

*Preliminary*

Report for:

Subsurface Exploration and  
MSE Wall and Embankment Evaluations for  
Proposed US 23 / SR 823 Interchange

DLZ Ohio, Inc.

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DLZ Job No. 0121-3070.03

January 9, 2006

**TRAN**SYSTEMS  
CORPORATION 

5747 Perimeter Dr., Suite 240

Dublin, Ohio 43017

Prepared for:

Mike Weeks

Project Manager

**TranSystems Corporation**

Prepared by



*Note  
date*



**Peter  
Narsavage/Structures/CEN  
/ODOT**

06/30/2006 01:00 PM

To David Norris/Administration/D09/ODOT@ODOT

cc thampshire@dlz.com, pnix@dlz.com

bcc

Subject SCI-823 and 23 interchange MSE walls

Dave-

I had a telephone conversation with Tim Hampshire of DLZ about my concerns with DLZ's analyses for MSE walls at the proposed interchange of 23 and 823. I had two main concerns. 1) That the bearing capacity analyses use soil properties for granular material which are appropriate within the proposed five foot undercut, but do not reflect the fact that loose soils below the five foot undercut have not been improved. 2) The report states that settlement analyses were not performed because the soils are primarily granular soils. I don't believe this is true. For the 14 MSE wall borings (I am including TR-47 and TR-61), 10 encountered clayey soils (A-6a, A-6b, or A-7-6) that were generally 5-12 feet thick. These soils were generally moist to wet. These soils will generally consolidate.

The proposed undercuts will improve the bearing capacity beneath the MSE walls, but I do not think that DLZ's analyses accurately reflect the improvement. The soils that cause bearing capacity problems are about 10 to 13 feet below the existing ground surface and generally consist of medium stiff to stiff clay soils or very loose to loose granular soils. The five foot undercuts will not improve these soils. To analyze the bearing capacity, I recommended that DLZ either perform an analysis with layered soils or use strengths that are weighted averages for the soils within a depth equal to the MSE wall width.

Tim told me that DLZ would reconsider the bearing capacity and look at the settlement issue.

-Peter

---

Peter Narsavage, P.E. \* Foundation Engineering Coordinator  
Ohio Dept. of Transportation - Office of Structural Engineering  
1980 West Broad St., Columbus, Ohio 43229

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TR-61 Silty Sand  $\phi = 50^\circ$

this is only lab strength testing

Slope stability B-1108 2:1 slope FS = 1.33 (why 2.5:1 in report)

Bearing Capacity

B-1108 w/ 5' undercut  $\phi = 34^\circ$

B-1109 w/ 5' undercut  $\phi = 34^\circ$

TR-61 " "

B-1108 11'-23' A-6b or A-7-6  $S_u = 1000 - 1750$  psf  $W = 32 - 38$  mst  
(used  $S_u = 2.5$  ksf) FS=2)

B-1109 13'-18' A-7-6  $S_u = 1.5 - 2.0$  ksf  $W = 16$  mst  
(2.0 ksf used FS=1.6) wet (not to bad)

B-1105 6-15.5' A-6a  $S_u = 1.0 - 1.75$  ksf mst

B-1106 11-15.5' A-6b  $S_u = 1.0 - 2.0$  ksf mst (not to bad)

B-1107 10.5-23' A-7-6  $S_u = 1.25 - 3.0$  ksf  $W = 29$  mst

granular soil below clay tended to be loose or very loose

B-1110 13-20' A-3a/A-1-b very loose to loose

B-1119 8-18' V loose or loose A-1-b ~ A-2-4

B-1120 8.5-10.5' A-6b  $S_u = 0.75$  ksf mst - wet

used  $S_u = 2.5$  ksf FS=1.89

10.5-15' V loose to loose A-1-b

B-1121 5.5-13' A-6b  $S_u = 1 - 1.25$  ksf mst

13-15' V loose A-2-6

B-1122 13-20.5' A-6b  $S_u = 0.5 - 1.0$  ksf wet

B-1123 13-20.5' A-6b  $S_u = 1.0 - 2.0$  ksf moist - wet

B-1124 0-10.5' A-6a/A-6b/A-7-6  $S_u = 0.25 - 1.75$  ksf mst - wet

10.5-13.5' A-6a  $N=1$  V soft wet used  $\phi = 28^\circ$  FS 0.91

soil parameters for slope stability analyses are not given

TR-47 7-13' A-6a  $S_u = 0.5$  ksf moist - wet  $S_u = 2.0$  FS=1.51  
13-18' A-3a V loose used  $\phi = 28^\circ$  FS=2.0

TR-61 10.5-23' V loose A-1-b / A-3a



Letter of Transmittal

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To: Peter Narsavage  
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Date: 6-2-06

No. of Pages:

From: Mike Weeks

Subject: MSE Wall Evaluations for US 23 Interchange

Project Name: SCI-823-0.00 PID 19415

Project No: P403030064

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Comments:

Peter,

I have sent you this report prepared by DLZ to assess the MSE Wall evaluations and recommendations for the referenced project. We are developing the retaining wall study submission and would like OSE concurrence with the geotechnical assessment prior to finalizing the study. Hopefully this will result in an expedited review of the retaining wall study.

Please contact me with any questions,

Deliver Via:

- Overnight Service (FedEx, UPS, DHL)
- Courier/Messenger
- Hand Deliver
- Mail

CC: Dave Norris, PE (ODOT D-9)  
 \_\_\_\_\_  
 \_\_\_\_\_

Signature: Mike Weeks  
 Print: \_\_\_\_\_



**REPORT  
OF  
SUBSURFACE EXPLORATION AND  
MSE WALL AND EMBANKMENT EVALUATIONS  
FOR  
PROPOSED US 23 / SR 823 INTERCHANGE**

Prepared for:  
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**REPORT  
OF  
SUBSURFACE EXPLORATION AND  
MSE WALL AND EMBANKMENT EVALUATIONS  
FOR  
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**1.0 INTRODUCTION**

This report presents the findings of the subsurface exploration and mechanically stabilized earth (MSE) retaining wall and embankment evaluations conducted for the proposed US 23 and SR 823 (Portsmouth Bypass) interchange to be located in Scioto County, north of Lucasville, Ohio, within the area of the Scioto County Fairgrounds. This exploration has been performed essentially in accordance with the DLZ Ohio, Inc. proposal for State Route 823, Portsmouth Bypass, through Scioto County.

Reports of subsurface explorations and MSE wall and embankment evaluations for the various bridge structures at the US 23 and SR 823 interchange will be presented under separate cover.

The purpose of this exploration was to 1) determine the subsurface conditions to the depths penetrated by the borings, 2) evaluate the engineering characteristics of the subsurface materials, and 3) provide information to assist in designing the proposed MSE walls and earthen embankments.

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

**2.0 GENERAL PROJECT INFORMATION**

The proposed interchange reportedly will include four ramps: Ramp A will direct southbound US 23 traffic onto SR 823, Ramp B will direct northbound US 23 traffic onto SR 823, Ramp C will direct SR 823 traffic onto US 23 north, and Ramp D will direct SR 823 traffic onto US 23 south. It is understood that as of the preparation of this report it is uncertain exactly where earthwork or MSE walls will be constructed for the four ramps at the proposed US 23 and SR 823 interchange. However based on the information provided by TranSystems, it is understood that approximately 2,100 feet of MSE walls will be used on Ramps B and C and there will be no MSE walls on Ramps A or D. It is understood that on Ramp B, a MSE wall will be used on the east side of the ramp from station 2596+50 to 2605+50 and on the west side of the ramp from station 2604+00 to 2605+50. It is understood that on Ramp C, a MSE wall will be used on the east side of the ramp from station 3898+50 to 3901+00 and on the west side of the ramp from station

3898+50 to 3906+50. The entire interchange reportedly will require an increase in grade of up to 40 feet, except where the four ramps merge into the proposed SR 823; at this location cuts of up to 80 feet reportedly will be required.

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

### **3.0 FIELD EXPLORATION**

Between July 13, 2005 and November 2, 2005, 52 borings, identified as borings B-1101 through B-1152, were drilled and sampled for the design of the proposed interchange. The depths of these 52 borings ranged from 10 feet to 49 feet below the existing ground surface.

In addition, between March 14, 2005 and March 22, 2005, 16 borings pertaining to the various structures for the proposed interchange and identified as borings TR-46 through TR-61 were drilled and sampled to the top of rock, where 10 feet of rock was cored in each boring. The depths of these borings ranged from 25 feet to 45 feet below the existing ground surface. These 16 borings have also been included in this report.

The locations of the 68 borings were established, staked, and surveyed by representatives of DLZ Ohio, Inc. The locations of the 68 borings are presented in both tabular and graphical format in Appendix I. All borings were advanced using either a truck-mounted or ATV-mounted rotary-type drill rig. Information concerning the drilling procedures is presented in Appendix II.

### **4.0 FINDINGS SUMMARIZED**

#### **4.1 Geology of the Site**

Generalized geological references report that the site lies on the flood plain at the east side of the Scioto Valley. This area is unglaciated but the Scioto Valley is filled with Illinoian and Wisconsin outwash to depths of up to 90 feet. The rock is generally Berea sandstone underlain with Bedford and Ohio shales.

#### **4.2 Subsurface Conditions**

The following sections present the generalized subsurface conditions encountered by the borings. For more detailed information, please refer to the Boring Logs in Appendix II.

#### **4.2.1 Soil Conditions**

Forty-four of the 68 borings first encountered topsoil during drilling. The thickness of topsoil encountered in these borings ranged from 1 to 7 inches with an average thickness of approximately 3.5 inches. In addition, 17 of the remaining borings first encountered asphalt and aggregate base during drilling. The thickness of asphalt encountered ranged from 3 to 8 inches with an average thickness of approximately 5.5 inches while the thickness of the aggregate base encountered ranged from 4 to 8 inches with an average thickness of approximately 5.75 inches.

Underlying any topsoil or paving materials, 26 of the 68 borings encountered fill and/or possible fill material to depths of up to 33 feet. The fill and/or possible fill material generally consisted of cohesive soils (sandy silt (A-4a), silt and clay (A-6a), or silty clay (A-6b)), some of which were confirmed by laboratory testing to be slightly organic to organic.

Underlying any fill or possible fill, most of the 68 borings generally encountered cohesive soils consisting of very stiff to hard, damp to moist, silt and clay (A-6a), silty clay (A-6b), sandy silt (A-4a), clay (A-7-6), or silt (A-4b) to depth of between 10 and 20 feet. Some of these naturally occurring cohesive soils were also confirmed by laboratory testing to be slightly organic to organic. Granular material was then typically encountered beneath these cohesive soils to the top of bedrock.

However it should be noted that 7 of the 68 borings first encountered very loose to dense, damp to moist, gravel with sand (A-1-b) or gravel with sand and silt (A-2-4) before encountering any cohesive soils and the cohesive soils that were encountered at the site generally had seams or were interbedded with granular material. The soil conditions varied across the entire interchange, therefore the individual boring logs should be reviewed for the soil conditions at a particular location.

#### **4.2.2 Bedrock Conditions**

Fifty-six of the 68 borings encountered bedrock during drilling. The bedrock generally consisted of medium hard to very hard sandstone. However shale, siltstone, and claystone layers were also encountered. Top of bedrock was first encountered at depths of between 13 and 38 feet below the existing ground surface, with the average depth to top of bedrock being 24 feet below the existing ground surface. It should be noted that some of the bedrock encountered at higher elevations was highly weathered or deteriorated and exhibited more of a soil-like structure.

### 4.2.3 Groundwater Conditions

Groundwater seepage was encountered in most of the 68 borings during drilling. Seepage was first encountered at depths of between 9 feet and 35 feet below the existing ground surface.

At the completion of drilling the depth to water, as measured inside the drilling augers, ranged from 2 to 48 feet below the ground surface. However it should be noted that some of these water levels also included water used during drilling (rock coring) operations and therefore may not be indicative of actual groundwater conditions.

## 5.0 ANALYSIS AND RECOMMENDATIONS

### 5.1 Mechanically Stabilized Earth (MSE) Retaining Walls – General Information

An MSE retaining wall essentially consists of good quality backfill material with layers of metal or plastic reinforcing that are attached to concrete facing panels. The MSE wall and associated backfill should be constructed in accordance with the specifications of the manufacturer of the MSE wall.

Global and external stability analyses were performed by DLZ for the various MSE walls for this project. Calculations, stability requirements (i.e. factors of safety), and material properties were based on information presented in the latest edition of the Ohio Department of Transportation (ODOT) “Bridge Design Manual” and the American Association of State Highway and Transportation Officials (AASHTO) “Standard Specifications for Highway Bridges” as well as on materials encountered in the borings. The minimum factor of safety for the global stability analysis was taken to be 1.5. The minimum length of the reinforcing strips needed in each of the MSE walls was determined based on a minimum factor of safety of 2.5 for the bearing capacity. A minimum factor of safety of 1.5 was used for the sliding analysis along with a sliding coefficient of 0.35 for all analysis prior to an undercut and 0.55 for all analysis with an undercut. A minimum factor of safety of 2.0 was used for the overturning analysis. Internal stability analyses are also required for the design of an MSE wall, however these calculations are typically the responsibility of the manufacturer of the MSE wall and hence are not provided herein. All internal stability analyses for MSE retaining walls should be performed in accordance with the ODOT specifications. Settlement analyses were not performed for the various MSE walls because the existing materials encountered by the borings are primarily granular soils or contain significant granular amount, and therefore should not have any significant long-term settlement issues.

should be  
1.3

## 5.2 MSE Wall Recommendations

Based on the soils encountered by the borings and the stability analyses that were performed, the subsurface conditions in the vicinity of Ramp B and Ramp C appear to be capable of satisfactorily supporting the proposed MSE walls. However a minimum of a 5-foot undercut is required beneath all proposed MSE walls in order to remove weaker in-situ soils. The resulting excavations should be backfilled with select granular embankment (friction angle greater than or equal to 34 degrees) to the elevation of the top of the MSE wall leveling pad. If soft or looser soils are encountered at depths of greater than 5 feet, the overexcavation may need to extend deeper. Finally, a minimum reinforcing strip length of 0.7 times the wall height is recommended in order to achieve the minimum factors of safety.

## 5.3 Embankment Recommendations

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."

Topsoil was encountered in the majority of the borings to depths of between 1 and 7 inches. The average topsoil thickness, as measured at the boring locations, was 3.5 inches. All topsoil should be removed prior to placing fill, MSE Walls, or pavement materials.

Fill and/or possible fill was encountered in several of the borings. The presence of these materials does not necessarily indicate poor subgrade conditions. However, because of the apparent uncontrolled nature of some of the fill, it should be anticipated that conditions at some locations along the proposed roadway alignments may vary considerably from those encountered by the borings, especially outside of the existing roadways.

The soils identified as possible fill did not necessarily contain deleterious material or other obvious evidence that they were fill. It is often difficult to distinguish between clean fill and natural material based solely on the appearance of the samples. The materials classified as possible fill were identified as such based on other additional information, including the topography of the site and depth below existing grade.

In addition, several of the borings encountered material classified as silt (A-4b). Where silt is encountered at proposed subgrade levels, it should be overexcavated and replaced to a depth of at least 3 feet below the surface of the proposed subgrade in accordance with the applicable sections of the ODOT-CMS Item 203. Silt is generally considered suitable for use in roadway embankments only when placed at least 3 feet below the surface of the subgrade.



Based on the findings of the borings, areas of soft, organic or otherwise unsuitable material will likely be encountered during construction. Unsuitable subgrade areas may be revealed during subgrade compaction and testing. However, they can best be identified by proof rolling. Areas which are unstable or exhibit excessive deflection or rutting during proof rolling should be overexcavated and replaced with suitable material in accordance with the ODOT-CMS Item 203.13. Overexcavations should extend to suitable material or to the depth necessary to achieve a reasonable stability can generally be achieved with overexcavation and replacement of 2 feet or less.

A global stability analysis was performed by DLZ for the earthen embankments for this project. Calculations, stability requirements (i.e. factors of safety), and material properties were based on information presented in the latest edition of the Ohio Department of Transportation (ODOT) "Bridge Design Manual" and the American Association of State Highway and Transportation Officials (AASHTO) "Standard Specifications for Highway Bridges" as well as on materials encountered in the borings. Based on the soils encountered in the borings and the stability analysis that was performed, the US 23 and SR 823 interchange site appears to be suitable for earthen embankments, provided they are constructed with side slopes of no steeper than 2.5:1 (Horizontal:Vertical). *2:1 in calculations*

#### **5.4 Excavation and Groundwater Considerations**

Based on the findings of the borings, excavations 9 feet or less should not encounter significant groundwater seepage. However, excavations deeper than 9 feet may encounter significant groundwater seepage. Consequently, the Contractor should be prepared to deal with anticipated or unexpected seepage and with any surface water, which may accumulate, in excavation. Special efforts, such as sumping and pumping or surface drainage may be needed in order to maintain dry excavations. In addition, groundwater conditions can vary seasonally and with the passage of time.

The bottom of the excavations should be kept essentially dry. Excavations extending below the water table into sand, silt, or gravel deposits can result in a "quick condition" when the confining effect of the overburden is removed. To prevent this occurrence, areas of proposed excavation may need to be dewatered and the water level maintained a minimum of 3 feet below the bottom of the proposed excavation during construction.

All excavations should be constructed in accordance with the current OSHA regulations governing excavation and trench safety standards (29 CFR Part 1926).

Heavy equipment working close to excavations and stockpiles of construction materials close to the excavations act as a surcharge weight and may result in

instability of the excavation sidewalls. In addition, vibrations from heavy equipment or trains could result in instability of the excavation sidewalls as well.

A "competent person" having knowledge relative to slope stability should constantly observe side slopes of excavations for signs of yielding and potential failure or "cave'ins".

## 6.0 CLOSING REMARKS

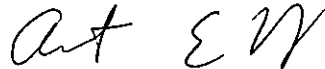
We encourage you to discuss with us any questions or concerns you have about the findings and conclusions presented in this report. Please do not hesitate to call if we can be of any further assistance.

Sincerely,

DLZ Ohio, Inc.



Jamie North  
Geotechnical Engineer



Arthur (Pete) Nix, P.E.  
Geotechnical Division Manager

Copies: Mike Weeks, TranSystems Corporation – 5  
File – 2

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**APPENDIX I**

Table of Boring Locations  
Boring Location Plan



Table of Boring Locations

Boring	As Drilled			Ramp	Type	Boring Depth (ft.)
	Northing	Easting	Elevation			
B-1101	323061.247	1827070.641	541.57	B	RDWY	10
B-1102	323332.814	1826993.771	540.78	B	RDWY	10
B-1103	323618.601	1826908.781	539.51	B	EMB	10
B-1104	324017.412	1826783.581	538.82	B	EMB	41.5
B-1105	324017.469	1826783.266	538.96	B	MSE	37
B-1106	324159.837	1826733.921	540.22	B	MSE	37.5
B-1107	324299.806	1826682.352	540.52	B	MSE	35
B-1108	324444.358	1826634.809	540.69	B	MSE	33.5
B-1109	324583.865	1826589.040	540.64	B	MSE	30
B-1110	324695.088	1826626.272	542.30	B	MSE	30
B-1111	324800.005	1826593.701	543.79	B	STR	35
B-1112	325034.315	1826688.991	560.88	B	STR	43
B-1113	325197.009	1826860.751	566.84	B	STR	49
B-1114	325260.432	1827090.824	584.14	B	STR	31.5
B-1115	325343.406	1827073.558	582.38	C	STR	29
B-1116	325386.086	1826805.402	565.84	C	STR	48
B-1117	325458.045	1826571.466	562.56	C	STR	48
B-1118	325533.090	1826443.997	546.17	C	STR	35
B-1119	325668.639	1826236.989	542.03	C	MSE	30
B-1120	325809.232	1826192.665	542.67	C	MSE	33.5
B-1121	325893.136	1826112.414	539.03	C	MSE	30
B-1122	326069.463	1826027.053	540.66	C	MSE	32.5
B-1123	326207.660	1825973.884	540.85	C	MSE	32.5
B-1124	326357.984	1825942.319	533.47	C	MSE	25
B-1125	326716.410	1825803.510	538.90	C	EMB	30
B-1126	327052.646	1825651.739	540.71	C	EMB	32.5
B-1127	327331.386	1825549.607	539.99	C	RDWY	10
B-1128	327710.700	1825399.765	540.56	C	RDWY	10
B-1129	328086.377	1825253.394	540.86	C	RDWY	10
B-1130	328394.202	1825118.313	541.42	C	RDWY	10
B-1131	327899.004	1825229.125	540.95	A	RDWY	10
B-1132	327513.460	1825367.896	540.65	A	RDWY	10
B-1133	327134.200	1825508.691	540.15	A	EMB	35
B-1134	326741.512	1825584.253	534.00	A	EMB	30

\* Northing, Easting and Elevation for Boring are "As Per Plan"

Borings ending in "A", are redrilled holes due to original holes being staked wrong

STR = Structure Boring

MSE = MSE Wall Boring

RDWY = Roadway Boring

EMB = Embankment Boring

Overpass = Mainline Overpass Over US 23



Table of Boring Locations

Boring	As Drilled			Ramp	Type	Boring Depth (ft.)
	Northing	Easting	Elevation			
B-1135	326352.347	1825512.811	533.14	A	EMB	35
B-1136	325931.815	1825360.454	524.92	A/D	EMB	32.5
B-1137	325620.882	1825310.332	524.99	A/D	EMB	31
B-1138	325422.958	1825443.598	525.33	A/D	EMB	30
B-1139	325353.958	1825678.123	529.66	A/D	EMB	35
B-1140	325340.967	1825934.726	535.83	A/D	EMB	40
B-1141	325362.944	1826517.749	556.24	Overpass	STR	43
B-1142	325293.723	1826586.346	560.39	Overpass	STR	48.5
B-1143	325327.769	1826689.992	563.20	Overpass	STR	37
B-1144	325347.233	1826785.628	565.17	Overpass	STR	26
B-1145	325285.001	1826918.911	567.30	Overpass	STR	24.5
B-1146	325329.610	1826929.736	567.69	Overpass	STR	24.5
B-1147	326057.226	1825578.667	529.70	D	EMB	33
B-1148	325941.799	1825938.520	530.24	D	EMB	25
B-1149	325581.623	1826105.077	540.44	D	RDWY	10
B-1150	325132.329	1826281.059	540.75	D	RDWY	10
B-1151	324869.302	1826393.170	541.12	D	RDWY	10
B-1152*	325413.066	1826677.035	563.00	C	STR	37
TR-46	325824.223	1826216.977	543.10	C	STR	37
TR-47	325689.987	1826278.864	543.06	C	MSE STR	36.5
TR-48	325635.827	1826379.383	546.33	C	STR	35
TR-49A	325351.073	1826116.599	538.10	Overpass	STR	35
TR-50A	325302.044	1826260.104	539.25	Overpass	STR	37.5
TR-51	325336.603	1826395.590	544.46	Overpass	STR	37.5
TR-52	325303.442	1826548.490	558.01	Overpass	STR	45
TR-53A	325447.818	1826720.590	565.34	C	STR	32.5
TR-54	325382.450	1826885.040	566.91	C	STR	25
TR-55A	325312.752	1826817.666	565.44	Overpass	STR	30
TR-56	325291.521	1826974.037	569.95	Overpass	STR	25
TR-57	325198.417	1826977.925	569.52	B	STR	25
TR-58	325195.371	1826928.980	567.12	B	STR	25
TR-59A	325126.513	1826809.594	563.91	B	STR	35
TR-60	324934.012	1826665.121	552.28	B	STR	40
TR-61	324742.822	1826622.009	543.40	B	MSE STR	35

\* Northing, Easting and Elevation for Boring are "As Per Plan"

Borings ending in "A", are redrilled holes due to original holes being staked wrong

STR = Structure Boring

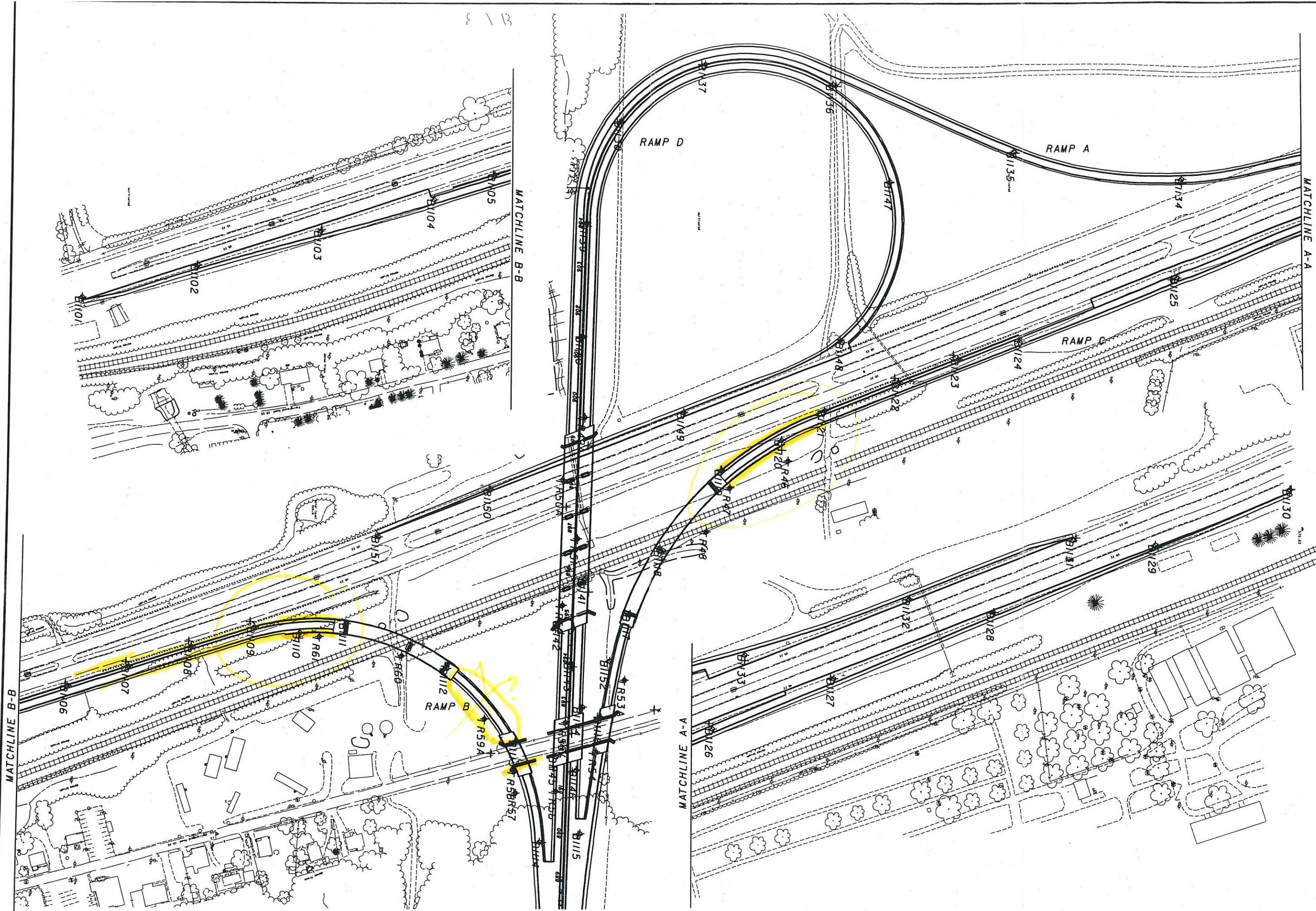
MSE = MSE Wall Boring

RDWY = Roadway Boring

EMB = Embankment Boring

Overpass = Mainline Overpass Over US 23





CALCULATED  
CHECKED

**BORING LOCATION PLAN  
PROPOSED US 23 / SR 823 INTERCHANGE**

SCI-832-0.00



## **APPENDIX II**

General Information – Drilling Procedures and Logs of Borings

Legend – Boring Log Terminology

Boring Logs – 68 Boring Logs



## 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

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

### Cohesive Soils – Consistency

<u>Term</u>	<u>Unconfined Compression tons/sq.ft.</u>	<u>Blows/Foot Standard Penetration</u>	<u>Hand Manipulation</u>
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:

<u>Description</u>	<u>Size</u>	<u>Description</u>	<u>Size</u>
Boulders	Larger than 8"	Sand – Coarse	2.0 mm to 0.42 mm
Cobbles	8" to 3"	– Fine	0.42 mm to 0.074 mm
Gravel – Coarse	3" to 3/4"	Silt	0.074 mm to 0.005 mm
– Fine	3/4" 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:

<u>Term</u>	<u>Relative Moisture or Appearance</u>
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.

<u>Term</u>	<u>Relative Moisture or Appearance</u>
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**.

<u>Term</u>	<u>Description</u>
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.

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro- meter (tsf)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	DESCRIPTION	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL   LL Blows per foot - ○			
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
0	541.6																		
1.0	540.6	24			1				Asphalt - 5" Aggregate Base - 7"										
		20	13		2				Medium dense to dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; damp to moist.										
		10																	
5		7			3														
		8	10																
		23																	
		12	16																
7.5	534.1	7			4				Stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; moist.										
		5																	
		6	16																
		6																	
10.0	531.6	5							Bottom of Boring - 10.0'										



Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	DESCRIPTION	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL   LL Blows per foot - 30 40
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	
0.4	539.5	2							Topsoil - 5"	18	17	-	15	31	19	
2.0	539.1	3	24	1			4.5+		Hard brown SILT AND CLAY (A-6a), some fine to coarse sand, little gravel; slightly organic; damp.	0	2	-	4	50	44	
5.0	537.5	6	22	2			3.0		Very stiff to hard gray SILTY CLAY (A-6b), trace fine to coarse sand; moist.							
		7	22	3			4.5+		@ 2.0', 4.0', slightly organic.							
		4	20	4					@ 4.0'-6.0', damp.							
		4							@ 7.0', stiff.							
10.0	529.5	2	18	4			1.5									
		2	18	5			1.0									
		4	18													
		4	18													
		3							Bottom of Boring - 10.0'							

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf)	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○						
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay					
0	538.8																		
0.8	538.0	7 6 8 7	24	1		4.5+	Asphalt - 6" Aggregate Base - 4" Very stiff to hard brown SILT AND CLAY (A-6a), little to some fine to coarse sand, trace gravel; damp.	4	4	--	8	51	33						
5		3 5 5 7 4	24	2		4.0		0	2	--	17	45	36						
10	528.3	3 5 4 6 1 2 1 15	22	3		3.5	@ 7.0', stiff, grayish brown, moist.	0	2	--	4	62	32						
10.5				4		1.0													
15				5		1.5													
15.5	523.3	1 1 4 17		6		3.5	Very stiff brown SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; moist.												
20		3 3 3 4 18		7		2.0													
20.5	518.3	2 4 6 18		8		4.5+	Hard brown CLAY (A-7-6), trace fine to coarse sand, trace gravel; damp.												
25		2 5 4 6 16		9		4.25													
25		1 2 3 18		10			Loose to medium dense brown GRAVEL WITH SAND (A-1-b), little clay, trace silt; wet.												
30		3 4 9 17		11															
30		10 18 17 15		12															
30		5 12 17 16		13															





LOG OF: Boring B-1105 Location: Ramp B N:324017.469, E:1826783.266 Date Drilled: 07/14/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ — 40	
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay
0	539.0						Water seepage at: 22.0' - 30.0' Water level at completion: 6' (including drill water)							
0.4	538.6	8 8	5 18	1		4.5+		Topsoil - 5"	3	3	-	8	56	30
3.0	536.0	2 5	7 13	2		4.0		Hard brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp.	1	3	-	12	46	38
5		2 2	3 18	3		1.5		Very stiff brown and gray SILT AND CLAY (A-6a), trace gravel, trace fine to coarse sand; damp.	0	2	-	6	61	31
10		1 1	1 13	4		1.75		@ 6.0', stiff; moist.						
15		1 1	1 15	5		1.0								
15.5	523.5	1 1	3 16	6		1.25								
20		4 5	7 18	7		4.25		Very stiff to hard brown and gray CLAY (A-7-6), trace gravel, trace fine to coarse sand; damp.						
20.5	518.5	2 3	5 17	8		3.5								
25		2 3	4 18	9				Loose to medium dense brown GRAVEL WITH SAND (A-1-b), little clay; wet.						
		WOH	4	10										
		5 6	15 18	11										
30		6 21	28 16	12										



Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp B N:324159.837, E:1826733.921

Date Drilled: 07/14/05

**LOG OF: Boring B-1106**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL	
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay
0.3	540.2							Water seepage at: 22.5' - 31.0'	Topsoil - 4"	0	0	0	2	61	37	
5	539.9	6 7	14	1			4.5+		Hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp to moist.	1	2	0	6	60	31	
5.5	534.7	4 6	18	2			4.5+		Very stiff gray SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; moist.	0	1	0	4	59	36	
10		2 5	16	3			3.75									
15		4 4	17	4			3.5									
15.5	524.7	2 2	13	5			2.0		@ 11.0', stiff, little gravel.							
20		1 2	16	6			1.0									
23.0	517.2	3 4	18	7			4.5+		Very stiff to hard brown CLAY (A-7-6), trace gravel, trace fine to coarse sand; damp.							
25		4 6	18	8			3.5									
		2 3	17	9			2.5									
		1 1	13	10					Loose brown COARSE AND FINE SAND (A-3a), little gravel, trace clay; wet.							
		4 3	16	11					@ 26.0'-27.5', little clay.							
		2 2	18	12												



Client: TranSystems, Inc.

Project: SCI-823-0.00

**LOG OF: Boring B-1107**

Location: Ramp B N:324299.806, E:1826682.352

Date Drilled: 07/20/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf)	DESCRIPTION	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL  -----  LL Blows per foot - 10 20 30 40
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	
0	540.5						Asphalt - 4" Aggregate Base - 8"	27	24	--	20	18	11	
1.0	539.5	5	7	6	10	3.5	Medium dense dark brown GRAVEL WITH SAND AND SILT (A-2-4), little clay; damp.							
3.0	537.5	4	5	6	11	4.5+	Hard brown SILT (A-4b), trace fine to coarse sand, trace gravel; damp to moist.	3	1	--	5	57	34	
5.5	535.0	4	5	4	14	3.0	Very stiff gray SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp to moist.	8	5	--	12	42	33	
10	530.0	3	4	4	12	2.5								
10.5		2	2	3	14	1.5	Stiff to very stiff brown and gray CLAY (A-7-6), trace fine to coarse sand; moist.							
15		1	3	4	14	3.0								
20		1	3	3	16	2.5								
20		3	4	5	13	2.5								
23.0	517.5	2	2	3	17	1.25	Loose brown COARSE AND FINE SAND (A-3a), little gravel, trace clay; wet.	0	2	--	5	38	55	
25		WOH	1	1	15									
28.0	512.5	2	4	5	10		Medium dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; moist.	9	70	--	14	7		
30		10	11	19	18									





Client: TransSystems, Inc.

Project: SCI-823-0.00

Location: Ramp B N:324444.358, E:1826634.809 Date Drilled: 07/21/05

**LOG OF: Boring B-1108**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	DESCRIPTION	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - 0 10 20 30 40			
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
0	540.7							Asphalt - 4" Aggregate Base - 8"										
1.0	539.7	3	12	1	1	1.5		FILL: Stiff dark brown SANDY SILT (A-4a), little clay, little gravel; damp to moist.	10	18	28	31	13					
3.0	537.7	3	10	2	2	3.0		FILL: Very stiff dark brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp to moist.	6	4	8	43	39					
5.5	535.2	2	16	3	3	-		FILL: Stiff to very stiff gray SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; slightly organic; moist.	10	4	8	51	27					
8.0	532.7	3	13	4	4	4.5+		Hard brown and gray SILTY CLAY (A-6b), trace to little fine to coarse sand, trace gravel; moist.	7	6	10	44	33					
10		2	14	5	5	1.0		@ 11.0', stiff.	3	0	1	59	37					
15		2	16	6	6	1.5												
18.0	522.7	1	15	7	7	1.75												
20		2	15	8	8	1.0		Stiff brown CLAY (A-7-6), trace gravel, trace fine to coarse sand; moist.										
23.0	517.7	1	18	9	9	1.5												
25		WOH	15	10	10			Very loose to loose gray COARSE AND FINE SAND (A-3a), little gravel, trace clay; wet.	2	0	1	25	72					
26.5	514.2	6	9	11	11			Soft to medium hard black SHALE; fine grained, slightly to moderately weathered, carbonaceous, thinly laminated.										
28.5	512.2							Hard gray SANDSTONE interbedded with SILTSTONE; fine grained, slightly weathered, argillaceous, micaceous, medium										



**LOG OF: Boring B-1109**

Location: Ramp B N:324583.865, E:1826589.04

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL   Blows per foot - LL	
								% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay
0	540.6						Asphalt - 4" Aggregate Base - 8"							
1.0	539.6	3		1	1.5	Water seepage at: 19.0' - 22.0' Water level at completion: 8.0' (Including drill water)	FILL: Stiff dark brown SILT AND CLAY (A-6a), some fine to coarse sand, trace gravel; moist.	7	10	-	11	48	24	
3.0	537.6	2	12	2	2.0		FILL: Stiff dark brown SANDY SILT (A-4a), some gravel, little clay; contains wood fragments; damp.	22	15	-	12	32	19	
5		4	5	3	3.5		POSSIBLE FILL: Very stiff to hard grayish brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; slightly organic; moist.	1	3	-	7	51	38	
5.5	535.1	3	5	4	4.25		Medium stiff brown SANDY SILT (A-4a), some gravel, little clay; moist.	1	4	-	11	47	37	
10		2	3	5			Stiff gray CLAY (A-7-6), trace fine to coarse sand, trace gravel; moist to wet.	33	17	-	14	24	12	
10.5	530.1	1	4	6	1.5		Very loose brown SANDY SILT (A-4a), little clay, trace gravel; wet.	1	3	-	7	35	54	
13.0	527.6	1	2	7	2.0		Soft black SHALE; very fine grained, slightly to moderately weathered, carbonaceous, thinly laminated, highly fractured. @ 28.3'-30.0', gray calcareous sandstone. @ 28.0'-28.1'; 28.3'-28.6', high angle fractures.	3	12	-	32	39	14	
15		1	1	8				0	1	-	52	47		
18.0	522.6	1	1	9										
20		1	2	10										
23.5	517.1	10	9											
25		50/5												
30.0	510.6	Core 60"	Rec 60"	RQD 77%			Bottom of Boring - 30.0'							

Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp B N:324695.088, E:1826626.272 Date Drilled: 07/14/05

**LOG OF: Boring B-1110**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: 12.0' - 25.0' Water level at completion: 5.0' (including drill water)	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL  -----  LL Blows per foot - 10 20 30 40			
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay		
0	542.3							Topsoil - 6"									
0.5	541.8	6	8	1			4.5+	Hard brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp.	1	4	-	11	57	27			
3.0	539.3	6	5	2			3.5	Very stiff brown SILT (A-4b), some clay, little fine to coarse sand; damp.	0	7	-	11	60	22			
5	536.8	2	3	3			4.0	Very stiff brown SILT AND CLAY (A-6a), "and" fine to coarse sand, trace gravel; moist.	3	15	-	25	28	29			
10		1	4	4			2.5										
		2	2	2			2.0										
13.0	529.3	1	1	6				Very loose brown COARSE AND FINE SAND (A-3a), little clay, little gravel; wet.									
15		1	1	10													
18.0	524.3	2	1	2				Loose to medium dense brown GRAVEL WITH SAND (A-1-b), little silt; wet.									
20		9	6	7													
23.0	519.3	50/5	7					Soft to medium hard black SHALE; fine grained, slightly to moderately weathered, carbonaceous, thinly laminated, moderately fractured.									
25								Medium hard black CLAYSTONE; very fine grained, unweathered, carbonaceous, thinly laminated, highly fractured. @ 27.8'-28.0', 29.3'-29.5', high angle fractures.									
25.6	516.7																
30.0	512.3							Bottom of Boring - 30.0'									

Client: TranSystems, Inc.

**LOG OF: Boring B-111**

Location: Ramp B N:324800.005, E:1826593.701

Date Drilled: 11/2/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: 10.0'-22.5' Water level at completion: 8.0' (includes drilling water)	DESCRIPTION	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ ——— 40				
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
0.3	543.8							Topsoil - 3"											
5.5	543.5	3	13	1	1	2.5		FILL: Very stiff to hard brown SANDY SILT (A-4a), little clay, trace gravel; damp.											
5.5	538.3	4	10	2	2	4.5+		Hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; moist.											
10.5	533.3	2	12	3	3	4.25		@ 8.5', some gravel, some fine to coarse sand.											
13.0	530.8	2	12	4	4	2.0		Loose brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); wet.											
15		WOH	16	5	5			Very loose brown COARSE AND FINE SAND (A-3a), little clay, little gravel; wet.											
20.5	523.3	WOH	18	6	6			Loose brown GRAVEL WITH SAND AND SILT (A-2-4), little clay; wet.											
20.5		WOH	11	7	7			Medium hard to hard black CLAYSTONE; very fine grained, slightly to moderately weathered, argillaceous, micaceous, thickly bedded, moderately fractured; contains turbidity.											
20.5		WOH	11	8	8			@ 25.0'-25.4', broken zone.											
20.5		WOH	11	9	9			@ 26.4', 26.5', 27.2', low angle fracture.											
23.0	520.8	2	12	10	10														
25		50/4	2																
30																			



**LOG OF: Boring B-1112**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ ——— 40		
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay	
0.3	560.9							Water seepage at: 26.0'-30.0'	Topsoil - 3"								
3.0	560.6	3 3 4 9		1			4.0	Water level at completion: 6.6' (includes drilling water)	FILL: Very stiff brown SILT AND CLAY (A-6a), little gravel, trace fine to coarse sand; moist.								
5.5	557.9	5 5 6 18		2					FILL: Medium dense brown and dark gray SANDY SILT (A-4a), trace clay, trace gravel; damp.								
5.5	555.4	5 7 7 15		3					POSSIBLE FILL: Medium dense brown COARSE AND FINE SAND (A-3a), trace to little gravel; dry.								
10		13 14 14 10		4													
15		4 10 11 11		5													
15		8 8 6 9		6													
20		3 3 4 17		7													
20		5 8 8 6		8													
23.0	537.9	5 6 6 13		9													
25		9 11 15 1		10													
25		3 5 6 14		11													
30		6 25 15 11		12													
										26	39	--	19	13	3		

@ 16.0', little silt, little clay; damp to moist.

POSSIBLE FILL: Medium dense to dense brown GRAVEL WITH SAND (A-1-b), little silt, trace clay; wet.

Non-Plastic





Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp B N:325197.009, E:1826860.751

Date Drilled: 9/28/05

LOG OF: Boring B-113

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: 15' Water level at completion: None	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ —●—						
								% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay					
0.4	566.8																		
5.5	566.4	8	8	13	3.5		Topsoil - 5" Very stiff dark brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; contains roots; damp.	1	3	—	11	52	33						
10	561.3	4	3	4	4.0		Very stiff brown and gray SILTY CLAY (A-6b), little fine to coarse sand, trace to little gravel; moist.	0	1	—	12	47	40						
15.5	551.3	3	4	6	4.0		@ 8.5', "and" fine to coarse sand.	15	15	—	28	23	19						
18.0	548.8	5	4	7	1.5		Very loose brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); wet.	18	37	—	25	8	12						
20		2	1	2	1.5		Soft to medium hard gray SHALE; very fine grained, highly weathered to decomposed, micaceous.												
25		2	1	1	1.0														
30		2	1	1															









Client: TranSystems, Inc.

Project: SCI-823-0.00

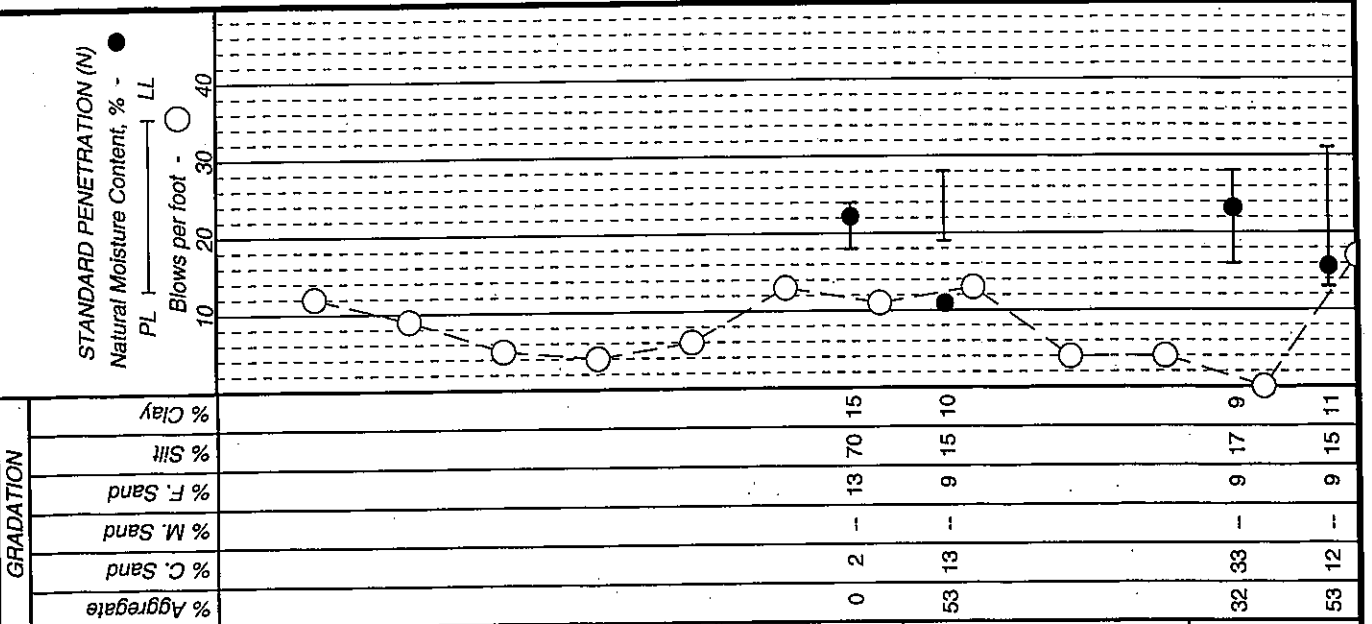
LOG OF: Boring B-1116 Location: Ramp C N:325386.086, E:1826805.402 Date Drilled: 9/27/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS: Water seepage at: 16.0' Water level at completion: 48.0' (includes drilling water)	DESCRIPTION	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL Natural Moisture Content, % - LL Blows per foot - 10 20 30 40		
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay			
0.3	565.8								Topsoil - 4"									
0.3	565.5	18			1				Dense grayish brown SANDY SILT (A-4a), trace clay; possible boulder; dry.									
3.0		21	9		2				Medium dense brown SANDY SILT (A-4a), some clay; damp.									
5.0		26	8		3													
8.0		8	13		4				Medium dense reddish brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); damp to moist.									
10.0	557.8	9	13		5				@ 11.0', moist to wet.									
15.0		10	13		6				@ 14.0', wet.									
18.0		11	13		7													
20.0		12	9		8													
25.0		50/3	4		9													
30.0		50/4	4		10													
30.0		50/4	4		11													
30.0		50/4	4		12													



**LOG OF: Boring B-1117**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS: Water seepage at: 26.0' Water level at completion: 35.0' (includes drilling water)	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - 10 20 30 40									
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay								
0	562.6																							
5.5	557.1	3	6	6	1				POSSIBLE FILL: Medium dense brown and gray SANDY SILT (A-4a), little coarse gravel, trace clay; damp. @ 0.0'-2.5', contains roots.															
10		3	4	5	2																			
15.5	547.1	4	2	3	3				POSSIBLE FILL: Medium stiff gray SILTY CLAY (A-6b), little gravel; contains organic material and sandstone fragments; moist.															
18.0	544.6	2	2	4	4																			
20		2	2	4	5																			
25.5	537.1	2	4	9	5				Very stiff brown SILT (A-4b), little clay; contains coarse sand seams; wet.															
25.5	537.1	5	6	5	12		3.0																	
25.5	537.1	5	6	7	12																			
25.5	537.1	3	2	2	8				Medium stiff brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; moist.															
25.5	537.1	2	2	2	12																			
25.5	537.1	1	WOH	WOH	12				@ 21.0', wet.															
25.5	537.1	2	2	2	12																			
25.5	537.1	6	8	9	6				Very loose brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); wet.															
30		6	8	9	6																			

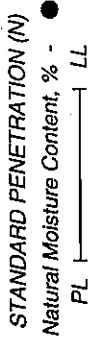




**LOG OF: Boring B-1117**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION							
							% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay		
30.0	532.6	4				Water seepage at: 26.0' Water level at completion: 35.0' (includes drilling water)								
33.0	529.6	50/4	6	13	0.5	Medium stiff gray SILT (A-4b), little fine to coarse sand, trace to little clay; wet.								
35		50/3	4	14		Soft black SHALE; very fine grained, slightly weathered, carbonaceous, thickly bedded, moderately fractured.								
40		50/3		15										
45		50/3		16										
48.0	514.6	Core 60"	Rec 60"	RQD 28%										
50														
55														
60														

Bottom of Boring - 48.0'



Client: TransSystems, Inc. Project: SCI-823-0.00

LOG OF: Boring B-1118 Location: Ramp C N:325533.09, E:1826443.997 Date Drilled: 10/18/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: 11.8'-20.5' Water level at completion: 15.6' (includes drilling water)	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL   LL Blows per foot - ○ 40					
								% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay				
0	546.2																	
1		1		1		0.75	Medium stiff to stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; moist.	1	2	-	5	62	30					
2		2	18			1.5												
3		3	18			2.5		Very stiff brown CLAY (A-7-6), trace fine to coarse sand; moist.	0	0	-	2	31	67				
4		4	18			2.0												
5		5	18				Medium dense brown GRAVEL WITH SAND AND SILT (A-2-4), little clay; wet.	41	16	-	9	24	10					
6		6	18			0.25												
7		7	13					Medium dense brown GRAVEL WITH SAND (A-1-b), little silt, trace clay; wet.	55	12	-	10	18	5				
8		8	13															
9		9	10				Medium hard black SHALE; very fine grained, slightly weathered, carbonaceous, thickly bedded, highly fractured.											
10		10	10															
11		11	10															
12		12	10															
13		13	10															
14		14	10															
15		15	10															
16		16	10															
17		17	10															
18		18	10															
19		19	10															
20		20	10															
21		21	10															
22		22	10															
23		23	10															
24		24	10															
25		25	10															
26		26	10															
27		27	10															
28		28	10															
29		29	10															
30		30	10															

@ 28.9' to 29.1' is a broken zone.

RQD R1  
78%

Core Rec  
120" 120"



Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp C N:325668.639, E:1826236.989

Date Drilled: 7/18/05

**LOG OF: Boring B-1119**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetro-meter (tsf)	WATER OBSERVATIONS:	GRADATION	STANDARD PENETRATION (N)
0.3	542.0					Water seepage at: 10.0'-25.0'		
	541.7					Water level at completion: 5.0' (including drill water)		
3.0	539.0	6	7	1	3.0	Topsoil - 4"		
		6	5			Very stiff brown SANDY SILT (A-4a), little clay, trace gravel; possible organic; damp.		
5		4	12	2	4.5+	Very stiff to hard brown CLAY (A-7-6), trace fine to coarse sand, trace gravel; damp.		
		5	7					
8.0	534.0	4	12	3	2.0	@ 6.0', some fine to coarse sand; moist.	9	11
		4	5					
10		3	10	4		Loose to medium dense brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; wet.	46	18
		3	3					
13.0	529.0	1	8	5		Very loose to loose brown GRAVEL WITH SAND (A-1-b), little clay; wet.	9	18
		1	1					
15		1	14	6				
		1	2					
18.0	524.0	2	12	7		Medium dense brown GRAVEL WITH SAND AND SILT (A-2-4), little clay; contains sandstone fragments; wet.	12	47
		2	4					
20.5	521.5	5	13	8		Medium dense to dense brown COARSE AND FINE SAND (A-3a), little clay; contains sandstone fragments; moist.	36	22
		5	8					
25.0	517.0	4	12	9		Very hard gray SANDSTONE interbedded with SHALE; fine to medium grained, moderately weathered, micaceous, thinly bedded to medium bedded, highly fractured, iron-staining @ 28.7'-28.9', high angle fractures.	6	18
		4	5					
		5	17					
		7	14	10				
		7	19					
30.0	512.0					Bottom of Boring - 30.0'		

Client: TransSystems, Inc.

Project: SCI-823-0.00

Location: Ramp C N:325809.232, E:1826192.665

Date Drilled: 7/18/05

**LOG OF: Boring B-1120**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Blows per foot -	Natural Moisture Content, % - PL LL	
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt			% Clay
0.4	542.7							Topsoil - 5"								
5.9	542.3	3 5 7	9	1	1	4.5+	Water seepage at: 11.0'-19.0' Water level at completion: 5.0' (including drill water)	Very stiff to hard brown CLAY (A-7-6), trace fine to coarse sand; damp.	0	1	2	44	53			
5.9	537.2	3 6 7	15	2	2	3.25		Very stiff brown SILTY CLAY (A-6b); "and" fine to coarse sand, little gravel; moist to wet.	0	0	2	49	49			
10.5	532.2	2 5 4	12	3	3	2.5		@ 8.5', Medium stiff.	16	30	20	14	20			
15.0		1 2 4	8	4	4	0.75		Loose brown GRAVEL WITH SAND (A-1-b), some clay; wet.								
20.0		3 3 2	6	5	5											
20.0		1 1 1	8	6	6											
20.0		8 7 6	7	7	7											
23.0	519.7	7 29 10	6	8	8			Medium dense brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); contains sandstone fragments; moist.								
23.0		14 22 18	6	9	9											
25.0		10 12 9	14	10	10			Hard gray SANDSTONE interbedded with SHALE; fine grained, slightly weathered, micaceous, argillaceous, medium bedded, highly fractured.								
26.0	516.7	50/5	6	11	11											



Client: TranSystems, Inc.

Project: SCI-823-0.00

Date Drilled: 7/19/05

Location: Ramp C N:325893.136, E:1826112.414

LOG OF: Boring B-1121

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ — 40			
								% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay		
0.3	539.0						Topsoil - 4"									
3.5	538.7	3	4	5	13		FILL: Hard dark brown SILTY CLAY (A-6b), little fine to coarse sand, little gravel; damp.	16	9	7	38	30				
5	535.5	3	4	5	8		FILL: Medium stiff brown SANDY SILT (A-4a), some clay, trace gravel; wet.	7	16	24	31	22				
5.5	533.5	3	4	3	13		Medium stiff gray SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; moist. @ 6.0'-7.5', organic staining.	2	4	6	57	31				
10		2	2	2	16		@ 11.0', some sand.									
13.0	526.0						Loose to medium dense brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); moist to wet.									
15		2	1	1	10											
18.0	521.0						Medium dense brown COARSE AND FINE SAND (A-3a), some clay, trace gravel; wet.									
20		4	9	9	9											
21.5	517.5						Soft to medium hard gray SANDSTONE; fine grained, highly weathered, micaceous, argillaceous.									
24.0	515.0						Very hard gray SANDSTONE interbedded with SILTSTONE; fine grained, slightly weathered, micaceous, argillaceous, medium bedded, slightly fractured. @ 25.3'-25.4', 26.3'-26.4', 29.1'-29.5', shale. @ 29.7'-30.0', calcareous sandstone.									
30.0	509.0						Bottom of Boring - 30.0'									

Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp C N:326069.463, E:1826027.053

Date Drilled: 7/19/05

**LOG OF: Boring B-1122**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL ○ Blows per foot - ———		
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay	
0	540.7							Water seepage at: 16.0'-22.0' Water level at completion: 10.5' (including drill water)	Asphalt - 8" Aggregate Base - 4"								
1.0	539.7	5	9	1			2.0		FILL: Stiff brown SANDY SILT (A-4a), little clay, little gravel; damp to moist.	16	19	—	22	28	15		
3.0	537.7	5	14	2			4.5+		Hard brown and gray SILTY CLAY (A-6b), trace fine to coarse sand; moist.	0	1	—	4	56	39		
5		5	7	3			4.0		Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, little gravel; contains sand seams; moist.	13	11	—	8	44	24		
6.0	534.7	5	12	4					Medium dense brown COARSE AND FINE SAND (A-3a), little gravel, trace clay; damp to moist.								
8.0	532.7	10	9	5					Very stiff brown SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; moist.								
10		5	4	6					@ 13.0', Medium stiff; wet.								
10.5	530.2	3	2	7			3.0										
15		2	3	8			1.0										
20		1	1	9													
20.5	520.2	WOH	3	10			0.5		Dense brown and gray GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); contains sandstone fragments; moist.								
25		13	15	11													
26.5	514.2	18	18	12					Medium hard to hard gray SANDSTONE interbedded with SILTSTONE; fine grained, moderately weathered, micaceous, argillaceous, thinly bedded to medium bedded, slightly fractured, iron-staining.								
30		22	50/3	13													
		Core 60"	Rec 54"	RQD 65%													





Project: SCI-823-0.00

Date Drilled: 7/19/05

Cifent: TranSystems, Inc.

Location: Ramp C N:326207.66, E:1825973.884

**LOG OF: Boring B-1123**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS: Water seepage at: 19.0'-20.0' Water level at completion: 12.5' (including drill water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - 10 20 30 40	
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay		
0	540.9								25	12	--	13	34	16		
1.0	539.9	4	9	1			2.5	Asphalt - 6" Aggregate Base - 6"	7	6	--	4	45	38		
3.0	537.9	2	10	2			4.5+	FILL: Very stiff gray SANDY SILT (A-4a), some gravel, little clay; damp.	4	8	--	8	47	33		
5		5	15	3			3.0	FILL: Hard brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.								
10		3	9	4			3.5	@ 6.0', gray, organic staining and odor, contains sand seams.								
13.0	527.9	3	13	5			2.5									
15		2	9	6			2.0	Stiff brown and gray SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; moist to wet.								
20		1	14	7			1.0									
20.5	520.4	2	10	8			1.0	Hard brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); damp.								
25		5	6	9			4.5+									
27.0	513.9	10	13	10			4.5+	Hard gray SANDSTONE interbedded with SILTSTONE; fine grained, moderately weathered, micaceous, argillaceous, medium bedded, moderately fractured, iron-staining.								
30		8	8	11			4.5+									
		46	50/3													
		Core 60"	Rec 50"													
				RQD 42%												



Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp C N:326357.984, E:1825942.319 Date Drilled: 7/19/05

**LOG OF: Boring B-1124**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Dive	Press / Core	Hand Penetrometer (isf)	WATER OBSERVATIONS: Water seepage at: 11.0'-16.0' Water level at completion: 14.0' (including drill water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ 40						
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay							
0.3	533.5																				
3.0	533.2	WOH 1 1	16	1	1		1.0	Topsoil - 4" FILL: Stiff gray SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; contains roots; organic odor; moist to wet.	1	5	--	11	59	24							
5.5	530.5	1 1	12	2	2		1.75	FILL: Stiff gray CLAY (A-7-6), trace fine to coarse sand; moist.	0	1	--	8	48	43							
10.5	528.0	2 2	12	3	2		1.5	Stiff brown SILTY CLAY (A-6b), trace fine to coarse sand; moist to wet.	0	0	--	7	52	41							
15.0	523.0	2 1	12	4	2		0.25	@ 8.5', very soft, some sand seems.													
19.5	514.0	WOH WOH	8	5	1		0.0	Very soft brown SANDY SILT (A-4a), little clay, trace gravel; wet.	1	1	--	36	44	18							
20.0		8 40	8	6	30			@ 13.5', some gravel; moist.													
20.5		8 10	8	7	15			@ 18.0', gray; wet.													
21.0		46 18	8	8	50/4			Hard gray SANDSTONE interbedded with SILTSTONE; fine grained, moderately weathered, micaceous, medium bedded, slightly fractured, iron-staining.													
25.0	508.5	Core 60"	48*	RQD 70%	R-1			@ 22.1'-22.5'; 23.1'-23.2', high angle fractures.	27	14	--	18	30	11							
30.0								Bottom of Boring - 25.0'													

Client: TransSystems, Inc.		Project: SCI-823-0.00		Job No. 0121-3070.03									
LOG OF Boring B-1125		Location: Ramp C N:326716.41, E:1825803.51		Date Drilled: 7/19/05									
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (ft)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ —○— 40	
							% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay
0.3	538.9	2	5	1	4.5+	Topsoil - 4"	8	14	-	11	49	18	
0.3 - 4.0	538.6	5, 6, 7, 8	18	2	4.5+	FILL: Hard brown SANDY SILT (A-4a), trace gravel, little clay; damp.	1	8	-	9	53	29	
4.0 - 5.0	534.9	4, 3, 4, 4	17	3	2.0	Stiff brown SILT AND CLAY (A-6a), trace gravel, little fine to coarse sand; moist.							
5.0 - 6.0	530.9	2, 3, 3	16	4	1.5	Very stiff brown SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; moist.							
6.0 - 10.0	523.4	2, 3, 4	18	5	2.5	@ 13.5'; "and" sand; wet.							
10.0 - 15.5	523.4	3, 3, 4	16	6	2.25	Very loose brown GRAVEL WITH SAND (A-1-b), some silt, little clay; wet.							
15.5 - 20.0	515.9	2, 2, 2	12	7	-								
20.0 - 23.0	515.9	1, 1, 2	10	8									
23.0 - 25.0	513.9	WOH 2, 2	3	9									
25.0 - 30.0	508.9	WOH 2, 2	18	10									
		8, 25, 50	52	11		Very dense brown SANDY SILT (A-4a), trace gravel, trace clay; moist.							
		Core 60"	52	RQD R-1 48%		Hard gray SANDSTONE interbedded with SILTSTONE; fine grained, slightly weathered, micaceous, argillaceous, medium bedded, moderately fractured, iron-staining. @ 25.2'-25.7', 26.2'-26.6', 27.5'-27.8', broken. @ 26.6'-26.7', 28.5'-28.6', high angle fractures. Bottom of Boring - 30.0'							

Client: TranSystems, Inc. Project: SCI-823-0.00 Location: Ramp C N:327052.646, E:1825651.739 Date Drilled: 7/20/05

**LOG OF: Boring B-1126**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL Blows per foot - LL	
							% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay
0	540.7												
0.9	539.8	5		1	4.5+	Asphalt - 3" Aggregate Base - 8"	0	1	-	2	62	35	
3.0	537.7	16		2	4.5+	Hard brown SILTY CLAY (A-6b), trace fine to coarse sand; damp.	8	13	-	10	37	32	
5		17		3	3.0	Very stiff to hard brown SILT AND CLAY (A-6a), some fine to coarse sand, trace gravel; damp to moist.	0	1	-	11	42	46	
		14		4	2.5	@ 5.0'-7.0', contains sand seems.							
		5		5	3.5	@ 5.0', gray and brown.							
		13		6	0.25	@ 8.5', little fine to coarse sand.	0	1	-	15	58	26	
10	530.2					Very soft brown SILT (A-4b), some clay, little fine to coarse sand; wet.	0	1	-	15	58	26	
15		15		7	0.5								
15.5	525.2					Medium stiff brown SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; moist to wet.							
		13		8	0.75								
		18		9	1.0								
20		16		10	0.0	Very soft brown SANDY SILT (A-4a), little clay; wet.	0	12	-	48	29	11	
20.5	520.2												
		17		11									
23	517.7					Dense brown and gray GRAVEL WITH SAND (A-1-b), trace clay; wet.	5	69	-	20		6	
		18		12									
25		11				Hard to very hard gray SANDSTONE; fine grained, moderately weathered, micaceous, argillaceous, thinly bedded to medium bedded, slightly fractured, iron-staining.							
26.5	514.2												
30		53"											



Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp C N:327331.386, E:1825549.607 Date Drilled: 7/13/05

LOG OF: Boring B-1127

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○					
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay				
0.3	540.0	2																	
	539.7	3																	
		3	20	1		3.75		Topsail - 4"											
		7						Very stiff to hard brown SANDY SILT (A-4a), some clay, trace gravel; damp.											
		6		2		4.5+													
		5	22																
		7																	
5		5		3		4.5+													
		16																	
		16	21					Hard dark brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; damp.											
6.0	534.0	2		4		4.5+													
		5																	
		8	17																
		5																	
		6																	
8.0	532.0	5		5		3.0		Very stiff brown SILTY CLAY (A-6b), trace fine to coarse sand; moist.											
		6																	
		7	18																
10.0	530.0							Bottom of Boring - 10.0'											



Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp C N:327710.7, E:1825399.765

Date Drilled: 7/13/05

**LOG OF: Boring B-1128**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - 10 20 30 40			
				Drive	Press / Core				% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay		
0	540.6							Asphalt - 8" Aggregate Base - 4"									
1.0	539.6	8				4.5+		Hard brown SILT AND CLAY (A-6a), trace gravel, trace fine to coarse sand; damp.	8	2	-	2	55	33			
3.0	537.6	3	7	19				Medium dense brown GRAVEL WITH SAND (A-1-b), little silt, trace clay; damp.	41	23	-	14	17	5			
5.0	535.6	8	9	17		4.5+		Hard brown SILT AND CLAY (A-6a), trace gravel, trace fine to coarse sand; damp.									
7.0	533.6	2	4	16		4.5+		Hard gray SILTY CLAY (A-6b), trace fine to coarse sand; damp.									
10.0	530.6	4	4	18		4.25		@ 8.5', brown.									
15																	
20																	
25																	
30																	

Bottom of Boring - 10.0'

Client: TranSystems, Inc.

Project: SCI-823-0.00

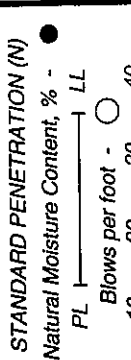
**LOG OF: Boring B-1129**

Location: Ramp C N:328086.377, E:1825253.394

Date Drilled: 7/13/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	DESCRIPTION
0.8	540.1	6	20	1			4.5+	Asphalt - 6" Aggregate Base - 4"	
3.0	537.9	7	22	2				Hard black SILT (A-4b), some clay, trace gravel, trace fine to coarse sand; organic; damp.	
5		10	21	3				Medium dense brown COARSE AND FINE SAND (A-3a), little gravel, little silt, trace clay; damp.	
		15		4				@ 8.5', contains sandstone fragments.	
		14	20	5					
10.0	530.9	18	18					Bottom of Boring - 10.0'	

GRADATION				
% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt
6	2	-	5	55
17	32	-	26	17
				8









Client: TranSystems, Inc.

LOG OF: Boring B-1133

Location: Ramp A N:327134.2, E:1825508.691

Date Drilled: 7/20/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Hand Penetro-meter (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ ——— 40								
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay							
0	540.2																					
0.4	539.8	2																				
2.0	538.2	6	7	16	1	2.75	Topsoil - 5" Very stiff brown SANDY SILT (A-4a), some clay, little gravel; moist.															
		7	7	14	2	4.5+	Hard brown SILT AND CLAY (A-6a), some fine to coarse sand, little gravel; damp.															
5		5	6	12	3	4.0	@ 6.0'-7.5', very stiff, gray, organic staining.															
		4	5	16	4	3.5																
		5	5	15	5	4.0																
10		3	5	14	6		Very loose brown SANDY SILT (A-4a), some clay, little gravel; wet.															
10.5	529.7	1	1	13	7		@ 13.5'-15.0', "and" gravel.															
15		WOH	1	17	8																	
		WOH	WOH	WOH	9																	
		WOH	WOH	WOH	10																	
		WOH	WOH	WOH	11																	
		WOH	WOH	WOH	12																	
18.0	522.2	1	4	15	13	0.25	Very soft gray SILTY CLAY (A-6b), trace fine to coarse sand; wet.															
20		1	9	15	14	0.5																
		1	4	15	15																	
25.5	514.7	1	4	15	16	0.25	Loose gray COARSE AND FINE SAND (A-3a), little gravel; wet.															
28.0	512.2	7	11	50/4	17		Medium dense brown and gray GRAVEL WITH SAND AND SILT (A-2-4), little clay; contains sandstone fragments; wet.															
29.5	510.7				18																	



Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp A N:326741.512, E:1825584.253

Date Drilled: 7/27/05

**LOG OF: Boring B-1134**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - 10 20 30 40	
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay
0.3	534.0	3		1		4.5+	Water seepage at: 14.0'-19.0' Water level at completion: 11.0' (Including drill water)							
2.0	532.0	4	15	2		4.5+	Topsoil - 4" Hard dark brown SANDY SILT (A-4a), little clay, damp.							
4.0	530.0	6	16	3		1.5	Hard brown SILT AND CLAY (A-6a), trace fine to coarse sand; damp.							
5		2	18	4		0.25	Stiff brown SANDY SILT (A-4a), some clay, trace gravel; moist. @ 6.0', soft; wet.							
10		WOH 2	18	5		0.5								
13.0	521.0	WOH 2	17	6		1.0								
15		WOH 1	16	7			Loose brown COARSE AND FINE SAND (A-3a), trace clay, trace gravel; wet.							
19.0	515.0	2 6 9	15	8										
20		28 50/4	10	9										
24.0	510.0	10 12 21	12	10			Dense brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); contains sandstone fragments; moist to wet.							
25		18 50/5	8	11										
30.0	504.0			R-1 35%			Medium hard gray SANDSTONE interbedded with SILTSTONE; fine grained, moderately weathered, micaceous, argillaceous, thinly bedded to medium bedded, moderately fractured. @ 25.4'-26.3', 28.1'-28.4', 28.9'-29.2', interbedded shale. @ 29.8', high angle fractures.							
							Bottom of Boring - 30.0'							





Client: TranSystems, Inc.

Project: SCI-823-0.00

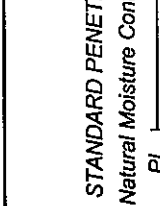
Date Drilled: 7/28/05

Location: Ramp A N:326352.347, E:1825512.811

LOG OF: Boring B-1135

Depth (ft)	Elev. (ft)	Blows per ft	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ ——— 40			
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay		
0.4	533.1							Water seepage at: 11.0'-16.0' and 29.0'										
5	532.7	4	5	4	12		4.5+	Water level at completion: 6.0' (including drill water)	Topsoil - 5"									
6.5	526.6	1	2	3	8		4.5+		Hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp.									
10	522.6	3	6	5	10				Loose to medium dense brown COARSE AND FINE SAND (A-3a), little gravel, trace clay; moist.									
15		4	6	8	11				Loose to medium dense brown GRAVEL WITH SAND (A-1-b), little clay, little silt; moist to wet.									
18.0	515.1	6	10	6	12				Stiff brown and gray SILTY CLAY (A-6b), trace fine to coarse sand; wet.									
20		3	3	3	11		1.5											
25		1	4	5	15		2.0											
28.5	504.6	2	2	2	16		1.25											
29.0	504.1	WOH	WOH	WOH	4		0.5											
30		50/6	6															

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro- meter (tsf)	WATER OBSERVATIONS:	GRADATION										
				Drive	Press /Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
30	503.1						Water seepage at: 11.0'-16.0' and 29.0' Water level at completion: 6.0' (including drill water)											
35.0	498.1	Core 60"	Rec 30"	RQD 58%	R-1		Hard gray SANDSTONE interbedded with SILTSTONE; very fine to fine grained, slightly weathered, micaceous, argillaceous, thinly bedded to thickly bedded, slightly fractured. @ 30.4'-30.7', 32.5'-32.8', interbedded with shale.											
							Bottom of Boring - 35.0'											



Client: TranSystems, Inc. Project: SCI-823-0.00

LOG OF: Boring B-1136 Location: Ramps A & D N:325931.815, E:1825360.454 Date Drilled: 7/26/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot — ○ — 40						
								% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay					
0.3	524.9						Water seepage at: 15.0'-21.0'												
5.5	519.4						Water level at completion: 11.5' (including drill water)												
10.5	514.4																		
15.5	509.4																		
20.5	504.4																		
25.0	498.9																		
30.0																			

**DESCRIPTION**

Topsoil - 4"  
 Hard dark brown SANDY SILT (A-4a), little clay; slightly organic; damp.  
 @ 3.0', brown.

Stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand; moist.

Soft gray SILT (A-4b); moist to wet.

Loose brown COARSE AND FINE SAND (A-3a), trace clay, trace gravel; wet.

Medium stiff to stiff brown and gray SILTY CLAY (A-6b), little fine to coarse sand; wet.

Loose to medium dense gray COARSE AND FINE SAND (A-3a), some silt, little clay; wet.

Hard gray SANDSTONE interbedded with SHALE; fine grained, slightly weathered, micaceous, argillaceous, thinly bedded to medium bedded, highly fractured.  
 @ 28.7'-30.3', 31.5'-32.5', interbedded shale.  
 @ 28.7'-30.3', 31.5'-32.5', broken.



Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Dive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ — 40					
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay				
0.3	525.0							Water seepage at: 9.0'-25.0'												
5.5	524.7	7	5	7	1		4.5+	Water level at completion: 6.0' (Including drill water)	Topsoil - 4"											
		4	3	2	2				FILL: Hard brown SANDY SILT (A-4a), some clay, trace gravel; contains organic material; damp.											
	519.5	3	1	1	3				Very loose brown COARSE AND FINE SAND (A-3a), little clay, trace gravel; moist to wet.											
		WOH	1	1	4															
10.5	514.5	5	11	8	5				Medium dense brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); moist.											
15.5	509.5	6	18	25	6				Medium dense brown and gray COARSE AND FINE SAND (A-3a), little gravel, trace clay; wet.											
		3	4	9	7															
		2	4	7	8															
		2	4	8	9				@ 21.0', gray.											
24.0	501.0	28	50/5	11	10				Hard gray SANDSTONE; fine grained, moderately weathered, micaceous, argillaceous, thinly bedded, moderately fractured.											
25									@ 27.9'-28.3', 29.6'-30.0', interbedded shale.											
									@ 26.4'-26.6', 27.1'-27.7', high angle fractures.											
30																				







Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramps A & D N:325353.958, E:1825678.123

Date Drilled: 7/25/05

LOG OF: Boring B-1139

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS:	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - 10 20 30 40			
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
0.3	529.7							Water seepage at: 11.0'-26.0'										
	529.4	5	5	1			4.5+	Water level at completion: 9.0' (Including drill water)										
3.0	526.7	5	8	2			2.5	Topsoil - 4"										
5		7	3	3			1.5	FILL: Hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp.										
10	519.2	2	4	4				FILL: Very stiff gray SILTY CLAY (A-6b), trace gravel; contains organic material and odor; moist.										
10.5		4	2	2				@ 6.0', wood fragments.										
15		1	1	2				Loose to medium dense brown GRAVEL WITH SAND (A-1-b), trace clay; wet.										
20	509.2	2	4	4														
20.5		4	5	4														
23.0	506.7	6	16	14				Medium dense brown FINE SAND (A-3), trace clay, trace gravel; wet.										
25		2	6	9														
28.5	501.2	4	12	12				Loose to medium dense brown GRAVEL WITH SAND (A-1-b), trace clay; wet.										
30		50/3	3					@ 26.0', gray.										
								Hard gray SANDSTONE interbedded with SILTSTONE; fine grained slightly weathered micaceous argillaceous thinly										

Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramps A & D N:325353.958, E:1825678.123

Date Drilled: 7/25/05

**LOG OF: Boring B-1139**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION										
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
30	499.7						Water seepage at: 11.0'-26.0' Water level at completion: 9.0' (Including drill water)											
		Core 60"	Rec 56"	RQD 68%	R-1		bedded to medium bedded, slightly fractured. Hard gray SANDSTONE interbedded with SILTSTONE; fine grained, slightly weathered, micaceous, argillaceous, thinly bedded to medium bedded, slightly fractured. @ 30.8'-31.3', 33.1'-33.4', broken interbedded shale.											
35.0	494.7						Bottom of Boring - 35.0'											
40																		
45																		
50																		
55																		
60																		

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: 16.0'-21.0' Water level at completion: 19.0' (including drill water)	DESCRIPTION	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ —●— 40							
										% Aggregate	% C Sand	% M. Sand	% F. Sand	% Silt	% Clay								
0	535.8																						
0.4	535.4	3	6	9	2																		
3.0	532.8	3	2	2	6																		
5		1	2	3	7																		
10	525.3	2	2	4	8																		
10.5		2	2	3	16																		
15	520.3	1	2	3	15																		
15.5		7	11	10	12																		
20	515.3	8	9	12	14																		
20.5		WOH	2	5	11																		
25		3	4	4	10																		
		7	8	7	12																		
30		3	8	14	13																		

Project: SCI-823-0.00

Date Drilled: 7/25/05

Client: TranSystems, Inc.

Location: Ramps A & D N:325340.967, E:1825934.726

**LOG OF: Boring B-1140**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Dive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS: Water seepage at: 16.0'-21.0' Water level at completion: 19.0' (including drill water)	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ————— LL Blows per foot - ○ — 40						
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay					
30	505.8																			
34.0	501.8	22 50/4	6	14				Loose to medium dense gray GRAVEL WITH SAND (A-1-b), trace clay; moist to wet.												
35		6 6	13	13				Hard gray SANDSTONE interbedded with SILTSTONE; fine grained, slightly weathered, micaceous, argillaceous, thinly bedded to medium bedded, highly fractured. @ 35.0'-35.8', lost recovery. @ 37.8'-40.0'; interbedded shale.												
40.0	495.8				RQD	R-1														
		Core 60"	Rec 51"		43%															
								Bottom of Boring - 40.0'												

Client: TranSystems, Inc.

Project: SCI-823-0.00

LOG OF: Boring B-1141 Location: Mainline Overpass N:325362.944, E:1826517.749 Date Drilled: 10/12/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: 21.0'-30.0' Water level at completion: 7.7' (includes drilling water)	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ — 40			
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay		
0.2	556.2								Topsoil - 2"									
5	556.0	5	18	1					FILL: Medium dense gray SANDY SILT (A-4a), trace clay, trace gravel; contains shale fragments; damp to moist.									
10		4	18	2														
15		2	6	3														
15.5	540.7	4	8	4					@ 11.0', contains wood fragments.									
20		15	7	5					FILL: Soft to medium stiff brown and gray GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); moist to wet. @ 16.0'-20.0', contains wood fragments.									
25		4	5	6														
28.0	528.2	3	5	7					@ 21.0', brown.									
30		5	5	8														
		3	5	0														
		5	5	3														
		3	4	3														
		2	1	1														
		1	1	5														
		10	15	8					Stiff brown SANDY SILT (A-4a), some clay, little gravel; wet.									
		57	15	8														
		7	8	13														
		27	32	22														

Project: SCI-823-0.00

Client: TranSystems, Inc.

Location: Mainline Overpass N:325362.944, E:1826517.749 Date Drilled: 10/12/05

**LOG OF: Boring B-1141**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS: Water seepage at: 21.0'-30.0' Water level at completion: 7.7' (includes drilling water)	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ 40						
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay					
30	526.2								Stiff brown SANDY SILT (A-4a), some clay, little gravel; wet.												
33.0	523.2								Medium hard to hard dark gray SHALE; very fine grained, slightly weathered, carbonaceous, thinly bedded to thickly bedded, highly fractured. @ Low angle fractures at 33.3', 33.4', 33.5', 33.9', 34.7'-34.8', 35.1', 35.3', 35.4', 36.0', 37.2', 37.4'-37.6', 38.0', 38.3', 38.8', 39.2', 39.3', 39.9', 40.1', 40.8', 41.1'.												
42.6	513.6								Hard gray SANDSTONE; fine grained, slightly weathered, micaceous, medium bedded, unfractured. Bottom of Boring - 43.0'												
43.0	513.2																				
45																					
50																					
55																					
60																					

**LOG OF: Boring B-1142**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ ——— 40					
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay				
0.3 - 560.4	560.4																			
5 - 560.1	560.1	5 7 7 5		1			4.0		Topsoil - 4" FILL: Very stiff to hard gray SILTY CLAY (A-6b), trace gravel; damp.											
5 - 552.4	552.4	3 5 5 6		2			4.25		@ 6.0', moist.											
8.0 - 552.4	552.4	2 1 5 5		3			2.5		FILL: Stiff brown SILT AND CLAY (A-6a), little gravel, trace fine to coarse sand; moist.											
10 - 547.4	547.4	11 5 6 6		4			1.0		@ 11.0', brown and gray.											
15 - 544.9	544.9	5 5 4 4		5			1.0		FILL: Medium stiff black SANDY SILT (A-4a), trace gravel; contains brick fragments and organic material; moist.											
15.5 - 539.9	539.9	5 7 6 18		6			2.0		Very stiff brown SANDY SILT (A-4a), some clay, trace gravel; damp.	0	3	6	62	29						
20 - 537.4	537.4	5 4 4 18		7			3.5		Medium stiff brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); contains red sandstone fragments; moist.	30	26	16	11	17						
20.5 - 537.4	537.4	4 5 5 8		8			3.0		Soft brown SILT AND CLAY (A-6a), little fine to coarse sand, trace gravel; wet.											
23.0 - 534.9	534.9	5 4 4 2		9			0.5		Medium dense brown COARSE AND FINE SAND (A-3a), "and" clay, little silt, little gravel; wet.											
25 - 531.4	531.4	5 5 5 1		10					Very dense brown GRAVEL WITH SAND AND SILT (A-2-4),	31	28	12	21	8						
25.5 - 531.4	531.4	18 50 10 12		11																
29.0 - 531.4	531.4			12A																
30 - 531.4	531.4			12B																

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	DESCRIPTION	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ 40										
								% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay											
30.0	530.4																							
34.5	525.9	5	18	13			trace clay; moist. Loose gray SANDY SILT (A-4a), little clay, trace gravel, wet.	0	1	—	37	47	15											
35		4																						
40		5																						
45.1	515.3	3	18	14A 14B			Medium hard black SHALE; very fine grained, slightly weathered, carbonaceous, medium bedded, moderately fractured.	1	1	—	42	44	12											
		2																						
		24																						
		50/4	4	15																				
		50/2	2	16			@ 43.6'-44.0', high angle fracture.																	
48.5	511.9						Very hard gray SANDSTONE; fine grained, slightly weathered, argillaceous, medium bedded, slightly fractured to unfractured. @ Moderate siltstone and sandstone laminae. @ Multiple fractures from 48.0' to 48.5'. Bottom of Boring - 48.5'																	
50																								
55																								
60																								



**LOG OF: Boring B-1143**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL  -----  LL Blows per foot - 0 10 20 30 40								
								% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay							
0.2	563.2					Water seepage at: 23.5'-26.3' Water level at completion: 3.5' (includes drilling water)															
	563.0	7 10 11	18	1	-		Topsoil - 2"														
		4 5 3	14	2	4.5+		FILL: Very stiff to hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp.														
5		5 6 6	18	3	3.0																
		4 5 9	9	4	3.0																
10.5	552.7	5 5 6	8	5			POSSIBLE FILL: Medium dense brown GRAVEL WITH SAND (A-1-b), trace to little silt, trace to little clay; dry to damp.														
15		4 5 5	9	6																	
		3 4 7	10	7																	
20		4 6 8	14	8																	
		3 4 5	18	9																	
25		3 2 3	3	10			@ 23.5', wet.														
26.5	596.7	25 50/4	8	11A 11B			Soft greenish gray SHALE; very fine grained, highly weathered, micaceous, thinly bedded to medium bedded, highly fractured. @ 28.8'-29.3'; loss of recovery from washed out clay.														
30																					

Client: TranSystems, Inc. Project: SCI-823-0.00

Location: Mainline Overpass N-325327.769, E-1826689.992 Date Drilled: 10/13/05

**LOG OF: Boring B-1143**

Depth (ft)	Elev. (ft)	Blows per 6"	Rec (ft)	Sample No.	Drive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL  -----  LL Blows per foot - 10 20 30 40			
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
30.5	533.2							Water seepage at: 23.5'-26.3' Water level at completion: 3.5' (includes drilling water)										
30.5 - 37.0	532.7	Core 120"	Rec 120"	RQD 81%				@ High angle fractures from 29.3' to 29.4' and 29.6' to 29.7'. Medium hard black SHALE; very fine grained, slightly weathered, carbonaceous, thinly bedded to thickly bedded, moderately fractured. @ Low angle fractures at 30.5', 31.2', 31.7', 33.6', 34.7', 35.3', 36.7'.										
37.0	526.2							Bottom of Boring - 37.0'										

Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Mainline Overpass N:325347.233, E:1826785.628 Date Drilled: 9/22/05

**LOG OF: Boring B-1144**

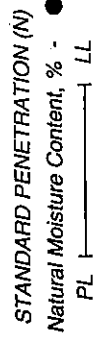
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS:	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ —○— 40			
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay		
0.3	565.2							Water seepage at: None Water level at completion: None									
3.0	564.9	5 8 11	6	1				Topsail - 3"									
5	562.2	12 14 17	12	2				FILL: Medium dense gray and brown SANDY SILT (A-4a), little clay, little gravel; contains organic material; dry to damp.									
		9 11 13	13	3				Medium dense to dense reddish brown SANDY SILT (A-4a), little clay, trace gravel; damp to moist.	4	14	-	32	30	20			
10		6 7 9 14		4													
13.0	552.2	5 4 5 12	12	5													
15		3 4 5 8	8	6				Medium dense brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6), little clay, little gravel; moist to wet.	13	31	-	30	9	17			
20		2 3 2 14		7													
21.0	544.2	1 1 20 8		8				Medium hard gray SHALE; very fine grained, moderately to highly weathered, thinly bedded, highly fractured, contains few laminated fine grained sandstone layers. @ 21.0'-21.1', chert layer.									
25			Core 60"	RQD 14%													
26.0	539.2		Rec 45"	R1				Bottom of Boring - 26.0'									

Client: TransSystems, Inc. Project: SCI-823-0.00

Location: Mainline Overpass N:325285.001, E:1826918.911 Date Drilled: 10/13/05

**LOG OF: Boring B-1145**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetro-meter (tsf)	WATER OBSERVATIONS:	GRADATION											
				Drive	Press / Core			% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
0.2	567.3																		
5	567.1	5 7 8	18	1		4.5+	Water seepage at: 10.5'-13.0' Water level at completion: 3.4' (includes drilling water)	0	1	-	2	58	39						
		9 13 16	18	2		4.0	Topsoil - 2" Very stiff to hard brown SILTY CLAY (A-6b), trace fine to coarse sand, trace gravel; moist.												
		3 5 9	18	3		2.0													
		4 7 9	18	4		2.5	@ 8.5', some fine to coarse sand.												
10	556.8																		
10.5		4 3 7	18	5			Medium dense dark brown GRAVEL WITH SAND (A-1-b); moist to wet.	4	47	-	33	16							
14.0	553.3	8 50/4	10	6			Soft gray SHALE; very fine grained, highly weathered, micaceous, medium bedded, highly fractured. @ Few siltstone laminae. @ Loss of Recovery at 14.9' to 15.2'. @ Low angle fractures at 14.5', 14.7', 15.6', 16.1', 16.5', 17.1', 17.2', 18.0'. Medium hard gray SHALE; very fine grained, slightly weathered, micaceous, thickly bedded, moderately fractured. @ Low angle fractures at 21.2', 21.3', 21.7', 22.2'.												
15																			
19.0	548.3	Core 120"	Rec 116"	RQD 87%	R1														
20																			
24.5	542.8						Bottom of Boring - 24.5'												
25																			
30																			



Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL			
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
0.2	567.7							Water seepage at: 10.5'-13.0'										
	567.5							Water level at completion: 3.4' (includes drilling water)										
5		6 7 9	18	1			4.5+	Topsoil - 2" Very stiff to hard brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp to moist.  @ 8.5', stiff, contains sand seam	0	3	1	5	50	42				
		7 12 17	18	2			4.5+											
		2 6 8	18	3			3.0											
		5 8 8	18	4			1.75											
10	557.2	2 4 6	14	5				Medium dense dark brown GRAVEL WITH SAND (A-1-b); moist.  Soft brownish gray SHALE; very fine grained, highly weathered to decomposed, micaceous, medium bedded, highly fractured. @ High angle fracture from 14. 8 to 14.9. @ Many broken areas from low angle fractures.	30	29	--	25	16					
13.0	554.7	35 50/2	8	6														
15																		
19.0	548.7	Core 120"	Rec 120"	RQD 77%	R1			Medium hard gray SHALE; very fine grained, slightly weathered, micaceous, thinly bedded to medium bedded, moderately fractured. @ Low angle fractures at 21.3' and 22.4'.  Bottom of Boring - 24.5'										
20																		
24.5	543.2																	
25																		
30																		

Client: TranSystems, Inc.

LOG OF: Boring B-1147

Location: Ramp D N:326057.226, E:1825578.667

Date Drilled: 7/27/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○				
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay			
0.4	529.7						Water seepage at: 9.0'-16.0' and 25.0'-26.0'											
	529.3	7	6	7	13		Water level at completion: 7.0' (Including drill water)	Topsoil - 5"										
5		4	2	2	9			FILL: Hard brown SANDY SILT (A-4a), little clay, trace gravel; damp.										
5.5	524.2	2	2	3	10			Loose to medium dense brown GRAVEL WITH SAND AND SILT (A-2-4), some clay; moist to wet.										
10		3	4	4	12													
		4	8	7	13													
13.0	516.7	3	3	2	13			Loose brown COARSE AND FINE SAND (A-3a), little clay, little gravel; wet.										
15																		
15.5	514.2	3	5	6	15			Stiff to very stiff brown SILTY CLAY (A-6b), little gravel, trace fine to coarse sand; moist.										
20		3	5	5	12													
20.5	509.2	1	2	4	11			Very stiff gray SILT (A-4b), little fine to coarse sand, trace clay; moist.										
23.0	506.7	1	2	5	13			Loose gray COARSE AND FINE SAND (A-3a), little gravel, trace clay; wet.										
25																		
25.5	504.2	25	50/2	10				Dense gray GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); contains sandstone fragments; moist.										
26.5	503.2							Hard gray SANDSTONE; fine grained, slightly weathered, argillaceous, micaceous, thinly bedded to medium bedded, slightly fractured.										
30																		



Client: TransSystems, Inc.

**LOG OF: Boring B-1148**

Location: Ramp D N:325941.799, E:1825938.52

Date Drilled: 7/20/05

Project: SCI-823-0-00

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL   Blows per foot -   LL		
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay	
0.3	530.2							Water seepage at: 11.0'-14.0'	Topsoil - 4"								
3.0	529.9	2 3 5 12		1			3.0	Water level at completion: 9.0' (Including drill water)	FILL: Very stiff grayish brown SANDY SILT (A-4a), little clay, trace gravel; slightly organic; damp.								
5.5	527.2	2 3 4 8		2			2.5		Very stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; contains one large rock; damp to moist.								
10.5	524.7	2 4 4 11		3			2.5		Stiff to very stiff brown SILTY CLAY (A-6b), trace fine to coarse sand; moist to wet.								
13.0	519.7	3 2 2 14		4			1.25		Very soft brown SANDY SILT (A-4a), little clay; contains sand seams; wet.								
15.0	517.2	WOH 1 11		5			0.5		Very loose to medium dense brown GRAVEL WITH SAND (A-1-b), trace clay; wet.								
19.5	510.7	3 10 11 17		7					Medium hard to hard gray SANDSTONE; fine grained, moderately weathered, argillaceous, micaceous, thinly bedded to medium bedded, highly fractured. @ 28.7'-28.9', 29.2'-30.3', interbedded shale.								
20.0	510.7	5 15 50/4 10		8													
25.0	505.2	Core 60"	Rec 60"	RQD R-1 60%					Bottom of Boring - 25.0'								



Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp D N:325581.623, E:1826105.077

Date Drilled: 7/13/05

**LOG OF: Boring B-1149**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ — 40					
				Drive	Press / Core				% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay				
0	540.4																		
0.9	539.5	10				4.5+		Asphalt - 7" Aggregate Base - 4"	1	4	—	5	50	40					
3.0	537.4	6	10	21	1	2.5		Hard brown SILT AND CLAY (A-6a), trace gravel, trace fine to coarse sand; damp.	20	12	—	11	34	23					
5		10	13	20	2	2.25		Very stiff brown SANDY SILT (A-4a), some clay, little gravel; damp.											
7.0	533.4	3	10	8	3	4.0		Very stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand; moist.											
10.0	530.4	3	3	15	4	2.5		Bottom of Boring - 10.0'											

Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp D N:325132.329, E:1826281.059

Date Drilled: 7/13/05

**LOG OF: Boring B-1150**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL		
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay	
0	540.8							Water seepage at: None Water level at completion: None									
0.9	539.9	6			1		4.0		Asphalt - 6" Aggregate Base - 5"	7	6	-	8	48	31		
3.0	537.8	3	22		2		4.5+		Very stiff dark gray SANDY SILT (A-4a), some clay, trace gravel; organic; damp.	0	2	-	5	57	36		
5		8	22		3		2.5		Very stiff to hard brown and gray SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; damp. @ 3.0'-5.0', slightly organic.								
		7															
		7	24		4		4.0										
		8															
		4	18		5		3.5										
		5															
10.0	530.8	5	17														
15																	
20																	
25																	
30																	

Bottom of Boring - 10.0'

Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp D N:324869.302, E:1826393.17

Date Drilled: 7/27/05

**LOG OF: Boring B-1151**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: None	DESCRIPTION	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ ——— 40		
				Drive	Press / Core				% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay			
0	541.1							Asphalt - 4" Aggregate Base - 8"	18	23	-	32	16	11			
1.0	540.1	18		1				Medium dense gray GRAVEL WITH SAND AND SILT (A-2-4), little clay; damp.	4	5	-	7	42	42			
3.0	538.1	3	13	2		3.0		Very stiff to hard brown and gray SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp.									
4.0		5	15	3		4.5+											
5.0		7	12	4													
6.0		6															
7.0		9															
8.0		8															
10.0	531.1	8	16					Bottom of Boring - 10.0'									
15																	
20																	
25																	
30																	



Client: TranSystems, Inc.

Project: SCI-823-0.00

LOG OF: Boring B-1152

Location: Ramp C N:325413.0663, E:1826677.035

Date Drilled: 10/18/2005

to 10/19/2005

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS: Water seepage at: 15.5'-20.5' Water level at completion: 13.9' (includes drilling water)	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○		
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay			
30	533.0																
32.9	530.1							Very soft to medium hard gray SHALE; very fine grained, highly weathered to decomposed, micaceous, medium bedded, broken. @ 30.5'-32.9', calcareous. @ 32.0'-32.7', lost recovery from washed out clay.									
35								Medium hard black SHALE; very fine grained, slightly weathered, carbonaceous, thickly bedded, moderately fractured. @ 35.6', low angle fracture.									
37.0	526.0							Bottom of Boring - 37.0'									
40																	
45																	
50																	
55																	
60																	

Client: TranSystems, Inc.

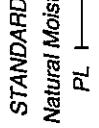
LOG OF: Boring TR-46

Location: Ramp C N:325824.223, E:1826216.977

Date Drilled: 03/17/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - ○ —○— 40			
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay		
0.1	543.1							Water seepage at: 13.5'-19.0'	Topsoil - 1"									
	543.0	2	1	1	1			Water level at completion: 6.0' (Prior to coring) 5.0' (Including drill water)	FILL: Very loose brown and black GRAVEL WITH SAND (A-1-b), some silty clay; contains roots; damp.	44	19	-	13	16	8			
5.5		2	2	2	2				Stiff brown SILT AND CLAY (A-6a), little fine to coarse gravel, trace fine to coarse sand; damp to moist.									
5.5	537.6	3	3	3	3		2.0		Medium dense brown and gray GRAVEL WITH SAND (A-1-b), little silty clay; moist.	56	15	-	9	16	4			
8.5	534.6	2	6	6	6				Loose brown GRAVEL WITH SAND (A-1-b), some silt, trace clay; wet.	33	31	-	13	20	3			
10		2	11	7	11				@ 18.0', heaving sand.									
13.5	529.6	3	4	3	8				Dense light brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; moist to wet.									
15		5	4	4	12				@ 23.0', gray.									
19.0	524.1	16	15	20	14				Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, laminated to medium bedded, slightly fractured. @ 29.4', very thin clay seam. @ 29.8' - 30.8', thin clay seam.	30	11	-	24	25	9			
20		14	19	20	8													
25		5	5	12	14													
26.0	517.1	50/3			3													
30																		

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION									
							% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
30	513.1					Water seepage at: 13.5'-19.0' Water level at completion: 6.0' (Prior to coring) 5.0' (Including drill water)										
		Core 120"	Rec 118"	RQD 83%	R1		Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, laminated to medium bedded, slightly fractured. @ 31.4', very thin clay seam. @ 31.6'-32.0', broken zone with clay and rock fragments. @ 33.4'-33.7', clay seam. @ 33.7'-34.2', cross bedded. @ 35.9', very thin clay seam.									
37.0	506.1						Bottom of Boring - 37.0'									
40																
45																
50																
55																
60																



Client: TranSystems, Inc. Location: Ramp C N:325689.987, E:1826278.864 Date Drilled: 03/17/05  
 Project: SCI-823-0.00

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: 13.0'-18.0' Water level at completion: 18.0' (Prior to coring) 9.0' (Including drill water)	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL	
								% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay
0.1	543.1						Topsoil - 1"							
1	543.0	1		1	1.5		Stiff brown and gray CLAY (A-7-6), trace fine sand; slightly organic; moist. @ 3.0', very stiff.	0	0	2	48	50		
2		4	10	2	2.5		@ 6.0', hard.	0	0	2	48	50		
4		2	13	3	4.5		Medium stiff brown SANDY SILT (A-4a), trace gravel, trace clay; moist to wet.	0	0	2	48	50		
5		4		4	0.5			0	0	2	48	50		
6	536.1	6	15	5	--		Very loose brown COARSE AND FINE SAND (A-3a), trace clay; wet.	0	2	83	15		Non-Plastic	
7		1		6				0	2	83	15		Non-Plastic	
8		2	7	7			Stiff brown SANDY SILT (A-4a), some gravel; moist.	30	11	24	22	13		
9		2		8	1.5		Very stiff to hard dark gray SANDY SILT (A-4a), little clay, little gravel; moist.	15	9	35	26	15		
10		11	10	9			Very soft black SHALE; highly weathered, carbonaceous, laminated, broken, contains silt filled high angle fracture.	29	23	31	12	5		Non-Plastic
11		14		10			Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, laminated to medium bedded, slightly fractured. @ 26.7'-28.4', 30.0'-30.2', vertical healed fracture.	29	23	31	12	5		Non-Plastic
12		12		11				29	23	31	12	5		Non-Plastic
13	530.1	42	12	11				29	23	31	12	5		Non-Plastic
14		34		12				29	23	31	12	5		Non-Plastic
15		17		12				29	23	31	12	5		Non-Plastic
16		17		12				29	23	31	12	5		Non-Plastic
17		17		12				29	23	31	12	5		Non-Plastic
18	525.1	11		12				29	23	31	12	5		Non-Plastic
19		14		12				29	23	31	12	5		Non-Plastic
20		12		12				29	23	31	12	5		Non-Plastic
21	522.1	42	12	12				29	23	31	12	5		Non-Plastic
22		34		12				29	23	31	12	5		Non-Plastic
23		17		12				29	23	31	12	5		Non-Plastic
24		17		12				29	23	31	12	5		Non-Plastic
25	520.1	4	10	11				29	23	31	12	5		Non-Plastic
26		21		11				29	23	31	12	5		Non-Plastic
27		21		11				29	23	31	12	5		Non-Plastic
28		50/4	4	11				29	23	31	12	5		Non-Plastic
29	516.6	50/4	4	11				29	23	31	12	5		Non-Plastic
30				11				29	23	31	12	5		Non-Plastic



**LOG OF: Boring TR-47**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION	STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - 0 10 20 30 40
				Drive	Press / Core				
30	513.1						Water seepage at: 13.0'-18.0' Water level at completion: 18.0' (Prior to coring) 9.0' (including drill water)	% Aggregate	
		Core 120"	Rec 120"	RQD 74%	R1		<p><b>DESCRIPTION</b></p> <p>Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, laminated to medium bedded, slightly fractured.</p> <p>@ 30.2'-32.4', 34.7'-35.4', high angle bedding.</p> <p>@ 31.8'-32.4', broken zone with thin clay seam.</p> <p>@ 33.1'-33.6', low angle healed fracture.</p> <p>@ 33.1'-33.6', high angle healed fracture.</p> <p>@ 33.7'-34.0', very argillaceous.</p> <p>@ 33.7', highly weathered fracture.</p>	% C. Sand	
								% M. Sand	
								% F. Sand	
								% Silt	
								% Clay	
36.5	506.6						Bottom of Boring - 36.5'		
40									
45									
50									
55									
60									

Client: TranSystems, Inc.

Location: Ramp C N:325635.827, E:1826379.383

Date Drilled: 3/21/05

Project: SCI-823-0.00

**LOG OF: Boring TR-48**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetro-meter (tsf)	WATER OBSERVATIONS:	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL		
							% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay		Blows per foot	
0	546.3														
3.0	543.3	2 2 3 14		1		FILL: Loose brown GRAVEL WITH SAND (A-1-b); contains mostly coal fragments and cinders; damp.									
5		WOH WOH WOH 1		2		FILL: Very loose brown SILT AND CLAY (A-6a), little fine to coarse sand; contains roots, coal and cinder fragments; damp.									
6.5	539.8	WOH 2 3 16		3	2.5	Very stiff brown and gray CLAY (A-7-6), trace fine sand; damp to moist.	0	0	2	43	55				
10		2 5 7 17		4	3.5										
13.0	533.3	2 5 6 15		5	3.5										
15		1 2 2 5		6		Very loose brown GRAVEL WITH SAND (A-1-b), trace to little clay; wet.									
20		1 1 1 8		7		@ 18.5', medium dense, little silt; moist.	37	27	17	19					
22.0	524.3	6 6 7 10		8		@ 21.0', trace gravel and trace clay.	52	14	15	12	7				
25		2 7 30 15		9		Soft to medium hard black SHALE; very fine grained, slightly weathered, very thinly bedded, highly fractured.									
		20 15 50 12		10		@ 25.3'-25.6', 26.0'-26.4', broken									
						@ 27.15'-27.2', sandstone seam.									
30															

Project: SCI-823-0.00

Date Drilled: 3/21/05

Client: TranSystems, Inc.

Location: Ramp C N:325635.827, E:1826379.383

**LOG OF: Boring TR-48**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL   LL Blows per foot - 10 20 30 40		
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay			
29.9	516.3 516.4							Water seepage at: 13.0'-18.0' Water level at completion: 8.0' (includes drilling water)										
35.0	511.3								Hard gray SANDSTONE; fine grained, slightly weathered, thinly bedded. @ 32.9', fracture									
									Bottom of Boring - 35.0'									

Client: TranSystems, Inc.

**LOG OF: Boring TR-49A**

Location: Mainline Overpass N:325351.073, E:1826116.599 Date Drilled: 3/21/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, %	
							% Aggregate	% C Sand	% M. Sand	% F. Sand	% Silt	% Clay		
0	538.1													
		4 5 7	17	1	4.5+	Water seepage at: 18.0'-28.0' Water level at completion: 14.0' (includes drilling water)								
		3 4 4	16	2	4.0									
		3 5 5	16	3	1.5									
		2 2 3	17	4	1.0									
		3 4 5	18	5	1.5									
13.0	525.1	WOH 2 2	18	6	--		Hard brown SANDY SILT (A-4a), some clay, some gravel; damp.	23	16	--	9	30	22	
15		1 2 3	18	7	--		@ 6.0', stiff; moist.	0	5	--	16	54	25	
18.0	520.1	WOH WOH WOH	3	8	--		@ 11.0', little gravel.	0	0	--	1	67	32	
20		5 9	12	9	--		Soft brown SILT AND CLAY (A-6a), trace fine to coarse sand; moist to wet.	0	0	--	8	14		
25		2 2 6	18	10	--		Very loose brown GRAVEL (A-1-a), some to "and" fine to coarse sand, little clay; moist to wet.	62	16	--	8	14		
29.0	509.1	10 43 50/4	16	12	--		@ 21.0', medium dense.							
30							Medium hard gray SANDSTONE							

Cifent: TranSystems, Inc. Project: SCI-823-0.00

LOG OF: Boring TR-49A Location: Mainline Overpass N:325351.073, E:1826116.599 Date Drilled: 3/21/05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS:	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL   LL Blows per foot - ○ 30 40					
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
30	508.1							Water seepage at: 18.0'-28.0' Water level at completion: 14.0' (includes drilling water)												
		50/2	1		13			Medium hard gray SANDSTONE; fine grained, slightly weathered, argillaceous, broken, multiple clay seams, low and high angle fractures.												
40																				
45.0	493.1																			
50																				
55																				
60																				

Bottom of Boring - 45.0'

Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Mainline Overpass N:325302.044, E:1826260.104 Date Drilled: 3/22/05

**LOG OF: Boring TR-50A**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetro-meter (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL	
								% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay
0.1	539.3					Water seepage at: 18.0'-25.0'	Topsoil -1"							
3.0	539.2	3	10	1			FILL: Loose dark brown SANDY SILT (A-4a), trace gravel; contains roots; damp.							
5.0	536.3	2	8	2	1.0		Stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; moist.							
10.5		2	13	3	2.0		@ 6.0'-7.5', little to some gravel.							
10.5	528.8	1	16	4	1.5									
15.0		2	18	5	1.25		Stiff brown SILTY CLAY (A-6b), some gravel, some fine to coarse sand; moist to wet.							
15.0		WOH	18	6	1.5		@ 16.0', trace gravel.							
18.0	521.3	1	18	7	1.25									
20.0		WOH	16	8			Very loose to loose brown GRAVEL WITH SAND (A-1-b), little to some clay; wet.							
20.0		2	16	9			@ 21.0', medium dense.							
24.5	514.8	2	18	10			Medium hard brownish gray SANDSTONE; highly weathered.							
25.0		7	50											
27.5	511.8	25	10	11			Hard gray SANDSTONE; fine grained, slightly weathered, argillaceous, medium bedded.							
30.0		37					@ 28.1', 28.7', 29.0'-29.1', clay seams							

**LOG OF: Boring TR-50A**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.		Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION	STANDARD PENETRATION (N) Natural Moisture Content, % - PL   LL
				Drive	Press / Core				
30	509.3						Water seepage at: 18.0'-25.0' Water level at completion: 18.0' (includes drilling water)		
		Core 120"	Rec 117"	RQD 68%	R1		Hard gray SANDSTONE; fine grained, slightly weathered, argillaceous, medium bedded. @ 30.8'-32.1', high angle fracture. @ 33.3', 34.3'-34.4', 36.2', 37.2', clay seams.		
37.5	501.8							Bottom of Boring - 37.5'	
35									
40									
45									
50									
55									
60									

Project: SCI-823-0.00

Location: Mainline Overpass N:325336.603, E:1826395.590 Date Drilled: 03/17/05

Client: TranSystems, Inc.  
LOG OF: Boring TR-51

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL	
							% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay		
0.1	544.5													
0.1 - 0.4	544.4													
1.0 - 1.5		1 2 1	7	1	2.0	Topsoil - 2" Stiff dark brown SILT AND CLAY (A-6a), little fine to coarse sand, trace fine to coarse gravel; damp to moist.								
1.5 - 2.0		1 2 3	13	2	1.0									
2.0 - 2.5		2 3 6	8	3	3.5	Very stiff brown SILTY CLAY (A-6b), trace fine to coarse sand, trace fine to coarse gravel; damp.								
2.5 - 3.0	539.0	3 3 4	10	4	2.0	Very loose to loose brown GRAVEL WITH SAND (A-1-b), little clay, trace silt; damp.								
3.0 - 3.5	536.5	1 1 1	7	5	1.5	@ 11.0', moist.								
3.5 - 4.0		WOH WOH WOH	18	6		Very loose brown COARSE AND FINE SAND (A-3a), trace fine to coarse gravel, trace clay; wet.								
4.0 - 4.5		WOH WOH WOH	18	7										
4.5 - 5.0	526.5	16 7 8	18	8		Medium dense reddish brown GRAVEL WITH SAND AND SILT (A-2-4), trace clay; damp to moist.								
5.0 - 5.5		7 14 11	14	9										
5.5 - 6.0	521.5	1 3 5	11	10	1.5	Stiff gray CLAY (A-7-6), trace fine sand; moist.								
6.0 - 6.5		20 50/3	8	11		Medium hard black SHALE; moderately weathered, pyritic, laminated, broken.								
6.5 - 7.0	519.0					@ 28.1'-28.2', gray. Hard gray SANDSTONE								
7.0 - 7.5	515.9													
7.5 - 8.0														





Client: TranSystems, Inc.  
Project: SCI-823-0.00

Location: Mainline Overpass N:325303.442, E:1826548.490 Date Drilled: 03/15/05

LOG OF: Boring TR-52

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ———— LL Blows per foot - ○ ———— 40	
							% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay
0.1	558.0												
5	557.9	2 2 3 4		1	4.5+	Topsoil - 1" Hard gray SILTY CLAY (A-6b), trace to little fine to coarse sand; damp.							
10		3 5 7 10		2	4.5+								
10.5		10 7 4 9		3	4.5+								
10.5	547.5	1 2 3 8		4	4.5+								
13.0	545.0	2 2 3 7		5		Loose gray GRAVEL WITH SAND AND SILT (A-2-4), trace clay; damp.	66	4	2	18	10		
15		2 3 3 16		6	3.75	Very stiff gray SILT AND CLAY (A-6a), trace fine to coarse sand, trace fine to coarse gravel; moist.							
		3 5 6 16		7	4.0	@ 16.0', brown.							
		2 2 2 18		8	1.0	@ 18.5', stiff, moist to wet.							
20	537.5	2 4 4 12		9		Loose brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); damp.	35	20	17	14	14		
25		WOH WOH 1 18		10		@ 23.0', wet. @ 23.0'-28.0', very loose. @ 23.5'-25.0', no gravel.							
30		WOH WOH 18		11		@ 28.0', medium dense.							
		13 15 5 17		12									

Project: SCI-823-0.00

Date Drilled: 03/15/05

Location: Mainline Overpass N:325303.442, E:1826548.490

Client: TranSystems, Inc.  
LOG OF: Boring TR-52

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - 10 20 30 40				
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
30	528.0							Water seepage at: 23.0'-30.0' Water level at completion: 27.0' (Prior to coring) 6.0' (including drill water)											
33.5	524.5	22	10	13				Medium dense brown SANDY SILT (A-4a), trace clay; wet.											
35		50/5						Medium hard black SHALE; moderately weathered, pyritic, laminated, broken.											
40	517.6	Core 120"	Rec 120"	RQD 35%	R1			Hard gray SANDSTONE; very fine to fine grained, slightly weathered, argillaceous, micaceous, very thinly bedded to medium bedded.											
45.0	513.0							Bottom of Boring - 45.0'											
50																			
55																			
60																			

**LOG OF: Boring TR-53A**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetrometer (tsf)	OBSERVATIONS: WATER	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL Blows per foot - 10 20 30 40			
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
0	565.3							Water seepage at: None Water level at completion: Dry (Prior to coring) 11.0' (Including drill water)										
0.6	564.7				1			Topsoil - 7"										
3.0	562.3	5 5 4	4		2			Stiff gray SILT AND CLAY (A-6a), trace gravel; damp.										
5	559.8	3 4 4	11		3		4.5+	Hard brown SANDY SILT (A-4a), some gravel, little clay; damp.										Non-Plastic
5.5	559.8	5 3 3	12		4			Loose brown COARSE AND FINE SAND (A-3a), some gravel; damp.										Non-Plastic
10		3 3 5	13		5													
15		4 4 5	12		6			@ 13.5'-15.0', medium dense.										
20		4 7 9	10		7													
20.5	544.8	5 3 2	8		8			@ 18.5', Very loose; wet.										
25		1 2 1	8		9			Medium hard gray SHALE; moderately weathered, thinly laminated, slightly fractured. @ 22.5'-28.0', highly fractured. @ 28.8'-28.9' high angle fracture. @ 23.5', 27.8', 31.3', clay seams.										
30		50/4	4		RQD R-1													
			120"		78%													



Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp C N:325382.450, E:1826885.040

Date Drilled: 3-16-05

**LOG OF: Boring TR-54**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL	
							% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay
0.2	566.9												
	566.7												
		2	14	1	1.0	Topsoil - 3"							
		2				Stiff to very stiff brown SILTY CLAY (A-6b), trace fine sand; damp.							
		2	17	2	3.5	@ 0.0'-2.5', contains roots.	0	0	4	61	35		
5													
5.5	561.4												
		3	18	3	2.25	Very stiff brown SILT (A-4b), some clay, little fine sand; damp.	0	0	12	67	21		
		5											
		6											
10		1	11	4	2.0								
10.5	556.4					Loose dark brown COARSE AND FINE SAND (A-3a), trace to little clay, trace gravel; damp.							
		1											
		2	13	5									
		3											
13.6	553.3					Soft gray SHALE; moderately weathered.	7	38	-	37	18		
		7											
		35											
		50/4	14	6									
15.0	551.9					Medium hard gray SHALE; fine grained, moderately weathered, laminated.							
						@ 15.0'-17.3', broken with high angles fractures and thin clay seams.							
						@ 18.9'-19.0', 20.6'-20.9', high angle fractures.							
20		Core 120"	Rec 120"	RQD 83%									
22.6	544.3					Hard gray SILTSTONE; very fine to fine grained, slightly weathered, argillaceous, medium bedded, slightly fractured.							
23.5	543.4					Hard gray SHALE; slightly weathered, argillaceous, very thinly bedded.							
25.0	541.9												
						Bottom of Boring - 25.0'							

Client: TranSystems, Inc.  
**LOG OF: Boring TR-55A**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ———— LL Blows per foot - ○ ———— 40		
										% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay	
0	565.4							Water seepage at: 13.0'-18.0' Water level at completion: 18.0' (Prior to coring) 18.0' (Including drill water)									
3.0	562.4	3	5	10	1		4.5+		Hard gray SILTY CLAY (A-6b); damp.	22	15	--	23	21	19		
5		6	7	9	2		4.5+		Hard brown SILT AND CLAY (A-6a), "and" fine to coarse sand, some gravel; damp.	4	25	--	39	16	16		
8.0	557.4	11	11	9	3		4.5+		Loose brown GRAVEL WITH SAND AND SILT (A-2-4), little clay; damp.  @ 11.0', hard.	9	38	--	40	13			
10		4	5	4	4				Loose brown COARSE AND FINE SAND (A-3a), trace gravel; wet.								
13.0	552.4	5	4	3	5				Hard gray SHALE interbedded with SANDSTONE; fine grained, highly weathered, very thinly bedded, highly fractured. @ 20.0'-22.0', 26.7'-27.5', 28.3'-28.5', 29.3'-29.6', highly fractured with clay seams. @ 21.0'-21.3', 21.7'-21.9', 26.5'-26.7', 26.9'-22.0', hard brown sandstone; slightly weathered laminated.								
15		2	2	2	6												
18.0	547.4	1	2	7	7												
20		35	30/5	11	8												
25																	
30.0	535.4																

Bottom of Boring - 30.0'





Client: TranSystems, Inc.

Project: SCI-823-0.00

LOG OF: Boring TR-56 Location: Mainline Overpass N:325291.521, E:1826974.037 Date Drilled: 3-16-05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION					STANDARD PENETRATION (N) Blows per foot -	
								% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay
0.2	570.0						Water seepage at: None Water level at completion: Dry (Prior to coring) 7.5' (Including drill water)							
3.0	569.8	2	15	1	1	2.5	Topsoil -3" Very stiff brown SANDY SILT (A-4a), trace clay, trace gravel; damp to moist.							
5.0	567.0	4	17	2	2	4.5+	Hard brown SILTY CLAY (A-6b), trace fine sand; damp.							
8.0	562.0	4	16	3	3	4.25	Loose brown and gray SANDY SILT (A-4a), trace clay; damp to moist.	0	0	2	57	41		
10.0		2	18	4	4			0	1	19	55	25		
14.1	555.9	2	9	5	5									
15.0		2	4	6	6									
20.0		8	15	6	6		Medium hard grayish brown SILTSTONE interbedded with SHALE; very fine to fine grained, slightly weathered, argillaceous, thinly bedded, highly fractured. @ 16.4'-17.2', high angle fracture and clay seam. @ 17.2', gray. @ 19.2'-19.7', clay seam. @ 20.4'-20.8', highly broken, clay seam.							
25.0	545.0	Core Rec 120"	120"	ROD R-1 68%			Bottom of Boring - 25.0'							

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Dry (Prior to coring) 3.5' (Including drill water)	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Blows per foot -	Natural Moisture Content, % - PL ——— LL
								% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		
0.3	569.5						Topsoil -4"							
0.3 - 2.0	569.2	2	14	1	4.0		Very stiff to hard brown SILTY CLAY (A-6b), trace fine sand; damp.							
2.0 - 5.0		3		2	4.5									
5.0 - 8.0		5	12	3	3.5		Stiff brown SILT (A-4b), some clay, little fine to coarse sand; moist.							
8.0 - 10.0	561.5	4	17	4	1.0		Medium dense brown SILT AND CLAY (A-6a), "and" fine to coarse sand, some gravel; damp.							
10.0 - 10.5	559.0	1	18	4										
10.5 - 14.0		2	14	5										
14.0 - 15.0	555.5	12	13	6			Soft to medium hard gray SHALE; moderately weathered, laminated. @ 15.8'-16.3', 19.1'-19.5', clay seams							
15.0 - 20.0		27												
20.0 - 20.9	548.6	50/3												
20.9 - 22.9	546.6						Hard gray SILTSTONE interbedded with SHALE; slightly weathered, laminated. @ 22.7'-22.9', high angle fracture							
22.9 - 25.0	544.5						Hard gray SHALE; slightly weathered, laminated, slightly fractured.							
25.0 - 30.0							Bottom of Boring - 25.0'							

Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp B N:325195.371, E:1826928.980

Date Drilled: 3-16-05

LOG OF: Boring TR-58

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive Press / Core	Hand Penetro-meter (tsf)	WATER OBSERVATIONS: Water seepage at: None Water level at completion: Dry (Prior to coring) 4.0' (including drill water)	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL		
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay	
0.3	567.1							Topsoil -4"								
1	566.8	1		1				Soft brown SILTY CLAY (A-6b), trace fine sand; damp to moist. @ 0.0'-2.5', contains roots.								
2		2	16					@ 3.5', very stiff to hard.								
3		6	8	2		4.25										
5		8	15													
6		7	18	3		3.5										
8.0	559.1							Loose dark brown COARSE AND FINE SAND (A-3a), trace to little clay, trace gravel; damp.	0	0	6	65	29			
10		2	3	4												
14.0	553.1							Soft to medium hard gray SHALE; moderately weathered, argillaceous, thinly bedded, slightly fractured.	7	34	—	40	19			
15		4	3	5				@ 15.0'-16.7', broken with clay seams and high angle fractures								
		4	3					@ 17.5'-17.8', 19.5'-20.1', clay seams with high angle fractures								
		4	3					@ 20.9'-21.0', clay seam.								
		2	5	6				@ 24.2' and 24.4', very thin clay seam.								
20		20	16													
		50/5														
		Core 120"	Rec 120"	RQD 82%	R-1											
25.0	542.1							Bottom of Boring - 25.0'								

Client: TranSystems, Inc.

Project: SCI-823-0.00

**LOG OF: Boring TR-59A**

Location: Ramp B N:325126.513, E:1826809.594

Date Drilled: 3-14-05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ———— LL Blows per foot - ○ ———— 40			
							% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay		
0	563.9														
3		3	3	1		Water seepage at: 19'-21.5' Water level at completion: Dry (Prior to coring) 17.0' (including drill water)									
3		3	14												
2		2	12	2											
2		2													
2		2	15	3											
2		2													
2		2	13	4											
2		2	16	5											
1		1	15	6											
2		2	12	7											
0		0	14	8											
1		1													
1		1	36	9											
32		32	50/3	10											
5	558.4					Loose dark gray SANDY SILT (A-4a), some clay, trace gravel; damp.									
						@ 3.5', brown.									
						Very loose to loose brown COARSE AND FINE SAND (A-3a), trace clay, trace silt; moist.									
						Loose brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6); damp to moist.									
						@ 19.0'-21.5', very loose; wet.									
						Medium hard gray SHALE; slightly weathered.									
						Medium hard to hard gray SILTSTONE interbedded with SHALE; very fine to fine grained, slightly weathered, argillaceous, thinly bedded, slightly fractured. @ 25.4'-25.7', 28.5', 29.6', clay seams @ 25.9', 26.5-26.7', 27.8', high angle fractures @ 28.6'-29.6', moderately weathered SHALE.									
30															

Client: TranSystems, Inc.

Project: SCI-823-0.00

Location: Ramp B N:325126.513, E:1826809.594

Date Drilled: 3-14-05

**LOG OF: Boring TR-59A**

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Drive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION						STANDARD PENETRATION (N) Natural Moisture Content, % - ● PL  -----  LL Blows per foot - ○ 10 20 30 40					
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay						
30	533.9							Water seepage at: 19'-21.5' Water level at completion: Dry (Prior to coring) 17.0' (including drill water)												
33.0	530.9							<b>DESCRIPTION</b>  Medium hard to hard gray SILTSTONE interbedded with SHALE; very fine to fine grained, slightly weathered, argillaceous, thinly bedded, slightly fractured. @ 31.4'-31.7', clay seams with high angle fractures. Hard black SHALE; fine grained, slightly weathered, carbonaceous, thinly bedded. @ 33.8'-34.0', high angle fractures and broken. Bottom of Boring - 35.0'												
35.0	528.9																			
40																				
45																				
50																				
55																				
60																				

Client: TranSystems, Inc.

Project: SCI-823-0.00

**LOG OF: Boring TR-60**

Location: Ramp B N:324934.012, E:1826665.121

Date Drilled: 3-14-05

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ——— LL				
								% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay			
0.1	552.3					Water seepage at: 18'-28'											
	552.2					Water level at completion: 26.0' (Prior to coring) 19.0' (including drill water)	Topsoil -1"										
3.0	549.3	4	8	12			FILL: Medium dense brown SANDY SILT (A-4a), little gravel, trace clay; damp.	33	43	--	11	13					
5		4	4	12			Loose brown COARSE AND FINE SAND (A-3a), some gravel, trace clay; damp.										
		3	2	9													
		3	2	3													
10		3	2	13													
10.5	541.8						Loose brown GRAVEL WITH SAND (A-1-b), little silt, trace clay; damp.	50	20	--	9	17	4				
		3	3	14													
		3	3	4			@ 13.5', moist.										
		3	3	1													
		2	3	14													
18.0	534.3						Very loose to loose brown COARSE AND FINE SAND (A-3a), trace clay, trace gravel; wet.	10	53	--	20	17					
		1	1	17													
		4	3	16													
23.0	529.3						Stiff brown SANDY SILT (A-4a), little to some gravel, little clay; wet.	31	27	--	12	18	12				
		7	4	18													
25.5	526.8						Loose reddish brown COARSE AND FINE SAND (A-3a), some clay, trace gravel; wet.	7	14	--	58	21					
		3	6	18													
28.0	524.3						Soft black SHALE; highly weathered.										
		50/4	4														
30																	

Cifent: TranSystems, Inc.

Project: SCI-823-0.00

Date Drilled: 3-14-05

Location: Ramp B N:324934.012, E:1826665.121

**LOG OF: Boring TR-60**

Depth (ft)	Elev. (ft)	Blows per 6"	Rec	Core	Drive	Press / Core	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION									
									% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
30	522.3							Water seepage at: 18'-28' Water level at completion: 26.0' (Prior to coring) 19.0' (Including drill water)										
								<b>DESCRIPTION</b> Medium hard black SHALE; moderately weathered, carbonaceous, laminated, highly fractured. @ 30.0'-32.3', clay seam. @ 32.3' hard. @ 33.2', 38.0'-38.2', clay seams.										
	512.3		119"	120"	RQD 79%	R-1		@ 39.4'-39.8', high angle fracture. @ 39.9', Hard gray SANDSTONE. Bottom of Boring - 40.0'										
35																		
40.0																		
45																		
50																		
55																		
60																		

Client: TranSystems, Inc. Project: SCI-823-0-00 Date Drilled: 3-16-05

LOG OF: Boring TR-61 Location: Ramp B N:324742.822, E:1826622.009

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetro-meter (tsf)	WATER OBSERVATIONS:	DESCRIPTION	GRADATION					STANDARD PENETRATION (N) Natural Moisture Content, % - PL ———— LL Blows per foot - ○ ———— 40					
								% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt		% Clay				
0	543.4					Water seepage at: 13.5'-23.0' Water level at completion: 14.0' (prior to coring) 9.0' (includes drilling water)												
2		2	2	1			FILL: Loose black SANDY SILT (A-4a), little clay, little gravel; organic; dry to damp.	14	20	--	26	28	12					
3		4	3	2			Very stiff light brown CLAY (A-7-6), some fine to coarse sand, trace gravel; damp.	8	12	--	12	29	39					
5	537.9				2.5		@ 8.5', brown.	9	46	--	32	13		Non-Plastic				
10	532.9				2.25		Very loose brown GRAVEL WITH SAND (A-1-b), little silty clay; moist to wet.	1	22	--	62	15		Non-Plastic				
13	530.4						Very loose brown COARSE AND FINE SAND (A-3a), little silty clay, trace gravel; wet.											
15		WOH WOH WOH	16	6			Very loose to loose brown GRAVEL WITH SAND (A-1-b), little silty clay; moist to wet.											
17	526.4						Medium hard black SHALE; moderately weathered.											
20		1 3 2	18	8			Hard black SHALE; fine grained, moderately weathered, carbonaceous, thinly bedded, moderately fractured, fissile. @ 25.0'-25.2', 27.5'-27.6', 28.1'-28.2', 29.3'-30.0', high angle fractures											
23	520.4																	
25	518.4																	
30																		












**APPENDIX III**

Calculations

SCI-823-0.00 DLZ Job #: 0121-3070.03  
 JS 23 / SR 823 MSE Wall Evaluations -- Ramp B








Borings: B-1105 - B-1110, TR-61

**Boring -- B-1108**

MSE Height	41'	Rq'd	Calculated	L=0.8H
 Bearing Capacity - UD		2.5	<b>2.02</b>	
 Bearing Capacity - D		2.5	2.71	
 Sliding		1.5	1.55	
 Overturning		2.0	5.08	
 Undrained		1.5	<b>1.44</b>	
 Drained		1.5	1.75	
 Seismic		1.1	1.65	








**Comment:**

**Boring -- B-1108**

MSE Height	41'	Rq'd	Calculated	L=0.7H
 Bearing Capacity - UD		2.5	3.75	
 Bearing Capacity - D		2.5	3.75	
 Sliding		1.5	1.74	
 Overturning		2.0	3.89	
 Undrained		1.5	<b>1.44*</b>	
 Drained		1.5	1.70	
 Seismic		1.1	1.61	








**Comment:** Undercut with 5' of ODOT 304  
 \*F.S.<1.5, However per ODOT BDM  
 204.6.2.1 required F.S.>1.3 "For all other  
 walls". This does not control the design.

**Boring -- B-1109**

MSE Height	41'	Rq'd	Calculated	L=0.8H
 Bearing Capacity - UD		2.5	<b>1.62</b>	
 Bearing Capacity - D		2.5	<b>2.02</b>	
 Sliding		1.5	<b>1.42</b>	
 Overturning		2.0	4.65	
 Undrained		1.5	1.69	
 Drained		1.5	1.65	
 Seismic		1.1	1.56	








**Comment:**

**Boring -- B-1109**

MSE Height	41'	Rq'd	Calculated	L=0.7H
 Bearing Capacity - UD		2.5	3.75	
 Bearing Capacity - D		2.5	3.75	
 Sliding		1.5	1.74	
 Overturning		2.0	3.89	
 Undrained		1.5	1.76	
 Drained		1.5	1.63	
 Seismic		1.1	1.54	








**Comment:** Undercut with 5' of ODOT 304

**Boring -- TR-61**

MSE Height	41'	Rq'd	Calculated	L=0.8H
 Bearing Capacity - UD		2.5	<b>2.02</b>	
 Bearing Capacity - D		2.5	<b>2.02</b>	
 Sliding		1.5	<b>1.42</b>	
 Overturning		2.0	4.65	
 Undrained		1.5	1.68	
 Drained		1.5	1.76	
 Seismic		1.1	1.65	

**Comment:**

**Boring -- TR-61**

MSE Height	41'	Rq'd	Calculated	L=0.7H
 Bearing Capacity - UD		2.5	3.75	
 Bearing Capacity - D		2.5	3.75	
 Sliding		1.5	1.74	
 Overturning		2.0	3.89	
 Undrained		1.5	1.67	
 Drained		1.5	1.71	
 Seismic		1.1	1.61	

**Comment:** Undercut with 5' of ODOT 304

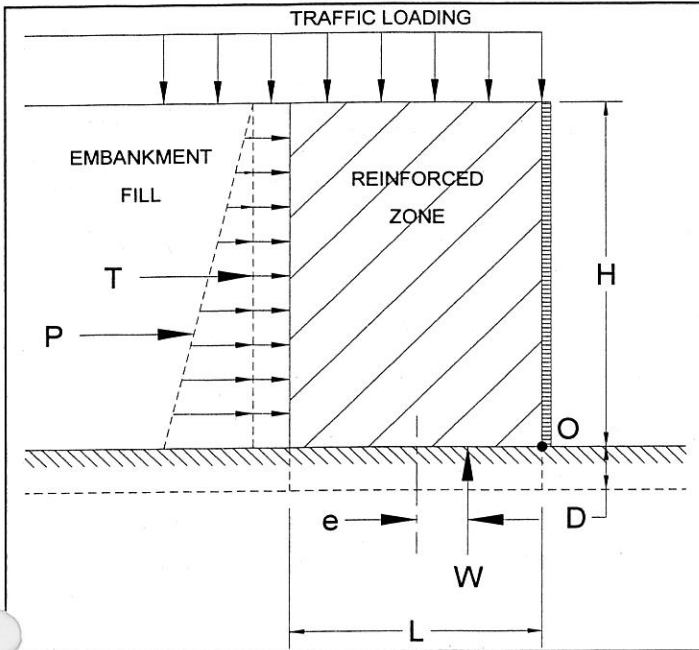


SUBJECT Client TranSystems  
 Project SCI 823-0.00  
 Item Bearing Capacity  
 US 23 / SR 823 - Ramp B (B-1108 no undercut)

JOB NUMBER 0121-3070.03  
 SHEET NO. 1 OF 1  
 COMP. BY JAN DATE 1/3/06  
 CHECKED BY TNA DATE 1-9-06

### BEARING CAPACITY OF A MSE WALL (non-coped)

Ref: {AASHTO; STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17th Edition, 2002}



#### Soil Properties

$\gamma_{MSE}$	=	120	pcf	unit weight	mse fill
$\gamma_{FDN}$	=	125	pcf	unit weight	foundation soil
c	=	2500	psf	cohesion	undrained
$\phi$	=	0	deg.	friction ang.	undrained
c'	=	0	psf	cohesion	drained
$\phi'$	=	30	deg.	friction ang.	drained

#### Loads and Parameters

$\omega t$	=	240	psf	traffic loading
L=B	=	32.8	ft	length of mse block
L factor	=	0.8		Length factor-range (0.7 - 1.0)
D	=	0	ft	embedment depth
Dw	=	0	ft	groundwater depth
H+D	=	41	ft	
H	=	41	ft	height of wall
Ka	=	0.33		ODOT BDM 204.6.2.1
$\Gamma Pa$	=	13.667	ft	moment arm
$\Gamma Wt$	=	20.5	ft	moment arm
B'	=	26.64	ft	
$\gamma'$	=	57.6	pcf	
$W_t$	=	7,872	lb/ft of wall	
$W_{mse}$	=	161,376	lb/ft of wall	

#### Effective Bearing Pressure

$$\sigma_v = \frac{W_t + W_{MSE}}{L - 2e} \quad \sigma_v = 6,353 \text{ psf}$$

#### Ultimate undrained bearing capacity, $q_{ult}$

$$q_{ULT} = cN_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 12,850 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 5,140 \text{ psf}$$

Factor of Safety = 2.02 No Good

#### Ultimate drained bearing capacity, $q_{ult}$

$$q_{ULT} = c' N_c + \sigma_D N_q + \frac{1}{2} \gamma B N_\gamma \quad q_{ULT} = 17,186 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 6,874 \text{ psf}$$

Factor of Safety = 2.71 OK

#### Bearing Capacity Factors for Equations

	Undrained		Drained
$N_c$	5.14	$N_c$	30.14
$N_q$	1.00	$N_q$	18.40
$N_\gamma$	0.00	$N_\gamma$	22.40

#### Eccentricity of Resultant Force

$$e = 3.08 \text{ ft}$$

#### Kern

$$e < L/6 = 5.47 \text{ ft}$$

## STABILITY OF MSE WALL

### Assumptions:

- 1 Estimated height of embankment; ~~H=30'~~ <sup>41'</sup>
- 2 ~~It is assumed that the bridge is supported on piles~~
- 3 Ground water; Dw=0.0'
- 4 Traffic loading is neglected in resisting forces
- 5

### Wall Properties

H = 41 feet  
 $\gamma_{mse} = 120$  pcf  
 L = 32.8 feet  
 L factor = 0.80

### Foundational Soil Properties

c = 2500 psf cohesion  
 $\phi' = 30$  deg friction angle  
 $\omega_T = 240$  psf traffic loading  
 Length factor-range (0.7 - 1.0)

## RESISTANCE AGAINST SLIDING ALONG BASE

Thrust:  $P_a = K_a \left[ \frac{1}{2} \gamma H^2 + \omega_T H \right]$

where;  $K_a = \tan^2(45 - \frac{\phi}{2})$   $K_a = 0.33$

$P_a = 36,531$  lbs per foot of wall

Resistance:  $P_r = W(0.67)(\mu)$  (Drained)

where;  $\mu = \tan(\phi)$   $0.67\mu = 0.39$

$0.67\mu$  Max. = 0.35 (AASHTO, Bridge Design Manual, 303.4.1.1)

$P_r = 56,482$  lbs per foot of wall

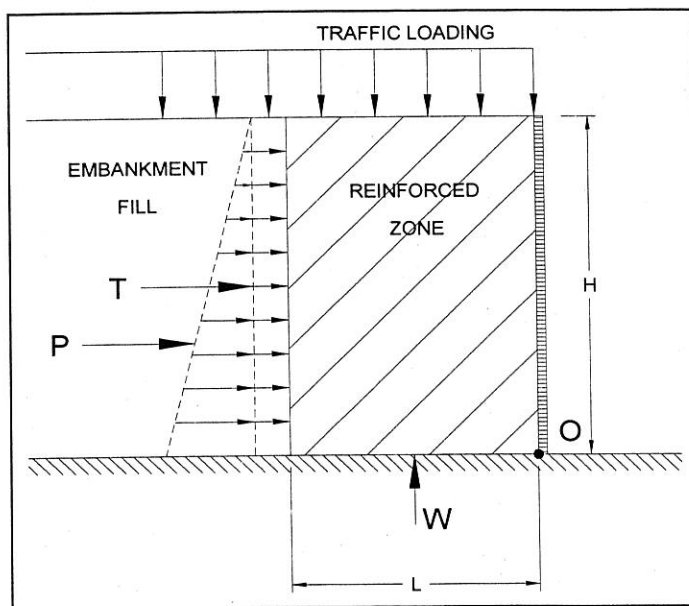
USE THIS VALUE

$P_r = L(c)$  (Undrained)

$P_r = 82,000$  lbs per foot of wall

Use Drained Value

	Calculated	Required	Resistance Against Sliding is	<b>OK</b>
$FS = \frac{P_r}{P_a}$	FS = 1.55	FS = 1.50		



## RESISTANCE AGAINST OVERTURNING

- \* Summation of Moments about point "O" (base of wall).
- \* Traffic loading is neglected in resisting forces

$\Sigma M_{resisting} = 2,646,566$  lb-ft

$\Sigma M_{resisting} = \gamma H L \left( \frac{L}{2} \right)$

$\Sigma M_{overturning} = 521,446$  lb-ft

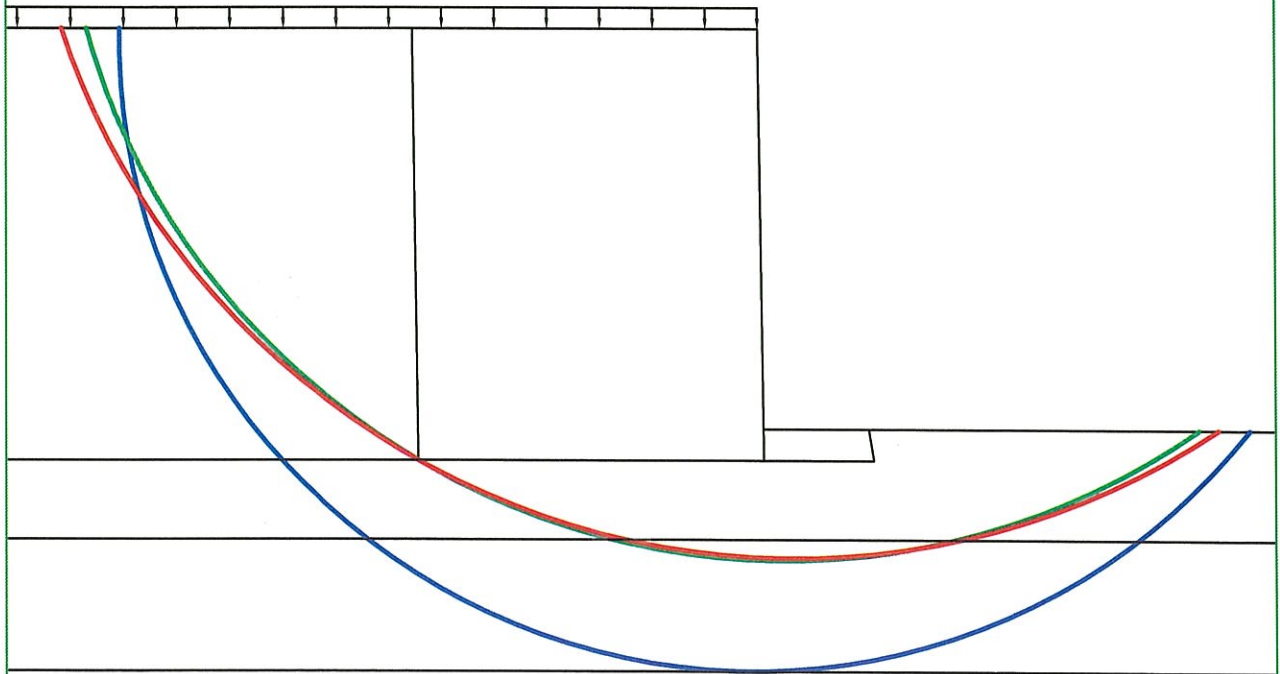
$\Sigma M_{overturning} = K_a \left[ \frac{1}{2} \gamma H^2 \left( \frac{H}{3} \right) + \omega_T H \left( \frac{H}{2} \right) \right]$

	Calculated	Required	Resistance Against Overturning is	<b>OK</b>
$FS = \frac{\Sigma M_{resisting}}{\Sigma M_{overturning}}$	FS = 5.08	FS = 2.00		

Undrained - F.S. = 1.435

Drained - F.S. = 1.754

Seismic - F.S. = 1.652



MSE WALL EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
RAMP B B-1108  
WITHOUT 5' UNDERCUT

DRAWN:	CHK'D:
DESIGNED:	APPRV'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
0121-3070.03	



SUBJECT Client TranSystems  
 Project SCI 823-0.00  
 Item Bearing Capacity  
 US 23 / SR 823 - Ramp B (B-1108 with undercut)

JOB NUMBER 0121-3070.03  
 SHEET NO. 1 OF 1  
 COMP. BY JAN DATE 1/3/06  
 CHECKED BY TMA DATE 1-9-06

### BEARING CAPACITY OF A MSE WALL (non-coped)

Ref: {AASHTO; STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17th Edition, 2002}

#### Soil Properties

$\gamma_{MSE}$	=	120	pcf	unit weight	mse fill
$\gamma_{FDN}$	=	115	pcf	unit weight	foundation soil
$c$	=	0	psf	cohesion	undrained
$\phi$	=	34	deg.	friction ang.	undrained
$c'$	=	0	psf	cohesion	drained
$\phi'$	=	34	deg.	friction ang.	drained

#### Loads and Parameters

$\omega t$	=	240	psf	traffic loading
$L=B$	=	28.7	ft	length of mse block
L factor	=	0.7		Length factor-range (0.7 - 1.0)
$D$	=	0	ft	embedment depth
$D_w$	=	0	ft	groundwater depth
$H+D$	=	41	ft	height of wall
$H$	=	41	ft	
$K_a$	=	0.33		ODOT BDM 204.6.2.1
$\Gamma Pa$	=	13.667	ft	moment arm
$\Gamma Wt$	=	20.5	ft	moment arm
$B'$	=	21.66	ft	
$\gamma'$	=	57.6	pcf	

$W_t$	=	6,888	lb/ft of wall
$W_{mse}$	=	141,204	lb/ft of wall

#### Bearing Capacity Factors for Equations

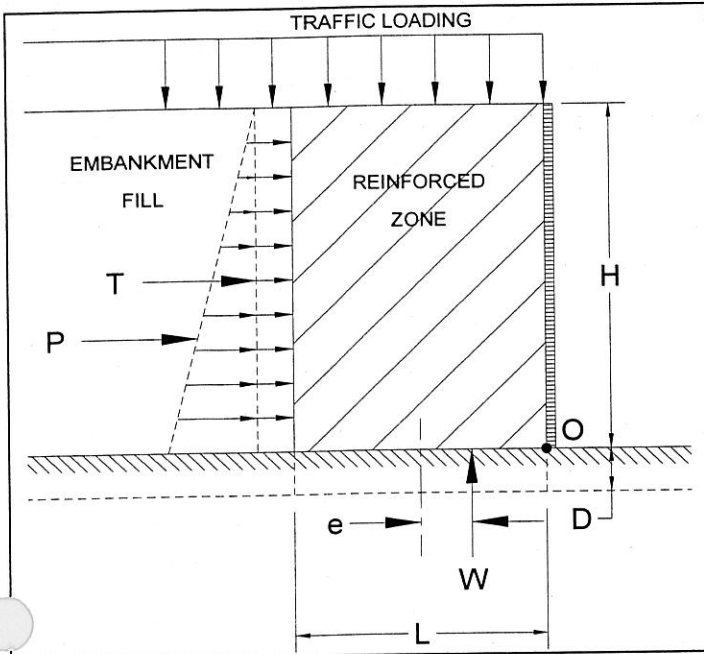
	Undrained		Drained
$N_c$	42.16	$N_c$	42.16
$N_q$	29.44	$N_q$	29.44
$N_\gamma$	41.06	$N_\gamma$	41.06

#### Eccentricity of Resultant Force

$e = 3.52$  ft

#### Kern

$e < L/6 = 4.78$  ft



#### Effective Bearing Pressure

$$\sigma_v = \frac{W_t + W_{MSE}}{L - 2e} \quad \sigma_v = 6,837 \text{ psf}$$

#### Ultimate undrained bearing capacity, $q_{ult}$

$$q_{ULT} = cN_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 25,614 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 10,246 \text{ psf}$$

Factor of Safety = 3.75 OK

#### Ultimate drained bearing capacity, $q_{ult}$

$$q_{ULT} = c'N_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 25,614 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 10,246 \text{ psf}$$

Factor of Safety = 3.75 OK





SUBJECT

Client TranSystems ODOT D-9  
 Project SCI 823-0.00 Portsmouth Bypass  
 Item MSE Wall Stability  
 US 23 / SR 823 - Ramp B (B-1108 with undercut)

JOB NUMBER 0121-3070.03  
 SHEET NO. 1 OF 1  
 COMP. BY JAN DATE 1/3/06  
 CHECKED BY TAA DATE 1-9-06

**STABILITY OF MSE WALL**

**Assumptions:**

- 1 Estimated height of embankment; H=41' ~~H=30'~~
- 2 ~~It is assumed that the bridge is supported on piles~~
- 3 Ground water; Dw=0.0'
- 4 Traffic loading is neglected in resisting forces
- 5

**Wall Properties**

H = 41 feet  
 $\gamma_{mse}$  = 120 pcf  
 L = 28.7 feet  
 L factor = 0.70

**Foundational Soil Properties**

c = 0 psf cohesion  
 $\phi'$  = 34 deg friction angle  
 $\omega_T$  = 240 psf traffic loading  
 Length factor-range (0.7 - 1.0)

**RESISTANCE AGAINST SLIDING ALONG BASE**

Thrust:  $P_a = K_a \left[ \frac{1}{2} \gamma H^2 + \omega_T H \right]$

where;  $K_a = \tan^2(45 - \frac{\phi}{2})$   $K_a = 0.33$

$P_a = 36,531$  lbs per foot of wall

Resistance:  $P_r = W(0.67)(\mu)$  (Drained)

where;  $\mu = \tan(\phi)$   $0.67\mu = 0.45$   
 $0.67\mu$  Max. = 0.55 (AASHTO, Bridge Design Manual, 303.4.1.1)

$P_r = 63,542$  lbs per foot of wall

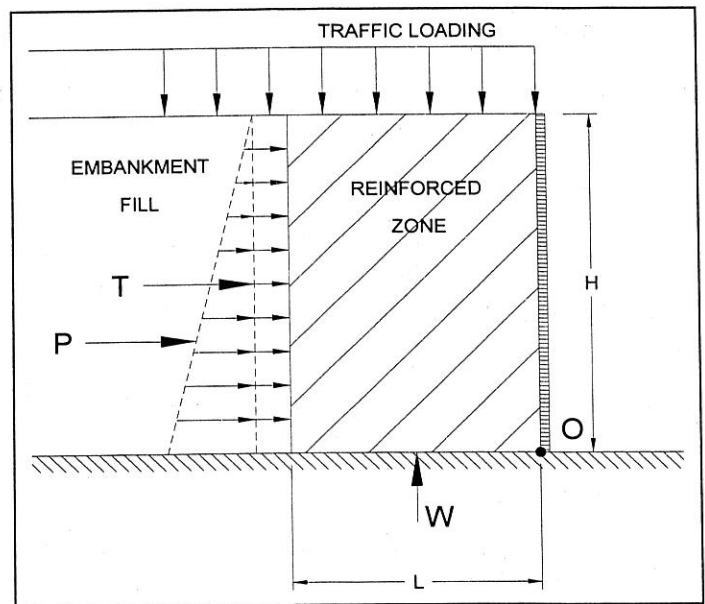
**USE THIS VALUE**

$P_r = L(c)$  (Undrained)

$P_r = 0$  lbs per foot of wall

**Use Drained Value**

	Calculated	Required	Resistance Against Sliding is	<b>OK</b>
$FS = \frac{P_r}{P_a}$	FS = 1.74	FS = 1.50		



**RESISTANCE AGAINST OVERTURNING**

- \* Summation of Moments about point "O" (base of wall).
- \* Traffic loading is neglected in resisting forces

$\Sigma M_{resisting} = 2,026,277$  lb-ft

$\Sigma M_{resisting} = \gamma HL \left( \frac{L}{2} \right)$

$\Sigma M_{overturning} = 521,446$  lb-ft

$\Sigma M_{overturning} = K_a \left[ \frac{1}{2} \gamma H^2 \left( \frac{H}{3} \right) + \omega_T H \left( \frac{H}{2} \right) \right]$

	Calculated	Required	Resistance Against Overturning is	<b>OK</b>
$FS = \frac{\Sigma M_{resisting}}{\Sigma M_{overturning}}$	FS = 3.89	FS = 2.00		

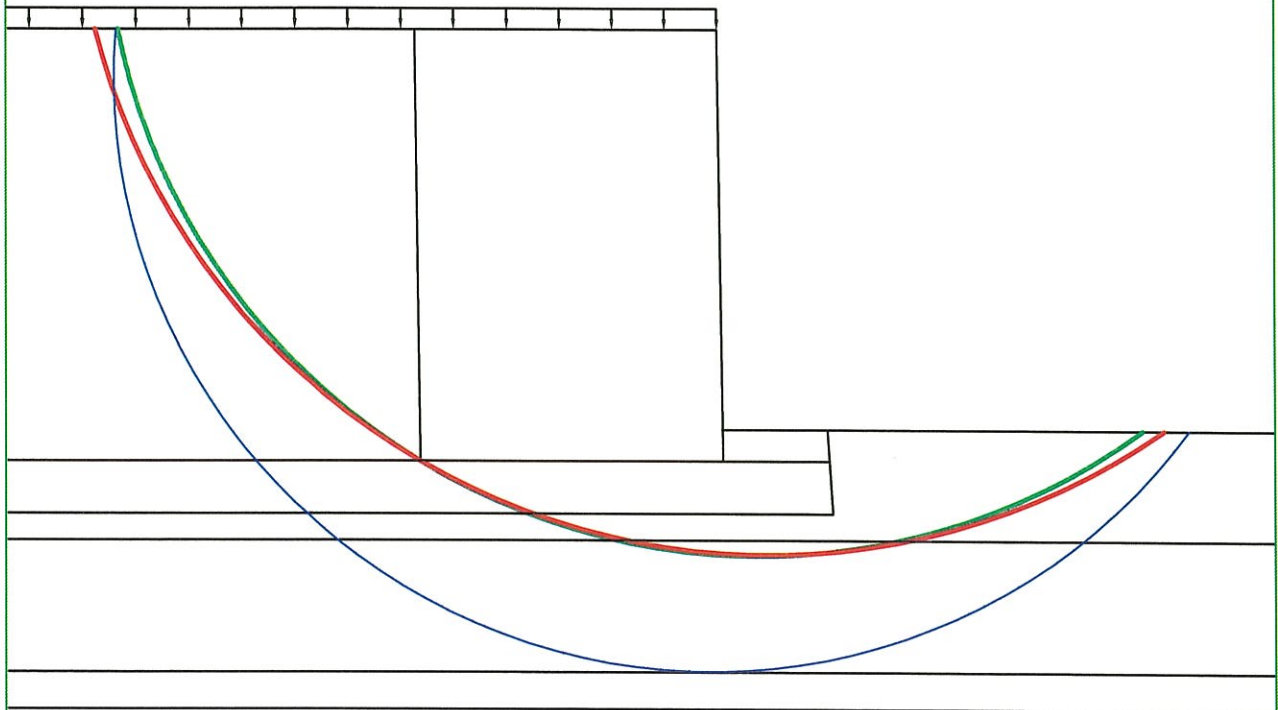


\*Undrained - F.S. = 1.444

Drained - F.S. = 1.700

Seismic - F.S. = 1.611

\* F.S.<1.5, however per  
ODOT BDM 204.6.2.1  
required F.S.>1.3 "For all  
other walls". This does  
not control the design.



MSE WALL EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
RAMP B B-1108  
WITH 5' UNDERCUT

DRAWN:	CHK'D:
DESIGNED:	APPRV'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
	0121-3070.03



SUBJECT Client TranSystems  
 Project SCI 823-0.00  
 Item Bearing Capacity  
 US 23 / SR 823 - Ramp B (B-1109 no undercut)

JOB NUMBER 0121-3070.03  
 SHEET NO. 1 OF 1  
 COMP. BY JAN DATE 1/3/06  
 CHECKED BY TJK DATE 1-9-06

### BEARING CAPACITY OF A MSE WALL (non-coped)

Ref: {AASHTO; STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17th Edition, 2002}

#### Soil Properties

$\gamma_{MSE}$	=	120	pcf	unit weight	mse fill
$\gamma_{FDN}$	=	120	pcf	unit weight	foundation soil
$c$	=	2000	psf	cohesion	undrained
$\phi$	=	0	deg.	friction ang.	undrained
$c'$	=	0	psf	cohesion	drained
$\phi'$	=	28	deg.	friction ang.	drained

#### Loads and Parameters

$\omega t$	=	240	psf	traffic loading
$L=B$	=	32.8	ft	length of mse block
L factor	=	0.8		Length factor-range (0.7 - 1.0)
$D$	=	0	ft	embedment depth
$D_w$	=	0	ft	groundwater depth
$H+D$	=	41	ft	height of wall
$H$	=	41	ft	height of wall
$K_a$	=	0.33		ODOT BDM 204.6.2.1
$\Gamma Pa$	=	13.667	ft	moment arm
$\Gamma W_t$	=	20.5	ft	moment arm
$B'$	=	26.64	ft	
$\gamma'$	=	57.6	pcf	

$W_t$	=	7,872	lb/ft of wall
$W_{mse}$	=	161,376	lb/ft of wall

#### Bearing Capacity Factors for Equations

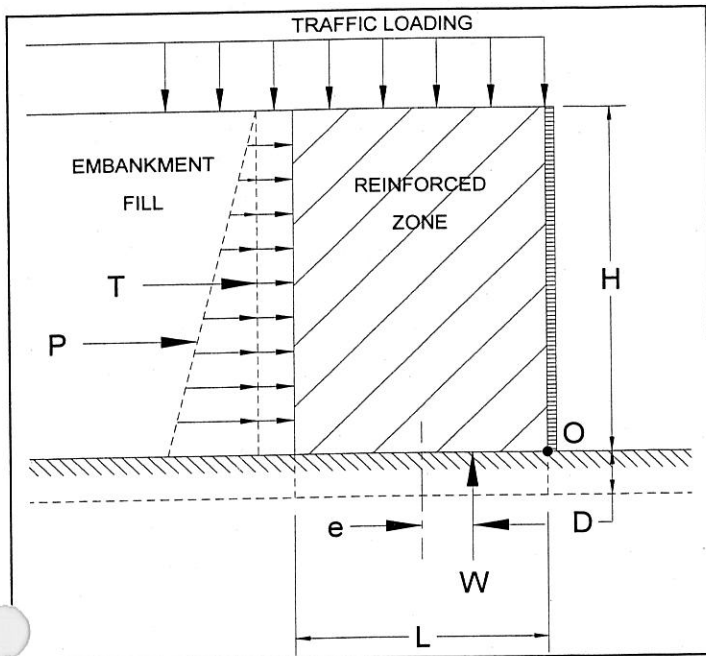
Undrained		Drained	
$N_c$	5.14	$N_c$	25.80
$N_q$	1.00	$N_q$	14.72
$N_\gamma$	0.00	$N_\gamma$	16.72

#### Eccentricity of Resultant Force

$e = 3.08$  ft

#### Kern

$e < L/6 = 5.47$  ft



#### Effective Bearing Pressure

$$\sigma_v = \frac{W_t + W_{MSE}}{L - 2e} \quad \sigma_v = 6,353 \text{ psf}$$

#### Ultimate undrained bearing capacity, $q_{ult}$

$$q_{ULT} = cN_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 10,280 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 4,112 \text{ psf}$$

Factor of Safety = 1.62 No Good

#### Ultimate drained bearing capacity, $q_{ult}$

$$q_{ULT} = c' N_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 12,828 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 5,131 \text{ psf}$$

Factor of Safety = 2.02 No Good



SUBJECT

Client TranSystems ODOT D-9

JOB NUMBER

0121-3070.03

Project SCI 823-0.00 Portsmouth Bypass

SHEET NO.

1 OF 1

Item MSE Wall Stability

COMP. BY

JAN DATE 1/3/06

US 23 / SR 823 - Ramp B (B-1109 no undercut)

CHECKED BY

TRK DATE 1-9-06

**STABILITY OF MSE WALL**

## Assumptions:

- 1 Estimated height of embankment;  $H=41$
- 2 ~~It is assumed that the bridge is supported on piles~~
- 3 Ground water;  $D_w=0.0'$
- 4 Traffic loading is neglected in resisting forces
- 5

## Wall Properties

$H = 41$  feet  
 $\gamma_{mse} = 120$  pcf  
 $L = 32.8$  feet  
 L factor = 0.80

## Foundational Soil Properties

$c = 2000$  psf cohesion  
 $\phi' = 28$  deg friction angle  
 $\omega_T = 240$  psf traffic loading  
 Length factor-range (0.7 - 1.0)

**RESISTANCE AGAINST SLIDING ALONG BASE**

Thrust:  $P_a = K_a \left[ \frac{1}{2} \gamma H^2 + \omega_T H \right]$

where;  $K_a = \tan^2(45 - \frac{\phi}{2})$   $K_a = 0.36$

$P_a = 39,852$  lbs per foot of wall

Resistance:  $P_r = W(0.67)(\mu)$  (Drained)

where;  $\mu = \tan(\phi)$   $0.67\mu = 0.36$

$0.67\mu$  Max. = 0.35 (AASHTO, Bridge Design Manual, 303.4.1.1)

$P_r = 56,482$  lbs per foot of wall

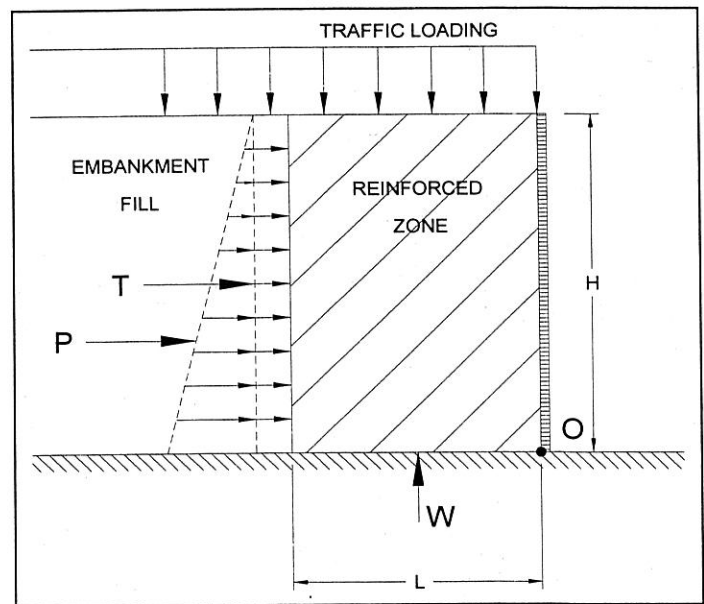
USE THIS VALUE

$P_r = L(c)$  (Undrained)

$P_r = 65,600$  lbs per foot of wall

Use Drained Value

$FS = \frac{P_r}{P_a}$  Calculated FS = 1.42 Required FS = 1.50

Resistance Against Sliding is **No Good****RESISTANCE AGAINST OVERTURNING**

\* Summation of Moments about point "O" (base of wall).

\* Traffic loading is neglected in resisting forces

$\Sigma M_{resisting} = 2,646,566$  lb-ft

$\Sigma M_{resisting} = \gamma H L \left( \frac{L}{2} \right)$

$\Sigma M_{overturning} = 568,850$  lb-ft

$\Sigma M_{overturning} = K_a \left[ \frac{1}{2} \gamma H^2 \left( \frac{H}{3} \right) + \omega_T H \left( \frac{H}{2} \right) \right]$

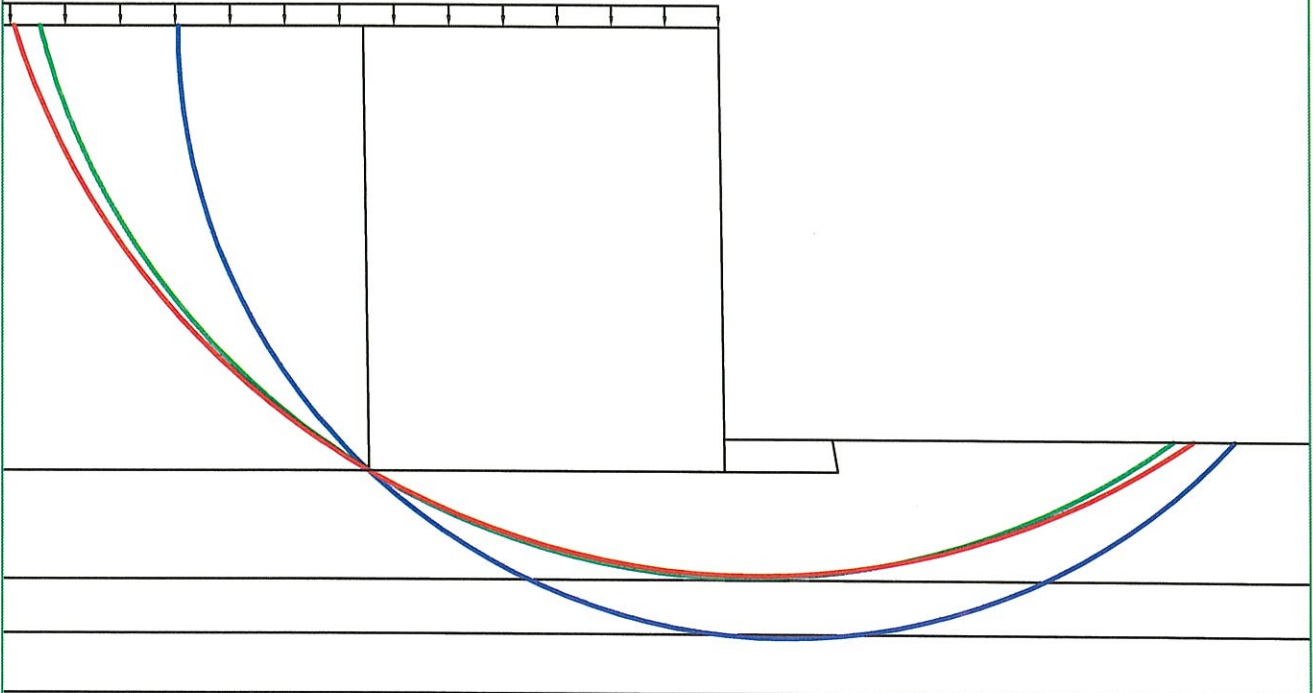
$FS = \frac{\Sigma M_{resisting}}{\Sigma M_{overturning}}$  Calculated FS = 4.65 Required FS = 2.00

Resistance Against Overturning is **OK**

Undrained - F.S. = 1.686

Drained - F.S. = 1.652

Seismic - F.S. = 1.557



MSE WALL EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
RAMP B B-1109  
WITHOUT 5' UNDERCUT

DRAWN:	CHK'D:
DESIGNED:	APPR'V'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
	0121-3070.03



SUBJECT

Client TranSystems

JOB NUMBER 0121-3070.03

Project SCI 823-0.00

SHEET NO. 1 OF 1

Item Bearing Capacity

COMP. BY JAN DATE 1/3/06

US 23 / SR 823 - Ramp B (B-1109 with undercut)

CHECKED BY TAW DATE 1-9-06

### BEARING CAPACITY OF A MSE WALL (non-coped)

Ref: (AASHTO; STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17th Edition, 2002)

#### Soil Properties

$\gamma_{MSE}$	=	120	pcf	unit weight	mse fill
$\gamma_{FDN}$	=	115	pcf	unit weight	foundation soil
$c$	=	0	psf	cohesion	undrained
$\phi$	=	34	deg.	friction ang.	undrained
$c'$	=	0	psf	cohesion	drained
$\phi'$	=	34	deg.	friction ang.	drained

#### Loads and Parameters

$\omega t$	=	240	psf	traffic loading
$L=B$	=	28.7	ft	length of mse block
$L$ factor	=	0.7		Length factor-range (0.7 - 1.0)
$D$	=	0	ft	embedment depth
$D_w$	=	0	ft	groundwater depth
$H+D$	=	41	ft	height of wall
$H$	=	41	ft	
$K_a$	=	0.33		ODOT BDM 204.6.2.1
$\Gamma Pa$	=	13.667	ft	moment arm
$\Gamma Wt$	=	20.5	ft	moment arm
$B'$	=	21.66	ft	
$\gamma'$	=	57.6	pcf	

$W_t = 6,888$  lb/ft of wall

$W_{mse} = 141,204$  lb/ft of wall

#### Bearing Capacity Factors for Equations

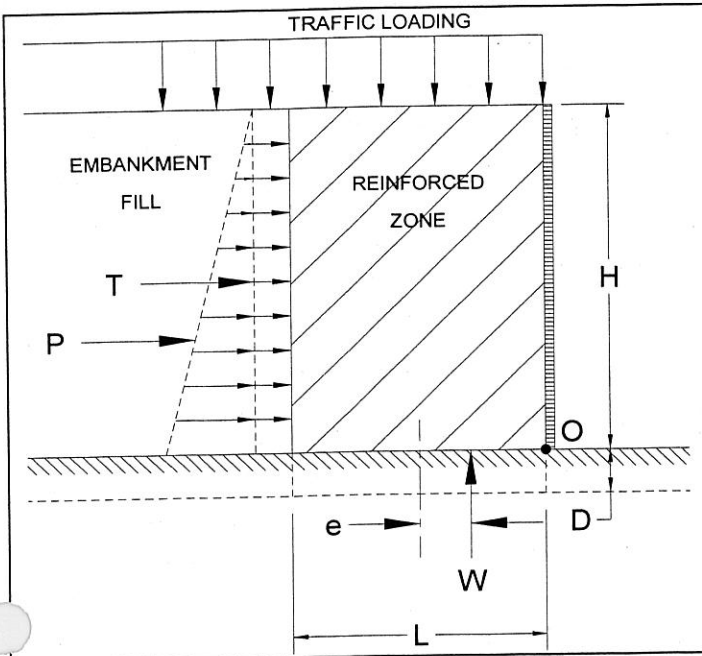
Undrained		Drained	
$N_c$	42.16	$N_c$	42.16
$N_q$	29.44	$N_q$	29.44
$N_\gamma$	41.06	$N_\gamma$	41.06

#### Eccentricity of Resultant Force

$e = 3.52$  ft

#### Kern

$e < L/6 = 4.78$  ft



#### Effective Bearing Pressure

$$\sigma_v = \frac{W_t + W_{MSE}}{L - 2e} \quad \sigma_v = 6,837 \text{ psf}$$

#### Ultimate undrained bearing capacity, $q_{ult}$

$$q_{ULT} = cN_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 25,614 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 10,246 \text{ psf}$$

Factor of Safety = 3.75 OK

#### Ultimate drained bearing capacity, $q_{ult}$

$$q_{ULT} = c'N_c + \sigma_D N_q + \frac{1}{2} \gamma B N_\gamma \quad q_{ULT} = 25,614 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 10,246 \text{ psf}$$

Factor of Safety = 3.75 OK



## STABILITY OF MSE WALL

### Assumptions:

- 1 Estimated height of embankment;  $H = 41'$
- 2 It is assumed that the bridge is supported on piles
- 3 Ground water;  $D_w = 0.0'$
- 4 Traffic loading is neglected in resisting forces
- 5

### Wall Properties

$H = 41$  feet  
 $\gamma_{mse} = 120$  pcf  
 $L = 28.7$  feet  
 L factor = 0.70

### Foundational Soil Properties

$c = 0$  psf cohesion  
 $\phi' = 34$  deg friction angle  
 $\omega_T = 240$  psf traffic loading  
 Length factor-range (0.7 - 1.0)

## RESISTANCE AGAINST SLIDING ALONG BASE

Thrust: 
$$P_a = K_a \left[ \frac{1}{2} \gamma H^2 + \omega_T H \right]$$

where;  $K_a = \tan^2(45 - \frac{\phi}{2})$   $K_a = 0.33$

$P_a = 36,531$  lbs per foot of wall

Resistance:  $P_r = W(0.67\mu)$  (Drained)

where;  $\mu = \tan(\phi)$   $0.67\mu = 0.45$

$0.67\mu$  Max. = 0.55 (AASHTO, Bridge Design Manual, 303.4.1.1)

$P_r = 63,542$  lbs per foot of wall

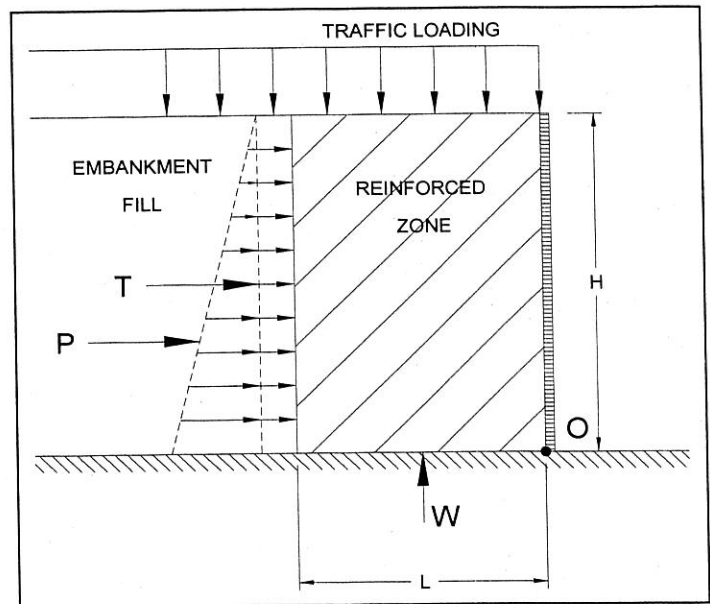
USE THIS VALUE

$P_r = L(c)$  (Undrained)

$P_r = 0$  lbs per foot of wall

Use Drained Value

	Calculated	Required	Resistance Against Sliding is	<b>OK</b>
$FS = \frac{P_r}{P_a}$	$FS = 1.74$	$FS = 1.50$		



## RESISTANCE AGAINST OVERTURNING

- \* Summation of Moments about point "O" (base of wall).
- \* Traffic loading is neglected in resisting forces

$\Sigma M_{resisting} = 2,026,277$  lb-ft

$\Sigma M_{resisting} = \gamma H L \left( \frac{L}{2} \right)$

$\Sigma M_{overturning} = 521,446$  lb-ft

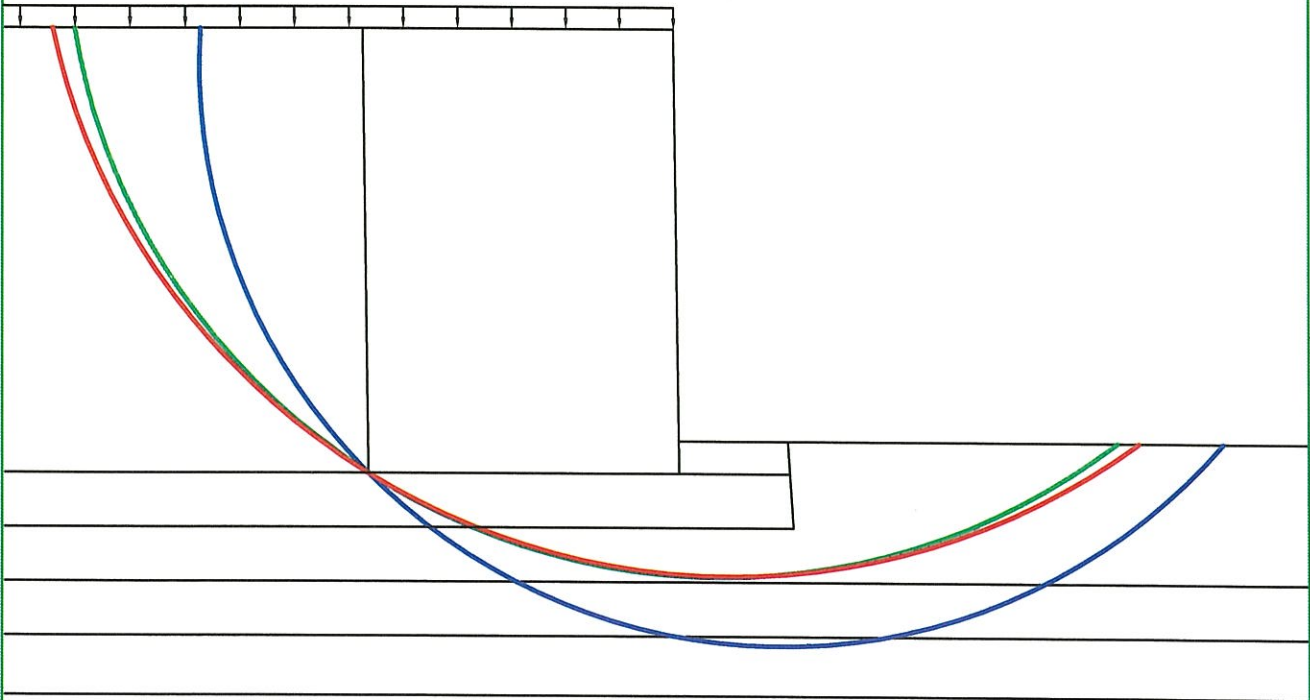
$\Sigma M_{overturning} = K_a \left[ \frac{1}{2} \gamma H^2 \left( \frac{H}{3} \right) + \omega_T H \left( \frac{H}{2} \right) \right]$

	Calculated	Required	Resistance Against Overturning is	<b>OK</b>
$FS = \frac{\Sigma M_{resisting}}{\Sigma M_{overturning}}$	$FS = 3.89$	$FS = 2.00$		

Undrained - F.S. = 1.763

Drained - F.S. = 1.626

Seismic - F.S. = 1.542



MSE WALL EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
RAMP B B-1109  
WITH 5' UNDERCUT

DRAWN:	CHK'D:
DESIGNED:	APPR'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
0121-3070.03	



SUBJECT

Client TranSystems

JOB NUMBER

0121-3070.03

Project SCI 823-0.00

SHEET NO.

1

OF

1

Item Bearing Capacity

COMP. BY

JAN

DATE

1/3/06

US 23 / SR 823 - Ramp B (TR-61 no undercut)

CHECKED BY

TRW

DATE

1-9-06

### BEARING CAPACITY OF A MSE WALL (non-coped)

Ref: {AASHTO; STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17th Edition, 2002}

#### Soil Properties

$\gamma_{MSE}$	=	120	pcf	unit weight	mse fill
$\gamma_{FDN}$	=	120	pcf	unit weight	foundation soil
$c$	=	0	psf	cohesion	undrained
$\phi$	=	28	deg.	friction ang.	undrained
$c'$	=	0	psf	cohesion	drained
$\phi'$	=	28	deg.	friction ang.	drained

#### Loads and Parameters

$\omega t$	=	240	psf	traffic loading
$L=B$	=	32.8	ft	length of mse block
L factor	=	0.8		Length factor-range (0.7 - 1.0)
$D$	=	0	ft	embedment depth
$D_w$	=	0	ft	groundwater depth
$H+D$	=	41	ft	height of wall
$H$	=	41	ft	
$K_a$	=	0.33		ODOT BDM 204.6.2.1
$\Gamma_{Pa}$	=	13.667	ft	moment arm
$\Gamma_{Wt}$	=	20.5	ft	moment arm
$B'$	=	26.64	ft	
$\gamma'$	=	57.6	pcf	

$W_t$	=	7,872	lb/ft of wall
$W_{mse}$	=	161,376	lb/ft of wall

#### Bearing Capacity Factors for Equations

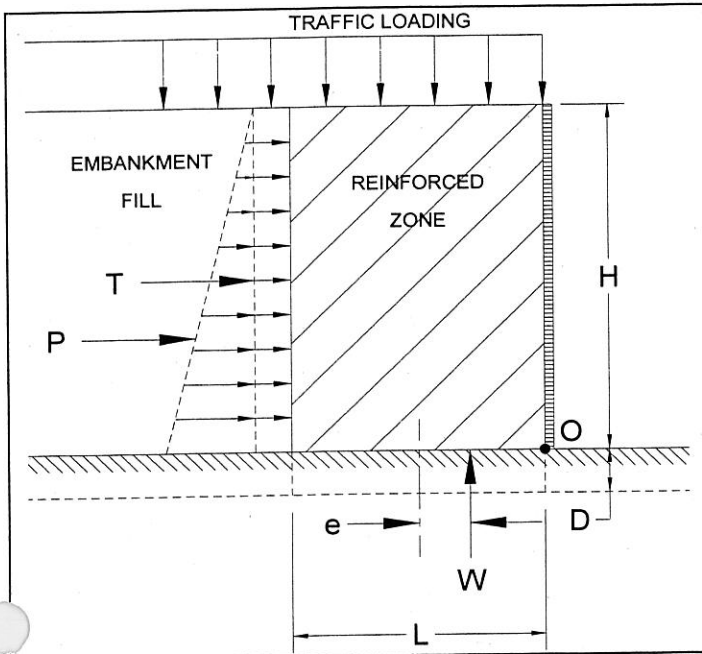
	Undrained		Drained
$N_c$	25.80	$N_c$	25.80
$N_q$	14.72	$N_q$	14.72
$N_\gamma$	16.72	$N_\gamma$	16.72

#### Eccentricity of Resultant Force

$e = 3.08$  ft

#### Kern

$e < L/6 = 5.47$  ft



#### Effective Bearing Pressure

$$\sigma_v = \frac{W_t + W_{MSE}}{L - 2e} \quad \sigma_v = \underline{\underline{6,353 \text{ psf}}}$$

#### Ultimate undrained bearing capacity, $q_{ult}$

$$q_{ULT} = cN_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = \underline{\underline{12,828 \text{ psf}}}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = \underline{\underline{5,131 \text{ psf}}}$$

Factor of Safety = 2.02 No Good

#### Ultimate drained bearing capacity, $q_{ult}$

$$q_{ULT} = c'N_c + \sigma_D N_q + \frac{1}{2} \gamma B N_\gamma \quad q_{ULT} = \underline{\underline{12,828 \text{ psf}}}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = \underline{\underline{5,131 \text{ psf}}}$$

Factor of Safety = 2.02 No Good



## STABILITY OF MSE WALL

### Assumptions:

- 1 Estimated height of embankment; H=30' <sup>41'</sup>
- ~~2 It is assumed that the bridge is supported on piles~~
- 3 Ground water; Dw=0.0'
- 4 Traffic loading is neglected in resisting forces
- 5

### Wall Properties

H = 41 feet  
 $\gamma_{mse} = 120$  pcf  
 L = 32.8 feet  
 L factor = 0.80

### Foundational Soil Properties

c = 0 psf cohesion  
 $\phi' = 28$  deg friction angle  
 $\omega_T = 240$  psf traffic loading  
 Length factor-range (0.7 - 1.0)

## RESISTANCE AGAINST SLIDING ALONG BASE

Thrust:  $P_a = K_a \left[ \frac{1}{2} \gamma H^2 + \omega_T H \right]$

where;  $K_a = \tan^2(45 - \frac{\phi}{2})$   $K_a = 0.36$

$P_a = 39,852$  lbs per foot of wall

Resistance:  $P_r = W(0.67)(\mu)$  (Drained)

where;  $\mu = \tan(\phi)$   $0.67\mu = 0.36$

$0.67\mu$  Max. = 0.35 {AASHTO, Bridge Design Manual, 303.4.1.1}

$P_r = 56,482$  lbs per foot of wall

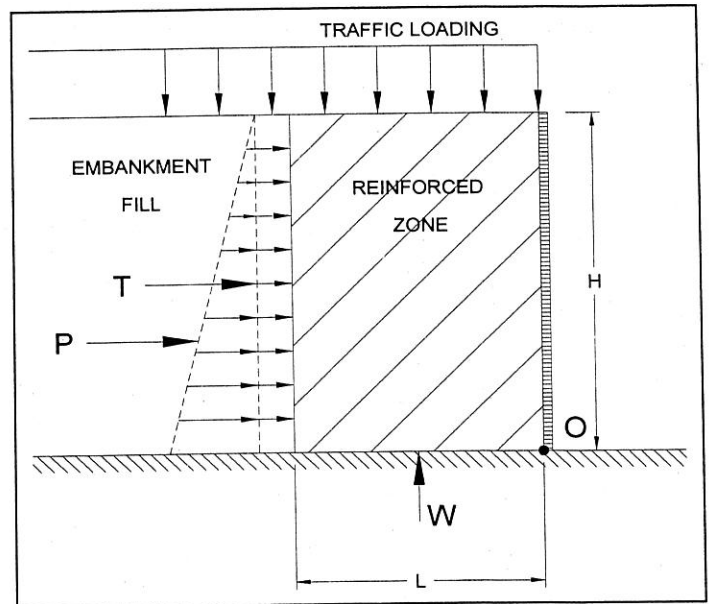
**USE THIS VALUE**

$P_r = L(c)$  (Undrained)

$P_r = 0$  lbs per foot of wall

**Use Drained Value**

	Calculated	Required	Resistance Against Sliding is
$FS = \frac{P_r}{P_a}$	FS = 1.42	FS = 1.50	<b>No Good</b>



## RESISTANCE AGAINST OVERTURNING

\* Summation of Moments about point "O" (base of wall).

\* Traffic loading is neglected in resisting forces

$\Sigma M_{resisting} = 2,646,566$  lb-ft

$\Sigma M_{resisting} = \gamma HL \left( \frac{L}{2} \right)$

$\Sigma M_{overturning} = 568,850$  lb-ft

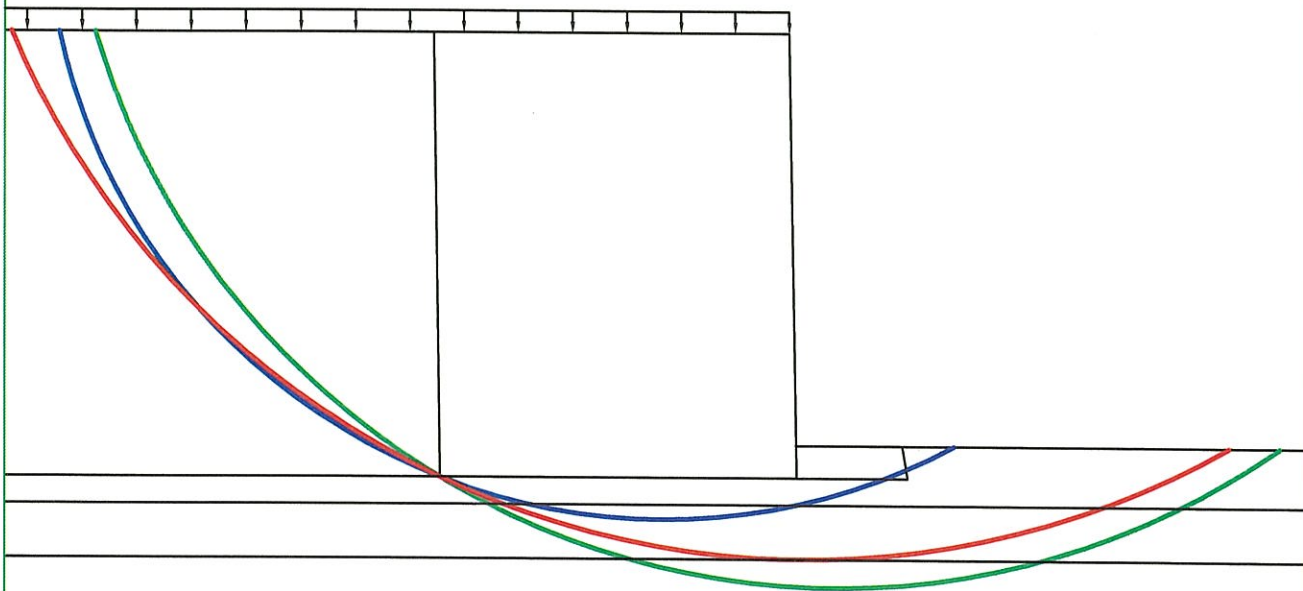
$\Sigma M_{overturning} = K_a \left[ \frac{1}{2} \gamma H^2 \left( \frac{H}{3} \right) + \omega_T H \left( \frac{H}{2} \right) \right]$

	Calculated	Required	Resistance Against Overturning is
$FS = \frac{\Sigma M_{resisting}}{\Sigma M_{overturning}}$	FS = 4.65	FS = 2.00	<b>OK</b>

Undrained - F.S. = 1.681

Drained - F.S. = 1.760

Seismic - F.S. = 1.645



MSE WALL EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
RAMP B TR-61  
WITHOUT 5' UNDERCUT

DRAWN:	CHK'D:
DESIGNED:	APPR'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
0121-3070.03	



SUBJECT

Client TranSystems

JOB NUMBER 0121-3070.03

Project SCI 823-0.00

SHEET NO. 1 OF 1

Item Bearing Capacity

COMP. BY JAN DATE 1/3/06

US 23 / SR 823 - Ramp B (TR-61 with undercut)

CHECKED BY TJK DATE 1-9-06

### BEARING CAPACITY OF A MSE WALL (non-coped)

Ref: {AASHTO; STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17th Edition, 2002}

#### Soil Properties

$\gamma_{MSE}$	=	120	pcf	unit weight	mse fill
$\gamma_{FDN}$	=	115	pcf	unit weight	foundation soil
$c$	=	0	psf	cohesion	undrained
$\phi$	=	34	deg.	friction ang.	undrained
$c'$	=	0	psf	cohesion	drained
$\phi'$	=	34	deg.	friction ang.	drained

#### Loads and Parameters

$\omega t$	=	240	psf	traffic loading
$L=B$	=	28.7	ft	length of mse block
L factor	=	0.7		Length factor-range (0.7 - 1.0)
D	=	0	ft	embedment depth
Dw	=	0	ft	groundwater depth
H+D	=	41	ft	height of wall
H	=	41	ft	height of wall
$K_a$	=	0.33		ODOT BDM 204.6.2.1
$\Gamma Pa$	=	13.667	ft	moment arm
$\Gamma Wt$	=	20.5	ft	moment arm
$B'$	=	21.66	ft	
$\gamma'$	=	57.6	pcf	

$W_t = 6,888$  lb/ft of wall

$W_{mse} = 141,204$  lb/ft of wall

#### Bearing Capacity Factors for Equations

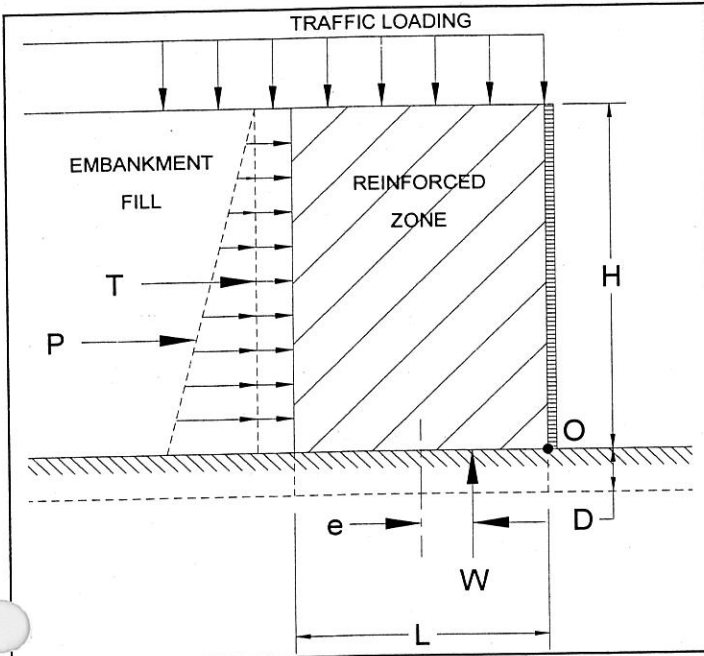
Undrained		Drained	
$N_c$	42.16	$N_c$	42.16
$N_q$	29.44	$N_q$	29.44
$N_\gamma$	41.06	$N_\gamma$	41.06

#### Eccentricity of Resultant Force

$e = 3.52$  ft

#### Kern

$e < L/6 = 4.78$  ft



#### Effective Bearing Pressure

$$\sigma_v = \frac{W_t + W_{MSE}}{L - 2e} \quad \sigma_v = 6,837 \text{ psf}$$

#### Ultimate undrained bearing capacity, $q_{ult}$

$$q_{ULT} = cN_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 25,614 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 10,246 \text{ psf}$$

Factor of Safety = 3.75 OK

#### Ultimate drained bearing capacity, $q_{ult}$

$$q_{ULT} = c' N_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 25,614 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 10,246 \text{ psf}$$

Factor of Safety = 3.75 OK



SUBJECT

Client TranSystems ODOT D-9

JOB NUMBER

0121-3070.03

Project SCI 823-0.00 Portsmouth Bypass

SHEET NO.

1

OF

1

Item MSE Wall Stability

COMP. BY

JAN

DATE

1/3/06

US 23/SR 823 - Ramp B (TR-61 with undercut)

CHECKED BY

TAKA

DATE

1-9-06

### STABILITY OF MSE WALL

**Assumptions:**

- 1 Estimated height of embankment; H = 41' ~~30'~~
- 2 It is assumed that the bridge is supported on piles.
- 3 Ground water; Dw=0.0'
- 4 Traffic loading is neglected in resisting forces
- 5

**Wall Properties**

H = 41 feet  
 $\gamma_{mse}$  = 120 pcf  
 L = 28.7 feet  
 L factor = 0.70

**Foundational Soil Properties**

c = 0 psf cohesion  
 $\phi'$  = 34 deg friction angle  
 $\omega_T$  = 240 psf traffic loading  
 Length factor-range (0.7 - 1.0)

### RESISTANCE AGAINST SLIDING ALONG BASE

**Thrust:**  $P_a = K_a \left[ \frac{1}{2} \gamma H^2 + \omega_T H \right]$

where;  $K_a = \tan^2(45 - \frac{\phi}{2})$   $K_a = 0.33$

$P_a = 36,531$  lbs per foot of wall

**Resistance:**  $P_r = W(0.67)(\mu)$  (Drained)

where;  $\mu = \tan(\phi)$   $0.67\mu = 0.45$

$0.67\mu$  Max. = 0.55 (AASHTO, Bridge Design Manual, 303.4.1.1)

$P_r = 63,542$  lbs per foot of wall

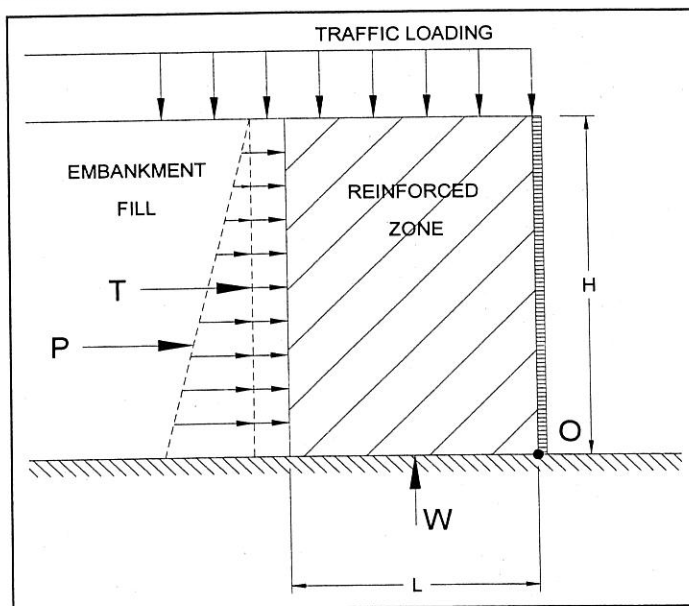
**USE THIS VALUE**

$P_r = L(c)$  (Undrained)

$P_r = 0$  lbs per foot of wall

**Use Drained Value**

	Calculated	Required	Resistance Against Sliding is	<b>OK</b>
$FS = \frac{P_r}{P_a}$	$FS = 1.74$	$FS = 1.50$		



### RESISTANCE AGAINST OVERTURNING

- \* Summation of Moments about point "O" (base of wall).
- \* Traffic loading is neglected in resisting forces

$\Sigma M_{resisting} = 2,026,277$  lb-ft

$\Sigma M_{resisting} = \gamma H L \left( \frac{L}{2} \right)$

$\Sigma M_{overturning} = 521,446$  lb-ft

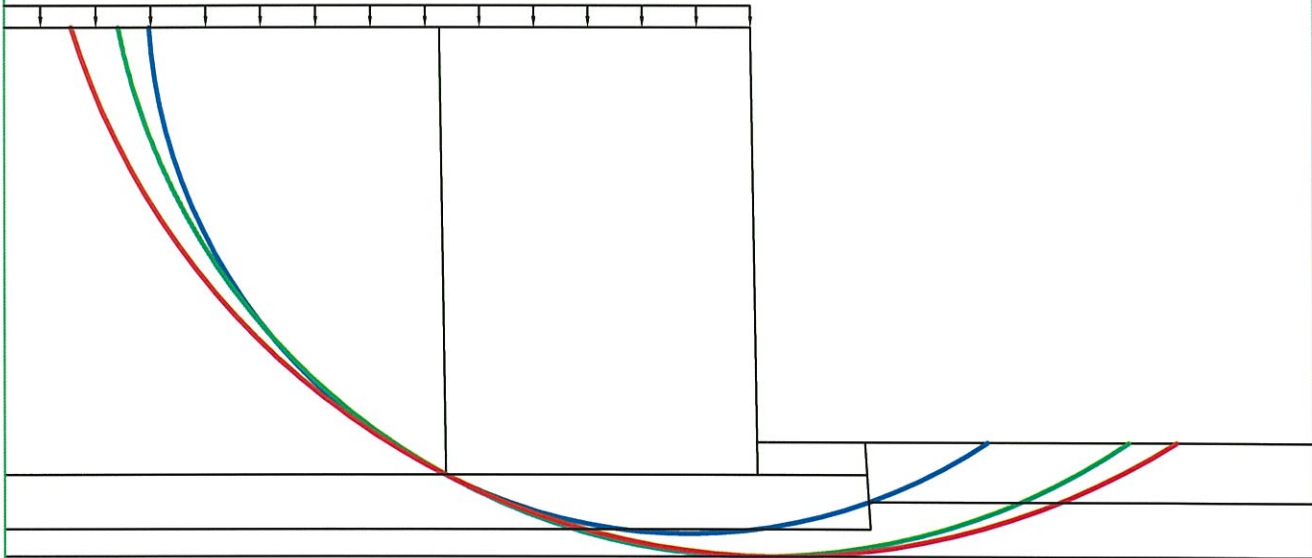
$\Sigma M_{overturning} = K_a \left[ \frac{1}{2} \gamma H^2 \left( \frac{H}{3} \right) + \omega_T H \left( \frac{H}{2} \right) \right]$

	Calculated	Required	Resistance Against Overturning is	<b>OK</b>
$FS = \frac{\Sigma M_{resisting}}{\Sigma M_{overturning}}$	$FS = 3.89$	$FS = 2.00$		

Undrained - F.S. = 1.667

Drained - F.S. = 1.705

Seismic - F.S. = 1.612



MSE WALL EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
RAMP B TR-61  
WITH 5' UNDERCUT

DRAWN:	CHK'D:
DESIGNED:	APPRV'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
0121-3070.03	










SCI-823-0.00 DLZ Job #: 0121-3070.03

JS 23 / SR 823 MSE Wall Evaluations -- Ramp C








Borings: B-1119 - B-1126, TR-46 - TR-48

**Boring -- B-1119**

MSE Height	44'	Rq'd	Calculated	L=0.8H
 Bearing Capacity - UD		2.5	<b>1.51</b>	
 Bearing Capacity - D		2.5	2.72	
 Sliding		1.5	1.56	
 Overturning		2.0	5.12	
 Undrained		1.5	1.86	
 Drained		1.5	1.73	
 Seismic		1.1	1.63	








**Comment:**

**Boring -- B-1124**

MSE Height	44'	Rq'd	Calculated	L=0.8H
 Bearing Capacity - UD		2.5	0.91	
 Bearing Capacity - D		2.5	<b>2.03</b>	
 Sliding		1.5	<b>0.93</b>	
 Overturning		2.0	4.69	
 Undrained		1.5	2.81	
 Drained		1.5	1.63	
 Seismic		1.1	1.55	








**Comment:** Global Stability was performed with actual proposed wall height

**Boring -- B-1120 / 21**

MSE Height	44'	Rq'd	Calculated	L=0.8H
 Bearing Capacity - UD		2.5	<b>1.89</b>	
 Bearing Capacity - D		2.5	<b>2.03</b>	
 Sliding		1.5	<b>1.43</b>	
 Overturning		2.0	4.69	
 Undrained		1.5	<b>1.39</b>	
 Drained		1.5	1.66	
 Seismic		1.1	1.56	








**Comment:**

**Boring -- TR-47**

MSE Height	44'	Rq'd	Calculated	L=0.8H
 Bearing Capacity - UD		2.5	<b>1.51</b>	
 Bearing Capacity - D		2.5	2.72	
 Sliding		1.5	1.56	
 Overturning		2.0	5.12	
 Undrained		1.5	1.65	
 Drained		1.5	1.53	
 Seismic		1.1	1.45	








**Comment:**

**Boring -- B-1119**

MSE Height	44'	Rq'd	Calculated	L=0.7H
 Bearing Capacity - UD		2.5	3.77	
 Bearing Capacity - D		2.5	3.77	
 Sliding		1.5	1.75	
 Overturning		2.0	3.92	
 Undrained		1.5	1.88	
 Drained		1.5	1.68	
 Seismic		1.1	1.59	

**Comment:** Undercut with 5' of ODOT 304








**Boring -- B-1124**

MSE Height	44'	Rq'd	Calculated	L=0.7H
 Bearing Capacity - UD		2.5	3.77	
 Bearing Capacity - D		2.5	3.77	
 Sliding		1.5	1.75	
 Overturning		2.0	3.92	
 Undrained		1.5	1.87	
 Drained		1.5	1.82	
 Seismic		1.1	1.74	

**Comment:** Undercut with 5' of ODOT 304

Global Stability was performed with actual proposed wall height








**Boring -- B-1120 / 21**

MSE Height	44'	Rq'd	Calculated	L=0.7H
 Bearing Capacity - UD		2.5	3.77	
 Bearing Capacity - D		2.5	3.77	
 Sliding		1.5	1.75	
 Overturning		2.0	3.92	
 Undrained		1.5	<b>1.42*</b>	
 Drained		1.5	1.63	
 Seismic		1.1	1.54	

**Comment:** Undercut with 5' of ODOT 304

\*F.S.<1.5, However per ODOT BDM 204.6.2.1 required F.S.>1.3 "For all other walls". This does not control the design.

**Boring -- TR-47**

MSE Height	44'	Rq'd	Calculated	L=0.7H
 Bearing Capacity - UD		2.5	3.77	
 Bearing Capacity - D		2.5	3.77	
 Sliding		1.5	1.75	
 Overturning		2.0	3.92	
 Undrained		1.5	1.67	
 Drained		1.5	1.50	
 Seismic		1.1	1.42	

**Comment:** Undercut with 5' of ODOT 304

## BEARING CAPACITY OF A MSE WALL (non-coped)

Ref: (AASHTO; STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17th Edition, 2002)

### Soil Properties

$\gamma_{MSE}$	=	120	pcf	unit weight	mse fill
$\gamma_{FDN}$	=	125	pcf	unit weight	foundation soil
$c$	=	2000	psf	cohesion	undrained
$\phi$	=	0	deg.	friction ang.	undrained
$c'$	=	0	psf	cohesion	drained
$\phi'$	=	30	deg.	friction ang.	drained

### Loads and Parameters

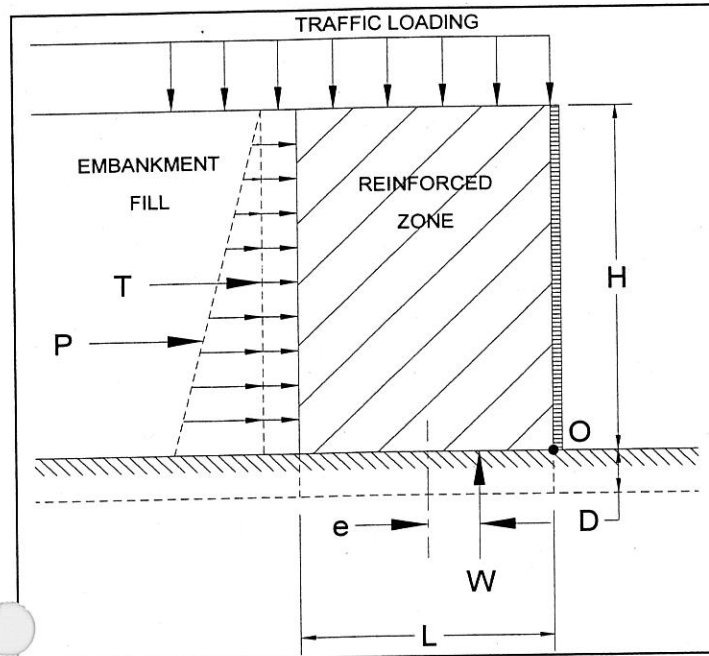
$\omega t$	=	240	psf	traffic loading
$L=B$	=	35.2	ft	length of mse block
$L$ factor	=	0.8		Length factor-range (0.7 - 1.0)
$D$	=	0	ft	embedment depth
$D_w$	=	0	ft	groundwater depth
$H+D$	=	44	ft	height of wall
$H$	=	44	ft	
$K_a$	=	0.33		ODOT BDM 204.6.2.1
$\Gamma Pa$	=	14.667	ft	moment arm
$\Gamma Wt$	=	22	ft	moment arm
$B'$	=	28.62	ft	
$\gamma'$	=	57.6	pcf	

$W_t = 8,448$  lb/ft of wall

$W_{mse} = 185,856$  lb/ft of wall

### Bearing Capacity Factors for Equations

	Undrained		Drained
$N_c$	5.14	$N_c$	30.14
$N_q$	1.00	$N_q$	18.40
$N_\gamma$	0.00	$N_\gamma$	22.40



### Effective Bearing Pressure

$$\sigma_v = \frac{W_t + W_{MSE}}{L - 2e} \quad \sigma_v = 6,789 \text{ psf}$$

### Ultimate undrained bearing capacity, $q_{ult}$

$$q_{ULT} = cN_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 10,280 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 4,112 \text{ psf}$$

Factor of Safety = 1.51 No Good

### Ultimate drained bearing capacity, $q_{ult}$

$$q_{ULT} = c' N_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 18,463 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 7,385 \text{ psf}$$

Factor of Safety = 2.72 OK

### Eccentricity of Resultant Force

$e = 3.29$  ft

### Kern

$e < L/6 = 5.87$  ft

### STABILITY OF MSE WALL

#### Assumptions:

- 1 Estimated height of embankment;  $H = 44'$
- ~~2 It is assumed that the bridge is supported on piles.~~
- 3 Ground water;  $D_w = 0.0'$
- 4 Traffic loading is neglected in resisting forces
- 5

#### Wall Properties

$H = 44$  feet  
 $\gamma_{mse} = 120$  pcf  
 $L = 35.2$  feet  
 L factor = 0.80

#### Foundational Soil Properties

$c = 2000$  psf cohesion  
 $\phi' = 30$  deg friction angle  
 $\omega_T = 240$  psf traffic loading  
 Length factor-range (0.7 - 1.0)

### RESISTANCE AGAINST SLIDING ALONG BASE

Thrust: 
$$P_a = K_a \left[ \frac{1}{2} \gamma H^2 + \omega_T H \right]$$

where;  $K_a = \tan^2 \left( 45 - \frac{\phi}{2} \right)$   $K_a = 0.33$

$P_a = 41,818$  lbs per foot of wall

Resistance:  $P_r = W(0.67\mu)$  (Drained)

where;  $\mu = \tan(\phi)$   $0.67\mu = 0.39$

$0.67\mu$  Max. = 0.35 (AASHTO, Bridge Design Manual, 303.4.1.1)

$P_r = 65,050$  lbs per foot of wall

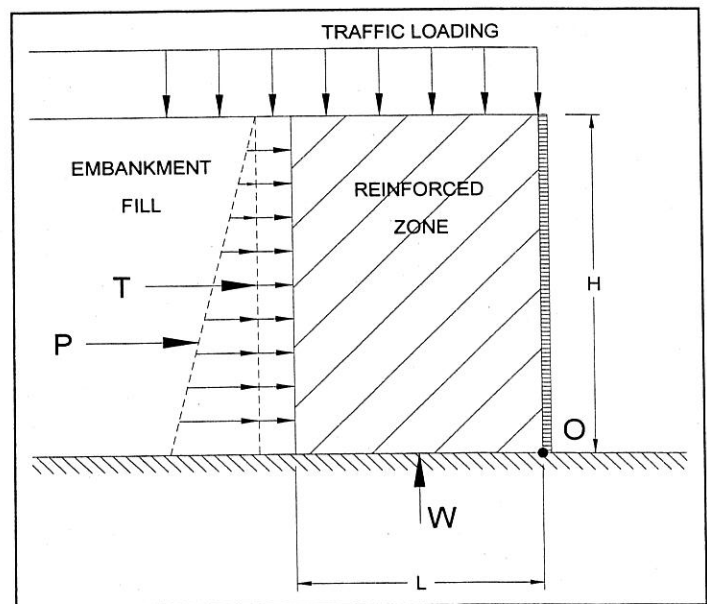
USE THIS VALUE

$P_r = L(c)$  (Undrained)

$P_r = 70,400$  lbs per foot of wall

Use Drained Value

	Calculated	Required	Resistance Against Sliding is	<b>OK</b>
$FS = \frac{P_r}{P_a}$	$FS = 1.56$	$FS = 1.50$		



### RESISTANCE AGAINST OVERTURNING

- \* Summation of Moments about point "O" (base of wall).
- \* Traffic loading is neglected in resisting forces

$\Sigma M_{resisting} = 3,271,066$  lb-ft

$\Sigma M_{resisting} = \gamma H L \left( \frac{L}{2} \right)$

$\Sigma M_{overturning} = 638,880$  lb-ft

$\Sigma M_{overturning} = K_a \left[ \frac{1}{2} \gamma H^2 \left( \frac{H}{3} \right) + \omega_T H \left( \frac{H}{2} \right) \right]$

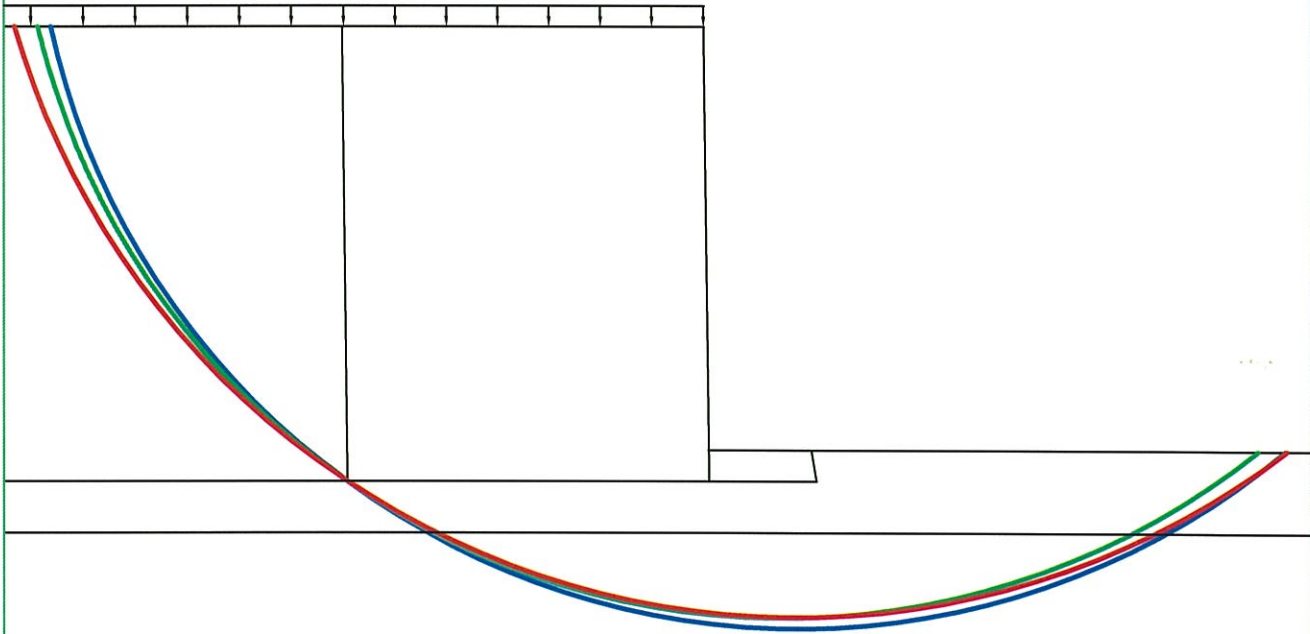
	Calculated	Required	Resistance Against Overturning is	<b>OK</b>
$FS = \frac{\Sigma M_{resisting}}{\Sigma M_{overturning}}$	$FS = 5.12$	$FS = 2.00$		



Undrained - F.S. = 1.855

Drained - F.S. = 1.728

Seismic - F.S. = 1.628



MSE WALL EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
RAMP C B-1119  
WITHOUT 5' UNDERCUT

DRAWN:	CHK'D:
DESIGNED:	APPRV'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
0121-3070.03	

### BEARING CAPACITY OF A MSE WALL (non-coped)

Ref: {AASHTO; STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17th Edition, 2002}

#### Soil Properties

$\gamma_{MSE}$	=	120	pcf	unit weight	mse fill
$\gamma_{FDN}$	=	115	pcf	unit weight	foundation soil
$c$	=	0	psf	cohesion	undrained
$\phi$	=	34	deg.	friction ang.	undrained
$c'$	=	0	psf	cohesion	drained
$\phi'$	=	34	deg.	friction ang.	drained

#### Loads and Parameters

$\omega t$	=	240	psf	traffic loading
$L=B$	=	30.8	ft	length of mse block
$L$ factor	=	0.7		Length factor-range (0.7 - 1.0)
$D$	=	0	ft	embedment depth
$D_w$	=	0	ft	groundwater depth
$H+D$	=	44	ft	✓ height of wall
$H$	=	44	ft	height of wall
$K_a$	=	0.33		ODOT BDM 204.6.2.1
$\Gamma$ Pa	=	14.667	ft	moment arm
$\Gamma$ Wt	=	22	ft	moment arm
$B'$	=	23.28	ft	
$\gamma'$	=	57.6	pcf	

$$W_t = 7,392 \text{ lb/ft of wall}$$

$$W_{mse} = 162,624 \text{ lb/ft of wall}$$

#### Bearing Capacity Factors for Equations

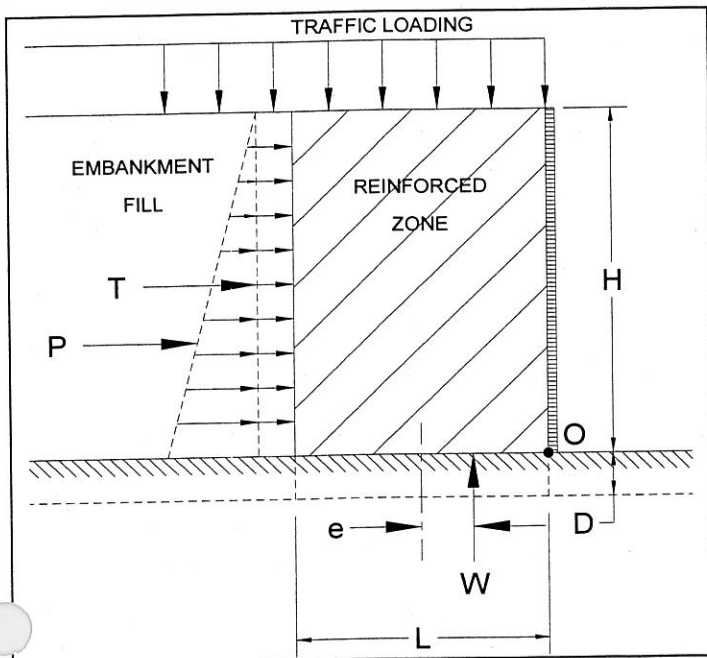
Undrained		Drained	
$N_c$	42.16	$N_c$	42.16
$N_q$	29.44	$N_q$	29.44
$N_\gamma$	41.06	$N_\gamma$	41.06

#### Eccentricity of Resultant Force

$$e = 3.76 \text{ ft}$$

#### Kern

$$e < L/6 = 5.13 \text{ ft}$$



#### Effective Bearing Pressure

$$\sigma_v = \frac{W_t + W_{MSE}}{L - 2e} \quad \sigma_v = 7,303 \text{ psf}$$

#### Ultimate undrained bearing capacity, $q_{ult}$

$$q_{ULT} = cN_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 27,529 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 11,012 \text{ psf}$$

Factor of Safety = 3.77 OK

#### Ultimate drained bearing capacity, $q_{ult}$

$$q_{ULT} = c' N_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 27,529 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 11,012 \text{ psf}$$

Factor of Safety = 3.77 OK

### STABILITY OF MSE WALL

Assumptions:

- 1 Estimated height of embankment; H = ~~30~~ <sup>44</sup>
- 2 It is assumed that the bridge is supported on piles
- 3 Ground water; Dw=0.0'
- 4 Traffic loading is neglected in resisting forces
- 5

Wall Properties

H = 44 feet  
 $\gamma_{mse}$  = 120 pcf  
 L = 30.8 feet  
 L factor = 0.70

Foundational Soil Properties

c = 0 psf cohesion  
 $\phi'$  = 34 deg friction angle  
 $\omega_T$  = 240 psf traffic loading  
 Length factor-range (0.7 - 1.0)

### RESISTANCE AGAINST SLIDING ALONG BASE

Thrust:  $P_a = K_a \left[ \frac{1}{2} \gamma H^2 + \omega_T H \right]$

where;  $K_a = \tan^2 \left( 45 - \frac{\phi}{2} \right)$   $K_a = 0.33$

$P_a = 41,818$  lbs per foot of wall

Resistance:  $P_r = W(0.67\mu)$  (Drained)

where;  $\mu = \tan(\phi)$   $0.67\mu = 0.45$   
 $0.67\mu$  Max. = 0.55 (AASHTO, Bridge Design Manual, 303.4.1.1)

$P_r = 73,181$  lbs per foot of wall

USE THIS VALUE

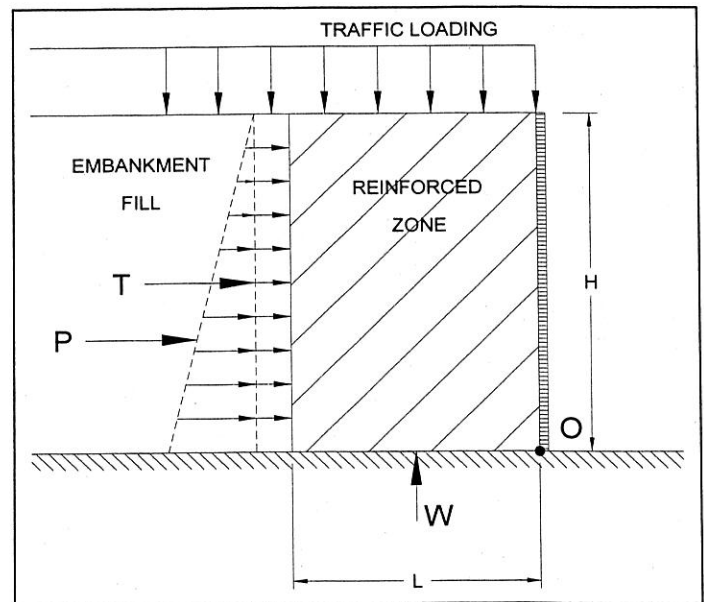
$P_r = L(c)$  (Undrained)

$P_r = 0$  lbs per foot of wall

Use Drained Value

Calculated  $FS = 1.75$  Required  $FS = 1.50$

Resistance Against Sliding is **OK**



### RESISTANCE AGAINST OVERTURNING

- \* Summation of Moments about point "O" (base of wall).
- \* Traffic loading is neglected in resisting forces

$\Sigma M_{resisting} = 2,504,410$  lb-ft

$\Sigma M_{resisting} = \gamma HL \left( \frac{L}{2} \right)$

$\Sigma M_{overturning} = 638,880$  lb-ft

$\Sigma M_{overturning} = K_a \left[ \frac{1}{2} \gamma H^2 \left( \frac{H}{3} \right) + \omega_T H \left( \frac{H}{2} \right) \right]$

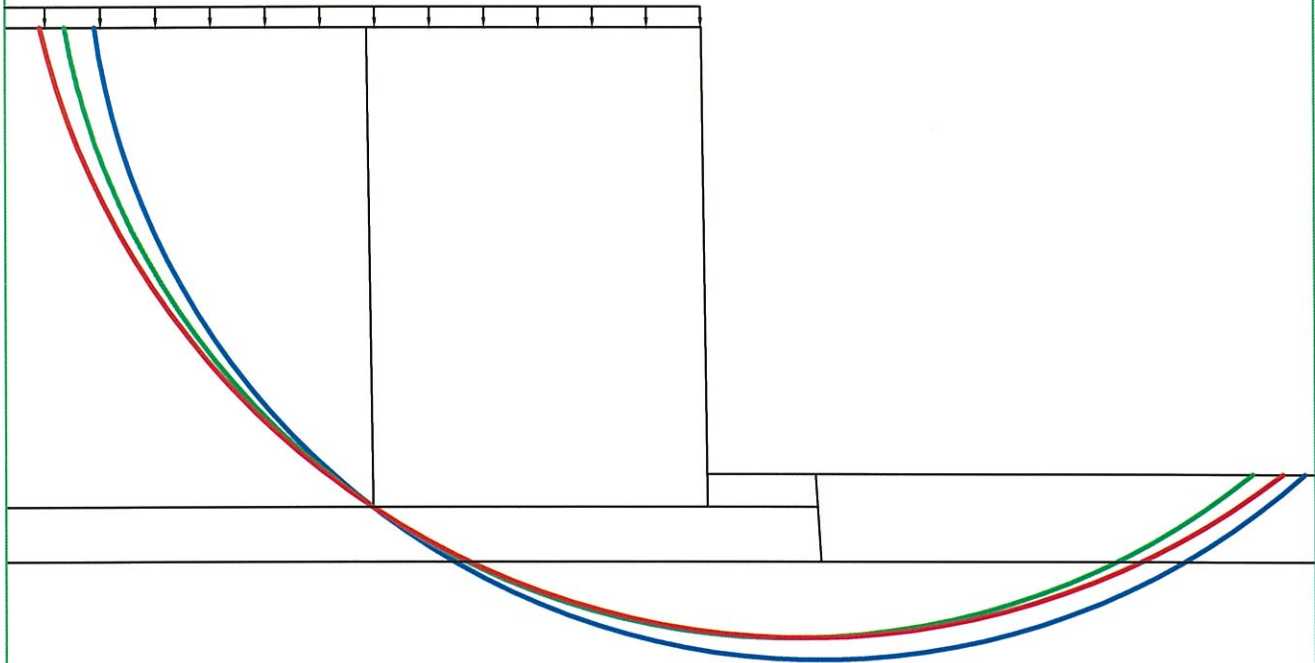
Calculated  $FS = 3.92$  Required  $FS = 2.00$

Resistance Against Overturning is **OK**

Undrained - F.S. = 1.883

Drained - F.S. = 1.679

Seismic - F.S. = 1.590



MSE WALL EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
RAMP C B-1119  
WITH 5' UNDERCUT

DRAWN:	CHK'D:
DESIGNED:	APPR'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
0121-3070.03	



SUBJECT Client TranSystems  
 Project SCI 823-0.00  
 Item Bearing Capacity  
 US 23 / SR 823 - Ramp C (B-1124 no undercut)

JOB NUMBER 0121-3070.03  
 SHEET NO. 1 OF 1  
 COMP. BY JAN DATE 1/3/06  
 CHECKED BY TRW DATE 1-9-06

### BEARING CAPACITY OF A MSE WALL (non-coped)

Ref: {AASHTO; STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17th Edition, 2002}

#### Soil Properties

$\gamma_{MSE}$	=	120	pcf	unit weight	mse fill
$\gamma_{FDN}$	=	125	pcf	unit weight	foundation soil
$c$	=	1200	psf	cohesion	undrained
$\phi$	=	0	deg.	friction ang.	undrained
$c'$	=	0	psf	cohesion	drained
$\phi'$	=	28	deg.	friction ang.	drained

#### Loads and Parameters

$\omega t$	=	240	psf	traffic loading
$L=B$	=	35.2	ft	length of mse block
$L$ factor	=	0.8		Length factor-range (0.7 - 1.0)
$D$	=	0	ft	embedment depth
$D_w$	=	0	ft	groundwater depth
$H+D$	=	44	ft	
$H$	=	44	ft	height of wall
$K_a$	=	0.33		ODOT BDM 204.6.2.1
$\Gamma Pa$	=	14.667	ft	moment arm
$\Gamma Wt$	=	22	ft	moment arm
$B'$	=	28.62	ft	
$\gamma'$	=	57.6	pcf	

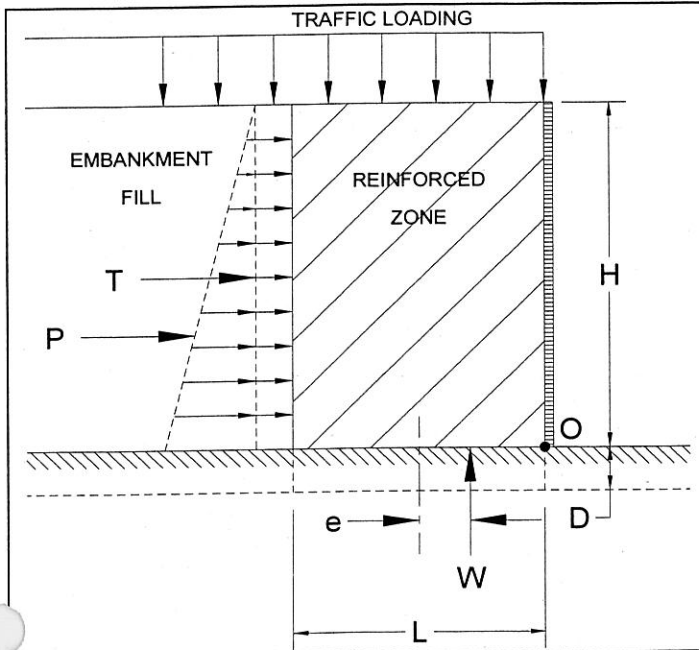
$W_t$	=	8,448	lb/ft of wall
$W_{mse}$	=	185,856	lb/ft of wall

#### Bearing Capacity Factors for Equations

Undrained		Drained	
$N_c$	5.14	$N_c$	25.80
$N_q$	1.00	$N_q$	14.72
$N_\gamma$	0.00	$N_\gamma$	16.72

#### Eccentricity of Resultant Force

$e$	=	3.29	ft	<u>Kern</u>
				$e < L/6 = 5.87$ ft



#### Effective Bearing Pressure

$$\sigma_v = \frac{W_t + W_{MSE}}{L - 2e} \quad \sigma_v = 6,789 \text{ psf}$$

#### Ultimate undrained bearing capacity, $q_{ult}$

$$q_{ULT} = cN_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 6,168 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 2,467 \text{ psf}$$

Factor of Safety = 0.91 No Good

#### Ultimate drained bearing capacity, $q_{ult}$

$$q_{ULT} = c' N_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 13,782 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 5,513 \text{ psf}$$

Factor of Safety = 2.03 No Good



SUBJECT

Client TranSystems ODOT D-9  
 Project SCI 823-0.00 Portsmouth Bypass  
 Item MSE Wall Stability  
 US 23 / SR 823 - Ramp C (B-1124 no undercut)

JOB NUMBER 0121-3070.03  
 SHEET NO. 1 OF 1  
 COMP. BY JAN DATE 1/3/06  
 CHECKED BY TAW DATE 1-9-06

### STABILITY OF MSE WALL

#### Assumptions:

- 1 Estimated height of embankment; H=30 <sup>44'</sup>
- ~~2 It is assumed that the bridge is supported on piles~~
- 3 Ground water; Dw=0.0'
- 4 Traffic loading is neglected in resisting forces
- 5

#### Wall Properties

H = 44 feet  
 $\gamma_{mse}$  = 120 pcf  
 L = 35.2 feet  
 L factor = 0.80

#### Foundational Soil Properties

c = 1200 psf cohesion  
 $\phi'$  = 28 deg friction angle  
 $\omega_T$  = 240 psf traffic loading  
 Length factor-range (0.7 - 1.0)

### RESISTANCE AGAINST SLIDING ALONG BASE

Thrust:  $P_a = K_a \left[ \frac{1}{2} \gamma H^2 + \omega_T H \right]$

where;  $K_a = \tan^2 \left( 45 - \frac{\phi}{2} \right)$   $K_a = 0.36$

$P_a = 45,619$  lbs per foot of wall

Resistance:  $P_r = W(0.67)(\mu)$  (Drained)

where;  $\mu = \tan(\phi)$   $0.67\mu = 0.36$

$0.67\mu$  Max. = 0.35 (AASHTO, Bridge Design Manual, 303.4.1.1)

$P_r = 65,050$  lbs per foot of wall

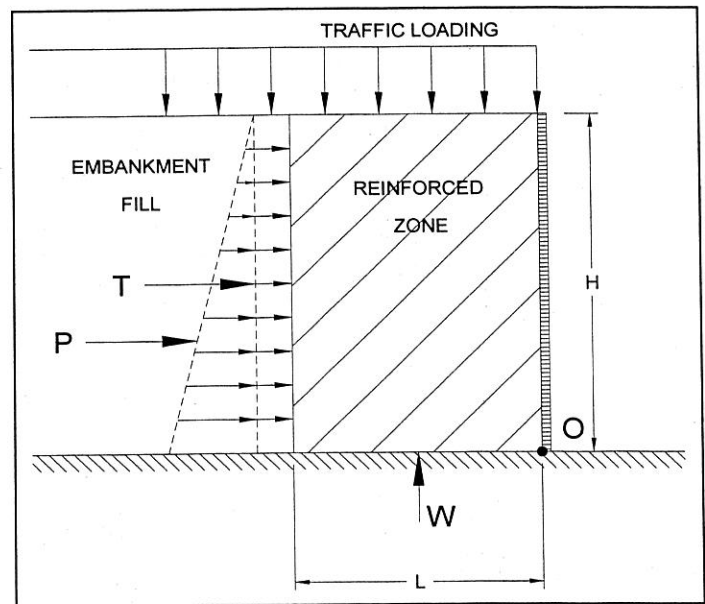
Use Undrained Value

$P_r = L(c)$  (Undrained)

$P_r = 42,240$  lbs per foot of wall

USE THIS VALUE

	Calculated	Required	Resistance Against Sliding is	<b>No Good</b>
$FS = \frac{P_r}{P_a}$	FS = 0.93	FS = 1.50		



### RESISTANCE AGAINST OVERTURNING

- \* Summation of Moments about point "O" (base of wall).
- \* Traffic loading is neglected in resisting forces

$\Sigma M_{resisting} = 3,271,066$  lb-ft

$\Sigma M_{resisting} = \gamma H L \left( \frac{L}{2} \right)$

$\Sigma M_{overturning} = 696,960$  lb-ft

$\Sigma M_{overturning} = K_a \left[ \frac{1}{2} \gamma H^2 \left( \frac{H}{3} \right) + \omega_T H \left( \frac{H}{2} \right) \right]$

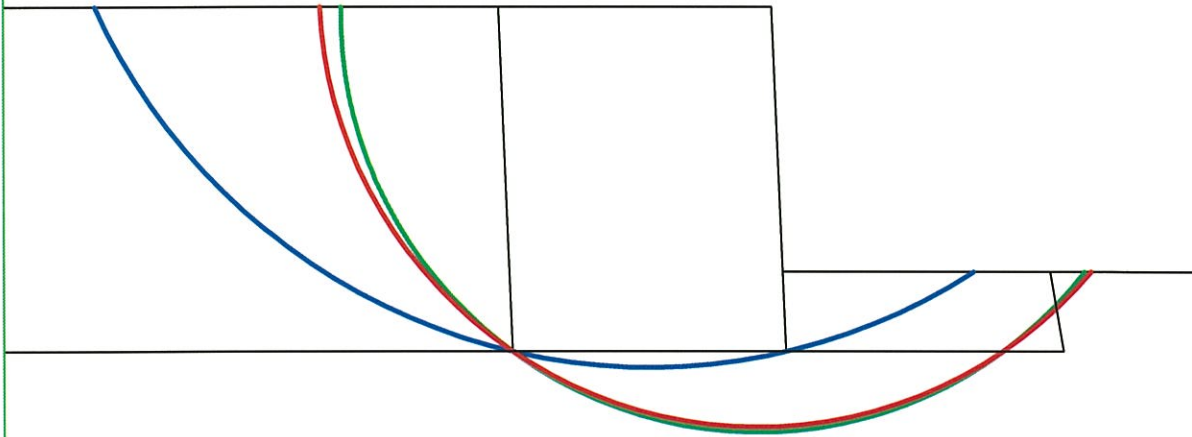
	Calculated	Required	Resistance Against Overturning is	<b>OK</b>
$FS = \frac{\Sigma M_{resisting}}{\Sigma M_{overturning}}$	FS = 4.69	FS = 2.00		



Undrained - F.S. = 2.806

Drained - F.S. = 1.627

Seismic - F.S. = 1.552



MSE WALL EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
RAMP C B-1124  
WITHOUT 5' UNDERCUT.

DRAWN:	CHK'D:
DESIGNED:	APPR'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
0121-3070.03	



SUBJECT Client TranSystems  
 Project SCI 823-0.00  
 Item Bearing Capacity  
 US 23 / SR 823 - Ramp C (B-1124 with undercut)

JOB NUMBER 0121-3070.03  
 SHEET NO. 1 OF 1  
 COMP. BY JAN DATE 1/3/06  
 CHECKED BY TRM DATE 1-9-06

### BEARING CAPACITY OF A MSE WALL (non-coped)

Ref: {AASHTO; STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17th Edition, 2002}

#### Soil Properties

$\gamma_{MSE}$	=	120	pcf	unit weight	mse fill
$\gamma_{FDN}$	=	115	pcf	unit weight	foundation soil
$c$	=	0	psf	cohesion	undrained
$\phi$	=	34	deg.	friction ang.	undrained
$c'$	=	0	psf	cohesion	drained
$\phi'$	=	34	deg.	friction ang.	drained

#### Loads and Parameters

$\omega t$	=	240	psf	traffic loading
$L=B$	=	30.8	ft	length of mse block
$L$ factor	=	0.7		Length factor-range (0.7 - 1.0)
$D$	=	0	ft	embedment depth
$D_w$	=	0	ft	groundwater depth
$H+D$	=	44	ft	
$H$	=	44	ft	height of wall
$K_a$	=	0.33		ODOT BDM 204.6.2.1
$\Gamma Pa$	=	14.667	ft	moment arm
$\Gamma Wt$	=	22	ft	moment arm
$B'$	=	23.28	ft	
$\gamma'$	=	57.6	pcf	
$W_t$	=	7,392	lb/ft of wall	
$W_{mse}$	=	162,624	lb/ft of wall	

#### Bearing Capacity Factors for Equations

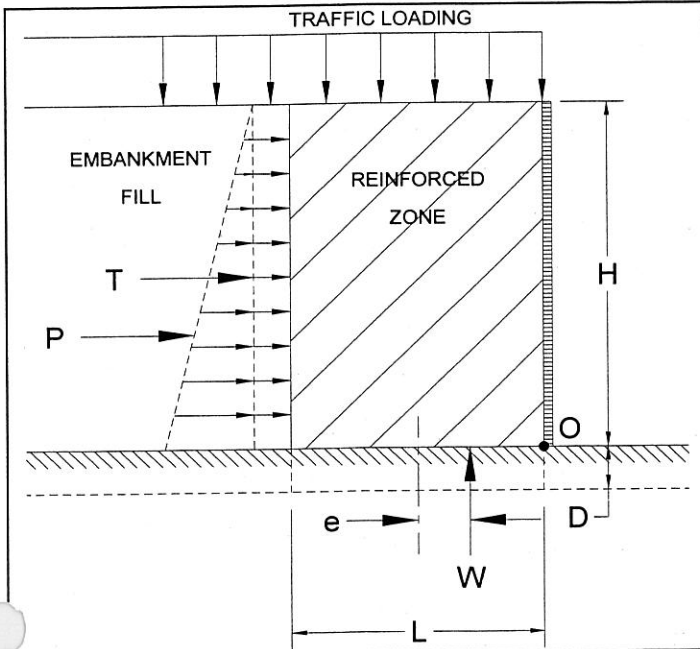
	Undrained		Drained
$N_c$	42.16	$N_c$	42.16
$N_q$	29.44	$N_q$	29.44
$N_\gamma$	41.06	$N_\gamma$	41.06

#### Eccentricity of Resultant Force

$e = 3.76$  ft

#### Kern

$e < L/6 = 5.13$  ft



#### Effective Bearing Pressure

$$\sigma_v = \frac{W_t + W_{MSE}}{L - 2e} \quad \sigma_v = 7,303 \text{ psf}$$

#### Ultimate undrained bearing capacity, $q_{ult}$

$$q_{ULT} = cN_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 27,529 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 11,012 \text{ psf}$$

Factor of Safety = 3.77 OK

#### Ultimate drained bearing capacity, $q_{ult}$

$$q_{ULT} = c' N_c + \sigma_D N_q + \frac{1}{2} \gamma B N_\gamma \quad q_{ULT} = 27,529 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 11,012 \text{ psf}$$

Factor of Safety = 3.77 OK





SUBJECT

Client TranSystems ODOT D-9  
 Project SCI 823-0.00 Portsmouth Bypass  
 Item MSE Wall Stability  
 US 23 / SR 823 - Ramp C (B-1124 with undercut)

JOB NUMBER 0121-3070.03  
 SHEET NO. 1 OF 1  
 COMP. BY JAN DATE 1/3/06  
 CHECKED BY TRW DATE 1-9-06

**STABILITY OF MSE WALL**

**Assumptions:**

- 1 Estimated height of embankment; H = ~~30~~ <sup>44'</sup>
- ~~2 It is assumed that the bridge is supported on piles~~
- 3 Ground water; Dw=0.0'
- 4 Traffic loading is neglected in resisting forces
- 5

**Wall Properties**

H = 44 feet  
 $\gamma_{mse}$  = 120 pcf  
 L = 30.8 feet  
 L factor = 0.70

**Foundational Soil Properties**

c = 0 psf cohesion  
 $\phi'$  = 34 deg friction angle  
 $\omega_T$  = 240 psf traffic loading  
 Length factor-range (0.7 - 1.0)

**RESISTANCE AGAINST SLIDING ALONG BASE**

**Thrust:**  $P_a = K_a \left[ \frac{1}{2} \gamma H^2 + \omega_T H \right]$

where;  $K_a = \tan^2(45 - \frac{\phi}{2})$   $K_a = 0.33$

$P_a = 41,818$  lbs per foot of wall

**Resistance:**  $P_r = W(0.67)(\mu)$  (Drained)

where;  $\mu = \tan(\phi)$   $0.67\mu = 0.45$

$0.67\mu$  Max. = 0.55 (AASHTO, Bridge Design Manual, 303.4.1.1)

$P_r = 73,181$  lbs per foot of wall

**USE THIS VALUE**

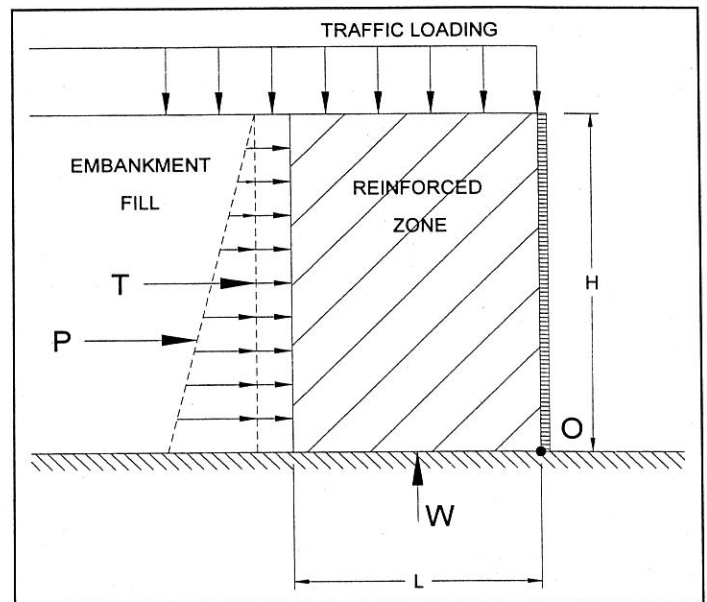
$P_r = L(c)$  (Undrained)

$P_r = 0$  lbs per foot of wall

**Use Drained Value**

$FS = \frac{P_r}{P_a}$  Calculated FS = 1.75 Required FS = 1.50

Resistance Against Sliding is **OK**



**RESISTANCE AGAINST OVERTURNING**

- \* Summation of Moments about point "O" (base of wall).
- \* Traffic loading is neglected in resisting forces

$\Sigma M_{resisting} = 2,504,410$  lb-ft

$\Sigma M_{resisting} = \gamma H L \left( \frac{L}{2} \right)$

$\Sigma M_{overturning} = 638,880$  lb-ft

$\Sigma M_{overturning} = K_a \left[ \frac{1}{2} \gamma H^2 \left( \frac{H}{3} \right) + \omega_T H \left( \frac{H}{2} \right) \right]$

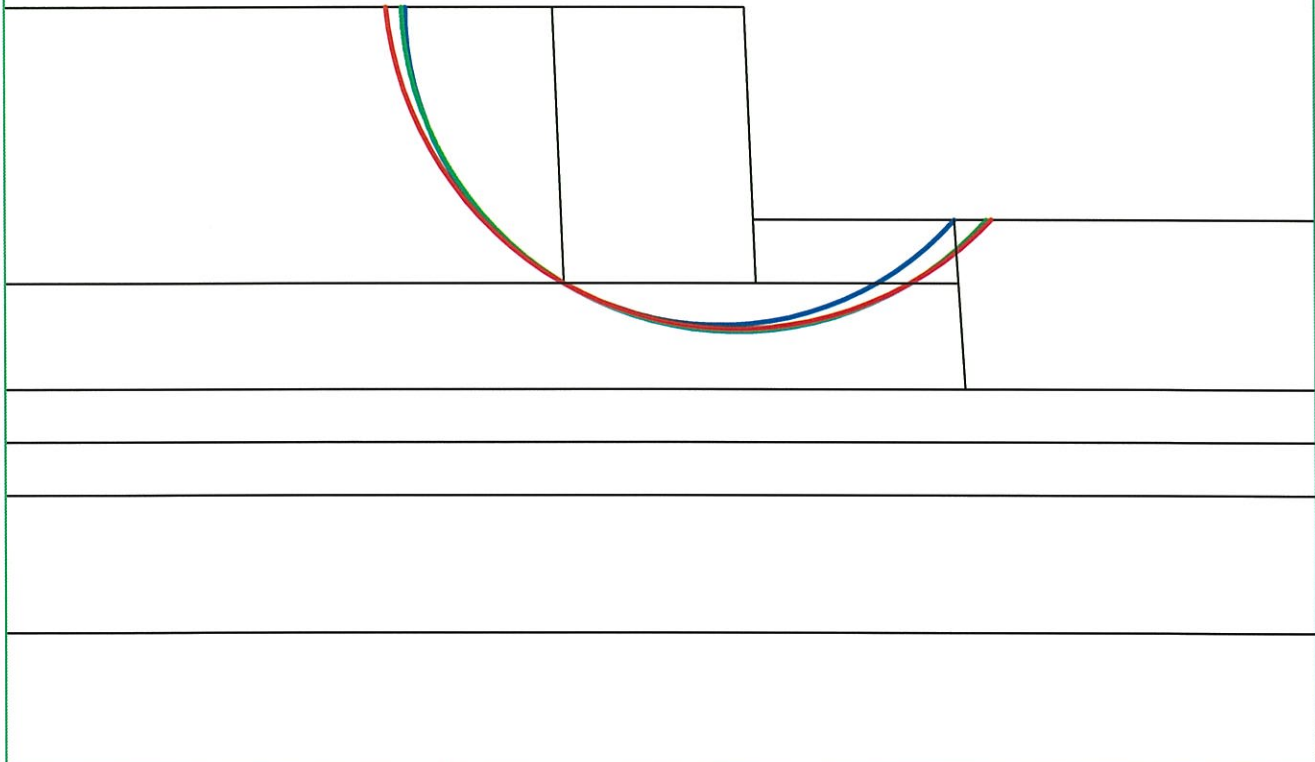
$FS = \frac{\Sigma M_{resisting}}{\Sigma M_{overturning}}$  Calculated FS = 3.92 Required FS = 2.00

Resistance Against Overturning is **OK**

Undrained - F.S. = 1.867

Drained - F.S. = 1.817

Seismic - F.S. = 1.736



MSE WALL EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
RAMP C B-1124  
WITH 5' UNDERCUT

DRAWN:	CHK'D:
DESIGNED:	APPRV'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
	0121-3070.03

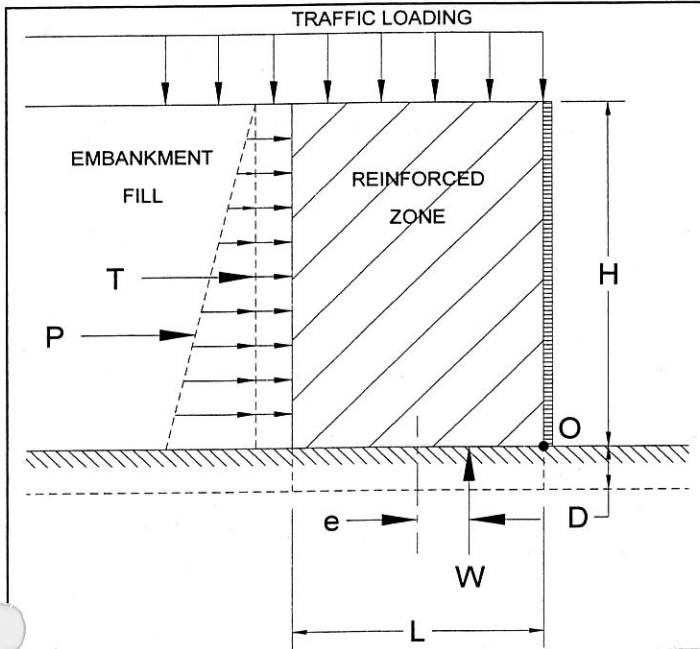


SUBJECT Client TranSystems  
 Project SCI 823-0.00  
 Item Bearing Capacity  
 US 23 / SR 823 - Ramp C (B-1120-21 no undercut)

JOB NUMBER 0121-3070.03  
 SHEET NO. 1 OF 1  
 COMP. BY JAN DATE 1/3/06  
 CHECKED BY TJA DATE 1-9-06

### BEARING CAPACITY OF A MSE WALL (non-coped)

Ref: {AASHTO; STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17th Edition, 2002}



#### Soil Properties

$\gamma_{MSE}$	=	120	pcf	unit weight	mse fill
$\gamma_{FDN}$	=	125	pcf	unit weight	foundation soil
$c$	=	2500	psf	cohesion	undrained
$\phi$	=	0	deg.	friction ang.	undrained
$c'$	=	0	psf	cohesion	drained
$\phi'$	=	28	deg.	friction ang.	drained

#### Loads and Parameters

$\omega t$	=	240	psf	traffic loading
$L=B$	=	35.2	ft	length of mse block
$L$ factor	=	0.8		Length factor-range (0.7 - 1.0)
$D$	=	0	ft	embedment depth
$D_w$	=	0	ft	groundwater depth
$H+D$	=	44	ft	height of wall
$H$	=	44	ft	
$K_a$	=	0.33		ODOT BDM 204.6.2.1
$\Gamma Pa$	=	14.667	ft	moment arm
$\Gamma Wt$	=	22	ft	moment arm
$B'$	=	28.62	ft	
$\gamma'$	=	57.6	pcf	

#### Effective Bearing Pressure

$$\sigma_v = \frac{W_t + W_{MSE}}{L - 2e} \quad \sigma_v = \underline{\underline{6,789 \text{ psf}}}$$

#### Ultimate undrained bearing capacity, $q_{ult}$

$$q_{ULT} = cN_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = \underline{\underline{12,850 \text{ psf}}}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = \underline{\underline{5,140 \text{ psf}}}$$

Factor of Safety = 1.89 No Good

#### Ultimate drained bearing capacity, $q_{ult}$

$$q_{ULT} = c'N_c + \sigma_D N_q + \frac{1}{2} \gamma B N_\gamma \quad q_{ULT} = \underline{\underline{13,782 \text{ psf}}}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = \underline{\underline{5,513 \text{ psf}}}$$

Factor of Safety = 2.03 No Good

#### Bearing Capacity Factors for Equations

	Undrained		Drained
$N_c$	5.14	$N_c$	25.80
$N_q$	1.00	$N_q$	14.72
$N_\gamma$	0.00	$N_\gamma$	16.72

#### Eccentricity of Resultant Force

$$e = 3.29 \text{ ft}$$

#### Kern

$$e < L/6 = 5.87 \text{ ft}$$



SUBJECT

Client TranSystems ODOT D-9

JOB NUMBER

0121-3070.03

Project SCI 823-0.00 Portsmouth Bypass

SHEET NO.

1 OF 1

Item MSE Wall Stability

COMP. BY

JAN

DATE

1/3/06

US 23 / SR 823 - Ramp C (B-1120-21 no undercut)

CHECKED BY

TRW

DATE

1-9-06

### STABILITY OF MSE WALL

#### Assumptions:

- 1 Estimated height of embankment; H = ~~36~~ <sup>44'</sup>
- 2 ~~It is assumed that the bridge is supported on piles~~
- 3 Ground water; Dw=0.0'
- 4 Traffic loading is neglected in resisting forces
- 5

#### Wall Properties

H = 44 feet  
 $\gamma_{mse}$  = 120 pcf  
 L = 35.2 feet  
 L factor = 0.80

#### Foundational Soil Properties

c = 2500 psf cohesion  
 $\phi'$  = 28 deg friction angle  
 $\omega_T$  = 240 psf traffic loading  
 Length factor-range (0.7 - 1.0)

### RESISTANCE AGAINST SLIDING ALONG BASE

Thrust:  $P_a = K_a \left[ \frac{1}{2} \gamma H^2 + \omega_T H \right]$

where;  $K_a = \tan^2 \left( 45 - \frac{\phi}{2} \right)$   $K_a = 0.36$

$P_a = 45,619$  lbs per foot of wall

Resistance:  $P_r = W(0.67)(\mu)$  (Drained)

where;  $\mu = \tan(\phi)$   $0.67\mu = 0.36$

$0.67\mu$  Max. = 0.35 {AASHTO, Bridge Design Manual, 303.4.1.1}

$P_r = 65,050$  lbs per foot of wall

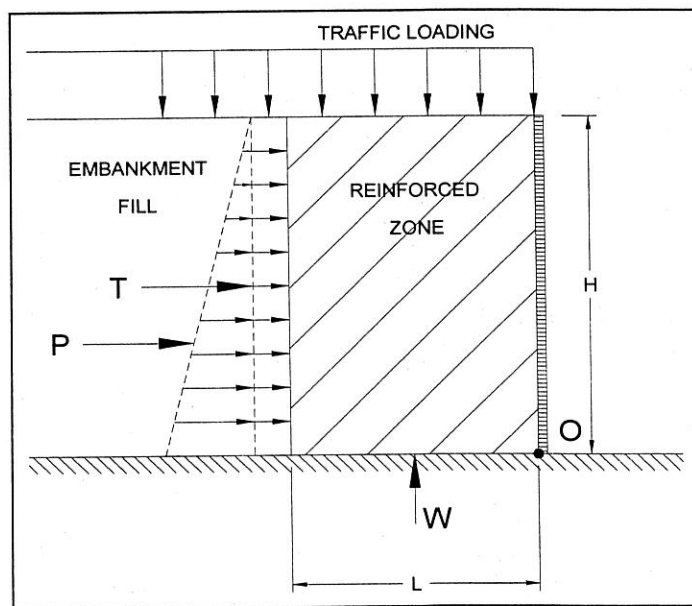
USE THIS VALUE

$P_r = L(c)$  (Undrained)

$P_r = 88,000$  lbs per foot of wall

Use Drained Value

	Calculated	Required	Resistance Against Sliding is	<b>No Good</b>
$FS = \frac{P_r}{P_a}$	FS = 1.43	FS = 1.50		



### RESISTANCE AGAINST OVERTURNING

- \* Summation of Moments about point "O" (base of wall).
- \* Traffic loading is neglected in resisting forces

$\Sigma M_{resisting} = 3,271,066$  lb-ft

$\Sigma M_{resisting} = \gamma HL \left( \frac{L}{2} \right)$

$\Sigma M_{overturning} = 696,960$  lb-ft

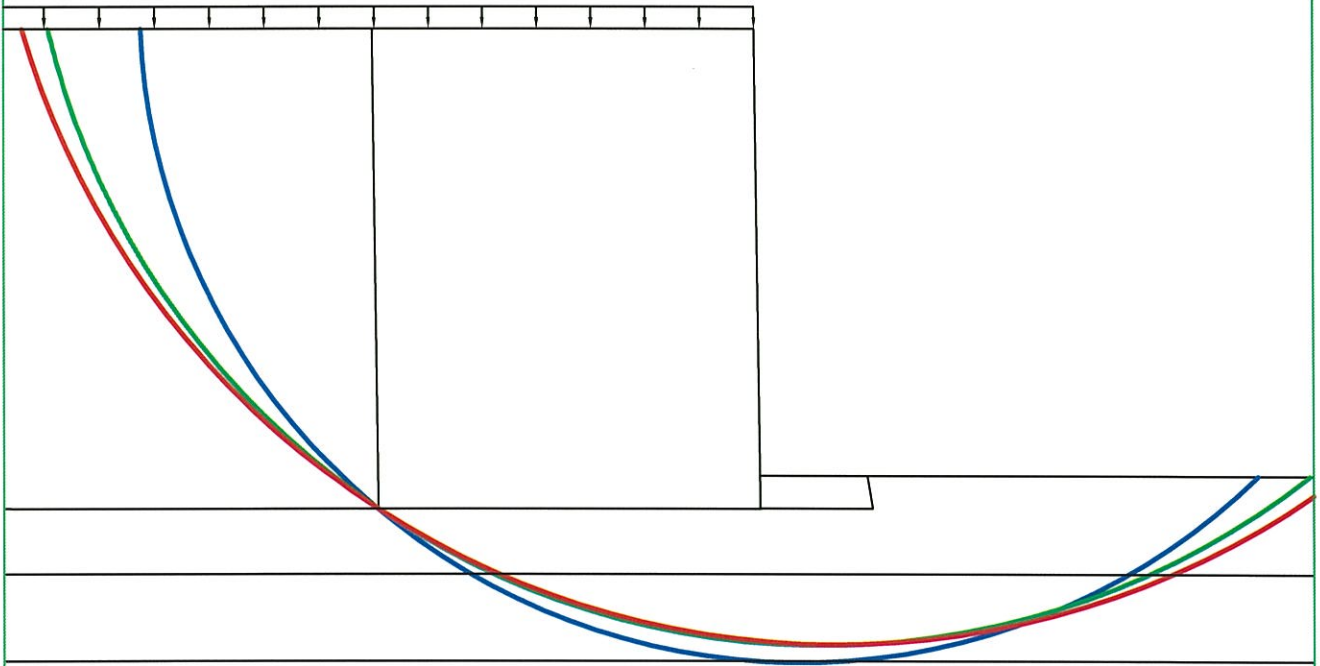
$\Sigma M_{overturning} = K_a \left[ \frac{1}{2} \gamma H^2 \left( \frac{H}{3} \right) + \omega_T H \left( \frac{H}{2} \right) \right]$

	Calculated	Required	Resistance Against Overturning is	<b>OK</b>
$FS = \frac{\Sigma M_{resisting}}{\Sigma M_{overturning}}$	FS = 4.69	FS = 2.00		

Undrained - F.S. = 1.388

Drained - F.S. = 1.659

Seismic - F.S. = 1.563



MSE WALL EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
RAMP C B-1120-21  
WITHOUT 5' UNDERCUT

DRAWN:	CHK'D:
DESIGNED:	APPR'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
	0121-3070.03



SUBJECT

Client TranSystems

JOB NUMBER 0121-3070.03

Project SCI 823-0.00

SHEET NO. 1 OF 1

Item Bearing Capacity

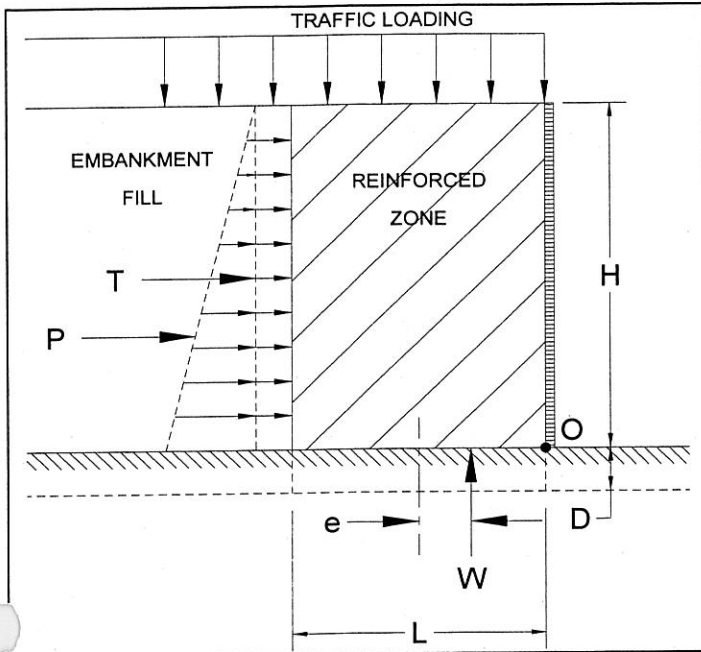
COMP. BY JAN DATE 1/3/06

US 23 / SR 823 - Ramp C (B-1120-21 with undercut)

CHECKED BY TKK DATE 1-9-06

### BEARING CAPACITY OF A MSE WALL (non-coped)

Ref: {AASHTO; STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17th Edition, 2002}



#### Soil Properties

$\gamma_{MSE}$	=	120	pcf	unit weight	mse fill
$\gamma_{FDN}$	=	115	pcf	unit weight	foundation soil
$c$	=	0	psf	cohesion	undrained
$\phi$	=	34	deg.	friction ang.	undrained
$c'$	=	0	psf	cohesion	drained
$\phi'$	=	34	deg.	friction ang.	drained

#### Loads and Parameters

$\omega t$	=	240	psf	traffic loading
$L=B$	=	30.8	ft	length of mse block
L factor	=	0.7		Length factor-range (0.7 - 1.0)
D	=	0	ft	embedment depth
Dw	=	0	ft	groundwater depth
H+D	=	44	ft	height of wall
H	=	44	ft	
Ka	=	0.33		ODOT BDM 204.6.2.1
$\Gamma Pa$	=	14.667	ft	moment arm
$\Gamma Wt$	=	22	ft	moment arm
B'	=	23.28	ft	
$\gamma'$	=	57.6	pcf	

$W_t = 7,392$  lb/ft of wall  
 $W_{mse} = 162,624$  lb/ft of wall

#### Effective Bearing Pressure

$$\sigma_v = \frac{W_t + W_{MSE}}{L - 2e} \quad \sigma_v = 7,303 \text{ psf}$$

#### Ultimate undrained bearing capacity, $q_{ult}$

$$q_{ULT} = cN_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 27,529 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 11,012 \text{ psf}$$

Factor of Safety = 3.77 OK

#### Ultimate drained bearing capacity, $q_{ult}$

$$q_{ULT} = c'N_c + \sigma_D N_q + \frac{1}{2} \gamma B N_\gamma \quad q_{ULT} = 27,529 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 11,012 \text{ psf}$$

Factor of Safety = 3.77 OK

#### Bearing Capacity Factors for Equations

	Undrained		Drained
$N_c$	42.16	$N_c$	42.16
$N_q$	29.44	$N_q$	29.44
$N_\gamma$	41.06	$N_\gamma$	41.06

#### Eccentricity of Resultant Force

$e = 3.76$  ft

#### Kern

$e < L/6 = 5.13$  ft





SUBJECT

Client TranSystems ODOT D-9

JOB NUMBER

0121-3070.03

Project SCI 823-0.00 Portsmouth Bypass

SHEET NO.

1

OF

1

Item MSE Wall Stability

COMP. BY

JAN

DATE

1/3/06

US 23 / SR 823 - Ramp C (B-1120-21 with undercut)

CHECKED BY

THW

DATE

1-9-06

### STABILITY OF MSE WALL

Assumptions:

- 1 Estimated height of embankment; H=44
- ~~2 It is assumed that the bridge is supported on piles~~
- 3 Ground water; Dw=0.0'
- 4 Traffic loading is neglected in resisting forces
- 5

#### Wall Properties

H = 44 feet  
 $\gamma_{mse} = 120$  pcf  
 L = 30.8 feet  
 L factor = 0.70

#### Foundational Soil Properties

c = 0 psf cohesion  
 $\phi' = 34$  deg friction angle  
 $\omega_T = 240$  psf traffic loading  
 Length factor-range (0.7 - 1.0)

### RESISTANCE AGAINST SLIDING ALONG BASE

Thrust:  $P_a = K_a \left[ \frac{1}{2} \gamma H^2 + \omega_T H \right]$

where;  $K_a = \tan^2(45 - \frac{\phi}{2})$   $K_a = 0.33$

$P_a = 41,818$  lbs per foot of wall

Resistance:  $P_r = W(0.67)(\mu)$  (Drained)

where;  $\mu = \tan(\phi)$   $0.67\mu = 0.45$

$0.67\mu$  Max. = 0.55 {AASHTO, Bridge Design Manual, 303.4.1.1}

$P_r = 73,181$  lbs per foot of wall

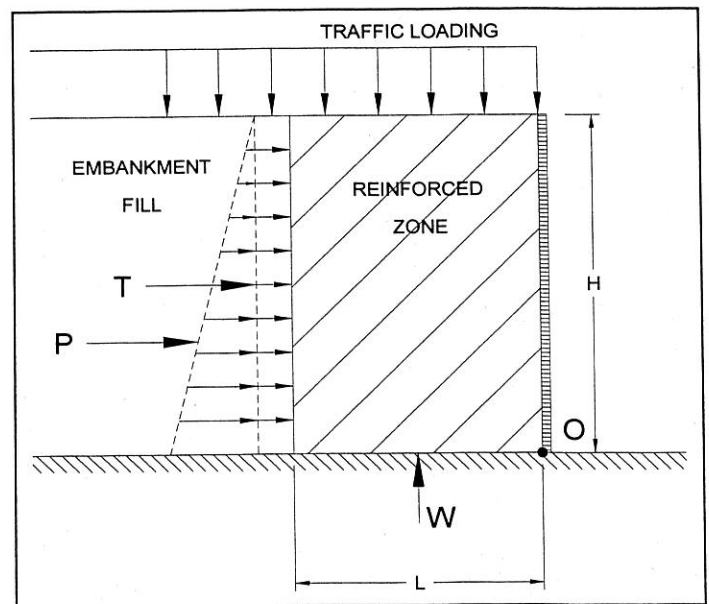
USE THIS VALUE

$P_r = L(c)$  (Undrained)

$P_r = 0$  lbs per foot of wall

Use Drained Value

	Calculated	Required	Resistance Against Sliding is	<b>OK</b>
$FS = \frac{P_r}{P_a}$	FS = 1.75	FS = 1.50		



### RESISTANCE AGAINST OVERTURNING

- \* Summation of Moments about point "O" (base of wall).
- \* Traffic loading is neglected in resisting forces

$\Sigma M_{resisting} = 2,504,410$  lb-ft

$\Sigma M_{resisting} = \gamma HL \left( \frac{L}{2} \right)$

$\Sigma M_{overturning} = 638,880$  lb-ft

$\Sigma M_{overturning} = K_a \left[ \frac{1}{2} \gamma H^2 \left( \frac{H}{3} \right) + \omega_T H \left( \frac{H}{2} \right) \right]$

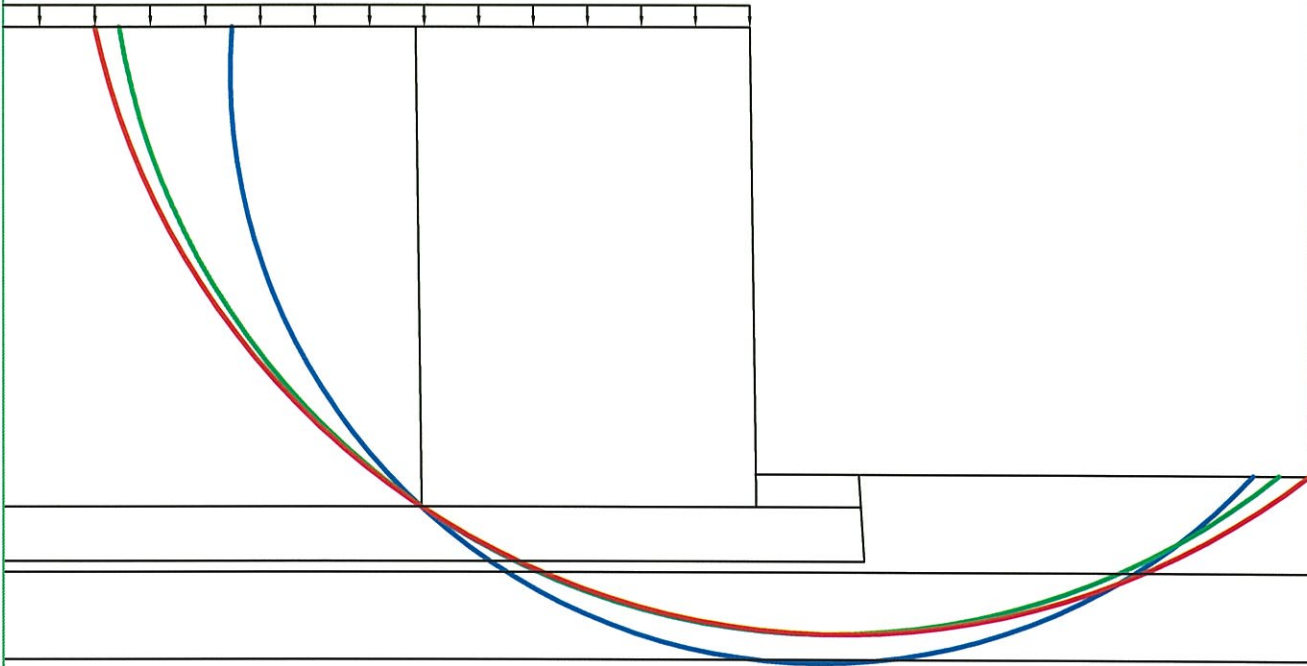
	Calculated	Required	Resistance Against Overturning is	<b>OK</b>
$FS = \frac{\Sigma M_{resisting}}{\Sigma M_{overturning}}$	FS = 3.92	FS = 2.00		

\*Undrained - F.S. = 1.418

Drained - F.S. = 1.628

Seismic - F.S. = 1.542

\*F.S.<1.5, however per  
ODOT BDM 204.6.2.1  
required F.S.>1.3 "For all  
other walls". This does  
not control the design.



MSE WALL EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
RAMP C B-1120-21  
WITH 5' UNDERCUT

DRAWN:	CHK'D:
DESIGNED:	APPRV'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
0121-3070.03	



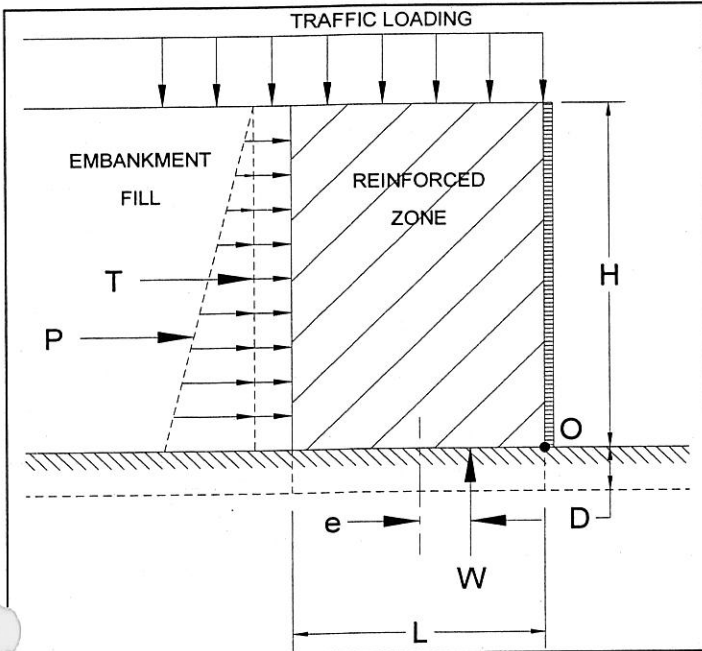


SUBJECT Client TranSystems  
 Project SCI 823-0.00  
 Item Bearing Capacity  
 US 23 / SR 823 - Ramp C (TR-47 no undercut)

JOB NUMBER 0121-3070.03  
 SHEET NO. 1 OF 1  
 COMP. BY JAN DATE 1/3/06  
 CHECKED BY ~~TAN~~ DATE 1-9-06

### BEARING CAPACITY OF A MSE WALL (non-coped)

Ref: {AASHTO; STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17th Edition, 2002}



#### Soil Properties

$\gamma_{MSE}$	=	120	pcf	unit weight	mse fill
$\gamma_{FDN}$	=	125	pcf	unit weight	foundation soil
$c$	=	2000	psf	cohesion	undrained
$\phi$	=	0	deg.	friction ang.	undrained
$c'$	=	0	psf	cohesion	drained
$\phi'$	=	30	deg.	friction ang.	drained

#### Loads and Parameters

$\omega t$	=	240	psf	traffic loading
$L=B$	=	35.2	ft	length of mse block
$L$ factor	=	0.8		Length factor-range (0.7 - 1.0)
$D$	=	0	ft	embedment depth
$D_w$	=	0	ft	groundwater depth
$H+D$	=	44	ft	height of wall
$H$	=	44	ft	
$K_a$	=	0.33		ODOT BDM 204.6.2.1
$\Gamma Pa$	=	14.667	ft	moment arm
$\Gamma Wt$	=	22	ft	moment arm
$B'$	=	28.62	ft	
$\gamma'$	=	57.6	pcf	

$W_t$  = 8,448 lb/ft of wall  
 $W_{mse}$  = 185,856 lb/ft of wall

#### Effective Bearing Pressure

$$\sigma_v = \frac{W_t + W_{MSE}}{L - 2e} \quad \sigma_v = 6,789 \text{ psf}$$

#### Ultimate undrained bearing capacity, $q_{ult}$

$$q_{ULT} = cN_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 10,280 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 4,112 \text{ psf}$$

Factor of Safety = 1.51 No Good

#### Ultimate drained bearing capacity, $q_{ult}$

$$q_{ULT} = c' N_c + \sigma_D N_q + \frac{1}{2} \gamma B N_\gamma \quad q_{ULT} = 18,463 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 7,385 \text{ psf}$$

Factor of Safety = 2.72 OK

#### Bearing Capacity Factors for Equations

	Undrained		Drained
$N_c$	5.14	$N_c$	30.14
$N_q$	1.00	$N_q$	18.40
$N_\gamma$	0.00	$N_\gamma$	22.40

#### Eccentricity of Resultant Force

$e$  = 3.29 ft

#### Kern

$e < L/6 = 5.87$  ft



SUBJECT

Client TranSystems ODOT D-9

JOB NUMBER

0121-3070.03

Project SCI 823-0.00 Portsmouth Bypass

SHEET NO.

1

OF

1

Item MSE Wall Stability

COMP. BY

JAN

DATE

1/3/06

US 23 / SR 823 - Ramp C (TR-47 no undercut)

CHECKED BY

TRK

DATE

1-9-06

### STABILITY OF MSE WALL

Assumptions:

44'

- 1 Estimated height of embankment; ~~H=30'~~
- 2 ~~It is assumed that the bridge is supported on piles~~
- 3 Ground water; Dw=0.0'
- 4 Traffic loading is neglected in resisting forces
- 5

Wall Properties

H = 44 feet  
 $\gamma_{mse}$  = 120 pcf  
 L = 35.2 feet  
 L factor = 0.80

Foundational Soil Properties

c = 2000 psf cohesion  
 $\phi'$  = 30 deg friction angle  
 $\omega_T$  = 240 psf traffic loading  
 Length factor-range (0.7 - 1.0)

### RESISTANCE AGAINST SLIDING ALONG BASE

Thrust:  $P_a = K_a \left[ \frac{1}{2} \gamma H^2 + \omega_T H \right]$

where;  $K_a = \tan^2(45 - \frac{\phi}{2})$   $K_a = 0.33$

$P_a = 41,818$  lbs per foot of wall

Resistance:  $P_r = W(0.67\mu)$  (Drained)

where;  $\mu = \tan(\phi)$   $0.67\mu = 0.39$

$0.67\mu$  Max. = 0.35 (AASHTO, Bridge Design Manual, 303.4.1.1)

$P_r = 65,050$  lbs per foot of wall

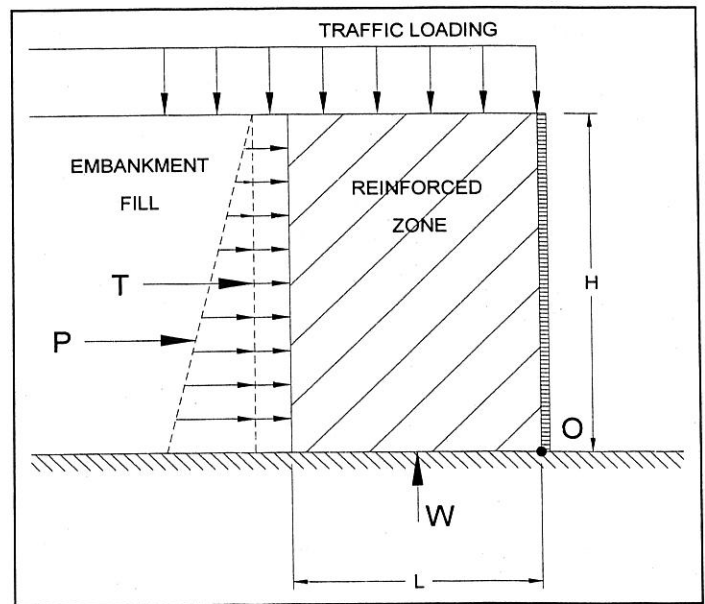
USE THIS VALUE

$P_r = L(c)$  (Undrained)

$P_r = 70,400$  lbs per foot of wall

Use Drained Value

	Calculated	Required	Resistance Against Sliding is	<b>OK</b>
$FS = \frac{P_r}{P_a}$	FS = 1.56	FS = 1.50		



### RESISTANCE AGAINST OVERTURNING

- \* Summation of Moments about point "O" (base of wall).
- \* Traffic loading is neglected in resisting forces

$\Sigma M_{resisting} = 3,271,066$  lb-ft

$\Sigma M_{resisting} = \gamma H L \left( \frac{L}{2} \right)$

$\Sigma M_{overturning} = 638,880$  lb-ft

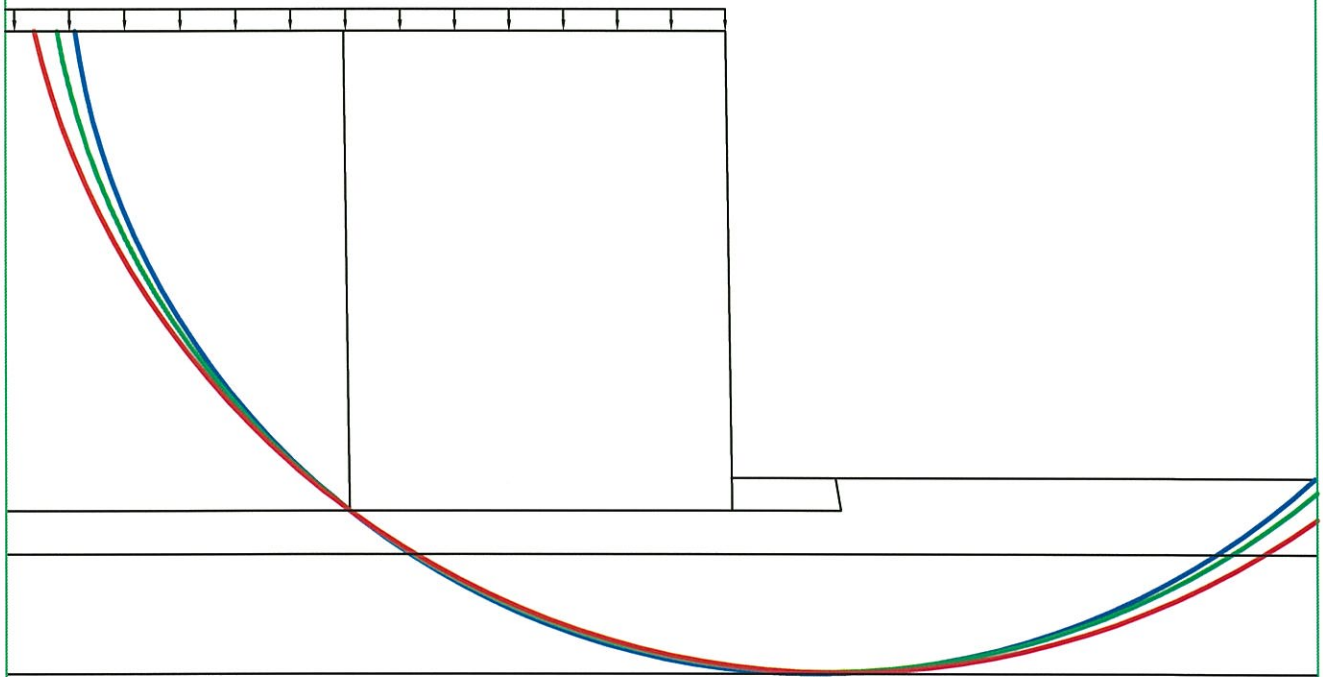
$\Sigma M_{overturning} = K_a \left[ \frac{1}{2} \gamma H^2 \left( \frac{H}{3} \right) + \omega_T H \left( \frac{H}{2} \right) \right]$

	Calculated	Required	Resistance Against Overturning is	<b>OK</b>
$FS = \frac{\Sigma M_{resisting}}{\Sigma M_{overturning}}$	FS = 5.12	FS = 2.00		

Undrained - F.S. = 1.654

Drained - F.S. = 1.532

Seismic - F.S. = 1.445

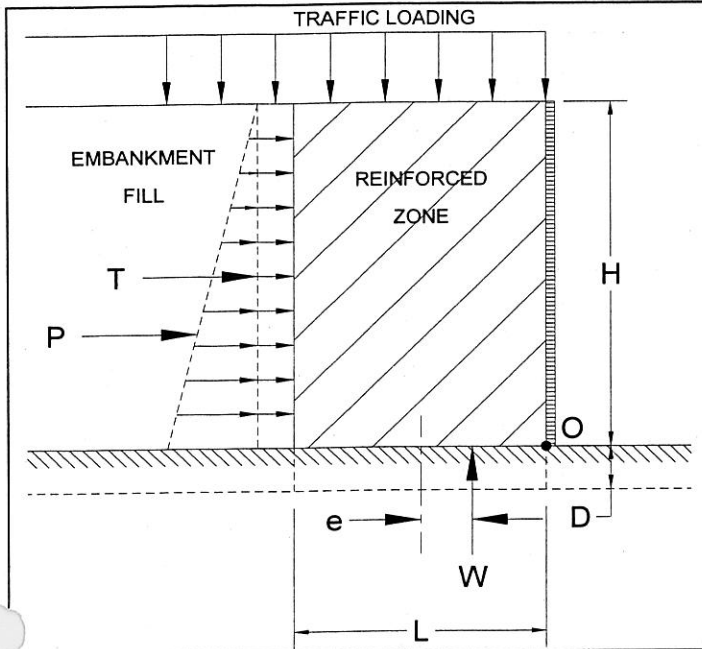


MSE WALL EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
RAMP C TR-47  
WITHOUT 5' UNDERCUT

DRAWN:	CHK'D:
DESIGNED:	APPRV'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
0121-3070.03	

## BEARING CAPACITY OF A MSE WALL (non-coped)

Ref: {AASHTO; STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17th Edition, 2002}



### Soil Properties

$\gamma_{MSE}$	=	120	pcf	unit weight	mse fill
$\gamma_{FDN}$	=	115	pcf	unit weight	foundation soil
$c$	=	0	psf	cohesion	undrained
$\phi$	=	34	deg.	friction ang.	undrained
$c'$	=	0	psf	cohesion	drained
$\phi'$	=	34	deg.	friction ang.	drained

### Loads and Parameters

$\omega t$	=	240	psf	traffic loading
$L=B$	=	30.8	ft	length of mse block
$L$ factor	=	0.7		Length factor-range (0.7 - 1.0)
$D$	=	0	ft	embedment depth
$D_w$	=	0	ft	groundwater depth
$H+D$	=	44	ft	
$H$	=	44	ft	height of wall
$K_a$	=	0.33		ODOT BDM 204.6.2.1
$\Gamma Pa$	=	14.667	ft	moment arm
$\Gamma Wt$	=	22	ft	moment arm
$B'$	=	23.28	ft	
$\gamma'$	=	57.6	pcf	

$W_t$	=	7,392	lb/ft of wall
$W_{mse}$	=	162,624	lb/ft of wall

### Effective Bearing Pressure

$$\sigma_v = \frac{W_t + W_{MSE}}{L - 2e} \quad \sigma_v = 7,303 \text{ psf}$$

### Ultimate undrained bearing capacity, $q_{ult}$

$$q_{ULT} = cN_c + \sigma_D N_q + \frac{1}{2} \gamma' B N_\gamma \quad q_{ULT} = 27,529 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 11,012 \text{ psf}$$

Factor of Safety = 3.77 OK

### Ultimate drained bearing capacity, $q_{ult}$

$$q_{ULT} = c'N_c + \sigma_D N_q + \frac{1}{2} \gamma B N_\gamma \quad q_{ULT} = 27,529 \text{ psf}$$

$$q_{ALL} = \frac{q_{ULT}}{FS} \quad q_{ALL} = 11,012 \text{ psf}$$

Factor of Safety = 3.77 OK

### Bearing Capacity Factors for Equations

	Undrained		Drained
$N_c$	42.16	$N_c$	42.16
$N_q$	29.44	$N_q$	29.44
$N_\gamma$	41.06	$N_\gamma$	41.06

### Eccentricity of Resultant Force

$e = 3.76 \text{ ft}$

### Kern

$e < L/6 = 5.13 \text{ ft}$

## STABILITY OF MSE WALL

### Assumptions:

- 1 Estimated height of embankment; H = 44
- 2 It is assumed that the bridge is supported on piles
- 3 Ground water; Dw=0.0'
- 4 Traffic loading is neglected in resisting forces
- 5

### Wall Properties

H = 44 feet  
 $\gamma_{mse} = 120$  pcf  
 L = 30.8 feet  
 L factor = 0.70

### Foundational Soil Properties

c = 0 psf cohesion  
 $\phi' = 34$  deg friction angle  
 $\omega_T = 240$  psf traffic loading  
 Length factor-range (0.7 - 1.0)

### RESISTANCE AGAINST SLIDING ALONG BASE

Thrust:  $P_a = K_a \left[ \frac{1}{2} \gamma H^2 + \omega_T H \right]$

where;  $K_a = \tan^2(45 - \frac{\phi}{2})$   $K_a = 0.33$

$P_a = 41,818$  lbs per foot of wall

Resistance:  $P_r = W(0.67)(\mu)$  (Drained)

where;  $\mu = \tan(\phi)$   $0.67\mu = 0.45$

$0.67\mu$  Max. = 0.55 {AASHTO, Bridge Design Manual, 303.4.1.1}

$P_r = 73,181$  lbs per foot of wall

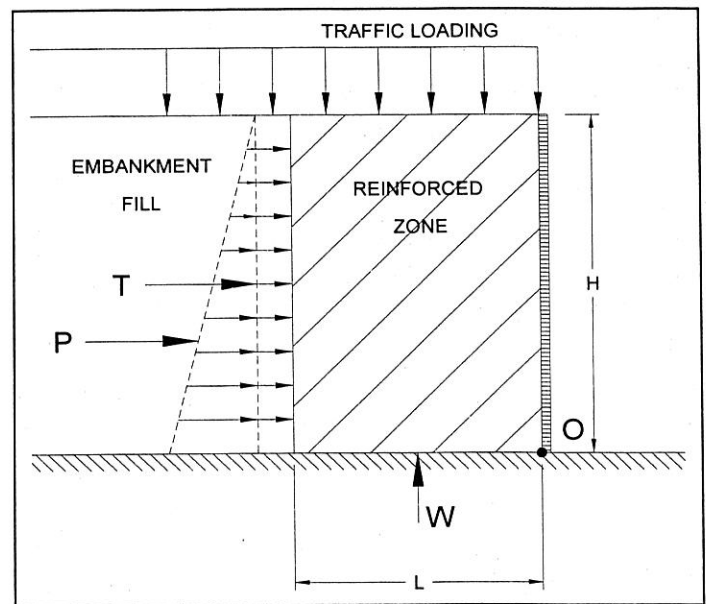
USE THIS VALUE

$P_r = L(c)$  (Undrained)

$P_r = 0$  lbs per foot of wall

Use Drained Value

	Calculated	Required	Resistance Against Sliding is	<b>OK</b>
$FS = \frac{P_r}{P_a}$	FS = 1.75	FS = 1.50		



### RESISTANCE AGAINST OVERTURNING

\* Summation of Moments about point "O" (base of wall).

\* Traffic loading is neglected in resisting forces

$\Sigma M_{resisting} = 2,504,410$  lb-ft

$\Sigma M_{resisting} = \gamma H L \left( \frac{L}{2} \right)$

$\Sigma M_{overturning} = 638,880$  lb-ft

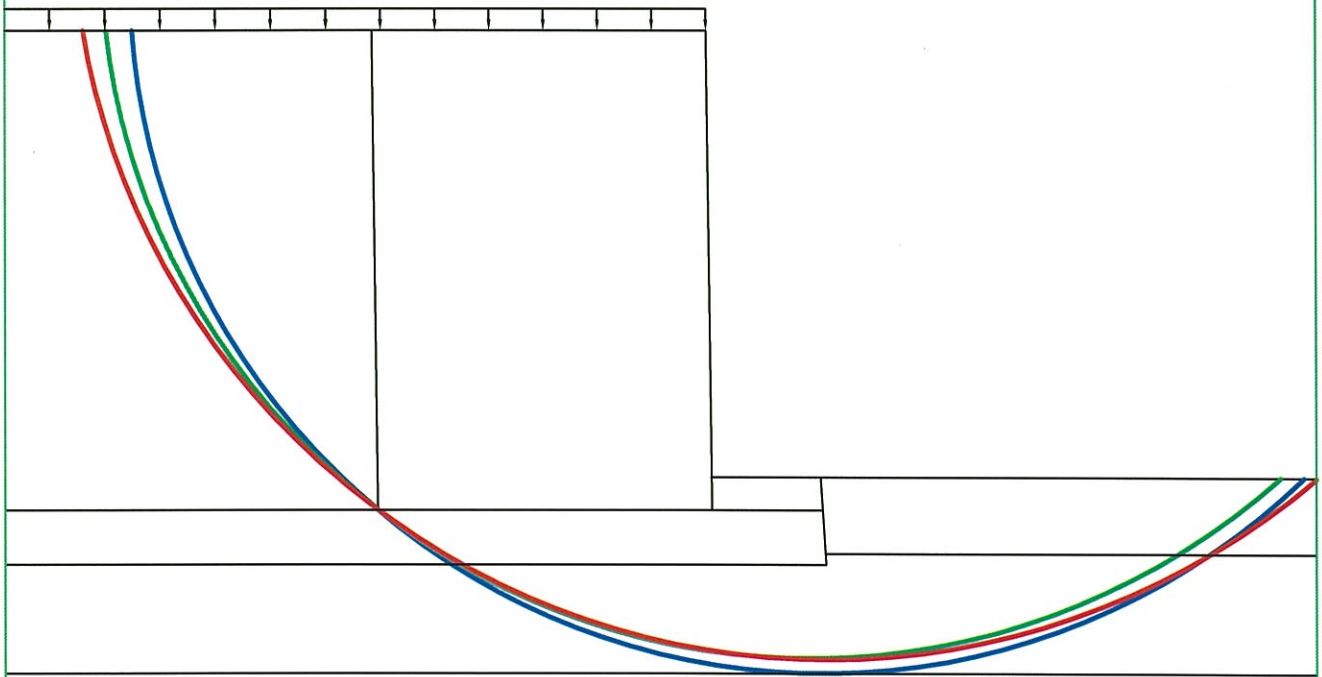
$\Sigma M_{overturning} = K_a \left[ \frac{1}{2} \gamma H^2 \left( \frac{H}{3} \right) + \omega_T H \left( \frac{H}{2} \right) \right]$

	Calculated	Required	Resistance Against Overturning is	<b>OK</b>
$FS = \frac{\Sigma M_{resisting}}{\Sigma M_{overturning}}$	FS = 3.92	FS = 2.00		

Undrained - F.S. = 1.671

Drained - F.S. = 1.502

Seismic - F.S. = 1.423



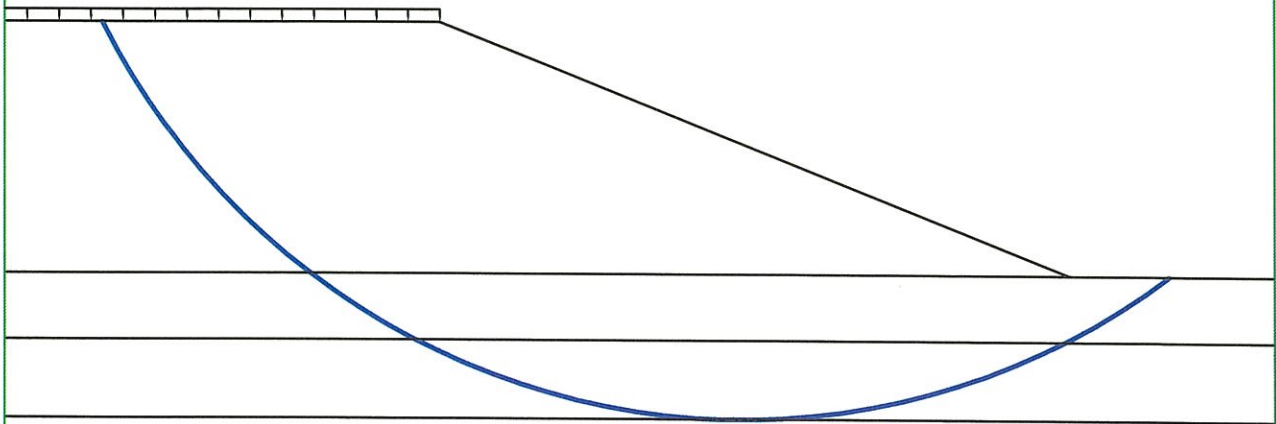
MSE WALL EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
RAMP C TR-47  
WITH 5' UNDERCUT

DRAWN:	CHK'D:
DESIGNED:	APPRV'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
0121-3070.03	



Undrained - F.S. = 2.371

Drained - F.S. = 1.329  
Infinite Slope Failure



EMBANKMENT EVALUATION FOR  
PROPOSED US 23 / SR 823 INTERCHANGE  
B-1108, 40' EMBANKMENT, 2:1 SLOPE

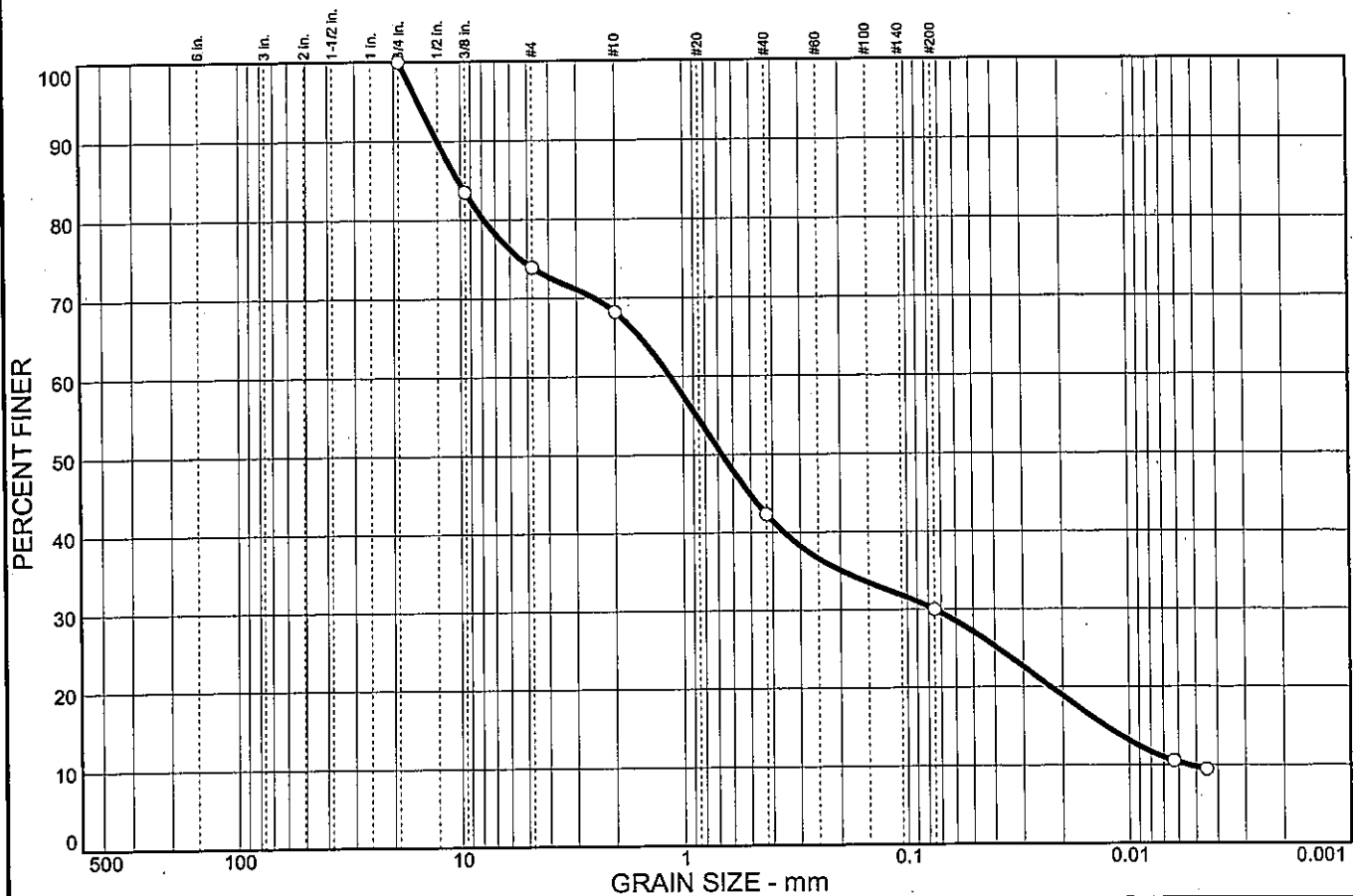
DRAWN:	CHK'D:
DESIGNED:	APPR'D:
DATE:	
SCALE_TITLE_#1	
SCALE_TITLE_#2	
PROJECT NUMBER	
	0121-3070.03

**APPENDIX IV**

Laboratory Test Results



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	26.1	5.7	25.9	12.3	20.3	9.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	83.5		
#4	73.9		
#10	68.2		
#40	42.3		
#200	30.0		

**Soil Description**

Silty, clayey sand with gravel

**Atterberg Limits**

PL= 18      LL= 24      PI= 6

**Coefficients**

D<sub>85</sub>= 10.3      D<sub>60</sub>= 1.14      D<sub>50</sub>= 0.672  
D<sub>30</sub>= 0.0750      D<sub>15</sub>= 0.0128      D<sub>10</sub>= 0.0055  
C<sub>u</sub>= 208.85      C<sub>c</sub>= 0.90

**Classification**

USCS= SC-SM      AASHTO= A-2-4(0)

**Remarks**

Moisture Content= 10.0%  
F.M.=0.43

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1101

Date: 8/15/05  
Elev./Depth: 1.0

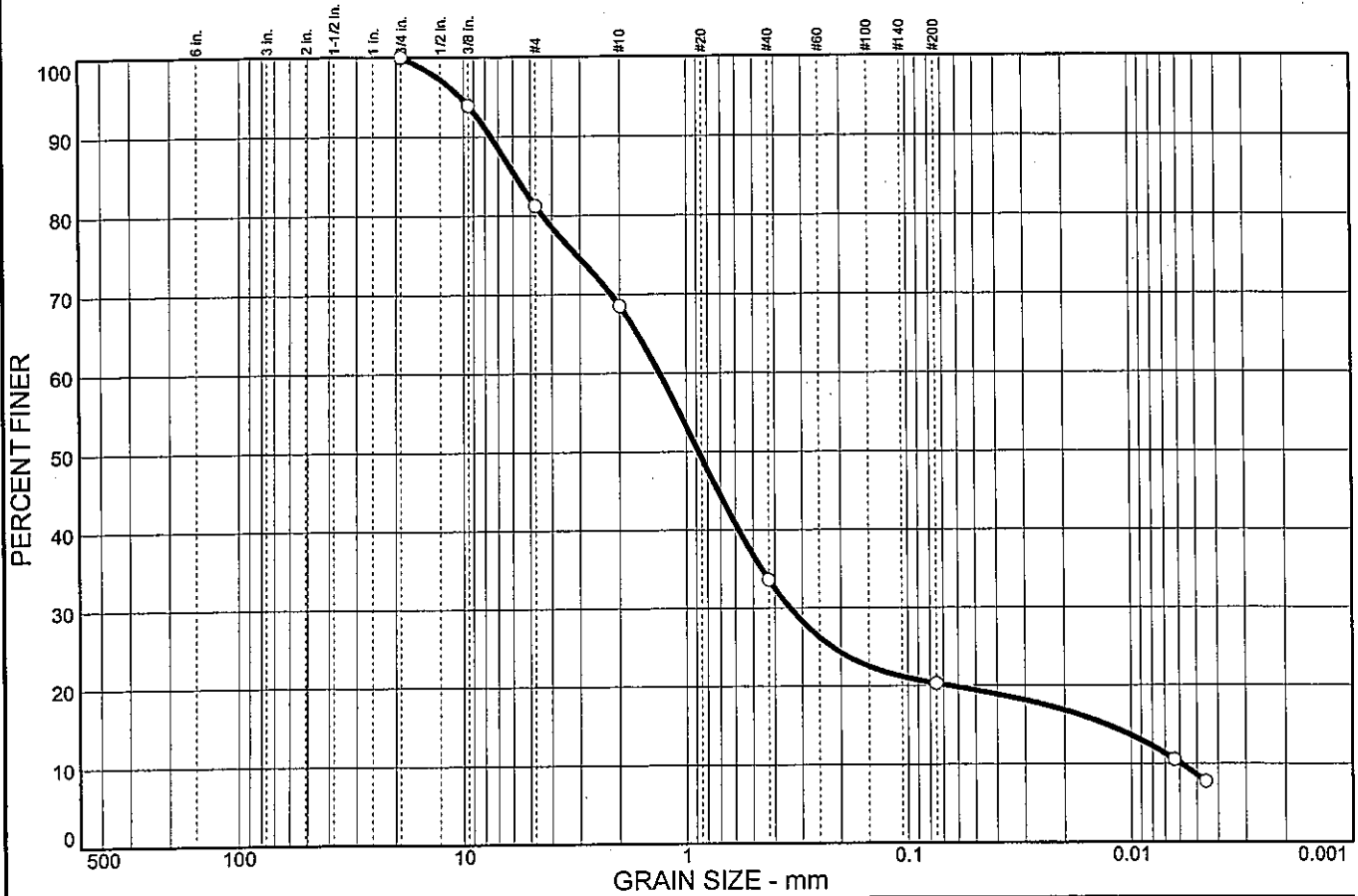


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	18.8	12.7	34.9	13.3	11.7	8.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	93.9		
#4	81.2		
#10	68.5		
#40	33.6		
#200	20.3		

**Soil Description**

Clayey sand with gravel

**Atterberg Limits**

PL= 17      LL= 27      PI= 10

**Coefficients**

D<sub>85</sub>= 5.84      D<sub>60</sub>= 1.33      D<sub>50</sub>= 0.880  
D<sub>30</sub>= 0.340      D<sub>15</sub>= 0.0129      D<sub>10</sub>= 0.0059  
C<sub>u</sub>= 223.30      C<sub>c</sub>= 14.71

**Classification**

USCS= SC      AASHTO= A-2-4(0)

**Remarks**

Moisture Content= 13.2%  
F.M.=0.25

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1101

Date: 8/15/05  
Elev./Depth: 3.0

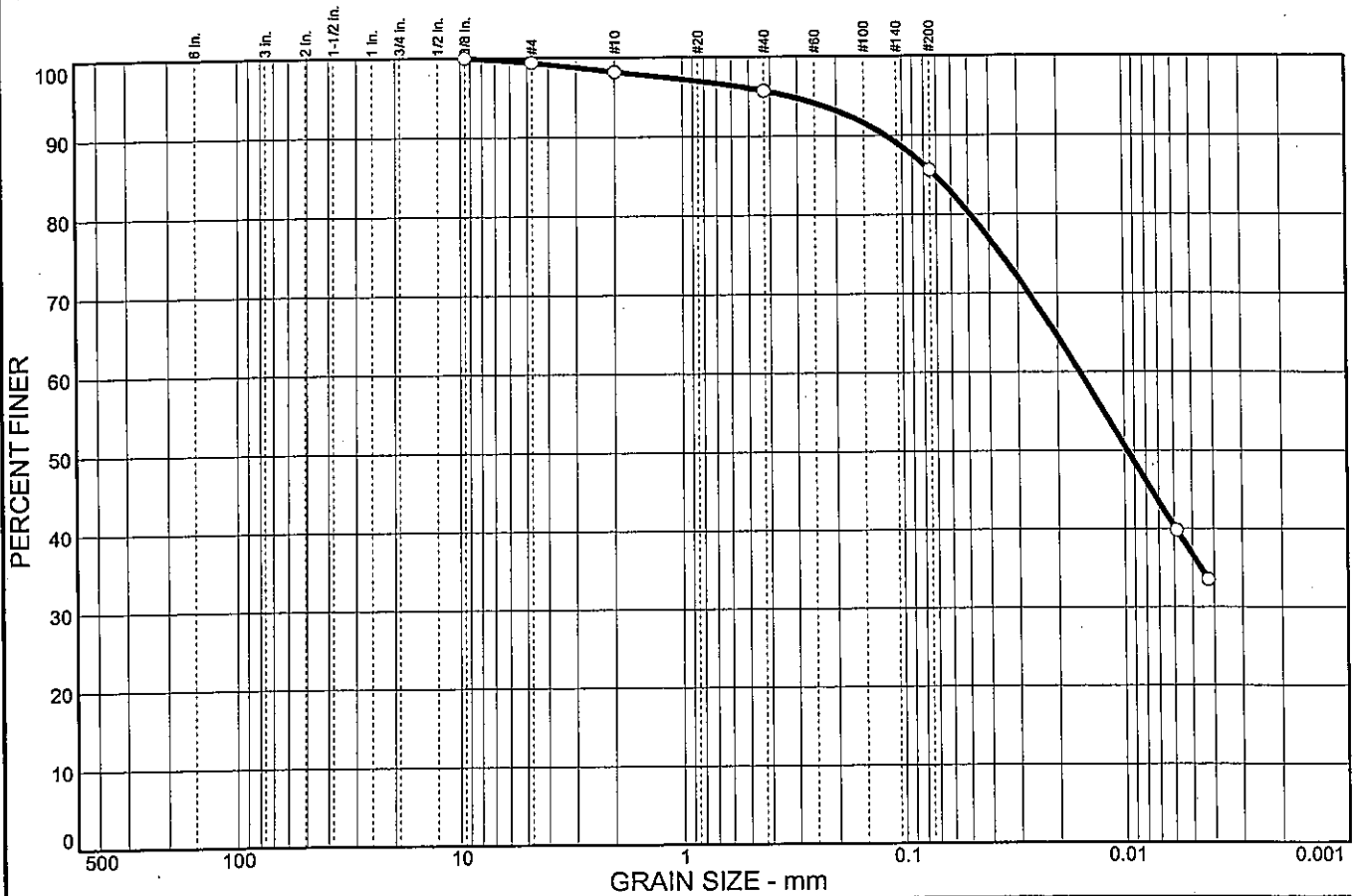


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	1.2	2.5	10.1	48.9	36.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.4		
#10	98.2		
#40	95.7		
#200	85.6		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 17      LL= 35      PI= 18

**Coefficients**

D<sub>85</sub>= 0.0712      D<sub>60</sub>= 0.0159      D<sub>50</sub>= 0.0097  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                C<sub>c</sub>=

**Classification**

USCS= CL              AASHTO= A-6(15)

**Remarks**

Moisture Content= 16.9%  
F.M.=0.01

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1102

Date: 8/15/05  
Elev./Depth: 1.0

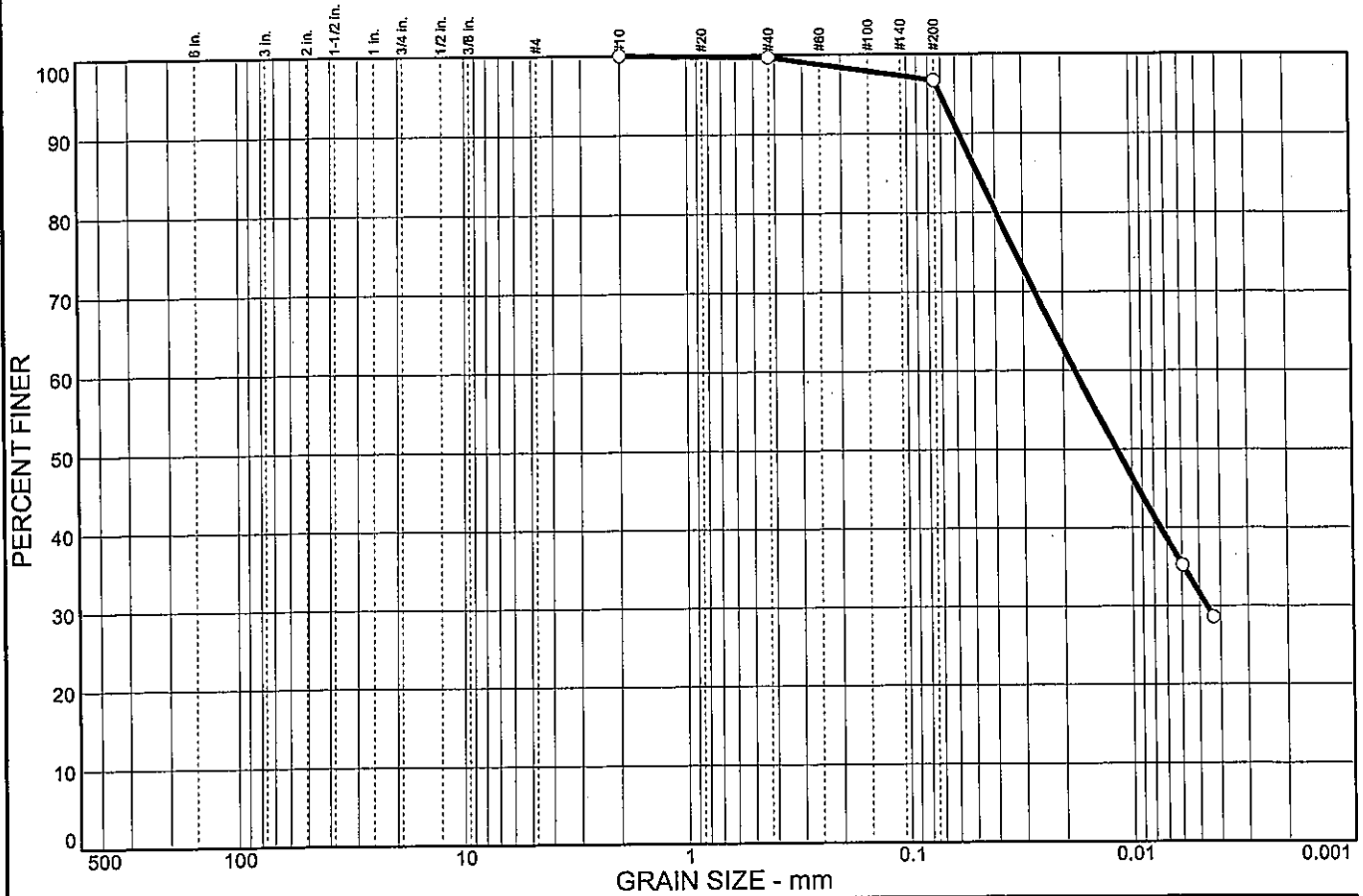


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	3.0	65.1	31.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.7		
#200	96.7		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 17      LL= 27      PI= 10

**Coefficients**

D<sub>85</sub>= 0.0478      D<sub>60</sub>= 0.0178      D<sub>50</sub>= 0.0117  
D<sub>30</sub>= 0.0046      D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-4(8)

**Remarks**

Moisture Content= 23.0%  
LOI (Organic Content)= 3.82%

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1102

Date: 8/15/05  
Elev./Depth: 3.0

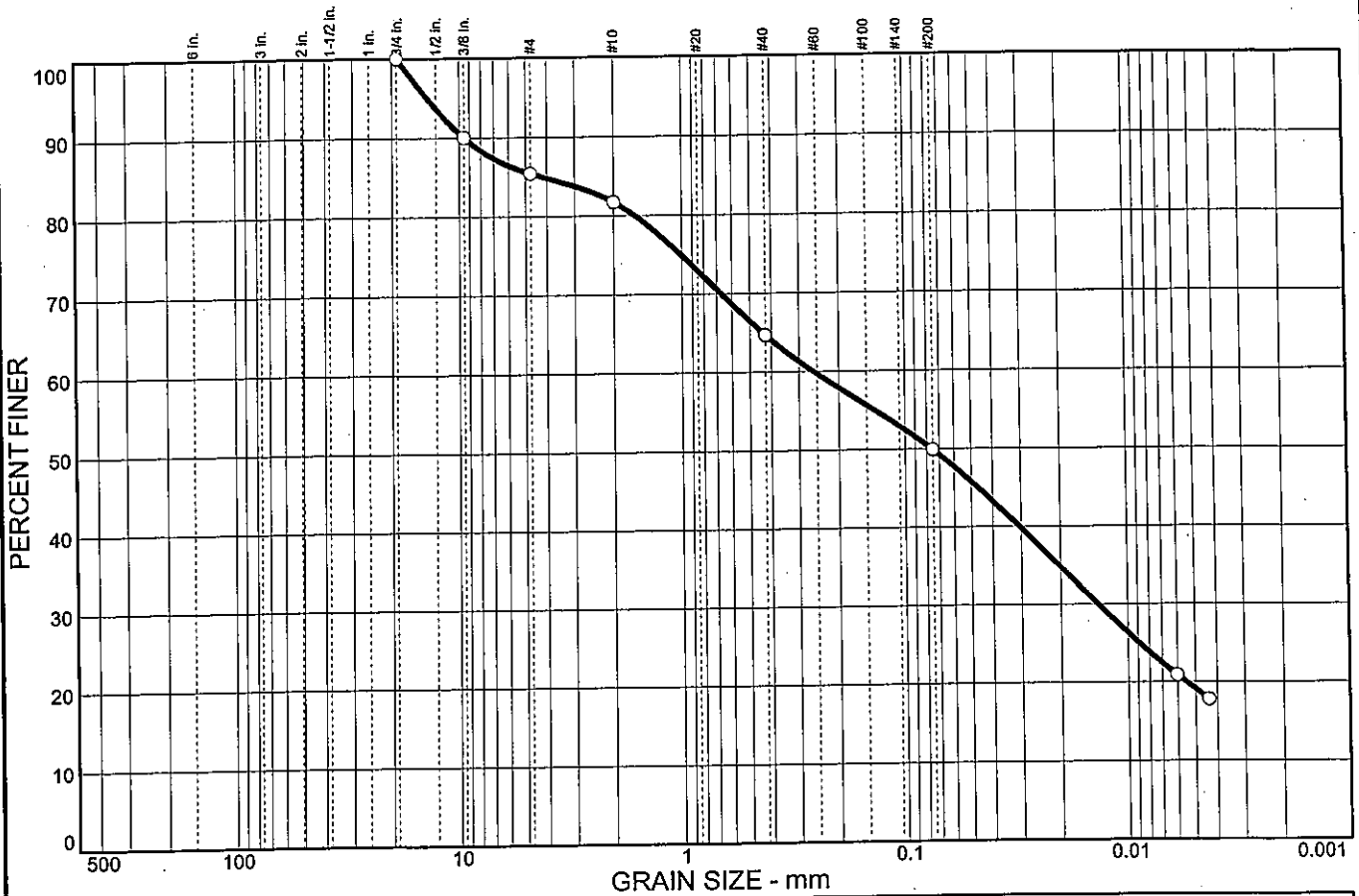


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	14.6	3.7	17.0	14.8	30.8	19.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	90.0		
#4	85.4		
#10	81.7		
#40	64.7		
#200	49.9		

**Soil Description**

Clayey sand

**Atterberg Limits**

PL= 17      LL= 28      PI= 11

**Coefficients**

D<sub>85</sub>= 4.26      D<sub>60</sub>= 0.258      D<sub>50</sub>= 0.0758  
D<sub>30</sub>= 0.0136      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC      AASHTO= A-6(2)

**Remarks**

Moisture Content= 12.0%  
F.M.=0.25

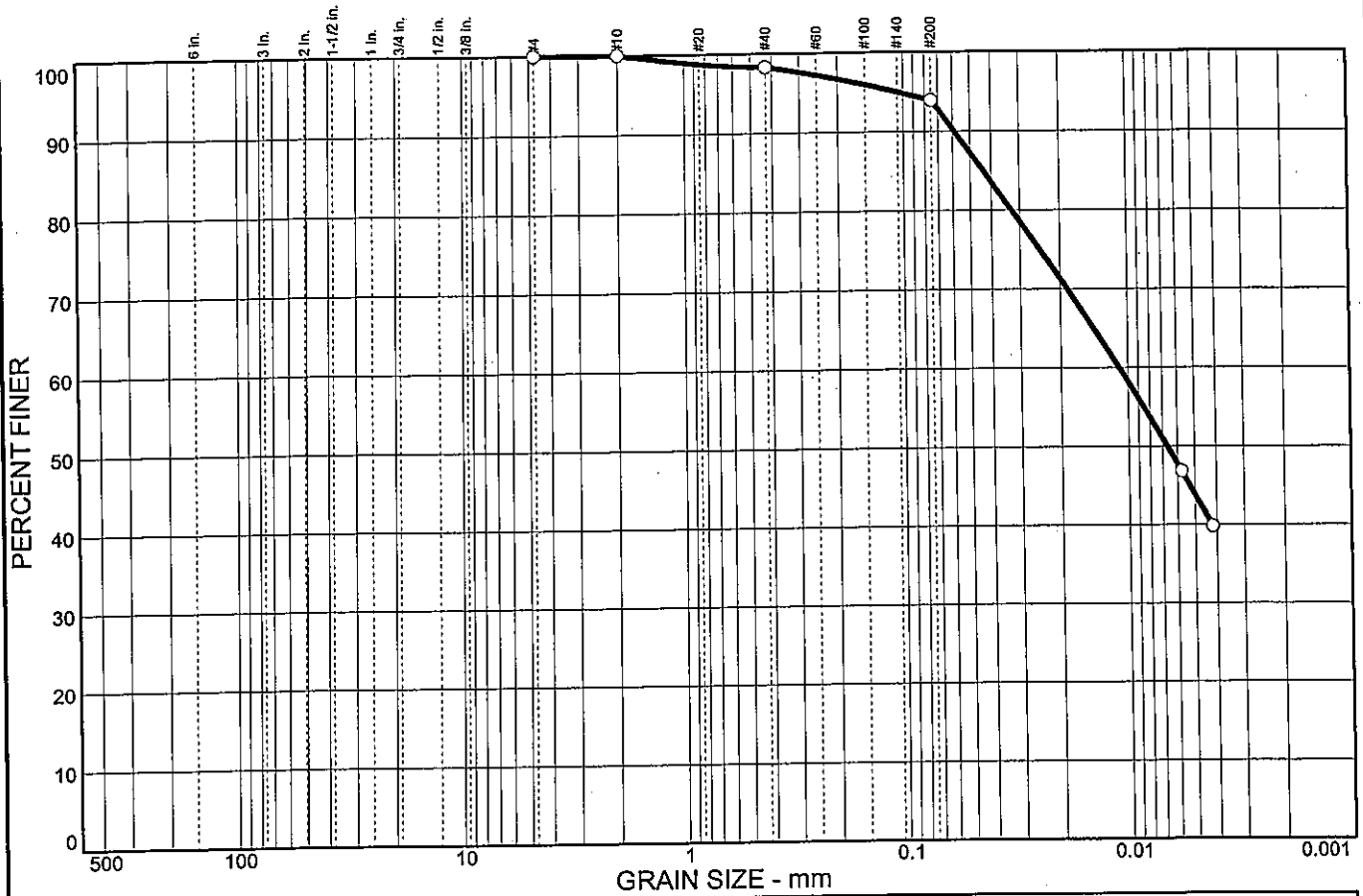
\* (no specification provided)

Sample No.: 1      Source of Sample: B-1103      Date: 8/15/05  
Location:      Elev./Depth: 0.0



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	1.7	4.4	50.1	43.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	98.3		
#200	93.9		

**Soil Description**

Lean clay

---

**Atterberg Limits**

PL= 20      LL= 37      PI= 17

---

**Coefficients**

D<sub>85</sub>= 0.0437      D<sub>60</sub>= 0.0109      D<sub>50</sub>= 0.0067  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                C<sub>c</sub>=

---

**Classification**

USCS= CL                      AASHTO= A-6(16)

---

**Remarks**

Moisture Content= 22.5%  
LOI (Organic Content)= 4.92%

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1103

Date: 8/15/05  
Elev./Depth: 2.0

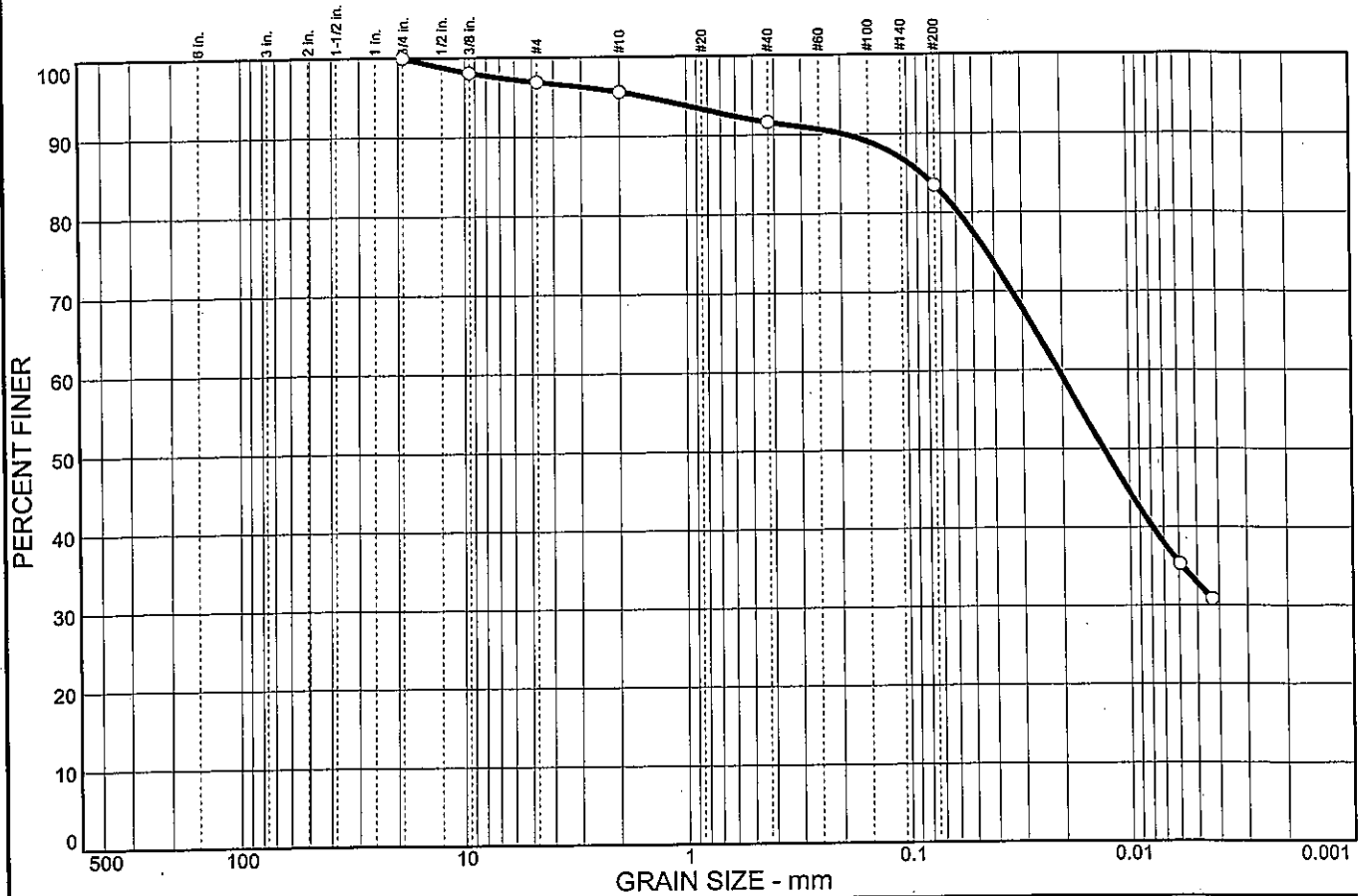


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	3.1	1.3	4.0	8.1	50.6	32.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	98.1		
#4	96.9		
#10	95.6		
#40	91.6		
#200	83.5		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 18      LL= 31      PI= 13

**Coefficients**

D<sub>85</sub>= 0.0858      D<sub>60</sub>= 0.0208      D<sub>50</sub>= 0.0131  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-6(10)

**Remarks**

Moisture Content= 15.1%  
F.M.=0.05

\* (no specification provided)

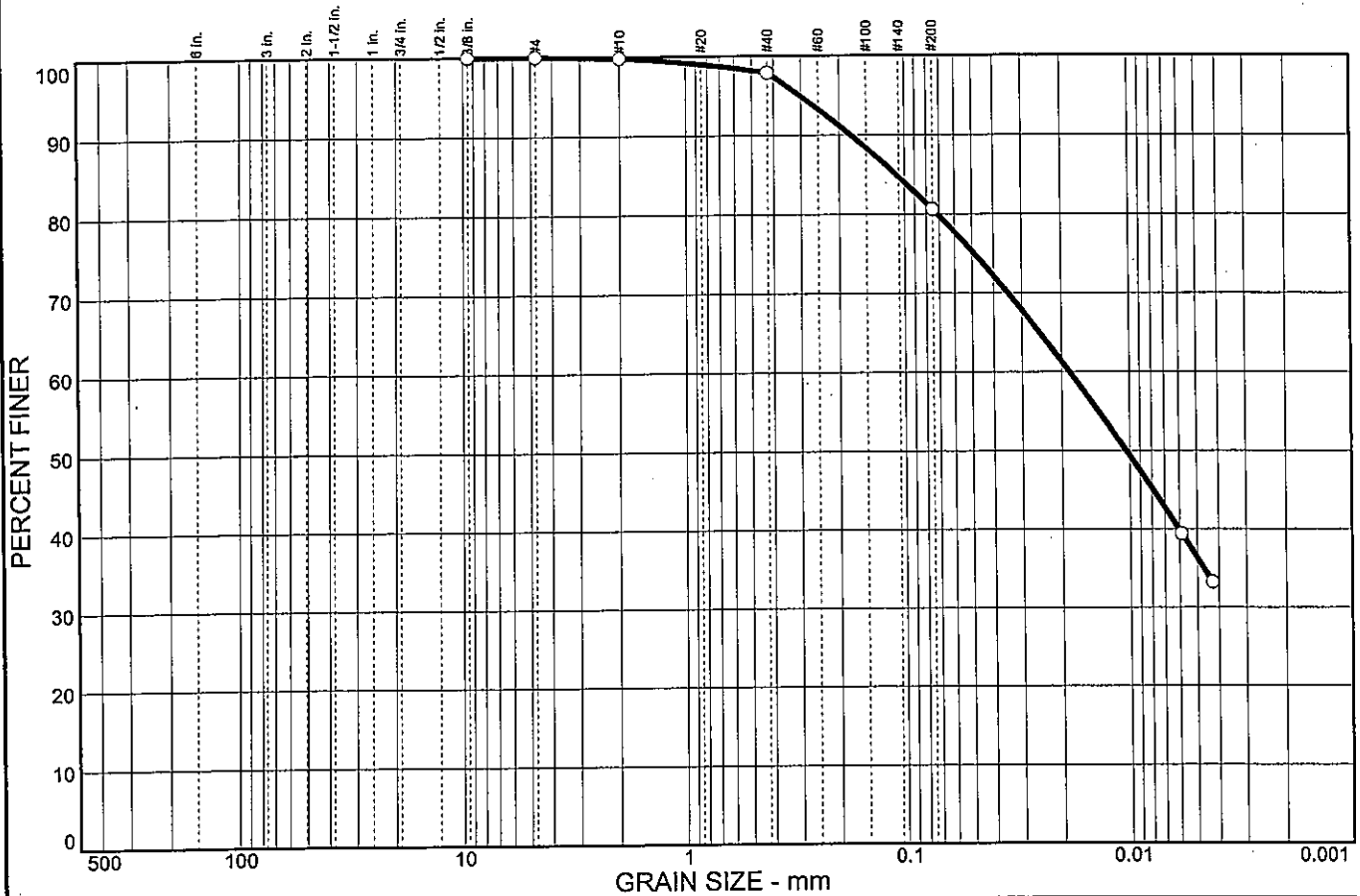
Sample No.: 1      Source of Sample: B-1104      Date: 10/26/05  
Location:      Elev./Depth: 1.0



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	0.2	1.9	17.3	44.3	36.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	99.8		
#40	97.9		
#200	80.6		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 18      LL= 33      PI= 15

**Coefficients**

D<sub>85</sub>= 0.109      D<sub>60</sub>= 0.0184      D<sub>50</sub>= 0.0104  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-6(11)

**Remarks**

Moisture Content= 18.3%

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1104

Date: 10/26/05  
Elev./Depth: 3.0



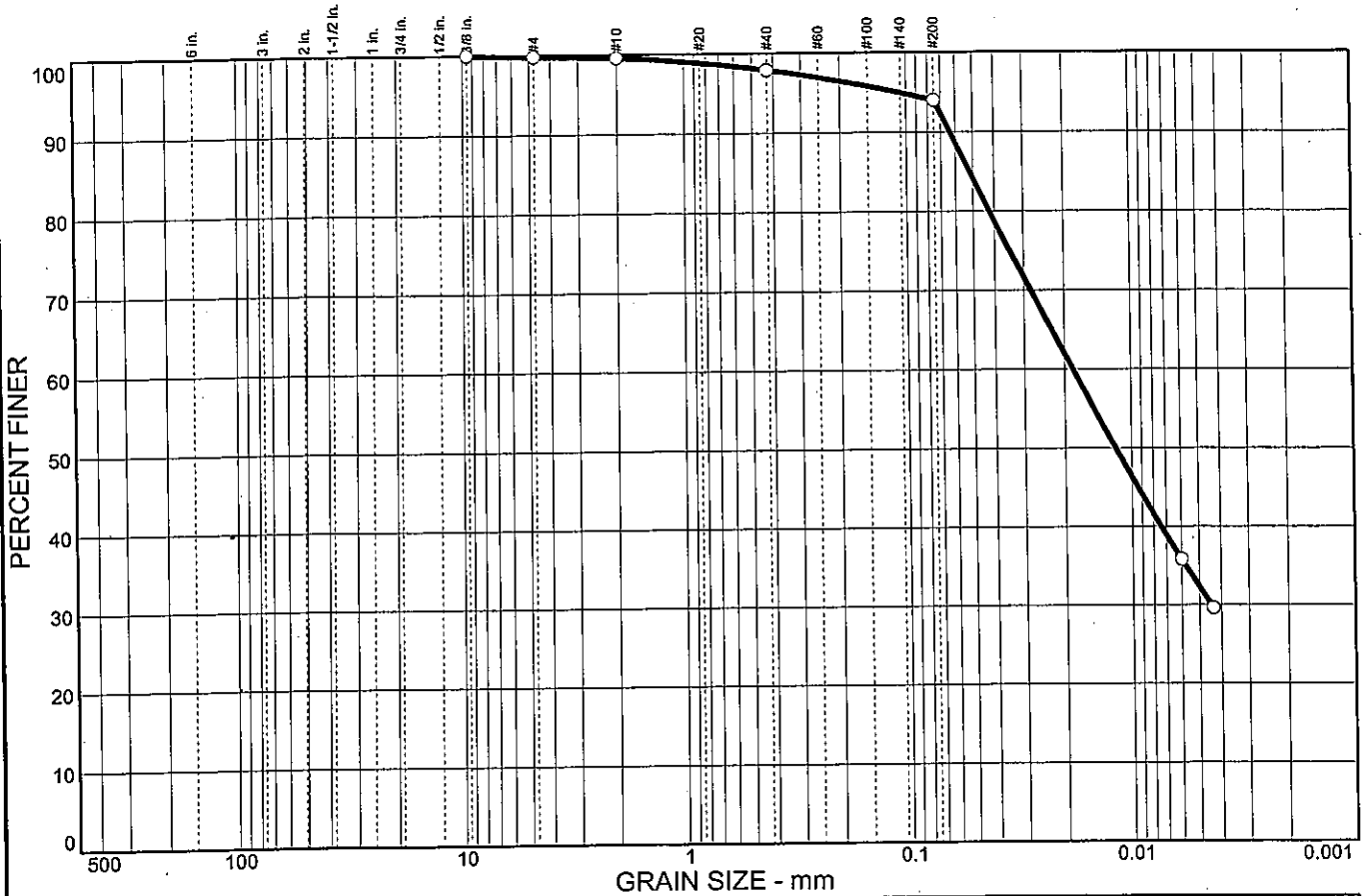
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.2	1.7	3.9	61.7	32.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.8		
#10	99.6		
#40	97.9		
#200	94.0		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 20      LL= 32      PI= 12

**Coefficients**

D<sub>85</sub>= 0.0519      D<sub>60</sub>= 0.0183      D<sub>50</sub>= 0.0118  
D<sub>30</sub>= 0.0044      D<sub>15</sub>=                      D<sub>10</sub>=  
C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL                      AASHTO= A-6(11)

**Remarks**

Moisture Content= 20.7%  
F.M.=0.00

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: B-1104

Date: 10/26/05  
Elev./Depth: 5.0

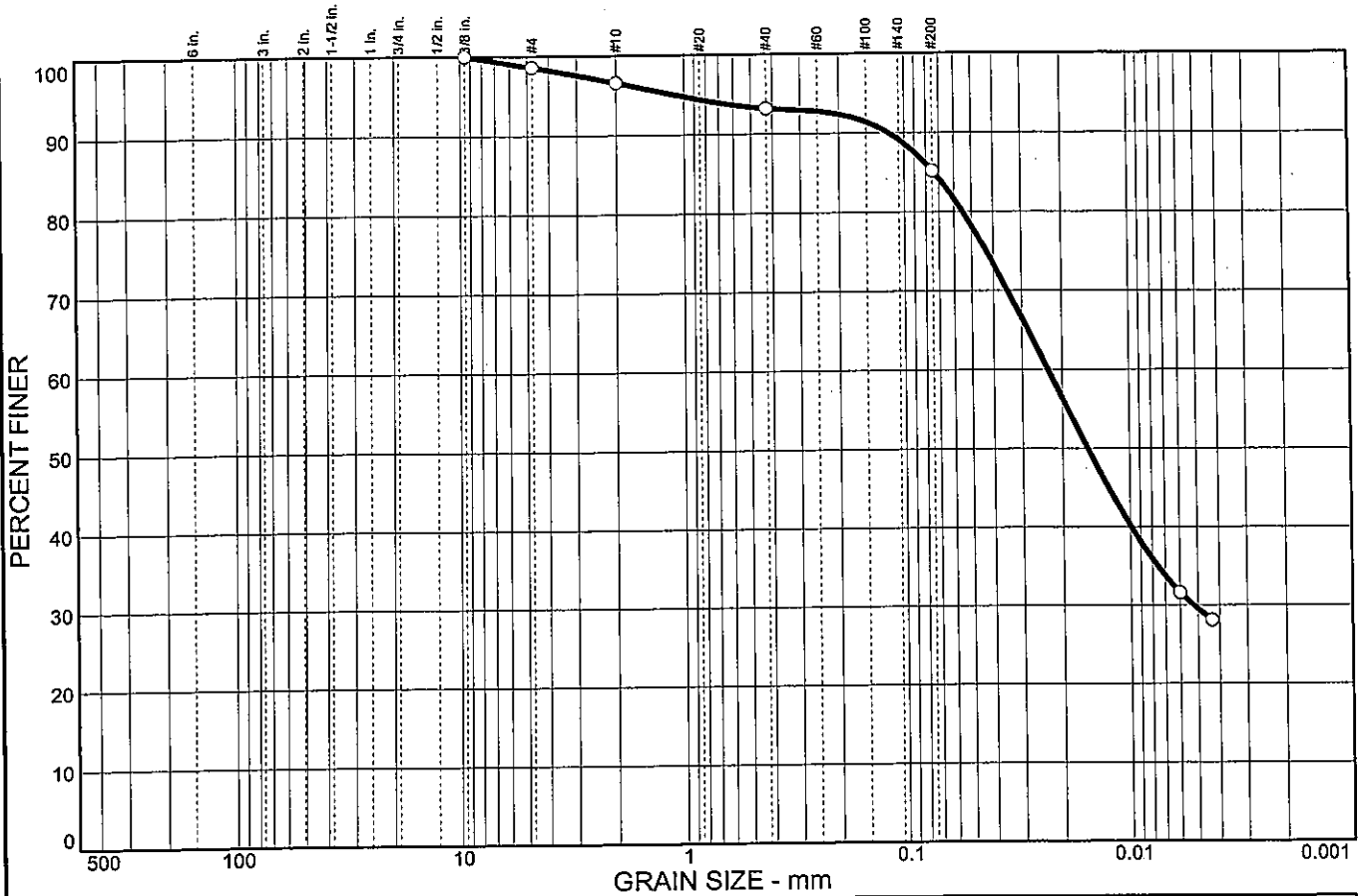


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	1.4	2.0	3.4	8.0	55.7	29.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	98.6		
#10	96.6		
#40	93.2		
#200	85.2		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 22      LL= 38      PI= 16

**Coefficients**

D<sub>85</sub>= 0.0740      D<sub>60</sub>= 0.0231      D<sub>50</sub>= 0.0154  
D<sub>30</sub>= 0.0052      D<sub>15</sub>=                      D<sub>10</sub>=  
C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-6(14)

**Remarks**

Moisture Content= 15.6%  
F.M.=0.01

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1105

Date: 10/26/05  
Elev./Depth: 1.0

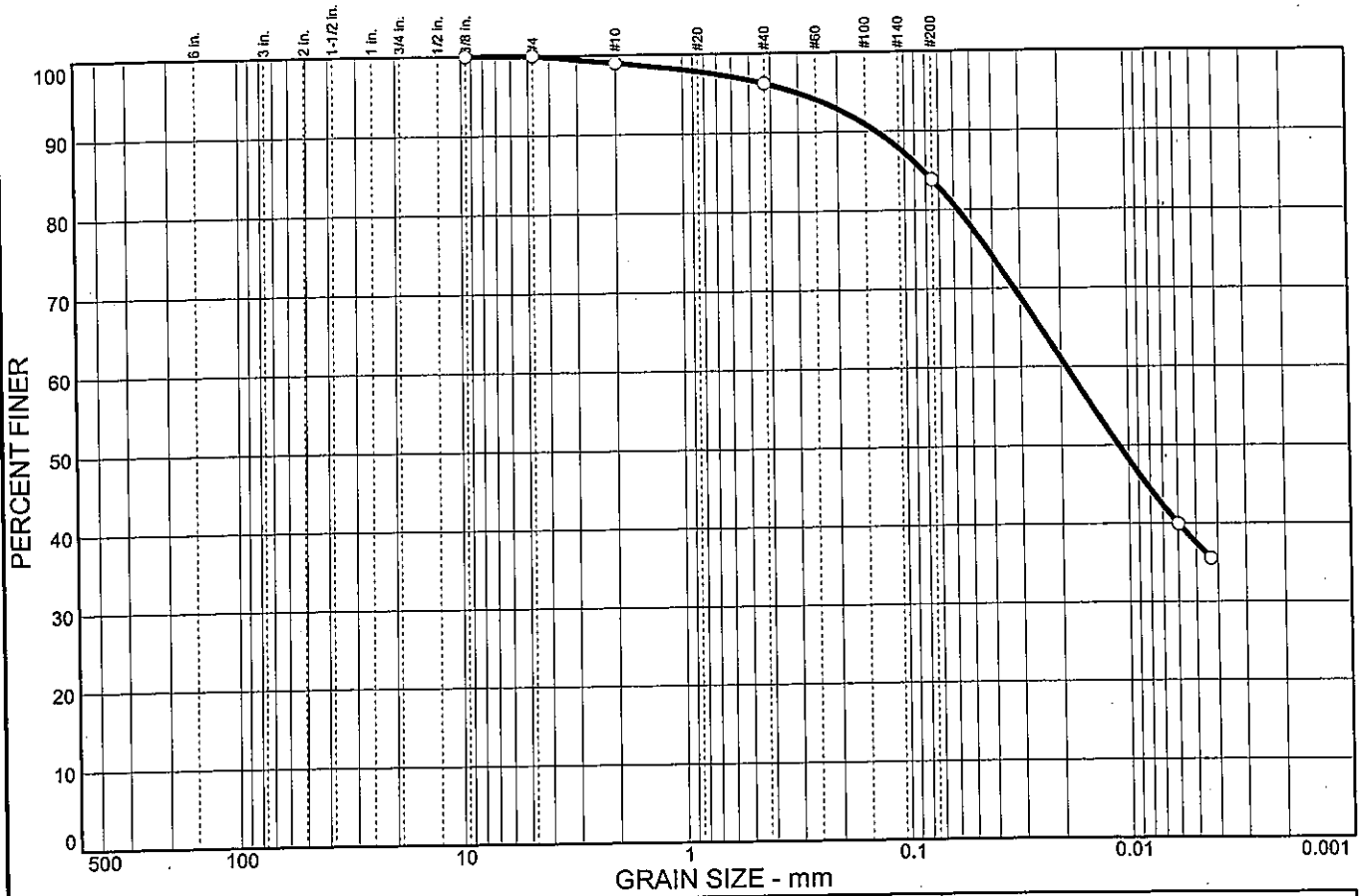


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	1.0	2.8	12.4	46.3	37.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	99.0		
#40	96.2		
#200	83.8		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 19      LL= 34      PI= 15

**Coefficients**

D<sub>85</sub>= 0.0824      D<sub>60</sub>= 0.0189      D<sub>50</sub>= 0.0111  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-6(12)

**Remarks**

Moisture Content= 19.0%

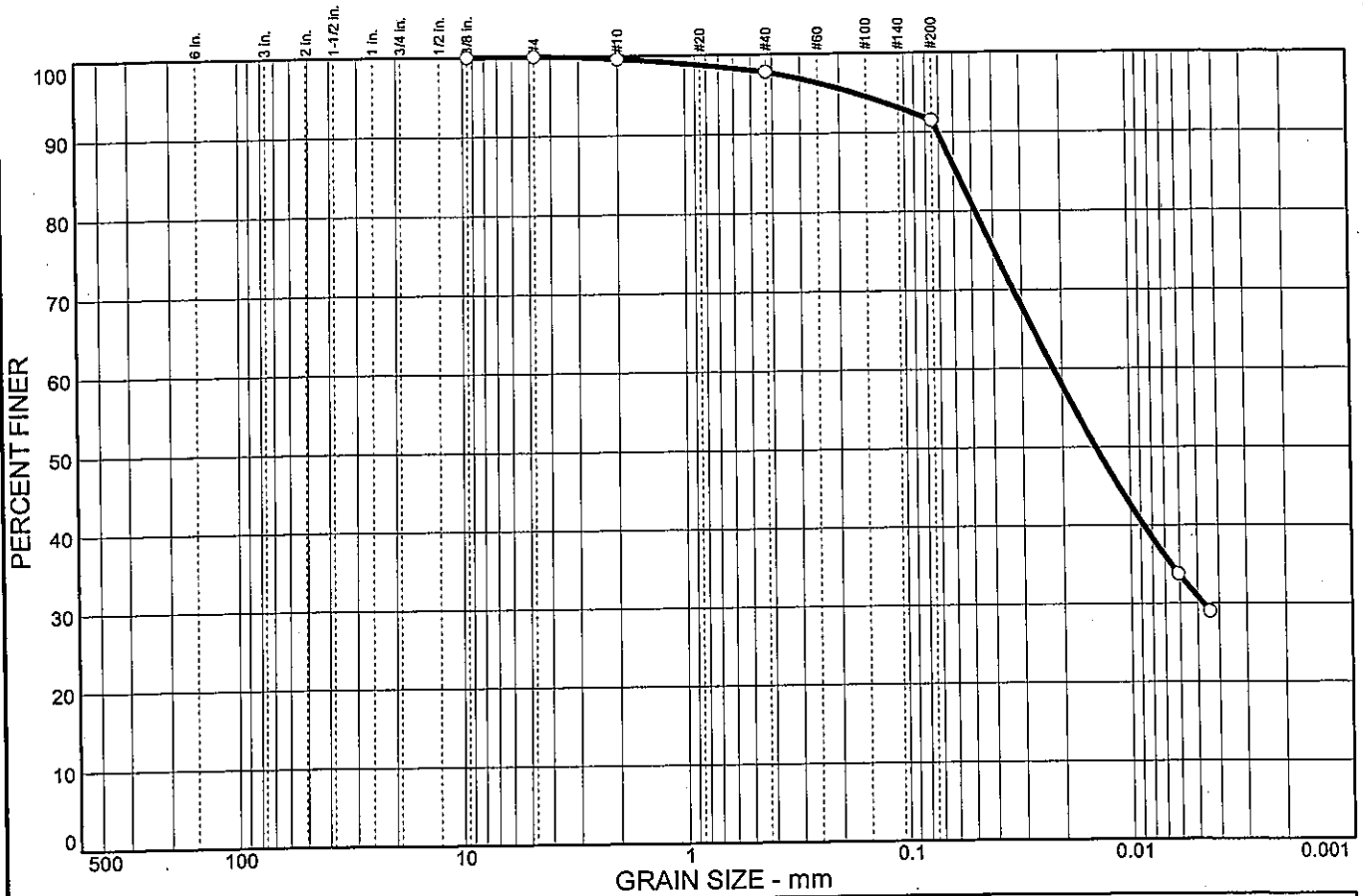
\* (no specification provided)

Sample No.: 2      Source of Sample: B-1105      Date: 10/26/05  
 Location:      Elev./Depth: 3.5



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	1.8	6.3	60.6	30.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	99.6		
#40	97.8		
#200	91.5		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 19      LL= 30      PI= 11

**Coefficients**

D<sub>85</sub>= 0.0583      D<sub>60</sub>= 0.0218      D<sub>50</sub>= 0.0142  
D<sub>30</sub>= 0.0047      D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL              AASHTO= A-6(9)

**Remarks**

Moisture Content= 23.2%

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: B-1105

Date: 10/26/05  
Elev./Depth: 6.0

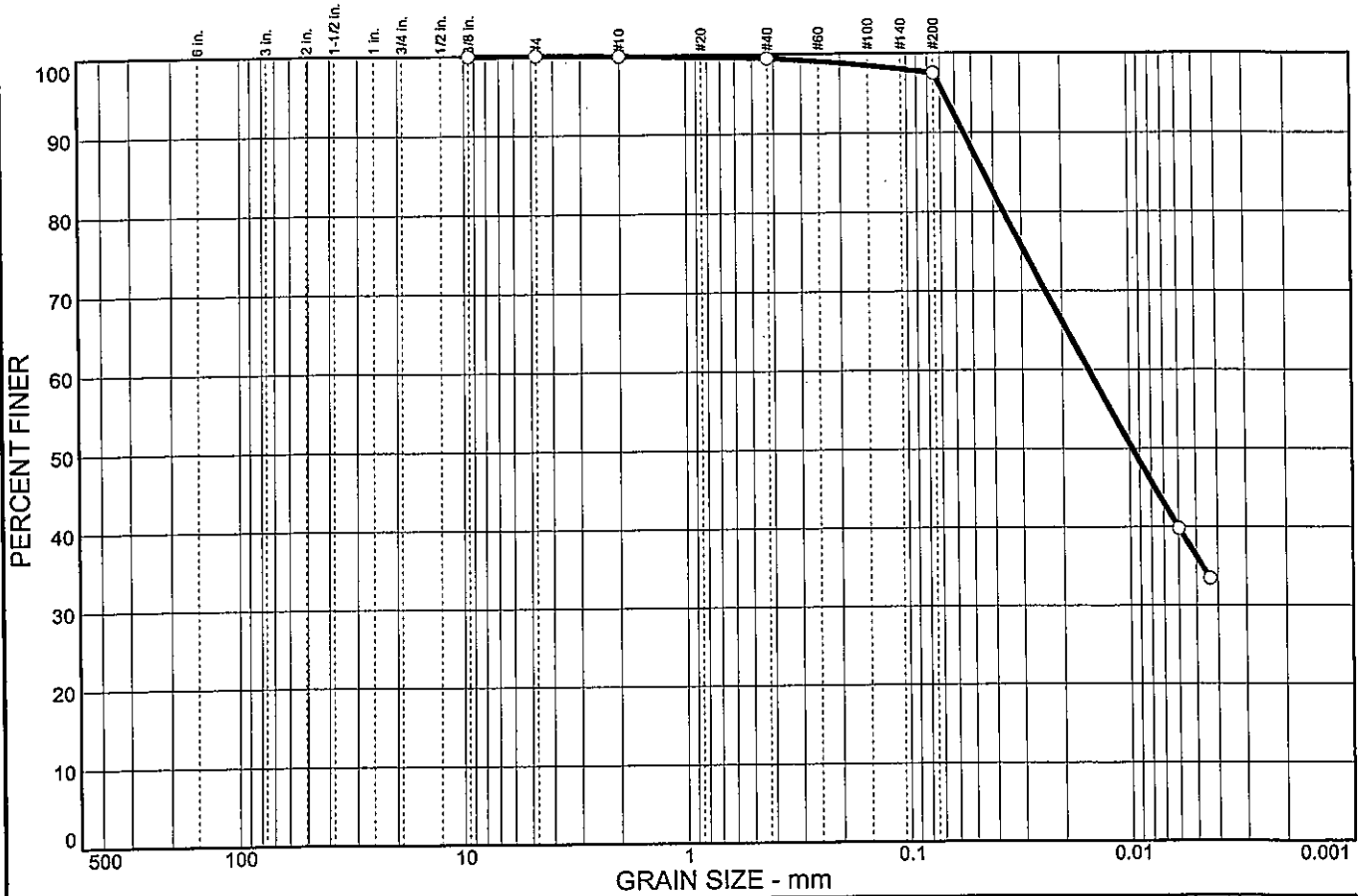


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	2.0	61.2	36.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	99.9		
#40	99.5		
#200	97.5		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 17      LL= 32      PI= 15

**Coefficients**

D<sub>85</sub>= 0.0444      D<sub>60</sub>= 0.0153      D<sub>50</sub>= 0.0097  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-6(14)

**Remarks**

Moisture Content= 16.9%

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1106

Date: 10/26/05  
Elev./Depth: 1.0

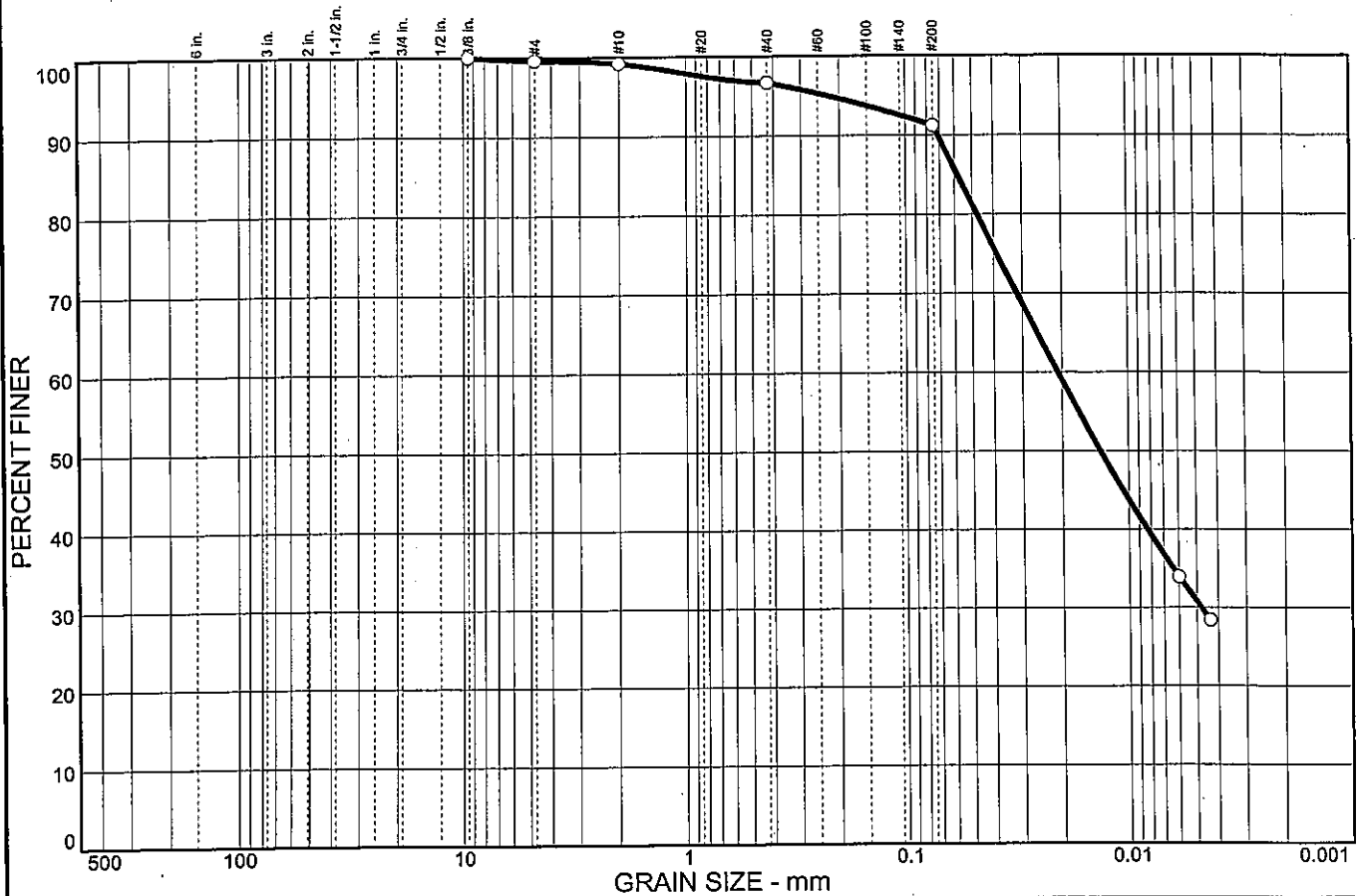


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.4	2.5	5.5	60.4	30.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.6		
#10	99.2		
#40	96.7		
#200	91.2		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 19      LL= 31      PI= 12

**Coefficients**

D<sub>85</sub>= 0.0583      D<sub>60</sub>= 0.0208      D<sub>50</sub>= 0.0134  
D<sub>30</sub>= 0.0048      D<sub>15</sub>=                      D<sub>10</sub>=  
C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL                      AASHTO= A-6(10)

**Remarks**

Moisture Content= 18.0%  
F.M.=0.00

\* (no specification provided)

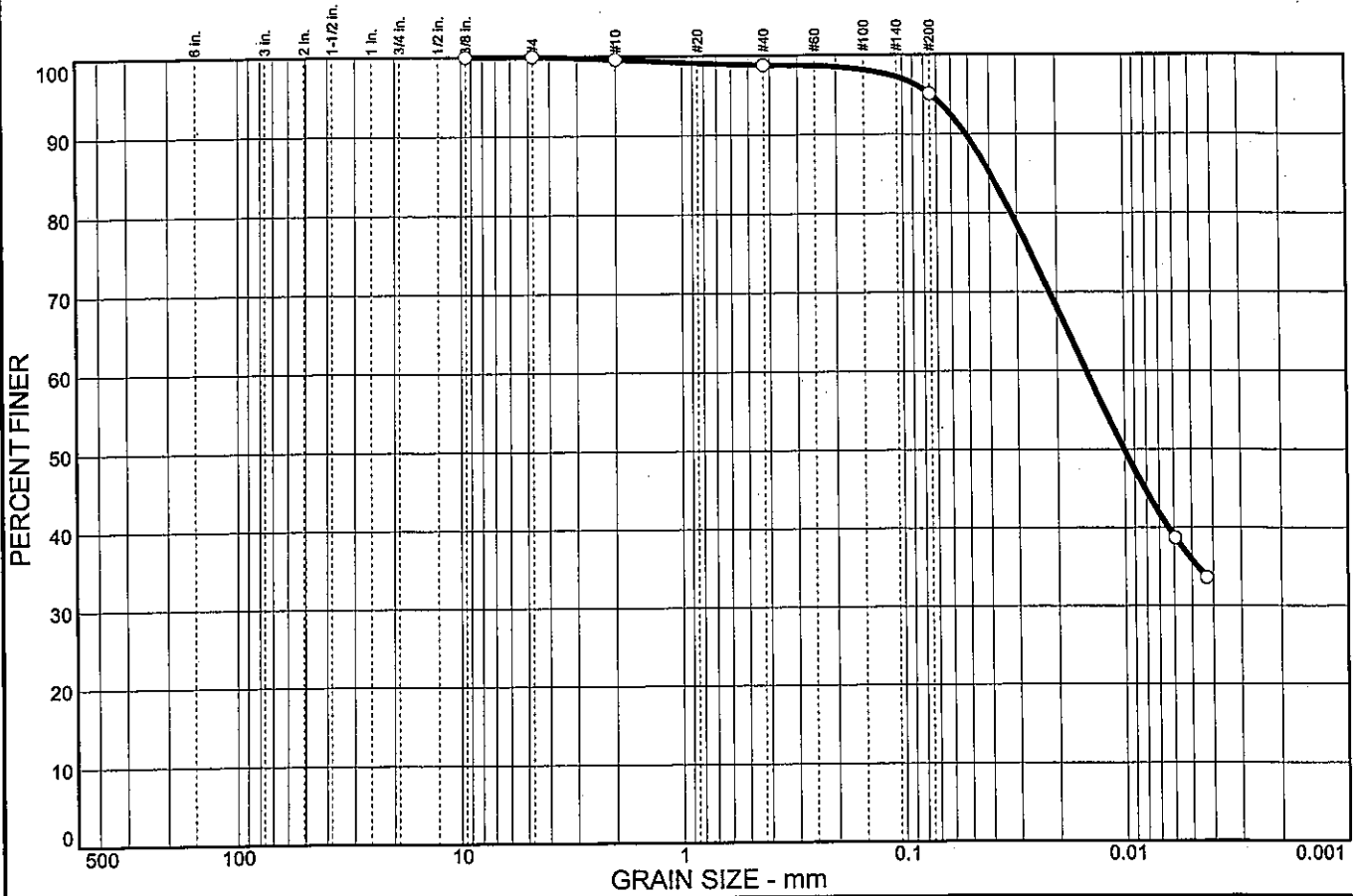
Sample No.: 2      Source of Sample: B-1106      Date: 10/26/05  
Location:      Elev./Depth: 3.5



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	0.8	3.7	59.2	35.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	99.6		
#40	98.8		
#200	95.1		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 18      LL= 34      PI= 16

**Coefficients**

D<sub>85</sub>= 0.0398      D<sub>60</sub>= 0.0148      D<sub>50</sub>= 0.0101  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-6(15)

**Remarks**

Moisture Content= 21.4%

\* (no specification provided)

Sample No.: 3  
 Location:

Source of Sample: B-1106

Date: 10/26/05  
 Elev./Depth: 6.0

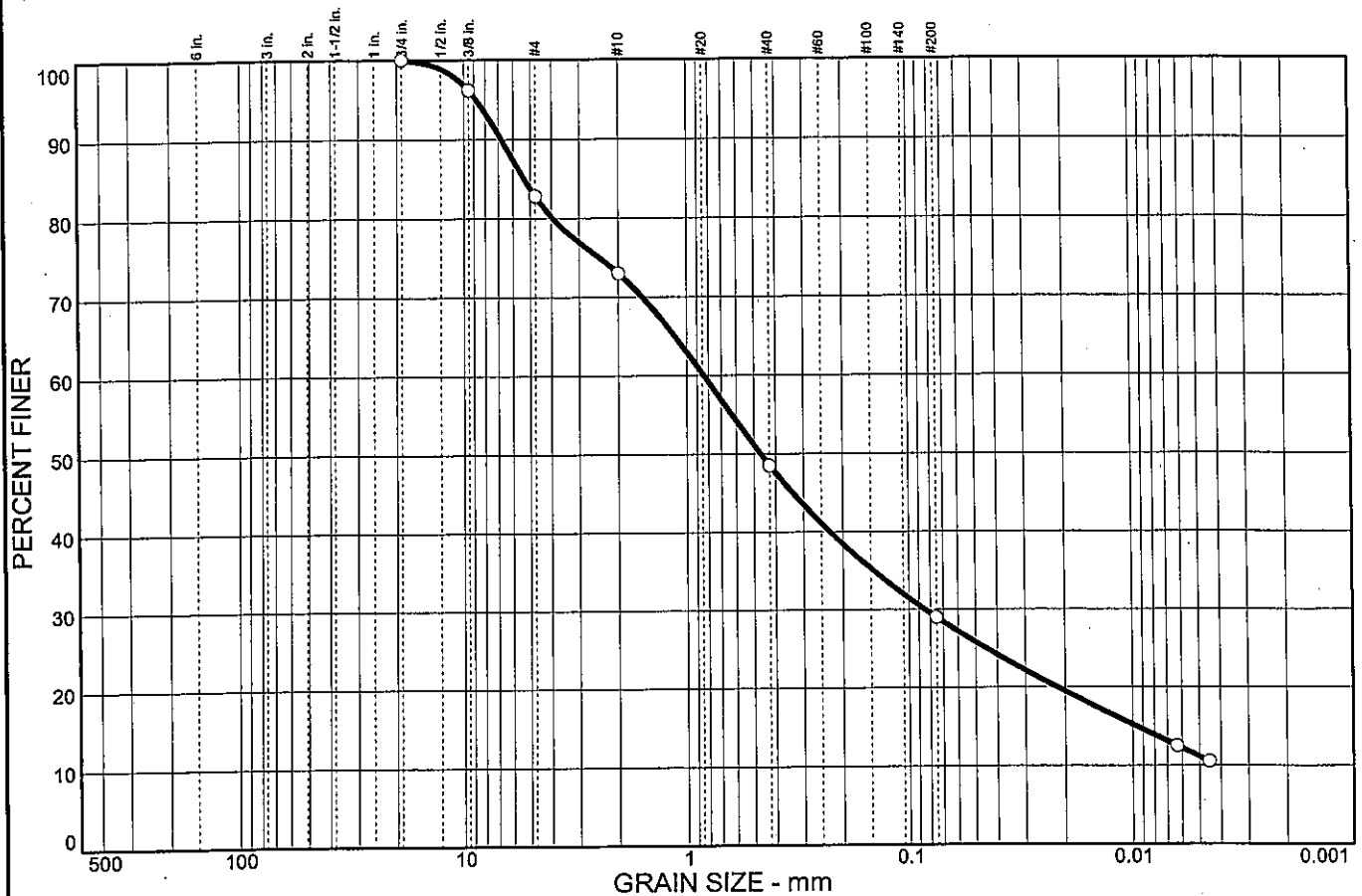


Client: TranSystems, Inc.  
 Project: SCI-823-0.00

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	17.2	9.8	24.5	19.5	17.9	11.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	96.2		
#4	82.8		
#10	73.0		
#40	48.5		
#200	29.0		

**Soil Description**

Clayey sand with gravel

**Atterberg Limits**

PL= 14      LL= 23      PI= 9

**Coefficients**

D<sub>85</sub>= 5.35      D<sub>60</sub>= 0.838      D<sub>50</sub>= 0.467  
D<sub>30</sub>= 0.0846      D<sub>15</sub>= 0.0096      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC      AASHTO= A-2-4(0)

**Remarks**

Moisture Content= 11.5%  
F.M.=0.21

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1107

Date: 9/23/05  
Elev./Depth: 1.0



Client: TranSystems, Inc.  
Project: SCI-823-0.00

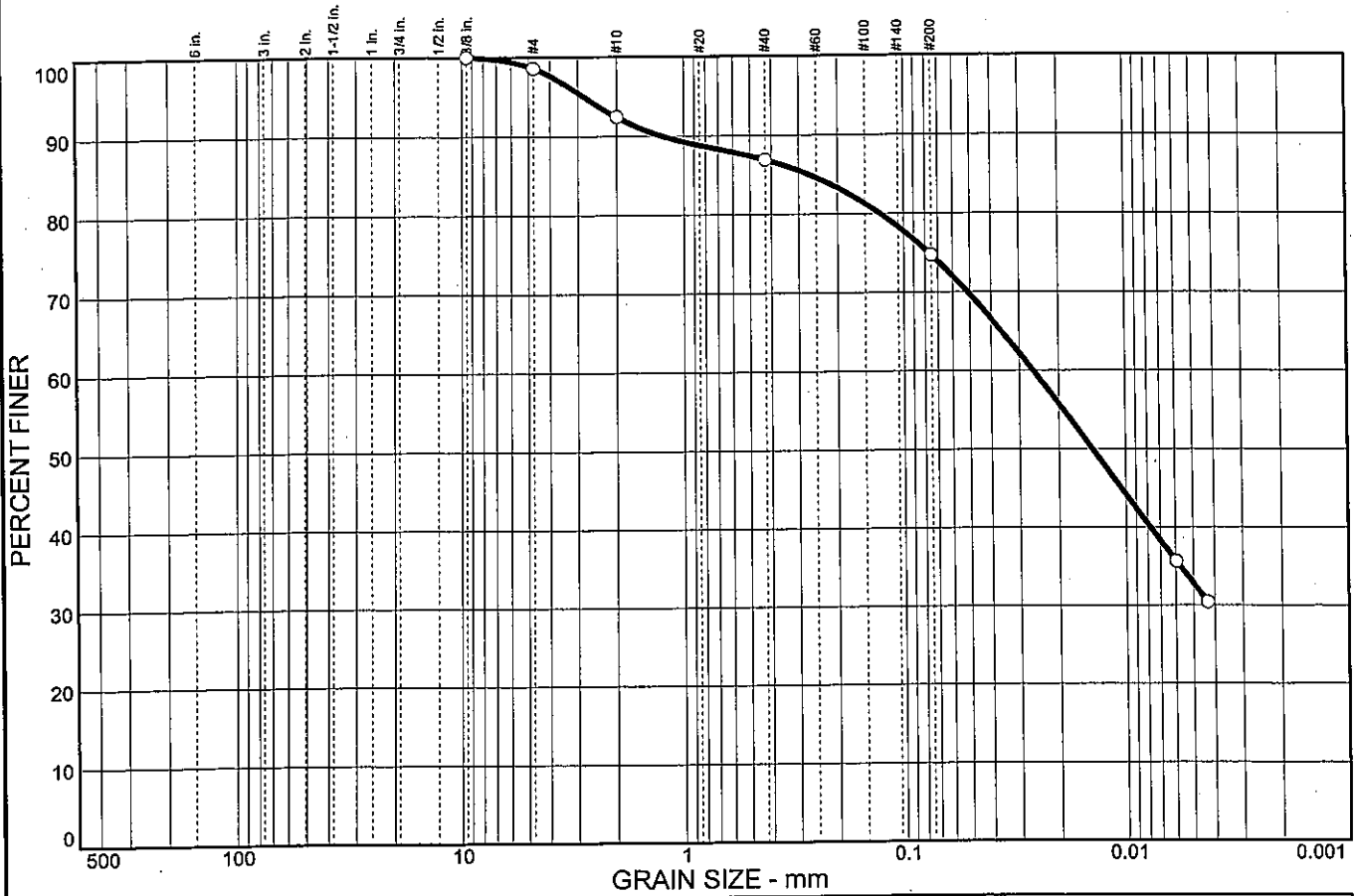
Project No: 0121-3070.03

Figure





# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	1.4	6.2	5.5	12.2	41.9	32.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	98.6		
#10	92.4		
#40	86.9		
#200	74.7		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 18      LL= 35      PI= 17

**Coefficients**

D<sub>85</sub>= 0.270      D<sub>60</sub>= 0.0260      D<sub>50</sub>= 0.0141  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                C<sub>c</sub>=

**Classification**

USCS= CL                      AASHTO= A-6(11)

**Remarks**

Moisture Content= 21.2%  
F.M.=0.01

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: B-1107

Date: 10/26/05  
Elev./Depth: 6.0

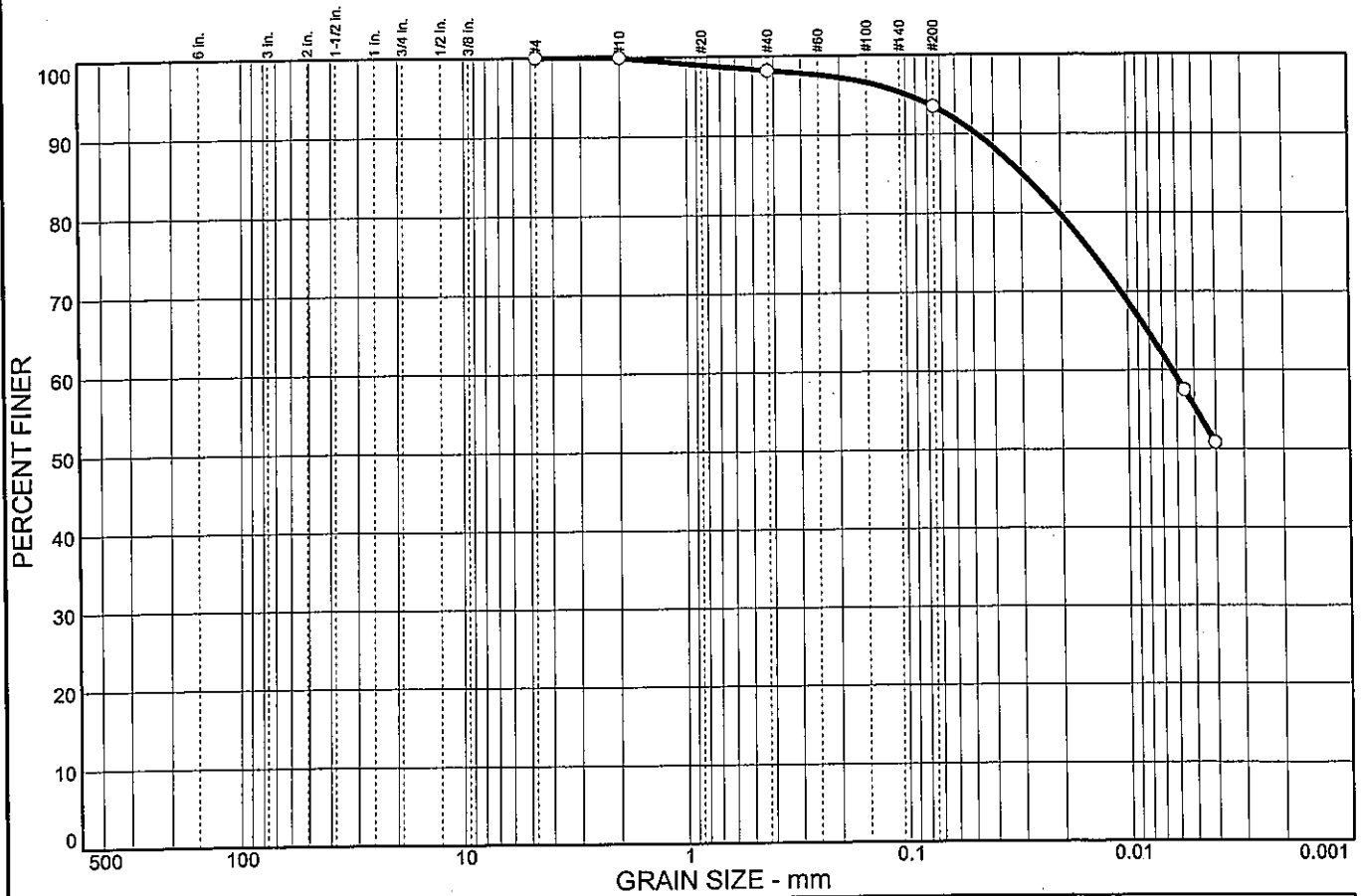


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	4.7	38.1	55.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	98.2		
#200	93.5		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 20      LL= 46      PI= 26

**Coefficients**

D<sub>85</sub>= 0.0298      D<sub>60</sub>= 0.0063      D<sub>50</sub>=  
D<sub>30</sub>=                      D<sub>15</sub>=                      D<sub>10</sub>=  
C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL                      AASHTO= A-7-6(26)

**Remarks**

Moisture Content= 29.5%

\* (no specification provided)

Sample No.: 9  
Location:

Source of Sample: B-1107

Date: 9/23/05  
Elev./Depth: 21.0

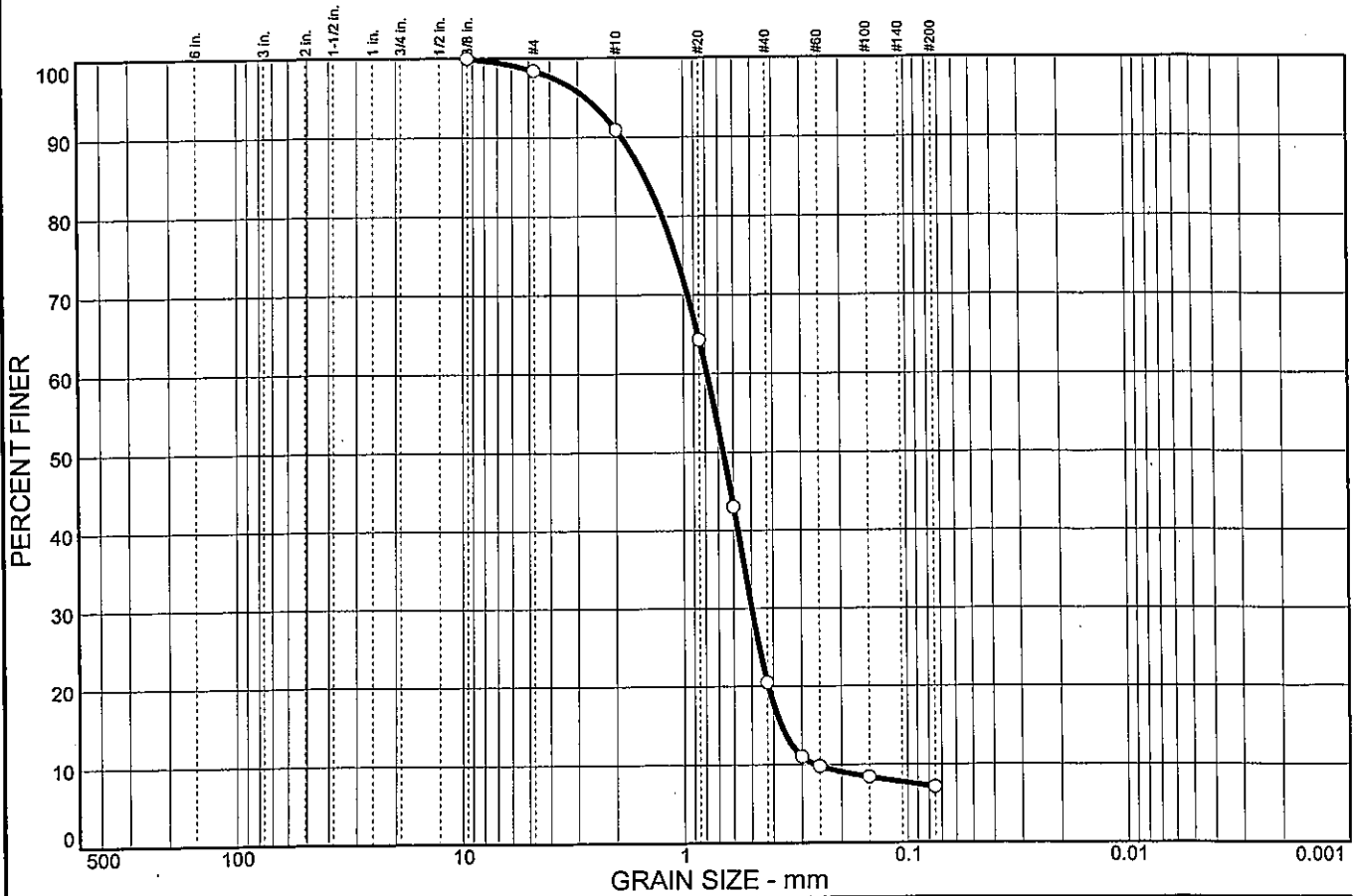


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	1.6	7.5	70.4	13.4	7.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	98.4		
#10	90.9		
#20	64.3		
#30	43.0		
#40	20.5		
#50	11.0		
#60	9.8		
#100	8.4		
#200	7.1		

**Soil Description**  
Poorly graded sand with silt

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 1.49      D<sub>60</sub>= 0.785      D<sub>50</sub>= 0.666  
 D<sub>30</sub>= 0.498      D<sub>15</sub>= 0.369      D<sub>10</sub>= 0.262  
 C<sub>u</sub>= 3.00      C<sub>c</sub>= 1.21

**Classification**  
 USCS= SP-SM      AASHTO= A-1-b

**Remarks**  
 Moisture Content= 25.9%  
 F.M.=2.39

\* (no specification provided)

Sample No.: 10  
Location:

Source of Sample: B-1107

Date: 9/23/05  
Elev./Depth: 23.5

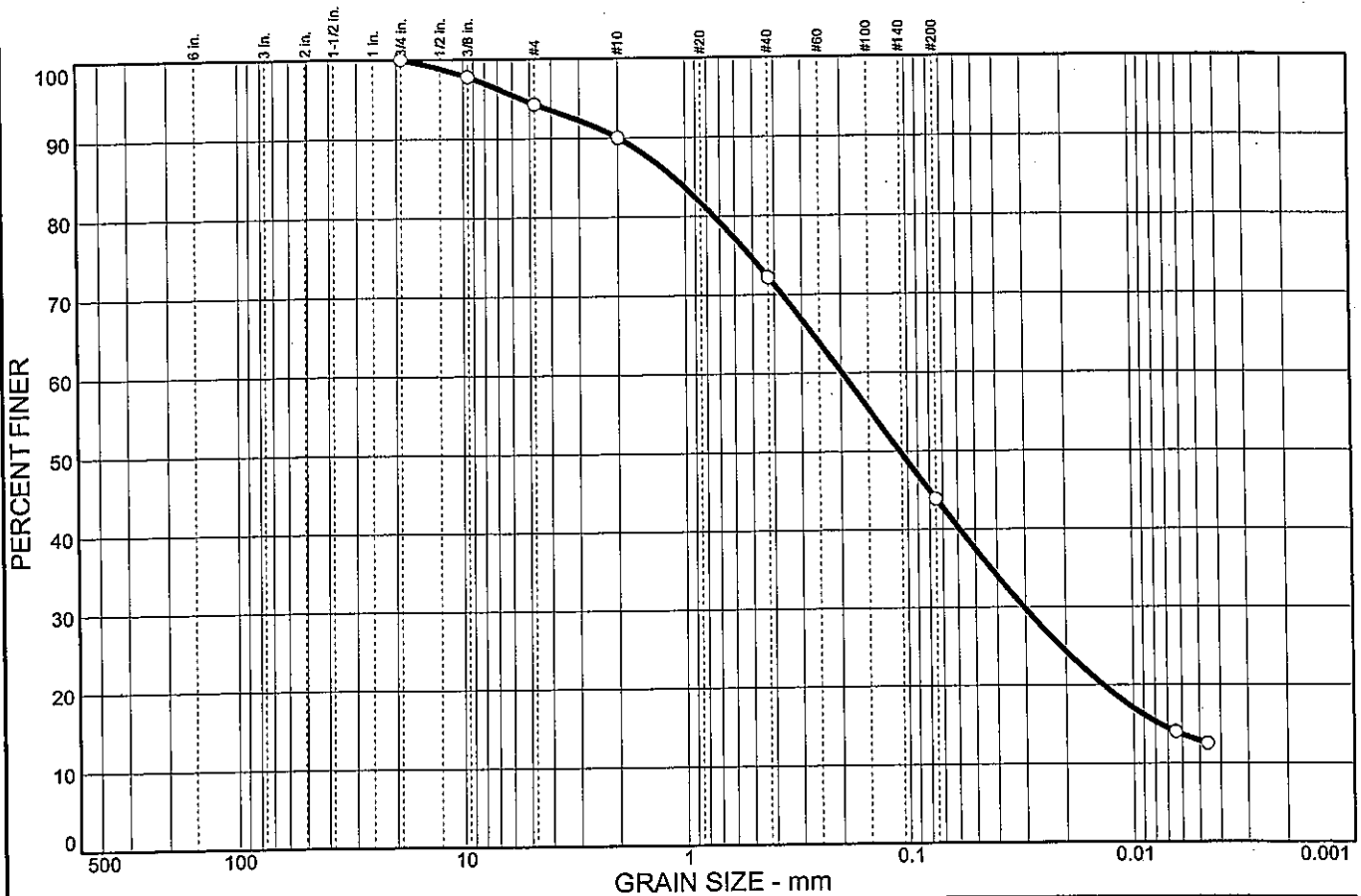


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	5.7	4.3	17.8	28.3	31.0	12.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	97.8		
#4	94.3		
#10	90.0		
#40	72.2		
#200	43.9		

**Soil Description**

Silty, clayey sand

**Atterberg Limits**

PL= 14      LL= 18      PI= 4

**Coefficients**

D<sub>85</sub>= 1.13      D<sub>60</sub>= 0.197      D<sub>50</sub>= 0.108  
D<sub>30</sub>= 0.0305      D<sub>15</sub>= 0.0076      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC-SM      AASHTO= A-4(0)

**Remarks**

Moisture Content= 14.0%  
F.M.=0.08

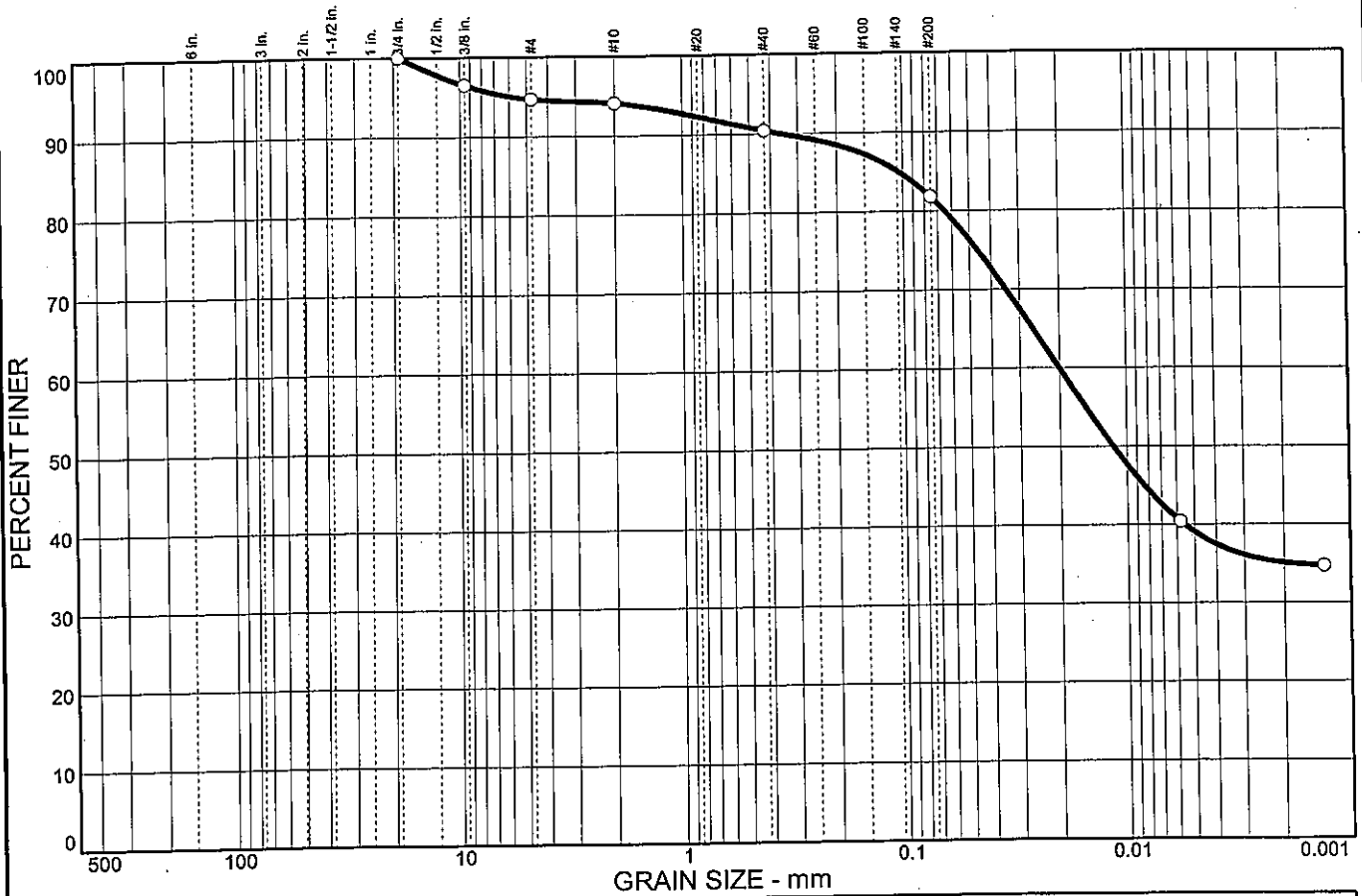
\* (no specification provided)

Sample No.: 1      Source of Sample: B-1108      Date: 10/26/05  
Location:      Elev./Depth: 1.0



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	5.3	0.6	3.7	8.6	42.7	39.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	96.5		
#4	94.7		
#10	94.1		
#40	90.4		
#200	81.8		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 19      LL= 36      PI= 17

**Coefficients**

D<sub>85</sub>= 0.105      D<sub>60</sub>= 0.0200      D<sub>50</sub>= 0.0115  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                C<sub>c</sub>=

**Classification**

USCS= CL              AASHTO= A-6(13)

**Remarks**

Moisture Content= 19.5%  
F.M.=0.09

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1108

Date: 10/26/05  
Elev./Depth: 3.5

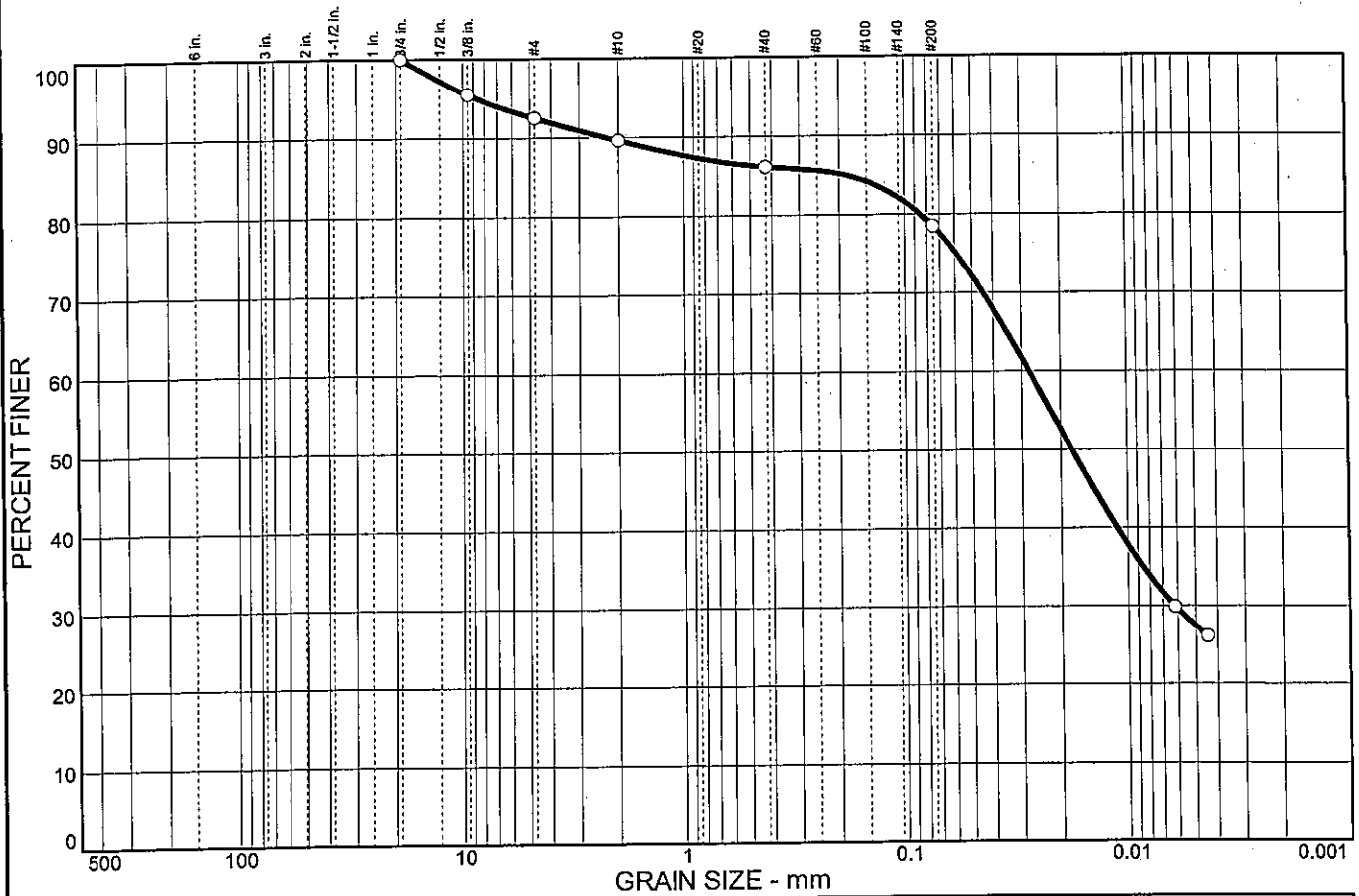


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	7.5	2.9	3.5	7.6	51.1	27.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	95.5		
#4	92.5		
#10	89.6		
#40	86.1		
#200	78.5		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 19      LL= 33      PI= 14

**Coefficients**

D<sub>85</sub>= 0.188      D<sub>60</sub>= 0.0277      D<sub>50</sub>= 0.0178  
D<sub>30</sub>= 0.0062      D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-6(10)

**Remarks**

Moisture Content= 20.6%  
F.M.=0.12

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: B-1108

Date: 10/26/05  
Elev./Depth: 6.0

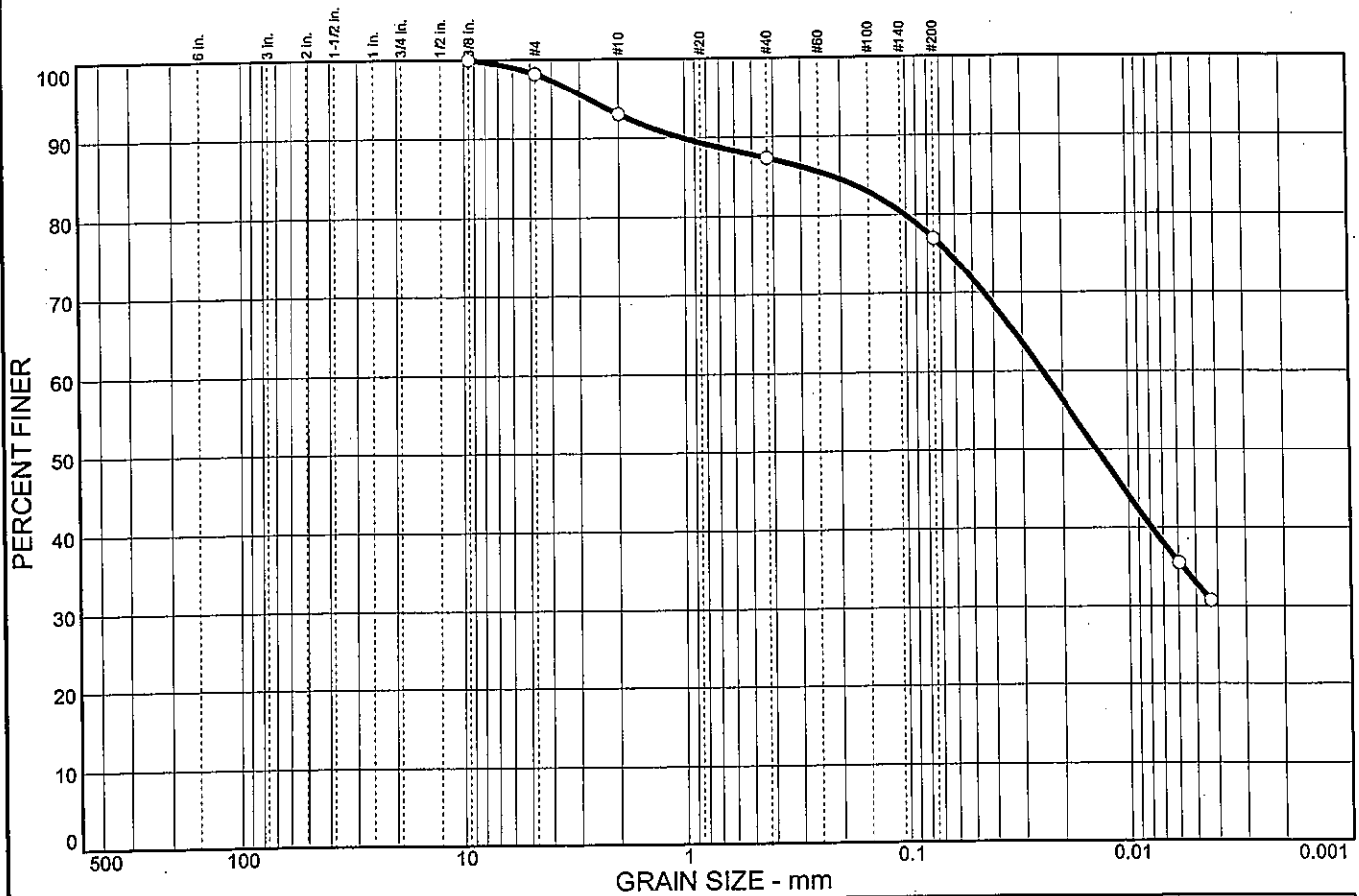


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	5.2	5.7	10.3	44.0	33.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	98.2		
#10	93.0		
#40	87.3		
#200	77.0		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 17      LL= 33      PI= 16

**Coefficients**

D<sub>85</sub>= 0.221      D<sub>60</sub>= 0.0243      D<sub>50</sub>= 0.0139  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                C<sub>c</sub>=

**Classification**

USCS= CL              AASHTO= A-6(11)

**Remarks**

Moisture Content= 17.9%  
F.M.=0.02

\* (no specification provided)

Sample No.: 4  
Location:

Source of Sample: B-1108

Date: 9/23/05  
Elev./Depth: 8.5



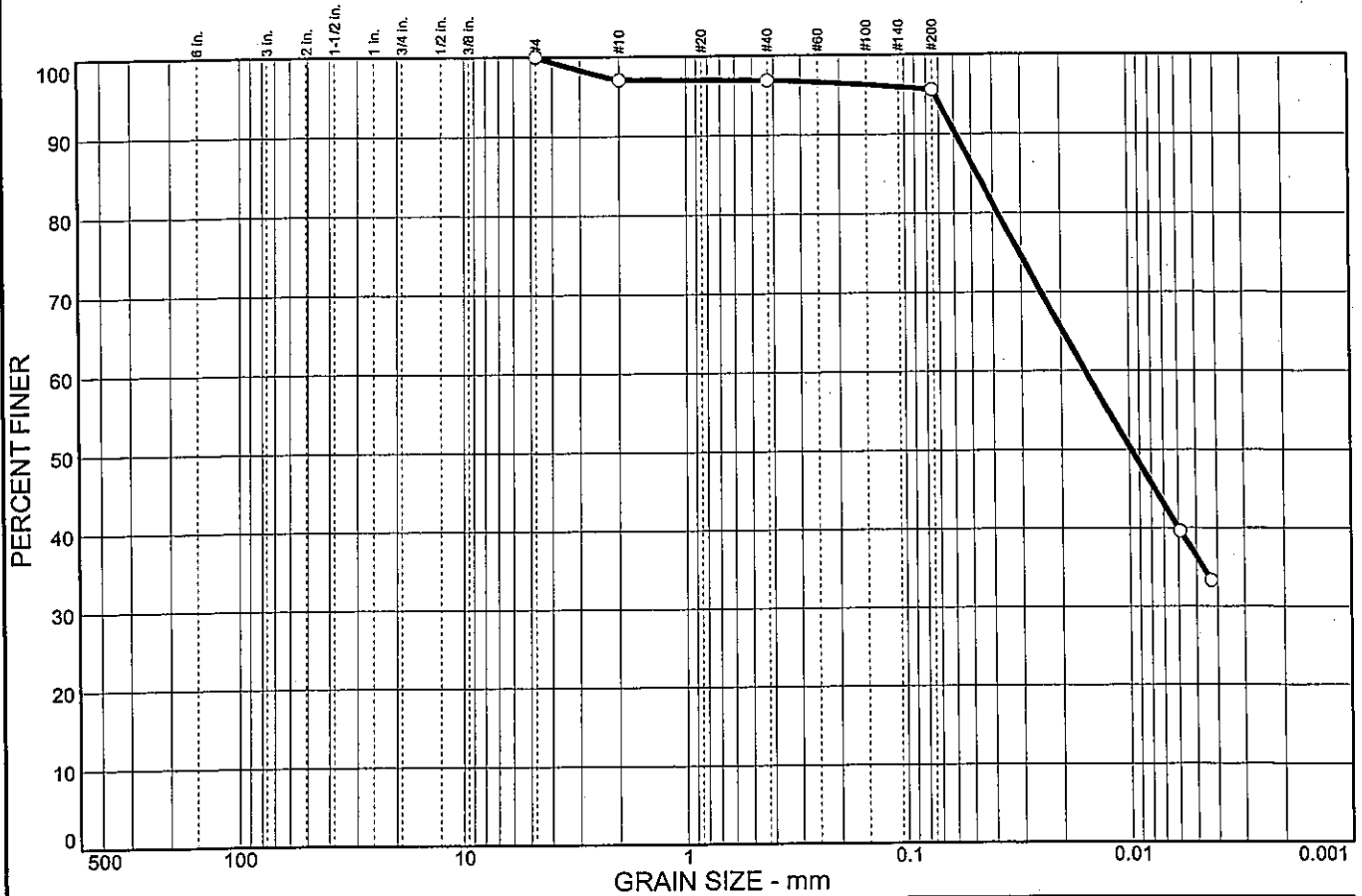
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	2.9	0.2	1.3	59.2	36.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	97.1		
#40	96.9		
#200	95.6		

**Soil Description**  
Lean clay

**Atterberg Limits**  
 PL= 20      LL= 37      PI= 17

**Coefficients**  
 D<sub>85</sub>= 0.0472      D<sub>60</sub>= 0.0156      D<sub>50</sub>= 0.0098  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
 USCS= CL      AASHTO= A-6(17)

**Remarks**  
 Moisture Content= 32.1%

\* (no specification provided)

Sample No.: 5  
Location:

Source of Sample: B-1108

Date: 9/23/05  
Elev./Depth: 11.0

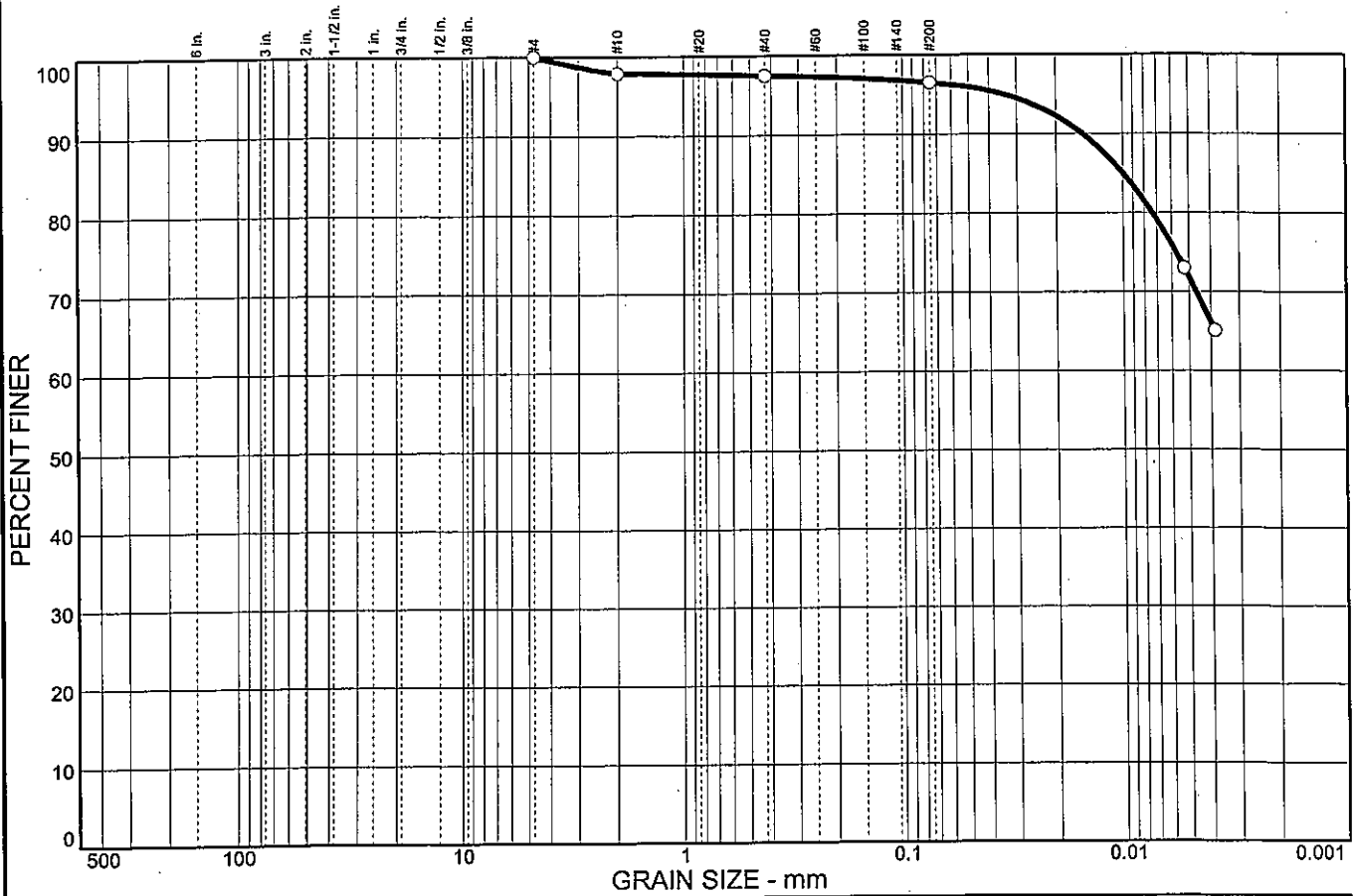


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	2.1	0.4	1.0	24.7	71.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	97.9		
#40	97.5		
#200	96.5		

**Soil Description**

Fat clay

**Atterberg Limits**

PL= 23      LL= 59      PI= 36

**Coefficients**

D<sub>85</sub>= 0.0100      D<sub>60</sub>=      D<sub>50</sub>=  
D<sub>30</sub>=      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= CH      AASHTO= A-7-6(39)

**Remarks**

Moisture Content= 38.1%

\* (no specification provided)

Sample No.: 9  
Location:

Source of Sample: B-1108

Date: 9/23/05  
Elev./Depth: 21.0

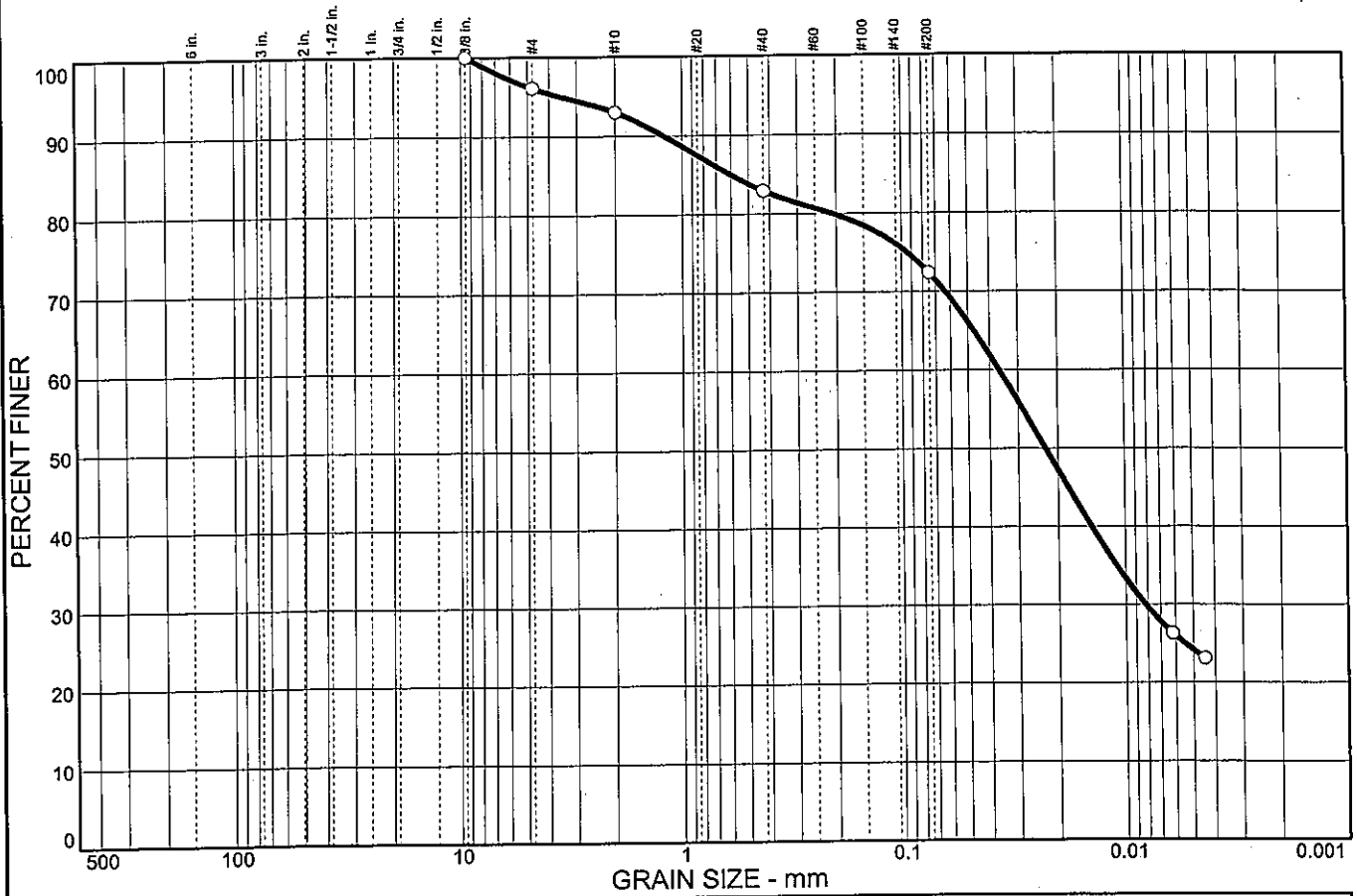


Client: TranSystems, Inc.  
Project: SCI-823-0.00

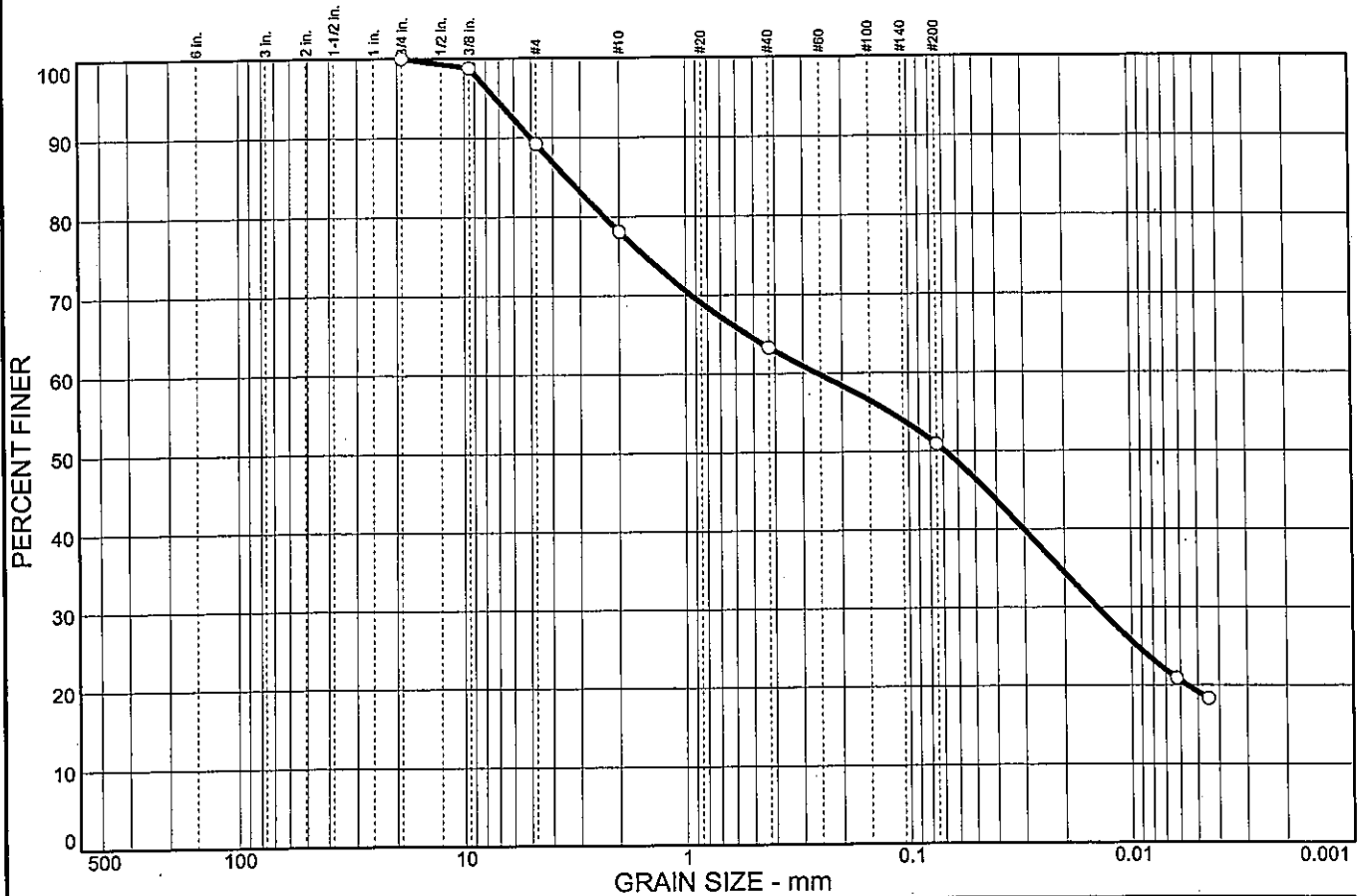
Project No: 0121-3070.03

Figure

# PARTICLE SIZE DISTRIBUTION TEST REPORT



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	10.8	11.1	14.8	12.4	31.7	19.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	98.8		
#4	89.2		
#10	78.1		
#40	63.3		
#200	50.9		

**Soil Description**  
Sandy lean clay

**Atterberg Limits**  
PL= 16      LL= 25      PI= 9

**Coefficients**  
D<sub>85</sub>= 3.47      D<sub>60</sub>= 0.258      D<sub>50</sub>= 0.0686  
D<sub>30</sub>= 0.0143      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
USCS= CL      AASHTO= A-4(2)

**Remarks**  
Moisture Content= 13.7%  
F.M.=0.12

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1109

Date: 10/26/05  
Elev./Depth: 3.5

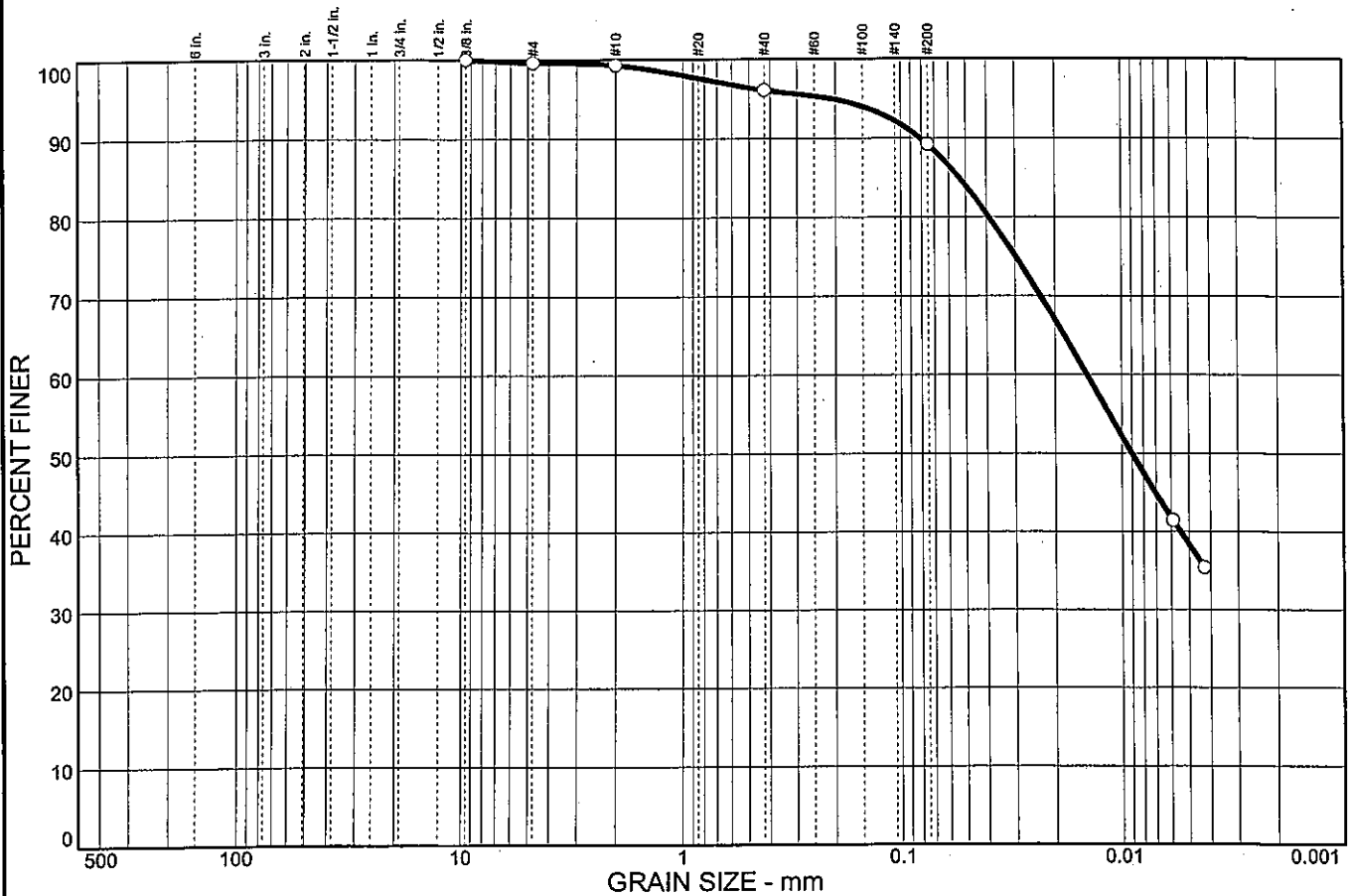


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.3	3.2	6.9	50.9	38.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.6		
#10	99.3		
#40	96.1		
#200	89.2		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 19      LL= 35      PI= 16

**Coefficients**

D<sub>85</sub>= 0.0537      D<sub>60</sub>= 0.0144      D<sub>50</sub>= 0.0090  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-6(14)

**Remarks**

Moisture Content= 20.3%  
 F.M.=0.00

\* (no specification provided)

Sample No.: 3  
 Location:

Source of Sample: B-1109

Date: 10/26/05  
 Elev./Depth: 6.0



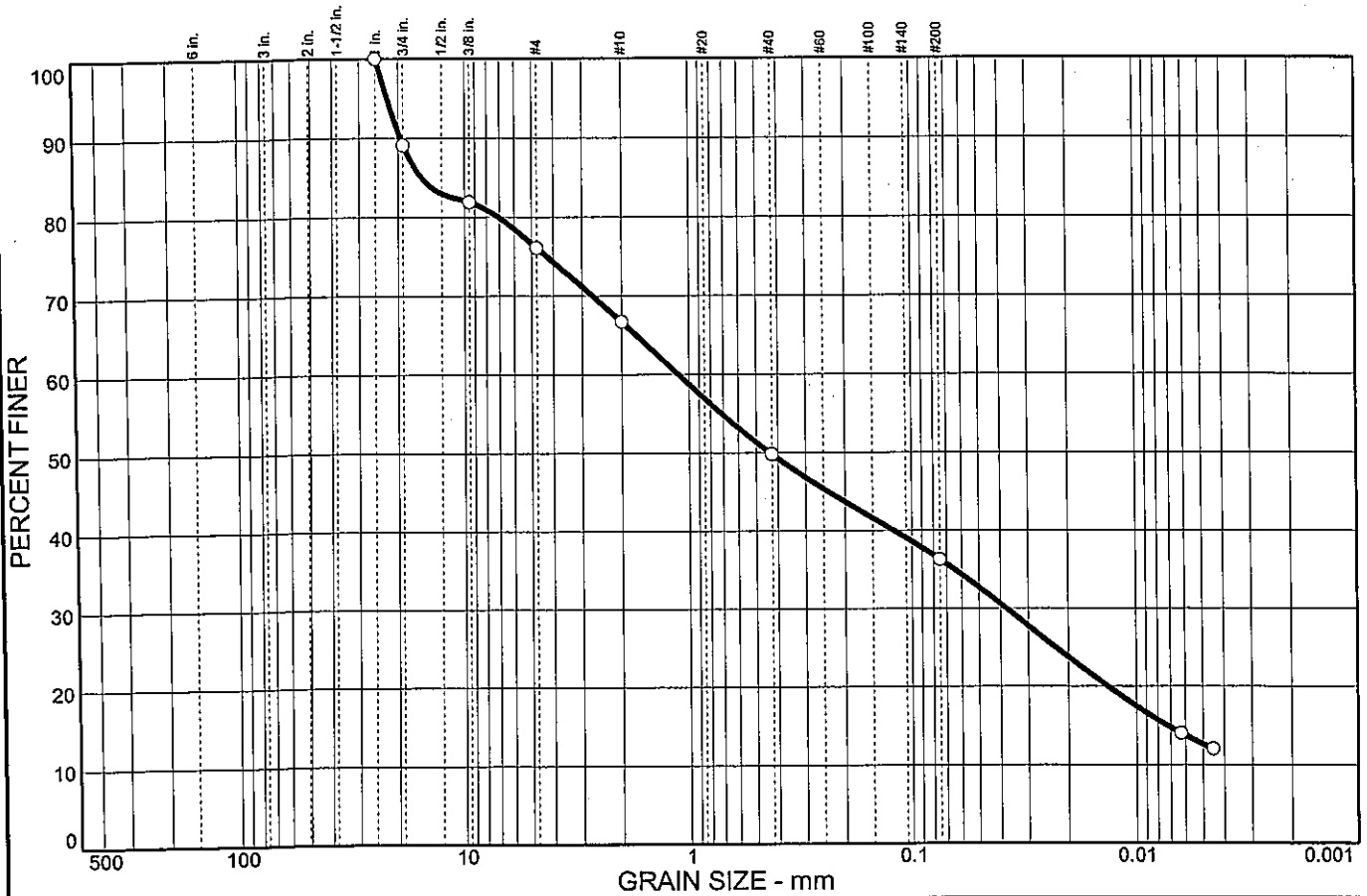
Client: TranSystems, Inc.  
 Project: SCI-823-0.00

Project No: 0121-3070.03

Figure



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	10.9	13.0	9.4	16.9	13.5	23.7	12.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
0.75 in.	89.1		
0.375 in.	81.9		
#4	76.1		
#10	66.7		
#40	49.8		
#200	36.3		

**Soil Description**

Clayey sand with gravel

**Atterberg Limits**

PL= 17      LL= 25      PI= 8

**Coefficients**

D<sub>85</sub>= 15.7      D<sub>60</sub>= 1.11      D<sub>50</sub>= 0.434  
D<sub>30</sub>= 0.0377      D<sub>15</sub>= 0.0073      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC      AASHTO= A-4(0)

**Remarks**

Moisture Content= 11.1%  
F.M.=0.53

\* (no specification provided)

Sample No.: 5  
Location:

Source of Sample: B-1109

Date: 9/29/05  
Elev./Depth: 11.0

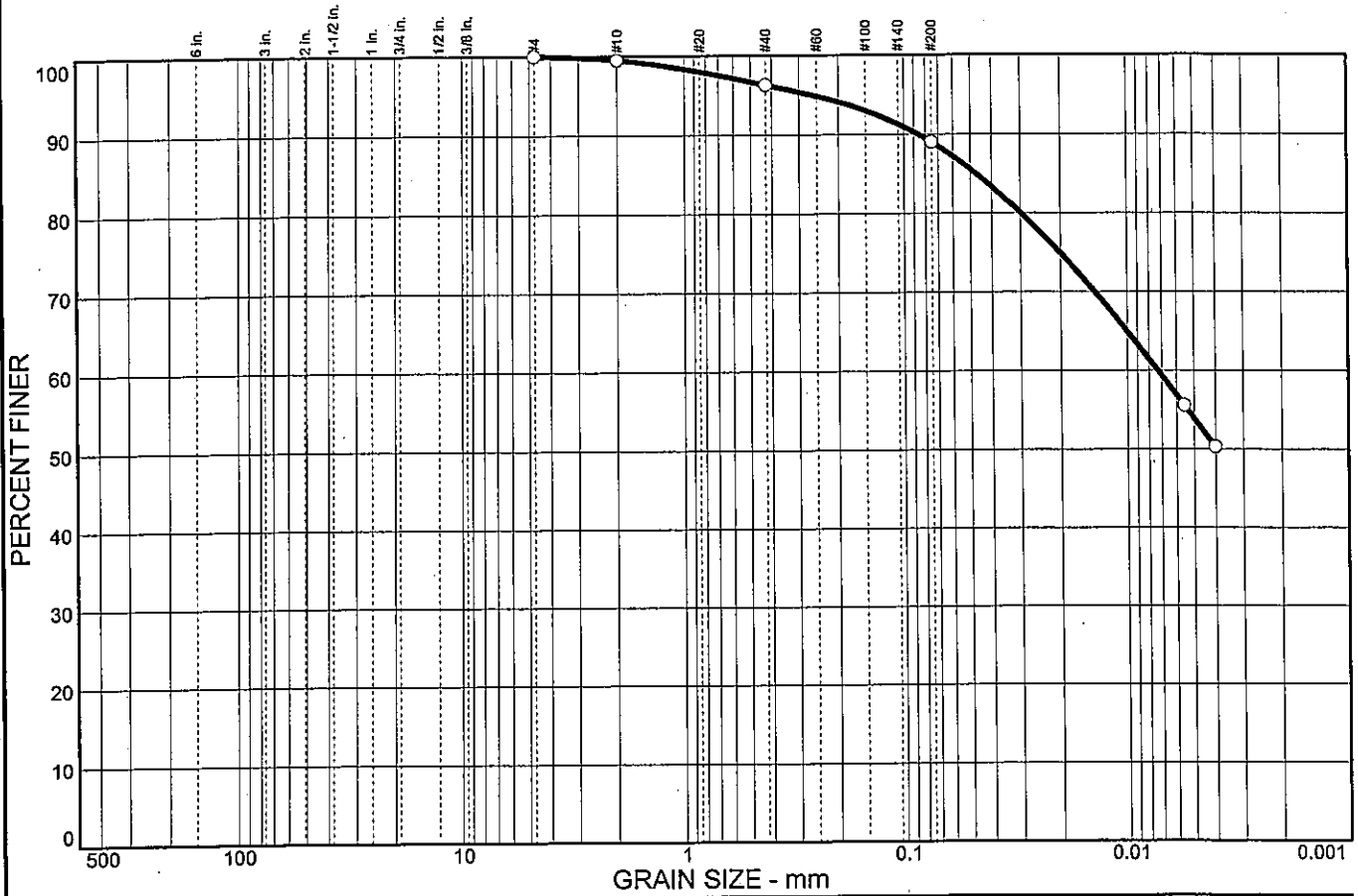


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	3.2	7.3	35.1	53.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.5		
#40	96.3		
#200	89.0		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 21      LL= 46      PI= 25

**Coefficients**

D<sub>85</sub>= 0.0473      D<sub>60</sub>= 0.0073      D<sub>50</sub>=  
D<sub>30</sub>=                      D<sub>15</sub>=                      D<sub>10</sub>=  
C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL                      AASHTO= A-7-6(24)

**Remarks**

Moisture Content= 28.6%

\* (no specification provided)

Sample No.: 6  
 Location:

Source of Sample: B-1109

Date: 9/29/05  
 Elev./Depth: 13.5



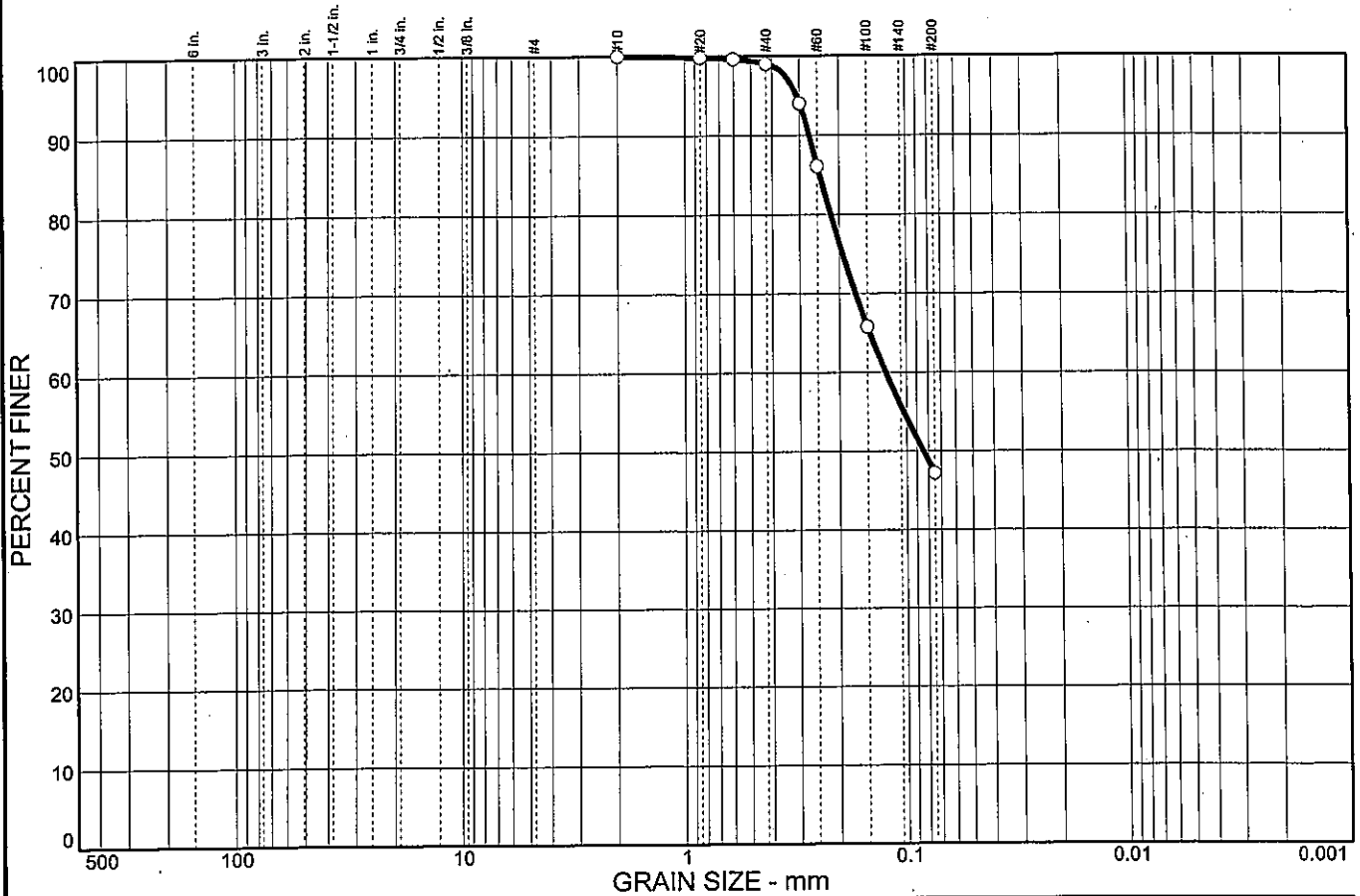
Client: TranSystems, Inc.  
 Project: SCI-823-0.00  
 Project No: 0121-3070.03

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	1.0	51.8	47.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.8		
#30	99.6		
#40	99.0		
#50	94.0		
#60	86.1		
#100	65.8		
#200	47.2		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL=                      LL=                      PI=

**Coefficients**  
 D<sub>85</sub>= 0.244      D<sub>60</sub>= 0.124      D<sub>50</sub>= 0.0843  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**  
 USCS= SM                      AASHTO= A-4(0)

**Remarks**  
 Moisture Content= 29.1%  
 F.M.=0.41

\* (no specification provided)

Sample No.: 9  
 Location:

Source of Sample: B-1109

Date: 9/29/05  
 Elev./Depth: 21.0

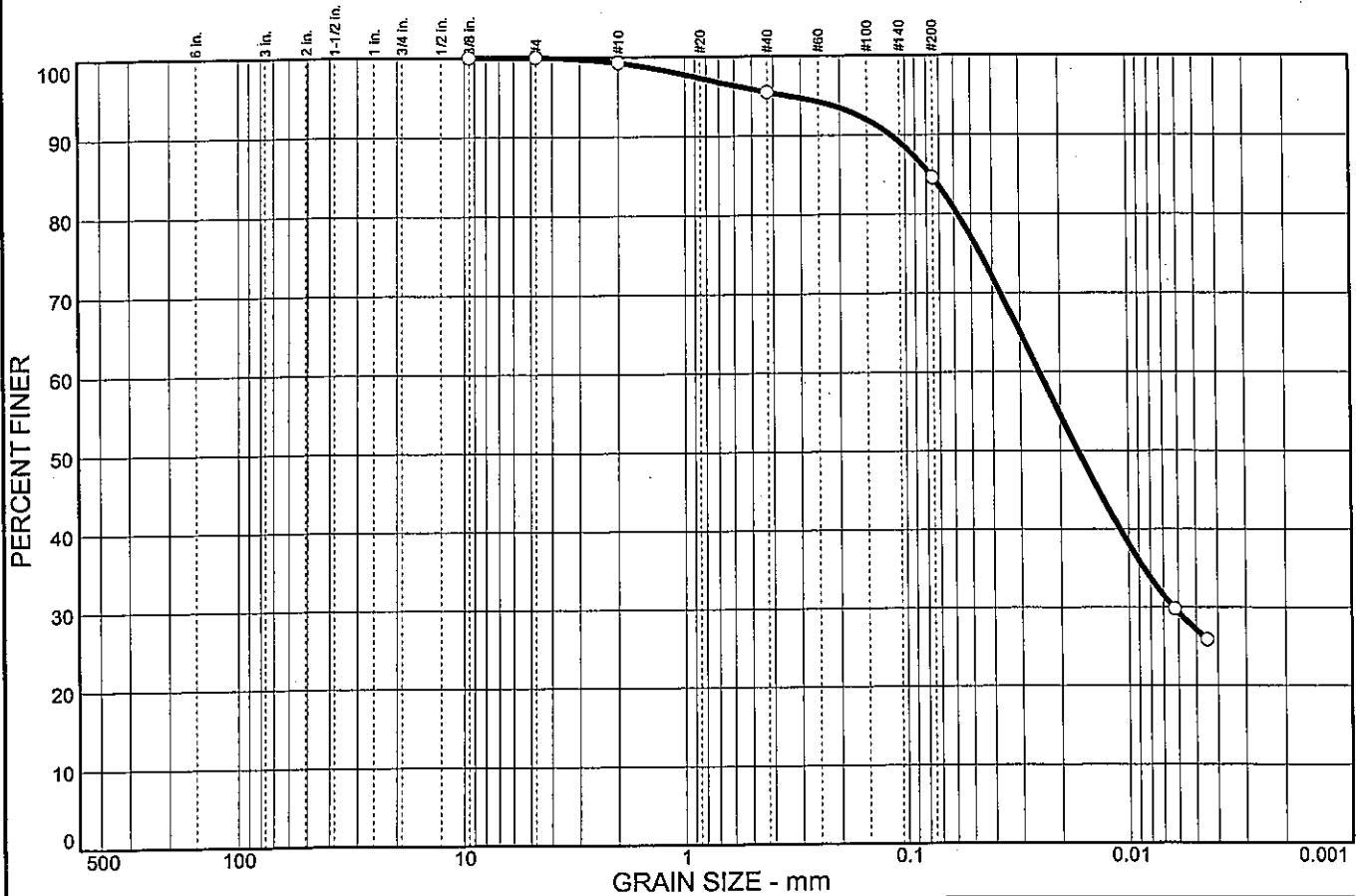


Client: TranSystems, Inc.  
 Project: SCI-823-0.00

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	0.7	3.8	10.9	57.5	27.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	99.3		
#40	84.6		
#200	32.0		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 12      LL= 28      PI= 16

**Coefficients**

D<sub>85</sub>= 0.0770      D<sub>60</sub>= 0.0247      D<sub>50</sub>= 0.0167  
 D<sub>30</sub>= 0.0063      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL                      AASHTO= A-6(11)

**Remarks**

Moisture Content= 11.5%

\* (no specification provided)

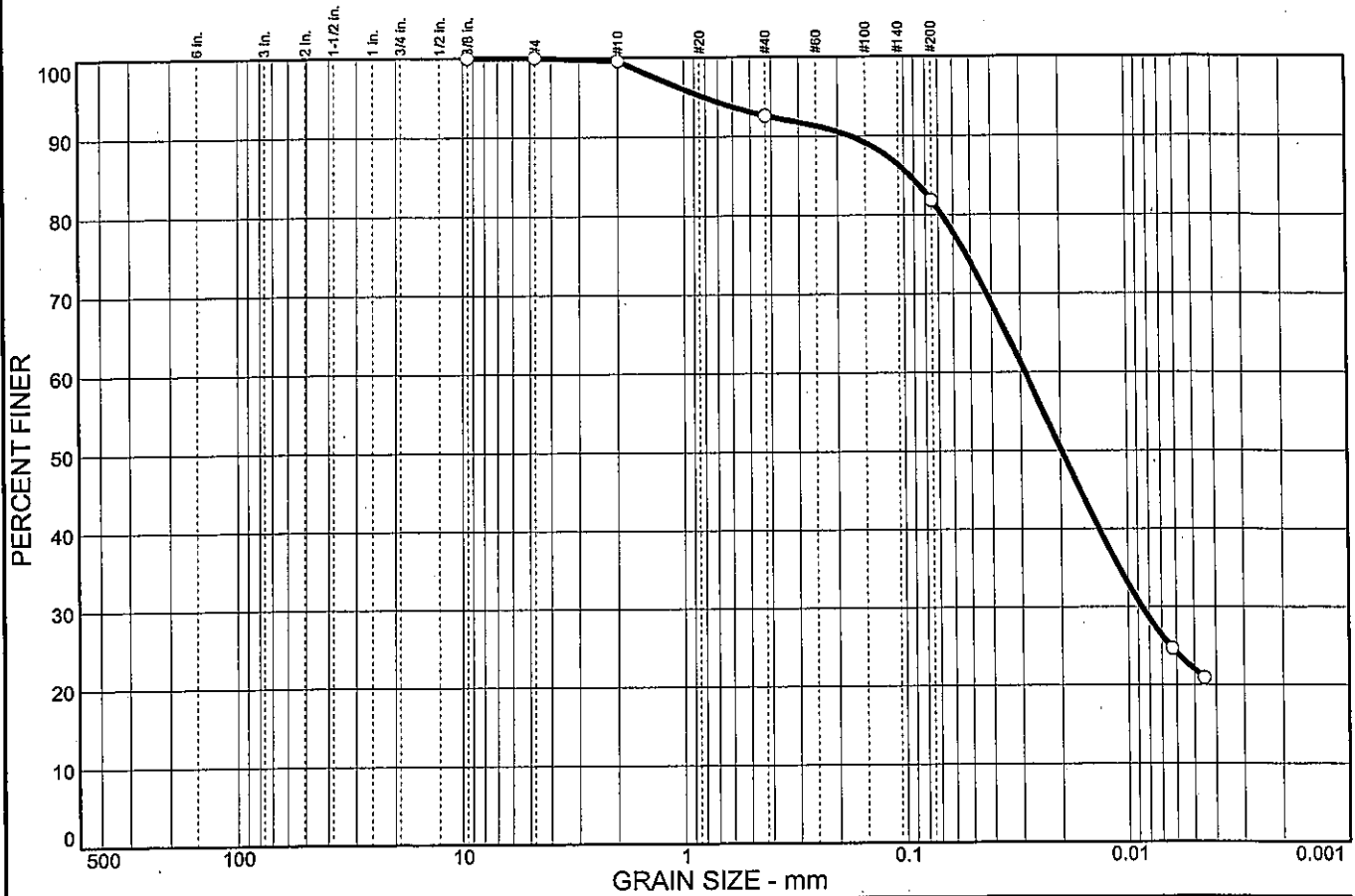
Sample No.: 1      Source of Sample: B-1110      Date: 11/1/05  
 Location:      Elev./Depth: 1.0



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	7.0	10.8	59.8	22.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	99.6		
#40	92.6		
#200	81.8		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 17      LL= 27      PI= 10

**Coefficients**

D<sub>85</sub>= 0.0942      D<sub>60</sub>= 0.0286      D<sub>50</sub>= 0.0198  
D<sub>30</sub>= 0.0086      D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL                      AASHTO= A-4(6)

**Remarks**

Moisture Content= 14.5%

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1110

Date: 11/1/05  
Elev./Depth: 3.5

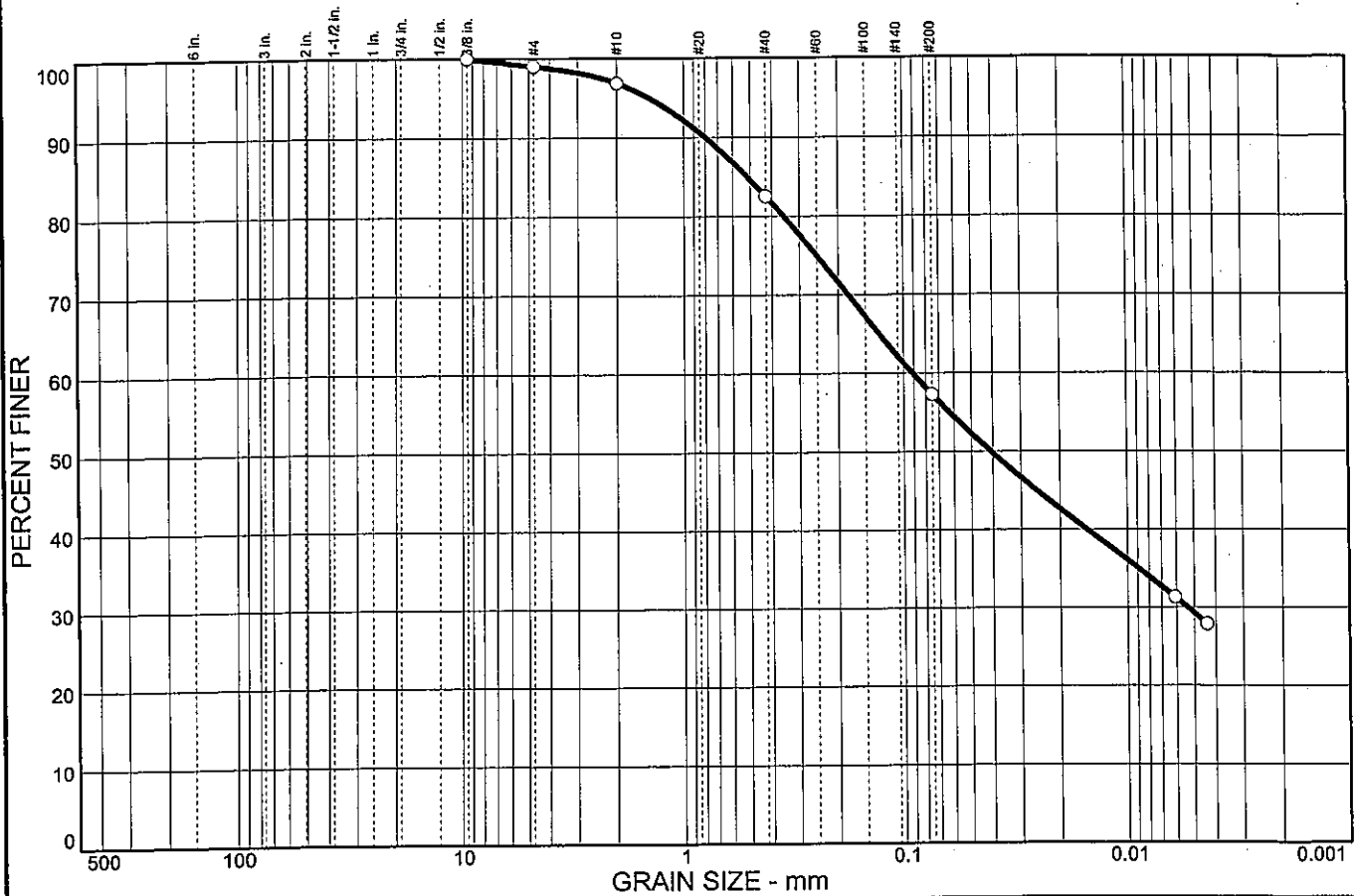


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	1.0	2.1	14.4	25.2	28.0	29.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.0		
#10	96.9		
#40	82.5		
#200	57.3		

**Soil Description**  
Sandy lean clay

**Atterberg Limits**  
 PL= 16      LL= 27      PI= 11

**Coefficients**  
 D<sub>85</sub>= 0.516      D<sub>60</sub>= 0.0914      D<sub>50</sub>= 0.0410  
 D<sub>30</sub>= 0.0054      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
 USCS= CL      AASHTO= A-6(3)

**Remarks**  
 Moisture Content= 14.3%  
 F.M.=0.01

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: B-1110

Date: 11/1/05  
Elev./Depth: 6.0



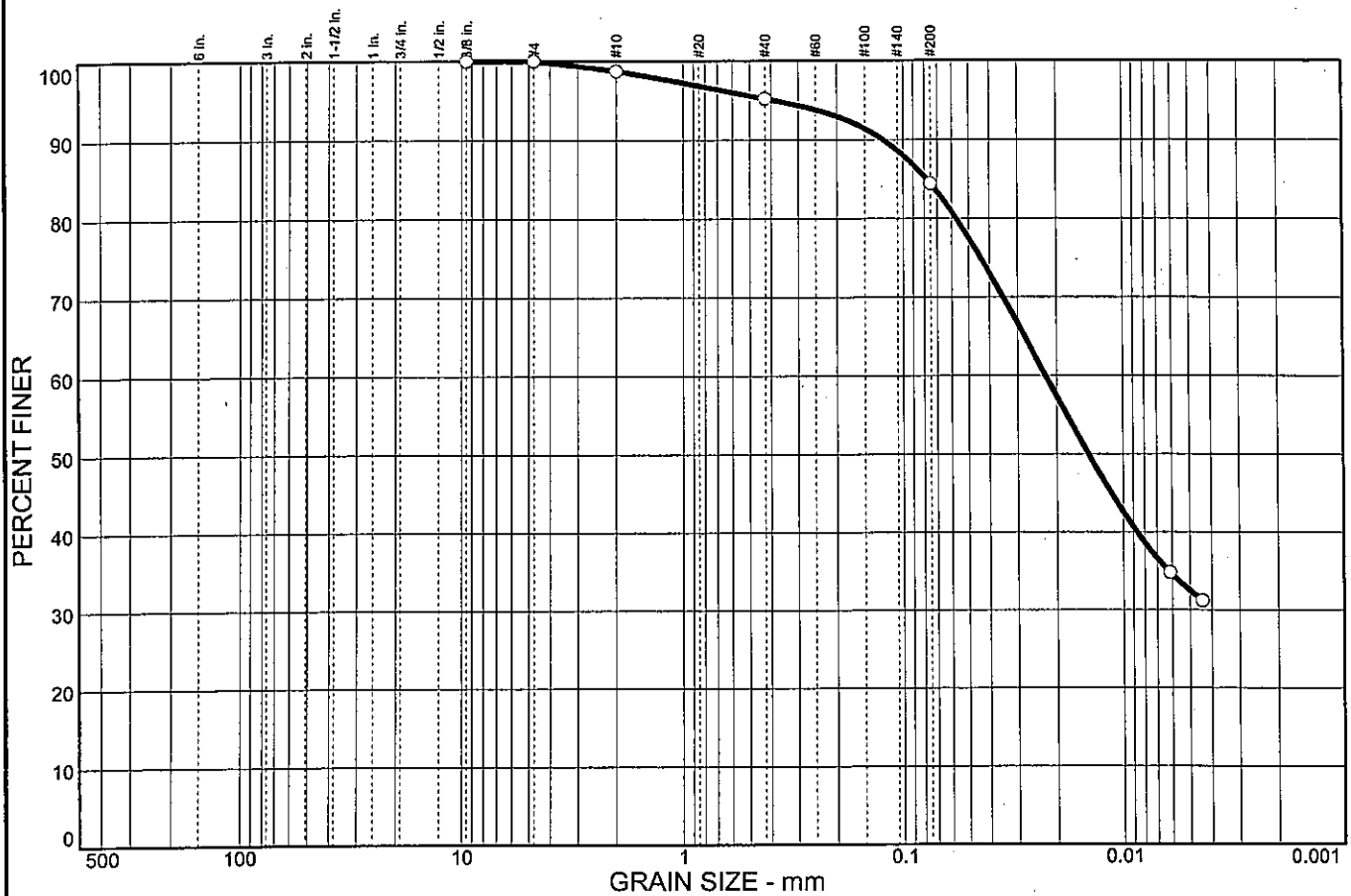
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	1.3	3.5	10.8	51.9	32.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	98.7		
#40	95.2		
#200	84.4		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 19      LL= 31      PI= 12

**Coefficients**

D<sub>85</sub>= 0.0783      D<sub>60</sub>= 0.0224      D<sub>50</sub>= 0.0144  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-6(9)

**Remarks**

Moisture Content= 18.1%

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1113

Date: 10/27/05  
Elev./Depth: 3.5

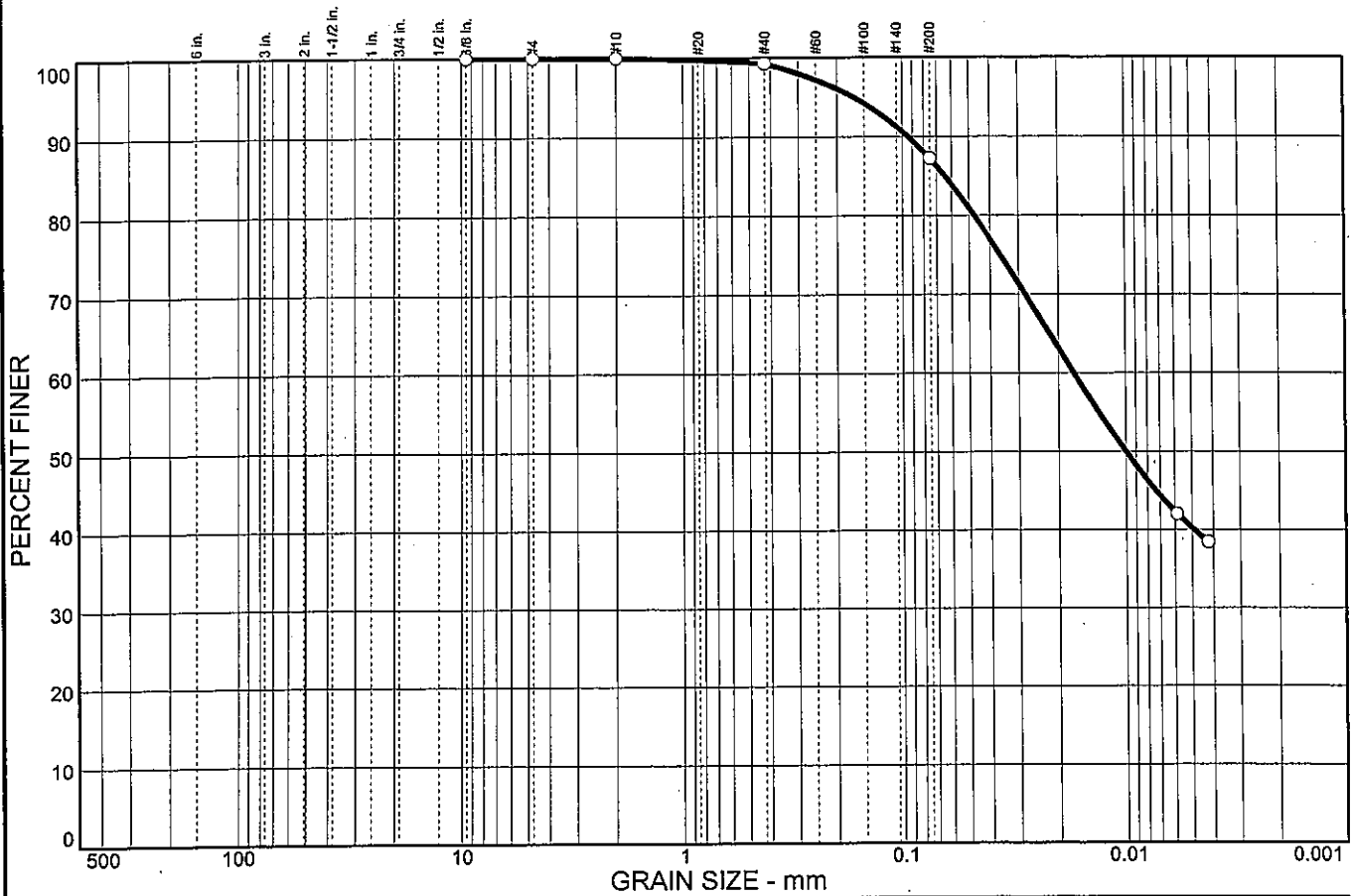


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.7	12.1	47.0	40.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	100.0		
#40	99.3		
#200	87.2		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 16      LL= 41      PI= 25

**Coefficients**

D<sub>85</sub>= 0.0643      D<sub>60</sub>= 0.0170      D<sub>50</sub>= 0.0100  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-7-6(21)

**Remarks**

Moisture Content= 21.8%

\* (no specification provided)

Sample No.: 3      Source of Sample: B-1113      Date: 10/27/05  
 Location:      Elev./Depth: 6.0

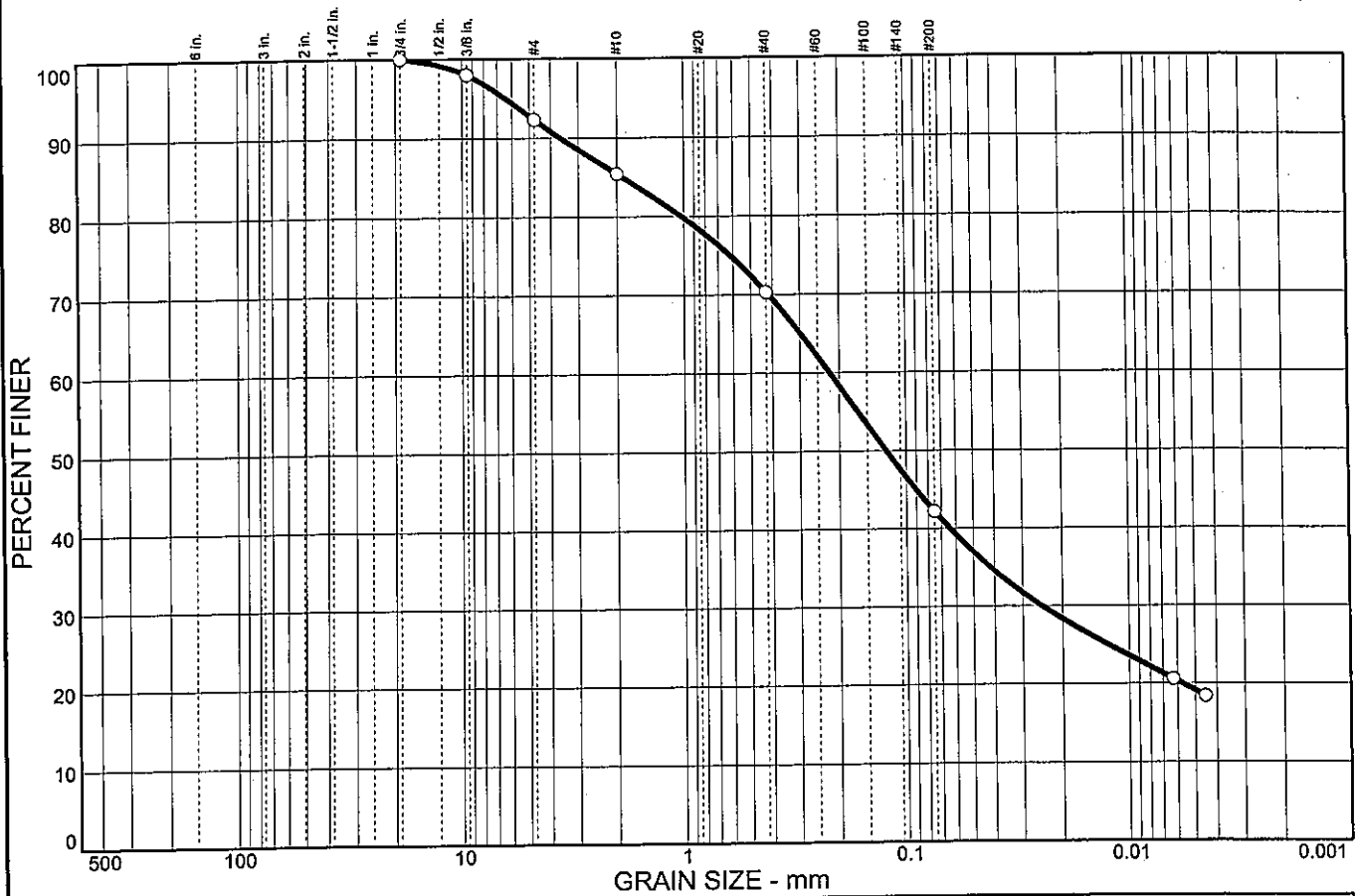


Client: TranSystems, Inc.  
 Project: SCI-823-0.00  
 Project No: 0121-3070.03

Figure



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	7.7	6.9	15.1	28.1	23.1	19.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	98.0		
#4	92.3		
#10	85.4		
#40	70.3		
#200	42.2		

**Soil Description**  
Clayey sand

**Atterberg Limits**  
 PL= 14      LL= 31      PI= 17

**Coefficients**  
 D<sub>85</sub>= 1.90      D<sub>60</sub>= 0.221      D<sub>50</sub>= 0.123  
 D<sub>30</sub>= 0.0246      D<sub>15</sub>=      D<sub>10</sub>=  
 C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
 USCS= SC      AASHTO= A-6(3)

**Remarks**  
 Moisture Content= 17.3%  
 F.M.=0.10

\* (no specification provided)

Sample No.: 4  
Location:

Source of Sample: B-1113

Date: 10/27/05  
Elev./Depth: 8.5

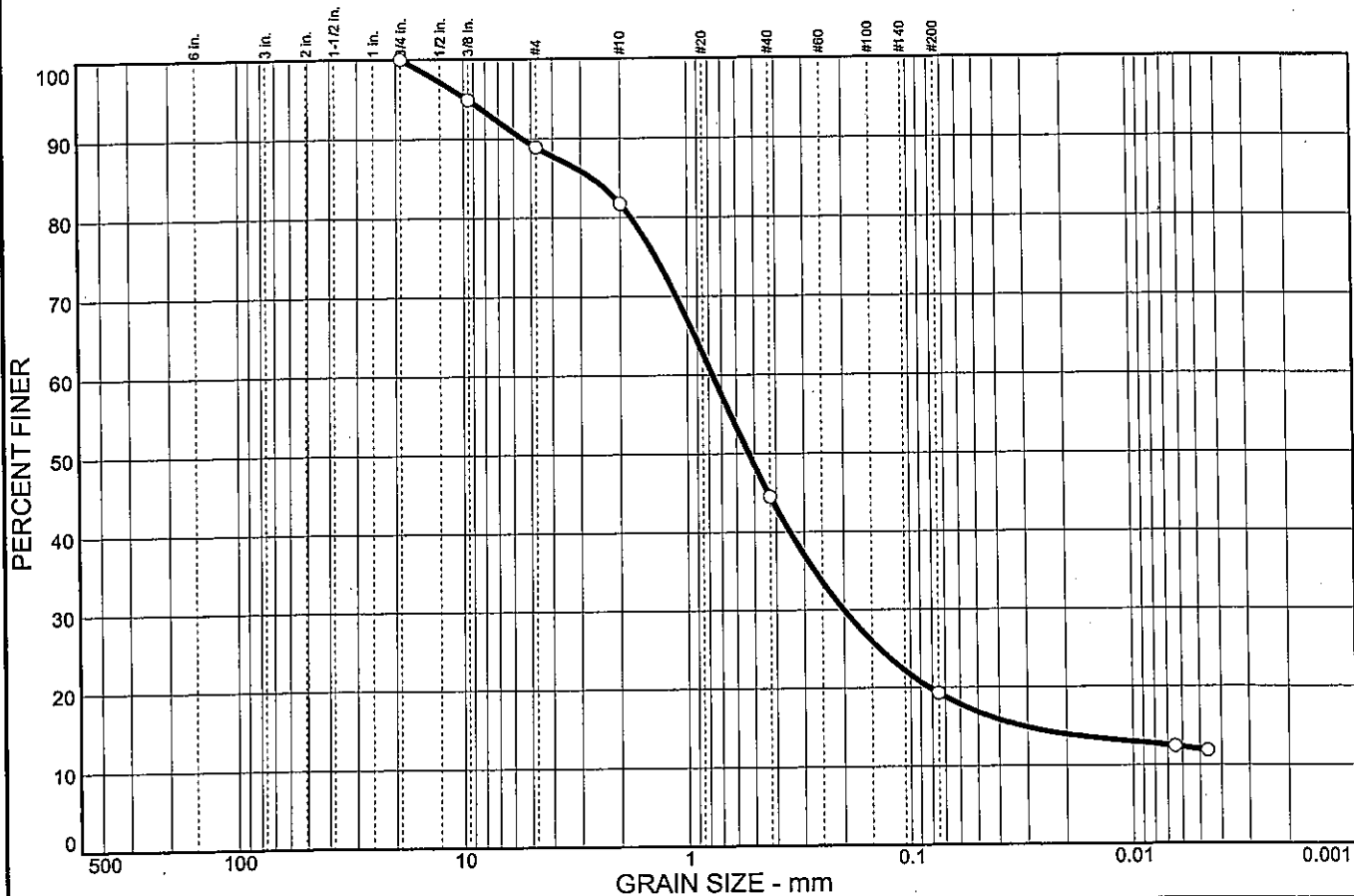


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	11.1	7.2	37.2	25.2	7.3	12.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	94.9		
#4	88.9		
#10	81.7		
#40	44.5		
#200	19.3		

**Soil Description**  
Clayey sand

**Atterberg Limits**  
 PL= 14      LL= 29      PI= 15

**Coefficients**  
 D<sub>85</sub>= 2.69      D<sub>60</sub>= 0.767      D<sub>50</sub>= 0.529  
 D<sub>30</sub>= 0.201      D<sub>15</sub>= 0.0313      D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
 USCS= SC              AASHTO= A-2-6(0)

**Remarks**  
 Moisture Content= 25.5%  
 F.M.=0.16

\* (no specification provided)

Sample No.: 7  
Location:

Source of Sample: B-1113

Date: 10/27/05  
Elev./Depth: 16.0

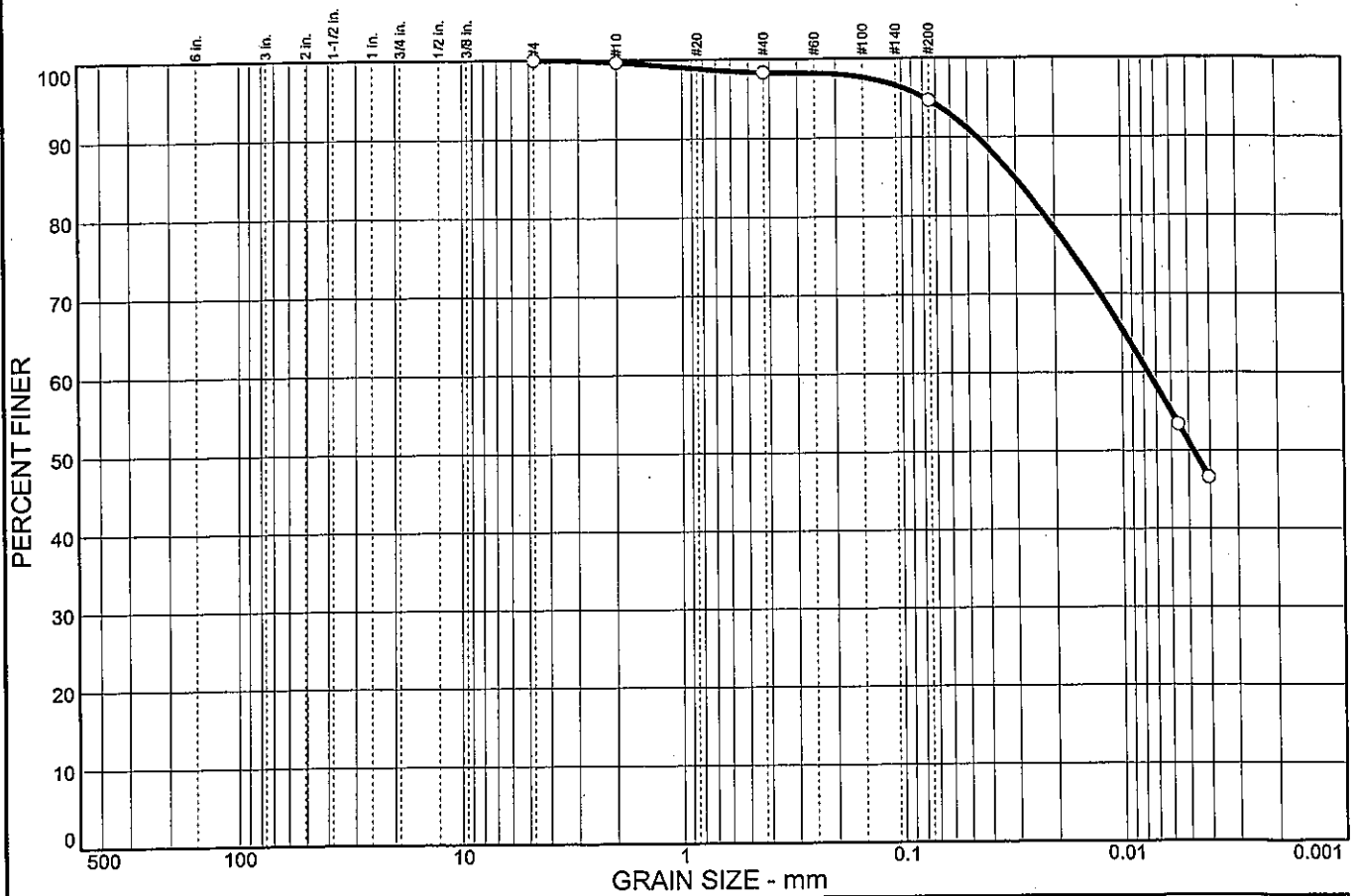


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.3	1.4	3.6	43.6	51.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#40	98.3		
#200	94.7		

**Soil Description**  
Lean clay

**Atterberg Limits**  
 PL= 18      LL= 36      PI= 18

**Coefficients**  
 D<sub>85</sub>= 0.0306      D<sub>60</sub>= 0.0076      D<sub>50</sub>= 0.0047  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
 USCS= CL      AASHTO= A-6(17)

**Remarks**  
 Moisture Content= 16.2%

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1114

Date: 10/27/05  
Elev./Depth: 1.0

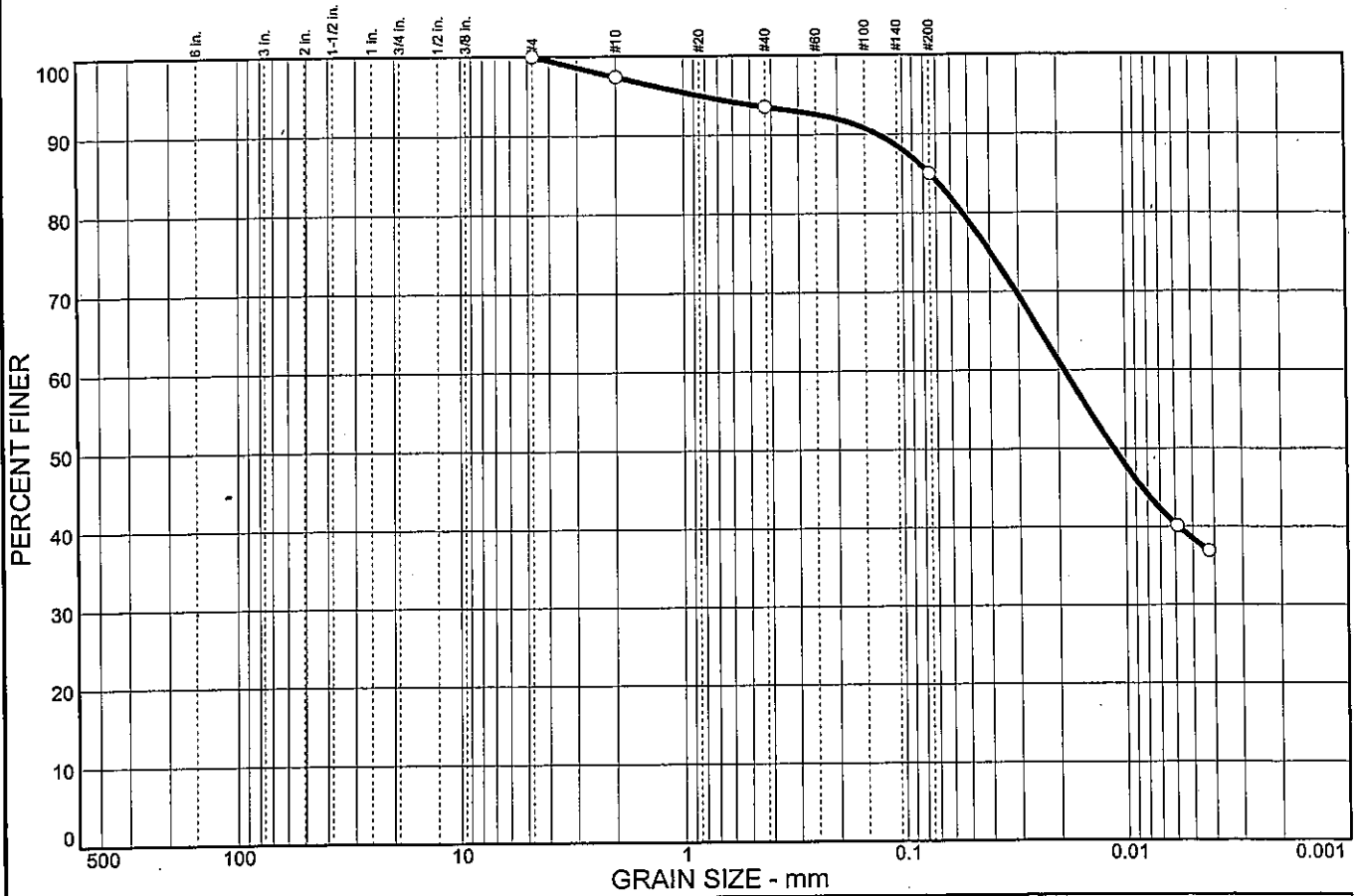


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	2.6	3.9	8.5	46.6	38.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	97.4		
#40	93.5		
#200	85.0		

**Soil Description**  
Lean clay

**Atterberg Limits**  
PL= 16      LL= 36      PI= 20

**Coefficients**  
D<sub>85</sub>= 0.0750      D<sub>60</sub>= 0.0188      D<sub>50</sub>= 0.0113  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
USCS= CL      AASHTO= A-6(16)

**Remarks**  
Moisture Content= 14.0%

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1114

Date: 10/27/05  
Elev./Depth: 3.5

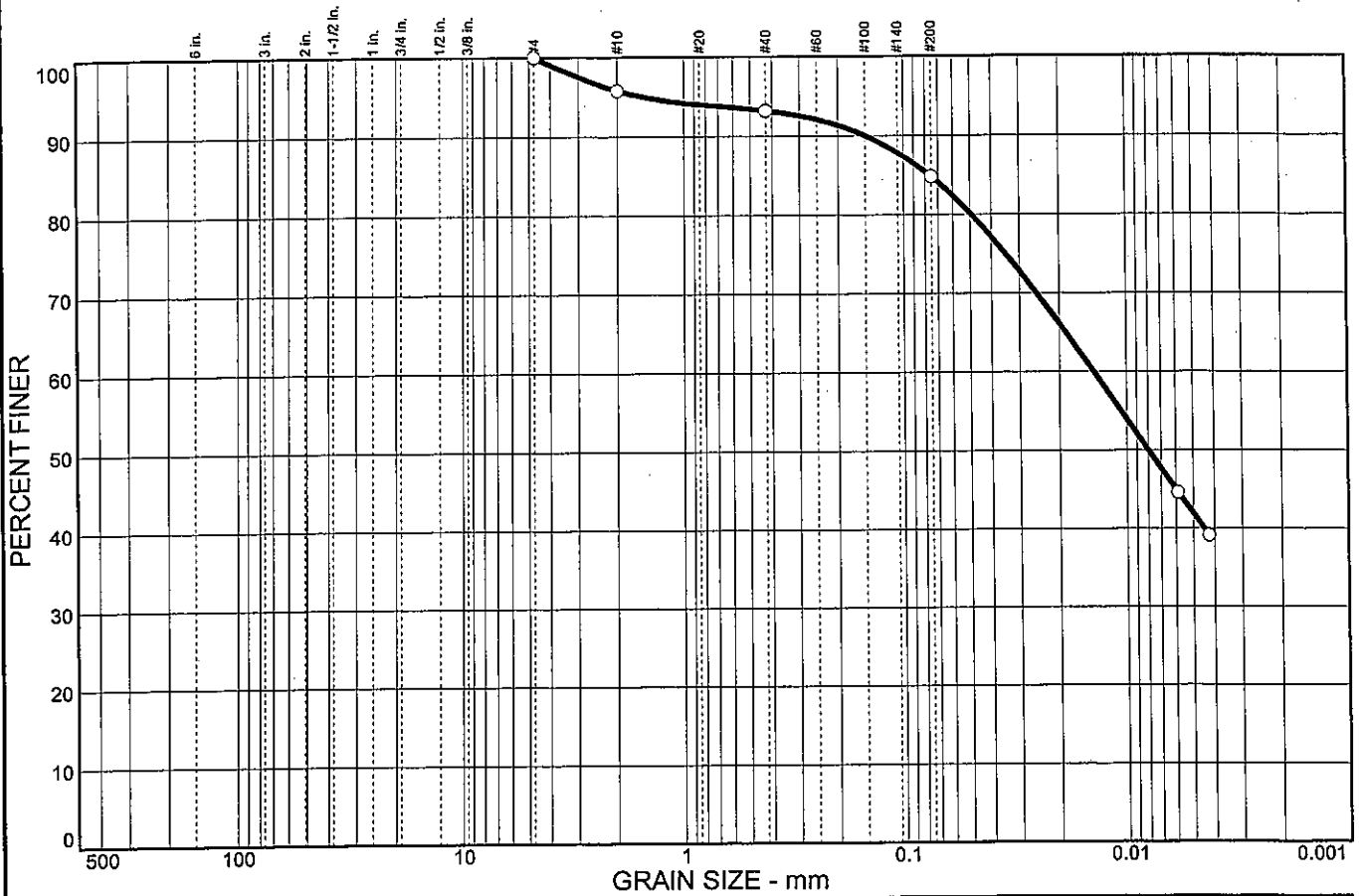


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	4.2	2.6	8.4	42.9	41.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	95.8		
#40	93.2		
#200	84.8		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 18      LL= 40      PI= 22

**Coefficients**

D<sub>85</sub>= 0.0765      D<sub>60</sub>= 0.0140      D<sub>50</sub>= 0.0080  
D<sub>30</sub>=                      D<sub>15</sub>=                      D<sub>10</sub>=  
C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL                      AASHTO= A-6(18)

**Remarks**

Moisture Content= 13.7%

\* (no specification provided)

Sample No.: 1  
 Location:

Source of Sample: B-1115

Date: 10/27/05  
 Elev./Depth: 1.0

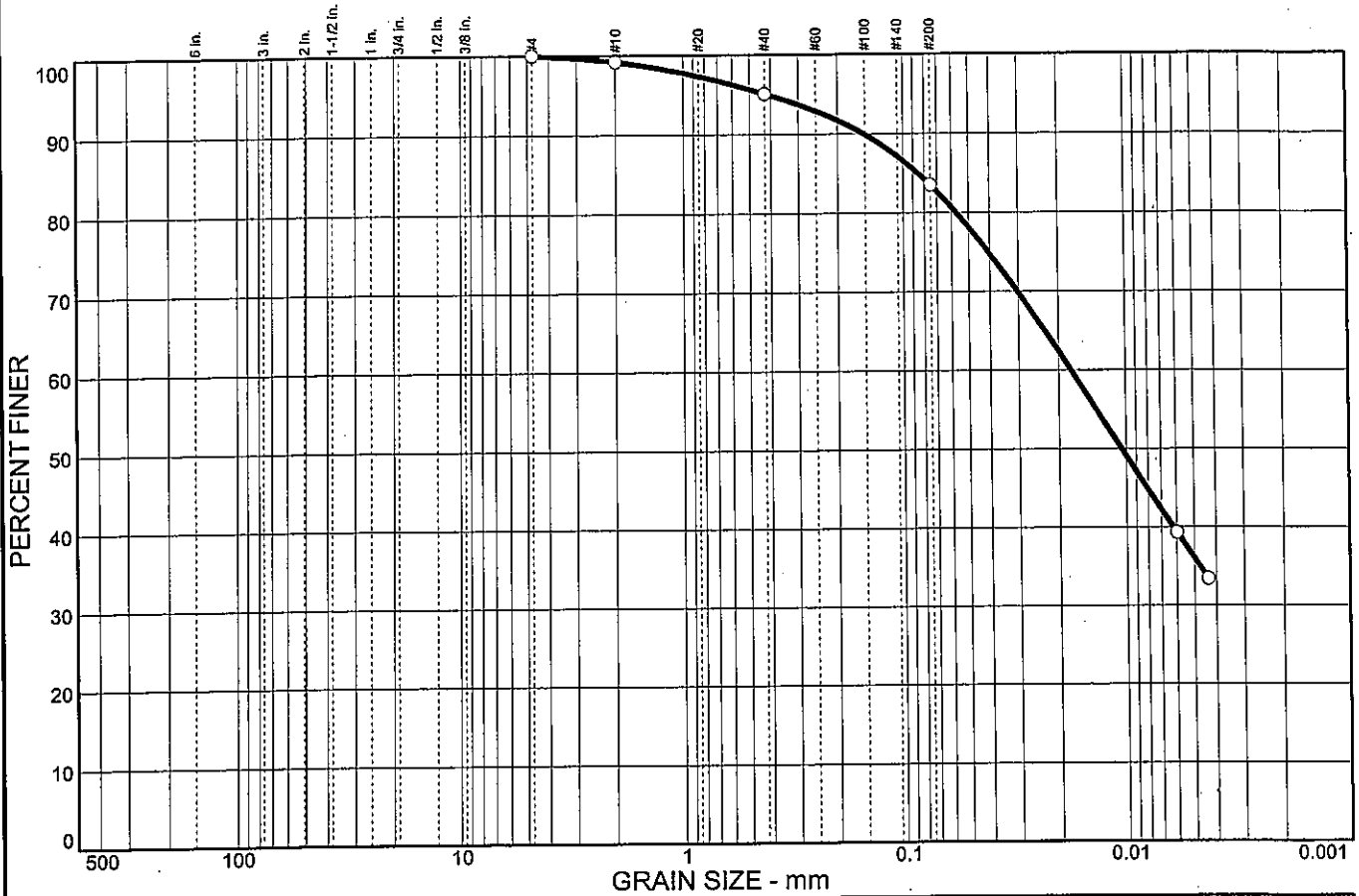


Client: TranSystems, Inc.  
 Project: SCI-823-0.00

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	0.8	4.1	11.6	47.5	36.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.2		
#40	95.1		
#200	83.5		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 16      LL= 33      PI= 17

**Coefficients**

D<sub>85</sub>= 0.0857      D<sub>60</sub>= 0.0175      D<sub>50</sub>= 0.0105  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-6(13)

**Remarks**

Moisture Content= 12.3%

\* (no specification provided)

Sample No.: 2  
 Location:

Source of Sample: B-1115

Date: 10/27/05  
 Elev./Depth: 3.5

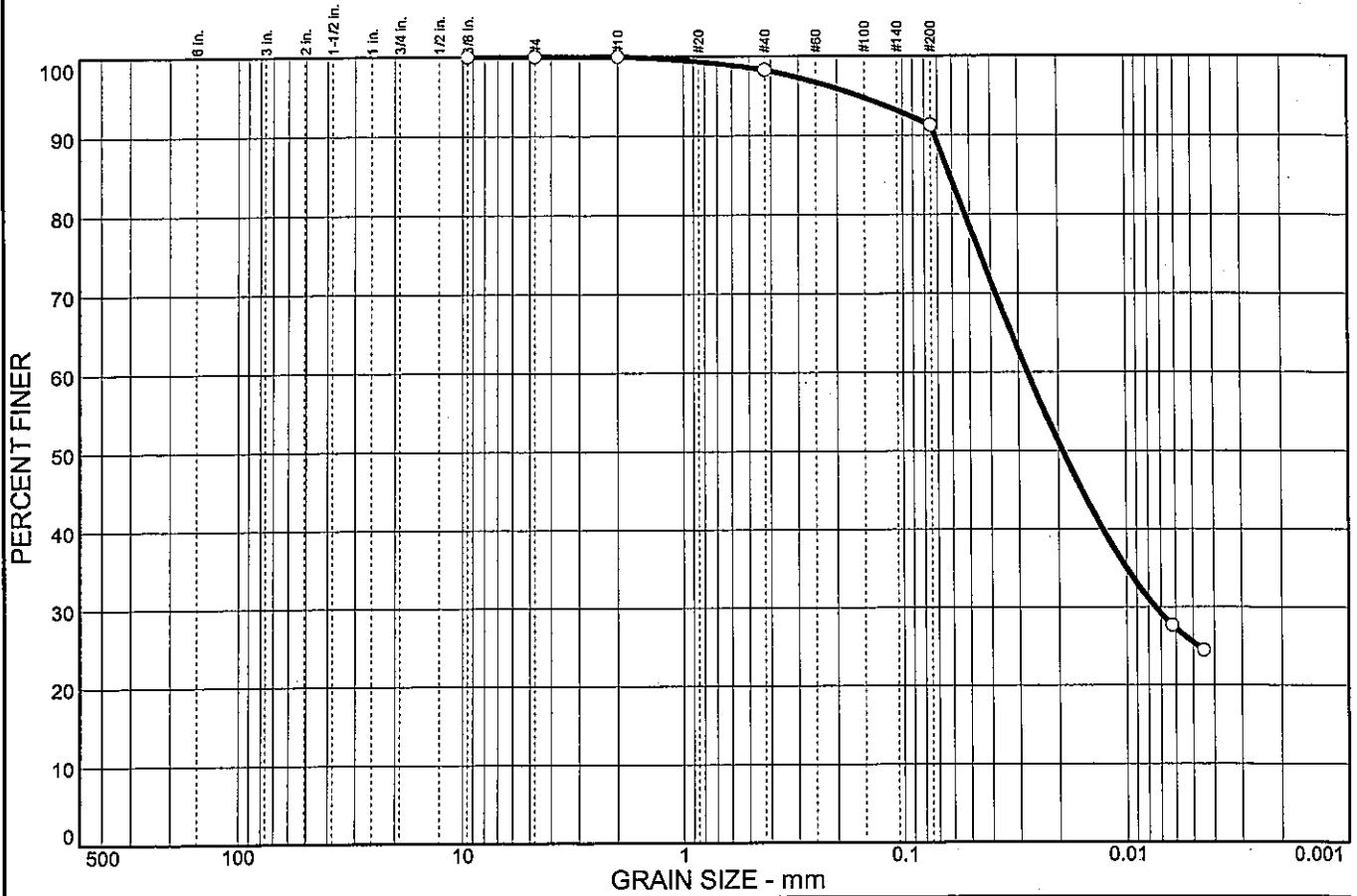


Client: TranSystems, Inc.  
 Project: SCI-823-0.00

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	1.7	7.0	65.8	25.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	100.0		
#40	98.3		
#200	91.3		

**Soil Description**  
Lean clay

**Atterberg Limits**  
 PL= 18      LL= 27      PI= 9

**Coefficients**  
 D<sub>85</sub>= 0.0614      D<sub>60</sub>= 0.0273      D<sub>50</sub>= 0.0191  
 D<sub>30</sub>= 0.0074      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**  
 USCS= CL                      AASHTO= A-4(7)

**Remarks**  
 Moisture Content= 12.2%

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1116

Date: 10/27/05  
Elev./Depth: 3.5



Client: TranSystems, Inc.  
Project: SCI-823-0.00

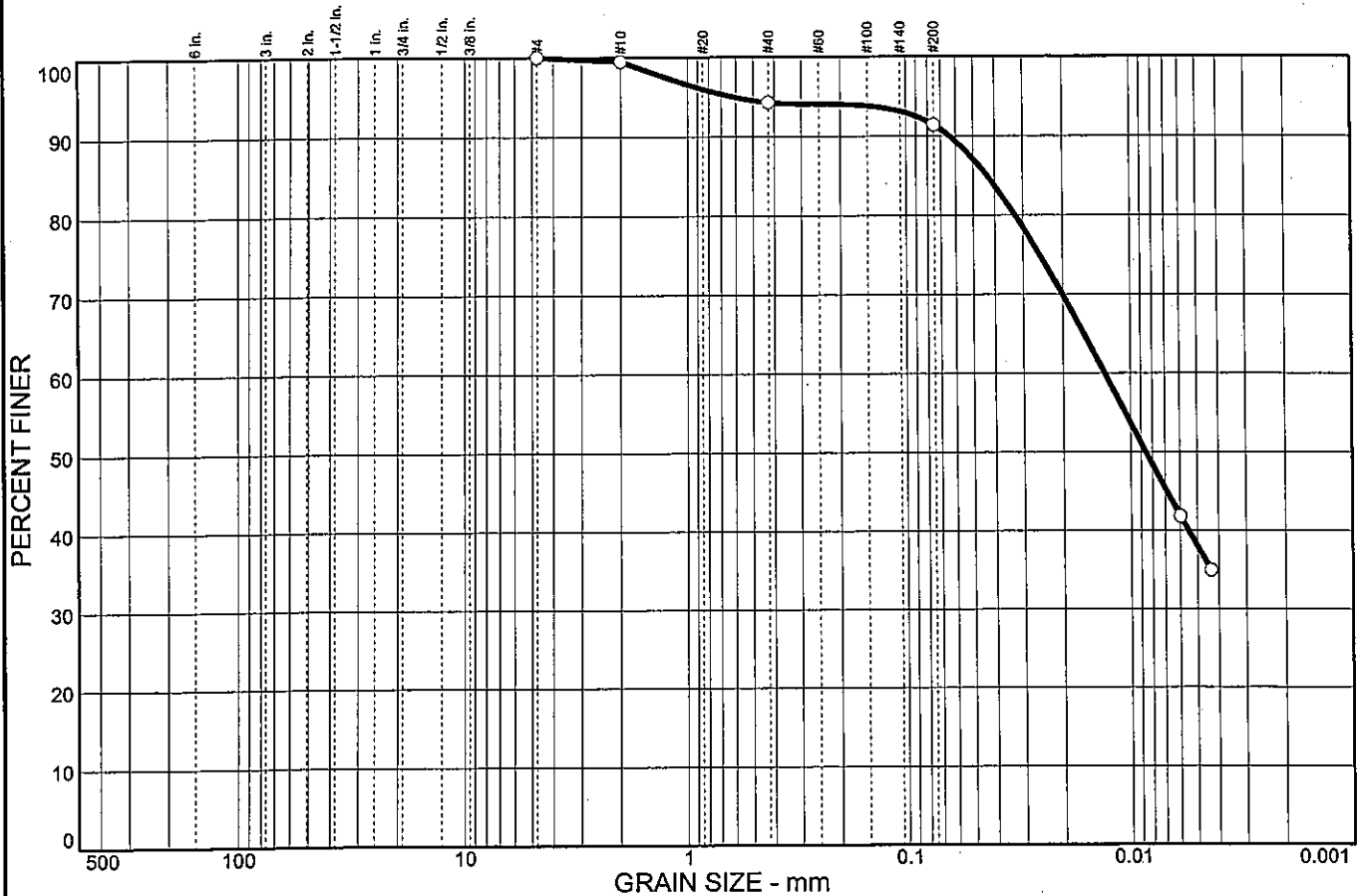
Project No: 0121-3070.03

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	5.2	2.9	53.4	38.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.5		
#40	94.3		
#200	91.4		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 19      LL= 35      PI= 16

**Coefficients**

D<sub>85</sub>= 0.0435      D<sub>60</sub>= 0.0130      D<sub>50</sub>= 0.0086  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-6(14)

**Remarks**

Moisture Content= 12.5%

\* (no specification provided)

Sample No.: 8  
Location:

Source of Sample: B-1116

Date: 10/27/05  
Elev./Depth: 18.5

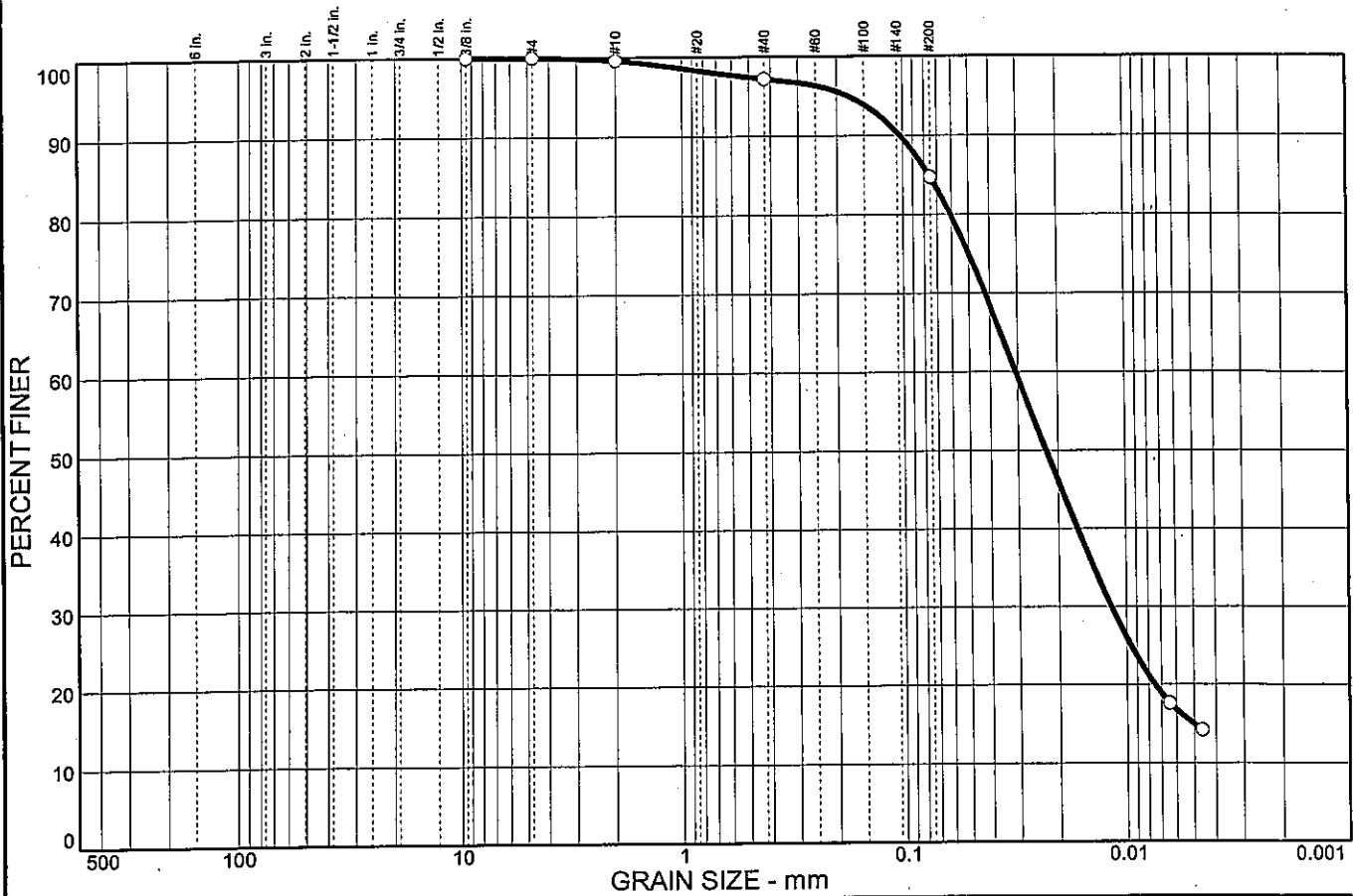


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	2.4	12.5	69.7	15.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	99.6		
#40	97.2		
#200	84.7		

**Soil Description**

Silty clay with sand

**Atterberg Limits**

PL= 18      LL= 24      PI= 6

**Coefficients**

D<sub>85</sub>= 0.0761      D<sub>60</sub>= 0.0307      D<sub>50</sub>= 0.0226  
 D<sub>30</sub>= 0.0117      D<sub>15</sub>= 0.0050      D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL-ML      AASHTO= A-4(3)

**Remarks**

Moisture Content= 22.2%

\* (no specification provided)

Sample No.: 7  
 Location:

Source of Sample: B-1117

Date: 10/27/05  
 Elev./Depth: 16.0

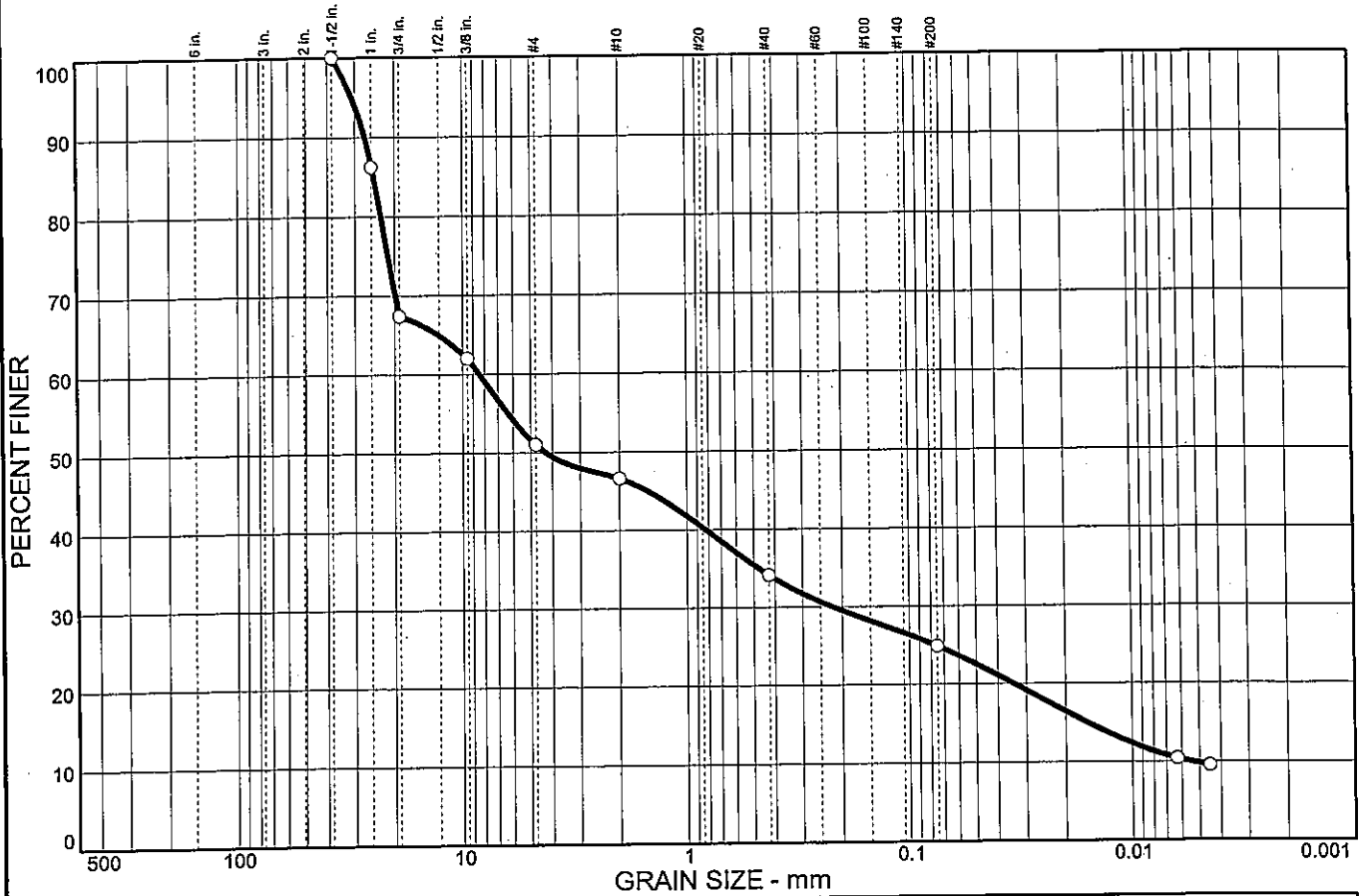


Client: TranSystems, Inc.  
 Project: SCI-823-0.00

Project No: 0121-3070.03

Figure

# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	32.6	16.4	4.4	12.5	9.2	15.1	9.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	86.2		
0.75 in.	67.4		
0.375 in.	62.0		
#4	51.0		
#10	46.6		
#40	34.1		
#200	24.9		

**Soil Description**

Clayey gravel with sand

**Atterberg Limits**

PL= 19      LL= 28      PI= 9

**Coefficients**

D<sub>85</sub>= 24.9      D<sub>60</sub>= 8.45      D<sub>50</sub>= 4.29  
 D<sub>30</sub>= 0.220      D<sub>15</sub>= 0.0159      D<sub>10</sub>= 0.0055  
 C<sub>u</sub>= 1545.52      C<sub>c</sub>= 1.05

**Classification**

USCS= GC      AASHTO= A-2-4(0)

**Remarks**

Moisture Content= 10.9%  
 F.M.=1.20

\* (no specification provided)

Sample No.: 8  
 Location:

Source of Sample: B-1117

Date: 10/27/05  
 Elev./Depth: 18.5

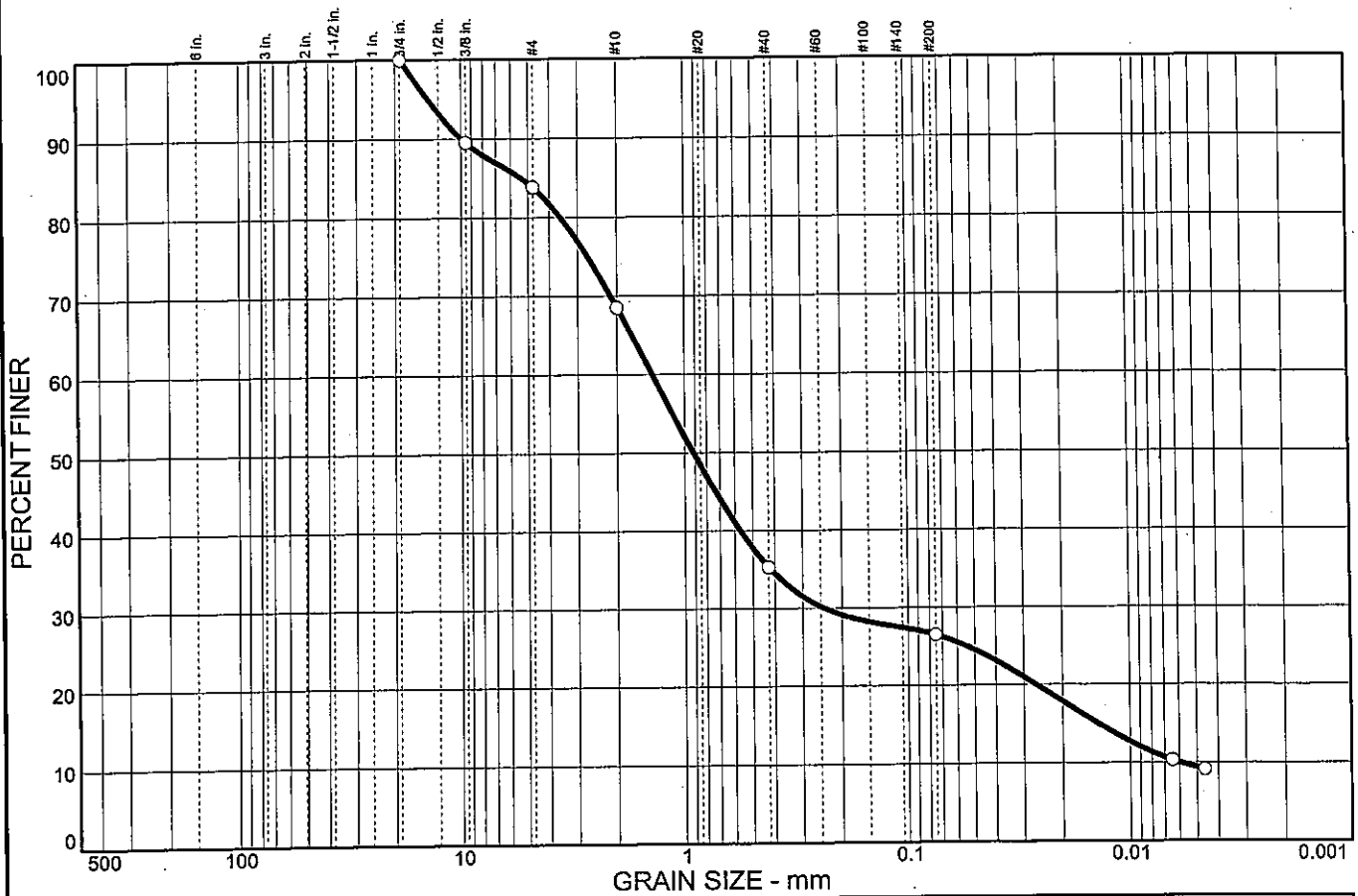


Client: TranSystems, Inc.  
 Project: SCI-823-0.00

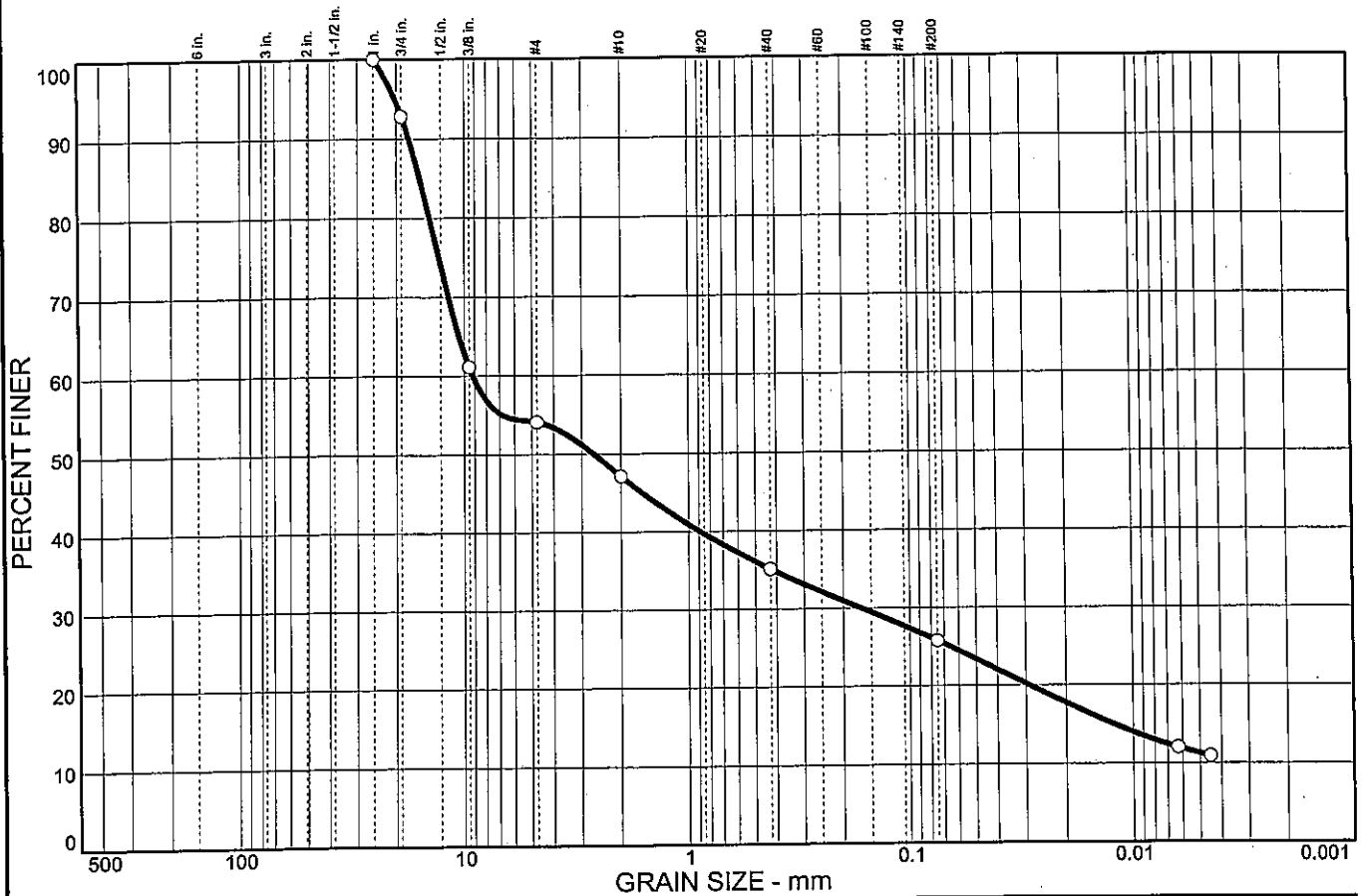
Project No: 0121-3070.03

Figure

# PARTICLE SIZE DISTRIBUTION TEST REPORT



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	7.2	38.7	7.0	12.0	9.3	14.6	11.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
0.75 in.	92.8		
0.375 in.	61.1		
#4	54.1		
#10	47.1		
#40	35.1		
#200	25.8		

**Soil Description**

Clayey gravel with sand

**Atterberg Limits**

PL= 13      LL= 31      PI= 18

**Coefficients**

D<sub>85</sub>= 15.8      D<sub>60</sub>= 9.19      D<sub>50</sub>= 2.66  
D<sub>30</sub>= 0.165      D<sub>15</sub>= 0.0122      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= GC      AASHTO= A-2-6(1)

**Remarks**

Moisture Content= 15.6%  
F.M.=0.92

\* (no specification provided)

Sample No.: 12  
Location:

Source of Sample: B-1117

Date: 10/27/05  
Elev./Depth: 28.5

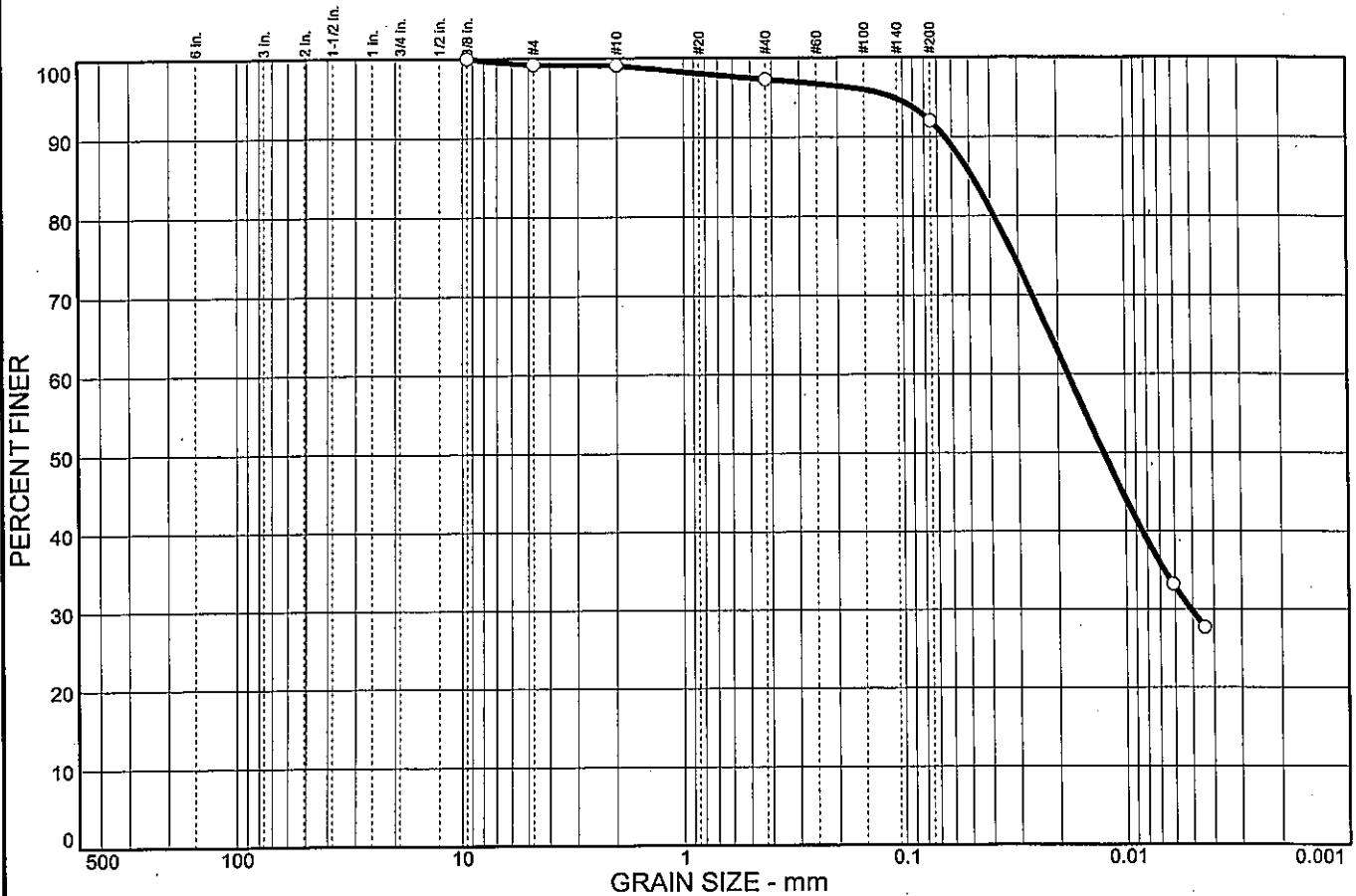


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.1	1.8	5.3	62.3	29.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.2		
#10	99.1		
#40	97.3		
#200	92.0		

**Soil Description**

Lean clay

---

**Atterberg Limits**

PL= 20      LL= 33      PI= 13

---

**Coefficients**

D<sub>85</sub>= 0.0484      D<sub>60</sub>= 0.0180      D<sub>50</sub>= 0.0125  
 D<sub>30</sub>= 0.0051      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

---

**Classification**

USCS= CL                      AASHTO= A-6(12)

---

**Remarks**

Moisture Content= 24.5%  
 F.M.=0.01

\* (no specification provided)

Sample No.: 2  
 Location:

Source of Sample: B-1118

Date: 10/27/05  
 Elev./Depth: 3.5



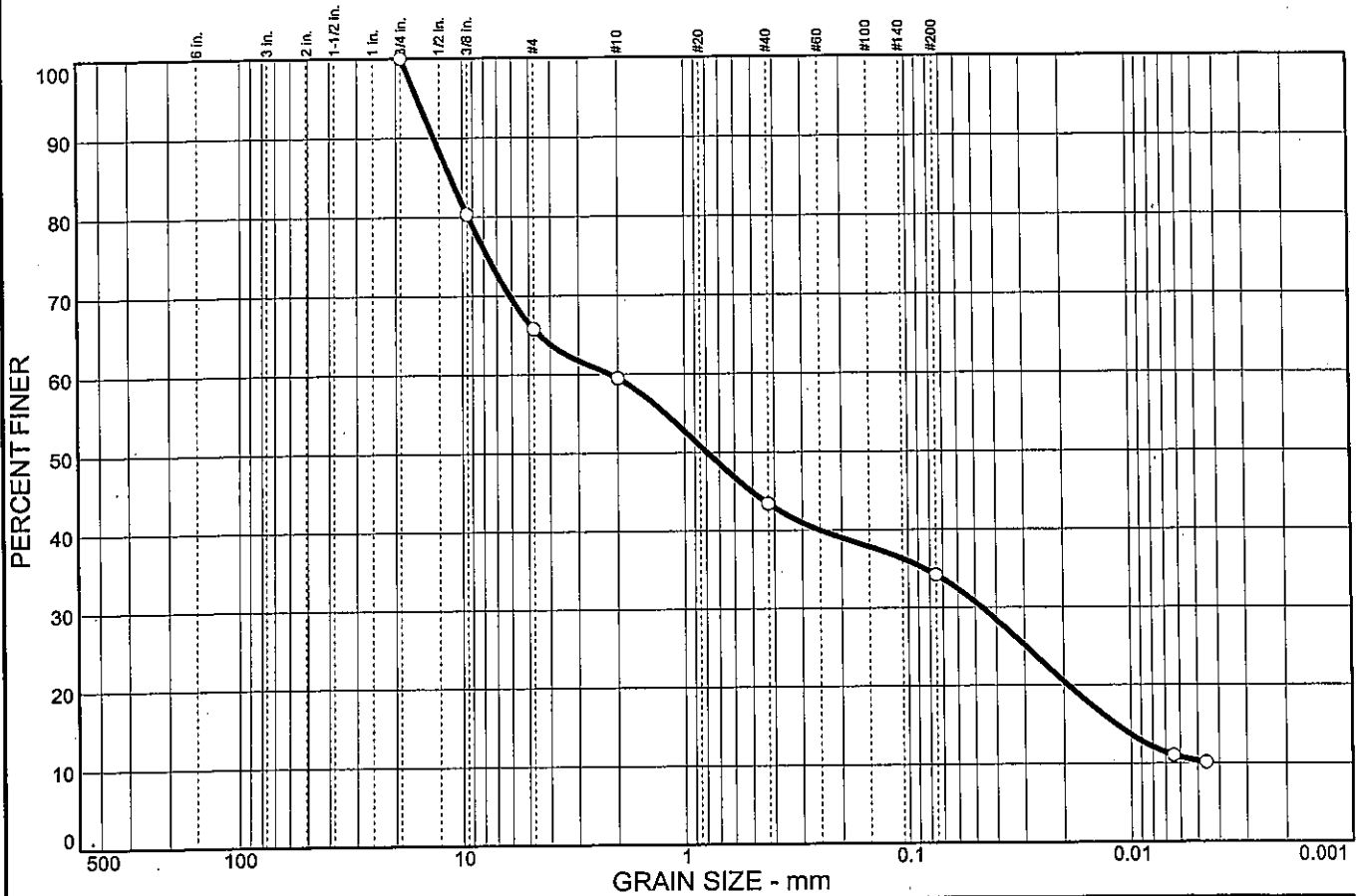
Client: TranSystems, Inc.  
 Project: SCI-823-0.00

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	34.2	6.3	16.1	9.2	23.9	10.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	80.3		
#4	65.8		
#10	59.5		
#40	43.4		
#200	34.2		

**Soil Description**

Clayey gravel with sand

**Atterberg Limits**

PL= 16      LL= 26      PI= 10

**Coefficients**

D<sub>85</sub>= 11.3      D<sub>60</sub>= 2.16      D<sub>50</sub>= 0.793  
D<sub>30</sub>= 0.0467      D<sub>15</sub>= 0.0117      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= GC      AASHTO= A-2-4(0)

**Remarks**

Moisture Content= 17.4%  
F.M.=0.54

\* (no specification provided)

Sample No.: SB  
Location:

Source of Sample: B-1118

Date: 10/27/05  
Elev./Depth: 11.8



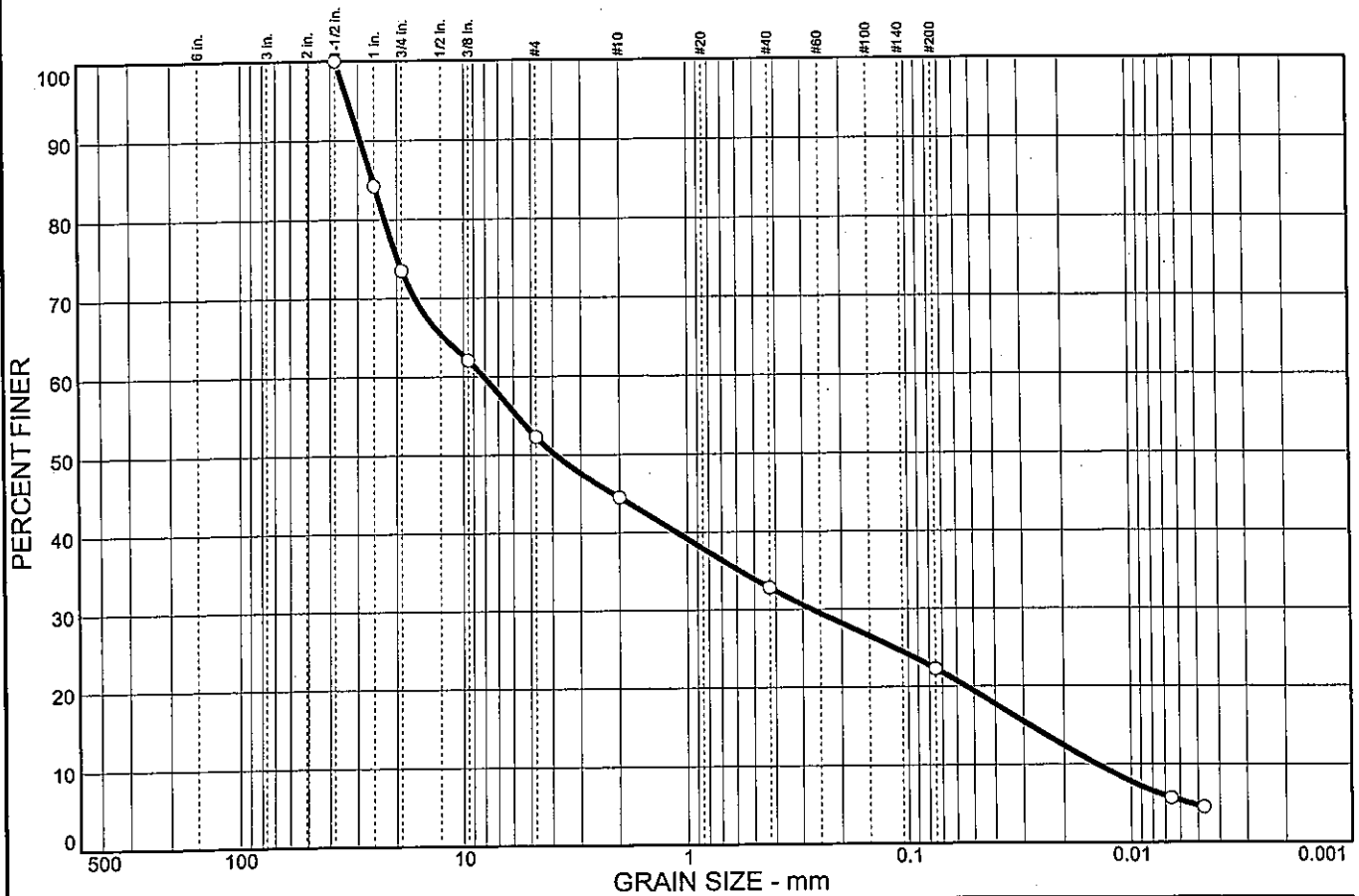
Client: TranSystems, Inc.  
Project: SCI-823-0.00

Project No: 0121-3070.03

Figure



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	26.5	21.2	7.8	11.7	10.5	17.6	4.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	84.2		
0.75 in.	73.5		
0.375 in.	62.1		
#4	52.3		
#10	44.5		
#40	32.8		
#200	22.3		

**Soil Description**

Silty clayey gravel with sand

**Atterberg Limits**

PL= 16      LL= 20      PI= 4

**Coefficients**

D<sub>85</sub>= 25.9      D<sub>60</sub>= 8.11      D<sub>50</sub>= 3.89  
D<sub>30</sub>= 0.272      D<sub>15</sub>= 0.0282      D<sub>10</sub>= 0.0143  
C<sub>u</sub>= 569.29      C<sub>c</sub>= 0.64

**Classification**

USCS= GC-GM      AASHTO= A-1-b

**Remarks**

Moisture Content= 14.9%  
F.M.=1.12

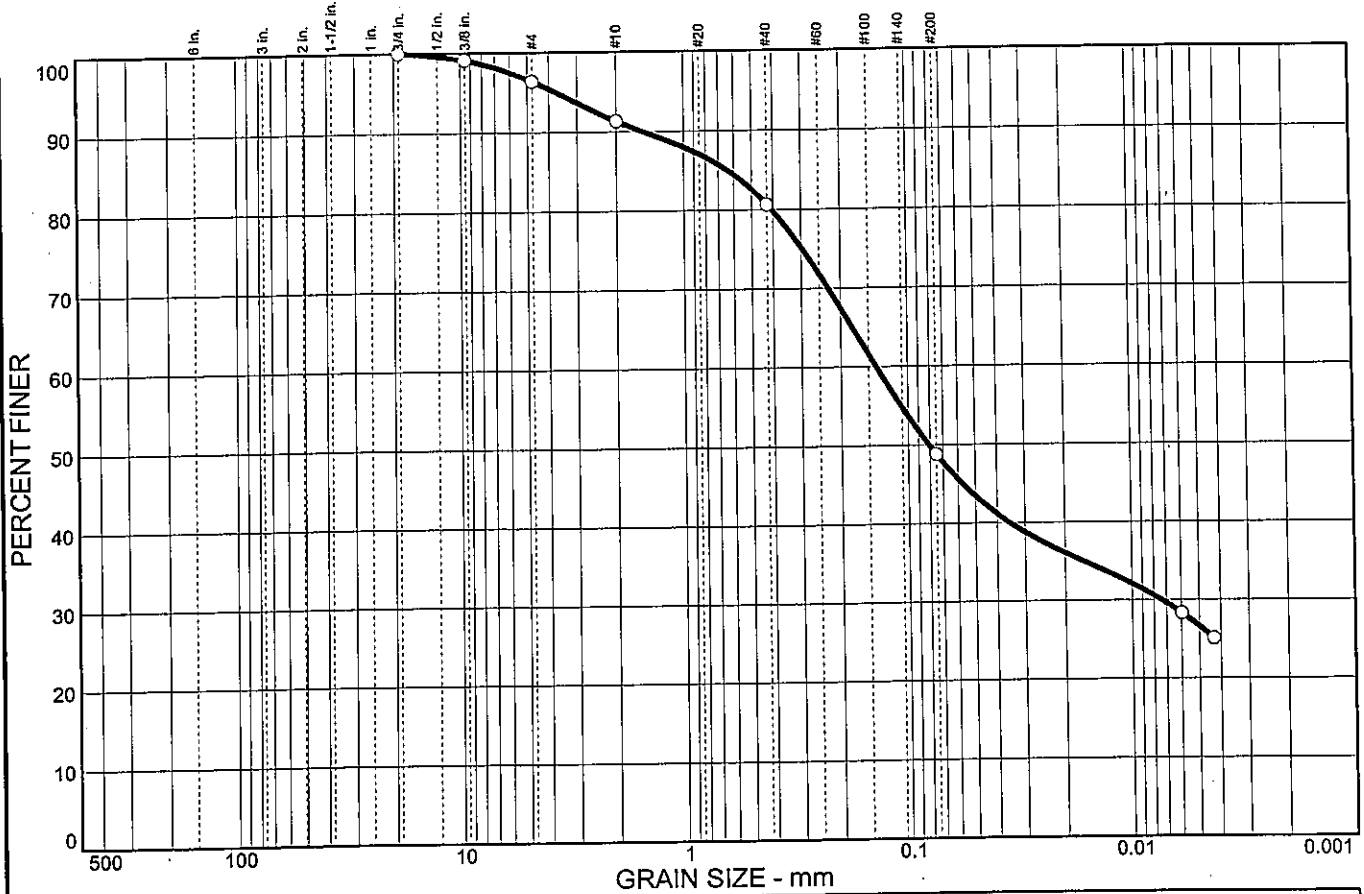
\* (no specification provided)

Sample No.: 7      Source of Sample: B-1118      Date: 11/1/05  
Location:      Elev./Depth: 16.0



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	3.6	5.1	10.7	31.8	22.2	26.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	99.1		
#4	96.4		
#10	91.3		
#40	80.6		
#200	48.8		

**Soil Description**  
Clayey sand

**Atterberg Limits**  
 PL= 12      LL= 30      PI= 18

**Coefficients**  
 D<sub>85</sub>= 0.640      D<sub>60</sub>= 0.138      D<sub>50</sub>= 0.0809  
 D<sub>30</sub>= 0.0074      D<sub>15</sub>=      D<sub>10</sub>=  
 C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
 USCS= SC      AASHTO= A-6(5)

**Remarks**  
 Moisture Content= 19.3%  
 F.M.=0.05

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: B-1119

Date: 9/23/05  
Elev./Depth: 6.0



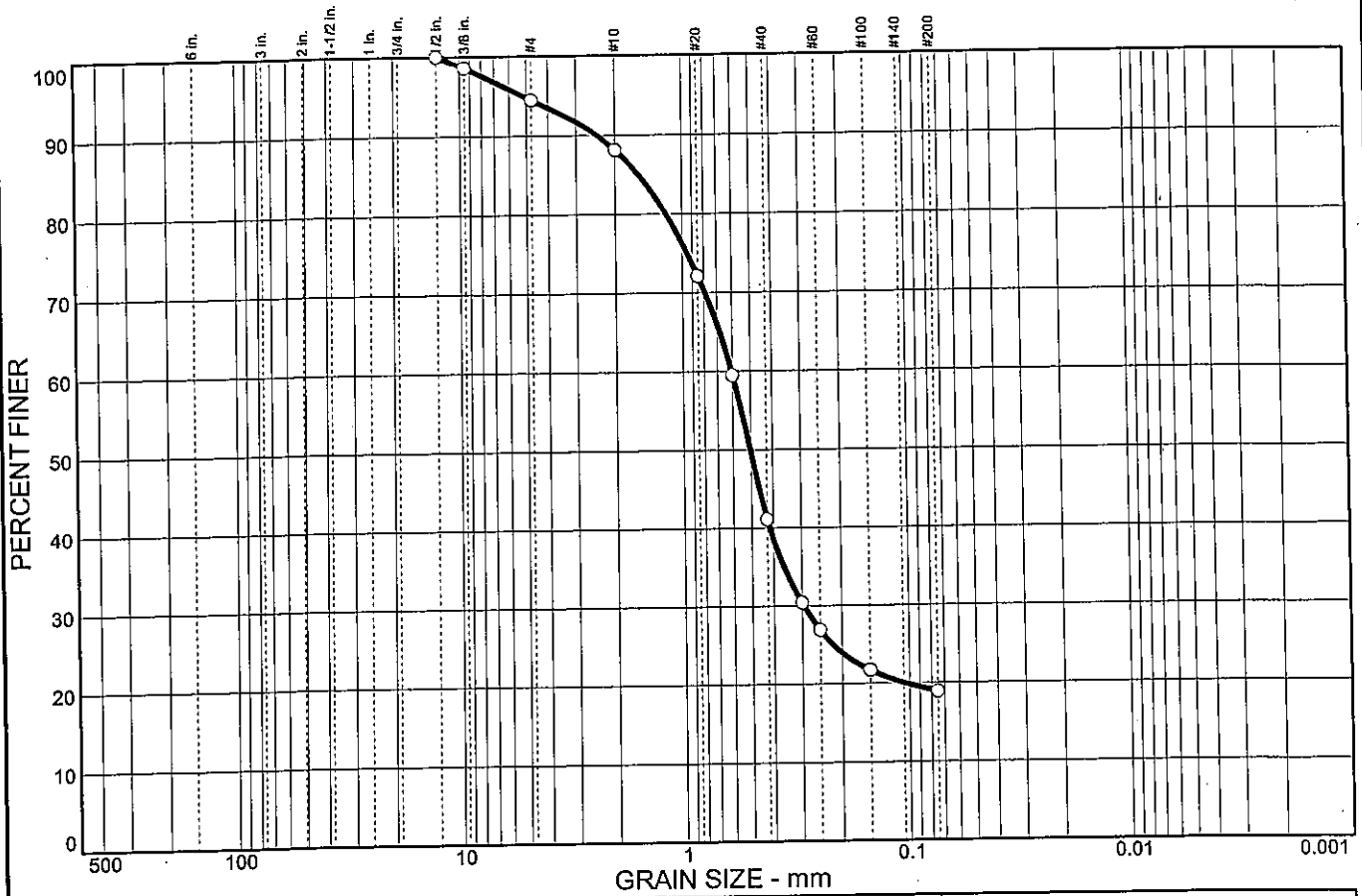
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	5.5	6.4	47.0	22.2	18.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.50 in.	100.0		
0.375 in.	98.6		
#4	94.5		
#10	88.1		
#20	72.1		
#30	59.5		
#40	41.1		
#50	30.4		
#60	26.9		
#100	21.7		
#200	18.9		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 1.58      D<sub>60</sub>= 0.606      D<sub>50</sub>= 0.504  
 D<sub>30</sub>= 0.294      D<sub>15</sub>=      D<sub>10</sub>=  
 C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
 USCS= SM      AASHTO= A-1-b

**Remarks**  
 Moisture Content= 19.5%  
 F.M.=1.95

\* (no specification provided)

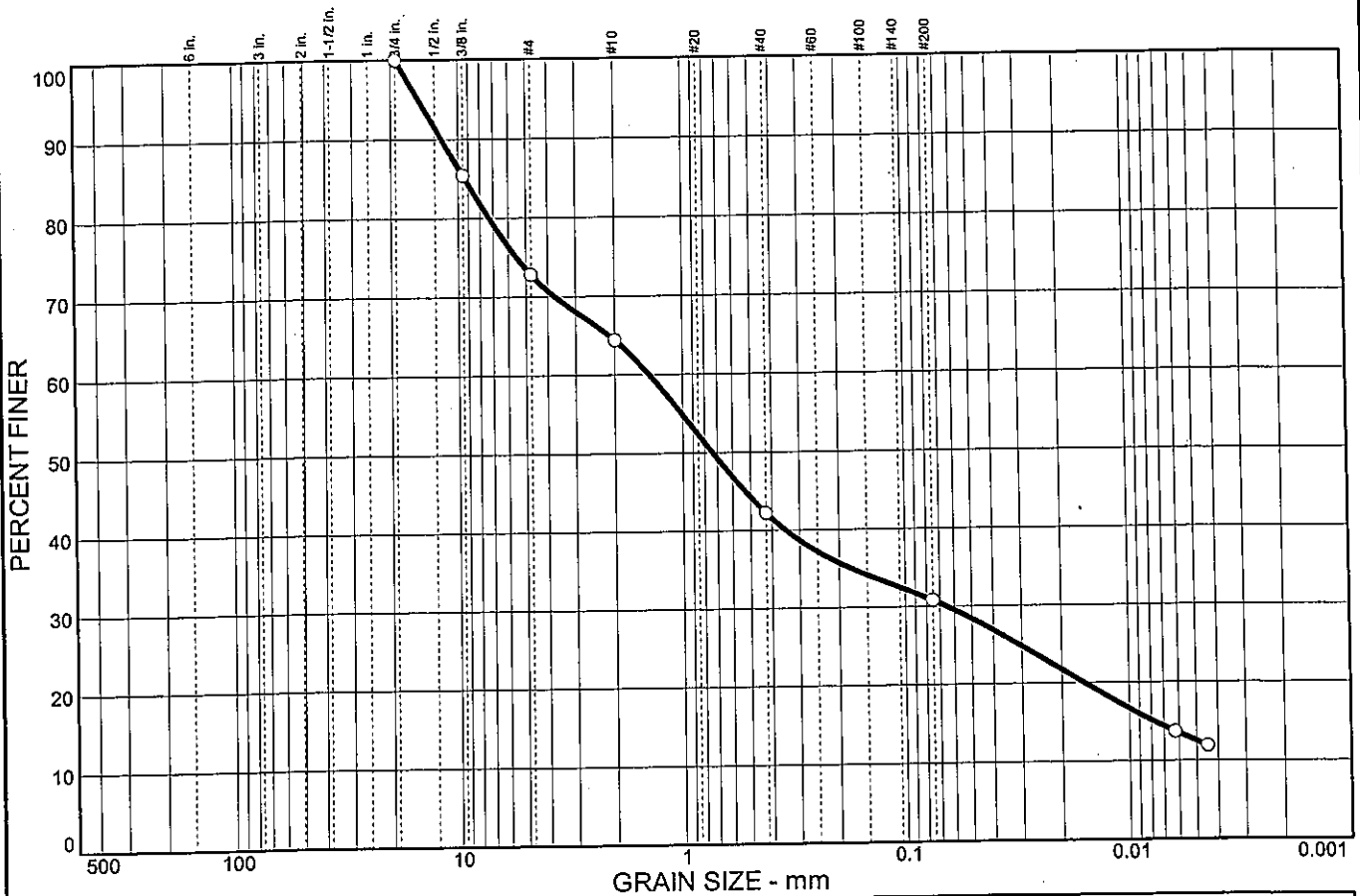
Sample No.: 7      Source of Sample: B-1119      Date: 9/23/05  
 Location:      Elev./Depth: 16.0



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	27.2	8.4	22.2	11.4	18.3	12.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	85.4		
#4	72.8		
#10	64.4		
#40	42.2		
#200	30.8		

**Soil Description**

Silty sand with gravel

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 9.34      D<sub>60</sub>= 1.41      D<sub>50</sub>= 0.736  
D<sub>30</sub>= 0.0650      D<sub>15</sub>= 0.0077      D<sub>10</sub>=  
C<sub>u</sub>=

**Classification**

USCS= SM      AASHTO= A-2-4(0)

**Remarks**

Moisture Content= 15.3%  
F.M.=0.42

\* (no specification provided)

Sample No.: 8  
Location:

Source of Sample: B-1119

Date: 9/23/05  
Elev./Depth: 18.5



Client: TranSystems, Inc.  
Project: SCI-823-0.00

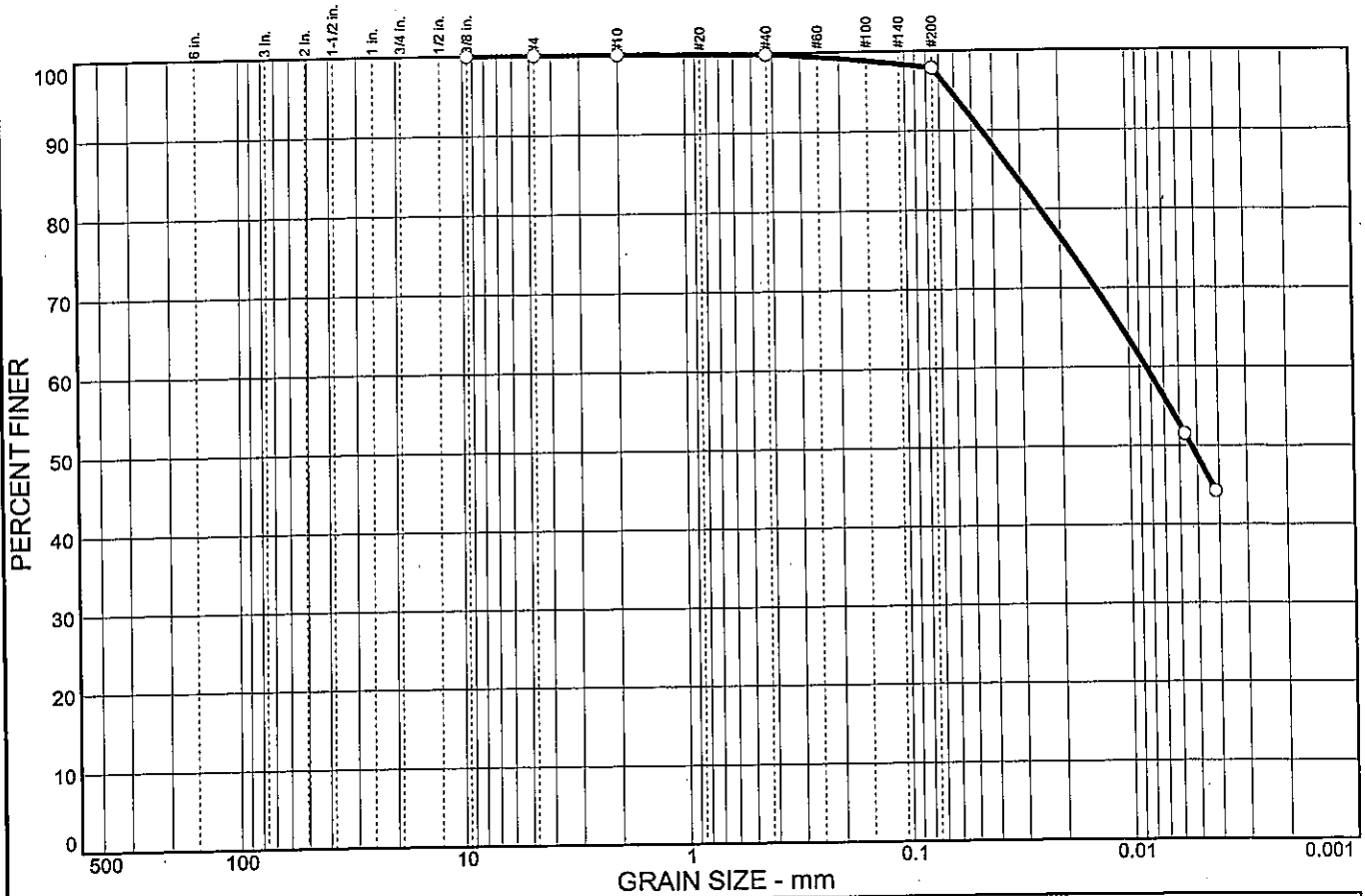
Project No: 0121-3070.03

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	1.9	49.3	48.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	100.0		
#40	99.8		
#200	97.9		

**Soil Description**  
Lean clay

**Atterberg Limits**  
PL= 24      LL= 42      PI= 18

**Coefficients**  
D<sub>85</sub>= 0.0330      D<sub>60</sub>= 0.0084      D<sub>50</sub>= 0.0053  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
USCS= CL      AASHTO= A-7-6(20)

**Remarks**  
Moisture Content= 21.1%

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1120

Date: 11/1/05  
Elev./Depth: 3.5



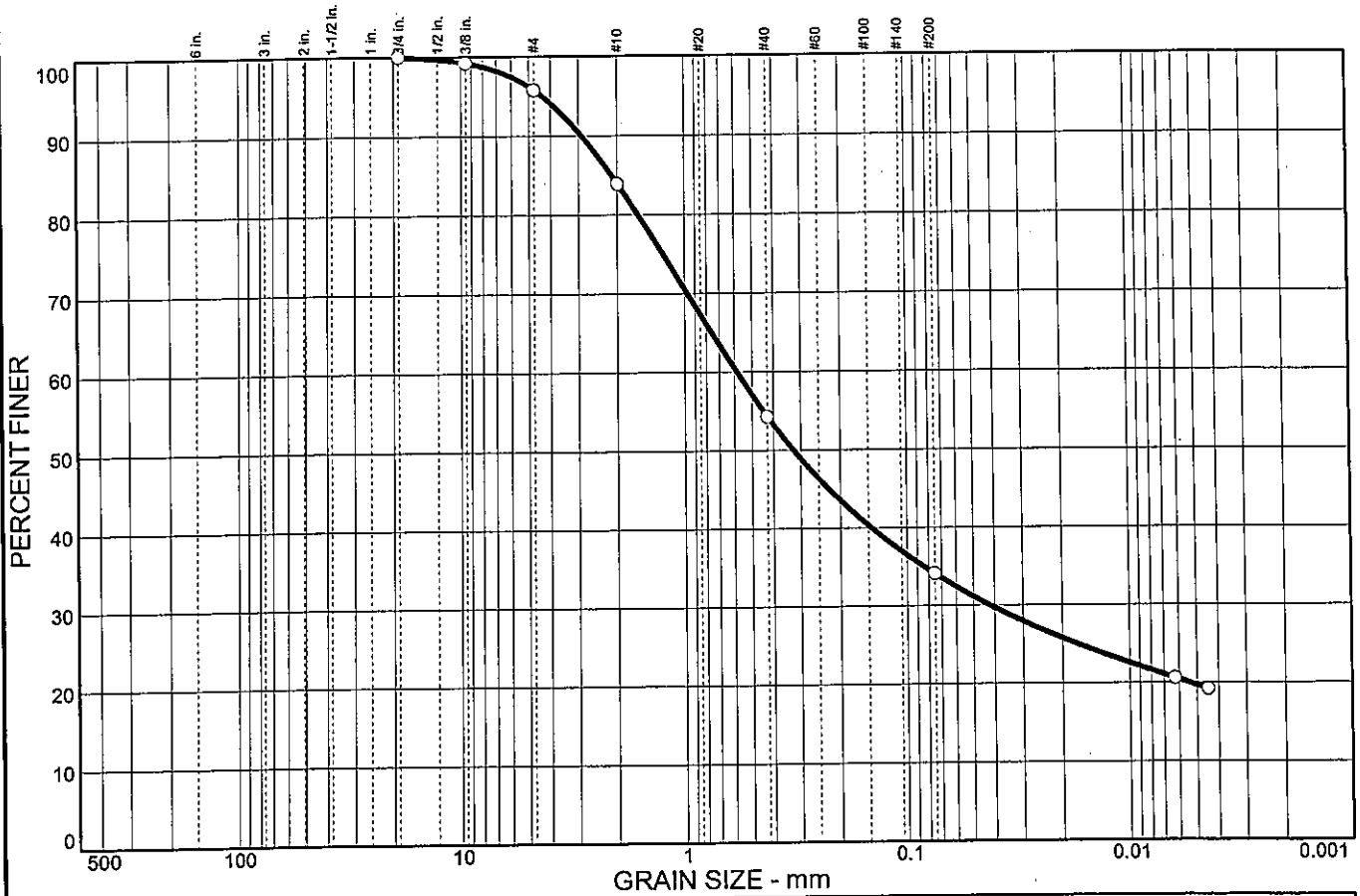
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	11.9	29.6	20.2	14.4	19.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	99.2		
#4	95.8		
#10	83.9		
#40	54.3		
#200	34.1		

**Soil Description**

Clayey sand

**Atterberg Limits**

PL= 17      LL= 35      PI= 18

**Coefficients**

D<sub>85</sub>= 2.13      D<sub>60</sub>= 0.584      D<sub>50</sub>= 0.324  
D<sub>30</sub>= 0.0420      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC      AASHTO= A-2-6(2)

**Remarks**

Moisture Content= 16.6%  
F.M.=0.05

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: B-1120

Date: 11/1/05  
Elev./Depth: 6.0

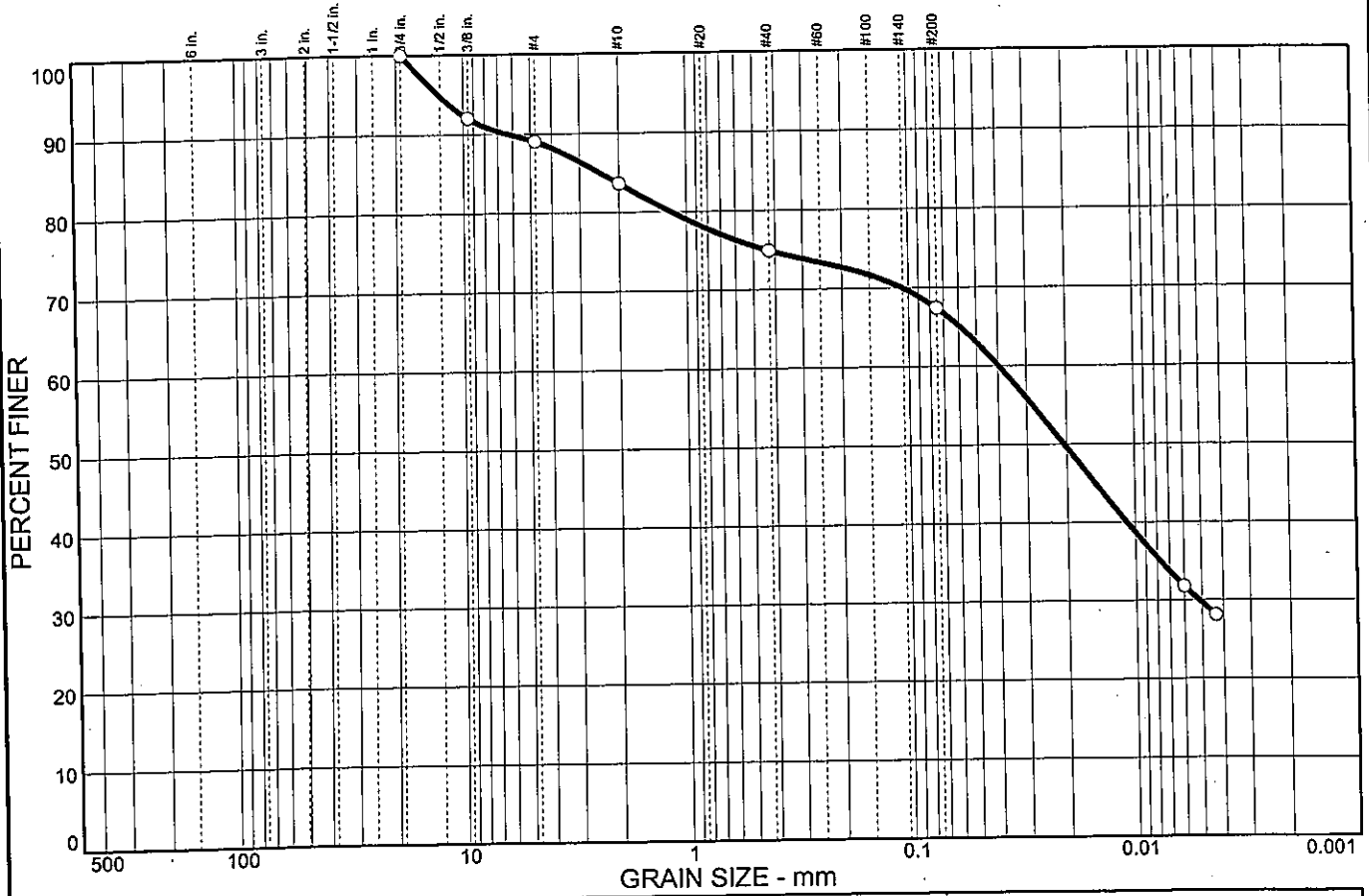


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	11.0	5.4	8.7	7.5	37.7	29.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	92.0		
#4	89.0		
#10	83.6		
#40	74.9		
#200	67.4		

**Soil Description**

Sandy lean clay

**Atterberg Limits**

PL= 23      LL= 36      PI= 13

**Coefficients**

D<sub>85</sub>= 2.43      D<sub>60</sub>= 0.0397      D<sub>50</sub>= 0.0205  
 D<sub>30</sub>= 0.0051      D<sub>15</sub>=      D<sub>10</sub>=  
 C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-6(7)

**Remarks**

Moisture Content= 17.4%  
 F.M.= 0.19

\* (no specification provided)

Sample No.: 1  
 Location:

Source of Sample: B-1121

Date: 11/1/05  
 Elev./Depth: 1.0

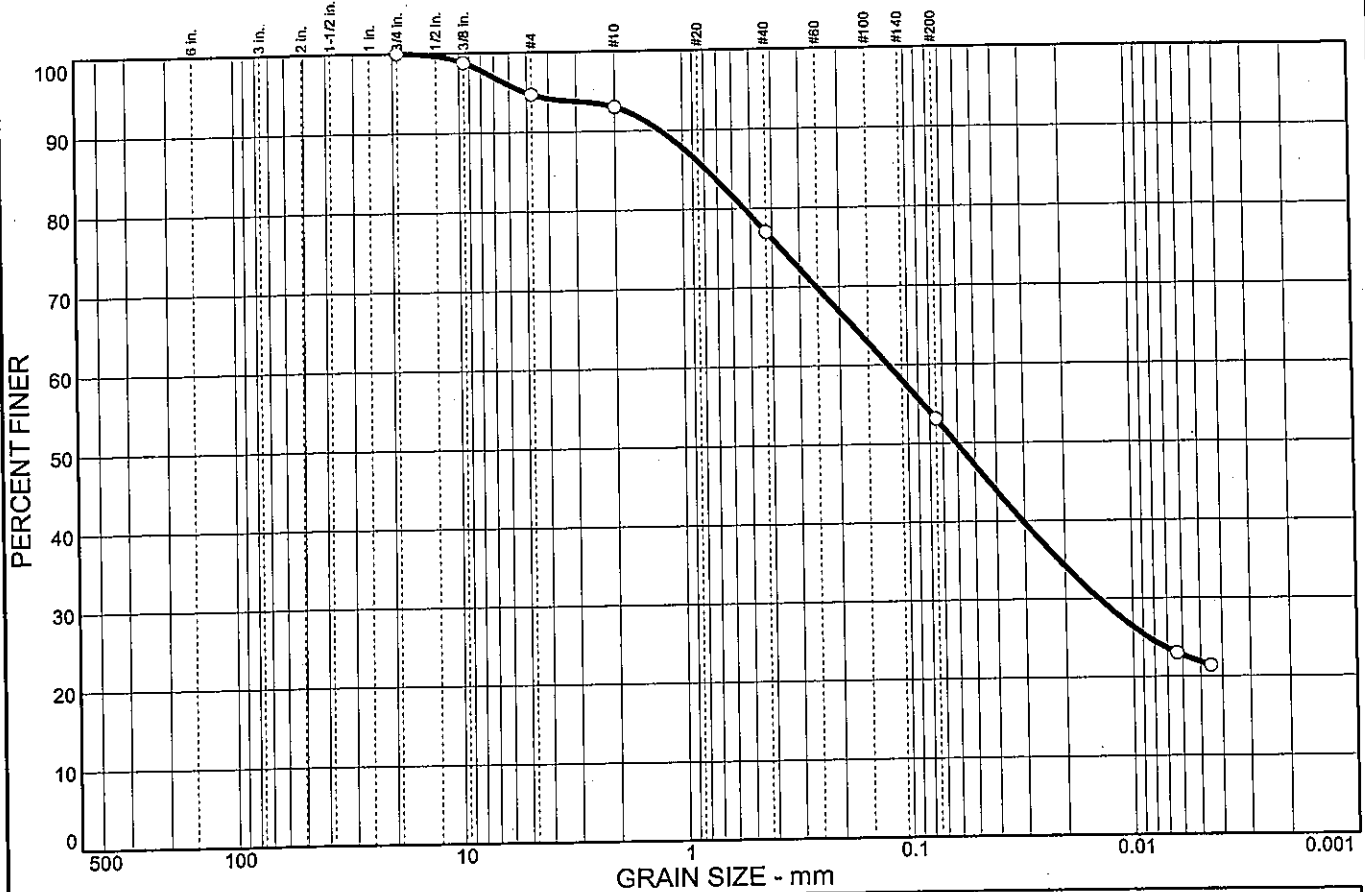


Client: TranSystems, Inc.  
 Project: SCI-823-0.00

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	5.3	1.7	16.0	23.9	31.2	21.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	98.8		
#4	94.7		
#10	93.0		
#40	77.0		
#200	53.1		

**Soil Description**

Sandy lean clay

**Atterberg Limits**

PL= 14      LL= 23      PI= 9

**Coefficients**

D<sub>85</sub>= 0.783      D<sub>60</sub>= 0.122      D<sub>50</sub>= 0.0607  
D<sub>30</sub>= 0.0141      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-4(2)

**Remarks**

Moisture Content= 14.3%  
F.M.=0.06

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1121

Date: 11/1/05  
Elev./Depth: 3.5



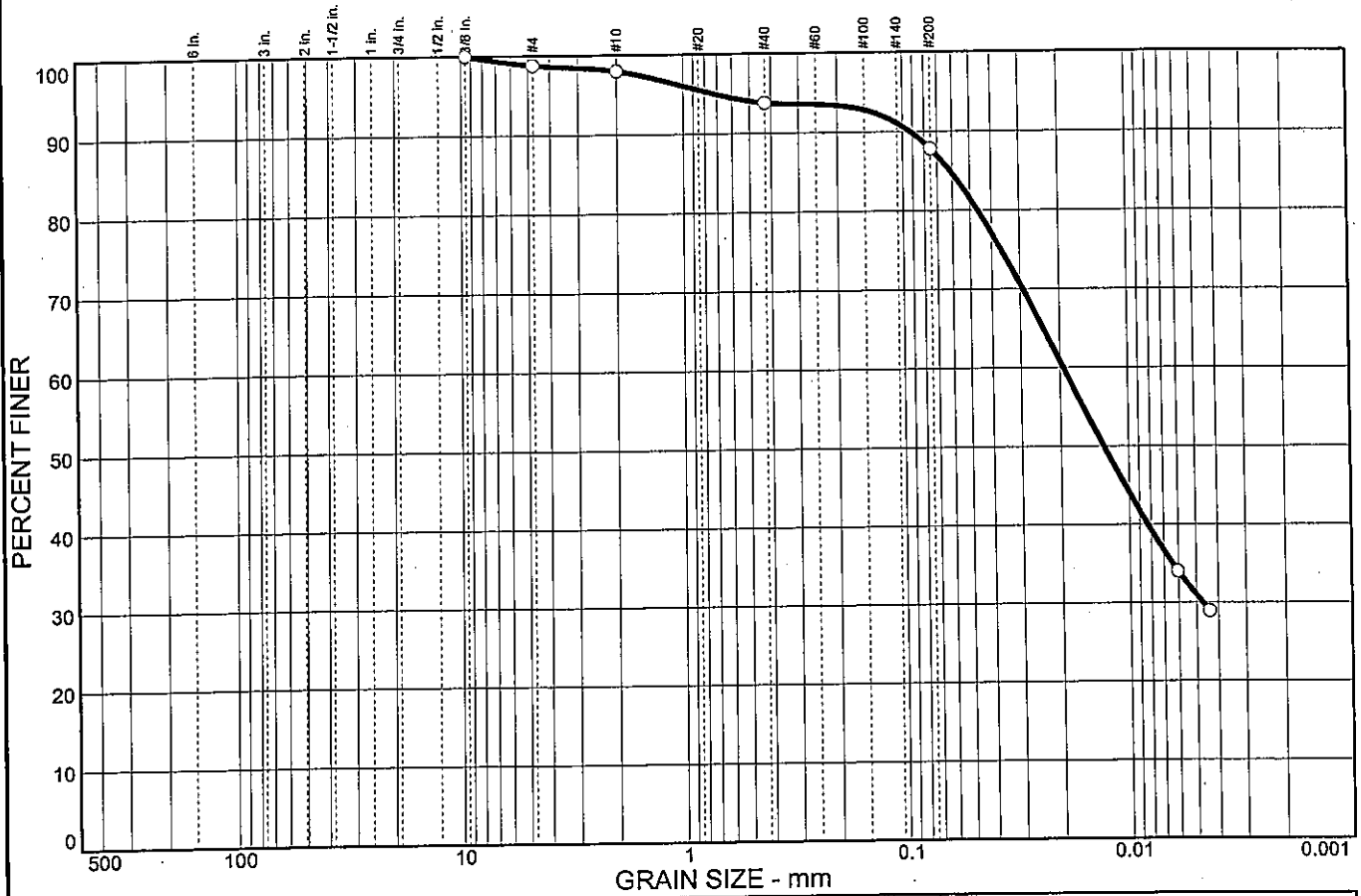
Client: TranSystems, Inc.

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	1.2	0.8	4.2	6.0	56.8	31.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	98.8		
#10	98.0		
#40	93.8		
#200	87.8		

**Soil Description**  
Lean clay

**Atterberg Limits**  
 PL= 23      LL= 37      PI= 14

**Coefficients**  
 D<sub>85</sub>= 0.0614      D<sub>60</sub>= 0.0193      D<sub>50</sub>= 0.0129  
 D<sub>30</sub>= 0.0047      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**  
 USCS= CL              AASHTO= A-6(13)

**Remarks**  
 Moisture Content= 28.4%  
 F.M.= 0.01

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: B-1121

Date: 11/1/05  
Elev./Depth: 6.0



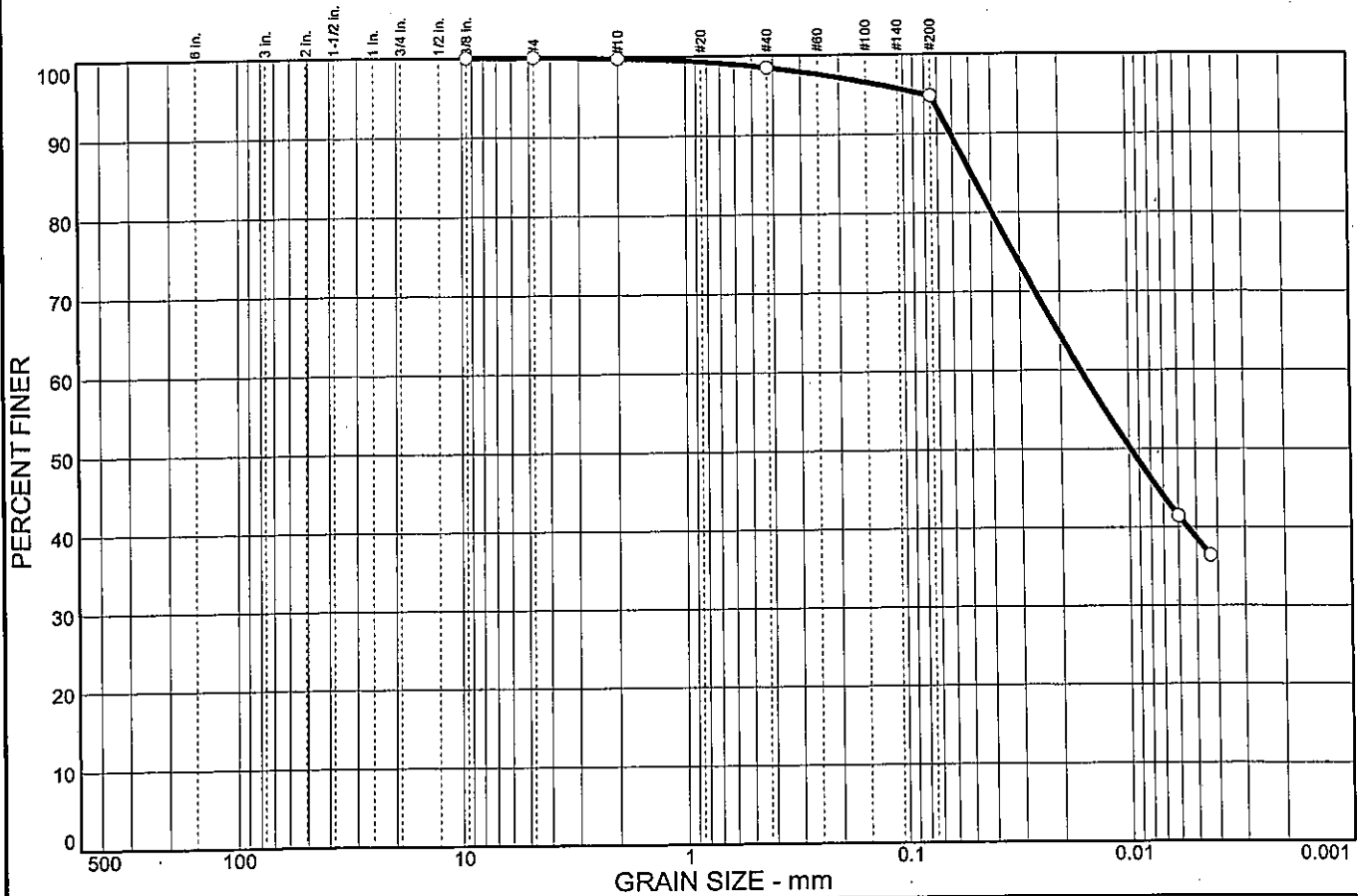
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.2	1.3	3.7	56.2	38.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	99.8		
#40	98.5		
#200	94.8		

**Soil Description**  
Lean clay

**Atterberg Limits**  
 PL= 18      LL= 34      PI= 16

**Coefficients**  
 D<sub>85</sub>= 0.0493      D<sub>60</sub>= 0.0162      D<sub>50</sub>= 0.0098  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
 USCS= CL      AASHTO= A-6(15)

**Remarks**  
 Moisture Content= 17.2%

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1122

Date: 11/1/05  
Elev./Depth: 3.5



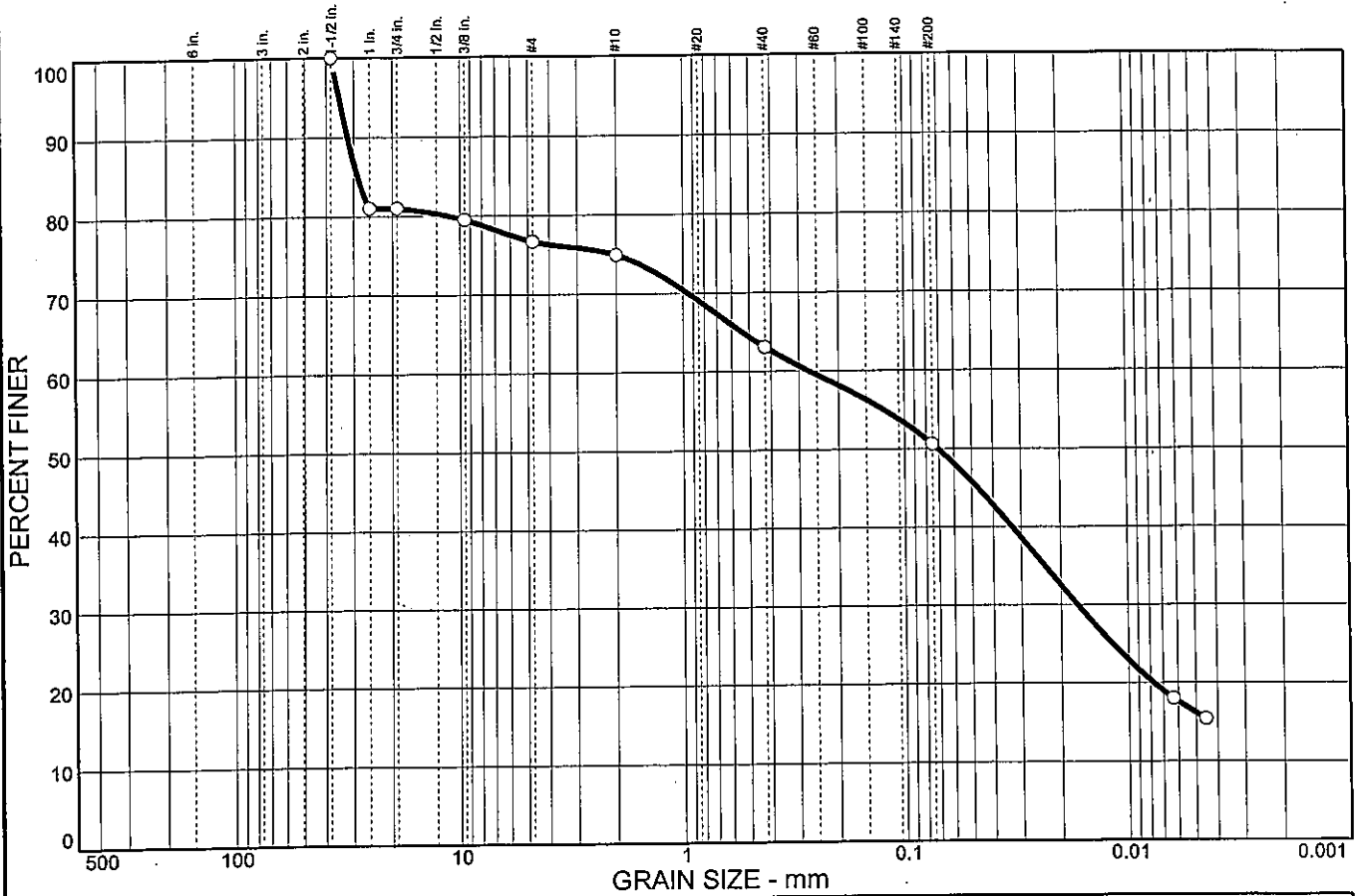
Client: TranSystems, Inc.  
Project: SCI-823-0.00

Project No: 0121-3070.03

Figure



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	19.0	4.3	1.8	11.8	12.5	34.4	16.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	81.0		
0.75 in.	81.0		
0.375 in.	79.5		
#4	76.7		
#10	74.9		
#40	63.1		
#200	50.6		

**Soil Description**

Sandy lean clay with gravel

**Atterberg Limits**

PL= 18      LL= 26      PI= 8

**Coefficients**

D<sub>85</sub>= 28.9      D<sub>60</sub>= 0.270      D<sub>50</sub>= 0.0709  
D<sub>30</sub>= 0.0168      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-4(1)

**Remarks**

Moisture Content= 14.3%  
F.M.=0.63

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1123

Date: 11/1/05  
Elev./Depth: 1.0



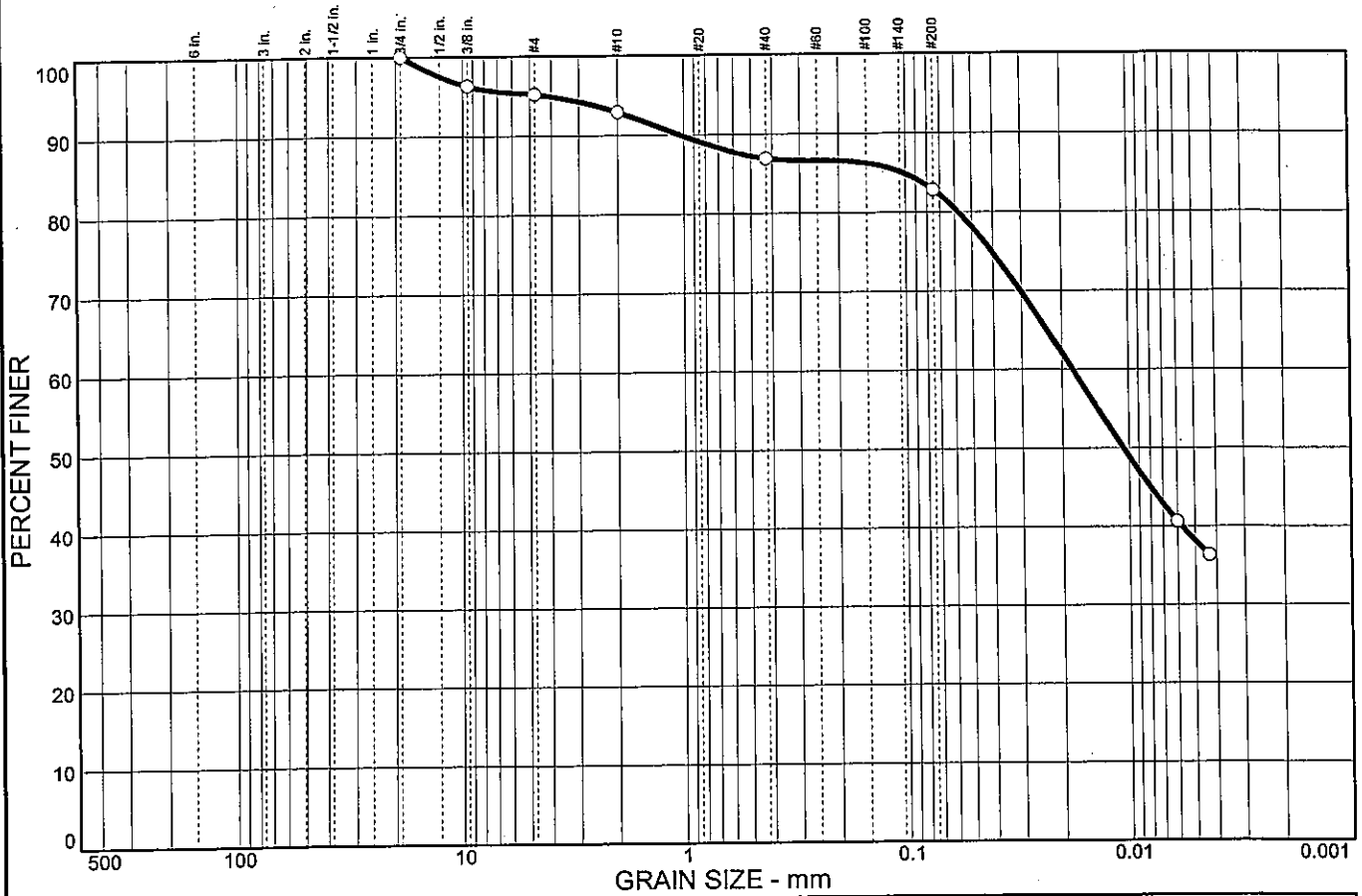
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	4.8	2.3	6.0	4.1	44.6	38.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	96.3		
#4	95.2		
#10	92.9		
#40	86.9		
#200	82.8		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 19      LL= 34      PI= 15

**Coefficients**

D<sub>85</sub>= 0.103      D<sub>60</sub>= 0.0179      D<sub>50</sub>= 0.0106  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                C<sub>c</sub>=

**Classification**

USCS= CL                      AASHTO= A-6(12)

**Remarks**

Moisture Content= 18.5%  
F.M.=0.09

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1123

Date: 11/1/05  
Elev./Depth: 3.5



Client: TranSystems, Inc.  
Project: SCI-823-0.00

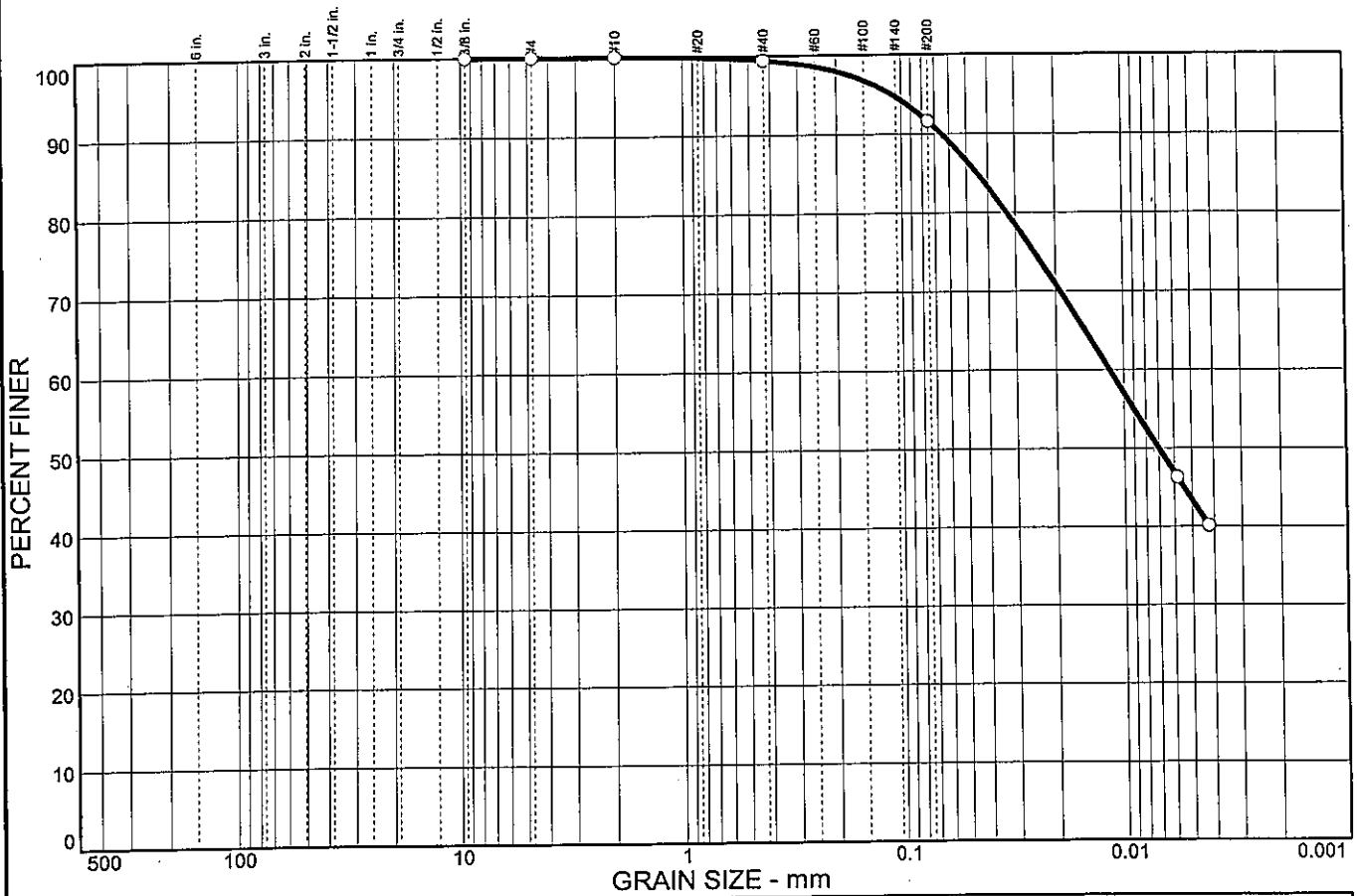
Project No: 0121-3070.03

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	0.6	7.8	48.2	43.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	100.0		
#40	99.4		
#200	91.6		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 21      LL= 42      PI= 21

**Coefficients**

D<sub>85</sub>= 0.0449      D<sub>60</sub>= 0.0115      D<sub>50</sub>= 0.0070  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                C<sub>c</sub>=

**Classification**

USCS= CL              AASHTO= A-7-6(20)

**Remarks**

Moisture Content= 26.8%

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1124

Date: 11/1/05  
Elev./Depth: 3.5

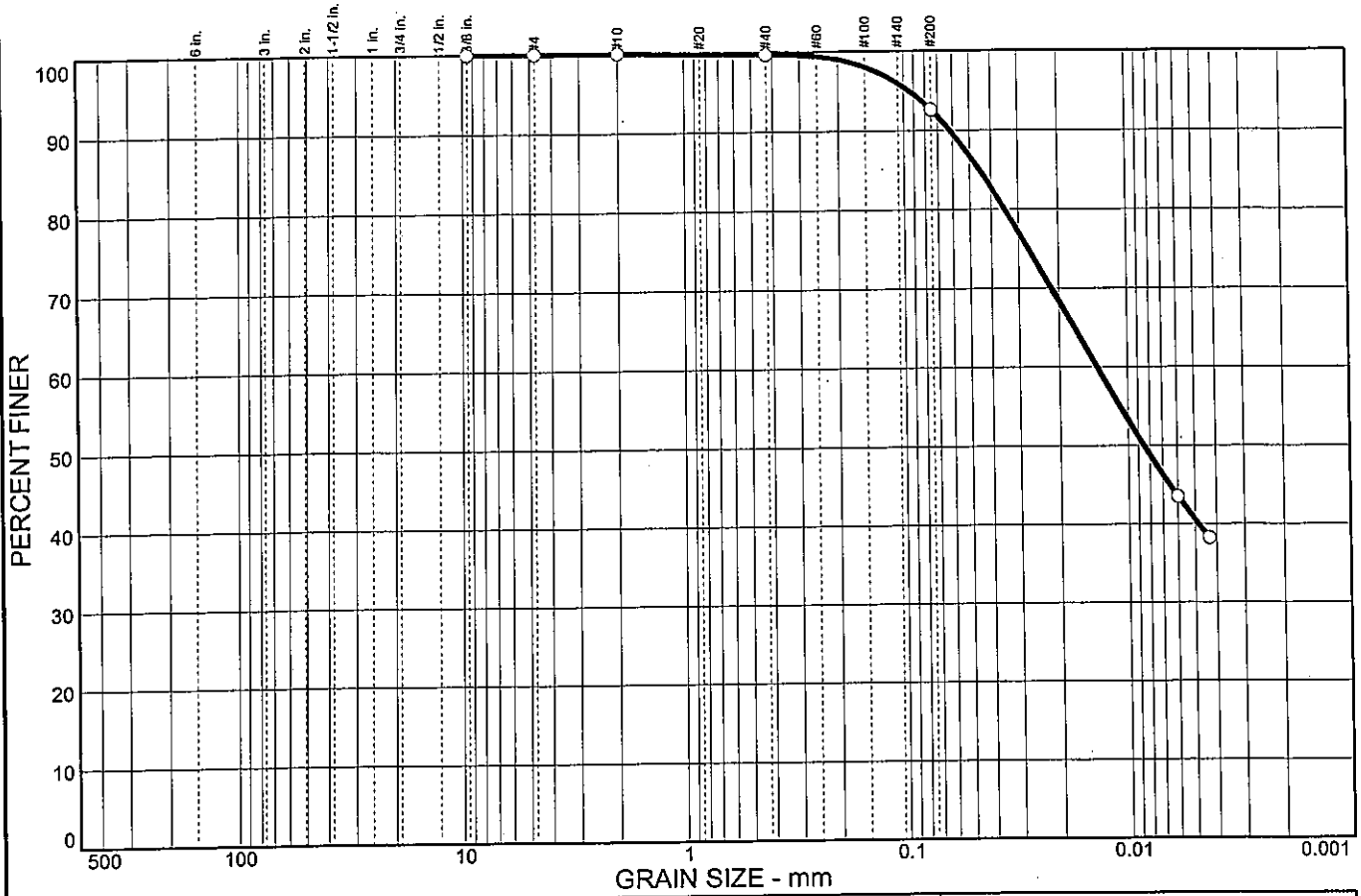


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	7.1	52.0	40.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	100.0		
#40	99.7		
#200	92.6		

**Soil Description**  
Lean clay

**Atterberg Limits**  
 PL= 20      LL= 40      PI= 20

**Coefficients**  
 D<sub>85</sub>= 0.0452      D<sub>60</sub>= 0.0137      D<sub>50</sub>= 0.0085  
 D<sub>30</sub>=                      D<sub>15</sub>=                      D<sub>10</sub>=  
 C<sub>u</sub>=                              C<sub>c</sub>=

**Classification**  
 USCS= CL                      AASHTO= A-6(19)

**Remarks**  
 Moisture Content= 26.0%

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: B-1124

Date: 11/1/05  
Elev./Depth: 6.0

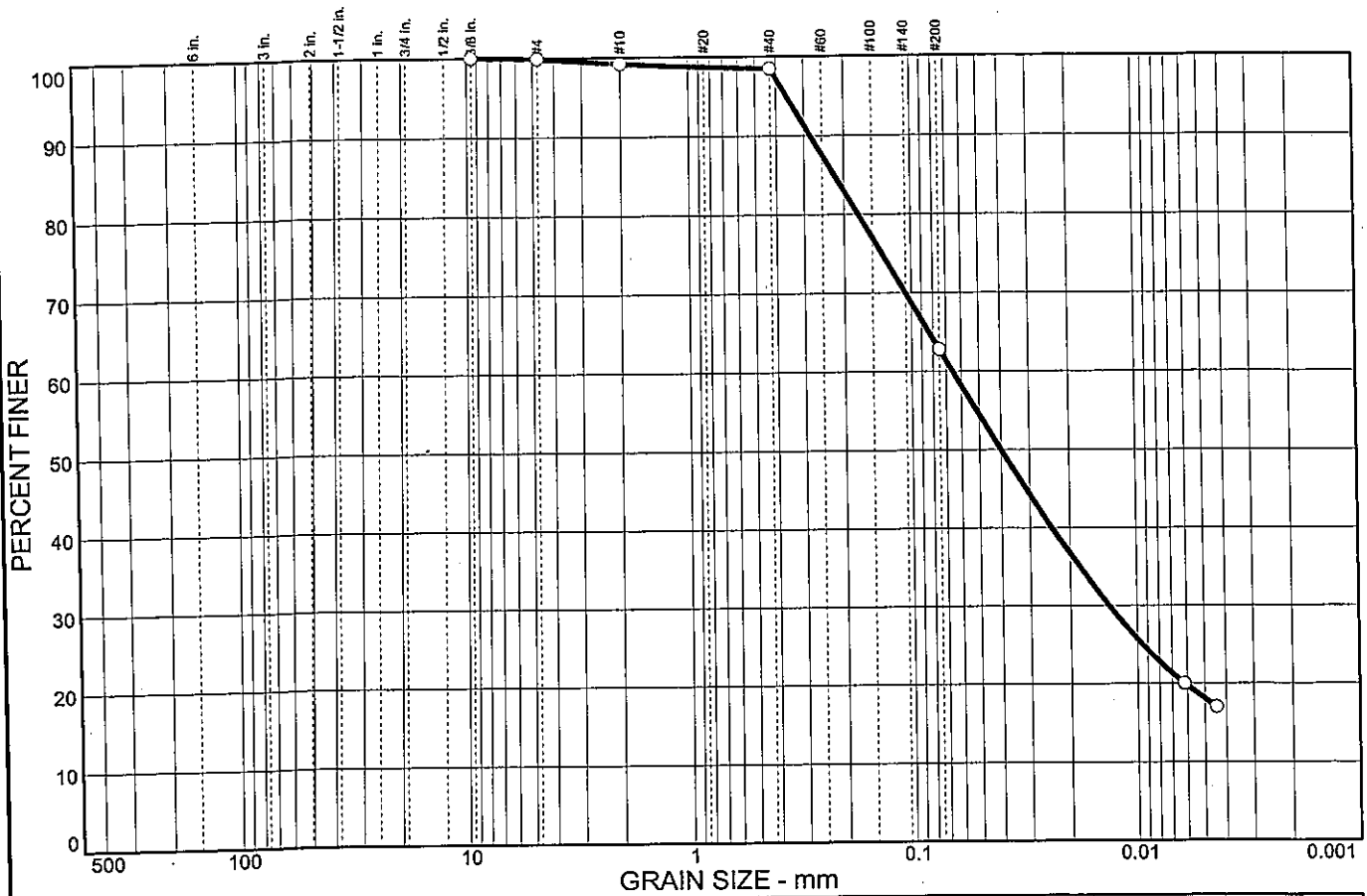


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.1	0.7	0.7	35.7	44.7	18.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.9		
#10	99.2		
#40	98.5		
#200	62.8		

**Soil Description**

Sandy silty clay

**Atterberg Limits**

PL= 16      LL= 20      PI= 4

**Coefficients**

D<sub>85</sub>= 0.221      D<sub>60</sub>= 0.0655      D<sub>50</sub>= 0.0401  
D<sub>30</sub>= 0.0134      D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL-ML      AASHTO= A-4(0)

**Remarks**

Moisture Content= 28.4%  
F.M.=0.00

\* (no specification provided)

Sample No.: 5  
Location:

Source of Sample: B-1124

Date: 9/23/05  
Elev./Depth: 11.0

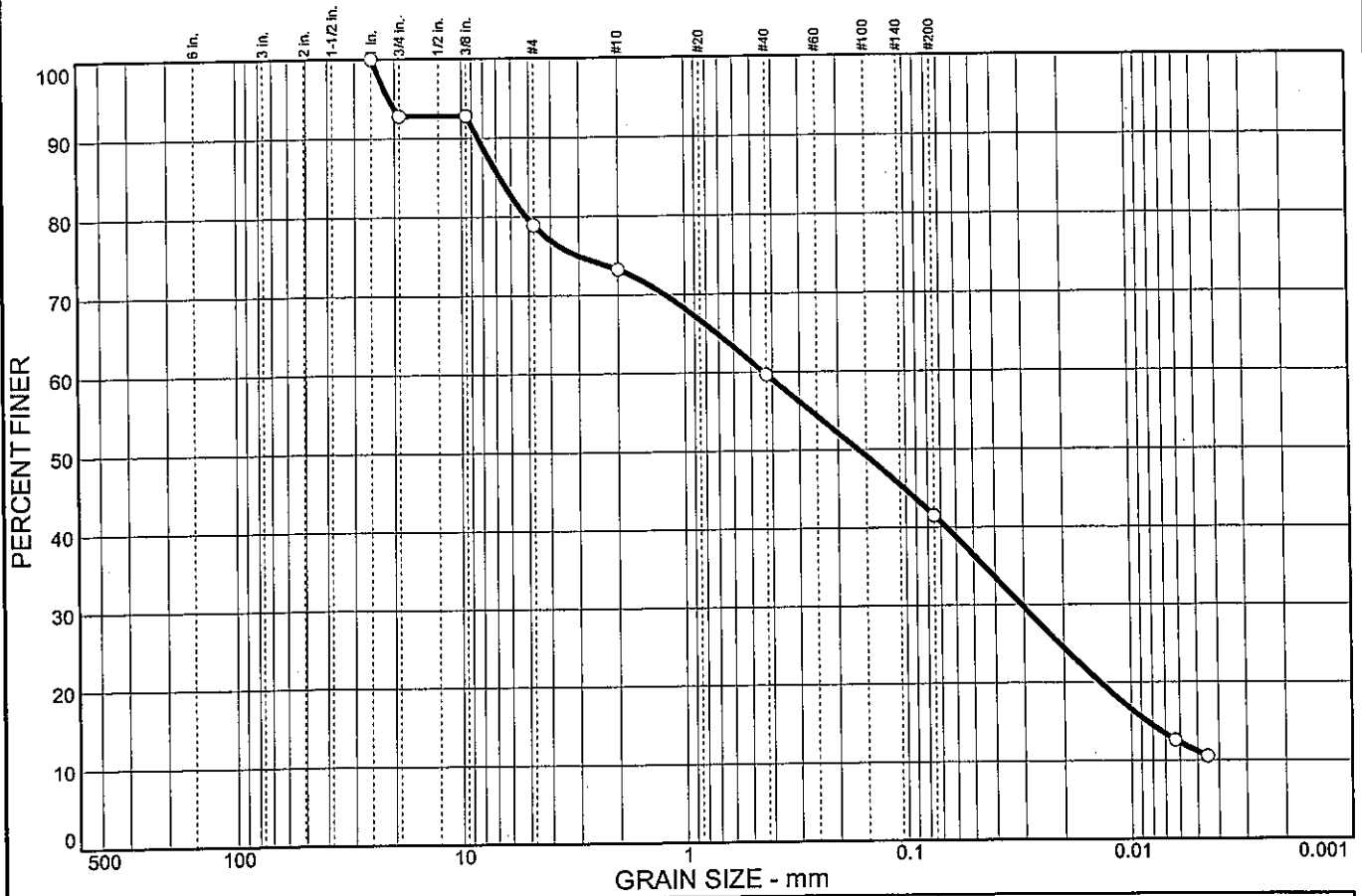


Client: TranSystems, Inc.  
Project: SCI-823-0.00

Project No: 0121-3070.03

Figure

# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	7.2	13.9	5.7	13.5	18.2	30.4	11.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.00 in.	100.0		
0.75 in.	92.8		
0.375 in.	92.8		
#4	78.9		
#10	73.2		
#40	59.7		
#200	41.5		

**Soil Description**

Silty, clayey sand with gravel

**Atterberg Limits**

PL= 19      LL= 24      PI= 5

**Coefficients**

D<sub>85</sub>= 6.72      D<sub>60</sub>= 0.438      D<sub>50</sub>= 0.162  
D<sub>30</sub>= 0.0307      D<sub>15</sub>= 0.0085      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC-SM      AASHTO= A-4(0)

**Remarks**

Moisture Content= 15.3%  
F.M.=0.35

\* (no specification provided)

Sample No.: 6  
Location:

Source of Sample: B-1124

Date: 9/23/05  
Elev./Depth: 13.5

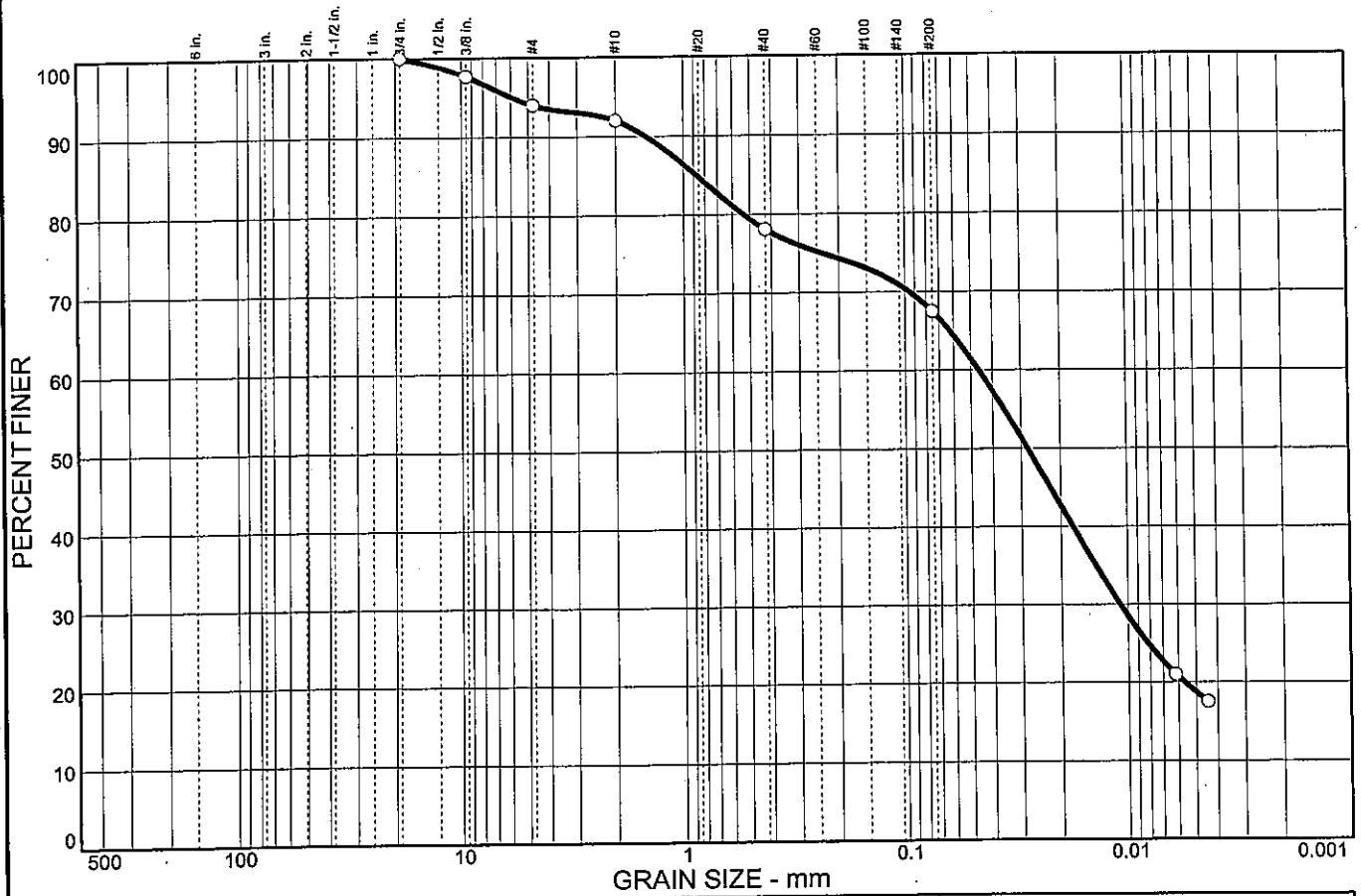


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	6.0	2.0	13.9	10.6	48.8	18.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	97.7		
#4	94.0		
#10	92.0		
#40	78.1		
#200	67.5		

**Soil Description**

Sandy silty clay

**Atterberg Limits**

PL= 20      LL= 27      PI= 7

**Coefficients**

D<sub>85</sub>= 0.872      D<sub>60</sub>= 0.0461      D<sub>50</sub>= 0.0280  
D<sub>30</sub>= 0.0108      D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL-ML      AASHTO= A-4(3)

**Remarks**

Moisture Content= 15.8%  
F.M.=0.08

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1125

Date: 9-2-05  
Elev./Depth: 2.0



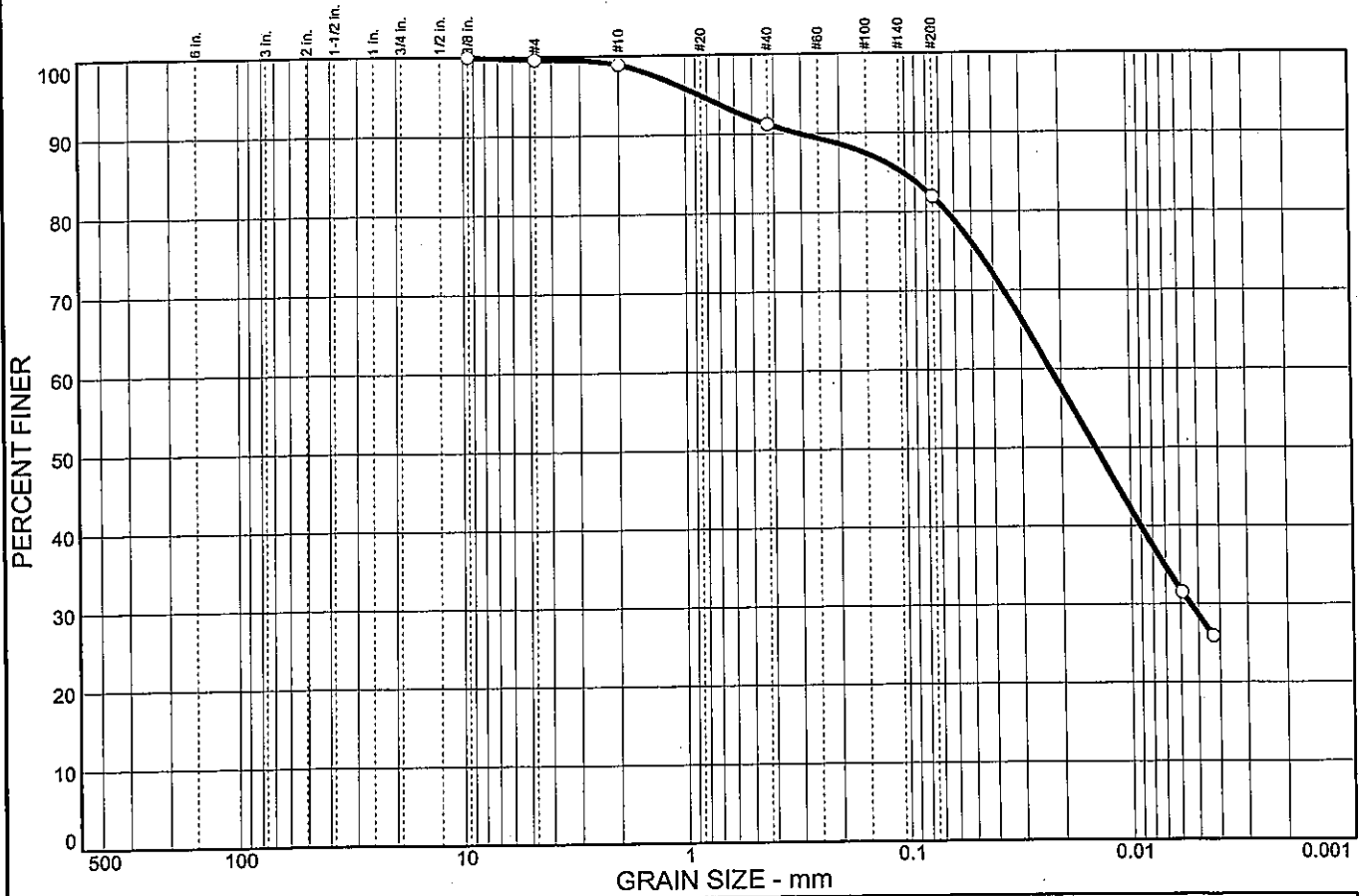
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.7	7.7	9.3	53.3	28.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.6		
#10	98.9		
#40	91.2		
#200	81.9		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 19      LL= 30      PI= 11

**Coefficients**

D<sub>85</sub>= 0.103      D<sub>60</sub>= 0.0223      D<sub>50</sub>= 0.0142  
D<sub>30</sub>= 0.0054      D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL                      AASHTO= A-6(8)

**Remarks**

Moisture Content= 21.4%  
F.M.=0.00

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: B-1125

Date: 9-2-05  
Elev./Depth: 4.0

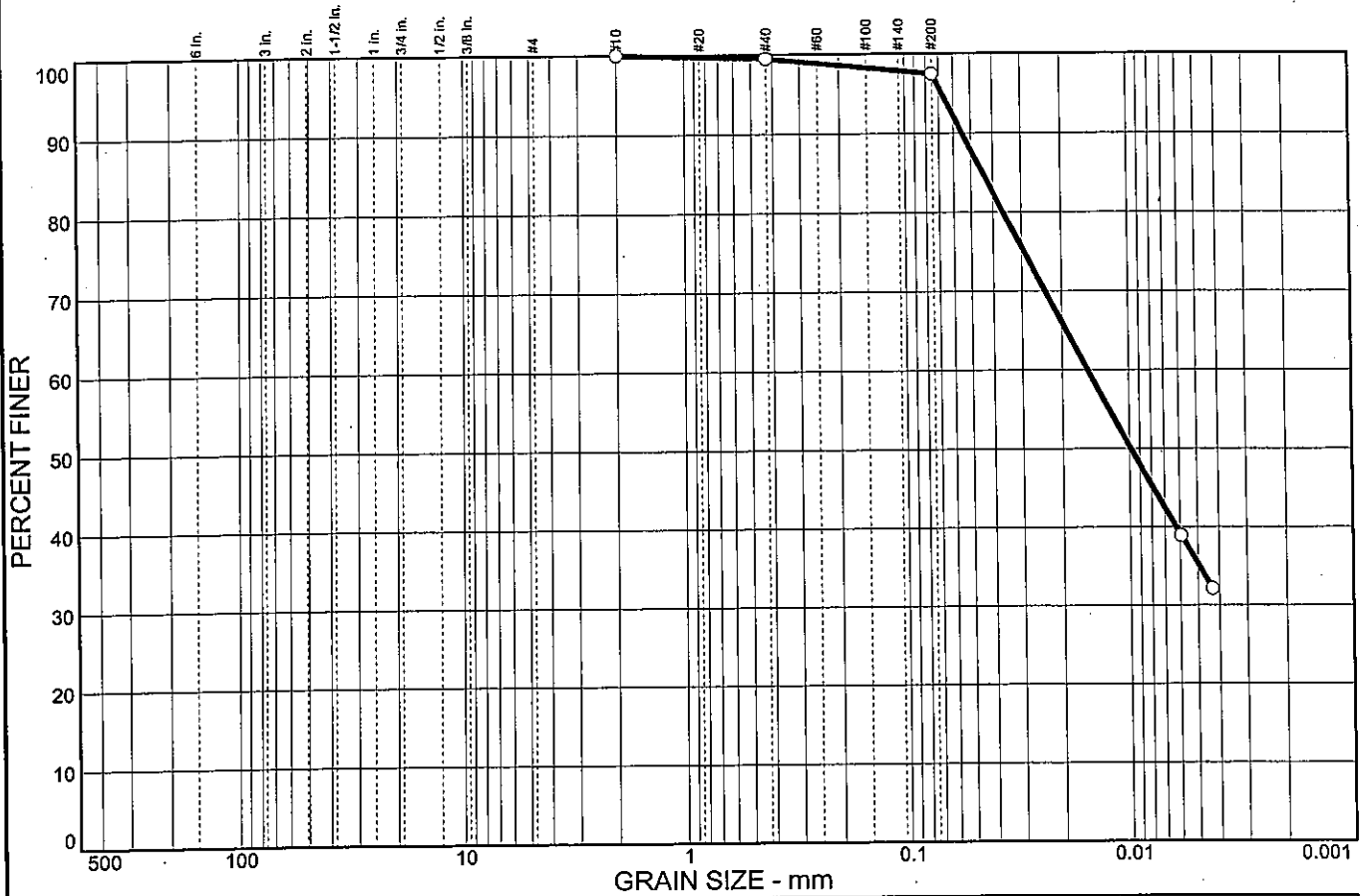


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.5	2.0	62.2	35.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.5		
#200	97.5		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 20      LL= 36      PI= 16

**Coefficients**

D<sub>85</sub>= 0.0445      D<sub>60</sub>= 0.0153      D<sub>50</sub>= 0.0099  
D<sub>30</sub>=                  D<sub>15</sub>=                  D<sub>10</sub>=  
C<sub>u</sub>=                    C<sub>c</sub>=

**Classification**

USCS= CL                  AASHTO= A-6(16)

**Remarks**

Moisture Content= 17.2%

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1126

Date: 9-2-05  
Elev./Depth: 1.0



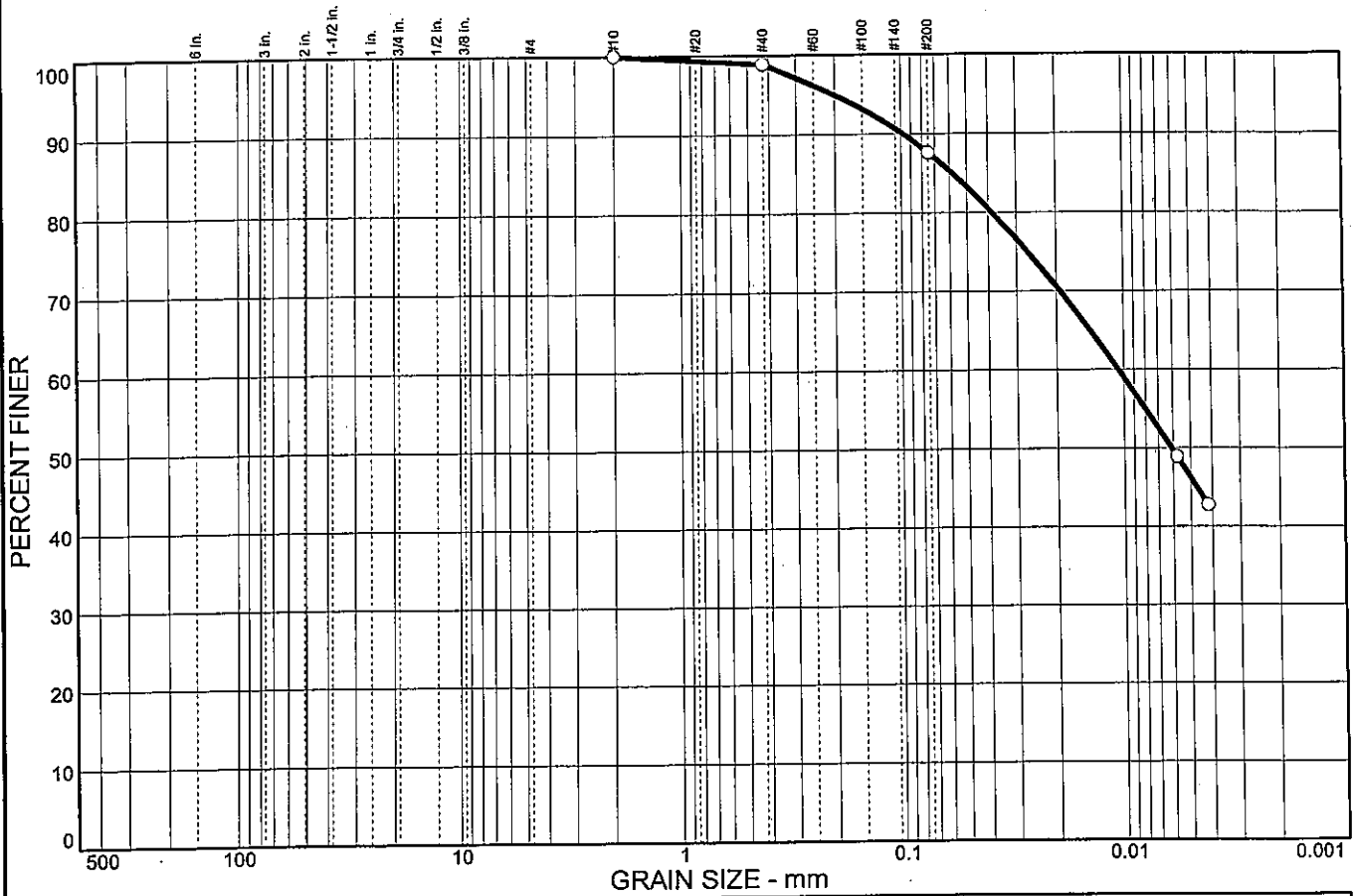
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	1.1	11.3	41.4	46.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	98.9		
#200	87.6		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 19      LL= 34      PI= 15

**Coefficients**

D<sub>85</sub>= 0.0583      D<sub>60</sub>= 0.0106      D<sub>50</sub>= 0.0061  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                C<sub>c</sub>=

**Classification**

USCS= CL                      AASHTO= A-6(13)

**Remarks**

Moisture Content= 21.5%

\* (no specification provided)

Sample No.: 5  
Location:

Source of Sample: B-1126

Date: 9/29/05  
Elev./Depth: 8.5

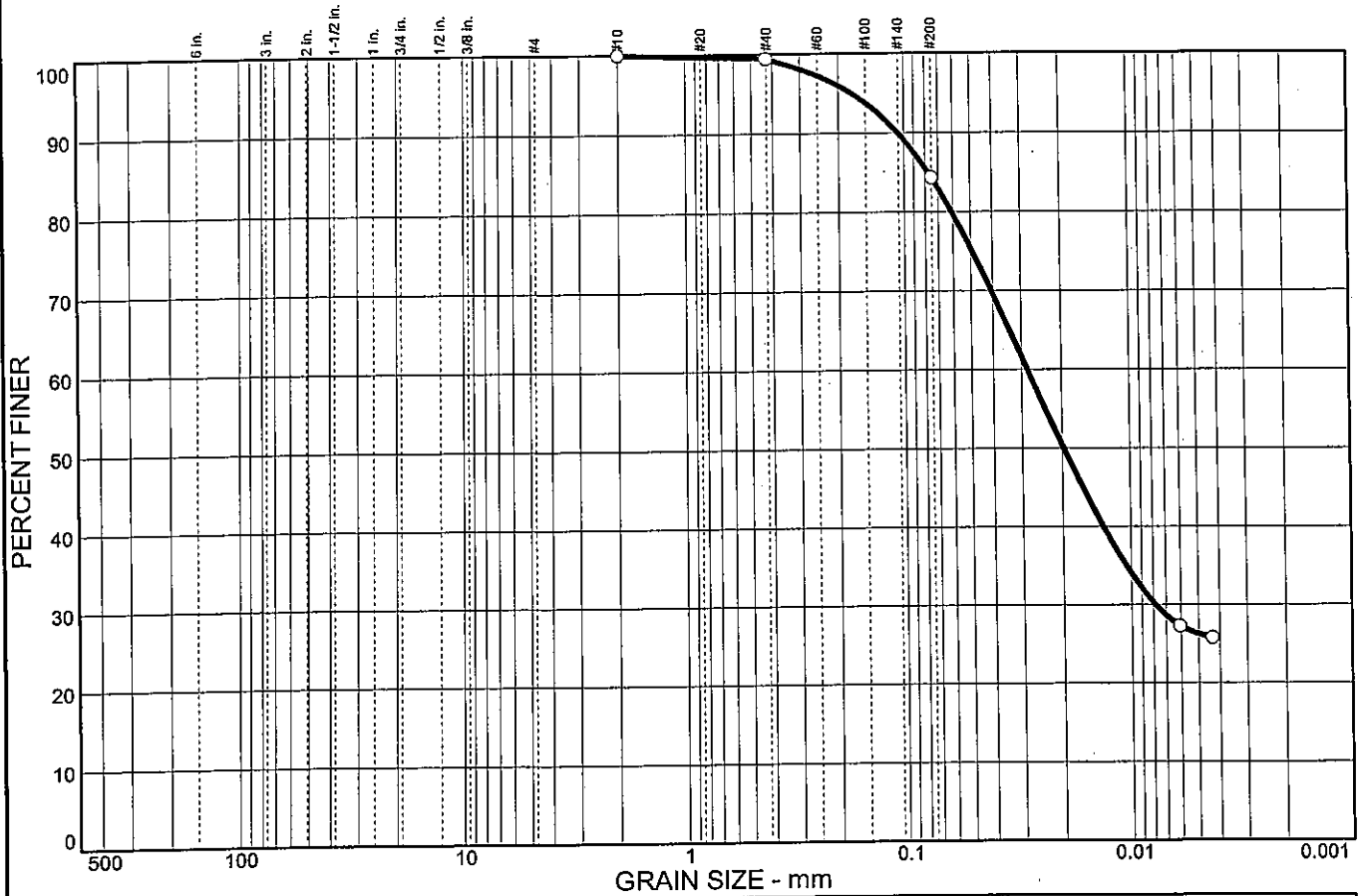


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.6	15.1	58.0	26.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.4		
#200	84.3		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 18      LL= 26      PI= 8

**Coefficients**

D<sub>85</sub>= 0.0779      D<sub>60</sub>= 0.0283      D<sub>50</sub>= 0.0197  
 D<sub>30</sub>= 0.0078      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= CL              AASHTO= A-4(5)

**Remarks**

Moisture Content= 29.0%

\* (no specification provided)

Sample No.: 6  
Location:

Source of Sample: B-1126

Date: 9/29/05  
Elev./Depth: 11.0

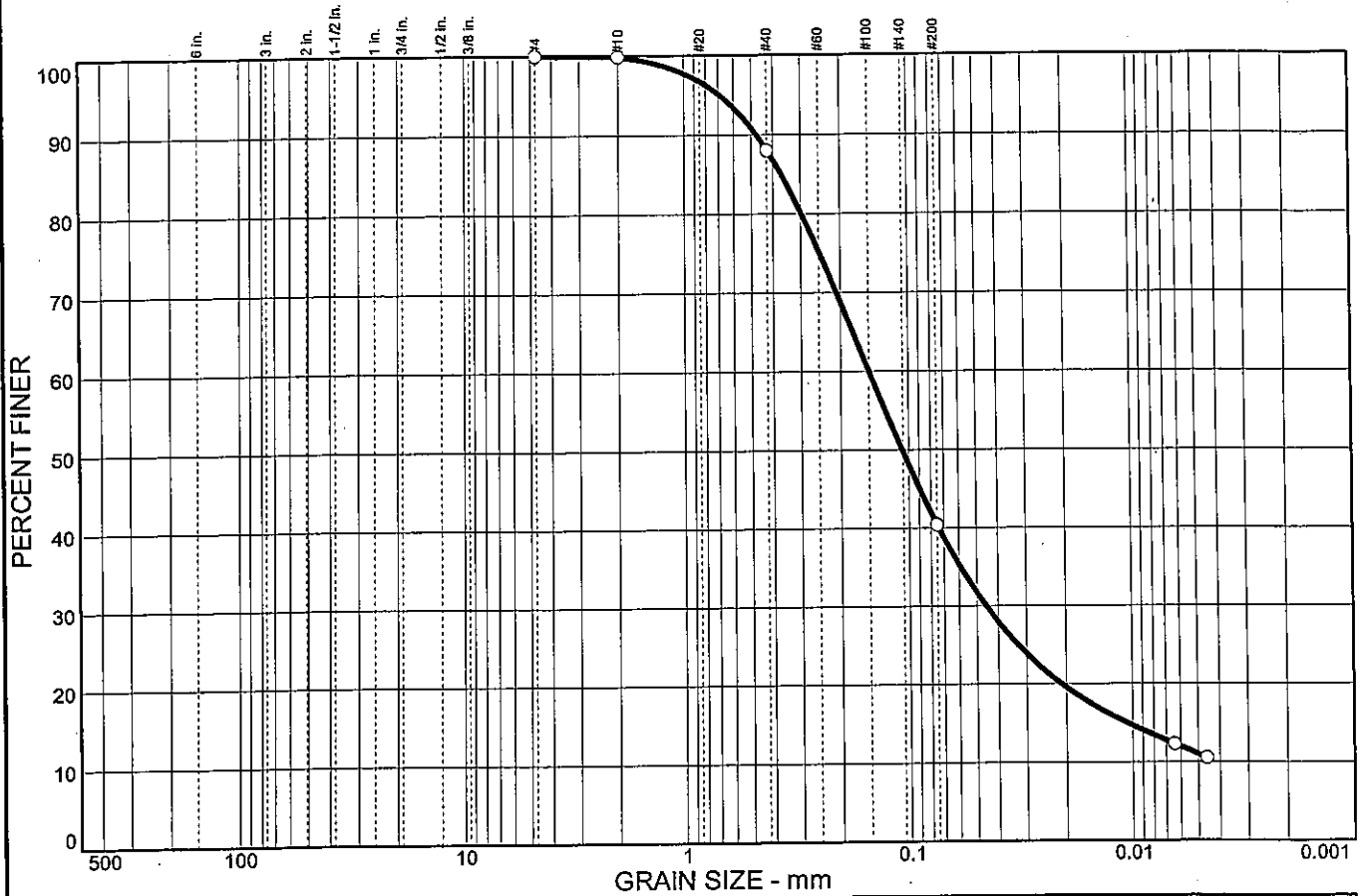


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	11.9	47.6	29.4	11.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#40	88.0		
#200	40.4		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 0.368      D<sub>60</sub>= 0.150      D<sub>50</sub>= 0.107  
 D<sub>30</sub>= 0.0454      D<sub>15</sub>= 0.0106      D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**  
 USCS= SM                      AASHTO= A-4(0)

**Remarks**  
 Moisture Content= 28.8%

\* (no specification provided)

Sample No.: 10  
Location:

Source of Sample: B-1126

Date: 9/29/05  
Elev./Depth: 21.0

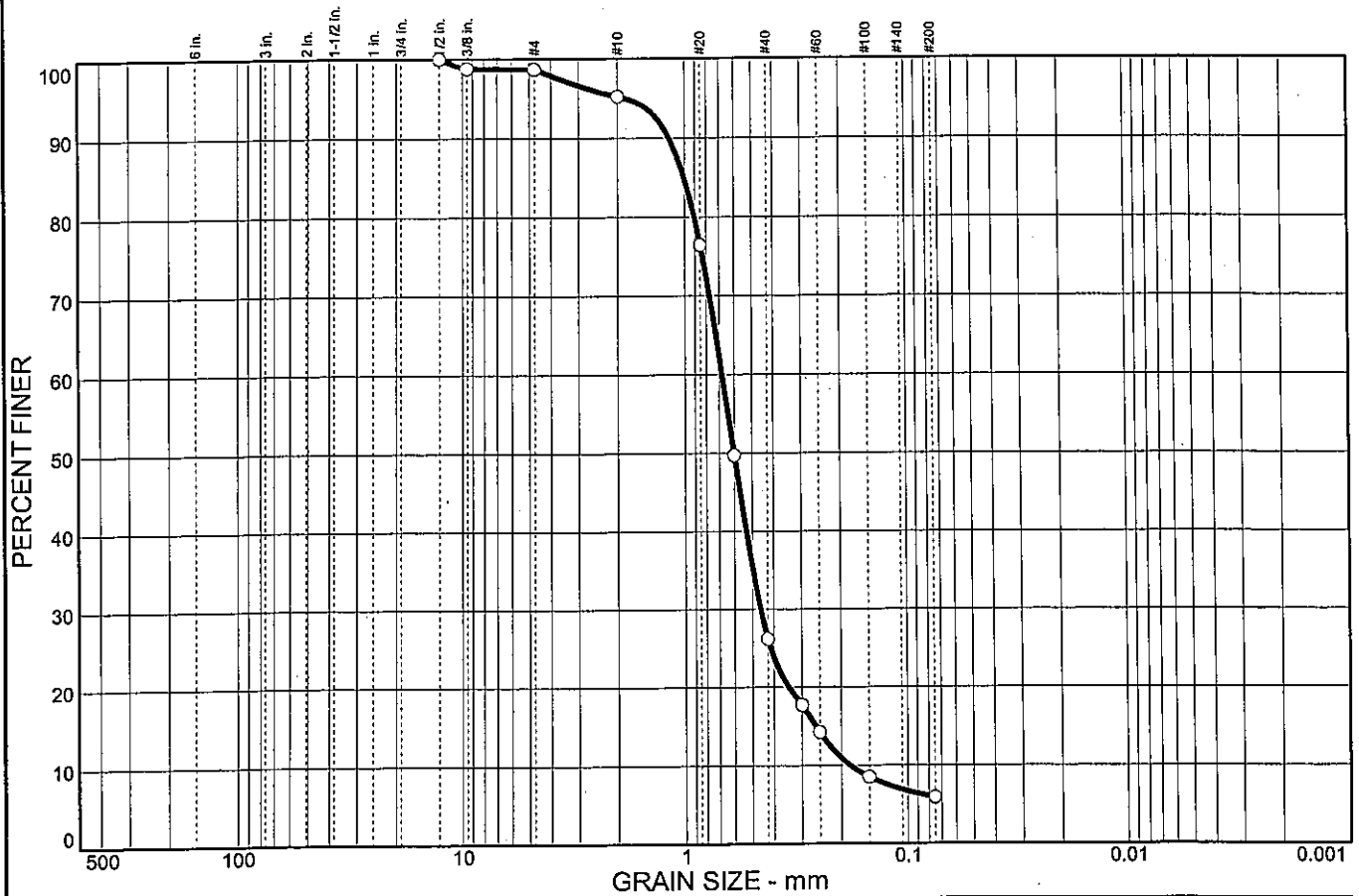


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	1.3	3.5	69.0	20.3	5.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.50 in.	100.0		
0.375 in.	98.8		
#4	98.7		
#10	95.2		
#20	76.4		
#30	49.7		
#40	26.2		
#50	17.7		
#60	14.2		
#100	8.5		
#200	5.9		

**Soil Description**

Poorly graded sand with silt

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 1.01      D<sub>60</sub>= 0.680      D<sub>50</sub>= 0.602  
D<sub>30</sub>= 0.458      D<sub>15</sub>= 0.261      D<sub>10</sub>= 0.183  
C<sub>u</sub>= 3.72      C<sub>c</sub>= 1.69

**Classification**

USCS= SP-SM      AASHTO= A-1-b

**Remarks**

Moisture Content= 18.9%  
F.M.=2.27

\* (no specification provided)

Sample No.: 11  
Location:

Source of Sample: B-1126

Date: 9/29/05  
Elev./Depth: 23.5



Client: TranSystems, Inc.  
Project: SCI-823-0.00

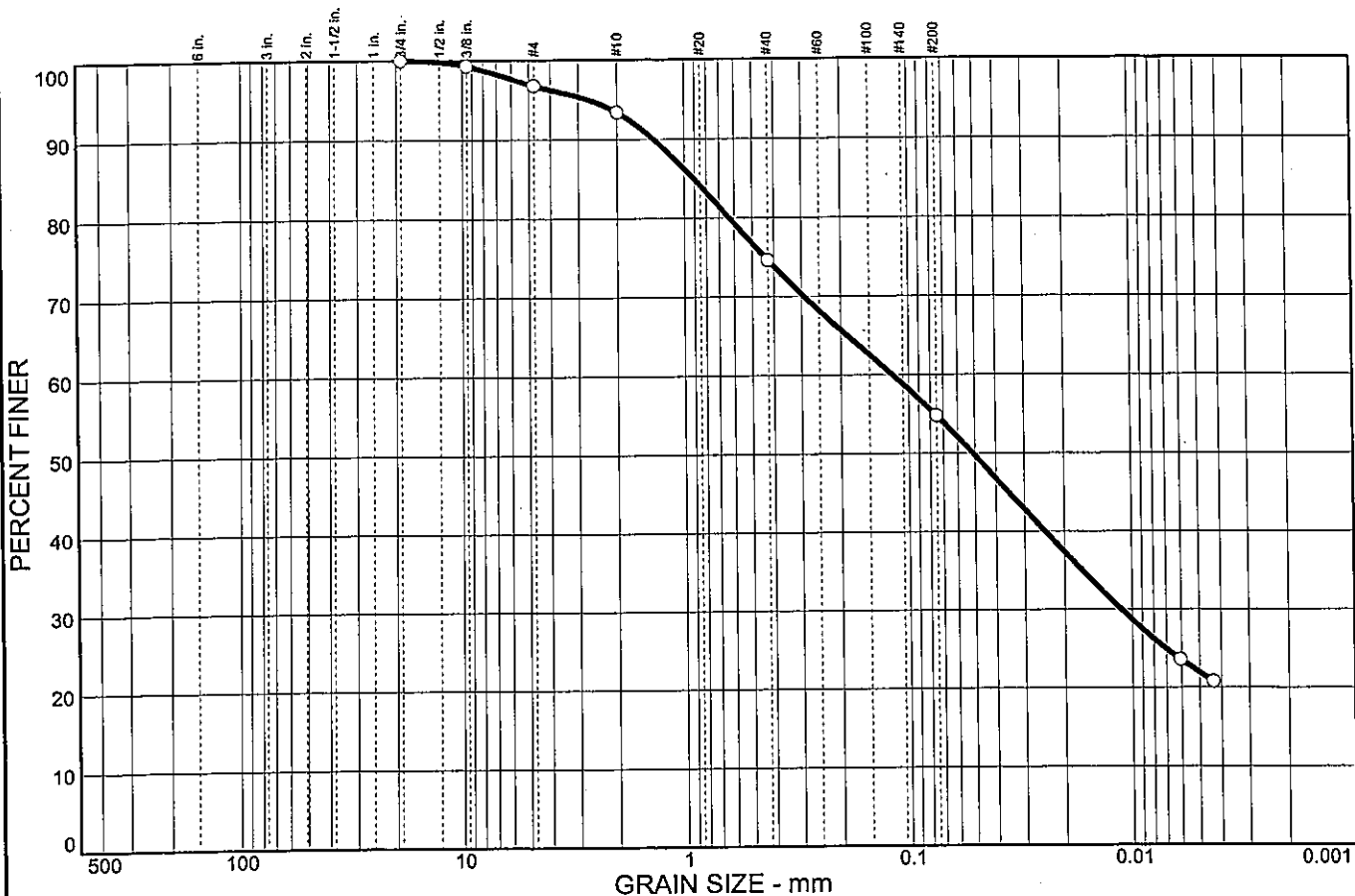
Project No: 0121-3070.03

Figure





# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	3.2	3.4	18.8	19.8	32.9	21.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	99.3		
#4	96.8		
#10	93.4		
#40	74.6		
#200	54.8		

**Soil Description**

Sandy lean clay

**Atterberg Limits**

PL= 16      LL= 24      PI= 8

**Coefficients**

D<sub>85</sub>= 0.909      D<sub>60</sub>= 0.118      D<sub>50</sub>= 0.0512  
D<sub>30</sub>= 0.0112      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-4(2)

**Remarks**

Moisture Content= 11.3%  
F.M.=0.04

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1127

Date: 8/15/05  
Elev./Depth: 2.0

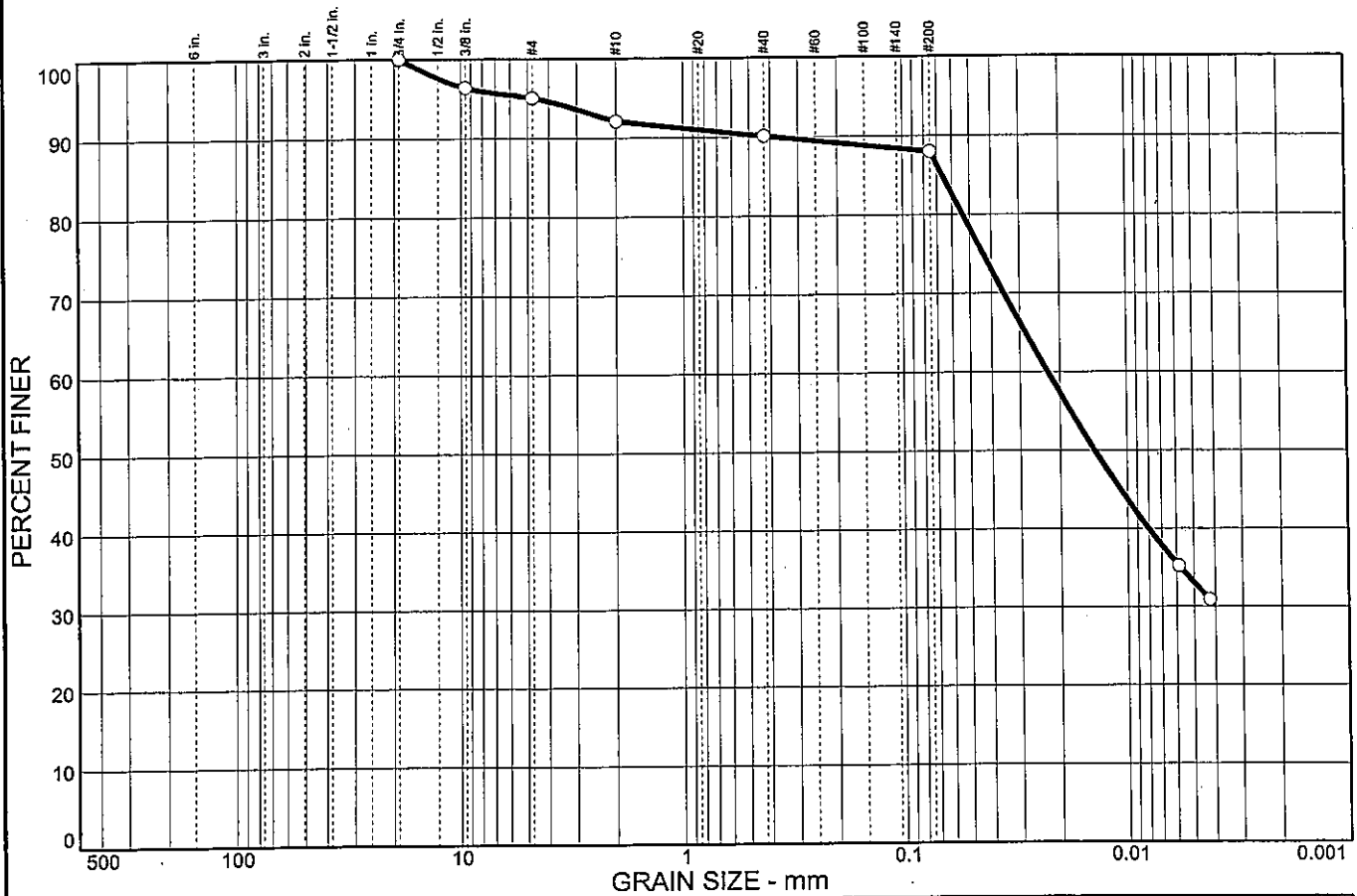


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	4.9	3.0	2.0	2.1	54.9	33.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	96.4		
#4	95.1		
#10	92.1		
#40	90.1		
#200	88.0		

**Soil Description**  
Lean clay

**Atterberg Limits**  
PL= 21      LL= 32      PI= 11

**Coefficients**  
D<sub>85</sub>= 0.0662      D<sub>60</sub>= 0.0226      D<sub>50</sub>= 0.0140  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
USCS= CL              AASHTO= A-6(9)

**Remarks**  
Moisture Content= 15.9%  
F.M.=0.09

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1128

Date: 8/15/05  
Elev./Depth: 1.0

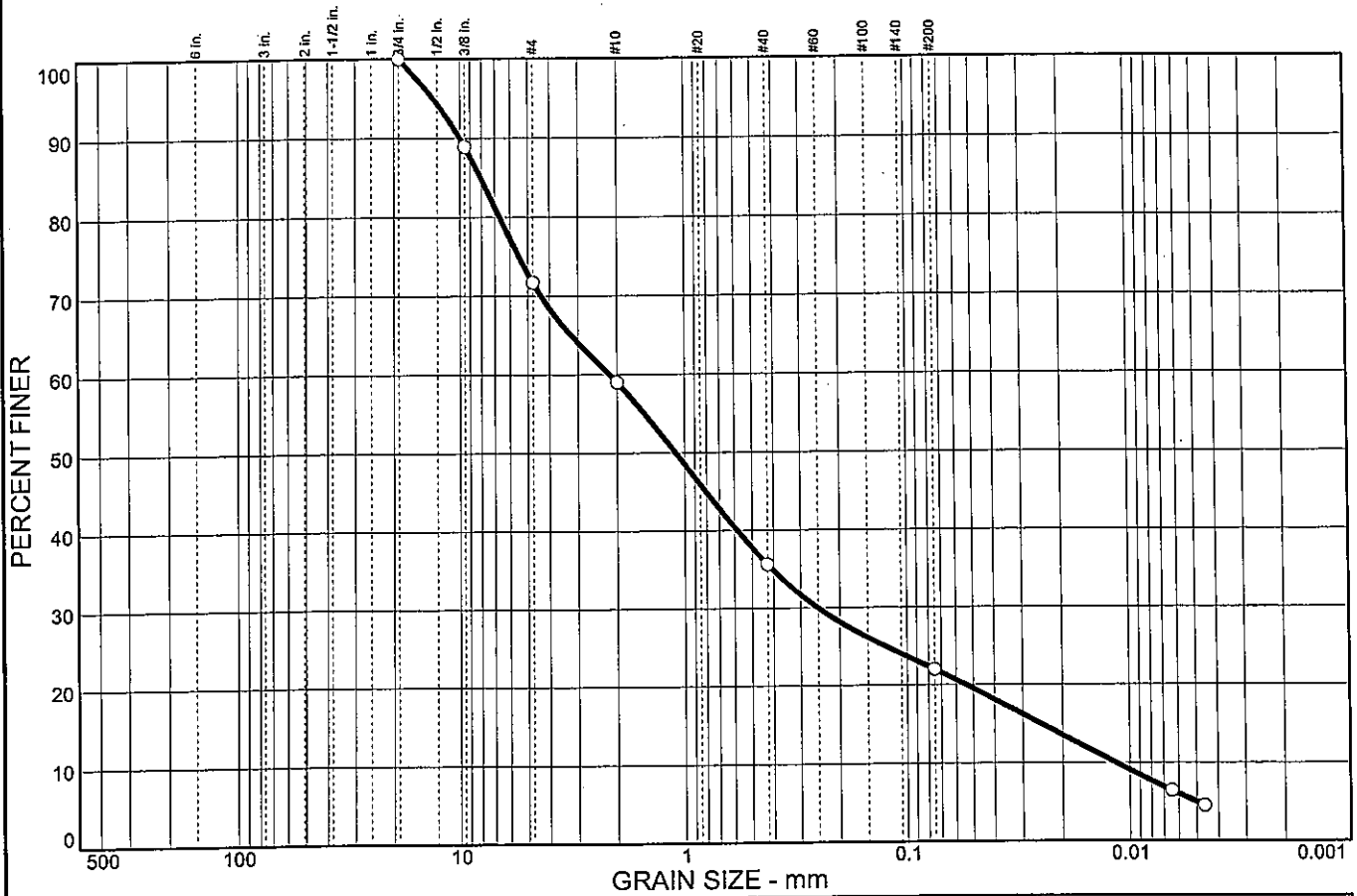


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	28.3	12.7	23.4	13.6	17.0	5.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	88.9		
#4	71.7		
#10	59.0		
#40	35.6		
#200	22.0		

**Soil Description**

Silty sand with gravel

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 8.08      D<sub>60</sub>= 2.16      D<sub>50</sub>= 1.10  
 D<sub>30</sub>= 0.250      D<sub>15</sub>= 0.0250      D<sub>10</sub>= 0.0116  
 C<sub>u</sub>= 186.40      C<sub>c</sub>= 2.50

**Classification**

USCS= SM      AASHTO= A-1-b

**Remarks**

Moisture Content= 7.1%  
 F.M.=0.39

\* (no specification provided)

Sample No.: 2  
 Location:

Source of Sample: B-1128

Date: 8/15/05  
 Elev./Depth: 3.0

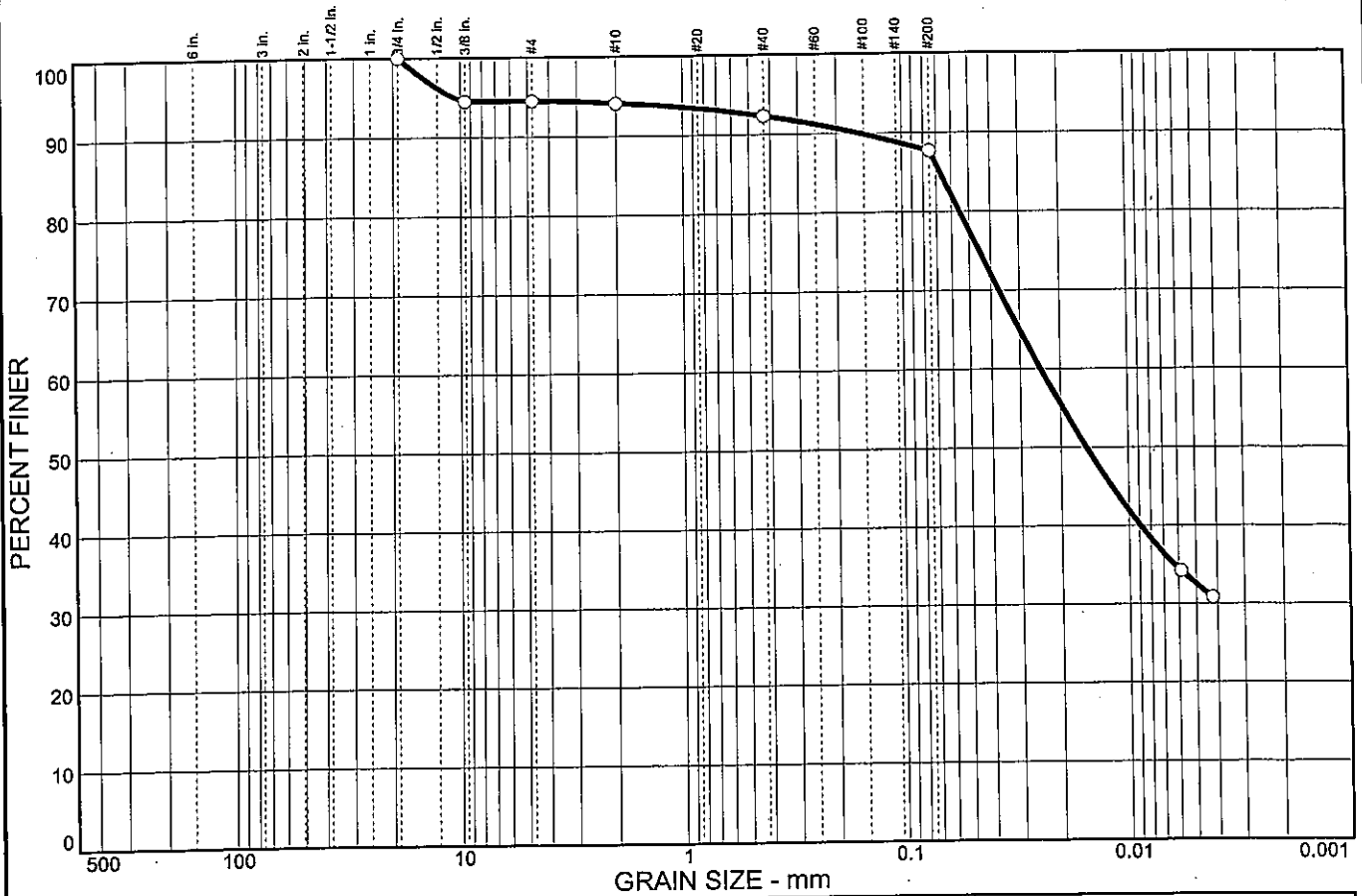


Client: TranSystems, Inc.  
 Project: SCI-823-0.00

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	5.5	0.4	1.8	4.6	55.2	32.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	94.5		
#4	94.5		
#10	94.1		
#40	92.3		
#200	87.7		

**Soil Description**

Silt

**Atterberg Limits**

PL= 25      LL= 31      PI= 6

**Coefficients**

D<sub>85</sub>= 0.0674      D<sub>60</sub>= 0.0243      D<sub>50</sub>= 0.0154  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= ML      AASHTO= A-4(5)

**Remarks**

Moisture Content= 18.7%  
 LOI (Organic Content)= 6.12%  
 F.M.=0.11

\* (no specification provided)

Sample No.: 1  
 Location:

Source of Sample: B-1129

Date: 8/15/05  
 Elev./Depth: 1.0



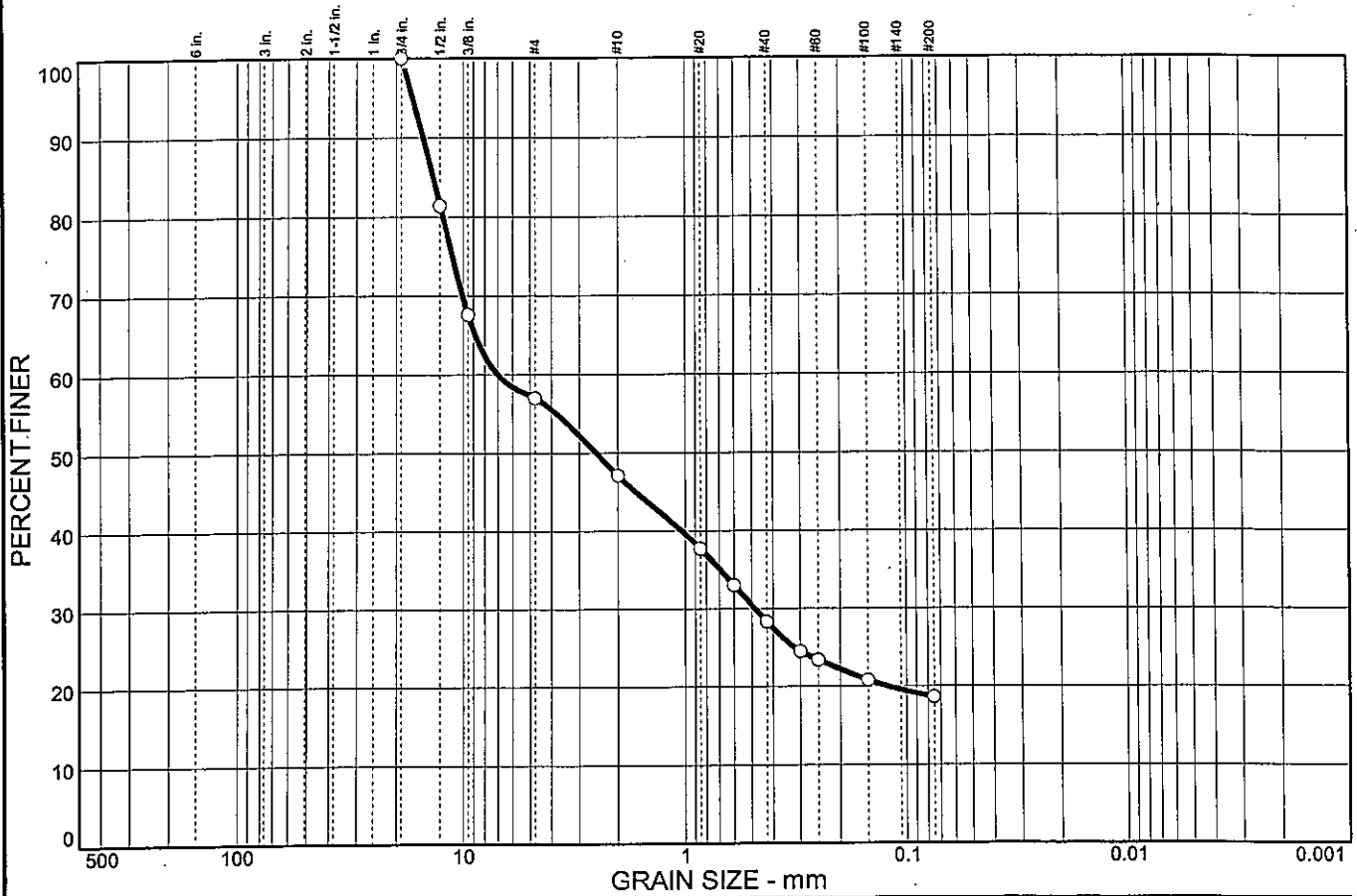
Client: TranSystems, Inc.  
 Project: SCI-823-0.00

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	43.0	9.9	18.8	9.7	18.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.50 in.	81.4		
0.375 in.	67.6		
#4	57.0		
#10	47.1		
#20	37.7		
#30	33.0		
#40	28.3		
#50	24.5		
#60	23.4		
#100	20.8		
#200	18.6		

**Soil Description**

Silty gravel with sand

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 13.7      D<sub>60</sub>= 6.99      D<sub>50</sub>= 2.52  
D<sub>30</sub>= 0.483      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= GM      AASHTO= A-1-b

**Remarks**

Moisture Content= 4.9%  
F.M.=2.97

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1130

Date: 8/20/05  
Elev./Depth: 1.0

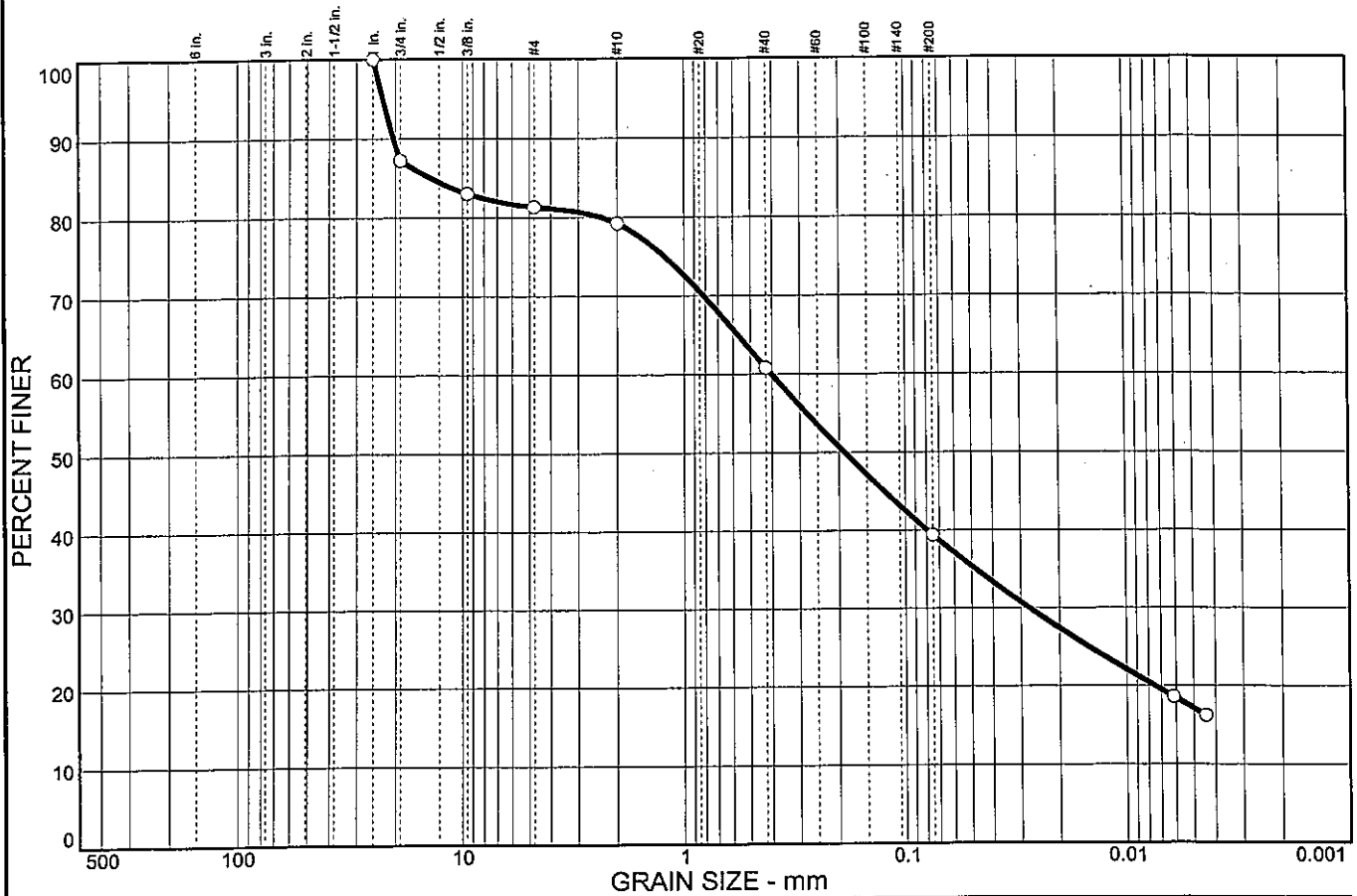


Client: TranSystems, Inc.  
Project: SCI-823-0.00

Project No: 0121-3070.03

Figure

# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	12.8	5.9	2.1	18.4	21.4	22.3	17.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0 in.	100.0		
0.75 in.	87.2		
0.375 in.	83.0		
#4	81.3		
#10	79.2		
#40	60.8		
#200	39.4		

**Soil Description**

Clayey sand with gravel

**Atterberg Limits**

PL= 15      LL= 24      PI= 9

**Coefficients**

D<sub>85</sub>= 13.9      D<sub>60</sub>= 0.402      D<sub>50</sub>= 0.189  
 D<sub>30</sub>= 0.0274      D<sub>15</sub>=      D<sub>10</sub>=  
 C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC      AASHTO= A-4(0)

**Remarks**

Moisture Content= 14.0%  
 F.M.=0.49

\* (no specification provided)

Sample No.: 2  
 Location:

Source of Sample: B-1130

Date: 8/20/05  
 Elev./Depth: 3.0

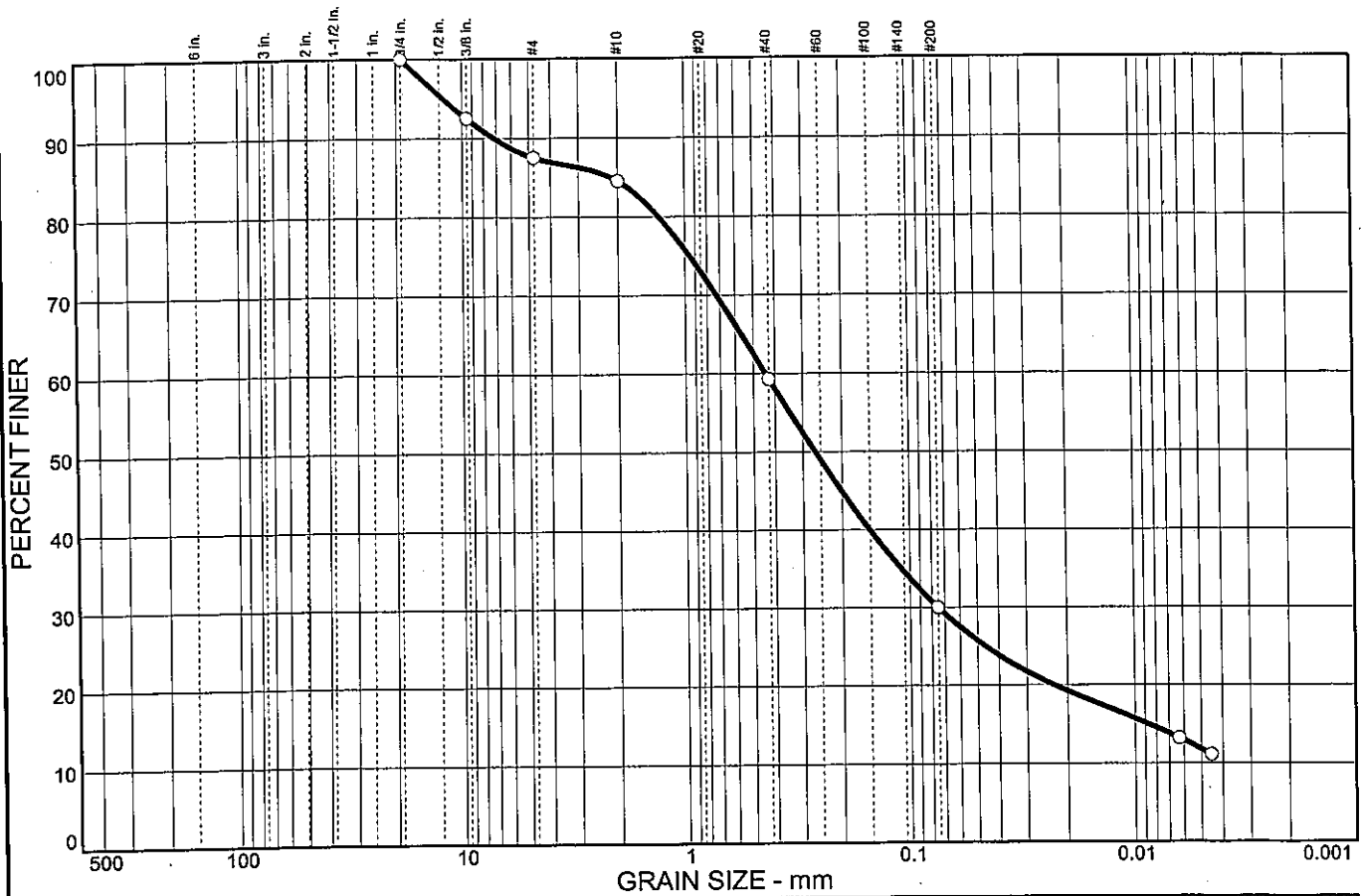


Client: TranSystems, Inc.  
 Project: SCI-823-0.00

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	12.5	3.0	25.2	29.3	18.2	11.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	92.5		
#4	87.5		
#10	84.5		
#40	59.3		
#200	30.0		

**Soil Description**

Silty, clayey sand

**Atterberg Limits**

PL= 14      LL= 18      PI= 4

**Coefficients**

D<sub>85</sub>= 2.16      D<sub>60</sub>= 0.440      D<sub>50</sub>= 0.264  
D<sub>30</sub>= 0.0750      D<sub>15</sub>= 0.0087      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC-SM      AASHTO= A-2-4(0)

**Remarks**

Moisture Content= 7.7%  
F.M.=0.20

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1131

Date: 8/20/05  
Elev./Depth: 1.0



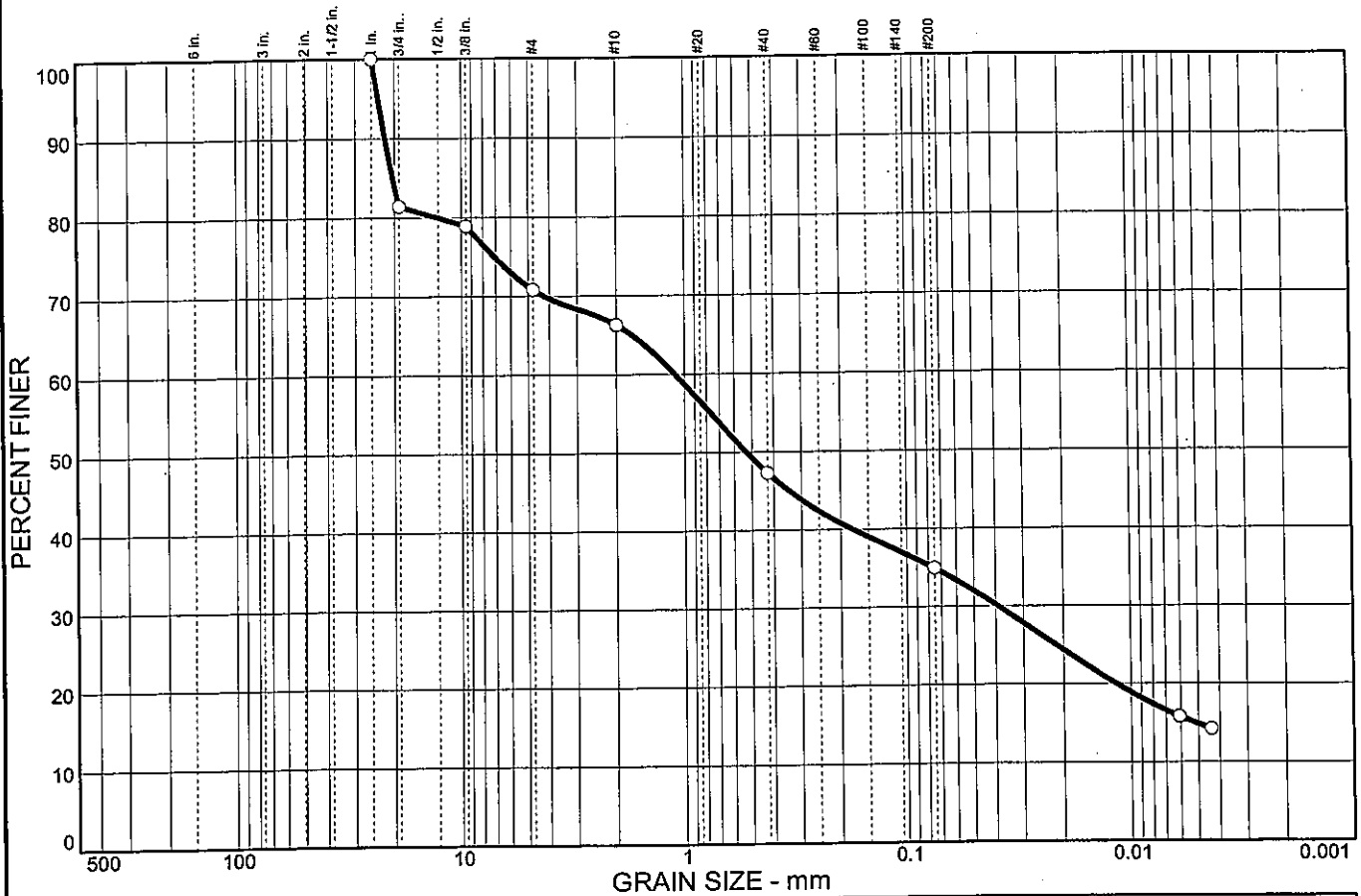
Client: TranSystems, Inc.  
Project: SCI-823-0.00

Project No: 0121-3070.03

Figure



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	18.6	10.6	4.5	19.0	12.4	20.1	14.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0 in.	100.0		
0.75 in.	81.4		
0.375 in.	78.9		
#4	70.8		
#10	66.3		
#40	47.3		
#200	34.9		

**Soil Description**

Clayey sand with gravel

**Atterberg Limits**

PL= 15      LL= 24      PI= 9

**Coefficients**

D<sub>85</sub>= 20.4      D<sub>60</sub>= 1.10      D<sub>50</sub>= 0.530  
D<sub>30</sub>= 0.0390      D<sub>15</sub>= 0.0052      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC      AASHTO= A-2-4(0)

**Remarks**

Moisture Content= 8.4%  
F.M.=0.69

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1131

Date: 8/20/05  
Elev./Depth: 3.0

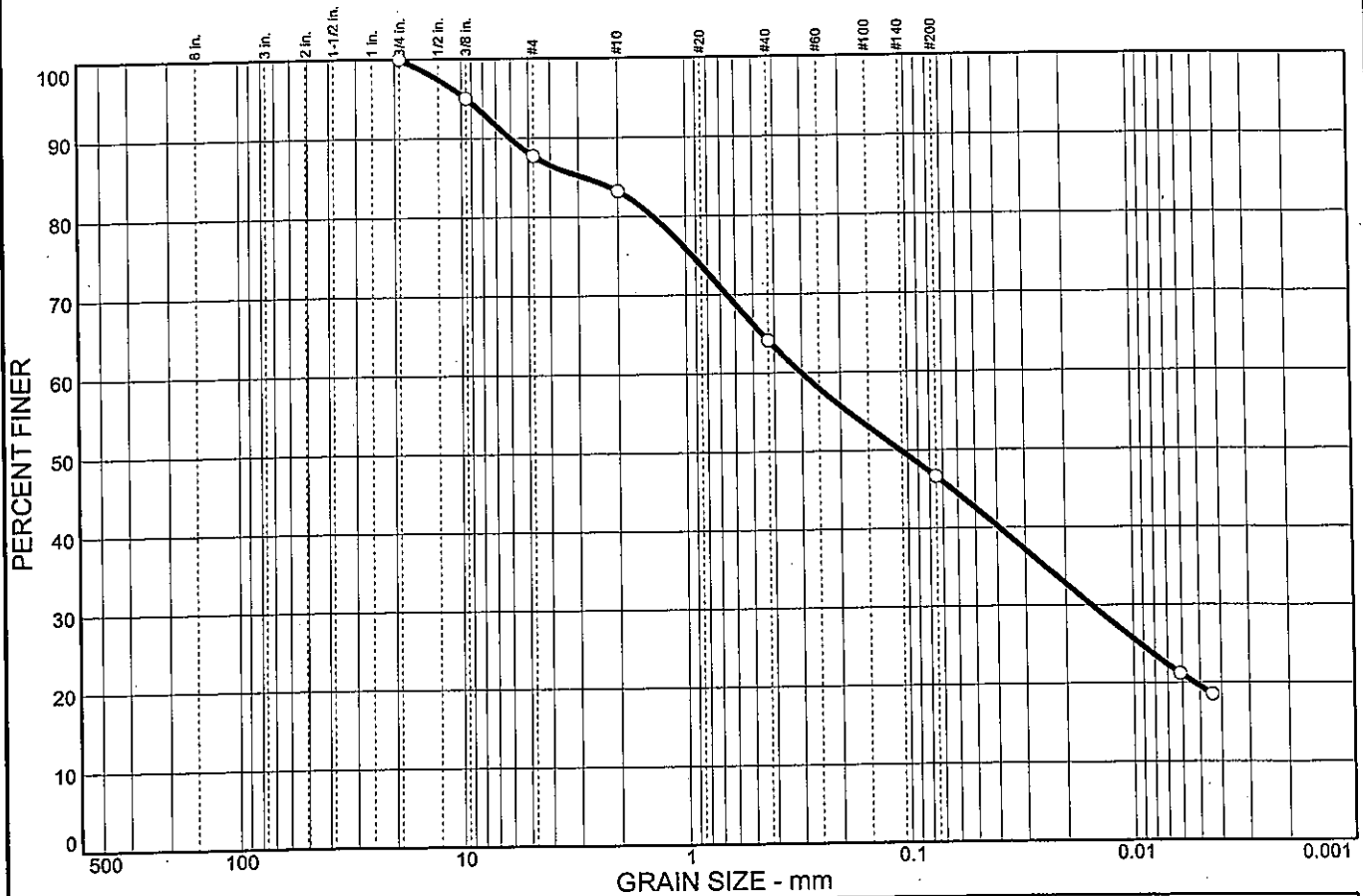


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	12.3	4.5	19.1	17.5	27.0	19.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	95.0		
#4	87.7		
#10	83.2		
#40	64.1		
#200	46.6		

**Soil Description**  
Clayey sand

**Atterberg Limits**  
 PL= 15      LL= 24      PI= 9

**Coefficients**  
 D<sub>85</sub>= 2.85      D<sub>60</sub>= 0.301      D<sub>50</sub>= 0.108  
 D<sub>30</sub>= 0.0154      D<sub>15</sub>=      D<sub>10</sub>=  
 C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
 USCS= SC      AASHTO= A-4(1)

**Remarks**  
 Moisture Content= 11.2%  
 F.M.=0.17

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1132

Date: 8/15/05  
Elev./Depth: 1.0

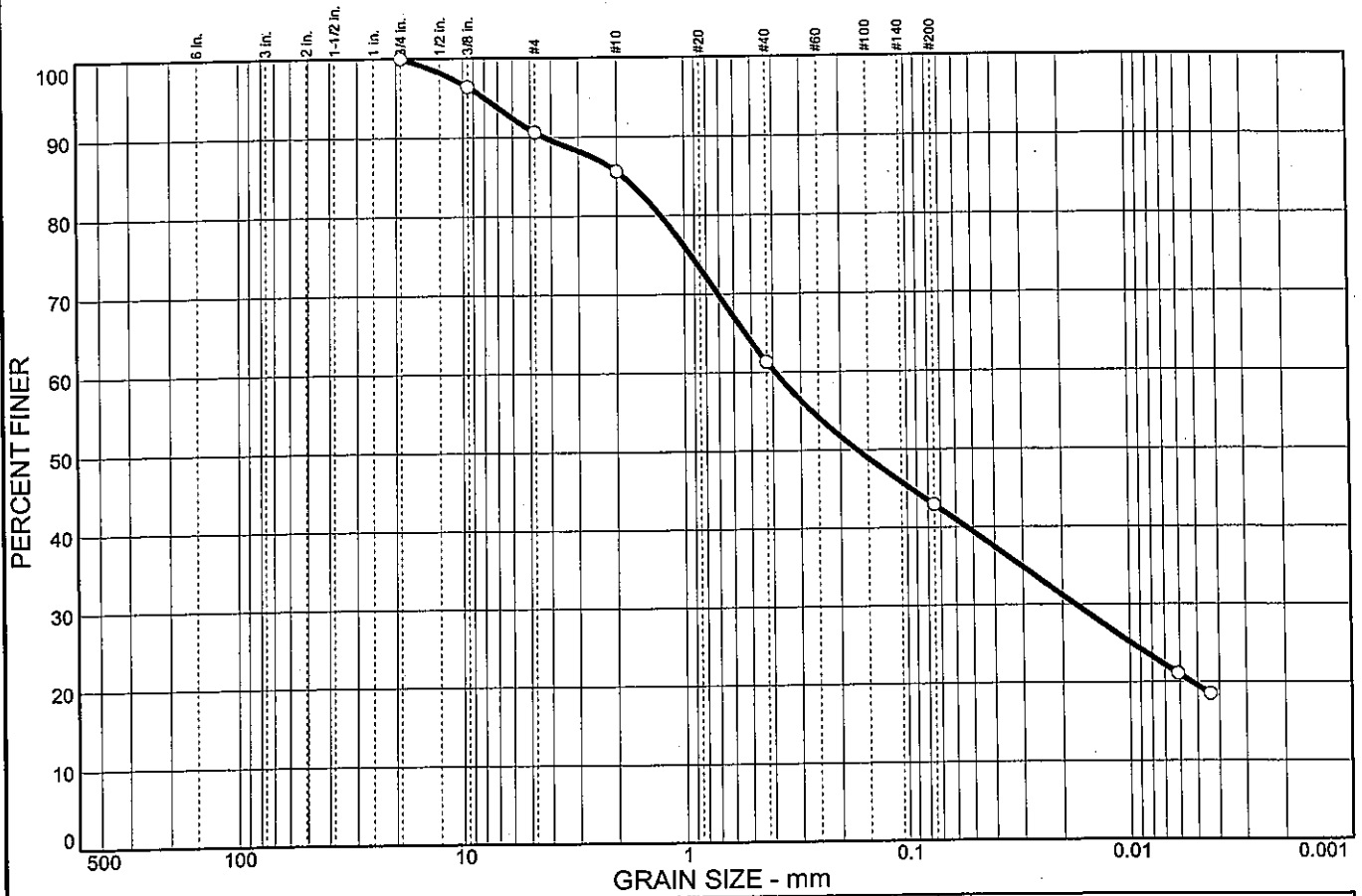


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	9.4	5.0	24.3	18.4	23.4	19.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	96.4		
#4	90.6		
#10	85.6		
#40	61.3		
#200	42.9		

**Soil Description**

Clayey sand

**Atterberg Limits**

PL= 15      LL= 26      PI= 11

**Coefficients**

D<sub>85</sub>= 1.88      D<sub>60</sub>= 0.390      D<sub>50</sub>= 0.168  
 D<sub>30</sub>= 0.0175      D<sub>15</sub>=      D<sub>10</sub>=  
 C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC      AASHTO= A-6(1)

**Remarks**

Moisture Content= 12.8%  
 F.M.=0.13

\* (no specification provided)

Sample No.: 2  
 Location:

Source of Sample: B-1132

Date: 8/15/05  
 Elev./Depth: 3.0

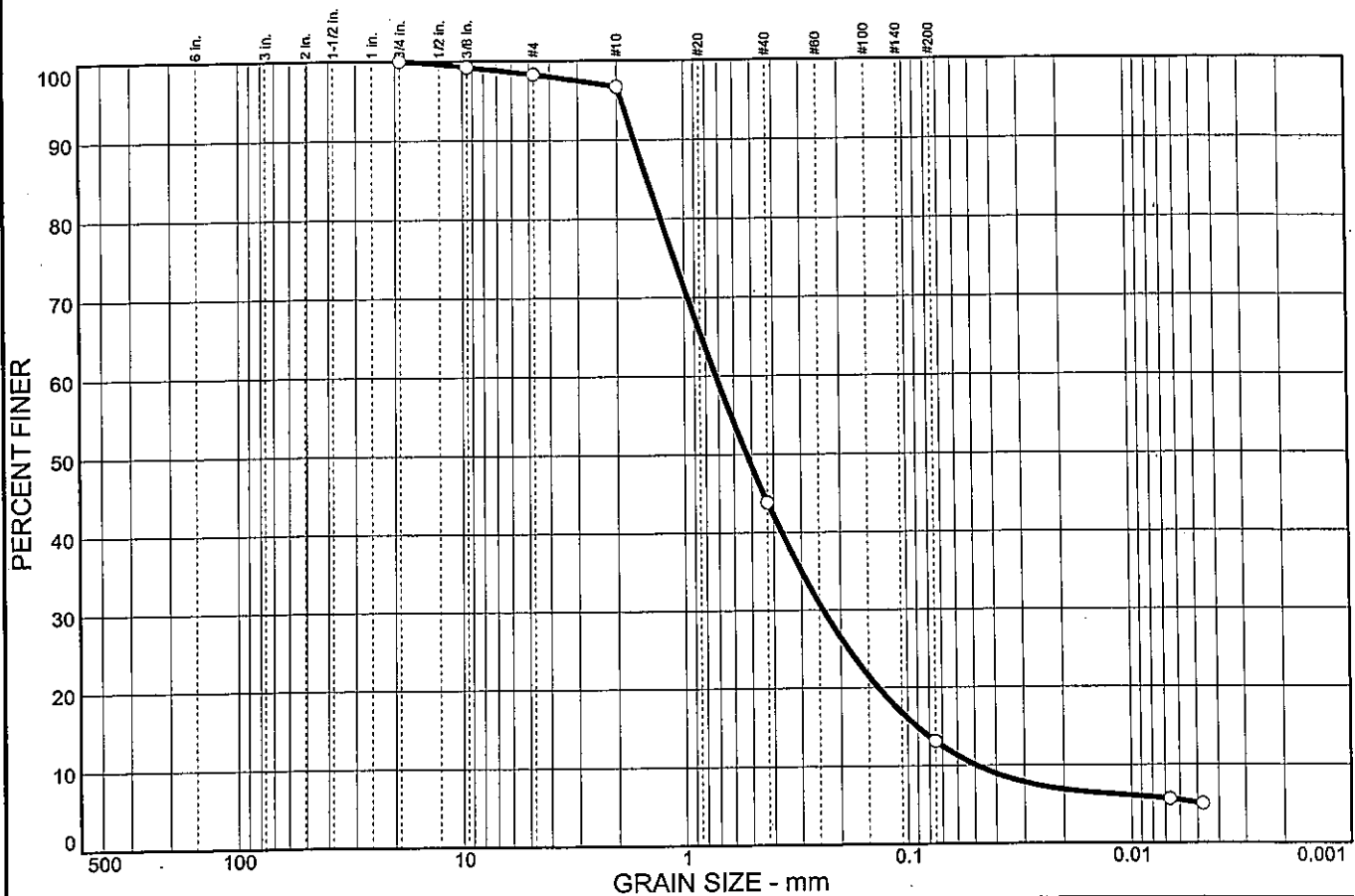


Client: TranSystems, Inc.  
 Project: SCI-823-0.00

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	1.6	52.9	30.7	8.0	5.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	99.2		
#4	98.3		
#10	96.7		
#40	43.8		
#200	13.1		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 1.46      D<sub>60</sub>= 0.721      D<sub>50</sub>= 0.526  
 D<sub>30</sub>= 0.240      D<sub>15</sub>= 0.0909      D<sub>10</sub>= 0.0493  
 C<sub>u</sub>= 14.62      C<sub>c</sub>= 1.61

**Classification**  
 USCS= SM      AASHTO= A-1-b

**Remarks**  
 Moisture Content= 25.5%  
 F.M.=0.03

\* (no specification provided)

Sample No.: 6  
Location:

Source of Sample: B-1139

Date: 11/1/05  
Elev./Depth: 13.5

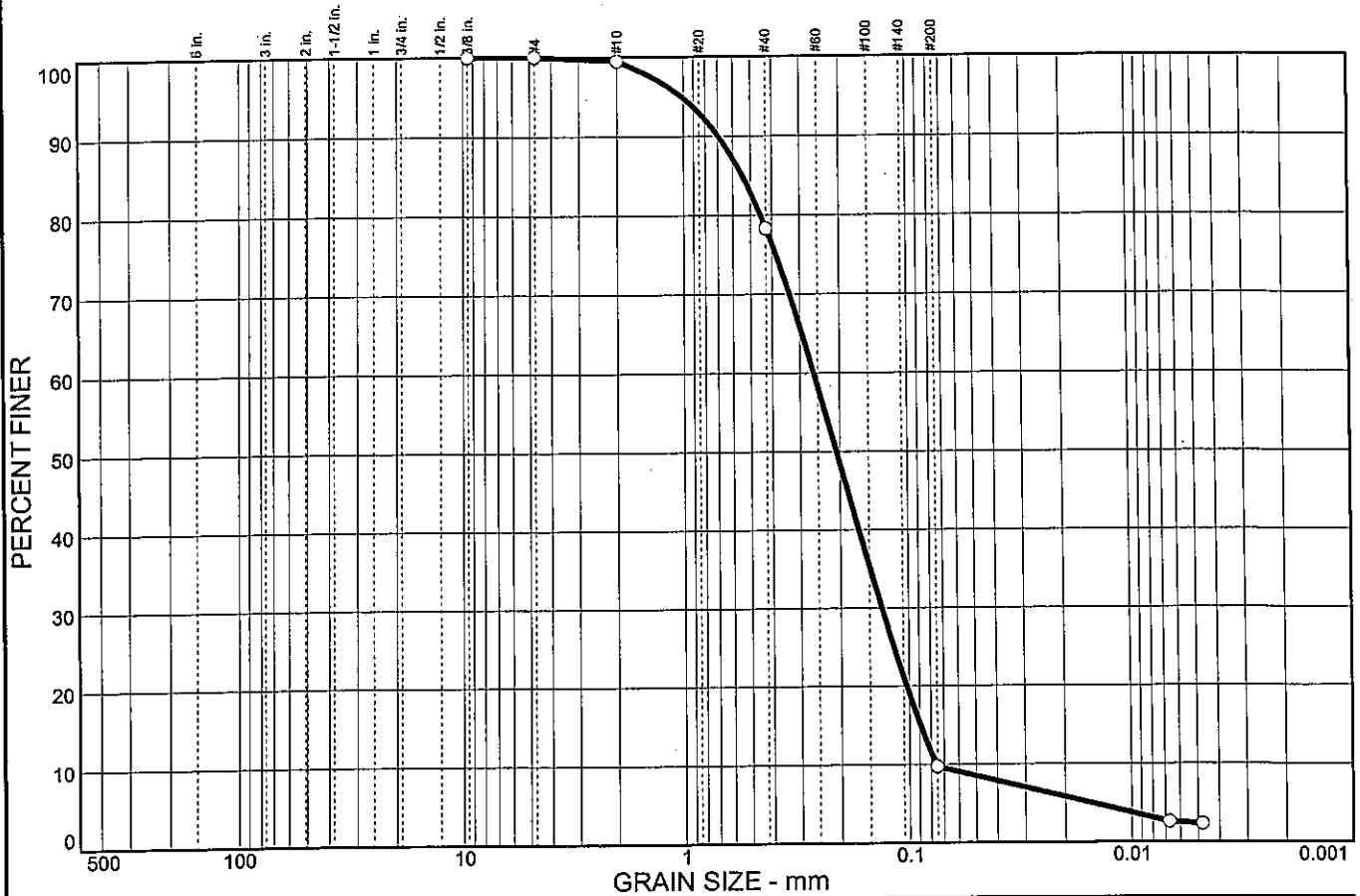


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	21.2	68.6	7.4	2.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	99.5		
#40	78.3		
#200	9.7		

**Soil Description**

Poorly graded sand with silt

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 0.544      D<sub>60</sub>= 0.261      D<sub>50</sub>= 0.208  
D<sub>30</sub>= 0.132      D<sub>15</sub>= 0.0892      D<sub>10</sub>= 0.0758  
C<sub>u</sub>= 3.44      C<sub>c</sub>= 0.88

**Classification**

USCS= SP-SM      AASHTO= A-3

**Remarks**

Moisture Content= 23.6%

\* (no specification provided)

Sample No.: 9  
Location:

Source of Sample: B-1139

Date: 11/1/05  
Elev./Depth: 21.0

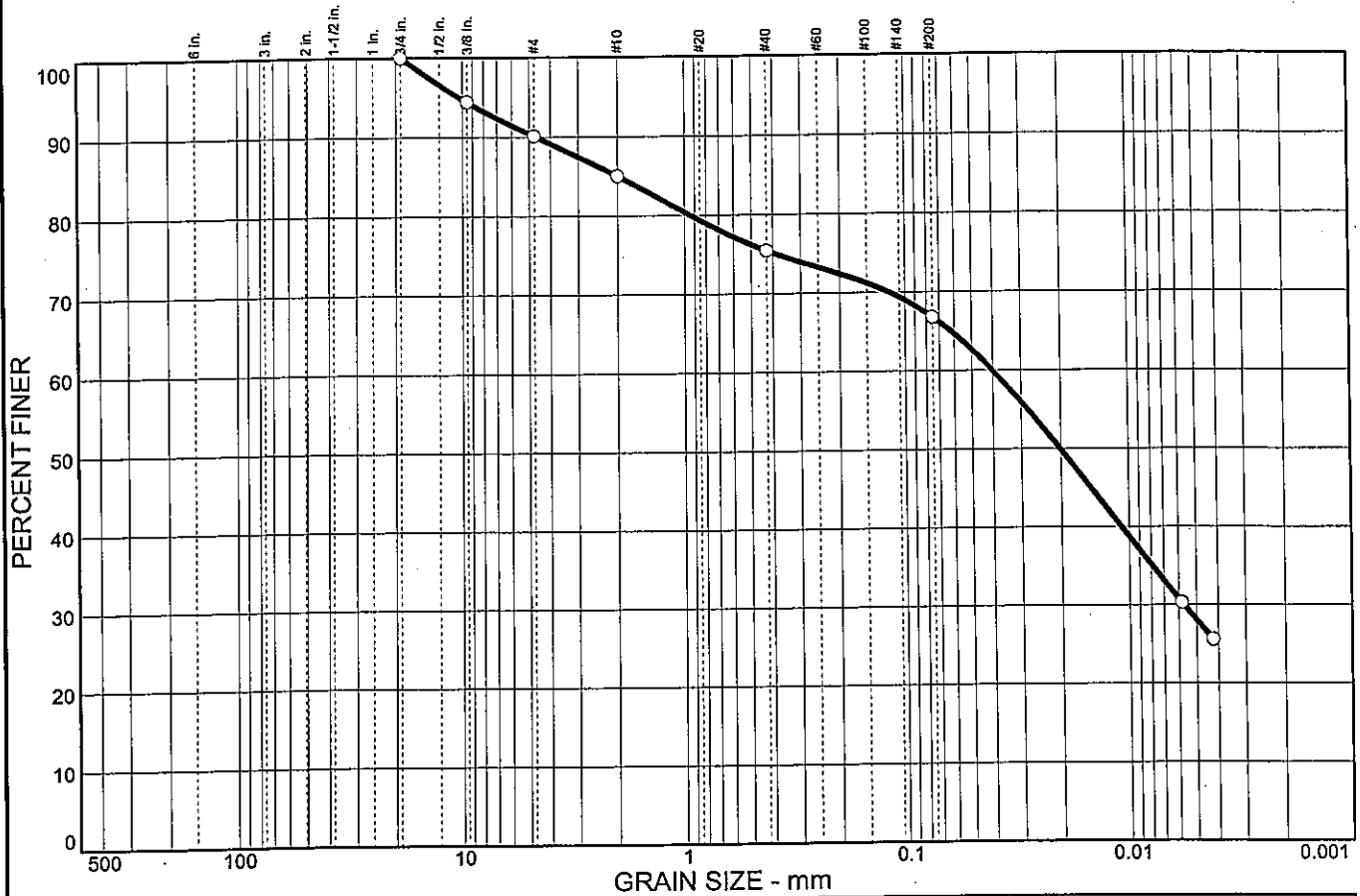


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	9.9	5.1	9.6	8.6	38.7	28.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	94.4		
#4	90.1		
#10	85.0		
#40	75.4		
#200	66.8		

**Soil Description**

Sandy lean clay

**Atterberg Limits**

PL= 18      LL= 32      PI= 14

**Coefficients**

D<sub>85</sub>= 2.00      D<sub>60</sub>= 0.0403      D<sub>50</sub>= 0.0202  
D<sub>30</sub>= 0.0057      D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= CL              AASHTO= A-6(7)

**Remarks**

Moisture Content= 18.9%  
F.M.= 0.16

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: B-1140

Date: 9/23/05  
Elev./Depth: 6.0

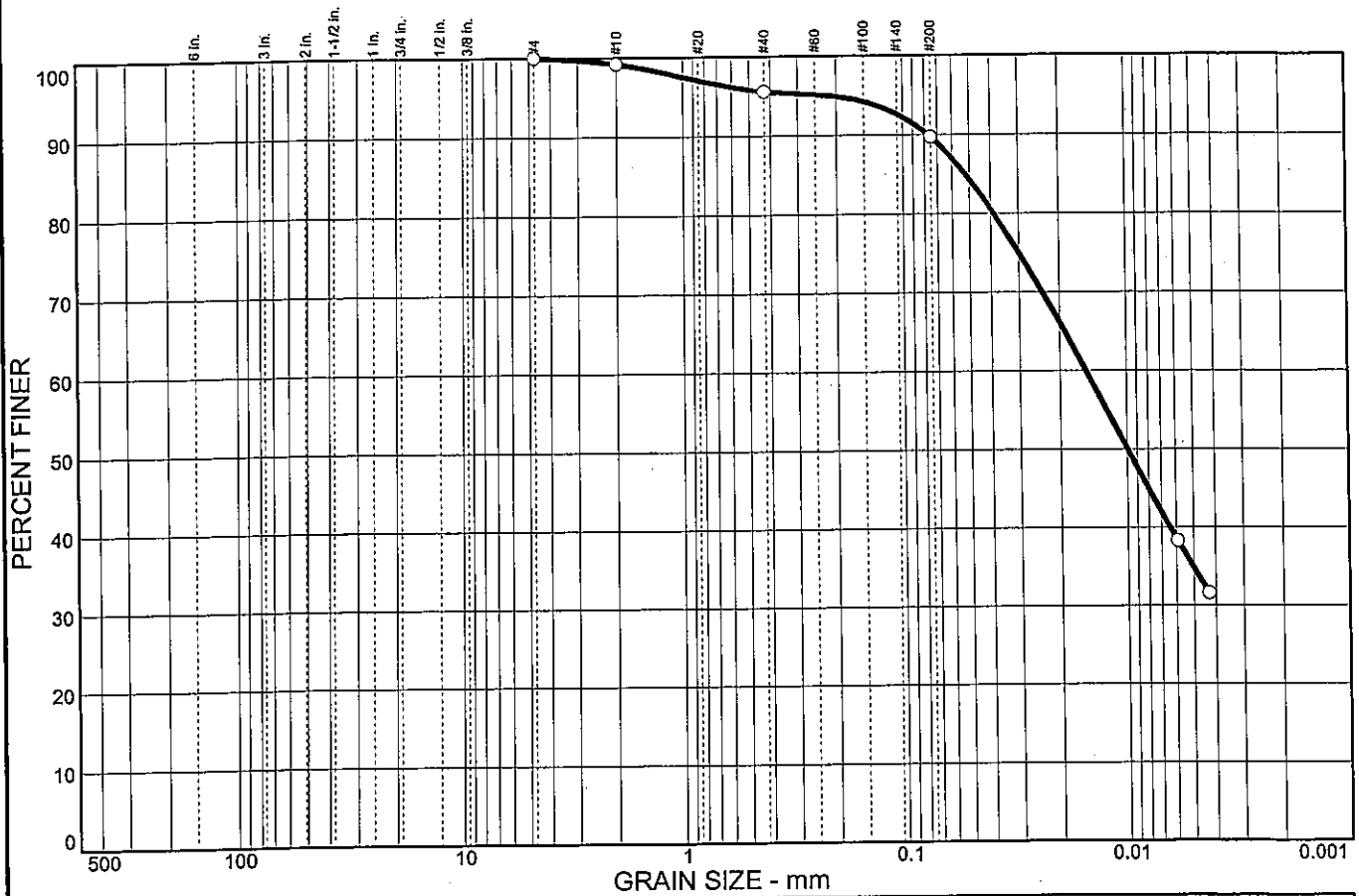


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.8	3.6	5.9	54.9	34.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.2		
#40	95.6		
#200	89.7		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 18      LL= 33      PI= 15

**Coefficients**

D<sub>85</sub>= 0.0523      D<sub>60</sub>= 0.0153      D<sub>50</sub>= 0.0100  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= CL              AASHTO= A-6(13)

**Remarks**

Moisture Content= 21.6%

\* (no specification provided)

Sample No.: 4  
Location:

Source of Sample: B-1140

Date: 9/23/05  
Elev./Depth: 8.5

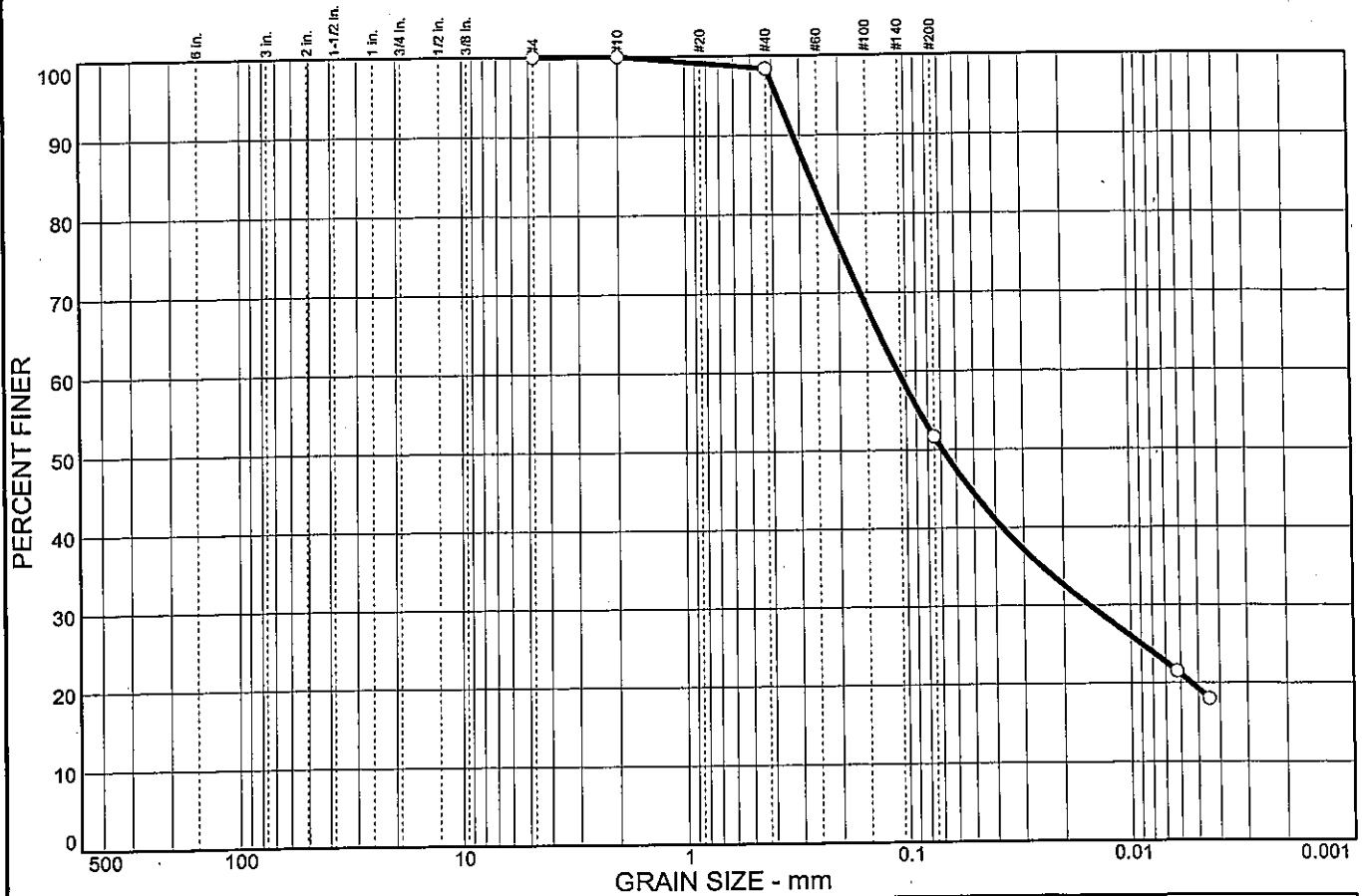


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	1.6	46.7	32.4	19.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	98.4		
#200	51.7		

**Soil Description**

Sandy lean clay

**Atterberg Limits**

PL= 14      LL= 22      PI= 8

**Coefficients**

D<sub>85</sub>= 0.272      D<sub>60</sub>= 0.109      D<sub>50</sub>= 0.0688  
 D<sub>30</sub>= 0.0153      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL                      AASHTO= A-4(1)

**Remarks**

Moisture Content= 19.3%

\* (no specification provided)

Sample No.: 5  
Location:

Source of Sample: B-1140

Date: 9/23/05  
Elev./Depth: 11.0



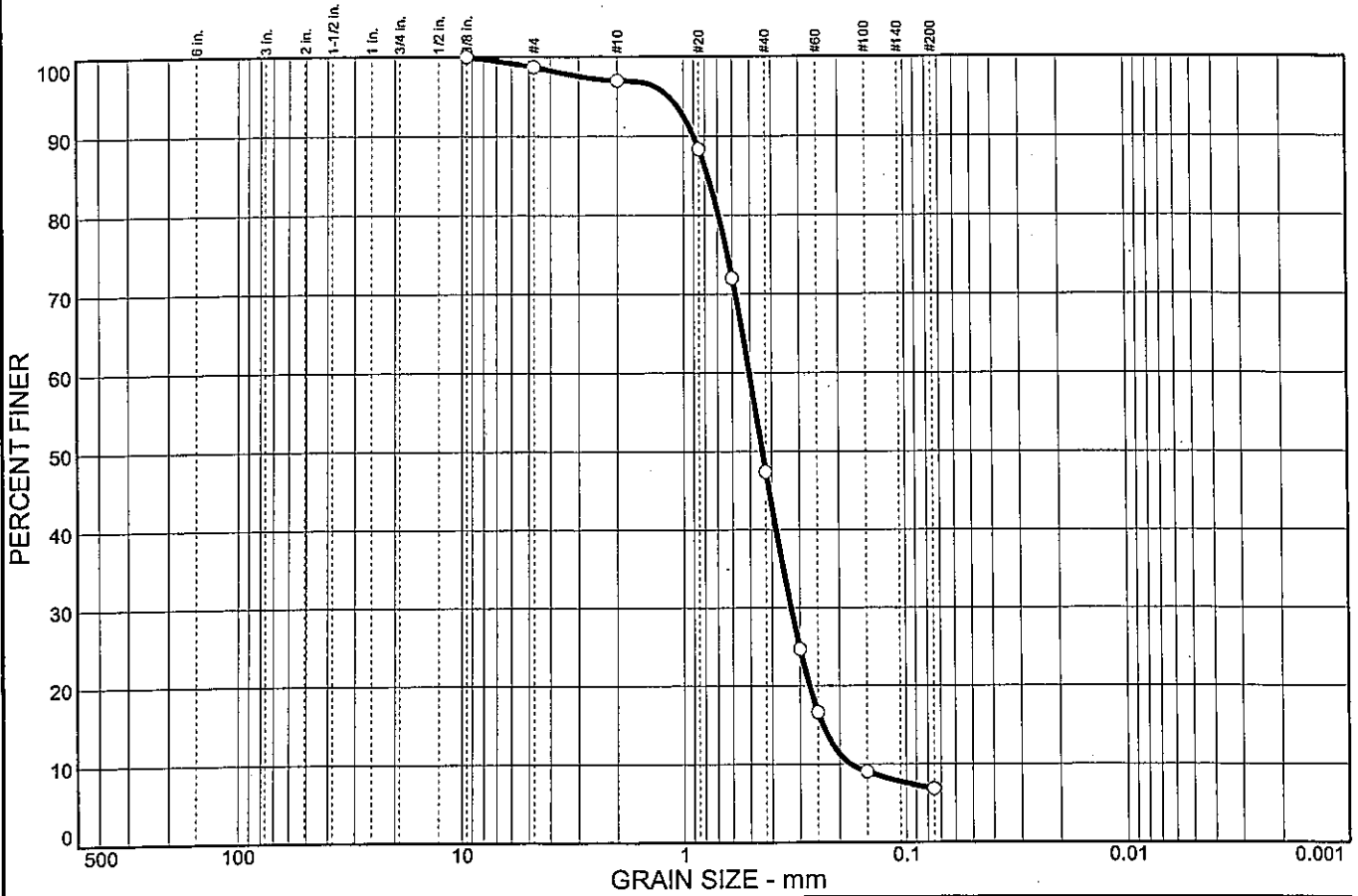
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	1.3	1.7	49.6	40.6	6.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	98.7		
#10	97.0		
#20	88.3		
#30	72.0		
#40	47.4		
#50	24.7		
#60	16.6		
#100	9.0		
#200	6.8		

**Soil Description**

Poorly graded sand with silt

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 0.775      D<sub>60</sub>= 0.504      D<sub>50</sub>= 0.440  
D<sub>30</sub>= 0.329      D<sub>15</sub>= 0.238      D<sub>10</sub>= 0.178  
C<sub>u</sub>= 2.83      C<sub>c</sub>= 1.21

**Classification**

USCS= SP-SM      AASHTO= A-1-b

**Remarks**

Moisture Content= 21.4%  
F.M.=1.96

\* (no specification provided)

Sample No.: 9  
Location:

Source of Sample: B-1140

Date: 9/23/05  
Elev./Depth: 21.0

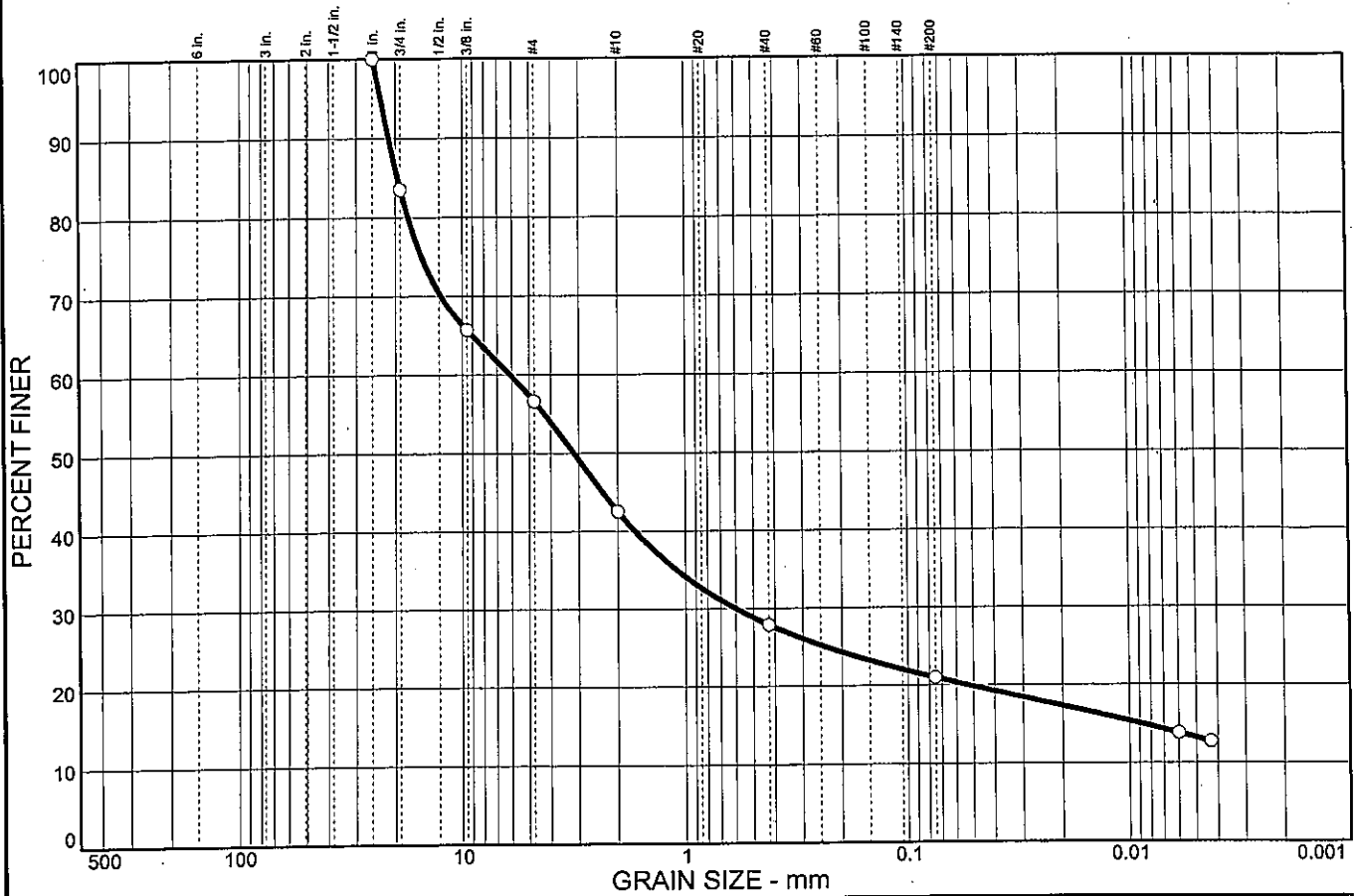


Client: TranSystems, Inc.  
Project: SCI-823-0.00

Project No: 0121-3070.03

Figure

# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	16.5	26.9	14.1	14.6	6.9	7.8	13.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
0.75 in.	83.5		
0.375 in.	65.7		
#4	56.6		
#10	42.5		
#40	27.9		
#200	21.0		

**Soil Description**

Clayey gravel with sand

**Atterberg Limits**

PL= 18      LL= 38      PI= 20

**Coefficients**

D<sub>85</sub>= 19.6      D<sub>60</sub>= 6.09      D<sub>50</sub>= 3.16  
D<sub>30</sub>= 0.598      D<sub>15</sub>= 0.0088      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= GC      AASHTO= A-2-6(1)

**Remarks**

Moisture Content= 18.2%  
F.M.=0.94

\* (no specification provided)

Sample No.: 9  
Location:

Source of Sample: B-1141

Date: 10/27/05  
Elev./Depth: 21.0

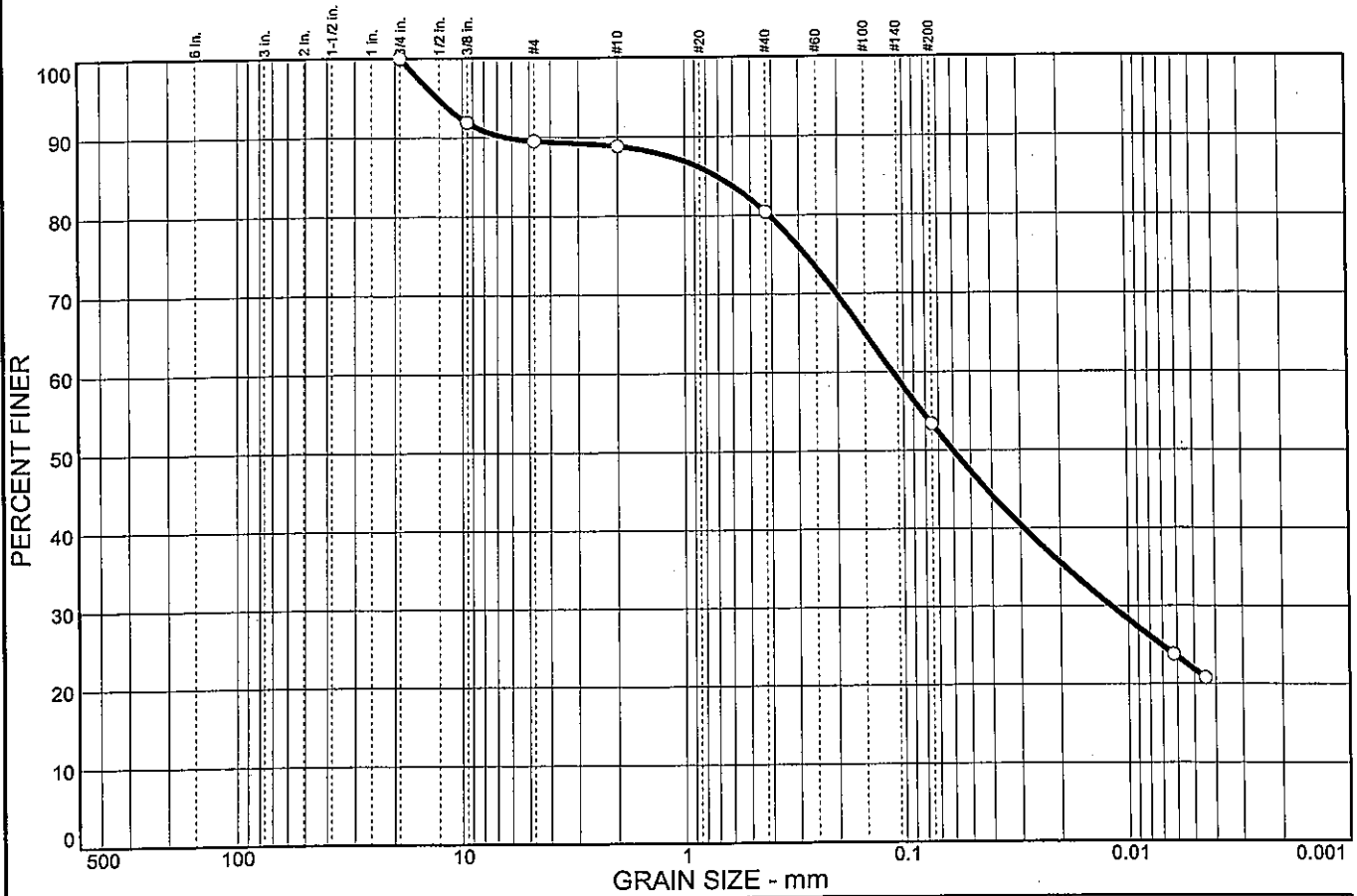


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	10.5	0.7	8.4	27.0	31.5	21.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	91.9		
#4	89.5		
#10	88.8		
#40	80.4		
#200	53.4		

**Soil Description**

Sandy lean clay

**Atterberg Limits**

PL= 18      LL= 27      PI= 9

**Coefficients**

D<sub>85</sub>= 0.713      D<sub>60</sub>= 0.112      D<sub>50</sub>= 0.0602  
 D<sub>30</sub>= 0.0119      D<sub>15</sub>=      D<sub>10</sub>=  
 C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-4(2)

**Remarks**

Moisture Content= 19.6%  
 F.M.=0.19

\* (no specification provided)

Sample No.: 12      Source of Sample: B-1141      Date: 10/27/05  
 Location:      Elev./Depth: 28.5

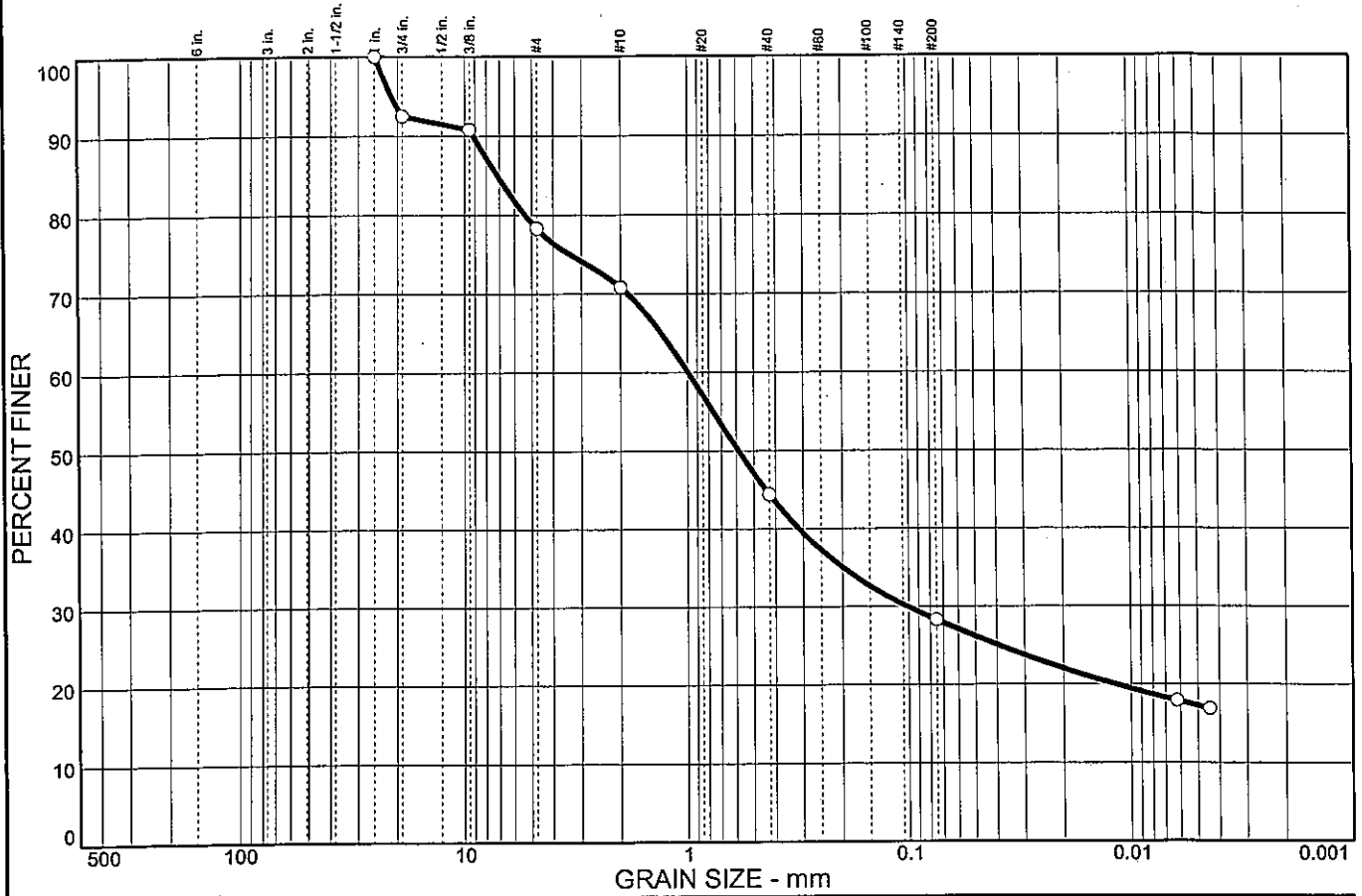


Client: TranSystems, Inc.  
 Project: SCI-823-0.00  
 Project No: 0121-3070.03

Figure



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	7.5	14.2	7.5	26.4	16.1	11.0	17.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.00 in.	100.0		
0.75 in.	92.5		
0.375 in.	90.8		
#4	78.3		
#10	70.8		
#40	44.4		
#200	28.3		

**Soil Description**

Clayey sand with gravel

**Atterberg Limits**

PL= 16      LL= 34      PI= 18

**Coefficients**

D<sub>85</sub>= 7.14      D<sub>60</sub>= 0.991      D<sub>50</sub>= 0.586  
D<sub>30</sub>= 0.101      D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= SC      AASHTO= A-2-6(1)

**Remarks**

Moisture Content= 15.6%  
F.M.=0.38

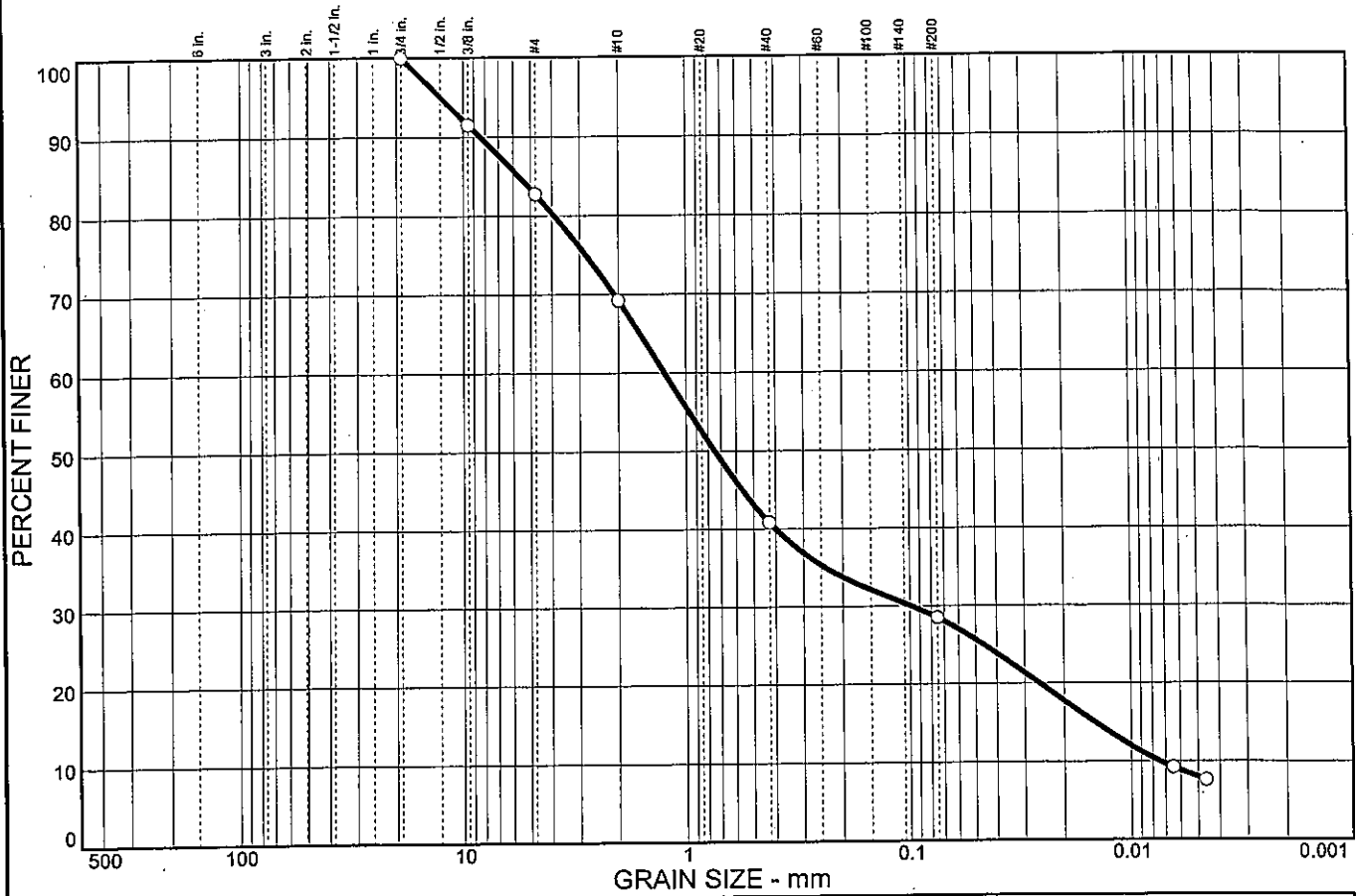
\* (no specification provided)

Sample No.: 9      Source of Sample: B-1142      Date: 10/27/05  
Location:      Elev./Depth: 21.0



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	17.3	13.5	28.4	12.3	20.5	8.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	91.5		
#4	82.7		
#10	69.2		
#40	40.8		
#200	28.5		

**Soil Description**

Silty, clayey sand with gravel

**Atterberg Limits**

PL= 20      LL= 24      PI= 4

**Coefficients**

D<sub>85</sub>= 5.65      D<sub>60</sub>= 1.24      D<sub>50</sub>= 0.746  
D<sub>30</sub>= 0.0981      D<sub>15</sub>= 0.0146      D<sub>10</sub>= 0.0074  
C<sub>u</sub>= 167.34      C<sub>c</sub>= 1.04

**Classification**

USCS= SC-SM      AASHTO= A-2-4(0)

**Remarks**

Moisture Content= 18.4%  
F.M.=0.26

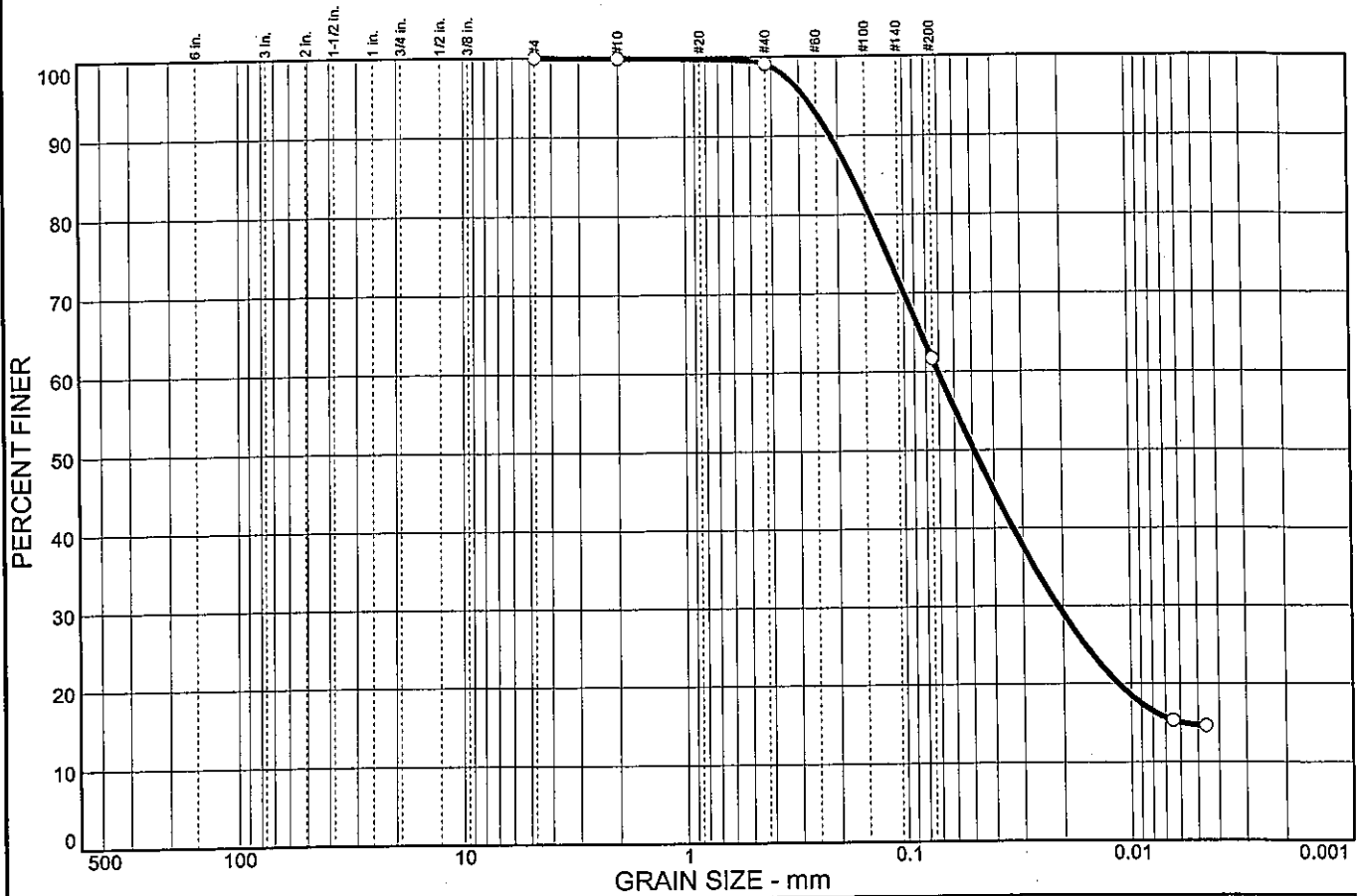
\* (no specification provided)

Sample No.: 12B      Source of Sample: B-1142      Date: 10/27/05  
Location:      Elev./Depth: 28.5



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	0.8	37.4	47.0	14.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#40	99.1		
#200	61.7		

**Soil Description**  
Sandy lean clay

**Atterberg Limits**  
 PL= 16      LL= 26      PI= 10

**Coefficients**  
 D<sub>85</sub>= 0.174      D<sub>60</sub>= 0.0707      D<sub>50</sub>= 0.0492  
 D<sub>30</sub>= 0.0210      D<sub>15</sub>= 0.0059      D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**  
 USCS= CL                      AASHTO= A-4(4)

**Remarks**  
 Moisture Content= 26.0%

\* (no specification provided)

Sample No.: 13  
Location:

Source of Sample: B-1142

Date: 10/27/05  
Elev./Depth: 31.0

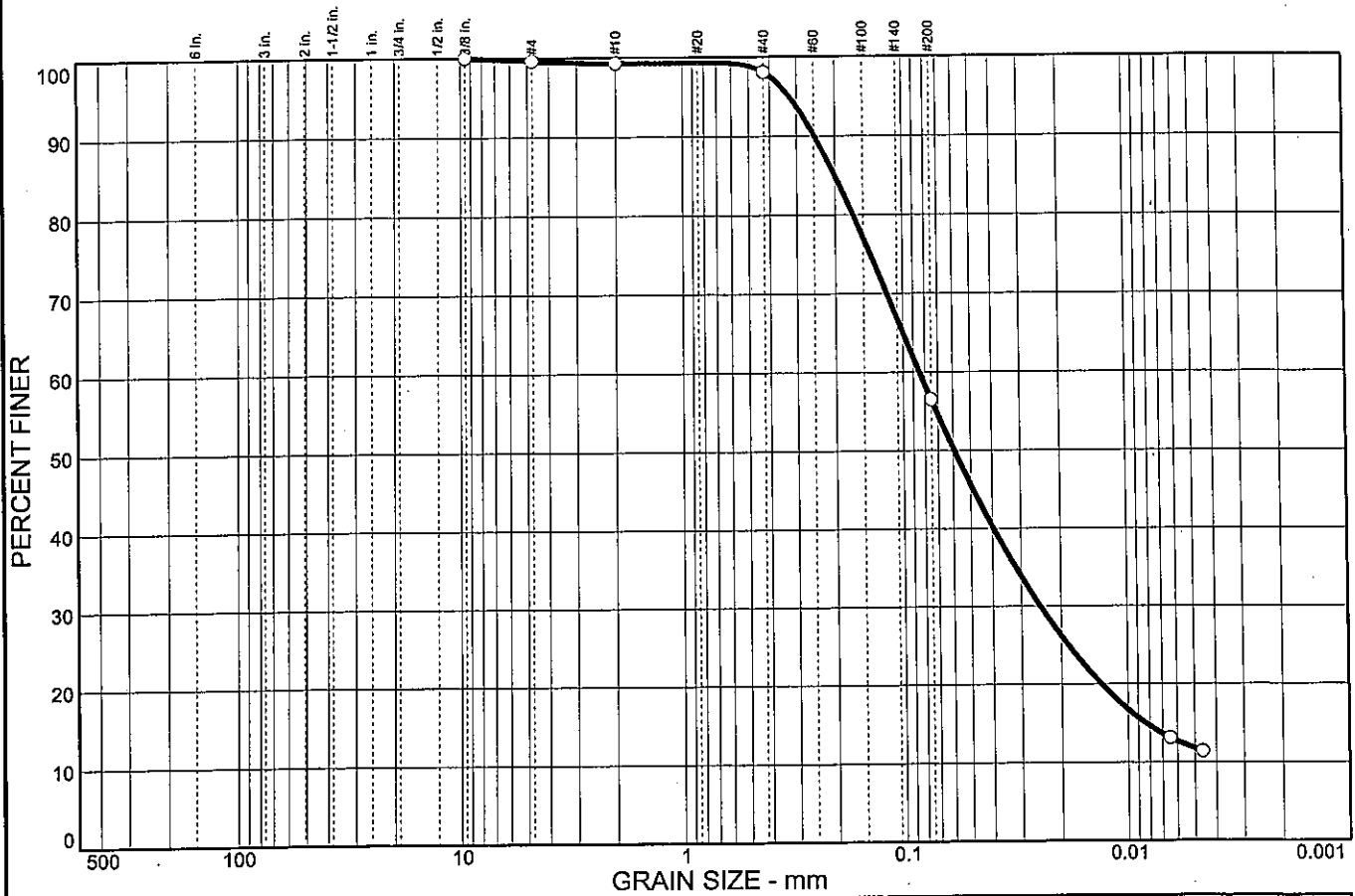


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.3	1.2	41.6	44.7	11.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.6		
#10	99.3		
#40	98.1		
#200	56.5		

**Soil Description**  
Sandy silt

**Atterberg Limits**  
 PL= 15      LL= 17      PI= 2

**Coefficients**  
 D<sub>85</sub>= 0.201      D<sub>60</sub>= 0.0846      D<sub>50</sub>= 0.0593  
 D<sub>30</sub>= 0.0247      D<sub>15</sub>= 0.0083      D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**  
 USCS= ML                      AASHTO= A-4(0)

**Remarks**  
 Moisture Content= 24.8%  
 F.M.=0.00

\* (no specification provided)

Sample No.: 14A  
Location:

Source of Sample: B-1142

Date: 10/27/05  
Elev./Depth: 33.5



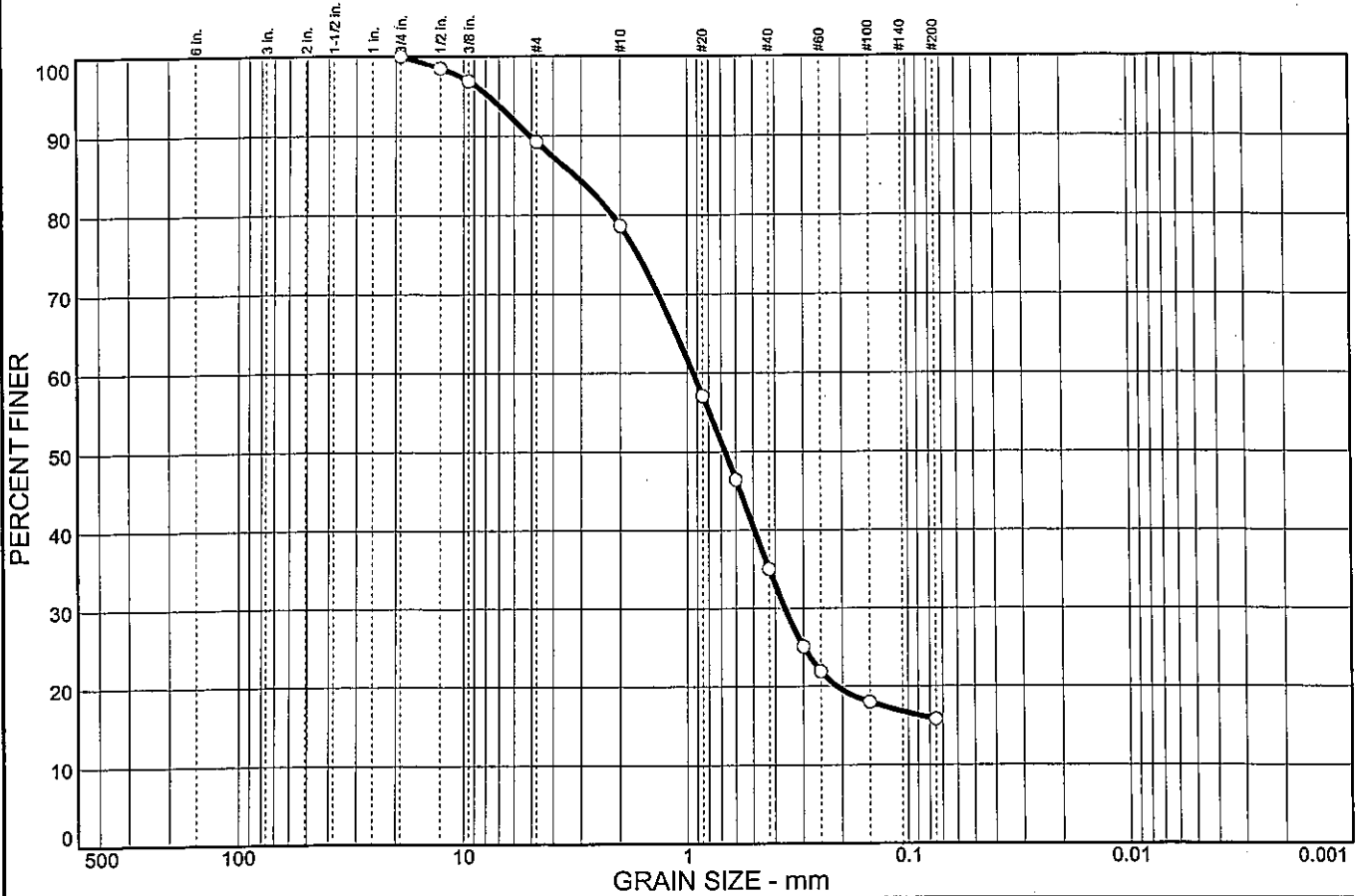
Client: TranSystems, Inc.  
Project: SCI-823-0.00

Project No: 0121-3070.03

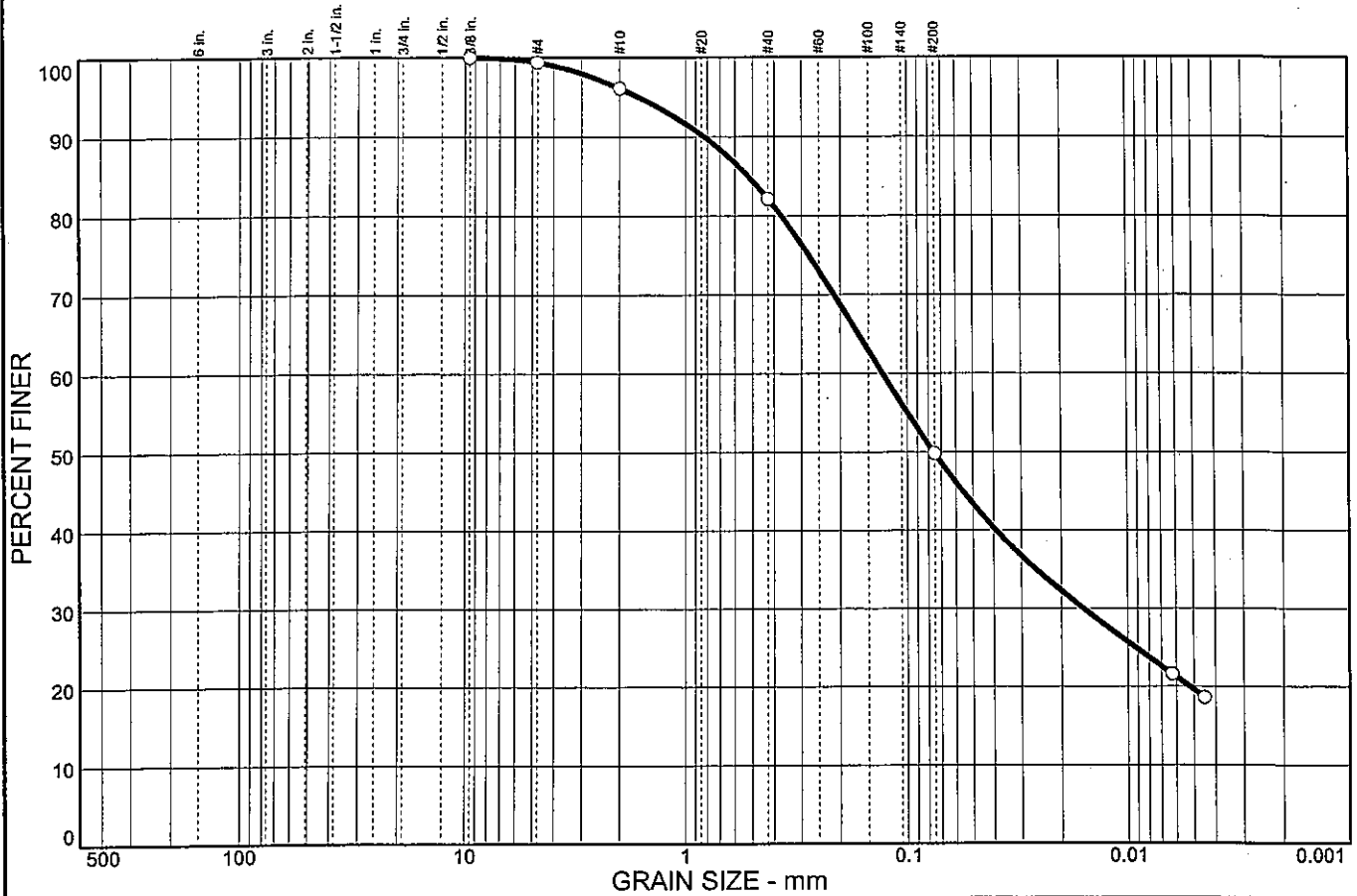
Figure



# PARTICLE SIZE DISTRIBUTION TEST REPORT



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.6	3.3	14.0	32.3	30.2	19.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.4		
#10	96.1		
#40	82.1		
#200	49.8		

**Soil Description**

Silty, clayey sand

**Atterberg Limits**

PL= 12      LL= 19      PI= 7

**Coefficients**

D<sub>85</sub>= 0.524      D<sub>60</sub>= 0.129      D<sub>50</sub>= 0.0759  
D<sub>30</sub>= 0.0159      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC-SM      AASHTO= A-4(0)

**Remarks**

Moisture Content= 8.5%  
F.M.=0.01

\* (no specification provided)

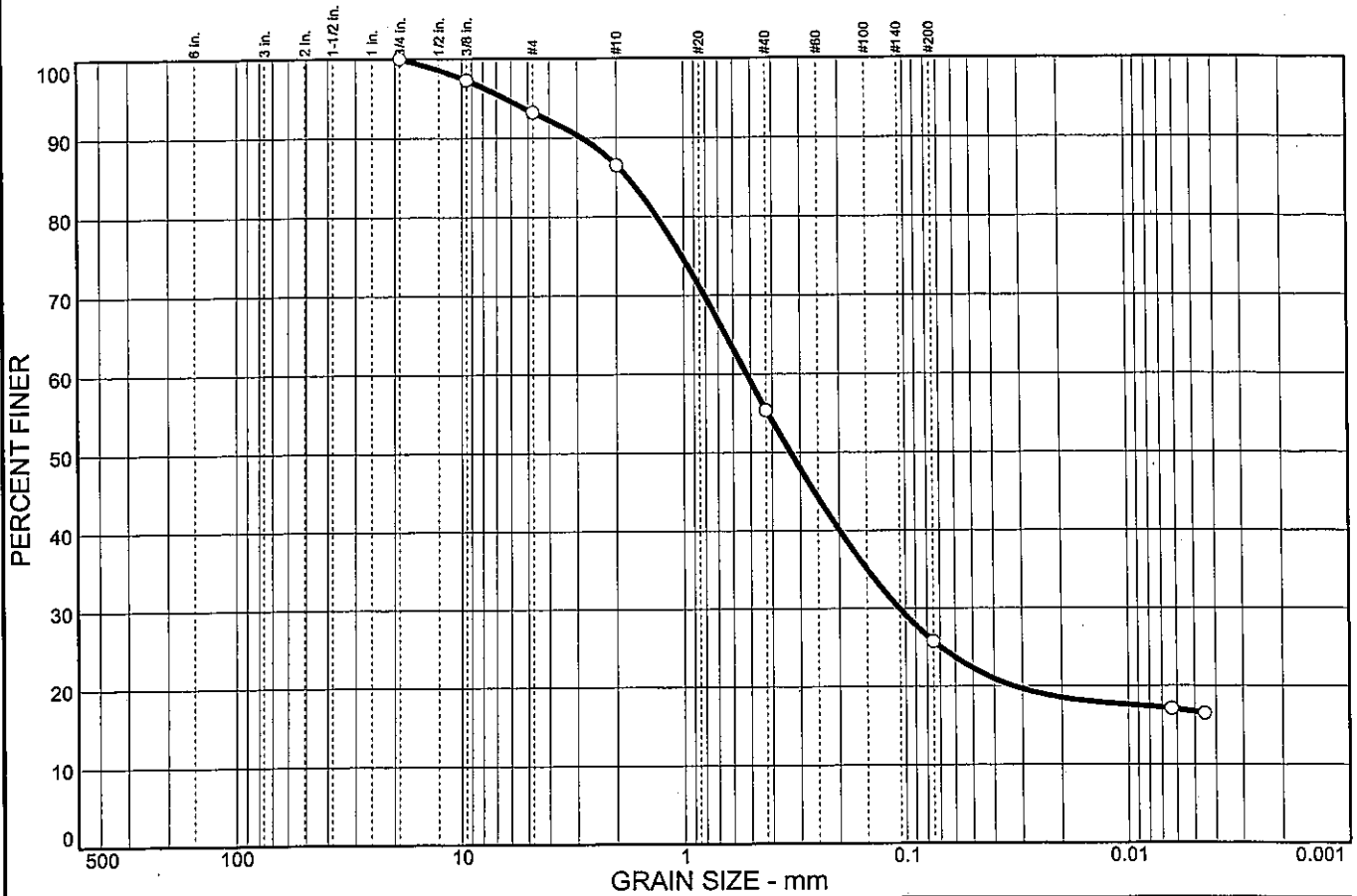
Sample No.: 2      Source of Sample: B-1144      Date: 10/27/05  
Location:      Elev./Depth: 3.5



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	6.8	6.7	31.1	29.6	9.1	16.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	97.3		
#4	93.2		
#10	86.5		
#40	55.4		
#200	25.8		

**Soil Description**  
Clayey sand

**Atterberg Limits**  
 PL= 15      LL= 32      PI= 17

**Coefficients**  
 D<sub>85</sub>= 1.79      D<sub>60</sub>= 0.521      D<sub>50</sub>= 0.331  
 D<sub>30</sub>= 0.107      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
 USCS= SC      AASHTO= A-2-6(1)

**Remarks**  
 Moisture Content= 18.3%  
 F.M.=0.09

\* (no specification provided)

Sample No.: 6  
Location:

Source of Sample: B-1144

Date: 10/27/05  
Elev./Depth: 13.5

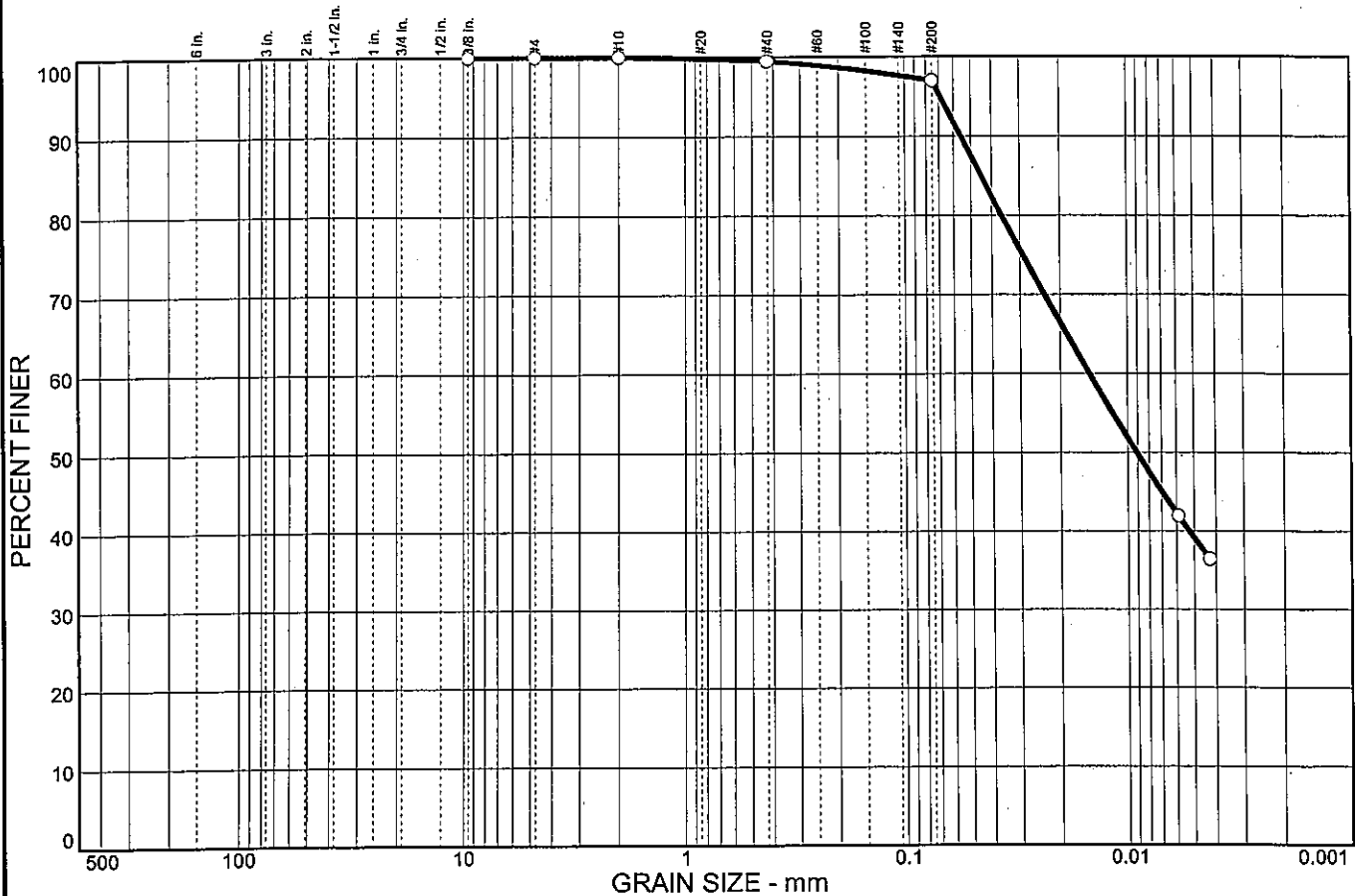


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.5	2.5	57.9	39.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	100.0		
#40	99.5		
#200	97.0		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 18      LL= 37      PI= 19

**Coefficients**

D<sub>85</sub>= 0.0449      D<sub>60</sub>= 0.0148      D<sub>50</sub>= 0.0091  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-6(19)

**Remarks**

Moisture Content= 20.1%

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1145

Date: 10/27/05  
Elev./Depth: 3.5

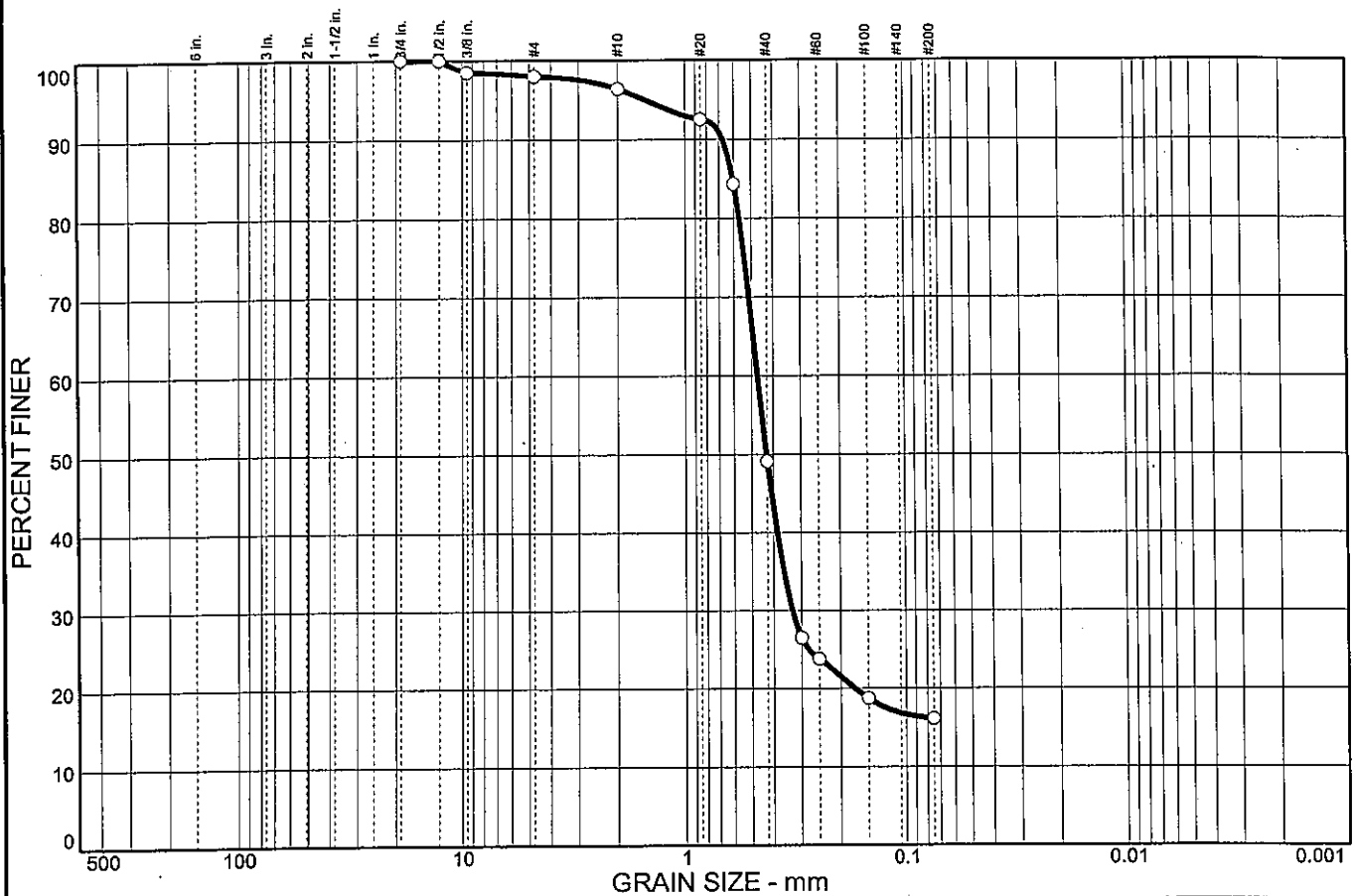


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	1.6	47.3	33.0	16.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.50 in.	100.0		
0.375 in.	98.5		
#4	98.0		
#10	96.4		
#20	92.5		
#30	84.3		
#40	49.1		
#50	26.5		
#60	23.8		
#100	18.7		
#200	16.1		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 0.606      D<sub>60</sub>= 0.470      D<sub>50</sub>= 0.429  
 D<sub>30</sub>= 0.329      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**  
 USCS= SM                      AASHTO= A-1-b

**Remarks**  
 Moisture Content= 11.5%  
 F.M.=1.74

\* (no specification provided)

Sample No.: 5  
Location:

Source of Sample: B-1145

Date: 10/27/05  
Elev./Depth: 11.0

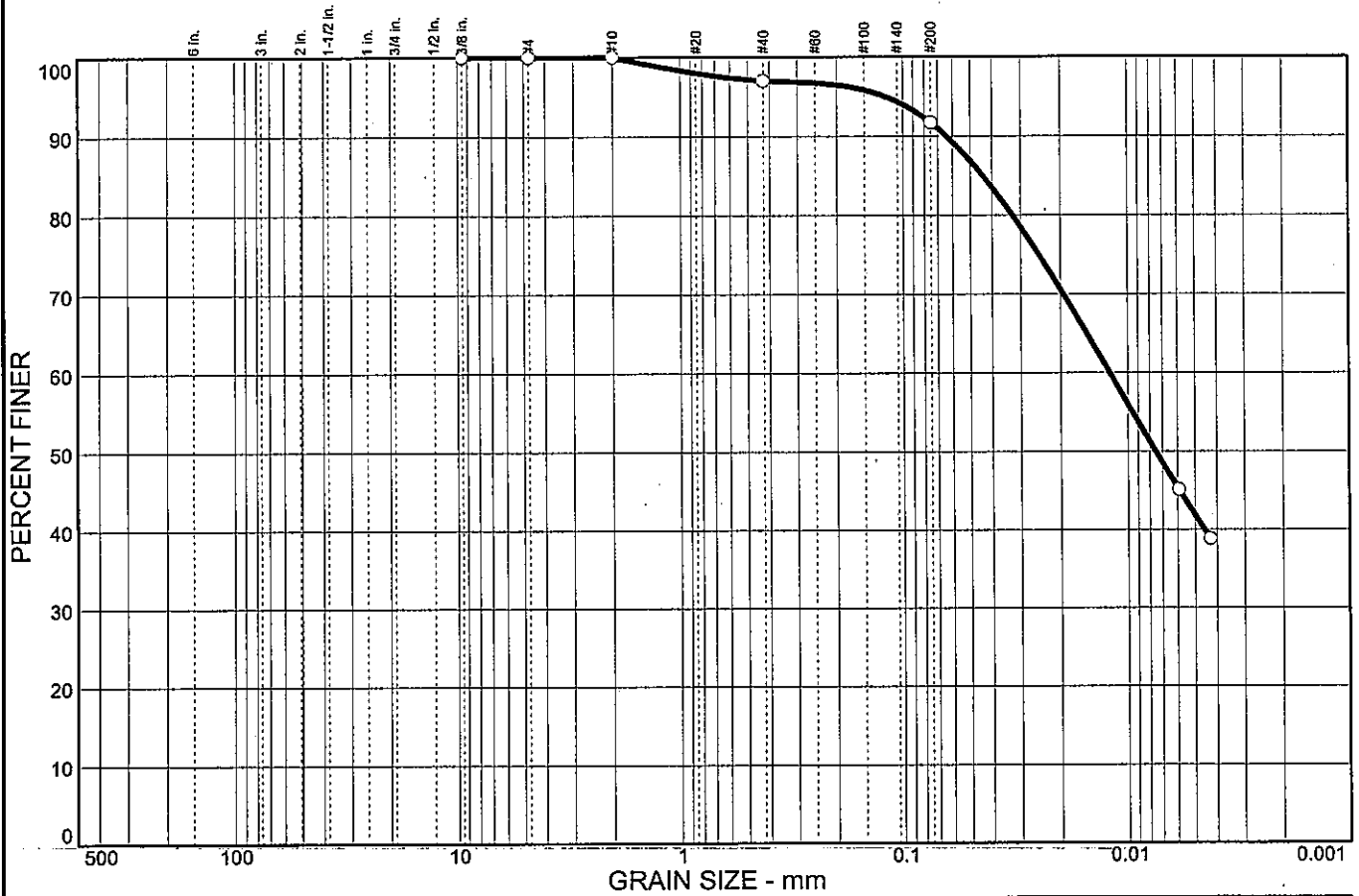


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	5.3	49.9	41.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	100.0		
#40	97.0		
#200	91.7		

**Soil Description**  
Lean clay

**Atterberg Limits**  
 PL= 20      LL= 35      PI= 15

**Coefficients**  
 D<sub>85</sub>= 0.0441      D<sub>60</sub>= 0.0121      D<sub>50</sub>= 0.0075  
 D<sub>30</sub>=                  D<sub>15</sub>=                  D<sub>10</sub>=  
 C<sub>u</sub>=                    C<sub>c</sub>=

**Classification**  
 USCS= CL                  AASHTO= A-6(14)

**Remarks**  
 Moisture Content= 18.4%

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1146

Date: 10/27/05  
Elev./Depth: 1.0

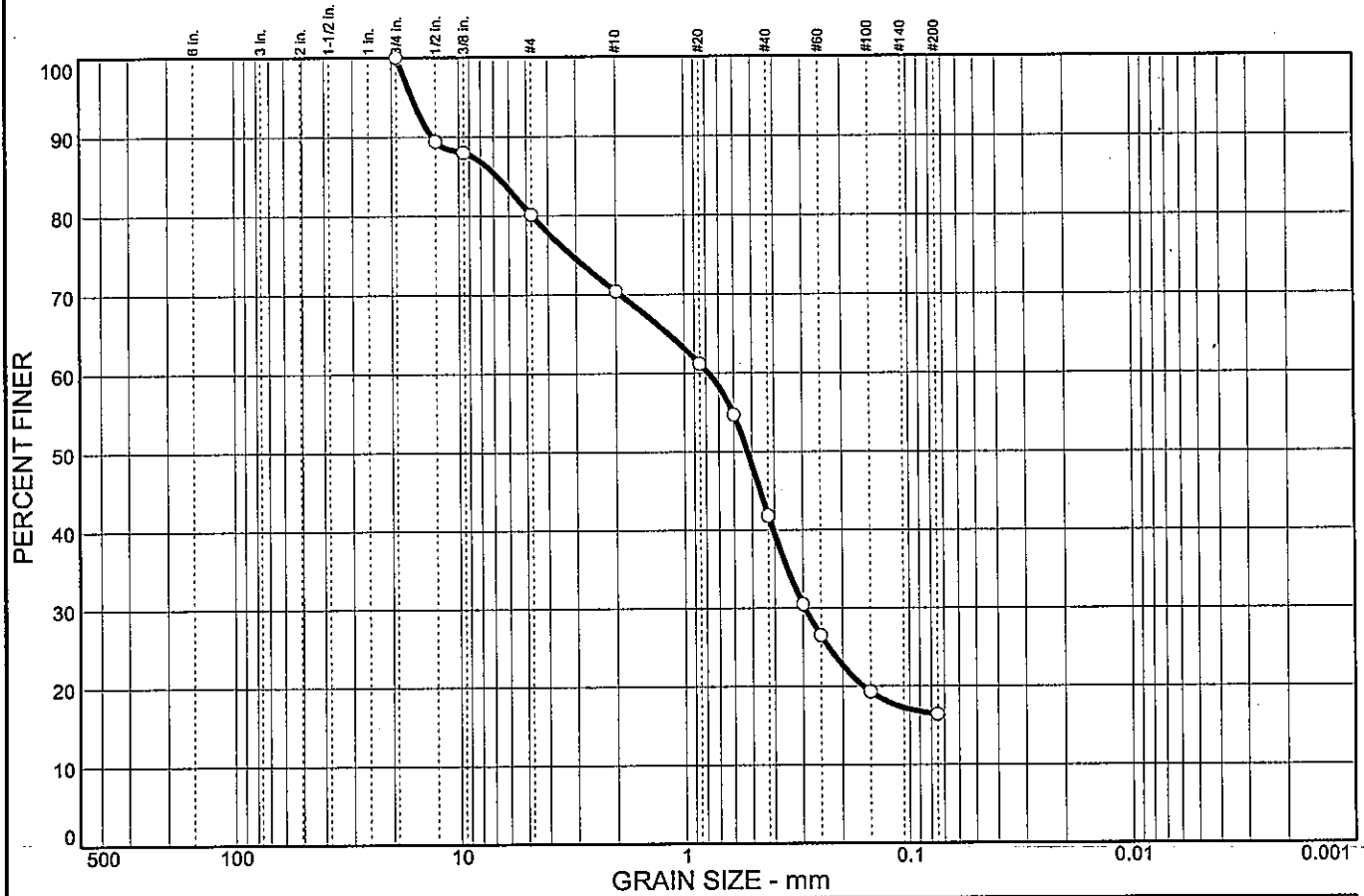


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	19.9	9.7	28.6	25.4	16.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.50 in.	89.4		
0.375 in.	88.0		
#4	80.1		
#10	70.4		
#20	61.2		
#30	54.7		
#40	41.8		
#50	30.5		
#60	26.5		
#100	19.3		
#200	16.4		

**Soil Description**

Silty sand with gravel

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 6.77      D<sub>60</sub>= 0.777      D<sub>50</sub>= 0.523  
D<sub>30</sub>= 0.294      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SM      AASHTO= A-1-b

**Remarks**

Moisture Content= 14.0%  
F.M.=2.27

\* (no specification provided)

Sample No.: 5  
Location:

Source of Sample: B-1146

Date: 10/27/05  
Elev./Depth: 11.0

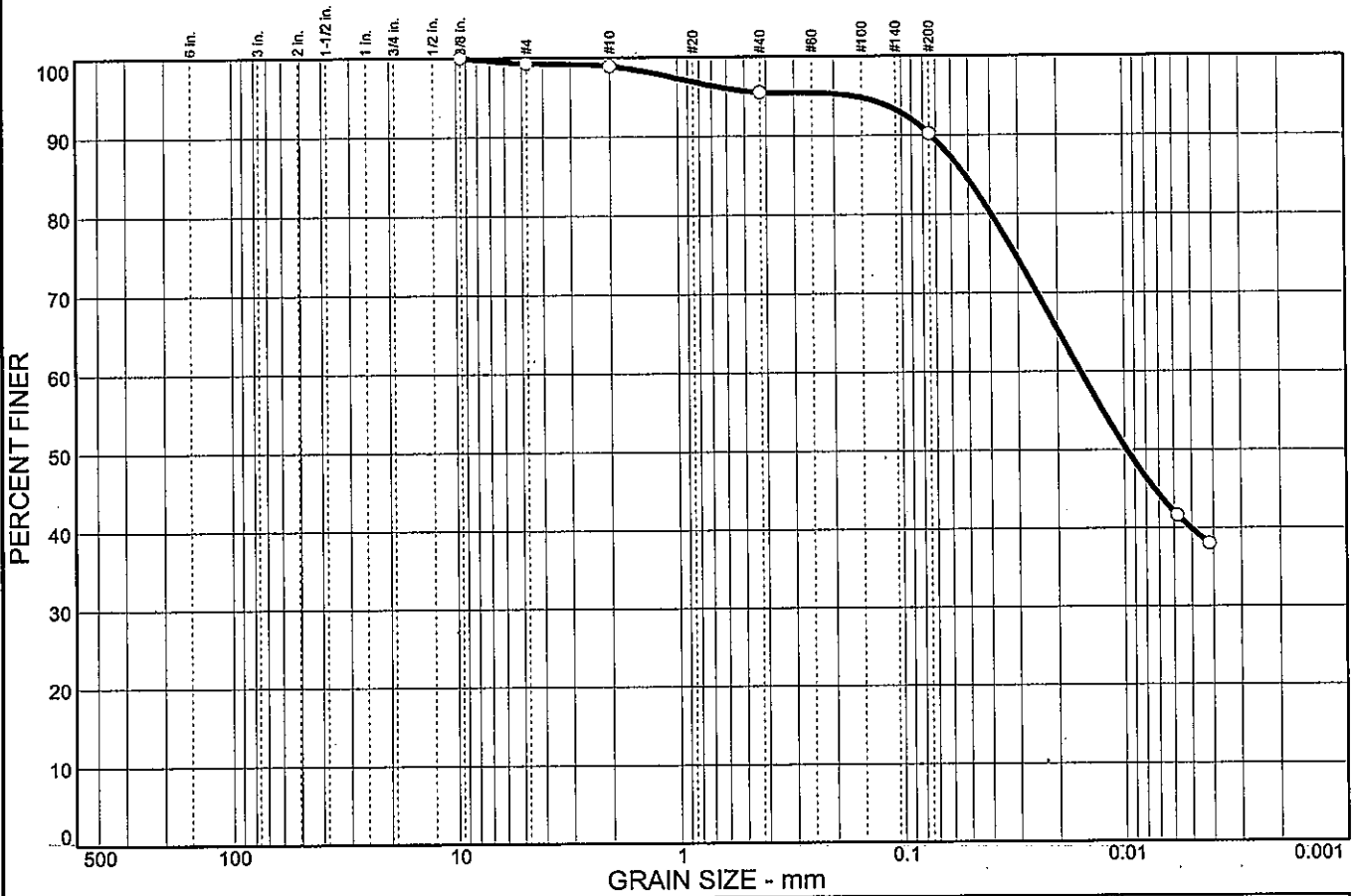


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.4	3.4	5.3	50.3	39.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.3		
#10	98.9		
#40	95.5		
#200	90.2		

**Soil Description**  
Lean clay

**Atterberg Limits**  
 PL= 19      LL= 34      PI= 15

**Coefficients**  
 D<sub>85</sub>= 0.0520      D<sub>60</sub>= 0.0157      D<sub>50</sub>= 0.0097  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
 USCS= CL      AASHTO= A-6(13)

**Remarks**  
 Moisture Content= 17.7%  
 F.M.=0.01

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1149

Date: 8/15/05  
Elev./Depth: 1.0



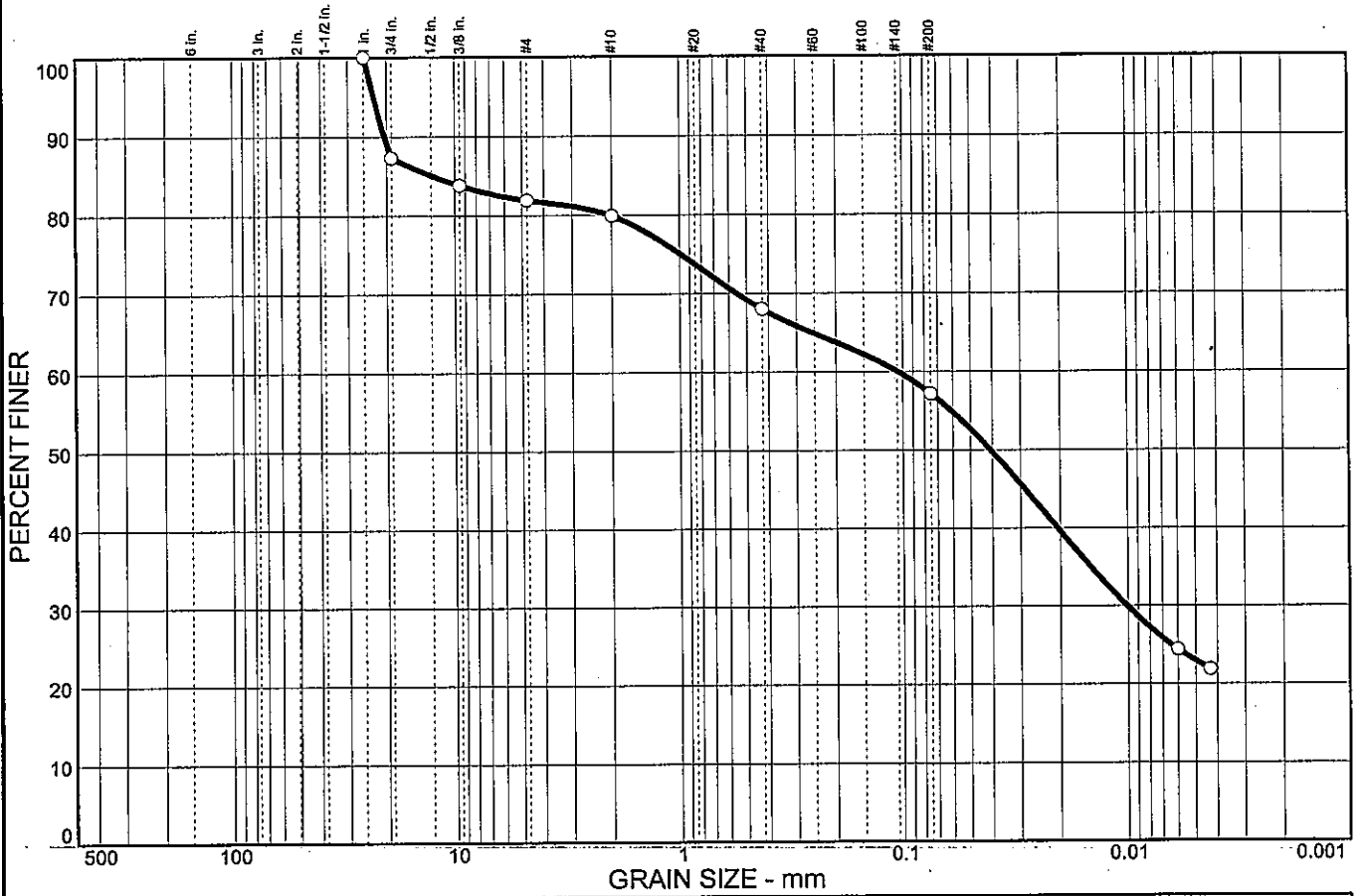
Client: TranSystems, Inc.  
Project: SCI-823-0.00

Project No: 0121-3070.03

Figure



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	12.7	5.4	2.0	11.9	10.8	34.2	23.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0 in.	100.0		
0.75 in.	87.3		
0.375 in.	83.8		
#4	81.9		
#10	79.9		
#40	68.0		
#200	57.2		

**Soil Description**

Sandy lean clay with gravel

**Atterberg Limits**

PL= 17      LL= 25      PI= 8

**Coefficients**

D<sub>85</sub>= 12.5      D<sub>60</sub>= 0.105      D<sub>50</sub>= 0.0409  
D<sub>30</sub>= 0.0101      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-4(2)

**Remarks**

Moisture Content= 13.8%  
F.M.=0.47

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1149

Date: 8/20/05  
Elev./Depth: 3.0

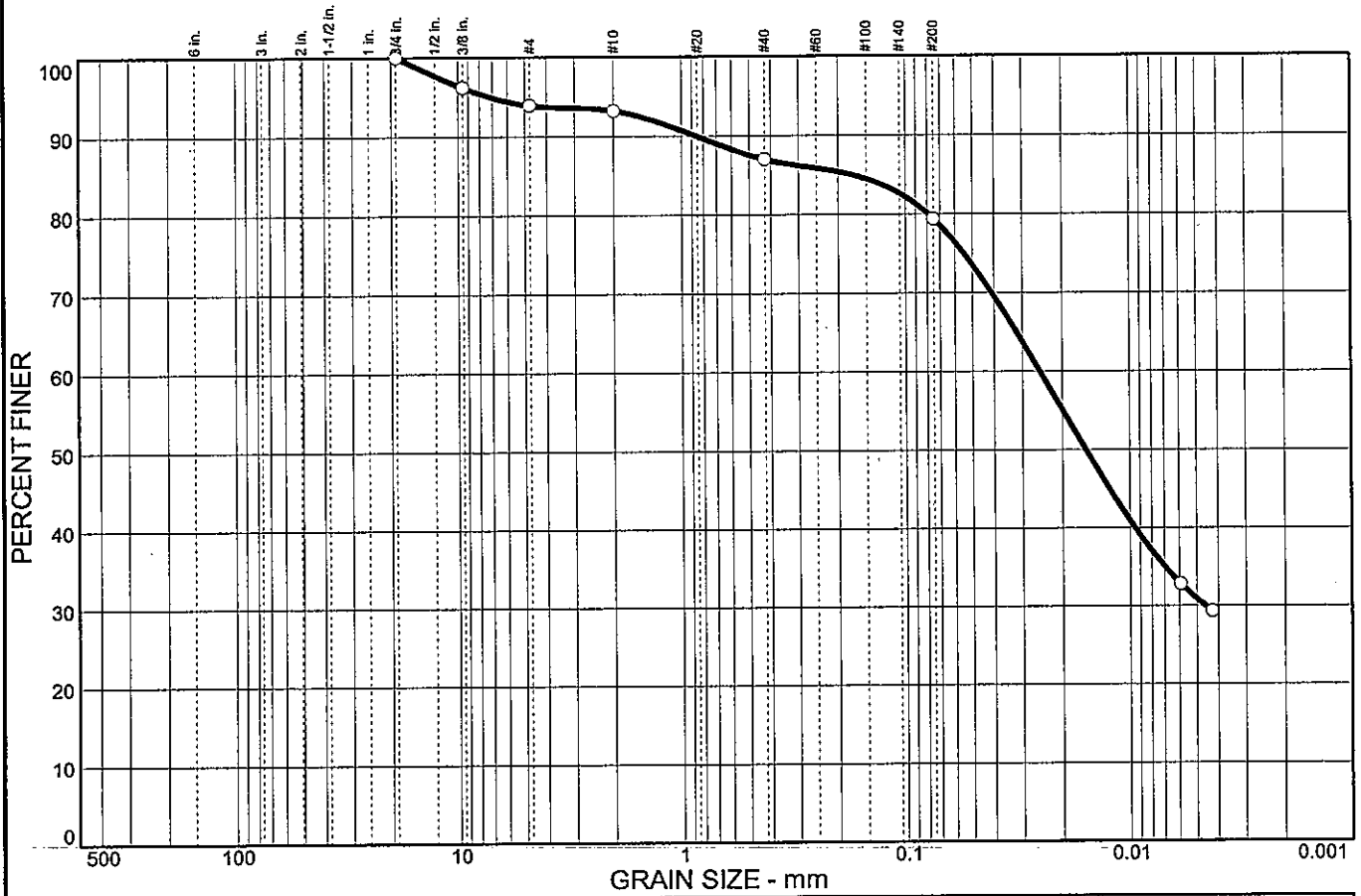


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	6.1	0.7	6.2	7.6	48.5	30.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	96.2		
#4	93.9		
#10	93.2		
#40	87.0		
#200	79.4		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 20      LL= 30      PI= 10

**Coefficients**

D<sub>85</sub>= 0.174      D<sub>60</sub>= 0.0251      D<sub>50</sub>= 0.0157  
D<sub>30</sub>= 0.0046      D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= CL              AASHTO= A-4(7)

**Remarks**

Moisture Content= 19.0%  
LOI (Organic Content)= 5.42%  
F.M.=0.10

\* (no specification provided)

Sample No.: 1  
Location:

Source of Sample: B-1150

Date: 8/20/05  
Elev./Depth: 1.0

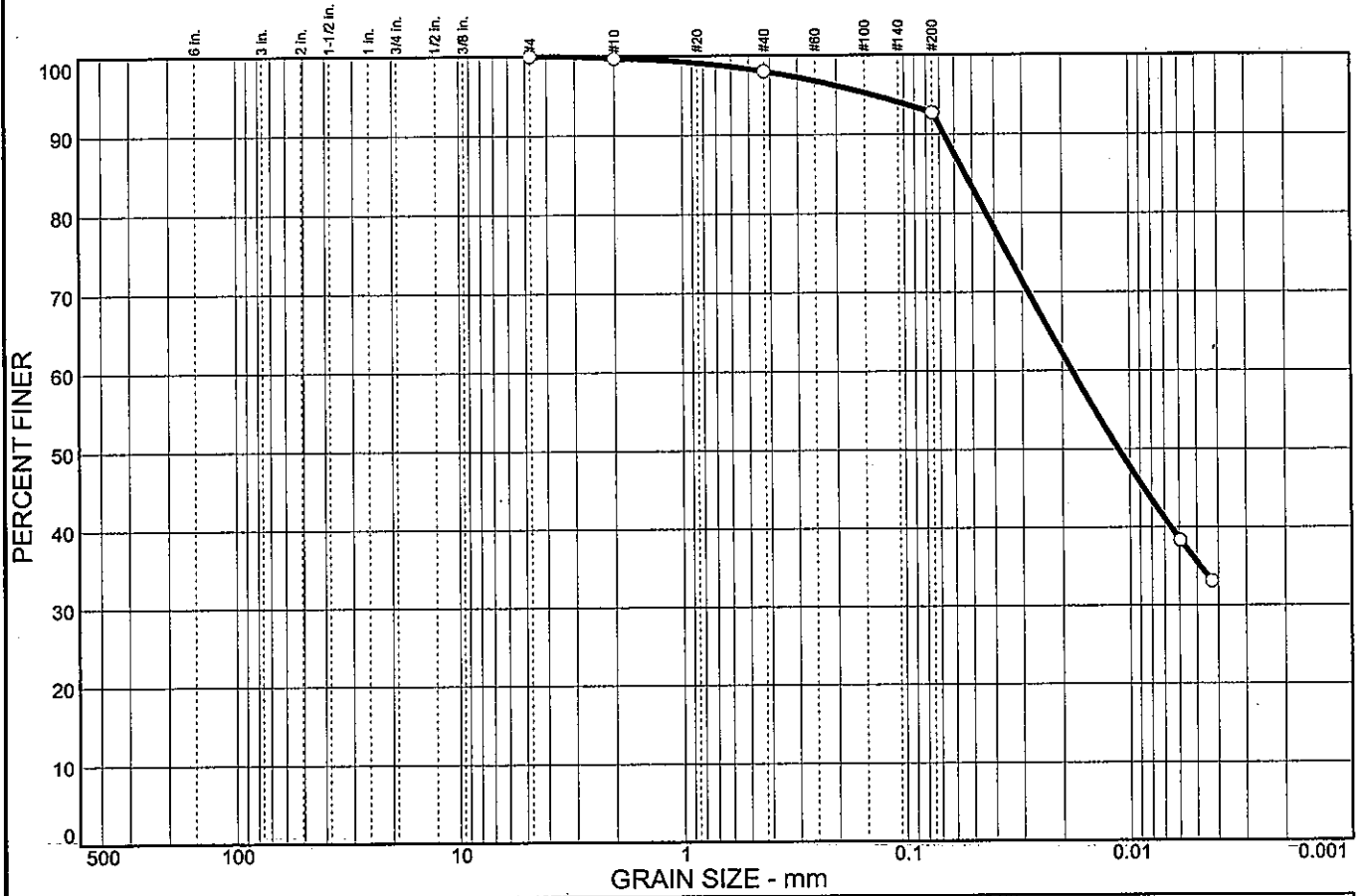


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.3	1.7	5.3	57.1	35.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#40	98.0		
#200	92.7		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 19      LL= 33      PI= 14

**Coefficients**

D<sub>85</sub>= 0.0539      D<sub>60</sub>= 0.0181      D<sub>50</sub>= 0.0112  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= CL              AASHTO= A-6(13)

**Remarks**

Moisture Content= 15.7%  
LOI (Organic Content)= 3.74%

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1150

Date: 8/20/05  
Elev./Depth: 3.0



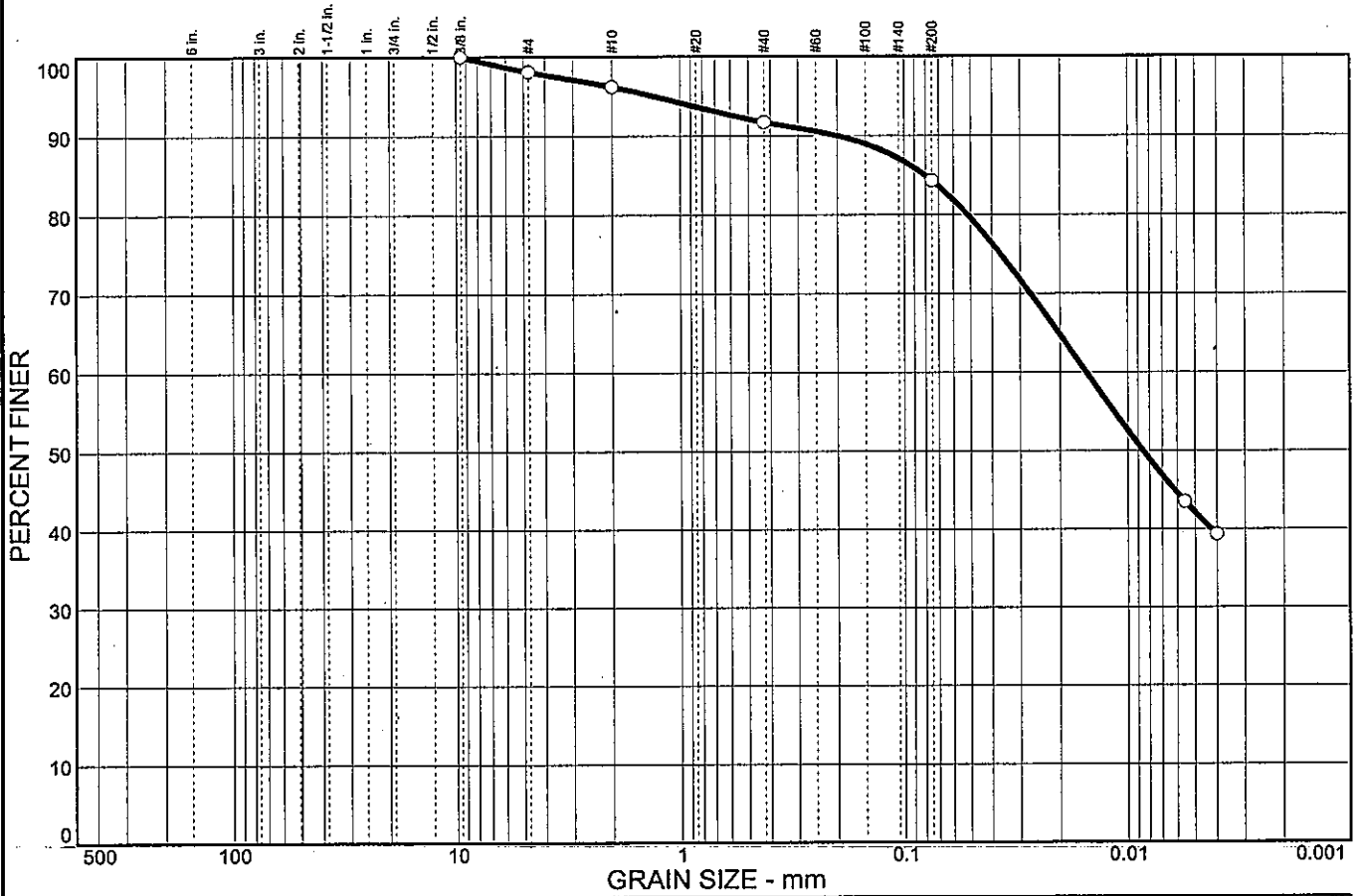
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	1.9	1.9	4.5	7.4	42.2	42.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	98.1		
#10	96.2		
#40	91.7		
#200	84.3		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 21      LL= 38      PI= 17

**Coefficients**

D<sub>85</sub>= 0.0808      D<sub>60</sub>= 0.0153      D<sub>50</sub>= 0.0086  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= CL              AASHTO= A-6(14)

**Remarks**

Moisture Content= 20.7%  
F.M.=0.02

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: B-1151

Date: 8/20/05  
Elev./Depth: 3.0

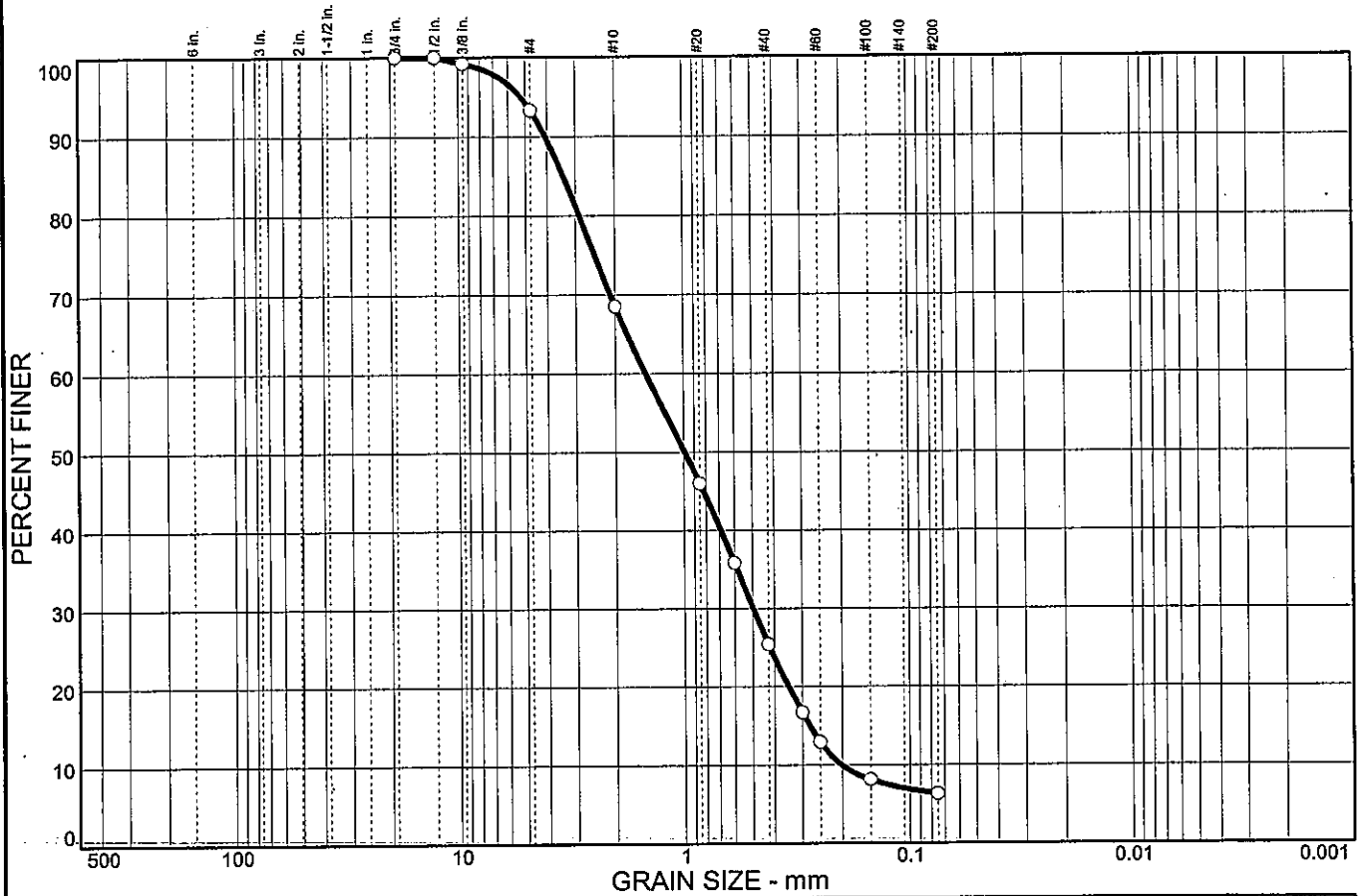


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	6.7	24.8	43.1	19.1	6.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.50 in.	100.0		
0.375 in.	99.2		
#4	93.3		
#10	68.5		
#20	46.0		
#30	35.8		
#40	25.4		
#50	16.7		
#60	12.9		
#100	8.1		
#200	6.3		

**Soil Description**

Poorly graded sand with silt

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 3.40      D<sub>60</sub>= 1.47      D<sub>50</sub>= 0.988  
D<sub>30</sub>= 0.497      D<sub>15</sub>= 0.278      D<sub>10</sub>= 0.202  
C<sub>u</sub>= 7.28      C<sub>c</sub>= 0.84

**Classification**

USCS= SP-SM      AASHTO= A-1-b

**Remarks**

Moisture Content= 4.4%  
F.M.=2.47

\* (no specification provided)

Sample No.: 4  
Location:

Source of Sample: B-1152

Date: 11/1/05  
Elev./Depth: 8.5



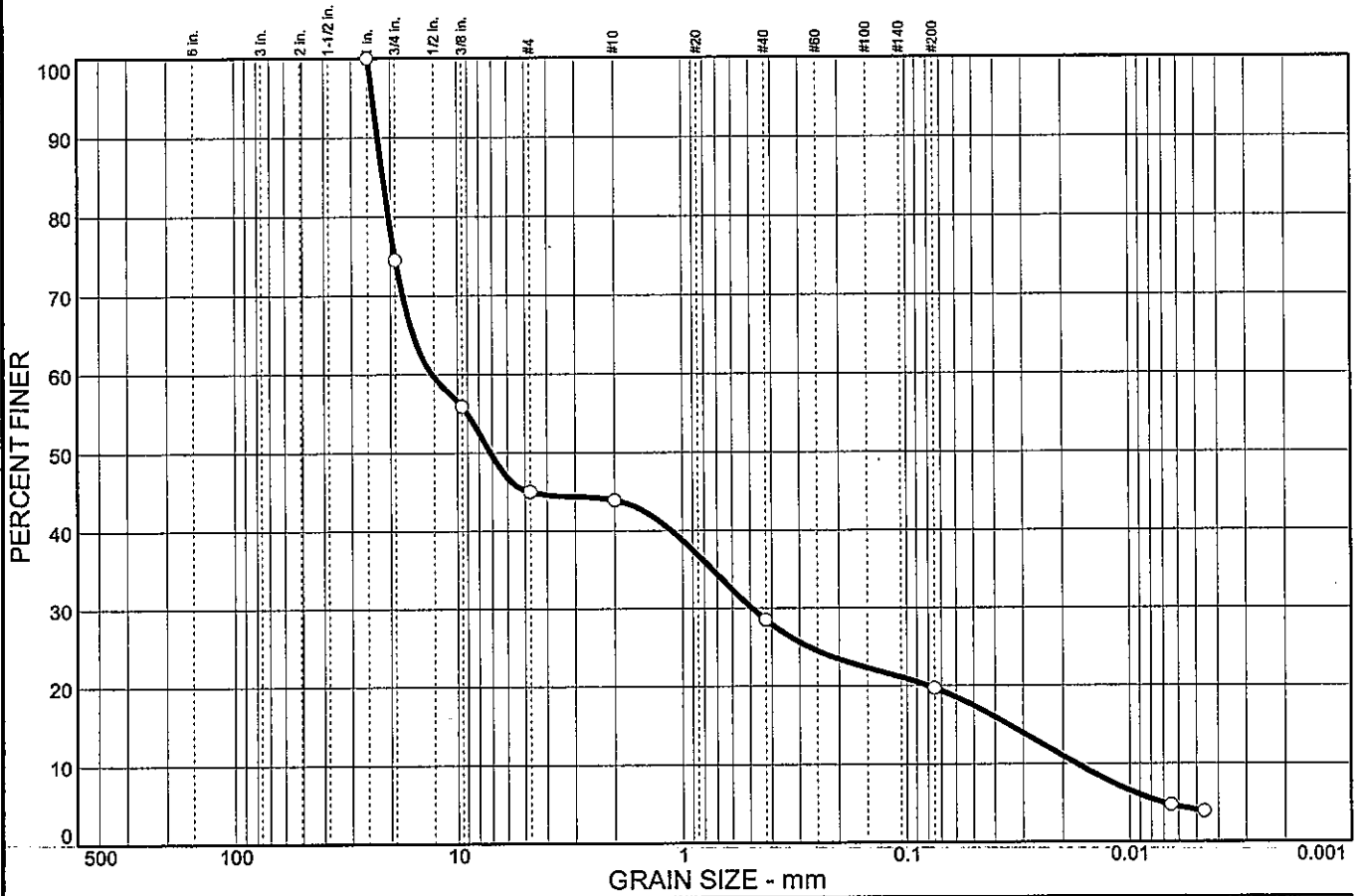
Client: TranSystems, Inc.  
Project: SCI-823-0.00

Project No: 0121-3070.03

Figure



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	25.5	29.5	1.1	15.4	8.8	15.6	4.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.00 in.	100.0		
0.75 in.	74.5		
0.375 in.	55.9		
#4	45.0		
#10	43.9		
#40	28.5		
#200	19.7		

**Soil Description**

Silty gravel with sand

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 21.7      D<sub>60</sub>= 13.0      D<sub>50</sub>= 7.12  
D<sub>30</sub>= 0.490      D<sub>15</sub>= 0.0348      D<sub>10</sub>= 0.0174  
C<sub>u</sub>= 748.18      C<sub>c</sub>= 1.06

**Classification**

USCS= GM      AASHTO= A-1-b

**Remarks**

Moisture Content= 9.0%  
F.M.=1.25

\* (no specification provided)

Sample No.: 5  
Location:

Source of Sample: TR-46

Date: 4/7/05  
Elev./Depth: 11.0



Client: TranSystems, Inc.  
Project: SCI-823-0.00

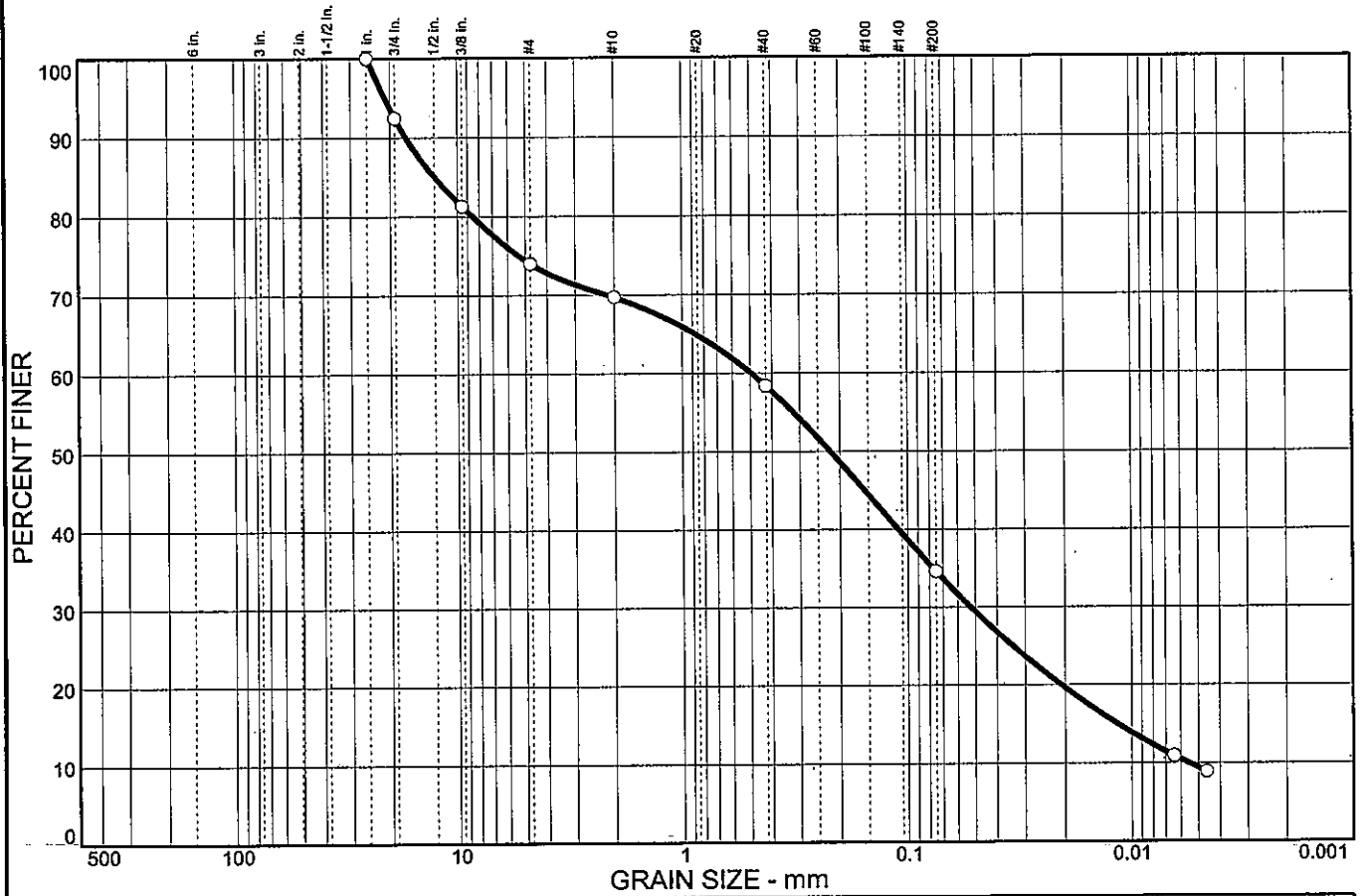
Project No: 0121-3070.03

Figure





# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	7.6	18.4	4.3	11.3	23.8	25.2	9.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.00 in.	100.0		
0.75 in.	92.4		
0.375 in.	81.3		
#4	74.0		
#10	69.7		
#40	58.4		
#200	34.6		

**Soil Description**

Silty, clayey sand with gravel

**Atterberg Limits**

PL= 18      LL= 23      PI= 5

**Coefficients**

D<sub>85</sub>= 12.7      D<sub>60</sub>= 0.493      D<sub>50</sub>= 0.221  
D<sub>30</sub>= 0.0525      D<sub>15</sub>= 0.0116      D<sub>10</sub>= 0.0055  
C<sub>u</sub>= 89.20      C<sub>c</sub>= 1.01

**Classification**

USCS= SC-SM      AASHTO= A-2-4(0)

**Remarks**

Moisture Content= 15.6%  
F.M.=0.52

\* (no specification provided)

Sample No.: 10  
Location:

Source of Sample: TR-46

Date: 4/7/05  
Elev./Depth: 23.5

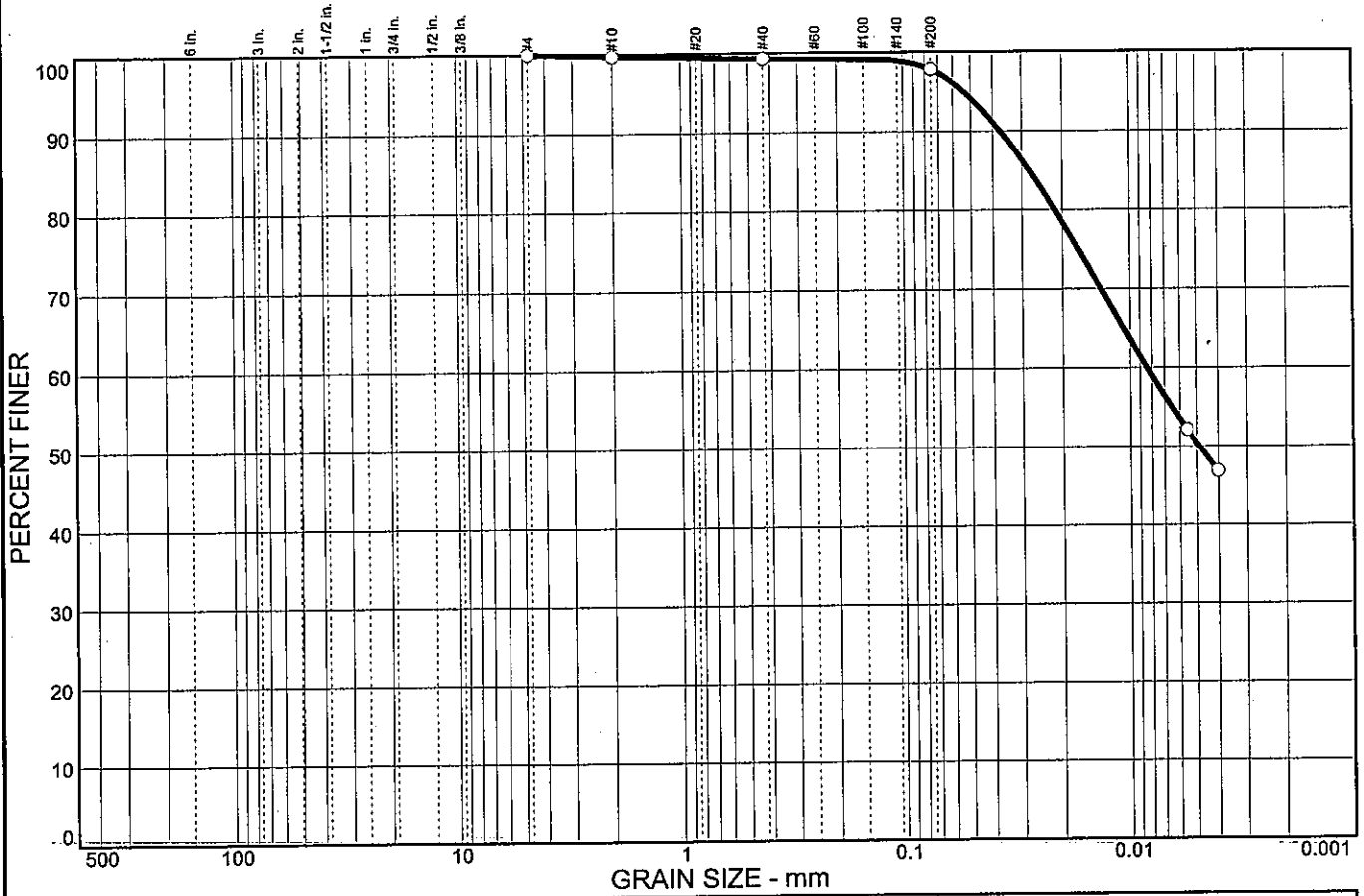


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.3	0.4	1.5	47.5	50.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#40	99.3		
#200	97.8		

**Soil Description**  
Lean clay

**Atterberg Limits**  
 PL= 21      LL= 42      PI= 21

**Coefficients**  
 D<sub>85</sub>= 0.0279      D<sub>60</sub>= 0.0084      D<sub>50</sub>= 0.0049  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
 USCS= CL              AASHTO= A-7-6(22)

**Remarks**  
 Moisture Content= 21.4%

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: TR-47

Date: 4/11/05  
Elev./Depth: 6.0

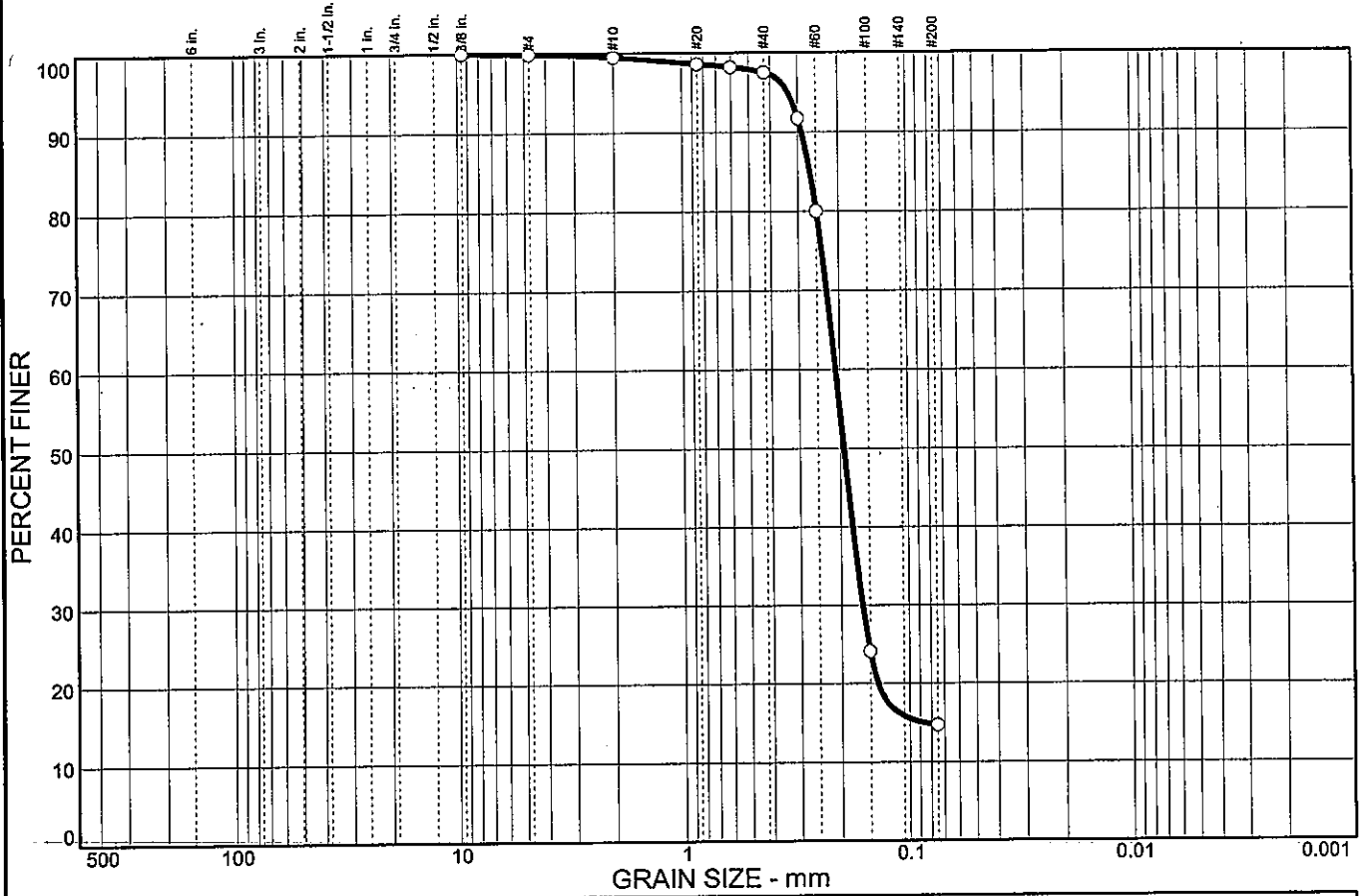


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.1	0.4	2.0	82.8	14.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.9		
#10	99.5		
#20	98.6		
#30	98.2		
#40	97.5		
#50	91.7		
#60	80.0		
#100	24.1		
#200	14.7		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 0.266      D<sub>60</sub>= 0.209      D<sub>50</sub>= 0.193  
 D<sub>30</sub>= 0.161      D<sub>15</sub>= 0.0864      D<sub>10</sub>=  
 C<sub>u</sub>=                  C<sub>c</sub>=

**Classification**  
 USCS= SM                  AASHTO= A-2-4(0)

**Remarks**  
 Moisture Content= 35.5%  
 F.M.=0.86

\* (no specification provided)

Sample No.: 6  
Location:

Source of Sample: TR-47

Date: 4/23/05  
Elev./Depth: 13.5

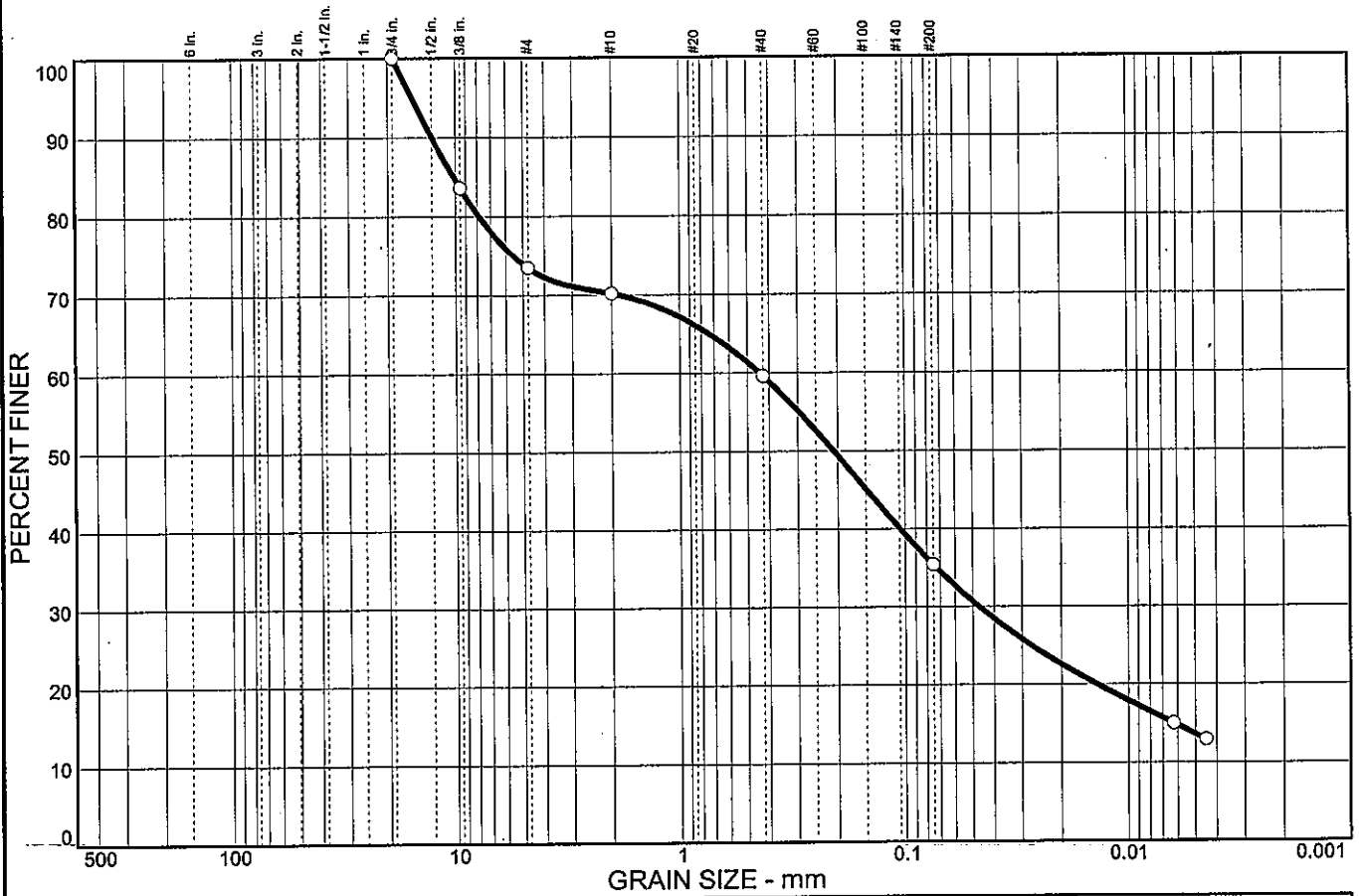


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	26.5	3.3	10.6	24.2	21.8	13.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	83.6		
#4	73.5		
#10	70.2		
#40	59.6		
#200	35.4		

**Soil Description**

Silty, clayey sand with gravel

**Atterberg Limits**

PL= 18      LL= 24      PI= 6

**Coefficients**

D<sub>85</sub>= 10.2      D<sub>60</sub>= 0.440      D<sub>50</sub>= 0.208  
D<sub>30</sub>= 0.0468      D<sub>15</sub>= 0.0062      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC-SM      AASHTO= A-2-4(0)

**Remarks**

Moisture Content= 17.2%  
F.M.=0.43

\* (no specification provided)

Sample No.: 8  
Location:

Source of Sample: TR-47

Date: 4/11/05  
Elev./Depth: 18.5

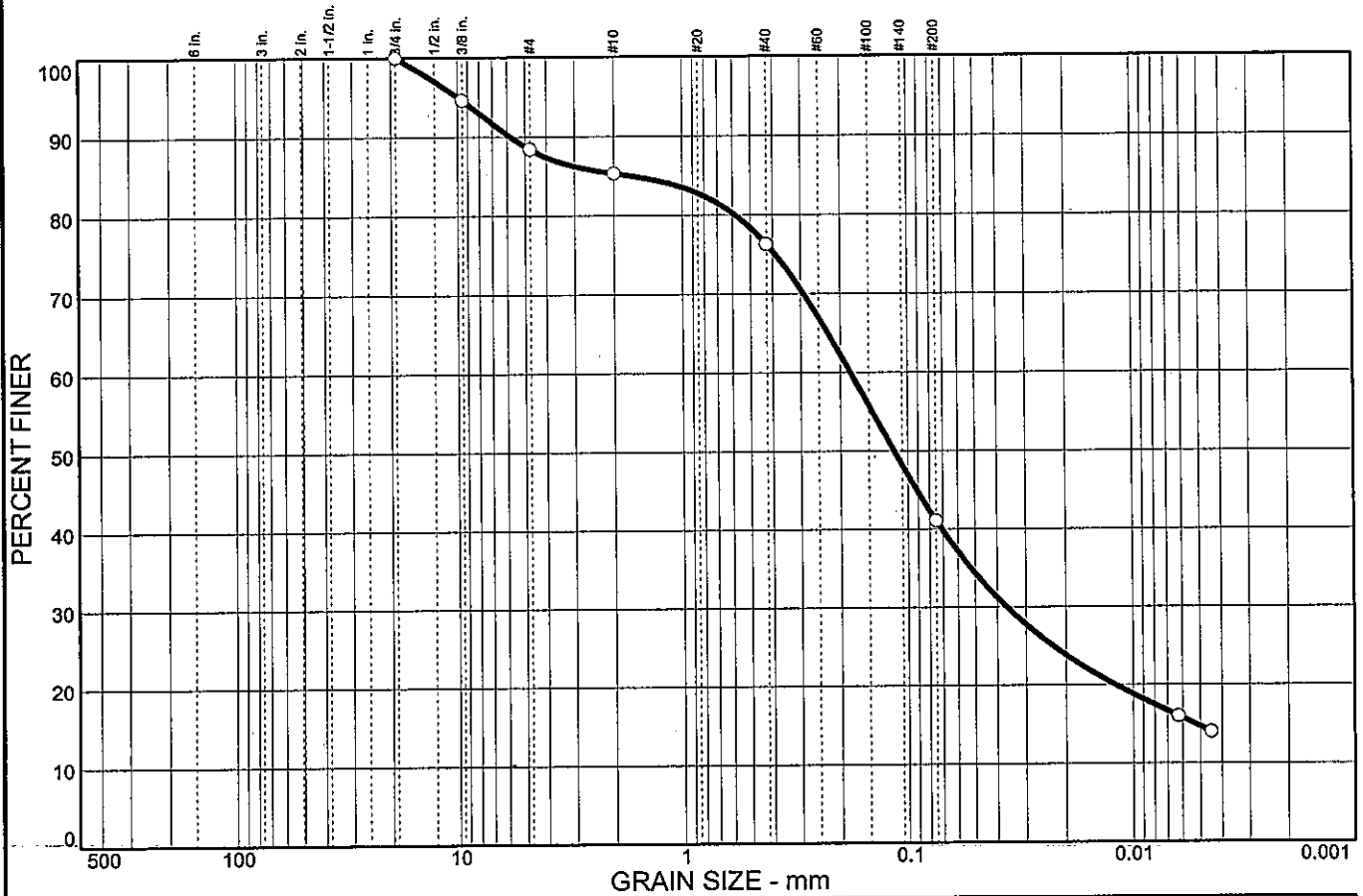


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	11.6	3.1	9.0	35.2	26.4	14.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	94.6		
#4	88.4		
#10	85.3		
#40	76.3		
#200	41.1		

**Soil Description**

Silty, clayey sand

**Atterberg Limits**

PL= 16      LL= 22      PI= 6

**Coefficients**

D<sub>85</sub>= 1.70      D<sub>60</sub>= 0.181      D<sub>50</sub>= 0.115  
D<sub>30</sub>= 0.0364      D<sub>15</sub>= 0.0053      D<sub>10</sub>=  
C<sub>u</sub>=                  C<sub>c</sub>=

**Classification**

USCS= SC-SM      AASHTO= A-4(0)

**Remarks**

Moisture Content= 15.1%  
F.M.=0.17

\* (no specification provided)

Sample No.: 9  
Location:

Source of Sample: TR-47

Date: 4/11/05  
Elev./Depth: 21.0

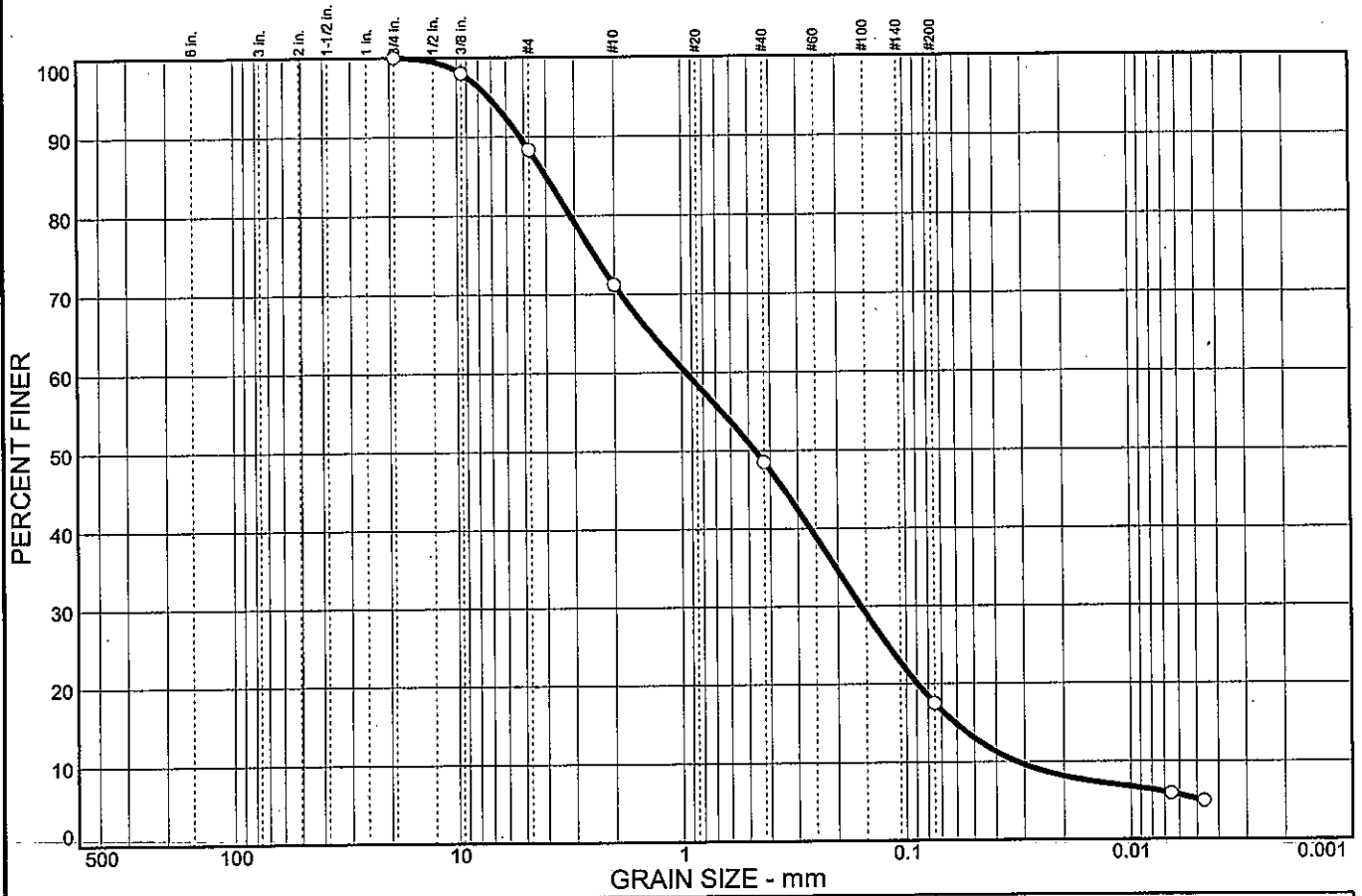


Client: TranSystems, Inc.  
Project: SCI-823-0.00

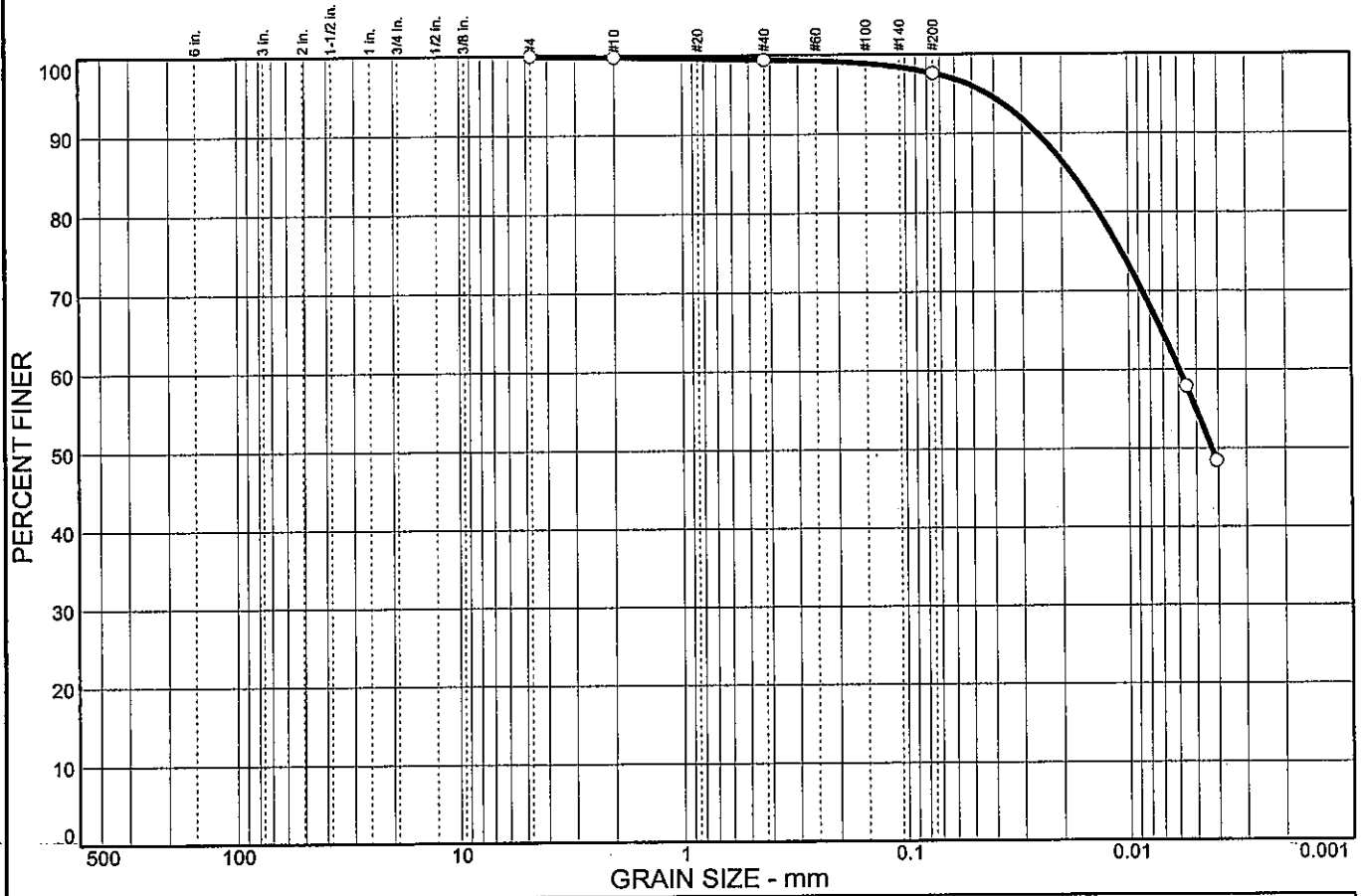
Project No: 0121-3070.03

Figure

# PARTICLE SIZE DISTRIBUTION TEST REPORT



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.2	0.4	1.8	42.7	54.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.8		
#40	99.4		
#200	97.6		

**Soil Description**  
Lean clay

**Atterberg Limits**  
 PL= 23      LL= 49      PI= 26

**Coefficients**  
 D<sub>85</sub>= 0.0181      D<sub>60</sub>= 0.0059      D<sub>50</sub>= 0.0043  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
 USCS= CL      AASHTO= A-7-6(29)

**Remarks**  
 Moisture Content= 23.5%

\* (no specification provided)

Sample No.: 4  
Location:

Source of Sample: TR-48

Date: 4/15/05  
Elev./Depth: 8.5



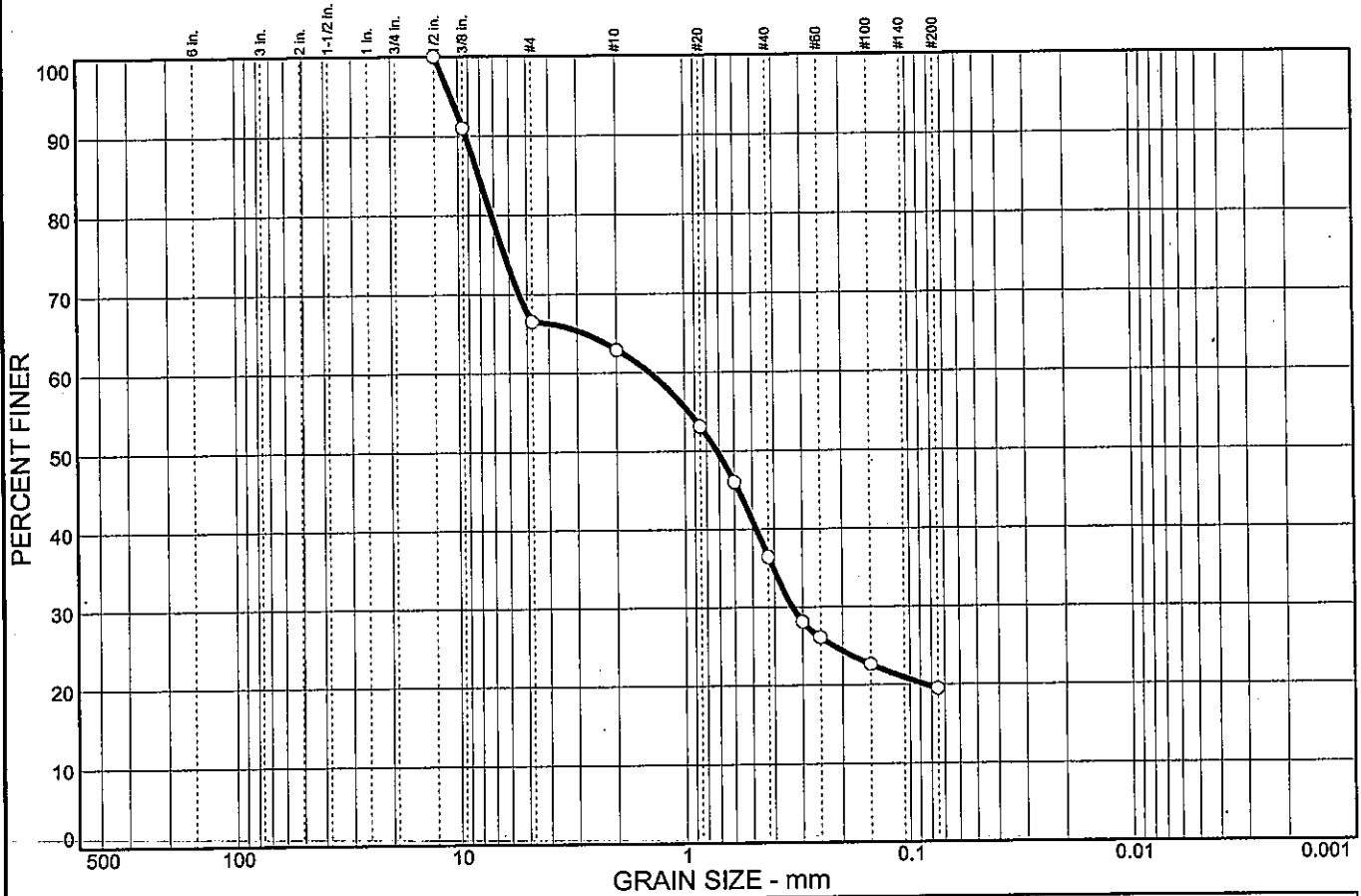
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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Figure



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	33.5	3.6	26.5	16.9	19.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.50 in.	100.0		
0.375 in.	91.0		
#4	66.5		
#10	62.9		
#20	53.1		
#30	46.0		
#40	36.4		
#50	28.1		
#60	26.1		
#100	22.6		
#200	19.5		

**Soil Description**

Silty sand with gravel

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 8.51      D<sub>60</sub>= 1.42      D<sub>50</sub>= 0.718  
D<sub>30</sub>= 0.332      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SM      AASHTO= A-1-b

**Remarks**

Moisture Content= 18.7%  
F.M.=2.46

\* (no specification provided)

Sample No.: 7  
Location:

Source of Sample: TR-48

Date: 4/15/05  
Elev./Depth: 16.0

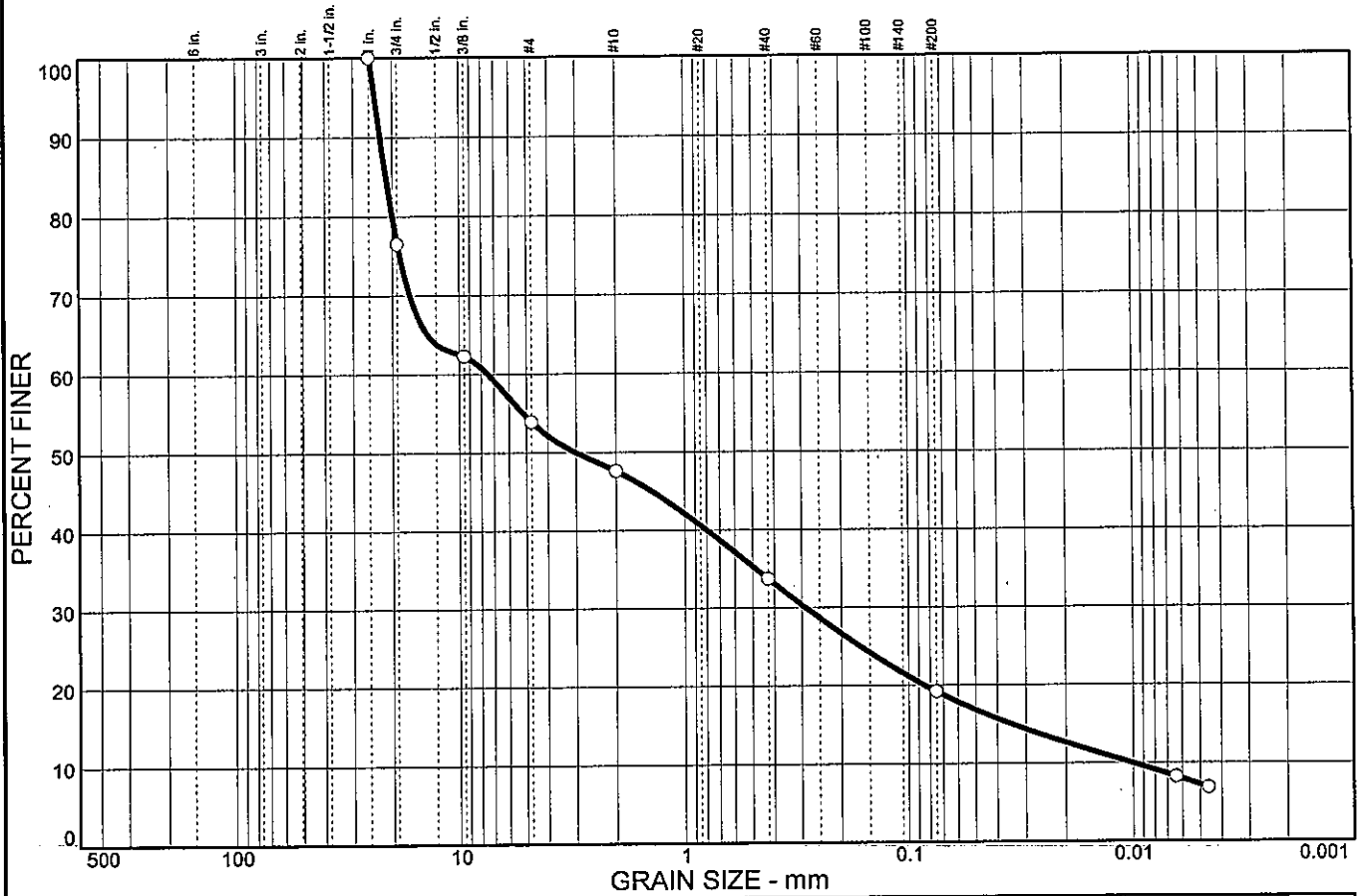


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Figure

# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	23.5	22.6	6.3	13.9	14.5	12.0	7.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.00 in.	100.0		
0.75 in.	76.5		
0.375 in.	62.3		
#4	53.9		
#10	47.6		
#40	33.7		
#200	19.2		

**Soil Description**

Silty gravel with sand

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 21.4      D<sub>60</sub>= 7.47      D<sub>50</sub>= 3.02  
D<sub>30</sub>= 0.289      D<sub>15</sub>= 0.0348      D<sub>10</sub>= 0.0101  
C<sub>u</sub>= 736.20      C<sub>c</sub>= 1.10

**Classification**

USCS= GM      AASHTO= A-1-b

**Remarks**

Moisture Content= 15.2%  
F.M.=1.07

\* (no specification provided)

Sample No.: 8  
Location:

Source of Sample: TR-48

Date: 4/15/05  
Elev./Depth: 18.5

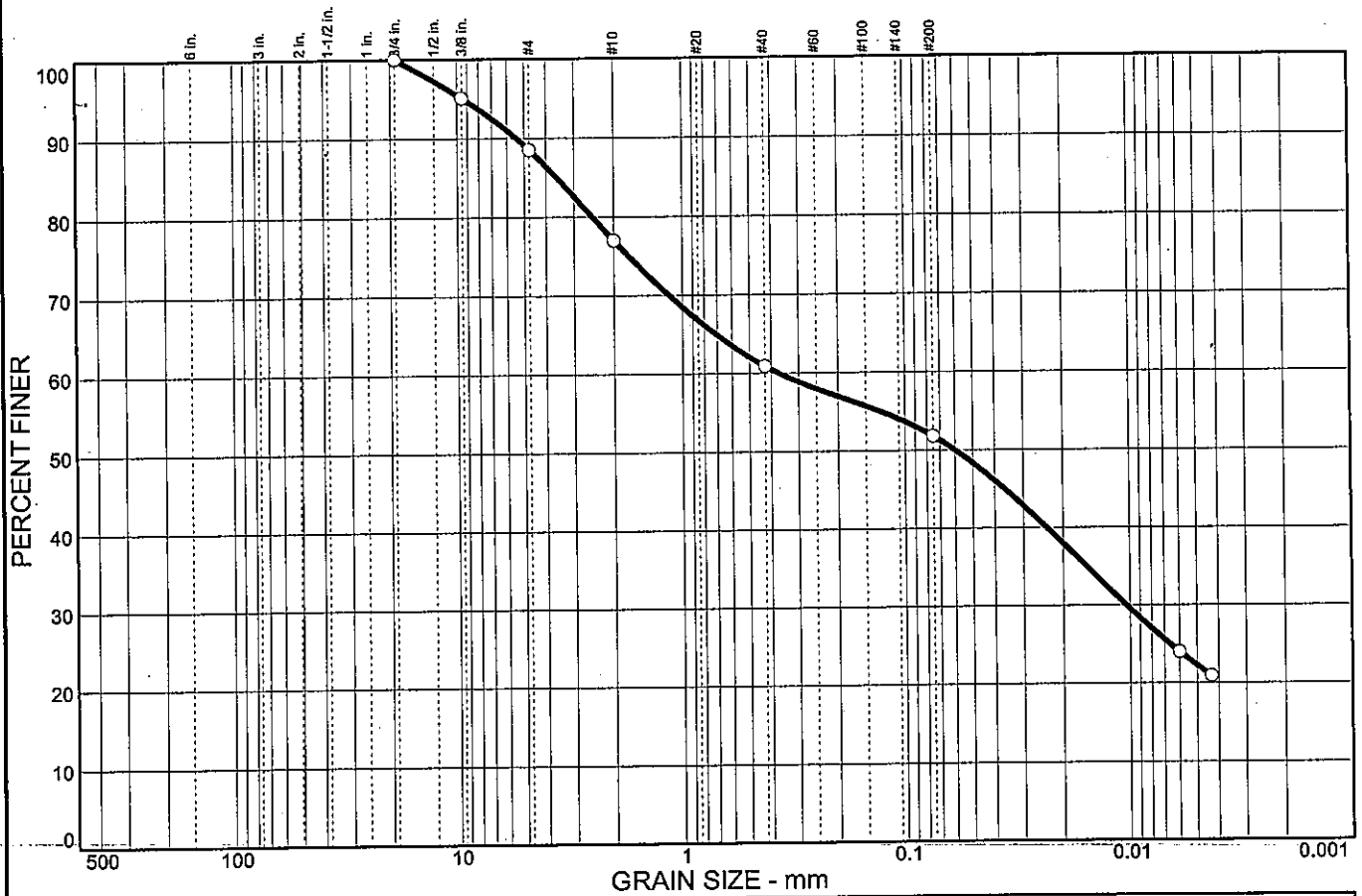


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Project: SCI-823-0.00

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	11.5	11.5	16.1	9.1	29.5	22.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	95.1		
#4	88.5		
#10	77.0		
#40	60.9		
#200	51.8		

**Soil Description**  
Sandy silt

**Atterberg Limits**  
 PL= 18      LL= 20      PI= 2

**Coefficients**  
 D<sub>85</sub>= 3.59      D<sub>60</sub>= 0.368      D<sub>50</sub>= 0.0600  
 D<sub>30</sub>= 0.0104      D<sub>15</sub>=      D<sub>10</sub>=  
 C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
 USCS= ML      AASHTO= A-4(0)

**Remarks**  
 Moisture Content= 16.8%  
 F.M.=0.16

\* (no specification provided)

Sample No.: 5  
Location:

Source of Sample: TR-49A

Date: 4/15/05  
Elev./Depth: 11.0

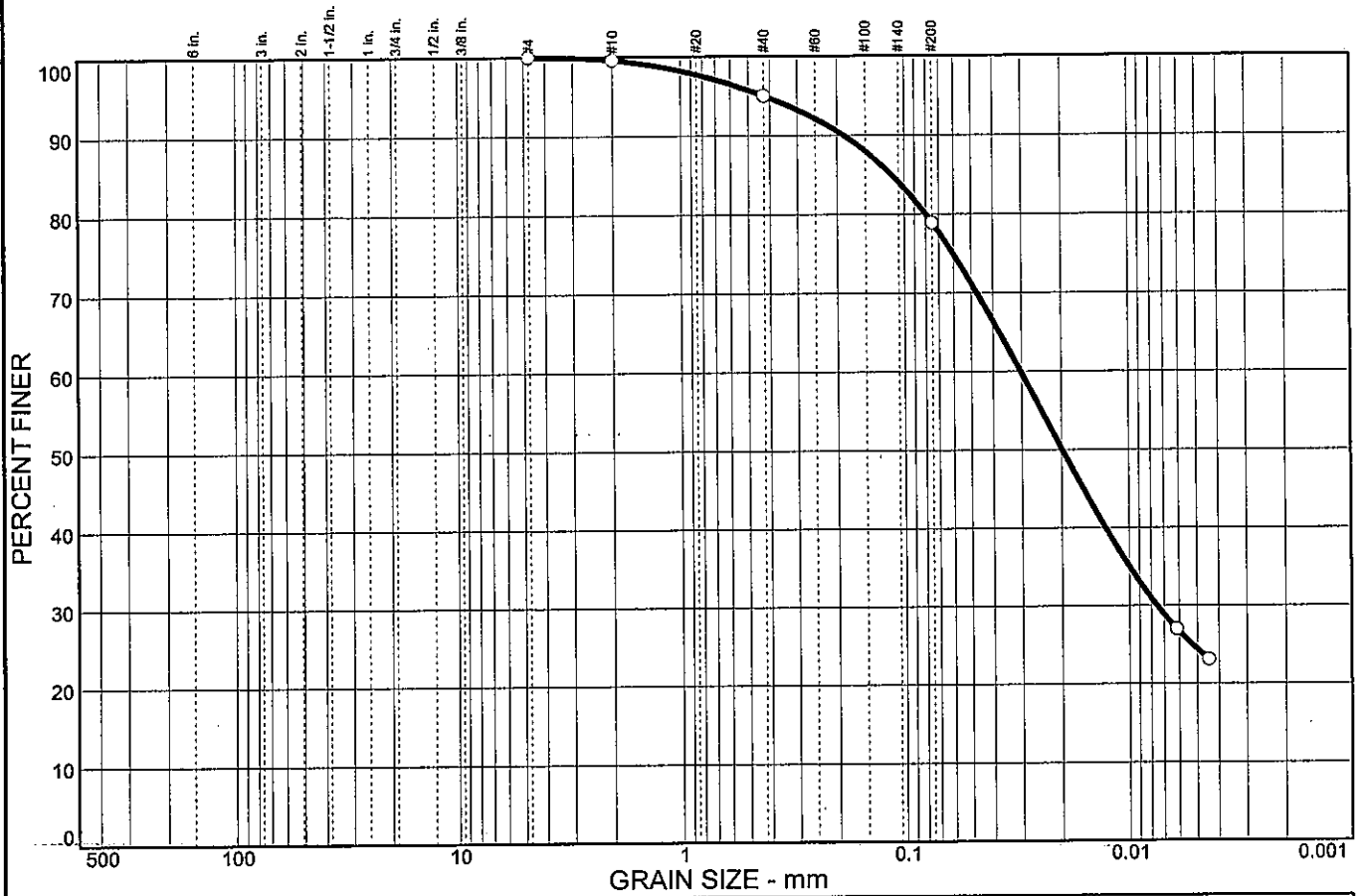


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Project: SCI-823-0.00

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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	4.6	16.1	54.4	24.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.6		
#40	95.0		
#200	78.9		

**Soil Description**

Lean clay with sand

**Atterberg Limits**

PL= 17      LL= 28      PI= 11

**Coefficients**

D<sub>85</sub>= 0.114      D<sub>60</sub>= 0.0303      D<sub>50</sub>= 0.0198  
D<sub>30</sub>= 0.0075      D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                  C<sub>c</sub>=

**Classification**

USCS= CL                  AASHTO= A-6(7)

**Remarks**

Moisture Content= 23.2%

\* (no specification provided)

Sample No.: 6  
Location:

Source of Sample: TR-49A

Date: 4/15/05  
Elev./Depth: 13.5

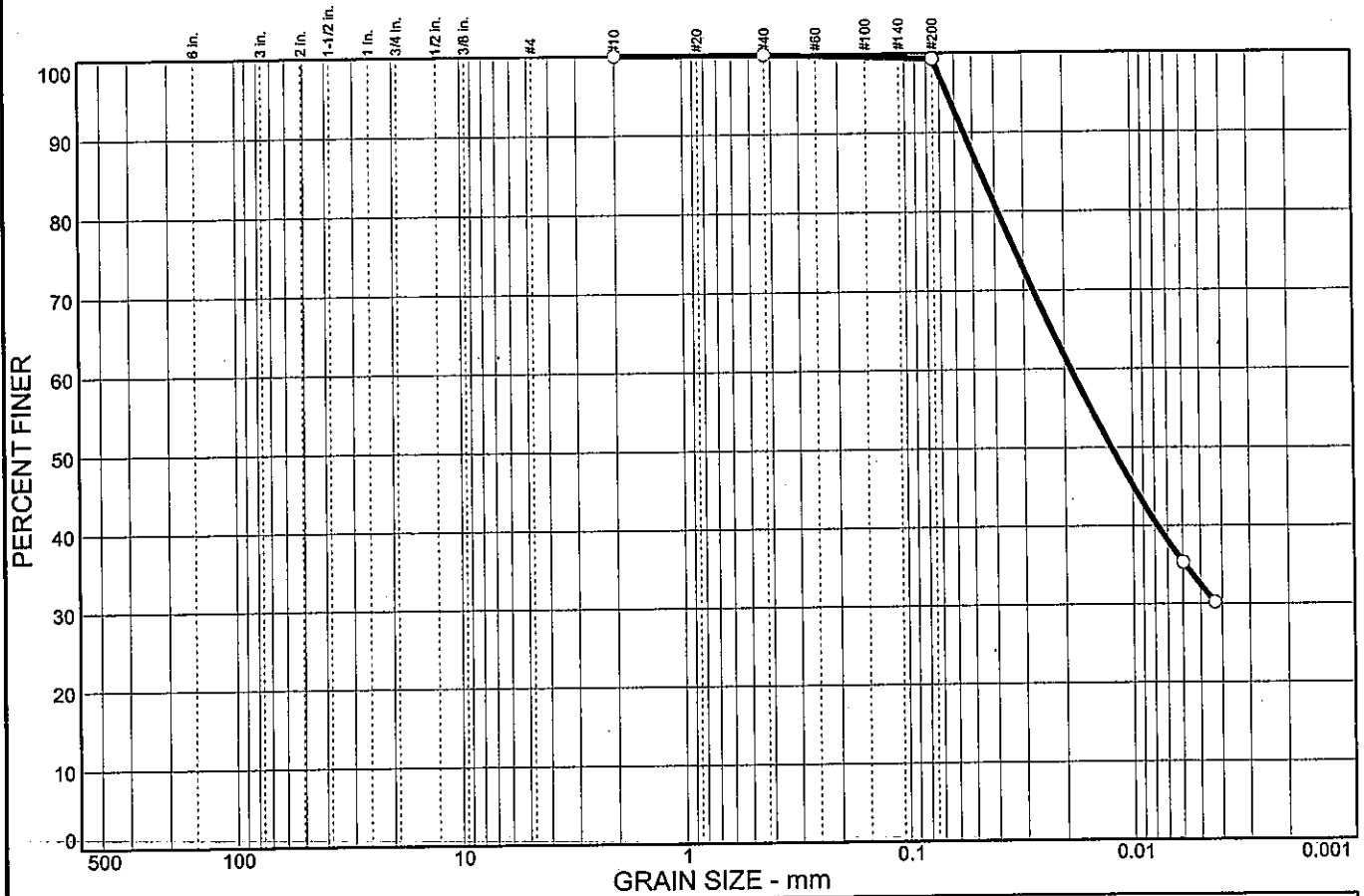


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Figure

# 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	0.7	66.8	32.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	100.0		
#200	99.3		

**Soil Description**  
Lean clay

**Atterberg Limits**  
 PL= 20      LL= 34      PI= 14

**Coefficients**  
 D<sub>85</sub>= 0.0461      D<sub>60</sub>= 0.0187      D<sub>50</sub>= 0.0124  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                  C<sub>c</sub>=

**Classification**  
 USCS= CL              AASHTO= A-6(14)

**Remarks**  
 Moisture Content= 26.8%

\* (no specification provided)

Sample No.: 7  
Location:

Source of Sample: TR-49A

Date: 4/15/05  
Elev./Depth: 16.0

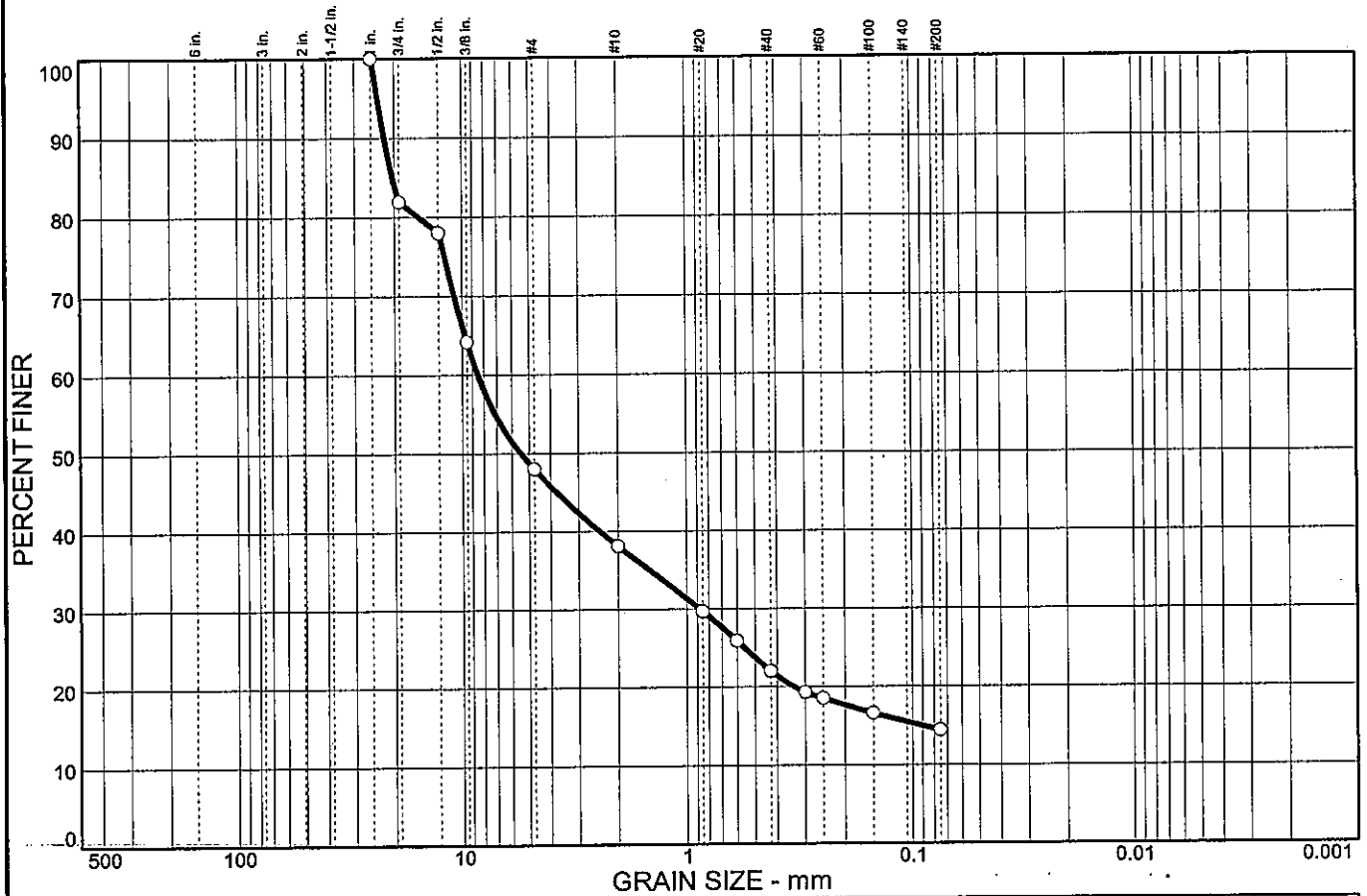


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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Figure

# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	18.1	33.9	9.9	16.1	7.6	14.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.00 in.	100.0		
0.75 in.	81.9		
0.50 in.	78.0		
0.375 in.	64.2		
#4	48.0		
#10	38.1		
#20	29.7		
#30	25.9		
#40	22.0		
#50	19.3		
#60	18.5		
#100	16.6		
#200	14.4		

**Soil Description**

Silty gravel with sand

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 20.5      D<sub>60</sub>= 8.50      D<sub>50</sub>= 5.47  
D<sub>30</sub>= 0.875      D<sub>15</sub>= 0.0914      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= GM      AASHTO= A-1-a

**Remarks**

Moisture Content= 9.9%  
F.M.=3.44

\* (no specification provided)

Sample No.: 9  
Location:

Source of Sample: TR-49A

Date: 4/15/05  
Elev./Depth: 21.0

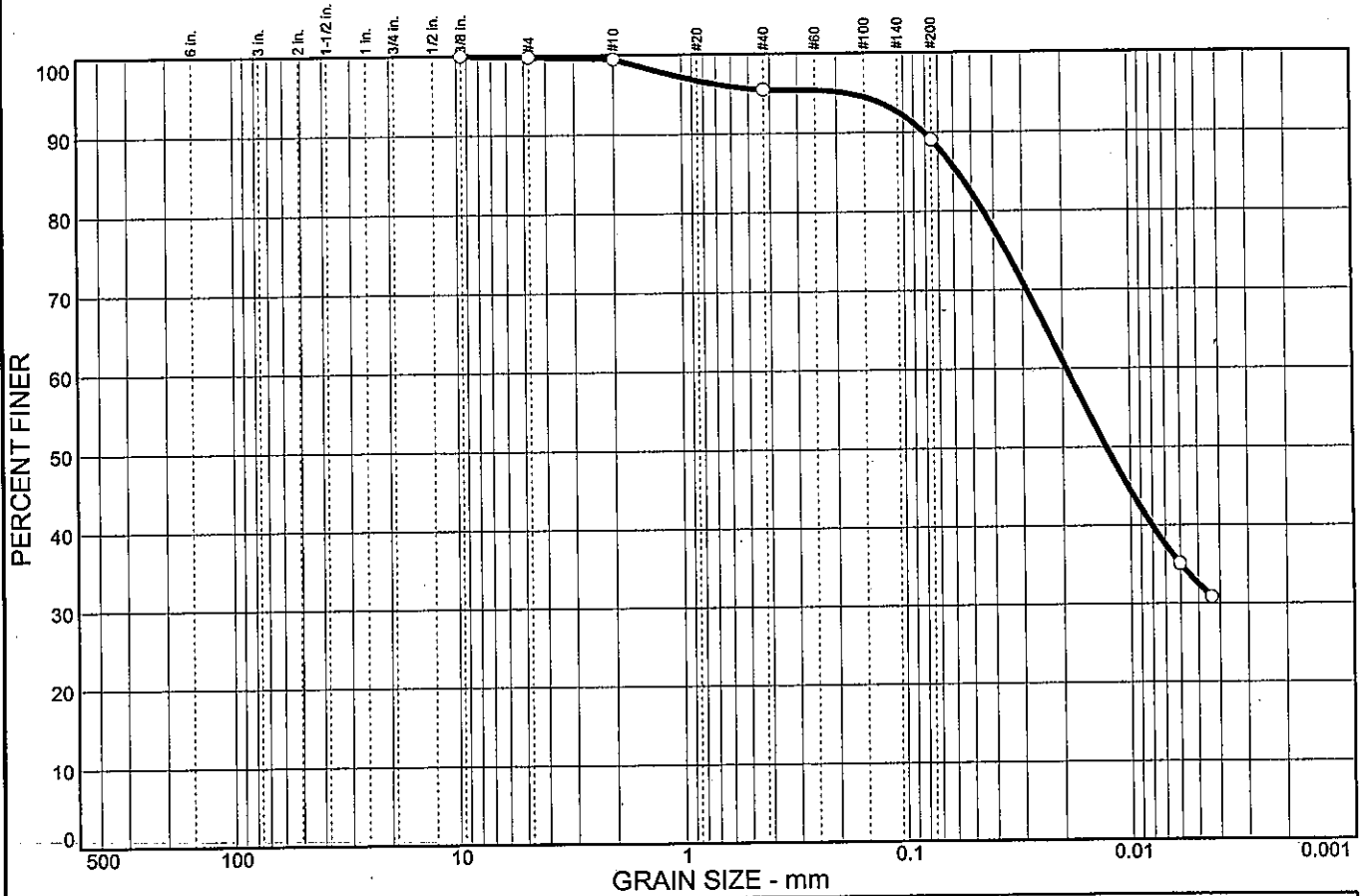


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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Figure

# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.2	0.3	4.0	6.5	56.5	32.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.8		
#10	99.5		
#40	95.5		
#200	89.0		

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 19      LL= 33      PI= 14

**Coefficients**

D<sub>85</sub>= 0.0578      D<sub>60</sub>= 0.0192      D<sub>50</sub>= 0.0128  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-6(12)

**Remarks**

Moisture Content= 22.9%  
 F.M.=0.00

\* (no specification provided)

Sample No.: 4  
 Location:

Source of Sample: TR-50A

Date: 4/13/05  
 Elev./Depth: 8.5



Client: TranSystems, Inc.  
 Project: SCI-823-0.00

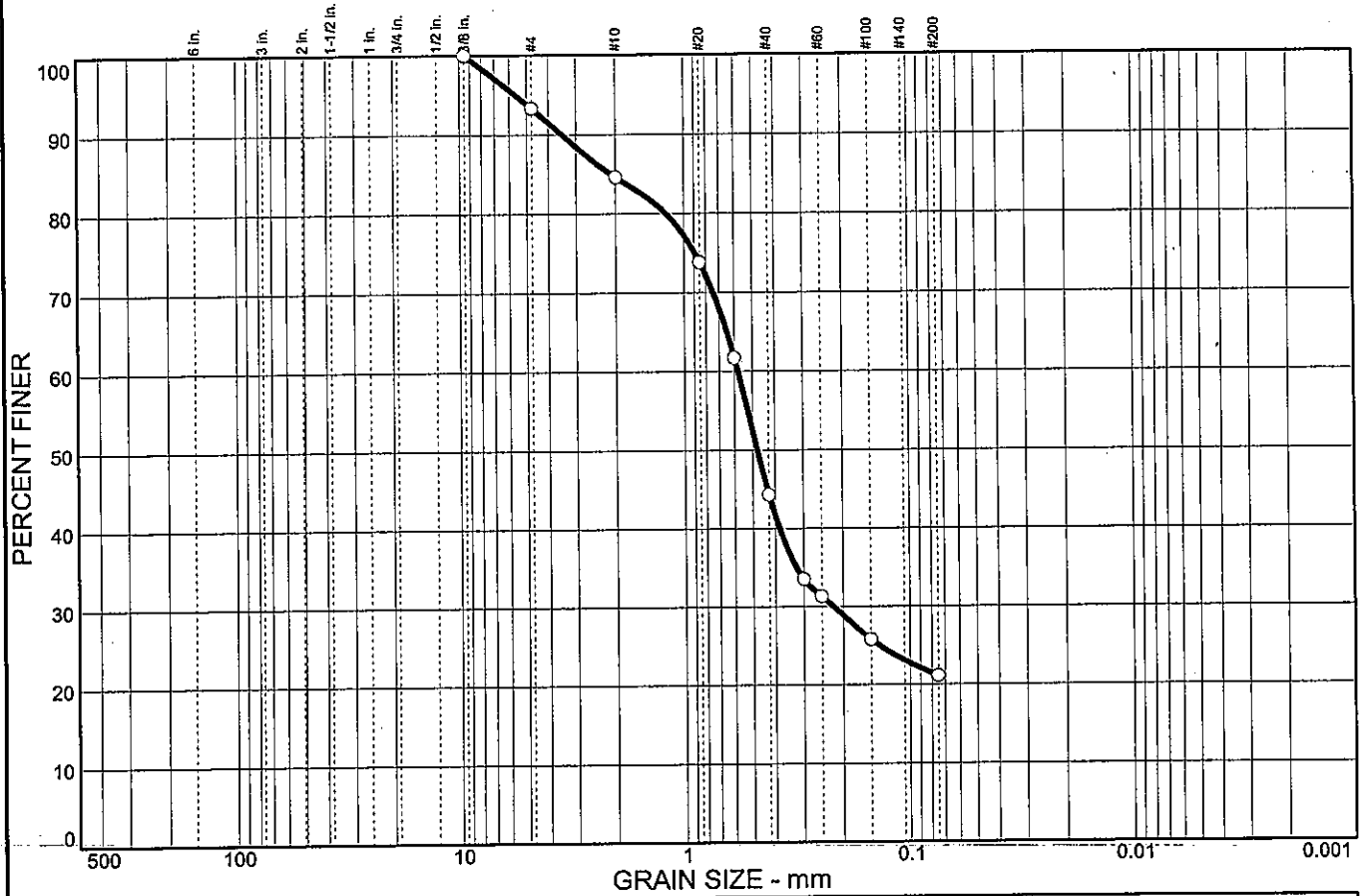
Project No: 0121-3070.03

Figure





# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	6.7	8.7	40.3	23.2	21.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	93.3		
#10	84.6		
#20	73.8		
#30	61.7		
#40	44.3		
#50	33.5		
#60	31.3		
#100	25.8		
#200	21.1		

**Soil Description**

Silty sand

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 2.10      D<sub>60</sub>= 0.579      D<sub>50</sub>= 0.477  
D<sub>30</sub>= 0.221      D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= SM              AASHTO= A-1-b

**Remarks**

Moisture Content= 20.7%  
F.M.=1.86

\* (no specification provided)

Sample No.: 8  
Location:

Source of Sample: TR-50A

Date: 4/15/05  
Elev./Depth: 18.5

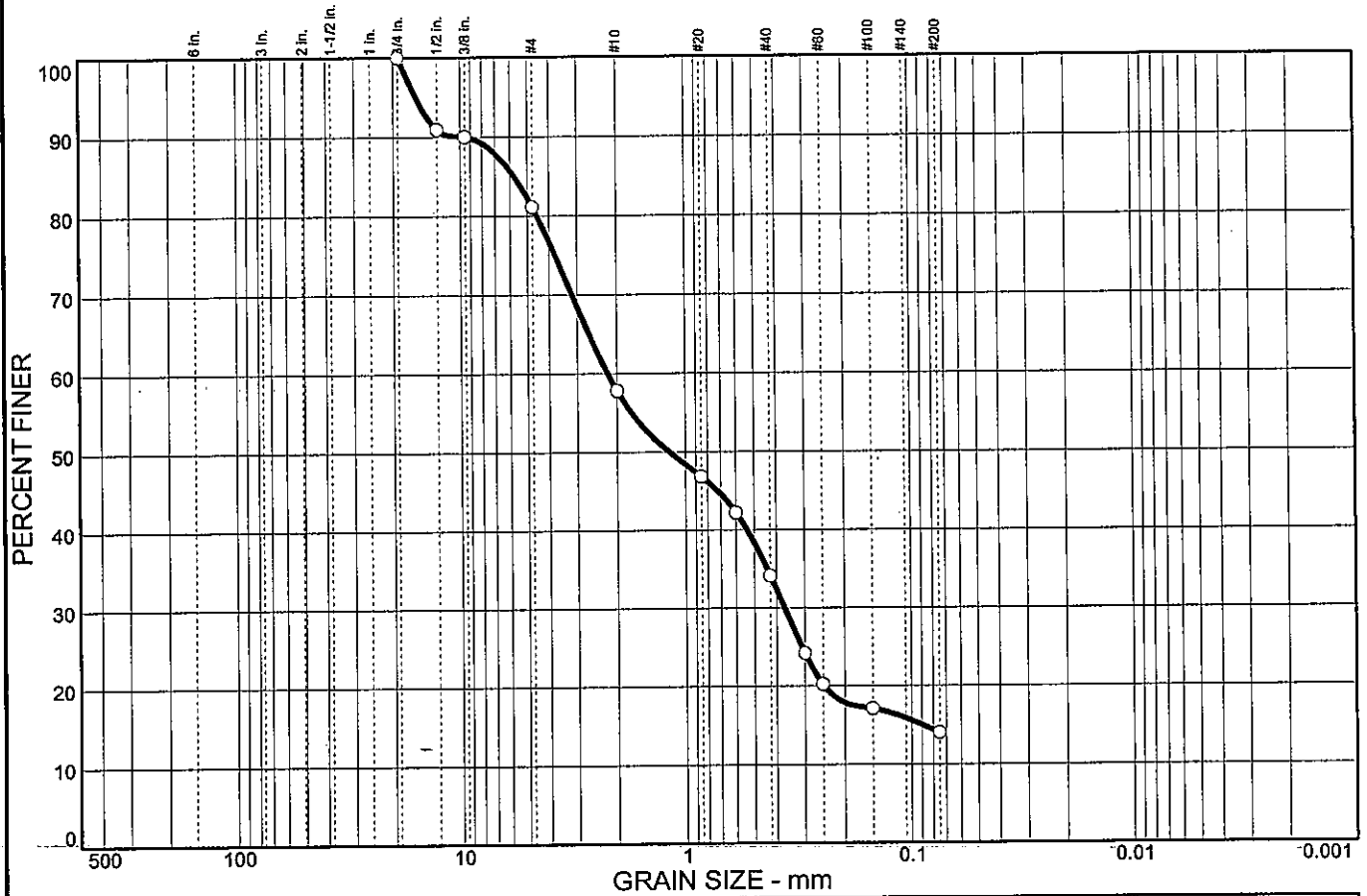


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	18.9	23.3	23.7	20.1	14.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.50 in.	90.9		
0.375 in.	90.0		
#4	81.1		
#10	57.8		
#20	46.8		
#30	42.2		
#40	34.1		
#50	24.2		
#60	20.2		
#100	17.1		
#200	14.0		

**Soil Description**

Silty sand with gravel

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 5.74      D<sub>60</sub>= 2.20      D<sub>50</sub>= 1.18  
D<sub>30</sub>= 0.369      D<sub>15</sub>= 0.0896      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SM      AASHTO= A-1-b

**Remarks**

Moisture Content= 12.4%  
F.M.=2.45

\* (no specification provided)

Sample No.: 9  
Location:

Source of Sample: TR-50A

Date: 4/15/05  
Elev./Depth: 21.0

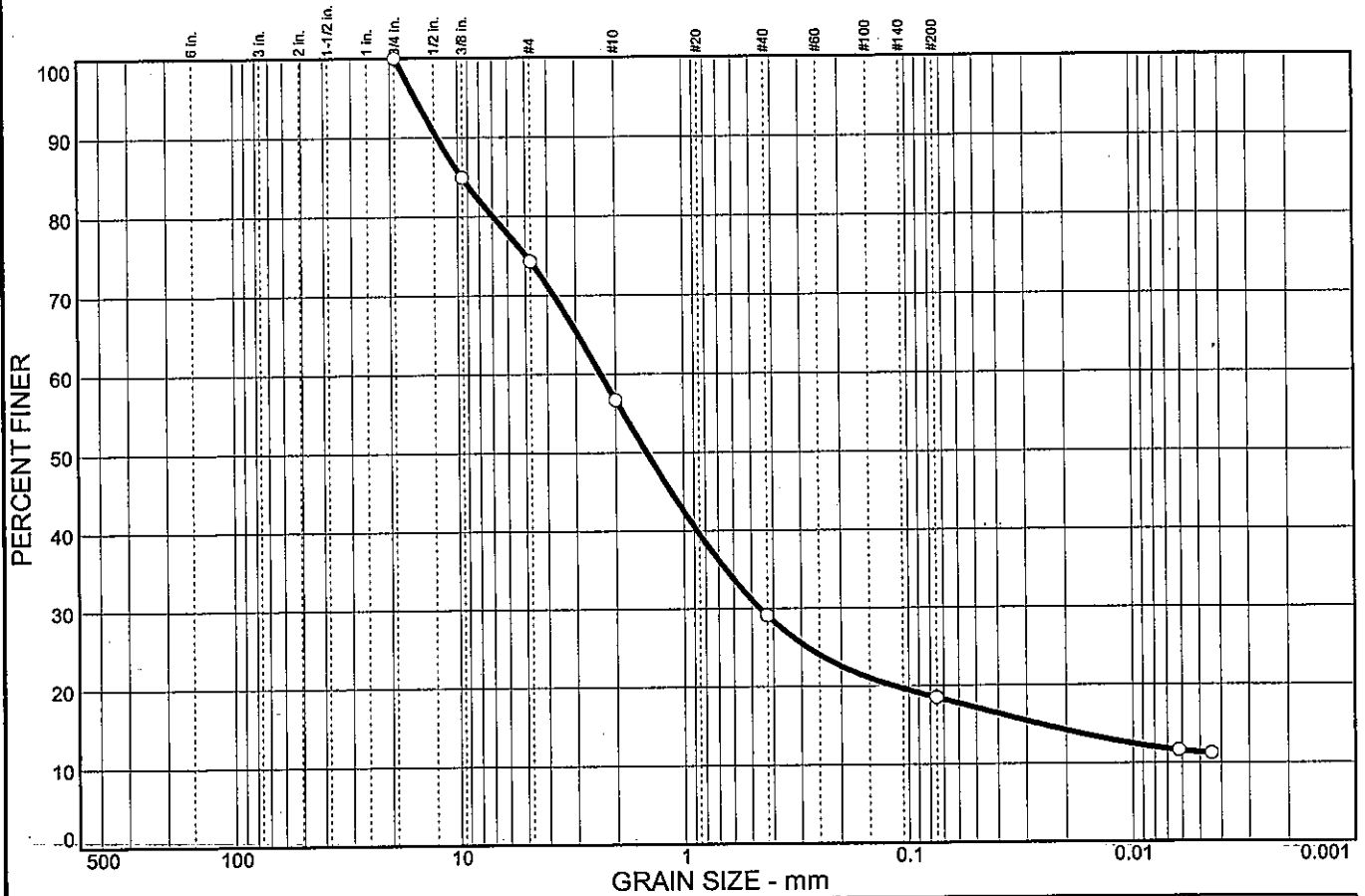


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	25.7	17.6	27.6	10.6	7.2	11.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	84.9		
#4	74.3		
#10	56.7		
#40	29.1		
#200	18.5		

**Soil Description**

Silty sand with gravel

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 9.58      D<sub>60</sub>= 2.33      D<sub>50</sub>= 1.46  
D<sub>30</sub>= 0.457      D<sub>15</sub>= 0.0259      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SM      AASHTO= A-1-b

**Remarks**

Moisture Content= 19.0%  
F.M.=0.41

\* (no specification provided)

Sample No.: 5  
Location:

Source of Sample: TR-51

Date: 4/11/05  
Elev./Depth: 11.0

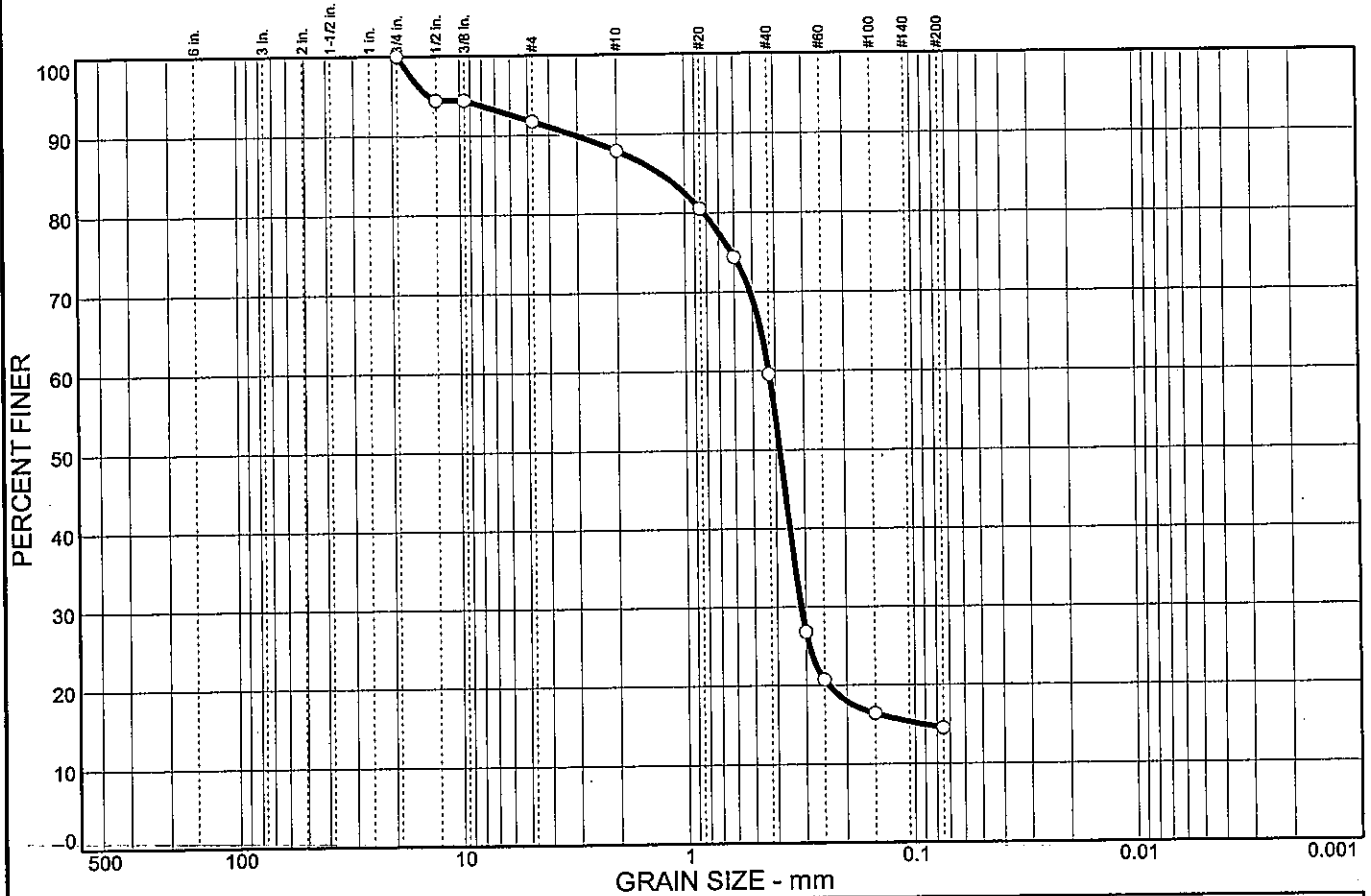


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	8.3	3.8	28.3	45.1	14.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.50 in.	94.4		
0.375 in.	94.4		
#4	91.7		
#10	87.9		
#20	80.5		
#30	74.4		
#40	59.6		
#50	26.8		
#60	20.7		
#100	16.4		
#200	14.5		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 1.28      D<sub>60</sub>= 0.427      D<sub>50</sub>= 0.384  
 D<sub>30</sub>= 0.314      D<sub>15</sub>= 0.0928      D<sub>10</sub>=  
 C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
 USCS= SM      AASHTO= A-2-4(0)

**Remarks**  
 Moisture Content= 28.2%  
 F.M.=1.96

\* (no specification provided)

Sample No.: 6  
Location:

Source of Sample: TR-51

Date: 4/11/05  
Elev./Depth: 13.5

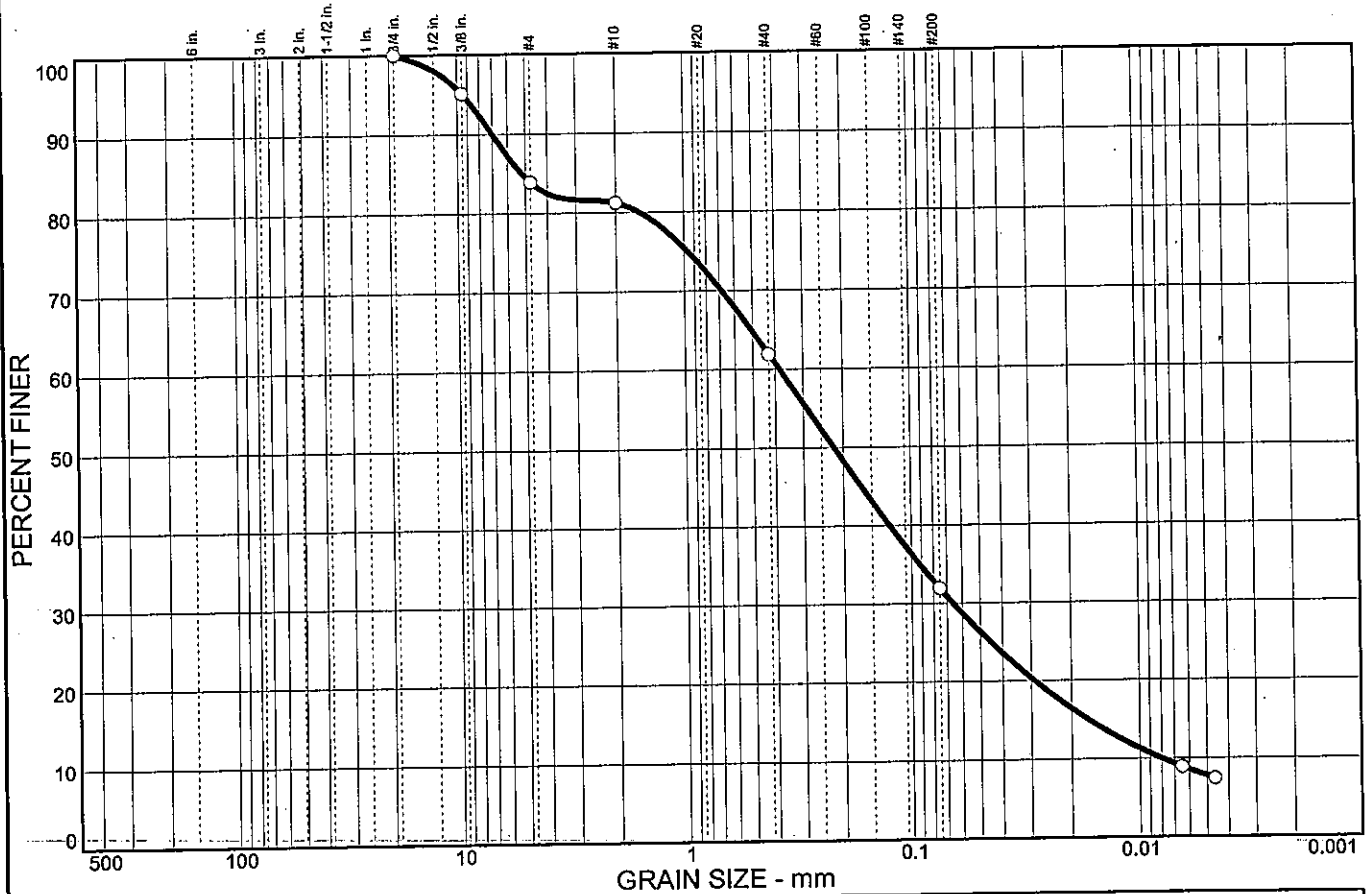


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	16.1	2.7	19.3	30.0	24.1	7.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	95.1		
#4	83.9		
#10	81.2		
#40	61.9		
#200	31.9		

**Soil Description**

Silty sand with gravel

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 5.19      D<sub>60</sub>= 0.382      D<sub>50</sub>= 0.220  
D<sub>30</sub>= 0.0658      D<sub>15</sub>= 0.0168      D<sub>10</sub>= 0.0080  
C<sub>u</sub>= 47.72      C<sub>c</sub>= 1.41

**Classification**

USCS= SM      AASHTO= A-2-4(0)

**Remarks**

Moisture Content= 15.2%  
F.M.=0.21

\* (no specification provided)

Sample No.: 9  
Location:

Source of Sample: TR-51

Date: 4/11/05  
Elev./Depth: 21.0

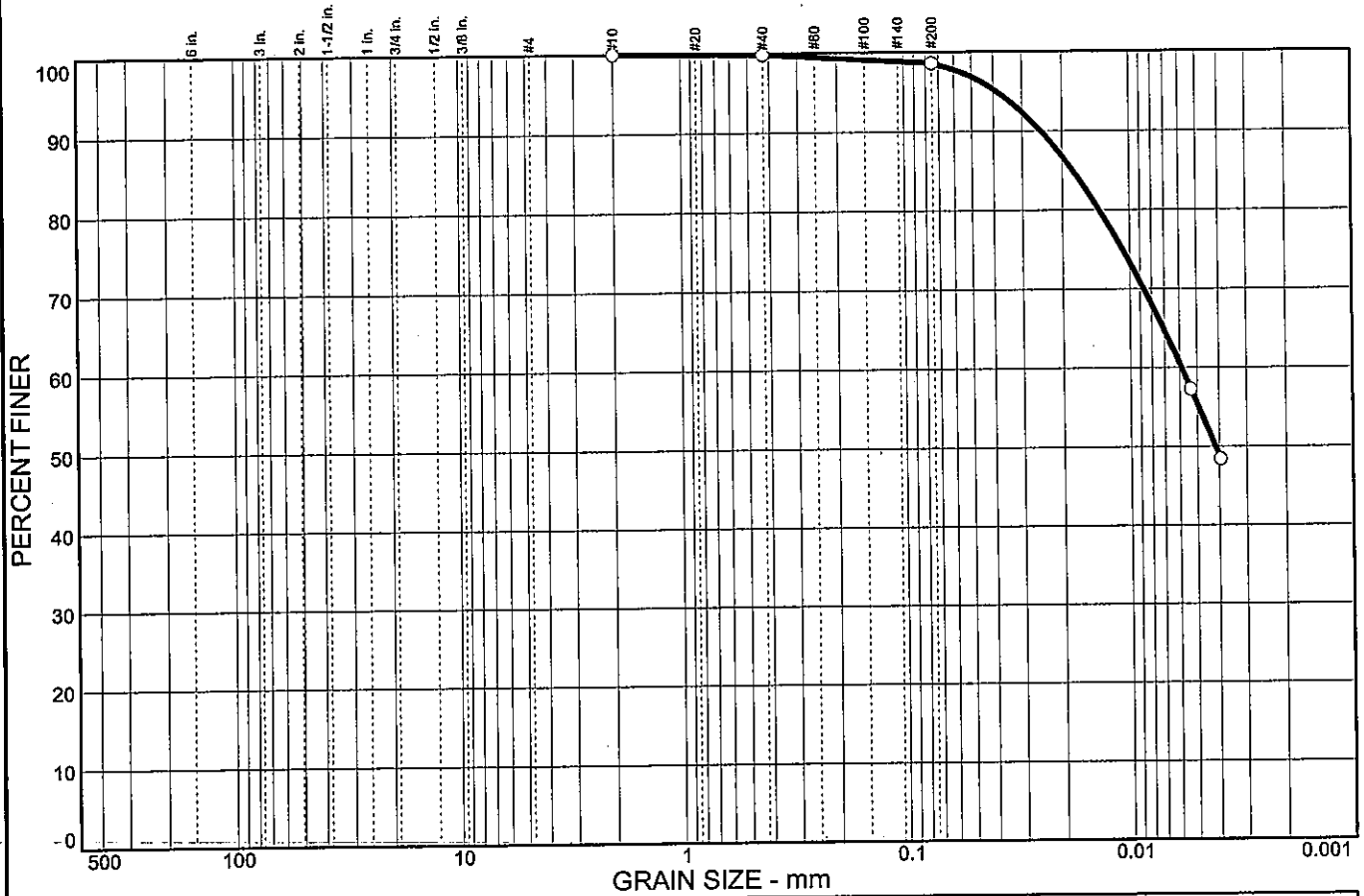


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	1.2	43.2	55.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.8		
#200	98.6		

\* (no specification provided)

**Soil Description**

Lean clay

**Atterberg Limits**

PL= 22      LL= 42      PI= 20

**Coefficients**

D<sub>85</sub>= 0.0179      D<sub>60</sub>= 0.0059      D<sub>50</sub>= 0.0042  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                C<sub>c</sub>=

**Classification**

USCS= CL      AASHTO= A-7-6(22)

**Remarks**

Moisture Content= 27.2%

Sample No.: 10  
Location:

Source of Sample: TR-51

Date: 4/11/05  
Elev./Depth: 23.5

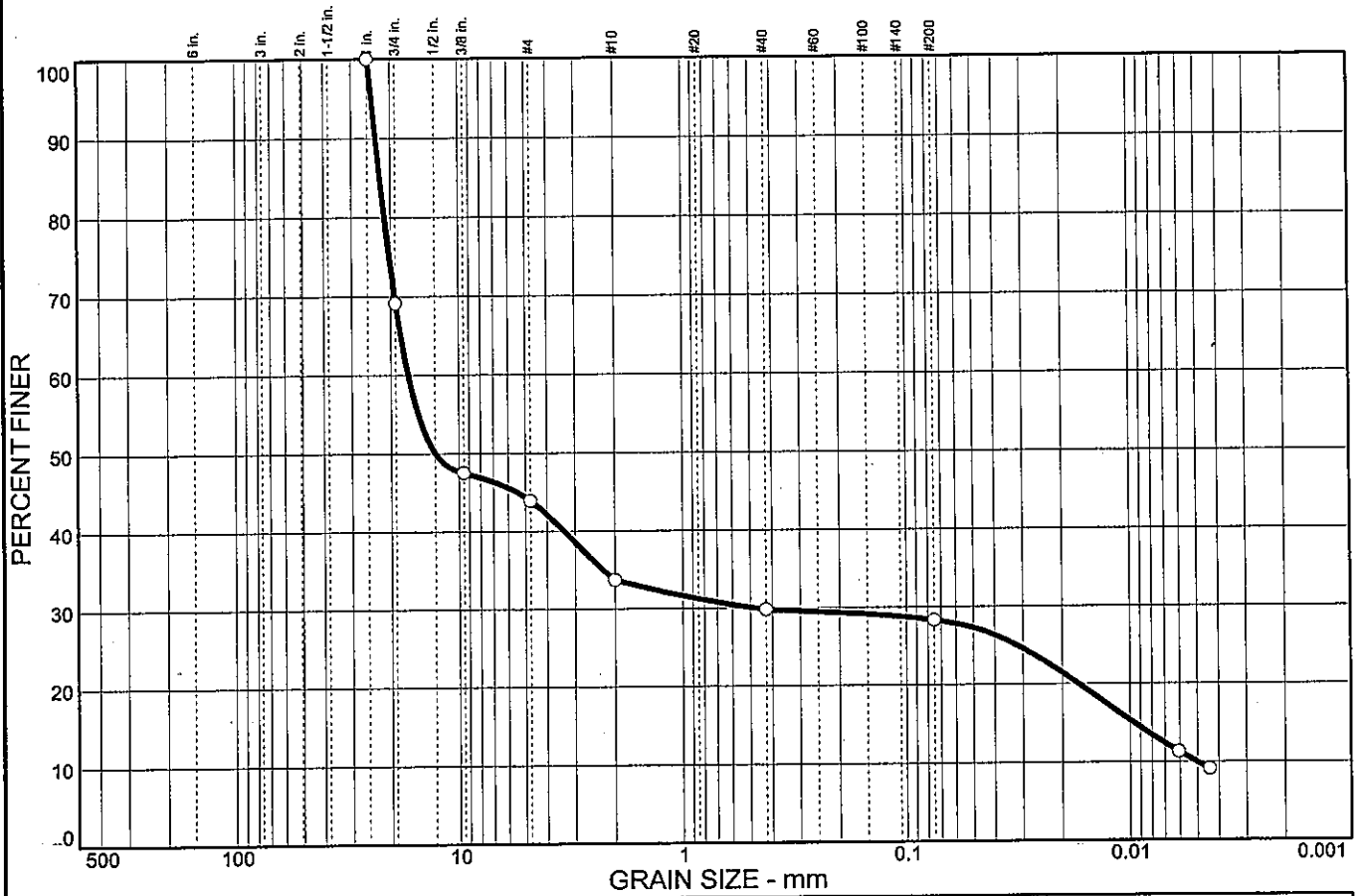


Client: TranSystems, Inc.  
Project: SCI-823-0.00

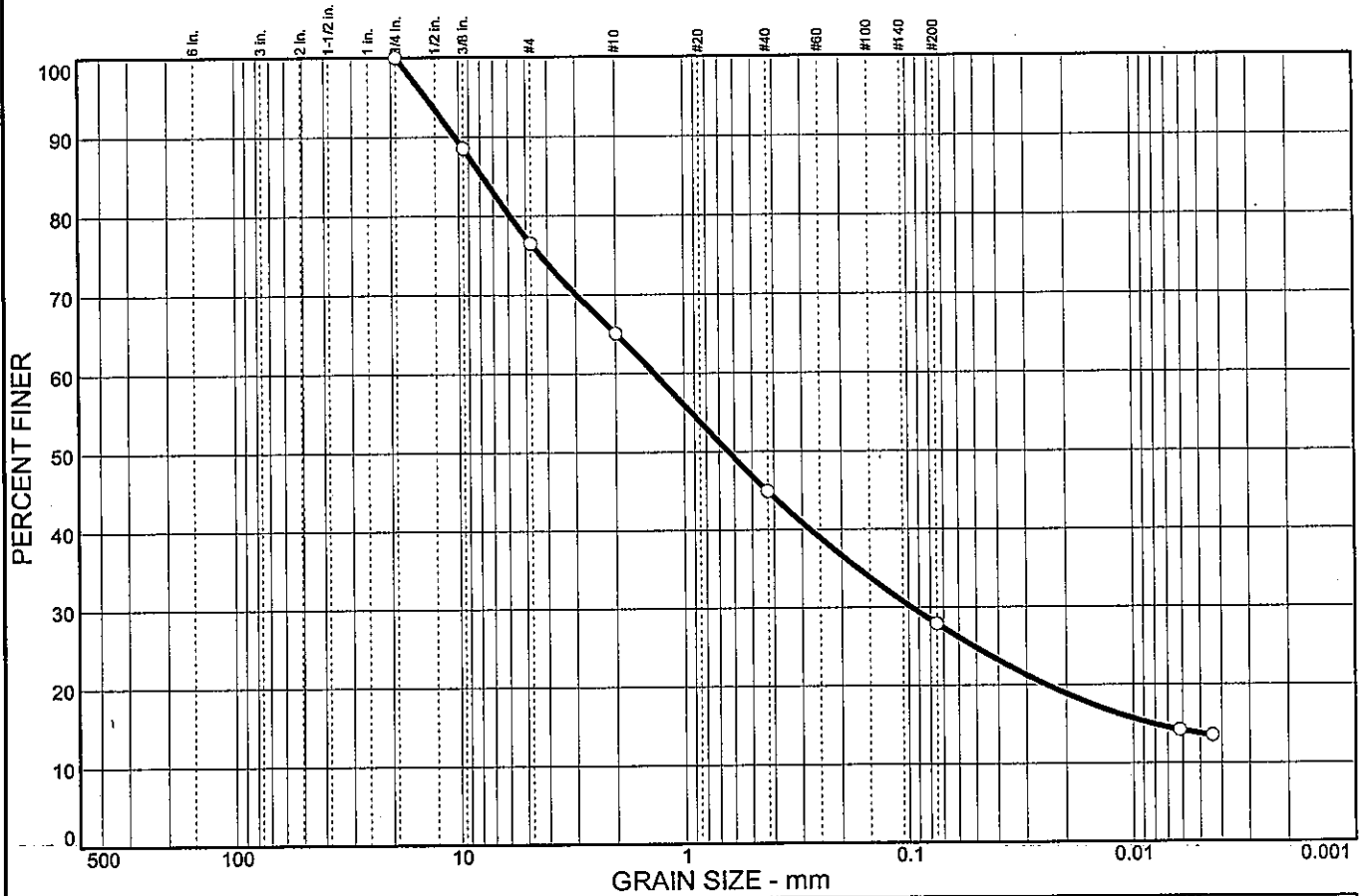
Project No: 0121-3070.03

Figure

# PARTICLE SIZE DISTRIBUTION TEST REPORT



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	23.5	11.4	20.2	17.0	14.2	13.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	88.5		
#4	76.5		
#10	65.1		
#40	44.9		
#200	27.9		

**Soil Description**

Clayey sand with gravel

**Atterberg Limits**

PL= 18      LL= 33      PI= 15

**Coefficients**

D<sub>85</sub>= 7.82      D<sub>60</sub>= 1.35      D<sub>50</sub>= 0.637  
D<sub>30</sub>= 0.0969      D<sub>15</sub>= 0.0082      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC      AASHTO= A-2-6(1)

**Remarks**

Moisture Content= 14.4%  
F.M.=0.35

\* (no specification provided)

Sample No.: 9  
Location:

Source of Sample: TR-52

Date: 4/25/05  
Elev./Depth: 21.0



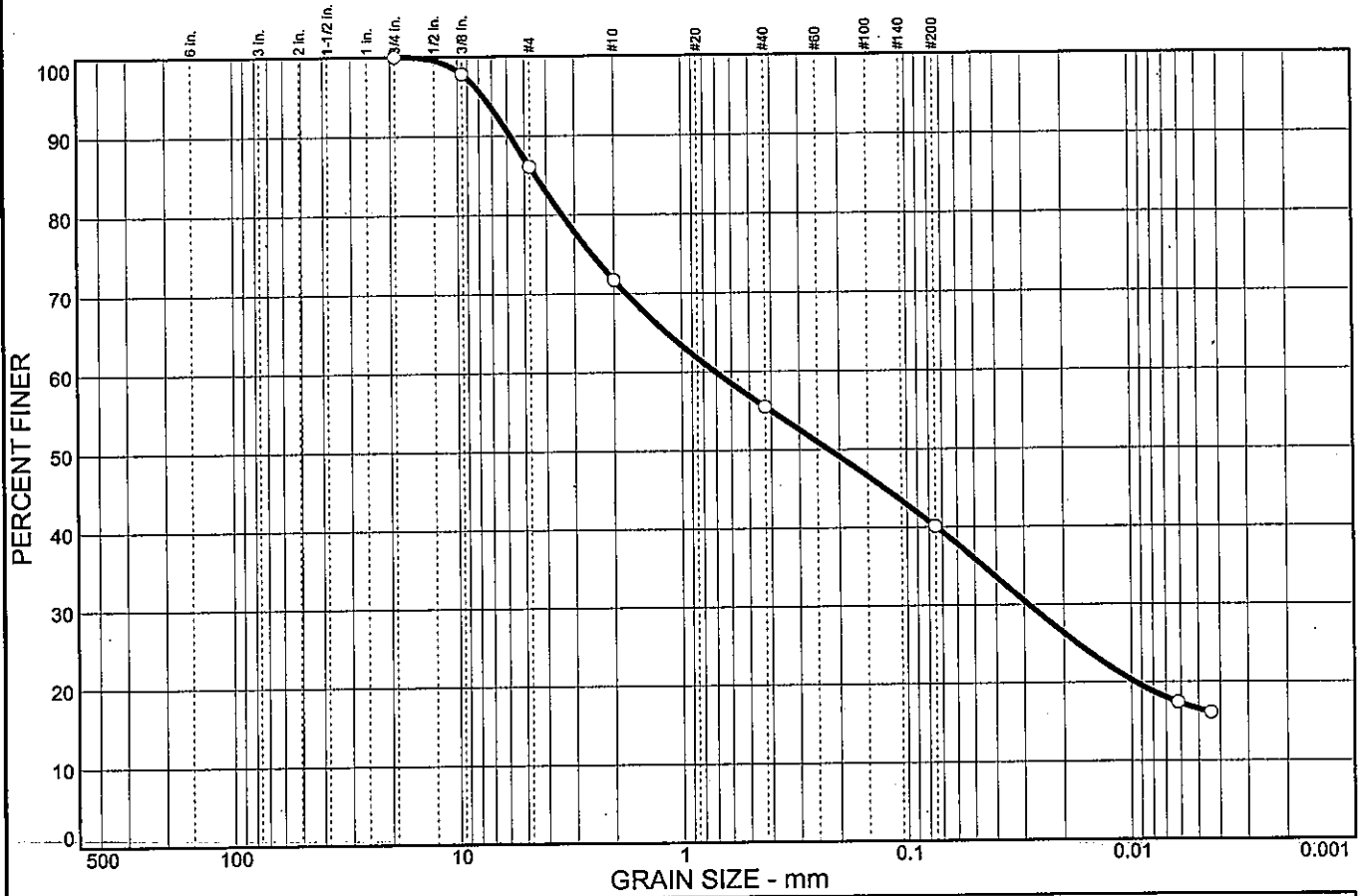
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	13.9	14.4	16.2	15.4	23.5	16.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	97.8		
#4	86.1		
#10	71.7		
#40	55.5		
#200	40.1		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 4.48      D<sub>60</sub>= 0.708      D<sub>50</sub>= 0.222  
 D<sub>30</sub>= 0.0286      D<sub>15</sub>=      D<sub>10</sub>=  
 C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
 USCS= SM      AASHTO= A-4(0)

**Remarks**  
 Moisture Content= 13.9%  
 F.M.=0.16

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: TR-53A

Date: 4/11/05  
Elev./Depth: 3.5



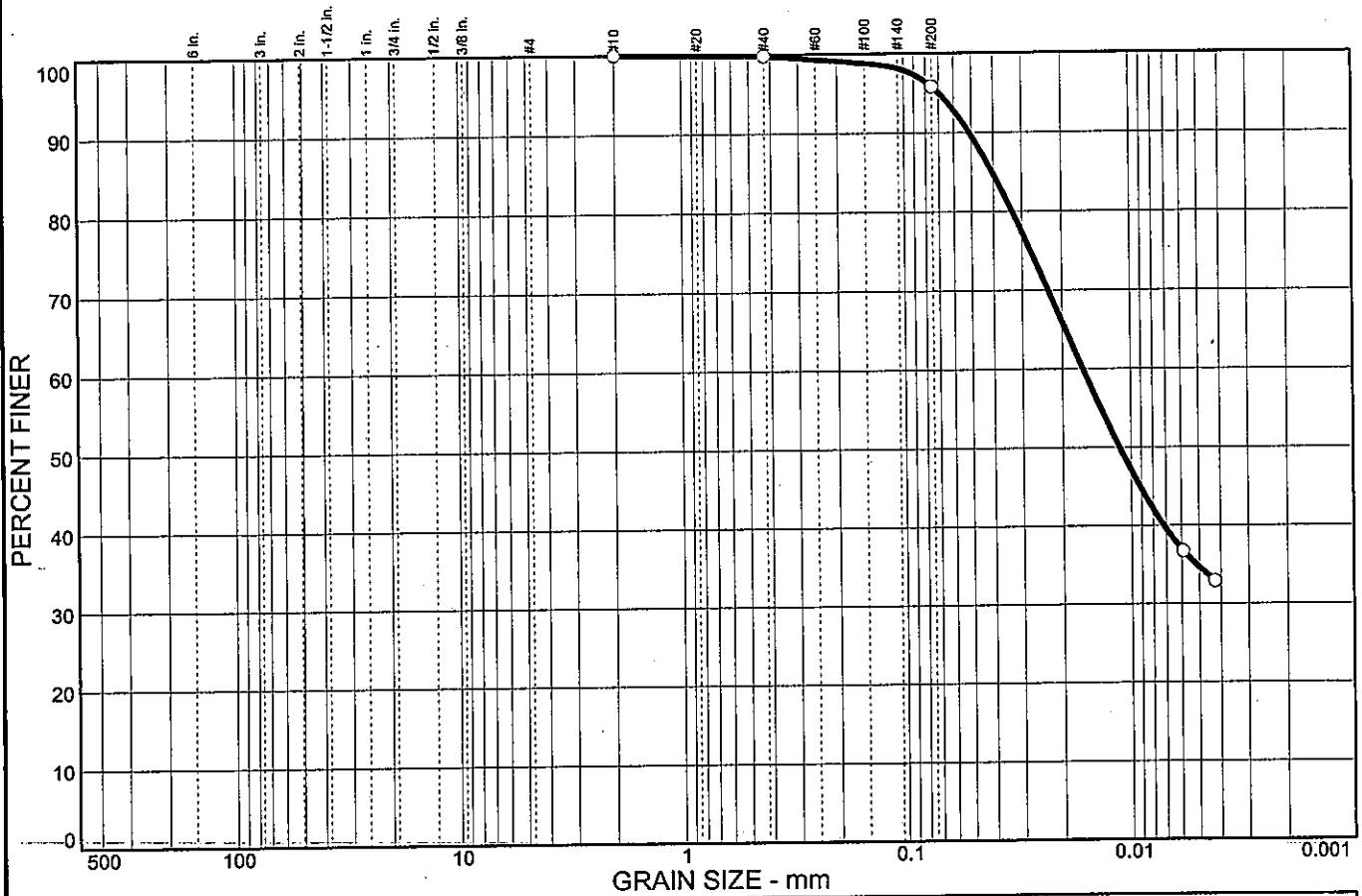
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	4.0	61.1	34.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.8		
#200	95.8		

**Soil Description**  
Lean clay

**Atterberg Limits**  
PL= 19      LL= 35      PI= 16

**Coefficients**  
D<sub>85</sub>= 0.0406      D<sub>60</sub>= 0.0162      D<sub>50</sub>= 0.0112  
D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
C<sub>u</sub>=                  C<sub>c</sub>=

**Classification**  
USCS= CL              AASHTO= A-6(16)

**Remarks**  
Moisture Content= 21.6%

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: TR-54

Date: 4/12/05  
Elev./Depth: 3.5



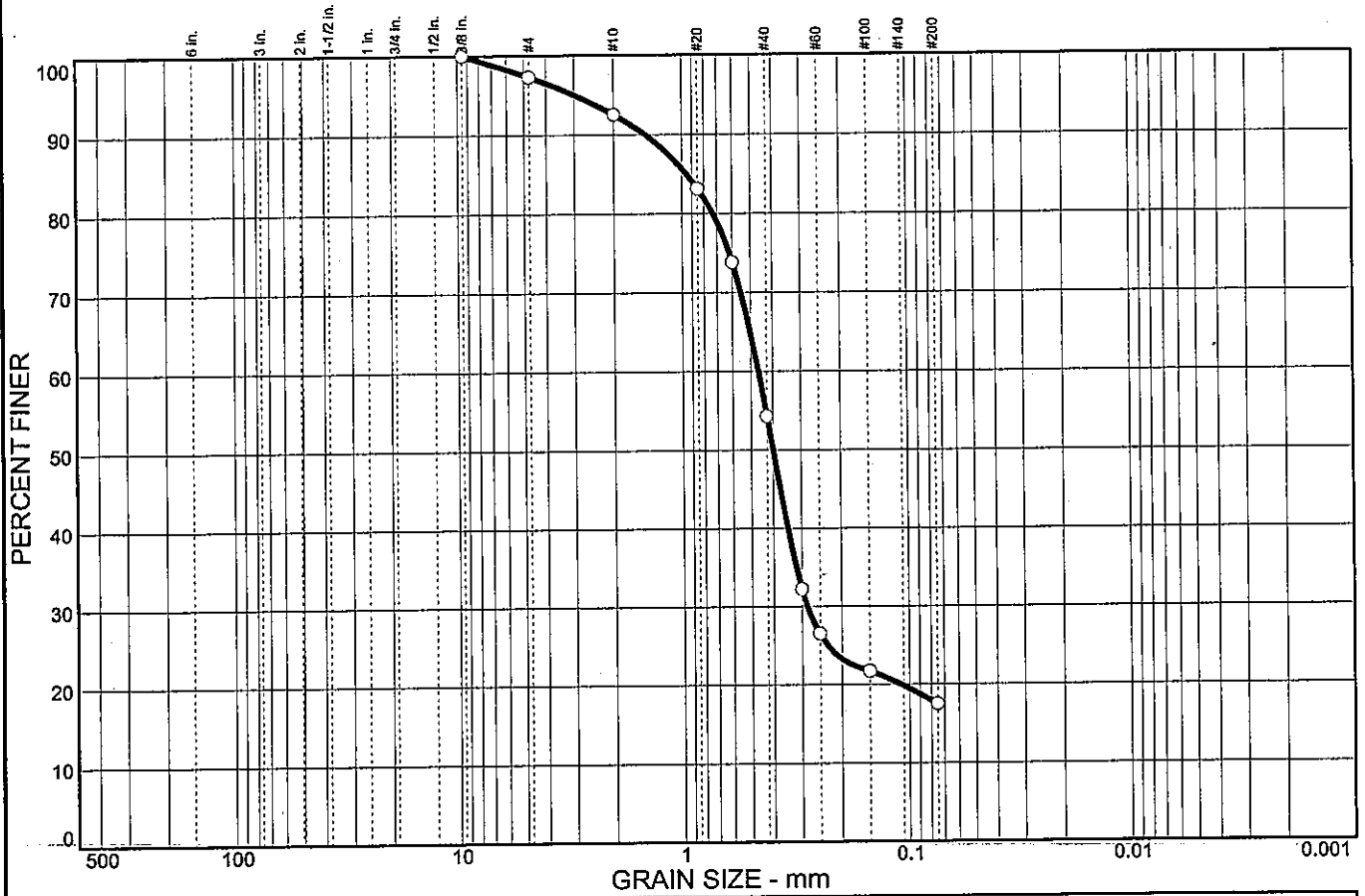
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	4.8	38.2	36.8	17.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	97.3		
#10	92.5		
#20	83.1		
#30	73.8		
#40	54.3		
#50	32.2		
#60	26.5		
#100	21.7		
#200	17.5		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 0.954      D<sub>60</sub>= 0.463      D<sub>50</sub>= 0.400  
 D<sub>30</sub>= 0.284      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                  C<sub>c</sub>=

**Classification**  
 USCS= SM                  AASHTO= A-2-4(0)

**Remarks**  
 Moisture Content= 17.8%  
 F.M.=1.75

\* (no specification provided)

Sample No.: 5  
Location:

Source of Sample: TR-54

Date: 4/12/05  
Elev./Depth: 11.0

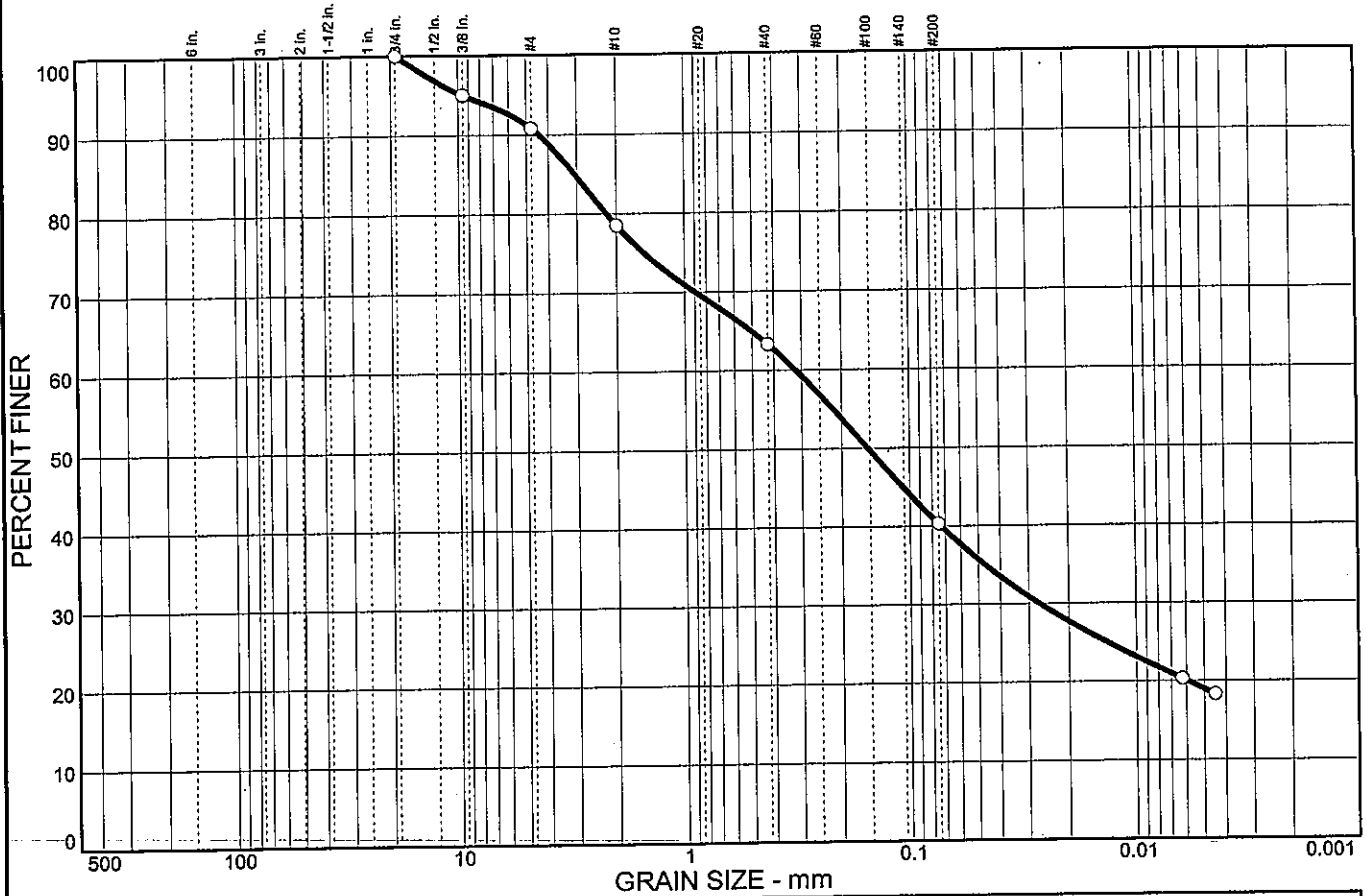


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	9.2	12.3	15.2	23.0	21.3	19.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	95.0		
#4	90.8		
#10	78.5		
#40	63.3		
#200	40.3		

**Soil Description**

Clayey sand

**Atterberg Limits**

PL= 14      LL= 25      PI= 11

**Coefficients**

D<sub>85</sub>= 3.07      D<sub>60</sub>= 0.319      D<sub>50</sub>= 0.153  
D<sub>30</sub>= 0.0269      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC      AASHTO= A-6(1)

**Remarks**

Moisture Content= 10.3%  
F.M.=0.14

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: TR-55A

Date: 4/12/05  
Elev./Depth: 6.0'



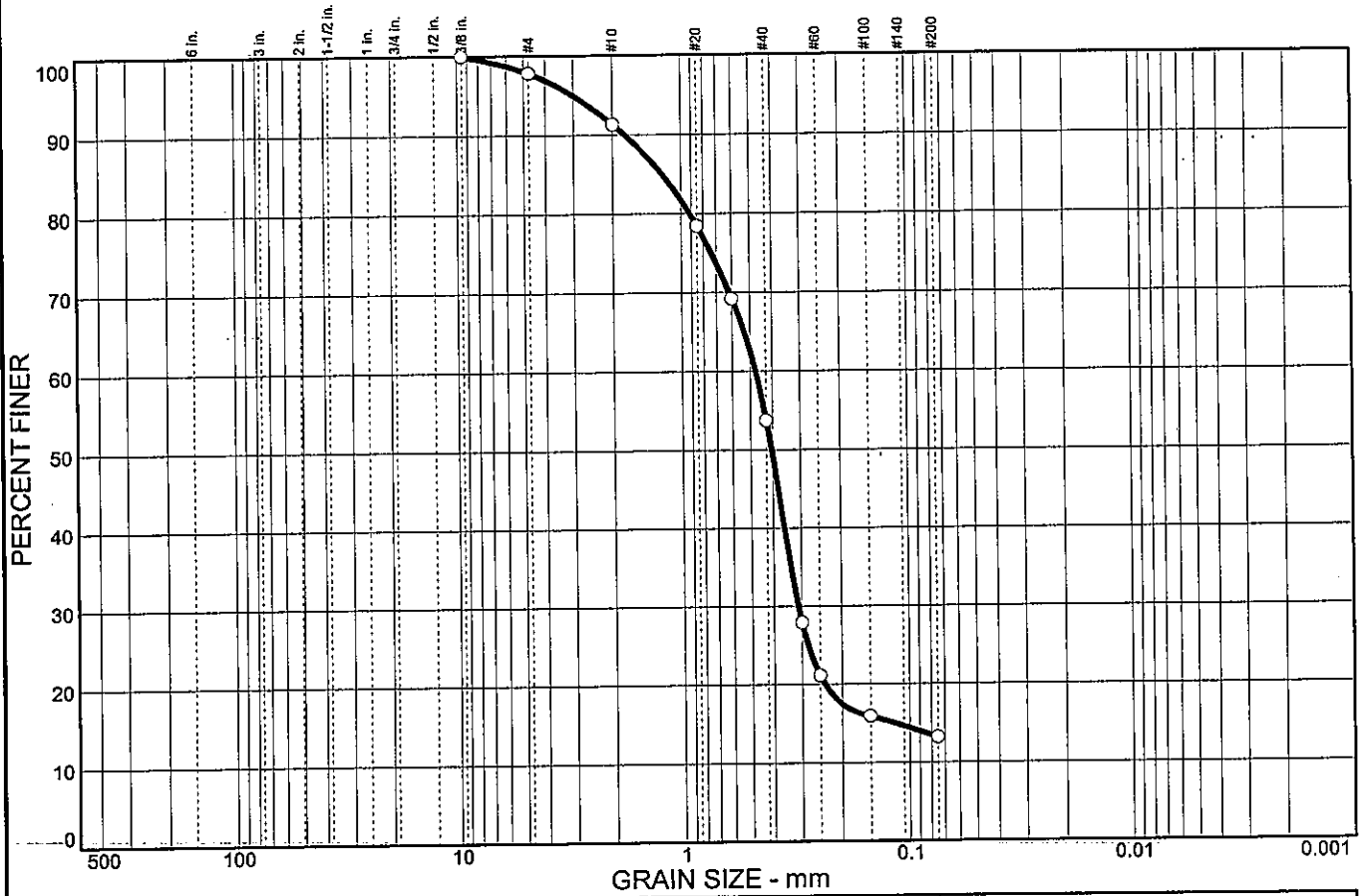
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	2.2	6.5	37.6	40.5	13.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	97.8		
#10	91.3		
#20	78.4		
#30	69.2		
#40	53.7		
#50	27.9		
#60	21.1		
#100	15.9		
#200	13.2		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 1.21      D<sub>60</sub>= 0.473      D<sub>50</sub>= 0.404  
 D<sub>30</sub>= 0.311      D<sub>15</sub>= 0.117      D<sub>10</sub>=  
 C<sub>u</sub>=                  C<sub>c</sub>=

**Classification**  
 USCS= SM                  AASHTO= A-2-4(0)

**Remarks**  
 Moisture Content= 19.5%  
 F.M.=1.89

\* (no specification provided)

Sample No.: 6  
Location:

Source of Sample: TR-55A

Date: 4/12/05  
Elev./Depth: 13.5



Client: TranSystems, Inc.  
Project: SCI-823-0.00

Project No: 0121-3070.03

Figure

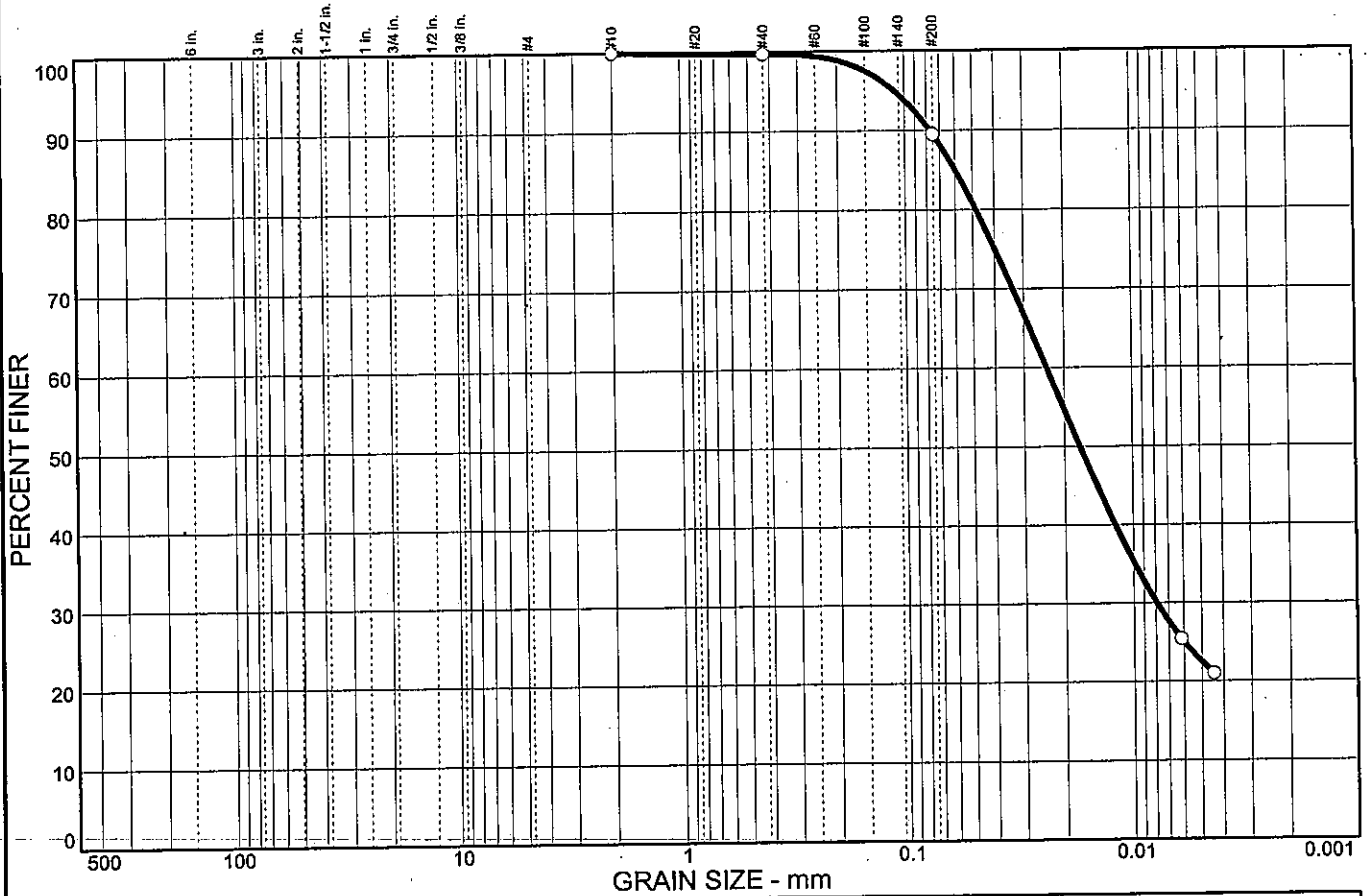








# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.3	10.2	67.0	22.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.7		
#200	89.5		

**Soil Description**  
Lean clay

**Atterberg Limits**  
 PL= 19      LL= 29      PI= 10

**Coefficients**  
 D<sub>85</sub>= 0.0598      D<sub>60</sub>= 0.0239      D<sub>50</sub>= 0.0171  
 D<sub>30</sub>= 0.0079      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**  
 USCS= CL              AASHTO= A-4(8)

**Remarks**  
 Moisture Content= 24.2%

\* (no specification provided)

Sample No.: 4  
Location:

Source of Sample: TR-57

Date: 4/26/05  
Elev./Depth: 8.5



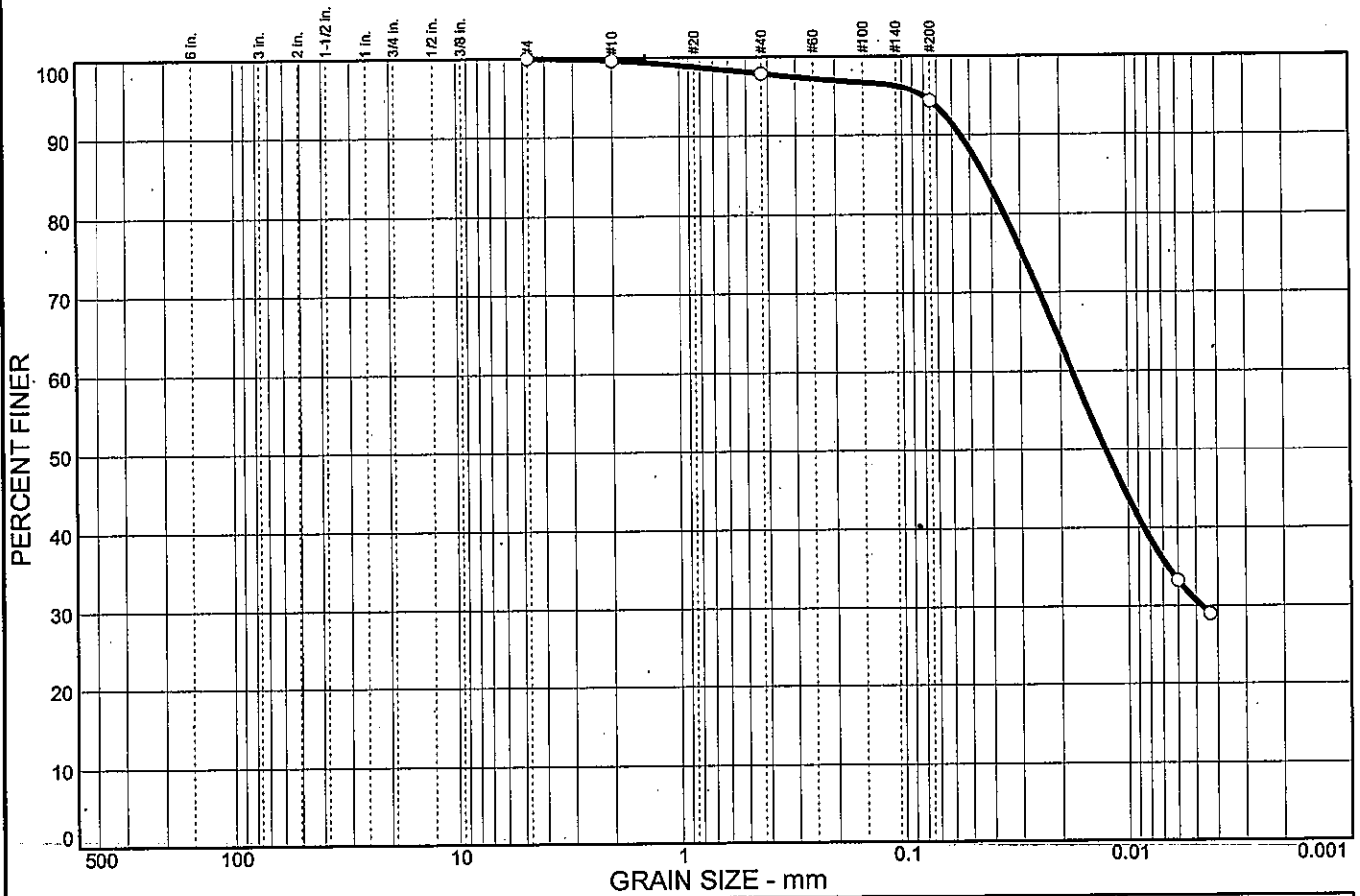
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.3	1.8	3.6	63.6	30.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#40	97.9		
#200	94.3		

**Soil Description**  
Lean clay

**Atterberg Limits**  
 PL= 20      LL= 31      PI= 11

**Coefficients**  
 D<sub>85</sub>= 0.0433      D<sub>60</sub>= 0.0177      D<sub>50</sub>= 0.0125  
 D<sub>30</sub>= 0.0047      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**  
 USCS= CL                      AASHTO= A-6(10)

**Remarks**  
 Moisture Content= 23.0%

\* (no specification provided)

Sample No.: 6  
Location:

Source of Sample: TR-57

Date: 4/25/05  
Elev./Depth: 13.5

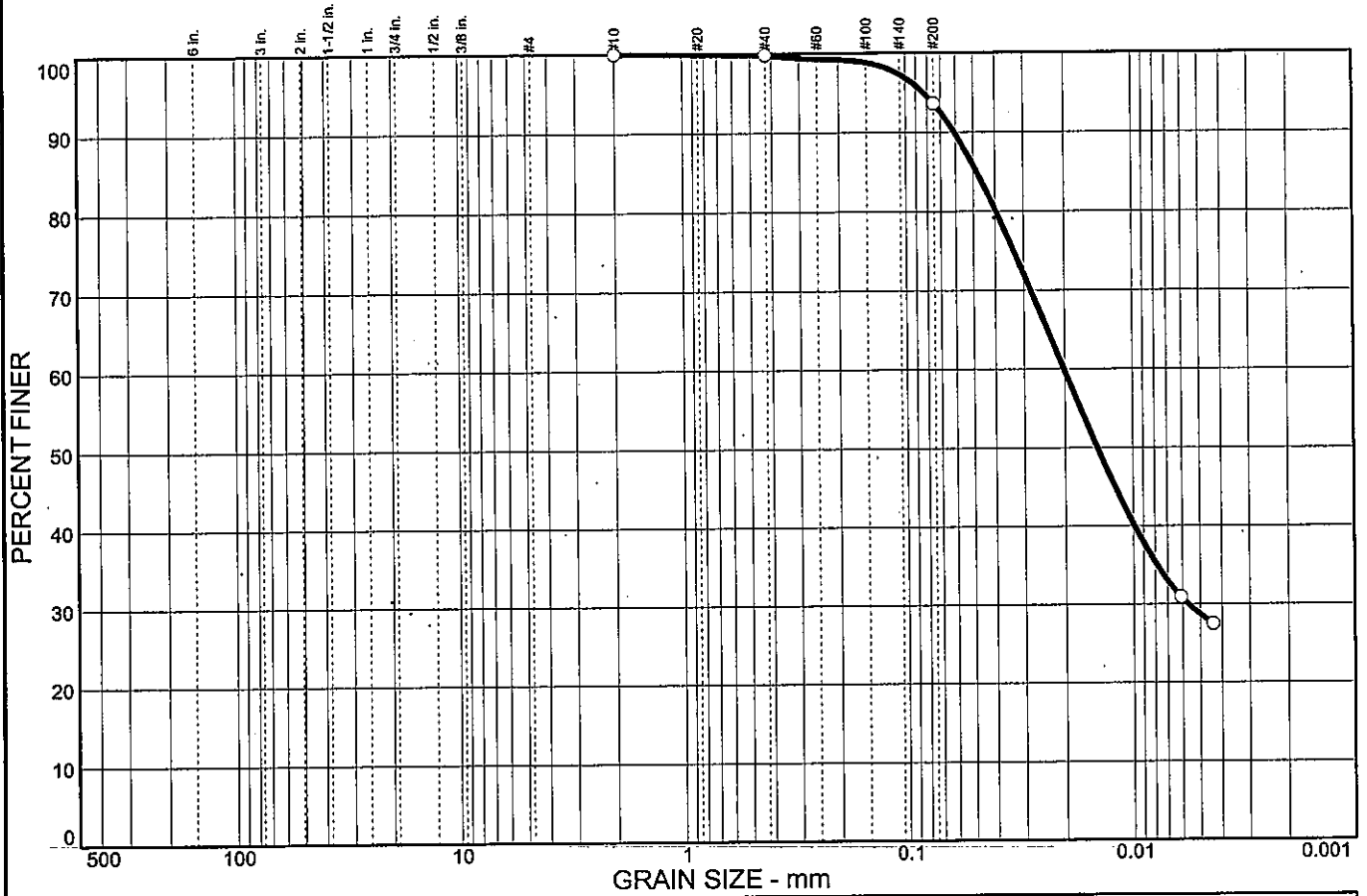


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	6.2	64.9	28.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.8		
#200	93.6		

**Soil Description**  
Lean clay

**Atterberg Limits**  
 PL= 18      LL= 34      PI= 16

**Coefficients**  
 D<sub>85</sub>= 0.0484      D<sub>60</sub>= 0.0201      D<sub>50</sub>= 0.0144  
 D<sub>30</sub>= 0.0057      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**  
 USCS= CL                      AASHTO= A-6(15)

**Remarks**  
 Moisture Content= 22.0%

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: TR-58

Date: 4/12/05  
Elev./Depth: 6.0

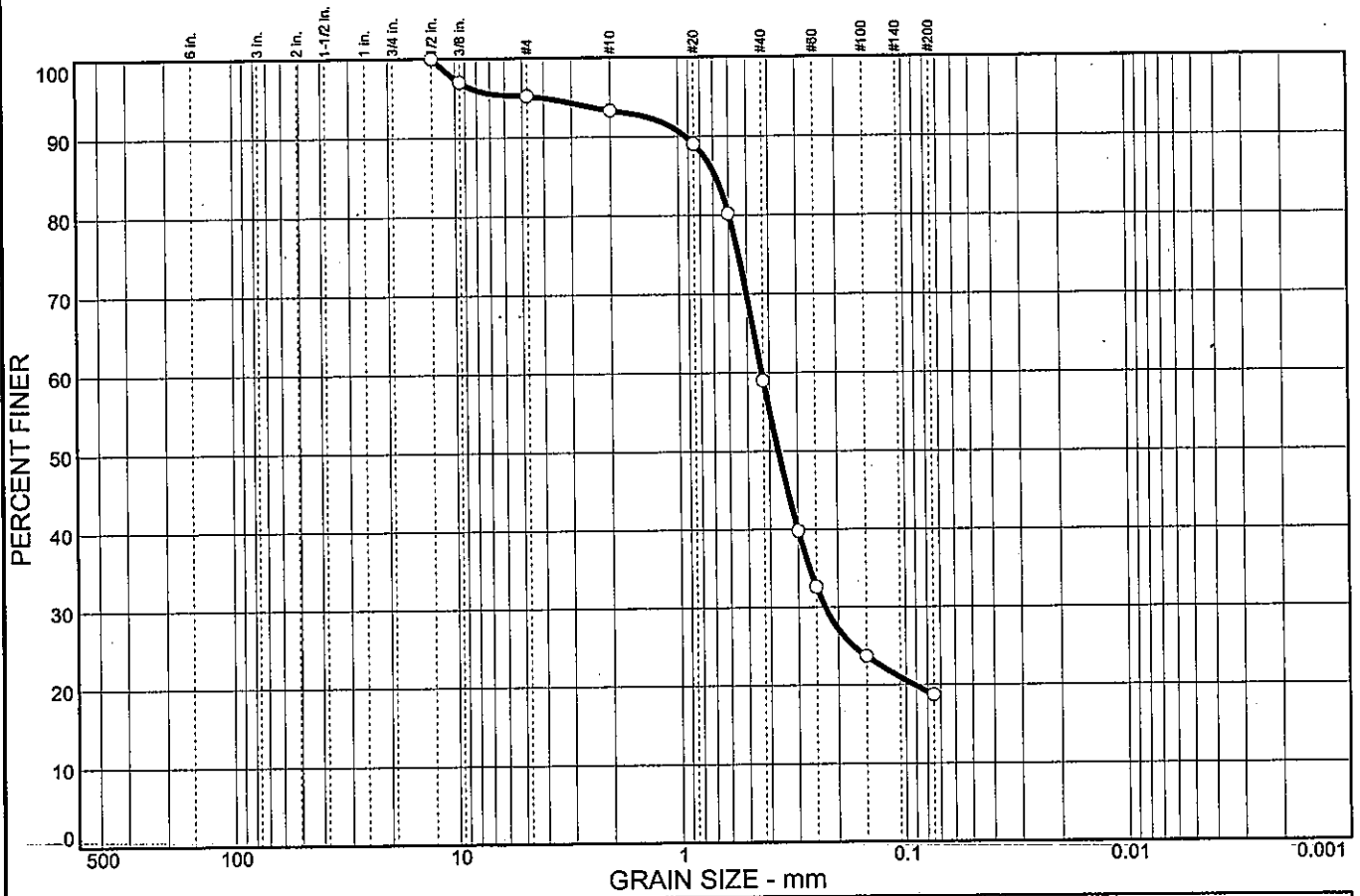


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	4.8	1.9	34.3	40.3	18.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.50 in.	100.0		
0.375 in.	97.0		
#4	95.2		
#10	93.3		
#20	89.0		
#30	80.2		
#40	59.0		
#50	39.8		
#60	32.6		
#100	23.7		
#200	18.7		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 0.685      D<sub>60</sub>= 0.432      D<sub>50</sub>= 0.366  
 D<sub>30</sub>= 0.229      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                  C<sub>c</sub>=

**Classification**  
 USCS= SM                  AASHTO= A-2-4(0)

**Remarks**  
 Moisture Content= 16.3%  
 F.M.=1.64

\* (no specification provided)

Sample No.: 4  
Location:

Source of Sample: TR-58

Date: 4/12/05  
Elev./Depth: 8.5



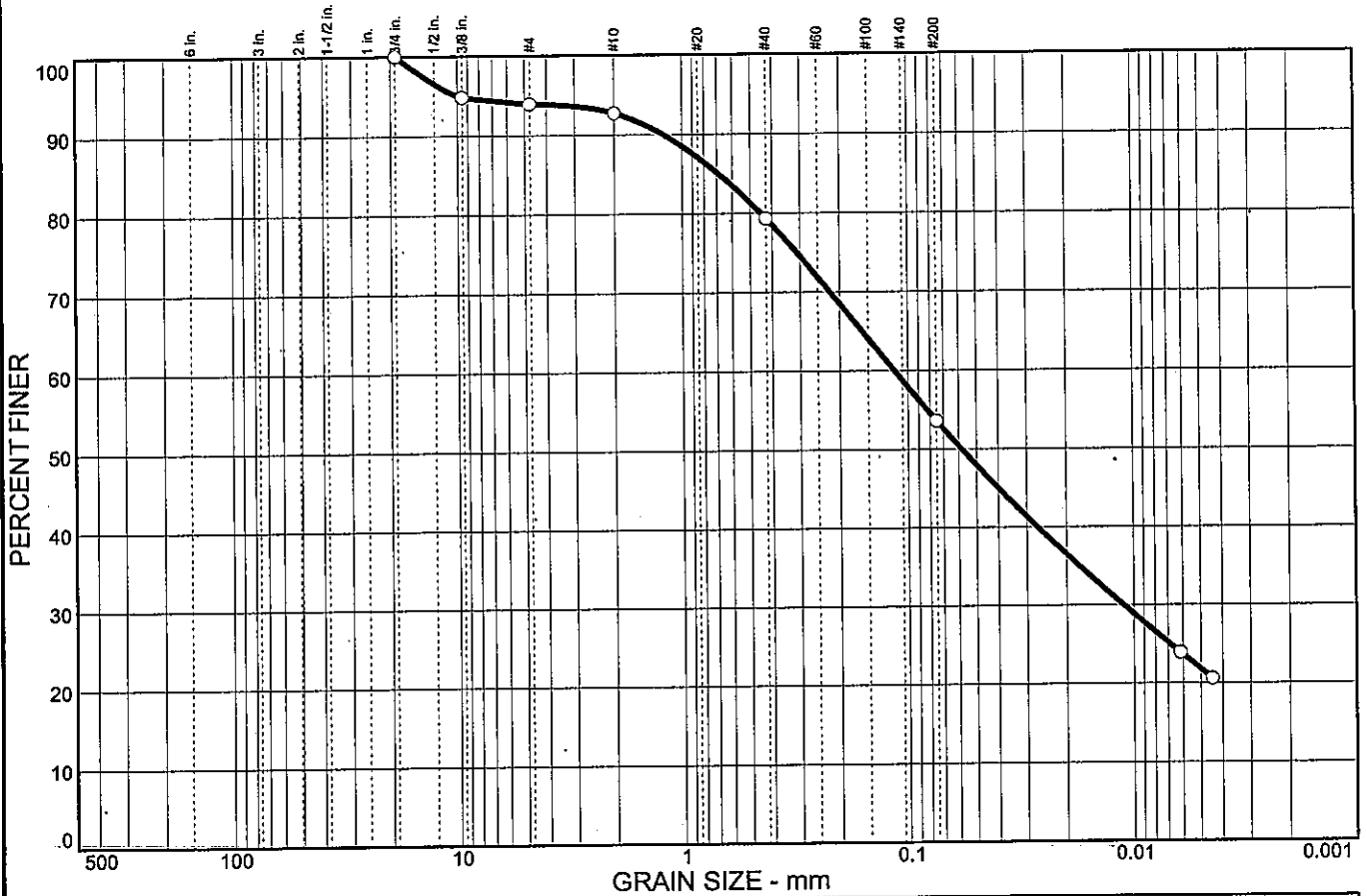
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	6.1	1.2	13.4	25.7	31.8	21.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	94.8		
#4	93.9		
#10	92.7		
#40	79.3		
#200	53.6		

**Soil Description**  
Sandy silty clay

**Atterberg Limits**  
 PL= 16      LL= 22      PI= 6

**Coefficients**  
 D<sub>85</sub>= 0.689      D<sub>60</sub>= 0.115      D<sub>50</sub>= 0.0582  
 D<sub>30</sub>= 0.0111      D<sub>15</sub>=      D<sub>10</sub>=  
 C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
 USCS= CL-ML      AASHTO= A-4(1)

**Remarks**  
 Moisture Content= 11.5%  
 F.M.=0.11

\* (no specification provided)

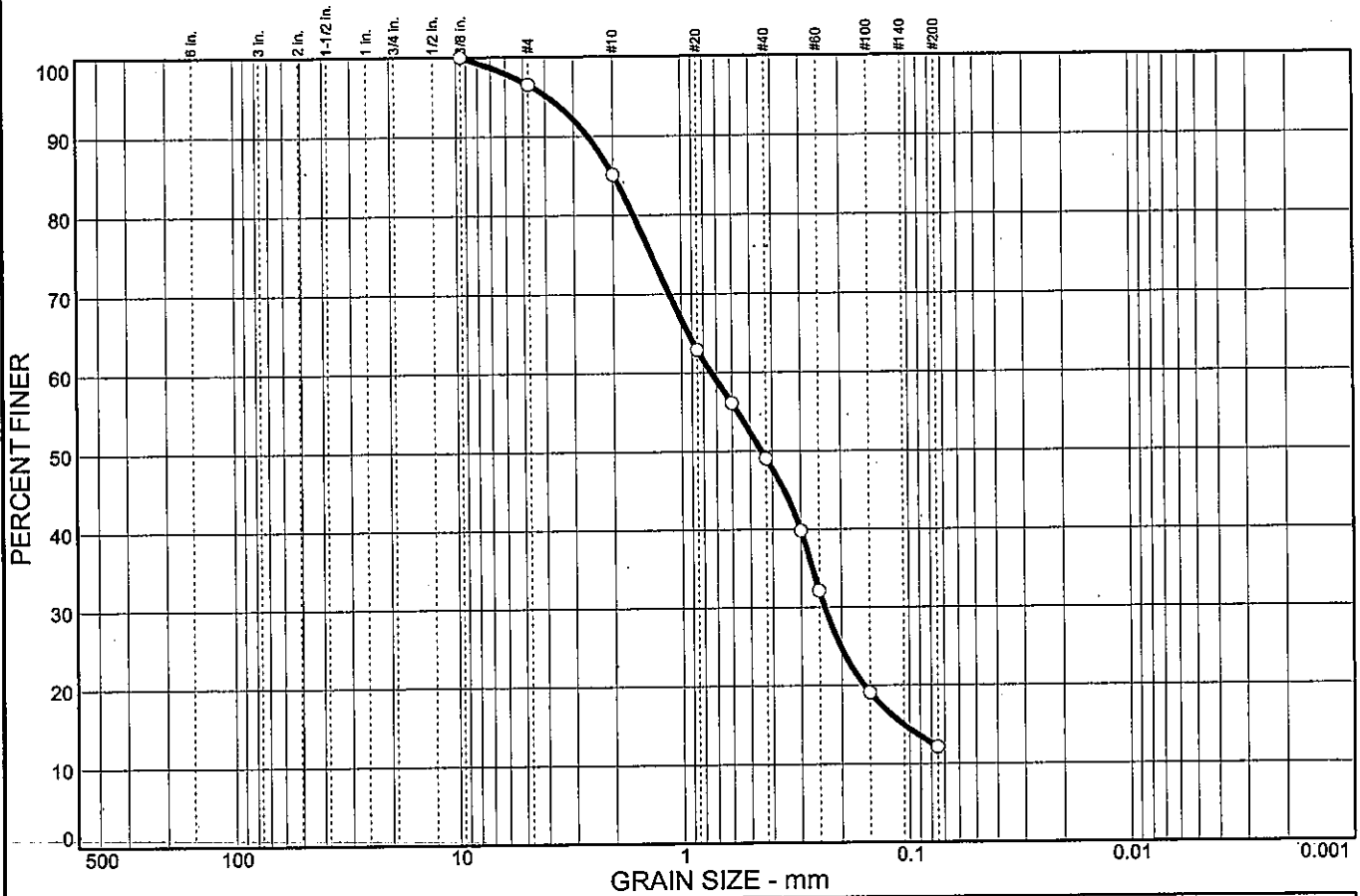
Sample No.: 2      Source of Sample: TR-59A      Date: 4/12/05  
 Location:      Elev./Depth: 3.5



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	3.5	11.4	36.1	36.9	12.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	96.5		
#10	85.1		
#20	62.9		
#30	56.1		
#40	49.0		
#50	39.8		
#60	32.1		
#100	19.1		
#200	12.1		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 1.99      D<sub>60</sub>= 0.737      D<sub>50</sub>= 0.446  
 D<sub>30</sub>= 0.237      D<sub>15</sub>= 0.107      D<sub>10</sub>=  
 C<sub>u</sub>=                  C<sub>c</sub>=

**Classification**  
 USCS= SM                  AASHTO= A-1-b

**Remarks**  
 Moisture Content= 17.4%  
 F.M.=1.88

\* (no specification provided)

Sample No.: 3  
Location:

Source of Sample: TR-59A

Date: 4/12/05  
Elev./Depth: 6.0



Client: TranSystems, Inc.  
Project: SCI-823-0.00

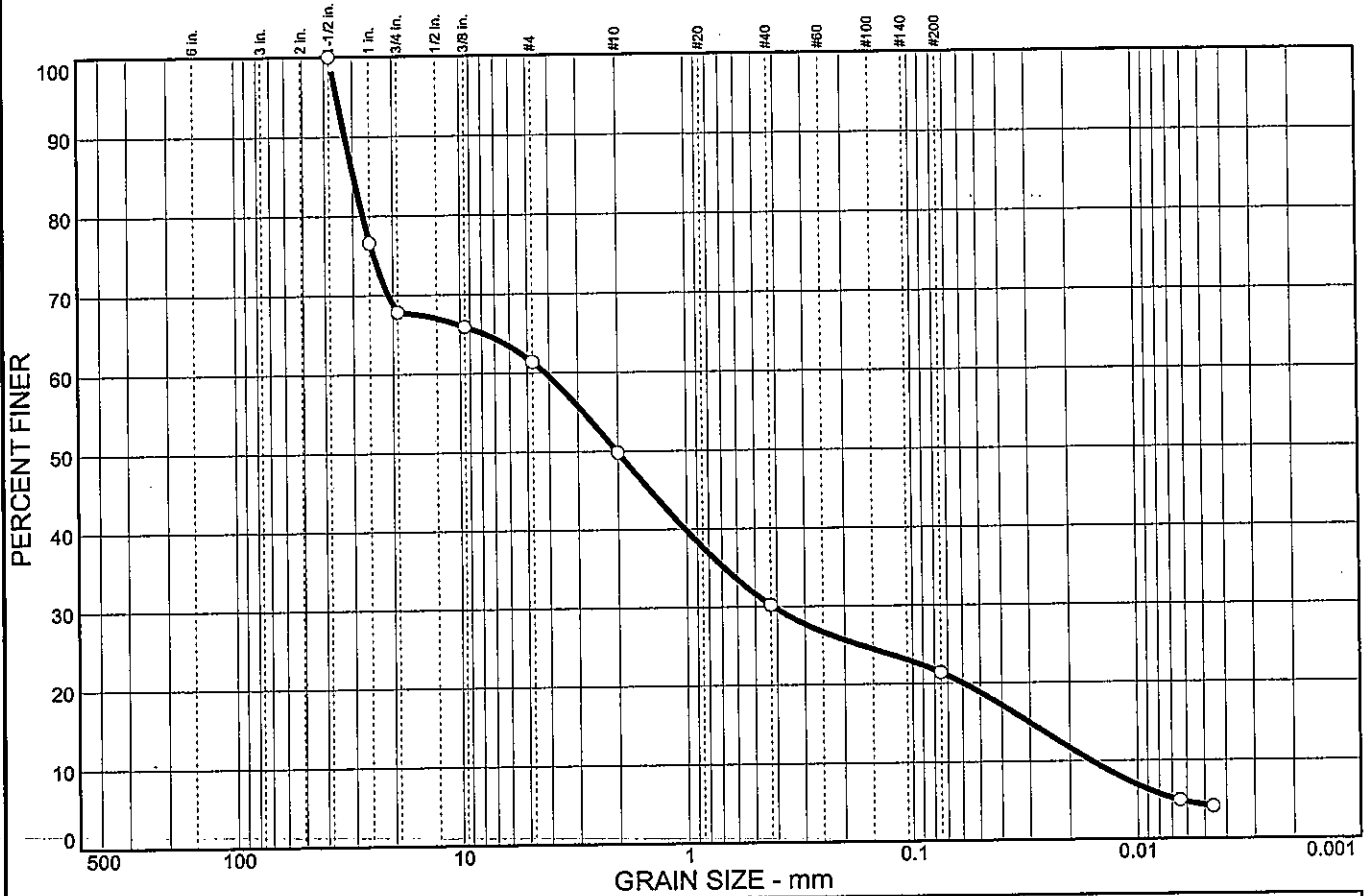
Project No: 0121-3070.03

Figure





# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	32.2	6.4	11.6	19.6	8.8	17.1	4.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.50 in.	100.0		
1.00 in.	76.6		
0.75 in.	67.8		
0.375 in.	65.9		
#4	61.4		
#10	49.8		
#40	30.2		
#200	21.4		

**Soil Description**

Silty sand with gravel

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>85</sub>= 29.9      D<sub>60</sub>= 4.17      D<sub>50</sub>= 2.03  
D<sub>30</sub>= 0.415      D<sub>15</sub>= 0.0304      D<sub>10</sub>= 0.0161  
C<sub>u</sub>= 259.64      C<sub>c</sub>= 2.57

**Classification**

USCS= SM      AASHTO= A-1-b

**Remarks**

Moisture Content= 9.7%  
F.M.=1.05

\* (no specification provided)

Sample No.: 5  
Location:

Source of Sample: TR-60

Date: 4/26/05  
Elev./Depth: 11.0

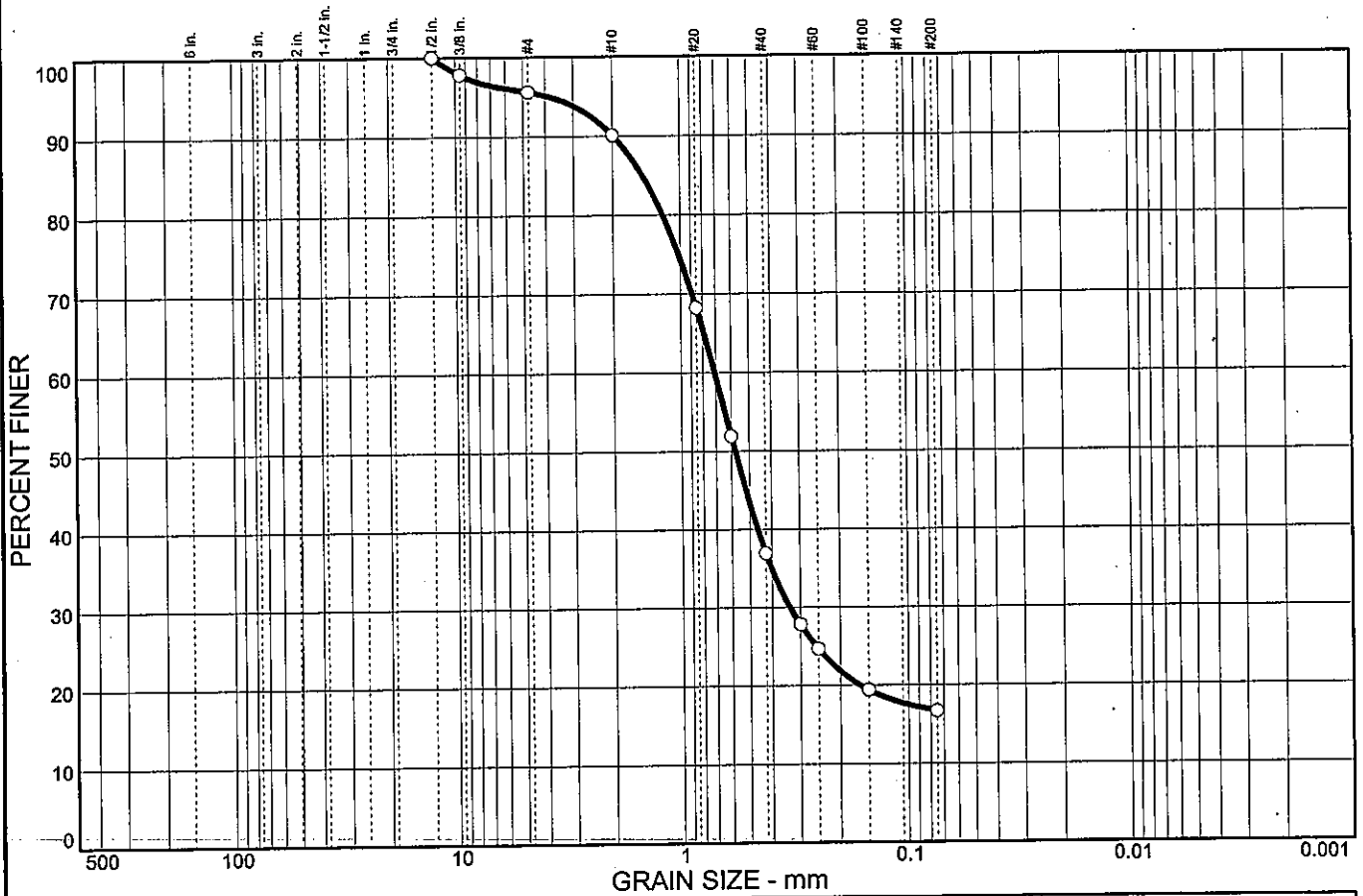


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	5.5	53.2	20.2	16.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.50 in.	100.0		
0.375 in.	97.8		
#4	95.6		
#10	90.1		
#20	68.2		
#30	51.9		
#40	36.9		
#50	27.8		
#60	24.7		
#100	19.4		
#200	16.7		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 1.47      D<sub>60</sub>= 0.709      D<sub>50</sub>= 0.577  
 D<sub>30</sub>= 0.333      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
 USCS= SM              AASHTO= A-1-b

**Remarks**  
 Moisture Content= 25.4%  
 F.M.=2.08

\* (no specification provided)

Sample No.: 8  
Location:

Source of Sample: TR-60

Date: 4/26/05  
Elev./Depth: 18.5



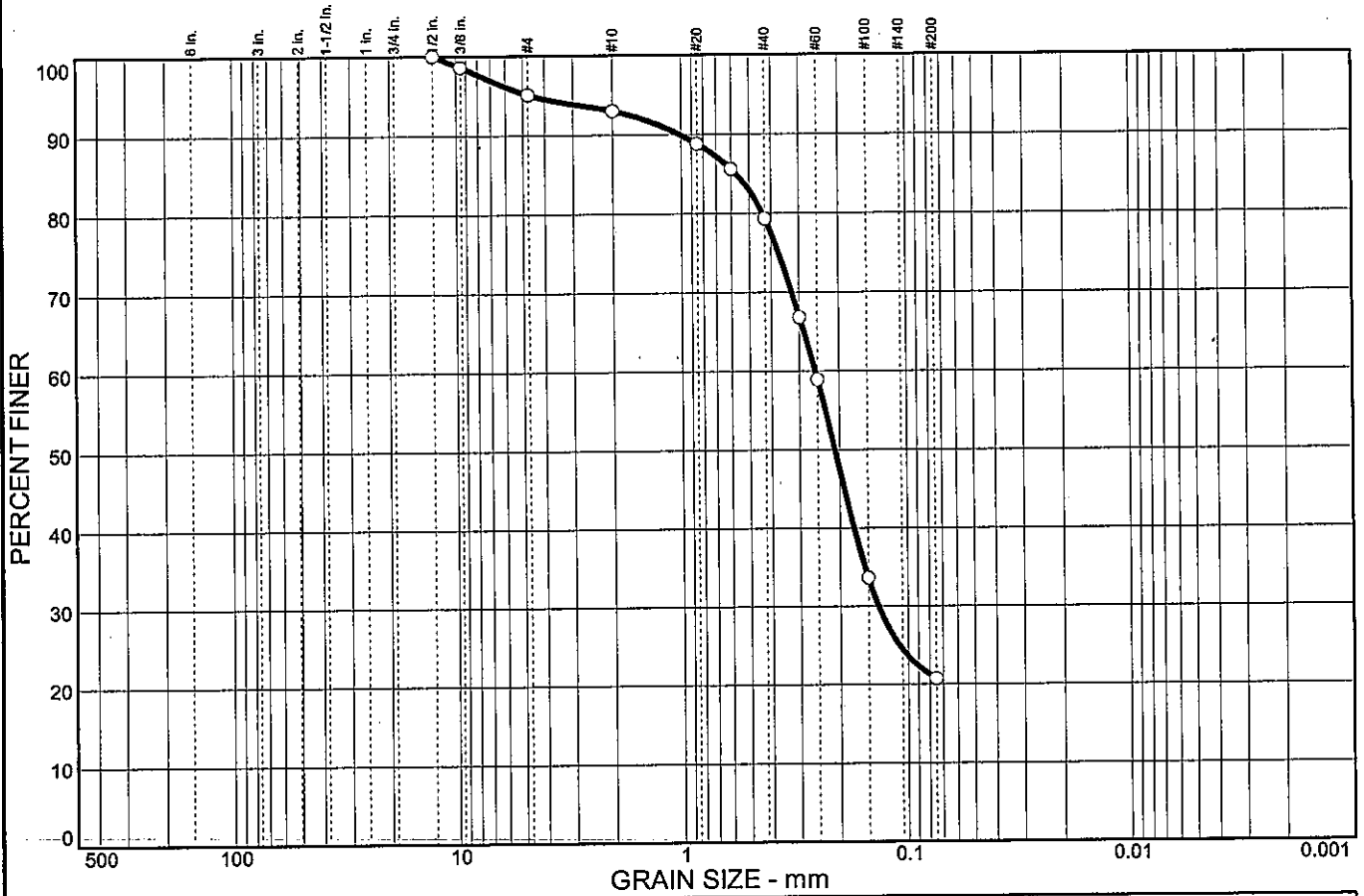
Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	4.9	2.1	13.7	58.6	20.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.50 in.	100.0		
0.375 in.	98.6		
#4	95.1		
#10	93.0		
#20	88.8		
#30	85.6		
#40	79.3		
#50	66.8		
#60	58.9		
#100	33.6		
#200	20.7		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 0.572      D<sub>60</sub>= 0.256      D<sub>50</sub>= 0.210  
 D<sub>30</sub>= 0.135      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                  C<sub>c</sub>=

**Classification**  
 USCS= SM                  AASHTO= A-2-4(0)

**Remarks**  
 Moisture Content= 23.1%  
 F.M.=1.20

\* (no specification provided)

Sample No.: 11  
Location:

Source of Sample: TR-60

Date: 4/23/05  
Elev./Depth: 26.0



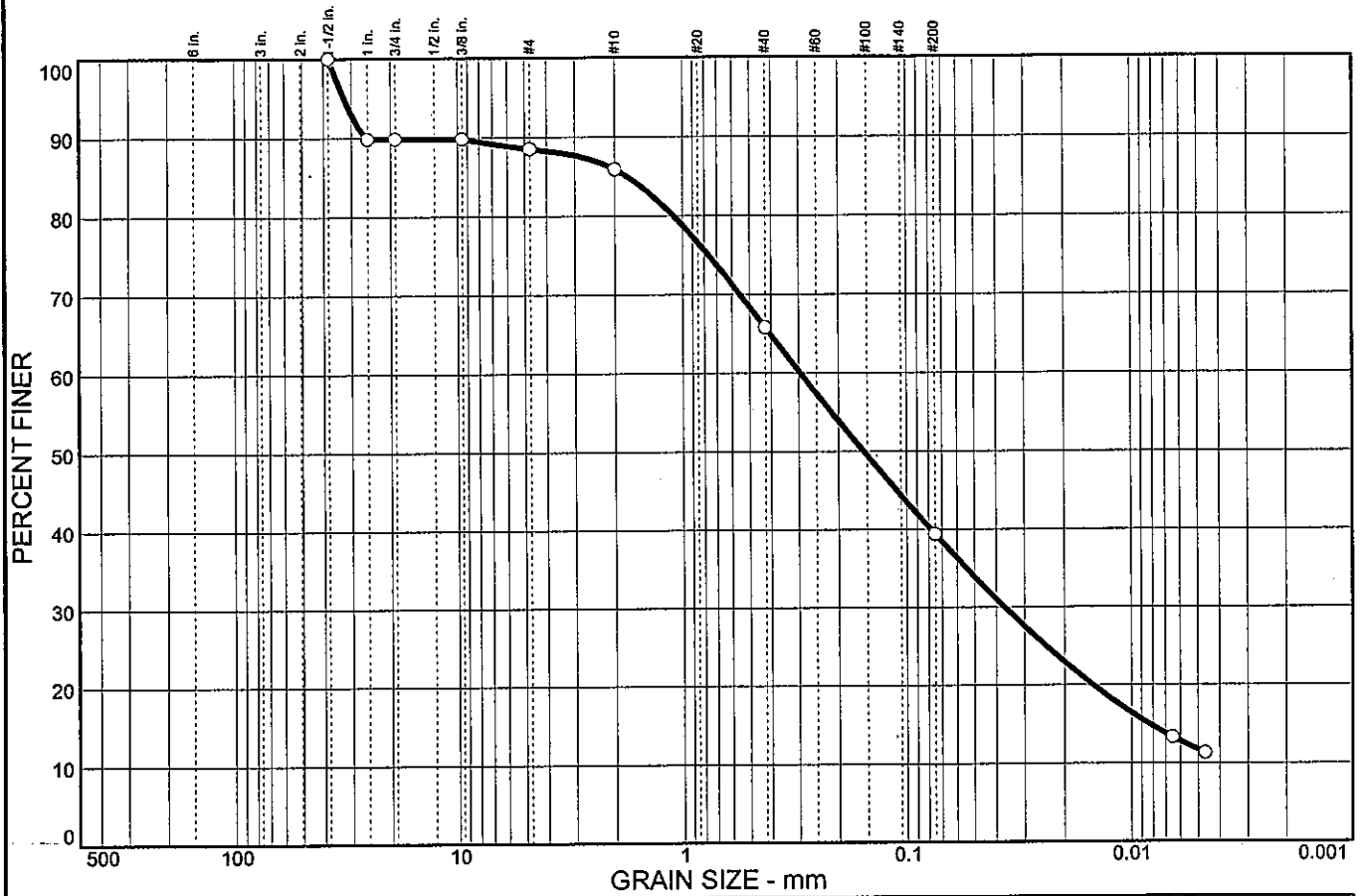
Client: TranSystems, Inc.  
Project: SCI-823-0.00

Project No: 0121-3070.03

Figure



# PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	10.2	1.3	2.6	20.1	26.4	27.7	11.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.50 in.	100.0		
1.00 in.	89.8		
0.75 in.	89.8		
0.375 in.	89.8		
#4	88.5		
#10	85.9		
#40	65.8		
#200	39.4		

**Soil Description**

Silty, clayey sand

**Atterberg Limits**

PL= 21      LL= 26      PI= 5

**Coefficients**

D<sub>85</sub>= 1.77      D<sub>60</sub>= 0.295      D<sub>50</sub>= 0.155  
D<sub>30</sub>= 0.0368      D<sub>15</sub>= 0.0083      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SC-SM      AASHTO= A-4(0)

**Remarks**

Moisture Content= 20.6%  
F.M.=0.32

\* (no specification provided)

Sample No.: 2  
Location:

Source of Sample: TR-61

Date: 4/23/05  
Elev./Depth: 3.5

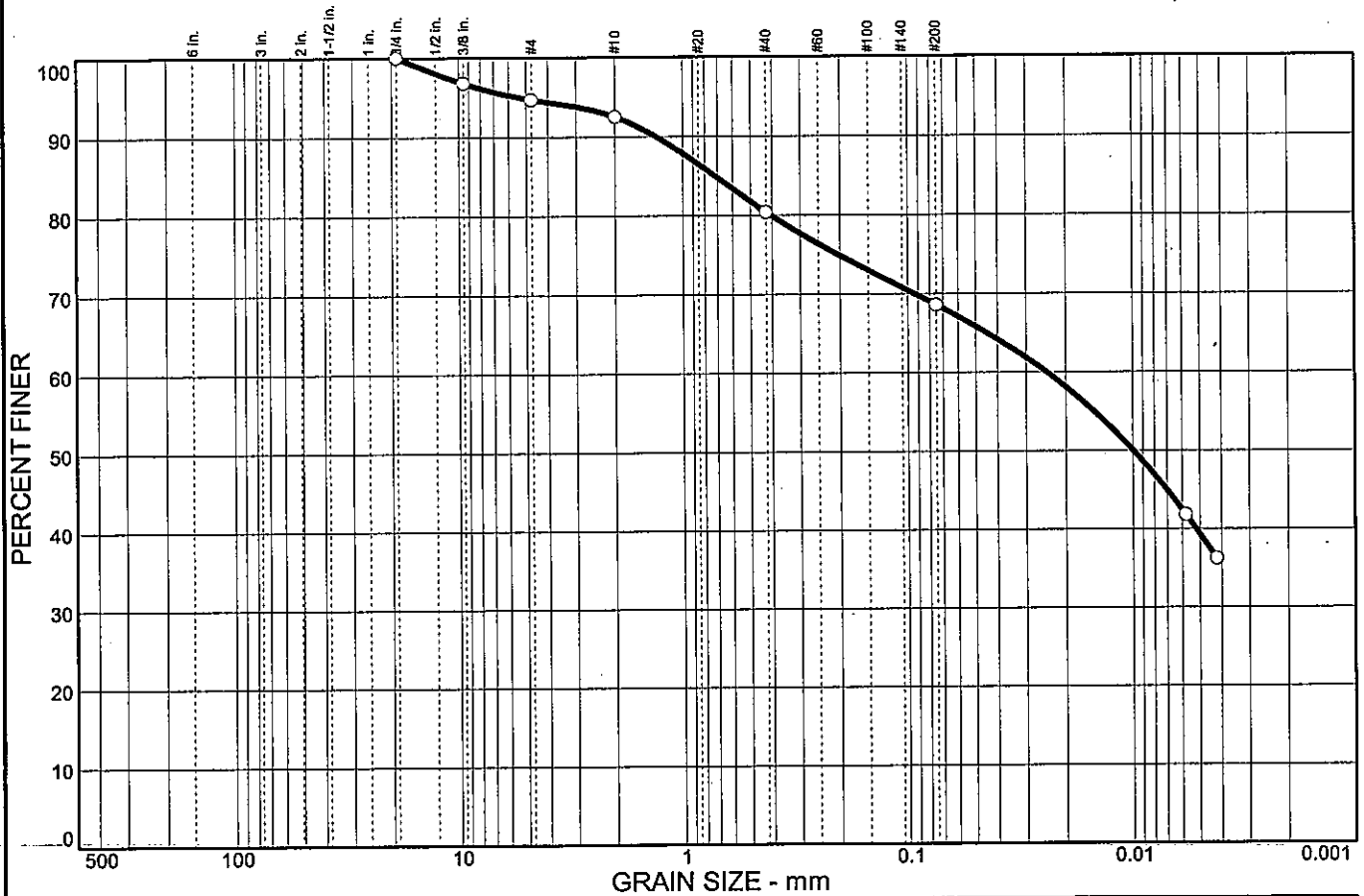


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	5.3	2.2	12.1	11.8	29.3	39.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	96.8		
#4	94.7		
#10	92.5		
#40	80.4		
#200	68.6		

**Soil Description**  
Sandy lean clay

**Atterberg Limits**  
 PL= 15      LL= 45      PI= 30

**Coefficients**  
 D<sub>85</sub>= 0.718      D<sub>60</sub>= 0.0243      D<sub>50</sub>= 0.0099  
 D<sub>30</sub>=              D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
 USCS= CL              AASHTO= A-7-6(18)

**Remarks**  
 Moisture Content= 24.9%  
 F.M.=0.09

\* (no specification provided)

Sample No.: 4  
Location:

Source of Sample: TR-61

Date: 4/23/05  
Elev./Depth: 8.5

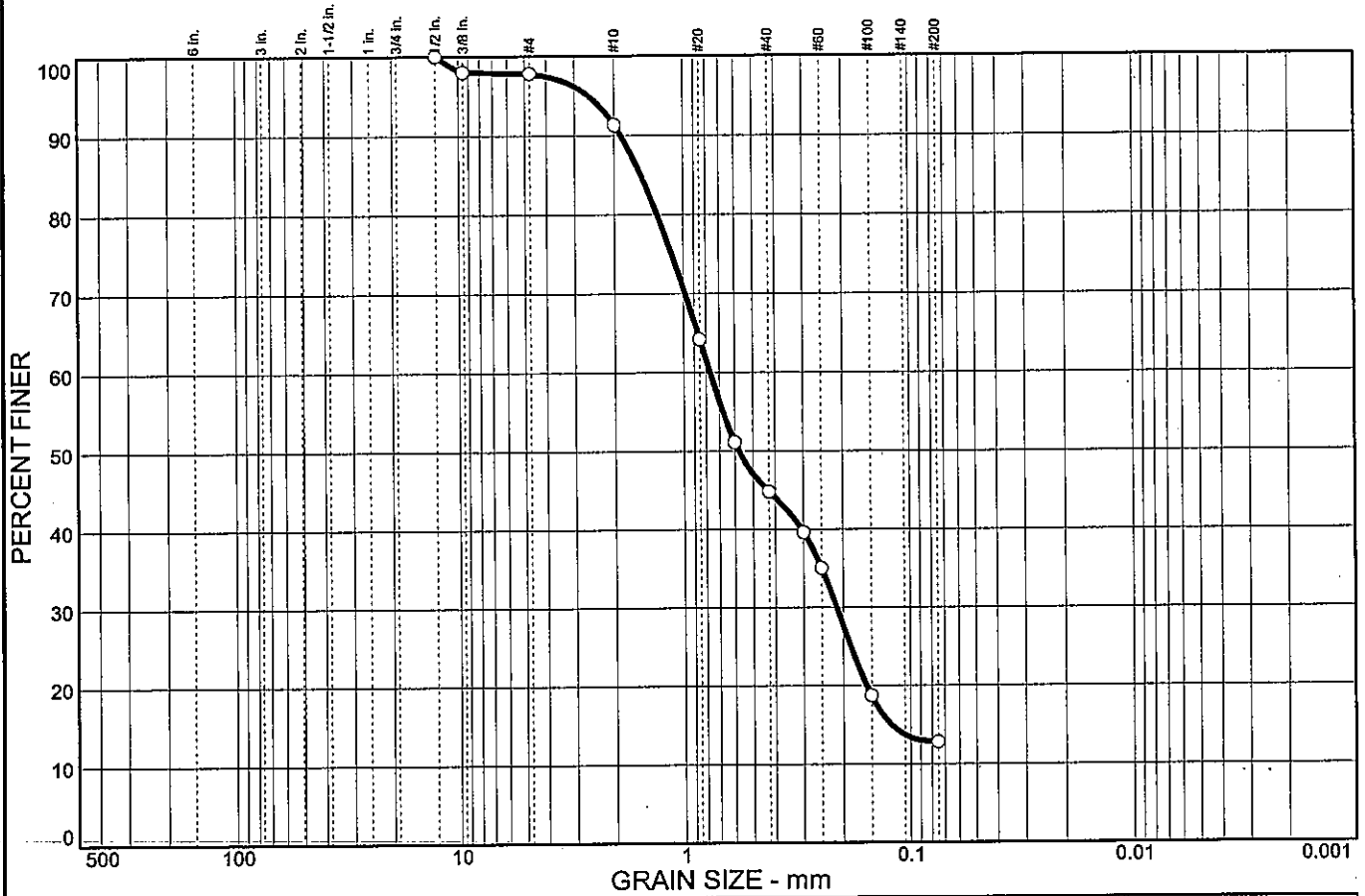


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	2.2	6.5	46.5	32.0	12.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.50 in.	100.0		
0.375 in.	98.0		
#4	97.8		
#10	91.3		
#20	64.2		
#30	51.1		
#40	44.8		
#50	39.6		
#60	35.0		
#100	18.7		
#200	12.8		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 1.53      D<sub>60</sub>= 0.768      D<sub>50</sub>= 0.576  
 D<sub>30</sub>= 0.214      D<sub>15</sub>= 0.122      D<sub>10</sub>=  
 C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
 USCS= SM              AASHTO= A-1-b

**Remarks**  
 Moisture Content= 23.0%  
 F.M.=1.95

\* (no specification provided)

Sample No.: 5  
Location:

Source of Sample: TR-61

Date: 4/23/05  
Elev./Depth: 11.0

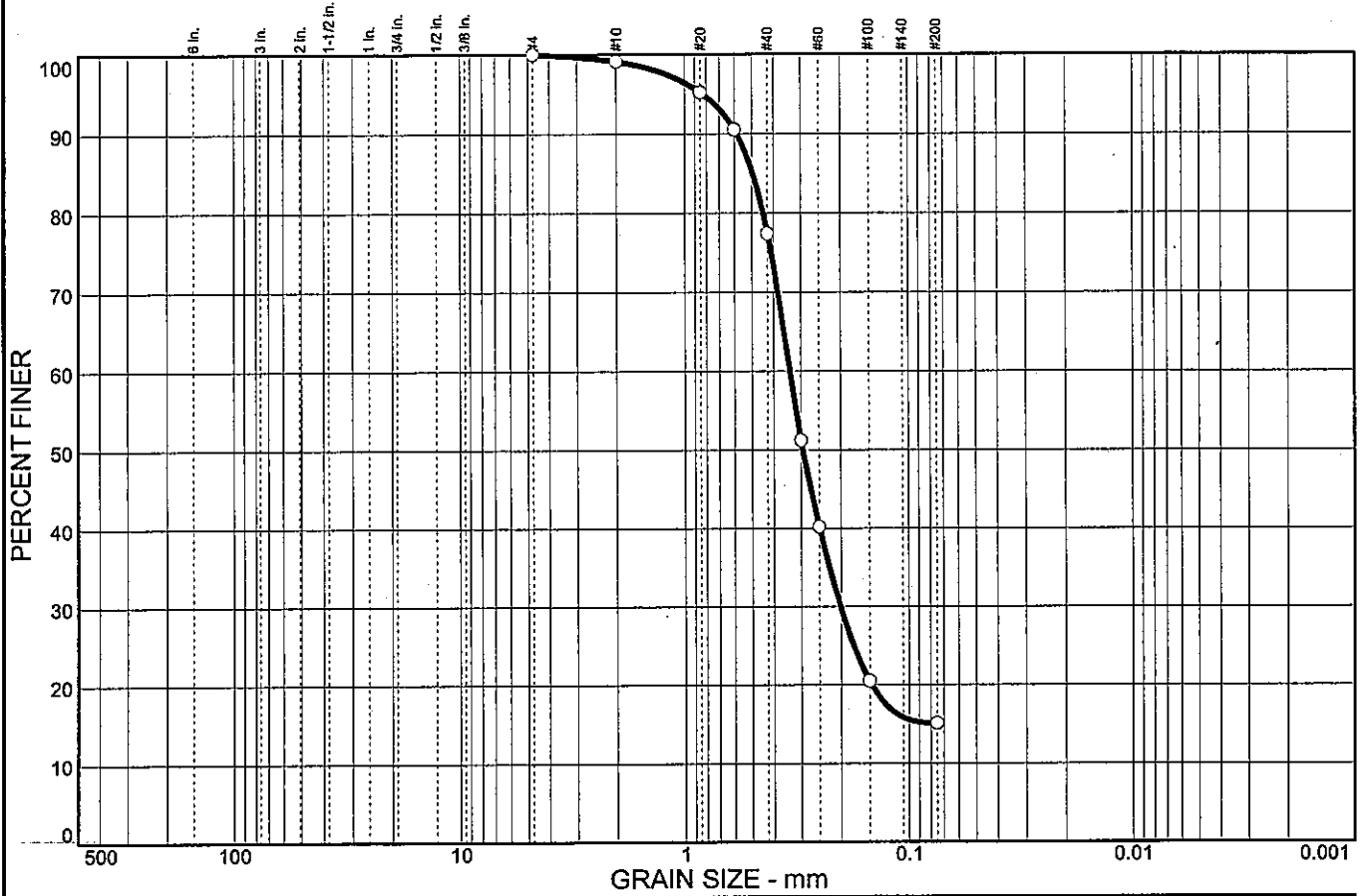


Client: TranSystems, Inc.  
Project: SCI-823-0.00

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	0.9	21.7	62.3	15.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.1		
#20	95.2		
#30	90.5		
#40	77.4		
#50	51.2		
#60	40.2		
#100	20.5		
#200	15.1		

**Soil Description**  
Silty sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>85</sub>= 0.495      D<sub>60</sub>= 0.337      D<sub>50</sub>= 0.295  
 D<sub>30</sub>= 0.201      D<sub>15</sub>=              D<sub>10</sub>=  
 C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**  
 USCS= SM                      AASHTO= A-2-4(0)

**Remarks**  
 Moisture Content= 28.7%  
 F.M.=1.38

\* (no specification provided)

Sample No.: 6  
Location:

Source of Sample: TR-61

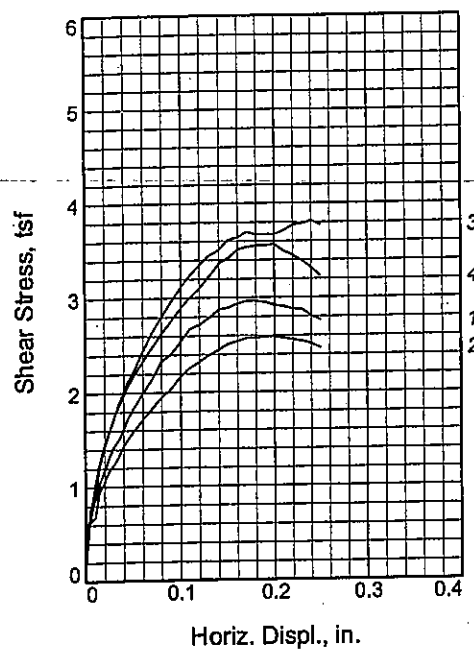
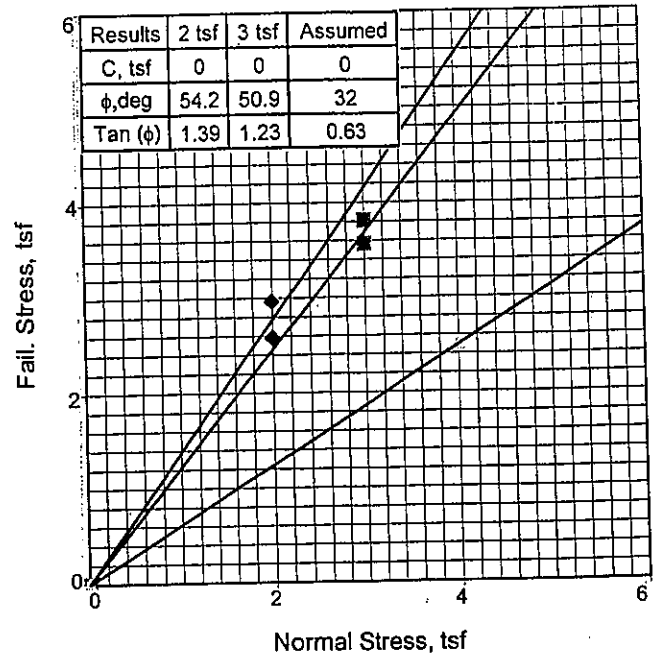
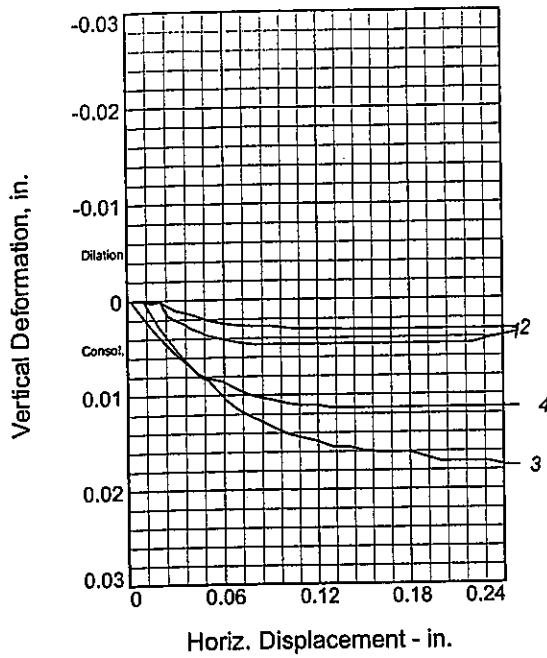
Date: 11/7/05  
Elev./Depth: 13.5



Client: TranSystems, Inc.  
Project: SCI-823-0.00

Project No: 0121-3070.03

Figure



Sample No.	1	2	3	4	
Initial	Water Content, %	28.7	28.7	28.7	28.7
	Dry Density, pcf	106.4	101.0	98.5	101.4
	Saturation, %	132.3	115.7	108.8	116.8
	Void Ratio	0.5849	0.6691	0.7111	0.6628
	Diameter, in.	2.50	2.50	2.50	2.50
	Height, in.	1.02	1.21	1.27	1.21
At Test	Water Content, %	21.2	21.2	19.4	19.4
	Dry Density, pcf	111.1	104.8	102.5	104.9
	Saturation, %	110.7	94.1	81.2	86.3
	Void Ratio	0.5172	0.6089	0.6451	0.6069
	Diameter, in.	2.50	2.50	2.50	2.50
	Height, in.	0.98	1.16	1.22	1.17
Normal Stress, tsf	2.000	2.000	3.000	3.000	
Fail. Stress, tsf	2.963	2.582	3.814	3.564	
Displacement, in.	0.17	0.19	0.24	0.20	
Ult. Stress, tsf					
Displacement, in.					
Strain rate, in./min:	0.01	0.01	0.01	0.01	

**Sample Type:** Standard Penetration Test  
**Description:** Silty sand

LL= NP      PL= NP      PI= NP  
**Assumed Specific Gravity= 2.7**

**Remarks:** Due to small REC, S-6 & S-7 were combined for testing. Samples were completely saturated and contained "free water". Sample was stired prior to testing, to incorporate excess water.

**Figure** \_\_\_\_\_

**Client:** TranSystems, Inc.

**Project:** SCI-823-0.00

**Source of Sample:** TR-61      **Depth:** 13.5

**Sample Number:** 6

Proj. No.: 0121-3070.03      **Date:** 11/7/05

**Tested By:** JN \_\_\_\_\_