REPORT

OF

SUBSURFACE INVESTIGATION

FOR

LUCASVILLE-MINFORD ROAD INTERCHANGE

PROJECT SCI-823-6.81

PHASE 1-STAGE I

SCIOTO COUNTY, OHIO

For:

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DLZ Job. No. 0121-3070.03 PID No. 19415

November 29, 2006

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APPENDIX A

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REPORT OF SUBSURFACE EXPLORATION FOR LUCASVILLE-MINFORD ROAD INTERCHANGE PROJECT SCI-823-6.81 PHASE 1-STAGE I

SCIOTO COUNTY, OHIO

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 asdrilled 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, P.E.

Geotechnical Engineer

Pete Nix, P.E.

Geotechnical Division Manager

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Dorothy a. adams



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.

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LEGEND - BORING LOG TERMINOLOGY

Explanation of each column, progressing from left to right

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.

- 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

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

Cohesive Soils - Consistency

	Unconfined Compression	Blows/Foot Standard	
Term	tons/sq.ft.	<u>Penetration</u>	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".
- Texture is based on the Ohio Department of Transportation Classification System. Soil particle size definitions are as follows:

<u>Description</u>	<u>Size</u>	Description	<u>Size</u>
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

- The main soil component is listed first. The minor components are listed in order of decreasing percentage of particle size.
- Modifiers to main soil descriptions are indicated as a percentage by weight of particle sizes.

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

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

<u>Term</u>

Relative Moisture or Appearance

Dry

No moisture present

Damp

Internal moisture, but none to little surface moisture

Moist Wet

Free water on surface Voids filled with free water

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

<u>Term</u>

Relative Moisture or Appearance

Dry

Powdery

Damp

Moisture content slightly below plastic limit

Moist

Very Hard

Moisture content above plastic limit but below liquid limit

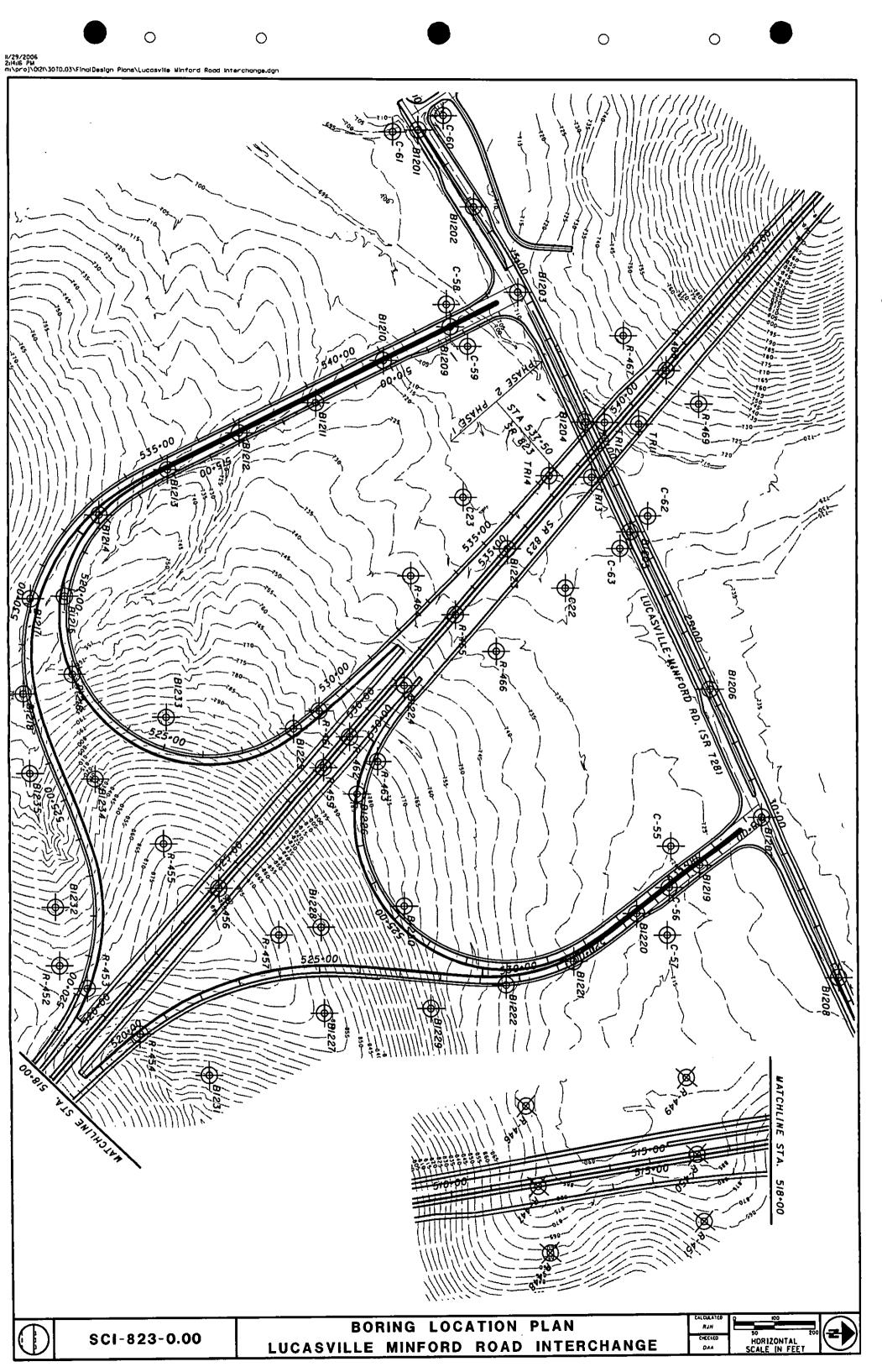
Wet

Moisture content above liquid limit

- 10. Rock Hardness and Rock Quality Designation
 - The following terms are used to describe the relative hardness of the bedrock.

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

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



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Client: T				4	7.	Sto	. 10+90.4, 6.9 ft. RT of Lucasville Minford Rd. CL Date Drilled: 07	/21	/05										
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_	714.7-	4 5 7	_10	1		1.5	Asphalt - 3" Aggregate Base - 7" FILL: Stiff brown SILT AND CLAY (A-6a), some gravel, some fine to coarse sand; contains asphalt and glass fragments; moist.	25			12			()) ,		•		
	710.5	11		3		4.5+	Hard brown SANDY SILT (A-4a), some gravel, little fine to coarse sand; damp. Very stiff brown SILT AND CLAY (A-6a), some gravel, little fine to coarse sand; damp to moist.	24			11				•	0)		
10.0	705. 5 -	4 6 7	18	4		2.0	Bottom of Boring - 10.0'								ď				
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LOG		_		2		ocation: Sta	. 13+24.7, 7.6 ft. LT of Lucasville Minford Rd. CL Date Drilled: 07	/21/			4									
Depth (ft)	Elev.	Blows per 6"	Recovery (in)	Sami No		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None DESCRIPTION	Aggregate	% C. Sand	M. Sand			6 Clay	Nat	ural l PL 1	Moist	PENI ure C	onten	t, % ⊣ Ll ○	- • -
0-	715.3	98	8	Drive	ď	(psi)		%	%	%	%	<u>*</u>	*		<u>10</u>	2	<i>o</i> 	30 : :	4)
1	714.5	6 5	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	-		46			q	•				
		3 5	20	2		2.0		5	4	-	4	38	49				•		Ţ	
5.5	709. 8	3 5 5	18	3		2.0	Stiff mottled brown and gray CLAY (A-7-6), trace fine to coarse sand; moist.	0	1		1	33	65		þ		•			
12.0	705.3	5 4 3	20	4		1.0	@ 8.0'-10.0', gray.							C	5					
15 -							Bottom of Boring - 10.0'													
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	F: Bo			3	L		. 15+63.3, 6.2 ft. RT of Lucasville Minford Rd. CL Date Drilled: 07	/21/		.45	TIC	A.1								-
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0-0.8	715.0 -714.1- -712.0-	8 7 5	17	1		3.0	Asphalt - 4" Aggregate Base - 6" FILL: Very stiff gray SILT (A-4b), trace gravel, trace fine to coarse sand; moist. Very stiff mottled brown and gray CLAY (A-7-6), trace fine to	2	3		1	58	34		ρ	•				52
5.0	710.0	3	12	3		1.5	coarse sand, trace gravel; moist. Stiff brown ELASTIC CLAY (A-7-5), trace fine to coarse sand; moist.	0	0		1		96	Υ •				 •		65
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Client: `	TranSy	stems,	Inc.				Project: SCI-823-0.00								Job N	lo. 01	121-3	3070.	.03
LOG C	F: Bo	ring E	3-120		_		. 19+24.7, 6.1 ft. LT of Lucasville Minford Rd. CL Date Drilled: 07	/21/		RAD.	ATIC	24/	_						
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None DESCRIPTION	% Aggregate		Sand		% Sitt	% Clay	Natur Pl	al Mo	D PEi isture s per fo 20	Conte	nt, % → L	- •
0 — 0.8 <u>-</u> 3.0 —		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. Medium stiff to stiff brown SILT (A-4b), little fine to coarse sand;	14	9	-					•	+)	
5.5 - 5.5	709.0-	5 5	18	3		1.0 1.0	moist. Medium stiff to stiff reddish brown SANDY SILT (A-4a), some	ľ						Ç	•	(
	706.5 704.5	3 4	19	4		2.5	fine to coarse sand, little gravel, little clay; damp to moist. Very stiff gray CLAY (A-7-6), trace fine to coarse sand; laminated; moist.							O					
15 — 20 —							Bottom of Boring - 10.0'												

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Client	TranSy	stems	Inc		-		Project: SCI-823-0.00	-00							Job	Vo. ()121	1-307	0.0	3
	F: Bo			5	1	ocation: Sta	. 22+17.7, 7.9 ft. RT of Lucasville Minford Rd. CL Date Drilled: 07	/21	05											
Depth (ft)	Elev. (ft) 719.9	Blows per 6"	Recovery (in)	Drive Drive			WATER OBSERVATIONS: Water seepage at: None Water level at completion: None DESCRIPTION	% Aggragate			% F. Sand		% Clay	ST/ Natu	ANDAI Iral Mo PL ⊢ Blow 10	isture	e Cor	ntent,	% - LL	
0 — 1.0— - 3.0—	718.9 716.9	5	16	1		2.0	Asphalt - 4" Aggregate Base - 8" FILL: Stiff to very stiff mottled brown and gray SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.	5					32		$\frac{1}{\gamma}$					
5.0-	714.9	7 5	14	2		3.5	Very stiff gray SANDY SILT (A-4a), some fine to coarse sand, little gravel; damp. Stiff brown CLAY (A-7-6), trace fine to coarse sand; moist.	14	12		11				Þ	,	+			5(
-	-	5 3	20	3		1.5		0	0	-	1	15	84	Ç	S					
-10.0-	709.9	2 3 3	21	4		1.0								d						
20 —							Bottom of Boring - 10.0'													

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	2. Blows per 6"	Recovery (in)	Samp No.	ole		Project: SCI-823-0.00 . 26+54.5, 7.1 ft. LT of Lucasville Minford Rd. CL Date Drilled: 07. WATER OBSERVATIONS: Water seepage at: None Water level at completion: None		GF		TION		s			PENE		ION (F	
(ft) 729.6 728. 0	Blows per		No.	Core	Hand Penetro- meter (tsf) / * Point-Load Strength	OBSERVATIONS: Water seepage at: None	egate					s						
	5 5				(17	DESCRIPTION	% Aggregate	% C. Sar	% M. Sar	% F. Sand	% Clay	Na	PL H				LL	•
	3 4	20	1		2.0	Asphalt - 4" Aggregate Base - 8" FILL: Stiff to very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp to moist. Very stiff mottled brown and gray SILTY CLAY (A-6b), trace fine	4	6		8 5) O	•				
724. 6	⁷ 6 5 4 5 7 6	22	3		2.5 2.0	to coarse sand; moist. Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.	5	13		7 6			QQ			-4		
719.6	3 8 11 11	21	4		2.0	Bottom of Boring - 10.0') 				
								<u>:</u>										
		3 8 11	3 8 11 21	3 8 11 21	3 8 11 21	3 8 11 21 4 2.0	Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.	Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.	Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.	Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.	Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.	Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist. Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.	Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.	Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.	Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.	Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.	Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.	Stiff to very stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.

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Client:	TranSy	stems	. Inc.				Project: SCI-823-0.00								Jol	No.	012	1-307	0.03	
	F: Bo			7	7	ocation: Sta	. 29+94.9, 7.1 ft. RT of Lucasville Minford Rd. CL Date Drilled: 07	/21/	05											
				Samp No.	ole		WATER	H		RAD.	ATIC	NC								
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Drive	Press / Core	Penetro- meter (tsf) / * Point-Load Strength (psi)	Water seepage at: None Observed Water level at completion: None DESCRIPTION	% Aggregate	6 C. Sand	% M. Sand	F. Sand	e Sitt	6 Clay	Nat	ural M PL ⊢ Blo	Aoisti	ire Co	TRATI	% - LL	•
0-	732.3	80	œ	٥	<u> </u>		Asphalt - 3" Aggregate Base - 7"	%	%	*	%	%	%	111	10 : : :	2() 	30 : : :	<u>40</u>	
-		13 12 8	17	1			Medium dense gray SILT (A-4b), little fine to coarse sand, trace gravel; damp to moist.	2	6		6	70	16			7	5			
3.0	729.3	1 1 1	24	2	į	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) O			•			
		6 7	24	3		2.0		11	5	-	5	54	25			•		+		
	722.3-	6 8 9	20	4		2.5					ł					ζ ,				
15 — 20 —							Bottom of Boring - 10.0'													

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

Client:	TranSy	stems	, Inc.				Project: SCI-823-0.00								Job	No.	0121	-3070	.03_	4
	OF: Bo			8	l	ocation: Sta	1. 34+35.0, 6.8 ft. LT of Lucasville Minford Rd. CL Date Drilled: 07	/21/			4 =									4
Depth (ft)	Elev.	Blows per 6"	Recovery (in)	Samj No		Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None DESCRIPTION	% Aggregate		% M. Sand			6 Clay	Natu F	ral Me L ⊢ Blov	oistur vs pei	e Con	- 0		,
0-	729.6	eg B	& &	Driva	å	(psi)		%	8	%	%	8	%	111	10 : :	- 20	111	<u> </u>	40	$\overline{\top}$
	i i	15 9 4	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		Q.	•				
3.0	726. 6 -	9 13 10		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		-			28				?			
	-	11 10 12	20	3		2.5		12	9	-	11	47	21)	†! 		
7.5	722.1- - - 719.6	3 5	7 24	4		3.0	Very stiff gray CLAY (A-7-6), trace fine to coarse sand; laminated; moist.								ď					
FILE: 0121-3070-03 11/21/2006 2:17 PM 20-0721-3070-03 11/21/2006 2:17 PM 20-0721-3070-03							Bottom of Boring - 10.0'													

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

00:4 7	[eoc Sec	1000	Inc				Project: SCI-823-0.00								Job	No.	0121	-307	0.03	
Client: T					٦.	anation, Sto	. 508+24.4, 19.7 ft. RT of SR 728 Ramp C BL Date Drilled: 07	127	05											
LOG O	r: 60	rın g l	D-1∠U:	Samo	_		WATER	<u> </u>		RAD	ATIC	N		_						
Depth	Elev.	per 6"	ry (in)	No.			OBSERVATIONS: Water seepage at: Not reported Water level at completion: 20.0'	regate	Sand	and	Sand			Natu		oistui		TRATII	-	v) •
(ft)	(ft) 704.9	Blows	Кесоvегу	Drive	Press/		DESCRIPTION	% Aggregate	Ü	Σ	u:	% Sill					r foot	_		;;;
0.3	704.6	1 2 3	16	1			Topsoil - 4" Loose brown SILT (A-4b), some clay, trace to little fine to	0	3	-	7	68	22	0			4			
-	1	3 3	15	2	ļ.		coarse sand, trace gravel; damp to moist.	3	2	-	6	67	22	<u></u>		•	1			
3.0	701.9	3 6 13	17	3	į		Medium dense brown SANDY SILT (A-4a), some gravel, little clay; damp.	26	18	-	16	29	11	<u> </u>		J	-1			
5—		5 10 9	14	4		_		34	12	-	12	30	12							
6.0	698.9	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.							(
10 —	696.4	4 7	17	6	ļ	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.		1		i				þ					
-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.							Ó	/					
15 —	-	0 1	18	8		0.75		0	0		0	10	90	.,/ Ф			H		•	55
		0 0	18	9		0.75		0	0	-	0	18	82	Q.						: :54
E 20 —	_				P1	0	@ 18.0', PSI - 50 → 75 max				}									1 2 4 1 1 3 4 4 1 3 4 4 1 3 4 4 1 3 4 4 1 4 1 7 1 4 1 7 1 4 1 7
_	683.9	8 9	18	11		3.5	Very stiff brown SILT (A-4b), some fine to coarse sand, trace clay; damp.			-		į				\)			
25.0-23.5	681.4	4 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.	-	}					C						
23	-	8 25 40	18	13		-													<u> </u>	-)65 -
—28.5 —29.4—	676.4 675.5	20 50/5	11	14	\perp		Decomposed gray SILTSTONE.													50+

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

Client:	TranSv	stems	. Inc.				Project: SCI-823-0.00								Job N	. 0121	-3070.0	3
LOG				9	7 1	ocation: Sta	a. 508+24.4, 19.7 ft. RT of SR 728 Ramp C BL	Date Drilled: 07	/27									
				Sam No	ole	Hand	WATER OBSERVATIONS: Water seepage at: Not reported				RAD.	ATIC	אכ	\dashv				
	1		(in)			Penetro- meter	Water level at completion: 20.0'		ę.						STANDAR	PENE	TRATION	(N)
Depth	Elev.	9er 6	1 1		Š	(tsf) / * Point-Load			regal	and	and	and			Natural Moi:		ntent, % - ── LL	
(ft)	(ft) 674.9	Blows per (Recovery	Drive	Press / Core	Strength (psi)	DESCRIPTION		% Agg	% C. S	% M. Sand	% F. S	% Sitt	% Clay	Blows	per foot 20		
30 —	014.8						Bottom of Boring - 29.4'											
35 — 40 — 55 —																		

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

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

Clion	ı. T	ranSy	stems	Inc				Project: SCI-823-0.00		_						Job I	Vo. (121	-3070	0.03	
		F: Bo			0	٦,	ocation: Sta	1. 540+98.2, 22.7 ft. RT of SR 728 Ramp D BL Date Drilled: 07	/27/	/05											
		50			Samı No	ole	Hand Penetro-	WATER OBSERVATIONS: Water seepage at: Not reported			RAD	ATIC	N							-	
Dep		Elev.	s per 6"	very (in)	ļ	Core	meter (tsf) / * Point-Load Strength	Water level at completion: 30.0' (prior to coring) 0.5' (Includes drilling water)	% Aggregate	Sand	Sand	Sand	tt	Clay	Natu	ral Mo L ⊢	isture	e Cor		6 - LL	
(ft)	'	<i>(ft)</i> 71 <u>6.</u> 5	Blows	Recovery	Drive	Press.	(psi)	DESCRIPTION	% Ag	8	% M	% F. S	% S			Blow.	s per 20	foot	· ()	40	
0.3 1.5		-716.2 -715.0-	2 2	12	1		2.5	Topsoil - 3" Very stiff brown SANDY SILT (A-4a), some fine to coarse sand,	6	7	_	22	42	23	Q	•					
-3.0		713.5	5	11	2		~	\trace gravel; damp to moist. \trace Very stiff brown SILT AND CLAY (A-6a), some fine to coarse	12	3	-	19	39	27		8			†!!!		
		Į.	4	15	3		3.0	\sand, little gravel; damp. Very stiff light brown SILTY CLAY (A-6b), little fine to coarse	0	1	-	12	46	41	l	<u>[] </u>			 		
4.5	í —	-712.0 -	3 3 5	12	4		4.5	\sand; moist.	1	0	-	2	38	59		,	+				
	1		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.			!				Ç)					
10	- -		3 3	13	6	}	2.75			<u> </u>			ı		<i>ф</i>						
	-		3 4	16	7		2.0		0	0	-	1	5	94) ဝို			,			65
15	- -		2	18	8		2.5	@ 13.5'-15.0', gray.		i					φ						
_	-					P-9			!												
11/28/2006 1:49 PM	- 		1 3 3	18	10		1.25	@ 18.5'-30.0', medium stiff to stiff, gray.							ļ						
11/28/200	-		1 2	18	11		0.75	@ 22.4'-22.5', silt lens.							\$						
70-02-0	- 5 —		0 1	18	12		0.75								<i> </i> 						
75 25 25 25 25 25 25 25 25 25 25 25 25 25	-	-	1 1	18	13		1.0								Q						
30	_		1 2	18	14		1.25														

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

		_					DLZ OHIO INC. 6121 HUNTLEY ROAD, CO BUS, OHIO 43229 (614)880		-				 .,,	ob No.	0121	3070	.03
Client: 1					7.		Project: SCI-823-0.00 . 540+98.2, 22.7 ft. RT of SR 728 Ramp D BL Date Drilled: 07	127	05	_			 10.				
LOGO	F: Bo	ring E	3-1210	Samp	_	ocation: Sta	WATER			RADI	ATIO	N				_	
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Drive No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: Not reported Water level at completion: 30.0' (prior to coring) 0.5' (Includes drilling water)	% Aggregate	% C. Sand	Z.	% F. Sand	% Silt	Vatural PL	Moistu ——	PENET re Con er foot	tent, % L	- •
30 —	686.5						Stiff gray CLAY (A-7-6), trace fine to coarse sand, trace gravel; moist.										
35 —	683.0	2 11 19	18	15			Severely weathered gray SANDSTONE, contains few rust stains.										
40 —		19 22 33	18	16		,											<u></u>
43.5	673.0	50/2	2	17		-	Severely weathered gray SILTSTONE.				Ì						50+
E 50	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.										
51.5	665.0				_		Bottom of Boring - 51.5'					:					
File: 0121-3070-03	-				!												

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

Client:	TranSy	stems.	Inc.				Project: SCI-823-0.00							Job i	Vo. C	121	-3070	0.03	3
	F: Bo			1	L		. 512+06.9, 0.5 ft. LT of SR 728 Ramp C BL Date Drilled: 07	/28/											
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: 37.0' (approx.) Water level at completion: 40.5' DESCRIPTION	% Aggregate	Í		% F. Sand	Sift	Clay	STANDAI Natural Mo PL ⊢ Blow	isture	Con	tent, 9	6 - LL	v) •
1	715.3 715.1 713.8	2 3	운 14	1 Drive	Pre	(psi) 	\Topsoil - 2" Medium stiff brown SILT (A-4b), some fine to coarse sand,	4	% 4		19		21	10 ♀	20	3	30	40	52
		3 3 4 2 3 4	15 10	2 3		3.5	\trace gravel; contains roots; damp. Stiff to very stiff brown CLAY (A-7-6), trace fine to coarse sand; damp to moist.	0	0		i	- 1	73 93	Ö Ö	+	H			1
5-	-	2 2 3	17	4 5		2.5 2.0	@ 6.0'-7.5', contains sand lenses.	0	0		0	8	92) ()					.60
10 —	- - -	1 3 3	18	6		2.5			i i			i		Υ 		,			
	- - - -	2 2 3	18	7		2.5		0	o		0	16	84	<i>ф</i>			•		55
15 —	-	1 2 2	18	8		1.25				!	ı.			, i					
	-				P9														
20 —	- - -	1 2 2	18	10		1.25	@ 21.0'-22.5', contains silt lenses.							þ					
	_	2 3	18	11		1.0	W 21.0-22.3, CORRAINS SIR ICHSCS.						ļ	o I					
25 —	-	2 2	18	12	1	1.25								Ò					
	-	2 2	18	13		1.25								ļ Ċ					
30	7	3 ,	18	14		1.25				•									<u> </u>

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C

MBUS, OHIO 43229 * (614)888-0040

Client [.]	TranSy	/stems	. Inc.				Project: SCI-823-0.00							<u> </u>	Job No.	0121	-3070	.03
	OF: Bo			1	L	ocation: Sta	. 512+06.9, 0.5 ft. LT of SR 728 Ramp C BL Date Drilled: 07	/28										
			(in)	Sam _i No	ole	Hand Penetro- meter	WATER OBSERVATIONS: Water seepage at: 37.0' (approx.) Water level at completion: 40.5'	ate			ATIO	N 	_		IDARD			
Depth (ft)	Elev. (ft) 685.3	Blows per 6"	Recovery	Drive	Press / Core	(tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	PL	al Moist Hows p	er foot		LL
30 -	-	1 3	1 18	15		1.5	Medium stiff to stiff brown CLAY (A-7-6), trace fine to coarse sand, moist. @ 31.0'-32.5', contains silt lenses.) O				
35 -	- - -	2 3	5 18	16		0.75	@ 33.5'-35.0', contains numerous silt lenses.							Ò	,			
	- - - -						:									<i>†</i>)	
38.5- 40 -		37	4 16	17		į	Dense gray SANDY SILT (A-4a), some fine to coarse sand, little to some gravel, trace clay; contains few rust stains; damp.	2										O61−
43.5	- - - - - - - - - - - - - - - - - - -	50/3	3	18			Decomposed gray SILTSTONE.											50+
45 -	-		ļ		ļ		Bottom of Boring - 43.8'	:				 						
:17 PM]	- - -				ŀ				ļ									
11/21/2006 2:17 PM								;				•						
-1	- - -																	
FILE: 0121-3070-03									1									
60	+											<u>.</u>						

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C. 1885, OHIO 43229 * (614)888-0040

Client:	TranSy	stems	. Inc.				Project: SCI-823-0.00								Joi	b No.	013	21-3	3070.0	03
_	OF: Bo			2	L	ocation: Sta	. 536+98.4, 23.5 ft. RT of SR 728 Ramp D BL Date Drilled: 07	/28/												
				Samp No.	ole		WATER OBSERVATIONS: Water seepage at: Not reported		GR	ADA	ATIO	<u>N</u>	-							
		.0	(iu)		و	meter	Water level at completion: Not reported	욡	_			l							ATION	(N)
Depth	Elev.	per	ery		/ Core	(tsf) / * Point-Load		gerg	Sand	Sand	Sand		اج		urai i PL +		ure C	Orne	nt, % · —∣ LL	
(ft)	(ft) 721.5	lows	Recovery	Drive	Press	Strength (psi)	DESCRIPTION	% Aggregate	ა %	Σ	u:	% Silt	% Clay				er fo	ot - 30	0	0
— 0.1∓	721.4	3 5		1			Topsoil - 1"	٥	1	_	10	57	32		•	ı.		1		
		8	3 14				Stiff brown SILT (A-4b), some clay, little fine to coarse sand;	ا ا			اما	ام	20							
3.0	718.5	10	13	2			damp.	0	1	-	13	°	26			7	5			
	-	7,	3 14	3			Stiff brown SANDY SILT (A-4a), some fine to coarse sand, little gravel; damp.	14	6	-	17	43	20			4 				64
4.5	716.8	3 5	7 13	4	١	4.5	@ 4.5'-4.7', hard silt layers.	0	0		0	8	92							
		5 8		5		4.5+	Hard mottled brown and gray CLAY (A-7-6), trace fine sand, trace silt; contains trace carbonaceous material; damp to moist.								Μ	\ \ \	Ļ			
	_		10)	[
40	7	6	B 18	6		4.25										3				
10-	710.5																			5
11.0	- 10.3	3 5	6 18	7		2.25	Stiff to very stiff gray CLAY (A-7-6), trace to little silt; damp to moist.	0	٥	-	0	10	90		8			•		
	_	3 3	4 18	8		1.75								٠	\/ \					
15 -							@ 46 0' 17 5' mottled brown and gray													
_	-	3	5 18	9		1.5	@ 16.0'-17.5', mottled brown and gray.													
71:2 20 -		2 2	3 18	10		1.25								,						
	-		31 10	1					Ì					Ι Υ						
11/21/2006	7	1 8	3 18	11		1.5		0	0	-	0	13	87		Ŋ					
- 11	4			U																
FILE: 0121-3070-03	_	3	3 18	12		1.5									5					
121-3(-	2 2	+	∐		1.25														
0 	7	3	3 18	13		1.25	@ 27.4'-27.5', silt layer.)					
E]	1	 	╽								1								
30	1	3	3 18	14	<u>L</u>	1.0		<u> </u>			<u>L</u> _	L		لج	ΥL	<u> </u>	<u> </u>		<u> </u>	

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

Client:	CronQu	o mo	lnc				Project: SCI-823-0.00								Job	No. (0121	-3070	0.03
LOG C				2	٦,	ocation: Sta	. 536+98.4, 23.5 ft. RT of SR 728 Ramp D BL Date Drilled: 07	/28	05										
	. 50	mg		Samp No.	ole		WATER			RAD.	ATIC	NC	\square						
			(in)			Penetro- meter	Water seepage at: Not reported Water level at completion: Not reported	6						ST	ANDA	RD P	ENET	RATIO	N (N)
00045	Elev.	er 6.	l . I	ı	ပ္ပြ	(tsf) / * Point-Load		egat	Sand	and	Sand							itent, %	
Depth (ft)	(ft)	Blows per 6	Recovery	g	Press /	Strength	DESCRIPTION	% Aggregate	ان	M. Sand	u:	Silt	Clay	,				- 0	
30	691.5	98	8	Drive	8	(psi)	DESCRIPTION	%	%	%	%	%	8	···	10	20	111	30 1 : : : :	40
-							Stiff gray CLAY (A-7-6); damp.		:										
-	1	1 2 2	18	15		1.0								Щ					
35 —	1 1 1 - 1		. 10				C 00 51 40 01 partoine feverille larges			i)					
1 -	┪	1 2	18	16		1.0	@ 38.5'-40.0', contains few silt lenses.							Д					
40 —	678.0	7			ļ		Medium dense gray SANDY SILT (A-4a), some fine to coarse			i				,					
45 —		8	18	17			sand, little gravel, trace clay; damp to moist. (possible decomposed sandstone)	1								8	/	<i></i>	
₹ 48.5 ⊆	673.0	50/5	5	18			Decomposed Gray SILTSTONE.	1											50+
-50.00 -5	671.5	Core 78"	Rec 75"	RQC 91%	R-	*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.												
-56.5	665.0						Bottom of Boring - 56.5'	i											

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

Client:	: Tr	ranSy	stems	, Inc.				Project: SCI-823-0.00		=						Job No	. 012	21-30	70.0)3
LOG	OF	: Bo	ring	B-121			ocation: Sta	i. 516+09.5, 14.6 ft. RT of SR 728 Ramp C BL Date Drilled: 07	/28/											
Depti (ft)		Elev. (ft) 733.6	Blows per 6"	Recovery (in)	Sami No Prive		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: Not reported Water level at completion: 4.0' DESCRIPTION	% Aggregate		M. Sand	% F. Sand	Silt	% Clay	Natur	NDARD al Moist Blows p 0 2	ure Co	onten	t, % - ⊣ LL	- •
3.0		730.6	2 2 2 3 4	15	1 2		2.5 3.5	No topsoil Very stiff light brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp to moist. Very stiff light brown ELASTIC CLAY (A-7-5); damp.	6	4	-	6	57 51	32	QQ	•				62
4. 5 5 -	- -	729.1-	3 3	. <u>.</u>	4		3.25	Stiff to very stiff light brown CLAY (A-7-6), trace fine to coarse sand; contains occasional silt lenses; moist.	0	0	1	٥١	13	87	<u>ـ ا</u>					
10 -			3 5 2 4 3	18	6		3.0 2.5								ф /- ф					
	1 1 1 1		3 4	18	7		2.75								Q-~					
15 -			3 3 4	18	9		2.25 0.75	@ 16.0'-17.5', medium stiff, gray, no silt lenses.							¢ Į)				
20 -			² 2 ₂	18	10		1.0								, О					ς.
-	-		1 2 3	18	12	P-1	1.0		0	0	***	0	13	87) <u>-</u>		•	
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.	<u> </u>) - - 				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
30	\exists		2 3 3	18	14		1.25													

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C 480, OHIO 43229 * (614)888-0040

Client:	FranSv	steme	Inc			=	Project: SCI-823-0.00							Job No	. 0121-3070.03
LOG C				3	7,	ocation: Sta	. 516+09.5, 14.6 ft. RT of SR 728 Ramp C BL Date Drilled: 07	7/28	/05					1	
				Samp	ole	Hand	WATER	Ï			ATIC	N .			
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Drive	Press / Core	Penetro- meter (Isf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: Not reported Water level at completion: 4.0' DESCRIPTION	Aggregate	C. Sand	M. Sand	% F. Sand	% Sitt	Clay	Natural Mois PL ⊢—	PENETRATION (N) ture Content, % - LL per foot -
30 —	703.6	89	88	8	Œ	(psi)	DESCRIPTION	%	%	%	%	%	%	10	20 30 40
-							Medium stiff to stiff brown and gray CLAY (A-7-6), trace fine to coarse sand; damp.								
35 — - -		3 3	18	15		1.0	·		l .					ا	
40		3 4	18	16		1.0								<u>О</u>	
45		3 4	18	17		0.75								<u>.</u> П	
-500	}	3 3	18	18		1.0	·							Д	
50.0	683.6						Bottom of Boring - 50.0'								

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

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

Cli	ent:	ranSy	stems	, Inc.			•	Project: SCI-823-0.00						-	Je	b No. (121-30	070.03
		F: Bo			4	l	ocation: Sta	. 532+88.8, 30.5 ft. RT of SR 728 Ramp D BL Date Drilled: 07	//28	/05			to		07/29/05			· .
					Sam, No	ole		WATER OBSERVATIONS: Water seepage at: None	F			ATIO						
			.9	(in)		e e	meter (tsf) /	Water level at completion: 40.0' (Prior to coring) 4.0' (Includes drilling water)	ate	_								TION (N)
	epth (ft)	Elev. (ft)	Blows per 6"	Recovery		Press / Core	* Point-Load Strength	no (mades shining valer)	% Aggregate	Sand	Sand	Sand		ay			Conten	t, % -
).ĝ =	755.3 -755.1-	Blow	Rec	Drive	Pres	(psi)	DESCRIPTION	% Ag	% C	% M.	% F. S	% S	% Clay	Bi 10	ows per 20	foot - 30	O 40
Γ	J.Z	-/55.1 -	3 2	15	1		4.25	Topsoil - 2" Hard brown SILT (A-4b), little fine sand, trace gravel, trace clay;	}									
	- 3.0	-752 2	2 2 4	15	2		4.5+	contains few rust stains and rock fragments; damp.										
	J.U —	- 752.3-	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.										
-	3.5 	- 746.8-	3					Very stiff to hard brown CLAY (A-7-6); moist.	-									
	10 —		4 4	15	6		3.5	vory suit to haird brown OEAT (A-1-0), moist.							d			
	_		3 4 5	18	7		3.25											
	_			10											9			
	 15 —		¹ 3	18	8		3.5	@ 13.5'-17.5', brown and gray mottled.							ا بر			
	-		2 .		_													
_	1		4	18	9		4.25								þ			
2:17 PM	_		1 3		10		2.5											
.z 900	20 —		3	18_											🗘			
11/21/2006	•		3 3 4	18	11		1.5	@ 21.0'-30.0', stiff, gray.										
-1	 -									_			20					
FILE: 0121-3070-03	25					P-1			0	0	-	"	30	70				
0121-3	-		1 2		13		1.25											
II TE:	-		2	18	•		1120							1	¢			
	- 30		1 2 3	18	14		1.0											

FILE: 0121-3070-03 [11/21/2006

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

Client:	FranSv	stems	Inc.				Project: SCI-823-0.00	, , , , , , , , , , , , , , , , , , , 							Jab No	0121	3070	.03
LOG C				4	77	ocation: Sta	. 532+88.8, 30.5 ft. RT of SR 728 Ramp D BL Date Drilled: 07	/28	 /05			to		07/29/0				- -
				Samp	le	Hand	WATER			RAD	ATIC							-
Depth (ft)	Elev. (ft) 725.3	Blows per 6"	Recovery (in)	Drive	Press / Core	Penetro- meter (tsf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: None Water level at completion: 40.0' (Prior to coring) 4.0' (Includes drilling water) DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	Natur Pl	al Moist	PENETO	tent, %	- •
3ô.ô <u></u> _ _ _		13					Hard brown SANDY SILT (A-4a), little clay, trace gravel; contains rust stains; damp.							γ	/	/		
35 —		13 18 22	18	15		4.5+											7	
-38.5 40 -	716.8	12 16 30 50/4	18	16			Severely weathered brownish-gray to gray SILTSTONE, arenaceous.											λ ,
2005/17 PM]	710.3	Core 84"	Rec 83"	RQD 64%	R-1	*356	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. @ 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).											
FILE: 0121-3070-03 11/21	-703.3-						Bottom of Boring - 52.0'											

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

	Client:	ranSy	stems	, Inc.		_		Project: SCI-823-0.00							Job	No. 01	21-3070.	.03
	LOG O	F: Bo	ring	B-121				. 520+18.8, 7.9 ft. RT of SR 728 Ramp C BL Date Drilled: 9/	28/0									
			.9	(in)	Sam, No	<u> </u>	Hand Penetro- meter	WATER OBSERVATIONS: Water seepage at: 33.9' Water level at completion: 8.3' (includes drilling water)	ste			ATIO			STANDA		ETRATIOI	V (N)
	Depth (ft)	Elev. (ft) 754.4	Blows per	Recovery	Drive	Press / Core	(tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sano	% F. Sand	# Sitt	% Clay	Natural Me PL ⊢ Blow 10	oisture C s per for 20	—— L	_ L 10
	-0.4 -	- 754.0-	3 4 3	18	1		2.75	Topsoil - 5" Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand; damp.							ρ			
L	 4.0	- 750.4-	4 4	15	2		2.75								, c			
	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.							d			
	-		3 5	18	4		1.5	@ 7.0', thin sand seam.							¢			
	10		3	16	5		2.25) A			
	-		3 4	18	6		1.5								ļ ģ			
	15 —		3 5	18	7		2.5								þ			
_	- -		3 4	18	8		0.75	@ 16.0', becomes gray.							γ			
11/21/2006 2:17 PM	20 —		3 4	18	9		1.5								β			
11/21/20	-		3 4	18	10		0.5								þ			
-3070-03	25 —		3 4	18	11		0.5								Å			
elee: 0121-3070-03	-		3 6	18	12		<0.25	@ 26.0'-27.5', very soft.										
	 30					P-1												

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C 18US, OHIO 43229 * (614)888-0040

Clien	nt: Ti	ranSys	stems,	Inc.				Project: SCI-823-0.00								Job No.	0121	-3070.	.03
_			ring (_	5	L	ocation: Sta	. 520+18.8, 7.9 ft. RT of SR 728 Ramp C BL Date Drilled: 9/2	28/0	_									
Dep		Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.	Press / Core	Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: 33.9' Water level at completion: 8.3' (includes drilling water)	% Aggregate	Sand	M. Sand		% Sill	Clay	Natur PL		ure Cor	FRATIOI ntent, % ——↓ L	-
30	\perp	724.4	Blo	Rec	Drive	Pre	(psi)	DESCRIPTION	%	% C	8	%	%	%	10		ō ;	30	10
		-720. 5	R					Stiff brown CLAY (A-7-6), trace fine sand; moist.											
35	5		10	14	13b 13a		1.75	Dense brown FINE SAND (A-3), trace silt; moist.									<i>y</i>	Ö	
40	0 — - - - -	- 715.9 -	12 13		14			Hard gray SANDY SILT (A-4a), little fine to coarse sand, little clay; damp. (DECOMPOSED SILTSTONE)									, Q		
<u></u>	.5_	-710.9-	40 30/1		15			Gray SANDSTONE fragments	1										50+
4:		-7 IU.Z-	Core 60"	Rec 60"	RQD 50%	R-1	*440	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.					9						307
49 5	.2	- 705.2 -						Bottom of Boring - 49.2'											
6					<u> </u>						J.	<u> </u>	L		<u> </u>				<u> </u>

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

Client: 1	[rang.~	tome	Inc				Project: SCI-823-0.00					_		Joh	No. 012	1-3070.03	
LOG O				ß.	٦,	ocation: Sta	. 522+07.5, 16.1 ft. RT of SR 728 Ramp C BL Date Drilled: 9	28/	05			to	9/2	29/05			
1000	7. 50	IIIg	3-12-1	Samp	ole		WATER			RAL	ATIO		_				
Depth (ft)	Elev. (ft) 763.8	Blows per 6"	Recovery (in)	Drive No.	Press / Care	Penetro- meter (tsf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: 10.5' Water level at completion: None (prior to coring) 4.9' (includes drilling water) DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	#S %	% Clay	Natural M PL ⊢		<i>LL</i>	•
-0.3	763.5	3 4 6 7	24	1		3.5	Very stiff to hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp to moist.							 			
-		9 11 4 3	20_	2	j	4.5+								}) 		
5-		6 6	19	3		2.25								Ý			
-6.6	757.2	5	18	4A 4B	į	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 moisi							ά,	,		
10 —		12 18 20	18	5		4.25										7	
-11.0	-752. 8 -	16 38 50/5	15	6			Very dense brown and gray SILT (A-4b), some fine sand, trace gravel; damp.									5	50+
15—		50/5	_ 5	7			·										50+(
16.0 - -	-747. 8 -	50/5	_5_	8			Severely weathered brown and gray SILTSTONE, arenaceous occasional rust stains.										50+
-19.0-	744.8-	50/4	4	9	4		Medium hard gray SANDSTONE; very fine to fine grained,	\dashv									50+
20	739.8	Core 60"	Rec 60"	RQD 41%		*136	moderately to highly weathered, argillaceous, thickly bedded, highly fractured. @ 19.0' to 20.8', broken, highly weathered to decomposed, discolored fractures infilled with silty clay and sandstone fragments.										
25 —	-138.6						Bottom of Boring - 24.0'										

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

	Client: 1	<u> </u>	stems	, Inc.		_		Project: SCI-823-0.00							Job No. 0121-3070.03
	LOG O	F: Bo	ring	B-121		_		. 530+13.7, 4.8 ft. LT of SR 728 Ramp D BL Date Drilled: 08	/02	_			.		
	Depth (ft)	Elev. (ft) 764.4	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 18.0' Water level at completion: 22.0' (prior to coring) 11.0' (Includes drilling water) DESCRIPTION	% Aggregate		RAD pus W %			% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - PL
	-0.2 	764.2	3 5 10 5 11 12 5 6	18	1 2 3		4.5+ 3.75	Topsoil - 2" Very stiff to hard brown SILT (A-4b), some fine sand, little clay; contains rust stains; damp.			i)
-	-4. 5 -	-759.9-	3 3	13	4 5		4.5 3.5	Hard brown SANDY SILT (A-4a), little clay; contains rust stains; damp.				į			
	-7.0 -8.5 10	-757.4- -755.9-	5	11	6		3.5	Very stiff gray SILTY CLAY (A-6b), little fine sand; contains rust stains; moist. Very stiff brown SANDY SILT (A-4a), little gravel, trace to little clay; contains rust stains; damp.							
	- -		4 5	18	7		2.5	@ 11.0'-12.5', numerous interbedded sand seams.							<i> </i>
	13.5 15	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.							
11/28/2006 11:30 AM J	20—		1 2 2	18	10	9	<0.25	@ 18.5'-20.0', very soft, wet.							
-	-		² 7 4	15	11		2.75								
FILE: 0121-3070-03	25 — - -	1	19 14 20	<u> </u>	12		4.5+ 4.5+	@ 23.5'-30.0', hard.) , ,
	- -30	1	5 14 25	18	14		4.5+								

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

DLZ OHIO INC. * 6121 HUNTLEY ROAD, 0 MBUS, OHIO 43229 * (614)888-0040

000	[aa=0:	• • • • • •	I				DLZ OHIO INC 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 (614)8	xo-00	40		-				040	4 202	0.00	
Client:	_				_		Project: SCI-823-0.00		10-	 				Job No	. U12	1-307	0.03	
LOG C	F: BO	ring	B-121	7 Sami	_	.ocation: Sta	i. 530+13.7, 4.8 ft. LT of SR 728 Ramp D BL Date Drilled: 08	3/U2		1A T'	044				· · · -			
Depth (ft)	Elev. (ft) 734.4	Blows per 6"	Recovery (in)	Drive Drive		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: 18.0' Water level at completion: 22.0' (prior to coring) 11.0' (Includes drilling water) DESCRIPTION	% Aggregate		% F. Sand		% Clay	Natu P	NDARD ral Mois L Blows (ture Co	ntent, s	% - LL	
- -		50/4	4	E 15			Severely weathered gray SILTSTONE.											\ .o+(
-35.0 - - - - - 40	- 729.4-	Core 72"	Rec 72*	RQD 86%	R-1	*429	Hard gray SANDSTONE interbedded with few MUDSTONE layers; very fine grained, argillaceous, thickly bedded, slightly fractured. @ 35.1', 35.3', low angle fractures, pyritic.			:								
45 —		Core 120*	Rec 120"	RQD 99%	R-2	*409	@ 43.8'-43.9', argillaceous bands.											
50 —	-713.4-				,		@ 50.1'-50.5', fine grained sand layer.											
55— 	7 10.7						Bottom of Boring - 51.0°											

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

DLZ OHIO INC. * 6121 HUNTLEY ROAD,

	_			
MBUS,	OHIO	43229	•	(614)888-0040

Client:	TranS	ystem	s, Inc.	,			Project: SCI-823-0.00	-			_				Joh	No fi	121-	3070	.03
LOG				8	7	ocation: Sta	a. 527+80.1, 13.7 ft. LT of SR 728 Ramp D BL Date Drilled: 08	/02	/05						_ 555			20.0	
				Sam No	ple	Hand	WATER OBSERVATIONS: Water seepage at: 26.0'	<u> </u>			DATI	ON							
Depth (ft)	Elev (ft)	OWS	Recovery (in)	Drive	Press / Core	Penetro- meter (tsf) / * Point-Load Strength (psi)	Water level at completion: 29.0' (prior to coring) 13.0' (includes drilling water)	Aggregate	ان	M. Sand	և	Silt	Clay	Natu	ural Mo PL +	oisture	Cont	RATIO	- •
—0.2̂=	769.4 769.2	- 3	 "	<u> </u>	1		\Topsoil - 2"	%	%	%	%	%	%	::::	10 :::	20	30)	40 T:::
	1	9	14	1			Very stiff to hard brown SANDY SILT (A-4a), trace gravel, trace clay; contains roots; damp.							Q					
-	1	11 13	17	2		4.5+	say, comanic roots, camp.												
5 0	764.4	15	18	3		2.75										ر	$\sqcup \sqcup$		
-	-	5 5	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		\ \				
-	1	4	18	5		4.0								<i>J</i>					
10 —		3 3	12	6		2.5								0	,				
		3 5	12	7		2.75	@ 11.0'-12.5', trace silt.						!	Ì	5				
- 15 —		2 2	15	8		3.5								<i>d</i>					
_	<u>.</u>	2 2	18	9		2.0	@ 16.0'-17.5', contains fine to coarse sand seams.							0					
20 —					10									T					
-	748.4	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;	0	1	-	4	41	54	d				,	
-23.5 25	745.9	26 11 18	15	12			moist. Medium dense light brown and red SILT (A-4b), some fine to coarse sand, little gravel; moist.	19	3		23	5	 5	Non-P	tastic	,	0		
-	743.4	10	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 30	-740.9	2 5	12	14		3.5	Medium dense brown SILT (A-4b), some fine sand; moist.									1			

DLZ OHIO INC. * 6121 HUNTLEY ROAD, 0 MBUS, OHIO 43229 * (614)888-0040

Client:	TranS	vstem	Inc				Project: SCI-823-0.00				-	-:			loh M	n ()11	21-307	0.03
_	OF: B			8	٦,	ocation: Sta	1. 527+80.1, 13.7 ft. LT of SR 728 Ramp D BL Date Drilled: 08	/02	/05						200 141	J. U 12	- j-307	5.05
				Sam	ole		WATER			RAD	ATI	ON						
Depth (ft)	(ft) 739 4	Blows	Recovery (in)	Drive	Press / Care	Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: 26.0' Water level at completion: 29.0' (prior to coring) 13.0' (includes drilling water) DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	Natu P	ral Mois L ⊢— Blows	ture C	ontent, f	ON (N) % - ● LL) 40
30.0	7-739.4	3					Stiff brown SANDY SILT (A-4a), some fine to coarse sand, trace clay; moist.								Ĭ Į			
35	720.0	4	17	15		1.5	@ 34.5'-35.0', contains silt seams.						Í					
38. 5 -40	- - -	12	13	16		4.5	Severely weathered gray SILTSTONE, arenaceous.										Ò	
43.5 45 – 45 – 50 – 50 – 51.5	725.9	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.											
712/11) 50-020-03 (11/21/	717.9						Bottom of Boring - 51.5'											

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

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

	Client: T	ranSy:	stems	Inc.				Project: SCI-823-0.00								J	ob No	. 01	21-	3070	0.03	<u>, </u>	1
_	LOG O					_	ocation: Sta	. 516+57.6, 28.5 ft. LT of SR 728 Ramp B BL Date Drilled: 07	/28/														4
	Depth	Elev.	эөг 6 "	ny (in)	Sam, No.		Hand Penetro- meter (Isf) / * Point-Load	WATER OBSERVATIONS: Water seepage at: 41.0' (Prior to coring) Water level at completion: 12.5' (Including drilling water)	regate			ATIO Pue					DARD Moisi				6 -	v) •	
	(ft)	(ft) 722.6	Blows per	Recovery	Drive	Press / Care	Strength (psi)	DESCRIPTION	% Aggregate	% C. S	% M. S	% F. Sand	% Silt	% Clay	··		lows j	per fo	oot -				
Ī	—0.3 _	722.3	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		Я	1	•					
	-	<u> </u> 	2 2 1	18	2		2.0	illue line to coarse sand, trace graver, moist.	0	3		4	66	27	þ		-	•					
	5 — —6.0—	-716. 6-	1 3 5	17	3		3.5									b							
	_	1	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		\ \ \	}	•		#			
l	10 —	714.1-	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			\ \ \ \		7				
Ī	 11.0	711.0	2 4	16	6		3.25	Stiff to very stiff brown and gray CLAY (A-7-6); damp.	0	0	-	0	10	90) 		.	•			5	9
	15 —		2 5 2	17	7		2.75	@ 13.5'-15.0', contains occasional silt lenses.								\ ح							
	- - -		3	17	8		2.5									۱ أ							
6 2:17 PM	20 —	-	2 2	18	9		1.5	@ 18.5', becomes gray.							Ç	/ }							
11/21/200	- -		1 2	18	10		1.25								<i>ј</i> ф								
0121-3070-03 [25		1 2	17	11		0.5	@ 23.5'-25.0', medium stiff.							 								
FILE: 0121-3	-	-	1 2	11	12		1.25								¢)							
II.	- - - 30		2 3	17	13		1.25								١		* * * * * * * * * * * * * * * * * * *						

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

Client:	ranSy	stems	, Inc.				Project: SCI-823-0.00			_				<u>\</u>	Job N	<i>to.</i> 0	<u> 121-</u>	3070	.03
LOG 0	F: Bo	ring	B-121	9	L	ocation: Sta	. 516+57.6, 28.5 ft. LT of SR 728 Ramp B BL Date Drilled: 07	/28/											
Depth (ft)	Elev. (ft) 692.6	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 41.0' (Prior to coring) Water level at completion: 12.5' (Including drilling water) DESCRIPTION	% Aggregate			% F. Sand		% Clay	Natui Pi	al Mo		Cont	RATIOI ent, %	- •
30 —	002.0	2 2 3	18	14		1.0	Medium stiff to stiff gray CLAY (A-7-6), damp to moist.) 0					
35 —		1 2 3	17	15		0.75								0					
-	1	1 3 ₂	18_	16		0.75			i					Q					
40 — —41.0—	681.6	3 4	18	17		1.25	Medium stiff gray SILT (A-4b), little clay; wet.							Q					
-	679.1	6	17	18		0.75	Stiff gray CLAY (A-7-6), trace fine sand; contains silt lenses;	°	0	-			14 67		þ				
45 46.0	676.6	9	18	19		1.5	moist. Medium dense brown and gray SANDY SILT (A-4a), some			_	18	 	8	Q				Nd	n-Plastic
11.17 PM)	- - -i	12 13 13	20	20			gravel, some fine to coarse sand; damp to moist. @ 48.5'-50.0', contains sandstone fragments.						}			\Diamond			
	671.6	48 50/5	12	22			Severely weathered gray SILTSTONE.	-									δ	<i></i>	50+
71E: 0121-3070-03 [17]	669.1	Core 60*		RQD 68%	R-	1	Soft to medium hard gray SHALE interbedded with SANDSTONE; very fine to fine grained, highly weathered, laminated to thinly bedded, slightly fractured. @ 58.2'-58.3', sandstone seam.												
58.5	664.1						Bottom of Boring - 58.5				ļ								

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

	Client: T	ranSys	stems	, Inc.				Project: SCI-823-0.00								Jo	b No	. 0	121	-3070).03	<u>. </u>	1
	LOG O	F: Bo	ring	B-122			ocation: Sta	. 533+41.2, 13.9 ft. LT of SR 728 Ramp A BL Date Drilled: 7/2	29/0		14.5	. T.C		_		<u>-</u>							4
	Depth (ft)	Elev.	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 48.0' Water level at completion: 48.0' DESCRIPTION	% Aggregate	Sand	Σį	F. Sand		% Clay	Nat	ural PL	Mois	ture		_	6 - LL	V) ●	
	_0.3 	721.5 -721.2-		14	1 2		2.5 2.75	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			8						
	5— -		3 4 6 3 5	13_	3		2.25	·	0	3		10	50	37) O	1						
}	8.5 	713.0-	7 9	16	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			Ç				7		
ľ	 11.0 - -	710.5	4 	16	6		2.75	Very stiff light brown CLAY (A-7-6), trace fine to coarse sand; moist.	0	0	-	5	33	62				•					
	15 		3 6	15	7	P1	1	@ 14.9'-15.0', silt lens.								0			* 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
17 PM)	- 18.5	703.0	6 4 6		8	P2	3.0	Very stiff light brown SILTY CLAY (A-6b), little to some fine to	10	4 3		15	30	50		¢) \ \ H						
/21/2006 2:	20 		5 9	17	10		4.0	coarse sand, trace gravel; contains siltstone fragments; damp to moist. @ 21.0'-22.5', contains coal fragments.	7		-						Q \ \ \						
11 1 60-020	23.5 25	698.0			11	i	1.25	Stiff gray CLAY (A-7-6), trace fine to coarse sand; damp to moist.	0	0	-	0	11	89	Ç		,		-			*	4
FILE: 0121-3070-03	-	-	1 2	17	12		1.25						i		 							, , , , , , , , , , , , , , , , , , , ,	
ı	30	1	1 2	18	13		1.5																:

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

Client:	TranSy	stems	, Inc.				Project: SCI-823-0.00								Job	No. ()121-	3070.03	\Box
	OF: Bo				_		. 533+41.2, 13.9 ft. LT of SR 728 Ramp A BL Date Drilled: 7	7/29/											_
				Samp No.	le	Hand	WATER OBSERVATIONS: Water compage at: 48 0'	-	Τ	GRA.	DATI T	ION T							1
Depth (ft)	Elev.	Blows per 6	Recovery (in)		Press / Core	Penetro- meter (tsf) / * Point-Load Strength	Water level at completion: 48.0'	% Accreoate	2000	Sand	Sand	% Sitt	lay	Na	tural M PL ⊢	oisture	Cont	— LL	•
1	601.6	Blow	Rec	Drive	Pres	(psi)	DESCRIPTION	\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \	2 6	8 8	\$ %	8 %	% Clay		10	vs per 20	foot -) 40	
30 -							Medium stiff to stiff gray CLAY (A-7-6), trace fine to coarse sand; damp to moist.)					
	-	1 2	15	14		1.75	,		İ					Ţ					
35 -	-											ł							
l	-	2 4	18	15		0.75	@ 38.5'-40.0', contains silt lenses.					1							
40 - 45 -	-		17	16		1.5									Y	,	<i></i>		
49.0	672.5						Dense brown and gray SANDY SILT (A-4a), some fine to coarse sand, trace to little gravel; contains rock fragments; damp. Dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; wet. (possible heave) @ 53.5'-53.8', sandy silt seam.		0 1	13	- 2	0 40	17					Non-Pla	/
53.8 55.	667.7	50/3	4	18		2.25	Bottom of Boring - 53.8'											56	0+

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

Client:	ranSv	stems	Inc.				Project: SCI-823-0.00		7.0						Job I	vo. O	121-	3070.	.03
LOGO				1	ı	ocation: Sta	a. 520+43.5, 35.1 ft. LT of SR 728 Ramp B BL Date Drilled: 0	8/01	/05		-	-			1 000 /	-5. 0		,,,,	
				Sam _i No	ole	Hand	WATER	Ĺ			ATIO	ON							
Depth	Elev.	Blows per 6"	very (in)		/ Core	Penetro- meter (tsf) / * Point-Load	Water seepage at. 56.5 Water level at completion: Not reported	% Aggregate	Sand	Sand	Sand		у	Nati	ANDAF ural Mo PL ⊢	isture			- •
(ft)	(ft) 729.9		Recovery	Drive	Press	Strength (psi)	DESCRIPTION	% Ag	% C)	% M.	% F. Sand	% Silt	% Clay			s per f 20	oot - 30	0	10
0.3 - -	-729. 6 -	3 4	16	1		3.75	Very stiff to hard brown SILT AND CLAY (A-6a), little fine to coarse sand; damp to moist.							C	2				
-		11 6 7 10 2	16	2		4.0	@ 2.0'-4.0', contains trace carbonaceous material.								Ò				
5 		4 5 8	16	3,		2.5								(/				
	-721.4 -	12 9	17	4		4.5	Vancatiff to bond and the state of the state									þ			
10 —		9	15	5	D. 1	4.5 2.75	Very stiff to hard mottled brown and gray CLAY (A-7-6), trace fine to coarse sand; moist.			_		12	86			4			5
-		9 11	16	6		3.75			"		'	13	00						
- 15 —		2 2 4	17	7		2.5	@ 13.5'-22.5', brown.							Q	/				
-		2 3 4	17	8	P-2	2.0 3.5		0	0	-	٥	8	92	1 ا) 				1 6
- 20		2 3 3	16	9		3.0) 					
-		3 2 3	18	10		1.25	@ 21.0'-30.0', stiff.) 					
25 —		1 2 3	18	11		1.5	@ 23.5'-30.0', gray.		:										
25 		1 2 3	18	12		1.25								ΙΫ́					
30		1 3 3	18	13		1.5								Y			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

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

DLZ OHIO INC. * 6121 HUNTLEY ROAD, 4 MBUS, OHIO 43229 * (614)888-0040

Client:	Transv	stame	Inc			-	Project: SCI-823-0.00							Job No. 0121-3070.03
LOG C				1	٦,	ocation: Sta	. 520+43.5, 35.1 ft. LT of SR 728 Ramp B BL Date Drilled: 08	8/01	/05					000 110. 0121 001 0.00
				Sami	_		WATER	L		RAD	ATIO)N		
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Drive		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: 58.5' Water level at completion: Not reported DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - PL LL Blows per foot - 10 20 20 40
30 —	699.9	49	<u> </u>	3	1	<u> </u>	Stiff gray CLAY (A-7-6); moist.	+*	9.	12	8	8	6	10 20 30 40
35 —		1 3 2	18	14		1.25	Guil gray CEAT (A-7-0), moist.							
40 —		2 4 3	18	15		1.25	·							Ö
- - 45 —	- - - -	2 2 3	18	16		1.25								
50 —		² 3 3	18	17		1.0	@ 48.5'-50.0', contains numerous silt laminations.							O,
53.5	676.4	11 18 20	18	18		2.0	Stiff to very stiff gray SANDY SILT (A-4a); damp.							
- -59.0	670.9	12					@ 58.5'-59.0', very soft silty clay seam.							
-59.0 -60	6,0.9	21 46	15	19A		<0.25	Hard gray SILT (A-4b), trace clay; damp.			<u></u>				

DLZ OHIO INC. * 6121 HUNTLEY ROAD, 0 MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc	· · · · · ·	Project: SCI-823-0.00	~ (0		_	_			lob i	vo. 0121-3070.03	_
LOG OF: Boring B-1		ta. 520+43.5, 35.1 ft. LT of SR 728 Ramp B BL Date Drilled: 08	V/01	/05			_			40. 0121-3070.0 <u>3</u>	
Loc or . Bolling B-1	Sample	WATER	1			DATI	ON				
Depth Elev. 46 MOIS 669.9 669.9	No. Hand Penetro meter (tsf) / * Point-Lo Strengti	OBSERVATIONS: Water seepage at: 58.5' Water level at completion: Not reported	% Aggregate		% M. Sand		Silt	% Clay	Natural Mo PL ⊢	RD PENETRATION (N isture Content, % - LL s per foot - 20 30 40	
	RQD 62% R-1	Medium hard gray SHALE interbedded with SANDSTONE; very fine to fine grained, highly weathered, arenaceous, laminated to thinly bedded, highly fractured to broken.									
70 — 664.9 — 70 — 75 — 75 — 75 — 75 — 75 — 75 — 75		Bottom of Boring - 65.0'									

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

ſ	Client: 1	ranSys	stems	, Inc.				Project: SCI-823-0.00			_					Job	No.	012	1-30	070.0)3	7
_		F: Bo			2	L	ocation: Sta	. 529+64.0, 4.6 ft. RT of SR 728 Ramp A BL Date Drilled: 8	01/0	5			to	8	3/02/0	5						
Γ					Samp No.	ole	Hand	WATER OBSERVATIONS: Water seepage at: 68.5'	\vdash	GF	RAD.	ATIC	N 								_	
١			.9	(in)		9	Penetro- meter	Water seepage at. 66.5 Water level at completion: 74.0' (inside hollowstern augers)	ا و						STA	ANDA.	RD F	PENE	ETRA	TION	(N)	
	Depth	Elev.	per			, Co	(tsf) / * Point-Load		regai	Sand	M. Sand	Sand	1			iral Mo L ⊢	oistui	re Co	onteni	t, % - ⊣ LL		'
	(ft)	(ft) 744.9	Blows	Recovery	Drive	Press / Core	Strength (psi)	DESCRIPTION	% Aggregate	% C. S	% M.	% F. Sa	% Sitt	% Cla			/s pe 20	r foo	t - 30		0	
\mathbf{l}	-0.5	744.4	2 2					Topsoil - 6"		-		12		П			Ī					\blacksquare
L	-2.0	742.9	5	13	1		-	Very stiff brown SANDY SILT (A-4a), some fine to coarse sand little gravel; damp.	10	11	_	12	41	20	Q							
	-	1	8 12	13	2			Very stiff brown SILT (A-4b), some fine to coarse sand, trace gravel; damp.	2	9		16	52	21		•	À					
	-4.0 5	740.9	5 8	10	3		-	Stiff brown SILTY CLAY (A-6b), some fine to coarse sand, trac- gravel; damp.	7	8		13	44	28		ļ	/					
	_	-738.9 -737.5	5	6_	4		3.5	Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.								В						
	- 10 		2 3 4	15	5	<u> </u>	1.5	Stiff to very stiff mottled brown and gray CLAY (A-7-6), little silt; damp.	0	0		0	12	88	Ö			<u>, </u>			<u> </u>	59
	-		1 2 3	18	6		2.0								ó							
	15		1 3	18	7		2.5								i Ç							
_	-		3 4	18	8		2.5	·				!			\ 							
16 2:17 PM	20 —		3 4	18	9		1.75	@ 18.5'-30.0', gray.			į				Ç							
11/21/2006 2:17	- -		1 2 3	18	10		1.0	•							і ф							
-3070-03	25 		1 2 3	18	11		1.5								Q							
FILE: 0121-3070-03	- -		1 2 4	18	12		0.75		0	0	-	0	11	89	\ ф			+	+			-
	30 -		2 2 3	18	13		1.5															

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

Client:	TranSy	stems	, Inc.				Project: SCI-823-0.00					_				ob No.	012	1-3 <u>070</u>	.03
LOG				2	l	ocation: Sta	. 529+64.0, 4.6 ft. RT of SR 728 Ramp A BL Date Drilled: 8	/01				to		8/0	2/05				
				Samp No.	ole	Hand Penetro-	WATER OBSERVATIONS: Water seepage at: 68.5' Water level at completion: 74.0' (inside hollowstern augers)	}	T	GR.	ADA I	TION	<u>'</u>	1	STAN	DARD	PENE	TRATIO	N (N)
Depth	Elev.	Blows per 6"	ery (in)		/ Core	meter (tsf) / * Point-Load	vvater to to at compression, 14.0 (more necession engine		ж жадгедаге	Sand	Sand	% F. Sand % Silt	\ _ \			l Moist		ntent, %	- •
(ft) 30 —	(ft) 714.9	Blows	Recovery	Drive	Press	Strength (psi)	DESCRIPTION	, ,	8 X 8	ပ %	% ? ₹ !	% % T %	% Clay	<u> </u>		lows p		- () 30	40
-		2					Medium stiff to stiff gray CLAY (A-7-6), little silt; moist.												
35 —		2 2 3		14		0.5					ļ								
40 —	- - -	3	18	15		1.25									\Diamond				
45 —		WOH 2	1 18	16		1.5									0				
002/12/11 1/21/2006 2::7 PM 1 1 1 1 1 1 1 1 1		3	1 18	17		1.0		e e			1000								
TLE: 0121-3070-03 65	-	1 2	4 18	18		0.75									d \	N.			
38.5	686.4	2 8	1	19		0.5	Medium stiff gray SILT AND CLAY (A-6a), little fine sand;	7								χ.			
60	j	<u> </u>	9 18		┷		contains occasional silt lenses; moist	ئب					_						

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C 18US, OHIO 43229 * (614)888-0040

Client:	FranSv	stems	Inc.				Project: SCI-823-0.00								Job N	o. 01	21-30	70.03
LOGO				2	Tι	ocation: Sta	. 529+64.0, 4.6 ft. RT of SR 728 Ramp A BL Date Drilled: 8/0	01/0)5			to	8	/02/0	5			
				Sam _l No	ole	Hand	WATER OBSERVATIONS: Water seepage at: 68.5'		GI	RAD.	ĀTIC	NC						
Į.		•.	(in)		9	Penetro- meter	Water level at completion: 74.0' (inside hollowstem augers)	9	l					STA				ION (N)
Depth	Elev.	эөг б ⁻			ફે	(tsf) / * Point-Load		rega	and	Sand	and			Natu	ıral Moi °L ⊢—		ontent,	% - ● LL
(ft)	(ft)	Blows per	Recovery	Drive	Press / Core	Strength (psi)	DESCRIPTION	% Aggregate	% C. S	% M. Sand	% F. S	% Sitt	% Cla	•			ot - (_30	
60.0	684.9 684.9	7					Severely weathered gray SILTSTONE.									7.,		
]																	
-	-			 		!												7.7
-	-	10 43 24	18_	20							•							——————————————————————————————————————
65		29		┫					ļ									
_																		
-	-	<u> </u>	<u> </u>			<u> </u>												
-	1	2 6	18	21			@ 68.5'-70.0', wet.						Ì			- -		
70 —	1	s	1	1				ì										
-]		•						ļ								\downarrow	
-	4							1										
-	1	10 20 29	15	22			@ 73.5'-75.0', brown and gray, contains occasional rust stains.		ŀ									
75-]	-25	10-	1														
-	4										l							
<u>.</u>	-			∐					1									
91	666.0	50/5	5	23	丨		Bottom of Boring - 78.9'	7										50+
80 —]											ļ						
3137	-							١										
-	-																	
0-03						1												
85 — 85 — — — — — — — — — — — — — — — —	1																	
. 012	-																	
111	-																	
1 00	1											L						

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C 7/18US, OHIO 43229 * (614)888-0040

Client:	FranSy	stems	, Inc.				Project: SCI-823-0.00							Job	No. C)12	1-30	70.0	3
LOG C	F: Bo	ring	B-1223		_		. 535+28.2, 7.1 ft. LT of SR 823 CL Date Drilled: 8/0	3/0		454	710							—	
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: 39.0' Water level at completion: 44.0' (inside hollowstem augers) DESCRIPTION	Aggregate		% M. Sand			Clay	STANDA Natural Mi PL — Blow		e Co	ntent,		•
0-	717.4	Bío	æ	Drive	p.	(psi)		%	%	8	%	%	%	10	20	: : :	30	40	
0.5	716.9	2 4	8_	1		2.75	Very stiff brown SILTY CLAY (A-6b), little fine to coarse sand; moist.	0	1	-	10	46	43	Q	•		-		
5-	713.9	4_6	8	2		4.5+	Hard brown CLAY (A-7-6), trace fine to coarse sand; contains roots; damp.	0	3		4	9:	3	\ \ \	•	-			58
6.0	711.4-	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	φ		-	•		60
10-	 	2 2 3	18	4	P1	2.5		0	0		0	17	83	ζ.			•		+**
		2 4	18	5		2.0	@ 11.0'-12.5', contains few silt seams.							\ 					
15	-	1 2	18	6		1.5	@ 13.5', becomes gray.		!					φ					
-	-	1 2	18	7		0.75	@ 16.0'-17.5', medium stiff.							φ					6
20 –	-	1 2	18	8	P2	1.25		0	0	-	0	5	95	ļ		+		1) 1
. 11/21/20	-	1 2	18	9		1.0	@ 21.0'-22.5', 28.5'-30.0, contains few silt seams.							Ò					
25	d .	1 3	18	10		1.25								Ò					
FILE: 0121-3070-03	_ - -	2	3 18	11	-	1.0								Ó					5
30	-	2 2	10	12	P3	1.5		0	0	-	0	21	79						

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

	Client: T	ranSy:	stems	, Inc.				Project: SCI-823-0.00								Job	No. 0	121-	<u>3070.</u>	03
		F: Bo			3	I	ocation: Sta	. 535+28.2, 7.1 ft. LT of SR 823 CL Date Drilled: 8	/03/0											
Γ					Samj No		Hand	WATER OBSERVATIONS: Water seepage at: 39.0°	\vdash	G	RAL	ATIO	אכ	\dashv						
				(in)			Penetro- meter	Water seepage at. 59.0 Water level at completion: 44.0' (inside hollowstem augers)	و ا					ĺ	S	TANDA	RD PE	NETF	RATIOI	V (N)
1	Depth	Elev.	er 6"		<u> </u>	ပို	(tsf) / * Point-Load		ga	and	and	and				tural Mi PL ⊢		Conte	ent, % —⊣ L	
1	(ft)	(ft)	Blows per	Recovery	Drive	Press/		DESCRIPTION	% Aggregate	S	% M. Sand	F. S	Sit	% Clay		Blov	s per i		0	
	30 —	687.4	BK	8	6	ď	(53)	Medium stiff gray CLAY (A-7-6) , trace fine to coarse sand;	+ %	1 %	%	1%	%	%	: : ``	10 ': :::	_20 	30) <u>4</u>	10 :::::
ı	_							moist.					1							
١	_			1												\mathbf{V}				
١	_		1			1			1		1									
1	35 —		1 3	18	13		0.5	@ 34.9'-35.0', silt seam.		ſ						Ŕ				
Ì	-	1	•				Ì		Ì				ļ							
1	-								Į	1										
┢	-38. 5 _	678.9	9	-				Stiff to very stiff brown SILT AND CLAY (A-6a), little fine to	╣				Ì							
ı	40	1	9 14 13	17	14		2.0	coarse sand, little gravel; damp.										Q		
ı	-			1							ļ								N	
	-	1				1			1	Į										$\left\{ \left[\cdot \right] \right\}$
┞	 43.5	673.9	8	 	-11			Decomposed gray SILTSTONE, arenaceous.	┥											N
ł	45		20 50/4	1 12	15			Decomposed gray cit 1010101000000.	İ				1							50+
ı	-		1	•	11															
I	-	-				1														
- E	-	668.6	50/2	3	16	L			_		Ì									50+
2:17		000.0	30/3	1 *	1	1		Bottom of Boring - 48.8'		ļ										
	50 —]	•							Ì										
11/21/2006	-	4																		
-	-	-				١														
-03	-	1																		
-3070	55 -]		1																
FILE: 0121-3070-03	-	_																		
FILE:	-	-																		
		-																		
L	60	1	1				_L	I		_	_	_	_		_					

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

Client:	TranSv	stems	Inc				Project: SCI-823-0.00						-		Job	No.	012	<u>21-</u> 3	3070.	.03	
	F: Bo			4	٦,	ocation: Sta	. 531+05.5, 39.2 ft. LT of SR 823 CL Date Drilled: 07	/28/	05												
2000		9		Samp No.	le		WATER	Н		RAD,	ATIC	N	\dashv								
Depth	Elev.	per 6"	ery (in)	140.	/ Core	Penetro- meter (tsf) / * Point-Load	OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	% Aggregate	Sand	M. Sand	Sand		<u>×</u>	Nati		loistu			ATIOI nt, %	- (•
(ft)	(ft) 750.0	Blows	Recovery	Drive	Press,	Strength (psi)	DESCRIPTION	% Age	% C.	% M.	% F. Sa	% Silt	S %				er fo	ot - 30	0	40	
0.3	-749.7 -	3 4	14	1		3.5	Topsoil - 3" Very stiff brown SANDY SILT (A-4a), some fine to coarse sand,	28	4	-	21	4	7	Q	•		+				
2.0	748.0	5 5 8	12	2		2.75	Some gravel; damp to moist. Very stiff brown CLAY (A-7-6), trace fine to coarse sand, trace gravel; damp to moist.	1	2	-	7	27	63		ې ا		•				
5	-	4 7 8	14	3		4.0	@ 2.0'-4.0', light brown; contains roots.	1	0	-	0	10	89		\mathcal{C}						108
	1	5 5 6	12	4		3.5						į			þ						
10 —		3 5 4	16	5		3.0					i			(<u> </u>						
	-	3 4 5	15_	6		2.5						i i									
15 —		3 4 5	16	7		2.75			1												
	- - -	4	17	8		2.5									; 						
—18.5— 20 —	731.5	2 3	16	9		2.5	Stiff to very stiff brown SILT AND CLAY (A-6a), trace fine sand; moist.	•	0	-	1	11	88			-					
			14_	10		1.5						:		\ Q							
23.5_	726.5	1 5	15	11	P	1.25	Stiff gray CLAY (A-7-6), trace fine sand; moist.	1							\ }	>		•			
25 —	- -	WÔH	1 13	12		1.5								Ç	;						
30_	-	3 4	5 _18_	13		1.25										:					

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

Client:	ranSv	stems	Inc.				Project: SCI-823-0.00								Job No. 0121-3070.03
LOG O				1	L	ocation: Sta	. 531+05.5, 39.2 ft. LT of SR 823 CL	Date Drilled: 07	/28						
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.	le	Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	-	Aggregate			ATIO pues :		% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - PL LL Blows per foot -
	720.0	Blov	Rec	Drive	Pre	(psi)	DESCRIPTION		8	%	8	%	%	%	10 20 30 40
30	72010	1 3 3	17	14		1.25	Stiff gray CLAY (A-7-6); moist.				: 		i i		/1 φ
35 —		WOH 3	16	15		1.5			1			į			φ
		2 3 4	17_	16		1.5									Ö
40		3 5	17_	17		1.5									\$\diamondrate{\diamonder}\$
	1	33	17	18		1.5									$\dot{\phi}$
45 —	-	3 3	18	19		1.25	@ 43.5'-45.0', contains silt lenses.								o l
		5 4	18	20		1.5	@ 47.0'-47.1', contains silt lenses.								
11/21/2006 2:17 FM 1	-	3 4 5	18	21		2.0									d d
- -		2 4 4	18	22		1.25									Ò
55 — 55 —	1	4 3	17	23		1.5									ζ ,
FILE: 0121-3070-03	1	3 5	18	24		1.25	@ 56.0'-57.5', contains silt lenses.								\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
60	-	3 5	17	25		1.5									

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

O'' - · ·	TropS	veter					Project: SCI-823-0.00			_		_			Job	No.	012	1-307	70.03	
	TranS OF: B			24	٦,	ocation: Sta	1. 531+05.5, 39.2 ft. LT of SR 823 CL Date Drilled: 0	7/28	/05											
100	UF: B	Jing	0-122	Sam	_		WATER Date 2: 101 ST 023 GE Date 2: 1105 CT	Ĺ		RAD.	ATIC	N								
Depth (ft)	(ft)	Ows	Recovery (in)	Drive		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	Nat	ural M PL ⊢	oistu	re Co er foot	ntent,	LL	v) •
65		2 4	4 18	26		1.25	Stiff gray CLAY (A-7-6), trace fine to coarse sand; moist.)					
70		5 5	4 18	27		1.25	@ 68.5'-70.0', contains numerous interbedded silt lenses.	\ \ \ \ \							 			,		
—73.5		5 32 50/5	5 12	28			Very dense gray SANDY SILT (A- 4a), some fine to coarse sand, some gravel; moist.	26	14		14	4	6						Non-P	lastic 50+
79.5		Cor 60'		RQ1 52%	R-	1	Soft gray SANDSTONE interbedded with SHALE; very fine to fine grained, highly weathered to decomposed, micaceous, medium bedded to laminated, moderately fractured.													
85. 85. 85. 85. 85. 86. 87. 89.							Bottom of Boring - 84.5'													

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C

MBUS, OHIO 43229 * (614)888-0040

Clien	r Tr	anSys	stems	, Inc.				Project: SCI-823-0.00								Job N	o. 01	21-30	70.03	3
		_	_	B-122		_	ocation: Sta	. 528+38.8, 1.3 ft. RT of SR 728 Ramp C BL Date Drilled: 07	/27/											
			.0.	(in)	Samp No.		Hand Penetro- meter (tsf) /	WATER OBSERVATIONS: Water seepage at: 39.0' Water level at completion: 38.0'	gate		RAD.				STA Natur	NDAR. ral Moi:			TION (1	(N)
Dept (ft)		Elev. (ft) 780.1	Blows per	Recovery	Drive	Press / C	* Point-Load	DESCRIPTION	% Aggre	% C. Sar	% M. Sa	% F. San	% Silt	% Clay	P)	L			⊣ LL	111
1.5		-779.7 -778.6	2	8 15	1 2		3.0 3.75	Topsoil - 5" Very stiff brown SILT AND CLAY (A-6a), some fine to coarse sand, trace gravel; contains roots, slight petroleum odor; damp. Very stiff to hard mottled brown and gray CLAY (A-7-6), trace							Ç	} }				
5	-		6 2 5		3		4.5+ 4.0	fine to coarse sand; contains occasional silt lenses; damp. @ 1.5'-3.0', contains roots. @ 3.0'-10.0', brown.								Ò Ö				
			3	16	5		4.5+									6				
10			3 4		7		3.25 2.5	@ 11.0', becomes gray.					į) (
15			2 2	18	8		2.0													
	-		1 3	1 18	9		2.0								ļ Ģ					
20	, -		1 2	1 18	10		1.5	@ 18.5'-30.0', medium stiff to stiff.							Ò					
			1 2		11		1.25								¢ į					
F1LE: 0121-3070-03	;— — —		1 2	2 18	13		1.25					-	- - 		φ φ					
E	+		1 1 ,	18	14		0.5													

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

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C

084	[rans:	-10~~	Inc				Project: SCI-823-0.00								Job No	. 012	1-307	0.03
Client:				5	٦,	ocation: Sta	. 528+38.8, 1.3 ft. RT of SR 728 Ramp C BL Date Drilled: 07	/27	/05									
1000		mg	D-122.	Samp			WATER			RAD	ATIC	NC						
Depth	Elev.	Blows per 6"	very (in)	No.	Core	Hand Penetro- meter (tsf) / * Point-Load Strength	OBSERVATIONS: Water seepage at: 39.0' Water level at completion: 38.0'	% Aggregate	Sand	% M. Sand	% F. Sand	iit	Clay	Natu	NDARE ral Mois L ——	ture Co	ntent, 9	% - • LL
(ft)	(ft) 750.1	Blows	<i>Rесо</i> ивлу	Drive	Press /	(psi)	DESCRIPTION	%	%	% ¥	% n.	% Silt	%	7::	Blows	per fooi	30) <u>40</u> : [: : : :
30	7.00.1	0 1	18	15		3.25	Very stiff brown CLAY (A-7-6), moist.				<u> </u>			Ĭ 				
35 — - - - - - - - -	741.0	5 46		16			Severely weathered gray SANDSTONE, contains interbedded			D	!			<i>y</i>				
40 —		16		17	1		shale; moist to wet.										Q	50+
-44.0 45 - 45 - 45 - 45 - 45 - 45 - 45 - 45	736.1	30/4					Bottom of Boring - 44.0'											

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

	Client: T	ranSy	stems	, Inc.				Project: SCI-823-0.00			_					Jot) No	. 012	21-3	070.	03
	.0G 0	F: Bo	ring	B-122	6		ocation: Sta	1. 528+21.7, 15.1 ft. LT of SR 728 Ramp B BL Date Drilled: 8/9	02/0)5											
					Sam, No	ple	Hand	WATER	L	_	RAD.	ATIC	NC	1							
	Depth	Elev.	er 6"	ry (in)		Core	Penetro- meter (tsf) / * Point-Load	Water seepage at: None Water level at completion: None	gate	Sand	Sand	Sand								ATION nt, %	
	(ft) 0 —	(ft) 784.3	Blows per	Recovery	Drive	Press / Core	Strength (psi)	DESCRIPTION	% Aggregate	ان	% M. Se	u.	S	% Clay	F	PL ⊩ Blo 10		er foc		-	L :0
┢		- 783.7-	<u> </u>		_			Topsoil - 7"								Tiii			\prod		
	-		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		•	O.F.	 			
	5 —		5 10 12	15	2		2.75		2	7		23	47	21		•	1				
	1		4 6 7	18	3		4.0						 			~	/)			
	- -10.0	-774 2	2 5 7	18	4		3.0) 					
	-	774,3	3 6 6	18	5	P-1	2.25 3.75	Stiff mottled light brown and gray CLAY (A-7-6), trace silt; damp to moist. @ 12.0'-12.5', sandy silt seam.	0 2		-	0 22		90 24		Y	•	1	+		63
	15 —		2 2 4	13	6		1.75	G 12.0 72.0, salidy six scall.	0	0		0	10	90	ζ			<u></u>		•	70
_		- 768.3-	1 1 2	18	7		1.0	Stiff gray CLAY (A-7-6), trace silt; damp to moist.	0	0	-	0	14	86	$\frac{\gamma}{\zeta}$			<u> </u>	\perp		58
11/28/2006 11:30 AM	20 —	I	1 2 2	18	8		1.0								$\mathcal{Y} = \mathcal{L}$	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
1/28/2006	-	!	WOH 2	18	9		1.0	@ 22.0'-23.5', sandy silt seam.							<u>) </u>) ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;					
-	25		WOH 1 2	18_	10	P-2	2.25 1.0		9	4		21	44	22	Y Q		•				
FILE: 0121-3070-03	-		2 2 4	18	11		1.25								γ. Φ			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
	- 30 -	ļ	2 3 3	18	12		1.25														

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

C	lient: T	ranSy:	stems	, Inc.				Project: SCI-823-0.00								Jo	ob No	012	21-30	70.03	4
		F: Bo			6] [ocation: Sta	. 528+21.7, 15.1 ft. LT of SR 728 Ramp B BL Date Drilled: 8/	02/0										"	_	
Г	-				Samp No.		Hand	WATER OBSERVATIONS: Water seenage at: None	\vdash	GI	RAD I	ATIC	NC 								
1						Γ-	Penetro-	OBSERVATIONS: Water seepage at: None Water level at completion: None			١				S	TANI	DARD	PENI	FTRAT	TION (N	n l
			.0	(in)		Core	meter (tsf) /	Tratal at a sample con trains	gate	ρu	3	מַ			Na				ontent		•
1	Pepth (ft)	Elev. (ft)	s pe	very		s/c	* Point-Load Strength		% Aggregate	Sa	S	Sa	111	lay.		PL				+ LL	
		754.3	Blows per 6	Recovery	Drive	Press /	(psi)	DESCRIPTION	% A	% C. Sand	%	% F	s %	% Clay		10		er roc 20	ot - (30	40	
1	30 —	104.0						Stiff gray CLAY (A-7-6), trace fine to coarse sand; moist.								1					
ı	7																				
1																					
ı	_		1	ļ	40		4.0	·													
	35 —		` 3	18	13		1.0								Ċ	5 :					
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_	_																				
2:17 PH]	_		2 3	1	16		1.5														
	50.0	734.3	 	18	1 '0	+-	- '	Bottom of Boring - 50.0'	-												
11/21/2006	_	1						Bottom of Borning - 30.0													
/27/	-	1	1						Ì	ŀ											
11	-	1								1											
-03	-	1							-		1										
3070	55 —	1	Ì	ļ		1			1					}							
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DLZ OHIO INC. * 6121 HUNTLEY ROAD, O

MBUS, OHIO 43229 * (614)888-0040

Client: TranSystems, Inc. Project: SCI-823-0.00 Job No. 0121-3070.03														.03				
LOG OF: Boring B-1227																		
		.6"	Recovery (in)	Sam; No		Hand Penetro- meter (tsf) /	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring)				ATIC				.NDARD ral Moisi			
Depth (ft)	Elev. (ft) 863.0	Blows per		Drive	Press / C	* Point-Load	DESCRIPTION		% C. Sar	% M. Sand	% F. Sand	% Sitt	% Clay	P	L			
0.7	862.3	4 7 8	9	1		4.0	Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.								0,	<i></i>		
-3.5 5	859.5	8 30 50/6			<u> </u>		Decomposed brown SANDSTONE, argillaceous.				<u>.</u>						<i>)</i>	50+(
-		50/4	3	3							1							50+(50+(
10.0 15	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.											
20 —		Core 60"	Rec 59"	RQE 99%	R-2	*213	@ 16.4', low angle fractures. @ 18.5', 19.4', 20.5', 21.5', 22.8', low angle fractures.											
-		Core 60"	Rec 60"	RQE 100%) R-3	*258												
-25.0 -25.0	838.0	Core 60"	Rec 60"	RQI 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.											

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C

MBUS, OHIO 43229 * (614)888-0040

Client:	TranSy:	stems	, Inc.				Project: SCI-823-0.00								Job N	10. O	121-	3070.	.03
LOG C	F: Bo	ring	B-122		_	ocation: Sta	i. 525+10.3, 99.6 ft. RT of SR 728 Ramp A BL Date Drilled: 8/	03/0	_										
Depth (ft)	Elev. (ft)	ws per 6"	Recovery (in)	Sam _i No		Hand Penetro- meter (tsf) / * Point-Load Strength		% Aggregate	Sand	% M. Sand		,	Clay	Natu	ral Moi		Conte	RATIOI ent, %	- •
l	833.0 833.0	Blows	Rec	Drive	P	(psi)	DESCRIPTION	%	% C	%	% F.	%	%	1	0	20	30		40
30.0 	833.0	Core 60"	Rec 60"	RQD 88%	R-5	336	Hard gray SANDSTONE, very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, slightly fractured to unfractured. @ 33.9', 34.1', 34.2', 34.6', low angle fractures.												
- 40		Core 60*	Rec 60"	RQD 100%	R-6	*329		į											
-		Core 60"	Rec 60"	RQE 83%	R-7	*548													
- - - - - - - - - - - - - - - - - - -	-	Core 60"	Rec 60"	RQE 90%	R-8	*368													
111/21/2006		Core 60"	Rec 60"	RQE 84%	R-9	*433	@ 53.3', low angle fractures.	;											
55 —		Core 60"	Rec 60*	RQE 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. 												

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

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

ent: T	ranSy	stems	, Inc.				Project: SCI-823-0.00								Job No	. 01:	21-30	70.0)3
OG O	F: Bo	ring	B-122		_	ocation: Sta)3/0	_										
						Hand	ODDCOVATIONS.		GI	RAD.	ATIO	ON 	\dashv						
epth (ft)	Elev. (ft)	ows per 6*	covery (in)		Care	Strength	Water level at completion: None (prior to coring)	Aggregate	C. Sand	M. Sand	F. Sand	Sitt	Clay	Natu	ral Mois L ⊢—	ture C	Conten	t, % - ⊣ <i>LL</i>	•
60	803.0	Bk	8	Ğ	ď	(psi/		8	%	%	%	%	%	1	0	20	30	40	<u>)</u>
-		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.												
-	-788.Q-		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.												
- - -		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													
	65 — — — — — — — — — — — — — — — — — — —	DG OF: Bo Appth Elev. (ft) 803.0	Core 60" 5.0 788.0 Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60"	Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60" Core 60"	Core Rec RQD	Core Rec RQD R-100% RQD R-100% RQD	Core Rec RQD R-100% R-100% Rec RQD R-100% R-1	Location: Sta. 525+10.3, 99.6 ft. RT of SR 728 Ramp A BL Date Drilled: 8/I WATER OBSERVATIONS: Water seepage at: None (Mare of Str. 100	Core Rec ROD R- Rod	Core Rec ROD Rec Rod	Core Rec ROD R- Rod	Core Rec ROD Rec ROD Rec ROD Rec ROD Rec ROD Rec ROD Rec ROD Rec Rod	Location: Sta. 525+10.3, 99.6 ft. RT of SR 728 Ramp A BL Date Drilled: 8/03/05 GRADATION	Core Rec ROD Room Ro	Core Rec ROD	Core Rec ROD R 60° 77% 13 485 60° 60° 77% 13 60° 6	Core Rec ROD Rec ROD Rec ROD Rec ROD Rec Rod Rect Rod R	Core Rec ROD R- Rod	Core Rec ROD R Rod



DLZ OHIO INC. . 6121 HUNTLEY ROAD,

MBUS, OHIO 43229 * (614)888-0040

		ranSy						Project: SCI-823-0.00								Job No	. 012	1-307	0.03
	.0G 0	F: Bo	ring	B-122			ocation: Sta	n. 525+10.3, 99.6 ft. RT of SR 728 Ramp A BL Date Drilled: 8/0)3/0		745	A T**	<u> </u>	1					
			•.	(in)	Samp No.		Hand Penetro- meter	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring)			RAD.				STA	ANDARD) PENE	TRATIO	ON (N)
1	Depth (ft)	Elev. (ft)	Blows per 6	Кесоивлу	Drive	Press / Care	(tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	C. Sand	M. Sand	F. Sand	Silt	% Clay	Natu P	ral Mois L Blows (ture Co	ntent, 9	6 - • LL
\	.9ô.0 95 	773.0 -773.0	Core 60*	Rec 60"	RQD 32%	R-		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.	*	%	%	%	%	%		10 3	20	30	40
	100		Core 60"	Rec 60"	RQD 29%	R- 18	*233	@ 98.5'-110.0', pyritic.	i i					-					
	 105 		Core 60"	Rec 60"	RQD 58%	R- 19	*380												
2:17 PM]	 - - - 110.0	-753.0-	Core 60"	Rec 60"	RQD 80%	R- 20													
FILE: 0121-3070-03 (11/21/2006	115 —							Bottom of Boring - 110.0°											

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

	ranSy: F: Bo	stems sing		Ω	٦,	anation: Sta	Project: SCI-823-0.00 1. 525+05.9, 110.2 ft. LT of SR 728 Ramp A BL Date Drilled: 8/0	14/0)5						IOD NO.	0121-	3070.03
0 0 0	г. во	mg	D-122	Samp No.	le	Hand	WATER	7,70		RAD.	ATIO	ON					
Pepth (ft)	Elev. (ft) 848.6	Blows per 6"	Recovery (in)	Drive	Press / Core	Penetro- meter (tsf) / * Point-Load Strength (psi)	Water seepage at. Notice Water level at completion: None (prior to coring)	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natura PL	l Moist∟ ———	ire Conte	→ <i>LL</i>
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	1	9	69	20	•	0-	1 7	
3.5 5	845.1-	10 50/6	10	2	! !		Decomposed brown and gray SANDSTONE, arenaceous.										, /,
-		30 50/2	6	3	i						:						
	-020 0	35 50/2	5	4													
 	-8 38. 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	3 *313						:					
25 — - -		Core 60"	Rec 60"	RQD 55%	R-4	.	@ 25.3', 25.9', 26.5', 26.7', 29.6', low angle fractures.										

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MBUS, OHIO 43229 * (614)888-0040

Client:	TranSy	stems	, Inc.				Project: SCI-823-0.00	_						,	Job	No.	012	1-307	0.03	,
LOG	OF: Bo	ring	B-122			ocation: Sta	i. 525+05.9, 110.2 ft. LT of SR 728 Ramp A BL Date Drilled: 8/	04/0												
				Sam _l No		Hand	WATER OBSERVATIONS: Water sagged at: Nage	⊢	GI	RAD T	ATIO	NC T	-							I
		į	ا ج ا	T	<u> </u>	Penetro- meter	Water seepage at: None Water level at completion: None (prior to coring)			k				0.7				TO 4 T		.,
		ř. 6.	(in)	1	g O	(tsf) /		gate	ַ פַּ	٩	٦		ĺ		ANDA: ural Mo					"-
Depth (ft)	Elev. (ft)	s pe	Š.		12	* Point-Load Strength		ğ	Sand	Sand	Sand		<u>چ</u>		2L				LL	
(1.7	` .	Blows per	Recovery	Drive	Press /	(psi)	DESCRIPTION	% Aggregate	% C)	6 M.	% F.	% Sitt	% Clay					· ()	
30 -	818.6	Core 60"	Rec 60"	RQD 67%		*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.	6		8	6	6	6		10	20		30	40	
35 -	- - - - - -	Core 60"	Rec 60"	RQD 82%	R-6	-	ر عادی عادی کی انتخاب کی انتخاب کی انتخاب کی انتخاب کی انتخاب کی انتخاب کی انتخاب کی انتخاب کی انتخاب کی انتخاب													
40 -		Core	Rec	POD	_															
45 -	<u>-</u>	60*	60"	RQD 73%	R-7	*332	@ 43.2'-43.3', 45.9'-46.1', argillaceous bands.													
501 - 00	_ _ _	Core 60"	Rec 60"	RQD 73%	R-8		@ 49.2'-52.9', rust stained. @ 49.7'-51.1', high angle fracture, rust stained. @ 58.0'-59.3', rust stained sandstone.			ļ						1	, i , i , i , i , i , i , i , i , i , i			
File: 0121-3070-03 11/21/2006		Core 120"	Rec 120"	RQD 89%	R-9	*517	@ 58.0'-59.3', rust stained sandstone. @ 55.3', 58.6', low angle fractures, rust stained.													
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:	ranSys	stems,	Inc.				Project: SCI-823-0.00								Job No. C	121-	3070.0	ევ
LOG O	F: Bo	ring l	3-1228	3	$\int L$	ocation: Sta	. 525+05.9, 110.2 ft. LT of SR 728 Ramp A BL Date Drilled: 8/0	4/0	5									
			ŀ	Samp		Hand	WATER OBSERVATIONS:	_	GI	RAD	ATI	ON						
Depth (ft)	Elev. (ft) 788.6	Blows per 6"	Recovery (in)	Drive No.	Press / Care	Penetro- meter (tsf) / * Point-Load Strength (psi)	Water seepage at: None Water level at completion: None (prior to coring)	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natu P	ANDARD PE ral Moisture L \ Blows per	Conte	ent, % · —⊢ LL	- •
65	700.0	Core 120*	Rec 120"	RQD 78%	R-	*444	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. @ 65.0'-65.3', broken zone.											
70 — 72.6 — 75 —	-776.0-	Core 120"	Rec 119*	RQD 52%	R- 11	*389	 @ 71.7'-71.8', high angle fracture. @ 70.5'-70.6', 70.9'-71.2', argillaceous bands. 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. @ 73.1'-73.2', argillaceous bands. @ 74.7'-75.0', calcareous layer. 											
80 — 80 — 81/21/2006 3	766.3	Core 120*	Rec 116"	RQD 88%	R- 12	*445/371	@ 80.0'-82.3', siltstone layer. @ 81.5'-82.5', highly to moderately weathered, contains some rust staining. 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. @ 84.1'-84.4', high angle fracture. @ 84.5'-85.0' calcareous layer. @ 85.0'-85.4', lost recovery fracture suspected.			0000								

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Client:	ranSv	stems	, Inc.				Project: SCI-823-0.00			_					Job No	. 0121	-3070.0	03
LOG C				8		ocation: Sta	. 525+05.9, 110.2 ft. LT of SR 728 Ramp A BL Date Drilled: 8/	04/0)5						_			
	:	6*	(in)	Sam No	ple).	Hand Penetro- meter	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring)	Į,		RAD.				STA	NDARD	PENET	RATION	· (N)
Depth (ft)	Elev. (ft) 758.6	Blows per	Recovery	Drive	Press / Core	(tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natu F	L		tent, % - C 30 4	
95 —	-748. 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. @ 94.5'-95.0', vertical fracture, calcareous. @ 95.0'-96.1', broken zone.											
105 — 110 — 115 — 120																		

£ FILE: 0121-3070-03 { 11/21/2006 2:17 DLZ OHIO INC. * 6121 HUNTLEY ROAD, C MBUS, OHIO 43229 * (614)888-0040

	lient: T	ranSy	stems	, Inc.				Project: SCI-823-0.00								Job N	o. 012	1-3070	.03
	OG O	F: Bo	ring	B-122		_		. 527+83.2, 70.7 ft. RT of SR 728 Ramp A BL Date Drilled: 8/	10/0	_							_		
				Ų	Samp No.		Hand Penetro- meter	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported		GF	RADA	ATIC	אמ		67	ANDAD	D PENE	TPATIO	N (N)
			ı 6"	(in) v		Core	(tsf) /	Tratal at a ampleton. Tot reported	gate	שַ	pu	g			Nat		sture Co		
ľ	Depth ((ft)	Elev. (ft)	Blows per	Recovery)/ss	* Point-Load Strength		% Aggregate	Sa.	f. Sa	Sa	#	lay.	1	PL			LL
		778.6	Blov	Rec	Drive	Press/	(psi)	DESCRIPTION	%	2 %	% M. Sand	%	%	%		Blows 10	per foo 20	30	40
┢	-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.									Q.		
	5		8 21 16	12	2		4.5+												,
-	- 1	-772. 6-	7					00.707075	ł										
	_		['] 21 25	10	3			Severely weathered brown and gray SILTSTONE, arenaceous, occasional rust stains.						!					þδ
	- 10 		5 20 34	9	4					İ									○ 54→
1			10 50/5		5		}					ļ	i i						
	_		50/5	9	3														50+(
	_		50/3	3	6					Ì									50+(
	15 —	1																	
⊢	-16. 5-	-762.1-				1		Medium hard gray SANDSTONE ; very fine to fine grained,	\mid										
_	_							moderately weathered, argillaceous, micaceous, pyritic,											
2:17 PM	-	-	Core 60"	Rec 60"	RQD 70%	R-1	*217	moderately fractured, few to moderate agrillaceous laminae.											
	20 —	1		"	, .														
1/200	-	1		 		-													
11/21/2006	_]						@ 21.8'-21.9', 24.8'-25.1', high angle rust stained fractures. @ 22.2'-23.7', moderate to abundant argillaceous laminations.											
	_	1						@ 23.7'-24.4', brown rust staining.											
070-0	25 —							@ 24.7'-24.8', broken zone.		1									
FILE: 0121-3070-03	_	{	Core	Rec 120"	RQD 37%	 -	320	@ 24.8'-25.0', calcareous zone.											
ان 10	-	1	120*	120*	37%		. 320												
F11	-	1										1							
L	30																		

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Client:	TranSy	stems	. Inc.					Project: SC	CI-823-0.0	0									Jo	b No.	0121	-3070	0.03	ᆚ
	F: Bo			9		ocation: Sta	. 527+83. <mark>2,</mark> 7				Date Drilled	ı: 8/10						1						4
Depth	Elev.	6"	(in)	Sam No	ple	Hand Penetro- meter (tsf) / * Point-Load	WATER OBSERVATION		seepage at: I	None		-				Nort		Ná		ARD P Moistur		tent, %		•
(ft)	(ft) 748.6	Blows per	Recovery	Drive	Press /	Strength (psi)			DESCRI	PTION			% Agg	% C)	% M. Sand	8 19 N. 19	Clay			ows pe 20				
30 —							Medium ha	ard gray SA	NDSTONE															
35 31.5 35 -	747.1-							Во	ottom of Bo	ring - 31.5'														

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0" 1 3	[rosc.	oto	inc				Project: SCI-823-0.00								Job I	vo. 0	121-	3070.0	3
Client:					٦,	ecotion: Sto	525+09.2, 24.2 ft. RT of SR 728 Ramp B BL Date Drilled: 8/0)2/0	5					-		<u>-</u>			_
1000	F: BO	ring	D-123	Samı			WATER			RADI	ATIO	N							
Depth	Elev.	s per 6"	very (in)	No.	/ Core		OBSERVATIONS: Water seepage at: 27.0' Water level at completion: 17.0' (inside hollowstem augers)	gregate	Sand	Sand	% F. Sand	#	lay	Nati	ıral Mo PL I—	isture	Conte	<u> </u>	•
(ft)	(ft) 775.6	Blows	Recovery	Drive	Press	(psi)	DESCRIPTION	% A	% C	W %	% F.	8 8	%		Blow 10	s per 20	foot - <u>30</u>		<u>)</u>
-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.									2			
5 —		10 8	6	2				25	11		23	4				\		Non	Plastic
6.0	769. 6	13	12	3		-	Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.	1	2		11	62	24		•	1	ا م		
8.5 10	767.1	5 7	6_	4		-	Very stiff to hard brown SILT AND CLAY (A-6a), little to some fine to coarse sand, trace gravel; damp.		<u>.</u>						a				
-	1	5 15	8_	5		4.5+) i)	
15 —	-	5 10 1	1 18	6		4.5+				ļ							ز ز		
		5 10	5 8	7		3.25		2	5	-	13	47	33			•	Q.		
18.5 20 —	 7 57.1	9 2	3 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	4	2		•			Non	Plastic
1 11/21/2006		7 10 1	1 13	9		3.0										þ	\		
25 — -26.0	-	15 3	5 14	10		3.25													<i>}</i>
-26.0	749.6	1		11			Very dense light brown GRAVEL WITH SAND AND SILT (A-2-4); wet.	45	11		9	3	35			•		Nor	Plasti 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+

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stems,			_		Project: SCI-823-0.00								Jo	b No.	012	21-30	70.0)3
ring E	3-1230			ocation: Sta		02/0												
Blows per 6"	Recovery (in)	No.		Hand Penetro- meter (Isf) / * Point-Load Strength (psi)		% Aggregate					% Clay	Nat	ural I PL +	doist	ure Co	ontent,	, % + LL	(
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.													
Core 60"	Rec 60"	RQD 56%	R-2	*980	@ 34.9'-35.0', 35.4'-35.6', broken zones.													
					Bottom of Boring - 40.0'							* 1						
	Core 60"	## Pring B-123 ### ### ### ########################	Core 60" Rec 60" Core 60" Rec 60" 60" 56%	Core 60" Rec 60" R-2 60" R-2	Core Rec 60" Rec 60" Rec 60" Rec 60" Rec 60" Rec 60" Rec 60" Rec 60" Rec 60" Rec 60" Rec 60" Rec 60" Rec 60" Rec 60" Rec 60" Rec RQD Rec 60" Rec RQD Rec 60" Rec RQD Rec 60" Rec RQD Rec 60" Rec RQD Rec 60" Rec 60" Rec RQD Rec 60" Rec 60" Rec RQD Rec 60"	Location: Sta. 525+09.2, 24.2 ft. RT of SR 728 Ramp B BL Sample No. Hand Penetrometer (tsf) / *Point-Load Strength (psi) Core 60" Rec	Location: Sta. 525+09.2, 24.2 ft. RT of SR 728 Ramp B BL Sample No. Hand Penetrometer (tsf) / Point-Load Strength (psi) Core 60"	Core Rec 60"	Location: Sta. 525+09.2, 24.2 ft. RT of SR 728 Ramp B BL Date Drilled: 8/02/05	Core Rec 60"	Location: Sta. 525+09.2, 24.2 ft. RT of SR 728 Ramp B BL Date Drilled: 8/02/05	Location: Sta. 525+09.2, 24.2 ft. RT of SR 728 Ramp B BL Date Drilled: 8/02/05	Location: Sta. 525+09.2, 24.2 ft. RT of SR 728 Ramp B BL Sample No. Hand Penetro-meter (tst) Point-Load Strength (psi) DESCRIPTION Point-Load Strength (psi) Point-Load Point-Load Point-Load Point-Load Point-Load Point-Load Point-Load Point-Load Point-Load Point-Load Point-Load Point-Load Point-Load Point-Load Point-Load Point-Load Poin	Location: Sta. 525+09.2, 24.2 ft. RT of SR 728 Ramp B BL Sample No. Water seepage at: 27.0' Water level at completion: 17.0' (inside hollowstem augers) Back Sample Penetro-meter (ist) / Point-Load Strength (psi) Core Rec 60' RQD 23% R-1 T795 Water seepage at: 27.0' Water seepage at: 27.0' Water seepage at: 27.0' Water level at completion: 17.0' (inside hollowstem augers) DESCRIPTION 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. Core Rec 60' RCD RCD RCD RCD RCD RCD RCD RCD RCD RCD	Location: Sta. 525+09.2, 24.2 ft. RT of SR 728 Ramp B BL Sample No. Water seepage at: 27.0' Water level at completion: 17.0' (inside hollowstem augers) DESCRIPTION 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. (a) 30.2'-30.3', 30.6'-31.1', 32.4'-32.5', broken zones. Date Drilled: 8/02/05 GRADATION STANDARD Natural Moister PL PL PB PB PB PB PB PB PB PB PB PB PB PB PB P	Location: Sta. 525+09.2, 24.2 ft. RT of SR 728 Ramp B BL Sample No. Sample (IS) / Point-Load Strength (psi) Core Rec 60* Core Rec 60* R-1 Core Rec 60* R-2 R-1 Core Rec 60* R-2 R-1 Core Rec 60* R-2 R-1 Core Rec 60* R-2 R-2 R-2 R-3 R-1 R-3 R-2 R-3 R-2 R-3 R-2 R-3 R-2 R-3 R-3	Core Rec Rop R-1 23% R-1 27.95 Ramp Rob R-2 2980	Location: Sta. 525+09.2, 24.2 ft. RT of SR 728 Ramp B BL Bate Drilled: 8/02/05 Sample No. Hand Penetro-micro (tst) / Point-Load Strength (psi) DESCRIPTION Plants (psi) / Point-Load Strength (psi) DESCRIPTION Plants (psi) / Plants (psi) DESCRIPTION Plants (psi) / Plants (psi) Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION Plants (psi) DESCRIPTION DESCRIPTION Plants (psi) DESCRIPTION Plants (psi

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

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Client:	FranSv	stems	Inc.				Project: SCI-823-0.00							Jo	b No. 01	21-3070	.03
LOG O				1	7,	ocation: Sta	. 521+18.3, 170.3 ft. RT of SR 728 Ramp A BL Date Drilled: 0	9/01	/05			to		09/02/05			
3333				Samp No.	le		WATER	F	_		ATIO	NC		,-			
Depth (ft)	Elev. (ft) 837.4	Blows per 6"	Recovery (in)	Drive	Press / Care	Penetro- meter (tsf) / * Point-Load Strength (psi)	Water seepage at: None Water level at completion: None (Prior to coring) 35.7 (Includes drilling water) DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANI Natural PL Bi 10	OARD PEN Moisture C lows per for 20	ontent, %	-
-0.3	837.1	4 8 20	14	1		4.0	Topsoil - 4" Very stiff brown and gray SANDY SILT (A-4a), little fine to coarse sand, trace gravel; damp.	<u> </u> 	!							٥.,	
5 —		17 50/5	9	2		3.0											50+
6.0 - -	831.4	50/3	3	3			Severely weathered brown and gray SANDSTONE, argillaceous.										50+(
-		50/3	3	4													50+
15 —	827.4-	Core 120°	Rec 120"	RQD 87%	R-1	*366	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.										
25 —		Core 120"	Rec 120"	RQE 100%	R-2	2 *384											

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Client:	TranSv	stems	Inc.			_	Project: SCI-823-0.00							Job	No. 01:	21-3070	.03
	F: Bo			1	7	.ocation: Sta	1. 521+18.3, 170.3 ft. RT of SR 728 Ramp A BL Date Drilled: 0	9/01	/05			to	_ 0	9/02/05			
				Samı No	ole	Hand	WATER	-			ATIC	N	\dashv				
Depth (ft)	Elev. (ft) 807.4	Blows per 6"	Recovery (in)	Drive	Press / Core	Penetro- meter (tsf) / * Point-Load Strength (psi)	Water level at completion: None (Prior to coring) 35.7 (Includes drilling water)	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural M PL ⊢	oisture C	ot - ()	- •
35 —		Core 120**	Rec 120*	RQD 100%	R-3	*485	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massive bedded, slightly fractured to unfractured.	ly									
45 —		Core 120"	Rec 117"	RQD 98%	R-4	*415											
50 - 50 - 50 - 50 - 50 - 50 - 50 - 50 -		Core 120"	Rec 120"	RQD 100%	R-5	*415											

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Client: 1	ranSys	tems	, Inc.				Project: SCI-823-0.00							ob No.	0121	-3070.	03
LOG O				1	L	ocation: Sta	. 521+18.3, 170.3 ft. RT of SR 728 Ramp A BL Date Drilled: 09	<u>/01</u>			to		9/02/05				
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sami No Pvive		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 35.7 (Includes drilling water) DESCRIPTION	% Aggregate		% F. Sand		% Clay	Natura	Moistui	r foot	FRATION tent, % 	- •
65 —	777.4	Core 120"	Rec 120"	RQD		*354	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded to very thickly bedded, slightly fractured. @ 67.5'-70.0', moderate argillaceous laminations; laminated to thinly bedded.										
70 —		Core 120"	Rec 120"	RQI 1009	R-7	* 495	@ 70.0'-85.0', pyritic, laminated to thinly bedded. @ 75.3' to 75.4', rust stained.										
000-03 (11/21/2006 2:17 PM)	752.4	Core 60"	Rec 60"	RQ1	R-6	386 °386	Bottom of Boring - 85.0'										
85.00 -0.21-3010-03							Bottom of boring - 63.0										

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C

BUS, OHIO 43229 * (614)888-0040

Client: 1	ranSys	tems,	Inc.				Project: SCI-823-0.00								Job No	o. 012	1-307	70.03
LOG O	F: Bo	ring	B-123		_	ocation: Sta	. 522+25.6, 100.6 ft. LT of SR 728 Ramp D BL Date Drilled: 8/	09/0		040		24.	т	_				
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sami No Duve		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported DESCRIPTION	% Aggregate		Σį	pu	Silt	% Clay	Natu P	ral Mois		ontent,	: LL
 —₀.3=	829.1 828.8	90	α	10	Q.		`\Topsoil - 4"	 	1	╚	-	-	6	::::	/ <i>U</i>	<u> </u>	: : :	: 1
-		² _{3 2}	10	1		3.5	Very stiff brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp. @ 1.0'-2.5', contains roots.				!			ď				
5—		13 15 13	.8	2		0.75	@ 3.5'-4.0', gray clay seam. Medium stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.									/ /)	
6.0	823.1-	11 37 33	12	3		; ;	Severely weathered brown SILTSTONE, arenaceous.											770-
10 —		11 50/5	10	4		ļ												50+(
—11.0— -	818.1-	50/4	4	5		,	Severely weathered gray SANDSTONE, argillaceous.	1	ŧ									50+(
- 15.0-	814.1-	25 50/2	5	6					ļ			1						50+(
:17 PM]	-	Core 60"	Rec 60"	RQ(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.											
11/21/2006	1	Core 60"	Rec 60"	RQI 65%	R-2	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.	i i										
25 — 25 — 300 — 30		Core		RQ 869	O 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.	,			·							

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Client:	FranSys	tems,	Inc.			L	Project: SCI-823-0.00								Job No	012	1-307	0.03
	F: Bor				_	ocation: Sta	. 522+25.6, 100.6 ft. LT of SR 728 Ramp D BL Date Drilled: 8/	09/0			ATIC	241						
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.	Press / Core	Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported DESCRIPTION	% Aggregate	C. Sand	M. Sand	% F. Sand	Silt	% Clay	Natu P	NDARD ral Moist L Home Blows p 02	ure Co	ntent, 9	% - ● LL
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. @ 35.0'-51.9', moderately weathered, moderately fractured. @ 35.8', 36.7', low angle fractures.											
- - 40 — - - - 45 —		Core 120"	Rec 120"	RQD 84%	R-4	*373	@ 39.5'-39.9', rust staining.											
	777.2	Core 120**	Rec 120*	RQD 73%	R-5	*356	@ 48.0'-48.1', high angle fracture. @ 49.2'-49.3', shale layer. Soft gray SHALE interbedded with SANDSTONE; very fine grained, highly weathered to decomposed, argillaceous, micaceous, thinly bedded to thinly laminated, highly fractured. @ 52.4'-53.2', calcareous layer.											
55 —	- - - -	Core	Rec 120"	RQE 76%	R-I	6												

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ſ	Client: 1	ranSy:	stems,	Inc.				Project: SCI-823-0.00								Job	No.	012	1-307	<u>0.03</u>	
	LOG O				2	$]_L$	ocation: Sta	. 522+25.6, 100.6 ft. LT of SR 728 Ramp D BL Date Drilled: 8/	09/0												
	Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.	Press / Core	Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported DESCRIPTION	Aggregate		% M. Sand			Clay	ST Nat	ural M PL ⊢ Blo	oistu	re Co	t - (% - LL)	
ı	60 —	769.1	9)6	8	Õ	ď	*124/741		1%	%	%	%	%	%	111	10	- 20 : :		30	40	===
-		767.3					124/74	Soft gray SHALE interbedded with SANDSTONE. 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.													
	70 		Core 120*	Rec 120*	RQD 83%	R-7	*463	@ 62.3'-62.7', calcareous.													
0-03 [11/21/2006 2:17 PM]	75 — - - 80 — -		Core 120"	Rec 120"	RQD 83%	R-8	3 *401														
FILE: 0121-3070-03	85.0	744.1·						Bottom of Boring - 85.0'													

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Client	ranSys	tems	Inc				Project: SCI-823-0.00		-	_					Job N	lo. 012	1-3070	.03
	F: Bo	_	_	3	7	ocation: Sta	. 524+77.0, 76.8 ft. LT of SR 728 Ramp C BL Date Drilled: 8/)8/0										
Depth (ft)	Elev. (ft) 803.7	Blows per 6"	Recovery (in)	Samp No.	le		WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported DESCRIPTION	% Aggregate	% C. Sand		% F. Sand		% Clay	Nati	ıral Mo. PL ├─	isture Co	TRATIO	5 - •
-0.3 		5 9 5 17 30 40	12	1 2		3.5 4.5+	Topsoil - 4" 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 6			• Ö		Ŧ	70-
5 — 6.0—		6 50/3	8	3			Decomposed brown SANDSTONE.						:					50+(
10 —		9 50/4	3	5														50+(50+(
	788.7-		Rec 90"	RQD 39%	R-	0.75	Medium stiff light brown SILT (A-4b), some fine to coarse sand, trace gravel; contains clayey seams; damp. Soft to medium hard brownish gray SANDSTONE; fine to very fine grained, highly weathered, argillaceous, thin to medium bedded, highly fractured to broken. @ 19.6', becomes gray.	4	8		15	7	3					50+(
25 – 23.0-29.		Core 60"	Rec 58	RQI 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.											
30_	-	Core 60"	Rec 60"	RQI 55%	R-	3 *338												

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Job No. 0121-3070.03 Project: SCI-823-0.00 Client: TranSystems, Inc. Location: Sta. 524+77.0, 76.8 ft. LT of SR 728 Ramp C BL Date Drilled: 8/08/05 LOG OF: Boring B-1233 GRADATION WATER Sample Hand **OBSERVATIONS:** No. Water seepage at: None Penetro-Water level at completion: Not reported STANDARD PENETRATION (N) \bar{z} meter % Aggregate Core Sand Sand (tsf) / Natural Moisture Content, % -Recovery ğ Point-Load Depth Elev. Clay is Strength (ft)(ft) Drive Blows per foot - O DESCRIPTION (psi) % 773.7 Soft to medium hard gray SANDSTONE interbedded with SHALE. @ 31.7', 34.4', 34.6', low angle fractures. ROD R-4 -33.4--|-770.3-Core Medium hard to hard gray SANDSTONE; very fine to fined Rec *318 60" 57" 60% grained, slightly to moderately weathered, argillaceous, 35 laminated to medium bedded, slightly to moderately fractured. @ 33.7', 33.8', 34.0'-34.3', calcareous layers. -36.5--767.2-∖@ 34.0'-34.6', high angle fractures. Hard to very hard gray SANDSTONE interbedded with few SHALE layers; very fine grained, slightly weathered, RQD Core Rec R-5 *207 argillaceous, medium bedded, slightly to moderately fractured. 83% 58" @ 37.6', 37.7', 40.8', low angle fractures. 40 @ 37.6', 40.2' to 40.8', calcareous layers. @ 41.2'-41.5.', high angle fracture. ROD R-6 Core Rec *839 @ 43.8'-44.0', 44.1'-44.2', 44.4'-45.0', 46.4', calcareous zones. 35% 60" 60" @ 44.2'-44.9', broken zone. 45 @ 47.5', 47.8', 49.3', 50.2', 50.7', low angle fractures. Core Rec RQD R-7 *187 60" 60" 63% 50 @ 52.6', 54.7', 59.2', low angle fractures. 55 RQD Rec Core *223 120" 120" 61% @ 57.5'-58.0', 58.4'-58.7', high angle fractures.

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C

Job No. 0121-3070.03 Project: SCI-823-0.00 Client: TranSystems, Inc. Date Drilled: 8/08/05 Location: Sta. 524+77.0, 76.8 ft. LT of SR 728 Ramp C BL LOG OF: Boring B-1233 **GRADATION** WATER Sample Hand **OBSERVATIONS:** No. Water seepage at: None Penetro-Water level at completion: Not reported STANDARD PENETRATION (N) $\tilde{\epsilon}$ meter % Aggregate Š % M. Sand % F. Sand Sand (tsf) / Natural Moisture Content, % -Blows per Recovery Point-Load Depth Elev. % Clay Silt Strenath رن 8 (ft)(ft) Blows per foot -DESCRIPTION (psi) % 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 RQD 67% R-9 Rec Core *452 120" 120* 70 -@ 71.5'-91.5', contains moderately argillaceous laminations, thinly bedded, contains rust stains. @ 72.8', 80.4', low angle fractures. 75 Core Rec ROD R-*424 78% 10 120" 120" 80 @ 81.8', 83.2', 87.2', 90.2', 90.3', low angle fractures. 85 RQD R-Rec Core *625 74% 11 120" 112"

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BUS, OHIO 43229 1 (614)888-0040 DLZ OHIO INC. * 6121 HUNTLEY ROAD, CO Job No. 0121-3070.03 Project: SCI-823-0.00 Client: TranSystems, Inc. Location: Sta. 524+77.0, 76.8 ft. LT of SR 728 Ramp C BL Date Drilled: 8/08/05 LOG OF: Boring B-1233 GRADATION Sample WATER Hand **OBSERVATIONS:** No. Water seepage at: None Penetro-STANDARD PENETRATION (N) Water level at completion: Not reported (E) meter % C. Sand % M. Sand % F. Sand Blows per 6" Press / Core Natural Moisture Content, % -(tsf) / Point-Load Depth Elev. % Clay % Sitt Strength Blows per foot -(ft) (ft) Drive **DESCRIPTION** (psi) 713.7 Medium hard gray SANDSTONE. -91.5---|-712.2 Bottom of Boring - 91.5' 95 100 105 110 115

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Client:	FranSy	stems,	Inc.				Project: SCI-823-0.00							J	ob No. 0	121-3070	0.03
LOG	F: Bo	ring l	B-123			ocation: Sta	n. 525+21.2, 85.2 ft. RT of SR 728 Ramp D BL Date Drilled: 8/	04/0)5								
Depth (ft)	Elev. (ft) 828.2	Blows per 6"	Recovery (in)	Sam No		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported DESCRIPTION	% Aggregate	C. Sand	M. Sand	% F. Sand	Silt	% Clay	Natural PL	Moisture		6 - • LL
-		11 15 7	16	1		4.5+	No topsoil Hard light brown SILT (A-4b), some clay, trace fine to coarse sand; damp.	0			П				Ö		
3.5— 5—	824.7-	8 18 50/4	10	2		-	Decomposed brown SANDSTONE										50+(
-		31 50/3	9	3		-	•										50+(
-10.0-	818.2	27 50/2	1	4		-						, 					50+1
15 —		Core 120"	Rec 118"	RQI 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.										
20 — 20,007,727/11 20,000,000		Core 120"	Rec 119"	RQI 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.										

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ΔB==4. T	rang.~	tomo	Inc				Project: SCI-823-0.00								Job	No. C	121	3070	.03
Client: T				4	٦,	ocation: Sta	. 525+21.2, 85.2 ft. RT of SR 728 Ramp D BL Date Drilled: 8/0)4/0	5										
1000	1. 60	my	J-123	Samp	_		WATER			RAD	ATIO	NC							
Depth (ft)	Elev.	ws per 6"	Recovery (in)	No	/ Core	Hand Penetro- meter (tsf) / * Point-Load Strength	OBSERVATIONS: Water seepage at: None Water level at completion: Not reported DESCRIPTION	% Aggregate	C. Sand	M. Sand	% F. Sand	Sitt	, Clay		ural Me PL —	oisture _	Con	RATIO	
	798.2	Blows	Rec	Drive	Press.	(psi)		8	%	8	%	%	%	111	10	20	3	o	40
30		Core 120"	Rec 119*	RQD 23%	R-3	*232	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. @ 34.2'-35.1', decomposed. @ 35.7'-36.0', 37.5'-38.1', broken zone.												
-	-			ł			laminations.												
45 — 47.5 — 50 —	780.7	Core 120"	Rec 117"	RQE 39%), R-4	4 *256	@ 46.4'-46.6', high angle fractures. 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.												
28.5 - 58	769.7	Core 120°	Rec 118"	RQI 35%	R-	5 *293	@ 50.5', 50.9', 51.6', 56.9', 57.0', low angle fractures. @ 52.5'-55.8', broken shale layer. Medium hard to hard gray SANDSTONE.												

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						0	LZ OHIO INC. * 6121 HUNTLEY ROAD, CO BUS, OHIO 43229 * (614)8	B8-00	40					 					
Client:	TranS	ystems,	Inc.				Project: SCI-823-0.00							Jo	ob No	. 01	21-	3070	.03
LOG	OF: B	oring l	B-123	4	Lo	ocation: Sta	. 525+21.2, 85.2 ft. RT of SR 728 Ramp D BL Date Drilled: 8	<u>/04/0</u>											
Depth (ft)	Elev.	Blows per 6"	Recovery (in)	Samp No.	/ Core	Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	% Aggregate	!	% M. Sand			% Clay	atural PL	Mois	ture (ent, % —⊢ i	
, ,,,	768.2	J &	79ec	Drive	Press.	(psi)	DESCRIPTION	%	%	% Y	% F	₩S %	%	 10		20	30		40
60 — 65 —		Core 120"	Rec 120*	RQD 85%		*362	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.												
70 - 75 -		Core 120*	Rec 120"	RQD 75%	R-7	287	@ 70.0'-70.6', argillaceous laminations.												
(21/2006 2:17 PM)									•						, , , , , , , , , , , , , , , , , , ,				
FILE: 0121-3070-03 [11/2		Core 120"	Rec 120"	RQ0 81%	R-6	3 *254	@ 82.9', 83.9', 88.3', 88.5', low angle fractures. @ 83.7'-83.9', argillaceous zone.												
<u></u>	+						@ 88.3'-88.5', broken, argillaceous.												

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		<u> </u>	less				Project: SCI-823-0.00								Job	No. (0121-	3070.	03
Client:					7	tion Sto	. 525+21.2, 85.2 ft. RT of SR 728 Ramp D BL Date Drilled: 8/0)4/()5										
LOGO	F: B0	ring_i	B-1234	Samı	_		WATER			ZAD,	ATIC	N						_	
Depth	Elev. (ft) 738.2	Blows per 6"	Recovery (in)	Drive			OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	Natu F	ıral Me PL 1—	oistur	e Cont		- •
90 — 901 — 905 — 11/21/2006 5:11 PM] — 95 — 100.00 — 105 — 110 — 105 —	738.2	Core 120"	Rec 120°	RQD 99%		*347	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. Bottom of Boring - 100.0'												

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Client:	FranSv	stems	lnc				Project: SCI-823-0.00								Job No.	0121	-3070.03
LOG O		_		5	Tı	ocation: Sta	. 525+94.3, 58.9 ft. LT of SR 728 Ramp D BL Date Drilled: 9.	29/0)5			to	9	/30/05			
				Sam	ole	Hand	WATER	匚		RAD	ATI	ON	\blacksquare				
Depth	Elev.	er 6"	ry (in)	No	Core	Penetro- meter (tsf) / * Point-Load	OBSERVATIONS: Water seepage at: None Water level at completion: 4.1'	egate	Sand	and	Sand			Natu	al Moistu	ıre Cor	
(ft)	(ft) 786.7	Blows per	Recovery	Drive	Press/	Strength (psi)	DESCRIPTION	% Aggregate	% C. S	Σį	%F.S	l is	% Clay		Blows po 0 20		- LL - O 30 40
0.4	786.3			U			Topsoil - 5" / 6" soil removed before drilling	-									
-		5 7 9	11	1			Very stiff to hard brown SANDY SILT (A-4a), some fine to coarse sand, trace to little gravel; damp.	}				<u> </u>			Q		
5-		11 16 17		2		4.5+						į					0.
-6.0	780.7-	19 31 45	18	3	i		Severely weathered brown and gray SANDSTONE, argillaceous.	-									<i>○</i> 76
10-	- - -	19 24 4	18	4)
-		19 44 50/4	16	5					ļ)
-	1	50/5	5	6													
15.0-	771.7-	Core 12"	Rec 2"	RQI .0%	R-1		Soft reddish brown SANDSTONE; very fine to fine grained, decomposed, broken, contains rock fragments.										
-17.7-	769.0	Core 120"	Rec 120"	RQ(85%	R-2	2 *266	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.										
25 – 25 – 3031-3030-03							@ 26.0'-27.0', broken zone infilled with silty clay and sandstone fragments. @ 27.0', slightly fractured.			, p. p. p. p. p. p. p. p. p. p. p. p. p.							

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Client: 1	ranSy	stems	, Inc.				Project: SCI-823-0.00								Job N	lo. 01	21-307	0.03
LOG O	F: Bo	ring	B-123		_	ocation: Sta	. 525+94.3, 58.9 ft. LT of SR 728 Ramp D BL Date Drilled: 9/	29/0				to	9/:	30/0	5			
				Sam No		Hand Penetro-	WATER OBSERVATIONS: Water seepage at: None	\vdash	GI	RAD	ATIC	NC	-					
		.9	(ii)		re re	meter (tsf) /	Water level at completion: 4.1*	ate	_	-		.						ON (N)
Depth	Elev.	per	وُ		/ Care	* Point-Load		7.09	San	San	Sanc		_			sture C	ontent,	% - LL
(ft)	(ft) 756.7	Blows per	Recovery	Drive	Press / (Strength (psi)	DESCRIPTION	% Ags	2,0	% W.	% F. S	% Sitt	% Clay				ot - (
30.0 	- 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. @ 34.5'-34.6', silty clay seam with sandstone fragments											
40 —		Core 120"	Rec 120"	RQD 100%	R-4	*531	(medium to coarse and size).											
50 — - - - - - 55 —		Core 120*	Rec 120"	RQE 100%	, 5 R	*478	@ 54.5', 1/2" zone of clay and sandstone fragments.											
55 — - - -																		

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Client:	TranSv	stems	. Inc.				Project: SCI-823-0.00								Job No.	0121	-3070	.03
LOG				5	1	ocation: Sta	. 525+94.3, 58.9 ft. LT of SR 728 Ramp D BL Date Drilled: 5	9/29/				to	Ş	/30/05				
				Sam	ole	Hand	WATER	\perp	G	RAL	ATI	ON						
Depth	Elev.	per 6"	rary (in)	No	/ Core	Penetro- meter (tsf) / * Point-Load	OBSERVATIONS: Water seepage at: None Water level at completion: 4.1'	% Aggregate	Sand	% M. Sand	Sand	14	ау	Natui	NDARD i	ire Cor	ntent, % ——	- •
(ft)	(ft) 726.7	Blows per	Recovery	Drive	Press	Strength (psi)	DESCRIPTION	% Ac	, % C	%	% r.	is %	% Clay	<u> </u>	Blows po			40
65 —		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.											
-	740.7	Core 48"	Rec 48"	RQD 100%	R-7	*628												
FILE: 0121-3070-03 (11/28/2006 11:30 AM) - 52 - 68 - 68 - 68 - 68 - 68 - 68 - 68 - 6							Bottom of Boring - 70.0'											

DLZ OHIO INC. * 6121 HUNTLEY ROAD,

MBUS, OHIO 43229 * (614)888-0040

Client:	Trans	Systems	s, Inc.			_		Project: SCI-823-0.00								Job I	Vo. ()121	-307	0.03	
		oring		5		Lo	ocation: Sta	. 512+17.7, 189.3 ft. LT of SR 823 CL Date Drilled: 7/	7/04												
Depti	h Elev	per 6"	ery (in)		nple lo.	\dashv		WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 16.5' (Includes drilling water)	% Aggregate	nd	pue	Sand		ابر	Nati	ANDAF ural Mo PL ⊢	isture		ntent, '		s) •
(ft)	(ft) 883.	lows	Recovery) Orivo	Drose	1922	Strength (psi)	DESCRIPTION	% Age	ان	Ξ	% F. Sa	% Silt	% Cis	1111	Blow 10	s per 20	foot	- ⊂ 30) 40 : :	
0 · 1.5	882	3-7 44 31	6 18_]]]] 1			4,5+	No topsoil Hard brown SANDY SILT (A-4a); contains roots; damp. Soft light gray and brown SANDSTONE; very fine to fine grained, decomposed, argillaceous, broken.													_80 <u>_</u>
	-	34 37 50/	2 14	2		İ															50+
10		Core 96"		R(ND R	-1	*211	Medium hard light gray and brown SANDSTONE; fine to coarse grained medium bedded, highly fractured. ② 5.5', low angle fracture. ② 8.3'-9.6', qu = 7,920 psi, SDI = 96.1%. ② 9.6', low angle clean rough fracture. ② 10.3'-10.5', high angle clay filled fracture. ② 12.0'-12.2', high angle rust stained fracture. ② 12.3'-13.0', high angle partially healed rust stained fracture.													
15 —16.6 —19.2 20 25 —25 —25 —25 —25 —25 —25 —25 —25 —25	2 864 	Core 120		R(63	2D 8	₹-2	*128	 @ 14.0', low angle clay filled fracture. @ 14.2', low angle rust stained fracture. @ 14.8'-16.6', gray slightly carbonaceous. @ 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. @ 18.9'-19.2', ironstone nodule. 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. 													
FILE: 0121-3070-03		Cor 120		R 7	2D 7%	₹-3	*216	@ 28.7'-30.0', highly argillaceous zone.													

Client:	TranSys	stems	, Inc.				Project: SCI-823-0.00								Job No.	0121	<u>-3070.</u>	03
LOG	DF: Bo	ring	R-446		L		. 512+17.7, 189.3 ft. LT of SR 823 CL Date Drilled: 7/3	7/04										
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.	/ Care	Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 16.5' (Includes drilling water)	Aggregate	Sand	RAD pus 1	pue		Clay	Natu	NDARD i	re Con	tent, % L	- •
1	853.8	Blow	Rec	Drive	Press	(psi)	DESCRIPTION	% 4	%	% %	1 %	% Silt	18	1	Blows po		_	10
30 -	555.5						Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thinly bedded to medium bedded, broken to highly fractured.											
36.0- 38.4- 40	847.8	Core 120"	Rec 120*	RQD 97%	R-4	*378	Medium hard gray SANDSTONE; medium to coarse grained, highly weathered, micaceous, contains gravel and cobble sized particles, poorly cemented. 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.											
45		Core 120°	Rec 120"	RQD 100%	R-5	*442	@ 43.1', high angle black shale laminae. @ 43.0', massive bedding with turbidites. @ 45.5'-46.1', pyritic zone. @ 49.5'-50.5', qu = 11,286 psi. @ 49.5'-50.9', pyritic zone.											
FILE: 0121-3070-03 1	 	Core 120°	Rec 120*	RQD 100%	R-6	6 *413												

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						U	LZ OHIO INC. * 6121 HUNTLEY ROAD, Q MBUS, OHIO 43229 * (614)888	0-00	 					10 5 2	<i>lo.</i> 01	21.2	070 (13
Client:					_		Project: SCI-823-0.00	7/0.4	 					JOD N	10. U I	21-3	070.	" —
LOGC	F: Bo	ring F	₹-446	_	_		512+17.7, 189.3 ft. LT of SR 823 CL Date Drilled: 717	7704	240	ATIC	N.	٦						
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 16.5' (Includes drilling water) DESCRIPTION	% Aggregate		nd		% Clay	Natu F	ANDAR Iral Moi PL I Blows 10_	isture (Conte	nt, % → Li	•
60 —	823.8	Core 120"	Rec 120"	RQD		*422	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.											
75 — 80 — 80 —		Core 120"	Rec 120"	RQD 100%	R-8	*387	@ 76.0', low angle smooth fracture. @ 80.5'-81.7', qu = 11,660 psi.											
- 128		Core 120"	Rec 120*	RQI 96%	R-s	•497	@ 85.9'-86.4', high angle fracture.											

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Clicat.	Transia	etems	Inc				Project: SCI-823-0.00	U-00	70	_	_	 -		Job N	lo. 01	21-3	070.0)3
Client:					7	ocation: Sta	. 512+17.7, 189.3 ft. LT of SR 823 CL Date Drilled: 7/	7/04	1	_			_	-				
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.	ole	Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 16.5' (Includes drilling water) DESCRIPTION	% Aggregate	GI	Sand	և	% Clay	Natu P	ANDAR iral Moi PL I— Blows 10		Conte	nt, % → Ll	- •
90 —	793.0	Core 120"	Rec 120"	RQD 100%		*567	Hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thinly bedded to massive, moderately fractured to unfractured, contains turbidite beds. @ 98.2'-99.3', qu = 10,699 psi. @ 100.4', low angle clay filled fracture.											
105 —		Core 120*	Rec 120"	RQD 100%) R1	1 *563												
115 -		Core 120**	Rec 120"	RQ0 95%	R1	2 *333												

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Client:	TranSy	stems,	Inc.				Project: SCI-823-0.00								Job No	. 012	<u>21-30</u>)70.C	3
	DF: Bo				_	ocation: Sta	. 512+17.7, 189.3 ft. LT of SR 823 CL Date Drilled: 7/1	7/04										_	
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 16.5' (Includes drilling water) DESCRIPTION	% Aggregate	% C. Sand		% F. Sand		% Clay	Natui Pl	NDARE al Mois . I—— Blows i	ture C per foo	onteni ot -	t, % ⊣ LL ○	•
120 —	763.8	18	Re				Hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, very thinly bedded to massive, moderately fractured to unfractured, contains turbidite beds.	%	%	%	%	8	%	1	0 2	20	30	4()
125.0- 130		Core 24"	Rec 24"	RQD 100%	R13	348	@ 122.6', pyritic. Bottom of Boring - 125.0'			A PARTICIPATION OF THE PARTICI									
1355 - 1405 13150 EM) 1405 - 1405 1405 15150 EM) 1405 - 1405 1405 1405 1405 1405 1405 1405 1405																			

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Client:	TranSy	/stems	, Inc.				Project: SCI-823-0.00								Job No	o. 012	21-307	0.03
LOG	OF: Be	oring	R-447		Į	ocation: Sta	i. 512+15.8, 8.5 ft. RT of SR 823 CL Date Drilled: 7/	2/04				to	7	/6/04				
				Samj No		Hand Penetro-	WATER OBSERVATIONS: Water seepage at: None	\vdash	<u>G</u>	RAD	ATK	ON_	\vdash	•				
Depth (ft)	Elev.	ws per 6"	Recovery (in)	6,	ss / Core	meter (tsf) / • Point-Load Strength	Water level at completion: None (prior to coring) 19.0' (includes drilling water)	Aggregate	C. Sand	M. Sand	F. Sand	Sit	Clay	Nati	ANDARI ural Mois PL +	ture Co	ontent, '	% - • LL
n-	881.2		Rec	Drive	Press	(psi)	DESCRIPTION	%	%	%	%	%	%	1111	10 	20 1	30	40 : ::::
0.4	880.8	³ ₃	18	1			Topsoil - 5" Loose brown SANDY SILT (A-4a); contains rootlet and roots; damp.		<u> </u>					0				
3.0-	878.2	50/3	3	2			Severely weathered brown SANDSTONE, argillaceous, micaceous.											50+
10 -		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.											
15 -							 @ 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° 20° 20° 20° 20° 20° 20° 20° 20° 20° 2	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.	,										
25.5 —25.5 —25.5	855.7 - -	Core 120"	Rec 120"	RQE 87%	R-S		@ 23.7' to 25.5', broken. Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, thinly bedded to medium bedded, slightly fractured.											

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Clien	r: Trar	nSyst	ems,	Inc.				Project: SCI-823-0.00								Job No.	0121	-3070	.03
LOC	OF:	Bori	ng F	₹-447		I	ocation: Sta	. 512+15.8, 8.5 ft. RT of SR 823 CL Date Drilled: 7/	2/04				to	7	/6/04				
					Sam, No		Hand Penetro-	WATER OBSERVATIONS: Water seepage at: None		GI	RAD	ATIC	N 	\dashv					
Dept (ft)	(1	lev. (ft)	Blows per 6"	Recovery (in)	Drive	Press / Core	meter (tsf) / * Point-Load Strength (psi)	Water level at completion: None (prior to coring) 19.0' (includes drilling water) DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natur PL	NDARD al Moist Blows p	ure Cor er foot	itent, %	•
30	-	,,,,,						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	R-4						:							
40) — - - -				ē			@ 40.0', near horizontal fracture.											
45	; - ; - -	:						@ 43.3', brown and gray, moderately to highly weathered.@ 44.6' to 46.6', high angle partially healed rust stained fracture.				j							
11/29/2006 12:50 PM]			Core 120"	Rec 120"	RQE 48%	R-5		@ 47.5' to 48.2', high angle partially healed rust stained fracture. @ 50.1' to 50.5', high angle partially healed rust stained											
-	5-					I		fracture. @ 50.5' to 53.0', broken zone. @ 52.5' to 58.4', high angle partially healed rust stained fracture.											
FILE: 0121-3070-03	- - - -		Core 120"	Rec 120*	RQE 48%) R-6	6	@ 58.9' to 59.6', high angle partially healed rust stained fracture.					,						

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JMBUS, OHIO 43229 * (614)888-0040

Client:	ranSy:	stems,	Inc.				Project: SCI-823-0.00					_				No.	012	1- <u>30</u> 7	70.03	<u>-</u>
LOG O					L	ocation: Sta	. 512+15.8, 8.5 ft. RT of SR 823 CL Date Drilled: 7	/2/04			_	to	7	/6/04	<u> </u>					
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Drive No.		Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 19.0' (includes drilling water) DESCRIPTION	% Aggregate	% C. Sand		% F. Sand		% Clay	Nat	ural M PL 1-	loistu			% - LL	
60 —	821.2	8	a.	0	Ь		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.		6		6		5							
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.			-										
75 — 75 — 80 — 80 — 80 — 80 — 80 — 80 — 80 — 8		Core 120"	Rec 120*	RQE 100%	R-{		@ 74.9', low angle rust stained and partially clay filled fracture.													
FILE: 0121-3070-03		Core 120"	Rec 120	RQI 100°) R-	9														

Client:	Transve	teme	Inc				Project: SCI-823-0.00				_				Job No.	0121-	3070	03
LOG C					٦,	acation: Sta	. 512+15.8, 8.5 ft. RT of SR 823 CL Date Drilled: 7/	2/0/	1			to	7	7/6/04	300 710.	0121	00.0.	
12000	1 0	nig	\ <u>-</u>	Samp	_		WATER	<u> </u>		RAD	ATI		一	10/04				
Depth (ft)	Elev. (ft) 791.2	Blows per 6"	Recovery (in)	Drive So:	Press / Care	Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 19.0' (includes drilling water) DESCRIPTION	% Aggregate	% C. Sand	Ξ	% F. Sand	िळ	% Clay	Natu P	INDARD I ral Moistu L I——— Blows pe	re Cont	ent, % \ L ·\ ()	-
90 —	731.2						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		@ 98.9', 99.0', 99.9', low angle partially clay filled fracture. contains dark gray siltstone laminae.											
-	769.2	Core 120"	Rec 120"	RQD 100%	R11		Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, laminated to medium bedded, slightly fractured,											
115 - 0001-1001-1001-1001-1001-1001-1001		Core 120"	Rec 120*	RQD 100%	R12		contains few to moderate argillaceous laminations				\ \ \							

	TranSy				Ţ		Project: SCI-823-0.00								Job No.	0121	-3070	.03
LOG	OF: Bo	ring	R-447			ocation: Sta	. 512+15.8, 8.5 ft. RT of SR 823 CL Date Drilled: 7/	2/04				to	7	7/6/04				
ļ				Sam, No		Hand	WATER OBSERVATIONS: Water seepage at: Name	<u> </u>	GF	RAD.	ATIC	NC I	┌┤					
Depth (ft)	Elev. (ft) 761.2 761.3	Blows per 6"	Recovery (in)	Drive	Press / Core	Penetro- meter (tsf) / * Point-Load Strength (psi)	Water level at completion: None (prior to coring) 19.0' (includes drilling water) DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natur P	NDARD ral Moiste L I Blows p 0 20	ire Con er foot	tent, % 	-
_119.9 <u>`</u>	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. @ 120.9', pyritic.	1										
—125 O	756 2	Core 24"	Rec 24"	RQD 100%	R13													
130 - 135 - 140 - 145 - 145 - 150 - 150 -							Bottom of Boring - 125.0°											

Client:	ranSy:	stems,	Inc.				Project: SCI-823-0.00						Job N	o. 0 1:	21-30	70.03	
LOG O	F: Bo	ring F	₹-448		_		. 512+19.5, 175.0 ft. RT of SR 823 CL Date Drilled: 7/8	3/04			 					_	
Depth (ft)	Elev. (ft) 857.5	Blows per 6"	Recovery (in)	Samp No.	Press / Core		WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 11.0' (Includes drilling water) DESCRIPTION	% Aggregate	G. Sand	% F. Sand	% Clay	Nati F	ıral Mois PL I	sture C	ontent,	LL.	D
3.0	854.5	7 9 21. 32 50/5	18	1		4.5+	No topsoil Hard brown and gray SANDY SILT (A-4a); contains sandstone fragments; contains roots; damp. Soft to medium hard light gray SANDSTONE, decomposed.								<u> </u>	, d	7+
5.0 10	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.									9	**************************************
15	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.										
25 —		Core 120"	Rec 120*	RQD 98%	R-3	*260	@ 23.2', low angle rust stained fracture.										



		(OLZ OHIO INC. * 6121 HUNTLEY ROAD, CO BUS, OHIO 43229 * (614)88	38-00	40_						Job No	01	21-3	70 (13
	_	_	tems,		_	_		Project: SCI-823-0.00 512+19.5. 175.0 ft. RT of SR 823 CL Date Drilled: 7/1	1010					_		300 140	. 01.	<u> </u>	3.0.0	<u>~</u>
LOG	OF	: Boı	ing l	R-448		_		. 0 12 10 0	T		RAD.	ATIC)N	ī						
Dep		Elev.	Blows per 6"	rary (in)	Samp No.	Core	Hand Penetro- meter (tsf) / * Point-Load	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 11.0' (Includes drilling water)	% Aggregate		pue	F. Sand		lay	Natur	NDARI al Mois	ture C	Conten	nt, % → Ll	- •
(ft)	- 1	(ft)	310ws	Recovery	Drive	Press / (Strength (psi)	DESCRIPTION	% Ac	\%	% W	% 	S %	Ω %	1	Blows 0	per fo 20	ot - <u>30</u>	<u> </u>	0
30	\ 	827.5	Ţ					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	Rec	RQD 100%	R-4	*262													
4(- - - - - -		120"	120"	100%			@ 41.7', near horizonal fracture.												
4: E	5-		Core 120"	Rec 120**	RQD 100%	R-5	*260													
61:2 3002/12/11] 1	0 -																			
FILE: 0121-3070-03	5 —		Core 120"		RQ1 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. 												

	Client: 1	FranSy:	stems,	Inc.				Project: SCI-823-0.00								Job No.	012	1-3070	0.03
ΙŒ	LOG O	F: Bo	ring l	R-448		1	ocation: Sta	. 512+19.5, 175.0 ft. RT of SR 823 CL Date Drilled: 7/8	3/04							_		_	
				,	Samp No.		Penetro-	WATER OBSERVATIONS: Water seepage at: None		GF	RAD.	ATIC	NC				2545	TD 4 T/	A 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1
	Depth	Elev.	per 6"	ery (in)		Press / Core	meter (tsf) / * Point-Load	Water level at completion: None (Prior to coring) 11.0' (Includes drilling water)	% Aggregate	Sand	. Sand	Sand			Natur	NDARD al Moist . ' 			5 - •
	(ft) 60 —	(ft) 797.5	Blows	Recovery	Orive	Press	Strength (psi)	DESCRIPTION	% Agg	% C	% M. S	% F. S	W Sitt	% Clay		Blows p			40
	-							Hard to medium hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, unfractured to slightly fractured.											
	65 - -					:		@ 64.6', low angle smooth fracture. @ 64.6' to 71.1', iron stained.											
1	70 —		Core 120"	Rec 120"	RQD 100%	R-7	*331												
PM 1	- 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. 											
11/21/2006 2:19	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.											
FILE: 0121-3070-03	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. 											



Client:	ranSv	stems	Inc			_	Project: SCI-823-0.00								Job No	012	1-30	70.0	3
LOGO					T_{L}	ocation: Sta	. 512+19.5, 175.0 ft. RT of SR 823 CL Date Drilled: 7/8	3/04											
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.	ile	Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 11.0' (Includes drilling water) DESCRIPTION	% Aggregate	nd	pud	% F. Sand	% Sitt	% Clay	Natur Pl	NDARD al Moisi . 1 Blows ! 02	ure Co	onten		•
95 —	767.5	Core 120"	Rec 120"	RQD 92%		*291	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. @ 96.5'-97.5', qu = 8,045 psi, SDI = 62.6%.												
105 	- - - - - - -	Core 120"	Rec 120**	RQI 87%	R1	1 *295	@ 98.4' to 108.0', pyritic. @ 108.1' to 108.4', high angle argillaceous. @ 109.0' to 109.6', high angle fracture												
115: 01-070-1211	-	Core		RQ 100°	O _% R1	2 *623	@ 113.4' to 113.8', high angle fracture. @ 117.0', low angle CLAY coated fracture.												

Cli	ent: T	ranSy	stems	, Inc.				Project: SCI-823-0.00								Job	No.	0121	-307	0.03	<u>-</u>
_	_		_	R-448	ľ] [ocation: Sta	. 512+19.5, 175.0 ft. RT of SR 823 CL Date Drilled: 7	8/04												
	epth	Elev.	Blows per 6"	very (in)	Sam, No	/ Core	Hand Penetro- meter (tsf) / * Point-Load	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 11.0' (Includes drilling water)	% Aggregate			Sand		% Clay	Nati	ıral M PL ⊢	oistur 	e Cor		% - LL	
1	(ft)	(ft) 73 <u>7.5</u>	Blows	Recovery	Drive	Press	Strength (psi)	DESCRIPTION	% A	%	% ≥	% F.	% S	% C		Blov 10	vs per 20		- (30) _40_	
	20 -	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.					:								
İ	_		Core 24"	Rec 24"	RQE 100%) R13	3 *482														
-1	25.0— _	-732. 5						Bottom of Boring - 125.0'		:				:							
	_																				
	130 —																				
	-									į											
	- 135 																				
	- -										ļ										
- FM -	-																				
2006 2:19	140 — -																				
11/21/21	-																				
1 60-02	- 145 —																				
FILE: 0121-3070-03	, , , , , , , , , , , , , , , , , , , 																				
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	150		1		Ш_						_L			L			: : :		: [; ;		<u> : : : :</u>

MBUS, OHIO 43229 * (614)888-0040

Client:	TranSy	stems	Inc.		_		Project: SCI-823-0.00								Job No	o. 01:	21-30	70.0	3
_	F: Bo				L	ocation: Sta	. 516+22.4, 193.4 ft. LT of SR 823 CL Date Drilled: 71	/04											
Depth (ft)	Elev.	s per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 78.4' (Includes drilling water)	% Aggregate			Sand		Clay	Nati	ANDARL ural Mois PL 1——	ture C	Content	, % - ⊣ LL	'N) •
0-	891.3	Blows	Reco	Drive	Pres	(psi)	DESCRIPTION	% A	%	% %	% T.	% Silt	%		Blows	per fo	ət - (⊃ <u>40</u>	
		3 4 7	18	1		4.0	No topsoil Hard light brown SILT AND CLAY (A-6a), trace gravel; damp.								R				
5 —	-	7 9 9	18	2		4.5	@ 3.5', light gray and light brown.								۲)	 		
6.8	884.5	7 25 50/5	17	3		4.5+	@ 6.0', gray, trace organic. Soft brown and gray SANDSTONE; decomposed, broken.											1	50+(
8.6 10		Core 60"	Rec 60*	RQD 93%	R-1	*258	Medium hard light gray SANDSTONE; fine grained, moderately to highly weathered, micaceous, thickly bedded, moderately fractured.												
15 —							@ 12.9', iron staining. @ 13.8' to 15.5', argillaceous and dark gray layers.												
18.0—18.0 yr — 18.0 — 20 — 20 — 20 — 20 — 20 — 20 — 20 —	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.	X	:										
23.1— 	868.2 866.6 865.3	Core 120*	Rec 120"	RQD 91%	R-3	3 *359	Very soft to soft dark gray CLAYSHALE; highly weathered to decomposed, carbonaceous, laminated to thinly bedded. Hard light gray SANDSTONE; very fine to fine grained, moderately weathered, thinly laminated, moderately fractured. Soft to medium hard gray SHALE; highly weathered to decomposed, slightly arenaceous, thinly bedded, slightly fractured. @ 27.6' to 28.2', contains iron.												

	TranSy:				_	- 01	Project: SCI-823-0.00								Job N	lo. 01	<u>21-30</u>	70.03	
LOG O	F: Bo	ring	R-449	Samp			i. 516+22.4, 193.4 ft. LT of SR 823 CL Date Drilled: 7/1 WATER	1/04		RAD	ATI	ON	:						_
Depth (ft)	Elev. (ft) 861.3	Blows per 6"	Recovery (in)	Drive	Press / Core	Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 78.4' (Includes drilling water) DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	Nati	ural Moi. PL I	sture (Content	+ LL	ツ ・
30.0 _ 31. 8 _ _ _ _ 35 _	859.5			5 5 5 5 5 5 5 7			Medium hard gray CLAYSTONE; highly weathered to decomposed, slightly arenaceous. @ 31.3' to 31.8', carbonaceous with coal stringer. 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.												
40 —		Core 120"	Rec 120"	RQD 96%	R-4	*468	 @ 35.6' to 36.6', fine to coarse grained, fossiliferous. @ 37.1' to 37.3', iron stains. @ 39.2', slickensides fracture. @ 40.5' to 41.5', medium-grained, turbidity beds. 												
45 — -47.3 — - -50 —	844.0	Core	Rec 120*	RQD 100%	R-5	*140	 @ 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. @ 46.9' to 47.3', fine to medium grained, carbonaceous, poorly cemented. 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													,

0"		<u> </u>	1				0 : 1 : CCI 000 0 00		 _	-				Π.	^	121-3	2070 /	12
Client:					7		Project: SCI-823-0.00	14 10	 					JOD	140. U	121-3	<i>ν</i> , τυ. ι	, <u>o</u>
LOG	F: Bor	ing i	-449		_	ocation: Sta	n. 516+22.4, 193.4 ft. LT of SR 823 CL Date Drilled: 7	/1/U	 240	ATIC		_						
Depth (ft)	Elev. (ft) 831.3	Blows per 6"	Recovery (in)	Samp No.	Press / Core	Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 78.4' (Includes drilling water) DESCRIPTION	% Aggregate	 % M. Sand	-	% Sitt	% Clay	Nat	ural Me PL ⊬	oisture	ENETRA Conte	nt, % - —⊢ LL	-
65	991.3	Core 120*	Rec 120"	RQD 100%		*417	Hard light gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, massive, unfractured to slightly fractured, contains iron inclusions.											
75 — 75 — - - - 80 — -		Core 120"	Rec 120*	RQD 100%	R-8	*500												
85 — - - - -		Core 120"	Rec 120"	RQD 100%	R-9	* 575												

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

Client	TranSy	etome	Inc				Project: SCI-823-0.00			_	_				Job No.	0121-	3070 0	3
	F: Bo				٦,	ocation: Sta	1. 516+22.4, 193.4 ft. LT of SR 823 CL Date Drilled: 7/	1/0/	 l	_					300 110.	0121-	30,0.0	-
1000	71 . 00	g	1 443	Samp		, i	WATER	170-		RAD	ATIC	ON						
Depth (ft)	Elev. (ft) 801.3	Blows per 6"	Recovery (in)	Drive		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 78.4' (Includes drilling water) DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	Natur Pl	NDARD I al Moistu _	re Cont er foot -	ent, % - LL 	•
90				-			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												
105 —		Core 120*	Rec 120**	RQD 100%	R11	•433	@ 109.0' to 114.0', crossbedded.											
115 —	771.3	Core 84"	Rec 84"	RQD 100%	R12	*560	Bottom of Boring - 120.0'											

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Client:	FranSy:	stems	, Inc.				Project: SCI-823-0.00								Job N	o. 012	21-3 <u>0</u>	70.03	3
LOG C	F: Bo	ring	R-450		L	ocation: Sta	. 516+18.1, 3.7 ft. LT of SR 823 CL Date Drilled: 6/2	29/0				to	_ 6	/30/0	4				
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samj No Prive		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	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) DESCRIPTION	% Aggregate	C. Sand	W. Sand	F. Sand	Sitt	Clay	Natu	ANDARI ral Mois L —— Blows		ontent,	% - LL	
0-	886.7	10		1	P	4.5+	No topsoil Hard light brown SILT AND CLAY (A-6a), trace organics; damp.	%	%	%	%	%	%		10	20	30	40	
3.4—3 5—	883.3	20 22	15			4.5*	Medium hard brown and light gray SANDSTONE; fine to medium grained, highly weathered, broken, contains numerous											C)
- - - 10 —	1	Core 115"	Rec 115"	RQD 63%	R-1		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.												
15 — 17.0—	869.7-	Core 120	Rec 120"	RQD 90%	R-2		@ 14.7' to 15.0', high angle rust stained. @ 16.6', low angle highly weathered rust stained fracture. Soft to medium hard dark gray and black SHALE; moderately to highly weathered, carbonaceous, moderately to highly fractured Soft gray SHALE; highly weathered to decomposed, thinly laminated, arenaceous, moderately to highly fractured.												
25 — 23.6 — 25 — 25 — 30	863.1-	Core 120"	Rec 120"	RQE 91%	R-3	- Control of the Cont	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.												

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Client	: Trar	Sys	tems.	Inc.				Project: SCI-823-0.00								Job	No.	0121	-307	0.03
	OF:					L	ocation: Sta	. 516+18.1, 3.7 ft. LT of SR 823 CL Date Drilled: 6	29/0	_			to	6	/30/0	04				
					Samp No.		Hand	WATER OBSERVATIONS: Water accessed at: None	\vdash	G.	RAD T	ATK	NC	Н						
Dept (ft)	85	ev. ft) 6.7	Blows per 6"	Recovery (in)	Drive	Press / Core	Penetro- meter (tsf) / * Point-Load Strength (psi)	Water seepage at. None Water level at completion: None (prior to coring) 18.1' (morning of 6/30/04)	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Nat	tural M PL ⊢	loistur	e Cor	ntent, S	LL
30	-	5.7						Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, contains few argillaceous laminations, broken to moderately fractured.												
35	- - - -		Core 120"	Rec 115*	RQD 86%	R-4		@ 33.0' and 39.1', low angle fractures. @ 33.4', 35.4', 39.2', low angle fractures. @ 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.												
45 —47.3	8 - 83 - 83	38.9	Core 120"	Rec 120"	RQD 98%	R-5	5	 @ 42.6' to 42.9', ferric band. @ 46.2', dark gray and light gray argillaceous interbeds. @ 46.0', 46.5', 47.4', low angle fracture. Medium hard to hard light gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, thickly bedded to massive, unfractured to slightly fractured. 												
FILE: 0121-3070-03 (Core 120	Rec 120*	RQD 95%	R-	6	@ 56.1', low angle fracture. @ 57.4' to 57.7', high angle fractures.												

Client	TranSy	stems	Inc				Project: SCI-823-0.00							Job No.	012	1-307	0.03
	F: Bo				L	ocation: Sta	. 516+18.1, 3.7 ft. LT of SR 823 CL Date Drilled: (/29/	04		to	- 6	/30/04				
Depth (ft)	Elev.	Blows per 6"	Recovery (in)	Samp No.	•		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) DESCRIPTION	% Accretable		W. Sand	ON Nill	% Clay	Natur Pl	al Moist	ure Co	ontent,	LL
60.0	826.7	Core		RQD 82%			Medium hard to hard light gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, thickly bedded to massive, unfractured to slightly fractured. © 67.0 to 67.3', high angle fractures. © 67.8', high angle partially healed highly weathered fracture.										
75 - 75 - 80 - 80 -		Core 120"	Rec 120"	RQD 68%	R-£	3	angle fractures. @ 76.1' to 78.1', broken with core loss, contains multiple high angle fractures; possible drilling induced breakage. @ 81.8' pyrite nodules.										
85 - 85 - 9121-3010-03		Core 120"	Rec 120"	RQE 100%	R-1	9											

Client:	ranSv:	stems	, Inc.				Project: SCI-823-0.00									Job N	o. 0	<u> 121</u>	-3 <u>07</u>	0.03	
LOG O					L	ocation: Sta	. 516+18.1, 3.7 ft. LT of SR 823 CL Date Drilled: 6/	29/0				to	(6/30	/04						
Depth (ft)	Elev.	Blows per 6"	Recovery (in)	Sami No		Hand Penetro- meter (tsf) /	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) DESCRIPTION	% Aggregate	% C. Sand	% M. Sand QV	pua		% Clay	N	atura PL	ıl Moi: Blows	sture	Con foot	tent,	ON (I % - LL) _40	
_90.0 - - -	796.7 -796.7-	3	1	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"	RQE 100%	R10				:												
105 — 105 —		Core 120*	Rec 120"	RQE 1009	R1	1															
115	766.7	Core 84	Rec 84*	RQ! 93%	R ₁	2	 @ 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. Bottom of Boring - 120.0'	5.													

Cit	nt. T	ranSys	toms	Inc		_		Project: SCI-823-0.00							Jot	No. 0121-3	070.03
		F: Bor				٦,	ocation: Sta	. 516+08.6, 160.8 ft. RT of SR 823 CL Date Drilled: 6/3	30/0	14							
<u> </u>			g	1 10.	Samp	_		WATER			RAD	ATIC)N	\Box	"		
	epth ft)	Elev. (ft)	Blows per 6"	Recovery (in)	No.	Press / Core	Hand Penetro- meter (Isf) / * Point-Load Strength	OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 14.2' (Includes drilling water) DESCRIPTION	% Aggregate	C. Sand	Ξ	F. Sand	% Sitt	Clay	Natural N PL H	ARD PENETRA loisture Conter	nt, % - ● LL
	\Box	866.4	910	Re	Drive	ď	(psi)		%	%	1%	%	%	%	10	20 30	<u>40</u>
	-	-866.1-	6 9 13	18	1		2.0	Topsoil - 4" Stiff to very stiff reddish brown SANDY SILT (A-4a), little sandstone fragments; damp			į					Q.	
-3	5 —	- 863.4-	13 17 23	18	2		4.5+	Hard reddish brown SILT AND CLAY (A-6a), little fine to coarse sand; damp									, γ
			11 11 21	18	3		4.5+	@ 6.0', decomposed shale, trace fine to coarse sand.									
1	- 10 — 0.5—	-855.9	17 31 45	15	4		4.5+	@ 8.5', red, brown and gray, trace gravel.									○76 −
	_	-854.7 -	50/4	4	5]		Soft brown SHALE; highly weathered, thinly bedded, broken.	-		1			ļ			50+
	_ _	004.7	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 - -		Core 120"	Rec 120"	RQE 68%	R-2	*187	@ 15.5'-16.6', SDI = 2.3%.									
21/2006	20 	042 0-						@ 21', IRONSTONE inclusion.									
. 1 60-	.2.5 - 25 	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.									
FILE: 01	- - 30		Core 120"	Rec 120"	RQI 78%	R-	3 *295	@ 28.0'-29.0', qu = 9,850 psi, SDI = 95.6%.									

	ranSys	_			7		Project: SCI-823-0.00	00/	_						Job No	. 0121	-3070	.03
<u>.06 0</u>	F: Bo	ring	R-451	Samp	le		i. 516+08.6, 160.8 ft. RT of SR 823 CL Date Drilled: 6/3 WATER	30/0		RAD	ATI	ON						
Depth (ft)	Elev. (ft) 836.4	Blows per 6"	Recovery (in)	Drive 3	Press / Core	Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 14.2' (Includes drilling water) DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	ST. Nati	ıral Mois PL ⊢— Blows ı	PENET ture Con per foot	ıtent, % ——∣ l	-
30 -							Medium hard gray SANDSTONE; fine to medium grained, moderately to highly weathered, pyritic, thinly bedded to medium bedded, contains moderate coal laminae.											
-33.5 35 	- 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.											
40 —	-827.3- -825.6-	Core 120"	Rec 120"	RQD 98%	R-4	*512	Medium hard light gray and gray BRECCIA; highly weathered, poorly cemented. Hard gray SANDSTONE; very fine to fine grained, unweathered to slightly weathered, micaceous, thinly bedded to thickly bedded, slightly fractured.				:							
45 - -		Core 120"	Rec 120"	RQD 100%	R-5	*532	@ 46.4'-46.8', high angle fracture.	ř										
50							@ 49.5', low angle fracture.											
55							@ 53.7', low angle fracture.											
		Core 120"	Rec 120"	RQD 100%	R-6	*564	,											

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Client:	FranSy:	stems,	Inc.				Project: SCI-823-0.00								Job No	. 012	1-30	70.03	_
LOG C	F: Bo	ring	R-451		_		. 516+08.6, 160.8 ft. RT of SR 823 CL Date Drilled: 6/3	30/0					·						
Depth (ft)	Elev. (ft) 806.4	Blows per 6"	Recovery (in)	Sami No		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 14.2' (Includes drilling water) DESCRIPTION	% Aggregate	% C. Sand	Σ	F. Sand	Silt	% Clay	Natura PL	al Moisi IIII Blows I	ture Co	ontent,	10N (N, % - 1 LL) 40	
65 —		Core 120"	Rec 120"	RQD 100%		*508	Hard gray SANDSTONE; very fine to fine grained, unweathered to slightly weathered, micaceous, thinly bedded to thickly bedded, slightly fractured to unfractured. @ 66.5', pyritic.												
75 — 80 — 80 —		Core 120"	Rec 120"	RQE 100%	R-8	*522	@ 83.0', argillaceous beds with turbidity bedding and argillaceous clasts.												
FILE: 0121-3070-03	-	Core 120"	Rec 120*	RQI 100%	R-9	*557	@ 86.6'-87.3' argillacious interbeds. @ 88.5'-88.8', argillaceous interbeds.												

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

Clie	nt: T	ranSy	stems,	Inc.				Project: SCI-823-0.00								Job No	. 012	1-307	0.03
LΟ	G O	F: Bo	ring l	₹-451		_	ocation: Sta	. 516+08.6, 160.8 ft. RT of SR 823 CL Date Drilled: 6/	30/0		245	A T.	241	- 1					
De,	pth	Elev. (ft)	Blows per 6"	Recovery (in)	Samj No		Hand Penetro- meter (tsf) / * Point-Load Strength		Aggregate		% M. Sand			% Clay	Natur	NDARD al Moisi Blows j	ture Co	ontent, !	LL
١.		776.4	Blo	Rec	Drive	Pre	(psi)	DESCRIPTION	%	%	%	1 %	%	%	1		20	30	40
)e).0 <u></u> _ _ _ _	776.4 -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		İ										
95	5.0 — — —	 771.4 -						Bottom of Boring - 95.0'											
10	00 —																		
10	05 — - -						,												
1/21/2006 2:19 PM)	- - 10 — - -																		
FILE: 0121-3070-03 [1]	 15 																		
1	- - 20	1																	

Client:	ranSvs	tems	Inc.			-	Project: SCI-823-0.00								Jol	b No.	012	1-3070	0.03
LOG O				_	1	ocation: Sta	. 520+21.3, 169.5 ft. LT of SR 823 CL Date Drilled: 6/2	24/0	4			to	7	/8/04	١ _				
		Ž		Samp No.	ile		WATER OBSERVATIONS: Water seepage at: None		GF	RAD	ATIC	N	_						
Depth (ft)	Elev. (ft) 866.7	Blows per 6"	Recovery (in)	Drive	Press / Core	meter (tsf) / * Point-Load Strength (psi)	Water level at completion: None (Prior to coring) 2.0' (Includes drilling water)	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	Nat	ural N PL +	Moistu ———	ıre Co	TRATIC ntent, % 	6 - • LL
-0.3 -	866.4	2 4 5	18	1		1.75	Topsoil - 3"/6" soil removed before drilling Stiff to very stiff brown SANDY SILT (A-4a), some clay, trace gravel; damp.								ς,				
5		6 13 14	12	2		3.0											Ç		
5.5	861.2	² 7 8	16	3		4.5+	Hard light brown CLAY (A-7-6), trace fine to coarse sand; damp.	0	1	 -	7	47	45			2	/		
8.0	858.7	10 26 50/5	17	4			Severely weathered brown and gray SANDSTONE.	0	0		9	65	26		•	H	<u> </u>	/	50+
-		24 50/4	8	5															50+
-	853.7 851.7	Core 48"	Rec 42"	RQD 13%	R-1	1	Soft to medium hard brown and gray SANDSTONE; fine to coarse grained, highly weathered, broken. Soft to medium hard brown and gray BRECCIA; highly												
17.0	849.7-			- !	1		weathered, arenaceous, broken, poorly cemented. Soft to medium hard brown and gray SANDSTONE; fine to				:								
20 —	-	Core 60"	Rec 30"	RQD 0%	R-2	2	coarse grained, highly weathered, broken. @ 22.0'-22.7', contains rust stains.												
25 —	844.2	Core 60"	Rec 52*	RQ0 13%	R-	3 *641	Soft to medium hard gray SANDSTONE interbedded with SILTSHALE and CLAYSHALE; very fine to fine grained, highly weathered to decomposed, broken.												
—28. 5	838.2	Core	Rec	RQC	R-	4 *641	Soft to medium hard gray BRECCIA; highly weathered, broken, poorly cemented												

Γ.	Client: T	ranSva	tems	Inc				Project: SCI-823-0.00								Job I	vo. 0	<u> 121-</u>	3070	.03
_	LOG O		_,			77	ocation: Sta	. 520+21.3, 169.5 ft. LT of SR 823 CL Date Drilled: 6/	24/0				to	7	/8/04					
ľ	2000				Sam, No	ole	Hand	WATER OBSERVATIONS: Water seepage at: None		Gi	RAD	ATIO	N							
	Depth	Elev.	per 6"	ery (in)		Press / Core	Penetro- meter (tsf) / * Point-Load	Water level at completion: None (Prior to coring) 2.0' (Includes drilling water)	% Aggregate	Sand	% M. Sand	Sand	% Silt	Clay	Natu	ANDAF iral Mo PL I—	isture	Cont	ent, % —⊢ L	-
	(ft)	(ft) 836.7	Blows per	Кесоивгу	Drive	Press	Strength (psi)	DESCRIPTION	% Ag	% C)	%	% F	% S	% C		Blow 10	s per i 20	foot - 30 1		40
-	30	000.7	60"	55°	18%	Г							}]						
f	—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"	RQE 100%	R-5	*511	@ 34.1',35.9',36.9', low angle fractures.												
	-							@ 37.0',40.7',42.4', low angle fractures.												
	40 — - -		Core 60"	Rec 60*	100%	R-6	5 *511													
	45 —		Core 60"	Rec 60"	RQI 100°) R-	7 *468	@ 43.2',45.0',47.0', low angle fractures.												
21/2006 2:19 PM]	50 	-	Core 60"	Rec 60°	RQ 100	D _R -	8 *468													
FILE: 0121-3070-03 11/	55 —		Core 60"	Rec 60"	RQ 100	D %	9 *486	@ 56.8', low angle clean fracture. @ 57.0'-57.2', pitted surface, moderately weathered.												
FILE:	60	_	Core	Rec	RO	D _{R1}	0 486	@ 57.0'-57.2', pitted surface, moderately weathered.												

Client:	TranSy	stems	, Inc.	_			Project: SCI-823-0.00						_	Job	No.	0121	-3070	0.03
	DF: Bo				L	ocation: Sta	. 520+21.3, 169.5 ft. LT of SR 823 CL Date Drilled: 6/	24/0			to	7	/8/0	1				
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 2.0' (Includes drilling water) DESCRIPTION	% Aggregate	% M. Sand	and		% Clay	Na	ural M PL ⊢		re Cor		, •
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.											
65 —		Core 60"	Rec 60"	RQD 100%	R11	*355	@ 62.6', low angle fractures. @ 62.9', low angle partially clay coated fracture.											
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.											
11/21/2006 2:19 FM		Core 60"	Rec 58.5"	RQ[98%	R14	*355												
91LE: 0121-3070-03		Core 60"	Rec 60"	RQI 97%	R1	5 *304												
90	-	Core	Rec	RQI) R1	6 *304												

FILE: 0121-3976-03 | 11/21/2006 2:19 PM |

BUS, OHIO 43229 * (614)888-0040

Client:	TranSy	stems	, Inc.				Project: SCI-823-0.00						_	Jo	b No.	012	<u>1-30</u>	<u>70.0</u>	3
	F: Bo] [ocation: Sta	. 520+21.3, 169.5 ft. LT of SR 823 CL Date Drilled: 6/	24/(_	to_	_7	/8/04	4					
Depth (ft)	Elev.	Blows per 6"	Recovery (in)	Sami No		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 2.0' (Includes drilling water) DESCRIPTION	% Aggregate				% Clay	Na	tural i	Moist	ıre Co er foo	ontent	TION -, %' - -1 LL 	
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												
		Core 36"	Rec 36"	RQD 100%	R17		fractured.												
100 — 105 — 110 — 115 — 115 — 115 — 120 —	-771.7-						Bottom of Boring - 95.0'												

							Project: SCI-823-0.00								Job N	o. 012	21-307	0.03
	FranSys				٦.	tion: Sto	. 520+24.6, 82.1 ft. LT of SR 823 CL Date Drilled: 6	/21/	04			to	- (5/23/0				
LOG O	r: Boi	ing i	1-453	Samp	_		WATER	T	_	_	DAT	ION						
Depth (ft)	Elev. (ft) 872.5	Blows per 6"	Recovery (in)	Drive Drive		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 45.2' (includes drilling water) DESCRIPTION	% Accrecate	Pacs 0 /8	د ا د	% F Sand	: 🕏	% Clay	Nat	ural Moi PL I—	sture C	ETRATII	% - • LL
0.3=	872.2						Topsoil - 4"	4	ľ									
-		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		3			Severely weathered brown and gray CLAYSHALE.										+) (62 –
-9.0-	863.5		9	4			Severely weathered brown SANDSTONE.											50+
10 —	1	50/4	3	5														50+
	859.5	Core 24"	Rec 24"	RQE 100%) R-	1	Medium hard brown SANDSTONE; fine to coarse grained, moderately weathered, argillaceous, thinly bedded to medium											
15 — 19.2—20.2= —20.2= —23.7—		Core 120"	Rec 110"				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. Medium hard brown and gray BRECCIA; highly weathered, broken. Soft to medium hard gray SILTSTONE; highly weathered, broken to highly fractured, argillaceous. Medium hard gray SANDSTONE; very fine to fine grained, broken to highly meaning and to highly searched to highly meaning and to highly meaning and to highly searched to highly meaning and to highly meaning and to highly meaning and to highly meaning and to highly meaning and to highly meaning and to highly meaning and to highly meaning and to highly meaning and to highly meaning and to highly meaning and to highly meaning and to highly meaning and to highly meaning and to highly meaning and highly mea											
25 - 25 - 3012	- - -	Core		RQ:	0 % R-	3	highly weathered, micaceous, argillaceous, laminated to moderately bedded, highly fractured. ② 23.7'-25.0', contains abundant argillaceous laminae. ② 25.6'-26.3', high angle rust stained fracture.											

Clie	nt: T	ranSys	stems.	, Inc.				Project: SCI-823-0.00								Job N	o. 0 1	21-3	070.	03
LO	G O	F: Bo	ring	R-453		L	ocation: Sta	. 520+24.6, 82.1 ft. LT of SR 823 CL Date Drilled: 6/2	21/0			_	to	- 6	3/23/0	4				
			ر6"	, (in)	Samp No.		Hand Penetro- meter (tsf) /	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 45.2' (includes drilling water)	gate		İ	ATIC				ANDARi ural Moi:				
Dej (fi		Elev. (ft) 842.5	Blows per	Recovery	Drive	Press / Core	* Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	Σį	% F. Sand	% Silt	% Clay		PL			O L	
	-							Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, laminated to thick bedded.												
3	5							@ 35.2',37.9',38.2', low angle fractures.												
	9		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.												
1 M3 81:5 2002/12/11 1	-	-826.7 -	Core 120"	Rec 119"	RQD 91%	R-5		Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, medium bedded to massively bedded. @ 48.2', 49.5', 53.0', 53.3', low angle fractures.												
FILE: 0121-3070-03	- - - 50		Core	Rec 119"	RQD 99%	R-6		@ 57.7'-58.3', high angle fracture with calcite on face.												

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Client:	TranSy	stems	, Inc.				Project: SCI-823-0.00								Job No	. 012	21-30	70.0	3
LOG	OF: Bo	ring	R-453		L	ocation: Sta	. 520+24.6, 82.1 ft. LT of SR 823 CL Date Drilled: 6/	21/0	_			to	€	3/23/04		_			
				Sam, No		Hand Penetro-	WATER OBSERVATIONS: Water seepage at: None		G	RAD	ATIO	NC							
1		.9.	(in)		Core	meter (tsf) /	Water level at completion: None (prior to coring) 45.2' (includes drilling water)	gate	٩	۾	٩				NDARD al Mois				(N) •
Depth (ft)	Elev. (ft)	s pe	very			* Point-Load Strength		% Aggregate	Sand	Sand	Sand	#	Clay	PL		_		⊣ LL	1
	012.6	Blows per	Recovery	Drive	Press.	(psi)	DESCRIPTION	% A	ن %	%	% F. S	% S	% C	_1	Blows _I	per foo 20	ot - 30	O 40	,
60.0 <u>-</u>							Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, laminated to thinly bedded.												
70 -	- - - - -	Core 120*	Rec 120"	RQD 100%	R-7		@ 66.5',67.5',68.6', low angle highly weathered fracture.												
75 ·	- - - - - - - -	Core	Rec 117"	- RQE	R-8		@ 76.5',80.5',81.3', low angle fractures.		, appropri										
FILE: 0121-3070-03 (11/21/2006	- - - - - -						@ 82.5',82.6',83.0', low angle fractures. @ 83.4',84.3', low angle fractures. @ 85.1'-86.3', broken zone, high angle fracture.												
90	1	Core 120"	Rec 119"	RQE 84%	R-9									<u> </u>					

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

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Client: T	ranSv	stems.	Inc.				Project: SCI-823-0.00								Job No	. 012	1-307	0.03
LOG O			_		Į	ocation: Sta	. 520+24.6, 82.1 ft. LT of SR 823 CL Date Drilled: 6/	<u>21/0</u>	4			to	6	/23/0	4			
		I		Samp No.		Hand	WATER OBSERVATIONS: Water seepage at: None	<u> </u>	Gi	RAD	ATI	ON T	-					
Depth (ft)	Elev. (ft) 782.5	Blows per 6"	Recovery (in)	Drive	Press / Core	Penetro- meter (tsf) / * Point-Load Strength (psi)	Water seepage at. None (prior to coring) 45.2' (includes drilling water)	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	Natu F	ANDARD iral Moisi PL \ Blows p 10 2	ture Co	ontent, s	% - • LL
90 —	-777. 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.											
-	,,,,,,	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.											
 	-767 5-	Core 60"	Rec 60"	RQD 93%	R11		@ 103.5'-104.5', SDI = 85.9%.											-
	707.3						Bottom of Boring - 105.0' .											
115						t t												

Client: 1	ranSvs	stems.	Inc.				Project: SCI-823-0.00								Job I	lo. 01	<u>21-3</u>	070 <u>.0</u>)3
LOG O					L	ocation: Sta	. 520+24.4, 88.4 ft. RT of SR 823 CL Date Drilled: 7/	8/0			_	to	7	7/9/04	<u> </u>				
Depth (ft)	Elev. (ft)	per 6"	Recovery (in)	Samp No.	/ Core		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)	% Aggregate	٩	RAD pues W %	ρι		Slay	Nat	ANDAF ural Mo PL	isture (Conter	nt.% - → LL	•
1 "	841.3	Blows	Reco	Drive	Press	(psi)	DESCRIPTION	% 	\ %	% v	%	8 %	%	L	10	20 20	30	40	2
0.4	840.9	3 5 7	16	1			Topsoil - 5"/1.5' soil removed before drilling Medium dense brown COARSE AND FINE SAND (A-3a); dry to damp.								Q				
-	838.3	2 10 12	18	2		4.5+	Hard brown and gray SILT AND CLAY (A-6a), trace fine to coarse sand; damp.			:						Ó			
5 — -5.5 —	835.8	26 49 50/4	14	3			Severely weathered brown and gray SANDSTONE.											<i></i>	50+(
10 —	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.												
15 —		Core 60"	Rec 60"	RQD 50%	R-2	*348													
20 —	- - - - -	Core 60"	Rec 60*	RQD 95%	R-3	*503	@ 16.3'-21.1', moderately weathered.												
25.000000000000000000000000000000000000	820.2	Core 60"	Rec 60"	RQ0 33%	R-4	*503	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.												
FILE: 0121-3070-03		Core 60"	Rec 60"	RQ1	R-	5 *419	@ 26.8-27.1, rust stained.												

Client	TranSy	stems	. Inc.		-		Project: SCI-823-0.00								Job No	o. 0 12	21-30	70.0	3
	OF: Bo				L	ocation: Sta	. 520+24.4, 88.4 ft. RT of SR 823 CL Date Drilled: 7/8	B/04	_			to	7/9	/04					
Depti (ft)	(ft)	Blows per 6"	Recovery (in)	Samp No.			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) DESCRIPTION	% Aggregate	C. Sand	M. Sand	% F. Sand	Silt	Clay	Natu P	ANDARI Iral Mois PL I Blows 10	sture C	onten	i, % - ⊣ LL	•
35	811.3	Care 60"	Rec 60"	RQD 37%		*419	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. @ 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%. @ 36.0'-37.0', abundant argillaceous interbeds.												
40	- - - - -	Core 60"	Rec 60"	RQD 0%	R-7		@ 37.8'-37.2', abundant argillaceous interbeds. @ 39.2'-40.3', SDI = 89.7%. @ 40.0', occassional fossil evident. @ 41.0'-45.0', abundant argillaceous interbeds.												
45 45.1	795.6	Core 60"	Rec 60*	RQ[0%	P-8		Medium hard gray SANDSTONE; very fine to fine grained,												
11/22/2006 1:43 PM J 09	- - - -	Core 60"	Rec 60"	RQI 0%	P _{R-}	*321	highly weathered, thinly bedded to medium bedded, broken, contains clay seams. @ 47.5'-51.0', abundant argillaceous interbeds, broken.												
FILE: 0121-3070-03 { 11/22/	- - - - -	Core 60"	Rec 60"	RQI 38%	O R1	d *321													
FILE:		Core 60*	Rec 54*	RQ 0%	D R1	1 *214	@ 59.5'-59.8', abundant argillaceous interbeds												

Client:	TranSys	stems	Inc.				Project: SCI-823-0.00								Job No	. 012	1-307	70.03
	F: Bo				L	ocation: Sta	. 520+24.4, 88.4 ft. RT of SR 823 CL Date Drilled: 7	8/04				to	7/	9/04				
				Samp No.	_	Hand	WATER OBSERVATIONS: Water seepage at: None		Gi	RAD	ATIO	NC						
Depth (ft)	Elev. (ft) 781.3	Blows per 6"	Recovery (in)	Drive	Press / Core	Penetro- meter (tsf) / * Point-Load Strength (psi)	Water seepage at. None (Prior to coring) 44.3' (Includes drilling water) 50.2' (10 minutes after completion) DESCRIPTION		% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	Natu P	ral Mo is L I Blows I	ture Co	ontent,	LL
60.0	7-781.3-	Core 60"	Rec 59"	RQD 32%	R12	*214	Medium hard gray SANDSTONE interbedded with SHALE; verifine to fine grained, highly weathered, thinly bedded to medium bedded, broken, contains clay seams. @ 60.7'-63.9', little shale interbeds. @ 64.3'-64.9', 65.4'-66.4', abundant argillaceous interbeds.											
70.0	- - - - 771.3-	Core 48"	Rec 48"	RQD 0%	R13													
FILE: 0121-3070-63 [11/22/2006]:43 PM]							Bottom of Boring - 70.0'											

Client: T	ranSvs	tems	Inc				Project: SCI-823-0.00							Job i	Vo. 01	21-307	70.03
LOG O				 ,	7 4	ocation: Sta	. 524+19.6, 174.3 ft. LT of SR 823 CL Date Drilled: 6/	17/0			to	6	18/0	4			
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.	ole		WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 35.5' (Includes drilling water) DESCRIPTION	% Aggregate		% F. Sand		% Clay	Nati F	ural Mo PL	isture (Content,	ION (N) % - ● LL) 40
0.3	871.2 -870.9	2 2 4	16	1		4.0	Topsoil - 4" Hard brown SILT AND CLAY (A-6a), little fine to coarse sand; damp.						Q				
5		6 8 10		2		4.5+									Ö,		
-		8 10		3		4.5+ 4.5+											
10 —		15 18 24		5		4.5+											Ò
-	-	50/3	2	6	} }		•										50+
	856.2 855.7	Core 60"	Rec 56"	RQI 73%	R-	*237	Medium hard brown and gray BRECCIA; medium to coarse grained, highly weathered, contains gravel, cobble and boulder sized particles. Medium hard gray SANDSTONE; decomposed, argillaceous, thinly bedded to medium bedded. @ 16.3', gradational change begins.										
	850.8	Core	Rec 114"	RQI 76%	O R-:	2 *297	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%. @ 25.0'-25.9', Breccia zone, highly weathered to decomposed, broken. @ 26.2'-27.2', high-angle fracture.										
30							@ 28.7'-29.0', low-angle fracture with clay infilling.	 									

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Client:	ranSv	stems	Inc		_		Project: SCI-823-0.00							Jo	ob No. O	121-3	070.0	3
LOGO					L	ocation: Sta	. 524+19.6, 174.3 ft. LT of SR 823 CL Date Drilled: 6/	17/0)4			to	6/18					
				Samı No.	ile	Hand	WATER OBSERVATIONS: Water seepage at: None			RAD	ATIO	ON.			-			
Depth (ft)	Elev. (ft) 841.2	Blows per 6"	Recovery (in)	Drive	Press / Core	Penetro- meter (tsf) / * Point-Load Strength (psi)	Water level at completion: None (Prior to coring) 35.5' (Includes drilling water)	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	. /	Vatural PL	DARD PE Moisture Lows per l	Conter	ıt, % - → LL	•
30 — — — — 35 — — — — —		Core 120*	Rec 100*	RQD 82%	R-3	*381	Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, thinly bedded to massive, slightly fractured. @ 30.8', 38.3', low-angle fracture.											
45		Core 120	Rec 119"	RQD 78%	R-4	*428												
50		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.											

FILE: 0121-3076-03 [11/22/2006 1:43 PM]

Job No. 0121-3070.03 Project: SCI-823-0.00 Client: TranSystems, Inc. Date Drilled: 6/17/04 6/18/04 Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL to LOG OF: Boring R-455 GRADATION WATER Sample Hand **OBSERVATIONS:** No. Water seepage at: None Penetro-Water level at completion: None (Prior to coring) STANDARD PENETRATION (N) 3 meter % Aggregate ė Core 35.5' (Includes drilling water) % M. Sand % F. Sand Sand Natural Moisture Content, % -(tsf) / Blows per Recovery Point-Load Depth Elev. Clay Sit Strength U Blows per foot -Drive DESCRIPTION (psi) % % 811.2 Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, thinly bedded to medium bedded, slightly to moderately fractured. @ 61.7'-63.3', brown. @ 62.0'-63.3', high angle rust stained fracture. Core Rec RQD *447 R-6 65 113" 78% 120" 70 @ 71.3', low angle smooth fracture. RQD 100% R-7 Rec Core *345 120" 120" @ 76.3', low angle fracture. @ 77.8', low angle smooth fracture. @ 79.7', low angle fracture. @ 82.2', low angle fracture. @ 82.4', low angle highly weathered fracture. @ 82.8', low angle highly weathered fracture. @ 83.9'-84.0', highly weathered, thinly laminated, broken. RQD 90% R-8 Core Rec *373 85 120" 120" @ 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.

BUS, OHIO 43229 * (614)888-0040

DLZ OHIO INC. * 6121 HUNTLEY ROAD, CO Job No. 0121-3070.03 Project: SCI-823-0.00 Client: TranSystems, Inc. 6/18/04 Date Drilled: 6/17/04 Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL to LOG OF: Boring R-455 GRADATION WATER Sample Hand OBSERVATIONS: No. Water seepage at: None Penetro-Water level at completion: None (Prior to coring) STANDARD PENETRATION (N) \hat{z} meter % Aggregate 35.5' (Includes drilling water) % C. Sand Sand % F. Sand Natural Moisture Content, % -(tsf) / Blows per Recovery Point-Load % Silt % Clay Depth Elev. Press / (% ™ Strength (ft) Blows per foot -Drive DESCRIPTION (psi) 781.2 Medium hard gray SANDSTONE; very fine to fine grained, 90.0 -781.2moderately weathered, thinly bedded to medium bedded, argillaceous, micaceous, slightly fractured, contains argillaceous RQD 100% R-9 Core Rec *349 laminae. 60" 60" @ 90.0'-91.2', SDI = 57.5%. @ 92.5', plant fossils evident. @ 93.0', pyritic. 95 @ 97.5', very fine grained SANDSTONE interbeds, highly weathered, abundant argillaceous interbeds. @ 98.5'-99.5', SDI = 66.8%. RQD 78% R10 Core Rec *198 100 120" 110" --105.0--|-766.2-Bottom of Boring - 105.0' FILE: 0121-3070-03 [11/22/2006 1:43 PM] 110 115

			_				JEZ ONIO INC. 6121 NONTLET ROAD, 500 MBOS, ONIO 43229 (014)888		_				_	$\neg \neg$		046	0071	
	TranSy				7	. 5	Project: SCI-823-0.00					. -		0/4 / 10 /	Job No	. 012	1-30/(J.U3
LOG	F: Bo	ring	K-456		_	.ocation: Sta	1. 524+22.5, 1.9 ft. RT of SR 823 CL Date Drilled: 6/9	//04		040	A T*	to		6/11/04	·			
Depth	Elev.	per 6"	rery (in)	Sam _j No		Hand Penetro- meter (tsf) / * Point-Load	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 26.5' (Includes drilling water)	% Aggregate	Sand		Sand			Natui	NDARD al Moisi			6 - •
(ft)	(ft) 882.4	Blows per	Recovery	Drive	Press	Strength (psi)	DESCRIPTION	% Agg	% C. S	% W.	% F. S	% Sit	% Clay	1	Blows p	oer foot 20		40
-0.3	882.1-	1 1		1		0.25	`\Topsoil - 3" Soft brown SANDY SILT (A-4a), trace clay; moist.											
3.0	879.4-		12			0,20	Medium dense brown COARSE AND FINE SAND (A-3a);							O,				
5 —	-	5 7 10	14	2			contains sandstone fragments; damp.								ρ			
-8.0	874.4-	3 6 4	16	3											<u> </u>			
10-	1	8 10 12	18	4		4.5+	Hard black CLAY (A-7-6); dry to damp.									0.		
10.5	871.9 -	12 18 30	18	5			Severely weathered gray SANDSTONE argillaceous.										<i>, , ,</i>	7 7
45.0		50/4	_4	6														504
-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.											
20-							@ 19.4'-20.2', argillaceous.					ŀ						
-	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- - -						Hard gray SANDSTONE, very fine to medium grained, argillaceous, thin to thick bedded, moderately weathered, highly fractured.											
30		Core 120"	Rec 120"	RQD 100%	R-3													

Client: 1	ranSys	tems	Inc.				Project: SCI-823-0.00									b No.	01:	21-3	070.	03	_
LOG O				_	L	ocation: Sta	. 524+22.5, 1.9 ft. RT of SR 823 CL Date Drilled: 6/9	9/04				to	6	/11/	04						4
Depth (ft)	Elev. (ft)	ws per 6"	Recovery (in)	Sam No		Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 26.5' (Includes drilling water) DESCRIPTION	Aggregate	C. Sand	M. Sand	F. Sand	Sitt	Clay	Na	tural PL	DARD Moist I	ure C	onter		-	
20_	852.4	Blows	Rec	Drive	Pre	(psi)		%	%	%	%	%	%	; ; ;	10	2	0	30	_	0	\pm
30 —							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.							. ,							
-		Cara	Page	POI			@ 36.7', 37.2', 37.8', 38.5', 39.1', low angle clean fractures.		5												
40 —	+ - - - - - - -	Core 120"	Rec 119**	99%	R-4		@ 40.2', 42.0', 43.1', 44.6', low angle clean fractures.														
(11/22/2006 1:43 PM)		Core 120"		- RQI 100°	D)R-:	5	@ 47.0', low angle fracture. @ 48.7', 50.2', low angle clean fractures.														
File: 0121-3070-03		Core	Rec 119"	RQ 98°	D R-	6	 @ 54.5', low angle fracture. @ 56.2', low angle fracture. @ 56.8', 57.3', low angle clean fractures. @ 58.1', 58.8', 62.8', low angle clean fractures. 														

DLZ OHIO INC. * 6121 HUNTLEY ROAD,

MBUS, OHIO 43229 * (614)888-0040

Client:	TranSy:	stems,	, Inc.		_		Project: SCI-823-0.00	_						_	Jol	No.	012	1-30	70.0	3
LOG C					L	ocation: Sta	i. 524+22.5, 1.9 ft. RT of SR 823 CL Date Drilled: 6/9/0	04				to	6	/11/0			-			
				Sam _i No		Hand	WATER OBSERVATIONS: Water seconds at Many		GR	AD.	ATIC	NC	\Box					•		
Depth (ft)	Elev. (ft) 822.4	Blows per 6"	Recovery (in)	Drive	Press / Core	Penetro- meter (tsf) / * Point-Load Strength (psi)	Water level at completion: None (orior to coring)	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Nat	TANDA Tural M PL ⊢ Blow	loistu	re Co	ntent,	% - LL	
65 —							Hard gray SANDSTONE, very fine to medium grained, argillaceous, thin to thick bedded, slightly weathered (see previous).		•											
70 —		Core 120"	Rec 116"	RQD 95%	R-7		 @ 67.6', 67.7', low angle clean fractures. @ 70.4'-70.6', leached limestone layer. @ 70.5', low angle clean fracture. @ 72.7', low angle clean fracture. @ 74.6', low angle fracture. 	:												
80 —		Core 120"	Rec 120*	RQD 100%	R-8															
85 —		Core	Rec 119"	RQD 97%	R-9		@ 88.1', argillaceous laminations, low angle fracture.													

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

Client: T					_		Project: SCI-823-0.00	010					11.10		o. 01	21-30	70.0	3
LOG O	F: Bo	ring	R-456	Samı	_		. 524+22.5, 1.9 ft. RT of SR 823 CL Date Drilled: 6/	9/04 T	RAD	ATIO	to ON	- 6	/11/0	4				_
Depth (ft)	Elev. (ft) 792.4	Blows per 6"	Recovery (in)	Drive		Hand Penetro- meter	OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 26.5' (Includes drilling water) DESCRIPTION	% Aggregate				% Clay	Nati F	ANDAR Iral Moi PL Blows 10	sture C	Conten	, % - ⊣ LL	
90 —	102.4						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. @ 98.0', low angle clean fracture, argillaceous lamination.	i i										
- 100 — - -		Core 120"	Rec 120"	RQD 88%	R10		@ 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"	87%	R1	1	@ 110.7', pyritic.											
- - 115.0 - -	767.4						Bottom of Boring - 115.0'											
120	1																	

	(D	LZ OHIO INC. * 6121 HUNTLEY ROAD, CC BUS, OHIO 43229 * (614)8	88-00	40	 						- 53	^^
Client: T	ranSvs	tems.	Inc.				Project: SCI-823-0.00								. 0121	-3070	.03
OG O				_	L	ocation: Sta	. 524+32.7, 189.2 ft. RT of SR 823 CL Date Drilled: 6	/11/0		 	to	6	/17/0	<u> </u>			
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samı No.			WATER OBSERVATIONS: Water seepage at: None Water level at completion: 38.5' (includes drilling water) DESCRIPTION	% Aggregate		% F. Sand		% Clay	Natu F	ral Mois L ├── Blows	oer foot	tent, % — ≀ l	- •
	871.2 870.8			 	Ħ		Topsoil - 5"/6" soil removed before drilling										
-		2 4 8	18	1			Very dense brown SANDY SILT (A-4a); damp.							O.	\	+	
5 —	i	16 26 38 38 50/5		2													○64 50
_	'	50/5	12	,													30
8.0 10	863.2	Core 36"	Rec 26"	RQE 17%	PR-1		Soft to medium hard light brown and brown SANDSTONE; ver fine to fine grained, highly weathered to decomposed, thinly bedded to medium bedded.	У									
15 — - - - - - - - 19.5 —	851.7-	Core 120"	Rec 120*	RQI 31%	O R-2	*183	Medium hard gray SANDSTONE, very fine to fine grained, argillaceous, moderately weathered, highly fractured, fracture	s									
25 —		Core 120"	Rec 116"	RQ 86%	D %	3 *547	contain slickensides. @ 20.8' to 21.1', breccia zone. @ 22.5' to 23.2', ferric. @ 23.6' to 29.2', contains coal stringers. @ 28.8' to 29.0', ferric.										

Client: 1	ranSvs	tems	Inc				Project: SCI-823-0.00								Job	No.	012	1-30	70.0	3
LOG O					7	ocation: Sta	. 524+32.7, 189.2 ft. RT of SR 823 CL Date Drilled: 6	/11/	04			to	6	/17/0	4					
				Sam	ole	Hand	WATER		G	RAL	ATI	ON								
Depth (ft)	Elev. (ft)	ws per 6"	Recovery (in)	No	/ Core	Penetro- meter (tsf) / * Point-Load Strength	OBSERVATIONS: Water seepage at: None Water level at completion: 38.5' (includes drilling water)	% Ancreaste	C. Sand		F. Sand	Silt	Clay	Natu	ıral M ²L ⊢	oistu	гө Сс	TRAT	% - <i>LL</i>	•
	841.2	Blows	Rec	Drive	Press	(psi)	DESCRIPTION	%	8	8	8	%	8		10	20		30	40	
35 — - - - 40 — -	837.2	Core 120*	Rec 119"	RQD 93%		*372	Medium hard gray SANDSTONE, very fine to fine grained, argillaceous, micaceous, moderately weathered, unfractured to slightly fractured, contains few to moderate argillaceous laminations, fissile. @ 33.2' to 33.5', conglomerate/breccia zone. @ 33.5' to 34.0', high angle fracture. @ 33.9',high-angle, rust stained fracture. 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.	1												
45 — 45 — 5002/527/10 11/25/2006 1143 PM 55 — 55 — 55 — 55 — 55 — 55 — 56 — 56		Core 120"	118"	RQI 98% RQI 98%			@ 51.6' low angle fracture. @ 53.8', 53.9', 54.1', low angle fractures. @ 57.4', 57.7', 88.8', low angle fractures.													

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C

ABUS, OHIO 43229 * (614)888-0040

Client:	ranSys	tems,	Inc.				Project: SCI-823-0.00								_	b No.	01	21-	3070	.03
LOG O					L	ocation: Sta	. 524+32.7, 189.2 ft. RT of SR 823 CL Date Drilled: 6/1	11/0		=:=		to	<u>6</u>	/17/0	4					
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sam) No		Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 38.5' (includes drilling water) DESCRIPTION	% Aggregate	Sand	% M. Sand	Sand		% Clay	Nat	ural i PL H	Moist	ure (Conte		N (N) • LL
65 —	811.2	Core 120"	Rec 120"	RQD 100%		*418	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, unfractured to slightly fractured. @ 62.7', low angle fracture. @ 65.2', low angle fracture. @ 67.7', 72.5', 80.2', 80.6', low angle fractures.													
75 — 75 — 75 — 76 — 76 — 76 — 76 — 76 —		Core 120"	Rec 120"	RQ1) R-6	3 *365	@ 73.2' to 73.5', broken. @ 80.1' to 80.2', 80.5', 80.6', argillaceous laminations. @ 81.5', 83.6', low angle fracture.													
E1LE: 0121-3070-03		Core 120*	Rec 116*	RQI 91%	O R-9	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.													

Client:	ranSy:	stems	, Inc.			- "	Project: SCI-823-0.00								Job	No. 0	121-3	3070.	03
LOG O					L	ocation: Sta	. 524+32.7, 189.2 ft. RT of SR 823 CL Date Drilled: 6/	11/0)4			to	6/	17/0					_
				Samp No.		Hand	WATER OBSERVATIONS: Water coopers at: Name		Gi	RAD	ATIC	N	\Box						
Depth (ft)	Elev. (ft) 781.2	Blows per 6"	Recovery (in)	Drive	Press / Core	Penetro- meter (tsf) / * Point-Load	Water seepage at: None Water level at completion: 38.5' (includes drilling water) DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natu F	ıral Mo PL ├─	RD PE pisture rs per l	Conte	nt, %	
90	701.2						Medium hard gray SANDSTONE, very fine to fine grained,	<u> </u>	Ť	<u> </u>	<u> </u>	-			Ť				
95 —		Core 120"	Rec 104"	RQD 78%	R10	*399	slightly weathered, thinly laminated to medium bedded, argillaceous, pyritic, slightly fractured, contains few to moderate argillaceous laminae. @ 94.5' to 101.0', contains moderate argillaceous laminae. @ 96.2', pyritic.												
105 —	-765.2-	Core 60"	Rec 59"	RQD 99%	R11	*309	@ 102.0' to 106.0', contains few argillaceous laminae.		:										
110 —							Bottom of Boring - 106.0'												

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

Client:	Trai	nSys	tems.	Inc.				Project: SCI-823-0.00								Job N	o. 01	121-3	3070	.03
LOG								1. 528+20.4, 1.4 ft. RT of SR 823 CL Date Drilled: 6.	/3/04											
					Sam No		Hand Penetro-	WATER OBSERVATIONS: Water seepage at: None	-	GI	RAD	ATIO	אכ							
	1	1	9	(in)		8	meter (tsf) /	Water level at completion: None	ate	_		_				NDAR				
Depth		lev.	per	өлу		ပိ	* Point-Load		7.69	Sanc	San	Sano		_	L	ral Moi. L I—	sture	Conte	:nt, % L	
(ft)	- 1	(ft)	Blows per 6"	Recovery	Drive	Press / Core	Strength (psi)	DESCRIPTION	% Aggregate	Ü	% M. Sand	ų.	Silt	Clay		Blows			\circ	
o.3-	78	33.8 33.5	ã	ά	<u>a</u>	a	(1-57)		%	%	1%	%	%	%		O	20 ::	<u>30</u>	: : : :	10
0.3	Η"		1					\text{Topsoil - 4"} Very stiff to hard brown and gray CLAY (A-7-6), trace fine to	٠,	1		6	50	43			H			1 : 5
		}	1 3	12	1		1.5	coarse sand; moist.							Q					5
	-	ł	2 4 5	18	2		2.5		0	0	-	1	51	48	\ ,					111111111111111111111111111111111111111
5-			4	, v																
	_		<u>4</u> 5	18	3		2.5								¢	}				5
10-	_		2 4 5	18	4		4.5+		0	0	-	0	47	53						 -
'0-	1		2 4				2.05													
			4 5	18	5	ľ	2.25								ς	}				
15 -	_		1 2 3	18	6		1.25	@ 13.5'-20.0', medium stiff to stiff, gray.							φ'					
_			1 2 3	18	7		0.75								Ļ					
£20.0-	-	63.8 -	1 2 2	18	8		1.25								0					
11/22/2006	-							Bottom of Boring - 20.0'												
_	+																			
F1LE: 0121-3070-03	\exists											ļ								
-1210																				
F11E	-																			
. 30				<u> </u>					_								<u>: [</u>		::::	<u> </u>

Γ	Client: T	ranSy	stems	, Inc.				Project: SCI-823-0.00							-	J	ob N	o. 0	121	-307	0.03	<u>}</u>
	.OG O					L	ocation: Sta	. 529+17.9, 97.4 ft. LT of SR 823 CL Date Drilled: 6	/3/04		240	A T10										
	Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sami No No	Press / Core	Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None DESCRIPTION	% Aggregate			% F. Sand		% Clay	S Na	tural PL	Moi I ilows	sture	Cor		% - LL	
L	_0.4	767.3 -766.9-		"	9	1		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	(ح		-	•			154
	5 —		2 2	16	2		1.75		0	0		0	51	49)		-	•			56
	- -		3	18	3		3.0															
	10 —		2 4	18	4		4.5+	@ 8.5'-10.0', hard.								<u> </u>)					
	- -	- - -	3 5	3 18	5		3.0		0	0	-	0	48	52			Ò		+			59
	15 —	- - - 1	3 4	7 18	6		2.5									{	5					
_	- -	- - -	4	7 18	7		2.0	@ 16.0', brown and gray.		į	}						5					
6 1:43 PM	20 —		3 3	5 18	8		2.5									ϕ						
11/22/2006	-	1	3 3	5 18	9		1.0									Q						
3070-03	25 -	-	2 2	4 18	10		1.0									! -						
FILE: 0121-3070-03	- - -		3	4 18	11		1.5															
	30.0	737.3	2 3	4 18	12		1.0	Bottom of Boring - 30.0'														

CEan	₁/- T	ran9*	stems,	Inc	-			Project: SCI-823-0.00							Job N	o. 01	<u> 21-</u>	3070	.03
			ring l		_	7 1	ocation: Sta.	529+19.5, 2.0 ft. RT of SR 823 CL Date Drilled: 6/	3/04										
					Sam _j No	ole		WATER OBSERVATIONS: Water seepage at: None		GF	RAD	ATIC	N	$\dot{\parallel}$					
			١, ١	(ii)	1		meter	Water level at completion: None	٩					l	STANDAR				
Dep	,,, Ì	Elev.	er 6		ļ	Š	(tsf) / * Point-Load		rega	and	Sand	and			Natural Moi PL ⊢	sture (Conti	ent, % —⊣ l	
(ft)		(ft) 769.1	Blows per 6*	Recovery	Drive	Press / Care	Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% W %	% F. Sand	% Silt	% Cla	Blows 10	per fo 20	ot - 30	0	40
├ -0.3	3=	-768.8			1	Ť		Topsoil - 3"											
 	1		2 2 3	18	1		2.25	Stiff to very stiff brown CLAY (A-7-6); damp to moist.			}				o				
	 		2 4		2		3.5		0	0	_	0	69	31	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	•			5
	5-		4	16															
	-		3 5	18	3	1	2.5								d				
	_		2 2 4	18	4		2.0								/ 				
11	0																		
			3 5	18	5		2.75		0	0	-	0	48	52	þ		•		
1	- - 15 		1 4	18	6		2.5												
	- -]	2 3 5	18	7		1.0								þ				
11/22/2006 1:43 PM	- - 20 		2 3	18	8		1.25								<i>ј</i> ф				
11/22/2006	- -		2 3	18	9		3.0	@ 21.0', brown and gray.				:) Ö				
	- 25 		2 3	18	10		4.5+	@ 23.5'-25.0', hard.							Ö				
FILE: 0121-3070-03 (_	1	3 4	18	 11		1.0												
	- - 0.0_	739.1	2 3	18_	12		1.5	Bottom of Boring - 30.0'											

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C

BUS, OHIO 43229 * (614)888-0040 Job No. 0121-3070.03 Project: SCI-823-0.00 Client: TranSystems, Inc. Date Drilled: 6/3/04 Location: Sta. 529+20.1, 93.2 ft. RT of SR 823 CL LOG OF: Boring R-463 GRADATION WATER Sample Hand **OBSERVATIONS:** No. Water seepage at: None Penetro-Water level at completion: None STANDARD PENETRATION (N) (ij)meter 6 % C. Sand % M. Sand % F. Sand % Sift (tsf) / Natural Moisture Content, % -Point-Load Depth Elev. % Sitt % Clay Press/ Strength Drive Blows per foot -DESCRIPTION (psi) 770.6 -770.3 Topsoil - 3" Very stiff to hard moltted brown and light gray CLAY (A-7-6), 3 4.5+ trace to little fine to coarse sand, trace gravel; damp to moist. 18 12 48 28 4 2 4.5+ 18 4.0 18 0 48 52 0 2.25 18 10 2.0 18 3 2.0 18 15 2.0 18 @ 18.5'-22.5, stiff, gray. 1.25 8 20 9 1.5 18 2 10 2.0 @ 26.0'-30.0, medium stiff, moist. 2 0.5 11 0.5 12 Bottom of Boring - 30.0' 740.6

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C

ABUS, OHIO 43229 * (614)888-0040

Client:	[ranSv	stems	. Inc.	-	•		Project: SCI-823-0.00								Job I	Vo.	012	1-307	70.0	3
LOG C					7 4	ocation: Sta	. 533+20.3, 143.7 ft. LT of SR 823 CL Date Drilled: 6/2	2/04	ļ			to	6	/3/04						
				Samp No.	ile		WATER			RAD.	ATIC	N	\dashv							
		ı, 6"	(in) /		Core	Penetro- meter (tsf) /	water seepage at. 40.5	gate	ام	pu	ρι				ANDAF iral Mo					'N)
Depth (ft)	Elev. (ft) 728.9	Blows per 6"	Recovery	Drive	Press / C	* Point-Load Strength (psi)	DESCRIPTION	% Aggre	% C. Sar	% M. Sa	% F. Sand	% Sitt	% Clay	F	<u>'L</u>				LL	
0.3 	728.6	- 4	-	-	_		"\Topsoil 4"	Ů.	<u> </u>	Ŭ.	0.	•			ĬIII			Tii	Ť	
-		2 4 4	18	1		4.25	Hard brown SILT AND CLAY (A-6a), little fine to coarse sand; damp.							C) 					
-		4 8 11	18	2		4.5+							į							
5 5.5	723.4	11	18	1												9				56
-		4 7 11	18	3		3.0	Stiff to very stiff brown CLAY (A-7-6); damp to moist.	0	0		1	45	54							
10 —		2 5 5	18	4		3.0			:											
-		3 5	18	5		2.25								Ċ	/ 					-6
15 —		² 3 5	18	6		3.0		0	0	-	0	45	55	Ļ			1			1:-1
		2 3	18	7		2.5	@ 16.0'-17.5', brown and gray.							<i>ј</i> ф						
20 —		1 2 3	18	8		1.0	@ 18.5'-30.0', gray.							Ý						
1 1 2/22/11		0 1 3	18	9	P1	1.25		0	1	-	1	11	87	0			+		,	51
25 —		2 2	18	10		2.5								γ						
25 —	-	2 2	18	11		0.75	@ 26.0'-27.5', medium stiff.							¢						
30		WOH 2	18	12		1.0								l L						

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

Client: T	ranSvs	tems	Inc.				Project: SCI-823-0.00								Job	No. 0	121	-3070	0.03
LOG O				-	L	ocation: Sta	. 533+20.3, 143.7 ft. LT of SR 823 CL Date Drilled: 6/	2/04				to	6.	/3/04					
Depth	Elev.		(in)	Samp No.	_	Hand Penetro- meter (Isf) / * Point-Load	WATER OBSERVATIONS: Water seepage at: 48.5' Water level at completion: 40.4'	gregate			% F. Sand	Ì	Jay.	Nati		oisture)N (N) 5 - ● LL
(ft)	(ft) 698.9	Blows per 6"	Recovery	Drive	Press	Strength (psi)	DESCRIPTION	% Ag	% C)	% %	% F.	% Sil	% Clay	,	Blov 10	vs per 20		- 0	40
30 —		2					Medium stiff to stiff gray CLAY (A-7-6); damp to moist.							Ĭ					
35		² 2	18	13		0.75								\ 					
40		WOH 2 3	18	14		0.5								0					
45 —	-	2 3 4	18	15		2.5	@ 43.5'-45.0', very stiff.							الل) V				
-46.5	682.4	3 5		16			Medium dense gray SILT (A-4b), trace clay; wet.	() -	1	82	17			-			
50 - 52.0	676.9		18				Dense gray GRAVEL WITH SAND (A-1-b), trace silt; damp.									,	/		
55 - 55 - 57 - 57 - 57 - 57 - 57 - 57 -		4 15 50/4	16	17						5									50+
37.0 11.E:	- 6 71.9-						Severely weathered gray SHALE.												
58.8 60	6 70.1	50/4	4	18			Bottom of Boring - 58.8'					į							50+

	ranSy				٦.		Project: SCI-823-0.00	5/27//				*0		3/3/04	Job N	o. U12	1-3070	.03
.06 0	F: Bo	ring	R-465	Samp	_		i. 533+20.9, 2.3 ft. RT of SR 823 CL. Date Drilled: WATER	12//		RAD.	ATIC	to ON		3/3/04		-		
Depth (ft)	Elev. (ft) 726.2	Blows per 6"	Recovery (in)	Drive		Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: 53.5' Water level at completion: 40.8' (inside augers) DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	Natu F	ral Moi: 'L ⊢—	sture Co	TRATIO ontent, % t - O 30	-
0.3	- 725.9-	1 3	18	1		2.5	Topsoil - 3" Very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand; damp to moist.		ļ	<u> </u> 		1		Q				
5 —		3 4	18	2		2.5		ŀ						V	}			
6.0 -	- 720.2-	2 4	18	3		2.5	Very stiff brown CLAY (A-7-6), trace silt; damp to moist.								↓ 구			
10 —		3	18	4		2.5								Ç)			
- - -	_	2 2	18	5		2.5			į					<i>ј</i> ф				
13.5 _ 15 —	-712.7-	2 2	18	6		1.5	Stiff gray CLAY (A-7-6), little silt; damp to moist.			ļ				\ \ \ \ \ \ \				
]	2 2	18	7	_	1.0								Ó				
20 —		2	18	8	P-1	1.0		0	0	-	0	18	82	Ó		H•		+
_		3	18	9		1.0								\ \ \ \ !				
25 —		2	18	10		1.5								Ó				
		2 2	18	11		1.0								Ó				
	1	2 3	18	12		1.0								li i				

Client: T	TranSys	stems	, Inc.				Project: SCI-823-0.00									Job No	. 01	21-3	070.0	3
LOG O	F: Bo	ring	R-465		-	ocation: Sta	. 533+20.9, 2.3 ft. RT of SR 823 CL	Date Drilled: 5/	27/0				to	- 6	3/3/04	<u> </u>				
Depth (ft)	Elev.	Blows per 6"	Recovery (in)	Samp. No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 53.5' Water level at completion: 40.8' (inside augers) DESCRIPTION		% Aggregate		8 M. Sand			% Clay	STA Natur PL	NDARE al Mois . I—— Blows	ture C	conten	ıt,% - → LL ○	• •
30 —	696.2	8	œ	Q	<u>a</u>		Stiff gray CLAY (A-7-6), little silt; damp to moist.		8	8	68	8	5	6		<i>y</i> ;	20	30	40	,
35 — - - -		1 2 4		13		1.5									O					
40 — - -		2 2 3	18	14		1.0					3				Q					
45 — 	-	1 4 5	18	15		1.5);;;;;				
11/22/2006 1:43 FM		3 3 4	18	16		1.5									Å	, /	/			
53.5— 55—	-	39 50/3	8_	17			Very dense gray GRAVEL WITH SAND (A-1-b), silty clay; damp to moist.	trace to little												50+
J –	-669.2						Brown SANDSTONE fragments.]											
58. 6 _	667.6	50/1	0_	18			Bottom of Boring - 58.6'													50+(

Client:	TranSy	stems	, Inc.				Project: SCI-823-0.00	J-00							Job No.	012	1-307	0.03
LOG C	-					ocation: Sta	a 533+18.7, 138.2 ft. RT of SR 823 CL Date Drilled: 5/	27/0)4									
Depth (ft)	Elev. (ft) 732.6	Blows per 6"	Recovery (in)	Sam _i No		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 58.5'-60.0' Water level at completion: 47.8' (inside hollowstem augers) DESCRIPTION	% Aggregate	ınd	pue	% F. Sand		% Clay	Natura	nl Moistu I——— Blows pe	ire Co er foo	ontent, '	LL
0.2 	732.4	2 3 5	18	1		3.0	Topsoil - 2" Stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand; damp.							Ó	/	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
—4.0— 5 — 	-728. 6	21	18	3			Severely weathered brown SANDSTONE, possible boulder.										, ,	
8.0 10	724.6	2 3 5	18	4		2.25	Stiff to very stiff brown CLAY (A-7-6), moist.	0	0		2	16	82	Ò	+	17-1		
- - 15		3 5 7 2 4 6	15	5 6		2.5									þ			
-		³ ₅ ₇	18	7		2.0		į							5			
20 —		3 5	18	8		1.5		0	0		1	9	90	Ϋ́		+		
- -		3 5 WOH		10	P-2	1.25 0.5	@ 23.5', becomes gray. @ 23.5'-30.0', medium stiff.	0	0		0	3	97	φ , ,		!		
25 		1 3 4	18	11		0.75								Q V Q				
_ 30		2 3 5	18	12		0.5												

Client:	ranSvs	tems	. Inc.				Project: SCI-823-0.00								Job No	. 01:	21-3	070.0)3
LOG O				··	L	ocation: Sta	533+18.7, 138.2 ft. RT of SR 823 CL Date Drilled: 5/	27/0											
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.	_		WATER OBSERVATIONS: Water seepage at: 58.5'-60.0' Water level at completion: 47.8' (inside hollowstern augers) DESCRIPTION	% Aggregate	C. Sand	M. Sand	F. Sand	Sitt	S Clay	Natur Pl	NDARD al Mois . I—— Blows j	ture C	ontei ot -	nt, % → Lt	•
30 —	702.6	ğ	8	ă	ď.	(μοι)	Medium stiff gray CLAY (A-7-6); moist.	1%	%	%	%	%	%	<u> </u>	<u>0 2</u>	?0 :::::	30	4(<u> </u>
35—		1 3 4	18	13		0.75	Medium Stin gray CEAT (A-7-0), moist.												
40 —		WOH 1	1	14		0.75		0	0		0	9	91	0				•	60
45 —		WOH 2	18	15		0.5													
50	 	WOH 1	18	16		0.5								j Q					
-	680.6	2 5	18	17		1.0	Medium stiff to stiff gray SILT AND CLAY (A-6a), trace fine to coarse sand; moist.						ŀ	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\ \ \				
55 —	675.6	38 49 50/4	1 14	18A			Very dense grayish brown GRAVEL (A-1-a); damp. @ 59.1'-59.8', sand seam.) / / · · · · · · · · · · · · · · · · ·

	DLZ OHIO INC. 6121 HUNTLEY ROAD, CO BUS, OHIO 43229 (614)	J886-0040	0424 2070 03
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:		
Sample No.	Hand OBSERVATIONS: Water seepage at: 58.5'-60.0' Water level at completion: 47.8' (inside hollowstern augers)	GRADATION epp pu pu Nati	ANDARD PENETRATION (N)
Debty (ti) (ti) (brive Press / Core	* Point-Load Strength (psi) DESCRIPTION	% Aggregate % C. Sand % M. Sand % F. Sand % Silt % Clay	PL LL Blows per foot - 10 20 30 40
65 —	Bottom of Boring - 59.8'		
75—			
81E: 0121-3070-03 [11/22/2006 1:43 PH]			
90			

Clier	nt: T	ranSys	stems	, Inc.				Project: SCI-823-0.00								Job No.	012	1-307	0.03	
_		F: Bo				L	ocation: Sta.	.541+15.1, 135.6 ft. LT of SR 823 CL Date Drilled: 04	/20/		_		to	(04/21/0	5	_			
Dep (ft		Elev. (ft) 737.5	Blows per 6"	Recovery (in)	Samp No.	Press / Core		WATER OBSERVATIONS: Water seepage at: 6.0' Water level at completion: 4.3' (prior to coring) 12.1' (includes drilling water) DESCRIPTION	% Aggregate	G. Sand	% M. Sand	F. Sand	Silt	% Clay	Natur PL	NDARD al Moist I Blows p	ure Co	ontent, '	% - LL	(ا •
0.3	3 - -	-737.2		12	1		3.5	Topsoil - 3" Very stiff brown with gray mottling SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; moist.							Q					
	5		3 3	10	2	,	3.0		i					ľ	\ \ \ \					
6.0	o	-731. 5 -	WOH	11	3		2.0	Stiff to very stiff brown CLAY (A-7-6), little fine to coarse sand; moist.	.			İ			<i>'</i> Q					
11	o —		3 3 4	13	4		3.0			:			<u> </u>		O					
	7		3 3 4	18	5		1.25		1	0		1	21	77	Ò		1			:57
1.	5 —		3 4	18	6		2.5								þ					
- -	1		3 4	18	7		1.75							!	þ					
Na Et : 1 2	- 20		3 4	18	8		3.5													
₹ -22	2.0—	-715.5 -		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	;						O					
FILE: 0121-3070-03	.5 —		3 4	18	10		1.75	moist.							Ó					
FILE: 012	_		2 4	18	11		1.25	@ 28.5'-30.0', very soft.	2	1	-	2	45	50	ر ا	 	H		4	
	- 10	1	2 2	18	12		<0.25				·									

ı								LZ OHIO INC. * 6121 HUNTLEY ROAD, CO BUS, OHIO 43229 * (614)88.	8-00	40	_							.	00
С	lient: T	ranSys	stems,	Inc.				Project: SCI-823-0.00			_	_		_		ob No.	0121-	3070.	03
L	OG O	F: Bor	ring F	₹-467		L	ocation: Sta	. 541+15.1, 135.6 ft. LT of SR 823 CL Date Drilled: 04	/20.			ATIO	to	- 우	4/21/05				
	Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.	/ Core	Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: 6.0' Water level at completion: 4.3' (prior to coring) 12.1' (includes drilling water)	% Aggregate	and	and	% F. Sand		Clay	Natural PL		re Cont	tent, % —⊣ L	- •
11	```	707.5	Blow	Rea	Drive	Press	(psi)	DESCRIPTION	%	%	1%	%	%	8	10	20			10
	3Ô.0 <u>-</u> - -	-707.5-	3			1		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.							X				
	35 —		7 8 16	18	13		2.0										Ò.		
	40 —		5 9 13	18	14		3.75										\		
	45 —		9 12 15	18	15		4.5+										φ 1		
12/2006 1:43 PM)	50 —		7 9 15	16	16		-	@ 48.5'-50.0', soft, orangish brown, moist.			!						0		
FILE: 0121-3070-03 (11/22/2	-51.5 -52.1 - - - 55 -	686.0 685.4	Core 90"	Rec 58"	RQI 53%	R-	1	Medium hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, medium bedded, highly fractured. Soft to medium hard gray SHALE; very fine to fine grained, highly weathered to decomposed, arenaceous, laminated, moderately to highly fractured.											
FIL	_	1			1			Loss of 32" in run due to blockage after first half of run.											
	-59.0- -60	678.5						Bottom of Boring - 59.0'	\perp		1	_				<u>.!!!!!</u>			<u> </u>

DLZ OHIO INC. * 6121 HUNTLEY ROAD, CO

US, OHIO 43229 * (614)888-0040

Job No. 0121-3070.03 Project: SCI-823-0.00 Client: TranSystems, Inc. 04/18/05 Date Drilled: 04/15/05 to Location: Sta. 541+19.8, 1.4 ft. RT of SR 823 CL LOG OF: Boring R-468 GRADATION WATER Sample Hand OBSERVATIONS: No. Water seepage at: 10.0' Penetro-Water level at completion: 10.2 (prior to coring) STANDARD PENETRATION (N) (in meter % Aggregate 8.6' (includes drilling water) % M. Sand Natural Moisture Content, % -Core % F. Sand % Silt % Clay Blows per 6" % C. Sand (tsf) / Point-Load Depth Elev. Press/(Strength Blows per foot -(ft) Drive DESCRIPTION (psi) 741.4 Topsoil - 2" Very stiff to hard brown SILT AND CLAY (A-6a), little fine sand; 3.5 damp. 2 4.5+ 16 Stiff to very stiff brown CLAY (A-7-6), trace gravel, fine sand; -735.4· 6.0 -3 3.75 3 18 damp to moist. 3 2.0 18 10 @ 9.9'-10.0', silt seam. WOH 2 1 31 68 2.5 5 18 2 1.5 18 15 0 22 77 0 1.25 3 18 FILE: 0121-3070-03 (11/22/2006 1:43 PM] 4.0 15 20 -9 1.75 18 3 10 1.25 25 -@ 26.0'-26.5', SILT AND CLAY (A-6a) seam, highly laminated. 11A 11B 3 1.0 18 12 3.0 12

	Client:	ranSy	stems	, Inc.				Project: SCI-823-0.00	-						· · · · · ·	Job N	o. 012	1-3070.0	03
	OG C	F: Bo	ring	R-468		L	ocation: Sta	a. 541+19.8, 1.4 ft. RT of SR 823 CL Date Drilled: 04	/15	/05			to	C)4/18/0				
	Depth (ft)	Elev. (ft) 711.4	Blows per 6"	Recovery (in)	Drive No.		Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 10.0' Water level at completion: 10.2 (prior to coring) 8.6' (includes drilling water) DESCRIPTION	% Aggregate		RAD pueS W %	% F. Sand	% Silt	6 Clay	Natu P	al Mois L I Blows	ture Co	_	
}	_3ô.ô <u></u> _ _ _ _ _	-711.4-	12 16 23		13			Medium dense to dense brown SANDY SILT (A-4a), little gravel, trace clay; contains sandstone fragments; damp.		8		6	6	61		<u>o</u>	20	30 40)
	35 —			:														β / /	
	40 — -43.5	-6 97.9-	12 19	17	14												\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\$	
м 1	45 —		5 7	18	15			Stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; moist.								Ý			
[11/22/2006 1:43 PM	50 —		4 6 9		16				6	3		4	60	27		δ	/		
FILE: 0121-3070-03 [55 — 57.0—	- 684.4 -	11 19 33	18	17)52 🕇
FILE	- - 60		Core	Rec	RQD	R-1		Medium hard dark gray SANDSTONE; very fine to fine grained, hightly to moderately weathered, argillaceous, micaceous, thinly laminated to medium bedded, moderately fractured to broken.											

Client:	TranSy	stems	, Inc.		-	•	Project: SCI-823-0.00		_	 				No.	0121	-3070	0.03
	DF: Bo				T_L	ocation: Sta	. 541+19.8, 1.4 ft. RT of SR 823 CL Date Drilled: 04	/15/		 to	0	<u>4/18</u>	<u>/05</u>				
Depth (ft)	Elev.	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter	WATER OBSERVATIONS: Water seepage at: 10.0' Water level at completion: 10.2 (prior to coring) 8.6' (includes drilling water) DESCRIPTION	% Aggregate	% M. Sand		% Clay	Na	tural N PL +	Aoistu —	re Cor er foot	ntent, 9	ON (N) 6 - ● LL 40
60	681.4	60"	60"	100%			Medium hard dark gray SANDSTONE; very fine to fine grained.										
75 - 75 - 80 - 85 - 85 - 85 - 85 - 85 - 85 - 8	679.4						Bottom of Boring - 62.0'										

BUS. OHIO 43229 * (614)888-0040

							NLZ OHIO INC. * 6121 HUNTLEY ROAD, CO BUS, OHIO 43229 * (614)88	8-00	40						_				
Client: 1	ranSy	stems	, Inc.				Project: SCI-823-0.00									No. ()121	3070	0.03
LOG O	F: Bo	ring	R-469		L	ocation: Sta	. 541+09.5, 116.7 ft. RT of SR 823 CL Date Drilled: 04	/19 _/				to	_0	4/20	<u>/05</u>				
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sam No Prive		Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 1.0' Water level at completion: 25.5' (prior to coring) 2.7' (includes drilling water) DESCRIPTION	6 Aggregate			% F. Sand	Silt	% Clay	Nat	ural Me PL ⊢	oisture	e Con	tent, % 	ON (N) 5 - ● LL 40
_0.2̂=	736.1 735.9		α	0	<u>a.</u>	,, ,	\Topsoil - 2"	 ^	l°.	6	*	*	*	111	<u> </u>	- ZV-		<u>, </u>	1 : : :
- -		1 1	16	1		1.0	Medium stiff to stiff brown SANDY SILT (A-4a), trace gravel; moist.							9					
—3.5— 5 —	732.6	3 3	18	2		4.25	Very stiff to hard brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp.		<u>.</u>					\ \ \					
- 8.5	727. 6	3 3	16	3	i	3.25								þ					
10	1 /21.0	3 3	18	4	<u>.</u>	3.25	Stiff to very stiff brown CLAY (A-7-6), little fine to coarse sand, trace gravel; damp.		i					Ç					
-		3 3	18_	5		1.75		0	0		0	24	76	¢)				
15 — —16.0	- - -720.1	3 3	18	6		3.0	Out to the CHT (A 4h) come also trope for condi-							¢					
-	-	10 11 3	18	7		1.0	Stiff to very stiff brown SILT (A-4b), some clay, trace fine sand; moist.			!							,		
20 — —20.5	715. 6	710	18	8		3.0	@ 17.0'-17.5', medium stiff to stiff. Hard brown SILT AND CLAY (A-6a), little fine to coarse sand,	°	3		6	68	23			Q \	7		
-	-	8 8		9		4.5+	trace gravel; damp to moist.										Ò,		
25		16	ļ	10		4.5												Ò	
-	1	11 20	18	11	ļ	-											,	Б	
-	1	11	18	12		-				1							14		

BUS, OHIO 43229 * (614)888-0040 DLZ OHIO INC. * 6121 HUNTLEY ROAD, CO Job No. 0121-3070.03 Project: SCI-823-0.00 Client: TranSystems, Inc. 04/20/05 Location: Sta. 541+09.5, 116.7 ft. RT of SR 823 CL Date Drilled: 04/19/05 to LOG OF: Boring R-469 GRADATION WATER Sample Hand **OBSERVATIONS:** No. Water seepage at: 1.0° Penetro-Water level at completion: 25.5' (prior to coring) STANDARD PENETRATION (N) (ii) meter % Aggregate 2.7' (includes drilling water) % M. Sand Press / Core % F. Sand % Silt % Clay Blows per 6" % C. Sand Natural Moisture Content, % -(tsf) / Recovery Point-Load Elev. Depth Strength Blows per foot -(ft) (ft) Drive DESCRIPTION (psi) 706.1 30 Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp to moist. 13 4.5+ 16 35 10 17 _19) 4.5+ 14 18 40 15 4.25 18 45 -@ 48.5'-49.0', contains sandstone fragments. 687.1 50/6 16 49.0-Hard dark gray SHALE, very fine grained, moderately weathered, micaceous, very thin bedded, moderately fractured; 50 contains few to moderate arenacious laminations. ROD R-1 Core Rec 72% 52" 60" 682.1 Bottom of Boring - 54.0' 55 -

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

						C	LZ OHIO INC. * 6121 HUNTLEY ROAD, COL US, OHIO 43229 * (614)88	8-00-	40	_					lot	No.	0121	-361-2	.03
Client:	ranSy	stem <u>s,</u>	Inc.				Project: SCI-823-0.00		<u></u> _		_	+0	10)/27/		110.	<u> </u>		
LOG C	F: Bo	ring l	₹-2449)	Lo		. 516+22.4, 193.4 ft. LT of SR 823 CL Date Drilled: 10	12//		RADA		to	- `	11211	<u>00</u>				
Depth	Elev.	per 6"	(in)	Samp No.	Core	Hand Penetro- meter (tsf) / * Point-Load	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 28.1' (includes drilling water)	% Aggregate	Sand	Sand	Sand		ye	Nati	ural M PL -	Aoistu	re Cor	TRATIO	- •
(ft)	(ft) 891.3	Blows p	Recovery	Drive	Press/	Strength (psi)	DESCRIPTION	% Ag	% 'S	%	% F.	% Siit	% Clay	:::	Blo 10	ws pe	r foot	- ○ 30	40
0-0.7-	890. 6	8 10 18		1		4.5+	Topsoil - 8" Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; contains sandstone fragments; damp.										C		
	1	15 18 25	18	2		4.5+													Ģ
5.5	-885. 8			3			Severely weathered gray and light brown SANDSTONE.												/
	1	50/3	3	4	 	<u> </u>													50+
15 -	881.3	Core 72"	Rec 72"	RQE 61%	R-1	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.												
—17.9—	- 873.4	Core	Rec	ROI			Soft to medium hard black SHALE; moderately to highly weathered, arenaceous, carbonaceous, micaceous, thinly laminated to laminated.												
007/27/11 E0	870.3 - - -	120		RQI 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 - 26.3			ļ	_			@ 25.8'-26.3', gray sandstone seam.	_											
26.3	865.						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				1_			<u> </u>		_										

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C IBUS, (

IBUS, OHIO 43229 * (614)888-0040

Job No. 0121-3070.03 Project: SCI-823-0.00 Client: TranSystems, Inc. Date Drilled: 10/27/05 10/27/05 Location: Sta. 516+22.4, 193.4 ft. LT of SR 823 CL to LOG OF: Boring R-2449 GRADATION WATER Sample Hand **OBSERVATIONS:** No. Water seepage at: None Penetro-STANDARD PENETRATION (N) Water level at completion: None (prior to coring) $\overline{\epsilon}$ meter % Aggregate % M. Sand % F. Sand % Sitt ဦ 28.1' (includes drilling water) % C. Sand Natural Moisture Content, % -(tsf) / ğ Recovery Point-Load % Clay Depth Elev. Press / Strenath Blows per foot -(ft) Drive DESCRIPTION (psi) ROD R-3 30.7 Core Rec 860.6 Hard gray SANDSTONE; very fine to fine grained, slightly *1030 120" 80% 120" weathered, argillaceous, laminated to medium bedded, unfractured to slightly fractured, contains coal stringers. 35 ROD R-4 Core Rec *1001 @ 44.0'-44.2', 45.2'-45.4', 46.0'-46.6'; conglomerate/breccia 120" 98% 120" zone. @ 46.0'-46.6', highly fractured; coarse grained gravel sized. 46.6- 844.7 Very hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, massively bedded, unfractured. 50 Core Rec RQD R-5 *1491 98% 120" 120" @ 54.3'-54.4', broken. 55 @ 56.2'-56.8', vertical fracture.

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C. 1888-0040

Γ	Client: T	ranSv	stems	Inc.				Project: SCI-823-0.00										lo. 0	<u> 121-</u>	<u>3070.</u>	.03
_	LOG O				9	L	ocation: Sta	. 516+22.4, 193.4 ft. LT of SR 823 CL Date Drilled: 1	0/2					to	1	0/27/	05				
	Depth	Elev.	per 6"	Recovery (in)	Sam No	Core	Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 28.1' (includes drilling water)			Ī		Sand	% Silt	lay	Natu	ANDAR Iral Moi	sture	Cont	ent, % -—⊢ L	- •
ı	(ft)	(ft)	Blows	Звсо	Drive	Press /	(psi)	DESCRIPTION	3	2 8	8	% 8	% F	S %	% Clay		Blows	per : 20	toot - 30		40
	_60.0 65	831.3 -831.3-	Core 120"	Rec 120*	RQE 100%		*1476	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massive, unfractured to slightly fractured.			-										
	70 —		Core 120*	Rec 120*	RQI 1009	R-7	*1871														
FILE: 0121-3070-03 (11/22/2006 1:43 PM }	80 		Core 120*	Rec 120"	RQ 100) R-I	3 *1012														
FILE: 01	- - 90	-						@ 87.7'-87.8', carbonaceous clasts prevalent.													

Client: T	ranSv	stems.	Inc.				Project: SCI-823-0.00					J	ob No. 01	21-3070	.03
LOG O				9		ocation: Sta	. 516+22.4, 193.4 ft. LT of SR 823 CL Date Drilled: 1	10/27		 to	1	0/27/05			
Depth (ft)	Elev. (ft) 801.3	Blows per 6"	Recovery (in)	San No	Core	Hand Penetro- meter (tsf) / * Point-Load	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 28.1' (includes drilling water) DESCRIPTION	% Aggregate	% M. Sand		% Clay	STAN Natura PL E 10	DARD PEN Moisture (L	Content, %	. •
90		Core 120	Rec 120"	RQI 1009	1		Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, unfractured to slightly fractured.								
100		Core 120	Rec 120"	RQI 100	D R- % 10	*1677									
 110 1115		Core 120°	Rec 120*	RQ 100	D R- % 11	*966									
-120	-						@ 118.3'-125.8', contains moderate to abundant argillaceous laminations. @ 119.2'-120.1', calcareous.								

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C

ABUS, OHIO 43229 * (614)888-0040

Client: T	ranSv	stems	. Inc.			<u> </u>	Project: SCI-823-0.00								Jol	b No	<u>. 01</u>	21-	<u>3070</u>	.03
LOG O				9	L	ocation: Sta	. 516+22.4, 193.4 ft. LT of SR 823 CL Date Drilled: 10)/27				to	1	0/27/	<u> 05</u>					
Depth	Elev.	per 6"	(in)	Sam, No	/ Core	Hand Penetro- meter (tsf) / Point-Load	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 28.1' (includes drilling water)	% Aggregate		% M. Sand			'ay	Nati	ural M PL F	Mois	ture (Cont	→ 1	- •
(ft)	(ft) 771.3	Blows	Recovery	Drive	Press	Strength (psi)	DESCRIPTION	% A SA SA	%	% X	% F.	% Si	<i>S</i>		Blc 10		oer fo 20	oot - 3(, 0	40
120 —	771.3	Соге 120°	Rec 120"	RQD 27%	R-	*348	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, unfractured to slightly fractured.													
130 —		Core 120*	Rec 120"	RQE	R- 6 13	*1906	@ 126.4'-128.2', argillaceous laminations.													
135 —		Core 120°		RQI 1009	O R-	*169	@ 138.5'-140.8', calcareous. @ 139.1'-139.5', pyritic, vertical fracture.													
145 —							·													

							12 Of 10 1100: 0121 110111 121	4)000		_	_		_		4	h. M 1	0121-3	2070 0	13
Client:	TranSy	stems,	Inc.				Project: SCI-823-0.00		1071					10/2		D NO. 1	J1215	0.0	~
)F: Bo			9	L		. 516+22.4, 193.4 ft. LT of SR 823 CL Date Drilled.	: 10/	271	05	140/	ATIO	to	10/27	7/05				
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 28.1' (includes drilling water) DESCRIPTION		% Aggregate				% Sitt	% Clay	atural . PL	Moistur	ENETR e Conte	ent, % -	•
150 —	741.3	Core 108"	Rec 108"	RQD 100%	R-	*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'												
17722/2006 1:43 PM }																			
175:																			

							D	LZ OHIO INC. * 6121 HUNTLEY ROAD, CO 3US, OHIO 43229 * (61	4)000	-00		_		-		1 ,	b No. 0121-3070.03
Clien	ıt: Tı	ranSys	tems,	Inc.				Project: SCI-823-0.00							401		6 No. 0121-3070.03
LOC	3 OF	: Bor	ing F	R-2451	Γ	L	ocation: Sta	516+08.6, 160.8 ft. RT of SR 823 CL Date Drilled	: 10/	<u>31/</u>		454	to	_	10/	31/05	
Dep (ft	oth	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 22.0' Water level at completion: None (prior to coring) 2.0' (includes drilling water) DESCRIPTION		% Aggregate	Sand	M. Sand	% F. Sand		, Cay	Natural I PL H	ARD PENETRATION (N) Moisture Content, % - LL Dws per foot - 20 30 40
—0.5 —2.	-	866.4 -866.1 -863.9	² 3 6	7	2		4.5+ 4.5+	Topsoil - 3" Hard brown SANDY SILT (A-4a), trace to little clay; contains sandstone and rock fragments; damp. Hard reddish brown SILTY CLAY (A-6b), trace fine to coars sand; contains sandstone and rock fragments; damp.								q	
1	0 -	- 855.9	7 10 14 6 15 29		3		4.5+ 4.5+	Severely weathered brown and gray SANDSTONE,									6,,0
	-		34 50/2 15 50/6	10	6	:		argillaceous.									50+C
(11/22/2006 1:43 PM)	- - - 20 		17 50/5	<u> </u>	8												50+0
	- - - 5.0 	841.4	8 9 50/5	3_	9		i.	A. II. Land CANDSTONE work fine to modium gra	ned								50+(
FILE: 0121-3070-03	 - - -		Core 18"	Rec 18"	RQ 78°	D _%	1 *1143	Medium hard gray SANDSTONE; very fine to medium grai moderately weathered, argillaceous, micaceous, slightly carbonaceous, laminated to medium bedded, slightly fract @ 26.4', low angle fracture.		1							

		_					DEZ OHIO INC 6121 HONTLET ROAD, CO BOS, OTHER 19225 (011)								Job	No. C	121	3070	.03
	TranSy				7	01-	Project: SCI-823-0.00 1. 516+08.6, 160.8 ft. RT of SR 823 CL Date Drilled: 10	/31/	05			to	1	0/31/					
LOG	OF: Bo	ring i	₹-245°	Samp	_	ocation: Sta	WATER			RADA	ATIC								
Depth (ft)	(ft)	Blows per 6"	Recovery (in)	No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: 22.0' Water level at completion: None (prior to coring) 2.0' (includes drilling water)	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	Nat	ural M	oisture	Con foot	RATIO tent, % 	- •
30 - 32.7- 35 -	836.4	Core 120"	Rec 120"	RQD 83%	Г	*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. Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded to massive, unfractured to slightly fractured.												
40 -		Core 120"	Rec 120*	RQE 92%) R-3	*1720	@ 39.3'-40.2'; brecciated zone. @ 39.4', 39.6', 40.0', 40.15', low angle fractures.			5 5 5 5 5									
770-03 (11/22/2006 1:43 PM) 05	-	Core 120"	Rec 120**	RQ1	O R-	4 *737													
FILE: 0121-3070-03	- - - -				_														

BUS, OHIO 43229 * (614)888-0040

DLZ OHIO INC. * 6121 HUNTLEY ROAD, CO Job No. 0121-3070.03 Project: SCI-823-0.00 Client: TranSystems, Inc. 10/31/05 Date Drilled: 10/31/05 to Location: Sta. 516+08.6, 160.8 ft. RT of SR 823 CL LOG OF: Boring R-2451 **GRADATION** WATER Sample Hand **OBSERVATIONS:** No. Water seepage at: 22.0' Penetro-STANDARD PENETRATION (N) Water level at completion: None (prior to coring) 3 meter 2.0' (includes drilling water) % C. Sand % M. Sand Natural Moisture Content, % -Core % F. Sand % Silt Blows per 6" (tsf) / % Clay Point-Load Depth Elev. Strength Blows per foot -(ft) (ft) Drive DESCRIPTION (psi) 806.4 60 Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded to massive, RQD 100% R-5 Core Rec *1642 120" unfractured to slightly fractured. 120" @ 61.8', 65.9', low angle fracture. 65 70 RQD 100% R-6 Core Rec @ 71.4'; low angle fracture. *1572 120" 120" 75 . 80 RQD 100% R-7 Core Rec *1320 120" 120" @ 85.0', calcareous zone. 85 @ 86.7'-87.0', 89.4'-89.4', argillaceous zone.

Client:	TranSy	stems.	, Inc.		_		Project: SCI-823-0.00								Job	No.	012	21-3	070.0)3
LOG	OF: Bo	ring	R-245	1	\prod_L	ocation: Sta	n. 516+08.6, 160.8 ft. RT of SR 823 CL Date Drilled: 10	/31/	_			to	1	0/31/	05					
Depth (ft)	Elev.	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 22.0' Water level at completion: None (prior to coring) 2.0' (includes drilling water) DESCRIPTION	% Aggregate	C. Sand	M. Sand	ارز		6 Clay	Nati	ıral M PL ⊩	oistu		onter	ATION nt, % - -	- •
90 -	776.4 - -	Core 120"	Rec 120"	RQD 100%			Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded to massive, unfractured to slightly fractured.	8	%	8	8	8	6		10	20		30	4(
95 -		Core 120"	Rec 120**	RQD 100%	R-9	*980	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.													
1055/2007	763.1	Core 120*	Rec 120*	RQD 100%			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.													
115: 0151-3020-03	-						@ 113.5'-114.3', calcareous zone, turbidic. @ 116.5', pyritic, turbidic.													

RUS OHIO 43229 * (614)888-0040

	į						ILZ OHIO INC. * 6121 HUNTLEY ROAD, CO BUS, OHIO 43229 * (614)	388-00	40						_				y	
Client:	ranSy	stems,	Inc.				Project: SCI-823-0.00			_						_	. 01	21-3	070.	03
LOG				1	L	ocation: Sta	. 516+08.6, 160.8 ft. RT of SR 823 CL Date Drilled:	10/31				to	1	0/3	1/05					
Depth	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.	/ Core	Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: 22.0' Water level at completion: None (prior to coring) 2.0' (includes drilling water)	% Aggregate		% M. Sand			% Clay		atural PL	Mois	PEN ture C	Conter	→ <i>L</i> :	- •
(ft)	1	3/OW	3000	Drive	Press	(psi)	DESCRIPTION	% 4	8	% %	% ₽	% Sitt	%		10	iows	oer 10 20	30 30		0
120 — - - -	746.4	Core 120"	Rec 120	RQD 100%	R-	*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 —											ŀ									
—126.5 -	 739.9-		 -		-		Bottom of Boring - 126.5'			1										
130 —	-	<u>.</u>	į																	
											i									
135 —	- - -	;										k		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						
140-																				
145 —								ļ												
	-																			

DLZ OHIO INC. * 6121 HUNTLEY ROAD, CO

BUS, OHIO 43229 * (614)888-0040

Client: T	ranSys	stems	Inc.				Project: SCI-823-0.00								Job No	. 012	1-307	0.03	_
LOG O				2_		ocation: Sta	. 520+21.3, 169.5 ft. LT of SR 823 CL Date Drilled: 10)/19		_		to	1	0/20/2	2005				_
Depth (ft)	Elev. (ft) 866.7	Blows per 6"	Recovery (in)	Sam		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 45.8' (includes drilling water) DESCRIPTION	% Aggregate	C. Sand	% M. Sand	F. Sand	Sit	% Clay	Natu P	ANDARI ral Mois L Blows 10	ture C	ontent,	% - (LL	, •
0 <u>-</u>		4 16 19		1 2		2.5	No topsoil Very stiff to hard brown SANDY SILT (A-4a), trace clay, trace gravel; contains sandstone fragments; damp.) /	>	
5	860.7-	17 43 50/4 31 50/3	16	3			Severely weathered brown SANDSTONE.										\		i0+(
10.0 15	-856.7- -	Core 72"		RQ 25%	D R-	1 *853	Soft to medium hard brownish gray SANDSTONE; fine to medium grained, highly weathered, micaceous, medium bedde to thinly bedded, highly fractured.	ď											
20— 20— 20.5—	846.2	Core	Rec	RQ	D % R-	2 *809	@ 16.6'-20.5' loss of recovery; possible void or fracture in poor cemented zone. Medium hard to hard gray SANDSTONE; very fine to fine	ly ly											
711E: 0121-3070-03 [11/22/2006		120	73*	299	% R-	2 609	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.												
28.5	838.2						Soft to medium hard gray SANDSTONE interbedded with CONGLOMERATE/BRECCIA												

Client:	- Con Cur	toms	Inc			<u>~</u>	Project: SCI-823-0.00							Joi	b No.	012	1-30	70.0	3
LOG O				2	\mathbf{I}_L	ocation: Sta	. 520+21.3, 169.5 ft. LT of SR 823 CL Date Drilled: 10	/19/			to	1	0/20	200	5	_		_	
Depth (ft)	Elev.	Blows per 6"	Recovery (in)	Samp No.	le		WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 45.8' (includes drilling water) DESCRIPTION	% Aggregate	% M. Sand S	F. Sand	Sit	% Clay	Nat	ural l PL +	Moist	er foo	ontent	⊣ LL	•
30	836.7	Core 120"	Rec 62"	RQD 29%		*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.												
40 —	831.5	Core 120"	Rec 120"	RQC 100%	R-4	*1363	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, unfractured to slightly fractured. @ 37.6', low angle fracture.												
50 - 55 - 55 - 55 - 55 - 55 - 55 - 55 -		Core 120"	Rec 120"	RQI 1005	D R	5 *1827													
FILE: C	- - -																		

DLZ OHIO INC. * 6121 HUNTLEY ROAD, C

MBUS, OHIO 43229 * (614)888-0040

Client: T	ranSv	stems	, Inc.				Project: SCI-823-0.00									Job	No.	012	1-307	0.03	
LOG O				2	L	ocation: Sta	. 520+21.3, 169.5 ft. LT of SR 823 CL Date Drilled:	10/	19/				to	1	0/20/2	2005	<u> </u>				
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No		Hand Penetro- meter (tsf) / * Point-Load	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 45.8' (includes drilling water) DESCRIPTION		% Aggregate			% F. Sand		6 Clay	STA Natu	ıral Mı PL ⊢ Blov	oistur vs pe	re Co r foot	· (% - LL	<i>y</i>
60	806.7	Core 120"	Rec 120"	RQD 100%			Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded, unfractured to slightly fractured. @ 61.0'-61.5', slightly calcareous.		%	66	8	6	6	6		10	20		30	40	
70		Core 120"	Rec 120"	RQD 100%	R-7	*2367															
80		Core 120°	Rec 120"	RQE 93%	R-8	*1219	@ 83.9'-85.2', slightly calcareous. @ 85.3'-86.0', broken zone with some clay seams.														
-																					

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

Client: T	rangi	etame	Inc				Project: SCI-823-0.00	_						Ι.	lob No. ()121-3	070.0	3
LOG O				2	7,	ocation: Sta	. 520+21.3, 169.5 ft. LT of SR 823 CL Date Drilled: 10	/19	/20	05		to	1	0/20/20				
				Samı	_		WATER				ATIO	N						
Depth (ft)	Elev. (ft) 776.7	Blows per 6"	Recovery (in)	Drive	Press / Core	Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 45.8' (includes drilling water) DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	Natura	IDARD P I Moisture I——— Blows per 20	Conte	nt, % - → LL	•
90		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.											
100 —		Core 120"	Rec 120"	RQD 97%	R- 10	*1282	@ 101.0'-102.5', pyritic.											
		Core 120"	Rec 120"	RQD 100%	R- 11	*1424	@ 113.3'-114.8', calcareous.											
115 —	746.7	Core 48"	Rec 48"	RQE 90%	R- 12	*1651	@ 117.5'-117.8' high angle fracture. @ 119.0', 119.1', low angle fractures. Bottom of Boring - 120.0'											1

Client:	FranSvs	stems	, Inc.				Project: SCI-823-0.00									o. 012	1-307	0.03
LOG C		_			L	ocation: Sta	. 524+19.6, 174.3 ft. LT of SR 823 CL Date Drilled: 10)/26				to	1	0/27/)5			
Depth (ft)	Elev. (ft)	per 6"	Recovery (in)	Samp No.	/ Care	Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	% Aggregate		% M. Sand	Sand		Clay	Natu	ral Moi L ⊢	sture C	ontent,	LL
	871.2	Blows	Rec	Drive	Press	(psi)	DESCRIPTION	8	%	%	%	%	8	::::	10	20	30	40
-0.2	871.0	10 15 17	5	1		3.0	\Topsoil - 2" Very stiff brown SANDY SILT (A-4a), trace clay, trace gravel; contains sandstone fragments; damp.										<u>о</u> .	
5.0		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.		Ì									O51 →
5.5]- 865.7-	40 50/2	8	3			Severely weathered brown SANDSTONE.											50+(
- 100	064 2	50/2	2	4								:						50+
15 —	+861.2-	Core 72"	Rec 53"	RQD 74%	R-1	•592	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.	1										
:43 FN]							@ 16.5'-18.7', lost recovery; void suspected.											
002/22/2006 1:43 PM 1		Core 120**		RQI 42%	R-	*438	@ 20.5'-22.1', 22.6'-23.8', breccia/comglomerate zone.		ļ		ļ	1						
25 - 23.8 - 25 - 25 - 25 - 25 - 25 - 25 - 25 - 2	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.	;		}								
30	-						@ 28.2'-28.4', 29.1'-29.6', 33.0'-33.5', decomposed shale bed.											

Client:	ranSv	stems	Inc		_		Project: SCI-823-0.00								Job I	vo. 0	121-3	070.03	
LOG O				5	1	ocation: Sta	. 524+19.6, 174.3 ft. LT of SR 823 CL Date Drilled: 10)/26				to	1	0/27 <u>/</u>	05				
Depth	Elev.	Blows per 6"	(in)	Samı No	/ Core	Hand Penetro- meter (tsf) / * Point-Load	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	% Aggregate			Sand	Sitt	ау	Natu	iral Mo PL I—	isture	Conte	⊣ <i>LL</i>	۷) •
(ft)	(ft) 841.2	Blows	Recovery	Drive	Press	Strength (psi)	DESCRIPTION	% Ag	% V	% X	% F.	% Si	% C		Blow 10	s per f	oot - 30	40_	
30 — - - - - 33.5 —	837.7-	Core 120"	Rec 79"	RQD 66%		*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. Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, thickly bedded to massive, slightly fractured,												
40 —		Core 120*	Rec 117	RQI 97%	R-4	*1314	contains few argillaceous laminations.		3										
50 — 55 —	-	Core 120"	Rec 117"	RQ(97%		5 *833	© 56 0' 57 0' 50 1' low and fractures												
60	-						@ 56.2', 57.9', 59.1', low angle fractures.												

Client:	ranSv	stems.	Inc.				Project: SCI-823-0.00								ob No.	. 01	<u>21-3</u>	070	.03	4
LOG O				5	$]_L$	ocation: Sta	. 524+19.6, 174.3 ft. LT of SR 823 CL Date Drilled: 10	0/26			to		10/27	<u>′/05</u>						\dashv
Depth (ft)	Elev. (ft) 811.2	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (Isf) / * Point-Load	DESCRIPTION	% Aggregate		% F. Sand		% Clay		itural PL	lows p	ure (Conte	nt, % —\ l	. (
60		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.													
70 —		Core 120*	Rec 120*	RQE 100%	R-7	*1468	@ 67.2', 68.6', 68.7', 69.4', 72.1', 73.9', 74.3', low angle fractures.													
11.1-3070-03 (11/22/2006 1:43 PM) 9 2 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9		Core 120°	Rec 120*	RQ!	D _R -	8 *632	@ 81.6', 83.0', 85.6', low angle fractures.													
FILE: 012	<u>-</u>						@ 87.0', low angle fracture @ 87.5'-87.6', rust stained high angle fracture. @ 87.0'-87.7', rust stained.													

DLZ OHIO INC. * 6121 HUNTLEY ROAD, CO

BUS, OHIO 43229 * (614)888-0040

Job No. 0121-3070.03 Project: SCI-823-0.00 Client: TranSystems, Inc. 10/27/05 Date Drilled: 10/26/05 to Location: Sta. 524+19.6, 174.3 ft. LT of SR 823 CL LOG OF: Boring R-2455 GRADATION WATER Sample Hand **OBSERVATIONS:** No. Water seepage at: None Penetro-STANDARD PENETRATION (N) Water level at completion: Not reported % Aggregate % C. Sand % M. Sand 3 meter ဦ % F. Sand Natural Moisture Content, % -Blows per 6" (tsf) / Recovery % Clay Point-Load Depth Elev. ₩Silt Press/ Strength Blows per foot -(ft) Drive DESCRIPTION (psi) 781.2 Medium hard to hard gray SANDSTONE; very fine to fine RQD Rec Core grained, slightly to moderately weathered, micaceous, R-9 *722 92% 120" 111" argillaceous, thickly bedded to massive, unfractured to slightly fractured, contains few argillaceous laminations. 95 @ 98.5'-108.0', moderately to highly weathered, laminated to thinly bedded, moderately to highly fractured, contains 100 abundant argillaceous laminations. Rec RQD R-Core *1343 83" 69% 10 120" 105 0121-3070-03 [11/28/2006 11:30 AM] @ 108.0'-120.0', pyritic. 110-Rec RQD R-Core *1369 84% 11 101" 120" 115

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Client: 1	rope.	ctomo	Inc	_	_		Project: SCI-823-0.00] ,	Job N	o. 0	<u> 121-</u>	3070	.03	
LOG O				5	٦,	ocation: Sta	. 524+19.6, 174.3 ft. LT of SR 823 CL Date Drilled:	10/2	6/0	5		to		10	/27/0	5					ᆜ
LOGO	r. bo	ring	1 - 2 - 3 -	Samp	_		WATER		_ (GRA	DA	TION		Ţ							ı
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Drive Drive		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: None Water level at completion: Not reported DESCRIPTION	0/ Assessed	organist of	% C. Sand	% M. Sand	% F. Sand % Sitt	% Clay	(Gio a)	Natura PL	al Moi	sture	Cont	ent, %		•
120	751.2	Core 120"	Rec 115"	RQD 96%	R-	*1642	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, pyritic, unfractured to slightly fractured.														
-130.0-	741.2	Core 48"	Rec 48*	RQD 100%	R- 13	*1476	@ 127.4', 127.6', low angle fractures.														
135 — 140 — 140 — 145 — 145 — 145 — 145 — 145 — 145 — 150 — 145 — 150 —							Bottom of Boring - 130.0'														

Cica	,, T	ranSys	tems	Inc				Project: SCI-823-0.00								Jol	No. (0121-3	3070.	03
		F: Bor	_		7	7	ocation: Sta	. 524+32.7, 189.2 ft. RT of SR 823 CL Date Drilled: 1	0/21	/05	i .		to		10/26	/05				<u></u>
					Samı No	ole	Hand Penetro-	WATER OBSERVATIONS: Water seepage at: None	-	G	RAD	ATI	ON							
1	l		. [<u>(i)</u>	1	ا ۾ ا	meter	Water level at completion: Not reported	9		1_	1	1					ENETR		V (N)
			per 6		1	g	(tsf) / * Point-Load		659	and	and	Sand		١.				e Conte	ent, % i L	- •
Dep (ft		Elev. (ft)	d sv	Recovery		_	Strength		% Aggregate	S	M. Sand	I.S.	N.S.	Clay	1	PL + Bk		foot -	_	.L.
		871.2	Blows	Rec	Drive	Press,	(psi)	DESCRIPTION	%	%	%	%	1%	%	ļ	10	20	30	4	10
├ -0.7	iI	-871.1-						Topsoil - 1"	_	l	Ì		1	1						
1	_		5		i]	Very stiff brown SILT AND CLAY (A-6a), little fine to coarse		1			1							
1	7		10 22	18	1	١	3.5	sand, trace gravel; contains sandstone fragments; damp.			1		1						5	
— 3.	5—	867.7	11					Severely weathered brown and gray SANDSTONE.	\dashv										ĪijÌſ	} ;;;
١.	_		50/5	11_	2	}		Severely weathered brown and gray critical contents			Ì									50+
'	5 —			:					Ì					1						
l l]	50/5	_ 5	3	ļ				1		1	l		1					504
1	_]]				İ		ļ		1							
	_	1	16		U			@ 8.5', gray.			İ			ł						
	_		19 50/4	16	4						-		1							50
1	0	1			Π							1								
11	.5	859.7	50/2	2	5	4	1	Medium hard brownish gray SANDSTONE; very fine to fine	1				1		liii					50
	_							grained, highly weathered, argillaceous, micaceous, thickly	ı				ļ	ì						
1						ł	1	bedded, moderately fractured, highly iron stained.	Ì				Ì							
1 .											1	1	1	1				! ! ! ! 		
'	5 —		Core	Rec	POL				ì	1			1							
	_	1	114"	74"	RQI 65%	(R-	1 *267	@ 16.2'-22.5', gray, moderately weathered, carbonaceous,			Ì	Ì								
-]			1	1		thinly laminated to medium bedded, moderately to highly fractured, contains coal stringes and laminations.		١										
8					L			Tractured, contains coarstringes and laminations.			Ì	1		Ì						
	- ۱۸							@ 19.2'-19.4', ferric band.												
9	<u> </u>]			_									1						
/28/2006 11:30 AM	_																			
<u></u>	2.5	848.7	1	ļ				Hard gray SANDSTONE; very fine to fine grained, slightly to	\neg											
-				1	1	1	1	moderately weathered, micaceous, argillaceous, thickly bedde	d	١			-							
9	-		i					to massive, slightly fractured.				ł		-						
400-	25 —		Core	Rec	RQI 82%		2 *751		- {											
FILE: 0121-3070-03	-		120"	Rec 99"	829	'اه	731													
: 4	_]									İ									
E	-		1		1		1	@ 29.0'-29.4', 30.2'-31.6', rust staining.												
1.	- የበ	7						@ 29.2', high angle fracture.						1	<u> </u>		<u> </u>	<u> </u>		

Client -	FranSys	tems	Inc				Project: SCI-823-0.00								Job I	No. ()12 <u>1</u>	-307	0.03	
LOG				7	1	ocation: Sta	. 524+32.7, 189.2 ft. RT of SR 823 CL Date Drilled: 10	/21/				to	1	0/26/	05_					_
				Samp	ole		WATER	<u> </u>	GF	RAD.	ATIO	NC					•			
Depth	Elev.	Blows per 6"	ery (in)	No.	Press / Core	Penetro- meter (tsf) / * Point-Load	OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	% Aggregate	Sand	Sand	Sand	% Silt	эу	ST/ Natu	ANDAI iral Mo PL	oisture	e Con	tent, 9	% - LL	•
(ft)	(ft) 841.2	Blows	Recovery	Drive	Press	Strength (psi)	DESCRIPTION	% Ag	% C	% W.	% T.	% Sil	% C!		Blow 10	s per 20		- C	40 40	
30		Core 120"	Rec 115"	RQD 96%	R-3	*1157	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.													
40 — 45 —		Core 120"	Rec 120"	RQD 100%) R-4	4 *731														
2005-727/11 11/25/2006 1:43 EM 55		Core	Rec 120"	RQI 1009)) _R -	5	@ 55.4'-55.6', ferric, vuggy, fossiliferous.													

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Client:	TranSy	stems	Inc.				Project: SCI-823-0.00								Job No	. 012	<u>1-307</u>	0.03	4
	F: Bo			7	7	ocation: Sta	i. 524+32.7, 189.2 ft. RT of SR 823 CL Date Drilled: 10)/21				to		10/26/	05				4
				Samp No.	ole	Hand Penetro-	WATER OBSERVATIONS: Water seepage at: None	-	G	RAD	ATI	ON							
Depth	Elev.	per 6"	ry (in)		Care	meter (tsf) / * Point-Load	Water level at completion: Not reported	% Aggregate	Sand	Sand	Sand			Natu	ANDARD Iral Mòis PL I——		ontent,		•
(ft)	(ft)	Blows	Recovery	Drive	Press /	Strength (psi)	DESCRIPTION	% Agg	ς; γ	% M. Sand	% 7.	% Silt	% Clay		Blows	per foo 20			
_60.0 <u></u>	7-811.2- - - -						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, thickly bedded to massive, slightly fractured.				į:	} 	<u> </u> 						
65 — 70 —		Core 120"	Rec 112"	RQD 93%	R-6	*1439	@ 66.0'-66.7', high angle fracture. @ 66.0'-67.3', rust staining.												
75 -		Core 120"	Rec 120"	RQE 100%) R-	7 *1282													
FILE: 0121-3070-03 11/22/2006		Core 120"	Rec 70"	RQI 58%	P R-	8 •267	 @ 81.4'-81.6', argillaceous zone. @ 81.8'-84.9', high angle rust stained fracture. @ 83.1'-89.5', rust stained. @ 85.9'-86.3', broken zone. 												

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Client:	ranSy	stems,	Inc.				Project: SCI-823-0.00								Job N	lo. 0	21-	3070.	03
LOG O					_	ocation: Sta	i. 524+32.7, 189.2 ft. RT of SR 823 CL Date Drilled: 10	/21/				to	1	0/26/)5				
		.6"	(in)	Samp No.		Hand Penetro- meter (tsf) /	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	ete		RAD.					NDAF rai Mo				
Depth (ft)	Elev. (ft) 781.2	Blows per	Recovery	Drive	Press / Co	* Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. San	% M. Sand	% F. San	% Silt	% Clay	P	L			L	
95 —		Core 120*	Rec 91*	RQD 76%	R-9	*1300	Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, thickly bedded to massive, unfractured to slightly fractured. @ 94.2'-95.5', high angle fractures. @ 96.4'-107.1', contains few to moderate argillaceous laminations. @ 97.5'-97.6', calcareous. @ 99.2', 120.0', pyritic.												
105 —		Core 120*	Rec 120"	RQD 100%	R- 10	*1372													
115 —		Core 120"	Rec 111*	RQD 92%	R- 11	*1302													

	Fee of Co.		loc	-			Project: SCI-823-0.00								Job No.	012	1-3070.	03
	FranSys			,	1	ocation: Sta	. 524+32.7, 189.2 ft. RT of SR 823 CL Date Drilled: 10)/21	/05			to	1	0/26/0	5			
1000	P. BUI	ing i	\- <u>z-4-5</u>	Samp	_		WATER			RAD	ATIC	NC		-				
		r 6"	(in) ,	No.		Penetro- meter (tsf) /	OBSERVATIONS: Water seepage at: None Water level at completion: Not reported	egate	pue	pug	pue			Natui	al Moist	ure Co	TRATIOI	
Depth (ft)	Elev. (ft) 751.2	Blows per	Recovery	Drive	Press / (* Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. S	% F. Sand	% Silt	% Clay		. ⊢—— Blows µ 02			10
125 —	751.2	Core 120"	Rec 120"	RQD 100%	R- 12	*1050	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, pyritic, massively bedded, unfractured to slightly fractured.											
-135.0-	736.2	_			<u> </u>		Bottom of Boring - 135.0'	-										
143 PM) 1 1/22/2006 1:43 PM) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1																		

	, T	200512	tome	Inc				Project: SCI-823-0.00					_			Job I	Vo. C)121	-3070	0.03	
		ranSys			-	7,	ocation: Sta	. 535+49.4, 165.7 ft. RT of SR 823 CL Date Drilled: 7/2	5/2												_
Dept (ft)	th	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.	ole	Hand Penetro- meter (tsf) / * Point-Load	WATER OBSERVATIONS: Water seepage at: 11.0'-12.5', 43.5'-45.0' Water level at completion: 37.4' (inside hollowstem augers) DESCRIPTION		GF	% M. Sand			% Clay	Natu F	ıral Mo PL ⊢	isture	Cor	TRATIO ntent, % 	6 - LL	1
0.6	, – T	720.0 -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.							Ο,	7					
5	5-		7 11 12	18	2		4.5+	@ 3.5'-5.0', hard.)			
	-		6 7 8	16_	3		1.25		0	0	-	8	48	44		Ç	/				
	0 -0.	-709.0-	. 4 		5		2.25	Medium dense brown SANDY SILT (A-4a), little to some clay,								φ \ _\					
13. 15	4	- 707.0-	7	13	6		2.5	trace gravel; moist. 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		19		I- S -			52
[H4]	-		6	1 18	7		4.0										را (
72006 12:50 PM	o —		3	5 18	8		2.0					ł				<u>}</u>					
03 [11/29,	- -		3 3	4 18	10	P-	1.5 1 2.25 1.25		0	O	-	0	10	90				+	•		59
FILE: 0121-3070-03	.5 - -		3 3	4 17_	11		1.25									Υ] 5					
FILE	_ 		3 4	£ 18	12	P-	2 1.0 1.5		0	C) -	0	31	69							

				Samp	ile			1	(574	A 1 1 M	TION							
l .	Elev. (ft)	Blows per 6"	Recovery (in)	Drive		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 11.0'-12.5', 43.5'-45.0' Water level at completion: 37.4' (inside hollowstem augers) DESCRIPTION	% Aggregate			% F. Sand % Silt		Vatur PL	al Mo	sture	e Cor	tent, %	LL
30 - 6	590.0		u.			·	Stiff brown and gray CLAY (A-7-6), trace to some silt, trace fine to coarse sand; damp to moist.					9 9						
35 —	 - - -	3 3 4	18_	13	P-3	1.5 1.5							\ \ \	\ \ \				
40		3 4 14	18	14		1.25	•											
43.5	6 76.5	9 14 18	14	15			Dense gray SANDY SILT (A-4a), trace gravel; moist to wet.					i					, D	, ,
48.5	-6 71.5	22 28 50	15	16			Very dense gray GRAVEL WITH SAND AND SILT (A-2-4); (decomposed sandstone); moist to wet.					1						07
-53.5 -54.0 -55	-666.5- -666.0-	50+	6	17	-	2.75	Very stiff gray SILT AND CLAY (A-6a); (decomposed shale); damp. Bottom of Boring - 54.0'											

MBUS, OHIO 43229 * (614)888-0040 DLZ OHIO INC. * 6121 HUNTLEY ROAD, C Job No. 0121-50/0.03 Project: SCI-823-0.00 Client: TranSystems, Inc. Date Drilled: 7/24/2006 Location: Sta. 535+51.6, 173.0 ft. LT of SR 823 CL LOG OF: Boring C-23 **GRADATION** WATER Sample Hand **OBSERVATIONS:** No. Water seepage at: 38.5'-39.0' Penetro-Water level at completion: 42.0' (inside hollowstem augers) STANDARD PENETRATION (N) Ē meter % C. Sand % M. Sand Natural Moisture Content, % -% F. Sand % Silt (tsf) / Blows per Recovery Point-Load % Clay Elev. Depth Strength Blows per foot -DESCRIPTION (psi) 714.0 Topsoil - 5" Stiff to very stiff brown and gray SILT AND CLAY (A-6a), trace 2.25 1 fine to coarse sand; damp to moist. WOH 2 - 7 55 36 2 1.25 @ 6.0'-7.5', hard. 6 3 4.5+ 3.75 Stiff to very stiff brown and gray CLAY (A-7-6), trace to "and" -10.0 -704.0silt, trace fine sand, trace gravel; moist. 1 22 76 οl 5 2.75 3 18 2.5 15 2.5 0 0 0 4 96 1.0 2 1.0 18 20 -3 1.25 18 @ 23.0'-24.0', medium stiff. 0 l 40 60 0 0 0.75 10 18 1.5 25 -3 1.25 11 18 25 0 1.0 3 12

1.5

					_		DLZ OHIO INC. 6121 HUNTLEY ROAD, Q MBUS, OHIO 43229 (014)00								lob No.	0121	-3070	.03
	TranSy	7			_		Project: SCI-823-0.00 535+51.6. 173.0 ft. LT of SR 823 CL Date Drilled: 71/2	24/2	nne									
LOG	DF: Bo	ring C	:- <u>23</u>		_		. 535+51.6, 173.0 ft. LT of SR 823 CL Date Drilled: 7/2 WATER				ATIO	N -	\Box					
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	OBSERVATIONS: Water seepage at: 38.5'-39.0' Water level at completion: 42.0' (inside hollowstem augers)	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natura PL	I Moistu ⊢ Blows p	ire Cor	TRATIO	- •
30 35 38.5- 40	684.0	3 4 4	18	13	4	1.5	Stiff brown and gray CLAY (A-7-6), trace to "and" silt, trace fine sand, trace gravel; moist. Very dense gray GRAVEL WITH SAND AND SILT (A-2-4); (decomposed sandstone); damp.								7	<i>,</i>	<i></i>	/ 5 5
43.5-0-01-1210 :3713		50/3	3	15		4.5+	Hard gray SILT AND CLAY (A-6a); (decomposed shale); damp Bottom of Boring - 44.0'											50+

Client: T	ranSv	stems,	Inc.				Project: SCI-823-0.00								Job	No.	012	1-30	70.0	3_	4
LOG O					_		. 535+13.6, 95.8 ft. LT of SR 728 Ramp A BL Date Drilled: 08	/30/		AD.	ATIC	LAI					_		—		\dashv
Depth (ft)	Elev. (ft) 720.5	Blows per 6"	Recovery (in)	Samp No.			WATER OBSERVATIONS: Water seepage at: 47.0'-51.5' Water level at completion: 39.7' (prior to coring) 22.3' (includes drilling water) DESCRIPTION	% Aggregate		ŀ	% F. Sand		% Clay	Natu P	rai Mo L —	oistu	PENE	ntent,	,% - + LL	•	_
0.3 - - 	720.2		18	1		1.0	Topsoil - 4" Medium stiff to stiff light brown SILT (A-4b), trace to little clay, trace fine sand; damp to moist.							Q							
-]	2 2 3	18	2	ŀ	1.0								d							
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.								þ						
10-		3 4 6	18	4	i	2.5		0	0	-	6	46	48		Q	H			4		
-	-	8 9	18	5		3.0	@ 10.5'-13.0', little fine to coarse sand, trace to little gravel; contains sandstone fragments.								\	χ					
15-	+707. 5	2 4	18	6	l 	2.25	Stiff to very stiff brown CLAY (A-7-6), some silt, trace fine to coarse sand, trace gravel; moist.								/ 						
		2 4	18	7		1.5	@ 15.5', mottled brown and gray, contains trace organic material.	4	2	-	6	25	63				•			H	
20	700.0	3 4	18	8		2.5									 						
_20.5		1 2	2 18	9		0.25-0.5	Soft to medium stiff brownish gray CLAY (A-7-6), trace silt, trace fine sand; moist.			ļ	ļ										
25 —	_	2	2 18	10		0.25		C	C	-	- o	1	99	þ				H			
25 -	_	WOH 2	2 18	11		0.5								Q							
30.	7	1 3	18	12		0.75															

DLZ OHIO INC. . 6121 HUNTLEY ROAD,

MBUS, OHIO 43229 * (614)888-0040

Job No. 0121-3070.03 Project: SCI-823-0.00 Client: TranSystems, Inc. Location: Sta. 535+13.6, 95.8 ft. LT of SR 728 Ramp A BL Date Drilled: 08/30/06 LOG OF: Boring C-55 GRADATION WATER Sample Hand OBSERVATIONS: No. Water seepage at: 47.0'-51.5' Penetro-Water level at completion: 39.7' (prior to coring) STANDARD PENETRATION (N) Ē meter % C. Sand % M. Sand % F. Sand % Silt % Clay ė 22.3' (includes drilling water) Natural Moisture Content, % - • (tsf) / Blows per Recovery Point-Load Elev. Depth Strength (ft) (ft) Blows per foot -DESCRIPTION (psi) 690.5 Medium stiff brownish gray CLAY (A-7-6), trace silt, trace fine sand; moist. 2 13 0.5 18 35 -14 0.5 18 40 -@ 43.5'-45.0, little to some silt. 1.0 15 45 -671.5 6 12 49.0-Medium dense gray SILT (A-4b), little clay, trace to little fine 16 18 sand, some gravel; damp. 50 --669.0-Medium hard gray SILTSTONE; moderately weathered, micaceous, argillaceous, thinly bedded to medium bedded. highly fractured. RQD 86% R-1 Rec Core @ 51.5'-51.9', decomposed zone. 56" @ 54.8'-55.2', clay seam. 55 -56.5 664.0 Bottom of Boring - 56.5'

	30 4 T	ranSys	toms	lac				Project: SCI-823-0.00								Job No	. 012	1-3070	0.03
		F: Bo				7	ocation: Sta	534+43.9, 14.6 ft. LT of SR 728 Ramp A BL Date Drilled: 08	/24/	06			to	0	8/29/0	6			
ľ	2000	r. Bu	ing		Sam, No	ole		WATER OBSERVATIONS: Water seepage at: 14.5'-20.5', 41.0'-48.0' Water level at completion: 37.6' (prior to coring)			RAD.	ATIC	N		STA	NDARI) PENE	TRATIC	ON (N)
	Depth (ft)	Elev. (ft)	s per 6"	very (in)		s/Core	meter (tsf) / * Point-Load Strength	23.3' (includes drilling water)	% Aggregate	. Sand	A. Sand	% F. Sand	#	Clay	Natui	al Mois	ture Co	ontent, %	6 - ● 止
١	(11)	718.4	Blows	Recovery	Drive	Press	(psi)	DESCRIPTION	%	%	%	% F	%	%	1	0 	20 1	30	40
t	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.			<u> </u>				Q				
	_ _ _5		² 3	18	2		4.0	@ 3.5'-5.0', trace fine to coarse sand, contains trace organic material.		ì	i				\ \ \) }			
	5.5 -	712.9- - 710.4-	10 15 21	18	3	ja S	4.5+	Hard reddish brown SILT AND CLAY (A-6a), trace fine sand, trace to little coarse sand, trace to little gravel; damp.			}						<i>*</i>	1,5)
	10 —	1 7 10.4	5 8 14	18	4	i	4.5+	Very stiff to hard mottled brown and gray CLAY (A-7-6), "and" silt, trace fine sand; moist.									Q'		
	- -	- - -	7 7 14	18	5		2.0	@ 13.5'-14.5', reddish brown, little to some fine to coarse sand.	0	0	-	2	52	46			8		
	15 —		3 6	18	6A 6B		2.0	@ 14.5'-15.0', moist to wet.								Ø /			
FM)		-	5		7		-	@ 18.5'-20.0', medium stiff to stiff; little to some gravel.								6			
2:19	20-	1,,,,	10 20	10	8		1.0					1							
1/21/2006	—20.5 -	697.9	3 6	1 18	9		1.75	Stiff gray CLAY (A-7-6), trace to little silt, trace fine sand; damp to moist.	4	C	, -	0	4	92		برا		•	
0-03 (1		1	WOH	2 18	10	,	<0.25	@ 23.5'-30.0', very soft, moist to wet.								/			
: 0121-3070-03	25 —		WOH 1	2 18	1		<0.25								0				
FILE:	30	-	1 2	3 18	12	2	<0.25					i							

Client: T	ronCve	toms	loc				Project: SCI-823-0.00								Job	No. ()121-	3070.03	3
LOG O					7	ocation: Sta	1. 534+43.9, 14.6 ft. LT of SR 728 Ramp A BL Date Drilled: 08	/24/	06			to	0	8/29/					
2000	. 50	ii ig		Samp No.	le		WATER OBSERVATIONS: Water seepage at: 14.5'-20.5', 41.0'-48.0'				ATIO	<u> </u>	\dashv				- 1	DATION (,,,
			(ii)		ē	meter (tsf) /	Water tevel at completion: 37.6' (prior to coring) 23.3' (includes drilling water)	ate	þ	Į,	اہ		ı					RATION (i ent, % -	~
Depth	Elev.	per 6"	8		/ Core	* Point-Load	·	greg	Sand	Sar	F. Sand		~		PL H			—₁ <i>LL</i>	
(ft)	(ft) 688.4	Blows	Recovery	Drive	Press	Strength (psi)	DESCRIPTION	% Aggregate	% C	% M.	% F.	is %	ΰ %		Blov 10	vs per 20	foot -) () 	
35 —		1 2 3	18	13		0.5	Medium stiff gray (A-7-6), trace to little silt, trace fine sand; moist.											•	
45 —	676.4- 671.4-	WOH 2	10	15		-	Very loose light gray SILT (A-4b), little to some fine sand, wet.												
	ł	1	ł	11			Hard gray SILT (A-4b), trace fine sand, little clay; damp.	1											
E	1	7 20 50/:		16		4.5+													50+(
11/21/2006	668.4	Core 60"		RQ0 91%	R-		Soft to medium hard gray SILTSTONE; moderately weathered, argillaceous, micaceous, thinly bedded to medium bedded, highly fractured. @ 50.0'-50.3', decomposed zone.												
55.0	663.4						Bottom of Boring - 55.0'												

RUS OHIO 43229 * (614)888-0040

		(D	LZ OHIO INC. * 6121 HUNTLEY ROAD, CO BUS, OHIO 43229 * (614)888	3-00-	10							_		_{-)	
	Client: T	ranSys	stems,	Inc.				Project: SCI-823-0.00								Job	No.	012	1-307	0.03	
-	LOG O				*	1	ocation: Sta.	533+67.7, 75.0 ft. RT of SR 728 Ramp A BL Date Drilled: 08	/29/												
	Depth (ft)	Elev. (ft)	per 6"	Recovery (in)	Samp No	/Core		WATER OBSERVATIONS: Water seepage at: 42.0'-47.0' Water level at completion: 34.8' (prior to coring) 23.9' (includes drilling water)	Aggregate			% F. Sand		Clay	Nati	ural M PL 1—	oistu	ire Co	ETRATI	% - LL	√)
ł	` ′	716.3	Blows	Rec	Drive	Press	(psi)	DESCRIPTION	%	%	%	%	8	%		10	20	2	30	40	
	-0.4 -	-715.9		18	1		1.0	Topsoil - 5" Stiff to very stiff brown SILT (A-4b), trace to little clay, trace fine to coarse sand, contains trace organic meterial; damp.							Q						
ł	5 5.5		2 3 6	18	2		3.0									d					
		- 710. 8	3 6 10	18	3		2.5	Very stiff mottled reddish brown and gray SILT AND CLAY (A-6a), trace to little fine to coarse sand; damp to moist.	0	1	-	9	65	25			Q				
	- 10 	-705. 8 -	5 12 10	18	4		2.5			i								Ò			
	- 10.3 - -	703.8	3 4 Z	18	5		2.25	Very stiff mottled brown and gray CLAY (A-7-6), little to some silt, trace fine sand, contains trace organic material; moist.								l P					
	- 15 		4 6 10	18	6		3.0	@ 16.0'-17.5', little organic material.	0	0		4	17	79			þ	 -	,		
1	- - 18.0	698.3	6 10	18	7		2.5										þ				
5 2:19 PM]	20 -	-	3 3	18	8		1.5	Medium stiff to stiff brownish gray ELASTIC CLAY (A-7-5), trac silt, (varved); moist.	9							φ'					
11/21/2006	- 	693.3	1 3	18	9		0.5		ر ا	c	-	0	1	99	Ç	5					:73 ► +
) 60-0706-1210		-	WOH 1	18	10		0.2505	Soft to medium stiff brownish gray CLAY (A-7-6), trace silt, (varved); moist.							/ ф						
FILE: 0121-	· -	1	WOH 2	2 18	11 11		0.75								0						
ia.		-	WOH 2	18	12		0.75														

Client: T	ransva	tems	Inc				Project: SCI-823-0.00								Job N	vo. 0	121-3	070.	03
LOG O					7	ocation: Sta	1. 533+67.7, 75.0 ft. RT of SR 728 Ramp A BL Date Drilled: 08.	/29/	06										
				Samp No.	le	Hand Penetro-	WATER OBSERVATIONS: Water seepage at: 42.0'-47.0'		GF	RAD	ATIC	NC							
		.9	(in)		Core	meter (tsf) /	Water level at completion: 34.8' (prior to coring) 23.9' (includes drilling water)	3810	g	٦	ا ج				ANDAF ıral Mo				I (N) - ●
Depth	Elev.	Blows per	very		•	* Point-Load	·	% Aggregate	San	M. Sand	F. Sand	Ш	Clay		L I			<u> </u>	L
(ft)	(ft) 686.3	Blow	Recovery	Drive	Press,	(psi)	DESCRIPTION	% A	2%	% W	% F	% Sitt	%		10 10	20 20	oot - <u>30</u>	4	0
30	000.0						Soft to medium stiff brownish gray CLAY (A-7-6), trace silt, (varved); moist.							ĭ					
35 —		1 2 3	18	13		0.5			į					þ					
-		1				į													
40		3 4	18_	14		0.5								ک ا	2				
-42.0	674.3	4 13		15			Dense brown COARSE AND FINE SAND (A-3a), little to some silty clay, little gravel; damp.											, ,	,
45		⁴ 13 31	18		ŀ								į						
47.5	668.8	l					Soft gray SILTSTONE; highly weathered to decomposed,												
49.5	666.8	30 50/3	9	16	-		arenacous. Medium hard gray SILTSTONE interbedded with SANDSTONE	-											50+
-	1	Core 60"	Rec 60"	RQD 90%	R-	1	very fine grained, moderately weathered, thinly bedded to medium bedded, highly fractured. @ 51.2', high angle fracture.	,											
54.5 55 —	661.8						Bottom of Boring - 54.5'												
-60]	l	l					L	\perp	1_	_		1_				111		

		_	_				LZ OHIO INC. 6121 HUNTLEY ROAD, CC BUS, OHIO 43229 (614)888			_					Job	No.	0121	-3070	.03
	TranSy			_	7-		Project: SCI-823-0.00 508+08 6, 72.8 ft, RT of SR 728 Ramp C BL Date Drilled: 08.	1201	06										
LOG	F: Bo	ring (<i>-</i> -58	Com	_		. 508+08.6, 72.8 ft. RT of SR 728 Ramp C BL Date Drilled: 08. WATER	£31	_	ADA	TIOI	<u> </u>	Т						
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	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) DESCRIPTION	8	Sand	M. Sand	% F. Sand	Silt	% Clay	Natu	rai Mo L ⊢	oistur			
0-	704.3	9	· ·	1	-		Topsoil - 10"						\neg						
0.8	1	6 5 4	18	1			Loose light brown SANDY SILT (A-4a), trace clay; contains roots; damp.			į				Ç	 				
3.5 5	700.8	5 5 12	14_	2	ı		Medium dense light brown SILT (A-4b), some clay, trace fine to coarse sand; contains roots; damp.	5	3	_	13	56	23				+		
		4 6	18	3		<u></u>	@ 6.0'-7.5', contains weathered SANDSTONE fragments.							(
10 -	695.8	5 6	18	4	ļ	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			 -		+	
11.0-	693.3-	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	Ó					i i
15 -	<u>-</u>	1 2 2	18	6				0	0	_	1	15	84	Ó,			, , , , , , , , , , , , , , , , , , , 		9 1
- 2	- -				P-1	-													
19.5- 20-	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.	<u> </u>	į							δ			
23.5	-	9 9	16	8									1			\Diamond			
25 -		⁷ 8	14	9			Medium dense gray COARSE AND FINE SAND (A-3a); wet.									5-			
:: :::	-	47		10			Very dense mottled brown and gray GRAVEL WITH SAND (A-1-b); damp.) ()94
28.5	675.8	17 50/5	8	11			Soft gray SANDSTONE; very fine grained, decomposed.												50

			_		_			Print CCI 923 0.00								Jo	b No.	012	1-30	70.0	3[
		anSys				_		Project: SCI-823-0.00 508+08 6 72 8 ft. RT of SR 728 Ramp C BL Date Drilled: 08	1/29/	06	_						<u> </u>				
LO	G OF	: Bo	ring (C-58	Sam	_		. 508+08.6, 72.8 ft. RT of SR 728 Ramp C BL Date Drilled: 08			RAD.	ATIC	N			_					
Der (fi	"	Elev. (ft)	Blows per 6"	Recovery (in)	Drive		Hand Penetro- meter (tsf) / * Point-Load	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)	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Sitt	% Clay	Na	ural i PL I	Moistu	ire Co er foo	ontent	ΓΙΟΝ (; % - -1 LL Ο -40	•
_30	- - - - - - - - - -	674.3 674.3	Core 60"	Rec 60"	RQI 86%			Soft to medium hard gray SILTSTONE interbedded with SANDSTONE; very fine to fine grained, highly weathered to decomposed, argillaceous, thinly bedded, highly fractured.													
35	i.o	- 669.3 -	<u> </u>	<u> </u>	 	+	 	Bottom of Boring - 35 0'	1			1									
2:19 PM }		-669.3 -						Bottom of Boring - 35.0'													
FILE: 0121-30	55 																				

Client:	TranSy	stems	, Inc.				Project: SCI-823-0.00							Job No. 0121-3070.03
LOG						ocation: Sta	. 508+07.4, 43.3 ft. LT of SR 728 Ramp C BL Date Drilled: 08	/28	/06			to		08/29/06
				Samj	ole		WATER		GI	RAD.	ATIC	NC		
Depth (ft)	Elev.	's per 6"	Recovery (in)	No	/Core	Penetro- meter (tsf) / * Point-Load Strength	OBSERVATIONS: Water seepage at: None Water level at completion: 7.0' (includes drilling water)	ggregate	Sand	% M. Sand	Sand	n.	lay	STANDARD PENETRATION (N) Natural Moisture Content, % - PL LL
	705.7	Blows	Reco	Drive	Press	(psi)	DESCRIPTION	% A	ر %	% W	% F.	S %	%	Blows per foot - () 10 20 30 40
0-							Topsoil - 10"]					ļ	
-0.8	704.9	6 4 4	18	1			Loose to medium dense light brown SILT (A-4b), little clay, little fine to coarse sand, trace gravel; damp to moist.					İ	•	Q
5-		7 9 7	14	2				8	4		10	63	15	,
6.0-	699.7 -							1						
-		9	12	3			Medium dense mottled brown and red SANDY SILT (A-4a), trace gravel; damp.							À
8.5 10 —	697.2	6 11 16	12	4		2.0	Medium stiff to stiff brown and gray CLAY (A-7-6), trace fine sand; moist.		<u> </u>	:				۵
		3	18	5		1.0			ļ					Ç
15 —		MOH	18	6		0.75		0	0	-	1	27	72	2
_	1	WOH	18	7		1.0								
20 -	-	WOH 2	18	8		1.0								\ \dots
11/21/200			18	9		1.0								
23.5	682.2	81	18	10			Medium dense gray GRAVEL WITH SAND AND SILT (A-2-4); damp.							
25 — 25 — 20.0 —	679.7-	4	18	11			Loose gray SANDY SILT (A-4a); damp.							
-28.5 30	677.2	24 30 4	16_	12	,		Very dense brown and gray GRAVEL WITH SAND (A-1-b), trace silty clay: damp							

	<u>'</u>	<u> </u>				<u> </u>	Project: SCI-823-0.00	~ 00				_			Job No.	0121	-3070	.03
Client: T					٦.	- Cto	. 508+07.4, 43.3 ft. LT of SR 728 Ramp C BL Date Drilled: 0	3/28	/06	-	1	to	-	08/29/0				
Depth	Elev.	Blows per 6"	Recovery (in)	Samp No.	ole	Hand Penetro- meter (Isf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: 7.0' (includes drilling water) DESCRIPTION	% Aggregate		W. Sand	% F. Sand	Silt	% Clay	Natu P	NDARD ral Moist L I—— Blows p 0 2	ure Cor er foot	ntent, % 	- •
30 —	675.7	E	4		1		Very dense brown and gray GRAVEL WITH SAND (A-1-b), trace silty clay; damp.											75
33.5	672.2	50/3	3	13	ļ		Soft gray SANDSTONE; decomposed, thinly bedded.											50+
-	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.											
45 -002712717 17217200 45 -002712717 50-0027127 50-0027127	665.7-						Bottom of Boring - 40.0'											
FILEY USE																		

Clie	ant. T	ranSys	tems	Inc				Project: SCI-823-0.00									Vo. C)1 <u>2</u> 1-	3070.	03
		F: Bor				L	ocation: Sta	. 10+93.5, 64.6 ft. LT of SR 728 CL Date Drilled: 09	/05/			_	to	0	9/06/0	06				
De	epth ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.	le		WATER OBSERVATIONS: Water seepage at: 7.5'-8.5' Water level at completion: 3.0' (prior to coring) 2.4' (includes drilling water)	% Aggregate	% C. Sand	and	% F. Sand	Silt	6 Clay	Natu P	ral Mo L I— Blow	isture ——-		RATIOI	- •
1	0-	706.4	BK	8	Ğ	P	(μω)		%	- %	22	22	6	m		10 Tiii	-20		<u> </u>	
). 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.							Q					
	5—	-703.4 -700.0	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.								Ç) 			
	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.) }				
	10 —		3 4 6	19	4	P-1	1.5	@ 8.5'-12.5', varved.	0	0	-	1	27	72		0		#		
	ــ ـــــاد،	693.4	2 5 6	18	5		1.0	Ou T (A 4h) like along come fine to coarse					ļ			Q.				
	15		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.] 	
W 1	-		9 10	14	7		-		7	11	ı	13	53	16				- 		
06 11:30 7	20 —		8 9	13	8		-	@ 21.0'-24.0', little to some gravel, little fine sand.									\Diamond			
11/26/20	- -		3 7 11	10	9		-							i,			4	, , , , , , , , , , , , , , , , , , ,	<i></i>	
		682.4	1	11	10			Soft gray SILTSTONE, highly weathered to decomposed.					1							50
FILE: 0121-3070	25.0— - - -	681.4	Core 60"		RQ0 65%	PR-	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'		1					1:::	<u>: : :</u>	::[:::		<u>: </u>

		•					D	LZ OHIO INC. * 6121 HUNTLEY ROAD, CO BUS, OHIO 43229 * (614)88	8-00	40					-			040		02
Client:	Trans	Syste	ems,	Inc.				Project: SCI-823-0.00								Job	No.	012	1-3070	1.03
LOG						L	ocation: Sta.	10+60.7, 62.5 ft. RT of SR 823 CL Date Drilled: 08	/30/						_	_				
Depth (ft)		v.	per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: 18.5'-20.0' Water level at completion: None (prior to coring) 6.5' (includes drilling water) DESCRIPTION	Aggregate	Sand		% F. Sand		Clay	Na	tural M PL ⊢	loistu	re Co	TRATIC ntent, % ——I	6 - • LL
	697	.6	Blows	8	Drive	Pre	(psi)	DESCRIPTION	%	%	%	%	8	%	:::	10	<u>20</u>	<u>, </u>	<u>30 </u>	40
0.9	696	.7-6	33 50/3	9	1			Topsoil - 11" Brown SANDSTONE fragments; slightly to moderately weathered.											,	55
—3.5— 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			0			32
] 		10	14	3		4.5		0	1	_		16	92	1 1 1 1			Ż,		.58
10 -	<u> </u> -		3 11 19	18	4		3.0		1				i	70) 	
—13. 5	 	1.1-	8 9 9 13	18	5		2.0	Dense brown SANDY SILT (A-4a), trace gravel; damp.	-								9		}	
15 · —16.0	68		14		7		1	Dense brown and gray GRAVEL WITH SAND (A-1-b), trace gravel; damp.					ļ							
18.5 20			9 14	18	8			Medium dense brown and gray COARSE AND FINE SAND (A-3a); wet.												
21.0	67	6. 6	13 22 28	18_	9			Very dense brown GRAVEL WITH SAND AND SILT (A-2-4); damp.												
23.5			50/4	4	10			Soft to medium hard gray SANDSTONE; very fine grained, decomposed. Soft to medium hard gray SILTSTONE interbedded with	1											50+
FILE: 0121-3	-	1	Core 60"	Rec 60"	RQI 73%	R-	1	SANDSTONE; highly weathered to decomposed, argillaceous, thinly bedded, highly fractured.									, , , , , , , , , , , , , , , , , , ,			
_30.0	, – 66	7.6			1			Bottom of Boring - 30.0'				_					<u>! ! !</u>		<u>:[::</u>	

_							Di	Z OHIO INC. * 6121 HUNTLEY ROAD, COL 305, OHIO 43229 * (614)88	, 00		_	_				let i	No. C	1121	3070	03
Cli	ent: Ti	ranSys	stems,	Inc.				Project: SC1-823-0.00	10.1							JOD I	vo. L	1 2 1-	3070.	-
			ring C			L	ocation: Sta.	22+01.0, 47.7 ft LT of SR 728 CL Date Drilled: 08	/31/			710	N 1							
D	epth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: 29.5'-35.0' Water level at completion: 42.6' (prior to coring) 10.6' (includes drilling water) DESCRIPTION	% Aggregate	Sand		% F. Sand		% Clay	Natu F	ıral Mo PL ⊢	isture 			- •
	0. 	715.9 -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	Q		•			
	5 —		6 7 9	18	2				28	12		13	32	15		}		4		
	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.												66
	10 —		3 4	15	4		2.0		0	0		1	3	96	بح 1			H	•	
	-		2 4 4	18	5		2.5								(5				
	15 —		1 2 2	18	6		1.5								Ó					
- F4	-		1 2 2	18	7		1.5								ڼ ا					
1006 2:19 PM)	20 —	1	3 3	18	8		1.5								\ \ 					
11/21/2006	-	1	' 2 3	18	9		1.5								Ó)				
FILE: 0121-3070-03 [1	25 —		WOH WOH	18	10	'	1.5					į		ŀ) 				
FILE: 013		-	3	18			-						į			2				
	-29.0- 30	686.9		18	12	^	1.25	Medium dense gray COARSE AND FINE SAND (A-3a).	L_			Д.		Щ.	1::	<u>: </u>		1111	: [] : :	<u>: ::</u>

DLZ OHIO INC. * 6121 HUNTLEY ROAD, COM US. OHIO 43229 * (614)888-0040 Job No. 0121-30-0.03 Project: SCI-823-0.00 Client: TranSystems, Inc. Date Drilled: 08/31/06 Location: Sta. 22+01.0, 47.7 ft LT of SR 728 CL LOG OF: Boring C-62 GRADATION WATER Sample Hand **OBSERVATIONS:** No. Water seepage at: 29.5'-35.0' Penetro-STANDARD PENETRATION (N) Water level at completion: 42.6' (prior to coring) (ii) meter % Aggregate 10.6' (includes drilling water) Natural Moisture Content, % -% C. Sand % M. Sand % F. Sand Sand Sand Core (tsf) / þ PL ----Point-Load % Clay Elev. % Sitt Depth Blows per foot -Strength Drive DESCRIPTION (psi) 685.9 Medium dense gray COARSE AND FINE SAND (A-3a); 30 contains organic material; moist to wet. 11 13 14 35 14 18 50+ 672.4 50/5 Severely weathered gray SANDSTONE. 15 -5" Soft to medium hard gray SILTSTONE interbedded with -45.0--| 670.9-SANDSTONE; highly weathered to decomposed. ROD R-1 Core Rec Soft to medium hard gray SILTSTONE; highly weathered to -668.6- 46" 58% decomposed, argillaceous, thinly bedded, highly fractured. @ 49.8'-49.9', clay seam. Bottom of Boring - 50.0' 50.0-665.9

Г	Client: T	ranSır	tome	Inc				Project: SCI-823-0.00								Jo	b No.	012	<u>21-3</u>	070.0	<u>ავ</u>	_
-	LOG O					7,	ocation: Sta	. 22+44.3, 47.7 ft. RT of SR 728 CL Date Drilled: 08	/30/	06			to	0	8/31.	06						4
	Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.	ole		WATER OBSERVATIONS: Water seepage at: 38.5'-39.0' Water level at completion: 42.2' (prior to corings) 7.7' (includes drilling water) DESCRIPTION	% Aggregate			% F. Sand		% Clay	Nat	ural l PL +	Moisti	ıre C	onte	ATION nt, % — LI	- •	•
	0 0. 8 -	723.9 -723.1-	6 7_8		1		3.5	Topsoil - 10" Very stiff light brown SILTY CLAY (A-6b), trace fine to coarse sand; contains roots; damp.	0	1			47				0					
	5 —		5 6 7	9_	2		3.5	@ 3.5'-5.0', mottled brown and gray.		 	, 						5					50
ŀ	6.0 	717.9	6 7	13	3		4.0	Stiff to very stiff brown and gray CLAY (A-7-6); moist.	0	0	_	0	9	91				H			 	20
	10	-	3 4 3	16	4	ļ	2.5									O						
	- - -	-	3 4		5		3.0 2.5	@ 13.5'-20.0', mottled brown and gray.								þ)		, ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;			
	15 — -	-	2 3	18	7		2.0	·														
6 11:30 AM }	20	- - -	2 2	5 18	8	ļ	2.5	@ 21.0'-30.0', gray.	C	0		0	3	97) -						70
11/28/200		-		3 18	9		1.0	@ 21.0-30.0, gray.								>						
FILE: 0121-3070-03	25 —	- - -	3	4 18	10		1.5						!)						
FILE: 01:	30	- - -	WOF WOR	3 18	11		1.0									5						

		(DI	Z OHIO INC. * 6121 HUNTLEY ROAD, CO BUS, OHIO 43229 * (614)88	8-00-	40	_					0404	30.0	
Client	Tra	anSvs	tems,	Inc.				Project: SCI-823-0.00						001044	Job No.	0121	·30-0.0	3
	_		ing C			L	ocation: Sta.	22+44.3, 47.7 ft. RT of SR 728 CL Date Drilled: 08	3/30/		2404		to	08/31/0)6			
Dept (ft)	h l	Elev. (ft) 693.9	Blows per 6"	Recovery (in)	Samp No.	le	Hand Penetro- meter (tsf) / * Point-Load	WATER OBSERVATIONS: Water seepage at: 38.5'-39.0' Water level at completion: 42.2' (prior to corings) 7.7' (includes drilling water) DESCRIPTION	% Aggregate	% C. Sand	% W. Sand	F. Sand	Sit	Natu ke O	ANDARD ral Moiste Blows p 10 20	ire Con	tent, % Li	•
35	1 1 1		2 3 3	18	13		1.5	Stiff gray CLAY (A-7-6); damp.										
I.	5-7	685.4 684.4	- A	18	14A 14B		2.0	Loose gray COARSE AND FINE SAND (A-3a); wet. Stiff to very stiff gray CLAY (A-7-6); damp.					<u>.</u>					
_ [_ ·-	.5-7	-680.4- -679.4-	10	18	15A 15B			Dense gray COARSE AND FINE SAND (A-3a); wet. Dense reddish brown and gray GRAVEL WITH SAND (A-1-b); damp. (Decomposed sandstone)) O	
1/2006	0 -		26 32 21	14	16							;						○53 →
۲I	i.0—	669.9	50/3 Core	3 Rec	17 RQ			Soft to medium hard gray SANDSTONE; very fine grained, highly weathered to decomposed, thin bedded, broken. @ 54.1'-54.6', decomposed argillaceous zone.										50+:(
50 - 50	-	-667.1 -664.9	60*	56"	839	% R	-1	Soft to medium hard gray SILTSTONE; fine grained, highly weathered to decomposed, argillaceous, thinly bedded, highly fractured. Bottom of Boring - 59.0'	,			1						
	30	<u> </u>			Ш.	_ _		Bottom of Bonna - 59.u		<u> </u>								

DI 7 OHIO INC * 6121 HUNTI EY ROAD UMBUS, OHIO 43229 * (614)888-0040

			•				D	LZ OHIO INC. * 6121 HUNTLEY ROAD LUMBUS, OHIO 43229 * (614)888	5-00-	40	_							40	2070	02	\neg
CI	lient: T	ranSy	stems,	Inc.				Project: SCI-823-0.00									lo. U	121-	3070	1.03	ᅴ
		F: Bo			-	7	ocation: Sta.	539+75.3, 37.2 ft. RT of SR 823 CL Date Drilled: 3/1	6/0	5			to	-3/	/17/0						\dashv
E	Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sam No	ple BvO/	Hand Penetro- meter (tsf) / * Point-Load	WATER OBSERVATIONS: Water seepage at: 23.5' Water level at completion: None (Prior to coring) 21.9' (Includes drilling water)	% Aggregate			% F. Sand		% Clay	Natu	ANDAF iral Mo PL I— Blow	isture	Con		LL	
	17	722.5	Blow	Rec	Drive	Press	(psi)	DESCRIPTION	8	%	%	%	8	%		10	20		0	40	
	-0.3 	-722.2-	1 3 3	18	1			Topsoil - 4" Stiff to very stiff light brown CLAY (A-7-6), some silt, trace fine sand; damp.							Q						
	5 —		3 4	18	2		2.5						i		Ċ						
	- - -	1	3 4 5	18	3		1.5	@ 6.0', 45° fractures.							(}					56
	10 —	-	2 3	18	4		2.0		0	0	-	1	20	79	Q				•		1
	- - -12 0	709.5	4 4 5	18	5		2.5	@ 11.0', gray.	_						(.] }					
	-13.0 - 15 	709.5	2 2 3	18	6	i	0.75	Medium stiff gray CLAY (A-7-6); moist.	}						/ ဝှ						
	-	- - -	2 2	18	7		0.75														
10:04 AM	20 —	-	WOH 2	18	8		0.5								O O						
11/6/2006	•	- - -	1 2		9		0.5								Ó						5
-3070-03 [25 —	-	WOH	18	10	,	0.5					0	14	86				1			-11-1
FILE: 0121-3070-03			1 2	18	1	1	0.5								Ò						
_	30	-	WOH	18	1:	2	0.5	@ 28.5', contains sandstone fragments.										•			

LUMBUS, OHIO 43229 * (614)888-0040

		,				_0	LZ OHIO INC. * 6121 HUNTLEY ROAD	-00	40									
Client:	ranSys	tems,	Inc.	_			Project: SCI-823-0.00								Job No.	0121	-3070	.03
LOG O				*	L	ocation: Sta	539+75.3, 37.2 ft. RT of SR 823 CL Date Drilled: 3/1	6/0				to	3.	<u>/17/05</u>	<u>-</u>			
Depth (ft)	Elev. (ft) 692.5	Blows per 6"	Recovery (in)	Samp No.	le		WATER OBSERVATIONS: Water seepage at: 23.5' Water level at completion: None (Prior to coring) 21.9' (Includes drilling water) DESCRIPTION	% Aggregate			% F. Sand	,	% Clay	Natui Pl	NDARD ral Moisti L Blows p	ure Cor	ntent, % 1 	- •
30 —	002.0	1 2 4 8 6 9	18	13		0.5 0.75	Medium stiff light brown CLAY (A-7-6); moist.							Ċ.) O			
35 — - -37.0— - - 40 —	685.5	7 8 15		15		2.5	Very stiff gray SILTY CLAY (A-6b), trace fine sand; damp to moist.	0	0	-	1	50	49			0,		
43.0 45	- - - -679.5-	50/5	5	16			Severely weathered gray SHALE.										<i>f</i>	
76/2006 10:04 AM 005	675.5	Core 120"	Rec 120"	RQI 91%	R ₁	1	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.											
55 - 57.0-							Bottom of Boring - 57.0'											

)				D	LZ OHIO INC. * 6121 HUNTLEY ROAD. UMBUS, OHIO 43229 * (614)88	10-UU	40					_	1	Ma	712		70.0	₹
G	lient: T	ranSys	stems	Inc.				Project: SCI-823-0.00	4 7 10							JOD	NO.	012	1-60	70.0	-
		F: Bo						539+22.5, 28.9 ft. LT of SR 823 CL Date Drilled: 3/	17/0 T		240	ATIC	N	一				-	—		一
	Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sam, No	/ Core	Hand Penetro- meter (tsf) / * Point-Load	WATER OBSERVATIONS: Water seepage at: 10.5'-30.5' Water level at completion: None (prior to coring) 10.1' (includes drilling water)	% Aggregate	Sand	Sand	Sand	Silt	Clay	Natu	iral M PL ⊢	loistui	re Co	ntent.	ΓΙΟΝ : ; % - ⊣ LL Ο	•
1	, ,	713.0	Blow	Rec	Drive	Press	(psi)	DESCRIPTION	<u>%</u>	%	% M.	%	%	%	 -	10	20		30	40	
-	-0.4 -	713.6 -712. 6			1		0.75	Topsoil - 5" POSSIBLE FILL: Medium stiff to stiff brown SANDY SILT (A-4a), some gravel, little clay; damp to moist.							ρ						
	- 5 	ļ	WOH 1 2	16	2				30	15	-	11	27	17	ļQ						
-	-5.Š - -	-707.5 -	3 3 4	18	3		2.5	Very stiff brown and gray CLAY (A-7-6); varved; moist.							\ }	}					66
	- 10 —	<u> </u> 	1 2	18	4		2.25		0	0	-	0	11	89	Ó		, i				1.00
	-	-	WOH 2	18	5		0.75	@ 11.0'-30.0', medium stiff, brownish gray.							0						ee
	15 —		WQH	18	6 1		0.75		0	0	-	0	10	90	Ö		i			•	1
	•		Woh	18	7		0.5								þ						
10:20 AM	20 -	_	WoH	2 18	8		0.5								þ					•	
11/6/2006		-	WOR 2	3 18	9		0.5								Ó						
0121-3070-03 (25 —	_	1 2	3 18	1 1 1 1	,	0.75														
FILE: 0121-3		-	1 2	3 18	1·	١	0.5								Ļ						
ฉ	30	-	3 3	4 18	1:	2	0.5													•	

	ranSys F: Bo		_		_		539+22.5, 28.9 ft. LT of SR 823 CL Date Drilled: 3	17/0		ADA	TION	ı				_			
epth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Samp No.		Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: 10.5'-30.5' Water level at completion: None (prior to coring) 10.1' (includes drilling water) DESCRIPTION	Aggregate	% C. Sand	M. Sand	% F. Sand	o Ollic	c Clay	Natu P	ral Mo L I Blow	isture			- •
 1_0.036 -	683.0 -683.0-	Blo	Rec	Drive	Pre	(psi)	Stiff gray and brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; varved; damp to moist.	%	%	8%	8 6	× ·	*	Υ	0	20	30	<u>, </u>	
35 —		2 3 6	18_	13		1.5		1	5		8 5	58 2	28		<u> </u>	• /			
 37.0	676.0						Severely weathered gray SHALE.	-									, ,	, ,	/
_	673.0-	12 38 50/4	16	14		!		4											50
45 —	-	Core 120"	Rec 120"	RQE 92%	R1		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. @ 45.9' to 48.2', light brown siltstone layer.												
-50.0 -		+-					Bottom of Boring - 50.0'												
55 																			

RUS OHIO 43229 * (614)888-0040

		(LZ OHIO INC. * 6121 HUNTLEY ROAD, CO BUS, OHIO 43229 * (614)88	8-00-	40						Job No	012	1.3	70.0	3
		ranSys				_		Project: SCI-823-0.00 537+97.9. 36.5 ft. RT of SR 823 CL Date Drilled: 6/8	2/0/		_					JOB NO	012	1-00	10.0	<u> </u>
L	<u>.OG O</u>	F: Bo	ring	TR-13		_	ocation: Sta		70-		RAD.	ATIC	N	П						
	Depth	Elev.	Blows per 6"	rery (in)	Sam No	Sore	Penetro- meter (tsf) / * Point-Load	WATER OBSERVATIONS: Water seepage at: 33.5'-35.0' Water level at completion: None (prior to coring) 28.6' (includes drilling water)	% Aggregate		% M. Sand			lay	Natu	ANDARD	ure Co	onten	t,% - → <i>LL</i>	•
	(ft)	(ft) 713.5	Blows	Recovery	Drive	Press/	Strength (psi)	DESCRIPTION	% A	%	%	% F	% S	%	;;;;	Blows	er foc 20	30 	<u>40</u>	<u>, </u>
\parallel	-0.5 -	- 713.0-	1 1 2	10	1		1.75	Stiff gray SANDY SILT (A-4a), some clay, trace gravel; moist.							Q					
	-3.0 - 5 <i>-</i>	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.							Q					
	- -		2 4 7	18	3		3.5	@ 6.0'-7.5', mottled brown and gray.				!			Ň	Ò				
-	-8.5 10	705.0	3 5	18	4		3.25	Stiff to very stiff mottled brown and gray CLAY (A-7-6), trace fine to coarse sand; moist.								Ċ				
	- -		3	18	5		2.25			ļ					,	<i>)</i>				
	15 		1 2	3 18	6		1.25								Ó					
- F	- - -		1 2	3 18	7		2.0	@ 16.0'-27.5', gray.							O					
11:30	20 —	1	1 2	2 18	8	ļ	1.5	@ 24.0' 22.5' modium stiff							Q 1					.5
11/28/2006			1 2	3 18	9		0.75	@ 21.0'-22.5', medium stiff.) (o	1	19	80	Ó					
FILE: 0121-3070-03	25 —	1	2 WOH	3 18	10)	1.0	@ 26.0', contains sand seams.												
FILE: 012			WOF 2	3 18			1.5								¢					
1	30		2	⊿ 18	13	۱ ۲	1.5		_1_			\perp			المنظر المساحدة	<u> </u>	<u>: L::</u>	<u>::[</u>	<u>::::</u>	<u>.:::</u>

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Cliente	TranSy	ctome	Inc				Project: SCI-823-0.00								Job No. C	121-	3070.03	
	OF: Bo		_	-	1	ocation: Sta	. 537+97.9, 36.5 ft. RT of SR 823 CL Date Drilled: 6/8	3/04										
Depth (ft)	Elev.	per 6"	Recovery (in)	Samp No.	le	Hand Penetro- meter (tsf) / * Point-Load Strength	WATER OBSERVATIONS: Water seepage at: 33.5'-35.0' Water level at completion: None (prior to coring) 28.6' (includes drilling water) DESCRIPTION	% Aggregate			% F. Sand		Clay	Natur PL	NDARD Plate Moisture	Conti	ent, % - —⊣ LL ○	2)
30.0_	683.5 7-683.5	Blows	Rec	Drive	Pre	(psi)	Very stiff to hard gray and brown SANDY SILT (A-4a), little clay, trace gravel; contains sandstone fragments; damp to moist.	8	%	8	%	%	%) 20	30) 40	
35 —	1 - - -	8 24 32	18	13		3.0		5	10		25	48	12		•		Non-P	lastro 56 →
4 0.0-	- - - - - - -	27 49 50/2	16	14		4.5+	Medium hard gray SILTSTONE; fissile. @40.0' - 44.9', core loss.											50+(
45 -	-	Core 120"		RQC 25%	R-	1	@46.6' - 46.8', clay seam. @47.8' - 50.0', broken to highly fractured with occasional clay seams.											
FILE: 0121-3070-03 (11/6/2006 10:	-						Bottom of Boring - 50.0°											
11.53																		

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Г	Client: T	ranSv	stems	, Inc.			<u>.</u>	Project: SCI-823-0.00							[Job No. (121-3070	.03
	LOG O		_			ı	ocation: Sta	. 537+32.3, 46.2 ft. LT of SR 823 CL Date Drilled: 6/4	4/04				to		5/7/04			
					Samp No.	ile		WATER OBSERVATIONS: Water seepage at: 33.5', 38.5' Water level at completion: 24.8' (Prior to coring)		G	RAD	ATIO	אכ ו		STA.	NDARO PI	ENETRATIO	N /N1
	Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)		s / Core	(tsf) / * Point-Load	8.9' (includes drilling water)	% Aggregate	C. Sand	% M. Sand	Sand	Silt	Clay	Natur Pl	al Moisture	e Content, % ——— L	- •
ı		713.6	Blow	Reco	Drive	Press	(psi)	DESCRIPTION	%	%	%	% 	% S	2 % C		Blows per 0 20		40
	0.3 	-713.3 -	2 3 5	18	1		2.25	Topsoil - 4" Very stiff brown and gray SILTY CLAY (A-6b), little fine to coarse sand; moist.							φ			
	5 		2 2 4	18	2		3.75		· •					į	Q			
	- -		2 4 6	18	3		2.75	@6.0' - 7.5', gray.							\ }			
-	8.5 10	705.1-	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.	9						/ 0			
	- -		3 4	18	5		2.25								þ			
	15 —		WOH	18	6	ST 1	1.0	@13.5', gray.	0	C	-	0	7	93	<i>ф</i>			65
	-		WOH 2	3 18	7		1.5								1			
120 Hall	- 20 	<u> </u>	1 2	3 18	8		1.25							ļ ļ	 - 			
11/6/2005	-	1	2	3 18	9		1.25					!			þ			
1 2.1-4.2	25 —	<u> </u> - -	2	3 18	10		1.5	@ 23.5', gray and brown.							Ò			
ZIER ATTI-BATA-	- - 		2 2	3 18	11		1.25											
	30	-	2 2	3 18	12		2.0	@ 28.5', contains sand seams.										<u>]</u> :

DLZ OHIO INC. * 6121 HUNTLEY RO

COLUMBUS, OHIO 43229 * (614)888-0040

Client:	FranS y	stems	, Inc.					Project: \$	SCI-823-0.0	00		, ,								Job No.	0121	-3070.	03
LOG	F: Bo	ring	TR-14				. 537+32.3, 4	6.2 ft. LT	of SR 823	CL	Date D	rilled: 6/4	4/04	,			to	6	/7/04			_	
		.9	(in)	Samp No	<u> </u>	Hand Penetro- meter	WATER OBSERVATION	wate		24.8' (Prior to					RADA		N		STA	NDARD	PENET	RATION	! (N)
Depth (ft)	Elev. (ft)	Blows per 6	Recovery	Drive	Press / Core	(tsf) / * Point-Load Strength (psi)			DESCRI	8.9' (includes d	drilling water)		% Aggregate	C. Sand	% M. Sand	F. Sand	Silt	Clay	Natur Pi	al Moist L ——— Blows p	ure Con	tent, % ——⊢ L	- •
30	683.6	,		0	a.		Stiff to very to coarse s	stiff gray and; varve	and brown	CLAY (A-7-	6), trace to li	ittle fine moist.		%	%	%	%	%		0 2			0
33.5 35 —	680.1-	14 28 40	18	13	:		Severely w	eathered (gray SILTS	TONE.)68.→
40 —		40 50/4	_12	14																			50+(
44.0 45	669.6	50/4	4	_ 15			Medium ha	ırd gray Sl	ILTSTONE;	; fissile.													50+(
- -		Core 60*	Rec 54"	RQD 72%	R-1					', clay seams in to highly fr								ļ					
50		Core 60*	Rec 56"	RQD 77%	R-2																		
54.0 55 —	659.6						@ 53.5'-53			oring - 54.0'													
-																							
60	}		1		1	<u> </u>		_												1 : : : !	•	:	



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	i					Results						
	i			ODOT Classification	7d (pcf)	γm (pcf)	e _o	Cc	Cr	p _c (tsf)	c (psf)	c' (psf)	0	Θ,	qu (tsf)
B-1213	P1	21-23	CIU, UNC	A-7-6	86.7	117.6		-	1		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		<u> </u>	-	-	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		-			<u> </u>
	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

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	<u>A-4a</u>
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								<u> </u>			
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 1	12	46	41	38	16	22	21	A-6b
B-1210	4.5-6.0	1	Ö	2	38	59	46	19	27	23	A-7-6
B-1210	11.0-12.5	Ö	0	1 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 1	5	21	73	52	19	33	22	A-7-6

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	Ö	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

Boring	Sample Depth	%Agg	%Coarse Sand	% Fine Sand	%Silt	% Clay	LL	PL	Pl	% 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	77	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

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	Ö	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 at											
C-22	6.0-7.5	0	Τ ο	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	ō	0	0	40	60	43	20	23	29	A-7-6
C-23	28.0-30.0	0	0	Ö	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	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

Boring	Sample Depth	%Agg	%Coarse Sand	% Fine Sand	%Silt	% Clay	LL	PL	Pl	% MC	ODOT Class
C-56	38.5-40.0		-	-	-					36	<u> </u>
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	***			-		<u> </u>			32	-
C-57	38.5-40.0			- 1						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	<u> </u>
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	o o	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-12	21.0-22.5	-	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	 	1 0	0	7	93	65	28	37	28	A-7-6



APPENDIX C

Stability Analyses

Portsmouth Bypass Lucasville-Minford Embankment Antaysis 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

3) Ramps A/B Analysis

Emb. Height(ft)	Condition	FS
12	Undrained	1.59
12	Drained	1.98

Max. Settlement=21.8 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

b) Drained Analysis

	Emb. Height at end of Stage(ft)	FS	Stage #	Critical pore water pressure head (ft)*
ł	32 ft	1.59	Stage 1-Drained	3 (above)
ł	45 ft	1.53	Stage 2-Drained	-2 (below)

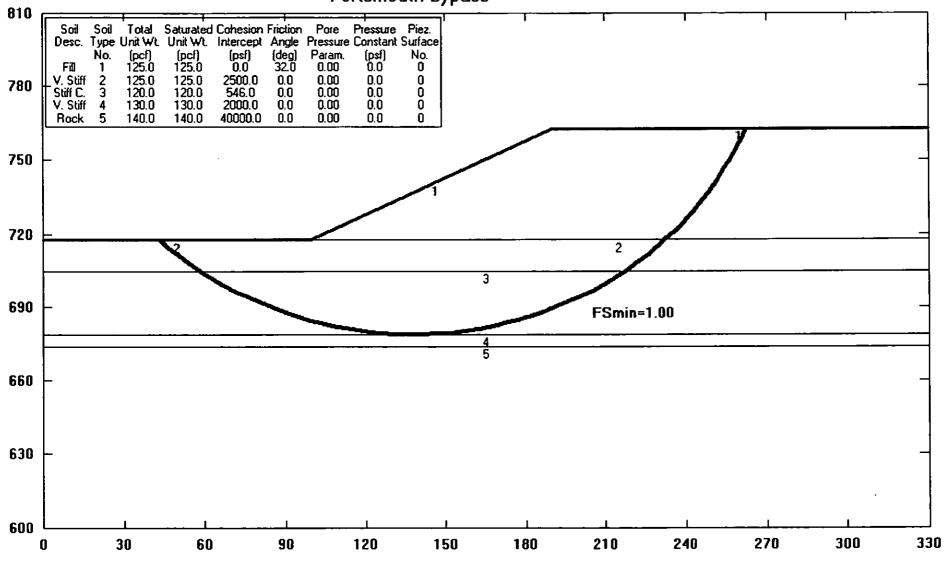
^{*} Head measured from the ground surface. Use ground surface for construction.

4) Ramps C/D Analysis

Emb. Height(ft)	Condition	FS
13	Undrained	1.85
13	Drained	2.07

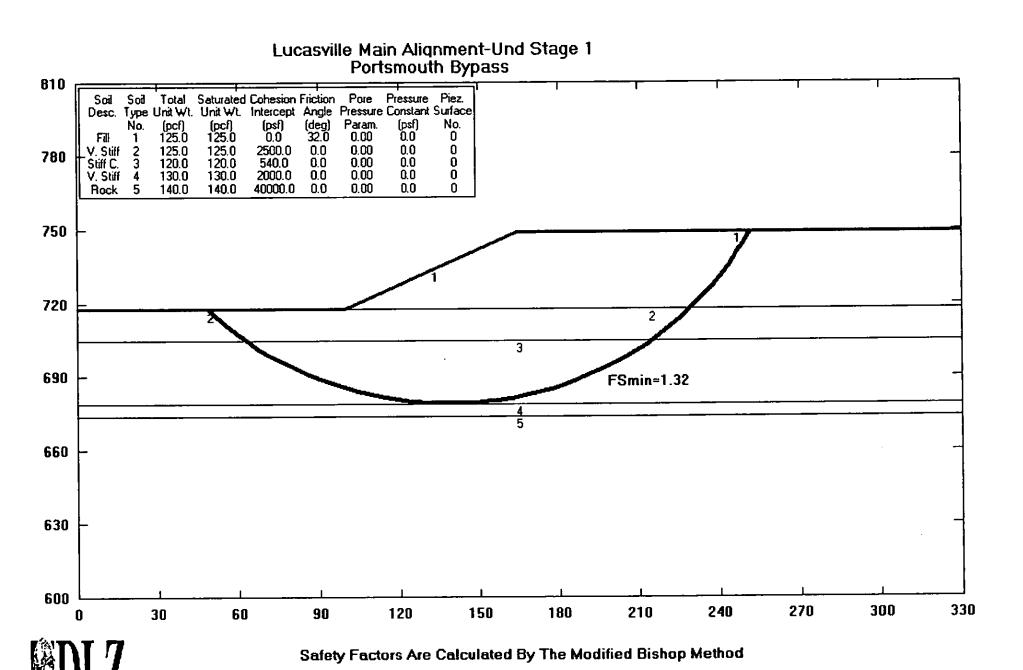
Max. Settlement=10.6 inches

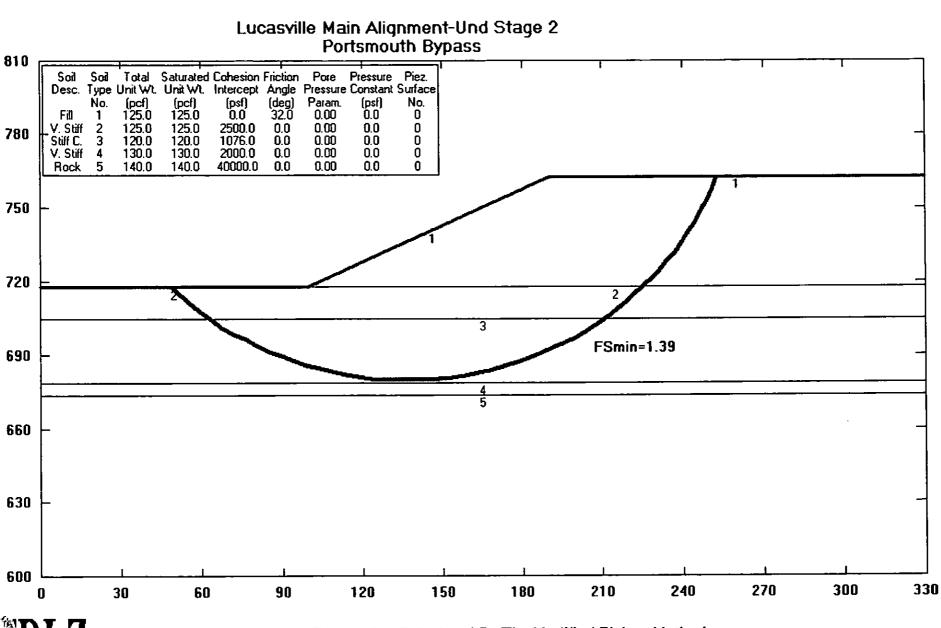
Lucasville Main Alignment-No Stage Const Portsmouth Bypass





Safety Factors Are Calculated By The Modified Bishop Method







Safety Factors Are Calculated By The Modified Bishop Method

Lucasville Main Alignment-Dra. No Stage **Portsmouth Bypass** 810 Saturated Cohesion Friction Pore Pressure Total Unit Wt. Intercept Angle Pressure Constant Desc. Type Unit Wt. Param. (psf) No. (pcf) (pcf) (psf) (deg) 32.0 0.00 0.0 WI 125.0 0.0 125.0 32.0 0.00 0.0 WI 780 V. Stiff 125.0 125.0 0.0 17.8 WI Stiff C. 120.0 120.0 317.0 0.00 0.0 32.0 0.00 0.0 WI 0.0 V. Stiff 130.0 130.0 W 40000.0 0.0 0.00 0.0 5 140.0 Rock 140.0 **750** FSmin=1.36 720 2 2 3 690 ▽ GWT 860 630 600 330 240 270 300 210 180 120 150 30 60 90 0

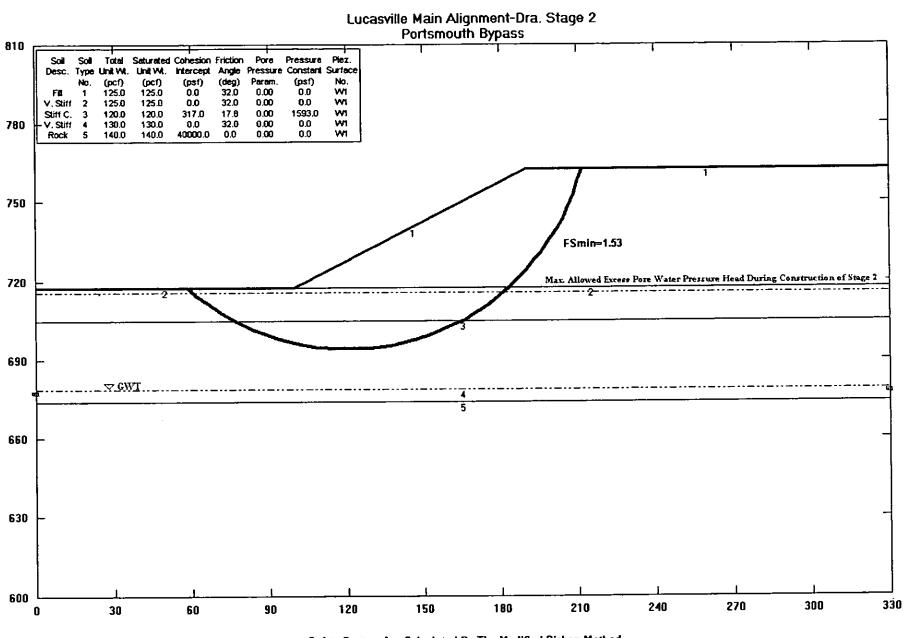


Safety Factors Are Calculated By The Modified Bishop Method

Lucasville Main Alignment-Dra. Stage 1 Portsmouth Bypass 810 Total Saturated Cohesion Friction Pore Pressure Piez. Intercept Angle Pressure Constant Surface Desc. Type Unit Wt. Unit Wt. (psf) (deg) 32.0 Peram. (pst) No. (pcf) (pcf) 0.00 0.0 WI 125.0 125.0 0.0 32.0 0.00 0.0 WI V. Stiff 125.0 125.0 0.0 Stiff C. 120.0 120.8 317.0 17.8 0.00 1994.0 W 780 V. Stiff 130.0 130.0 0.0 32.0 0.00 0.0 Wi 40000.0 0.00 0.0 WI 140.0 140.0 0.0 750 FSmin=1.59 Max. Allowed Excess Pore Water Pressure Head During Construction of Stage 1 720 690 660 630 600 270 300 330 120 150 180 210 240 60 38 90



Safety Factors Are Calculated By The Modified Bishop Method





Safety Factors Are Calculated By The Modified Bishop Method

Lucasville Ramp B-Undrained Portsmouth Bypass 860 Total Saturated Cohesion Friction Pore Pressure Piez. Soil Soil Desc. Type Unit Wt. Unit Wt. Intercept Angle Pressure Constant Surface (psf) 0.0 0.0 (deg) 32.0 (pcf) 125.0 (psf) 0.0 No. Param. No. (pcf) Fill 125.0 0.00 0 Stiff V. Stiff 0 121.0 426.0 0.00 121.0 0.0 830 Ŏ 0.0 0.00 0.0 128.0 128.0 2478.0 Stiff 125.0 125.0 1300.0 0.0 0.00 0.0 0.00 0.0 5 140.0 40000.0 0.0 Rock 140.0 800 770 740 2 2 FSmin=1.59 710 680 5



0

30

60

90

120

650

Safety Factors Are Calculated By The Modified Bishop Method

150

180

240

210

278

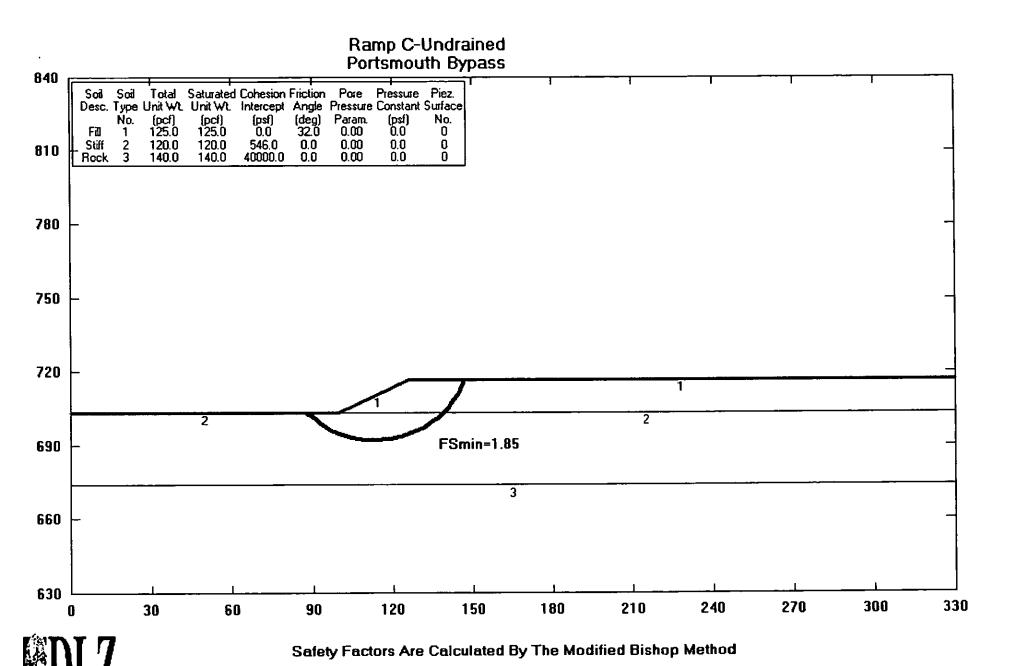
300

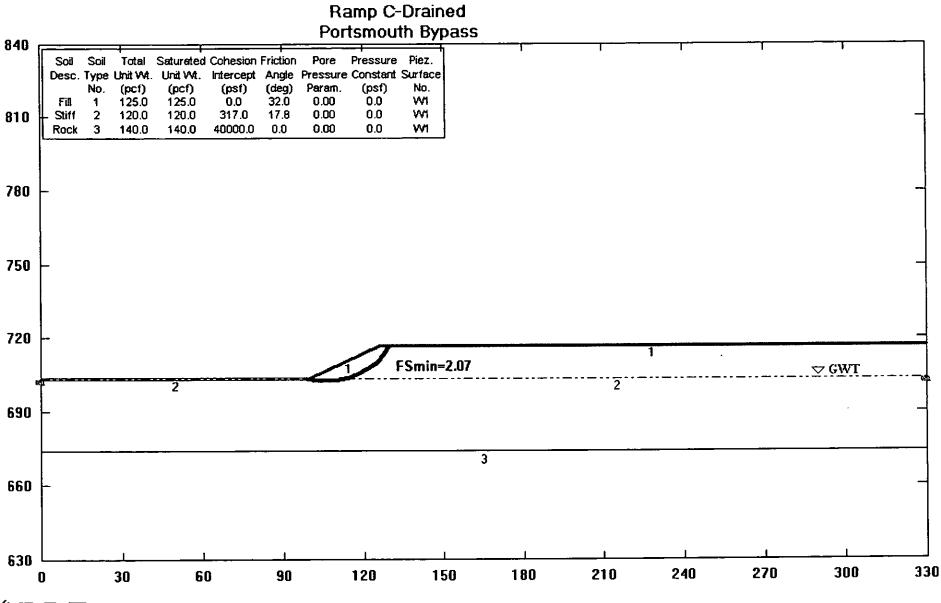
330

Lucasville Ramp B-Drained Portsmouth Bypass 830 Soil Soil Total Saturated Cohesion Friction Pore Desc. Type Unit Wt. Unit Wt. Intercept Angle Pressure Pressure Piez. Pressure Constant Surface (psf) 0.0 0.0 No. No. (pcf) (pcf) 125.0 (psf) 0.0 (deg) 32.0 Param. Fa 125.0 0.00 0 0.00 2 0 Stiff 121.0 121.0 289.0 11.7 0.0 V. Stiff Stiff 30.0 32.0 0 0.0 0.00 128.0 128.0 800 0.00 0.0 125.0 125.0 0.0 Õ 40000.0 0.0 Rock 5 140.0 140.0 770 740 FSmin=1.98 2 2 710 680 5 650 270 210 240 120 150 180 30 60 90 0



Safety Factors Are Calculated By The Modified Bishop Method







Safety Factors Are Calculated By The Modified Bishop Method



APPENDIX D

Settlement Analysis



Client Project Item

TranSystems, Inc. SCI-823-0.00

Lucasville-Minford / Main Road Emb. **Total Settlement**

JOB NUMBEI0121-3070.03

CHECKED BY DAA

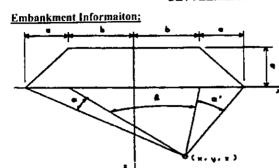
SHEET NO. COMP. BY

OF DATE DATE

ft

10/30/06 11/29/06

SETTLEMENT ANALYSIS - EMBANKMENT



38.5 Groundwater Table: D= 45

Embankment Height: 125 Fill Unit Weight:

q = 5,625 psf90 Width of Slope:

Top half-width of Emb: b = 130

Distance from CL:

45 **Output Range:**

*See Data output Attached

$$\sigma_{\mathbf{v}}(z) := \left(\frac{q}{\pi}\right) \left(a\left(\alpha(z) + \beta(z) + \alpha'(z)\right) + b\left(\alpha(z) + \alpha'(z)\right) + x\left(\alpha(z) - \alpha'(z)\right)\right)$$

$$\beta(z) := \operatorname{atan}\left[\frac{(b-x)}{z}\right] + \operatorname{atan}\left[\frac{(b+x)}{z}\right]$$

$$\alpha'(z) := \operatorname{atan}\left[\frac{(a+b-x)}{z}\right] - \operatorname{atan}\left[\frac{(b-x)}{z}\right]$$

$$\alpha'(z) := \operatorname{aten}\left[\frac{(a+b-x)}{z}\right] - \operatorname{aten}\left[\frac{(b-x)}{z}\right] \qquad \alpha(z) := \operatorname{aten}\left[\frac{(a+b+x)}{z}\right] - \operatorname{aten}\left[\frac{(b+x)}{z}\right]$$

Reference: US Army Corps of Engineers EM 1110-1-1904 "Settlement Analysis"

										(Johesionies:	5		
	Elevat	ion	Soil Propert	ios:	Stresses are cal	culated at mid-po	int of laver				Soils	C	ohesive So	oils
No		Bott.	Layer Bott.	14.35	Soil Type	g _{soil} (pcf)	s' c (psf)	s', (psf)	Dsz (psf)	s' _f (psf)	<u>C'</u>	C,	C _e	e _a
10	717.4		6.0	ft	Very Stiff Clay	125	1,780	375	5,625	6,000	0.0	0.10	0.27	0.790
		704.9	12.5	<u> </u>	Very Stiff Clay	125	1,780	1,156	5,625	6,781	0.0	0.10	0.27	0.790
			17.5	ft	Stiff Clay	120	10,800	1,863	5,623	7,486	0.0	0.16	0.37	1.124
<u> </u>	704.9		-		Stiff Clay	120	10.800	2,463	5,621	8,084		0.16	0.37	1.124
4			-	ft	Stiff Clay	120	10,800	3,063	5,617	8,680		0.16	0.37	1.124
5			_		Stiff Clay	120	10.800	3,663	5,612	9,275		0,16	0.37	1,124
_6		684.9	-	<u>-ft</u>	Stiff Clay	120	10,800	4,323	5,604	9,927		0,16	0.37	1.124
		678.9	_	<u>n</u> _		130	1.780	4,852	5,593	10,444		0.10	0.27	0.790
8	678.9	673.9	43.5	<u>ft</u> _	Very Stiff Clay		0	7,052	2,0,2					
9						0						-		
П)					. 0	0							-

Reference: Geotechnical Engineering Principles and Practices; Coduto, 1999

Overconsolidated Soils - Case I (s'0<s'c) Eqn:11.24

$$\left(\delta_{c}\right)_{ab} = \sum \frac{C_{r}}{1 + e_{0}} H \log \left(\frac{\sigma'_{f}}{\sigma'_{0}}\right)$$

Overconsolidated Soils - Case II (s'o<s'c<st) Eqn:11.25

$$\left(\delta_{c}\right)_{ab} = \sum \left[\frac{C_{r}}{1 + e_{0}} H \log \left(\frac{\sigma_{c}^{\prime}}{\sigma_{0}^{\prime}}\right) + \frac{C_{c}}{1 + e_{0}} H \log \left(\frac{\sigma_{f}^{\prime}}{\sigma_{c}^{\prime}}\right)\right]$$

Normally Consolidated Soils (S'0=S'c) Eqn: 11.23

$$\left(\delta_{c}\right)_{nh} = \sum \frac{C_{c}}{1 + e_{0}} H \log \left(\frac{\sigma'_{f}}{\sigma'_{0}}\right)$$

Cohesionless Soils (S'a=S',)

$$\left(\delta_{c}\right)_{alt} = \sum \frac{1}{C'} H \log \left(\frac{\sigma'_{f}}{\sigma'_{0}}\right)$$

No.	Settleme	nt:	Total Settlement
ı	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			



Client Project ltem

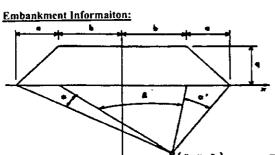
TranSystems, Inc. SCI-823-0.00 Lucasville-Minford / Ramp A/B Emb.

Total Settlement

SHEET NO. OF DATE COMP. BY WMA CHECKED BY DAA DATE

10/30/06 11/29/06

SETTLEMENT ANALYSIS - EMBANKMENT



48.0 ft Groundwater Table: 12 Embankment Height:

JOB NUMBEI0121-3070.03

1.500 psf Fill Unit Weight: 125

24 Width of Slope: Top half-width of Emb: b = 130

Distance from CL:

Output Range: z =

*See Data output Attached

$$\sigma_{\sqrt{z}}(z) := \left(\frac{q}{\pi} \frac{d}{d}\right) \left(a\left(\alpha(z) + \beta(z) + \alpha'(z)\right) + b\left(\alpha(z) + \alpha'(z)\right) + x\left(\alpha(z) - \alpha'(z)\right)\right)$$

$$\beta(z) := atan \left[\frac{(b-z)}{z} \right] + atan \left[\frac{(b+z)}{z} \right]$$

$$\alpha'(z) := \operatorname{atan} \left[\frac{(a+b-x)}{z} \right] - \operatorname{atan} \left[\frac{(b-x)}{z} \right]$$

$$\alpha'(z) := \operatorname{aten}\left[\frac{(a+b-x)}{z}\right] - \operatorname{aten}\left[\frac{(b-x)}{z}\right] \qquad \alpha(z) := \operatorname{aten}\left[\frac{(a+b+x)}{z}\right] - \operatorname{aten}\left[\frac{(b+x)}{z}\right]$$

Reference: US Army Corps of Engineers EM 1110-1-1904 "Settlement Analysis"

	Call Dans and	·	S	culated at mid-pa	int of lawer				Cohesionless Soils		hesive So	oils
Elevation No. Top Bott.	Soil Properti Layer Bott,	ies:	Soil Type	g _{soil} (pcf)	s' _c (psf)	s'o (psf)	Dsz (psf)	s' _f (psf)	C'	C _r	C _c	e,
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
710,0 703,0		ft	Stiff Clay	121	1.500	1,150	1,500	2,649	0.0	0.07	0.40	0.940
103.0 698.0	_	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	_	ft	Stiff Clay	125	1,500	2,526	1,498	4.024		0.05	0.54	0.940
5 693.0 688.0	_	n	Stiff Clay	125	1.500	3,151	1,497	4,647		0.05	0.54	0.940
6 688.0 683.0		ft	Stiff Clay	125	1.500	3,776	1,494	5,270		0.05	0.54	0.940
7 683.0 678.0	_	ft	Stitl Clay	125	1.500	4,401	1,491	5,891		0.05	0.54	0.940
8 678.0 671.0	_	ft	Stiff Clay	125	1.500	5,151	1,486	6,636		0.05	0.54	0.940
9				0	0							
10				()	0							_

No.	Settleme	nt:	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

$$\left(\delta_{c}\right)_{ut} = \sum \frac{C_{r}}{1 + e_{0}} H \log \left(\frac{\sigma'_{f}}{\sigma'_{0}}\right)$$

$$\left(\delta_{i\cdot}\right)_{ab} = \sum \left[\frac{C_r}{1 + e_n} H \log \left(\frac{\sigma_{i\cdot}}{\sigma_{i\cdot}}\right) + \frac{C_r}{1 + e_n} H \log \left(\frac{\sigma_{i\cdot}}{\sigma_{i\cdot}}\right)\right]$$

Normally Consolidated Soils (S'0=S'c) Eqn: 11.23

$$\left(\delta_{c}\right)_{uh} = \sum \frac{C_{c}}{1 + e_{0}} H \log \left(\frac{\sigma'_{f}}{\sigma'_{0}}\right)$$

Cohesionless Soils (8'n=8',)

$$\left(\delta_{c}\right)_{olt} = \sum \frac{1}{C'} H \log \left(\frac{\sigma'_{f}}{\sigma'_{0}}\right)$$



Client Project Item

TranSystems, Inc.

SCI-823-0.00 Lucasville-Minford / Ramps C/D Emb.

Total Settlement

JOB NUMBEI0121-3070.03

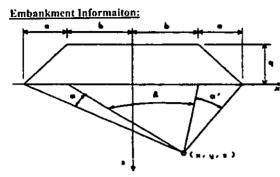
CHECKED BY DAA

SHEET NO. DATE COMP. BY

10/30/06

1,625 psf

SETTLEMENT ANALYSIS - EMBANKMENT



38.5 Groundwater Table: D=

13 Embankment Height: 125 Fill Unit Weight:

Width of Slope: 26

Top half-width of Emb: b= 130

Distance from CL:

Output Range: 35

*See Data output Attached

$$\sigma_{\mathbf{v}}(\mathbf{z}) := \left(\frac{\mathbf{q}}{\pi \mathbf{a}}\right) \left(\mathbf{a} \cdot (\alpha(\mathbf{z}) + \beta(\mathbf{z}) + \alpha'(\mathbf{z})) + \mathbf{b} \cdot (\alpha(\mathbf{z}) + \alpha'(\mathbf{z})) + \mathbf{x} \cdot (\alpha(\mathbf{z}) - \alpha'(\mathbf{z}))\right)$$

$$\beta(z) := \operatorname{atan}\left[\frac{(b-x)}{z}\right] + \operatorname{atan}\left[\frac{(b+x)}{z}\right]$$

$$\alpha'(z) := \operatorname{aten}\left[\frac{(a+b-x)}{z}\right] - \operatorname{aten}\left[\frac{(b-x)}{z}\right]$$

$$\alpha'(z) := \operatorname{atan}\left[\frac{(a+b-x)}{z}\right] - \operatorname{atan}\left[\frac{(b-x)}{z}\right] \qquad \alpha(z) := \operatorname{atan}\left[\frac{(a+b+x)}{z}\right] - \operatorname{atan}\left[\frac{(b+x)}{z}\right]$$

DATE

Reference: US Army Corps of Engineers EM 1110-1-1904 "Settlement Analysis"

Stresses are culc	ulated at mid-poin								
		n oj iaver				Soils	Cc	ohesive So	ils
Soil Type	g _{soil} (pcf)	s'c (psf)	s', (psf)	Dsz (psf)	s' _f (psf)	C'	C _r	. C _e	e _o
Stiff Clay	120	10,800	300	1,625	1,925	0.0	0.16	0.37	1.124
Stiff Clay	120	10,800	900	1,625	2,525	0.0	0.16	0.37	1.245
Stiff Clay	120	10,800	1,500	1,625	3,125	0.0	0.16	0.37	1.124
Stiff Clay	120	10,800	2,100	1,624	3,724		0.16	0.37	1.124
	120	10,800	2,682	1,623	4,305		0.16	0.37	1,124
	130	1,780	3,289	1,621	4,910		0.10	0.27	0.790
	Stiff Clay Very Stiff Clay	Stiff Clay 120	Stiff Clay 120 10,800	Stiff Clay 120 10,800 2,682	Stiff Clay 120 10,800 2,682 1,623	Stiff Clay 120 10,800 2,682 1,623 4,305	Stiff Clay 120 10,800 2,682 1,623 4,305	Stiff Clay 120 10,800 2,682 1,623 4,305 0,16	Stiff Clay 120 10,800 2,682 1,623 4,305 0.16 0.37

9

10

Reference: Geotechnical Engineering Principles and Practices: Coduto, 1999

Overconsolidated Soils - Case I (s'0<s'c) Eqn:11.24

$$(\delta_c)_{ab} = \sum \frac{C_r}{1 + e_0} H \log \left(\frac{\sigma_f'}{\sigma_0'} \right)$$

Overconsolidated Soils - Case II (s'0<s'c<sf) Eqn:11.25

$$(\delta_c)_{uh} = \sum \left[\frac{C_r}{1 + e_0} H \log \left(\frac{\sigma_c^i}{\sigma_0^i} \right) + \frac{C_r}{1 + e_0} H \log \left(\frac{\sigma_t^i}{\sigma_c^i} \right) \right]$$

Normally Consolidated Soils (S'0=S'c) Eqn: 11.23

$$\left(\delta_{c}\right)_{ab} = \sum \frac{C_{c}}{1 + e_{0}} H \log \left(\frac{\sigma'_{f}}{\sigma'_{0}}\right)$$

Cohesionless Soils (S'n=S',)

$$(\delta_c)_{ab} = \sum \frac{1}{C'} H \log \left(\frac{\sigma'_f}{\sigma'_o} \right)$$

No.	Settleme	nt:	Total Settlement
ı	0.304	ſt	
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			



Client Project Item

TranSystems, Inc. SCI-823-0.00 Lucasville-Minford / Main Road Embankment

SHEET NO. COMP. BY

CHECKED BY

JOB NUMBER 0121-3070.03

DAA

OF

DATE

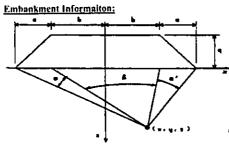
DATE

4,000 psf

10/30/06 1/29/06

STAGE CONSTRUCTION ANALYSIS - EMBANKMENT- Total Stress Analysis

STAGE 1 (Undrained)



Groundwater Table: 32 ft Embankment Height: Fill Unit Weight: 125

Width of Slope:

Top half-width of Emb: b = Distance from CL:

Output Range:

 $\sigma_{\sqrt{z}}(z) := \left(\frac{q}{z}\right) \left(e(\alpha(z) + \beta(z) + \alpha'(z)) + b(\alpha(z) + \alpha'(z)) + x(\alpha(z) - \alpha'(z))\right)$

Stage Settlement= 17

$$\beta(z) := \operatorname{atan} \left[\frac{(b-x)}{z} \right] + \operatorname{atan} \left[\frac{(b+x)}{z} \right]$$

$$\alpha'(z) := \operatorname{aten} \left[\frac{(a+b-z)}{z} \right] - \operatorname{aten} \left[\frac{(b-z)}{z} \right]$$

$$\alpha(z) := \operatorname{aten}\left[\frac{(a+b+x)}{z}\right] - \operatorname{aten}\left[\frac{(b+x)}{z}\right]$$

Reference: US Army Corps of Engineers EM 1110-2-1902 "Slope Stability"

Wick Drains: fl²/day 5 E-05 in /sec (0.030) 60 days 0.16 year consolidation time 60 days 38.50 ft H= S= 3 ft Spacing T≠tCv/H2 diameter of wick drain influence zone (Rectangular D=1.13S; Triangular D=1.05S) 0.00 D= 3.15 n Vertical Average Degree of Consolidation 0.04 0,03 ft²/day horizontal drainage coefficient Need Wick Drains to accelerate the settlement width of drain (Assume for 4" wide x1/4" thick) in thickness of drain (Assume for 4" wide x1/4" thick) 0.25 in equivalent diameter

0.55 Total Average Degree of Consolidation U=1-(1-U₁)(1-U_h)

Total Settlement = 30 (See Settlement Calculation Sheet)

546 $C_{\mu\nu} = C_{\mu\nu} + (U_{avg})(\Delta\sigma_r)(\tan\phi_{cons})$

Horizontal Average Degree of Consolidation

13.5

0.23

0.54

	Elevat	ion	Soil Proper	ies;	Stresses are cul	culated at mid-poin	u of layer			Change in Strength
No.	Тор	Bott.	Layer Bott.		Soil Type	g _{wil} (pcf)	s', (psf)	Dsz (psf)	s ' (psf)	Unce ocon Con
1	717,1	711,4	6.0	ft	Very Stiff Clay	125	375	4,000	4,375	
ī	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	A	Stiff Clay	120	2,463	3,975	6,437	0.55 13.5 1075
5	694,9	689,9	27.5	fl	Stiff Clay	120	3,063	3,953	7,015	0.55 13.5 1072
6	689.9	684.9	32.5	fl	Stiff Clay	120	3,663	3,923	7,585	0.55 13.5 1068
7	684.9	678.9	38.5	R	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				

ing 5 ∞, 1 m		•	
850	1 B		' <i>I</i>
4	•	1 /	
_			

Client Project ltem

TranSystems, Inc. SCI-823-0.00

Lucasville-Minford / Main Road Embankment STAGE 1 (Drained)

JOB NUMBE 0121-3070.03 SHEET NO.

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10/30/06 129/06

ft²/day

4,000 psf

(0.030)

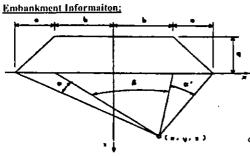
T=(Cv/H2

Need Wick Drains to accelerate the settlement

0.22 year

Vertical Average Degree of Consolidation

STAGE CONSTRUCTION ANALYSIS - EMBANKMENT- Effective Stress Analysis



Groundwater Table:

Embankment Height: H= 32 fi pcf

Fill Unit Weight: 125 Width of Slope:

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Top half-width of Emb: b =

Distance from CL:

Output Range: z =

$$\sigma_{\gamma}(z) := \left(\frac{q}{q}\right) \left(a \cdot (\alpha(z) + \beta(z) + \alpha'(z)) + b \cdot (\alpha(z) + \alpha'(z)) + z \cdot (\alpha(z) - \alpha'(z))\right)$$

$$\beta(z) := atan \left[\frac{(b-x)}{z} \right] + atan \left[\frac{(b+x)}{z} \right]$$

$$\alpha'(z) := atan \left[\frac{(a+b-x)}{z} \right] - atan \left[\frac{(b-x)}{z} \right]$$

$$\alpha(z) := \operatorname{aten}\left[\frac{(a+b+x)}{z}\right] - \operatorname{aten}\left[\frac{(b+x)}{z}\right]$$

5.E-05 in²/sec

days

80

38.50 fì

0.00

0.05

H=

U.=

Reference: US Army Corps of Engineers EM 1110-2-1902 "Slope Stability"

Wick Drains:

$$\ln\left(\frac{1}{1-\overline{U}_A}\right) = \left(\frac{t}{D^2/8c_A}\right) \ln\frac{D}{d_A} = 0.75$$

consolidation time days

3 ft Spacing SE

diameter of wick drain influence zone (Rectangular D=1.13S; Triangular D=1.05S) Ħ

0.03 ft /day horizontal drainage coefficient

width of drain (Assume for 4" wide x 1/4" thick) in

thickness of drain (Assume for 4" wide x1/4" thick) 0.25 in h=

equivalent diameter 0.23 ft

Horizontal Average Degree of Consolidation U_b=

Total Average Degree of Consolidation U=1-(1-U₁)(1-U_h) U_{nvp}= 0.66

фсо≖ 17.8

> 9,69 K_o=1-sin¢_{CD}

₿= 1,00 Pore pressure parameter $\Delta u_p = B[(1+2K_0/3]\Delta\sigma_z(1-U_{avg})]$

(Excess pore water pressure)

1	Elevat	ion	Soil Propert	ties:	Stresses are cal	culated at mid-poin	t of layer				
No.	Тор	Bott.	Layer Bott.		Soil Type	g _{soil} (pcf)	s', (pst)	Dsz (psf)	s' _f (psf)	Ս _{ույլ} ф _{СD}	Δu _p (psf)
Π	717.4	711,4	6.0	tì	Very Stiff Clay	125	375	4,000	4,375		
ī	711.4	704.9	12.5	fì	Very Stiff Clay	125	1,156	3,999	5,155		
2	704,9	699,9	17.5	fì	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		

10

0

1994 Avg.

Total Settlement= 30

(See Settlement Calculation Sheet)

Stage Settlement= 20

D	LZ
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SCI-823-0.00

Lucasville-Minford / Main Road Embankment STAGE 2 (Drained) JOB NUMBE 0121-3070.03 SHEET NO. 1

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11/29/06

5.625 psf

(0.030)

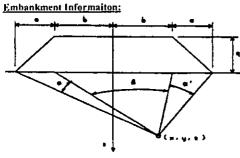
T≒tCv/H²

0.34 year

Vertical Average Degree of Consolidation

ft²/day

STAGE CONSTRUCTION ANALYSIS - EMBANKMENT- Effective Stress Analysis



Groundwater Table: D= 3 Embankment Height: H =

Embankment Height: H = 45 ft Fill Unit Weight: $\gamma_{cmb} = 125$ pcf

Width of Slope: a = 90

Top half-width of Emb: b = 65Distance from CL: x = 0

Output Range: z = 0 to 45

*See Data output Attached

$$\sigma_{\sqrt{z}} := \left(\frac{q}{\pi e}\right) \left(e\left(\alpha(z) + \beta(z) + \alpha'(z)\right) + b\left(\alpha(z) + \alpha'(z)\right) + x\left(\alpha(z) - \alpha'(z)\right)\right)$$

H≠

U,=

$$\beta(z) := atan \left[\frac{(b-x)}{z} \right] + atan \left[\frac{(b+x)}{z} \right]$$

$$\alpha'(z) := \operatorname{atan} \left[\frac{(a+b-x)}{x} \right] - \operatorname{atan} \left[\frac{(b-x)}{x} \right]$$

$$\alpha(z) := aten \left[\frac{(a+b+x)}{z} \right] - aten \left[\frac{(b+x)}{z} \right]$$

5.E-05 in²/sec

days

Need Wick Drains to accelerate the settlement

123

38,50

0.00

0.06

Reference: US Army Corps of Engineers EM 1110-2-1902 "Slope Stability"

Wick Drains:

$$\ln\left(\frac{1}{1-\overline{U}_{\star}}\right) = \left(\frac{\ell}{D^2/8c_{\star}}\right) \ln\frac{D}{d_{\star}} = 0.75$$

 $(1-\overline{U_*}) = (D^2/8c_*) (-\overline{U_*})$ consolidation time

123 days consolid 3 ft Spacing

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 ft³/day horizontal drainage coefficient

a= 4 in width of drain (Assume for 4" wide x 1/4" thick)
b= 0.25 in thickness of drain (Assume for 4" wide x 1/4" thick)

d_a= 0.23 ft equivalent diameter

U_h= 0.79 Horizontal Average Degree of Consolidation

 $U_{ava} = 0.80$ Total Average Degree of Consolidation $U=1-(1-U_v)(1-U_h)$

φ_{CD}= 17.8

K₀= 0.69 K₀=1-sinφ_{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)

Elevation	Soil Properties:	Stresses are	calculated	l at mid-point	of layer
		C. H. T.	_	· 65	

No. To	op t	Bott.	Layer Bott.		Soil Type	g _{snit} (pct)	S' _o (psf)	DSZ (pst)	S'(pst)	$U_{avg} \Phi_{CD}$	7n ^b (bst)
1 713	7.4	711.4	6.0	ft	Very Stiff Clay	125	375	5,625	6,000		
1 71	1.4	704.9	12.5	fì	Very Stiff Clay	125	1,156	5,623	6,779		
2 70-	1,9	699,9	17.5	ft	Stiff Clay	120	1,863	5,617	7,479	0.80 17.8	1603
4 699	9,9	694,9	22.5	fì	Stiff Clay	120	2,463	5,606	8.069	0.80 17.8	1599
5 (594	4.9	689.9	27.5	ft	Stiff Clay	120	3,063	5,589	8,652	0.80 17.8	1595
6 689	9.9	684,9	32.5	fì	Stiff Clay	120	3,663	5,566	9,228	0.80 17.8	1588
7 68-	4,9	678.9	38.5	ft	Stiff Clay	120	4,323	5,532	9,855	0.80 17.8	1578
8 678	8,9	673.9	43.5	ft	Very Stiff Clay	130	4,852	5,486	10,338		
_									·		

9

0

Avg 1593

Total Settlement= 30 inches

(See Settlement Calculation Sheet)

Stage Settlement= 24 inche

②D	LZ
----	----

Client Project Item

TranSystems, Inc. SCI-823-0.00 Lucasville-Minford / Ramps A/B JOB NUMBER SHEET NO. COMP. BY WMA CHECKED BY

0121-3070.03

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WICK DRAINS ANALYSIS

NO Wick Drains.

in /sec (0.030) ft²/day 5.E-05 C'= 112 days 0.31 year H≃ 13.00 T=tCv/H2 0.02 T=

Need Wick Drains to accelerate the settlement

Wick Drains Only:

0.159

U,=

Vertical Average Degree of Consolidation

112 days consolidation time

N Spacing 3

3.15 ft diameter of wick drain influence zone (Rectangular D=1.13S; Triangular D=1.05S)

0.03 ft2/day horizontal drainage coefficient

width of drain (Assume for 4" wide x1/4" thick) thickness of drain (Assume for 4" wide x1/4" thick) 0.25 in

0.23 R equivalent diameter

0.76 Horizontal Average Degree of Consolidation U_h=

U_{sig} = 0.800 Total Average Degree of Consolidation U=1-(1-U_s)(1-U_h)

Total Settlement= 22 inchestlement Calculation Sheet)

Settlement at U ing = 17

17

Client Project

Item

TranSystems, Inc. SCI-823-0.00 Lucasville-Minford / Ramps C/D JOB NUMBER 0121-3070.03 SHEET NO.

COMP. BY

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OF WMA DATE

DATE

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11/01/06 11/29/06

WICK DRAINS ANALYSIS

NO Wick Drains:

in²/sec 5.E-05

(0.030) fl²/day

120 days

0.33 year

H≃ 24.00 ft T≃

C,=

T=tCv/H2

0.01

0,089 U,=

Vertical Average Degree of Consolidation

Need Wick Drains to accelerate the settlement

Wick Drains Only:

$$\ln\left(\frac{1}{1-t\overline{U}_k}\right) = \left(\frac{t}{D^2/8c_k}\right) \ln\frac{D}{d_k} = 0.75$$

120 days

consolidation time

3 fì Spacing

D= 3.15 ft

diameter of wick drain influence zone (Rectangular D=1.13S; Triangular D=1.05S)

0.03

ft2/day horizontal drainage coefficient

4

width of drain (Assume for 4" wide x1/4" thick) thickness of drain (Assume for 4" wide x1/4" thick)

0.25 in 0.23 ft

equivalent diameter

U_I= 0.785 Horizontal Average Degree of Consolidation

U_{avg}= 0.80 Total Average Degree of Consolidation U=1-(1-U₁)(1-U_h)

Total Settlement= 11

inchestlement Calculation Sheet)

Settlement at U mg = 8.5



APPENDIX E

Instrumentation Details



0 0 0 0 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 BY THE CONTRACTOR 9 Ø 7. ġ, 'n 4 ج N 2. THE SAND SHALL CONSIST OF CLEAN, FREE-DRAINING, COARSE NATURAL SAND, OR SAND AND PEA GRAVEL, SHALL BE GRADED UNIFORMLY FROM COARSE TO FINE, AND SHALL BE OF SUCH SIZE THAT, WHEN TESTING ON U.S. STANDARD SIEVES IN ACCORDANCE WITH AASHTO T27 AND WASHING THE SAMPLE IN ACCORDANCE WITH AASHTO T11, SHALL CONFORM TO THE GRADING REQUIREMENTS OF ODOT CMS 703.02. 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. VIBRATING WIRE PIEZOMETERS SHALL SLOPE INDICATOR MODEL 52611099 OR EQUIVALENT. 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. 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. 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. SETTLEMENT PLATES SHALL MODEL 4600 OR EQUIVALENT. THE SAND SHALL NOT CONTAIN ANY ORGANIC OR OTHER DELETERIOUS MATERIALS AND SHALL NOT BE FROZEN WHEN PLACED. PLACE 3 FEET OF ODOT ITEM 703.02 EMBANKMENT BEFORE THE INSTALLAT, OF THE WICK DRAIN WICK DRAINS TO INSTALLED PRIOR TO EMBANKMENT CONSTRUCTION. NOTES BE GEOKON BE ВE WICK DRAIN FIELD TRENCH FOR CABLE
WITH NATURAL SAND
BACKFILL (ODOT Item
703.02) EXISTING GRADE SEE TABLE DEPTHS TYPICAL LAYOUT-PLAN VIEW DETAIL VIBRATING WIRE SIGNAL FOR WICK DRAIN SPACING (NOT TO SCALE) */ FT SEE VIBRATING WIRE PIEZOMETER \sim SETTLEMENT PLATE DETAIL *****5 FTPIEZOMETER (TYPICAL) BENTONITE PELLETS BACKFILL TO GROUND SOIL CUTTINGS FROM BENTONITE 70 CABLEREADING Бo TUBING EXISTING STATION TRENCH FOR AND TUBING (NOT TO SCALE) SETTLEMEN SURFACE WI BORING AND SETTLEMEN: PLATE GRADE DETAIL DETAIL "B" CAB CNOT ITH ш TO SCALE) CABLE AND TUBING LIQUID SETTLEMENT-RESEVOIR AT READING STATION DETAIL NATURAL SAND BACKFILL (ODOT_Item 703.02) TRENCH I FT DEEP, I FT WIDE, BACKFILLED WITH NATURAL SAND (ODOT Item 703.02) SETTLEMENT TRANSDUCER -EXISTING GRADE 2 FT INSTRUMENTATION **DETAILS WMA EDLZ** SCI-823-6.81 INTERCHANGE LUCASVILLE-MINFORD



APPENDIX F

Geotechnical Design Checklists

III.A. Centerline Cuts Checklist

	1———		
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		
♥ N X 1	Does drilling provide continuous stratigraphic sections for the range of elevations that represent proposed cut slope areas?	
Ý N X 2	Do the cut slopes have a minimum stability F.S. of 1.30 and are not steeper than 2:1?	Cut in similar soils at Shumway Hollow Interchange is stable
	Check stability calculation method used:	
	STABL or equivalent software	
	□ hand calculations	
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 🛞 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⊗	a Did the design consider the construction or long term ramifications of cutting below the water table?	
Y N 🏵	b Did the design consider additional drainage in the cut slope (springs / seeps) and roadway base?	
Rock Slopes		
	For rockfall and additional design considerations	s, see the "Rockfall Corrections Checklist."
⊗ 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.
⊗ N X 8	Have the slope angles, benching scheme, rockfall catchment design, and drainage controls been determined as prescribed in GB 3?	
У и х э	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

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:

C-R-S: SCI-823-6.81 PID: 19415 Reviewer: Dorothy Adams Date: 11-29-06

Settlen	nen	t	
Øи	X	1	If soil conditions and project requirements warrant, have settlement issues been addressed?
Ì			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
Ϋ́ν	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
(V) 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?
YN	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?
Øи	X	6	If total settlement or time of consolidation is unacceptable, have the stations and lateral extent of the problem areas been defined?
Ϋ́Ν	Х	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:

	Ϋ́ν	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)?	
	YN) X	9	Has an economic analysis been performed to evaluate the cost benefits of the recommended solution compared to others?	
	Øи	X	10	Have all necessary notes, specifications, and details for the chosen solution been determined?	
	Øи	X	11	Have the need, locations, type, plan notes, and reading schedule for settlement platforms been determined?	
	VМ	X	12	Have the effects of the predicted settlement and the chosen solution been determined and accounted for on the construction schedule?	
:	Ϋ́ν	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:

Stability		-	
Ŷn x	14	If soil conditions and project requirements warrant, have stability issues been addressed?	
		If not applicable (X), go to Question 27	
(ΨN 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	
YNX	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
(V) N X	17	Have calculations been performed to determine the F.S. for stability?	selected are as follows; Total and Effective: cohesion = 0, friction angle = 35 degrees. Please refer to section 5.4.1 in
		Check method used:	the report for more information.
		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:	
(∀N X		a 1.30 for short term condition	
(Y) N X		b 1.30 for long term condition	
Y N 🛞		c 1.10 for rapid drawdown, flood condition	
Y N 🛞		d 1.50 for embankment supporting bridge abutments (not on deep foundations)	
⊗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?	
Ŷnx	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	

1				□ 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:
(X)	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?
()	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?
8	N	X	26	If piezometers will be used, has the critical pressure value been determined and the appropriate information included in the plans?
8	N	X	27	Have the effects of the stability solution been determined and accounted for on the construction schedule?
8	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:

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Y	N ($\overline{\otimes}$	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 <u>Geotechnical Bulletin 2:</u> <u>Special Benching and Sidehill Embankment Fills</u> (GB 2), have sidehill fills been evaluated to determine if special benching or shear keys are needed?	
į			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
Y	N	X		b quantities for both excavation and embankment been calculated for the benched areas and added to the plan General Quantities?	Corporation.
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:

Special		······································	
Y N 🛞	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,	
ŶN X		a has the material type for the fill to be end dumped been specified?	
YNX		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?	
YNX		d have all notes and specifications for end dumping been developed?	

Notes: