GEOTECHNICAL ENGINEERING REPORT ON RETAINING WALLS
NEW BRITAIN-HARTFORD BUSWAY
STATE PROJECT NO. 171-305
NEWINGTON TO WEST HARTFORD, CONNECTICUT

by

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Parsippany, New Jersey

for

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New York, New York

File No. 32669-000
7 September 2010

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7 September 2010
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Attention: Samia Abdou, P.E.

Subject: Revised Report - Retaining Walls
New Britain-Hartford Busway
State Project No. 171-305
Newington to West Hartford, Connecticut

Ladies and Gentlemen:

We are pleased to present this revised Geotechnical Engineering Report summarizing our recommendations, based on comments provided by Connecticut Department of Transportation in February 2010, for the retaining walls to be constructed as part of the New Britain-Hartford Busway Project in Newington and West Hartford, Connecticut. Twelve (12) retaining walls, denoted Retaining Wall 101 through Retaining Wall 112 (from south to north), are required along the proposed Busway.

Recommendations in this report are based on our observations of the site, recent and previous subsurface explorations, the results of laboratory soil testing, and the retaining wall design information provided by the Connecticut Department of Transportation.

Our work was performed in general accordance with our subcontract agreement, dated 24 September 2007, with necessary adjustments made to accommodate changes in the plans and actual field conditions.

We appreciate the opportunity to provide engineering services on this project. Please do not hesitate to call if you have any questions or comments.

Sincerely yours,
HALEY & ALDRICH, INC.

STATE OF CONNECTICUT
EDWARD M. ZAMISKIE JR.
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Enclosures

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EXECUTIVE SUMMARY

The purpose of this Geotechnical Engineering Report is to present wall design and construction recommendations for the twelve (12) retaining walls associated with the proposed New Britain-Hartford Busway, State Project No. 171-305, in Newington and West Hartford, Connecticut. The project is sponsored by the Connecticut Department of Transportation (ConnDOT). The combined total proposed length of the walls is 3567 feet (ft) and the maximum wall heights are up to 20 ft. The proposed Busway in this section begins in Newington and follows the alignment of the existing Amtrak rail line to the northeast ending in West Hartford. In general, the area along the alignment has been previously developed and surface features include vegetated ground, railroad embankments, bridges and streams. The site location is shown on the Project Locus, Figure 1. This report includes discussion of the site conditions, subsurface explorations and laboratory testing, subsurface conditions, geotechnical evaluation, foundation design recommendations and construction considerations. Plans and profiles showing the specific locations and subsurface conditions for each proposed wall are presented in Figures 2 through 13B.

This portion of the Busway Project lies completely within the Central Valley region of the state. Bedrock is the Late Triassic Portland Arkose Formation, sedimentary rock composed of interbedded red brown shales, siltstones, and sandstones. The project site is underlain by fill, alluvium, glaciolacustrine deposits, and glacial till over the bedrock. The alluvium and glaciolacustrine deposits have compressible zones. For this phase of the project, thirty six (36) test borings were drilled along proposed alignments of Walls 101 through 111. Previous borings were completed by Baker Engineering. Soil mechanics testing was performed on representative soil samples to aid in soil and rock classification, and for determination of engineering properties.

Appropriate wall and foundation systems were evaluated relative to the proposed configurations and the geotechnical conditions at the site. To evaluate alternatives, bearing resistance, global stability and settlement were evaluated. Based on the evaluations and findings, the wall recommendations are summarized on the table at the end of this section. Further recommendations are provided in the report.

This report also includes comments related to foundation construction and other geotechnical aspects of the project. It will aid the preparation of contract plans and specifications and those involved with construction monitoring.

Wall Recommendation Summary

Wall	Begin Station	End Station	Length* (ft)	Max. Wall Height, Includes Footing (ft)	Max. Exposed Wall** Face Height (ft)	Wall Type	Backfill Type
101	215+40	218+27	285	8.5	4	CIPCC	PSF
102	225+50	229+00	350	10.5	5	CIPC	ESCS[1]
103	244+17	247+29	317.5	15	10.5	CIPCC	PSF
104	251+00	251+60	60	20	6	CIPCC	PSF
105	295+50	300+10	460	23	17	MSE or PMW	PSF
106	295+75	300+10	435.1	9.2	5	CIPCC or MSE/PMW	PSF
107	301+59	303+00	136.7	14.8	9	MSE	PSF
108	301+58	304+27	268.5	10	4.5	MSE/PMW or CIPCC[2]	PSF
109	304+77	308+04	329.9	18.5	12	MSE	ESCS[3]
110	305+68	308+06	237.3	8.5	3.5	CIPCC or MSE/PMW	PSF
111	309+24	316+20	696.3	17.5	12	CIPCC or MSE/PMW	PSF
112	229+20	239+00	979.5	7.5	4	RPW	--

CIPCC - Cast-in-place Concrete Cantilever wall supported on Spread Footing,
CIPC - Cast-in-place Concrete wall supported on Driven Piles
RPW - Roadway Parapet Wall (Precast barrier wall with moment slab on steel sheet piling)
PMW - Prefabricated Modular Wall
MSE - Mechanically Stabilized Earth wall
PSF - Pervious Structural Fill
ESCS - Expanded Shale Clay & Slate (Lightweight fill)
[1] ESCS use to reduce footing and pile-support requirements
[2] CIPCC if Wall 108 site is preloaded and constructed 6 months after Wall 107
[3] ESCS use due to excessive settlements

*Note that wall lengths will not equal difference between beginning and ending station when walls are not parallel to baseline.

**These values are maximum heights and may not be representative of typical conditions. Additional wall height information is provided in report text and on figures.

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1. INTRODUCTION

1.1 Project Description

The purpose of this Geotechnical Engineering Report is to present our recommendations for the twelve (12) retaining walls associated with the proposed New Britain-Hartford Busway, State Project No. 171-305, in Newington and West Hartford, Connecticut. The project is sponsored by the Connecticut Department of Transportation (ConnDOT). The site location is shown on the Project Locus, Figure 1. This report includes discussion of the site conditions, subsurface explorations and laboratory testing, subsurface conditions, foundation design recommendations and construction considerations.

1.2 Scope of Work

Haley & Aldrich, Inc. (Haley & Aldrich) performed the following scope of work for the subject project:

- Performed site reconnaissance
- Developed subsurface exploration and laboratory testing programs
- Monitored and logged subsurface explorations
- Prepared and analyzed field and laboratory data
- Evaluated settlements based on proposed construction
- Evaluated wall global stability
- Evaluated wall alternatives
- Prepared this report summarizing the findings and recommendations

1.3 Elevation Datum

Elevations provided in this report are in feet and refer to National Geodetic Vertical Datum of 1929 (NGVD29). Coordinates are in feet and refer to North American Datum of 1983 (NAD83).

1.4 Proposed Construction

The project consists of constructing a roadway parallel to and adjacent to an existing Amtrak rail line with associated crash walls and noise barrier walls. It also includes the construction of two (2) new bridges, crossings over three (3) culverts, and twelve (12) retaining walls. The following table summarizes the proposed construction of the retaining walls, which are the subject of this report.

Proposed Retaining Wall	Left or Right of Centerline	Location Station to Station	Length (ft)	Maximum Wall Height (ft)
101	L	Sta. 215+40 to Sta. 218+27	285	8.5
102	L	Sta. 225+50 to Sta. 229+00	350	10.5
103	L	Sta. 244+17 to Sta. 247+29	317.5	15
104	L	Sta. 251+00 to Sta. 251+60	60	20
105	L	Sta. 295+50 to Sta. 300+10	460	23
106	R	Sta. 295+75 to Sta. 300+10	435	9.2
107	L	Sta. 301+59 to Sta. 303+00	136.7	14.8
108	R	Sta. 301+58 to Sta. 304+27	268.5	10

Proposed Retaining Wall	Left or Right of Centerline	Location Station to Station	Length (ft)	Maximum Wall Height (ft)
109	L	Sta. 304+77 to Sta. 308+04	329.9	18.5
110	R	Sta. 305+68 to Sta. 308+06	237.3	8.5
111	L	Sta. 309+24 to Sta. 316+20	696.3	17.5
112	R	Sta. 229+20 to Sta. 239+00	979.5	7.5

This report contains recommendations specific to the proposed retaining walls. Plans and profiles showing the specific locations and subsurface conditions for each proposed wall are presented in Figures 2 through 13B.

1.4.1 Retaining Wall 101

Retaining Wall 101 will extend approximately 285 ft along the western side of the proposed Busway from about Sta. 215+40 to Sta. 218+27. The location of Wall 101 is shown on Figure 2, Retaining Wall 101, Subsurface Exploration Plan and Profile. The wall will be constructed by cutting into the existing slope to accommodate the width of the proposed roadway, retaining and supporting the soil behind the wall. The exposed wall height will range from about 2 to 4 ft. The ground surface west of the proposed wall will vary from about El. 72 to El. 66, sloping downward from south to north. The top of pavement for the proposed Busway along the front face of the wall will vary between about El. 67 at Sta. 215+00 to about El. 65 at Sta. 218+27. Footing subgrade will be a minimum of 4 ft below the proposed ground surface at approximately El. 61.0. Approximately up to 5 ft of cut will be required to construct Wall 101.

1.4.2 Retaining Wall 102

Retaining Wall 102 will extend approximately 350 ft along the western side of the proposed Busway from about Sta. 225+50 to Sta. 229+00. The location of Wall 102 is shown on Figure 3, Retaining Wall 102, Subsurface Exploration Plan and Profile. The wall will be constructed to accommodate the width of the proposed roadway, retaining and supporting the fill needed to widen the existing Amtrak embankment and build the roadway at the proposed grade. The exposed wall on the western side will be approximately 5-ft high, not including the noise wall to be constructed on top of Wall 102. The ground surface west of the proposed wall will vary from about El. 57 at Sta. 225+50 to about El. 61 at Sta. 229+00, sloping upward from south to north. The centerline of the top of pavement for the proposed Busway along the front face of the wall will vary from approximately El. 65.5 to El. 66.7, sloping upward from south to north. Footing subgrade will be a minimum of 4.0 ft below the proposed ground surface at the base of the wall, and will vary between approximately El. 52 and El. 56.5. Approximately 5 to 9 ft of fill will be required for backfill to raise the grade at Wall 102.

1.4.3 Retaining Wall 103

Retaining Wall 103 will extend approximately 317.5 ft along the western side of the proposed Busway from about Sta. 244+17 to Sta. 247+29. The location of Wall 103 is shown on Figure 4, Retaining Wall 103, Subsurface Exploration Plan and Profile. The wall will be constructed by cutting into an existing adjacent slope to accommodate the width of the proposed roadway, retaining and supporting the soil behind the wall. The exposed wall will range up to 10.5-ft high, not including the chain-link fence to be constructed on top. The ground surface west of the

proposed wall will vary from about El. 80 to El. 83, sloping from a high point (El. 83) at the middle of the wall downward to the south and north ends (El. 80 and El. 81.5, respectively). The top of pavement at the proposed Busway centerline along the front face of the wall will vary between approximately El. 71.7 at Sta. 245+00, sloping downward to approximately El. 70. Footing subgrade will be a minimum of 4.0 ft below the proposed ground surface at the base of the wall and will vary between about El. 63.5 and El. 67.5. Approximately 12 to 16 ft of cut will be required to construct Wall 103.

1.4.4 Retaining Wall 104

Retaining Wall 104 will extend approximately 60 ft along the western side of the proposed Busway from about Sta. 251+00 to Sta. 251+60. The location of Wall 104 is shown on Figure 5, Retaining Wall 104, Subsurface Exploration Plan and Profile. The wall will be constructed to accommodate the width of the proposed roadway, retaining and supporting the fill needed to widen the existing Amtrak embankment and build the roadway at the proposed grade. The exposed wall segment will be approximately 3 to 6-ft high, not including the concrete barrier to be constructed on top of Wall 104. The ground surface west of the proposed wall will vary from about El. 61.5 at Sta. 250+70 to about El. 68 at Sta. 251+05. The top of pavement at the proposed Busway centerline slopes upward from about El. 69.2 at Sta. 250+70 to about El. 69.6 at Sta. 251+05. Foundation subgrade will be a minimum of 4.0 ft below the proposed ground surface and will vary between approximately El. 57.5 and El. 62.5. Approximately 2 to 7 ft of fill will be required for backfill to raise the grade at Wall 104.

1.4.5 Retaining Wall 105

Retaining Wall 105 will extend approximately 460 ft along the western side of the proposed Busway from about Sta. 295+50 to Sta. 300+10, where it terminates at the wingwall for the proposed bridge that will cross New Britain Avenue (Route 529). The location of Wall 105 is shown on Figure 6, Retaining Wall 105, Subsurface Exploration Plan and Profile. The wall will be constructed to accommodate the width of the proposed roadway, retaining and supporting the fill needed to widen the existing Amtrak embankment and build the roadway at the proposed grade. The exposed wall on the western side will be approximately 2 to 17-ft high, not including the concrete barrier to be constructed on top of Wall 105. The ground surface west of the proposed varies from about El. 67.5 at Sta. 295+50 to El. 57 at Sta. 300+00. The top of pavement along the centerline of the proposed Busway slopes upward from about El. 71.4 at Sta. 295+25 to about El. 73.8 at Sta. 299+50. Foundation subgrade will be a minimum of 4.0 ft below the proposed ground surface at the base of the wall and will vary between approximately El. 50 and El. 63. Approximately 1 to 15 ft of fill will be required for backfill to raise the grade at Wall 105.

1.4.6 Retaining Wall 106

Retaining Wall 106 will extend approximately 435 ft along the eastern side of the proposed Busway from about Sta. 295+75 to Sta. 300+10, where it terminates at the wingwall for the proposed bridge that will cross New Britain Avenue (Route 529). The location of Wall 106 is shown on Figure 7, Retaining Wall 106, Subsurface Exploration Plan and Profile. The wall will be constructed to accommodate the width of the proposed roadway, retaining and supporting the fill needed to widen the existing Amtrak embankment and build the roadway at the proposed grade. The exposed wall on the eastern side will be approximately 2 to 5-ft high, not including the concrete barrier to be constructed on top of Wall 106. The ground surface east of the proposed wall is relatively flat, about El. 70 at Sta. 296+75 to about El. 69 at Sta. 300+00. The top of pavement along the centerline of the proposed Busway slopes upward from about El. 71.8

at Sta. 296+75 to about El. 73.8 at Sta. 299+50. Footing subgrade will be a minimum of 4.0 ft below the proposed ground surface at the base of the wall and will be approximately El. 65. Approximately 1 to 5 ft of fill will be required for backfill to raise the grade at Wall 106.

1.4.7 Retaining Wall 107

Retaining Wall 107 will extend approximately 137 ft along the western side of the proposed Busway from the termination of the northwestern wingwall for the proposed bridge over New Britain Avenue (Route 529) at about Sta. 301+59 to Sta. 303+00. The location of Wall 107 is shown on Figure 8, Retaining Wall 107, Subsurface Exploration Plan and Profile. The wall will be constructed to accommodate the width of the proposed roadway, retaining and supporting the fill needed to build the roadway at the proposed grade. The exposed wall on the western side will be approximately 4 to 9-ft high, not including the concrete barrier to be constructed on top of Wall 107. The majority of the wall has an exposed height of about 5 ft. The ground surface west of the proposed wall varies from about El. 67.5 at Sta. 302+00 to about El. 63 at Sta. 303+00. In the vicinity of Sta. 302+00, the ground slope in front of the proposed wall will be about 2.9H:1V. The top of pavement along the centerline of the proposed Busway slopes downward from about El. 72.1 at Sta. 301+50 to about El. 70.4 at Sta. 303+50. Foundation subgrade will be a minimum of 4.0 ft below the proposed ground surface at the toe of the wall and will be approximately El. 58. Approximately 3 to 8 ft of fill will be required for backfill to raise the grade at Wall 107.

1.4.8 Retaining Wall 108

Retaining Wall 108 will extend approximately 268 ft along the eastern side of the proposed Busway from the termination of the northwestern wingwall for the proposed bridge over New Britain Avenue (Route 529) at about Sta. 301+58 to Sta. 304+27. The location of Wall 108 is shown on Figure 9, Retaining Wall 108, Subsurface Exploration Plan and Profile. The wall will be constructed to accommodate the width of the proposed roadway, retaining and supporting the fill needed to build the roadway at the proposed grade. The exposed wall on the eastern side will be approximately 3 to 5-ft high, not including the concrete barrier to be constructed on top of Wall 108. The ground surface east of the proposed wall is relatively flat at about El. 67 to about El. 68. The top of pavement along the centerline of the proposed Busway slopes downward from about El. 72.1 at Sta. 301+50 to about El. 69.5 at Sta. 304+50. Foundation subgrade will be a minimum of 4.0 ft below the proposed ground surface at the base of the wall and will be approximately El. 62.5. Approximately 1 to 3 ft of fill will be required for backfill to raise the grade at Wall 108.

A 12-inch (in.) diameter RCP storm sewer will run from approximately 3 to 4 ft above and behind the base of Wall 108. Two (2) catch basins are proposed at Sta. 301+68 and Sta. 303+10, adjacent to and behind Wall 108.

1.4.9 Retaining Wall 109

Retaining Wall 109 will extend approximately 330 ft along the western side of the proposed Busway from the southbound exit ramp at about Sta. 304+77 to Sta. 308+04, where the proposed wall terminates at the southwestern wingwall of the proposed bridge over Trout Brook. Between Sta. 304+60 and Sta. 306+10 (approximately 150 ft), Wall 109 will support the proposed Busway southbound exit ramp to Elmwood Station. The location of Wall 109 is shown on Figure 10, Retaining Wall 109, Subsurface Exploration Plan and Profile. The wall will be constructed to accommodate the width of the proposed roadway, retaining and supporting the fill needed to widen the existing Amtrak embankment and build the roadway at the proposed grade. The

exposed wall on the western side will be approximately 9.5 to 12-ft high, not including the concrete barrier to be constructed on top of Wall 109. The ground surface west of the proposed wall generally slopes downward from the ends of the proposed wall, about El. 60 at Sta. 305+00 and about El. 57 at Sta. 308+00, toward the middle of the wall, about El. 54 at Sta. 306+50. The top of pavement along the centerline of the proposed Busway slopes downward from about El. 69.1 at Sta. 305+00 to about El. 66.6 at Sta. 308+00. Foundation subgrade will be a minimum of 4.0 ft below the proposed ground surface at the base of the wall and will vary between approximately El. 50 and El. 55. Approximately 9 to 14 ft of fill will be required for backfill to raise the grade at Wall 109.

A 15-in. RCP storm sewer that outlets to Trout Brook will penetrate the wall at Station 308+08. Additionally, two (2) catch basins are proposed at Sta. 306+10 and Sta. 308+08 adjacent to and behind Wall 109 on the eastern side.

1.4.10 Retaining Wall 110

Retaining Wall 110 will extend approximately 237 ft along the eastern side of the proposed Busway from the northbound entrance ramp of the proposed Busway at about Sta. 305+68 to Sta. 308+06, where the proposed wall terminates at the southeastern wingwall of the proposed bridge over Trout Brook. Between Sta. 305+63 and Sta. 307+13 (approximately 150 ft), Wall 110 will support the proposed Busway northbound entrance ramp at Elmwood Station. The location of Wall 110 is shown on Figure 11, Retaining Wall 110, Subsurface Exploration Plan and Profile. The wall will be constructed to accommodate the width of the proposed roadway, retaining and supporting the fill needed to build the roadway at the proposed grade. The exposed wall on the eastern side will be approximately 2.5 to 4-ft high, not including the concrete barrier to be constructed on top of Wall 110. The ground surface east of the proposed wall is relatively flat at about El. 65.5 to about El. 64.5. The top of pavement along the centerline of the proposed Busway slopes downward from about El. 68.3 at Sta. 306+00 to El. 66.6 at Sta. 308+00. Footing subgrade will be a minimum of 4.0 ft below the proposed ground surface at the base of the wall and will vary between approximately El. 60 and El. 62. Approximately 2 to 3 ft of fill will be required for backfill to raise the grade at Wall 110.

Two (2) catch basins are proposed at Sta. 306+10 and Sta. 308+08 adjacent to and behind Wall 110 on the western side.

1.4.11 Retaining Wall 111

Retaining Wall 111 will extend approximately 696 ft along the western side of the proposed Busway from the northern end of the proposed bridge over Trout brook at about Sta. 309+24 to Sta. 316+20. The location of Wall 111 is shown on Figures 12A and 12B, Retaining Wall 111, Subsurface Exploration Plan and Profile, Sheets 1 and 2. The wall will be constructed to accommodate the width of the proposed roadway, retaining and supporting the fill needed to widen the existing Amtrak embankment and build the roadway at the proposed grade. The exposed wall on the western side will be approximately 2 to 12-ft high, not including the concrete barrier to be constructed on top of Wall 111. The ground surface west of the proposed wall varies, but generally slopes upward from about El. 52 at Sta. 309+00 to about El. 61.5 at Sta. 316+00. The top of pavement along the centerline of the proposed Busway varies, but generally slopes downward from about El. 65.7 at Sta. 309+00 to about El. 63.7 at Sta. 316+00. Footing subgrade will be a minimum of 4.0 ft below the proposed ground surface at the base of the wall and will vary between approximately El. 48 and El. 55.5. Approximately 1 to 11 ft of fill will be required for backfill to raise the grade at Wall 111.

A proposed catch basin will be located at about Sta. 313+43 and will connect to a proposed manhole approximately 25 ft from the face of proposed Wall 111 through an 18-in. diameter CMP that penetrates through the wall. An 18-in. diameter RCP is proposed behind the wall along some sections.

1.4.12 Retaining Wall 112

Retaining Wall 112 will extend approximately 979 ft along the eastern side of the proposed Busway from about Sta. 229+20 to Sta. 239+00. The location of Wall 112 is shown on Figures 13A and 13B, Retaining Wall 112, Subsurface Exploration Plan and Profile. The wall will be constructed to accommodate the width of the proposed roadway, retaining and supporting the fill needed to build the roadway at the proposed grade along the proposed drainage swale between the railroad track and the Busway. The exposed wall height will range from about 1.5 to 4 ft. The finished grade at the top of the swale along the proposed wall will vary from about El. 65 to El. 68, sloping downward from south to north. The top of pavement for the proposed Busway along the front face of the wall will vary between about El. 66.7 at Sta. 229+50 to about El. 70.3 at Sta. 239+00. Two (2) catch basins are proposed at Sta. 230+00 and 233+50 adjacent to and behind Wall 112 on the western side.

2. SITE CONDITIONS

2.1 Regional Geology

This portion of the New Britain-Hartford Busway Project extends from Newington to West Hartford, Connecticut, and lies completely within the Central Valley region of the state. Bedrock is the Late Triassic Portland Arkose Formation, sedimentary rock composed of interbedded red brown shales, siltstones, and sandstones, and occasional gray shale layers. These lithologies are largely the result of fluvial (river), alluvial fan, and lake deposition of sediments derived from crystalline mountains in a tropical environment. Regional-scale normal faulting to the east resulted in the approximately 20 to 30 degree characteristic dip in the sedimentary beds.

Connecticut's surficial deposits have been largely sculpted over the past 25,000 years, at the close of the Ice Age during the final advance of the Wisconsinan Glacier. Continental ice sheets flowed south, scouring the land of its existing subsoil, saprolite, and weathered bedrock, and polishing or plucking the more competent bedrock. This material was deposited by the ice as a dense, heterogeneous mixture of soil (clay to boulders) known as *glacial till*. Other material was deposited by glacial meltwater, either in contact with the ice (*stratified drift*) or in meltwater streams (*glaciofluvial deposits*). Often meltwater streams would become dammed by either ice or sediment dams, forming glacial lakes. In the deep lake waters only the finest particles (silt and clay) were deposited (*glaciolacustrine deposits*), while streams entering the lakes would drop their silt and sand in *glaciodeltaic deposits*.

The initial stages of glacial lake formation, as observed in test boring samples, were often characterized by heavy sediment loads in glacial meltwaters and long winters, creating thick and irregularly-spaced layers. As time progressed, glacial margins retreated north, and seasons were more regular, creating varved deposits with rhythmically-deposited layers. The Newington end of this portion of the project, southwest of Willard Avenue, is one of the few areas in Connecticut that soil deposits predating Glacial Lake Hitchcock (other than glacial till) are exposed. The clays here have been mapped previously (Deane, 1967) as being part of the Berlin Clay varved deposits. The Berlin Clay was deposited in a series of ice-marginal glacial lakes that existed prior to the final major advance of the Wisconsinan glacier, and have been found to be overlain in various locations by till, glaciofluvial deposits, and Lake Hitchcock varved clays. Varved clays northeast of Willard Avenue have been mapped previously as being deposited in Glacial Lake Hitchcock, one of the largest and longest-lived glacial lakes in the Northeast (Deane, 1967). The Berlin Clay may underlie the Lake Hitchcock clay in portions of Newington and southern West Hartford.

Since the retreat of the glaciers, recent geological and anthropogenic processes have continued to shape the land surface. Streams and associated wetlands deposit sediments in their channels and floodplains as *alluvium* (silt, sand, and gravel) and as *organic soil deposits*. Shallow-depth fills underlie the railroad tracks throughout the project alignment. Thicker fills, generally composed of local soils, were encountered at railroad crossings dating from the early 20th Century, and include the New Britain Avenue overpass, the bridge over Trout Brook, and two (2) deep storm-drainage culverts.

2.2 Existing Site Conditions

The project site begins in Newington following the existing Amtrak rail line to the northeast ending in West Hartford. In general, the area along the alignment has been previously developed and surface features include vegetated ground, railroad embankments, bridges and streams.

2.2.1 Retaining Wall 101

The area of proposed Wall 101 is covered by dense trees preceding an industrial park to the west and an existing railroad that lies to the east of the site. The railroad embankment slopes at about 5H:1V from the railroad tracks up to the industrial park on the western side of Wall 101. The ground surface behind the wall will vary from about El. 72 to El. 66, sloping downward from south to north. At the top of the slope and along the top of Wall 101, grade is relatively flat at about El. 69 to El. 72. Similarly, at the proposed toe of Wall 101, the grade along the existing railroad tracks is generally flat, sloping gently from southwest to northeast from about El. 67 to El. 66.

2.2.2 Retaining Wall 102

The area of proposed Wall 102 is covered by dense trees preceding a residential area to the west, and an existing railroad that lies to the east of the site. The west side of the existing railroad embankment slopes from approximately 2.6H:1V to 1.3H:1V along the proposed wall. The top of the embankment is relatively flat, varying from about El. 64 to El. 66.

2.2.3 Retaining Wall 103

The area of proposed Wall 103 is covered by dense trees preceding commercial buildings to the west and an existing railroad, which lies to the east of the site. There is an existing building approximately 14 ft west of proposed Wall 103 at about Sta. 245+83. The railroad embankment slopes at about 4H:1V from the railroad tracks up to the existing buildings on the western side of Wall 103. At the top of the slope and along the top of Wall 103, the existing grade slopes upward from the north and south ends of the wall (El. 82 to El. 83) towards the middle at about El. 86. At the proposed toe of Wall 103, the grade along the existing railroad tracks is generally flat at about El. 70.

2.2.4 Retaining Wall 104

The area of proposed Wall 104 is covered by dense trees preceding residential buildings to the west and an existing railroad that lies to the east of the site. The west side of the railroad embankment slopes from approximately 1H:1V at Sta. 250+50 to 6H:1V from Sta. 251+00 to 252+00, along the proposed wall alignment. The 1H:1V portion of the slope is confined to a very limited area. The top of the embankment is relatively flat, varying from about El. 70 to El. 71.

2.2.5 Retaining Wall 105

The area of proposed Wall 105 is covered by dense trees preceding industrial buildings to the west and an existing railroad to the east. The existing railroad embankment slopes at about 2H:1V to 2.5H:1V from the railroad tracks down to the industrial park on the western side of proposed Wall 105. At the bottom of the slope along the alignment of the proposed wall, grade generally slopes down from about El. 59 to El. 53.5. The grade along the existing railroad tracks is relatively flat, sloping gently downward from about El. 70 to El. 68.2 approaching the New Britain Avenue Bridge.

2.2.6 Retaining Wall 106

The area of proposed Wall 106 is covered by dense trees preceding industrial buildings to the west and an existing railroad to the east. The existing railroad embankment slopes at about

4.7H:1V, which lie about 12 to 14 ft to the east of proposed Wall 106. Behind Wall 106, the existing grade along the railroad is about El. 69 and slopes upward slightly to about El. 70 approaching the New Britain Avenue Bridge.

2.2.7 Retaining Wall 107

The area of proposed Wall 107 is generally covered by dense trees preceding commercial buildings to the west and an existing railroad, which lies to the east of the site. An existing car wash and its associated driveways are located at the western toe of the proposed wall. The car wash will be demolished for the construction of the proposed Busway. East of proposed Wall 107, the existing railroad embankment slopes at about 6H:1V from the railroad tracks westward to the existing car wash.

2.2.8 Retaining Wall 108

The area of proposed Wall 108 is generally covered by dense trees preceding an existing railroad and commercial buildings to the east. To the west of proposed Wall 108 lies the proposed site for Wall 107 and an existing car wash.

2.2.9 Retaining Wall 109

The area of proposed Wall 109 is generally covered by dense trees preceding a commercial building to the west and an existing railroad, which lies to the east of the site. The existing railroad embankment is relatively flat, sloping gently downward from about El. 60 at Sta. 305+00 to about El. 57 at Sta. 305+50. Between Sta. 306+00 and Sta. 308+00, the embankment slope steepens to about 2.8H:1V.

2.2.10 Retaining Wall 110

The area of proposed Wall 110 is generally covered by dense trees preceding an existing railroad, dense trees, and a soil stockyard, which lie to the east of the site. The existing railroad embankment at Wall 110 is relatively flat, sloping gently downward from about El. 65.5 at Sta. 306+00 to El. 64.5 at Sta. 308+00.

2.2.11 Retaining Wall 111

The area of proposed Wall 111 is covered by dense trees preceding two (2) existing structures and their associated parking areas to the west, and an existing railroad east of the site. The railroad embankment adjacent to the wall slopes at approximately 1H:1V to 2H:1V downward from east to west to the existing developments on the western side of the proposed wall.

2.2.12 Retaining Wall 112

The area of proposed Wall 112 is located on the top of the railroad embankment with the existing railroad to the east of the location. At the top of the embankment and along the Wall 112 grade is relatively flat at about El. 66 to El. 69.

3. SUBSURFACE EXPLORATIONS AND LABORATORY TESTING

For this phase of the project, forty one (41) test borings were drilled along proposed alignments of Walls 101 through 111 by General Borings, Inc., from Prospect, Connecticut between 18 and 22 October 2007, between 9 and 29 April 2008, between 30 September and 2 October 2009 and between 19 and 23 July 2010. Borings were advanced using hollow stem augers to depths ranging from 17 to 110 ft below ground surface. Soil samples were obtained using a 2-in. O.D. split spoon sampler at 5-ft intervals with a donut or safety hammer. Undisturbed soil samples were obtained using a 3-in. diameter piston tube sampler. Rock core samples were obtained in selected borings using a NX or NQ core barrel.

The borings were monitored full-time by a Haley & Aldrich field representative. Exploration locations were surveyed by the Connecticut Department of Transportation. The exploration logs are presented in Appendix A, Test Boring Logs.

Previous borings, completed under the direction of GZA GeoEnvironmental, Inc. (GZA) between 7 July and 20 August 2003 were also utilized in this study. These borings were monitored by Baker Engineering and the exploration logs are included in Appendix B, Test Borings Performed by Others.

Locations of the borings and subsurface profiles drawn based on the boring data are shown on Figures 2 through 13B.

Forty four (44) representative soil samples for this phase of the site investigation were submitted to a soil mechanics laboratory for testing to aid in soil and rock classification, and for determination of engineering properties. Testing included:

- Grain size distribution/wash 200 sieve analysis (ASTM D421 and D422)
- Atterberg Limits (ASTM D4318)
- Water Content (ASTM D2216)
- Organic Content (ASTM D2974)
- Consolidated Undrained Triaxial Compression Tests (ASTM D4767)
- One-dimension Consolidation (ASTM D2435)

The test results are presented in Appendix C, Laboratory Testing Results.

Sixty nine (69) representative soil samples from the July and August 2003 site investigation were submitted by Baker Engineering to a soil mechanics laboratory for testing to aid in soil and rock classification, and for determination of engineering properties. Testing included:

- Grain size distribution/wash 200 sieve analysis (ASTM D421 and D422)
- Atterberg Limits (ASTM D4318)
- Water Content (ASTM D2216)
- Consolidated Undrained Triaxial Compression Tests (ASTM D4767)
- One-dimension Consolidation (ASTM D2435)

The test results are presented in Appendix D, Laboratory Testing Performed by Others.

3.1 Retaining Wall 101

3.1.1 Test Borings

Five (5) test borings were drilled along proposed Wall 101 (from south to north: RW-101, RW-101A, RW-102, RB-105, and RW-103) on 18 October 2007 and between 9 April and 25 April 2008. Borings were advanced to depths ranging from 17 to 26 ft below ground surface. Rock core samples were obtained in borings RW-101, RW-102, RB-105, and RW-103.

3.1.2 Laboratory Testing

Two (2) grain-size distribution analyses were performed on selected representative samples from borings RW-101 and RB-105 to confirm visual classification.

3.2 Retaining Wall 102

3.2.1 Test Borings

Three (3) test borings were drilled along proposed Wall 102 (from south to north: RW-124, RB-107 (OW) and RW-123) between 9 April and 24 April 2008. Two (2) additional borings were drilled (RW-124A and RW-123A) between 30 September and 2 October, 2009 for additional information to support pile foundation design. Borings were advanced to depths ranging from 25 to 67 ft below ground surface. Undisturbed soil samples were obtained from boring RW-123. Bedrock core was obtained in boring RW-124A from El -3 to -12 and top of bedrock was inferred at boring RW-123A at about El. +5.

3.2.2 Laboratory Testing

No samples were selected for laboratory testing from the borings associated with proposed Wall 102.

3.3 Retaining Wall 103

3.3.1 Test Borings

A total of four (4) test borings were performed in the vicinity of proposed Wall 103. One (1) test boring (RW-105) was drilled to the south of Wall 103, two (2) test borings were drilled directly along the Wall 103 alignment (from south to north: RW-106 (OW) and RW-107), and one (1) test boring (RB-110) was drilled to the north of Wall 103. Borings were performed between 18 and 19 October 2007, and between 14 and 25 April 2008. Borings were advanced to depths ranging from 24 to 40.8 ft below existing ground surface. A rock core sample was obtained in boring RW-105, and the top of bedrock was inferred at RW-106 (OW) at about El. 34.95.

3.3.2 Laboratory Testing

Two (2) grain size distribution analyses were performed on selected representative samples from borings RB-110 and RW-105 to confirm visual classification.

3.4 Retaining Wall 104

3.4.1 Test Borings

A total of four (4) borings were performed in the vicinity of Wall 104. One (1) test boring (RB-28) was drilled to the south of Wall 104, one (1) test boring was drilled directly along the Wall 104 alignment (CB-103), and two (2) test borings (RB-111 and RB-112) were drilled to the north of Wall 104. Test boring RB-28 was previously performed by GZA on 7 July 2003. The remaining test borings were performed by General Borings for this project phase on 14 April 2008. Borings were advanced using to depths ranging from 25 to 50 ft below ground surface. Undisturbed soil samples were obtained from borings CB-103 and RB-112. Bedrock was not confirmed or sampled at any of the boring locations.

3.4.2 Laboratory Testing

One (1) grain size distribution analysis was performed on a selected representative sample from CB-103 to confirm visual classification. One (1) Lab Vane, two (2) Atterberg Limits, and four (4) consolidated undrained triaxial compression analyses were performed on selected representative undisturbed samples from borings CB-103 and RB-112.

3.5 Retaining Wall 105

3.5.1 Test Borings

A total of ten (10) test borings were performed in the vicinity of proposed Wall 105. One (1) test boring (SB-44) was drilled to the south of Wall 105, seven (7) test borings were drilled either directly along or in the vicinity of the proposed wall alignment (RW-109, RW-110, RW-111, RW-112, RW-113, RW-114 and RW-115), and two (2) test borings (SB-46 and NBA-101) were drilled to the north of Wall 105. Test borings SB-44 and SB-46 were performed by GZA between 8 July and 19 August 2003. The remaining test borings were performed by General Borings for this project phase on 22 October 2007 and between 15 and 28 April 2008. Borings were advanced to depths ranging from 37.5 to 73.7 ft below ground surface. Undisturbed soil samples were obtained from borings RW-110, RW-112, RW-114 and NBA-101. Rock core samples were obtained in borings SB-44, SB-46 and NBA-101.

3.5.2 Laboratory Testing

Four (4) grain size distribution analyses, four (4) Atterberg Limits tests, four (4) consolidated undrained triaxial compression analyses, and two (2) one-dimensional consolidation tests were performed to aid in soil classification and to determine engineering properties on selected representative samples.

GZA performed two (2) grain size distribution analyses, two (2) Atterberg Limits tests, and one (1) consolidated undrained triaxial compression analysis on selected samples from SB-46.

3.6 Retaining Wall 106

3.6.1 Test Borings

A total of seven (7) test borings were performed in the vicinity of proposed Wall 106. Five (5) test borings were drilled either directly along or in the vicinity of the proposed wall alignment

(RW-111, RW-112, RW-113, RW-114 and RW-115), and two (2) test borings (SB-46 and NBA-101) were drilled to the north of Wall 106. Test boring SB-46 was performed by GZA between 8 and 11 July 2003. The remaining test borings were performed by General Borings for this project phase on 22 October 2007 and between 15 and 28 April 2008. Borings were advanced to depths ranging from 37.5 to 73.7 ft below ground surface. Undisturbed soil samples were obtained from borings RW-112, RW-114 and NBA-101. Rock core samples were obtained in borings SB-46 and NBA-101.

3.6.2 Laboratory Testing

Three (3) grain size distribution analyses, three (3) Atterberg Limits tests, two (2) consolidated undrained triaxial compression analyses, and one (1) one-dimensional consolidation test were performed to aid in soil classification and to determine engineering properties on selected representative samples.

GZA performed two (2) grain size distribution analyses, two (2) Atterberg Limits tests, and one (1) consolidated undrained triaxial compression analysis on selected samples from SB-46.

3.7 Retaining Wall 107

3.7.1 Test Borings

A total of five (5) test borings were performed in the vicinity of proposed Wall 107. One (1) test boring (NBA-102 (OW)) was drilled to the south of the proposed wall, and four (5) test borings were drilled either directly along or in the vicinity of the proposed wall alignment (RW-116 and RW-117 (OW), SB-47 and SB-50). Test borings SB-47 and SB-50 were performed by GZA between 19 and 20 August 2003. The remaining test borings were performed by General Borings for this project phase between 16 and 28 April 2008. Borings were advanced to depths ranging from 51.5 to 78 ft below ground surface. Undisturbed soil samples were obtained from borings RW-116 and RW-117 (OW). Boring NBA-102 (OW) terminated in auger refusal on suspected bedrock, and rock core samples were obtained from borings SB-47 and SB-50.

3.7.2 Laboratory Testing

One (1) Atterberg Limits test, one (1) consolidated undrained triaxial test, and one (1) one-dimensional consolidation test was performed to determine engineering properties on representative samples.

GZA performed two (2) grain-size distribution analyses on selected samples from SB-50.

3.8 Retaining Wall 108

3.8.1 Test Borings

A total of five (5) test borings were performed in the vicinity of proposed Wall 108. One (1) test boring (NBA-102 (OW)) was drilled to the south of the proposed wall, and four (5) test borings were drilled either directly along or in the vicinity of the proposed wall alignment (RW-116 and RW-117 (OW), SB-47 and SB-50). Test borings SB-47 and SB-50 were performed by GZA between 19 and 20 August 2003. The remaining test borings were performed by General Borings for this project phase between 16 and 28 April 2008. Borings were advanced to depths ranging from 51.5 to 78 ft below ground surface. Undisturbed soil samples were obtained from borings

RW-116 and RW-117 (OW). Boring NBA-102 (OW) terminated in auger refusal on suspected bedrock, and rock core samples were obtained from borings SB-47 and SB-50.

3.8.2 Laboratory Testing

One (1) Atterberg Limits test, one (1) consolidated undrained triaxial test, and one (1) one-dimensional consolidation test was performed to determine engineering properties on representative samples.

GZA performed two (2) grain-size distribution analyses on selected samples from SB-50.

3.9 Retaining Wall 109

3.9.1 Test Borings

Six (6) test borings were performed in the vicinity of proposed Wall 109: SB-49, RW-125, RW-118, SB-51, SB-52 and TB-101. Test borings SB-49, SB-51 and SB-52 were performed by GZA between 8 July and 18 August 2003. The remaining test borings were performed by General Borings for this project phase between 17 and 29 April 2008. Borings were advanced to depths ranging from 54.4 to 110 ft below ground surface. Undisturbed soil samples were obtained from borings RW-118 and TB-101. Rock core samples were obtained from borings TB-101, SB-49, SB-51 and SB-52.

3.9.2 Laboratory Testing

Five (5) grain-size distribution analyses, two (2) Atterberg Limits tests, and two (2) organic content tests were performed to aid in soil classification and to determine engineering properties on representative samples.

GZA performed five (5) grain-size distribution analyses and one (1) consolidated undrained triaxial test on selected samples from SB-51 and SB-52.

3.10 Retaining Wall 110

3.10.1 Test Borings

Five (5) test borings were performed in the vicinity of proposed Wall 110: RW-125, RW-118, SB-51, SB-52 and TB-101. Test borings SB-51 and SB-52 were performed by GZA between 8 July and 18 August 2003. The remaining test borings were performed by General Borings for this project phase between 17 and 29 April 2008. Borings were advanced to depths ranging from 54.4 to 110 ft below ground surface. Undisturbed soil samples were obtained from borings RW-118 and TB-101. Rock core samples were obtained from borings TB-101, SB-51 and SB-52.

3.10.2 Laboratory Testing

Five (5) grain-size distribution analyses, two (2) Atterberg Limits tests, and two (2) organic content tests were performed to aid in soil classification and to determine engineering properties on representative samples.

GZA performed five (5) grain-size distribution analyses and one (1) consolidated undrained triaxial test on selected samples from SB-51 and SB-52.

3.11 Retaining Wall 111

3.11.1 Test Borings

Seven (7) test borings were performed in the vicinity of proposed Wall 111: TB-102 (OW), RW-119, RW-120, SB-54, RW-121, SB-55 and RW-122. Test borings SB-54 and SB-55 were performed by GZA between 9 and 11 July 2003. The remaining test borings were performed by General Borings for this project phase between 19 and 24 April 2008. Borings were advanced to depths ranging from 55 to 165 ft below ground surface. Undisturbed soil samples were obtained from borings TB-102 (OW), RW-119, RW-120 and RW-122. Rock core samples were obtained from boring SB-54.

3.11.2 Laboratory Testing

Two (2) grain-size distribution analyses, two (2) Atterberg Limits tests, two (2) consolidated undrained triaxial tests, and two (2) one-dimensional consolidation tests were performed to aid in soil classification and to determine engineering properties on representative samples.

GZA performed one (1) grain-size distribution analysis, one (1) one-dimensional consolidation test, and four (4) undrained triaxial tests on selected samples from SB-54.

3.12 Retaining Wall 112

3.12.1 Test Borings

Eleven (11) test borings were drilled along proposed Wall 112: RW-123, RW-123A, RW-125, CB-102, RW-126, RW-127, RB-108, RW-128, RB-109, SB-40 and RW-129. Test boring SB-40 was performed by GZA in July 2003. The remaining test borings were performed by General Borings in October 2007, April 2008, September to October 2009 and July 2010. Test borings RW-125 thru RW-129 were performed between 19 and 23 July, 2010.

3.12.2 Laboratory Testing

No samples were selected for laboratory testing from the borings associated with proposed Wall 112.

4. SUBSURFACE CONDITIONS

4.1 Retaining Wall 101

In general, the subsurface stratigraphy observed at each boring location associated with Wall 101 was fill overlying alluvium, glacial till, and bedrock, respectively. Generalized descriptions of soil strata in order of increasing depth below ground surface follow. A subsurface profile along Wall 101 is presented on Figure 2.

Thickness (FT)	Generalized Description
2.0 to 6.5	**Fill** – Loose to dense, brown to red brown and dark brown and black, coarse to fine SAND, some to trace coarse to fine gravel, some to trace silt, with occasional coal cinders/slag, brick or wood fragments
2.0 to 6.0	**Alluvium** – Medium dense to very stiff, brown and red brown, coarse to fine SAND and clayey SILT, some to trace coarse to fine gravel
3.8 to 12.5	**Glacial Till** – Dense to very dense, brown and red brown, coarse to fine SAND with coarse to fine gravel, some to trace silt or clayey silt, some cobbles; bonded in-situ
More than 5.0	**Bedrock** – Moderately hard to hard, slightly weathered to fresh, brown to dark brown, aphanitic SILTSTONE or SHALE with low angle bedding

The subsurface conditions observed in the borings were generally consistent with published geologic data for the area. Geologic maps indicate that bedrock at the site location consists of Portland Arkose, or "brownstone," which corresponds to the bedrock observed in the borings.

Groundwater levels in the borings ranged from about El. 52.4 to El. 61.8. However, these levels were measured upon completion of drilling and do not represent stabilized groundwater conditions. Groundwater levels measured in nearby observation wells installed for this project typically ranged from about El. 54.9 to El. 65.4. Groundwater will fluctuate with season changes, precipitation, temperature, construction activity, and other factors.

The exploration logs are presented in Appendix A. A summary of subsurface data is presented in Table I.

4.2 Retaining Wall 102

In general, the subsurface stratigraphy observed at each boring location associated with Wall 102 was fill overlying alluvium and lacustrine deposits, respectively. In boring RW-123A, glacial till was observed beneath the lacustrine deposits. Generalized descriptions of soil strata in order of increasing depth below ground surface follow. A subsurface profile along Wall 102 is presented on Figure 3.

Thickness (FT)	Generalized Description
4.0 to 6.0	**Fill** – Medium dense, brown and black, coarse to fine SAND, some to little coarse to fine gravel, trace silt, with coal cinders

Thickness (FT)	Generalized Description
12.0 to 14.5	**Alluvium** – Loose to very stiff, brown and red brown, coarse to fine SAND and clayey SILT, some to trace coarse to fine gravel
6.5 to up to 48	**Lacustrine Deposits** – Stiff to very stiff, brown, varved CLAY and SILT, trace fine sand
Up to 17.0	**Glacial Till** – Hard, brown, SILT, some coarse to fine sand, little gravel, poorly stratified
More than 9.0	**Bedrock** – Moderately hard, slightly weathered, brown, aphanitic SILTSTONE with low angle bedding

The subsurface conditions observed in the borings were generally consistent with published geologic data for the area.

Groundwater levels in the borings ranged from about El. 52.8 to El. 54.6. However, these levels were measured upon completion of drilling and do not represent stabilized groundwater conditions. Groundwater level in the observation well at RB-107 (OW) was measured at El. 54.6. Groundwater will fluctuate with season changes, precipitation, temperature, construction activity, and other factors.

The exploration logs are presented in Appendix A. A summary of subsurface data is presented in Table II.

4.3 Retaining Wall 103

In general, the subsurface stratigraphy observed at each boring location associated with Wall 103 was fill overlying alluvium, glacial till and bedrock, respectively. A thin layer (approximately 1.2 ft) of organic soil was encountered at RB-110 approximately 5 ft below ground surface. Generalized descriptions of soil strata in order of increasing depth below ground surface follow. A subsurface profile along Wall 103 is presented on Figure 4.

Thickness (FT)	Generalized Description
3.0 to 5.0	**Fill** – Loose to medium dense, brown and dark brown to black, coarse to fine SAND, some to trace coarse to fine gravel, some to trace silt, with coal cinders
0 to 1.2	**Organic Deposits** (RB-110 only) **–** Medium stiff, dark gray-brown, SILT and ORGANIC SILT, little coarse to fine sand, trace organic fibers
5.0 to 7.0	**Alluvium** – Medium stiff to stiff, brown to dark brown, clayey SILT and CLAY, some to trace coarse to fine sand, trace medium to fine gravel, trace organic fibers
12.5 to 18.5	**Glaciolacustrine Deposits –** Medium **s**tiff to very stiff, brown and red brown, CLAY and clayey SILT, trace fine sand, trace fine gravel

Thickness (FT)	Generalized Description
11.8 to 16.0	**Glacial Till** – Dense to very dense, red brown and gray, coarse to fine SAND and coarse to fine GRAVEL, some to little silt, occasional cobbles and boulders
More than 5.0	**Bedrock** – Hard, slightly weathered, dark gray to dark brown, aphanitic SHALE with low angle bedding

The subsurface conditions observed in the borings were generally consistent with published geologic data for the area. Geologic maps indicate bedrock consists of Portland Arkose or "brownstone" which corresponds to the bedrock observed in boring RW-105.

Groundwater levels in the borings ranged from about El. 64.4 to El. 69.0. However, these levels were measured upon completion of drilling at borings RW-107 and RB-110 and do not represent stabilized groundwater conditions. The groundwater level measured in observation well RW-106 was about El. 69.7. Groundwater will fluctuate with season changes, precipitation, temperature, construction activity, and other factors.

The exploration logs are presented in Appendix A. A summary of subsurface data is presented in Table III.

4.4 Retaining Wall 104

In general, the subsurface stratigraphy observed at each boring location associated with Wall 104 was fill overlying alluvium, glaciolacustrine deposits and glacial till, respectively. However, in borings RB-28 and RB-112, no alluvium or glacial till was observed. Generalized descriptions of soil strata in order of increasing depth below ground surface follow. A subsurface profile along Wall 104 is presented on Figure 5.

Thickness (FT)	Generalized Description
3.0 to 10.0	**Fill** – Loose to medium dense, brown to black, coarse to fine SAND, some to trace coarse to fine gravel, little to trace silt, with coal cinders
0 to 8.5	**Alluvium** – Very soft to stiff, brown, SILT, some to little fine sand, trace organics
17.0 to 26.5	**Glaciolacustrine Deposits –** Soft to very stiff, brown and red brown, SILT and CLAY, some to trace coarse to fine sand, some to trace medium to fine gravel; stratified
More than 5.0	**Glacial Till** – Medium dense to very dense, red brown, SILT and coarse to fine SAND, some coarse to fine gravel

The subsurface conditions observed in the borings were generally consistent with published geologic data for the area.

Groundwater levels in the borings ranged from about El. 60.4 to El. 66.1. However, these levels were measured upon completion of drilling and do not represent stabilized groundwater conditions. Groundwater will fluctuate with season changes, precipitation, temperature, construction activity, and other factors.

The exploration logs are presented in Appendices A and B. A summary of subsurface data is presented in Table IV.

4.5 Retaining Wall 105

In general, the subsurface stratigraphy observed at each boring location associated with Wall 105 was fill overlying glaciolacustrine deposits, glacial till and bedrock, respectively. Generalized descriptions of soil strata in order of increasing depth below ground surface follow. A subsurface profile along Wall 105 is presented on Figure 6.

Thickness (FT)	Generalized Description
5.0 to 25.0	**Fill** – Loose to medium dense, light brown to black, coarse to fine SAND, varying amounts of silt and gravel, some fragments of brick, cinders, coal, ash, slag, trace organics. Lower fill consists of very stiff to hard red brown CLAY or gray brown SILT, some to trace fine sand
23.0 to 42.5	**Glaciolacustrine Deposits** – Soft to very stiff red-brown varved CLAY and SILT, some to trace fine sand, trace fine gravel
0 to more than 7.7	**Glacial Till** – Medium dense to very dense, brown to red brown, fine SAND, some to trace coarse to fine gravel, some to trace silt or clay, some to trace cobbles
More than 5.0	**Bedrock** – Moderately hard to hard, moderately to slightly weathered, brown to red brown, aphanitic SILTSTONE or SHALE with low angle bedding

The subsurface conditions observed in the borings were generally consistent with published geologic data for the area. Geologic maps indicate bedrock consists of Portland Arkose or “brownstone” which corresponds to the bedrock observed in the borings.

Groundwater levels in the borings ranged from about El. 46.4 to El. 62.1. However, these levels were measured upon completion of drilling and do not represent stabilized groundwater conditions. Groundwater will fluctuate with season changes, precipitation, temperature, construction activity, and other factors.

The exploration logs are presented in Appendices A and B. A summary of subsurface data is presented in Table V.

4.6 Retaining Wall 106

In general, the subsurface stratigraphy observed at each boring location associated with Wall 106 was fill overlying glaciolacustrine deposits, glacial till and bedrock, respectively. Generalized descriptions of soil

strata in order of increasing depth below ground surface follow. A subsurface profile along Wall 106 is presented on Figure 7.

Thickness (FT)	Generalized Description
5.0 to 25.0	**Fill** – Loose to medium dense, light brown to black, coarse to fine SAND, varying amounts of silt and gravel, some fragments of brick, cinders, coal, ash, slag, trace organics. Lower fill consists of very stiff to hard red brown CLAY or gray brown SILT, some to trace fine sand
23.0 to 37.0	**Glaciolacustrine Deposits** – Soft to very stiff red-brown varved CLAY and SILT, some to trace fine sand, trace fine gravel
0 to more than 7.7	**Glacial Till** – Medium dense to very dense, brown to red brown, fine SAND, some to trace coarse to fine gravel, some to trace silt or clay, some to trace cobbles
More than 5.0	**Bedrock** – Moderately hard to hard, moderately to slightly weathered, brown to red brown, aphanitic SILTSTONE or SHALE with low angle bedding

The subsurface conditions observed in the borings were generally consistent with published geologic data for the area. Geologic maps indicate bedrock consists of Portland Arkose or "brownstone" which corresponds to the bedrock observed in the borings.

Groundwater levels in the borings ranged from about El. 46.4 to El. 54.2. However, these levels were measured upon completion of drilling and do not represent stabilized groundwater conditions. Groundwater will fluctuate with season changes, precipitation, temperature, construction activity, and other factors.

The exploration logs are presented in Appendices A and B. A summary of subsurface data is presented in Table VI.

4.7 Retaining Wall 107

In general, the subsurface stratigraphy observed at each boring location associated with Wall 107 was fill overlying glaciolacustrine deposits, glacial till and bedrock, respectively. Generalized descriptions of soil strata in order of increasing depth below ground surface follow. A subsurface profile along Wall 107 is presented on Figure 8.

Thickness (FT)	Generalized Description
2.5 to 16.5	**Fill** – Loose to dense, brown to black, coarse to fine SAND, some to little coarse to fine gravel, little to trace silt, with coal cinders
40.5 to more than 54.5	**Glaciolacustrine deposits** – Very soft to very stiff, gray brown, red brown and brown, varved CLAY and SILT, some to trace fine sand
5.0 to 16.0	**Glacial Till** – Very dense, red brown and dark brown, SILT and coarse to fine SAND, some coarse to fine gravel

Thickness (FT)	Generalized Description
More than 11.0	**Bedrock** – Moderately hard to hard, red brown, slightly weathered to fresh, aphanitic SILTSTONE

The subsurface conditions observed in the borings were generally consistent with published geologic data for the area. Geologic maps indicate bedrock consists of Portland Arkose or "brownstone" which corresponds to the bedrock observed in the borings.

Stabilized groundwater measurements taken in observation wells installed at NBA-102 (OW) and RW-117 (OW) indicate groundwater between about El 46.1 and El 52.6. Groundwater will fluctuate with season changes, precipitation, temperature, construction activity, and other factors.

The exploration logs are presented in Appendices A and B. A summary of subsurface data is presented in Table VII.

4.8 Retaining Wall 108

In general, the subsurface stratigraphy observed at each boring location associated with Wall 108 was fill overlying glaciolacustrine deposits, glacial till and bedrock, respectively. Generalized descriptions of soil strata in order of increasing depth below ground surface follow. A subsurface profile along Wall 108 is presented on Figure 9.

Thickness (FT)	Generalized Description
2.5 to 16.5	**Fill** – Loose to dense, brown to black, coarse to fine SAND, some to little coarse to fine gravel, little to trace silt, with coal cinders
40.5 to more than 54.5	**Glaciolacustrine deposits** – Very soft to very stiff, gray brown, red brown and brown, varved CLAY and SILT, some to trace fine sand
5.0 to 16.0	**Glacial Till** – Very dense, red brown and dark brown, SILT and coarse to fine SAND, some coarse to fine gravel
More than 11.0	**Bedrock** – Moderately hard to hard, red brown, slightly weathered to fresh, aphanitic SILTSTONE

The subsurface conditions observed in the borings were generally consistent with published geologic data for the area. Geologic maps indicate bedrock consists of Portland Arkose or "brownstone" which corresponds to the bedrock observed in the borings.

Stabilized groundwater measurements taken in observation wells installed at NBA-102 (OW) and RW-117 (OW) indicate groundwater between about El 46.1 and El 52.6. Groundwater will fluctuate with season changes, precipitation, temperature, construction activity, and other factors.

The exploration logs are presented in Appendices A and B. A summary of subsurface data is presented in Table VIII.

4.9 Retaining Wall 109

In general, the subsurface stratigraphy observed at each boring location associated with Wall 109 was fill overlying glaciolacustrine deposits, glacial till and bedrock, respectively. Generalized descriptions of soil strata in order of increasing depth below ground surface follow. A subsurface profile along Wall 109 is presented on Figure 10.

Thickness (FT)	Generalized Description
4.5 to 36.4	**Fill** - Medium dense to dense or medium stiff to hard, dark brown, red brown, and black, coarse to fine SAND and SILT or CLAY, some to trace coarse to fine gravel, with coal cinders, brick and cobbles
32.1 to 56.5	**Glaciolacustrine Deposits** – Very soft to very stiff, brown and red brown, varved CLAY and SILT, some to trace coarse to fine sand, trace fine gravel
16.0 to 31.5	**Glacial Till** – Very dense, red brown coarse to fine SAND, some coarse to fine gravel, some to trace silt or clay, with cobbles
More than 5 feet	**Bedrock** – Moderately hard to hard, slightly to moderately weathered, brown to red brown, fine-grained to aphanitic SHALE and SILTSTONE with thin beds of sandstone and low angle bedding

The subsurface conditions observed in the borings were generally consistent with published geologic data for the area. Geologic maps indicate bedrock consists of Portland Arkose or "brownstone" which corresponds to the bedrock observed in the borings.

Groundwater levels in the borings ranged from El 32.8 to El 54.4. However, these levels were measured upon completion of drilling and do not represent stabilized groundwater conditions. Groundwater will fluctuate with season changes, precipitation, temperature, construction activity, and other factors.

The exploration logs are presented in Appendices A and B. A summary of subsurface data is presented in Table IX.

4.10 Retaining Wall 110

In general, the subsurface stratigraphy observed at each boring location associated with Wall 110 was fill overlying glaciolacustrine deposits, glacial till and bedrock, respectively. Generalized descriptions of soil strata in order of increasing depth below ground surface follow. A subsurface profile along Wall 110 is presented on Figure 11.

Thickness (FT)	Generalized Description
4.5 to 36.4	**Fill** - Medium dense to dense or medium stiff to hard, dark brown, red brown, and black, coarse to fine SAND and SILT or CLAY, some to trace coarse to fine gravel, with coal cinders, brick and cobbles

Thickness (FT)	Generalized Description
32.1 to 56.5	**Glaciolacustrine Deposits** – Very soft to very stiff, brown and red brown, varved CLAY and SILT, some to trace coarse to fine sand, trace fine gravel
16.0 to 31.5	**Glacial Till** – Very dense, red brown coarse to fine SAND, some coarse to fine gravel, some to trace silt or clay, with cobbles
More than 5 feet	**Bedrock** – Moderately hard to hard, slightly to moderately weathered, brown to red brown, fine-grained to aphanitic SHALE and SILTSTONE with thin beds of sandstone and low angle bedding

The subsurface conditions observed in the borings were generally consistent with published geologic data for the area. Geologic maps indicate bedrock consists of Portland Arkose or "brownstone" which corresponds to the bedrock observed in the borings.

Groundwater levels in the borings ranged from El 32.8 to El 54.4. However, these levels were measured upon completion of drilling and do not represent stabilized groundwater conditions. Groundwater will fluctuate with season changes, precipitation, temperature, construction activity, and other factors.

The exploration logs are presented in Appendices A and B. A summary of subsurface data is presented in Table X.

4.11 Retaining Wall 111

In general, the subsurface stratigraphy observed at each boring location associated with Wall 111 was fill overlying glaciolacustrine deposits and glacial till, respectively. Bedrock was encountered and sampled in boring SB-54 only. Generalized descriptions of soil strata in order of increasing depth below ground surface follow. A subsurface profile along Wall 111 is presented on Figures 12A and 12B.

Thickness (FT)	Generalized Description
10.0 to 37.5	**Fill** – Very loose to very dense, light brown to black, coarse to fine SAND, some to trace coarse to fine gravel, some to trace silt and clay, with coal cinders, ash and wood.
39.0 to 83.5	**Glaciolacustrine Deposits** – Very soft to hard, brown and red brown, varved CLAY and SILT, some to trace coarse to fine sand, some to trace fine gravel
18.0 to more than 65.0	**Glacial Till** – Dense to very dense, red brown, coarse to fine SAND, some to little coarse to fine gravel, some to trace silt and clay, with cobbles
More than 5.0	**Bedrock** - Moderately hard to hard, moderately to slightly weathered, red brown, aphanitic SILTSTONE

The subsurface conditions observed in the borings were generally consistent with published geologic data for the area. Geologic maps indicate bedrock consists of Portland Arkose or "brownstone" which corresponds to the bedrock observed in boring SB-54.

Groundwater levels in the borings ranged between about El 24.5 to El 55.7. However, these levels were measured upon completion of drilling and do not represent stabilized groundwater conditions. Stabilized groundwater measurements taken in observation well TB-102 (OW) indicate groundwater at about El 32.5. Groundwater will fluctuate with season changes, precipitation, temperature, construction activity, and other factors.

The exploration logs are presented in Appendices A and B. A summary of subsurface data is presented in Table XI.

4.12 Retaining Wall 112

In general, the subsurface stratigraphy observed at boring locations associated with Wall 112 was fill overlying alluvium and lacustrine deposits, respectively. Borings RW-125 thru RW-129 were terminated in glacial till encountered below the lacustrine deposits. Generalized descriptions of soil strata in order of increasing depth below ground surface follow. A subsurface profile along Wall 112 is presented on Figures 13A and 13B.

Thickness (ft)	Generalized Description
5 to 7	**Fill** - Medium dense, brown and black, coarse to fine SAND, some to little coarse to fine gravel, little to trace silt, with coal cinders.
6 to 14	**Alluvium** - Medium dense to dense, brown and red brown, coarse to fine SAND and clayey SILT, some to trace coarse to fine gravel.
Up to 48	**Lacustrine Deposits** - Medium stiff to very stiff, red-brown, varved CLAY and SILT, trace fine sand.
Up to 17	**Glacial Till** - Very dense to hard, red-brown, SILT and coarse to fine SAND, some to little coarse to fine gravel, poorly stratified with occasional cobbles and boulders.

The exploration logs are presented in Appendix A. A summary of subsurface data is presented in Table XII.

4.13 Summary of Laboratory Testing Results

The nature of the alluvial and glaciolacustrine deposits underlying the project site is critical to evaluating the proposed construction. Of particular importance are the compressibility characteristics of these soils and their impact on potential settlements caused by newly applied loads (wall structures and fills). Table XII summarizes the laboratory testing results relative to the compressibility of the glaciolacustrine deposits as determined by the one-dimensional consolidation laboratory tests. The results indicate a compression ratio average of about 0.15, with a range of 0.03 to 0.28 and a re-compression ratio ranging from 0.018 to 0.045. Based on the results the soils are over-consolidated in certain areas and zones.

5. DESIGN RECOMMENDATIONS AND CONSTRUCTION CONSIDERATIONS

5.1 Retaining Wall 101

5.1.1 Wall and Foundation Type

As described in Section 1.4.1, Wall 101 will extend approximately 285 ft along the western side of the proposed Busway from about Sta. 215+40 to Sta. 218+27 and be used to retain a proposed cut necessary to construct the Busway. The exposed wall height will range from about 3 to 4 ft. Approximately 2 to 6 ft of cut will be required to construct the foundation of the wall. Based on the profile presented on Figure 2, the majority of Wall 101 is underlain by between 1 and 5 ft of alluvial deposits, with varying stiffness, overlying glacial till. Based on these conditions, a reinforced concrete cantilever retaining wall supported by a spread footing bearing on granular fill is recommended. Over-excavation of the alluvial deposits and replacement with granular fill to design subgrade elevations is recommended to reduce total and differential settlement beneath Wall 101. The over-excavation should be replaced with granular fill.

5.1.2 Foundation Design

The following is a list of general recommendations that should be considered for the design of Wall 101.

- Over-excavate alluvial deposits and replace it with granular fill. Utilize a maximum factored bearing resistance of 8 ksf for strength limit state and 6 ksf for the service limit state at assumed 1-in. settlement limit. The subgrade should be proofrolled with a vibratory roller (minimum static weight of 4 tons) to identify for removal and replacement any soft materials, and treated in accordance with ConnDOT specifications prior to foundation construction.

- The granular fill should be a minimum 12-in. thick and extend 24 in. horizontally outside the foundation limits, and slope outward and downward on a 1H:1V slope.

- Foundations should bear at least 4 ft below the lowest adjacent ground surface for frost protection.

- The wall shall have a 6-in. nominal diameter perforated underdrain pipe, and pervious structural backfill, in accordance with the Connecticut Department of Transportation Bridge Design Manual.

5.1.3 Global Stability

Based on conditions encountered in the borings and the proposed wall configuration, the minimum factor of safety for global stability was calculated to be 3.4 which is greater than the factor of safety of 1.5 as required by Connecticut Busway Design Manual, dated December 2002. The computer program SLIDE was used to perform the analysis. The analysis assumed the width of the footing to be 0.6 times the height.

5.1.4 Settlement

Provided the footing for Wall 101 is designed and constructed in accordance with the above criteria, total settlements are anticipated to be less than 1 in. with maximum differential settlements of ¼ in. or less. Most of the elastic settlement will occur during construction as load is applied.

5.1.5 Lateral Earth Pressures

The wall should be designed for lateral earth pressures and surcharge loads shown on Figure 14, Recommended Active Lateral Earth Pressure Loads on Unrestrained Abutments and Wingwalls.

5.1.6 Reuse of Excavated Material

Excavations will be primarily in the existing fill and alluvial deposits. Since a 2 to 6-ft cut will be required to construct Wall 101, we do not anticipate that re-use of the excavated materials will be required. However, material will be required to backfill the excavation made to remove the alluvial deposits. It may be possible to reuse excavated granular fill materials as backfill, however these materials frequently contain relatively high proportions of silt, and placement and compaction of these materials can be difficult when wet. As such, re-use of these materials may potentially only be feasible during warm, dry weather.

5.1.7 Construction Considerations

This section provides comments related to foundation construction and other geotechnical aspects of the project. It will aid those responsible for preparation of contract plans and specifications and those involved with construction monitoring. Contractors should evaluate potential construction problems on the basis of their own knowledge and experience in the area and on the basis of similar localities, taking into account their own proposed construction methods and procedures.

5.1.7.1 Excavation and Temporary Lateral Support

Based upon the wall location and depth of required excavation temporary sheet piling will be necessary to support the excavation sides. The design of the sheeting should be provided by the contractor. Excavation can be made with conventional earth moving equipment.

5.1.7.2 Dewatering

Groundwater was encountered at about El. 60.4 in RB-105, which is below but within 2 ft of the proposed bottom of footing elevation of Wall 101. Excavation to remove the alluvial soils will be below this measured groundwater level. Accordingly, dewatering will likely be required during excavation to proposed footing subgrade elevations. The contractor should be responsible for the selecting the appropriate dewatering system.

5.2 Retaining Wall 102

5.2.1 Wall and Foundation Type

As described in Section 1.4.2, Wall 102 will extend approximately 350 ft along the western side of the proposed Busway, from about Sta. 225+50 to Sta. 229+00. Wall 102 will retain approximately 5 to 9 ft of existing fill to extend the existing embankment to meet the design grades for the proposed Busway. A noise wall is proposed to be constructed on top of the retaining wall, which continues beyond the limits of Wall 102. The exposed retaining wall on the western side will be approximately 5-ft high, not including the noise wall. The wall is directly underlain by a 5 to 8 ft of alluvium.

As the retaining wall will be supporting the noise wall, the retaining wall will be subjected to additional loads from the weight and wind loads on the noise wall. For this reason, it is recommended that the wall to be supported on a pile foundation to limit settlement and rotation and withstand other induced loads. The foundation should be sized to accommodate the required number of piles based on the foundation design criteria described below. In addition, as discussed below, the use of lightweight backfill would decrease design lateral earth loads and should be considered if cost effective in reducing structure foundation size and pile requirements.

5.2.2 Foundation Design

The following is a list of general recommendations that should be considered for the design of Wall 102.

- Design the foundation for the retaining wall based on the following pile capacity parameters:

Pile Type/Size:	H-Pile, HP 12x53
Pile material:	Grade 50 steel
Test pile Length:	70 ft
Pile order length:	65 ftNumber of Test Piles:
4 piles, spread along the length	
Pile bearing elevation:	EL +5.0 to EL -3.0
Bottom of footing elevation:	EL +57.0
Bearing Stratum:	Bedrock, piles driven to refusal
Nominal Axial Bearing Resistance:	635 kips
Factored Axial Bearing Resistance:	250 kips
Ultimate Pile Capacity:	128 kips
Nominal uplift resistance:	190 kips
Factored uplift resistance:	55 kips
Downdrag load:	35 kips

For a horizontal deflection of 1/4 in. at the top of the pile, the lateral resistance in the strong axis for a free head condition is 10 kips.

Ultimate Pile Capacity indicated above is based on design pile loads provided by Ammann & Whitney and the Consulting Engineers General Memorandum 09-07 by the Connecticut Department of Transportation, Bureau of Engineering and Highway Operations, Office of Engineer, as a revision to Bridge Design Standard Practices.

- The wall shall have a 6-in. nominal diameter perforated underdrain, or 4-in. weep holes in accordance with the Connecticut Department of Transportation Bridge Design Manual.

- Foundation should bear at least 4 ft below the lowest adjacent ground surface for frost protection

- The wall backfill can be pervious structural fill or alternative lightweight fill, such as Expanded, Shale Clay & Slate (ESCS), as discussed below. The following properties can be used for design with ESCS material:

  Compacted in-place moist unit weight - 65 pcf
  Friction angle - 35°
  Active lateral earth pressure coefficient (k_a) - 0.245

5.2.3 Settlement

The glaciolacustrine soils are overconsolidated in this area. Based on an evaluation of recompression consolidation of the glaciolacustrine deposits, using a recompression ratio of 0.025, due to the new load from the conventional granular fill material for the backfill, a settlement of up to 1.8 in. of settlement is predicted. This magnitude of settlement is not severe but could likely shorten the life of the roadway pavement, produce rideability issues, and cause downdrag loads on the wall foundation piles. The use of a lightweight fill, like Expanded Shale, Clay and Slate (ESCS) for the backfill material would reduce settlements and related problems. Settlement platforms should be constructed and periodically monitored along the proposed fill placement along the retaining wall in order to monitor the rate of consolidation settlement.

5.2.4 Lateral Earth Pressures

If conventional granular soil backfill is used, the wall should be designed for lateral earth pressures and surcharge loads shown on Figure 14, Recommended Active Lateral Earth Pressure Loads on Unrestrained Abutments and Wingwalls.

If Expanded Shale Clay & Shale lightweight backfill is used, the wall should be designed for lateral earth pressures and surcharge loads shown on Figure 15, Recommended Active Lateral Earth Pressure Loads on ESCS Backfilled Retaining Walls. The use of lightweight fill is advantageous if a reduction in wall footing size is desired and cost effective.

5.2.5 Construction Considerations

This section provides comments related to foundation construction and other geotechnical aspects of the project. It will aid those responsible for preparation of contract plans and specifications and those involved with construction monitoring. Contractors should evaluate potential construction problems on the basis of their own knowledge and experience in the area and on the basis of similar localities, taking into account their own proposed construction methods and procedures.

5.2.5.1 Excavation

We anticipate that where space permits, excavation for the proposed Wall 102 can be made with open cuts sloped no steeper than 1.5H:1V; however, some sloughing should

be anticipated particularly in areas of seepage, where precipitation falls on slope faces or surface water runs over slope faces.

5.2.5.2 Dewatering

Groundwater was encountered at El 54.6 in RB-107 (OW), which is approximately 0.6 ft above the proposed bottom of footing elevation of Wall 102. Accordingly, dewatering will likely be required during excavation to proposed footing subgrade elevations and construction. The contractor will be responsible for selecting the appropriate dewatering system.

5.3 Retaining Wall 103

5.3.1 Wall and Foundation Type

As described in section 1.4.3, Wall 103 will extend approximately 317 ft, along the western side of the proposed Busway, from about Sta. 244+17 to Sta. 247+29. The wall will retain up to 12 ft of earth cut and will be located approximately 10 ft from an existing building. Approximately up to 18 ft of cut will be required to construct the wall. The exposed wall height will range up to 10.5 ft. A stiff layer of alluvium is found below the proposed wall foundation to a depth of approximately 7 to 9 ft overlaying the glaciolacustrine clay layer. The alluvium layer beneath Wall 103 will be suitable to support the retaining wall and a reinforced concrete cantilever retaining wall supported on spread footings will be suitable for this wall. Along the wall segment adjacent to the existing building at Sta. 245+83, temporary sheeting will be required. The wall alignment is offset in this area to limit the impact of construction on the existing building.

5.3.2 Foundation Design

Following is a list of general recommendations that should be considered for the design of Wall 103:

- Utilize a maximum factored bearing resistance of 4.9 ksf for strength limit state and 2.0 ksf for the service limit state at assumed 1-in. settlement limit for the spread footing bearing on the alluvium layer. The subgrade should be proofrolled with a vibratory roller (minimum static weight of 4 tons) to identify for removal and replacement any soft materials, and treated in accordance with ConnDOT specifications prior to foundation construction.

- Foundations should bear at least 4.0 ft below the lowest adjacent ground surface for frost protection.

- Place a 12-in. thick layer of granular fill beneath footing for uniform bearing. Granular fill should extend 24 in. horizontally outside the foundation limits and slope outward and downward on a 1H:1V slope.

- The wall shall have a 6-in. nominal diameter perforated underdrain pipe and pervious structural fill, in accordance with the Connecticut Department of Transportation Bridge Design Manual.

- Because of the height of this wall and the potential for seepage from the cut behind, the wall should have weep holes installed every 20 ft to allow for relief of hydrostatic

pressure from behind the wall. The weep holes should be installed with a minimum 0.02% slope from the back face of the wall to the front to allow for positive drainage towards the proposed swale along the front face of the wall.

5.3.3 Global Stability

Based on conditions encountered in the borings and the proposed wall configuration, the minimum factor of safety for global stability was calculated to be 3.0, which is greater than the factor of safety 1.5 as required by the Connecticut Busway Design Manual, dated December 2002. The computer program SLIDE was utilized to perform the analysis. This analysis assumed the width of the footing to be 0.6 times the height of the wall.

5.3.4 Settlement

Provided the footing for Wall 103 is designed and constructed in accordance with the above criteria, total settlements are anticipated to be less than 1 in. with maximum differential settlements of ¼ in. or less. Most of the settlement will occur during construction as load is applied.

5.3.5 Lateral Earth Pressures

The wall should be designed for lateral earth pressures and surcharge loads shown on Figure 14, Recommended Active Lateral Earth Pressure Loads on Unrestrained Abutments and Wingwalls.

5.3.6 Reuse of Excavated Material

Excavations will be primarily in the existing fill and alluvial deposits. Since an approximately 18-ft cut will be required to construct Wall 103, it is not anticipated that re-use of the excavated materials will be required. It may be possible to reuse excavated granular fill materials as backfill, however these materials frequently contain relatively high proportions of silt, and placement and compaction of these materials can be difficult when wet. As such, re-use of these materials may potentially only be feasible during warm, dry weather.

5.3.7 Construction Considerations

This section provides comments related to foundation construction and other geotechnical aspects of the project. It will aid those responsible for preparation of contract plans and specifications and those involved with construction monitoring. Contractors should evaluate potential construction problems on the basis of their own knowledge and experience in the area and on the basis of similar localities, taking into account their own proposed construction methods and procedures.

5.3.7.1 Excavation and Lateral Earth Support

Based on the wall location, depth of the required excavation and distance to the existing building construction for Wall 103 should be accomplished by installing temporary steel sheet piling. The building foundation is a spread footing bearing an estimated 4.0 ft below ground surface and only supports the exterior wall. The influence zone of this footing intersects near the base of the proposed excavation for Wall 103 therefore, temporary sheeting will be necessary. Lateral deflection of the sheeting will need to be controlled to reduce the potential for building foundation movement. In addition,

because of the height of the sheeting (about 17 ft) it may be necessary to provide lateral support using rakers near the top of the wall. . Settlement of the existing footing caused by vibrations must also be avoided. The project specifications should include deflection, settlement and vibration monitoring criteria. Excavation can be made with conventional earth moving equipments.

5.3.7.2 Dewatering

Groundwater was measured at El. 69.65 in RW-106 (OW), which is approximately 3 ft above the proposed lowest footing excavation elevation of Wall 103. Accordingly, dewatering will be required during excavation to proposed footing subgrade elevations. The contractor should be responsible for the selecting the appropriate dewatering system.

5.4 Retaining Wall 104

5.4.1 Wall and Foundation Type

As described in section 1.4.4, Wall 104 will extend approximately 60 ft along the western side of the proposed Busway from about Sta. 251+00 to Sta. 251+60, to retain approximately 0.5 to 9 ft of fill, however, except for approximately 12 ft section the depth of required fill is only about 3 ft. The exposed height of the wall ranges from 3 to 6 ft. A soft to medium stiff layer of alluvium is found to a depth of 0 to 4 ft below the proposed wall foundation, overlying a soft to stiff glaciolacustrine layer. The alluvium or glaciolacustrine layer beneath Wall 104 will be suitable to support the retaining wall and the surcharge from the proposed Busway. Due to the limited extent of the deep fill, short wall length, and wall geometry (stepped), a reinforced concrete cantilever retaining wall supported on spread footings may be considered. .

5.4.2 Foundation Design

The following is a list of general recommendations that should be considered for the design of Wall 104.

- Utilize a maximum factored bearing resistance of 3.8 ksf for strength limit state and 4.0 ksf for the service limit state at assumed 1-in. settlement limit. The subgrade should be proofrolled with a vibratory roller (minimum static weight of 4 tons) to identify for removal and replacement any soft materials, and treated in accordance with ConnDOT specifications prior to foundation construction.

- To reduce the possibility of cracking due to differential settlement between the nominal fill zone and deepest fill zone structural solutions should be considered. These could include thickening the footing depth and/or placing a joint at the step in the wall, allowing independent movement.

- Foundations should bear at least 4.0 ft below the lowest adjacent ground surface for frost protection.

- Place a 12-in. thick layer of granular fill beneath footing for uniform bearing. Granular fill should extend 24 in. horizontally outside the foundation limits and slope outward and downward on a 1H:1V slope.

- The wall shall have a 6-in. nominal diameter perforated underdrain pipe and pervious backfill, in accordance with the Connecticut Department of Transportation Bridge Design Manual.

5.4.3 Global Stability

Based on conditions encountered in the borings and the proposed wall configuration, the minimum factor of safety for global stability was calculated to be 1.6, using simplified Bishop's Method. This value is greater than the factor of safety of 1.5 required by the Connecticut Busway Design Manual, dated December 2002. The computer program SLIDE was used for the analysis. Internal stability of the MSE and Modular Walls should be established by the manufacturer/contractor during final design of these systems.

5.4.4 Settlement

For the lower wall and thinner backfill sections, total settlement at the bottom of the embankment fill will be less than 1 in. No significant differential settlement is anticipated. Most of the settlement will occur during construction. However, based on an evaluation of consolidation of the overconsolidated glaciolacustrine layer, assuming a recompression ratio of 0.018, due to the new load from the conventional granular fill material for the backfill in the deep backfill section, settlements of up to 2 in. are predicted. Most of this settlement is expected to occur within first 6 months of placing the fill. This magnitude of settlement is not severe but a flexible wall system is recommended to accommodate the anticipated settlement. A MSE wall or PMW is appropriate for this section and is recommended. Settlement platforms should be constructed and periodically monitored along the proposed fill placement along the retaining wall in order to monitor the rate of consolidation settlement. Due to the limited wall length a CIPCC wall can be considered as described above.

5.4.5 Construction Considerations

This section provides comments related to foundation construction and other geotechnical aspects of the project. It will aid those responsible for preparation of contract plans and specifications and those involved with construction monitoring. Contractors should evaluate potential construction problems on the basis of their own knowledge and experience in the area and on the basis of similar localities, taking into account their own proposed construction methods and procedures.

5.4.5.1 Excavation and Temporary Lateral Support

Based on Amtrak's 'Normal Requirements for Sheet Piling Adjacent to Track', Sketch 1, Spec. 02261A-Rev.1, temporary sheet pile installation will be required adjacent to the excavation. The design of the sheeting shall be provided by the contractor. The temporary sheet piles can be removed after the construction of the retaining wall. We anticipate that where space permits, excavation for the proposed Wall 104 can be made with open cuts sloped no steeper than 1.5H:1V.

5.4.5.2 Dewatering

Groundwater levels in the borings ranged from about El. 60.4 to El. 66. However, these levels were measured upon completion of drilling and do not represent stabilized groundwater conditions. Based on these observations and the ground elevation near the

wall, approximately 5 to 6 ft of water may be anticipated above the bottom of the excavation. Accordingly, dewatering will be required during excavation to proposed footing subgrade elevations. The contractor should be responsible for the selecting the appropriate dewatering system.

5.5 Retaining Wall 105

5.5.1 Wall and Foundation Type

As described in section 1.4.5 Retaining Wall 105 will extend approximately 460 ft from about Sta. 295+50 to Sta. 300+10 along the proposed Busway. The exposed wall on the western side will be between 5 and 17-ft high. Wall 105 will retain approximately 1 to 13 ft of fill that will be placed to meet the design grades for the proposed Busway. Based on the profile presented in Figure 6 the base of the wall will be directly underlain by 6 to 15 ft of existing fill which overlies the glaciolacustrine deposit. The existing fill and glaciolacustrine deposit beneath Wall 105 will be suitable to support the retaining wall and the surcharge from the proposed Busway. A Mechanically Stabilized Earth (MSE) or Prefabricated Modular Wall (PMW) will be appropriate for this wall section. Contractor should be responsible for the final design of the MSE wall or PMW.

5.5.2 Foundation Design

The following is a list of general recommendations that should be considered for the design of Wall 105:

- Utilize an allowable bearing capacity of 2.0 ksf for bearing on the fill layer. The subgrade should be proofrolled with a vibratory roller (minimum static weight of 4 tons) to identify for removal and replacement any soft materials, and treated in accordance with ConnDOT specifications prior to foundation construction.

- Foundations for the wall should bear at least 4.0 ft below the lowest adjacent ground surface for frost protection.

- The wall shall have a 6-in. nominal diameter perforated underdrain pipe, and pervious structural backfill, in accordance with the ConnDOT Bridge Design Manual.

- Pervious structural fill can be used for backfill.

5.5.3 Global Stability

Based on conditions encountered in the borings and the proposed wall configuration, the minimum factor of safety for global stability was calculated to be 1.7 using simplified Bishop's Method. This value is larger than the factor of safety of 1.5 as required by the Connecticut Busway Design Manual, dated December 2002. The computer program SLIDE was used for the analysis. Internal stability of the MSE and Modular Walls would be established by the manufacturer/contractor during final design of these systems.

5.5.4 Settlement

The glaciolacustrine layer is overconsolidated in this area. The anticipated settlement, due to the consolidation of the glaciolacustrine layer, assuming a recompression ratio of 0.05, due to the

applied load considering conventional granular fill, was calculated to be up to 1.5 in. Most of this settlement is expected to occur within first 6 months of placing the fill. This magnitude of settlement is not severe but a flexible wall system is recommended to accommodate the anticipated settlement. MSE or PMW walls are appropriate for this section and are recommended. Settlement platforms should be constructed and periodically monitored along the proposed fill placement along the retaining wall in order to monitor the rate of consolidation settlement. Wall 105 is located parallel to and opposite Wall 106 and a differential settlement of less than 1 in. should be anticipated between the two wall backfills.

5.5.5 Construction Considerations

This section provides comments related to foundation construction and other geotechnical aspects of the project. It will aid those responsible for preparation of contract plans and specifications and those involved with construction monitoring. Contractors should evaluate potential construction problems on the basis of their own knowledge and experience in the area and on the basis of similar localities, taking into account their own proposed construction methods and procedures.

5.5.5.1 Excavation

In general, it appears that excavation for the proposed Wall 105 can be made with open cuts sloped no steeper than 1.5H:1V. However, some sloughing should be anticipated particularly in areas of seepage, where precipitation falls on slope faces or surface water runs over slope faces.

5.5.5.2 Utilities

A catch basin is to be located within 50 ft of the south end of the MSE wall. Special provisions and detailing by the MSE wall designer will be required to accommodate these structures within the MSE wall system.

5.5.5.3 Dewatering

Groundwater was encountered at about El 46.1 in NBA-102 (OW) which is about 7 ft below the lowest proposed footing subgrade elevation of Wall 105. Accordingly, construction phase dewatering will most likely only consist of control of precipitation accumulation and surface water. Perched and trapped water may also be encountered.

5.6 Retaining Wall 106

5.6.1 Wall and Foundation Type

As described in Section 1.4.6, Wall 106 will extend approximately 335 ft along the eastern side of the proposed Busway from Sta. 296+75 to Sta. 300+10. Wall 106 will retain approximately up to 4 ft of fill. The exposed wall height will be approximately 2 to 6.5 ft. The railroad tracks are located approximately 14 ft from the proposed wall face. An existing fill layer consisting of medium stiff to stiff clay and silt is found at a depth of up to 25 ft below the proposed wall foundation. The fill layer beneath Wall 106 will be suitable to support the retaining wall and surcharge from the proposed Busway. A reinforced concrete cantilever retaining wall, supported on spread footings will be appropriate for this wall section. MSE and PMW walls are also appropriate for consideration.

5.6.2 Foundation Design

The following is a list of general recommendations that should be considered for the design of reinforced concrete cantilever retaining wall for Wall 106:

- Utilize a maximum factored bearing resistance of 4.8 ksf for strength limit state and 3.0 ksf for the service limit state at assumed 1-in. settlement limit. The subgrade should be proofrolled with a vibratory roller (minimum static weight of 4 tons) to identify for removal and replacement any soft materials,, and treated in accordance with ConnDOT specifications prior to foundation construction.

- Foundations should bear at least 4.0 ft below the lowest adjacent ground surface for frost protection.

- Place a 12-in. thick layer of granular fill beneath footing for uniform bearing. Granular fill should extend 24 in. horizontally outside the foundation limits and slope outward and downward on a 1H:1V slope.

- The wall shall have a 6-in. nominal diameter perforated underdrain pipe and pervious backfill, in accordance with the Connecticut Department of Transportation Bridge Design Manual.

- The wall backfill can be pervious structural fill.

Alternatively, following is a list of general recommendations that should be considered for the design of MSEW or PMW for Wall 106:

- Utilize an allowable bearing capacity of 1.5 tsf for bearing on the fill layer. The subgrade should be proofrolled with a vibratory roller (minimum static weight of 4 tons) to identify for removal and replacement any soft materials, and treated in accordance with ConnDOT specifications prior to foundation construction.

- Foundations for the wall should bear at least 4.0 ft below the lowest adjacent ground surface for frost protection.

- The wall shall have a 6-in. nominal diameter perforated underdrain pipe, and pervious structural backfill, in accordance with the ConnDOT Bridge Design Manual.

- Pervious structural fill can be used for backfill.

5.6.3 Global Stability

Based on conditions encountered in the borings and the proposed wall configuration, the minimum factor of safety for global stability was calculated to be 3.0, using simplified Bishop's Method. This value is greater than the value of 1.5 required by the Connecticut Busway Design Manual, dated December 2002. The computer program SLIDE was used for the analysis.

5.6.4 Settlement

Provided the footing for Wall 106 is designed in accordance with the above criteria, total settlement at the bottom of the embankment fill will be less than 1 in. No significant differential

settlement is anticipated. Most of the settlement will occur during construction. Wall 106 is located parallel to and opposite Wall 105 and a differential settlement of less than 1 in. should be anticipated between the two wall backfills

5.6.5 Lateral Earth Pressures

Design the wall for lateral earth pressures and surcharge loads shown on Figure 14 for pervious structural backfill. An active earth pressure condition is assumed..

5.6.6 Construction Considerations

This section provides comments related to foundation construction and other geotechnical aspects of the project. It will aid those responsible for preparation of contract plans and specifications and those involved with construction monitoring. Contractors should evaluate potential construction problems on the basis of their own knowledge and experience in the area and on the basis of similar localities, taking into account their own proposed construction methods and procedures.

5.6.6.1 Excavation and Temporary Lateral Support

Based on Amtrak's 'Normal Requirements for Sheet Piling Adjacent to Track', Sketch 1, Spec. 02261A-Rev.1, temporary sheet pile installation may be required adjacent to the excavation. The design of the sheeting shall be provided by the contractor. The temporary sheet piles can be removed after the construction of the retaining wall. However, in some limited locations, in general it appears that excavation for the proposed Wall 106 can be made with open cuts sloped no steeper than 1.5H:1V.

5.6.6.2 Dewatering

Groundwater was encountered at about El. 46.1 in NBA-102 (OW) which is about 18 ft below the proposed footing subgrade elevation of Wall 106. Accordingly, construction phase dewatering will most likely only consist of control of precipitation accumulation and surface water. Perched and trapped water may also be encountered.

5.7 Retaining Wall 107

5.7.1 Wall and Foundation Type

As described in Section 1.4.9, Wall 107 extends approximately 137 ft from about Sta. 301+59 to Sta. 303+00 and will retain approximately 3 to 9 ft of fill that will be placed to provide the design grades for the Busway. Based on the profile presented in Figure 8 the footing of the wall will be directly underlain with glaciolacustrine deposit. A Mechanically Stabilized Earth (MSE) wall will be appropriate for this wall section. Contractor should be responsible for the final design of the MSE wall.

5.7.2 Foundation Design

The following is a list of general recommendations that should be considered for the design of Wall 107:

- Utilize an allowable bearing capacity of 1.6 ksf for bearing on the glaciolacustrine layer. The subgrade should be proofrolled with a vibratory roller (minimum static weight of 4 tons) to identify for removal and replacement any soft materials, and treated in accordance with ConnDOT specifications prior to foundation construction.

- Foundations for the wall should bear at least 4.0 ft below the lowest adjacent ground surface for frost protection.

- The wall shall have a 6-in. nominal diameter perforated underdrain pipe, and pervious structural backfill, in accordance with the ConnDOT Bridge Design Manual.

- Pervious structural fill can be used for backfill.

5.7.3 Global Stability

Based on conditions encountered in the borings and the proposed wall configuration, the minimum factor of safety for global stability was calculated to be 5.0 using simplified Bishop's Method. This value is larger than the factor of safety of 1.5 as required by the Connecticut Busway Design Manual, dated December 2002. The computer program SLIDE was used for the analysis.

5.7.4 Settlement

The glaciolacustrine layer is overconsolidated in this area. The anticipated settlement, due to consolidation of the glaciolacustrine deposits, assuming a recompression ration of 0.05, caused by the applied load and considering conventional granular fill, was calculated to be up to 2.3 in. Most of this settlement is expected to occur within first 7 months of placing the fill. This magnitude of settlement is not severe but a flexible wall system is recommended to accommodate the anticipated settlement. A MSE wall is appropriate for this section and is recommended. Settlement platforms should be constructed and periodically monitored along the proposed fill placement along the retaining wall in order to monitor the rate of consolidation settlement.

5.7.5 Construction Considerations

This section provides comments related to foundation construction and other geotechnical aspects of the project. It will aid those responsible for preparation of contract plans and specifications and those involved with construction monitoring. Contractors should evaluate potential construction problems on the basis of their own knowledge and experience in the area and on the basis of similar localities, taking into account their own proposed construction methods and procedures.

5.7.5.1 Excavation

We anticipate that, excavation for the proposed Wall 107 can be made with open cuts sloped no steeper than 1.5H:1V; however some sloughing should be anticipated particularly in areas of seepage, where precipitation falls on slope faces or surface water runs over slope faces.

5.7.5.2 Utilities

A catch basins and 12-in. diameter storm pipe is to be located within 10 ft of the south end of the MSE wall. Special provisions and detailing by the MSE wall designer will be required to accommodate these structures within the MSE wall system.

5.7.5.3 Dewatering

Groundwater was encountered at about El. 52 in monitoring well RW-117 (OW) which is about 8 ft below the lowest proposed footing subgrade elevation of Wall 107. Accordingly, construction phase dewatering will most likely only consist of control of precipitation accumulation and surface water. Perched and trapped water may also be encountered.

5.8 Retaining Wall 108

5.8.1 Wall and Foundation Type

As described in Section 1.4.8, Wall 108 extends approximately 268 ft from about Sta. 301+58 to Sta. 304+27 and will retain approximately 1 to 3 ft of fill that will be placed to provide the design grades for the Busway. Based on the profile presented in Figure 9, the footing of the wall will be directly underlain by glaciolacustrine deposits from the south end of the wall at Sta. 301+60 to Sta. 303+45, and with up to a 9 ft of existing fill, overlying glaciolacustrine deposits, from Sta. 303+45 to Sta. 304+45, at the north end of the wall. Wall 107 runs parallel to Wall 108 from Sta. 301+65 to Sta. 303+45. A Mechanically Stabilized Earth (MSE) wall or PMW will be appropriate for this wall section. Contractor should be responsible for the final design of the MSE wall. Alternatively, as Wall 108 is located opposite to retaining wall 107, which is an MSE wall, the site can be preloaded for about 6 months starting at the time of Wall 107 construction and Wall 108 be constructed at the end of preloading period. It is anticipated that approximately 1 in., 50 percent of consolidation settlement will occur due to preloading, and therefore post-construction settlement will be less than 1 in.

5.8.2 Foundation Design

The following is a list of general recommendations that should be considered during the design of MSE walls or PMW for Wall 108:

- Utilize an allowable bearing capacity of 1.6 ksf for bearing on the glaciolacustrine layer. The subgrade should be proofrolled with a vibratory roller (minimum static weight of 4 tons) to identify for removal and replacement any soft materials, and treated in accordance with ConnDOT specifications prior to foundation construction.

- Foundations for the wall should bear at least 4.0 ft below the lowest adjacent ground surface for frost protection.

- The wall shall have a 6-in. nominal diameter perforated underdrain pipe, and pervious structural backfill, in accordance with the ConnDOT Bridge Design Manual.

- Pervious structural fill can be used for backfill.

5.8.3 Global Stability

Based on conditions encountered in the borings and the proposed wall configuration, the minimum factor of safety for global stability was calculated to be 1.5 using simplified Bishop's Method. This value is equal to the factor of safety of 1.5 as required by the Connecticut Busway Design Manual, dated December 2002. The computer program SLIDE was used for the analysis.

5.8.4 Settlement

The glaciolacustrine layer in this area is overconsolidated. The anticipated settlement, due to the consolidation of the glaciolacustrine deposits, assuming a recompression ratio of 0.05, due to new loads from conventional granular fill, was calculated to be up to 2.2 in. Most of this settlement is expected to occur within first 6 months of placing the fill. This magnitude of settlement is not severe but a flexible wall system is recommended to accommodate the anticipated settlement. A MSE wall or PMW is appropriate for this section and is recommended, however a reinforced concrete cantilever wall can be also considered as mentioned in Section 5.8.1. Settlement platforms should be constructed and periodically monitored along the proposed fill placement along the retaining wall in order to monitor the rate of consolidation settlement.

5.8.5 Construction Considerations

This section provides comments related to foundation construction and other geotechnical aspects of the project. It will aid those responsible for preparation of contract plans and specifications and those involved with construction monitoring. Contractors should evaluate potential construction problems on the basis of their own knowledge and experience in the area and on the basis of similar localities, taking into account their own proposed construction methods and procedures.

5.8.5.1 Excavation

We anticipate that excavation for the proposed Wall 108 can be made with open cuts sloped no steeper than 1.5H:1V; however, some sloughing should be anticipated particularly in areas of seepage, where precipitation falls on slope faces or surface water runs over slope faces.

5.8.5.2 Utilities

A catch basin and 12-in. diameter storm pipe is to be located within the MSE wall. Special provisions and detailing by the MSE wall designer will be required to accommodate these structures within the MSE wall system.

5.8.5.3 Dewatering

Groundwater was encountered at about El. 52 in monitoring well RW-117 (OW) which is about 11 ft below the lowest proposed footing subgrade elevation of Wall 108. Accordingly, construction phase dewatering will most likely only consist of control of precipitation accumulation and surface water. Perched and trapped water may also be encountered.

5.9 Retaining Wall 109

5.9.1 Wall and Foundation Type

As described in Section 1.4.9, Wall 109 extends approximately 330 ft from about Sta. 304+77 to Sta. 308+04 and will retain approximately 9 to 14 ft of fill that will be placed to provide the design grades for the Busway. Based on the profile presented in Figure 10, the footing of the wall will be directly underlain with 4 to 25 ft of existing fill which overlies the glaciolacustrine deposit. A Mechanically Stabilized Earth (MSE) wall will be appropriate for this wall section. Contractor should be responsible for the final design of the MSE wall. Based on anticipated settlement if conventional backfill materials are used, as described below, the use of lightweight fill, such as Expanded Shale, Clay & Slate (ESCS), in the backfill zone is recommended.

5.9.2 Foundation Design

The following is a list of general recommendations that should be considered for the design of Wall 109:

- Utilize an allowable bearing capacity of 3.0 ksf for bearing on the glaciolacustrine layer. The subgrade should be proofrolled with a vibratory roller (minimum static weight of 4 tons) to identify for removal and replacement any soft materials, and treated in accordance with ConnDOT specifications prior to foundation construction.

- Foundations for the wall should bear at least 4.0 ft below the lowest adjacent ground surface for frost protection.

- The wall shall have a 6-in. nominal diameter perforated underdrain pipe, and pervious structural backfill, in accordance with the ConnDOT Bridge Design Manual.

- Lightweight ESCS material should be used for backfill. The following properties can be used for design with ESCS material:

  Compacted in-place moist unit weight - 65 pcf
  Friction angle - 35°
  Active lateral earth pressure coefficient (k_a) - 0.245

5.9.3 Global Stability

Based on conditions encountered in the borings and the proposed wall configuration, the minimum factor of safety for global stability was calculated to be 1.5 using simplified Bishop's Method. This value is equal to the factor of safety of 1.5 as required by the Connecticut Busway Design Manual, dated December 2002. The computer program SLIDE was used for the analysis.

5.9.4 Settlement

The glaciolacustrine layer in this area is overconsolidated. The anticipated settlement, due to the consolidation of the glaciolacustrine deposits, assuming a recompression ratio of 0.05, due to the applied load from conventional granular fill, was calculated to be up to 3.6 in. This magnitude of settlement is considered excessive and a lightweight backfill material, such as ESCS, is recommended for use with an MSE wall system. Provided the wall is designed in accordance with the above criteria and ESCS backfill is used, total settlements are anticipated to be up to 2.3 in.

Settlement platforms should be constructed and periodically monitored along the proposed fill placement along the retaining wall in order to monitor the rate of consolidation settlement. Wall 109 is located parallel to and opposite Wall 110 and a differential settlement of about 1 in. can be anticipated between the two wall backfills provided Wall 109 is constructed about 6 months in advance of Wall 110 in order to allow approximately 1 in. of the total settlement to occur before the construction of Wall 110.

5.9.5 Construction Considerations

This section provides comments related to foundation construction and other geotechnical aspects of the project. It will aid those responsible for preparation of contract plans and specifications and those involved with construction monitoring. Contractors should evaluate potential construction problems on the basis of their own knowledge and experience in the area and on the basis of similar localities, taking into account their own proposed construction methods and procedures.

5.9.5.1 Excavation

In general, it appears that excavation for the proposed Wall 109 can be made with open cuts sloped no steeper than 1.5H:1V. However, some sloughing should be anticipated particularly in areas of seepage, where precipitation falls on slope faces or surface water runs over slope faces.

5.9.5.2 Utilities

Three (3) catch basins and 12-in. reinforced concrete drainage pipes are to be located within the MSE wall. Special provisions and detailing by the MSE wall designer will be required to accommodate these structures within the MSE wall system.

5.9.5.3 Dewatering

Groundwater was encountered at about El. 52 at monitoring well RW-117 (OW), located approximately 150 ft from the south end of the wall. The groundwater elevation data available at this time indicate that between approximate Sta. 306+00 and Sta. 307+00, the embedded portions of Wall 109 may be up to 2 ft below groundwater. Accordingly, dewatering will likely be required during construction of Wall 109 in these areas. The contractor should be responsible for selecting the appropriate dewatering system.

5.10 Retaining Wall 110

5.10.1 Wall and Foundation Type

As described in Section 1.4.10, Wall 110 will extend approximately 237 ft along the eastern side of the proposed Busway from Sta. 305+68 to Sta. 308+06. Wall 110 will retain approximately 2 to 3 ft of fill. The exposed wall height will be approximately 4 ft. The railroad tracks are located approximately 17 to 24 ft from the proposed wall face. Wall 109 runs parallel to Wall 110 from Sta. 305+63 to Sta. 308+10. Based on the profile presented in Figure 11, the footing of the wall will be directly underlain with 14 to 33 ft of medium stiff to stiff clayey silt and loose to medium dense sand and gravel fill at foundation bearing elevation.

The existing fill layer beneath Wall 110, after compaction at any loose areas, will be suitable to support the retaining wall and surcharge from the proposed Busway. A reinforced concrete cantilever retaining wall, supported on spread footings will be appropriate for this wall section. MSEW and PMW should be considered as alternatives, subject to contractor final designs.

5.10.2 Foundation Design

The following is a list of general recommendations that should be considered for the design of reinforced concrete cantilever wall for Wall 110:

- Utilize a maximum factored bearing resistance of 3.0 ksf for strength limit state and 3.0 ksf for the service limit state at assumed 1-in. settlement limit. The subgrade should be proofrolled with a vibratory roller (minimum static weight of 4 tons) to identify for removal and replacement any soft materials, and treated in accordance with ConnDOT specifications prior to foundation construction.

- Foundations should bear at least 4.0 ft below the lowest adjacent ground surface for frost protection.

- Place a 12-in. thick layer of granular fill beneath footing for uniform bearing. Granular fill should extend 24 in. horizontally outside the foundation limits and slope outward and downward on a 1H:1V slope.

- The wall shall have a 6-in. nominal diameter perforated underdrain pipe and pervious backfill, in accordance with the Connecticut Department of Transportation Bridge Design Manual.

The following is a list of general recommendations that should be considered for the design of MSEW or PMW for Wall 110:

- Utilize an allowable bearing capacity of 1.6 tsf for bearing on the fill layer. The subgrade should be proofrolled, and treated in accordance with ConnDOT specifications prior to foundation construction.

- Foundations for the wall should bear at least 4.0 ft below the lowest adjacent ground surface for frost protection.

- The wall shall have a 6-in. nominal diameter perforated underdrain pipe, and pervious structural backfill, in accordance with the ConnDOT Bridge Design Manual.

- Pervious structural fill can be used for backfill.

5.10.3 Global Stability

Based on conditions encountered in the borings and the proposed wall configuration, the minimum factor of safety for global stability was calculated to be 1.5, using simplified Bishop's Method. This value is greater than the factor of safety of 1.5 required by the Connecticut Busway Design Manual, dated December 2002. The computer program SLIDE was used for the analysis.

5.10.4 Settlement

Provided the footing for Wall 110 is designed in accordance with the above criteria, total settlement at the bottom of the embankment fill will be less than 1 in. Wall 110 is located parallel to and opposite Wall 109 and a differential settlement of about 1 in. can be anticipated between the two wall backfills provided, Wall 109 is constructed 6 months in advance of Wall 110 in order to allow approximately 1 in. of the total settlement to occur before the construction of Wall 110.

5.10.5 Lateral Earth Pressures

Design the wall for lateral earth pressures and surcharge loads shown on Figure 14 for pervious structural backfill.

5.10.6 Construction Considerations

This section provides comments related to foundation construction and other geotechnical aspects of the project. It will aid those responsible for preparation of contract plans and specifications and those involved with construction monitoring. Contractors should evaluate potential construction problems on the basis of their own knowledge and experience in the area and on the basis of similar localities, taking into account their own proposed construction methods and procedures.

5.10.6.1 Excavation

We anticipate that where space permits, excavation for the proposed Wall 110 can be made with open cuts sloped no steeper than 1.5H:1V. However, some sloughing should be anticipated particularly in areas of seepage, where precipitation falls on slope faces or surface water runs over slope faces.

5.10.6.2 Dewatering

Groundwater was encountered at about El. 52 in observation well RW-117 (OW), which is about 9 ft below the proposed footing subgrade elevation of Wall 110. Accordingly, construction phase dewatering will most likely only consist of control of precipitation accumulation and surface water. Perched and trapped water may also be encountered.

5.11 Retaining Wall 111

5.11.1 Wall and Foundation Type

As described in Section 1.4.11, Wall 111 will extend approximately 696 ft along the western side of the proposed Busway from about Sta. 309+24 to Sta. 316+20. Wall 111 will retain approximately 1 to 10 ft of fill. The exposed wall height will be approximately 2 to 12 ft. Based on the profile presented in Figures 12A and 12B the footing of the wall will be directly underlain with 7 to 20 ft of medium stiff to stiff clayey silt at wall foundation bearing elevation. The existing fill layer beneath Wall 111 will be suitable to support the retaining wall and surcharge from the proposed Busway. A reinforced concrete cantilever retaining wall, supported on spread footings will be appropriate for this wall section. MSEW and PMW should be considered as alternatives, subject to contractor final designs.

5.11.2 Foundation Design

The following is a list of general recommendations that should be considered during the design of Wall 111:

- Utilize a maximum factored bearing resistance of 5.8 ksf for strength limit state and 3.0 ksf for the service limit state at assumed 1-in. settlement limit. The subgrade should be proofrolled with a vibratory roller (minimum static weight of 4 tons) to identify for removal and replacement any soft materials, and treated in accordance with ConnDOT specifications prior to foundation construction.

- Foundations should bear at least 4.0 ft below the lowest adjacent ground surface for frost protection.

- Place a 12-in. thick layer of granular fill beneath footing for uniform bearing. Granular fill should extend 24 in. horizontally outside the foundation limits and slope outward and downward on a 1H:1V slope.

- The wall shall have a 6-in. nominal diameter perforated underdrain pipe and pervious backfill, in accordance with the Connecticut Department of Transportation Bridge Design Manual.

The following is a list of general recommendations that should be considered for the design of MSEW or PMW for Wall 111:

- Utilize an allowable bearing capacity of 1.6 tsf for bearing on the fill layer. The subgrade should be proofrolled, with a vibratory roller (minimum static weight of 4 tons) to identify for removal and replacement any soft materials, and treated in accordance with ConnDOT specifications prior to foundation construction.

- Foundations for the wall should bear at least 4.0 ft below the lowest adjacent ground surface for frost protection.

- The wall shall have a 6-in. nominal diameter perforated underdrain pipe, and pervious structural backfill, in accordance with the ConnDOT Bridge Design Manual.

- Pervious structural fill can be used for backfill.

5.11.3 Global Stability

Based on conditions encountered in the borings and the proposed wall configuration, the minimum factor of safety for global stability was calculated to be 1.8, using simplified Bishop's Method. This value is greater than the factor of safety of 1.5 required by the Connecticut Busway Design Manual, dated December 2002. The computer program SLIDE was used for the analysis.

5.11.4 Settlement

Provided the footing for Wall 111 is designed in accordance with the above criteria, total settlement at the bottom of the embankment fill will be less than 1 in. No significant differential settlement is anticipated. Most of the settlement will occur during construction.

5.11.5 Lateral Earth Pressures

Design the wall for lateral earth pressures and surcharge loads shown on Figure 14 for pervious structural backfill.

5.11.6 Construction Considerations

This section provides comments related to foundation construction and other geotechnical aspects of the project. It will aid those responsible for preparation of contract plans and specifications and those involved with construction monitoring. Contractors should evaluate potential construction problems on the basis of their own knowledge and experience in the area and on the basis of similar localities, taking into account their own proposed construction methods and procedures.

5.11.6.1 Excavation and Temporary Lateral Support

We anticipate that excavation for the proposed Wall 111 can be made with open cuts sloped no steeper than 1.5H:1V. However, some sloughing should be anticipated particularly in areas of seepage, where precipitation falls on slope faces or surface water runs over slope faces. The construction of barrier wall on the eastern side of the Busway opposite Wall 111 will require temporary sheet pile installation, based on Amtrak's 'Normal Requirements for Sheet Piling Adjacent to Track. The design of the sheeting shall be provided by the contractor. The temporary sheet piles can be removed after the construction of the barrier wall.

5.11.6.2 Dewatering

Groundwater was encountered at about El. 32 in observation well TB-102 (OW), which is about 18 feet below the proposed footing subgrade elevation of Wall 111. Accordingly, construction phase dewatering will most likely only consist of control of precipitation accumulation and surface water. Perched and trapped water may also be encountered.

5.12 Retaining Wall 112

5.12.1 Wall and Foundation Type

As described in Section 1.4.12, Wall 112 will extend approximately 980 ft along the eastern side of the proposed Busway from about Sta. 229+20 to Sta. 239+00. Wall 112 will retain approximately up to 3 ft of fill including the pavement section. The exposed wall heights will be approximately 1.5 to 4 ft. The railroad tracks are located approximately 14 ft from the proposed wall face. The existing fill layer consisting of medium dense sand will be suitable to support the wall and surcharge from the proposed Busway. A Roadway Parapet Wall (RPW) consisting of 7.2 ft high precast barrier wall connected to a 1.5 ft thick cast-in-place reinforced concrete moment slab bearing on existing grade or granular fill will be appropriate for this wall section, where needed, because of exposed heights, steel sheeting extends below the precast panel. A cast-in-place concrete cantilever wall supported on spread footings, Mechanically Stabilized Earth (MSE) wall and Prefabricated Modular wall (PMW) are alternative designs appropriate for consideration. However, excavation for these alternative wall types will extend into 'Zone 2', that lies below the 'Theoretical Railroad Embankment Line' as specified in Sketch-1, Spec.02261A - Rev.1 by Amtrak - Office of Chief Engineer, Structures (dated 6/06/01) and

therefore would require installation of temporary steel sheet pile wall adjacent to the railroad tracks. Use of RPW will not require any excavation, but will require permanent steel sheet pile, installed to limited depths, in order to retain the fill where the final grade difference between the two (2) sides of the wall is greater than 20 in.

5.12.2 Foundation Design

The following are general recommendations that should be considered for the design of the RPW for Wall 112:

- Utilize a maximum factored bearing resistance of 3.0 ksf for strength limit state and 4.0 ksf for the service limit state at assumed 1-in. settlement limit. The subgrade should be proofrolled with a vibratory roller (minimum static weight of 4 tons) to identify for removal and replacement any soft materials, and treated in accordance with ConnDOT specifications prior to foundation construction.

- Utilize a sliding coefficient between the bearing soil and cast-in-place moment slab of 0.6.

- The sheet pile wall to be installed below the precast concrete barrier may experience some vertical load from the wall. Vertical bearing resistance of the sheet pile should be estimated according to the AASHTO LRFD Bridge Design Specification 2008, for non-displacement piles.

- Place a 12-in. thick layer of granular fill beneath the precast barrier wall and cast-in-place moment slab for uniform bearing. Granular fill should extend 24 in. horizontally outside the foundation limits and slope outward and downward on a 1H:1V slope.

- The wall shall have a 6-in. nominal diameter perforated underdrain pipe and pervious backfill, in accordance with the Connecticut Department of Transportation Bridge Design Manual. A combined underdrain with the roadway may be possible.

- The wall backfill should be standard pervious structural fill.

5.12.3 Global Stability

Based on conditions encountered in the borings and the proposed wall configuration, the minimum factor of safety for global stability was calculated to be 3.0, using simplified Bishop's Method. This value is greater than the value of 1.5 required by the Connecticut Busway Design Manual, dated December 2002. The computer program SLIDE was used for the analysis.

5.12.4 Settlement

Provided the footing for Wall 112 is designed in accordance with the above criteria, total settlement at the bottom of the embankment fill will be less than 1 in. No significant differential settlement is anticipated. Most of the settlement will occur during construction. Settlement due to consolidation of the lacustrine deposit, due to new fill, will be negligible.

5.12.5 Lateral Earth Pressures

Design the wall for lateral earth pressures and surcharge loads shown on Figure 14 for pervious structural backfill. An active earth pressure condition is appropriate.

5.12.6 Construction Considerations

This section provides comments related to foundation construction and other geotechnical aspects of the project. It will aid those responsible for preparation of contract plans and specifications and those involved with construction monitoring. Contractors should evaluate potential construction problems on the basis of their own knowledge and experience in the area and on the basis of similar localities, taking into account their own proposed construction methods and procedures.

5.12.6.1 Dewatering

Groundwater was encountered at about El. 54 in RB-107(OW) which is about 12 ft below the existing grade near Wall 112 and below the proposed foundation depth. Accordingly, construction phase dewatering will most likely only consist of control of precipitation accumulation and surface water.

FINAL COMMENTS

This report has been prepared for specific application to the proposed retaining walls (Wall 101 through Wall 112) associated with the New Britain-Hartford Busway Project, as understood at this time, in accordance with generally accepted geotechnical engineering practice common to the local area. In the event that changes in the nature, design or location of the project elements are planned, the conclusions and recommendations contained in this report should not be considered valid, unless the changes are reviewed by Haley & Aldrich, Inc. and the conclusions of this report modified or verified in writing.

The analyses and recommendations are based, in part, upon data obtained from the referenced subsurface explorations. The nature and extent of variations between explorations may not become evident until construction. If variations then appear, it may be necessary to reevaluate the recommendations of this report.

REFERENCES

1. American Association of State Highway Transportation Officials (AASHTO) LRFD Bridge Design Specifications,(2007), 4th Edition with 2008 Interim Revision.

2. American Association of State Highway Transportation Officials (AASHTO) Standard Specifications for Highway Bridges, (2002), 17th Edition.

3. Ammann & Whitney Consulting Engineers, "Connecticut Department of Transportation Plan for Construction of New Britain – Hartford Busway," 60% Semi Final Submission.

4. Baker Engineering NY, Inc., 2007, "New Britain – Hartford Busway Transfer Package to Final Designer," prepared for the Connecticut Department of Transportation.

5. Baker Engineering NY, Inc., 2002, "Connecticut Busway Design Manual," prepared for the Connecticut Department of Transportation.

6. Baker Engineering NY, Inc., 2006, "Report on Settlement due to the Glacial Lake Deposits," prepared for the Connecticut Department of Transportation.

7. Connecticut Transportation Institute, Connecticut Cooperative Transportation Research Program, University of Connecticut, "Field Consolidation of Varved Clay, Final Report," April 1978, JHR 78-113.

8. Connecticut Department of Transportation, Geotechnical Engineering Manual, 2005 Edition, Rev. February 2009.

9. Deane, R. E., 1967, *The Surficial Geology of the Hartford South Quadran*gle, State Geological and Natural History Survey of Connecticut, Quadrangle Report No. 20.

10. Ensoft, Inc. (2004). "LPILE Plus 5.0 for Windows," Austin, Texas, July.

11. Federal Highway Administration (1998). "DRIVEN 1.0, A Microsoft Windows Based Program for Determining Ultimate Vertical Static Pile Capacity," FHWA-SA-98-074, Washington, D.C., May.

12. Holtz, R.D. and Kovacs, W.D., 1981, An Introduction to Geotechnical Engineering, Prentice Hall, Englewood Cliffs, New Jersey.

13. NCHRP Report 529, 2004, "Guideline and Recommended Standard for Geofoam Applications in Highway Embankments", TRB.

14. NCHRP Web Document 65 (Project 24-11), 2004, "Geofoam Applications in the Design and Construction of Highway Embankments", TRB.

15. Rocscience, Inc., 2004, *Slide 5.0* - 2D Limit Equilibrium Slope Stability Analysis.

TABLES

TABLE I
RETAINING WALL 101
SUMMARY OF SUBSURFACE DATA
NEW BRITAIN - HARTFORD BUSWAY
STATE PROJECT NO. 171-305
NEWINGTON TO WEST HARTFORD, CONNECTICUT

EXPLORATION NUMBER	ELEV. (FT)	DEPTH (FT)	THICKNESS OF SOIL STRATA (FT)			BEDROCK (FT)		WATER LEVEL (FT)	
			FILL	ALLUVIUM	GLACIAL TILL	DEPTH	ELEV.	DEPTH	ELEV.
RW-101	71.20	26.0	6.5	2.0	12.5	21.0	50.20	--	--
RW-101A	66.35	17.0	2.0	4.0	9.0	15.0	51.35	14.00	52.35
RW-102	66.16	22.5	5.0	3.0	3.8	11.8	54.36	10.00	56.16
RB-105	66.44	20.0	3.0	6.0	6.0	15.0	51.44	4.66	61.78
RW-103	65.41	21.0	3.5	6.0	6.5	16.0	49.41	8.00	57.41

Notes:
1. "--" indicates not encountered or not observed.
2. ">" indicates stratum thickness is greater than the number indicated since the boring was terminated within the stratum.
3. Elevations are in feet and refer to NGVD29.
4. Refer to boring logs in Appendix A for detailed soil descriptions.
5. Water levels were measured shortly after drilling and may not represent stabilized groundwater conditions.

TABLE II
RETAINING WALL 102
SUMMARY OF SUBSURFACE DATA
NEW BRITAIN - HARTFORD BUSWAY
STATE PROJECT NO. 171-305
NEWINGTON TO WEST HARTFORD, CONNECTICUT

EXPLORATION NUMBER	ELEV. (FT)	DEPTH (FT)	THICKNESS OF SOIL STRATA (FT)				BEDROCK (FT)		WATER LEVEL (FT)	
			FILL	ALLUVIUM	LACUSTRINE DEPOSITS	GLACIAL TILL	DEPTH	ELEV.	DEPTH	ELEV.
RW-124	64.23	40.0	4.00	12.0	21.5	> 5.5	--	--	12.00	52.23
RB-107 (OW)	64.81	25.0	6.00	12.5	> 6.5	--	--	--	10.20	54.61
RW-123	64.82	40.0	4.00	14.5	> 21.5	--	--	--	12.00	52.82
RW-123A	65.00	60.0	10.00	7.0	25	16	60.00	5	--	--
RW-124A	64.00	67.00	5.00	10.00	48.00	--	67.00	-3.00	--	--

Notes:
1. "--" indicates not encountered or not observed.
2. ">" indicates stratum thickness is greater than the number indicated since the boring was terminated within the stratum.
3. Elevations are in feet and refer to NGVD29.
4. Refer to boring logs in Appendix A for detailed soil descriptions.
5. Water levels were measured shortly after drilling and may not represent stabilized groundwater conditions, except at observation well RB-107 (OW).

TABLE III
RETAINING WALL 103
SUMMARY OF SUBSURFACE DATA
NEW BRITAIN - HARTFORD BUSWAY
STATE PROJECT NO. 171-305
NEWINGTON TO WEST HARTFORD, CONNECTICUT

EXPLORATION NUMBER	ELEV. (FT)	DEPTH (FT)	THICKNESS OF SOIL STRATA (FT)					BEDROCK (FT)		WATER LEVEL (FT)	
			FILL	ORGANIC SOIL	ALLUVIUM	GLACIO-LACUSTRINE DEPOSITS	GLACIAL TILL	DEPTH	ELEV.	DEPTH	ELEV.
RW-105	76.36	24.0	3.0	--	--	--	16.0	19.0	57.36	--	--
RW-106 (OW)	69.95	40.8	3.0	--	7.0	12.5	12.5	35.0	34.95	0.30	69.65
RW-107	69.99	40.3	5.0	--	5.0	18.5	11.8	--	--	1.00	68.99
RB-110	69.37	25.0	5.0	1.2	5.3	> 13.5	--	--	--	5.00	64.37

Notes:
1. "--" indicates not encountered or not observed.
2. ">" indicates stratum thickness is greater than the number indicated since the boring was terminated within the stratum.
3. Elevations are in feet and refer to NGVD29.
4. Refer to boring logs in Appendix A for detailed soil descriptions.
5. Water levels were measured shortly after drilling and may not represent stabilized groundwater conditions, except at observation well RW-106 (OW).

TABLE IV
RETAINING WALL 104
SUMMARY OF SUBSURFACE DATA
NEW BRITAIN - HARTFORD BUSWAY
STATE PROJECT NO. 171-305
NEWINGTON TO WEST HARTFORD, CONNECTICUT

EXPLORATION NUMBER	ELEV. (FT)	DEPTH (FT)	THICKNESS OF SOIL STRATA (FT)				BEDROCK (FT)		WATER LEVEL (FT)	
			FILL	ALLUVIUM	GLACIO-LACUSTRINE DEPOSITS	GLACIAL TILL	DEPTH	ELEV.	DEPTH	ELEV.
CB-103	71.44	50.0	10.0	8.5	26.5	> 5	--	--	11.00	60.44
RB-111	71.56	25.0	3.0	5.0	> 17	--	--	--	5.50	66.06
RB-112	71.19	25.0	3.0	--	> 22	--	--	--	5.50	65.69
Boring Performed by Others										
RB-28	69.80	30.0	10.0	--	> 20	--	--	--	--	--

Notes:
1. "--" indicates not encountered or not observed.
2. ">" indicates stratum thickness is greater than the number indicated since the boring was terminated within the stratum.
3. Elevations are in feet and refer to NGVD29.
4. Refer to boring logs in Appendix A (RB-28 in Appendix B) for detailed soil descriptions.
5. Water levels were measured shortly after drilling and may not represent stabilized groundwater conditions.

TABLE V
RETAINING WALL 105
SUMMARY OF SUBSURFACE DATA
NEW BRITAIN - HARTFORD BUSWAY
STATE PROJECT NO. 171-305
NEWINGTON TO WEST HARTFORD, CONNECTICUT

EXPLORATION NUMBER	ELEV. (FT)	DEPTH (FT)	THICKNESS OF SOIL STRATA (FT)			BEDROCK (FT)		WATER LEVEL (FT)	
			FILL	GLACIO-LACUSTRINE DEPOSITS	GLACIAL TILL	DEPTH	ELEV.	DEPTH	ELEV.
RW-109	67.23	40.0	10.5	26.5	> 3	--	--	--	--
RW-110	70.03	40.0	16.0	> 24	--	--	--	--	--
RW-111	57.68	40.0	11.0	25.0	> 4	--	--	--	--
RW-112	69.33	55.7	21.0	27.0	> 7.7	55.7	13.63	16.00	53.33
RW-113	55.42	37.5	13.0	23.0	--	36.0	19.42	--	--
RW-114	69.21	57.0	25.0	28.0	> 4	--	--	15.00	54.21
RW-115	55.81	40.0	13.5	> 26.5	--	--	--	--	--
NBA-101	51.84	50.0	5.0	32.8	--	37.8	14.04	5.00	46.84
Borings Performed by Others									
SB-44	70.10	67.0	7.5	42.5	8.4	58.4	11.70	8.00	62.10
SB-46	68.20	73.7	19.5	37.0	7.2	63.7	4.50	21.80	46.40

Notes:
1. "--" indicates not encountered or not observed.
2. ">" indicates stratum thickness is greater than the number indicated since the boring was terminated within the stratum.
3. Elevations are in feet and refer to NGVD29.
4. Refer to boring logs in Appendix A (SB-44 and SB-46 in Appendix B) for detailed soil descriptions.
5. Water levels were measured shortly after drilling and may not represent stabilized groundwater conditions.

TABLE VI
RETAINING WALL 106
SUMMARY OF SUBSURFACE DATA
NEW BRITAIN - HARTFORD BUSWAY
STATE PROJECT NO. 171-305
NEWINGTON TO WEST HARTFORD, CONNECTICUT

EXPLORATION NUMBER	ELEV. (FT)	DEPTH (FT)	THICKNESS OF SOIL STRATA (FT)			BEDROCK (FT)		WATER LEVEL (FT)	
			FILL	GLACIO-LACUSTRINE DEPOSITS	GLACIAL TILL	DEPTH	ELEV.	DEPTH	ELEV.
RW-111	57.68	40.0	11.0	25.0	> 4	--	--	--	--
RW-112	69.33	55.7	21.0	27.0	> 7.7	55.7	13.63	16.00	53.33
RW-113	55.42	37.5	13.0	23.0	--	36.0	19.42	--	--
RW-114	69.21	57.0	25.0	28.0	> 4	--	--	15.00	54.21
RW-115	55.81	40.0	13.5	> 26.5	--	--	--	--	--
NBA-101	51.84	50.0	5.0	32.8	--	37.8	14.04	5.00	46.84
Borings Performed by Others									
SB-46	68.20	73.7	19.5	37.0	7.2	63.7	4.50	21.80	46.40

Notes:
1. "--" indicates not encountered or not observed.
2. ">" indicates stratum thickness is greater than the number indicated since the boring was terminated within the stratum.
3. Elevations are in feet and refer to NGVD29.
4. Refer to boring logs in Appendix A (SB-46 in Appendix B) for detailed soil descriptions.
5. Water levels were measured shortly after drilling and may not represent stabilized groundwater conditions.

TABLE VII
RETAINING WALL 107
SUMMARY OF SUBSURFACE DATA
NEW BRITAIN - HARTFORD BUSWAY
STATE PROJECT NO. 171-305
NEWINGTON TO WEST HARTFORD, CONNECTICUT

EXPLORATION NUMBER	ELEV. (FT)	DEPTH (FT)	THICKNESS OF SOIL STRATA (FT)			BEDROCK (FT)		WATER LEVEL (FT)	
			FILL	GLACIO-LACUSTRINE DEPOSITS	GLACIAL TILL	DEPTH	ELEV.	DEPTH	ELEV.
NBA-102 (OW)	53.82	51.5	3.5	40.5	--	44.0	9.8	7.70	46.12
RW-116	67.82	57.0	2.5	> 54.5	--	--	--	10.00	57.82
RW-117 (OW)	66.76	55.0	2.5	> 52.5	--	--	--	14.20	52.56
Borings Performed by Others									
SB-47	64.10	70.0	8.7	46.3	5.0	60.0	4.1	20.10	44.00
SB-50	62.90	78.0	2.8	52.2	12.0	67.0	-4.1	18.50	44.40

Notes:
1. "--" indicates not encountered or not observed.
2. ">" indicates stratum thickness is greater than the number indicated since the boring was terminated within the stratum.
3. Elevations are in feet and refer to NGVD29.
4. Refer to boring logs in Appendix A (SB-47 and SB-50 in Appendix B) for detailed soil descriptions.
5. Water levels were measured shortly after drilling and may not represent stabilized groundwater conditions, except at observation wells NBA-102 (OW) and RW-117 (OW).

TABLE VIII
RETAINING WALL 108
SUMMARY OF SUBSURFACE DATA
NEW BRITAIN - HARTFORD BUSWAY
STATE PROJECT NO. 171-305
NEWINGTON TO WEST HARTFORD, CONNECTICUT

EXPLORATION NUMBER	ELEV. (FT)	DEPTH (FT)	THICKNESS OF SOIL STRATA (FT)			BEDROCK (FT)		WATER LEVEL (FT)	
			FILL	GLACIO-LACUSTRINE DEPOSITS	GLACIAL TILL	DEPTH	ELEV.	DEPTH	ELEV.
NBA-102 (OW)	53.82	51.5	3.5	40.5	--	44.0	9.82	7.70	46.12
RW-116	67.82	57.0	2.5	> 54.5	--	--	--	10.00	57.82
RW-117 (OW)	66.76	55.0	2.5	> 52.5	--	--	--	14.20	52.56
Borings Performed by Others									
SB-47	64.10	70.0	8.7	46.3	5.0	60.0	4.1	20.10	44.00
SB-50	62.90	78.0	2.8	52.2	12.0	67.0	-4.10	18.50	44.40

Notes:
1. "--" indicates not encountered or not observed.
2. ">" indicates stratum thickness is greater than the number indicated since the boring was terminated within the stratum.
3. Elevations are in feet and refer to NGVD29.
4. Refer to boring logs in Appendix A (SB-47 and SB-50 in Appendix B) for detailed soil descriptions.
5. Water levels were measured shortly after drilling and may not represent stabilized groundwater conditions, except at observation wells NBA-102 (OW) and RW-117 (OW).

TABLE IX
RETAINING WALL 109
SUMMARY OF SUBSURFACE DATA
NEW BRITAIN - HARTFORD BUSWAY
STATE PROJECT NO. 171-305
NEWINGTON TO WEST HARTFORD, CONNECTICUT

EXPLORATION NUMBER	ELEV. (FT)	DEPTH (FT)	THICKNESS OF SOIL STRATA (FT)			BEDROCK (FT)		WATER LEVEL (FT)	
			FILL	GLACIO-LACUSTRINE DEPOSITS	GLACIAL TILL	DEPTH	ELEV.	DEPTH	ELEV.
RW-125	53.51	54.4	10.0	39.0	> 5.4	--	--	14.0	39.51
RW-118	64.39	55.0	22.0	> 33	--	--	--	10.0	54.39
TB-101	63.75	110.0	36.4	32.1	31.5	100.0	-36.3	31.0	32.75
Borings Performed by Others									
SB-49	65.9	85.0	16.5	41.5	16.0	74.0	-8.10	--	--
SB-51	60.4	78.0	4.5	46.5	14.1	65.1	-4.7	20.2	40.2
SB-52	64.2	110.0	13.5	56.5	30.0	100.0	-35.8	--	--

Notes:
1. "--" indicates not encountered or not observed.
2. ">" indicates stratum thickness is greater than the number indicated since the boring was terminated within the stratum.
3. Elevations are in feet and refer to NGVD29.
4. Refer to boring logs in Appendix A (SB-49, SB-51 and SB-52 in Appendix B) for detailed soil descriptions.
5. Water levels were measured shortly after drilling and may not represent stabilized groundwater conditions.

TABLE X
RETAINING WALL 110
SUMMARY OF SUBSURFACE DATA
NEW BRITAIN - HARTFORD BUSWAY
STATE PROJECT NO. 171-305
NEWINGTON TO WEST HARTFORD, CONNECTICUT

EXPLORATION NUMBER	ELEV. (FT)	DEPTH (FT)	THICKNESS OF SOIL STRATA (FT)			BEDROCK (FT)		WATER LEVEL (FT)	
			FILL	GLACIO-LACUSTRINE DEPOSITS	GLACIAL TILL	DEPTH	ELEV.	DEPTH	ELEV.
RW-125	53.51	54.4	10.0	39.0	> 5.4	--	--	14.0	39.51
RW-118	64.39	55.0	22.0	> 33	--	--	--	10.0	54.39
TB-101	63.75	110.0	36.4	32.1	31.5	100.0	-36.3	31.0	32.75
Borings Performed by Others									
SB-51	60.4	78.0	4.5	46.5	14.1	65.1	-4.7	20.2	40.2
SB-52	64.2	110.0	13.5	56.5	30.0	100.0	-35.8	--	--

Notes:
1. "--" indicates not encountered or not observed.
2. ">" indicates stratum thickness is greater than the number indicated since the boring was terminated within the stratum.
3. Elevations are in feet and refer to NGVD29.
4. Refer to boring logs in Appendix A (SB-51 and SB-52 in Appendix B) for detailed soil descriptions.
5. Water levels were measured shortly after drilling and may not represent stabilized groundwater conditions.

TABLE XI
RETAINING WALL 111
SUMMARY OF SUBSURFACE DATA
NEW BRITAIN - HARTFORD BUSWAY
STATE PROJECT NO. 171-305
NEWINGTON TO WEST HARTFORD, CONNECTICUT

EXPLORATION NUMBER	ELEV. (FT)	DEPTH (FT)	THICKNESS OF SOIL STRATA (FT)			BEDROCK (FT)		WATER LEVEL (FT)	
			FILL	GLACIO-LACUSTRINE DEPOSITS	GLACIAL TILL	DEPTH	ELEV.	DEPTH	ELEV.
TB-102 (OW)	63.51	78.8	37.5	39.0	> 2.3	--	--	31.0	32.51
RW-119	63.41	60.0	31.0	> 29	--	--	--	15.0	48.41
RW-120	63.32	55.0	33.5	> 21.5	--	--	--	15.0	48.32
RW-121	63.55	55.0	28.0	> 27	--	--	--	15.0	48.55
RW-122	63.68	55.0	16.0	> 39	--	--	--	8.0	55.68
Borings Performed by Others									
SB-54	63.2	118.0	10.0	80.0	18.0	108.0	-44.8	38.7	24.5
SB-55	63.6	165.0	16.5	83.5	> 65	--	--	34.3	29.3

Notes:
1. "--" indicates not encountered or not observed.
2. ">" indicates stratum thickness is greater than the number indicated since the boring was terminated within the stratum.
3. Elevations are in feet and refer to NGVD29.
4. Refer to boring logs in Appendix A (SB-54 and SB-55 in Appendix B) for detailed soil descriptions.
5. Water levels were measured shortly after drilling and may not represent stabilized groundwater conditions, except at observation well TB-102 (OW).

TABLE XII
RETAINING WALL 112
SUMMARY OF SUBSURFACE DATA
NEW BRITAIN - HARTFORD BUSWAY
STATE PROJECT NO. 171-305
NEWINGTON TO WEST HARTFORD, CONNECTICUT

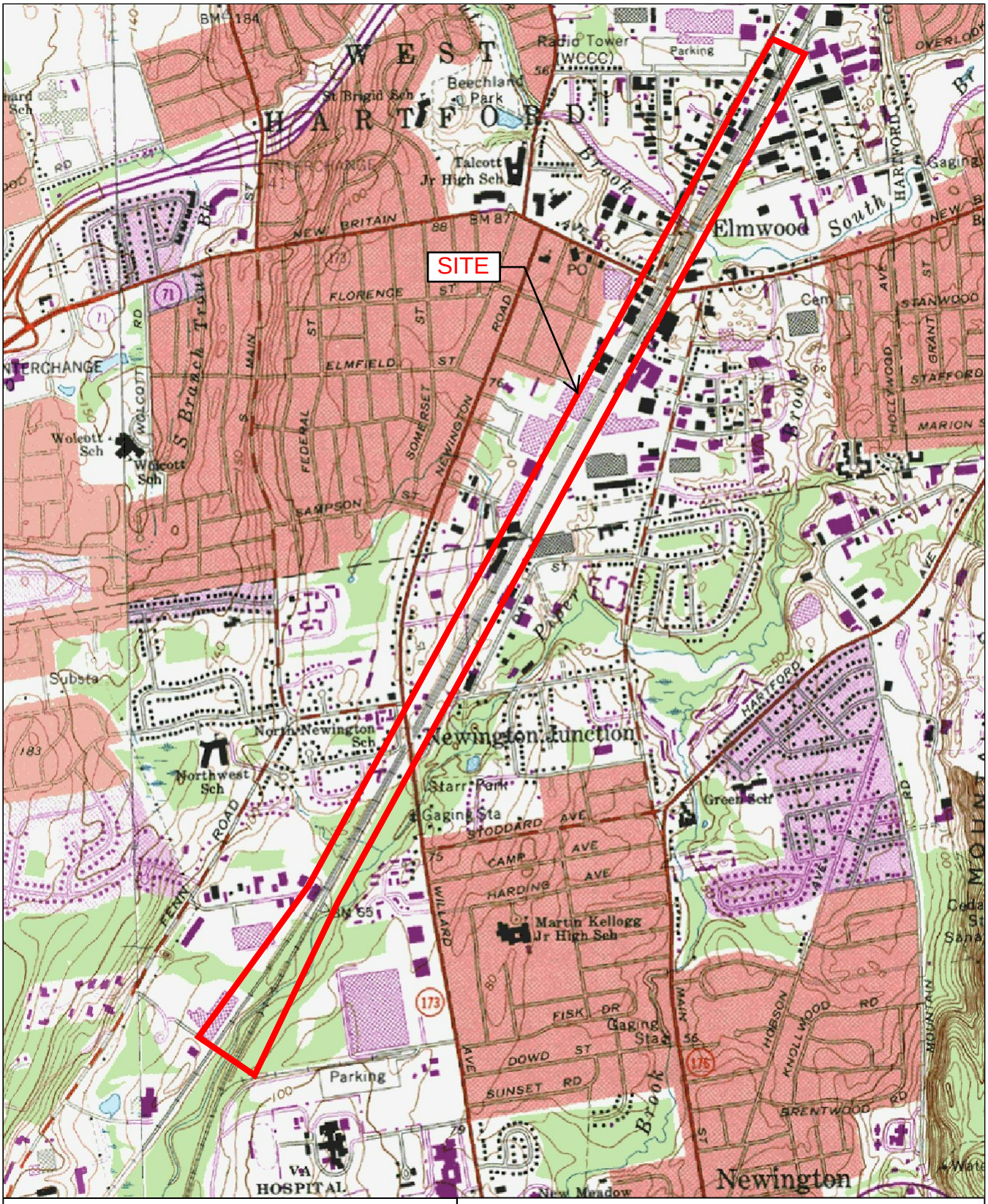
EXPLORATION NUMBER	ELEV. (FT)	DEPTH (FT)	THICKNESS OF SOIL STRATA (FT)				BEDROCK (FT)		WATER LEVEL (FT)	
			FILL	ALLUVIUM	LACUSTRINE DEPOSITS	GLACIAL TILL	DEPTH	ELEV.	DEPTH	ELEV.
RW-123	64.82	40.0	4	14.5	> 21.5	--	--	--	12	52.82
RW-123A	65.00	60.0	10	7	25	16	60	5	--	--
RW-125	63.0	61.8	7	6.5	42	>6.5	--	--	--	--
CB-102	63.1	40.0	1.5	7.5	>31	--	--	--	10	53.11
RW-126	65.0	68.1	6	--	57	>5	--	--	--	--
RW-127	66.5	59.0	5	--	52	>2	--	--	--	--
RB-108	66.9	25.0	5	7	>13	--	--	--	9	57.9
RW-128	67.5	57.5	5	--	51.5	>2	--	--	--	--
RB-109	67.9	25.0	3.5	10.5	>11	--	--	--	10	57.9
SB-40	68.4	76.0	2.7	4.8	32.5	26	66	2.4	13	55.4
RW-129	68.5	51.9	5	--	>47	--	--	--	--	--

Notes:
1. "--" indicates not encountered or not observed.
2. ">" indicates stratum thickness is greater than the number indicated since the boring was terminated within the stratum.
3. Elevations are in feet and refer to NGVD29.
4. Refer to boring logs in Appendix A for detailed soil descriptions.
5. Water levels were measured shortly after drilling and may not represent stabilized groundwater conditions,

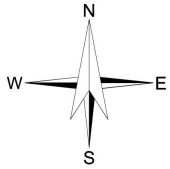
TABLE XIII
SUMMARY OF LABORATORY RESULTS FOR CONSOLIDATION
NEW BRITAIN - HARTFORD BUSWAY
STATE PROJECT NO. 171-305
NEWINGTON TO WEST HARTFORD, CONNECTICUT

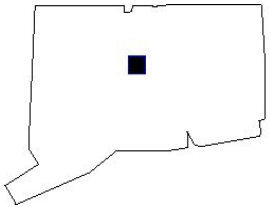
Boring	Sample	Depth	Layer	Soil Description per Boring Log	Compression Ratio	Compression Index	Estmated per-consolidation stress (tsf)	Estimated Overburden stress* (tsf)	OCR
NBA-101	U3-D	37.1	Glaciolacustrine	Silt	0.055	0.089	3.6	2.2	1.6
RB-112	U-1E	19.85	Glaciolacustrine	Clay	0.171	0.365	2.2	1.2	1.8
RW-110	U-1D	24.9	Glaciolacustrine	Clay, varved	0.23	0.623	2	1.5	1.3
RW-116	D	19.75	Glaciolacustrine	Clay, varved	0.279	0.755	2.3	1.2	1.9
RW-121	U-1E	45.05	Glaciolacustrine	Clay, varved	0.167	0.408	1.1	2.7	0.4
TB-102	U-3E	56.85	Glaciolacustrine	Clay, varved	0.102	0.236	2.2	3.4	0.6
				Mean	0.167				
Laboratory Testing Performed by Others									
RB-27	UP-1	16.3			0.09				
SB-44	UP-1	30.7	Glaciolacustrine	Lean Clay	0.03				
SB-46	UP-1	31	Glaciolacustrine	Clay with Silt	0.26				
SB-52	ST-1	50.5	Glaciolacustrine	Silty Clay	0.15				
SB-54	ST-1	43.6	Glaciolacustrine	Silty Clay	0.17				
				Mean	0.153				

FIGURES



SITE COORD NATES:41°43'11"N 72°43'59"W





U.S.G.S. QUADRANGLE: HARTFORD SOUTH, CT

HALEY & ALDRICH

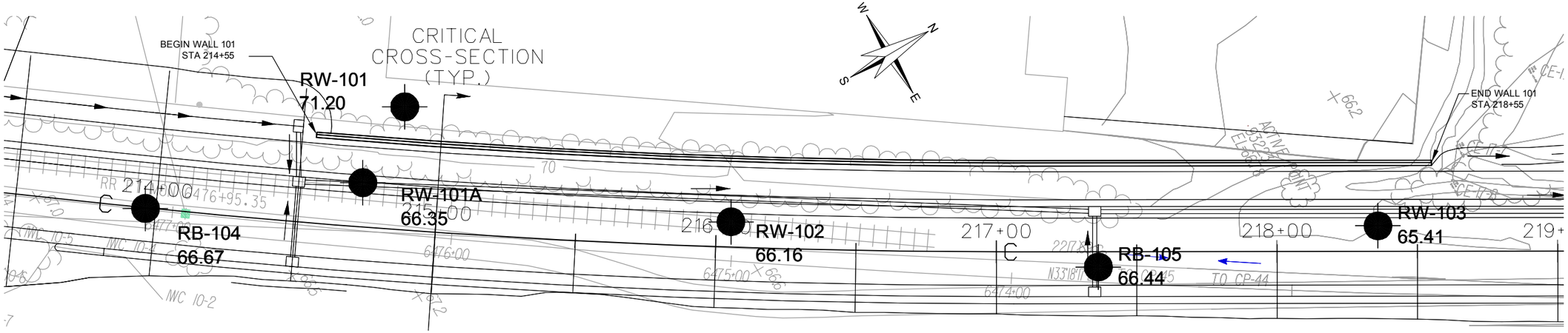
NEW BRITAIN - HARTFORD BUSWAY
NEW NGTON - WEST HARTFORD, CONNECTICUT

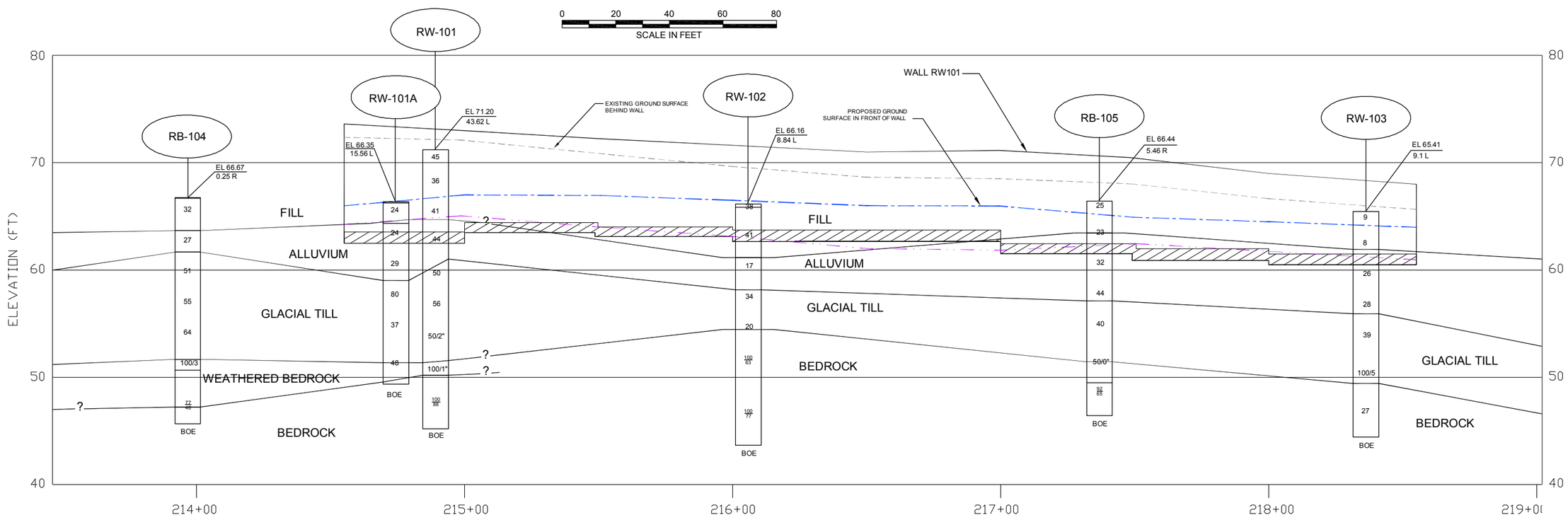
PROJECT LOCUS

SCALE: 1:24,000
SEPTEMBER 2010

FIGURE 1

32669-000 1.PDF





ELEVATION LOOKING WEST AT FACE OF WALL

HORIZ. 0 20 40 60 80
VERT. 0 5 10 15 20
SCALE IN FEET

NBA-102 (OW) — BORING DESIGNATION; "OW" INDICATES OBSERVATION WELL INSTALLED IN COMPLETED TEST BORING.

EL 53.82 / 22.32 R — APPROXIMATE GROUND SURFACE ELEVATION; BORING OFFSET FROM CENTERLINE .

4 — APPROXIMATE LOCATION OF SOIL SAMPLE AND STANDARD PENETRATION RESISTANCE, "N"

WOH — WEIGHT OF HAMMER

PUSH — APPROXIMATE LOCATION OF SHELBY TUBE SAMPLE

INTERPRETED GEOLOGIC STRATUM INTERFACE

INFERRED GEOLOGIC STRATUM INTERFACE

100/40 — % RECOVERY / % RQD

BOE — BOTTOM OF EXPLORATION

LEGEND

RB-101 69.35 — LOCATION, DESIGNATION AND ELEVATION OF RECENT TEST BORINGS DRILLED BY GENERAL BORINGS, INC., OF PROSPECT, CONNECTICUT DURING THE PERIODS BETWEEN 18 AND 22 OCTOBER 2007 AND 9 AND 29 APRIL 2008.

EXISTING GROUND SURFACE BEHIND WALL

PROPOSED GROUND SURFACE IN FRONT OF WALL

PROPOSED BOTTOM OF WALL FOOTING SHOWN IN 60% CONTRACT DRAWINGS

APPROXIMATE LOCATION OF LEVELING PAD / COMPACTED GRANULAR FILL

NOTES:

1. COORDINATE SYSTEM IS IN FEET AND REFERS TO THE CONNECTICUT COORDINATE SYSTEM BASED ON NAD 83.
2. ELEVATIONS ARE IN FEET AND REFER TO NGVD 1929.
3. REFER TO THE REPORT APPENDICES FOR TEST BORING LOGS.
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5. THE ROCK QUALITY DESIGNATION (RQD) IS DEFINED AS THE SUM OF ALL PIECES OF ROCK CORE, 4 INCHES IN LENGTH OR LONGER, DIVIDED BY THE TOTAL LENGTH IN INCHES OF THE CORE DRILLED IN THE GIVEN RUN, EXPRESSED AS A PERCENTAGE. IF THE CORE IS BROKEN BY HANDLING OR DRILLING PROCEDURES, THE PIECES OF THE CORE ARE FITTED TOGETHER AND COUNTED AS ONE PIECE, PROVIDED THEY CONSTITUTE THE REQUIRED 4-INCH LENGTH.
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7. SUBSURFACE PROFILES DEPICT THE GENERAL GEOLOGIC CONDITIONS AT THE SITE AND ARE BASED ON INTERPRETATION OF DATA ENCOUNTERED IN THE EXPLORATIONS. LINES REPRESENTING INTERFACES BETWEEN STRATA ON THE PROFILE ARE BASED ON ADJACENT BORINGS. THE BORING STICKS SHOW THE INTERPRETED SEQUENCE OF STRATA ENCOUNTERED AT THAT LOCATION. ACTUAL SOIL CONDITIONS AND INTERFACES BETWEEN EXPLORATIONS MAY VARY FROM THOSE INDICATED ON THE PROFILE.

HALEY & ALDRICH

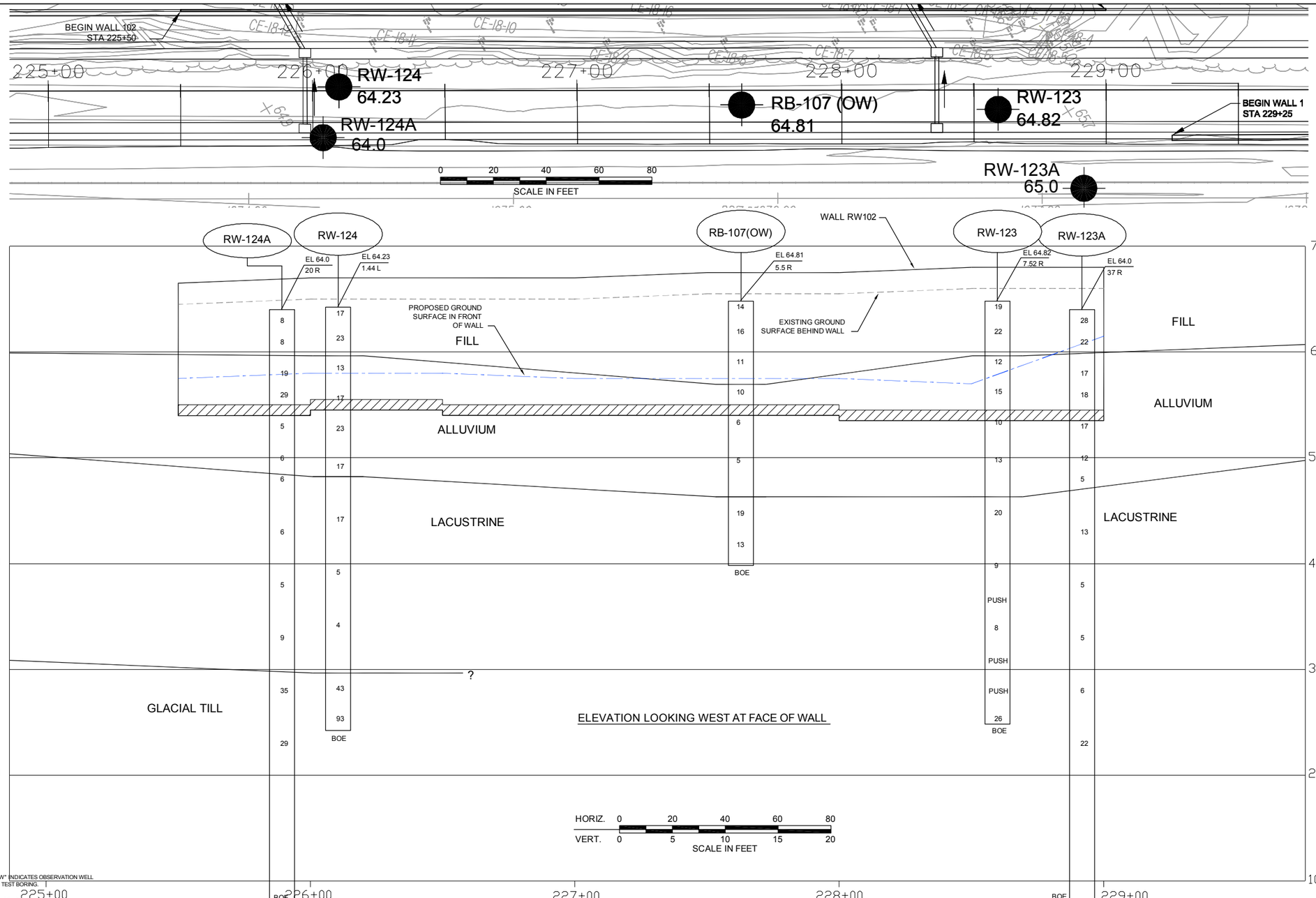
NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

RETAINING WALL 101
SUBSURFACE EXPLORATION PLAN
AND PROFILE

SCALE: AS SHOWN
AUGUST 2010

FIGURE 2

G:\32669-CT BUSWAY\004\CAD\DRAWINGS\32669-000-0D14-RET_WALLS.DWG



NBA-102 (OW) — BORING DESIGNATION; "OW" INDICATES OBSERVATION WELL INSTALLED IN COMPLETED TEST BORING.

EL 53.82 / 22.32 R — APPROXIMATE GROUND SURFACE ELEVATION, BORING OFFSET FROM CENTERLINE .

4 — APPROXIMATE LOCATION OF SOIL SAMPLE AND STANDARD PENETRATION RESISTANCE, "N"

WOH — WEIGHT OF HAMMER

PUSH — APPROXIMATE LOCATION OF SHELBY TUBE SAMPLE

INTERPRETED GEOLOGIC STRATUM INTERFACE

INFERRED GEOLOGIC STRATUM INTERFACE

100/40 — % RECOVERY / % RQD

BOE — BOTTOM OF EXPLORATION

LEGEND

RB-101 / 69.35 — LOCATION, DESIGNATION AND ELEVATION OF RECENT TEST BORINGS DRILLED BY GENERAL BORINGS, INC., OF PROSPECT, CONNECTICUT DURING THE PERIODS BETWEEN 18 AND 22 OCTOBER 2007 AND 9 AND 29 APRIL 2008.

EXISTING GROUND SURFACE BEHIND WALL

PROPOSED GROUND SURFACE IN FRONT OF WALL

PROPOSED BOTTOM OF WALL FOOTING SHOWN IN 60% CONTRACT DRAWINGS

APPROXIMATE LOCATION OF LEVELING PAD / COMPACTED GRANULAR FILL

NOTES:

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HALEY & ALDRICH

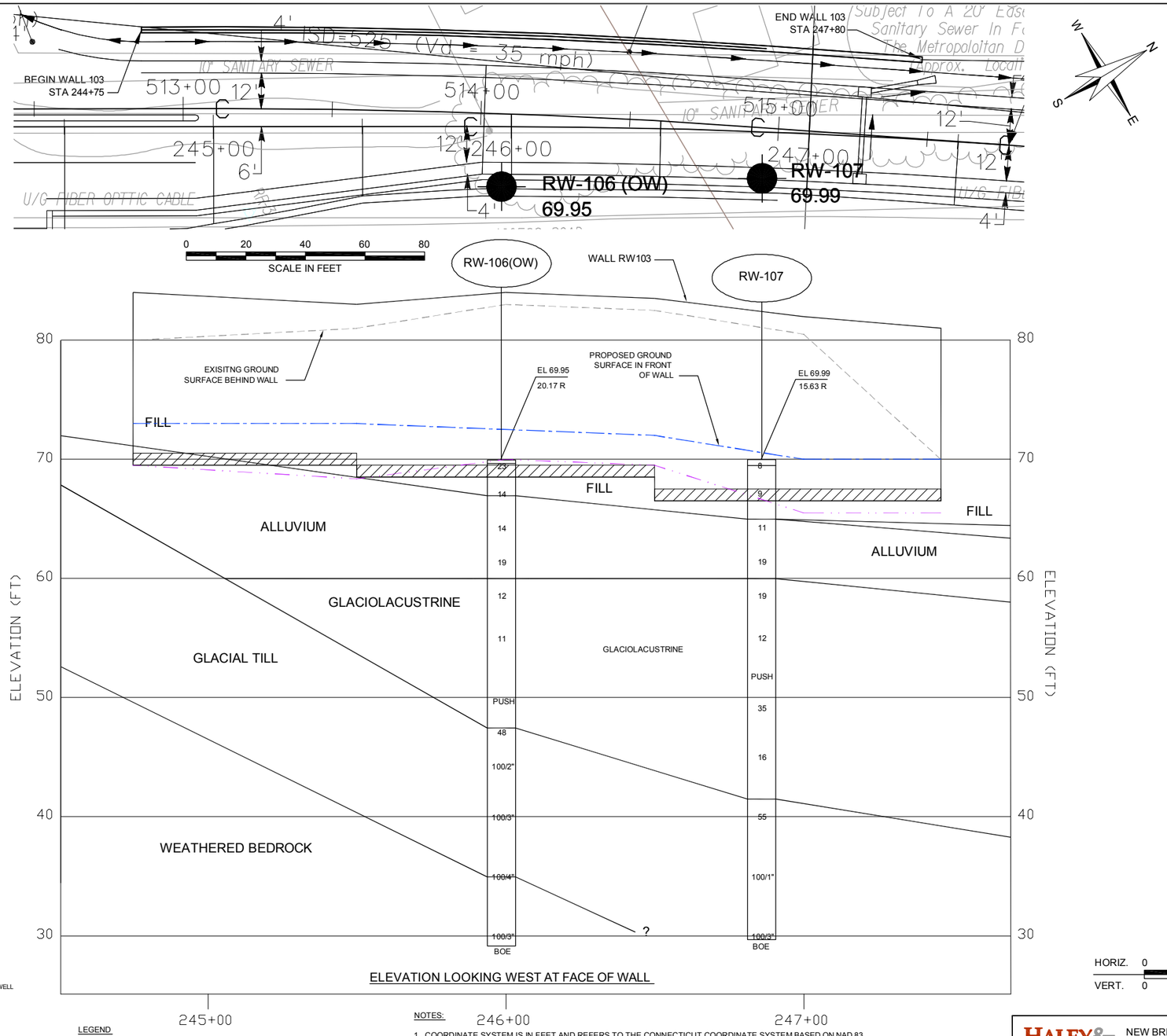
NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

RETAINING WALL 102
SUBSURFACE EXPLORATION PLAN
AND PROFILE

SCALE: AS SHOWN
AUGUST 2010

FIGURE 3

G:\32669-CT BUSWAY\004\CAD\DRAWINGS\32669-000-0D14-RET_WALLS.DWG



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EL 53.82 / 22.32 R — APPROXIMATE GROUND SURFACE ELEVATION; BORING OFFSET FROM CENTERLINE .

4 — APPROXIMATE LOCATION OF SOIL SAMPLE AND STANDARD PENETRATION RESISTANCE, "N"

WOH — WEIGHT OF HAMMER

PUSH — APPROXIMATE LOCATION OF SHELBY TUBE SAMPLE

INTERPRETED GEOLOGIC STRATUM INTERFACE

INFERRED GEOLOGIC STRATUM INTERFACE

100 / 40 — % RECOVERY / % RQD

BOE — BOTTOM OF EXPLORATION

LEGEND

RB-101 / 69.35 — LOCATION, DESIGNATION AND ELEVATION OF RECENT TEST BORINGS DRILLED BY GENERAL BORINGS, INC., OF PROSPECT, CONNECTICUT DURING THE PERIODS BETWEEN 18 AND 22 OCTOBER 2007 AND 9 AND 29 APRIL 2008.

EXISTING GROUND SURFACE BEHIND WALL

PROPOSED GROUND SURFACE IN FRONT OF WALL

PROPOSED BOTTOM OF WALL FOOTING SHOWN IN 60% CONTRACT DRAWINGS

APPROXIMATE LOCATION OF LEVELING PAD / COMPACTED GRANULAR FILL

NOTES:

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HALEY & ALDRICH

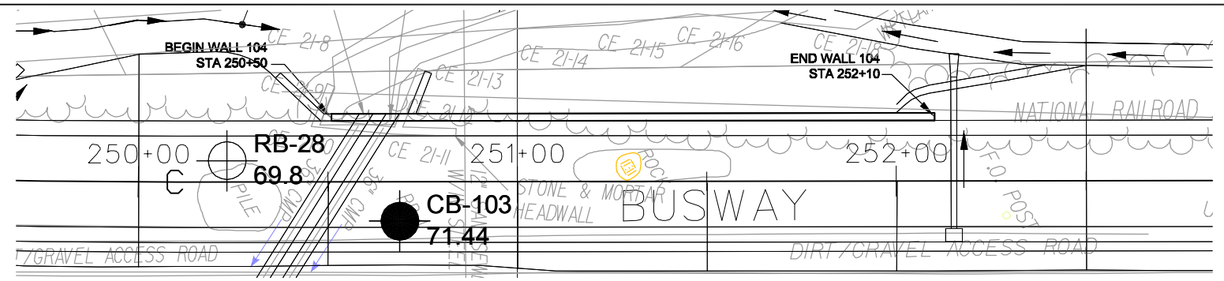
NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

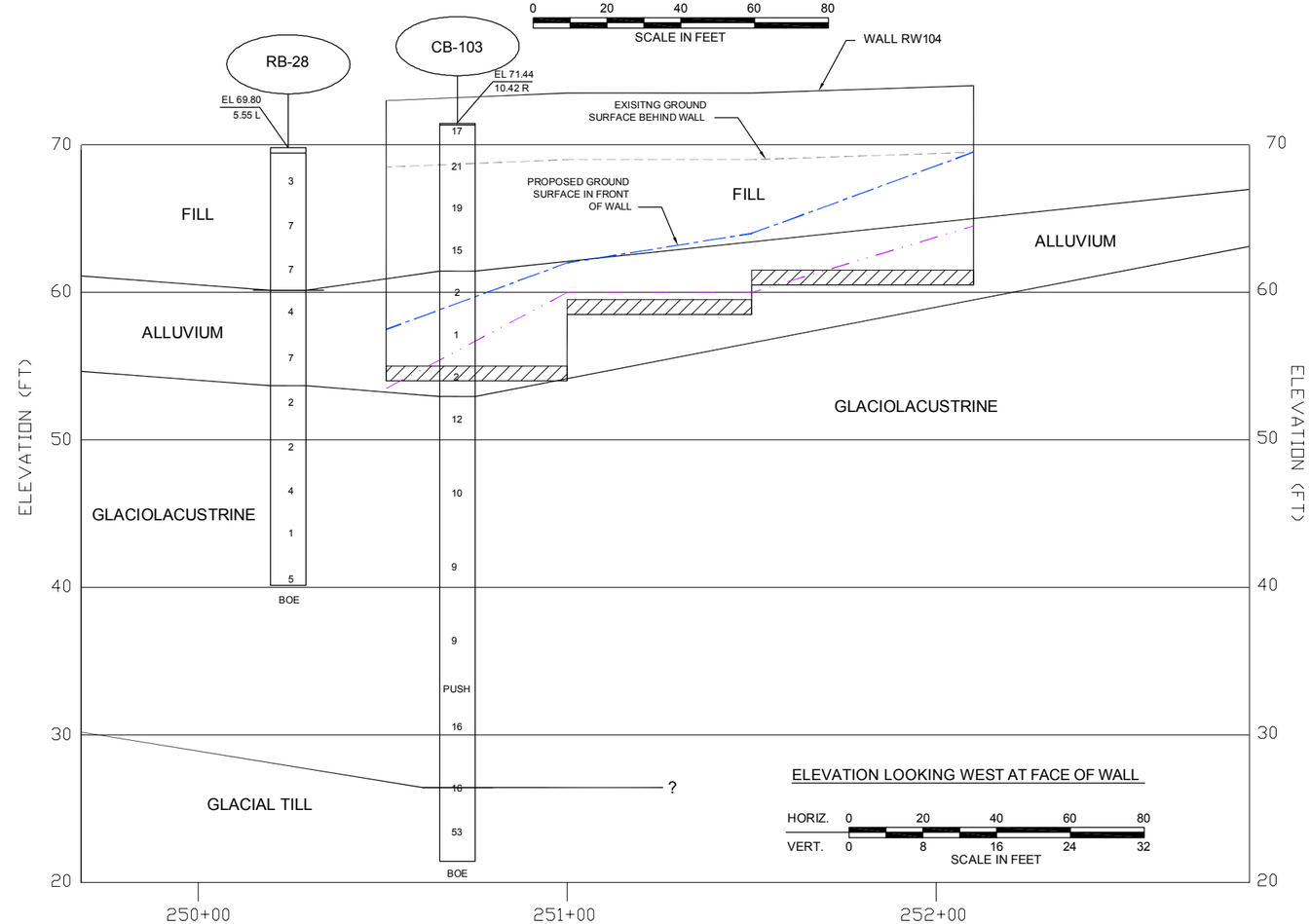
RETAINING WALL 103
SUBSURFACE EXPLORATION PLAN AND PROFILE

SCALE: AS SHOWN
AUGUST 2010

FIGURE 4

G:\32669-CT BUSWAY\004\CAD\DRAWINGS\32669-000-0D14-RET_WALLS.DWG





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WOH — WEIGHT OF HAMMER

PUSH — APPROXIMATE LOCATION OF SHELBY TUBE SAMPLE

INTERPRETED GEOLOGIC STRATUM INTERFACE

INFERRED GEOLOGIC STRATUM INTERFACE

100 / 40 — % RECOVERY / % RQD

BOE — BOTTOM OF EXPLORATION

LEGEND

RB-101 / 69.35 — LOCATION, DESIGNATION AND ELEVATION OF RECENT TEST BORINGS DRILLED BY GENERAL BORINGS, INC., OF PROSPECT, CONNECTICUT DURING THE PERIODS BETWEEN 18 AND 22 OCTOBER 2007 AND 9 AND 29 APRIL 2008.

SB-46 / 68.2 — LOCATION, DESIGNATION AND ELEVATION OF PREVIOUS PILOT BORINGS BY OTHERS.

EXISTING GROUND SURFACE BEHIND WALL

PROPOSED GROUND SURFACE IN FRONT OF WALL

PROPOSED BOTTOM OF WALL FOOTING SHOWN IN 60% CONTRACT DRAWINGS

APPROXIMATE LOCATION OF LEVELING PAD / COMPACTED GRANULAR FILL

NOTES:

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HALEY & ALDRICH

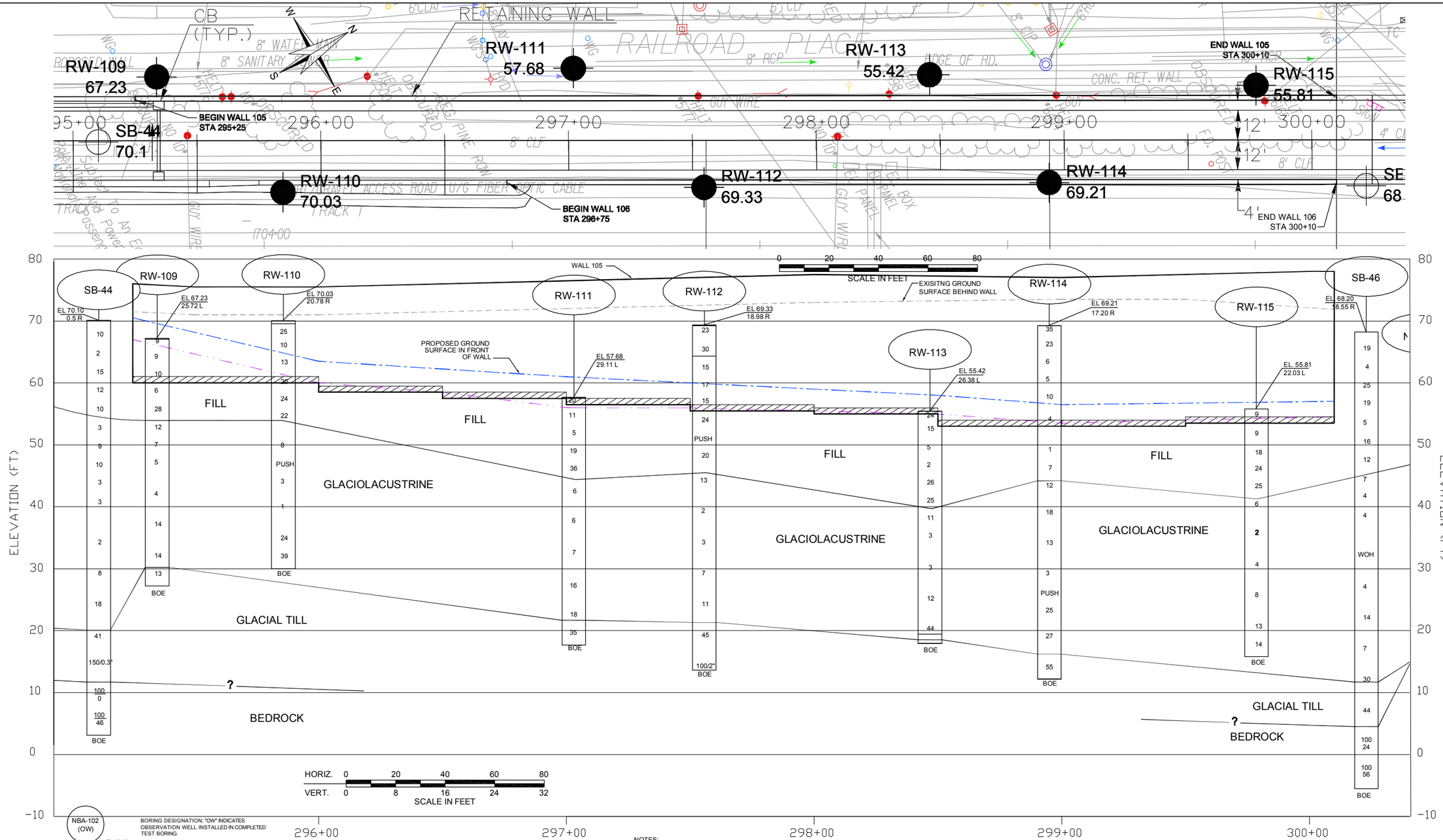
NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

RETAINING WALL 104
SUBSURFACE EXPLORATION PLAN
AND PROFILE

SCALE: AS SHOWN
AUGUST 2010

FIGURE 5

G:\32669-CT BUSWAY\004\CAD\DRAWINGS\32669-000-0D14-RET_WALLS.DWG



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WOH — WEIGHT OF HAMMER

PUSH — APPROXIMATE LOCATION OF SHELBY TUBE SAMPLE

INTERPRETED GEOLOGIC STRATUM INTERFACE

INFERRED GEOLOGIC STRATUM INTERFACE

100 / 46 — % RECOVERY / % RQD

BOE — BOTTOM OF EXPLORATION

LEGEND

RB-101 69.35 — LOCATION, DESIGNATION AND ELEVATION OF RECENT TEST BORINGS DRILLED BY GENERAL BORINGS, INC., OF PROSPECT, CONNECTICUT DURING THE PERIODS BETWEEN 18 AND 22 OCTOBER 2007 AND 9 AND 29 APRIL 2008.

SB-44 70.1 — LOCATION, DESIGNATION AND ELEVATION OF PREVIOUS PILOT BORINGS BY OTHERS.

EXISTING GROUND SURFACE BEHIND WALL

PROPOSED GROUND SURFACE IN FRONT OF WALL

PROPOSED BOTTOM OF WALL FOOTING SHOWN IN 60% CONTRACT DRAWINGS

APPROXIMATE LOCATION OF LEVELING PAD / COMPACTED GRANULAR FILL

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HALEY & ALDRICH

NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

RETAINING WALL 105
SUBSURFACE EXPLORATION PLAN AND PROFILE

SCALE: AS SHOWN
AUGUST 2010

FIGURE 6

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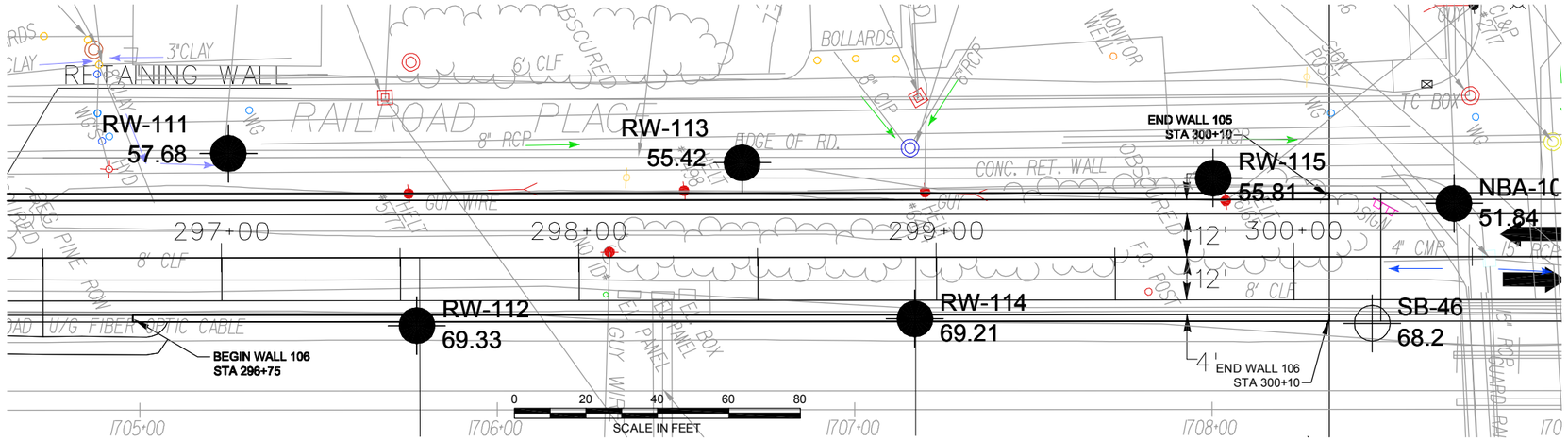

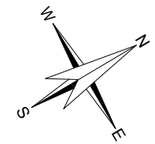

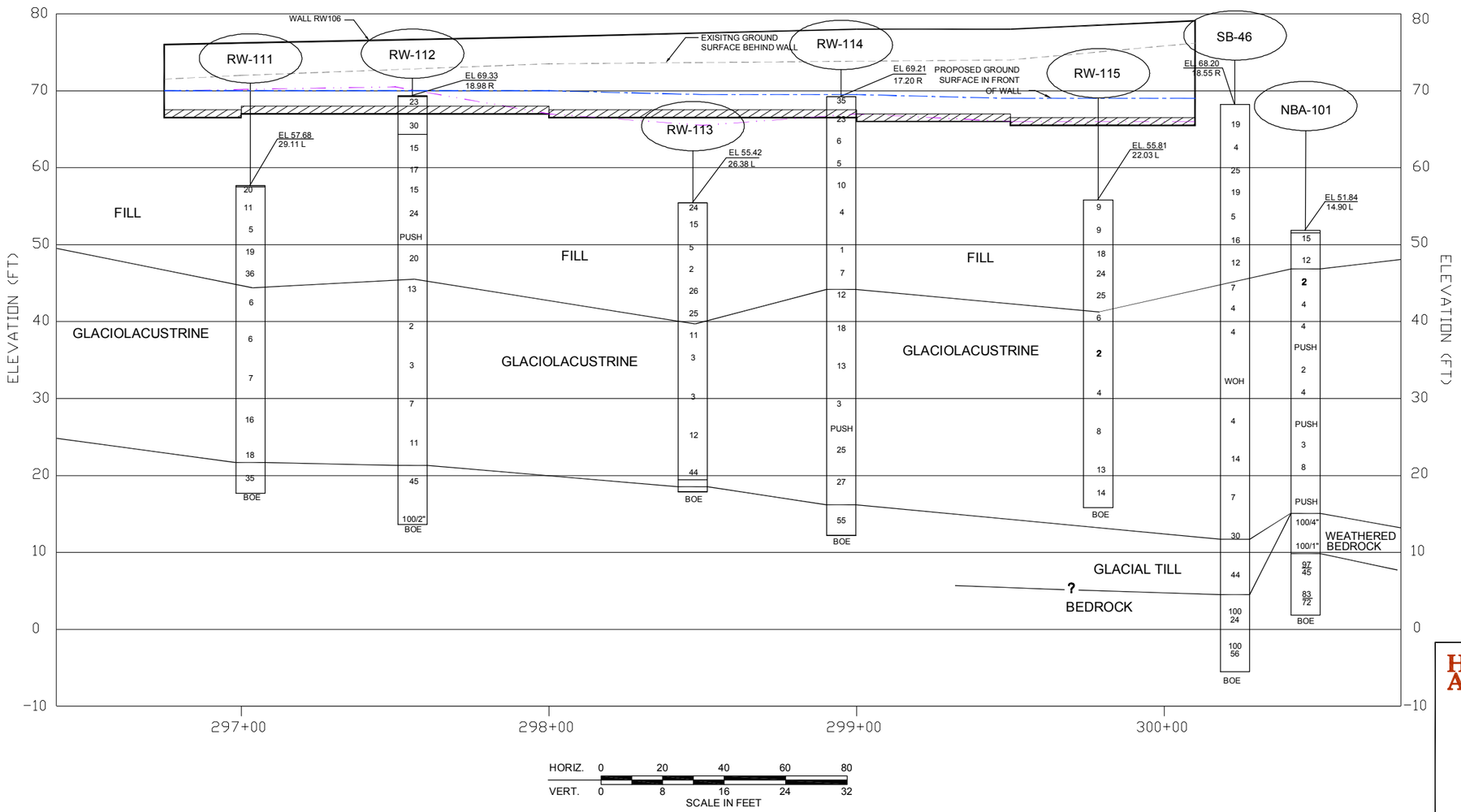

LEGEND

NBA-102 (OW)	BORING DESIGNATION; "OW" INDICATES OBSERVATION WELL INSTALLED IN COMPLETED TEST BORING.
EL 53.82 / 22.32 R	APPROXIMATE GROUND SURFACE ELEVATION; BORING OFFSET FROM CENTERLINE .
4	APPROXIMATE LOCATION OF SOIL SAMPLE AND STANDARD PENETRATION RESISTANCE, "N"
WOH	WEIGHT OF HAMMER
PUSH	APPROXIMATE LOCATION OF SHELBY TUBE SAMPLE
	INTERPRETED GEOLOGIC STRATUM INTERFACE
	INFERRED GEOLOGIC STRATUM INTERFACE
100 / 40	% RECOVERY / % RQD
BOE	BOTTOM OF EXPLORATION
RB-101 69.35	LOCATION, DESIGNATION AND ELEVATION OF RECENT TEST BORINGS DRILLED BY GENERAL BORINGS, INC., OF PROSPECT, CONNECTICUT DURING THE PERIODS BETWEEN 18 AND 22 OCTOBER 2007 AND 9 AND 29 APRIL 2008.
SB-46 68.2	LOCATION, DESIGNATION AND ELEVATION OF PREVIOUS PILOT BORINGS BY OTHERS.
	EXISTING GROUND SURFACE BEHIND WALL
	PROPOSED GROUND SURFACE IN FRONT OF WALL
	PROPOSED BOTTOM OF WALL FOOTING SHOWN IN 60% CONTRACT DRAWINGS
	APPROXIMATE LOCATION OF LEVELING PAD / COMPACTED GRANULAR FILL

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7. SUBSURFACE PROFILES DEPICT THE GENERAL GEOLOGIC CONDITIONS AT THE SITE AND ARE BASED ON INTERPRETATION OF DATA ENCOUNTERED IN THE EXPLORATIONS. LINES REPRESENTING INTERFACES BETWEEN STRATA ON THE PROFILE ARE BASED ON ADJACENT BORINGS. THE BORING STICKS SHOW THE INTERPRETED SEQUENCE OF STRATA ENCOUNTERED AT THAT LOCATION. ACTUAL SOIL CONDITIONS AND INTERFACES BETWEEN EXPLORATIONS MAY VARY FROM THOSE INDICATED ON THE PROFILE.

HALEY & ALDRICH

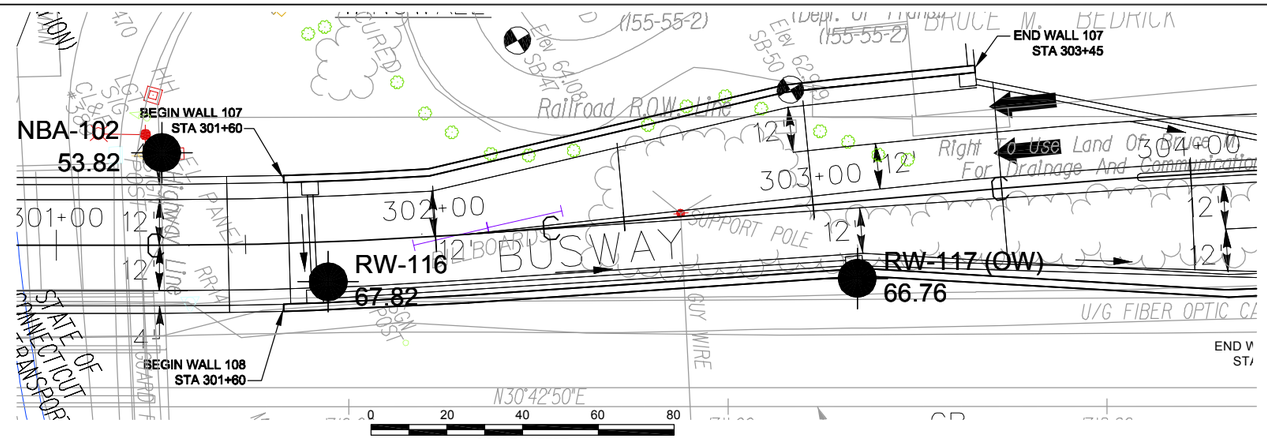
NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

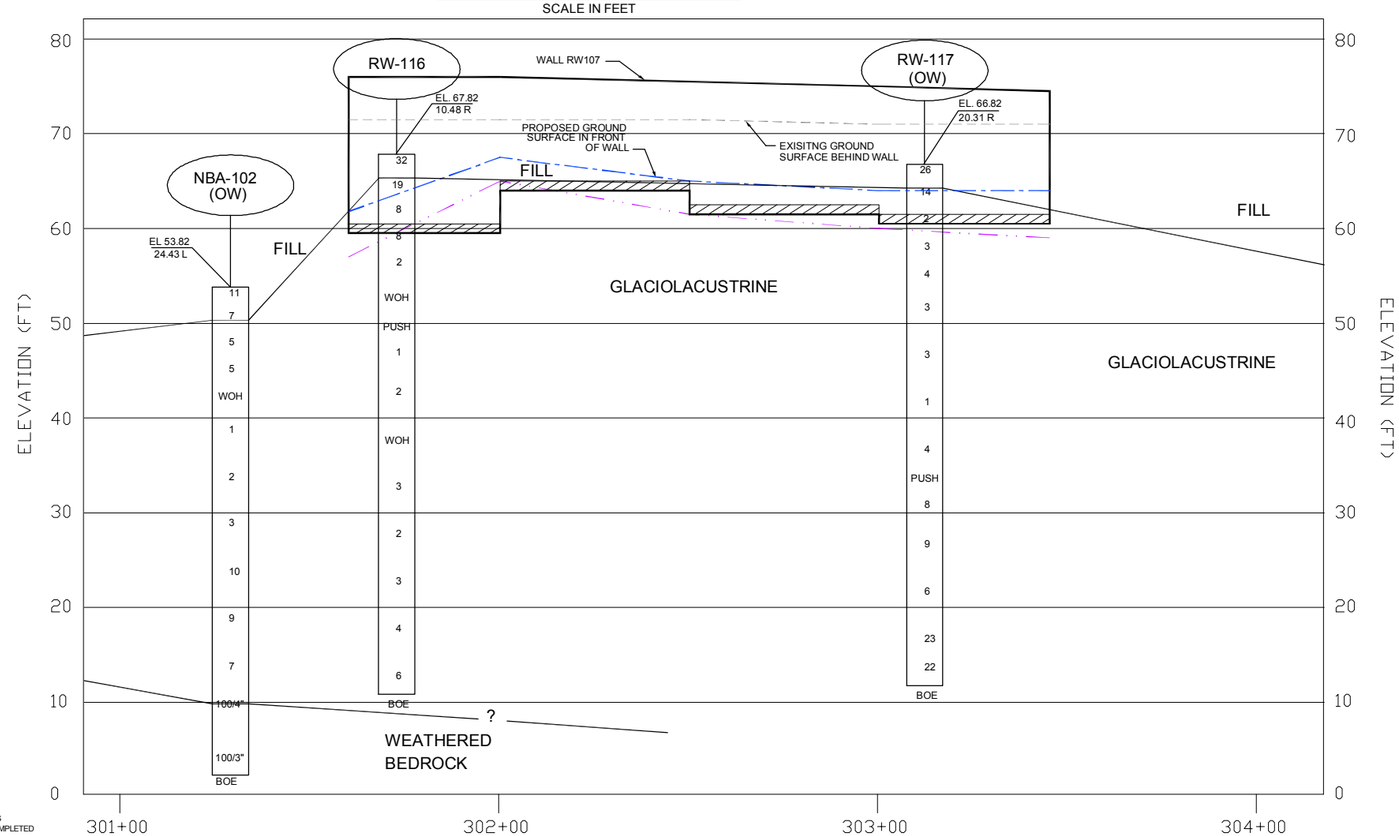
RETAINING WALL 106
SUBSURFACE EXPLORATION PLAN
AND PROFILE

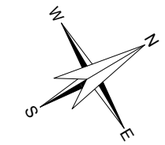
SCALE: AS SHOWN
AUGUST 2010

FIGURE 7

G:\32669-CT BUSWAY\004\CAD\DRAWINGS\32669-000-0D14-RET_WALLS.DWG







HORIZ. 0 20 40 60 80
VERT. 0 8 16 24 32
SCALE IN FEET

NBA-102 (OW) — BORING DESIGNATION; "OW" INDICATES OBSERVATION WELL INSTALLED IN COMPLETED TEST BORING.

EL 53.82 / 22.32 R — APPROXIMATE GROUND SURFACE ELEVATION; BORING OFFSET FROM CENTERLINE .

4 — APPROXIMATE LOCATION OF SOIL SAMPLE AND STANDARD PENETRATION RESISTANCE, "N"

WOH — WEIGHT OF HAMMER

PUSH — APPROXIMATE LOCATION OF SHELBY TUBE SAMPLE

INTERPRETED GEOLOGIC STRATUM INTERFACE

INFERRED GEOLOGIC STRATUM INTERFACE

100 / 40 — % RECOVERY / % RQD

BOE — BOTTOM OF EXPLORATION

LEGEND

RB-101 / 69.35 — LOCATION, DESIGNATION AND ELEVATION OF RECENT TEST BORINGS DRILLED BY GENERAL BORINGS, INC., OF PROSPECT, CONNECTICUT DURING THE PERIODS BETWEEN 18 AND 22 OCTOBER 2007 AND 9 AND 29 APRIL 2008.

SB-47 / EL. 64.1 — LOCATION, DESIGNATION AND ELEVATION OF PREVIOUS PILOT BORINGS BY OTHERS.

EXISTING GROUND SURFACE BEHIND WALL

PROPOSED GROUND SURFACE IN FRONT OF WALL

PROPOSED BOTTOM OF WALL FOOTING SHOWN IN 60% CONTRACT DRAWINGS

APPROXIMATE LOCATION OF LEVELING PAD / COMPACTED GRANULAR FILL

NOTES:

1. COORDINATE SYSTEM IS IN FEET AND REFERS TO THE CONNECTICUT COORDINATE SYSTEM BASED ON NAD 83.
2. ELEVATIONS ARE IN FEET AND REFER TO NGVD 1929.
3. REFER TO THE REPORT APPENDICES FOR TEST BORING LOGS.
4. THE STANDARD PENETRATION RESISTANCE, "N", IS DEFINED AS THE NUMBER OF BLOWS OF A 140-LB HAMMER FALLING THROUGH A VERTICAL DISTANCE OF 30 INCHES REQUIRED TO DRIVE A 2-INCH O.D., 1-3/8-INCH I.D. SPLITS POON SAMPLER 12 INCHES.
5. THE ROCK QUALITY DESIGNATION (RQD) IS DEFINED AS THE SUM OF ALL PIECES OF ROCK CORE, 4 INCHES IN LENGTH OR LONGER, DIVIDED BY THE TOTAL LENGTH IN INCHES OF THE CORE DRILLED IN THE GIVEN RUN, EXPRESSED AS A PERCENTAGE. IF THE CORE IS BROKEN BY HANDLING OR DRILLING PROCEDURES, THE PIECES OF THE CORE ARE FITTED TOGETHER AND COUNTED AS ONE PIECE, PROVIDED THEY CONSTITUTE THE REQUIRED 4-INCH LENGTH.
6. REFER TO THE REPORT TEXT FOR MORE DETAILED SOIL STRATUM DESCRIPTIONS AND THE TEST BORING LOGS FOR DETAILED SAMPLE DESCRIPTIONS.
7. SUBSURFACE PROFILES DEPICT THE GENERAL GEOLOGIC CONDITIONS AT THE SITE AND ARE BASED ON INTERPRETATION OF DATA ENCOUNTERED IN THE EXPLORATIONS. LINES REPRESENTING INTERFACES BETWEEN STRATA ON THE PROFILE ARE BASED ON ADJACENT BORINGS. THE BORING STICKS SHOW THE INTERPRETED SEQUENCE OF STRATA ENCOUNTERED AT THAT LOCATION. ACTUAL SOIL CONDITIONS AND INTERFACES BETWEEN EXPLORATIONS MAY VARY FROM THOSE INDICATED ON THE PROFILE.

HALEY & ALDRICH

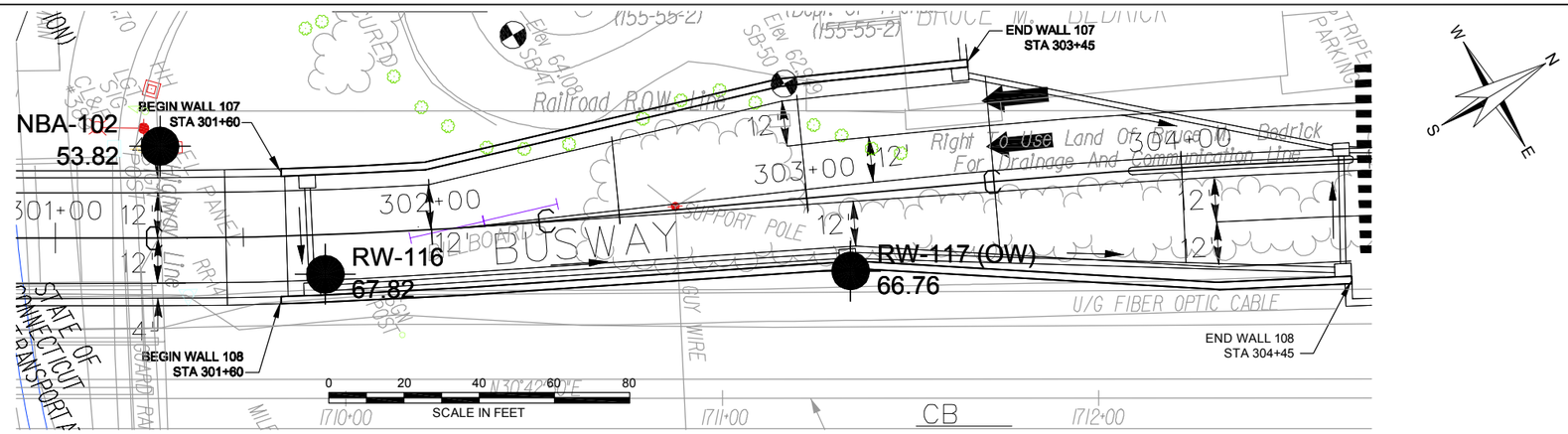
NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

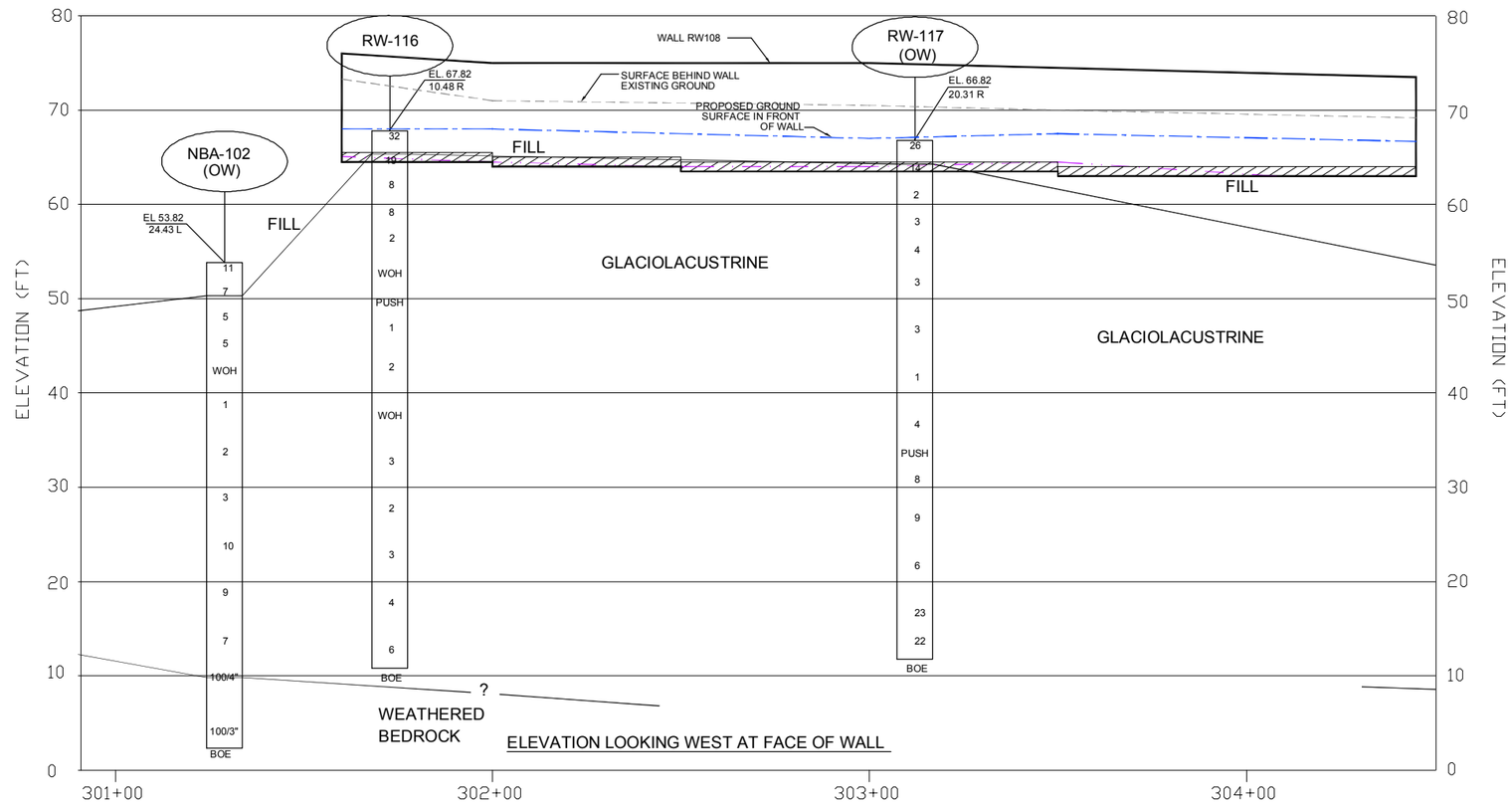
RETAINING WALL 107
SUBSURFACE EXPLORATION PLAN
AND PROFILE

SCALE: AS SHOWN
AUGUST 2010

FIGURE 8

G:\32669-CT BUSWAY\004\CAD\DRAWINGS\32669-000-0D14-RET_WALLS.DWG





BORING DESIGNATION; "OW" INDICATES OBSERVATION WELL INSTALLED IN COMPLETED TEST BORING.

APPROXIMATE GROUND SURFACE ELEVATION; BORING OFFSET FROM CENTERLINE .

APPROXIMATE LOCATION OF SOIL SAMPLE AND STANDARD PENETRATION RESISTANCE, "N"

WEIGHT OF HAMMER

APPROXIMATE LOCATION OF SHELBY TUBE SAMPLE

INTERPRETED GEOLOGIC STRATUM INTERFACE

INFERRED GEOLOGIC STRATUM INTERFACE

% RECOVERY / % RQD

BOTTOM OF EXPLORATION

LEGEND

RB-101 69.35 — LOCATION, DESIGNATION AND ELEVATION OF RECENT TEST BORINGS DRILLED BY GENERAL BORINGS, INC., OF PROSPECT, CONNECTICUT DURING THE PERIODS BETWEEN 18 AND 22 OCTOBER 2007 AND 9 AND 29 APRIL 2008.

SB-50 EL. 62.9 — LOCATION, DESIGNATION AND ELEVATION OF PREVIOUS PILOT BORINGS BY OTHERS.

EXISTING GROUND SURFACE BEHIND WALL

PROPOSED GROUND SURFACE IN FRONT OF WALL

PROPOSED BOTTOM OF WALL FOOTING SHOWN IN 60% CONTRACT DRAWINGS

APPROXIMATE LOCATION OF LEVELING PAD / COMPACTED GRANULAR FILL

NOTES:

1. COORDINATE SYSTEM IS IN FEET AND REFERS TO THE CONNECTICUT COORDINATE SYSTEM BASED ON NAD 83.
2. ELEVATIONS ARE IN FEET AND REFER TO NGVD 1929.
3. REFER TO THE REPORT APPENDICES FOR TEST BORING LOGS.
4. THE STANDARD PENETRATION RESISTANCE, "N", IS DEFINED AS THE NUMBER OF BLOWS OF A 140-LB HAMMER FALLING THROUGH A VERTICAL DISTANCE OF 30 INCHES REQUIRED TO DRIVE A 2-INCH O.D., 1-3/8-INCH I.D. SPLITS POON SAMPLER 12 INCHES.
5. THE ROCK QUALITY DESIGNATION (RQD) IS DEFINED AS THE SUM OF ALL PIECES OF ROCK CORE, 4 INCHES IN LENGTH OR LONGER, DIVIDED BY THE TOTAL LENGTH IN INCHES OF THE CORE DRILLED IN THE GIVEN RUN, EXPRESSED AS A PERCENTAGE. IF THE CORE IS BROKEN BY HANDLING OR DRILLING PROCEDURES, THE PIECES OF THE CORE ARE FITTED TOGETHER AND COUNTED AS ONE PIECE, PROVIDED THEY CONSTITUTE THE REQUIRED 4-INCH LENGTH.
6. REFER TO THE REPORT TEXT FOR MORE DETAILED SOIL STRATUM DESCRIPTIONS AND THE TEST BORING LOGS FOR DETAILED SAMPLE DESCRIPTIONS.
7. SUBSURFACE PROFILES DEPICT THE GENERAL GEOLOGIC CONDITIONS AT THE SITE AND ARE BASED ON INTERPRETATION OF DATA ENCOUNTERED IN THE EXPLORATIONS. LINES REPRESENTING INTERFACES BETWEEN STRATA ON THE PROFILE ARE BASED ON ADJACENT BORINGS. THE BORING STICKS SHOW THE INTERPRETED SEQUENCE OF STRATA ENCOUNTERED AT THAT LOCATION. ACTUAL SOIL CONDITIONS AND INTERFACES BETWEEN EXPLORATIONS MAY VARY FROM THOSE INDICATED ON THE PROFILE.

HORIZ. 0 20 40 60 80
VERT. 0 8 16 24 32
SCALE IN FEET

HALEY & ALDRICH

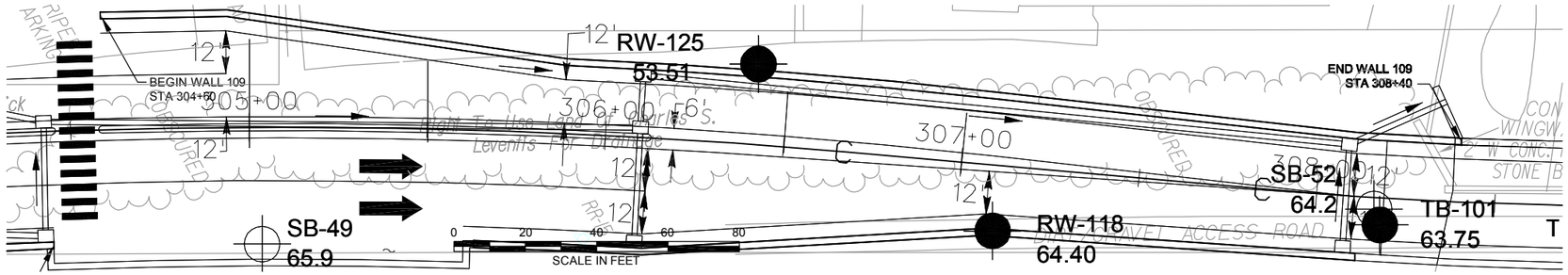
NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

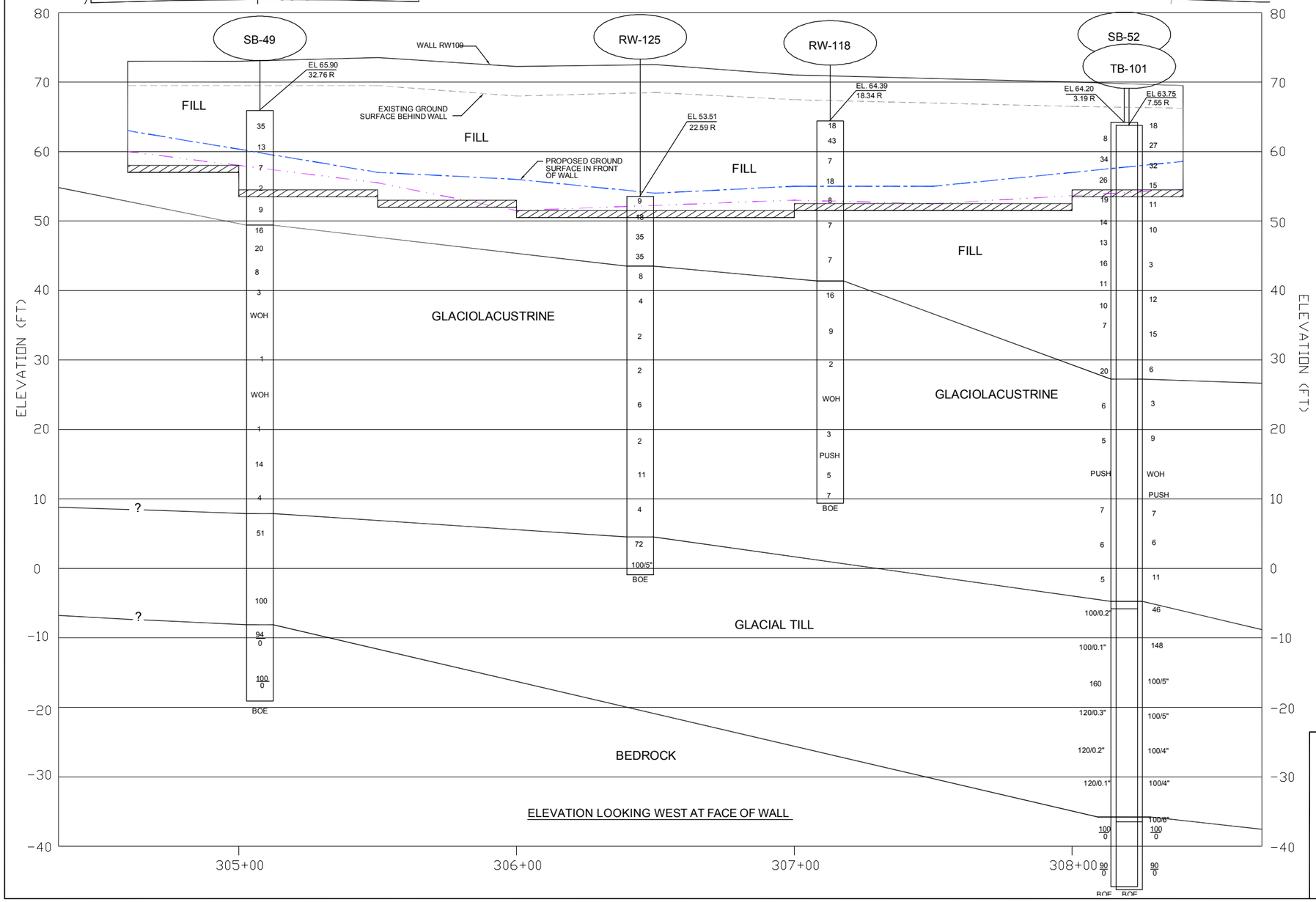
RETAINING WALL 108
SUBSURFACE EXPLORATION PLAN
AND PROFILE

SCALE: AS SHOWN
AUGUST 2010

FIGURE 9

G:\32669-CT BUSWAY\0004\CAD\DRAWINGS\32669-000-0D14-RET_WALLS.DWG





ELEVATION LOOKING WEST AT FACE OF WALL

LEGEND

NBA-102 (OW)	BORING DESIGNATION; "OW" INDICATES OBSERVATION WELL INSTALLED IN COMPLETED TEST BORING.
EL 53.82 / 22.32 R	APPROXIMATE GROUND SURFACE ELEVATION; BORING OFFSET FROM CENTERLINE .
4	APPROXIMATE LOCATION OF SOIL SAMPLE AND STANDARD PENETRATION RESISTANCE, "N"
WOH	WEIGHT OF HAMMER
PUSH	APPROXIMATE LOCATION OF SHELBY TUBE SAMPLE
	INTERPRETED GEOLOGIC STRATUM INTERFACE
	INFERRED GEOLOGIC STRATUM INTERFACE
100 / 40	% RECOVERY / % RQD
BOE	BOTTOM OF EXPLORATION
RB-101 69.35	LOCATION, DESIGNATION AND ELEVATION OF RECENT TEST BORINGS DRILLED BY GENERAL BORINGS, INC., OF PROSPECT, CONNECTICUT DURING THE PERIODS BETWEEN 18 AND 22 OCTOBER 2007 AND 9 AND 29 APRIL 2008.
SB-49 65.9	LOCATION, DESIGNATION AND ELEVATION OF PREVIOUS PILOT BORINGS BY OTHERS.
	EXISTING GROUND SURFACE BEHIND WALL
	PROPOSED GROUND SURFACE IN FRONT OF WALL
	PROPOSED BOTTOM OF WALL FOOTING SHOWN IN 60% CONTRACT DRAWINGS
	APPROXIMATE LOCATION OF LEVELING PAD / COMPACTED GRANULAR FILL

NOTES:

1. COORDINATE SYSTEM IS IN FEET AND REFERS TO THE CONNECTICUT COORDINATE SYSTEM BASED ON NAD 83.
2. ELEVATIONS ARE IN FEET AND REFER TO NGVD 1929.
3. REFER TO THE REPORT APPENDICES FOR TEST BORING LOGS.
4. THE STANDARD PENETRATION RESISTANCE, "N", IS DEFINED AS THE NUMBER OF BLOWS OF A 140-LB HAMMER FALLING THROUGH A VERTICAL DISTANCE OF 30 INCHES REQUIRED TO DRIVE A 2-INCH O.D., 1-3/8-INCH I.D. SPLITS POON SAMPLER 12 INCHES.
5. THE ROCK QUALITY DESIGNATION (RQD) IS DEFINED AS THE SUM OF ALL PIECES OF ROCK CORE, 4 INCHES IN LENGTH OR LONGER, DIVIDED BY THE TOTAL LENGTH IN INCHES OF THE CORE DRILLED IN THE GIVEN RUN, EXPRESSED AS A PERCENTAGE. IF THE CORE IS BROKEN BY HANDLING OR DRILLING PROCEDURES, THE PIECES OF THE CORE ARE FITTED TOGETHER AND COUNTED AS ONE PIECE, PROVIDED THEY CONSTITUTE THE REQUIRED 4-INCH LENGTH.
6. REFER TO THE REPORT TEXT FOR MORE DETAILED SOIL STRATUM DESCRIPTIONS AND THE TEST BORING LOGS FOR DETAILED SAMPLE DESCRIPTIONS.
7. SUBSURFACE PROFILES DEPICT THE GENERAL GEOLOGIC CONDITIONS AT THE SITE AND ARE BASED ON INTERPRETATION OF DATA ENCOUNTERED IN THE EXPLORATIONS. LINES REPRESENTING INTERFACES BETWEEN STRATA ON THE PROFILE ARE BASED ON ADJACENT BORINGS. THE BORING STICKS SHOW THE INTERPRETED SEQUENCE OF STRATA ENCOUNTERED AT THAT LOCATION. ACTUAL SOIL CONDITIONS AND INTERFACES BETWEEN EXPLORATIONS MAY VARY FROM THOSE INDICATED ON THE PROFILE.

HORIZ. 0 20 40 60 80
VERT. 0 8 16 24 32
SCALE IN FEET

HALEY & ALDRICH

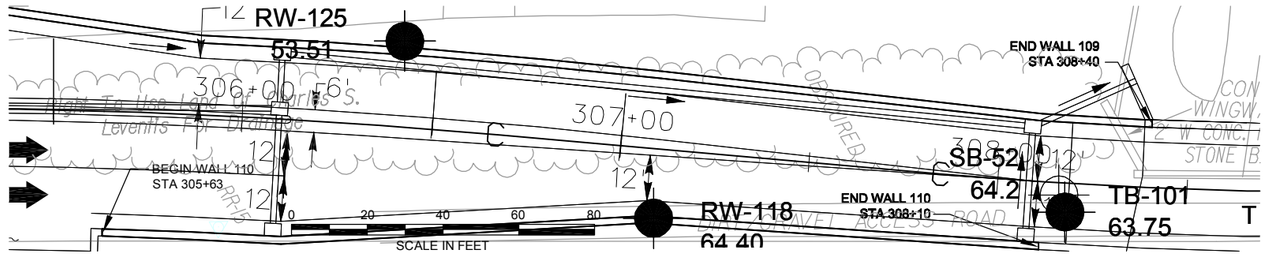
NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

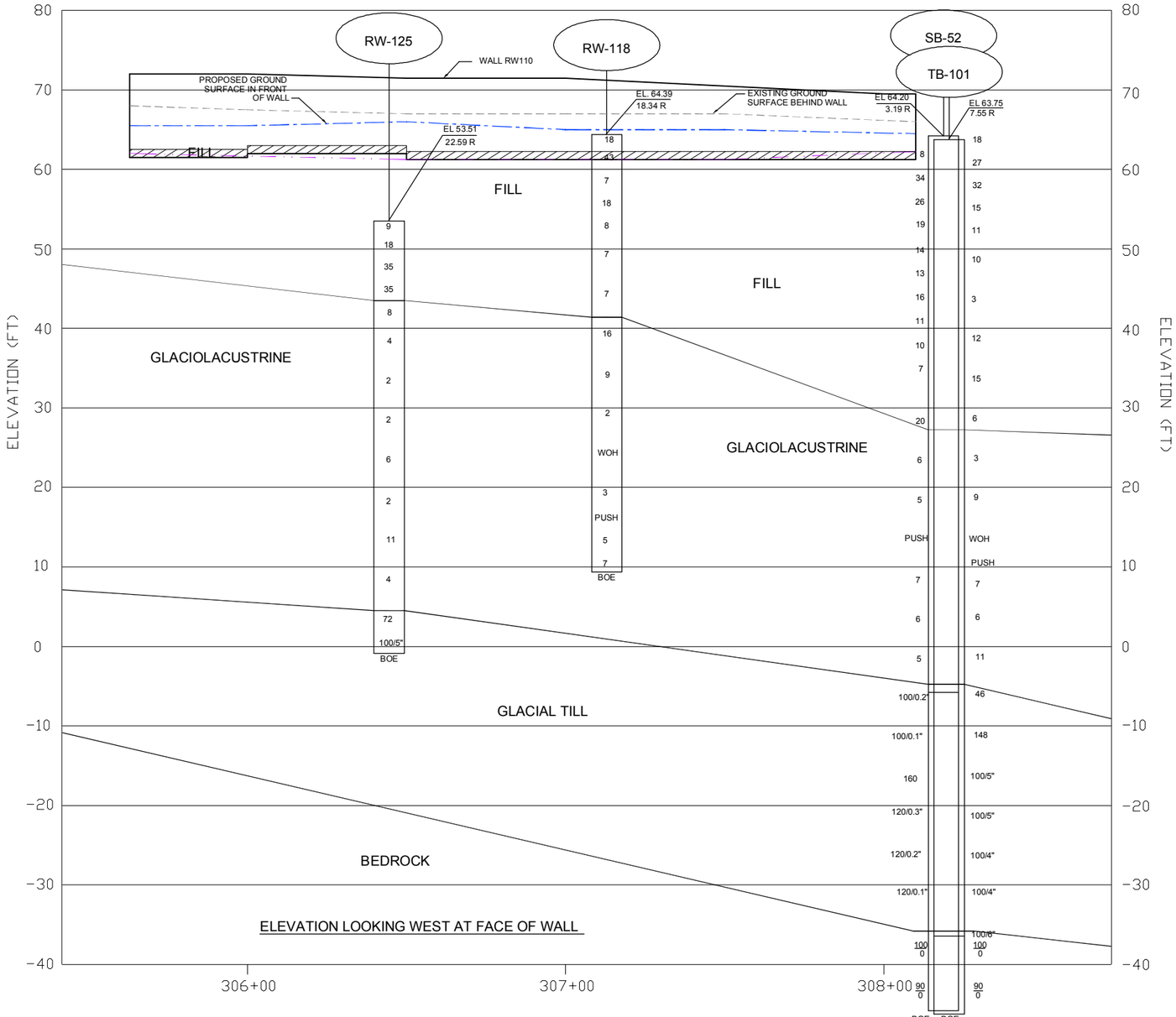
RETAINING WALL 109 SUBSURFACE EXPLORATION PLAN AND PROFILE

SCALE: AS SHOWN
AUGUST 2010

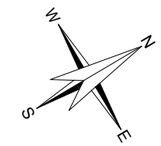
FIGURE 10

G:\32669-CT BUSWAY\004\CAD\DRAWINGS\32669-000-0D14-RET_WALLS.DWG





ELEVATION LOOKING WEST AT FACE OF WALL



LEGEND

NBA-102 (OW)	BORING DESIGNATION; "OW" INDICATES OBSERVATION WELL INSTALLED IN COMPLETED TEST BORING.
EL 53.82 / 22.32 R	APPROXIMATE GROUND SURFACE ELEVATION; BORING OFFSET FROM CENTERLINE .
4	APPROXIMATE LOCATION OF SOIL SAMPLE AND STANDARD PENETRATION RESISTANCE, "N"
WOH	WEIGHT OF HAMMER
PUSH	APPROXIMATE LOCATION OF SHELBY TUBE SAMPLE
	INTERPRETED GEOLOGIC STRATUM INTERFACE
	INFERRED GEOLOGIC STRATUM INTERFACE
100 / 40	% RECOVERY / % RQD
BOE	BOTTOM OF EXPLORATION
RB-101 69.35	LOCATION, DESIGNATION AND ELEVATION OF RECENT TEST BORINGS DRILLED BY GENERAL BORINGS, INC., OF PROSPECT, CONNECTICUT DURING THE PERIODS BETWEEN 18 AND 22 OCTOBER 2007 AND 9 AND 29 APRIL 2008.
SB-49 65.9	LOCATION, DESIGNATION AND ELEVATION OF PREVIOUS PILOT BORINGS BY OTHERS.
	EXISTING GROUND SURFACE BEHIND WALL
	PROPOSED GROUND SURFACE IN FRONT OF WALL
	PROPOSED BOTTOM OF WALL FOOTING SHOWN IN 60% CONTRACT DRAWINGS
	APPROXIMATE LOCATION OF LEVELING PAD / COMPACTED GRANULAR FILL

NOTES:

1. COORDINATE SYSTEM IS IN FEET AND REFERS TO THE CONNECTICUT COORDINATE SYSTEM BASED ON NAD 83.
2. ELEVATIONS ARE IN FEET AND REFER TO NGVD 1929.
3. REFER TO THE REPORT APPENDICES FOR TEST BORING LOGS.
4. THE STANDARD PENETRATION RESISTANCE, "N", IS DEFINED AS THE NUMBER OF BLOWS OF A 140-LB HAMMER FALLING THROUGH A VERTICAL DISTANCE OF 30 INCHES REQUIRED TO DRIVE A 2-INCH O.D., 1-3/8-INCH I.D. SPLITS POON SAMPLER 12 INCHES.
5. THE ROCK QUALITY DESIGNATION (RQD) IS DEFINED AS THE SUM OF ALL PIECES OF ROCK CORE, 4 INCHES IN LENGTH OR LONGER, DIVIDED BY THE TOTAL LENGTH IN INCHES OF THE CORE DRILLED IN THE GIVEN RUN, EXPRESSED AS A PERCENTAGE. IF THE CORE IS BROKEN BY HANDLING OR DRILLING PROCEDURES, THE PIECES OF THE CORE ARE FITTED TOGETHER AND COUNTED AS ONE PIECE, PROVIDED THEY CONSTITUTE THE REQUIRED 4-INCH LENGTH.
6. REFER TO THE REPORT TEXT FOR MORE DETAILED SOIL STRATUM DESCRIPTIONS AND THE TEST BORING LOGS FOR DETAILED SAMPLE DESCRIPTIONS.
7. SUBSURFACE PROFILES DEPICT THE GENERAL GEOLOGIC CONDITIONS AT THE SITE AND ARE BASED ON INTERPRETATION OF DATA ENCOUNTERED IN THE EXPLORATIONS. LINES REPRESENTING INTERFACES BETWEEN STRATA ON THE PROFILE ARE BASED ON ADJACENT BORINGS. THE BORING STICKS SHOW THE INTERPRETED SEQUENCE OF STRATA ENCOUNTERED AT THAT LOCATION. ACTUAL SOIL CONDITIONS AND INTERFACES BETWEEN EXPLORATIONS MAY VARY FROM THOSE INDICATED ON THE PROFILE.

HORIZ. 0 20 40 60 80
VERT. 0 8 16 24 32
SCALE IN FEET

HALEY & ALDRICH

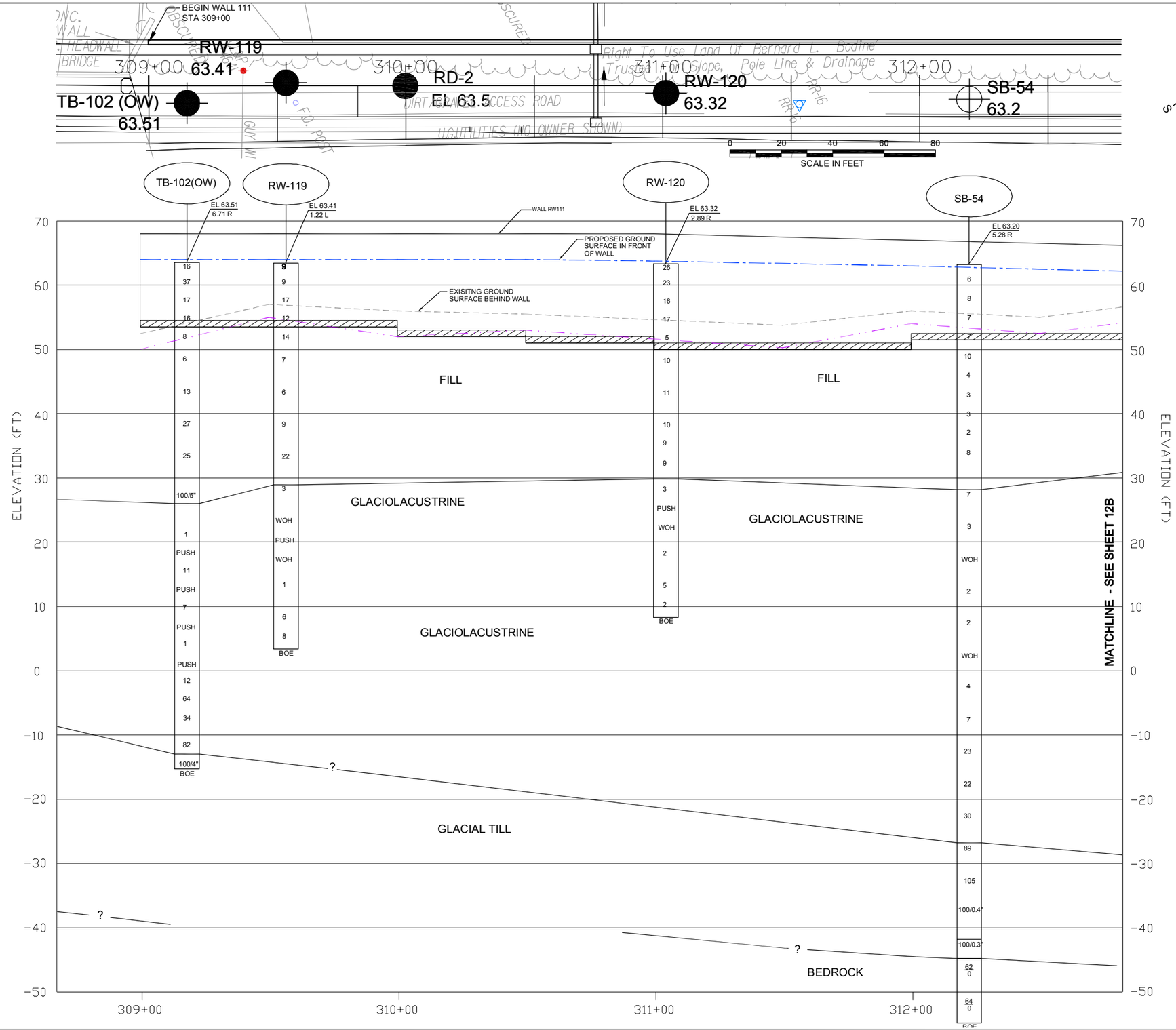
NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

RETAINING WALL 110
SUBSURFACE EXPLORATION PLAN AND PROFILE

SCALE: AS SHOWN
AUGUST 2010

FIGURE 11

G:\32669-CT BUSWAY\004\CAD\DRAWINGS\32669-000-0D14-RET_WALLS.DWG



LEGEND

NBA-102 (OW)	BORING DESIGNATION; "OW" INDICATES OBSERVATION WELL INSTALLED IN COMPLETED TEST BORING.
EL 53.82 / 22.32 R	APPROXIMATE GROUND SURFACE ELEVATION; BORING OFFSET FROM CENTERLINE .
4	APPROXIMATE LOCATION OF SOIL SAMPLE AND STANDARD PENETRATION RESISTANCE, "N"
WOH	WEIGHT OF HAMMER
PUSH	APPROXIMATE LOCATION OF SHELBY TUBE SAMPLE
	INTERPRETED GEOLOGIC STRATUM INTERFACE
	INFERRED GEOLOGIC STRATUM INTERFACE
100 / 40	% RECOVERY / % RQD
BOE	BOTTOM OF EXPLORATION
RB-101 69.35	LOCATION, DESIGNATION AND ELEVATION OF RECENT TEST BORINGS DRILLED BY GENERAL BORINGS, INC., OF PROSPECT, CONNECTICUT DURING THE PERIODS BETWEEN 18 AND 22 OCTOBER 2007 AND 9 AND 29 APRIL 2008.
SB-54 63.2	LOCATION, DESIGNATION AND ELEVATION OF PREVIOUS PILOT BORINGS BY OTHERS.
	EXISTING GROUND SURFACE BEHIND WALL
	PROPOSED GROUND SURFACE IN FRONT OF WALL
	PROPOSED BOTTOM OF WALL FOOTING SHOWN IN 60% CONTRACT DRAWINGS
	APPROXIMATE LOCATION OF LEVELING PAD / COMPACTED GRANULAR FILL

NOTES:

1. COORDINATE SYSTEM IS IN FEET AND REFERS TO THE CONNECTICUT COORDINATE SYSTEM BASED ON NAD 83.
2. ELEVATIONS ARE IN FEET AND REFER TO NGVD 1929.
3. REFER TO THE REPORT APPENDICES FOR TEST BORING LOGS.
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HORIZ. 0 20 40 60 80
VERT. 0 8 16 24 32
SCALE IN FEET

HALEY & ALDRICH

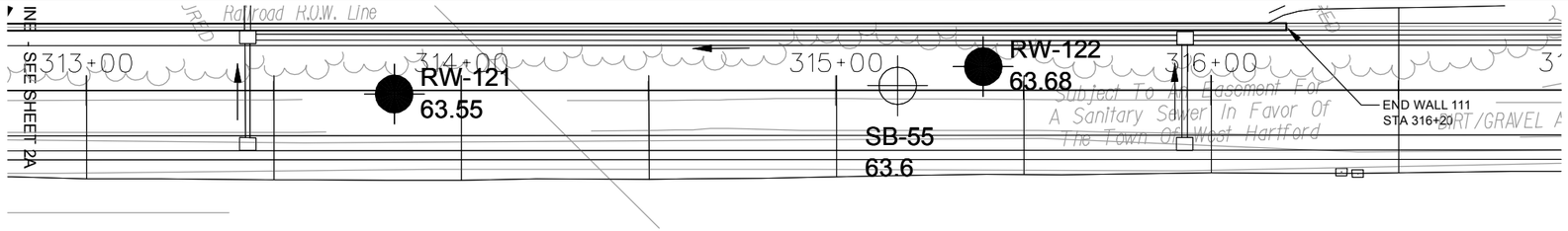
NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

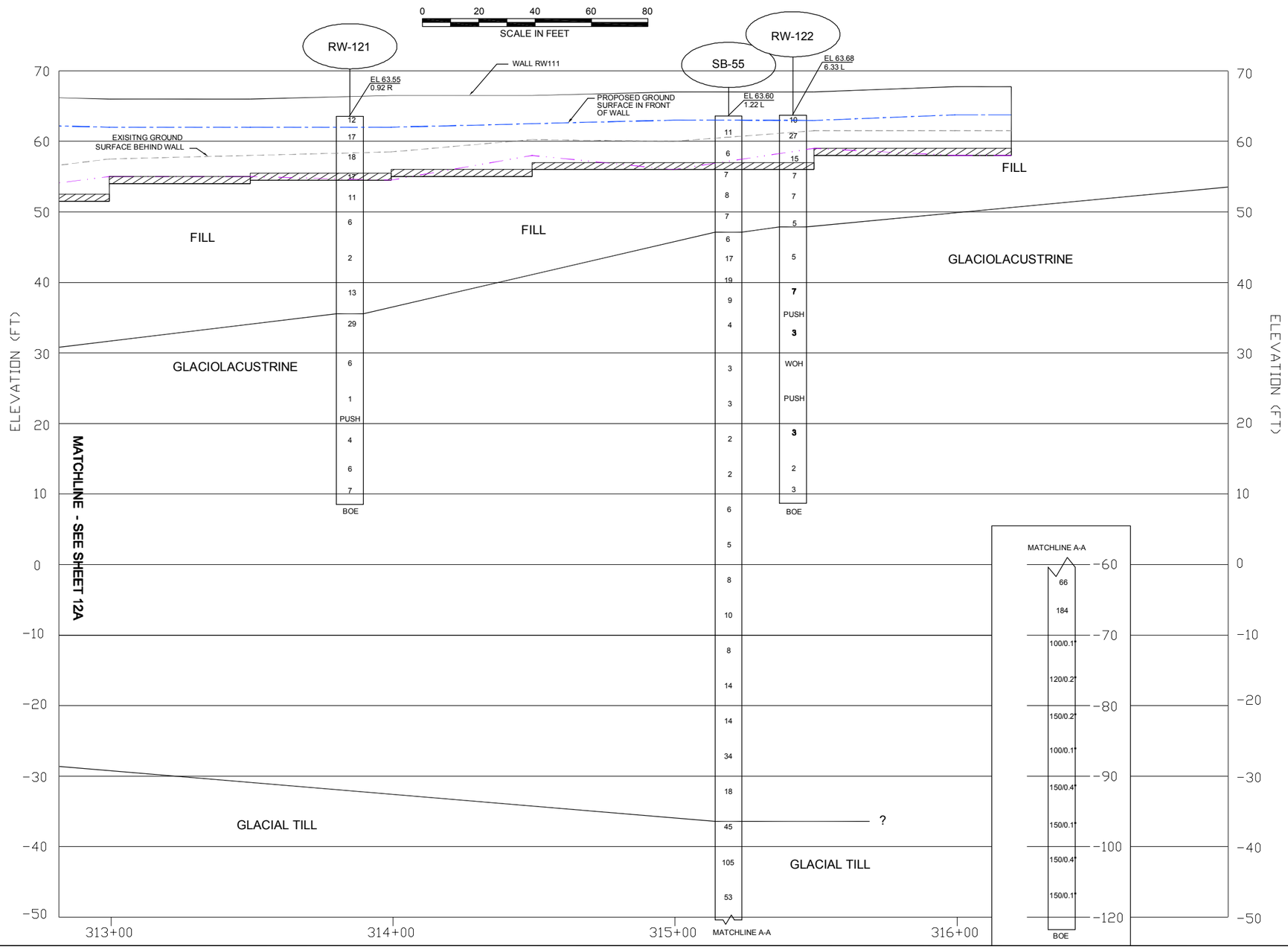
RETAINING WALL 111
SUBSURFACE EXPLORATION PLAN
AND PROFILE - SHEET 1

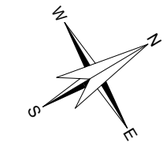
SCALE: AS SHOWN
AUGUST 2010

FIGURE 12A

G:\32669-CT BUSWAY\004\CAD\DRAWINGS\32669-000-0D14-RET_WALLS.DWG







LEGEND

NBA-102 (OW)	BORING DESIGNATION; "OW" INDICATES OBSERVATION WELL INSTALLED IN COMPLETED TEST BORING.
EL 53.82 / 22.32 R	APPROXIMATE GROUND SURFACE ELEVATION; BORING OFFSET FROM CENTERLINE .
4	APPROXIMATE LOCATION OF SOIL SAMPLE AND STANDARD PENETRATION RESISTANCE, "N"
WOH	WEIGHT OF HAMMER
PUSH	APPROXIMATE LOCATION OF SHELBY TUBE SAMPLE
	INTERPRETED GEOLOGIC STRATUM INTERFACE
	INFERRED GEOLOGIC STRATUM INTERFACE
100 / 40	% RECOVERY / % RQD
BOE	BOTTOM OF EXPLORATION
RB-101 69.35	LOCATION, DESIGNATION AND ELEVATION OF RECENT TEST BORINGS DRILLED BY GENERAL BORINGS, INC., OF PROSPECT, CONNECTICUT DURING THE PERIODS BETWEEN 18 AND 22 OCTOBER 2007 AND 9 AND 29 APRIL 2008.
SB-46 68.2	LOCATION, DESIGNATION AND ELEVATION OF PREVIOUS PILOT BORINGS BY OTHERS.
	EXISTING GROUND SURFACE BEHIND WALL
	PROPOSED GROUND SURFACE IN FRONT OF WALL
	PROPOSED BOTTOM OF WALL FOOTING SHOWN IN 60% CONTRACT DRAWINGS
	APPROXIMATE LOCATION OF LEVELING PAD / COMPACTED GRANULAR FILL

NOTES:

1. COORDINATE SYSTEM IS IN FEET AND REFERS TO THE CONNECTICUT COORDINATE SYSTEM BASED ON NAD 83.
2. ELEVATIONS ARE IN FEET AND REFER TO NGVD 1929.
3. REFER TO THE REPORT APPENDICES FOR TEST BORING LOGS.
4. THE STANDARD PENETRATION RESISTANCE, "N", IS DEFINED AS THE NUMBER OF BLOWS OF A 140-LB HAMMER FALLING THROUGH A VERTICAL DISTANCE OF 30 INCHES REQUIRED TO DRIVE A 2-INCH O.D., 1-3/8-INCH I.D. SPLITS POON SAMPLER 12 INCHES.
5. THE ROCK QUALITY DESIGNATION (RQD) IS DEFINED AS THE SUM OF ALL PIECES OF ROCK CORE, 4 INCHES IN LENGTH OR LONGER, DIVIDED BY THE TOTAL LENGTH IN INCHES OF THE CORE DRILLED IN THE GIVEN RUN, EXPRESSED AS A PERCENTAGE. IF THE CORE IS BROKEN BY HANDLING OR DRILLING PROCEDURES, THE PIECES OF THE CORE ARE FITTED TOGETHER AND COUNTED AS ONE PIECE, PROVIDED THEY CONSTITUTE THE REQUIRED 4-INCH LENGTH.
6. REFER TO THE REPORT TEXT FOR MORE DETAILED SOIL STRATUM DESCRIPTIONS AND THE TEST BORING LOGS FOR DETAILED SAMPLE DESCRIPTIONS.
7. SUBSURFACE PROFILES DEPICT THE GENERAL GEOLOGIC CONDITIONS AT THE SITE AND ARE BASED ON INTERPRETATION OF DATA ENCOUNTERED IN THE EXPLORATIONS. LINES REPRESENTING INTERFACES BETWEEN STRATA ON THE PROFILE ARE BASED ON ADJACENT BORINGS. THE BORING STICKS SHOW THE INTERPRETED SEQUENCE OF STRATA ENCOUNTERED AT THAT LOCATION. ACTUAL SOIL CONDITIONS AND INTERFACES BETWEEN EXPLORATIONS MAY VARY FROM THOSE INDICATED ON THE PROFILE.

HORIZ. 0 20 40 60 80
VERT. 0 8 16 24 32
SCALE IN FEET

HALEY & ALDRICH

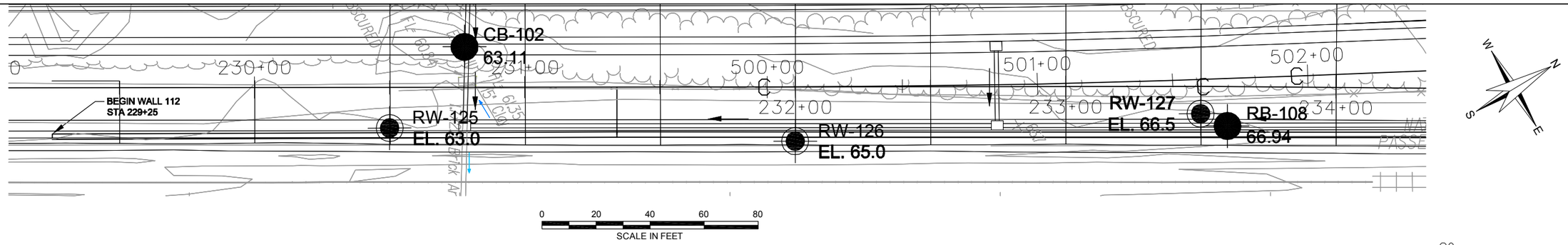
NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

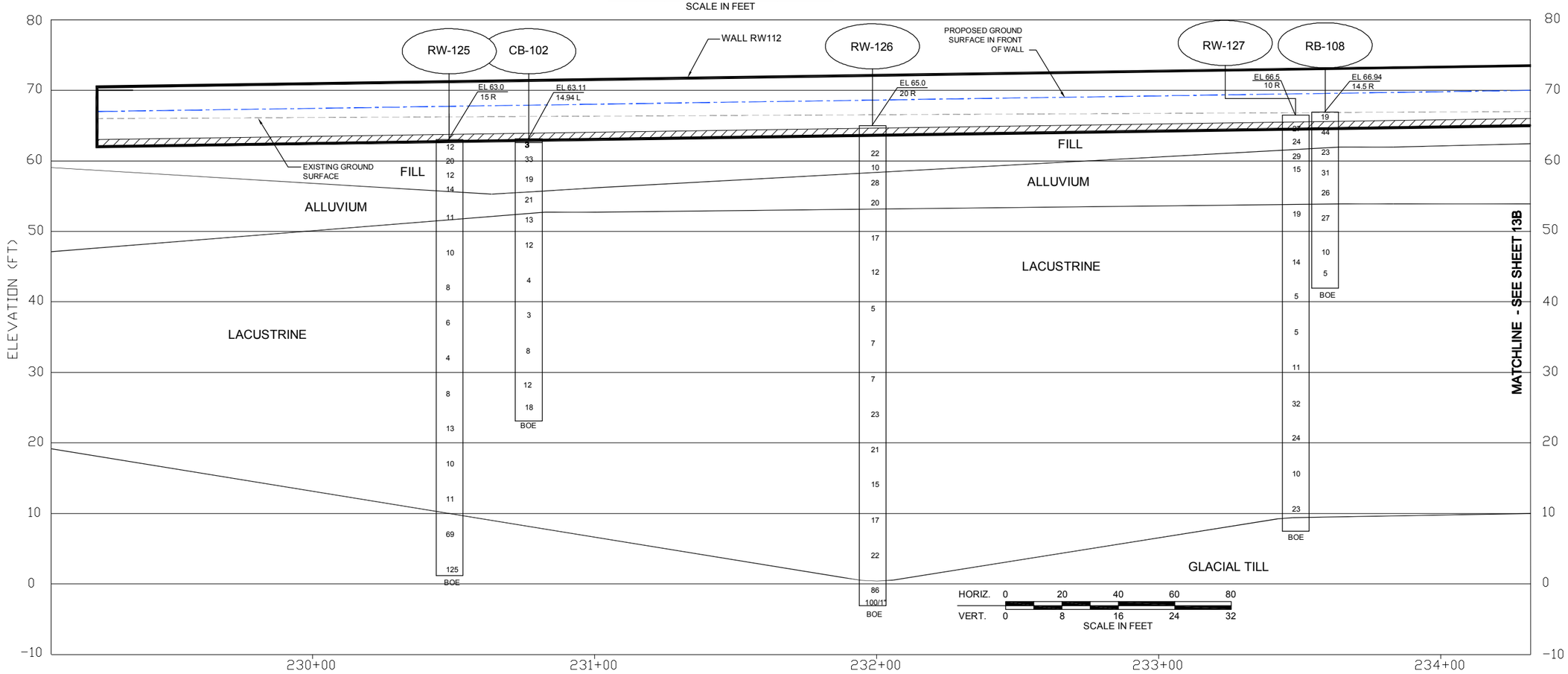
RETAINING WALL 111
SUBSURFACE EXPLORATION PLAN
AND PROFILE - SHEET 2

SCALE: AS SHOWN
AUGUST 2010

FIGURE 12B

G:\32669-CT BUSWAY\004\CAD\DRAWINGS\32669-000-0D14-RET_WALLS.DWG





NBA-102 (OW) — BORING DESIGNATION; "OW" INDICATES OBSERVATION WELL INSTALLED IN COMPLETED TEST BORING.

EL 53.82 / 22.32 R — APPROXIMATE GROUND SURFACE ELEVATION; BORING OFFSET FROM CENTERLINE .

4 — APPROXIMATE LOCATION OF SOIL SAMPLE AND STANDARD PENETRATION RESISTANCE, "N"

WOH — WEIGHT OF HAMMER

PUSH — APPROXIMATE LOCATION OF SHELBY TUBE SAMPLE

INTERPRETED GEOLOGIC STRATUM INTERFACE

INFERRED GEOLOGIC STRATUM INTERFACE

100 / 40 — % RECOVERY / % RQD

BOE — BOTTOM OF EXPLORATION

LEGEND

RB-101 / 69.35 — LOCATION, DESIGNATION AND ELEVATION OF RECENT TEST BORINGS DRILLED BY GENERAL BORINGS, INC., OF PROSPECT, CONNECTICUT DURING THE PERIODS BETWEEN 18 AND 22 OCTOBER 2007 AND 9 AND 29 APRIL 2008.

EXISTING GROUND SURFACE BEHIND WALL

PROPOSED GROUND SURFACE IN FRONT OF WALL

APPROXIMATE LOCATION OF LEVELING PAD / COMPACTED GRANULAR FILL

NOTES:

1. COORDINATE SYSTEM IS IN FEET AND REFERS TO THE CONNECTICUT COORDINATE SYSTEM BASED ON NAD 83.
2. ELEVATIONS ARE IN FEET AND REFER TO NGVD 1929.
3. REFER TO THE REPORT APPENDICES FOR TEST BORING LOGS.
4. THE STANDARD PENETRATION RESISTANCE, "N", IS DEFINED AS THE NUMBER OF BLOWS OF A 140-LB HAMMER FALLING THROUGH A VERTICAL DISTANCE OF 30 INCHES REQUIRED TO DRIVE A 2-INCH O.D., 1-3/8-INCH I.D. SPLITS POON SAMPLER 12 INCHES.
5. THE ROCK QUALITY DESIGNATION (RQD) IS DEFINED AS THE SUM OF ALL PIECES OF ROCK CORE, 4 INCHES IN LENGTH OR LONGER, DIVIDED BY THE TOTAL LENGTH IN INCHES OF THE CORE DRILLED IN THE GIVEN RUN, EXPRESSED AS A PERCENTAGE. IF THE CORE IS BROKEN BY HANDLING OR DRILLING PROCEDURES, THE PIECES OF THE CORE ARE FITTED TOGETHER AND COUNTED AS ONE PIECE, PROVIDED THEY CONSTITUTE THE REQUIRED 4-INCH LENGTH.
6. REFER TO THE REPORT TEXT FOR MORE DETAILED SOIL STRATUM DESCRIPTIONS AND THE TEST BORING LOGS FOR DETAILED SAMPLE DESCRIPTIONS.
7. SUBSURFACE PROFILES DEPICT THE GENERAL GEOLOGIC CONDITIONS AT THE SITE AND ARE BASED ON INTERPRETATION OF DATA ENCOUNTERED IN THE EXPLORATIONS. LINES REPRESENTING INTERFACES BETWEEN STRATA ON THE PROFILE ARE BASED ON ADJACENT BORINGS. THE BORING STICKS SHOW THE INTERPRETED SEQUENCE OF STRATA ENCOUNTERED AT THAT LOCATION. ACTUAL SOIL CONDITIONS AND INTERFACES BETWEEN EXPLORATIONS MAY VARY FROM THOSE INDICATED ON THE PROFILE.

HALEY & ALDRICH

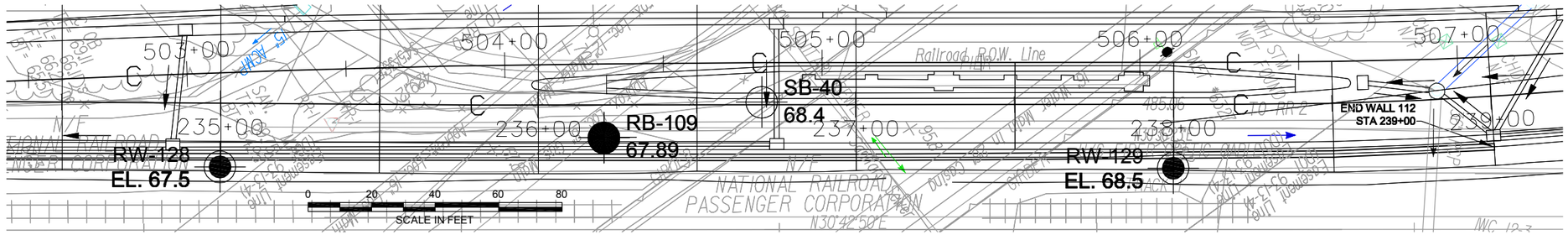
NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

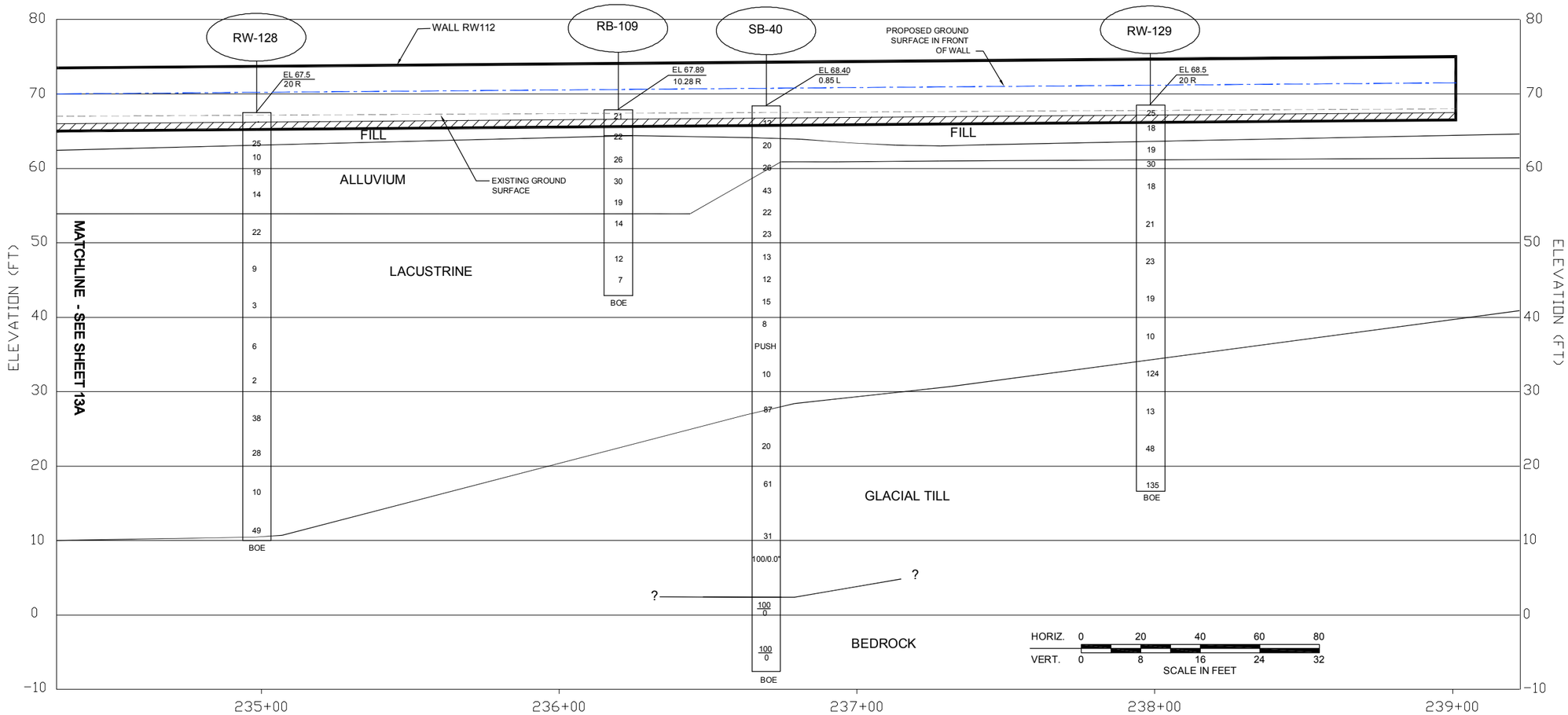
RETAINING WALL 112
SUBSURFACE EXPLORATION PLAN AND PROFILE

SCALE: AS SHOWN
AUGUST 2010

FIGURE 13A

G:\32669-CT BUSWAY\004\CAD\DRAWINGS\32669-000-0D14-RET_WALLS.DWG





NBA-102 (OW) — BORING DESIGNATION; "OW" INDICATES OBSERVATION WELL INSTALLED IN COMPLETED TEST BORING.

EL 53.82 / 22.32 R — APPROXIMATE GROUND SURFACE ELEVATION; BORING OFFSET FROM CENTERLINE .

4 — APPROXIMATE LOCATION OF SOIL SAMPLE AND STANDARD PENETRATION RESISTANCE, "N"

WOH — WEIGHT OF HAMMER

PUSH — APPROXIMATE LOCATION OF SHELBY TUBE SAMPLE

INTERPRETED GEOLOGIC STRATUM INTERFACE

INFERRED GEOLOGIC STRATUM INTERFACE

100 / 40 — % RECOVERY / % RQD

BOE — BOTTOM OF EXPLORATION

LEGEND

RB-101 / 69.35 — LOCATION, DESIGNATION AND ELEVATION OF RECENT TEST BORINGS DRILLED BY GENERAL BORINGS, INC., OF PROSPECT, CONNECTICUT DURING THE PERIODS BETWEEN 18 AND 22 OCTOBER 2007 AND 9 AND 29 APRIL 2008.

EXISTING GROUND SURFACE BEHIND WALL

PROPOSED GROUND SURFACE IN FRONT OF WALL

APPROXIMATE LOCATION OF LEVELING PAD / COMPACTED GRANULAR FILL

NOTES:

1. COORDINATE SYSTEM IS IN FEET AND REFERS TO THE CONNECTICUT COORDINATE SYSTEM BASED ON NAD 83.
2. ELEVATIONS ARE IN FEET AND REFER TO NGVD 1929.
3. REFER TO THE REPORT APPENDICES FOR TEST BORING LOGS.
4. THE STANDARD PENETRATION RESISTANCE, "N", IS DEFINED AS THE NUMBER OF BLOWS OF A 140-LB HAMMER FALLING THROUGH A VERTICAL DISTANCE OF 30 INCHES REQUIRED TO DRIVE A 2-INCH O.D., 1-3/8-INCH I.D. SPLITS POON SAMPLER 12 INCHES.
5. THE ROCK QUALITY DESIGNATION (RQD) IS DEFINED AS THE SUM OF ALL PIECES OF ROCK CORE, 4 INCHES IN LENGTH OR LONGER, DIVIDED BY THE TOTAL LENGTH IN INCHES OF THE CORE DRILLED IN THE GIVEN RUN, EXPRESSED AS A PERCENTAGE. IF THE CORE IS BROKEN BY HANDLING OR DRILLING PROCEDURES, THE PIECES OF THE CORE ARE FITTED TOGETHER AND COUNTED AS ONE PIECE, PROVIDED THEY CONSTITUTE THE REQUIRED 4-INCH LENGTH.
6. REFER TO THE REPORT TEXT FOR MORE DETAILED SOIL STRATUM DESCRIPTIONS AND THE TEST BORING LOGS FOR DETAILED SAMPLE DESCRIPTIONS.
7. SUBSURFACE PROFILES DEPICT THE GENERAL GEOLOGIC CONDITIONS AT THE SITE AND ARE BASED ON INTERPRETATION OF DATA ENCOUNTERED IN THE EXPLORATIONS. LINES REPRESENTING INTERFACES BETWEEN STRATA ON THE PROFILE ARE BASED ON ADJACENT BORINGS. THE BORING STICKS SHOW THE INTERPRETED SEQUENCE OF STRATA ENCOUNTERED AT THAT LOCATION. ACTUAL SOIL CONDITIONS AND INTERFACES BETWEEN EXPLORATIONS MAY VARY FROM THOSE INDICATED ON THE PROFILE.

HALEY & ALDRICH

NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

RETAINING WALL 112
SUBSURFACE EXPLORATION PLAN AND PROFILE

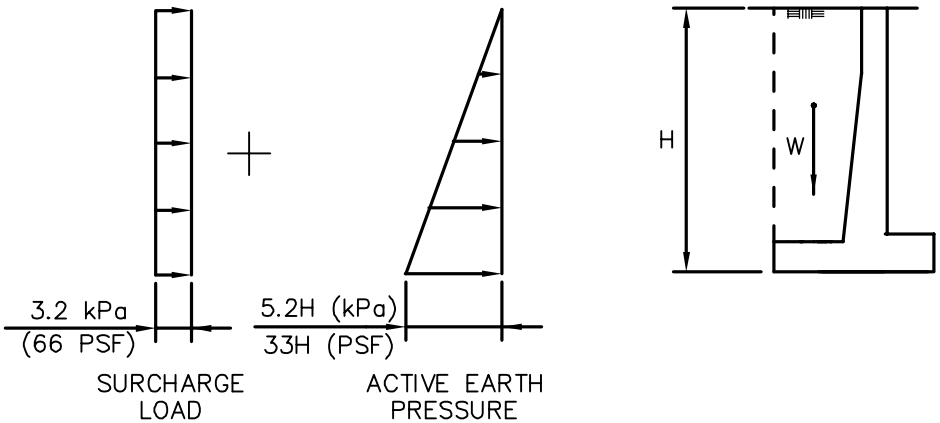
SCALE: AS SHOWN
AUGUST 2010

FIGURE 13B

G:\32669-CT BUSWAY\004\CAD\DRAWINGS\32669-000-0D14-RET_WALLS.DWG

G:\32669-CT BUSWAY\004\CAD\DRAWINGS\32669-000-0A04-LATLOADS.DWG

STATIC



NOTES:

1. H IS IN METERS FOR S.I. CALCULATIONS AND FT. FOR ENGLISH CALCULATIONS.
2. THE WALL SHOULD BE DRAINED BY PERVIOUS STRUCTURE BACKFILL AND A STRUCTURE UNDERDRAIN OR WEEPHOLES, THEREFORE A HYDROSTATIC PRESSURE DIAGRAM IS OMITTED FROM THIS FIGURE.
3. THESE PRESSURE DISTRIBUTIONS ASSUME HORIZONTAL BACKFILL BEHIND THE WALL.
4. RETAINING WALLS DO NOT REQUIRE SEISMIC DESIGN.
5. SLIDING:
   COEFF. OF FRICTION BETWEEN FOOTING AND BASE = 0.60
   FS > 1.5 (STATIC)
6. OVERTURNING:
   FS $\geq$ 2.0 (STATIC)
7. IGNORE PASSIVE RESISTANCE IN FRONT OF FOOTING.

HALEY & ALDRICH

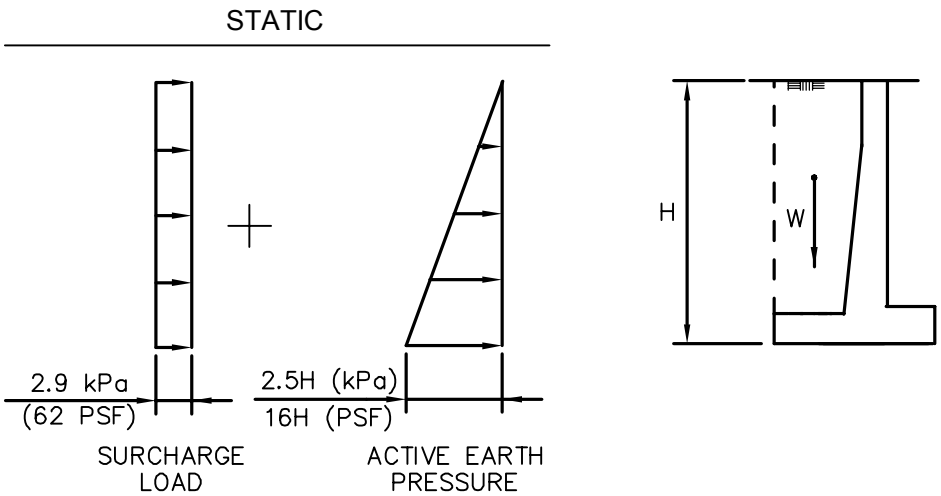
NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

RECOMMENDED ACTIVE LATERAL EARTH PRESSURE LOADS ON RESTRAINED ABUTMENTS & WINGWALLS

SCALE: NOT TO SCALE
SEPTEMBER 2010

FIGURE 14

G:\32669-CT BUSWAY\004\CAD\DRAWINGS\32669-000-0A04-LATLOADS.DWG



NOTES:

1. H IS IN METERS FOR S.I. CALCULATIONS AND FT. FOR ENGLISH CALCULATIONS.
2. THE WALL SHOULD BE DRAINED BY PERVIOUS STRUCTURE BACKFILL AND A STRUCTURE UNDERDRAIN OR WEEPHOLES, THEREFORE A HYDROSTATIC PRESSURE DIAGRAM IS OMITTED FROM THIS FIGURE.
3. THESE PRESSURE DISTRIBUTIONS ASSUME HORIZONTAL BACKFILL BEHIND THE WALL.
4. ASSUME 2 FT. THICK REGULAR GRANULAR FILL (BULK DENSITY = 125 PCF) FOR SURCHARGE LOAD

HALEY & ALDRICH

NEW BRITAIN - HARTFORD BUSWAY
NEWINGTON - WEST HARTFORD, CONNECTICUT

RECOMMENDED ACTIVE LATERAL EARTH PRESSURE LOADS ON ESCS BACKFILLED RETAINING WALLS AND ABUTMENTS

SCALE: NOT TO SCALE
SEPTEMBER 2010

FIGURE 15

APPENDIX A

Test Boring Logs

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-101
Inspector: E. Danaher	Town: Newington to West Hartford		Stat./Offset: 214+84.51/43.62L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 819389.797263
Start Date: 10-18-07	Route No.:		Easting: 1002315.785686
Finish Date: 10-18-07	Bridge No.:		Surface Elevation: 71.20
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.0 in. / HW	Sampler Type/Size: SS / 1 3/8 in.		Core Barrel Type: NX
Hammer Wt.: 300 lb. Fall: 30 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	18 21 24 36	2	14			FILL	Dense brown to red-brown coarse to fine SAND, some gravel, little silt, wet	70
	S-2	25 18 18 20	2	16				Similar to S1	
	S-3	24 22 19 23	2	17				Dense brown to red-brown coarse to fine SAND and SILT, some gravel	
5	S-4	22 25 19 24	2	18			ALLUVIUM	Dense red-brown coarse to fine SAND some silt, fine gravel	65
							GLACIAL TILL		
10	S-5	20 23 27 32	2	20				Similar to S4, except wet	60
	S-6	23 25 31 30	2	15				Very dense red-brown coarse to fine SAND, some gravel, silt	
15	S-7	26 93 50/2	1.2	12				Similar to S6	55
20	S-8	100/1	1	1				Siltstone fragments	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 21.0 ft Rock: 5.0 ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 7 No. of Core Runs: 1		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-101
Inspector: E. Danaher	Town: Newington to West Hartford		Stat./Offset: 214+84.51/43.62L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 819389.797263
Start Date: 10-18-07	Route No.:		Easting: 1002315.785686
Finish Date: 10-18-07	Bridge No.:		Surface Elevation: 71.20
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.0 in. / HW	Sampler Type/Size: SS / 1 3/8 in.		Core Barrel Type: NX
Hammer Wt.: 300 lb. Fall: 30 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
	C-1		5	60	88	1 1.5 1.5 1 1.5	BEDROCK	Moderately hard to hard, fresh, brown to red-brown, aphanitic SILTSTONE. Bedding low angle, extremely thin to thin, planar to slightly undulating. Primary joints horizontal to low angle, close to moderately spaced, smooth, planar to slightly undulating, slightly disintegrated to fresh, open to tight. Secondary joints high angle to vertical, moderately spaced or wider, rough, planar to stepped, disintegrated, open	50
25									45
								END OF BORING 26 ft	
30									40
35									35
40									30

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 21.0 ft Rock: 5.0 ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 7 No. of Core Runs: 1		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RW-101A
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 214+72.53/15.56L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 819363.159051
Start Date: 4-24-08	Route No.:		Easting: 1002331.360906
Finish Date: 4-25-08	Bridge No.:		Surface Elevation: 66.35
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 14.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	5 9 15 12	2	15		FILL	Medium dense brown coarse to fine SAND and coarse to fine GRAVEL, little coal cinders, trace silt, no odor, dry	65
	S-2	13 13 11 11	2	18		ALLUVIUM	Medium dense brown coarse to fine SAND and coarse to fine GRAVEL, some silt, no odor, moist; compact, bonded-in-situ	
5	S-3	4 15 14 15	2	12			Similar to S2	
						GLACIAL TILL		60
	S-4	18 54 26 20	2	16			Similar to S3, except very dense Note: Few cobbles from 5.0 to 15.0 ft Note: Switched to NW casing at 10.0 ft	
10	S-5	16 23 14 32	2	9			Similar to S4, except dense	55
15	S-6	29 27 21 100/3	1.8	16		DECOMPOSED ROCK	Dense brown coarse to fine SAND and coarse to fine GRAVEL, little silt, no odor, wet; composed of shale chips Note: Roller bit refusal at 17.0 ft	50
							END OF BORING 17 ft	
20								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 17.0 ft Rock: - ft	NOTES:	Sheet 1 of 1
No. of Soil Samples: 6 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RW-102
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 216+04.6/8.84L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 819468.743271
Start Date: 4-25-08	Route No.:		Easting: 1002410.378703
Finish Date: 4-25-08	Bridge No.:		Surface Elevation: 66.16
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: NX
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 10.0 ft b.g.s			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	8 13 25 24	2	19			RAILROAD BALLAST / FILL	Dense dark brown to black coarse to fine SAND and COAL CINDERS, little medium to fine gravel, trace silt, coal particles, brick, no odor, dry	65
	S-2	17 21 20 21	2	16				Dense brown coarse to fine SAND, little gravel, trace silt, no odor, dry Dense brown coarse to fine SAND, some coarse to fine gravel, silt, trace clay, no odor, dry; bonded/compact	
5	S-3	5 8 9 10	2	18			GLACIOFLUVIAL DEPOSITS	Very stiff poorly-stratified clayey SILT with occasional layers of SILT, some fine sand, no odor, moist, wet at approximately 6.0 ft	60
	S-4	10 12 22 11	2	14			GLACIAL TILL	Similar to S3, except dense, wet Dense brown to red-brown coarse to fine SAND and clayey SILT, some coarse to fine gravel, no odor, moist; well-bonded in-situ Note: Switched to NW casing at 10.0 ft	
10	S-5	12 10 10 100/3	1.8	11				Similar to S4 (below 8.0 ft); decomposed shale in spoon tip	55
	C-1		5	60	63	1 1 1.5 2	BEDROCK	Note: Roller bit grinding 11.7 to 12.5 ft. Began rock core at 12.5 ft Moderately hard to hard, slightly weathered to fresh, brown, aphanitic SILTSTONE. Bedding appears thin to thick, not easily discernible. Primary joints low angle, close to moderately spaced, smooth, planar to slightly undulating, slightly disintegrated to fresh, open to tight. Secondary joints high angle to near-vertical, moderately spaced (or wider), smooth, planar to undulating, slightly disintegrated to fresh, open to tight	
15									50

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 12.5 ft Rock: 10.0 ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 5 No. of Core Runs: 2		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RW-102
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 216+04.6/8.84L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 819468.743271
Start Date: 4-25-08	Route No.:		Easting: 1002410.378703
Finish Date: 4-25-08	Bridge No.:		Surface Elevation: 66.16
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: NX
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 10.0 ft b.g.s			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
	C-2		5	60	77	2	BEDROCK *(con't)*	Similar to C1, except hard, fresh; all joints observed in fresh condition	
						2			
						2		-PORTLAND ARKOSE FORMATION-	
20						2			
						3			45
						3			
								END OF BORING 22.5 ft	
25									40
30									35

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 12.5 ft Rock: 10.0 ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 5 No. of Core Runs: 2		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RB-105
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 217+36.41/5.46R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 819572.967969
Start Date: 4-9-08	Route No.:		Easting: 1002491.092011
Finish Date: 4-9-08	Bridge No.:		Surface Elevation: 66.44
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: NX
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 6.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	10 15 10 6	2	18			FILL	Medium dense dark brown to light brown fine GRAVEL and coarse to fine SAND, little silt, no odor, moist	65
	S-2	11 11 12 13	2	17			GLACIOFLUVIAL DEPOSITS	Medium dense red-brown coarse to fine SAND, little silt, fine gravel, trace coarse to medium gravel, no odor, moist Similar to S1 (below 1.5 ft)	
5	S-3	12 17 15 16	2	16				Medium dense red-brown coarse to fine SAND and SILT, little fine gravel, trace medium gravel, no odor, moist; bonded in-situ	
	S-4	18 21 23 25	2	21				Dense brown medium to fine GRAVEL and coarse to fine SAND, some silt, trace coarse gravel, no odor, wet Dense brown coarse to fine SAND, some silt, some medium to fine gravel, trace coarse gravel, no odor, wet	60
							GLACIAL TILL	Note: Switched to NW casing at 10.0 ft	
10	S-5	17 20 20 21	2	16				Similar to S4; bonded in-situ	55
								No recovery	
15	S-6	50/0	0	0			BEDROCK	Note: Spoon refusal at 15.0 ft; began core run	
	C-1		5	55	65	1		Moderately hard, fresh, brown, aphanitic SHALE. Bedding low angle. Primary joints horizontal to low angle, very close to moderately close, smooth, planar to slightly undulating, discolored to fresh, open. Secondary joints high angle to vertical, moderately spaced (generally), smooth, stepped, discolored, open	50
						1			
						1.5			
						1.5			
						1.5			
20								END OF BORING 20 ft	45

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 15.0 ft Rock: 5.0 ft	NOTES:	Sheet 1 of 1
No. of Soil Samples: 6 No. of Core Runs: 1		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RW-103
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 218+36.06/9.1L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 819666.086796
Start Date: 4-25-08	Route No.:		Easting: 1002529.433393
Finish Date: 4-25-08	Bridge No.:		Surface Elevation: 65.41
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: NX
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 8.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	4 5 4 4	2	6			FILL	Loose dark brown to black SAND, some silt, trace gravel, with few fragments of slag and wood	65
	S-2	4 4 4 8	2	22				Similar to S1	
							GLACIO-LACUSTRINE DEPOSITS		
5	S-3	4 15 11 9	2	18				Very stiff red-brown clayey SILT, trace sand	60
	S-4	11 14 14 9	2	18				Similar to S3 Medium dense brown SILT and fine SAND, wet Note: Switched to NW casing at 10.0 ft	
10	S-5	13 22 17 14	2	16			GLACIAL TILL	Dense red-brown SAND, some silt, little gravel, wet	55
15	S-6	11 100/5	0.9	10				Very dense red-brown GRAVEL and SAND, some clayey silt, wet	50
	C-1		5	58	27	2 2 2 2 2	BEDROCK	Moderately hard to hard, slightly weathered, dark brown, aphanitic SILTSTONE. Primary joints low angle, extremely close to moderately spaced, smooth, planar to slightly undulating, slightly disintegrated to fresh, open. Secondary joints similar, except high angle to near vertical, moderately spaced (or wider)	
20									45
								-PORTLAND ARKOSE FORMATION-	
								END OF BORING 21 ft	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 16.0 ft Rock: 5.0 ft	NOTES:	Sheet 1 of 1
No. of Soil Samples: 6 No. of Core Runs: 1		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**	Hole No.: RW-124	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 226+9.92/1.44L	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 820327.650907	
Start Date: 4-23-08	Route No.:	Easting: 1002930.99123	
Finish Date: 4-23-08	Bridge No.:	Surface Elevation: 64.23	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 11.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	5 7 10 11	2	18		FILL	Medium dense brown to black coarse to fine SAND and COAL CINDERS, little coarse to fine gravel, trace silt, roots, no odor, dry	
	S-2	11 10 13 11	2	17			Medium dense brown coarse to fine SAND, some coal cinders, little medium to fine gravel, trace silt, no odor, dry	
						ALLUVIUM		60
5	S-3	6 7 6 6	2	0			No recovery (pushing gravel)	
	S-4	9 8 9 11	2	0			No recovery (pushing gravel) Note: Sampler basket changed. Drill cuttings suggest similar to S2, except little silt Note: Switched to NW casing at 10.0 ft	
								55
10	S-5	9 11 12 5	2	6			Medium dense brown coarse to fine SAND, some silt, some coarse to fine gravel, no odor, wet at approximately 11.0 ft	
								50
15	S-6	6 7 10 8	2	16			Similar to S5	
						LACUSTRINE DEPOSITS	Very stiff SILT, trace fine sand, no odor, dry	
								45
20	S-7	10 9 8 8	2	3			Very stiff brown CLAY varved with brown clayey SILT, trace coarse to fine sand in occasional seams, no odor, wet (poor recovery)	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40.0 ft Rock: - ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-124
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 226+9.92/1.44L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 820327.650907
Start Date: 4-23-08	Route No.:		Easting: 1002930.99123
Finish Date: 4-23-08	Bridge No.:		Surface Elevation: 64.23
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 11.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						LACUSTRINE DEPOSITS *(con't)*		40
25	S-8	2 2 3 4	2	23			Medium stiff brown SILT, trace clay, fine sand, no odor, wet; stratified with occasional clay layers generally 0.5 to 1.0 in. thick	
								35
30	S-9	3 2 2 1	2	20			Similar to S8, except soft	
							Note: Attempt to push piston tube at 34.0 ft, crushed at 34.5 ft	30
35						GLACIAL TILL		
	S-10	23 22 21 40	2	24			Hard brown SILT, trace coarse to fine sand, fine gravel, no odor, wet; poorly-stratified to massive	
	S-11	27 34 59 100	2	17			Similar to S10	25
40							END OF BORING 40 ft	
								20
45								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40.0 ft Rock: - ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RW-124A
Inspector: P. Duanj	Town: Newington		Stat./Offset: 226+3/20R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing:
Start Date: 9-30-09	Route No.:		Easting:
Finish Date: 10-2-09	Bridge No.:		Surface Elevation: 64
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich No. 32669-009			
Casing Size (in.)/Type: HAS 3.25/HW	Sampler Type/Size: S / 1 3/8		Core Barrel Type: NX
Hammer Wt.: - Fall: -	Hammer Wt. (lb): 140 Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 in.	Pen. (ft)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	1 4 4 4	2	18			FILL	Loose black coarse to fine SAND and COAL CINDERS, little coarse to fine gravel, trace silt, roots, no odor, dry	64
1							FILL		63
2	S-2	4 3 5 7	2	17			FILL	Loose brown coarse to fine SAND, little coarse to fine gravel, trace silt, no odor, dry	62
3							FILL	Loose brown to black coarse to fine SAND and COAL CINDERS, little coarse to fine gravel, trace silt, no odor, dry	61
4								Loose brown medium to fine SAND, little coarse to fine gravel, trace coarse sand, no odor, dry	60
5	S-3	7 9 10 10	2	19				Very stiff red-brown clayey SILT, little coarse to fine sand, trace fine gravel, no odor, dry	59
6									58
7	S-4	13 15 14 14	2	11				Similar to S3	57
8									56
9									55
10	S-5	4 3 2 2	2	18			ALLUVIAL DEPOSITS	Similar to S4	54
11								Medium stiff brown clayey SILT, trace coarse gravel, organic fibers, trace fine sand, no odor, moist	53
12	S-6	4 3 3 3	2	17			ALLUVIAL DEPOSITS	Medium stiff brown clayey SILT, trace organic fibers, no odor, moist	52
13									51
14								Note: Switched to HW casing at approximately 15.0 ft	50
15	S-7	3 3 3 5	2	19			LACUSTRINE DEPOSITS	Medium stiff brown clayey SILT varved with CLAY, no odor, wet	49
16									48
17									47
18									46
19									45
20									44

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 67.0 ft Rock: 9.0 ft	NOTES: Elevations and Station and Offset are estimated	Sheet 1 of 4
No. of Soil Samples: 17 No. of Core Runs: 2		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: RW-124A
Inspector: P. Duanj	Town: Newington	Stat./Offset: 226+3/20R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing:
Start Date: 9-30-09	Route No.:	Easting:
Finish Date: 10-2-09	Bridge No.:	Surface Elevation: 64

Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich No. 32669-009

Casing Size (in.)/Type: HAS 3.25/HW	Sampler Type/Size: S / 1 3/8	Core Barrel Type: NX
Hammer Wt.: - Fall: -	Hammer Wt. (lb): 140 Fall: 30 in.	

Groundwater Observations:

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 in.	Pen. (ft)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
20	S-8	3 3 3 4	2	18			LACUSTRINE DEPOSITS *(con't)*	Medium stiff brown clayey SILT varved with CLAY, no odor, wet	44
21									43
22									42
23									41
24									40
25	S-9	2 2 3 4	2	18				Similar to S8 with 1 to 2 in. thick varves	39
26									38
27									37
28									36
29									35
30	S-10	5 4 5 8	2	0				No recovery	34
31									33
32									32
33							FLOW TILL	Note: Drill action indicates strata change at approximately 33.0 ft	31
34									30
35	S-11	20 19 16 20	2	9				Hard brown SILT, trace coarse to fine gravel, trace coarse to fine sand, well structure, no odor, wet	29
36									28
37									27
38									26
39									25
40									24

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in	NOTES: Elevations and Station and Offset are estimated	Sheet 2 of 4
Earth: 67.0 ft Rock: 9.0 ft		
No. of Soil Samples: 17 No. of Core Runs: 2		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RW-124A
Inspector: P. Duanj	Town: Newington		Stat./Offset: 226+3/20R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing:
Start Date: 9-30-09	Route No.:		Easting:
Finish Date: 10-2-09	Bridge No.:		Surface Elevation: 64
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich No. 32669-009			
Casing Size (in.)/Type: HAS 3.25/HW	Sampler Type/Size: S / 1 3/8		Core Barrel Type: NX
Hammer Wt.: - Fall: -	Hammer Wt. (lb): 140 Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 in.	Pen. (ft)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
40	S-12	16 14 15 16	2	15			LACUSTRINE DEPOSITS	Very stiff brown clayey SILT, no odor, wet	24
41									23
42									22
43									21
44									20
45	S-13	3 3 4 5	2	22				Medium stiff brown CLAY , no odor, wet	19
46							LACUSTRINE DEPOSITS	Medium stiff brown CLAY varved with silty CLAY, no odor, wet	18
47									17
48									16
49									15
50	S-14	3 3 4 11	2	20				Medium stiff clayey SILT with varved fat CLAY up to 0.5 in. thick, no odor, wet	14
51									13
52									12
53									11
54									10
55	S-15	4 4 14 14	2	14				Very stiff brown clayey SILT varved with clay, with frequent fine sand seams below 56.0 ft, no odor, wet	9
56									8
57								Note: Rig chatter with drill advancement to approximately 60.0 ft	7
58									6
59									5
60									4

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 67.0 ft Rock: 9.0 ft No. of Soil Samples: 17 No. of Core Runs: 2	NOTES: Elevations and Station and Offset are estimated	Sheet 3 of 4 SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RW-124A
Inspector: P. Duanj	Town: Newington		Stat./Offset: 226+3/20R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing:
Start Date: 9-30-09	Route No.:		Easting:
Finish Date: 10-2-09	Bridge No.:		Surface Elevation: 64
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich No. 32669-009			
Casing Size (in.)/Type: HAS 3.25/HW	Sampler Type/Size: S / 1 3/8		Core Barrel Type: NX
Hammer Wt.: - Fall: -	Hammer Wt. (lb): 140 Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 in.	Pen. (ft)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
60	S-16	10 15 12 11	2	13			LACUSTRINE DEPOSITS *(con't)*	Very stiff brown clayey SILT, trace fine sand, no odor, wet	4
61									3
62									2
63							WEATHERED SILTSTONE	Note: Rig chatter with drill advancement to approximately 65.0 ft	1
64									0
65	S-17	7 100/6	2	9				Very dense brown gravel or bedrock fragments with clayey silt, no odor, wet	-1
66									-2
67	C-1		4	44	17	1.5	PORTLAND ARKOSE	Note: Roller bit refusal encountered at 67.0 ft, began core run Moderately hard to hard, slightly weathered to fresh, brown, aphanitic SILTSTONE. Bedding appears thin to thick. Primary joints low angle, close to moderate, smooth, planar to slightly undulating, slightly disintegrated to fresh, open to tight. Secondary joints high angle to near vertical, moderately spaced, smooth, planar to undulating, slightly disintegrated to fresh, open to tight Similar to C1, except hard	-3
68						1.5			-4
69						1.5			-5
70						1.5			-6
71	C-2		5	53	23	1.5			-7
72						2			-8
73						2			-9
74						2.5			-10
75						2.5			-11
76						2			-12
77								END OF BORING 76 ft	-13
78									-14
79									-15
80									-16

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 67.0 ft Rock: 9.0 ft No. of Soil Samples: 17 No. of Core Runs: 2	NOTES: Elevations and Station and Offset are estimated	Sheet 4 of 4 SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: RB-107(OW)
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 227+62.28/5.5R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 820455.127304
Start Date: 4-9-08	Route No.:	Easting: 1003014.727403
Finish Date: 4-10-08	Bridge No.:	Surface Elevation: 64.81

Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000

Casing Size(in.)/Type: 4.25/4; HSA/HW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.	

Groundwater Observations: @ approximately 10.2 ft b.g.s after 22 days

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	3 5 9 9	2	10		TOPSOIL / FILL	Medium dense brown coarse to fine SAND and coarse to medium GRAVEL, trace silt, no odor, dry	
	S-2	5 8 8 10	2	10			Similar to S1, with 2 in. layer of black cinders at top of sample	
5	S-3	3 5 6 7	2	10		ALLUVIUM	Medium dense brown coarse to fine SAND, some fine gravel, silt, trace coarse to medium gravel, brick, asphalt, no odor, moist	60
	S-4	6 5 5 5	2	12			Loose brown coarse to fine SAND, some silt, little medium to fine gravel	
							Note: Switch to HW casing at 10.0 ft	
10	S-5	2 3 3 2	2	9			Loose brown coarse to fine SAND and SILT, some medium to fine gravel, trace coarse gravel, clay, no odor, wet	55
15	S-6	2 2 3 5	2	16			Loose brown fine SAND and SILT, little coarse sand, fine gravel, trace clay, no odor, wet; no structure Loose dark brown fine SAND, some silt, little coarse sand, no odor, wet Loose brown to red-brown coarse to fine SAND, little silt, trace fine gravel, no odor, wet	50

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 25.0 ft Rock: - ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 8 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: RB-107(OW)	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 227+62.28/5.5R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 820455.127304	
Start Date: 4-9-08	Route No.:	Easting: 1003014.727403	
Finish Date: 4-10-08	Bridge No.:	Surface Elevation: 64.81	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/4; HSA/HW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 10.2 ft b.g.s after 22 days			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						LACUSTRINE DEPOSITS		
20	S-7	5 11 8 7	2	17			Very stiff brown laminated SILT, frequent clay seams, no odor, wet	45
	S-8	4 6 7 6	2	18			Stiff brown laminated clayey SILT with frequent clay seams, no odor, wet; clay seams are generally 1/8 to 1/4 in. thick, but occasionally 1+in. thick Note: Well installed in completed borehole	
25							END OF BORING 25 ft	40
30								35
35								30

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 25.0 ft Rock: - ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 8 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**	Hole No.: RW-123	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 228+59.31/7.32R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 820537.636922	
Start Date: 4-23-08	Route No.:	Easting: 1003065.813385	
Finish Date: 4-24-08	Bridge No.:	Surface Elevation: 64.82	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 12.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	8 9 10 10	2	16		FILL	Medium dense coarse to fine SAND and COAL CINDERS, little gravel, trace silt, no odor, dry; layers 6 in. or greater on average	
	S-2	9 10 12 11	2	18			Similar to S1	
						ALLUVIUM		
5	S-3	6 5 7 9	2	0			No recovery	60
	S-4	6 6 9 7	2	16			Stiff brown clayey SILT, little coarse to fine sand, no odor, moist; disturbed soils	
							Note: Switched to NW casing at 10.0 ft	
10	S-5	5 4 6 6	2	24			Stiff brown clayey SILT, trace fine sand, occasional lenses of gray fine sand, no odor	55
15	S-6	5 6 7 7	2	0			No recovery (cuttings similar to S5)	50
						LACUSTRINE DEPOSITS		
20	S-7	7 9 11 11	2	24			Medium dense brown coarse to fine SAND, trace fine gravel, silt; no odor, wet; stratified Medium dense brown coarse to fine SAND, little coarse to fine gravel, silt, no odor, wet; stratified Very stiff brown varved CLAY with clayey SILT, no odor, wet; clay and silt layers 1.0 to 2.0 in.	45

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40.0 ft Rock: - ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 10 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**	Hole No.: RW-123	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 228+59.31/7.32R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 820537.636922	
Start Date: 4-23-08	Route No.:	Easting: 1003065.813385	
Finish Date: 4-24-08	Bridge No.:	Surface Elevation: 64.82	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 12.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						LACUSTRINE DEPOSITS *(con't)*	thick	
25	S-8	4 4 5 4	2	20			Stiff brown CLAY varved with brown clayey SILT, no odor, wet; varve couplets approximately 1.0 to 2.0 in. thick on average	40
	UP-1	p u s h	2	16			Note: Piston tube sample 28.0 to 30.0 ft	
30	S-9	3 4 4 5	2	24			Similar to S8, except medium stiff	35
	UP-2	p u s h	2	0			Note: Piston tube sample 33.0 to 35.0 ft (no recovery)	
35	UP-3	p u s h	2	24			Note: Piston tube sample 35.0 to 37.0 ft	30
	S-10	12 13 13 15	2	20			Very stiff brown stratified clayey SILT with frequent clay layers (approximately 0.25 to 2.0 in. thick, variable), no odor, wet	
40								25
							END OF BORING 40 ft	
45								20

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40.0 ft Rock: - ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 10 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RW-123A
Inspector: P. Duanj	Town: Newington		Stat./Offset: 228+90/37R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing:
Start Date: 10-2-09	Route No.:		Easting:
Finish Date: 10-2-09	Bridge No.:		Surface Elevation: 65
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich No. 32669-009			
Casing Size (in.)/Type: HAS 3.25/HW	Sampler Type/Size: S / 1 3/8		Core Barrel Type: None
Hammer Wt.: - Fall: -	Hammer Wt. (lb): 140 Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 in.	Pen. (ft)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	12 16 12 13	2	7		FILL	Medium dense black to gray coarse to fine SAND, trace coarse to fine gravel, with roots, no odor, dry	65
1								64
2	S-2	9 10 12 13	2	16			Medium dense black to red-brown coarse to fine SAND, trace coarse to fine gravel, with coal cinders, no odor, dry	63
3						FILL		62
4							Medium dense black to red-brown coarse to fine SAND, trace coarse to fine gravel, no odor, dry	61
5	S-3	7 8 9 11	2	0		FILL	No recovery (gravel piece in spoon tip)	60
6								59
7	S-4	7 9 9 7	2	0			No recovery (pushing gravel or cobble piece)	58
8								57
9								56
10	S-5	7 9 8 4	2	11		ALLUVIAL DEPOSITS	Very stiff brown clayey SILT, trace coarse to medium sand, with occasional gray fine sand, no odor, moist	55
11								54
12	S-6	4 4 8 7	2	14			Stiff brown clayey SILT with gray fine sand seams, no odor, moist	53
13								52
14							Note: Switched to HW casing at 15.0 ft	51
15	S-7	2 2 3 6	2	24			Medium stiff gray SILT, little clay, with organics, trace coarse to fine SAND, slight organic odor, moist	50
16								49
17						LACUSTRINE DEPOSITS	Medium stiff brown clayey SILT, no odor, wet	48
18								47
19								46
20	S-8	6 7 6 8	2	15			Stiff brown clayey SILT, no odor, wet	45
21								44
22								43
23								42
24								41
25								40

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 60.2 ft Rock: - ft No. of Soil Samples: 16 No. of Core Runs: ---	NOTES: Elevations and Station and Offset are estimated	Sheet 1 of 3 SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RW-123A
Inspector: P. Duanj	Town: Newington		Stat./Offset: 228+90/37R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing:
Start Date: 10-2-09	Route No.:		Easting:
Finish Date: 10-2-09	Bridge No.:		Surface Elevation: 65
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich No. 32669-009			
Casing Size (in.)/Type: HAS 3.25/HW	Sampler Type/Size: S / 1 3/8		Core Barrel Type: None
Hammer Wt.: - Fall: -	Hammer Wt. (lb): 140 Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 in.	Pen. (ft)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
25	S-9	3 3 2 4	2	23		LACUSTRINE DEPOSITS *(con't)*	Medium stiff brown clayey SILT varved with CLAY, varve couplets up to 1 in. thick, no odor, wet	40
26								39
27								38
28								37
29								36
30	S-10	3 3 2 2	2	24			Medium stiff brown clayey SILT varved with CLAY, no odor, wet	35
31								34
32								33
33								32
34								31
35	S-11	2 2 4 8	2	24			Medium stiff brown lean CLAY, trace silt, no odor, wet	30
36								29
37						LACUSTRINE DEPOSITS	Medium stiff brown CLAY, trace coarse sand, fine gravel, trace silt, no odor, wet Note: Drill action indicates gravel present in strata	28
38								27
39								26
40	S-12	6 8 14 26	2	16			Very stiff brown clayey SILT, with varved clay, trace coarse to fine gravel, coarse sand, no odor, wet (pocket of coarse to medium sand, some clayey silt, little fine gravel from approximately 41.5 to 42.0 ft)	25
41								24
42						GLACIAL TILL		23
43							Medium dense brown coarse to medium sand, some clayey silt, little fine gravel	22
44								21
45	S-13	23 18 21 46	2	14			Very stiff SILT, some coarse to fine sand, little coarse to fine gravel, well bonded, no odor, wet Note: Roller bit advancement very slow from approximately 47.0 to 50.0 ft	20
46								19
47								18
48								17
49								16
50								15

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 60.2 ft Rock: - ft No. of Soil Samples: 16 No. of Core Runs: ---	NOTES: Elevations and Station and Offset are estimated	Sheet 2 of 3 SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RW-123A
Inspector: P. Duanj	Town: Newington		Stat./Offset: 228+90/37R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing:
Start Date: 10-2-09	Route No.:		Easting:
Finish Date: 10-2-09	Bridge No.:		Surface Elevation: 65
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich No. 32669-009			
Casing Size (in.)/Type: HAS 3.25/HW	Sampler Type/Size: S / 1 3/8		Core Barrel Type: None
Hammer Wt.: - Fall: -	Hammer Wt. (lb): 140 Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 in.	Pen. (ft)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
50	S-14	100/2	2	0		GLACIAL TILL *(con't)*	No recovery Note: Roller bit advancement very slow from approximately 50.0 to 55.0 ft	15
51								14
52								13
53								12
54								11
55	S-15	32 100/5	2	9			Very stiff SILT, some coarse to fine SAND, little coarse to fine gravel, well structured, no odor, wet	10
56								9
57								8
58								7
59	S-16	100/2	2	0		WEATHERED BEDROCK	Note: Drill action indicates strata change at approximately 58.5 ft	6
60								5
61							END OF BORING 60.2 ft	4
62								3
63								2
64								1
65								0
66								-1
67								-2
68								-3
69								-4
70								-5
71								-6
72								-7
73								-8
74								-9
75								-10

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 60.2 ft Rock: - ft No. of Soil Samples: 16 No. of Core Runs: ---	NOTES: Elevations and Station and Offset are estimated	Sheet 3 of 3 SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RW-105
Inspector: E. Danaher	Town: Newington to West Hartford		Stat./Offset: 244+1.02/11.48L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 821881.32056
Start Date: 10-18-07	Route No.:		Easting: 1003821.112729
Finish Date: 10-19-07	Bridge No.:		Surface Elevation: 76.36
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.0 in. / HW	Sampler Type/Size: SS / 1 3/8 in.		Core Barrel Type: NX
Hammer Wt.: 300 lb. Fall: 30 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	8 11 10 6	2	12			FILL	Medium dense brown fine SAND, some silt, little coarse to fine gravel	75
	S-2	8 8 16 28	2	7				Medium dense red-brown coarse to fine SAND, some fine gravel, silt, dry	
							GLACIAL TILL		
5	S-3	12 27 41 80	2	20				Very dense red-brown GRAVEL, some coarse to fine sand, silt	70
	S-4	40 100/5	0.9	4				Very dense red-brown GRAVEL (fractured rock), some coarse to fine sand, silt, dry	
10	S-5	100/5	0.5	3				Weathered rock, fragments of siltstone. Advanced roller bit through cobbles and boulders	65
	S-6	11 17 29 100/5	1.9	12				Dense red-brown clayey SILT and coarse to fine SAND, little fine gravel, wet Note: Cored through boulder from 15.0 to 18.0 ft	
15									60
	S-7	18 32 100/4	1.3	6				Very dense gray GRAVEL, some coarse to fine sand, little red-brown clayey silt	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 19.0 ft Rock: 5.0 ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 7 No. of Core Runs: 1		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RW-105
Inspector: E. Danaher	Town: Newington to West Hartford		Stat./Offset: 244+1.02/11.48L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 821881.32056
Start Date: 10-18-07	Route No.:		Easting: 1003821.112729
Finish Date: 10-19-07	Bridge No.:		Surface Elevation: 76.36
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.0 in. / HW	Sampler Type/Size: SS / 1 3/8 in.		Core Barrel Type: NX
Hammer Wt.: 300 lb. Fall: 30 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
	C-1		5	60	45		BEDROCK	Hard, slightly weathered, dark gray to dark brown aphanitic SHALE. Bedding is low angle, extremely thin, planar to slightly undulating. Primary joints horizontal to low angle, very close to close spacing, smooth, planar to slightly undulating, fresh to slightly disintegrated, open. secondary joints high angle to vertical, generally moderately spaced (or wider), smooth to rough, planar to stepped, slightly disintegrated to fresh, open. Occasional calcite in-filling in joints	
20						3			
						3			
						4			55
						4			
						3			
25								END OF BORING 24 ft	
									50
30									
									45
35									
									40

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 19.0 ft Rock: 5.0 ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 7 No. of Core Runs: 1		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-106(OW)
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 245+96.71/20.17R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 822033.43589
Start Date: 4-24-08	Route No.:		Easting: 1003948.219458
Finish Date: 4-25-08	Bridge No.:		Surface Elevation: 69.95
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 0.3 ft b.g.s after 8 days			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	9 11 12 11	2	22		RAILROAD BALLAST / FILL	Medium dense brown to dark brown coarse to fine SAND, some coal cinders, little silt, coarse to fine gravel, no odor, moist	
	S-2	9 7 7 6	2	20		ALLUVIAL DEPOSITS	Similar to S1 Stiff brown clayey SILT, little coarse to fine sand, trace medium to fine gravel, no odor, moist; trace mottling; sand and gravel occurs in frequent small lenses	
5	S-3	4 5 9 13	2	20			Stiff brown to dark brown laminated SILT, little fine sand, organic fibers, no odor, moist	65
	S-4	8 8 11 13	2	24			Similar to S3, no organic fibers observed	
							Note: Switched to NW casing at 10.0 ft	
10	S-5	5 5 7 9	2	24		GLACIO-LACUSTRINE DEPOSITS	Stiff brown laminated clayey SILT with frequent brown clay seams, no odor, wet	60
15	S-6	4 5 6 8	2	24			Similar to S5, except with trace medium to fine gravel-sized dropstones	55
20	UP-1	p u s h	2	24			Note: Piston tube sample from 20.0 to 22.0 ft	50

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40.8 ft Rock: - ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**	Hole No.: RW-106(OW)	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 245+96.71/20.17R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 822033.43589	
Start Date: 4-24-08	Route No.:	Easting: 1003948.219458	
Finish Date: 4-25-08	Bridge No.:	Surface Elevation: 69.95	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 0.3 ft b.g.s after 8 days			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
	S-7	6 21 27 32	2	16		GLACIAL TILL	Similar to S6 Dense red-brown coarse to fine SAND and clayey SILT, some coarse to fine gravel, no odor, wet; well-bonded in-situ	
25	S-8	51 100/2	0.2	6			Very dense red-brown coarse to fine SAND and coarse to fine GRAVEL, little silt, no odor, wet; composed of shale chips Note: Roller bit grinding from approximately 25.0 to 27.0 ft on siltstone boulder. Cored 27.0 to 30.0 ft, broke through boulder at approximately 29.0 ft	45
30	S-9	100/3	0.3	3			Very dense red-brown coarse to fine SAND and GRAVEL, some silt, no odor, wet	40
35	S-10	79 100/4	0.8	7		DECOMPOSED BEDROCK	Similar to S9, except red-brown to gray, frequent shale chips	35
40	S-11	73 100/3	0.8	5			Similar to S10, except gray	30
							Note: Well installed in completed borehole END OF BORING 40.8 ft	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40.8 ft Rock: - ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-107
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 246+84.18/15.63R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 822110.0055
Start Date: 4-25-08	Route No.:		Easting: 1003990.544
Finish Date: 4-25-08	Bridge No.:		Surface Elevation: 69.99
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 1.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	4 4 4 5	2	20		RAILROAD BALLAST / FILL	Loose dark brown to black coarse to fine SAND and COAL CINDERS, little coarse to fine gravel, silt, trace coal particles, no odor, dry	
	S-2	5 4 5 7	2	18			Loose brown coarse to fine SAND, trace fine gravel, silt, no odor, wet	
5	S-3	4 4 7 11	2	18		ALLUVIAL DEPOSITS	Stiff brown clayey SILT, little coarse to fine sand, no odor, wet	65
	S-4	8 10 9 11	2	20			Similar to S3, except very stiff, poorly-stratified	
							Note: Switched to NW casing at 10.0 ft	
10	S-5	5 7 12 13	2	18		GLACIO-LACUSTRINE DEPOSITS	Very stiff red-brown CLAY varved with brown clayey SILT, trace fine sand, no odor, wet	60
15	S-6	8 7 5 5	2	14			Similar to S5, except stiff	55
	UP-1	p u s h	2	0			Note: Piston tube sample taken 18.0 to 20.0 ft (tube crushed during push)	
20	S-7	11 17 18 10	2	0			No recovery	50

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40.3 ft Rock: - ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-107
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 246+84.18/15.63R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 822110.0055
Start Date: 4-25-08	Route No.:		Easting: 1003990.544
Finish Date: 4-25-08	Bridge No.:		Surface Elevation: 69.99
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 1.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
25	S-8	6 8 8 13	2	24			Very stiff brown stratified SILT and clayey SILT, no odor, wet; layers approximately 1/8 to 1/4 in. thick	45
						GLACIAL TILL		
30	S-9	16 23 32 41	2	10			Very dense red-brown coarse to fine SAND, some silt, little coarse to fine gravel, wet	40
35	S-10	46 81 100/1	1.1	11			Very dense red-brown coarse to fine GRAVEL, some silt, little coarse to fine sand, no odor, wet Note: Drill action indicates hard material from 36.5 to 40.0 ft	35
40	S-11	100/3	0.3	3			Similar to S10	30
							END OF BORING 40.3 ft	
45								25

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40.3 ft Rock: - ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: RB-110	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 247+87.61/12.43R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 822197.332752	
Start Date: 4-14-08	Route No.:	Easting: 1004045.706434	
Finish Date: 4-14-08	Bridge No.:	Surface Elevation: 69.37	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 5.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	8 9 11 12	2	19		RAILROAD BALLAST / FILL	Medium dense gray coarse to fine GRAVEL, little coarse to fine sand, trace silt, no odor, dry	
							Medium dense black to dark gray-brown coarse to fine SAND and COAL CINDERS, little medium to fine gravel, silt, no odor, dry	
	S-2	9 10 8 6	2	6			Medium dense coarse to fine SAND, some silt, trace medium to fine gravel, no odor, moist	
								65
5	S-3	1 2 4 4	2	18		ORGANIC SILT	Medium stiff dark gray-brown SILT and ORGANIC SILT, little coarse to fine sand, trace organic fibers, slight organic odor, wet	
						ALLUVIUM	Medium stiff brown CLAY, no odor, wet; trace gravel in spoon tip	
	S-4	2 3 2 3	2	23			Medium stiff brown SILT, trace fine sand, no odor, wet	
							Note: Switched to NW casing at 10.0 ft	60
10	S-5	6 7 4 6	2	18			Stiff brown to light brown SILT, some fine sand, no odor, wet	
						GLACIO-LACUSTRINE DEPOSITS	Stiff brown silty CLAY, no odor, wet	
								55
15	S-6	2 3 4 4	2	16			Medium stiff brown silty CLAY, no odor, wet; stratified (not truly varved)	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 25.0 ft Rock: - ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 8 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: RB-110	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 247+87.61/12.43R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 822197.332752	
Start Date: 4-14-08	Route No.:	Easting: 1004045.706434	
Finish Date: 4-14-08	Bridge No.:	Surface Elevation: 69.37	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 5.0 ft b.g.s			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		50
20	S-7	1 1 2 2	2	20			Similar to S6, except soft, trace fine gravel, coarse to fine sand	
	S-8	2 4 5 6	2	21			Similar to S7, except stiff	45
25							END OF BORING 25 ft	40
30								35
35								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 25.0 ft Rock: - ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 8 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: CB-103
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 250+68.97/10.42R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 822435.200992
Start Date: 4-14-08	Route No.:		Easting: 1004195.67663
Finish Date: 4-14-08	Bridge No.:		Surface Elevation: 71.44
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 11.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	7 8 9 9	2	7		FILL	Medium dense brown coarse to fine SAND, little coarse to fine gravel, silt, trace roots, no odor, dry	70
	S-2	9 11 10 7	2	0			No recovery, pushed gravel (cuttings are similar to S1)	
5	S-3	7 10 9 7	2	18			Medium dense brown to red-brown coarse to fine SAND, some coarse to fine gravel, little silt, no odor, dry	65
	S-4	7 7 8 13	2	14			Similar to S3	
							Note: Switched to NW casing at 10.0 ft	
10	S-5	2 1 1 1	2	20		ALLUVIUM	Very soft SILT, little fine sand, clay, no odor, wet	60
	S-6	woh - 1 1	2	21			Similar to S5	
15	S-7	1 1 1 1	2	18			Very soft brown stratified SILT and fine SAND, with frequent layers of black organic silt approximately 1/8 to 1/2 in. thick., trace organic matter, slight organic odor, wet	55
20	S-8	5 5 7 8	2	18		GLACIO-LACUSTRINE DEPOSITS	Medium dense red-brown coarse to fine SAND, some medium to fine gravel, clayey silt, trace coarse gravel, no odor, wet; bonded in-situ	50

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 50.0 ft Rock: - ft	NOTES:	Sheet 1 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: CB-103
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 250+68.97/10.42R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 822435.200992
Start Date: 4-14-08	Route No.:		Easting: 1004195.67663
Finish Date: 4-14-08	Bridge No.:		Surface Elevation: 71.44
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 11.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
25	S-9	3 4 6 8	2	17			Medium stiff brown silty CLAY, with coarse gravel dropstone at 26.0 ft, no odor, wet Stiff brown clayey SILT, no odor, wet	45
30	S-10	4 4 5 5	2	18			Stiff brown silty CLAY, some coarse to fine sand, little medium to fine gravel, no odor, wet; resembles ablation or flow till	40
35	S-11	3 4 5 5	2	19			Stiff brown varved SILT and CLAY, no odor, wet; silt and clay layers generally 0.5 to 1 in. thick each	35
	UP-1	p u s h	2	12			Note: Piston tube sample from 38.0 to 40.0 ft, poor recovery	
40	S-12	7 7 9 11	2	24			Very stiff brown clayey SILT, no odor, wet	30
45	S-13	5 8 8 13	2	16		GLACIAL TILL	Medium dense red-brown SILT and coarse to fine SAND, some coarse to fine gravel, no odor, wet; bonded in-situ	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 50.0 ft Rock: - ft	NOTES:	Sheet 2 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: CB-103
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 250+68.97/10.42R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 822435.200992
Start Date: 4-14-08	Route No.:		Easting: 1004195.67663
Finish Date: 4-14-08	Bridge No.:		Surface Elevation: 71.44
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 11.0 ft b.g.s			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIAL TILL *(con't)*		25
	S-14	12 18 35 100	2	19			Similar to S13 Note: Completely weathered shale in tip of soon, possible top of bedrock	
50							END OF BORING 50 ft	20
55								15
60								10
65								5

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 50.0 ft Rock: - ft	NOTES:	Sheet 3 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: RB-111	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 253+02.32/6.32R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 822637.951858	
Start Date: 4-14-08	Route No.:	Easting: 1004311.24775	
Finish Date: 4-14-08	Bridge No.:	Surface Elevation: 71.56	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 5.5 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	9 10 12 10	2	10		RAILROAD BALLAST / FILL	Medium dense black to dark gray-brown coarse to fine SAND and COAL CINDERS, trace coarse to fine gravel, coal particles, no odor, dry	
	S-2	11 7 7 6	2	16			Medium dense brown coarse to fine SAND and fine GRAVEL, trace silt, no odor, dry Similar to S1 (below 0.8 ft)	70
						ALLUVIUM	Stiff brown SILT, some fine sand, trace clay, no odor, wet at approximately 5.5 ft	
5	S-3	3 3 4 4	2	17			Similar to S2 (below 3.0 ft), except loose, wet	65
	S-4	2 3 9 16	2	15			Similar to S3	
						GLACIO-LACUSTRINE DEPOSITS	Very stiff brown clayey SILT, moist; compact Note: Switched to NW casing at 10.0 ft	
10	S-5	4 8 8 9	2	18			Very stiff red-brown to brown silty CLAY, no odor, wet	60
15	S-6	3 4 6 8	2	18			Stiff brown stratified SILT, some fine sand, frequent clay layers, no odor, wet	55

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 25.0 ft Rock: - ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 8 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RB-111
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 253+02.32/6.32R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 822637.951858
Start Date: 4-14-08	Route No.:		Easting: 1004311.24775
Finish Date: 4-14-08	Bridge No.:		Surface Elevation: 71.56
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 5.5 ft b.g.s			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
20	S-7	1 1 2 3	2	24			Soft brown silty CLAY, no odor, wet; with frequent layers of clayey SAND, little fine gravel approximately 0.5 to 2 in. thick; possible ice-raft deposits	50
	S-8	3 3 2 2	2	24			Similar to S7, except medium stiff; sandy layer approximately 6 in. thick from 23.3 to 23.8 ft	
25							END OF BORING 25 ft	45
30								40
35								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 25.0 ft Rock: - ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 8 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: RB-112	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 255+80.99/4.89R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 822878.174052	
Start Date: 4-14-08	Route No.:	Easting: 1004452.509162	
Finish Date: 4-14-08	Bridge No.:	Surface Elevation: 71.19	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 5.5 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	8 6 8 8	2	14		RAILROAD BALLAST / FILL	Medium dense black to dark gray-brown coarse to fine SAND and COAL CINDERS, trace medium to fine gravel, silt, no odor, wet	70
	S-2	8 6 6 9	2	14		GLACIO-LACUSTRINE DEPOSITS	Similar to S1 Stiff red-brown to brown laminated SILT and CLAY, occasional fine sand partings, no odor, moist	
5	S-3	8 10 13 8	2	16			Very stiff brown to red-brown stratified clayey SILT (approximately 5.0 to 6.2 ft and 6.7 to 7 ft) and SAND, some silt (6.2 to 6.7 ft), no odor, wet	65
	S-4	7 7 8 7	2	16			Stiff brown CLAY varved with clayey SILT, no odor, wet; clay layers generally 1 to 2 in. thick, silt layers generally 4 in. +	
							Note: Switched to NW casing at 10.0 ft	
10	S-5	1 2 3 4	2	18			Medium stiff brown SILT, trace clay, grading to SILT, trace fine sand, no odor, wet	60
15	S-6	3 2 3 3	2	20			Medium stiff brown clayey SILT, trace fine sand, no odor, wet	55

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 25.0 ft Rock: - ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 8 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: RB-112	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 255+80.99/4.89R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 822878.174052	
Start Date: 4-14-08	Route No.:	Easting: 1004452.509162	
Finish Date: 4-14-08	Bridge No.:	Surface Elevation: 71.19	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 5.5 ft b.g.s			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
	UP-1	p u s h	2	24		GLACIO-LACUSTRINE DEPOSITS *(con't)*	Note: Piston tube sample from 18.0 to 20.0 ft	
20	S-7	5 4 2 4	2	23			Medium stiff brown CLAY, some silt, no odor, wet; laminated silt and clay approximately 20.0 to 20.8 ft and 21.7 to 22.0 ft; single massive clay layer approximately 20.8 to 21.7 ft	50
	S-8	3 4 4 4	2	24			Similar to S7; laminated SILT and clayey SILT approximately 23 to 23.6 ft and 24.7 to 25.0 ft; massive clay layer 23.6 to 24.7 ft with occasional medium to fine gravel (dropstones), layer of medium to fine gravel and coarse sand at approximately 24.1 to 24.2 ft in massive clay layer (possible ice-raft deposits)	
25							END OF BORING 25 ft	45
30								40
35								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 25.0 ft Rock: - ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 8 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: RW-109	
Inspector: E. Danaher	Town: Newington to West Hartford	Stat./Offset: 295+33.84/25.72L	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 826292.463623	
Start Date: 10-22-07	Route No.:	Easting: 1006444.273249	
Finish Date: 10-22-07	Bridge No.:	Surface Elevation: 67.23	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.0 in. / HW	Sampler Type/Size: SS / 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: 300 lb. Fall: 30 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	8 5 4 4	2	15		BITUMINOUS CONCRETE	Loose dark brown GRAVEL, some coarse to fine sand, trace silt	
						FILL	Stiff red-brown coarse to fine SAND, some silt, clay	
	S-2	4 4 5 6	2	0			No recovery	65
5	S-3	1 3 7 4	2	4			Medium dense red-brown coarse to fine SAND, some silt, trace clay	
	S-4	3 3 3 5	2	17			Loose gray-brown fine SAND, some silt, no odor, wet	60
10	S-5	8 13 15 16	2	20		GLACIO-LACUSTRINE DEPOSITS	Very stiff red-brown CLAY varved with fine SAND and SILT	
	S-6	9 7 5 6	2	8			Stiff red-brown CLAY varved with fine SAND and SILT	55
15	S-7	2 3 4 5	2	24			Similar to S6, except medium stiff	
								50
20	S-8	1 2 3 2	2	24			Similar to S7	
								45

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40.0 ft Rock: - ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 12 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RW-109
Inspector: E. Danaher	Town: Newington to West Hartford		Stat./Offset: 295+33.84/25.72L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826292.463623
Start Date: 10-22-07	Route No.:		Easting: 1006444.273249
Finish Date: 10-22-07	Bridge No.:		Surface Elevation: 67.23
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.0 in. / HW	Sampler Type/Size: SS / 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: 300 lb. Fall: 30 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
25	S-9	2 2 2 1	2	24			Similar to S8, except soft	
								40
30	S-10	3 5 9 10	2	24			Similar to S9, except medium stiff	
							Medium dense red-brown SILT and fine SAND	35
35	S-11	3 5 9 9	2	16			Medium stiff red-brown CLAY varved with SILT and fine SAND	
							Note: Cobbles and/or boulder encountered to approximately 37.0 to 38.0 ft	30
						GLACIAL TILL		
	S-12	5 6 7 6	2	24			Medium dense red-brown coarse to fine SAND and SILT, little fine gravel	
40							END OF BORING 40 ft	
								25
45								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40.0 ft Rock: - ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 12 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-110
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 295+84.79/20.78R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826312.547855
Start Date: 4-15-08	Route No.:		Easting: 1006510.279731
Finish Date: 4-15-08	Bridge No.:		Surface Elevation: 70.03
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ (not observed)			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0						RAILROAD BALLAST / FILL		70
	S-1	10 14 11 7	2	21			Medium dense brown coarse to fine SAND, some medium to fine gravel, little silt, no odor, wet	
	S-2	3 5 5 4	2	18			Stiff dark gray-brown clayey SILT, trace fine sand, slight organic odor, moist	
5	S-3	5 6 7 7	2	6			Stiff brown to gray silty CLAY, trace fine sand, no odor, moist; some mottling (poor recovery)	65
	S-4	7 9 11 7	2	6			Similar to S3, except very stiff	
							Note: Switched to NW casing at 10.0 ft	
10	S-5	8 11 13 16	2	19			Very stiff brown to light brown to gray-brown varved SILT and silty CLAY, trace fine sand; varves typically approximately 1/8 to 1/4 in. thick consisting of fine sand parting-silt seam-clay seam sequences	60
15	S-6	7 8 14 18	2	24		GLACIO-LACUSTRINE DEPOSITS	Very stiff brown to red-brown varved CLAY and SILT, no odor, wet; silt layers approximately 2 to 3 in. thick, clay layers approximately up to 1.5 in. thick	55
20	S-7	4 4 4 4	2	24			Similar to S6, except medium stiff	50

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40.0 ft Rock: - ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-110
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 295+84.79/20.78R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826312.547855
Start Date: 4-15-08	Route No.:		Easting: 1006510.279731
Finish Date: 4-15-08	Bridge No.:		Surface Elevation: 70.03
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ (not observed)			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
	UP-1	p u s h	2	24		GLACIO-LACUSTRINE DEPOSITS *(con't)*	Piston tube sample 23.0 to 25.0 ft	
25	S-8	2 1 2 2	2	24			Soft brown to red-brown varved CLAY and clayey SILT, no odor, wet	45
30	S-9	woh woh 1 2	2	24			Very stiff red-brown CLAY varved with gray-brown to olive-brown clayey SILT, no odor, wet; silt layers generally 0.5 to 1 in. thick, clay layers generally 0.5 to over 2 in. thick, layer containing little coarse to fine sand from 31.1 to 31.2 ft	40
35	S-10	14 11 13 16	2	24			Note: Drill action suggests stratum change at approximately 34.0 ft Medium dense red-brown stratified SILT and fine SAND, occasional clay seams, occasional seams with coarse to fine sand, no odor, wet	35
	S-11	9 15 24 27	2	24			Hard brown to red-brown varved CLAY and clayey SILT, with occasional lenses of red-brown clayey coarse to fine sand, no odor, wet	
40								30
							END OF BORING 40 ft	
45								25

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40.0 ft Rock: - ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: M. Jennett	**Connecticut DOT Boring Report**	Hole No.: RW-111	
Inspector: E. Danaher	Town: Newington to West Hartford	Stat./Offset: 297+02.03/29.11L	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 826438.797469	
Start Date: 10-22-07	Route No.:	Easting: 1006527.235797	
Finish Date: 10-22-07	Bridge No.:	Surface Elevation: 57.68	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.0 in. / HW	Sampler Type/Size: SS / 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: 300 lb. Fall: 30 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	8 8 12 10	2	6		BITUMINOUS CONCRETE / FILL	Medium dense dark brown coarse to fine SAND, little gravel, trace brick, cinders, silt, no odor, dry	
	S-2	5 5 6 4	2	14			Medium dense dark brown coarse to fine SAND, little fine gravel, cinders, coal, ash, trace silt, no odor, dry	55
5	S-3	2 3 2 7	2	21			Similar to S2, except loose Loose gray-brown silty fine SAND, no odor, moist	
	S-4	4 9 10 12	2	14			Very stiff red-brown SILT, some fine sand, trace clay, no odor, moist	50
10	S-5	19 19 17 19	2	12		GLACIO-LACUSTRINE DEPOSITS	Hard red-brown CLAY varved with SILT and fine SAND, little fine gravel, no odor, moist	45
15	S-6	3 3 3 3	2	24			Medium stiff red-brown CLAY varved with SILT and fine SAND, no odor, wet	40
20	S-7	2 4 2 4	2	24			Similar to S6	35

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40 ft Rock: - ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: M. Jennett	**Connecticut DOT Boring Report**		Hole No.: RW-111
Inspector: E. Danaher	Town: Newington to West Hartford		Stat./Offset: 297+02.03/29.11L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826438.797469
Start Date: 10-22-07	Route No.:		Easting: 1006527.235797
Finish Date: 10-22-07	Bridge No.:		Surface Elevation: 57.68
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.0 in. / HW	Sampler Type/Size: SS / 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: 300 lb. Fall: 30 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
25	S-8	2 3 4 3	2	20			Similar to S7	
								30
30	S-9	6 8 8 16	2	20			Very stiff red-brown CLAY varved with SILT	
							Dense red-brown fine GRAVEL and SILT, little clay, trace coarse to fine sand	25
35	S-10	8 11 7 9	2	20			Very stiff red-brown CLAY, some silt, little coarse to fine SAND and fine gravel	
						GLACIAL TILL		
	S-11	10 18 17 27	2	18			Dense red-brown silty fine SAND, little gravel, coarse to fine sand, trace clay; possible flow-till	20
40							END OF BORING 40 ft	
								15
45								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40 ft Rock: - ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**	Hole No.: RW-112	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 297+54.72/18.98R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 826459.571573	
Start Date: 4-15-08	Route No.:	Easting: 1006595.503034	
Finish Date: 4-15-08	Bridge No.:	Surface Elevation: 69.33	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 16.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0						RAILROAD BALLAST / FILL		
	S-1	9 13 10 17	2	12			Medium dense black to brown coarse to fine SAND, little coarse to fine gravel, coal cinders, trace silt, no odor, dry	
	S-2	11 13 17 18	2	16			Medium dense red-brown coarse to fine SAND, some silt, little medium to fine gravel, no odor, dry	65
5	S-3	8 7 8 11	2	20			Stiff brown to gray-brown to yellow-brown clayey SILT, trace fine sand, no odor, moist; little mottling	
	S-4	10 7 10 11	2	18			Similar to S3, except little clay	
							Note: Switched to NW casing at 10.0 ft	
10	S-5	8 7 8 8	2	24			Stiff brown silty CLAY varved with brown to light brown to light gray-brown SILT, trace fine sand, no odor, moist; varve couplets approximately 1/8 to 1/4 in. thick on average	60
15	S-6	9 11 13 15	2	24			Similar to S5, except very stiff	55
	UP-1	p u s h	2	24			Note: Piston tube sample from 18.0 to 20.0 ft	
20	S-7	7 9 11 14	2	24		GLACIO-LACUSTRINE DEPOSITS	Very stiff brown to red-brown CLAY varved with brown to gray-brown clayey SILT, no odor, wet; varve couplets generally 0.5 to 1.0 in. thick on average	50

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.7 ft Rock: - ft	NOTES:	Sheet 1 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore Inspector: S. Poff	**Connecticut DOT Boring Report** Town: Newington to West Hartford	Hole No.: RW-112 Stat./Offset: 297+54.72/18.98R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 826459.571573	
Start Date: 4-15-08	Route No.:	Easting: 1006595.503034	
Finish Date: 4-15-08	Bridge No.:	Surface Elevation: 69.33	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 16.0 ft b.g.s			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
25	S-8	7 7 6 9	2	24			Similar to S7, except stiff	45
30	S-9	woh woh 2 2	2	24			Very soft brown silty CLAY varved with brown clayey SILT, clay and silt layers generally 1 to 2 in. thick each, with occasional clay layers 4 in. or thicker	40
35	S-10	woh 1 2 3	2	24			Similar to S9, except soft	35
40	S-11	4 3 4 3	2	24			Similar to S10, except medium stiff, trace fine sand	30
45	S-12	5 6 5 5	2	22			Stiff brown to red-brown clayey SILT, frequent clay seams	25

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.7 ft Rock: - ft	NOTES:	Sheet 2 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-112
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 297+54.72/18.98R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826459.571573
Start Date: 4-15-08	Route No.:		Easting: 1006595.503034
Finish Date: 4-15-08	Bridge No.:		Surface Elevation: 69.33
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 16.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
						GLACIAL TILL	Note: Drill action suggests possible stratum change at approximately 48.0 ft	
50	S-13	13 21 24 30	2	20			Dense brown to red-brown clayey SILT and fine SAND, trace fine gravel, no odor, wet	20
55	S-14	26 100/2	0.7	5			Similar to S13, except with trace coarse gravel Note: Spoon refusal at 55.7 ft (shale fragments in spoon tip)	15
							END OF BORING 55.7 ft	
60								10
65								5

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.7 ft Rock: - ft	NOTES:	Sheet 3 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: M. Jennett	**Connecticut DOT Boring Report**		Hole No.: RW-113
Inspector: E. Danaher	Town: Newington to West Hartford		Stat./Offset: 298+45.78/26.38L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826561.008645
Start Date: 10-22-07	Route No.:		Easting: 1006602.982814
Finish Date: 10-22-07	Bridge No.:		Surface Elevation: 55.42
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.0 in. / HW	Sampler Type/Size: SS / 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: 300 lb. Fall: 30 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	10 15 9 6	2	13		FILL	Medium dense dark brown coarse to fine SAND, some gravel, little brick, ash, cinders and slag, trace silt	55
	S-2	7 9 6 6	2	14			Medium dense dark brown to brown coarse to fine SAND, little silt, fine gravel, slag, brick, cinders, ash, trace organics, no odor, moist	
5	S-3	7 3 2 2	2	5			Loose dark brown GRAVEL, some coarse to fine sand, little slag, cinders, ash, trace brick, no odor, wet	50
	S-4	1 1 1 2	2	10			Very loose gray-brown fine SAND and SILT, no odor, wet	
10	S-5	8 11 15 16	2	0			No recovery	45
	S-6	12 12 13 11	2	18			Very stiff red-brown CLAY varved with SILT, trace fine sand, no odor, moist	
						GLACIO-LACUSTRINE DEPOSITS		
15	S-7	5 5 6 7	2	24			Similar to S6, except stiff, wet at approximately 16.0 ft	40

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 37.5 ft Rock: - ft	NOTES:	Sheet 1 of 3
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: M. Jennett	**Connecticut DOT Boring Report**		Hole No.: RW-113
Inspector: E. Danaher	Town: Newington to West Hartford		Stat./Offset: 298+45.78/26.38L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826561.008645
Start Date: 10-22-07	Route No.:		Easting: 1006602.982814
Finish Date: 10-22-07	Bridge No.:		Surface Elevation: 55.42
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.0 in. / HW	Sampler Type/Size: SS / 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: 300 lb. Fall: 30 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
20	S-8	3 1 2 2	2	24			Similar to S7, except soft	35
25	S-9	1 1 2 2	2	24			Soft red-brown CLAY varved with SILT, trace fine sand, no odor, wet	30
30	S-10	3 4 8 9	2	24			Stiff red-brown clayey SILT	25
35	S-11	6 13 31 65	2	8			Similar to S10, except very stiff	20

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 37.5 ft Rock: - ft	NOTES:	Sheet 2 of 3
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: M. Jennett	**Connecticut DOT Boring Report**		Hole No.: RW-113
Inspector: E. Danaher	Town: Newington to West Hartford		Stat./Offset: 298+45.78/26.38L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826561.008645
Start Date: 10-22-07	Route No.:		Easting: 1006602.982814
Finish Date: 10-22-07	Bridge No.:		Surface Elevation: 55.42
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.0 in. / HW	Sampler Type/Size: SS / 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: 300 lb. Fall: 30 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	SAMPLES: Sample Type/No.	SAMPLES: Blows on Sampler per 6 inches	SAMPLES: Pen. (ft.)	SAMPLES: Rec. (in.)	SAMPLES: RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						WEATHERED BEDROCK	Dense red-brown GRAVEL (weathered siltstone), little silt Note: Roller bit refusal at 37.5 ft	
							END OF BORING 37.5 ft	
40								15
45								10
50								5

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 37.5 ft Rock: - ft	NOTES:	Sheet 3 of 3
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-114
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 298+94.02/17.2R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826580.249578
Start Date: 4-16-08	Route No.:		Easting: 1006665.090457
Finish Date: 4-16-08	Bridge No.:		Surface Elevation: 69.21
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 15.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	16 18 17 15	2	14		RAILROAD BALLAST FILL	Dense brown to black coarse to fine SAND and COAL CINDERS, trace silt, gravel, no odor, dry	
	S-2	10 10 13 11	2	16			Dense brown to light brown coarse to fine SAND, trace silt, fine gravel, no odor, dry Similar to S1 (below 1.5 ft)	65
5	S-3	8 4 2 2	2	17			Loose red-brown coarse to fine SAND, little fine gravel, silt, trace medium gravel, no odor, moist	
	S-4	2 2 3 2	2	18			Medium stiff brown to gray SILT, little fine sand, trace clay lenses, no odor, moist Note: Switched to NW casing at 10.0 ft	
10	S-5	3 5 5 7	2	20			Stiff brown to orange-brown to gray-brown SILT, some fine sand, trace clay lenses, no odor, wet; mottled Note: Switched to NW casing at 15.0 ft	60
15	S-6	2 2 2 2	2	24			Soft dark gray SILT, with organic silt, trace organic matter, slight organic odor, wet	55
20	S-7	woh woh 1 1	2	22			Very soft black ORGANIC SILT, little organics (mainly roots, twigs), trace sand, silt, organic odor, moist	50
	S-8	3 3 4 5	2	24			Medium stiff dark brown SILT, trace fine sand, organic silt, peat fibers, slight organic odor, wet	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 57.0 ft Rock: - ft	NOTES:	Sheet 1 of 3
No. of Soil Samples: 15 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-114
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 298+94.02/17.2R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826580.249578
Start Date: 4-16-08	Route No.:		Easting: 1006665.090457
Finish Date: 4-16-08	Bridge No.:		Surface Elevation: 69.21
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 15.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						FILL *(con't)*		
25	S-9	6 5 7 7	2	24		GLACIO-LACUSTRINE DEPOSITS	Stiff red-brown to brown CLAY, varved with brown to gray-brown SILT, trace fine sand, no odor, wet; varve couplets generally 0.5 to 1.0 in. thick	45
30	S-10	7 9 9 7	2	24			Similar to S9, except very stiff	40
35	S-11	4 4 9 11	2	24			Similar to S10, except stiff; varve couplets 1.0 to 1.5 in. thick on average; with 2 in. layer of red-brown SILT, some fine sand from approximately 36.1 to 36.3 ft	35
40	S-12	4 2 1 2	2	24			Similar to S11, except soft, varve couplets approximately 1.5 to 2.0 in. thick on average, clay fraction dominates	30
	UP-1	p u s h	2	24			Note: Piston tube sample from 43.0 to 45.0 ft	
45	S-13	10 13 12 13	2	24			Very stiff brown laminated SILT and CLAY, trace fine gravel and sand-sized dropstones, no odor, wet	25

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 57.0 ft Rock: - ft	NOTES:	Sheet 2 of 3
No. of Soil Samples: 15 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-114
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 298+94.02/17.2R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826580.249578
Start Date: 4-16-08	Route No.:		Easting: 1006665.090457
Finish Date: 4-16-08	Bridge No.:		Surface Elevation: 69.21
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 15.0 ft b.g.s			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
50	S-14	12 14 13 14	2	24			Similar to S13	20
						GLACIAL TILL	Note: Drill action suggests possible stratum change at approximately 53.0 ft	
55	S-15	17 24 31 43	2	16			Very dense red-brown SILT, some coarse to fine sand, little medium to fine gravel, trace clay, no odor, moist; compact bonded in-situ	15
							END OF BORING 57 ft	
60								10
65								5

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 57.0 ft Rock: - ft	NOTES:	Sheet 3 of 3
No. of Soil Samples: 15 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: M. Jennett	**Connecticut DOT Boring Report**		Hole No.: RW-115
Inspector: E. Danaher	Town: Newington to West Hartford		Stat./Offset: 299+77.53/22.03L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826672.077052
Start Date: 10-22-07	Route No.:		Easting: 1006674.000626
Finish Date: 10-22-07	Bridge No.:		Surface Elevation: 55.81
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.0 in. / HW	Sampler Type/Size: SS / 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: 300 lb. Fall: 30 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0						FILL		
	S-1	2 3 6 6	2	10			Loose brown fine SAND and SILT, little brick, ash, cinders, trace gravel	55
	S-2	4 4 5 5	2	18			Loose gray-brown SILT and fine SAND, no odor, moist	
5	S-3	3 7 11 17	2	18			Very stiff gray-brown SILT, some fine sand, trace clay, no odor, moist	50
	S-4	9 11 13 17	2	20			Medium dense gray-brown fine SAND and SILT, no odor, moist	
10	S-5	8 11 14 21	2	24			Very stiff gray-brown SILT, little clay, gravel, trace fine sand, no odor, moist	45
						GLACIO-LACUSTRINE DEPOSITS		
15	S-6	2 3 3 4	2	24			Medium stiff red-brown CLAY varved with SILT; no odor, wet	40
20	S-7	1 1 1 2	2	24			Very soft red-brown CLAY varved with SILT, no odor, wet	35

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40 ft Rock: - ft	NOTES:	Sheet 1 of 2
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: M. Jennett	**Connecticut DOT Boring Report**		Hole No.: RW-115
Inspector: E. Danaher	Town: Newington to West Hartford		Stat./Offset: 299+77.53/22.03L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826672.077052
Start Date: 10-22-07	Route No.:		Easting: 1006674.000626
Finish Date: 10-22-07	Bridge No.:		Surface Elevation: 55.81
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.0 in. / HW	Sampler Type/Size: SS / 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: 300 lb. Fall: 30 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations:			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
25	S-8	5 1 3 4	2	18			Similar to S7, except soft	30
30	S-9	2 3 5 7	2	20			Similar to S8, except medium stiff	25
35	S-10	5 6 7 9	2	18			Similar to S9, except stiff	20
	S-11	7 6 8 13	2	24			Similar to S10	
40							Medium dense red-brown fine SAND and SILT	
							END OF BORING 40 ft	15
45								10

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 40 ft Rock: - ft	NOTES:	Sheet 2 of 2
No. of Soil Samples: 11 No. of Core Runs: -		SM-001-M REV. 1/02

Driller:	T. McGovern	**Connecticut DOT Boring Report**		Hole No.:	NBA-101
Inspector:	S. Poff	Town:	Newington to West Hartford	Stat./Offset:	300+44.89/14.9L
Engineer:	Haley & Aldrich, Inc.	Project No.:	171-305	Northing:	826726.358885
Start Date:	4-28-08	Route No.:		Easting:	1006714.527666
Finish Date:	4-28-08	Bridge No.:		Surface Elevation:	51.84

Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000

Casing Size(in.)/Type: 3; NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: NW
Hammer Wt.: 300 lb Fall: 24 in.	Hammer Wt.: 140 lb Fall: 30 in.	

Groundwater Observations: @ approximately 5.0 ft b.g.s

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0							BITUMINOUS PAVEMENT		
	S-1	3 5 10 14	2	4			FILL	Medium dense brown coarse to fine SAND, some medium to fine gravel, trace silt, no odor, dry	50
	S-2	7 7 5 7	2	5				Medium dense brown coarse to fine SAND and medium to fine GRAVEL, trace silt, no odor, dry	
5	S-3	2 1 1 2	2	20			GLACIO-LACUSTRINE DEPOSITS	Very soft brown to red-brown CLAY varved with gray-brown SILT, no odor, wet; varve couplets approximately 0.5 to 1.0 in. thick on average, with occasional clay layers up to 3 in. thick, gravel dropstones	
	S-4	2 2 2 2	2	2				Similar to S3, except soft, with a thick clay layer from approximately 8.2 to 8.7 ft	45
10	S-5	2 2 2 2	2	18				Similar to S4	40
15	UP-1	p u s h	2	24				Note: Piston tube sample from 15.0 to 17.0 ft	
	S-6	1 1 1 1	2	16				Very soft brown to red-brown CLAY varved with gray-brown clayey SILT, no odor, wet; clay and silt layers approximately 1.0 in. thick each on average	35
20	S-7	1 1 3 4	2	20				Similar to S6, except soft	30

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 42.0 ft Rock: 8.0 ft	NOTES:	Sheet 1 of 3
No. of Soil Samples: 11 No. of Core Runs: 2		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: NBA-101
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 300+44.89/14.9L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826726.358885
Start Date: 4-28-08	Route No.:		Easting: 1006714.527666
Finish Date: 4-28-08	Bridge No.:		Surface Elevation: 51.84
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 3; NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: NW
Hammer Wt.: 300 lb Fall: 24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 5.0 ft b.g.s			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
							GLACIO-LACUSTRINE DEPOSITS *(con't)*		
25	UP-2	p u s h	2	24				Note: Piston tube sample from 25.0 to 27.0 ft	
	S-8	1 1 2 3	2	20				Soft brown to red-brown laminated clayey SILT with frequent clay layers, no odor, wet; silt layers approximately 2.0 to 3.0 in. thick on average, clay layers approximately 1 in. thick on average	25
30	S-9	1 3 5 5	2	12				Similar to S8, except medium stiff	
									20
35	UP-3	p u s h	2	24				Note: Piston tube sample from 35.0 to 37.0 ft	
	S-10	10 100/4	0.8	10				Medium dense red-brown SILT, little coarse to fine gravel, trace coarse to fine sand, clay, no odor, moist; compact, massive, well-bonded in-situ, angular to subrounded gravel	15
							WEATHERED BEDROCK	Note: Spoon refusal at 37.8 ft on probable top of bedrock	
40	S-11	100/1	0.1	1				Red-brown shale fragments, spoon refusal at 40.1 ft Note: Roller bit refusal at approximately 42.0 ft, began rock core at 42.0 ft	
	C-1		5	58	45	2	BEDROCK	Hard, fresh, brown , aphanitic SILTSTONE. Bedding is low angle, extremely thin to thin, often cross-bedded. Primary joints low angle (generally along bedding planes), extremely close to close, smooth, planar to slightly undulating, slightly disintegrated to fresh, open. Secondary joints are high angle,	10
						2			
						2			
45						2			

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 42.0 ft Rock: 8.0 ft	NOTES:	Sheet 2 of 3
No. of Soil Samples: 11 No. of Core Runs: 2		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: NBA-101
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 300+44.89/14.9L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826726.358885
Start Date: 4-28-08	Route No.:		Easting: 1006714.527666
Finish Date: 4-28-08	Bridge No.:		Surface Elevation: 51.84
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 3; NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: NW
Hammer Wt.: 300 lb Fall: 24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 5.0 ft b.g.s			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						2	BEDROCK *(con't)*	moderately spaced (or wider), smooth to rough, planar to slightly undulating, slightly disintegrated to fresh, open; occasional calcite in-filling in joints	
	C-2		3	30	72			Similar to C1, except primary joints are very close to moderately spaced	5
50								-PORTLAND ARKOSE FORMATION-	
								END OF BORING 50 ft	0
55									-5
60									-10
65									-15

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 42.0 ft Rock: 8.0 ft	NOTES:	Sheet 3 of 3
No. of Soil Samples: 11 No. of Core Runs: 2		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: NBA-102(OW)
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 301+27.86/24.43L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826802.55494
Start Date: 4-28-08	Route No.:		Easting: 1006748.698956
Finish Date: 4-28-08	Bridge No.:		Surface Elevation: 53.82
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/4; HSA/HW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 7.7 ft b.g.s after 3 days			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	3 5 6 4	2	10		TOPSOIL FILL	Medium dense brown coarse to fine SAND, some coarse to fine gravel, trace silt, no odor, dry	
	S-2	5 4 3 3	2	13			Similar to S1, except loose	
						GLACIO-LACUSTRINE DEPOSITS	Medium stiff brown CLAY varved with gray-brown clayey SILT, no odor, moist	50
5	S-3	2 2 3 4	2	24			Medium stiff brown to red-brown CLAY varved with gray-brown clayey SILT, trace fine sand, no odor, wet; varve couplets approximately 0.5 to 1.0 in. thick on average, with occasional clay layers over 2 in. thick; clay dominant, occasional gravel-sized dropstones	
	S-4	2 2 3 3	2	24			Similar to S3	
							Note: Switch to HW casing at 10.0 ft	45
10	S-5	woh/18 - - 2	2	24			Similar to S4, except very soft	
								40
15	S-6	woh/12 - 1 2	2	24			Similar to S5	
								35
20	S-7	woh/12 - 2 2	2	24			Similar to S6	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 51.5 ft Rock: - ft	NOTES:	Sheet 1 of 3
No. of Soil Samples: 13 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**	Hole No.: NBA-102(OW)	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 301+27.86/24.43L	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 826802.55494	
Start Date: 4-28-08	Route No.:	Easting: 1006748.698956	
Finish Date: 4-28-08	Bridge No.:	Surface Elevation: 53.82	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/4; HSA/HW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 7.7 ft b.g.s after 3 days			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		30
25	S-8	woh 1 2 4	2	18			Similar to S7	
								25
30	S-9	4 6 4 4	2	20			Stiff brown to red-brown laminated clayey SILT with frequent layers of clay (up to 1.5 in. thick on average), no odor, wet; frequent layers of SILT, some fine sand	
								20
35	S-10	4 5 4 4	2	24			Similar to S9	
								15
40	S-11	2 4 3 5	2	20			Similar to S10, except medium stiff	
							Note: Drill action suggests stratum change at approximately 44.0 ft	10
45	S-12	100/4	0.3	3		WEATHERED BEDROCK	Very dense red-brown coarse to fine GRAVEL, some coarse to fine sand, little silt, no odor, wet; composed of shale fragments	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 51.5 ft Rock: - ft	NOTES:	Sheet 2 of 3
No. of Soil Samples: 13 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**	Hole No.: NBA-102(OW)	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 301+27.86/24.43L	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 826802.55494	
Start Date: 4-28-08	Route No.:	Easting: 1006748.698956	
Finish Date: 4-28-08	Bridge No.:	Surface Elevation: 53.82	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/4; HSA/HW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 7.7 ft b.g.s after 3 days			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						WEATHERED BEDROCK *(con't)*		5
50	S-13	100/3	0.3	2			Similar to S11 Note: Roller bit refusal at 51.5 ft	
							Note: Well installed in completed borehole END OF BORING 51.5 ft	0
55								-5
60								-10
65								-15

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 51.5 ft Rock: - ft	NOTES:	Sheet 3 of 3
No. of Soil Samples: 13 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-116
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 301+70.86/10.48R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826822.904342
Start Date: 4-16-08	Route No.:		Easting: 1006800.414252
Finish Date: 4-17-08	Bridge No.:		Surface Elevation: 67.82
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 10.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	12 15 17 11	2	0		RAILROAD BALLAST / FILL	Dense dark brown to black coarse to fine SAND and COAL CINDERS, some coarse to fine gravel, little silt, no odor, dry	
	S-2	8 6 13 6	2	18		GLACIO-LACUSTRINE DEPOSITS	Medium dense brown coarse to fine SAND, little medium to fine gravel, trace silt, no odor, dry	65
							Very stiff gray-brown CLAY varved with brown SILT and fine SAND, no odor, moist; varve couplets are approximately 1/8 to 1/4 in. thick on average	
5	S-3	7 4 4 5	2	24			Similar to S2, except medium stiff, wet	
	S-4	5 4 4 6	2	24			Similar to S3	60
							Note: Switched to NW casing at 10.0 ft	
10	S-5	woh woh 2 2	2	24			Very soft gray-brown CLAY varved with brown SILT, little fine sand, no odor, wet; varve couplets generally approximately 0.25 to 0.5 in. thick, although single 5 in. thick layer was encountered at approximately 23.2 to 23.6 ft	55
15	S-6	woh woh woh 2	2	24			Similar to S5, except trace fine sand	
	UP-1	p u s h	2	24			Note: Piston tube sample 18.0 to 20.0 ft	50
20	S-7	woh woh 1 2	2	24			Similar to S6	
								45

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 57.0 ft Rock: - ft	NOTES:	Sheet 1 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**	Hole No.: RW-116	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 301+70.86/10.48R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 826822.904342	
Start Date: 4-16-08	Route No.:	Easting: 1006800.414252	
Finish Date: 4-17-08	Bridge No.:	Surface Elevation: 67.82	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 10.0 ft b.g.s			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
25	S-8	woh woh 2 2	2	24			Similar to S7	
								40
30	S-9	woh woh woh 2	2	24			Similar to S8	
								35
35	S-10	woh 1 2 3	2	24			Similar to S9, except soft	
								30
40	S-11	woh 1 1 2	2	24			Very soft brown CLAY varved with gray-brown SILT, no odor, wet; varve couplets approximately 1.5 to 3.0 in. thick on average	
								25
45	S-12	1 1 2 2	2	24			Similar to S11, except soft	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 57.0 ft Rock: - ft	NOTES:	Sheet 2 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**	Hole No.: RW-116	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 301+70.86/10.48R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 826822.904342	
Start Date: 4-16-08	Route No.:	Easting: 1006800.414252	
Finish Date: 4-17-08	Bridge No.:	Surface Elevation: 67.82	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 10.0 ft b.g.s			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		20
50	S-13	woh 2 2 4	2	24			Similar to S12	
								15
55	S-14	2 3 3 5	2	24			Medium stiff brown to red-brown clayey SILT, no odor, wet	
							END OF BORING 57 ft	10
60								5
65								0

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 57.0 ft Rock: - ft	NOTES:	Sheet 3 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-117(OW)
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 303+10.02/20.31R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826943.322226
Start Date: 4-17-08	Route No.:		Easting: 1006871.032327
Finish Date: 4-18-08	Bridge No.:		Surface Elevation: 66.76
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/4; HSA/HW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 14.2.0 ft b.g.s after 13 days			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	10 15 11 19	2	11		RAILROAD BALLAST / FILL	Medium dense brown to red-brown coarse to fine SAND, some coarse to fine gravel, little silt, coal cinders, no odor, moist	
	S-2	10 7 7 10	2	18		GLACIO-LACUSTRINE DEPOSITS	Similar to S1 Stiff dark brown to gray-brown laminated clayey SILT, trace fine sand, no odor, dry	65
5	S-3	1 1 1 2	2	24			Very soft gray CLAY varved with brown to red-brown SILT, trace fine sand, no odor, wet; varve couplets generally 1/8 to 1/4 in. thick	
	S-4	2 1 2 2	2	24			Soft brown to gray-brown silty CLAY varved with brown to red-brown SILT, trace fine sand, no odor, wet; varve couplets generally 1/4 to 3/4 in. thick, but up to 4 in. thick, clay dominant	60
							Note: Switched to HW casing at 10.0 ft	
10	S-5	2 2 2 2	2	24			Similar to S4	55
15	S-6	1 1 2 3	2	24			Similar to S5, except CLAY varved with clayey SILT	50
20	S-7	woh 1 2 1	2	24			Similar to S6	45

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 1 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-117(OW)
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 303+10.02/20.31R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 826943.322226
Start Date: 4-17-08	Route No.:		Easting: 1006871.032327
Finish Date: 4-18-08	Bridge No.:		Surface Elevation: 66.76
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/4; HSA/HW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 14.2.0 ft b.g.s after 13 days			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
25	S-8	woh woh 1 2	2	24			Similar to S7, except very soft; red-brown to brown CLAY varved with brown to gray-brown clayey SILT, varve couplets generally 0.5 to 1.5 in. thick	40
30	S-9	2 2 2 3	2	24			Similar to S8, except soft	35
	UP-1	p u s h	2	24			Note: Piston tube sample from 33.0 to 35.0 ft	
35	S-10	3 4 4 4	2	24			Similar to S9, except medium stiff	30
40	S-11	4 5 4 4	2	24			Similar to S10	25
45	S-12	3 2 4 4	2	24			Similar to S11	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 2 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**	Hole No.: RW-117(OW)	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 303+10.02/20.31R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 826943.322226	
Start Date: 4-17-08	Route No.:	Easting: 1006871.032327	
Finish Date: 4-18-08	Bridge No.:	Surface Elevation: 66.76	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/4; HSA/HW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 14.2.0 ft b.g.s after 13 days			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		20
50	S-13	10 11 12 18	2	20			Very stiff brown to red-brown laminated clayey SILT, with occasional layers of red-brown clayey SILT, some sand (ice-raft deposits)	15
	S-14	12 10 12 16	2	21			Similar to S13 Note: Well installed in completed borehole	
55							END OF BORING 55 ft	10
60								5
65								0

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 3 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: RW-125	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 306+40.95/22.59L	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 827252.246246	
Start Date: 4-29-08	Route No.:	Easting: 1006998.497559	
Finish Date: 4-29-08	Bridge No.:	Surface Elevation: 53.51	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 14.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	1 2 7 6	2	9		FILL	Stiff dark brown to gray-brown clayey SILT, little coarse to fine sand, roots/organics, trace brick, slight organic odor, moist (topsoil and disturbed top of clay deposits)	
	S-2	5 8 10 15	2	14			Very stiff light brown to brown to gray-brown laminated silty CLAY, frequent partings of fine sand, no odor, dry	50
5	S-3	4 14 21 26	2	20			Hard light brown to gray-brown laminated CLAY, some silt, trace fine sand partings, with 0.25 in. thick layer of SILT and SAND, some organic fibers at approximately 6.2 ft	
	S-4	13 17 18 19	2	18			Similar to S3, except no organic-containing sand layers	
							Note: Switched to NW casing at 10.0 ft	45
10	S-5	2 3 5 5	2	24		GLACIO-LACUSTRINE DEPOSITS	Medium stiff brown to red-brown CLAY varved with brown SILT, trace fine sand, no odor, moist; varve couplets composed of clay seam-silt seam-fine sand parting sequences, 0.5 to 1.0 in. thick on average	
								40
15	S-6	2 2 2 2	2	24			Similar to S5, except soft, wet; varve couplets approximately 1.0 to 2.0 in. thick on average	
								35
20	S-7	1 1 1 1	2	24			Very soft red-brown CLAY varved with gray-brown clayey SILT, no odor, wet; varve couplets approximately 1.0 to 3.0 in. thick on average; clay dominant	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 54.4 ft Rock: - ft	NOTES:	Sheet 1 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: RW-125
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 306+40.95/22.59L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 827252.246246
Start Date: 4-29-08	Route No.:		Easting: 1006998.497559
Finish Date: 4-29-08	Bridge No.:		Surface Elevation: 53.51
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 14.0 ft b.g.s			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		30
25	S-8	1 1 1 2	2	24			Similar to S7, with occasional clay layers approximately 3.0 to 4.0 in. thick on average	
								25
30	S-9	4 3 3 1	2	24			Similar to S8, except medium stiff	
								20
35	S-10	1 1 1 2	2	20			Similar to S9, except very soft Very soft red-brown to brown CLAY with frequent layers of red-brown to brown silty CLAY, no odor, wet	
								15
40	S-11	2 5 6 7	2	20			Stiff red-brown to brown clayey SILT with frequent interbeds of both SILT and CLAY, no odor, wet	
								10
45	S-12	1 2 2 1	2	22			Soft red-brown SILT, trace clay with frequent interbeds of clayey SILT, no odor, wet	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 54.4 ft Rock: - ft	NOTES:	Sheet 2 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: RW-125	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 306+40.95/22.59L	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 827252.246246	
Start Date: 4-29-08	Route No.:	Easting: 1006998.497559	
Finish Date: 4-29-08	Bridge No.:	Surface Elevation: 53.51	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 14.0 ft b.g.s			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
						GLACIAL TILL	Note: Drill action indicates probable stratum change at approximately 49.0 ft, with 6 in. of cobbles from 49.0 to 49.5 ft	5
50	S-13	19 36 36 46	2	18			Very dense red-brown coarse to fine SAND and coarse to fine GRAVEL, some silt, occasional clayey lenses, no odor, wet	
	S-14	36 42 100/5	1.4	16			Very dense red-brown coarse to fine SAND and medium to fine GRAVEL, trace silt, no odor, wet; subrounded to rounded particles (confined aquifer)	0
55							END OF BORING 54.4 ft	
								-5
60								
								-10
65								
								-15

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 54.4 ft Rock: - ft	NOTES:	Sheet 3 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-118
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 307+10.44/18.34R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 827284.770257
Start Date: 4-17-08	Route No.:		Easting: 1007072.189525
Finish Date: 4-17-08	Bridge No.:		Surface Elevation: 64.39
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 10.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	8 9 9 18	2	5		FILL	Medium dense brown to tan coarse to fine SAND and medium to fine GRAVEL, trace silt, no odor, dry	
	S-2	21 23 20 17	2	6			Dense brown coarse to fine SAND, some coarse to fine gravel, trace silt, coal cinders, no odor, dry	
5	S-3	3 3 4 9	2	14			Stiff brown to gray to yellow-brown clayey SILT, trace fine sand, no odor, moist; mottled	60
	S-4	9 9 9 10	2	4			Similar to S3, except very stiff, poor recovery; piece of gravel pushed through clay Note: Switched to NW casing at 10.0 ft	
10	S-5	4 4 4 6	2	20			Medium stiff dark brown to dark gray-brown clayey SILT, trace fine sand, organic fibers, slight organic odor, wet	55
15	S-6	3 3 4 5	2	21			Medium stiff dark brown to dark gray-brown clayey SILT and ORGANIC SILT, trace fine sand, organics, organic odor, wet; stratified	50
20	S-7	2 4 3 4	2	18			Similar to S6, except slight organic odor	45

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 1 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-118
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 307+10.44/18.34R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 827284.770257
Start Date: 4-17-08	Route No.:		Easting: 1007072.189525
Finish Date: 4-17-08	Bridge No.:		Surface Elevation: 64.39
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 10.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
25	S-8	7 8 8 7	2	24			Very stiff red-brown CLAY varved with brown SILT, trace fine sand, no odor, wet; varve couplets generally 0.25 to 0.75 in. thick on average	40
30	S-9	4 5 4 4	2	24			Similar to S8, except stiff; varve couplets average approximately 1.0 to 1.5 in. thick	35
35	S-10	1 1 1 2	2	24			Very soft brown to red-brown CLAY varved with brown to gray-brown clayey SILT, no odor, wet; varve couplets approximately 1.0 to 2.0 in. thick on average	30
40	S-11	woh/18 - - 2	2	24			Similar to S10	25
45	S-12	3 2 1 1	2	24			Similar to S11, except soft	20

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 2 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-118
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 307+10.44/18.34R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 827284.770257
Start Date: 4-17-08	Route No.:		Easting: 1007072.189525
Finish Date: 4-17-08	Bridge No.:		Surface Elevation: 64.39
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 10.0 ft b.g.s			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		
	UP-1	p u s h	2	24			Note: Piston tube sample at 48.0 to 50.0 ft	
50								15
	S-13	4 2 3 4	2	24			Similar to S12, except medium stiff, brown (both clay and silt), trace sand	
	S-14	3 3 4 5	2	24			Similar to S13	
55								10
							END OF BORING 55 ft	
60								5
65								0

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 3 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: TB-101
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 308+18.42/7.55R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 827378.897167
Start Date: 4-17-08	Route No.:		Easting: 1007126.269904
Finish Date: 4-22-08	Bridge No.:		Surface Elevation: 63.75
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: NX
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 31.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	9 9 9 10	2	12			FILL	Medium dense brown to dark brown coarse to fine SAND, some coarse to fine gravel, trace silt, coal cinders, no odor, dry	
	S-2	9 9 18 17	2	6				Medium dense brown to yellow-brown coarse to fine SAND and medium to fine GRAVEL, trace silt, coarse gravel, few cobbles, no odor, dry; rounded gravel and cobbles	60
5	S-3	14 16 16 11	2	0				No recovery (pushing gravel) (cuttings similar to S2)	
	S-4	12 6 9 15	2	8				Similar to S2	
								Note: Switched to NW casing at 10.0 ft	55
10	S-5	6 4 7 8	2	10				Similar to S4	
									50
15	S-6	3 5 5 5	2	12				Loose light brown to yellow-brown coarse to fine SAND, trace medium to fine gravel, silt, no odor, dry	
								Note: Roller bit grinding approximately 18.0 to 19.0 ft. Refusal at 19.0 ft. No cuttings indicated type of obstruction, however slight creosote odor suggests possible railroad ties. Moved 5 ft south-southwest and redrilled.	45
20	S-7	1 1 2 3	2	12				Very loose brown to orange-brown coarse to fine SAND, little medium to fine gravel, trace silt, coal particles, no odor, moist	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 103.0 ft Rock: 7.0 ft	NOTES:	Sheet 1 of 5
No. of Soil Samples: 23 No. of Core Runs: 2		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: TB-101
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 308+18.42/7.55R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 827378.897167
Start Date: 4-17-08	Route No.:		Easting: 1007126.269904
Finish Date: 4-22-08	Bridge No.:		Surface Elevation: 63.75
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: NX
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 31.0 ft b.g.s			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
							FILL *(con't)*		40
25	S-8	3 6 6 7	2	4				Medium dense brown coarse to fine SAND and COBBLES, little silt, gravel, no odor, wet; poor recovery, mainly sandstone cobble fragments. Note: Drill action suggests cobbles and sand from 27.0 to 30.0 ft	
30	S-9	7 7 8 8	2	8				Stiff brown clayey SILT, some coarse to fine gravel, little coarse to fine sand, no odor, wet; trace wood in spoon (fill cuttings), actual depth (between 27.0 and 30.0 ft) of wood location could not be determined	35
35	S-10	4 3 3 2	2	11			GLACIO-LACUSTRINE DEPOSITS	Medium stiff CLAY varved with gray-brown clayey SILT, no odor, wet; top 5 in. of sample contains wood fragments (disturbed)	30
40	S-11	1 1 2 2	2	20				Soft brown CLAY varved with gray-brown clayey SILT, no odor, wet; varve couplets typically 1.0 to 2.0 in. thick, clay dominant; one clay layer 6 in. thick from approximately 40.3 to 40.8 ft	25
45	S-12	1 3 6 3	2	20				Similar to S11, except stiff, layer of red-brown SILT, some fine sand at approximately 46.6 to 46.8 ft	20

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 103.0 ft Rock: 7.0 ft	NOTES:	Sheet 2 of 5
No. of Soil Samples: 23 No. of Core Runs: 2		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: TB-101	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 308+18.42/7.55R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 827378.897167	
Start Date: 4-17-08	Route No.:	Easting: 1007126.269904	
Finish Date: 4-22-08	Bridge No.:	Surface Elevation: 63.75	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: NX	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 31.0 ft b.g.s			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
							GLACIO-LACUSTRINE DEPOSITS *(con't)*		
								Very soft red-brown to brown CLAY varved with brown clayey SILT, trace coarse to fine sand, no odor, wet; clay layer thicknesses vary from approximately 0.5 to 3.0 in., silt thicknesses vary from approximately 0.25 to 2.0 in.; trace coarse to fine sand and fine gravel-sized dropstones	15
50	S-13	1 1/12 - 2	2	23					
	UP-1	p u s h	2	24				Note: Piston tube sample from 53.0 to 55.0 ft	10
55	S-14	3 3 4 3	2	24				Similar to S13	
									5
60	S-15	3 2 4 3	2	24				Medium stiff brown laminated clayey SILT, occasional clay layers generally 0.25 to 0.5 in. thick, trace coarse sand to fine gravel-sized dropstones, no odor, wet	
									0
65	S-16	6 6 5 2	2	24				Similar to S15, except stiff	
								Note: Drill action suggests stiffer/coarser material at approximately 68.5 ft	
							GLACIAL TILL		-5

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 103.0 ft Rock: 7.0 ft	NOTES:	Sheet 3 of 5
No. of Soil Samples: 23 No. of Core Runs: 2		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: TB-101
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 308+18.42/7.55R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 827378.897167
Start Date: 4-17-08	Route No.:		Easting: 1007126.269904
Finish Date: 4-22-08	Bridge No.:		Surface Elevation: 63.75
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: NX
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 31.0 ft b.g.s			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
70	S-17	21 21 25 21	2	16			GLACIAL TILL *(con't)*	Hard red-brown SILT, little coarse to fine sand, coarse to fine gravel, no odor, wet; gravel present in layers at approximately 69.5 to 69.7 ft and 70.3 to 70.5 ft, some stratification, possible flow-till Note: Few cobbles from 72.0 to 75.0 ft	
									-10
75	S-18	19 54 94 98	2	15				Very dense red-brown coarse to fine SAND and SILT, some coarse to fine gravel, trace clay, few cobbles, no odor, wet; compact and well-bonded in-situ; bottom 6 in. of sample is brown siltstone fragments (cobble)	
									-15
80	S-19	96 100/5	0.9	10				Similar to S18, composed primarily of horizontal red-brown shale flakes	
									-20
85	S-20	100/5	0.4	4				Very dense red-brown coarse to fine SAND and fine GRAVEL, some silt, little coarse to medium gravel, no odor, wet; well-bonded in-situ	
									-25
90	S-21	100/4	0.3	4				Similar to S20	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 103.0 ft Rock: 7.0 ft	NOTES:	Sheet 4 of 5
No. of Soil Samples: 23 No. of Core Runs: 2		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: TB-101
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 308+18.42/7.55R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 827378.897167
Start Date: 4-17-08	Route No.:		Easting: 1007126.269904
Finish Date: 4-22-08	Bridge No.:		Surface Elevation: 63.75
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: NX
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 31.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Core Times per 12"	Generalized Strata Description	Material Description and Notes	Elevation (ft)
							GLACIAL TILL *(con't)*		
									-30
95	S-22	56 100/4	0.8	9				Similar to S21, gravel lithologies in sample dominated by siltstone but includes basalt, wet	
									-35
100	S-23	56 100/6	1	9			BEDROCK	Similar to S22 Very dense/soft red-brown decomposed SHALE, no odor, wet Note: Roller bit refusal at 103.0 Moderately hard, highly to moderately weathered, brown, fine-grained to aphanitic SHALE with occasional thin beds of fine-grained sandstone up to 2 in. thick. Bedding is low angle, planar, laminated with frequent depositional features. Primary joints low angle along bedding, extremely to very close, smooth, planar to slightly undulating, slightly disintegrated, open. Secondary joints high angle to vertical, close (or wider) spacing, rough, stepped, slightly disintegrated to open, with small calcite-lined vugs (largest vug observed measured 1.5 in. long vertical, 0.25 in. wide, approximately 0.5 in. deep)	
	C-1		2	24	0				-40
105	C-2		5	54	0	1 1.5 1.5 2 2			-45
110								-PORTLAND ARKOSE FORMATION- Note: Core terminated at 110.0 ft due to refusal and destruction of core bit by metal fragments (casing shoe fragments)	
								END OF BORING 110 ft	-50
115									

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 103.0 ft Rock: 7.0 ft	NOTES:	Sheet 5 of 5
No. of Soil Samples: 23 No. of Core Runs: 2		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: TB-102(OW)	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 309+15.00/6.71R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 827461.702129	
Start Date: 4-22-08	Route No.:	Easting: 1007177.191157	
Finish Date: 4-24-08	Bridge No.:	Surface Elevation: 63.51	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/4; HSA/HW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 31.0 ft b.g.s after 7 days			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	5 7 9 13	2	12		FILL	Medium dense brown to light brown coarse to fine SAND and COAL CINDERS, some coarse to fine gravel, trace silt, no odor, dry	
	S-2	11 16 21 21	2	7			Dense brown coarse to fine SAND and coarse to fine GRAVEL, trace silt, no odor, dry; rounded gravel	60
5	S-3	6 9 8 12	2	10			Similar to S2, except medium dense Note: Frequent cobbles from 5.0 to 10.0 ft	
	S-4	7 7 9 10	2	12			Similar to S3 Note: Switched to NW casing at 10.0 ft	55
10	S-5	2 4 4 5	2	15			Loose light brown fine SAND, some coal cinders (layer approximately 11.5 to 11.8 ft), little coarse sand, medium to gravel, trace silt, no odor, dry	50
15	S-6	2 3 3 2	2	15			Loose light brown coarse to fine SAND, trace silt, fine gravel, no odor, dry Note: Auger grinding approximately 18.0 to 19.0 ft. Refusal at 19.0 ft. Offset 5 ft north-northeast and re-drill to 20.0 ft Note: Switched to HW casing at 20.0 ft	45
20	S-7	3 4 9 7	2	14			Similar to S6, except medium dense, little gravel	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 80.0 ft Rock: - ft	NOTES:	Sheet 1 of 4
No. of Soil Samples: 19 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**		Hole No.: TB-102(OW)
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 309+15.00/6.71R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 827461.702129
Start Date: 4-22-08	Route No.:		Easting: 1007177.191157
Finish Date: 4-24-08	Bridge No.:		Surface Elevation: 63.51
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/4; HSA/HW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 31.0 ft b.g.s after 7 days			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						FILL *(con't)*		40
25	S-8	11 12 15 15	2	12			Medium dense brown to dark brown coarse to fine SAND, some coarse to fine gravel, little silt, trace wood (branches), no odor, dry Note: Drill through wood (treated lumber) from approximately 28.0 to 29.0 ft. Roller bit grinding through hard material 29.0 to 35.0 ft (possible granite block wall-cuttings include flecks of muscovite and biotite, fine quartz sand and white powder that does not react with acid (ground orthoclase). Borehole abandoned after refusal. Off set 7 ft north-northeast and re-drilled, wood at approximately 28.5 to 29.5 ft	35
30	S-9	6 7 18 21	2	8			Very stiff gray CLAY with wood, gravel, cobbles, boulders, wood lumber odor, dry Note: Drill action suggests frequent voids approximately 3 to 4 in. diameter on average, but occasionally greater than 12 in., dense materials between voids from 32.0 to 36.0 ft	30
35	S-10	8 100/5	1 0.9	4			Possible void from 35. to 36.0 ft Very dense brown coarse to fine GRAVEL, little coarse to fine sand, trace silt, no odor, wet (poor recovery) Note: Drill action suggests gravel and cobbles from 36.0 to 37.5 ft	
						GLACIO-LACUSTRINE DEPOSITS		25
40	S-11	1/12 - 1 2	2	19			Note: Roller bit released from drill head and swivel at 40.0 ft. Sank to approximately 41.0 ft under weight of rods Very soft brown to red-brown CLAY varved with brown to gray-brown clayey SILT, no odor, wet; clay and silt layers approximately 0.5 to 1.0 in. thick each on average, with occasional clay layers up to 3 in. thick	20
45	UP-1	p u s h	2	24			Note: Piston tube sample 45.0 to 47.0 ft	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 80.0 ft Rock: - ft	NOTES:	Sheet 2 of 4
No. of Soil Samples: 19 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: TB-102(OW)	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 309+15.00/6.71R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 827461.702129	
Start Date: 4-22-08	Route No.:	Easting: 1007177.191157	
Finish Date: 4-24-08	Bridge No.:	Surface Elevation: 63.51	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/4; HSA/HW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 31.0 ft b.g.s after 7 days			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
	S-12	2 3 8 8	2	22		GLACIO-LACUSTRINE DEPOSITS *(con't)*	Similar to S11, except stiff with occasional layer of red-brown SILT and fine SAND	15
50	UP-2	p u s h	2	24			Note: Piston tube sample 50.0 to 52.0 ft	
	S-13	2 3 4 4	2	10			Similar to S12, except medium stiff, no fine sand layers, all brown	10
55	UP-3	p u s h	2	22			Note: Piston tube sample 55.0 to 57.0 ft	
	S-14	1/12 - 1 2	2	6			Similar to S13, except very loose	5
60	UP-4	p u s h	2	24			Note: Piston tube sample 60.0 to 62.0 ft	
	S-15	2 4 8 15	2	16			Similar to S14, except stiff	0
65	S-16	26 34 30 37	2	10			Hard brown laminated SILT with frequent seams of brown clay and light brown fine sand, no odor, wet	-5

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 80.0 ft Rock: - ft	NOTES:	Sheet 3 of 4
No. of Soil Samples: 19 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: T. McGovern	**Connecticut DOT Boring Report**	Hole No.: TB-102(OW)	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 309+15.00/6.71R	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 827461.702129	
Start Date: 4-22-08	Route No.:	Easting: 1007177.191157	
Finish Date: 4-24-08	Bridge No.:	Surface Elevation: 63.51	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/4; HSA/HW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 31.0 ft b.g.s after 7 days			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
70	S-17	13 16 18 23	2	14		GLACIO-LACUSTRINE DEPOSITS *(con't)*	Similar to S16, except dense, trace coarse to fine sand, occasional seams of clayey silt	
								-10
75	S-18	23 31 51 100/1	1.6	9			Hard brown SILT, trace coarse to fine sand, no odor, wet; massive, with 0.5 in. of red-brown clayey SILT and coarse to fine SAND, little fine gravel in spoon tip	
						GLACIAL TILL		
	S-19	95 100/4	0.8	6			Very dense red-brown coarse to fine SAND and coarse to fine GRAVEL, some clayey silt, no odor, wet; well-bonded in-situ	-15
							Note: Well installed in completed borehole	
80							END OF BORING 78.8 ft	
								-20
85								
								-25
90								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 80.0 ft Rock: - ft	NOTES:	Sheet 4 of 4
No. of Soil Samples: 19 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-119
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 309+53.52/1.22L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 827498.865187
Start Date: 4-19-08	Route No.:		Easting: 1007190.063762
Finish Date: 4-21-08	Bridge No.:		Surface Elevation: 63.41
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 15.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	4 5 4 6	2	6		FILL	Loose dark brown coarse to fine SAND, some coarse to fine gravel,little silt, trace roots, leaves, slight organic (topsoil) odor, dry	
	S-2	7 5 4 4	2	13			Loose red-brown coarse to fine SAND, some coal cinders, little coarse to fine gravel, silt, no odor, dry	60
5	S-3	7 8 9 9	2	11			Similar to S2, except medium dense, little coal cinders, trace medium to fine gravel	
	S-4	6 5 7 9	2	15			Similar to S3, except no coal cinders	55
							Note: Switched to NW casing at 10.0 ft	
10	S-5	6 8 6 9	2	12			Medium dense dark brown coarse to fine sandy silty CLAY, trace fine gravel	50
15	S-6	3 4 3 3	2	24			Medium stiff brown SILT, some fine sand, trace coarse sand, organic fibers, no odor, wet	45
20	S-7	3 3 3 4	2	24			Medium stiff, predominantly gray-brown with small brown, blue-gray, green, gray and red-brown specks, SILT, some coarse to fine sand, trace clay, fine gravel, organic fibers, very slight organic odor, wet	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 60.0 ft Rock: - ft	NOTES:	Sheet 1 of 3
No. of Soil Samples: 15 No. of Core Runs: -		SM-001-M REV. 1/02

Driller:	E. DelPriore	**Connecticut DOT Boring Report**		Hole No.:	RW-119
Inspector:	S. Poff	Town:	Newington to West Hartford	Stat./Offset:	309+53.52/1.22L
Engineer:	Haley & Aldrich, Inc.	Project No.:	171-305	Northing:	827498.865187
Start Date:	4-19-08	Route No.:		Easting:	1007190.063762
Finish Date:	4-21-08	Bridge No.:		Surface Elevation:	63.41

Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000

Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.	

Groundwater Observations: @ approximately 15.0 ft b.g.s

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						FILL *(con't)*		40
25	S-8	3 3 6 4	2	24			Similar to S7, except interbedded SILT and CLAY, trace fine sand (25.0 to 25.6 ft and 26.7 to 27.0 ft) with SILT and fine SAND (25.6 to 26.7 ft), no odor, wet; frequent lenticular deposits	
								35
30	S-9	5 7 15 12	2	22		GLACIO-LACUSTRINE DEPOSITS	Very stiff brown to red-brown SILT, some coarse to fine sand, little fine gravel grading to coarse to fine SAND, some medium to fine gravel, little silt, no odor, wet	
								30
35	S-10	woh 1 2 2	2	24			Soft brown to red-brown CLAY varved with brown to gray-brown SILT, no odor, wet; varve couplets generally 1 to 2 in. thick	
								25
40	S-11	woh woh woh 1	2	24			Similar to S10, except very soft; varve thicknesses reduce to approximately 1/8 to 1/4 in. thick on average at approximately 41.0 ft	
	UP-1	p u s h	2	24			Note: Piston tube sample from 43.0 to 45.0 ft	20
45	S-12	woh woh woh 2	2	16			Similar to S11, except varve couplets 1.5 to 2.5 in. thick on average; occasional sand to fine gravel-sized dropstones	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 60.0 ft Rock: - ft	NOTES:	Sheet 2 of 3
No. of Soil Samples: 15 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**	Hole No.: RW-119	
Inspector: S. Poff	Town: Newington to West Hartford	Stat./Offset: 309+53.52/1.22L	
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305	Northing: 827498.865187	
Start Date: 4-19-08	Route No.:	Easting: 1007190.063762	
Finish Date: 4-21-08	Bridge No.:	Surface Elevation: 63.41	
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size (in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None	
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 15.0 ft b.g.s			

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		15
50	S-13	woh woh 1 2	2	20			Similar to S12	10
55	S-14	3 3 3 4	2	24			Medium stiff brown to red-brown irregularly interbedded CLAY and clayey SILT, trace coarse to fine sand in occasional layers, no odor, wet	5
	S-15	3 3 5 5	2	24			Similar to S14	
60							END OF BORING 60 ft	0
65								-5

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 60.0 ft Rock: - ft	NOTES:	Sheet 3 of 3
No. of Soil Samples: 15 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-120
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 311+1.39/2.89R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 827623.876933
Start Date: 4-21-08	Route No.:		Easting: 1007269.143851
Finish Date: 4-21-08	Bridge No.:		Surface Elevation: 63.32
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 15.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	10 14 12 10	2	11		FILL	Medium dense coarse to fine GRAVEL and coarse to fine SAND, little silt, trace organics (mainly railroad ballast and topsoil), no odor, dry	
	S-2	11 13 10 10	2	12			Medium dense tan to black coarse to fine SAND and COAL CINDERS, trace fine gravel, silt, no odor, dry	60
5	S-3	7 8 8 9	2	18			Medium dense light brown to tan coarse to fine SAND, trace fine gravel, silt, no odor, dry	
	S-4	9 9 8 7	2	20			Medium dense light brown to tan medium to fine SAND, trace silt	55
							Note: Switched to NW casing at 10.0 ft	
10	S-5	4 3 2 3	2	18			Similar to S4, except loose, moist	
							Loose black COAL CINDERS and coarse to fine SAND, little silt, no odor, moist	
							Loose brown to red-brown coarse to fine SAND, some clayey silt, no odor, moist	50
15	S-6	2 4 6 6	2	16			Stiff brown to orange-brown to gray clayey SILT, little fine sand, no odor, wet; stratified, sandy layers alternating with clayey layers; layers generally 3.0 to 6.0 in. thick on average	45
20	S-7	3 5 6 5	2	20			Stiff brown SILT, little fine sand, trace coarse sand, no odor, wet	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 1 of 3
No. of Soil Samples: 15 No. of Core Runs: -		SM-001-M REV. 1/02

Driller:	E. DelPriore	**Connecticut DOT Boring Report**		Hole No.:	RW-120
Inspector:	S. Poff	Town:	Newington to West Hartford	Stat./Offset:	311+1.39/2.89R
Engineer:	Haley & Aldrich, Inc.	Project No.:	171-305	Northing:	827623.876933
Start Date:	4-21-08	Route No.:		Easting:	1007269.143851
Finish Date:	4-21-08	Bridge No.:		Surface Elevation:	63.32

Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000

Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.	

Groundwater Observations: @ approximately 15.0 ft b.g.s

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						FILL *(con't)*		40
25	S-8	3 5 5 3	2	20			Loose brown coarse to fine SAND and SILT, occasional lenses of gray silty clay 25.0 to 25.8 ft, no odor, wet	
	S-9	4 2 7 7	2	21			Similar to S8, except poorly-stratified	
							Stiff brown SILT and ORGANIC SILT, trace fine sand, organic fibers	35
30	S-10	3 3 6 7	2	24			Medium stiff brown SILT, little organic silt, trace fine sand, organic fibers, no odor, wet Medium dense brown to gray-brown fine SAND and clayey SILT grading to coarse to fine SAND, little silt, trace fine gravel, trace organics (mainly decayed leaves) found throughout	
						GLACIO-LACUSTRINE DEPOSITS		30
35	S-11	woh 2 1 2	2	24			Soft brown CLAY varved with gray-brown clayey SILT, no odor, wet; varve couplets generally 1.0 to 2.0 in., thick, but vary from approximately 0.5 to 3.0 in. thick	
	UP-1	p u s h	2	24			Note: Piston tube sample from 38.0 to 40.0 ft	25
40	S-12	woh woh woh 1	2	20			Similar to S11, except very soft	
								20
45	S-13	woh 1 1 3	2	24			Similar to S12	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 2 of 3
No. of Soil Samples: 15 No. of Core Runs: -		SM-001-M REV. 1/02

Driller:	E. DelPriore	**Connecticut DOT Boring Report**		Hole No.:	RW-120
Inspector:	S. Poff	Town:	Newington to West Hartford	Stat./Offset:	311+1.39/2.89R
Engineer:	Haley & Aldrich, Inc.	Project No.:	171-305	Northing:	827623.876933
Start Date:	4-21-08	Route No.:		Easting:	1007269.143851
Finish Date:	4-21-08	Bridge No.:		Surface Elevation:	63.32

Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000

Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.	

Groundwater Observations: @ approximately 15.0 ft b.g.s

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		15
50	S-14	3 2 3 4	2	24			Similar to S13, except medium stiff, brown clay and silt	
	S-15	2 1 1 2	2	24			Similar to S14, except very soft	10
55							END OF BORING 55 ft	5
60								0
65								-5

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 3 of 3
No. of Soil Samples: 15 No. of Core Runs: -		SM-001-M REV. 1/02

Driller:	E. DelPriore	**Connecticut DOT Boring Report**		Hole No.:	RW-121
Inspector:	S. Poff	Town:	Newington to West Hartford	Stat./Offset:	313+82.18/0.92R
Engineer:	Haley & Aldrich, Inc.	Project No.:	171-305	Northing:	827866.257518
Start Date:	4-21-08	Route No.:		Easting:	1007410.926125
Finish Date:	4-22-08	Bridge No.:		Surface Elevation:	63.55

Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000

Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.	

Groundwater Observations: @ approximately 15.0 ft b.g.s

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	8 6 6 8	2	10		FILL	Medium dense brown to dark brown to black coarse to fine SAND, some medium to fine gravel, coal cinders, little silt, trace coal particles, slag particles, few to frequent cobbles, no odor, dry	
	S-2	6 8 9 7	2	8			Similar to S1, except trace coal cinders, no slag particles	60
5	S-3	7 9 9 6	2	4			Medium dense brown coarse to fine SAND, some coarse to fine gravel, trace silt, no odor, dry (poor recovery)	
	S-4	13 10 7 8	2	0			No recovery (pushing gravel)	
							Note: Switched to NW casing at 10.0 ft	55
10	S-5	4 6 5 5	2	22			Medium dense dark brown to orange-brown to gray SILT, little clay, fine sand interbedded with fine SAND and SILT, trace coarse sand, organic fibers, no odor, moist; layers generally 6 to 8 in. thick, gradational contacts between beds	
							Note: Switch to NW casing at 15.0 ft	50
15	S-6	3 1 5 3	2	16			Medium stiff brown to dark brown to gray stratified SILT, some coarse to fine sand, trace organic fibers, fine gravel, no odor, wet; occasional seams of coarse to fine sand, trace medium to fine gravel	
								45
20	S-7	2 1 1 3	2	24			Very loose brown to dark brown SILT and fine SAND, trace coarse sand, medium to fine gravel, organic fibers, no odor, wet; poorly-stratified	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 1 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller:	E. DelPriore	**Connecticut DOT Boring Report**		Hole No.:	RW-121
Inspector:	S. Poff	Town:	Newington to West Hartford	Stat./Offset:	313+82.18/0.92R
Engineer:	Haley & Aldrich, Inc.	Project No.:	171-305	Northing:	827866.257518
Start Date:	4-21-08	Route No.:		Easting:	1007410.926125
Finish Date:	4-22-08	Bridge No.:		Surface Elevation:	63.55

Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000

Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.	

Groundwater Observations: @ approximately 15.0 ft b.g.s

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						FILL *(con't)*		40
25	S-8	2 4 9 11	2	20			Similar to S7 Stiff brown to dark brown clayey SILT and silty CLAY, trace organic fibers, no odor, moist; dry and very stiff below 26.8 ft	
						GLACIO-LACUSTRINE DEPOSITS		35
30	S-9	11 13 16 19	2	22			Very stiff brown CLAY varved with gray SILT, trace fine sand, no odor, dry; varve couplets generally approximately 0.25 to 0.5 in. thick, up to 1.5 in. thick below 31.5 ft	
								30
35	S-10	2 3 3 4	2	24			Similar to S9, except medium stiff; varve couplets generally 1.0 to 2.0 in. thick with single thick clay layer from approximately 35.5 to 35.8 ft	
								25
40	S-11	woh woh 1 2	2	24			Similar to S10, except very soft, clay dominant	
	UP-1	p u s h	2	24			Note: Piston tube sample from 43.0 to 45.0 ft	20
45	S-12	1 1 3 4	2	20			Similar to S11, except soft	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 2 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-121
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 313+82.18/0.92R
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 827866.257518
Start Date: 4-21-08	Route No.:		Easting: 1007410.926125
Finish Date: 4-22-08	Bridge No.:		Surface Elevation: 63.55
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 15.0 ft b.g.s			

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		15
50	S-13	2 2 4 4	2	21			Similar to S12, except medium stiff	
	S-14	5 3 4 5	2	24			Similar to S13	10
55							END OF BORING 55 ft	5
60								0
65								-5

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 3 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller: E. DelPriore	**Connecticut DOT Boring Report**		Hole No.: RW-122
Inspector: S. Poff	Town: Newington to West Hartford		Stat./Offset: 315+39.32/6.33L
Engineer: Haley & Aldrich, Inc.	Project No.: 171-305		Northing: 828005.037749
Start Date: 4-22-08	Route No.:		Easting: 1007484.983344
Finish Date: 4-22-08	Bridge No.:		Surface Elevation: 63.68
Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000			
Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.		Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.		
Groundwater Observations: @ approximately 8.0 ft b.g.s			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	4 4 6 8	2	7		FILL	Loose dark brown coarse to fine SAND, some medium to fine gravel, coal cinders, trace coarse gravel, silt, no odor, dry	
	S-2	9 16 11 13	2	5			Medium dense dark brown to black coarse to fine SAND and COAL CINDERS, little medium to fine gravel, trace silt, coal particles, no odor, dry	60
5	S-3	11 8 7 9	2	10			Stiff dense brown layers of clayey SILT, trace sand with occasional layers of coarse to fine sand, trace silt, no odor, dry	
	S-4	7 4 3 3	2	18			Similar to S3 Similar to below, but disturbed Medium stiff light brown to yellow-brown to gray SILT, some fine sand, trace coarse sand, root fibers, no odor, wet	55
10	S-5	3 3 4 3	2	19			Note: Switch to NW casing at 10.0 ft Medium stiff brown to yellow-brown to gray SILT, some fine sand, occasional lenses of gray clay; bottom 6 in. is gray clayey SILT with a seam of decayed leaf matter in the spoon tip	50
15	S-6	2 2 3 2	2	23		GLACIO-LACUSTRINE DEPOSITS	Soft gray-brown clayey SILT, trace organics, slight organic odor, wet Loose brown fine SAND, some silt, trace coarse sand, gravel, no odor, wet	45
20	S-7	2 2 3 2	2	24			Medium stiff gray to brown laminated CLAY and clayey SILT, occasional seams of fine sand, no odor, moist	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 1 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller:	E. DelPriore	**Connecticut DOT Boring Report**		Hole No.:	RW-122
Inspector:	S. Poff	Town:	Newington to West Hartford	Stat./Offset:	315+39.32/6.33L
Engineer:	Haley & Aldrich, Inc.	Project No.:	171-305	Northing:	828005.037749
Start Date:	4-22-08	Route No.:		Easting:	1007484.983344
Finish Date:	4-22-08	Bridge No.:		Surface Elevation:	63.68

Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000

Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.	

Groundwater Observations: @ approximately 8.0 ft b.g.s

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		40
25	S-8	3 4 3 4	2	24			Medium stiff brown to red-brown CLAY varved with brown to gray-brown clayey SILT, no odor, moist; varve couplets approximately 0.25 to 0.5 in. thick on average	
	UP-1	p u s h	2	24			Note: Piston tube sample from 28.0 to 38.0 ft	35
30	S-9	woh 1 2 3	2	20			Similar to S8, except soft, varve couplets approximately 0.75 to 1.5 in. thick on average, occasionally up to 4 in. thick	30
35	S-10	woh woh woh 1	2	24			Similar to S9, except very soft; varve couplets approximately 1.5 to 3.0 in. thick on average	25
40	S-11	woh woh woh 24	2	20			Similar to S10	20
45	S-12	woh 1 2 2	2	12			Similar to S11, except soft	

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 2 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

Driller:	E. DelPriore	**Connecticut DOT Boring Report**		Hole No.:	RW-122
Inspector:	S. Poff	Town:	Newington to West Hartford	Stat./Offset:	315+39.32/6.33L
Engineer:	Haley & Aldrich, Inc.	Project No.:	171-305	Northing:	828005.037749
Start Date:	4-22-08	Route No.:		Easting:	1007484.983344
Finish Date:	4-22-08	Bridge No.:		Surface Elevation:	63.68

Project Description: Connecticut DOT Busway Final Design - Haley & Aldrich Project No. 32669-000

Casing Size(in.)/Type: 4.25/3; HSA/NW	Sampler Type/Size: SS; 1 3/8 in.	Core Barrel Type: None
Hammer Wt.: -/300 lb Fall: -/24 in.	Hammer Wt.: 140 lb Fall: 30 in.	

Groundwater Observations: @ approximately 8.0 ft b.g.s

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (ft.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
						GLACIO-LACUSTRINE DEPOSITS *(con't)*		15
50	S-13	woh woh 2 4	2	24			Similar to S12, except silt and clay layers approximately 1.0 to 2.0 in. thick each	
	S-14	woh 1 2 3	2	24			Similar to S13	10
55							END OF BORING 55 ft	5
60								0
65								-5

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportions Used: Trace = 1 - 10%, Little = 10 - 20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 55.0 ft Rock: - ft	NOTES:	Sheet 3 of 3
No. of Soil Samples: 14 No. of Core Runs: -		SM-001-M REV. 1/02

APPENDIX B

Testing Borings Performed by Others

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **RB-28**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 822404.2
Start Date: 7/7/03	Route No.:	Easting: 1004158.7
Finish Date: 7/7/03	Bridge No.:	Surface Elevation: 69.8
Project Description: New Britain to Hartford Busway		
Casing Type/Size: NA	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NA
Hammer Wt.: Fall:	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ DRY after: 0 hours, @ DRY after: 24 hours, @ DRY after: 48 hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
0–1	A-N		1.5					69
2	S-1	3 2 1	1.5	0.8			POORLY GRADED SAND (SP) - brown, tan and black fine to coarse sand; dry, very loose, NP; organics present; (FILL).	68
3								67
4	A-N		1.5					66
5	S-2	5 4 3	1.5	0.8			POORLY GRADED SAND (SP) - brown, tan and black fine to coarse sand; dry, loose, NP; organics present; (FILL).	65
6								64
7	A-N		1.5					63
7.5'							ELEV. 62.3	
8	S-3	4 4 3	1.5	0.1			POORLY GRADED SAND WITH SILT (SP-SM) - brown, tan and black fine to coarse sand, little silt; dry, loose, NP; organics present; (FILL).	62
9	A-N		1.0					61
10.0'							ELEV. 59.8	60
10–11	S-4	2 2 2	1.5	1.1			SILTY CLAY (CL-ML) - red clay, some silt; moist to wet, medium stiff, -PL to +PL; (GLACIAL LAKE DEPOSIT).	59
12	A-N		2.0					58
13								57
14	S-5	2 3 4	1.5	1.0			SILTY CLAY (CL-ML) - red clay, some silt; moist to wet, medium stiff, -PL to +PL; (GLACIAL LAKE DEPOSIT).	56
15								55
16	A-N		1.5					54
17	S-6	2 1 1	1.5	1.5			SILTY CLAY (CL-ML) - red clay, some silt; moist to wet, soft, -PL to +PL; (GLACIAL LAKE DEPOSIT).	53
18								52
19	A-N		1.5					51
		2					SILTY CLAY (CL-ML) - red clay, some silt; moist to	50

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 30.0' Rock: 0.0' No. of Samples: 10	NOTES:	Sheet 1 of 2 SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **RB-28**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 822404.2
Start Date: 7/7/03	Route No.:	Easting: 1004158.7
Finish Date: 7/7/03	Bridge No.:	Surface Elevation: 69.8
Project Description: New Britain to Hartford Busway		
Casing Type/Size: NA	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NA
Hammer Wt.: Fall:	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ DRY after: 0 hours, @ DRY after: 24 hours, @ DRY after: 48 hours		
Baker Info: S.O. Number: B25624LPDSOIL41802/42002	File: northern	Template: CDOT_E (LD4 1/03)

Depth (ft.)	SAMPLES Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
20	S-7	1 1	1.5	1.3			wet, soft, -PL to +PL; (GLACIAL LAKE DEPOSIT).	
21								49
22	A-N		1.5					48
23	S-8	1 2 2	1.5	1.5			SILTY CLAY (CL-ML) - red clay, some silt; moist to wet, soft, -PL to +PL; (GLACIAL LAKE DEPOSIT).	47
24	A-N		1.0					46
25								45
26	S-9	WOH WOH 1	1.5	1.5			SILTY CLAY (CL-ML) - red clay, some silt; moist to wet, very soft, -PL to +PL; (GLACIAL LAKE DEPOSIT).	44
27	A-N		2.0					43
28								42
29	S-10	2 2 3	1.5	1.5			SILTY CLAY (CL-ML) - red clay, some silt; moist to wet, medium stiff, -PL to +PL; (GLACIAL LAKE DEPOSIT).	41
30							ELEV. 39.8	40
31							End of Boring at 30.0'	39
32								38
33								37
34								36
35								35
36								34
37								33
38								32
39								31
								30

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 30.0' Rock: 0.0' No. of Samples: 10	NOTES:	Sheet 2 of 2
		SM-001-M REV. 1/02

Driller: Seth Murkette/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-44**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826258.8
Start Date: 8/18/03	Route No.:	Easting: 1006454.8
Finish Date: 8/19/03	Bridge No.:	Surface Elevation: 70.1
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 8.0 after: 0 hours, @ after: 24 hours, @ after: 48 hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
0–1	A-N		1.5					70
2	S-1	4 5 5	1.5	1.0			SILTY SAND WITH GRAVEL (SM) - black to brown and reddish brown fine to coarse sand, some silt, little fine gravel; moist, medium dense, NP; (FILL).	69
3	A-N		1.5					68
4								67
4.5'							Encountered water at 4.5'	66
5	S-2	1 1 1	1.5	1.2			ELEV. 65.6	65
6							SILT (ML) - gray to brown silt, trace fine sand, trace clay; wet to moist, soft, +PL.	64
7	W-N		1.5					63
7.5'							ELEV. 62.6	
8	S-3	5 7 8	1.5	0.5			LEAN CLAY (CL) - brown clay, little silt; moist, stiff, +PL; (GLACIAL LAKE DEPOSIT).	62
9	W-N		1.0					61
10	S-4	4 5 7	1.5	1.5			LEAN CLAY (CL) - brown and gray clay, little silt; moist, stiff, +PL; (GLACIAL LAKE DEPOSIT).	60
11								59
12	W-N		2.0					58
13								57
14	S-5	3 4 6	1.5	1.5			LEAN CLAY (CL) - brown and reddish brown clay, little silt; moist, stiff, +PL; (GLACIAL LAKE DEPOSIT).	56
15								55
16	W-N		1.5					54
17	S-6	1 1 2	1.5	1.3			LEAN CLAY (CL) - reddish brown clay, little silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	53
18								52
19	W-N		1.5					51
		4					LEAN CLAY (CL) - gray and reddish brown clay, little	

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 57.0' Rock: 10.0' No. of Samples: 15	NOTES:	Sheet 1 of 4 SM-001-M REV. 1/02

Driller: Seth Murkette/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-44**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826258.8
Start Date: 8/18/03	Route No.:	Easting: 1006454.8
Finish Date: 8/19/03	Bridge No.:	Surface Elevation: 70.1
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 8.0 after: 0 hours, @ after: 24 hours, @ after: 48 hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
20	S-7	5 4	1.5	0.7			silt; moist, stiff, +PL; (GLACIAL LAKE DEPOSIT).	50
21								49
22	W-N		1.5					48
23	S-8	6 6 4	1.5	0.4			LEAN CLAY (CL) - reddish brown clay, little silt; moist, stiff, +PL; (GLACIAL LAKE DEPOSIT).	47
24	W-N		1.0					46
25	S-9	1 2 1	1.5	1.5			LEAN CLAY (CL) - reddish brown clay, little silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	45
26								44
27	W-N		2.0					43
28								42
29	S-10	1 2 1	1.5	0.5			LEAN CLAY (CL) - reddish brown clay, little silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	41
30								40
31	UP-1		2.0	1.2				39
32								38
33	W-N		3.0					37
34								36
35	S-11	1 1 1	1.5	1.5			LEAN CLAY (CL) - reddish brown clay, little silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	35
36								34
37	W-N		3.5					33
38								32
39								31

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 57.0' Rock: 10.0' No. of Samples: 15	NOTES:	Sheet 2 of 4
		SM-001-M REV. 1/02

Driller: Seth Murkette/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-44**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826258.8
Start Date: 8/18/03	Route No.:	Easting: 1006454.8
Finish Date: 8/19/03	Bridge No.:	Surface Elevation: 70.1
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 8.0 after: 0 hours, @ after: 24 hours, @ after: 48 hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
40						40.0'	ELEV. 30.1	30
41	S-12	2 4 4	1.5	1.5			SILT (ML) - reddish brown silt, little clay; moist, stiff, +PL.	29
42								28
43	W-N		3.5					27
44								26
45								
46	S-13	6 6 12	1.5	1.1			SILT WITH SAND (ML) - reddish brown silt, little fine sand; wet, very stiff, +PL.	25 24
47								23
48	W-N		3.5					22
49								21
50						50.0'	ELEV. 20.1	20
51	S-14	33 20 21	1.5	0.3			POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) - reddish brown and black coarse gravel, little silt, little coarse sand; wet, very dense, NP; (TILL).	19
52								18
53	W-N		3.5					17
54								16
55	S-15	150/0.3	0.3	0.3			POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM) - reddish brown and black coarse gravel, little silt, little coarse sand; wet, very dense, NP; (TILL).	15
56	W-N		1.7					14
57				5.0	0.0	57.0'	ELEV. 13.1	13
						57.6'	SHALE; gray, soft, weathered; (COBBLE IN TILL). ELEV. 12.5	
58						58.4'	GRAVELLY CLAY WITH SAND (CL) - black and brown clay, some fine to coarse gravel, little fine to coarse sand; wet, hard, +PL, organics present; (TILL).	12
59	C-1		5.0				ELEV. 11.7	11

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 57.0' Rock: 10.0' No. of Samples: 15	NOTES:	Sheet 3 of 4

SM-001-M REV. 1/02

Driller: Seth Murkette/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-44**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826258.8
Start Date: 8/18/03	Route No.:	Easting: 1006454.8
Finish Date: 8/19/03	Bridge No.:	Surface Elevation: 70.1
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 8.0 after: 0 hours, @ after: 24 hours, @ after: 48 hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	SAMPLES: Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
60							SHALE; gray, soft, weathered, vertically fractured throughout	10
61								9
62				100%	0%			8
63				5.0	2.3	62.4'	SHALE; gray, soft, weathered, vertically fractured throughout	7
							ELEV. 7.7	
64	C-2		5.0				SILTSTONE; reddish brown, medium hard to hard, slightly weathered, calcite veins and high angle fractures throughout.	6
65								5
66								4
67				100%	46%			3
							ELEV. 3.1	
68							End of Boring at 67.0'	2
69								1
70								0
71								-1
72								-2
73								-3
74								-4
75								-5
76								-6
77								-7
78								-8
79								-9

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 57.0' Rock: 10.0' No. of Samples: 15	NOTES:	Sheet 4 of 4
		SM-001-M REV. 1/02

Driller: Seth Murkette/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-46**
Inspector: Rachael Marks	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826689.6
Start Date: 7-8-03	Route No.:	Easting: 1006731.6
Finish Date: 7-11-03	Bridge No.:	Surface Elevation: 68.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	
Groundwater Obs. @ 22.0 after: 0 hours, @ after: hours, @21.8 after: 48 hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	SAMPLES Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
0–1	A-N		1.5					68
2–3	S-1	4 8 11	1.5	0.6			WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) - tan to brown fine sand, some silt, some angular medium gravel; dry, medium dense, NP; (FILL).	67 66
4	A-N		1.5					65
5–6	S-2	2 2 2	1.5	0.3			WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) - tan to brown fine sand, some silt, some angular medium gravel; moist, loose, NP; (FILL).	64 63
7	W-N		1.5					62
8–9	S-3	13 14 11	1.5	0.4			WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) - tan to brown fine sand, some silt, some angular medium gravel; dry, medium dense, NP; (FILL).	61 60
10	W-N		1.0					59
11	S-4	15 11 8	1.5	0.0			NO RECOVERY ON S-4.	58
12–13	W-N		2.0					57 56
14–15	S-5	4 2 3	1.5	0.1			WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) - tan to brown fine sand, some silt, some angular medium gravel; dry, loose, NP; (FILL).	55 54
16	W-N		1.5					53
17–18	S-6	5 6 10	1.5	0.3			WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM) - tan to brown fine sand, some silt, some angular medium gravel; dry, medium dense, NP; (FILL).	52 51
19	W-N		1.5					50
		4				19.5'	ELEV. 48.7	49

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 63.7' Rock: 10.0' No. of Samples: 16	NOTES:	Sheet 1 of 4 SM-001-M REV. 1/02

Driller: Seth Murkette/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-46**
Inspector: Rachael Marks	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826689.6
Start Date: 7-8-03	Route No.:	Easting: 1006731.6
Finish Date: 7-11-03	Bridge No.:	Surface Elevation: 68.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	

Groundwater Obs. @ 22.0 after: 0 hours, @ after: hours, @21.8 after: 48 hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
20	S-7	5 7	1.5	1.4			SILT WITH CLAY (ML) -red to brown silt, some clay; moist, stiff, -PL; (GLACIAL LAKE DEPOSIT).	48
21								47
22	W-N		1.5					46
						22.5'	ELEV. 45.7	
23	S-8	3 3 4	1.5	1.0			CLAY WITH SILT (CL) - tan to brown clay, little silt; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	45
24	W-N		1.0					44
25	S-9	3 2 2	1.5	1.4			CLAY WITH SILT (CL) - tan to brown clay, little silt; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	43
26								42
27	W-N		2.0					41
28								40
29	S-10	1 2 2	1.5	1.5			CLAY WITH SILT (CL) - tan to brown clay, little silt; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	39
30								38
31	UP-1		2.0	1.7				37
32								36
33	W-N		3.0					35
34								34
35	S-11	WOH WOH WOH	1.5	1.5			CLAY WITH SILT (CL) - tan to brown clay, little silt; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	33
36								32
37	W-N		3.5					31
38								30
39								29

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 63.7' Rock: 10.0' No. of Samples: 16	NOTES:	Sheet 2 of 4

SM-001-M REV. 1/02

Driller: Seth Murkette/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-46**
Inspector: Rachael Marks	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826689.6
Start Date: 7-8-03	Route No.:	Easting: 1006731.6
Finish Date: 7-11-03	Bridge No.:	Surface Elevation: 68.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	
Groundwater Obs. @ 22.0 after: 0 hours, @ after: hours, @21.8 after: 48 hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	SAMPLES Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
40, 41	S-12	2 3 1	1.5	1.5			CLAY WITH SILT (CL) - tan to brown clay, little silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	28, 27
42, 43, 44	W-N		3.5					26, 25, 24
45, 46	S-13	1 7 7	1.5	1.5			CLAY WITH SILT (CL) - tan to brown clay, little silt; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	23, 22
47, 48, 49	W-N		3.5					21, 20, 19
50, 51	S-14	2 3 4	1.5	1.3			CLAY WITH SILT (CL) - tan to brown clay, little silt; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	18, 17
52, 53, 54	W-N		3.5					16, 15, 14
55						55.0'	ELEV. 13.2	13
56	S-15	4 10 20	1.5	1.5			SILTY CLAY (CL-ML) - red to brown clay, some silt, trace of fine gravel (in spoon tip); moist, stiff, -PL.	
57						56.5'	ELEV. 11.7	12
58, 59	W-N		3.5					11, 10, 9

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 63.7' Rock: 10.0' No. of Samples: 16	NOTES:	Sheet 3 of 4
		SM-001-M REV. 1/02

Driller: Seth Murkette/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-46**
Inspector: Rachael Marks	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826689.6
Start Date: 7-8-03	Route No.:	Easting: 1006731.6
Finish Date: 7-11-03	Bridge No.:	Surface Elevation: 68.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	

Groundwater Obs. @ 22.0 after: 0 hours, @ after: hours, @21.8 after: 48 hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
60							ELEV. 8.2	8
61	S-16	35 21 23	1.5	1.3			WELL-GRADED SAND WITH SILT (SW-SM) - red to brown fine to medium sand, some silt, trace fine gravel; moist, medium dense, NP; (TILL).	7
62								6
63	W-N		2.2					5
64				5.0	1.2	63.7'	ELEV. 4.5	4
65							SILTSTONE; red to brown; medium hard, fresh; calcite inclusions throughout.	3
66	C-1		5.0					2
67								1
68				100%	24%			0
69				5.0	2.8		SILTSTONE; red to brown; medium hard, fresh; calcite inclusions throughout.	-1
70								-2
71	C-2		5.0					-3
72								-4
73				100%	56%			-5
74							ELEV. -5.5	-6
							END OF BORING AT 73.7'	
75								-7
76								-8
77								-9
78								-10
79								-11

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 63.7' Rock: 10.0' No. of Samples: 16	NOTES:	Sheet 4 of 4 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-47**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826898.3.2
Start Date: 8/19/03	Route No.:	Easting: 1006771.3
Finish Date: 8/19/03	Bridge No.:	Surface Elevation: 64.1
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 18.5 after: 0 hours, @20.1 after: 24 hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
0–1	A-N		1.5					64
2–3	S-1	2 4 9	1.5	0.6			SILTY SAND WITH GRAVEL (SM) - reddish brown fine to coarse sand, some silt, little coarse gravel; moist, medium dense, NP; (FILL).	63, 62
4	A-N		1.5					61
5–6	S-2	63 3 4	1.5	0.8				60
7	A-N		1.5					59
8–9	S-3	2 2 2	1.5	0.8				58, 57
10	W-N		1.0					56
11–12	S-4	1 1 1	1.5	1.5				55
13	W-N		2.0					54, 53
14–15	S-5	1 1 1	1.5	1.5				52
16	W-N		1.5					51
17–18	S-6	1 1 1	1.5	1.5				50
19	W-N		1.5					49
		1						48, 47, 46, 45

4.5' — ELEV. 59.6

5.0' — CONCRETE COBBLE AT 4.5'

ELEV. 59.1

SILT (ML) - gray silt, little fine sand; moist, medium stiff, +PL; (FILL).

8.0' — SILT (ML) - gray silt, little fine sand; moist, soft, +PL; (FILL).

ELEV. 56.1

8.7' — POORLY GRADED SAND (SP) - tan fine sand, little silt; moist, very loose, NP; (FILL).

ELEV. 55.4

LEAN CLAY (CL) - gray clay; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).

LEAN CLAY (CL) - gray and reddish brown clay; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).

LEAN CLAY (CL) - gray and reddish brown clay; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).

LEAN CLAY (CL) - gray and reddish brown clay; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).

LEAN CLAY (CL) - gray and reddish brown clay;

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 60.0' Rock: 10.0' No. of Samples: 15	NOTES:	Sheet 1 of 4 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-47**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826898.3.2
Start Date: 8/19/03	Route No.:	Easting: 1006771.3
Finish Date: 8/19/03	Bridge No.:	Surface Elevation: 64.1
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 18.5 after: 0 hours, @20.1 after: 24 hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
20	S-7	1 1	1.5	1.5			moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	44
21								43
22	W-N		1.5					42
23	S-8	1 1 1	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	41
24	W-N		1.0					40
25	S-9	WOR 1 1	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	39
26								38
27	W-N		2.0					37
28								36
29	S-10	WOR/1.0 1	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	35
30	W-N		5.0					34
31								33
32								32
33								31
34								30
35	S-11	WOR/1.5	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	29
36								28
37	W-N		3.5					27
38								26
39								25

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 60.0' Rock: 10.0' No. of Samples: 15	NOTES:	Sheet 2 of 4 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-47**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826898.3.2
Start Date: 8/19/03	Route No.:	Easting: 1006771.3
Finish Date: 8/19/03	Bridge No.:	Surface Elevation: 64.1
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 18.5 after: 0 hours, @20.1 after: 24 hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
40, 41	S-12	WOR/1.5	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	24, 23
42, 43, 44	W-N		3.5					22, 21, 20
45, 46	S-13	4 4 4	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay; moist, very stiff, +PL; (GLACIAL LAKE DEPOSIT).	19, 18
47, 48, 49	W-N		3.5					17, 16, 15
50						50.0'	ELEV. 14.1	14
51	S-14	21 38 55	1.5	1.3			SILT (ML) - reddish brown silt, trace fine gravel; moist, hard, -PL.	13
52, 53, 54	W-N		3.5					12, 11, 10
55						55.0'	ELEV. 9.1	9
	S-15	82 100/0.2	0.7	0.5			SILTY GRAVEL (GM) - reddish brown fine to coarse gravel, little silt, little fine to coarse sand; wet, very dense, NP; (DECOMPOSED ROCK).	
56, 57, 58, 59	W-N		4.3					8, 7, 6, 5

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 60.0' Rock: 10.0' No. of Samples: 15	NOTES:	Sheet 3 of 4

SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-47**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826898.3.2
Start Date: 8/19/03	Route No.:	Easting: 1006771.3
Finish Date: 8/19/03	Bridge No.:	Surface Elevation: 64.1
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 18.5 after: 0 hours, @20.1 after: 24 hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	SAMPLES: Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
60				4.4	0.6	60.0'	ELEV. 4.1	4
61							SILTSTONE; reddish brown, medium hard to hard, slightly weathered.	3
62	C-1		5.0					2
63								1
64								0
65				88%	12%			
				4.1	1.5		SILTSTONE; reddish brown, medium hard to hard, slightly weathered.	-1
66								-2
67	C-2		5.0					-3
68								-4
69								-5
70				82%	30%		ELEV. -5.9	-6
							End of Boring at 70.0'	
71								-7
72								-8
73								-9
74								-10
75								-11
76								-12
77								-13
78								-14
79								-15

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 60.0' Rock: 10.0' No. of Samples: 15	NOTES:	Sheet 4 of 4
		SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-49**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827106.9
Start Date: 7-8-03	Route No.:	Easting: 1006970.7
Finish Date: 7-9-03	Bridge No.:	Surface Elevation: 65.9
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	
Groundwater Obs. @ 0.0' after: 0 hours, @ after: hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
0–1	A-N		1.5					65
1–2	S-1	10 16 19	1.5	1.3			WELL-GRADED SAND WITH GRAVEL (GW) - black and brown fine to coarse sand, little fine to medium gravel; moist, dense, NP (FILL).	64
2–3								63
3–4	A-N		1.5					62
4.5'							ELEV. 61.4	
4–5	S-2	5 9 4	1.5	1.5			SILTY SAND WITH GRAVEL (SM) - red, brown and black fine to coarse sand, some silt, little fine to medium gravel; moist, medium dense, NP; (FILL).	61
5–6								60
6–7	A-N		1.5					59
7.5'							ELEV. 58.4	
7–8	S-3	5 3 4	1.5	1.4			SANDY SILT (ML) - tan and brown silt, some fine to medium sand, trace fine to medium gravel; moist, medium stiff, -PL; (FILL).	58
8–9	W-N		1.0					57
9–10								56
10–11	S-4	1 1 1	1.5	1.5			SANDY SILT (ML) - tan and brown silt, some fine to medium sand, trace fine to medium gravel; moist, medium stiff, -PL; (FILL).	55
11–12								54
12–13	W-N		2.0					53
13–14	S-5	5 4 5	1.5	1.3			SANDY SILT (ML) - tan and brown silt, some very fine sand, trace fine to medium gravel; moist, loose, NP; (FILL).	52
14–15								51
15–16	W-N		1.5					50
16.5'							ELEV. 49.4	
16–17	S-6	5 8 8	1.5	1.1			CLAYEY SILT (ML) - gray and brown silt, some clay; dry to moist, stiff to very stiff, -PL; (GLACIAL LAKE DEPOSIT).	49
17–18								48
18–19	W-N		1.5					47
19–		5					CLAYEY SILT (ML) - gray and brown silt, some clay;	46

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 75.0' Rock: 10.0' No. of Samples: 18	NOTES:	Sheet 1 of 5

SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-49**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827106.9
Start Date: 7-8-03	Route No.:	Easting: 1006970.7
Finish Date: 7-9-03	Bridge No.:	Surface Elevation: 65.9
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	
Groundwater Obs. @ 0.0' after: 0 hours, @ after: hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
20	S-7	8 12	1.5	1.5			dry to moist, stiff to very stiff, -PL; (GLACIAL LAKE DEPOSIT).	
21								45
22	W-N		1.5					44
23	S-8	2 2 6	1.5	1.5			CLAYEY SILT (ML) - gray and brown silt, some clay; dry to moist, stiff to very stiff, -PL; (GLACIAL LAKE DEPOSIT).	43
24	W-N		1.0					42
25						25.0'	ELEV. 40.9	41
26	S-9	1 2 1	1.5	1.5			SILTY CLAY (CL-ML) - red and brown clay, some silt; moist to wet, soft, +PL; (GLACIAL LAKE DEPOSIT).	40
27	W-N		2.0					39
28								38
29	S-10	1 1 WOH	1.5	1.5			SILTY CLAY (CL-ML) - red and brown clay, some silt; moist to wet, soft, +PL; (GLACIAL LAKE DEPOSIT).	37
30								36
31								35
32	W-N		5.0					34
33								33
34								32
35	S-11	WOH WOH 1	1.5	1.4			SILTY CLAY (CL-ML) - red and brown clay, some silt; moist to wet, soft, +PL; (GLACIAL LAKE DEPOSIT).	31
36								30
37								29
38	W-N		3.5					28
39								27
								26

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 75.0' Rock: 10.0' No. of Samples: 18	NOTES:	Sheet 2 of 5
		SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-49**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827106.9
Start Date: 7-8-03	Route No.:	Easting: 1006970.7
Finish Date: 7-9-03	Bridge No.:	Surface Elevation: 65.9
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	
Groundwater Obs. @ 0.0' after: 0 hours, @ after: hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
40–41	S-12	WOH WOH WOH	1.5	1.5			SILTY CLAY (CL-ML) - red and brown clay, some silt; moist to wet, soft, +PL; (GLACIAL LAKE DEPOSIT).	25
42–44	W-N		3.5					24, 23, 22
45–46	S-13	WOH WOH 1	1.5	1.5			SILTY CLAY (CL-ML) - red and brown clay, and silt; moist to wet, soft, +PL; (GLACIAL LAKE DEPOSIT).	21, 20
47–49	W-N		3.5					19, 18, 17
50–51	S-14	5 6 8	1.5	1.5			SILTY CLAY (CL-ML) - red and brown clay, and silt; moist to wet, soft, +PL; (GLACIAL LAKE DEPOSIT).	16, 15
52–54	W-N		3.5					14, 13, 12
55–56	S-15	5 1 3	1.5	1.3			SILTY CLAY (CL-ML) - red and brown clay, some silt; moist to wet, soft, +PL; (GLACIAL LAKE DEPOSIT).	11, 10
57–59	W-N		3.5			58.0'	ELEV. 7.9	9, 8, 7, 6

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 75.0' Rock: 10.0' No. of Samples: 18	NOTES:	Sheet 3 of 5

SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-49**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827106.9
Start Date: 7-8-03	Route No.:	Easting: 1006970.7
Finish Date: 7-9-03	Bridge No.:	Surface Elevation: 65.9
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	
Groundwater Obs. @ 0.0' after: 0 hours, @ after: hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
60–61	S-16	27 26 25	1.5	1.0			SILTY SAND WITH GRAVEL (SM) - red and brown fine to coarse sand, some silt, some fine to coarse gravel; moist, very dense, NP; (TILL).	5
62–64	W-N		3.5					4, 3, 2
65						65.0'	ELEV. 0.9	1
65–66	S-17	37 65 67	1.5	1.1			GRAVELLY SILT (ML) - red and brown silt, some fine to coarse gravel; moist, very dense, NP; (TILL).	0
67–69	W-N		3.5					-1, -2, -3
70	S-18	53 100	1.0	1.0			GRAVELLY SILT (ML) - red and brown silt, some fine to coarse gravel; moist, very dense, NP; (TILL).	-4
71–73	W-N		4.0					-5, -6, -7
74						74.0'	ELEV. -8.1	-8
75–79	C-1		5.0	4.7	0.0		SILTSTONE; red, fresh to slightly weathered, calcite inclusions present.	-9, -10, -11, -12, -13, -14

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 75.0' Rock: 10.0' No. of Samples: 18	NOTES:	Sheet 4 of 5 SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-49**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827106.9
Start Date: 7-8-03	Route No.:	Easting: 1006970.7
Finish Date: 7-9-03	Bridge No.:	Surface Elevation: 65.9
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	
Groundwater Obs. @ 0.0' after: 0 hours, @ after: hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	SAMPLES: Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
80				94%	0%		SILTSTONE; red, fresh to slightly weathered, calcite inclusions present.	
81				5.0	0.0			-15
82	C-2		5.0					-16
83								-17
84								-18
85				100%	0%		ELEV. -19.1	-19
							END OF BORING AT 85.0'	
86								-20
87								-21
88								-22
89								-23
90								-24
91								-25
92								-26
93								-27
94								-28
95								-29
96								-30
97								-31
98								-32
99								-33
								-34

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 75.0' Rock: 10.0' No. of Samples: 18	NOTES:	Sheet 5 of 5
		SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-50**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826953.6
Start Date: 8/19/03	Route No.:	Easting: 1006819.3
Finish Date: 8/20/03	Bridge No.:	Surface Elevation: 62.9
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @	after: 0 hours, @18.5 after: 24 hours, @	after: 48 hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
0								
1	A-N		1.5					62
2	S-1	9 6 4	1.5	1.0			SILTY SAND (SM) - reddish brown fine sand, some silt; dry, medium dense, NP; (FILL).	61
3						2.8'	ELEV. 60.1	60
4	A-N		1.5				LEAN CLAY (CL) - gray clay, little silt; moist, soft, +PL (GLACIAL LAKE DEPOSIT).	59
5	S-2	3 3 4	1.5	1.5			LEAN CLAY (CL) - gray clay, little silt; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	58
6								57
7	W-N		1.5					56
8	S-3	3 3 4	1.5	1.0			LEAN CLAY (CL) - gray clay, little silt; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	55
9	W-N		1.0					54
10	S-4	1 1 1	1.5	1.3			LEAN CLAY (CL) - gray clay, little silt; moist, soft, +PL (GLACIAL LAKE DEPOSIT).	53
11								52
12	W-N		2.0					51
13								50
14	S-5	1 2 1	1.5	1.5			LEAN CLAY (CL) - gray clay, little silt; moist, soft, +PL (GLACIAL LAKE DEPOSIT).	49
15								48
16	W-N		1.5					47
17	S-6	WOH WOH 1	1.5	1.4			LEAN CLAY (CL) - gray and reddish brown clay, little silt; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	46
18								45
19	W-N		1.5					44
		WOH					LEAN CLAY (CL) - gray and reddish brown clay, little	43

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 68.0' Rock: 10.0' No. of Samples: 17	NOTES:	Sheet 1 of 4
		SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-50**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826953.6
Start Date: 8/19/03	Route No.:	Easting: 1006819.3
Finish Date: 8/20/03	Bridge No.:	Surface Elevation: 62.9
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ after: 0 hours, @18.5 after: 24 hours, @ after: 48 hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	SAMPLES Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
20	S-7	WOH WOH	1.5	1.5			silt; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	
21								42
22	W-N		1.5					41
23	S-8	WOH WOH WOH	1.5	1.0			LEAN CLAY (CL) - gray and reddish brown clay, little silt; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	40
24	W-N		1.0					39
25	S-9	WOH 1 1	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay, little silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	38
26								37
27	W-N		2.0					36
28								35
29	S-10	WOH WOH WOH	1.5	1.5			LEAN CLAY (CL) - reddish brown clay, little silt; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	34
30								33
31								32
32	W-N		5.0					31
33								30
34								29
35						35.0'	ELEV. 27.9	28
36	S-11	7 3 3	1.5	1.0			SILTY SAND (SM) - reddish brown fine sand and silt; wet, loose, NP; (GLACIAL LAKE DEPOSIT).	27
37								26
38	W-N		3.5					25
39								24
								23

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 68.0' Rock: 10.0' No. of Samples: 17	NOTES:	Sheet 2 of 4

SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-50**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826953.6
Start Date: 8/19/03	Route No.:	Easting: 1006819.3
Finish Date: 8/20/03	Bridge No.:	Surface Elevation: 62.9
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ after: 0 hours, @18.5 after: 24 hours, @ after: 48 hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
40						40.0'	ELEV. 22.9	
41	S-12	1 2 3	1.5	1.5			LEAN CLAY (CL) - reddish brown clay, little silt; wet, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	22
42								21
43	W-N		3.5					20
44								19
45						45.0'	ELEV. 17.9	18
46	S-13	9 10 14	1.5	0.7			SILT (ML) - reddish brown silt; wet, very stiff, +PL.	17
47								16
48	W-N		3.5					15
49								14
50								13
51	S-14	12 30 31	1.5	1.2			SILT WITH GRAVEL (ML) - reddish brown silt, little fine to coarse gravel; moist, hard, -PL.	12
52								11
53	W-N		3.5					10
54								9
55						55.0'	ELEV. 7.9	8
56	S-15	27 34 37	1.5	1.4			SILTY SAND (SM) - reddish brown fine to coarse sand, some silt; wet, very dense, NP.	7
57								6
58	W-N		3.5					5
59								4
								3

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger

Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 68.0' Rock: 10.0' No. of Samples: 17	NOTES:	Sheet 3 of 4

SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-50**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826953.6
Start Date: 8/19/03	Route No.:	Easting: 1006819.3
Finish Date: 8/20/03	Bridge No.:	Surface Elevation: 62.9
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ after: 0 hours, @18.5 after: 24 hours, @ after: 48 hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
60	S-16	88 100/0.4	0.9	0.9		60.0'	ELEV. 2.9	
61							GRAVELLY SILT WITH SAND (ML) - reddish brown silt, some fine to coarse gravel, little fine to coarse sand; wet, very dense, NP; (TILL).	2
62								1
63	W-N		4.1					0
64								-1
65	S-17	50 100/0.1	0.6	0.6			GRAVELLY SILT WITH SAND (ML) - reddish brown silt, some fine to coarse gravel, little fine to coarse sand; wet, very dense, NP; (TILL).	-2
66								-3
67	W-N		2.4			67.0'	ELEV. -4.1	-4
68				5.0	0.4		SILTSTONE; reddish brown, medium hard to hard, slightly weathered, calcite veins and vertically fractured throughout.	-5
69								-6
70	C-1		5.0					-7
71								-8
72								-9
73				100%	8%			-10
				5.0	2.2		SILTSTONE; reddish brown, medium hard to hard, slightly weathered, calcite veins and vertically fractured throughout.	
74								-11
75								-12
76	C-2		5.0					-13
77								-14
78				100%	44%		ELEV. -15.1	-15
							End of Boring at 78.0'	
79								-16
								-17

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 68.0' Rock: 10.0' No. of Samples: 17	NOTES:	Sheet 4 of 4 SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-51**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826122.0
Start Date: 8/18/03	Route No.:	Easting: 1006916.7
Finish Date: 8/18/03	Bridge No.:	Surface Elevation: 60.4
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 21.0 after: 0 hours, @20.2 after: 24 hours, @ after: 48 hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
0–1	A-N		1.5					60
1–2	S-1	5 10 6	1.5	1.2			CLAYEY SAND WITH GRAVEL (SC) - gray fine to coarse sand, some clay, little coarse gravel; moist, very stiff, +PL; (FILL).	59, 58
2–3	A-N		1.5					57
3–4							Encountered water at 3.8'	
4.5'							ELEV. 55.9	56
4–5	S-2	1 2 3	1.5	1.0			LEAN CLAY (CL) - gray clay, trace fine sand; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	55
5–6	W-N		1.5					54
6–7	S-3	4 6 5	1.5	1.5			LEAN CLAY (CL) - brown clay; moist, stiff, +PL; (GLACIAL LAKE DEPOSIT).	53, 52
7–8	W-N		1.0					51
8–9	S-4	3 3 4	1.5	1.5			LEAN CLAY (CL) - brown and reddish brown clay; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	50
9–10	W-N		2.0					49, 48
10–11	S-5	2 1 1	1.5	1.5			LEAN CLAY (CL) - brown and reddish brown clay; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	47, 46
11–12	W-N		1.5					45
12–13	S-6	1 1 1	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	44, 43
13–14	W-N		1.5					42
14–15		WOH					LEAN CLAY (CL) - gray and reddish brown clay;	41

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 68.0' Rock: 10.0' No. of Samples: 17	NOTES:	Sheet 1 of 4
		SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-51**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826122.0
Start Date: 8/18/03	Route No.:	Easting: 1006916.7
Finish Date: 8/18/03	Bridge No.:	Surface Elevation: 60.4
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 21.0 after: 0 hours, @20.2 after: 24 hours, @ after: 48 hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
20	S-7	WOH 2	1.5	1.5			moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	40
21								
22	W-N		1.5					39
23	S-8	WOH WOH WOH	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	38
24	W-N		1.0					37
25	S-9	WOH WOH WOH	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	36
26								35
27	W-N		2.0					34
28								33
29	S-10	WOH WOH WOH	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	32
30								31
31	W-N		5.0					30
32								29
33								28
34								27
35	S-11	WOH WOH 1	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	26
36								25
37	W-N		3.5					24
38								23
39								22
								21

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 68.0' Rock: 10.0' No. of Samples: 17	NOTES:	Sheet 2 of 4
		SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-51**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826122.0
Start Date: 8/18/03	Route No.:	Easting: 1006916.7
Finish Date: 8/18/03	Bridge No.:	Surface Elevation: 60.4
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 21.0 after: 0 hours, @20.2 after: 24 hours, @ after: 48 hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
40, 41	S-12	WOH WOH 3	1.5	1.5			LEAN CLAY (CL) - reddish brown clay; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	20
42, 43, 44	W-N		3.5					19, 18, 17, 16
45						45.0'	ELEV. 15.4	
46	S-13	4 8 7	1.5	1.2			SILT (ML) - reddish brown silt, little clay; moist, stiff, +PL.	15
47, 48, 49	W-N		3.5					14, 13, 12, 11
50, 51	S-14	10 26 62	1.5	1.3			SILT (ML) - reddish brown silt, little clay; moist, hard, -PL.	10
						51.0'	ELEV. 9.4	
52, 53, 54	W-N		3.5				SILTY SAND WITH GRAVEL (SM) - reddish brown to dark brown fine to coarse sand, little silt, little fine to coarse gravel; wet, very dense, NP; (TILL).	9, 8, 7
55, 56	S-15	44 48 56	1.5	1.2			SILTY SAND WITH GRAVEL (SM) - reddish brown to dark brown fine to coarse sand, some silt, little fine to coarse gravel; wet, very dense, NP; (TILL).	6, 5
57, 58, 59	W-N		3.5					4, 3, 2, 1

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 68.0' Rock: 10.0' No. of Samples: 17	NOTES:	Sheet 3 of 4
		SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-51**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 826122.0
Start Date: 8/18/03	Route No.:	Easting: 1006916.7
Finish Date: 8/18/03	Bridge No.:	Surface Elevation: 60.4
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"I.D.
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 21.0 after: 0 hours, @20.2 after: 24 hours, @ after: 48 hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
60	S-16	97 100/0.1	0.6	0.6		60.0'	ELEV. 0.4	0
61							SANDY SILT WITH GRAVEL (ML) - reddish brown silt, little fine to medium sand, little fine to coarse gravel; moist, hard, -PL; (TILL).	-1
62								-2
63	W-N		4.4					-3
64								-4
65	S-17	100/0.1	0.1	0.1		65.1'	SILTY SAND WITH GRAVEL (SM) - reddish brown to dark brown fine to coarse sand, little silt, little fine to coarse gravel; wet, very dense, NP; (TILL).	-5
66							ELEV. -4.7	-6
67	W-N		2.4					-7
68				5.0	0.0		SILTSTONE; reddish brown, medium hard to hard, slightly weathered.	-8
69								-9
70	C-1		5.0					-10
71								-11
72				100%	0%			-12
73				4.7	1.7		SILTSTONE; reddish brown, medium hard to hard, slightly weathered.	-13
74								-14
75	C-2		5.0					-15
76								-16
77				94%	34%			-17
78							ELEV. -17.6	-18
79							End of Boring at 78.0'	-19

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 68.0' Rock: 10.0' No. of Samples: 17	NOTES:	Sheet 4 of 4 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-52**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827379.8
Start Date: 7-8-03	Route No.:	Easting: 1007121.6
Finish Date: 7-9-03	Bridge No.:	Surface Elevation: 64.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	

Groundwater Obs. @ 18.0' after: 0 hours, @29.2 after: 24 hours, @28.0 after: 48 hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
0–1	A-N		1.5					64
2–3	S-1	6 5 3	1.5	1.3			WELL-GRADED SAND WITH GRAVEL (SW) - brown, black and tan fine to coarse sand, some fine to coarse gravel; dry, loose, NP; (FILL).	63, 62
4	A-N		1.5					61
5–6	S-2	12 16 18	1.5	1.0			WELL-GRADED SAND WITH GRAVEL (SW) - brown, black and tan fine to coarse sand, some fine to coarse gravel; dry, dense, NP; (FILL).	60, 59
7	A-N		1.5					58
8–9	S-3	13 15 11	1.5	1.5			WELL-GRADED SAND WITH GRAVEL (SW) - brown, black and tan fine to coarse sand, some fine to coarse gravel; dry, medium dense, NP; (FILL).	57, 56
9	A-N		1.0					55
10–11	S-4	10 10 9	1.5	0.2			WELL-GRADED SAND WITH GRAVEL (SW) - brown, black and tan fine to coarse sand, some fine to coarse gravel; dry, medium dense, NP; (FILL).	54, 53
12–13	W-N		2.0					52
						13.5'	ELEV. 50.7	51
14–15	S-5	6 6 8	1.5	1.0			WELL-GRADED SAND WITH GRAVEL (SW) - tan, brown and black fine to coarse sand, some fine to coarse rounded gravel; moist, medium dense, NP; (ALLUVIUM).	50
16	W-N		1.5					49
17–18	S-6	5 6 7	1.5	0.7			WELL-GRADED SAND WITH GRAVEL (SW) - tan, brown and black fine to coarse sand, some fine to coarse rounded gravel; moist, medium dense, NP; (ALLUVIUM).	48, 47
19	W-N		1.5					46
		11					WELL-GRADED SAND WITH GRAVEL (SW) - tan,	45

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger

Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 100.0' Rock: 10.0' No. of Samples: 22	NOTES:	Sheet 1 of 6 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-52**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827379.8
Start Date: 7-8-03	Route No.:	Easting: 1007121.6
Finish Date: 7-9-03	Bridge No.:	Surface Elevation: 64.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	

Groundwater Obs. @ 18.0' after: 0 hours, @29.2 after: 24 hours, @28.0 after: 48 hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
20	S-7	8 8	1.5	0.7			brown and black fine sand, some fine to coarse rounded gravel, some silt; moist, medium dense, NP; (ALLUVIUM).	44
21								
22	W-N		1.5					43
								42
23	S-8	12 6 5	1.5	0.5			WELL-GRADED SAND WITH GRAVEL (SW) - tan, brown and black fine to coarse sand, some fine to coarse gravel; moist, medium dense, NP; (ALLUVIUM).	41
24	W-N		1.0					40
25						25.0'	ELEV. 39.2	39
26	S-9	6 5 5	1.5	0.3			WELL-GRADED GRAVEL WITH SAND (GW) - tan to brown and black fine to coarse gravel, little fine to coarse sand; moist, loose, NP; (ALLUVIUM).	38
27	W-N		2.0					37
28						28.5'	ELEV. 35.7	36
29	S-10	4 4 3	1.5	1.0			SILTY CLAY WITH GRAVEL (CL-ML) - red and brown clay, some silt; moist, medium stiff, +PL.	35
30								34
31								33
32	W-N		5.0					32
33								31
34								30
35						35.0'	ELEV. 29.2	29
36	S-11	6 8 12	1.5	0.7			WELL-GRADED GRAVEL (GW) - reddish brown fine to coarse gravel; moist to wet, medium dense, NP.	28
37								27
38	W-N		3.5					26
39								25

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 100.0' Rock: 10.0' No. of Samples: 22	NOTES:	Sheet 2 of 6 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-52**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827379.8
Start Date: 7-8-03	Route No.:	Easting: 1007121.6
Finish Date: 7-9-03	Bridge No.:	Surface Elevation: 64.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	

Groundwater Obs. @ 18.0' after: 0 hours, @29.2 after: 24 hours, @28.0 after: 48 hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	SAMPLES Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
40						40.0'	ELEV. 24.2	24
41	S-12	2 3 3	1.5	1.3			SILTY CLAY (CL-ML) - red and brown clay, some silt; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	23
42								22
43	W-N		3.5					21
44								20
45								
46	S-13	2 2 3	1.5	1.0			SILTY CLAY (CL-ML) - red and brown clay, some silt; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	19 18
47								17
48	W-N		3.5					16
49								15
50								14
51	ST-1		2.0	1.3				13
52								12
53	W-N		3.0					11
54								10
55								
56	S-14	2 3 4	1.5	1.5			SILTY CLAY (CL-ML) - red and brown clay, some silt; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	9 8
57								7
58	W-N		3.5					6
59								5

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 100.0' Rock: 10.0' No. of Samples: 22	NOTES:	Sheet 3 of 6 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-52**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827379.8
Start Date: 7-8-03	Route No.:	Easting: 1007121.6
Finish Date: 7-9-03	Bridge No.:	Surface Elevation: 64.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	

Groundwater Obs. @ 18.0' after: 0 hours, @29.2 after: 24 hours, @28.0 after: 48 hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
60	S-15	3 3 3	1.5	1.5			SILTY CLAY (CL-ML) - red and brown clay, some silt; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	4
61								3
62	W-N		3.5					2
63								1
64								0
65	S-16	2 2 3	1.5	1.3			SILTY CLAY (CL-ML) - red and brown clay, some silt; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	-1
66								-2
67	W-N		3.5					-3
68								-4
69								-5
70	S-17	55 80 100/.2	1.2	1.0		70.0'	ELEV. -5.8 SILTY SAND WITH GRAVEL (SM) - red to brown fine to medium sand, little silt, little fine to coarse gravel; moist, very dense, NP (TILL).	-6
71								-7
72	W-N		3.7					-8
73								-9
74								-10
75	S-18	100/0.1	0.1	0.0			NO RECOVERY	-11
76	W-N		4.9					-12
77								-13
78								-14
79								-15

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 100.0' Rock: 10.0' No. of Samples: 22	NOTES:	Sheet 4 of 6 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-52**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827379.8
Start Date: 7-8-03	Route No.:	Easting: 1007121.6
Finish Date: 7-9-03	Bridge No.:	Surface Elevation: 64.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	

Groundwater Obs. @ 18.0' after: 0 hours, @29.2 after: 24 hours, @28.0 after: 48 hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
80						80.0'	ELEV. -15.8	-16
81	S-19	27 65 95	1.5	0.7			GRAVELLY SILT WITH SAND (ML) - reddish brown silt, some fine to coarse gravel, some fine to coarse sand; moist, very dense, NP; (TILL).	-17
82								-18
83	W-N		3.5					-19
84								-20
85	S-20	120/0.3	0.3	0.2			GRAVELLY SILT WITH SAND (ML) - reddish brown silt, some fine to coarse gravel, some fine to coarse sand; moist, very dense, NP; (TILL).	-21
86								-22
87	W-N		4.7					-23
88								-24
89								-25
90	S-21	120/0.2	0.2	0.2			Lost drill water at 90.0'. GRAVELLY SILT WITH SAND (ML) - reddish brown silt, some fine to coarse gravel, some fine to coarse sand; moist, very dense, NP; (TILL).	-26
91								-27
92	W-N		4.8					-28
93								-29
94								-30
95	S-22	120/0.1	0.1	0.0			NO RECOVERY	-31
96								-32
97	W-N		4.9					-33
98								-34
99								-35

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 100.0' Rock: 10.0' No. of Samples: 22	NOTES:	Sheet 5 of 6 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-52**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827379.8
Start Date: 7-8-03	Route No.:	Easting: 1007121.6
Finish Date: 7-9-03	Bridge No.:	Surface Elevation: 64.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	

Groundwater Obs. @ 18.0' after: 0 hours, @29.2 after: 24 hours, @28.0 after: 48 hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
100				5.0	0.0	100.0'	ELEV. -35.8	-36
101							SILTSTONE WITH INTERBEDDED SANDSTONE; fine grained, red, hard, fresh to slightly weathered, calcite inclusions present.	-37
102	C-1		5.0					-38
103								-39
104								-40
105				100%	0%			-41
				4.5	0.0		SILTSTONE WITH INTERBEDDED SANDSTONE; fine-grained, red, hard, fresh to slightly weathered, calcite inclusions present. BASALT SEAM at 105.1'	
106								-42
107	C-2		5.0					-43
108								-44
109								-45
110				90%	0%		ELEV. -45.8	-46
							END OF BORING AT 110.0'	
111								-47
112								-48
113								-49
114								-50
115								-51
116								-52
117								-53
118								-54
119								-55

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 100.0' Rock: 10.0' No. of Samples: 22	NOTES:	Sheet 6 of 6 SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-54**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827734.1
Start Date: 7-9-03	Route No.:	Easting: 1007331.5
Finish Date: 7-11-03	Bridge No.:	Surface Elevation: 63.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	
Groundwater Obs. @ 38.7 after: 0 hours, @ after: hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
0–1	A-N		1.5					63
1–3	S-1	4 3 3	1.5	1.1			SILTY SAND (SM) - brown and black fine to coarse sand, some silt, little fine to coarse gravel; moist, loose, NP; (FILL).	62, 61
3–4	A-N		1.5					60
4.5'							ELEV. 58.7	59
4–6	S-2	4 4 4	1.5	1.0			WELL-GRADED SAND WITH SILT (SW-SM) - black, brown, tan fine to coarse sand, some silt, little fine to coarse gravel; moist, loose, NP; (FILL) .	58
6–7	A-N		1.5					57
7.5'							ELEV. 55.7	56
7–9	S-3	4 3 4	1.5	1.1			SILTY SAND WITH GRAVEL (SM) - black, brown, tan fine to coarse sand, some silt, little fine to medium gravel; moist, loose, NP; (FILL).	55
9–10	A-N		1.0					54
10.0'							ELEV. 53.2	53
10–11	S-4	3 4 3	1.5	1.5			SANDY SILT (ML) - tan and brown silt, some fine sand; moist, loose, NP; (ALLUVIUM).	52
11–13	W-N		2.0					51
13–14	S-5	5 5 5	1.5	1.3			SANDY SILT (ML) - tan and brown silt, some fine sand; moist to wet, stiff, +PL; (ALLUVIUM).	50, 49
14–16	W-N		1.5					48
16–17	S-6	2 2 2	1.5	1.5			SANDY SILT (ML) - tan and brown silt, some fine sand; moist to wet, stiff, +PL; (ALLUVIUM).	47, 46
17–19	W-N		1.5					45
19–		1					SANDY SILT (ML) - tan and brown silt, and fine sand;	44

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 108.0' Rock: 10.0' No. of Samples: 25	NOTES:	Sheet 1 of 6 SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: SB-54
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827734.1
Start Date: 7-9-03	Route No.:	Easting: 1007331.5
Finish Date: 7-11-03	Bridge No.:	Surface Elevation: 63.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	
Groundwater Obs. @ 38.7 after: 0 hours, @ after: hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
20	S-7	2 1	1.5	1.0			moist to wet, stiff, +PL; (ALLUVIUM).	43
21								
22	W-N		1.5					42
								41
23	S-8	2 2 1	1.5	1.0			SANDY SILT (ML) - tan and brown silt, and fine sand; moist to wet, stiff, +PL; (ALLUVIUM).	40
24	W-N		1.0					39
25	S-9	1 1 1	1.5	1.5			SANDY SILT (ML) - tan and brown silt, and fine sand; moist to wet, stiff, +PL; (ALLUVIUM).	38
26								37
27	W-N		2.0					36
28								35
29	S-10	1 3 5	1.5	1.5			SANDY SILT (ML) - tan and brown silt, and fine sand; moist to wet, stiff, +PL; (ALLUVIUM).	34
30								33
31								32
32	W-N		5.0					31
33								30
34								29
35						35.0'	ELEV. 28.2	28
36	S-11	9 4 3	1.5	1.0			SILTY CLAY (CL-ML) - red brown clay, some silt; moist to wet, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	27
37								26
38	W-N		3.5					25
39								24

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 108.0' Rock: 10.0' No. of Samples: 25	NOTES:	Sheet 2 of 6 SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-54**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827734.1
Start Date: 7-9-03	Route No.:	Easting: 1007331.5
Finish Date: 7-11-03	Bridge No.:	Surface Elevation: 63.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	
Groundwater Obs. @ 38.7 after: 0 hours, @ after: hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	SAMPLES Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
40, 41	S-12	1 2 1	1.5	1.5			SILTY CLAY (CL-ML) - red brown clay, some silt; moist to wet, soft, +PL; (GLACIAL LAKE DEPOSIT, VARVED CLAY).	23, 22
42	W-N		0.5					
43	ST-1		2.0	2.0				21, 20
44	W-N		1.0					19
45, 46	S-13	WOH WOH WOH	1.5	1.5			SILTY CLAY (CL-ML) - red brown clay, some silt; moist to wet, soft, +PL; (GLACIAL LAKE DEPOSIT, VARVED CLAY).	18, 17
47, 48, 49	W-N		3.5					16, 15, 14
50, 51	S-14	1 1 1	1.5	0.8			SILTY CLAY (CL-ML) - red brown clay, some silt; moist to wet, soft, +PL; (GLACIAL LAKE DEPOSIT, VARVED CLAY).	13, 12
52, 53, 54	W-N		3.5					11, 10, 9
55, 56	S-15	WOH 1 1	1.5	1.5			SILTY CLAY (CL-ML) - red brown clay, some silt; moist to wet, soft, +PL; (GLACIAL LAKE DEPOSIT, VARVED CLAY).	8, 7
57, 58, 59	W-N		3.5					6, 5, 4

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 108.0' Rock: 10.0' No. of Samples: 25	NOTES:	Sheet 3 of 6 SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-54**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827734.1
Start Date: 7-9-03	Route No.:	Easting: 1007331.5
Finish Date: 7-11-03	Bridge No.:	Surface Elevation: 63.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	
Groundwater Obs. @ 38.7 after: 0 hours, @ after: hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
60, 61	S-16	WOH WOH WOH	1.5	1.5			SILTY CLAY (CL-ML) - red brown clay, some silt; moist to wet, soft, +PL; (GLACIAL LAKE DEPOSIT, VARVED CLAY).	3, 2
62, 63, 64	W-N		3.5					1, 0, -1
65, 66	S-17	1 1 3	1.5	1.5			SILTY CLAY (CL-ML) - red brown clay, some silt; moist to wet, soft, +PL; (GLACIAL LAKE DEPOSIT, VARVED CLAY).	-2, -3
67, 68, 69	W-N		3.5					-4, -5, -6
70, 71	S-18	1 3 4	1.5	1.5			SILTY CLAY (CL-ML) - red brown clay, some silt; moist to wet, medium stiff, +PL; (GLACIAL LAKE DEPOSIT, VARVED CLAY).	-7, -8
72, 73, 74	W-N		3.5					-9, -10, -11
75						75.0'	ELEV. -11.8	-12
76	S-19	5 10 13	1.5	1.5			SANDY SILT (ML) - reddish brown silt, some fine sand; moist, very stiff, NP.	-13
77, 78, 79	W-N		3.5					-14, -15, -16

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 108.0' Rock: 10.0' No. of Samples: 25	NOTES:	Sheet 4 of 6
		SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-54**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827734.1
Start Date: 7-9-03	Route No.:	Easting: 1007331.5
Finish Date: 7-11-03	Bridge No.:	Surface Elevation: 63.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	
Groundwater Obs. @ 38.7 after: 0 hours, @ after: hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
80								
81	S-20	12 11 11	1.5				SANDY SILT (ML) - reddish brown silt, and sand; moist, very stiff, NP.	-17
								-18
82								
83	W-N		3.5					-19
								-20
84								
								-21
85								
86	S-21	10 15 15	1.5	1.2			SANDY SILT (ML) - reddish brown silt, little sand; moist, very stiff, NP; .	-22
								-23
87								
								-24
88	W-N		3.5					-25
89								-26
90						90.0'	ELEV. -26.8	
91	S-22	28 44 45	1.5	1.3			SILT WITH GRAVEL (ML) - reddish brown silt, little fine gravel; dry, very dense, NP; (TILL).	-27
								-28
92								
93	W-N		3.5					-29
								-30
94								
								-31
95	S-22	42 105	1.0	0.7			SANDY SILT WITH GRAVEL (ML) - reddish brown silt, some fine to coarse sand, some fine to medium gravel; dry to moist, very dense, NP; (TILL).	-32
96								-33
97								
98	W-N		4.0					-34
								-35
99								
								-36

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 108.0' Rock: 10.0' No. of Samples: 25	NOTES:	Sheet 5 of 6

SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-54**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827734.1
Start Date: 7-9-03	Route No.:	Easting: 1007331.5
Finish Date: 7-11-03	Bridge No.:	Surface Elevation: 63.2
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW 4" ID	Sampler Type/Size: SS/ 1-3/8 " ID	Core Barrel Type: NQ/1 7/8" ID
Hammer Wt.: 300 Fall: 24	Hammer Wt.: 140 Fall: 30	
Groundwater Obs. @ 38.7 after: 0 hours, @ after: hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	SAMPLES Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
100	S-24	100/0.4	0.4	0.3			GRAVELLY SILT WITH SAND (ML) - reddish brown silt, and fine to coarse gravel, little fine to coarse sand moist to wet, very dense, NP; (TILL).	-37
101								-38
102								-39
103	W-N		4.6					-40
104								-41
105	S-25	100/0.3	0.3	0.2		105.0'	ELEV. -41.8	-42
106							SILTY GRAVEL WITH SAND (GM) - reddish brown fine to medium gravel, little silt, little fine to coarse sand; moist, very dense, NP; (DECOMPOSED ROCK).	-43
107	W-N		2.7					-44
108				3.1	0.0	108.0'	ELEV. -44.8	-45
109							SILTSTONE; reddish brown, medium hard to hard; moderately to slightly weathered.	-46
110	C-1		5.0					-47
111								-48
112								-49
113				62%	0%			-50
114				3.2	0.0		SILTSTONE; reddish brown, medium hard to hard; moderately to slightly weathered.	-51
115	C-2		5.0					-52
116								-53
117								-54
118				64%	0%		ELEV. -54.8	-55
119							END OF BORING AT 118.0'	-56

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 108.0' Rock: 10.0' No. of Samples: 25	NOTES:	Sheet 6 of 6 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-55**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827982.8
Start Date: 7/9/03	Route No.:	Easting: 1007477.7
Finish Date: 7/11/03	Bridge No.:	Surface Elevation: 63.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 22.0 after: 0 hours, @34.3 after: 48 hours, @ after: hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
0–1	A-N		1.5					63
1–2	S-1	4 4 7	1.5	1.3			SILTY SAND WITH GRAVEL (SM) - black and dark brown fine to coarse sand, some silt, little fine to medium gravel; moist, medium dense, NP; (FILL).	62
2–3								61
3–4	A-N		1.5					60
4.5'							ELEV. 59.1	
4–5	S-2	4 3 3	1.5	1.5			SANDY SILT (ML) - red and tan silt, some fine sand; moist; loose, NP; (FILL).	59
5–6								58
6–7	A-N		1.5					57
7–8	S-3	4 3 4	1.5	0.7			SANDY SILT (ML) - red and tan silt, some fine sand; moist; loose, NP; organic material present; (FILL).	56
8–9								55
9–10	A-N		1.0					54
10–11	S-4	3 3 5	1.5	1.5			SANDY SILT (ML) - red, black and tan silt, some fine sand, trace fine gravel, trace clay; moist; loose, NP; (FILL).	53
11–12								52
12–13	W-N		2.0					51
13–14	S-5	3 3 4	1.5	1.3			SANDY SILT (ML) - red and tan silt, some fine sand; moist to wet; loose, NP; organic material present; (FILL).	50
14–15								49
15–16	W-N		1.5					48
16.5'							ELEV. 47.1	
16–17	S-6	2 3 3	1.5	1.5			SILTY CLAY (CL-ML) - gray and brown varved clay, some silt; dry to moist; medium stiff; -PL to +PL; (GLACIAL LAKE DEPOSIT).	47
17–18								46
18–19	W-N		1.5					45
19–		3					SILTY CLAY (CL-ML) - gray and brown varved clay,	44

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger

Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 165.0' Rock: 0.0' No. of Samples: 36	NOTES:	Sheet 1 of 9 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-55**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827982.8
Start Date: 7/9/03	Route No.:	Easting: 1007477.7
Finish Date: 7/11/03	Bridge No.:	Surface Elevation: 63.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 22.0 after: 0 hours, @34.3 after: 48 hours, @ after: hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
20	S-7	7 10	1.5	1.0			some silt; dry to moist; very stiff; -PL to +PL; (GLACIAL LAKE DEPOSIT).	43
21	W-N		1.5					42
22								
23	S-8	7 9 10	1.5	1.0			SILTY CLAY (CL-ML) - gray and brown varved clay, some silt; dry to moist; very stiff; -PL to +PL; (GLACIAL LAKE DEPOSIT).	41
24	W-N		1.0					40
25	S-9	4 4 5	1.5	0.8			SILTY CLAY (CL-ML) - gray and brown varved clay, some silt; dry to moist; stiff; -PL to +PL; (GLACIAL LAKE DEPOSIT).	39
26								38
27	W-N		2.0					37
28								36
29	S-10	2 2 2	1.5	1.5			SILTY CLAY (CL-ML) - gray and brown varved clay, some silt; dry to moist; soft; -PL to +PL; (GLACIAL LAKE DEPOSIT).	35
30	W-N		5.0					34
31								33
32								32
33								31
34								30
35	S-11	1 1 2	1.5	1.5			SILTY CLAY (CL-ML) - gray and brown varved clay, some silt; dry to moist; soft; -PL to +PL; (GLACIAL LAKE DEPOSIT).	29
36								28
37	W-N		3.5					27
38								26
39								25
								24

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 165.0' Rock: 0.0' No. of Samples: 36	NOTES:	Sheet 2 of 9 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-55**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827982.8
Start Date: 7/9/03	Route No.:	Easting: 1007477.7
Finish Date: 7/11/03	Bridge No.:	Surface Elevation: 63.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 22.0 after: 0 hours, @34.3 after: 48 hours, @ after: hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	SAMPLES: Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
40, 41	S-12	1 1 2	1.5	1.5			SILTY CLAY (CL-ML) - gray and brown varved clay, some silt; dry to moist; soft; -PL to +PL; (GLACIAL LAKE DEPOSIT).	23
42, 43, 44	W-N		3.5					22, 21, 20
45, 46	S-13	1 1 1	1.5	1.5			SILTY CLAY (CL-ML) - gray and brown varved clay, some silt; dry to moist; soft; -PL to +PL; (GLACIAL LAKE DEPOSIT).	19, 18
47, 48, 49	W-N		3.5					17, 16, 15
50, 51	S-14	1 1 1	1.5	1.5			SILTY CLAY (CL-ML) - gray and brown varved clay, some silt; dry to moist; soft; -PL to +PL; (GLACIAL LAKE DEPOSIT).	14, 13
52, 53, 54	W-N		3.5					12, 11, 10
55, 56	S-15	2 3 3	1.5	1.5			SILTY CLAY (CL-ML) - gray and brown varved clay, some silt; dry to moist; medium stiff; -PL to +PL; (GLACIAL LAKE DEPOSIT).	9, 8
57, 58, 59	W-N		3.5					7, 6, 5, 4

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger

Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 165.0' Rock: 0.0' No. of Samples: 36	NOTES:	Sheet 3 of 9 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-55**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827982.8
Start Date: 7/9/03	Route No.:	Easting: 1007477.7
Finish Date: 7/11/03	Bridge No.:	Surface Elevation: 63.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 22.0 after: 0 hours, @34.3 after: 48 hours, @ after: hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
60–61	S-16	2 2 3	1.5	1.5			SILTY CLAY (CL-ML) - gray and brown varved clay, some silt; dry to moist; medium stiff; -PL to +PL; (GLACIAL LAKE DEPOSIT).	3
62–64	W-N		3.5					2, 1, 0
65–66	S-17	2 3 5	1.5	1.5			SILTY CLAY (CL-ML) - gray and brown varved clay, some silt; dry to moist; medium stiff; -PL to +PL; (GLACIAL LAKE DEPOSIT).	-1, -2
67–69	W-N		3.5					-3, -4, -5
70						70.0'	ELEV. -6.4	-6
70–71	S-18	3 4 6	1.5	1.5			SANDY SILT (ML) - reddish brown silt, some fine sand; moist, stiff, -PL.	-7
72–74	W-N		3.5					-8, -9, -10
75						75.0'	ELEV. -11.4	-11
75–76	S-19	3 3 5	1.5	1.5			SILTY CLAY (CL-ML) - reddish brown silt, some clay; moist to wet, stiff, +PL.	-12
77–79	W-N		3.5					-13, -14, -15, -16

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 165.0' Rock: 0.0' No. of Samples: 36	NOTES:	Sheet 4 of 9 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-55**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827982.8
Start Date: 7/9/03	Route No.:	Easting: 1007477.7
Finish Date: 7/11/03	Bridge No.:	Surface Elevation: 63.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 22.0 after: 0 hours, @34.3 after: 48 hours, @ after: hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
80								
81	S-20	6 7 7	1.5	1.1			SILTY CLAY (CL-ML) - reddish brown silt, some clay; moist to wet, stiff, +PL.	-17
82								-18
83	W-N		3.5					-19
84								-20
85								-21
86	S-21	7 7 7	1.5	1.0			SILTY CLAY (CL-ML) - reddish brown silt, some clay, trace fine to medium gravel, trace fine sand; dry to moist, stiff, -PL.	-22
87								-23
88	W-N		3.5					-24
89								-25
90								-26
91	S-22	10 14 21	1.5	1.5			SILTY CLAY (CL-ML) - reddish brown silt, some clay, trace fine to medium gravel, trace fine sand; dry to moist, hard, -PL.	-27
92								-28
93	W-N		3.5					-29
94								-30
95								-31
96	S-23	3 7 11	1.5	1.5			SILTY CLAY (CL-ML) - reddish brown silt, some clay, trace fine to medium gravel, trace fine sand; dry to moist, very stiff, -PL to +PL.	-32
97								-33
98	W-N		3.5					-34
99								-35
								-36

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 165.0' Rock: 0.0' No. of Samples: 36	NOTES:	Sheet 5 of 9 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-55**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827982.8
Start Date: 7/9/03	Route No.:	Easting: 1007477.7
Finish Date: 7/11/03	Bridge No.:	Surface Elevation: 63.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 22.0 after: 0 hours, @34.3 after: 48 hours, @ after: hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT_E (LD4 1/03)

Depth (ft.)	Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
100						100.0'	ELEV. -36.4	
101	S-24	8 15 30	1.5	1.1			SANDY SILT WITH GRAVEL (ML) - reddish brown silt, some fine to medium sand, little fine gravel; dry to moist, dense, NP; (TILL).	-37
102								-38
103	W-N		3.5					-39
104								-40
105								-41
106	S-25	21 45 60	1.5	0.8			SILT WITH GRAVEL (ML) - reddish brown silt, little fine gravel; dry to moist, very dense, NP; (TILL).	-42
107								-43
108	W-N		3.5					-44
109								-45
110								-46
111	S-26	25 24 29	1.5	1.0			SILT WITH GRAVEL (ML) - reddish brown silt, little fine gravel; dry to moist, very dense, NP; (TILL).	-47
112								-48
113	W-N		3.5					-49
114								-50
115								-51
116	S-27	26 28 38	1.5	0.7			SILT (ML) - reddish brown silt; dry to moist, very dense, NP; (TILL).	-52
117								-53
118	W-N		3.5					-54
119								-55
								-56

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 165.0' Rock: 0.0' No. of Samples: 36	NOTES:	Sheet 6 of 9 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-55**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827982.8
Start Date: 7/9/03	Route No.:	Easting: 1007477.7
Finish Date: 7/11/03	Bridge No.:	Surface Elevation: 63.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 22.0 after: 0 hours, @34.3 after: 48 hours, @ after: hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	SAMPLES Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
120						120.0'	ELEV. -56.4	
121	S-28	95 74 110	1.5	0.8			SILTY SAND WITH GRAVEL (SM) - reddish brown fine sand and silt, little fine to medium gravel; moist, very dense, NP; (TILL).	-57
122								-58
123	W-N		3.5					-59
124								-60
125	S-29	100/0.1	0.1	0.0			NO RECOVERY ON S-29	-61
126								-62
127	W-N		4.9					-63
128								-64
129								-65
130	S-30	120/0.2	0.2	0.0			NO RECOVERY ON S-30	-66
131								-67
132	W-N		4.8					-68
133								-69
134								-70
135	S-31	150/0.2	0.2	0.2			SILTY SAND WITH GRAVEL (SM) - reddish brown fine sand and silt, little fine to medium gravel; moist, very dense, NP; (TILL).	-71
136								-72
137	W-N		4.8					-73
138								-74
139								-75
								-76

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 165.0' Rock: 0.0' No. of Samples: 36	NOTES:	Sheet 7 of 9 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-55**
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827982.8
Start Date: 7/9/03	Route No.:	Easting: 1007477.7
Finish Date: 7/11/03	Bridge No.:	Surface Elevation: 63.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 22.0 after: 0 hours, @34.3 after: 48 hours, @ after: hours		

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	SAMPLES Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
140	S-32	100/0.1	0.1	0.0			NO RECOVERY ON S-32	
141								-77
142								-78
143	W-N		4.9					-79
144								-80
145								-81
	S-33	55 150/0.4	0.9	0.5			SILTY SAND WITH GRAVEL (SM) - reddish brown fine sand and silt, little fine to medium gravel; moist, very dense, NP; (TILL).	-82
146								
147								-83
148	W-N		4.1					-84
149								-85
150	S-34	150/0.1	0.1	0.1			SILTY SAND WITH GRAVEL (SM) - reddish brown fine sand and silt, little fine to medium gravel; moist, very dense, NP; (TILL).	-86
151								-87
152								-88
153	W-N		4.9					-89
154								-90
155								-91
	S-35	150/0.4	0.4	0.4			SILTY SAND WITH GRAVEL (SM) - reddish brown fine sand and silt, little fine to medium gravel; moist, very dense, NP; (TILL).	
156								-92
157								-93
158	W-N		4.6					-94
159								-95
								-96

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 165.0' Rock: 0.0' No. of Samples: 36	NOTES:	Sheet 8 of 9 SM-001-M REV. 1/02

Driller: Mike St. John/NEBC	**Connecticut DOT Boring Report**	Hole No.: SB-55
Inspector: Ryan Tinsley	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827982.8
Start Date: 7/9/03	Route No.:	Easting: 1007477.7
Finish Date: 7/11/03	Bridge No.:	Surface Elevation: 63.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type: NQ/1-7/8"
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 22.0 after: 0 hours, @34.3 after: 48 hours, @ after: hours

Baker Info: S.O. Number: B25624LPDSOIL41802/42002 File: northern Template: CDOT E (LD4 1/03)

Depth (ft.)	SAMPLES Sample Type/No.	Blows on Sampler per 0.5 ft.	Pen. (ft.)	Rec. (ft./%)	RQD (ft./%)	Generalized Strata Description	Material Description and Notes	Elevation (ft.)
160	S-36	150/0.1	0.1	0.1			SILTY SAND WITH GRAVEL (SM) - reddish brown fine sand and silt, little fine to medium gravel; moist, very dense, NP; (TILL).	
161								-97
162								-98
163	W-N		4.9					-99
164								-100
165								-101
							ELEV. -101.4	
166							End of Boring at 165.0'	-102
167								-103
168								-104
169								-105
170								-106
171								-107
172								-108
173								-109
174								-110
175								-111
176								-112
177								-113
178								-114
179								-115
								-116

Sample Type: S=Split Spoon C=Core UP=Undisturbed Piston V=Vane Shear Test A=Auger
Proportions Used: Trace = 1 - 10%, Little = 10 -20%, Some = 20 - 35%, And = 35 - 50%

Total Penetration in Earth: 165.0' Rock: 0.0' No. of Samples: 36	NOTES:	Sheet 9 of 9
		SM-001-M REV. 1/02

APPENDIX C

Laboratory Testing Results

Geotesting Services, Inc.

Engineering & sciences applied to the earth & its environment

Geotechnical Laboratory

RECEIVED

JUN 13 2008

Haley & Aldrich, Inc.

TO: Haley & Aldrich, Inc.
Attn: Chris Albers
800 Connecticut Boulevard, Suite 100
East Hartford, CT 06108

DATE: June 10, 2008
PROJECT: 31737788-805

Transmittal

X Enclosed	_ Copy of Letter	_ Prints	_ As Requested
_ Under Separate Cover	_ Contracts	_ Photostats	_ Approved
_ First Class Mail	_ Documents	_ Tracings	_ Approved As Noted
X Messenger	X Test Results	_ Sepias	_ Re-Submit
_ UPS	_ Specifications	_ For Comments	_ Return
_ Air Mail	_ Drilling Logs	_ For Approval	_ Corrected Prints
_ Fed. Express	_ Photos	_ For Your Use	_
	_ Project Memo	_ For Your Files	

ITEM NO.	DESCRIPTION
1	Test results for H&A#32669-000 Connecticut Busway
2	Invoice

REMARKS: Test results previously e-mailed.

Copies to: file
/D805trm.doc

From: Geotesting Services, Inc.

Carolyn Jordan

Geotechnical Laboratory
45 J Commerce Way
Totowa, NJ 07512
• (973) 256-0494 • Fax (973) 812-8640

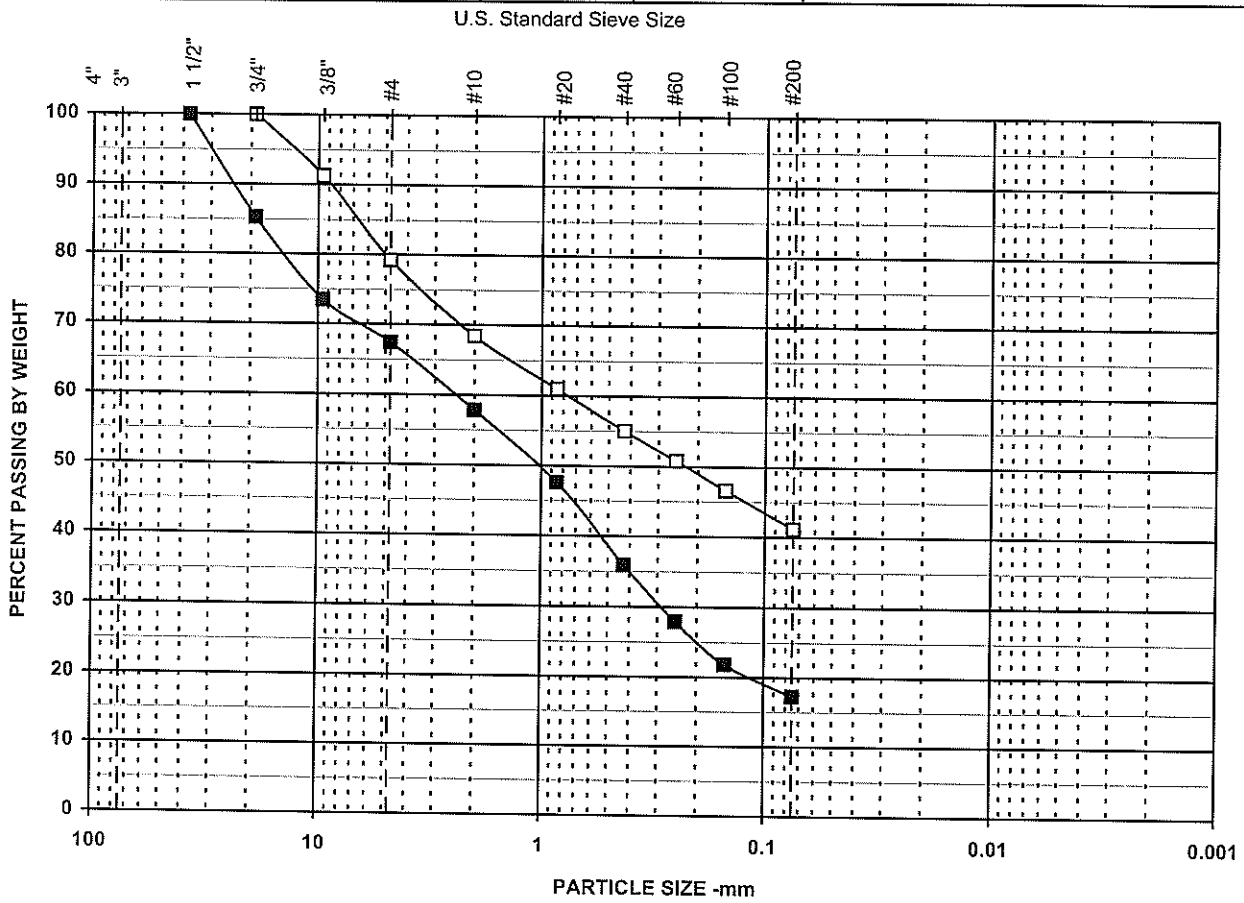
Project No.: 31737788-805 File: Indx jars.xls

Haley & Aldrich - #32669-000
Connecticut Busway
LABORATORY TESTING DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS							REMARKS
			WATER CONTENT (%)	LIQUID LIMIT (-)	PLASTIC LIMIT (-)	PLAS. INDEX (-)	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	ORGANIC CONTENT (burnoff) (%)	
CB-101	S-4	7-9	26.5				SC	41.1		
CB-103	S-3	5-7	8.1				SM	17.3		
NBA-101	S-2	3-5	5.7				SP-SM	8.1		
RB-101	S-4	7-9	25.8				SM	14.4		
RB-102	S-2	2-4	9.8				SM	17.8		
RB-103	S-4	6-8	14.9				SW-SM	8.2		
RB-104	S-1	1-3	11.9				SC	24.1		
RB-105	S-4	7-9	16.6				SC	25.0		
RB-107	S-1	0-2	4.9				SP-SM	5.8		
RB-107	S-4	7-9	12.9				SM	20.7		
RB-110	S-2	2-4	11.7				SM	28.4		
RB-120	S-1	0-2	6.8				SM	44.7		
RB-122	S-2	2-4	11.9				SM	14.4		
RB-124	S-3	5-7	202.5	271	137	134	PT		50.5	
RB-124	S-4	7-9	146.0	181	108	73	OH		23.9	
RB-124	S-5	10-12	61.4	66	42	24	OH		5.2	
RW-101	S-3	5-7	9.6				SC	36.2		
RW-105	S-1	0-2	7.7				SM	27.8		
RW-110	S-1	1-2	13.3				SM	14.1		
RW-112	S-2	3-5	9.2				SM	21.0		
RW-114	S-3	5-7	11.6				SM	13.2		
RW-114	S-6	15-17	27.9	29	23	6	ML		2.3	
RW-114	S-7	20-22	56.1	54	39	15	OH		8.9	
RW-118	S-1	0-2	2.5				SP	2.8		
RW-118	S-6	15-17	28.8	35	20	15	CL		3.1	
RW-118	S-7	20-22	25.0	29	18	11	CL		2.5	
RW-119	S-6	16-17								missing
RW-119	S-7	20-22	23.0	30	20	10	CL			
RW-119	S-8	25-27	30.7	36	21	15	CL		2.4	
RW-119	S-9	30-31.2	31.5	48	24	24	CL			
RW-119	S-5	10-12	21.1				CL	56.4		
RW-120	S-4	7-9	4.2				SP	3.1		
RW-124	S-5	10-12	18.5				SM	20.8		
TB-101	S-2	2-4	2.9				SP-SM	7.3		
TB-101	S-7	20-22	6.5				SP-SM	8.9		
TB-102	S-6	15-17	6.7				SP-SM	5.9		

Note: (1) USCS symbol based on visual observation and Sieve and Atterberg limits reported.

Prepared by: JR Reviewed by: GET Date: 5/19/2008



Symbol	□	■	○
Boring	CB-101	CB-103	
Sample	S-4	S-3	
Spec			
Depth	7-9	5-7	
% +3"			
% Gravel	20.8	32.6	
% SAND	38.1	50.1	
% FINES	41.1	17.3	
% -2μ			
Cc			
Cu			
LL			
PL			
PI			
USCS	SC	SM	
w (%)	26.5	8.1	

Particle Size (Sieve #)	PERCENT FINER □	■	○
4"			
3"			
1 1/2"		100.0	
3/4"	100.0	85.2	
3/8"	91.3	73.5	
4	79.2	67.4	
10	68.4	57.8	
20	60.9	47.6	
40	55.0	35.9	
60	50.8	27.9	
100	46.6	21.8	
200	41.1	17.3	

SYMBOL	DESCRIPTION AND REMARKS
□	brown clayey c-f SAND, some f. gravel.
■	red gravelly c-f SAND, some silt.
○	

PARTICLE SIZE DISTRIBUTION

H&A #32669-000 - Connecticut Busway

Project No.		Figure
31737788-805	May 2008	

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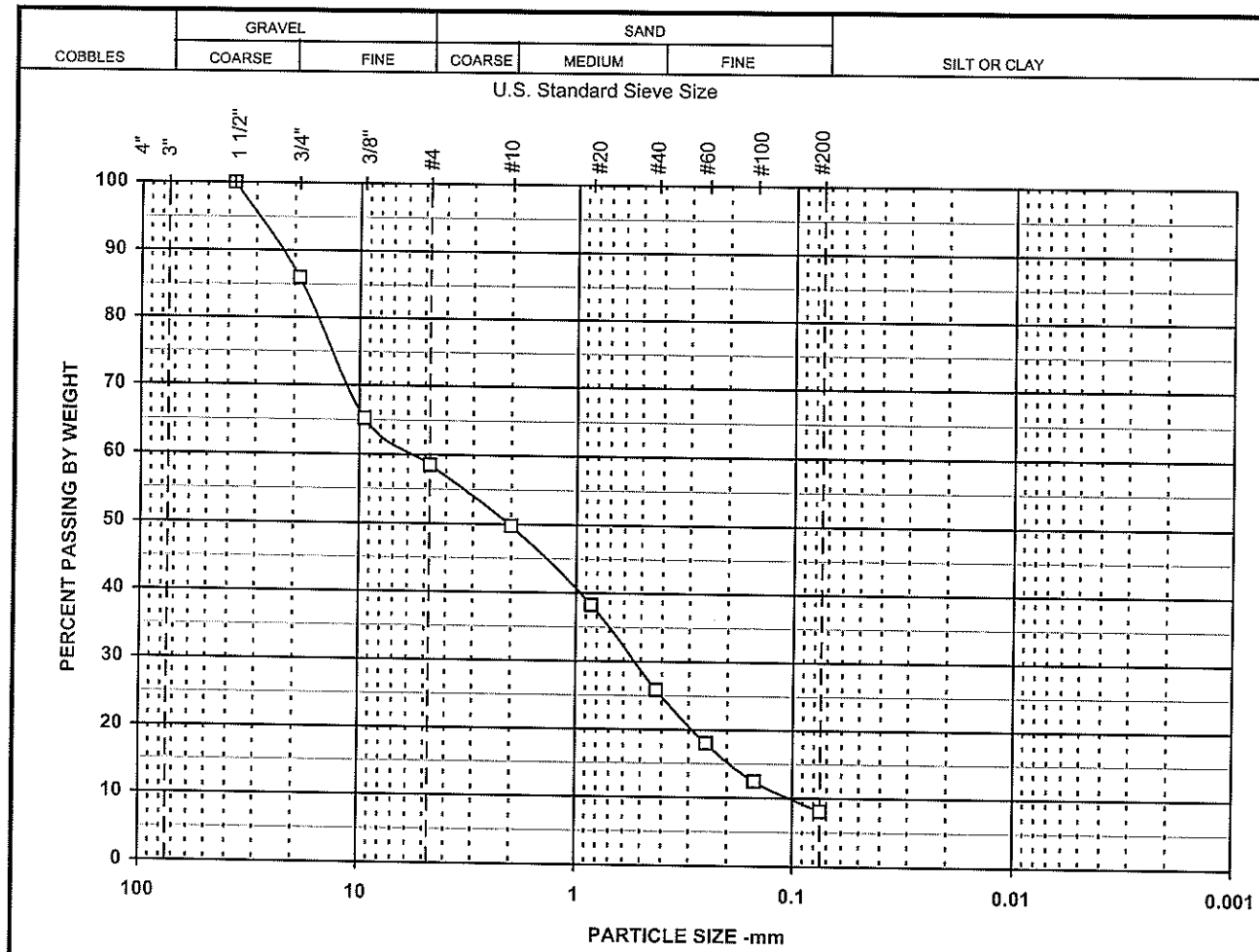

SYMBOL	DESCRIPTION AND REMARKS
□	brown gravelly c-f SAND, trace silt.
■	
○	

Symbol	□	■	○
Boring	NBA-101		
Sample	S-2		
Spec			
Depth	3-5		
% +3"			
% Gravel	41.5		
% SAND	50.4		
% FINES	8.1		
% -2μ			
Cc	0.5		
Cu	53.8		
LL			
PL			
PI			
USCS	SP-SM		
w (%)	5.7		

Particle Size (Sieve #)	PERCENT FINER □	■	○
4"			
3"			
1 1/2"	100.0		
3/4"	86.0		
3/8"	65.2		
4	58.5		
10	49.7		
20	38.2		
40	25.8		
60	18.0		
100	12.4		
200	8.1		

PARTICLE SIZE DISTRIBUTION

H&A #32669-000 - Connecticut Busway

Project No.		Figure
31737788-805	May 2008	

Geotesting Services, Inc.

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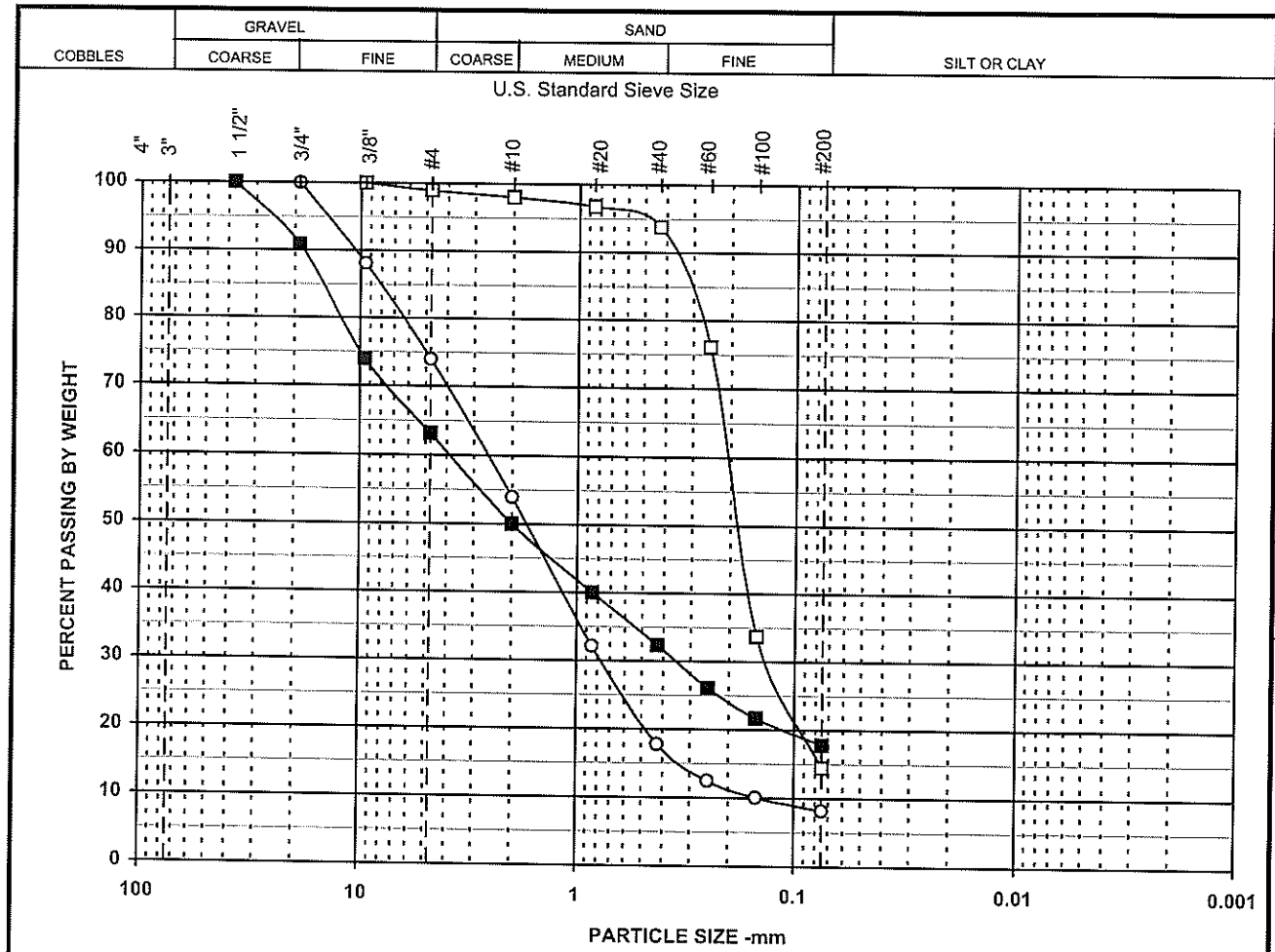


SYMBOL	DESCRIPTION AND REMARKS
□	brown f. SAND, some silt, trace f. gravel, c-f sand.
■	brown gravelly c-f SAND, some silt.
○	brown c-f SAND, some f. gravel, trace silt.

Symbol	□	■	○
Boring	RB-101	RB-102	RB-103
Sample	S-4	S-2	S-4
Spec			
Depth	7-9	2-4	6-8
% +3"			
% Gravel	1.0	36.9	26.0
% SAND	84.6	45.3	65.8
% FINES	14.4	17.8	8.2
% -2μ			
Cc			1.5
Cu			19.4
LL			
PL			
PI			
USCS	SM	SM	SW-SM
w (%)	25.8	9.8	14.9

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"		100.0	
3/4"		90.9	100.0
3/8"	100.0	73.9	88.1
4	99.0	63.1	74.0
10	98.0	50.0	53.9
20	96.8	40.0	32.1
40	93.7	32.3	17.8
60	76.1	26.1	12.5
100	33.7	21.7	10.1
200	14.4	17.8	8.2

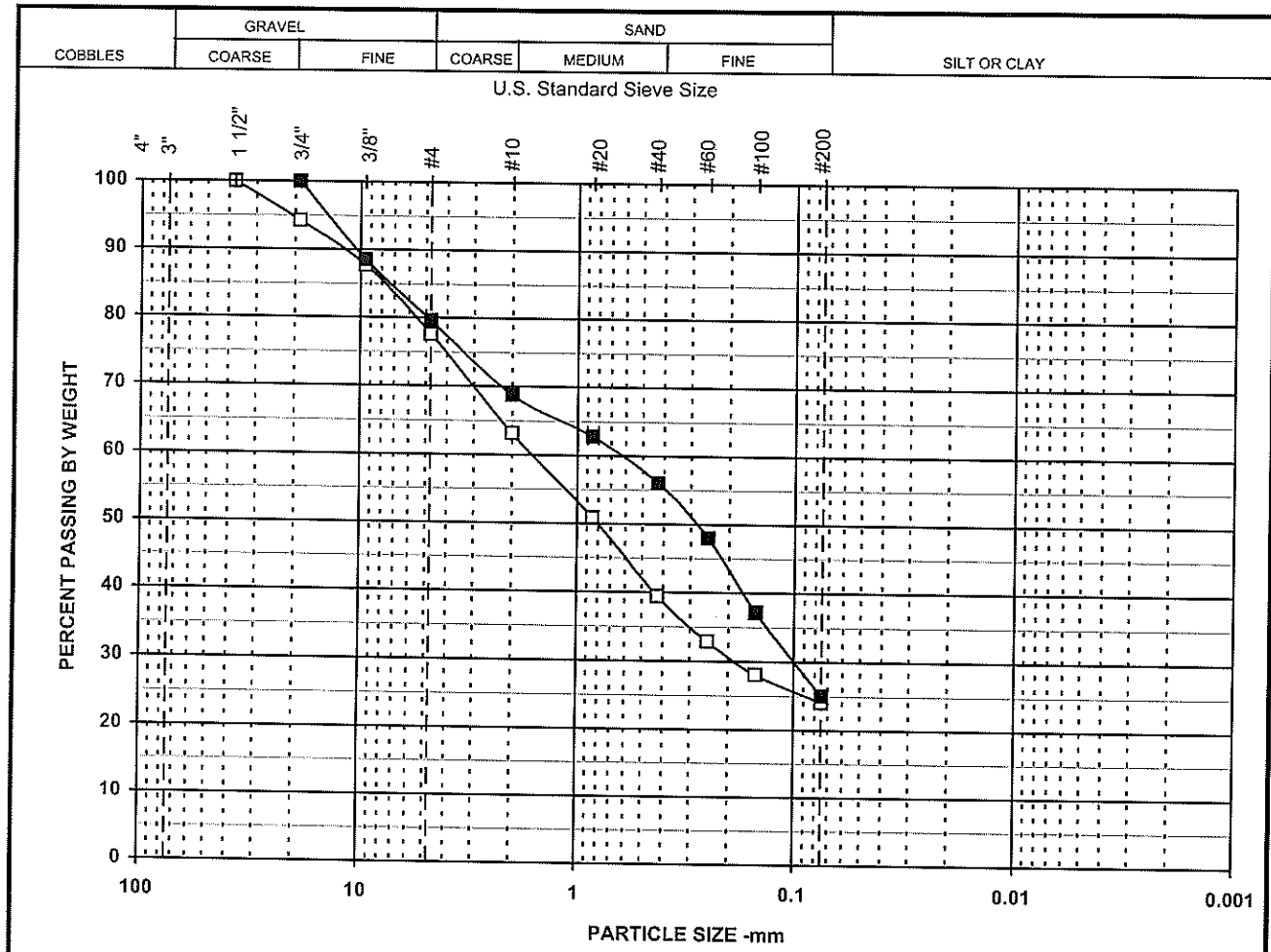
PARTICLE SIZE DISTRIBUTION

H&A #32669-000 - Connecticut Busway

Project No.		Figure
31737788-805	May 2008	

Geotesting Services, Inc.

sievj03.xls 5/19/2008



SYMBOL	DESCRIPTION AND REMARKS
□	red c-f SAND, some clay, trace gravel.
■	red c-f SAND, some f. gravel, clay.
○	

Symbol	□	■	○
Boring	RB-104	RB-105	
Sample	S-1	S-4	
Spec			
Depth	1-3	7-9	
% +3"			
% Gravel	22.4	20.4	
% SAND	53.5	54.6	
% FINES	24.1	25.0	
% -2μ			
Cc			
Cu			
LL			
PL			
PI			
USCS	SC	SC	
w (%)	11.9	16.6	

Particle Size (Sieve #)	PERCENT FINER □	■	○
4"			
3"			
1 1/2"	100.0		
3/4"	94.3	100.0	
3/8"	87.7	88.5	
4	77.6	79.6	
10	63.1	68.8	
20	50.9	62.7	
40	39.4	56.0	
60	32.9	48.0	
100	28.1	37.2	
200	24.1	25.0	

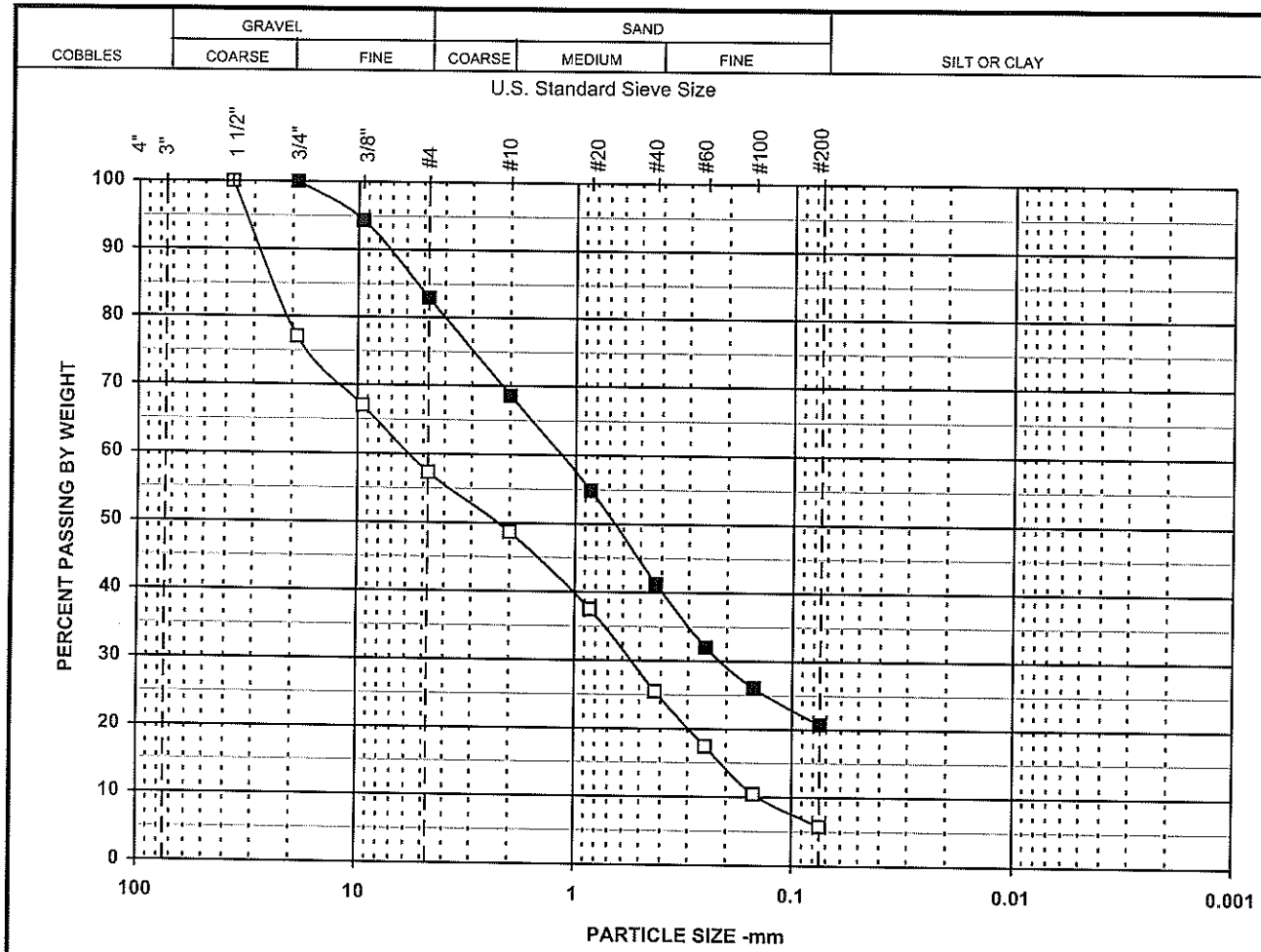
PARTICLE SIZE DISTRIBUTION

H&A #32669-000 - Connecticut Busway

Project No.		Figure
31737788-805	May 2008	

Geotesting Services, Inc.

sievj04.xls 5/19/2008



SYMBOL	DESCRIPTION AND REMARKS
□	reddish-brown gravelly c-f SAND, trace silt.
■	brown c-f SAND, some f. gravel, silt.
○	

Symbol	□	■	○
Boring	RB-107	RB-107	
Sample	S-1	S-4	
Spec			
Depth	0-2	7-9	
% +3"			
% Gravel	42.7	17.1	
% SAND	51.5	62.2	
% FINES	5.8	20.7	
% -2μ			
Cc	0.4		
Cu	42.5		
LL			
PL			
PI			
USCS	SP-SM	SM	
w (%)	4.9	12.9	

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"	100.0		
3/4"	77.1	100.0	
3/8"	67.0	94.3	
4	57.3	82.9	
10	48.6	68.6	
20	37.4	54.8	
40	25.5	41.3	
60	17.4	32.0	
100	10.5	26.1	
200	5.8	20.7	

PARTICLE SIZE DISTRIBUTION

H&A #32669-000 - Connecticut Busway

Project No.		Figure
31737788-805	May 2008	

Geotesting Services, Inc.

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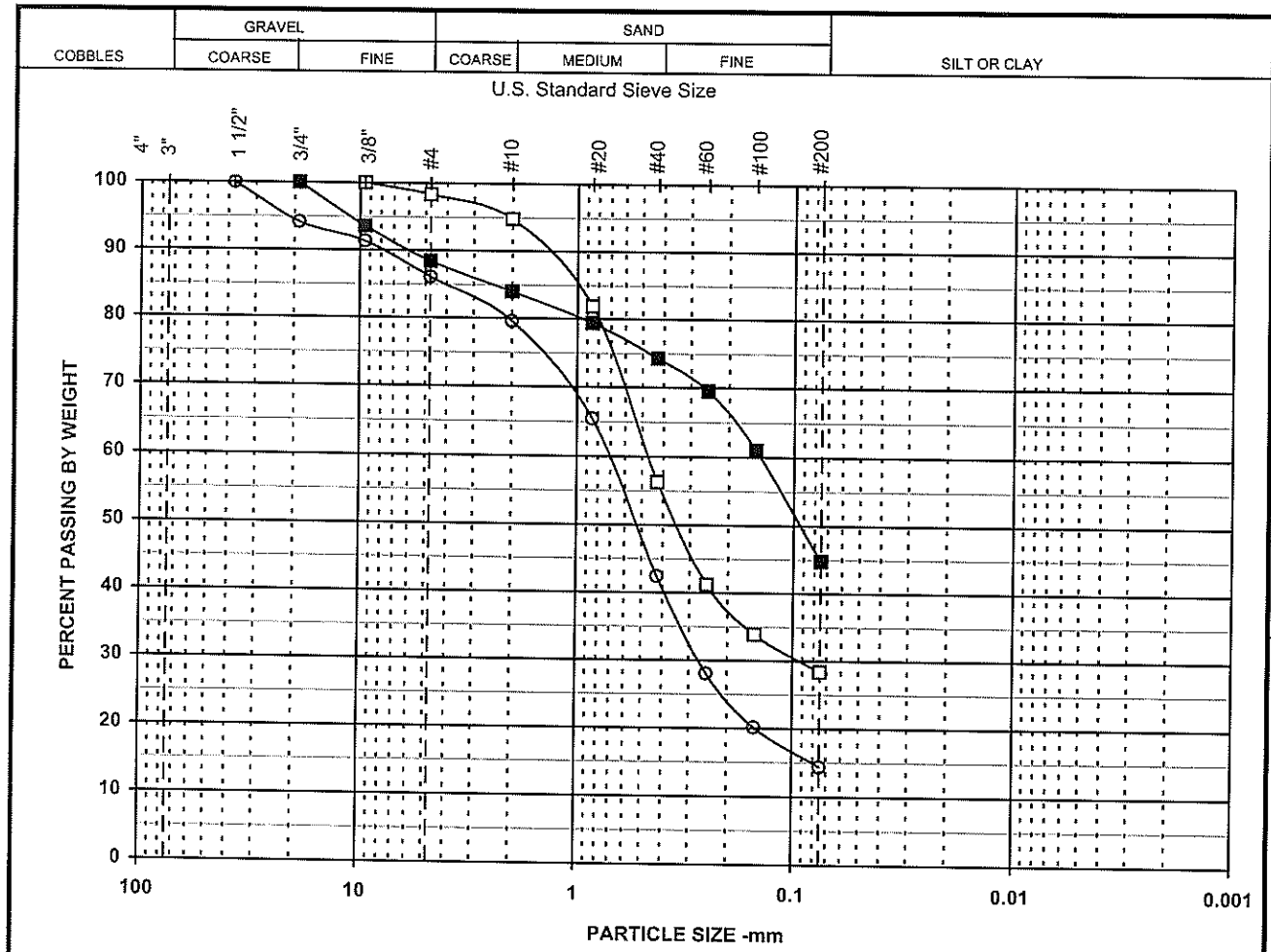

SYMBOL	DESCRIPTION AND REMARKS
□	reddish-brown c-f SAND, some silt, trace f. gravel; clay lumps noted.
■	brown silty c-f SAND, trace f. gravel.
○	reddish-brown c-f SAND, some gravel, silt.

Symbol	□	■	○
Boring	RB-110	RB-120	RB-122
Sample	S-2	S-1	S-2
Spec			
Depth	2-4	0-2	2-4
% +3"			
% Gravel	1.7	11.6	
% SAND	69.9	43.7	
% FINES	28.4	44.7	14.4
% -2μ			
Cc			
Cu			
LL			
PL			
PI			
USCS	SM	SM	SM
w (%)	11.7	6.8	11.9

Particle Size (Sieve #)	PERCENT FINER □	■	○
4"			
3"			
1 1/2"			100.0
3/4"		100.0	94.2
3/8"	100.0	93.6	91.4
4	98.3	88.4	86.1
10	94.8	84.0	79.6
20	81.9	79.4	65.5
40	56.3	74.3	42.4
60	41.2	69.5	28.1
100	33.9	61.0	20.2
200	28.4	44.7	14.4

PARTICLE SIZE DISTRIBUTION

H&A #32669-000 - Connecticut Busway

Project No.		Figure
31737788-805	May 2008	

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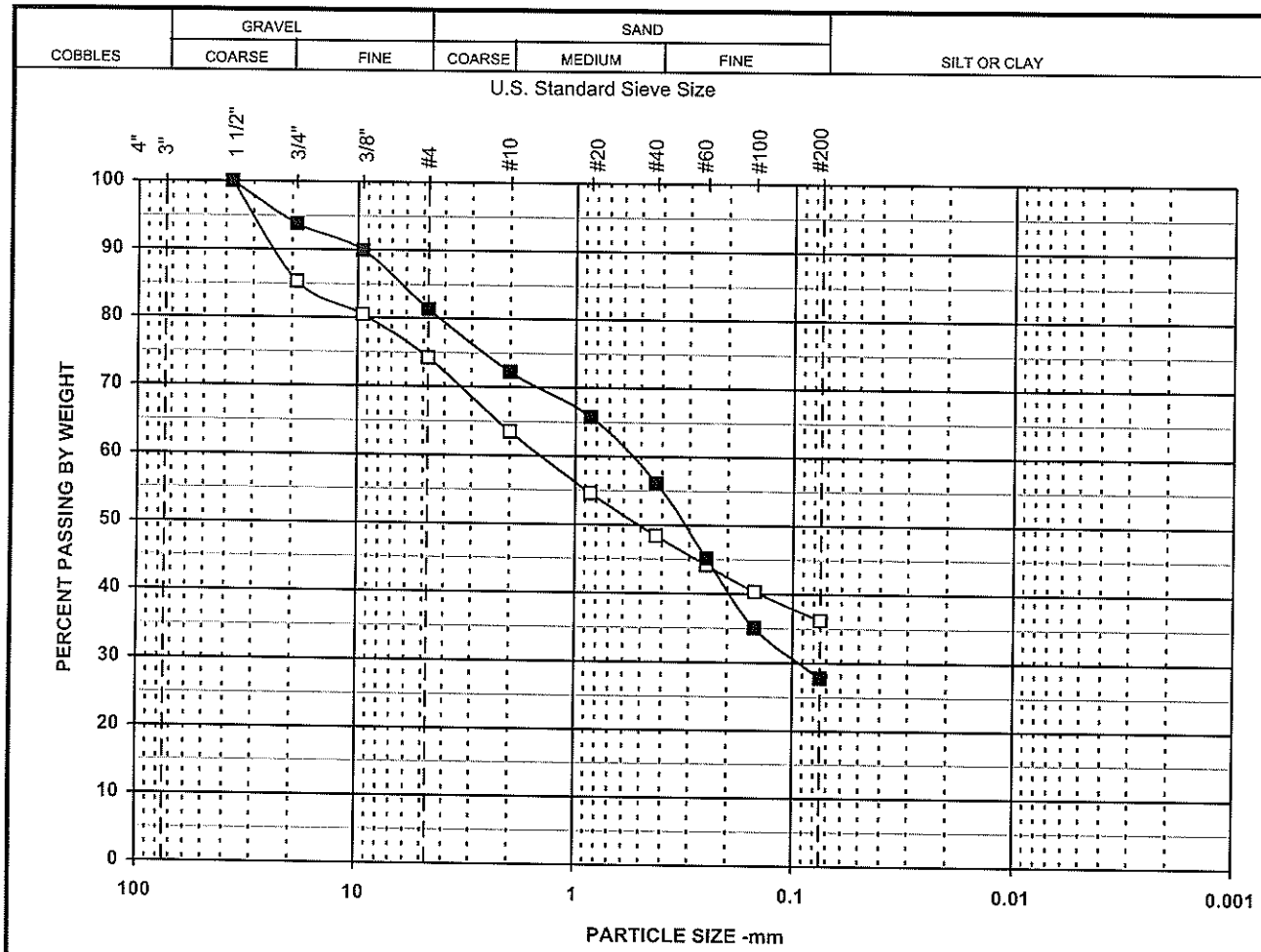

SYMBOL	DESCRIPTION AND REMARKS
□	brown clayey c-f SAND, some gravel.
■	brown c-f SAND, some gravel, silt.
○	

Symbol	□	■	○
Boring	RW-101	RW-105	
Sample	S-3	S-1	
Spec			
Depth	5-7	0-2	
% +3"			
% Gravel	25.8		
% SAND	38.0		
% FINES	36.2	27.8	
% -2μ			
Cc			
Cu			
LL			
PL			
PI			
USCS	SC	SM	
w (%)	9.6	7.7	

Particle Size (Sieve #)	PERCENT FINER □	■	○
4"			
3"			
1 1/2"	100.0	100.0	
3/4"	85.3	93.7	
3/8"	80.5	89.9	
4	74.2	81.4	
10	63.5	72.3	
20	54.6	65.7	
40	48.4	56.1	
60	44.1	45.1	
100	40.3	35.1	
200	36.2	27.8	

PARTICLE SIZE DISTRIBUTION

H&A #32669-000 - Connecticut Busway

Project No.		Figure
31737788-805	May 2008	

Geotesting Services, Inc.

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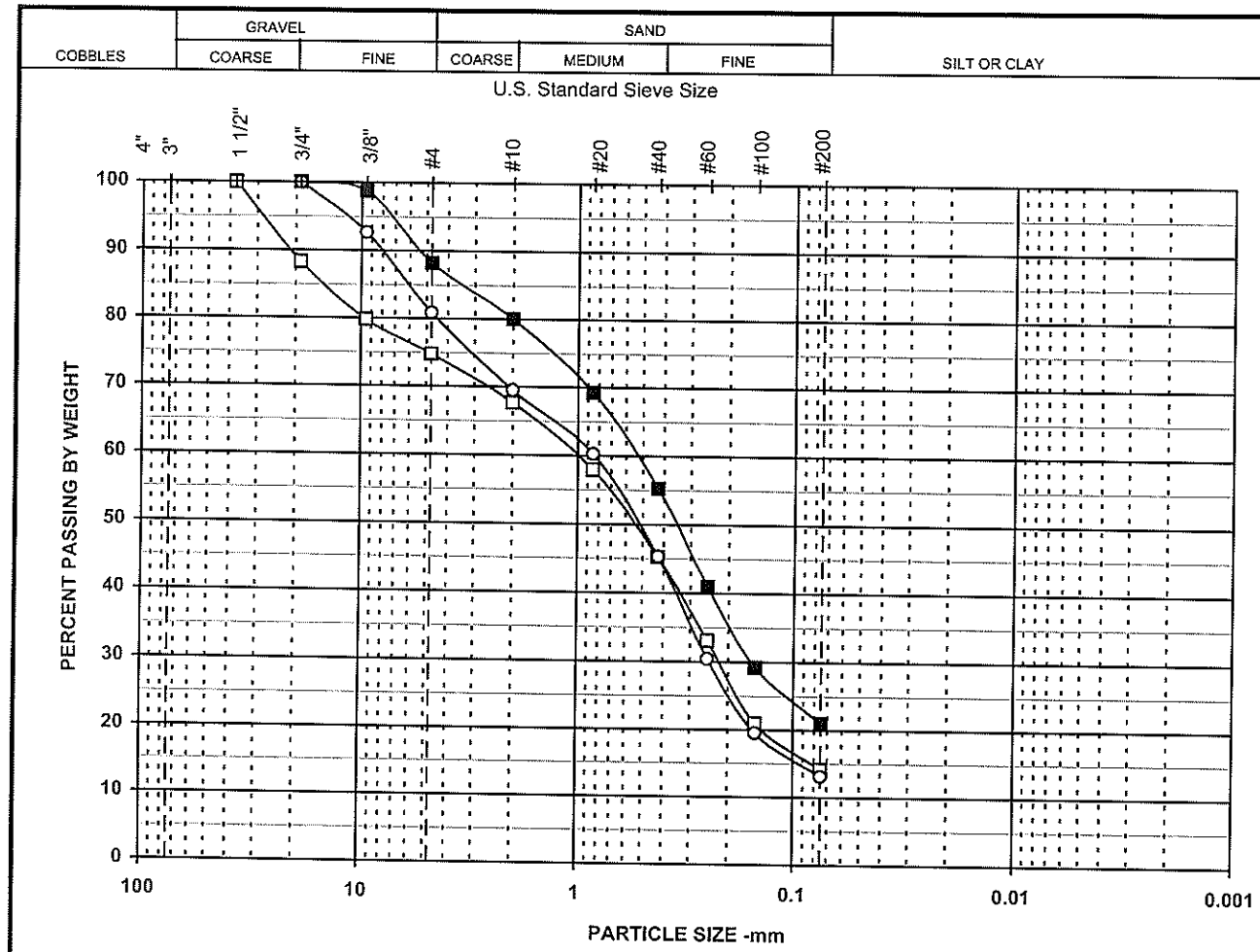

SYMBOL	DESCRIPTION AND REMARKS
□	red c-f SAND, some gravel, silt.
■	red c-f SAND, some silt, trace f. gravel.
○	red c-f SAND, some f. gravel, silt.

Symbol	□	■	○
Boring	RW-110	RW-112	RW-114
Sample	S-1	S-2	S-3
Spec			
Depth	1-2	3-5	5-7
% +3"			
% Gravel	25.2	11.8	19.1
% SAND	60.7	67.2	67.7
% FINES	14.1	21.0	13.2
% -2μ			
Cc			
Cu			
LL			
PL			
PI			
USCS	SM	SM	SM
w (%)	13.3	9.2	11.6

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"	100.0		
3/4"	88.3	100.0	100.0
3/8"	79.9	98.7	92.6
4	74.8	88.2	80.9
10	67.7	80.0	69.5
20	57.9	69.3	60.2
40	45.2	55.2	45.3
60	33.1	40.9	30.4
100	20.9	29.2	19.5
200	14.1	21.0	13.2

PARTICLE SIZE DISTRIBUTION

H&A #32669-000 - Connecticut Busway

Project No.		Figure
31737788-805	May 2008	

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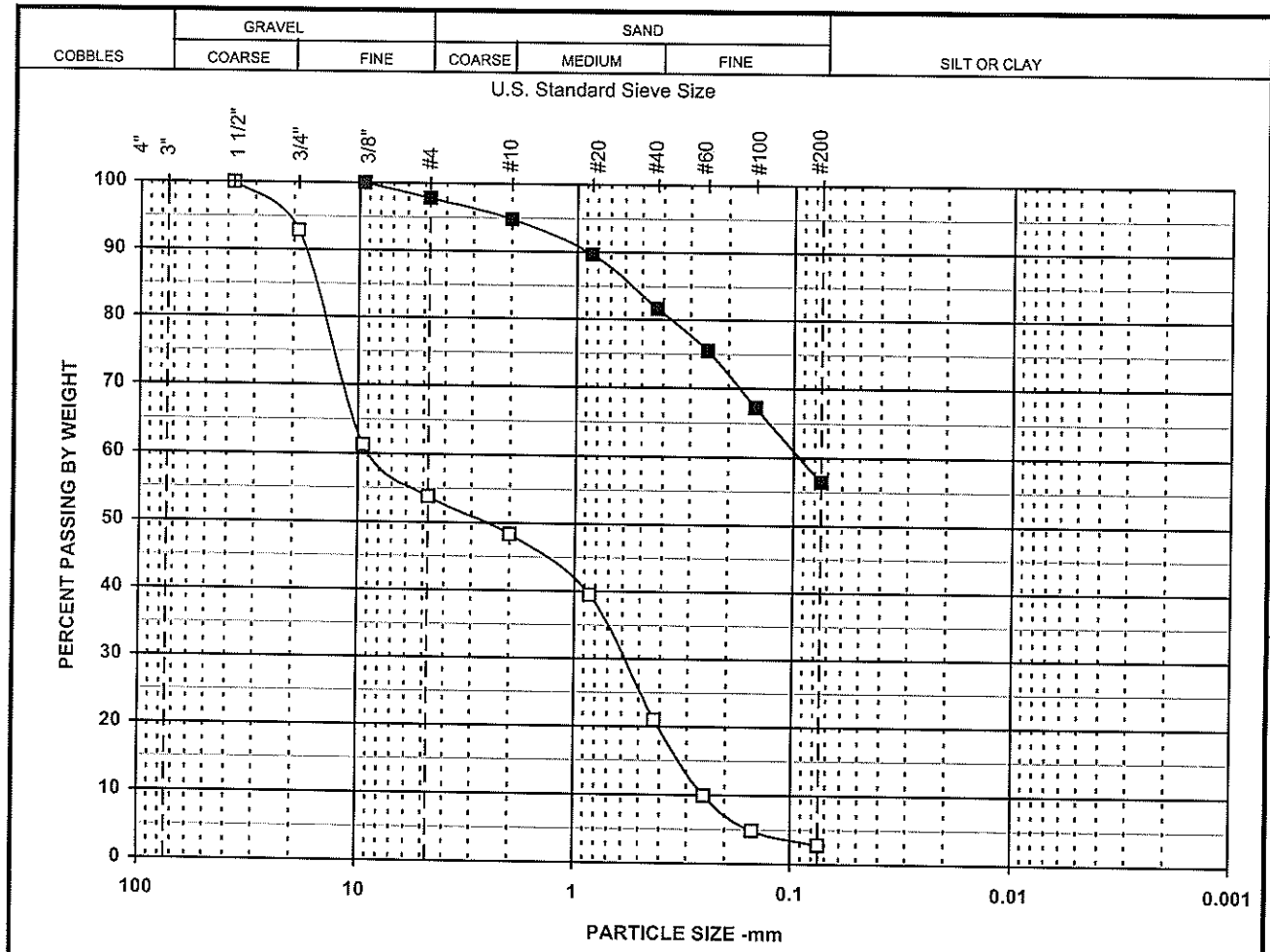

SYMBOL	DESCRIPTION AND REMARKS
□	brown gravelly c-f SAND, trace silt.
■	brown c-f sandy silty CLAY, trace f. gravel.
○	

Symbol	□	■	○
Boring	RW-118	RW-119	
Sample	S-1	S-5	
Spec			
Depth	0-2	10-12	
% +3"			
% Gravel	46.2	2.2	
% SAND	51.0	41.4	
% FINES	2.8	56.4	
% -2μ			
Cc	0.2		
Cu	34.7		
LL			
PL			
PI			
USCS	SP	CL	
w (%)	2.5	21.1	

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"	100.0		
3/4"	92.8		
3/8"	61.2	100.0	
4	53.8	97.8	
10	48.3	94.8	
20	39.5	89.6	
40	21.0	81.7	
60	9.9	75.5	
100	4.9	67.2	
200	2.8	56.4	

PARTICLE SIZE DISTRIBUTION

H&A #32669-000 - Connecticut Busway

Project No.		Figure
31737788-805	May 2008	

Geotesting Services, Inc.

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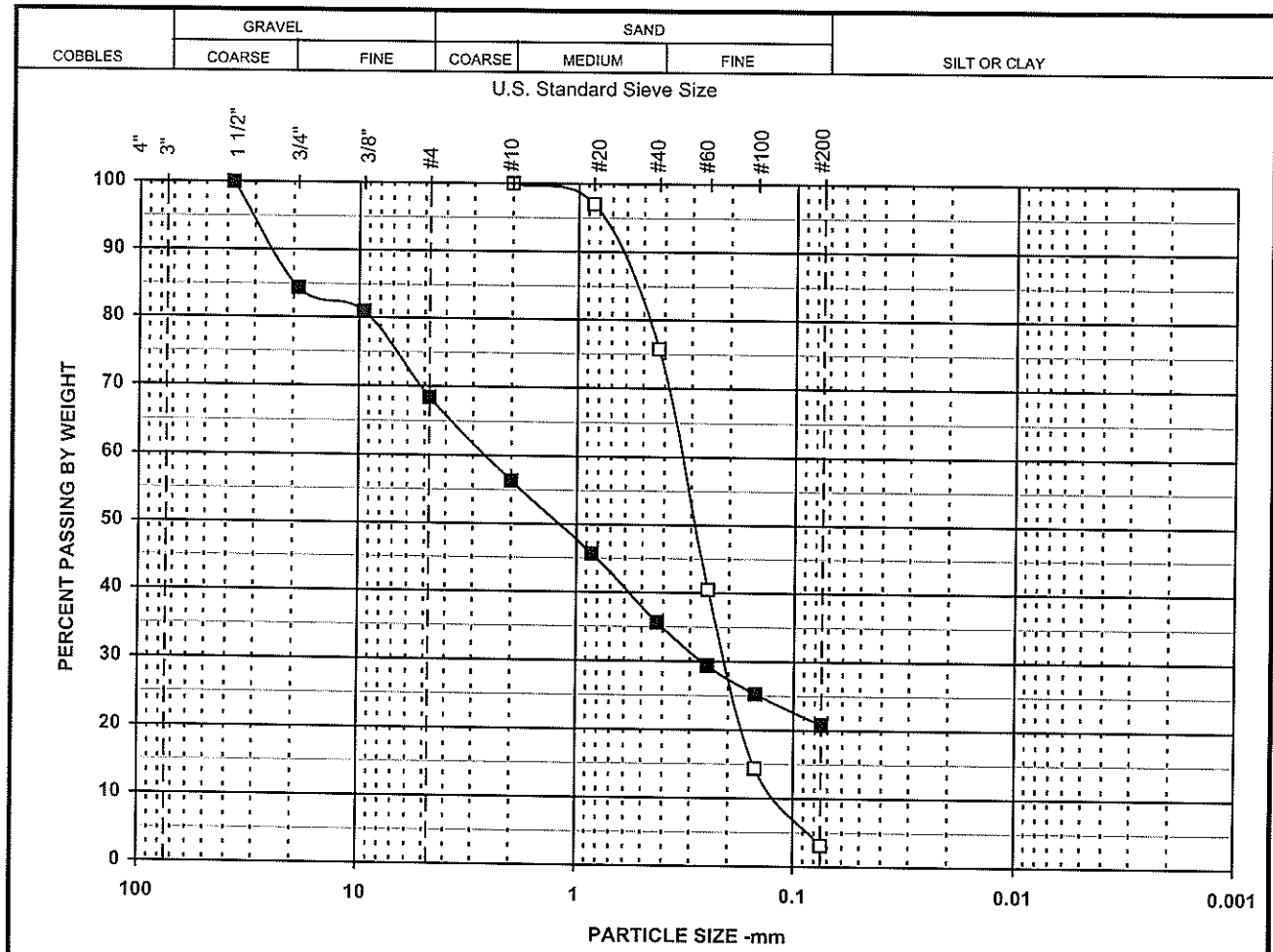


SYMBOL	DESCRIPTION AND REMARKS
□	brown m-f SAND, trace silt.
■	brown gravelly c-f SAND, some silt.
○	

Symbol	□	■	○
Boring	RW-120	RW-124	
Sample	S-4	S-5	
Spec			
Depth	7-9	10-12	
% +3"			
% Gravel		31.6	
% SAND	96.9	47.6	
% FINES	3.1	20.8	
% -2μ			
Cc	1.1		
Cu	2.9		
LL			
PL			
PI			
USCS	SP	SM	
w (%)	4.2	18.5	

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"		100.0	
3/4"		84.3	
3/8"		80.9	
4		68.4	
10	100.0	56.3	
20	97.0	45.7	
40	75.8	35.6	
60	40.5	29.4	
100	14.4	25.2	
200	3.1	20.8	

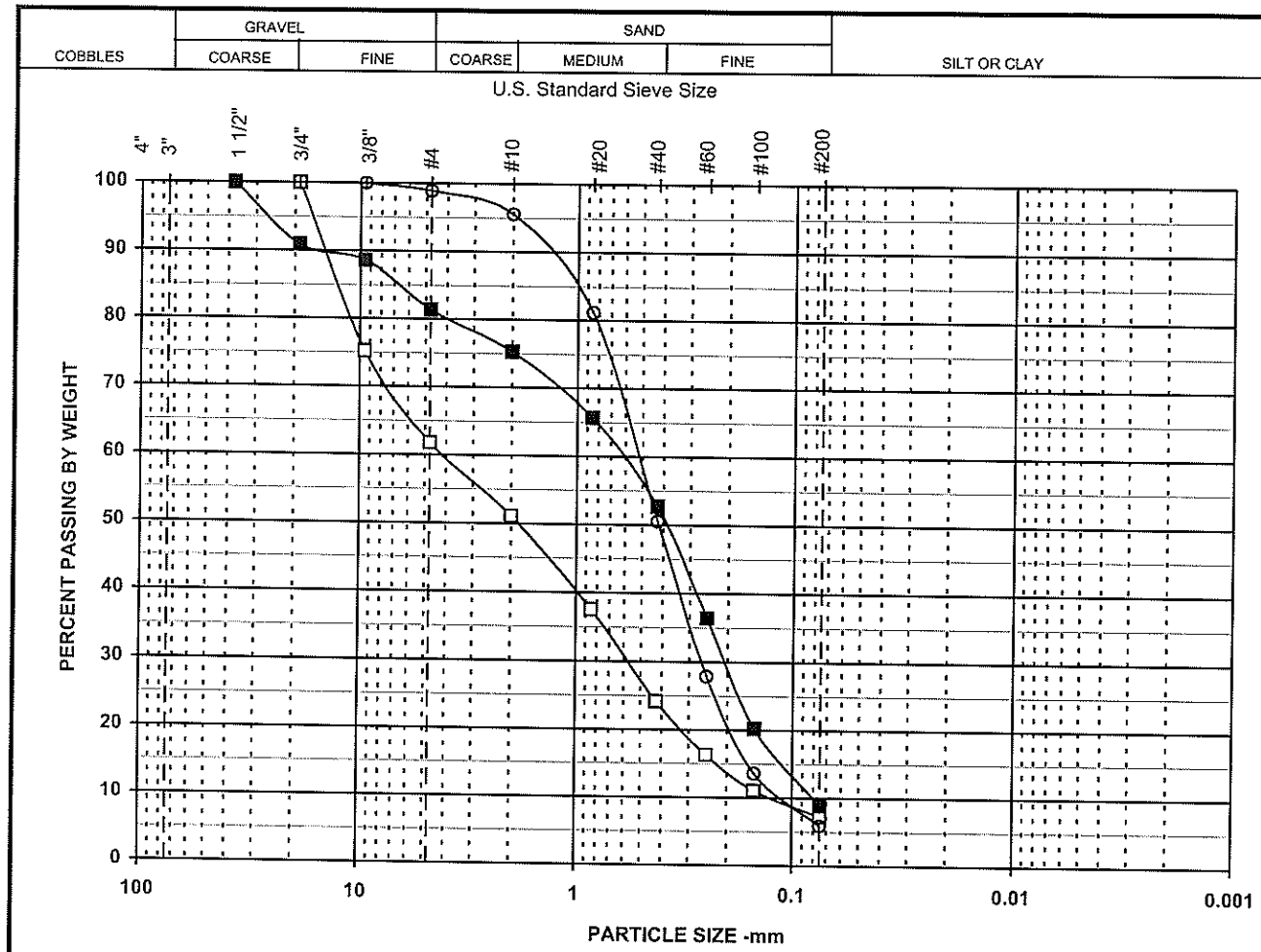
PARTICLE SIZE DISTRIBUTION

H&A #32669-000 - Connecticut Busway

Project No.		Figure
31737788-805	May 2008	

Geotesting Services, Inc.

sievj10.xls 5/19/2008



SYMBOL	DESCRIPTION AND REMARKS
□	yellowish-brown gravelly c-f SAND, trace silt.
■	yellowish-brown c-f SAND, some gravel, trace silt.
○	brown c-f SAND, trace f. gravel, silt.

Symbol	□	■	○
Boring	TB-101	TB-101	TB-102
Sample	S-2	S-7	S-6
Spec			
Depth	2-4	20-22	15-17
% +3"			
% Gravel	38.2	18.6	
% SAND	54.5	72.5	
% FINES	7.3	8.9	5.9
% -2μ			
Cc	0.7	0.8	1.1
Cu	33.3	8.1	4.8
LL			
PL			
PI			
USCS	SP-SM	SP-SM	SP-SM
w (%)	2.9	6.5	6.7

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"		100.0	
3/4"	100.0	90.9	
3/8"	75.2	88.6	100.0
4	61.8	81.4	98.9
10	51.1	75.3	95.5
20	37.6	65.7	81.1
40	24.1	52.6	50.5
60	16.3	36.4	27.9
100	11.0	20.2	13.6
200	7.3	8.9	5.9

PARTICLE SIZE DISTRIBUTION

H&A #32669-000 - Connecticut Busway

Project No.		Figure
31737788-805	May 2008	

Geotesting Services, Inc.

sievj11.xls 5/19/2008

Project No.: 31737788-805 File: Indx1 tubes.xls

Haley & Aldrich - #32669-000
Connecticut Busway
LABORATORY TESTING DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS WATER CONTENT (%)	LIQUID LIMIT (-)	PLASTIC LIMIT (-)	PLAS. INDEX (-)	USCS SYMB. (1)	TOTAL UNIT WEIGHT (pcf)	DRY UNIT WEIGHT (pcf)	STRENGTH Test Type @ STress (ksf)	PEAK SHEAR STRESS (ksf)	AXIAL STRAIN @ PEAK STRESS (%)	RESIDUAL SHEAR STRESS (ksf)	SENSITIVITY	CONSOLIDATION INITIAL CONDITIONS VOID RATIO (-)	SATUR-ATION (%)	REMARKS
CB-103	U-1	38-40						124.1									
CB-103	U-1B	38.65	28.1	25	20	5	CL-ML	122.6	97.7	CIU'@2.7	8.5	20.6					T2882
NBA-101	U-3	35-37						124.5									
NBA-101	U-3A	35.65	29.1				ML	126.6	98.0	CIU'@2.2	12.3	19.9					T2879
NBA-101	U-3B	36.15	27.6				CL&ML	121.7	95.4	CIU'@4.3	6.2	21.3					T2880
NBA-101	U-3C	36.65	24.5				CL-ML	129.1	103.7	CIU'@8.6	5.2	20.4					T2881
NBA-101	U-3D	37.1	22.4	28	18	10	CL	131.3	107.2						0.624	100	C08054
NBA-101	U-3D	37.1	22.0							LV	0.76		0.10	7.5			
RB-112	U-1	18-20						116.8									
RB-112	U-1A	18.2	17.1							LV	0.26		0.02	10.3			
RB-112	U-1B	18.45	21.6				CL-ML	135.3	111.2	CIU'@1.4	4.9	20.3					T2870
RB-112	U-1C	18.95	30.9				CL	121.9	93.1	CIU'@2.9	1.6	4.7					T2871
RB-112	U-1D	19.45	38.0				CL	118.7	86.0	CIU'@5.8	1.7	7.2					T2872
RB-112	U-1E	19.85	40.7	43	21	22	CL	114.5	81.4						1.132	100	C08051
RB-118	U-2	23-25						116.6									
RB-118	U-2	23.2	41.5							LV	0.22		0.04	5.4			
RB-118	U-2	23.65	32.5				ML	120.3	90.8	CIU'@1.7	6.2	19.2					T2864
RB-118	U-2	24.15	29.6				CL-ML	125.1	96.5	CIU'@3.5	8.9	10.1					T2865
RB-118	U-2	24.65	29.8				CL-ML	123.6	95.2	CIU'@6.9	13.4	12.5					T2866
RB-118	U-2	25.1	23.0	np	np	np	ML	128.1	104.2						0.648	98	C08048
RW-110	U-1	23-25						108.0									
RW-110	U-1A	23.45	51.6				CL	109.4	72.2	CIU'@2.9	0.8	6.9					T2876
RW-110	U-1B	23.95	46.9				CL	112.1	76.3	CIU'@5.8	1.7	17.2					T2877
RW-110	U-1C	24.45	49.7				CL	110.5	73.8	CIU'@11.5	3.1	17.7					T2878
RW-110	U-1D	24.9	61.1	49	28	21	ML	103.2	64.1						1.709	99	C08053
RW-110	U-1D	24.9	61.7							LV	0.34		0.10	3.7			bottom

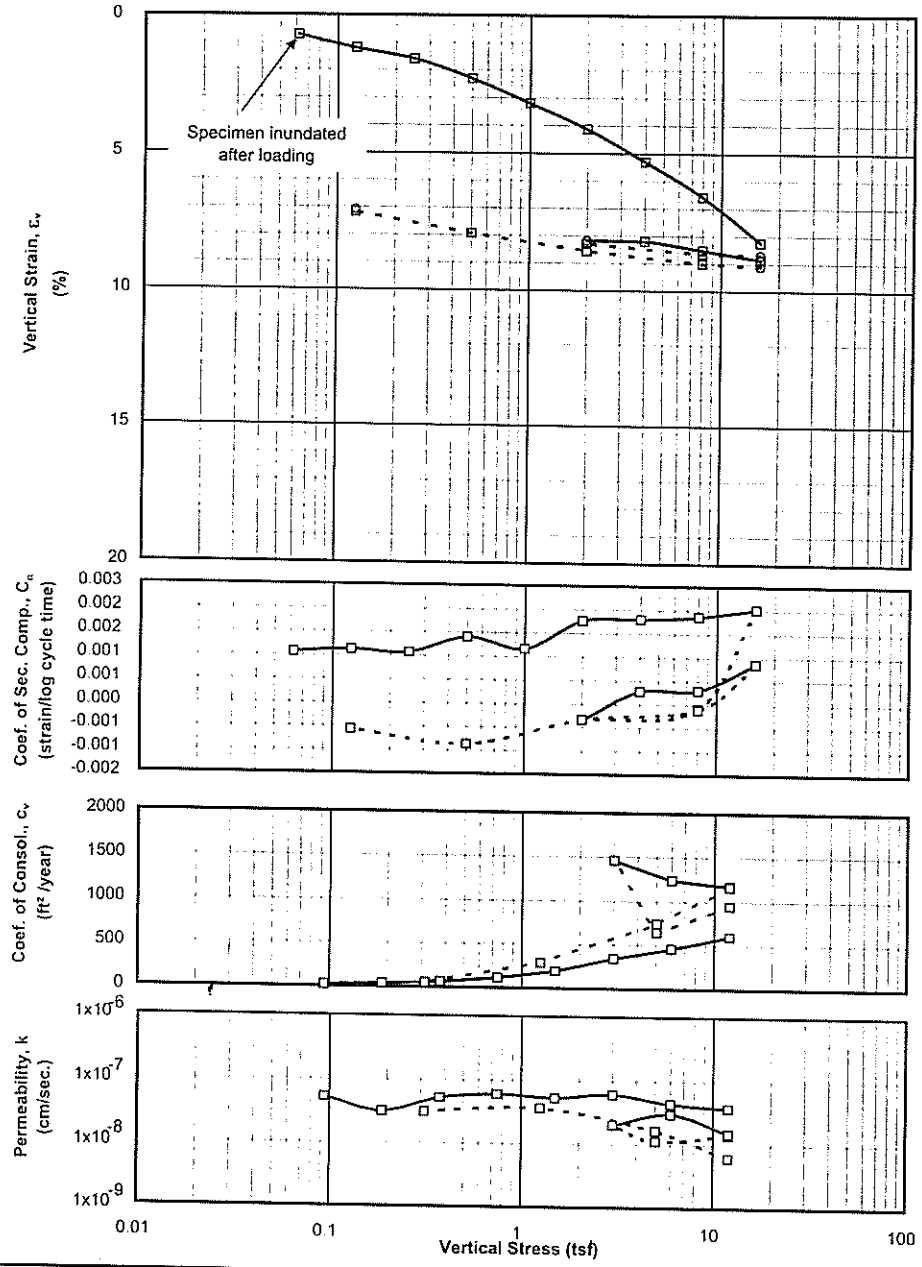
Prepared by: JR Reviewed by: GET Date: 5/28/2008

Haley & Aldrich - #32669-000
Connecticut Busway
LABORATORY TESTING DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS							STRENGTH					CONSOLIDATION INITIAL CONDITIONS		REMARKS
			WATER CONTENT (%)	LIQUID LIMIT (-)	PLASTIC LIMIT (-)	PLAS. INDEX (-)	USCS SYMB. (1)	TOTAL UNIT WEIGHT (pcf)	DRY UNIT WEIGHT (pcf)	Test Type @ STRESS (ksf)	PEAK SHEAR STRESS (ksf)	AXIAL STRAIN @ PEAK STRESS (%)	RESIDUAL SHEAR STRESS (ksf)	SENSITIVITY	VOID RATIO (-)	SATUR-ATION (%)	
RW-116		18-20						105.1									
RW-116	A	18.25	63.7				CH	104.8	64.0	CIU'@1.4	0.7	4.9					T2873
RW-116	B	18.75	60.7				CH	104.8	65.2	CIU'@2.9	1.1	2.6					T2874
RW-116	C	19.25	60.5				CH	104.4	65.0	CIU'@5.8	1.5	2.6					T2875
RW-116	D	19.75	60.7	69	29	40	CH	104.6	65.1						1.706	100	C08052
RW-116	D	19.75	65.3							LV	0.68		0.18	3.7			bottom
RW-121	U-1	43-45						108.5									
RW-121	U-1A	43.15	41.8							LV	0.32		0.08	4.10			
RW-121	U-1B	43.55	52.2				CL	109.4	71.9	CIU'@3.3	1.0	11.9					T2867
RW-121	U-1C	44.05	47.9				CL	109.9	74.3	CIU'@6.6	1.9	18.1					T2868
RW-121	U-1D	44.5	49.3				CL	110.4	73.9	CIU'@13.3	3.1	5.0					T2869
RW-121	U-1E	45.05	52.5	41	25	16	CL	107.1	70.3						1.444	100	C08049
TB-102	U-3	55-57						110.3									
TB-102	U-3A	55.1															disturbed
TB-102	U-3B	55.45															disturbed
TB-102	U-3C	55.95															disturbed
TB-102	U-3D	56.45	48.8				ML	111.7	75.1	CIU'@4.3	1.6	16.8					T2883
TB-102	U-3E	56.85	45.3	37	25	12	ML	114.3	78.7						1.317	100^{+}	C08050
TB-102	U-3E	56.85	66.0							LV	0.32		0.08	4.1			

Note: (1) USCS symbol based on visual observation and Sieve and Atterberg limits reported.

Prepared by: JR Reviewed by: GET Date: 5/28/2008



SAMPLE INFORMATION

Boring:	NBA-101
Sample:	U3-D
Depth:	37.10 feet
Elevation:	
Type:	3-inch thin wall tube
Description:	CL, reddish brown VARVED silty CLAY, trace f. sand. LL = 28, PL = 18, PI = 10

SPECIMEN INFORMATION

(NOTE: Initial and final states refer to beginning and end of test)

Initial height:	0.61	inch
Diameter:	2.50	inch

Initial water content:	22.4	%
Initial total unit weight:	131.3	pcf
Initial dry unit weight:	107.2	pcf
Initial void ratio:	0.624	
Initial degree of saturation:	100	%
Final water content:	18.9	%
Final total unit weight:	135.7	pcf
Final dry unit weight:	114.1	pcf
Final void ratio:	0.527	
Final degree of saturation:	100	%

(assumed specific gravity = 2.79)

TEST SUMMARY

Construction Method:	Casagrande (Log)
Estimated preconsolidation stress (tsf):	3.6 (Range: 1.4 to 4.3)
Estimated in situ effective overburden stress (tsf):	
Compression Ratio (strain per log cycle stress):	0.055
Compression Index (void ratio per log cycle stress):	0.089
Swell Ratio (strain per log cycle stress):	0.006
Swell Index (void ratio per log cycle stress):	0.010
Recompression Ratio (strain per log cycle stress):	0.007
Recompression Index (void ratio per log cycle stress):	0.011
Remarks:	

LEGEND: □ End of primary ○ End of Stage ——— Loading - - - - - - Unloading

Test Date: 5/8/08 Tested By: CMJ Checked By: GET

Haley & Aldrich	H&A #32669-000 Connecticut Busway	ONE DIMENSIONAL CONSOLIDATION TEST Boring. NBA-101 Depth: 37.10 feet
Geotesting Services, Inc.	Project No. 31737788-805	May 2008

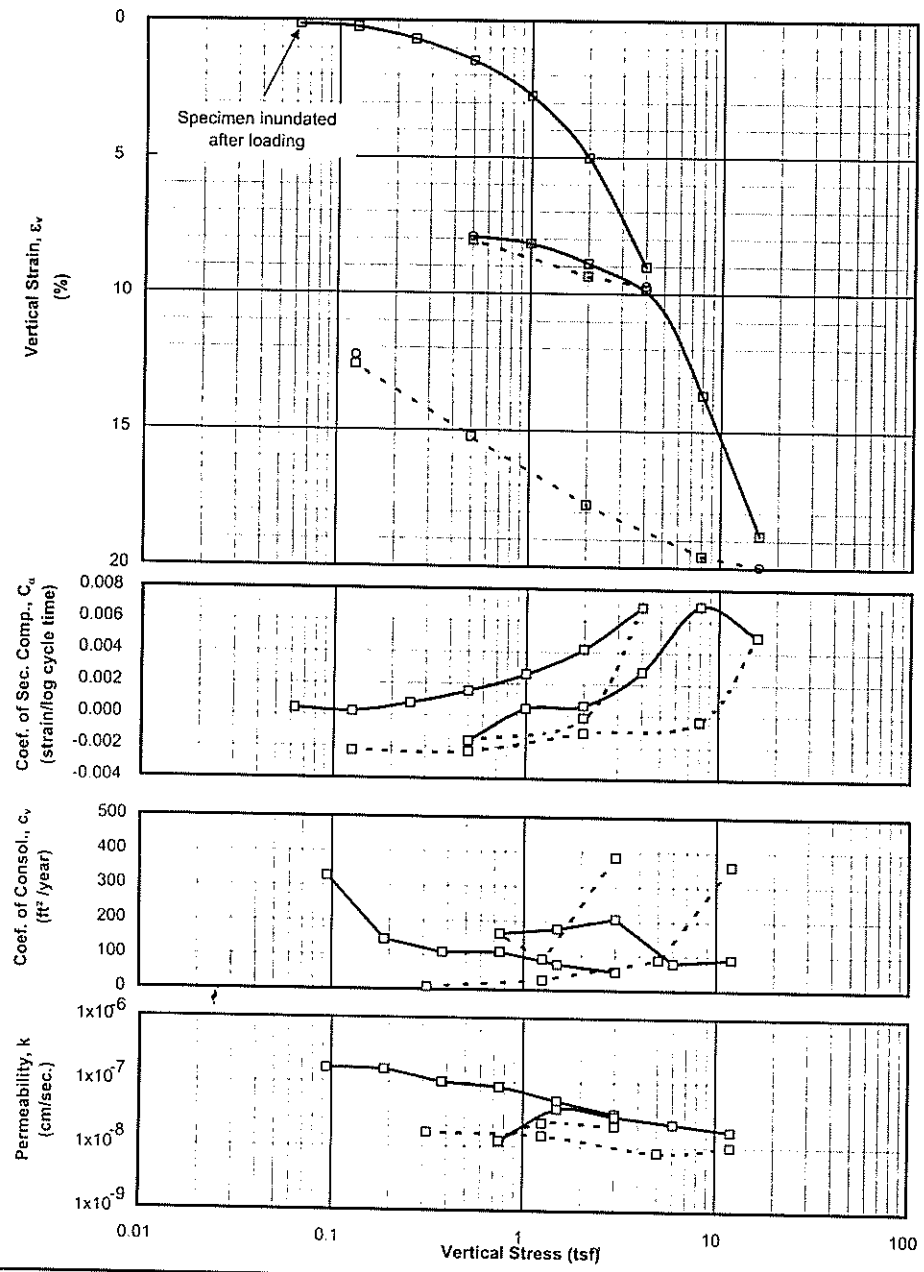
PROJECT:	CT Busway				
PROJECT NO.:	31737788-805	Initial height:	0.611 inch	Final height:	0.574 inch
BORING:	NBA-101	Initial water content:	22.4 %	Final water content:	18.9 %
SAMPLE:	U3-D	Initial dry density:	107.2 pcf	Final dry density:	114.1 pcf
TEST:	C08054	Initial total density:	131.3 pcf	Final total density:	135.7 pcf
DEPTH, feet:	37.1	Initial saturation:	100 %	Final saturation:	100 %
BY:	CMJ	Initial void ratio:	0.624	Final void ratio:	0.527
TEST DATE:	5/8/08			Final strain:	6.1 %

EQUIPMENT:
Load Frame No.: 3
Ring Diameter: 2.5 inch

SPECIMEN DESCRIPTION: CL, reddish brown VARVED silty CLAY, trace f. sand.

G	LL	PL	PI
2.79	28	18	10

Load No.	Load (tsf)	d_{100} (inch)	t_{100} Strain (%)	t_{100} Void Ratio (-)	Final Strain (%)	Final Void Ratio (-)	c_v (ft^2/year)	C_α (strain/logt)	Constrained Modulus (tsf)	Permeability (cm/sec)
1	0.063	0.0045	0.733	0.612	0.808	0.611	30.40	0.0011	8.53	1.07E-07
2	0.125	0.0074	1.218	0.604	1.183	0.605	22.11	0.0011	12.87	5.18E-08
3	0.250	0.0098	1.602	0.598	1.720	0.596	34.03	0.0011	32.59	3.15E-08
4	0.500	0.0141	2.309	0.587	2.495	0.584	61.10	0.0014	35.34	5.22E-08
5	1.00	0.0196	3.204	0.572	3.480	0.568	109.75	0.0012	55.87	5.93E-08
6	2.00	0.0252	4.129	0.557	4.610	0.549	191.10	0.0018	108.06	5.34E-08
7	4.00	0.0324	5.305	0.538	5.710	0.531	343.70	0.0018	170.17	6.09E-08
8	8.00	0.0403	6.583	0.517	6.981	0.511	456.04	0.0019	312.81	4.40E-08
9	16.0	0.0504	8.242	0.490	8.701	0.483	600.70	0.0020	482.19	3.76E-08
10	8.00	0.0528	8.641	0.484	8.625	0.484	949.83	-0.0001	2007.11	1.43E-08
11	2.00	0.0507	8.291	0.489	8.179	0.491	646.60	-0.0003	1714.58	1.14E-08
12	4.00	0.0501	8.200	0.491	8.278	0.490	1462.42	0.0003	2199.32	2.01E-08
13	8.00	0.0521	8.525	0.486	8.608	0.484	1240.88	0.0003	1230.30	3.04E-08
14	16.0	0.0542	8.865	0.480	9.107	0.476	1171.92	0.0009	2351.89	1.50E-08
15	8.00	0.0551	9.006	0.478	8.974	0.478	1166.13	-0.0001	5713.15	6.16E-09
16	2.00	0.0523	8.561	0.485	8.484	0.486	745.23	-0.0003	1349.12	1.67E-08
17	0.500	0.0485	7.935	0.495	7.676	0.499	290.38	-0.0009	239.87	3.65E-08
18	0.125	0.0439	7.173	0.508	7.101	0.509	51.45	-0.0006	49.17	3.16E-08



SAMPLE INFORMATION

Boring:	RB-112
Sample:	U-1E
Depth:	19.85 feet
Elevation:	
Type:	3-inch thin wall tube
Description:	CL, reddish brown CLAY, trace f. sand.

LL = 43, PL = 21, PI = 22

SPECIMEN INFORMATION

(NOTE: Initial and final states refer to beginning and end of test)

Initial height:	0.61	inch
Diameter:	2.50	inch

Initial water content:	40.7	%
Initial total unit weight:	114.5	pcf
Initial dry unit weight:	81.4	pcf
Initial void ratio:	1.132	
Initial degree of saturation:	100	%
Final water content:	35.3	%
Final total unit weight:	118.5	pcf
Final dry unit weight:	87.6	pcf
Final void ratio:	0.981	
Final degree of saturation:	100	%

(assumed specific gravity = 2.78)

TEST SUMMARY

Construction Method:	Casagrande (Log)
Estimated preconsolidation stress (tsf):	2.2 (Range: 1.7 to 2.3)
Estimated in situ effective overburden stress (tsf):	
Compression Ratio (strain per log cycle stress):	0.171
Compression Index (void ratio per log cycle stress):	0.365
Swell Ratio (strain per log cycle stress):	0.022
Swell Index (void ratio per log cycle stress):	0.047
Recompression Ratio (strain per log cycle stress):	0.020
Recompression Index (void ratio per log cycle stress):	0.043
Remarks:	

LEGEND: ☐ End of primary ○ End of Stage ——— Loading - - - - - - Unloading

Test Date: 5/5/08 Tested By: CMJ Checked By: GET 9/1

Haley & Aldrich	H&A #32669-000 Connecticut Busway	ONE DIMENSIONAL CONSOLIDATION TEST Boring: RB-112 Depth: 19.85 feet
Geotesting Services, Inc.	Project No. 31737788-805	May 2008

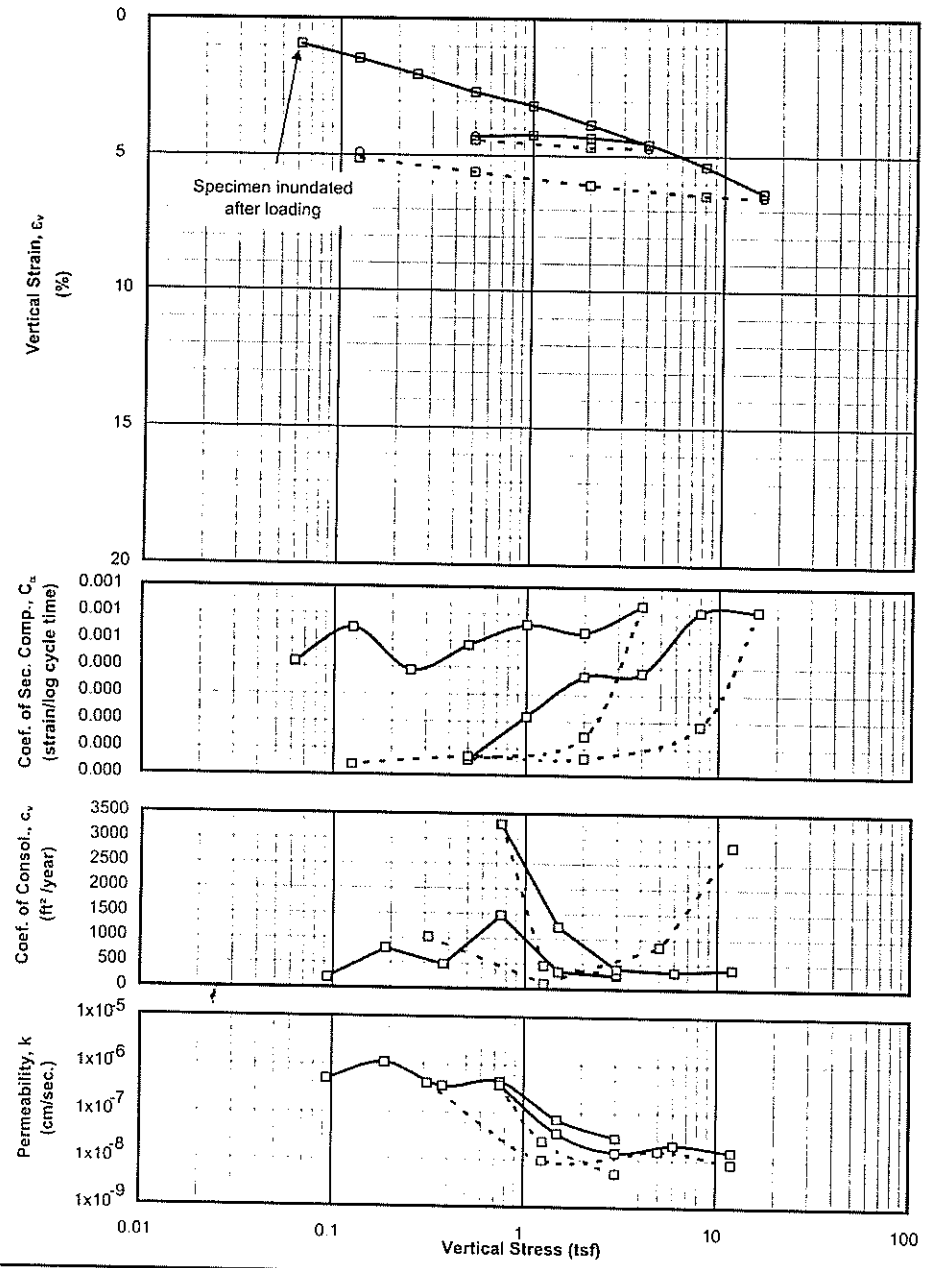
PROJECT:	H&A				
PROJECT NO.:	31737788-805	Initial height:	0.613 inch	Final height:	0.568 inch
BORING:	RB-112	Initial water content:	40.7 %	Final water content:	35.3 %
SAMPLE:	U-1E	Initial dry density:	81.4 pcf	Final dry density:	87.6 pcf
TEST:	C08051	Initial total density:	114.5 pcf	Final total density:	118.5 pcf
DEPTH, feet:	19.85	Initial saturation:	100 %	Final saturation:	100 %
BY:	CMJ	Initial void ratio:	1.132	Final void ratio:	0.981
TEST DATE:	5/5/2008			Final strain:	7.4 %

EQUIPMENT:
Load Frame No.: 5
Ring Diameter: 2.5 inch

SPECIMEN DESCRIPTION: CL, reddish brown CLAY, trace f. sand.

G	LL	PL	PI
2.78	43	21	22

Load No.	Load (tsf)	d_{100} (inch)	t_{100} Strain (%)	t_{100} Void Ratio (-)	Final Strain (%)	Final Void Ratio (-)	c_v (ft^2/year)	C_α (strain/logt)	Constrained Modulus (tsf)	Permeability (cm/sec)
1	0.063	0.0009	0.139	1.129	0.122	1.130	294.95	0.0004	44.89	1.98E-07
2	0.125	0.0015	0.241	1.127	0.243	1.127	328.80	0.0002	61.37	1.62E-07
3	0.250	0.0042	0.680	1.118	0.819	1.115	144.77	0.0007	28.46	1.53E-07
4	0.500	0.0089	1.454	1.101	1.612	1.098	108.21	0.0015	32.31	1.01E-07
5	1.00	0.0168	2.739	1.074	3.012	1.068	109.20	0.0026	38.92	8.46E-08
6	2.00	0.0308	5.021	1.025	5.498	1.015	74.86	0.0042	43.81	5.15E-08
7	4.00	0.0552	9.001	0.940	9.718	0.925	54.14	0.0069	50.25	3.25E-08
8	2.00	0.0574	9.362	0.933	9.320	0.934	385.39	-0.0001	554.08	2.10E-08
9	0.500	0.0494	8.049	0.961	7.907	0.964	89.34	-0.0016	114.21	2.36E-08
10	1.00	0.0501	8.173	0.958	8.239	0.957	162.83	0.0004	404.49	1.21E-08
11	2.00	0.0546	8.894	0.943	8.956	0.941	177.00	0.0006	138.56	3.85E-08
12	4.00	0.0604	9.844	0.922	10.260	0.913	206.93	0.0028	210.64	2.96E-08
13	8.00	0.0839	13.685	0.840	14.594	0.821	79.64	0.0069	104.13	2.31E-08
14	16.0	0.1154	18.820	0.731	19.952	0.707	90.89	0.0050	155.81	1.76E-08
15	8.00	0.1200	19.569	0.715	19.501	0.716	360.00	-0.0003	1067.66	1.02E-08
16	2.00	0.1087	17.715	0.755	17.576	0.758	87.98	-0.0011	323.69	8.20E-09
17	0.500	0.0934	15.229	0.808	15.003	0.812	29.29	-0.0023	60.33	1.46E-08
18	0.125	0.0773	12.608	0.863	12.268	0.871	7.69	-0.0023	14.31	1.62E-08



SAMPLE INFORMATION

Boring:	RB-118
Sample:	U-2E
Depth:	25.10 feet
Elevation:	
Type:	3-inch thin wall tube
Description:	ML, reddish brown SILT, some f. sand.

LL = 0, PL = 0, PI = 0

SPECIMEN INFORMATION

(NOTE: Initial and final states refer to beginning and end of test)

Initial height:	0.62	inch
Diameter:	2.50	inch
Initial water content:	23.0	%
Initial total unit weight:	128.1	pcf
Initial dry unit weight:	104.2	pcf
Initial void ratio:	0.648	
Initial degree of saturation:	98	%
Final water content:	21.6	%
Final total unit weight:	131.0	pcf
Final dry unit weight:	107.7	pcf
Final void ratio:	0.594	
Final degree of saturation:	100	% (assumed specific gravity = 2.75)

TEST SUMMARY

Construction Method:	Casagrande (Log)
Estimated preconsolidation stress (tsf):	2.0 (Range: 1.1 to 3.0)
Estimated in situ effective overburden stress (tsf):	
Compression Ratio (strain per log cycle stress):	0.030
Compression Index (void ratio per log cycle stress):	0.049
Swell Ratio (strain per log cycle stress):	0.004
Swell Index (void ratio per log cycle stress):	0.007
Recompression Ratio (strain per log cycle stress):	0.002
Recompression Index (void ratio per log cycle stress):	0.003
Remarks:	

LEGEND: ☐ End of primary ○ End of Stage ——— Loading - - - - - - Unloading

Test Date: 4/30/08 Tested By: CMJ Checked By: GET

Haley & Aldrich	H&A #32669-000 Connecticut Busway	ONE DIMENSIONAL CONSOLIDATION TEST Boring: RB-118 Depth: 25.10 feet
Geotesting Services, Inc.	Project No. 31737788-805	May 2008

PROJECT:	H&A
PROJECT NO.:	31737788-805
BORING:	RB-118
SAMPLE:	U-2E
TEST:	C08048
DEPTH, feet:	25.1
BY:	CMJ
TEST DATE:	4/30/2008

Initial height:	0.615 inch
Initial water content:	23.0 %
Initial dry density:	104.2 pcf
Initial total density:	128.1 pcf
Initial saturation:	98 %
Initial void ratio:	0.648

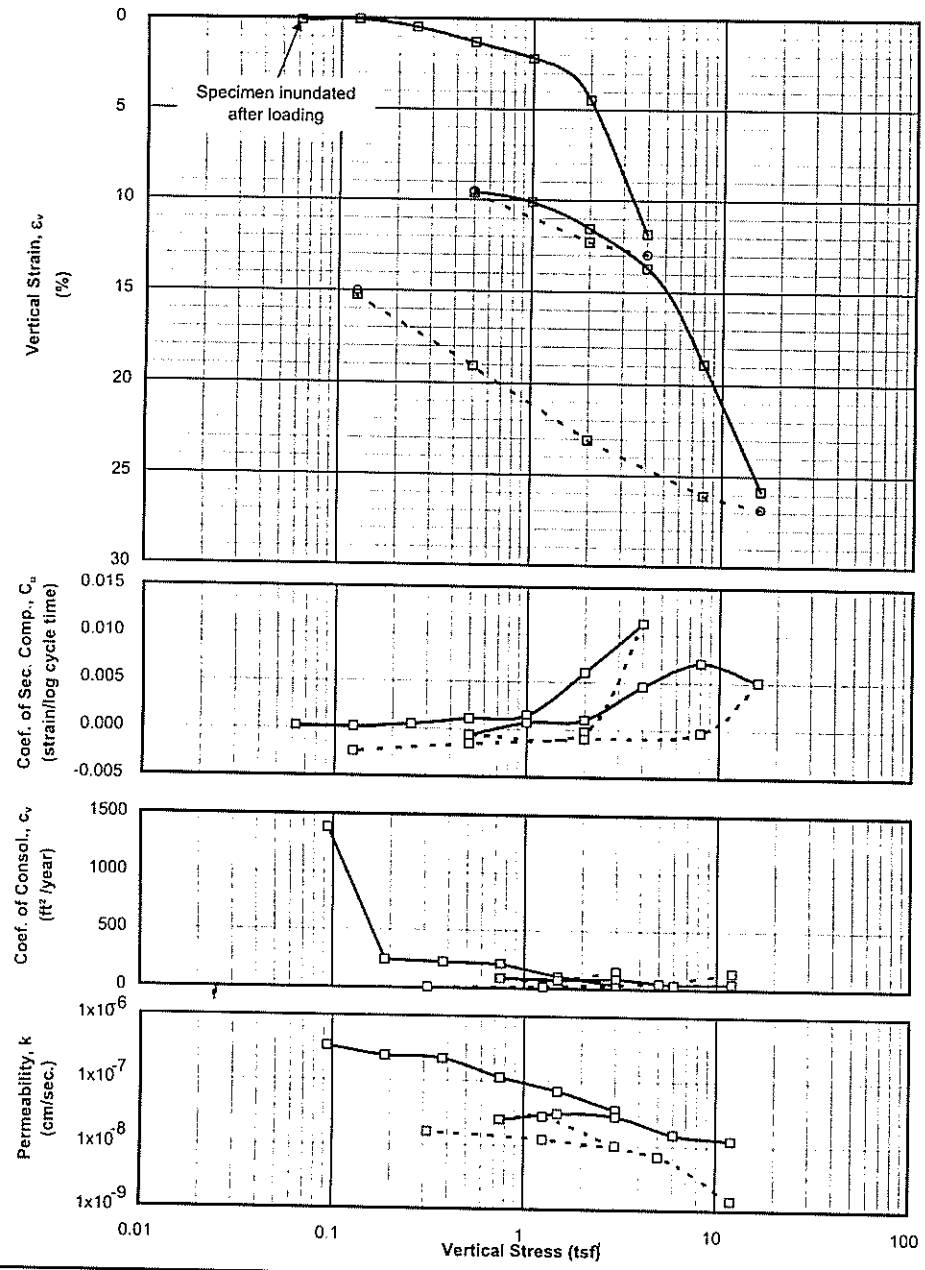
Final height:	0.594 inch
Final water content:	21.6 %
Final dry density:	107.7 pcf
Final total density:	131.0 pcf
Final saturation:	100 %
Final void ratio:	0.594
Final strain:	3.5 %

EQUIPMENT:
Load Frame No.: 6
Ring Diameter: 2.5 inch

SPECIMEN DESCRIPTION: ML, reddish brown SILT, some f. sand.

G	LL	PL	PI
2.75	np	np	np

Load No.	Load (tsf)	d_{100} (inch)	t_{100} Strain (%)	t_{100} Void Ratio (-)	Final Strain (%)	Final Void Ratio (-)	c_v (ft^2/year)	C_α (strain/logt)	Constrained Modulus (tsf)	Permeability (cm/sec)
1	0.063	0.0058	0.938	0.632	1.052	0.630	1393.62	0.0004	6.66	6.31E-06
2	0.125	0.0090	1.467	0.624	1.656	0.620	197.74	0.0007	11.83	5.04E-07
3	0.250	0.0126	2.043	0.614	2.151	0.612	791.03	0.0004	21.68	1.10E-06
4	0.500	0.0164	2.669	0.604	2.792	0.602	474.57	0.0006	39.92	3.59E-07
5	1.00	0.0195	3.175	0.595	3.368	0.592	1464.33	0.0007	98.86	4.47E-07
6	2.00	0.0237	3.858	0.584	4.016	0.582	345.72	0.0007	146.43	7.12E-08
7	4.00	0.0282	4.584	0.572	4.727	0.570	266.67	0.0009	275.67	2.92E-08
8	2.00	0.0289	4.697	0.570	4.682	0.571	301.66	-0.0001	1760.82	5.17E-09
9	0.500	0.0273	4.431	0.575	4.305	0.577	453.74	-0.0003	563.38	2.43E-08
10	1.00	0.0261	4.243	0.578	4.256	0.578	3287.92	0.0000	266.10	3.73E-07
11	2.00	0.0267	4.338	0.576	4.413	0.575	1241.14	0.0003	1048.18	3.57E-08
12	4.00	0.0282	4.580	0.572	4.648	0.571	398.51	0.0004	829.05	1.45E-08
13	8.00	0.0332	5.395	0.559	5.553	0.556	341.57	0.0008	490.69	2.10E-08
14	16.0	0.0393	6.382	0.543	6.530	0.540	398.85	0.0008	810.51	1.48E-08
15	8.00	0.0397	6.460	0.541	6.453	0.541	2846.27	0.0000	10283.51	8.35E-09
16	2.00	0.0375	6.093	0.547	5.982	0.549	851.18	-0.0003	1635.08	1.57E-08
17	0.500	0.0346	5.624	0.555	5.573	0.556	104.72	-0.0003	320.20	9.87E-09
18	0.125	0.0316	5.135	0.563	4.921	0.567	1026.65	-0.0003	76.59	4.04E-07



SAMPLE INFORMATION

Boring:	RW-110
Sample:	U-1D
Depth:	24.90 feet
Elevation:	
Type:	3-inch thin wall tube
Description:	ML, reddish brown VARVED clayey SILT, trace f. sand. LL = 49, PL = 28, PI = 21

SPECIMEN INFORMATION

(NOTE: Initial and final states refer to beginning and end of test)

Initial height:	0.61	inch
Diameter:	2.50	inch

Initial water content:	61.1	%
Initial total unit weight:	103.2	pcf
Initial dry unit weight:	64.1	pcf
Initial void ratio:	1.709	
Initial degree of saturation:	99	%
Final water content:	54.2	%
Final total unit weight:	106.8	pcf
Final dry unit weight:	69.3	pcf
Final void ratio:	1.506	
Final degree of saturation:	100	% (assumed specific gravity = 2.78)

TEST SUMMARY

Construction Method:	Casagrande (Log)
Estimated preconsolidation stress (tsf):	2.0 (Range: 1.7 to 2.0)
Estimated in situ effective overburden stress (tsf):	
Compression Ratio (strain per log cycle stress):	0.230
Compression Index (void ratio per log cycle stress):	0.623
Swell Ratio (strain per log cycle stress):	0.044
Swell Index (void ratio per log cycle stress):	0.119
Recompression Ratio (strain per log cycle stress):	0.045
Recompression Index (void ratio per log cycle stress):	0.122
Remarks:	

LEGEND: ☐ End of primary ○ End of Stage ——— Loading - - - - - - Unloading

Test Date: 5/7/08 Tested By: CMJ Checked By: GET 91

Haley & Aldrich	H&A #32669-000 Connecticut Busway	ONE DIMENSIONAL CONSOLIDATION TEST Boring: RW-110 Depth: 24.90 feet
Geotesting Services, Inc.	Project No. 31737788-805	May 2008

PROJECT:	H&A
PROJECT NO.:	31737788-805
BORING:	RW-110
SAMPLE:	U-1D
TEST:	C08053
DEPTH, feet:	24.9
BY:	CMJ
TEST DATE:	5/7/2008

Initial height:	0.612 inch
Initial water content:	61.1 %
Initial dry density:	64.1 pcf
Initial total density:	103.2 pcf
Initial saturation:	99 %
Initial void ratio:	1.709

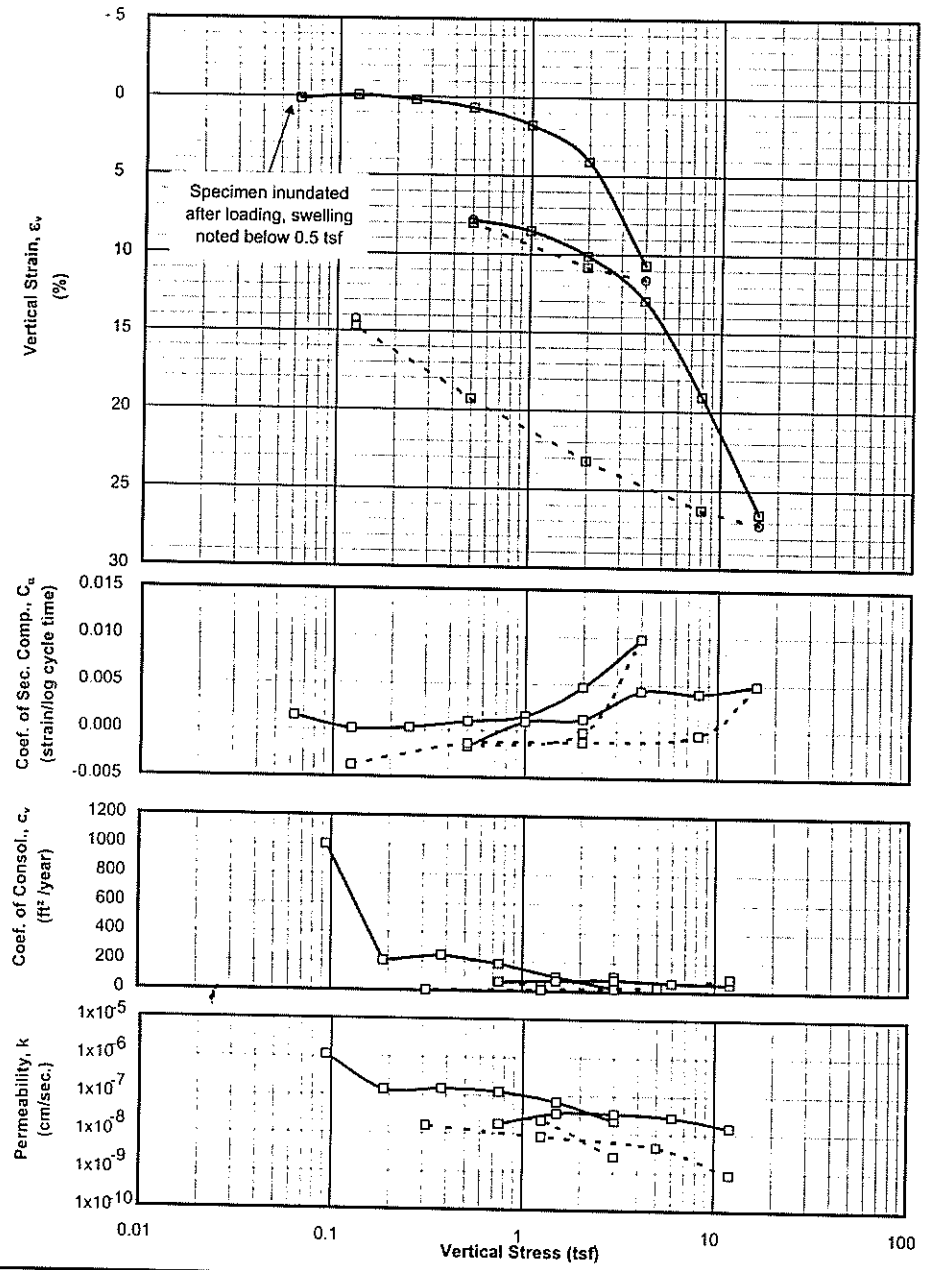
Final height:	0.553 inch
Final water content:	54.2 %
Final dry density:	69.3 pcf
Final total density:	106.8 pcf
Final saturation:	100 %
Final void ratio:	1.506
Final strain:	9.5 %

EQUIPMENT:
Load Frame No.: 4
Ring Diameter: 2.5 inch

SPECIMEN DESCRIPTION: ML, reddish brown VARVED clayey SILT, trace f. sand.

G	LL	PL	PI
2.78	49	28	21

Load No.	Load (tsf)	d_{100} (inch)	t_{100} Strain (%)	t_{100} Void Ratio (-)	Final Strain (%)	Final Void Ratio (-)	c_v (ft^2/year)	C_α (strain/logt)	Constrained Modulus (tsf)	Permeability (cm/sec)
1	0.063	0.0006	0.104	1.706	-0.004	1.709	533.71	0.0002	59.81	2.69E-07
2	0.125	0.0003	0.054	1.707	0.049	1.708	1386.08	0.0002	123.68	3.38E-07
3	0.250	0.0029	0.469	1.696	0.542	1.694	239.65	0.0005	30.12	2.40E-07
4	0.500	0.0078	1.282	1.674	1.576	1.666	224.37	0.0011	30.77	2.20E-07
5	1.00	0.0133	2.178	1.650	2.391	1.644	211.30	0.0015	55.81	1.14E-07
6	2.00	0.0273	4.455	1.588	5.088	1.571	103.02	0.0060	43.92	7.08E-08
7	4.00	0.0725	11.851	1.388	12.970	1.357	32.19	0.0112	27.04	3.59E-08
8	2.00	0.0752	12.297	1.376	12.258	1.377	150.81	-0.0002	447.82	1.02E-08
9	0.500	0.0591	9.656	1.447	9.543	1.450	53.54	-0.0007	56.79	2.84E-08
10	1.00	0.0620	10.132	1.434	10.219	1.432	88.41	0.0007	104.94	2.54E-08
11	2.00	0.0707	11.549	1.396	11.659	1.393	73.32	0.0011	70.57	3.13E-08
12	4.00	0.0838	13.702	1.338	14.171	1.325	88.62	0.0046	92.92	2.88E-08
13	8.00	0.1156	18.900	1.197	19.722	1.175	38.67	0.0071	76.94	1.52E-08
14	16.0	0.1580	25.828	1.009	26.854	0.981	47.35	0.0051	115.49	1.24E-08
15	8.00	0.1596	26.094	1.002	26.022	1.004	141.78	-0.0003	2998.69	1.43E-09
16	2.00	0.1411	23.071	1.084	22.870	1.089	45.22	-0.0010	198.47	6.87E-09
17	0.500	0.1166	19.066	1.192	18.910	1.197	15.66	-0.0016	37.45	1.26E-08
18	0.125	0.0934	15.269	1.295	15.010	1.302	5.25	-0.0024	9.88	1.60E-08



SAMPLE INFORMATION

Boring:	RW-116
Sample:	D
Depth:	19.75 feet
Elevation:	
Type:	3-inch thin wall tube
Description:	CH, reddish brown VARVED CLAY, trace f. sand.

LL = 69, PL = 29, PI = 40

SPECIMEN INFORMATION

(NOTE: Initial and final states refer to beginning and end of test)

Initial height:	0.61	inch
Diameter:	2.50	inch

Initial water content:	60.7	%
Initial total unit weight:	104.6	pcf
Initial dry unit weight:	65.1	pcf
Initial void ratio:	1.706	
Initial degree of saturation:	100	%
Final water content:	56.7	%
Final total unit weight:	106.3	pcf
Final dry unit weight:	67.9	pcf
Final void ratio:	1.594	
Final degree of saturation:	100	%

(assumed specific gravity = 2.82)

TEST SUMMARY

Construction Method:	Casagrande (Log)
Estimated preconsolidation stress (tsf):	2.3 (Range: 2.2 to 2.4)
Estimated in situ effective overburden stress (tsf):	
Compression Ratio (strain per log cycle stress):	0.279
Compression Index (void ratio per log cycle stress):	0.755
Swell Ratio (strain per log cycle stress):	0.047
Swell Index (void ratio per log cycle stress):	0.127
Recompression Ratio (strain per log cycle stress):	0.055
Recompression Index (void ratio per log cycle stress):	0.149
Remarks:	

LEGEND: ☐ End of primary ○ End of Stage ——— Loading - - - - - - Unloading

Test Date: 5/6/08 Tested By: CMJ Checked By: GET

Haley & Aldrich	H&A #32669-000 Connecticut Busway	ONE DIMENSIONAL CONSOLIDATION TEST Boring: RW-116 Depth: 19.75 feet
Geotesting Services, Inc.	Project No. 31737788-805	May 2008

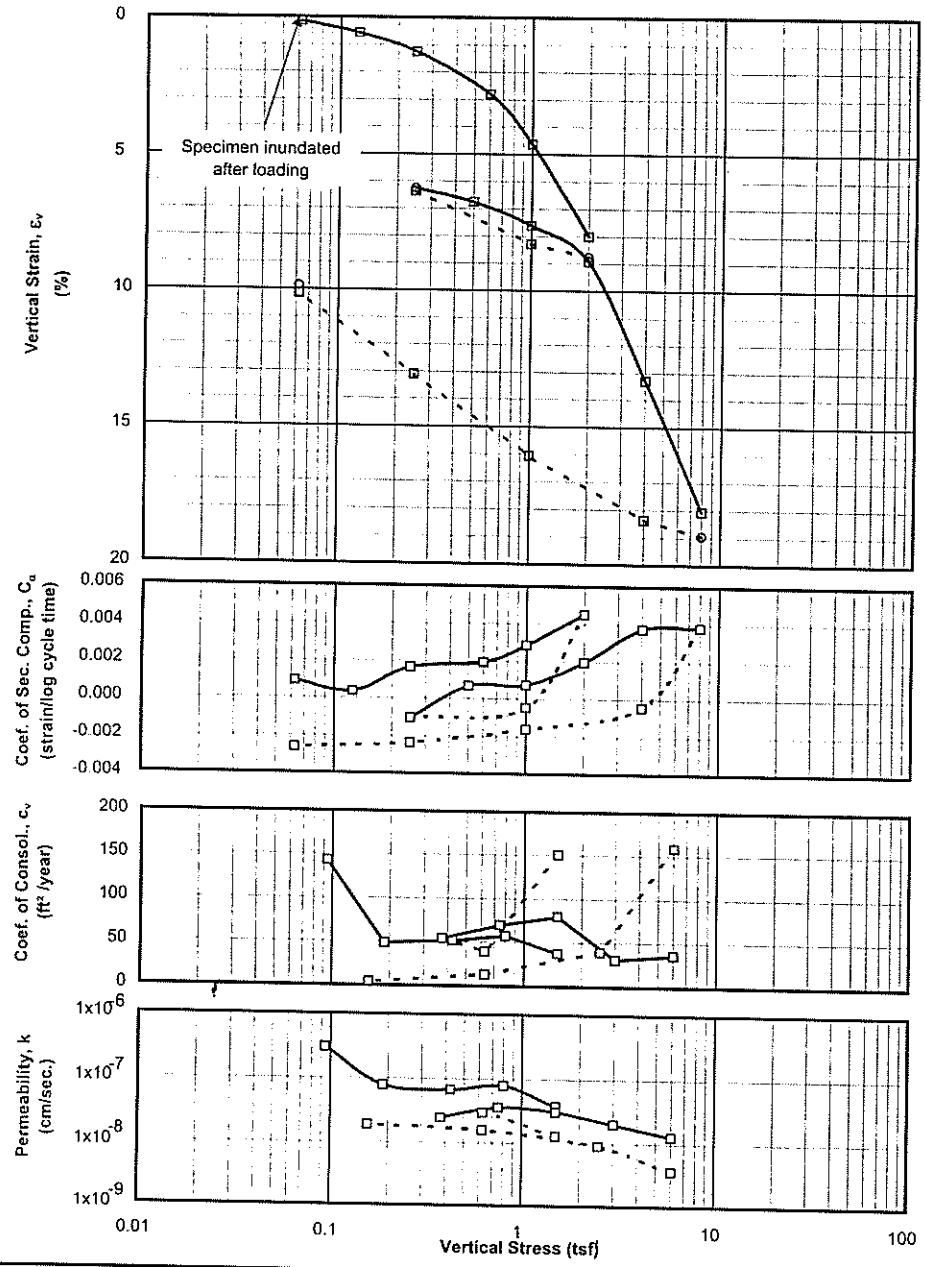
PROJECT:	H&A				
PROJECT NO.:	31737788-805	Initial height:	0.610 inch	Final height:	0.544 inch
BORING:	RW-116	Initial water content:	60.7 %	Final water content:	56.7 %
SAMPLE:	D	Initial dry density:	65.1 pcf	Final dry density:	67.9 pcf
TEST:	C08052	Initial total density:	104.6 pcf	Final total density:	106.3 pcf
DEPTH, feet:	19.75	Initial saturation:	100 %	Final saturation:	100 %
BY:	CMJ	Initial void ratio:	1.706	Final void ratio:	1.594
TEST DATE:	5/6/2008			Final strain:	10.9 %

EQUIPMENT:
Load Frame No.: 1
Ring Diameter: 2.5 inch

SPECIMEN DESCRIPTION: CH, reddish brown VARVED CLAY, trace f. sand.

G	LL	PL	PI
2.82	69	29	40

Load No.	Load (tsf)	d_{100} (inch)	t_{100} Strain (%)	t_{100} Void Ratio (-)	Final Strain (%)	Final Void Ratio (-)	c_v (ft^2/year)	C_α (strain/logt)	Constrained Modulus (tsf)	Permeability (cm/sec)
1	0.063	0.0008	0.126	1.703	-0.073	1.708	366.40	0.0015	49.56	2.23E-07
2	0.125	-0.0006	-0.102	1.709	-0.099	1.709	1001.42	0.0001	27.36	1.10E-06
3	0.250	0.0011	0.182	1.701	0.210	1.700	204.25	0.0003	43.92	1.40E-07
4	0.500	0.0042	0.683	1.688	0.835	1.683	243.65	0.0010	49.94	1.47E-07
5	1.00	0.0109	1.781	1.658	1.991	1.652	186.73	0.0016	45.53	1.24E-07
6	2.00	0.0249	4.087	1.595	4.622	1.581	97.66	0.0047	43.36	6.80E-08
7	4.00	0.0649	10.643	1.418	11.620	1.392	22.21	0.0098	30.51	2.20E-08
8	2.00	0.0659	10.814	1.413	10.777	1.414	100.68	-0.0002	1170.67	2.59E-09
9	0.500	0.0488	7.996	1.490	7.814	1.495	39.30	-0.0017	53.24	2.23E-08
10	1.00	0.0517	8.481	1.477	8.589	1.474	61.20	0.0009	103.27	1.79E-08
11	2.00	0.0616	10.097	1.433	10.247	1.429	70.67	0.0013	61.87	3.45E-08
12	4.00	0.0790	12.948	1.356	13.582	1.338	78.50	0.0043	70.15	3.38E-08
13	8.00	0.1162	19.056	1.190	19.941	1.166	60.40	0.0040	65.49	2.78E-08
14	16.0	0.1618	26.533	0.988	27.192	0.970	52.70	0.0049	106.99	1.49E-08
15	8.00	0.1602	26.272	0.995	26.228	0.996	89.81	-0.0004	3063.29	8.84E-10
16	2.00	0.1414	23.193	1.078	23.046	1.082	29.36	-0.0013	194.86	4.55E-09
17	0.500	0.1177	19.296	1.184	19.100	1.189	10.56	-0.0014	38.49	8.28E-09
18	0.125	0.0896	14.694	1.308	14.247	1.321	4.21	-0.0038	8.15	1.56E-08



SAMPLE INFORMATION

Boring:	RW-121
Sample:	U-1E
Depth:	45.05 feet
Elevation:	
Type:	3-inch thin wall tube
Description:	CL, reddish brown varved silty CLAY, trace f. sand.

LL = 41, PL = 25, PI = 16

SPECIMEN INFORMATION

(NOTE: Initial and final states refer to beginning and end of test)

Initial height:	0.62	inch
Diameter:	2.50	inch

Initial water content:	52.5	%
Initial total unit weight:	107.1	pcf
Initial dry unit weight:	70.3	pcf
Initial void ratio:	1.444	
Initial degree of saturation:	100	%
Final water content:	48.0	%
Final total unit weight:	109.5	pcf
Final dry unit weight:	73.9	pcf
Final void ratio:	1.322	
Final degree of saturation:	100	%

(assumed specific gravity = 2.75)

TEST SUMMARY

Construction Method:	Casagrande (Log)
Estimated preconsolidation stress (tsf):	1.1 (Range: 0.9 to 1.2)
Estimated in situ effective overburden stress (tsf):	
Compression Ratio (strain per log cycle stress):	0.167
Compression Index (void ratio per log cycle stress):	0.408
Swell Ratio (strain per log cycle stress):	0.032
Swell Index (void ratio per log cycle stress):	0.078
Recompression Ratio (strain per log cycle stress):	0.028
Recompression Index (void ratio per log cycle stress):	0.068
Remarks:	

LEGEND: ☐ End of primary ○ End of Stage ——— Loading - - - - - - Unloading

Test Date: 4/30/08 Tested By: CMJ Checked By: GET

Haley & Aldrich	H&A #32669-000 Connecticut Busway	ONE DIMENSIONAL CONSOLIDATION TEST Boring: RW-121 Depth: 45.05 feet
Geotesting Services, Inc.	Project No. 31737788-805	May 2008

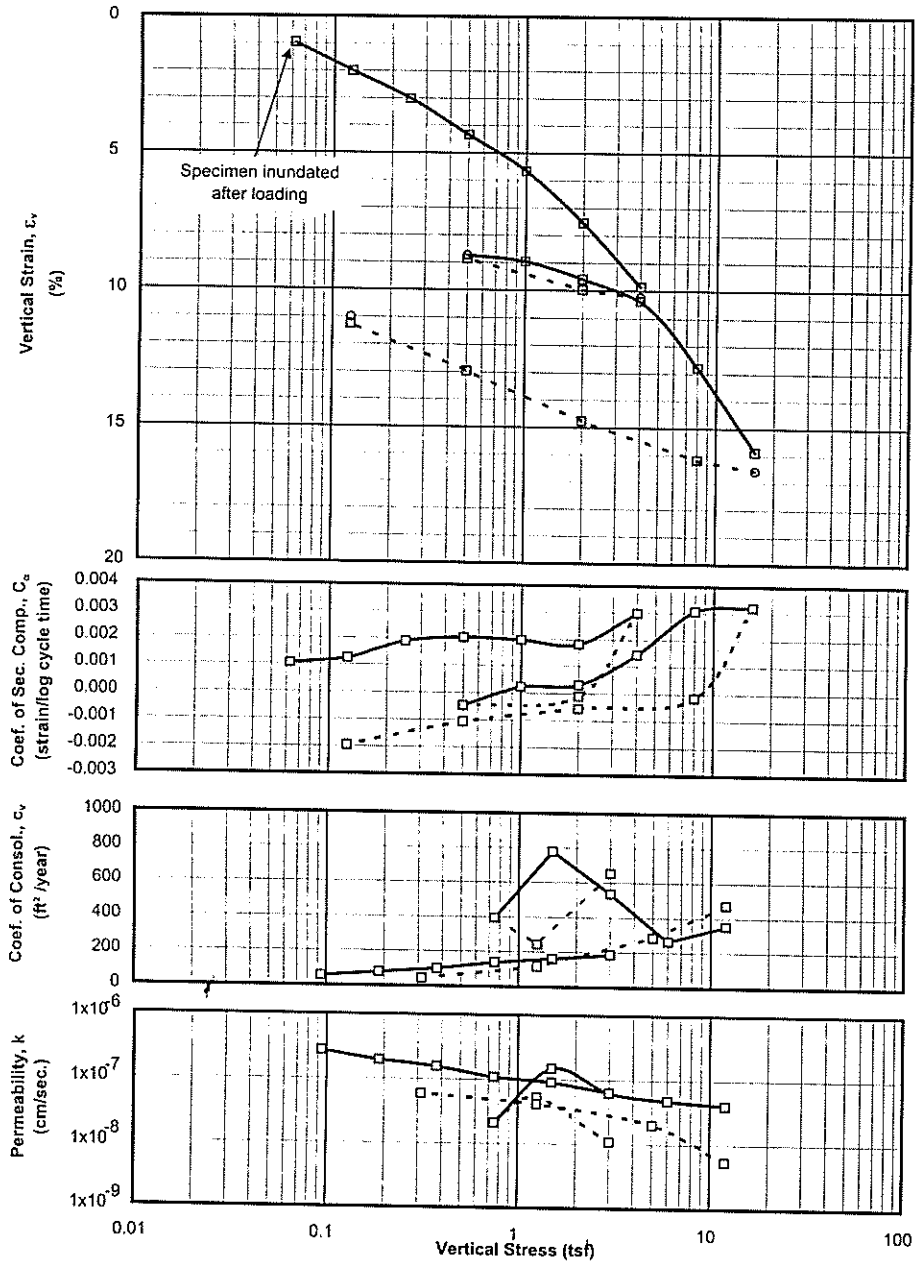
PROJECT:	H&A				
PROJECT NO.:	31737788-805	Initial height:	0.619 inch	Final height:	0.585 inch
BORING:	RW-121	Initial water content:	52.5 %	Final water content:	48.0 %
SAMPLE:	U-1E	Initial dry density:	70.3 pcf	Final dry density:	73.9 pcf
TEST:	C08049	Initial total density:	107.1 pcf	Final total density:	109.5 pcf
DEPTH, feet:	45.05	Initial saturation:	100 %	Final saturation:	100 %
BY:	CMJ	Initial void ratio:	1.444	Final void ratio:	1.322
TEST DATE:	4/30/2008			Final strain:	5.6 %

EQUIPMENT:
Load Frame No.: 7
Ring Diameter: 2.5 inch

SPECIMEN DESCRIPTION: CL, reddish brown varved silty CLAY, trace f. sand.

G	LL	PL	PI
2.75	41	25	16

Load No.	Load (tsf)	d_{100} (inch)	t_{100} Strain (%)	t_{100} Void Ratio (-)	Final Strain (%)	Final Void Ratio (-)	c_v (ft^2/year)	C_α (strain/logt)	Constrained Modulus (tsf)	Permeability (cm/sec)
1	0.063	0.0009	0.142	1.440	0.190	1.439	533.90	0.0009	43.87	3.67E-07
2	0.125	0.0036	0.586	1.429	0.650	1.428	142.76	0.0004	14.10	3.05E-07
3	0.250	0.0078	1.264	1.413	1.420	1.409	48.65	0.0017	18.43	7.96E-08
4	0.600	0.0173	2.802	1.375	3.028	1.370	51.30	0.0020	22.75	6.80E-08
5	1.00	0.0287	4.642	1.330	5.033	1.321	57.00	0.0029	21.74	7.91E-08
6	2.00	0.0495	8.002	1.248	8.753	1.230	37.29	0.0045	29.77	3.78E-08
7	1.00	0.0513	8.286	1.241	8.231	1.243	150.87	-0.0005	351.42	1.30E-08
8	0.250	0.0395	6.376	1.288	6.269	1.291	39.28	-0.0010	39.26	3.02E-08
9	0.500	0.0418	6.757	1.279	6.814	1.277	53.97	0.0007	65.57	2.48E-08
10	1.00	0.0472	7.621	1.258	7.688	1.256	69.61	0.0008	57.92	3.63E-08
11	2.00	0.0553	8.927	1.226	9.154	1.220	79.61	0.0020	76.53	3.14E-08
12	4.00	0.0823	13.293	1.119	14.015	1.101	30.77	0.0038	45.81	2.03E-08
13	8.00	0.1118	18.063	1.002	18.934	0.981	35.72	0.0038	83.87	1.29E-08
14	4.00	0.1137	18.366	0.995	18.271	0.997	159.17	-0.0004	1318.52	3.64E-09
15	1.00	0.0994	16.065	1.051	15.908	1.055	39.57	-0.0016	130.39	9.16E-09
16	0.250	0.0811	13.101	1.124	12.883	1.129	13.18	-0.0024	25.30	1.57E-08
17	0.063	0.0628	10.143	1.196	9.873	1.202	3.97	-0.0026	6.34	1.89E-08



SAMPLE INFORMATION

Boring:	TB-102
Sample:	U-3E
Depth:	56.85 feet
Elevation:	
Type:	3-inch thin wall tube
Description:	ML, reddish-brown varved clayey SILT, trace f. sand.

LL = 37, PL = 25, PI = 12

SPECIMEN INFORMATION

(NOTE: Initial and final states refer to beginning and end of test)

Initial height:	0.62	inch
Diameter:	2.50	inch
Initial water content:	45.3	%
Initial total unit weight:	114.3	pcf
Initial dry unit weight:	78.7	pcf
Initial void ratio:	1.317	
Initial degree of saturation:	101	%
Final water content:	38.8	%
Final total unit weight:	118.5	pcf
Final dry unit weight:	85.4	pcf
Final void ratio:	1.134	
Final degree of saturation:	100	% (assumed specific gravity = 2.92)

TEST SUMMARY

Construction Method:	Casagrande (Log)
Estimated preconsolidation stress (tsf):	2.2 (Range: 1.9 to 2.5)
Estimated in situ effective overburden stress (tsf):	
Compression Ratio (strain per log cycle stress):	0.102
Compression Index (void ratio per log cycle stress):	0.236
Swell Ratio (strain per log cycle stress):	0.018
Swell Index (void ratio per log cycle stress):	0.042
Recompression Ratio (strain per log cycle stress):	0.023
Recompression Index (void ratio per log cycle stress):	0.053
Remarks:	

LEGEND: ☐ End of primary ○ End of Stage ——— Loading - - - - - - Unloading

Test Date: 5/1/08 Tested By: CMJ Checked By: GET

Haley & Aldrich	H&A #32669-000 Connecticut Busway	ONE DIMENSIONAL CONSOLIDATION TEST Boring: TB-102 Depth: 56.85 feet
Geotesting Services, Inc.	Project No. 31737788-805	May 2008

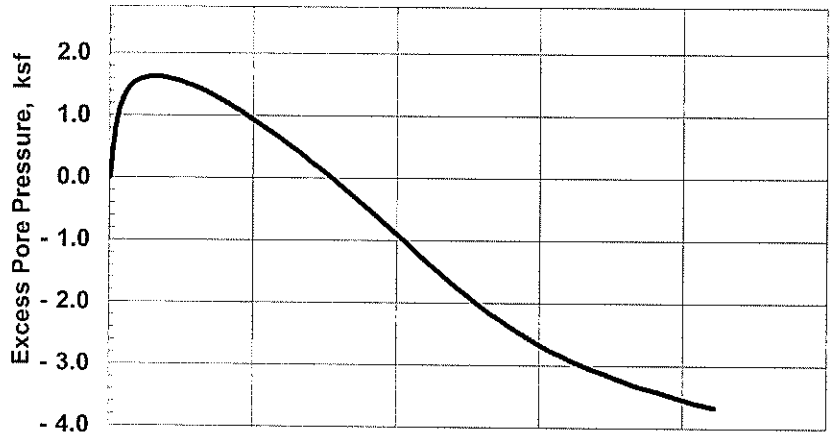
PROJECT:	H&A				
PROJECT NO.:	31737788-805	Initial height:	0.616 inch	Final height:	0.567 inch
BORING:	TB-102	Initial water content:	45.3 %	Final water content:	38.8 %
SAMPLE:	U-3E	Initial dry density:	78.7 pcf	Final dry density:	85.4 pcf
TEST:	C08050	Initial total density:	114.3 pcf	Final total density:	118.5 pcf
DEPTH, feet:	56.85	Initial saturation:	101 %	Final saturation:	100 %
BY:	CMJ	Initial void ratio:	1.317	Final void ratio:	1.134
TEST DATE:	5/1/2008			Final strain:	7.9 %

EQUIPMENT:
Load Frame No.: 4
Ring Diameter: 2.5 inch

SPECIMEN DESCRIPTION: ML, reddish-brown varved clayey SILT, trace f. sand.

G	LL	PL	PI
2.92	37	25	12

Load No.	Load (tsf)	d_{100} (inch)	t_{100} Strain (%)	t_{100} Void Ratio (-)	Final Strain (%)	Final Void Ratio (-)	c_v (ft²/year)	C_α (strain/logt)	Constrained Modulus (tsf)	Permeability (cm/sec)
1	0.063	0.0060	0.969	1.294	1.089	1.291	78.08	0.0011	6.45	3.65E-07
2	0.125	0.0123	2.004	1.270	2.253	1.265	54.48	0.0013	6.04	2.72E-07
3	0.250	0.0187	3.028	1.247	3.242	1.242	78.99	0.0019	12.21	1.95E-07
4	0.500	0.0268	4.347	1.216	4.567	1.211	99.05	0.0020	18.96	1.58E-07
5	1.00	0.0349	5.661	1.186	5.893	1.180	136.98	0.0020	38.03	1.09E-07
6	2.00	0.0465	7.551	1.142	7.740	1.137	160.04	0.0018	52.92	9.12E-08
7	4.00	0.0608	9.867	1.088	10.240	1.079	183.29	0.0030	86.37	6.40E-08
8	2.00	0.0615	9.977	1.086	9.942	1.086	653.95	-0.0001	1806.90	1.09E-08
9	0.500	0.0546	8.872	1.111	8.745	1.114	241.92	-0.0005	135.65	5.38E-08
10	1.00	0.0552	8.960	1.109	9.031	1.108	393.73	0.0002	564.29	2.11E-08
11	2.00	0.0591	9.592	1.095	9.667	1.093	779.61	0.0003	158.33	1.49E-07
12	4.00	0.0639	10.370	1.076	10.650	1.070	536.46	0.0014	257.04	6.30E-08
13	8.00	0.0788	12.790	1.020	13.357	1.007	263.98	0.0031	165.25	4.82E-08
14	16.0	0.0978	15.874	0.949	16.572	0.933	352.90	0.0032	259.45	4.10E-08
15	8.00	0.0997	16.177	0.942	16.137	0.943	474.77	-0.0001	2636.76	5.43E-09
16	2.00	0.0909	14.758	0.975	14.657	0.977	284.78	-0.0006	422.82	2.03E-08
17	0.500	0.0798	12.958	1.017	12.839	1.019	114.98	-0.0011	83.30	4.16E-08
18	0.125	0.0694	11.261	1.056	11.020	1.061	43.44	-0.0020	22.11	5.93E-08



SAMPLE INFORMATION

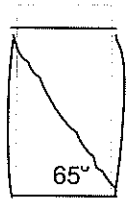
Boring: CB-103 Sample: U-1B Depth: 38.65 ft
Type: Intact
Description: CL-ML, reddish brown VARVED silty CLAY, trace f. sand.
LL = 25 PL = 20 PI = 5

SPECIMEN INFORMATION (Initial)

Height: 5.99 inch Diameter: 2.91 inch Area: 6.64 in²
Water Content: 28.1 % Total Unit Weight: 122.6 pcf

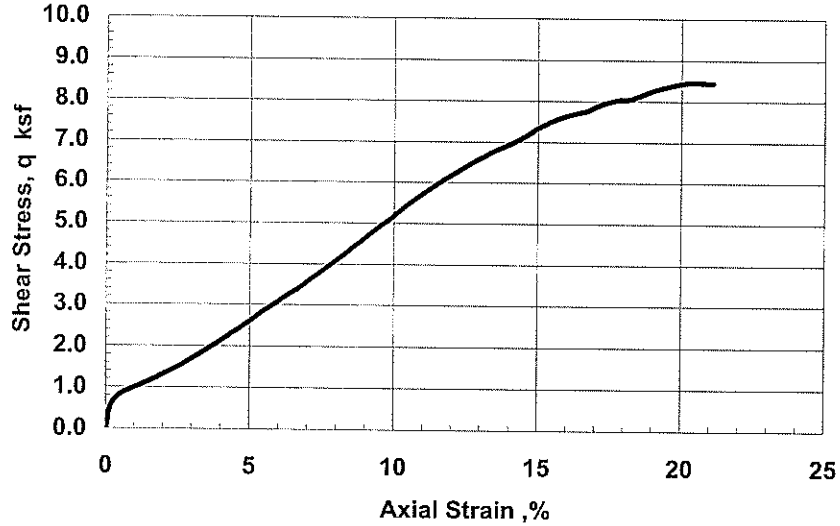
TEST SUMMARY

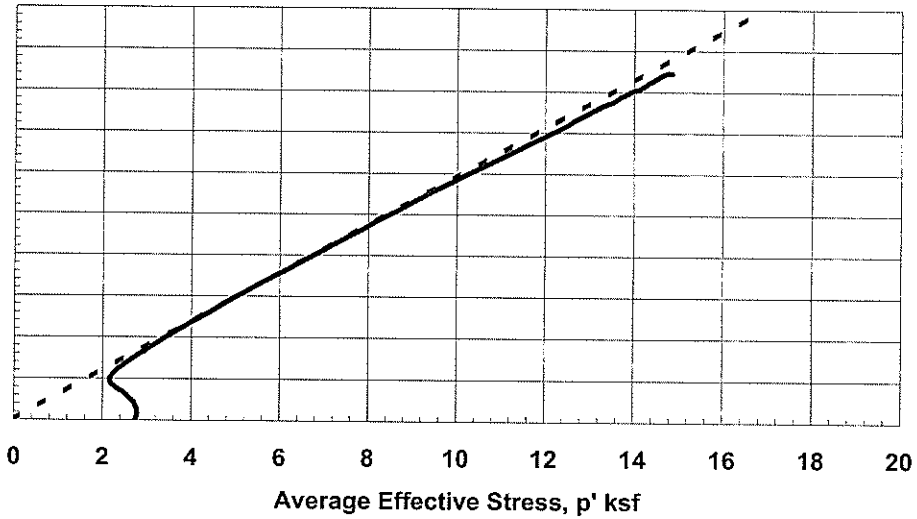
Consolidation Stresses: 2.74 ksf vertical, 2.74 ksf lateral
Water Content: 23.9 % Total Unit Weight: 128.3 pcf
B Coefficient: 95.6 Strain Rate: 0.020 %/min
Peak Shear Strength: 8.45 ksf @ 20.6 % Strain
Peak Effective Friction Angle: 36.4°



Failure Sketch

REMARKS:





Test by: DT

Checked by: GET

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements	
	Geotesting Services, Inc.	Boring CB-103 Sample U-1B @ 38.65 ft	May-08

SUMMARY FOR STATIC CIU' TRIAXIAL TESTS SPECIMENS

Test No	Boring No	Sample Section No	Depth / Elev (ft)	USCS Group Symbol / Gs	w_o / w_c (%)	$\gamma_{t,o}$ / $\gamma_{t,c}$ (pcf)	$\gamma_{d,o}$ / $\gamma_{d,c}$ (pcf)	$\sigma'_{c,max}$ (ksf) / OCR	$\sigma'_{v,c}$ (ksf) / $K_c = \sigma'_{v,c} / \sigma'_{h,c}$	$\varepsilon_{a,c}$ / $\varepsilon_{v,c}$ (%)	B factor (%) / ε_{rate} (%/hr)	at Peak Deviator Stress: ε_a (%)	at Peak Obliquity: $\frac{\sigma_1 - \sigma_3}{2}$ (ksf)	$\frac{\sigma'_1 + \sigma'_3}{2}$ (ksf)	σ'_1 / σ'_3	A factor	ϕ' for c'=0
T-2879	NBA-101	U-3A	35.65	ML	29.1	126.6	98.0	2.16	2.16	0.9	97.2	19.9	12.27	20.61	3.94	-0.252	36.5
				(2.90)	24.2	132.2	106.5	1.0	1.00	7.9	1.2	4.5	3.22	5.05	4.54	0.052	39.7
T-2880	NBA-101	U-3B	36.15	CL & ML	27.6	121.7	95.4	4.32	4.32	1.7	96.8	21.3	6.24	11.45	3.40	-0.071	33.0
				(2.75)	27.0	125.2	98.6	1.0	1.00	3.3	1.2	13.8	4.59	8.26	3.51	0.071	33.8
T-2881	NBA-101	U-3C	36.65	CL-ML	24.5	129.1	103.7	8.64	8.64	1.7	96.4	20.4	5.15	9.80	3.22	0.388	31.7
				(2.81)	20.7	133.8	110.9	1.0	1.00	6.5	1.3	8.8	4.34	7.98	3.39	0.577	33.0

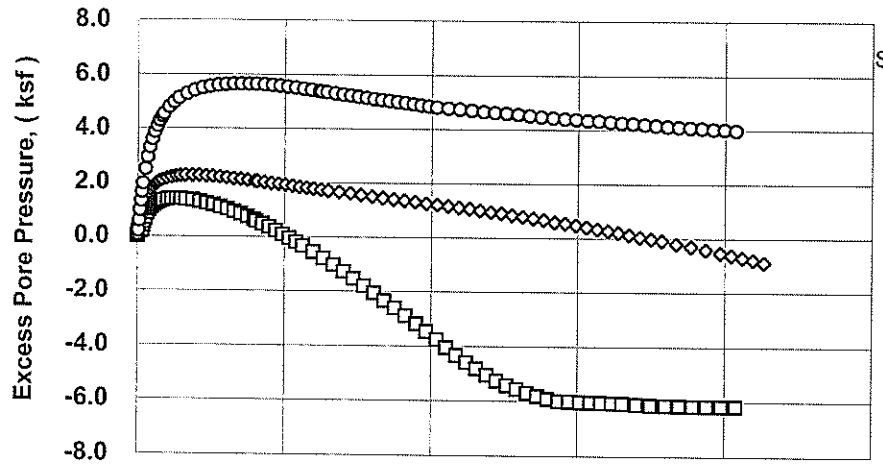
Test No	Description of Material Tested and Remarks
T-2879	ML, reddish brown SILT, trace f. sand.
T-2880	CL & ML, reddish brown silty CLAY, trace f. sand; bottom ML.
T-2881	CL-ML, reddish brown silty CLAY; top 1" ML.

Strength Envelope Summary

Test Series	Failure Criteria	ϕ' (deg)	c' (ksf)	α' (deg)	a' (ksf)	Correlation Coefficient
1	1	35.1	0.000	29.9	0.000	--
	2	24.1	1.271	22.2	1.161	0.995

Failure Criteria: 1 - Peak Deviator Stress; 2 - Peak Obliquity

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements NBA-101 SUMMARY	May 2008
	Geotesting Services, Inc.		

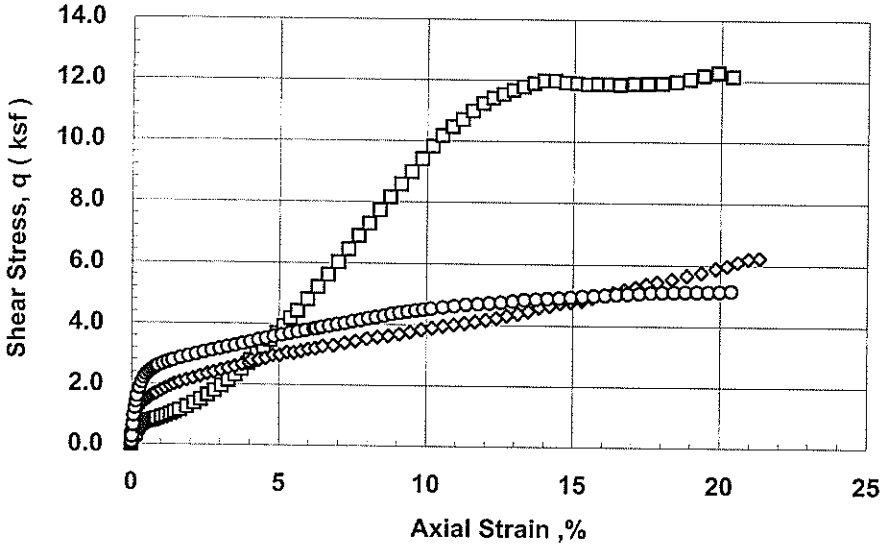


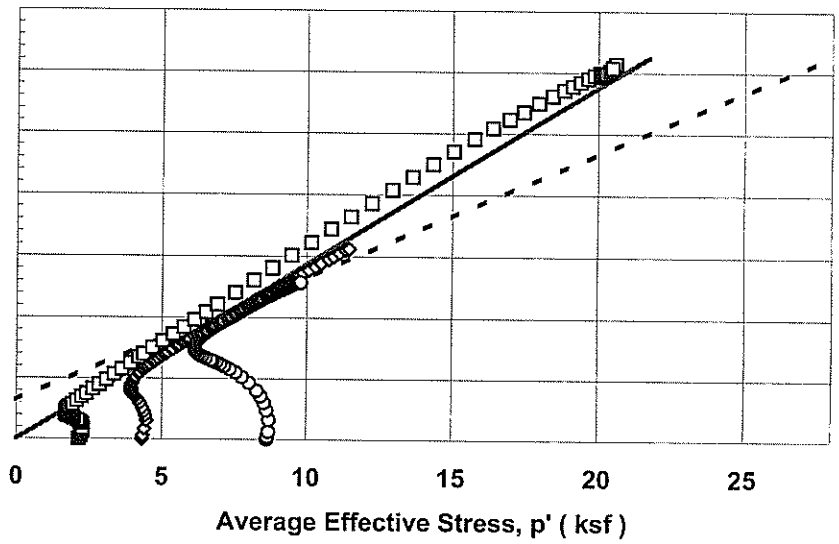
LEGEND AND SUMMARY INFORMATION

Symbol	Test	Boring	Sample	Depth (ft)	w_o (%)	γ_{to} (pcf)	σ'_c (ksf)
□	T-2879	NBA-101	U-3A	35.7	29.1	126.6	2.16
◊	T-2880	NBA-101	U-3B	36.2	27.6	121.7	4.32
○	T-2881	NBA-101	U-3C	36.7	24.5	129.1	8.64

SERIES SUMMARY

Notation	Failure Criteria	c' (ksf)	Φ' (degrees)
———	Peak Deviator Stress	0.00	35.1
- - - -	Peak Obliquity	1.27	24.1

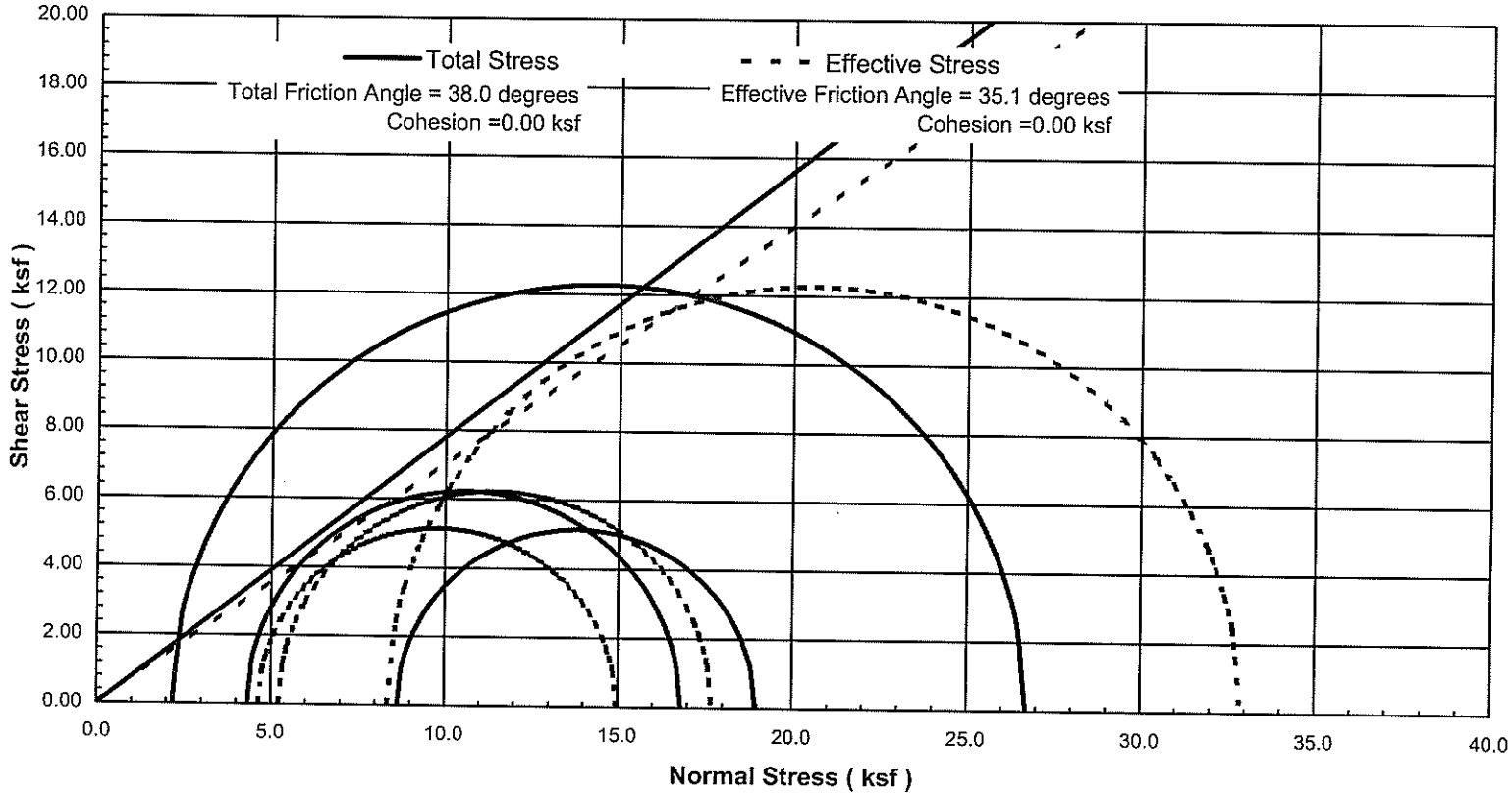




Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements NBA-101 SUMMARY	Figure 1
Prepared by: C. Jordan Checked by: G. Thomas	**Geotesting Services, Inc.**		May 2008

GSI Analysis File: Cu'sum3v4

5/27/2008 Test: Cu'sum1_NBA.xls

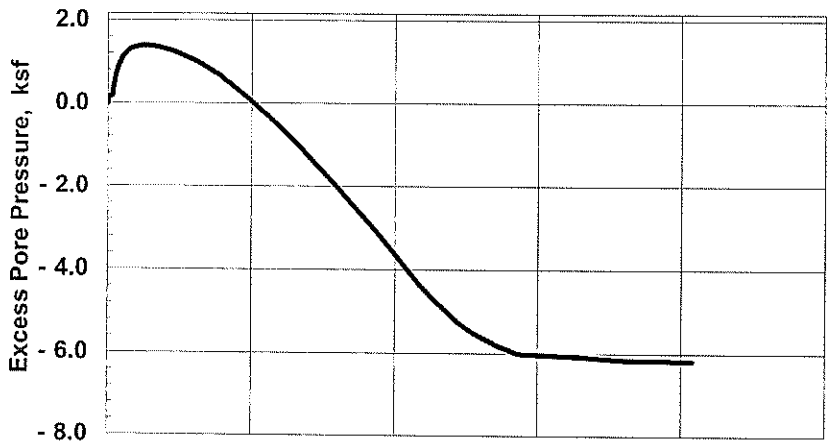


Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	Mohr Circles of Total and Effective Stresses at Peak CIU' Triaxial Test	Figure 2
Geotesting Services, Inc.		NBA-101 SUMMARY	May 2008

GSI Analysis File: Cu'sum3v4.xls

Cu'sum1_NBA.xls

5/27/2008



SAMPLE INFORMATION

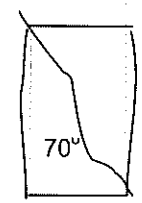
Boring: NBA-101 Sample: U-3A Depth: 35.65 ft
Type: Intact
Description: ML, reddish brown SILT, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 6.01 inch Diameter: 2.84 inch Area: 6.35 in²
Water Content: 29.1 % Total Unit Weight: 126.6 pcf

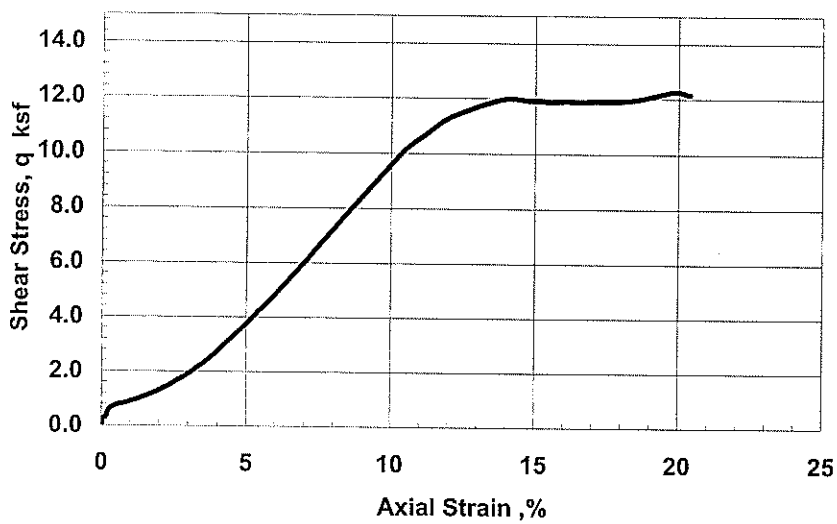
TEST SUMMARY

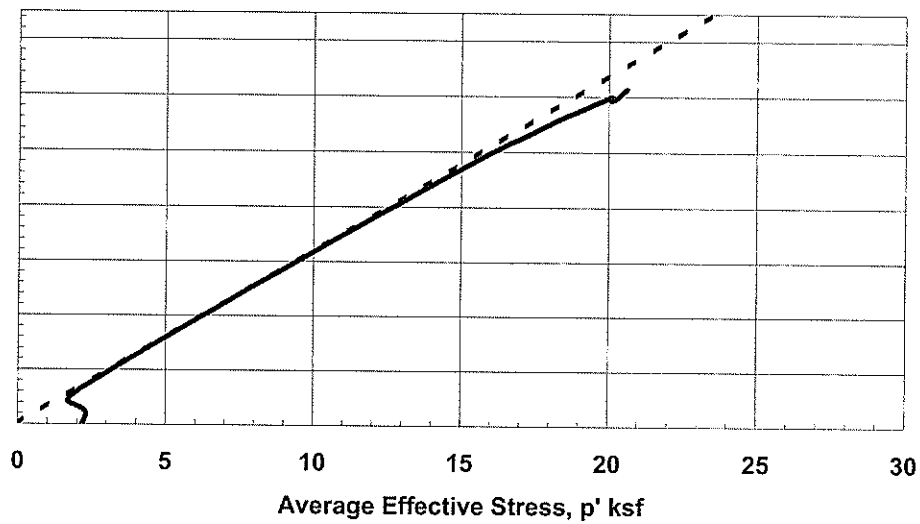
Consolidation Stresses: 2.16 ksf vertical, 2.16 ksf lateral
Water Content: 24.2 % Total Unit Weight: 132.2 pcf
B Coefficient: 97.2 Strain Rate: 0.019 %/min
Peak Shear Strength: 12.27 ksf @ 19.9 % Strain
Peak Effective Friction Angle: 39.7°



Failure Sketch

REMARKS:

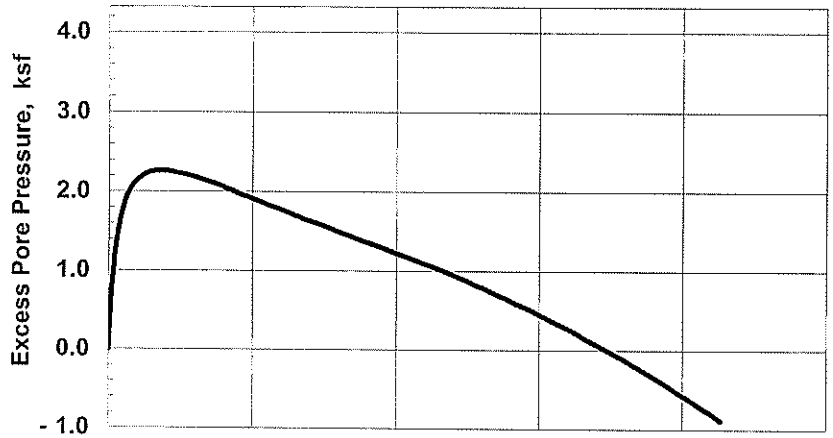




Test by: DT

Checked by: GET

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements	
	Geotesting Services, Inc.	Boring NBA-101 Sample U-3A @ 35.65 ft	May-08



SAMPLE INFORMATION

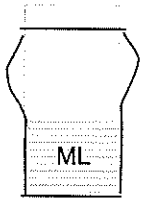
Boring: NBA-101 Sample: U-3B Depth: 36.15 ft
Type: Intact
Description: CL & ML, reddish brown silty CLAY, trace f. sand; bottom ML.

SPECIMEN INFORMATION (Initial)

Height: 6.00 inch Diameter: 2.87 inch Area: 6.48 in²
Water Content: 27.6 % Total Unit Weight: 121.7 pcf

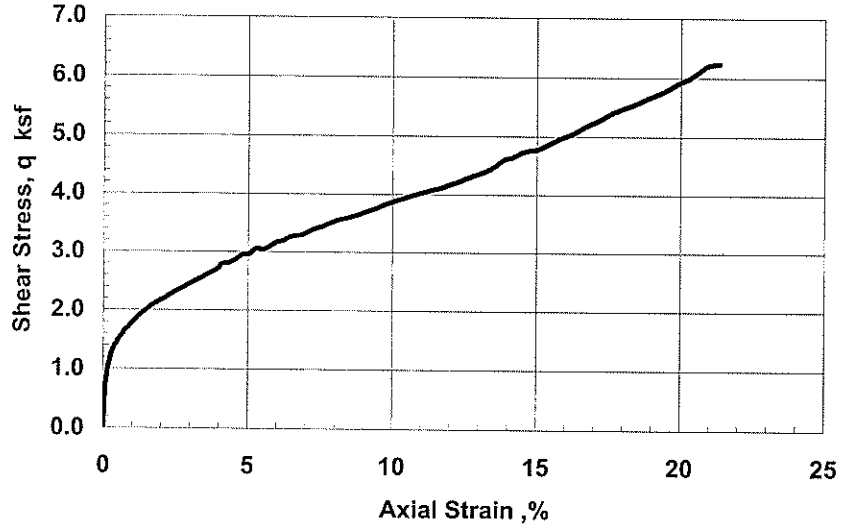
TEST SUMMARY

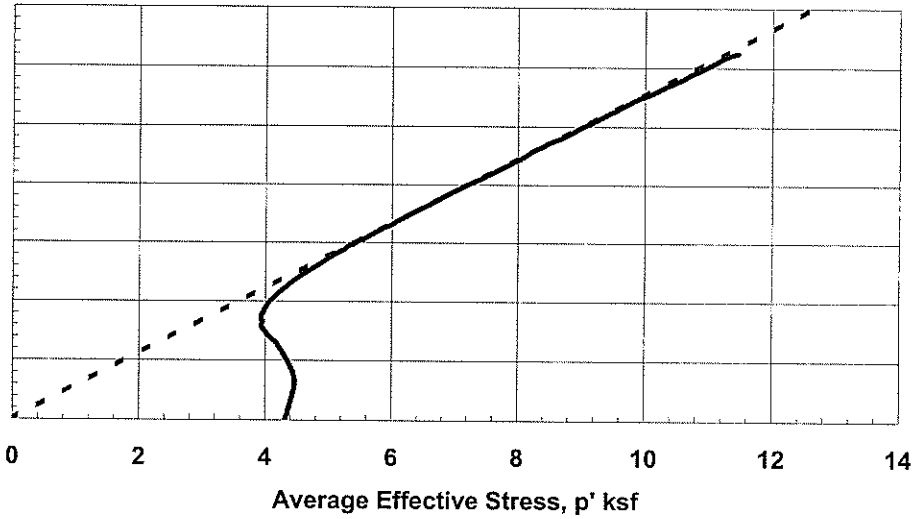
Consolidation Stresses: 4.32 ksf vertical, 4.32 ksf lateral
Water Content: 27.0 % Total Unit Weight: 125.2 pcf
B Coefficient: 96.8 Strain Rate: 0.020 %/min
Peak Shear Strength: 6.24 ksf @ 21.3 % Strain
Peak Effective Friction Angle: 33.8°



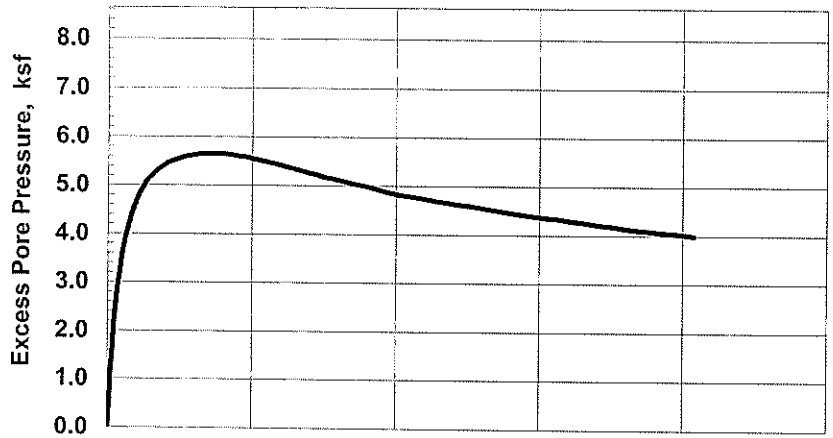
Failure Sketch

REMARKS:





Test by: DT	Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements
Checked by: GET	**Geotesting Services, Inc.**		Boring NBA-101 Sample U-3B @ 36.15 ft
			May-08



SAMPLE INFORMATION

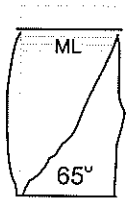
Boring: NBA-101 Sample: U-3C Depth: 36.65 ft
Type: Intact
Description: CL-ML, reddish brown silty CLAY; top 1" ML.

SPECIMEN INFORMATION (Initial)

Height: 5.98 inch Diameter: 2.87 inch Area: 6.47 in²
Water Content: 24.5 % Total Unit Weight: 129.1 pcf

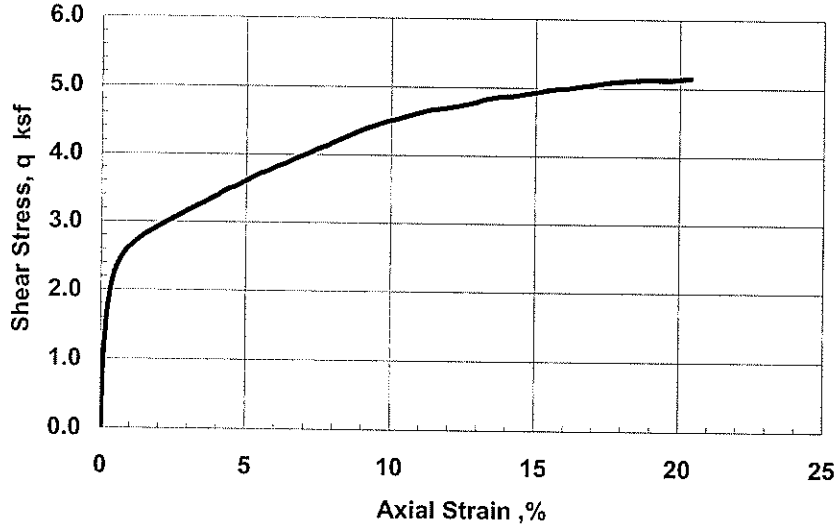
TEST SUMMARY

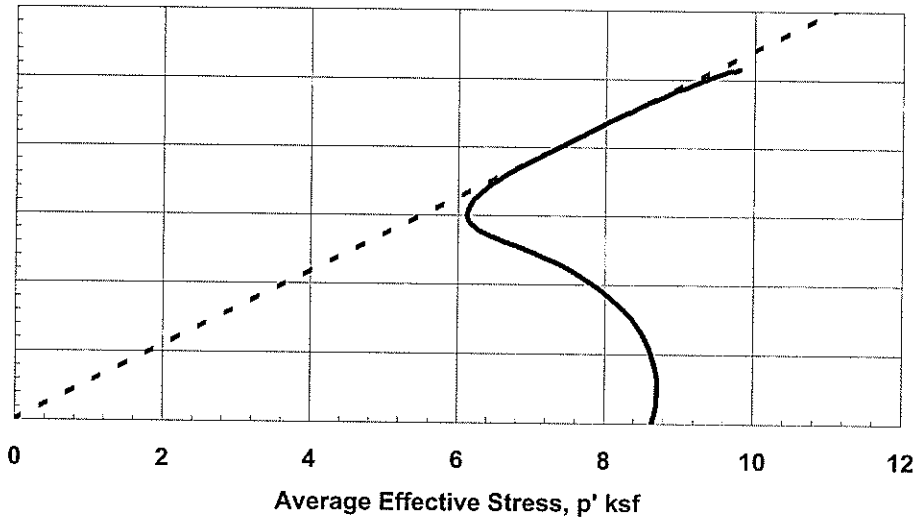
Consolidation Stresses: 8.64 ksf vertical, 8.64 ksf lateral
Water Content: 20.7 % Total Unit Weight: 133.8 pcf
B Coefficient: 96.4 Strain Rate: 0.022 %/min
Peak Shear Strength: 5.15 ksf @ 20.4 % Strain
Peak Effective Friction Angle: 33.0°



Failure Sketch

REMARKS:





Test by: DT

Checked by: GET

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements	
	Geotesting Services, Inc.	Boring NBA-101 Sample U-3C @ 36.65 ft	May-08

SUMMARY FOR STATIC CIU' TRIAXIAL TESTS SPECIMENS

Test No	Boring No	Sample Section No	Depth / Elev (ft)	USCS Group Symbol / Gs	w_o / w_c (%)	$\gamma_{t,o}$ / $\gamma_{t,c}$ (pcf)	$\gamma_{d,o}$ / $\gamma_{d,c}$ (pcf)	$\sigma'_{c,max}$ (ksf) / OCR	$\sigma'_{v,c}$ (ksf) / $K_c = \sigma'_{v,c} / \sigma'_{h,c}$	$\varepsilon_{a,c}$ / $\varepsilon_{v,c}$ (%)	B factor (%) / ε_{rate} (%/hr)	at Peak Deviator Stress / at Peak Obliquity: ε_a (%)	$(\sigma_1 - \sigma_3)/2$ (ksf)	$(\sigma'_1 + \sigma'_3)/2$ (ksf)	σ'_1 / σ'_3	A factor	ϕ' for c'=0
T-2870	RB-112	U-1B	18.45	CL-ML	21.6	135.3	111.2	1.44	1.44	0.5	96.8	20.3	4.85	8.05	4.04	-0.181	37.1
				(2.90)	19.9	137.6	114.7	1.0	1.00	3.0	1.1	9.9	3.54	5.64	4.38	-0.093	38.9
T-2871	RB-112	U-1C	18.95	CL	30.9	121.9	93.1	2.88	2.88	1.5	98.2	4.7	1.55	2.90	3.30	0.493	32.3
				(2.75)	27.6	124.5	97.6	1.0	1.00	4.6	1.1	4.0	1.52	2.83	3.32	0.518	32.5
T-2872	RB-112	U-1D	19.45	CL	38.0	118.7	86.0	5.76	5.76	1.8	97.9	7.2	1.67	4.19	2.33	0.968	23.5
				(2.89)	34.3	121.6	90.6	1.0	1.00	5.0	1.3	17.4	1.47	3.25	2.64	1.357	26.8

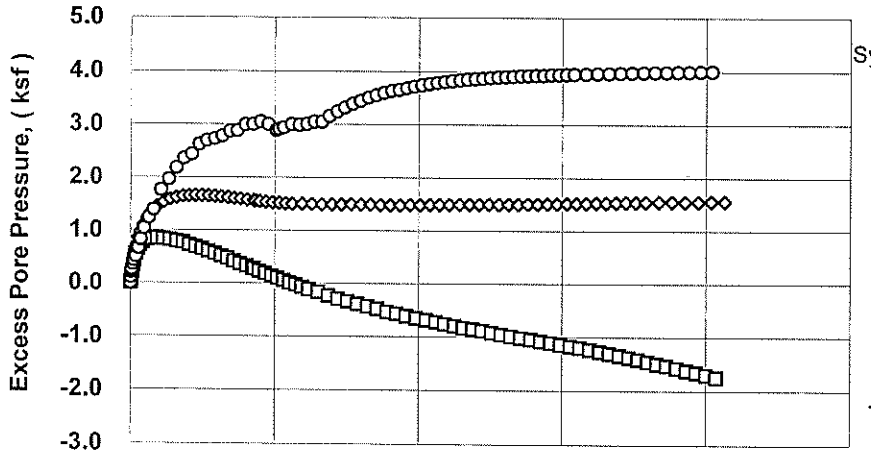
Test No	Description of Material Tested and Remarks
T-2870	CL-ML, reddish brown silty CLAY, trace f. sand.
T-2871	CL, reddish brown VARVED CLAY, trace f. sand.
T-2872	CL, reddish brown VARVED CLAY, trace f. sand.

Strength Envelope Summary

Test Series	Failure Criteria	ϕ' (deg)	c' (ksf)	α' (deg)	a' (ksf)	Correlation Coefficient
1	1	33.9	0.000	29.1	0.000	--
	2	35.2	0.000	30.0	0.000	--

Failure Criteria: 1 - Peak Deviator Stress; 2 - Peak Obliquity

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements RB-112 SUMMARY	May 2008
	Geotesting Services, Inc.		

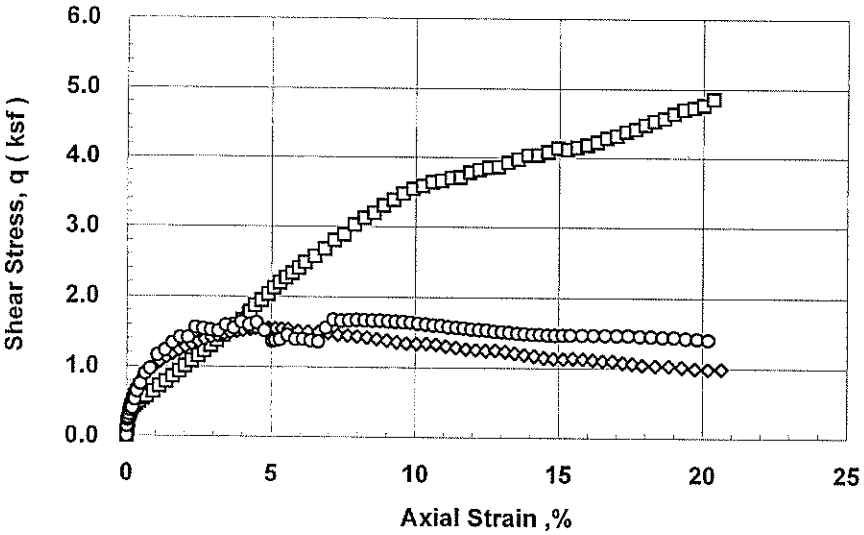


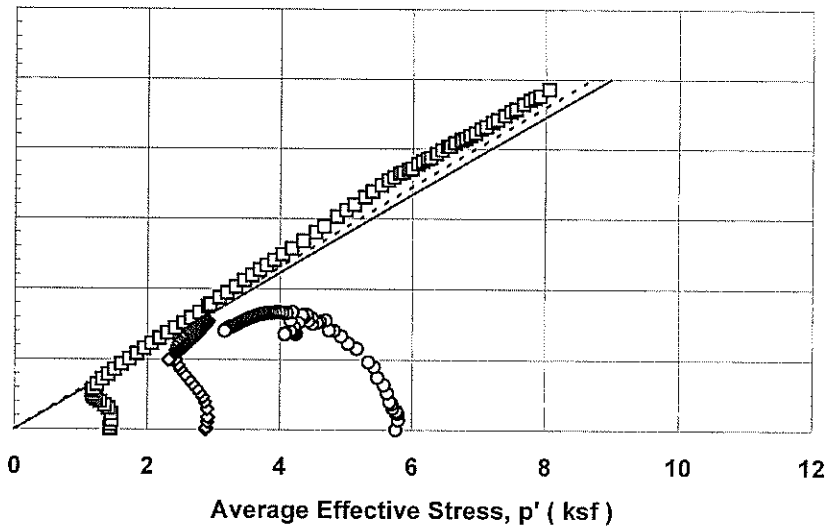
LEGEND AND SUMMARY INFORMATION

Symbol	Test	Boring	Sample	Depth (ft)	w_o (%)	γ_{to} (pcf)	σ'_c (ksf)
□	T-2870	RB-112	U-1B	18.5	21.6	135.3	1.44
◊	T-2871	RB-112	U-1C	19.0	30.9	121.9	2.88
○	T-2872	RB-112	U-1D	19.5	38.0	118.7	5.76

SERIES SUMMARY

Notation	Failure Criteria	c' (ksf)	Φ' (degrees)
	Peak Deviator Stress	0.00	33.9
	Peak Obliquity	0.00	35.2

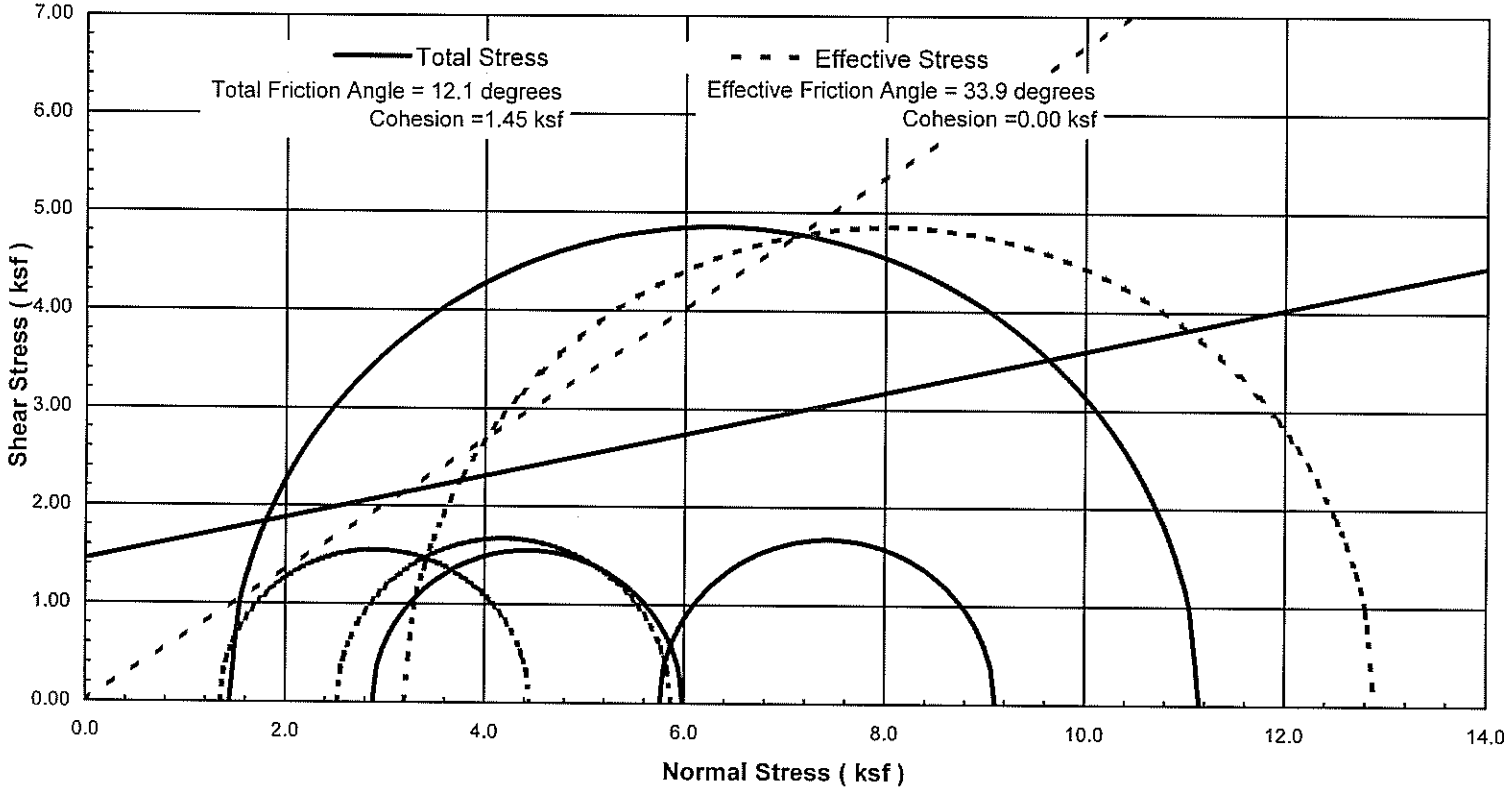




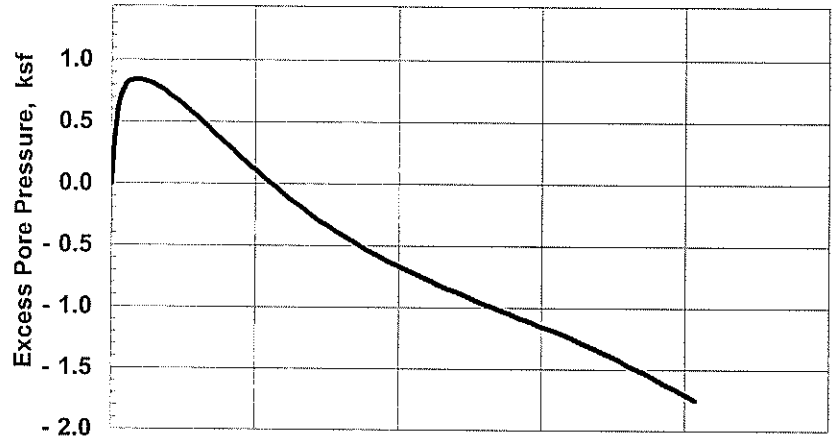
Prepared by: C. Jordan	Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements RB-112 SUMMARY	Figure 1
Checked by: G. Thomas	Geotesting Services, Inc.			May 2008

GSI Analysis File: Cu'sum3v4

5/28/2008 Test: Cu'sum1_rb112.xls



Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	Mohr Circles of Total and Effective Stresses at Peak CIU' Triaxial Test	Figure 2
Geotesting Services, Inc.		RB-112 SUMMARY	May 2008



SAMPLE INFORMATION

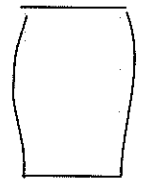
Boring: RB-112 Sample: U-1B Depth: 18.45ft
Type: Intact
Description: CL-ML, reddish brown silty CLAY, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 5.98 inch Diameter: 2.87 inch Area: 6.46 in²
Water Content: 21.6 % Total Unit Weight: 135.3 pcf

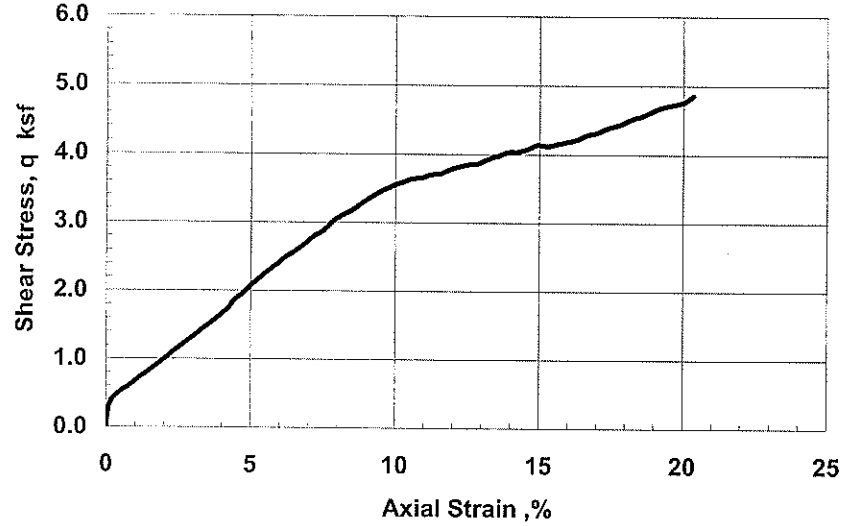
TEST SUMMARY

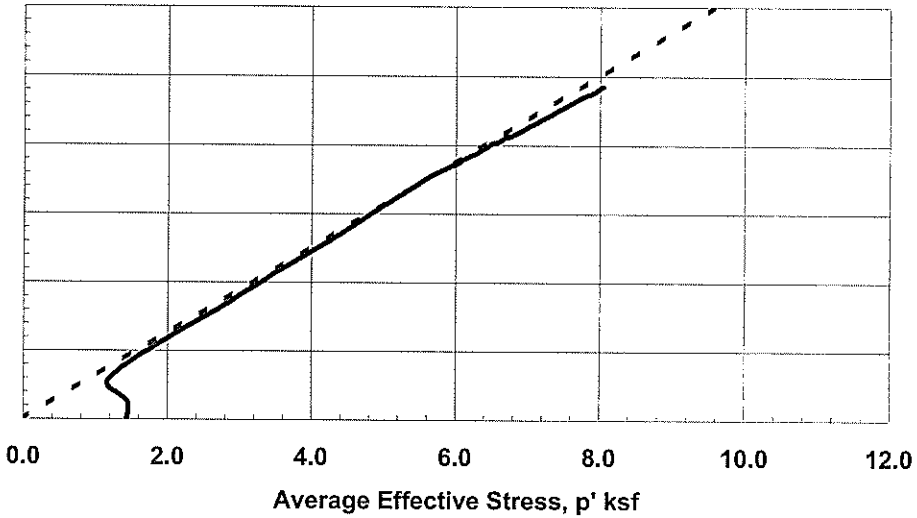
Consolidation Stresses: 1.44 ksf vertical, 1.44 ksf lateral
Water Content: 19.9 % Total Unit Weight: 137.6 pcf
B Coefficient: 96.8 Strain Rate: 0.019 %/min
Peak Shear Strength: 4.85 ksf @ 20.3 % Strain
Peak Effective Friction Angle: 38.9°



Failure Sketch

REMARKS:

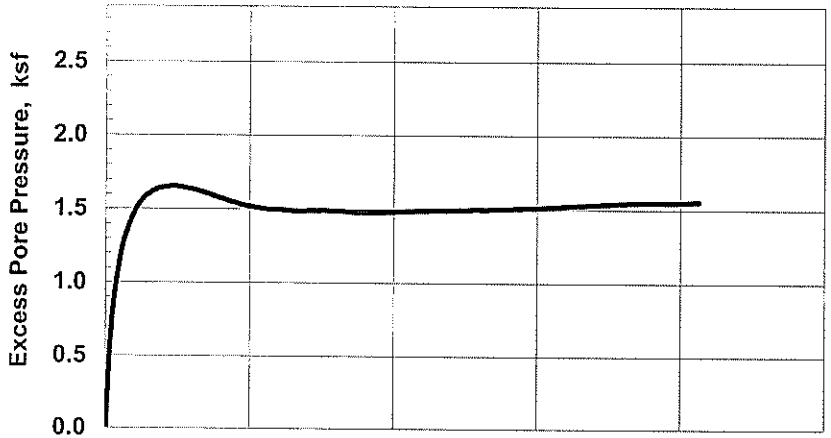




Test by: DT

Checked by: GET

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements	
Geotesting Services, Inc.		Boring RB-112 Sample U-1B	May-08



SAMPLE INFORMATION

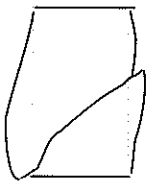
Boring: RB-112 Sample: U-1C Depth: 18.95ft
Type: Intact
Description: CL, reddish brown VARVED CLAY, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 6.00 inch Diameter: 2.88 inch Area: 6.51 in²
Water Content: 30.9 % Total Unit Weight: 121.9 pcf

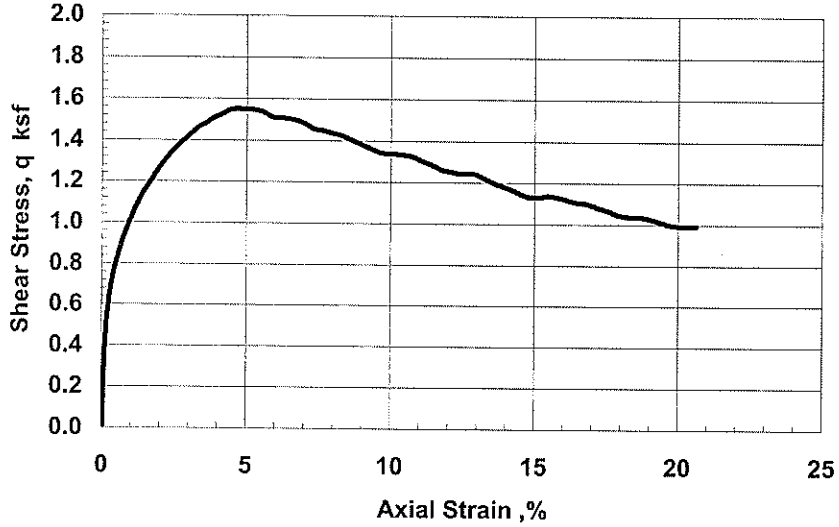
TEST SUMMARY

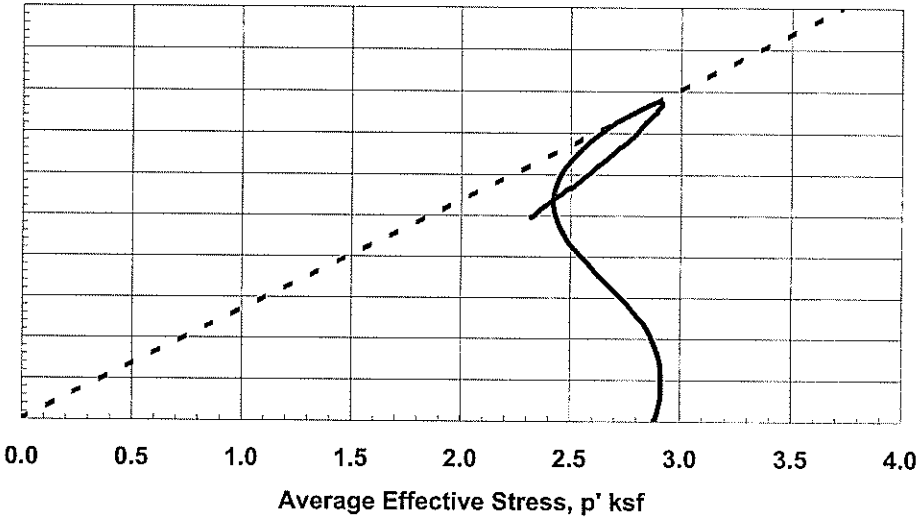
Consolidation Stresses: 2.88 ksf vertical, 2.88 ksf lateral
Water Content: 27.6 % Total Unit Weight: 124.5 pcf
B Coefficient: 98.2 Strain Rate: 0.019 %/min
Peak Shear Strength: 1.55 ksf @ 4.7 % Strain
Peak Effective Friction Angle: 32.5°



Failure Sketch

REMARKS:

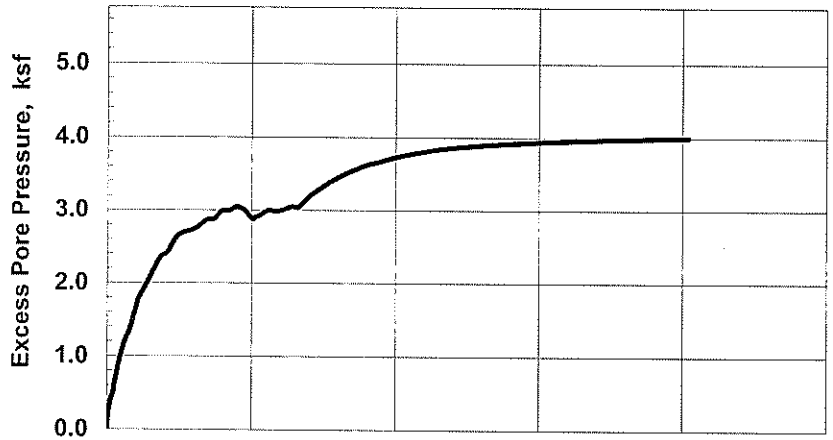




Test by: DT

Checked by: GET

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements	
	Geotesting Services, Inc.	Boring RB-112 Sample U-1C	May-08



SAMPLE INFORMATION

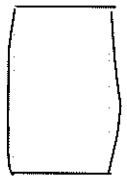
Boring: RB-112 Sample: U-1D Depth: 19.45ft
Type: Intact
Description: CL, reddish brown VARVED CLAY, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 6.01 inch Diameter: 2.85 inch Area: 6.37 in²
Water Content: 38.0 % Total Unit Weight: 118.7 pcf

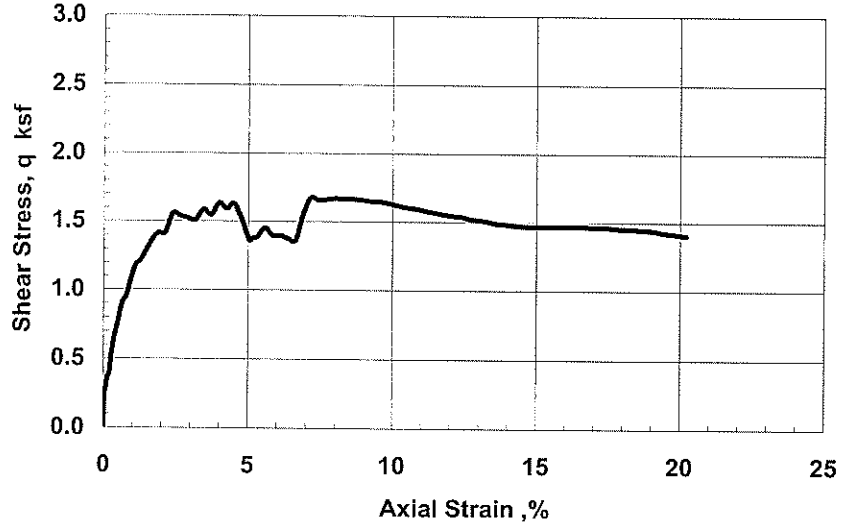
TEST SUMMARY

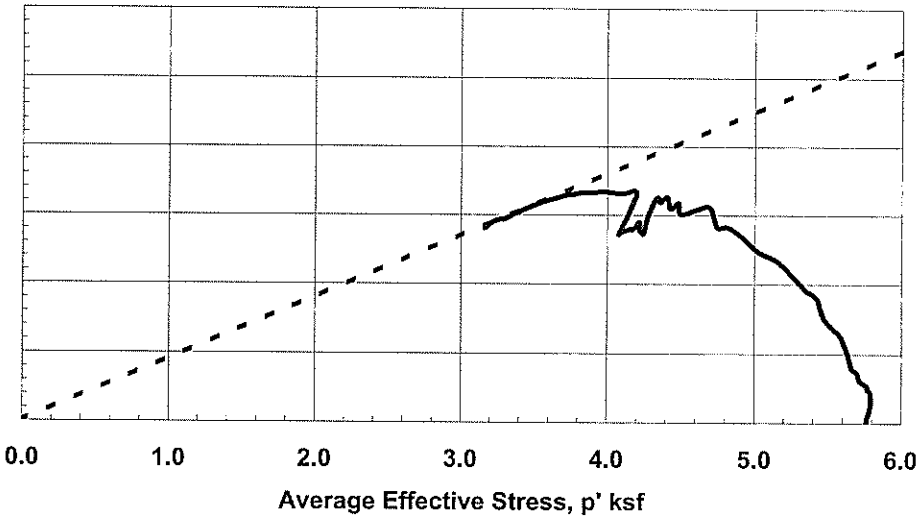
Consolidation Stresses: 5.76 ksf vertical, 5.76 ksf lateral
Water Content: 34.3 % Total Unit Weight: 121.6 pcf
B Coefficient: 97.9 Strain Rate: 0.022 %/min
Peak Shear Strength: 1.67 ksf @ 7.2 % Strain
Peak Effective Friction Angle: 26.8°



Failure Sketch

REMARKS:





Test by: DT	Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements
Checked by: GET	**Geotesting Services, Inc.**		Boring RB-112 Sample U-1D
			May-08

SUMMARY FOR STATIC CIU' TRIAXIAL TESTS SPECIMENS

Test No	Boring No	Sample Section No	Depth / Elev (ft)	USCS Group Symbol / Gs	w_o / w_c (%)	$\gamma_{t,o}$ / $\gamma_{t,c}$ (pcf)	$\gamma_{d,o}$ / $\gamma_{d,c}$ (pcf)	$\sigma'_{c,max}$ (ksf) / OCR	$\sigma'_{v,c}$ (ksf) / $K_c = \sigma'_{v,c} / \sigma'_{h,c}$	$\varepsilon_{a,c}$ / $\varepsilon_{v,c}$ (%)	B factor (%) / ε_{rate} (%/hr)	at Peak Deviator Stress: ε_a (%)	at Peak Obliquity: $(\sigma_1 - \sigma_3)/2$ (ksf)	at Peak Obliquity: $(\sigma'_1 + \sigma'_3)/2$ (ksf)	at Peak Obliquity: σ'_1 / σ'_3	at Peak Obliquity: A factor	at Peak Obliquity: ϕ' for c'=0
T-2864	RB-118	U-2B	23.65	ML	32.5	120.3	90.8	1.73	1.73	1.3	99.2	19.2	6.16	10.51	3.83	-0.213	35.9
				(2.75)	26.7	125.4	98.9	1.0	1.00	8.2	0.7	15.7	5.63	9.50	3.91	-0.190	36.4
T-2865	RB-118	U-2C	24.15	CL-ML	29.6	125.1	96.5	3.46	3.46	1.0	98.5	10.1	8.91	14.94	3.96	-0.144	36.6
				(2.85)	26.5	128.2	101.3	1.0	1.00	4.8	0.7	6.0	6.50	10.55	4.21	-0.045	38.1
T-2866	RB-118	U-2D	24.65	CL-ML	29.8	123.6	95.2	6.91	6.91	2.8	97.8	12.5	13.37	23.28	3.70	-0.112	35.0
				(2.80)	26.0	127.3	101.0	1.0	1.00	5.8	1.2	8.4	9.74	16.39	3.93	0.013	36.5

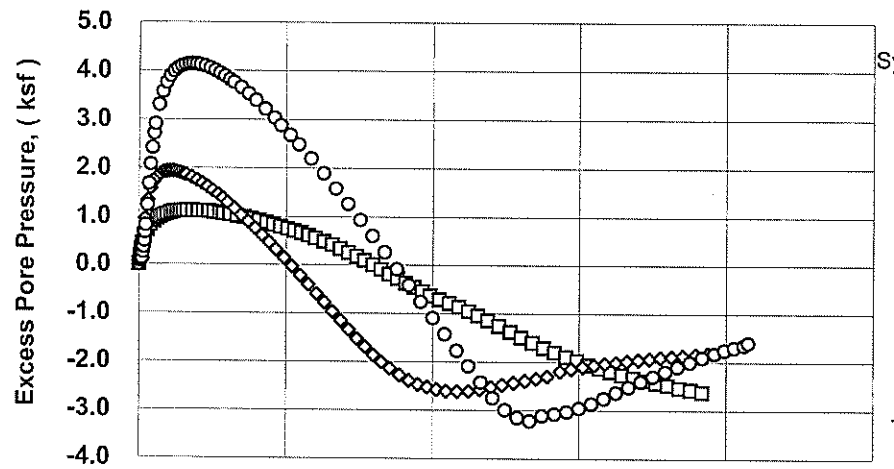
Test No	Description of Material Tested and Remarks
T-2864	ML, reddish brown SILT, trace f. sand.
T-2865	CL-ML, reddish brown VARVED silty CLAY, trace f. sand.
T-2866	CL-ML, reddish brown VARVED silty CLAY, trace f. sand.

Strength Envelope Summary

Test Series	Failure Criteria	ϕ' (deg)	c' (ksf)	α' (deg)	a' (ksf)	Correlation Coefficient
1	1	34.1	0.447	29.3	0.370	0.999
	2	35.6	0.270	30.2	0.220	0.998

Failure Criteria: 1 - Peak Deviator Stress; 2 - Peak Obliquity

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements RB-118 SUMMARY	May 2008
	Geotesting Services, Inc.		

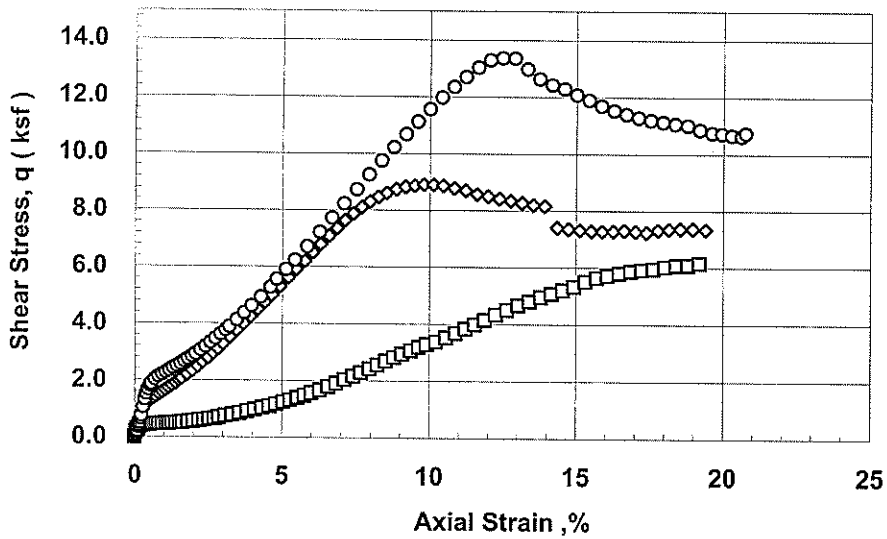


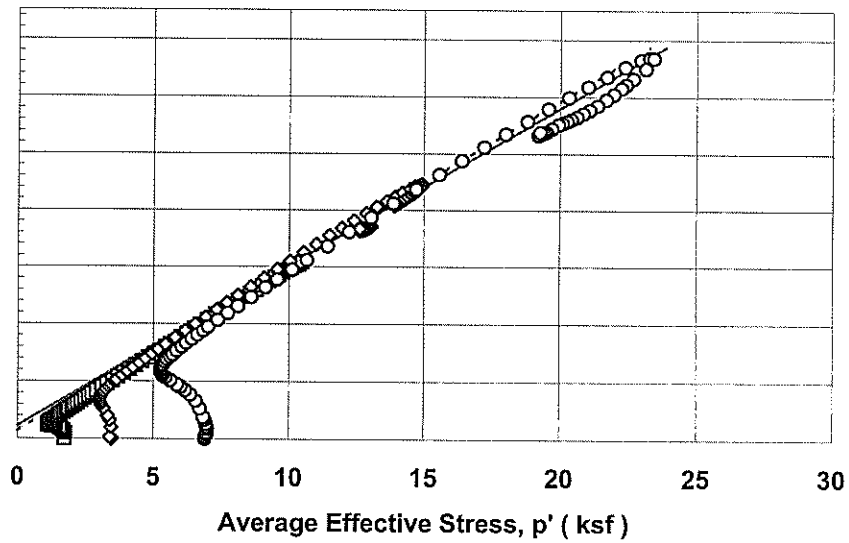
LEGEND AND SUMMARY INFORMATION

Symbol	Test	Boring	Sample	Depth (ft)	w_o (%)	γ_{to} (pcf)	σ'_c (ksf)
□	T-2864	RB-118	U-2B	23.7	32.5	120.3	1.73
◊	T-2865	RB-118	U-2C	24.2	29.6	125.1	3.46
○	T-2866	RB-118	U-2D	24.7	29.8	123.6	6.91

SERIES SUMMARY

Notation	Failure Criteria	c' (ksf)	Φ' (degrees)
———	Peak Deviator Stress	0.45	34.1
- - - -	Peak Obliquity	0.27	35.6

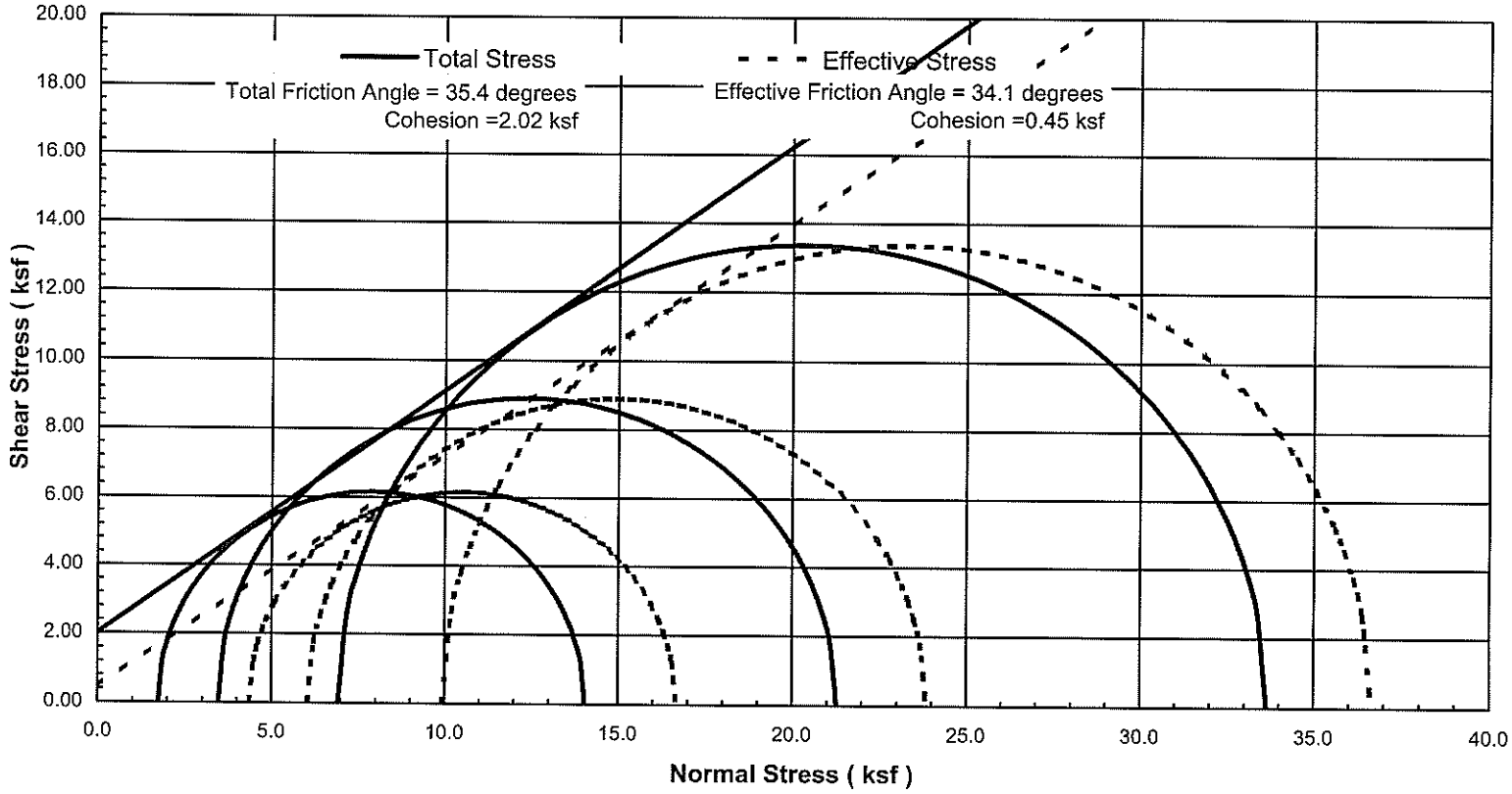




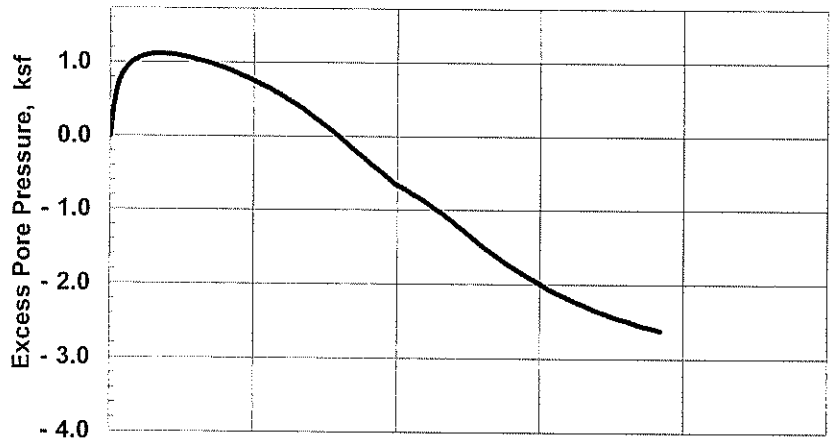
Prepared by: C. Jordan	Project No. 31737788-805	**Haley & Aldrich - #32669-000** **Connecticut Busway**	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements RB-118 SUMMARY	Figure 1
Checked by: G. Thomas	**Geotesting Services, Inc.**			May 2008

GSI Analysis File: Cu'sum3v4

5/27/2008 Test: Cu'sum1_rb118.xls



Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	Mohr Circles of Total and Effective Stresses at Peak CIU' Triaxial Test	Figure 2
Geotesting Services, Inc.		RB-118 SUMMARY	May 2008



SAMPLE INFORMATION

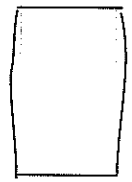
Boring: RB-118 Sample: U-2B Depth: 23.65ft
Type: Intact
Description: ML, reddish brown SILT, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 5.93 inch Diameter: 2.87 inch Area: 6.47 in²
Water Content: 32.5 % Total Unit Weight: 120.3 pcf

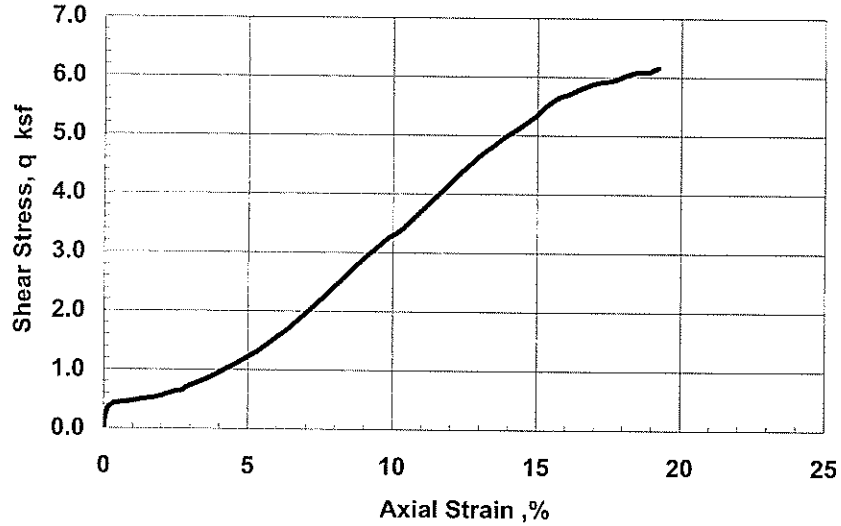
TEST SUMMARY

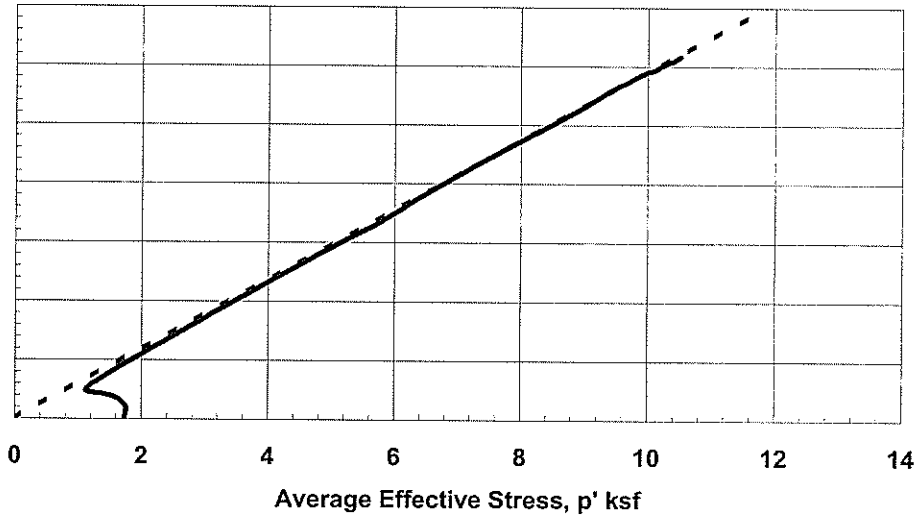
Consolidation Stresses: 1.73 ksf vertical, 1.73 ksf lateral
Water Content: 26.7 % Total Unit Weight: 125.4 pcf
B Coefficient: 99.2 Strain Rate: 0.012 %/min
Peak Shear Strength: 6.16 ksf @ 19.2 % Strain
Peak Effective Friction Angle: 36.4°



Failure Sketch

REMARKS:

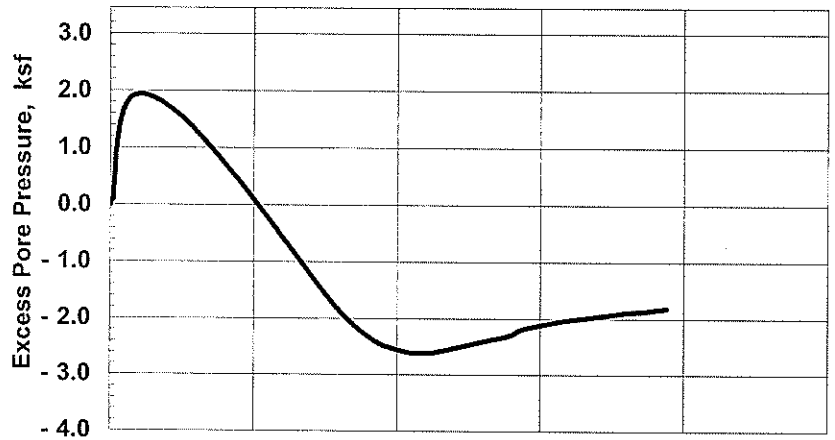


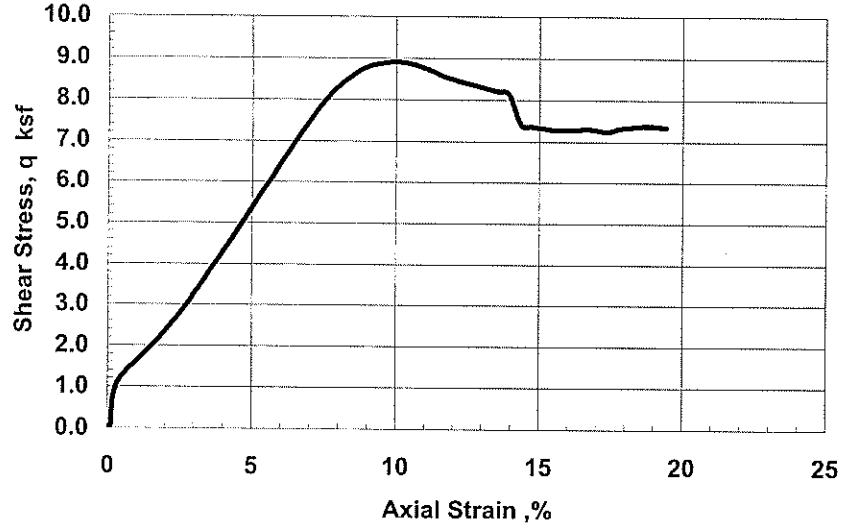


Test by: DT

Checked by: GET

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements	
	Geotesting Services, Inc.	Boring RB-118 Sample U-2B	May-08





SAMPLE INFORMATION

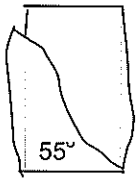
Boring: RB-118 Sample: U-2C Depth: 24.15ft
Type: Intact
Description: CL-ML, reddish brown VARVED silty CLAY, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 5.96 inch Diameter: 2.87 inch Area: 6.47 in²
Water Content: 29.6 % Total Unit Weight: 125.1 pcf

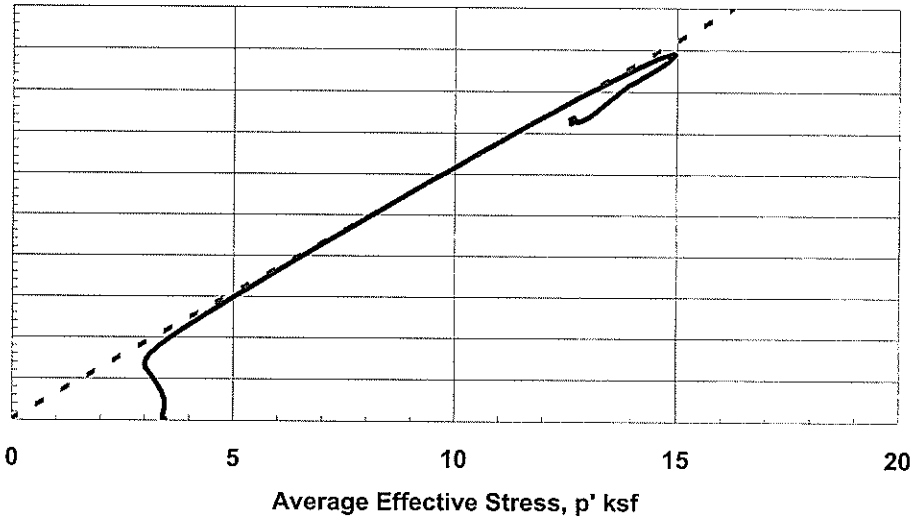
TEST SUMMARY

Consolidation Stresses: 3.46 ksf vertical, 3.46 ksf lateral
Water Content: 26.5 % Total Unit Weight: 128.2 pcf
B Coefficient: 98.5 Strain Rate: 0.012 %/min
Peak Shear Strength: 8.91 ksf @ 10.1 % Strain
Peak Effective Friction Angle: 38.1°



Failure Sketch

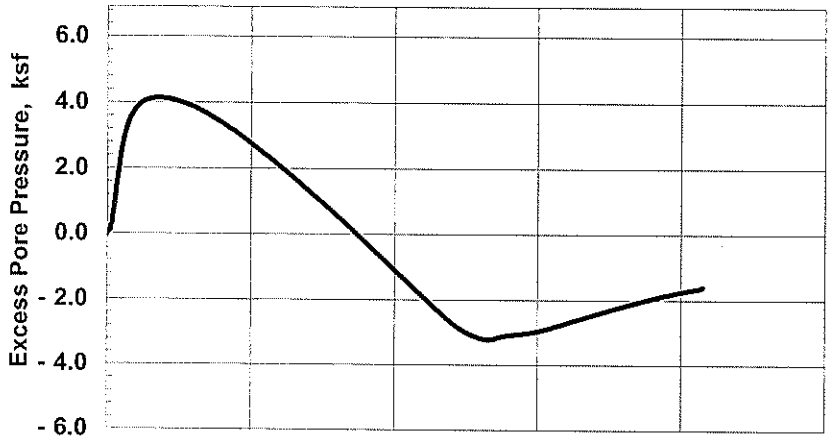
REMARKS:

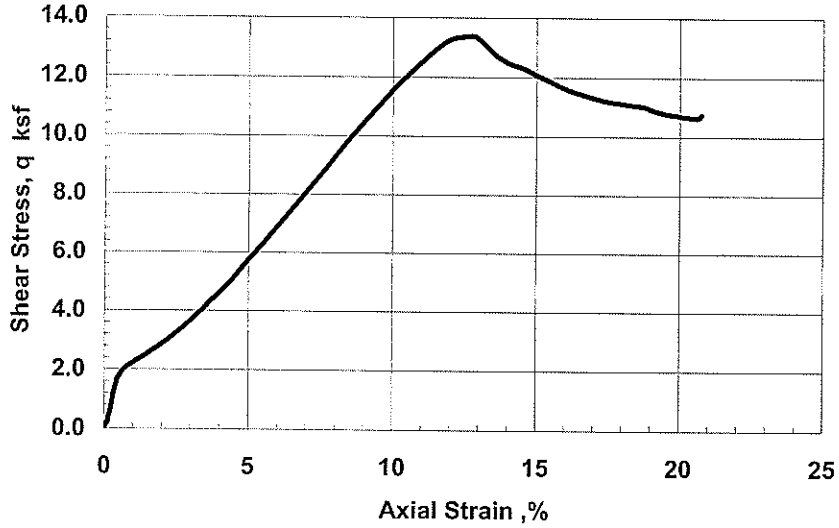


Test by: DT

Checked by: GET

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements	
	Geotesting Services, Inc.	Boring RB-118 Sample U-2C	May-08





SAMPLE INFORMATION

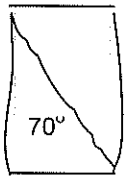
Boring: RB-118 Sample: U-2D Depth: 24.65ft
Type: Intact
Description: CL-ML, reddish brown VARVED silty CLAY, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 5.98 inch Diameter: 2.86 inch Area: 6.44 in²
Water Content: 29.8 % Total Unit Weight: 123.6 pcf

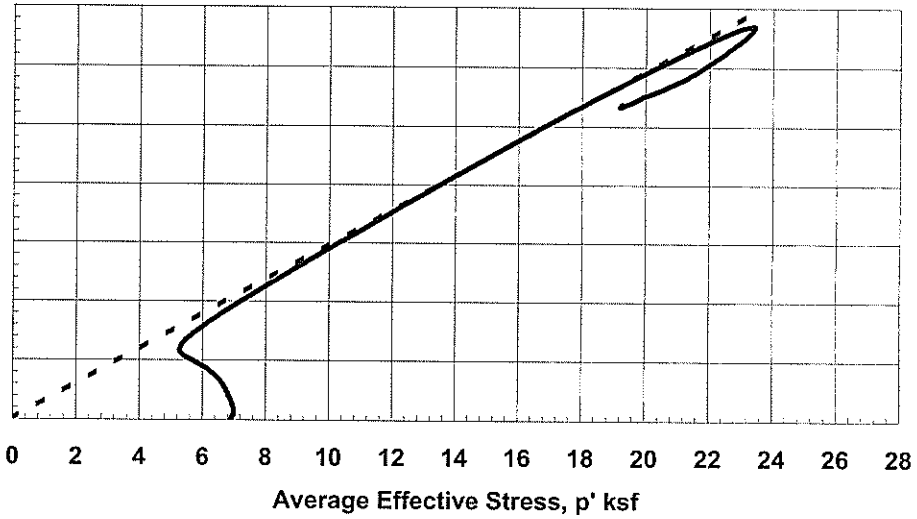
TEST SUMMARY

Consolidation Stresses: 6.91 ksf vertical, 6.91 ksf lateral
Water Content: 26.0 % Total Unit Weight: 127.3 pcf
B Coefficient: 97.8 Strain Rate: 0.021 %/min
Peak Shear Strength: 13.37 ksf @ 12.5 % Strain
Peak Effective Friction Angle: 36.5°



Failure Sketch

REMARKS:



Test by: DT

Checked by: GET

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements	
	Geotesting Services, Inc.	Boring RB-118 Sample U-2D	May-08

SUMMARY FOR STATIC CIU' TRIAXIAL TESTS SPECIMENS

Test No	Boring No	Sample Section No	Depth / Elev (ft)	USCS Group Symbol / Gs	w_o / w_c (%)	$\gamma_{t,o}$ / $\gamma_{t,c}$ (pcf)	$\gamma_{d,o}$ / $\gamma_{d,c}$ (pcf)	$\sigma'_{c,max}$ (ksf) / OCR	$\sigma'_{v,c}$ (ksf) / $K_c = \sigma'_{v,c} / \sigma'_{h,c}$	$\varepsilon_{a,c}$ / $\varepsilon_{v,c}$ (%)	B factor (%) / ε_{rate} (%/hr)	at Peak Deviator Stress: ε_a (%)	at Peak Obliquity: $(\sigma_1 - \sigma_3)/2$ (ksf)	at Peak Obliquity: $(\sigma'_1 + \sigma'_3)/2$ (ksf)	at Peak Obliquity: σ'_1 / σ'_3	at Peak Obliquity: A factor	at Peak Obliquity: ϕ' for c'=0
T-2876	RW-110	U-1A	23.45	CL	51.6	109.4	72.2	2.88	2.88	4.9	96.5	6.9	0.83	1.85	2.62	1.124	26.6
				(2.87)	42.3	115.1	80.9	1.0	1.00	10.8	1.3	7.9	0.82	1.83	2.63	1.135	26.7
T-2877	RW-110	U-1B	23.95	CL	46.9	112.1	76.3	5.76	5.76	4.0	98.2	17.2	1.74	3.33	3.18	1.199	31.4
				(2.87)	41.3	115.8	82.0	1.0	1.00	6.9	1.3	12.6	1.71	3.21	3.27	1.248	32.1
T-2878	RW-110	U-1C	24.45	CL	49.7	110.5	73.8	11.52	11.52	7.8	96.9	17.7	3.10	6.24	2.97	1.353	29.7
				(2.87)	39.4	117.2	84.1	1.0	1.00	12.2	1.4	16.1	3.07	6.18	2.98	1.370	29.8

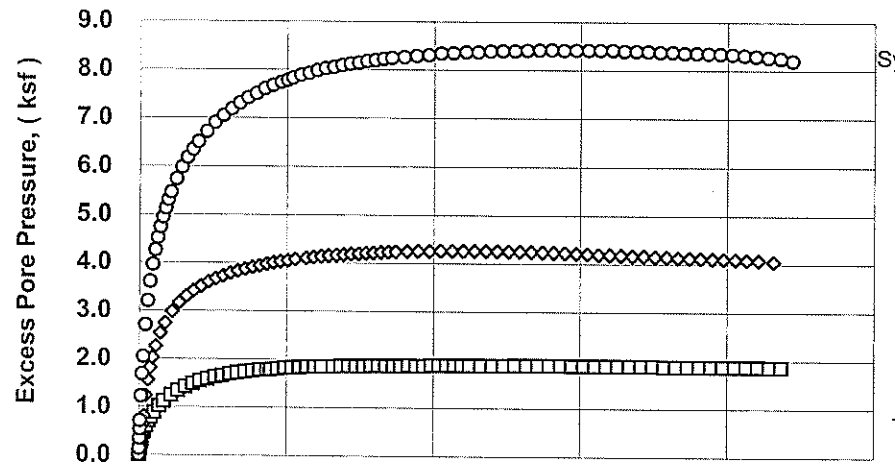
Test No	Description of Material Tested and Remarks
T-2876	CL, reddish brown VARVED silty CLAY, trace f. sand.
T-2877	CL, reddish brown VARVED silty CLAY, trace f. sand.
T-2878	CL, reddish brown VARVED silty CLAY, trace f. sand.

Strength Envelope Summary

Test Series	Failure Criteria	ϕ' (deg)	c' (ksf)	α' (deg)	a' (ksf)	Correlation Coefficient
1	1	29.9	0.000	26.5	0.000	--
	2	30.0	0.000	26.6	0.000	--

Failure Criteria: 1 - Peak Deviator Stress; 2 - Peak Obliquity

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements RW-110 SUMMARY	May 2008
	Geotesting Services, Inc.		

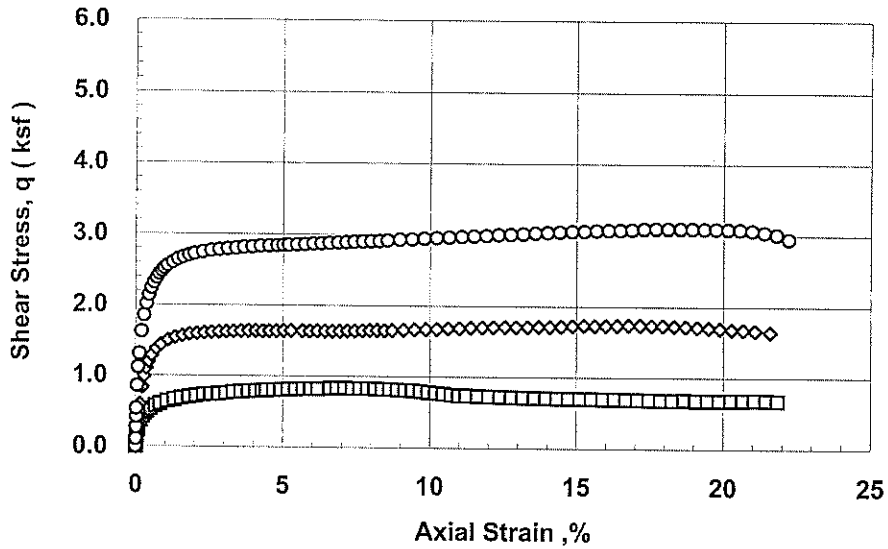


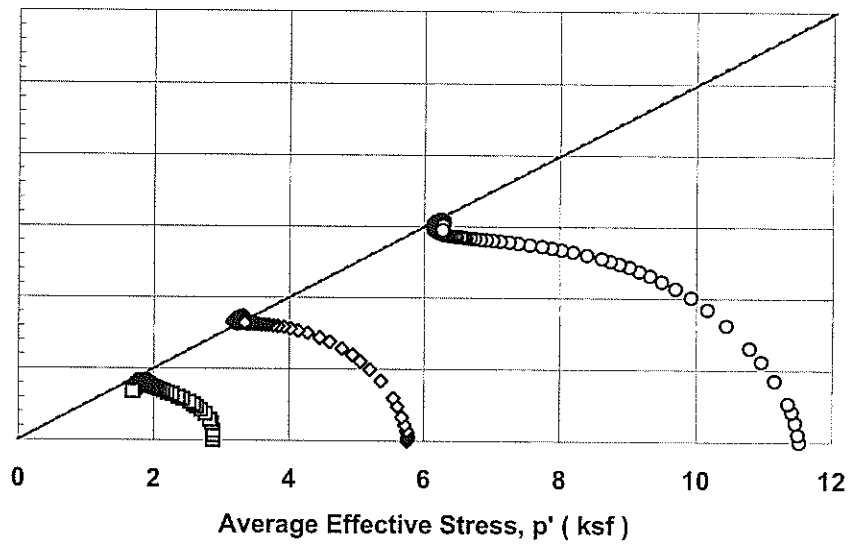
LEGEND AND SUMMARY INFORMATION

Symbol	Test	Boring	Sample	Depth (ft)	w_o (%)	γ_{to} (pcf)	σ'_c (ksf)
□	T-2876	RW-110	U-1A	23.5	51.6	109.4	2.88
◊	T-2877	RW-110	U-1B	24.0	46.9	112.1	5.76
○	T-2878	RW-110	U-1C	24.5	49.7	110.5	11.52

SERIES SUMMARY

Notation	Failure Criteria	c' (ksf)	Φ' (degrees)
	Peak Deviator Stress	0.00	29.9
	Peak Obliquity	0.00	30.0

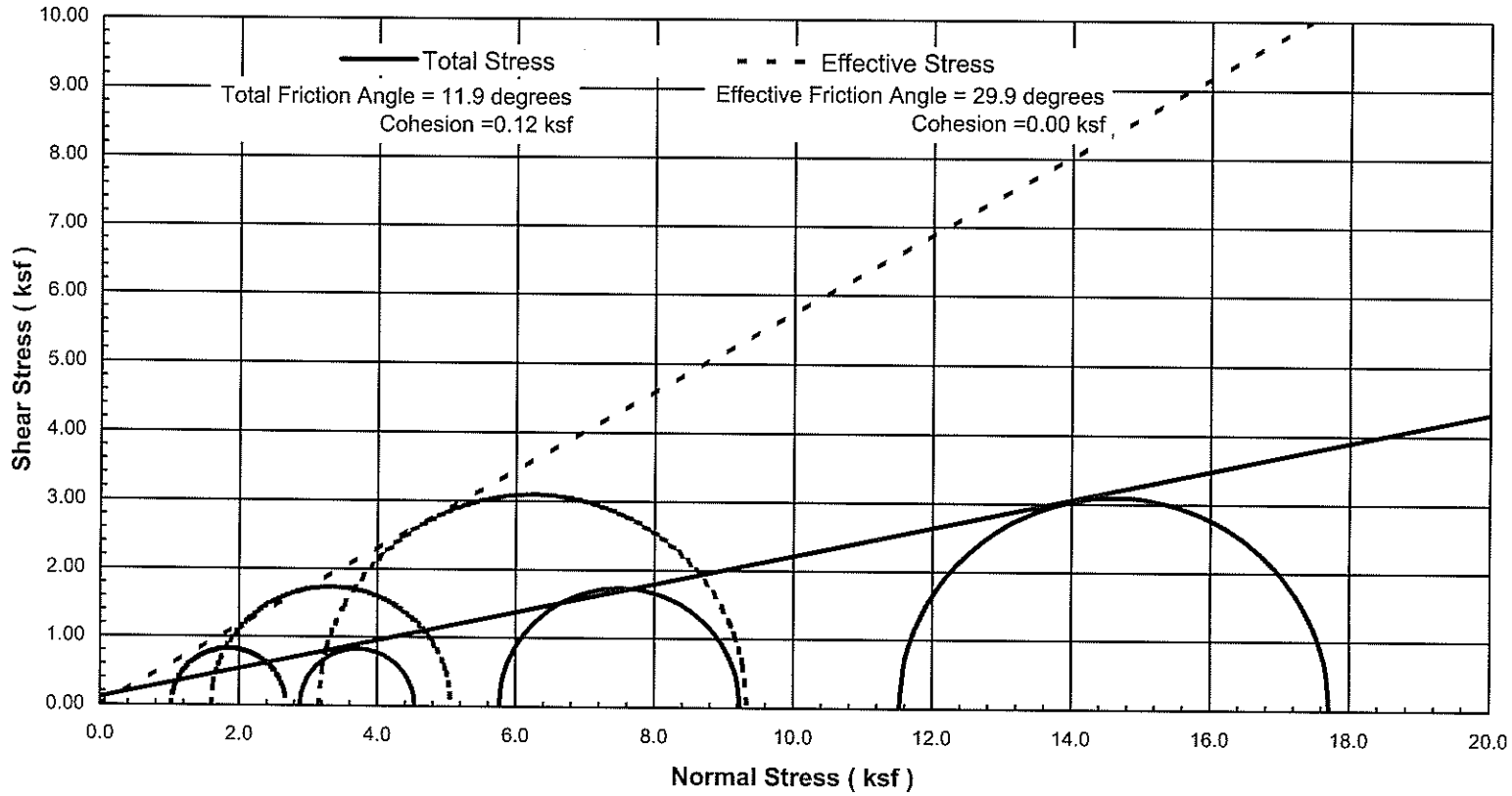




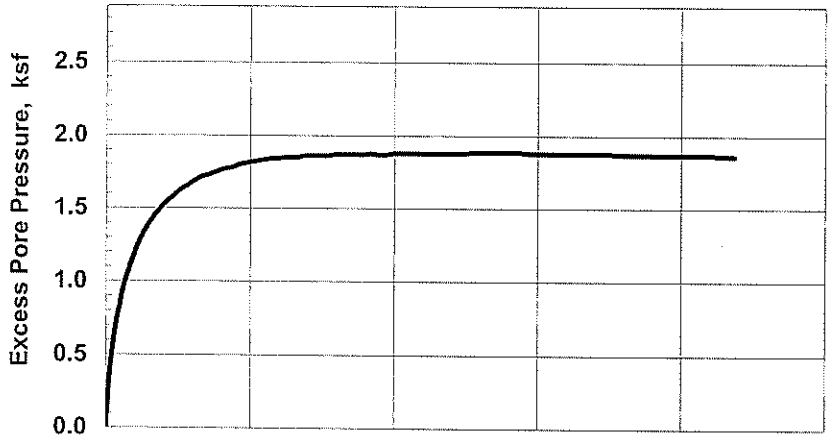
Project No. 31737788-805	**Haley & Aldrich - #32669-000** **Connecticut Busway**	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements RW-110 SUMMARY	Figure 1
Prepared by: C. Jordan Checked by: G. Thomas	**Geotesting Services, Inc.**		May 2008

GSI Analysis File: Cu'sum3v4

5/28/2008 Test: Cu'sum1_rw110.xls



Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	Mohr Circles of Total and Effective Stresses at Peak CIU' Triaxial Test	Figure 2
Geotesting Services, Inc.		RW-110 SUMMARY	May 2008



SAMPLE INFORMATION

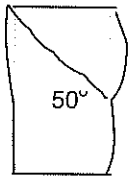
Boring: RW-110 Sample: U-1A Depth: 23.45ft
Type: Intact
Description: CL, reddish brown VARVED silty CLAY, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 5.98 inch Diameter: 2.86 inch Area: 6.42 in²
Water Content: 51.6 % Total Unit Weight: 109.4 pcf

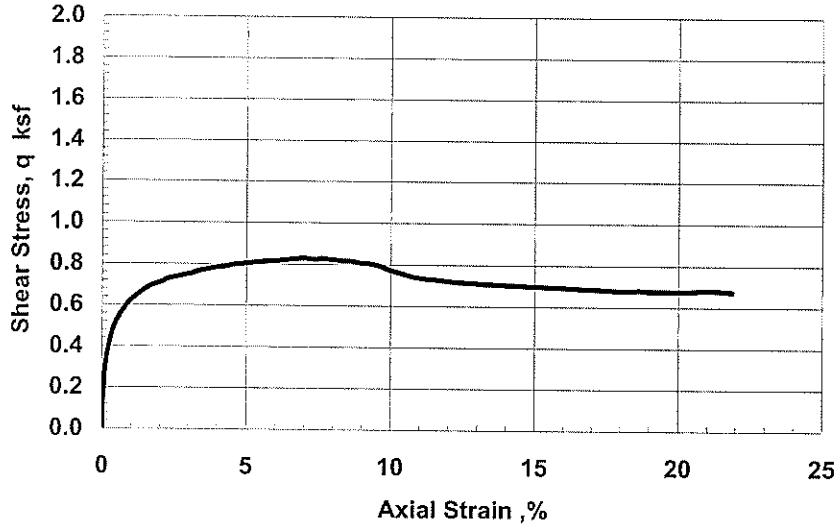
TEST SUMMARY

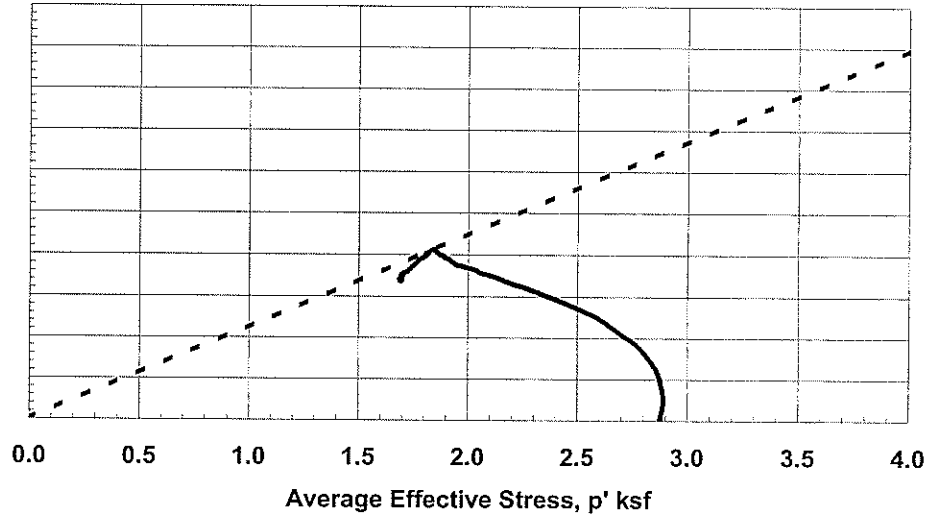
Consolidation Stresses: 2.88 ksf vertical, 2.88 ksf lateral
Water Content: 42.3 % Total Unit Weight: 115.1 pcf
B Coefficient: 96.5 Strain Rate: 0.021 %/min
Peak Shear Strength: 0.83 ksf @ 6.9 % Strain
Peak Effective Friction Angle: 26.7°



Failure Sketch

REMARKS:

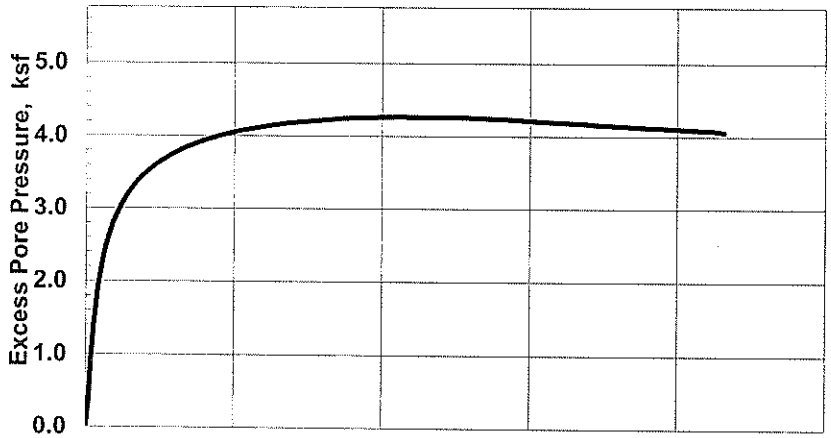




Test by: DT

Checked by: GET

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements	
	Geotesting Services, Inc.	Boring RW-110 Sample U-1A	May-08



SAMPLE INFORMATION

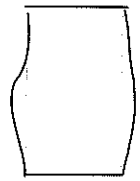
Boring: RW-110 Sample: U-1B Depth: 23.95ft
Type: Intact
Description: CL, reddish brown VARVED silty CLAY, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 6.00 inch Diameter: 2.85 inch Area: 6.37 in²
Water Content: 46.9 % Total Unit Weight: 112.1 pcf

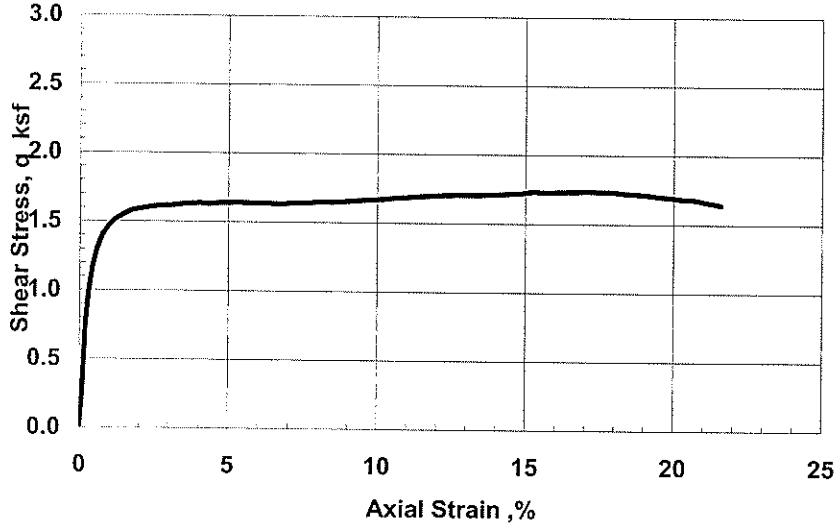
TEST SUMMARY

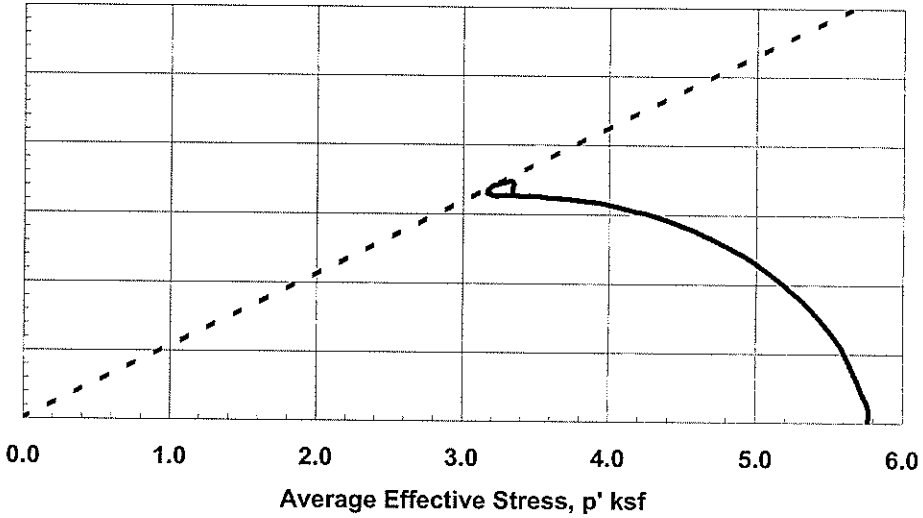
Consolidation Stresses: 5.76 ksf vertical, 5.76 ksf lateral
Water Content: 41.3 % Total Unit Weight: 115.8 pcf
B Coefficient: 98.2 Strain Rate: 0.021 %/min
Peak Shear Strength: 1.74 ksf @ 17.2 % Strain
Peak Effective Friction Angle: 32.1°



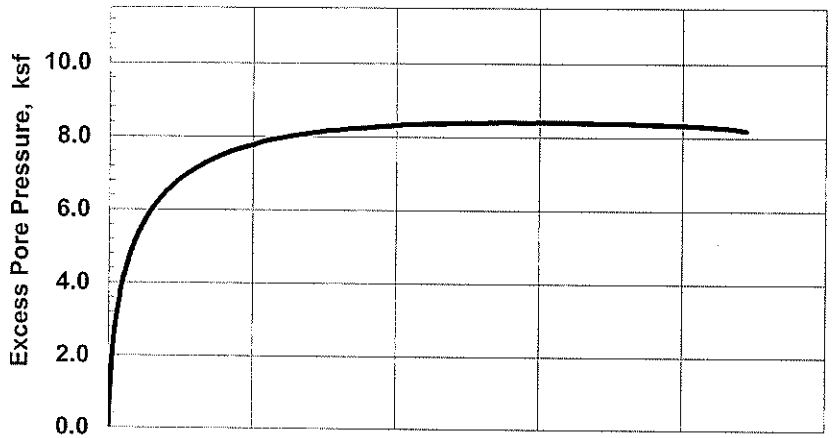
Failure Sketch

REMARKS:





Test by: DT Checked by: GET	Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements Boring RW-110 Sample U-1B	May-08
	Geotesting Services, Inc.			



SAMPLE INFORMATION

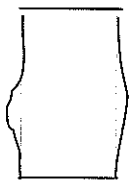
Boring: RW-110 Sample: U-1C Depth: 24.45ft
Type: Intact
Description: CL, reddish brown VARVED silty CLAY, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 5.99 inch Diameter: 2.86 inch Area: 6.41 in²
Water Content: 49.7 % Total Unit Weight: 110.5 pcf

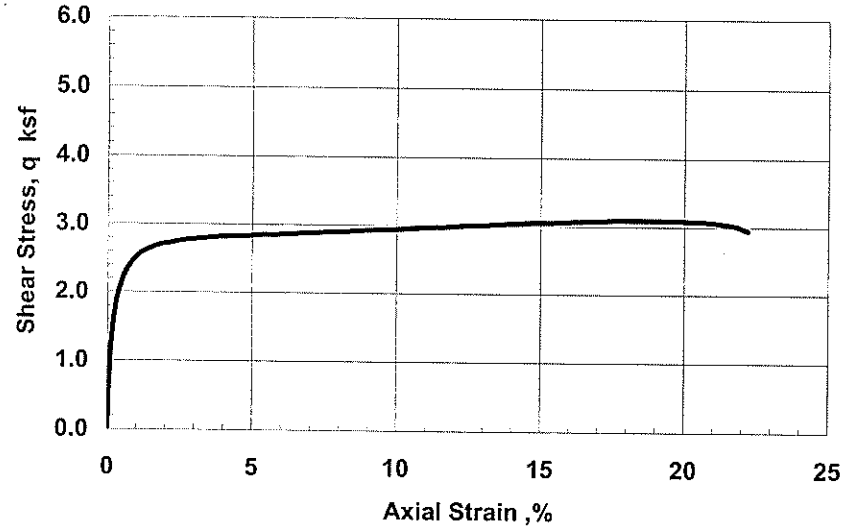
TEST SUMMARY

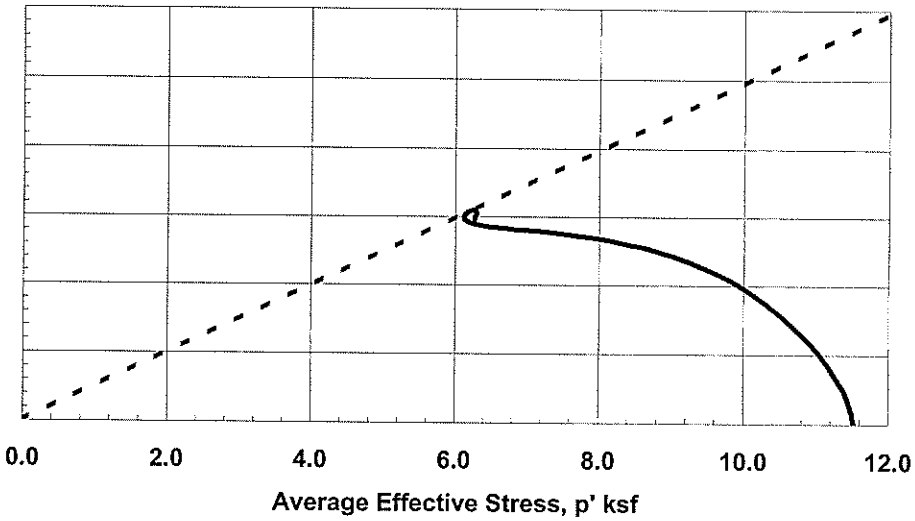
Consolidation Stresses: 11.52 ksf vertical, 11.52 ksf lateral
Water Content: 39.4 % Total Unit Weight: 117.2 pcf
B Coefficient: 96.9 Strain Rate: 0.023 %/min
Peak Shear Strength: 3.10 ksf @ 17.7 % Strain
Peak Effective Friction Angle: 29.8°



Failure Sketch

REMARKS:





Test by: DT	Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements
Checked by: GET	**Geotesting Services, Inc.**		Boring RW-110 Sample U-1C
			May-08

SUMMARY FOR STATIC CIU' TRIAXIAL TESTS SPECIMENS

Test No	Boring No	Sample Section No	Depth	USCS Group Symbol	w_o	$\gamma_{t,o}$	$\gamma_{d,o}$	$\sigma'_{c,max}$ (ksf)	$\sigma'_{v,c}$ (ksf)	$\varepsilon_{a,c}$	B factor (%)	at Peak Deviator Stress					
												at Peak Obliquity					
			Elev (ft)	Gs	w_c (%)	$\gamma_{t,c}$ (pcf)	$\gamma_{d,c}$ (pcf)	OCR	$K_c = \frac{\sigma'_{v,c}}{\sigma'_{h,c}}$	$\varepsilon_{v,c}$ (%)	ε_{rate} (%/hr)	ε_a (%)	$\frac{\sigma_1 - \sigma_3}{2}$ (ksf)	$\frac{\sigma'_1 + \sigma'_3}{2}$ (ksf)	σ'_1 / σ'_3	A factor	ϕ' for c'=0
T-2873	RW-116	A	18.25	CH	63.7	104.8	64.0	1.44	1.44	3.2	97.3	4.9	0.65	1.12	3.77	0.746	35.5
				(2.90)	58.9	106.2	66.8	1.0	1.00	4.2	1.2	3.7	0.64	1.08	3.90	0.782	36.3
T-2874	RW-116	B	18.75	CH	60.7	104.8	65.2	2.88	2.88	1.5	97.6	2.6	1.07	2.23	2.83	0.806	28.6
				(2.86)	55.8	107.2	68.8	1.0	1.00	5.3	1.3	3.7	1.02	2.10	2.88	0.882	29.0
T-2875	RW-116	C	19.25	CH	60.5	104.4	65.0	5.76	5.76	4.4	96.7	2.6	1.46	3.56	2.39	1.254	24.2
				(2.88)	53.4	108.7	70.9	1.0	1.00	8.3	1.4	13.0	1.19	2.32	3.09	1.948	30.7

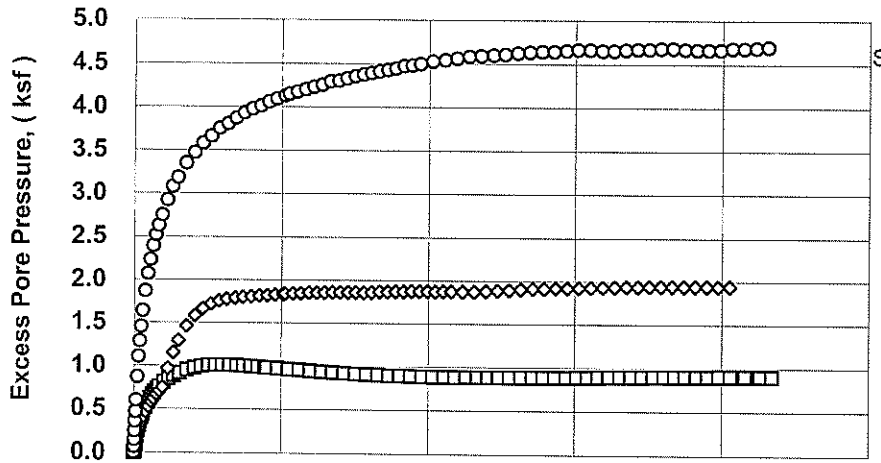
Test No	Description of Material Tested and Remarks
T-2873	CH, reddish brown VARVED CLAY, trace f. sand.
T-2874	CH, reddish brown VARVED CLAY, trace f. sand.
T-2875	CH, reddish brown VARVED CLAY, trace f. sand.

Strength Envelope Summary

Test Series	Failure Criteria	ϕ' (deg)	c' (ksf)	α' (deg)	a' (ksf)	Correlation Coefficient
1	1	19.3	0.316	18.3	0.298	0.998
	2	24.8	0.197	22.7	0.179	0.991

Failure Criteria: 1 - Peak Deviator Stress
2 - Peak Obliquity

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements RW-116 SUMMARY	May 2008
	Geotesting Services, Inc.		

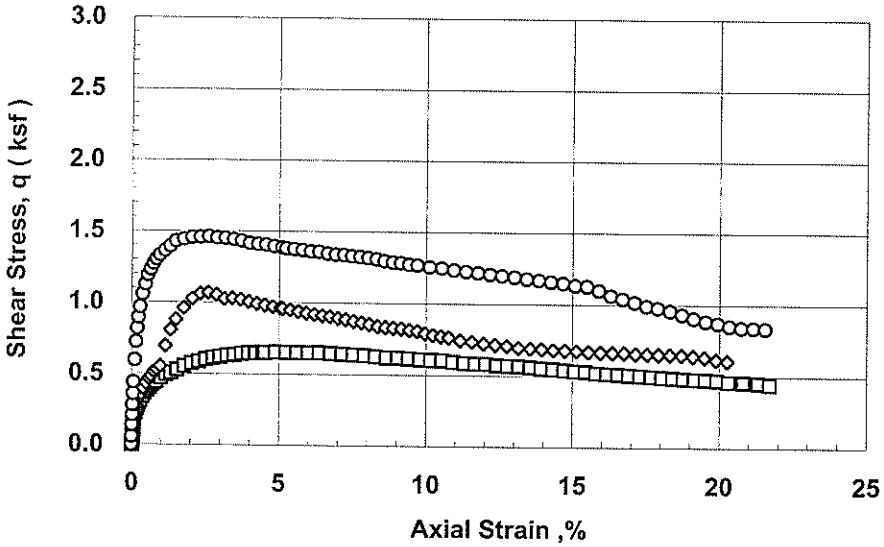


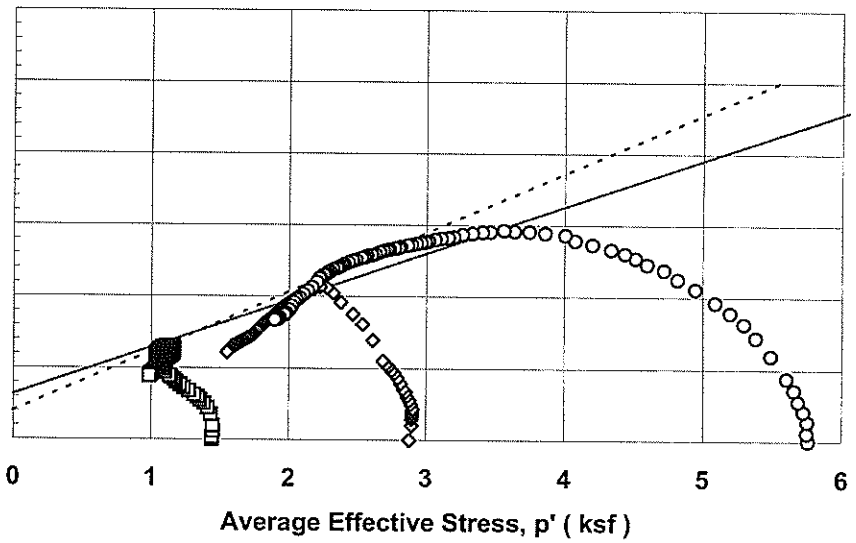
LEGEND AND SUMMARY INFORMATION

Symbol	Test	Boring	Sample	Depth (ft)	w_o (%)	γ_{to} (pcf)	σ'_c (ksf)
□	T-2873	RW-116	A	18.3	63.7	104.8	1.44
◊	T-2874	RW-116	B	18.8	60.7	104.8	2.88
○	T-2875	RW-116	C	19.3	60.5	104.4	5.76

SERIES SUMMARY

Notation	Failure Criteria	c' (ksf)	Φ' (degrees)
———	Peak Deviator Stress	0.32	19.3
- - - -	Peak Obliquity	0.20	24.8

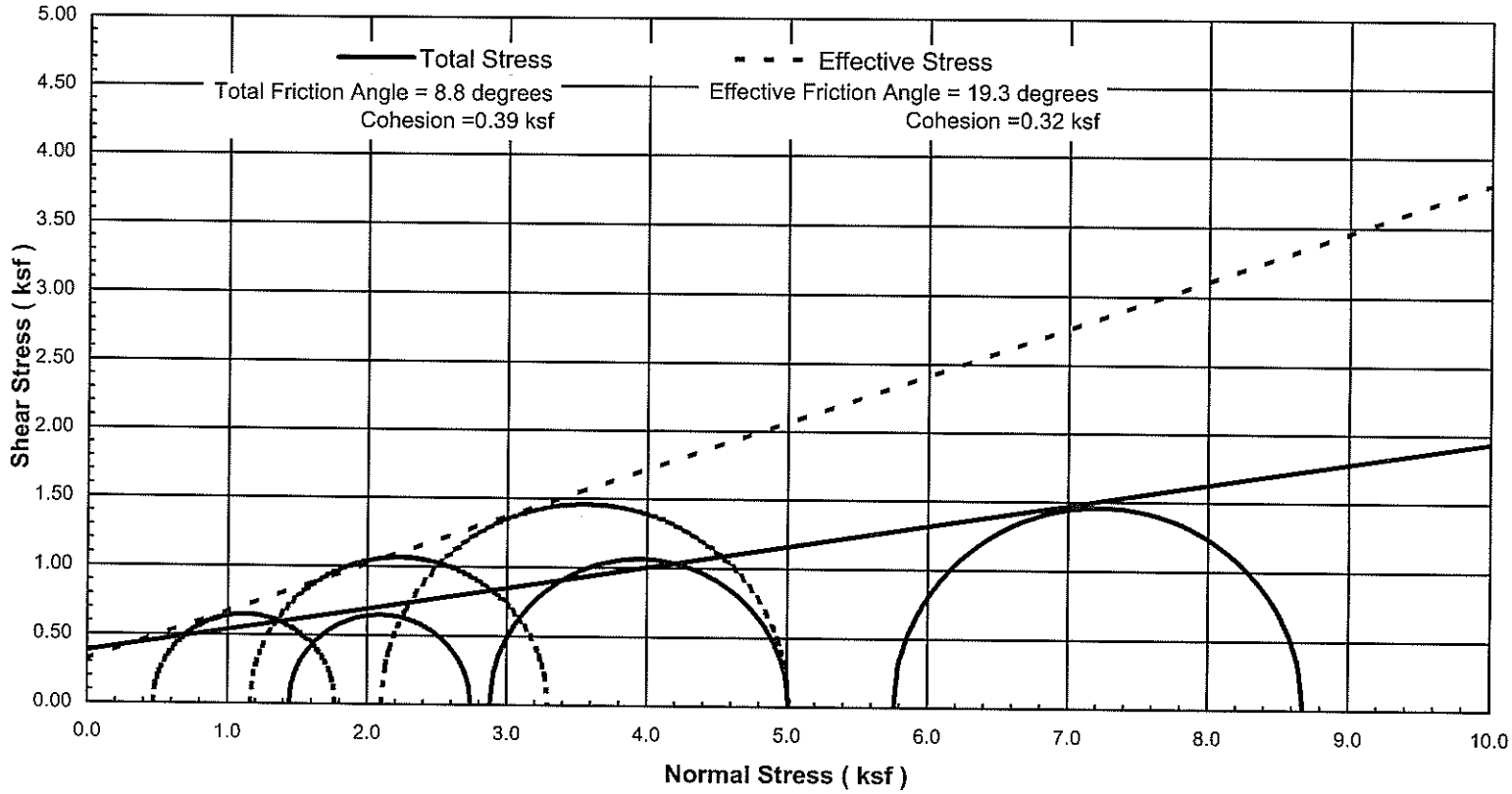




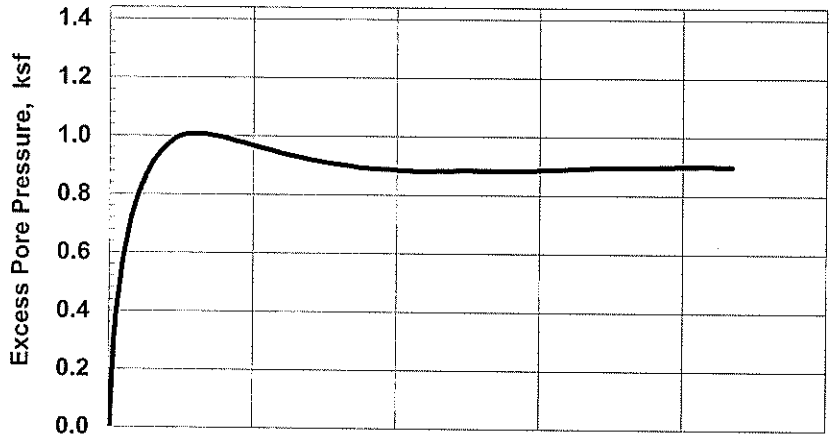
Project No. 31737788-805	**Haley & Aldrich - #32669-000** **Connecticut Busway**	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements RW-116 SUMMARY	Figure 1
Prepared by: C. Jordan Checked by: G. Thomas	**Geotesting Services, Inc.**		May 2008

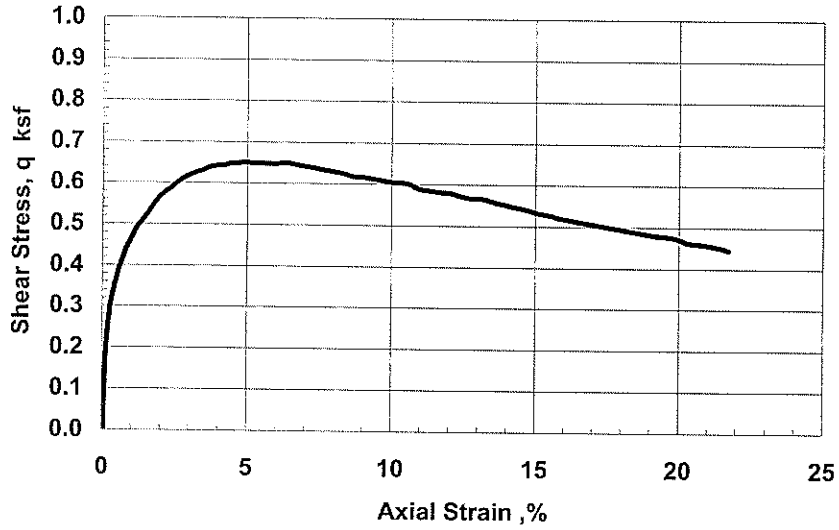
GSI Analysis File: Cu'sum3v4

5/27/2008 Test: Cu'sum1_rw116.xls



Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	Mohr Circles of Total and Effective Stresses at Peak CIU' Triaxial Test	Figure 2
Geotesting Services, Inc.		RW-116 SUMMARY	May 2008





SAMPLE INFORMATION

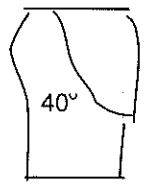
Boring: RW-116 Sample: A Depth: 18.25ft
Type: Intact
Description: CH, reddish brown VARVED CLAY, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 5.99 inch Diameter: 2.84 inch Area: 6.35 in²
Water Content: 63.7 % Total Unit Weight: 104.8 pcf

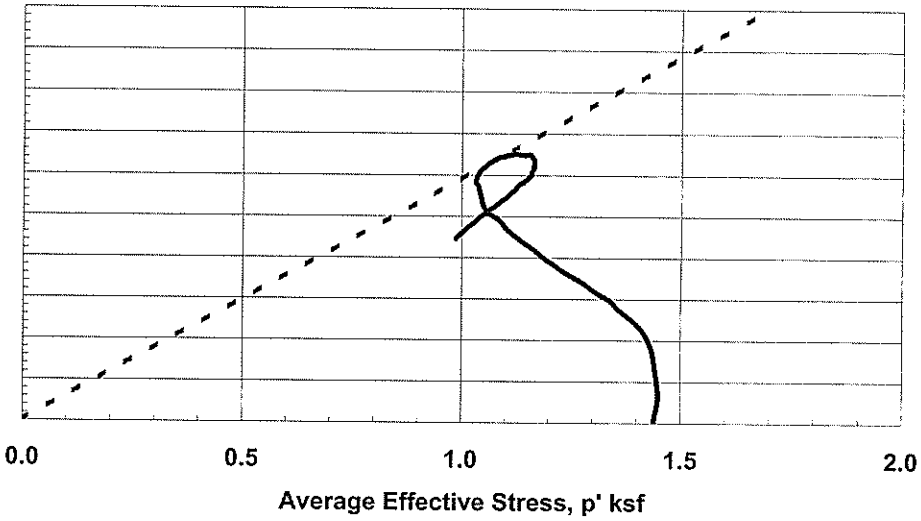
TEST SUMMARY

Consolidation Stresses: 1.44 ksf vertical, 1.44 ksf lateral
Water Content: 58.9 % Total Unit Weight: 106.2 pcf
B Coefficient: 97.3 Strain Rate: 0.021 %/min
Peak Shear Strength: 0.65 ksf @ 4.9 % Strain
Peak Effective Friction Angle: 36.3°

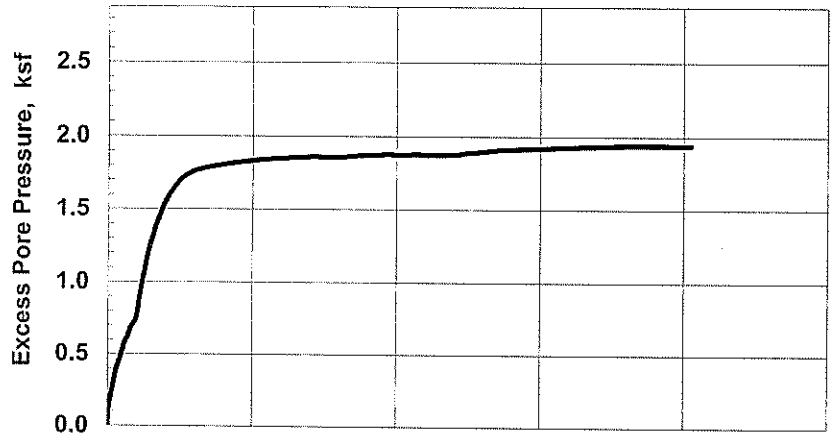


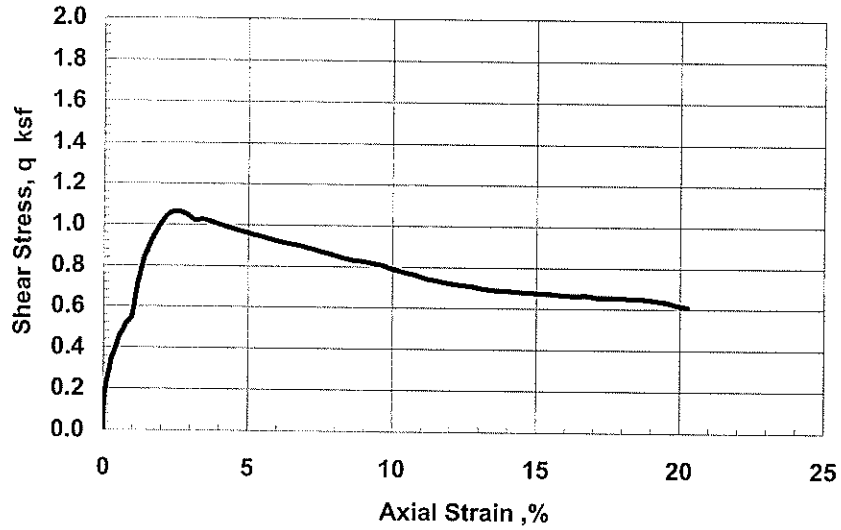
Failure Sketch

REMARKS:



Test by: DT	Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements
Checked by: GET	Geotesting Services, Inc.		Boring RW-116 Sample A
			May-08





SAMPLE INFORMATION

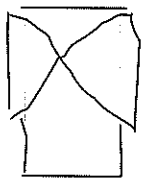
Boring: RW-116 Sample: B Depth: 18.75ft
Type: Intact
Description: CH, reddish brown VARVED CLAY, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 6.00 inch Diameter: 2.86 inch Area: 6.41 in²
Water Content: 60.7 % Total Unit Weight: 104.8 pcf

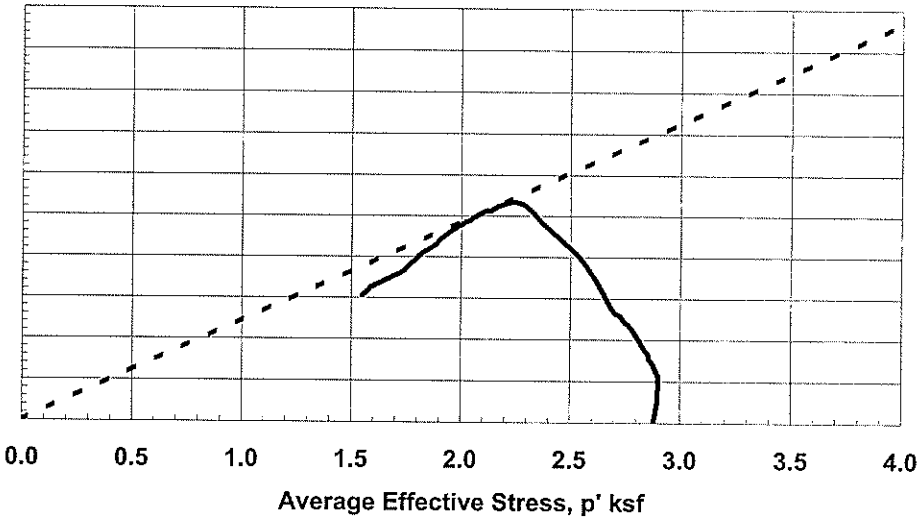
TEST SUMMARY

Consolidation Stresses: 2.88 ksf vertical, 2.88 ksf lateral
Water Content: 55.8 % Total Unit Weight: 107.2 pcf
B Coefficient: 97.6 Strain Rate: 0.022 %/min
Peak Shear Strength: 1.07 ksf @ 2.6 % Strain
Peak Effective Friction Angle: 29.0°

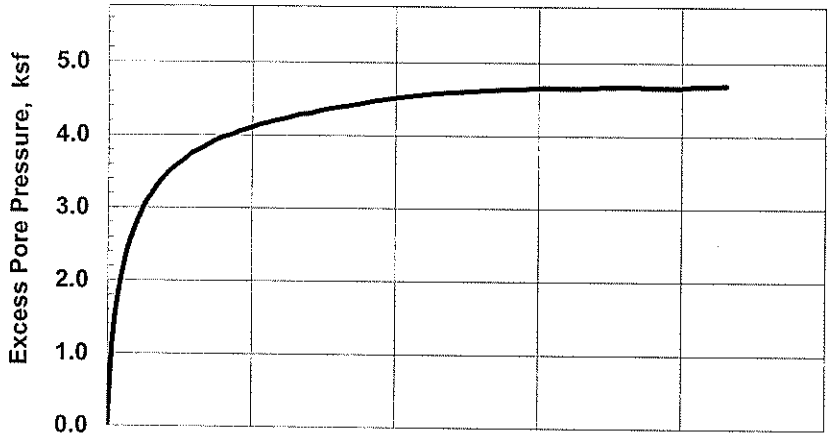


Failure Sketch

REMARKS:



Test by: DT Checked by: GET	Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements
	Geotesting Services, Inc.		Boring RW-116 Sample B
			May-08



SAMPLE INFORMATION

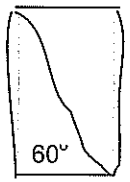
Boring: RW-116 Sample: C Depth: 19.25ft
Type: Intact
Description: CH, reddish brown VARVED CLAY, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 6.00 inch Diameter: 2.84 inch Area: 6.34 in²
Water Content: 60.5 % Total Unit Weight: 104.4 pcf

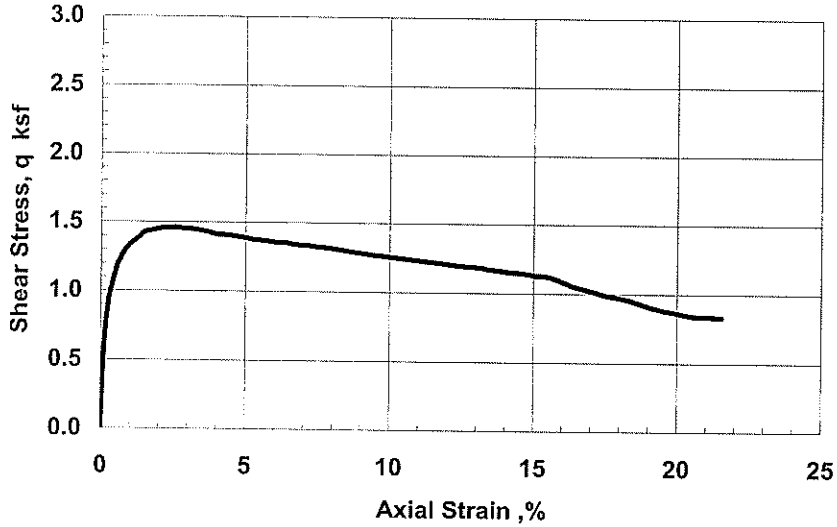
TEST SUMMARY

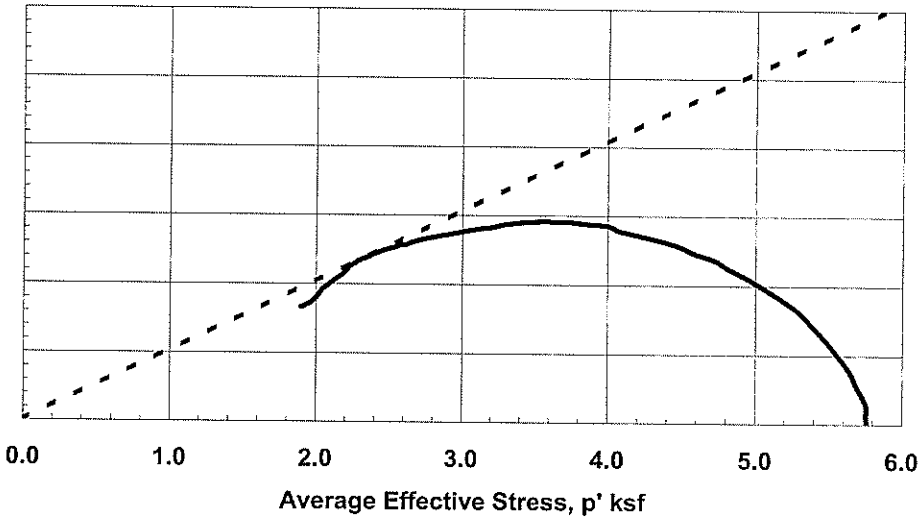
Consolidation Stresses: 5.76 ksf vertical, 5.76 ksf lateral
Water Content: 53.4 % Total Unit Weight: 108.7 pcf
B Coefficient: 96.7 Strain Rate: 0.023 %/min
Peak Shear Strength: 1.46 ksf @ 2.6 % Strain
Peak Effective Friction Angle: 30.7°



Failure Sketch

REMARKS:





Test by: DT	Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements
Checked by: GET	**Geotesting Services, Inc.**		Boring RW-116 Sample C
			May-08

SUMMARY FOR STATIC CIU' TRIAXIAL TESTS SPECIMENS

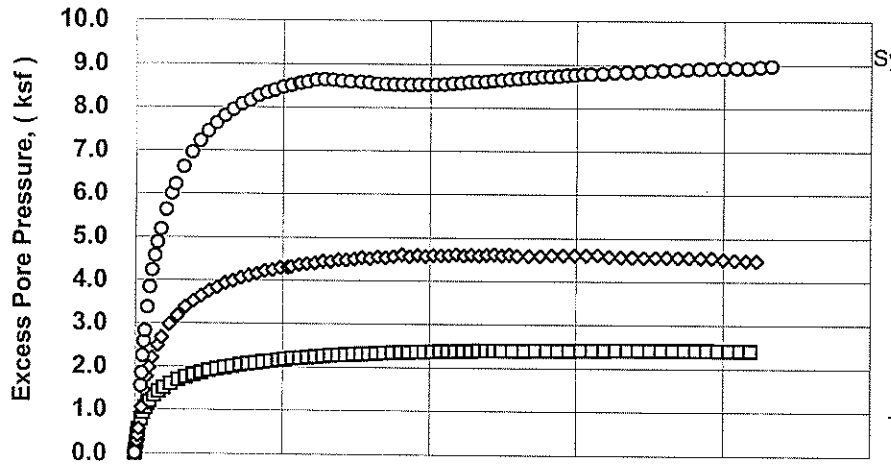
Test No	Boring No	Sample Section No	Depth	USCS Group Symbol	w_o	$\gamma_{t,o}$	$\gamma_{d,o}$	$\sigma'_{c,max}$ (ksf)	$\sigma'_{v,c}$ (ksf)	$\varepsilon_{a,c}$	B factor (%)	at Peak Deviator Stress					
												at Peak Obliquity					
			Elev (ft)	Gs	w_c (%)	$\gamma_{t,c}$ (pcf)	$\gamma_{d,c}$ (pcf)	OCR	$K_c = \frac{\sigma'_{v,c}}{\sigma'_{h,c}}$	$\varepsilon_{v,c}$ (%)	ε_{rate} (%/hr)	ε_a (%)	$\frac{\sigma_1 - \sigma_3}{2}$ (ksf)	$\frac{\sigma'_1 + \sigma'_3}{2}$ (ksf)	σ'_1 / σ'_3	A factor	ϕ' for c'=0
T-2867	RW-121	U-1B	43.55	CL	52.2	109.4	71.9	3.31	3.31	3.4	95.9	11.9	0.97	1.89	3.09	1.238	30.8
				(2.90)	46.5	112.9	77.1	1.0	1.00	6.7	1.3	16.4	0.95	1.85	3.13	1.269	31.0
T-2868	RW-121	U-1C	44.05	CL	47.9	109.9	74.3	6.62	6.62	5.6	96.8	18.1	1.86	3.92	2.80	1.228	28.3
				(2.75)	40.4	114.2	81.4	1.0	1.00	8.7	1.3	15.3	1.85	3.87	2.83	1.246	28.5
T-2869	RW-121	U-1D	44.55	CL	49.3	110.4	73.9	13.25	13.25	7.2	98.3	5.0	3.09	7.88	2.29	1.368	23.1
				(2.85)	38.4	117.6	85.0	1.0	1.00	13.0	1.4	6.1	3.04	7.66	2.31	1.421	23.4

Test No	Description of Material Tested and Remarks
T-2867	CL, reddish brown VARVED silty CLAY, trace f. sand.
T-2868	CL, reddish brown VARVED silty CLAY, trace f. sand.
T-2869	CL, reddish brown VARVED silty CLAY, trace f. sand.

Strength Envelope Summary						
Test Series	Failure Criteria	ϕ' (deg)	c' (ksf)	α' (deg)	a' (ksf)	Correlation Coefficient
1	1	20.5	0.403	19.3	0.378	0.996
	2	20.7	0.398	19.4	0.372	0.996

Failure Criteria: 1 - Peak Deviator Stress
2 - Peak Obliquity

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements RW-121 SUMMARY	May 2008
	Geotesting Services, Inc.		

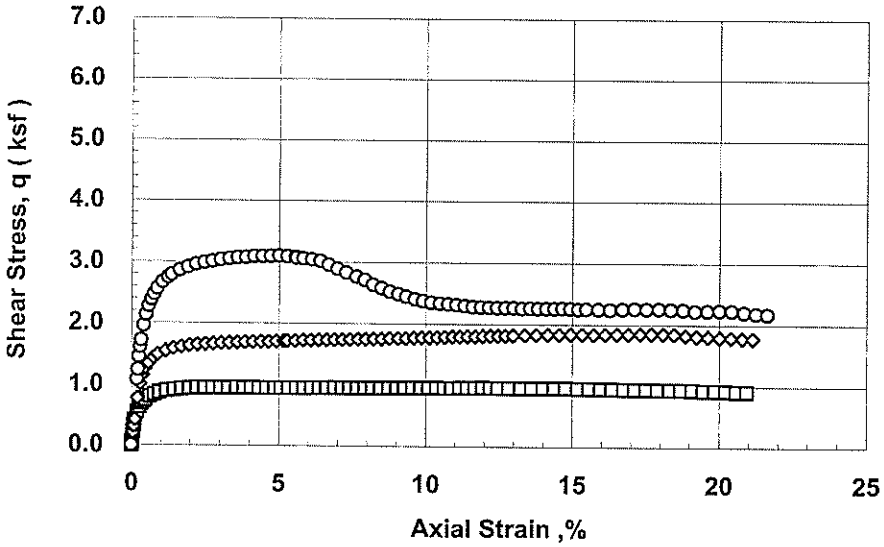


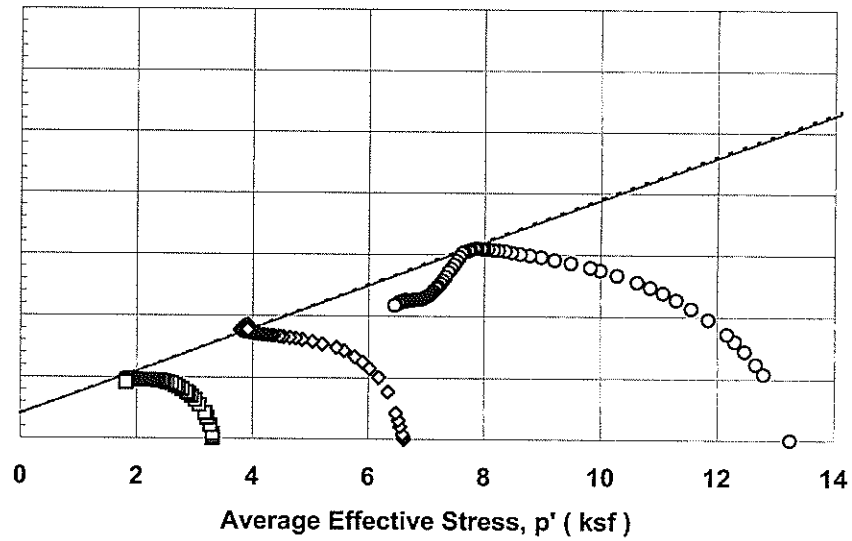
LEGEND AND SUMMARY INFORMATION

Symbol	Test	Boring	Sample	Depth (ft)	w_o (%)	γ_{to} (pcf)	σ'_c (ksf)
□	T-2867	RW-121	U-1B	43.6	52.2	109.4	3.31
◊	T-2868	RW-121	U-1C	44.1	47.9	109.9	6.62
○	T-2869	RW-121	U-1D	44.6	49.3	110.4	13.25

SERIES SUMMARY

Notation	Failure Criteria	c' (ksf)	Φ' (degrees)
	Peak Deviator Stress	0.40	20.5
	Peak Obliquity	0.40	20.7

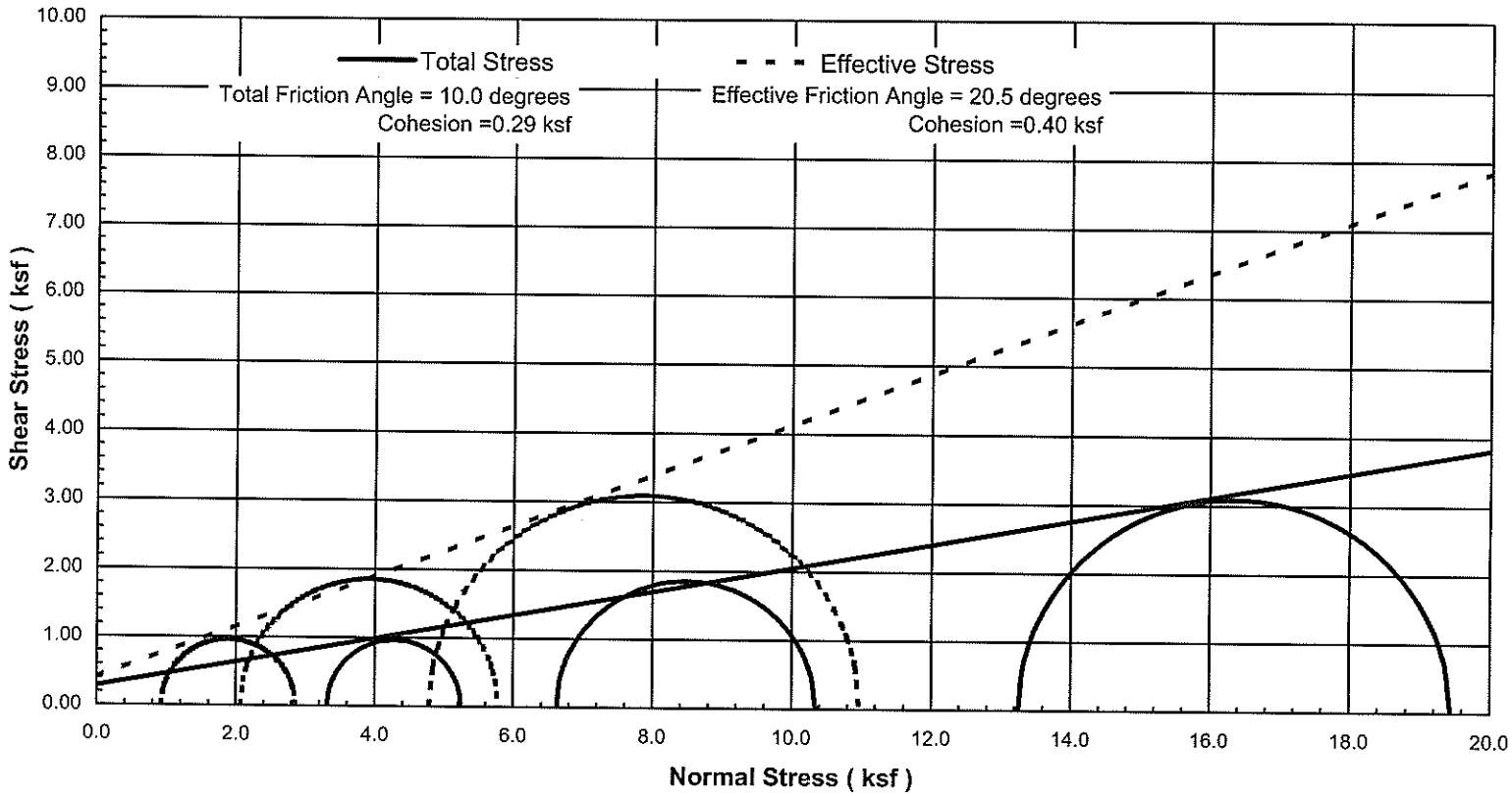




Prepared by: C. Jordan	Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements RW-121 SUMMARY	Figure 1
Checked by: G. Thomas	Geotesting Services, Inc.			May 2008

GSI Analysis File: Cu'sum3v4

5/27/2008 Test: Cu'sum1_rw121.xls

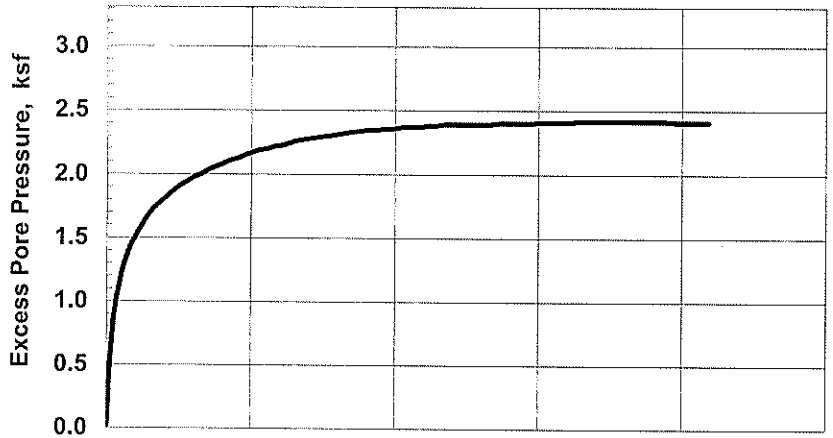


Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	Mohr Circles of Total and Effective Stresses at Peak CIU' Triaxial Test	Figure 2
Geotesting Services, Inc.		RW-121 SUMMARY	May 2008

GSI Analysis File: Cu'sum3v4.xls

Cu'sum1_rw121.xls

5/27/2008



SAMPLE INFORMATION

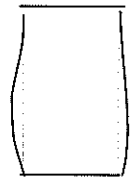
Boring: RW-121 Sample: U-1B Depth: 43.55ft
Type: Intact
Description: CL, reddish brown VARVED silty CLAY, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 5.99 inch Diameter: 2.85 inch Area: 6.36 in²
Water Content: 52.2 % Total Unit Weight: 109.4 pcf

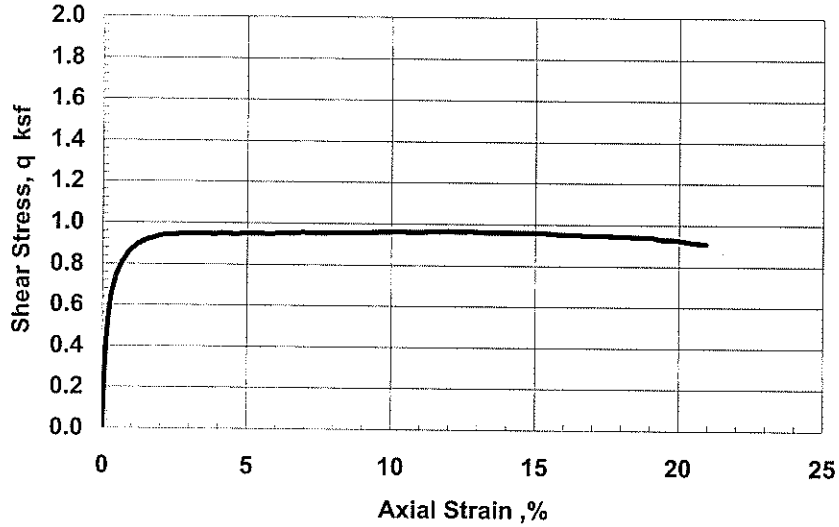
TEST SUMMARY

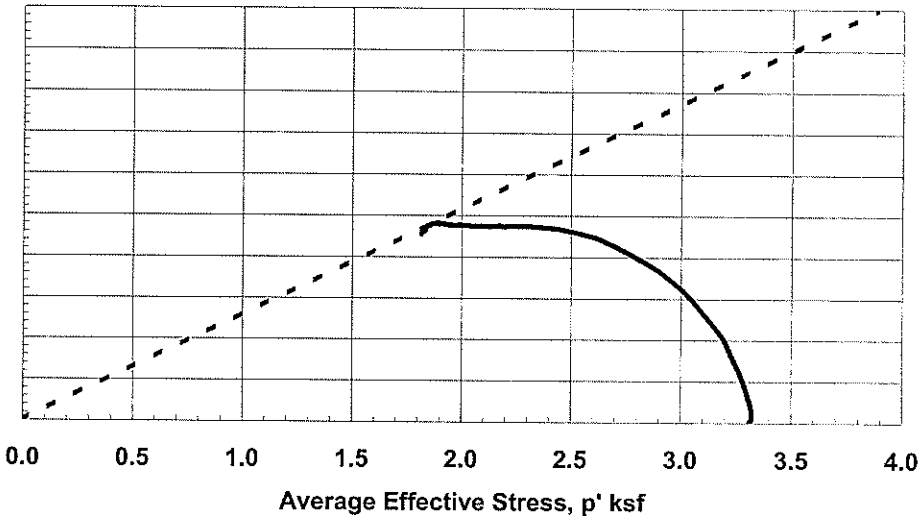
Consolidation Stresses: 3.31 ksf vertical, 3.31 ksf lateral
Water Content: 46.5 % Total Unit Weight: 112.9 pcf
B Coefficient: 95.9 Strain Rate: 0.022 %/min
Peak Shear Strength: 0.97 ksf @ 11.9 % Strain
Peak Effective Friction Angle: 31.0°



Failure Sketch

REMARKS:

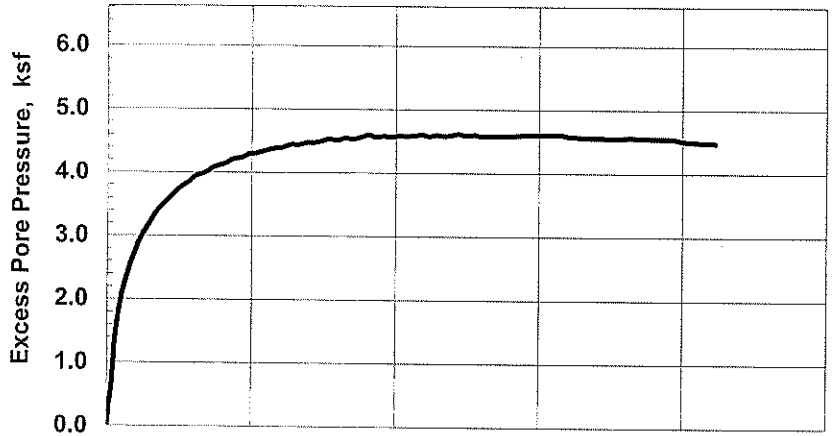


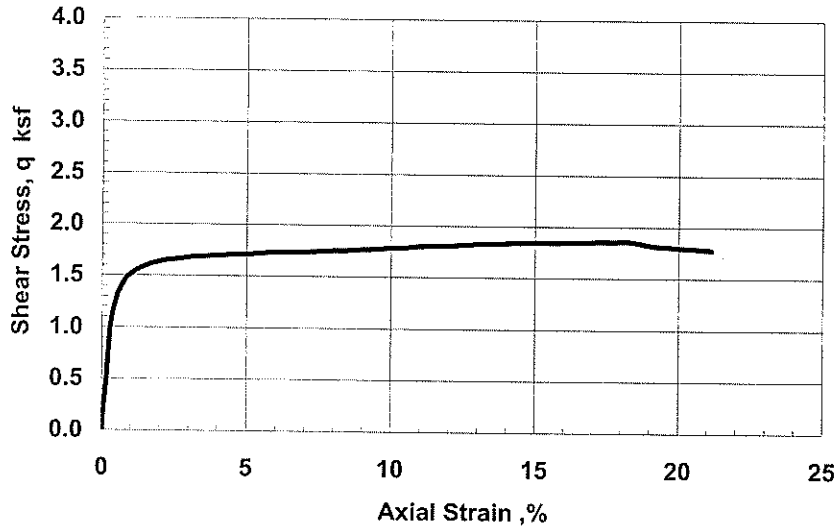


Test by: DT

Checked by: GET

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements	
	Geotesting Services, Inc.	Boring RW-121 Sample U-1B	May-08





SAMPLE INFORMATION

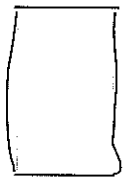
Boring: RW-121 Sample: U-1C Depth: 44.05ft
Type: Intact
Description: CL, reddish brown VARVED silty CLAY, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 6.00 inch Diameter: 2.87 inch Area: 6.45 in²
Water Content: 47.9 % Total Unit Weight: 109.9 pcf

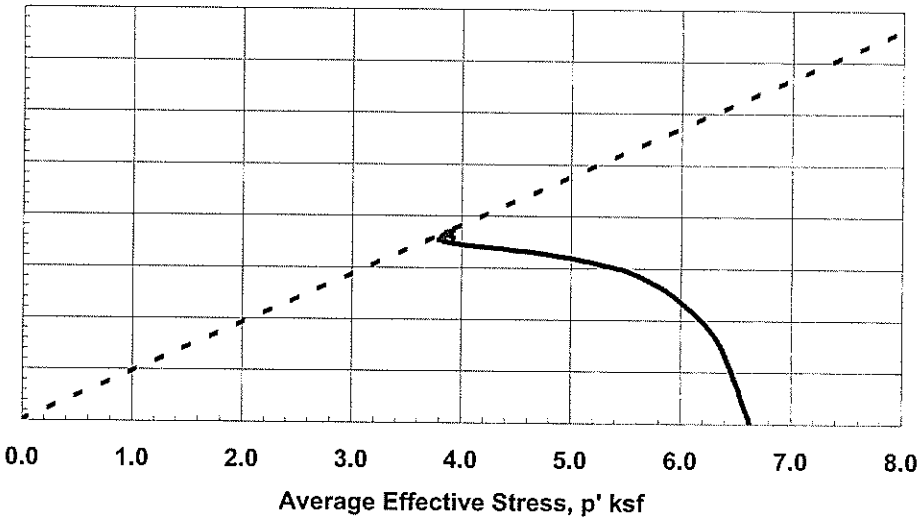
TEST SUMMARY

Consolidation Stresses: 6.62 ksf vertical, 6.62 ksf lateral
Water Content: 40.4 % Total Unit Weight: 114.2 pcf
B Coefficient: 96.8 Strain Rate: 0.022 %/min
Peak Shear Strength: 1.86 ksf @ 18.1 % Strain
Peak Effective Friction Angle: 28.5°



Failure Sketch

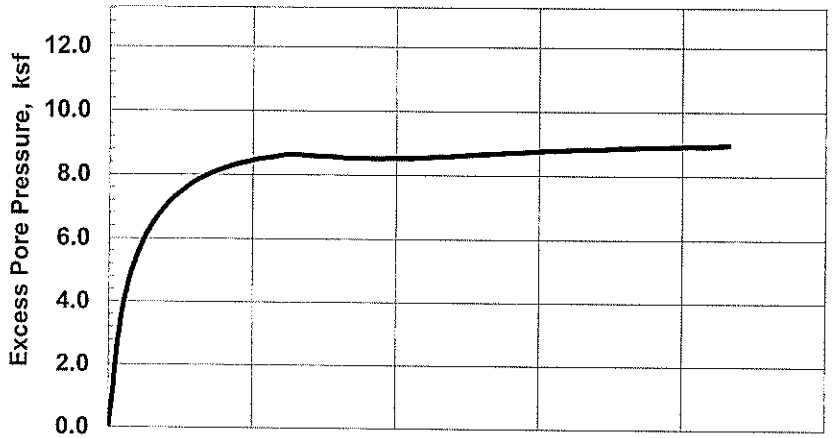
REMARKS:



Test by: DT

Checked by: GET

Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements	
	Geotesting Services, Inc.	Boring RW-121 Sample U-1C	May-08



SAMPLE INFORMATION

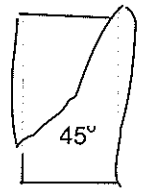
Boring: RW-121 Sample: U-1D Depth: 44.55ft
Type: Intact
Description: CL, reddish brown VARVED silty CLAY, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 6.00 inch Diameter: 2.85 inch Area: 6.36 in²
Water Content: 49.3 % Total Unit Weight: 110.4 pcf

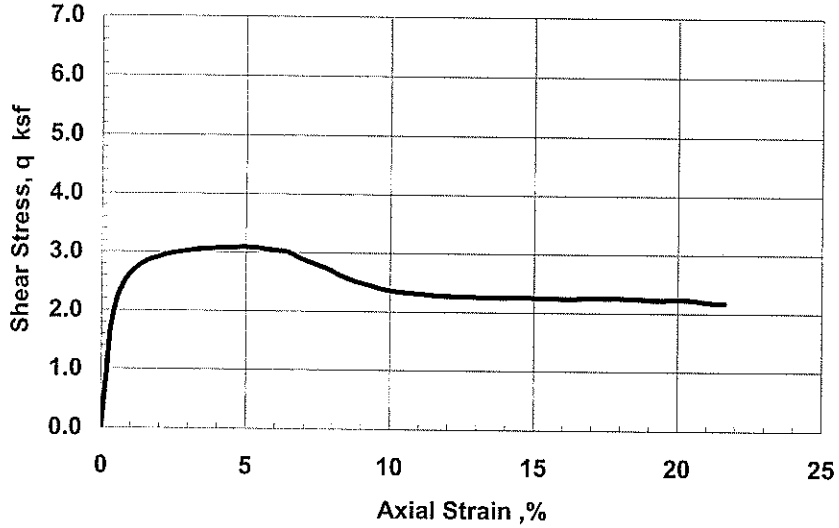
TEST SUMMARY

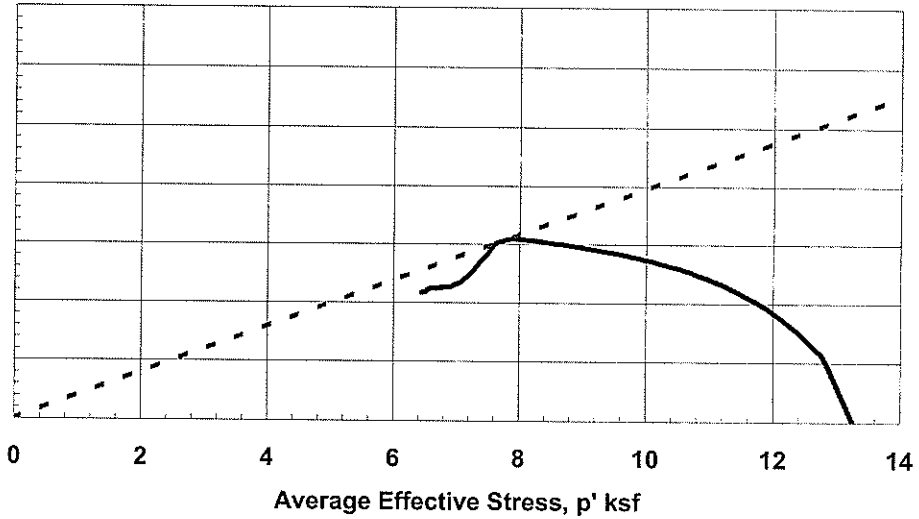
Consolidation Stresses: 13.25 ksf vertical, 13.25 ksf lateral
Water Content: 38.4 % Total Unit Weight: 117.6 pcf
B Coefficient: 98.3 Strain Rate: 0.023 %/min
Peak Shear Strength: 3.09 ksf @ 5.0 % Strain
Peak Effective Friction Angle: 23.4°



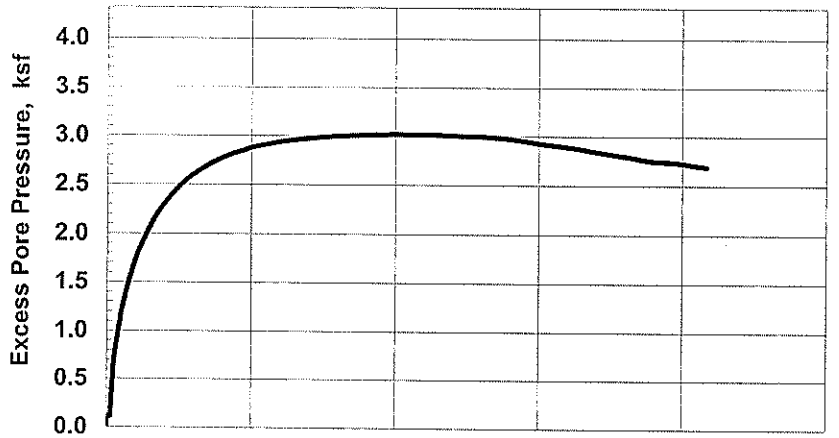
Failure Sketch

REMARKS:





Test by: DT	Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements
Checked by: GET	Geotesting Services, Inc.		Boring RW-121 Sample U-1D
			May-08



SAMPLE INFORMATION

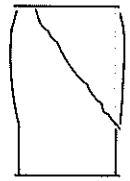
Boring: TB-102 Sample: U-3D Depth: 56.45 ft
Type: Intact 0
Description: ML, reddish brown VARVED clayey SILT, trace f. sand.

SPECIMEN INFORMATION (Initial)

Height: 5.99 inch Diameter: 2.87 inch Area: 6.46 in²
Water Content: 48.8 % Total Unit Weight: 111.7 pcf

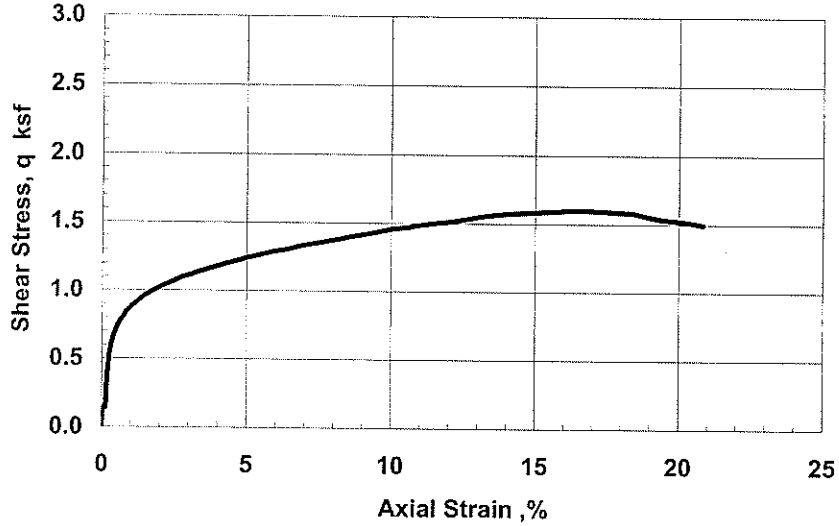
TEST SUMMARY

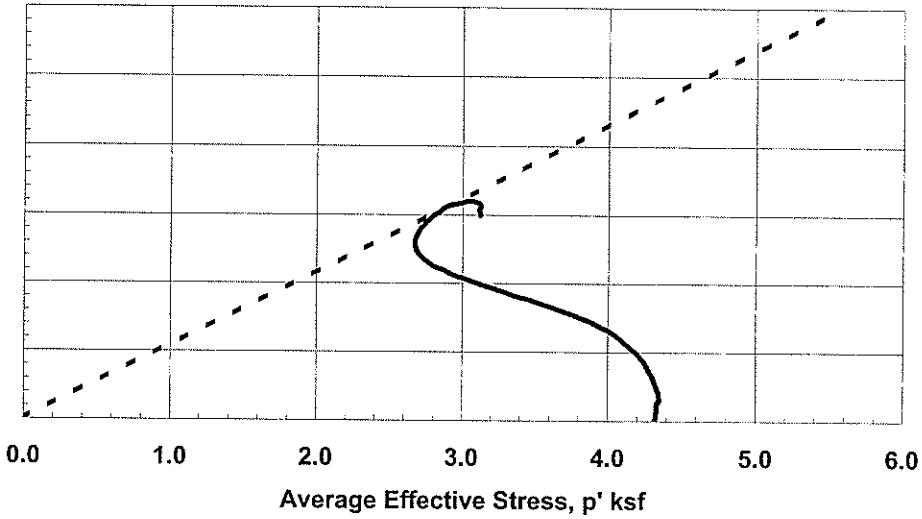
Consolidation Stresses: 4.32 ksf vertical, 4.32 ksf lateral
Water Content: 38.5 % Total Unit Weight: 118.9 pcf
B Coefficient: Strain Rate: 0.022 %/min
Peak Shear Strength: 1.60 ksf @ 16.8 % Strain
Peak Effective Friction Angle: 32.7°



Failure Sketch

REMARKS:





Test by: DT	Project No. 31737788-805	Haley & Aldrich - #32669-000 Connecticut Busway	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements
Checked by: GET	**Geotesting Services, Inc.**		Boring TB-102 Sample U-3D @ 56.45 ft
			May-08

APPENDIX D

Laboratory Testing Performed by Others

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

Project No.: L17828 | Assigned By: D. GAFFNEY | Reviewed By: Matthew Page

Project Engineer: D. SCHULZE | Date: NOV.03 | Date Reviewed: 11/11/03

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) / W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol.: $\frac{\Delta e}{1 + e_0}$	Laboratory Log and Soil Description
RB-26	S-6	16.5-18.0	248	9.2																
RB-27	S-2	4.5-6.0	249	15.8																
RB-27	S-5	13.5-15.0	250	26.2																
RB-28	S-4	10.0-11.5	251	19.1																
RB-28	S-9	25.0-26.5	252	27.2																
RB-29	S-2	4.5-6.0	253	28.7																
RB-30	S-3	7.5-9.0	254	31.7																
RB-30	S-6	16.5-18.0	255	44.2																
RB-31	S-9	25.0-26.5	256	38.5																
RB-32	S-2	4.5-6.0	257	38.1																
RB-32	S-9	25.0-26.5	258	21.5																
RB-33	S-6	16.5-18.0	259	44.7																
RB-34	S-9	25.0-26.5	260	60.6																
RB-35	S-3	7.5-9.0	261	38.7																
RB-35	S-9	25.5-27.0	262	55.6																

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828
Project Engineer: D. SCHULZE
Assigned By: D. GAFFNEY
Date: NOV.03
Reviewed By: [signature]
Date Reviewed: 11/11/03

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) / W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol.: $\frac{\Delta e}{1 + e_0}$	Laboratory Log and Soil Description
SB-40	S-3	7.5-9.0	275	21.1																
SB-40	S-11	35.0-36.5	276	29.9																
SB-40	S-13	45.0-46.5	277	30.4																
SB-41	S-2	4.5-6.0	278	21.3																
SB-42	S-3	7.5-9.0	279	26.8																
SB-42	S-9	25.5-26.2	280	10.8																
SB-43	S-2	4.5-6.0	281	25.4																
SB-44	S-9	25.0-26.5	282	47.6																
SB-46	S-11	35.0-36.5	283	48.7																
SB-46	S-15	55.0-56.5	284	18.8																
SB-47	S-4	10.0-11.5	285	48.5																
SB-47	S-14	50.0-51.5	286	11.7																
SB-48	S-3	7.5-9.0	287	55.5																
SB-49	S-5	13.5-15.0	288	35.4																

LABORATORY TESTING DATA SHEET

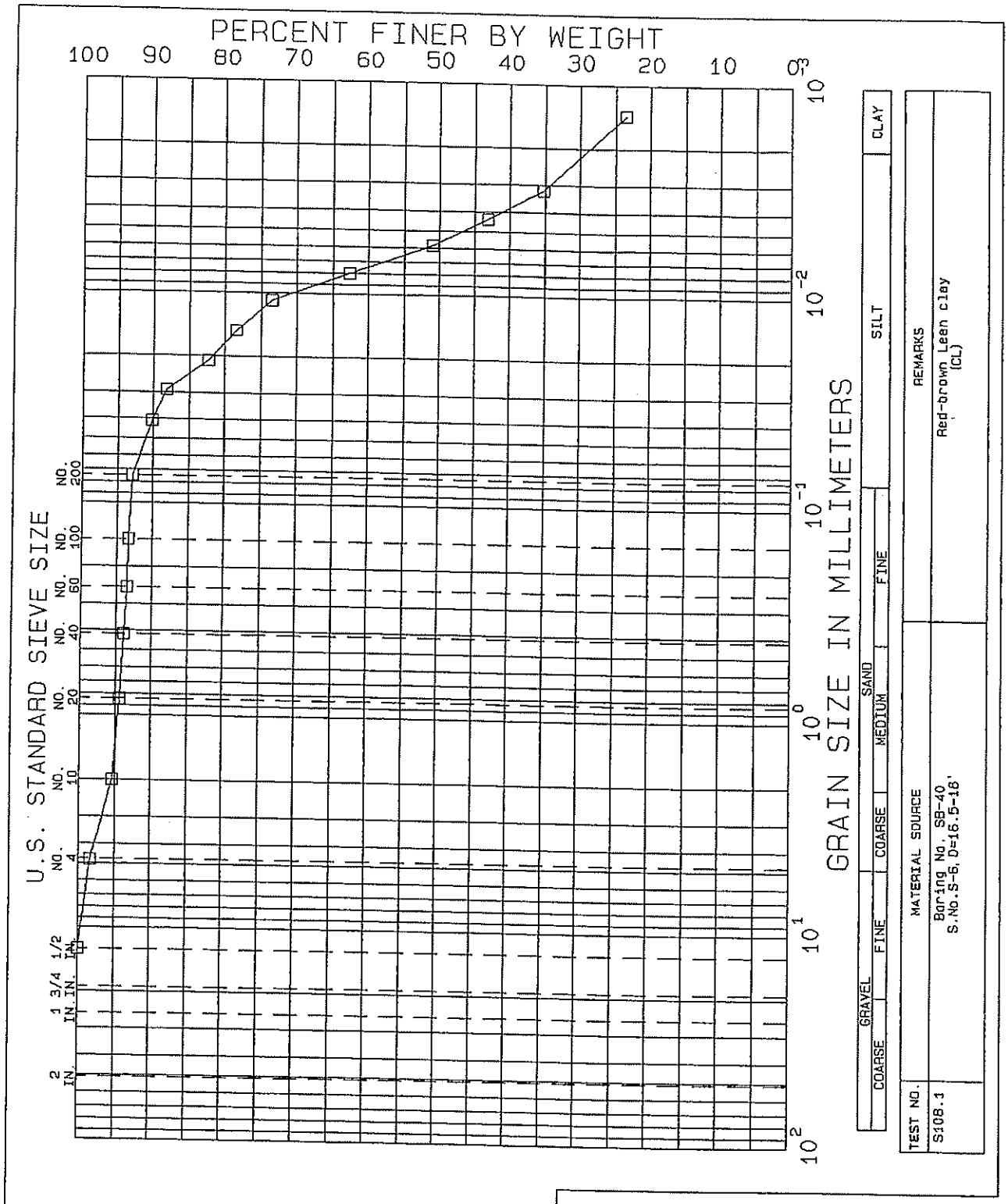
Project Name: NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

Project No.: L17828 | Assigned By: D. GAFFNEY | Reviewed By: Matthew Colby

Project Engineer: D. SCHULZE | Date: NOV.03 | Date Reviewed: 11/11/03

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) / W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol.: $\frac{C_c}{1+e_0}$	Laboratory Log and Soil Description
SB-50	S-2	4.5-6.0	289	32.6																
SB-50	S-10	28.5-30.0	290	55.5																
SB-51	S-5	13.5-15.0	291	49.0																
SB-51	S-13	45.0-46.5	292	21.1																
SB-52	S-10	28.5-30.0	293	23.8																
SB-53	S-13	45.0-46.5	294	41.2																
SB-54	S-21	85.0-86.5	295	24.3																
SB-55	S-10	28.5-30.0	296	54.9																
SB-55	S-25	105.0-106.5	297	20.9																
SB-56	S-19	75.0-76.5	298	27.3																
SB-57	S-10	28.5-30.0	299	57.1																
SB-57	S-22	90.0-91.5	300	22.5																
SB-58	S-4	10.0-11.5	301	32.7																
SB-58	S-11	35.0-36.5	302	59.5																

Classifications



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

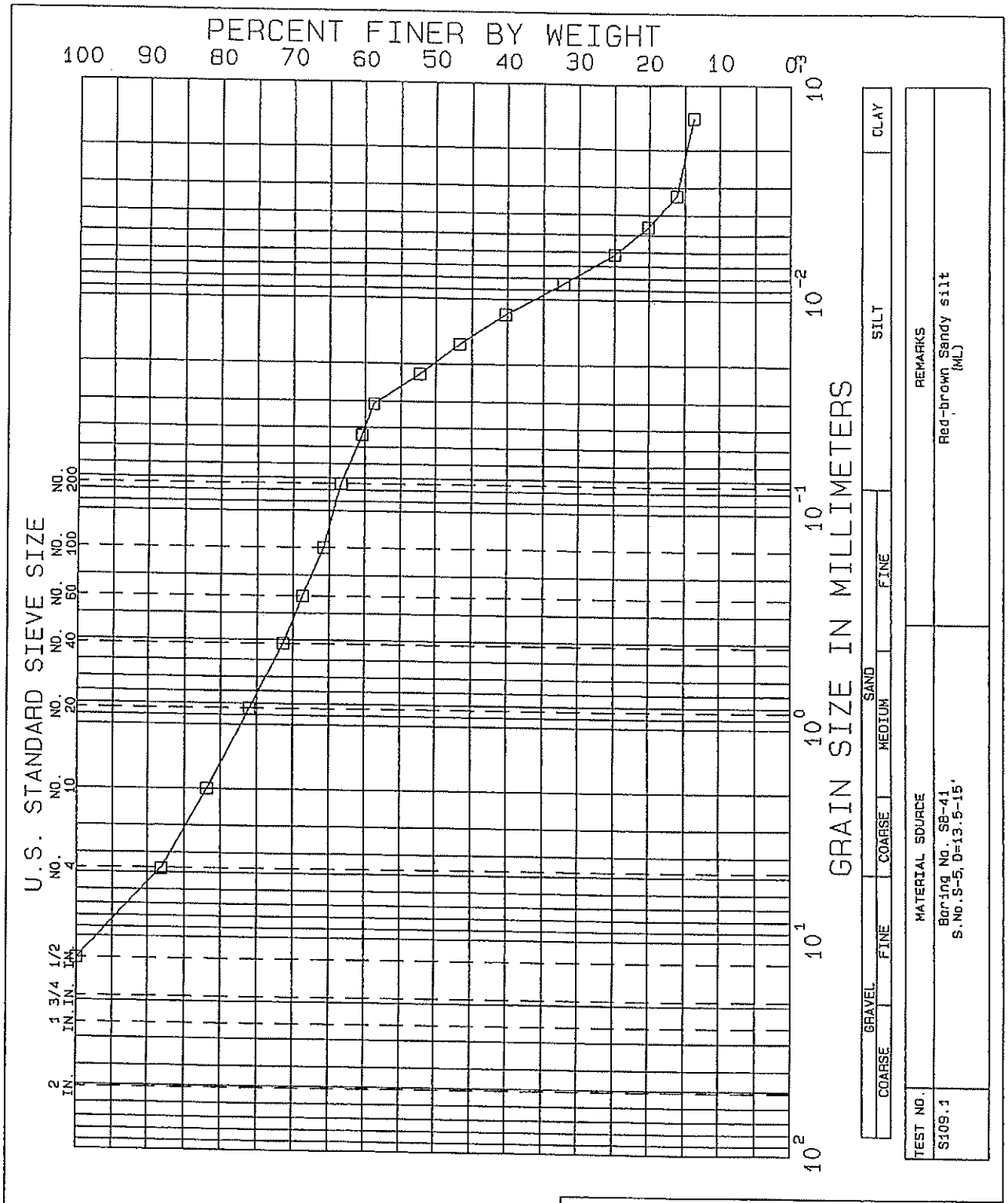
GRADATION TESTS

BORING NO. SB-40
SAMPLE S-6
DEPTH 16.5-18'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO. 108
DATE Nov.03

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

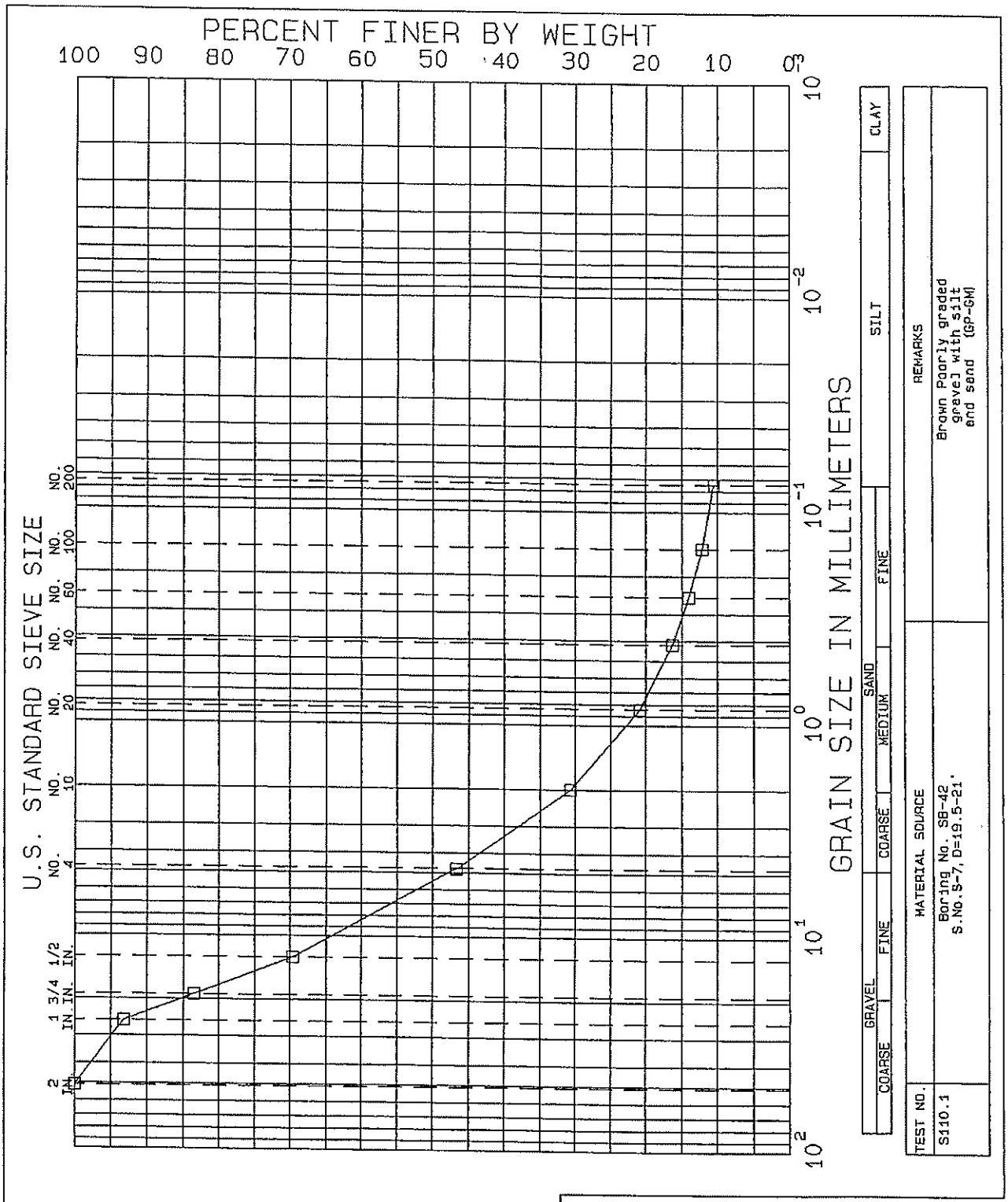
GRADATION TESTS

BORING NO. SB-41
SAMPLE S-5
DEPTH 13.5-15'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO. 109
DATE Nov.03

FILE L17628

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

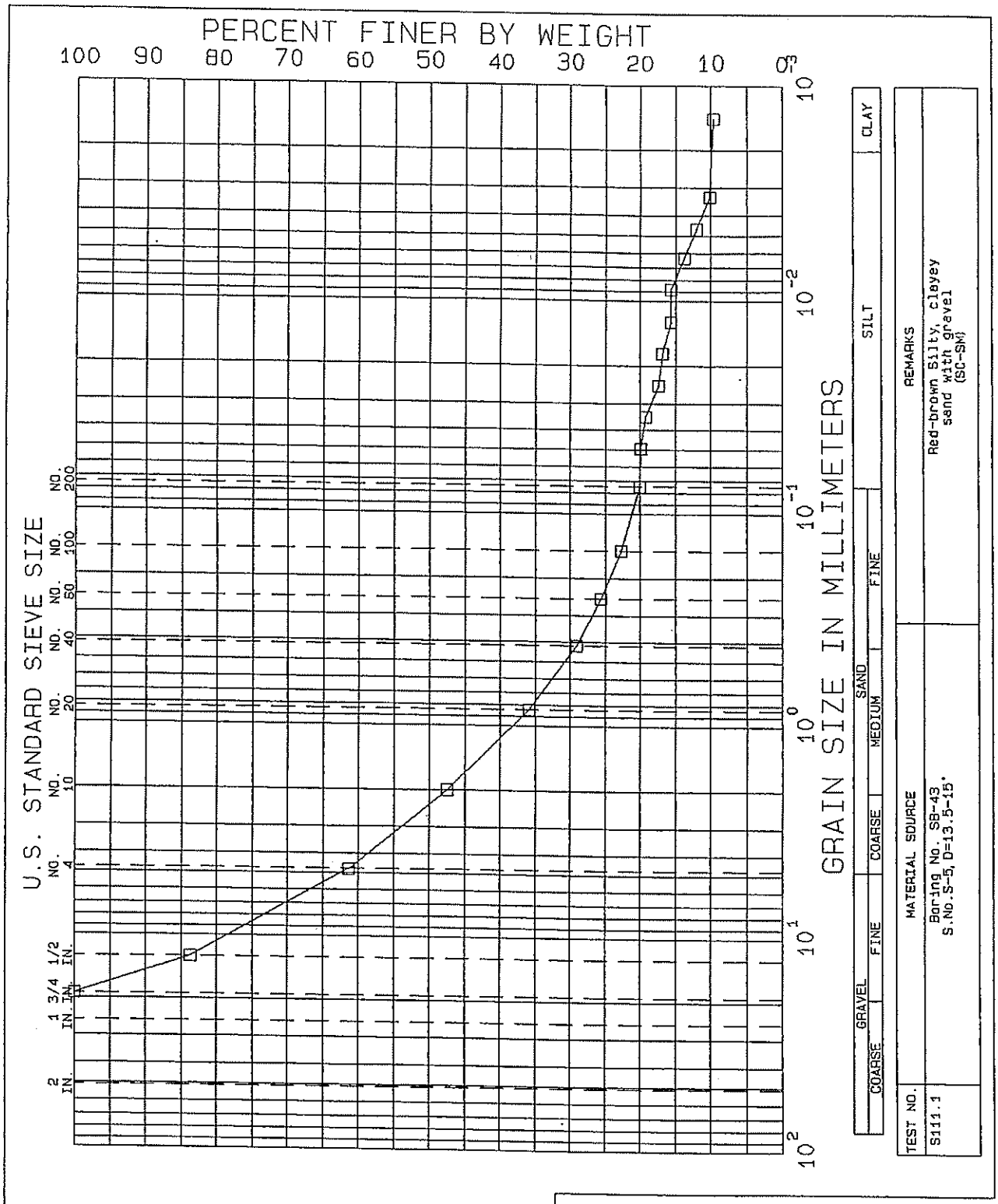


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-42	TEST SERIES	
SAMPLE	S-7	NO.	110
DEPTH	19.5-21'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828



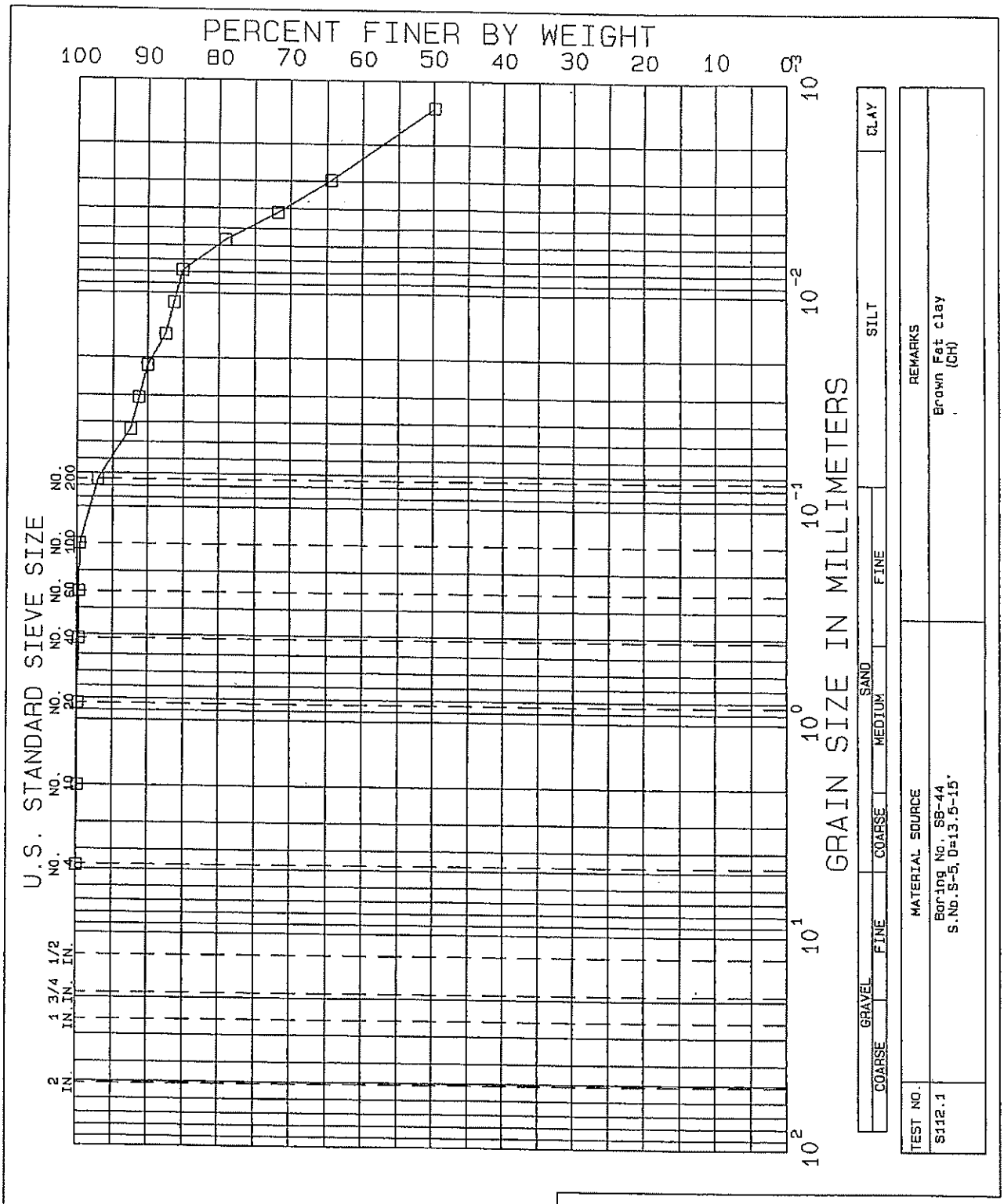
NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-43	TEST SERIES	
SAMPLE	S-5	NO.	111
DEPTH	13.5-15'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17628

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



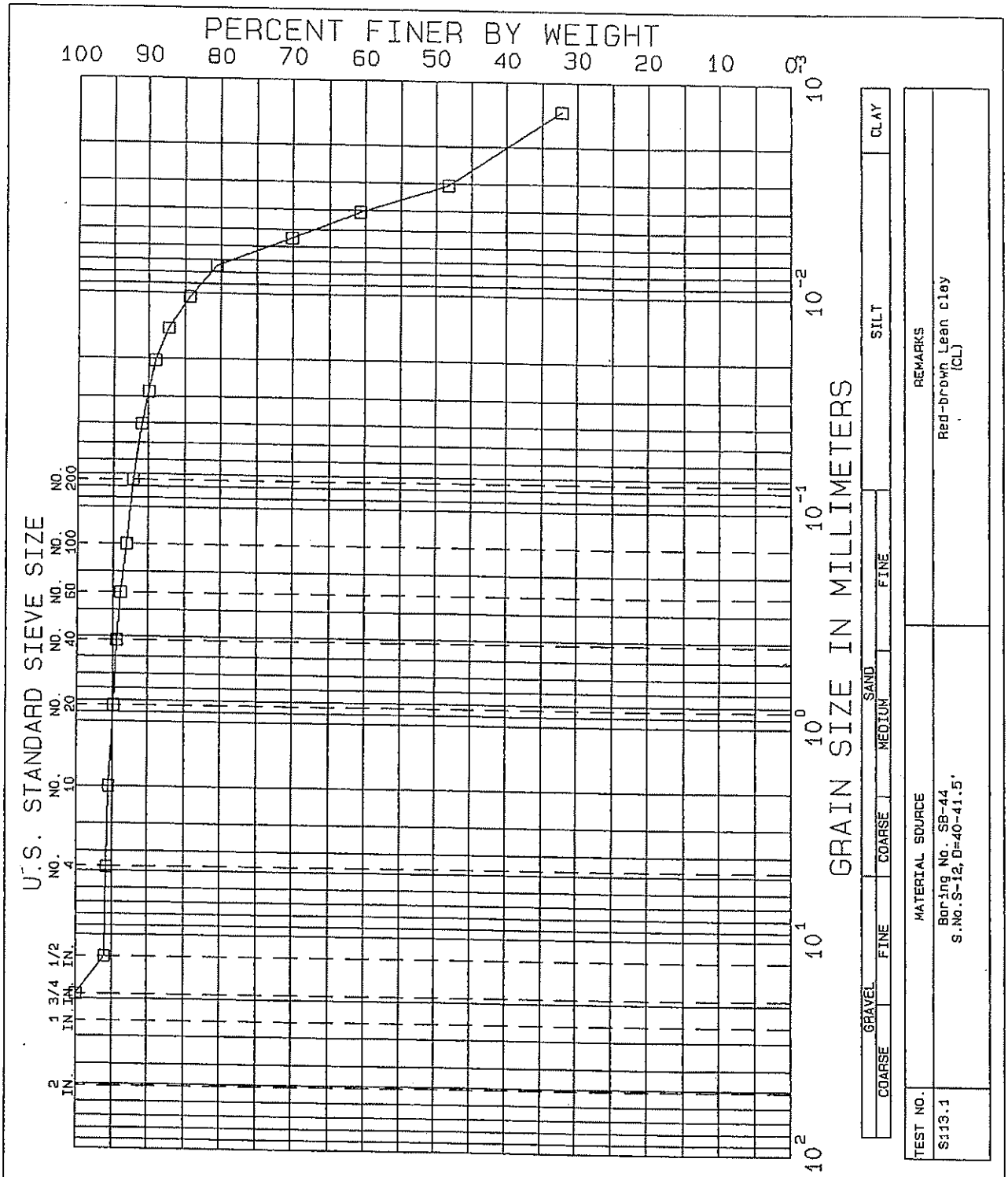
NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-44	TEST SERIES	
SAMPLE	S-5	NO.	112
DEPTH	13.5-15'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17628

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

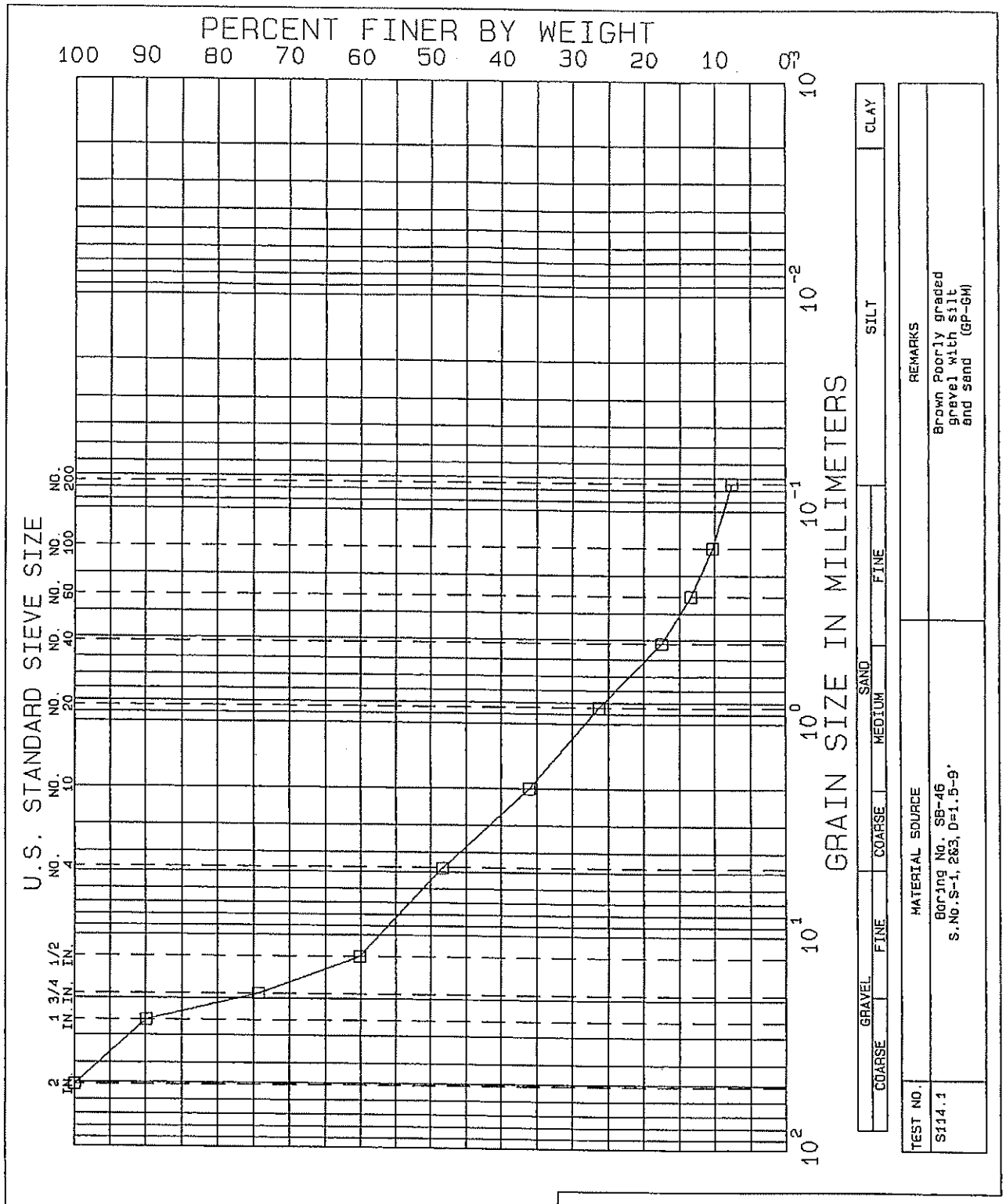


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-44	TEST SERIES	
SAMPLE	S-12	NO.	113
DEPTH	40-41.5'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828

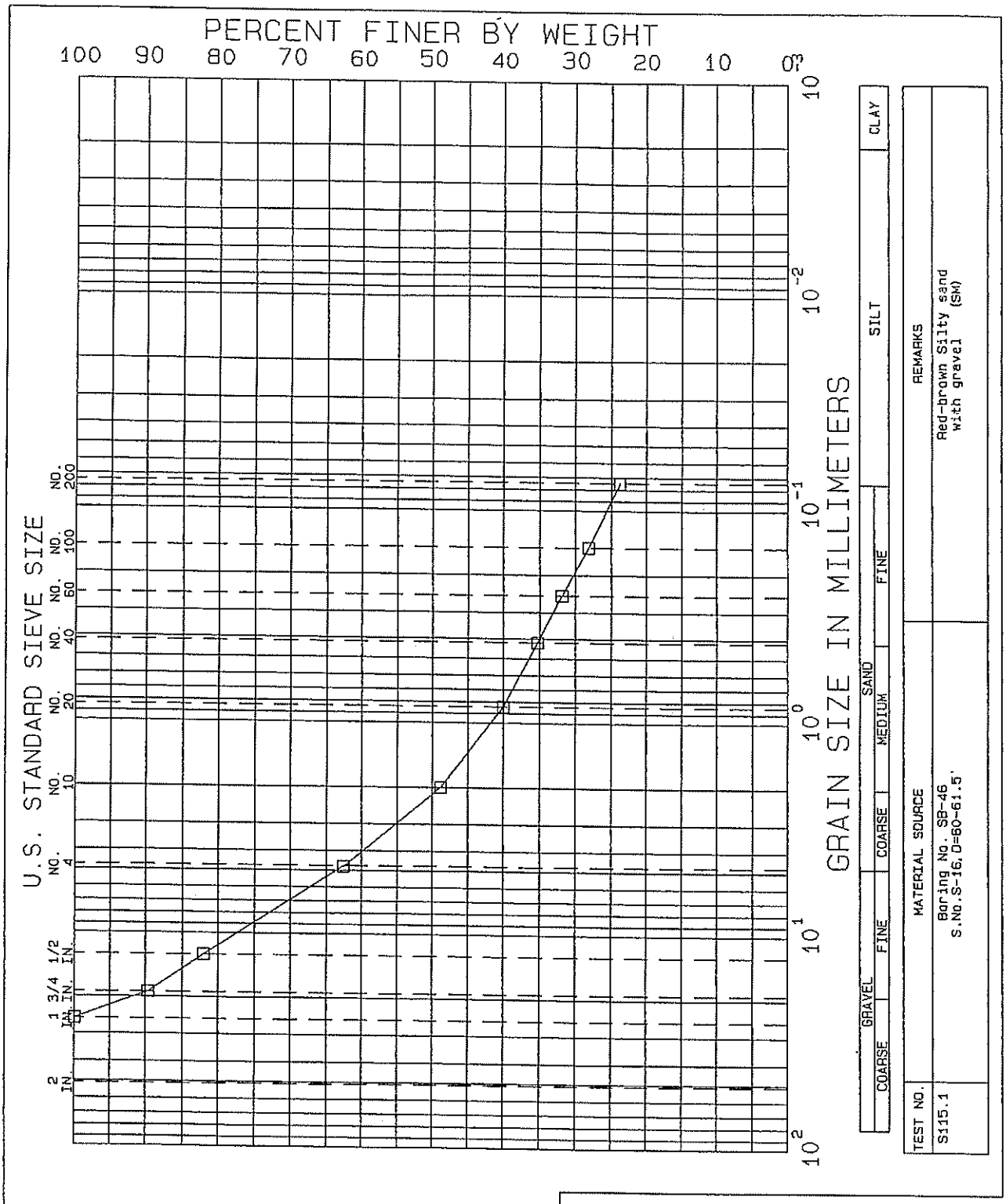


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-46	TEST SERIES	
SAMPLE	S1.2.3	NO.	114
DEPTH	1.5-9'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828



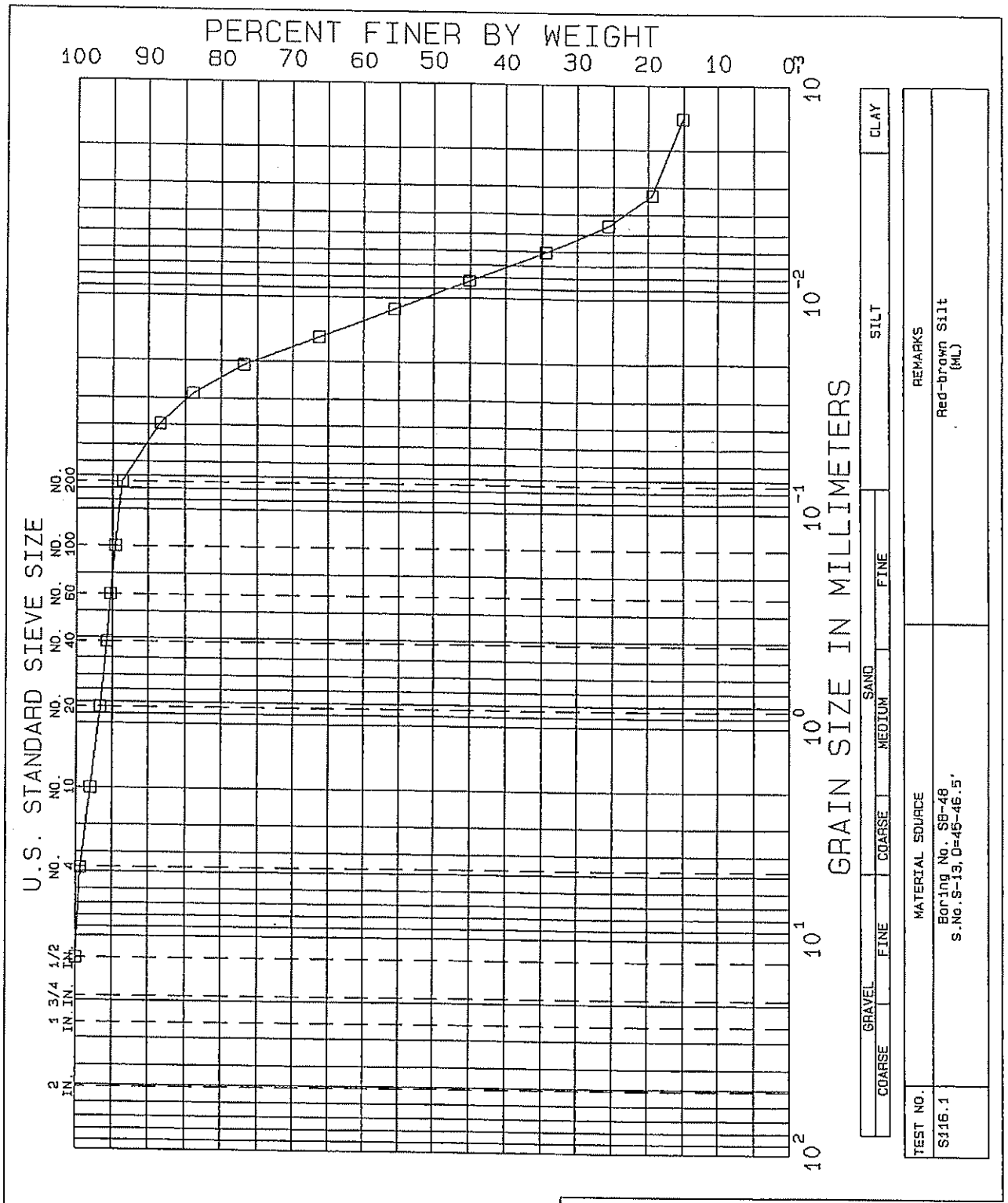
NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-46	TEST SERIES	
SAMPLE	S-16	NO.	115
DEPTH	60-61.5'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

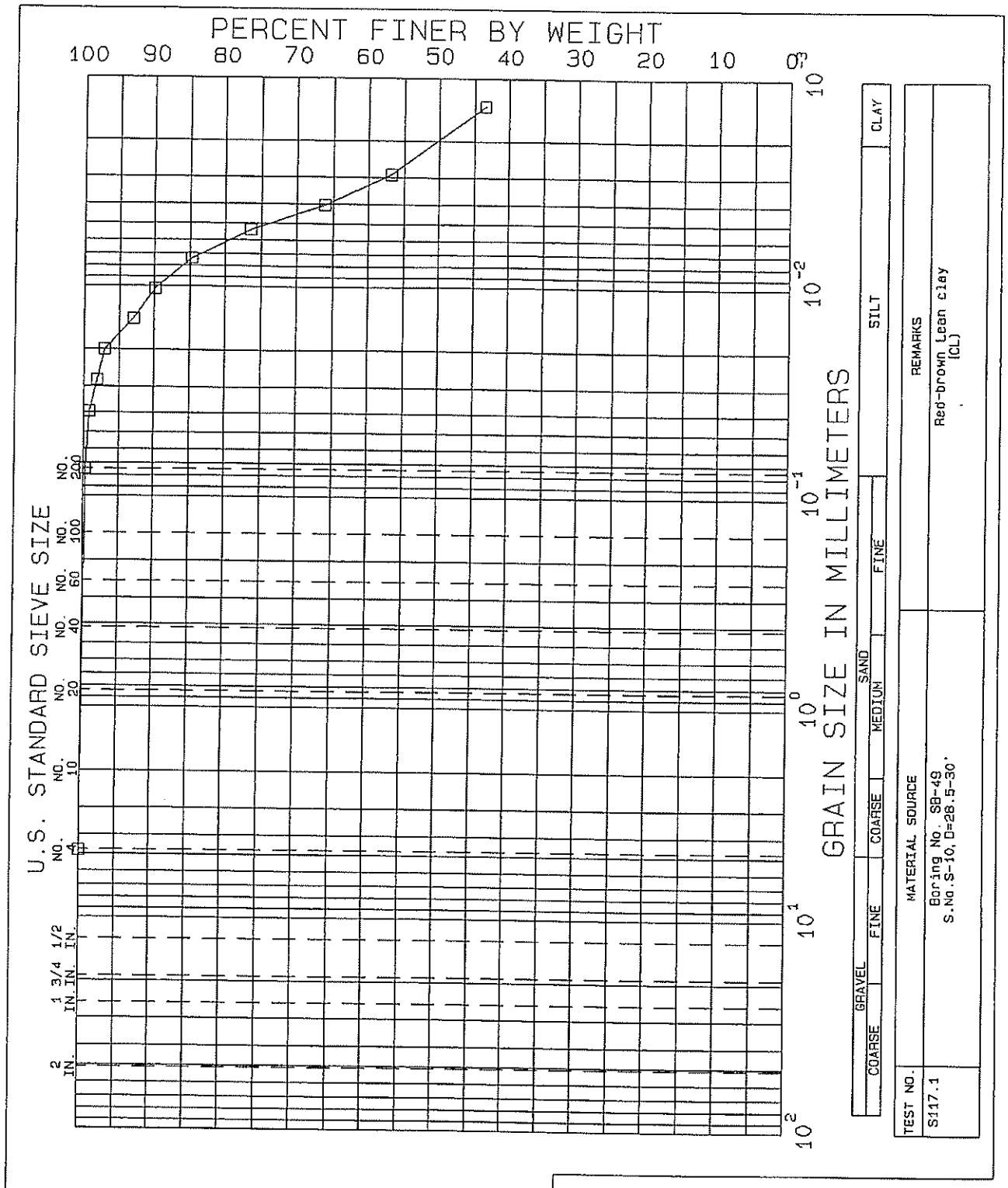
BORING NO.	SB-48	TEST SERIES	
SAMPLE	S-13	NO.	116
DEPTH	45-46.5'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828 — Assigned By: D. GAFFNEY — Reviewed By: Dan Schulze
Project Engineer: D. SCHULZE — Date: NOV.03 — Date Reviewed: 11/14/03

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol. $\frac{\Delta e}{1 + e_0}$	Laboratory Log and Soil Description
SB-49	S-10	28.5-30.0	117	48.0	41	24	100	50												Red-brown Lean clay (CL)
SB-49	S-17	65.0-66.5	118	7.8	20	13	42	12												Red-brown Sandy clay with gravel (CL)
SB-50	S-5	13.5-15.0	119	61.6	60	27	100	60												Brown Fat clay (CH)
SB-50	S-15	55.0-56.5	120	15.2	15	15	67													Red-brown Sandy silt (ML)
SB-51	S-3	7.5-9.0	121	36.2	59	26	99	62												Gray-brown Fat clay (CH)
SB-52	S-5	13.5-15.0	122	6.0	NP	NP	7													Gray-brown Poorly-graded sand with silt and gravel (SP-SM)
SB-52	S-14	55.0-56.5	123	63.2	37	22	99	39												Red-brown Lean clay (CL)
SB-52	S-17	70.0-71.2	124	15.3	NP	NP	24													Red-brown Silty sand with gravel (SM)
SB-53	S-4	10.5-12.0	125	2.9	*	*	9		* Insufficient sample for limit test											Gray Well-graded sand with silt and gravel (SW-SM)
SB-53	S-18	70.0-71.5	126	25.4	NP	NP	78	4												Red-brown Silt with sand (ML)



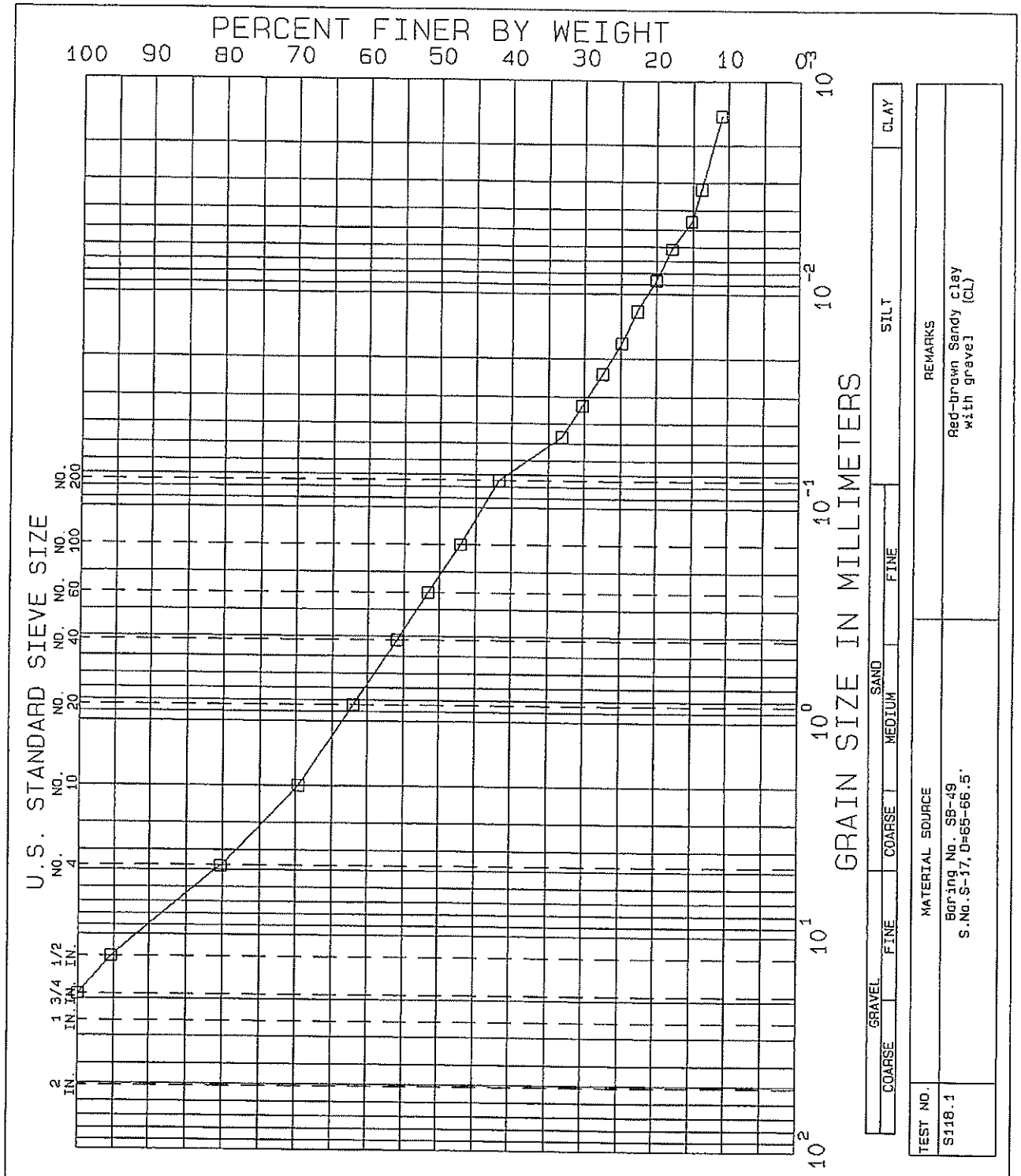
NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-49	TEST SERIES	
SAMPLE	S-10	NO.	117
DEPTH	28.5-30'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17628

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

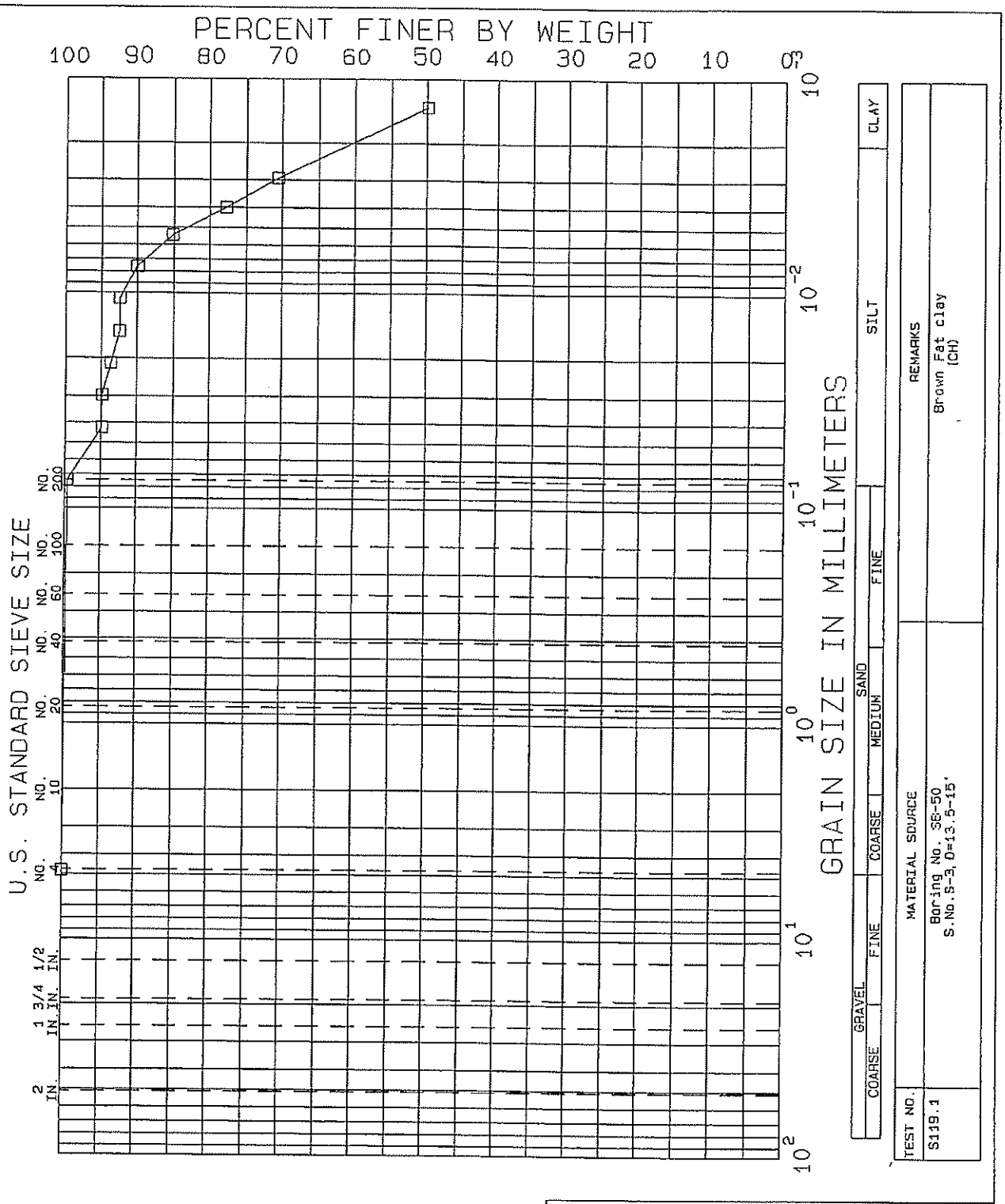


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-49	TEST SERIES	
SAMPLE	S-17	NO.	118
DEPTH	65-66.5'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828

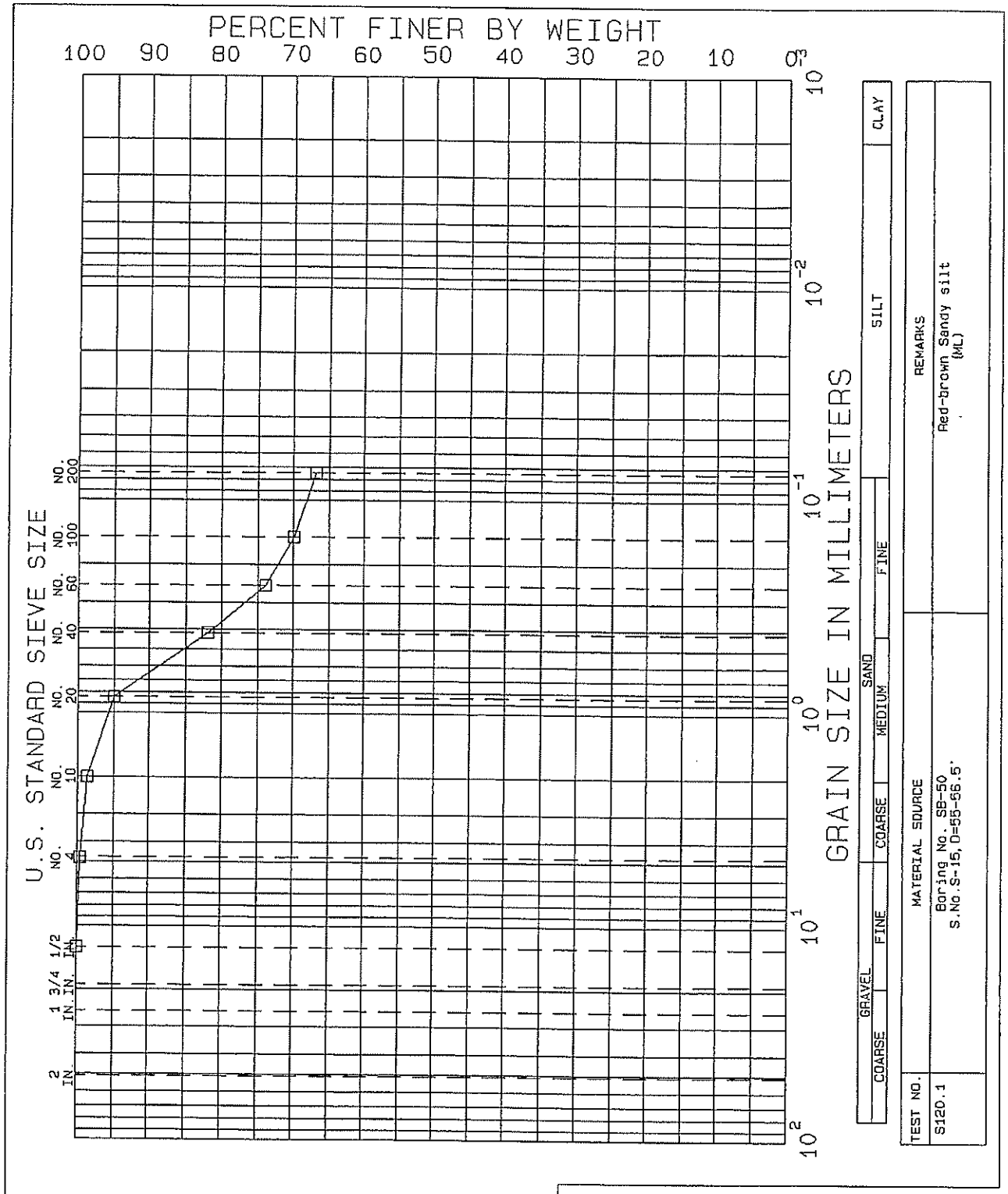


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-50	TEST SERIES	
SAMPLE	S-3	NO.	119
DEPTH	13.5-15'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828

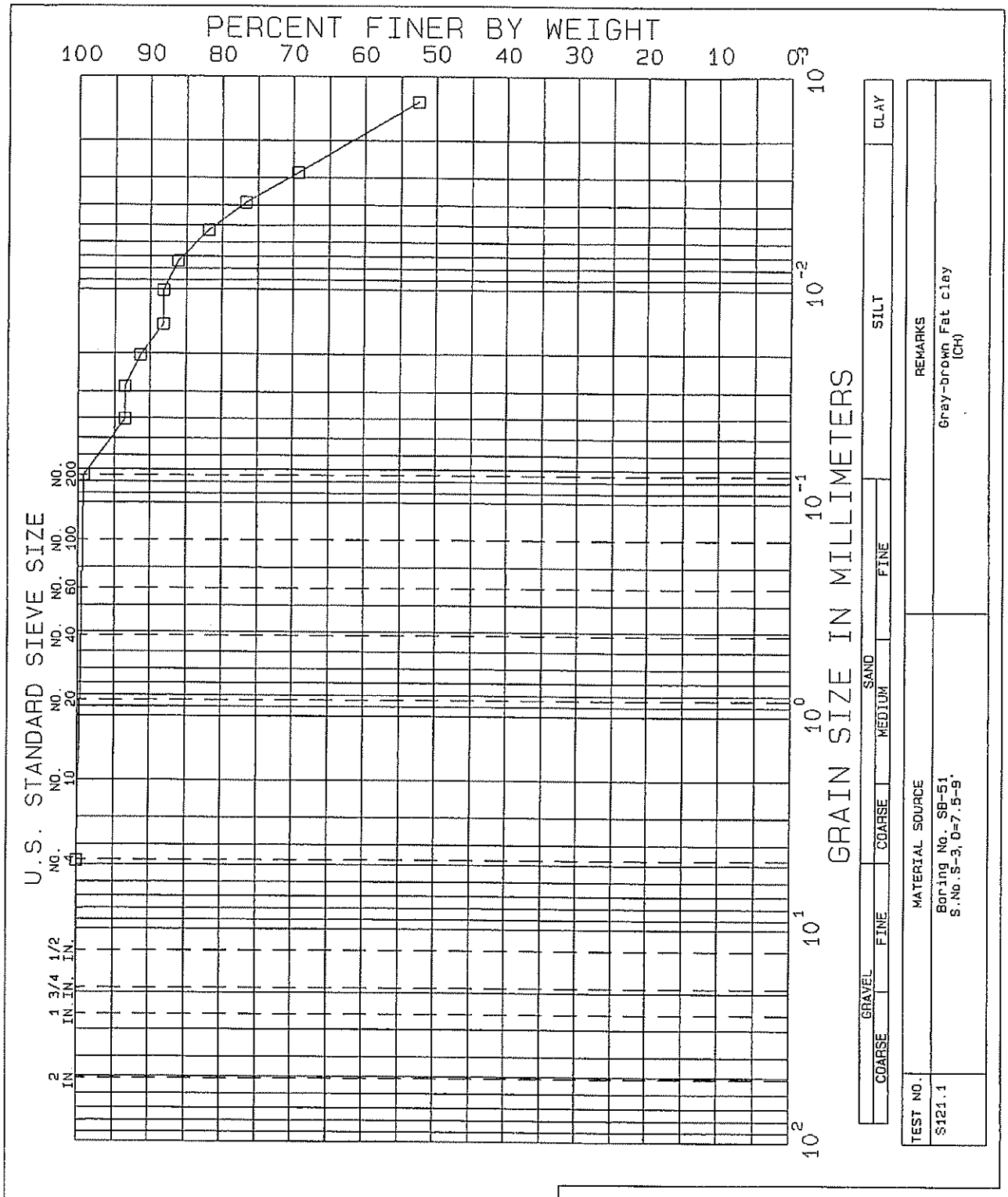


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-50	TEST SERIES	
SAMPLE	S-15	NO.	120
DEPTH	55-56.5'	DATE	Nov.03
TECH.	MCM		
REVIEWER	MBP	FILE	L17828



NEW BRITAIN-HARTFORD BUSWAY

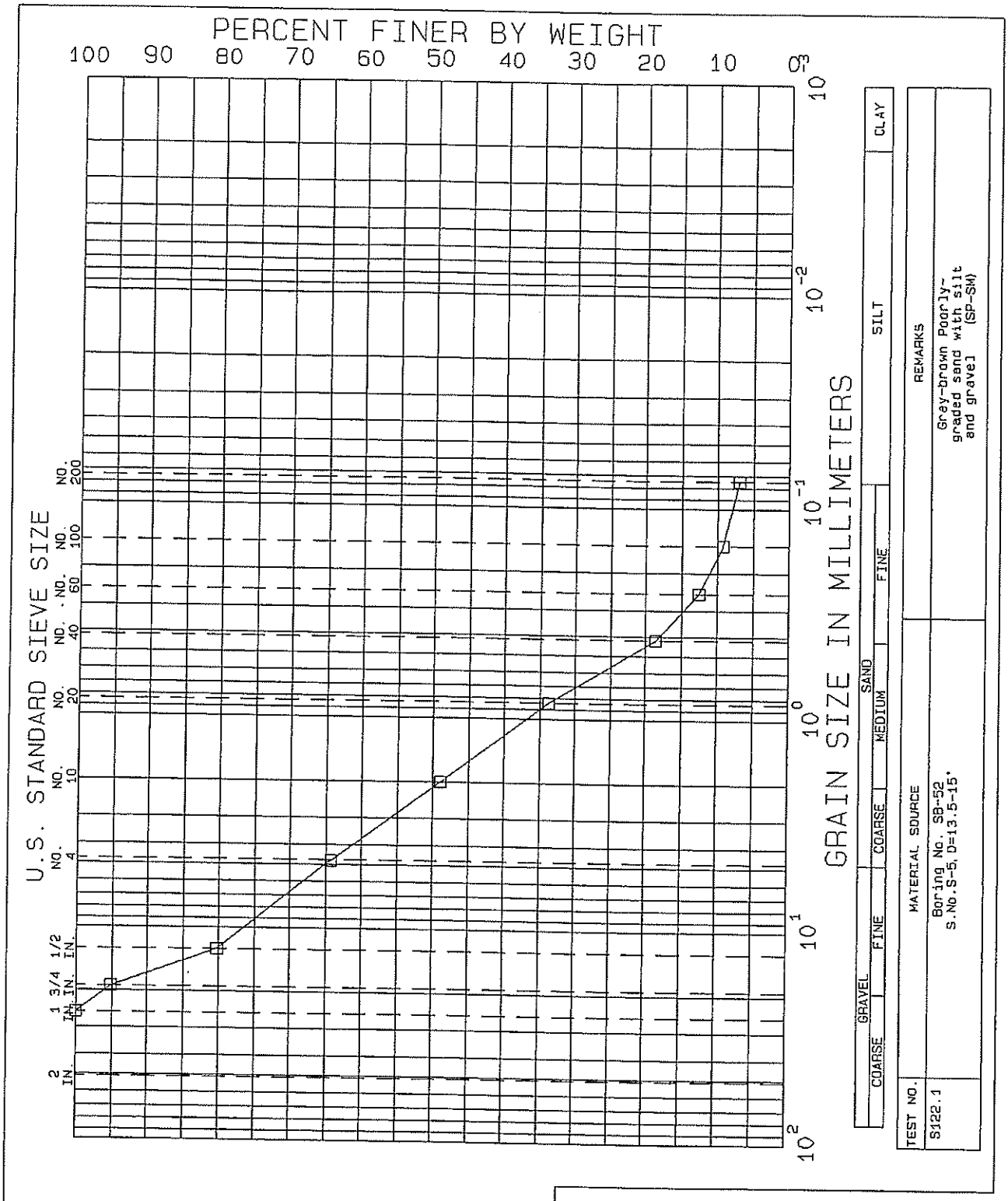
CONNECTICUT

GRADATION TESTS

BORING NO. SB-51
SAMPLE S-3
DEPTH 7.5-9'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO. 121
DATE Nov.03

FILE L17828



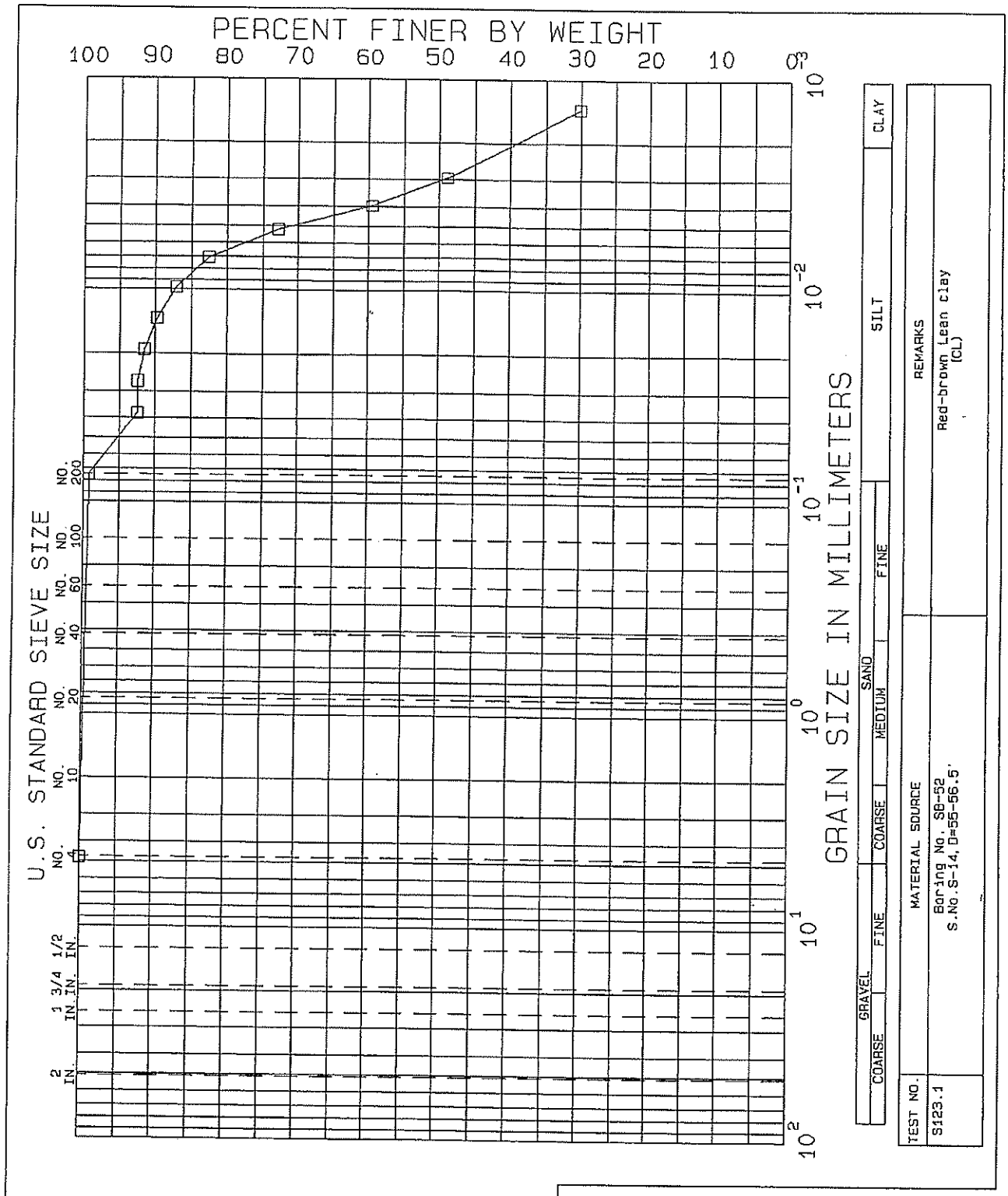
NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
GRADATION TESTS

BORING NO. SB-52
SAMPLE S-5
DEPTH 13.5-15'
TECH. PEC
REVIEWER MBP

TEST SERIES
NO. 122
DATE Nov.03

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

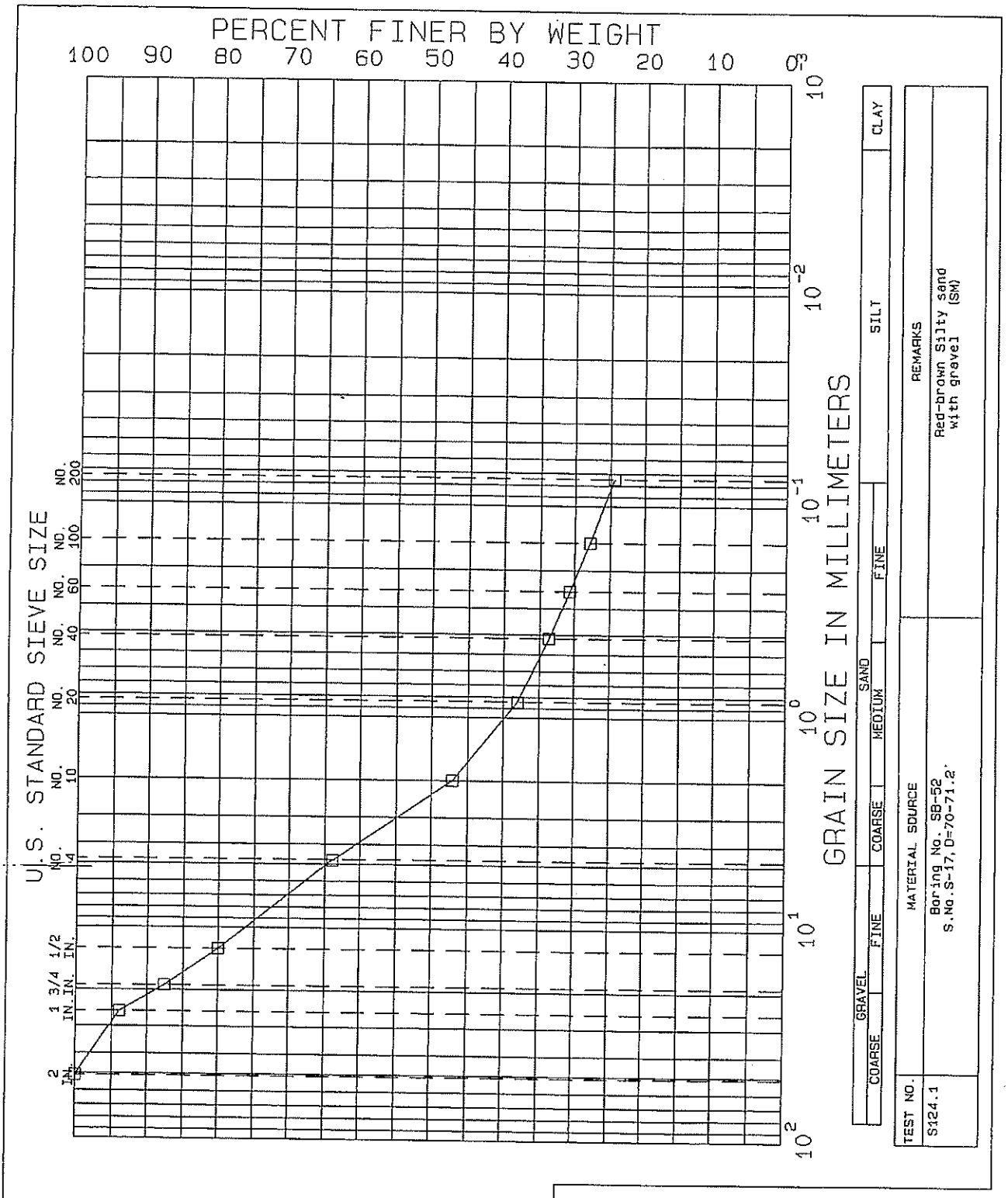


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-52	TEST SERIES	
SAMPLE	S-14	NO.	123
DEPTH	55-56.5'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828



NEW BRITAIN-HARTFORD BUSWAY

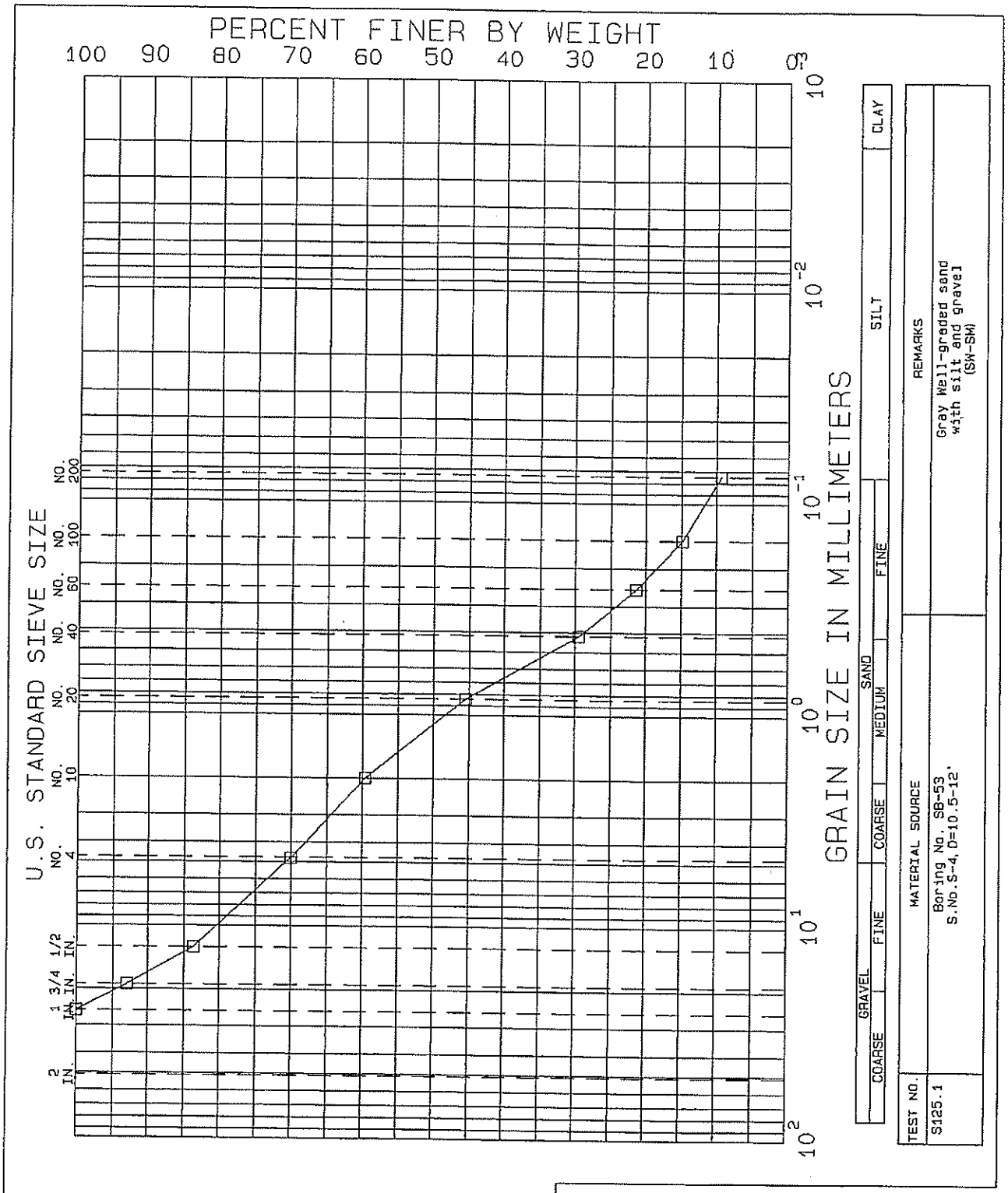
CONNECTICUT

GRADATION TESTS

BORING NO. SB-52
SAMPLE S-17
DEPTH 70-71.2'
TECH. PEC
REVIEWER MBP

TEST SERIES
NO. 124
DATE Nov.03

FILE L17828



NEW BRITAIN-HARTFORD BUSWAY

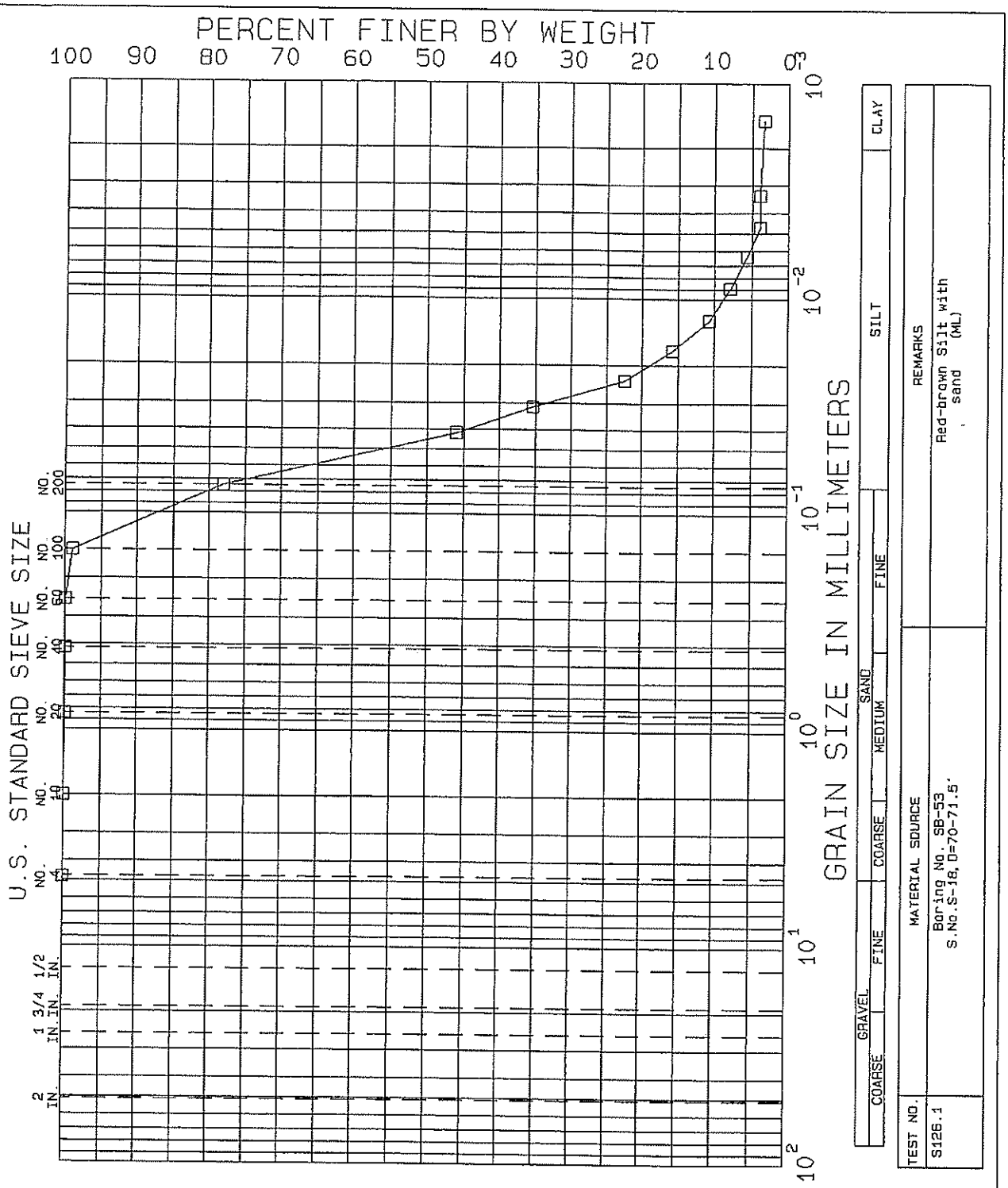
CONNECTICUT

GRADATION TESTS

BORING NO. SB-53
SAMPLE S-4
DEPTH 10.5-12'
TECH. PEC
REVIEWER MBP

TEST SERIES
NO. 125
DATE Nov.03

FILE L17828



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

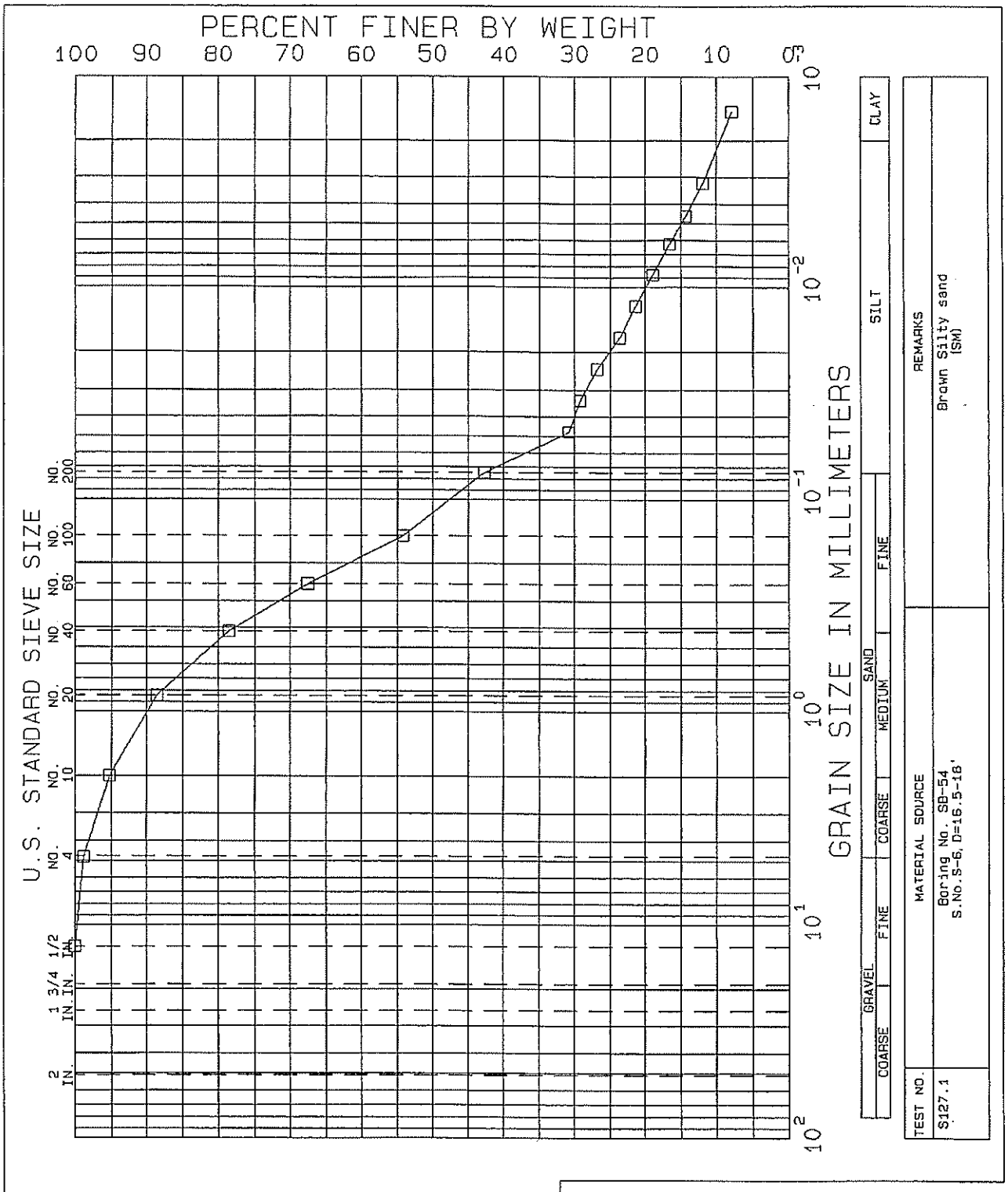
GRADATION TESTS

BORING NO.	SB-53	TEST SERIES	
SAMPLE	S-18	NO.	126
DEPTH	70-71.5'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828 | Assigned By: D. GAFFNEY | Reviewed By: Don Schulze
Project Engineer: D. SCHULZE | Date: NOV.03 | Date Reviewed: 11/18/03

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) / W_{opt} (%)	Perme-ability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol.: $\frac{C_c}{1 + e_0}$	Laboratory Log and Soil Description
SB-54	S-6	16.5-18.0	127	20.1	21	20	43	9												Brown Silty sand (SM)
SB-54	S-15	55.0-56.5	128	42.1	44	22	98	44												Red-brown Lean clay (CL)
SB-55	S-4	10.0-11.5	129	18.5	22	20	39	8												Brown Silty sand with gravel (SM)
SB-55	S-17	65.0-66.5	130	33.7	29	22	99	25												Red-brown Silty clay (CL-ML)
SB-55	S-28	120.0-121.5	131	16.1	NP	NP	25													Brown Silty sand (SM)
SB-56	S-15	55.0-56.5	132	40.2	41	25	100	40												Red-brown Lean clay (CL)
SB-56	S-25	105.0-106.5	133	15.2	NP	NP	15													Brown Silty sand (SM)
SB-57	S-15	55.0-56.5	134	45.7	42	23	100	35												Red-brown Lean clay (CL)
SB-58	S-14	50.0-51.5	135	56.6	53	25	100	60												Brown Fat clay (CH)
SB-58	S-21	90.0-91.5	136	34.2	24	24	100	15												Red-brown Silt (ML)
SB-58	S-25	110.0-111.5	137	23.1	NP	NP	30	5												Red-brown Silty sand (SM)

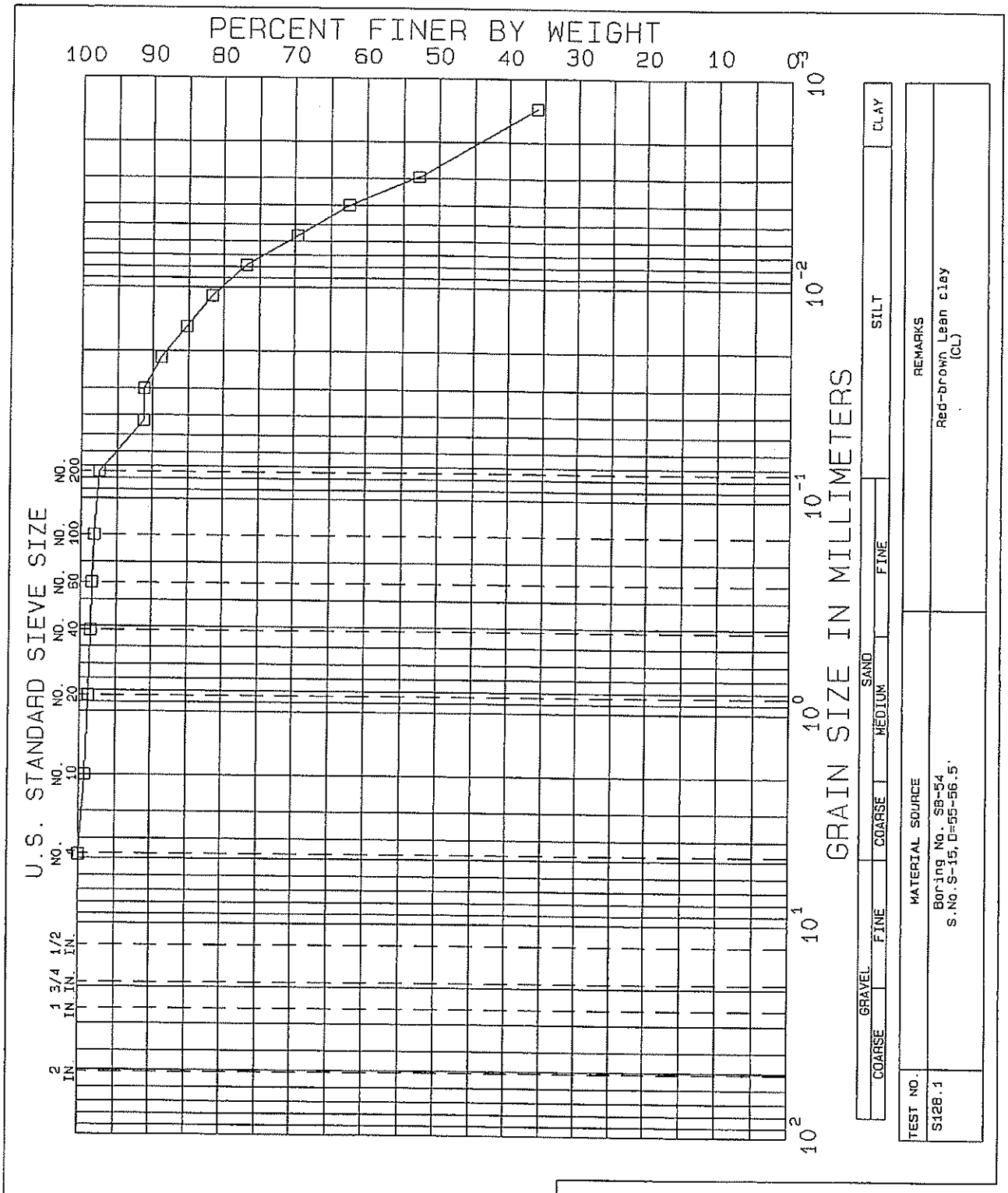


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-54	TEST SERIES	
SAMPLE	S-6	NO.	127
DEPTH	16.5-18'	DATE	Nov.03
TECH.	PEC		
REVIEWER	MBP	FILE	L17828



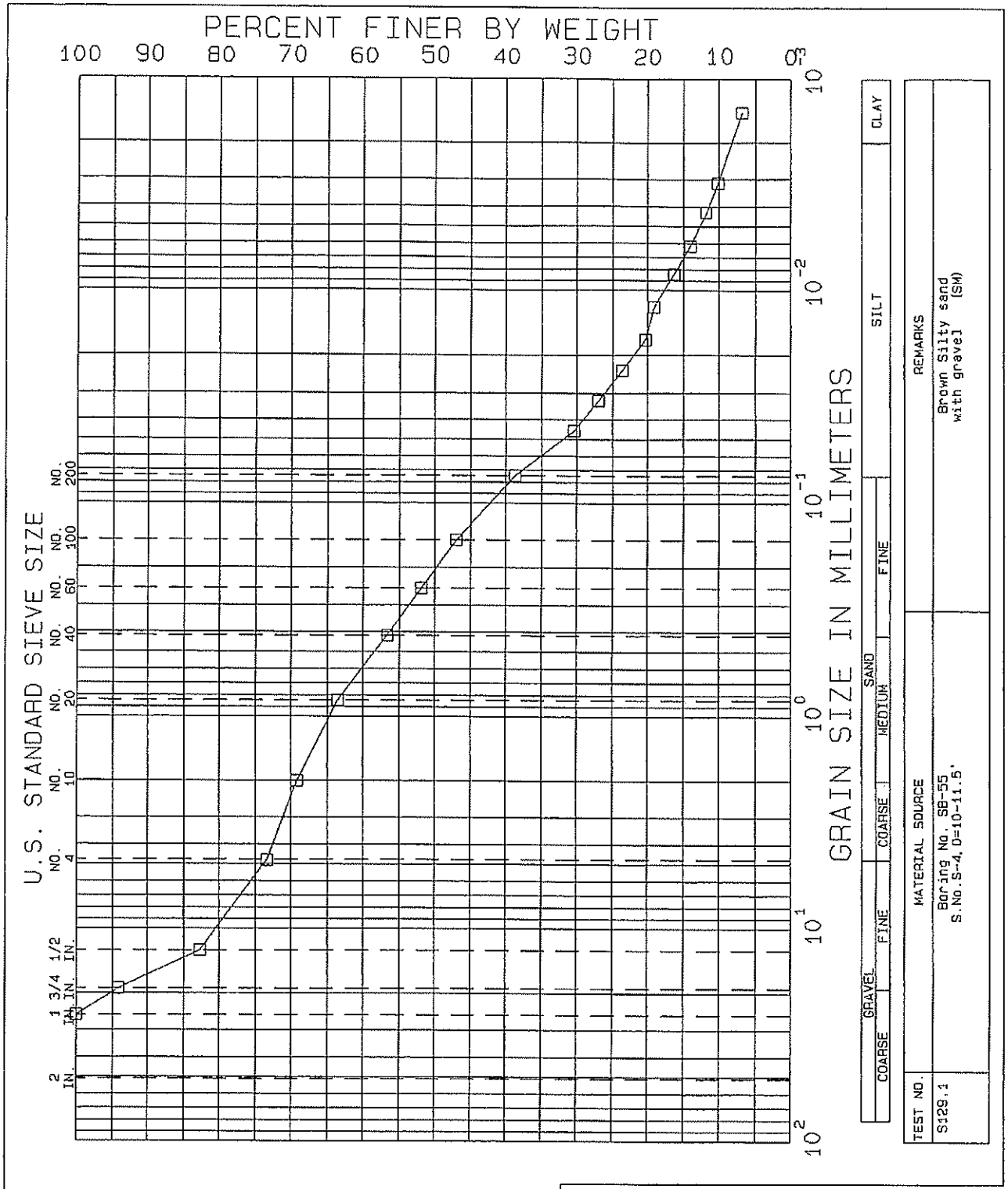
NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-54	TEST SERIES	
SAMPLE	S-15	NO.	128
DEPTH	55-56.5'	DATE	Nov.03
TECH.	PEC		
REVIEWER	MBP	FILE	L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

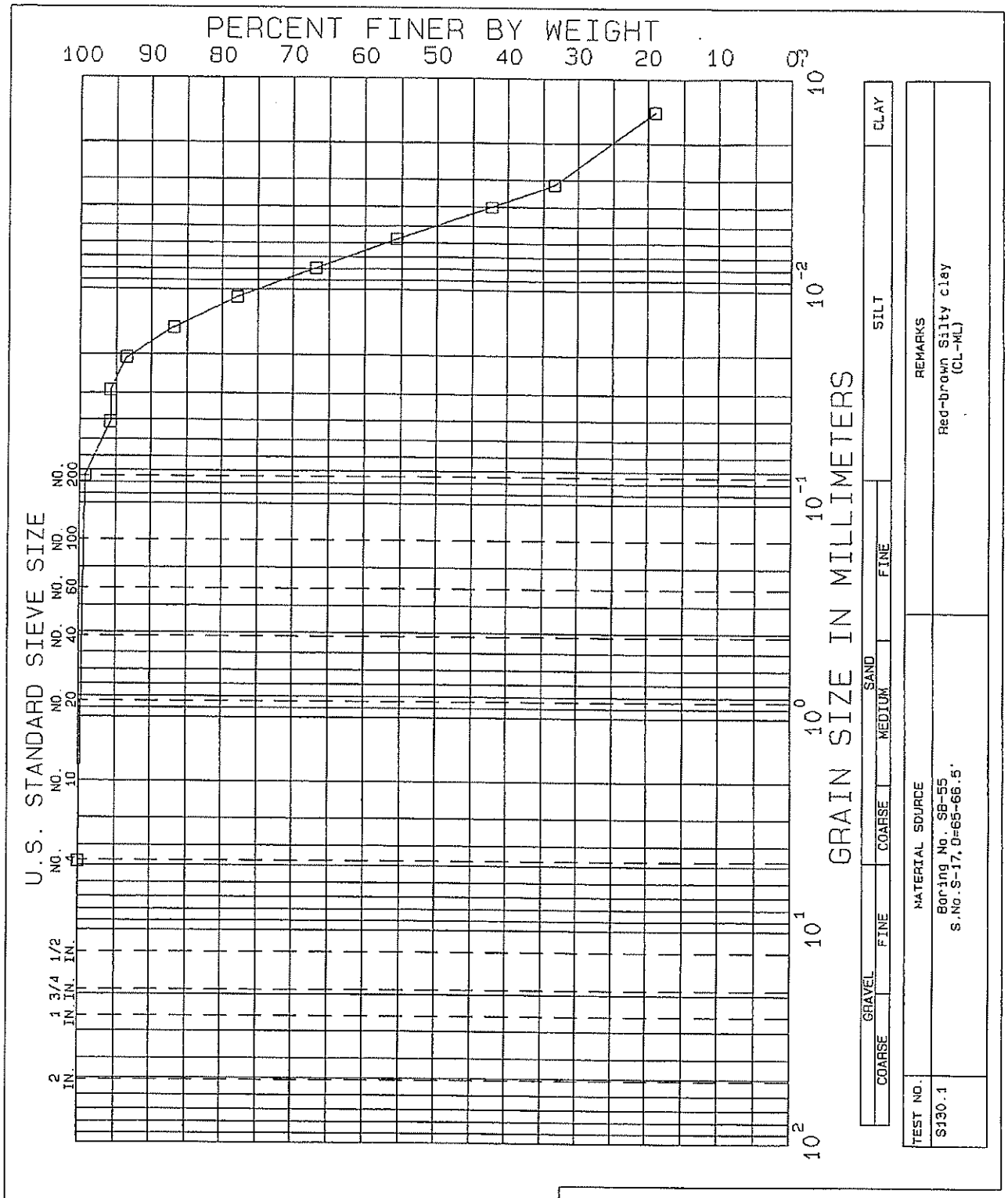


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-55	TEST SERIES	
SAMPLE	S-4	NO.	129
DEPTH	10-11.5'	DATE	Nov.03
TECH.	PEC		
REVIEWER	MBP	FILE	L17828

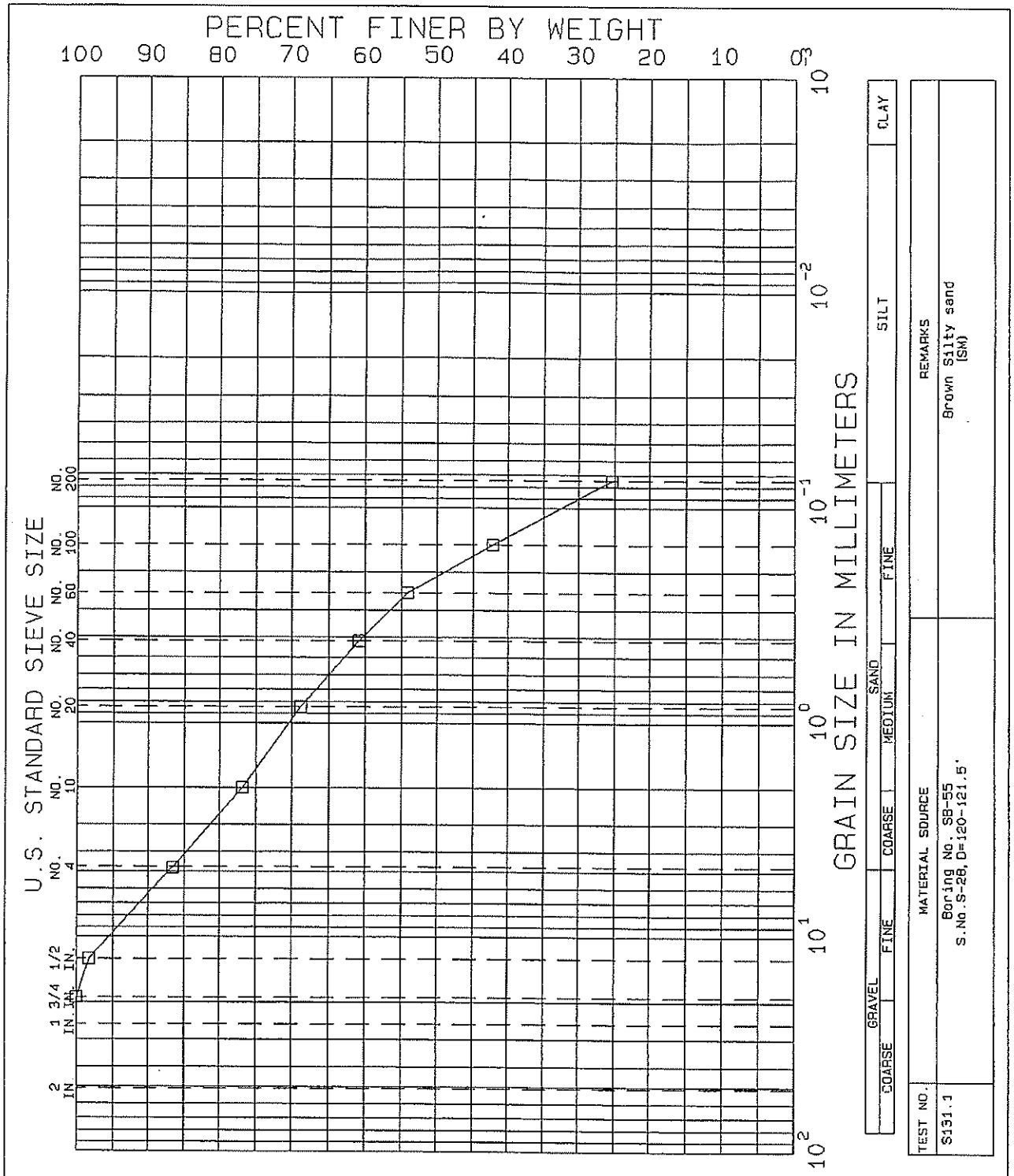


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-55	TEST SERIES	
SAMPLE	S-17	NO.	130
DEPTH	65-66.5'	DATE	Nov.03
TECH.	PEC		
REVIEWER	MBP	FILE	L17828



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

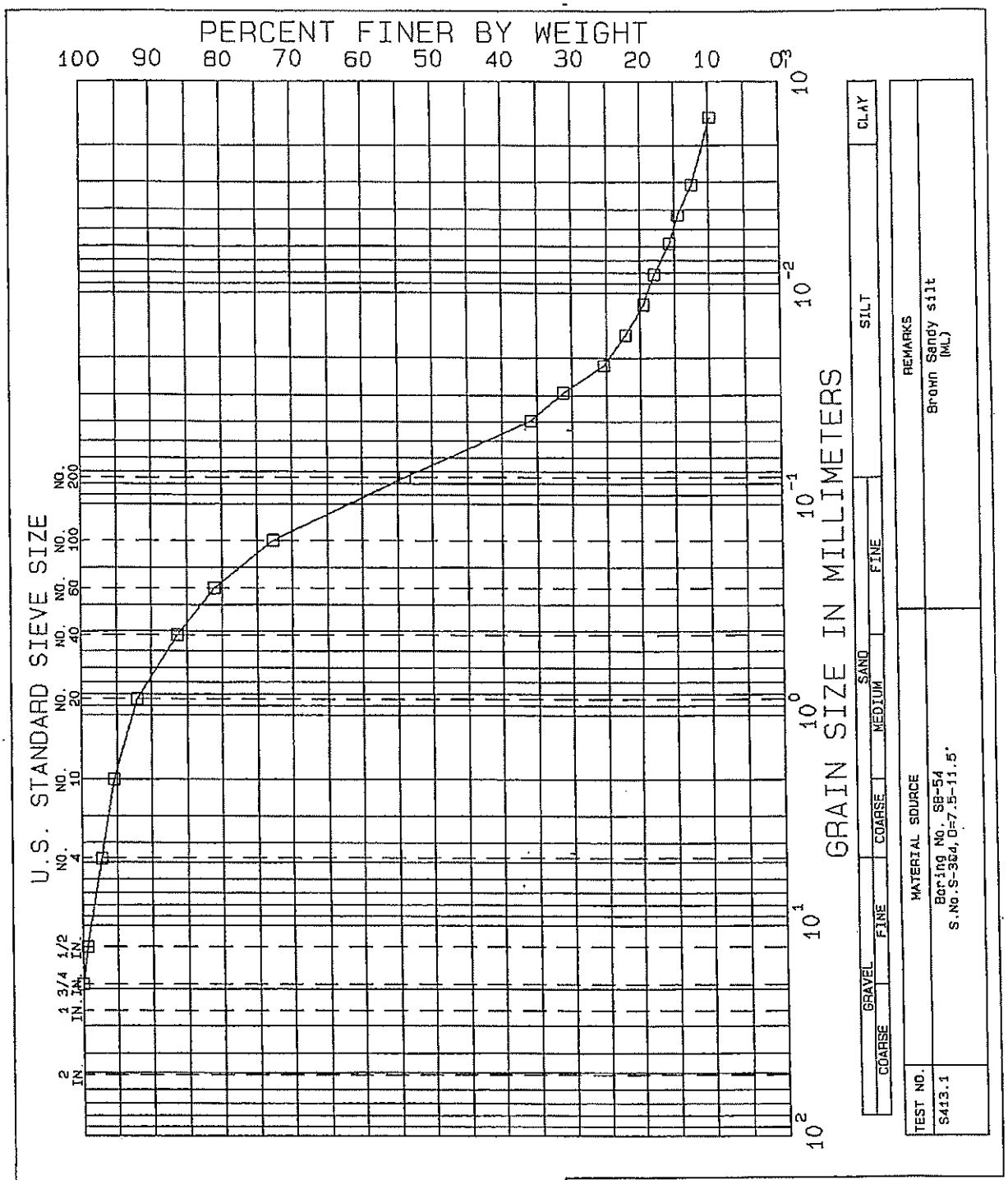
GRADATION TESTS

BORING NO.	SB-55	TEST SERIES	
SAMPLE	S-28	NO.	131
DEPTH	120-121.5'	DATE	Nov.03
TECH.	MCM		
REVIEWER	MBP	FILE	L17828

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828
Project Engineer: D. SCHULZE
Assigned By: D. GAFFNEY
Date: Feb.04
Reviewed By: Dan Schulze
Date Reviewed: 2/19/04

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) / W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol.: $\frac{C_c}{1 + e_o}$	Laboratory Log and Soil Description
SB-1	S-1, S-2 & S-3	1.5-9.0	408	15.9	25	21	24	6												Brown Silty gravel with sand (GM)
SB-1	S-6	16.5-18.0	409	12.3	NP	NP	45	8												Red-brown Silty sand (SM)
SB-39	S-1	1.5-3.0	410	9.1	NP	NP	10	2												Brown Well-graded sand with silt and gravel (SW-SM)
SB-39	S-2	4.5-6.0	411	10.5	NP	NP	14	2												Red-brown Silty sand with gravel (SM)
SB-39	S-6	16.5-18.0	412	31.4	34	21	93	34												Red-brown Lean clay (CL)
SB-54	S-3 S-4	7.5-11.5	413	20.9	24	23	54	11												Brown Sandy silt (ML)
SB-54	S-8	22.5-24.5	414	24.2	18	17	42	8												Red-brown Silty sand (SM)
SB-59	S-1 & S-4	1.5-11.5	415	46.5	42	23	97	40												Gray Lean clay (CL)
SB-59	S-7	19.5-21.0	416	48.9	47	25	100	45												Gray Lean clay (CL)
RB-10	S-1	1.5-3.0	417	8.9	NP	NP	15	2												Black Silty sand with gravel (SM)
RB-10	S-3	7.5-9.0	418	9.3	NP	NP	25	3												Red-brown Silty sand (SM)

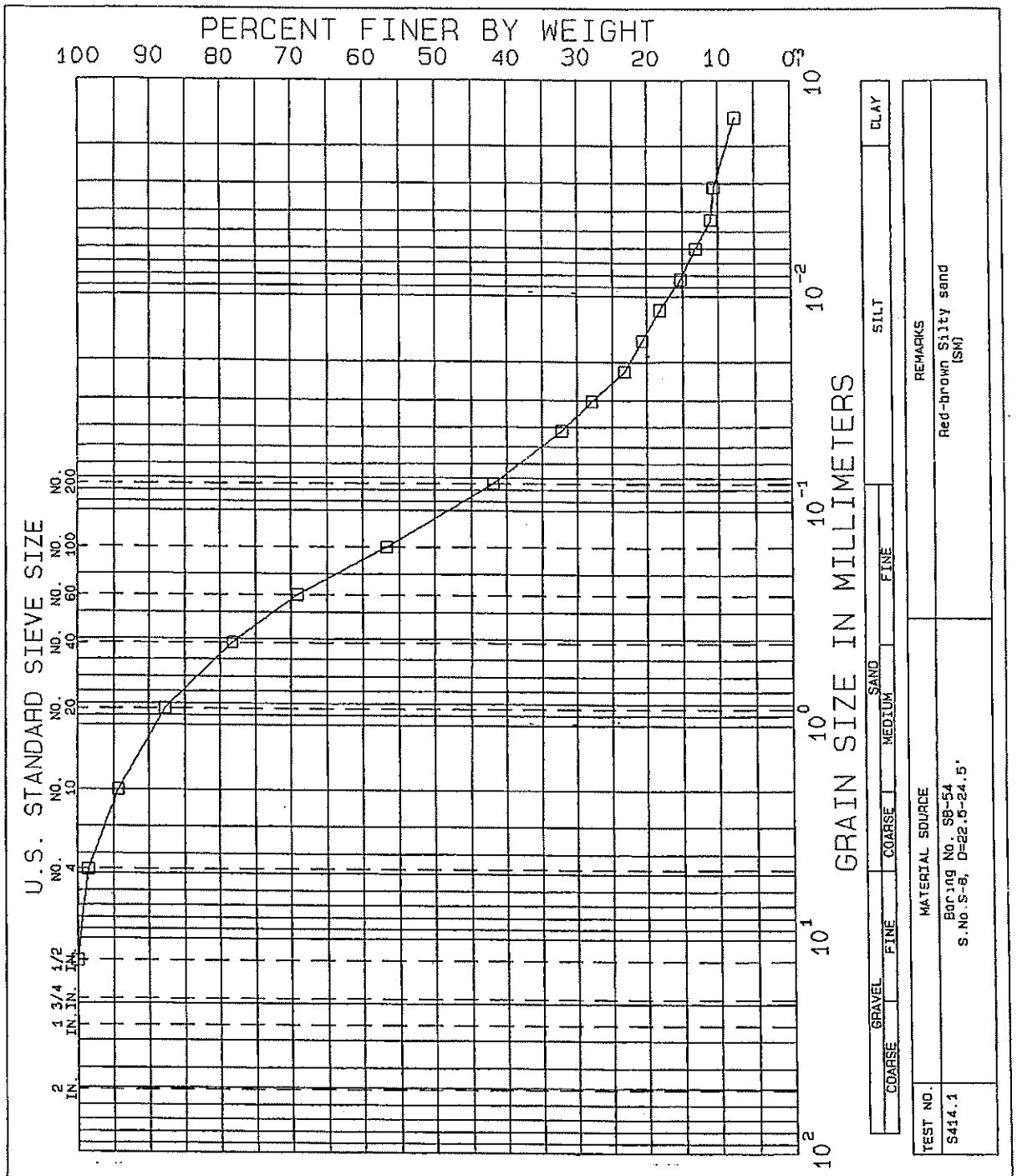


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-54	TEST SERIES
SAMPLE	S3&S4	NO. 413
DEPTH	7.5-11.5'	DATE Feb.04
TECH.	PEC	
REVIEWER	MBP	FILE L17828



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

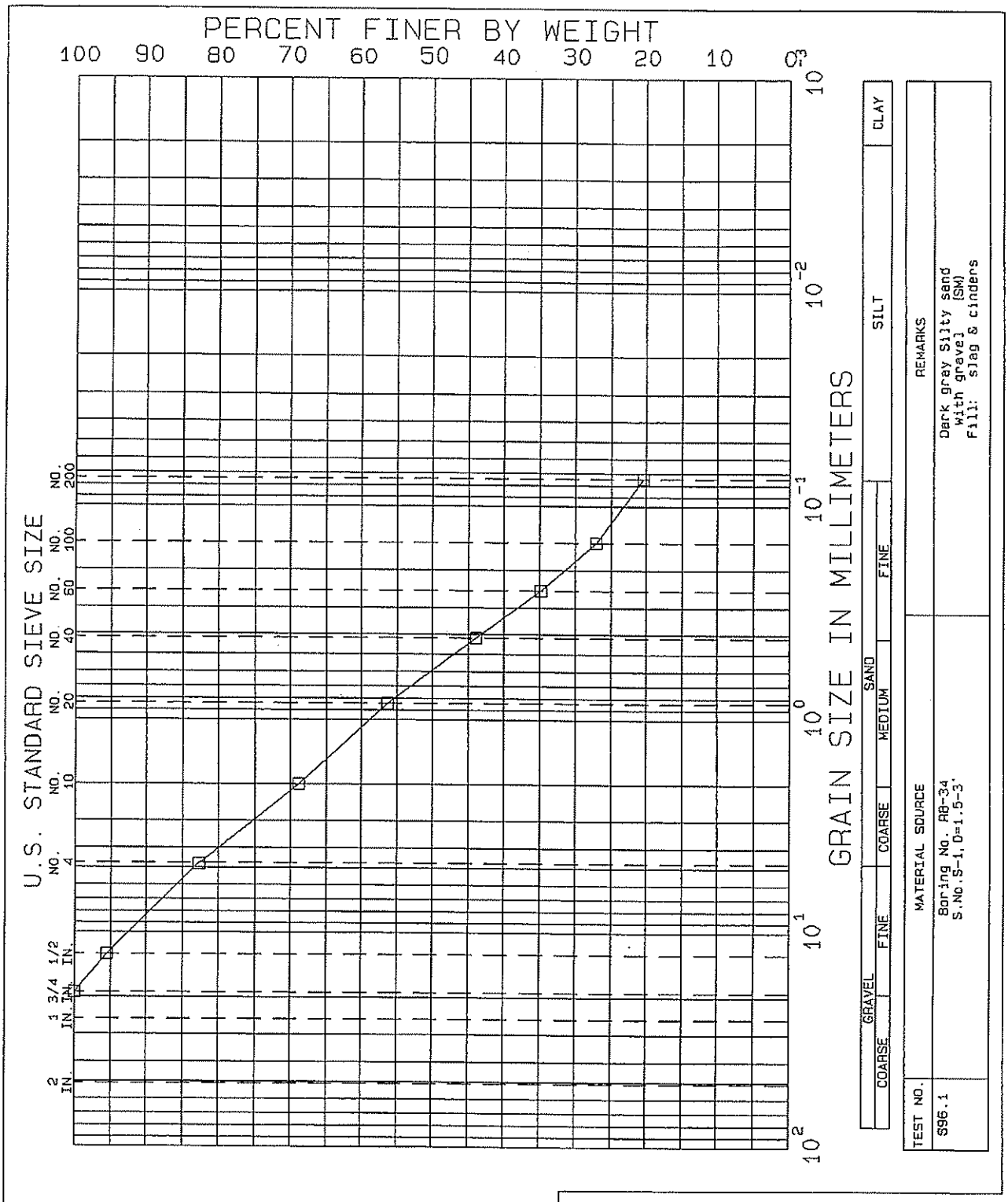
GRADATION TESTS

BORING NO.	SB-54	TEST SERIES	
SAMPLE	S-8	NO.	414
DEPTH	22.5-24.5'	DATE	Feb.04
TECH.	PEC		
REVIEWER	MBP	FILE	L17828

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828 — Assigned By: D. GAFFNEY — Reviewed By: [signature]
Project Engineer: D. SCHULZE — Date: NOV.03 — Date Reviewed: 11/6/03

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) W_{opt} (%)	Perme-ability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol. $\frac{\Delta e}{1 + e_0}$	Laboratory Log and Soil Description
RB-34	S-1	1.5-3.0	96	27.4	*	*	20		* Insufficient sample for limit test											Dark gray Silty sand with gravel (SM) Fill: slag & cinders
RB-34	S-4	10-11.5	97	41.6	39	23	99	34												Red-brown Lean clay (CL)
RB-35	S-5	13.5-15.0	98	36.1	36	21	98	27												Gray-brown Lean clay (CL)
RB-36	S-2	4.5-6.0	99	31.0	34	24	98	17												Brown Lean clay (CL)
RB-37	S-3	7.5-9.0	100	32.0	26	26	97	14												Gray-brown Silt (ML)
RB-38	S-1	1.5-3.0	101	5.2	NP	NP	10													Gray-brown Poorly-graded sand with silt and gravel (SP-SM)
RB-38	S-5	13.5-15.0	102	35.3	29	22	99	27												Gray-brown Silty clay (CL-ML)
RB-39	S-2	4.5-6.0	103	31.5	NP	NP	56													Brown Sandy silt (ML)
RB-40	S-5	13.5-15.0	104	43.0	49	24	99	38												Gray-brown Lean clay (CL)
RB-41	S-4	10.0-11.5	105	65.7	62	26	97	63												Brown Fat clay (CH)
RB-42	S-3	7.5-9.0	106	10.6	NP	NP	18													Brown Silty sand with gravel (SM)
RB-42	S-8 S-9	22.5-28.5	107	10.4	25	14	48	17												Red-brown Clayey sand with gravel (SC)

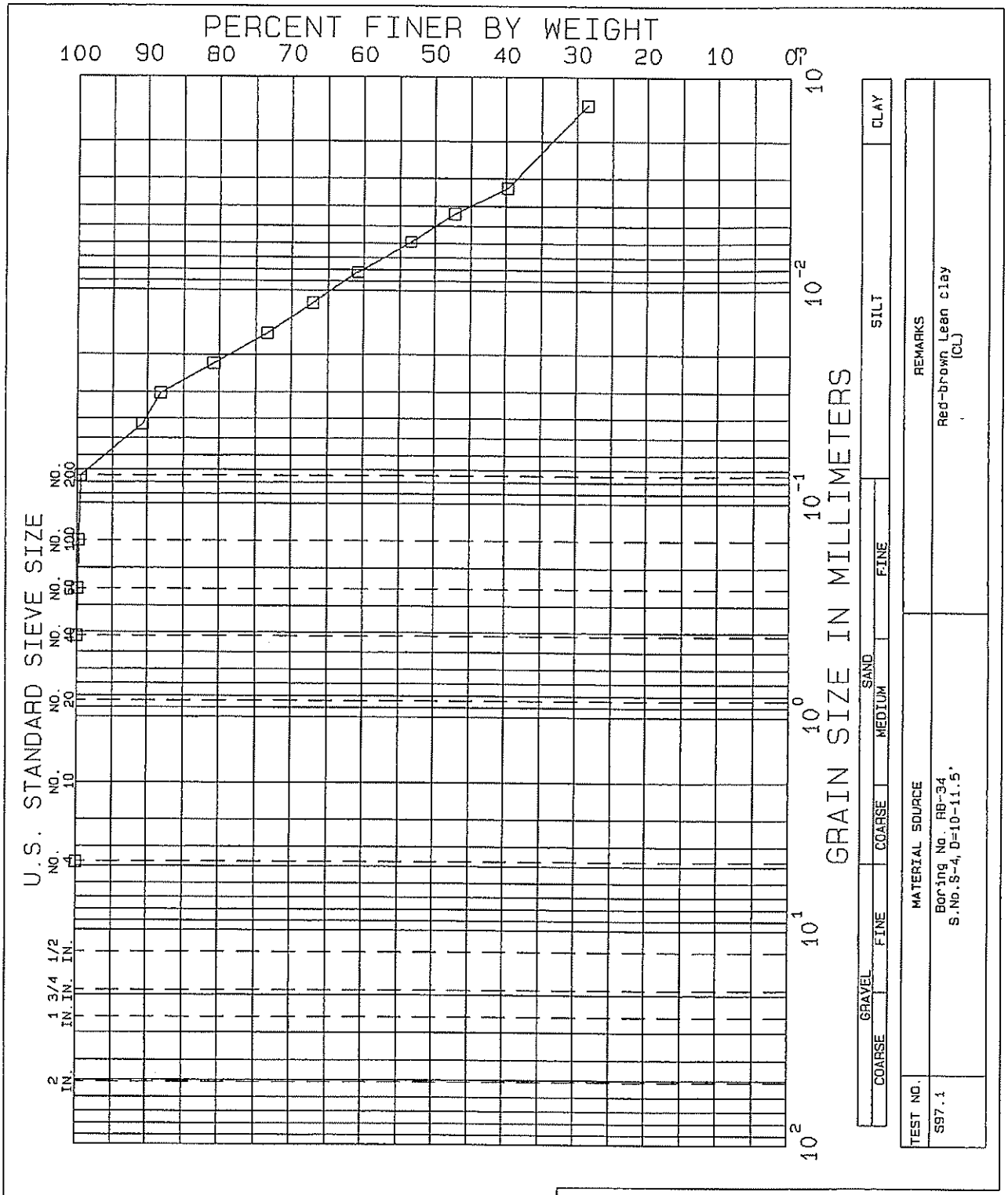


NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
GRADATION TESTS

BORING NO. AB-34
SAMPLE S-1
DEPTH 1.5-3'
TECH. PEC
REVIEWER MBP

TEST SERIES
NO. 96
DATE Nov.03

FILE L17828



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

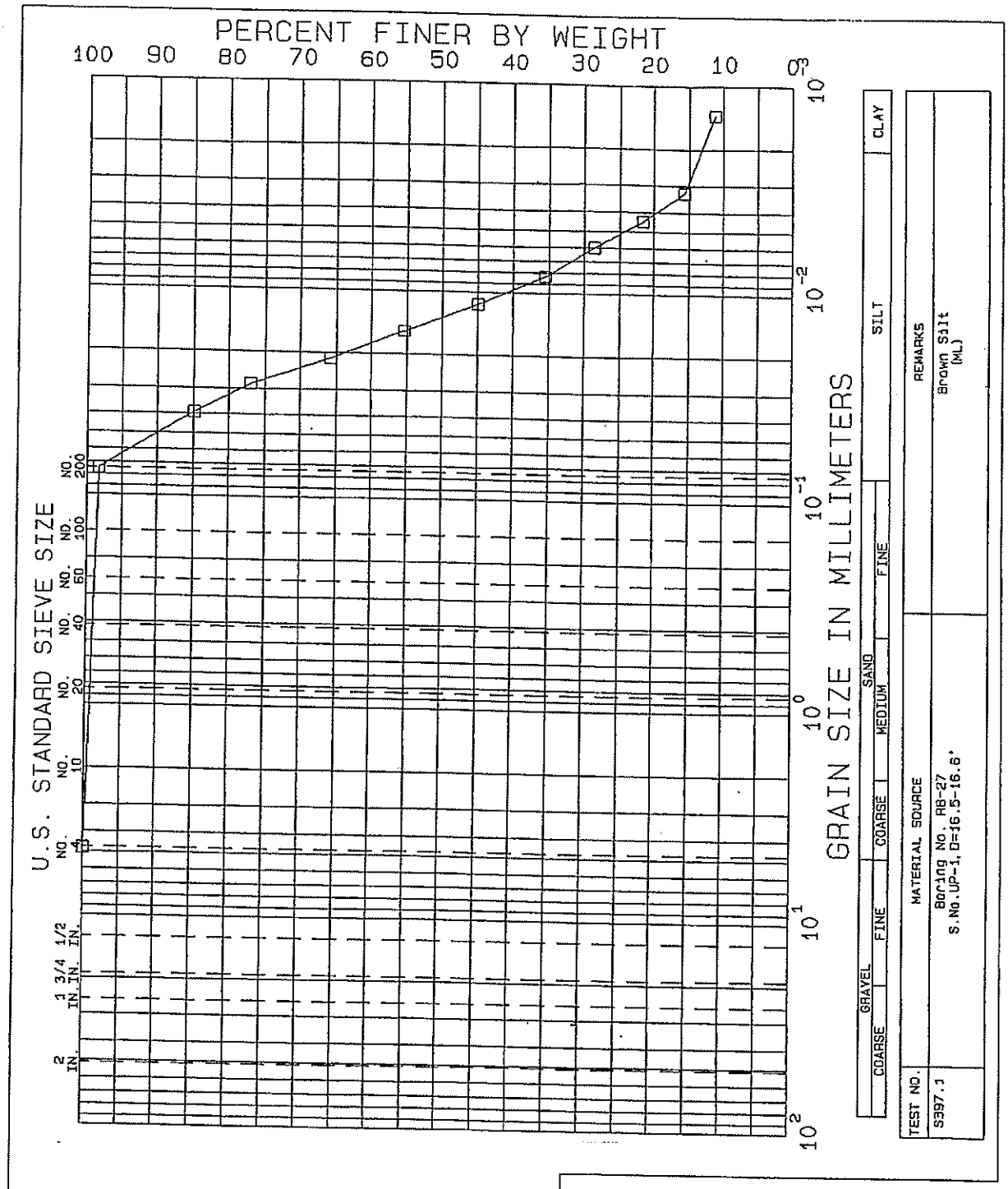
BORING NO.	RB-34	TEST SERIES	
SAMPLE	S-4	NO.	97
DEPTH	10-11.5'	DATE	Nov.03
TECH.	PEC		
REVIEWER	MBP	FILE	L17828

Consolidation and Triaxial Tests

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828 — Assigned By: D. Gaffney — Reviewed By: [signature]
Project Engineer: D. SCHULZE — Date: Feb.03 — Date Reviewed: 2/12/04

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol. $\frac{\Delta e}{1+e_0}$	Laboratory Log and Soil Description
RB-27	UP-1	15.5-16.7	397		Average Total Unit Weight (15.5-16.7') = 120.4 Pcf															Brown Silt (ML)
		15.6		25.9										Tv= 0.45 tsf						
		16.1		28.2										Tv= 0.50 tsf						
		16.2-16.3		24.7	23	21														
		16.3-16.4		31.5							93.3								0.09	
		16.5-16.6					98	13												
		16.7								2.71										
		5.3		25.0										Tv= 0.47 tsf						
SB-44	UP-1	30.0-32.0	398		Average Total Unit Weight (30.0-31.1') = 125.2 Pcf															Brown Silt with sand (ML)
		30.1		24.2										Tv= 0.45 tsf						
		30.6		23.9										Tv= 0.50 tsf						
		30.6-30.7		24.3	NP	NP														
		30.7-30.8		25.2							99.2								0.03	
		30.8-30.9					83	3												
		30.9-31.0								2.72										
		31.1		24.1										Tv= 0.52 tsf						



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

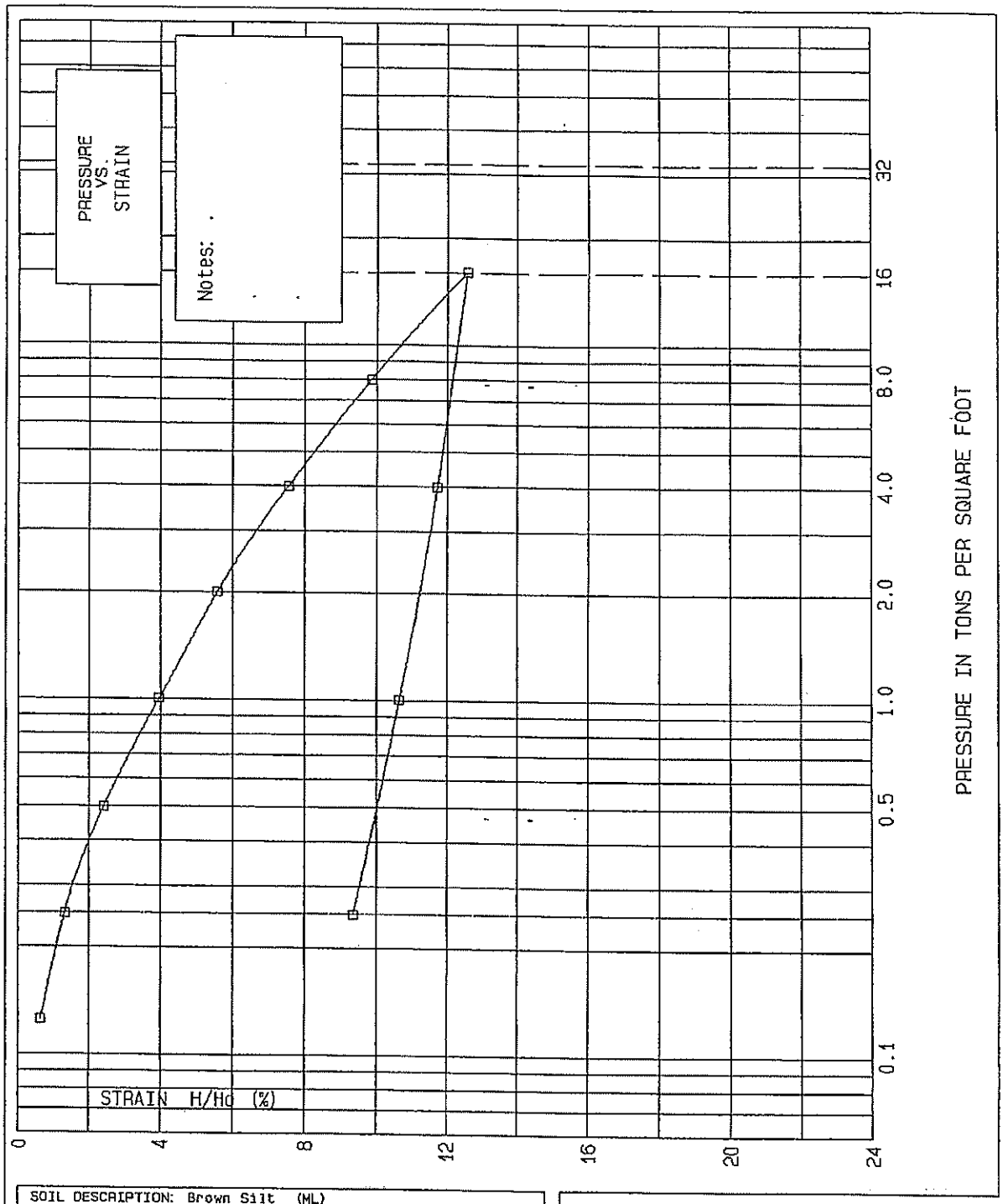
GRADATION TESTS

BORING NO. RB-27
SAMPLE UP-1
DEPTH 16.5-16.6'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO. 397
DATE Feb.04

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



SOIL DESCRIPTION: Brown Silt (ML)

SAMPLE DIAM. 2.5 IN. LIQUID LIMIT 23 % PLASTIC LIMIT 21 % SPECIFIC GRAVITY 2.71

	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	VOID RATIO	SATURATION, %	SAMPLE HEIGHT, INCH
INITIAL	31.50	93.30			0.80
FINAL	26.00	102.96			0.72

New Britain-Hartford Busway

CONSOLIDATION TEST

BORING NO. RB-27
SAMPLE UP-1
DEPTH 16.3-16.4'
TECH. MST
REVIEWER DAS

TEST SERIES NO. C397
DATE 2/12/04
FILE 17828

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

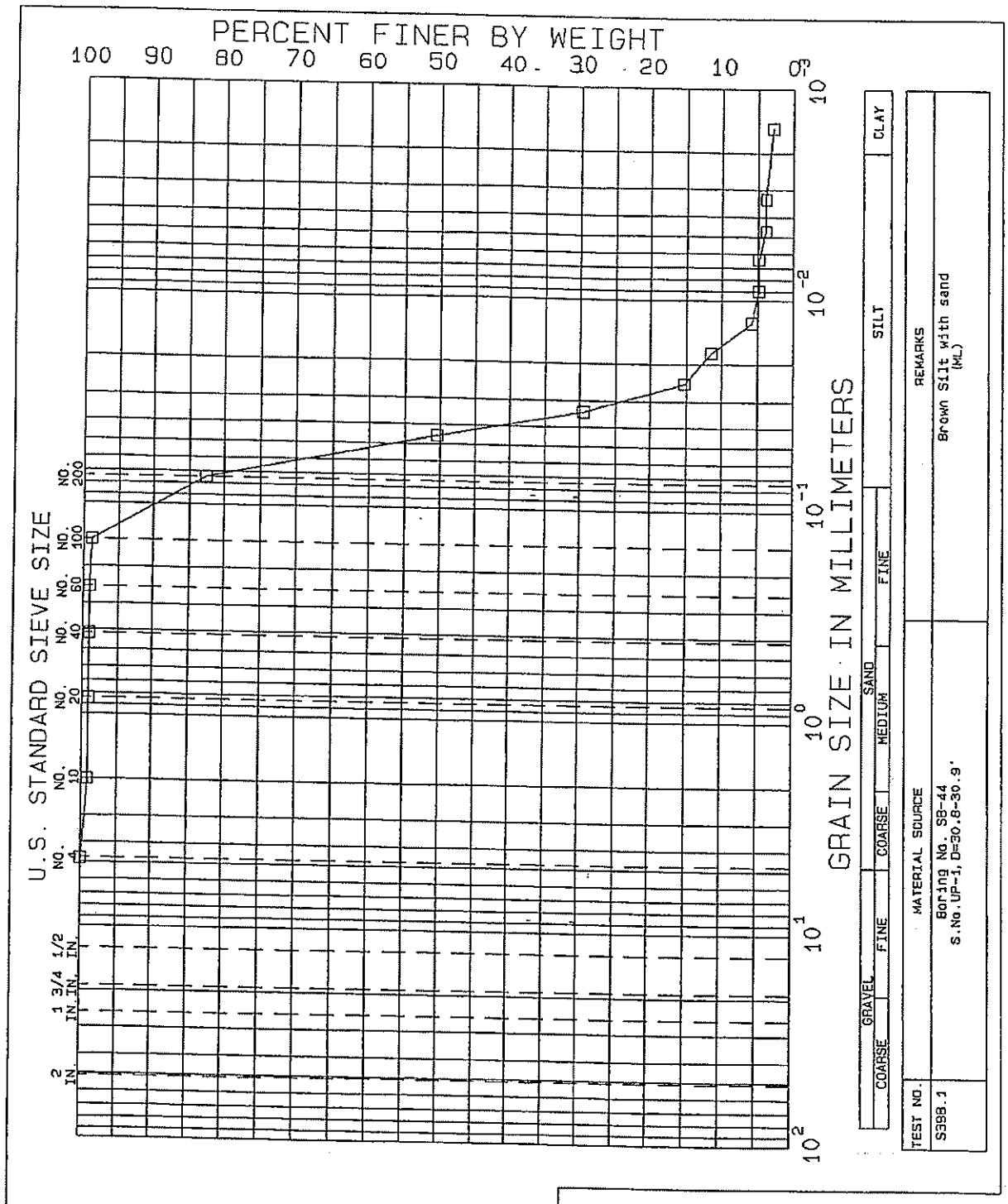
Job Number 17828
Project Name ..... New Britain-Hartford Busway
Test Number C397
Sample Description .. Brown Silt (ML)
Boring Number RB-27
Sample Number UP-1
Depth ..... 16.3-16.4'

Technician ..... MST
Reviewer ..... DAS

NOTES: Homogeneous
Sample

Specific Gravity ..... 2.7100E+00
Sample Dry Weight ..... 9.6180E+01
Sample Diameter ..... 2.5000E+00
Initial Void Ratio ..... 0.0000E+00
Initial Sample Height 8.0000E-01
Final Sample Height 7.2500E-01
Initial Water Content .... 3.1500E+01
Final Water Content ..... 2.6000E+01
Liquid Limit ..... 2.3000E+01
Plastic Limit ..... 2.1000E+01
Initial Saturation ..... 0.0000E+00
Final Saturation ..... 0.0000E+00
T50 data excluded
T90 data included

Increment umber	Pressure (TSF)	Final Dial	Percent Strain	Void Ratio	T90 (min)	Cv (T90) (/10000)	C_α
1	0.000	0.0	0.00	0.812			
2	0.125	50.0	0.63	0.801			
3	0.250	105.0	1.31	0.789	2.0	71.54	
4	0.500	194.0	2.42	0.768	4.0	35.12	
5	1.000	318.0	3.97	0.740	2.0	68.35	
6	2.000	446.0	5.57	0.711	2.3	57.52	0.0014
7	4.000	603.5	7.54	0.676	1.7	74.93	
8	8.000	789.0	9.86	0.634	1.2	101.34	
9	16.000	1006.0	12.57	0.584	1.2	95.83	0.0020
10	4.000	938.0	11.72	0.600			
11	1.000	852.0	10.65	0.619			
12	0.250	748.0	9.35	0.643			



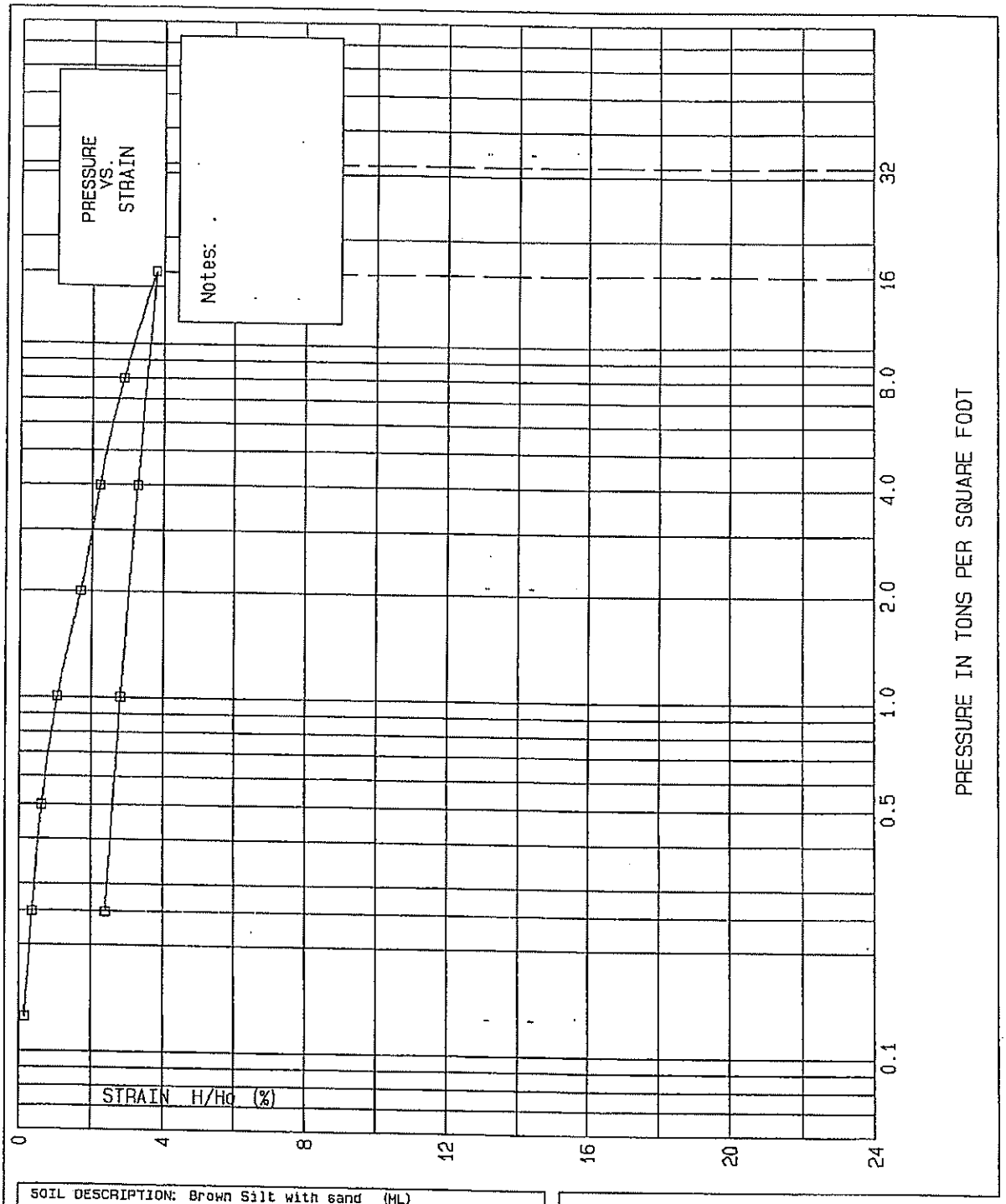
NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
GRADATION TESTS

BORING NO. SB-44
SAMPLE UP-1
DEPTH 30.8-30.9'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO. 398
DATE Feb.04

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



SOIL DESCRIPTION: Brown Silt with sand (ML)

SAMPLE DIAM. 2.5 IN.	LIQUID LIMIT 0 %	PLASTIC LIMIT 0 %	SPECIFIC GRAVITY 2.72

	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	VOID RATIO	SATURATION, %	SAMPLE HEIGHT, INCH
INITIAL	25.20	99.24			0.80
FINAL	25.40	101.65			0.78

New Britain-Hartford Busway

CONSOLIDATION TEST

FIGURE

BORING NO.	SB-44	TEST SERIES NO.	C398
SAMPLE	UP-1	DATE	2/12/04
DEPTH	30.7-30.8'		
TECH.	MST		
REVIEWER	DAS	FILE	17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

Job Number 17828
Project Name ..... New Britain-Hartford Busway
Test Number C398
Sample Description .. Brown Silt with sand (ML)
Boring Number SB-44
Sample Number UP-1
Depth ..... 30.7-30.8'

Technician ..... MST
Reviewer ..... DAS

NOTES: Silt Portion
Comprises 95%
of Sample

Specific Gravity ..... 2.7200E+00
Sample Dry Weight ..... 1.0230E+02
Sample Diameter ..... 2.5000E+00
Initial Void Ratio ..... 0.0000E+00
Initial Sample Height 8.0000E-01
Final Sample Height 7.8100E-01
Initial Water Content .... 2.5200E+01
Final Water Content ..... 2.5400E+01
Liquid Limit ..... 0.0000E+00
Plastic Limit ..... 0.0000E+00
Initial Saturation ..... 0.0000E+00
Final Saturation ..... 0.0000E+00
T50 data excluded
T90 data included

Increment umber	Pressure (TSF)	Final Dial	Percent Strain	Void Ratio	T90 (min)	Cv (T90) (/10000)	C_α
1	0.000	0.0	0.00	0.710			
2	0.125	11.0	0.14	0.708			
3	0.250	29.0	0.36	0.704	0.2	725.82	
4	0.500	50.0	0.63	0.700	0.5	288.91	
5	1.000	85.0	1.06	0.692	0.6	239.07	
6	2.000	136.0	1.70	0.681	0.6	236.48	0.00053
7	4.000	178.0	2.22	0.672	0.5	280.44	
8	8.000	231.0	2.89	0.661	0.6	230.88	
9	16.000	303.0	3.79	0.645	0.8	170.40	0.00072
10	4.000	262.0	3.27	0.654			
11	1.000	225.0	2.81	0.662			
12	0.250	192.0	2.40	0.669			

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828
Project Engineer: D. SCHULZE
Assigned By: D. Gaffney
Date: Nov.03
Reviewed By: Don Schulze
Date Reviewed: 11/24/03

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol.: $\frac{\Delta e}{1+e_0}$	Laboratory Log and Soil Description
SB-46	UP-1	30-32	390		Average Total Unit Weight (30.0-31.9') = 108.94 Pcf															Brown Varved Soil as follows:
		30.6		66.1	(Clay Portion)									Tv= 0.27 tsf						Fat Clay (CH) grading to Silt (ML)
		30.7		35.7	(Silt Portion)															
		30.8-30.9		48.6	(entire varve)															Varve thickness varies from 1-2.5"
		31.0-31.1		60.5							65.7								0.26	Clay portion varies from 0.375-0.875" in thickness and comprises approx. 25-40% of total varve
		31.1-31.2		39.6	34	29														
		31.1 31.2					100	15												
		31.2-31.3		68.0	88	30														
		31.4-31.5					100	87		2.89										

GZA GeoEnvironmental, Inc.
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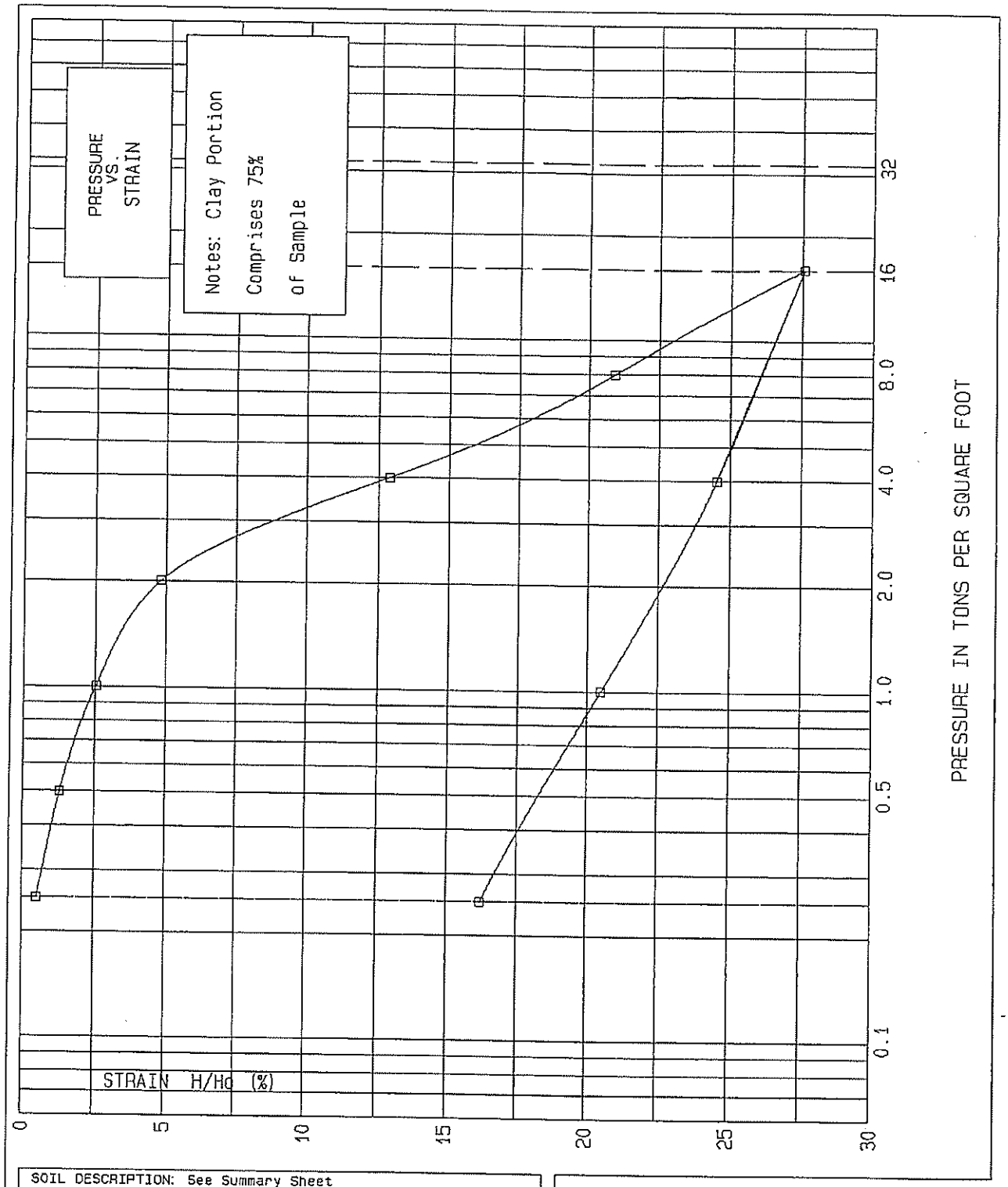
labform1.xls



SOIL DESCRIPTION: See Summary Sheet

SAMPLE DIAM. 2.5 IN.	LIQUID LIMIT 0 %	PLASTIC LIMIT 0 %	SPECIFIC GRAVITY 2.89

	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	VOID RATIO	SATURATION, %	SAMPLE HEIGHT, INCH
INITIAL	60.50	65.71			0.80
FINAL	46.80	78.58			0.67

NEW BRITAIN-HARTFORD BUSWAY

CONSOLIDATION TEST

FIGURE

BORING NO. SB-46
SAMPLE UP-1
DEPTH 31.0-31.1'
TECH. MST
REVIEWER DAS

TEST SERIES
NO. 390.1
DATE 11/19/03
FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

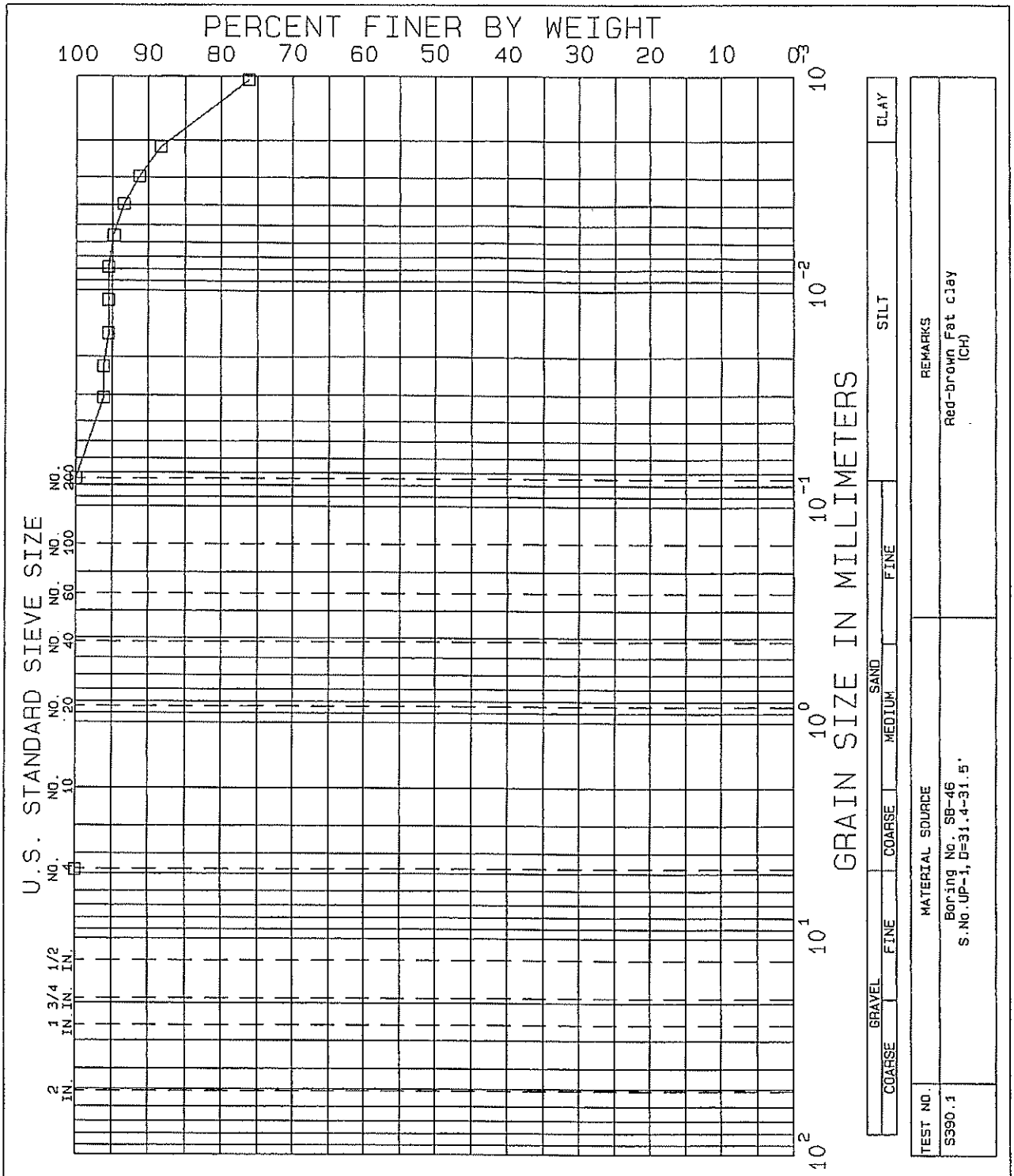
Job Number L17828
Project Name ..... NEW BRITAIN-HARTFORD BUSWAY
Test Number 390.1
Sample Description .. See Summary Sheet
Boring Number SB-46
Sample Number UP-1
Depth ..... 31.0-31.1'

Technician ..... MST
Reviewer ..... DAS

NOTES: Clay Portion
Comprises 75%
of Sample

Specific Gravity ..... 2.8900E+00
Sample Dry Weight ..... 6.7740E+01
Sample Diameter ..... 2.5000E+00
Initial Void Ratio ..... 0.0000E+00
Initial Sample Height 8.0000E-01
Final Sample Height 6.6900E-01
Initial Water Content .... 6.0500E+01
Final Water Content ..... 4.6800E+01
Liquid Limit ..... 0.0000E+00
Plastic Limit ..... 0.0000E+00
Initial Saturation ..... 0.0000E+00
Final Saturation ..... 0.0000E+00
T50 data excluded
T90 data included

Increment umber	Pressure (TSF)	Final Dial	Percent Strain	Void Ratio	T90 (min)	Cv (T90) (/10000) cm²/sec	C_α
1	0.125	17.0	0.00	1.744			
2	0.250	57.0	0.50	1.730	2.6	55.83	
3	0.500	121.0	1.30	1.709	6.3	22.74	0.0006
4	1.000	221.0	2.55	1.674	6.3	22.27	
5	2.000	402.0	4.81	1.612	6.3	21.48	
6	4.000	1049.0	12.90	1.390	23.0	5.27	
7	8.000	1689.0	20.90	1.171	13.0	7.75	0.007
8	16.000	2222.0	27.56	0.988	9.0	9.31	
9	4.000	1981.0	24.55	1.071			
10	1.000	1656.0	20.49	1.182			
11	0.250	1314.0	16.21	1.299			

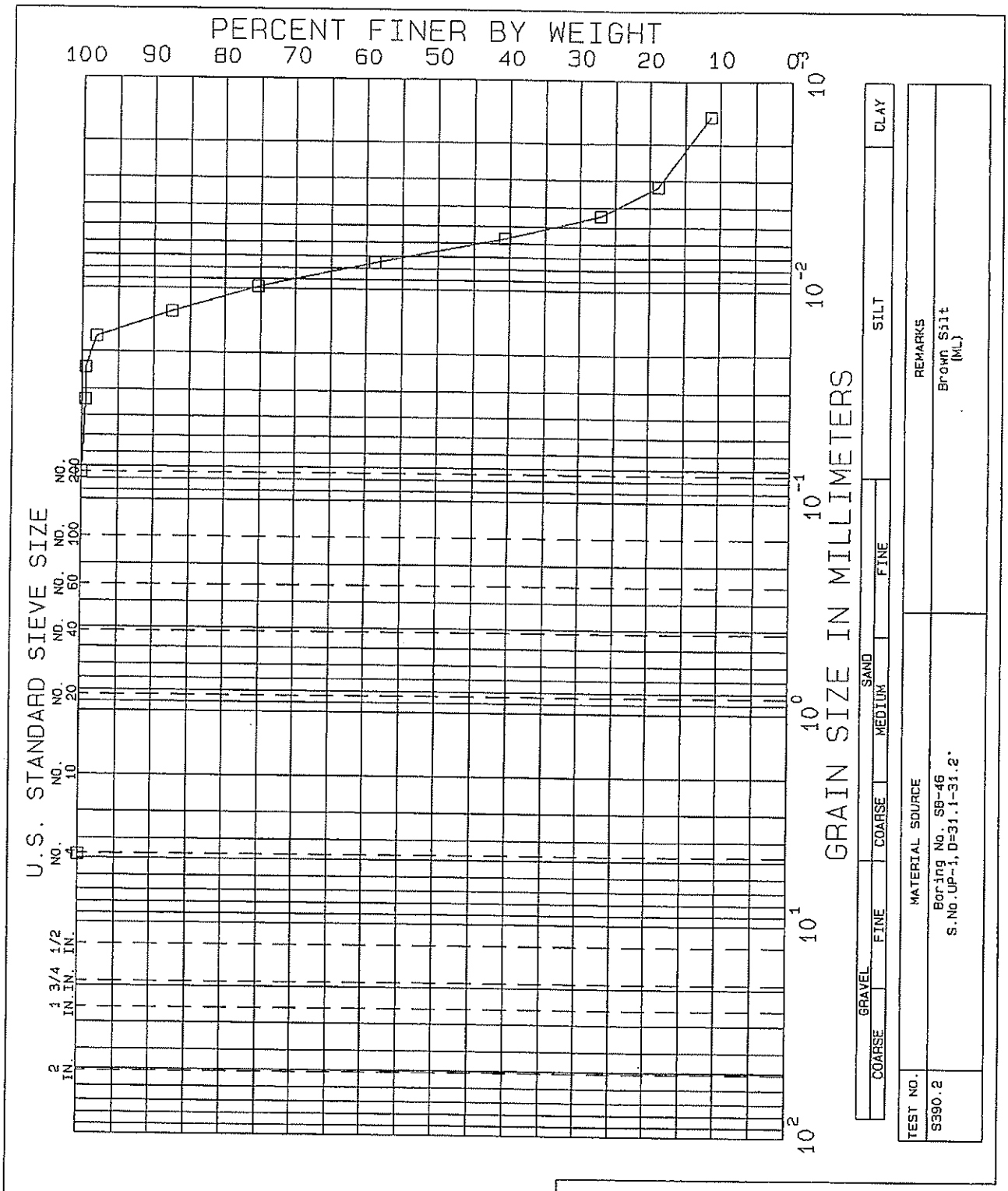


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-46	TEST SERIES	
SAMPLE	UP-1	NO.	390
DEPTH	31.4-31.5'	DATE	Nov.03
TECH.	pec		
REVIEWER	MBP	FILE	L17828



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO. SB-46
SAMPLE UP-1
DEPTH 31.1-31.2'
TECH. PEC
REVIEWER MBP

TEST SERIES
NO. 390
DATE Nov.03

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828
Project Engineer: D. SCHULZE
Assigned By: D. Gaffney
Date: Feb.03
Reviewed By: [illegible]
Date Reviewed: 2/23/04

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol. $\frac{\Delta e}{1+e_0}$	Laboratory Log and Soil Description
SB-52	ST-1	50.0-52.0	399		Average Total Unit Weight (50.0-51.3') = 117.8 Pcf															Red-brown Varved Soil as follows:
		50.1		48.7	(Clay Portion)									Tv= 0.24 tsf						Lean Clay (CL) grading to Silt (ML)
		50.5		23.2	(Silt Portion)									Tv= 0.20 tsf						
		50.5-50.6		43.7							79.3								0.15	Varve thickness varies from 0.25-0.5" Clay portion varies from 0.125-.25"
		50.7		41.6	(entire varve)									Tv= 0.25 tsf						in thickness and comprises approx. 35-50% of total varve
		50.0-51.3*		47.3	40	23														
		50.0-51.3*					100	47												* Note: Hydrometer, Specific Gravity, and Atterberg Limit samples taken from clay layers throughout the tube sample
		50.0-51.3*								2.83										

GZA GeoEnvironmental, Inc.
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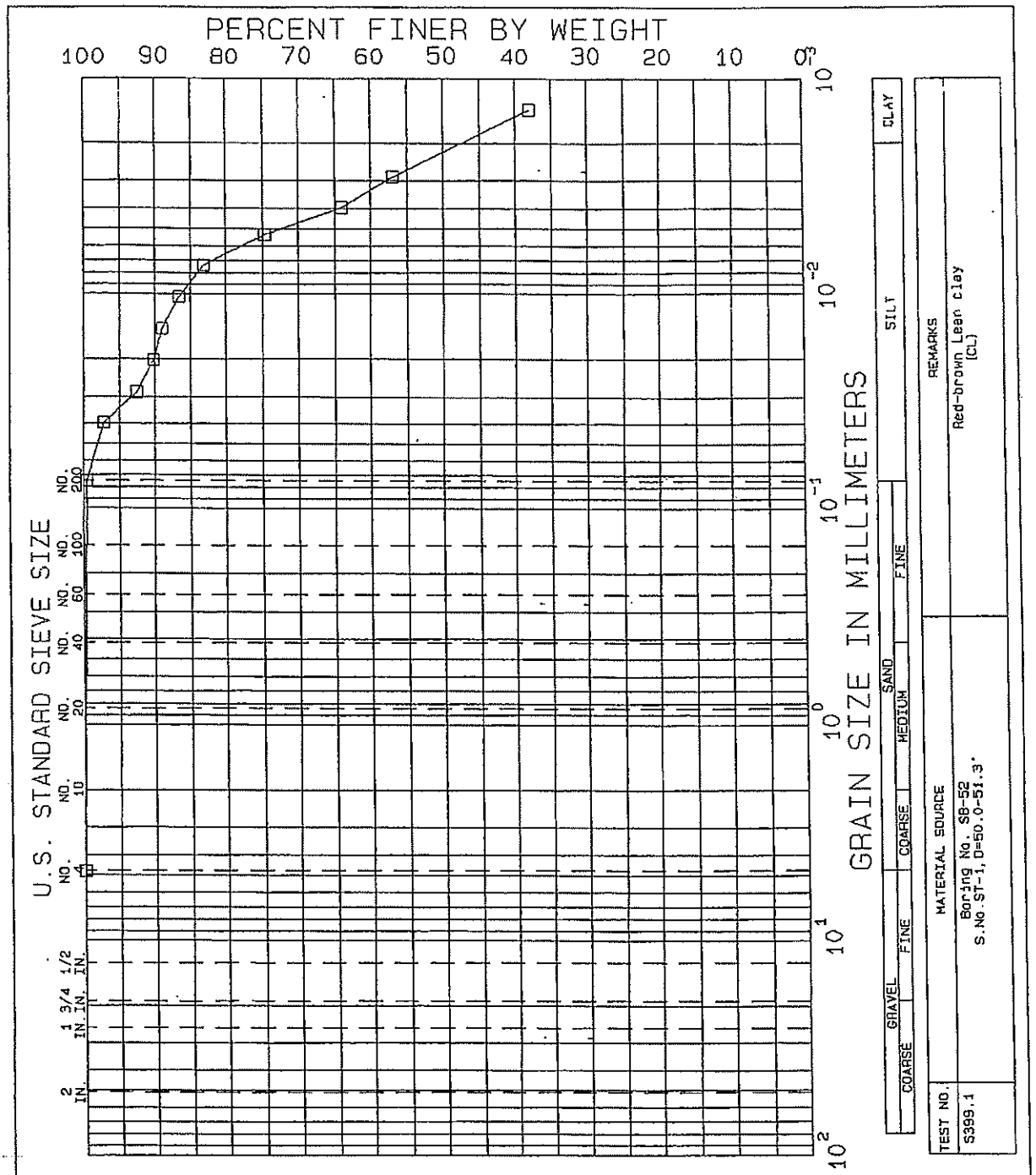
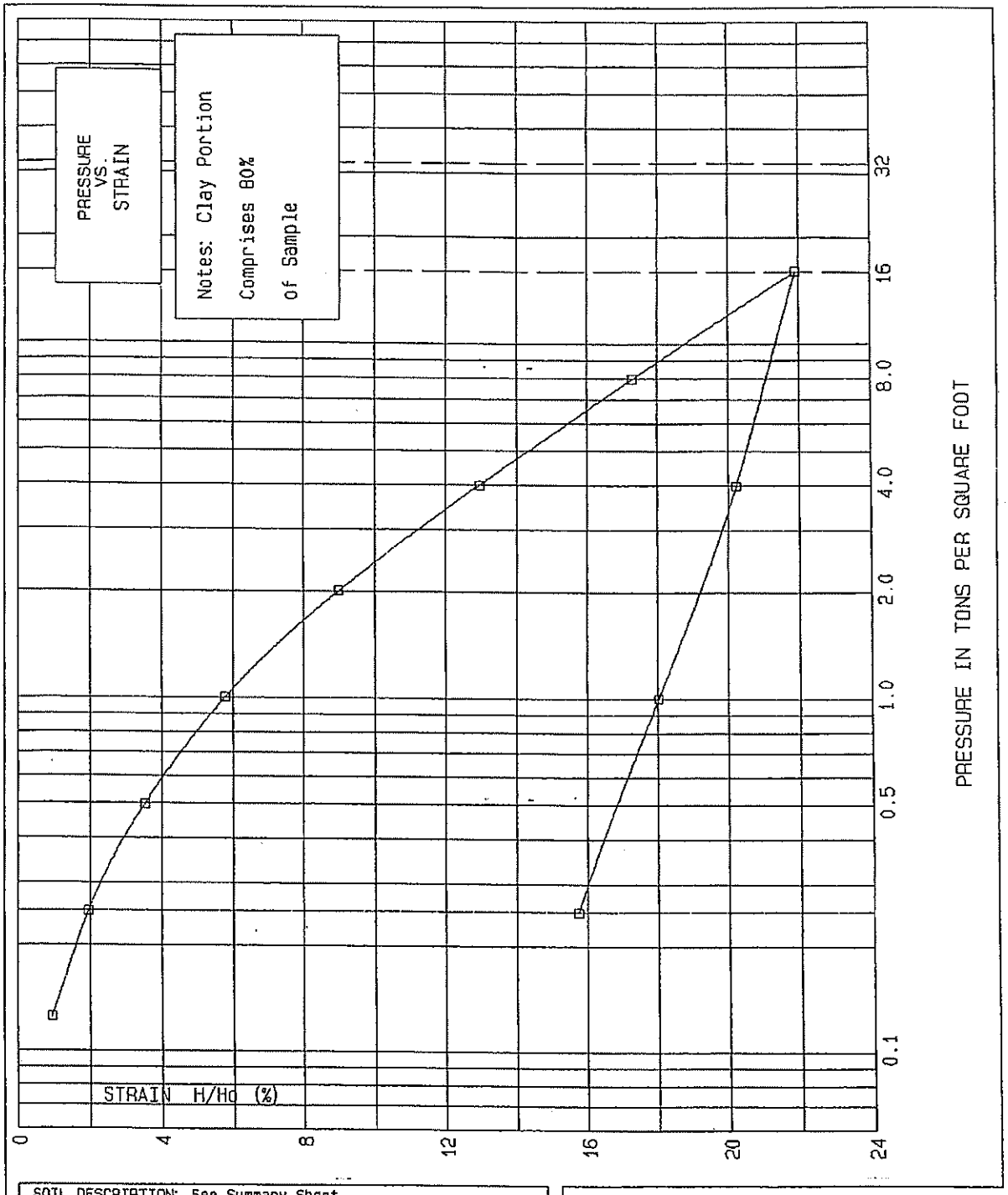
labform1.xls



NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
GRADATION TESTS

BORING NO.	SB-52	TEST SERIES	
SAMPLE	ST-1	NO.	399
DEPTH	50.0-51.3'	DATE	Feb.04
TECH.	PEC		
REVIEWER	MBP	FILE	L17828



SOIL DESCRIPTION: See Summary Sheet

SAMPLE DIAM. 2.5 IN.	LIQUID LIMIT 0 %	PLASTIC LIMIT 0 %	SPECIFIC GRAVITY 2.83

	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	VOID RATIO	SATURATION, %	SAMPLE HEIGHT, INCH
INITIAL	43.70	79.26			0.80
FINAL	32.20	94.07			0.67

New Britain-Hartford Busway

CONSOLIDATION TEST

BORING NO.	SB-52	TEST SERIES NO.	C399.1
SAMPLE	ST-1	DATE	2/23/04
DEPTH	50.5-50.6'		
TECH.	MST		
REVIEWER	DAS	FILE	L17828

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

Job Number L17828
Project Name ..... New Britain-Hartford Busway
Test Number C399.1
Sample Description .. See Summary Sheet
Boring Number SB-52
Sample Number ST-1
Depth ..... 50.5-50.6'

Technician ..... MST
Reviewer ..... DAS

NOTES: Clay Portion
Comprises 80%
of Sample

Specific Gravity ..... 2.8300E+00
Sample Dry Weight ..... 8.1700E+01
Sample Diameter ..... 2.5000E+00
Initial Void Ratio ..... 0.0000E+00
Initial Sample Height 8.0000E-01
Final Sample Height 6.7400E-01
Initial Water Content .... 4.3700E+01
Final Water Content ..... 3.2200E+01
Liquid Limit ..... 0.0000E+00
Plastic Limit ..... 0.0000E+00
Initial Saturation ..... 0.0000E+00
Final Saturation ..... 0.0000E+00
T50 data excluded
T90 data included

Increment umber	Pressure (TSF)	Final Dial	Percent Strain	Void Ratio	T90 (min)	Cv (T90) (/10000)	C_α
1	0.000	0.0	0.00	1.228			
2	0.125	75.0	0.94	1.207			
3	0.250	158.0	1.97	1.184	12.9	10.98	
4	0.500	283.0	3.54	1.149	12.3	11.22	0.0018
5	1.000	462.0	5.77	1.099	6.3	21.05	0.0024
6	2.000	719.0	8.99	1.028	8.4	14.90	
7	4.000	1036.0	12.95	0.940	6.3	18.36	
8	8.000	1384.0	17.30	0.843	6.3	16.68	
9	16.000	1752.0	21.90	0.740	4.0	23.58	0.0041
10	4.000	1619.0	20.24	0.777			
11	1.000	1443.0	18.04	0.826			
12	0.250	1259.0	15.74	0.877			

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

Project No.: L17828 | Assigned By: D. Gaffney | Reviewed By: Don Schulze

Project Engineer: D. SCHULZE | Date: Feb.04 | Date Reviewed: 2/12/04

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol. $\frac{\Delta e}{1+e_0}$	Laboratory Log and Soil Description
SB-54	ST-1	42-44	400		Average Total Unit Weight (42.0-43.9') = 111.9 Pcf															Brown Varved Soil as follows:
		42.0-42.5		48.2							74.9			CIU	4320	σ1/σ3 MAX	2887	15.3		Fat Clay (CH) grading to Silt (ML)
		42.5		67.7	(Clay Portion)									Tv= 0.28 tsf						
		42.5-43.0		45.9							76.8			CIU	5760	σ1/σ3 MAX	4023	13.2		Varve thickness varies from 0.5-2.0" Clay portion varies from 0.25-0.625"
		43.0-43.5		46.1							76.6			CIU	7200	σ1/σ3 MAX	4681	13.9		in thickness and comprises approx. 25-50% of total varve
		43.5		72.5	(Clay Portion)									Tv= 0.27 tsf						
		43.6-43.7		55.7							69.8								0.17	
		43.7		40.8	(Silt Portion)															
		43.7-43.9		46.8	(entire varve)															
		42.0-43.0		76.7	76	30	100	82		2.84	(Clay Portion)									

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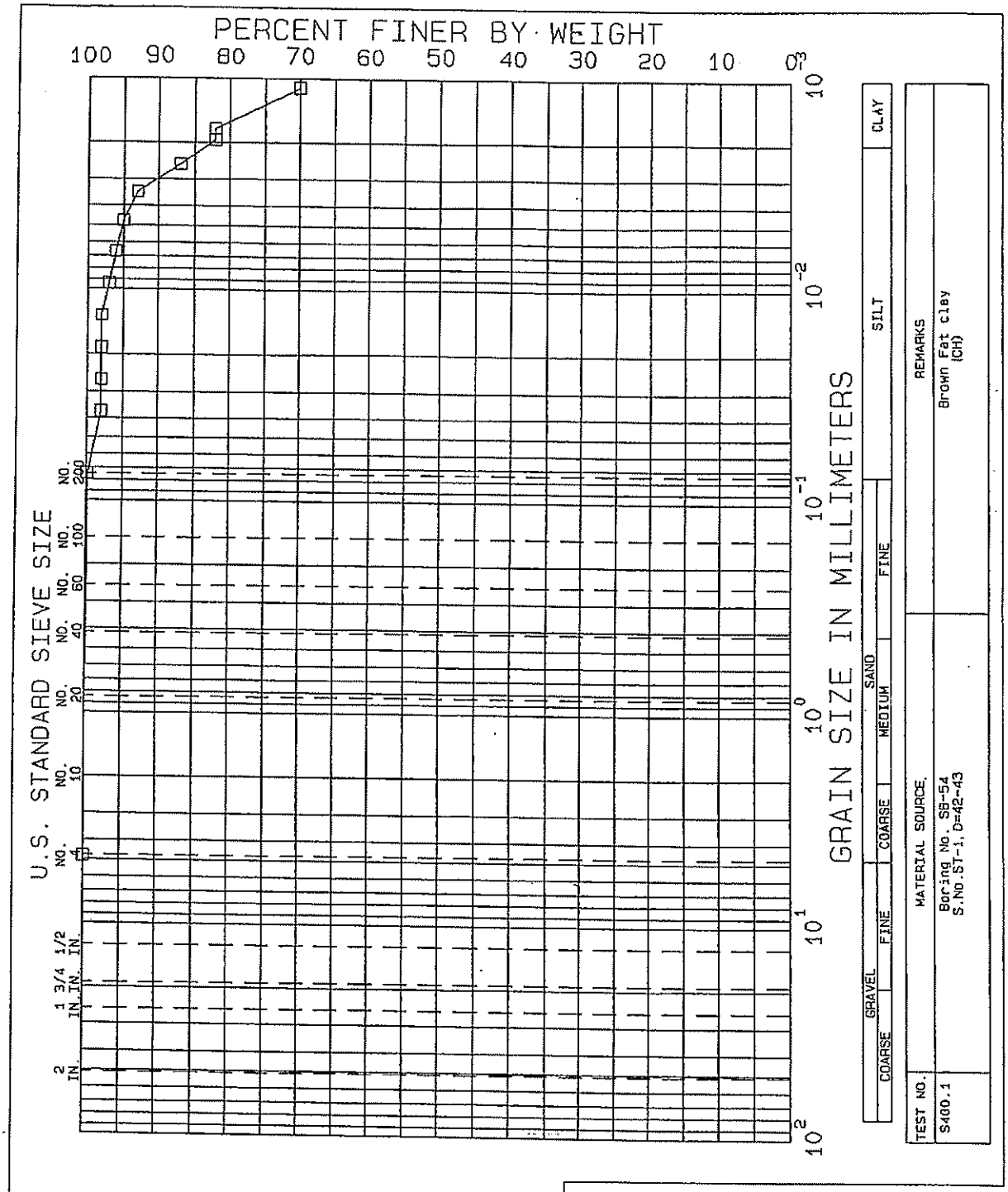
labform1.xls

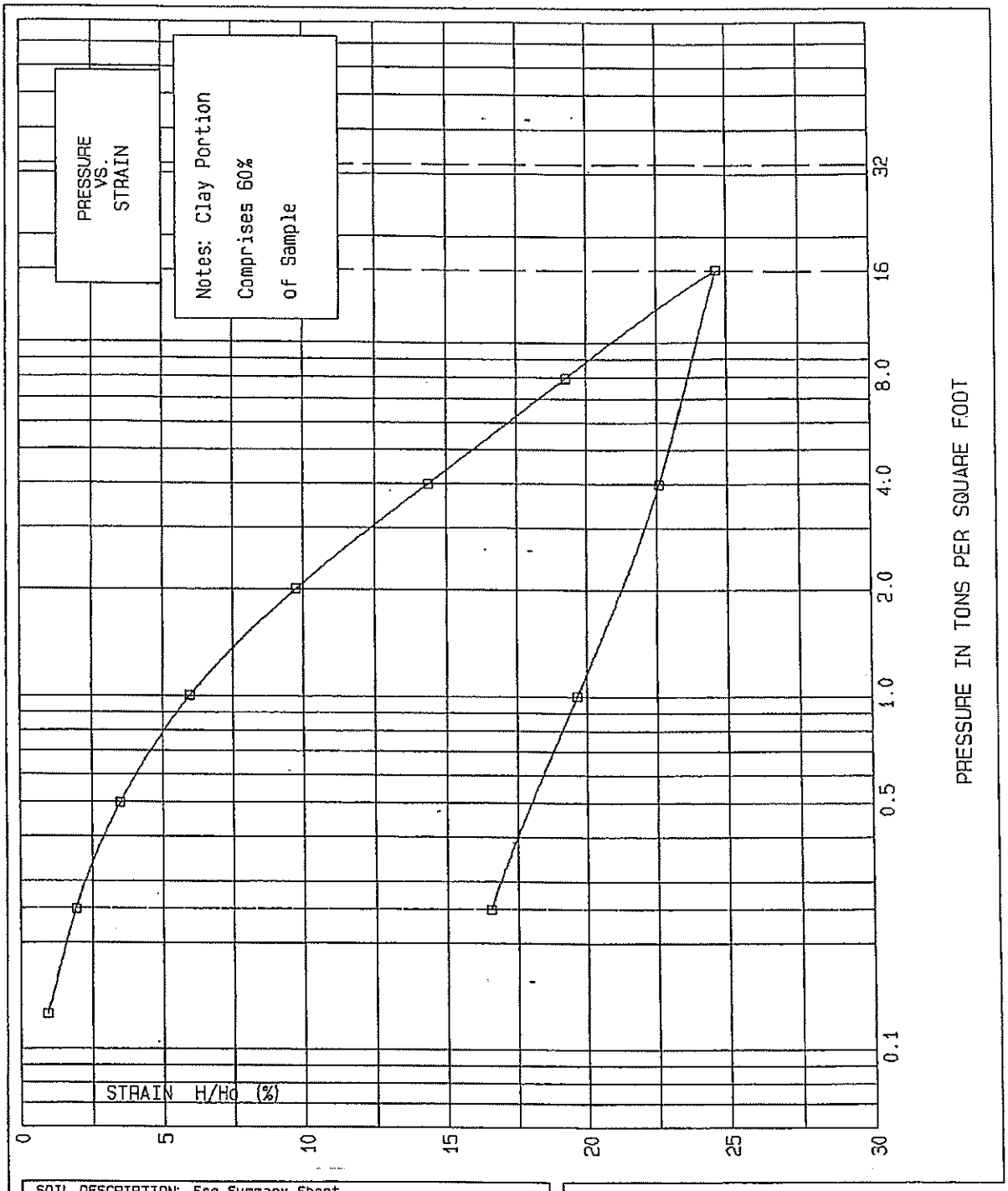


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-54	TEST SERIES	
SAMPLE	ST-1	NO.	400
DEPTH	42-43'	DATE	Feb.04
TECH.	CAG		
REVIEWER	MBP	FILE	L17828



SOIL DESCRIPTION: See Summary Sheet

SAMPLE DIAM.	LIQUID LIMIT	PLASTIC LIMIT	SPECIFIC GRAVITY
2.5 IN.	76 %	30 %	2.84

	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	VOID RATIO	SATURATION, %	SAMPLE HEIGHT, INCH
INITIAL	55.70	69.84			0.80
FINAL	41.10	83.64			0.67

New Britain-Hartford Busway

CONSOLIDATION TEST

BORING NO.	SB-54	TEST SERIES NO.	C400
SAMPLE	ST-1	DATE	2/12/04
DEPTH	43.6-43.7'		
TECH.	MST		
REVIEWER	DAS	FILE	17828

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

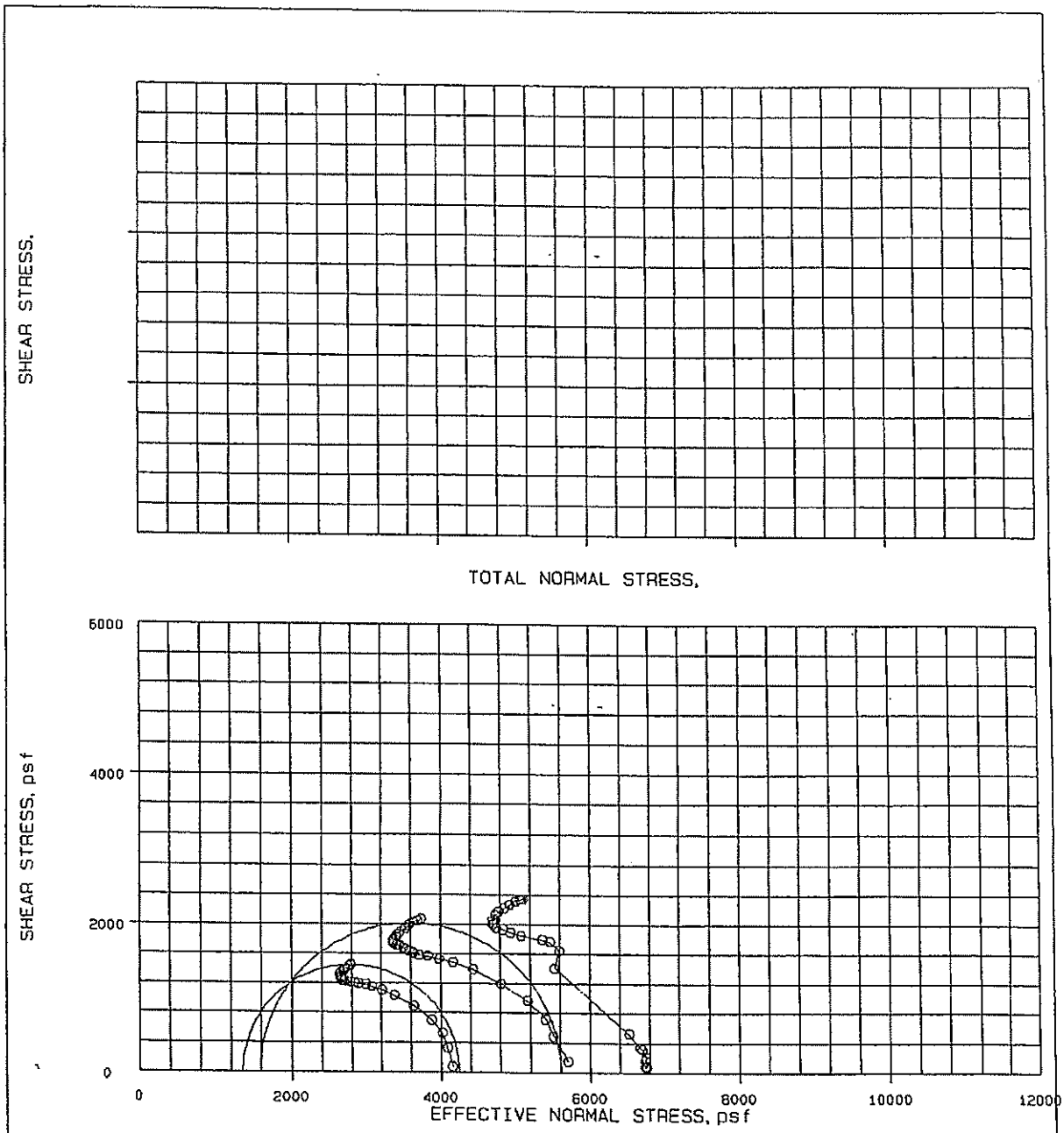
Job Number 17828
Project Name ..... New Britain-Hartford Busway
Test Number C400
Sample Description .. See Summary Sheet
Boring Number SB-54
Sample Number ST-1
Depth ..... 43.6-43.7'

Technician ..... MST
Reviewer ..... DAS

NOTES: Clay Portion
Comprises 60%
of Sample

Specific Gravity ..... 2.8400E+00
Sample Dry Weight ..... 7.1990E+01
Sample Diameter ..... 2.5000E+00
Initial Void Ratio ..... 0.0000E+00
Initial Sample Height 8.0000E-01
Final Sample Height 6.6800E-01
Initial Water Content .... 5.5700E+01
Final Water Content ..... 4.1100E+01
Liquid Limit ..... 7.6000E+01
Plastic Limit ..... 3.0000E+01
Initial Saturation ..... 0.0000E+00
Final Saturation ..... 0.0000E+00
T50 data excluded
T90 data included

Increment umber	Pressure (TSF)	Final Dial	Percent Strain	Void Ratio	T90 (min)	Cv (T90) (/10000) cm²/sec	C_α
1	0.000	0.0	0.00	1.538			
2	0.125	73.0	0.91	1.514			
3	0.250	155.0	1.94	1.488	6.2	22.87	
4	0.500	281.0	3.51	1.448	4.4	31.37	0.0016
5	1.000	478.0	5.97	1.386	3.6	36.77	
6	2.000	778.0	9.72	1.291	6.3	19.66	0.0040
7	4.000	1151.0	14.39	1.172	6.8	16.59	
8	8.000	1540.0	19.25	1.049	4.0	25.24	
9	16.000	1971.0	24.64	0.912	3.2	27.78	0.0053
10	4.000	1808.0	22.60	0.964			
11	1.000	1571.0	19.64	1.039			
12	0.250	1323.0	16.54	1.118			



SOIL DESCRIPTION:	See Summary Sheet		
LIQUID LIMIT 0 %	PLASTIC LIMIT 0	SPECIFIC GRAVITY 0	

FAILURE CRITERIA

REMARKS

σ_1/σ_3

NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

MOHR STRENGTH ENVELOPE

TRIAXIAL COMPRESSION TESTS (CIU)

FIGURE

BORING NO	SB-54	TEST SERIES NO.	400
SAMPLE	ST-1	DATE	Feb.04
DEPTH	43.0-43.5'		
TECH.	MST		
REVIEWER		FILE	L17828

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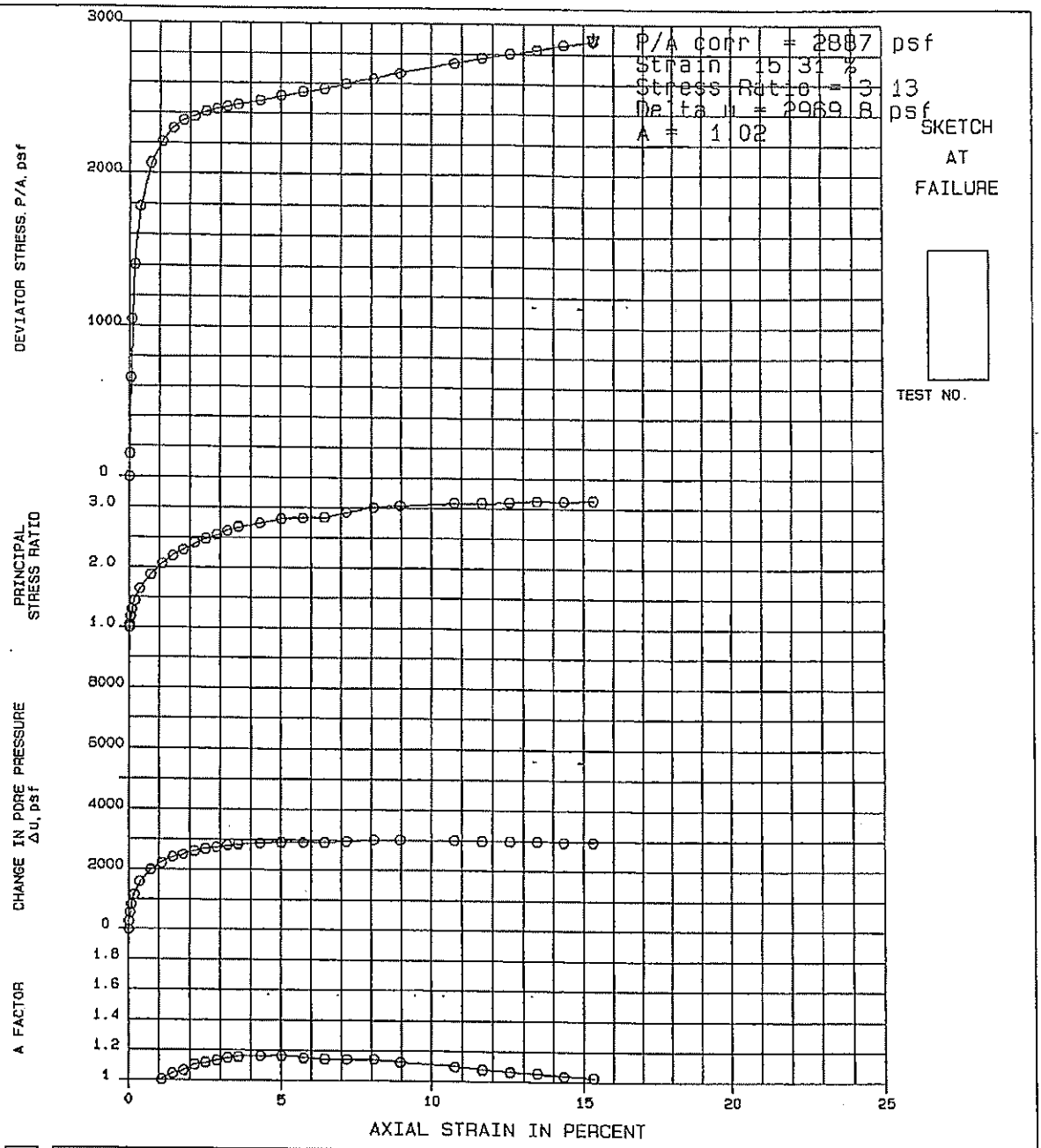


TEST NO./SYMBOL	INITIAL CONDITIONS: INITIAL WATER CONTENT, %	INITIAL CONDITIONS: INITIAL DRY UNIT WEIGHT, pcf	INITIAL CONDITIONS: SAMPLE HEIGHT & DIAMETER, IN.	CONDITIONS BEFORE SHEAR: INITIAL STRESSES $\bar{\sigma}_1 = \bar{\sigma}_3$, ksf	CONDITIONS BEFORE SHEAR: FINAL BACK PRESSURE, ksf	CONDITIONS BEFORE SHEAR: VOLUMETRIC STRAIN, %	CONDITIONS BEFORE SHEAR: PORE PRESSURE RESPONSE, %	FINAL CONDITIONS: FINAL WATER CONTENT, %	FINAL CONDITIONS: FINAL DRY UNIT WEIGHT,	RATE OF STRAIN, PERCENT PER MINUTE
400.1.1	48.2	74.9	5.698 2.825	4.32	8.64	6.2	98.2	43.8	79.9	.042

SOIL DESCRIPTION: See Summary Sheet

LIQUID LIMIT	PLASTIC LIMIT	SPECIFIC GRAVITY
0 %	0 %	0

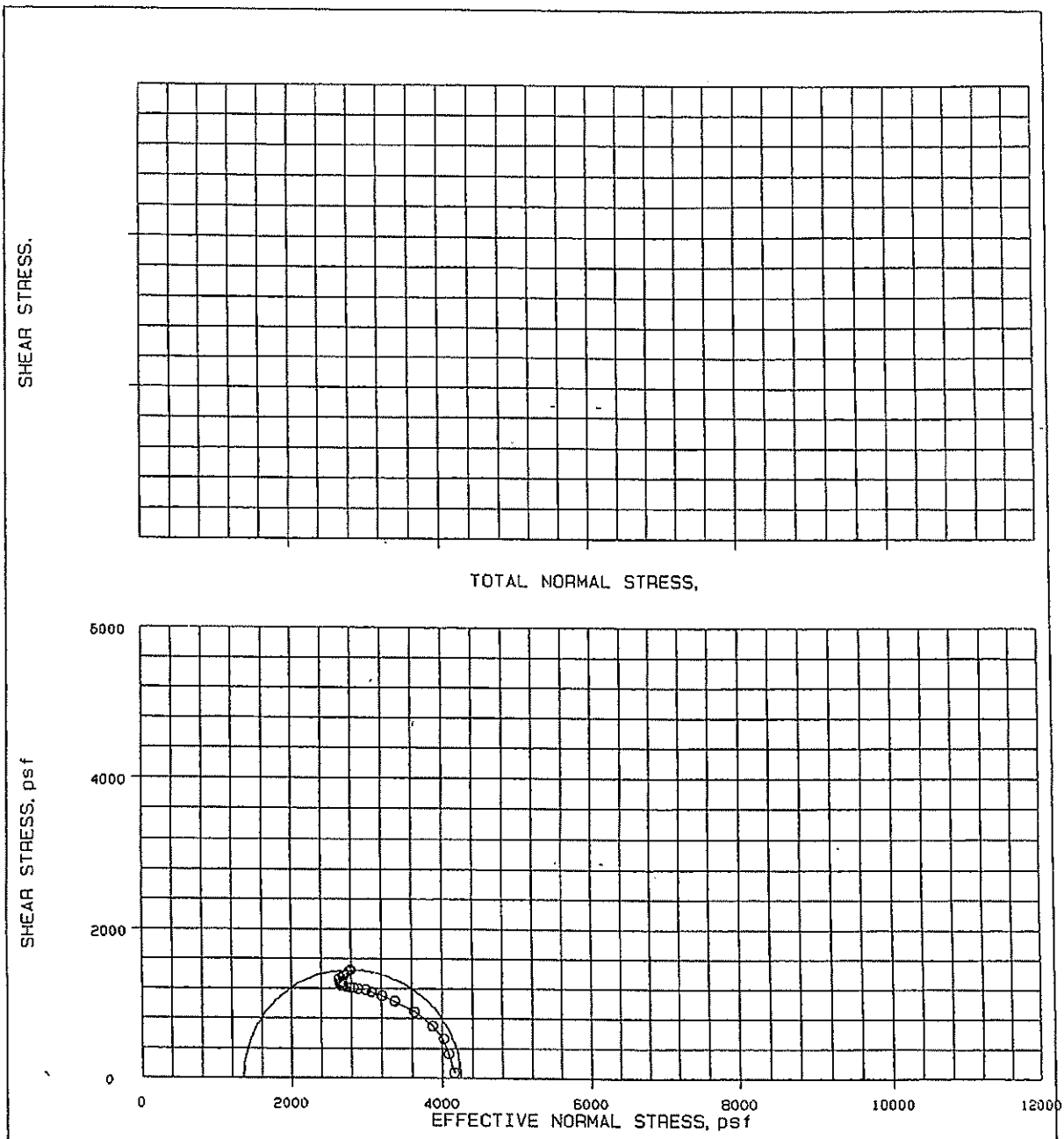
NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
TRIAXIAL COMPRESSION TESTS (CIU)

BORING NO.	SB-54	TEST SERIES NO.	400
SAMPLE	ST-1	DATE	Feb.04
DEPTH	42.0-42.5'		
TECH.	MST		
REVIEWER		FILE	L17828

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

T.9



SOIL DESCRIPTION:	See Summary Sheet				
LIQUID LIMIT	0 %	PLASTIC LIMIT	0	SPECIFIC GRAVITY	0

FAILURE CRITERIA

REMARKS σ_1'/σ_3'

NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

MOHR STRENGTH ENVELOPE

TRIAXIAL COMPRESSION TESTS (CIU)

FIGURE

BORING NO.	S8-54	TEST SERIES NO.	400
SAMPLE	ST-1	DATE	Feb.04
DEPTH	42.0-42.5'		
TECH.	MST		
REVIEWER		FILE	L1782B

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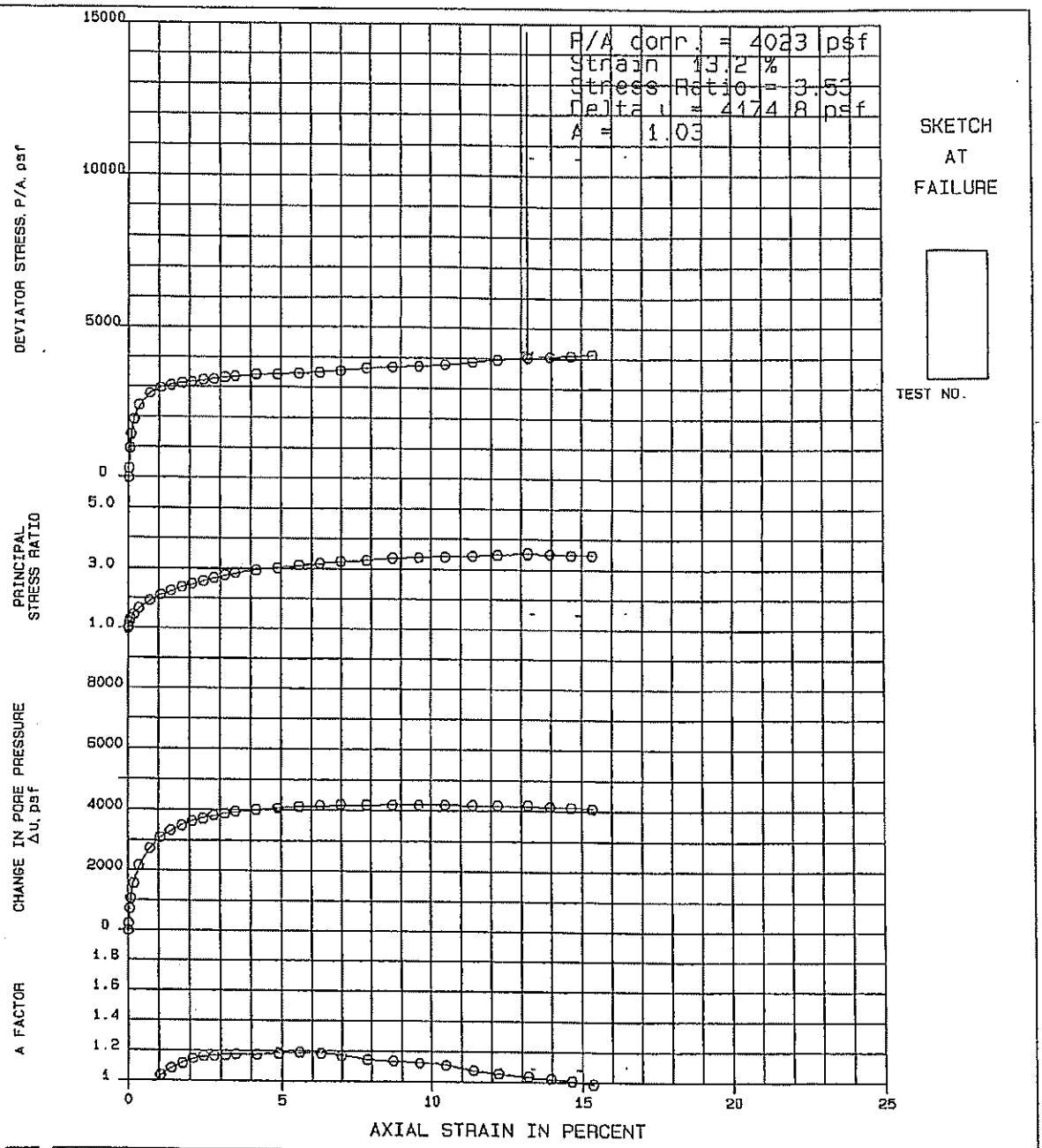


TEST NO./SYMBOL	INITIAL CONDITIONS: INITIAL WATER CONTENT, %	INITIAL CONDITIONS: INITIAL DRY UNIT WEIGHT, pcf	INITIAL CONDITIONS: SAMPLE HEIGHT & DIAMETER, IN.	CONDITIONS BEFORE SHEAR: INITIAL STRESSES $\bar{\sigma}_1 = \bar{\sigma}_3$, ksf	CONDITIONS BEFORE SHEAR: FINAL BACK PRESSURE, ksf	CONDITIONS BEFORE SHEAR: VOLUMETRIC STRAIN, %	CONDITIONS BEFORE SHEAR: PORE PRESSURE RESPONSE, %	FINAL CONDITIONS: FINAL WATER CONTENT, %	FINAL CONDITIONS: FINAL DRY UNIT WEIGHT,	RATE OF STRAIN, PERCENT PER MINUTE
400.1.2	45.9	76.8	5.875 2.825	5.75	8.64	7.2	97.8	40.6	82.8	.051

SOIL DESCRIPTION: See Summary Sheet

LIQUID LIMIT 0 % PLASTIC LIMIT 0 % SPECIFIC GRAVITY 0

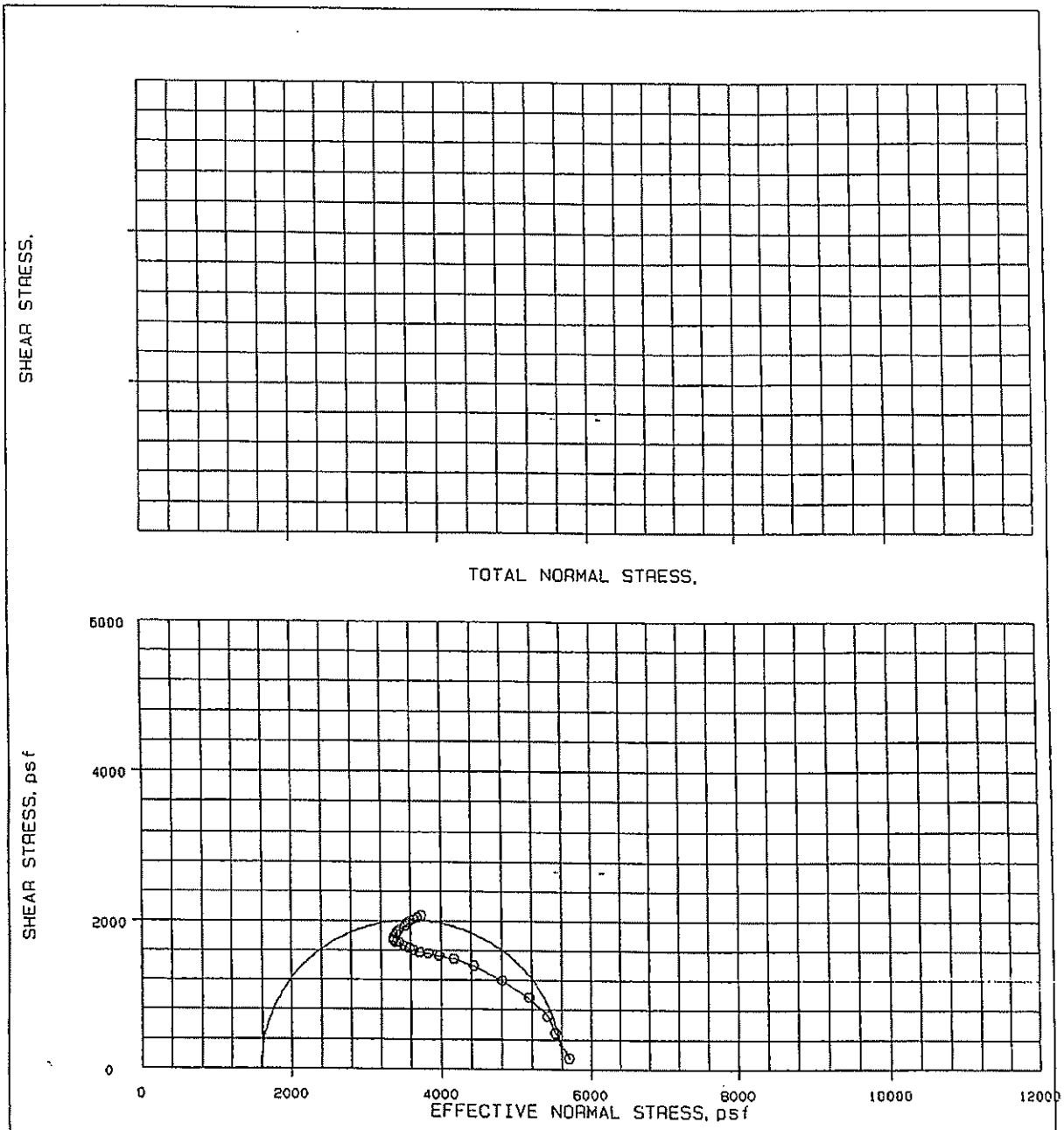
NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
TRIAXIAL COMPRESSION TESTS ($\overline{CIU}$)

BORING NO. SB-54
SAMPLE ST-1
DEPTH 42.5-43.0'
TECH. MST
REVIEWER

TEST SERIES NO. 400
DATE Feb.04
FILE L17828

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



SOIL DESCRIPTION:	See Summary Sheet	
LIQUID LIMIT 0 %	PLASTIC LIMIT 0	SPECIFIC GRAVITY 0

FAILURE CRITERIA

REMARKS

σ_1/σ_3

NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

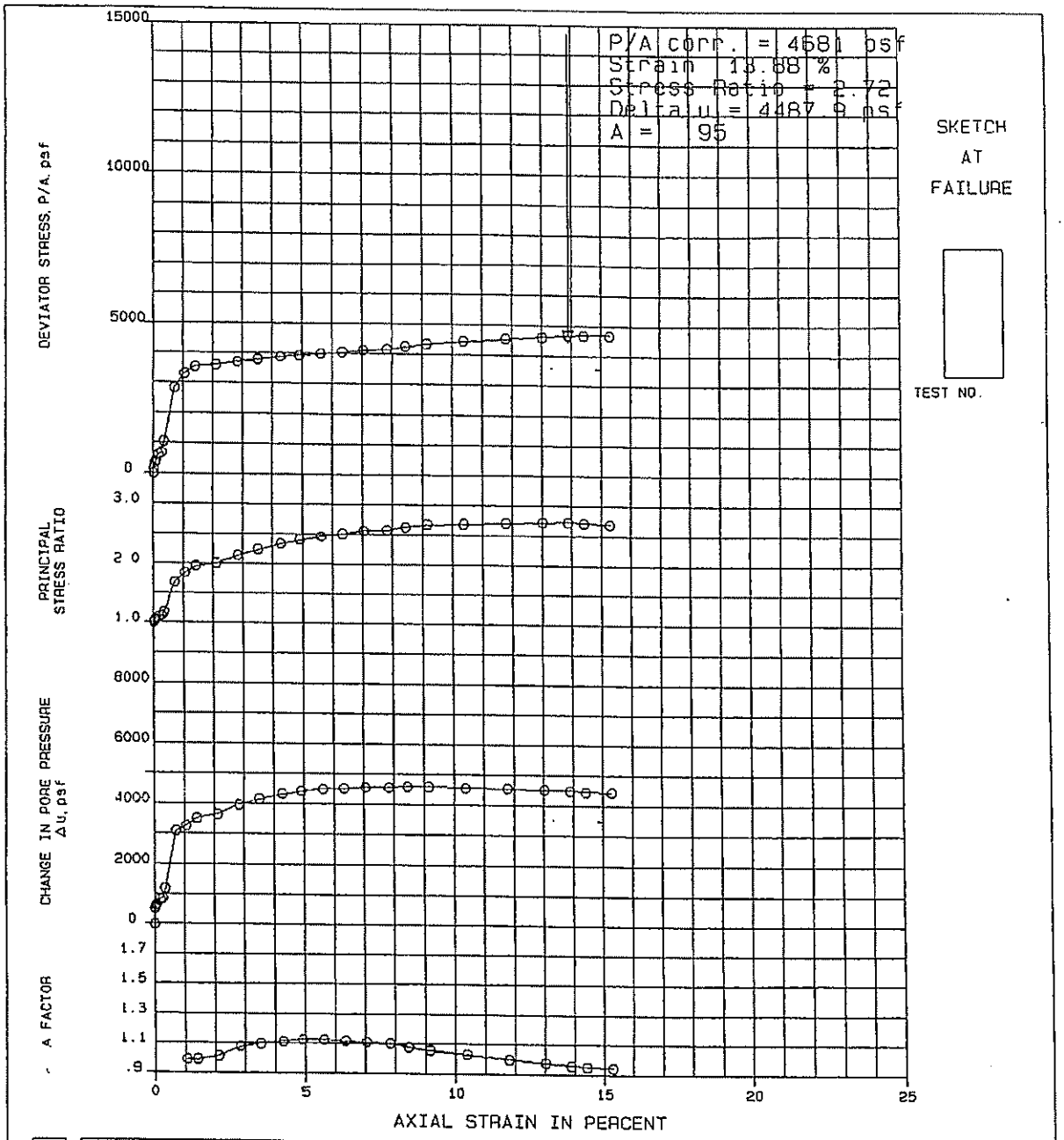
MOHR STRENGTH ENVELOPE

TRIAXIAL COMPRESSION TESTS (CIU)

FIGURE

BORING NO.	SB-54	TEST SERIES NO.	400
SAMPLE	ST-1	DATE	Feb.04
DEPTH	42.5-43.0'		
TECH.	MST		
REVIEWER		FILE	L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



TEST NO /SYMBOL	INITIAL CONDITIONS: INITIAL WATER CONTENT, %	INITIAL CONDITIONS: INITIAL DRY UNIT WEIGHT, pcf	INITIAL CONDITIONS: SAMPLE HEIGHT & DIAMETER, IN.	CONDITIONS BEFORE SHEAR: INITIAL STRESSES $\bar{\sigma}_1 = \bar{\sigma}_3$, ksf	CONDITIONS BEFORE SHEAR: FINAL BACK PRESSURE, ksf	CONDITIONS BEFORE SHEAR: VOLUMETRIC STRAIN, %	CONDITIONS BEFORE SHEAR: PORE PRESSURE RESPONSE, %	FINAL CONDITIONS: FINAL WATER CONTENT, %	FINAL CONDITIONS: FINAL DRY UNIT WEIGHT,	RATE OF STRAIN, PERCENT PER MINUTE
400.1.3	46.1	76.6	5.855 2.81	7.2	8.64	8.4	94	38.7	83.7	.031

SOIL DESCRIPTION: See Summary Sheet

LIQUID LIMIT 0 % PLASTIC LIMIT 0 % SPECIFIC GRAVITY 0

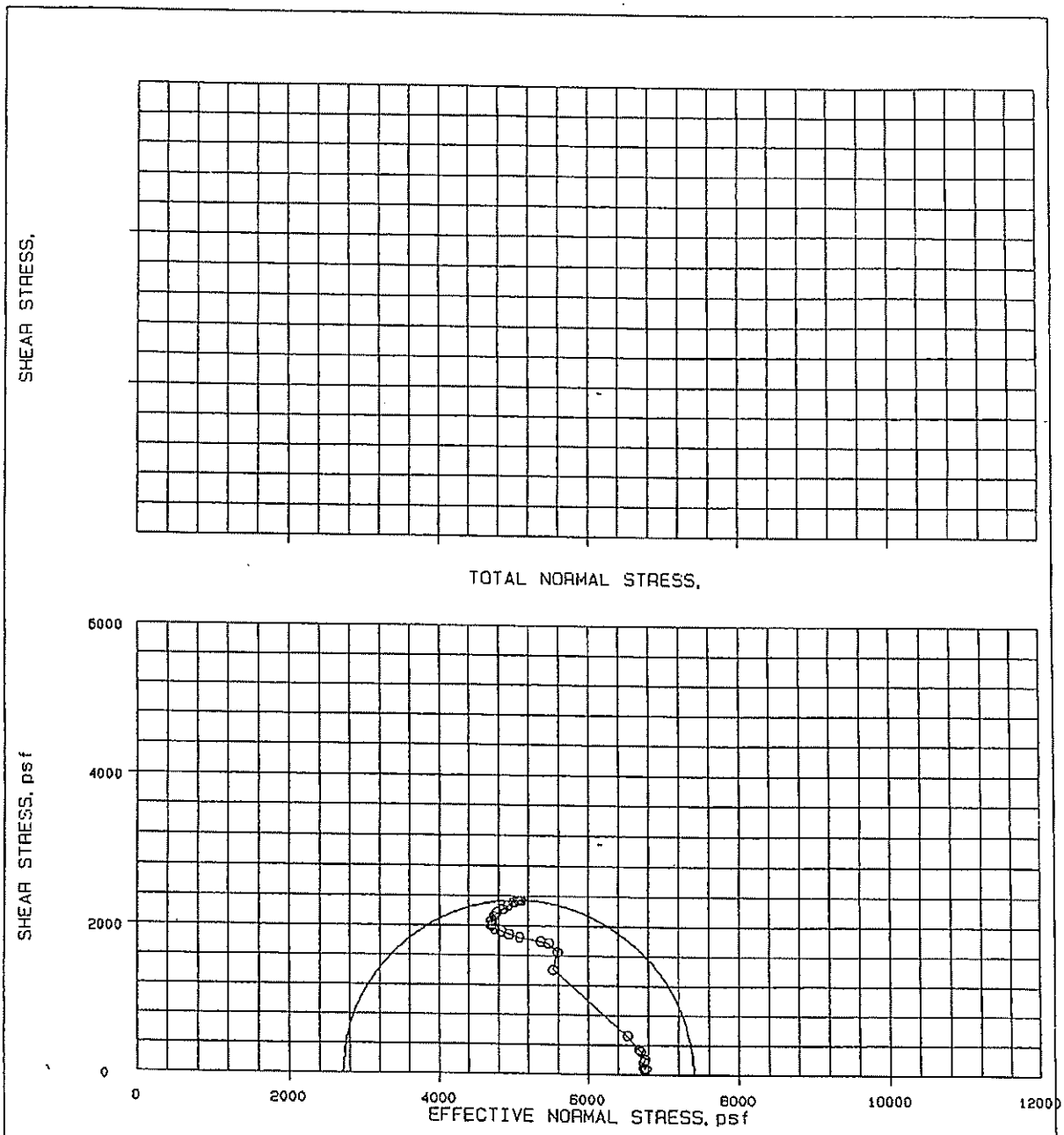
NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
TRIAXIAL COMPRESSION TESTS ($\overline{CIU}$)

BORING NO SB-54
SAMPLE SI-1
DEPTH 43.0-43.5'
TECH. MST
REVIEWER

TEST SERIES NO. 400
DATE Feb.04
FILE L17828

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



SOIL DESCRIPTION:	See Summary Sheet	
LIQUID LIMIT 0 %	PLASTIC LIMIT 0	SPECIFIC GRAVITY 0

FAILURE CRITERIA

REMARKS

σ_1/σ_3

NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

MOHR STRENGTH ENVELOPE

TRIAXIAL COMPRESSION TESTS (CIU)

FIGURE

BORING NO.	SB-54	TEST SERIES NO.	400
SAMPLE	ST-1	DATE	Feb.04
DEPTH	43.0-43.5'		
TECH.	MST		
REVIEWER		FILE	L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

UNCONFINED COMPRESSION TEST

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828 — Assigned By: D. Gaffney — Reviewed By: Don Schulze
Project Engineer: D. SCHULZE — Date: Mar.04 — Date Reviewed: 3/8/04

Boring/ Test Pit No.	Sample No.	Depth Ft.	Lab No.	Sample Data: Water Content %	Do in.	L in.	(1) Unit Wt. PCF	(2) Wet Density PCF	Bulk Gs.	(3) Other Tests	Compression Tests: (4) Strength KSI	(5) Strain %	(6) Conf. Stress	(7) E tan PSI EE+06	(8) E sec PSI EE+06	(9) Poisson's Ratio	σT KSI	Is50 KSI	Rock Formation or Description or Remarks
SB-25		33.8-34.3	428		1.993	4.412	164.0			U	7.53								
SB-26		50.2-50.7	429		1.962	4.195	166.5			U	7.77								
SB-27		61.0-61.4	430																Sample not testable due to fracture along bedding plane
SB-28		54.0-54.5	431		1.979	4.495	163.0			U	11.87								
SB-29			432																Sample not received
SB-30			433																Sample not received
SB-31		42.8-43.3	434		1.969	4.205	162.6			U	7.72								
SB-35		30.8-31.4	435		1.974	4.321	162.6			U	9.97								
SB-36		37.9-38.7	436		1.974	4.150	164.2			U	8.01								
SB-42		43.1-43.4	437		1.975	3.691	161.9			U	8.00								
SB-43		27.9-28.4	438																Sample not testable due to fracture along bedding plane

(1) Volume Determined By Measuring Dimensions
(2) Determined by Measuring Dimensions and Weight of Saturated Sample
(3) P=Petrographic PLD=Point Load (diametrical), PLA= Point Load (Axial) RST= Splitting Tensile U= Unconfined Compressive Strength

(4) Taken at Peak Deviator Stress
(5) Strain at Deviator Stress
(6) Represents Confining Stress on Triaxial Tests
(7) Represents Tangent Modulus at 50% of Total Failure Stress
(8) Represents Secant Modulus at 50% of Total Failure Stress
(9) Represents Secant Poisson's Ratio at 50% of Total Failure Stress

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: 1.17828 — Assigned By: D. Gaffney — Reviewed By: [signature]
Project Engineer: D. SCHULZE — Date: Mar.04 — Date Reviewed: 3/11/04

Boring/ Test Pit No.	Sample No.	Depth Ft.	Lab No.	Sample Data: Water Content %	Do in.	L in.	(1) Unit Wt. PCF	(2) Wet Density PCF	Bulk Gs.	(3) Other Tests	Compression Tests: (4) Strength KSI	(5) Strain %	(6) Conf. Stress	(7) E tan PSI EE+06	(8) E sec PSI EE+06	(9) Poisson's Ratio	σ_T KSI	Is_{50} KSI	Rock Formation or Description or Remarks
SB-44		65.0-65.5	439		1.965	4.394	156.9			U	* 4.45								* Sample failed on joint plane
SB-89		27.3-27.7	440		1.961	4.365	159.2			U	7.45								
SB-90		90.8-91.2	441																Sample not testable due to fracture along bedding plane
SB-92		42.0-42.4	442		1.941	3.846	158.7			U	4.73								
SB-95		16.8-17.4	443		1.981	4.314	161.6			U	10.06								
SB-96		16.8-17.3	444																Sample not testable due to fracture along bedding plane
SB-98		21.0-21.5	445		1.971	4.036	160.9			U	6.23								* Sample failed on joint plane
SB-99		37.6-38.0	446																Sample not testable due to fracture along bedding plane
SB-31		43.5-43.9	447		1.974	4.255	161.5			U	6.05								
SB-16		48.3-48.9	448		1.961	4.092	159.5			U	4.47								

(1) Volume Determined By Measuring Dimensions
(2) Determined by Measuring Dimensions and Weight of Saturated Sample
(3) P=Petrographic PLD=Point Load (diametrical). PLA= Point Load (Axial) RST= Splitting Tensile U= Unconfined Compressive Strength
(4) Taken at Peak Deviator Stress
(5) Strain at Deviator Stress
(6) Represents Confining Stress on Triaxial Tests
(7) Represents Tangent Modulus at 50% of Total Failure Stress
(8) Represents Secant Modulus at 50% of Total Failure Stress
(9) Represents Secant Poisson's Ratio at 50% of Total Failure Stress

Corrosivity Test Results

R.I. Analytical Laboratories, Inc.

CERTIFICATE OF ANALYSIS

GZA GeoEnvironmental Labs
Date Received: 02/04/2004
Work Order #: 0402-01543

Approved by: R.I. Analytical

Sample # 003
SAMPLE DESCRIPTION: LAB #411 SB-39 S-2 (4.5-6.0)
SAMPLE TYPE: COMPOSITE SAMPLE DATE/TIME: —

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
pH	7.2		SU	SW-846 9045C	02/04/2004	LKS
RESISTIVITY	0.087		MEGOHM-CM	SM2510 B	02/05/2004	CCP
SULFATE	<160	160	mg/kg dry	SM4500-SO4 E	02/10/2004	EC
SULFIDE	<2.5	2.5	mg/kg dry	EPA 276.2	02/09/2004	EC
CHLORIDE	<160	160	mg/kg dry	SM4500-CL B	02/10/2004	EC

Chloride, Sulfate, and Sulfide - Analysis performed on water soluble portion of sample.

Sulfate and Chloride - Increased detection limit due highly colored sample which interfered with test methodology.

Resistivity - Analyzed 5 grams of sample per 50 mls of Type II DI water.

Sample # 004
SAMPLE DESCRIPTION: LAB #413 COMPOSITE SB-54
SAMPLE TYPE: COMPOSITE SAMPLE DATE/TIME: —

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
pH	6.6		SU	SW-846 9045C	02/04/2004	LKS
RESISTIVITY	0.069		MEGOHM-CM	SM2510 B	02/05/2004	CCP
SULFATE	<420	420	mg/kg dry	SM4500-SO4 E	02/10/2004	EC
SULFIDE	<2.5	2.5	mg/kg dry	EPA 276.2	02/09/2004	EC
CHLORIDE	<830	830	mg/kg dry	SM4500-CL B	02/10/2004	EC

Chloride, Sulfate, and Sulfide - Analysis performed on water soluble portion of sample.

Sulfate and Chloride - Increased detection limit due highly colored sample which interfered with test methodology.

Resistivity - Analyzed 5 grams of sample per 50 mls of Type II DI water.

R.I. Analytical Laboratories, Inc.

CERTIFICATE OF ANALYSIS

GZA GeoEnvironmental Labs
Date Received: 02/04/2004
Work Order #: 0402-01543

Approved by: R.I. Analytical

Sample # 010
SAMPLE DESCRIPTION: LAB #414 SB-54 S-8 (22.5-24.5)
SAMPLE TYPE: COMPOSITE
SAMPLE DATE/TIME: ---

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
pH	7.4		SU	SW-846 9045C	02/04/2004	LKS
RESISTIVITY	0.026		MEGOHM-CM	SM2510 B	02/05/2004	CCP

Resistivity - Analyzed 5 grams of sample per 50 mls of Type II DI water.

Sample # 011
SAMPLE DESCRIPTION: LAB #416 SB-59 S-7 (19.5-21.0)
SAMPLE TYPE: COMPOSITE
SAMPLE DATE/TIME: ---

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
pH	7.7		SU	SW-846 9045C	02/04/2004	LKS
RESISTIVITY	0.013		MEGOHM-CM	SM2510 B	02/05/2004	CCP

Resistivity - Analyzed 5 grams of sample per 50 mls of Type II DI water.

APPENDIX D

Laboratory Testing Performed by Others

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

Project No.: L17828 | Assigned By: D. GAFFNEY | Reviewed By: Matthew Page

Project Engineer: D. SCHULZE | Date: NOV.03 | Date Reviewed: 11/11/03

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) / W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol.: $\frac{\Delta e}{1 + e_0}$	Laboratory Log and Soil Description
RB-26	S-6	16.5-18.0	248	9.2																
RB-27	S-2	4.5-6.0	249	15.8																
RB-27	S-5	13.5-15.0	250	26.2																
RB-28	S-4	10.0-11.5	251	19.1																
RB-28	S-9	25.0-26.5	252	27.2																
RB-29	S-2	4.5-6.0	253	28.7																
RB-30	S-3	7.5-9.0	254	31.7																
RB-30	S-6	16.5-18.0	255	44.2																
RB-31	S-9	25.0-26.5	256	38.5																
RB-32	S-2	4.5-6.0	257	38.1																
RB-32	S-9	25.0-26.5	258	21.5																
RB-33	S-6	16.5-18.0	259	44.7																
RB-34	S-9	25.0-26.5	260	60.6																
RB-35	S-3	7.5-9.0	261	38.7																
RB-35	S-9	25.5-27.0	262	55.6																

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828
Project Engineer: D. SCHULZE
Assigned By: D. GAFFNEY
Date: NOV.03
Reviewed By: [signature]
Date Reviewed: 11/11/03

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) / W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol.: $\frac{\Delta e}{1 + e_0}$	Laboratory Log and Soil Description
SB-40	S-3	7.5-9.0	275	21.1																
SB-40	S-11	35.0-36.5	276	29.9																
SB-40	S-13	45.0-46.5	277	30.4																
SB-41	S-2	4.5-6.0	278	21.3																
SB-42	S-3	7.5-9.0	279	26.8																
SB-42	S-9	25.5-26.2	280	10.8																
SB-43	S-2	4.5-6.0	281	25.4																
SB-44	S-9	25.0-26.5	282	47.6																
SB-46	S-11	35.0-36.5	283	48.7																
SB-46	S-15	55.0-56.5	284	18.8																
SB-47	S-4	10.0-11.5	285	48.5																
SB-47	S-14	50.0-51.5	286	11.7																
SB-48	S-3	7.5-9.0	287	55.5																
SB-49	S-5	13.5-15.0	288	35.4																

LABORATORY TESTING DATA SHEET

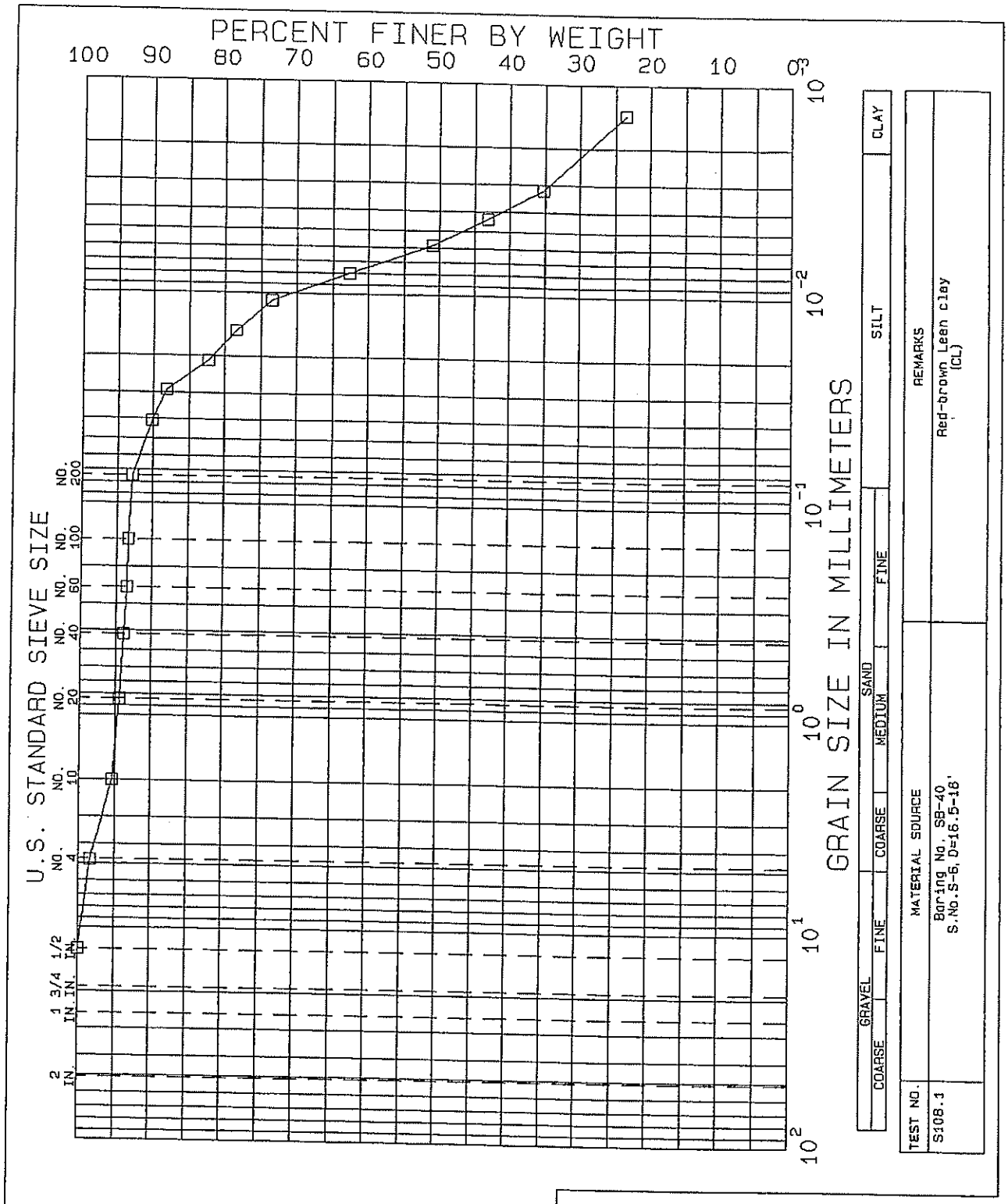
Project Name: NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

Project No.: L17828 | Assigned By: D. GAFFNEY | Reviewed By: Matthew Colby

Project Engineer: D. SCHULZE | Date: NOV.03 | Date Reviewed: 11/11/03

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) / W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol.: $\frac{C_c}{1+e_0}$	Laboratory Log and Soil Description
SB-50	S-2	4.5-6.0	289	32.6																
SB-50	S-10	28.5-30.0	290	55.5																
SB-51	S-5	13.5-15.0	291	49.0																
SB-51	S-13	45.0-46.5	292	21.1																
SB-52	S-10	28.5-30.0	293	23.8																
SB-53	S-13	45.0-46.5	294	41.2																
SB-54	S-21	85.0-86.5	295	24.3																
SB-55	S-10	28.5-30.0	296	54.9																
SB-55	S-25	105.0-106.5	297	20.9																
SB-56	S-19	75.0-76.5	298	27.3																
SB-57	S-10	28.5-30.0	299	57.1																
SB-57	S-22	90.0-91.5	300	22.5																
SB-58	S-4	10.0-11.5	301	32.7																
SB-58	S-11	35.0-36.5	302	59.5																

Classifications



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

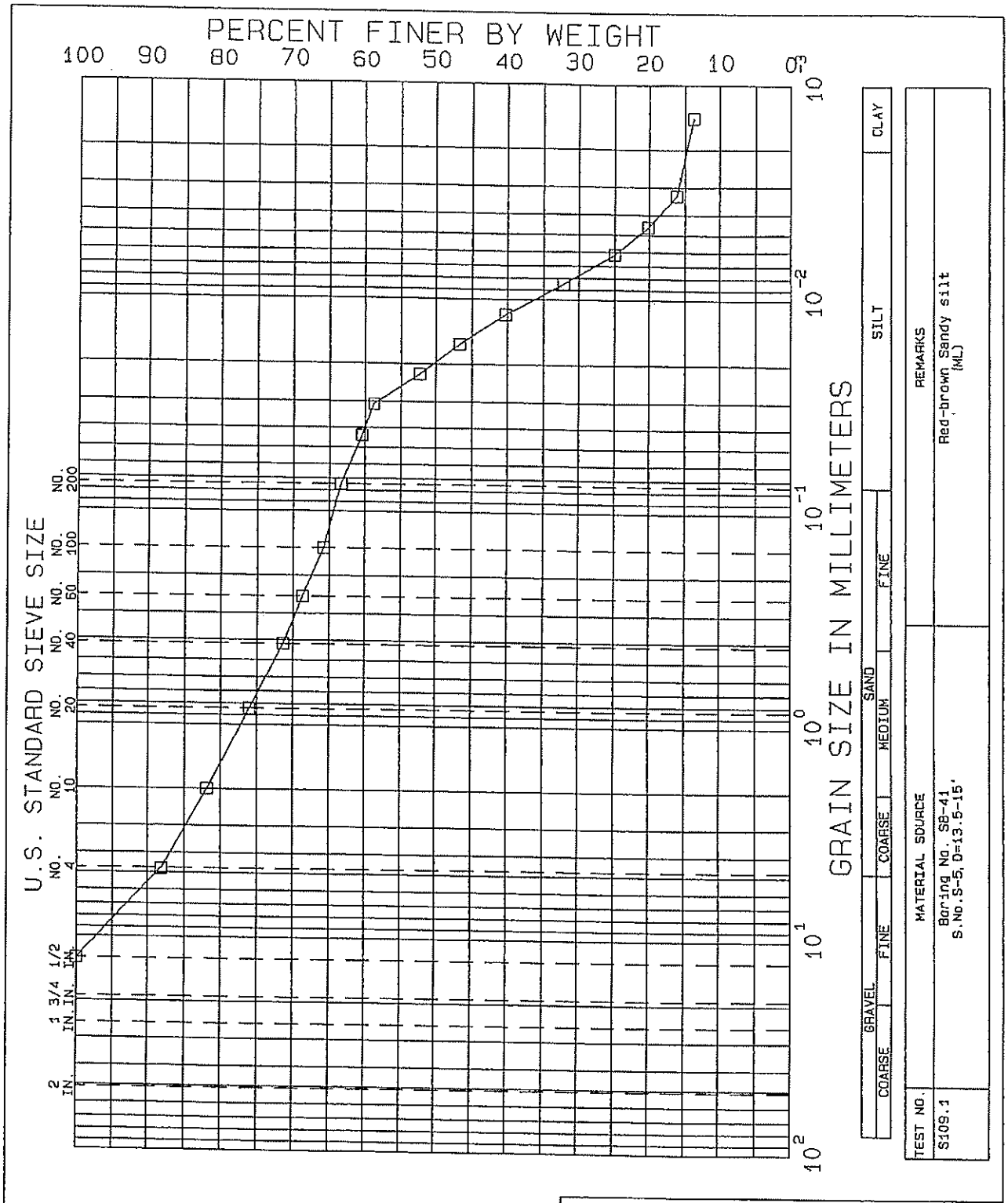
GRADATION TESTS

BORING NO. SB-40
SAMPLE S-6
DEPTH 16.5-18'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO. 108
DATE Nov.03

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

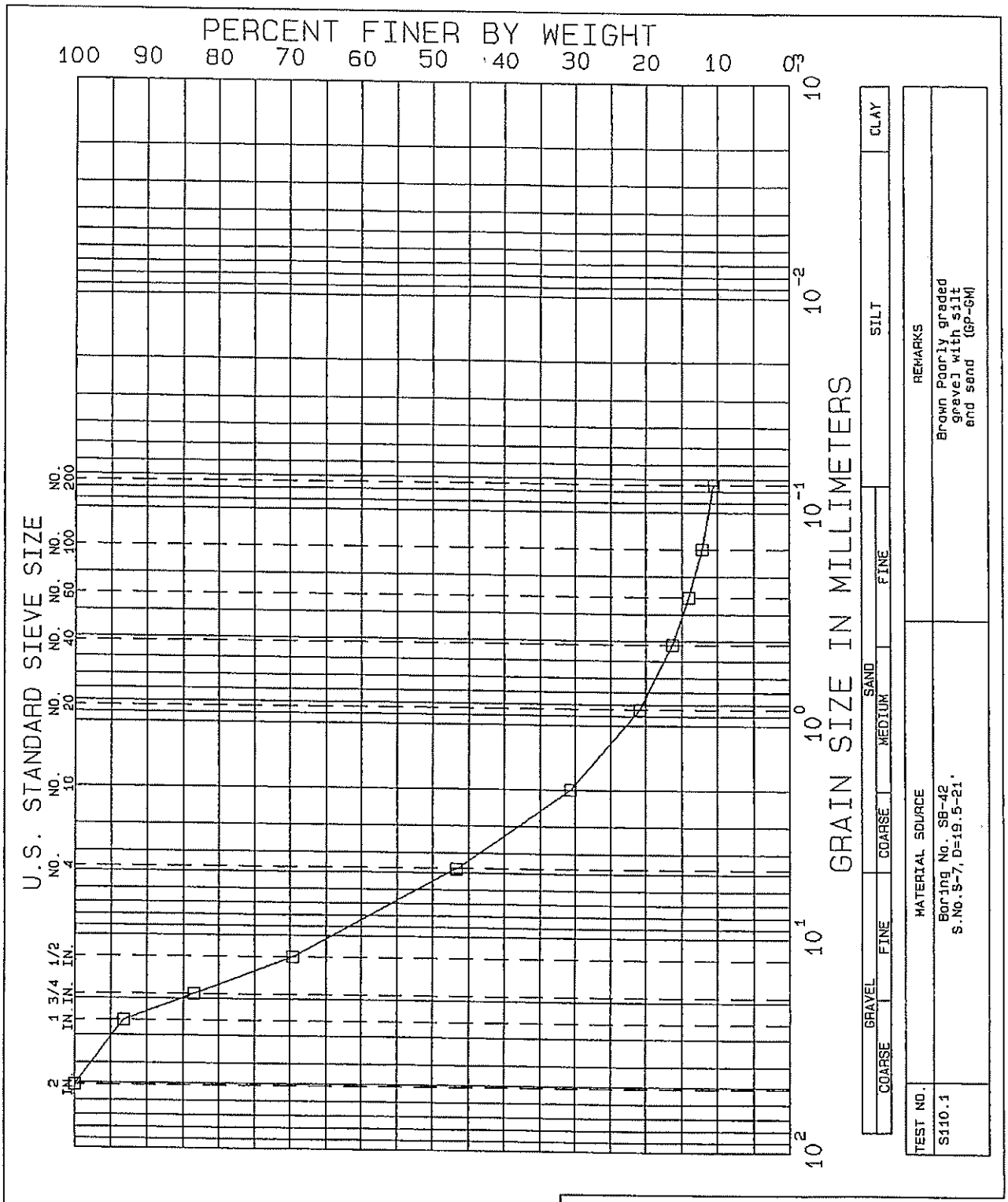
GRADATION TESTS

BORING NO. SB-41
SAMPLE S-5
DEPTH 13.5-15'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO. 109
DATE Nov.03

FILE L17628

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

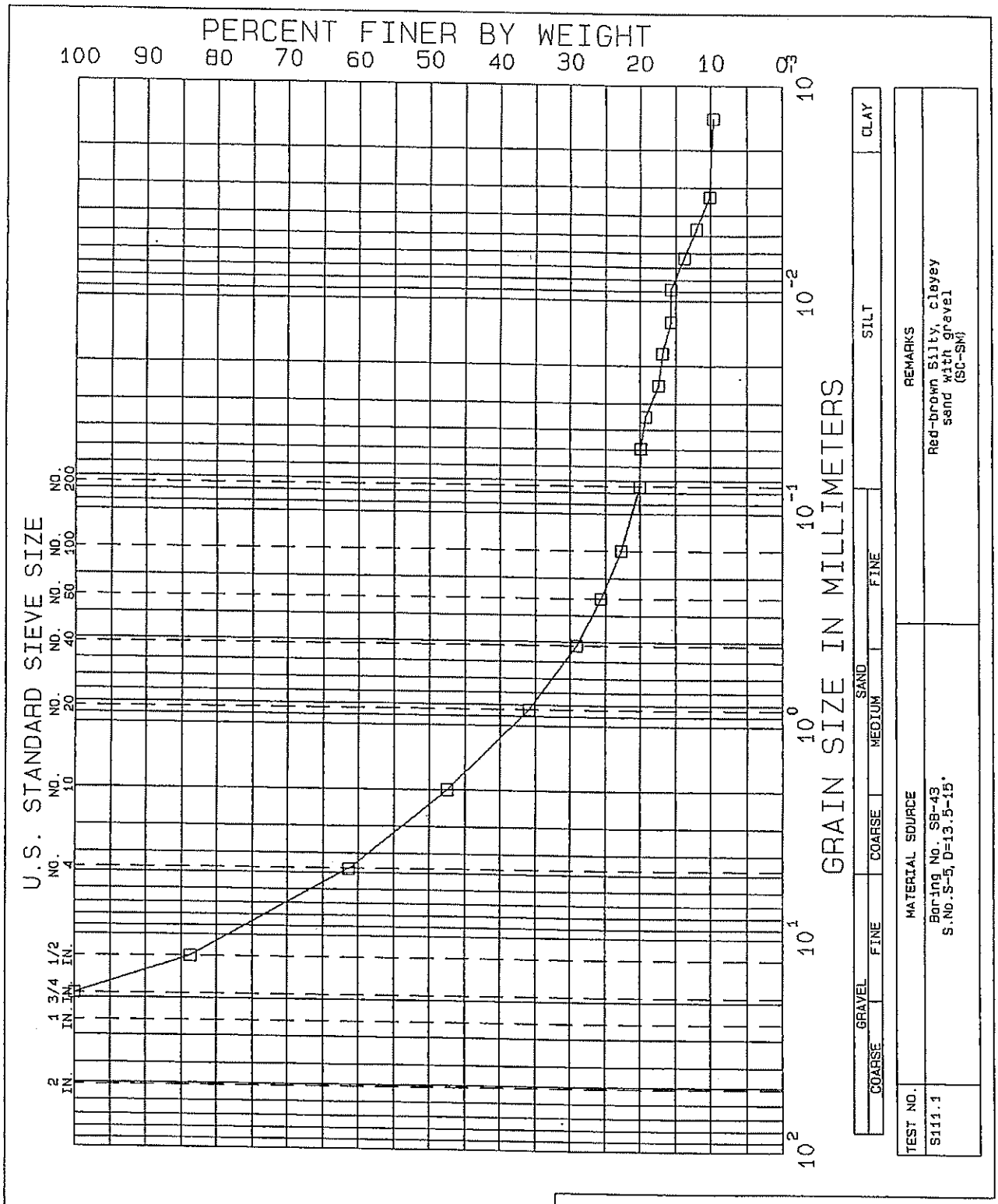


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-42	TEST SERIES	
SAMPLE	S-7	NO.	110
DEPTH	19.5-21'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828



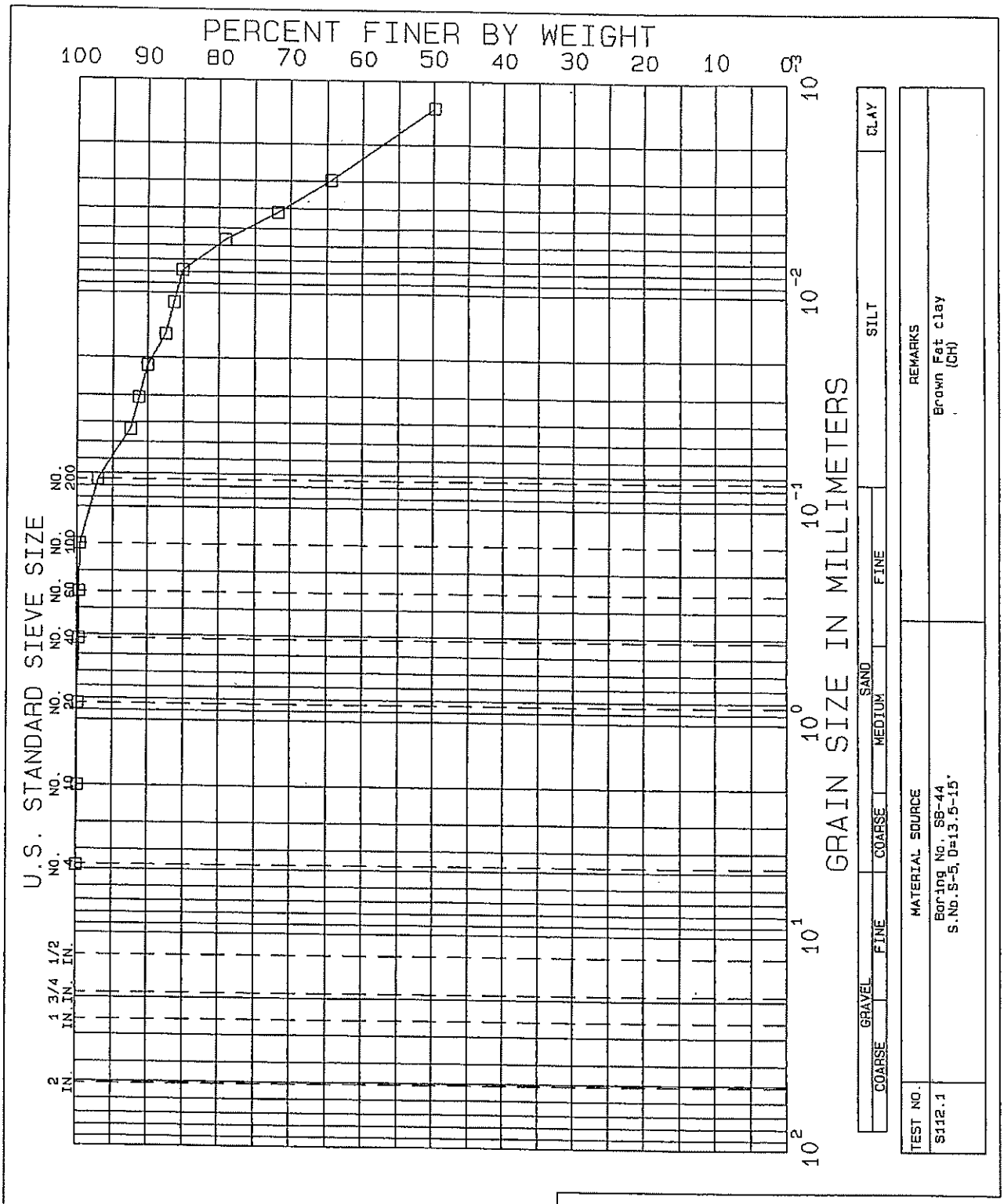
NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-43	TEST SERIES	
SAMPLE	S-5	NO.	111
DEPTH	13.5-15'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17628

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



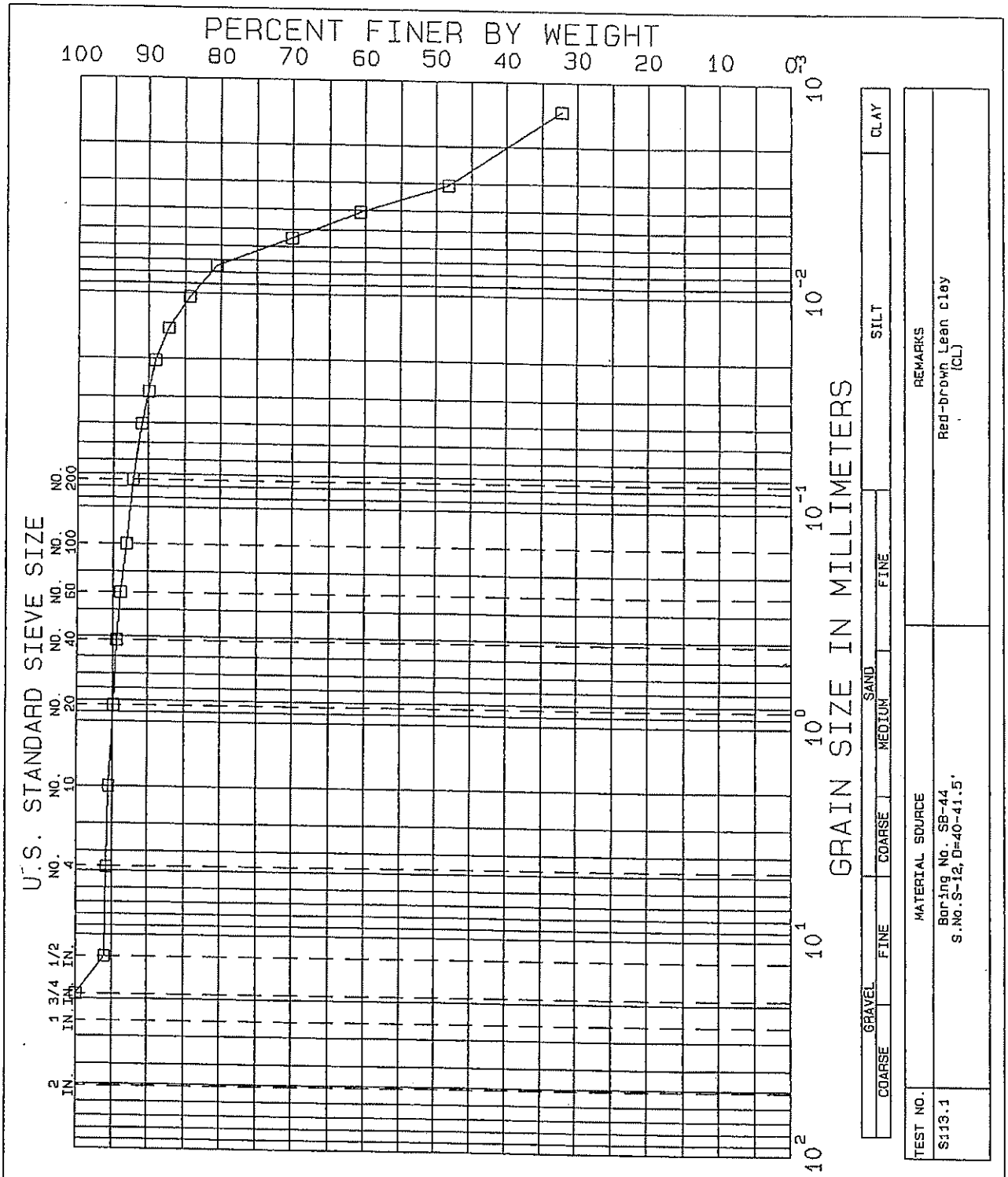
NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-44	TEST SERIES	
SAMPLE	S-5	NO.	112
DEPTH	13.5-15'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17628

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

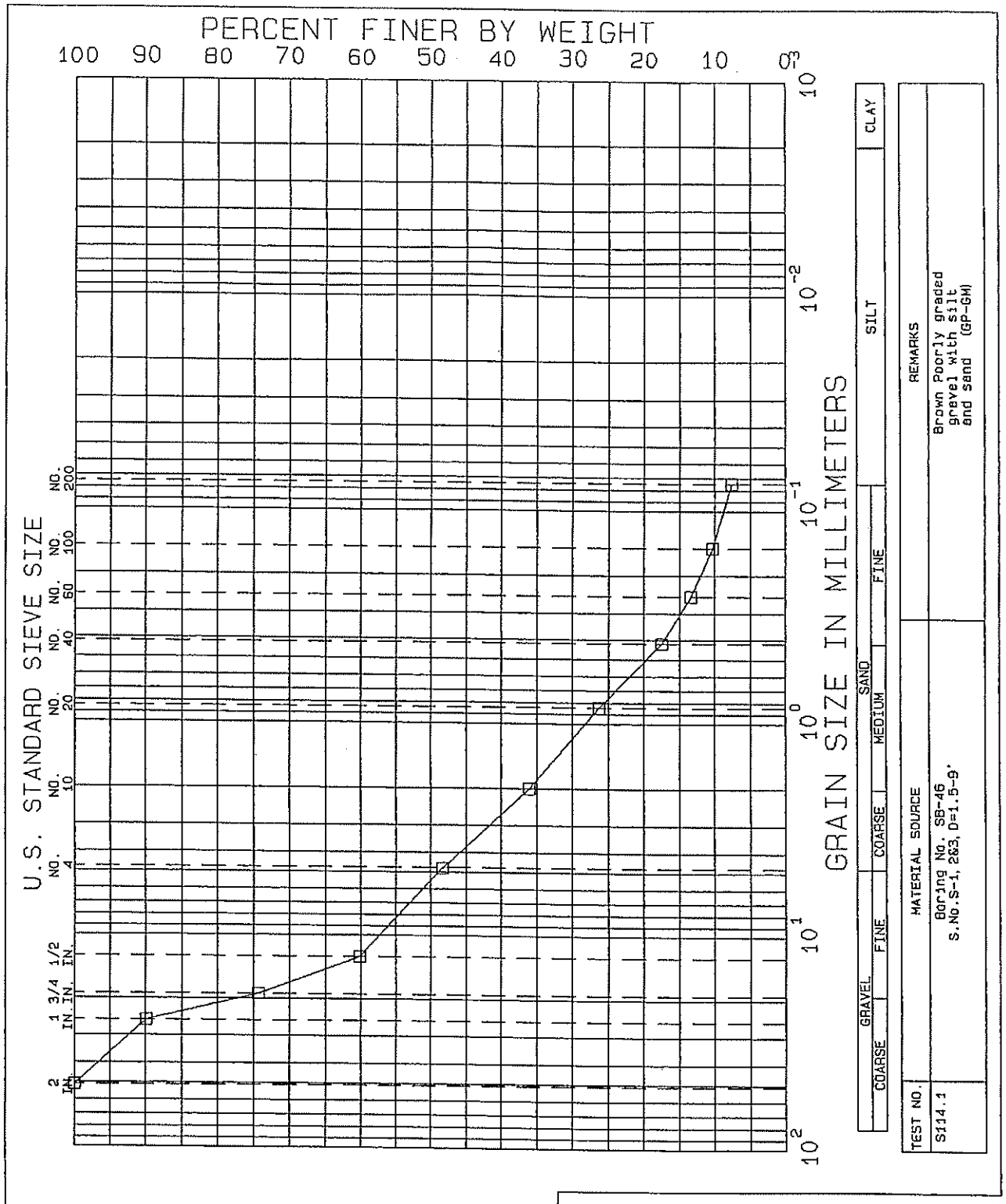


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-44	TEST SERIES	
SAMPLE	S-12	NO.	113
DEPTH	40-41.5'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828

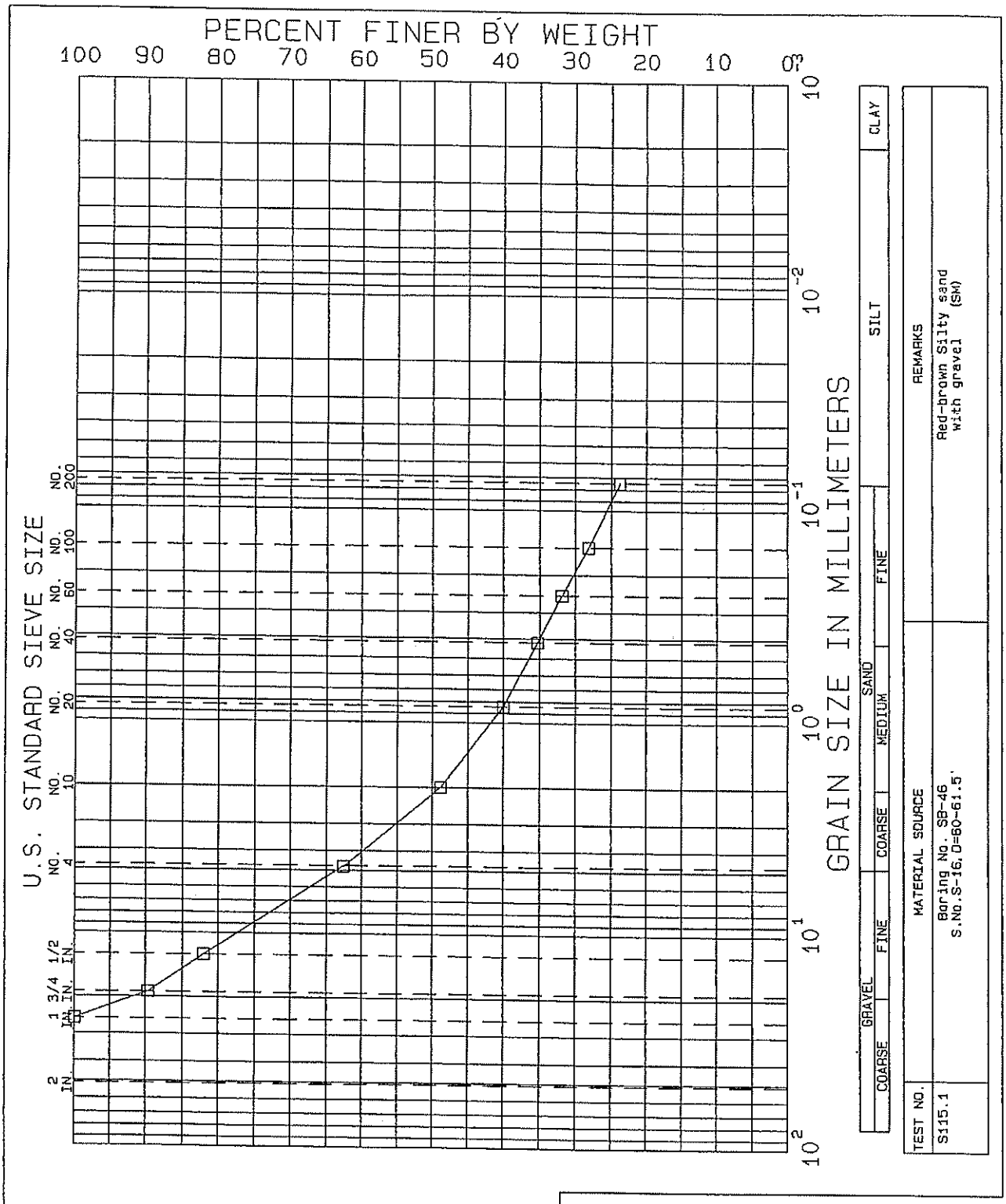


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-46	TEST SERIES	
SAMPLE	S1.2.3	NO.	114
DEPTH	1.5-9'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828



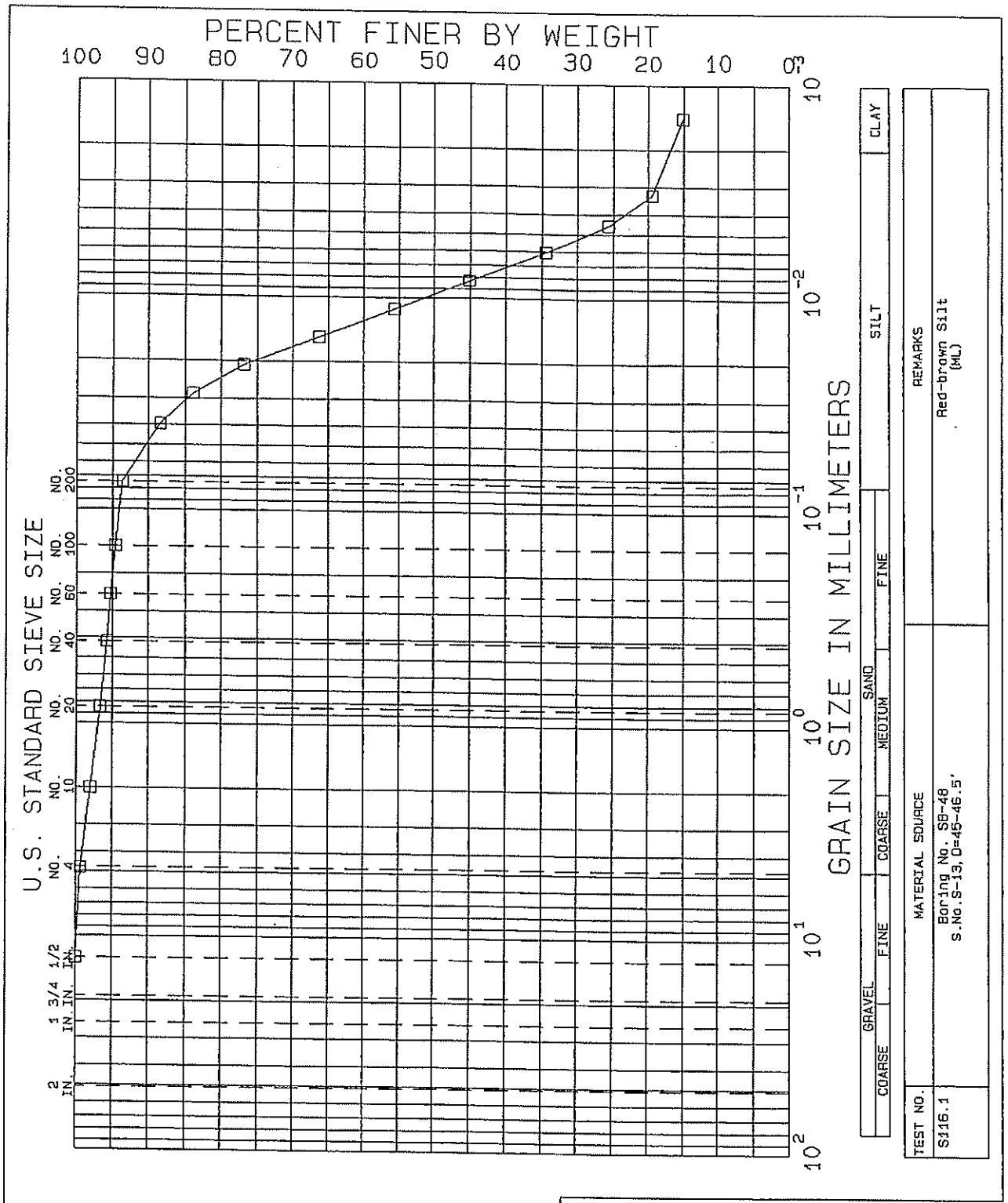
NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-46	TEST SERIES	
SAMPLE	S-16	NO.	115
DEPTH	60-61.5'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

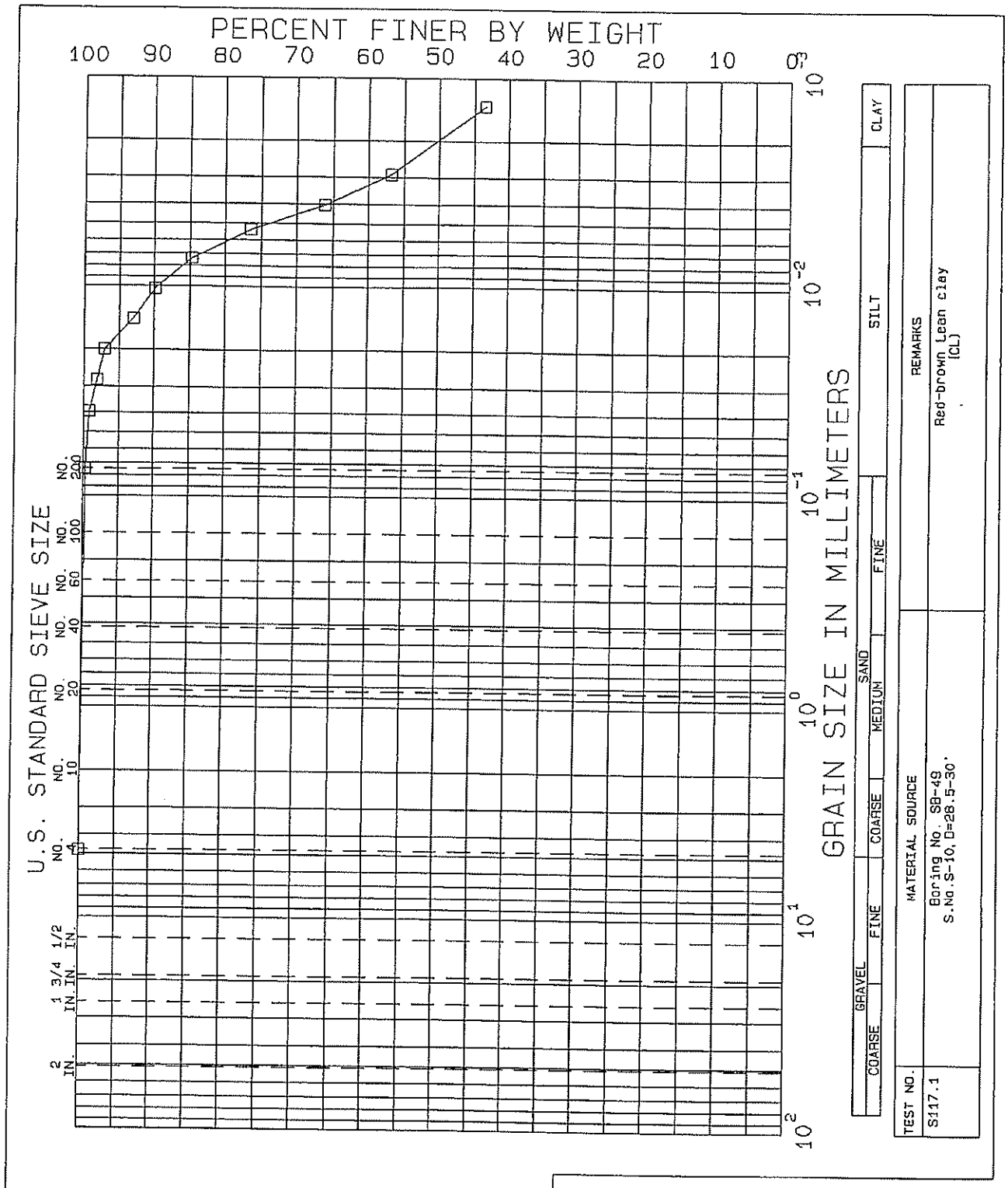
BORING NO.	SB-48	TEST SERIES	
SAMPLE	S-13	NO.	116
DEPTH	45-46.5'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828 — Assigned By: D. GAFFNEY — Reviewed By: Dan Schulze
Project Engineer: D. SCHULZE — Date: NOV.03 — Date Reviewed: 11/14/03

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol. $\frac{\Delta e}{1 + e_0}$	Laboratory Log and Soil Description
SB-49	S-10	28.5-30.0	117	48.0	41	24	100	50												Red-brown Lean clay (CL)
SB-49	S-17	65.0-66.5	118	7.8	20	13	42	12												Red-brown Sandy clay with gravel (CL)
SB-50	S-5	13.5-15.0	119	61.6	60	27	100	60												Brown Fat clay (CH)
SB-50	S-15	55.0-56.5	120	15.2	15	15	67													Red-brown Sandy silt (ML)
SB-51	S-3	7.5-9.0	121	36.2	59	26	99	62												Gray-brown Fat clay (CH)
SB-52	S-5	13.5-15.0	122	6.0	NP	NP	7													Gray-brown Poorly-graded sand with silt and gravel (SP-SM)
SB-52	S-14	55.0-56.5	123	63.2	37	22	99	39												Red-brown Lean clay (CL)
SB-52	S-17	70.0-71.2	124	15.3	NP	NP	24													Red-brown Silty sand with gravel (SM)
SB-53	S-4	10.5-12.0	125	2.9	*	*	9		* Insufficient sample for limit test											Gray Well-graded sand with silt and gravel (SW-SM)
SB-53	S-18	70.0-71.5	126	25.4	NP	NP	78	4												Red-brown Silt with sand (ML)



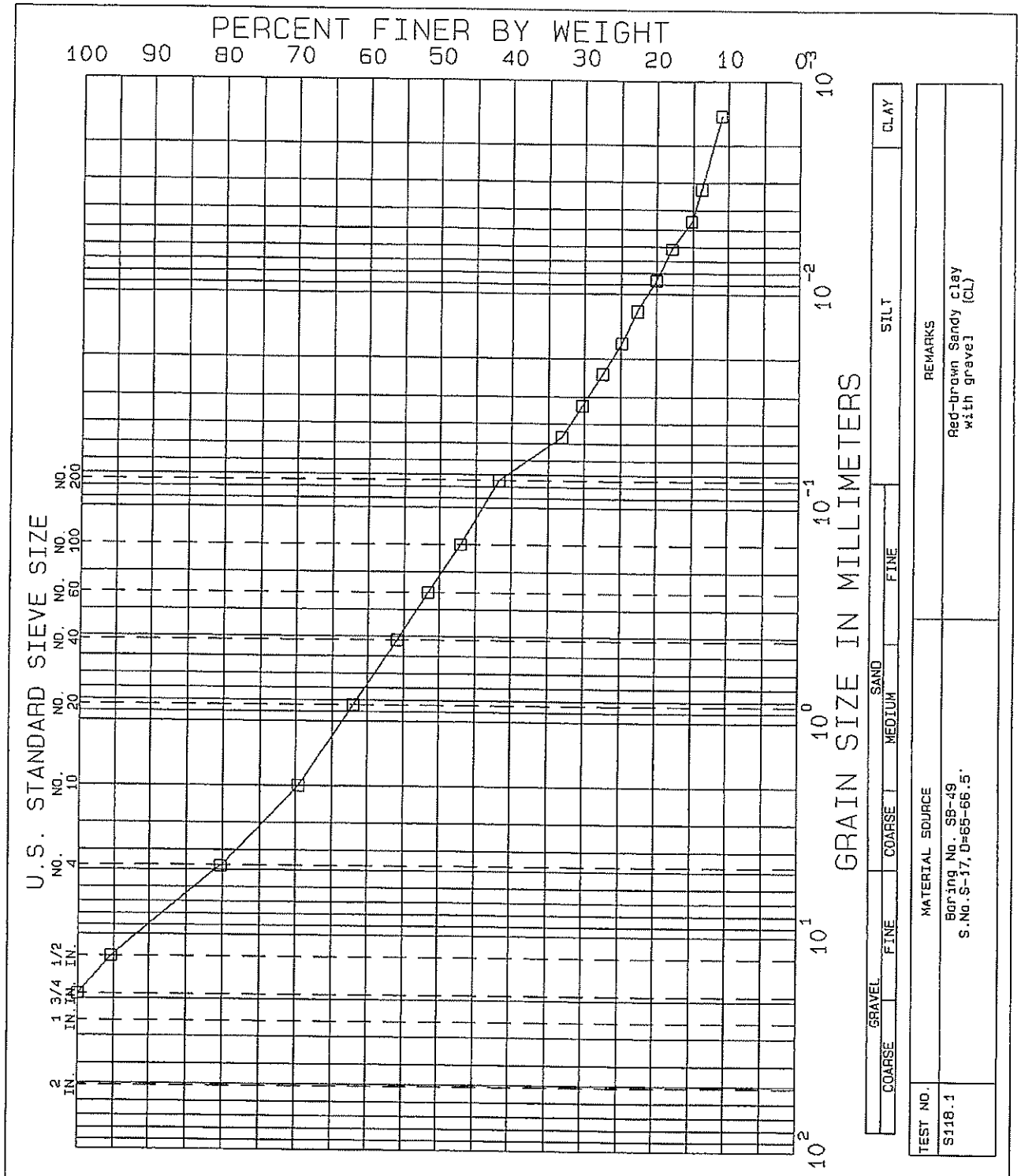
NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-49	TEST SERIES	
SAMPLE	S-10	NO.	117
DEPTH	28.5-30'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17628

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

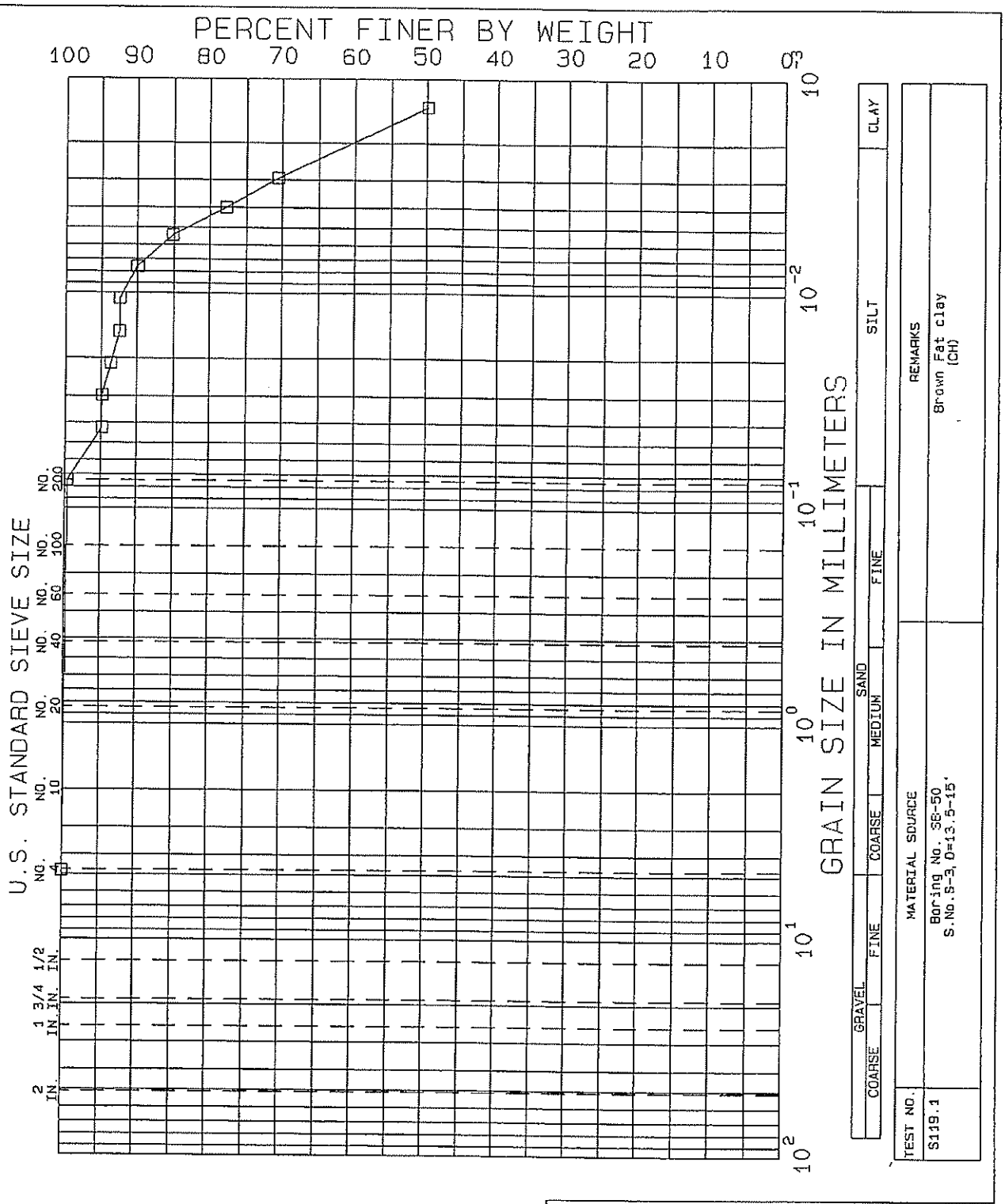


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-49	TEST SERIES	
SAMPLE	S-17	NO.	118
DEPTH	65-66.5'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828

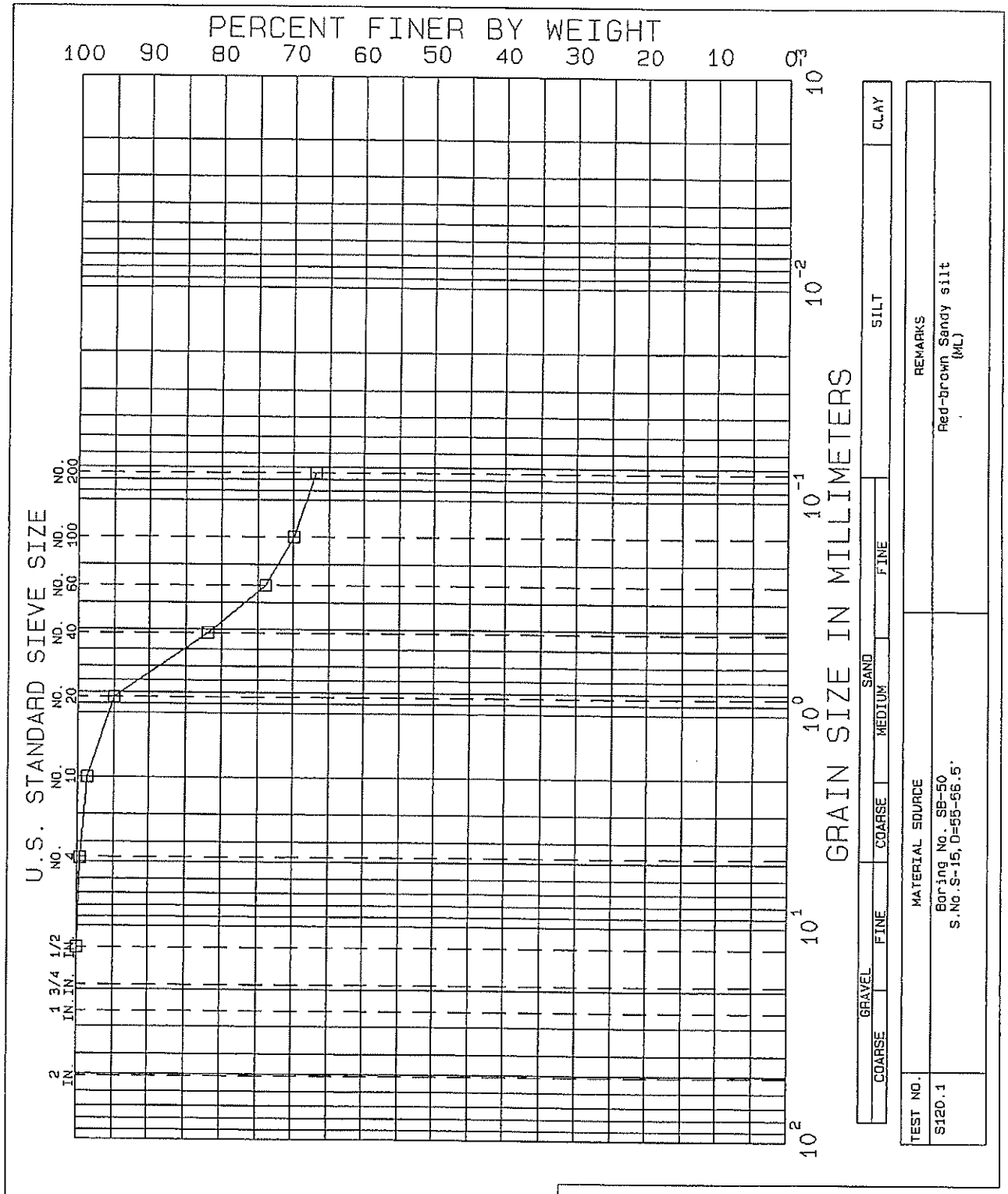


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-50	TEST SERIES	
SAMPLE	S-3	NO.	119
DEPTH	13.5-15'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828

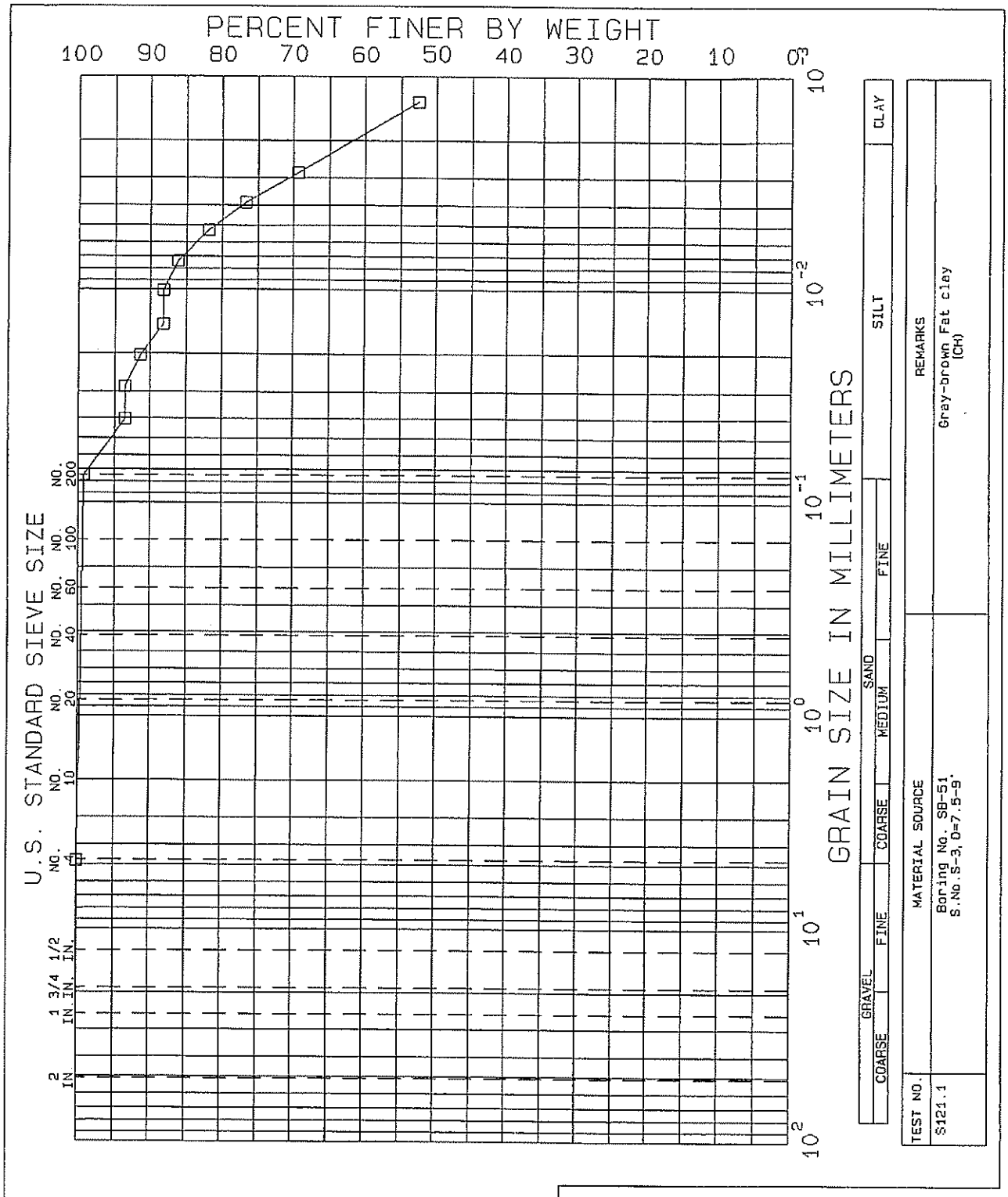


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-50	TEST SERIES	
SAMPLE	S-15	NO.	120
DEPTH	55-56.5'	DATE	Nov.03
TECH.	MCM		
REVIEWER	MBP	FILE	L17828



NEW BRITAIN-HARTFORD BUSWAY

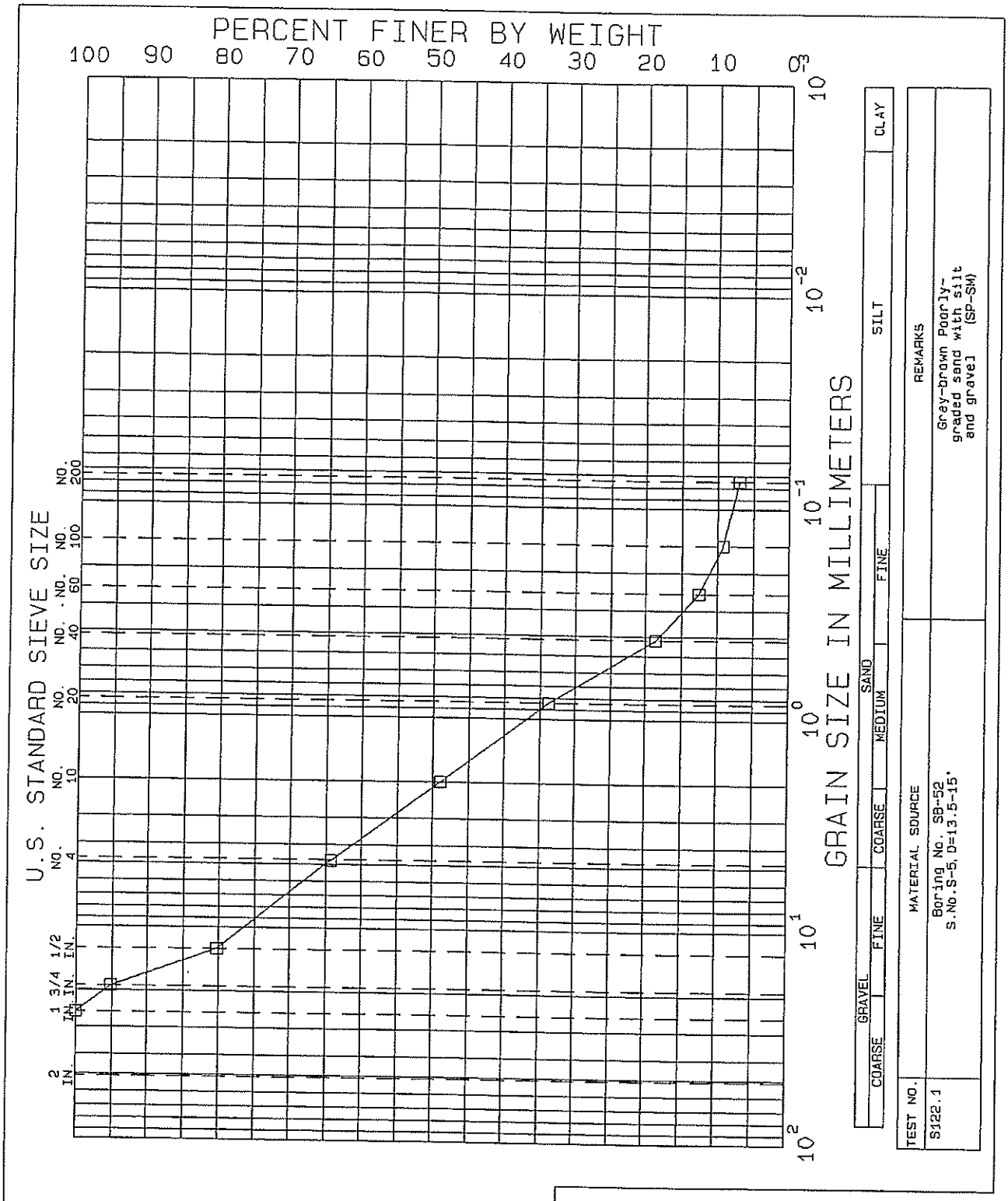
CONNECTICUT

GRADATION TESTS

BORING NO. SB-51
SAMPLE S-3
DEPTH 7.5-9'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO. 121
DATE Nov.03

FILE L17828



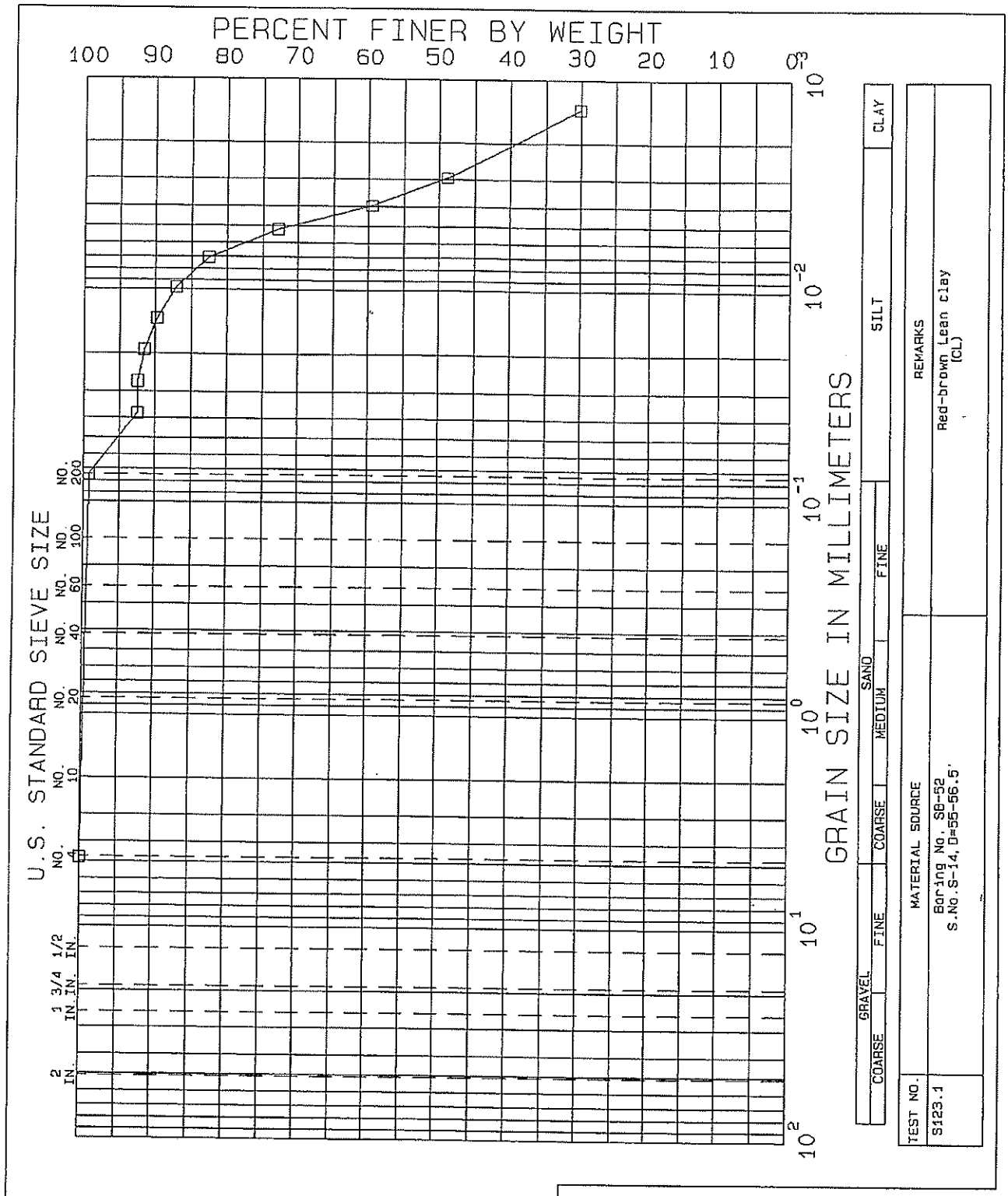
NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
GRADATION TESTS

BORING NO. SB-52
SAMPLE S-5
DEPTH 13.5-15'
TECH. PEC
REVIEWER MBP

TEST SERIES
NO. 122
DATE Nov.03

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

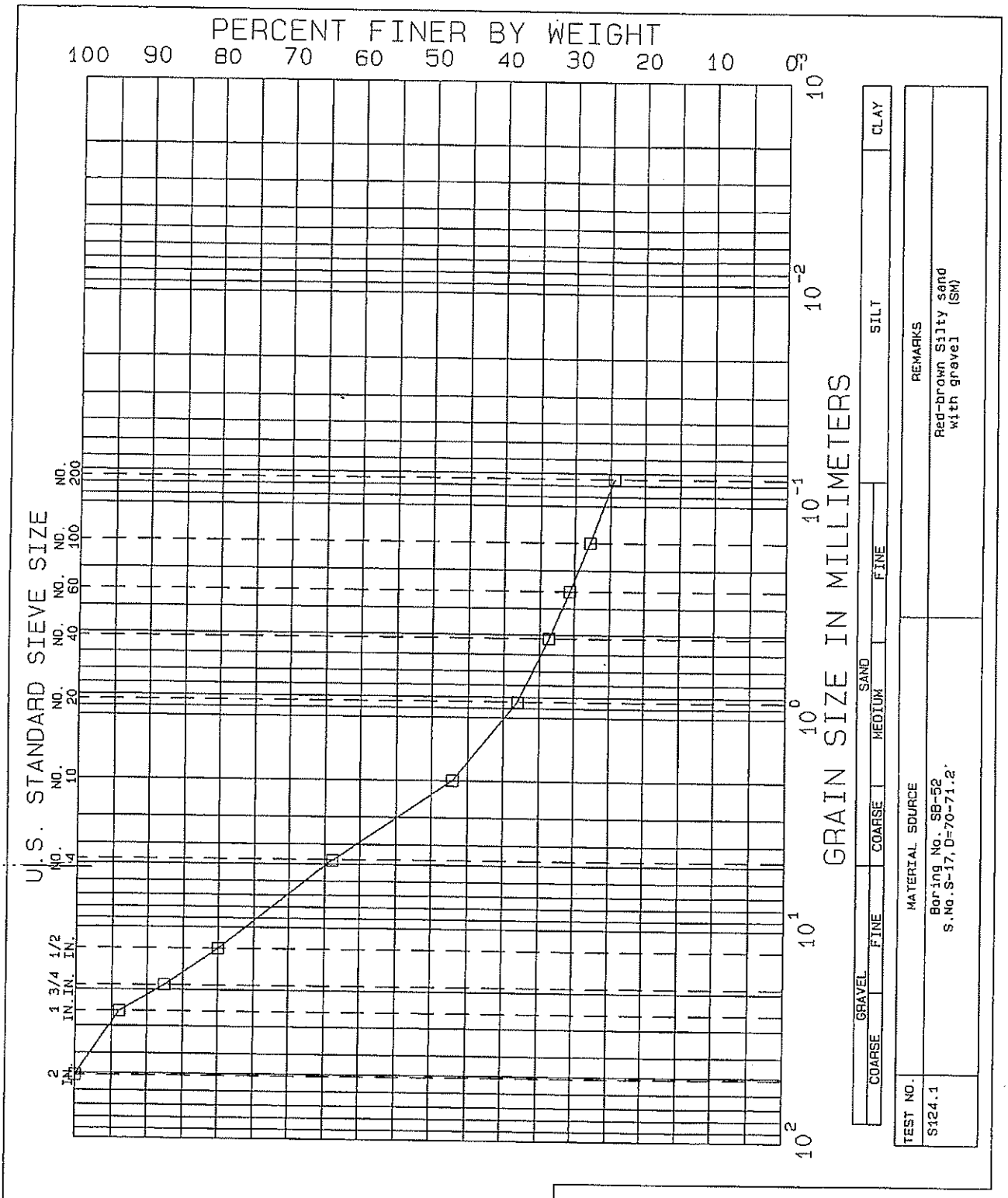


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-52	TEST SERIES	
SAMPLE	S-14	NO.	123
DEPTH	55-56.5'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828



NEW BRITAIN-HARTFORD BUSWAY

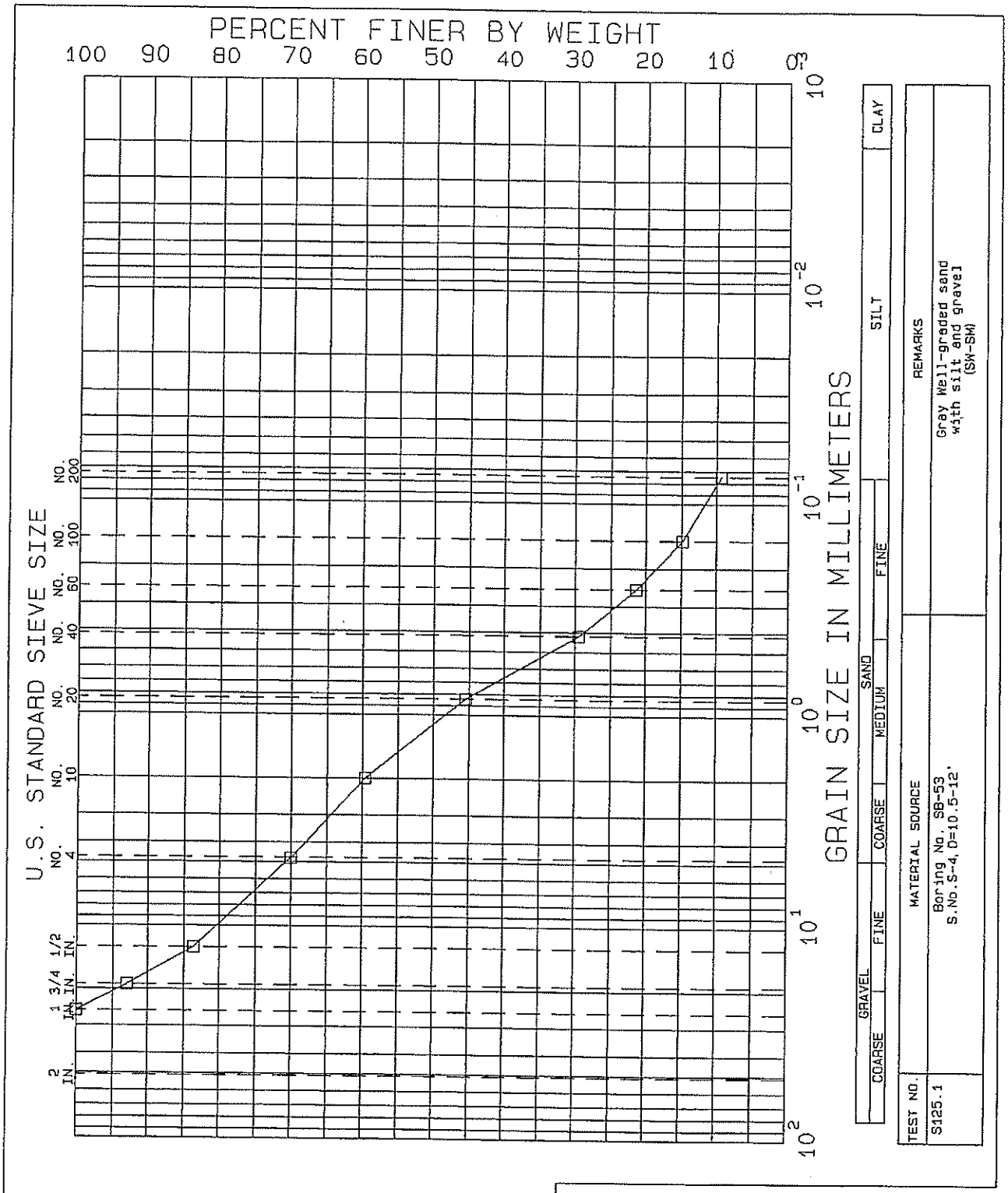
CONNECTICUT

GRADATION TESTS

BORING NO. SB-52
SAMPLE S-17
DEPTH 70-71.2'
TECH. PEC
REVIEWER MBP

TEST SERIES
NO. 124
DATE Nov.03

FILE L17828



NEW BRITAIN-HARTFORD BUSWAY

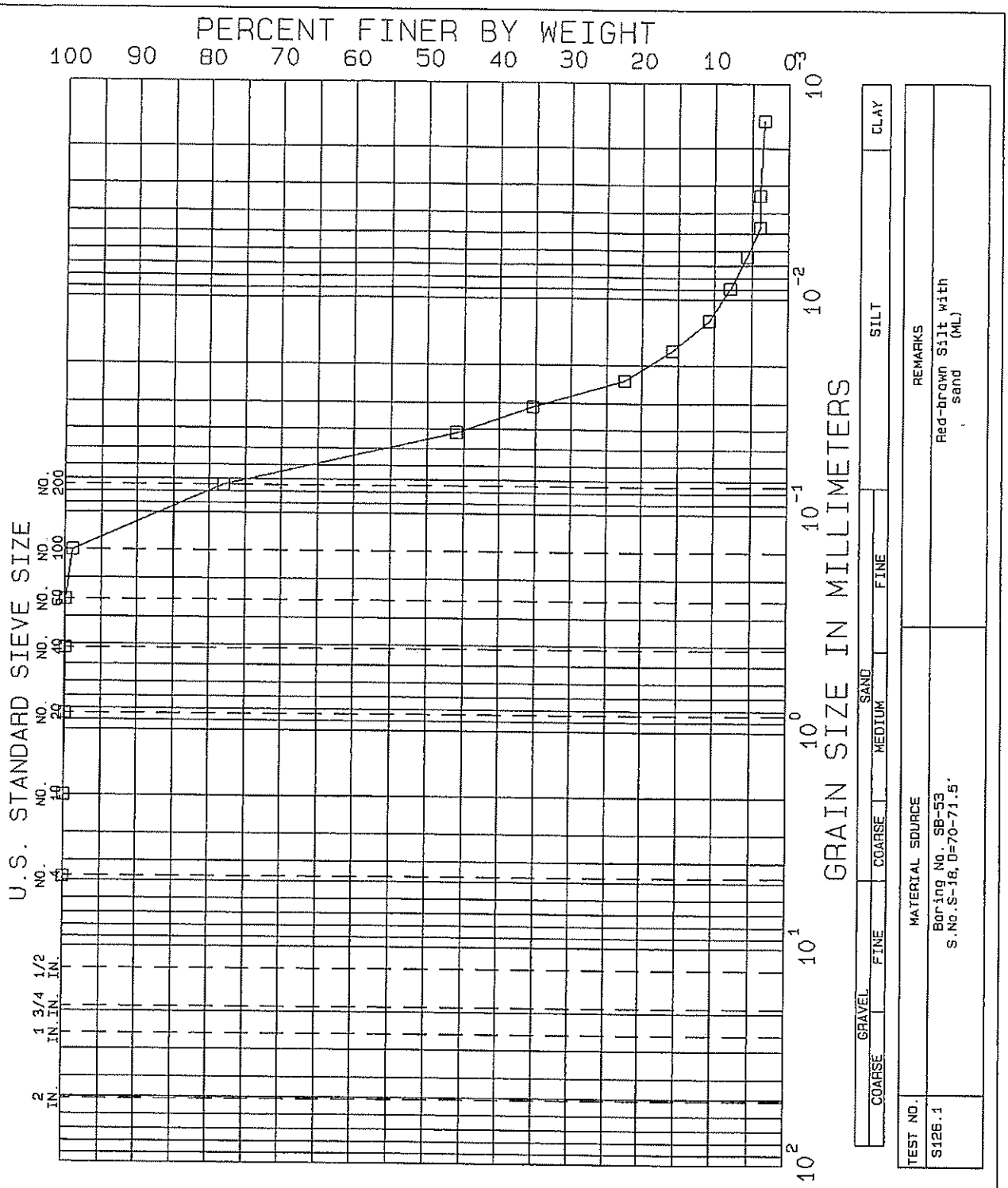
CONNECTICUT

GRADATION TESTS

BORING NO. SB-53
SAMPLE S-4
DEPTH 10.5-12'
TECH. PEC
REVIEWER MBP

TEST SERIES
NO. 125
DATE Nov.03

FILE L17828



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

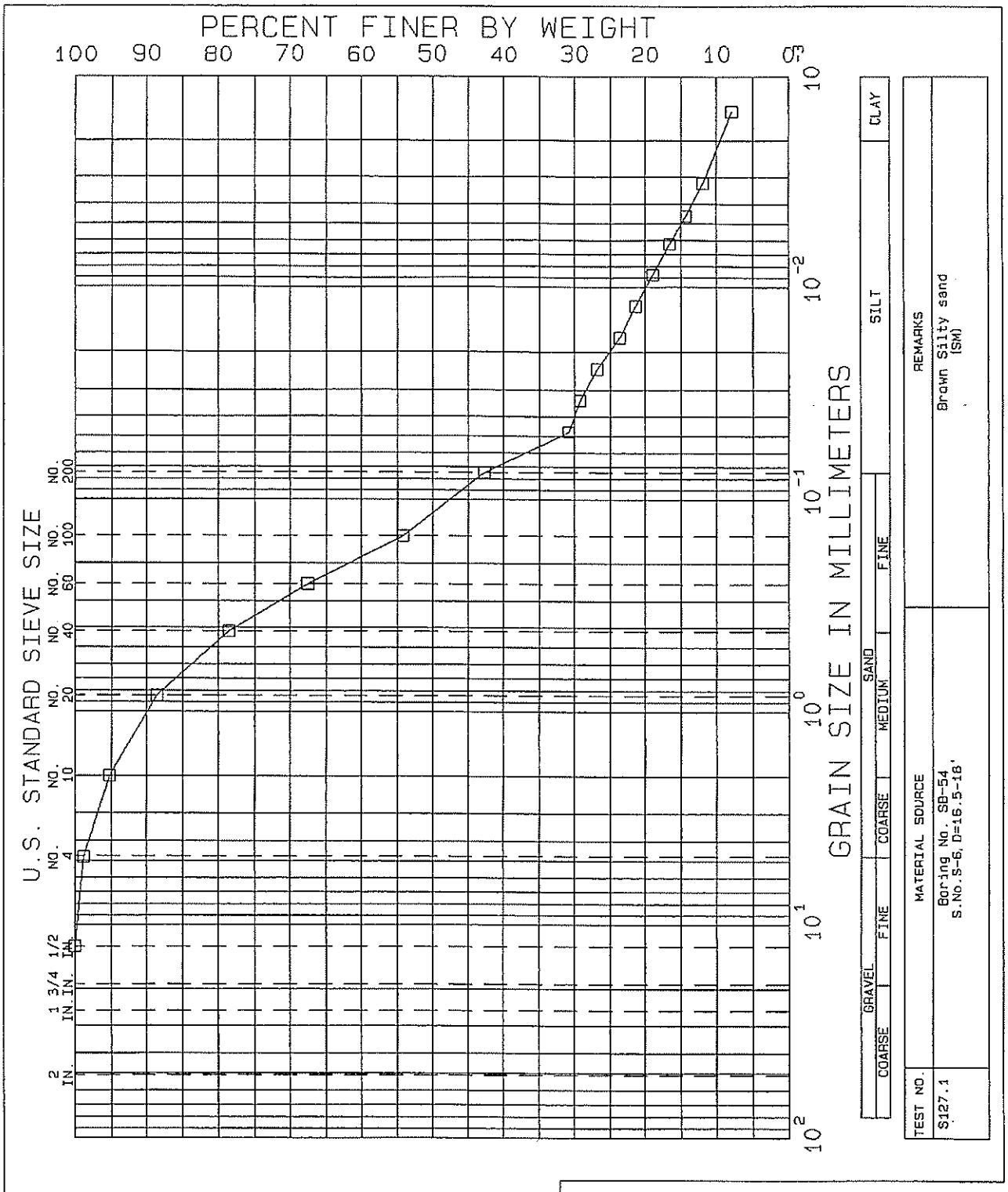
GRADATION TESTS

BORING NO.	SB-53	TEST SERIES	
SAMPLE	S-18	NO.	126
DEPTH	70-71.5'	DATE	Nov.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828 | Assigned By: D. GAFFNEY | Reviewed By: Don Schulze
Project Engineer: D. SCHULZE | Date: NOV.03 | Date Reviewed: 11/18/03

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) / W_{opt} (%)	Perme-ability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol.: $\frac{C_c}{1 + e_0}$	Laboratory Log and Soil Description
SB-54	S-6	16.5-18.0	127	20.1	21	20	43	9												Brown Silty sand (SM)
SB-54	S-15	55.0-56.5	128	42.1	44	22	98	44												Red-brown Lean clay (CL)
SB-55	S-4	10.0-11.5	129	18.5	22	20	39	8												Brown Silty sand with gravel (SM)
SB-55	S-17	65.0-66.5	130	33.7	29	22	99	25												Red-brown Silty clay (CL-ML)
SB-55	S-28	120.0-121.5	131	16.1	NP	NP	25													Brown Silty sand (SM)
SB-56	S-15	55.0-56.5	132	40.2	41	25	100	40												Red-brown Lean clay (CL)
SB-56	S-25	105.0-106.5	133	15.2	NP	NP	15													Brown Silty sand (SM)
SB-57	S-15	55.0-56.5	134	45.7	42	23	100	35												Red-brown Lean clay (CL)
SB-58	S-14	50.0-51.5	135	56.6	53	25	100	60												Brown Fat clay (CH)
SB-58	S-21	90.0-91.5	136	34.2	24	24	100	15												Red-brown Silt (ML)
SB-58	S-25	110.0-111.5	137	23.1	NP	NP	30	5												Red-brown Silty sand (SM)

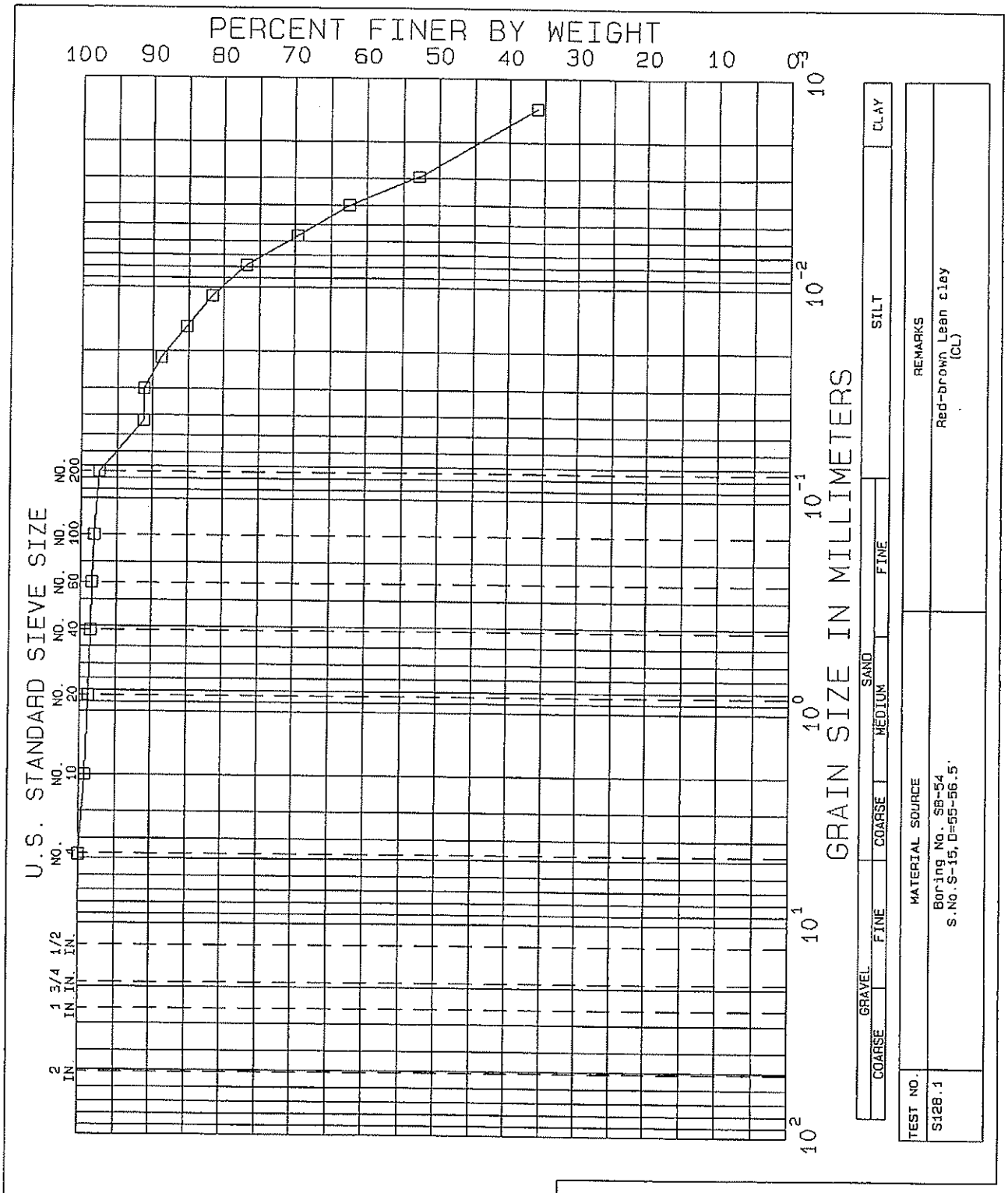


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-54	TEST SERIES	
SAMPLE	S-6	NO.	127
DEPTH	16.5-18'	DATE	Nov.03
TECH.	PEC		
REVIEWER	MBP	FILE	L17828



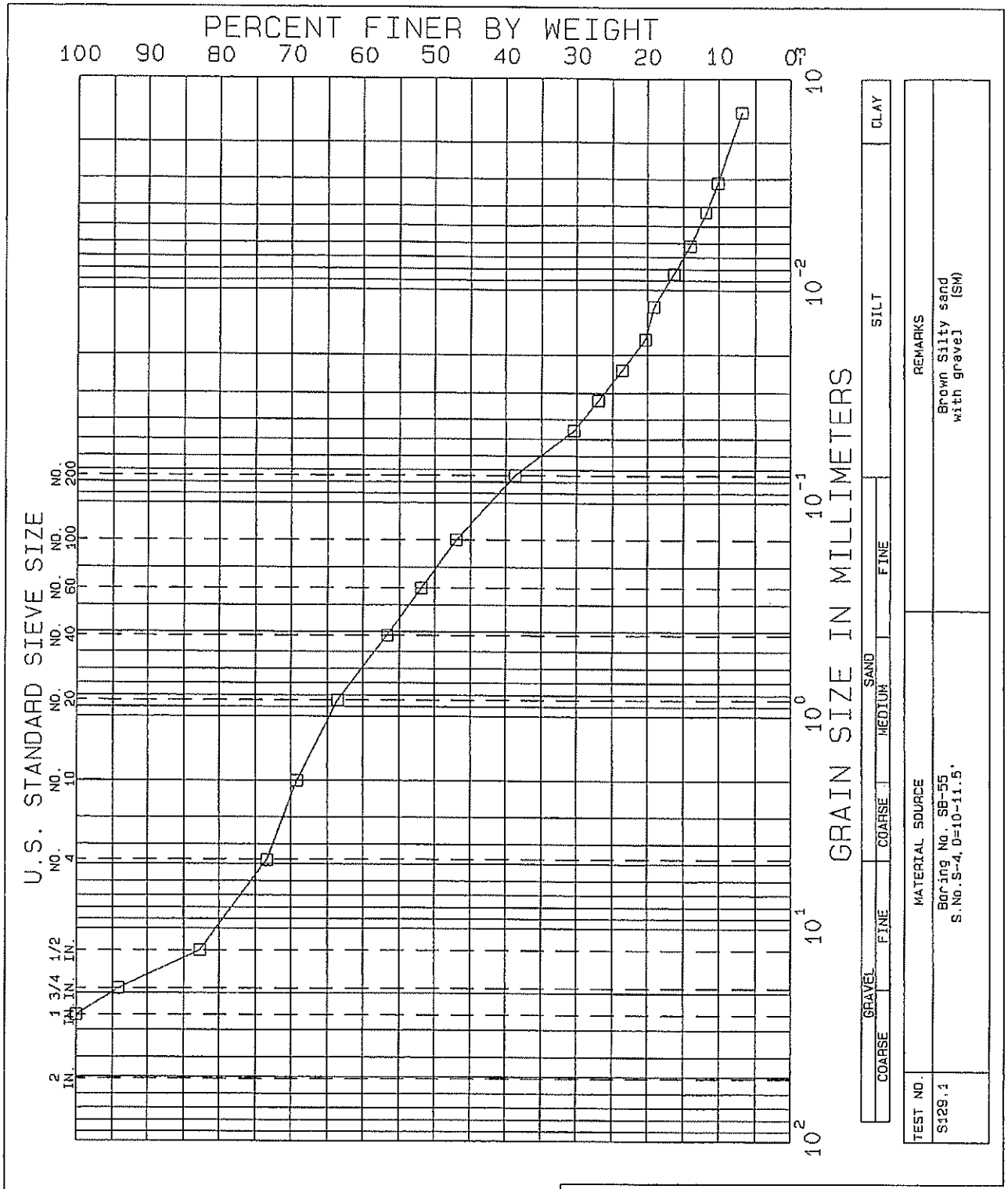
NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-54	TEST SERIES	
SAMPLE	S-15	NO.	128
DEPTH	55-56.5'	DATE	Nov.03
TECH.	PEC		
REVIEWER	MBP	FILE	L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

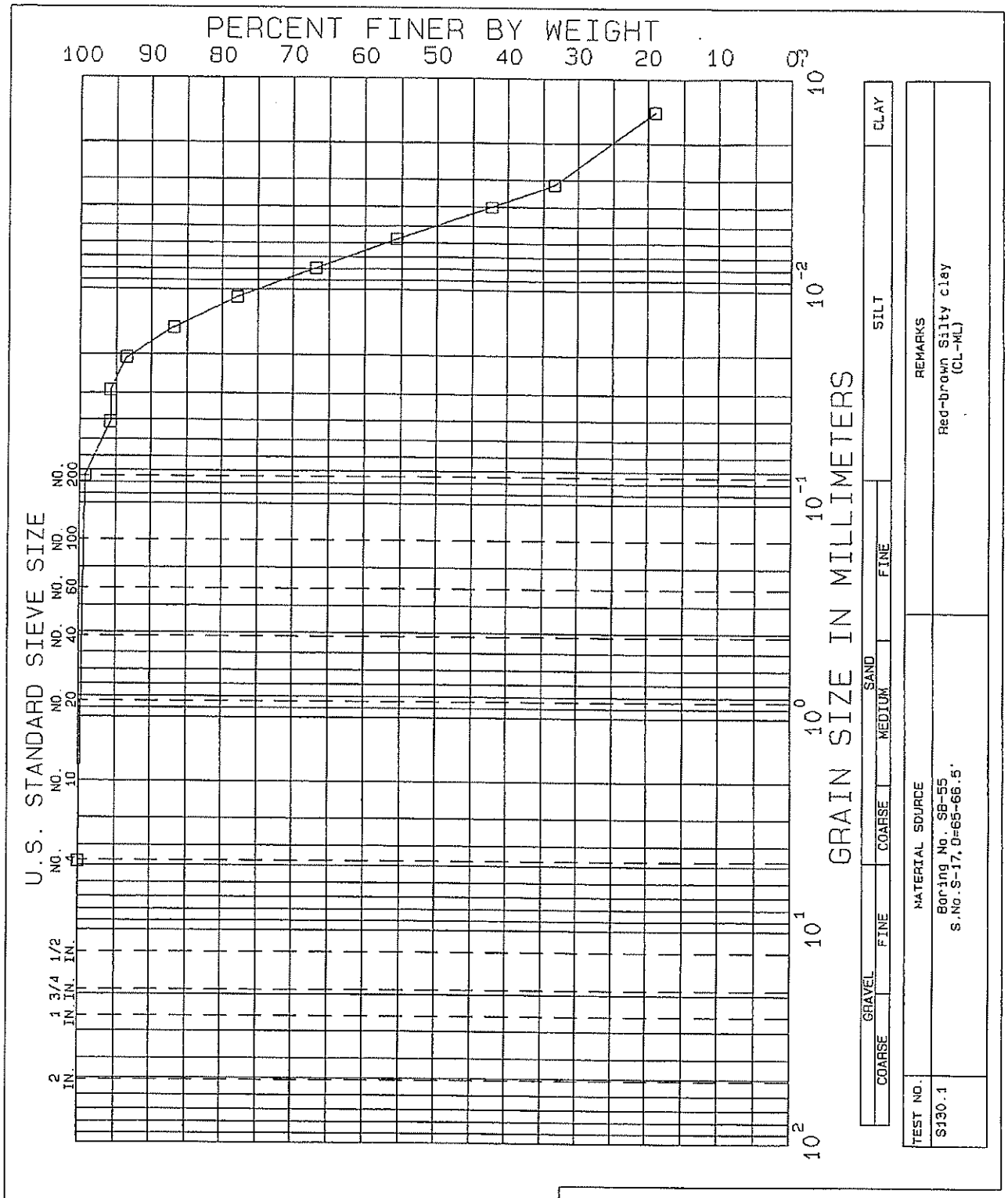


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-55	TEST SERIES	
SAMPLE	S-4	NO.	129
DEPTH	10-11.5'	DATE	Nov.03
TECH.	PEC		
REVIEWER	MBP	FILE	L17828

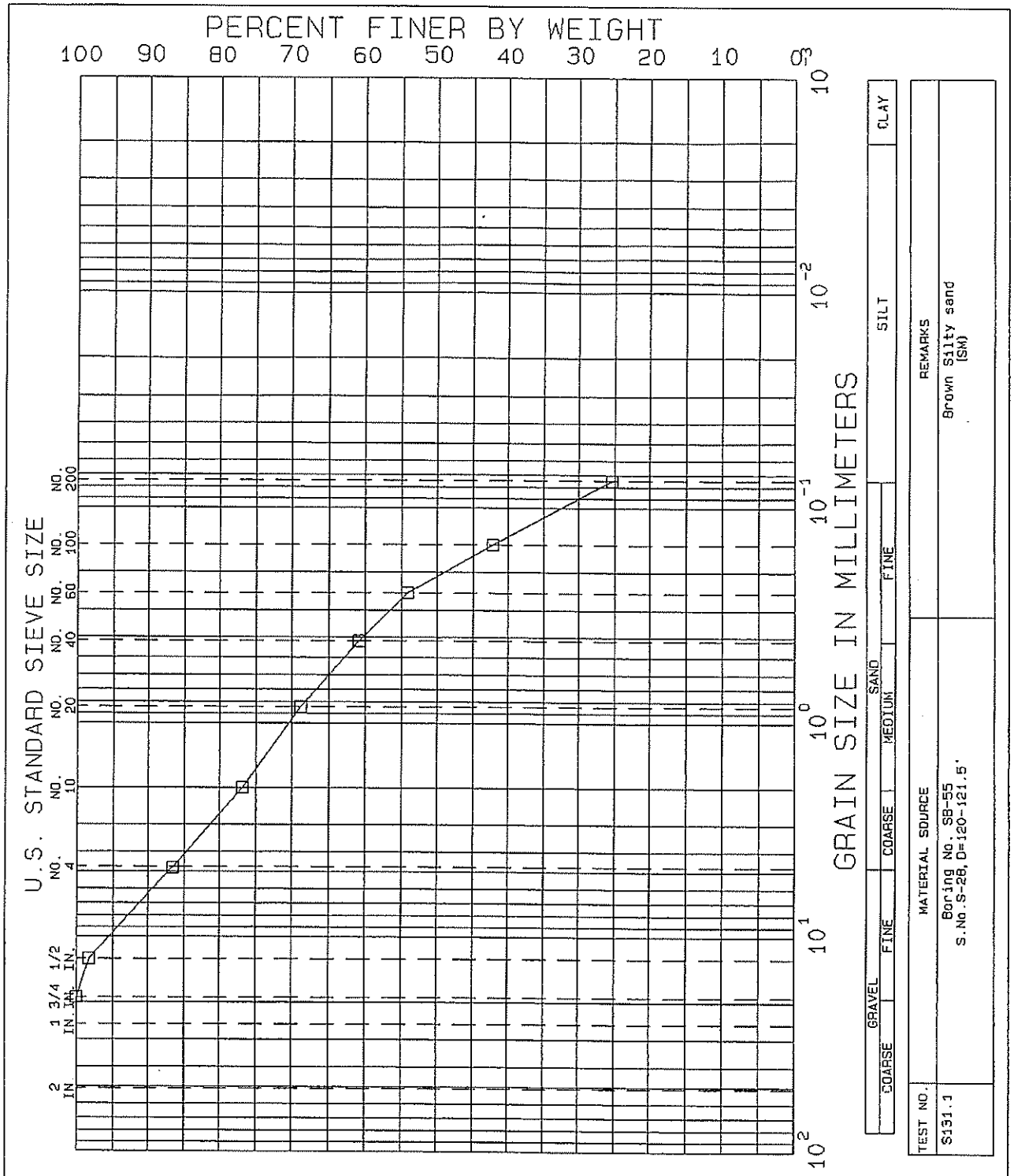


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-55	TEST SERIES	
SAMPLE	S-17	NO.	130
DEPTH	65-66.5'	DATE	Nov.03
TECH.	PEC		
REVIEWER	MBP	FILE	L17828



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

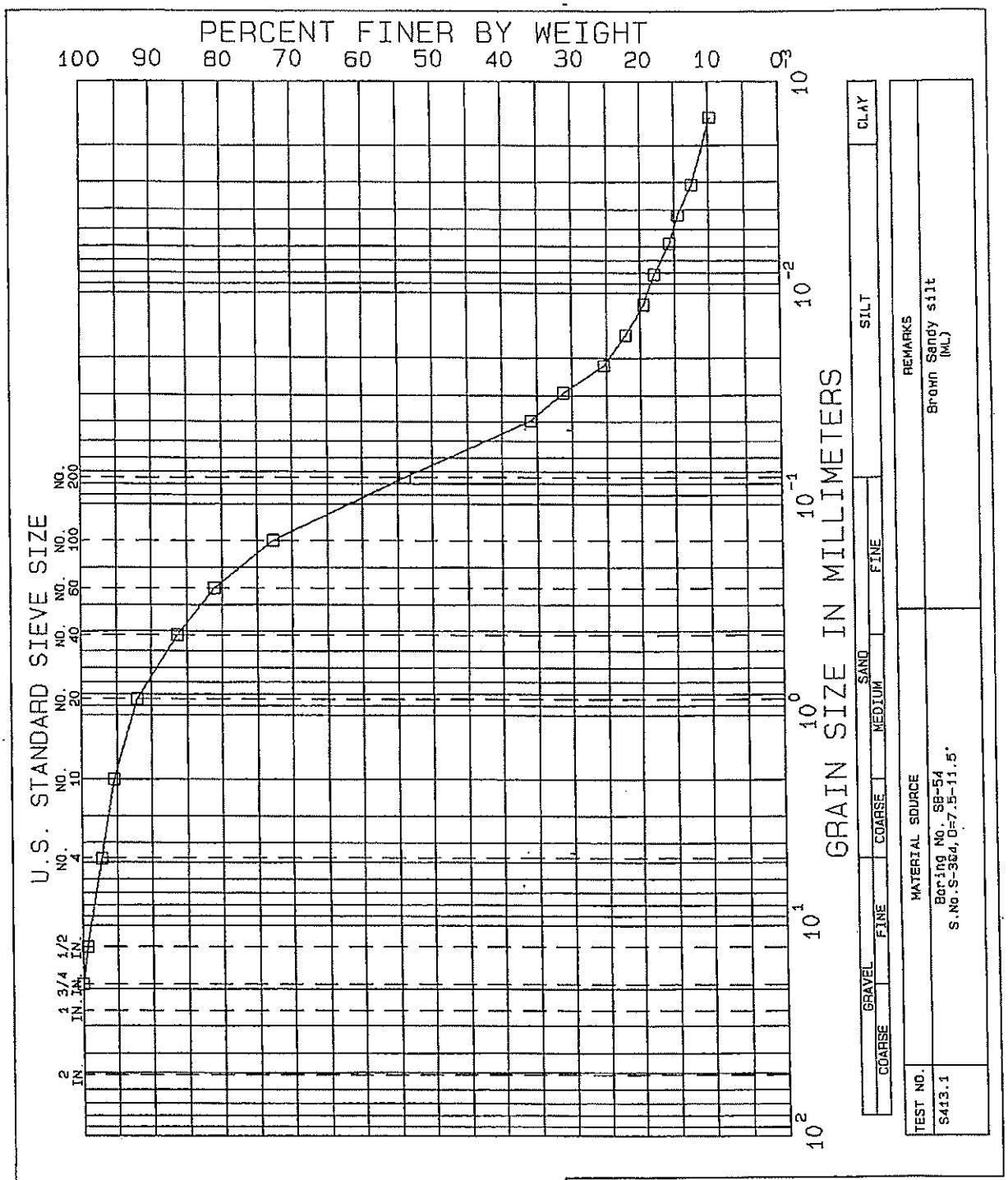
GRADATION TESTS

BORING NO.	SB-55	TEST SERIES	
SAMPLE	S-28	NO.	131
DEPTH	120-121.5'	DATE	Nov.03
TECH.	MCM		
REVIEWER	MBP	FILE	L17828

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828
Project Engineer: D. SCHULZE
Assigned By: D. GAFFNEY
Date: Feb.04
Reviewed By: Dan Schulze
Date Reviewed: 2/19/04

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) / W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol.: $\frac{C_c}{1 + e_o}$	Laboratory Log and Soil Description
SB-1	S-1, S-2 & S-3	1.5-9.0	408	15.9	25	21	24	6												Brown Silty gravel with sand (GM)
SB-1	S-6	16.5-18.0	409	12.3	NP	NP	45	8												Red-brown Silty sand (SM)
SB-39	S-1	1.5-3.0	410	9.1	NP	NP	10	2												Brown Well-graded sand with silt and gravel (SW-SM)
SB-39	S-2	4.5-6.0	411	10.5	NP	NP	14	2												Red-brown Silty sand with gravel (SM)
SB-39	S-6	16.5-18.0	412	31.4	34	21	93	34												Red-brown Lean clay (CL)
SB-54	S-3 S-4	7.5-11.5	413	20.9	24	23	54	11												Brown Sandy silt (ML)
SB-54	S-8	22.5-24.5	414	24.2	18	17	42	8												Red-brown Silty sand (SM)
SB-59	S-1 & S-4	1.5-11.5	415	46.5	42	23	97	40												Gray Lean clay (CL)
SB-59	S-7	19.5-21.0	416	48.9	47	25	100	45												Gray Lean clay (CL)
RB-10	S-1	1.5-3.0	417	8.9	NP	NP	15	2												Black Silty sand with gravel (SM)
RB-10	S-3	7.5-9.0	418	9.3	NP	NP	25	3												Red-brown Silty sand (SM)

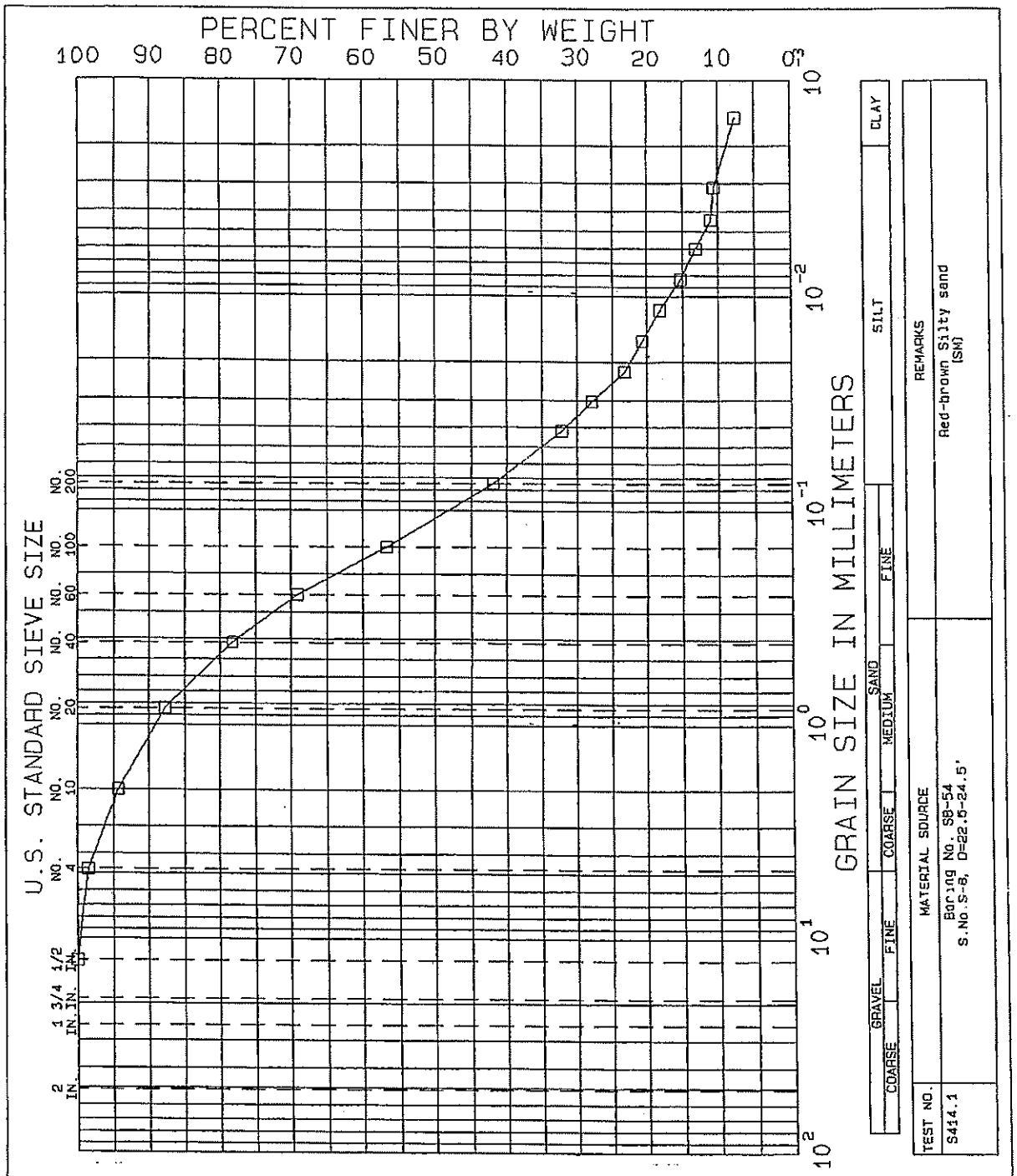


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-54	TEST SERIES
SAMPLE	S3&S4	NO. 413
DEPTH	7.5-11.5'	DATE Feb.04
TECH.	PEC	
REVIEWER	MBP	FILE L17828



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

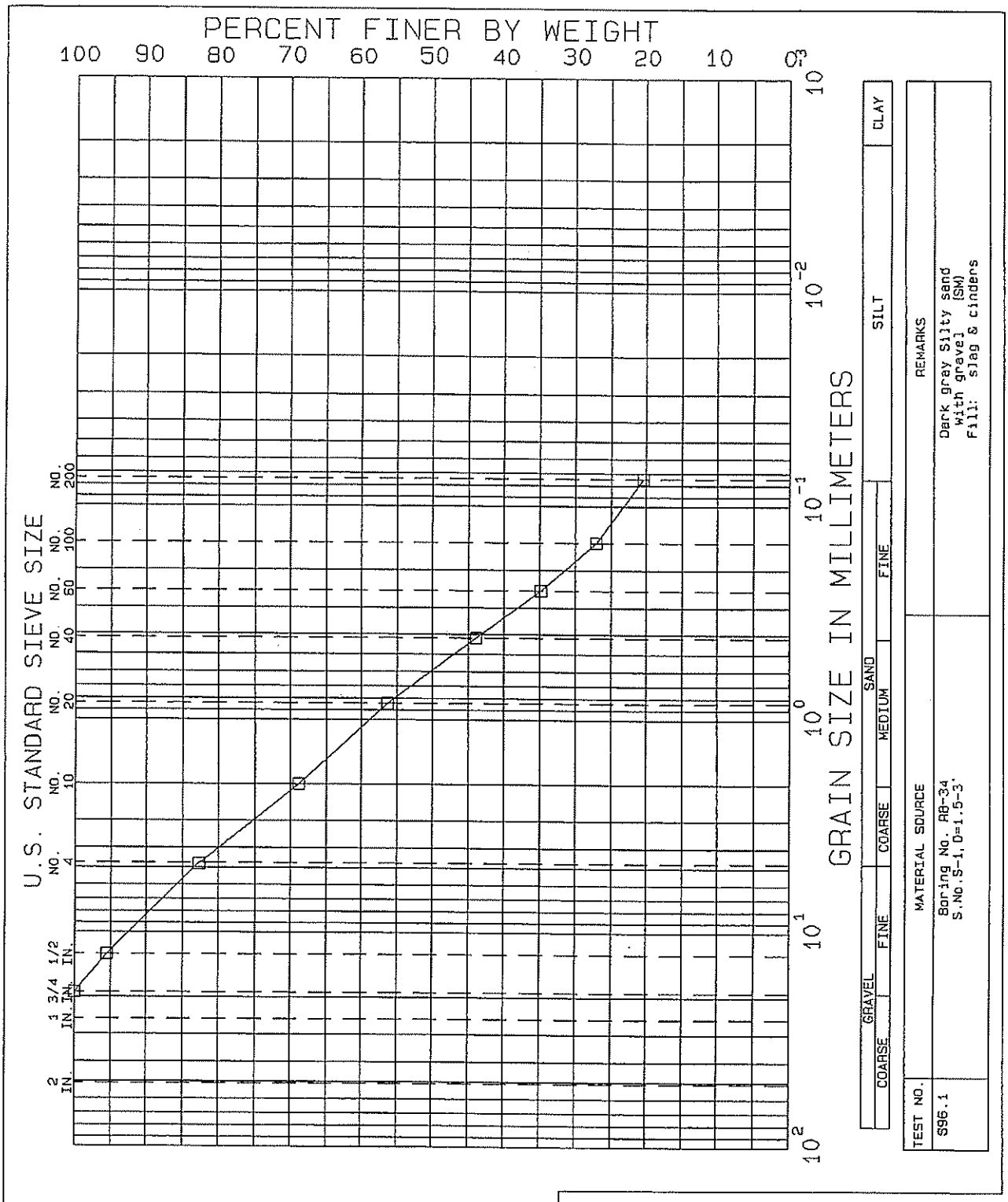
GRADATION TESTS

BORING NO.	SB-54	TEST SERIES	
SAMPLE	S-8	NO.	414
DEPTH	22.5-24.5'	DATE	Feb.04
TECH.	PEC		
REVIEWER	MBP	FILE	L17828

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828 — Assigned By: D. GAFFNEY — Reviewed By: [signature]
Project Engineer: D. SCHULZE — Date: NOV.03 — Date Reviewed: 11/6/03

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) W_{opt} (%)	Perme-ability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol. $\frac{\Delta e}{1 + e_0}$	Laboratory Log and Soil Description
RB-34	S-1	1.5-3.0	96	27.4	*	*	20		* Insufficient sample for limit test											Dark gray Silty sand with gravel (SM) Fill: slag & cinders
RB-34	S-4	10-11.5	97	41.6	39	23	99	34												Red-brown Lean clay (CL)
RB-35	S-5	13.5-15.0	98	36.1	36	21	98	27												Gray-brown Lean clay (CL)
RB-36	S-2	4.5-6.0	99	31.0	34	24	98	17												Brown Lean clay (CL)
RB-37	S-3	7.5-9.0	100	32.0	26	26	97	14												Gray-brown Silt (ML)
RB-38	S-1	1.5-3.0	101	5.2	NP	NP	10													Gray-brown Poorly-graded sand with silt and gravel (SP-SM)
RB-38	S-5	13.5-15.0	102	35.3	29	22	99	27												Gray-brown Silty clay (CL-ML)
RB-39	S-2	4.5-6.0	103	31.5	NP	NP	56													Brown Sandy silt (ML)
RB-40	S-5	13.5-15.0	104	43.0	49	24	99	38												Gray-brown Lean clay (CL)
RB-41	S-4	10.0-11.5	105	65.7	62	26	97	63												Brown Fat clay (CH)
RB-42	S-3	7.5-9.0	106	10.6	NP	NP	18													Brown Silty sand with gravel (SM)
RB-42	S-8 S-9	22.5-28.5	107	10.4	25	14	48	17												Red-brown Clayey sand with gravel (SC)

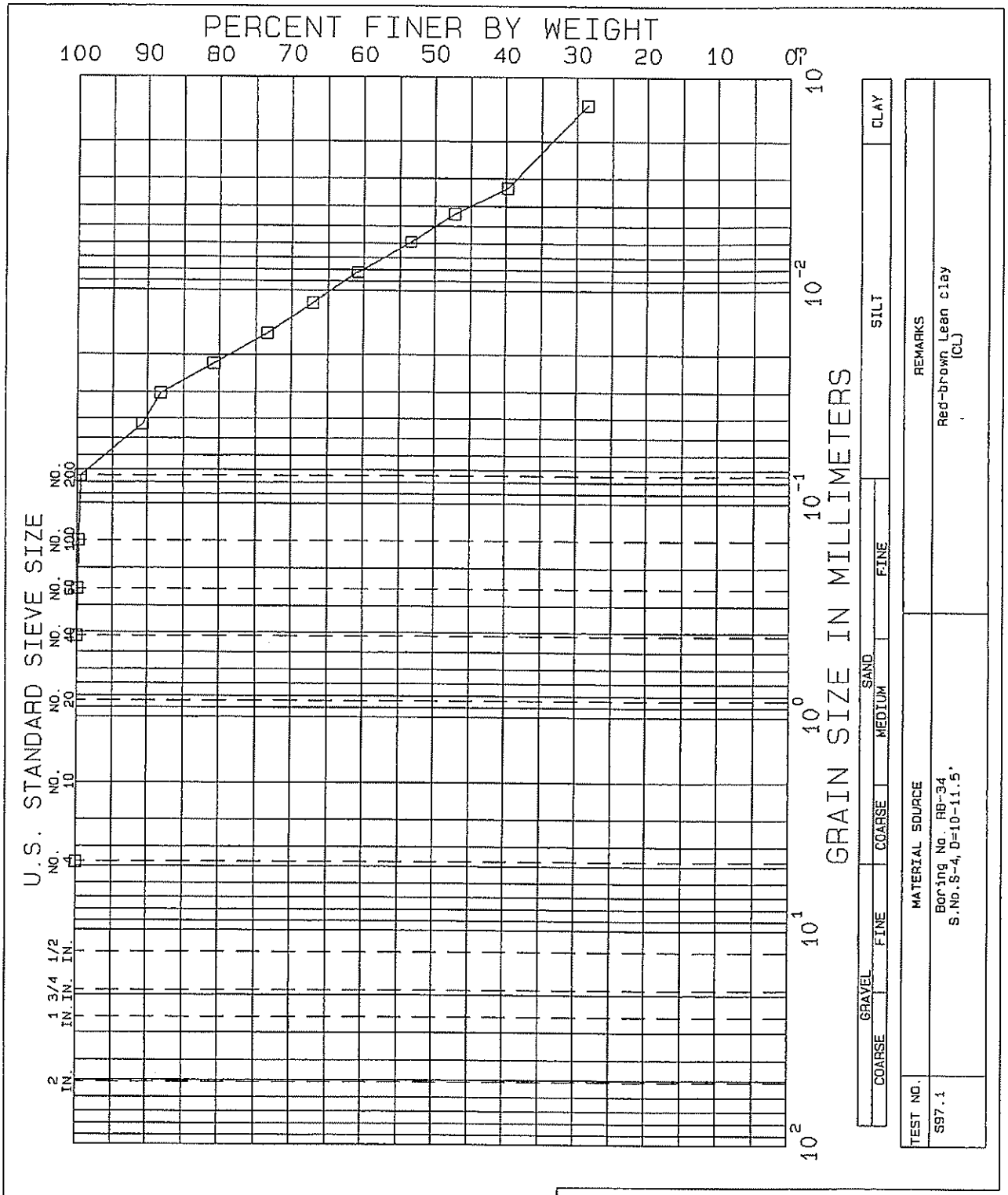


NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
GRADATION TESTS

BORING NO. AB-34
SAMPLE S-1
DEPTH 1.5-3'
TECH. PEC
REVIEWER MBP

TEST SERIES
NO. 96
DATE Nov.03

FILE L17828



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

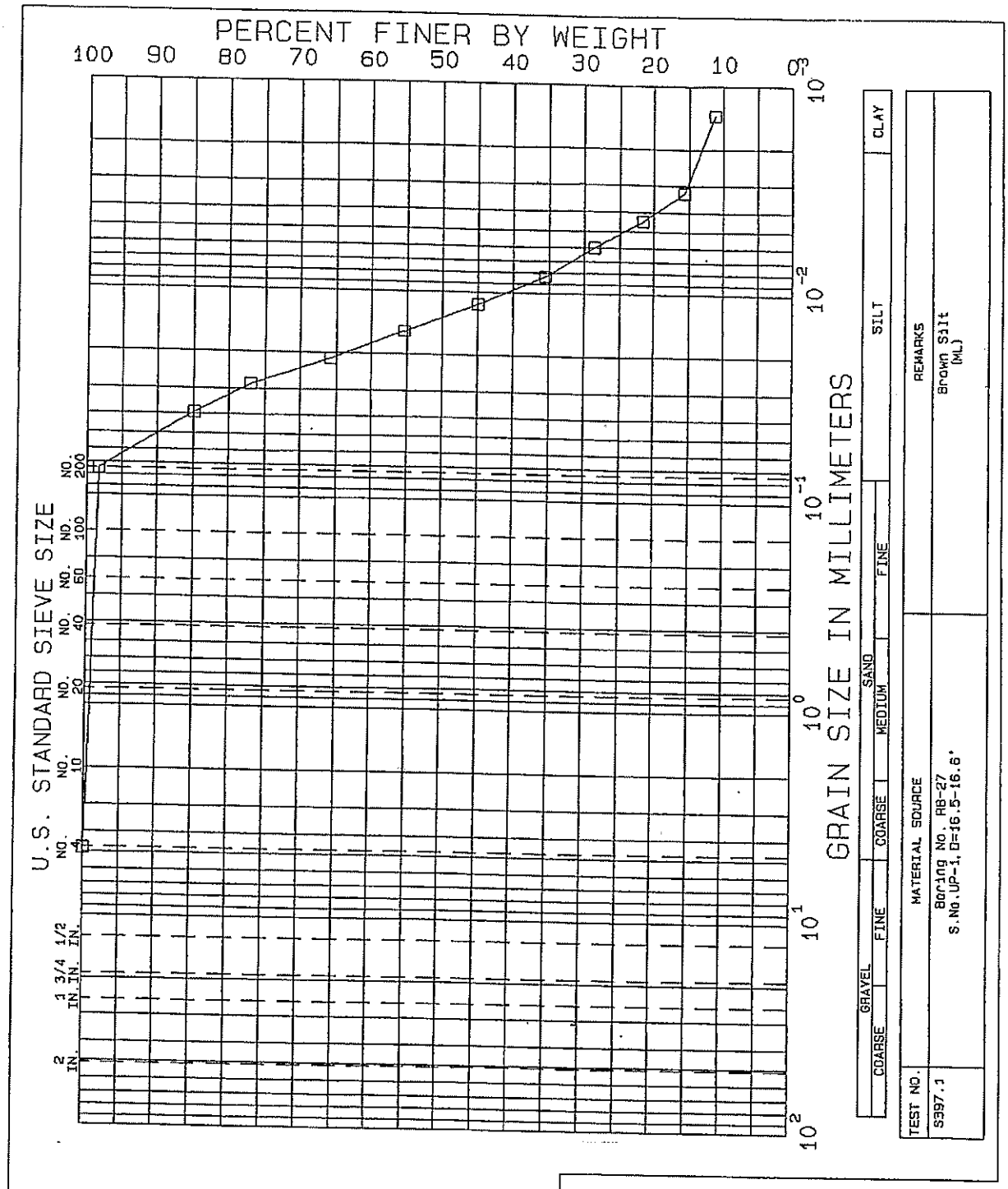
BORING NO.	RB-34	TEST SERIES	
SAMPLE	S-4	NO.	97
DEPTH	10-11.5'	DATE	Nov.03
TECH.	PEC		
REVIEWER	MBP	FILE	L17828

Consolidation and Triaxial Tests

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828 — Assigned By: D. Gaffney — Reviewed By: [signature]
Project Engineer: D. SCHULZE — Date: Feb.03 — Date Reviewed: 2/12/04

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol. $\frac{\Delta e}{1+e_0}$	Laboratory Log and Soil Description
RB-27	UP-1	15.5-16.7	397		Average Total Unit Weight (15.5-16.7') = 120.4 Pcf															Brown Silt (ML)
		15.6		25.9										Tv= 0.45 tsf						
		16.1		28.2										Tv= 0.50 tsf						
		16.2-16.3		24.7	23	21														
		16.3-16.4		31.5							93.3								0.09	
		16.5-16.6					98	13												
		16.7								2.71										
		5.3		25.0										Tv= 0.47 tsf						
SB-44	UP-1	30.0-32.0	398		Average Total Unit Weight (30.0-31.1') = 125.2 Pcf															Brown Silt with sand (ML)
		30.1		24.2										Tv= 0.45 tsf						
		30.6		23.9										Tv= 0.50 tsf						
		30.6-30.7		24.3	NP	NP														
		30.7-30.8		25.2							99.2								0.03	
		30.8-30.9					83	3												
		30.9-31.0								2.72										
		31.1		24.1										Tv= 0.52 tsf						



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

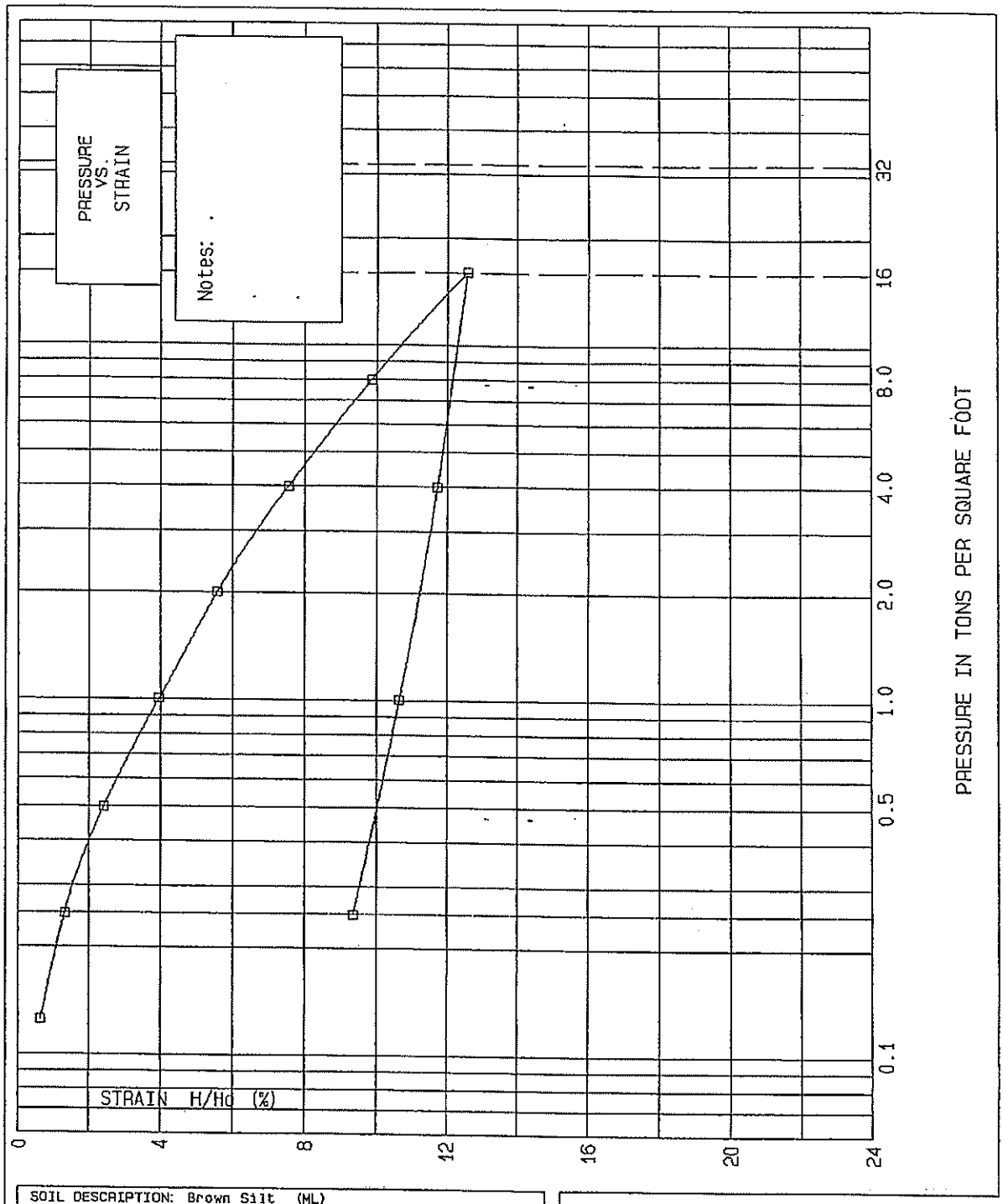
GRADATION TESTS

BORING NO. RB-27
SAMPLE UP-1
DEPTH 16.5-16.6'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO. 397
DATE Feb.04

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



SOIL DESCRIPTION: Brown Silt (ML)

SAMPLE DIAM. 2.5 IN. LIQUID LIMIT 23 % PLASTIC LIMIT 21 % SPECIFIC GRAVITY 2.71

	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	VOID RATIO	SATURATION, %	SAMPLE HEIGHT, INCH
INITIAL	31.50	93.30			0.80
FINAL	26.00	102.96			0.72

New Britain-Hartford Busway

CONSOLIDATION TEST

BORING NO. RB-27
SAMPLE UP-1
DEPTH 16.3-16.4'
TECH. MST
REVIEWER DAS

TEST SERIES NO. C397
DATE 2/12/04
FILE 17828

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

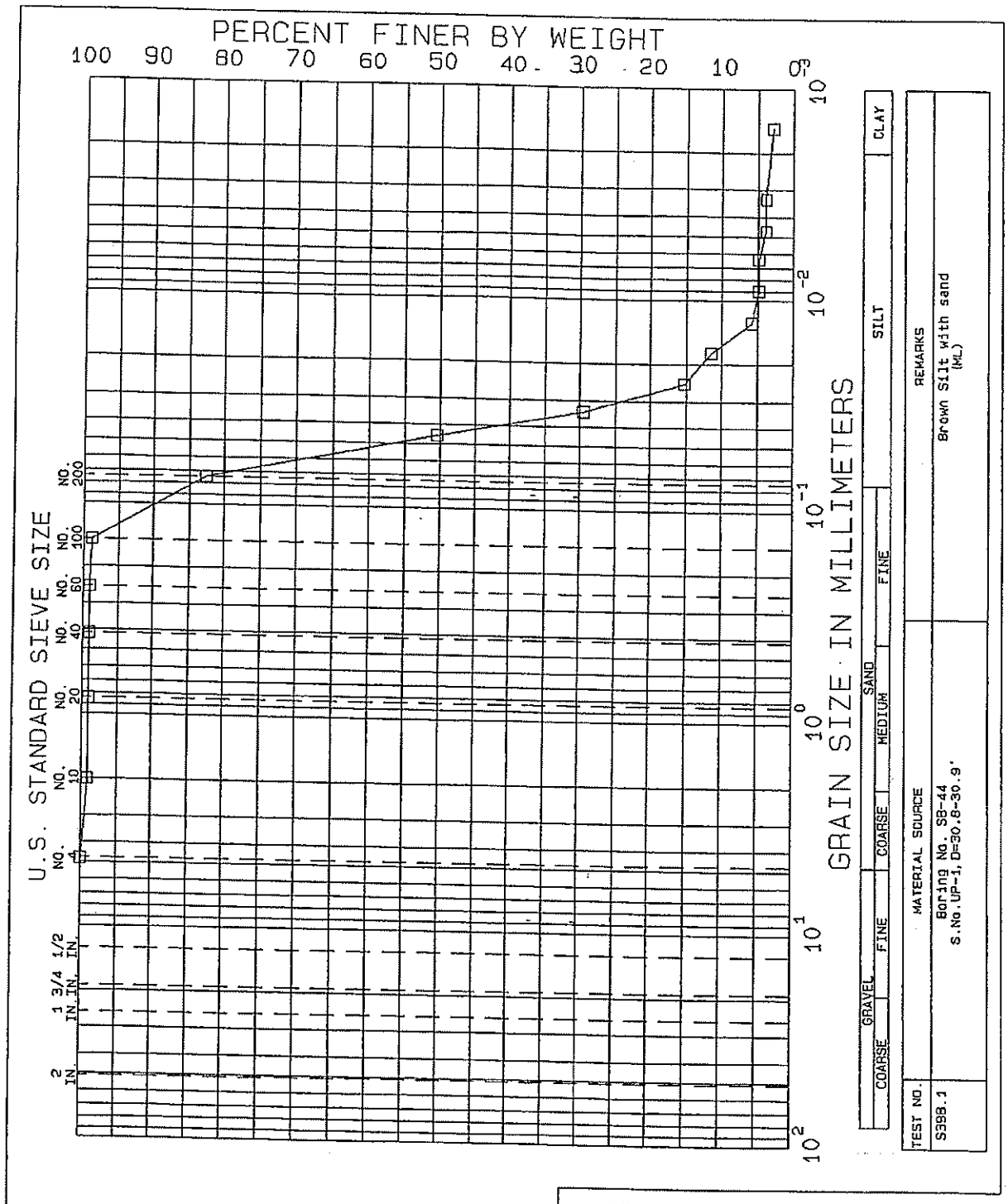
Job Number 17828
Project Name ..... New Britain-Hartford Busway
Test Number C397
Sample Description .. Brown Silt (ML)
Boring Number RB-27
Sample Number UP-1
Depth ..... 16.3-16.4'

Technician ..... MST
Reviewer ..... DAS

NOTES: Homogeneous
Sample

Specific Gravity ..... 2.7100E+00
Sample Dry Weight ..... 9.6180E+01
Sample Diameter ..... 2.5000E+00
Initial Void Ratio ..... 0.0000E+00
Initial Sample Height 8.0000E-01
Final Sample Height 7.2500E-01
Initial Water Content .... 3.1500E+01
Final Water Content ..... 2.6000E+01
Liquid Limit ..... 2.3000E+01
Plastic Limit ..... 2.1000E+01
Initial Saturation ..... 0.0000E+00
Final Saturation ..... 0.0000E+00
T50 data excluded
T90 data included

Increment umber	Pressure (TSF)	Final Dial	Percent Strain	Void Ratio	T90 (min)	Cv (T90) (/10000)	C_α
1	0.000	0.0	0.00	0.812			
2	0.125	50.0	0.63	0.801			
3	0.250	105.0	1.31	0.789	2.0	71.54	
4	0.500	194.0	2.42	0.768	4.0	35.12	
5	1.000	318.0	3.97	0.740	2.0	68.35	
6	2.000	446.0	5.57	0.711	2.3	57.52	0.0014
7	4.000	603.5	7.54	0.676	1.7	74.93	
8	8.000	789.0	9.86	0.634	1.2	101.34	
9	16.000	1006.0	12.57	0.584	1.2	95.83	0.0020
10	4.000	938.0	11.72	0.600			
11	1.000	852.0	10.65	0.619			
12	0.250	748.0	9.35	0.643			



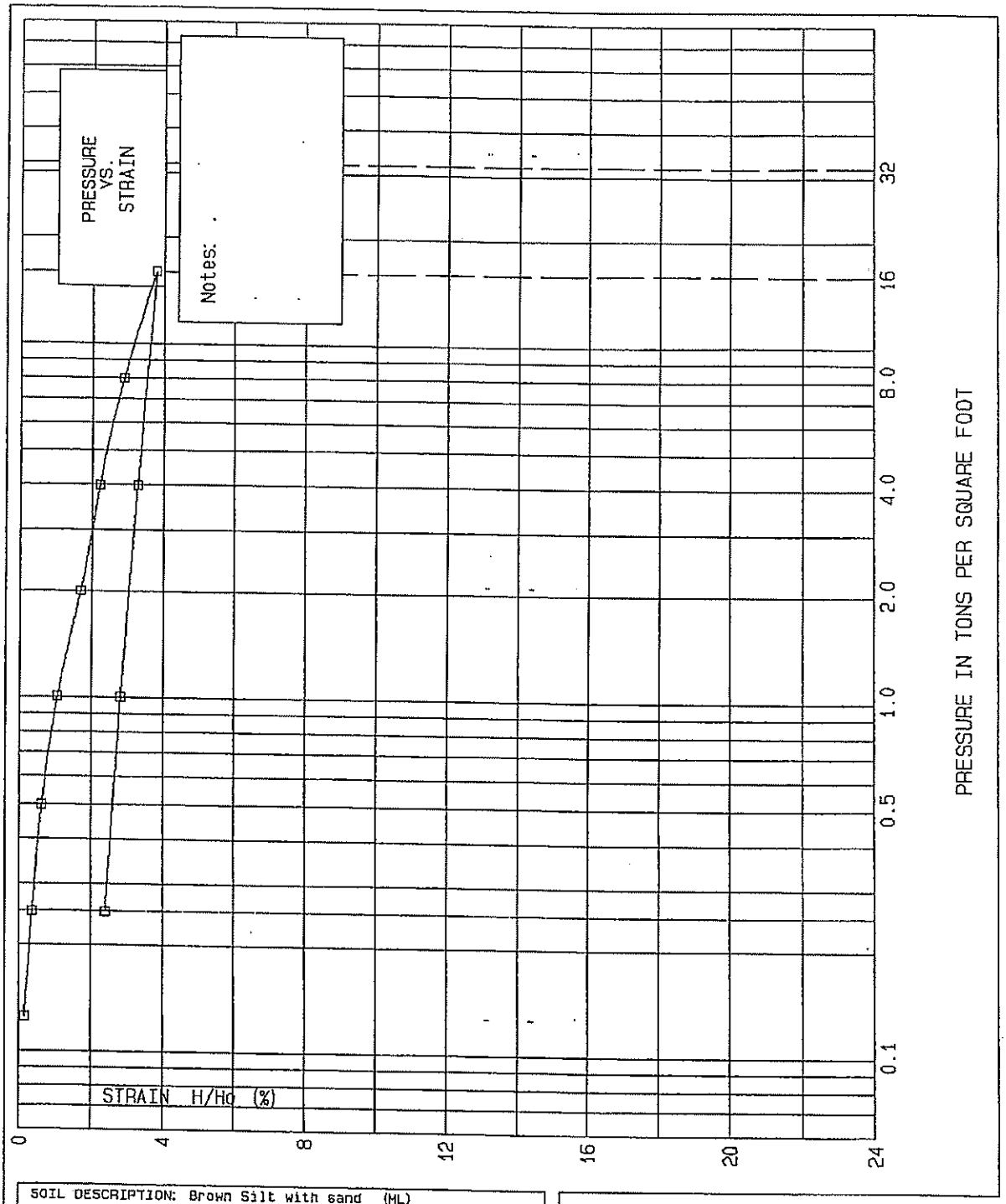
NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
GRADATION TESTS

BORING NO. SB-44
SAMPLE UP-1
DEPTH 30.8-30.9'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO. 398
DATE Feb.04

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



SOIL DESCRIPTION: Brown Silt with sand (ML)

SAMPLE DIAM. 2.5 IN.	LIQUID LIMIT 0 %	PLASTIC LIMIT 0 %	SPECIFIC GRAVITY 2.72

	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	VOID RATIO	SATURATION, %	SAMPLE HEIGHT, INCH
INITIAL	25.20	99.24			0.80
FINAL	25.40	101.65			0.78

New Britain-Hartford Busway

CONSOLIDATION TEST

FIGURE

BORING NO.	SB-44	TEST SERIES NO.	C398
SAMPLE	UP-1	DATE	2/12/04
DEPTH	30.7-30.8'		
TECH.	MST		
REVIEWER	DAS	FILE	17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

Job Number 17828
Project Name ..... New Britain-Hartford Busway
Test Number C398
Sample Description .. Brown Silt with sand (ML)
Boring Number SB-44
Sample Number UP-1
Depth ..... 30.7-30.8'

Technician ..... MST
Reviewer ..... DAS

NOTES: Silt Portion
Comprises 95%
of Sample

Specific Gravity ..... 2.7200E+00
Sample Dry Weight ..... 1.0230E+02
Sample Diameter ..... 2.5000E+00
Initial Void Ratio ..... 0.0000E+00
Initial Sample Height 8.0000E-01
Final Sample Height 7.8100E-01
Initial Water Content .... 2.5200E+01
Final Water Content ..... 2.5400E+01
Liquid Limit ..... 0.0000E+00
Plastic Limit ..... 0.0000E+00
Initial Saturation ..... 0.0000E+00
Final Saturation ..... 0.0000E+00
T50 data excluded
T90 data included

Increment umber	Pressure (TSF)	Final Dial	Percent Strain	Void Ratio	T90 (min)	Cv (T90) (/10000)	C_α
1	0.000	0.0	0.00	0.710			
2	0.125	11.0	0.14	0.708			
3	0.250	29.0	0.36	0.704	0.2	725.82	
4	0.500	50.0	0.63	0.700	0.5	288.91	
5	1.000	85.0	1.06	0.692	0.6	239.07	
6	2.000	136.0	1.70	0.681	0.6	236.48	0.00053
7	4.000	178.0	2.22	0.672	0.5	280.44	
8	8.000	231.0	2.89	0.661	0.6	230.88	
9	16.000	303.0	3.79	0.645	0.8	170.40	0.00072
10	4.000	262.0	3.27	0.654			
11	1.000	225.0	2.81	0.662			
12	0.250	192.0	2.40	0.669			

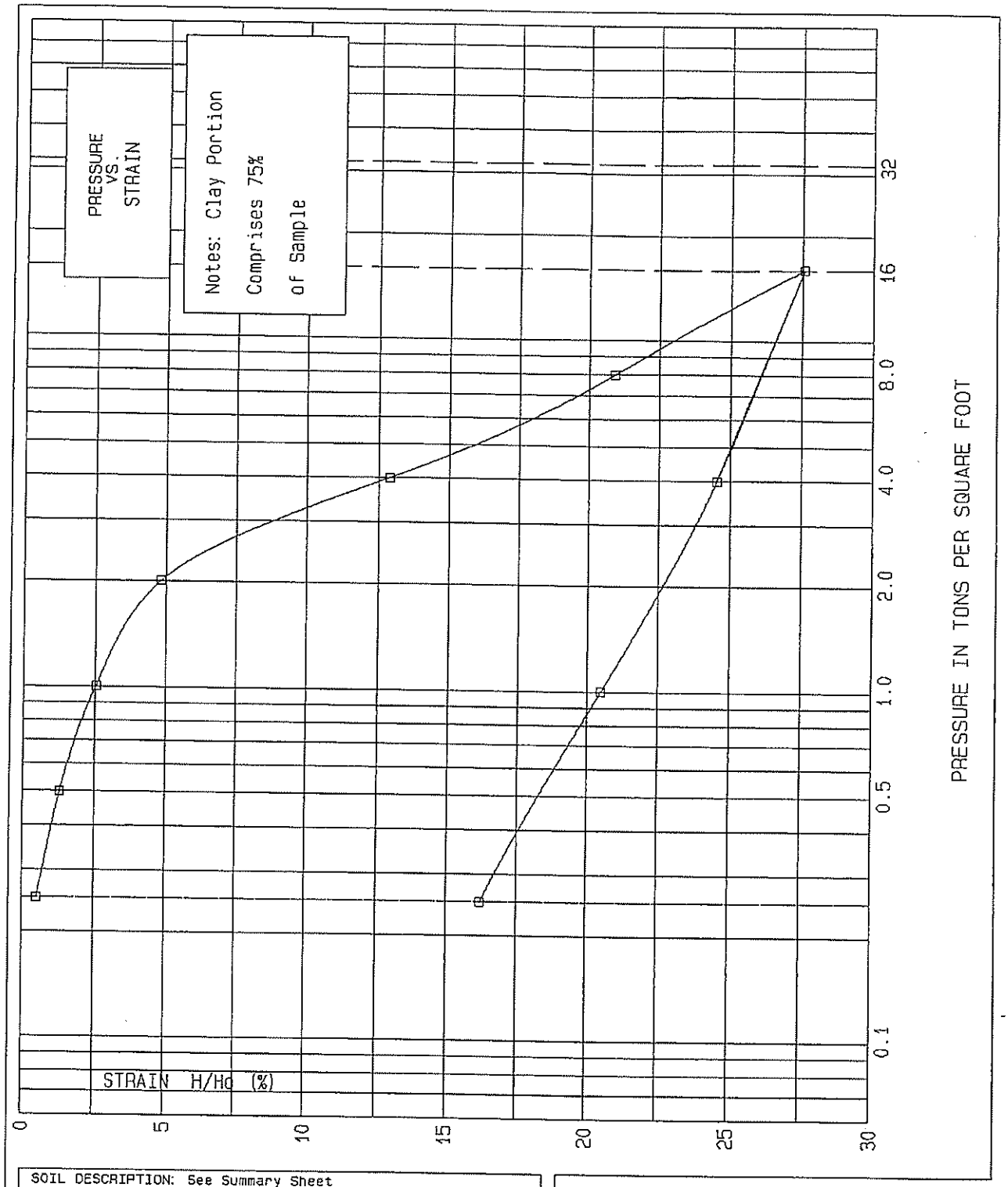
LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828
Project Engineer: D. SCHULZE
Assigned By: D. Gaffney
Date: Nov.03
Reviewed By: Don Schulze
Date Reviewed: 11/24/03

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol.: $\frac{\Delta e}{1+e_0}$	Laboratory Log and Soil Description
SB-46	UP-1	30-32	390		Average Total Unit Weight (30.0-31.9') = 108.94 Pcf															Brown Varved Soil as follows:
		30.6		66.1	(Clay Portion)									Tv= 0.27 tsf						Fat Clay (CH) grading to Silt (ML)
		30.7		35.7	(Silt Portion)															
		30.8-30.9		48.6	(entire varve)															Varve thickness varies from 1-2.5"
		31.0-31.1		60.5							65.7								0.26	Clay portion varies from 0.375-0.875" in thickness and comprises approx. 25-40% of total varve
		31.1-31.2		39.6	34	29														
		31.1 31.2					100	15												
		31.2-31.3		68.0	88	30														
		31.4-31.5					100	87		2.89										

GZA GeoEnvironmental, Inc.
Q:\NEWTON\LAB\LABFORM7.XLS

labform1.xls



SOIL DESCRIPTION: See Summary Sheet

SAMPLE DIAM. 2.5 IN.	LIQUID LIMIT 0 %	PLASTIC LIMIT 0 %	SPECIFIC GRAVITY 2.89

	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	VOID RATIO	SATURATION, %	SAMPLE HEIGHT, INCH
INITIAL	60.50	65.71			0.80
FINAL	46.80	78.58			0.67

NEW BRITAIN-HARTFORD BUSWAY

CONSOLIDATION TEST

FIGURE

BORING NO. SB-46
SAMPLE UP-1
DEPTH 31.0-31.1'
TECH. MST
REVIEWER DAS

TEST SERIES
NO. 390.1
DATE 11/19/03
FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

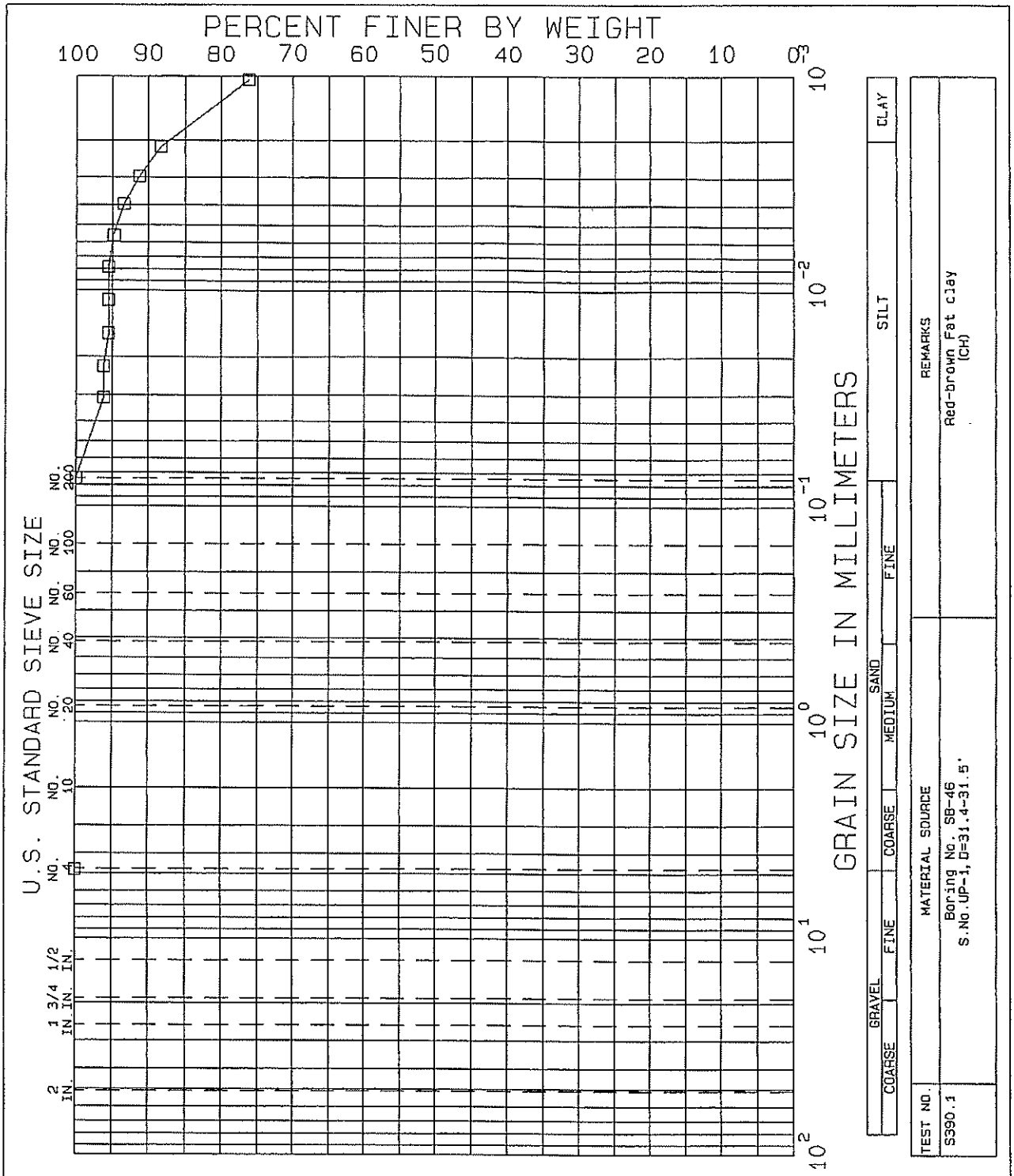
Job Number L17828
Project Name ..... NEW BRITAIN-HARTFORD BUSWAY
Test Number 390.1
Sample Description .. See Summary Sheet
Boring Number SB-46
Sample Number UP-1
Depth ..... 31.0-31.1'

Technician ..... MST
Reviewer ..... DAS

NOTES: Clay Portion
Comprises 75%
of Sample

Specific Gravity ..... 2.8900E+00
Sample Dry Weight ..... 6.7740E+01
Sample Diameter ..... 2.5000E+00
Initial Void Ratio ..... 0.0000E+00
Initial Sample Height 8.0000E-01
Final Sample Height 6.6900E-01
Initial Water Content .... 6.0500E+01
Final Water Content ..... 4.6800E+01
Liquid Limit ..... 0.0000E+00
Plastic Limit ..... 0.0000E+00
Initial Saturation ..... 0.0000E+00
Final Saturation ..... 0.0000E+00
T50 data excluded
T90 data included

Increment umber	Pressure (TSF)	Final Dial	Percent Strain	Void Ratio	T90 (min)	Cv (T90) (/10000) cm²/sec	C_α
1	0.125	17.0	0.00	1.744			
2	0.250	57.0	0.50	1.730	2.6	55.83	
3	0.500	121.0	1.30	1.709	6.3	22.74	0.0006
4	1.000	221.0	2.55	1.674	6.3	22.27	
5	2.000	402.0	4.81	1.612	6.3	21.48	
6	4.000	1049.0	12.90	1.390	23.0	5.27	
7	8.000	1689.0	20.90	1.171	13.0	7.75	0.007
8	16.000	2222.0	27.56	0.988	9.0	9.31	
9	4.000	1981.0	24.55	1.071			
10	1.000	1656.0	20.49	1.182			
11	0.250	1314.0	16.21	1.299			

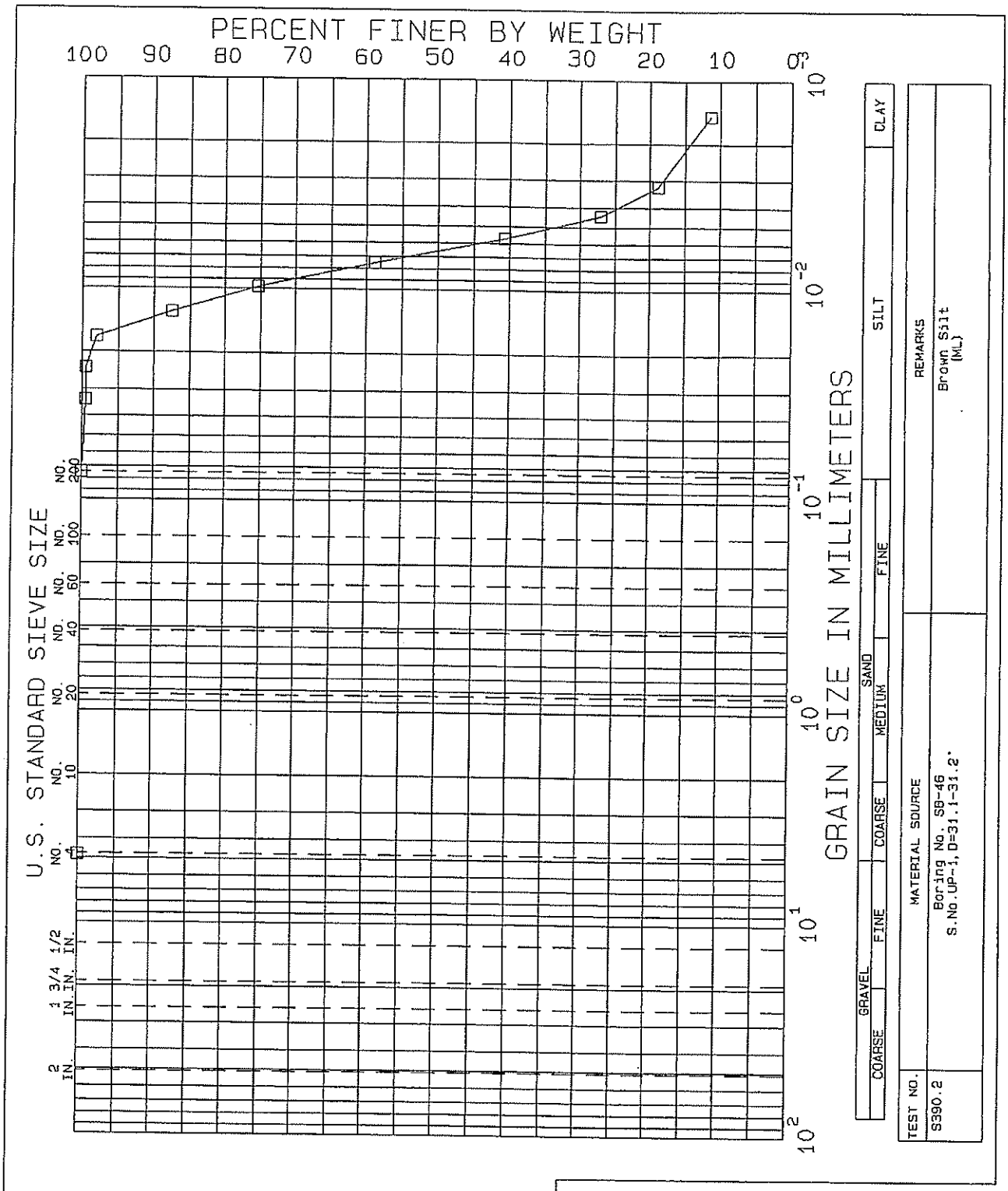


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-46	TEST SERIES	
SAMPLE	UP-1	NO.	390
DEPTH	31.4-31.5'	DATE	Nov.03
TECH.	pec		
REVIEWER	MBP	FILE	L17828



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO. SB-46
SAMPLE UP-1
DEPTH 31.1-31.2'
TECH. PEC
REVIEWER MBP

TEST SERIES
NO. 390
DATE Nov.03

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828
Project Engineer: D. SCHULZE
Assigned By: D. Gaffney
Date: Feb.03
Reviewed By: [illegible]
Date Reviewed: 2/23/04

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol. $\frac{\Delta e}{1+e_0}$	Laboratory Log and Soil Description
SB-52	ST-1	50.0-52.0	399		Average Total Unit Weight (50.0-51.3') = 117.8 Pcf															Red-brown Varved Soil as follows:
		50.1		48.7	(Clay Portion)									Tv= 0.24 tsf						Lean Clay (CL) grading to Silt (ML)
		50.5		23.2	(Silt Portion)									Tv= 0.20 tsf						
		50.5-50.6		43.7							79.3								0.15	Varve thickness varies from 0.25-0.5" Clay portion varies from 0.125-.25"
		50.7		41.6	(entire varve)									Tv= 0.25 tsf						in thickness and comprises approx. 35-50% of total varve
		50.0-51.3*		47.3	40	23														
		50.0-51.3*					100	47												* Note: Hydrometer, Specific Gravity, and Atterberg Limit samples taken from clay layers throughout the tube sample
		50.0-51.3*								2.83										

GZA GeoEnvironmental, Inc.
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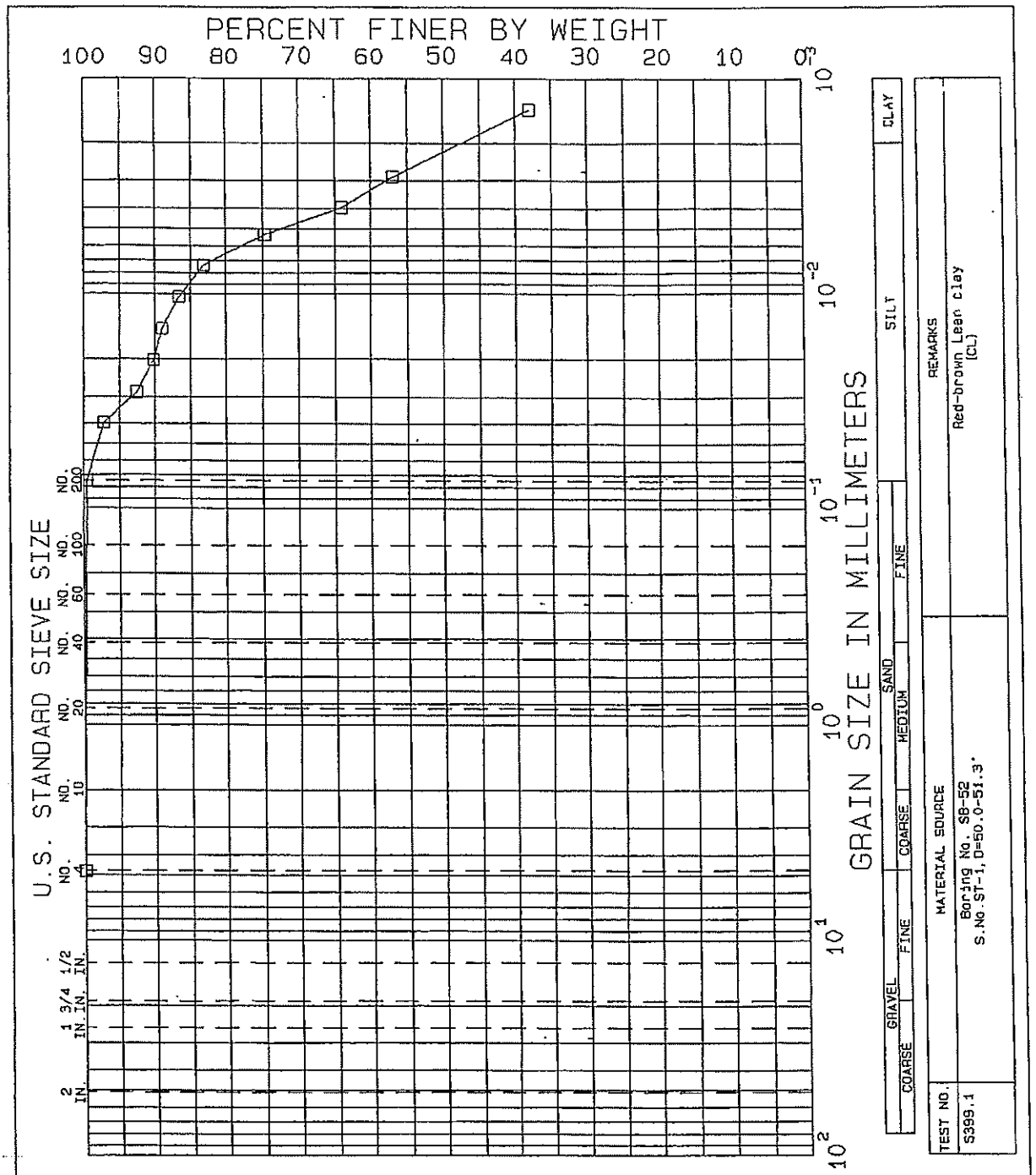
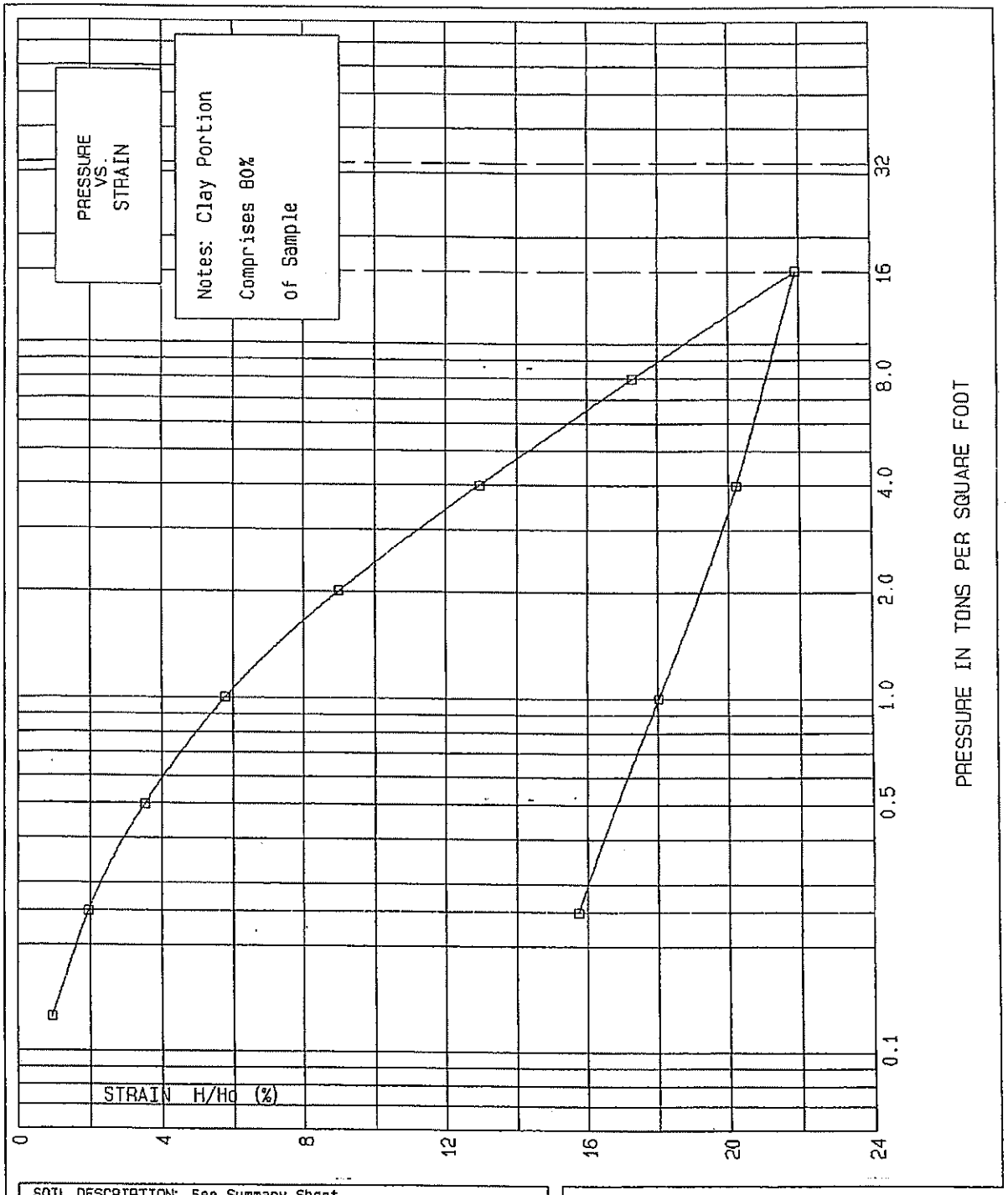
labform1.xls



NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
GRADATION TESTS

BORING NO.	SB-52	TEST SERIES	
SAMPLE	ST-1	NO.	399
DEPTH	50.0-51.3'	DATE	Feb.04
TECH.	PEC		
REVIEWER	MBP	FILE	L17828



SOIL DESCRIPTION: See Summary Sheet

SAMPLE DIAM. 2.5 IN.	LIQUID LIMIT 0 %	PLASTIC LIMIT 0 %	SPECIFIC GRAVITY 2.83

	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	VOID RATIO	SATURATION, %	SAMPLE HEIGHT, INCH
INITIAL	43.70	79.26			0.80
FINAL	32.20	94.07			0.67

New Britain-Hartford Busway

CONSOLIDATION TEST

BORING NO.	SB-52	TEST SERIES NO.	C399.1
SAMPLE	ST-1	DATE	2/23/04
DEPTH	50.5-50.6'		
TECH.	MST		
REVIEWER	DAS	FILE	L17828

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

Job Number L17828
Project Name ..... New Britain-Hartford Busway
Test Number C399.1
Sample Description .. See Summary Sheet
Boring Number SB-52
Sample Number ST-1
Depth ..... 50.5-50.6'

Technician ..... MST
Reviewer ..... DAS

NOTES: Clay Portion
Comprises 80%
of Sample

Specific Gravity ..... 2.8300E+00
Sample Dry Weight ..... 8.1700E+01
Sample Diameter ..... 2.5000E+00
Initial Void Ratio ..... 0.0000E+00
Initial Sample Height 8.0000E-01
Final Sample Height 6.7400E-01
Initial Water Content .... 4.3700E+01
Final Water Content ..... 3.2200E+01
Liquid Limit ..... 0.0000E+00
Plastic Limit ..... 0.0000E+00
Initial Saturation ..... 0.0000E+00
Final Saturation ..... 0.0000E+00
T50 data excluded
T90 data included

Increment umber	Pressure (TSF)	Final Dial	Percent Strain	Void Ratio	T90 (min)	Cv (T90) (/10000)	C_α
1	0.000	0.0	0.00	1.228			
2	0.125	75.0	0.94	1.207			
3	0.250	158.0	1.97	1.184	12.9	10.98	
4	0.500	283.0	3.54	1.149	12.3	11.22	0.0018
5	1.000	462.0	5.77	1.099	6.3	21.05	0.0024
6	2.000	719.0	8.99	1.028	8.4	14.90	
7	4.000	1036.0	12.95	0.940	6.3	18.36	
8	8.000	1384.0	17.30	0.843	6.3	16.68	
9	16.000	1752.0	21.90	0.740	4.0	23.58	0.0041
10	4.000	1619.0	20.24	0.777			
11	1.000	1443.0	18.04	0.826			
12	0.250	1259.0	15.74	0.877			

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

Project No.: L17828 | Assigned By: D. Gaffney | Reviewed By: Don Schulze

Project Engineer: D. SCHULZE | Date: Feb.04 | Date Reviewed: 2/12/04

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol. $\frac{\Delta e}{1+e_0}$	Laboratory Log and Soil Description
SB-54	ST-1	42-44	400		Average Total Unit Weight (42.0-43.9') = 111.9 Pcf															Brown Varved Soil as follows:
		42.0-42.5		48.2							74.9			CIU	4320	σ1/σ3 MAX	2887	15.3		Fat Clay (CH) grading to Silt (ML)
		42.5		67.7	(Clay Portion)									Tv= 0.28 tsf						
		42.5-43.0		45.9							76.8			CIU	5760	σ1/σ3 MAX	4023	13.2		Varve thickness varies from 0.5-2.0" Clay portion varies from 0.25-0.625"
		43.0-43.5		46.1							76.6			CIU	7200	σ1/σ3 MAX	4681	13.9		in thickness and comprises approx. 25-50% of total varve
		43.5		72.5	(Clay Portion)									Tv= 0.27 tsf						
		43.6-43.7		55.7							69.8								0.17	
		43.7		40.8	(Silt Portion)															
		43.7-43.9		46.8	(entire varve)															
		42.0-43.0		76.7	76	30	100	82		2.84	(Clay Portion)									

GZA GeoEnvironmental, Inc.

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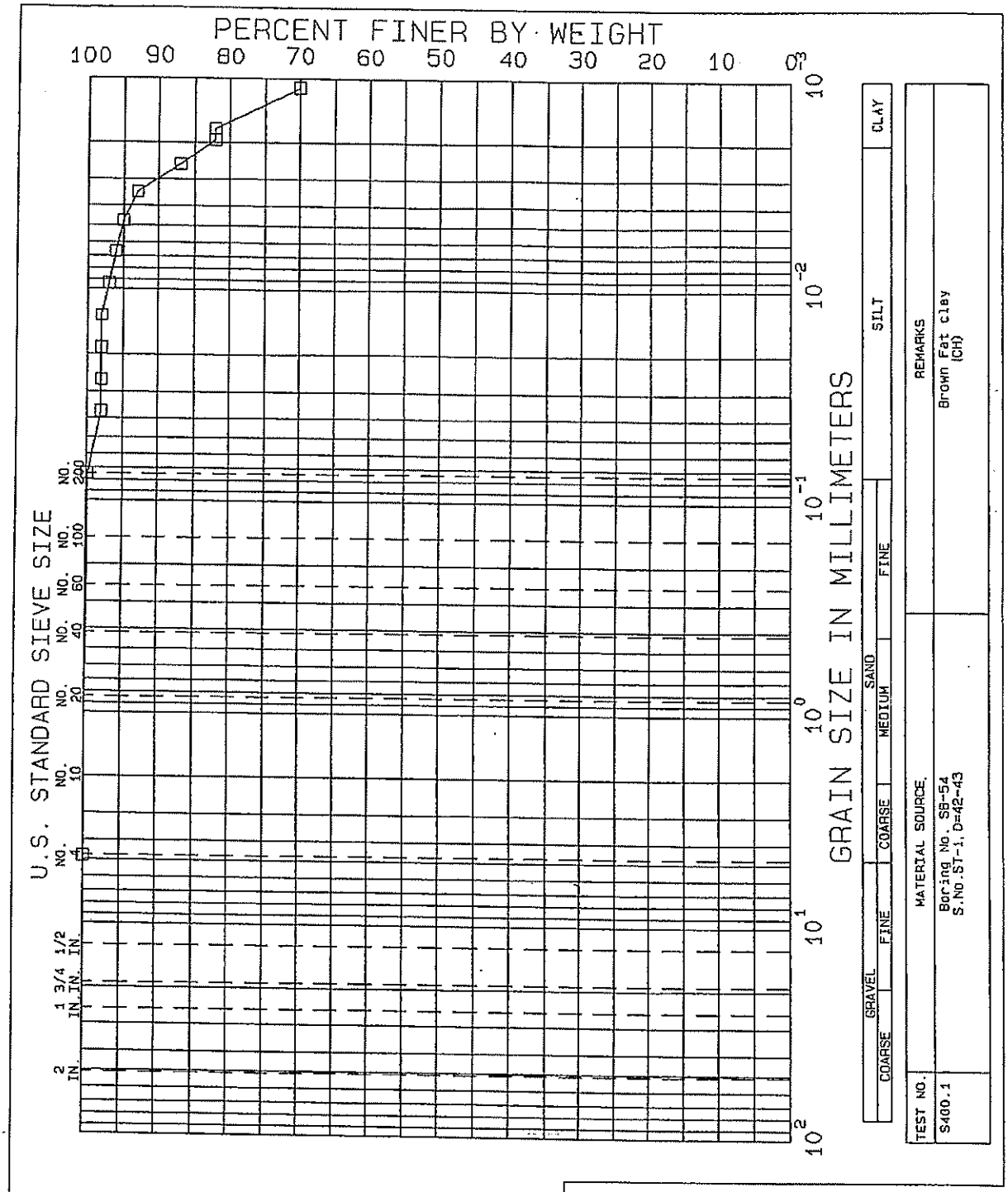
labform1.xls

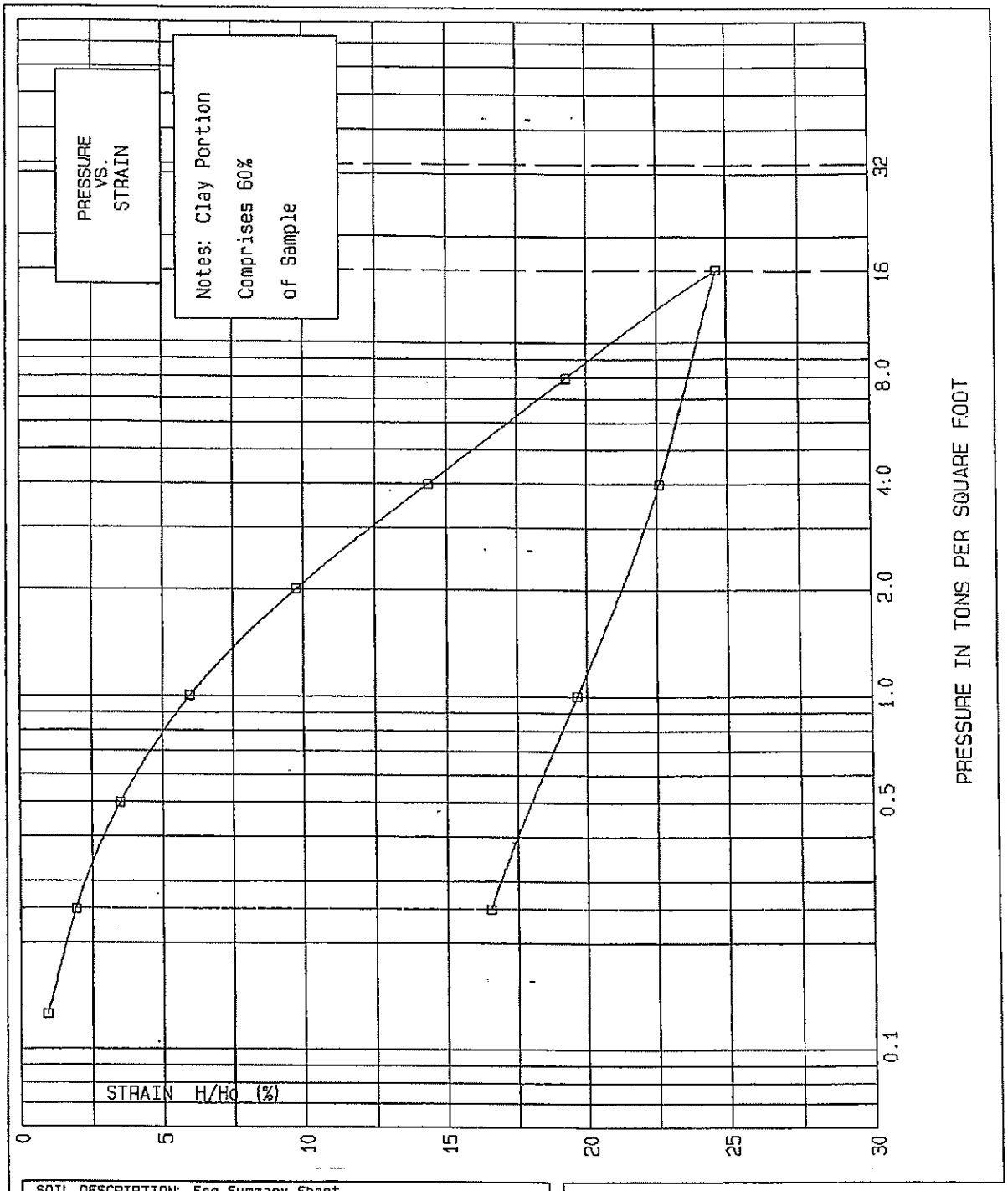


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-54	TEST SERIES	
SAMPLE	ST-1	NO.	400
DEPTH	42-43'	DATE	Feb.04
TECH.	CAG		
REVIEWER	MBP	FILE	L17828



SOIL DESCRIPTION: See Summary Sheet

SAMPLE DIAM.	LIQUID LIMIT	PLASTIC LIMIT	SPECIFIC GRAVITY
2.5 IN.	76 %	30 %	2.84

	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	VOID RATIO	SATURATION, %	SAMPLE HEIGHT, INCH
INITIAL	55.70	69.84			0.80
FINAL	41.10	83.64			0.67

New Britain-Hartford Busway

CONSOLIDATION TEST

BORING NO.	SB-54	TEST SERIES NO.	C400
SAMPLE	ST-1	DATE	2/12/04
DEPTH	43.6-43.7'		
TECH.	MST		
REVIEWER	DAS	FILE	17828

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

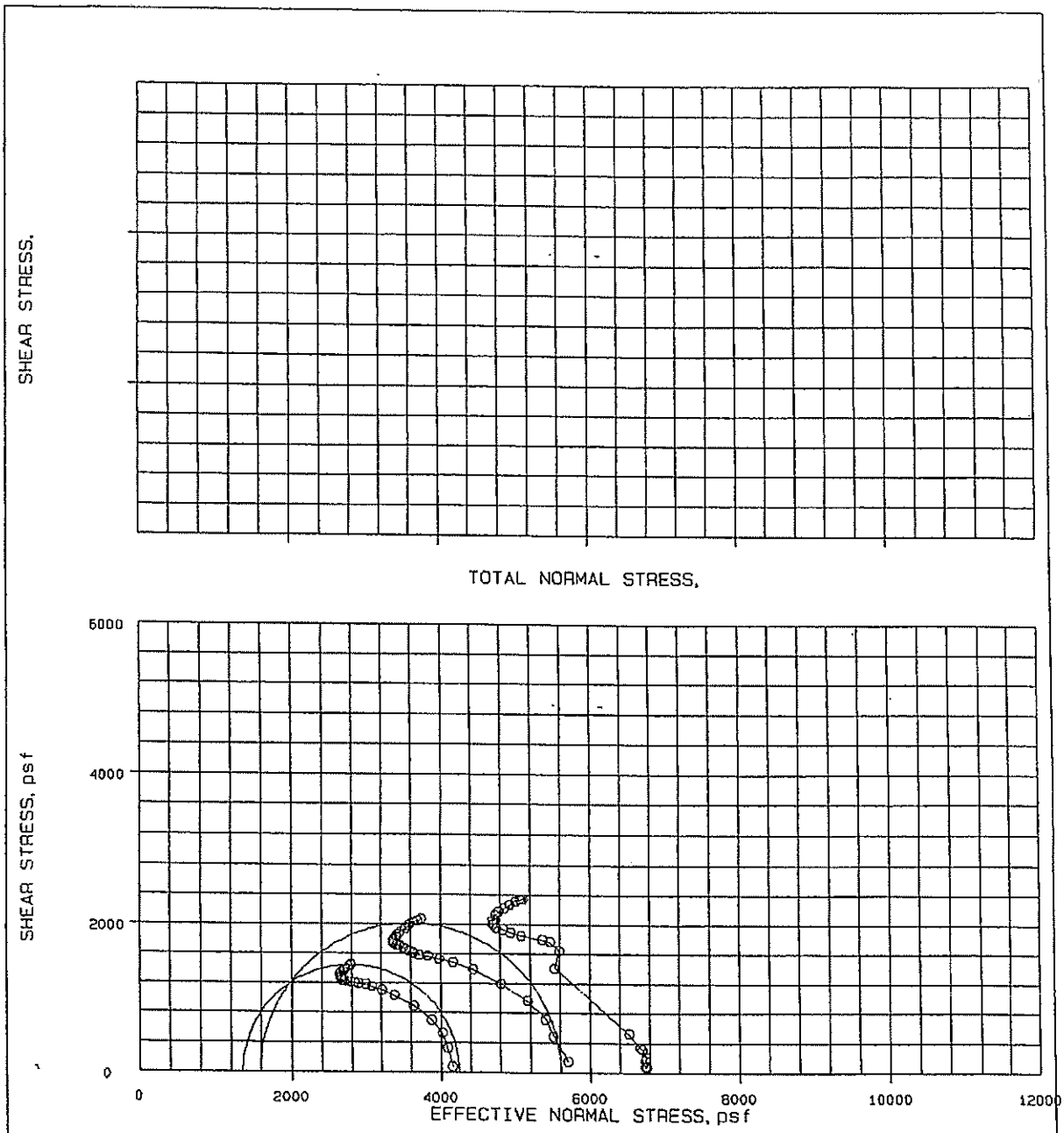
Job Number 17828
Project Name ..... New Britain-Hartford Busway
Test Number C400
Sample Description .. See Summary Sheet
Boring Number SB-54
Sample Number ST-1
Depth ..... 43.6-43.7'

Technician ..... MST
Reviewer ..... DAS

NOTES: Clay Portion
Comprises 60%
of Sample

Specific Gravity ..... 2.8400E+00
Sample Dry Weight ..... 7.1990E+01
Sample Diameter ..... 2.5000E+00
Initial Void Ratio ..... 0.0000E+00
Initial Sample Height 8.0000E-01
Final Sample Height 6.6800E-01
Initial Water Content .... 5.5700E+01
Final Water Content ..... 4.1100E+01
Liquid Limit ..... 7.6000E+01
Plastic Limit ..... 3.0000E+01
Initial Saturation ..... 0.0000E+00
Final Saturation ..... 0.0000E+00
T50 data excluded
T90 data included

Increment umber	Pressure (TSF)	Final Dial	Percent Strain	Void Ratio	T90 (min)	Cv (T90) (/10000) cm²/sec	C_α
1	0.000	0.0	0.00	1.538			
2	0.125	73.0	0.91	1.514			
3	0.250	155.0	1.94	1.488	6.2	22.87	
4	0.500	281.0	3.51	1.448	4.4	31.37	0.0016
5	1.000	478.0	5.97	1.386	3.6	36.77	
6	2.000	778.0	9.72	1.291	6.3	19.66	0.0040
7	4.000	1151.0	14.39	1.172	6.8	16.59	
8	8.000	1540.0	19.25	1.049	4.0	25.24	
9	16.000	1971.0	24.64	0.912	3.2	27.78	0.0053
10	4.000	1808.0	22.60	0.964			
11	1.000	1571.0	19.64	1.039			
12	0.250	1323.0	16.54	1.118			



SOIL DESCRIPTION:	See Summary Sheet		
LIQUID LIMIT 0 %	PLASTIC LIMIT 0	SPECIFIC GRAVITY 0	

FAILURE CRITERIA

REMARKS

σ_1/σ_3

NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

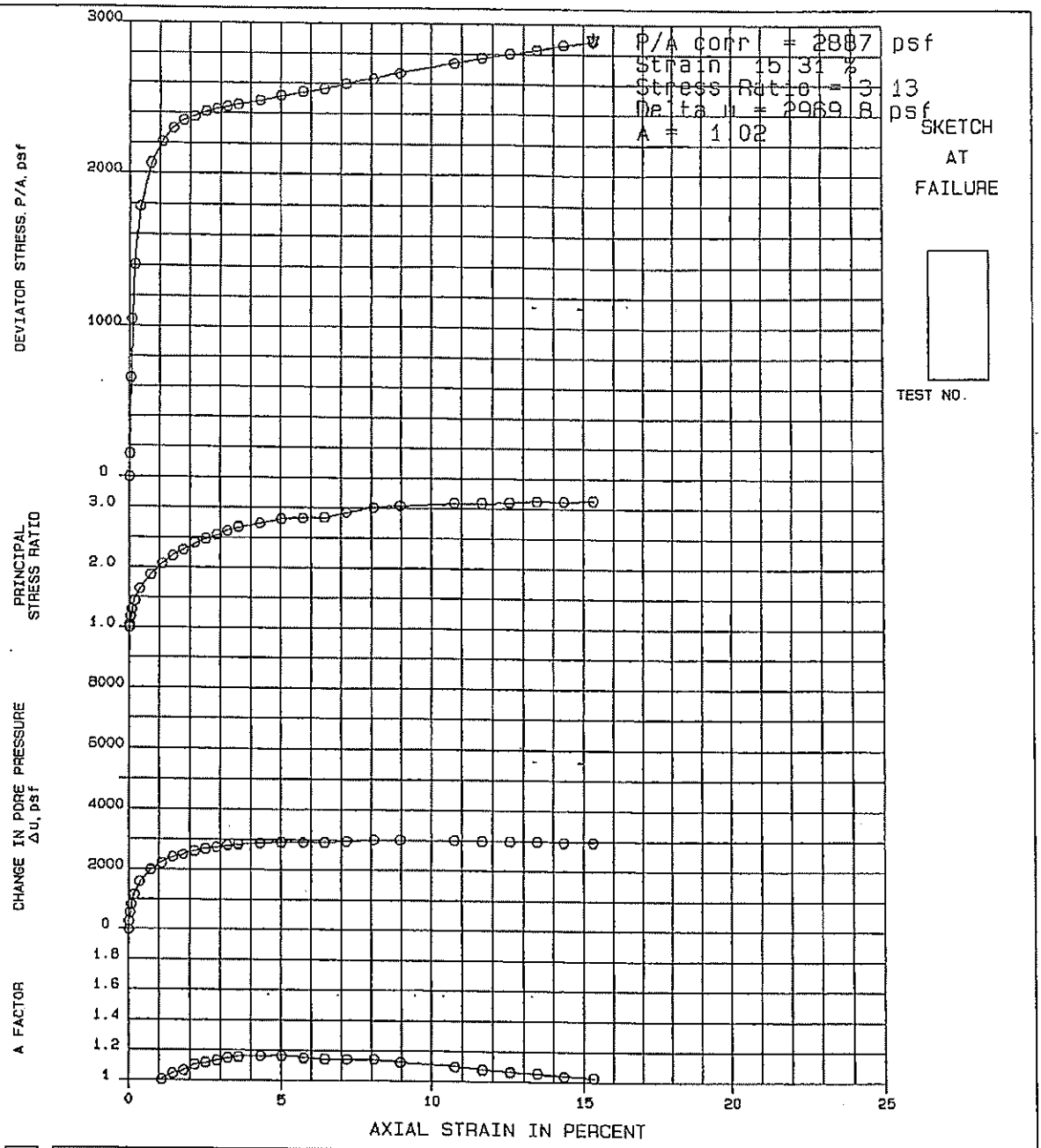
MOHR STRENGTH ENVELOPE

TRIAXIAL COMPRESSION TESTS (CIU)

FIGURE

BORING NO	SB-54	TEST SERIES NO.	400
SAMPLE	ST-1	DATE	Feb.04
DEPTH	43.0-43.5'		
TECH.	MST		
REVIEWER		FILE	L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



TEST NO./SYMBOL	INITIAL CONDITIONS: INITIAL WATER CONTENT, %	INITIAL CONDITIONS: INITIAL DRY UNIT WEIGHT, pcf	INITIAL CONDITIONS: SAMPLE HEIGHT & DIAMETER, IN.	CONDITIONS BEFORE SHEAR: INITIAL STRESSES $\bar{\sigma}_1 = \bar{\sigma}_3$, ksf	CONDITIONS BEFORE SHEAR: FINAL BACK PRESSURE, ksf	CONDITIONS BEFORE SHEAR: VOLUMETRIC STRAIN, %	CONDITIONS BEFORE SHEAR: PORE PRESSURE RESPONSE, %	FINAL CONDITIONS: FINAL WATER CONTENT, %	FINAL CONDITIONS: FINAL DRY UNIT WEIGHT,	RATE OF STRAIN, PERCENT PER MINUTE
400.1.1	48.2	74.9	5.698 2.825	4.32	8.64	6.2	98.2	43.8	79.9	.042

SOIL DESCRIPTION: See Summary Sheet

LIQUID LIMIT	PLASTIC LIMIT	SPECIFIC GRAVITY
0 %	0 %	0

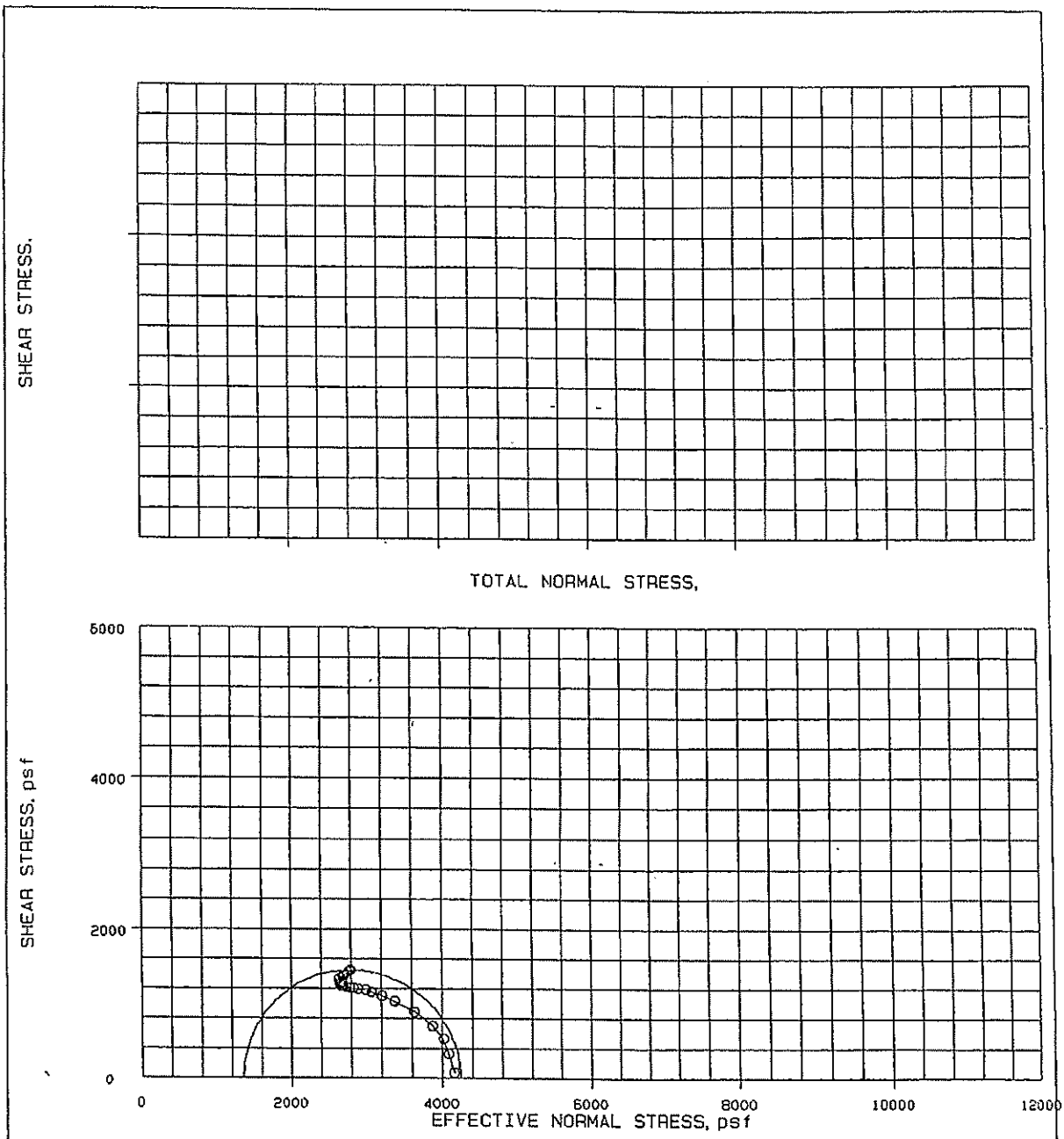
NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
TRIAXIAL COMPRESSION TESTS (CIU)

BORING NO.	SB-54	TEST SERIES NO.	400
SAMPLE	ST-1	DATE	Feb.04
DEPTH	42.0-42.5'		
TECH.	MST		
REVIEWER		FILE	L17828

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

T.9



SOIL DESCRIPTION:	See Summary Sheet				
LIQUID LIMIT	0 %	PLASTIC LIMIT	0	SPECIFIC GRAVITY	0

FAILURE CRITERIA

REMARKS σ_1'/σ_3'

NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

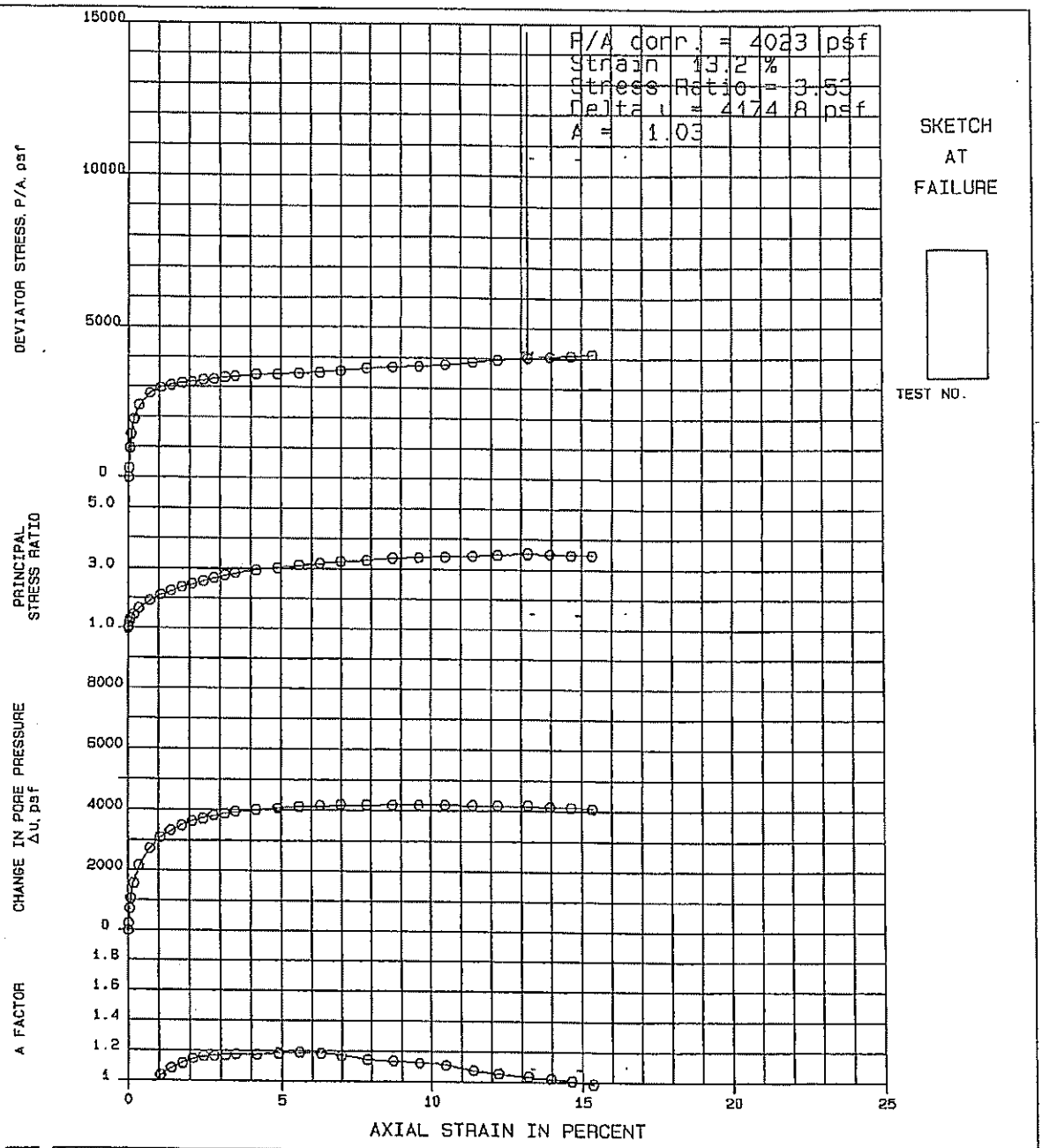
MOHR STRENGTH ENVELOPE

TRIAXIAL COMPRESSION TESTS (CIU)

FIGURE

BORING NO.	S8-54	TEST SERIES NO.	400
SAMPLE	ST-1	DATE	Feb.04
DEPTH	42.0-42.5'		
TECH.	MST		
REVIEWER		FILE	L1782B

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



TEST NO./SYMBOL	INITIAL CONDITIONS: INITIAL WATER CONTENT, %	INITIAL CONDITIONS: INITIAL DRY UNIT WEIGHT, pcf	INITIAL CONDITIONS: SAMPLE HEIGHT & DIAMETER, IN.	CONDITIONS BEFORE SHEAR: INITIAL STRESSES $\bar{\sigma}_1 = \bar{\sigma}_3$, ksf	CONDITIONS BEFORE SHEAR: FINAL BACK PRESSURE, ksf	CONDITIONS BEFORE SHEAR: VOLUMETRIC STRAIN, %	CONDITIONS BEFORE SHEAR: PORE PRESSURE RESPONSE, %	FINAL CONDITIONS: FINAL WATER CONTENT, %	FINAL CONDITIONS: FINAL DRY UNIT WEIGHT,	RATE OF STRAIN, PERCENT PER MINUTE
400.1.2	45.9	76.8	5.875 2.825	5.75	8.64	7.2	97.8	40.6	82.8	.051

SOIL DESCRIPTION: See Summary Sheet

LIQUID LIMIT 0 % PLASTIC LIMIT 0 % SPECIFIC GRAVITY 0

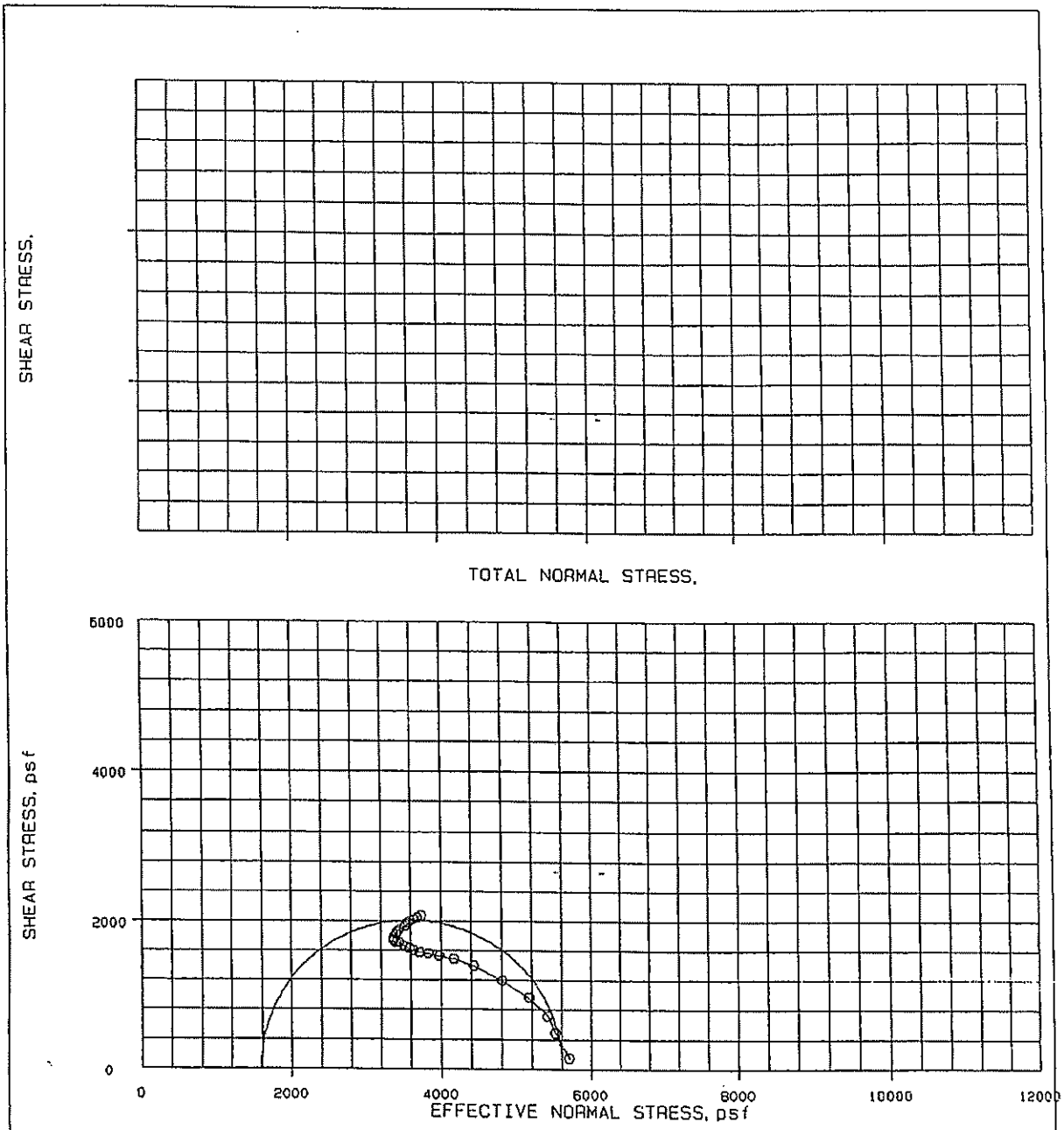
NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
TRIAXIAL COMPRESSION TESTS ($\overline{CIU}$)

BORING NO. SB-54
SAMPLE ST-1
DEPTH 42.5-43.0'
TECH. MST
REVIEWER

TEST SERIES NO. 400
DATE Feb.04
FILE L17828

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



SOIL DESCRIPTION:	See Summary Sheet	
LIQUID LIMIT 0 %	PLASTIC LIMIT 0	SPECIFIC GRAVITY 0

FAILURE CRITERIA

REMARKS

σ_1/σ_3

NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

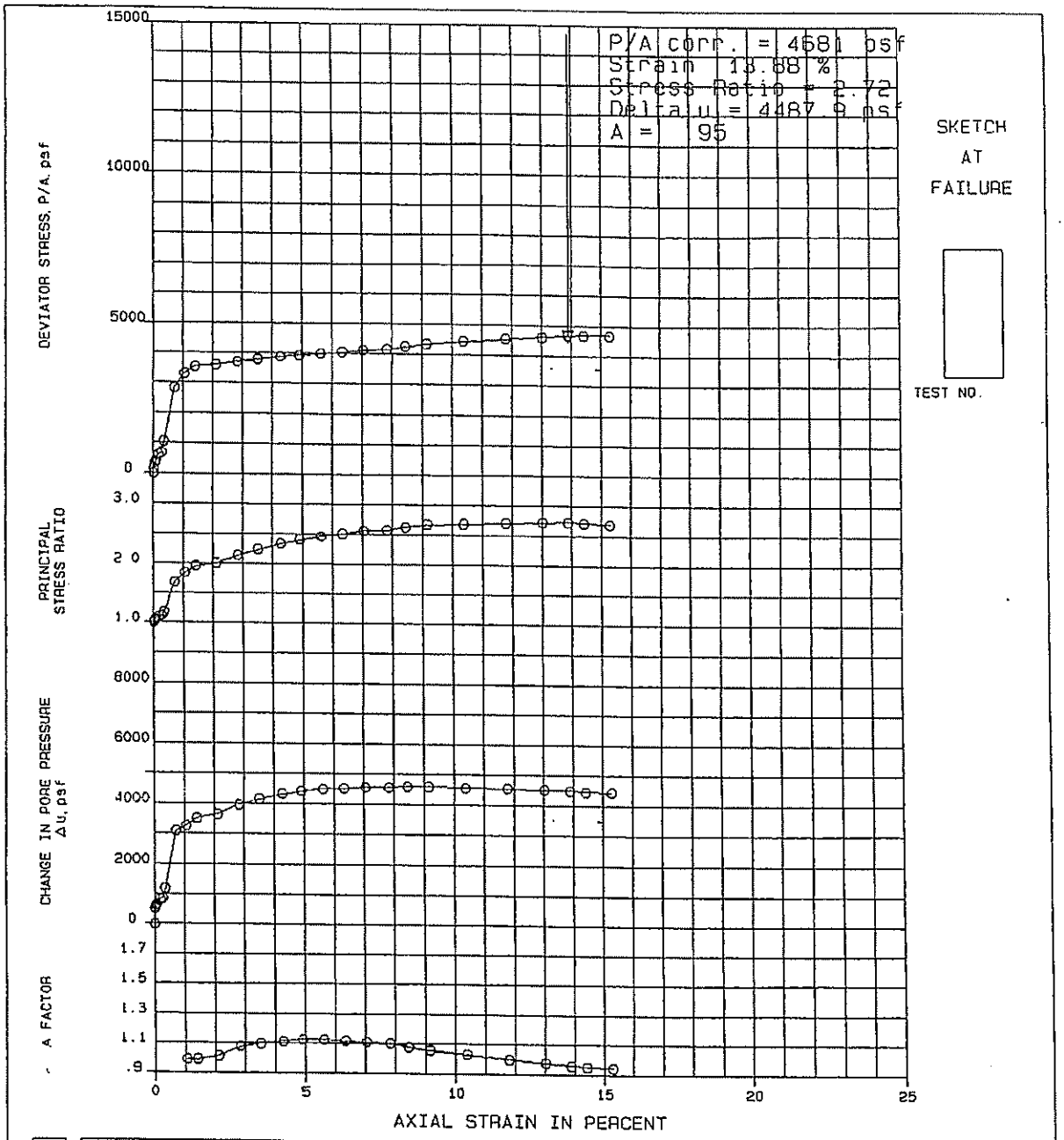
MOHR STRENGTH ENVELOPE

TRIAXIAL COMPRESSION TESTS (CIU)

FIGURE

BORING NO.	SB-54	TEST SERIES NO.	400
SAMPLE	ST-1	DATE	Feb.04
DEPTH	42.5-43.0'		
TECH.	MST		
REVIEWER		FILE	L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



TEST NO /SYMBOL	INITIAL CONDITIONS: INITIAL WATER CONTENT, %	INITIAL CONDITIONS: INITIAL DRY UNIT WEIGHT, pcf	INITIAL CONDITIONS: SAMPLE HEIGHT & DIAMETER, IN.	CONDITIONS BEFORE SHEAR: INITIAL STRESSES $\bar{\sigma}_1 = \bar{\sigma}_3$, ksf	CONDITIONS BEFORE SHEAR: FINAL BACK PRESSURE, ksf	CONDITIONS BEFORE SHEAR: VOLUMETRIC STRAIN, %	CONDITIONS BEFORE SHEAR: PORE PRESSURE RESPONSE, %	FINAL CONDITIONS: FINAL WATER CONTENT, %	FINAL CONDITIONS: FINAL DRY UNIT WEIGHT,	RATE OF STRAIN, PERCENT PER MINUTE
400.1.3	46.1	76.6	5.855 2.81	7.2	8.64	8.4	94	38.7	83.7	.031

SOIL DESCRIPTION: See Summary Sheet

LIQUID LIMIT 0 % PLASTIC LIMIT 0 % SPECIFIC GRAVITY 0

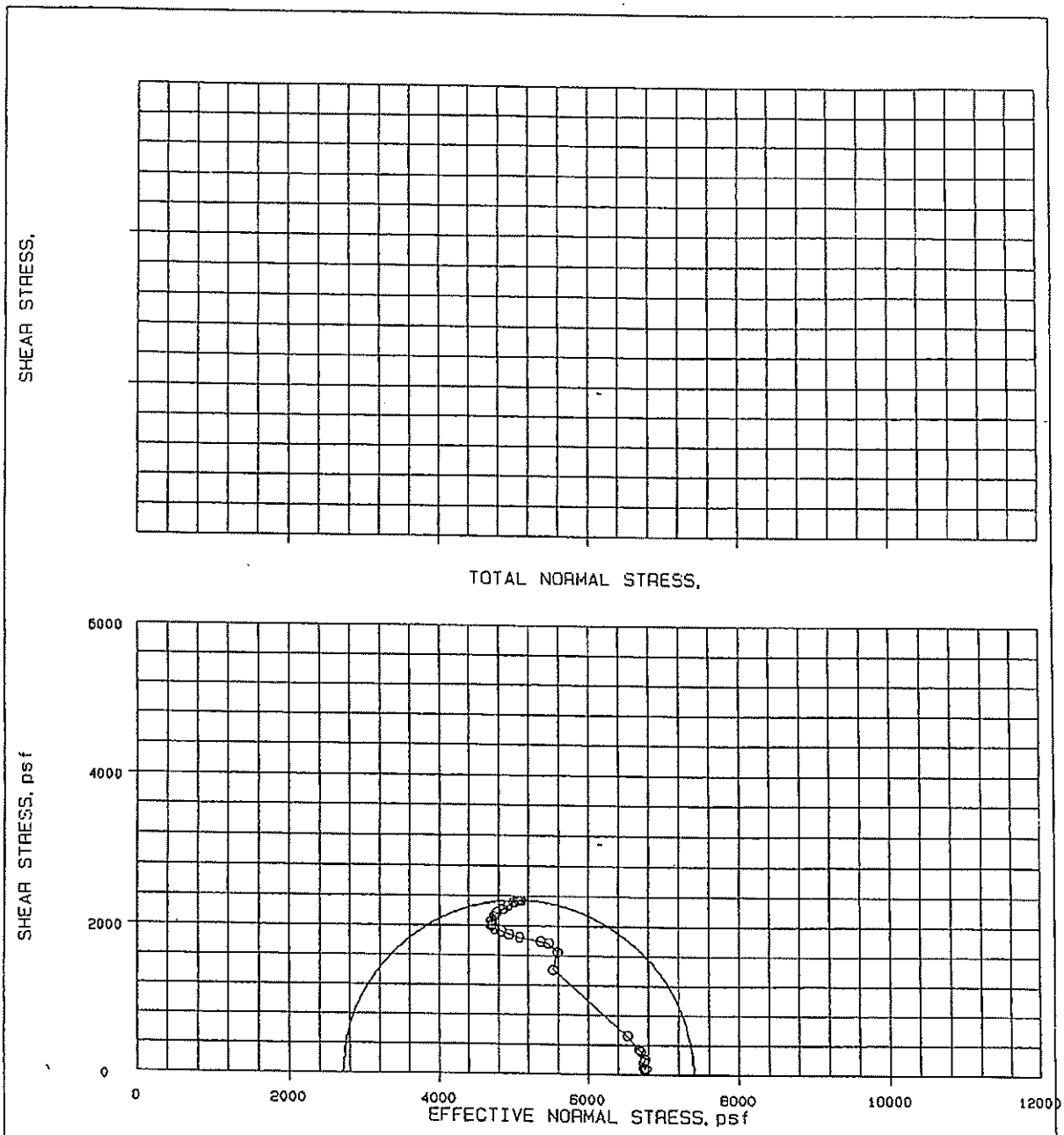
NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
TRIAXIAL COMPRESSION TESTS ($\overline{CIU}$)

BORING NO SB-54
SAMPLE SI-1
DEPTH 43.0-43.5'
TECH. MST
REVIEWER

TEST SERIES NO. 400
DATE Feb.04
FILE L17828

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



SOIL DESCRIPTION:	See Summary Sheet	
LIQUID LIMIT 0 %	PLASTIC LIMIT 0	SPECIFIC GRAVITY 0

FAILURE CRITERIA

REMARKS

σ_1/σ_3

NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

MOHR STRENGTH ENVELOPE

TRIAXIAL COMPRESSION TESTS (CIU)

FIGURE

BORING NO.	SB-54	TEST SERIES NO.	400
SAMPLE	ST-1	DATE	Feb.04
DEPTH	43.0-43.5'		
TECH.	MST		
REVIEWER		FILE	L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

UNCONFINED COMPRESSION TEST

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: L17828 — Assigned By: D. Gaffney — Reviewed By: Don Schulze
Project Engineer: D. SCHULZE — Date: Mar.04 — Date Reviewed: 3/8/04

Boring/ Test Pit No.	Sample No.	Depth Ft.	Lab No.	Sample Data: Water Content %	Do in.	L in.	(1) Unit Wt. PCF	(2) Wet Density PCF	Bulk Gs.	(3) Other Tests	Compression Tests: (4) Strength KSI	(5) Strain %	(6) Conf. Stress	(7) E tan PSI EE+06	(8) E sec PSI EE+06	(9) Poisson's Ratio	σT KSI	Is50 KSI	Rock Formation or Description or Remarks
SB-25		33.8-34.3	428		1.993	4.412	164.0			U	7.53								
SB-26		50.2-50.7	429		1.962	4.195	166.5			U	7.77								
SB-27		61.0-61.4	430																Sample not testable due to fracture along bedding plane
SB-28		54.0-54.5	431		1.979	4.495	163.0			U	11.87								
SB-29			432																Sample not received
SB-30			433																Sample not received
SB-31		42.8-43.3	434		1.969	4.205	162.6			U	7.72								
SB-35		30.8-31.4	435		1.974	4.321	162.6			U	9.97								
SB-36		37.9-38.7	436		1.974	4.150	164.2			U	8.01								
SB-42		43.1-43.4	437		1.975	3.691	161.9			U	8.00								
SB-43		27.9-28.4	438																Sample not testable due to fracture along bedding plane

(1) Volume Determined By Measuring Dimensions
(2) Determined by Measuring Dimensions and Weight of Saturated Sample
(3) P=Petrographic PLD=Point Load (diametrical), PLA= Point Load (Axial) RST= Splitting Tensile U= Unconfined Compressive Strength

(4) Taken at Peak Deviator Stress
(5) Strain at Deviator Stress
(6) Represents Confining Stress on Triaxial Tests
(7) Represents Tangent Modulus at 50% of Total Failure Stress
(8) Represents Secant Modulus at 50% of Total Failure Stress
(9) Represents Secant Poisson's Ratio at 50% of Total Failure Stress

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: 1.17828 — Assigned By: D. Gaffney — Reviewed By: [signature]
Project Engineer: D. SCHULZE — Date: Mar.04 — Date Reviewed: 3/11/04

Boring/ Test Pit No.	Sample No.	Depth Ft.	Lab No.	Sample Data: Water Content %	Do in.	L in.	(1) Unit Wt. PCF	(2) Wet Density PCF	Bulk Gs.	(3) Other Tests	Compression Tests: (4) Strength KSI	(5) Strain %	(6) Conf. Stress	(7) E tan PSI EE+06	(8) E sec PSI EE+06	(9) Poisson's Ratio	σ_T KSI	Is_{50} KSI	Rock Formation or Description or Remarks
SB-44		65.0-65.5	439		1.965	4.394	156.9			U	* 4.45								* Sample failed on joint plane
SB-89		27.3-27.7	440		1.961	4.365	159.2			U	7.45								
SB-90		90.8-91.2	441																Sample not testable due to fracture along bedding plane
SB-92		42.0-42.4	442		1.941	3.846	158.7			U	4.73								
SB-95		16.8-17.4	443		1.981	4.314	161.6			U	10.06								
SB-96		16.8-17.3	444																Sample not testable due to fracture along bedding plane
SB-98		21.0-21.5	445		1.971	4.036	160.9			U	6.23								* Sample failed on joint plane
SB-99		37.6-38.0	446																Sample not testable due to fracture along bedding plane
SB-31		43.5-43.9	447		1.974	4.255	161.5			U	6.05								
SB-16		48.3-48.9	448		1.961	4.092	159.5			U	4.47								

(1) Volume Determined By Measuring Dimensions
(2) Determined by Measuring Dimensions and Weight of Saturated Sample
(3) P=Petrographic PLD=Point Load (diametrical). PLA= Point Load (Axial) RST= Splitting Tensile U= Unconfined Compressive Strength
(4) Taken at Peak Deviator Stress
(5) Strain at Deviator Stress
(6) Represents Confining Stress on Triaxial Tests
(7) Represents Tangent Modulus at 50% of Total Failure Stress
(8) Represents Secant Modulus at 50% of Total Failure Stress
(9) Represents Secant Poisson's Ratio at 50% of Total Failure Stress

Corrosivity Test Results

R.I. Analytical Laboratories, Inc.

CERTIFICATE OF ANALYSIS

GZA GeoEnvironmental Labs
Date Received: 02/04/2004
Work Order #: 0402-01543

Approved by: R.I. Analytical

Sample # 003
SAMPLE DESCRIPTION: LAB #411 SB-39 S-2 (4.5-6.0)
SAMPLE TYPE: COMPOSITE SAMPLE DATE/TIME: —

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
pH	7.2		SU	SW-846 9045C	02/04/2004	LKS
RESISTIVITY	0.087		MEGOHM-CM	SM2510 B	02/05/2004	CCP
SULFATE	<160	160	mg/kg dry	SM4500-SO4 E	02/10/2004	EC
SULFIDE	<2.5	2.5	mg/kg dry	EPA 276.2	02/09/2004	EC
CHLORIDE	<160	160	mg/kg dry	SM4500-CL B	02/10/2004	EC

Chloride, Sulfate, and Sulfide - Analysis performed on water soluble portion of sample.

Sulfate and Chloride - Increased detection limit due highly colored sample which interfered with test methodology.

Resistivity - Analyzed 5 grams of sample per 50 mls of Type II DI water.

Sample # 004
SAMPLE DESCRIPTION: LAB #413 COMPOSITE SB-54
SAMPLE TYPE: COMPOSITE SAMPLE DATE/TIME: —

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
pH	6.6		SU	SW-846 9045C	02/04/2004	LKS
RESISTIVITY	0.069		MEGOHM-CM	SM2510 B	02/05/2004	CCP
SULFATE	<420	420	mg/kg dry	SM4500-SO4 E	02/10/2004	EC
SULFIDE	<2.5	2.5	mg/kg dry	EPA 276.2	02/09/2004	EC
CHLORIDE	<830	830	mg/kg dry	SM4500-CL B	02/10/2004	EC

Chloride, Sulfate, and Sulfide - Analysis performed on water soluble portion of sample.

Sulfate and Chloride - Increased detection limit due highly colored sample which interfered with test methodology.

Resistivity - Analyzed 5 grams of sample per 50 mls of Type II DI water.

R.I. Analytical Laboratories, Inc.

CERTIFICATE OF ANALYSIS

GZA GeoEnvironmental Labs
Date Received: 02/04/2004
Work Order #: 0402-01543

Approved by: R.I. Analytical

Sample # 010
SAMPLE DESCRIPTION: LAB #414 SB-54 S-8 (22.5-24.5)
SAMPLE TYPE: COMPOSITE
SAMPLE DATE/TIME: ---

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
pH	7.4		SU	SW-846 9045C	02/04/2004	LKS
RESISTIVITY	0.026		MEGOHM-CM	SM2510 B	02/05/2004	CCP

Resistivity - Analyzed 5 grams of sample per 50 mls of Type II DI water.

Sample # 011
SAMPLE DESCRIPTION: LAB #416 SB-59 S-7 (19.5-21.0)
SAMPLE TYPE: COMPOSITE
SAMPLE DATE/TIME: ---

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
pH	7.7		SU	SW-846 9045C	02/04/2004	LKS
RESISTIVITY	0.013		MEGOHM-CM	SM2510 B	02/05/2004	CCP

Resistivity - Analyzed 5 grams of sample per 50 mls of Type II DI water.