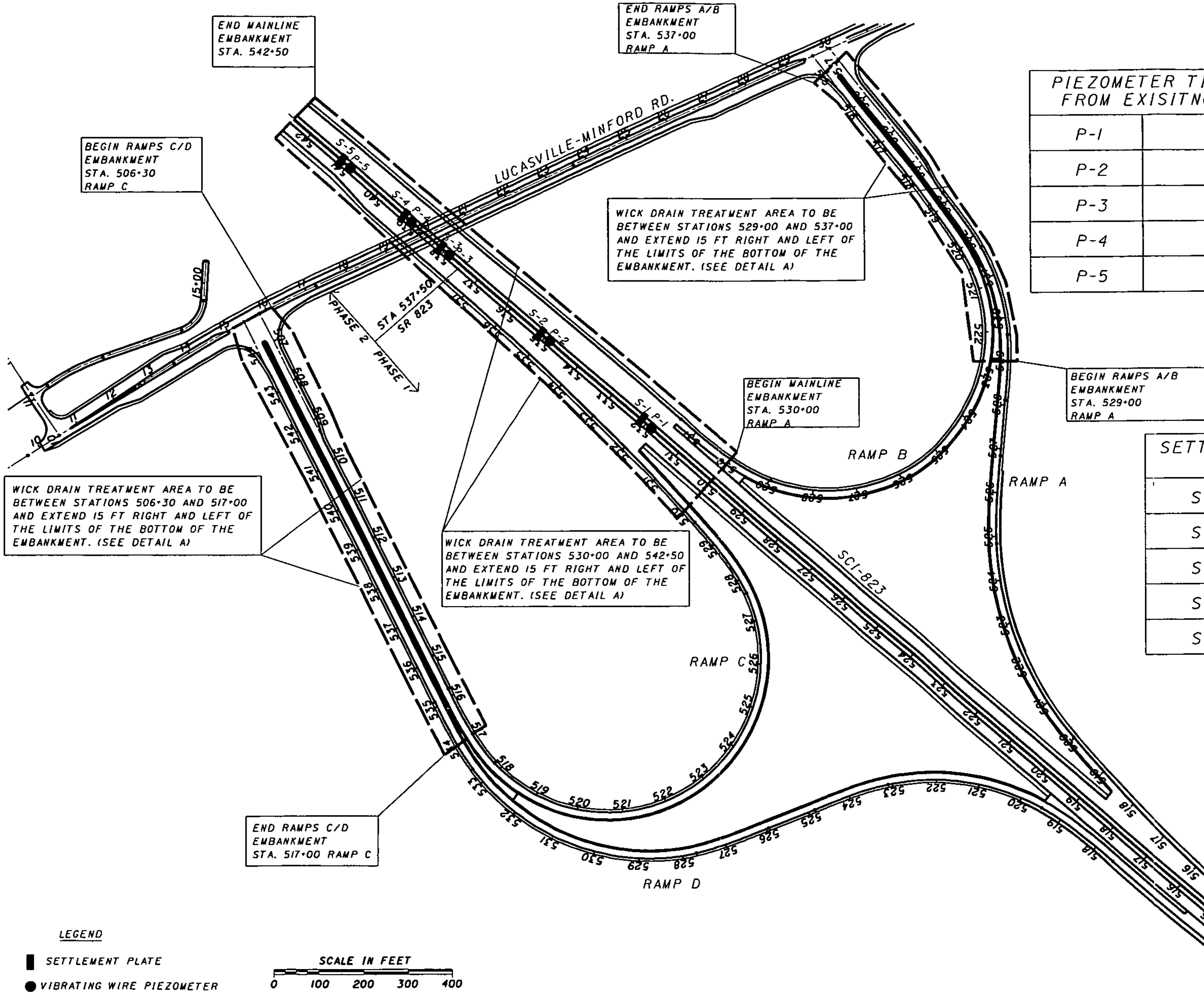
APPENDIX E

DLZ

APPENDIX E

Instrumentation Details

11/29/2006
2:19:55 PM
m:\proj\0121\3070.03\FinalDesign Plans\Wick Drains\Lucasville-Minford\mwickplan.dgn



PIEZOMETER TIP DEPTH FROM EXISITNG GRADE		SR 823 STATION
P-1	40 FT	531+95
P-2	40 FT	534+95
P-3	40 FT	537+95
P-4	40 FT	539+00
P-5	40 FT	540+90

SETTLEMENT PLATE LOCATIONS	
S-1	532+05
S-2	535+05
S-3	538+05
S-4	539+10
S-5	540+95

WICK DRAIN AND INSTRUMENTATION PLAN
LUCASVILLE-MINFORD INTERCHANGE

SCI-823-6.81

CALCULATED WMA
CHECKED AMJ

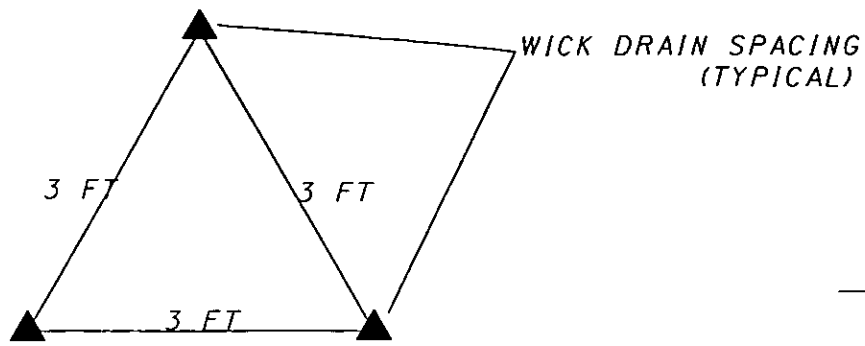
DLZ

1/2

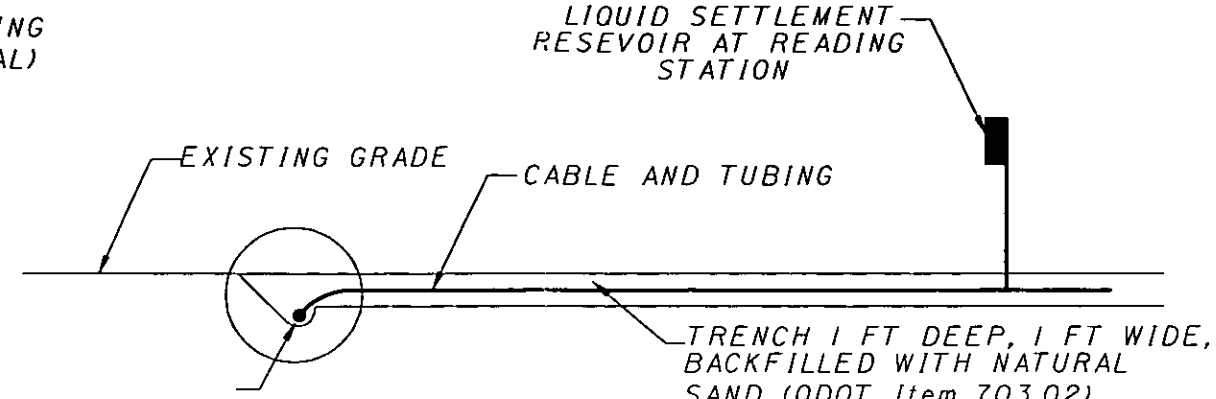
NOTES

1. PLACE 3 FEET OF ODOT ITEM 703.02 EMBANKMENT BEFORE THE INSTALLATION OF THE WICK DRAIN WICK DRAINS TO BE INSTALLED PRIOR TO EMBANKMENT CONSTRUCTION.
2. THE SAND SHALL CONSIST OF CLEAN, FREE-DRAINING, COARSE NATURAL SAND, OR SAND AND PEA GRAVEL, SHALL BE GRADED UNIFORMLY FROM COARSE TO FINE, AND SHALL BE OF SUCH SIZE THAT, WHEN TESTING ON U.S. STANDARD SIEVES IN ACCORDANCE WITH AASHTO T27 AND WASHING THE SAMPLE IN ACCORDANCE WITH AASHTO TII, SHALL CONFORM TO THE GRADING REQUIREMENTS OF ODOT CMS 703.02.
3. THE SAND SHALL NOT CONTAIN ANY ORGANIC OR OTHER DELETERIOUS MATERIALS AND SHALL NOT BE FROZEN WHEN PLACED.
4. IF DENSE SAND, GRAVEL OR HARD SOIL LAYERS ARE ENCOUNTERED BELOW THE GROUND SURFACE AND CANNOT BE PENETRATED WITH REASONABLE EFFORT, THE CONTRACTOR SHALL BE REQUIRED TO PRE-DRILL THE WICK DRAIN LOCATIONS.
5. WICK DRAINS SHALL BE INSTALLED FROM THE WORKING SURFACE TO THE DEPTH SHOWN IN THE PLANS, OR TO COMPLETELY PENETRATE THE COMPRESSIBLE FOUNDATION SOILS AT SUCH A DEPTH EITHER SHALLOWER OR DEEPER THAN PLAN DEPTH WHERE THE SOIL RESISTS A REASONABLE EFFORT AT FURTHER PENETRATION.
6. SETTLEMENT PLATES SHALL BE GEOKON MODEL 4600 OR EQUIVALENT.
7. VIBRATING WIRE PIEZOMETERS SHALL BE SLOPE INDICATOR MODEL 52611099 OR EQUIVALENT.
8. THE NUMBER OF WICKS IS ESTIMATED TO BE 93,000 AND THE AVERAGE WICK DRAIN DEPTH IS ESTIMATED TO BE 43 FEET FOR THE ENTIRE INTERCHANGE. THE TOTAL WICK DRAIN FOOTAGE AT THIS INTERSECTION IS ESTIMATED TO BE 3,999,999 LINEAR FEET.
9. THE MAINLINE EMBANKMENT AT THE LUCASVILLE MINFORD INTERCHANGE BETWEEN STATIONS 530+00 AND 542+50 SHALL BE CONSTRUCTED IN STAGES AND THE FOUNDATION PORE PRESSURES SHALL BE MONITORED. THE MAXIMUM HEIGHT OF THE INITIAL STAGE SHALL BE 32 FEET. IF AT ANY TIME, FOUNDATION PORE WATER PRESSURE HEAD IS AT OR HIGHER THAN THE EXISTING GROUND SURFACE IN THE INITIAL STAGE, THEN EMBANKMENT CONSTRUCTION SHALL STOP. IT IS ESTIMATED THAT THE INITIAL STAGE OF EMBANKMENT CONSTRUCTION WILL NEED TO CONSOLIDATE THE FOUNDATION SOILS FOR SIXTY DAYS BEFORE THE SUBSEQUENT STAGE OF THE EMBANKMENT IS PLACED.
10. THE ACTUAL WICK DRAIN TREATMENT AREA AND DEPTH MIGHT DIFFER FROM THE PROPOSED LIMITS DUE TO SOIL VARIATIONS AT THE SITE AND THEREFORE SHOULD BE CONFIRMED IN THE FIELD BY THE CONTRACTOR

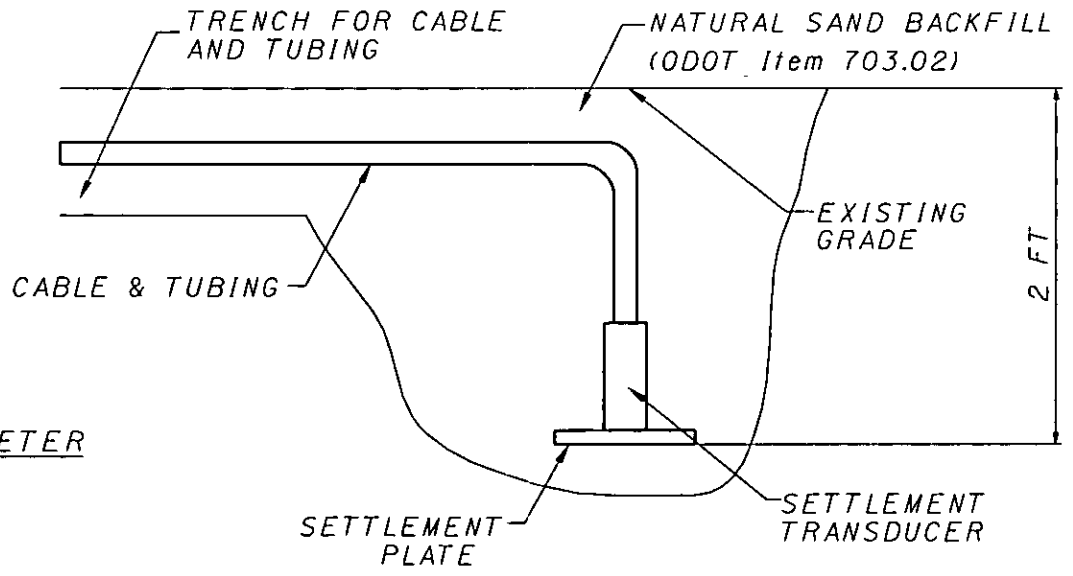
DETAIL "A"
WICK DRAIN TYPICAL LAYOUT-PLAN VIEW
(NOT TO SCALE)



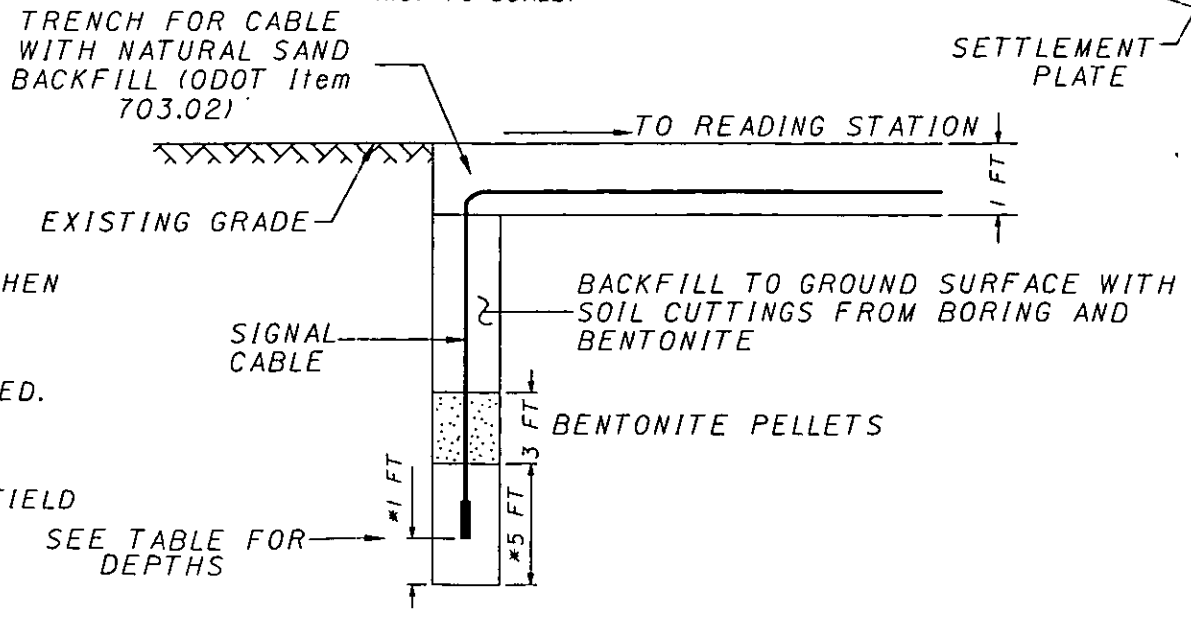
DETAIL "B"
INSTRUMENTATION DETAILS
(NOT TO SCALE)



SETTLEMENT PLATE DETAIL
(NOT TO SCALE)



VIBRATING WIRE PIEZOMETER
(NOT TO SCALE)



DLZ
CALCULATED WMA
CHECKED AMJ
INSTRUMENTATION DETAILS
LUCASVILLE-MINFORD INTERCHANGE
SCI-823-6.81
2/2

APPENDIX F

DLZ

APPENDIX F

Geotechnical Design Checklists

III.A. Centerline Cuts Checklist

C-R-S:SCI-823-6.81	PID: 19415	Reviewer: Dorothy Adams	Date: 11/29/2006

If you do not have a centerline cut on the project, you do not have to fill out this checklist.

Soil Cuts			
(Y) N X	1	Does drilling provide continuous stratigraphic sections for the range of elevations that represent proposed cut slope areas?	
(Y) N X	2	Do the cut slopes have a minimum stability F.S. of 1.30 and are not steeper than 2:1? Check stability calculation method used: (◘) STABL or equivalent software ◻ hand calculations	2. Cut in similar soils at Shumway Hollow Interchange is stable
Y (N) X	3	If there is a "red bed" or other historically unstable soil or rock layer through the cut slopes, was this layer considered as a possible failure zone?	
Y (N) X	4	Have erosion protection measures been addressed for backslopes, side slopes, and ditches (including riprap recommendations or special slope treatments)?	
Y N (X)	5	Have issues related to any special usage of excavated soils been addressed?	
	6	If the cut is not completely above the water table,	
Y N (X)		a Did the design consider the construction or long term ramifications of cutting below the water table?	
Y N (X)		b Did the design consider additional drainage in the cut slope (springs / seeps) and roadway base?	
Rock Slopes			
		For rockfall and additional design considerations, see the "Rockfall Corrections Checklist."	
(Y) N X	7	Has the subsurface exploration adequately characterized the rock in accordance with the Geotechnical Bulletin 3: Rock Cut Slope and Catchment Design (GB 3)?	7. to 10. See Rock Cut Report for details.
(Y) N X	8	Have the slope angles, benching scheme, rockfall catchment design, and drainage controls been determined as prescribed in GB 3?	
(Y) N X	9	In accordance with GB 3, are the rock cut slopes, benches, and catchment areas indicated on all appropriate cross-sections?	

III.A. Centerline Cuts Checklist

(Y)	N	X	10	In accordance with GB 3, has the rockfall catchment software analysis output and the cost analysis comparing catchment configurations been provided?	

Notes:

Stage 1:

III.B. Embankments Checklist

C-R-S: SCI-823-6.81	PID: 19415	Reviewer: Dorothy Adams	Date: 11-29-06

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 (□) 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 (□) 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 □ other List Other items:	

III.B. Embankments Checklist

(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?	13. Refer to report for bridge over Lucasville-Minford Road

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 (□) 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?	16.) Due to the large amount of rock to be excavated from adjacent cut sections, it is assumed that excavated rock will be used as fill to construct the embankments. The values selected are as follows; Total and Effective: cohesion = 0, friction angle = 35 degrees. Please refer to section 5.4.1 in the report for more information.
(Y) N X	17	Have calculations been performed to determine the F.S. for stability? Check method used: (□) 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	
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	

III.B. Embankments Checklist

				☐ 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**	
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?	31 a & c.) Information, Plan Notes, and Cross Section have been provided to TranSystems Corporation.
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?	
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: