REPORT

OF

SUBSURFACE INVESTIGATION

FOR

EMBANKMENTS (STATION 416+00 to 509+50)

PROJECT SCI-823-6.81

PHASE 1 – STAGE I

SCIOTO COUNTY, OHIO

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1.0 INTRODUCTION

Phase 1 of this project consists of the construction of approximately 3.51 miles of new interstate roadway situated in Scioto County, Ohio. The findings and recommendations presented in this document pertain to Phase 1 embankments from station 416+00 to 509+50 of the SCI-823-6.81, Portsmouth Bypass project. The Phase 1 area is understood to be from station 352+00 to 537+50. The findings and recommendations for Phases 2 and 3 of this project will be submitted in separate documents.

It should be noted that two interchanges are located in the Phase 1 area. The relocated Shumway Hollow Road interchange is located from approximately station 352+00 to 416+00. Similarly, the Lucasville-Minford Road interchange is located from approximately station 509+50 to 538+55. The analyses and recommendations pertaining to the interchange areas can be found in the respective interchange reports, submitted separately.

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

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

2.0 GENERAL PROJECT INFORMATION

Approximately 2.35 miles of side hill or embankment fills and 1.16 miles of soil and rock cuts are proposed to construct the mainline roadway in the Phase 1 area. Throughout the Phase 1 area, a maximum embankment height is anticipated to be 73 feet near station 466+50. Similarly, in the Phase 1 area, the maximum height of the soil and rock cuts is anticipated to be 132 feet at station 428+80.

Two proposed interchanges, relocated Shumway Hollow Road (TR 234) and Lucasville-Minford Road (CR 28) are also included in the Phase 1 area. As mentioned above, the findings and recommendations pertaining to the roadway embankments and ramps included in the interchanges

are presented under separate cover. Four structures are planned for the Phase 1 mainline alignment of this project. Two structures are proposed, one for each of the above referenced interchanges. Additionally, structures are proposed for crossing Portsmouth-Minford Road (SR 139) and Swauger Valley-Minford Road at stations 485+07 and 443+85, respectively. The findings and recommendations pertaining to the structures are presented under separate cover.

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

3.0 SUBSURFACE INVESTIGATION

The subsurface investigation for the Phase 1 embankments (stations 416+00 to 509+50) consisted of drilling a total of 83 borings. The 83 borings considered for these roadway embankment analyses are comprised of 17 structural borings, 10 culvert borings, and 56 roadway borings. The borings were drilled between July 9, 2004 and September 14, 2006. The borings were extended to depths of 8.0 to 173.0 feet and were drilled with both ATV-mounted and truck-mounted drill rigs. The locations of the borings are shown on the Boring Location Plan in Appendix A.

Representatives of DLZ Ohio, Inc. (DLZ) planned and staked the interchange boring locations in the field. Similarly, representatives of Lockwood, Lanier, Mathias and Noland Inc (2LMN) staked the locations of the non-interchange roadway borings in the Phase 1 area. Representatives of 2LMN also determined the as-drilled ground surface elevations and locations of most of the boring locations. The as-drilled boring locations and ground surface elevations are shown on the individual boring logs in Appendix A. At the time this document was drafted, the as-drilled locations of several 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 Information

The project is located in the Shawnee-Mississippian Plateau of the unglaciated portion of the Appalachian Plateau Physiographic Region. The project area is relatively underdeveloped, and contains limited secondary roadways. The area is characterized by rough, steep, broken, and severely dissected topography. The natural slopes are generally very steep, rising abruptly from the valley bottoms. The maximum topographic relief along the Phase 1 project centerline is approximately 275 feet and occurs between a high point near station 523+70 at elevation 890 feet, and a low point near station 353+80, at approximately elevation 615 feet. The maximum vertical relief along the proposed finished grade is approximately 130 feet,

with the lowest point at approximately station 352+00 (elevation 645 feet) and the highest point near station 519+30 (elevation 775 feet).

4.2 Geology of the Site

The genesis of the soils varies across the project location. Residual and colluvial soils are found on the ridge tops and the hillsides across the site. These soils are generally thin to moderately deep, covering moderate to steep slopes. Lacustrine soils, found in the 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 surface, 65 of 83 borings encountered topsoil ranging in thickness from 1 to 12 inches. Where encountered, the average thickness of topsoil was 5 inches.

Beneath the topsoil layers, borings located on the slopes and drilled for the roadway generally encountered soils ranging from silt (A-4b) to clay (A-7-6) to depths of 5 to 50 feet below the ground surface, at the top of bedrock. Soil conditions for selected Phase 1 fill sections are outlined below. For more detailed information, refer to the boring logs presented in Appendix A.

Phase 1 Mainline Station 434+00 to 449+00
In this area, boring R-379, at station 440+12.8 generally encountered hard silt (A-4b) to a depth of 11.0 feet below the ground surface. Beneath this layer, very stiff sandy silt (A-4a) was encountered to a depth of 18.0 feet below the ground surface, at the top of bedrock.

Phase 1 Mainline Station 457+00 to 479+00
In this area, boring R-393, at station 460+18.5 generally encountered cohesive and cohesionless medium dense/very stiff sandy silt (A-4a) to a depth of 30.0 feet below the ground surface. Beneath this layer, very stiff silt (A-4b) was encountered to a depth of 38.5 feet below the ground surface, at the top of bedrock.

Phase 1 Mainline Station 483+50 to 497+50
In this area, boring B-10, at station 486+01.5 generally encountered stiff silt (A-4b) to a depth of 8.5 feet below the ground surface, at the top of bedrock.

Phase 1 Mainline Station 504+00 to 507+50
In this area, the soil is very thin. Boring R-439, at station 504+62 generally encountered loose to medium stiff sandy silt (A-4a) to a depth of 4.5 feet below the ground surface, at the top of bedrock.

4.4 Bedrock Conditions

Bedrock was encountered in many of the borings and confirmed by coring in 76 borings. Bedrock encountered in the borings correlates well with the available geologic references. The cores obtained consist primarily of sandstone and occasionally shale, siltstone, and clayshale. A layer of severely weathered to decomposed bedrock was generally encountered immediately above the higher quality rock encountered in the rock cores. The layer of severely weathered rock generally ranged in thickness from 1 to 3 feet. The bedrock encountered in the cores generally consisted of medium hard to hard, fine-grained sandstone, which is slightly to highly weathered. For more detailed information, refer to the boring logs presented in Appendix A.

4.5 Groundwater Conditions

Seepage was observed in several borings at depths ranging from 5 to 58.5 feet below the ground surface. Groundwater conditions for selected Phase 1 fill sections are outlined below. For more detailed information, refer to the boring logs presented in Appendix A.

Phase 1 Mainline Station 434+00 to 449+00
In this area, no seepage or groundwater levels were observed in any of the borings prior to adding drilling water for coring operations. Final water levels (including drill water) were measured from 3.5 to 17 feet below the ground surface.

Phase 1 Mainline Station 457+00 to 479+00
In this area, seepage was encountered in 9 borings. In these borings, seepage was first encountered ranging from 2.5 to 19 feet below the ground surface. Groundwater levels were observed in two borings prior to adding drilling water for coring operations. In both borings, groundwater was encountered at 20 feet below the ground surface. Final water levels (including drill water) were measured from 0.5 to 17.4 feet below the ground surface.

Phase 1 Mainline Station 483+50 to 497+50
In this area, seepage was encountered in 4 borings. In these borings, seepage was first encountered ranging from 3 to 6.3 feet below the ground surface. No groundwater levels were observed in any of the borings prior to adding drilling water

for coring operations. Final water levels (including drill water) were measured from 1.6 to 16.3 feet below the ground surface.

Phase 1 Mainline Station 504+00 to 507+50
In this area, no seepage or groundwater levels were observed in any of the borings prior to adding drilling water for coring operations. Final water levels (including drill water) were measured from 4.8 to 6.8 feet below the ground surface.

It should be noted that groundwater levels may fluctuate with seasonal variations and following periods of heavy or prolonged precipitation, and therefore, the readings indicated on the boring logs may not be representative of the long-term groundwater levels. Long-term monitoring would be needed to obtain a more accurate estimate of the groundwater table elevation.

4.6 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. Due to the consistency of the soils encountered in this area, undisturbed Shelby tube samples were not obtained for laboratory testing. The results of the laboratory testing are presented in Appendix B, and on the boring logs in Appendix A.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 General

At the surface, 65 of 83 borings encountered topsoil ranging in thickness from 1 to 12 inches. Where encountered, the average thickness of topsoil was 5 inches. All topsoil should be removed prior to placing fill or pavement materials.

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

5.2 Pavement Design and Group Index

5.2.1 General

The results of the borings and the subgrade evaluations for the project (Phase 1) have been submitted in separate documents. However, the conclusions from the proposed State Route 823 Mainline evaluations are presented below. It should be noted that unsuitable soils were encountered in the Phase 1 area. Restrictions for the use of these materials should conform to ODOT CMS Item 203.03. Similarly, all subgrade

treatments should conform to ODOT CMS Item 206. More information concerning the suitability of soils for use as fill material can be found in section 5.6 of this report.

5.2.2 Proposed State Route 823 Mainline

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

Most of the mainline alignment will be constructed on embankment fill. However, some sections of the alignment will be in cuts where the subgrade will be in rock. The approximate station limits of these sections are listed in the following table.

Sections of Proposed State Route 823 Mainline Grade in Rock (Phase 1)
Station 416+00 to 509+50

Begin Station	End Station
416+00	434+00
449+00	457+00
480+00	483+50
497+50	504+00
507+50	509+50

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

5.3 Culverts

As discussed earlier in this report, 21 culverts are presently planned for within the limits of the Phase 1 area. Foundation recommendations and settlement analyses for the culverts have been presented for each culvert in separate reports.

5.4 Embankment Evaluations

5.4.1 Slope/Embankment Stability – State Route 823 Mainline

With the exception of the two interchange areas (presented under separate cover), slope/embankment stability is not considered to be a significant concern for most areas of the proposed State Route 823 mainline alignment. The following table outlines the station locations and approximate embankment heights for the proposed Phase 1 mainline embankments.

Sidehill Fill / Fill Embankments (STA. 416+00 to 509+50)

Begin Station	End Station	Approximate Maximum Fill (ft.)
434+00	449+00	44.3
457+00	479+00	70.6
483+50	497+50	58.9
504+00	507+50	34.7

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

In accordance with ODOT guidelines a unit weight of 120 pcf was used for the embankment fill materials. Due to the nature of the project, it is anticipated that the embankment fill will consist of cohesionless material ranging in size from fine granular material to rock but will generally be rock fill from adjacent cuts. The friction angles of the anticipated backfill materials will likely range from 28 degrees to over 40 degrees. We would anticipate that more of the rock fill would exhibit friction angles in excess of 40 degrees, but we conservatively selected a friction angle of 35 degrees for the embankment fill with no cohesion.

The stability analyses were performed using UTEXAS3 Version 1.204, a slope stability computer program using variations of the method of slices. UTEXAS3 was developed by Dr. Stephen Wright at the University of Texas for the U.S. Army Corps of Engineers. The Simplified Bishop procedure was used for all of the analyses and only circular failure surfaces were considered. All of the procedures use an iterative approach to investigate many failure surfaces until a critical surface is found. The results of stability analyses are included in Appendix C.

5.4.1.1 Phase 1 Mainline Embankments – General Information

The Phase 1 mainline roadway is comprised of approximately eight fill sections and five cut sections. All fill sections in Phase 1 were considered for stability. The two interchange areas (Shumway Hollow Road and Lucasville-Minford Road Interchanges) contain the poorest subsurface conditions in the Phase 1 area. The analyses and recommendations for the embankment slopes contained in the interchange areas are found within the respective interchange reports, presented separately.

A comprehensive review of subsurface conditions and the results of stability analyses indicate that the Phase 1 embankments, outside of the interchange areas may be built using 2H:1V or flatter slopes. A brief discussion of the analyses is presented below.

5.4.1.2 Phase 1 Mainline Embankments (Station 416+00 to 509+50)

The Phase 1 alignment from station 416+00 to 509+50 contains four sections, which will be constructed using fill embankments. Within these four sections, the soil is generally thin. The subsurface profile encountered in boring R-393 is assumed the most critical in this area. Additionally, the maximum embankment height encountered in this area, 73 feet, was coupled with the subsurface profile encountered in boring R-393 to evaluate the stability of 2H:1V embankment slopes.

Assuming 2H:1V slopes, global stability analyses performed for the mainline embankments in this area have indicated that the drained, seismic and undrained stability of the embankments is adequate. Based upon the results of the stability analyses, it is not anticipated that staged construction, wick drains, or other special construction techniques will be required to construct the embankments using 2H:1V slopes in this area. As a result, it is recommended that roadway embankments be built using 2H:1V for flatter slopes.

5.4.2 Settlement – State Route 823 Mainline

5.4.2.1 Phase 1 Mainline Embankments (Station 416+00 to 509+50)

Settlement has been evaluated for selected locations for the Phase 1 mainline embankments. The table on the following page summarizes the results of the calculations for the consolidation of foundational soils and the anticipated settlement of the associated embankment fill materials.

Summary of Settlement Analyses

Station	Boring	Approximate Maximum Fill (ft.)	Primary Consolidation (in.)	Anticipated Settlement of Fill Materials (in.)
441+00	R-379	44.3	2	6
465+00	R-393	70.6	5	9
487+00	B-10	58.9	2	8

The settlement evaluations indicate that embankment settlement is not considered a significant concern for Phase 1 embankments outside of the interchange areas. Based upon a comprehensive review of subsurface conditions, a critical soil profile and embankment height was selected for each fill section for the purposes of performing settlement calculations. In addition, time-rate of settlement calculations were also performed. The analyses and results are briefly discussed in the following sections.

Settlement – Mainline Embankments, Station 441+00

Settlement due to primary consolidation of the foundation soil is expected to be approximately 2 inches. In addition, the time needed to reach 80 percent of primary consolidation is expected to take up to approximately 369 days. Due to the relatively small magnitude of settlement, the use of wick drains or other means of accelerating the consolidation were not explored.

Settlement due to consolidation of the fill material itself was also considered. Consolidation within an embankment will generally range from one to four percent of the embankment height. Assuming one percent consolidation for a well compacted fill, approximately 6 inches of settlement can be expected for a 44 foot high embankment. However, it is anticipated that much of this settlement will occur during construction.

Settlement – Mainline Embankments, Station 465+00

Settlement due to primary consolidation within the foundation soil is expected to be approximately 5 inches. In addition, the time needed to reach 80 percent of primary consolidation is expected to take up to approximately 1,060 days. Due to the relatively small magnitude of settlement, the use of wick drains or other means of accelerating the consolidation were not explored.

Settlement due to consolidation of the fill material itself was also considered. Consolidation within an embankment will generally range from one to four percent of the embankment height. Assuming one percent consolidation for a well compacted fill, approximately 9 inches of settlement can be expected for a 71 foot high embankment. However, it is anticipated that much of this settlement will occur during construction.

Settlement – Mainline Embankments, Station 487+00
Settlement due to primary consolidation within the foundation soil is expected to be approximately 2 inches. In addition, the time needed to reach 80 percent of primary consolidation is expected to take up to approximately 68 days. Due to the relatively small magnitude of settlement, the use of wick drains or other means of accelerating the consolidation were not explored.

Settlement due to consolidation of the fill material itself was also considered. Consolidation within an embankment will generally range from one to four percent of the embankment height. Assuming one percent consolidation for a well compacted fill, approximately 8 inches of settlement can be expected for a 59 foot high embankment. However, it is anticipated that much of this settlement will occur during construction.

Settlement –Mainline Embankments, Station 504+00 to 507+50
Due to the very thin soil in this area, settlement was not evaluated for this embankment fill area. It is believed that any settlements in this area will be negligible. Borings drilled in the area encountered 3 to 4.5 feet of soil throughout the embankment fill area. The maximum embankment height in this area was 35 feet.

Settlement due to consolidation of the fill material itself was 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 4 inches of settlement can be expected for a 35 foot high embankment. However, it is anticipated that much of this settlement will occur during construction.

5.4.2.2 Additional Settlement Recommendations

Prior to beginning normal embankment fill operations, it is recommended that the initial embankment construction consist of at least 6 feet of free-draining granular material placed over the entire fill foundation area. This material will allow the drainage of the foundation soils, not inhibit the time-rate of consolidation, and will also provide a stable surface upon which normal fill operations can begin. It should be emphasized that the time of consolidation estimates are based on the assumption that the initial embankment construction will consist of at least 6 feet of free-draining granular material placed over the entire fill foundation area as previously discussed. Groundwater seepage, overexcavation, and removal of unsuitable soils should be anticipated within the interchange areas. Consequently, it may be necessary to utilize additional granular material or end-dumped rock in order to establish a dry and stable fill foundation.

Based on the results of calculations outlined above, excessive settlements are not anticipated for the Phase 1 embankments from station 416+00 to 509+50. Although settlement is not a significant concern in this area, general recommendations are included for accelerating or mitigating settlements.

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

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

5.4.3 Potential Areas of Instability

The dominant rock type along the proposed alignment is sandstone of the Mississippian aged Logan Formation. Siltstone and shale are commonly found interbedded with the sandstone. These siltstones and shales generally weather to clay with low shear strength over time. The steeper slopes are prone to gradual movement known as soil creep. The low shear strength of the residual and colluvial soils combined with the steep topography makes some of the hillsides within the proposed limits of construction prone to shallow surficial landslides and soil creep. Generally these conditions are easily corrected by removal of the unstable slope materials. No deep-seated landslides were observed along the proposed Phase 1 alignment. If the proposed alignment is in a fill section, it is recommended that these areas of instability be monitored during future design stages for any signs of slope movement.

In the steep terrain of Scioto County, soil creep is common. Areas of slope instability were first identified using survey data and aerial photography and then verified during the fieldwork. Four areas showed recent signs of significant instability near or

within the proposed limits of construction. All slope instability appeared to be relatively shallow soil creep and contained within the overburden, though one of these areas showed signs of a past massive landslide. These areas of slope instability are shown on the field notes and proposed centerline in Appendix A of the *Report of Geology and Field Reconnaissance for Project SCI-823-6.81, Phase 1-Stage I, dated November 29, 2006.*

Station 352+00 to Station 356+00
The aerial photography showed hummocky terrain from station 352+00 continuing to station 356+00. This area exhibited signs of recent instability. This is most likely due to erosion and shallow soil creep along the steep drainage channels of intermittent streams in the area.

Station 423+00 to Station 425+00
The area from station 423+00 to station 425+00 exhibited signs of recent instability. This is most likely due to erosion and saturation of the steep, nearly 1H:1V slopes along steep intermittent stream channels during heavy rainfall events. The instability in this area appeared to be relatively massive and was classified as a landslide. However, in this area, the current profile indicates the alignment will be in a deep rock cut section and the unstable soils will be removed.

Station 432+00 to Station 442+00
Another area to exhibit signs of instability is the steep slope from station 432+00 to station 442+00. This is most likely erosion from logging activities and the toes of these slopes being eroded by the intermittent streams that flow through the valley. The recent activity appears to be shallow soil creep and not a deep active landslide.

Station 482+00 to Station 484+25
Another area to exhibit signs of instability is the steep, nearly 1H: 1V slope from the station 482+00 to station 484+25. This is most likely due to the toe of the slope being eroded by Long Run. The recent activity appears to be shallow soil creep and not a deep active landslide.

5.5 Rock Cuts

Currently, approximately 1.16 miles of the Phase 1 mainline alignment is anticipated to be located in cuts. A majority of these cuts will be in rock. In accordance with ODOT's Geotechnical Bulletin Number 3 (GB-3) "Rock Cut Slope & "Catchment Design", Phase 1 rock cuts have been evaluated. For information pertaining to the rock cut slopes, please refer to our Report of Rock Cut Slopes dated November 29, 2006.

5.6 Construction Considerations

5.6.1 General

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

5.6.2 Subgrade Preparation

Silt (A-4b) was encountered at the existing ground surface at several boring locations in the Phase 1 area. Whenever silt is encountered at the subgrade level, it should be overexcavated to at least three feet below subgrade and replaced with suitable, compacted fill. Additionally, no silt (A-4b) should be placed within three feet of subgrade in embankment fill sections.

It should be noted that borings drilled for the relocated Shumway Hollow Road Interchange encountered soils classified as elastic clay (A-7-5). Additionally, borings drilled for the Lucasville-Minford Road Interchange and the relocated Shumway Hollow Road Interchange encountered soils with liquid limits above 65. Although borings drilled for this portion of the roadway (station 416+00 to 509+50) did not encounter these soils, excavations may encounter these soils. 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 CMS Item 703.16. Caution should be used while excavating in these soils to determine the type of soil and its suitability as fill material.

5.6.3 New Embankment Construction

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

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 into the lift. In addition, any soil classified as silt (A-4b) should not be used as fill.

5.6.4 Embankment Drainage

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

If springs or seeps are encountered during construction, the flow shall 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 shall 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) shall be placed in the bottom of the trench, then a six-inch diameter, fabric-wrapped, perforated PVC pipe shall be placed on top of the sand layer. The trench shall then be backfilled to the surface with concrete sand.

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

5.6.5 Rock Excavation

It is anticipated that rock excavation will be required for the roadway and interchange construction as indicated in Section 5.4.10. In addition, sandstone bedrock was encountered at the subgrade elevations indicated in Section 5.4.1. 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 CMS Item 204.05.

5.6.6 GB-2 Special Benching

The roadway cross-sections were analyzed in accordance with Ohio Department of Transportation's Office of Geotechnical Engineering Geotechnical Bulletin 2 (GB-2), released February 7, 2006. ODOT specifications require that any side hill fill on an existing slope steeper than 8:1 should be benched according to the ODOT CMS 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.

Construction along the proposed alignment will consist of side hill fills ranging from less than 2 feet to more than 60 feet. The existing slopes range from nearly flat to steeper than 3:1. In some cases, the existing ground surface is steeper than 4:1 and relatively thin, sliver fills will be placed. The bedrock and overburden interface is a common avenue for water during the wet winter months. In two places along the alignment, relatively thin fills will be placed in areas that will likely experience seepage and ground water infiltration from this interface. These fills are in areas that may be too thin or small to effectively place the free draining durable rock layer. In order to increase the performance of the embankments in these areas, special benching and drainage is recommended from station 415+00 to 416+00 and station 456+50 to 457+50.

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

5.7 Excavation and Groundwater Considerations

Seepage and groundwater conditions are variable across the Phase 1 location. The Contractor should be prepared to keep excavations reasonably dry, such as with sumping and pumping. The Contractor should also be prepared to deal with unexpected seepage and precipitation that enters any excavations. Please refer to section 4.3 of this document, and the boring logs in Appendix A for more information concerning seepage and groundwater levels.

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

5.8 Geotechnical Design Checklists

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

6.0 CLOSING REMARKS

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

Sincerely,

DLZ OHIO, INC.

Steven J. Riedy
Geotechnical Engineer

Pete Nix, P.E.
Geotechnical Division Manager

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APPENDIX A

DLZ

APPENDIX A

Boring Location Plan
General Information - Drilling Procedures and Logs of Borings
Legend - Boring Log Terminology
Boring Logs – Eighty-three (83) Borings

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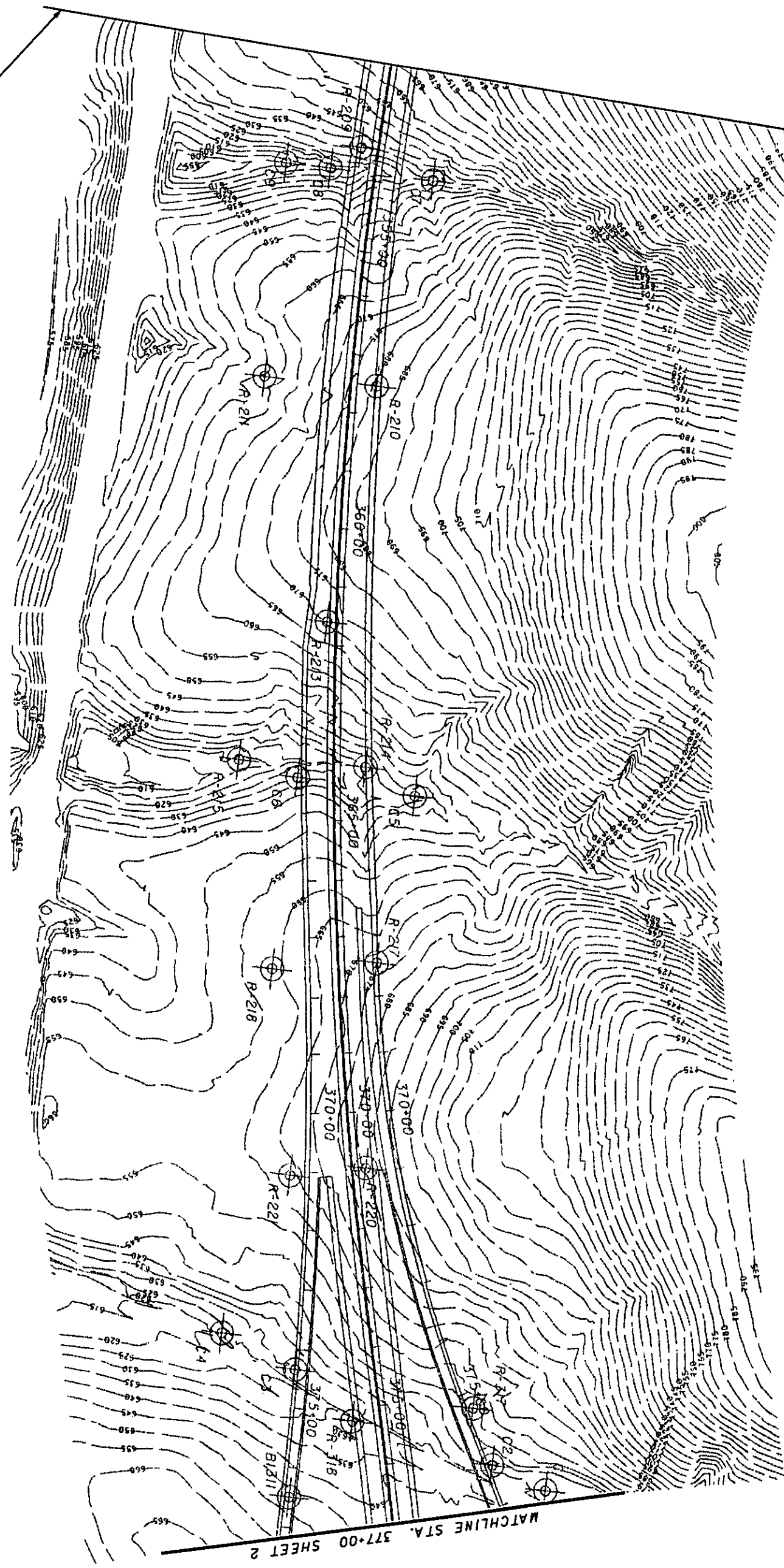

7 of 8	SCI-823-6.81	**BORING PLAN** **SR 823 STA. 352+00 TO STA. 377+00**	DRAWN RLS CHECKED	0 100 50 200 HORIZONTAL SCALE IN FEET

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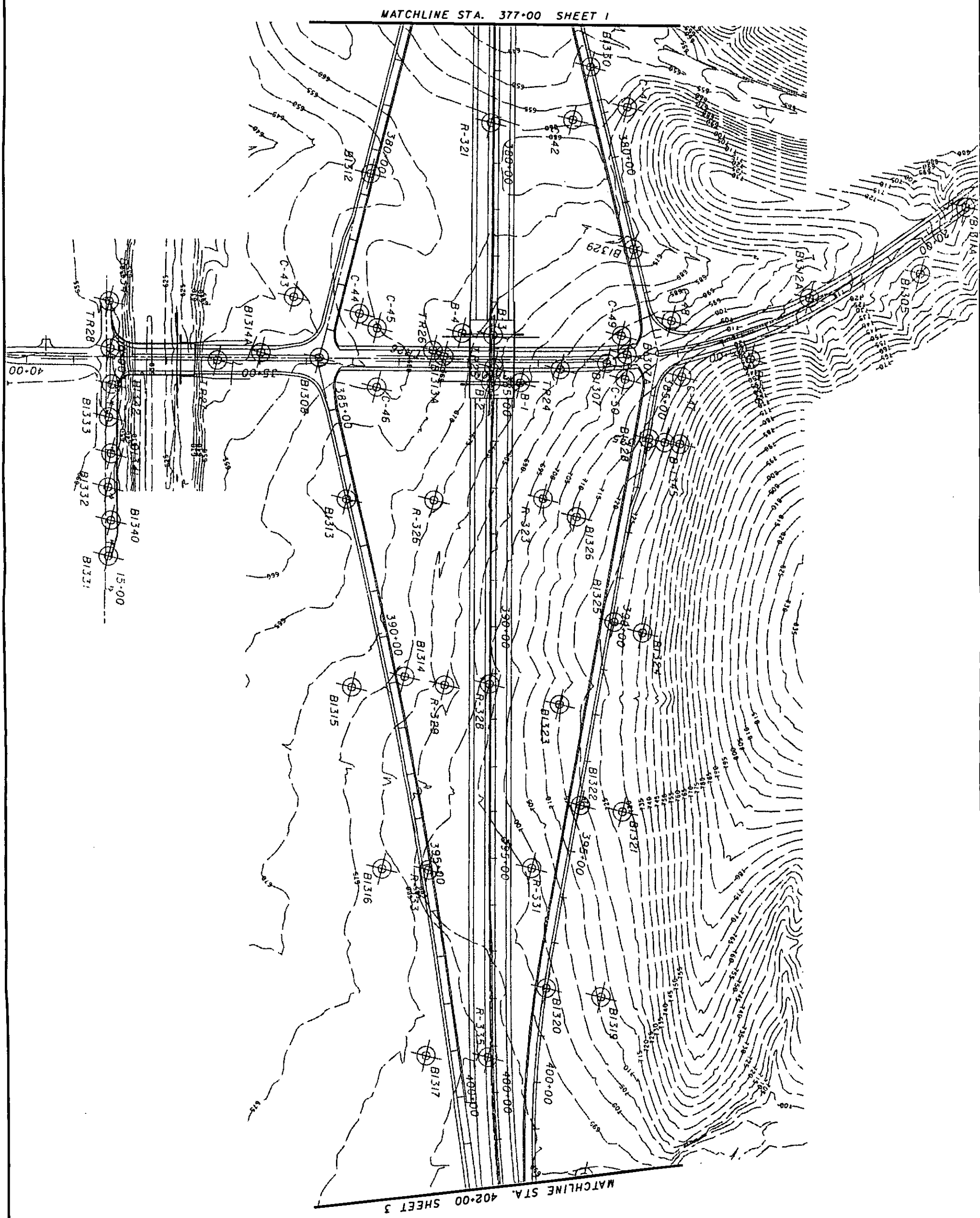

2/8	SCI-823-6.81	BORING PLAN SR 823 STA. 377+00 TO STA. 402+00	DRAWN RLS CHECKED	0 100 50 200 HORIZONTAL SCALE IN FEET

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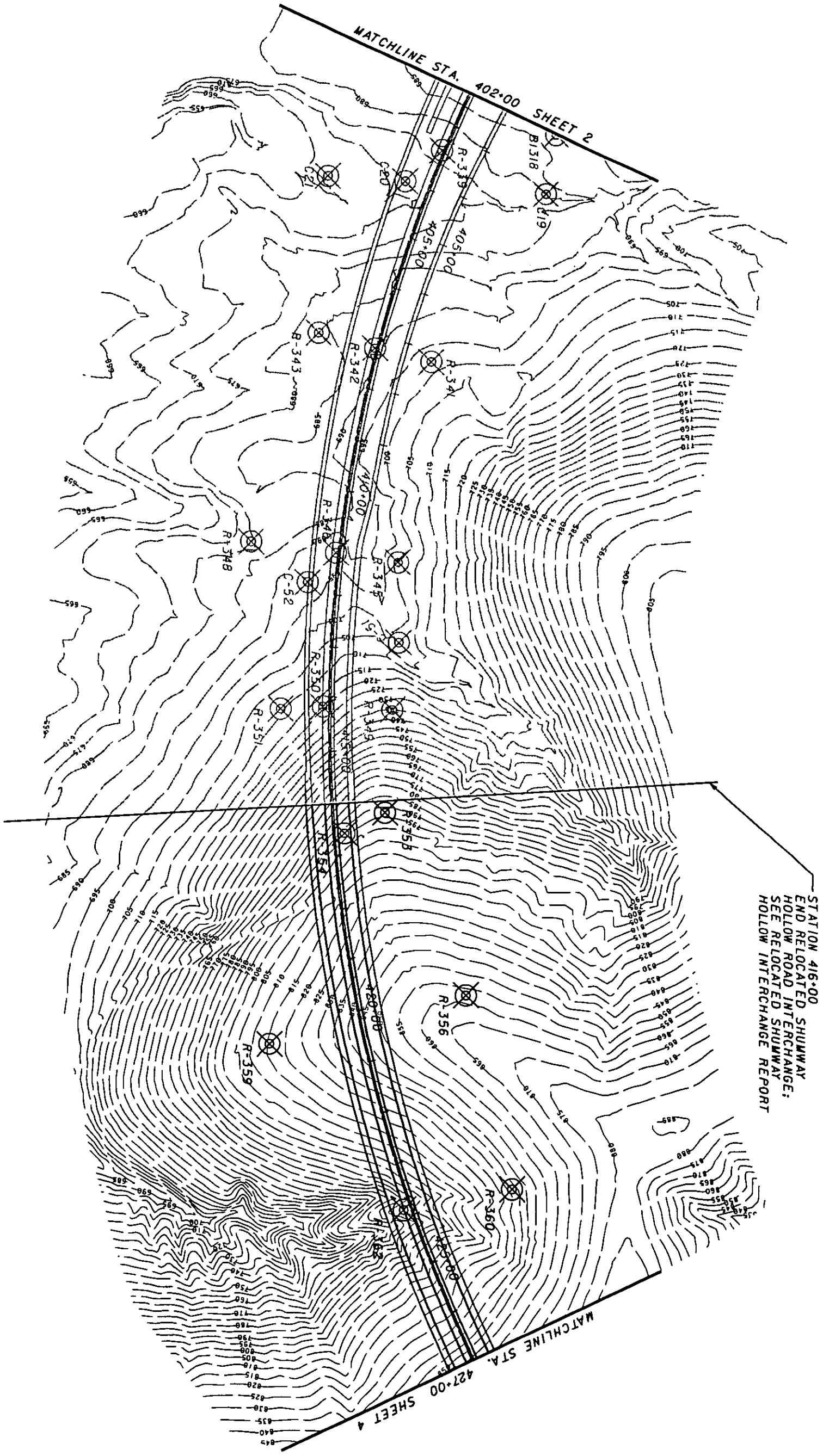
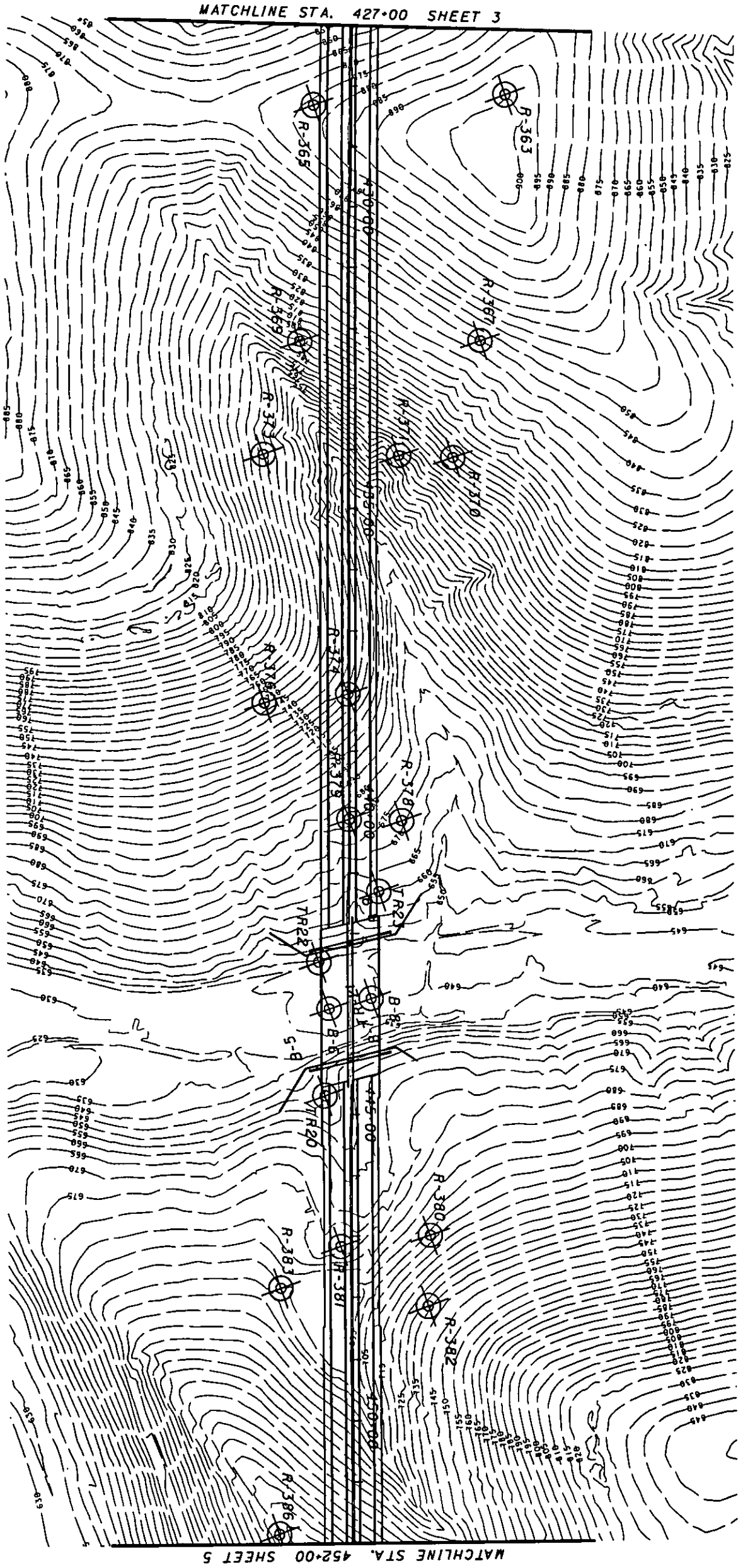


3/8	SCI-823-6.81	**BORING PLAN** **SR 823 STA. 402+00 TO STA. 427+00**	DRAWN RLS CHECKED	0 100 50 200 HORIZONTAL SCALE IN FEET



4/8	SCI-823-6.81	SOIL PROFILE SR 823 STA. 427+00 TO STA. 452+00	DRAWN RLS CHECKED	0 100 50 200 HORIZONTAL SCALE IN FEET

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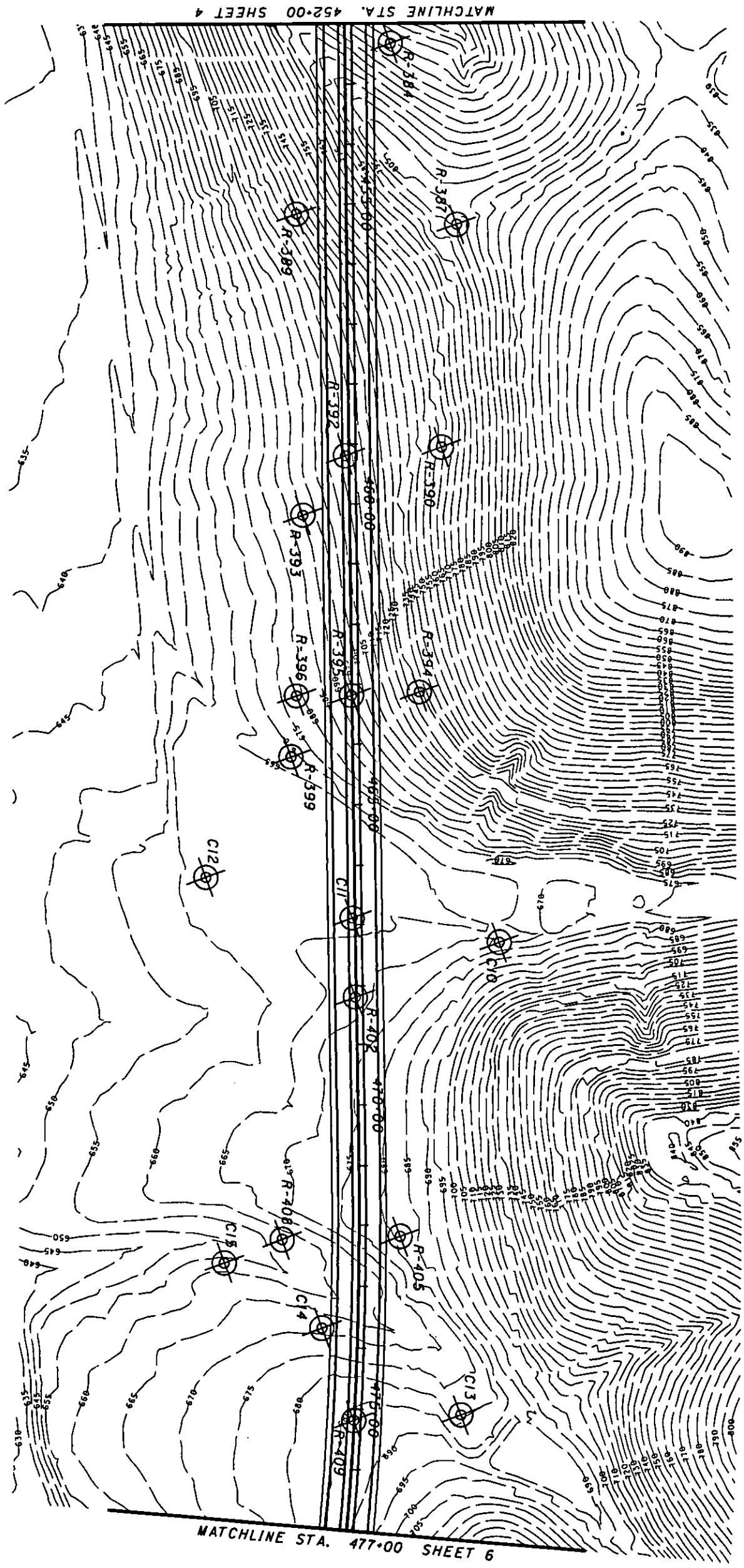

5/8	SCI-823-6.81	SOIL PROFILE SR 823 STA. 452+00 TO STA. 477+00	DRAWN RLS CHECKED	0 100 50 200 HORIZONTAL SCALE IN FEET

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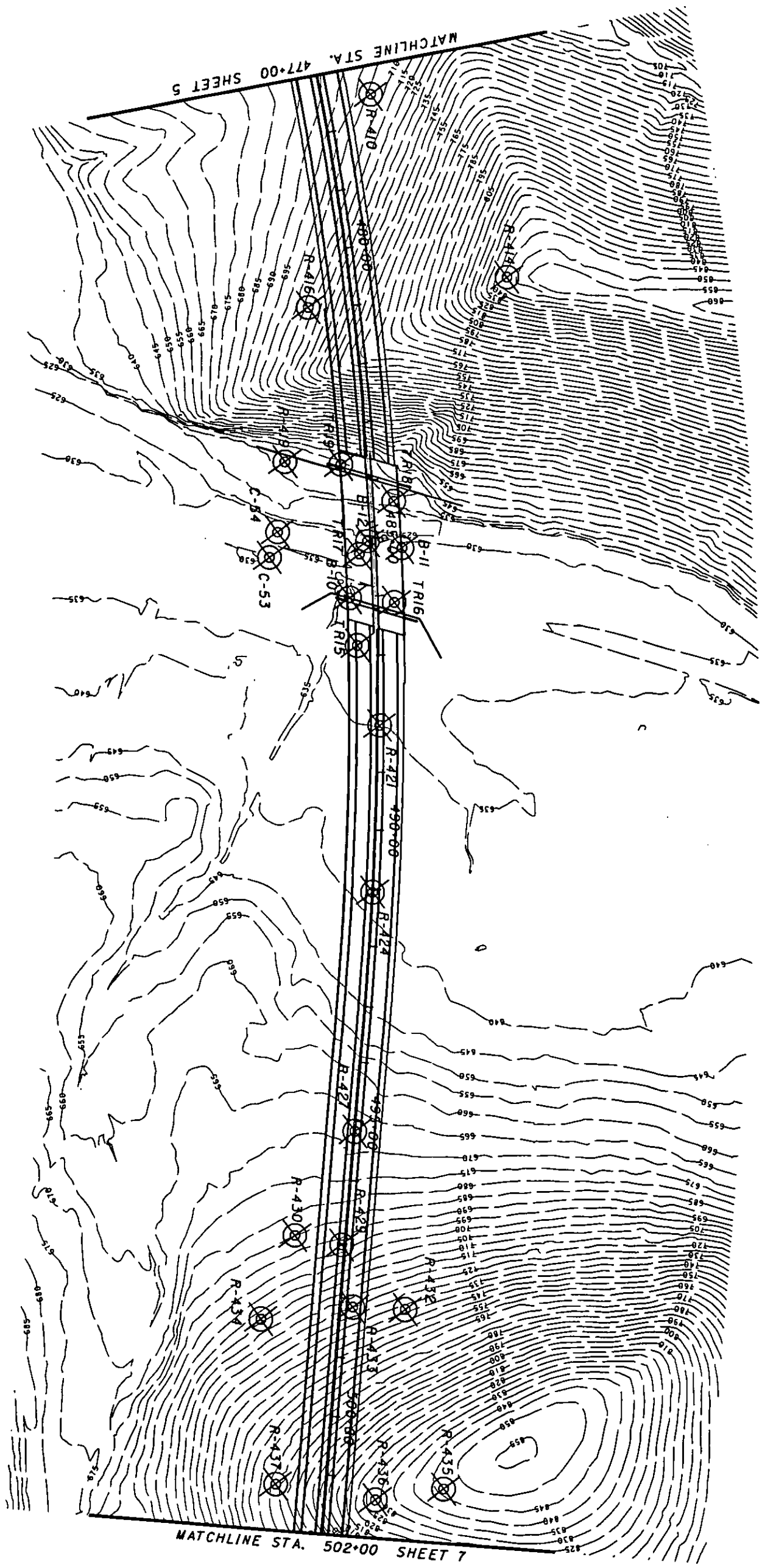

8/9	SCI-823-6.81	BORING PLAN SR 823 STA. 477+00 TO STA. 502+00	DRAWN RLS CHECKED	0 100 50 200 HORIZONTAL SCALE IN FEET

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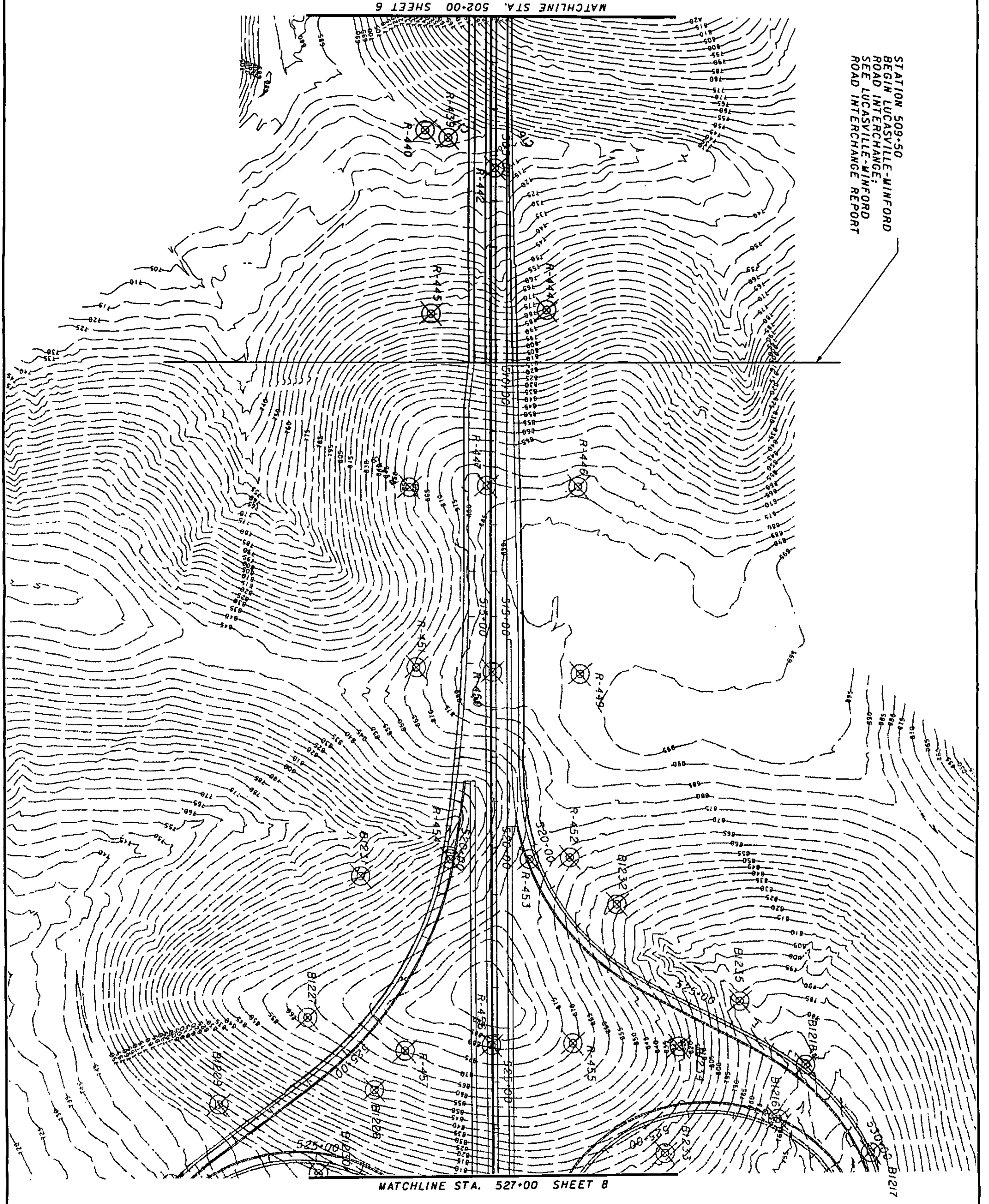
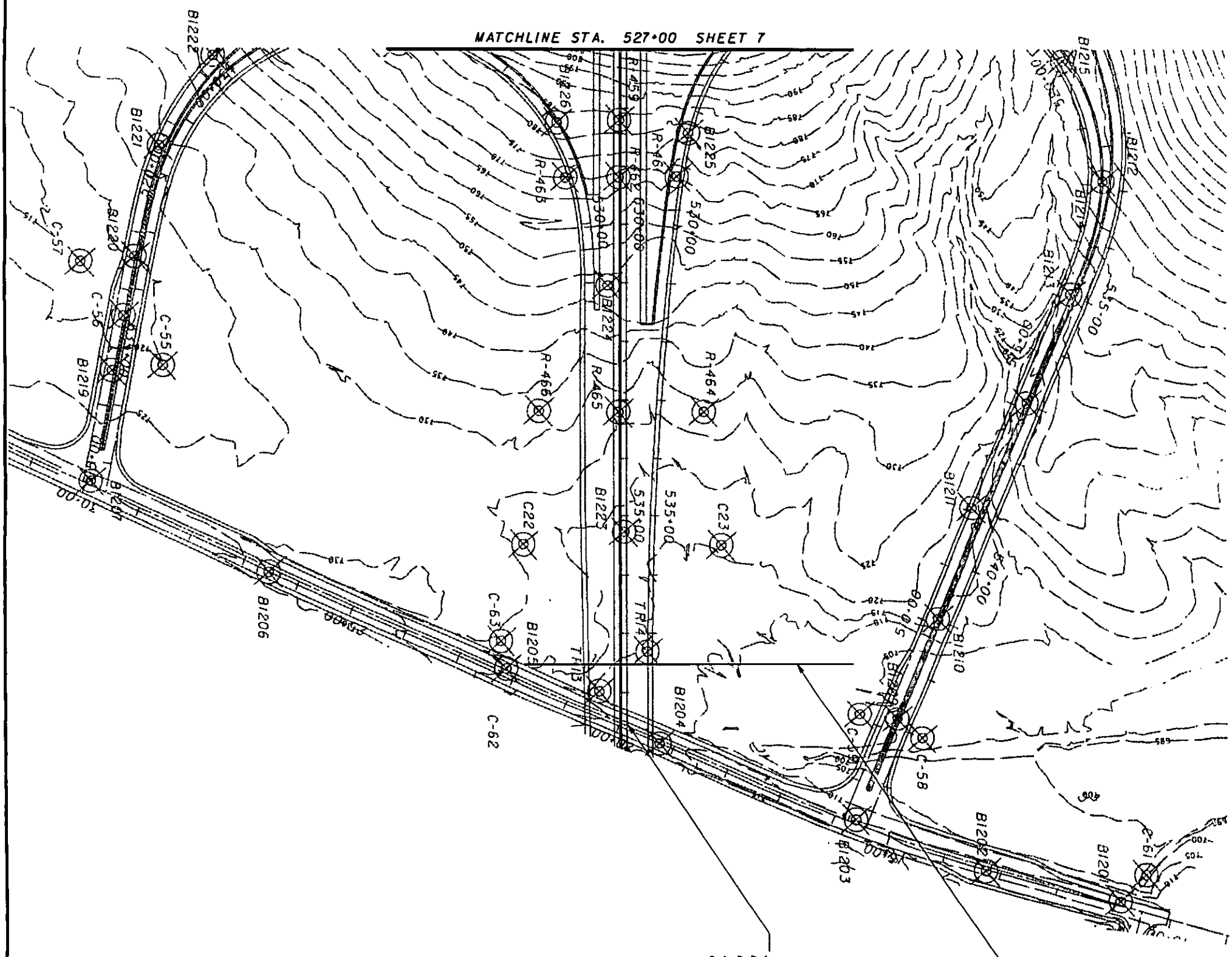


SCI-823-6.81	BORING PLAN SR 823 STA. 502+00 TO STA. 527+00	DRAWN RLS CHECKED	HORIZONTAL SCALE IN FEET

7/8



8/8	SCI-823-6.81	BORING PLAN SR 823 STA. 527+00 TO STA. 542+00	DRAWN RLS CHECKED XXX 0 100 50 200 HORIZONTAL SCALE IN FEET

GENERAL INFORMATION
DRILLING PROCEDURES AND LOGS OF BORINGS

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

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

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

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

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

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

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

LEGEND – BORING LOG TERMINOLOGY

Explanation of each column, progressing from left to right

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

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

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

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

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

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

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

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

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

9. Soil Description

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

   Granular Soils – Compactness

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

   Cohesive Soils – Consistency

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

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

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

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

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

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

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

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

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

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

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

10. Rock Hardness and Rock Quality Designation

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

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

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

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

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

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

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

LOG OF: Boring B-5 | Location: Sta. 444+30.2, 63.3 ft. RT of SR 823 CL *As Per Plan | Date Drilled: 06/15/06

WATER OBSERVATIONS: Water seepage at: none
Water level at completion: none (prior to coring)
0.5' (inside hollowstem augers, includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	644.0													
0.1	643.9						Topsoil - 1"							
		18					Medium dense gray SANDY SILT (A-4a), damp. (Decomposed Sandstone)							50/5+ ○
1.5	642.5	50/0	6	1			Medium hard to hard gray SANDSTONE, fine to very fine grained, moderately to highly weathered, argillaceous, micaceous, massive bedding, moderately fractured, contains few argillaceous laminations.							
5		Core 120"	Rec 114"	RQD 83%	R-1		@ 1.5'-7.2', 7.9'-8.3', 10.9', rust staining. @ 3.1'-3.3', high angle fracture. @ 3.5', qu = 8,382 psi.							
10														
11.5	632.5						Bottom of Boring - 11.5'							
15														
20														
25														
30														

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

LOG OF: Boring B-7 | Location: Sta. 444+00.8, 65.4 ft. LT of SR 823 CL *As Per Plan | Date Drilled: 06/15/06

WATER OBSERVATIONS: Water seepage at: none
Water level at completion: none

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0.2	658.0 / 657.8						Topsoil - 2"							
		8 18 23	13	1			Medium dense gray SANDY SILT (A-4a), damp. (Decomposed Sandstone)							
2.5	655.5						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, fossiliferous (trace fossils), massive bedding, highly fractured.							
		Core 120"	Rec 97"	RQD 76%	R-1		@ 2.5'-9.3', rust staining. @ 2.5'-5.0', broken zone. @ 3.5', lost water circulation. @ 6.5', qu = 7,966 psi. @ 8.7'-8.9', high angle fracture.							
12.5	645.5						Bottom of Boring - 12.5'							

5 10 15 20 25 30

FILE: 0121-3070-03 [11/24/2006 2:03 PM]

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

LOG OF: Boring B-8 | Location: Sta. 443+05.8, 34.6 ft. LT of SR 823 CL | Date Drilled: 06/16/06

WATER OBSERVATIONS: Water seepage at: none
Water level at completion: not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	638.4	3 2 2	11	1		4.0	Very stiff to hard brown SILT (A-4b), little clay, trace fine to coarse sand, trace gravel; damp.	4	12	--	15	52	17
3.0	635.4	7 6 5	17	2		4.5+	Hard brown SANDY SILT (A-4a), little clay, little gravel; damp.	12	23	--	17	35	13
5		9 15 50/4		3		4.5+							
7.5	630.9	Core 108"	Rec 87"	RQD 68%	R-1		Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, massive bedding, highly fractured, contains few laminations. @7.5'-8.7', rust staining.						
10													
15							@ 17.0', qu = 10,997 psi.						
20		Core 120"	Rec 120"	RQD 90%	R-2								
25													
27.5	610.9	Core 12"	Rec 12"	RQD 100%	R-3		Bottom of Boring - 27.5'						
30													

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

FILE: 0121-3070-03 [11/24/2006 2:03 PM]

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

LOG OF: Boring B-9 | Location: Sta. 441+98.6, 66.2 ft. LT of SR 823 CL *As Per Plan | Date Drilled: 06/15/06

WATER OBSERVATIONS: Water seepage at: none
Water level at completion: none (prior to coring)
1.0' (inside hollowstem augers, includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	647.5													
0.1	647.4						Topsoil - 1"							
		7 7 8	4	1			Medium dense gray SANDY SILT (A-4a), damp. (Decomposed Sandstone)							
							@ 4.0', auger refusal.							
4.0	643.5	50/0	0	2			Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, argillaceous, micaceous, massive bedding, highly fractured.							50+
5							@ 4.0'-11.4', rust staining.							
							@ 7.2', qu = 8,153 psi.							
		Core 120"	Rec 117"	RQD 66%	R-1		@ 8.7'-8.8', 8.9'-9.0', Decomposed argillaceous zones.							
10														
14.0	633.5						Bottom of Boring - 14.0'							
15														
20														
25														
30														

FILE: 0121-3070-03 [11/24/2006 2:03 PM]

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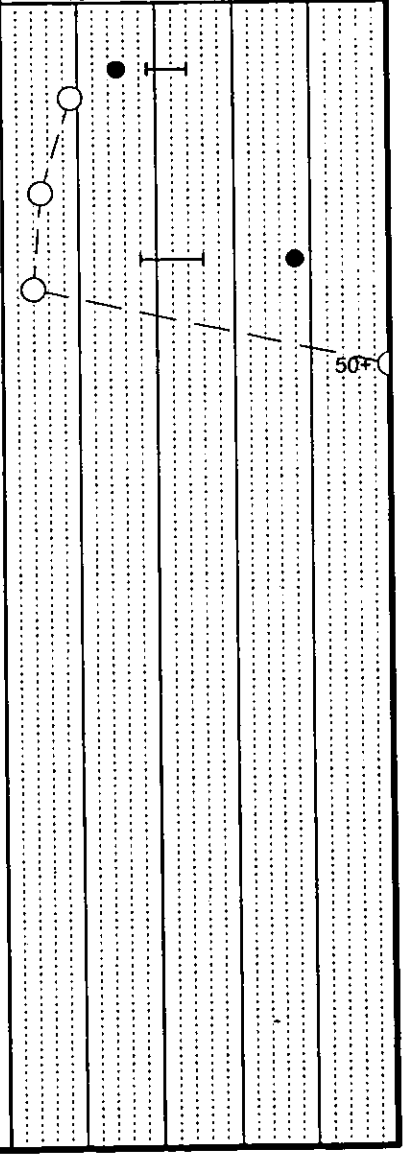
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring B-10 | Location: Sta. 486+01.5, 43.8' RT of SR 823 CL | Date Drilled: 06/28/06

WATER OBSERVATIONS: Water seepage at: none
Water level at completion: none (prior to coring)
6.0' (inside hollowstem augers, includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	632.6												
0.3	632.3						Topsoil - 3"						
		4 5 4	14	1		1.5	Stiff brown SILT (A-4b), little clay, trace to little fine sand; damp.	0	0	--	10	74	16
		3 3 2	17	2		--							
5		2 2 2	13	3		2.0	@ 6.0'-7.5', soft, wet.	0	0	--	11	74	15
8.5	624.1	10					Severely weathered gray SANDSTONE.						
9.5	623.1	50/2	6	4									
10		Core 120"	Rec 116"	RQD 87%	R-1		Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, laminated to thinly bedded, moderately fractured.						
15							@ 16.5', qu = 10,393 psi.						
19.5	613.1						Bottom of Boring - 19.5'						
20													
25													
30													

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



FILE: 0121-3070-03 (11/24/2006 2:03 PM)

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

LOG OF: Boring B-11 | Location: Sta. 485+19.1, 48.6 ft. LT of SR 823 CL | Date Drilled: 6/20/06

WATER OBSERVATIONS: Water seepage at: none
Water level at completion: not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
0	632.7													Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ 10 20 30 40
0.2	632.5						Topsoil - 2"							
		3 3 2	13	1			Loose brown SANDY SILT (A-4a), trace clay; damp.	0	1	–	17	82		Non-Plastic
4.0	628.7	4 8 9	15	2			Medium dense gray SANDY SILT (A-4a) ; damp. (Decomposed Rock)							
5		7 15 50/3	15	3			@ 8.5', auger refusal.							50+
8.5	624.2						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, laminated to thinly bedded, moderately fractured.							
10		Core 120"	Rec 93"	RQD 57%	R-1		@ 8.5' to 10.0', highly fractured to broken.							
15							@ 13.5', qu = 10,537 psi.							
20		Core 120"	Rec 116"	RQD 97%	R-2									
25														
28.5	604.2						Bottom of Boring - 28.5'							
30														

FILE: 0121-3070-03 [11/24/2006 2:03 PM]

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

LOG OF: Boring B-12 | Location: Sta. 485+04.7, 9.0 ft. RT of SR 823 CL | Date Drilled: 6/20/06

WATER OBSERVATIONS: Water seepage at: none
Water level at completion: none (prior to coring)
4.0' (inside hollowstem augers includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	632.5												
0.3	632.2						Topsoil - 3"						
		3 4 6	15	1			Loose to medium dense brown SANDY SILT (A-4a), trace clay; contains sandstone fragments; damp.	0	0	–	8	92	
4.0	628.5	10 7 4	9	2			Loose to medium dense reddish brown GRAVEL WITH SAND AND SILT (A-2-4); contains sandstone fragments; damp.						
5		4 5 50/3	15	3									
8.5	624.0						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, laminated to thinly bedded, moderately fractured.						
10		Core 120"	Rec 97"	RQD 67%	R-1		@ 13.0', qu = 11,829 psi.						
15													
20		Core 120"	Rec 120"	RQD 85%	R-2		@ 24.5', qu = 9,709 psi.						
25													
28.5	604.0						Bottom of Boring - 28.5'						
30													

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

Non-Plastic

50+

FILE: 0121-3070-03 [11/24/2006 2:04 PM]

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

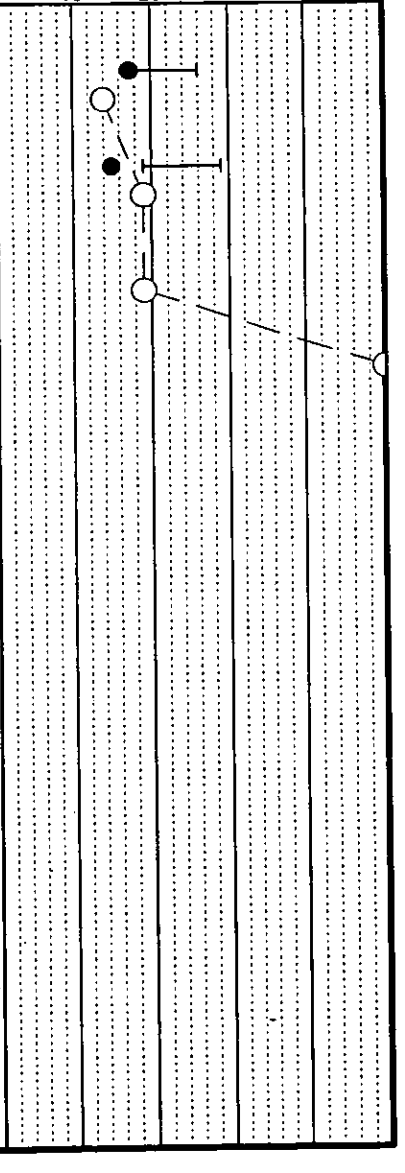
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-10 | Location: Sta. 467+32.2, 239.2 ft. LT of SR 823 CL | Date Drilled: 06/28/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
3.5' (includes drilling water, inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	663.9						No topsoil						
		5 6 8	17	1		4.5+	Very stiff to hard brown and gray SILT (A-4b), little to some clay, little fine to coarse sand, trace gravel; damp.	2	6	--	6	60	26
		6 8 11	18	2		4.5+	@ 4.0', mottled brown and gray.	2	9	--	9	62	18
5													
		6 9 10	18	3		2.5							
7.0	656.9						Medium dense brown SANDY SILT (A-4a), trace to little clay; damp to moist.						
8.5	655.4	34					Severely weathered brown and gray SANDSTONE.						
9.1	654.8	50/1	5	4									
10		Core 60"	Rec 60"	RQD 93%	R-1		Soft to medium hard gray SANDSTONE; very fine to fine grained, slightly weathered, laminated to very thinly bedded, slightly fractured.						
14.1	649.8						Bottom of Boring - 14.1'						
15													
20													
25													
30													

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



FILE: 0121-3070-03 [11/24/2006 2:04 PM]

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

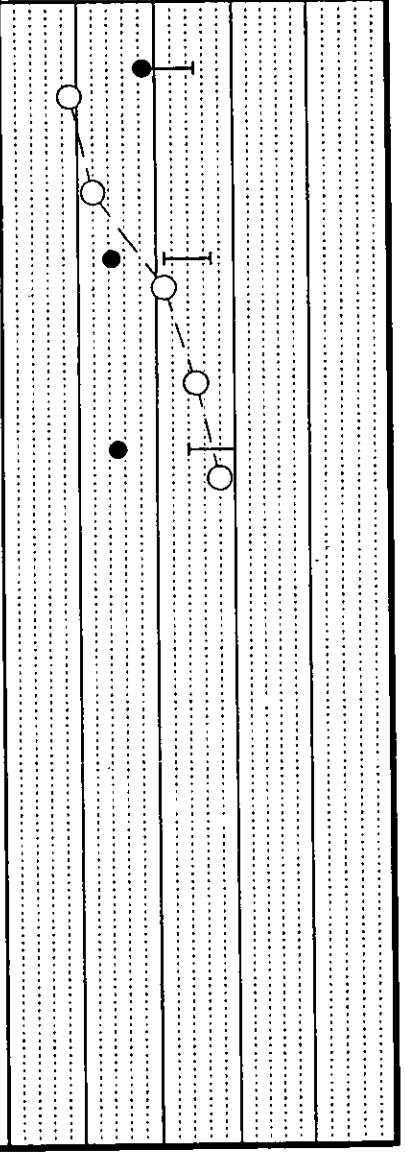
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-11 | Location: Sta. 466+89.0, 5.0 ft. RT of SR 823 CL | Date Drilled: 06/28/06

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS / DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.1	663.8						Topsoil - 1"						
		6 5 4	17	1		3.0	Very stiff brown SILT (A-4b), some clay, trace fine to coarse sand; damp.	0	2	--	4	68	26
		3 2 10	13	2		3.0	@ 4.5', little gravel.						
5.0	658.9						Very stiff brown SANDY SILT (A-4a), little clay, little gravel; damp.						
		4 8 13	18	3		3.0		16	14	--	15	42	13
		4 12 13	18	4		3.0							
10													
10.5	653.4						Hard gray SILT (A-4b), little clay, trace fine to coarse sand; damp.						
		4 10 18	16	5		4.5+		0	0	--	7	77	16
13.0	650.9						Soft to medium hard gray SANDSTONE; very fine to fine grained, slightly weathered, laminated to very thinly bedded, slightly fractured.						
15		Core 60"	Rec 53"	RQD 73%	R-1								
18.0	645.9						Bottom of Boring - 18.0'						
20													
25													
30													

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
0.5' (includes drilling water, inside hollowstem augers)

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



FILE: 0121-3070-03 [11/24/2006 2:04 PM]

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

LOG OF: Boring C-12 | Location: Sta. 466+17.4, 247.6 ft. RT of SR 823 CL | Date Drilled: 06/28/06

WATER OBSERVATIONS: Water seepage at: None observed. Water level at completion: None (prior to coring) 2.5' (includes drilling water, inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
0	661.8	4 3 3	5	1		--	No topsoil Medium stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand; damp.							
4.0	657.8	3 5 6	16	2		3.25	Stiff to very stiff mottled brown and gray CLAY (A-7-6), "and" silt, trace fine sand; damp to moist.	0	0	--	2	54	44	
5		3 3 7	18	3		1.25	@ 6.0', trace to little gravel.							
9.0	652.8	4 15 18	18	4		--	Hard light brown SILT (A-4b), little clay, trace to little fine to coarse sand, trace gravel; damp to moist.	1	3	--	8	71	17	
10		4 13 25	14	5		--								
14.0	647.8	50/5	4	6		--	Soft to medium hard gray SANDSTONE; very fine to fine grained, slightly weathered, laminated to very thinly bedded, slightly fractured.							
15		Core 60"	Rec 57"	RQD 62%	R-1									
18.5	643.3						Soft to medium hard gray CLAYSTONE; moderately weathered, arenaceous, slightly to moderately fractured.							
19.0	642.8						Bottom of Boring - 19.0'							
20														
25														
30														

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

FILE: 0121-3070-03 [11/24/2006 2:05 PM]

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

LOG OF: Boring C-13 | Location: Sta. 475+01.2, 176.4 ft. LT of SR 823 CL | Date Drilled: 06/29/06

WATER OBSERVATIONS: Water seepage at: 19.0' - 20.0'
Water level at completion: 20.0' (prior to coring)
2.0' (includes drilling water, inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
0	679.4													Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0.3	679.1						Topsoil - 4"							
		3 3 5	14	1		1.75	Stiff grayish brown SILT (A-4b), little fine to coarse sand, trace gravel, trace clay; damp.	3	6	--	7	72	12	
4.0	675.4	4 5 5	15	2			Medium dense to dense brown SANDY SILT (A-4a), little clay, little gravel; damp.	14	20	--	13	42	11	Non-Plastic
5		6 14 18	18	3										
8.0	671.4						Medium dense brown and gray SILT (A-4b), trace to some fine to coarse sand, trace gravel, little clay; damp to moist.							
		4 13 13	17	4										
10		8 10 12	16	5				2	10	--	15	61	12	Non-Plastic
		5 7 8	13	6				1	7	--	11	69	12	Non-Plastic
15		4 7 9	16	7										
19.0	660.4	3 5 4	16	8			Loose gray SANDY SILT (A-4a), little to some gravel; damp.							
20														
21.5	657.9	6 50/5	10	9			Severely weathered gray SANDSTONE.							50+
23.0	656.4						Soft to medium hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, laminated to very thinly bedded, slightly fractured.							
25		Core 60"	Rec 59"	RQD 80%	R-1									
28.0	651.4						Bottom of Boring - 28.0'							
30														

FILE: 0121-3070-03 (11/24/2006 2:05 PM)

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

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

LOG OF: Boring C-14 | Location: Sta. 473+69.0, 59.7 ft. RT of SR 823 CL | Date Drilled: 06/29/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
14.5' (includes drilling water, inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	668.8												
0.2	668.6						Topsoil - 2"						
		4 4 4	16	1		--	Stiff brown SILT (A-4b), some clay, trace fine to coarse sand, trace gravel; damp.	3	2	--	5	69	21
4.0	664.8	4 6 19	18	2		4.5+	Hard brown SANDY SILT (A-4a), little clay, some fine to coarse sand, some gravel; damp.	27	21	--	11	29	12
5													
5.5	663.3	5 7 11	17	3		3.5	Very stiff mottled brown and gray SILT (A-4b), little to some clay, trace fine sand; damp to moist.	0	0	--	4	77	19
		4 6 7	18	4		3.25		0	0	--	6	65	29
10													
10.5	658.3	3 4 4	18	5			Loose brown SANDY SILT (A-4a), little clay; moist.						
13.5	655.3	17 50/3	8	6			Severely weathered gray SANDSTONE.						
15.0	653.8	Core 60"	Rec 58"	RQD 48%	R-1		Soft to medium hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, laminated to very thinly bedded, slightly fractured.						
20.0	648.8						Bottom of Boring - 20.0'						
25													
30													

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

FILE: 0121-3070-03 [11/24/2006 2:05 PM]

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

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

LOG OF: Boring C-15 | Location: Sta. 472+64.1, 223.9 ft. RT of SR 823 CL | Date Drilled: 06/29/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
5.2' (includes drilling water, inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / PL — LL / Blows per foot
0	657.0													
		4 10 16	18	1		2.5	No topsoil Very stiff to hard brown SILT (A-4b), trace to some fine to coarse sand, trace gravel, little clay; damp.	1	12	--	13	59	15	
		10 20 30	18	2		4.5+		1	1	--	12	68	18	
5		13 50/3	9	3		4.5+	@ 7.5', auger refusal.							50+
7.5	649.5													
		Core 60"	Rec 60"	RQD 97%	R-1		Soft to medium hard gray SANDSTONE; very fine to fine grained, slightly weathered, laminated to very thinly bedded, slightly fractured.							
12.5	644.5						Bottom of Boring - 12.5'							
15														
20														
25														
30														

FILE: 0121-3070-03 [11/24/2006 2:05 PM]

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

LOG OF: Boring C-16 | Location: Sta. 504+86.1, 116.1 ft. LT of SR 823 CL | Date Drilled: 06/16/06

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (prior to coring)
1.0' (includes drilling water, inside hollowstem augers)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
0	706.5													Natural Moisture Content, % - ●
0.2	706.3						Topsoil - 2"							PL ⊢——⊣ LL
		3 6 15	15	1			Medium dense brown SANDY SILT (A-4a), trace silty clay; dry to damp. (Decomposed sandstone) @ 3.5', auger refusal.							Blows per foot - ○
3.5	703.0						Soft to medium hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, laminated to very thinly bedded, slightly fractured, contains rust stains.							10 20 30 40
5		Core 60"	Rec 55"	RQD 83%	R-1									
8.5	698.0						Bottom of Boring - 8.5'							
10														
15														
20														
25														
30														

GRADATION

FILE: 0121-3070-03 [11/24/2006 2:05 PM]

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

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

LOG OF: Boring C-17 | Location: Sta. 504+56.0, 22.5 ft. RT of SR 823 CL | Date Drilled: 06/16/06

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	699.0													
0.1	698.9						Topsoil - 1"							
		7 16 16	14	1			Dense to very dense brown SANDY SILT (A-4a), trace silty clay; dry to damp. (Decomposed sandstone)							
		6 50/4	10	2										50+
4.5	694.5						Soft to medium hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, laminated to very thinly bedded, moderately fractured, contains rust stains.							
		Core 60"	Rec 60"	RQD 82%	R-1									
9.5	689.5						Bottom of Boring - 9.5'							
10														
15														
20														
25														
30														

FILE: 0121-3070-03 | 11/24/2006 2:05 PM]

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

LOG OF: Boring C-53 | Location: Sta. 485+25.3, 177.8 ft. RT of SR 823 CL | Date Drilled: 09/14/06

WATER OBSERVATIONS: Water seepage at: 3.0'
Water level at completion: None (prior to coring)
2.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
0	630.5													
0.3	630.2						Topsoil - 4"							
		1 1 2	10	1		1.5	Stiff brown SILT (A-4b), little to some clay, trace fine sand; damp to moist.							
3.0	627.5													
		1 3 1	14	2		-	Loose brownish gray SANDY SILT (A-4a), trace to little clay, little coarse sand, trace gravel; moist.							
5							@ 6.0', becomes brown.							
6.5	624.0	5 50/3	7	3		-								50+
7.0	623.5						Soft brown SANDSTONE; very fine grained, highly weathered to decomposed.							
10		Core 60"	Rec 60"	RQD 85%	R-1		Soft to medium hard gray SANDSTONE; fine grained to very fine grained, slightly weathered, thinly bedded to medium bedded, moderately fractured. @ 8.0',8.1',8.5', low angle fractures.							
12.0	618.5						Bottom of Boring - 12.0'							
15														
20														
25														
30														

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

FILE: 0121-3070-03 (11/24/2006 2:06 PM)

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

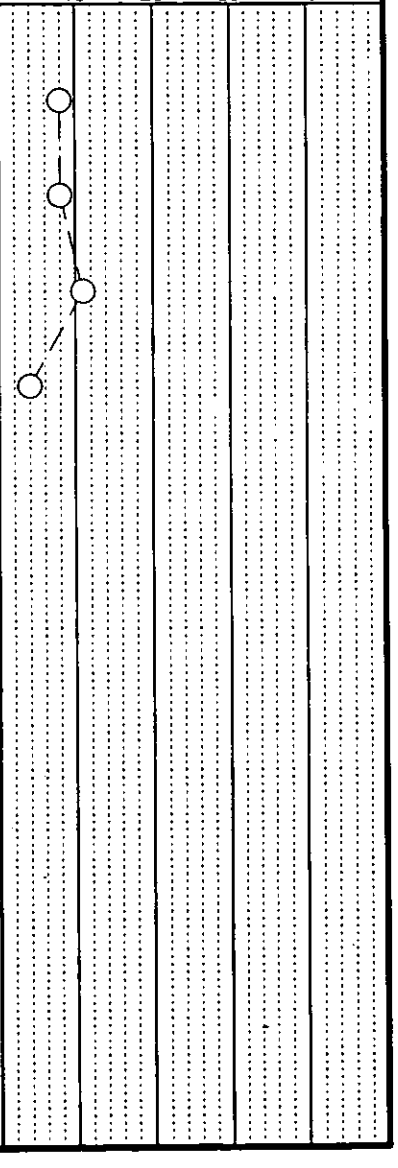
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring C-54 | Location: Sta. 484+80.3, 161.7 ft. RT of SR 823 CL | Date Drilled: 09/12/06

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	633.3												
0.4	632.9						Topsoil - 5"						
		3 3 5		1		--	Medium stiff to stiff brown SANDY SILT (A-4a), trace to little clay, trace gravel; damp to moist.						
		9 4 4		2		--							
5		5 5 6		3		1.0	@ 8.5'-10.0', little gravel.						
		2 2 2		4		--							
10													
11.0	622.3	Core 60"	Rec 60"	RQD 78%	R-1		Medium hard to hard gray SANDSTONE; fine grained, slightly weathered, thinly bedded to medium bedded, moderately fractured.						
15													
16.0	617.3						Bottom of Boring - 16.0'						
20													
25													
30													

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



FILE: 0121-3070-03 [11/24/2006 2:06 PM]

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

LOG OF: Boring R-353 | Location: Sta. 416+22.8, 102.8 ft. LT of SR 823 CL | Date Drilled: 7/28/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	792.9													
0.2	792.7						Topsoil - 2"							
		50/3	3	1			Severely weathered light brown SANDSTONE.							50+
		50/2	2	2										50+
5														
5.5	787.4						Medium hard light brown, reddish brown, and gray SANDSTONE; very fine to fine grained, highly weathered, thinly bedded to thickly bedded, broken with rust stained and clay filled fractures, contains occasional argillaceous beds.							
		Core 90"	Rec 90"	RQD 51%	R-1		@ 6.6'-7.1', high angle rust stained fracture.							
10														
15														
16.3	776.6						Medium hard light gray and dark gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, massively bedded, slightly fractured to unfractured.							
		Core 120"	Rec 120"	RQD 99%	R-2		@ 17.7', low angle clay filled fracture.							
20														
25														
		Core 120"	Rec 120"	RQD 100%	R-3									
30														

FILE: 0121-3070-03 [11/24/2006 2:08 PM]

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

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

LOG OF: Boring R-353 | Location: Sta. 416+22.8, 102.8 ft. LT of SR 823 CL | Date Drilled: 7/28/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢⊣ LL Blows per foot - ○ 10 20 30 40
30	762.9						Medium hard light gray and dark gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, massively bedded, slightly fractured to unfractured.							
35		Core 120"	Rec 120"	RQD 99%	R-4		@ 35.0', low angle clay filled fracture. @ 36.8', low angle clay filled fracture.							
40							@ 40.8', low angle clay filled fracture.							
45		Core 120"	Rec 120"	RQD 98%	R-5		@ 42.9'-43.0', broken. @ 43.0'-43.2', high angle fracture.							
50														
55		Core 120"	Rec 120"	RQD 100%	R-6									
60														

FILE: 0121-3070-03 [11/24/2006 2:08 PM]

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

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

LOG OF: Boring R-353 | Location: Sta. 416+22.8, 102.8 ft. LT of SR 823 CL | Date Drilled: 7/28/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
60	732.9						Medium hard light gray and dark gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, massively bedded, slightly fractured to unfractured.							
65		Core 120"	Rec 120"	RQD 94%	R-7		@ 69.3'-69.5', high angle fracture. @ 70.4'-70.5', high angle fracture. @ 71.1',71.6',72.6', low angle clay filled fractures; contains argillaceous laminations.							
70							@ ~~72.6~~'-75.4', turbidity bedding.							
75		Core 84"	Rec 84"	RQD 100%	R-8		@ 74.2'-74.6', fine to medium grained. @ 75.4'-75.9', fine to medium grained.							
80.0	712.9						Bottom of Boring - 80.0'							
85														
90														

FILE: 0121-3070-03 [11/24/2006 2:08 PM]

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

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

LOG OF: Boring R-354 | Location: Sta. 416+57.7, 23.1 ft. LT of SR 823 CL | Date Drilled: 7/27/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	792.3													
0.3	792.0						Topsoil - 3"							
		50/4	4	1			Severely weathered light brown SANDSTONE.							50+
		50/5	5	2										50+
5														
5.5	786.8						Medium hard brown and light gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, highly fractured with typically low angle rust stained to clean fractures.							
		Core 84"	Rec 71"	RQD 52%	R-1		@ 8.8'-9.0', high angle clay filled fracture.							
10														
13.4	778.9						@ 12.9'-13.0', high angle rust stained fracture.							
15							Hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, massively bedded, slightly fractured to unfractured.							
		Core 120"	Rec 120"	RQD 96%	R-2		@ 14.8'-15.9', brown. @ 15.2'-15.5', broken with low angle fracture. @ 14.8'-15.9', brown, broken with low angle fracture.							
20							@ 20.0', brown with a low angle fracture. @ 20.7'-30.0', brown with a low angle fracture.							
25							@ 24.4'-24.6', brown with a low angle fracture.							
		Core 120"	Rec 120"	RQD 100%	R-3									
30														

FILE: 0121-3070-03 [11/24/2006 2:08 PM]

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

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

LOG OF: Boring R-354 | Location: Sta. 416+57.7, 23.1 ft. LT of SR 823 CL | Date Drilled: 7/27/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION
30	762.3						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, pyritic, thinly bedded to massive, slightly fractured to unfractured.
35		Core 120"	Rec 120"	RQD 98%	R-4		@ 34.3', low angle clay filled fracture.
40							
45		Core 120"	Rec 120"	RQD 100%	R-5		
50							
55.0	737.3	Core 30"	Rec 20"	RQD 67%	R-6		Bottom of Boring - 55.0'
60							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

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

FILE: 0121-3070-03 [11/24/2006 2:08 PM]

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

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

LOG OF: Boring R-356 | Location: Sta. 420+12.6, 210.3 ft. LT of SR 823 CL | Date Drilled: 7/23/04 to 7/28/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION
0	857.6						
0.3	857.3						Topsoil - 4"/3" soil removed before drilling
		3 5 3	18	1		4.5+	Hard brown and gray SILT AND CLAY (A-6a), trace fine to coarse sand; damp.
		8 9 10	18	2		4.5+	
5		4 10 15	18	3		4.5+	
8.0	849.6						
		24 31 38	18	4			Soft gray SHALE; highly weathered.
10		30 35 48	18	5			
		32 50/4		6			
15							
15.5	842.1						
		Core 60"	Rec 57"	RQD 60%	R-1	*50	Soft brown and gray SHALE; highly weathered, arenaceous, micaceous, thinly laminated to thinly bedded, broken (contains numerous healed fractures); contains few arenaceous laminations.
20							
		Core 120"	Rec 102"	RQD 48%	R-2	*116	@ 24.0', gray. @ 24.9'-27.0', qu = 1,886 psi; SDI = 21.9%. @ 27.0'-29.0', SILTSTONE lens.
25							
29.0	828.6						Medium hard gray SANDSTONE; highly weathered.
30							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
69
83
50+

FILE: 0121-3070-03 [11/24/2006 2:08 PM]

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

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

LOG OF: Boring R-356 | Location: Sta. 420+12.6, 210.3 ft. LT of SR 823 CL | Date Drilled: 7/23/04 to 7/28/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	827.6						Medium hard gray SANDSTONE; highly weathered, micaceous, very thinly bedded to thinly bedded, very broken, contains numerous healed fractures, contains few to moderate argillaceous laminations.						
35		Core 120"	Rec 90"	RQD 55%	R-3	*193							
40							@ 41.9'-43.0', 45° dip on beds.						
43.2	814.4						Medium hard brown SANDSTONE; fine to medium grained, moderately weathered, micaceous, argillaceous, carbonaceous, broken; contains moderate argillaceous laminations.						
44.5	813.1	Core 120"	Rec 120"	RQD 42%	R-4		Soft to medium hard SHALE, decomposed to highly weathered, carbonaceous, arenaceous, highly fractured.						
45													
50							@ 54.5'-55.5' core loss, possible void						
55		Core 120"	Rec 109"	RQD 46%	R-5	*269	@ 54.0', dark gray, slightly carbonaceous, highly weathered. @ 56.1'-57.0' ferric SANDSTONE lens @ 56.4'-57.0', qu = 1,449 psi. @ 58.2'-58.9', brecciated layer. @ 58.9'-59.5', Ferric band.						
59.5	798.1												

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

FILE: 0121-3070-03 [11/24/2006 2:08 PM]

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

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

LOG OF: Boring R-356 | Location: Sta. 420+12.6, 210.3 ft. LT of SR 823 CL | Date Drilled: 7/23/04 to 7/28/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
60	797.6						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, thinly bedded to massive, contains argillaceous clasts, slightly fractured to unfractured; contains few argillaceous laminations.							PL — LL; 10 20 30 40
65		Core 120"	Rec 120"	RQD 95%	R-6	*457								
70														
75		Core 120"	Rec 120"	RQD 90%	R-7	*520								
80														
85		Core 120"	Rec 120"	RQD 99%	R-8	*445								
90														

FILE: 0121-3070-03 [11/24/2006 2:08 PM]

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

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

LOG OF: Boring R-356 | Location: Sta. 420+12.6, 210.3 ft. LT of SR 823 CL | Date Drilled: 7/23/04 to 7/28/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90	767.6						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, thinly bedded to massive, contains argillaceous clasts, slightly fractured to unfractured; contains few argillaceous laminations.						
95		Core 120"	Rec 120"	RQD 100%	R-9	*430	@ 98.0', pyritic.						
100													
105		Core 120"	Rec 120"	RQD 95%	R10	*645	@ 107.0', low angle fracture with argillaceous zone.						
110													
115		Core 120"	Rec 120"	RQD 97%	R11	*587	@ 113.9'-115.0', high angle partially clay filled fracture.						
120							@ 118.2', low angle fracture with clay seam.						

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

FILE: 0121-3070-03 [11/24/2006 2:08 PM]

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

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

LOG OF: Boring R-356 | Location: Sta. 420+12.6, 210.3 ft. LT of SR 823 CL | Date Drilled: 7/23/04 to 7/28/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
120	737.6	Core 120"	Rec 120"	RQD 100%	R12	*547	Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, thinly bedded to massive, contains argillaceous clasts, slightly fractured to unfractured.						
125													
130													
131.4	726.2	Core 120"	Rec 120"	RQD 72%	R13	*527	Medium hard to hard gray and dark gray SANDSTONE ; very fine to fine grained, moderately weathered, argillaceous, micaceous, laminated to medium bedded, moderately fractured; contains moderate to abundant argillaceous laminations, friable.						
135							@ 138.0'-139.5', qu = 11,462 psi (primarily sandstone), SDI = 89.5%.						
139.5	718.1	Core 60"	Rec 60"	RQD 92%	R14	*500	Hard gray SANDSTONE, very fine to fine grained, slightly to moderately weathered, argillaceous, thickly bedded, slightly fractured to unfractured.						
140													
144.5	713.1						Bottom of Boring - 144.5'						
145													
150													

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

FILE: 0121-3070-03 [11/24/2006 2:08 PM]

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

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

LOG OF: Boring R-359 | Location: Sta. 420+27.7, 176.5 ft. RT of SR 823 CL | Date Drilled: 7/27/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	815.9	8 13 14	18	1		4.5+	No Topsoil Hard brown and gray CLAY (A-7-6), little silt, trace fine sand, trace gravel; damp.						
5		9 15 17	18	2		4.5+							
5.5	810.4	31 50/3	9	3			Severely weathered gray SILTSTONE.						
7.0	808.9	Core 72"	Rec 72"	RQD 85%	R-1	*30	Very soft grayish brown SILTSTONE; decomposed to highly weathered, slightly arenaceous, thinly laminated to thinly bedded, highly fractures with low angle clay filled fractures. @ 10.0'-10.2' ironstone band @ 11.0'-12.4', qu = 339 psi, SDI = 5.9%.						
10													
14.8	801.1	Core 120"	Rec 120"	RQD 89%	R-2	*214	@ 14.4'-14.8', ferric zone, possible filled fractures. Hard brown and gray SANDSTONE; very fine to fine grained, highly weathered to moderately weathered, massively bedded, argillaceous, micaceous, slightly pyritic, slightly to moderately fractured; contains few argillaceous laminations. @ 17.9', low angle clay filled fracture. @ 19.5', low angle clay filled fracture.						
20													
25		Core 120"	Rec 120"	RQD 99%	R-3	*380	@ 23.6', low angle clay filled fracture. @ 26.7'-26.8', high angle fracture.						
30													

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

FILE: 0121-3070-03 [11/24/2006 2:08 PM]

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

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

LOG OF: Boring R-359 | Location: Sta. 420+27.7, 176.5 ft. RT of SR 823 CL | Date Drilled: 7/27/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	785.9						Hard brown and gray SANDSTONE; very fine to fine grained, highly weathered to moderately weathered, massively bedded, argillaceous, micaceous, slightly pyritic, slightly fractured to unfractured; contains few argillaceous laminations.							
35		Core 120"	Rec 120"	RQD 98%	R-4	*464	@ 38.4'-38.6', high angle clay filled fracture.							
40														
45		Core 120"	Rec 120"	RQD 100%	R-5	*390	@ 46.4', low angle clay filled fracture.							
50														
55		Core 120"	Rec 120"	RQD 100%	R-6	*402								
60														

FILE: 0121-3070-03 [11/24/2006 2:08 PM]

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

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

LOG OF: Boring R-359 | Location: Sta. 420+27.7, 176.5 ft. RT of SR 823 CL | Date Drilled: 7/27/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
60	755.9						Hard brown and gray SANDSTONE; very fine to fine grained, highly weathered to moderately weathered, massively bedded, argillaceous, micaceous, slightly pyritic, slightly fractured to unfractured; contains few argillaceous laminations.							
65		Core 120"	Rec 120"	RQD 100%	R-7	*509	@ 64.2'-64.7', qu = 11,633 psi.							
70														
75		Core 120"	Rec 120"	RQD 100%	R-8	*416								
80														
85		Core 120"	Rec 120"	RQD 98%	R-9	*481	@ 92.2'-92.3', ferric band.							
90														

FILE: 0121-3070-03 [11/24/2006 2:08 PM]

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

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

LOG OF: Boring R-359 | Location: Sta. 420+27.7, 176.5 ft. RT of SR 823 CL | Date Drilled: 7/27/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
90	725.9													
90.7	725.2						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, thinly bedded to massive.							
		Core 24"	Rec 24"	RQD 100%	R10	*62	Medium hard gray SHALE; slightly weathered, thinly laminated to thinly bedded, contains occasional siltstone interbeds. @ 92.0', 92.3', low angle clay filled fractures.							
94.3	721.6						Hard gray SANDSTONE; fine to medium grained, moderately weathered, thinly bedded.							
95.0	720.9						Bottom of Boring - 95.0'							
100														
105														
110														
115														
120														

FILE: 0121-3070-03 [11/24/2006 2:08 PM]

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

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

LOG OF: Boring R-360 | Location: Sta. 424+20.5, 196.2 ft. LT of SR 823 CL | Date Drilled: 7/22/04 to 7/23/04

WATER OBSERVATIONS: Water seepage at: 11.3' - 11.7'
Water level at completion: None (Prior to coring)
11.0' (at the start of 7/23/04)
9.0' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	836.1						No Topsoil/1.4' soil removed before drilling						
		10 11 12	18	1		2.25	Very stiff brown and gray SANDY SILT (A-4a), some gravel, little clay; contains sandstone fragments; damp.						
		9 13 15	18	2		2.5		27	13	--	16	26	18
5.5	830.6						Very stiff brown and gray SILT (A-4b); some clay; little fine to coarse sand; damp.						
		9 11 11	18	3		2.25		2	3	--	15	58	22
8.0	828.1						Hard brown CLAY (A-7-6); damp.						
		11 12 16	9	4		4.5+							
10.5	825.6						Severely weathered dark brown CLAYSHALE.						
		20 28 33	18	5									
		24 40 50/5	17	6									
15.5	820.6						Very soft to soft brown and gray CLAYSHALE; highly weathered to decomposed, micaceous, thinly laminated to thinly bedded, moderately fractured .						
		Core 90"	Rec 90"	RQD 86%	R-1	*17							
22.4	813.7						Soft black SHALE; moderately to highly weathered, carbonaceous, arenaceous, thinly laminated to thinly bedded, fractured; contains few arenaceous laminations, very fissile. @ 25.0',25.6', 25.9', low angle weathered fracture.						
		Core 120"	Rec 120"	RQD 75%	R-2	*53	@ 25.9'-26.4', high angle fracture.						
29.0	807.1						Medium hard gray SHALE; moderately to highly weathered.						

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
61
50+

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-360 | Location: Sta. 424+20.5, 196.2 ft. LT of SR 823 CL | Date Drilled: 7/22/04 to 7/23/04

WATER OBSERVATIONS: Water seepage at: 11.3' - 11.7'
Water level at completion: None (Prior to coring)
11.0' (at the start of 7/23/04)
9.0' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	806.1						Medium hard gray SHALE; moderately to highly weathered, micaceous, thinly laminated to thinly bedded. @ 32.3', contains small arenaceous clasts.							
32.8	803.3						Hard gray very fine grained SANDSTONE; moderately weathered, micaceous, very thinly bedded to thinly bedded, (gradational change). @ 33.7'-34.7', contains ferric zones.							
34.5	801.6													
35		Core 120"	Rec 120"	RQD 98%	R-3	*194	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, thinly bedded to thickly bedded, (gradational change), slightly fractured to unfractured. @ 35.0'-35.5', qu = 11,937 psi. @ 38.1', pyritic.							
40														
45		Core 120"	Rec 120"	RQD 100%	R-4	*549								
50														
55		Core 120"	Rec 120"	RQD 100%	R-5	*506	@ 58.0'-58.2', very hard ferric band.							
60														

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-360 | Location: Sta. 424+20.5, 196.2 ft. LT of SR 823 CL | Date Drilled: 7/22/04 to 7/23/04

WATER OBSERVATIONS: Water seepage at: 11.3' - 11.7'
Water level at completion: None (Prior to coring)
11.0' (at the start of 7/23/04)
9.0' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
60	776.1						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, thinly bedded to thickly bedded, (gradational change), slightly fractured to unfractured.							
65		Core 120"	Rec 120"	RQD 100%	R-6	*394								
70														
75		Core 120"	Rec 120"	RQD 100%	R-7	*547								
80														
85		Core 120"	Rec 120"	RQD 100%	R-8	*488								
90														

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-360 | Location: Sta. 424+20.5, 196.2 ft. LT of SR 823 CL | Date Drilled: 7/22/04 to 7/23/04

WATER OBSERVATIONS: Water seepage at: 11.3' - 11.7'
Water level at completion: None (Prior to coring)
11.0' (at the start of 7/23/04)
9.0' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢ LL Blows per foot - ○ 10 20 30 40
90	746.1						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, thinly bedded to thickly bedded, (gradational change), slightly fractured to unfractured.							
95		Core 120"	Rec 120"	RQD 100%	R-9	*553								
100														
105							@ 104.4'-113.6', contains rust stained bands.							
		Core 120"	Rec 120"	RQD 100%	R10	*449	@ 106.9'-108.8', qu = 12,620 psi, SDI = 98.3%.							
110														
							@ 112.7'-103.0', 110.2'-113.0', friable zone.							
113.8	722.3						@ 113.6'-113.8', medium hard, medium to coarse grained, poorly cemented.							
115							Hard gray and light gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, very thinly bedded to medium bedded.							
		Core 120"	Rec 120"	RQD 100%	R11	*503								
120														

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-360 | Location: Sta. 424+20.5, 196.2 ft. LT of SR 823 CL | Date Drilled: 7/22/04 to 7/23/04

WATER OBSERVATIONS: Water seepage at: 11.3' - 11.7'
Water level at completion: None (Prior to coring)
11.0' (at the start of 7/23/04)
9.0' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
120	716.1						Hard gray and light gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, very thinly bedded to medium bedded.							
125		Core 84"	Rec 84"	RQD 100%	R12	*479	@ 125.9', slightly pyritic.							
130.0	706.1						Bottom of Boring - 130.0'							
135														
140														
145														
150														

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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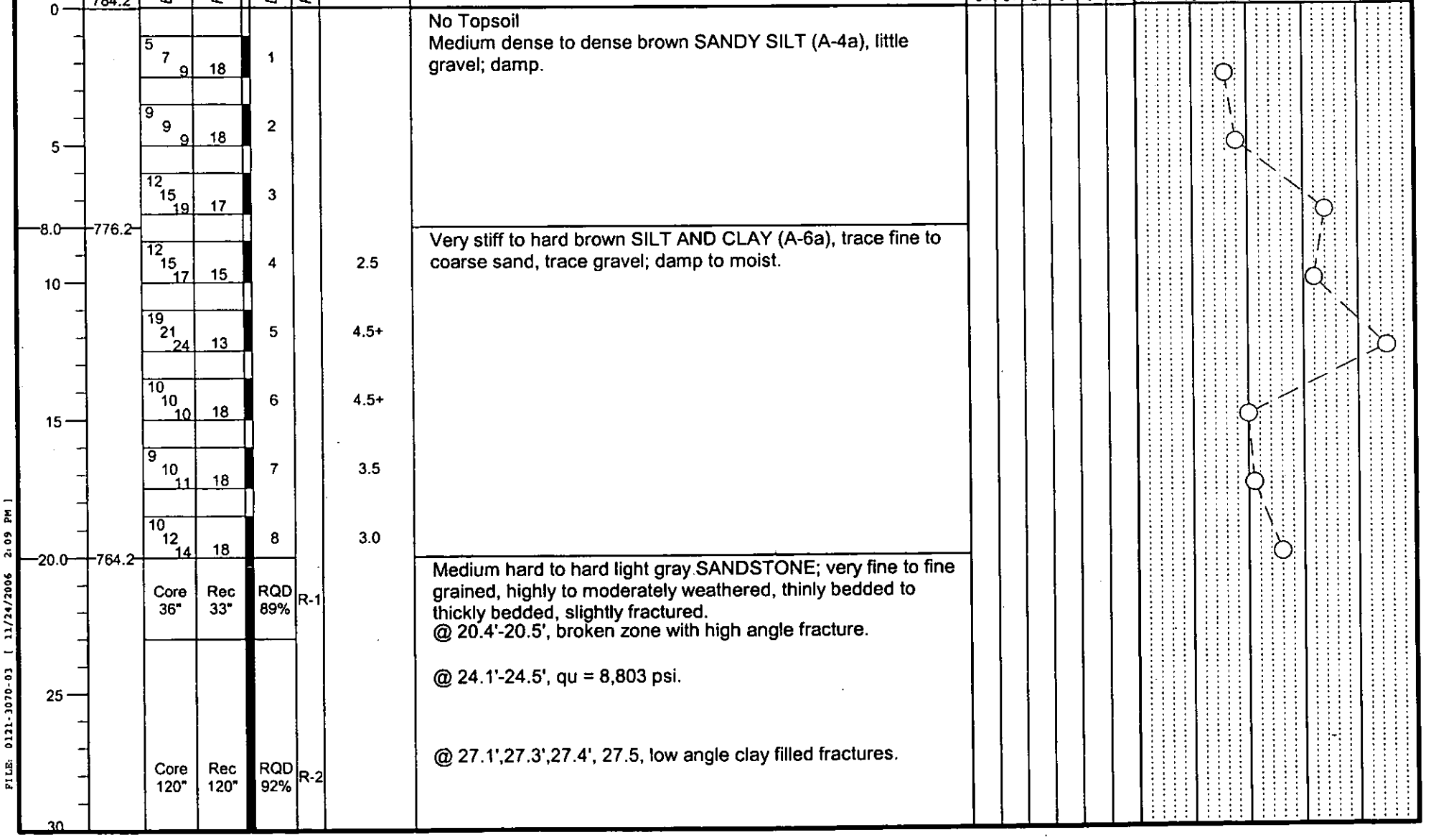
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-362 | Location: Sta. 423+86.0, 12.1 ft. RT of SR 823 CL | Date Drilled: 7/23/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	784.2												
		5 7 9	18	1			No Topsoil Medium dense to dense brown SANDY SILT (A-4a), little gravel; damp.						
		9 9 9	18	2									
5		12 15 19	17	3									
8.0	776.2												
		12 15 17	15	4		2.5	Very stiff to hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp to moist.						
10		19 21 24	13	5		4.5+							
		10 10 10	18	6		4.5+							
15		9 10 11	18	7		3.5							
		10 12 14	18	8		3.0							
20.0	764.2												
		Core 36"	Rec 33"	RQD 89%	R-1		Medium hard to hard light gray SANDSTONE; very fine to fine grained, highly to moderately weathered, thinly bedded to thickly bedded, slightly fractured. @ 20.4'-20.5', broken zone with high angle fracture.						
25							@ 24.1'-24.5', qu = 8,803 psi.						
		Core 120"	Rec 120"	RQD 92%	R-2		@ 27.1',27.3',27.4', 27.5, low angle clay filled fractures.						
30													

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



FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-362 | Location: Sta. 423+86.0, 12.1 ft. RT of SR 823 CL | Date Drilled: 7/23/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	754.2						Medium hard to hard light gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, thinly bedded to thickly bedded, slightly fractured to unfractured. @ 32.7', low angle clay filled fracture.							
35		Core 120"	Rec 120"	RQD 100%	R-3									
40														
45.0	739.2	Core 24"	Rec 24"	RQD 100%	R-4		Bottom of Boring - 45.0'							
50														
55														
60														

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-363 | Location: Sta. 428+11.8, 258.2 ft. LT of SR 823 CL | Date Drilled: 7/20/04 to 7/22/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0.2	899.6 / 899.4						Topsoil - 2"							
		6 7 9	17	1		4.5+	Hard brown SILT AND CLAY (A-6a), trace gravel; damp.							
3.0	896.6						Soft brown and gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous.							
		5 11 20	18	2										
5		17 11 20	18	3										
		25 48 40	18	4										88
10		8 27 35	18	5										62
13.0	886.6						Soft black SHALE; fine grained, moderately weathered, carbonaceous; contains coal stringers.							
14.5	885.1	13 39 45	18	6A 6B			Soft gray CLAYSHALE; moderately weathered, sulfur stains.							84
15		22 33 38	16	7										71
18.0	881.6						Soft gray SHALE; fine grained, moderately weathered.							
		37 38 40	13	8										78
20		25 50/4	10	9										50+
		37 38 50/4	18	10										50+
25.0	874.6	Core 60"	Rec 56"	RQD 70%	R-1		Soft dark gray SHALE; highly weathered, carbonaceous, micaceous, arenaceous, laminated to thinly bedded, highly fractured. @ 28.4'-29.4', SDI = 34.6% @ 28.7'-30.0', qu = 1,652 psi, SDI = 20.1%.							
30														

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-363 | Location: Sta. 428+11.8, 258.2 ft. LT of SR 823 CL | Date Drilled: 7/20/04 to 7/22/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	869.6						Soft to medium hard dark gray SHALE; highly weathered, carbonaceous, micaceous, laminated to thinly bedded, slightly fractured; contains few arenaceous laminations and dust.							
35		Core 120"	Rec 120"	RQD 75%	R-2									
40							@ 40.0', arenaceous.							
45		Core 120"	Rec 120"	RQD 97%	R-3									
47.2	852.4						Medium hard gray and dark gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous, laminated to thinly bedded; contains turbidity beds, moderately fractured to unfractured.							
50														
55		Core 120"	Rec 120"	RQD 98%	R-4									
60														

FILE: 0121-3070-03 [11/14/2006 2:09 PM]

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

LOG OF: Boring R-363 | Location: Sta. 428+11.8, 258.2 ft. LT of SR 823 CL | Date Drilled: 7/20/04 to 7/22/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	839.6						Hard gray and dark gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, laminated to thinly bedded, turbidity bedded with carbonaceous stringers. @ 60.2'-63.3', fine to medium grained.						
63.3	836.3						Medium hard dark gray SILTSHALE; moderately weathered, arenaceous, carbonaceous, laminated to thinly bedded, highly to moderately fractured; contains arenaceous laminations and dust. @ 63.3'-64.7', 65.0'-66.8', highly fractured to broken with high angle fractures.						
65		Core 120"	Rec 116"	RQD 63%	R-5								
70													
75		Core 120"	Rec 119"	RQD 98%	R-6		@ 75.3'-76.9', fine to coarse grained ferric layers. @ 76.1'-76.4', carbonaceous shale layers						
76.9	822.7						Hard light gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, thinly bedded to thickly bedded. @ 76.9'-77.5', rust stained.						
80													
85		Core 120"	Rec 118"	RQD 98%	R-7								
90													

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

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-363 | Location: Sta. 428+11.8, 258.2 ft. LT of SR 823 CL | Date Drilled: 7/20/04 to 7/22/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90	809.6						Hard light gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded.							
95		Core 120"	Rec 120"	RQD 99%	R-8		@ 91.0', rust stained band							
100														
105		Core 120"	Rec 120"	RQD 100%	R-9									
110														
115		Core 120"	Rec 118"	RQD 96%	R10									
120														

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-363 | Location: Sta. 428+11.8, 258.2 ft. LT of SR 823 CL | Date Drilled: 7/20/04 to 7/22/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION
120	779.6						Hard light gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded.
125		Core 120"	Rec 118"	RQD 98%	R11		@ 125.0'-125.4', qu = 11,597 psi.
130							@ 128.7'-129.2', pitted and rust stained. @ 129.3', low angle clay filled fracture.
135		Core 120"	Rec 118"	RQD 98%	R12		
140							
145		Core 120"	Rec 116"	RQD 96%	R13		
150							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

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

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-363 | Location: Sta. 428+11.8, 258.2 ft. LT of SR 823 CL | Date Drilled: 7/20/04 to 7/22/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
150	749.6						Hard light gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, massively bedded, slightly fractured to unfractured.							
155		Core 120"	Rec 120"	RQD 98%	R14		@ 153.8'-154.3', three high angle fractures.							
160														
165		Core 120"	Rec 120"	RQD 100%	R15		@ 169.7'-173.5', turbidity bedding with rust stained bands.							
170														
173.5	726.1													
175		Core 120"	Rec 120"	RQD 93%	R16		Medium hard to hard gray and dark gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, massive, slightly fractured to unfractured. @ 173.5'-174.0', thinly bedded to thickly bedded. @ 175.4'-176.8', qu = 12,551 psi, SDI = 98.0%.							
180														

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-363 | Location: Sta. 428+11.8, 258.2 ft. LT of SR 823 CL | Date Drilled: 7/20/04 to 7/22/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
180	719.6						Medium hard to hard gray and dark gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, massive, slightly fractured to unfractured. .							
185		Core 120"	Rec 120"	RQD 96%	R17		@ 184.6', pyritic.							
190														
195		Core 120"	Rec 120"	RQD 100%	R18									
200.0	699.6						Bottom of Boring - 200.0'							
205														
210														

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-365 | Location: Sta. 428+30.5, 57.7 ft. RT of SR 823 CL | Date Drilled: 7/21/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	875.5						No Topsoil						
		5 8 10	18	1		4.5+	Hard brown SILTY CLAY (A-6b); contains sandstone fragments; damp.						
		8 13 27	18	2		4.5+		34	7	--	6	17	36
5		8 15 28	18	3		4.5+	@ 6.0', gray.						
8.0	867.5												
		14 19 31	18	4			Severely weathered brown and gray SHALE, interbedded with SANDSTONE.						
10		10 17 24	18	5									
		16 20 28	18	6									
15		16 50/5	11	7									
17.5	858.0												
20		Core 66"	Rec 66"	RQD 89%	R-1		Soft black SHALE; moderately to highly weathered, arenaceous, carbonaceous, thinly laminated to thinly bedded, slightly fractured; contains few arenaceous laminations. @ 18.4'-18.8', qu = 1,677 psi. @ 18.9'-20.0', SDI = 30.8%.						
25													
27.7	847.8	Core 120"	Rec 120"	RQD 98%	R-2		Medium hard light gray SANDSTONE; very fine to fine grained, highly to moderately weathered, contains moderate argillaceous laminations						
30													

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

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-365 | Location: Sta. 428+30.5, 57.7 ft. RT of SR 823 CL | Date Drilled: 7/21/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	845.5						@ 29.2'-30.2', SDI = 59.5%. Medium hard light gray SANDSTONE; very fine to fine grained, highly to moderately weathered, argillaceous, micaceous, laminated to medium bedded, contains few to moderate argillaceous laminations.						
35		Core 120"	Rec 114"	RQD 88%	R-3		@ 35.2', high angle highly weathered fracture. @ 36.9', becomes laminated to thin bedded, contains occasional coal or carbonaceous laminae/stringer.						
40							@ 40.8',41.6', high angle highly weathered fracture.						
42.8	832.7						Soft to medium hard black SHALE; highly to moderately weathered, arenaceous, micaceous, carbonaceous, laminated to thinly bedded, contains thin arenaceous laminations.						
45		Core 120"	Rec 120"	RQD 98%	R-4		@ 46.1'-47.3', qu = 5,197 psi, SDI = 32.4%.						
50							@ 53.5'-54.1', decomposed to highly weathered.						
55							@ 56.0'-56.2', rust stained band.						
56.2	819.3						Hard light gray SANDSTONE; very fine to fine grained, moderately weathered, micaceous, slightly argillaceous, massively bedded, slightly fractured to unfractured.						
60		Core 120"	Rec 120"	RQD 53%	R-5								

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

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

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

LOG OF: Boring R-365 | Location: Sta. 428+30.5, 57.7 ft. RT of SR 823 CL | Date Drilled: 7/21/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
60	815.5						Hard light gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, massively bedded, slightly fractured to unfractured.							
65		Core 120"	Rec 120"	RQD 98%	R-6									
70														
75		Core 120"	Rec 120"	RQD 100%	R-7									
80														
85		Core 120"	Rec 120"	RQD 100%	R-8									
90														

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-365 | Location: Sta. 428+30.5, 57.7 ft. RT of SR 823 CL | Date Drilled: 7/21/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90	785.5						Hard light gray SANDSTONE; very fine to fine grained, slightly weathered micaceous, slightly argillaceous, massively bedded, slightly fractured to unfractured.							
95		Core 120"	Rec 120"	RQD 100%	R-9									
100														
105		Core 120"	Rec 120"	RQD 100%	R10									
110														
115		Core 120"	Rec 120"	RQD 100%	R11		@ 114.4'-114.8', rust stained band.							
120														

FILE: 0121-3070-03 (11/24/2006 2:09 PM)

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

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

LOG OF: Boring R-365 | Location: Sta. 428+30.5, 57.7 ft. RT of SR 823 CL | Date Drilled: 7/21/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION
120	755.5						WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 7.4' (includes drilling water) Hard light gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, slightly fractured to unfractured, massively bedded.
125		Core 120"	Rec 120"	RQD 99%	R12		
130							@ 129.0', low angle fractures.
135		Core 120"	Rec 120"	RQD 100%	R13		
140							
145		Core 120"	Rec 120"	RQD 100%	R14		@ 148.4', low angle fracture. @ 148.8'-150.8', medium hard, fine to medium grained, poorly cemented.
150							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

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

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-365 | Location: Sta. 428+30.5, 57.7 ft. RT of SR 823 CL | Date Drilled: 7/21/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
150	725.5						Hard light gray SANDSTONE; fine to fine grained, slightly weathered, micaceous, slightly argillaceous, massively bedded.						
155		Core 84"	Rec 84"	RQD 100%	R15		@ 151.1', low angle fracture.						
160.0	715.5						Bottom of Boring - 160.0'						
165													
170													
175													
180													

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

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-367 | Location: Sta. 432+20.4, 217.6 ft. LT of SR 823 CL | Date Drilled: 7/28/04 to 7/29/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	845.8												
0.2	845.6						Topsoil - 2"						
		3 4 5	18	1		4.5+	Hard brown and gray SILT (A-4b), little to some clay; little fine to coarse sand, trace gravel; damp.						
		13 14 15	18	2		4.25							
5		12 14 15	18	3		4.5+		5	4	--	11	61	20
		4 8 12	18	4		4.5+							
10													
10.5	835.3	12 50/5	9	5			Severely weathered gray and brown CLAYSHALE.						
		20 50/4	10	6									
15.0	830.8	Core 60"	Rec 60"	RQD 50%	R-1	*9	Medium hard brown CLAYSHALE; highly weathered to decomposed, laminated, broken to highly fractured with low angle rust stained fractures. @ 15.4'-15.6', high angle fractures.						
20							@ 21.5'-21.8', rust stained beds. @ 22.5'-24.0', qu = 8,200 psi, SDI = 71.0%.						
25		Core 120"	Rec 120"	RQD 88%	R-2	*409	@ 29.1'-30.5', sandstone seam.						
30													

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

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

LOG OF: Boring R-367 | Location: Sta. 432+20.4, 217.6 ft. LT of SR 823 CL | Date Drilled: 7/28/04 to 7/29/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Pass /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	815.8													
30.5	815.3						Hard gray SHALE; decomposed to highly weathered, thinly laminated to laminated, moderately to highly fractured; contains few arenaceous laminations.							
35		Core 120"	Rec 120"	RQD 71%	R-3	*766								
37.5	808.3						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, thinly bedded to medium bedded, moderately to slightly fractured.							
40							@ 41.2'-42.5', qu = 11,791 psi, SDI = 98.4%.							
45		Core 120"	Rec 112"	RQD 78%	R-4	*494								
50							@ 48.8', argillaceous clast evident.							
55		Core 120"	Rec 120"	RQD 100%	R-5	*411								
60														

FILE: 0121-3070-03 (11/24/2006 2:09 PM)

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

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

LOG OF: Boring R-367 | Location: Sta. 432+20.4, 217.6 ft. LT of SR 823 CL | Date Drilled: 7/28/04 to 7/29/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / PL — LL / Blows per foot
60	785.8						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, thinly bedded to medium bedded, slightly fractured to unfractured.							10 20 30 40
65		Core 120"	Rec 120"	RQD 100%	R-6	*455								
70														
75		Core 120"	Rec 120"	RQD 100%	R-7	*527								
80							@ 81.6'-81.8', brown and rust stained. @ 82.2'-82.4', brown, rust stained, pitted and fossiliferous.							
85		Core 120"	Rec 120"	RQD 100%	R-8	*514								
90							@ 88.8', argillaceous clast and few argillaceous laminations.							

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-367 | Location: Sta. 432+20.4, 217.6 ft. LT of SR 823 CL | Date Drilled: 7/28/04 to 7/29/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
90	755.8						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, thinly bedded to medium bedded, contains occasional siltstone beds. @ 90.4'-90.7', rust stained band. @ 90.7', low angle clay coated fracture.						
95		Core 120"	Rec 120"	RQD 100%	R-9	*415	@ 97.5', low angle clay coated fracture. @ 99.1', very thin clay seam.						
100													
105		Core 120"	Rec 120"	RQD 100%	R10	*441	@ 107.0'-107.2', contains moderate argillaceous laminations. @ 107.6', low angle fracture. @ 109.6',109.8', very thin clay seam.						
110							@ 112.0', very thin clay seam.						
114.0	731.8												
115		Core 120"	Rec 120"	RQD 83%	R11	*465	Medium hard to hard dark gray and gray SANDSTONE; very fine to fine grained, moderately weathered to highly weathered, laminated to thin bedded, argillaceous, micaceous, highly fractured; contains moderate to abundant argillaceous laminations, fissile. @ 117.5'-118.1', medium grained, poorly cemented. @ 117.5'-119.4', qu = 7,637 psi, SDI = 92.2%.						
120													

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

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-367 | Location: Sta. 432+20.4, 217.6 ft. LT of SR 823 CL | Date Drilled: 7/28/04 to 7/29/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION
120	725.8						Medium hard to hard dark gray and gray SANDSTONE; very fine to fine grained, moderately weathered to highly weathered, laminated to thin bedded, argillaceous, micaceous, pyritic, moderately fractured to slightly fractured; contains few argillaceous laminations.
125		Core 120"	Rec 120"	RQD 88%	R12	*584	@ 126.2', very thin clay seam.
							@ 118.1'-127.8', contains turbidity bedded zones.
130							
135		Core 120"	Rec 120"	RQD 100%	R13	*388	@ 135.9', slightly pyritic.
140		Core 60"	Rec 60"	RQD 100%	R14	*478	
145.0	700.8						Bottom of Boring - 145.0'
150							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

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

FILE: 0121-3070-03 [11/24/2006 2:09 PM]

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

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

LOG OF: Boring R-369 | Location: Sta. 432+21.3, 80.1 ft. RT of SR 823 CL | Date Drilled: 8/2/04 to 8/3/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION
0	805.9						WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (Prior to coring) 8.4' (Includes drilling water)
0.2	805.7						Topsoil-3"
		6 24 50/3	15	1			Medium dense gray SILT (A-4b), trace fine to coarse sand; contains roots; dry to damp.
4.5	801.4						
5		Core 102"	Rec 102"	RQD 52%	R-1	*331	Medium hard brown and gray SANDSTONE; moderately to highly weathered, slightly argillaceous, micaceous, highly fractured. @ 4.8'-4.9', filled fractures with rootlets. @ 5.5'-5.9', broken. @ 7.2'-7.3', 7.5'-7.6', 10.0'- 10.1', high angle fractures.
10							
							@ 13.7'-13.9', 14.1'-14.4', high angle fractures, rust stains. @ 15.0'-15.3', broken zone, rust stained.
15.3	790.6	Core 120"	Rec 120"	RQD 90%	R-2	*348	Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, laminated to thinly bedded, moderately to slightly fractured. @ 18.1', low angle moderately rust stained fractures. @ 19.1', low angle rust stained fractures.
20							
							@ 23.8', low angle fractures.
25		Core 120"	Rec 120"	RQD 100%	R-3	*517	@ 27.0', occassional pyrite nodules.
30							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

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

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

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

LOG OF: Boring R-369 | Location: Sta. 432+21.3, 80.1 ft. RT of SR 823 CL | Date Drilled: 8/2/04 to 8/3/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	775.9						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, laminated to thinly bedded, slightly fractured to unfractured.							
35		Core 120"	Rec 120"	RQD 97%	R-4	*530								
40							@ 41.0' low angle fractures							
45		Core 120"	Rec 120"	RQD 100%	R-5	*513								
50														
55		Core 120"	Rec 120"	RQD 100%	R-6	*430								
60														

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

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

LOG OF: Boring R-369 | Location: Sta. 432+21.3, 80.1 ft. RT of SR 823 CL | Date Drilled: 8/2/04 to 8/3/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	745.9						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, laminated to thinly bedded, slightly fractured to unfractured. @ 60.6'-61.0', qu = 7,165 psi.						
65													
67.5	738.4	Core 120"	Rec 120"	RQD 96%	R-7	*439	Medium hard gray SANDSTONE; highly to moderately weathered, micaceous, laminated to thinly bedded; contains few argillaceous laminations, friable. @ 68.7',71.5',71.8', low angle clay-filled fractures. @ 72.1'-73.2', slightly weathered, poorly cemented.						
70													
73.2	732.7						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, massive. @ 73.2'-74.3', rust stained, contains few argillaceous laminations.						
75													
		Core 120"	Rec 120"	RQD 100%	R-8	*426							
80													
85		Core 120"	Rec 120"	RQD 100%	R-9	*703							
90													

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

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

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

LOG OF: Boring R-369 | Location: Sta. 432+21.3, 80.1 ft. RT of SR 823 CL | Date Drilled: 8/2/04 to 8/3/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90	715.9						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, massively bedded, slightly fractured to unfractured.							
		Core 24"	Rec 24"	RQD 100%	R10	*547								
95.0	710.9						Bottom of Boring - 95.0'							
100														
105														
110														
115														
120														

FILE: 0121-3070-03 (11/24/2006 2:10 PM)

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

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

LOG OF: Boring R-370 | Location: Sta. 434+14.1, 171.9 ft. LT of SR 823 CL | Date Drilled: 7/29/04 to 7/30/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION
0	787.7						
0.3	787.4						Topsoil - 4"
		12 50/5	0	1			Medium dense to dense brown GRAVEL WITH SAND (A-1-b), little silt; (Auger Cuttings); dry to damp.
4.0	783.7						Medium hard brown SANDSTONE; very fine to fine grained, highly weathered to decomposed, argillaceous, broken to highly fractured.
5		Core 108"	Rec 108"	RQD 35%	R-1	*310	
10							@ 11.5'-13.0', qu = 6,244 psi, SDI = 95.4%.
15		Core 120"	Rec 120"	RQD 94%	R-2	*504	
19.5	768.2						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, moderately to slightly argillaceous, micaceous, slightly fractured.
20							@ 22.6'-23.1', rust stained.
25		Core 120"	Rec 114"	RQD 95%	R-3	*532	
30							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

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

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

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

LOG OF: Boring R-370 | Location: Sta. 434+14.1, 171.9 ft. LT of SR 823 CL | Date Drilled: 7/29/04 to 7/30/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	757.7						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, slightly argillaceous, micaceous, slightly fractured to unfractured.							
35		Core 120"	Rec 120"	RQD 100%	R-4	*439	@ 33.4',34.2', high angle clay coated fractures. @ 33.4'-34.2', rust stained. @ 34.2'-35.5', qu = 10,810 psi, SDI = 95.2%.							
40														
45		Core 120"	Rec 120"	RQD 100%	R-5	*470								
50														
55		Core 120"	Rec 120"	RQD 96%	R-6	*453	@ 54.8'-60.8', contains few to moderate argillaceous, laminations, turbidity bedding, rust stains.							
60														

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

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

LOG OF: Boring R-370 | Location: Sta. 434+14.1, 171.9 ft. LT of SR 823 CL | Date Drilled: 7/29/04 to 7/30/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢——⊣ LL Blows per foot - ○ 10 20 30 40
60	727.7						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, slightly argillaceous, micaceous, slightly fractured to unfractured. @ 61.2'-62.4', medium hard to hard, medium grained, moderately weathered, poorly cemented.							
65		Core 120"	Rec 120"	RQD 100%	R-7	*420	@ 66.8', occasional calcareous layer. @ 67.2', occasional pyrite nodule.							
70														
75		Core 120"	Rec 120"	RQD 100%	R-8	*570	@ 75.1', few arenaceous laminations.							
80														
85		Core 84"	Rec 84"	RQD 100%	R-9	*569	@ 83.0', pyritic.							
90.0	697.7						Bottom of Boring - 90.0'							

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

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

LOG OF: Boring R-370 | Location: Sta. 434+14.1, 171.9 ft. LT of SR 823 CL | Date Drilled: 7/29/04 to 7/30/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90	697.7													
95														
100														
105														
110														
115														
120														

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

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

LOG OF: Boring R-371 | Location: Sta. 434+11.0, 82.9 ft. LT of SR 823 CL | Date Drilled: 7/29/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	770.5												
0.4	770.1						Topsoil - 5"/2.2' soil removed before drilling						
		9 12 15	18	1			Medium dense to dense brown SANDY SILT (A-4a), trace to little clay, trace gravel; contains sandstone fragments; damp.						
5		15 15 15	16	2									
5.5	765.0						Medium hard brown SANDSTONE; very fine to fine grained, highly weathered, broken to highly fractured; contains clay filled fractures.						
10		Core 90"	Rec 90"	RQD 59%	R-1	*424	@ 10.6',11.4', thin clay seam.						
							@ 13.4',13.8',14.2', low angle clay coated fracture.						
14.6	755.9						Medium hard to hard gray SANDSTONE, very fine to fine grained, moderately weathered, argillaceous, micaceous, massive, slightly fractured to unfractured.						
15		Core 120"	Rec 120"	RQD 94%	R-2	*455	@ 15.7'-15.9', high angle fractures, clay seam.						
20							@ 19.9', low angle clay filled fracture. @ 20.0', 20.7', low angle rust stained fractures.						
							@ 22.0', slightly weathered.						
25							@ 26.2', occassional pyrite nodule.						
		Core 120"	Rec 120"	RQD 93%	R-3	*328							
30													

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

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

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

LOG OF: Boring R-371 | Location: Sta. 434+11.0, 82.9 ft. LT of SR 823 CL | Date Drilled: 7/29/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	740.5						Medium hard to hard gray SANDSTONE, very fine to fine grained, moderately weathered, argillaceous, micaceous, massive, slightly fractured to unfractured.						
31.8	738.7						Medium hard gray SANDSTONE; very fine grained, moderately weathered, thinly laminated to massively bedded, turbidity bedded, slightly fractured; contains few to moderate argillaceous laminations. @ 32.0'-33', friable. @ 35.3'-36.7', medium grained, poorly cemented.						
35													
36.7	733.8	Core 120"	Rec 120"	RQD 96%	R-4	*422	Hard gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, argillaceous, pyritic, laminated to medium bedded, slightly fractured to unfractured. @ 38.7'-38.8', rust stained.						
40													
45							@ 35.1'-35.3', shale bed.						
50		Core 120"	Rec 120"	RQD 100%	R-5	*458							
55		Core 120"	Rec 120"	RQD 100%	R-6	*319							
60													

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

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

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

LOG OF: Boring R-371 | Location: Sta. 434+11.0, 82.9 ft. LT of SR 823 CL | Date Drilled: 7/29/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	710.5						Hard gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, argillaceous, pyritic, massively bedded, slightly fractured.						
							@ 63.0'-65.9', very pyritic.						
65		Core 120"	Rec 120"	RQD 100%	R-7	*411							
70													
75		Core 120"	Rec 120"	RQD 100%	R-8	*562							
80													
85		Core 84"	Rec 78"	RQD 93%	R-9	*498	@ 86.7', low angle fractures. @ 87.5'-85.6', rust stained.						
90.0	680.5						Bottom of Boring - 90.0'						

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

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

LOG OF: Boring R-371 | Location: Sta. 434+11.0, 82.9 ft. LT of SR 823 CL | Date Drilled: 7/29/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢——⊣ LL Blows per foot - ○ 10 20 30 40
90	680.5													
95														
100														
105														
110														
115														
120														

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

LOG OF: Boring R-373 | Location: Sta. 434+08.2, 141.1 ft. RT of SR 823 CL | Date Drilled: 8/4/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	767.5												
0.3	767.2						Topsoil - 4"/2.0' soil removed before drilling						
		5 6 9	12	1		4.5+	Hard brown SANDY SILT (A-4a), little clay, trace gravel; damp.						
		7 11 17	10	2		4.5+		7	10	--	20	45	18
5		10 17 19	18	3		4.5+							
8.5	759.0	7 17 50/4	16	4			Severely weathered brown SANDSTONE.						
10.0	757.5	Core 60"	Rec 59"	RQD 43%	R-1		Hard brown and gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, thinly bedded to medium bedded; contains moderate to few argillaceous laminations. @ 12.0', gray. @ 15.4', contains occasional siltstone layers. @ 15.5'-15.9', qu = 9,869 psi.						
15													
17.0	750.5	Core 120"	Rec 120"	RQD 38%	R-2		Soft to hard gray SANDSTONE; very fine to fine grained, interbedded with SHALE, highly to moderately weathered, arenaceous, argillaceous, laminated to medium bedded, moderately fractured; contains argillaceous SHALE zones are very friable.						
20													
25													
30		Core 120"	Rec 120"	RQD 38%	R-3								

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

50+

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

LOG OF: Boring R-373 | Location: Sta. 434+08.2, 141.1 ft. RT of SR 823 CL | Date Drilled: 8/4/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	737.5						Soft to hard gray SANDSTONE; very fine to fine grained, interbedded with SHALE, highly to moderately weathered, arenaceous, argillaceous, laminated to medium bedded, moderately fractured; contains argillaceous SHALE zones are very friable. @ 31.2'-31.6', qu = 10,759 psi.						
35.3	732.2						Soft to medium hard brown and gray SHALE; highly weathered to decomposed, thinly laminated to thinly bedded, arenaceous, highly fractured.						
38.3	729.2												
39.5	728.0	Core 120"	Rec 120"	RQD 28%	R-4		Medium hard gray fine to medium grained SANDSTONE; moderately weathered, argillaceous, medium bedded, poorly cemented, highly fractured.						
40							Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, thinly bedded to thickly bedded, turbidity bedded, highly fractured; contains few argillaceous laminations.						
45													
50		Core 120"	Rec 118"	RQD 58%	R-5								
50.6	716.9						Hard gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, argillaceous, massively bedded; contains few argillaceous laminations.						
55							@ 56.1', pyritic.						
60		Core 120"	Rec 120"	RQD 100%	R-6								

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

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

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

LOG OF: Boring R-373 | Location: Sta. 434+08.2, 141.1 ft. RT of SR 823 CL | Date Drilled: 8/4/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
60	707.5						Hard gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, argillaceous, pyritic massively bedded; contains few argillaceous laminations.							
							@ 63.6'-64.4', high angle fractures.							
65														
70		Core 120"	Rec 120"	RQD 100%	R-7									
75.0	692.5						Bottom of Boring - 75.0'							
80														
85														
90														

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

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

LOG OF: Boring R-374 | Location: Sta. 438+05.1, 1.5 ft. RT of SR 823 CL | Date Drilled: 8/4/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	723.0													
0.4	722.6						Topsoil - 5"/12" soil removed before drilling.							
		2 4 4	16	1			Loose to medium dense light brown SANDY SILT (A-4a); contains sandstone fragments; damp.							
3.0	720.0						Severely weathered brown SANDSTONE argillaceous.							
		15 26 31	17	2										57
5														
		17 44 50/4	16	3										50+
8.5	714.5						Soft to medium hard brown SANDSTONE; very fine to fine grained, highly weathered to decomposed, thinly bedded, micaceous, argillaceous, broken.							
10		Core 78"	Rec 56"	RQD 22%	R-1									
15														
17.6	705.4						Medium hard to hard gray SANDSTONE; moderately to highly weathered, laminated to medium bedded, contains few to moderate argillaceous laminations.							
20		Core 120"	Rec 116"	RQD 41%	R-2									
25							@ 25.2'-27.4', broken and highly weathered; contains abundant argillaceous laminations.							
27.4	695.6						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, thinly bedded to medium bedded, argillaceous, micaceous.							
30		Core 120"	Rec 119"	RQD 41%	R-3									

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

LOG OF: Boring R-374 | Location: Sta. 438+05.1, 1.5 ft. RT of SR 823 CL | Date Drilled: 8/4/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
30	693.0						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, thinly bedded to medium bedded, argillaceous, micaceous, pyritic, slightly fractured to unfractured; contains few argillaceous laminations.							Natural Moisture Content, % - ● PL ⊢—⊣ LL; Blows per foot - ○ 10 20 30 40
35														
40		Core 120"	Rec 119"	RQD 78%	R-4									
45.0	678.0						Bottom of Boring - 45.0'							
50														
55														
60														

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

LOG OF: Boring R-376 | Location: Sta. 438+19.8, 139.9 ft. RT of SR 823 CL | Date Drilled: 8/4/04 to 8/5/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / PL — LL / Blows per foot
0	749.5													
0.3	749.2						Topsoil - 3"/1.5' soil removed before drilling							
		12 15 15	18	1			Dense brown SANDY SILT (A-4a); contains sandstone fragments; dry to damp.							
3.0	746.5													
		37 50/4	10	2			Severely weathered brown SANDSTONE argillaceous.							50+
5														
		20 50/4	10	3										50+
8.0	741.5													
10		Core 36"	Rec 34"	RQD 25%	R-1		Very soft to soft brown and gray SANDSTONE interbedded with SHALE; very fine to fine grained, highly weathered to decomposed, argillaceous, moderately to highly fractured.							
							@ 12.1'-13.4', SDI = 92.8%.							
15		Core 120"	Rec 113"	RQD 38%	R-2		@ 15.0', gray and brown.							
							@ 16.6'-18.5', qu = 385 psi, SDI = 23.3.							
20							@ 19.8' to 20.7', brown, highly weathered.							
25		Core 120"	Rec 117"	RQD 43%	R-3	*310	@ 26.7' to 27.2', high angle rust stained fracture. @ 27.3', gray with small argillaceous clasts.							
30														

FILE: 0121-3070-03 [11/24/2006 3:10 PM]

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

LOG OF: Boring R-376 | Location: Sta. 438+19.8, 139.9 ft. RT of SR 823 CL | Date Drilled: 8/4/04 to 8/5/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
30	719.5						Soft to hard brown SANDSTONE interbedded with SHALE; very fine to fine grained, moderately weathered, laminated to medium bedded, slightly to moderately fractured.							
35		Core 120"	Rec 120"	RQD 49%	R-4	*53	@ 35.8'-41.8', sandstone with few to moderate argillaceous laminations.							
40														
45		Core 120"	Rec 120"	RQD 28%	R-5	*477	@ 43.8', occassional pyrite. @ 47.4'-48.0', qu = 7,654 psi.							
50							@ 49.3'-50.3', SDI = 92.2%.							
55		Core 120"	Rec 120"	RQD 33%	R-6	*432								
60														

FILE: 0121-3070-03 [11/24/2006 2:10 PM]

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

LOG OF: Boring R-376 | Location: Sta. 438+19.8, 139.9 ft. RT of SR 823 CL | Date Drilled: 8/4/04 to 8/5/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
60	689.5													
60.5	689.0						Soft to medium hard brown SANDSTONE; very fine to fine grained, highly weathered to decomposed, argillaceous, highly fractured.							
65		Core 120"	Rec 117"	RQD 98%	R-7	*461								
70														
71.0	678.5						Bottom of Boring - 71.0'							
75														
80														
85														
90														

FILE: 0121-3070-03 [11/23/2006 2:10 PM]

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

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

LOG OF: Boring R-378 | Location: Sta. 440+15.6, 86.3 ft. LT of SR 823 CL | Date Drilled: 8/9/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.1	669.8						Topsoil - 1"						
		6 8 12	18	1		3.5	Very stiff to hard brown SILT (A-4b), some fine to coarse sand, little clay, trace gravel; damp.	5	5	--	16	55	19
		12 16 26	18	2		4.5+		3	8	--	21	50	18
5													
		8 12 13	17	3		4.0							
8.5	661.4	8 50/5	14	4		3.5	Severely weathered gray SANDSTONE.						
10.0	659.9						Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, micaceous, argillaceous, thinly to medium bedded, moderately fractured.						
							@ 10.0'-10.7', 11.0'-11.1', highly weathered, rust colored, broken.						
							@ 12.9', 14.1', 14.6', 19.7', low angle fractures.						
15		Core 120"	Rec 109"	RQD 75%	R-1		@ 18.3'-19.3'; contains moderate argillaceous laminations.						
20.0	649.9						Bottom of Boring - 20.0'						
25													
30													

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

FILE: 0121-3070-03 [11/24/2005 2:11 PM]

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

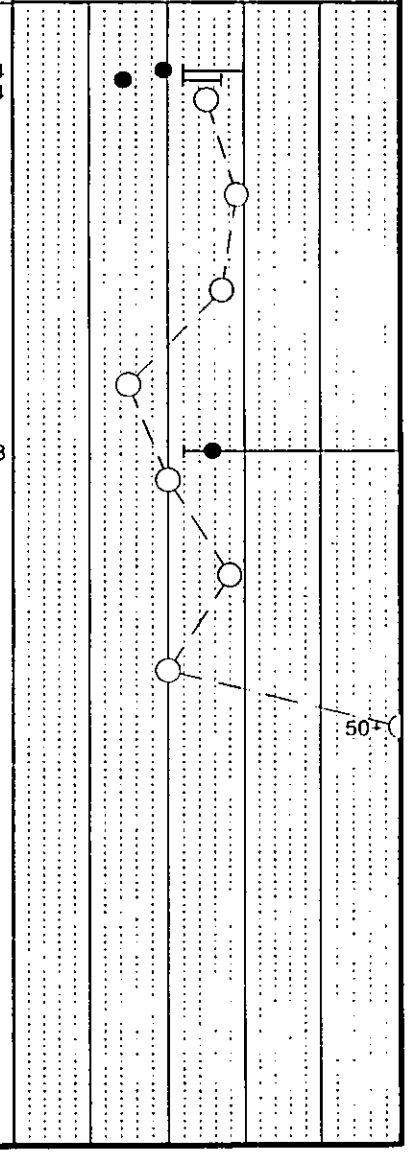
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-379 | Location: Sta. 440+12.8, 0.6 ft. RT of SR 823 CL | Date Drilled: 8/9/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	681.5												
0.1	681.4						Topsoil - 1"						
		2 5 20	18	1A		2.5	Stiff brown SANDY SILT (A-4a), trace gravel, trace clay; damp.	14	6	--	12	44	24
2.0	679.5			1B		4.5+	Hard brown SILT (A-4b), some fine to coarse sand, trace gravel; damp.	7	6	--	15	58	14
		14 14 15	18	2		4.5+							
5													
		11 12 15	18	3		4.5+							
		4 7 8	2	4		4.0							
10													
11.0	670.5												
11.8	669.8	7 9 11	18	5A		2.75	Very stiff brown CLAY (A-7-6); damp to moist.	0	1	--	3	23	73
				5B			Very stiff brown SANDY SILT (A-4a), trace gravel, trace clay; damp to moist.						
		8 14 14	18	6		3.75							
15													
		8 9 11	18	7		3.5							
18.0	663.5												
		50/5	2	8			Severely weathered gray SANDSTONE, argillaceous.						
19.5	662.0												
20		Core 60"	Rec 51"	RQD 38%	R-1		Medium hard brown SANDSTONE; very fine to fine grained, moderately to highly weathered, micaceous, argillaceous, massively bedded, moderately fractured.						
24.5	657.0						Bottom of Boring - 24.5'						
25													
30													

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



FILE: 0121-3070-03 [11/23/2005 2:11 PM]

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

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

LOG OF: Boring R-380 | Location: Sta. 446+99.5, 130.0 ft. LT of SR 823 CL | Date Drilled: 8/11/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	700.0						No topsoil							
		8 10 12	18	1		4.5+	Hard reddish brown SANDY SILT (A-4a), little to some clay, little gravel; contains sandstone fragments; damp.							
		14 20 21	18	2		4.0								
5		13 12 8	18	3		4.25								
		9 15 13	18	4		4.5+		18	4	--	11	46	21	
10		5 6 11	18	5		4.5+		19	4	--	13	45	19	
		14 50/3	9	6		4.5+								50+
15														
16.0	684.0						Medium hard to hard brown SANDSTONE; very fine to fine grained, highly to moderately fractured, moderately weathered, micaceous, argillaceous, laminated to medium bedded, contains few argillaceous laminations.							
20		Core 84"	Rec 84"	RQD 96%	R-1		@ 16.8', gray. @ 17.0', 17.6', 18.0', 19.5', 20.3', 22.9', fractured. @ 24.4', 24.8', 26.1', 27.2', 28.2', fractured.							
25		Core 120"	Rec 120"	RQD 93%	R-2		@ 25.5'-26.3', broken with low angle fractures and highly weathered, contains moderate argillaceous laminations.							
30														

FILE: 0121-3070-03 [11/24/2005 2:11 PM]

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

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

LOG OF: Boring R-380 | Location: Sta. 446+99.5, 130.0 ft. LT of SR 823 CL | Date Drilled: 8/11/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○ 10 20 30 40
30	670.0						Medium hard to hard brown SANDSTONE; very fine to fine grained, slightly fractured, moderately weathered, micaceous, argillaceous, laminated to medium bedded, contains few to moderate argillaceous laminations.							
		Core 24"	Rec 24"	RQD 100%	R-3		@ 31.0', 31.5', 31.9', fractured.							
35.0	665.0						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

GRADATION

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

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

LOG OF: Boring R-381 | Location: Sta. 447+17.3, 17.8 ft. RT of SR 823 CL | Date Drilled: 8/4/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
0.2	677.3 / 677.1						Topsoil - 3"							Natural Moisture Content, % - ● PL — LL; Blows per foot - ○ 10 20 30 40
		8 5 3	2	1		--	Stiff to very stiff brown SILT AND CLAY (A-6a), little gravel, trace to little fine to coarse sand; contains sandstone fragments; damp to moist.							
5		4 4 5	18	2		2.5								
7.0	670.3	10 50/5	11	3		1.5								50+
10		Core 72"	Rec 72"	RQD 71%	R-1		Medium hard to hard brown SANDSTONE; very fine to fine grained, highly fractured to moderately weathered, micaceous, argillaceous, laminated to medium bedded, contains several clay filled fractures. @ 10.5', gray.							
12.7	664.6						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, laminated to medium bedded, contains few argillaceous laminations.							
15		Core 84"	Rec 84"	RQD 94%	R-2		@ 15.3', 15.5', 16.0', 16.7' 18.7', clay filled fractures, weathered SHALE layers, low angle fractures.							
20.0	657.3						Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 [11/24/2005 2:11 PM]

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

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

LOG OF: Boring R-382 | Location: Sta. 448+15.2, 126.4 ft. LT of SR 823 CL | Date Drilled: 8/10/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	733.4						No topsoil Severely weathered brown SANDSTONE, argillaceous.							
		12 11 11	18	1										
		36 50/4	10	2										50+
5														
5.5	727.9						Medium hard to hard brown SANDSTONE; very fine to fine grained, moderately to highly weathered, laminated to medium bedded, micaceous, argillaceous, broken. @ 7.4', moderately fractured. @ 8.4', 12.3', low angle fractures. @ 8.9'-9.0', 10.5', 10.6', 10.8', high angle fractures. @ 12.3'-13.0', broken zone. @ 13.1', 13.3', 13.7', 14.2', 16.3' 16.4', 17.2', low angle fractures.							
		Core 90"	Rec 90"	RQD 50%	R-1									
10														
15														
17.6	715.8	Core 120"	Rec 120"	RQD 91%	R-2		Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, pyritic, laminated to medium bedded, slightly fractured. @ 17.6', 22.5', 22.7', low angle fractures. @ 22.9'-26.9', gray and brown. @ 23.8', thin ironstone nodule. @ 23.7', low angle highly weathered fracture. @ 25.2',25.4', 26.5', 26.8', low angle highly weathered fractures.							
20														
25														
		Core 120"	Rec 120"	RQD 95%	R-3									
30														

FILE: 0121-3070-03 [11/28/2006 2:45 PM]

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

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

LOG OF: Boring R-382 | Location: Sta. 448+15.2, 126.4 ft. LT of SR 823 CL | Date Drilled: 8/10/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	703.4						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, slightly fractured, pyritic, laminated to medium bedded. @ 32.0', slightly weathered.						
35		Core 120"	Rec 120"	RQD 95%	R-4		@ 36.4', 36.8', 39.0', 39.4', 39.7', low angle fractures in argillaceous laminations. @ 43.0', slightly fractured to unfractured.						
40													
45													
50		Core 120"	Rec 120"	RQD 100%	R-5								
55.0	678.4	Core 24"	Rec 24"	RQD 100%	R-6		Bottom of Boring - 55.0'						
60													

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

FILE: 0121-3070-03 [11/28/2006 2:45 PM]

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

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

LOG OF: Boring R-383 | Location: Sta. 447+85.1, 117.0 ft. RT of SR 823 CL | Date Drilled: 8/5/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	695.4												
0.3	695.1						Topsoil - 3"/1.8' soil removed before drilling						
		13 15 19	18	1			Dense brown SANDY SILT (A-4a), little gravel, trace clay; dry to damp.						
3.0	692.4												
		20 21 50/5	17	2			Severely weathered grayish brown SANDSTONE argillaceous, micaceous.						
5.0	690.4						Soft to medium hard brown SANDSTONE; very fine to fine grained, decomposed, micaceous, argillaceous, (has soil like appearance).						
7.8	687.6	Core 84"	Rec 84"	RQD 70%	R-1	*51	Medium hard to hard brown SANDSTONE; very fine to fine grained, moderately to highly weathered, micaceous, argillaceous, broken to highly fractured.						
10							@ 10.5'-11.2', decomposed zone, high angle fractures.						
							@ 11.1', gray.						
							@ 11.6'-12.9', high angle rust stained fracture.						
							@ 12.0'-20.8', contains abundant to moderate argillaceous laminations.						
15							@ 22.5'-22.8', contains moderate argillaceous laminations.						
		Core 120"	Rec 120"	RQD 81%	R-2	*38							
							@ 23.1', fractured.						
20							@ 23.1'-25.0', contains few argillaceous laminations.						
		Core 36"	Rec 36"	RQD 100%	R-3	*316							
25.0	670.4						Bottom of Boring - 25.0'						
30													

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

FILE: 0121-3070-03 [11/21/2005 2:11 PM]

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

LOG OF: Boring R-384 | Location: Sta. 452+33.5, 74.6 ft. LT of SR 823 CL | Date Drilled: 8/9/04 to 8/10/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	760.5													
0.4	760.1						Topsoil - 5"							
		36 20 27	18	1			Severely weathered brown SANDSTONE, argillaceous.							
		23 25 29	18	2										
5														54
		26 50/2	8	3										
7.0	753.5						Medium hard to hard brown SANDSTONE; very fine to fine grained, decomposed to highly weathered, broken, argillaceous, contains thin clay seams.							50+
10		Core 72"	Rec 60"	RQD 36%	R-1		@ 14.2', fractured. @ 10.4'-12.5', qu = 2,102 psi, SDI = 73.9%. @ 14.5'-14.7', 16.0'-16.5', broken decomposed zones.							
15							@ 16.8'-17.4', high angle fractures.							
		Core 120"	Rec 120"	RQD 63%	R-2		@ 17.2'-17.4', decomposed zone. @ 17.9', low angle fracture.							
20							@ 18.0'-22.0', contains moderate to abundant argillaceous laminations, decomposed to highly weathered. @ 22.1'-22.7', medium to coarse grained, poorly cemented.							
22.7	737.8						Hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, contains thin clay seams.							
25		Core 120"	Rec 114"	RQD 90%	R-3		@ 24.1', 24.3', 26.3', 27.8', low angle fractures. @ 25.3', slightly weathered to moderately weathered. @ 25.5'-27.0', qu = 9,350 psi, SDI = 93.2%.							
30														

FILE: 0121-3070-03 [11/21/2005 3:12 PM]

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

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

LOG OF: Boring R-384 | Location: Sta. 452+33.5, 74.6 ft. LT of SR 823 CL | Date Drilled: 8/9/04 to 8/10/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	730.5						Hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, contains thin clay seams. @ 30.8'-31.5', broken zone. @ 30.9'-31.6', broken with core loss. @ 33.9',35.2', 36.5', 38.0', low angle fractures.							
35		Core 120"	Rec 120"	RQD 100%	R-4		@ 34.6', pyritic.							
40														
45		Core 120"	Rec 120"	RQD 100%	R-5		@ 46.1'-48.0', qu = 11,063 psi, SDI = 98.0%.							
50							@ 48.9', low angle fractures.							
55		Core 120"	Rec 120"	RQD 100%	R-6									
60														

FILE: 0121-3070-03 [11/21/2006 2:12 PM]

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

LOG OF: Boring R-384 | Location: Sta. 452+33.5, 74.6 ft. LT of SR 823 CL | Date Drilled: 8/9/04 to 8/10/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
60	700.5						Hard gray SANDSTONE; very fine to fine grained, unweathered to slightly weathered, micaceous, pyritic, slightly argillaceous, laminated to medium bedded.							
65		Core 120"	Rec 120"	RQD 100%	R-7		@ 63.0'-63.6', high angle healed fractures.							
70														
75.0	685.5	Core 24"	Rec 24"	RQD 100%	R-8		Bottom of Boring - 75.0'							
80														
85														
90														

FILE: 0121-3070-03 [11/24/2005 2:12 PM]

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

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

LOG OF: Boring R-386 | Location: Sta. 451+83.9, 122.1 ft. RT of SR 823 CL | Date Drilled: 8/10/04 to 8/11/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢ LL Blows per foot - ○ 10 20 30 40
0	774.5	2 4 7	14	1			No topsoil/Drilled on old road cut Medium dense brown SANDY SILT (A-4a); contains sandstone fragments; dry.							
3.0	771.5	Core 72"	Rec 32"	RQD 0%	R-1		Soft brown SANDSTONE; very fine to fine grained, decomposed, argillaceous, micaceous, (has soil like appearance), contains moderate to abundant argillaceous laminations.							
9.0	765.5	Core 24"	Rec 22"	RQD 0%	R-2		Soft to medium hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, contains moderate to abundant argillaceous laminations.							
10		Core 36"	Rec 27"	RQD 14%	R-3									
15		Core 120"	Rec 116"	RQD 47%	R-4		@ 14.4', brown and gray, highly weathered to moderately weathered.							
20														
25														
29.6	744.9	Core 120"	Rec 120"	RQD 58%	R-5		@ 29.6', gray.							

FILE: 0121-3070-03 [11/23/2006 2:12 PM]

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

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

LOG OF: Boring R-386 | Location: Sta. 451+83.9, 122.1 ft. RT of SR 823 CL | Date Drilled: 8/10/04 to 8/11/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / Blows per foot
30	744.5						Medium hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, broken to highly fractured, contains abundant to moderate argillaceous laminations.							PL — LL; Blows per foot - ○ (10 20 30 40)
35		Core 120"	Rec 119"	RQD 63%	R-6		@ 38.0'-38.4', qu = 5,780 psi. @ 39.0'-40.5', SDI = 92.7%.							
40														
45		Core 120"	Rec 120"	RQD 60%	R-7		@ 42.7', pyritic.							
50														
55		Core 120"	Rec 120"	RQD 54%	R-8									
60														

GRADATION

FILE: 0121-3070-03 [11/21/2006 3:12 PM]

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

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

LOG OF: Boring R-386 | Location: Sta. 451+83.9, 122.1 ft. RT of SR 823 CL | Date Drilled: 8/10/04 to 8/11/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢ LL Blows per foot - ○ 10 20 30 40
60	714.5						Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, pyritic, micaceous, broken to highly fractured, contains abundant to moderate argillaceous laminations.							
65		Core 120"	Rec 119"	RQD 59%	R-9		@ 67.5', moderate to few argillaceous laminations.							
70														
75														
80		Core 120"	Rec 116"	RQD 55%	R10		@ 78.4', occasional calcareous layers.							
85														
90		Core 120"	Rec 118"	RQD 80%	R11									

FILE: 0121-3070-03 (11/24/2006 2:12 PM)

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

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

LOG OF: Boring R-386 | Location: Sta. 451+83.9, 122.1 ft. RT of SR 823 CL | Date Drilled: 8/10/04 to 8/11/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION
90	684.5						Medium hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, pyritic, micaeous, contains abundant to moderate argillaceous laminations. @ 92.5'-93.9', qu = 8,768 psi, SDI = 91.8%.
95		Core 72"	Rec 72"	RQD 75%	R12		
100.0	674.5						Bottom of Boring - 100.0'
105							
110							
115							
120							

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

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

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

FILE: 0121-3070-01 [11/24/2006 3:12 PM]

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

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

LOG OF: Boring R-387 | Location: Sta. 455+35.9, 182.3 ft. LT of SR 823 CL | Date Drilled: 8/11/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢——⊣ LL Blows per foot - ○ 10 20 30 40
0	800.7													
0.3	800.4						Topsoil - 4"/16" soil removed before drilling							
		43 24 50/4	3	1			Severely weathered light brown SANDSTONE.							50+ (○)
		50/4	3	2										50+ (○)
5														
6.0	794.7						Medium hard to hard brown SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, very thinly bedded to medium bedded, broken to highly fractured, contains abundant to moderate argillaceous laminations.							
10		Core 60"	Rec 60"	RQD 53%	R-1									
							@ 12.0', brown and gray, moderately to highly fractured.							
15		Core 120"	Rec 120"	RQD 72%	R-2		@ 14.6'-20.0', qu = 8,449 psi, SDI = 87.0%.							
20							@ 20.7', gray, broken.							
							@ 22.3', 23.0', interbedded with shale.							
25		Core 120"	Rec 120"	RQD 24%	R-3									
30														

FILE: 0121-3070-03 [11/24/2006 3:12 PM]

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

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

LOG OF: Boring R-387 | Location: Sta. 455+35.9, 182.3 ft. LT of SR 823 CL | Date Drilled: 8/11/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○
30	770.7						Medium hard to hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, micaceous, very thinly bedded to medium bedded, broken to highly fractured.							10 20 30 40
35		Core 120"	Rec 120"	RQD 51%	R-4		@ 38.0', 38.3', interbedded with shale.							
40							@ 41.5'-43.2', 47.5'-49.1', contains moderate argillaceous laminations.							
45		Core 120"	Rec 120"	RQD 61%	R-5		@ 44.3'-45.3', qu = 8,852 psi, SDI = 97.3%.							
50							@ 51.5'-51.6', 52.9'-53.5', 54.4'-58.0', abundant argillaceous laminations.							
55		Core 120"	Rec 120"	RQD 48%	R-6									
58.0	742.7													
58.8	741.9						Medium hard gray SANDSTONE; fine to coarse grained, moderately weathered, poorly cemented.							
60														

FILE: 0121-3070-03 [11/24/2006 2:12 PM]

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

LOG OF: Boring R-387 | Location: Sta. 455+35.9, 182.3 ft. LT of SR 823 CL | Date Drilled: 8/11/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
60	740.7						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, very thinly bedded to medium bedded, moderate to few fractures, contains calcareous layers. @ 62.2'-63.4', qu = 9,395 psi, SDI = 96.9%.							
65		Core 120"	Rec 116"	RQD 69%	R-7		@ 67.2'-67.7', high angle fracture with pyrite.							
70														
75		Core 120"	Rec 118"	RQD 67%	R-8		@ 73.5', pyritic.							
80														
85		Core 120"	Rec 120"	RQD 66%	R-9		@ 84.0', 86.9', 87.5', 88.9', low angle fractures.							
90														

FILE: 0121-3070-03 [11/23/2005 3:12 PM]

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

LOG OF: Boring R-387 | Location: Sta. 455+35.9, 182.3 ft. LT of SR 823 CL | Date Drilled: 8/11/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90	710.7						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, very thinly bedded to medium bedded, moderately fractured, contains thin clay seams, and calcareous layers.							
95		Core 120"	Rec 116"	RQD 86%	R10		@ 92.4', 96.5', 97.9', 98.1', 99.0', low angle fractures.							
100														
105		Core 120"	Rec 120"	RQD 82%	R11									
110							@ 110.0', moderately to slightly weathered.							
115		Core 120"	Rec 120"	RQD 86%	R12		@ 114.7'-115.1', qu = 9,618 psi. @ 116.0'-117.5', SDI = 70.6%.							
120														

FILE: 0121-3070-03 [11/24/2005 2:12 PM]

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

LOG OF: Boring R-387 | Location: Sta. 455+35.9, 182.3 ft. LT of SR 823 CL | Date Drilled: 8/11/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
120	680.7						Hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, very thinly bedded to medium bedded, moderately fractured, contains few argillaceous laminations and calcareous layers.							
125		Core 120"	Rec 119"	RQD 93%	R13									
130														
131.0	669.7						Bottom of Boring - 131.0'							
135														
140														
145														
150														

File: 0121-3070-03 [11/24/2006 2:13 PM]

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

LOG OF: Boring R-389 | Location: Sta. 455+17.0, 83.3 ft. RT of SR 823 CL | Date Drilled: 8/11/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	727.4													
0.3	727.1						Topsoil - 3"/2.1' soil removed before drilling							
		9 17 34	18	1			Severely weathered brown SANDSTONE, argillaceous.							51
		24 33 36	18	2										
5														69
		50/2	2	3										50+
7.0	720.4						Medium hard gray and brown SANDSTONE; very fine to fine grained, highly weathered, micaceous, argillaceous, thinly bedded to massive, highly fractured, typical fracture is low angle rust stained. @ 8.0'-9.5', SDI = 93.3%. @ 10.5'-10.9', qu = 6,641 psi.							
10		Core 72"	Rec 66"	RQD 33%	R-1	*227								
15														
18.3	709.1	Core 120"	Rec 120"	RQD 82%	R-2	*484	Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, thinly bedded to massive, slightly fractured to unfractured. @ 20.0', low angle clay filled fracture. @ 21.1', low angle clay filled fracture.							
20														
25		Core 120"	Rec 120"	RQD 100%	R-3	*487								
30														

FILE: 0121-3070-03 [11/23/2005 2:12 PM]

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

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

LOG OF: Boring R-389 | Location: Sta. 455+17.0, 83.3 ft. RT of SR 823 CL | Date Drilled: 8/11/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	697.4						@ 29.7'-31.2', qu = 11,215 psi, SDI = 98.8%. Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, thinly bedded to massive, slightly fractured to unfractured.							
35		Core 120"	Rec 120"	RQD 100%	R-4	*597								
40														
45		Core 84"	Rec 84"	RQD 98%	R-5	*450	@ 43.0'-50.0', contains friable bands of very fine sandstone. @ 44.6', low angle clay filled fracture. @ 44.7'-44.8', high angle clay filled fracture.							
50.0	677.4						Bottom of Boring - 50.0'							
55														
60														

FILE: 0121-3070-03 [11/24/2006 3:12 PM]

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

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

LOG OF: Boring R-390 | Location: Sta. 459+06.6, 153.1 ft. LT of SR 823 CL | Date Drilled: 8/11/04 to 8/12/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○
0	763.3													
1.0	762.3	6 9 9	18	1			Topsoil - 12"							
							Medium dense to dense brown SANDY SILT (A-4a), little gravel, trace clay; contains sandstone fragments; damp.							
5		7 17 22	18	2										
		21 30 23	18	3			@ 6.0', very dense.							53
8.0	755.3													
		9 25 48	18	4			Severely weathered brown SANDSTONE argillaceous, micaceous.							
10		7 30 23	18	5										73
		50/2	1	6										53
13.0	750.3													50+
		Core 30"	Rec 30"	RQD 97%	R-1	*208	Medium hard brown SANDSTONE; very fine to fine grained, highly weathered, micaceous, thinly bedded to thickly bedded, moderately fractured.							
16.3	747.0													
							Hard gray SANDSTONE; very fine to fine grained, highly to moderately weathered, micaceous, thinly bedded to thickly bedded; contains few to moderate argillaceous laminations.							
20		Core 120"	Rec 120"	RQD 46%	R-2	*481	@ 16.5', 16.7', 18.8', low angle clay filled fractures. @ 19.5', 21.7', low angle clay filled fractures. @ 19.2'-19.3', 21.3'-21.5', high angle fractures. @ 21.7'-21.8', fine to medium, poorly cemented sandstone.							
25							@ 24.8', massively bedded, moderately weathered.							
30														

FILE: 0121-3070-03 [11/24/2005 2:12 PM]

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

LOG OF: Boring R-390 | Location: Sta. 459+06.6, 153.1 ft. LT of SR 823 CL | Date Drilled: 8/11/04 to 8/12/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢——⊣ LL Blows per foot - ○ 10 20 30 40
30	733.3	Core 120"	Rec 120"	RQD 100%	R-3	*285	Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, massively bedded, slightly fractured to unfractured.							
35							@ 33.8'-47.0', occassional pyrite nodules.							
40		Core 120"	Rec 120"	RQD 100%	R-4	*661								
45														
50		Core 120"	Rec 120"	RQD 100%	R-5	*481								
55							@ 54.3'-54.8', very fine sandstone friable.							
60														

FILE: 0121-3070-03 [11/21/2006 3:12 PM]

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

LOG OF: Boring R-390 | Location: Sta. 459+06.6, 153.1 ft. LT of SR 823 CL | Date Drilled: 8/11/04 to 8/12/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
60	703.3	Core 120"	Rec 120"	RQD 100%	R-6	*578	Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, micaceous, argillaceous, massively bedded, slightly fractured to unfractured.							
65														
70		Core 120"	Rec 120"	RQD 100%	R-7	*549								
75							@ 75.5'-76.3', 76.8'-85.5', very fine SANDSTONE, friable.							
80		Core 120"	Rec 120"	RQD 100%	R-8	550								
85														
85.5	677.8						Bottom of Boring - 85.5'							
90														

FILE: 0121-3070-03 [11/24/2006 2:12 PM]

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

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

LOG OF: Boring R-392 | Location: Sta. 459+19.3, 6.3 ft. RT of SR 823 CL | Date Drilled: 8/3/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	711.9												
0.5	711.4						Topsoil - 6"						
		8 7 7	12	1		2.5	Very stiff brown SANDY SILT (A-4a); contains sandstone fragments; dry to damp.						
		9 16 25	18	2		2.0							
5		15 17 24	18	3		2.5		2	14	--	26	43	15
8.0	703.9												
		8 18 29	18	4			Severely weathered brown SANDSTONE, argillaceous.						
10													
11.5	700.4	5 50/4	4	5									
							Hard to medium hard brown SANDSTONE; highly weathered, moderately to highly fractured, argillaceous, contains moderate to few argillaceous laminations.					
15							@ 12.2'-12.3' high angle fractures						
		Core 120"	Rec 120"	RQD 88%	R-1		@ 12.4', 13.0', 13.1', 13.3', 13.8', 14.5', 14.8', 15.0' low angle fractures						
20							@ 12.5' gray						
							@ 16.4'-16.5', interbedded with shale.						
25		Core 102"	Rec 102"	RQD 100%	R-2		@ 17.3', 17.6', 18.2', 18.3', 19.9', low angle rust stained fractures.						
30.0	681.9						Bottom of Boring - 30.0'						

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

FILE: 0121-3070-03 [11/21/2005 3:12 PM]

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

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

LOG OF: Boring R-392 | Location: Sta. 459+19.3, 6.3 ft. RT of SR 823 CL | Date Drilled: 8/3/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None; Water level at completion: None (prior to coring); 4.5' (includes drilling water) — DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢——⊣ LL Blows per foot - ○ 10 20 30 40
30	681.9													
35														
40														
45														
50														
55														
60														

FILE: 0121-3070-01 [11/23/2005 2:12 PM]

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

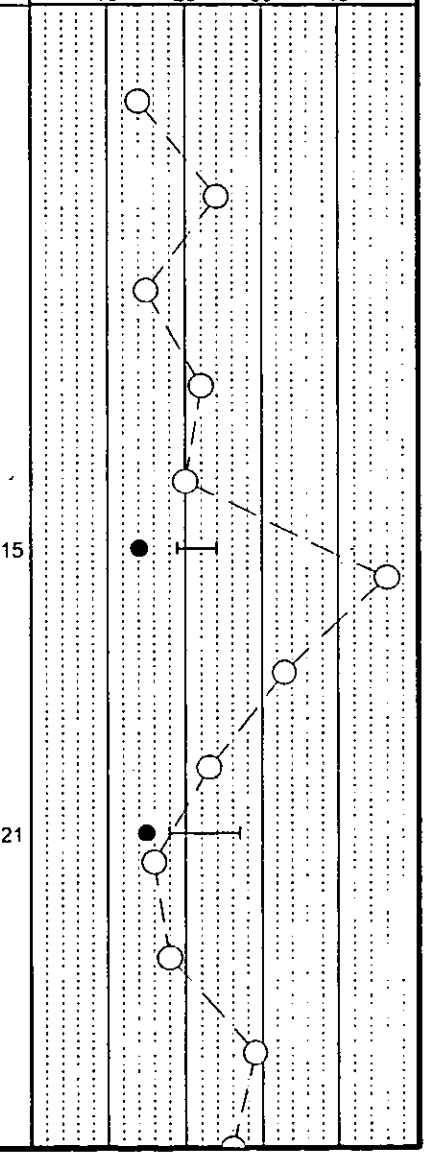
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-393 | Location: Sta. 460+18.5, 78.2 ft. RT of SR 823 CL | Date Drilled: 8/3/04 to 8/4/04

WATER OBSERVATIONS: Water seepage at: 4.0'
Water level at completion: 14.5'

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	691.0												
1.0	690.0	7 6 8	18	1			Topsoil - 12" Medium dense brown and gray SANDY SILT (A-4a), trace gravel; contains sandstone fragments; damp.						
5		11 13 11	18	2									
		4 9 6	18	3									
8.0	683.0	7 12 10	18	4		4.0	Very stiff to hard brown and gray SANDY SILT (A-4a), trace to little gravel; contains sandstone fragments; damp.						
10		4 7 13	18	5		3.5							
		10 20 26	18	6		4.5+		14	8	--	19	44	15
15		7 17 16	18	7		4.5+							
18.0	673.0	5 11 12	18	8			Medium dense brown SANDY SILT (A-4a); little gravel; damp. @ 18.5'-20.0', contains sandstone fragments.						
20		4 7 9	18	9				15	8	--	14	42	21
		5 7 11	18	10									
25		11 13 16	18	11									
		6 16 10	18	12									
30													

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



FILE: 0121-3070-03 [11/23/2005 2:13 PM]

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

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

LOG OF: Boring R-393 | Location: Sta. 460+18.5, 78.2 ft. RT of SR 823 CL | Date Drilled: 8/3/04 to 8/4/04

WATER OBSERVATIONS: Water seepage at: 4.0'
Water level at completion: 14.5'

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30.0	661.0						Very stiff gray SILT (A-4b), some clay, trace fine to coarse sand, trace gravel; damp.						
		2 2 3	18	13		3.0		1	1	-	8	60	30
38.5	652.5	6 16 44	18	14			Severely weathered gray SANDSTONE, argillaceous, micaceous.						
40.0	651.0						Bottom of Boring - 40.0'						

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

FILE: 0121-3070-03 [11/24/2006 2:13 PM]

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

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

LOG OF: Boring R-394 | Location: Sta. 463+14.3, 111.8 ft. LT of SR 823 CL | Date Drilled: 8/10/04

WATER OBSERVATIONS: Water seepage at: 11.0'
Water level at completion: None (prior to coring)
17.4' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	730.1												
1.0	729.1	15 17 29	18	1			Topsoil - 12"						
							Medium dense to dense brown SILT (A-4b), some fine to coarse sand, little clay, trace gravel; contains sandstone fragments; dry to damp.						
		10 19 34	18	2									
5		13 22 22	18	3									
		6 16 17	18	4									
10		7 11 14	18	5				9	5	--	17	53	16
		5 6 16	18	6									
15													
15.5	714.6	15 15 50/3	12	7			Severely weathered brown and gray SANDSTONE, argillaceous, micaceous.						
		50/3	0	8									
19.5	710.6	Core 6"	Rec 6"	RQD 83%	R-1		Medium hard to hard brown and gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, very thinly bedded to medium bedded, moderately fractured with typical low angle rust and clay filled fractures. @ 20.6'-21.4', 29.0'-29.4', high angle highly weathered clay coated fractures. @ 23.6', thin clay seam. @ 24.5'-25.1', qu = 7,852 psi.						
20													
25		Core 120"	Rec 120"	RQD 71%	R-2		@ 29.4', gray, slightly weathered.						
30													

STANDARD PENETRATION (N)
Natural Moisture Content, % - ●
PL ⊢——⊣ LL
Blows per foot - ○
10 20 30 40
53
50+
50+

FILE: 0121-3070-03 [11/21/2006 3:13 PM]

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

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

LOG OF: Boring R-394 | Location: Sta. 463+14.3, 111.8 ft. LT of SR 823 CL | Date Drilled: 8/10/04

WATER OBSERVATIONS: Water seepage at: 11.0'
Water level at completion: None (prior to coring)
17.4' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	700.1						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, very thinly bedded to medium bedded. @ 30.3', low angle rust stained fracture. @ 30.3'-30.5', limestone layer. @ 33.8'-34.3', qu = 7,616 psi.							
35		Core 120"	Rec 120"	RQD 100%	R-3									
40														
45		Core 117"	Rec 117"	RQD 100%	R-4		@ 46.5', contains occasional pyritic nodule.							
49.7	680.4						Bottom of Boring - 49.7'							
55														
60														

FILE: 0121-3070-33 [11/24/2006 2:13 PM]

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

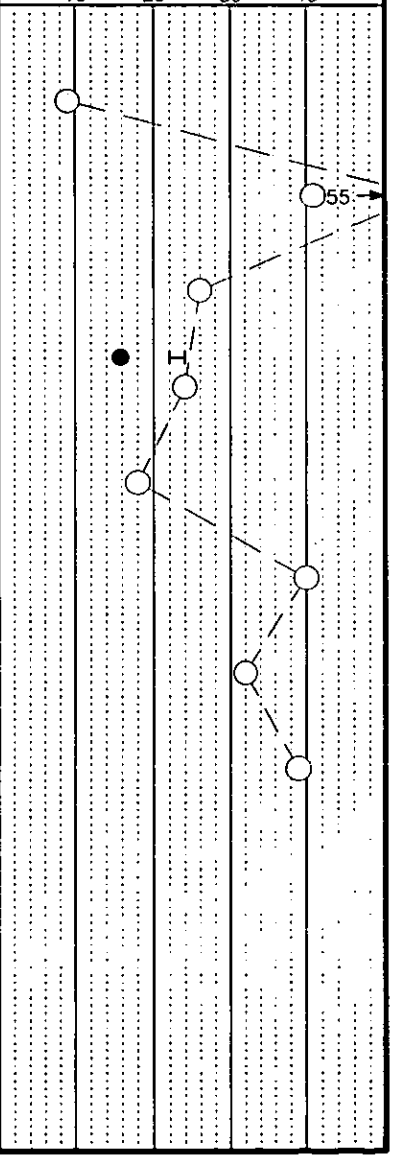
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-395 | Location: Sta. 463+19.1, 1.1 ft. RT of SR 823 CL | Date Drilled: 8/5/04

WATER OBSERVATIONS: Water seepage at: 13.5'
Water level at completion: None

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	694.8												
1.0	693.8	4 4 5	18	1			Topsoil - 12"						
							Loose brown SANDY SILT (A-4a), little clay, trace gravel; contains sandstone fragments; damp.						
5		14 32 23	18	2			@ 3.5', very dense.						
5.5	689.3												
		7 12 14	18	3			Medium dense to dense brown SILT (A-4b), some fine to coarse sand, little clay; contains sandstone fragments; damp.						
10		6 11 13	18	4				0	8	--	24	51	17
		5 8 10	18	5									
15		10 20 20	18	6									
		6 11 21	18	7									
20.0	674.8	10 22 17	18	8									
							Bottom of Boring - 20.0'						
25													
30													

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



FILE: 0121-3070-03 [11/24/2006 2:13 PM]

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

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

LOG OF: Boring R-396 | Location: Sta. 463+18.6, 92.1 ft. RT of SR 823 CL | Date Drilled: 8/5/04

WATER OBSERVATIONS: Water seepage at: 11.0'
Water level at completion: None

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / PL — LL / Blows per foot
0	678.9													
1.0	677.9	3 3 5	18	1			Topsoil - 12" Loose to medium dense brown and gray SANDY SILT (A-4a), "and" gravel, trace clay; contains sandstone fragments; damp.							
		11 16 38	18	2				47	7	--	7	32	7	54
5		16 16 12	18	3										
		4 6 8	18	4										
10		4 7 10	18	5										
13.0	665.9	3 4 7	18	6		3.5	Very stiff brown SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; damp.	4	3	--	5	59	29	
15		5 9 9	18	7		4.0								
18.0	660.9	5 12 16	18	8			Medium dense brown SANDY SILT (A-4a), trace clay, trace gravel; contains sandstone fragments; damp to moist.							
20														
20.5	658.4	4 5 6	18	9			Medium dense brown SILT(A-4b), some fine sand, little clay ; moist to wet.	0	0	--	20	68	12	Non-Plastic
		8 5 10	18	10			@ 23.5'-25.0', contains gray sand seams.							
25.0	653.9						Bottom of Boring - 25.0'							
30														

FILE: 0121-3070-03 [11/24/2006 2:13 PM]

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

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

LOG OF: Boring R-399 | Location: Sta. 464+20.0, 102.8 ft. RT of SR 823 CL | Date Drilled: 8/5/04

WATER OBSERVATIONS: Water seepage at: 8.5'
Water level at completion: None (prior to coring)
6.8' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	668.1												
0.2	667.9						Topsoil - 2"						
		10 8 9	18	1			Medium dense brown SILT (A-4b), some clay, little fine to coarse sand; moist.						
		3 6 8	18	2				0	0	--	13	65	22
5													
5.5	662.6						Stiff brown SILTY CLAY (A-6b), trace fine sand; contains sandstone fragments; damp.						
		5 8 11	6	3		1.5							
		2 2 4	18	4		2.0		0	0	--	1	59	40
10													
10.5	657.6						Medium dense brown SANDY SILT (A-4a), trace to little clay, trace gravel; contains sandstone fragments; damp.						
		2 3 6	18	5									
		5 5 5	18	6									
15													
		2 5 50/4	12	7									
17.5	650.6	Core 30"	Rec 30"	RQD 87%	R-1		Hard to medium hard gray SANDSTONE, very fine to fine grained, highly to moderately weathered, thinly to thickly bedded, broken to slightly fractured. @ 17.5'-17.8', rust stained. @ 18.5'-18.7' rust stained, broken zone.						
20.0	648.1						Bottom of Boring - 20.0'						
25													
30													

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

Non-Plastic

50+

FILE: 0121-3070-03 [11/24/2006 2:13 PM]

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

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

LOG OF: Boring R-402 | Location: Sta. 468+18.5, 1.4 ft. RT of SR 823 CL | Date Drilled: 8/5/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	668.1												
1.0	667.1	3 3 3	18	1		1.0	Topsoil - 12" Stiff to very stiff brown and gray SILT (A-4b), little to some clay, trace to little fine to coarse sand, trace gravel; damp.	0	3	--	3	63	31
5		4 5 7	18	2		3.5		0	2	--	5	69	24
		2 2 3	18	3		1.5							
10		3 7 7	18	4		3.5							
		3 6 6	18	5		2.0		3	5	--	19	57	16
13.0	655.1	12 50/4	8	6			Severely weathered brown SANDSTONE.						
14.5	653.6						Medium hard to hard gray SANDSTONE, very fine to fine grained, highly to moderately weathered, thinly to thickly bedded, broken to slightly fractured.						
15		Core 66"	Rec 66"	RQD 63%	R-1	*383							
20.0	648.1						Bottom of Boring - 20.0'						
25													
30													

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

FILE: 0121-3070-03 [11/24/2006 2:13 PM]

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

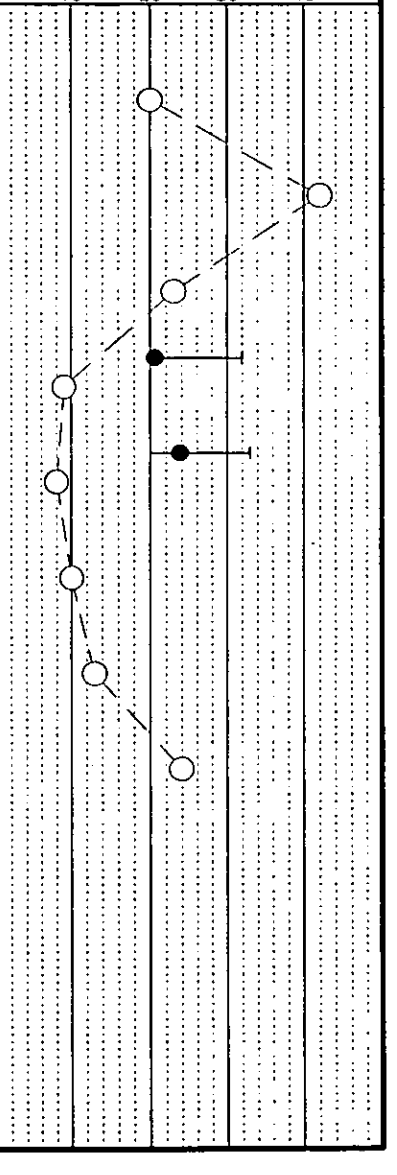
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-405 | Location: Sta. 472+18.3, 68.0 ft. LT of SR 823 CL | Date Drilled: 8/6/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	681.6												
1.0	680.6	4 7 13	18	1			Topsoil - 12"						
							Medium dense to dense brown SANDY SILT (A-4a), trace gravel; contains sandstone fragments; damp.						
5		11 21 21	18	2									
		8 12 11	18	3									
8.0	673.6												
		4 4 5	18	4		2.0	Very stiff brownish gray SILT AND CLAY (A-6a), trace fine sand, trace gravel; damp to moist.	2	4	--	3	67	24
10		3 3 5	18	5		2.5		0	0	--	1	70	29
		3 5 5	18	6		2.5							
15		2 5 8	18	7		3.0							
		3 8 16	18	8		4.0							
20.0	661.6						Bottom of Boring - 20.0'						
25													
30													

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



FILE: 0121-3070-03 [11/21/2006 2:14 PM]

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

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

LOG OF: Boring R-408 | Location: Sta. 472+24.1, 128.2 ft. RT of SR 823 CL | Date Drilled: 8/6/04

WATER OBSERVATIONS: Water seepage at: 2.5'
Water level at completion: Not reported

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	656.6												
0.6	656.0						Topsoil - 6"						
		3 4 4	18	1			Loose to medium dense brown SILT (A-4b), little clay, trace gravel, trace fine to coarse sand; damp.	10	3	--	6	63	18
		8 14 50/5	12	2			@ 3.5', contains sandstone fragments.						
5.0	651.6	Core 60"	Rec 60"	RQD 92%	R-1		Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, very thinly bedded to medium bedded. @ 5.0'-5.2', brown, moderately weathered. @ 5.5'-5.7', broken, highly weathered, contains clay infilling.						
10													
15		Core 120"	Rec 120"	RQD 98%	R-2		@ 13.7'-14.0', contains calcareous matrix.						
							@ 18.9'-19.3', limestone layer.						
20.0	636.6						Bottom of Boring - 20.0'						
25													
30													

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

FILE: 0121-3070-03 [11/24/2005 2:14 PM]

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

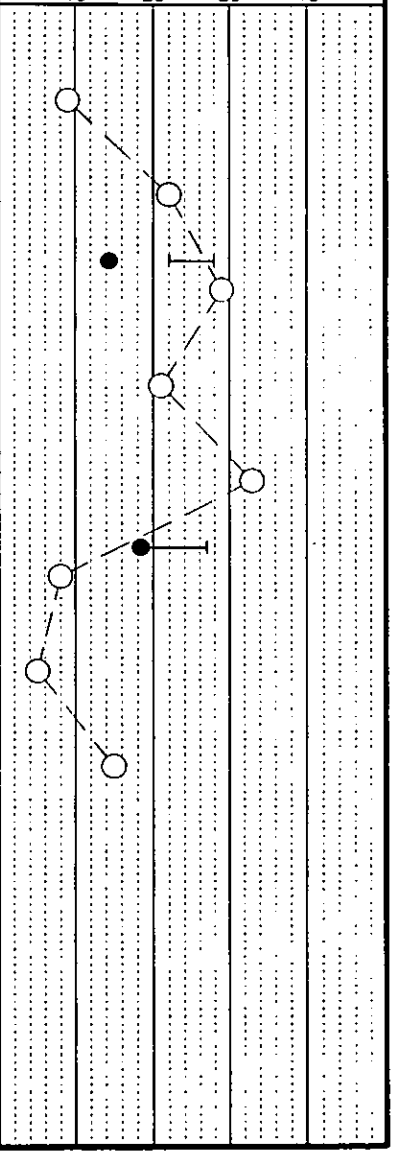
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-409 | Location: Sta. 475+18.9, 1.2 ft. RT of SR 823 CL | Date Drilled: 8/9/04

WATER OBSERVATIONS: Water seepage at: 5.0'
Water level at completion: None

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	685.7												
1.0	684.7	2 3 6	18	1			Topsoil-12"						
							Loose to medium dense brown SANDY SILT (A-4a), trace to little gravel; damp.						
5		8 9 13	18	2									
		8 12 17	18	3				13	16	--	13	43	15
10		3 8 13	18	4									
		10 18 15	18	5			@ 11.0'-12.5', dense.						
13.0	672.7												
		3 4 4	18	6			Loose brown and gray SILT (A-4b); moist.	0	0	--	2	73	25
15		2 2 3	18	7									
18.0	667.7												
		6 5 10	18	8			Medium dense brown SANDY SILT (A-4a), little gravel; contains sandstone fragments; damp to moist.						
20.0	665.7						Bottom of Boring - 20.0'						
25													
30													

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



FILE: 0121-3070-03 [11/24/2006 2:14 PM]

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

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

LOG OF: Boring R-410 | Location: Sta. 477+48.7, 83.4 ft. LT of SR 823 CL | Date Drilled: 8/9/04

WATER OBSERVATIONS: Water seepage at: 10.0'
Water level at completion: 20.0' (with augers removed)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	706.8												
1.0	705.8	2 2 4	18	1			Topsoil - 12"						
							Dense to very dense brown SILT (A-4b), trace to little gravel, trace clay; damp. @ 1.0'-2.5', loose.						
5		8 15 28	18	2				18	10	--	9	50	13
		20 39 39	18	3									
		9 17 20	18	4									
10													
10.5	696.3	3 3 6	18	5		2.0	Very stiff brown SILT AND CLAY (A-6a), trace gravel, little fine to coarse sand; damp.	1	9	--	5	61	24
		5 8 10	18	6		2.0							
15		5 11 16	18	7		3.25							
		8 15 24	18	8		3.5							
20		13 18 26	18	9		3.5							
23.0	683.8												
		11 14 17	18	10			Dense brown SILT (A-4b), some fine to coarse sand, little clay, trace gravel; contains sandstone fragments; damp.	3	13	--	11	57	16
25		13 17 17	18	11									
30		13 16 18	18	12									

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

78

FILE: 0121-3070-03 [11/24/2006 2:14 PM]

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

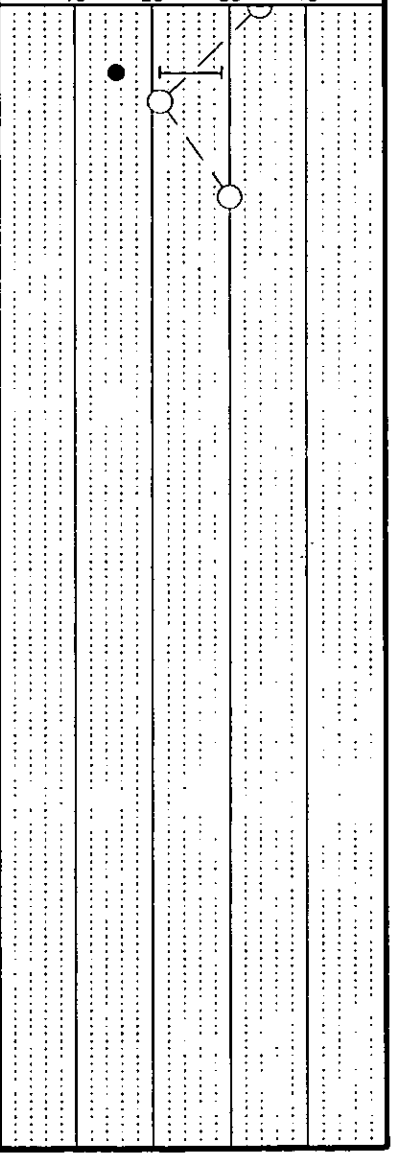
Client: TranSystems, Inc. | Project: SCI-823-0.00 | Job No. 0121-3070.03

LOG OF: Boring R-410 | Location: Sta. 477+48.7, 83.4 ft. LT of SR 823 CL | Date Drilled: 8/9/04

WATER OBSERVATIONS: Water seepage at: 10.0'
Water level at completion: 20.0' (with augers removed)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	676.8	7 9 12	18	13		3.75	Very stiff brown SILT (A-4b), some fine to coarse sand, little clay, trace gravel; contains sandstone fragments; damp.	1	14	--	10	57	18
		10 13 17	18	14		3.25							
35.0	671.8						Bottom of Boring - 35.0'						
40													
45													
50													
55													
60													

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



FILE: 0121-3070-03 [11/23/2005 2:14 PM]

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

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

LOG OF: Boring R-414 | Location: Sta. 480+84.1, 267.1 ft. LT of SR 823 CL | Date Drilled: 8/12/04 to 8/16/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL — LL Blows per foot - ○
0	846.9													
		16 50/4	10	1			No topsoil Severely weathered brown SANDSTONE.							
3.0	843.9						Medium hard to hard brown SANDSTONE; fine grained, moderately weathered, micaceous, slightly argillaceous, thinly bedded to medium bedded, contains small argillaceous clasts, broken to moderately fractured.							
5		Core 120"	Rec 120"	RQD 83%	R-1		@ 4.9', 5.9', clay filled fractures. @ 8.0'-9.7', qu = 6,016 psi, SDI = 91.6%.							
10							@ 6.8'-7.1', interbedded shale.							
15		Core 120"	Rec 120"	RQD 80%	R-2		@ 15.0', brown and gray. @ 7.4'-25.0', highly fractured. @ 16.3', high angle clay filled fractures. @ 19.9'-20.1', interbedded shale.							
20														
25		Core 120"	Rec 120"	RQD 90%	R-3		@ 24.6', thin clay seam.							
30														

FILE: 0121-3070-03 [11/24/2006 2:14 PM]

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

LOG OF: Boring R-414 | Location: Sta. 480+84.1, 267.1 ft. LT of SR 823 CL | Date Drilled: 8/12/04 to 8/16/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30.0	816.9						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, thinly bedded to thickly bedded, moderately to slightly fractured. @ 31.0', 32.7', high angle rust stained fractures. @ 31.4', low angle fracture.							
35		Core 120"	Rec 120"	RQD 98%	R-4		@ 36.1', 36.3', low angle highly weathered fractures. @ 36.3'-37.3', qu = 7,797 psi. @ 37.5'-38.0', qu = 7,698 psi.							
40														
45		Core 120"	Rec 120"	RQD 100%	R-5		@ 47.1'-47.3',47.5'-47.8', high angle highly weathered fractures with calcite on face.							
50														
55		Core 120"	Rec 120"	RQD 100%	R-6		@ 59.0', 59.2', interbedded shale.							
60														

FILE: 0121-3070-03 [11/21/2006 2:14 PM]

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

LOG OF: Boring R-414 | Location: Sta. 480+84.1, 267.1 ft. LT of SR 823 CL | Date Drilled: 8/12/04 to 8/16/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
60	786.9						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, thinly bedded to thickly bedded, slightly fractured.							
65		Core 120"	Rec 120"	RQD 100%	R-7		@ 66.9', slightly pyritic.							
70														
75														
75.5	771.4						Hard brown fine grained SANDSTONE, moderately weathered, slightly argillaceous, thinly to thickly bedded, highly fractured to moderatly fractured.							
		Core 120"	Rec 116"	RQD 72%	R-8		@ 78.8'-79.6', broken zone.							
80							@ 79.9'- 79.4', lost recovery, fracture suspected.							
82.8	764.1						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, thinly bedded to thickly bedded, slightly fractured.							
85							@ 89.2'-95.5', moderate to few argillaceous laminations.							
		Core 120"	Rec 120"	RQD 100%	R-9	*203	@ 87.5'-88.8', SDI = 78.3%.							
90														

FILE: 0121-3070-03 [11/23/2005 2:14 PM]

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

LOG OF: Boring R-414 | Location: Sta. 480+84.1, 267.1 ft. LT of SR 823 CL | Date Drilled: 8/12/04 to 8/16/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90	756.9						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, thinly bedded to thickly bedded, slightly fractured.							
95		Core 120"	Rec 120"	RQD 100%	R10									
100														
105		Core 120"	Rec 120"	RQD 100%	R11									
110							@ 109.5'-110.9', contains few argillaceous laminations, large concentration of pyrite.							
115		Core 120"	Rec 120"	RQD 98%	R12		@ 119.0', pyritic inclusion.							
120														

FILE: 0121-3070-03 [11/23/2005 2:14 PM]

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

LOG OF: Boring R-414 | Location: Sta. 480+84.1, 267.1 ft. LT of SR 823 CL | Date Drilled: 8/12/04 to 8/16/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
120	726.9						WATER OBSERVATIONS: Water seepage at: None Water level at completion: None (prior to coring) 3.8' (includes drilling water) Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, thinly bedded to thickly bedded, slightly fractured. @ 120.5'-121.6', qu = 11,804 psi.							
125		Core 120"	Rec 120"	RQD 97%	R13		@ 126.0'-138.5', pyritic inclusions.							
130							@ 129.7'-130.0', broken with interbedded shale.							
135		Core 120"	Rec 120"	RQD 100%	R14									
140														
145		Core 120"	Rec 120"	RQD 100%	R15									
150														

FILE: 0121-3070-03 [11/24/2006 2:14 PM]

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

LOG OF: Boring R-414 | Location: Sta. 480+84.1, 267.1 ft. LT of SR 823 CL | Date Drilled: 8/12/04 to 8/16/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
150	696.9						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, slightly argillaceous, thinly bedded to thickly bedded, slightly fractured.							
155		Core 120"	Rec 120"	RQD 100%	R16		@ 158.4'-158.5', high angle fracture.							
160														
165		Core 120"	Rec 120"	RQD 99%	R17		@ 170.5'-170.7', shale and clay filled fractures.							
173.0	673.9						Bottom of Boring - 173.0'							
175														
180														

FILE: 0121-3070-03 [11/23/2006 2:14 PM]

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

LOG OF: Boring R-416 | Location: Sta. 480+94.2, 75.9 ft. RT of SR 823 CL | Date Drilled: 8/10/04

WATER OBSERVATIONS: Water seepage at: 10.0'
Water level at completion: None (prior to coring)
19.4' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	712.5													
1.0	711.5	4 6 10	18	1			Topsoil - 12"							
							Dense to very dense brown SANDY SILT (A-4a), trace gravel, trace clay; contains sandstone fragments; damp. @ 1.0'-2.5', medium dense.							
5		11 21 20	18	2										
		16 23 28	18	3										51
10		6 13 18	18	4										
		6 14 22	18	5										
		15 35 53	18	6										
15.0	697.5						Severely weathered brown SANDSTONE argillaceous, micaceous.							88
17.0	695.5	8 50/3	6	7			Medium hard to hard brown SANDSTONE; very fine to fine grained, broken to moderately fractured, moderately weathered, micaceous, argillaceous.							50+
20		Core 120"	Rec 120"	RQD 83%	R-1		@ 21.0', high angle fracture. @ 20.5'-21.0', qu = 4,850 psi. @ 21.4', gray and brown.							
							@ 21.5', high angle fracture.							
25							@ 22.4', highly weathered, fractured. @ 24.4', slightly to moderately weathered.							
							@ 23.4', rust stained fractured.							
30							@ 29.1'-29.5', qu = 9,339 psi.							

FILE: 0121-3070-03 [11/24/2006 2:14 PM]

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

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

LOG OF: Boring R-416 | Location: Sta. 480+94.2, 75.9 ft. RT of SR 823 CL | Date Drilled: 8/10/04

WATER OBSERVATIONS: Water seepage at: 10.0'
Water level at completion: None (prior to coring)
19.4' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	682.5	Core 120"	Rec 120"	RQD 100%	R-2		Medium hard to hard brown SANDSTONE; very fine to fine grained, moderately weathered, micaceous, argillaceous.							
							@ 30.8'-35.5', abundant to moderate argillaceous laminations.							
35							@ 36.5'-37.4', moderate to few laminations.							
							@ 41.3'-41.6', 42.3'-42.9', few argillaceous laminations.							
							@ 44.0', 44.2', low angle fractures.							
40		Core 120"	Rec 117"	RQD 98%	R-3		@ 44.7', 45.2', few argillaceous laminations.							
45														
		Core 60"	Rec 60"	RQD 100%	R-4									
50														
50.5	662.0						Bottom of Boring - 50.5'							
55														
60														

FILE: 0121-3070-03 [11/24/2006 2:14 PM]

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

LOG OF: Boring R-419 | Location: Sta. 483+57.7, 141.2 ft. RT of SR 823 CL | Date Drilled: 8/16/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	656.6												
1.0	655.6	3 3 3	18	1			Topsoil - 12" Loose to medium dense brown SANDY SILT (A-4a), trace gravel; dry.						
		9 9 15	18	2			@ 3.5', contains sandstone fragments.						
5.0	651.6	Core 60"	Rec 60"	RQD 78%	R-1		Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, micaceous, massively bedded. @ 5.0' to 5.2', broken with typically low angle rust stained fractures. @ 5.5' to 5.7', broken with typically high angle rust stained fractures.						
10							@ 12.3' to 12.5', broken with typically low angle fractures.						
15		Core 120"	Rec 120"	RQD 81%	R-2								
20.0	636.6						Bottom of Boring - 20.0'						
25													
30													

GRADATION

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

FILE: 0121-3070-03 [11/24/2006 2:14 PM]

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

LOG OF: Boring R-421 | Location: Sta. 488+19.3, 4.0 ft. LT of SR 823 CL | Date Drilled: 7/9/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	633.8												
0.2	633.6						Topsoil - 2"						
		5 5 6	15	1			Medium dense brown COARSE AND FINE SAND (A-3a); dry to damp.						
3.0	630.8												
		28 14 13	14	2			Medium dense brown SANDY SILT (A-4a), trace clay; damp.						
5													
		6 5 6	14	3									
8.0	625.8												
9.0	624.8	50/5	5	4			Soft brown and gray SANDSTONE; very fine to fine grained, moderately weathered, argillaceous, highly fractured.						
10		Core 60"	Rec 60"	RQD 90%	R-1		Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, thickly bedded. @ 9.5', low angle, highly weathered fracture.						
14.0	619.8						Bottom of Boring - 14.0'						
15													
20													
25													
30													

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

FILE: 0121-3070-03 (11/24/2006 2:13 PM)

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

LOG OF: Boring R-424 | Location: Sta. 491+05.2, on centerline SR 823 | Date Drilled: 7/19/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	639.0												
		4 5 6	18	1		3.0	No Topsoil Very stiff brown SILT (A-4b), some clay, trace fine sand; contains sandstone fragments; damp.						
		5 9 8	18	2		2.0		0	0	--	7	73	20
5													
5.5	633.5	6 8 12	18	3		4.5+	Hard brown SANDY SILT (A-4a), little clay, trace gravel; damp.	5	26	--	14	40	15
8.0	631.0	21 50/3	9	4			Severely weathered brown SANDSTONE argillaceous, micaceous.						
10.0	629.0	Core 36"	Rec 36"	RQD 92%	R-1		Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, medium bedded to massive, slightly fractured. @ 10.1', 10.2', 10.5' and 12.3', low angle fractures with iron staining.						
15		Core 84"	Rec 84"	RQD 99%	R-2		@ 18.2'-18.6', iron stains.						
20.0	619.0						Bottom of Boring - 20.0'						
25													
30													

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

FILE: 0121-3070-03 [11/24/2006 2:15 PM]

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

LOG OF: Boring R-427 | Location: Sta. 495+16.9, 1.1 ft. LT of SR 823 CL | Date Drilled: 7/16/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	667.8													
0.3	667.5						Topsoil - 3"							
		4 4 4	18	1		3.0	Very stiff brown SANDY SILT (A-4a), trace clay, trace gravel; damp.							
		10 10 15	18	2		4.0								
5		8 8 10	18	3		3.5	@ 6.0', grayish brown.							
		3 6 10	18	4		4.0								
10		7 9 11	18	5		4.0								
13.0	654.8													
		43 50/2	8	6			Severely weathered brown SANDSTONE.							50+
15														
15.5	652.3						Soft to medium hard brown and gray SANDSTONE, argillaceous, highly weathered, moderately fractured. @ 15.8'-16.2', 18.6'-18.8', broken argillaceous interbeds. @ 16.5', 18.3', low angle fractures.							
		Core 54"	Rec 54"	RQD 100%	R-1									
20.0	647.8						Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 [11/21/2006 2:15 PM]

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

LOG OF: Boring R-429 | Location: Sta. 497+10.8, 5.6 ft. RT of SR 823 CL | Date Drilled: 7/15/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○
0	691.8													
0.5	691.3						Topsoil - 6"/1.9' soil removed before drilling							
		15 27 40	18	1			Very dense brown SANDY SILT (A-4a), little gravel, trace clay; contains sandstone fragments; damp.							67
		15 27 30	18	2										
5														57
6.0	685.8						Soft brown BRECCIA/SANDSTONE/ SHALE, fine to medium grained, decomposed, broken.							
10		Core 84"	Rec 45"	RQD 54%	R-1									
15		Core 84"	Rec 68"	RQD 0%	R-2		@ 18.5'-18.6', 19.7'-19.8', hard SANDSTONE, possible cobbles or boulders.							
20.0	671.8						Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 [11/24/2006 2:15 PM]

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

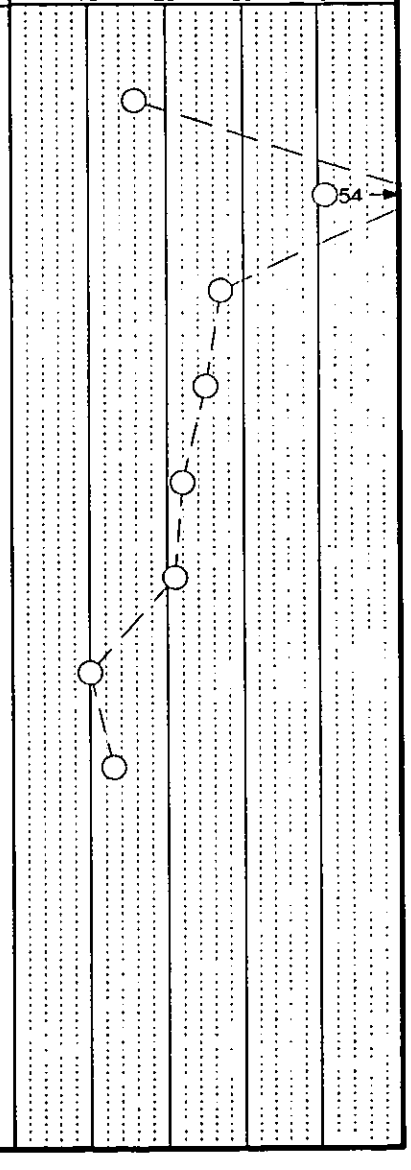
LOG OF: Boring R-430 | Location: Sta. 497+01.4, 86.8 ft. RT of SR 823 CL | Date Drilled: 7/16/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION
0	685.5	5 6 10	18	1		3.0	No topsoil/12" soil removed before drilling Very stiff brown and red SANDY SILT (A-4a), little to some gravel; damp.
		20 24 30	18	2		4.0	
5							
5.5	680.0	7 10 17	18	3		4.5+	Very stiff to hard brown and red SILT AND CLAY (A-6a), little fine to coarse sand, trace to little gravel; contains sandstone fragments; damp.
		7 10 15	18	4		4.5+	
10		9 10 12	18	5		3.75	
		6 10 11	18	6		2.75	
15							
15.5	670.0	4 5 5	18	7		0.5	Medium stiff brown and gray SANDY SILT (A-4a), trace clay; moist.
		4 5 8	18	8		0.75	
20.0	665.5						Bottom of Boring - 20.0'
25							
30							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

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



FILE: 0121-3070-03 [11/23/2006 2:13 PM]

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

LOG OF: Boring R-432 | Location: Sta. 498+11.4, 111.1 ft. LT of SR 823 CL | Date Drilled: 7/15/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	738.4												
0.6	737.8						Topsoil - 7"/2.1' soil removed before drilling						
		14 14 17	18	1			Dense brown SANDY SILT (A-4a), little gravel; contains sandstone fragments; damp.						
		14 17 50/3	18	1									
4.5	733.9						Severely weathered brown SANDSTONE.						
5													
6.0	732.4						Soft to medium hard light brown SANDSTONE, argillaceous, highly weathered to decomposed, broken, contains numerous clay coated and rust stained low angle fractures, broken.						
		Core 84"	Rec 84"	RQD 40%	R-1	*36	@ 6.4'-6.8', high-angle clay filled fracture.						
10							@ 9.3'-9.8', high-angle clay filled fracture.						
							@ 8.7'-10.3', qu = 5,466 psi, SDI = 73.6%.						
							@ 10.2'-11.6', high-angle clay filled fracture.						
							@ 12.4'-12.7', high-angle healed fracture.						
							@ 13.0'-13.5', very argillaceous.						
15							@ 13.0'-13.5', 14.0'-15.1', 16.5'-16.6', 17.3'-17.4', decomposed broken zones.						
							@ 14.6'-17.8', partially clay filled near vertical fracture.						
18.0	720.4	Core 120"	Rec 116"	RQD 48%	R-2	*162	Hard gray SANDSTONE, very fine to fine grained, moderately weathered, thin bedded to medium bedded, contains turbidity bedding, moderately to slightly fractured.						
20							@ 18.0'-18.6', brown and gray interbedded.						
							@ 18.2' and 18.4', low angle fracture containing argillaceous laminations.						
							@ 18.9', low angle fracture with rust staining.						
25							@ 24.5' and 28.7', low angle highly weathered fracture containing argillaceous laminations.						
							@ 26.5'-27.0', qu = 8,267 psi.						
		Core 120"	Rec 120"	RQD 100%	R-3	*414							
30													

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

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

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

LOG OF: Boring R-432 | Location: Sta. 498+11.4, 111.1 ft. LT of SR 823 CL | Date Drilled: 7/15/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	708.4						Hard gray SANDSTONE, very fine to fine grained, moderately weathered, thin bedded to medium bedded, contains turbidity bedding, moderately to slightly fractured. @ 30.1', 30.5', low angle fracture containing argillaceous lamination. @ 33.4'-34.9', rust stained, near vertical fracture.						
35		Core 84"	Rec 84"	RQD 77%	R-4	*320	@ 35.5'-36.0', iron inclusions.						
40.0	698.4						Bottom of Boring - 40.0'						
45													
50													
55													
60													

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

FILE: 0121-3070-03 [11/21/2006 2:16 PM]

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

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

LOG OF: Boring R-433 | Location: Sta. 498+14.4, 21.4 ft. LT of SR 823 CL | Date Drilled: 7/15/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	725.9												
0.5	725.4						Topsoil - 6"/1.9' soil removed before drilling						
		15 23 17	18	1			Dense to very dense brown and gray SANDY SILT (A-4a), trace gravel; damp.						
4.0	721.9	23 37 50/2	14	2			Severely weathered brown SANDSTONE						
5													
6.0	719.9						Medium hard light brown SANDSTONE, fine to medium grained, argillaceous, highly weathered to decomposed, broken; contains numerous silty clay filled, rust stained, low angled fractures.						
10		Core 84"	Rec 84"	RQD 75%	R-1	*112	@ 7.4'-7.6', high angle rust stained fracture. @ 8.2'-8.5', decomposed and very argillaceous.						
12.4	713.5						@ 11.6', low angle fracture. @ 12.0', 12.1', rust stained low angle fracture. @ 12.2'-12.4', brown and gray.						
15							Medium hard to hard gray SANDSTONE, very fine to fine grained, laminated to thin bedded, moderately weathered, contains very small argillaceous clasts, highly fractured. @ 13.3', very thin decomposed argillaceous zone. @ 13.7', 13.9' and 14.0', near horizontal rust stained fractures.						
		Core 120"	Rec 120"	RQD 73%	R-2	*512	@ 15.5'-16.7', contains contains soft to medium hard brown argillaceous interbeds, highly weathered to decomposed.						
20							@ 21.6', 22.1', 22.3' and 22.5', near horizontal rust stained fractures.						
		Core 24"	Rec 24"	RQD 92%	R-3	*387	@ 22.2'-22.5', high angle partially healed fracture with rust staining. @ 22.7' and 23.8', horizontal partially clay filled fractures.						
25.0	700.9						Bottom of Boring - 25.0'						
30													

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

FILE: 0121-3070-03 [11/24/2005 2:16 PM]

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

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

LOG OF: Boring R-434 | Location: Sta. 498+47.1, 133.5 ft. RT of SR 823 CL | Date Drilled: 7/15/04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	WATER OBSERVATIONS: Water seepage at: None; Water level at completion: None (Prior to coring) 7.9' (Includes drilling water) — DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	709.3													
0.4	708.9						Topsoil - 5"/1.4' soil removed before drilling							
		7 7 7	18	1			Medium dense reddish brown SANDY SILT (A-4a), little gravel; contains sandstone fragments; damp.							
3.0	706.3													
		17 35 50/4	16	2			Severely weathered brown SANDSTONE.							50+
6.0	703.3						Medium hard light brown and brown SANDSTONE, fine to medium grained, argillaceous, highly weathered, broken. @ 6.3', 6.5', 8.0', horizontal fractures. @ 6.7'-7.7', 8.2'-8.9', broken with clay layers, decomposed. @ 9.1', 10.0', and 10.3', partially clay filled low angle fracture.							
10		Core 84"	Rec 84"	RQD 39%	R-1	*193	@ 11.0'-11.2', high angle, clay filled fracture. @ 11.9', low angle clay filled fracture. @ 12.3'-13.3', broken with clay layers. @ 13.6 becomes grayish brown. @ 14.6'-14.9', partially healed rust stained high angle fracture.							
15														
15.9	693.4	Core 84"	Rec 84"	RQD 71%	R-2	*90	Medium hard to hard gray SANDSTONE, very fine to fine grained, moderately weathered, thin bedded to laminated, contains very small argillaceous clast. @ 16.3'-16.6' and 17.8'-18.0', rust stained horizontal fracture. @ 18.5'-18.7', partially healed rust stained high angle fracture.							
20.0	689.3						Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 [11/23/2005 2:16 PM]

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

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

LOG OF: Boring R-435 | Location: Sta. 501+08.3, 201.1 ft. LT of SR 823 CL | Date Drilled: 7/15/04 to 7/19/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (lost water circulation)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢ LL Blows per foot - ○ 10 20 30 40
0.1	847.7						Topsoil - 1"							
	847.6	5 22 15	18	1			Soft to medium hard brown SANDSTONE; decomposed, argillaceous.							50+
		22 50/3	8	2										
5		41 50/2	1	3										50+
		50/5	4	4			@ 8.0', light brown.							50+
10		50/4	4	5										50+
13.0	834.7	Core 12"	Rec 12"	RQD 67%	R-1	*181	Medium hard gray SANDSTONE, fine grained, thin to thick bedded, moderately to highly weathered, moderately fractured, contains occasional small argillaceous clasts, contains weathered rust stained zones.							
15							@ 16.0'-16.1', high-angle fracture.							
		Core 120"	Rec 120"	RQD 87%	R-2	*240	@ 17.1'-17.6', qu = 5,833 psi.							
20							@ 19.7', 0.1-ft. ironstone band, contains argillaceous laminations.							
21.9	825.8						@ 20.8', high angle clay filled fracture.							
							Medium hard to hard gray SANDSTONE, very fine to fine grained, medium to thick bedded, moderately weathered, high to slightly fractured, contains occasional small argillaceous clasts.							
25							@ 25.2'-25.4' & 26.4'-27.0', high angle clean fracture.							
							@ 26.2', low angle fracture, contains argillaceous laminations.							
		Core 120"	Rec 120"	RQD 90%	R-3	*308	@ 29.7', low angle fracture.							
30														

FILE: 0121-3070-03 [11/24/2006 2:16 PM]

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

LOG OF: Boring R-435 | Location: Sta. 501+08.3, 201.1 ft. LT of SR 823 CL | Date Drilled: 7/15/04 to 7/19/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (lost water circulation)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	817.7						Medium hard to hard gray SANDSTONE, very fine to fine grained, medium to thick bedded, moderately weathered, high to slightly fractured, contains occasional small argillaceous clasts. @ 30.0'-30.8', brown highly weathered with turbidite beds, rust stained zone. @ 30.2'-30.4', horizontal infilled rust stained fracture.							
35		Core 120"	Rec 120"	RQD 89%	R-4	*366	@ 36.1', horizontal spotty clay filled fracture. @ 36.8', contains fossils with pyrite. @ 39.6'-39.9', qu = 9,802 psi.							
40														
45							@ 44.0'-44.2', hard light gray calcareous zone, vuggy, pyritic, moderately weathered. @ 46.6'-51.1', brownish gray bed.							
50		Core 120"	Rec 120"	RQD 98%	R-5	*433	@ 51.4' and 51.6', low angle smooth clean fracture, contains argillaceous laminations.							
55							@ 55.8'-60.4', brownish gray. @ 56.6', low angle fracture.							
60		Core 120"	Rec 120"	RQD 95%	R-6	*413	@ 59.4'-60.0', high angle fracture.							

FILE: 0121-3070-03 [11/24/2006 2:16 PM]

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

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

LOG OF: Boring R-435 | Location: Sta. 501+08.3, 201.1 ft. LT of SR 823 CL | Date Drilled: 7/15/04 to 7/19/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (lost water circulation)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢——⊣ LL Blows per foot - ○ 10 20 30 40
60	787.7						Medium hard to hard gray SANDSTONE, very fine to fine grained, medium bedded to massive, moderately weathered.							
65		Core 120"	Rec 120"	RQD 100%	R-7	*288	@ 65.0', argillaceous siltstone laminae, trace fossils become evident. @ 65.3'-66.0', brown. @ 65.4'-66.0', rust stained zone. @ 66.0', argillaceous coating at bedding contact. @ 66.5', low angle highly weathered fracture. @ 66.5' to 72.4' and 72.8 to 74.2, light brown in color.							
70														
75		Core 120"	Rec 117"	RQD 63%	R-8	*367	@ 73.9', low angle fracture with argillaceous laminae. @ 74.0'-94.0', lost water circulation. @ 78.1'-79.3', high angle rust stained fracture. @ 79.9'-86.5', contains moderate to abundant argillaceous laminae. @ 80.9'-82.3', very broken.							
80														
85		Core 120"	Rec 120"	RQD 74%	R-9	*288	@ 84.0'-86.5', very broken. @ 86.5'-90.3', contains few argillaceous interbeds. @ 86.5'-87.6', SDI = 65.1%. @ 87.6'-88.0', qu = 5,862 psi. @ 89.0', very small pyrite crystals. @ 89.0'-91.5', calcareous layer.							
90														

FILE: 0121-3070-03 [11/24/2006 2:15 PM]

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

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

LOG OF: Boring R-435 | Location: Sta. 501+08.3, 201.1 ft. LT of SR 823 CL | Date Drilled: 7/15/04 to 7/19/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (lost water circulation)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90	757.7						Medium hard to hard gray SANDSTONE, very fine to fine grained, medium bedded to massive, moderately weathered, slightly fractured to unfractured. @ 92.1', ½" pyrite crystals (clasts).							
95							@ 96.5'-98.7', contains limestone layers.							
100		Core 120"	Rec 120"	RQD 100%	R10	*483								
105														
110		Core 120"	Rec 120"	RQD 98%	R11	*482	@ 108.4'-108.5', argillaceous laminations. @ 110.0'-120.0', lost water circulation. @ 112.0'-114.5', light brown rust stained zone. @ 113.5'-114.5', near vertical rust stained fracture.							
115														
120		Core 120"	Rec 120"	RQD 98%	R12	*481								

FILE: 0121-3070-03 [11/24/2006 2:16 PM]

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

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

LOG OF: Boring R-435 | Location: Sta. 501+08.3, 201.1 ft. LT of SR 823 CL | Date Drilled: 7/15/04 to 7/19/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: None (lost water circulation)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
120	727.7						Medium hard to hard gray and light brown SANDSTONE, very fine to fine grained, medium bedded to massive, moderately weathered, slightly fractured to unfractured.							
125		Core 72"	Rec 71"	RQD 94%	R13	*385	@ 124.1'-124.2', contains argillaceous laminations.							
130.0	717.7						@ 128.8'-128.9', contains argillaceous laminations.							
							Bottom of Boring - 130.0'							
135														
140														
145														
150														

FILE: 0121-3070-03 [11/23/2006 2:16 PM]

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

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

LOG OF: Boring R-436 | Location: Sta. 501+35.7, 85.8 ft. LT of SR 823 CL | Date Drilled: 7/13/04 to 7/14/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	827.2													
0.3	826.9						Topsoil - 4"/12" soil removed before drilling							
		50/5	4	1			Soft to medium hard brown SANDSTONE; decomposed.							50+
		50/5	2	2										50+
5														
6.0	821.2						Medium hard brown SANDSTONE, very fine to fine grained, thickly bedded, highly weathered, broken.							
		Core 48"	Rec 45"	RQD 52%	R-1	*47	@ 6.0'-7.0', very broken with low angle fractures and rust staining.							
							@ 8.7', 9.2' & 9.6', low angle rust stained and filled fractures.							
10							@ 10.0', high angle clay filled fracture.							
							@ 10.9', low angle partially clay filled fracture.							
							@ 11.6'-12.1', very broken with clay seams.							
							@ 12.9', low angle partially clay filled fracture.							
							@ 13.3', low angle clean smooth fracture.							
15		Core 120"	Rec 120"	RQD 76%	R-2	*180	@ 13.6', becomes brown and gray.							
							@ 14.6', low angle fracture with highly weathered to decomposed zone.							
							@ 14.9'-15.6', highly broken with low angle and high angle fractures with rust staining.							
							@ 16.2'-16.7', high angle clean rough fracture.							
							@ 17.5', low angle clay filled fracture.							
20							@ 19.6', low angle rust stained fracture.							
25		Core 120"	Rec 120"	RQD 76%	R-3	*295								
							@ 27.5', low angle rust stained clay coated fracture.							
30							@ 29.3', low angle fracture.							

FILE: 0121-3070-03 [11/24/2006 2:15 PM]

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

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

LOG OF: Boring R-436 | Location: Sta. 501+35.7, 85.8 ft. LT of SR 823 CL | Date Drilled: 7/13/04 to 7/14/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	797.2						Medium hard brown and gray SANDSTONE, very fine to fine grained, thin to thickly bedded, moderately weathered, contains turbidite beds, laminated to massive.						
							@ 31.3'-32.2', high angle clay coated rough fracture.						
35		Core 120"	Rec 120"	RQD 95%	R-4	*249							
40							@ 41.7' to 41.8', argillaceous zone.						
							@ 42.8' to 42.9', argillaceous zone.						
45		Core 120"	Rec 120"	RQD 98%	R-5	*384	@ 45.0', 45.1'& 45.5', low angle clay coated fracture with rust staining.						
							@ 45.3', rust stained, low angle fracture.						
							@ 45.3'-45.4', argillaceous zone.						
							@ 46.3'-46.4', argillaceous zone.						
							@ 46.7', low angle fracture with rust staining.						
							@ 48.4'-48.5', argillaceous zone.						
50							@ 48.5', low angle fracture with rust staining.						
							@ 49.7', low angle fracture with rust staining.						
55		Core 120"	Rec 120"	RQD 97%	R-6	*269							
							@ 56.5' and 56.9', argillaceous laminations.						
							@ 58.3', thin argillaceous laminations.						
60													

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

FILE: 0121-3070-03 (11/24/2006 2:16 PM)

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

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

LOG OF: Boring R-436 | Location: Sta. 501+35.7, 85.8 ft. LT of SR 823 CL | Date Drilled: 7/13/04 to 7/14/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
60	767.2						Medium hard to hard gray SANDSTONE, very fine to fine grained, moderately weathered, contains turbidite beds.						
							@ 60.5' to 69.4', moderate argillaceous laminae.						
							@ 61.5'-61.9', qu = 3,869 psi.						
							@ 61.9'-63.0', SDI = 67.5%.						
65		Core 120"	Rec 118"	RQD 85%	R-7	*348							
70							@ 69.7', pyritic.						
							@ 72.8', pyritic.						
							@ 73.6', 73.7', 73.9', and 74. 4', low angle fracture.						
75		Core 120"	Rec 120"	RQD 93%	R-8	*330							
							@ 77.6-78.7, limestone layer.						
							@ 78.7', low angle fracture.						
80													
85		Core 120"	Rec 120"	RQD 98%	R-9	*334							
90													

GRADATION

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

FILE: 0121-3070-03 [11/24/2005 2:16 PM]

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

LOG OF: Boring R-436 | Location: Sta. 501+35.7, 85.8 ft. LT of SR 823 CL | Date Drilled: 7/13/04 to 7/14/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
90	737.2						Medium hard to hard gray SANDSTONE, very fine to fine grained, pyritic, moderately weathered. @ 90.0', thin argillaceous seam. @ 91.1'-91.5', qu = 9,394 psi. @ 92.8' to 93.2', brown in color. @ 93.2', rust stained fracture. @ 93.8', fracture with thin argillaceous seam.							
95		Core 120"	Rec 120"	RQD 100%	R10	*404								
100							@ 103.0', thin argillaceous laminae. @ 104.2', fracture with argillaceous infilling.							
105		Core 120"	Rec 120"	RQD 98%	R11	*371								
110.0	717.2						Bottom of Boring - 110.0'							
115														
120														

FILE: 0121-3070-03 [11/24/2006 2:16 PM]

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

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

LOG OF: Boring R-437 | Location: Sta. 501+22.1, 86.1 ft. RT of SR 823 CL | Date Drilled: 7/12/04 to 7/13/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	771.8	5 5 5	18	1		–	No topsoil/1.5' soil removed before drilling Very stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; contains sandstone fragments; damp.						
		12 9 6	16	2		2.5							
5		2 6 15	18	3		3.5							
8.0	763.8	31 50/4	10	4			Soft to medium hard brown SANDSTONE; very fine to fine grained, decomposed to highly weathered, argillaceous.						
10		25 46 50/4	11	5									
		18 50/3	7	6									
15							@ 16.6', rust stained, low angle fracture. @ 17.2'-17.3', rust stained, high angle fracture.						
		50/3	2	7									
17.4	754.4	Core 42"	Rec 42"	RQD 79%	R-1	*278	Medium hard to hard gray SANDSTONE; very fine to fine grained, highly weathered, argillaceous, thinly bedded to medium bedded, moderately fractured. @ 19.9'-20.4', light brown colored. @ 20.4', pyritic. @ 21.3', moderately weathered. @ 21.3'-24.8', light brown colored. @ 21.8'-22.0', 22.1'-22.6', 23.4', 24.1', high angle rust stained fractures.						
20													
25		Core 120"	Rec 118"	RQD 78%	R-2	*902	@ 28.7'-30.0', contains few argillaceous laminations.						
30													

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

FILE: 0121-3070-03 [11/24/2006 2:15 PM]

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

LOG OF: Boring R-437 | Location: Sta. 501+22.1, 86.1 ft. RT of SR 823 CL | Date Drilled: 7/12/04 to 7/13/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
30	741.8						Medium hard to hard gray SANDSTONE; very fine to fine grained, moderately to slightly weathered, argillaceous, thinly bedded to medium bedded, moderately fractured, contains few argillaceous laminations. @ 31.1', 31.3', 31.4', 31.9', 32.8', low angle rust stained fracture.						
35		Core 120"	Rec 118"	RQD 75%	R-3	*1143	@ 35.8'-37.2', near vertical fracture with iron filling. @ 36.5', 36.8', 40.6', 41.1', contains argillaceous laminae						
39.2	732.6						@ 38.3'-38.9', near vertical fracture with iron filling.						
40							Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, thinly bedded to medium bedded, slightly fractured, contains turbidite beds, slightly fractured. @ 42.4', contains argillaceous lamination. @ 43.0', 47.1', 49.1', contains argillaceous laminae.						
45		Core 120"	Rec 120"	RQD 97%	R-4	*1262	@ 45.5'-45.7', contains argillaceous laminae. @ 45.9'-46.5', qu = 9,741 psi. @ 46.5'-46.8', argillaceous laminae.						
50							@ 48.9' and 49.1', filled fracture. @ 49.1'-49.2', low angle fracture with argillaceous lamination. @ 50.0'-51.8', contains few argillaceous laminae.						
55		Core 120"	Rec 120"	RQD 100%	R-5	*1038	@ 53.6'-53.7', argillaceous laminations.						
60.0	711.8						@ 58.6', argillaceous laminations. Bottom of Boring - 60.0'						

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

FILE: 0121-3070-03 [11/24/2006 2:15 PM]

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

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

LOG OF: Boring R-437 | Location: Sta. 501+22.1, 86.1 ft. RT of SR 823 CL | Date Drilled: 7/12/04 to 7/13/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢——⊣ LL Blows per foot - ○ 10 20 30 40
60	711.8													
65														
70														
75														
80														
85														
90														

FILE: 0121-3070-03 [11/24/2006 2:16 PM]

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

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

LOG OF: Boring R-439 | Location: Sta. 504+61.7, 91.4 ft. RT of SR 823 CL | Date Drilled: 7/13/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	696.6													
0.5	696.1	4 4 4	18	1			Topsoil - 5" Loose to medium dense brown SANDY SILT (A-4a), trace gravel; contains sandstone fragments; damp.							
4.5	692.1	7 10 50/2	14	2			Severely weathered brown SANDSTONE.							50+
6.0	690.6	Core 84"	Rec 84"	RQD 100%	R-1	*408	Medium hard brown SANDSTONE; very fine to fine grained, moderately weathered, moderately fractured to slightly fractured. @ 6.6', low angle rust stained fracture. @ 6.9', low angle fracture.							
15		Core 84"	Rec 84"	RQD 100%	R-2	*381	@ 15.4'-20.0', contains moderate argillaceous laminae.							
20.0	676.6						Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 [11/24/2006 2:17 PM]

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

LOG OF: Boring R-440 | Location: Sta. 504+45.8, 141.8 ft. RT of SR 823 CL | Date Drilled: 7/14/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.2	695.2						Topsoil - 2"						
0.2	695.0	3 3 4	18	1		2.0	Stiff to very stiff dark brown SILT (A-4b), trace fine to coarse sand; damp.						
3.0	692.2						Soft grayish brown SANDSTONE; very fine grained, decomposed, argillaceous.						
5		6 7 14	18	2									
6.0	689.2						Medium hard gray SANDSTONE, fine to medium grained, contains argillaceous clasts, highly weathered, broken with clay seams. @ 6.3', 7.1' iron stained. @ 6.8', iron stained fracture. @ 7.1'-8.1', contains argillaceous laminae. @ 8.5'-8.7', high angle fracture, iron stained in fracture, rock partly decomposed. @ 10.1'-13.5' contains few argillaceous interbeds. @ 10.6', moderately weathered.						
10		Core 90"	Rec 90"	RQD 92%	R-1								
13.5	681.7						Bottom of Boring - 13.5'						
15													
20													
25													
30													

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

FILE: 0121-3070-03 [11/24/2006 2:17 PM]

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

LOG OF: Boring R-442 | Location: Sta. 505+27.7, 9.2 ft. LT of SR 823 CL | Date Drilled: 7/13/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢ LL Blows per foot - ○ 10 20 30 40
0	711.5	49 10 6	18	1			No topsoil Medium dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; contains sandstone fragments; damp.							
4.0	707.5	7 50/3	9	2			Severely weathered brown SANDSTONE.							50+
7.5	704.0	Core 84"	Rec 84"	RQD 76%	R-1		Soft to medium hard brown SANDSTONE; fine to medium grained, highly weathered, argillaceous, broken. @ 7.5'-7.6', 8.7', 9.6', 10.2, low angle fractures. @ 8.1'-8.2', 9.5'-9.7', high angle fractures.							
10.2	701.3						Medium hard to hard gray SANDSTONE, moderately to slightly fractured, very fine to fine grained, moderately weathered, moderately to slightly fractured, contains medium to massive turbidite beds.							
15		Core 84"	Rec 84"	RQD 100%	R-2		@ 16.9', fracture.							
20.0	691.5						Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 [11/24/2006 2:17 PM]

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

LOG OF: Boring R-444 | Location: Sta. 508+34.4, 121.0 ft. LT of SR 823 CL | Date Drilled: 7/13/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢ LL Blows per foot - ○ 10 20 30 40
0	782.4													
0.7	781.7						Topsoil - 8"/2.0' soil removed							
		8 12 15	18	1			Medium dense reddish brown SANDY SILT (A-4a), little gravel; damp.							
3.0	779.4						Severely weathered brown SANDSTONE.							52
5		20 24 28	18	2										
		26 50/5	11	3										50+
7.0	775.4						Soft to medium hard brown and gray SANDSTONE; very fine to fine grained, highly weathered to decomposed, argillaceous, micaceous, thinly bedded to thickly bedded, broken.							
10		Core 72"	Rec 72"	RQD 38%	R-1	*18	@ 10.8'-11.8', vertical fracture.							
14.2	768.2						Medium hard gray CLAY SHALE interbedded with SANDSTONE, highly weathered, moderately fractured, laminated to thinly bedded.							
15		Core 120"	Rec 120"	RQD 93%	R-2	*324								
20.3	762.1						Medium hard to hard gray SANDSTONE; very fine to fine grained, highly weathered, micaceous, thinly bedded to thickly bedded, high to moderately fractured.							
25		Core 120"	Rec 120"	RQD 87%	R-3	*523	@ 20.0', 2 low angle clay filled fractures. @ 21.6' and 22.3', low angle clay filled fracture. @ 23.2'-23.5', high angle partially healed fracture with calcite. @ 24.4', low angle fracture. @ 24.6', pyritic with occasional fossils. @ 27.9', 28.4', low angle fracture.							
30														

FILE: 0121-3070-03 [11/24/2005 3:17 PM]

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

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

LOG OF: Boring R-444 | Location: Sta. 508+34.4, 121.0 ft. LT of SR 823 CL | Date Drilled: 7/13/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	752.4						Medium hard to hard gray SANDSTONE; very fine to fine grained, highly weathered, micaceous, thinly bedded to thickly bedded, high to moderately fractured. @ 32.0'-32.5', high angle fracture.							
35		Core 84"	Rec 84"	RQD 100%	R-4	*563								
40.0	742.4						Bottom of Boring - 40.0'							
45														
50														
55														
60														

FILE: 0121-3070-03 [11/24/2006 2:17 PM]

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

LOG OF: Boring R-445 | Location: Sta. 508+42.3, 128.2 ft. RT of SR 823 CL | Date Drilled: 7/13/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	779.8												
0.3	779.5						Topsoil - 4"/1.1' soil removed before drilling						
		7 7 12	18	1			Medium dense brown SANDY SILT (A-4a), little gravel; damp.						
3.0	776.8												
		50/3	3	2			Severely weathered brown SANDSTONE.						
5													
6.0	773.8						Soft brown and gray SANDSTONE; fine to medium grained, highly weathered to decomposed, argillaceous, micaceous, laminated to thickly bedded, broken.						
		Core 84"	Rec 84"	RQD 88%	R-1	*167	@ 7.8', thin clay seam. @ 8.8' and 9.8', thin clay seam with rock fragments.						
10							@ 10.4' and 11.9', clay seam with rock fragments, very fine to medium grained interbedded sandstone.						
12.0	767.8						Soft gray and brown CLAY SHALE; decomposed to highly weathered, arenaceous, micaceous, laminated to thinly bedded, broken.						
15		Core 120"	Rec 120"	RQD 79%	R-2	*68							
19.2	760.6						Medium hard brown and gray SANDSTONE; very fine to fine grained, moderately to highly weathered, pyritic, thinly bedded to medium bedded, broken to highly fractured, contains thin argillaceous beds, contains turbidite beds.						
20							@ 21.5', gray. @ 21.7'-22.3', argillaceous. @ 23.5', iron stained low angle fracture. @ 24.6', clay filled fracture. @ 25.0'-27.8', pyritic inclusions. @ 26.0', 26.2', 26.6' and 27.3', low angle clay filled fractures.						
25		Core 120"	Rec 113"	RQD 88%	R-3	*201	@ 29.0'-30.8', brown, very broken with core loss.						
30													

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

FILE: 0121-3070-03 [11/24/2005 2:17 PM]

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

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

LOG OF: Boring R-445 | Location: Sta. 508+42.3, 128.2 ft. RT of SR 823 CL | Date Drilled: 7/13/04

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

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
30	749.8						Medium hard gray SANDSTONE; very fine to fine grained, moderately to highly weathered, thinly bedded to medium bedded, contains thin argillaceous beds.							
		Core 24"	Rec 24"	RQD 100%	R-4	*210								
35.0	744.8						Bottom of Boring - 35.0'							
40														
45														
50														
55														
60														

FILE: 0121-3070-01 [11/24/2006 2:17 PM]

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

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

LOG OF: Boring TR-15 | Location: Sta. 486+83.3, 32.9 ft. RT of SR 823 CL | Date Drilled: 7/9/2004

WATER OBSERVATIONS: Water seepage at: 6.0'
Water level at completion: None

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	631.3												
0.2	631.1						Topsoil - 2"						
		4 2 3	14	1		1.0	Stiff to very stiff brown SANDY SILT (A-4a), trace gravel; moist.						
		2 1 1	13	2		<0.25	@ 3.5'-5.0', very soft.						
5													
		3 20 50/2	13	3A 3B		3.25							
7.0	624.3						Severely weathered brownish-gray SILTSTONE fragments.						
8.0	623.3						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, massively bedded, slightly fractured.						
10													
		Core 120"	Rec 99"	RQD 70%	R-1		@ 8.0'-9.0', probable core loss.						
15													
18.0	613.3						Bottom of Boring - 18.0'						
20													
25													
30													

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

FILE: 0121-3070-03 [11/24/2006 2:18 PM]

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

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

LOG OF: Boring TR-16 | Location: Sta. 486+12.4, 32.3 ft. LT of SR 823 CL | Date Drilled: 7/9/04

WATER OBSERVATIONS: Water seepage at: 6.0'
Water level at completion: 6.5'

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
0	631.9													Natural Moisture Content, % - ●
0.2	631.7						Topsoil - 2"							PL ⊢——⊣ LL
		2 3 2	16	1		1.0	Medium stiff brown SANDY SILT (A-4a); moist.							Blows per foot - ○
														10 20 30 40
		1 1 1	15	2		0.75								
5														
		4 10 50/5	12	3		--	@ 6.0' to 7.4', contains rock fragments.							50+
8.5	623.4						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, massively bedded, slightly fractured.							
10														
		Core 120"	Rec 118"	RQD 85%	R-1									
15							@ 17.0', contains few argillaceous laminations.							
18.5	613.4						Bottom of Boring - 18.5'							
20														
25														
30														

FILE: 0121-3070-03 (11/21/2006 2:18 PM)

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

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

LOG OF: Boring TR-17 | Location: Sta. 485+26.9, 24.3 ft. RT of SR 823 CL | Date Drilled: 2/23/2005

WATER OBSERVATIONS: Water seepage at: 6.3'-7.0'
Water level at completion: 1.6' (inside hollowstem augers, includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) / Natural Moisture Content, % / PL — LL / Blows per foot
0	631.7													
0.4	631.3						Topsoil - 5"							
		6 8 10	18	1			Medium dense brown SILT (A-4b), little fine to coarse sand, trace clay; damp.							
3.0	628.7						Loose brown GRAVEL WITH SAND AND SILT (A-2-4); damp.							
		6 4 5	18	2										
5														
5.5	626.2						Very dense brown SANDY SILT (A-4a); wet.							
6.3	625.4	3		3A			Severely weathered gray SANDSTONE.							
7.0	624.7	50/5	11	3B			Medium hard brown and gray SANDSTONE; fine grained, moderately weathered, slightly micaceous, slightly fractured.							50+
10		Core 120"	Rec 120"	RQD 83%	R-1		@ 7.3'-7.4', very soft, highly weathered. @ 8.5', irregular fracture. @ 8.7', gray.							
15							@ 16.0', 1" soft, weathered zone.							
17.0	614.7						Hard brown and gray SANDSTONE; fine grained, slightly weathered, slightly micaceous, slightly fractured.							
20		Core 120"	Rec 120"	RQD 97%	R-2		@ 22.8'-23.0', very soft, highly weathered siltstone seam. @ 23.0'-23.2', siltstone seam.							
25														
27.0	604.7						Bottom of Boring - 27.0'							
30														

FILE: 0121-3070-03 [11/24/2005 2:18 PM]

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

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

LOG OF: Boring TR-18 | Location: Sta. 484+38.6, 39.0 ft. LT of SR 823 CL | Date Drilled: 8/17/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 9.4' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N)
0	631.3						Topsoil - 12"							
1.0	630.3	2 3 3	18	1			Medium stiff brown SILT (A-4b), little clay, little fine to coarse sand, little gravel; contains roots; dry to damp.	13	7	--	9	58	13	
3.0	628.3	3 4 4	18	2			Loose brown SANDY SILT (A-4a), little clay, trace to little gravel; damp.	0	3	--	40	45	12	Non-Plastic
5		6 7 50/3	12	3				11	20	--	28	31	10	Non-Plastic 50+
7.3	624.0	Core 84"	Rec 84"	RQD 88%	R-1		Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, slightly to moderately fractured. @ 7.3'-7.6', broken. @ 7.3'-7.8',8.0',8.6'-8.8', brown, rust-stained fractures. @ 7.3'-7.8', vertical fracture.							
10														
15		Core 72"	Rec 71"	RQD 94%	R-2									
20.3	611.0						Bottom of Boring - 20.3'							
25														
30														

GRADATION

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

FILE: 0121-3070-03 (11/24/2006 2:18 PM)

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

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

LOG OF: Boring TR-19 | Location: Sta. 483+69.8, 46.5 ft. RT of SR 823 CL | Date Drilled: 8/16/04 to 8/17/04

WATER OBSERVATIONS: Water seepage at: None
Water level at completion: 16.3' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	633.0												
1.0	632.0	3 7 7	18	1			Topsoil - 12" Medium dense brown SANDY SILT (A-4a), trace gravel, trace clay; contains sandstone fragments; damp.						
5		4 7 9	18	2									
		4 5 6	18	3									
8.7	624.3	50/2	2	4			Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, massively bedded, slightly fractured. @ 9.2'-9.4', decomposed. @ 8.8'-9.0', brown. @ 13.1'-13.3', vertical fracture.						
10		Core 30"	Rec 30"	RQD 57%	R-1								
15		Core 108"	Rec 108"	RQD 70%	R-2		@ 13.9'-14.0', vertical fracture. @ 15.5', unfractured to slightly fractured. @ 14.7'-15.5', broken zone. @ 15.4'-15.5', clay filled fracture.						
20.2	612.8						Bottom of Boring - 20.2'						
25													
30													

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

FILE: 0121-3070-03 [11/24/2006 2:18 PM]

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

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

LOG OF: Boring TR-20 | Location: Sta. 444+69.7, 42.1 ft. RT of SR 823 CL | Date Drilled: 8/4/04

WATER OBSERVATIONS: Water seepage at: none
Water level at completion: 6.3' (Includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	650.0													
0.2	649.8						Topsoil - 2"							
		3 3 4	18	1		0.5	Medium stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, little gravel; contains sandstone fragments; moist.							
		1 3 50/3	15	2										50+
5.0	645.0						Hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, massively bedded, slightly fractured. @ 5.0'-5.3', broken.							
		Core 96"	Rec 91"	RQD 88%	R-1		@ 9.3'-9.5', broken zone, possible core loss.							
15		Core 84"	Rec 84"	RQD 86%	R-2		@ 13.9' to 14.5', high angle fracture with reddish brown discoloration.							
20.0	630.0						Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 [11/24/2006 2:18 PM]

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

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

LOG OF: Boring TR-21 | Location: Sta. 443+67.0, 46.5 ft. LT of SR 823 CL | Date Drilled: 8/3/04

WATER OBSERVATIONS: Water seepage at: 0.0'
Water level at completion: 0.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetro-meter (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ⊢—⊣ LL Blows per foot - ○ 10 20 30 40
0	639.0						Gray GRAVEL (A-1-a); wet. (Auger sample - boring drilled in stream bed)							
1.5	637.5						Medium hard to hard gray SANDSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, massively bedded, slightly fractured. @ 1.5'-3.9', brown, highly weathered, highly fractured to broken. @ 3.3'-3.4', clay filled fracture.							
5		Core 114"	Rec 114"	RQD 70%	R-1									
10														
15		Core 108"	Rec 108"	RQD 93%	R-2									
20.0	619.0						Bottom of Boring - 20.0'							
25														
30														

FILE: 0121-3070-03 [11/24/2006 2:18 PM]

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

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

LOG OF: Boring TR-22 | Location: Sta. 442+46.9, 51.5 ft. RT of SR 823 CL | Date Drilled: 2/24/2005

WATER OBSERVATIONS: Water seepage at: none
Water level at completion: 4.5' (inside hollowstem augers, includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION
0	636.2						
0.7	635.5	3 6 7	18	1		1.25	Topsoil - 8" Stiff brown SANDY SILT (A-4a), trace gravel; organic; moist.
2.8	633.4						
3.5	632.7	26 50/4	10	2A 2B			Very dense brown SANDY SILT (A-4a), trace gravel; organic; moist.
4.0	632.2						Severely weathered brown SANDSTONE.
5		Core 120"	Rec 120"	RQD 84%	R-1		Soft brown SANDSTONE; fine grained, moderately weathered, slightly micaceous, moderately fractured. @ 5.2'-5.7',7.1'-7.3',8.7'-8.9' very soft, highly weathered. @ 6.1', gray, medium hard.
10							@ 10.9'-11.0', iron stained horizontal fractures. @ 12.0'-12.8', siltstone.
14.0	622.2						
15		Core 120"	Rec 120"	RQD 96%	R-2		Hard gray SANDSTONE; fine grained, slightly weathered, slightly micaceous, slightly fractured. @ 14.7'-15.3', very soft gray and brown SILTSTONE, highly weathered.
20							@ 19.3'-19.4', irregular vertical fracture. @ 19.6', 1/2" clay filled fracture.
24.0	612.2						@ 23.2'-23.5', siltstone.
25							Bottom of Boring - 24.0'
30							

GRADATION: % Aggregate | % C. Sand | % M. Sand | % F. Sand | % Silt | % Clay

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

FILE: 0121-3070-03 [11/24/2006 2:13 PM]

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

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

LOG OF: Boring TR-23 | Location: Sta. 441+30.3, 48.1 ft. LT of SR 823 CL | Date Drilled: 8/9/04

WATER OBSERVATIONS: Water seepage at: none
Water level at completion: 2.0' (includes drilling water)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press /Core	Hand Penetrometer (tsf) / * Point-Load Strength (psi)	DESCRIPTION	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0	661.0												
0.3	660.7						Topsoil - 4"						
		6 13 15	17	1		4.5+	Hard brown SILT AND CLAY (A-6a), some fine to coarse sand, trace gravel; contains sandstone fragments; damp.						
		11 26 20	17	2		4.5							
5		11 16 40	16	3		4.5+							
7.5	653.5	Core 30"	Rec 26"	RQD 17%	R-1		Soft brown SANDSTONE; fine grained, decomposed.						
10.0	651.0						Hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, slightly fractured. @ 12.3',13.5', weathered fractures. @ 12.9' to 13.6', brown.						
15		Core 120"	Rec 120"	RQD 84%	R-2								
20.0	641.0						Bottom of Boring - 20.0'						
25													
30													

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

FILE: 0121-3070-03 [11/24/2006 2:19 PM]

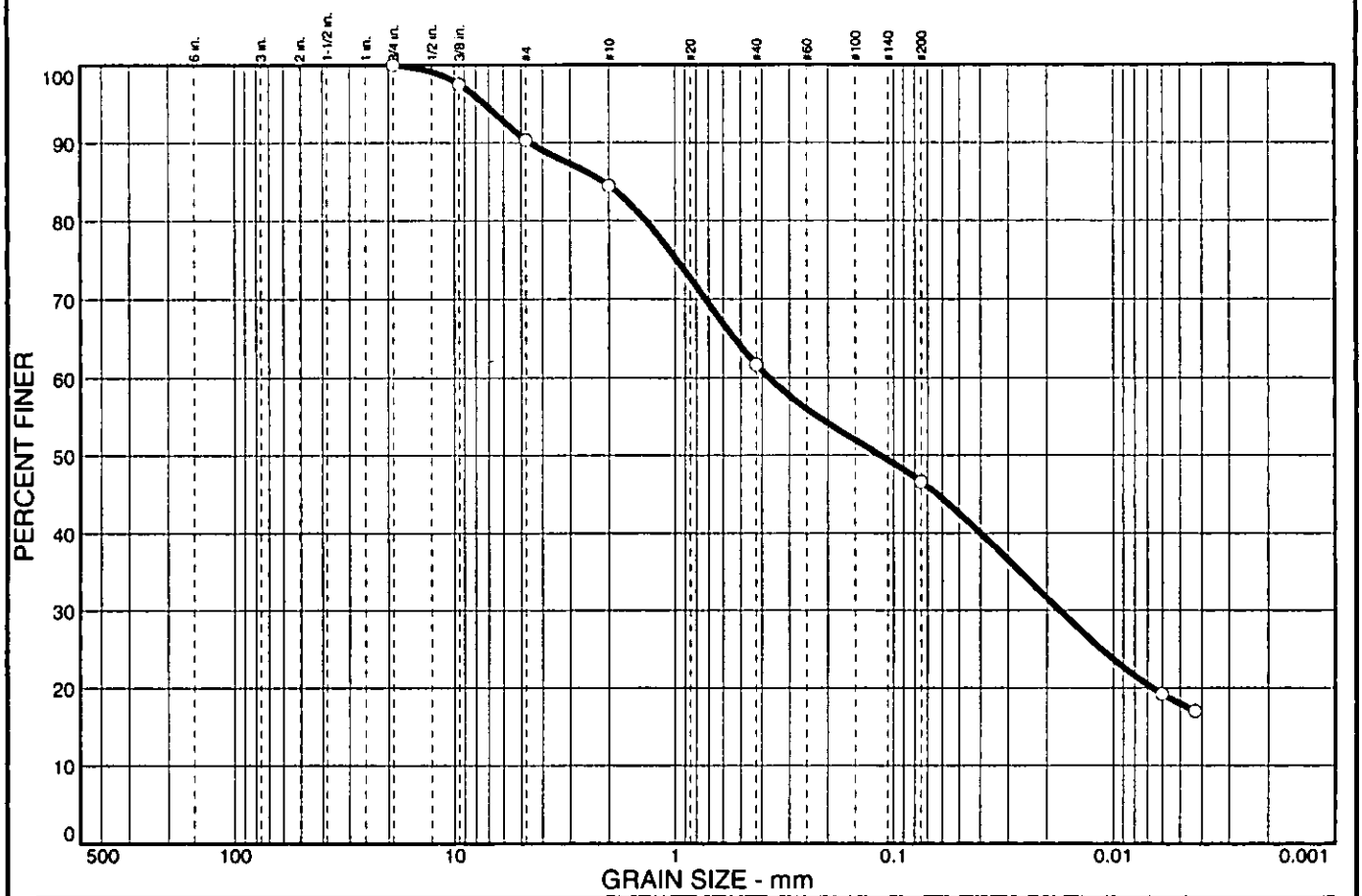
APPENDIX B

DLZ

APPENDIX B

Laboratory Test Results

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	9.7	5.8	22.8	15.2	28.5	18.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	97.5		
#4	90.3		
#10	84.5		
#40	61.7		
#200	46.5		

* (no specification provided)

Soil Description

Clayey sand

Atterberg Limits

PL= 18 LL= 26 PI= 8

Coefficients

D_{85}= 2.12 D_{60}= 0.372 D_{50}= 0.116
D_{30}= 0.0176 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SC AASHTO= A-4(1)

Remarks

Moisture Content= 12.7%
F.M.=0.12

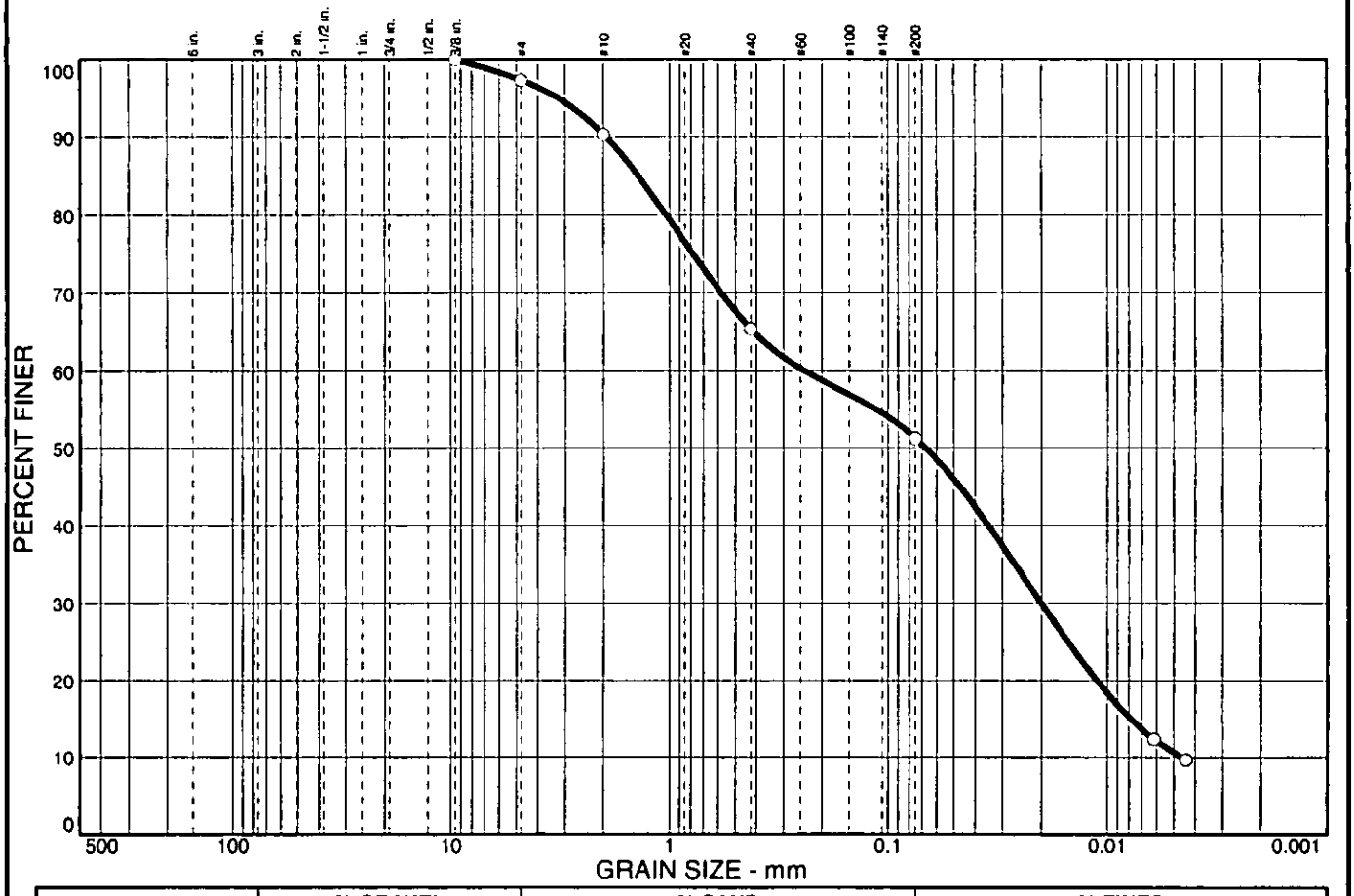
Sample No.: 1 **Source of Sample:** B-6 **Date:** 7/14/06
Location: **Elev./Depth:** 0.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	2.7	7.0	24.9	14.2	40.6	10.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	97.3		
#10	90.3		
#40	65.4		
#200	51.2		

* (no specification provided)

Soil Description

Sandy silt

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 1.39 D_{60}= 0.241 D_{50}= 0.0677
D_{30}= 0.0201 D_{15}= 0.0079 D_{10}= 0.0046
C_u= 51.92 C_c= 0.36

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Moisture Content= 11.7%
F.M.=0.03

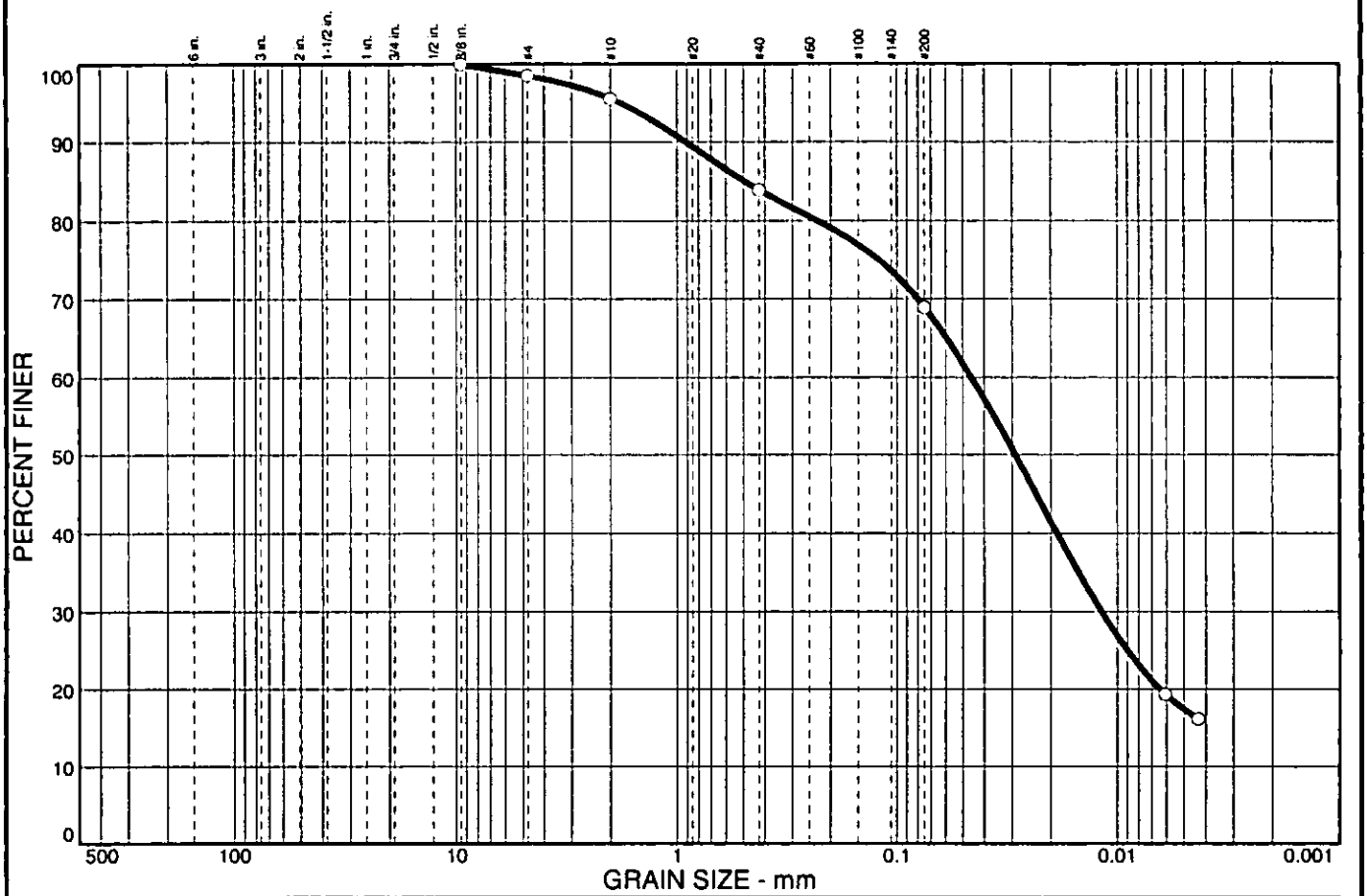
Sample No.: 2 **Source of Sample:** B-6 **Date:** 7/14/06
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	1.5	3.0	11.6	15.0	51.5	17.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	98.5		
#10	95.5		
#40	83.9		
#200	68.9		

* (no specification provided)

Soil Description

Sandy silty clay

Atterberg Limits

PL= 18 LL= 22 PI= 4

Coefficients

D_{85}= 0.494 D_{60}= 0.0460 D_{50}= 0.0292
D_{30}= 0.0118 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(0)

Remarks

Moisture Content= 13.4%
F.M.=0.01

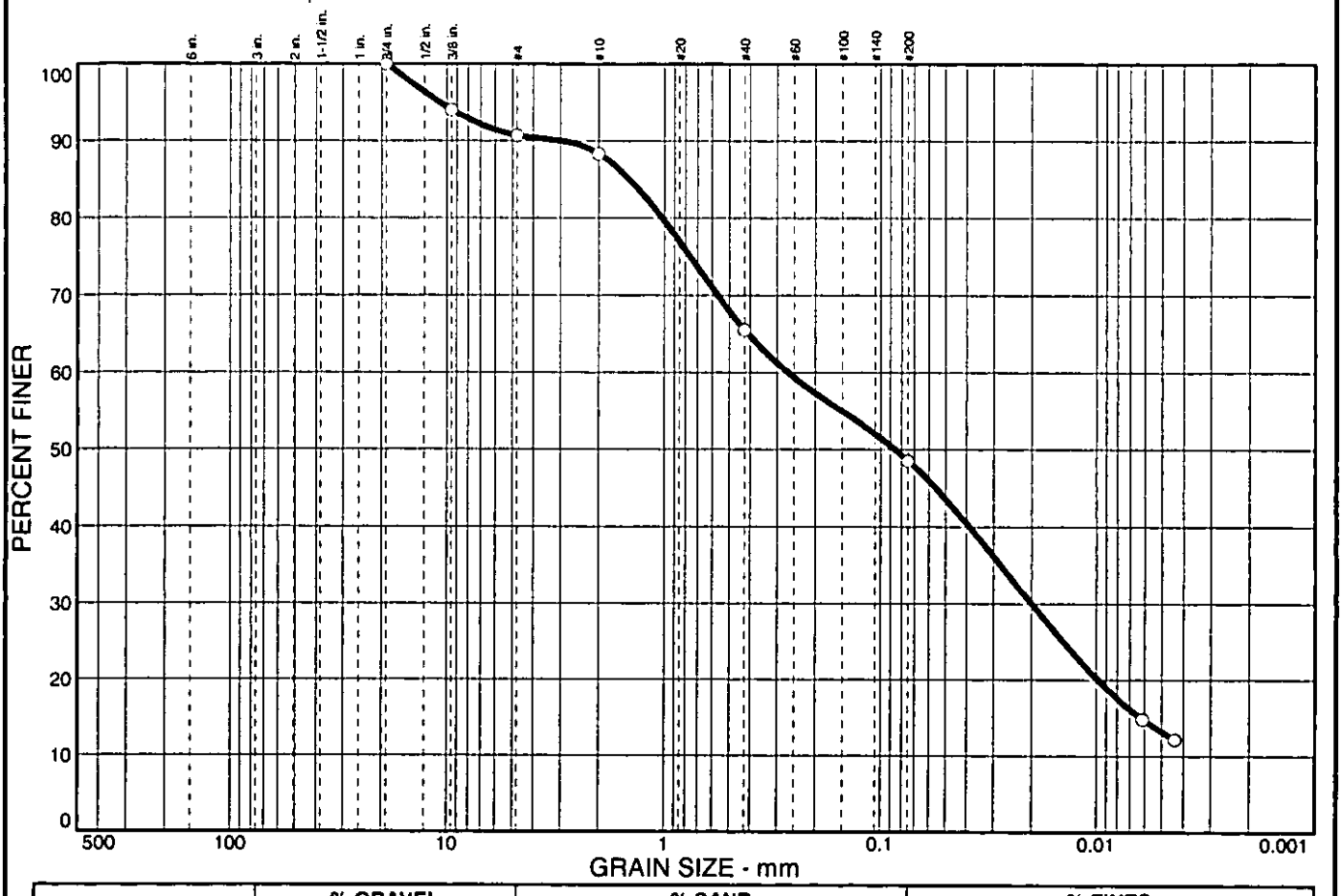
Sample No.: 1 **Source of Sample:** B-8 **Date:** 7/14/06
Location: **Elev./Depth:** 1.0

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	9.3	2.4	22.8	17.0	35.4	13.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	94.0		
#4	90.7		
#10	88.3		
#40	65.5		
#200	48.5		

* (no specification provided)

Soil Description

Silty sand

Atterberg Limits

PL= 19 LL= 22 PI= 3

Coefficients

D_{85}= 1.45 D_{60}= 0.267 D_{50}= 0.0866
D_{30}= 0.0200 D_{15}= 0.0063 D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Moisture Content= 11.7%
F.M.=0.15

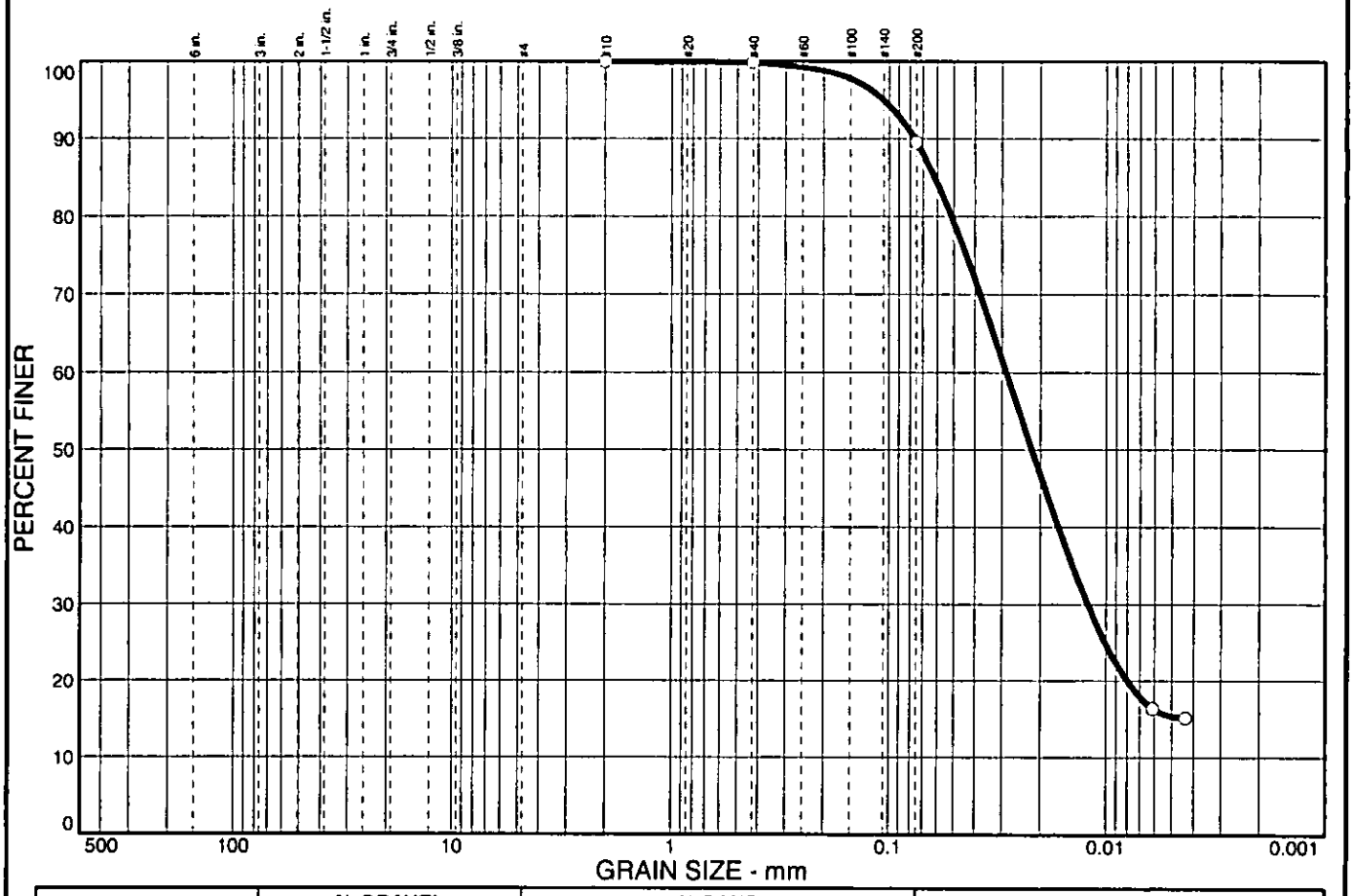
Sample No.: 2 **Source of Sample:** B-8 **Date:** 7/14/06
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.1	10.4	74.1	15.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.9		
#200	89.5		

* (no specification provided)

Soil Description

Silty clay

Atterberg Limits

PL= 19 LL= 24 PI= 5

Coefficients

D_{85}= 0.0618 D_{60}= 0.0288 D_{50}= 0.0220
D_{30}= 0.0122 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(3)

Remarks

Moisture Content= 15.1%

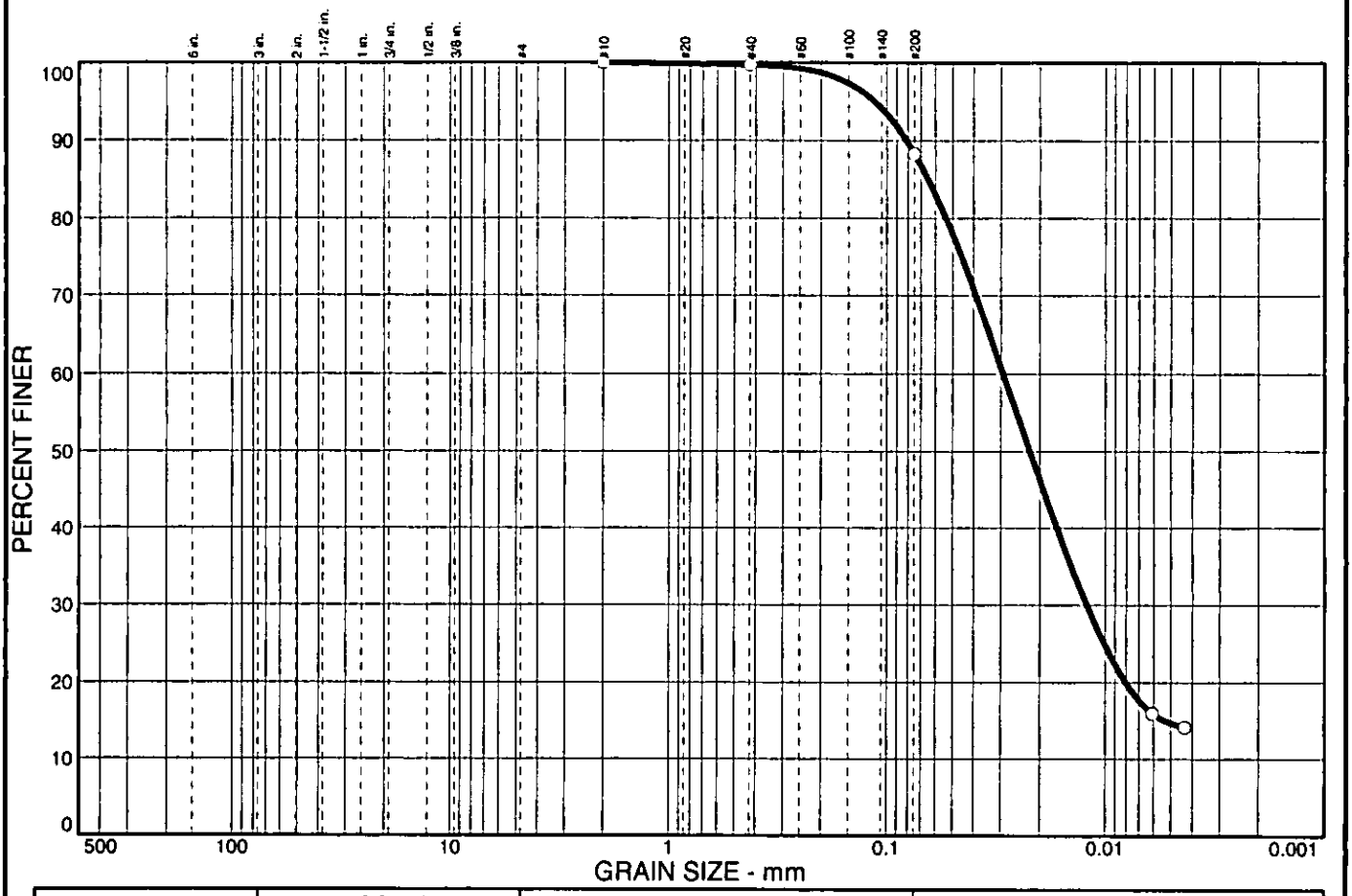
Sample No.: 1 **Source of Sample:** B-10 **Date:** 7/21/06
Location: **Elev./Depth:** 1.0

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.3	11.4	73.7	14.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.7		
#200	88.3		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 18 LL= 26 PI= 8

Coefficients

D_{85}= 0.0650 D_{60}= 0.0295 D_{50}= 0.0223
D_{30}= 0.0122 D_{15}= 0.0054 D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(5)

Remarks

Moisture Content= 38.0%

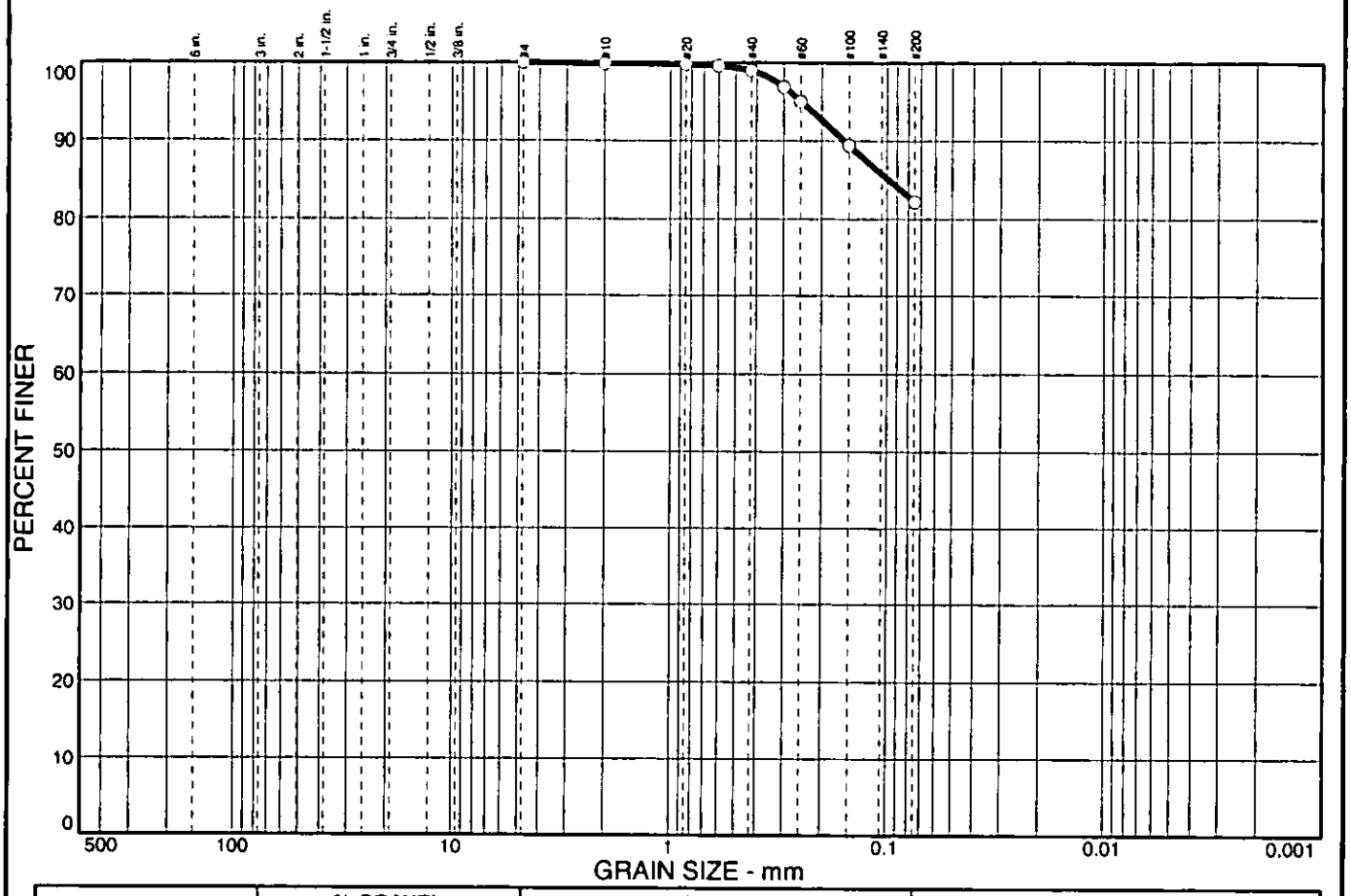
Sample No.: 3 **Source of Sample:** B-10 **Date:** 7/21/06
Location: **Elev./Depth:** 6.0

DLZ

Client: TranSystems. Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.1	0.9	16.8	82.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	99.8		
#30	99.6		
#40	99.0		
#50	96.9		
#60	95.0		
#100	89.4		
#200	82.2		

* (no specification provided)

Soil Description

Silt with sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.0986 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Moisture Content = 13.8%
F.M.=0.14

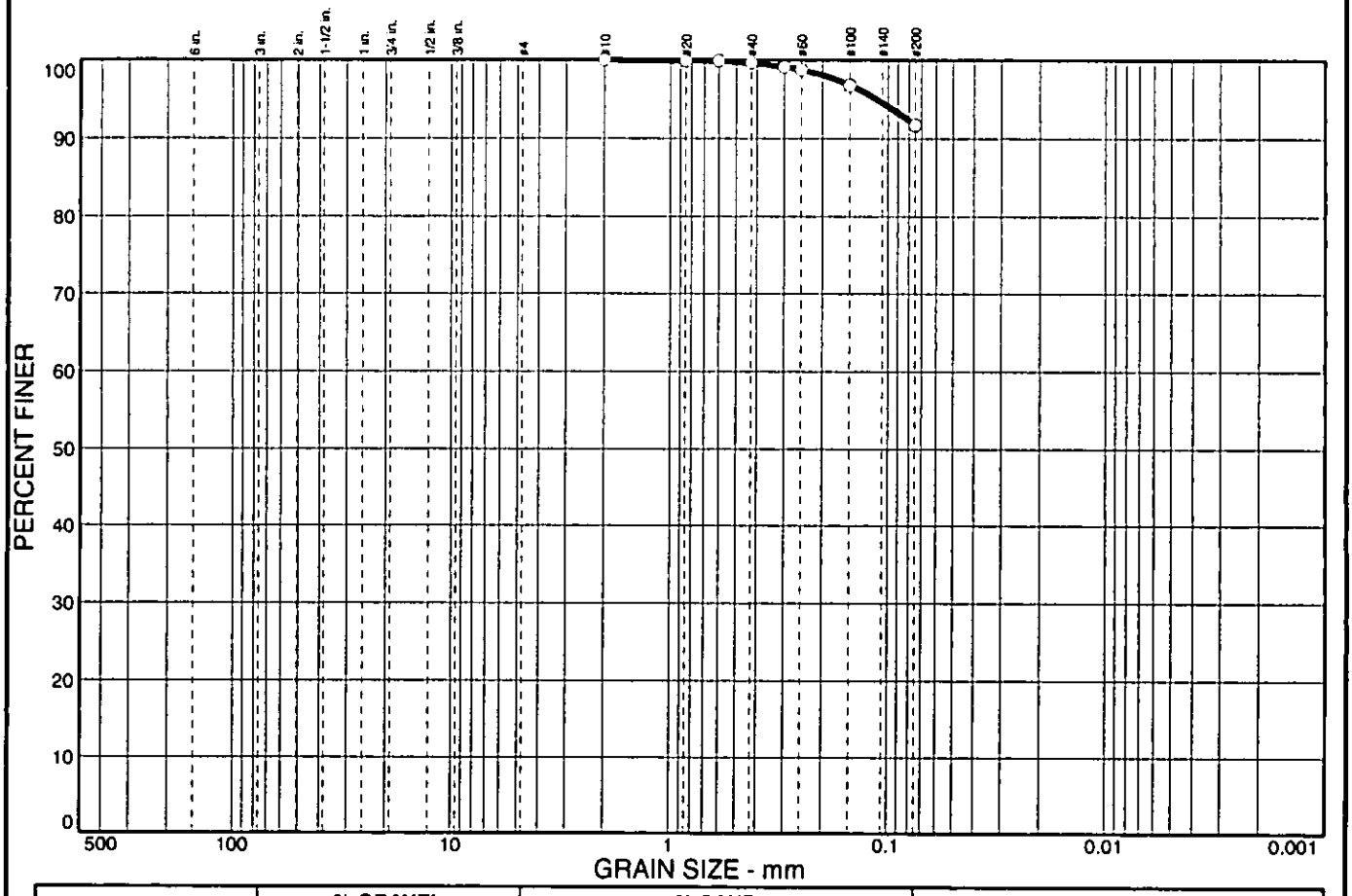
Sample No.: 1 **Source of Sample:** B-11 **Date:** 07/12/06
Location: **Elev./Depth:** 1.0

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.4	7.9	91.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#30	99.9		
#40	99.6		
#50	99.1		
#60	98.7		
#100	96.7		
#200	91.7		

* (no specification provided)

Soil Description

Silt

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

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

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Moisture Content = 17.0%
F.M.=0.04

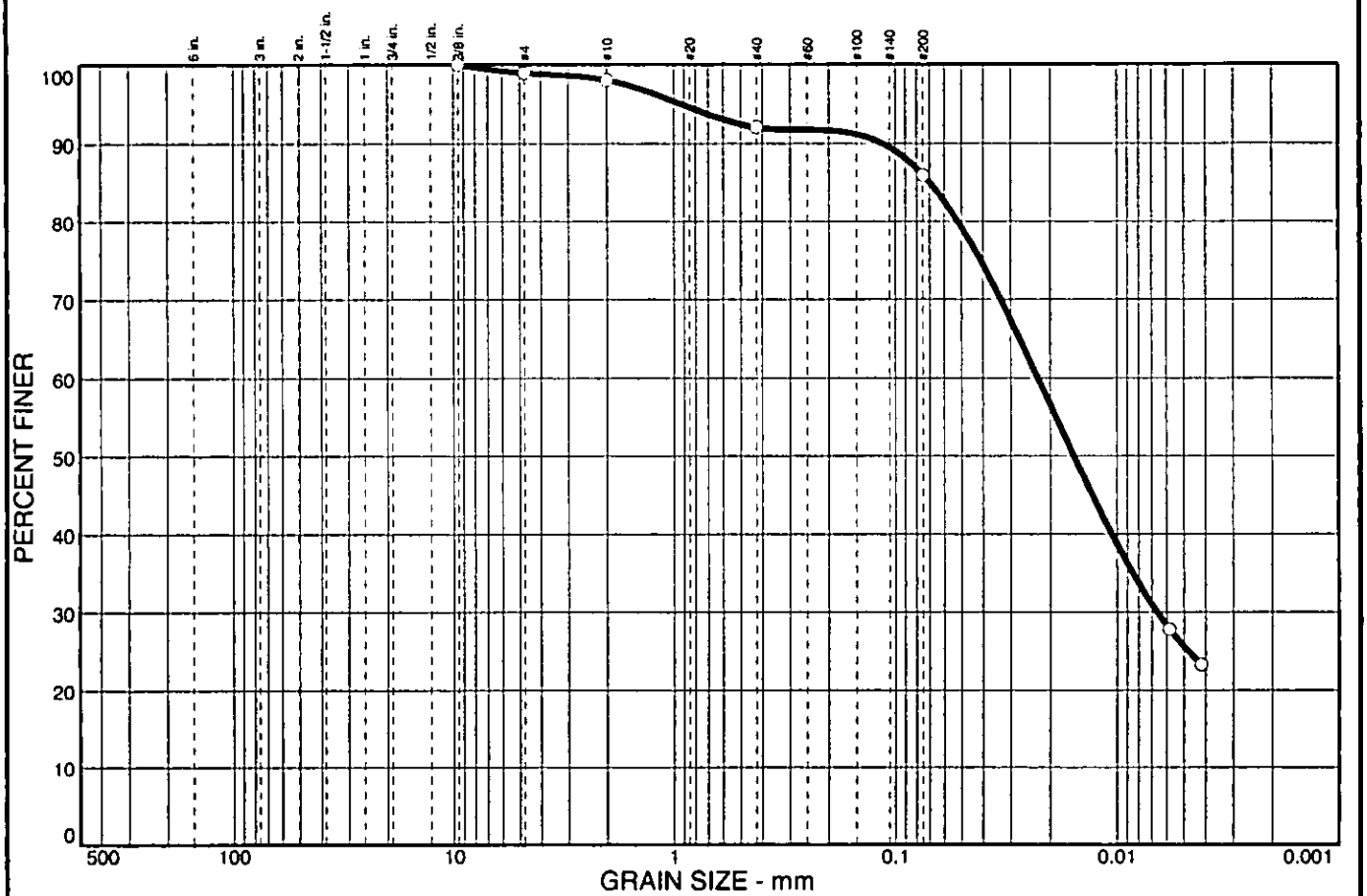
Sample No.: 1 **Source of Sample:** B-12 **Date:** 07/12/06
Location: **Elev./Depth:** 1.0

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	1.1	0.9	6.0	6.0	60.4	25.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	98.9		
#10	98.0		
#40	92.0		
#200	86.0		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 17 LL= 26 PI= 9

Coefficients

D_{85}= 0.0698 D_{60}= 0.0228 D_{50}= 0.0157
D_{30}= 0.0066 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(6)

Remarks

Moisture Content= 17.3%
F.M.=0.01

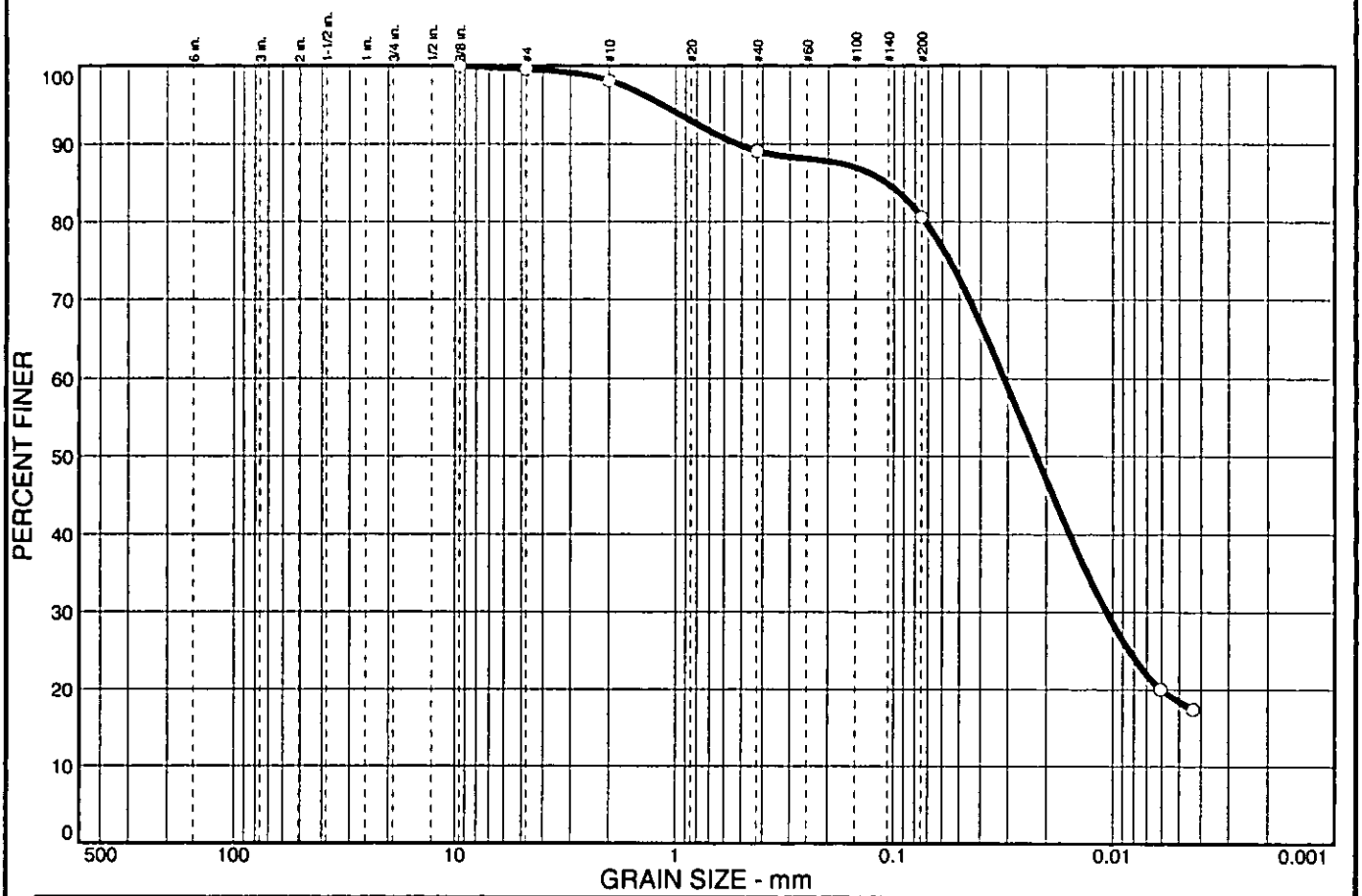
Sample No.: 1 **Source of Sample:** C-10 **Date:** 7/21/06
Location: **Elev./Depth:** 1.0

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.4	1.5	9.0	8.5	62.3	18.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.6		
#10	98.1		
#40	89.1		
#200	80.6		

* (no specification provided)

Soil Description

Lean clay with sand

Atterberg Limits

PL= 19 LL= 29 PI= 10

Coefficients

D_{85}= 0.108 D_{60}= 0.0313 D_{50}= 0.0223
D_{30}= 0.0107 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(7)

Remarks

Moisture Content= 15.0%
F.M.=0.00

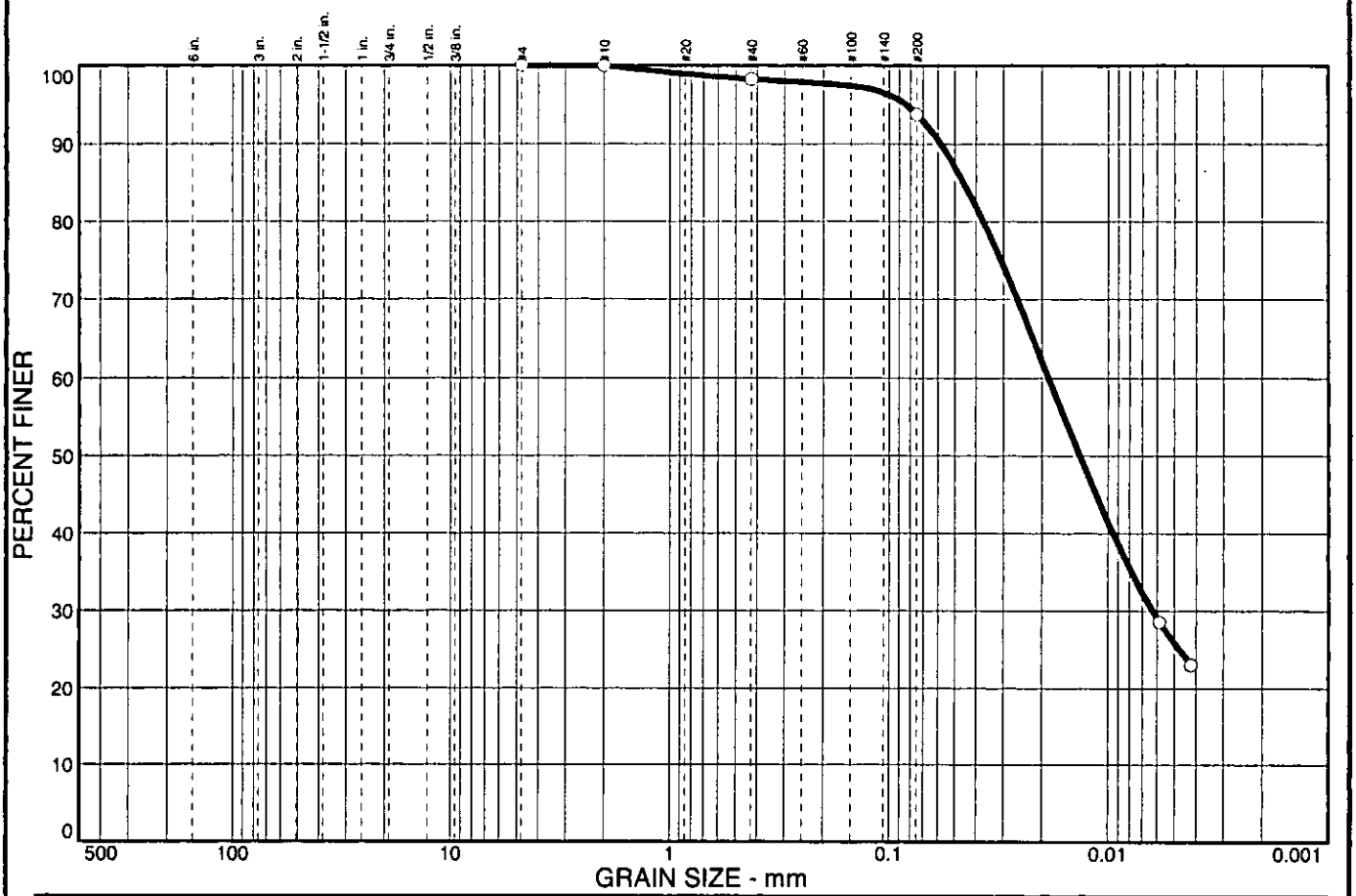
Sample No.: 2 **Source of Sample:** C-10 **Date:** 7/21/06
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	1.8	4.5	67.9	25.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	98.2		
#200	93.7		

* (no specification provided)

Soil Description

Silty clay

Atterberg Limits

PL= 18 LL= 25 PI= 7

Coefficients

D_{85}= 0.0457 D_{60}= 0.0187 D_{50}= 0.0135
D_{30}= 0.0063 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(5)

Remarks

Moisture Content= 18.5%

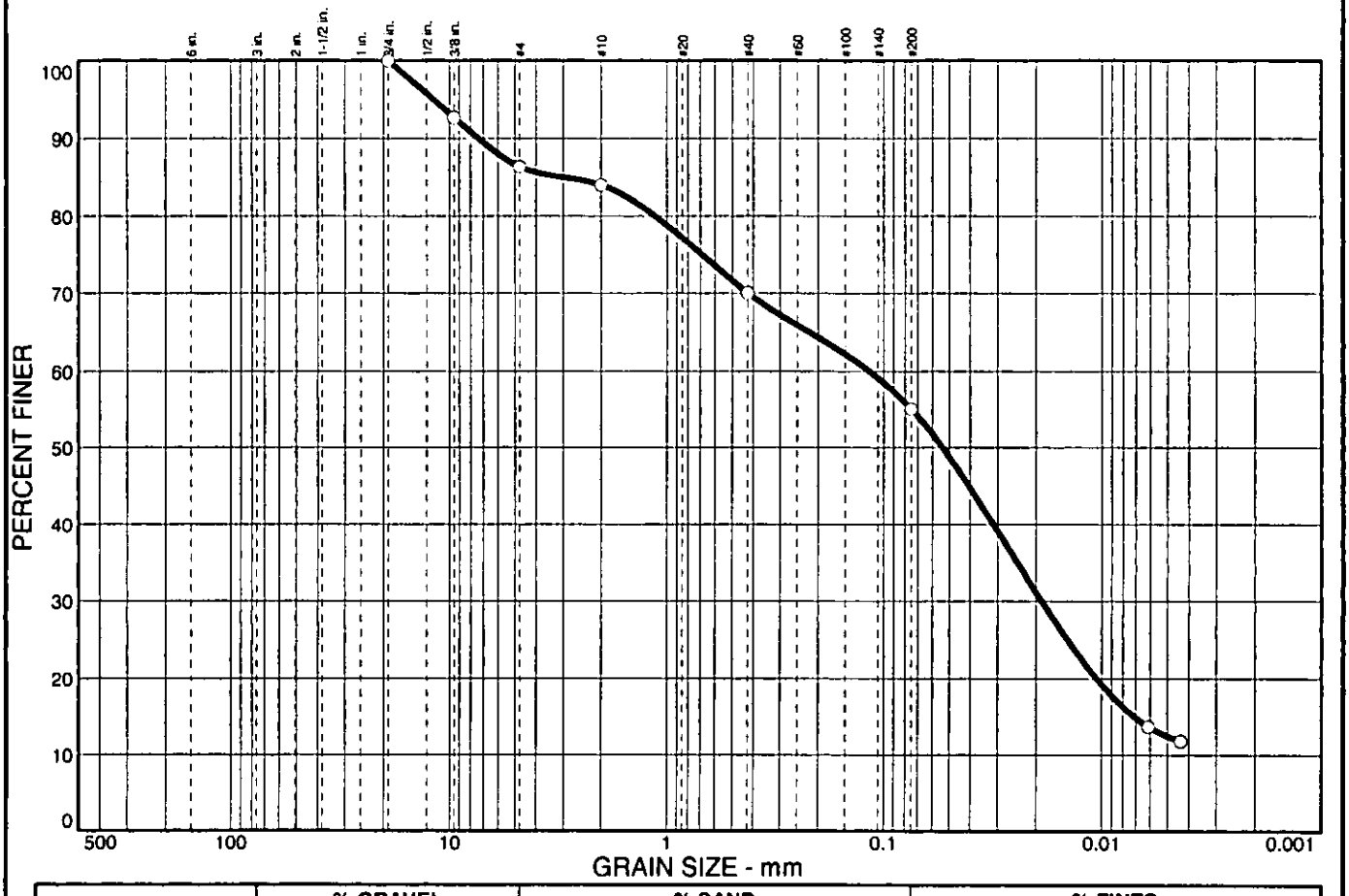
Sample No.: 1 **Source of Sample:** C-11 **Date:** 7/21/06
Location: **Elev./Depth:** 1.0

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	13.6	2.4	14.0	15.0	42.5	12.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	92.6		
#4	86.4		
#10	84.0		
#40	70.0		
#200	55.0		

* (no specification provided)

Soil Description

Sandy silty clay

Atterberg Limits

PL= 21 LL= 27 PI= 6

Coefficients

D_{85}= 2.95 D_{60}= 0.117 D_{50}= 0.0541
D_{30}= 0.0189 D_{15}= 0.0071 D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(1)

Remarks

Moisture Content= 14.4%
F.M.=0.21

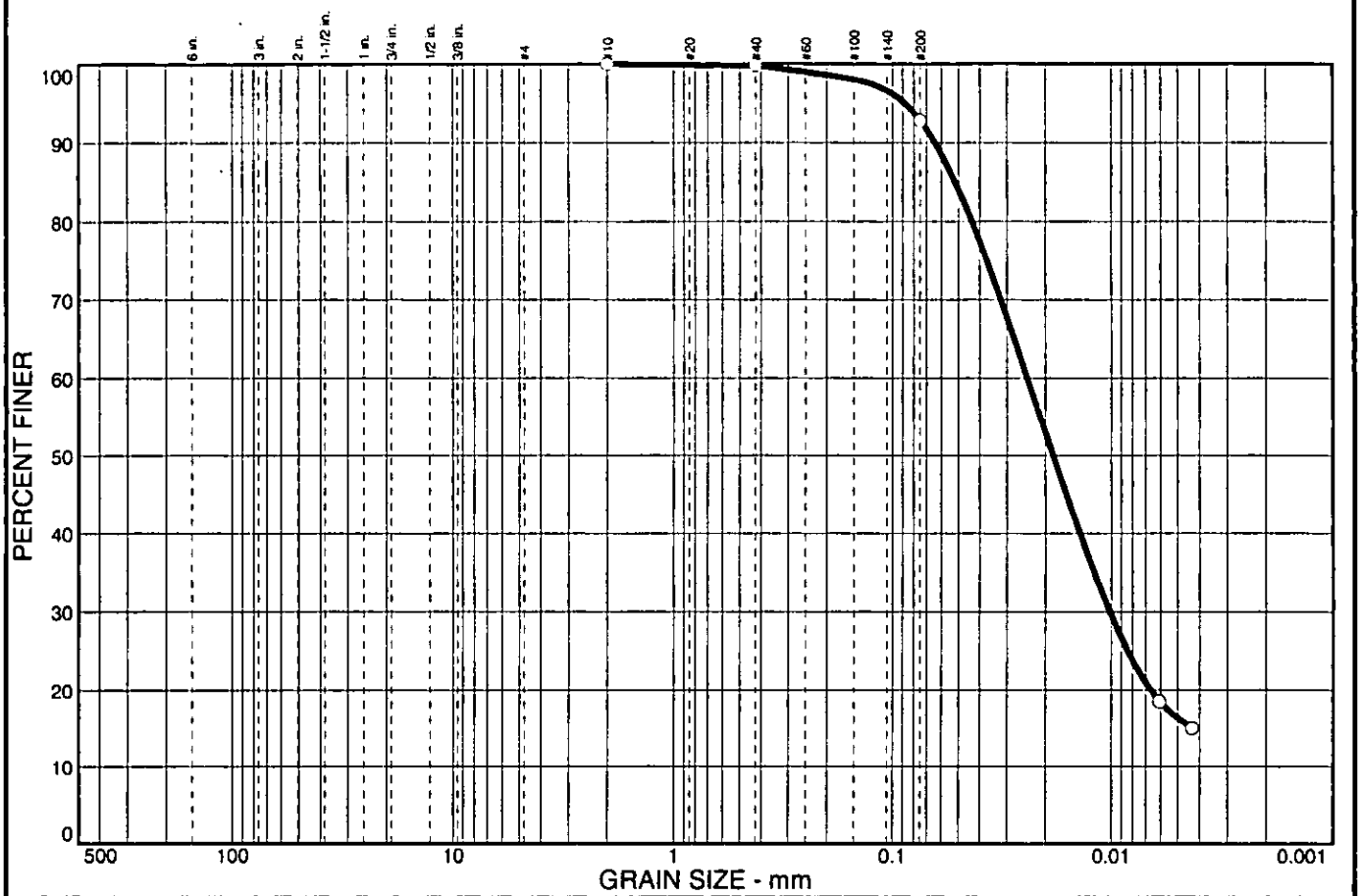
Sample No.: 3 **Source of Sample:** C-11 **Date:** 7/21/06
Location: **Elev./Depth:** 6.0

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.2	7.0	76.5	16.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.8		
#200	92.8		

* (no specification provided)

Soil Description

Silt

Atterberg Limits

PL= 24 LL= 30 PI= 6

Coefficients

D_{85}= 0.0522 D_{60}= 0.0244 D_{50}= 0.0185
D_{30}= 0.0102 D_{15}= 0.0043 D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(6)

Remarks

Moisture Content= 15.1%

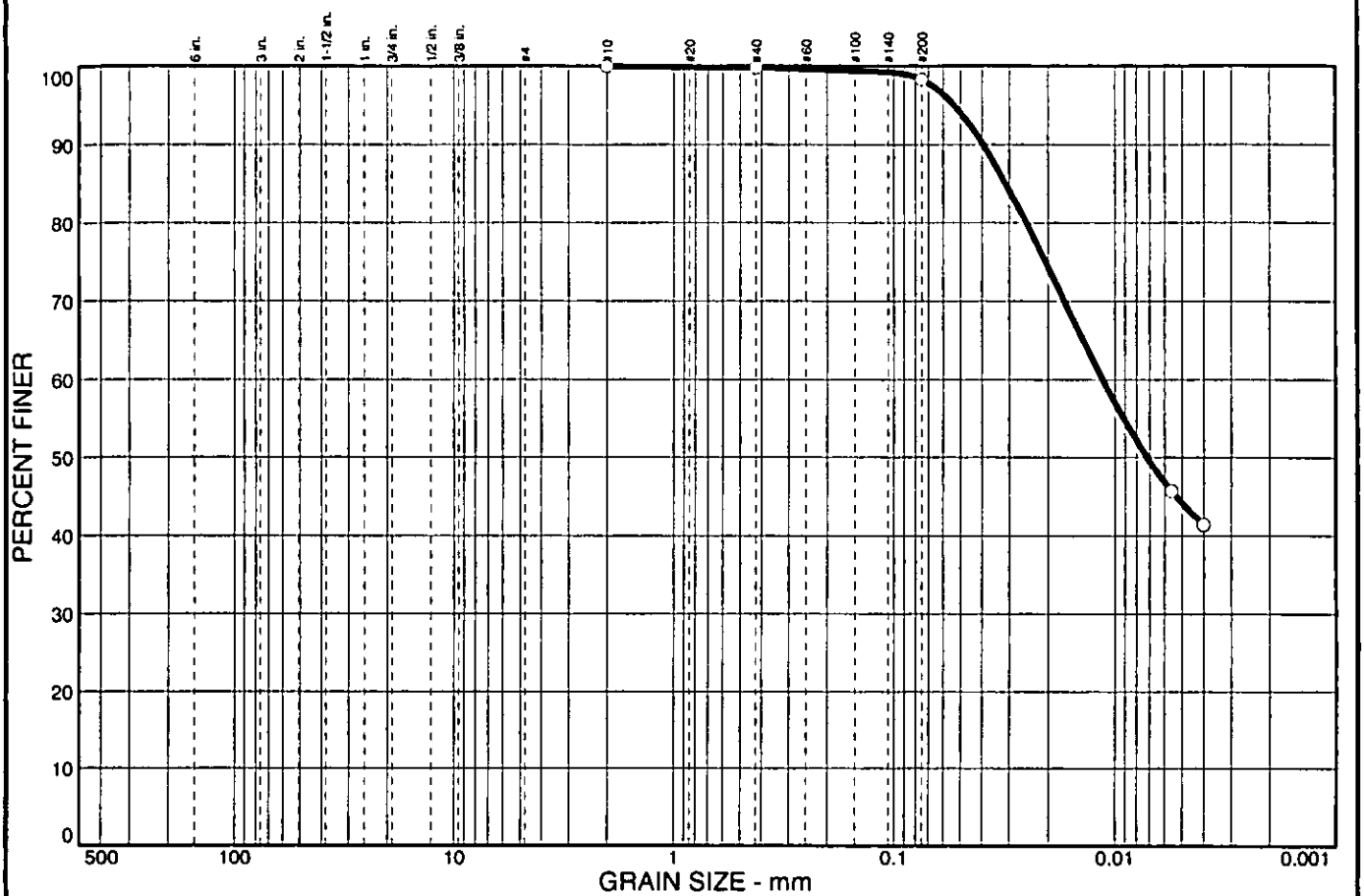
Sample No.: 5 **Source of Sample:** C-11 **Date:** 7/21/06
Location: **Elev./Depth:** 11.0

DLZ

Client: TranSystems. Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.2	1.5	54.2	44.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.8		
#200	98.3		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 19 LL= 41 PI= 22

Coefficients

D_{85}= 0.0313 D_{60}= 0.0114 D_{50}= 0.0072
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(23)

Remarks

Moisture Content= 23.3%

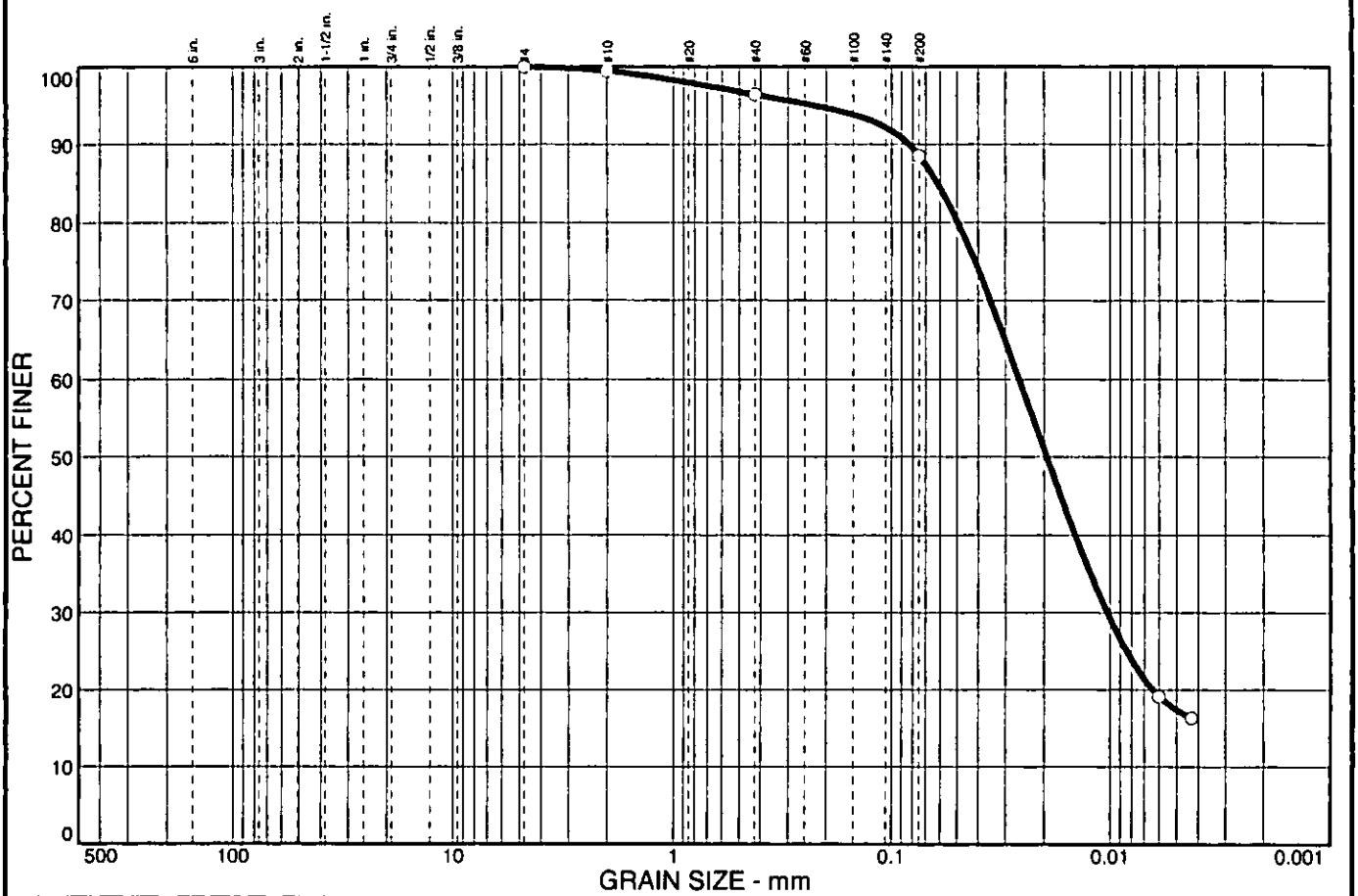
Sample No.: 2 **Source of Sample:** C-12 **Date:** 7/21/06
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.5	3.1	7.9	71.2	17.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.5		
#40	96.4		
#200	88.5		

* (no specification provided)

Soil Description

Silty clay

Atterberg Limits

PL= 17 LL= 21 PI= 4

Coefficients

D_{85}= 0.0617 D_{60}= 0.0261 D_{50}= 0.0195
D_{30}= 0.0103 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(1)

Remarks

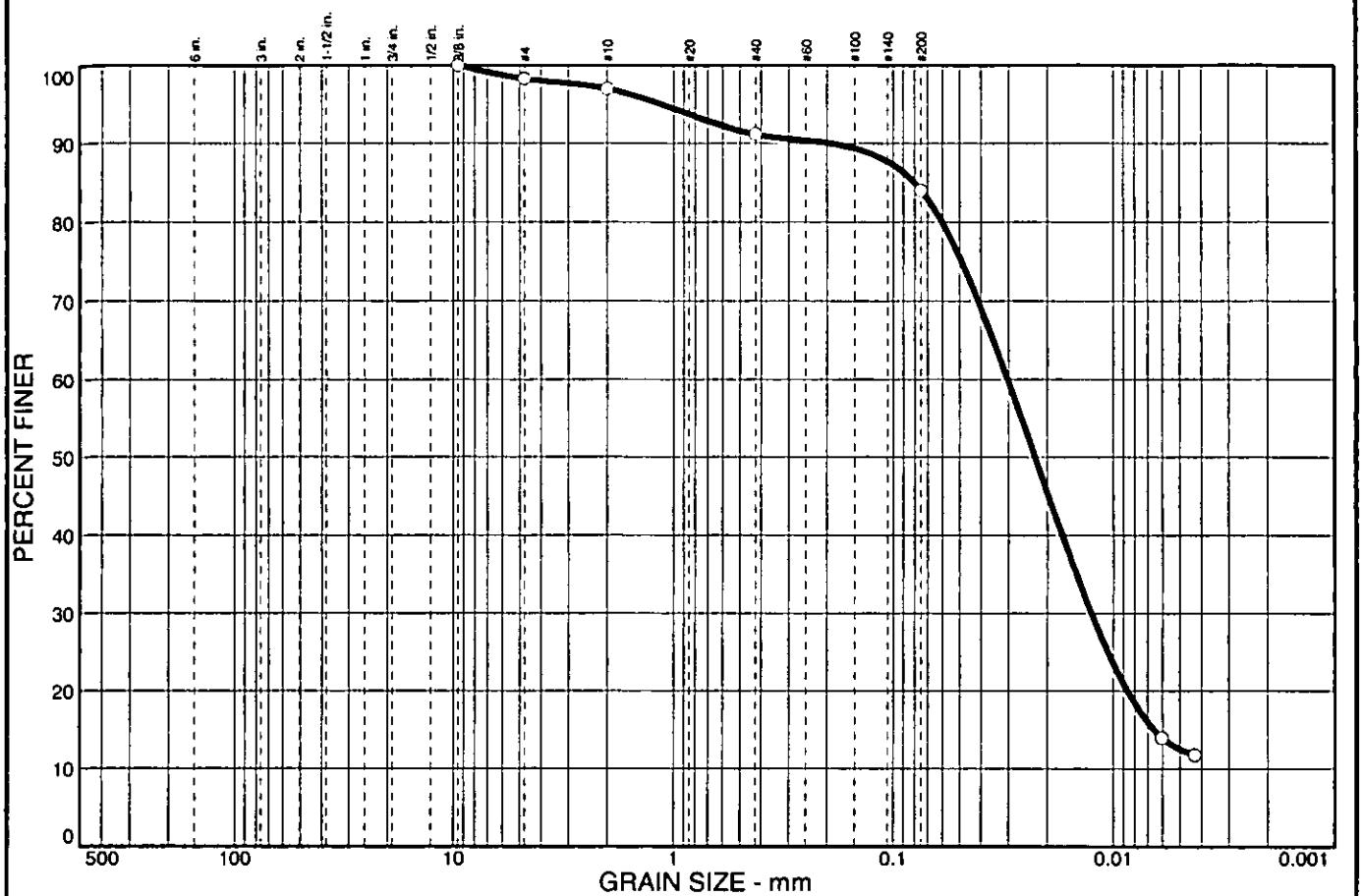
Moisture Content= 16.6%

Sample No.: 4 **Source of Sample:** C-12 **Date:** 7/21/06
Location: **Elev./Depth:** 8.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00
Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	1.7	1.3	5.9	7.1	71.6	12.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	98.3		
#10	97.0		
#40	91.1		
#200	84.0		

* (no specification provided)

Soil Description

Silt with sand

Atterberg Limits

PL= 26 LL= 30 PI= 4

Coefficients

D_{85}= 0.0805 D_{60}= 0.0305 D_{50}= 0.0229
D_{30}= 0.0126 D_{15}= 0.0066 D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(3)

Remarks

Moisture Content = 19.5%
F.M.=0.02

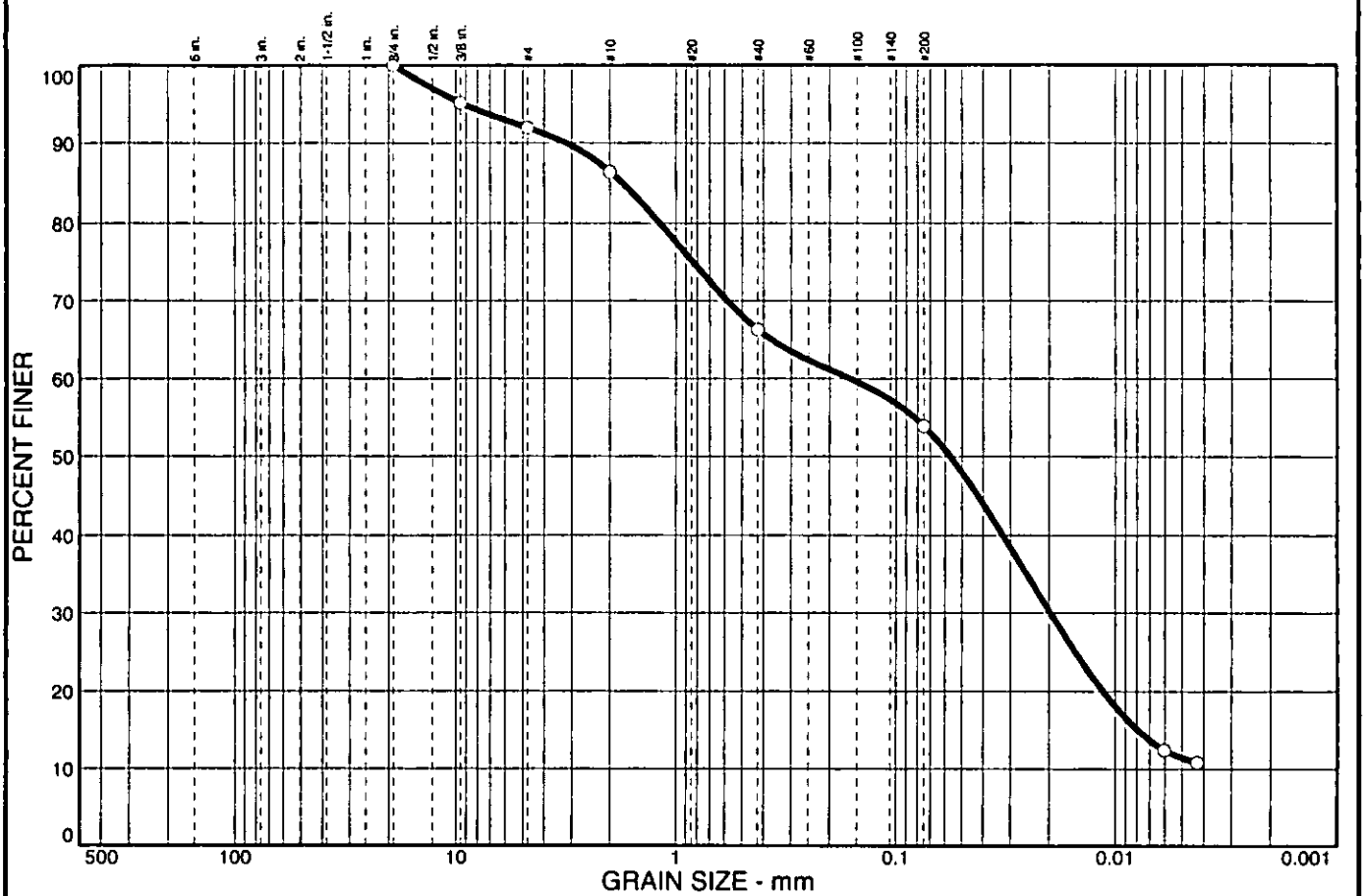
Sample No.: 1 **Source of Sample:** C-13 **Date:** 07/19/06
Location: **Elev./Depth:** 1.0

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	8.1	5.5	20.1	12.5	42.4	11.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	95.1		
#4	91.9		
#10	86.4		
#40	66.3		
#200	53.8		

* (no specification provided)

Soil Description

Sandy silt

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 1.75 D_{60}= 0.162 D_{50}= 0.0571
D_{30}= 0.0198 D_{15}= 0.0080 D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Moisture Content = 12.5%
F.M.=0.13

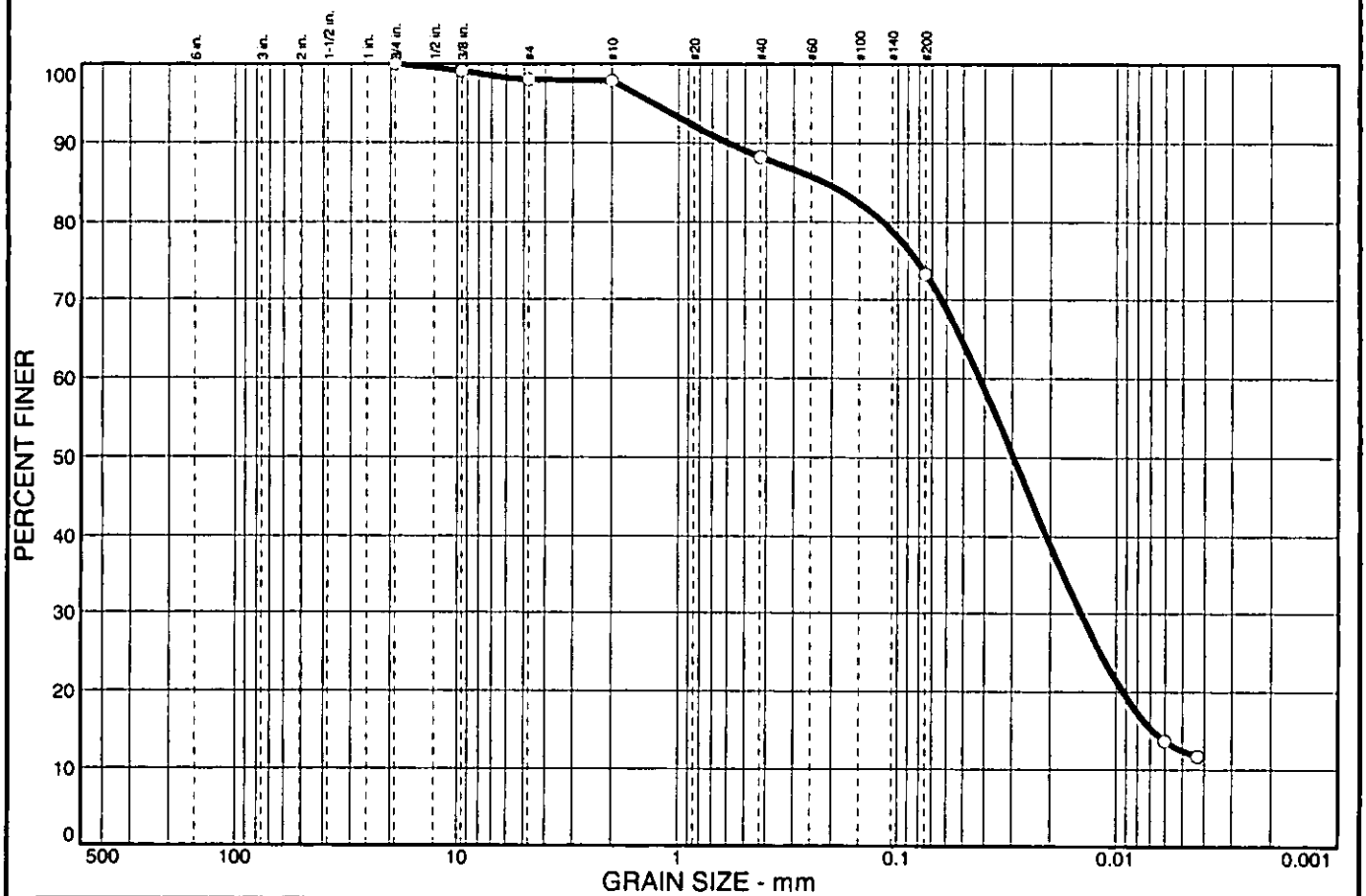
Sample No.: 2 **Source of Sample:** C-13 **Date:** 07/19/06
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	2.0	0.2	9.6	14.9	60.9	12.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	99.1		
#4	98.0		
#10	97.8		
#40	88.2		
#200	73.3		

* (no specification provided)

Soil Description

Silt with sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.215 D_{60}= 0.0424 D_{50}= 0.0297
D_{30}= 0.0145 D_{15}= 0.0068 D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Moisture Content = 15.4%
F.M.=0.03

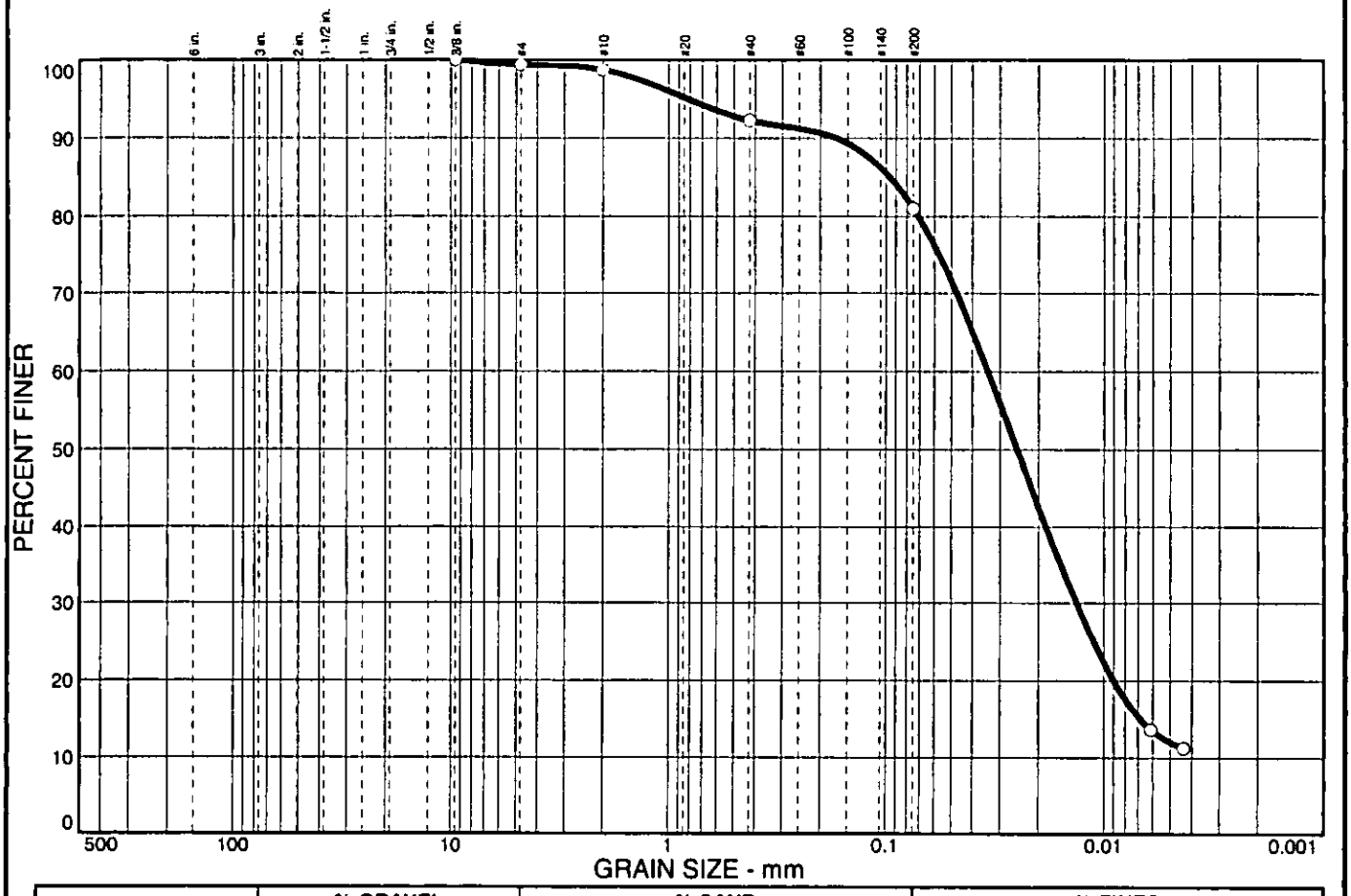
Sample No.: 5 **Source of Sample:** C-13 **Date:** 07/19/06
Location: **Elev./Depth:** 11.0

DLZ

Client: TranSystems. Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.6	0.7	6.5	11.2	69.0	12.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.4		
#10	98.7		
#40	92.2		
#200	81.0		

* (no specification provided)

Soil Description

Silt with sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.0958 D_{60}= 0.0342 D_{50}= 0.0252
D_{30}= 0.0134 D_{15}= 0.0069 D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

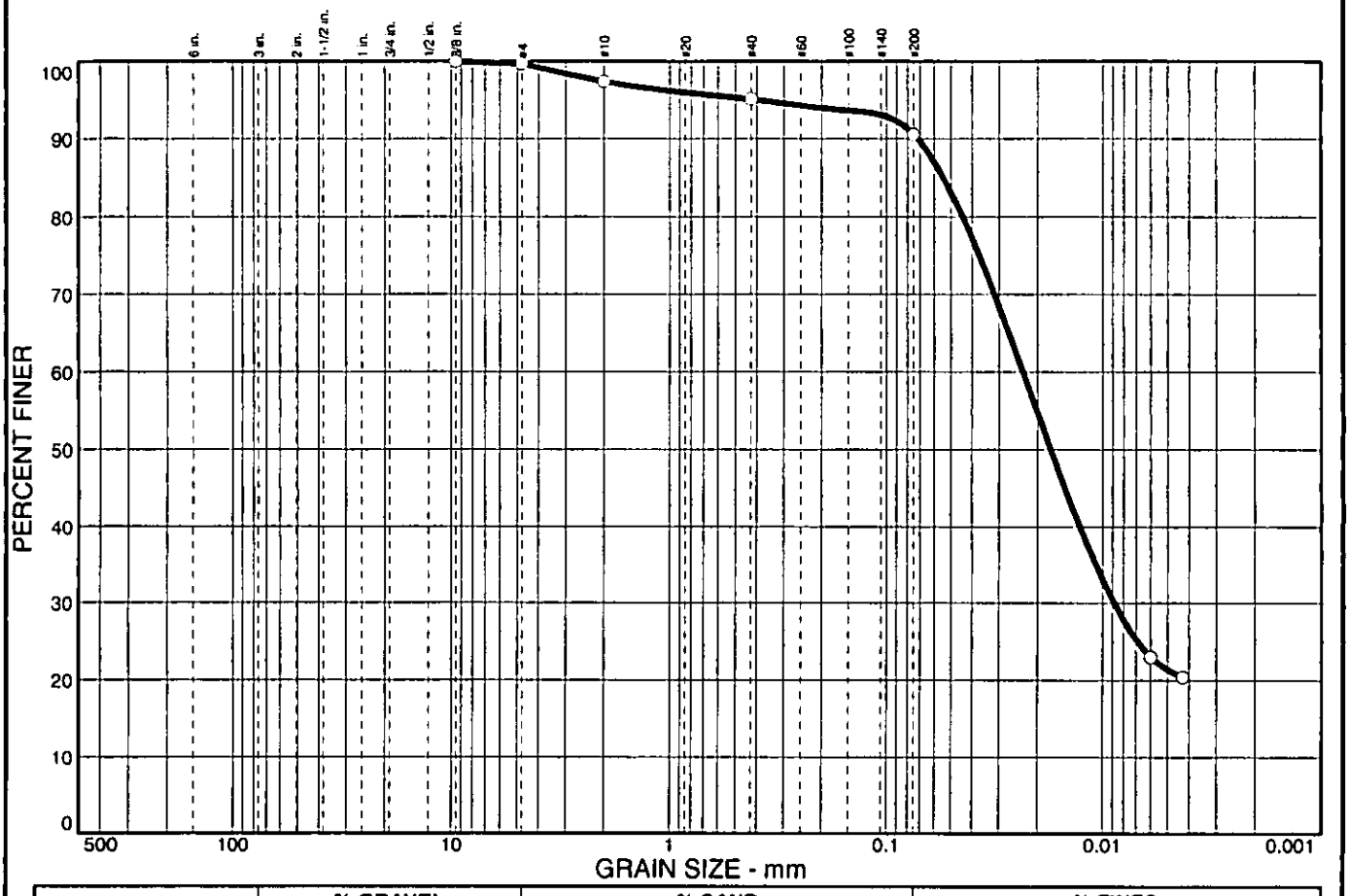
Moisture Content= 16.9%
F.M.=0.01

Sample No.: 6 **Source of Sample:** C-13 **Date:** 7/19/06
Location: **Elev./Depth:** 13.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00
Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.3	2.4	2.3	4.5	69.1	21.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.7		
#10	97.3		
#40	95.0		
#200	90.5		

* (no specification provided)

Soil Description

Silty clay

Atterberg Limits

PL= 20 LL= 27 PI= 7

Coefficients

D_{85}= 0.0545 D_{60}= 0.0234 D_{50}= 0.0175
D_{30}= 0.0089 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(5)

Remarks

Moisture Content= 15.8%
F.M.=0.00

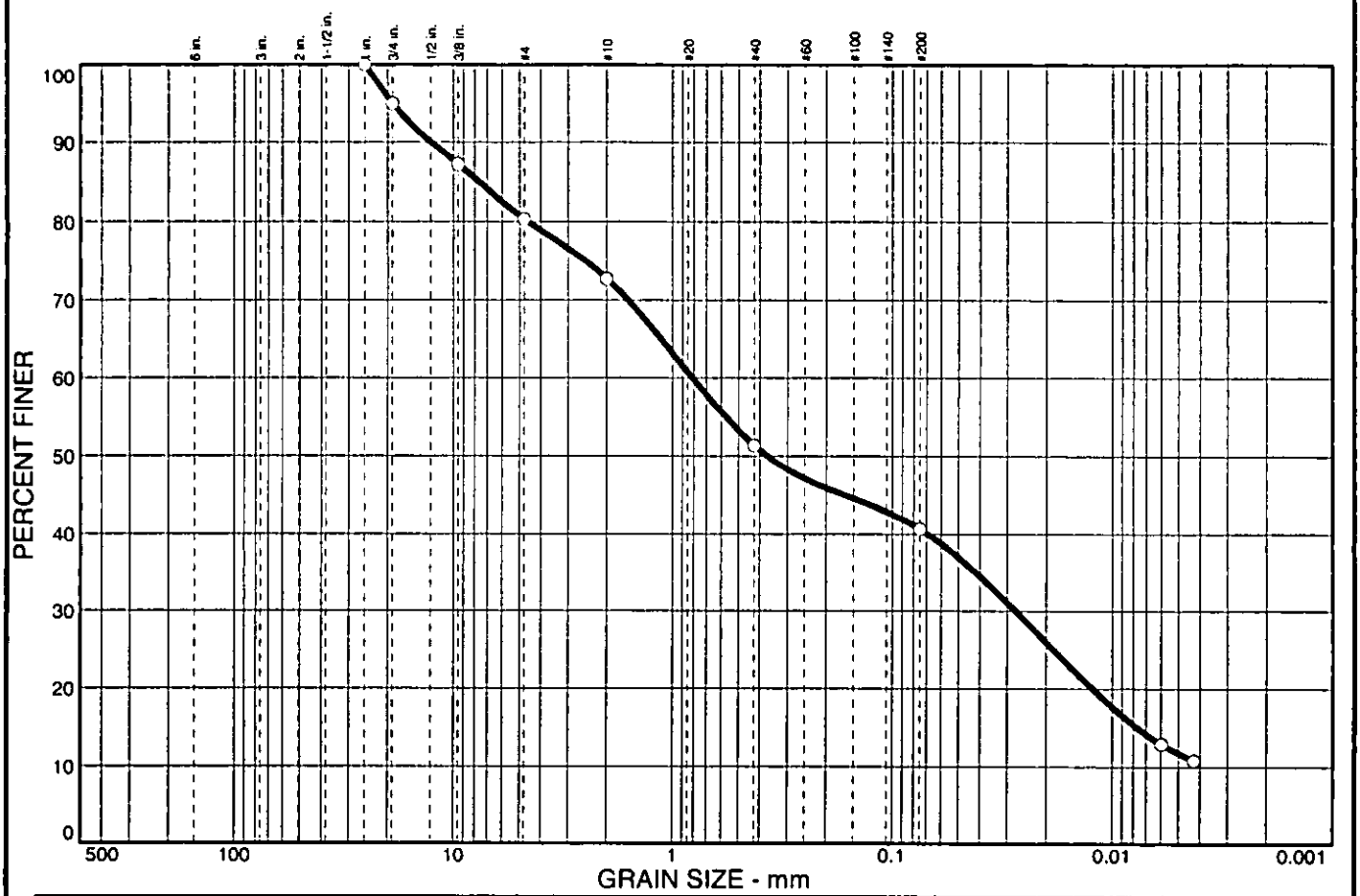
Sample No.: 1 **Source of Sample:** C-14 **Date:** 7/19/06
Location: **Elev./Depth:** 1.0

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	5.1	14.6	7.6	21.4	10.7	28.8	11.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.00 in.	100.0		
0.75 in.	94.9		
0.375 in.	87.2		
#4	80.3		
#10	72.7		
#40	51.3		
#200	40.6		

* (no specification provided)

Soil Description

Silty, clayey sand with gravel

Atterberg Limits

PL= 21 LL= 27 PI= 6

Coefficients

D_{85}= 7.64 D_{60}= 0.814 D_{50}= 0.372
D_{30}= 0.0276 D_{15}= 0.0077 D_{10}=
C_u= C_c=

Classification

USCS= SC-SM AASHTO= A-4(0)

Remarks

Moisture Content = 11.7%
F.M.=0.38

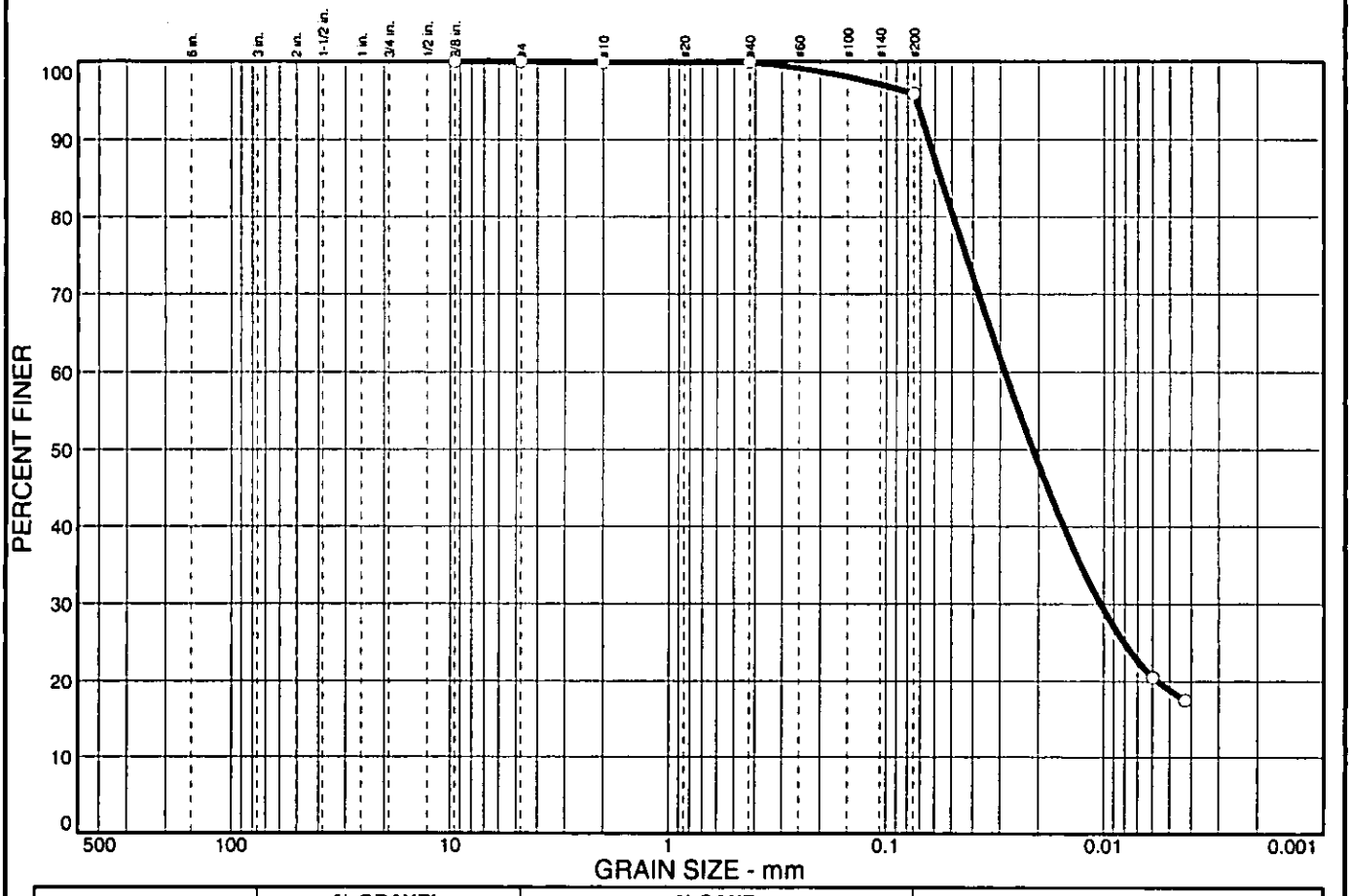
Sample No.: 2 **Source of Sample:** C-14 **Date:** 07/19/06
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.1	0.0	4.1	77.0	18.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	99.9		
#40	99.9		
#200	95.8		

* (no specification provided)

Soil Description

Silty clay

Atterberg Limits

PL= 18 LL= 24 PI= 6

Coefficients

D_{85}= 0.0565 D_{60}= 0.0287 D_{50}= 0.0213
D_{30}= 0.0104 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(4)

Remarks

Moisture Content = 18.2%

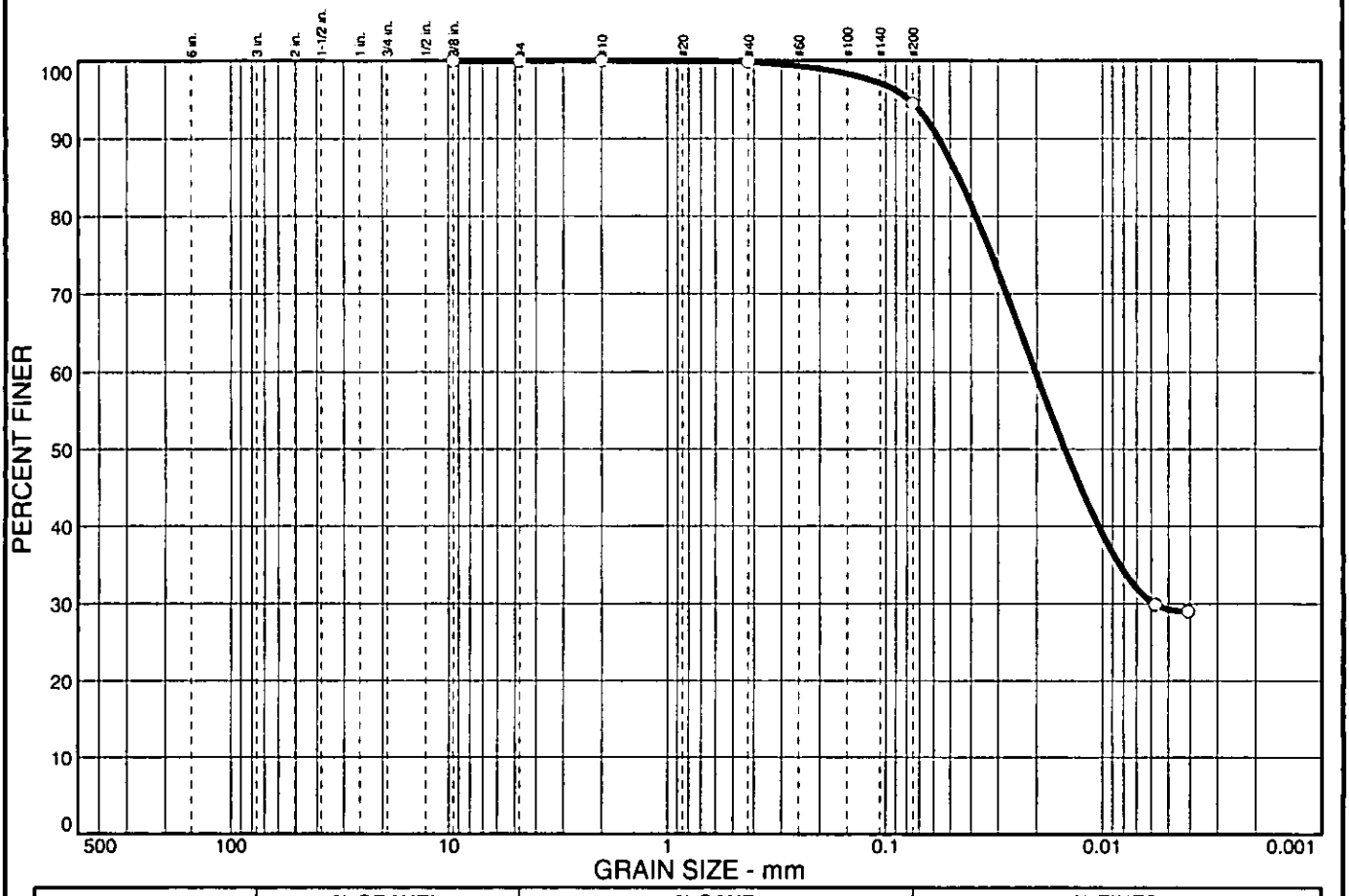
Sample No.: 3 **Source of Sample:** C-14 **Date:** 07/19/06
Location: **Elev./Depth:** 6.0

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.1	5.4	65.3	29.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	100.0		
#40	99.9		
#200	94.5		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 18 LL= 27 PI= 9

Coefficients

D_{85}= 0.0459 D_{60}= 0.0204 D_{50}= 0.0149
D_{30}= 0.0058 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(7)

Remarks

Moisture Content = 19.1%

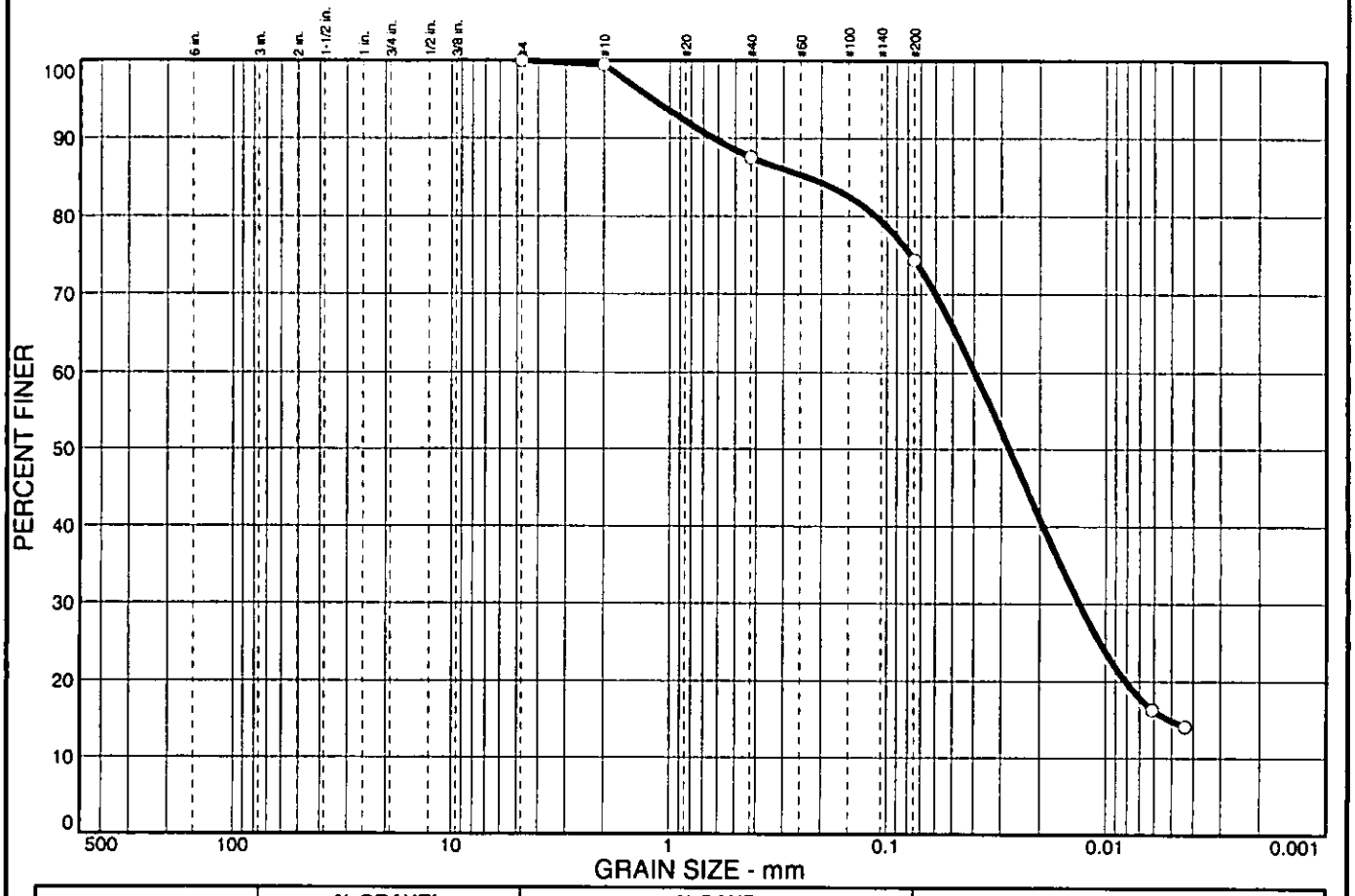
Sample No.: 4 **Source of Sample:** C-14 **Date:** 07/19/06
Location: **Elev./Depth:** 8.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.5	11.9	13.3	59.5	14.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.5		
#40	87.6		
#200	74.3		

* (no specification provided)

Soil Description

Lean clay with sand

Atterberg Limits

PL= 20 LL= 30 PI= 10

Coefficients

D_{85}= 0.231 D_{60}= 0.0399 D_{50}= 0.0277
D_{30}= 0.0132 D_{15}= 0.0051 D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(6)

Remarks

Moisture Content= 18.4%

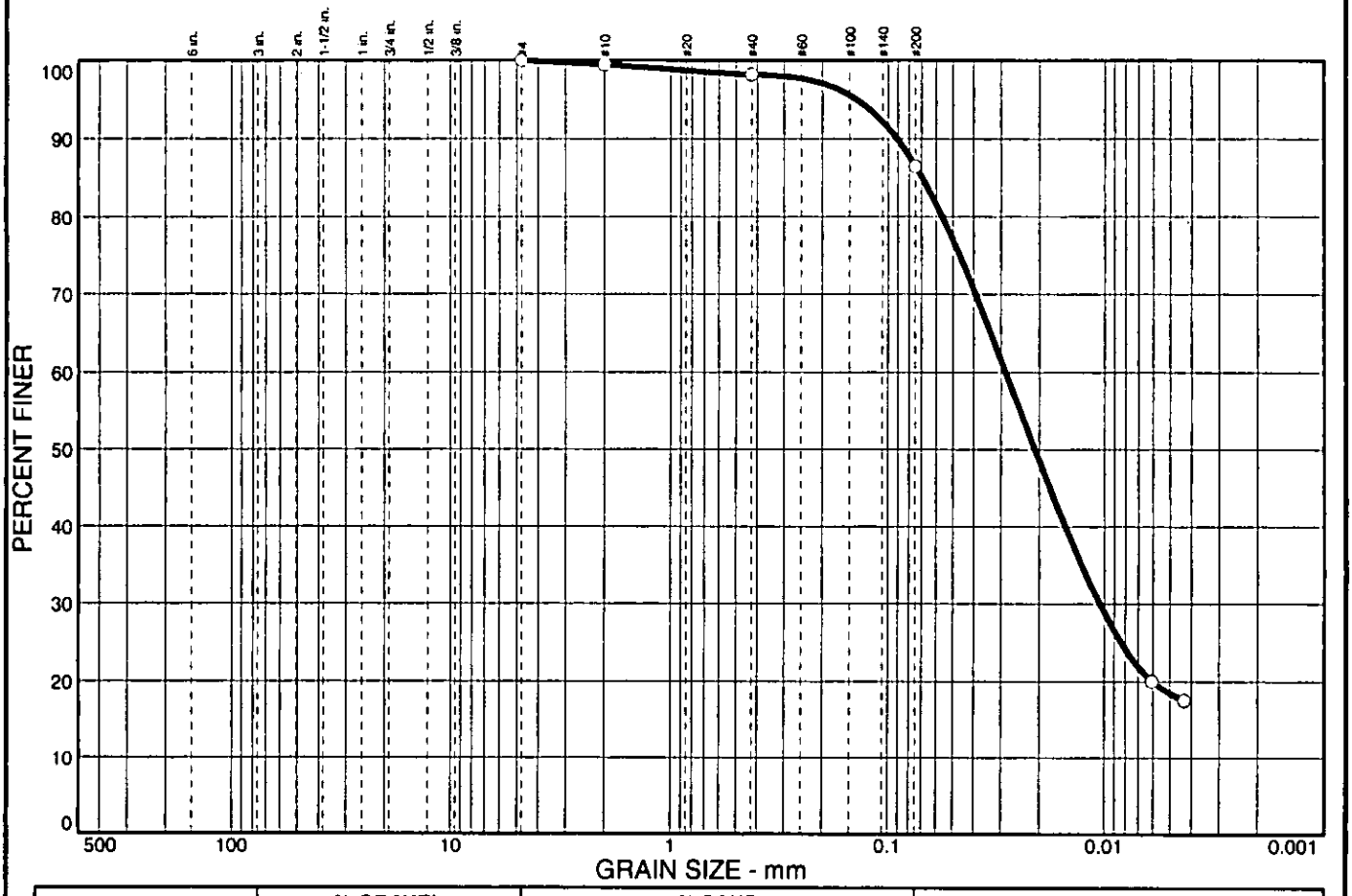
Sample No.: 1 **Source of Sample:** C-15 **Date:** 7/21/06
Location: **Elev./Depth:** 1.0

DLZ

Client: TranSystems. Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.5	1.3	11.7	68.1	18.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.5		
#40	98.2		
#200	86.5		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 21 LL= 30 PI= 9

Coefficients

D_{85}= 0.0697 D_{60}= 0.0287 D_{50}= 0.0210
D_{30}= 0.0105 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(7)

Remarks

Moisture Content= 13.6%

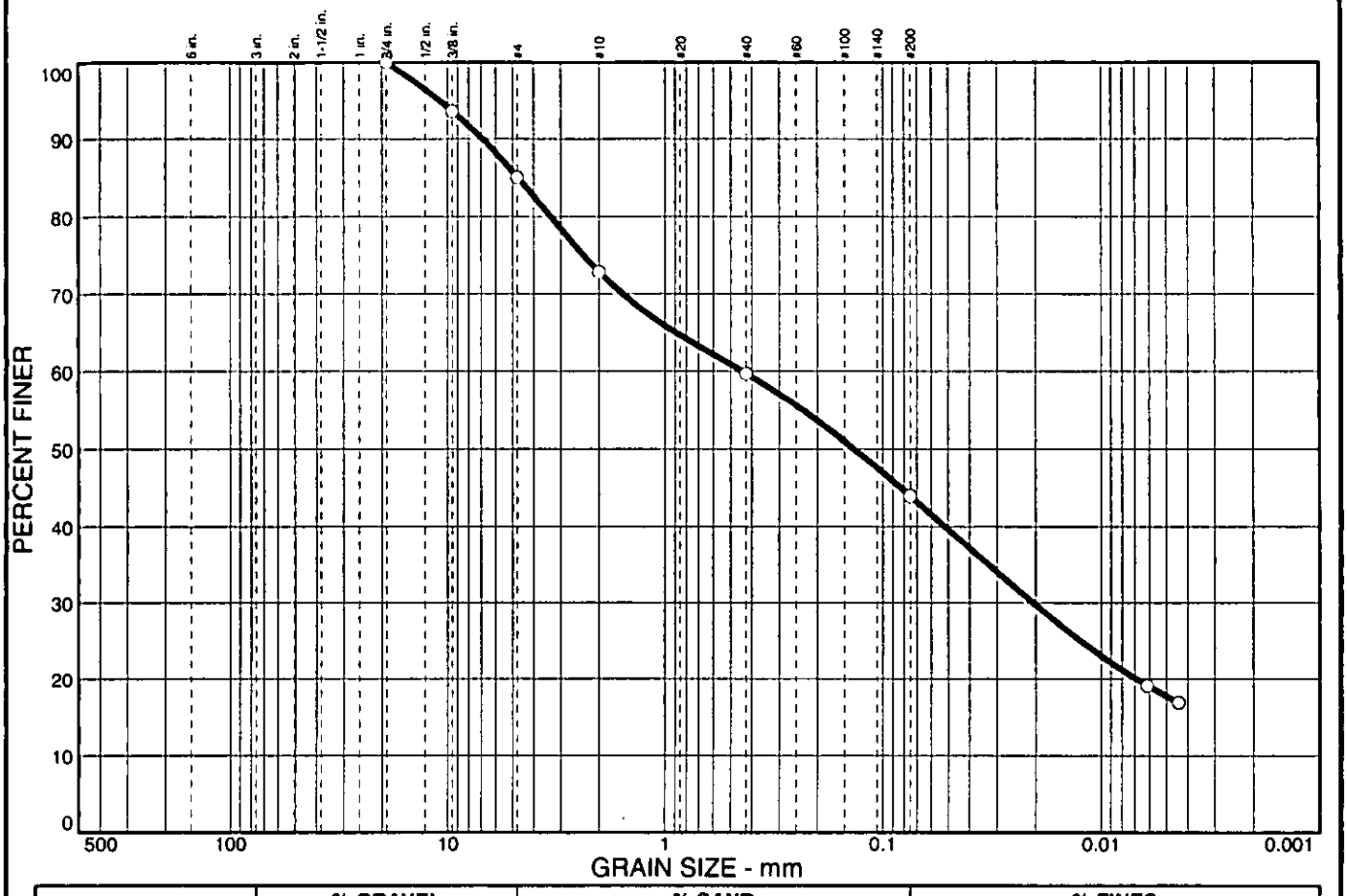
Sample No.: 2 **Source of Sample:** C-15 **Date:** 7/21/06
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	14.9	12.3	13.1	15.8	26.2	17.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	93.5		
#4	85.1		
#10	72.8		
#40	59.7		
#200	43.9		

* (no specification provided)

Soil Description

Clayey sand

Atterberg Limits

PL= 15 LL= 23 PI= 8

Coefficients

D_{85}= 4.72 D_{60}= 0.443 D_{50}= 0.137
D_{30}= 0.0206 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SC AASHTO= A-4(0)

Remarks

Moisture Content= 10.9%
F.M.=0.21

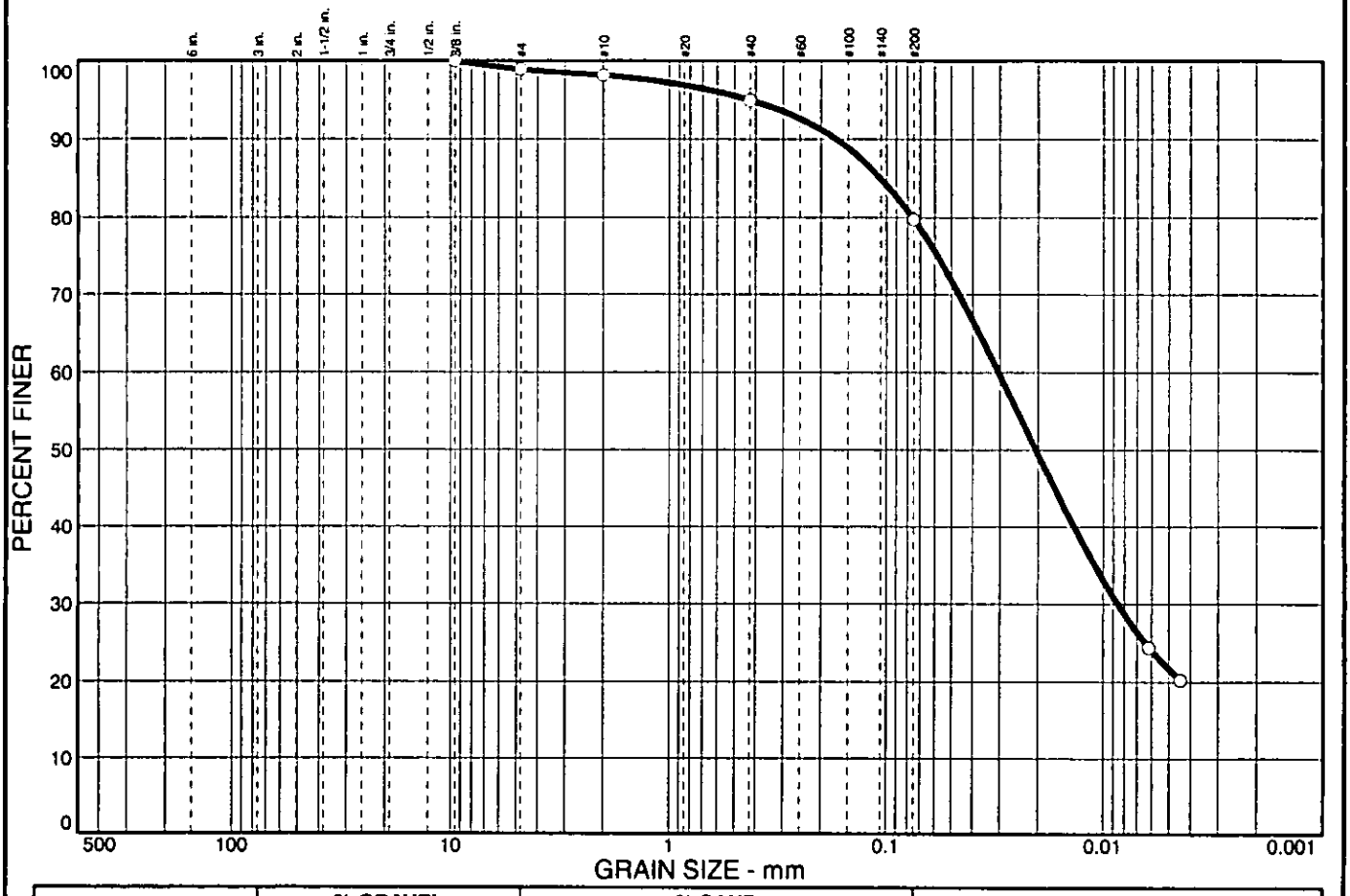
Sample No.: 2 **Source of Sample:** R-360 **Date:** 2/16/05
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	1.1	0.8	3.2	15.2	58.1	21.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	98.9		
#10	98.1		
#40	94.9		
#200	79.7		

* (no specification provided)

Soil Description

Silty clay with sand

Atterberg Limits

PL= 16 LL= 21 PI= 5

Coefficients

D_{85}= 0.107 D_{60}= 0.0306 D_{50}= 0.0206
D_{30}= 0.0086 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(1)

Remarks

Moisture Content= 9.9%
F.M.=0.01

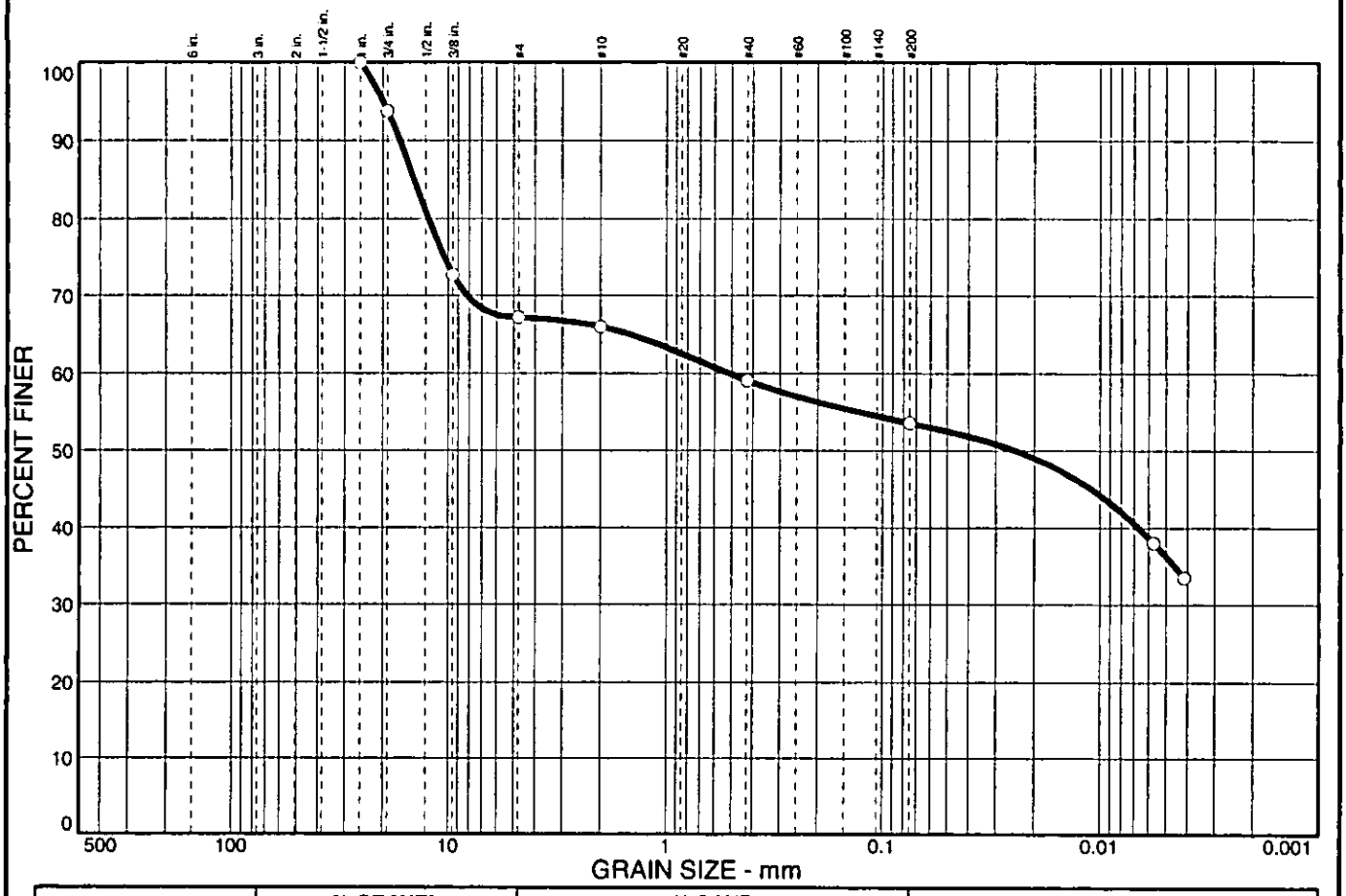
Sample No.: 3 **Source of Sample:** R-360 **Date:** 2/16/05
Location: **Elev./Depth:** 6

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	6.3	26.5	1.2	6.9	5.6	17.3	36.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.00 in.	100.0		
0.75 in.	93.7		
0.375 in.	72.6		
#4	67.2		
#10	66.0		
#40	59.1		
#200	53.5		

* (no specification provided)

Soil Description

Gravelly lean clay

Atterberg Limits

PL= 23 LL= 40 PI= 17

Coefficients

D_{85}= 14.4 D_{60}= 0.515 D_{50}= 0.0247
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-6(7)

Remarks

Moisture Content= 12.0%
F.M.=0.67

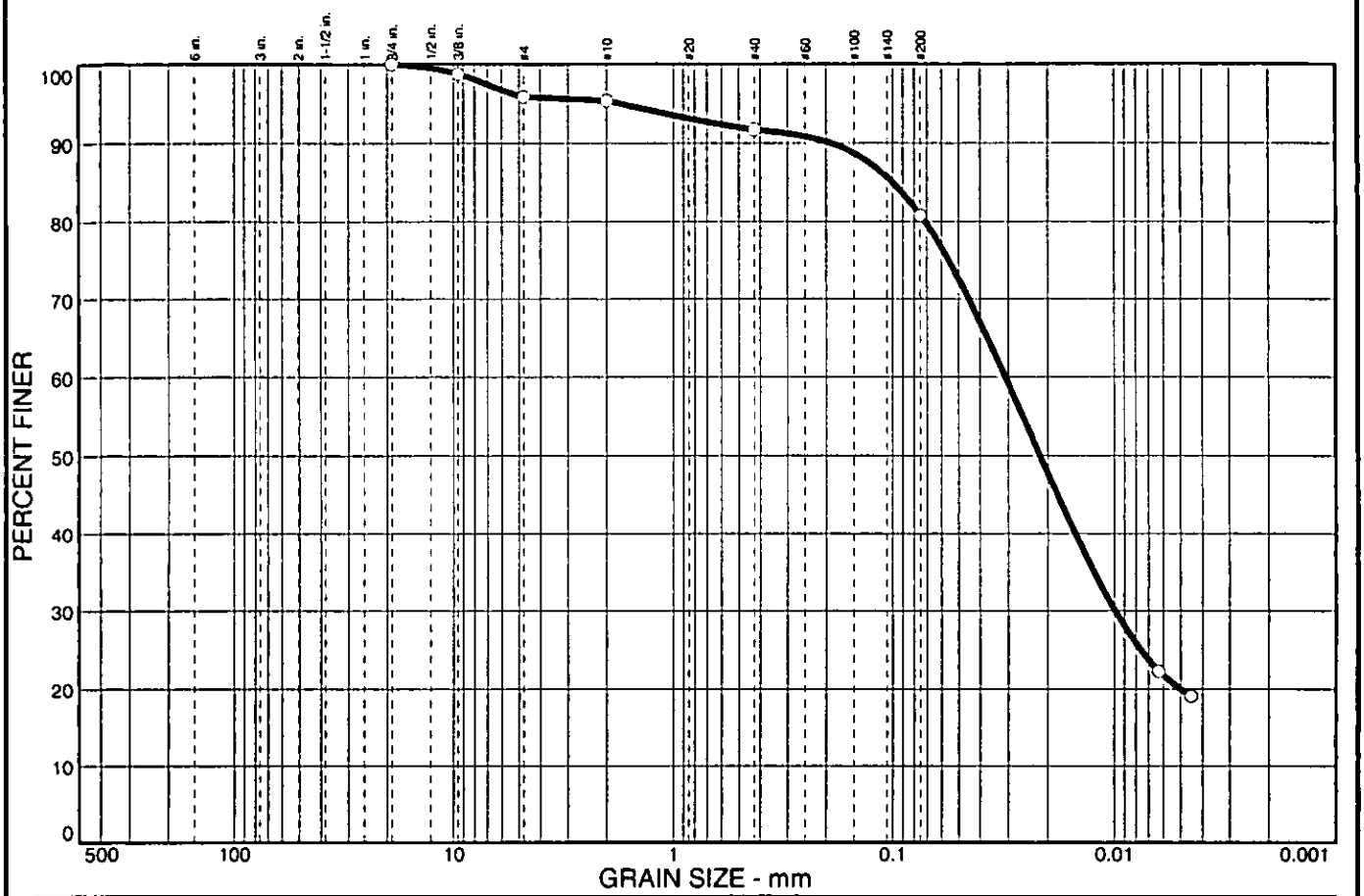
Sample No.: 2 **Source of Sample:** R-365 **Date:** 2/16/05
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	4.2	0.5	3.6	10.9	60.9	19.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	98.7		
#4	95.8		
#10	95.3		
#40	91.7		
#200	80.8		

* (no specification provided)

Soil Description

Lean clay with sand

Atterberg Limits

PL= 17 LL= 25 PI= 8

Coefficients

D_{85}= 0.100 D_{60}= 0.0311 D_{50}= 0.0218
D_{30}= 0.0100 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(4)

Remarks

Moisture Content= 9.9%
F.M.=0.05

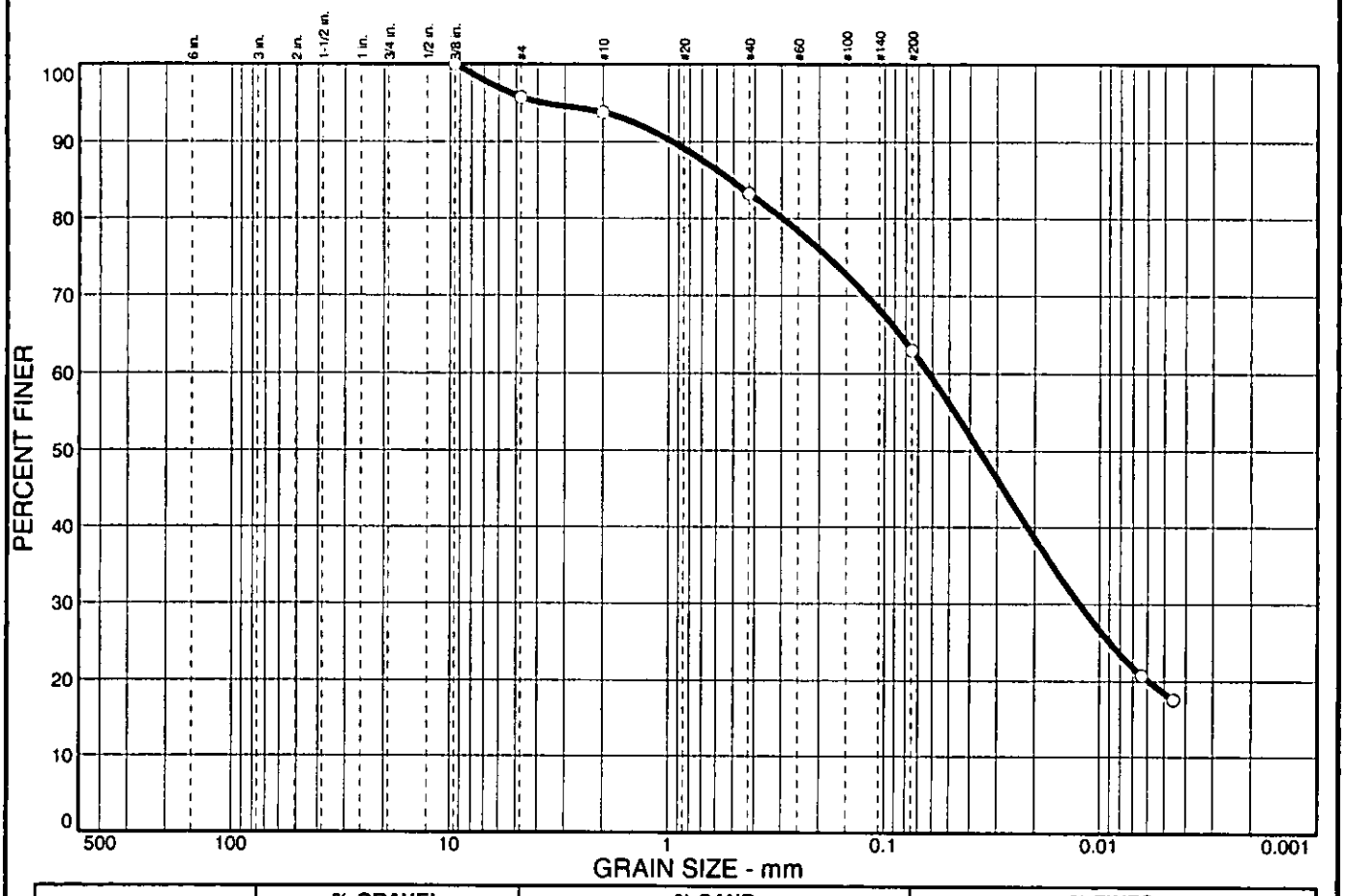
Sample No.: 3 **Source of Sample:** R-367 **Date:** 3/10/05
Location: **Elev./Depth:** 6

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	4.4	1.9	10.4	20.3	44.6	18.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	95.6		
#10	93.7		
#40	83.3		
#200	63.0		

* (no specification provided)

Soil Description

Sandy silty clay

Atterberg Limits

PL= 17 LL= 23 PI= 6

Coefficients

D_{85}= 0.514 D_{60}= 0.0626 D_{50}= 0.0364
D_{30}= 0.0124 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(1)

Remarks

Moisture Content= 11.2%
F.M.=0.04

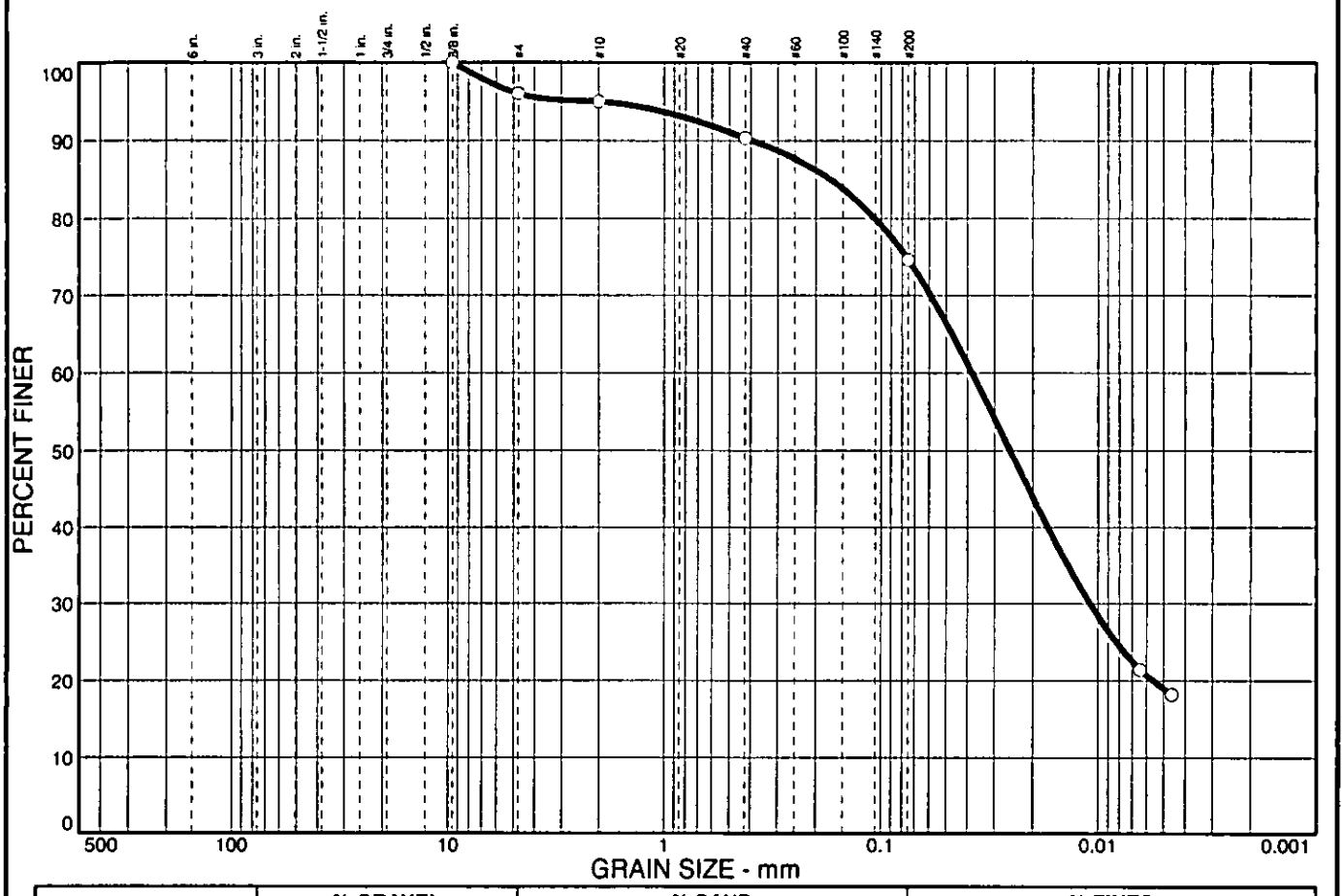
Sample No.: 2 **Source of Sample:** R-373 **Date:** 3/11/05
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	4.1	1.0	4.6	15.8	55.6	18.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	95.9		
#10	94.9		
#40	90.3		
#200	74.5		

* (no specification provided)

Soil Description

Silty clay with sand

Atterberg Limits

PL= 20 LL= 26 PI= 6

Coefficients

D_{85}= 0.173 D_{60}= 0.0382 D_{50}= 0.0256
D_{30}= 0.0109 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(3)

Remarks

Moisture Content= 8.3%
F.M.=0.04

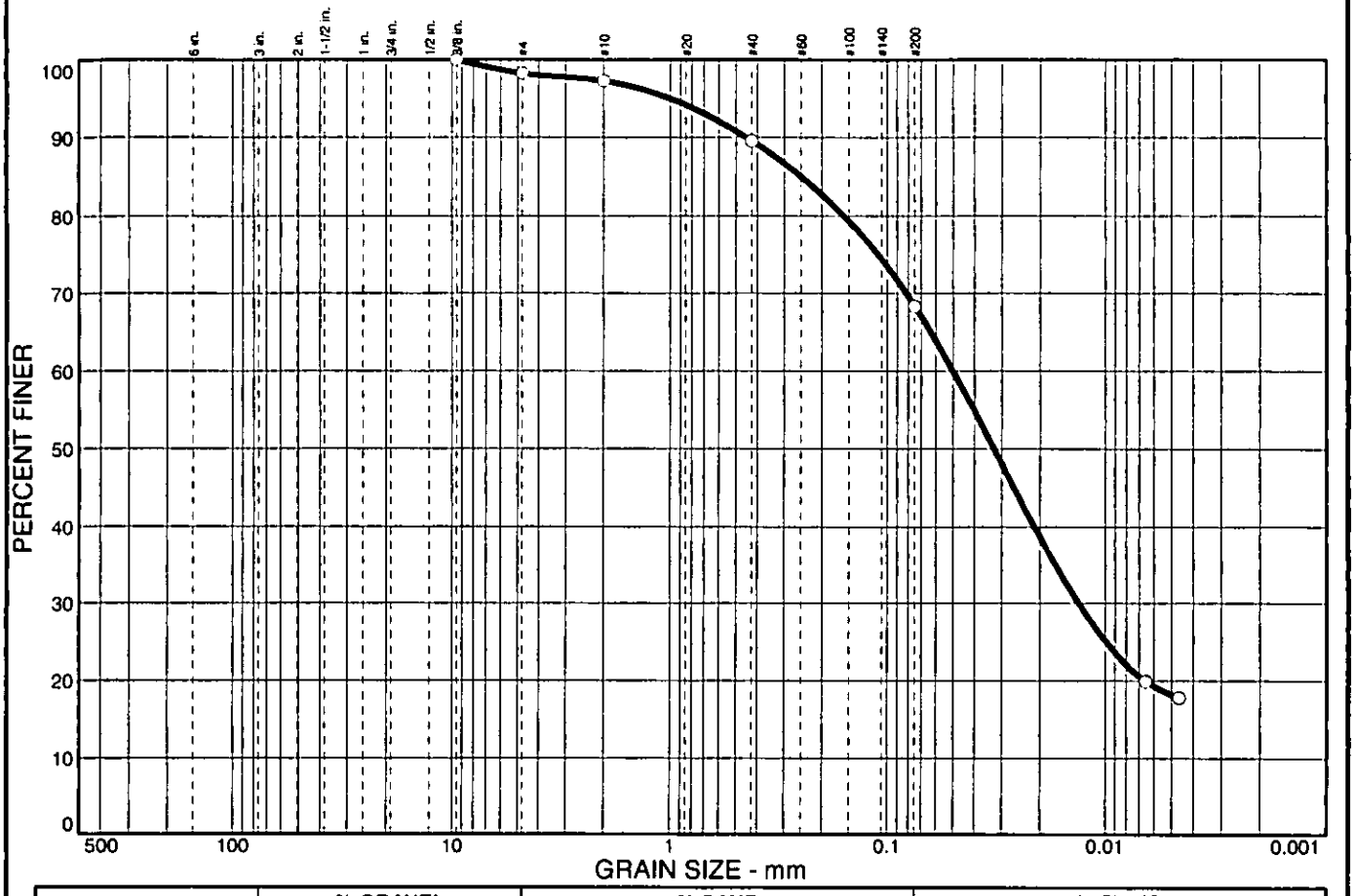
Sample No.: 1 **Source of Sample:** R-378 **Date:** 3/10/05
Location: **Elev./Depth:** 1.0

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	1.8	1.0	7.7	21.2	50.1	18.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	98.2		
#10	97.2		
#40	89.5		
#200	68.3		

* (no specification provided)

Soil Description

Sandy silty clay

Atterberg Limits

PL= 20 LL= 25 PI= 5

Coefficients

D_{85}= 0.251 D_{60}= 0.0504 D_{50}= 0.0328
D_{30}= 0.0133 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(1)

Remarks

Moisture Content= 9.3%
F.M.=0.02

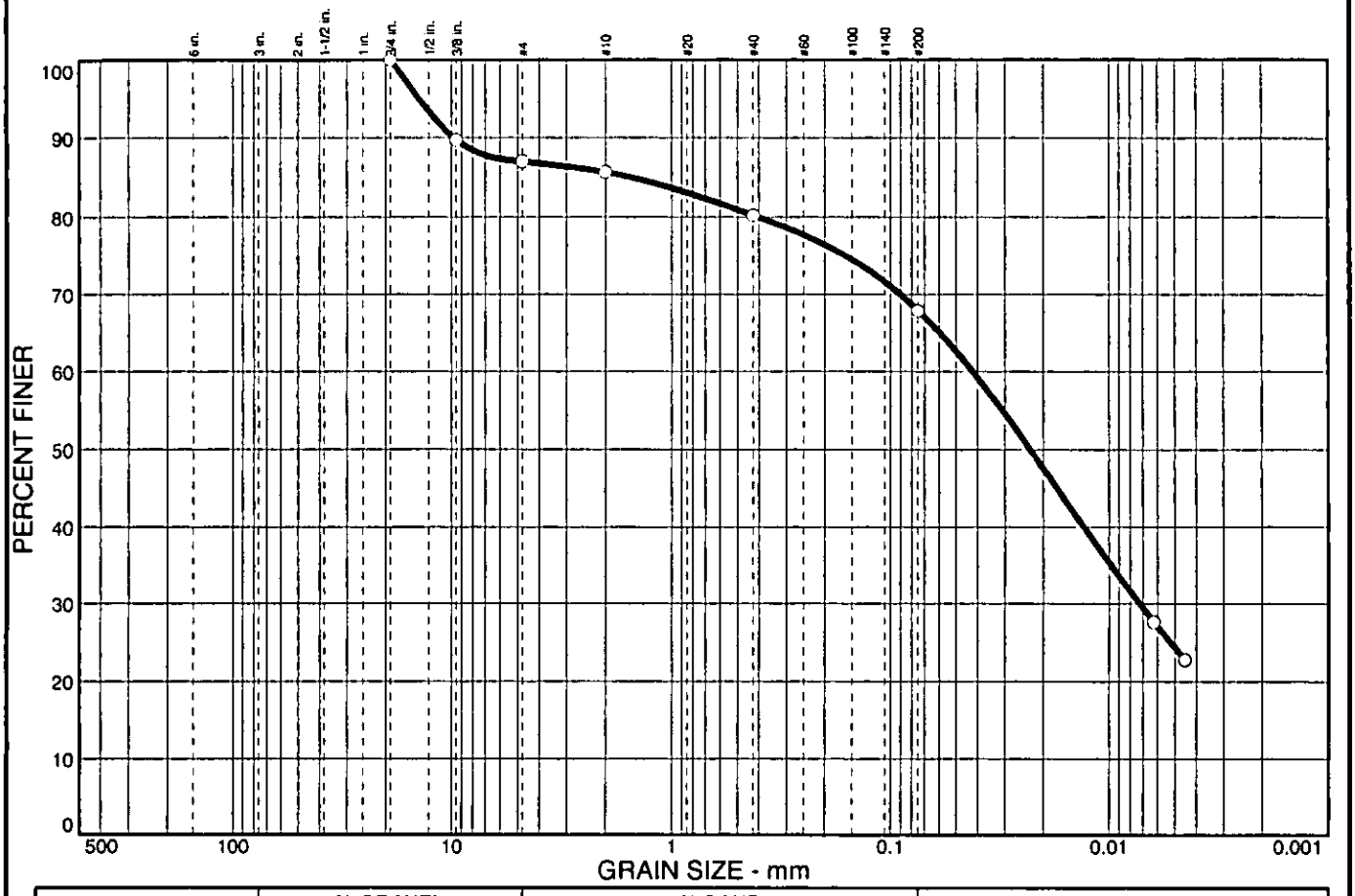
Sample No.: 2 **Source of Sample:** R-378 **Date:** 3/10/05
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	13.0	1.3	5.5	12.3	43.6	24.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	89.7		
#4	87.0		
#10	85.7		
#40	80.2		
#200	67.9		

* (no specification provided)

Soil Description

Sandy lean clay

Atterberg Limits

PL= 22 LL= 30 PI= 8

Coefficients

D_{85}= 1.51 D_{60}= 0.0422 D_{50}= 0.0231
D_{30}= 0.0073 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(4)

Remarks

Moisture Content= 19.5%
F.M.=0.23

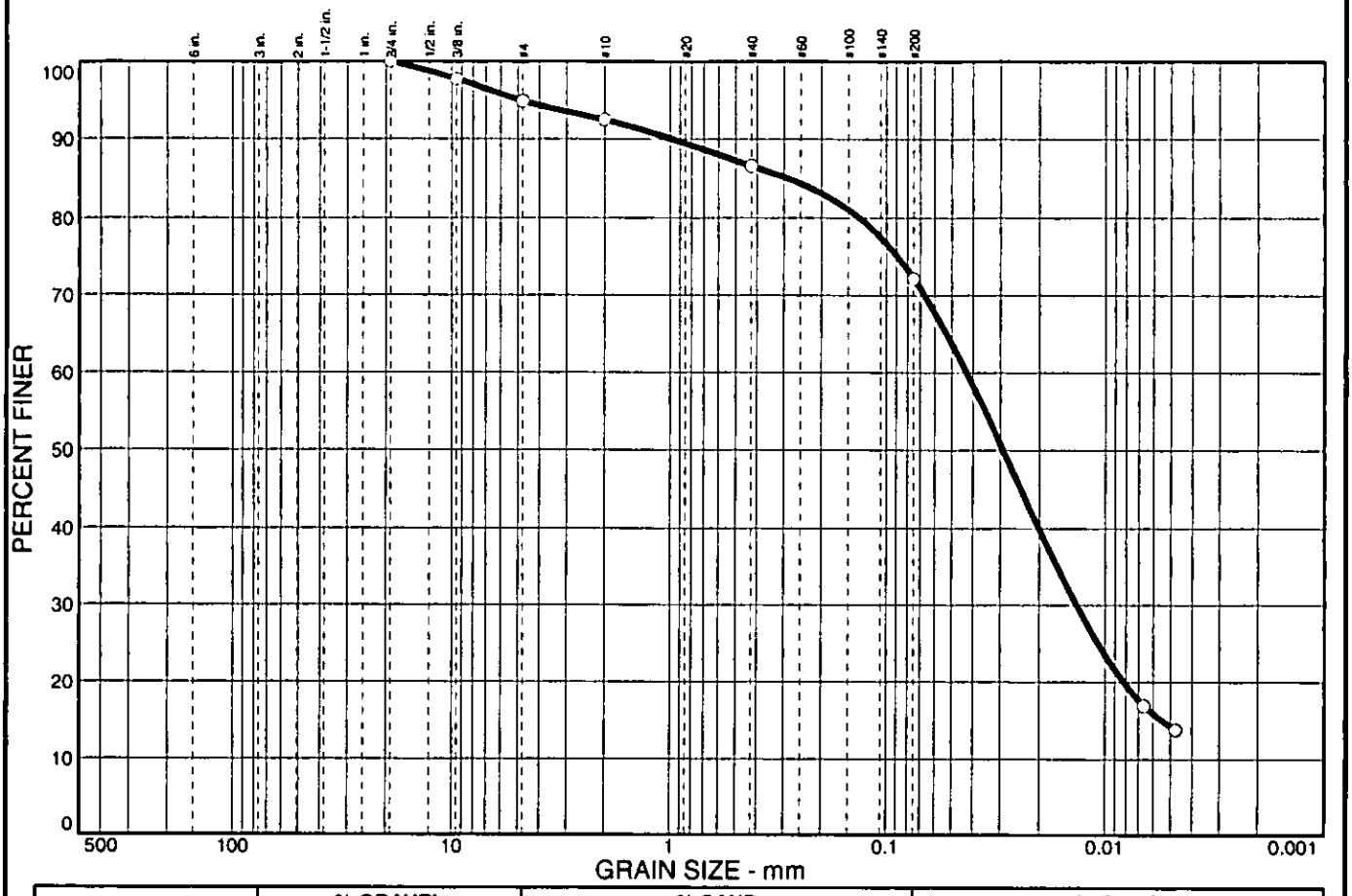
Sample No.: 1A **Source of Sample:** R-379 **Date:** 2/7/05
Location: **Elev./Depth:** 1.0

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	5.2	2.4	5.8	14.5	57.9	14.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	97.7		
#4	94.8		
#10	92.4		
#40	86.6		
#200	72.1		

* (no specification provided)

Soil Description

Silt with sand

Atterberg Limits

PL= 22 LL= 27 PI= 5

Coefficients

D_{85}= 0.285 D_{60}= 0.0431 D_{50}= 0.0293
D_{30}= 0.0136 D_{15}= 0.0055 D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(2)

Remarks

Moisture Content= 14.4%
F.M.=0.08

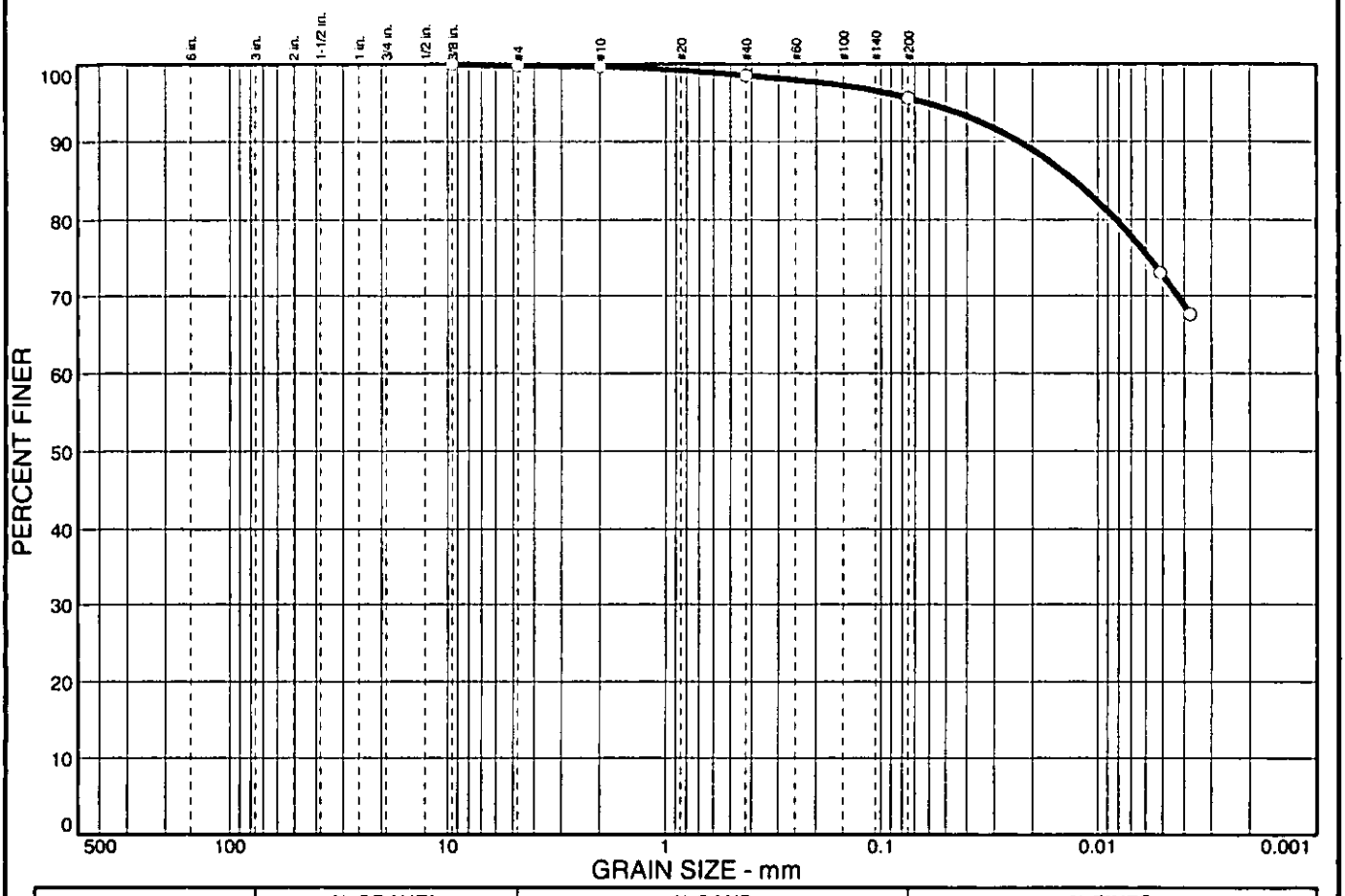
Sample No.: 1B **Source of Sample:** R-379 **Date:** 2/7/05
Location: **Elev./Depth:** 2.0

DLZ

Client: TranSystems. Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.2	0.1	1.2	3.0	22.9	72.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.8		
#10	99.7		
#40	98.5		
#200	95.5		

* (no specification provided)

Soil Description

Fat clay

Atterberg Limits

PL= 22 LL= 50 PI= 28

Coefficients

D_{85}= 0.0128 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(30)

Remarks

Moisture Content= 25.7%
F.M.=0.00

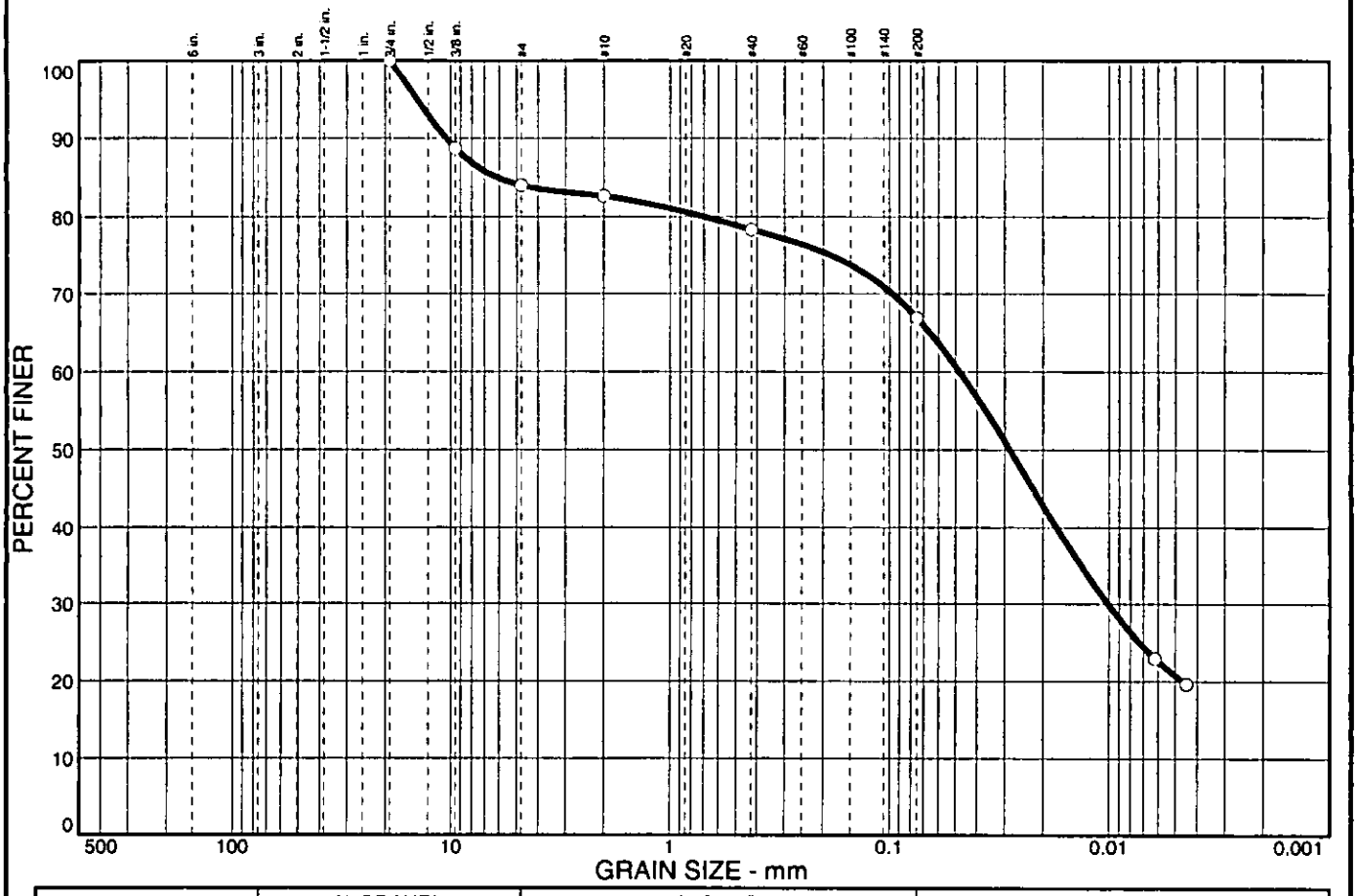
Sample No.: 5A **Source of Sample:** R-379 **Date:** 2/7/05
Location: **Elev./Depth:** 11.0

DLZ

Client: TranSystems. Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	15.9	1.4	4.4	11.4	46.2	20.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	88.7		
#4	84.1		
#10	82.7		
#40	78.3		
#200	66.9		

* (no specification provided)

Soil Description

Sandy silty clay with gravel

Atterberg Limits

PL= 19 LL= 25 PI= 6

Coefficients

D_{85}= 6.00 D_{60}= 0.0482 D_{50}= 0.0285
D_{30}= 0.0102 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(2)

Remarks

Moisture Content= 14.3%
F.M.=0.27

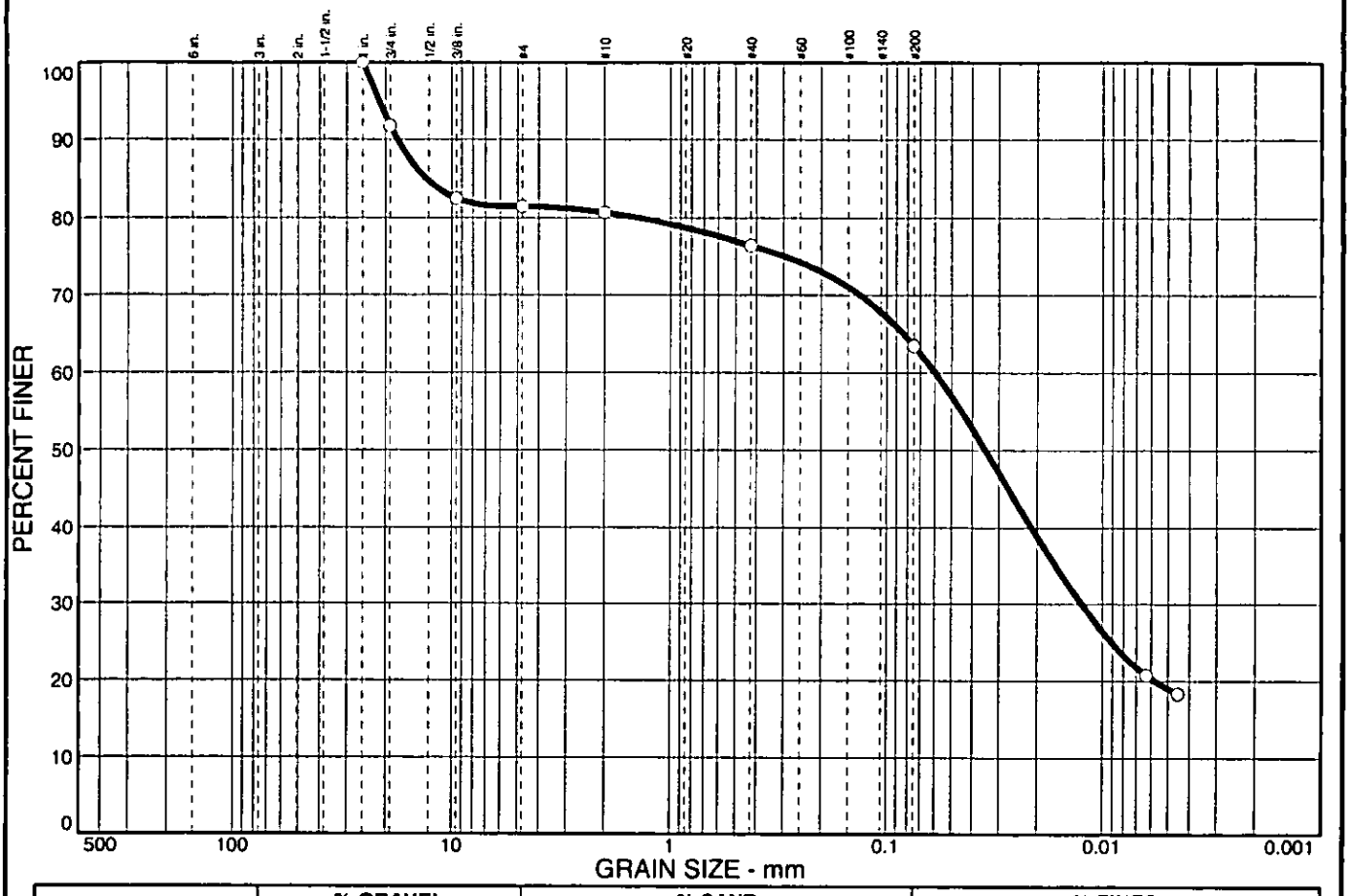
Sample No.: 4 **Source of Sample:** R-380 **Date:** 3/11/05
Location: **Elev./Depth:** 8.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	8.3	10.2	0.8	4.3	12.9	44.5	19.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.00 in.	100.0		
0.75 in.	91.7		
0.375 in.	82.5		
#4	81.5		
#10	80.7		
#40	76.4		
#200	63.5		

* (no specification provided)

Soil Description

Gravelly lean clay with sand

Atterberg Limits

PL= 21 LL= 29 PI= 8

Coefficients

D_{85}= 13.1 D_{60}= 0.0599 D_{50}= 0.0349
D_{30}= 0.0125 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(3)

Remarks

Moisture Content= 14.7%
F.M.=0.44

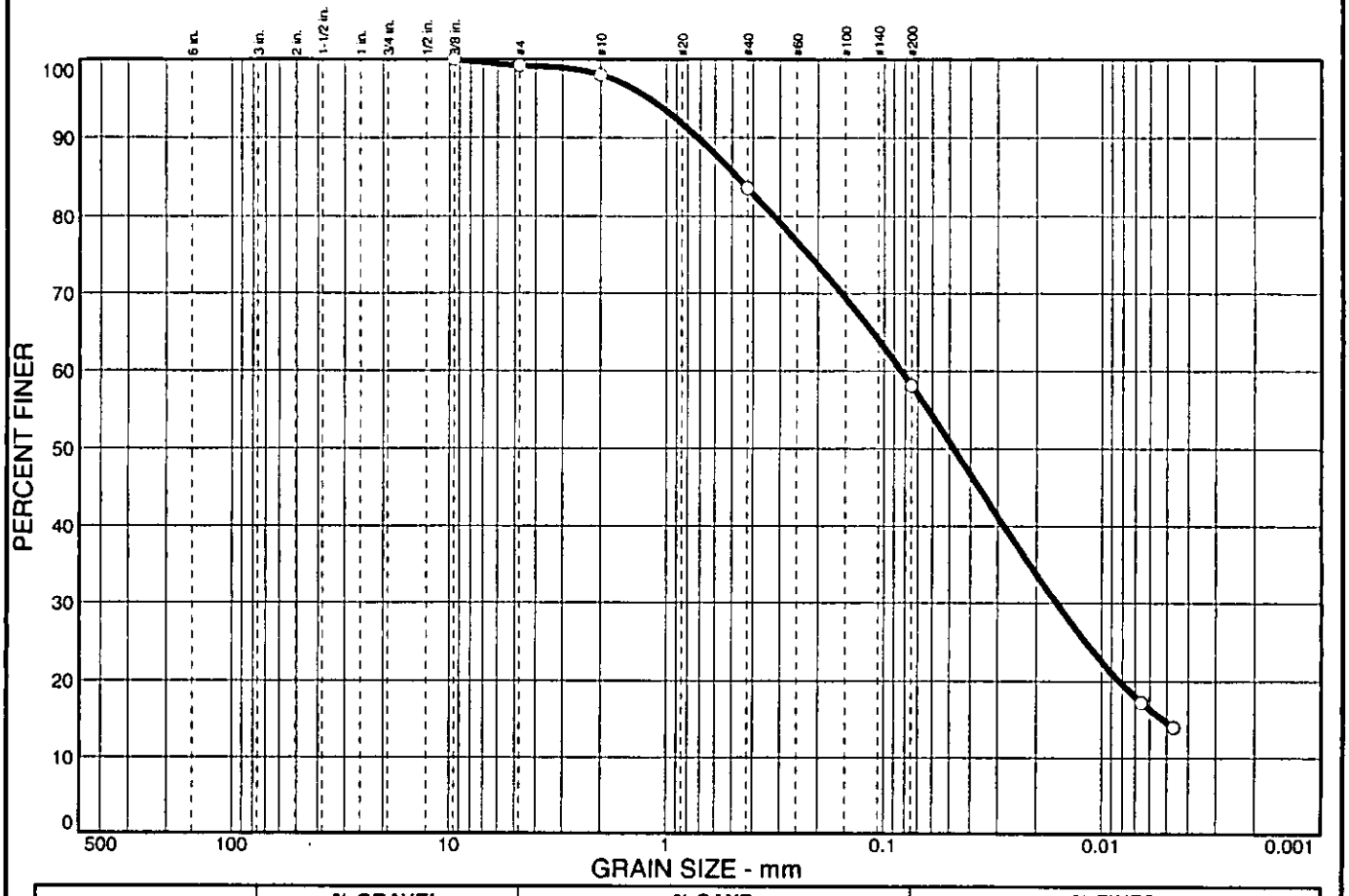
Sample No.: 5 **Source of Sample:** R-380 **Date:** 3/11/05
Location: **Elev./Depth:** 11

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.8	1.2	14.4	25.5	43.5	14.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.2		
#10	98.0		
#40	83.6		
#200	58.1		

* (no specification provided)

Soil Description

Sandy silt

Atterberg Limits

PL= 19 LL= 21 PI= 2

Coefficients

D_{85}= 0.475 D_{60}= 0.0837 D_{50}= 0.0480
D_{30}= 0.0162 D_{15}= 0.0052 D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Moisture Content= 11.6%
F.M.=0.01

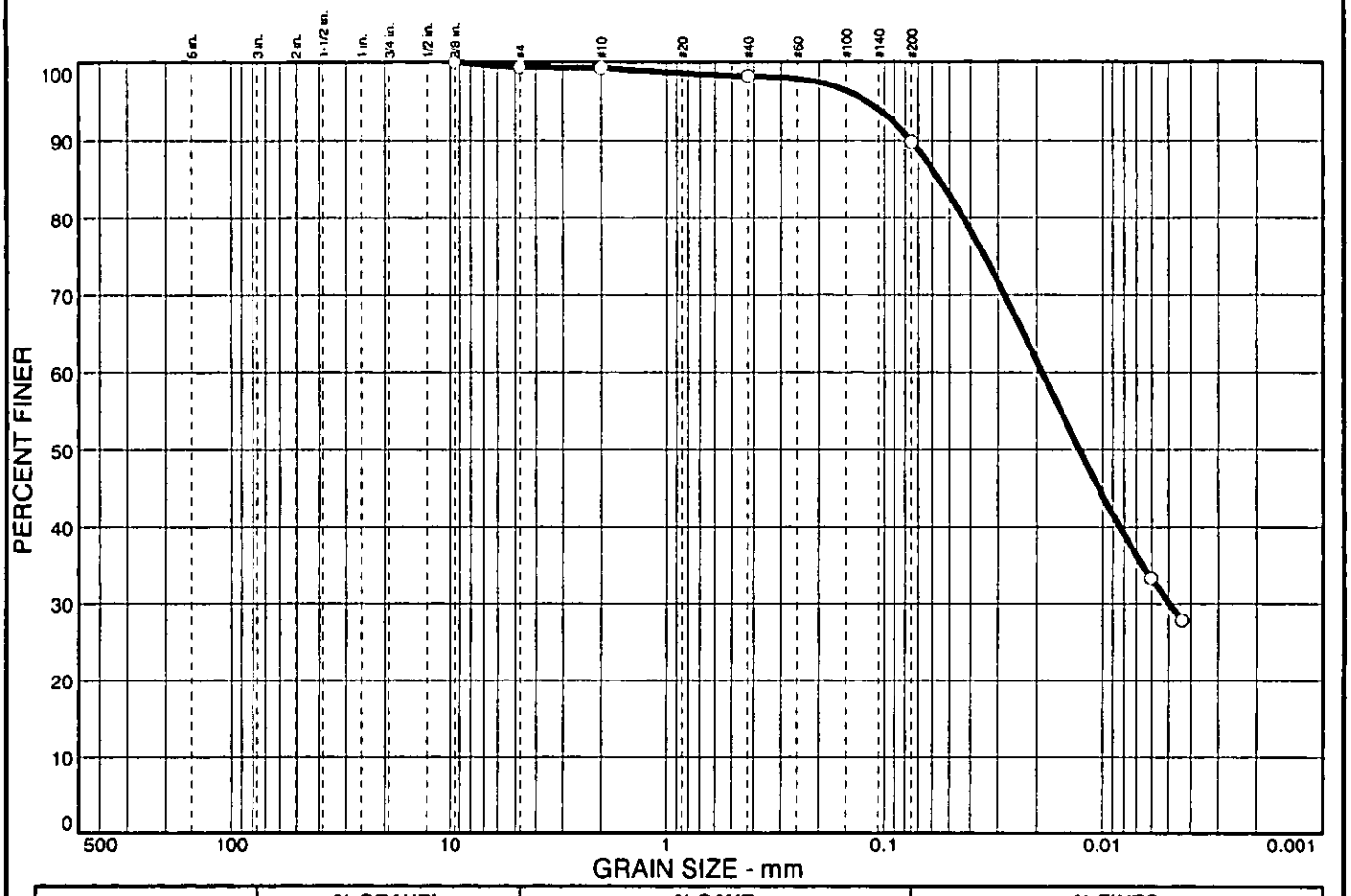
Sample No.: 3 **Source of Sample:** R-392 **Date:** 3/10/05
Location: **Elev./Depth:** 6

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.6	0.1	1.1	8.4	59.8	30.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.4		
#10	99.3		
#40	98.2		
#200	89.8		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 18 LL= 27 PI= 9

Coefficients

D_{85}= 0.0560 D_{60}= 0.0190 D_{50}= 0.0128
D_{30}= 0.0050 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(7)

Remarks

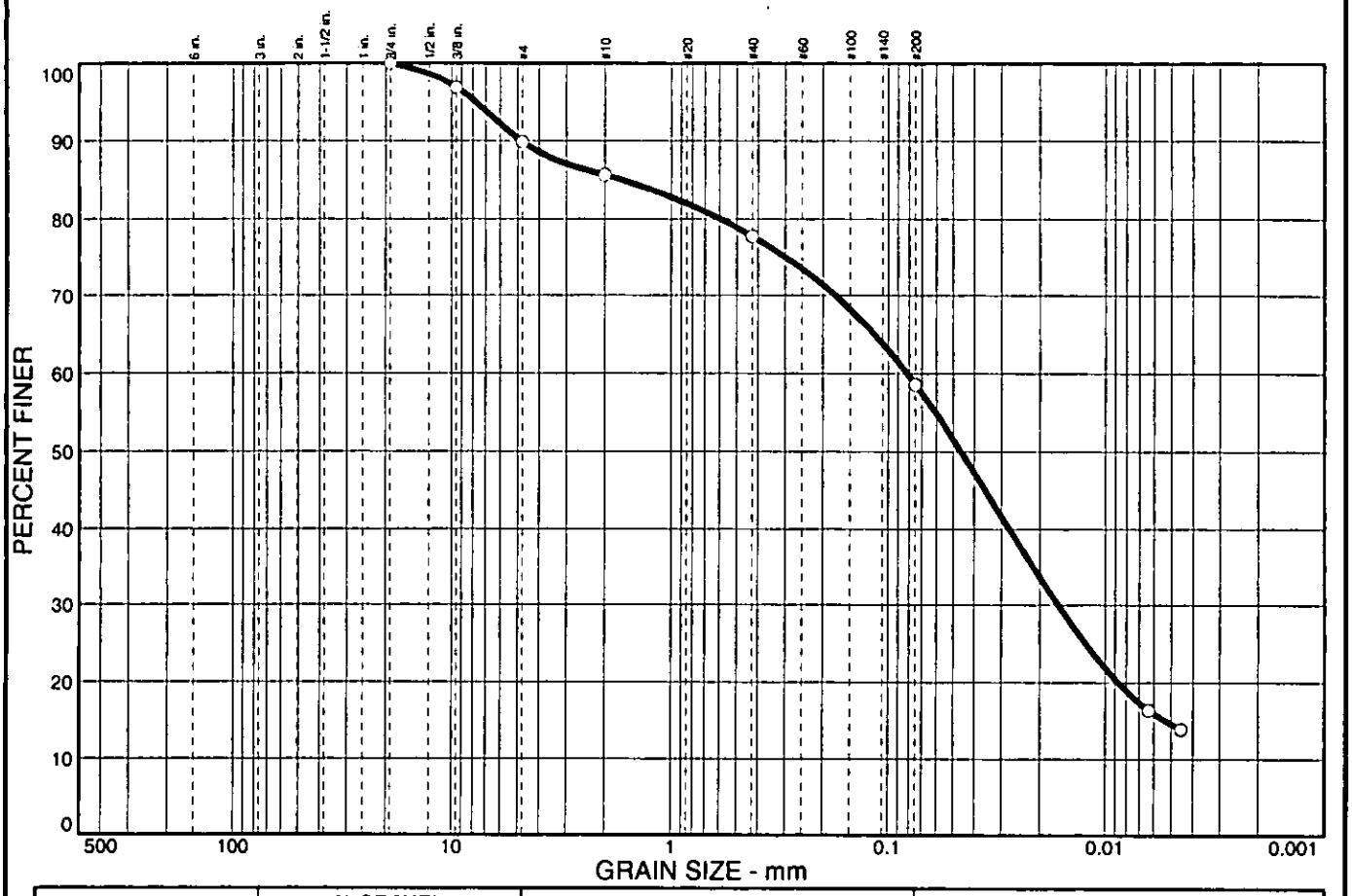
Moisture Content= 20.0%
F.M.=0.01

Sample No.: 13 **Source of Sample:** R-393 **Date:** 2/16/05
Location: **Elev./Depth:** 33.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00
Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	10.2	4.1	8.0	19.1	44.0	14.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	96.8		
#4	89.8		
#10	85.7		
#40	77.7		
#200	58.6		

* (no specification provided)

Soil Description

Sandy silty clay

Atterberg Limits

PL= 19 LL= 24 PI= 5

Coefficients

D_{85}= 1.64 D_{60}= 0.0819 D_{50}= 0.0463
D_{30}= 0.0165 D_{15}= 0.0053 D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(1)

Remarks

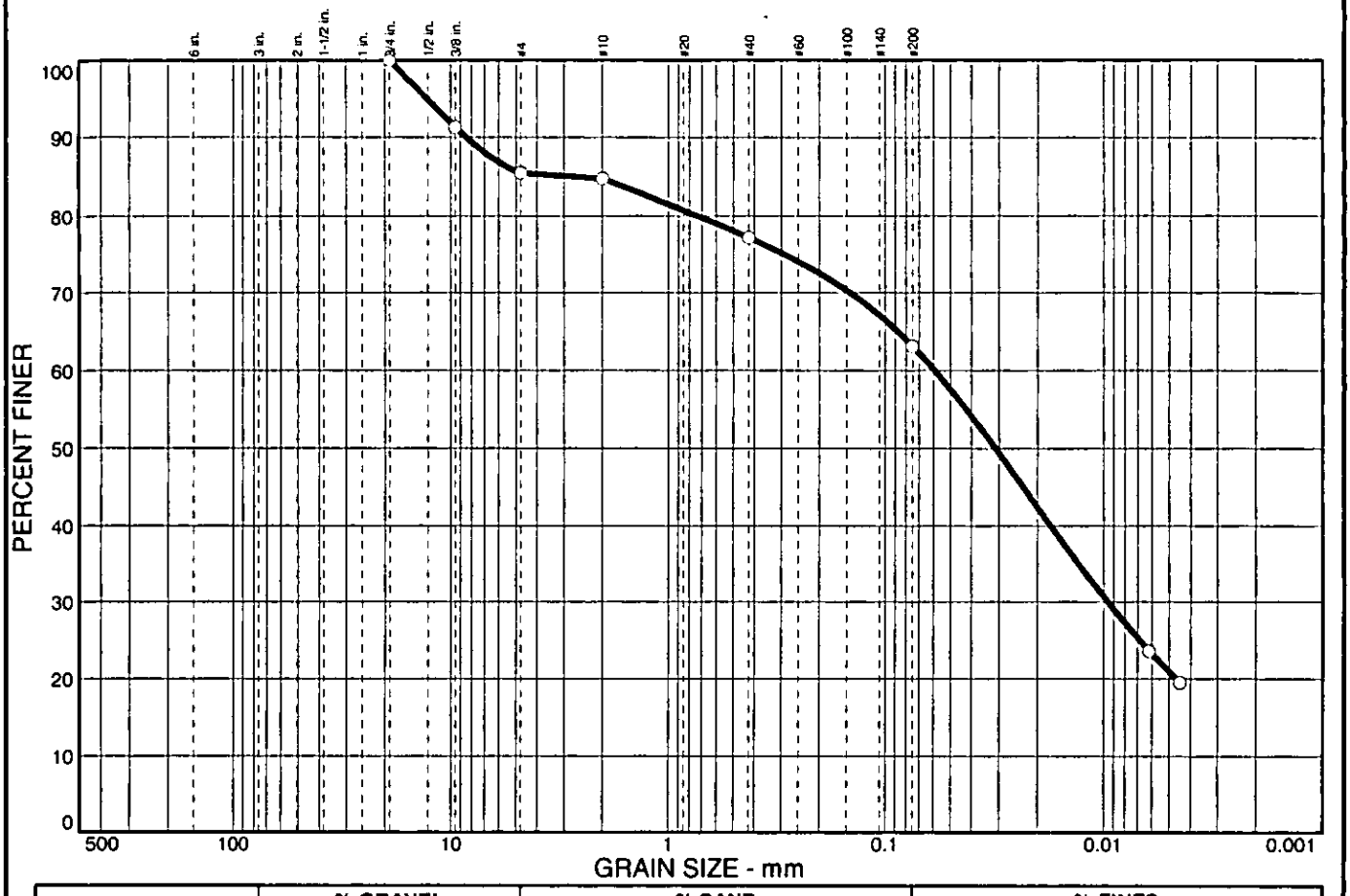
Moisture Content= 14.1%
F.M.=0.13

Sample No.: 6 **Source of Sample:** R-393 **Date:** 3/1/05
Location: **Elev./Depth:** 13.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00
Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	14.5	0.7	7.7	14.0	42.2	20.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	91.2		
#4	85.5		
#10	84.8		
#40	77.1		
#200	63.1		

* (no specification provided)

Soil Description

Sandy lean clay

Atterberg Limits

PL= 18 LL= 27 PI= 9

Coefficients

D_{85}= 2.56 D_{60}= 0.0595 D_{50}= 0.0314
D_{30}= 0.0096 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(3)

Remarks

Moisture Content= 15.0%
F.M.=0.23

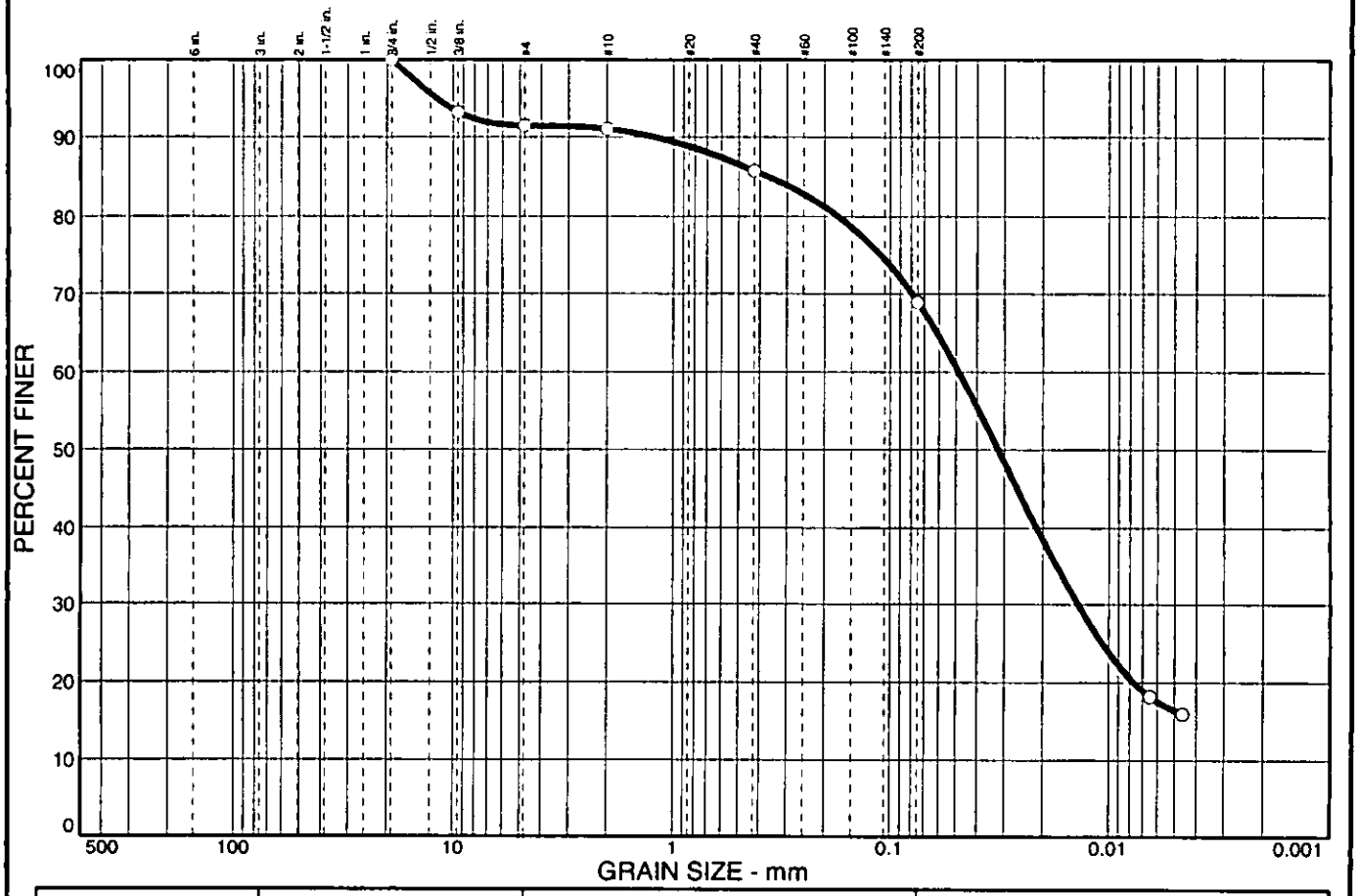
Sample No.: 9 **Source of Sample:** R-393 **Date:** 3/1/05
Location: **Elev./Depth:** 21

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	8.6	0.4	5.2	16.9	52.6	16.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	93.1		
#4	91.4		
#10	91.0		
#40	85.8		
#200	68.9		

* (no specification provided)

Soil Description

Sandy silt

Atterberg Limits

PL= 19 LL= 22 PI= 3

Coefficients

D_{85}= 0.363 D_{60}= 0.0488 D_{50}= 0.0322
D_{30}= 0.0139 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

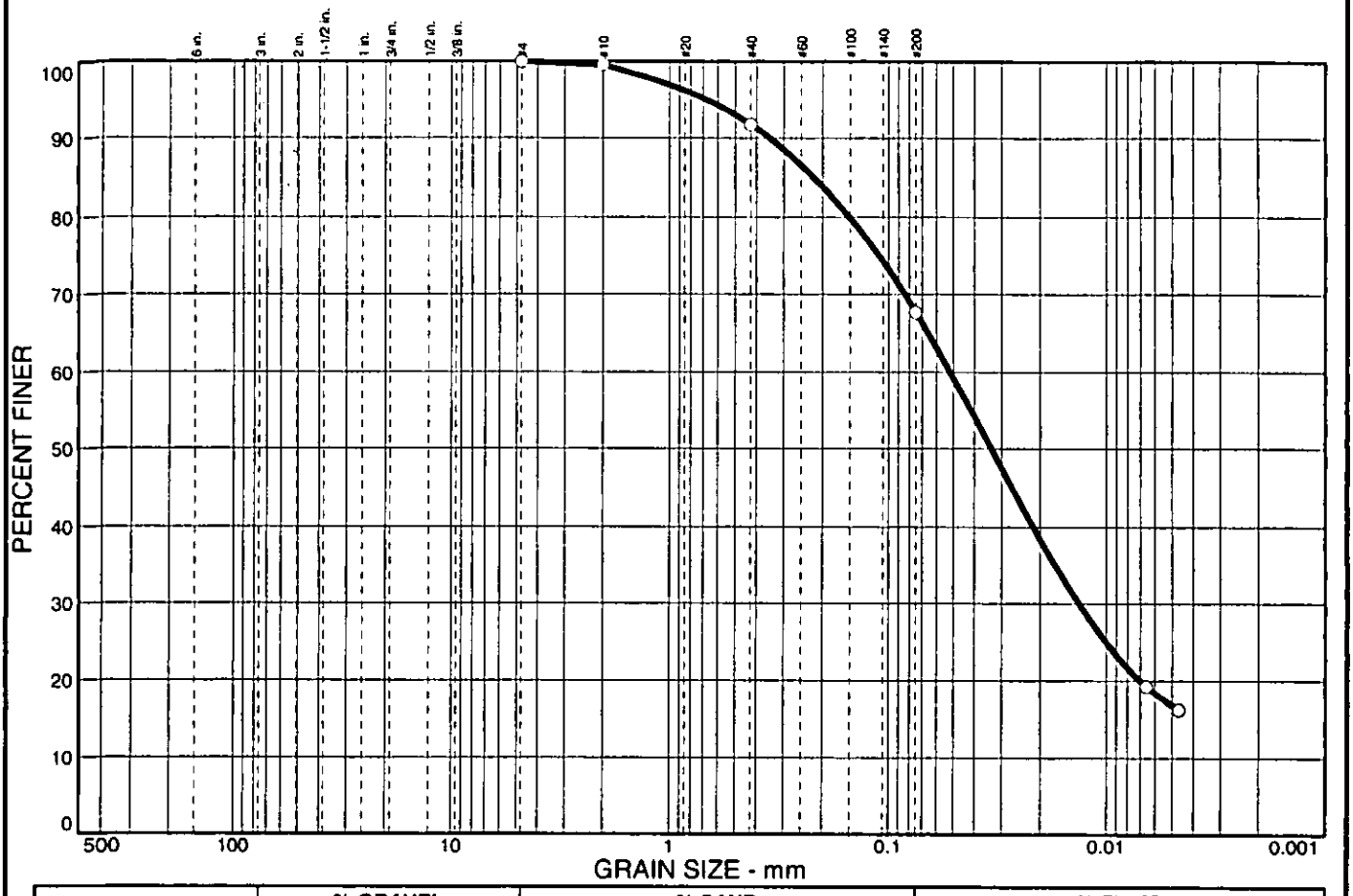
Moisture Content= 13.1%
F.M.=0.16

Sample No.: 5 **Source of Sample:** R-394 **Date:** 3/10/05
Location: **Elev./Depth:** 11

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00
Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.4	7.9	24.0	50.9	16.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.6		
#40	91.7		
#200	67.7		

* (no specification provided)

Soil Description

Sandy silt

Atterberg Limits

PL= 22 LL= 24 PI= 2

Coefficients

D_{85}= 0.221 D_{60}= 0.0521 D_{50}= 0.0335
D_{30}= 0.0133 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Moisture Content= 15.8%

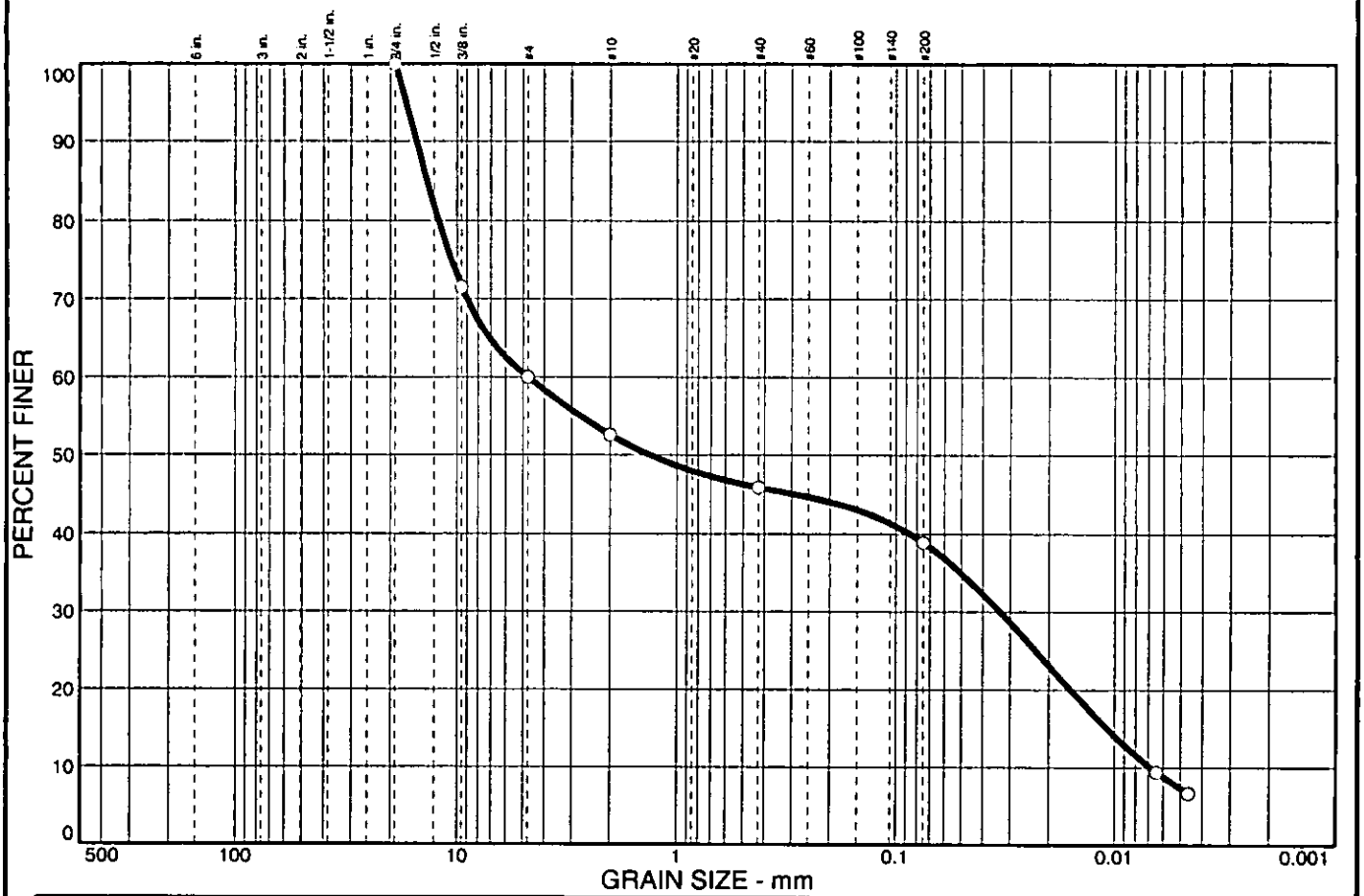
Sample No.: 4 **Source of Sample:** R-395 **Date:** 3/10/05
Location: **Elev./Depth:** 8.5

DLZ

Client: TranSystems. Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	40.0	7.5	6.7	6.9	31.6	7.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	71.5		
#4	60.0		
#10	52.5		
#40	45.8		
#200	38.9		

* (no specification provided)

Soil Description

Silty gravel with sand

Atterberg Limits

PL= 20 LL= 23 PI= 3

Coefficients

D_{85}= 13.7 D_{60}= 4.75 D_{50}= 1.34
D_{30}= 0.0335 D_{15}= 0.0108 D_{10}= 0.0069
C_u= 692.24 C_c= 0.03

Classification

USCS= GM AASHTO= A-4(0)

Remarks

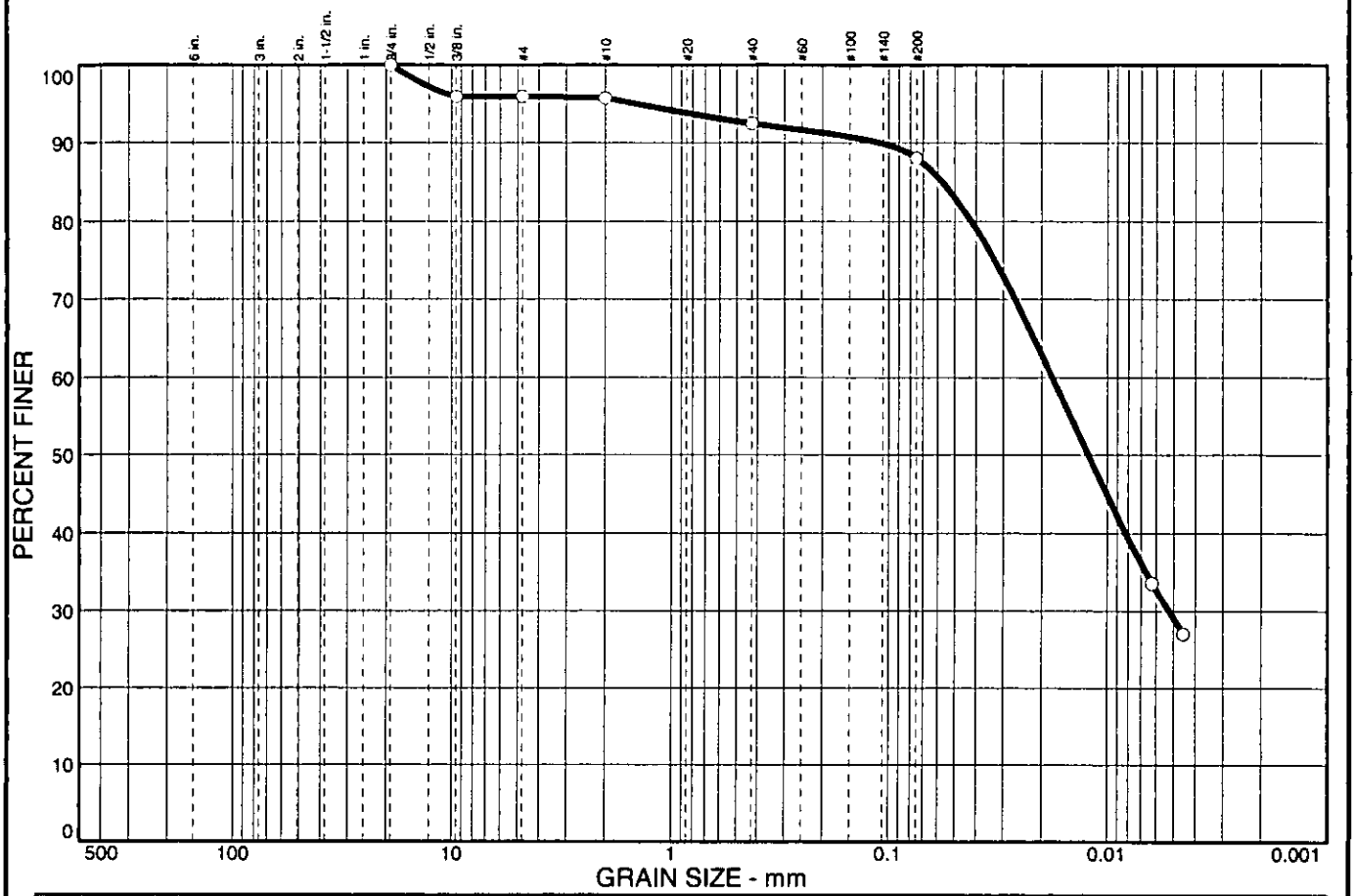
Moisture Content= 12.0%
F.M.=0.69

Sample No.: 2 **Source of Sample:** R-396 **Date:** 2/16/05
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00
Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	4.1	0.2	3.3	4.4	59.0	29.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	95.9		
#4	95.9		
#10	95.7		
#40	92.4		
#200	88.0		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 21 LL= 37 PI= 16

Coefficients

D_{85}= 0.0573 D_{60}= 0.0179 D_{50}= 0.0123
D_{30}= 0.0053 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-6(14)

Remarks

Moisture Content= 22.2%
F.M.=0.08

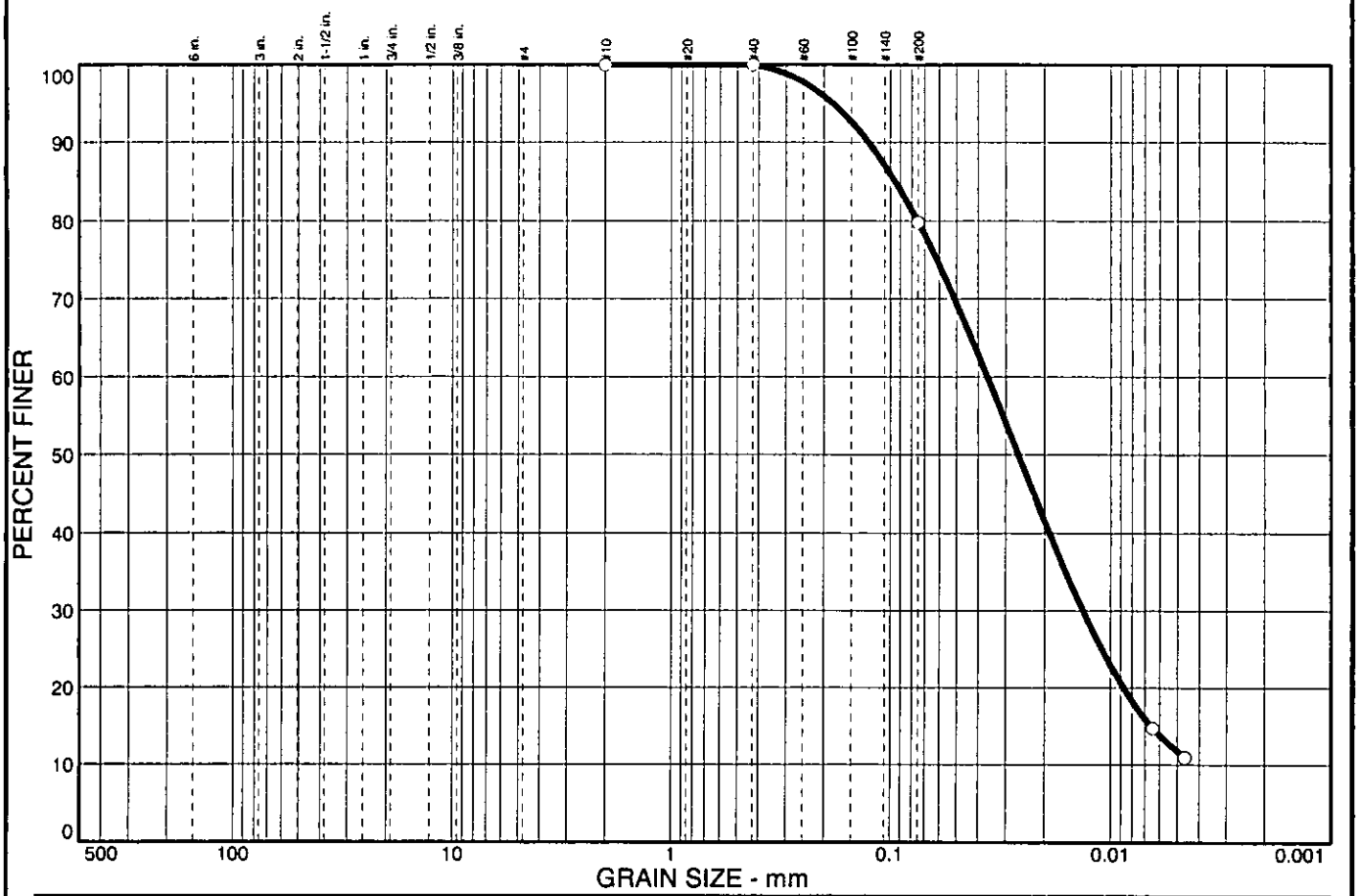
Sample No.: 6 **Source of Sample:** R-396 **Date:** 2/7/05
Location: **Elev./Depth:** 13.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.0	20.2	68.1	11.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	100.0		
#200	79.8		

* (no specification provided)

Soil Description

Silt with sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.0954 D_{60}= 0.0366 D_{50}= 0.0264
D_{30}= 0.0134 D_{15}= 0.0066 D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Moisture Content= 21.9%

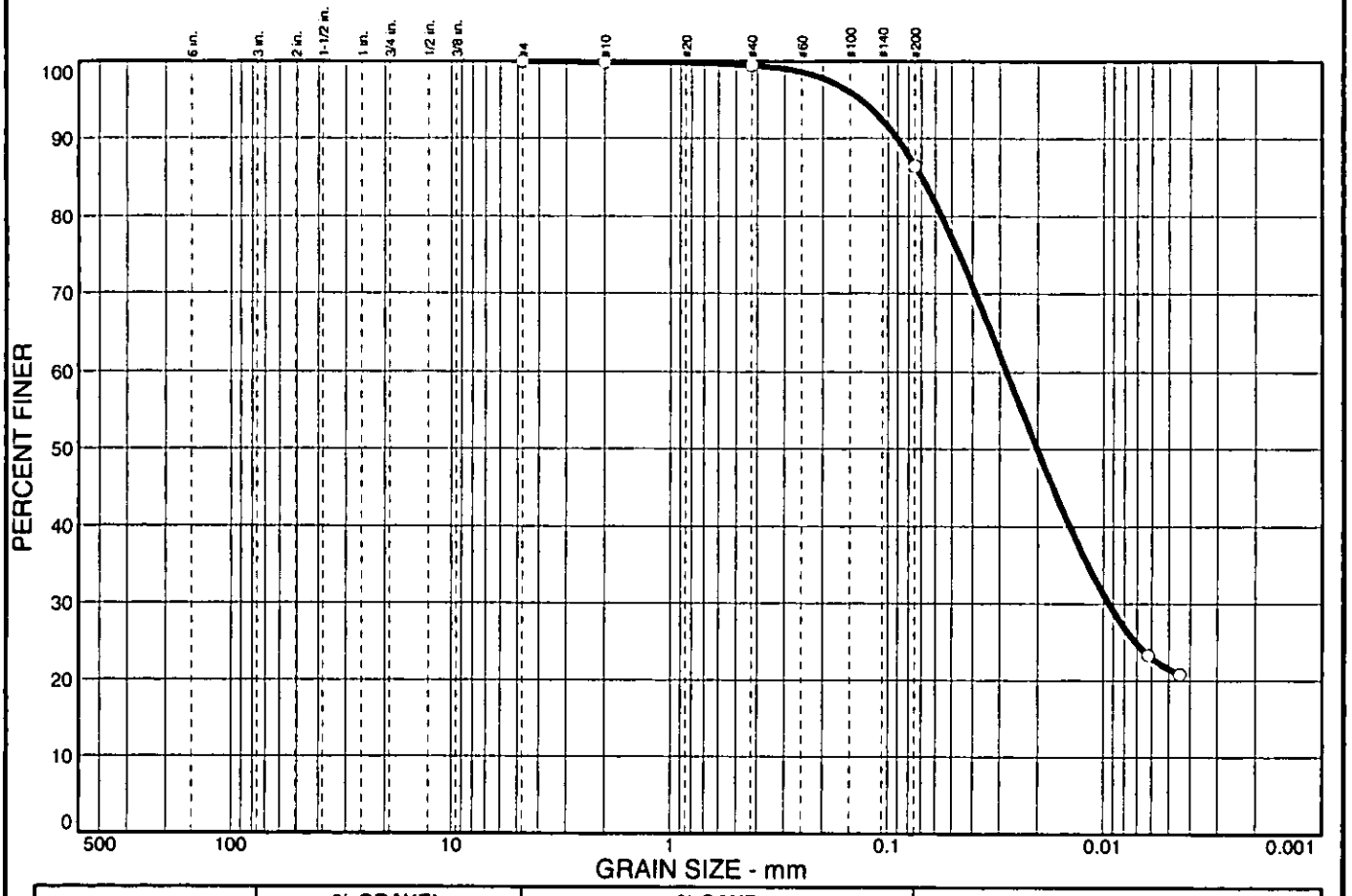
Sample No.: 9 **Source of Sample:** R-396 **Date:** 2/16/05
Location: **Elev./Depth:** 21

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.1	0.4	13.0	65.0	21.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#40	99.5		
#200	86.5		

* (no specification provided)

Soil Description

Silt

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.0697 D_{60}= 0.0280 D_{50}= 0.0202
D_{30}= 0.0095 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Moisture Content= 22.5%

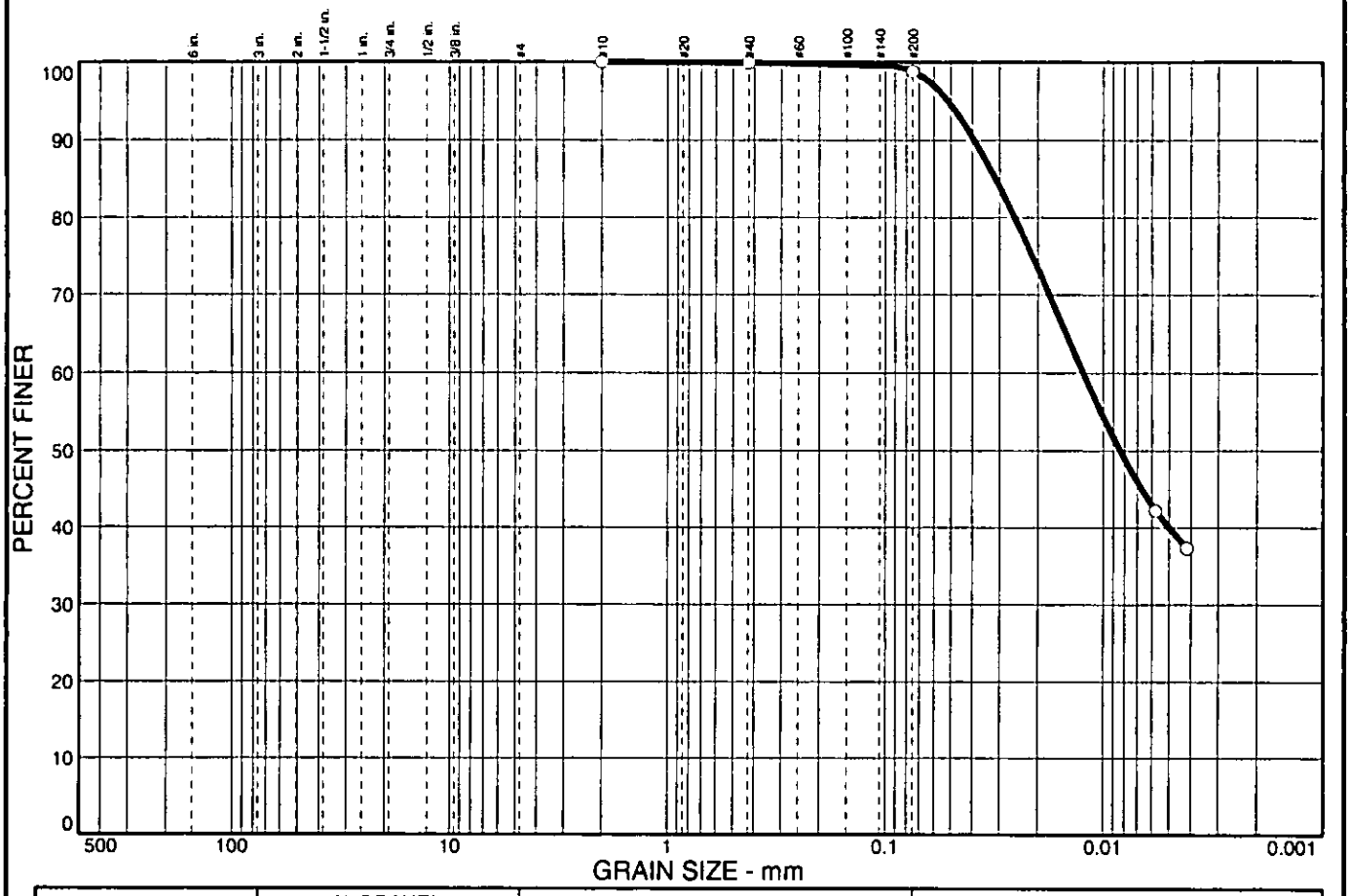
Sample No.: 2 **Source of Sample:** R-399 **Date:** 2/16/05
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.1	1.1	58.9	39.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.9		
#200	98.8		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 20 LL= 40 PI= 20

Coefficients

D_{85}= 0.0314 D_{60}= 0.0124 D_{50}= 0.0084
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-6(21)

Remarks

Moisture Content= 16.7%

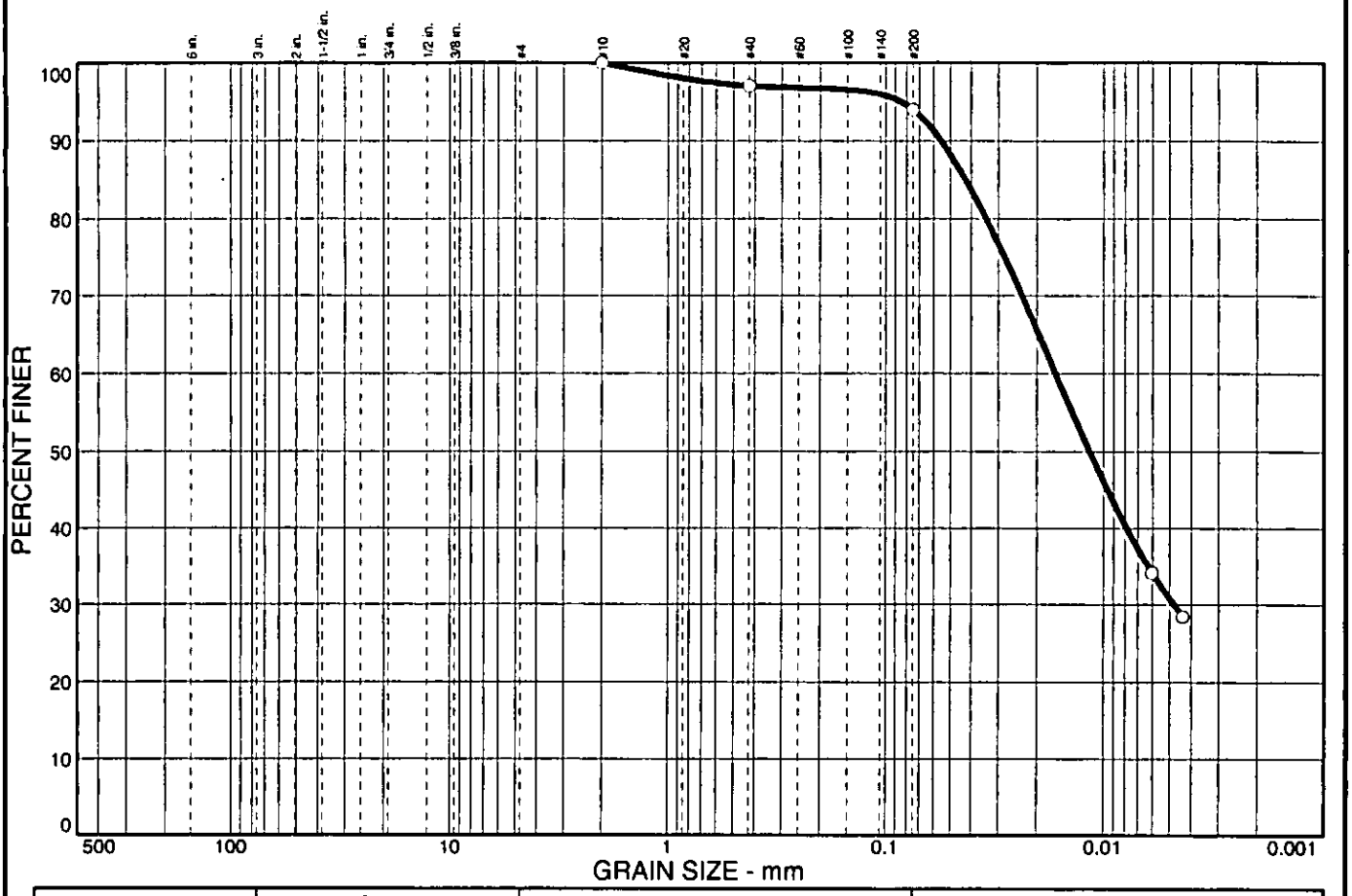
Sample No.: 4 **Source of Sample:** R-399 **Date:** 2/16/05
Location: **Elev./Depth:** 8.5

DLZ

Client: TranSystems. Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	3.0	3.1	63.2	30.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	97.0		
#200	93.9		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 21 LL= 30 PI= 9

Coefficients

D_{85}= 0.0428 D_{60}= 0.0165 D_{50}= 0.0116
D_{30}= 0.0048 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(8)

Remarks

Moisture Content= 19.3%

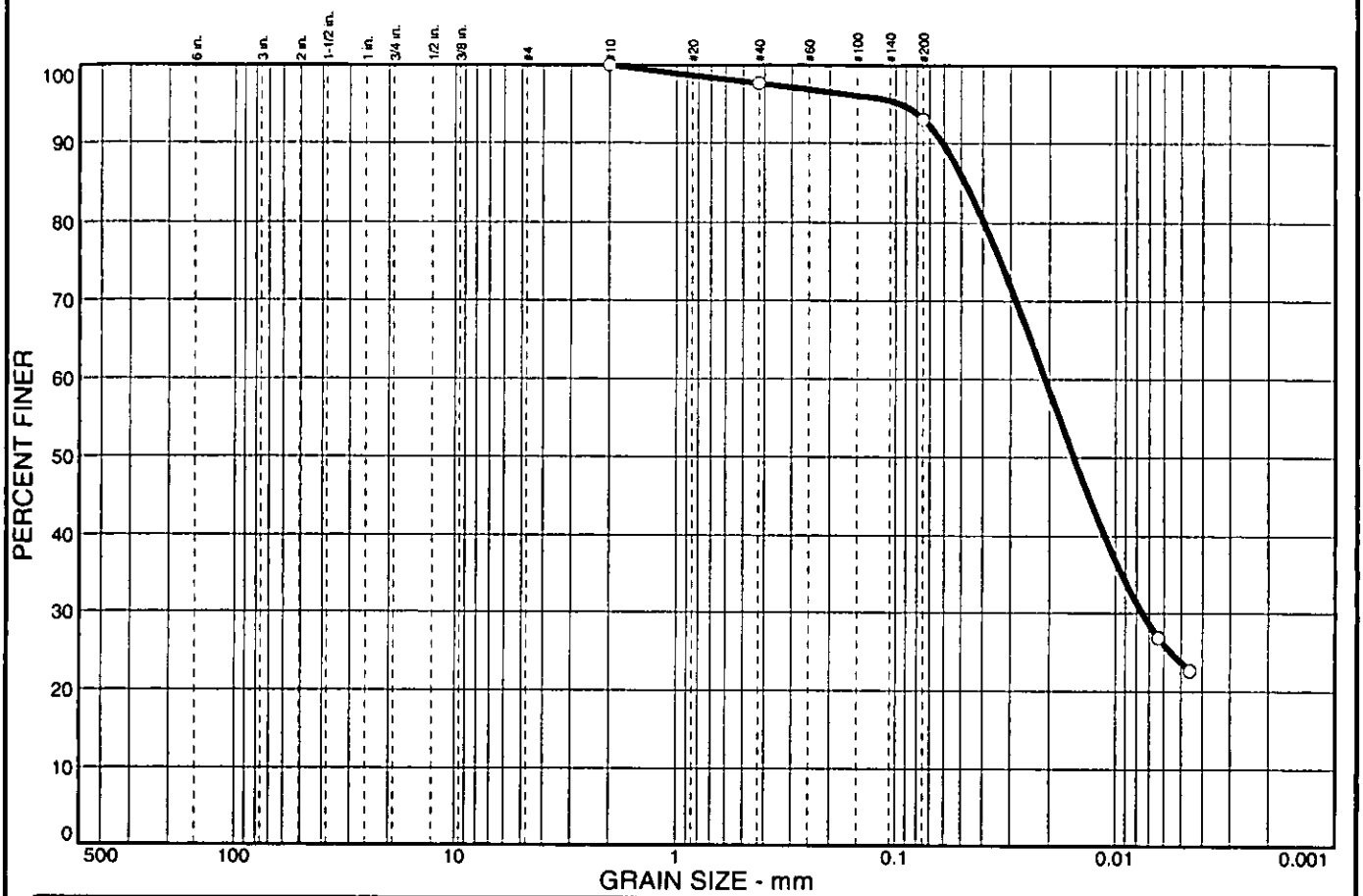
Sample No.: 1 **Source of Sample:** R-402 **Date:** 3/10/05
Location: **Elev./Depth:** 1.0

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	2.4	4.6	69.4	23.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	97.6		
#200	93.0		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 22 LL= 30 PI= 8

Coefficients

D_{85}= 0.0483 D_{60}= 0.0210 D_{50}= 0.0155
D_{30}= 0.0076 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(7)

Remarks

Moisture Content= 19.7%

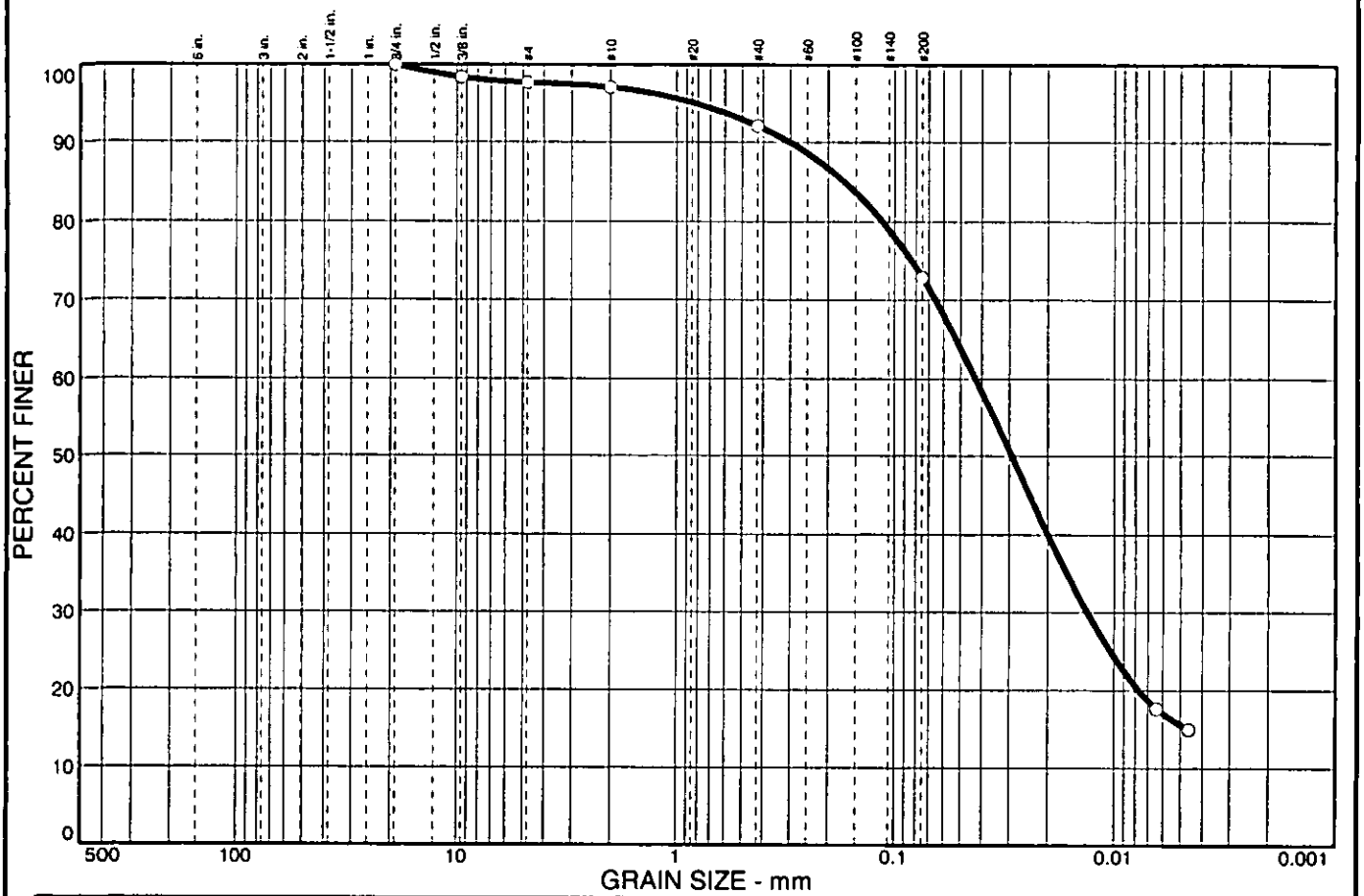
Sample No.: 2 **Source of Sample:** R-402 **Date:** 3/10/05
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	2.3	0.6	5.1	19.2	57.3	15.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	98.4		
#4	97.7		
#10	97.1		
#40	92.0		
#200	72.8		

* (no specification provided)

Soil Description

Silt with sand

Atterberg Limits

PL= 22 LL= 25 PI= 3

Coefficients

D_{85}= 0.170 D_{60}= 0.0430 D_{50}= 0.0293
D_{30}= 0.0133 D_{15}= 0.0046 D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(1)

Remarks

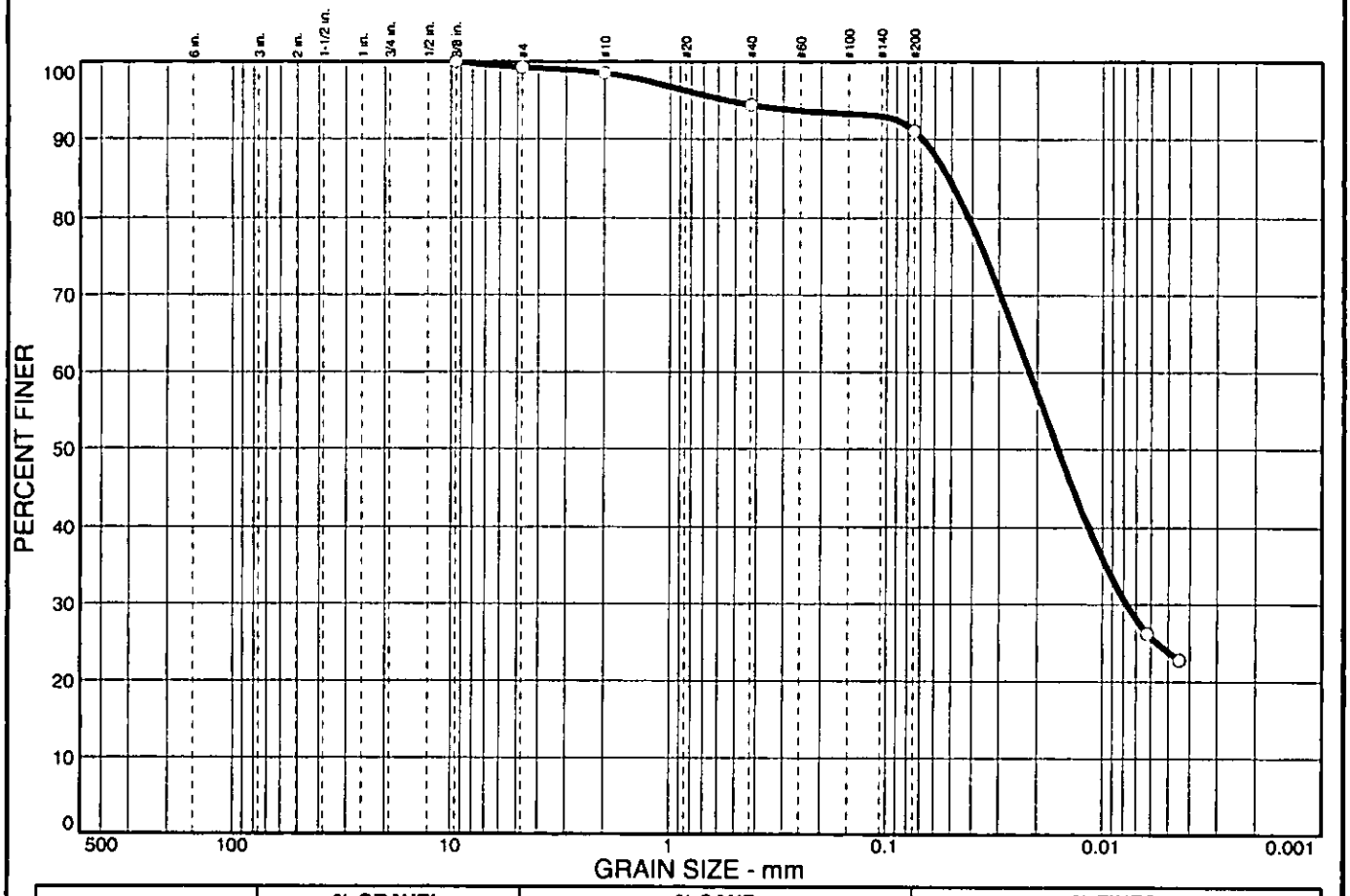
Moisture Content= 17.7%
F.M.=0.04

Sample No.: 5 **Source of Sample:** R-402 **Date:** 3/10/05
Location: **Elev./Depth:** 11

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00
Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.7	0.8	4.2	3.3	67.2	23.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.3		
#10	98.5		
#40	94.3		
#200	91.0		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 21 LL= 32 PI= 11

Coefficients

D_{85}= 0.0517 D_{60}= 0.0218 D_{50}= 0.0161
D_{30}= 0.0078 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-6(10)

Remarks

Moisture Content= 20.6%
F.M.=0.01

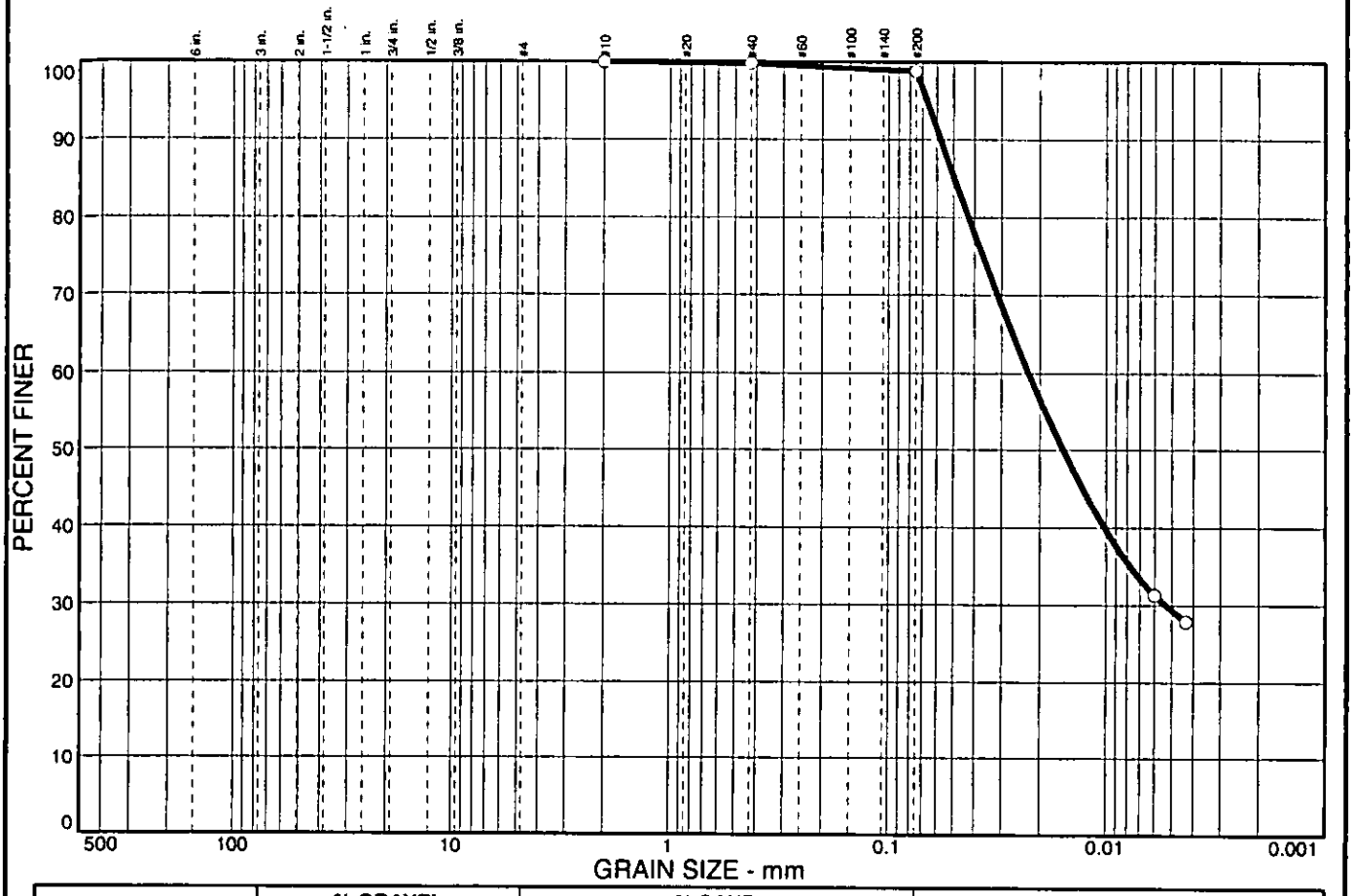
Sample No.: 4 **Source of Sample:** R-405 **Date:** 3/30/05
Location: **Elev./Depth:** 8.5

DLZ

Client: TranSystems. Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.2	1.0	69.5	29.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.8		
#200	98.8		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 20 LL= 33 PI= 13

Coefficients

D_{85}= 0.0499 D_{60}= 0.0226 D_{50}= 0.0157
D_{30}= 0.0053 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-6(13)

Remarks

Moisture content= 23.8%

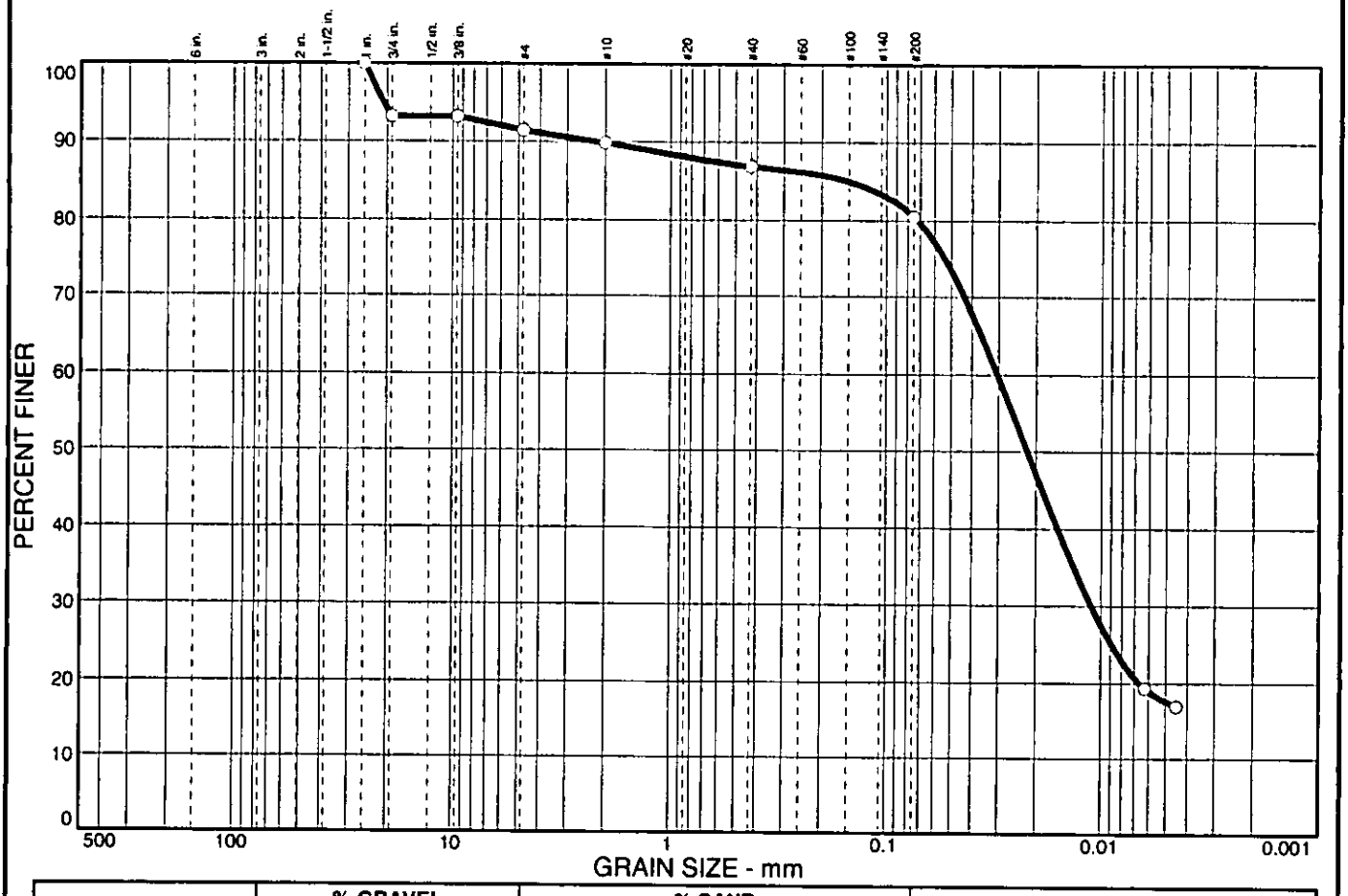
Sample No.: 5 **Source of Sample:** R-405 **Date:** 3/30/05
Location: **Elev./Depth:** 11

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	6.9	1.7	1.6	2.9	6.4	63.0	17.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.00 in.	100.0		
0.75 in.	93.1		
0.375 in.	93.1		
#4	91.4		
#10	89.8		
#40	86.9		
#200	80.5		

* (no specification provided)

Soil Description

Silty clay with sand

Atterberg Limits

PL= 19 LL= 25 PI= 6

Coefficients

D_{85}= 0.149 D_{60}= 0.0306 D_{50}= 0.0221
D_{30}= 0.0111 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(3)

Remarks

Moisture Content= 16.1%
F.M.=0.22

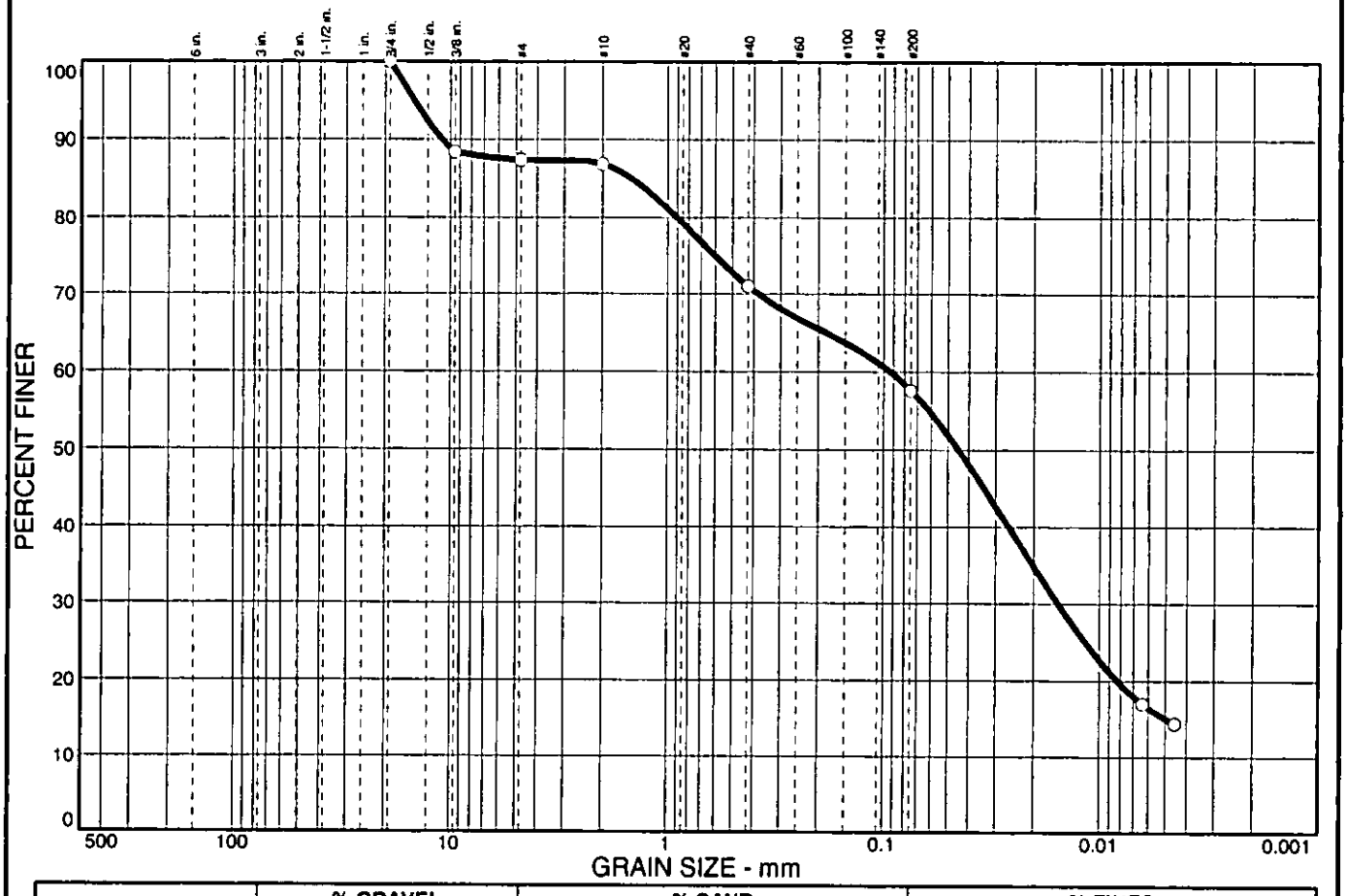
Sample No.: 1 **Source of Sample:** R-408 **Date:** 2/16/05
Location: **Elev./Depth:** 1.0

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	12.6	0.5	15.9	13.4	42.5	15.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	88.4		
#4	87.4		
#10	86.9		
#40	71.0		
#200	57.6		

* (no specification provided)

Soil Description

Sandy silty clay

Atterberg Limits

PL= 22 LL= 28 PI= 6

Coefficients

D_{85}= 1.46 D_{60}= 0.0935 D_{50}= 0.0451
D_{30}= 0.0155 D_{15}= 0.0049 D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(2)

Remarks

Moisture Content= 14.4%
F.M.=0.24

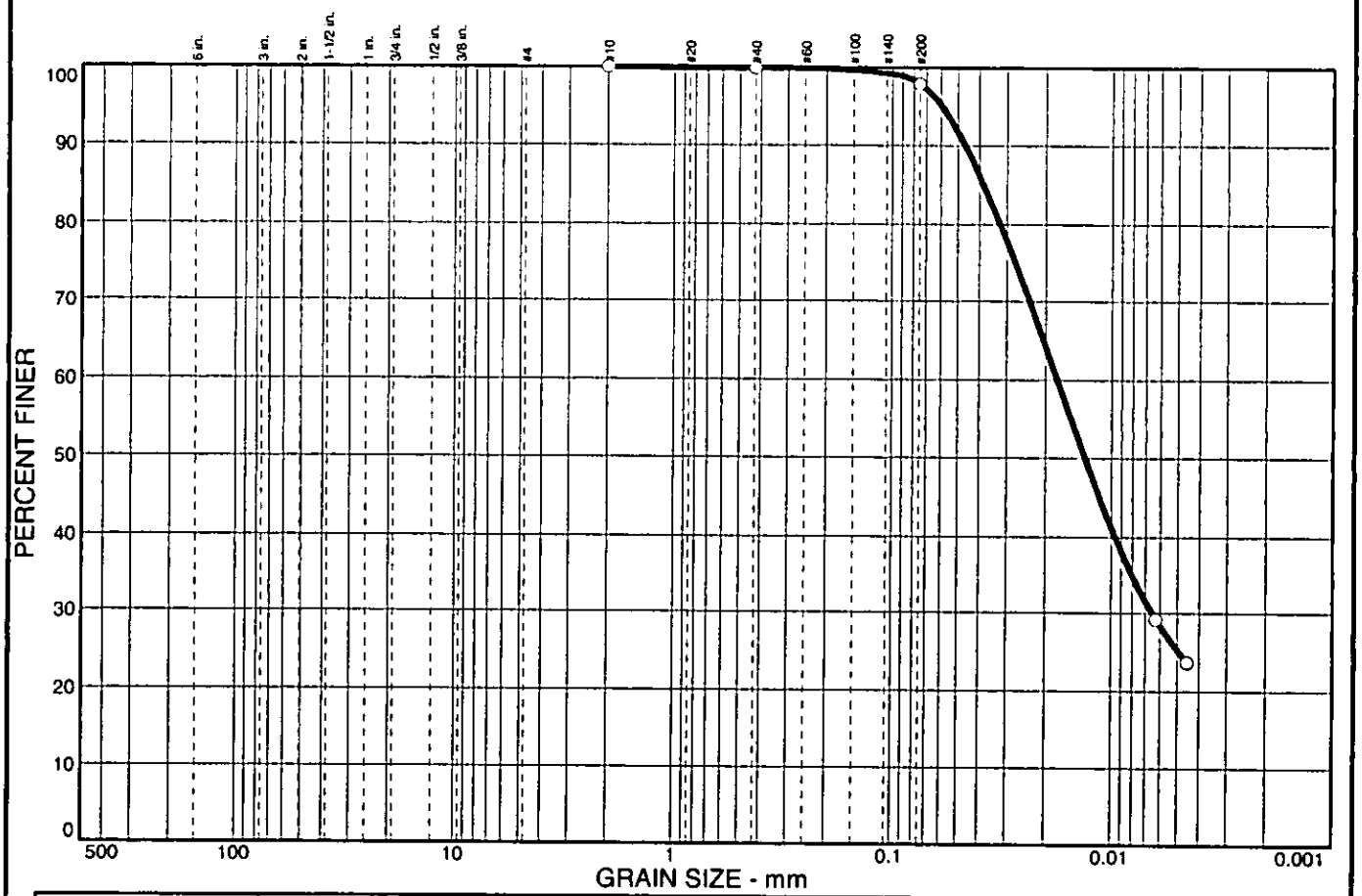
Sample No.: 3 **Source of Sample:** R-409 **Date:** 3/30/05
Location: **Elev./Depth:** 6

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.1	2.1	72.6	25.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.9		
#200	97.8		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 18 LL= 27 PI= 9

Coefficients

D_{85}= 0.0384 D_{60}= 0.0178 D_{50}= 0.0133
D_{30}= 0.0065 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(8)

Remarks

Moisture Content= 18.4%

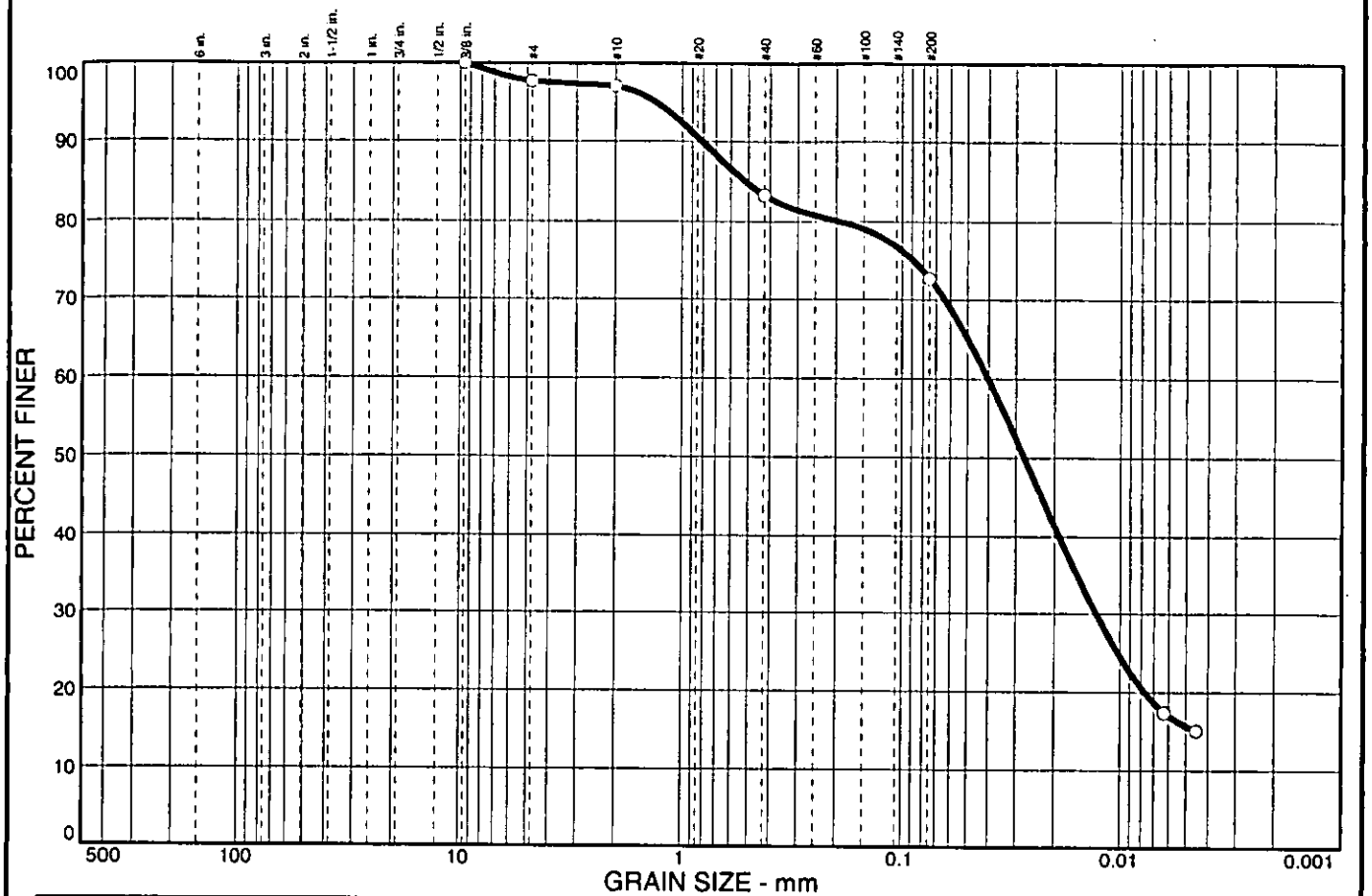
Sample No.: 6 **Source of Sample:** R-409 **Date:** 2/7/05
Location: **Elev./Depth:** 13.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	2.4	0.6	13.6	10.7	57.0	15.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	97.6		
#10	97.0		
#40	83.4		
#200	72.7		

* (no specification provided)

Soil Description

Silty clay with sand

Atterberg Limits

PL= 21 LL= 26 PI= 5

Coefficients

D_{85}= 0.513 D_{60}= 0.0404 D_{50}= 0.0276
D_{30}= 0.0129 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(2)

Remarks

Moisture Content= 13.3%
F.M.=0.02

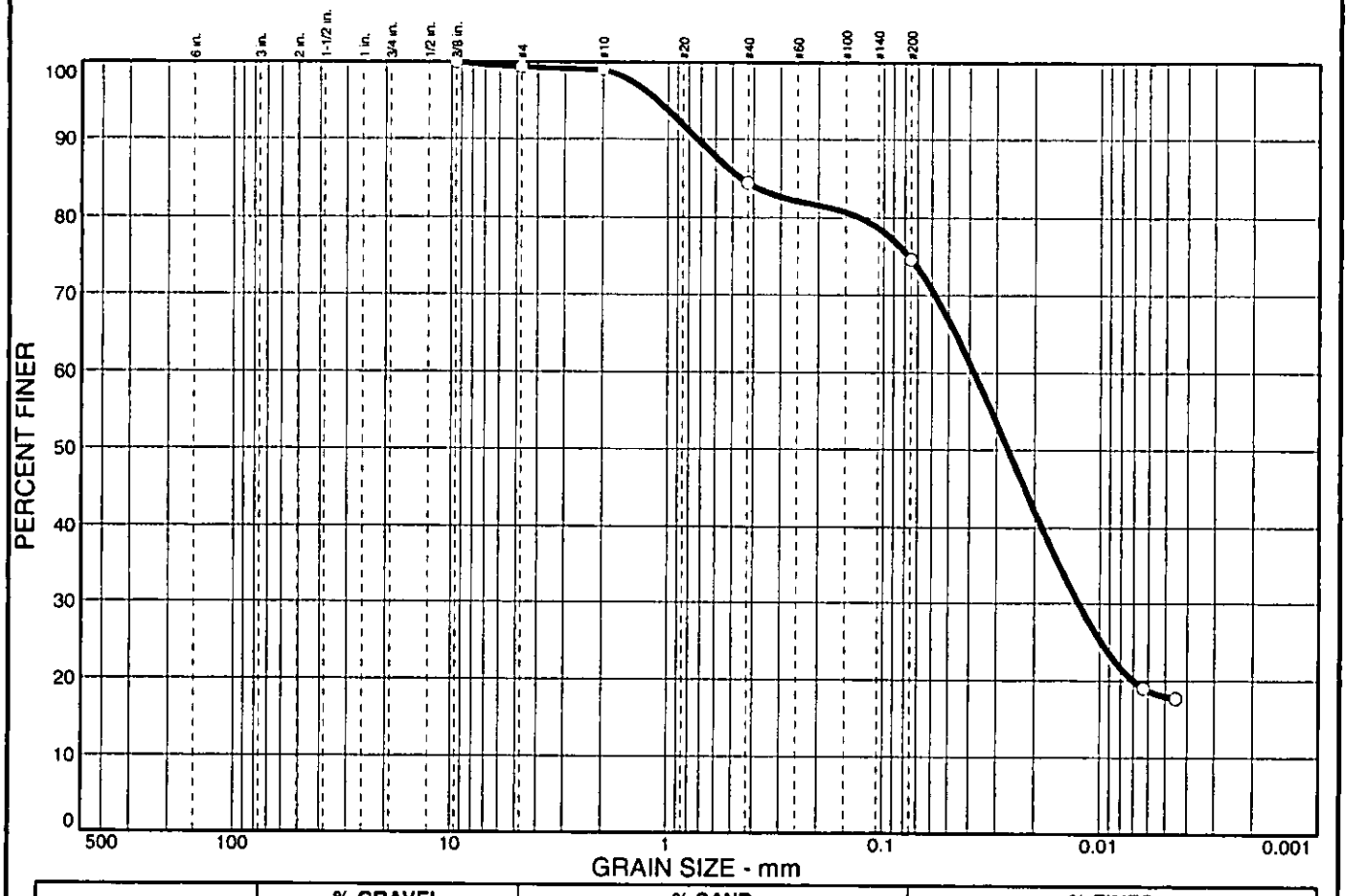
Sample No.: 10 **Source of Sample:** R-410 **Date:** 3/30/05
Location: **Elev./Depth:** 23.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.6	0.4	14.5	9.9	56.7	17.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.4		
#10	99.0		
#40	84.5		
#200	74.6		

* (no specification provided)

Soil Description

Lean clay with sand

Atterberg Limits

PL= 21 LL= 29 PI= 8

Coefficients

D_{85}= 0.453 D_{60}= 0.0382 D_{50}= 0.0266
D_{30}= 0.0126 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-4(5)

Remarks

Moisture Content= 15.4%
F.M.=0.01

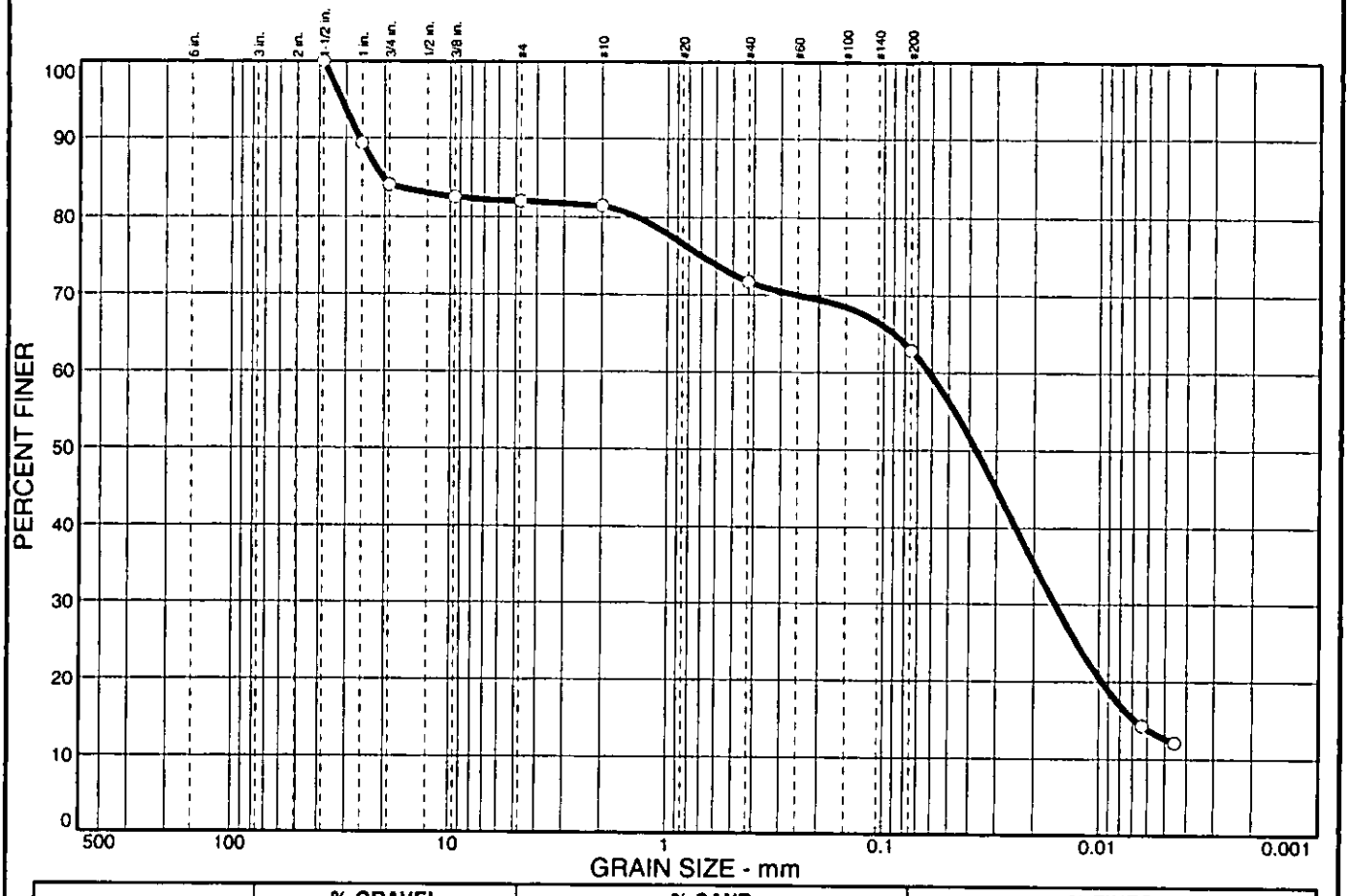
Sample No.: 13 **Source of Sample:** R-410 **Date:** 3/30/05
Location: **Elev./Depth:** 31

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	15.9	2.0	0.6	9.8	8.8	50.3	12.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.50 in.	100.0		
1.00 in.	89.3		
0.75 in.	84.1		
0.375 in.	82.6		
#4	82.1		
#10	81.5		
#40	71.7		
#200	62.9		

* (no specification provided)

Soil Description

Sandy silt with gravel

Atterberg Limits

PL= 22 LL= 26 PI= 4

Coefficients

D_{85}= 20.3 D_{60}= 0.0618 D_{50}= 0.0374
D_{30}= 0.0160 D_{15}= 0.0068 D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(1)

Remarks

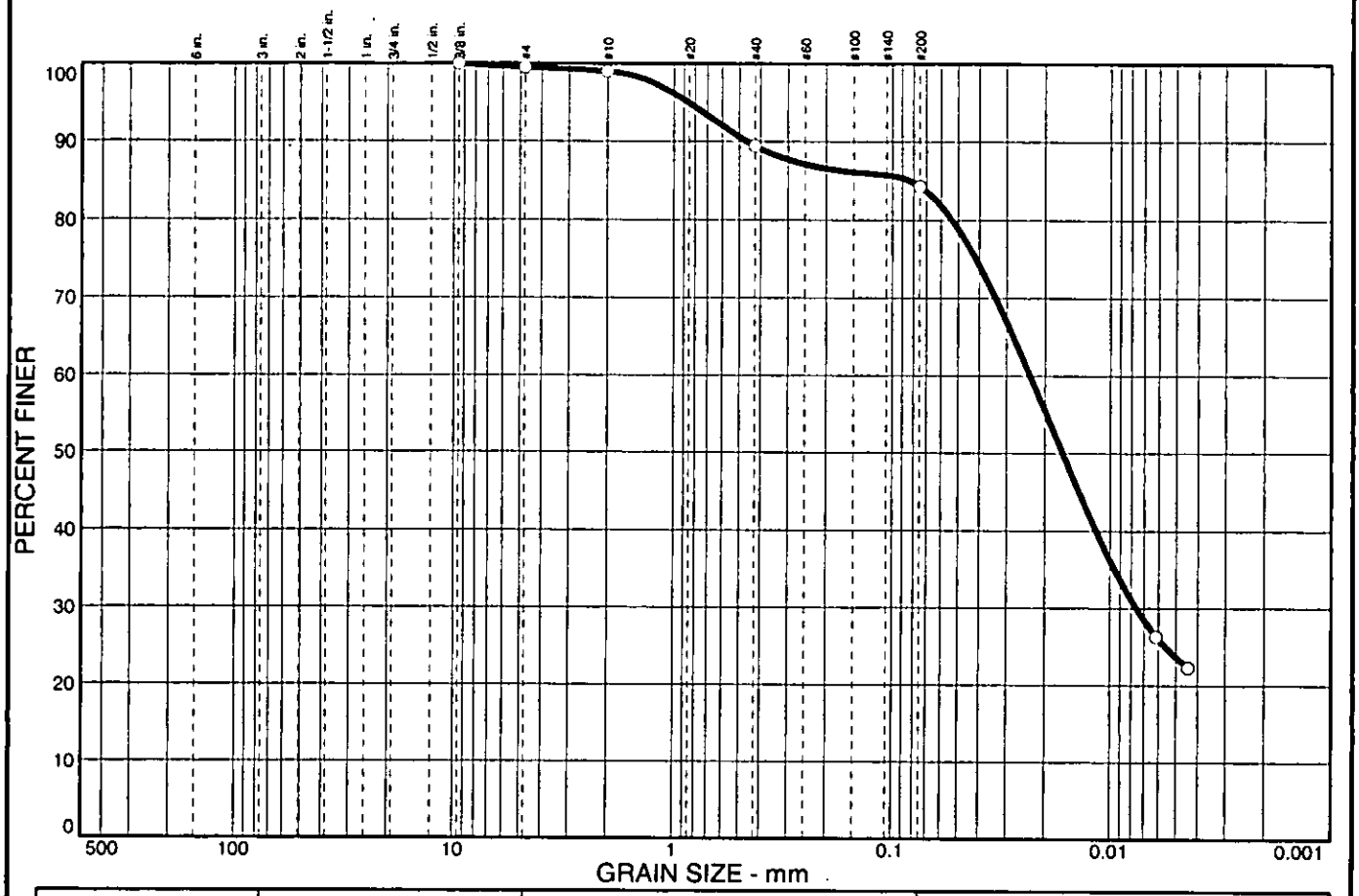
Moisture Content= 12.6%
F.M.=0.51

Sample No.: 2 **Source of Sample:** R-410 **Date:** 3/30/05
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00
Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.5	0.5	9.6	5.1	60.6	23.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.5		
#10	99.0		
#40	89.4		
#200	84.3		

* (no specification provided)

Soil Description

Lean clay with sand

Atterberg Limits

PL= 20 LL= 32 PI= 12

Coefficients

D_{85}= 0.0833 D_{60}= 0.0235 D_{50}= 0.0167
D_{30}= 0.0076 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-6(9)

Remarks

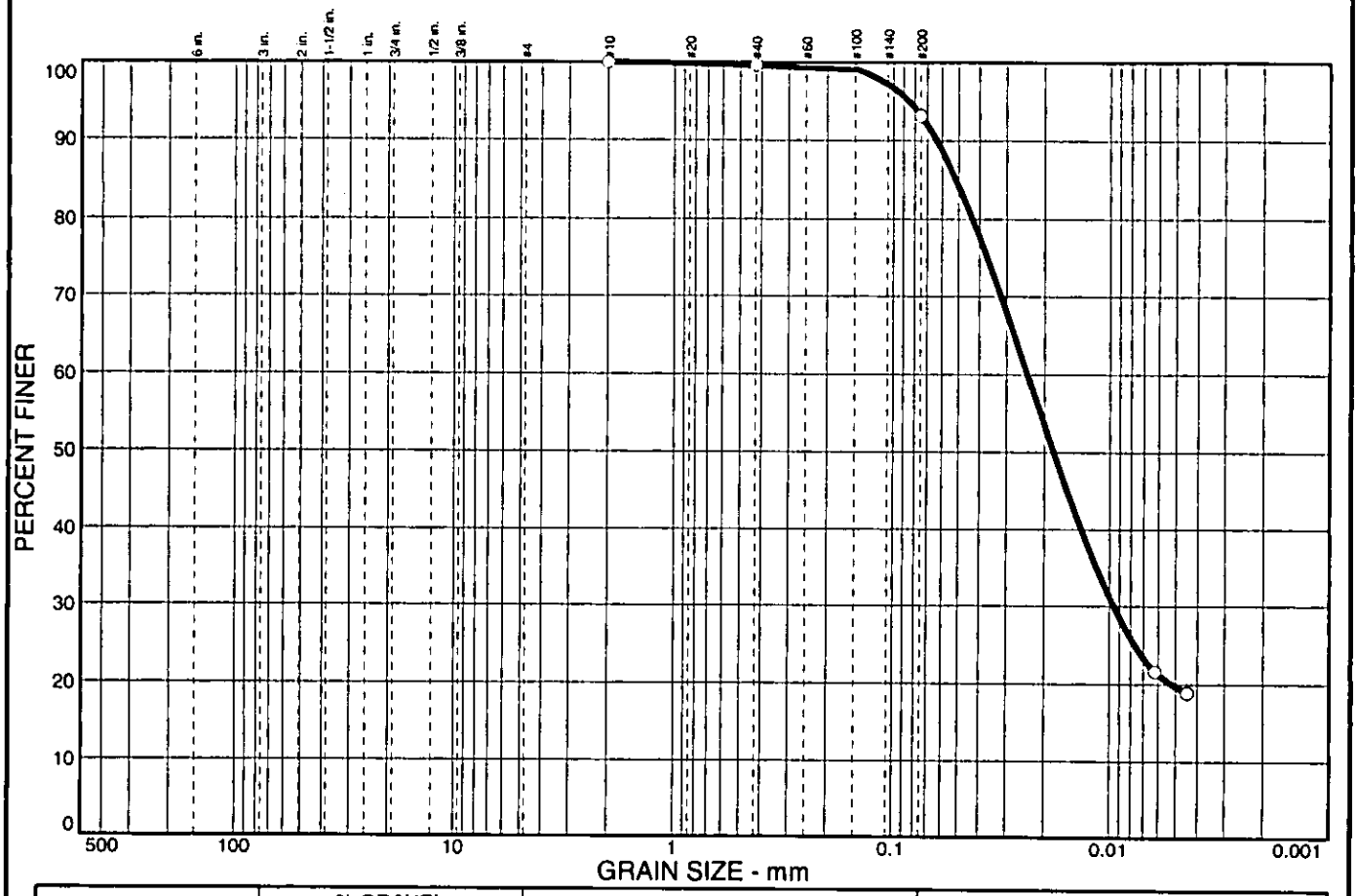
Moisture Content= 19.6%
F.M.=0.00

Sample No.: 5 **Source of Sample:** R-410 **Date:** 3/30/05
Location: **Elev./Depth:** 11

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00
Project No: 0121-3070.03 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.4	6.5	73.4	19.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.6		
#200	93.1		

* (no specification provided)

Soil Description

Silt

Atterberg Limits

PL= 24 LL= 32 PI= 8

Coefficients

D_{85}= 0.0517 D_{60}= 0.0241 D_{50}= 0.0182
D_{30}= 0.0096 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(8)

Remarks

Moisture Content= 21.4%

Sample No.: 2 **Source of Sample:** R-424 **Date:** 3/30/05
Location: **Elev./Depth:** 3.5

DLZ

Client: TranSystems, Inc.
Project: SCI-823-0.00

Project No: 0121-3070.03 **Figure**

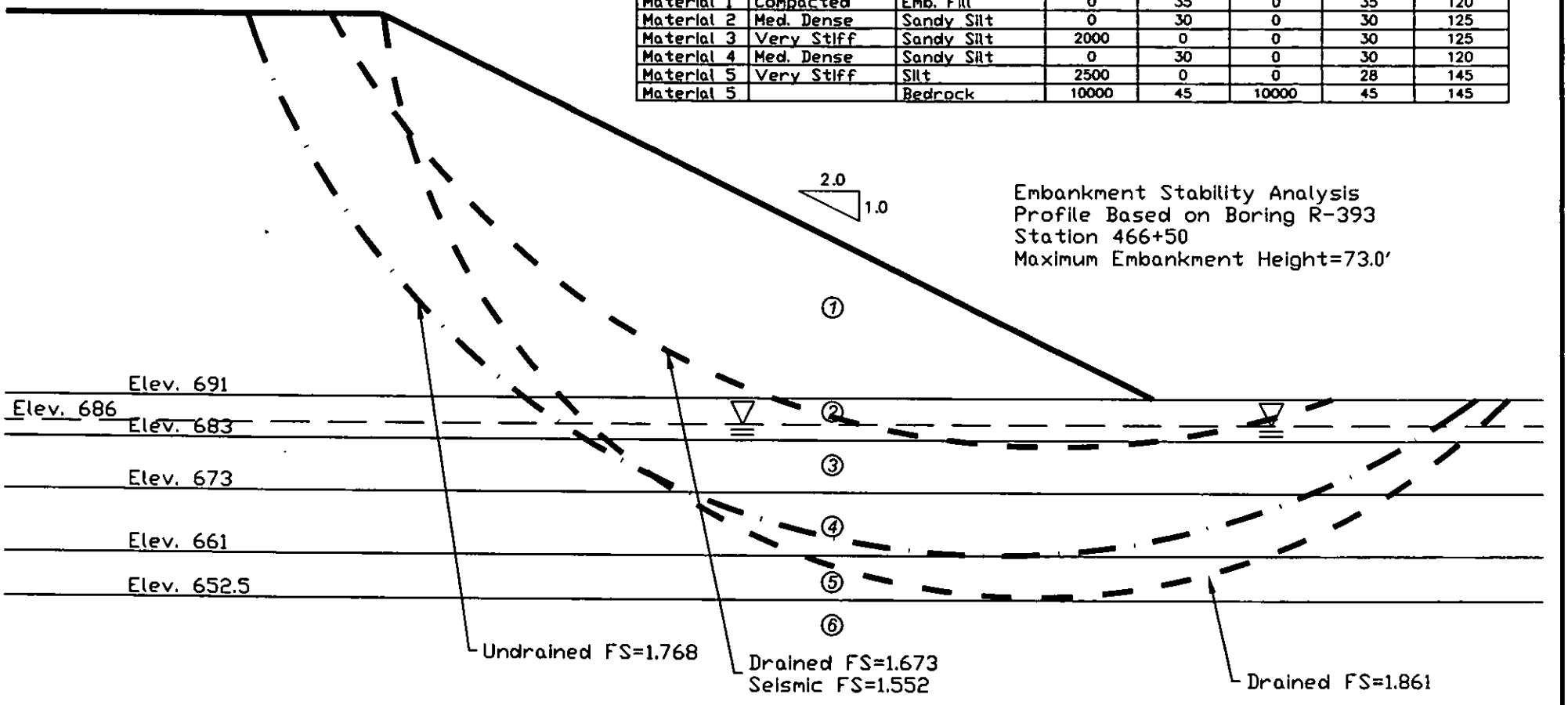
APPENDIX C

DLZ

APPENDIX C

Stability Analyses
Settlement Calculations

Material	Consistency	Soil Type	Undrained C (psf)	Undrained Φ (deg)	Drained C' (psf)	Drained Φ' (deg)	γ (pcf)
Material 1	Compacted	Emb. Fill	0	35	0	35	120
Material 2	Med. Dense	Sandy Silt	0	30	0	30	125
Material 3	Very Stiff	Sandy Silt	2000	0	0	30	125
Material 4	Med. Dense	Sandy Silt	0	30	0	30	120
Material 5	Very Stiff	Silt	2500	0	0	28	145
Material 5		Bedrock	10000	45	10000	45	145



Embankment Global Stability
Station 466+50 Mainline Embankment
Profile Based upon boring R-393

MSE STABILITY ANALYSIS

SCI-823-0.00

PROJECT NO. 0121-3070.03	CALC: SJR	DATE 11/25/06

M:\proj\0121\3070.03\Stability Analyses\Embankments\Embankment Stability Profiles.dwg, 11/28/2006 6:01:08 PM, \\Dlzbres\Q_geotechhp\5100n

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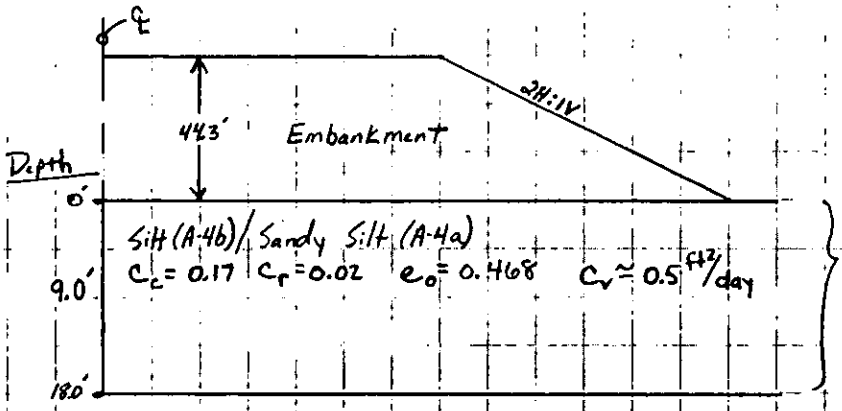
CLIENT TranSystems Corp / ODOT D-9 | PROJECT NO. 0121-3070.03
PROJECT SCI-823 Portsmouth Bypass | SHEET NO. 1 OF 6
SUBJECT Embankment Consolidation | COMP. BY SJR DATE 11-25-06
Time-Rate of Consolidation 441+00 | CHECKED BY JWT DATE 11-27-06

*Most critical soil profile assumed at boring R-379.
At station 441+00, the maximum embankment height is 443'



Consolidation Parameters Estimated from FHWA NHI-97-021.

Check if overconsolidated. $\frac{\omega - PL}{LL - PL} = \frac{17 - 22}{6} = -0.8 < 0.7$ ✓ Assume Overconsolidated.

$C_c = \frac{\omega}{100} = \frac{17}{100} = 0.17$ $C_r = \frac{\omega}{1000} = \frac{17}{1000} = 0.02$ $e_o = \frac{G_s \cdot \omega}{100} = \frac{2.75(17)}{100} = 0.468$

From attached calculation sheet:
δ_c = 2.1" - Consolidation of foundation soils
5.3" - Estimated settlement of embankment fill (10%).

Time-rate of Consolidation

$t_{80} = \frac{T_v \cdot H_v^2}{C_v}$

*Assume Single drainage
$C_v \simeq 0.5\ ft^2/day$

$t_{80} = \frac{(0.57)(18.0)^2}{0.5\ ft^2/day}$

For U = 80% (80% Consolidation)
↳ T_v = 0.57

H_v = 18.0'

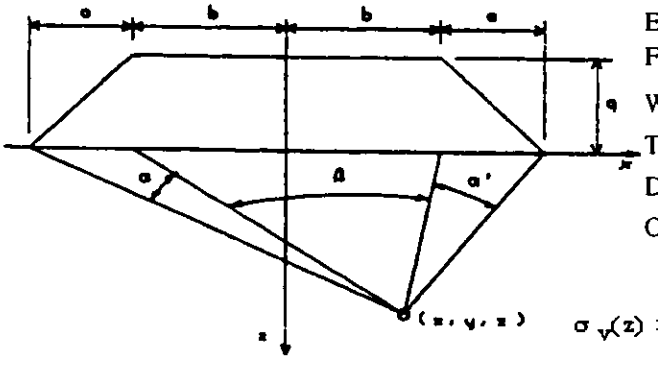
t_{80} = 369 days

DLZ SUBJECT

Client	TranSystems Corp. / ODOT D-9	JOB NUMBER	0121-3070.03
Project	SCI-823-6.81 Portsmouth Bypass	SHEET NO.	2 OF 6
Item	Settlement Sta. 441+00, H=44.3'	COMP. BY	SJR DATE 11/25/06
Profile Based Upon Boring R-379		CHECKED BY	GWT DATE 11-27-06

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	18.0	ft		
Embankment Height:	H =	44.3	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	5,316 psf
Width of Slope:	a =	88.6			
Top half-width of Emb:	b =	55			
Distance from CL:	x =	0			
Output Range:	z =	0	to	18	ft

**See Data output Attached*

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

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

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

Soil Properites: *Settlement is calculated at mid-point of layer*

No.	Bot. of Laye		Soil Type	γ_{soil} (pcf)	σ'_c (psf)	σ'_o (psf)	$\Delta\sigma z$ (psf)	σ'_f (psf)	Cohesionless Soils C'	Cohesive Soils C_r	C_c	e_o
1	9.0	ft	Silt	120	5,856	540	5,316	5,856	0.0	0.02	0.17	0.468
2	18.0	ft	Sandy Silt	120	6,928	1,620	5,308	6,928	0.0	0.02	0.17	0.468
3	0.0			0	0							
4	0.0			0	0							
5	0.0			0	0							
6	0.0			0	0							
7	0.0			0	0							
8	0.0			0	0							
9	0.0			0	0							
10	0.0			0	0							

No.	Settlement:		Total Settlement
1	0.108	ft	
2	0.066	ft	0.174 ft
3			
4			
5			2.1 in
6			
7			
8			
9			
10			

Reference: Geotechnical Engineering Principles and Practices; Coduto, 1999

Overconsolidated Soils - Case I ($\sigma'_o<\sigma'_c$) Eqn:11.24

$$(\delta_c)_{ult} = \sum \frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Overconsolidated Soils - Case II ($\sigma'_o<\sigma'_c<\sigma_f$) Eqn:11.25

$$(\delta_c)_{ult} = \sum\left[\frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_c}{\sigma'_0}\right) + \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_c}\right)\right]$$

Normally Consolidated Soils ($\sigma'_o=\sigma'_c$) Eqn: 11.23

$$(\delta_c)_{ult} = \sum \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Reference: FHWA NHI-00-045

Cohesionless Soils ($\sigma'_o=\sigma'_c$)

$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

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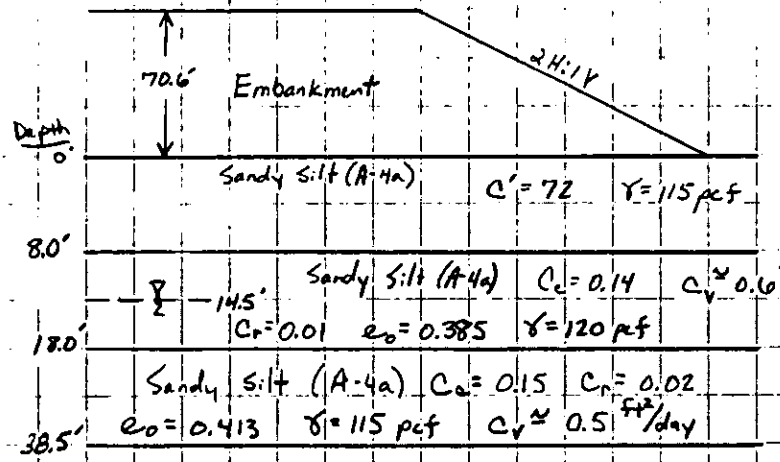
CLIENT TranSystems Corp / ODOT D-9 PROJECT NO. 0121-3070.03
PROJECT SCI-823 Portsmouth Bypass SHEET NO. 3 OF 6
SUBJECT Embankment Consolidation COMP. BY SJR DATE 11-25-06
Time-Rate of Consolidation 465+00 CHECKED BY GWT DATE 11-27-06

*Most critical soil profile assumed at boring R-393.
At station 465+00, the maximum embankment height is approximately 70.6'



C' estimated from FHWA-NHI-00-045

Consolidation Parameters Estimated from FHWA-NHI-97-021

Consolidation Parameters Estimated from FHWA-NHI-97-021

Sample Calculations: Layer 2

Check is soil is overconsolidated. $\frac{\omega - PL}{LL - PL} = \frac{14 - 19}{24 - 19} = -1.0 < 0.7$ ✓ Assume Overconsolidated

$C_c = \frac{\omega}{100} = \frac{14}{100} = 0.14$ $C_r = \frac{\omega}{1000} = \frac{14}{1000} = 0.014$ $e_o = \frac{G_s \cdot \omega}{1.00} = \frac{2.75(14)}{100} = 0.385$

From attached calculation sheet:

$\delta_c = 4.7"$

1.7" Occurs Instantly in granular layers.

3.0" Consolidation of foundation soils.

8.5" Estimated Settlement of embankment fill (1.0%)

Time-rate of Consolidation

$t_{80} = \frac{T_v \cdot H_v^2}{c_v}$

*Assume Single Drainage

$c_v \simeq 0.5$ ft²/day (more conservative)

$t_{80} = \frac{(0.57)(30.5')^2}{0.5 \text{ ft}^2/\text{day}}$

For U = 80% (80% Consolidation)

↳ $T_v = 0.57$

$t_{80} = 1{,}060$ days $= 2.9$ years

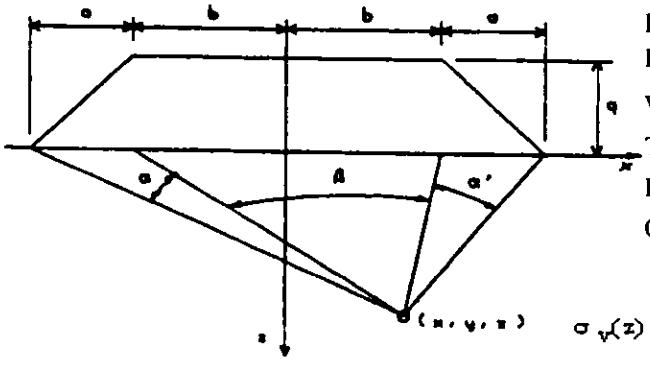
$H_v = 38.5 - 8 = 30.5'$

DLZ SUBJECT

Client	TranSystems Corp. / ODOT D-9	JOB NUMBER	0121-3070.03
Project	SCI-823-6.81 Portsmouth Bypass	SHEET NO.	4 OF 6
Item	Settlement Sta. 465+00, H=70.6'	COMP. BY	SJR DATE 11/25/06
	Profile Based Upon Boring R-393	CHECKED BY	GWT DATE 11-27-06

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	14.5	ft		
Embankment Height:	H =	70.6	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	8,472 psf
Width of Slope:	a =	141.2			
Top half-width of Emb:	b =	55			
Distance from CL:	x =	0			
Output Range:	z =	0	to	39	ft

**See Data output Attached*

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

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

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

Soil Properites: *Settlement is calculated at mid-point of layer*

No.	Bot. of Laye		Soil Type	γ_{soil} (pcf)	σ'_c (psf)	σ'_o (psf)	$\Delta\sigma z$ (psf)	σ'_f (psf)	Cohesionless Soils C'	Cohesive Soils C_r	C_c	e_o
1	8.0	ft	Sandy Silt	115	8,932	460	8,472	8,932	72.0	0.00	0.00	0.000
2	18.0	ft	Sandy Silt	120	9,984	1,520	8,464	9,984	0.0	0.01	0.14	0.385
3	28.0	ft	Sandy Silt	115	10,596	2,165	8,431	10,596	0.0	0.02	0.15	0.413
4	38.5	ft	Sandy Silt	115	11,061	2,704	8,358	11,061	0.0	0.02	0.15	0.413
5	0.0			0	0							
6	0.0			0	0							
7	0.0			0	0							
8	0.0			0	0							
9	0.0			0	0							
10	0.0			0	0							

No.	Settlement:		Total Settlement
1	0.143	ft	
2	0.059	ft	0.391 ft
3	0.098	ft	
4	0.091	ft	
5			4.7 in
6			
7			
8			
9			
10			

Reference: Geotechnical Engineering Principles and Practices; Coduto, 1999

Overconsolidated Soils - Case I ($\sigma'_0<\sigma'_c$) Eqn:11.24

$$(\delta_c)_{ult} = \sum \frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Overconsolidated Soils - Case II ($\sigma'_0<\sigma'_c<\sigma_f$) Eqn:11.25

$$(\delta_c)_{ult} = \sum\left[\frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_c}{\sigma'_0}\right) + \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_c}\right)\right]$$

Normally Consolidated Soils ($\sigma'_0=\sigma'_c$) Eqn: 11.23

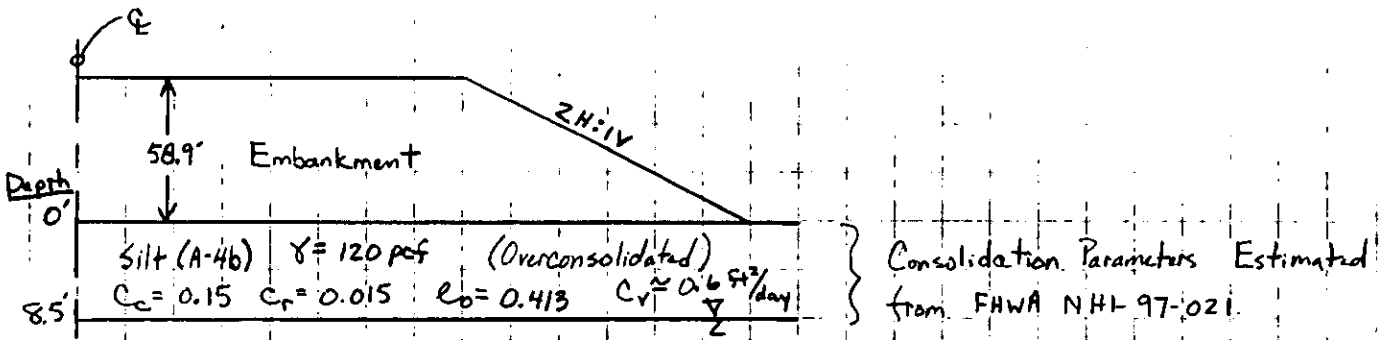
$$(\delta_c)_{ult} = \sum \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Reference: FHWA NHI-00-045

Cohesionless Soils ($\sigma'_0=\sigma'_c$)

$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

* Most critical soil profile assumed at boring B-10.
At station 487+00, the maximum embankment height is approximately 58.9'



Consolidation Parameters Estimated from FHWA NHI-97-021.

Sample Calculations

Check is soil overconsolidated $\frac{\omega - PL}{LL - PL} = \frac{15-19}{24-19} = -0.8 < 0.7$ ✓ Assum overconsolidated

$C_c = \frac{\omega}{100} = \frac{15}{100} = 0.15$ $C_r = \frac{\omega}{1000} = \frac{15}{1000} = 0.015$ $e_o = \frac{G_s \cdot \omega}{100} = \frac{2.75(15)}{100} = 0.413$

From attached calculation sheet:

$\delta_c = 1.7''$

7.1" Estimated Settlement of embankment fill (1.0%)

Time rate of consolidation

$T_{80} = \frac{T_v \cdot H_v^2}{C_v}$

* Assume Single Drainage
$C_v \simeq 0.6$ ft²/day

$T_{80} = \frac{(0.57)(8.5')^2}{0.6 \text{ ft}^2/\text{day}}$

For U = 80% (80% Consolidation)
↳ $T_v = 0.57$

$t_{80} = 68$ days.

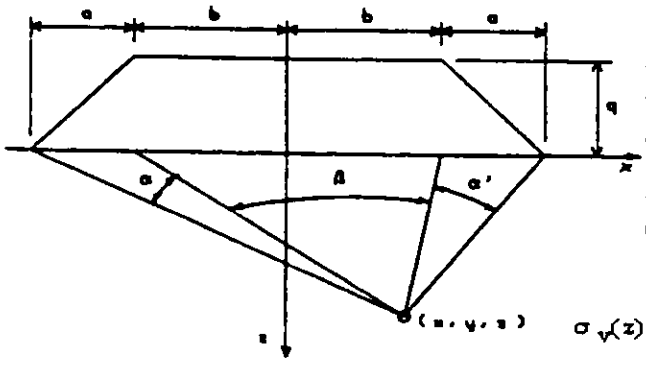
$H_v = 8.5'$

DLZ

SUBJECT	Client TranSystems Corp. / ODOT D-9	JOB NUMBER	0121-3070.03
	Project SCI-823-6.81 Portsmouth Bypass	SHEET NO.	6 OF 6
	Item Settlement Sta. 487+00, H=58.9'	COMP. BY	SJR DATE 11/25/06
	Profile Based Upon Boring B-10	CHECKED BY	GWT DATE 11-27-06

SETTLEMENT ANALYSIS - EMBANKMENT

Embankment Informaiton:



Groundwater Table:	D=	8.5	ft		
Embankment Height:	H =	58.9	ft		
Fill Unit Weight:	γ_{emb} =	120	pcf	q =	7,068 psf
Width of Slope:	a =	117.8			
Top half-width of Emb:	b =	55			
Distance from CL:	x =	0			
Output Range:	z =	0	to	9	ft

**See Data output Attached*

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

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

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

Soil Properites: *Settlement is calculated at mid-point of layer*

No.	Bot. of Laye	Soil Type	γ_{soil} (pcf)	σ'_c (psf)	σ'_o (psf)	$\Delta\sigma z$ (psf)	σ'_f (psf)	Cohesionless Soils C'	Cohesive Soils C_r	C_c	e_o
1	8.5 ft	Silt	120	7,578	510	7,068	7,578	0.0	0.02	0.15	0.413
2	0.0		0	0							
3	0.0		0	0							
4	0.0		0	0							
5	0.0		0	0							
6	0.0		0	0							
7	0.0		0	0							
8	0.0		0	0							
9	0.0		0	0							
10	0.0		0	0							

No.	Settlement:	Total Settlement
1	0.141 ft	
2		0.141 ft
3		
4		
5		1.7 in
6		
7		
8		
9		
10		

Reference: Geotechnical Engineering Principles and Practices; Coduto, 1999

Overconsolidated Soils - Case I ($\sigma'_0<\sigma'_c$) Eqn:11.24

$$(\delta_c)_{ult} = \sum \frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Overconsolidated Soils - Case II ($\sigma'_0<\sigma'_c<\sigma_f$) Eqn:11.25

$$(\delta_c)_{ult} = \sum\left[\frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_c}{\sigma'_0}\right) + \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_c}\right)\right]$$

Normally Consolidated Soils ($\sigma'_0=\sigma'_c$) Eqn: 11.23

$$(\delta_c)_{ult} = \sum \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

Reference: FHWA NHI-00-043

Cohesionless Soils ($\sigma'_0=\sigma'_c$)

$$(\delta_c)_{ult} = \sum \frac{1}{C'} H \log\left(\frac{\sigma'_f}{\sigma'_0}\right)$$

APPENDIX D

DLZ

APPENDIX D

ODOT Geotechnical Design Checklist

III.B. Embankments Checklist

C-R-S: SCI-823-6.81	PID: 19415	Reviewer: Steven Riedy	Date: 11-29-06

Settlement

(Y) N X 1 If soil conditions and project requirements warrant, have settlement issues been addressed?

If not applicable (X), go to Question **14**

(Y) N X 2 Have consolidation properties of the foundation soils been determined?

Check methods used:

- ☐ laboratory consolidation tests
- (☐) empirical correlations with moisture content and Atterberg values
- ☐ other

(Y) N X 3 Have calculations been performed to estimate the total expected embankment settlement and the time of consolidation?

Check method used:

- ☐ EMBANK or equivalent software
- (☐) hand calculations

(Y) N X 4 If differing foundation soil and/or loading conditions occur throughout the embankment area, have sufficient analyses been completed to evaluate consolidation at locations representative of the most critical conditions?

(Y) N X 5 Have the total settlement and the time of consolidation analyses indicated acceptable values at all locations for the scope of the embankment work?

Y N (X) 6 If total settlement or time of consolidation is unacceptable, have the stations and lateral extent of the problem areas been defined?

Y N (X) 7 Has a method been chosen as a solution to the settlement issues?

Check methods used:

- ☐ waiting periods with monitoring
- ☐ drainage blanket and wick drains
- ☐ surcharge (preloading)
- ☐ removal and replacement of weak soil
- ☐ lowering proposed grade / change alignment
- ☐ lightweight fill
- ☐ other List Other items:

III.B. Embankments Checklist

Y N (X)	8	Based on accepted design practices, and where applicable, adhering to published guidelines and design recommendations from FHWA, have calculations been performed to evaluate the effectiveness of the chosen solution(s)?	
Y N (X)	9	Has an economic analysis been performed to evaluate the cost benefits of the recommended solution compared to others?	
Y N (X)	10	Have all necessary notes, specifications, and details for the chosen solution been determined?	
Y N (X)	11	Have the need, locations, type, plan notes, and reading schedule for settlement platforms been determined?	
Y N (X)	12	Have the effects of the predicted settlement and the chosen solution been determined and accounted for on the construction schedule?	
Y (N) X	13	Has the effect of any foundation soil consolidation (including differential settlement) been evaluated with regard to adjacent structures (e.g., bridges, buildings, culverts, utilities) which will also undergo settlement and be subject to stresses induced by the consolidation of the surrounding soil?	The effect of the consolidation of foundational soils on the structures are evaluated in the respective MSE/Structure reports.

Notes :

Stage 1:

III.B. Embankments Checklist

Stability			
(Y) N X	14	If soil conditions and project requirements warrant, have stability issues been addressed? If not applicable (X), go to Question **27**	
(Y) N X	15	Has the total (short term) and effective (long term) shear strength of the foundation soils been determined? Check method used: □ laboratory shear tests (□) estimation from SPT or field tests	
Y (N) X	16	Have the OGE's recommended values of shear strength for proposed embankment fill material (total: c = 2000 psf, phi = 0; effective: c = 300 psf, phi = 28) been used in the stability analyses?	16.) Due to the large amount of rock to be excavated from adjacent cut sections, it is assumed that excavated rock will be used as fill to construct the embankments. The values selected are as follows; Total and Effective: cohesion = 0, friction angle = 35 degrees. Please refer to section 5.4.1 in the report for more information.
(Y) N X	17	Have calculations been performed to determine the F.S. for stability? Check method used: (□) STABL, XSTABL, or equivalent software □ hand calculations	
	18	Have the following F.S. been met or exceeded, as determined by the calculations, for the given stability conditions:	
(Y) N X		a 1.30 for short term condition	
(Y) N X		b 1.30 for long term condition	
Y N (X)		c 1.10 for rapid drawdown, flood condition	
Y N (X)		d 1.50 for embankment supporting bridge abutments (not on deep foundations)	
(Y) N X	19	When differing soil or loading conditions occur throughout the embankment area, have sufficient analyses been completed to evaluate the stability at locations representative of the most critical conditions?	
Y N (X)	20	If the F.S. was not met or exceeded, have the stations and lateral extent of the problem areas been defined?	
Y N (X)	21	Has a method been chosen as a solution to the stability issues? Check the method(s) used: □ flattening slopes □ counterberm □ lightweight embankment	

	☐ reinforced soil slope ☐ soil nailing ☐ drainage blanket and wick drains ☐ removal of soft soil, adding shear key ☐ reduced grade / change alignment ☐ stage construction ☐ controlled rate of fill placement ☐ drilled shaft slope stabilization ☐ other List Other items:	
Y N (X) 22	Based on accepted design practices, and where applicable, adhering to published guidelines and design recommendations from FHWA, have calculations been performed to evaluate the effectiveness of the chosen solution(s)?	
Y N (X) 23	Has an economic analysis been performed to evaluate the cost benefits of the recommended solution compared to others?	
Y N (X) 24	Have all necessary notes, specifications, and details for the chosen solution been determined?	
Y N (X) 25	Have the need, location, type, plan notes, and reading schedule for piezometers and inclinometers been determined?	
Y N (X) 26	If piezometers will be used, has the critical pressure value been determined and the appropriate information included in the plans?	
Y N (X) 27	Have the effects of the stability solution been determined and accounted for on the construction schedule?	
Y N (X) 28	Has the effect of the stability solution been evaluated with regard to structures (e.g., bridges, buildings, culverts, utilities) which may be subject to unusual stresses or require special construction considerations?	

Notes:

Stage 1:

III.B. Embankments Checklist

Sidehill Fills			
(Y) N X	29	If soil conditions and project requirements warrant, have sidehill fill issues been addressed? If not applicable (X), go to Question **34**	
(Y) N X	30	In accordance with Geotechnical Bulletin 2: Special Benching and Sidehill Embankment Fills (GB 2), have sidehill fills been evaluated to determine if special benching or shear keys are needed?	
	31	In accordance with GB 2, if special benching or shear keys are required, has	
(Y) N X		a Plan Note G110 from L&D3 been included in the General Notes?	31 a & c.) Information, Plan Notes, and Cross Section have been provided to TranSystems Corporation.
Y N (X)		b quantities for both excavation and embankment been calculated for the benched areas and added to the plan General Quantities?	
(Y) N X		c the special benching or shear keys been indicated on the appropriate cross sections?	
(Y) N X	32	Have water bearing zones been identified and their impact addressed?	
(Y) N X	33	Have subsurface drainage controls been adequately addressed?	

Notes:

Stage 1:

III.B. Embankments Checklist

Special			
Y N (X)	34	Have all of the environmental factors, including wetlands, stream mitigation, and landfills, been considered and incorporated prior to design and analysis of embankment settlement and stability, including EPA or other government agencies' involvement, mitigation, or special design or construction considerations?	
	35	If an embankment is to be placed through standing water or over weak, wet soils (with or without a fabric separator), the fill should be placed by the method of end dumping to a given height above the standing water or until compaction is achievable over the soft soil. If end dumping is to be specified,	
(Y) N X		a has the material type for the fill to be end dumped been specified?	
Y (N) X		b has the need for a fabric separator or filter layer been determined?	
(Y) N X		c has the height of fill to be end dumped been determined?	
Y (N) X		d have all notes and specifications for end dumping been developed?	

Notes:

Stage 1: