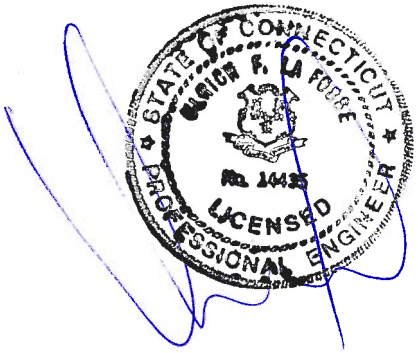
FINAL GEOTECHNICAL REPORT
CT DOT PROJECT NO. 171-305
AMTRAK ACCESS ROAD

AMTRAK ACCESS ROAD RETAINING WALLS
NEWINGTON, WEST HARTFORD, AND HARTFORD, CONNECTICUT

Prepared for:
Michael Baker Engineering, Inc.
500 Enterprise Drive, Suite 2B
Rocky Hill, CT 06067

Prepared By:
Geo**Design**, Inc.
984 Southford Road
Middlebury, CT 06762

File No. 0183-010.0
October 13, 2010



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1.0 INTRODUCTION

1.1 General

This report summarizes the final design subsurface exploration program, inferred subsurface conditions, and geotechnical analyses at five locations along the proposed Amtrak Access Road (AAR) project. This report provides geotechnical engineering recommendations for foundation design of Retaining Walls 101, 103, 106, 108 and 109. Proprietary walls may be used as an alternate to cast-in-place when certain criteria are met as discussed herein. Other portions of the AAR project, including a bridge at Trout Brook and the AAR roadway, are addressed under separate cover.

Baker Engineering Corporation (Baker) is the Prime Designer for the AAR. Geo**Design**, Inc. (Geo**Design**) is the Geotechnical Subconsultant to Baker.

The AAR project involves the design and construction of an unpaved/gravel 4.45 mile roadway to be utilized as an access road for Amtrak maintenance vehicles. The AAR will be adjacent to the existing railroad tracks and is required since a new busway line will replace the existing access road. The AAR project begins in Newington, Connecticut, passes through West Hartford, and ends in Hartford, Connecticut. The site location, alignment, and other portions of the AAR project are indicated on Figures 1A, 1B, and 1C, Appendix 1.

In general, retaining walls are proposed to increase the width of the Amtrak right-of-way at approximate track level without encroaching upon adjacent property. The retaining walls are discussed herein by their location along the stationing, from south to north.

1.2 Vertical and Horizontal Data

Elevations are in feet and reference NGVD 1929. The coordinates are based on Connecticut Coordinate System, NAD 1983.

1.3 Design Criteria

The AAR is intended to carry Amtrak maintenance vehicle and equipment traffic. It is not intended to carry rail traffic or to be a public highway. Foundation recommendations for design in this report are based on AASHTO Load and Resistance Factor Bridge Design Specifications, 3rd Edition, 2004 (AASHTO LRFD) with Interim Specifications through 2006; ConnDOT Bridge Design Manual, 2003 Edition; and Connecticut Department of Transportation Geotechnical Engineering Manual, 2005 Edition. Seismic design recommendations are based on AASHTO LRFD Specifications 4th Edition, 2007 with 2008 Interims. Recommendations are also based on State of Connecticut Department of Transportation (ConnDOT) Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816 (2004).

1.4 Existing Conditions

The RR tracks generally run southwest to northeast. For this report the railroad will be considered to run along a south-north alignment, and the proposed AAR is to be constructed east of the tracks. The AAR base line Stationing increases from south to north.

Existing conditions in the vicinity of each proposed retaining wall location are described in order of increasing Stations.

Retaining Wall 101 *(Station735+00 to 738+40)* – A culvert carries Piper Brook from the west to east side of the RR tracks at approximate Station 737+25. Piper Brook flows in a south-southeast direction to the east of the RR tracks and is surrounded by wetlands, small trees (less than 6-inches in diameter), brush, and forest litter. The slope of the embankment between the tracks and Piper Brook is about 1V:1.5H. Amtrak's right-of-way is approximately 25 feet east of the track centerline.

Retaining Wall 103 *(793+35 to 795+05)* – East of the Amtrak RR tracks between approximate Stations 793+30 and 795+00, an embankment slope of 1V:2H is covered with grass, brush, large trees, and upright utility poles. At the toe of the embankment slope, between approximate Stations 793+50 and 794+50, is a fenced communication tower.

Retaining Wall 108 *(796+61 to 796+75)* – East of the Amtrak RR Tracks, north of New Britain Ave, the embankment is covered with a mix of grass, shrubs, and trees, and includes billboards, light poles, and utility poles. The railroad embankment side slopes range from about 1V:1.5H to 1V:1H.

Retaining Wall 109 *(889+50 to 892+00)* – About 25 feet east of the track is a chain link fence. The ground surface in this area is relatively level. Amtrak's right-of-way is approximately 20 feet east of the track centerline.

Retaining Wall 106 *(932+90 to 937+43)* – East of Amtrak RR tracks and north of Laurel Street, the terrain is relatively flat for 20 to 30 feet. Further east, the area begins to slope upward at about 1V:2H, where a chain link fence is located at the top of the slope. Occasional shrubs and brush exist between the RR tracks and the chain link fence and east of the fence is a large parking lot.

1.5 Proposed Construction

Retaining walls are proposed where steep slopes exist, and right-of-way limits are too close to lay back slopes. Two locations (Retaining Walls 103 and 108) are located adjacent to the proposed Trout Brook Bridge.

Retaining walls typically increase the width of the Amtrak right-of-way at approximate track level and adjacent to the tracks to create more space for the Access Road. The exceptions are Retaining Walls 106 and 109 which cut into slopes away from the tracks.

The AAR is generally proposed to the east of the existing RR tracks. The edge of the proposed ten-foot wide AAR will begin about seven feet (varies) from the existing outside RR track. Retaining Walls are required where existing embankments are steep and the area is too limited to lay back slopes.

A culvert is proposed through the face of Retaining Wall 101. Recommendations for this culvert will be provided in the AAR Roadway report, under separate cover.

The table below is a summary of retaining wall locations (by station), bottom of footing elevations, lengths, and heights (bottom of footing to top of wall). Wall locations and dimensions were obtained from Baker Drawings RW-01, -03, -06, -08, and -09.

Retaining Wall No.	Approx. Station	Bottom of Footing Elevation (feet)	Length (feet)	Height (feet)
101	735+00 to 738+40	48.5 to 60	340	13 to 24
103	793+35 to 795+05	48 to 50	170	12 to 16
108	796+61 to 796+75	52	14	13
109	889+50 to 892+00	57	250	7 to 9
106	932+90 to 937+43	45	453	12 to 16

2.0 PREVIOUS SUBSURFACE INFORMATION

2.1 Geologic Setting

Published geologic data indicates that the site is generally underlain by sedimentary bedrock of the Portland Arkose formation. Bedrock depth generally increases from south to north (ranging from about 10 to 150 feet deep), except to the far north where bedrock depth begins to decrease again (to about 100 feet deep). The composition and texture of the Portland Arkose ranges from a coarse conglomerate to fine grained shale.

With increasing elevation upwards from bedrock, natural overburden soils are indicated to consist primarily of ground moraine glacial till mantling the bedrock. The natural overburden is overlain by glaciolacustrine deposits of clay (which thins to the south), and silt and sands. Surficial alluvial soils are indicated near Trout Brook and Piper Brook. The existing railroad embankment is mapped as artificial fill. Otherwise, the geologic maps imply surficial fill is relatively thin (less than 5 feet thick) at the project site.

The ground moraine glacial till is a dense heterogeneous mixture of rock and soil particle sizes ranging from cobbles to silt and clay sized particles that deposited below the advancing glacial ice. In this portion of Connecticut, the glacial till can vary greatly in composition, depending on the soils and bedrock present during the final glacial advance. Two types of till, termed "stony till" and "clayey till", are typically identified as occurring in the site vicinity in the geological literature.

The glaciolacustrine deposits consist of sediments deposited in Glacial Lake Hitchcock approximately 15,000 years ago. These sediments predominantly occur in alternating clayey and silty layers called varves. During the warm summer seasons, a more turbulent flow entering the lake transported silt-sized (or even fine Sand) particles from outwash and settled on the lake bottom. During the cold winter months, a frozen lake surface created a calm lake which promoted settlement of clay particles in suspension. Each varve represents a silt and clay pair resulting from yearly seasonal changes and lake behavior. Varving may be indistinct or absent in portions of the deposit, depending on conditions in the glacial lake at the time the sediments were deposited. It is also typical to find coarser sediments at the bottom and top of this stratum. The former consisting of sediments deposited into the lake bottom early during lake formation when water was shallow, and the latter due to sediments washed onto the exposed lake bed after the lake had drained.

In a broad range of reference literature, the glaciolacustrine deposit found in this region is referred to as Connecticut Valley Varved Clay (CVVC). We called this deposit layer Clay and Silt (varved) on our boring logs. However, in the rest of the report, we will use the term "Glaciolacustrine Silts and Clays" or "Silts and Clays" to refer to this strata.

2.2 Existing Subsurface Data

Pilot borings for the proposed "New Britain – Hartford Busway" (Busway) project were drilled in 2003 by GZA GeoEnvironmental, Inc. The Busway alignment is to the west side of the RR tracks. Borings referred for design of AAR were mostly performed approximately 60 feet or more to the west of proposed AAR. Laboratory tests were performed on several of these samples.

Concurrent with the AAR work, Geo**Design** is providing recommendations for design of the Busway. In 2008, New England Borings performed final design borings for the Busway. Several borings and laboratory tests were performed west of the RR tracks.
Existing boring logs and laboratory data are included in Appendix 4 and have been incorporated into the subsurface profiles presented on Figures 3A through 3E. Our review of existing data in correlation with data obtained for the AAR (as discussed below), indicates consistent findings between the sets of data.

3.0 FINAL DESIGN SUBSURFACE EXPLORATIONS

AAR borings were performed by Warren George, Inc. of Jersey City, New Jersey, and were observed and logged by Geo**Design**, Inc. The borings were drilled between July 23, 2008 and September 14, 2008. Borings were performed using conventional rotary drilling equipment, and were advanced using a drive and wash method. When borings were advanced without casing, Revert II drillers mud was used to maintain positive fluid head in the open hole. Samples were obtained with a two-inch O.D. split-barrel sampler in general compliance with ASTM 1586. Standard Penetration Test (SPT) sampling was typically semi-continuous (0-2, 2-4, 5-7, 7-9, 10-12, 12-14 feet, etc.) through strata above the natural deposits. The typical sampling interval changed to five feet in the underlying natural deposits. Ten to twenty-foot NX rock cores were obtained in borings advanced to bedrock.

Borings performed for each retaining wall location are summarized below (from south to north):

Retaining Wall No.	Boring Designations	Additional Adjacent Structure Boring Designations (1)
101	AARW-01-01 through AARW-01-04	n/a (2)
103	AARW-05-18 and AARW-5-19	AAB-02-21 through AAB-02-24
108	AARW-06-25 and AARW-06-26	AAB-02-23 and AAB-02-24
109	AARW-08-29 and AARW-08-30	n/a
106	AARW-11-41 through AARW-11-45	n/a

(1) "Additional Adjacent Structure Boring Designations" include borings performed for other proposed bridges and culverts within this project.
(2) n/a: none available

Locations of the final design borings at each retaining wall are shown on Figures 2A through 2D, Appendix 1, and boring logs are attached in Appendix 2.

3.1 Subsurface Profile

Between Retaining Walls 101 and 106, the subsurface data generally indicates that the Silts and Clays is thinnest at Retaining Wall 101 (0 to 25 feet thick), and thickest near Park Street (up to 118 feet thick). Between these extremes, the Silts and Clays thickness increases in a relatively linear trend from south to north. Other material thicknesses vary on a lesser scale and have been generalized below.

Subsurface Profiles for each proposed retaining wall location are attached as Figures 3A through 3D. The profiles depict the generalized subsurface conditions based on the exploration data. A legend for the subsurface profiles is provided on Figure 4.

The soil and rock profile can be generally summarized as follows:

- **Organic Topsoil and Subsoil** – 0 to 2 feet thick;
- **Fill –** 1 to 10 feet thick;
- **Silt/Sand (Alluvium Deposit)** – 0 to 22.5 feet thick;
- **Glaciolacustrine Silts and Clays** – 0 to 118 feet thick;
- **Silt/Fine Sand (Glaciofluvial Deposit)** – 0 to 40 feet thick;
- **Glacial Till** – 0 to 35 feet thick;
- **Bedrock (Shale)**.

3.1.1 Fill

The **Fill** generally consisted of Sand and/or Gravel with trace to little Silt, and trace amounts of Ash, Cinders, Brick, Wood, and Organic Fibers in select locations. The Fill was generally loose to dense with very loose and very dense pockets.

Fill thickness was mostly two to four feet thick. Fill thickness generally increases toward the tracks at the top of the embankments.

3.1.2 Alluvial Silt/Sand

A thin layer of **Silt/Sand (Alluvium Deposit)** layer was encountered in most borings. The layer was absent at Retaining Wall 106, and up to 12 feet thick at Retaining Wall 103. The layer generally consisted of loose to medium dense Silt and fine Sand.

3.1.3 Silts and Clays

The **Glaciolacustrine Silts and Clays** was encountered in each of the borings, except on the south end of Retaining Wall 101. The Silts and Clays layer typically consisted of alternating layers of Silt and Clay, however distinct varving was not always evident.

Approximately south of Trout Brook (south of Station 797+00) the Silts and Clays are less than 35 feet thick and medium to stiff in consistency. The consistency of the Silts and Clays generally stiffens with increasing Fill thickness.

About 2000 feet north of Trout Brook, the Silts and Clays deposit are thicker (up to 118 feet) and very soft to soft in consistency. The top ten feet of the layer was typically stiffer than the deeper Silts and Clays due to desiccation. Several borings ended within the Silts and Clays layer, and therefore did not explore the underlying soils.

3.1.4 Glaciofluvial Silt/Sand

The **Silt/Sand (Glaciofluvial Deposit)** was sporadically encountered in the deep borings. Where encountered, the layer was up to 40 feet thick and was of very dense consistency. The Sand/Silt generally consisted of red brown fine to coarse Sand, some (20 to 35 percent) Gravel, with trace to little (less than 20 percent) Silt.

3.1.5 Glacial Till

The **Glacial Till** was sporadically encountered in the deep borings. Where encountered, the layer was up to 35 feet thick and was of dense to very dense consistency. The Till was a red brown heterogeneous mixture of fine to coarse Sand with some (20 to 35 percent) Silt and a variable content of fine to coarse Gravel. The recovered Till samples were more representative of "Sandy Till" than "Clayey Till" (see Section 2.1). Cobbles and Boulders typically occur within the Glacial Till.

3.1.6 Bedrock

Shale **Bedrock** was cored in four of the retaining wall borings. The depth to bedrock ranges from 55 to 160 feet below the existing ground surface, generally increasing in depth from south to north. The Bedrock generally consisted of very poor to excellent quality, moderately hard, slightly weathered, red brown, fine grained Shale. The RQD ranged from 14 to 91 percent, generally increasing with depth. The bedrock encountered in borings is consistent with published descriptions of site bedrock formations.

3.2 Groundwater

Observation wells were installed in several locations along the proposed Amtrak Access Road. Groundwater level readings were obtained three to seven times post drilling, over 12 to 24 days. The groundwater levels were observed between El. 65.9 feet (about 6.4 feet below existing ground surface at AARW-03-09) and El. 38.1 feet (about 23 feet below existing ground surface at AARW-06-26). See Table 1, Appendix 1 for observation well readings and averages in wells installed for the AAR project.

Groundwater conditions vary depending on factors such as temperature, season, precipitation, construction activity, and other conditions. Water levels may be different from those at the time of the referenced readings.

4.0 LABORATORY TESTING RESULTS

The laboratory testing program conducted for this study is summarized below. Test reports are attached in Appendix 3. As previously noted, laboratory reports for previous testing by others are attached in Appendix 4.

Laboratory testing was focused primarily on the strength and consolidation properties of the Silts and Clays, and on index tests to evaluate the potential variability of the Silts and Clays properties. Laboratory testing was performed (as indicated) by either the University of Massachusetts (UMass) in Amherst, Massachusetts, or GeoTesting Express, Inc. (GeoTesting) in Boxborough, Massachusetts.

4.1 Consolidation Tests

Constant Rate of Strain (CRS) Consolidation Tests were performed on tube samples of the Silts and Clays by University of Massachusetts, Amherst (UMass), to determine the stress history and the compression/recompression index.

Ten CRS tests were performed throughout the AAR alignment. Consolidation test results indicate that the Silts and Clays are over consolidated. Overall, Over Consolidated Ratios (OCR) ranged from 1.2 to 5.13. The lower OCR values were observed at the north end of the AAR project near Park Street with greater OCR values observed at Retaining Wall 106 and south of (and including) New Britain Ave, where OCRs were greater than two. See Appendix 3 for the test results.

4.2 Strength Tests

Several Direct Simple Shear (DSS) Tests were performed at UMass to estimate the shear strength of Silts and Clays. DSS Tests simulate a shear force acting horizontally to soil. Because of the particular horizontal-layered structure of Silts and Clays, the shear strength parallel to the varves typically is much lower than the shear strength crossing the varves. Thus, DSS Tests on Silts and Clays samples give the more appropriate shear strength values relative to triaxial testing.

A total of nine DSS tests were performed. Horizontal shear strengths generally ranged between 1,000 psf and 1,500 psf; however, at Retaining Wall 101 shear strength results were as great as 3,000 psf. See Appendix 3 for the test results.

Geo**Design** also used the Stress History And Normalized Soil Engineering Properties (SHANSEP) Method recommended by Ladd & DeGroot in their 2003 article "*Recommended Practice for Soft Ground Site Characterization: Arthur Casagrande Lecture*". The SHANSEP method allows for the correlation of the undrained shear strength (S_u), insitu stress (σ'_{vc}), and

OCR to provide a reliable way to predict shear strength in the Varved Clay layer. This correlation was developed using the expression, $S_{u,DSS}/\sigma'_{vc} = 0.18(OCR)^{0.73}$.

4.3 Index Tests

Liquid Limits (LL), Plastic Limits (PL), and Plasticity Indexes (PI) were determined for thirteen jar samples (tested by GeoTesting) and six tube samples (tested by UMass) of the Silts and Clays. Test samples were selected from 10 to 120 foot depths. Figures 5A through 5C, Appendix 1, present a graphic and distribution of natural water content, LL, and PI vs. depth.

At the retaining wall structures, average LL results varied from 32 to 59 percent, average PI varied from 12 to 34 percent, and average natural water content varied from 25 to 60 percent. The average LL, PI, and natural water content percentages generally increased as clay thickness increased (from south to north).

4.4 Gradation Analyses

4.4.1 Sieve Analyses

Washed sieve tests were performed (by GeoTesting) on jar samples of Fill in accordance with ASTM D422-63. The samples were obtained between one to four feet below existing ground surface. The test results indicate fine to coarse Sand and Gravel, with less than 15 percent Silt. Test results are attached in Appendix 3.

4.4.2 Hydrometer Analyses

Fourteen hydrometer analyses were performed (by GeoTesting) on jar samples of the Silts and Clays from borings within the vicinity of the retaining wall structures. Samples were cut vertically across the varves for a representative gradation. The identity of test samples and test results are attached in Appendix 3.

Results indicated a relatively consistent pattern in gradation of the Silts and Clays. There was less than 6 percent fine sand in each sample tested. The Silt content (0.002 to 0.075 mm) varied from 32 to 91 percent, and the Clay content (less than 0.002 mm) varied from 9 to 68 percent. Generally, Clay was the major component in the samples tested from the bottom of the layer, and Silt was the major component in the samples tested from the middle and top of the layer.

4.5 Natural Moisture Content

Moisture contents were measured from 22 jar samples (tested by GeoTesting) and from ten tube samples (tested at UMass) of the Silts and Clays in the vicinity of the retaining wall structures.

Samples were cut vertically across the varves for representative moisture content. Results are plotted vs. depth in Appendix 1, Figure 5A through 5C.

The moisture content results for the Silts and Clays varied from 25 to 60 percent. In general, the results display a pattern with moisture contents greatest in the upper and middle area of the Silts and Clays layer, with lower moisture contents at the bottom of the Silts and Clays layer. Average moisture content at each retaining wall structure range from approximately 25 to 60 percent, increasing from south to north.

5.0 GEOTECHNICAL ISSUES AND ANALYSIS

5.1 Retaining Wall Types

According to the CTDOT Bridge Design Manual (2003), walls with less than 5000 feet^2 of vertical face area (measured to bottom of footing), a cast-in-place (CIP) wall should be designed to be bid against a proprietary wall option. Otherwise (walls with more than 5000 feet^2 of vertical face area), proprietary walls will most likely be more economical, unless site conditions or soil constraints necessitate a cast-in-place wall.

Regardless of the above guidance, proprietary walls are not feasible for retaining wall locations 101 and 103. Typical earth reinforcement lengths are 0.6 to 0.9 times the height of the wall. For retaining walls 103 and 108, the required reinforcement lengths would result in construction within the railroad foul zone, and the reinforcement lengths for Retaining Wall 101 would actually extend below the tracks. Therefore, we do not consider proprietary wall alternates to be feasible for Retaining Walls 101, 103, and 108.

The table below summarizes the wall type options for and Retaining Wall 106 and 109.

Retaining Wall No.	Length (feet)	Height (feet)	Vertical Face Area (feet^2)	Applicable Wall Types
106	453	14 to 16	6342 to 7248	Proprietary if applicable, otherwise Cast-in-Place
109	250	7 to 9	1750 to 2250	Cast-in-Place (Proprietary as contractor alternate)

Based on the above guidance and vertical face area, Retaining Wall 106 may be designed as a proprietary wall and Retaining Wall 109 should be cast-in-place, designed to be bid against the proprietary types. However, according to drawings provided by Baker, it appears Retaining Walls 106 and 109 are in close proximity to Amtrak right-of-way. To avoid substantial encroachment and disturbance of adjacent property, a cast-in-place wall may be the most applicable for these walls.

Proprietary wall options to be used as a CIP alternate include prefabricated wall types, such as mechanically stabilized earth (MSE), T-Wall, or Double-Wal.

5.2 Retaining Wall Foundation Types

Based on drawings provided by Baker and the above evaluation of retaining wall type, Geo**Design** estimates cast-in-place retaining wall footings will be generally 6 to 10 feet wide, except at Retaining Wall 106 where footings are between 3 and 5 feet wide. Cast-in-place footing size is dependent on the wall height.

5.2.1 Settlement Analyses

5.2.1.1 Magnitude of Settlements

The primary issue for selection of the foundation types is the potential consolidation settlements of the underlying Silt/Sand and/or Silts and Clays, under spread footings. Geo**Design** estimated settlements of the retaining walls based on the embankment build-out and wall construction loads indicated above, and a range of parameters for the Silts and Clays layer (depended on location along alignment) as provided in Table 2, Appendix 1.

Based on the laboratory test data, the Silts and Clays are pre-consolidated from existing conditions such that consolidation from new loads should occur in the re-compression range.

We estimate settlements at Retaining walls 101, 103, 106, 108 and 109 from 0.5 to 1 inch.

Where the retaining walls abut pile supported wingwalls, an expectation of differential settlement between the two is equal to the settlement predicted for the retaining wall, as the pile supported wingwall settlement is expected to be minimal. Differential settlements across a single retaining wall are estimated to range from 0.1 to 0.4 inches.

Consolidation of the Silts and Clays under the weight of the retaining wall structure and backfill will also induce settlement in nearby areas. We estimate settlements below the nearest RR track to be less than 0.1 inches, and at a distance ten feet east of the embankment toe to be less than 0.3 inches.

5.2.1.2 Rate of Settlements

Because the proposed retaining walls and embankments will be relatively narrow (about 15 feet) as compared to the thickness of the Silts and Clays (up to 118 feet), and because of the anisotropic properties of Varved Clay, horizontal drainage will greatly affect the rate of consolidation.

In estimating the rate of consolidation, we used *"Field Consolidation of Varved Clay"*, a report by Professor Richard P. Long, Professor Kent A. Healy and Mr. Peter J. Carey from University of Connecticut. Figure 13 of this report depicts the field-measured apparent coefficient of consolidation for different loading geometries quantified as the ratio of the Varved Clay Thickness (Silts and Clays) and to the Embankment Width (dimension ratio). For a dimension ratio of one, the field-measured apparent coefficient of consolidation is 4 ft^2/day. We conservatively chose this value because most embankment widths are narrower than the thickness of clay. As a result, the apparent coefficient of consolidation is no less than 4 ft^2/day.

At Retaining Walls 101, 103 106, 108, and 109 we estimate less than three months for settlements to be substantially complete. We estimate minor secondary settlements to occur over about 50 years.

5.2.1.3 Silts and Clays Properties

The Silts and Clays Properties used in our consolidation and settlement analyses are provided in Table 2, Appendix 1

5.2.2 Stability

Global stability analyses were performed at the critical retaining wall locations using the software package SLIDE. We analyzed retaining wall stability in the east-west direction for sliding, bearing, and overturning in accordance with AASHTO LRFD Section 11.6.3. We assumed level backfill with wall footing embedment of at least 4 feet below final grade. Reviewing the Janbu Simplified, Spencer, and Bishop Simplified methods, the resulting safety factors against global slope failure ranged from 1.5 to 3.0, respectively.

5.2.3 Utilities

At Station 738+00, a 12-inch sewer line crosses beneath Retaining Wall 101 in a west to east direction. We estimate settlement at Retaining Wall 101 of less than a ½-inch. We estimate differential settlements of less than ½-inch between the RR track and the retaining wall, and less than 1-inch between the retaining wall and to a distance ten feet from the toe of the embankment.

5.2.4 Liquefaction

Soils within and below the bearing zones of the wall substructures were analyzed for potential to liquefaction during the AASHTO design seismic event for this locale. Based on their high Silt and Clay contents and plasticity, these saturated soils are not considered susceptible to liquefaction in the event of an earthquake. The Glacial Till soils are sufficiently dense so as to not be susceptible to liquefaction.

AASHTO LRFD Section 4.7.4.1 states that the bridges in Seismic Zone 1 need not be analyzed for seismic loads, regardless of their importance and geometry; accordingly, recommendations for dynamic lateral earth pressures are not included. However, the minimum requirements, as specified in Sections 4.7.4.4 and 3.10.9, shall apply.

5.2.5 Soil Corrosiveness

Natural undisturbed soils in New England are normally not considered to be corrosive to concrete. Potentially corrosive soils would be limited to the existing Fill material depending on the chemical nature of the Fill. However, the proposed structure will have little exposure to the existing Fill material. Such Fill would be excavated and replaced below wall footings.

6.0 GEOTECHNICAL RECOMMENDATIONS FOR DESIGN

6.1 Spread Footing Foundations

Based on geometric and site constraints, we recommend that all retaining walls be designed as cast in place walls. We recommend shallow foundations be used at the retaining wall locations. Bottom of footings must be constructed a minimum of 4.0 feet below final grades.

Based on subsurface data, it appears that the proposed bottom of footings for Retaining Walls 101, 103, 106 and 109 will place the footings below the bottom of existing Fill material, within natural deposits. Retaining Walls 101 and 103 footing bottoms will be within granular soils; Retaining Walls 106 and 109 will be within the Silts and Clays layer. Where footing bottoms are within the Silts and Clays layer, we recommend over-excavating a minimum of six inches and replacing with Granular Fill (Form 816, Section 2.13) or Crushed Stone (Form 816, Article M.01.01) wrapped in filter fabric.

The bottom of footings on the north end of Retaining Wall 108, appears to be within the Fill layer. The existing Fill was not designed for use as an engineering material. Existing Fill must be excavated and replaced with material designed for that use. In order to remove most of the existing Fill from below the footings, and to allow examination of any Fill material that will remain, we recommend the retaining wall footing bear on a minimum thickness of three feet of CGF over the existing materials. If excavation to three feet below proposed footing level exposes any organic material, low-density fill material, or otherwise deleterious materials, such unsuitable materials should also be excavated and replaced with CGF. Minimum limits of replacement CGF should be two feet beyond the edges of the wall footings and extend downward and outward away from the footings at a slope of 1V:1H.

6.2 Static Design Parameters

For design of the proposed retaining walls, we recommend static design parameters as presented in the following sections.

6.2.1 General:

- Unit weight of soil above the water table of 125 pcf
- Unit weight of soil below the water table of 62.6 pcf
- Soil Angle of Internal Friction, phi = 35°
- Earth pressure calculations should assume a surface surcharge of 24 inches soil depth or 250 psf.
- Cooper E80 railroad loading shall be applied to retaining walls 101, 103, and 108 in accordance with Figure 7, Appendix 1.

6.2.2 Proprietary Walls

Mechanically Stabilized Earth (MSE) and/or prefabricated modular walls (such as Double-Wal or T-Wall) are feasible alternate wall types. We recommend the following static design parameters for proprietary retaining walls:

- Allowable Bearing Capacities:
  - Retaining Wall 109 – 3 ksf
  - Retaining Wall 106 – 5 ksf
- Coefficient of Friction for Sliding = 0.55
- Coefficient of Friction for Soil against Wall (tan δ) = 0.40

6.2.3 Cast-in-Place Walls

We recommend the following static design parameters for cast-in-place retaining walls:

- Nominal (Ultimate) Bearing Resistances:
  - Retaining Wall 101 – 10 ksf (kips per square foot)
  - Retaining Wall 103 – 10 ksf
  - Retaining Wall 108 – 10 ksf
  - Retaining Wall 109 – 6 ksf
  - Retaining Wall 106 – 10 ksf
- Bearing Resistance Factor (φ_b) = 0.50
- Load Factors from AASHTO LRFD Table 3.4.1-2.
- Sliding/Overturning:
  - Coefficient of Friction for Sliding over CGF = 0.55 (AASHTO LRFD Table 3.11.5.3-1)

- Coefficient of Friction for Soil against Wall (tan delta) = 0.40
- Sliding Resistance Factor (φ_τ) = 0.8 (AASHTO LRFD Table 10.5.5.2.2-1)
- Passive Earth pressure component of sliding resistance = 0.50 (AASHTO LRFD Table 10.5.5.2.2-1)

6.3 Differential Settlement

Where bridge abutments and wingwalls are pile supported (at Trout Brook-Bridge 02), differential settlement may occur between retaining walls abutting wingwalls (Retaining Walls 103 and 108 at Trout Brook). We anticipate differential settlements may be as great as the total retaining wall settlement at these two locations.

6.4 Backfill

Retaining wall backfill should consist of pervious structure backfill in accordance with ConnDOT Form 816 specification Section 2.16 and Article M.02.05. In accordance with these sections, where slopes exist, the slopes should be deeply plowed or cut into steps before and during backfill placement, so both types of materials are thoroughly bonded and compacted. Backfill layers should not exceed a compacted lift thickness of six-inches, and compaction shall not be less than 100-percent.

6.5 Drainage

Drainage details for retaining walls should be constructed in accordance with ConnDOT Bridge Design Manual specifications for walls and abutments. Specifically, bagged stone and weepholes should be utilized for wall stems.

7.0 CONSTRUCTION CONSIDERATIONS

7.1 Excavation Support and Protection

In accordance with American Railway Engineering and Maintenance-of-Way Association (AREMA) the contractor shall be solely responsible for the design, construction, and performance of temporary structures. Temporary structures are defined as those structures used to facilitate the construction of a permanent structure. Furthermore, the contractor shall have working drawings and design calculations for the temporary structures signed and sealed by a licensed CT professional engineer. These and other AREMA requirements should be referenced and noted in the contract documents.

The requirement for temporary sheeting is also set forth by Amtrak Specification 02261A - Rev. 1 dated June 6, 2001 (see Figure 6, Appendix 1).

Based on soil and groundwater conditions, steel sheeting or soldier piles and lagging are recommended for as temporary structures.

7.1.1 Existing Railroad Tracks and Embankment

According to Figure 6, temporary sheeting is required if excavations extend into "zone 2" below the boundary defined as a 1V:1.5H slope beginning 10 feet outside the centerline of the nearest RR track. Temporary sheeting normally left-in-place is required if excavations extend into "zone 3" below the boundary defined as a 1V:1H slope beginning at the closest end of the RR tie.

We recommend at least one foot between temporary sheeting and the edge of footings be accounted for to provide room for forming during construction. Based this spacing and Amtrak requirements, we estimate that portions of, or all of the footings for Retaining Walls 101, 103 and 108 are within "zone 3" and lateral support to remain will be required. We estimate portions of or all of Retaining Wall 103 footings will be within "zone 2", which requires sheeting that may be removed upon construction completion. We estimate portions of, or all of Retaining Wall 106 and 109 footings are within "zone 1" and should not require temporary lateral support to construct the wall.

Where temporary sheeting is within zones 1 or 2, they should be designed using Cooper E80 railroad live loading in accordance with Figure 7, Appendix 1.

For the purpose of measurement and payment, we recommend Baker show on their drawings, the limits of temporary lateral support, and the Amtrak zones in which excavations will take place. Further, we recommend that a separate measurement and payment item be developed for temporary lateral support (e.g. railway sheeting).

7.1.2 Design Parameters

We recommend the following parameters for temporary lateral earth support:

Existing Embankment
- Unit weight = 125 pounds per cubic foot (pcf)
- Submerged unit weight = 63 pcf
- Phi = 34 degrees
- Ka = 0.28
- Kp = 3.54

Silty Sand:
- Unit weight = 110 pcf
- Submerged weight = 48 pcf
- Phi = 34 degrees

Ka = 0.28
Kp = 3.54

Silts and Clays:
Unit weight = 105 pcf
Submerged unit weight = 43 pcf
Su (Undrained Shear Strength) = *Refer to Table 2, Appendix 1.*

Observed groundwater readings are shown in Table 1, Appendix 1.

7.1.3 Vibrations and Settlement

Subsurface data indicate Alluvium Silts/Sands with loose to medium dense consistency at Retaining Wall 103. This layer may be susceptible to localized settlement from vibrations during temporary lateral support installation and other construction activities. Vibrations from such operations may impact the railroad tracks and/or existing bridge. We recommend the contractor be required to develop means and methods in accordance with Amtrak requirements, and that these structures be monitored for vibrations and settlement.

7.1.4 Utilities

We understand utility poles in the existing embankment will be relocated by others.

Remnants of the existing culvert headwall should be removed in its entirety before constructing the new culvert and Retaining Wall 101.

Where Wall 101 construction is being performed in conjunction with other site features (e.g. pipe jacking, culvert installation, etc.), the final wall design and sequence of construction should be detailed to account for these features. In the case of proprietary and MSE walls, utility work must be confirmed to not conflict with design and construction elements of these walls.

Twelve-inch sewer lines are near Retaining Wall 101. These utilities must be considered during design of temporary lateral support. The design should include relocation or temporary support.

Temporary lateral earth support must be designed by a Connecticut Licensed Professional Engineer.

7.2 Reuse of Excavated Material

Excavated inorganic site soils, other than the Silts and Clays, are expected suitable for re-use as embankment fill (ConnDOT Form 816 Section 2.02.03.5) where other materials are not required for structure backfill. Excavated Silts and Clays are not expected to be suitable for reuse on the

project except as provided for placement of "unsuitable" materials in the outer slopes of an embankment as indicated on Standard Drawing No. 201.

Materials excavated are not expected to be suitable for re-use as Granular Fill or Pervious Structure Backfill.

7.3 Dewatering

At Retaining Walls 103, 106 108, and 109, the proposed bottom of footing elevations are up to seven feet below observed groundwater levels. Dewatering will be required to allow the foundation work to proceed in the dry. Once the excavation is established and Compacted Gravel Fill or working mat are placed, pumping from those layers should facilitate dewatering. We anticipate that dewatering at these retaining walls can be accomplished with conventional pumping from open sumps, however, the contractor should be prepared to collect and remove water from the sites caused by local, perched groundwater conditions, and water from precipitation and runoff.

At Retaining Wall 101, dewatering for most of the wall can be accomplished with conventional sump pumping from open sumps. However, we recommend a "Cofferdam and Pumping" pay item be established where the footing steps down 10 feet. For a 25-foot span, the footing steps down to El. 50 feet to accommodate a proposed culvert, at which point the footing will be approximately 12 feet below observed groundwater levels.

Notwithstanding our assessment of construction dewatering for each of the respective retaining walls, the contractor should be required to develop dewatering systems using their on means and methods. However, the contractor's means and methods should be developed to meet AREMA and Amtrak construction requirements; and further, that no dewatering-induced settlements greater than permissible values be permitted to impact Amtrak rail lines and structures.

The contractor should also be advised that construction dewatering and discharge should meet all applied federal and state environmental and other permit requirements.

7.4 Special Provisions

Special Provisions will need to be developed for Temporary Lateral Earth Support.

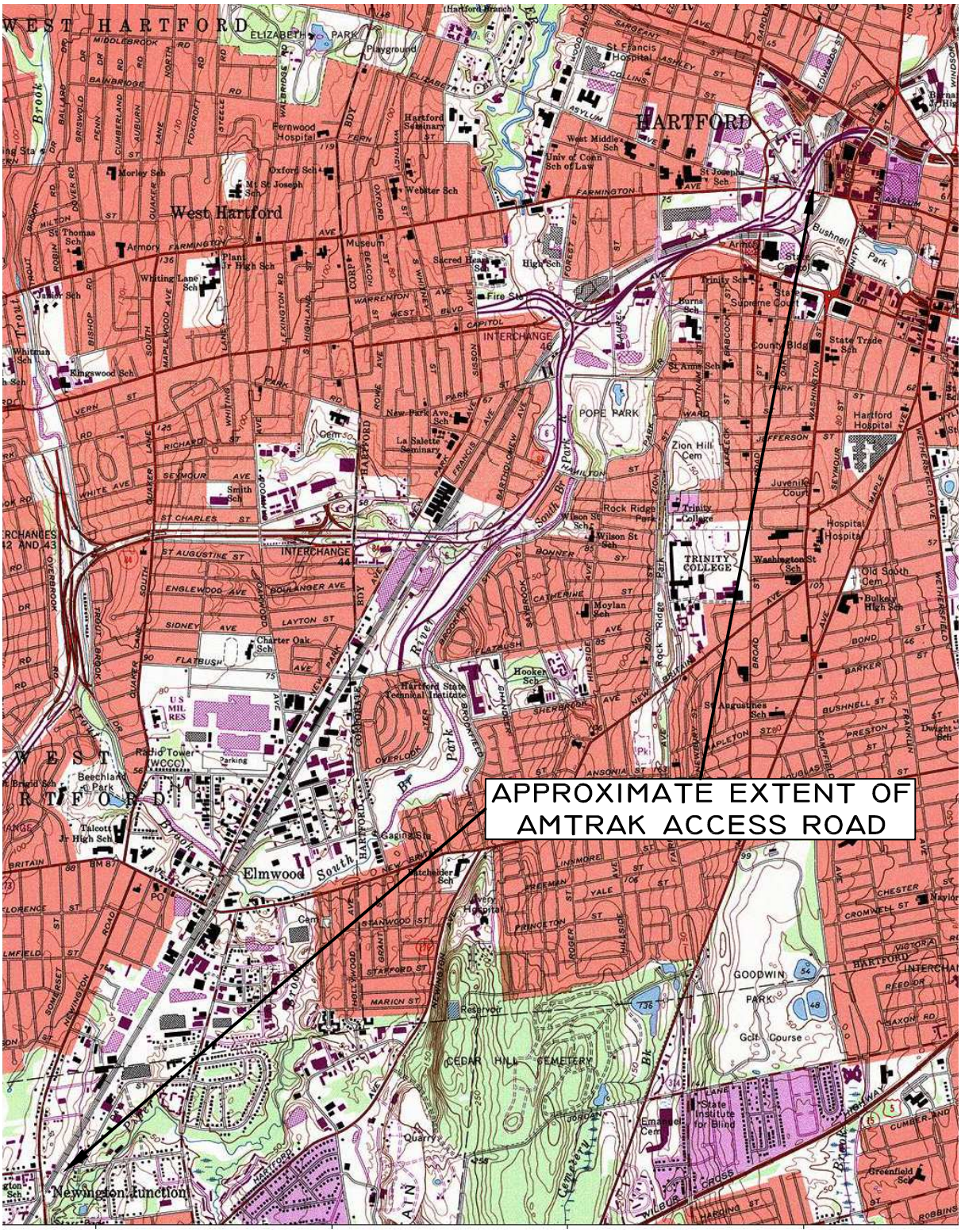
8.0 LIMITATIONS

This report is subject to the limitations attached in Appendix 5.

Appendix 1

Figures
&
Tables

Figures

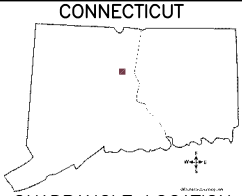


GEODESIGN INCORPORATED
GEOTECHNICAL ENGINEERS • ENVIRONMENTAL CONSULTANTS
984 SOUTHFORD ROAD • MIDDLEBURY CONNECTICUT 06762
TELEPHONE: (203)758-8836 FACSIMILE: (203)758-8842

DRAWN BY: SMC

REVIEWED BY: MGB

CONNECTICUT



QUADRANGLE LOCATION

AREA PLAN – AMTRAK ACCESS ROAD
NEWINGTON, WEST HARTFORD, HARTFORD, CONNECTICUT
CONNDOT PROJECT # 171-305

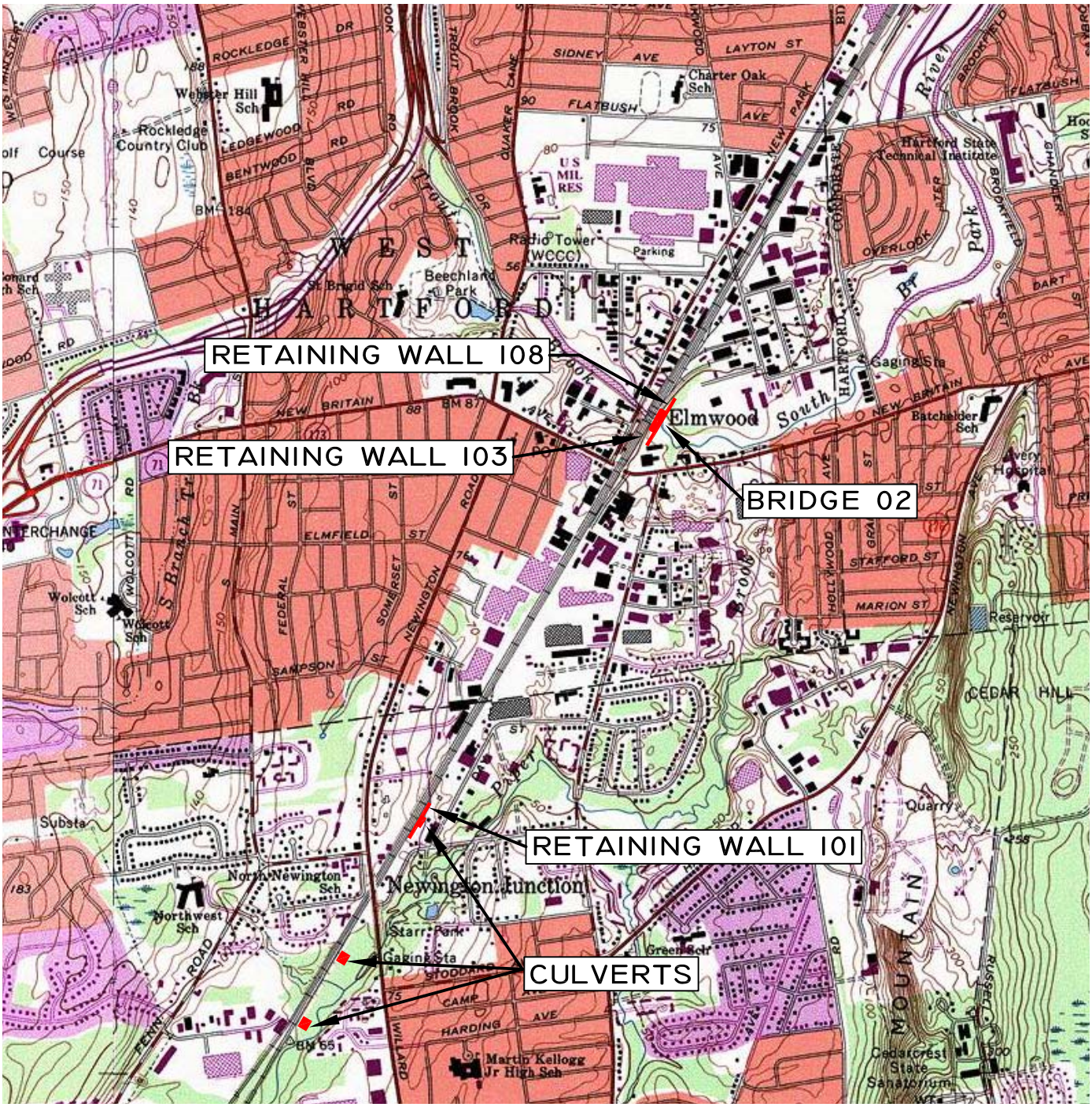
REFERENCE:
U.S.G.S. 7.5 MINUTE QUADRANGLE: NEWINGTON, W.HARTFORD, HARTFORD, CT. Figure was created using TOPO! 2003 software

NOT TO SCALE

PROJECT NO. 183-010.0

DATE: 10-23-08

FIGURE NO. 1A



GEODESIGN INCORPORATED

GEOTECHNICAL ENGINEERS • ENVIRONMENTAL CONSULTANTS
984 SOUTHFORD ROAD • MIDDLEBURY CONNECTICUT 06762
TELEPHONE: (203)758-8836 FACSIMILE: (203)758-8842

DRAWN BY: SMC/DSF | REVIEWED BY: MGB

CONNECTICUT

QUADRANGLE LOCATION

AREA PLAN – AMTRAK ACCESS ROAD NEWINGTON, WEST HARTFORD, HARTFORD, CONNECTICUT CONNDOT PROJECT # 171-305

REFERENCE:
U.S.G.S. 7.5 MINUTE QUADRANGLE: NEWINGTON, W.HARTFORD, HARTFORD, CT. Figure was created using TOPO! 2003 software

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PROJECT NO. 183-010.0
DATE: 10-23-08
FIGURE NO. 1B

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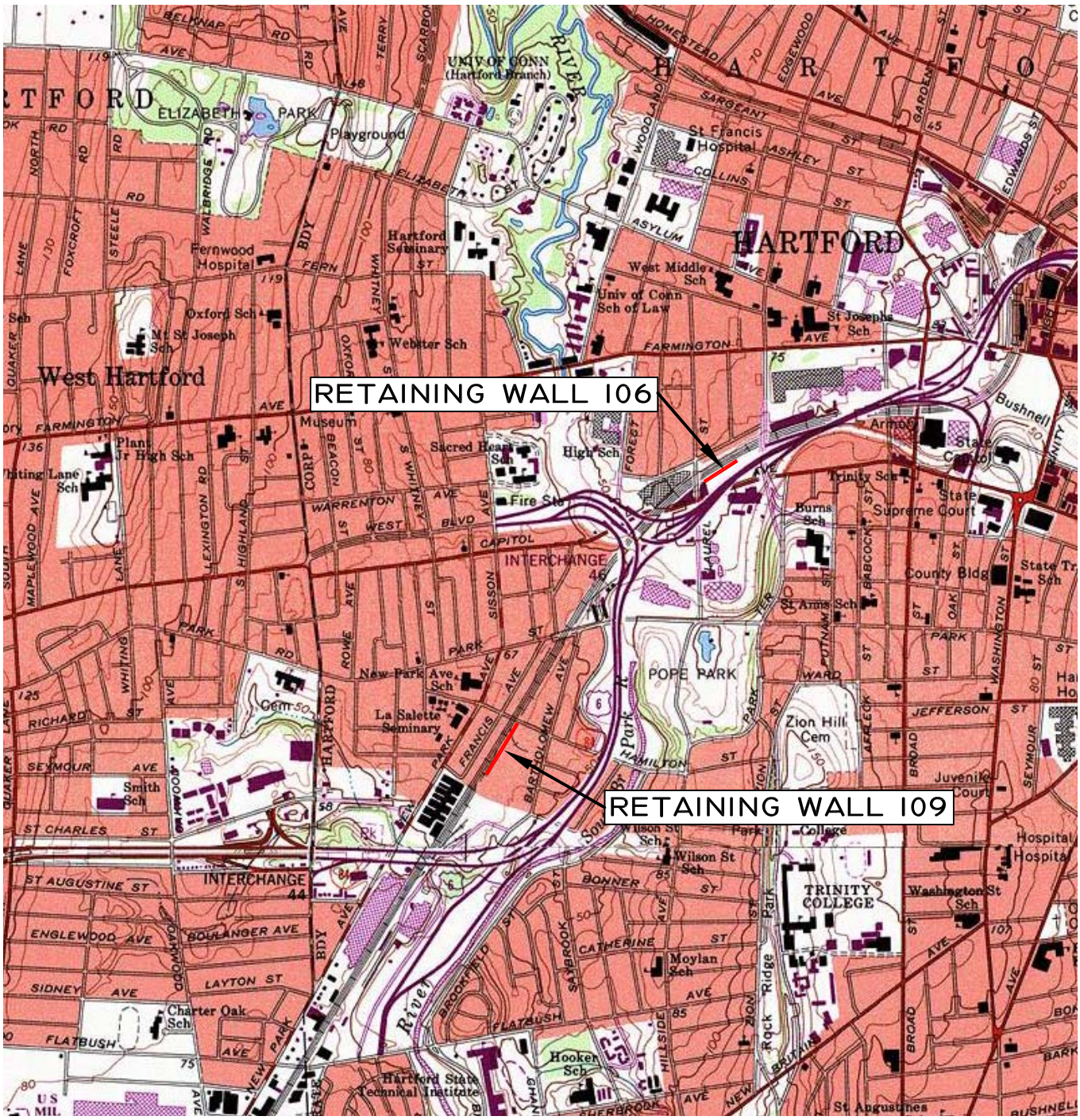

GEODESIGN INCORPORATED

GEOTECHNICAL ENGINEERS • ENVIRONMENTAL CONSULTANTS
984 SOUTHFORD ROAD • MIDDLEBURY CONNECTICUT 06762
TELEPHONE: (203)758-8836 FACSIMILE: (203)758-8842

DRAWN BY: SMC/DSF | REVIEWED BY: MGB

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QUADRANGLE LOCATION

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REFERENCE:
U.S.G.S. 7.5 MINUTE QUADRANGLE: NEWINGTON, W.HARTFORD, HARTFORD, CT. Figure was created using TOPO! 2003 software

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DATE: 10-23-08
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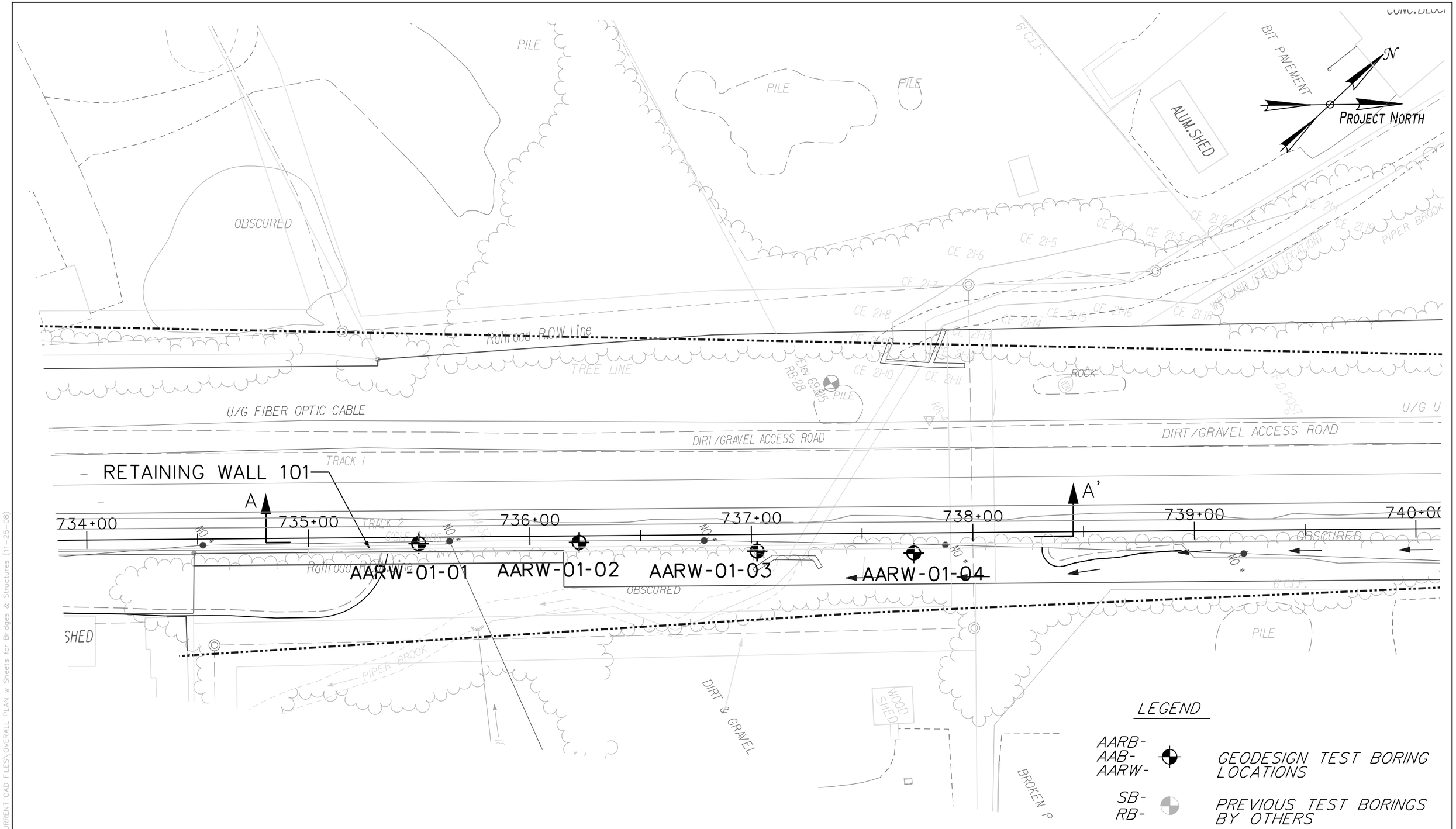

DESIGNED BY MGB						
DRAWN BY SMC						
CHECKED BY RTS						
APPROVED BY MPT		NO.	DATE		DRWN.	CHKD	APPVD
		REVISIONS				

PRIME DESIGNER:

Baker Engineering NY, Inc.
ROCKY HILL, CT. 06067
Tel: (860) 563-3044
Fax: (860) 529-6627

GEODESIGN INCORPORATED
GEOTECHNICAL ENGINEERS • ENVIRONMENTAL CONSULTANTS
984 SOUTHFORD ROAD • MIDDLEBURY CONNECTICUT 06762
TELEPHONE: (203)758-8836 FACSIMILE: (203)758-8842

DWG. TITLE
RETAINING WALL NO. 101

PROJECT STATE PROJECT NO. 171-305
AMTRAK ACCESS ROAD
NEWINGTON, WEST HARTFORD AND HARTFORD, CT.

FILE NO. 183-10
SCALE 1" = 40'
DATE 10-27-08
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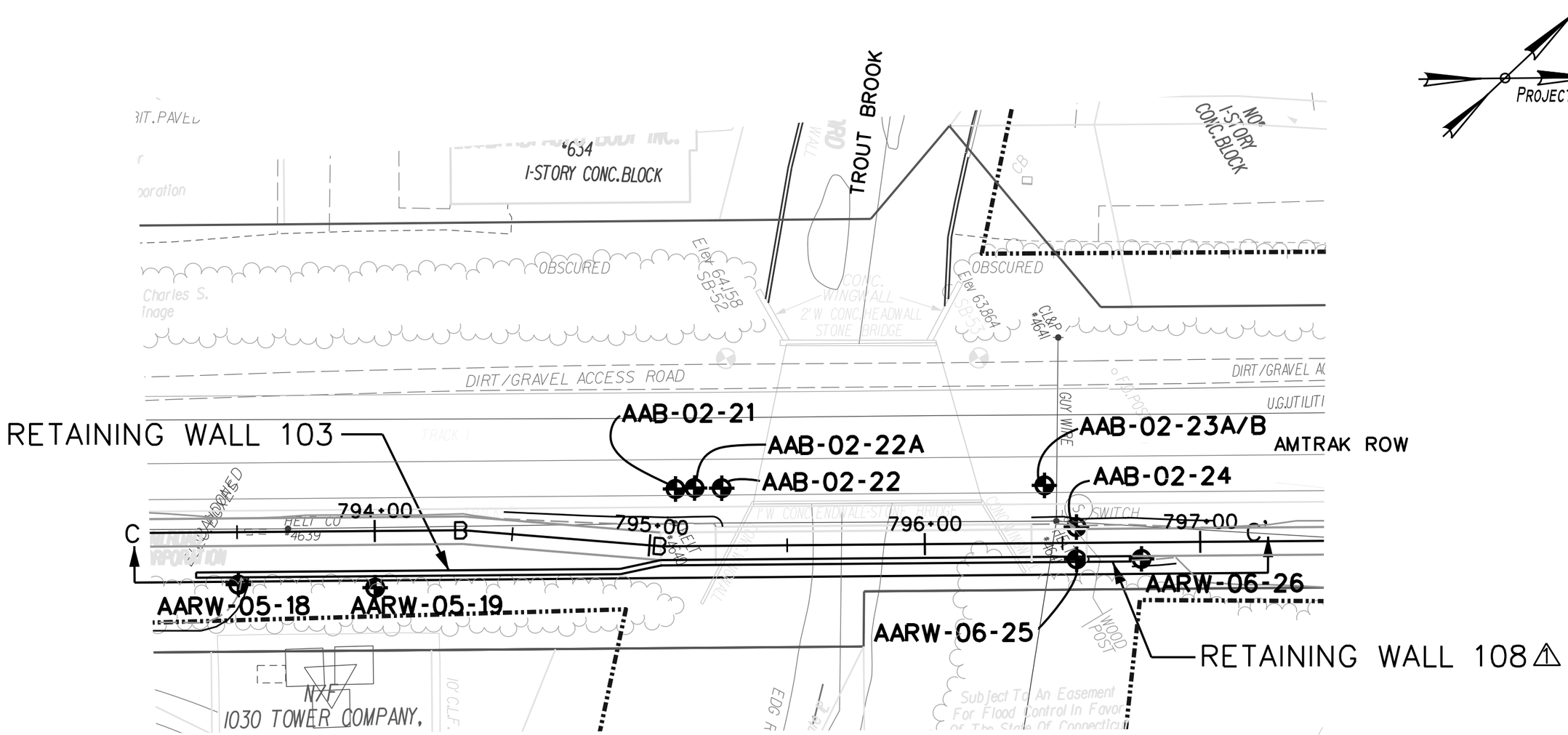

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SB- RB-	PREVIOUS TEST BORINGS BY OTHERS

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DESIGNED BY MGB					
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CHECKED BY RTS	1	9-21-09	RETAINING WALL 108 ADDED		
APPROVED BY MPT	NO.	DATE		DRWN.	CHKD	APPVD

REVISIONS

PRIME DESIGNER:

Baker Engineering NY, Inc.

ROCKY HILL, CT. 06067
Tel: (860) 563-3044
Fax: (860) 529-6627

GEODESIGN INCORPORATED

GEOTECHNICAL ENGINEERS • ENVIRONMENTAL CONSULTANTS
984 SOUTHFORD ROAD • MIDDLEBURY CONNECTICUT 06762
TELEPHONE: (203)758-8836 FACSIMILE: (203)758-8842

DWG. TITLE: RETAINING WALL 103 & 108

FILE NO. 183-10

SCALE 1" = 40' DATE 10-27-08

PROJECT: STATE PROJECT NO. 171-305
AMTRAK ACCESS ROAD
NEWINGTON, WEST HARTFORD AND HARTFORD, CT.

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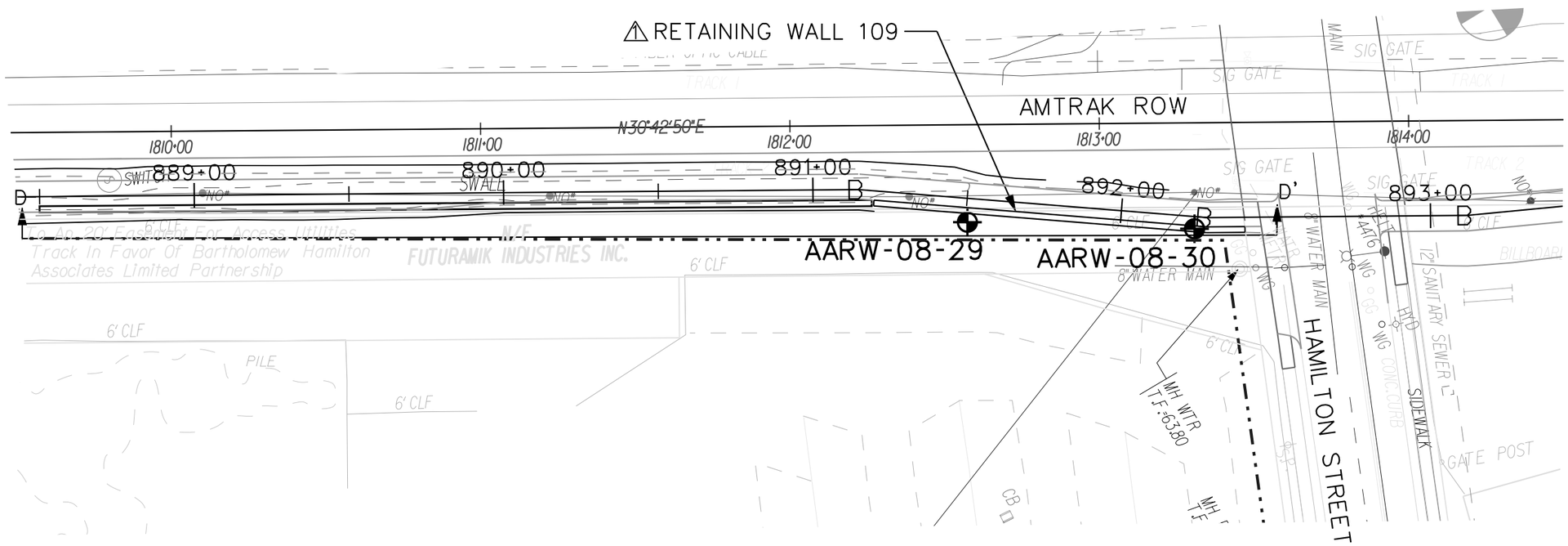

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SB-
RB- — PREVIOUS TEST BORINGS BY OTHERS

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DRAWN BY SMC						
CHECKED BY RTS	1	9-21-09	RETAINING WALL 109 ADDED			
APPROVED BY MPT	NO.	DATE		DRWN.	CHKD	APPVD
	REVISIONS					

PRIME DESIGNER:
Baker Engineering NY, Inc.
ROCKY HILL, CT. 06067
Tel: (860) 563-3044
Fax: (860) 529-6627

GEODESIGN INCORPORATED
GEOTECHNICAL ENGINEERS · ENVIRONMENTAL CONSULTANTS
984 SOUTHFORD ROAD · MIDDLEBURY CONNECTICUT 06762
TELEPHONE: (203)758-8836 FACSIMILE: (203)758-8842

DWG. TITLE: RETAINING WALL 109

FILE NO. 183-10
SCALE 1" = 40'
DATE 11-5-08

PROJECT: STATE PROJECT NO. 171-305
AMTRAK ACCESS ROAD
NEWINGTON, WEST HARTFORD AND HARTFORD, CT.

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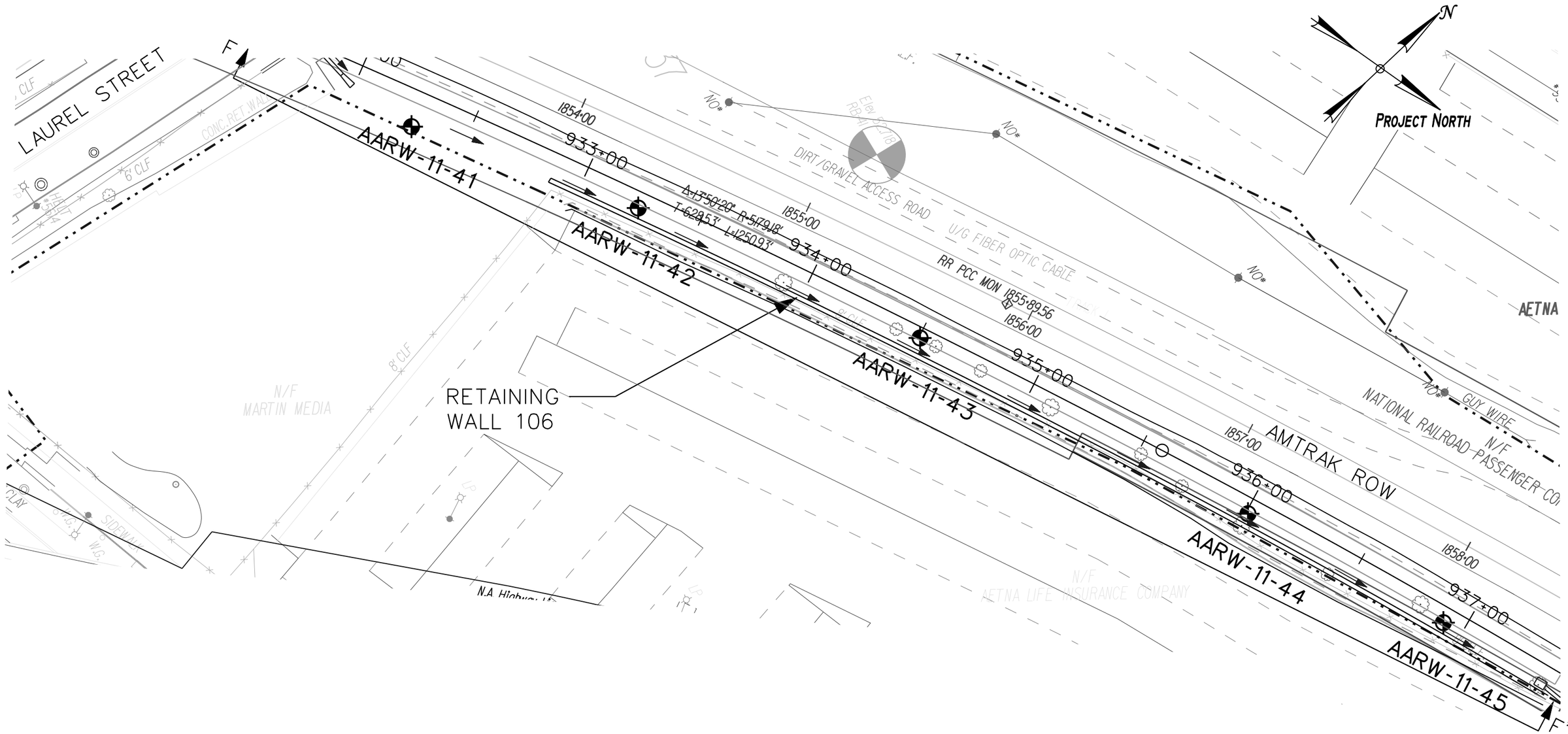

LEGEND

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SB- RB-	⊕	PREVIOUS TEST BORINGS BY OTHERS

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DRAWN BY SMC							
CHECKED BY RTS							
APPROVED BY MPT		NO.	DATE		DRWN.	CHKD	APPVD
		REVISIONS					

PRIME DESIGNER:

Baker Engineering NY, Inc.

ROCKY HILL, CT. 06067
Tel: (860) 563-3044
Fax: (860) 529-6627

GEODESIGN INCORPORATED

GEOTECHNICAL ENGINEERS · ENVIRONMENTAL CONSULTANTS
984 SOUTHFORD ROAD · MIDDLEBURY CONNECTICUT 06762
TELEPHONE: (203)758-8836 FACSIMILE: (203)758-8842

DWG. TITLE
RETAINING WALLS NO. 106

FILE NO. 183-10

SCALE 1" = 40' DATE 10-27-08

PROJECT
STATE PROJECT NO. 171-305
AMTRAK ACCESS ROAD
NEWINGTON, WEST HARTFORD AND HARTFORD, CT.

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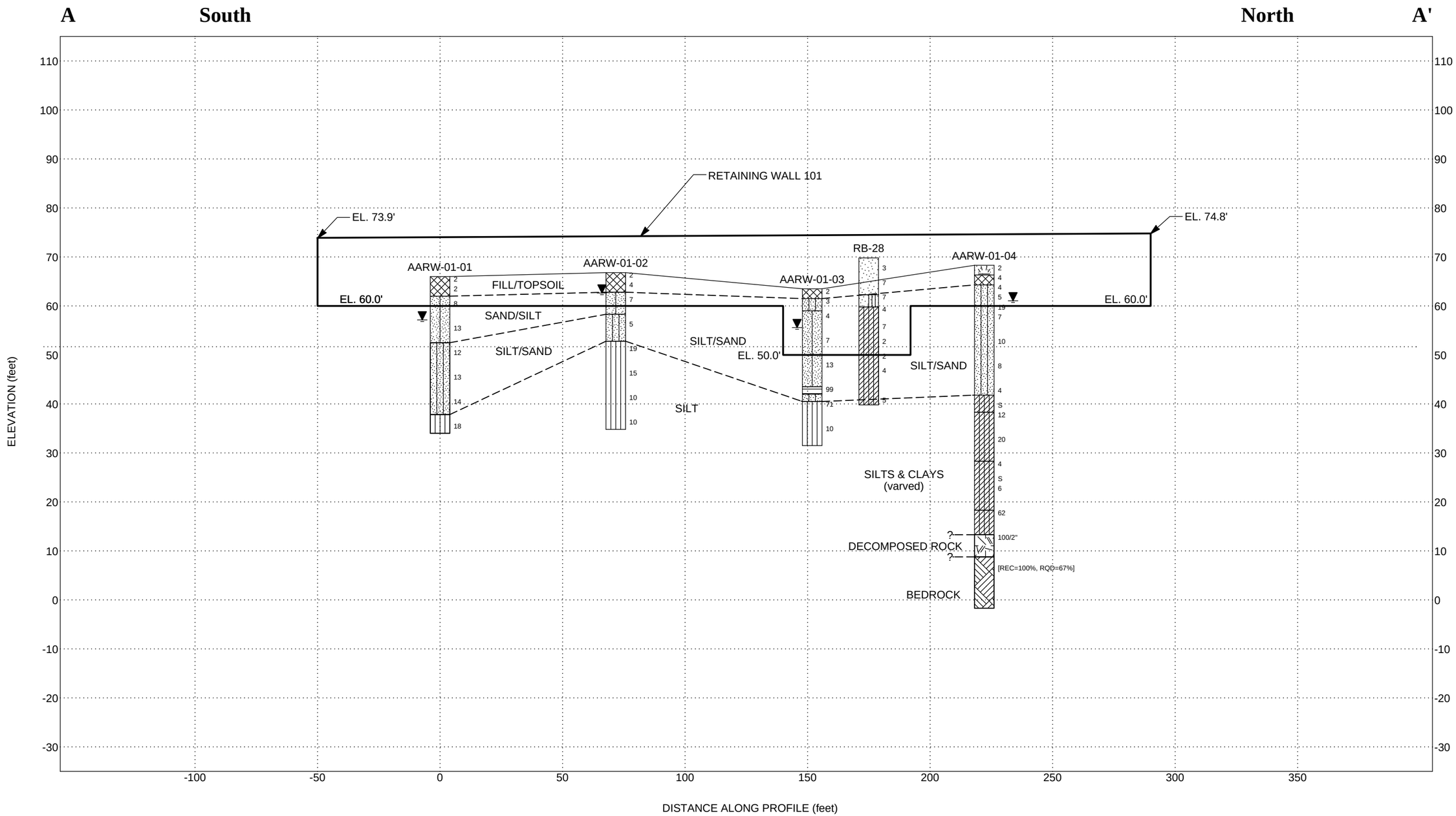


GEODESIGN INCORPORATED
Geotechnical Engineers and Environmental Consultants
984 Southford Road
Middlebury, Connecticut 06762
Telephone: 203-758-8836 Fax: 203-758-8842

0 40
Horizontal Scale (feet)
Vertical Exaggeration: 2x

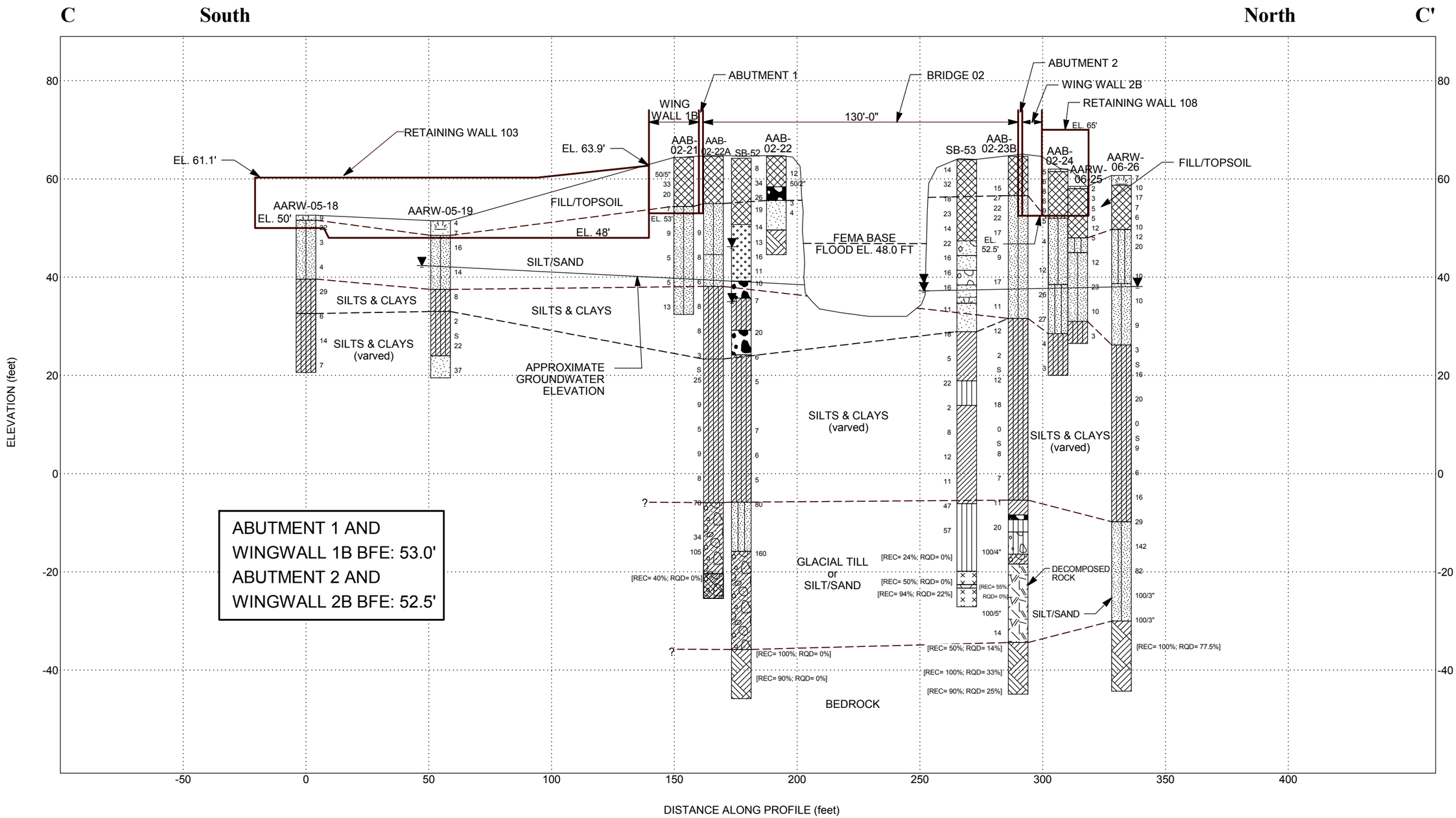
Notes:
1. Data concerning the various strata have been interpreted at boring locations only. The stratigraphy between borings may vary from that shown.
2. Refer to plan view for subsurface profile location. For strata details and symbol legend, see Subsurface Profile Legend and boring logs appended to this report.
3. Numbers displayed beside boring(s) represent SPT "N" values corresponding to their respective sampling interval. Where coring was performed, numbers represent Recovery and RQD values.

SUBSURFACE PROFILE A-A'

AMTRAK Access Road
Retaining Wall 101

Date: 11/7/08	Drawn By: JPM/DSF	Reviewed By: MGB	File No.: 0183-010.0	Figure No.: 3A

GEO STANDARD 11 X 17 (2/19/04) COMBINATION BORING LOGS - IMPORT AMTRACK ACCESS BORINGS.GPJ FBNWNL01.GDT 11/7/08



GEO STANDARD 11 X 17 (2/19/04) COMBINATION BORING LOGS - IMPORT AMTRACK ACCESS BORINGS.GPJ FBNWNL01.GDT 10/24/08

GEODESIGN INCORPORATED
Geotechnical Engineers and Environmental Consultants
984 Southford Road
Middlebury, Connecticut 06762
Telephone: 203-758-8836 Fax: 203-758-8842

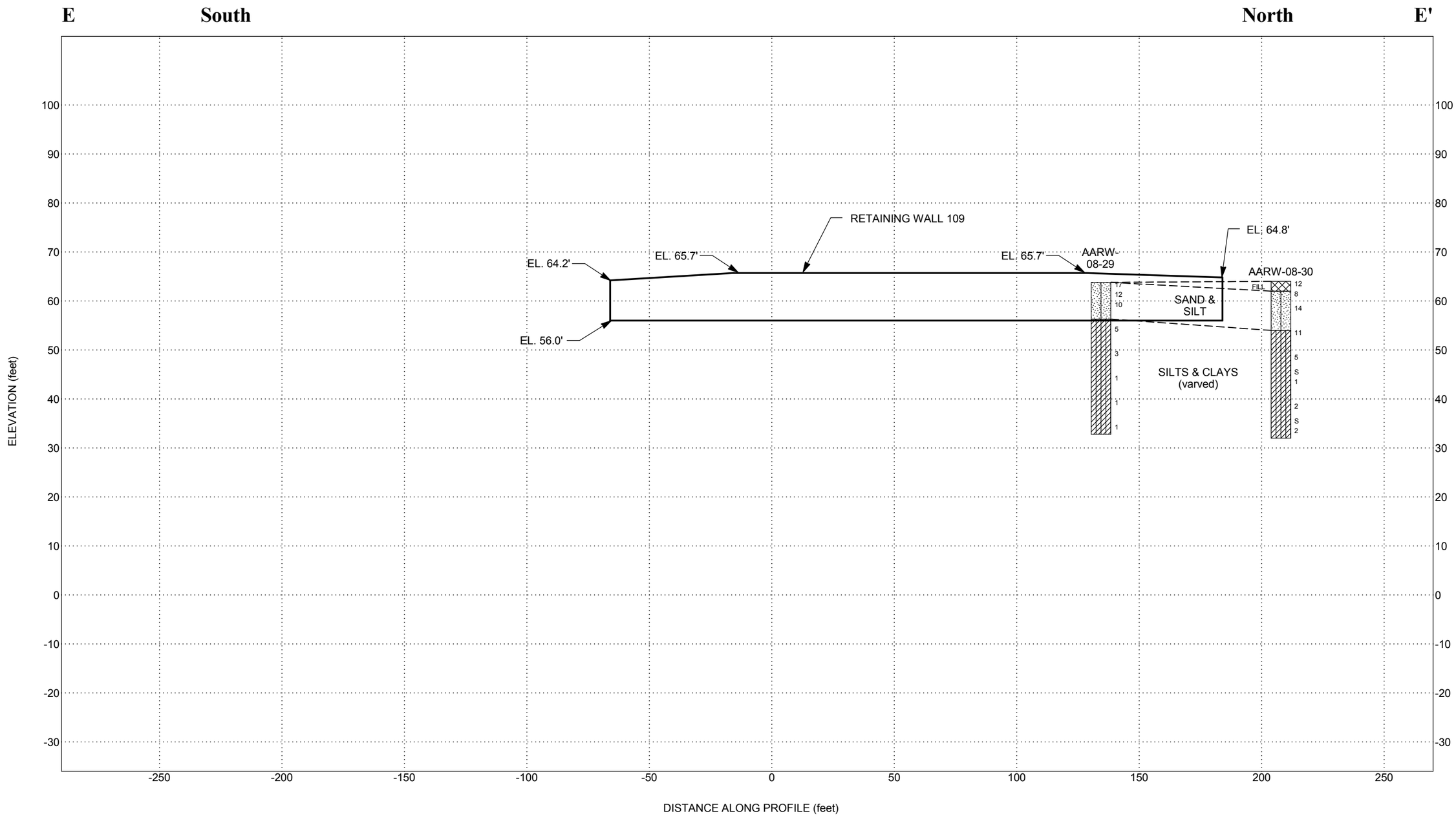
0 40
Horizontal Scale (feet)
Vertical Exaggeration: 2x

Notes:
1. Data concerning the various strata have been interpreted at boring locations only. The stratigraphy between borings may vary from that shown.
2. Refer to plan view for subsurface profile location. For strata details and symbol legend, see Subsurface Profile Legend and boring logs appended to this report.
3. Numbers displayed beside boring(s) represent SPT "N" values corresponding to their respective sampling interval. Where coring was performed, numbers represent Recovery and RQD values.

SUBSURFACE PROFILE C-C'

AMTRAK Access Road
RW 103, Bridge 02, RW 108

Date: 9/22/09	Drawn By: DSF/JPM	Reviewed By: MGB	File No.: 0183-010.0	Figure No.: 3B



GEO STANDARD 11 X 17 (2/19/04) COMBINED FOR PROFILE PURPOSES - 2-3-09.GPJ FBNWNL01.GDT 9/22/09

GEODESIGN INCORPORATED
Geotechnical Engineers & Environmental Consultants
984 Southford Road
Middlebury, Connecticut 06762
Telephone: 203-758-8836 Fax: 203-758-8842

0 40
Horizontal Scale (feet)
Vertical Exaggeration: 2x

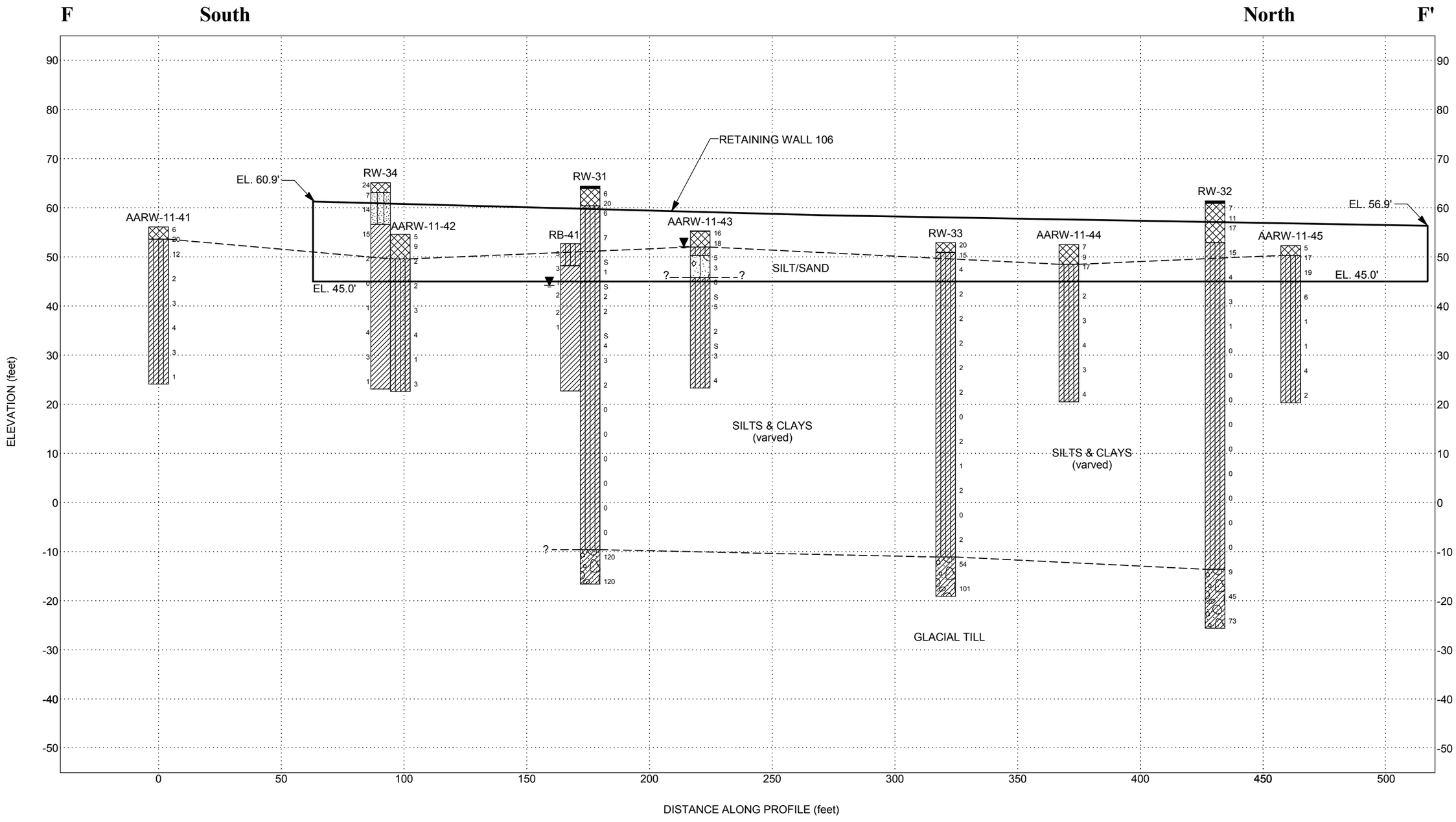
Notes:
1. Data concerning the various strata have been interpreted at boring locations only. The stratigraphy between borings may vary from that shown.
2. Refer to plan view for subsurface profile location. For strata details and symbol legend, see Subsurface Profile Legend and boring logs appended to this report.
3. Numbers displayed beside boring(s) represent SPT "N" values corresponding to their respective sampling interval. Where coring was performed, numbers represent Recovery and RQD values.

Date: 9/22/09 | Drawn By: DSF | Reviewed By: MGB

SUBSURFACE PROFILE E-E'

AMTRAK Access Road
Retaining Wall 109

File No.: 0183-010.0 | Figure No.: 3C



GEO STANDARD 11 X 17 (2/19/04) COMBINATION BORING LOGS - IMPORT AMTRACK ACCESS BORINGS.GPJ FBNWNL01.GDT 11/7/08

GEODESIGN INCORPORATED
Geotechnical Engineers and Environmental Consultants
984 Southford Road
Middlebury, Connecticut 06762
Telephone: 203-758-8836 Fax: 203-758-8842

0 40
Horizontal Scale (feet)
Vertical Exaggeration: 2x

Notes:
1. Data concerning the various strata have been interpreted at boring locations only. The stratigraphy between borings may vary from that shown.
2. Refer to plan view for subsurface profile location. For strata details and symbol legend, see Subsurface Profile Legend and boring logs appended to this report.
3. Numbers displayed beside boring(s) represent SPT "N" values corresponding to their respective sampling interval. Where coring was performed, numbers represent Recovery and RQD values.

Date: 9/22/09 | Drawn By: JPM/DSF | Reviewed By: MGB

SUBSURFACE PROFILE F-F'

AMTRAK Access Road
Retaining Wall 106

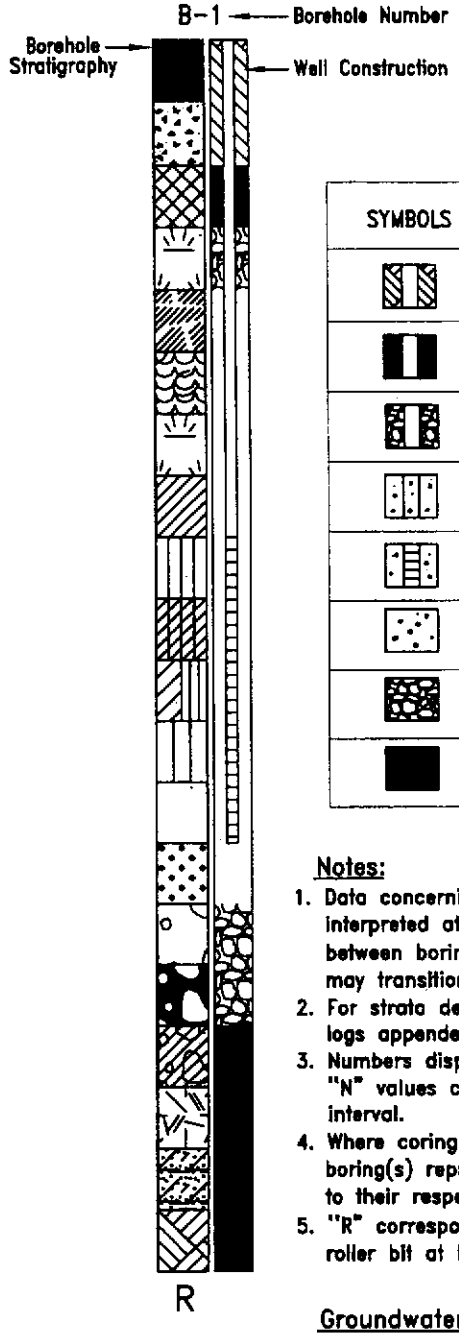
File No.: 0183-010.0 | Figure No.: 3D

\MISCELLANEOUS\LEGENDS\SUBSURFACE PROFILE LEGEND.dwg

STRATIGRAPHY SYMBOLS

SYMBOLS	TYPICAL DESCRIPTIONS OF PREDOMINENT MATERIAL TYPE
	ASPHALT
	CONCRETE
	FILL
	TOPSOIL
	SUBSOIL
	ORGANIC SILT OR CLAY WITH SHELLS
	PEAT
	CLAY
	SILT
	CLAY/SILT MIXTURE
	CLAY/SILT/SAND MIXTURE
	SILT/SAND MIXTURE
	SAND/SILT MIXTURE
	POORLY-GRADED SAND
	WELL-GRADED SAND
	SAND/GRAVEL MIXTURE
	SAND/GRAVEL/SILT MIXTURE
	BOULDERS AND/OR COBBLES
	GLACIAL TILL
	DECOMPOSED BEDROCK
	SANDSTONE
	BEDROCK

EXPLANATION OF BORING



WELL SYMBOLS

SYMBOLS	TYPICAL DESCRIPTIONS
	CEMENT SEAL: 1 PIPE
	BENTONITE SEAL: 1 PIPE
	SLOUGH BACKFILL: 1 PIPE
	FILTER PACK: 1 PIPE
	SLOTTED PIPE WITH FILTER PACK: 1 PIPE
	FILTER PACK AT BOTTOM OF HOLE
	SLOUGH AT BOTTOM OF HOLE
	BENTONITE AT BOTTOM OF HOLE

Notes:

1. Data concerning the various strata have been interpreted at boring locations only. The stratigraphy between borings may vary from that shown, and may transition more gradually within borings.
2. For strata details, see Report and boring logs appended to this report.
3. Numbers displayed beside boring(s) represent SPT "N" values corresponding to their respective sampling interval.
4. Where coring was performed, numbers displayed beside boring(s) represent Recovery and RQD values corresponding to their respective sampling interval.
5. "R" corresponds to refusal of sampler, casing and/or roller bit at bottom of boring.

Groundwater Observations (where applicable)

▽ Water Level Reading at time of drilling.

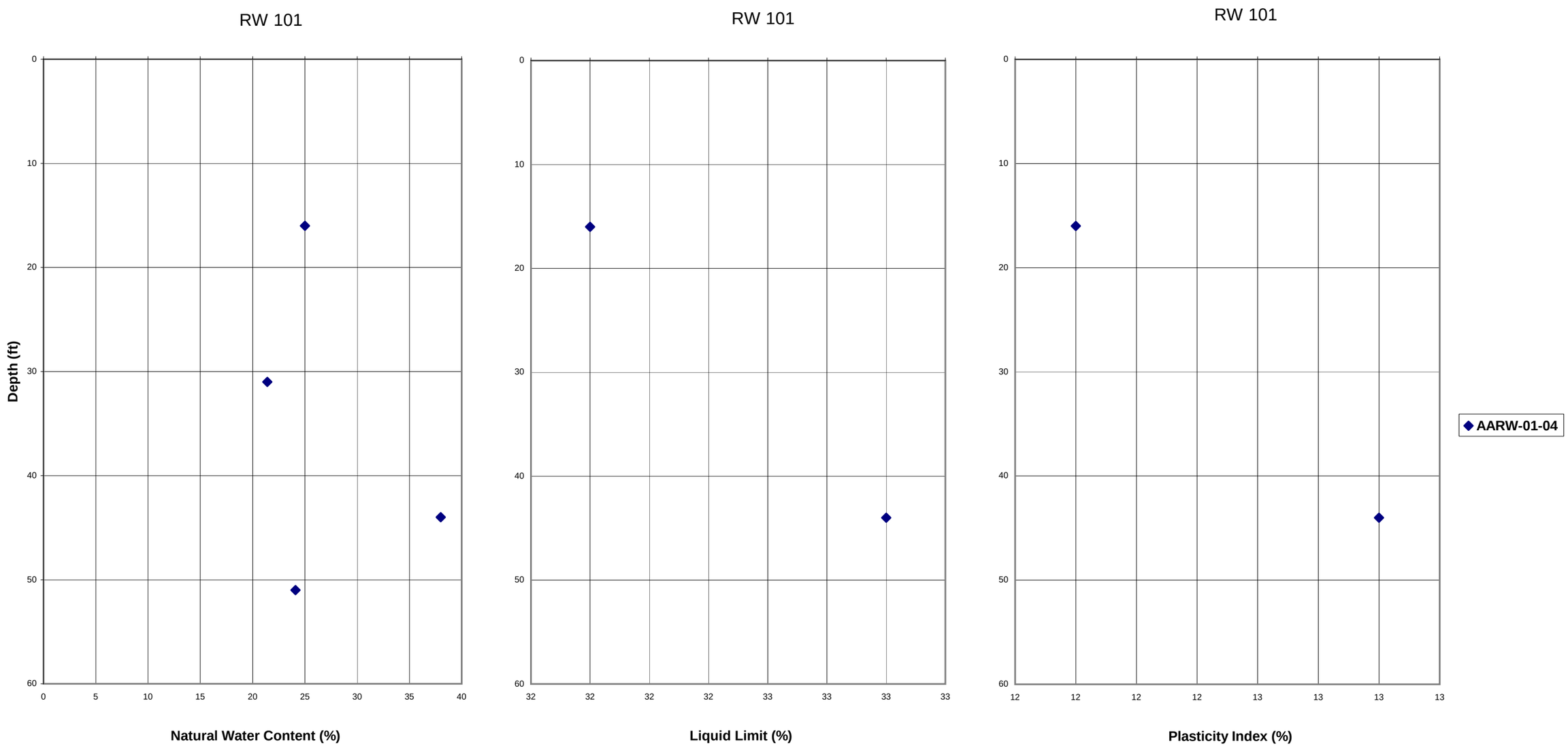
▼ Water Level Reading after completing drilling.

GEODESIGN INCORPORATED

GEOTECHNICAL ENGINEERS • ENVIRONMENTAL CONSULTANTS
984 SOUTHFORD ROAD • MIDDLEBURY CONNECTICUT 06762
TELEPHONE: (203)758-8836 FACSIMILE: (203)758-8842

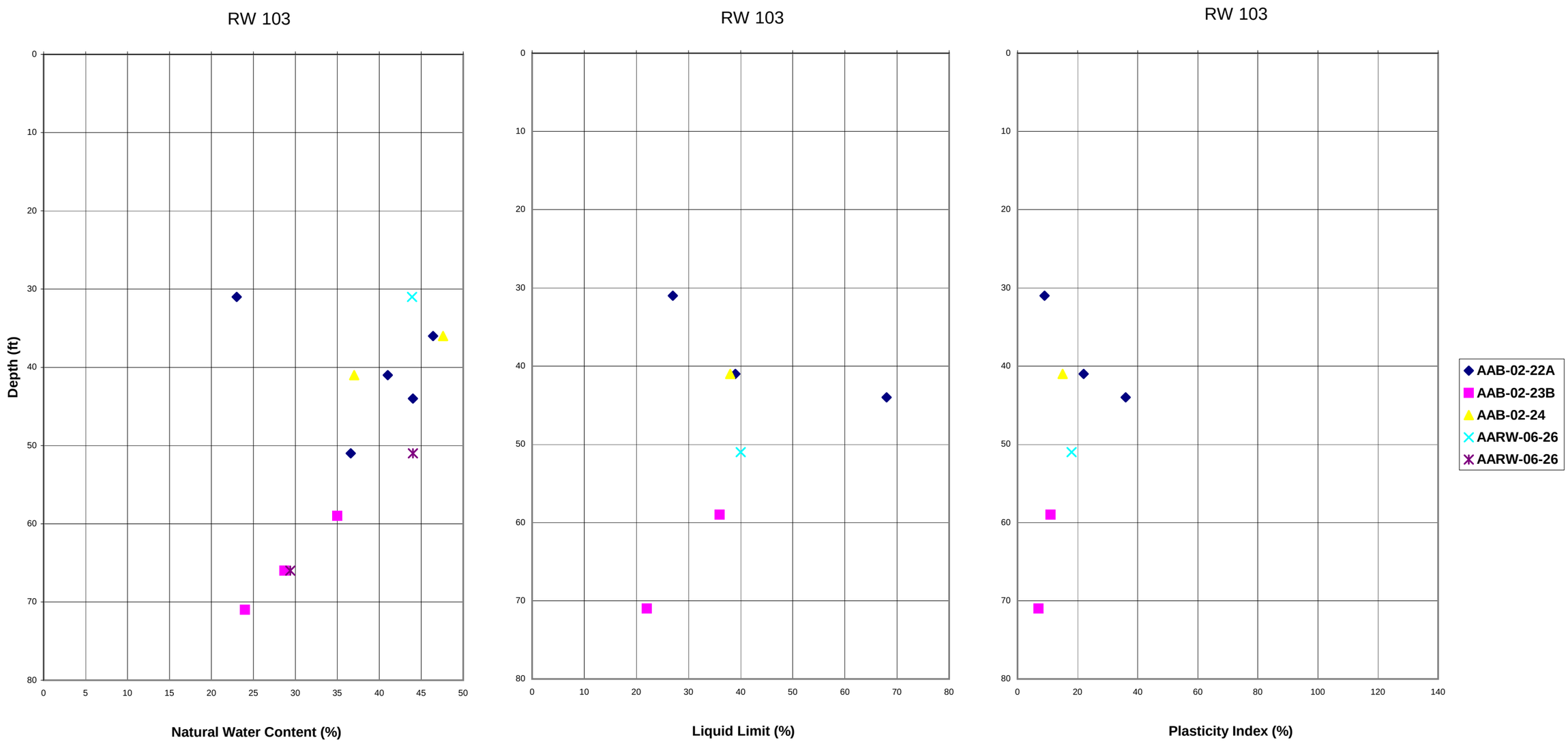
Figure 4

SUBSURFACE PROFILE LEGEND



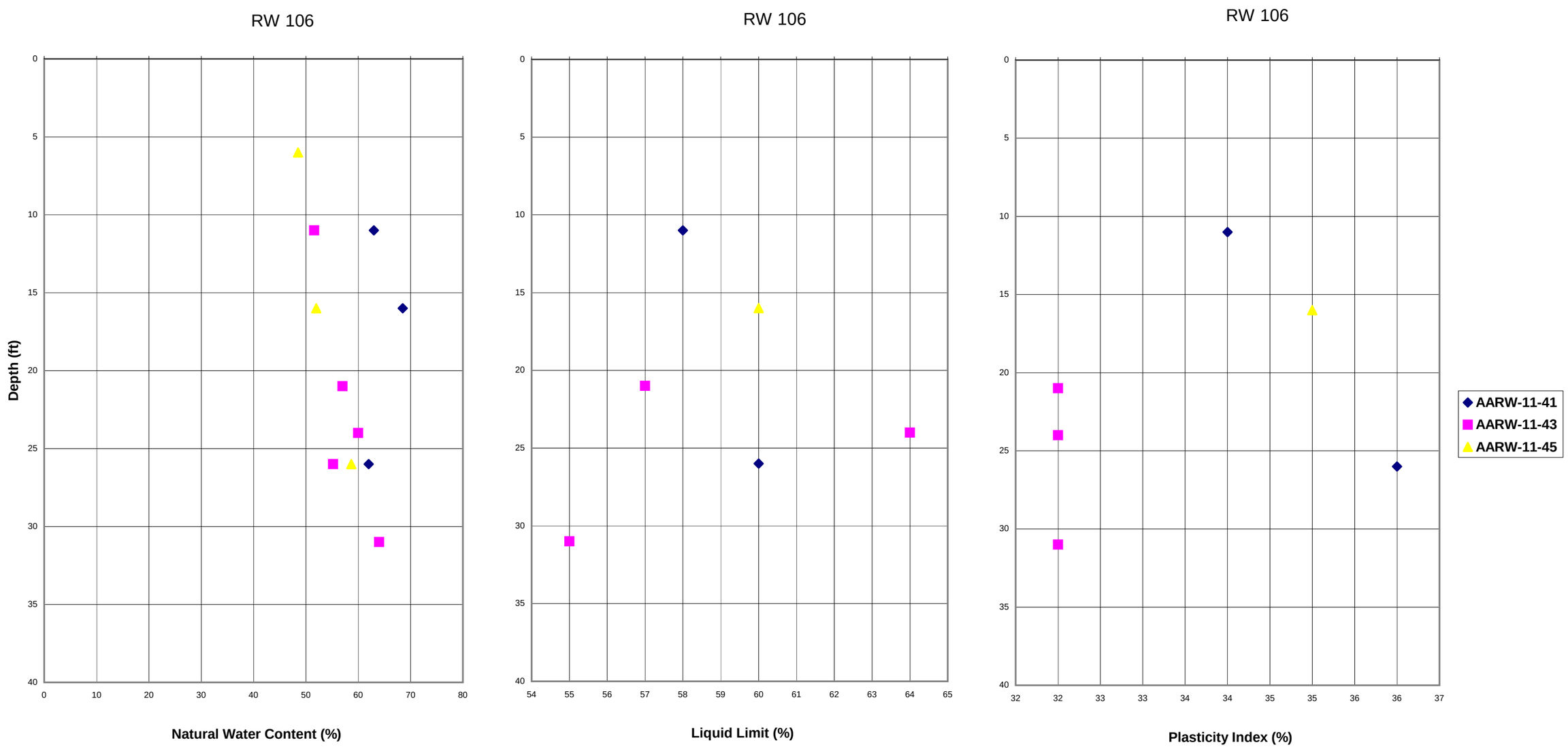
Retaining Wall 101
Amtrak Access Roadway

Figure 5A
Atterberg Limits Vs. Depth



Retaining Wall 103
Amtrak Access Roadway

Figure 5B
Atterberg Limits Vs. Depth



Retaining Wall 106
Amtrak Access Roadway

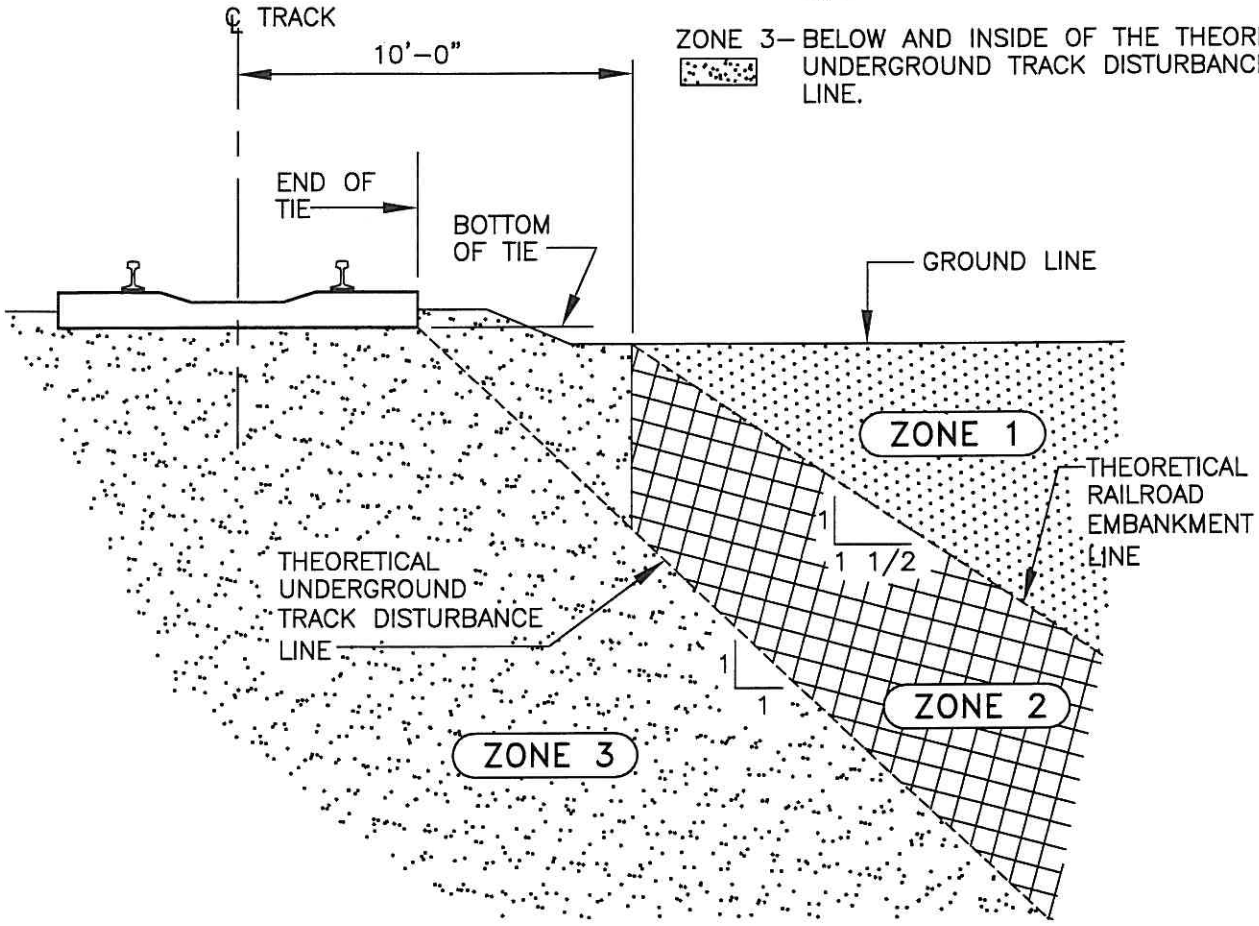
Figure 5C
Atterberg Limits Vs. Depth

LEGEND

ZONE 1 – ABOVE AND OUTSIDE THE THEORETICAL RAILROAD EMBANKMENT LINE.

ZONE 2 – FARTHER THAN 10 FEET FROM THE CENTERLINE OF TRACK, BELOW THE THEORETICAL RAILROAD EMBANKMENT LINE AND ABOVE THE THEORETICAL UNDERGROUND TRACK DISTURBANCE LINE.

ZONE 3 – BELOW AND INSIDE OF THE THEORETICAL UNDERGROUND TRACK DISTURBANCE LINE.



NORMAL REQUIREMENTS FOR SHEET PILING ADJACENT TO TRACK

1. EXCAVATIONS WITHIN ZONE 1 – ABOVE AND OUTSIDE OF THE THEORETICAL RAILROAD EMBANKMENT LINE – DO NOT NORMALLY REQUIRE SHEETING TO PROTECT RAILROAD ROAD BED. SHEETING MAY BE REQUIRED FOR OTHER REASONS.

2. EXCAVATIONS WHOSE BOTTOMS EXTEND INTO ZONE 2 REQUIRE SHEETING, BUT THE SHEETING MAY NORMALLY BE PULLED AFTER THE EXCAVATION HAS BEEN BACKFILLED.

3. EXCAVATIONS WHOSE BOTTOMS EXTEND INTO ZONE 3 WILL NORMALLY REQUIRE THE SHEETING TO BE LEFT IN PLACE AND CUT–OFF PER REQUIREMENTS.

Figure 6

Amtrak®
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Office of Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

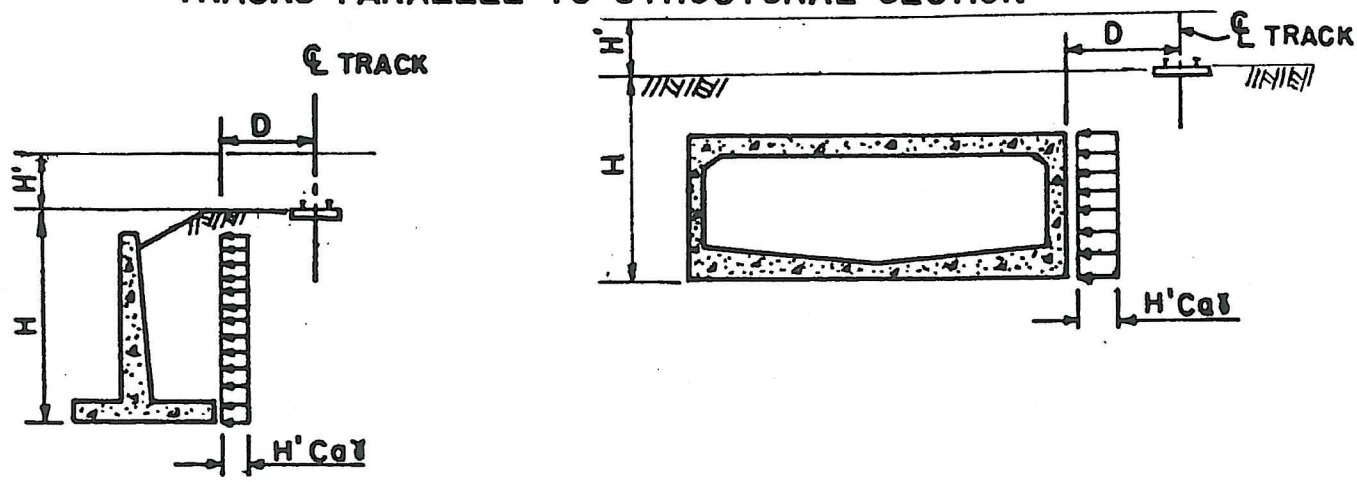
SKETCH 1
SPEC. 02261A – REV. 1

File No:	
Design No:	3501
Sheet No.	1 of 1
Drwg. No.	SK–1

Designed CJR | Drawn JLM | Date 6/06/01

COOPER E80 RAILROAD LIVE LOAD ON WALL

TRACKS PARALLEL TO STRUCTURAL SECTION



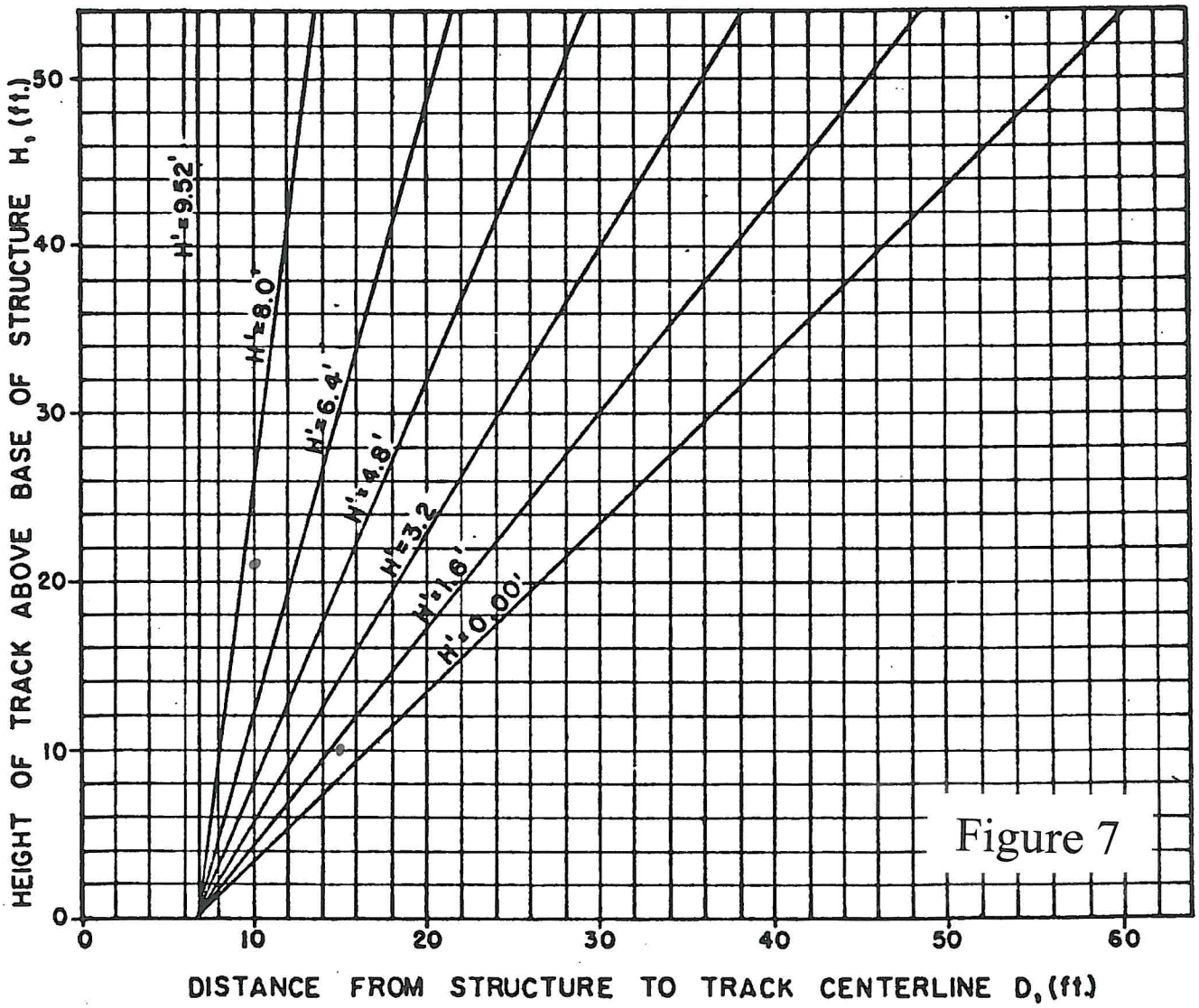


Figure H 374.2D

Calculation of L. L. SURCHARGE:

$$H' \text{ max.} = \frac{P}{s \times b \times \gamma} = \frac{80{,}000\#}{5' \times 14' \times 120\text{pcf}} = 9.52'$$

H' = live load surcharge
P = E80 axle load in lbs.
s = axle spacing in feet
γ = unit weight of backfill in lbs./ft.^{3}
b = transverse distribution of axle load in feet
C_a = active earth pressure coefficient

Ratio side loads when other than E80 Railroad loads are appropriate.

It is necessary to consider the effect of only one track in computing the LL surcharge. The exceptional case of tracks closer than 7' can be generally ignored since the increase in surcharge is minor.

Impact loads are not applied to side walls (AREA).

Refer also to Figure H374.2C

Tables

Amtrak Access Road Subsurface Explorations
Newington, West Hartford , and Hartford
State Project No. 171-305, Geo**Design** No. 0183-010.0

Table 1: 2008 Well Readings

Well #	Date Installed	Ground Surface Elevation (ft)	8/15	8/20	8/22	8/25	8/26	8/27	9/2[1]	9/8[1]	9/12	Average Depth	Average Elevation (ft)
AARW-01-04	08/14/08	68.3	7.2	6.6			6.9	7.0	7.4	6.4		6.9	61.4
AARW-03-09	08/19/08	72.3		7.5		6.0		6.1	6.7	5.7		6.4	65.9
AAB-01-14	08/27/08	54.9						7.0	6.5	6.2		6.6	48.3
AARW-05-19	08/21/08	51.5			9.1		8.4	8.9	8.6	8.2	8.2	8.6	42.9
AARW-06-26	08/19/08	60.7		23.0	23.0		22.8	22.8	22.8	20.8	22.8	22.6	38.1
AARW-07-28	08/19/08	66.8		3.3		4.6		4.9	5.7	2.4		4.2	62.6
AARW-08-29	08/19/08	64.8		5.0		4.6		4.7	5.1	4.9		4.9	59.9
AARW-09-33	08/04/08	63.0	17.9	19.0		18.8		19.0	19.8	18.5		18.8	44.2
AARW-10-38	08/11/08	62.3	12.6	13.8		14.3		14.4	15.0	13.0		13.9	48.5
AARW-11-43	08/01/08	55.3	3.0	3.2		3.2		3.3	3.2	2.8		3.1	52.2

Notes:
All well readings are depth (ft) to groundwater from ground surface.
Wells are listed in order from west to east.
[1] Approximately 5.5 inches of rainfall between 9/2 and 9/8

Amtrak Access Road Subsurface Explorations
Newington, West Hartford , and Hartford
State Project No. 171-305, Geo**Design** No. 0183-010.0

Table 2: Silts and Clays Properties

Retaining Wall	Void Ratio	Unit Weight (pcf)	Saturated Unit Weight (pcf)	Undrained Shear Strength (psf)	Young's Soil Modulus of Elasticity (tsf)
101	1.1	105	116	2000	400 to 500
103/Bridge 02/108	1.2	105	113	1300	300 to 500
109	1.8	105	103	1000	300 to 500
106	1.7	105	104	1100	150 to 250

Retaining Wall	Compression Index, C_c (dimensionless)	Re-Compression Ratio, C_r (dimensionless)	Secondary Compression Index, C_α	Initial Effective Stress at top of Silt/Clay Layer, pcf	Initial Effective Stress at bottom of Silt/Clay Layer, pcf
103/Bridge 02/108	0.11	0.02	0.0009	1515	3580
109	0.17	0.04	0.0018	940	6780
106	0.20	0.04	0.0018	440	3060

Retaining Wall	Max past Effective Stress at top of Silt/clay Layer, pcf	Max Past Effective Stress at bottom of Silt/Clay Layer, pcf	Primary Consolid. Time, months	Service Life (Secondary Settlement Time), years	Cohesion, c (ksf)
103/Bridge 02/108	7400	5560	3	50	-
109	5450	6900	30	50	0.20
106	4400	4400	3	50	0.25

Retaining Wall	Cohesion, c (ksf)
106	0.25

Sources Used:
Figures 5A through 5E of Retaining Wall Geotechnical Report;
"Geotechnical Engineer's Portable Handbook" pages 4.18 and 4.22;
and http://www.geotechnicalinfo.com/cohesion.html

Appendix 2

Boring Logs

Retaining Wall 101
(AARW-01-Series)

Station 777+75 to 778+95
(AARW-02-Series)

Station 780+61 to 783+43
(AARW-03-Series)

Retaining Wall 102
(AARW-04-Series, AAB-01-Series)

Retaining Wall 103
(AARW-05-Series, AAB-02-Series, AARW-06-Series)

Station 845+25 to 846+50
(AARW-07-Series)

Station 891+20 to 892+40
(AARW-08-Series)

Retaining Wall 105 and 104
(AARW-09-Series, AAB-03-Series, AARW-10-Series)

Retaining Wall 106
AARW-11-Series

Retaining Wall 101

Connecticut DOT Boring Report

Inspector:	RJM/BWE	Town:	Newington/Hartford/ West Hartford	Hole No.:	AARW-01-01
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	
Start Date:	8-26-08	Route No.:		Northing:	822207.46
Finish Date:	8-26-08	Bridge No.:		Easting:	1004124.16
				Surface Elevation:	66

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 140 lb. Fall: 24"	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations: @5' wet sample; 9.6' after 0.2 hours

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	1 1 1 1	24	1		Fill	Very loose, black fine to medium SAND, trace Silt	65
	S-2	1 1 1 3	24	3			Very loose, dark brown fine to medium SAND, little Silt	
5	S-3	2 3 5 4	24	12		Silty Sand	Loose, dark brown fine SAND and SILT, (wet)	60
10	S-4	2 4 9 7	24	14			Medium dense, red brown fine SAND, little Silt	55
15	S-5	4 5 7 16	24	12		Sandy Silt	Medium dense, red brown SILT, some fine to coarse Sand	50
20	S-6	5 7 6 7	24	12			Medium dense, red brown SILT, some fine Sand	45
25	S-7	4 7 7 10	24	6			Medium dense, red brown SILT, some fine to coarse Sand	40
30	S-8	4 7 11 16	24	24		Clayey SILT	Very Stiff, red brown Clayey SILT, trace fine Sand	35
35							END OF BORING 32ft	

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: 32ft Rock: 0ft	NOTES: Tripod, cathead driven donut hammer used. Pilot hole to 11 feet using 4 inch casing, then advanced open hole with REVERT II/drillers mud to maintain open hole.	Sheet 1 of 1
No. of Soil Samples: 5 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:	BWE	Town:	Newington/Hartford/ West Hartford	Hole No.:	AARW-01-02
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	
Start Date:	8-27-08	Route No.:		Northing:	822269.71
Finish Date:	8-27-08	Bridge No.:		Easting:	1004161.19
				Surface Elevation:	66.8

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 140 lb. Fall: 24"	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations: @10' wet sample; 4' after 0.2 hours

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	1 1 1 1	24	10		Fill	Very loose, black fine to medium SAND, trace Silt	65
	S-2	1 2 2 2	24	7			Loose, black fine to medium SAND, trace coarse Gravel, trace Silt	
5	S-3	2 3 4 4	24	12		Silty Sand	Loose, brown fine to coarse SAND, trace fine Gravel, trace Silt	60
10	S-4	1 2 3 2	24	20		Sandy Silt	Loose, gray brown SILT, some fine Sand, (wet)	55
15	S-5	3 8 11 13	24	24		Silt	Medium dense, gray brown SILT, trace fine Sand	50
20	S-6	4 6 9 12	24	24			Medium dense, red brown SILT, trace fine Sand	45
25	S-7	4 5 5 6	24	16			Medium dense, red brown SILT, trace fine Sand	40
30	S-8	4 3 7 9	24	24			Medium dense, red brown SILT, trace fine to coarse Sand	35
							END OF BORING 32ft	
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: 32ft Rock: 0ft	NOTES: Tripod, cathead driven donut hammer used. Pilot hole to 4 feet, 4 inch casing to 10 feet, open hole to 32 feet with REVERT II/drillers mud to maintain open hole.	Sheet 1 of 1
No. of Soil Samples: 6 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:	BWE	Town:	Newington/Hartford/ West Hartford	Hole No.:	AARW-01-03
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	
Start Date:	8-27-08	Route No.:		Northing:	822336.39
Finish Date:	8-27-08	Bridge No.:		Easting:	1004206.2
				Surface Elevation:	63.5

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 140 lb. Fall: 24"	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations: @10' wet sample; 8' after 0.2 hours

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	1 1 1 1	24	7		Fill	Very loose, black fine to medium SAND, trace Silt	
	S-2	2 1 2 2	24	10		Silty Sand	Very loose, brown fine to medium SAND, some Silt	60
5	S-3	2 2 2 1	24	16		Sandy Silt	Loose, brown SILT, some fine Sand	55
10	S-4	15 4 3 2	24	15			Loose, brown SILT, some fine Sand, (wet)	50
15	S-5	3 5 8 7	24	20			Medium dense, brown SILT, little fine Sand	45
20	S-6	27 58 41 10	24	8		Cobble or Boulder	Very dense, red brown Top 2": SHALE fragments Bottom 8": fine to coarse SAND, little Silt, Shale fragments	
						Silty Sand		
	S-7	11 33 38 22	24	24		Sandy Silt	Very dense, SILT, trace fine to coarse Sand	40
25								
	S-8	6 5 5 6	24	24			Medium dense, SILT, trace fine to coarse Sand	35
30								
							END OF BORING 32ft	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: 32ft Rock: 0ft	NOTES: Tripod, cathead driven donut hammer used. Pilot hole to 4 feet, 4 inch casing to 5 feet, open hole to 32 feet with REVERT II/drillers mud to maintain open hole.	Sheet 1 of 1
No. of Soil Samples: 5 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector: BWE	Town: Newington/Hartford/ West Hartford	Hole No.: AARW-01-04	
Engineer: Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:	
Start Date: 8-7-08	Route No.:	Northing: 822396.46	
Finish Date: 8-14-08	Bridge No.:	Easting: 1004243.53	
		Surface Elevation: 68.3	

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: NX
Hammer Wt.: Fall: Push	Hammer Wt.: 140 Fall: 30"	

Groundwater Observations: @4' wet sample; 6.5' after 0.2 hrs.; 6.6' in well after 24 hrs;6.4' in well after 25 days

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	2 1 1 1	24	1		Topsoil	Very loose, black fine to medium SAND, little Silt	
	S-2	2 2 2 2	24	4		Fill	Loose, black fine to medium SAND, little Silt	65
5	S-3	2 2 2 1	24	4		Sandy Silt	Loose, brown SILT and fine SAND, (wet)	
	S-4	2 3 2 3	24	12			Loose, brown SILT, some fine Sand	
	S-5	13 10 9 10	24	24			Medium dense, Top 4": brown SILT, some fine Sand Bottom 20": gray brown SILT and fine to coarse SAND	60
10	S-6	2 3 4 3	24	18			Loose, brown SILT and fine to coarse SAND	
								55
15	S-7	2 4 6 14	24	13			Loose, red brown SILT, trace fine to coarse Sand	
								50
20	S-8	3 3 5 4	24	13			Loose, red brown SILT, some fine to coarse Sand	
								45
25	S-9	2 2 2 3	24	24			Loose, medium, red brown Top 18": SILT, trace fine Sand Bottom 6": Silty CLAY (layers to 3/4" thick), varved with SILT and CLAY (layers to 1/4" thick)	
						Clay & Silt (varved)		
	UP-1	P U S H	24	24				40
30	S-10	2 6 6 10	24	3		Clay & Silt	Stiff, red brown CLAY & SILT, trace fine to coarse sand, fine Gravel	
								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: 55ft Rock: 15ft	NOTES: Acker steel track rig with cathead driven donut hammer used. Pilot hole with 4 inch casing to 10 feet, advanced open hole to 70 feet with REVERT/drilling fluid to maintain open hole. Two inch ID PVC monitoring well with tip of 10' slotted screen at 28 ft., filter sand to 5 ft., bentonite seal. Protective standpipe with concrete collar. See Table 1 (App 2) for additional G.W. readings.	Sheet 1 of 2
No. of Soil Samples: 10 No. of Core Runs: 1		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector: BWE	Town: Newington/Hartford/ West Hartford	Hole No.: AARW-01-04	
Engineer: Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:	
Start Date: 8-7-08	Route No.:	Northing: 822396.46	
Finish Date: 8-14-08	Bridge No.:	Easting: 1004243.53	
		Surface Elevation: 68.3	

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: NX
Hammer Wt.: Fall: Push	Hammer Wt.: 140 Fall: 30"	

Groundwater Observations: @4' wet sample; 6.5' after 0.2 hrs.; 6.6' in well after 24 hrs;6.4' in well after 25 days

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
35	S-11	6 12 8 8	24	3		Clay & Silt *(con't)*	Very stiff, red brown Silty CLAY, trace fine to coarse Sand	
								30
40	S-12	2 2 2 3	24	24		Clay & Silt (varved)	Medium, red brown CLAY and SILT (layers to 1" thick), varved with Silty CLAY (layers to 3/4" thick)	
	UP-2	P U S H	24	24				25
45	S-13	6 3 3 5	24	24			Medium, red brown CLAY and SILT (layers to 1" thick), varved with Silty CLAY (layers to 1" thick)	
								20
50	S-14	20 29 33 100/2"	20	13		Clay & Silt	Hard red brown CLAY & SILT, little fine to coarse sand, trace fine Gravel	
								15
55	S-15	100/2"	2	0		Decomposed Bedrock	Very dense, no recovery	
								10
60						Shale Bedrock		
								5
65	C-1		120	120	67		Fair Quality, Moderately Hard, Slightly Weathered, red brown, fine grained, very close to jointing SHALE, fracturing 5°(Core times not recorded)	
								0
70							END OF BORING 70ft	

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: 55ft Rock: 15ft	NOTES: Acker steel track rig with cathead driven donut hammer used. Pilot hole with 4 inch casing to 10 feet, advanced open hole to 70 feet with REVERT/drilling fluid to maintain open hole. Two inch ID PVC monitoring well with tip of 10' slotted screen at 28 ft., filter sand to 5 ft., bentonite seal. Protective standpipe with concrete collar. See Table 1 (App 2) for additional G.W. readings.	Sheet 2 of 2
No. of Soil Samples: 10 No. of Core Runs: 1		SM-001-M REV. 1/02

Retaining Wall 103

Connecticut DOT Boring Report

Inspector: RJM	Town: Newington/Hartford/ West Hartford	Hole No.: AAB-02-21	
Engineer: Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:	
Start Date: 8-27-08	Route No.:	Northing: 827339.66	
Finish Date: 8-27-08	Bridge No.:	Easting: 1007152.66	
		Surface Elevation: 64.4	

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 300 lb. Fall: Push	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations: @6.5' after 0.2 hours

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0						Fill		
	S-1	25 26 26	18	12			Very dense, gray black fine to coarse GRAVEL and fine to coarse SAND, trace Silt, trace Ash	
	S-2	37 28 50/5"	17	12			Very dense, brown to red brown fine to coarse SAND, little fine to coarse Gravel, little Silt	60
5	S-3	29 17 16 15	24	12			Dense, brown fine to medium SAND, trace fine to coarse Gravel, trace Silt	
	S-4	17 9 11 41	24	24			Medium dense, Top 12": gray fine to coarse SAND, little (-) fine to coarse Gravel, trace Silt Bottom 12": brown fine SAND, trace Silt, (with brown SILT partings to 1/8" thick)	55
10	S-5	3 3 4 3	24	12		Silty Sand	Loose, brown fine SAND, some Silt	
								50
15	S-6	3 4 5 5	24	20			Loose, brown fine SAND, some Silt	
								45
20	S-7	1 2 3 3	24	21			Loose, brown fine SAND, some Silt	
								40
25	S-8	1 2 3 3	24	21			Loose, brown to gray brown SILT, trace fine Sand	
								35
30	S-9	6 8 5 7	24	22			Medium dense, brown fine SAND, some Silt	
							END OF BORING 32ft	
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: 32ft Rock: 0ft	NOTES: High rail rig with cathead driven donut hammer used. Pilot hole to 6 feet with 4" casing, then boring advance open hole with REVERT II drillers mud to maintain open hole. Boring tremmy backfilled with cement grout and topped off with 2 feet of rail road ballast.	Sheet 1 of 1
No. of Soil Samples: 9 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector: RJM	Town: Newington/Hartford/ West Hartford	Hole No.: AAB-02-22	
Engineer: Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:	
Start Date: 8-28-08	Route No.:	Northing: 827354.16	
Finish Date: 8-28-08	Bridge No.:	Easting: 1007161.1	
		Surface Elevation: 64.6	

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 300 lb. Fall: Spin	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations: @None observed

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0						Fill		
	S-1	11 11 8	18	47			Medium dense, gray black fine to coarse GRAVEL, some fine to medium Sand, little Silt	
	S-2	6 6 6 12	24	12			Medium dense, brown fine to medium SAND, little Silt	
5	S-3	13 19 50/2"	14	3			Very dense, brown/gray fine to coarse GRAVEL, little fine to medium Sand, trace Silt	60
						Boulder		
10	S-4	1 1 2 1	24	12		Sand	Very loose, brown fine to medium SAND, trace fine Gravel, trace Silt	55
	S-5	2 2 2 3	24	12			Loose, brown fine to medium SAND, trace fine Gravel, trace Silt	
15						Boulder?		50
20							END OF BORING 20ft	45
25								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: 20ft Rock: 0ft	NOTES: High rail rig with cathead driven donut hammer used. Lost drill water after roller bit advance through boulder to 9', and again on boulder at 15'. Roller bit advanced into rock / possible bridge structure from 15-20'. Borehole abandoned at 20'; tremmy backfilled with cement grout, with 2' of railroad ballast replaced at ground surface. Boring relocated 10' W and redrilled (AAB-02-22A)	Sheet 1 of 1
No. of Soil Samples: 4 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:		Town: Newington/Hartford/ West Hartford	Hole No.: AAB-02-22A
Engineer:	Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:
Start Date:	8-29-08	Route No.:	Northing: 827345.75
Finish Date:	9-9-08	Bridge No.:	Easting: 1007155.94
Project Description:	AMTRAK Access Road		Surface Elevation: 64.6
Casing Size/Type:	HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 300 lb.	Fall: Spin/Push	Hammer Wt.: 140 lb. Fall: 30"	
Groundwater Observations:	@None observed		

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0						Fill	See AAB-02-22 for descriptions from 0-20 feet.	
5								60
10						Sand & Silt		55
15	S-1	2 3 6 5	24	6			Loose, brown fine SAND, some Silt	50
20	S-2	2 3 5 7	24	5			Loose, brown to dark brown varved fine SAND and SILT	45
25	S-3	3 3 3 4	24	12		Clay & Silt (varved)	Loose, brown Top 2": SAND and SILT, Middle 8": SILT, bottom 2": Clayey Silt	40
30	S-4	2 3 5 7	24	20			Medium/ loose Top 4": gray, Clayey SILT, some medium to coarse Sand, Bottom 16": loose, brown SILT, some fine Sand	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: 90ft Rock: 0ft	NOTES: Highrail rig with cathead driven donut hammer. Pilot hole to 15 feet, 4 inch casing then boring advanced open hole with use of revert drillers mud to maintain open hole. S-7 extended 4" casing to 30' due to water loss. After casing advanced to 40' S-9 due to continued loss of drill water. Boring abandoned at 90 feet due to drilling complications.	Sheet 1 of 3
No. of Soil Samples: 14 No. of Core Runs: 1		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:		Town: Newington/Hartford/ West Hartford	Hole No.: AAB-02-22A
Engineer:	Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:
Start Date:	8-29-08	Route No.:	Northing: 827345.75
Finish Date:	9-9-08	Bridge No.:	Easting: 1007155.94
Project Description:	AMTRAK Access Road		Surface Elevation: 64.6
Casing Size/Type:	HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 300 lb.	Fall: Spin/Push	Hammer Wt.: 140 lb. Fall: 30"	
Groundwater Observations:	@None observed		

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
35	S-5	4 4 4 5	24	24		Clay & Silt (varved) *(con't)*	Medium, brown gray SILT and CLAY, trace coarse Sand	
40	S-6	2 2 1 2	24	24			Soft, brown gray Clayey SILT	25
	UP-1	P U S H	24	24				20
45	S-7	5 13 12 18	24	24			Very stiff, brown Clayey SILT, varved, (layers to "thick)	
50	S-8	9 4 5 7	24	24			Stiff, loose Bottom 12": Brown Clayey SILT, Top 12" gray fine to coarse SAND, some Silt	15
55	S-9	4 1 4 5	24	24			Medium, brown clayey SILT, varved with medium coarse SAND, some Silt	10
60	S-10	5 4 5 5	24	12			Stiff, red brown clayey SILT, (layers to 2" thick) varved with Silty Clay (layers to 3/4" thick)	5
65	S-11	6 4 4 2	24	14			Stiff, red brown SILT and CLAY (one piece coarse gravel near sample bottom)	0
70								-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: 90ft Rock: 0ft	NOTES: Highrail rig with cathead driven donut hammer. Pilot hole to 15 feet, 4 inch casing then boring advanced open hole with use of revert drillers mud to maintain open hole. S-7 extended 4" casing to 30' due to water loss. After casing advanced to 40' S-9 due to continued loss of drill water. Boring abandoned at 90 feet due to drilling complications.	Sheet 2 of 3
No. of Soil Samples: 14 No. of Core Runs: 1		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:		Town: Newington/Hartford/ West Hartford	Hole No.: AAB-02-22A
Engineer:	Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:
Start Date:	8-29-08	Route No.:	Northing: 827345.75
Finish Date:	9-9-08	Bridge No.:	Easting: 1007155.94
Project Description:	AMTRAK Access Road		Surface Elevation: 64.6
Casing Size/Type:	HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 300 lb.	Fall: Spin/Push	Hammer Wt.: 140 lb. Fall: 30"	
Groundwater Observations:	@None observed		

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
70	S-12	19 20 50 50	21	21		Glacial Till	Hard, very dense Top 6": Red brown SILT and CLAY, Bottom 15": red brown fine to medium SAND, some Silt, trace fine Gravel	
75								-10
	S-13	10 26 8 2	18	12			Dense, red brown fine to coarse SAND, some Silt, little fine to coarse fractured Gravel	
80	S-14	28 100 5 2	18	6			Very dense, brown fine to coarse SAND, little Silt, trace fine Gravel	-15
85	C-1		60	24	0	Decomposed Bedrock	Cemented, red brown fine to coarse SAND, some Silt, little fine to coarse Gravel, Siltstone-cobble fragments embedded	-20
90							END OF BORING 90ft	-25
95								-30
100								-35
105								-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: 90ft Rock: 0ft	NOTES: Highrail rig with cathead driven donut hammer. Pilot hole to 15 feet, 4 inch casing then boring advanced open hole with use of revert drillers mud to maintain open hole. S-7 extended 4" casing to 30' due to water loss. After casing advanced to 40' S-9 due to continued loss of drill water. Boring abandoned at 90 feet due to drilling complications.	Sheet 3 of 3
No. of Soil Samples: 14 No. of Core Runs: 1		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:	BWE	Town:	Newington/Hartford/ West Hartford	Hole No.:	AARW-05-18
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	
Start Date:	8-21-08	Route No.:		Northing:	827180.06
Finish Date:	8-22-08	Bridge No.:		Easting:	1007099.52
				Surface Elevation:	52.6

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 140 lb. Fall: 30"	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations: @2' wet sample; 2.5' after 0.2 hours

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	3 4 5 4	24	4		Topsoil Silty Sand	Loose, dark brown fine GRAVEL, some fine to medium Sand, little Silt	
	S-2	5 9 13 23	24	8			Medium dense, red brown fine SAND, trace Silt, (wet)	50
5	S-3	1 2 1 2	24	10			Very loose, black fine to medium SAND, trace Silt, (oil odor)	45
10	S-4	1 2 2 4	24	20			Loose, black firm SAND and SILT, (petroleum odor)	40
						Silty Clay		
15	S-5	11 14 15 13	24	24			Very stiff, light brown Silty CLAY	35
20	S-6	2 3 3 3	24	24		Silt & Clay (varved)	Medium, red brown Silty CLAY (layers to 1" thick), varved with gray brown CLAY and SILT (layers to 1" thick)	30
25	S-7	3 5 9 7	24	18			Stiff, red brown Silty CLAY (layers to 1" thick), varved with gray brown CLAY and SILT (layers to 1" thick)	25
30	S-8	2 3 4 18	24	24			Medium, red brown Silty CLAY (layers to 3/4" thick), varved with gray brown CLAY and SILT (layers to 1/4" thick)	20
35							END OF BORING 32ft	

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: 32ft Rock: 0ft	NOTES: Acker steel track rig with cathead driven donut hammer used. Pilot hole to 4 feet, 4 inch casing to 5 feet, open hole to 32 feet with REVERT II/drillers mud to maintain open hole.	Sheet 1 of 1
No. of Soil Samples: 5 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector: BWE	Town: Newington/Hartford/ West Hartford	Hole No.: AARW-05-19	
Engineer: Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:	
Start Date: 8-21-08	Route No.:	Northing: 827227.81	
Finish Date: 8-21-08	Bridge No.:	Easting: 1007126.83	
		Surface Elevation: 51.5	

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 140 lb. Fall: 30"	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations: @2' wet sample; 9.1' after 1 hr.; 8.2' in well after 22 days

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	1 2 2 3	24	10		Topsoil	Loose, dark brown fine to medium SAND, some Silt, trace fine Gravel, trace Roots	50
	S-2	5 3 4 5	24	12		Sand	Loose, Top 6": dark brown fine to medium SAND, some Silt Bottom 6": light brown SAND, some Silt, (wet)	
5	S-3	4 6 10 9	24	15			Medium dense, light brown SAND, trace Silt	45
10	S-4	3 6 8 10	24	13			Medium dense, light brown SAND, trace Silt	40
15	S-5	6 5 3 4	24	11		Silty Clay	Medium, brown Silty CLAY	35
20	S-6	0 1 1 1	24	24		Silt & Clay (varved)	Soft, gray brown CLAY and SILT (layers to 1/5" thick), varved with Silty CLAY (layers to 1" thick)	30
	UP-1	P U S H	24	18				
25	S-7	8 9 13 13	24	20			Very stiff, gray brown CLAY and SILT (layers to 1/5" thick), varved with Silty CLAY (layers to 1" thick)	25
30	S-8	20 23 14 10	24	18		Sand	Dense, red brown fine SAND, trace Silt	20
35							END OF BORING 32ft	

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: 32ft Rock: 0ft	NOTES: Tripod, cathead driven donut hammer used. Pilot hole to 4 feet with 4 inch casing to 7 feet. Open hole beyond with REVERT II/drillers mud to maintain open hole. See Table 1 (App 2) for additional G.W. readings.	Sheet 1 of 1
No. of Soil Samples: 7 No. of Core Runs: 0		SM-001-M REV. 1/02

Retaining Wall 106

Connecticut DOT Boring Report

Inspector:	PAK/RJM	Town:	Newington/Hartford/ West Hartford	Hole No.:	AARW-11-41
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	2.5' North
Start Date:	7-29-08	Route No.:		Northing:	838831.45
Finish Date:	7-29-08	Bridge No.:		Easting:	1014525.31
				Surface Elevation:	56.1

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: N/A Fall: N/A	Hammer Wt.: 140 Fall: 30"	

Groundwater Observations: @2.5' wet sample; 2' after 0.2 hours

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	1 2 4 7	24	5		Fill	Loose, black fine to medium SAND, little Ash/Cinders, trace Silt	55
	S-2	9 11 9 8	24	7		Varved Clay & Silt	Very stiff, gray brown CLAY and SILT (layers to 1/4" thick) varved with SILT and CLAY (layers to 1/8" thick) (wet)	
5	S-3	13 5 7 6	24	1			Very Stiff, (coarse GRAVEL in spoon tip)	50
10	S-4	0 1 1 2	24	24			Soft, gray brown Silty CLAY with occasional varves of Clayey SILT (layers to 1/4" thick) with occasional fine red brown SAND partings	45
15	S-5	1 1 2 2	24	20			Soft, gray brown Silty CLAY with occasional varves of Clayey SILT (layers to 1/4" thick) with occasional fine red brown SAND partings	40
20	S-6	0 2 2 2	24	22			Soft, gray brown Silty CLAY with occasional varves of Clayey SILT (layers to 1/4" thick) with occasional fine red brown SAND partings	35
25	S-7	2 1 2 1	24	21			Soft, gray to red brown Silty CLAY (layers to 4" thick) varved with gray Clayey SILT (layers to 1/2" thick)	30
30	S-8	0 0 1 2	24	24			Very soft, red brown Silty CLAY (layers to 3/4" thick) varved with gray brown SILT and CLAY (layers to 1/4" thick)	25
							END OF BORING 32ft	
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: 32ft Rock: 0ft	NOTES: Pilot hole with 4 inch casing to 10 feet, open hole to 32 feet with REVERT II/driller's mud to maintain open hole. Acker steel track rig with cathead driven donut hammer used.	Sheet 1 of 1
No. of Soil Samples: 5 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:	RJM	Town:	Newington/Hartford/ West Hartford	Hole No.:	AARW-11-42
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	5' North
Start Date:	7-29-08	Route No.:		Northing:	838892.76
Finish Date:	7-30-08	Bridge No.:		Easting:	1014600.85
				Surface Elevation:	54.6

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: N/A Fall: N/A	Hammer Wt.: 140 Fall: 30"	

Groundwater Observations: @5' wet sample; 2' after 0.2 hours

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	1 2 3 2	24	5		Fill	Loose, black to brown fine to medium SAND, some fine to coarse Gravel, little Ash, little Silt	
	S-2	3 4 5 6	24	0			Loose, no recovery	
5	S-3	2 1 1 1	24	17		Varved Clay & Silt	Soft, gray brown Silty CLAY (layers to 1/4" thick) varved with gray brown Clayey SILT (layers to 1/8" thick), (wet)	50
10	S-4	2 1 1 2	24	12			Very soft to soft, gray CLAY and SILT with occasional varves of gray brown Silty CLAY (layers to 1/4" thick), (wet)	45
15	S-5	2 1 2 2	24	14			Soft, gray CLAY and SILT with occasional varves of gray brown Silty CLAY (layers to 1/4" thick), (wet)	40
20	S-6	0 2 2 2	24	15			Soft to medium, gray CLAY and SILT, (wet)	35
25	S-7	0 0 1 2	24	18			Very soft, gray Silty CLAY (layers to 3/4" thick) varved with gray CLAY and SILT (layers to 1/2" thick), (wet)	30
30	S-8	1 1 2 2	24	20			Soft, gray Silty CLAY (layers to 3/4" thick) varved with gray CLAY and SILT (layers to 1/2" thick), (wet)	25
							END OF BORING 32ft	
35								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: 32ft Rock: 0ft	NOTES: Pilot hole to 10 feet, 4 inch casing to 10 feet, open hole to 32 feet with REVERT II/drillers mud to maintain open hole. Acker steel track rig with cathead driven donut hammer used.	Sheet 1 of 1
No. of Soil Samples: 6 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:	PAK/BWE	Town:	Newington/Hartford/ West Hartford	Hole No.:	AARW-11-43
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	7' North
Start Date:	7-31-08	Route No.:		Northing:	838962.95
Finish Date:	8-1-08	Bridge No.:		Easting:	1014704.7
				Surface Elevation:	55.3

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: N/A Fall: N/A	Hammer Wt.: 140 Fall: 30"	

Groundwater Observations: @5' wet sample; 2.9' in well after 16 hrs.; 2.8' in well after 39 days

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	5 6 10 8	24	10		Topsoil Fill	Medium dense, Top 5": brown TOPSOIL (moist) Bottom 5": black fine to medium SAND and SILT (moist)	55
	S-2	9 7 11 15	24	17		Varved Clay & Silt	Medium dense/ Stiff, Top 11": black fine to medium SAND and SILT, (moist)	
5	S-3	6 3 2 3	24	1		Silt & Sand	Bottom 6": gray brown Clayey SILT (layers to 1/8" thick) varved with CLAY and SILT (layers to 1/8" thick)	50
	S-4	1 1 2 9	24	24			Loose, black coarse GRAVEL, little fine to medium Sand, trace Silt (wet)	
10	S-5	WOH 0 0 2	24	24		Varved Clay & Silt	Loose, gray SILT, fine to medium Sand, (layers to 3" thick)	45
	UP-1	P U S H	24	24			Very soft, gray brown Silty CLAY (layers to 1/2" thick) varved with CLAY and SILT (layers to 1/2" thick), occasional red brown fine SAND partings	
15	S-6	1 2 3 4	24	12			Medium, gray brown Silty CLAY (layers to 1/2" thick) varved with red brown CLAY and SILT (layers to 1/2" thick), occasional red brown fine SAND partings	40
20	S-7	WOR 0 2 2	24	24			Soft, gray brown Silty CLAY (layers to 1/2" thick) varved with red brown CLAY and SILT (layers to 1/2" thick), occasional red brown fine SAND partings	35
	UP-2	P U S H	24	24				
25	S-8	WOH 0 3 3	24	12			Soft, gray brown Silty CLAY (layers to 1/2" thick) varved with red brown CLAY and SILT (layers to 1/2" thick), occasional red brown fine SAND partings	30
30	S-9	1 2 2 2	24	6			Soft, gray brown Silty CLAY (layers to 1/2" thick) varved with red brown CLAY and SILT (layers to 1/2" thick), occasional red brown fine SAND partings	25
							END OF BORING 32ft	
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: 32ft Rock: 0ft	NOTES: Pilot hole to 4 feet, 4 inch casing to 5 feet, open hole to 32 feet with REVERT II/drillers mud used to maintain open hole. Acker steel track rig with cathead driven donut hammer used. Two inch ID PVC monitor well installed upon completion of boring with tip of 10 foot slotted screen set at 28 feet, filler Sand to 5 feet, with locking protective stand pipe and concrete collar installed. Installed on 8/4/08. See Table 1 (App 2) for additional G.W. readings.	Sheet 1 of 1
No. of Soil Samples: 8 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:	RJM/BWE	Town:	Newington/Hartford/ West Hartford	Hole No.:	AARW-11-44
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	5' North
Start Date:	8-4-08	Route No.:		Northing:	839039.47
Finish Date:	8-4-08	Bridge No.:		Easting:	1014834.01
				Surface Elevation:	52.5

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: N/A Fall: N/A	Hammer Wt.: 140 Fall: 30"	

Groundwater Observations: @3' after 1 hour

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	2 3 4 4	24	12		Fill	Loose, black fine to coarse SAND, trace Silt/ Ash, some fine Gravel	
	S-2	3 4 5 5	24	0			Medium dense, no recovery	50
5	S-3	6 7 10 10	24	12		Varved Clay & Silt	Very stiff, brown CLAY and SILT (wet)	
								45
10	S-4	2 1 1 2	24	24			Soft, gray brown varved CLAY and SILT	
								40
15	S-5	2 1 2 3	24	6			Soft, gray brown varved CLAY and SILT	
								35
20	S-6	0 2 2 2	24	24			Soft to medium, gray brown varved CLAY and SILT	
								30
25	S-7	1 1 2 3	24	24			Soft, gray brown varved CLAY and SILT	
								25
30	S-8	3 2 2 3	24	24			Soft, gray brown varved CLAY and SILT	
							END OF BORING 32ft	20
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: 32ft Rock: 0ft	NOTES: Pilot hole to 9 feet, 4 inch casing to 9 feet, open hole to 32 feet with REVERT II/drillers mud to maintain open hole. Acker steel track rig with cathead driven donut hammer used.	Sheet 1 of 1
No. of Soil Samples: 7 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:	RJM	Town:	Newington/Hartford/ West Hartford	Hole No.:	AARW-11-45
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	5' North
Start Date:	8-5-08	Route No.:		Northing:	839084.2
Finish Date:	8-5-08	Bridge No.:		Easting:	1014912.51
				Surface Elevation:	52.3

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: N/A Fall: N/A	Hammer Wt.: 140 Fall: 30"	

Groundwater Observations: @5' wet sample; 2.5' after 0.3 hours

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	2 2 3 2	24	7		Fill	Loose, black fine to medium SAND, fine to coarse Gravel, little Ash, trace Organics	
	S-2	6 7 10 11	24	24		Varved Clay & Silt	Very stiff, gray brown SILT and CLAY	50
5	S-3	7 8 11 11	24	24			Very stiff, gray Silty CLAY (layers to 1/8" thick) varved with gray brown SILT and CLAY (layers to 1/8" thick), (wet)	45
10	S-4	3 3 3 4	24	12			Medium, gray brown varved CLAY and SILT	40
15	S-5	0 0 1 2	24	24			Very soft, red brown Silty CLAY (layers to 3/8" thick) varved with gray brown Clayey SILT (layers to 1/4" thick)	35
20	S-6	0 0 1 2	24	24			Very soft, red brown Silty CLAY (layers to 3/8" thick) varved with gray brown Clayey SILT (layers to 1/4" thick)	30
25	S-7	2 2 2 2	24	24			Soft, red brown to gray brown varved CLAY and SILT	25
30	S-8	0 0 2 3	24	24			Soft, red brown Silty CLAY (layers to 2" thick) varved with gray brown Clayey SILT (layers to 1/2" thick)	20
35							END OF BORING 32ft	

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: 32ft Rock: 0ft	NOTES: Pilot hole to 5 feet, 4 inch casing to 5 feet, open hole to 32 feet with REVERT II/drillers mud to maintain open hole. Acker steel track rig with cathead driven donut hammer used.	Sheet 1 of 1
No. of Soil Samples: 8 No. of Core Runs: 0		SM-001-M REV. 1/02

Retaining Wall 108

Connecticut DOT Boring Report

Inspector:	BWE	Town:	Newington/Hartford/ West Hartford	Hole No.:	AARW-06-25
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	5' East
Start Date:	7-30-08	Route No.:		Northing:	827451.06
Finish Date:	7-30-08	Bridge No.:		Easting:	1007249.94
				Surface Elevation:	58.5

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: N/A Fall: N/A	Hammer Wt.: 140 Fall: 30"	

Groundwater Observations: @6' wet sample; 19' after 0.2 hours

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	2 1 1 1	24	3		Topsoil / Fill	Very loose, dark brown coarse GRAVEL and fine SAND, trace Silt	
	S-2	1 1 2 1	24	7			very loose, dark brown fine SAND, some coarse Gravel, some Silt	55
5	S-3	4 2 3 2	24	3			Loose, black fine to medium SAND, some fine Gravel, trace Silt, (wet)	
	S-4	3 2 3 5	24	12			Loose, black fine to coarse SAND, some fine to coarse Gravel, trace Silt, (wet)	
	S-5	6 6 6 6	24	4			Medium dense, black fine to coarse GRAVEL and fine to coarse SAND, trace Silt, (wet)	50
10	S-6	3 2 3 3	24	12		Sandy Silt	Loose, Top 6": brown fine to coarse GRAVEL, some fine to coarse Sand, some Silt, (wet) Bottom 6": light brown SILT, trace fine Sand, (wet)	
						Silty Sand		45
15	S-7	8 8 4 3	24	12			Medium dense, brown fine SAND, some Silt, (wet)	
								40
20	S-8	11 12 11 5	24	12			Medium dense, light brown fine SAND, some Silt, (wet)	
								35
25	S-9	2 3 7 7	24	12			Medium dense, red brown fine to coarse SAND, some Silt, (wet)	
						Varved Clay & Silt		30
30	S-10	1 1 2 1	24	24			Soft, gray brown CLAY and SILT (layers to 1-1/4" thick) varved with Silty CLAY (layers to 1/4" thick), (wet)	
							END OF BORING 32ft	25
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: 32ft Rock: 0ft	NOTES: Acker steel track rig with cathead driven donut hammer used. Pilot hole to 10 feet, 4 inch casing to 10 feet, open hole to 32 feet using REVERT II/driller's mud to maintain open hole.	Sheet 1 of 1
No. of Soil Samples: 8 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:	BWE/BRB	Town:	Newington/Hartford/ West Hartford	Hole No.:	AARW-06-26
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	None
Start Date:	7-22-08	Route No.:		Northing:	827471.28
Finish Date:	7-31-08	Bridge No.:		Easting:	1007262.01
				Surface Elevation:	60.7

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: NX
Hammer Wt.: 300 lb. Fall: 24"	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations: @6' wet sample; 22' after 0.2 hours; 22.8' in the well after 43 days

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	5 4 3 6	24	3		Topsoil	Loose, black to brown fine to coarse GRAVEL, some fine to coarse Sand, trace Organics	60
	S-2	10 6 4 4	24	5		FILL	Loose, brown to black fine to coarse GRAVEL, little fine to coarse Sand, trace Silt	
5	S-3	7 6 11 7	24	5			Medium dense, brown to black fine to coarse SAND and fine to coarse GRAVEL, trace Silt	55
	S-4	5 4 3 3	24	3			Loose, black fine to coarse SAND, little fine to coarse Gravel, trace Silt, (wet)	
	S-5	2 3 3 6	24	5			Loose, black to brown fine to coarse SAND, little fine to coarse Gravel, trace Silt	
10	S-6	3 4 6 3	24	0		Sandy Silt	Medium dense, no recovery	50
	S-7	4 4 8 10	24	24			Medium dense, light brown SILT, little fine Sand	
15	S-8	15 10 10 15	24	24			Medium dense, red brown SILT and fine SAND	45
20	S-9	4 4 6 5	24	24			Medium dense, red brown SILT and fine SAND	40
						Silty Sand		
25	S-10	2 5 5 4	24	20			Medium dense, red brown, fine SAND and SILT	35
30	S-11	4 4 5 9	24	14			Loose red brown, fine SAND and SILT	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: 90ft Rock: 10ft	NOTES: Acker steel track rig with cathead driven donut hammer used. Pilot hole to 10 feet, 4 inch casing to 10 feet, open hole to 85 feet with drillers mud/REVERT II used to maintain open hole. Casing driven to bedrock before coring C-1 See Table 1 (App 2) for additional G.W. readings.	Sheet 1 of 3
No. of Soil Samples: 17 No. of Core Runs: 1		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:	BWE/BRB	Town:	Newington/Hartford/ West Hartford	Hole No.:	AARW-06-26
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	None
Start Date:	7-22-08	Route No.:		Northing:	827471.28
Finish Date:	7-31-08	Bridge No.:		Easting:	1007262.01
				Surface Elevation:	60.7

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: NX
Hammer Wt.: 300 lb. Fall: 24"	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations: @6' wet sample; 22' after 0.2 hours; 22.8' in the well after 43 days

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
35	S-12	2 1 2 3	24	24		Varved Clay & Silt *(con't)*	Soft, gray brown CLAY and SILT (layers to 1-1/2" thick) varved with red brown Silty CLAY (layers to 1-1/2" thick)	25
	UP-1	P U S H	24	24				
40	S-13	3 6 10 12	24	24			Very stiff, gray brown CLAY and SILT (layers to 1" thick) varved with red brown Silty CLAY (layers to 1-1/4" thick), occasional fine red SAND partings	20
45	S-14	5 13 7 6	24	24			Medium dense/ Stiff Top 10": Red brown SILT, some fine Sand, (wet) Bottom 14": Red brown Silty CLAY (layers to 1" thick) varved with gray brown SILT and CLAY (layers to 1" thick)	15
50	S-15	WOH 0 0 2	24	24			Very soft, red brown Silty CLAY (layers to 1-1/4" thick) varved with SILT and CLAY (layers to 1" thick)	10
	UP-2	P U S H	24	24				
55	S-16	5 4 5 4	24	18			Stiff, red brown SILT and CLAY (layers to 1-1/2" thick) varved with Silty CLAY (layers to 1" thick)	5
60	S-17	4 3 3 4	24	24			Medium, red brown SILT and CLAY (layers to 1" thick) varved with Silty CLAY (layers to 1" thick)	0
65	S-18	7 7 9 10	24	20			Very stiff, red brown SILT and CLAY (layers to 4" thick) varved with Silty CLAY (layers to 1/4" thick)	-5
70								

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: 90ft Rock: 10ft	NOTES: Acker steel track rig with cathead driven donut hammer used. Pilot hole to 10 feet, 4 inch casing to 10 feet, open hole to 85 feet with drillers mud/REVERT II used to maintain open hole. Casing driven to bedrock before coring C-1 See Table 1 (App 2) for additional G.W. readings.	Sheet 2 of 3
No. of Soil Samples: 17 No. of Core Runs: 1		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:	BWE/BRB	Town:	Newington/Hartford/ West Hartford	Hole No.:	AARW-06-26
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	None
Start Date:	7-22-08	Route No.:		Northing:	827471.28
Finish Date:	7-31-08	Bridge No.:		Easting:	1007262.01
				Surface Elevation:	60.7

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: NX
Hammer Wt.: 300 lb. Fall: 24"	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations: @6' wet sample; 22' after 0.2 hours; 22.8' in the well after 43 days

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
70	S-19	12 14 15 13	24	12		Silty Sand	Very stiff, Top 4": red brown SILT and CLAY, (wet) Bottom 16": red brown fine SAND, some Silt and Clay	-10
75	S-20	29 52 90 87	24	14			Very dense, red brown fine SAND, trace Silt	-15
80	S-21	29 39 43 44	24	16			Very dense, red brown fine to coarse SAND, trace Silt	-20
85	S-22	139 107 100/3"	15	12			Very dense, red brown fine to coarse SAND, little Silt	-25
90	S-23	22 100/3"	9	8		Bedrock	Very dense, fine to coarse SAND and SILT, trace Gravel	-30
95								-35
100	C-1		120	120	77.5		Good Quality, Moderately Hard, Slightly Weathered, red brown, fine grained close to wide jointing, SHALE, fracturing 30º (Core times not recorded)	-40
105							END OF BORING 105ft	

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: 90ft Rock: 10ft	NOTES: Acker steel track rig with cathead driven donut hammer used. Pilot hole to 10 feet, 4 inch casing to 10 feet, open hole to 85 feet with drillers mud/REVERT II used to maintain open hole. Casing driven to bedrock before coring C-1 See Table 1 (App 2) for additional G.W. readings.	Sheet 3 of 3
No. of Soil Samples: 17 No. of Core Runs: 1		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:		Town: Newington/Hartford/ West Hartford	Hole No.: AAB-02-23
Engineer:	Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:
Start Date:	9-10-08	Route No.:	Northing: 827454.94
Finish Date:	9-10-08	Bridge No.:	Easting: 1007220.93
Project Description:	AMTRAK Access Road		Surface Elevation: 64.2
Casing Size/Type:	HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 300 lb.	Fall: Spin	Hammer Wt.: 140 lb.	Fall: 30"
Groundwater Observations:	@None observed		

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0						Base Course Gravel		
	S-1	18 17 21 23	24	12			Dense, black fine to coarse GRAVEL, trace Silt and Cinders	
	S-2	24 23 40 44	24	12		Fill	Very dense, brown fine to medium SAND, trace coarse Sand, trace Silt	60
5								
							END OF BORING 6ft	55
10								
								50
15								
								45
20								
								40
25								
								35
30								
								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: 6ft Rock: 0ft	NOTES: High rail rig with cathead driven donut hammer used. Pilot hole to 4 feet with 4 inch casing, advanced open hole with REVERT II/drillers mud to maintain open hole.	Sheet 1 of 1
No. of Soil Samples: 2 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:		Town: Newington/Hartford/ West Hartford	Hole No.: AAB-02-23A
Engineer:	Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:
Start Date:	9-10-08	Route No.:	Northing: 827454.94
Finish Date:	9-10-08	Bridge No.:	Easting: 1007220.93
Project Description:	AMTRAK Access Road		Surface Elevation: 64.2
Casing Size/Type:	HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 140 lb. Fall: 4"		Hammer Wt.: 140 lb. Fall: 24"	
Groundwater Observations:	@None observed		

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0						Fill		
5	S-1	49 20 30 31	24	5			Very dense, light brown fine SAND, little medium Sand, trace Silt	60
							END OF BORING 8ft	55
10								
15								50
20								45
25								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: 8ft Rock: 0ft	NOTES: High rail rig with cathead driven donut hammer used. Boring performed 5 feet west of AAB-02-23 for 0 to 5 ft; see AAB-02-23B	Sheet 1 of 1
No. of Soil Samples: 1 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:		Town: Newington/Hartford/ West Hartford	Hole No.: AAB-02-23B
Engineer:	Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:
Start Date:	9-11-08	Route No.:	Northing: 827454.94
Finish Date:	9-14-08	Bridge No.:	Easting: 1007220.93
			Surface Elevation: 64.6

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 300 lb. Fall: 24"	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations:

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0						Fill		
5								60
	S-1	10 7 8 9	24	1			Medium dense, brown fine to coarse SAND, trace Silt	
	S-2	13 13 14 14	24	15		Silty Sand	Medium dense, brown fine to coarse SAND, trace fine to coarse Gravel, trace Silt	
10								55
	S-3	8 6 16 14	24	14			Medium dense, brown fine SAND, some silt	
	S-4	8 6 16 14	24	12			Medium dense, brown fine SAND, some silt	
15								50
	S-5	2 8 9 10	24	20			Medium dense, brown fine SAND, some silt occasional gray brown CLAY and SILT, partings to 1/8"	
20								45
	S-6	4 4 5 7	24	12			Loose, brown fine SAND, some Silt	
25								40
	S-7	6 7 10 8	24	12			Medium dense, brown fine SAND, some Silt	
30								35
	S-8	5 4 7 6	24	22			Medium dense, red brown fine SAND, some Silt	
						Clay & Silt (Varved)		
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: 109.5ft Rock: ft	NOTES: Highrail truck rig with cathead driven donut hammer used. Boring performed 15 feet east of AAB-02-23A which was performed 5 feet west of AAB-02-23 following shallow refusals at initial locations Four inch casing advanced to 15 feet, boring then advanced open hole with REVERT II/drillers mud to maintain open hole.	Sheet 1 of 4
No. of Soil Samples: 17 No. of Core Runs: 4		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:		Town: Newington/Hartford/ West Hartford	Hole No.: AAB-02-23B
Engineer:	Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:
Start Date:	9-11-08	Route No.:	Northing: 827454.94
Finish Date:	9-14-08	Bridge No.:	Easting: 1007220.93
Project Description:	AMTRAK Access Road		Surface Elevation: 64.6
Casing Size/Type:	HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.:	300 lb. Fall: 24"	Hammer Wt.: 140 lb. Fall: 30"	
Groundwater Observations:			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
35	S-9	6 6 6 7	24	15		Clay & Silt (Varved) *(con't)*	Stiff, red brown Silty CLAY (layers to 3/4" thick) varved with gray clayey Silt, (layers to 1/4" thick)	
40	S-10	10 0 2 3	24	24			Soft, red brown Silty CLAY (layers to 3/4" thick) varved with gray clayey Silt, (layers to 1/4" thick)	25
	UP-1	P U S H	24	24			Stiff	
45	S-11	2 1 11 15	24	24			Top16': red brown Silty CLAY (layers to 1" thick) varved with gray brown SILT and CLAY (layers to 3/4" thick) Bottom 8" of sample red brown clayey Silt, trace fine Sand	20
50	S-12	1 3 15 9	24	24			Very stiff, medium dense Top 21": red brown Silty CLAY (layers to 3/4" thick) varved with red brown clayey SILT (layers to 3/4" thick) Bottom 3" of sample red brown SILT trace fine Sand.	15
55	S-13	0 0 0 0	24	24			Very soft, red brown Silty CLAY (layers to 2" thick), varved with red brown SILT and CLAY (layers to 1" thick)	10
	UP-2	P U S H	24	24				
60	S-14	4 4 4 5	24	24			Very soft, red brown Silty CLAY (layers to 2" thick), varved with red brown SILT and CLAY (layers to 1" thick)	5
65	S-15	5 4 3 5	24	20			Medium, red brown Clayey SILT, varved with Silty CLAY (layers to 2" thick) with occasional red fine Sand partings	0
70								-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: 109.5ft Rock: ft	NOTES: Highrail truck rig with cathead driven donut hammer used. Boring performed 15 feet east of AAB-02-23A which was performed 5 feet west of AAB-02-23 following shallow refusals at initial locations Four inch casing advanced to 15 feet, boring then advanced open hole with REVERT II/drillers mud to maintain open hole.	Sheet 2 of 4
No. of Soil Samples: 17 No. of Core Runs: 4		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:		Town: Newington/Hartford/ West Hartford	Hole No.: AAB-02-23B
Engineer:	Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:
Start Date:	9-11-08	Route No.:	Northing: 827454.94
Finish Date:	9-14-08	Bridge No.:	Easting: 1007220.93
Project Description:	AMTRAK Access Road		Surface Elevation: 64.6
Casing Size/Type:	HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.:	300 lb. Fall: 24"	Hammer Wt.: 140 lb. Fall: 30"	
Groundwater Observations:			

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
70	S-16	6 5 6 6	24	12		Clay	Stiff, red brown Silty CLAY, little coarse Sand, fine Gravel	
						Boulder		
						Silt	Very stiff Top 10": Brown clayey SILT, varved with CLAY with occasional fine Sand partings Bottom 10": Hard Clayey SILT, little coarse Sand, fine Gravel	-10
75	S-17	7 8 12 23	24	20				
						Silt w/ Gravel		
							Hard/ Very Dense Top 8": Clayey SILT, trace coarse Sand, trace fine to coarse Gravel Bottom 8": Brown SILT, some fine to coarse Sand, little to fine Gravel	-15
80	S-18	27 38 100/4"	16	16				
						Glacial Till		
						Decomposed Bedrock		
85								-20
								-25
90	C-1		42	23	0		Very poor quality, soft, extremely weathered red brown SHALE	
	S-19	45 100/5"	11	10			Very dense, red brown fine to coarse SAND & SILT, little fine gravel, completely decomposed SHALE	
95								-30
						Bedrock		
	C-2		36	18	14		Very poor quality, soft to medium hard, slightly weathered red brown SHALE (Core times not recorded)	
100								-35
	C-3		60	60	33		Poor quality, medium hard, slightly weathered red brown SHALE (Core times not recorded)	
105								-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: 109.5ft Rock: ft	NOTES: Highrail truck rig with cathead driven donut hammer used. Boring performed 15 feet east of AAB-02-23A which was performed 5 feet west of AAB-02-23 following shallow refusals at initial locations Four inch casing advanced to 15 feet, boring then advanced open hole with REVERT II/drillers mud to maintain open hole.	Sheet 3 of 4
No. of Soil Samples: 17 No. of Core Runs: 4		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:		Town: Newington/Hartford/ West Hartford	Hole No.: AAB-02-23B
Engineer:	Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:
Start Date:	9-11-08	Route No.:	Northing: 827454.94
Finish Date:	9-14-08	Bridge No.:	Easting: 1007220.93
Project Description:	AMTRAK Access Road		Surface Elevation: 64.6
Casing Size/Type:	HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.:	300 lb. Fall: 24"	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations:

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
105	C-4		60	54	25	Bedrock *(con't)*	Very poor quality, soft, extremely weather red brown SHALE with very poor quality (extremely weathered zone from approximately 106 to 107')	
110							END OF BORING 109.5ft	-45
115								-50
120								-55
125								-60
130								-65
135								-70
140								-75

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: 109.5ft Rock: ft	NOTES: Highrail truck rig with cathead driven donut hammer used. Boring performed 15 feet east of AAB-02-23A which was performed 5 feet west of AAB-02-23 following shallow refusals at initial locations Four inch casing advanced to 15 feet, boring then advanced open hole with REVERT II/drillers mud to maintain open hole.	Sheet 4 of 4
No. of Soil Samples: 17 No. of Core Runs: 4		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:	BWE	Town:	Newington/Hartford/ West Hartford	Hole No.:	AAB-02-24
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	5' East
Start Date:	7-29-08	Route No.:		Northing:	827457.4
Finish Date:	7-29-08	Bridge No.:		Easting:	1007239.88
				Surface Elevation:	62

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 300 lb. Fall: N/A	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations: @8' wet sample; 10'

Depth (ft)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	3 3 2 4	24	3		Topsoil / FILL	Loose, dark brown to black fine to coarse GRAVEL, some fine to coarse Sand, trace Silt, trace Organics	60
	S-2	5 2 4 2	24	3			Loose, dark brown to black fine to coarse GRAVEL, some fine to coarse Sand, trace Silt, trace Organics	
5	S-3	4 4 4 3	24	0			Loose, no recovery	
	S-4	4 3 3 4	24	12			Loose, black fine to coarse SAND, little fine to coarse Gravel, trace Silt	55
	S-5	5 4 5 8	24	1			Loose, black coarse GRAVEL, some fine to coarse Sand, trace Silt	
10	S-6	1 2 3 2	24	5		Sandy Silt	Loose, light brown fine SAND and SILT	50
15	S-7	2 2 2 3	24	12			Loose, light brown fine to medium SAND	45
20	S-8	4 5 7 8	24	18			Medium dense, light brown fine SAND, some Silt	40
25	S-9	12 8 18 10	24	12			Medium dense, red brown SILT, some Sand	35
30	S-10	18 14 13 6	24	8			Medium dense, red brown SILT and fine to coarse SAND	30
35						Varved Clay & 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: 42ft Rock: 0ft	NOTES: Track rig with cathead driven hammer used. Pilot hole to 10 feet, then casing advanced. Open hole sustained using drillers mud.	Sheet 1 of 2
No. of Soil Samples: 5 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector:	BWE	Town:	Newington/Hartford/ West Hartford	Hole No.:	AAB-02-24
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	5' East
Start Date:	7-29-08	Route No.:		Northing:	827457.4
Finish Date:	7-29-08	Bridge No.:		Easting:	1007239.88
				Surface Elevation:	62

Project Description: AMTRAK Access Road

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 300 lb. Fall: N/A	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations: @8' wet sample; 10'

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
35	S-11	1 2 2 1	24	24		Varved Clay & Silt *(con't)*	Soft, gray brown Clayey SILT (layers to 1" thick) varved with SILT & CLAY (layers to 3/4" thick)	25
40	S-12	1 2 1 2	24	24			Soft, gray brown Clayey SILT (layers to 1" thick) varved with SILT & CLAY (layers to 1/2" thick)	20
							END OF BORING 42ft	
45								15
50								10
55								5
60								0
65								-5
70								

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: 42ft Rock: 0ft	NOTES: Track rig with cathead driven hammer used. Pilot hole to 10 feet, then casing advanced. Open hole sustained using drillers mud.	Sheet 2 of 2
No. of Soil Samples: 5 No. of Core Runs: 0		SM-001-M REV. 1/02

Retaining Wall 109

Connecticut DOT Boring Report

Inspector:	BWE	Town:	Newington/Hartford/ West Hartford	Hole No.:	AARW-08-29
Engineer:	Geo**Design**, Inc.	Project No.:	0183-010.0 / 171-305	Stat./Offset:	4' South
Start Date:	7-18-00	Route No.:		Northing:	835613.0
Finish Date:	7-18-08	Bridge No.:		Easting:	1012097.49
				Surface Elevation:	64.8

Project Description: AMTRAK Access Road -

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 300 lb. Fall: 24"	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations: @5' wet sample; 3.8' after 0.2 hrs.; 5.0' in well after 24 hrs. 4.9' in well after 52 days

Depth (ft)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0								
	S-1	7 8 9	24	12		Sand & Silt	Medium dense, red brown fine to coarse SAND, little Silt	
	S-2	5 6 6 6	24	12			Medium dense, red brown fine to coarse SAND, little Silt	
5	S-3	4 5 5 6	24	18			Medium dense, gray brown SILT, little fine Sand, trace fine Gravel (wet)	60
						Clay & Silt (varved)		
10	S-4	2 2 3 3	24	20			Medium, gray SILT and CLAY (layers to 1/4" thick) varved with Silty CLAY (layers to 1/4" thick)	55
15	S-5	1 1 2 1	24	24			Soft, gray SILT and CLAY (layers to 1/4" thick) varved with Silty CLAY (layers to 1/4" thick) with occasional red fine SAND partings	50
20	S-6	1 0 1 1	24	24			Very soft, gray SILT and CLAY (layers to 1/4" thick) varved with Silty CLAY (layers to 1/4" thick) with occasional red fine SAND partings	45
25	S-7	1 0 1 1	24	24			Very soft, gray SILT and CLAY (layers to 1/4" thick) varved with Silty CLAY (layers to 1/4" thick), (wet)	40
30	S-8	1 0 1 0	24	24			Very soft, gray SILT and CLAY (layers to 1/4" thick) varved with Silty CLAY (layers to 1/4" thick) with occasional red fine SAND partings, (wet)	35
							END OF BORING 32ft	
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: 32ft Rock: 0ft	NOTES: Cable driven safety hammer used. Pilot hole to 5 feet. 4 inch casing advanced to 4 feet, open hole to 32 feet with REVERT/drillers mud to maintain open hole. Two inch ID PVC monitoring well installed with tip of 10' slotted screen set at 28 ft., filter sand to 5 ft., bentonite seal. Bolted flush mount curb box. See Table 1, Appendix 2 for groundwater readings.	Sheet 1 of 1
No. of Soil Samples: 8 No. of Core Runs: 0		SM-001-M REV. 1/02

Connecticut DOT Boring Report

Inspector: BRB/BWE	Town: Newington/Hartford/ West Hartford	Hole No.: AARW-08-30	
Engineer: Geo**Design**, Inc.	Project No.: 0183-010.0 / 171-305	Stat./Offset:	
Start Date: 7-17-08	Route No.:	Northing: 835674.7	
Finish Date:	Bridge No.:	Easting: 1012137.32	
		Surface Elevation: 64	

Project Description: AMTRAK Access Road -

Casing Size/Type: HW 4" ID	Sampler Type/Size: SS/ 1-3/8" ID	Core Barrel Type: N/A
Hammer Wt.: 300 lb. Fall: 24"	Hammer Wt.: 140 lb. Fall: 30"	

Groundwater Observations: @7' wet sample; 6.5' after 0.2 hours

Depth (ft)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec. (in.)	RQD %	Generalized Strata Description	Material Description and Notes	Elevation (ft)
0	S-1	3 6 6 7	24	14		Fill	Medium dense, brown fine to coarse SAND, little fine to coarse Gravel, trace Silt	
	S-2	3 3 5 5	24	24		Silty Sand	Loose, light brown fine SAND, some Silt	60
5	S-3	6 7 7 8	24	14			Medium dense, light brown fine SAND, some Silt, (wet)	55
10	S-4	4 5 6 6	24	18		Clay & Silt (varved)	Stiff, gray brown Silty CLAY (layers to 1/4" thick) varved with CLAY and SILT (layers to 1/8" thick)	50
15	S-5	2 2 3 3	24	22			Medium, gray brown Silty CLAY (layers to 1/4" thick) varved with CLAY and SILT (layers to 1/8" thick)	
	UP-1	P U S H	24	24				45
20	S-6	1 0 1 1	24	24			Very soft, gray brown Silty CLAY (layers to 1/4" thick) varved with CLAY and SILT (layers to 1/4" thick) with occasional red fine SAND partings	40
25	S-7	1 1 1 1	24	24			Very soft, gray brown Silty CLAY (layers to 1/4" thick) varved with CLAY and SILT (layers to 1/4" thick)	
	UP-2	P U S H	24	24				35
30	S-8	WOR 1 1 1	24	24			Very soft, gray brown Silty CLAY (layers to 1/4" thick) varved with CLAY and SILT (layers to 1/4" thick) with occasional red fine SAND partings	
							END OF BORING 32ft	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: 32ft Rock: 0ft	NOTES: Acker track rig with cathead safety hammer used. Pilot hole to 5 feet. 4 inch casing advanced to 5 feet, open hole to 32 feet with REVERT II/drillers mud to maintain open hole.	Sheet 1 of 1
No. of Soil Samples: 8 No. of Core Runs: 0		SM-001-M REV. 1/02

Appendix 3

Laboratory Test Results

Consolidation (CRS & DSS)
Atterberg Limits
Gradation (Sieve & Hydrometer)
Moisture Contents

Consolidation (CRS)
and
Direct Simple Shear (DSS)

Results of Laboratory Tests Conducted for the Amtrak Access Road Project

Prepared for

Marie Bartels, P.E.
Sr. Project Engineer
GeoDesign, Inc.
984 Southford Road
Middlebury, CT 06762

Prepared by

Don J. DeGroot, Sc.D., P.E.
218 Grantwood Drive
Amherst, MA

Review Draft – subject to change

17 November 2008

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1. INTRODUCTION

This report contains results of laboratory tests, including Atterberg Limits, constant rate of strain (CRS) consolidation and direct simple shear (DSS), conducted for GeoDesign, Inc., Middlebury, Connecticut. Eleven 3" tube samples were provided by GeoDesign for testing. All tests described herein were conducted at the University of Massachusetts Amherst Geotechnical Engineering Laboratory during September and October 2008 under the supervision of Dr. Don J. DeGroot. The report includes information on the scope of services, methods of investigation, and presentation of test results.

2. TEST SAMPLES

The test samples consisted of eleven 3" tubes labeled:

AAB-01-14 UP-1 18-20 ft.
AAB-01-14 UP-2 28-30 ft.
AAB-01-16 UP-1 13-15 ft.
AAB-02-22A UP-1 43-45 ft.
AAB-02-23B UP-2 58-60 ft.
AAB-03-36 UP-2 38-40 ft.
AARW-01-04 UP-2 43-45 ft.
AARW-04-11 UP-2 28-30 ft.
AARW-10-40 UP-1 63-65 ft.
AARW-10-40 UP-2 98-100 ft.
AARW-11-43 UP-2 23-25 ft.

The samples were collected by GeoDesign and provided to the University of Massachusetts Amherst Geotechnical Engineering Laboratory on September 16, 2008.

3. SCOPE OF SERVICES

The scope of services was discussed by telephone, electronic correspondence and in person between Dr. DeGroot and Marie Bartels, P.E. of GeoDesign, Inc. The final test program called for conducting Atterberg Limits, CRS and DSS tests on specimens taken from the sample tubes.

4. METHODS OF INVESTIGATION

4.1 Sample Extraction

CRS and DSS test specimens were extracted from the sample tube using the extrusion procedure shown in Figure 4.1.1. The selected section of a sample tube was cut using a horizontal band saw.

4.2 Water Content

Water contents were determined in general accordance with American Society for Testing and Materials (ASTM) Standard D2216 *Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock.*

4.3 Total and Dry Unit Weight

The total and dry unit weights of the soil were determined by using the trimmed CRS and DSS specimens. The volume of the CRS or DSS specimen/trimming ring was first measured and after trimming the wet mass of the specimen was weighed for calculation of the total unit weight. The dry unit weight was determined using the oven dry weight of the test specimen.

4.4 Atterberg Limits

Atterberg Limits were determined in general accordance with ASTM Standard D4318 *Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils*. Soil was prepared using the wet method. The as received soil was mixed with distilled water to a 15 blow count consistency using a Casagrande Cup and allowed to temper in a humid room for approximately 24 hours prior to testing. Liquid and Plastic Limit data points were determined by allowing the soil to dry at room temperature from the initial wet state to lower water contents.

4.5 Constant Rate of Strain (CRS) Consolidation

The constant rate of strain (CRS) consolidation tests were performed in general accordance with ASTM D4186 *Standard Test Method for One-Dimensional Consolidation Properties of Soils Using Controlled-Strain Loading* and Sandbeakken et al. (1986). The test was conducted using a GeoTac personal computer based test control and data acquisition system, which includes a load frame, flow pump, CRS consolidometer cell and Sigma-1 CRS consolidation software.

The general CRS test sequence consisted of the following stages:

1. Preparation of the specimen for testing first consisted of removing a test sample from the sample tube using the hand extrusion procedure described in Section 4.1 (Figure 4.1.1). The test specimen was hand trimmed in a humid room using a soil lathe together with a sharp trimming ring and sharp trimming tools. The top and bottom surfaces of the specimen were trimmed flat with a wire saw and a long sharp edged knife with the final trimmed dimensions equaling a diameter of 2.5 in and a height of 0.75 in.
2. The specimen was placed in the CRS cell with saturated moist top and bottom porous stones. After application of the seating load, one to three incremental loads were applied. Thereafter the cell chamber was filled with deaired water and the specimen was back pressure saturated to a final target back pressure equal to 6265 psf and left to sit overnight.
3. Constant rate of strain loading was conducted using a nominal strain rate of 1.5 %/hr (4.2×10^{-6} s^{-1}). An unload-reload loop was conducted during the test and included a constant stress period prior to starting the unload phase and again prior to starting the reload phase. The target unload stress was set equal to approximately 20% of the vertical stress acting on the specimen prior to start of the unload-reload loop.
4. After the unload-reload loop was completed, CRS loading continued until a maximum stress of approximately 58,000 psf or 30% strain at which point the test was either stopped or a final unload sequence was conducted.

All measurements during testing were made using load, displacement and pressure transducers. The measured data were reduced using the methods of Wissa et al. (1971; and also described in ASTM D4186 and Sandbeakken et al. 1986). All vertical strains were computed taking into

account the apparatus compliance that was determined using a steel disk. The preconsolidation stress was estimated using the Casagrande and strain energy methods (Becker et al. 1987).

4.6 Direct Simple Shear (DSS) Test

The Direct Simple Shear (DSS) tests were conducted using a Geonor DSS device in general accordance to the procedures described by Bjerrum and Landva (1966), DeGroot et al. (1992) and ASTM D6528 *Standard Test Method for Consolidated Undrained Direct Simple Shear Testing of Cohesive Soils.* The Geonor DSS device (Figure 4.6.1) consists of a specimen chamber, lever arm for application of consolidation weights and a gear driven thrust shaft for applying the horizontal shear stress to the specimen. Load cells and linear variable differential transformers, all connected to a dedicated data acquisition system, are used for measurement of load and displacement. Specimens are prepared for testing by trimming the soil into a 5.43 in^2 (35 cm^2) wire-reinforced rubber membrane or a set of thin stainless steel stacked rings with an internal membrane. Carborundum porous stones are placed on the top and bottom of the specimen. The membrane allows for one-dimensional consolidation during the consolidation phase of a test and direct simple shear strain mode of deformation during the shear phase of a test.

The general test sequence consisted of the following stages:

1. Preparation of the specimen for testing first consisted of extracting a test sample from the sample tube using a hand extrusion procedure (Figure 4.1.1) followed by use of Geonor trimming equipment that allows for setting up a nominal 2.6" diameter by 0.8" height specimen inside a wire reinforced membrane or stacked ring membrane assembly.
2. Incremental, one-dimensional consolidation to the preshear vertical effective stress using a lever arm and dead weight. Consolidation of the DSS specimens was conducted using the SHANSEP (Ladd 1991, Ladd and DeGroot 2003) method with the final preshear laboratory vertical effective stress (σ'_{vc}) creating either a normally consolidated (OCR = 1) or overconsolidated (OCR > 1) test specimen.
3. Maintaining the maximum consolidation stress (OCR = 1 tests) and the final preshear vertical effective stress (OCR > 1 tests) acting on the specimen for a period of approximately 24 hours.
4. Undrained shearing using the constant volume procedure at a nominal shear strain rate of 5%/hour during application of the horizontal shear stress.
5. Undrained shear is continued to an approximate maximum shear strain of 20%.

All vertical consolidation strains are computed taking into account the apparatus compliance which was determined using a steel disk. The measured horizontal force during undrained shear is corrected for the calibrated resistance of the wire reinforced membrane or stacked ring membrane assembly. Reduced data from the undrained shear phase of the test consists of shear strain (γ), horizontal shear stress (τ_h), equivalent change in pore water pressure (Δu), vertical effective stress (σ'_v), shear modulus ($G = \tau_h/\gamma$), and undrained shear strength (s_u) which is typically assumed to be equal to the maximum measured horizontal shear stress $(\tau_h)_{max}$ (Ladd 1991, DeGroot et al. 1992).

5. RESULTS

5.1 Tests Conducted and Specimen Locations

Table 1 presents a summary of the tests conducted on the sample tubes.

Figures 5.1.1 to 5.1.10 show the location of the CRS and DSS test specimens for each of the sample tubes.

5.2 Atterberg Limits and Torvane

Table 2 presents a summary of the Atterberg Limits results and Figure 5.2.1 plots them in a Casagrande Plasticity Chart.

5.3 Constant Rate of Strain and Incremental Load Consolidation Tests

Table 3 presents a summary of the CRS test specimen properties and results. Figures 5.3.1 to 5.3.40 present plots of the CRS test results including the compression curve (ε_v versus σ'_v), coefficient of consolidation versus vertical effective stress, void ratio versus hydraulic conductivity and constrained modulus versus vertical effective stress.

5.4 Direct Simple Shear Tests

Table 4 presents a summary of the DSS test specimen properties and results. Figures 5.4.1 to 5.4.45 present plots of the DSS tests results including the compression curve from the consolidation phase of the test and plots from the undrained shear phase including shear stress versus shear strain, shear induced pore pressure versus shear strain, shear stress versus vertical effective stress, and shear modulus versus shear strain.

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7. NOTATION AND UNITS

Notation

c_v = vertical coefficient of consolidation (ft^2/day)
e = void ratio
e_0 = initial void ratio
k_v = vertical hydraulic conductivity (ft/day)
LL = liquid limit (%)
PI = plasticity index (%)
PL = plastic limit (%)
s_u = undrained shear strength (psf)
t = time
w = water content (%)

% = percentage
Δu = equivalent DSS shear induced pore pressure (psf)
ε_v = vertical strain (%)
ε_{vc} = vertical consolidation strain (%)
ε_{vf} = final vertical consolidation strain (%)
ε_{vmax} = maximum vertical strain during consolidation phase of DSS test (%)
γ = shear strain for DSS test (%)
γ_t = total unit weight (pcf)
γ_d = dry unit weight (pcf)
σ'_p = preconsolidation stress (psf)
σ'_v = vertical effective stress (psf)
σ'_{vc} = vertical consolidation effective stress (psf)
σ'_{vmax} = maximum vertical stress during consolidation phase of DSS test (psf)
τ_h = horizontal shear stress (psf)

Units

cm = centimeter
ft = feet
in = inches
min = minute
pcf = pounds per cubic foot
psf = pounds per square foot
s = seconds

Table 1 Summary of Tests Performed

Test	**AAB-01-14 UP-1 18-20 ft.**	**AAB-01-14 UP-2 28-30 ft.**	**AAB-01-16 UP-1 13-15 ft.**	**AAB-02-22A UP-1 43-45 ft.**	**AAB-02-23B UP-2 58-60 ft.**	**AAB-03-36 UP-2 38-40 ft.**
Water Content	-	multiple	multiple	multiple	multiple	multiple
Total and Dry Unit Weight	-	1	1	multiple	1	multiple
Atterberg Limits	-	1	1	1	1	1
Torvane	-		multiple	multiple		multiple
Constant Rate of Strain Consolidation	-	CRS146	CRS153	CRS147	CRS155	CRS148
Incremental Load Consolidation	-					
Direct Simple Shear	-		G346	G348		G340 G341 G343

Table 1 (continued) Summary of Tests Performed

Test	**AARW-01-04 UP-2 43-45 ft.**	**AARW-04-11 UP-2 28-30 ft.**	**AARW-10-40 UP-1 63-65 ft.**	**AARW-10-40 UP-2 98-100 ft.**	**AARW-11-43 UP-2 23-25 ft.**
Water Content	multiple	multiple	multiple	multiple	multiple
Total and Dry Unit Weight	multiple	1	multiple	1	multiple
Atterberg Limits	1	1	1	1	1
Torvane	multiple				multiple
Constant Rate of Strain Consolidation	CRS152	CRS151	CRS150	CRS149	CRS154
Incremental Load Consolidation					
Direct Simple Shear	G347		G342		G344 G345

Table 2 Summary of Classification test results

Sample	CRS Test	LL	PL	PI	w	LI
-	-	(%)	(%)	(%)	(%)	(-)
1	2	3	4	5	6	7
AAB-01-14 UP-1 18-20 ft.	-	-	-	-	-	-
AAB-01-14 UP-2 28-30 ft.	CRS146	65	35	30	45	0.33
AAB-01-16 UP-1 13-15 ft.	CRS153	42	27	15	39	0.80
AAB-02-22A UP-1 43-45 ft.	CRS147	68	32	36	44	0.33
AAB-02-23B UP-2 58-60 ft.	CRS155	36	25	11	35	0.91
AAB-03-36 UP-2 38-40 ft.	CRS148	64	28	36	69	1.14
AARW-01-04 UP-2 43-45 ft.	CRS152	33	20	13	38	1.38
AARW-04-11 UP-2 28-30 ft.	CRS151	41	29	12	48	1.58
AARW-10-40 UP-1 63-65 ft.	CRS150	60	32	28	65	1.18
AARW-10-40 UP-2 98-100 ft.	CRS149	47	34	13	41	0.54
AARW-11-43 UP-2 23-25 ft.	CRS154	64	32	32	60	0.88

Note: water content values from adjacent CRS test specimen (see Table 4)

Table 3 Summary of Constant Rate of Strain (CRS) and Incremental Load (IL) specimen properties and test results

Test #	Boring Sample	Depth	w	e_0	γ_t	γ_d	σ'_{v0}	Sample Quality (at σ'_{v0})		σ'_p		OCR		Figure Numbers
								$\Delta e/e_0$	ε_v	Casa.	S.E.	Casa.	S.E.	
-	-	ft	%	-	pcf	pcf	psf	-	%	psf	psf	-	-	-
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CRS146	AAB-01-14 UP-2	28-30	45	1.278	111	77	1730	0.023 (1)	1.3 (B)	5618	5221	3.25	3.02	5.3.1 to 5.3.4
CRS147	AAB-02-22A UP-1	43-45	44	1.252	112	77	3650	0.068 (2)	3.8 (C)	7414†	6683†	1.83	2.03	5.3.5 to 5.3.8
CRS148	AAB-03-36 UP-2	38-40	69	1.945	100	59	2980	0.035 (1)	2.3 (C)	5430	5221	1.82	1.75	5.3.9 to 5.3.12
CRS149	AARW-10-40 UP-2	98-100	41	1.199	112	79	5200	0.072 (3)	3.9 (C)	6877†	7602†	1.31	1.46	5.3.13 to 5.3.16
CRS150	AARW-10-40 UP-1	63-65	65	1.863	100	61	3710	0.046 (2)	3.0 (C)	7519	7289	2.03	1.96	5.3.17 to 5.3.20
CRS151	AARW-04-11 UP-2	28-30	48	1.364	109	74	1455	0.027 (1)	1.6 (B)	7101	6662	4.88	4.58	5.3.21 to 5.3.24
CRS152	AARW-01-04 UP-2	43-45	38	1.088	115	83	2660	0.031 (2)	1.6 (B)	5952	5848	2.24	2.20	5.3.25 to 5.3.28
CRS153	AAB-01-16 UP-1	13-15	39	1.110	115	83	1030	0.020 (1)	1.0 (A/B)	5284	4657	5.13	4.52	5.3.29 to 5.3.32
CRS154	AARW-11-43 UP-2	23-25	60	1.710	103	64	1325	0.032 (2)	2.0 (B/C)	4365	4031	3.29	3.04	5.3.33 to 5.3.36
CRS155	AAB-02-23B UP-2	58-60 ft.	35	1.006	117	87	4575	0.058 (2)	2.9 (C)	-†	5556	-	1.21	5.3.37 to 5.3.40

Notes: †no distinct break evident in compression curve

1. Notation given in Section 7. 2. e_0 based on assumed specific gravity = 2.80 3. σ'_{v0} values provided by GeoDesign Inc

4. For estimates of σ'_p: Casa. = Casagrande construction; S.E. = strain energy method of Becker et al. (1987)

5. Sample quality evaluation methods:

Lunne et al. (2006) quality ratings 1 = very good to excellent, 2 = fair to good, 3 = poor, 4 = very poor					Terzaghi et al. (1996) Specimen Quality Designation (SQD) A (best) to E (worst)					
OCR	$\Delta e/e_0$ at σ'_{v0}									
1 to 2	< 0.04	0.04 – 0.07	0.07 – 0.14	> 0.14	ε_v at σ'_{v0}	< 1	1 - 2	2 - 4	4 - 8	> 8
2 to 4	< 0.03	0.03 – 0.05	0.05 – 0.10	> 0.10	SQD	A	B	C	D	E
Quality	1	2	3	4						

Table 4 Summary of Direct Simple Shear (DSS) specimen properties and test results

Test No.	Sample Tube	Depth	w_n	γ_t	γ_d	σ'_{vo}	Laboratory Consolidation					Shear Data at Peak $(\tau_h)_{max} = s_u$				Figure Numbers
							σ'_{vc}	σ'_{vmax}	OCR	ε_{vmax}	ε_{vf}	γ	τ_h	τ_h/σ'_{vc}	σ'_v/σ'_{vc}	
-	-	ft	%	pcf	pcf	psf	psf	psf	-	%	%	%	psf	-	-	-
1	2	3	4	5	5	6	7	8	9	10	11	12	13	14	15	16
G340	AAB-03-36 UP-2	38-40	63	104	63	2980	8332	8332	1.0	14.9	14.9	8.5	1557	0.187	0.611	5.4.1 to 5.4.5
G341	AAB-03-36 UP-2	38-40	65	103	62	2980	4189	8361	2.0	14.8	13.7	9.1	1229	0.294	0.887	5.4.6 to 5.4.10
G343	AAB-03-36 UP-2	38-40	62	104	64	2980	2111	8356	4.0	13.8	11.5	7.5	982	0.465	1.166	5.4.11 to 5.4.15
G342	AARW-10-40 UP-1	63-65	61	103	64	3710	10424	10424	1.0	15.2	15.2	9.6	1564	0.150	0.623	5.4.16 to 5.4.20
G344	AARW-11-43 UP-2	23-25	57	103	65	1325	8355	8355	1.0	14.4	14.4	8.8	1544	0.185	0.593	5.4.21 to 5.4.25
G345	AARW-11-43 UP-2	23-25	62	104	64	1325	2085	8353	4.0	16.0	13.5	18.4	1027	0.496	1.092	5.4.26 to 5.4.30
G346	AAB-01-16 UP-1	13-15	-	112	70	1030	12551	12551	1.0	16.1	16.1	8.3	2048	0.163	0.621	5.4.31 to 5.4.35
G347	AARW-01-04 UP-2	43-45	30	124	95	2660	12526	12526	1.0†	5.4†	5.4	10.0	3009	0.240	0.491	5.4.36 to 5.4.40
G348	AAB-02-22A UP-1	43-45	65	102	63	3650	8359	8359	1.0	16.4	16.4	10.2	1258	0.151	0.651	5.4.41 to 5.4.45

Notes:

†vertical strain likely too low for specimen to be truly normally consolidated

1. Notation given in Section 7
2. σ'_{v0} values provided by GeoDesign Inc
3. Undrained shear strength $s_u(DSS) = (\tau_h)_{max}$

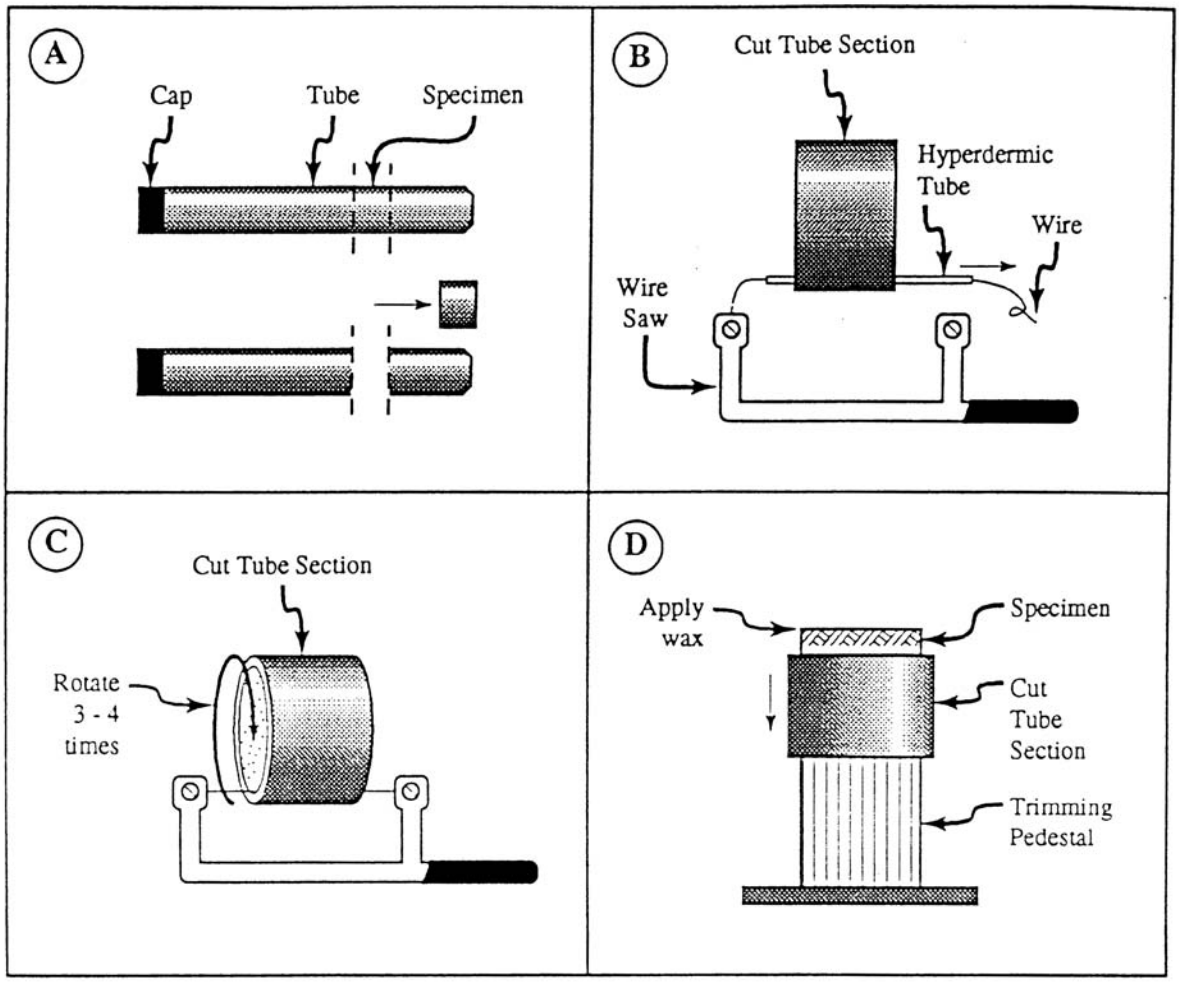

Figure 4.1.1 Procedure for sample extrusion for CRS, IL and DSS specimens (after Ladd and DeGroot 2003)

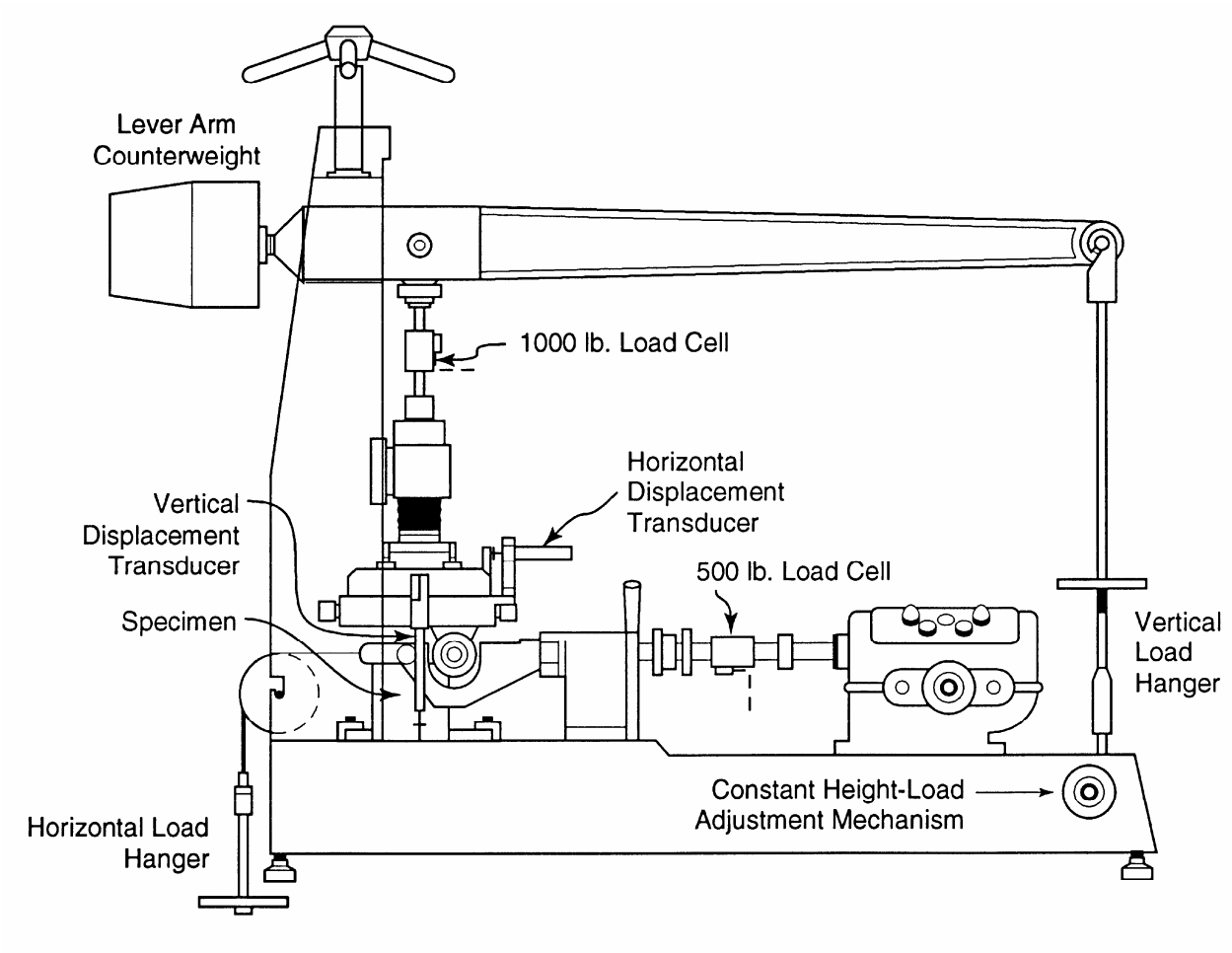

Figure 4.6.1 Geonor Direct Simple Shear (DSS) apparatus

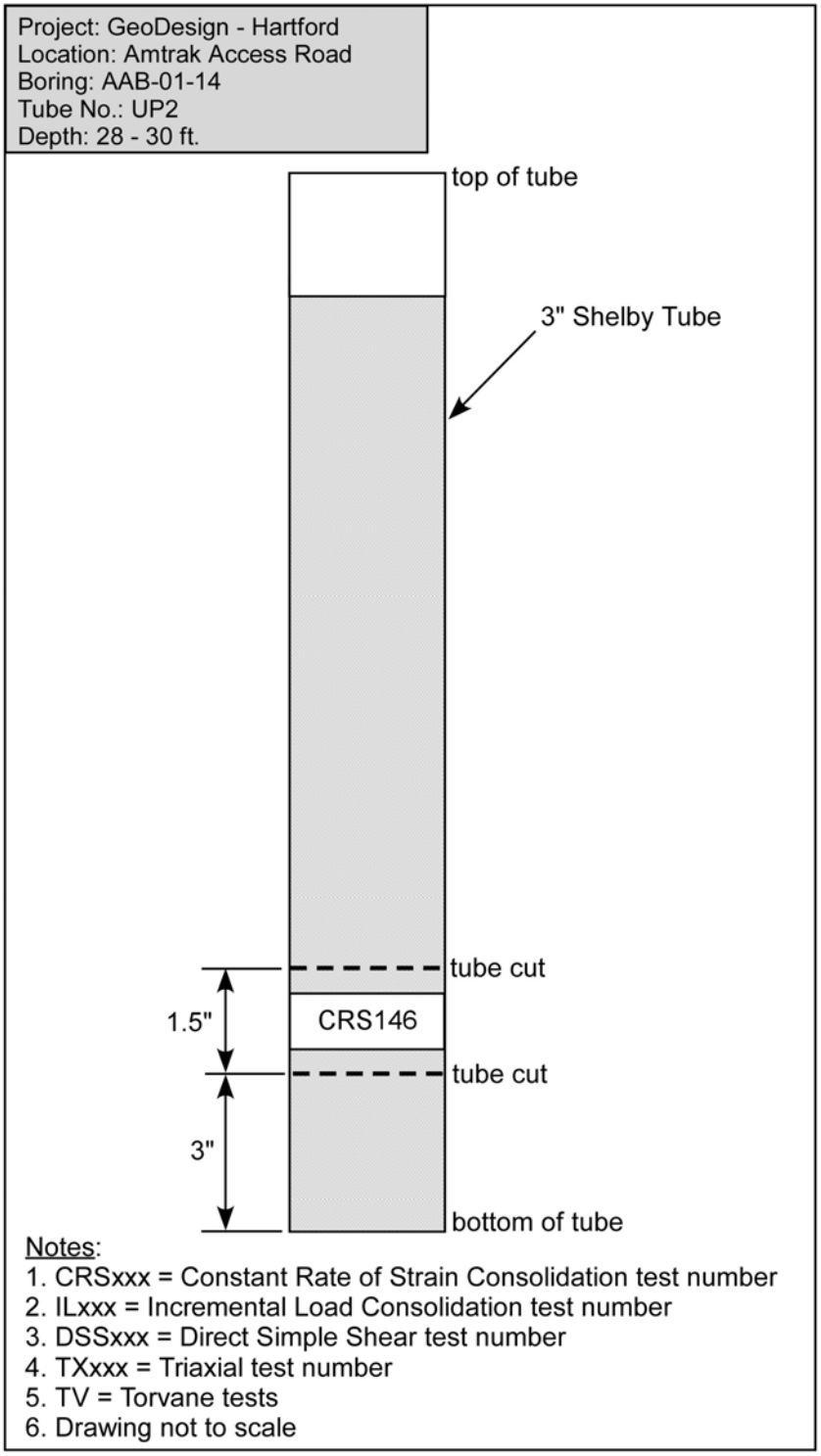

Figure 5.1.1 Test locations for Amtrak Access Road Sample AAB-01-14 UP-2 28-30 ft.

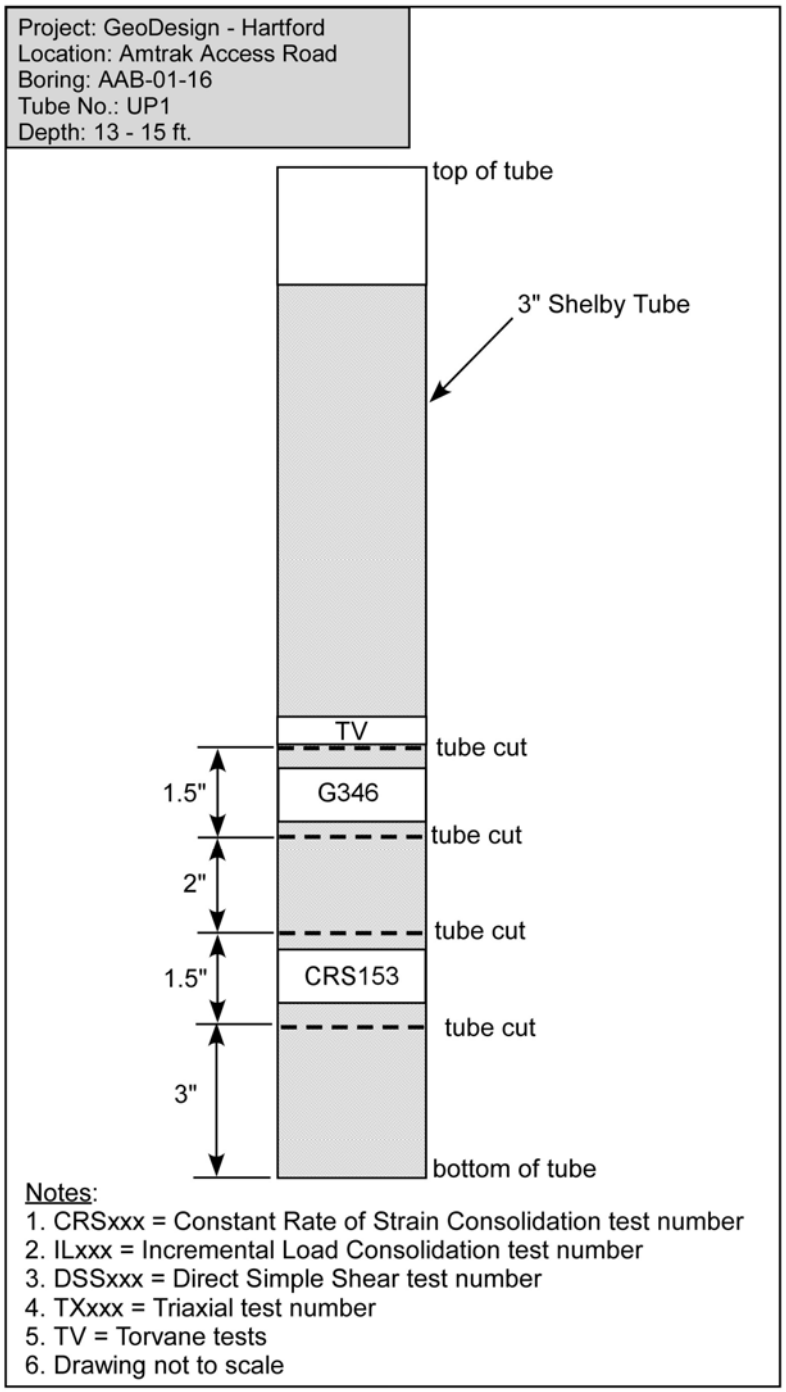

Figure 5.1.2 Test locations for Amtrak Access Road Sample AAB-01-16 UP-1 13-15 ft.

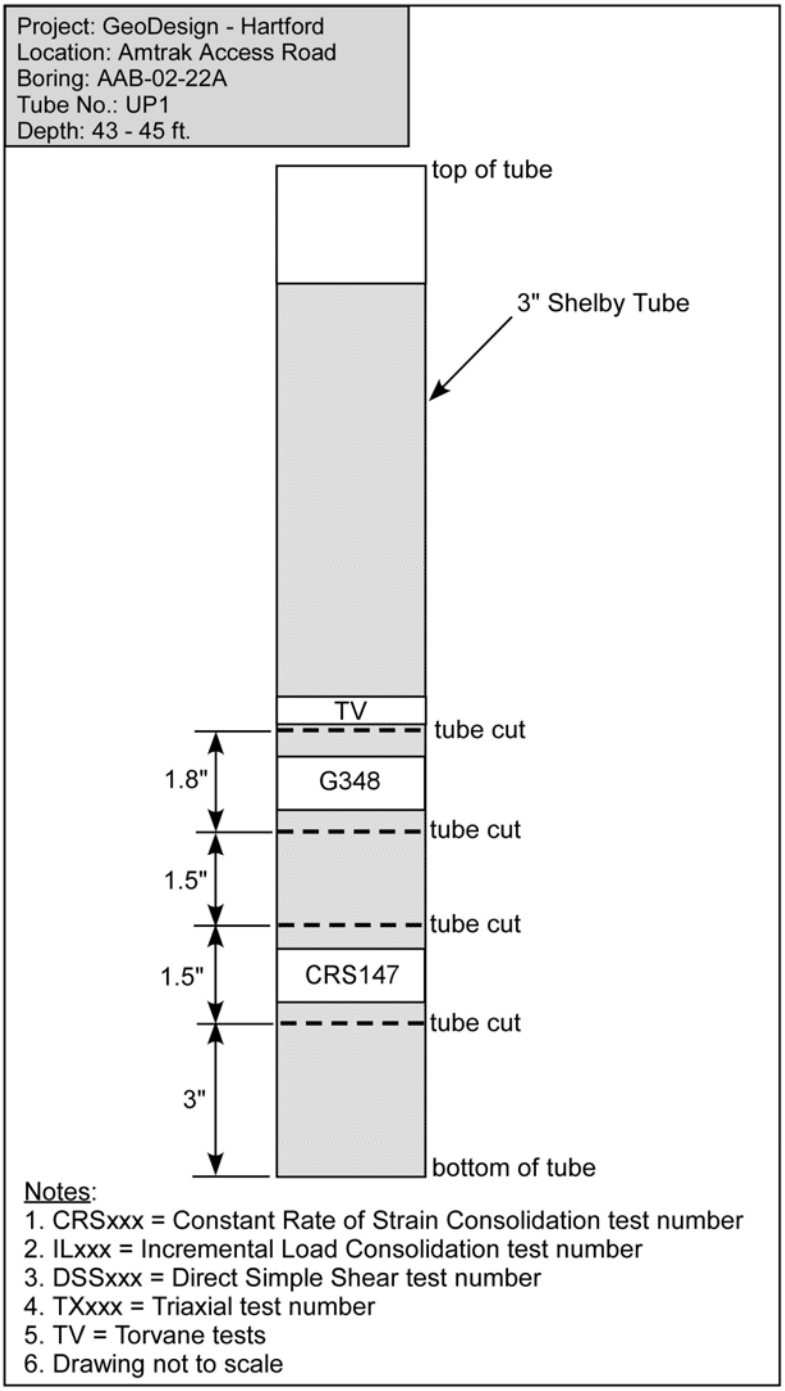

Figure 5.1.3 Test locations for Amtrak Access Road Sample AAB-02-22A UP-1 43-45 ft.

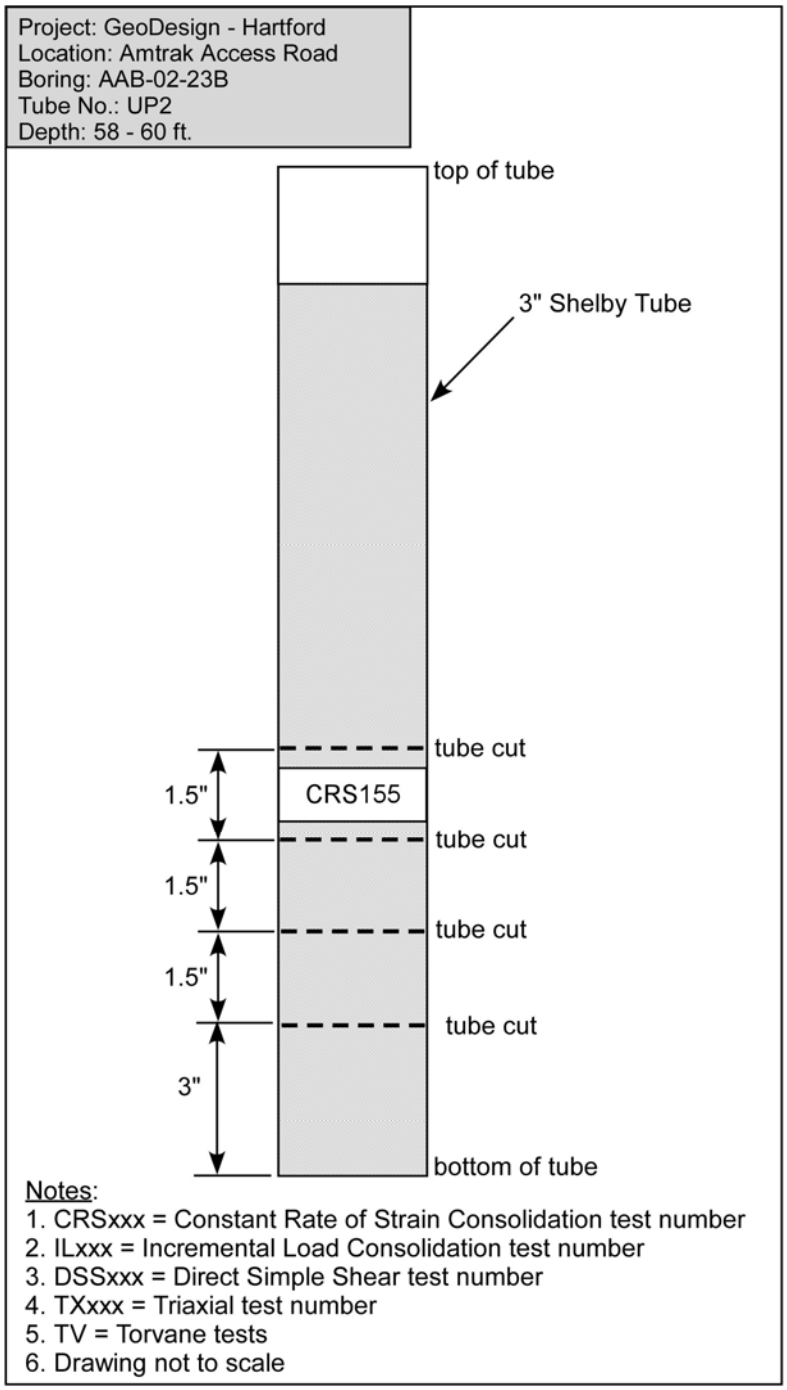

Figure 5.1.4 Test locations for Amtrak Access Road Sample AAB-02-23B UP-2 58-60 ft.

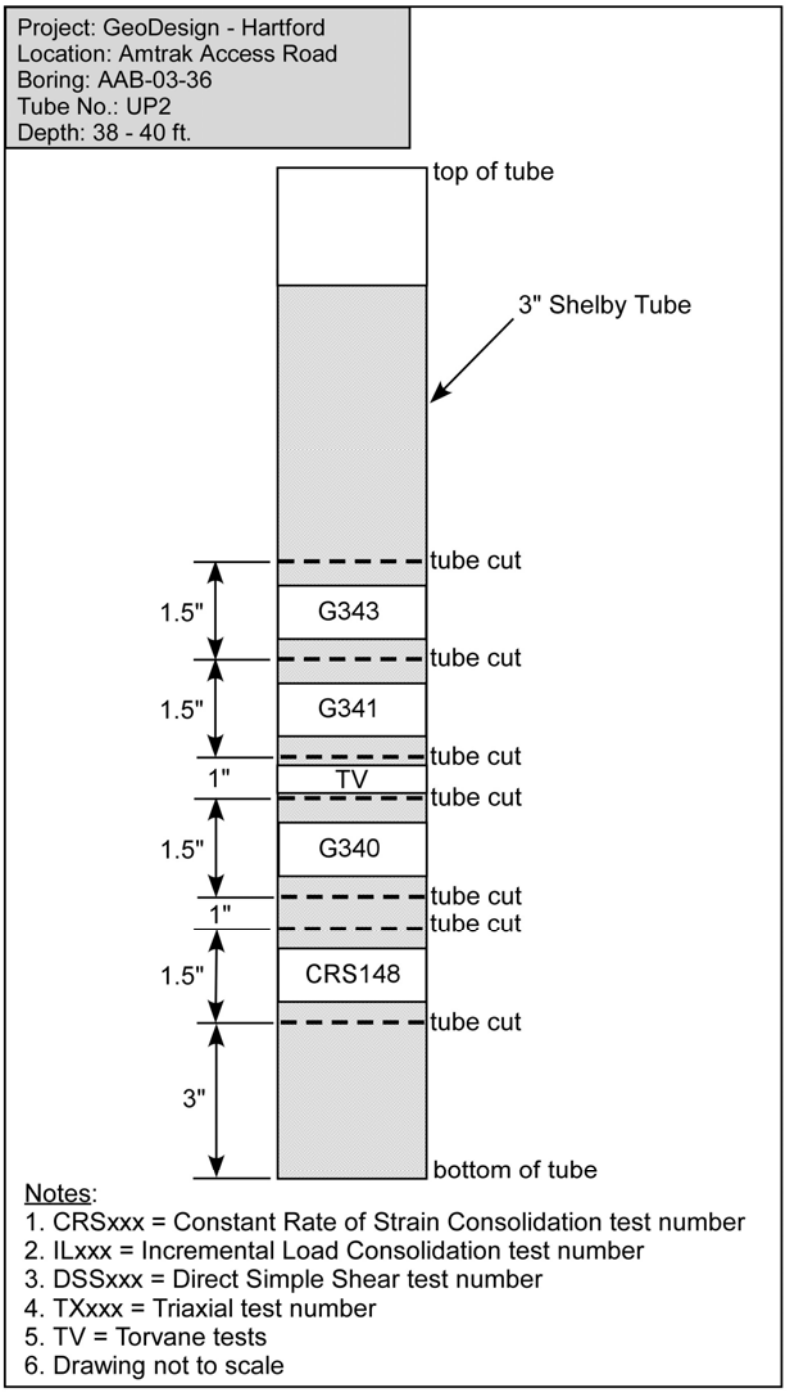

Figure 5.1.5 Test locations for Amtrak Access Road Sample AAB-03-36 UP-2 38-40 ft.

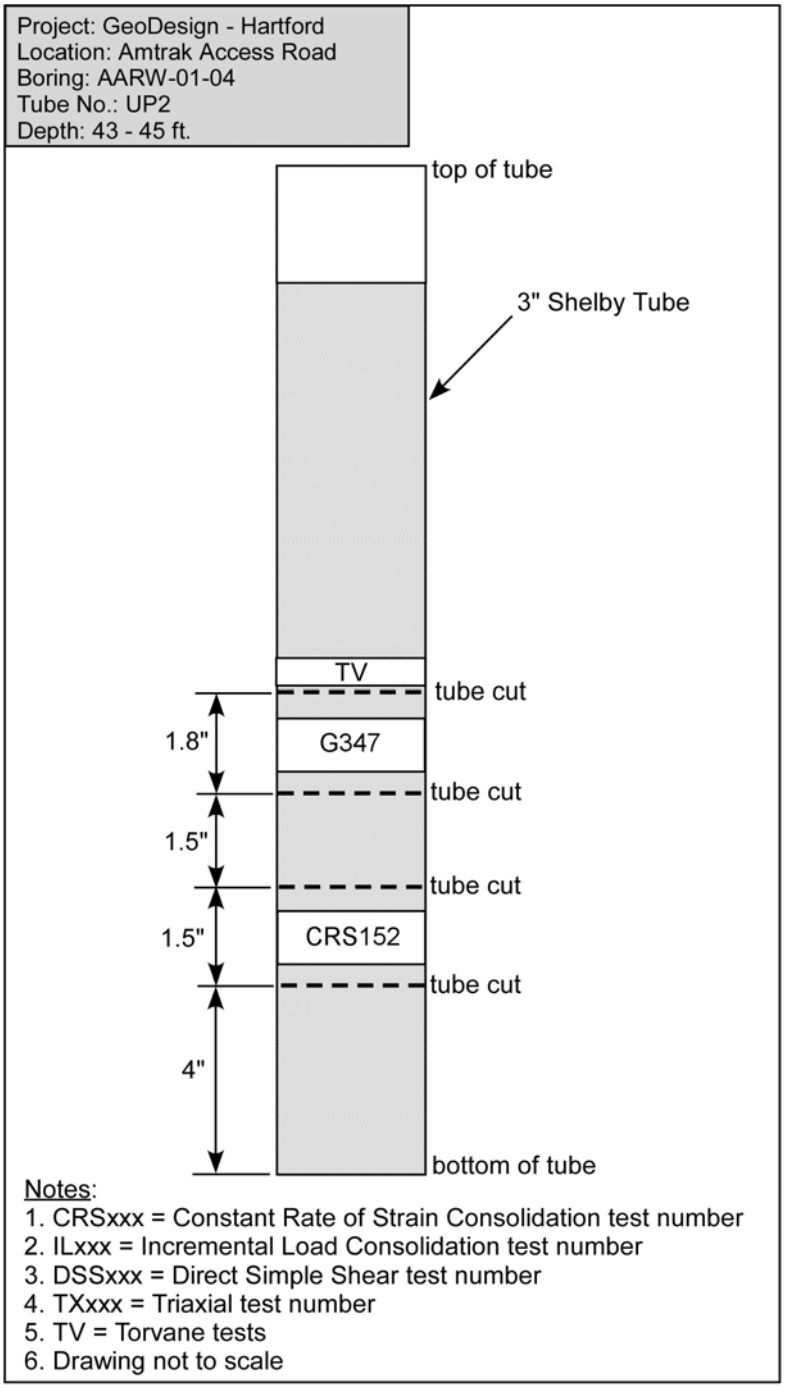

Figure 5.1.6 Test locations for Amtrak Access Road Sample AARW-01-04 UP-2 43-45 ft.

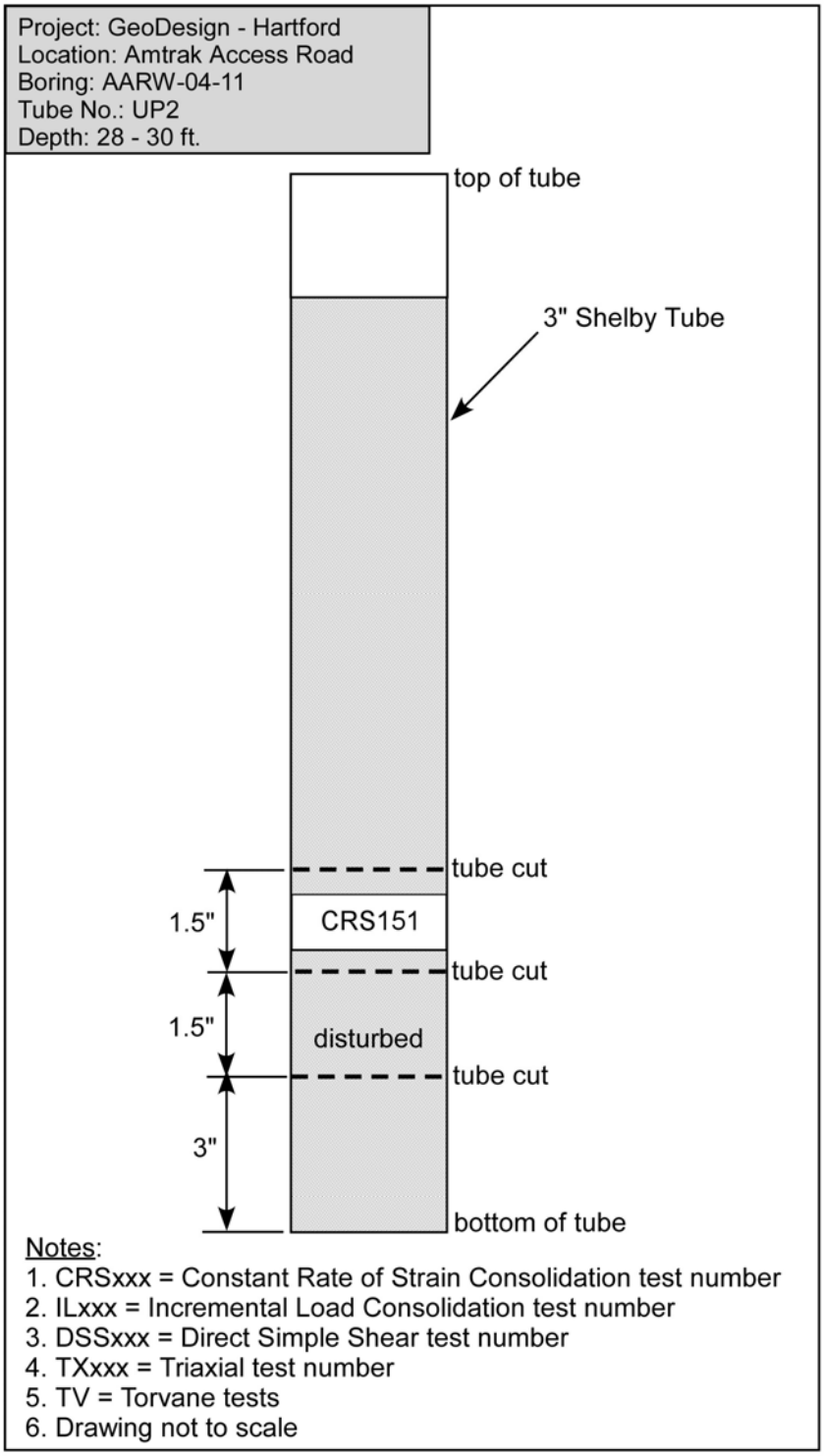

Figure 5.1.7 Test locations for Amtrak Access Road Sample AARW-04-11 UP-2 28-30 ft.

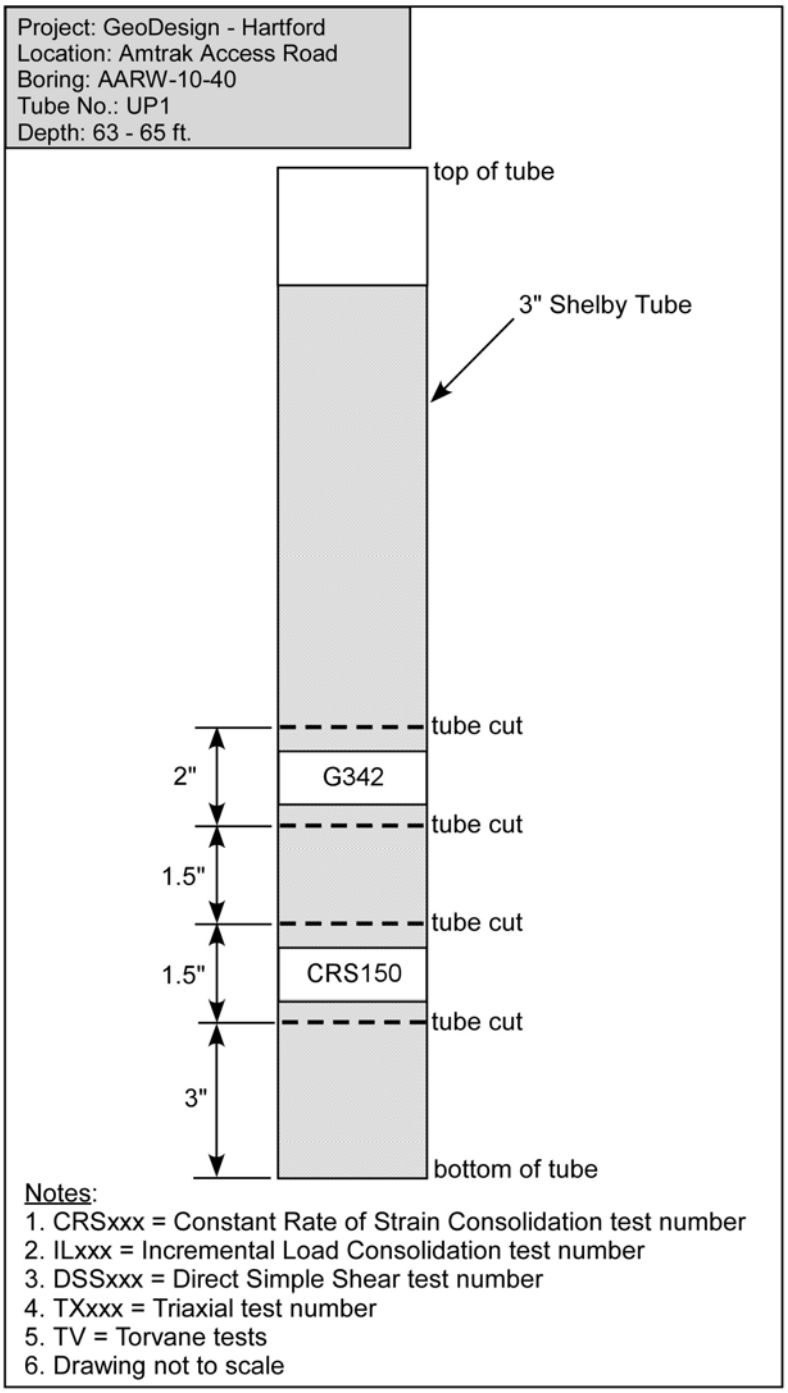

Figure 5.1.8 Test locations for Amtrak Access Road Sample AARW-10-40 UP-1 63-65 ft.

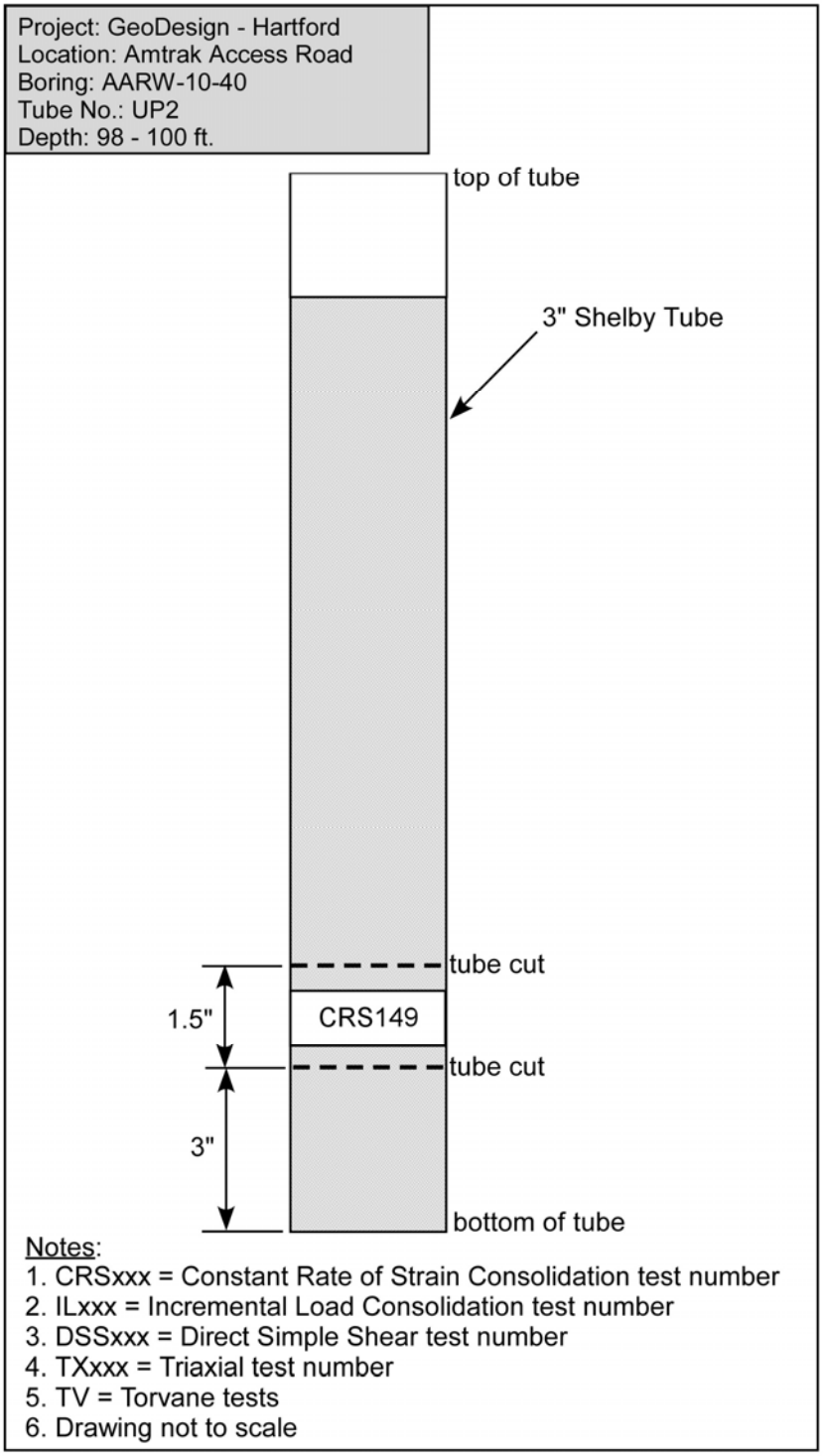

Figure 5.1.9 Test locations for Amtrak Access Road Sample AARW-10-40 UP-2 98-100 ft.

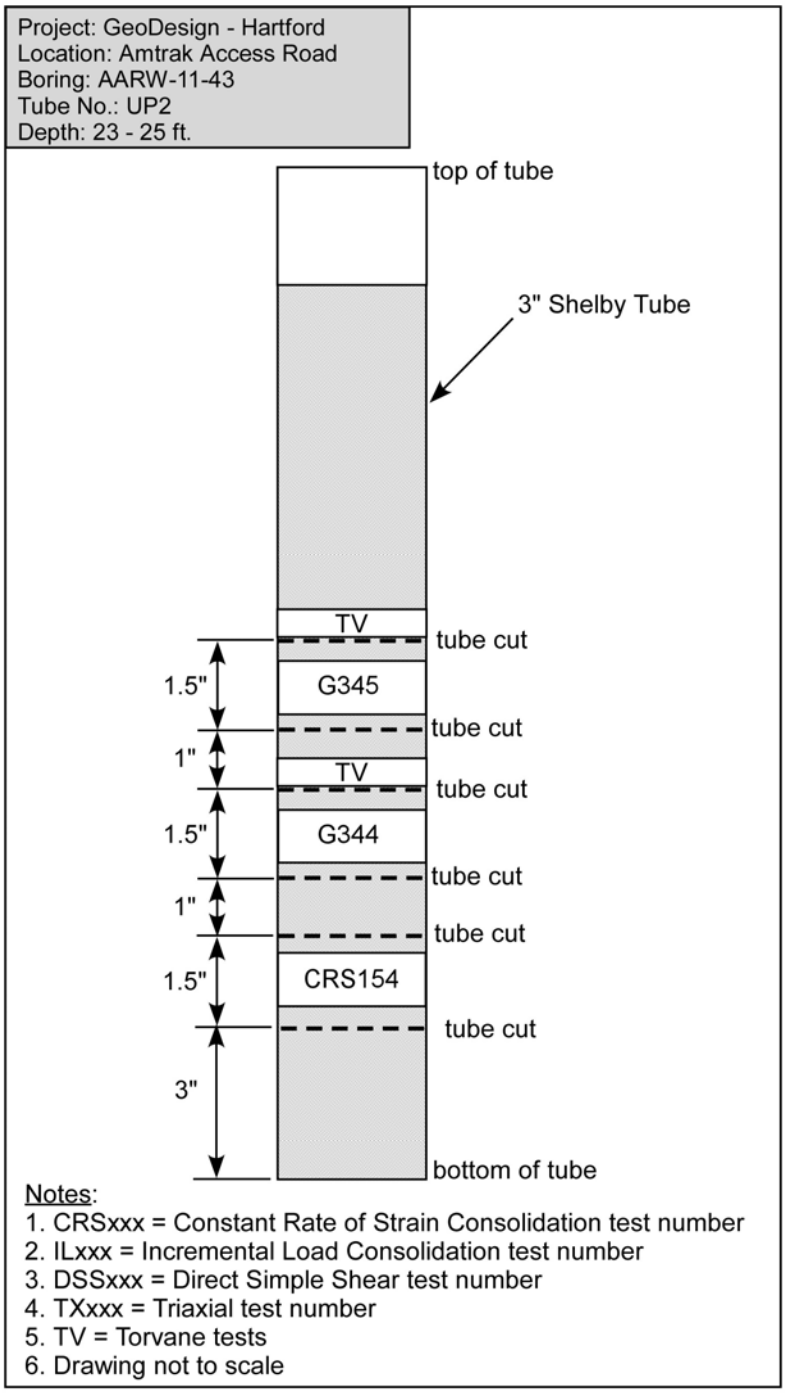

Figure 5.1.10 Test locations for Amtrak Access Road Sample AARW-11-43 UP-2 23-25 ft.

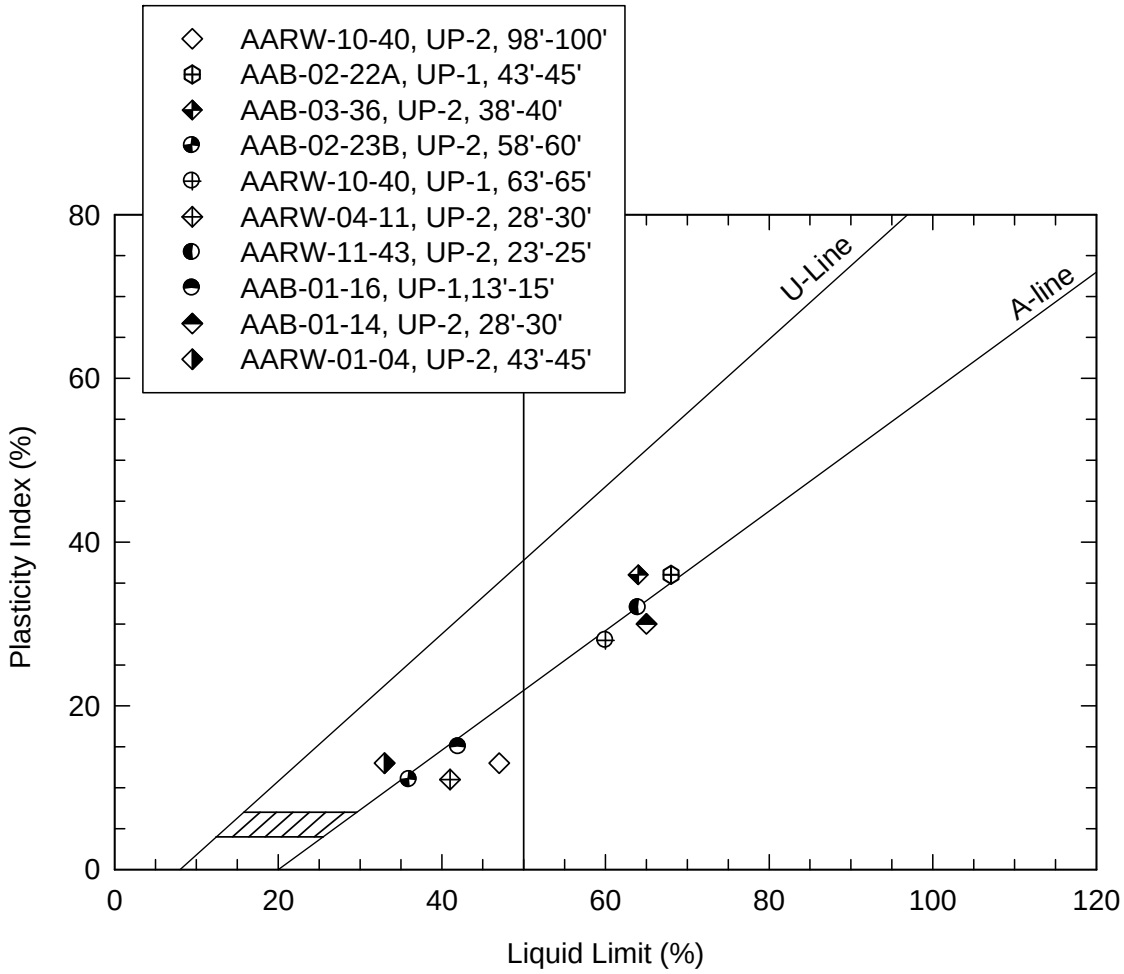

Figure 5.2.1 Plasticity Chart with Atterberg Limits results for selected samples

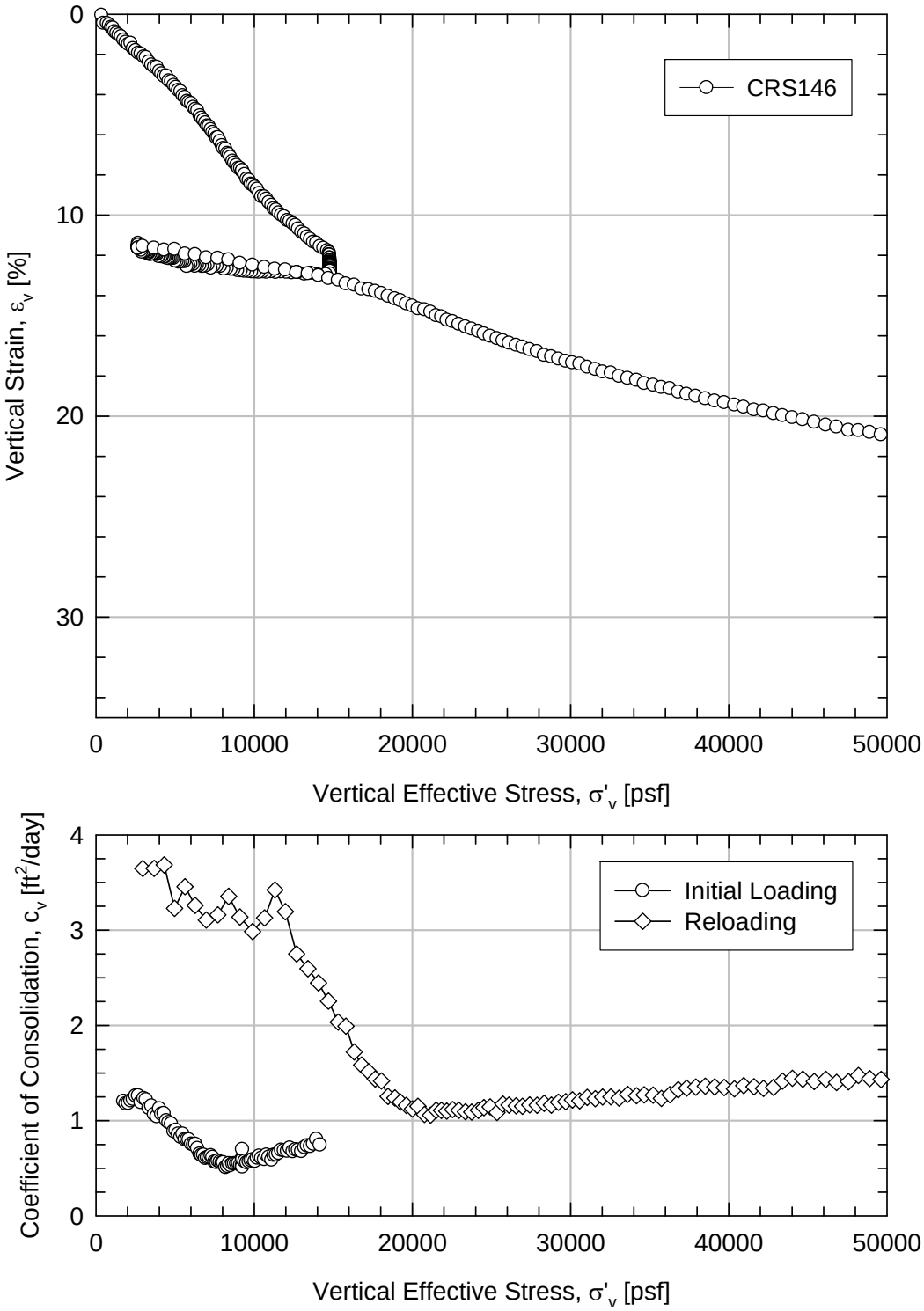

Figure 5.3.1 Vertical strain and coefficient of consolidation versus vertical effective stress for test CRS146 on sample AAB-01-14 UP-2 28-30 ft.

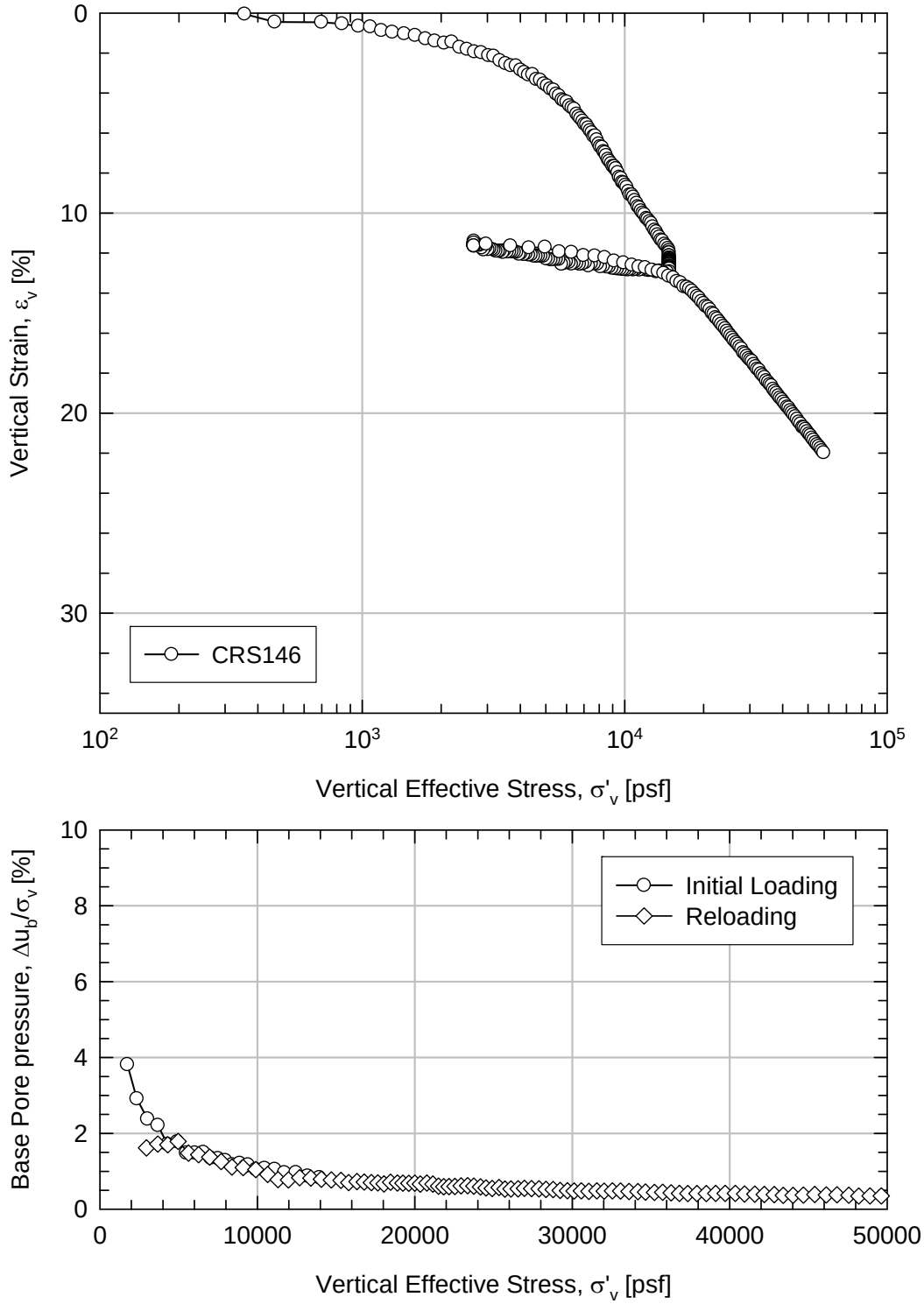

Figure 5.3.2 Vertical strain and normalized base pore pressure versus vertical effective stress for test CRS146 on sample AAB-01-14 UP-2 28-30 ft.

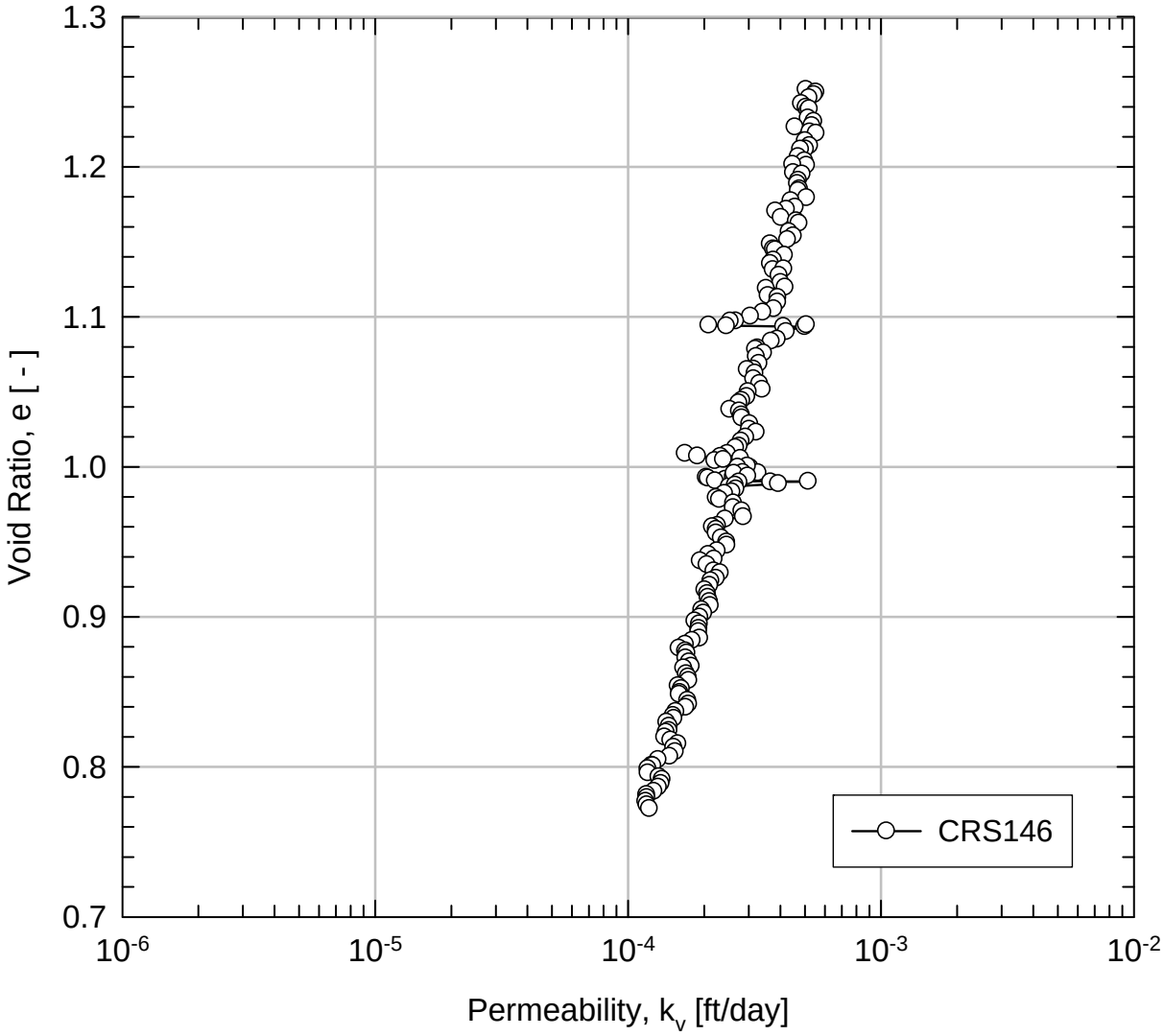

Figure 5.3.3 Void ratio versus permeability for CRS146 on sample AAB-01-14 UP-2 28-30 ft.

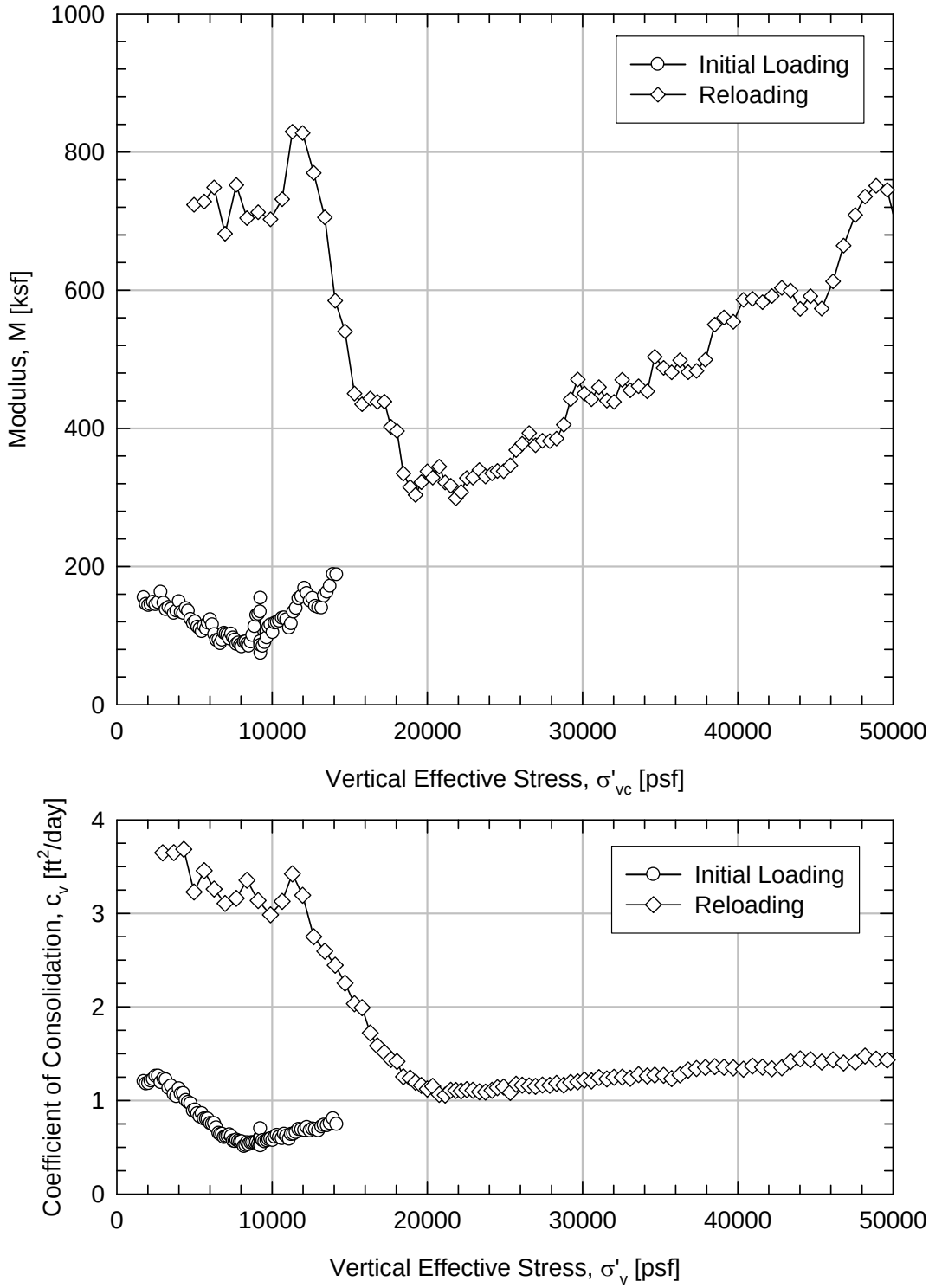

Figure 5.3.4 Modulus and coefficient of consolidation versus vertical effective stress for test CRS146 on sample AAB-01-14 UP-2 28-30 ft.

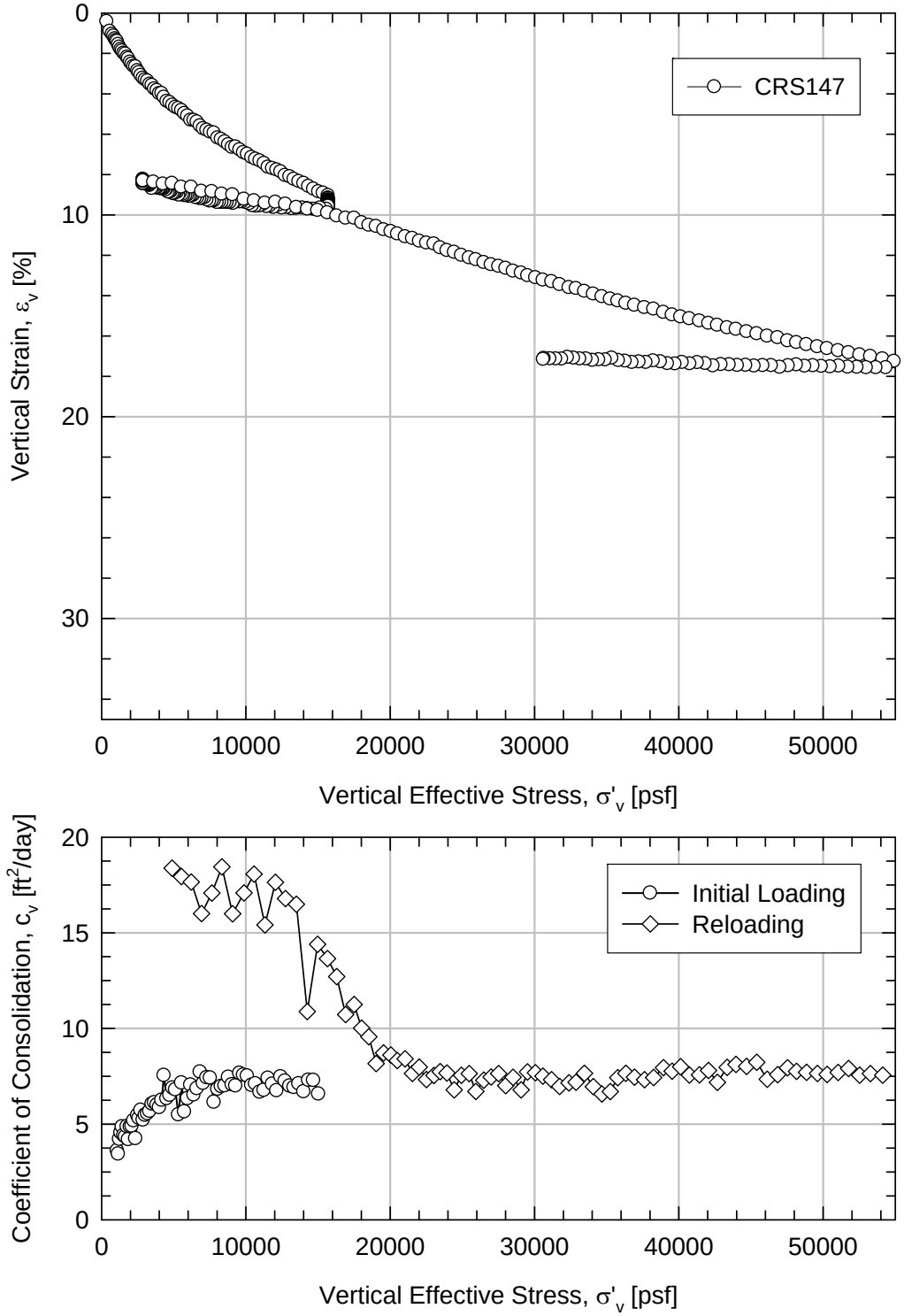

Figure 5.3.5 Vertical strain and coefficient of consolidation versus vertical effective stress for test CRS147 on sample AAB-02-22A UP-1 43-45 ft.

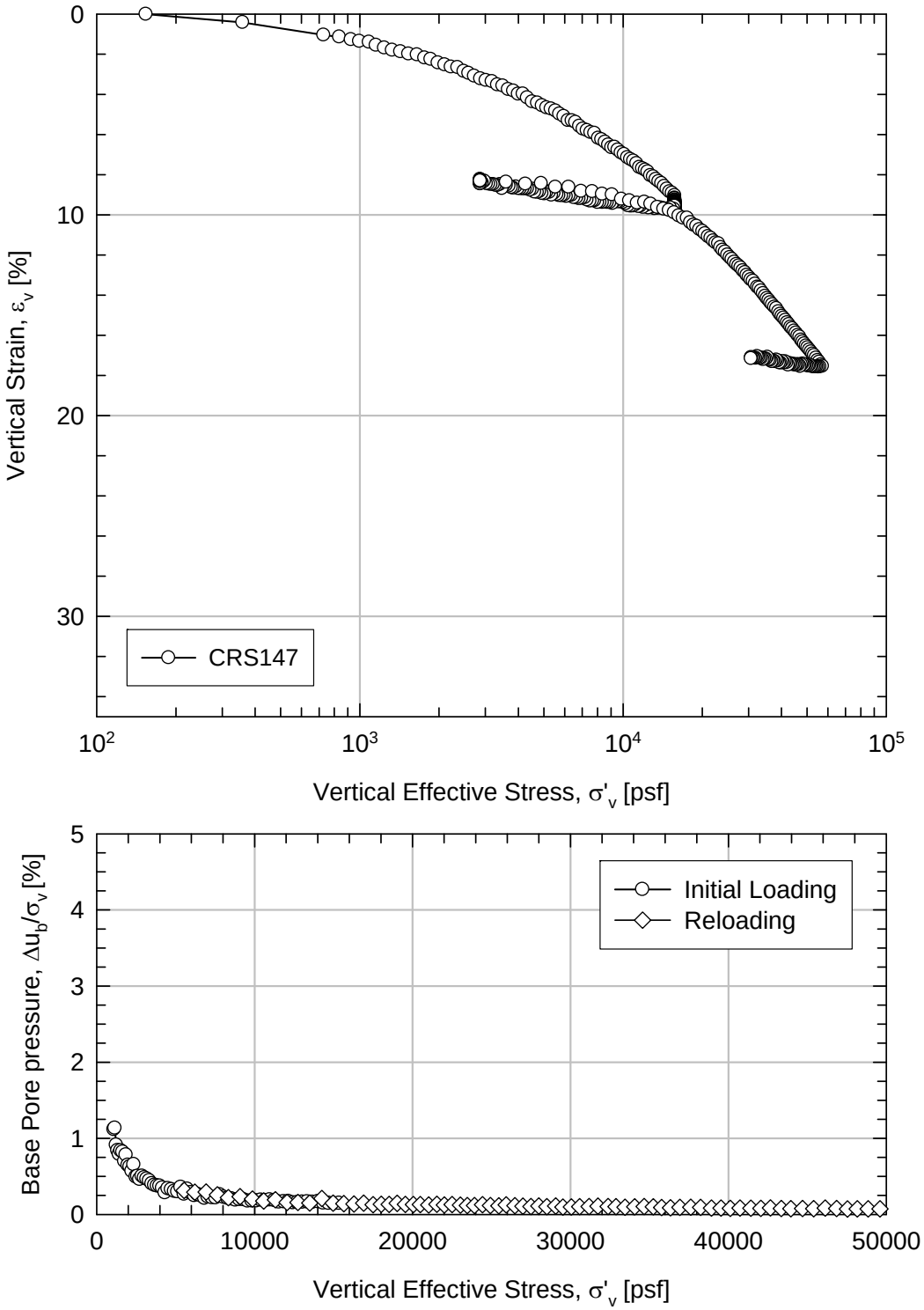

Figure 5.3.6 Vertical strain and normalized base pore pressure versus vertical effective stress for test CRS147 on sample AAB-02-22A UP-1 43-45 ft.

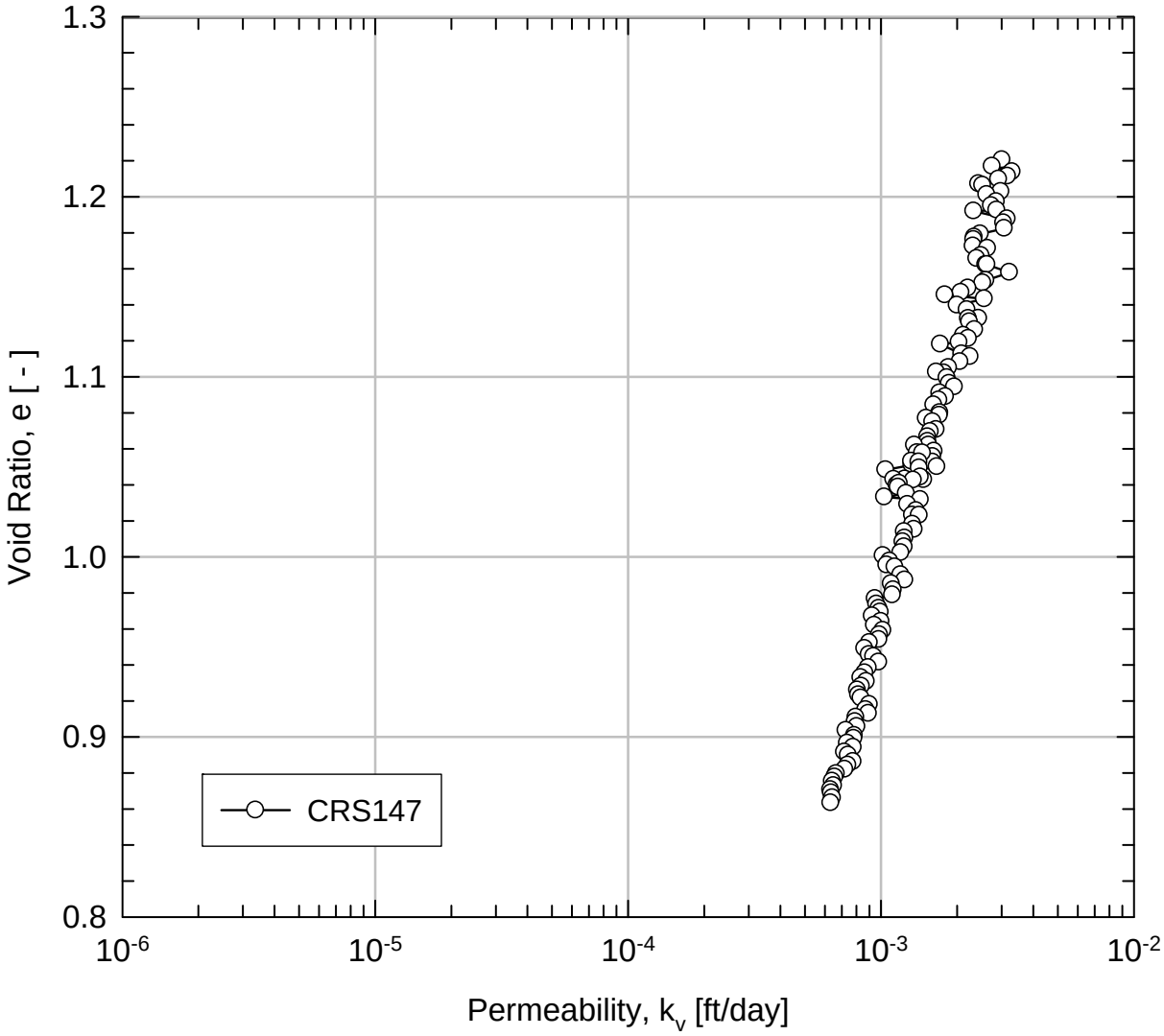

Figure 5.3.7 Void ratio versus permeability for CRS147 on sample AAB-02-22A UP-1 43-45 ft.

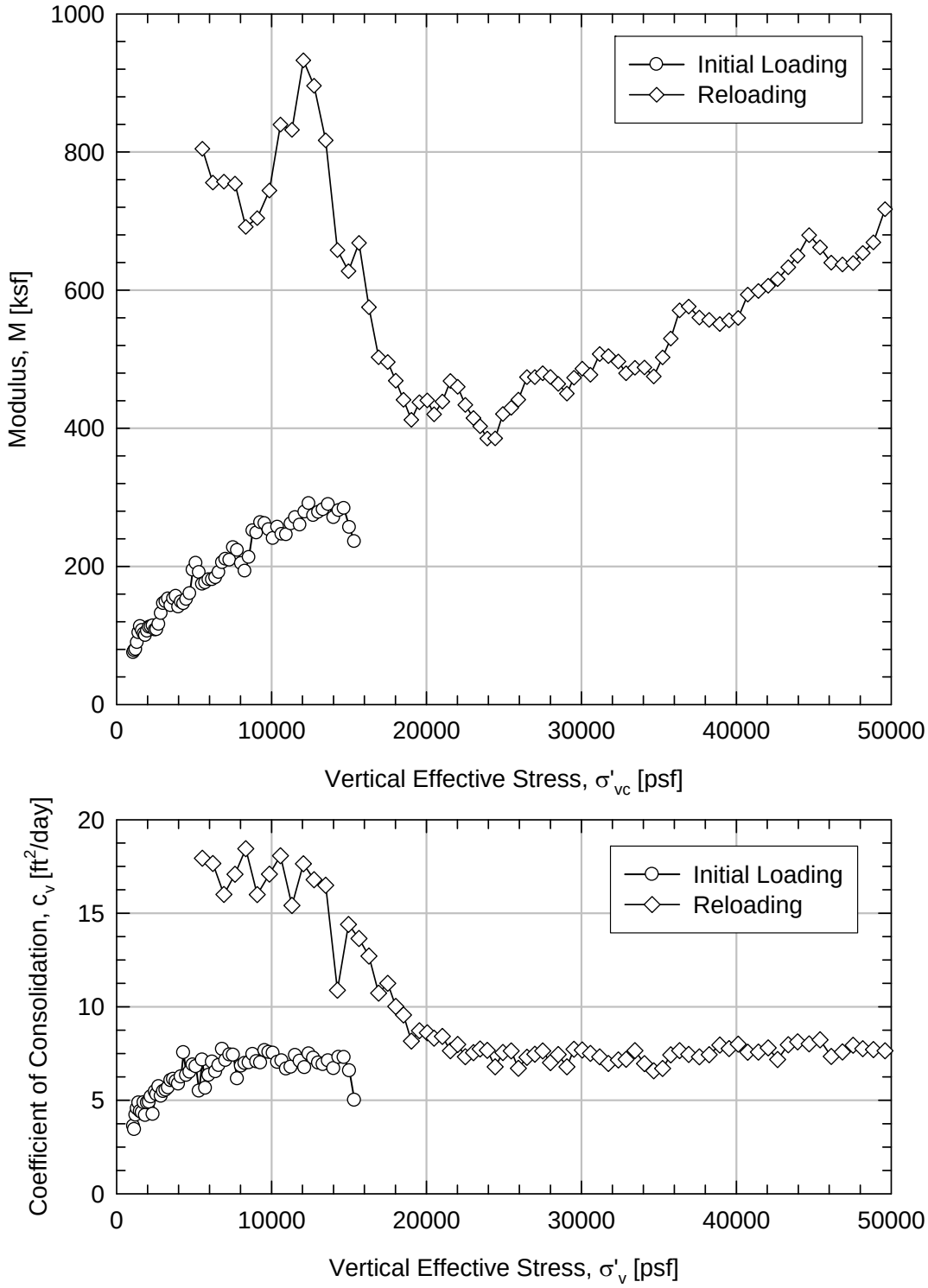

Figure 5.3.8 Modulus and coefficient of consolidation versus vertical effective stress for test CRS147 on sample AAB-02-22A UP-1 43-45 ft.

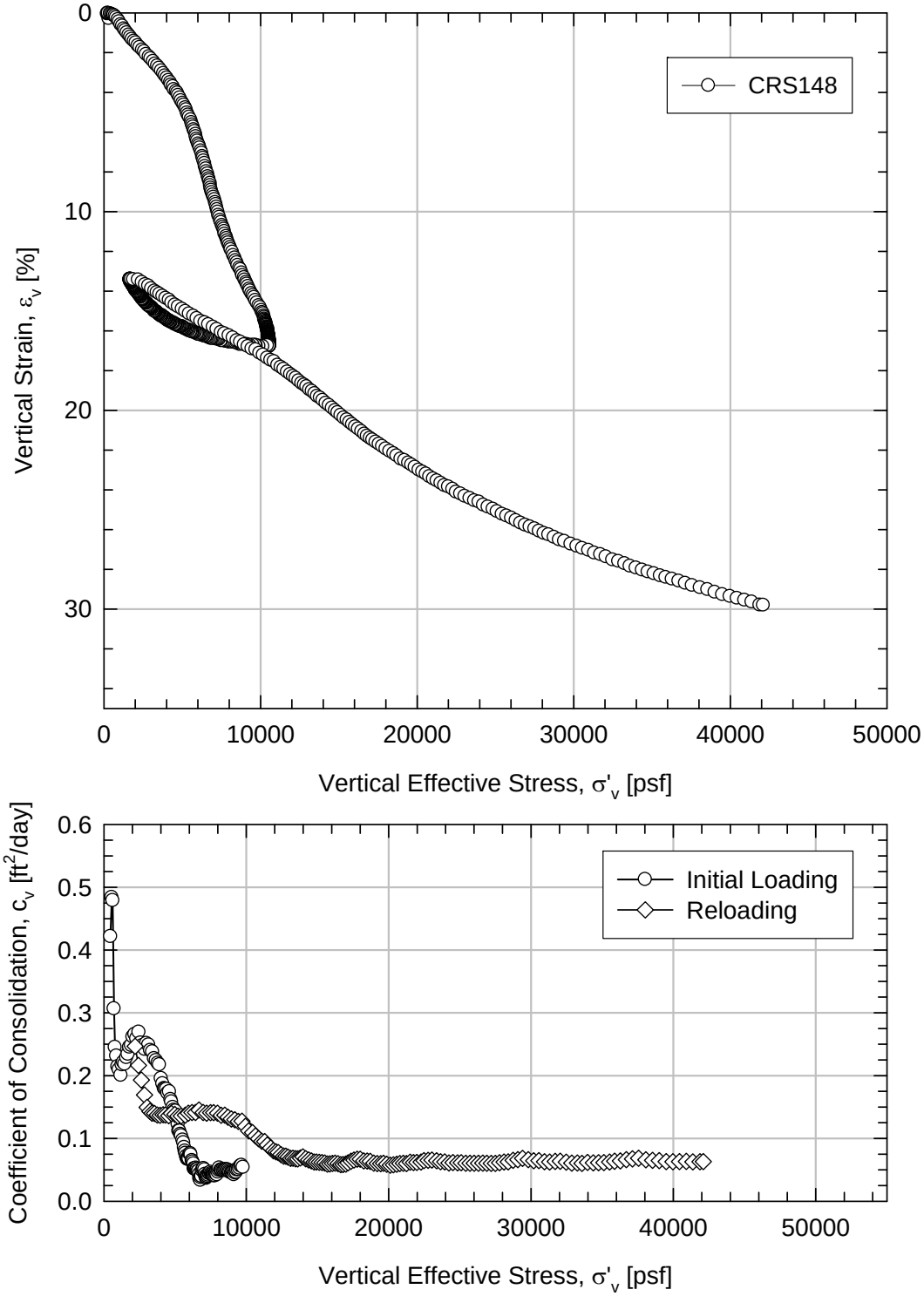

Figure 5.3.9 Vertical strain and coefficient of consolidation versus vertical effective stress for test CRS148 on sample AAB-03-36 UP-2 38-40 ft.

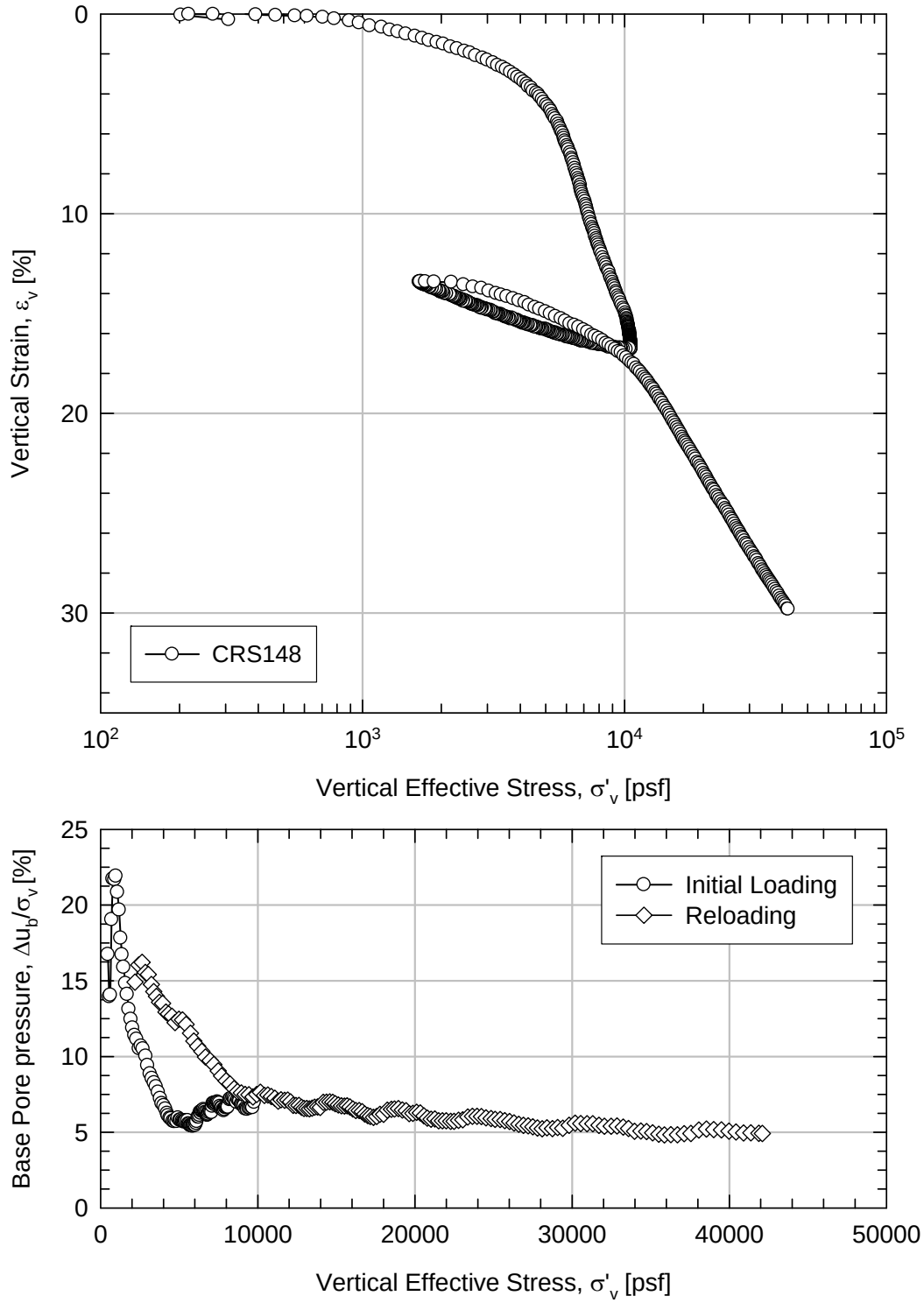

Figure 5.3.10 Vertical strain and normalized base pore pressure versus vertical effective stress for test CRS148 on sample AAB-03-36 UP-2 38-40 ft.

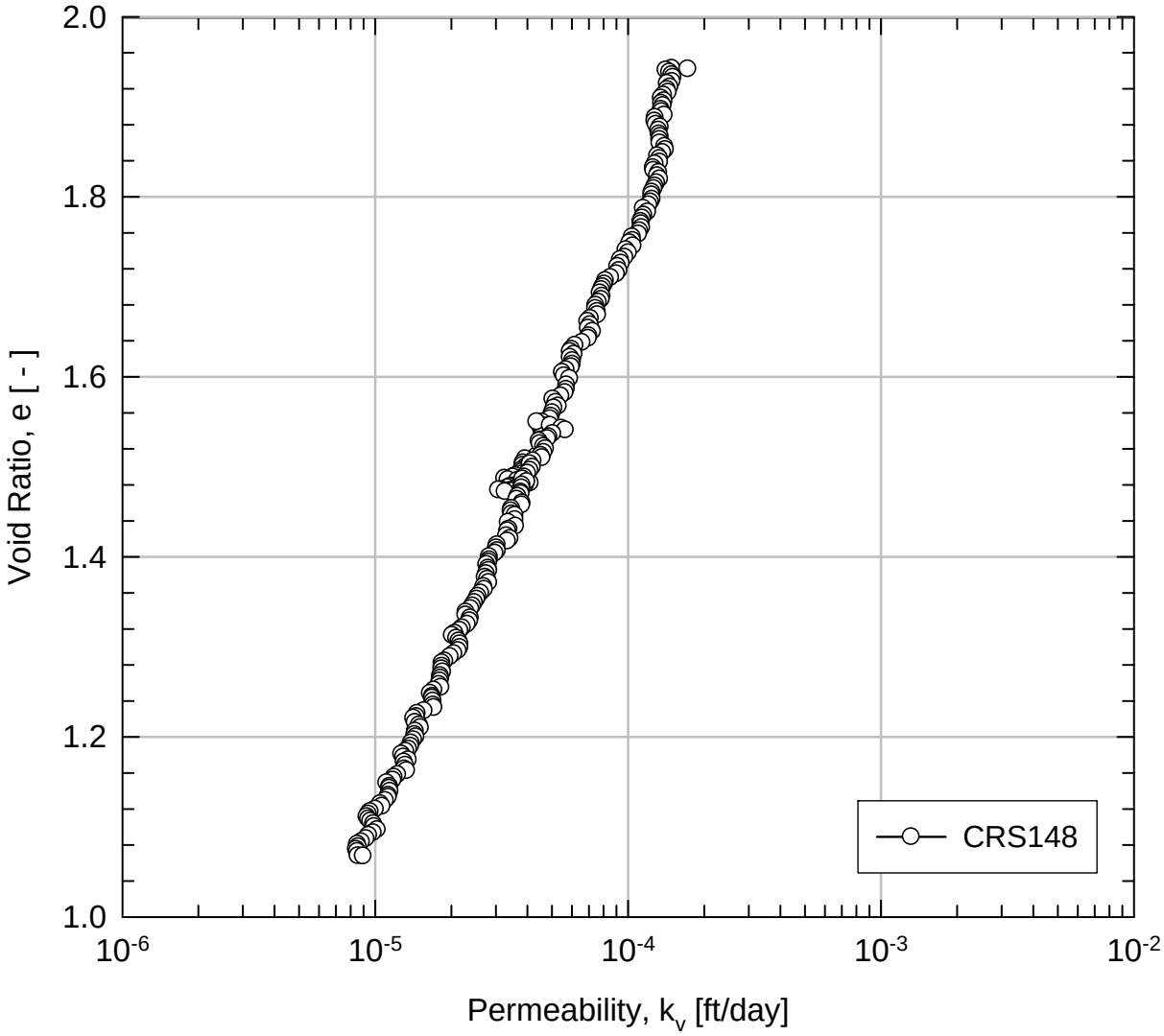

Figure 5.3.11 Void ratio versus permeability for CRS148 on sample AAB-03-36 UP-2 38-40 ft.

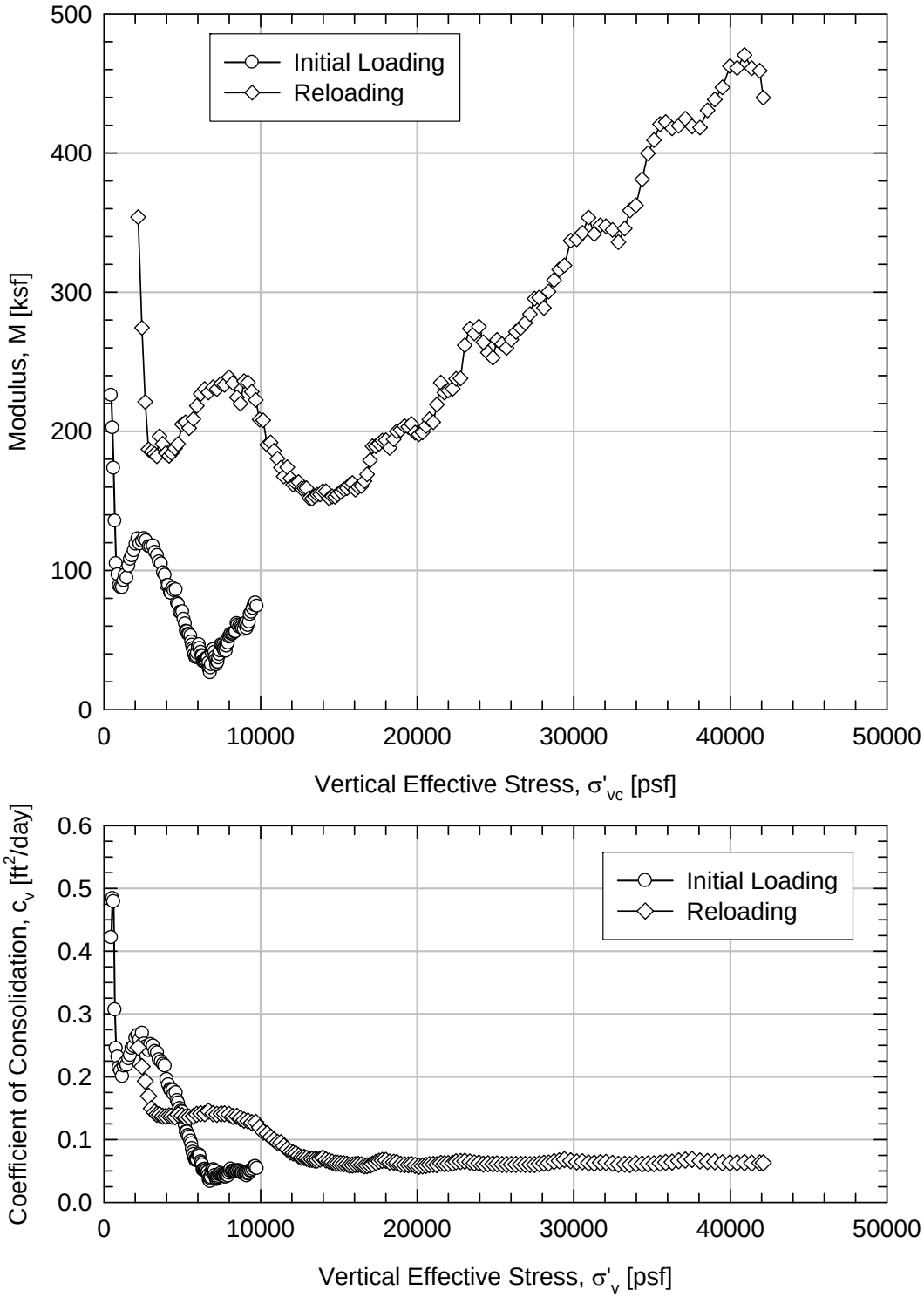

Figure 5.3.12 Modulus and coefficient of consolidation versus vertical effective stress for test CRS148 on sample AAB-03-36 UP-2 38-40 ft.

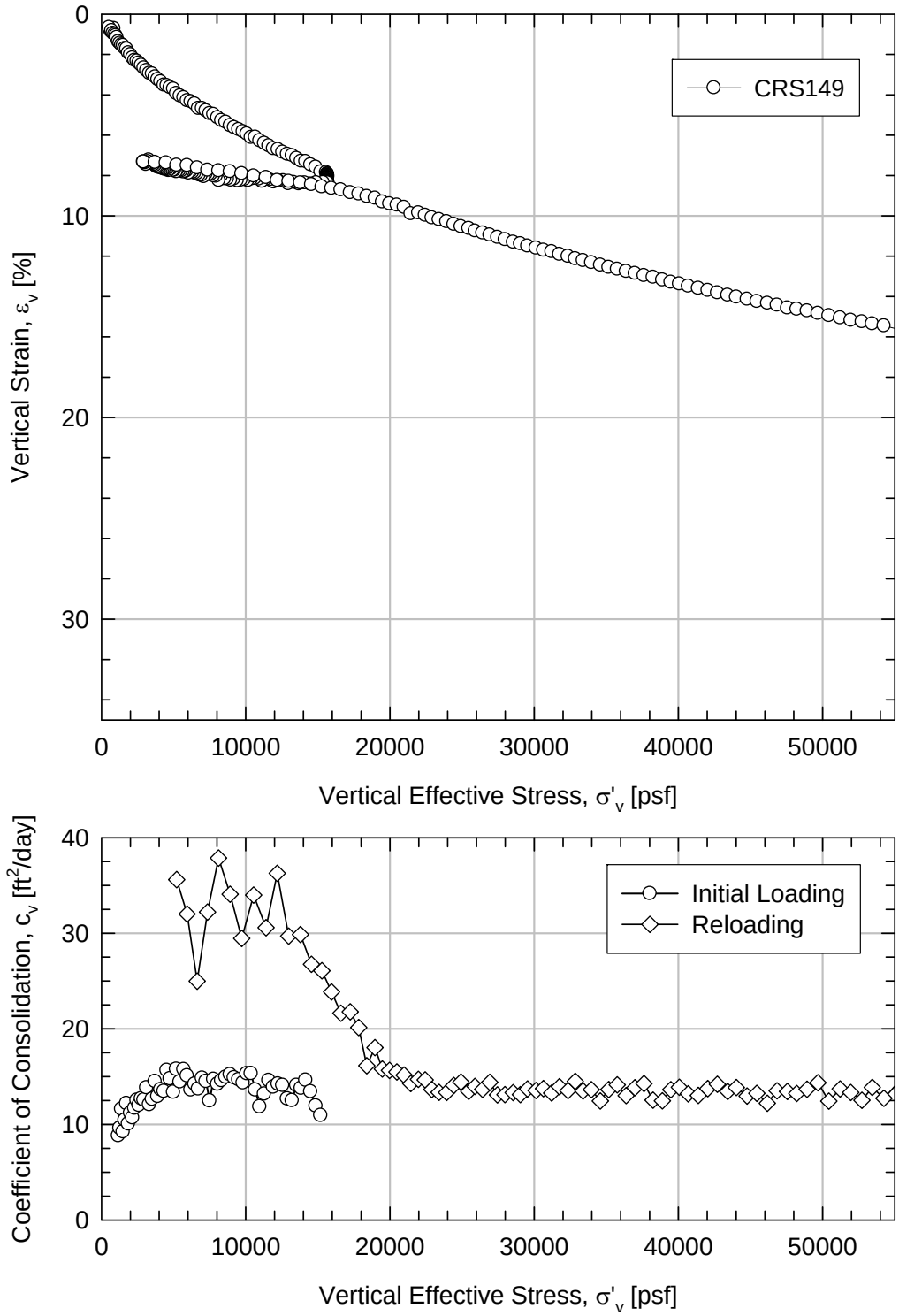

Figure 5.3.13 Vertical strain and coefficient of consolidation versus vertical effective stress for test CRS149 on sample AARW-10-40 UP-2 98-100 ft.

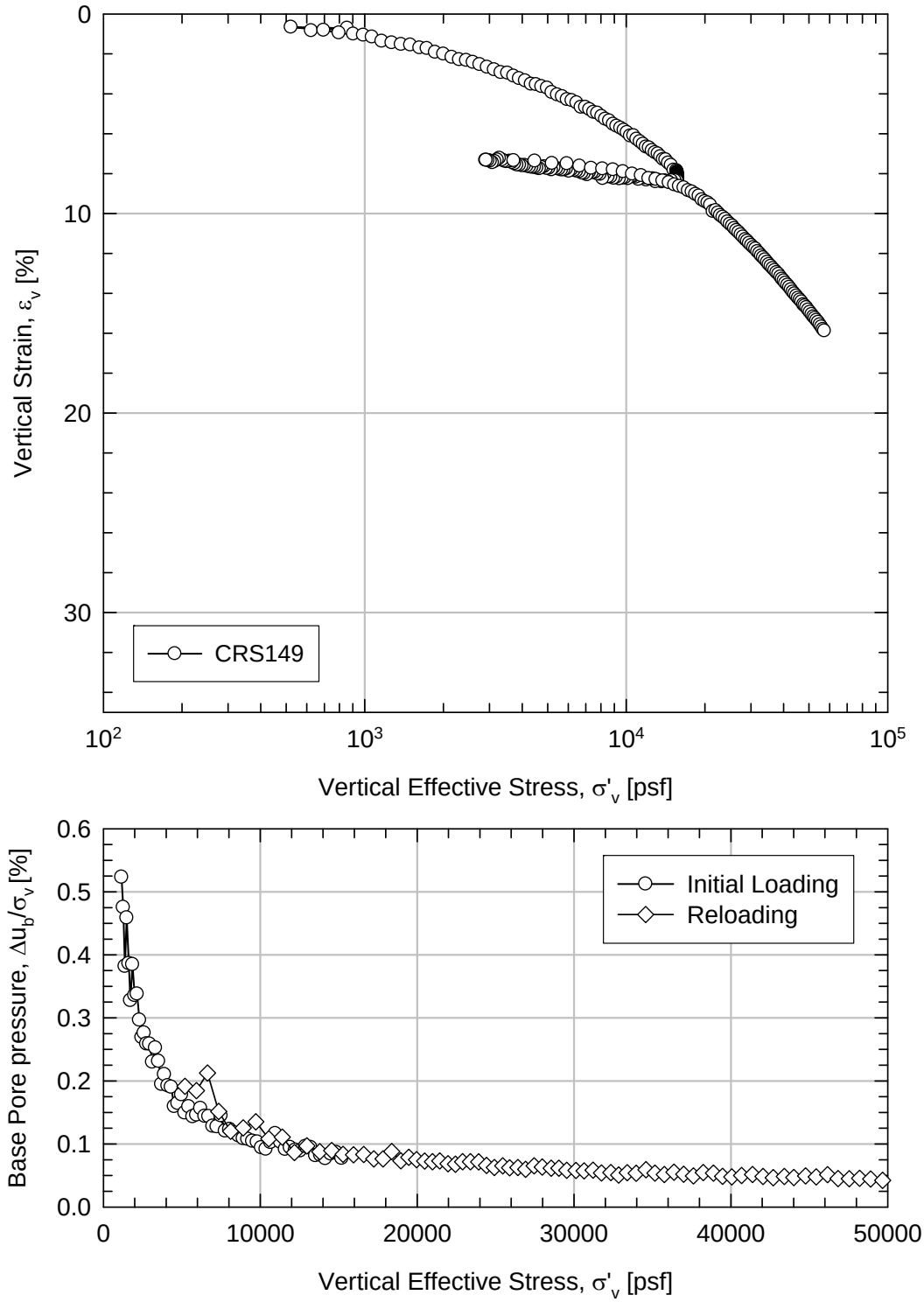

Figure 5.3.14 Vertical strain and normalized base pore pressure versus vertical effective stress for test CRS149 on sample AARW-10-40 UP-2 98-100 ft.

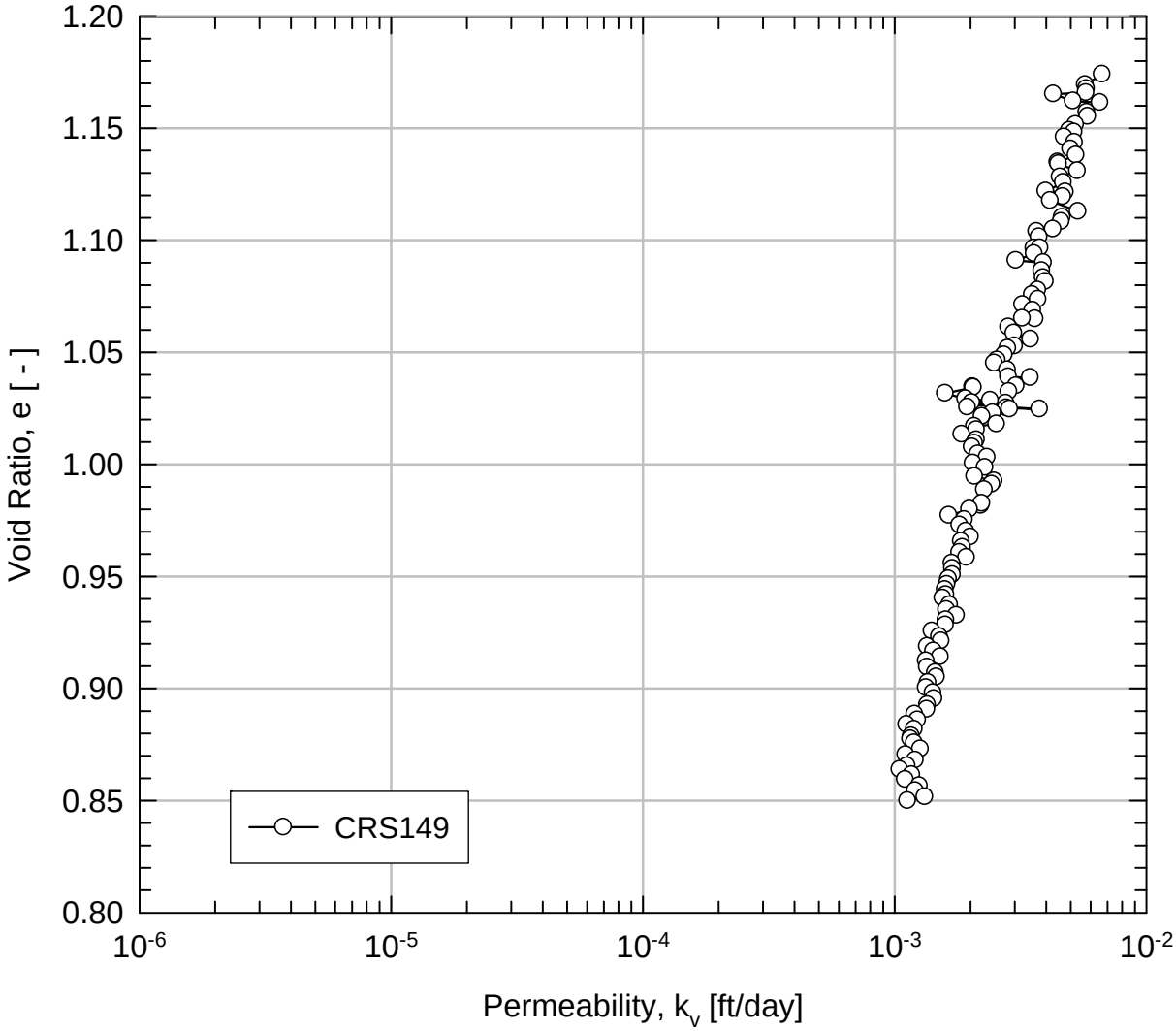

Figure 5.3.15 Void ratio versus permeability for CRS149 on sample AARW-10-40 UP-2 98-100 ft.

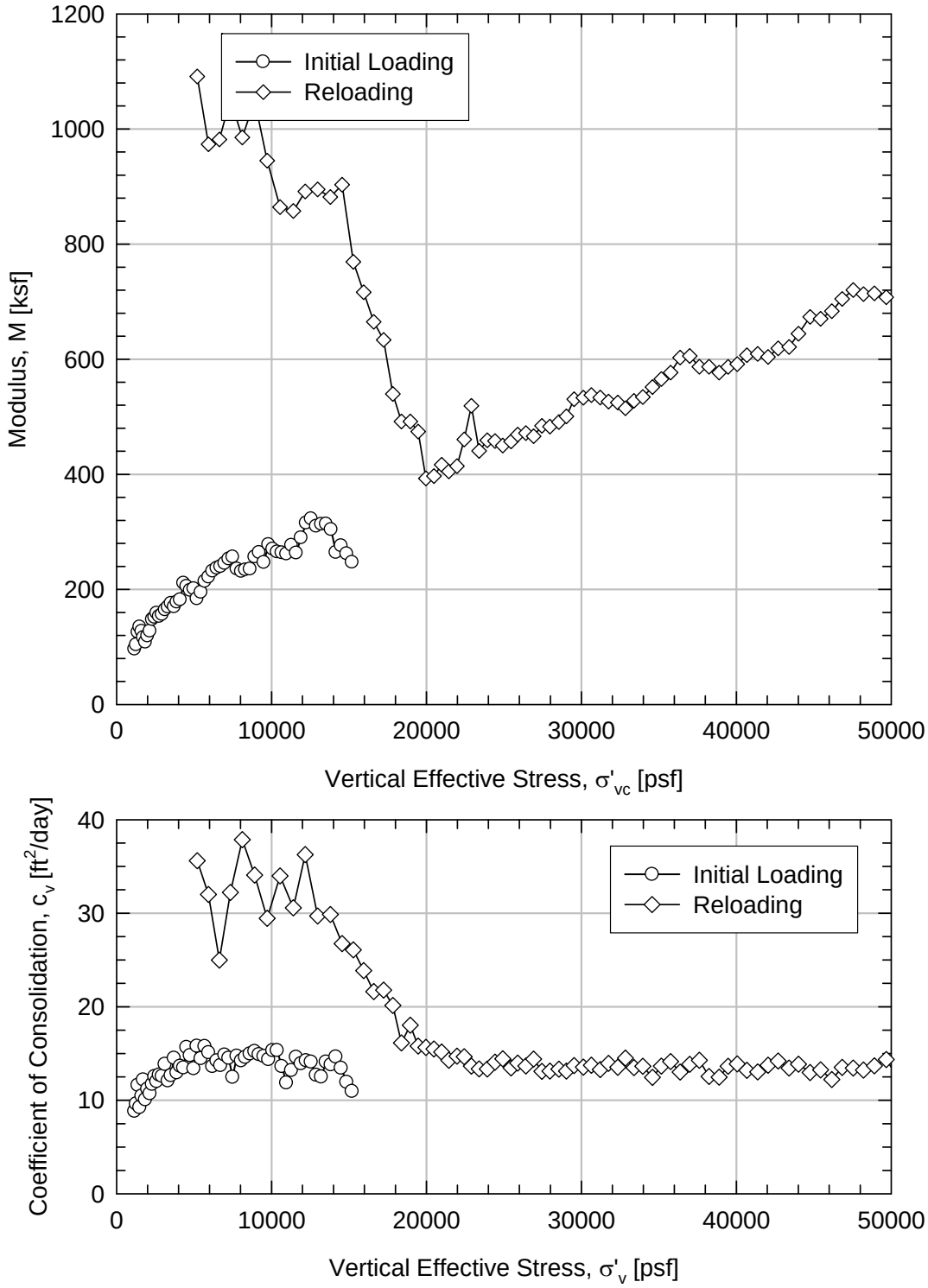

Figure 5.3.16 Modulus and coefficient of consolidation versus vertical effective stress for test CRS149 on sample AARW-10-40 UP-2 98-100 ft.

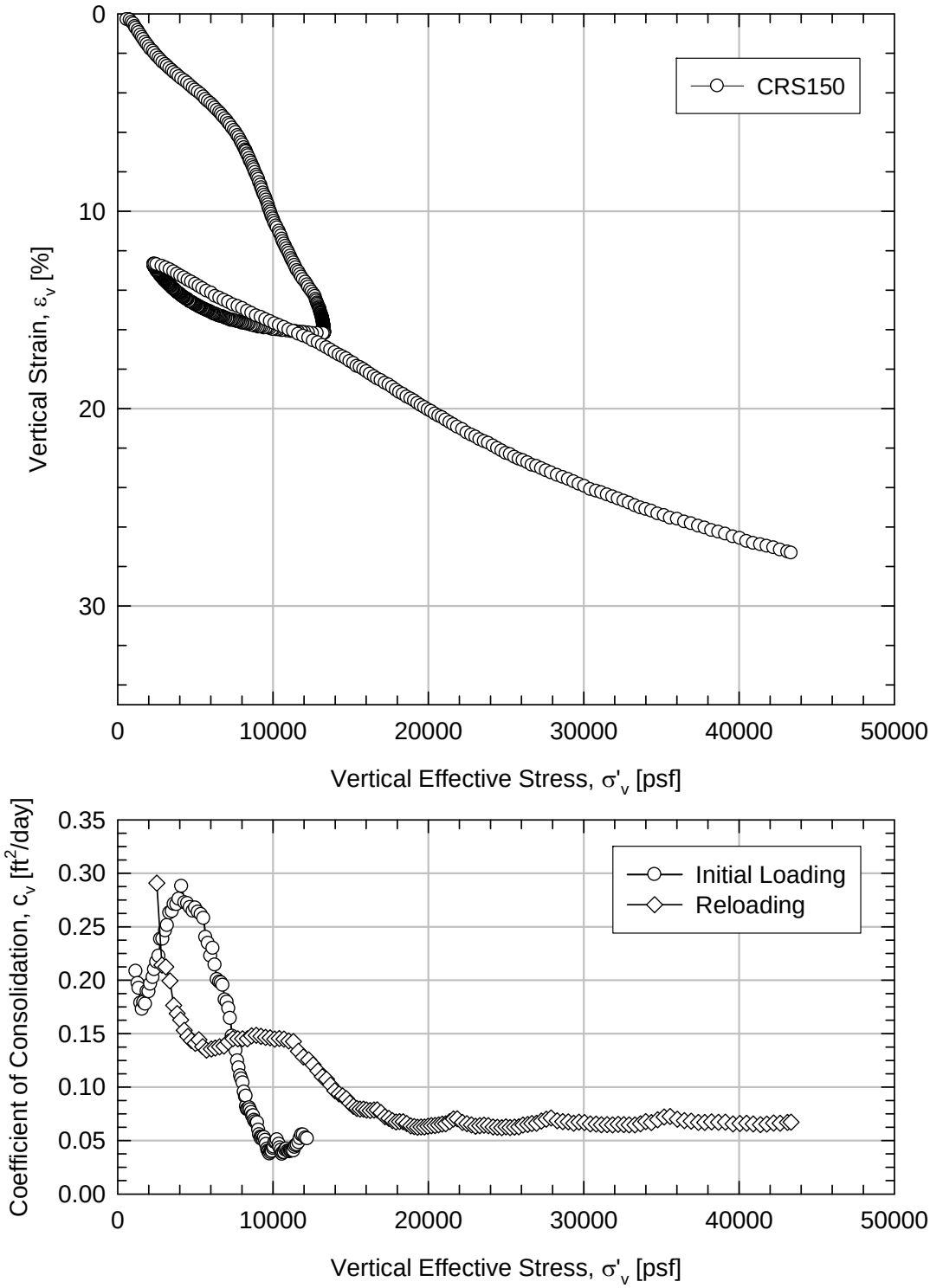

Figure 5.3.17 Vertical strain and coefficient of consolidation versus vertical effective stress for test CRS150 on sample AARW-10-40 UP-1 63-65 ft.

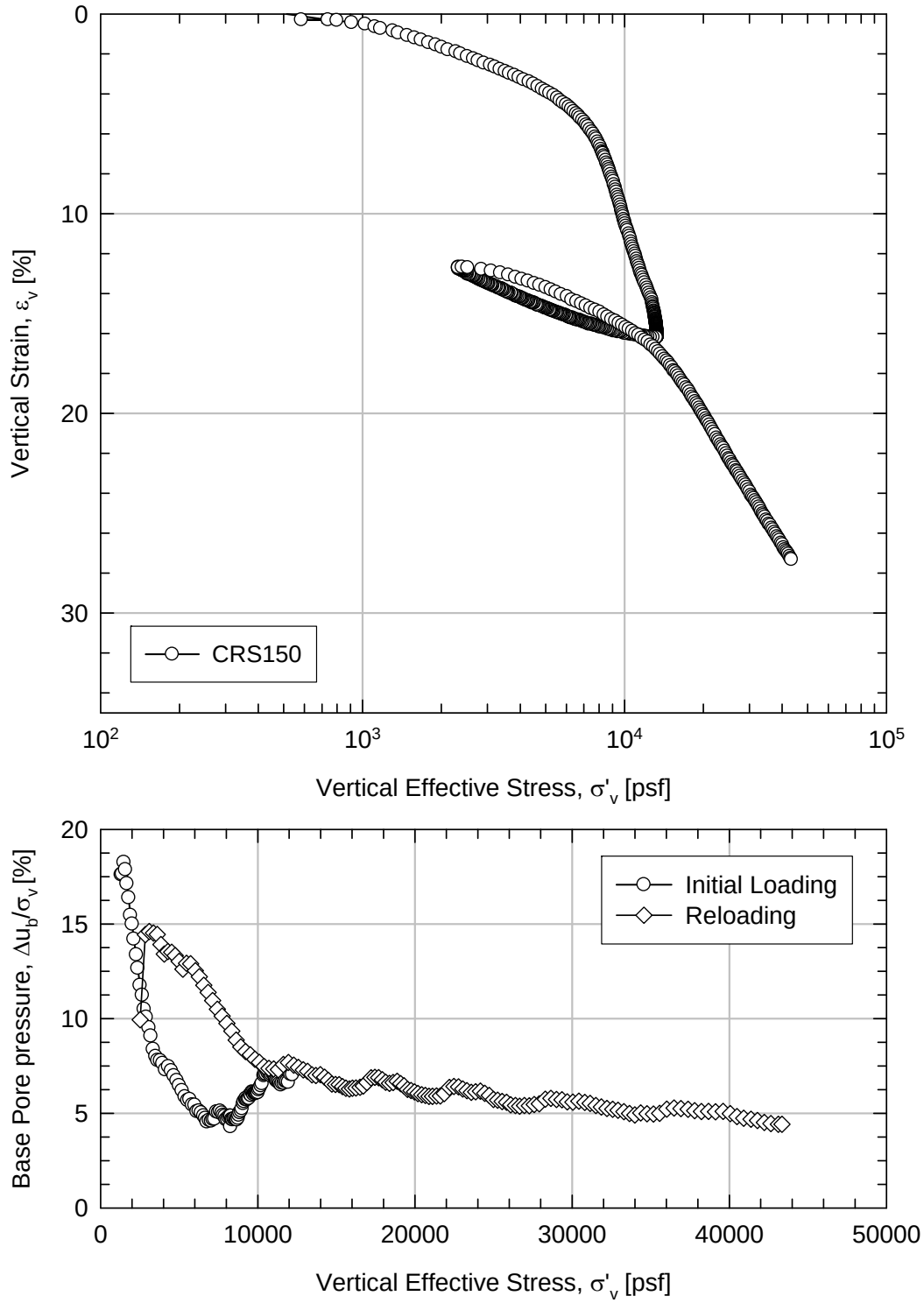

Figure 5.3.18 Vertical strain and normalized base pore pressure versus vertical effective stress for test CRS150 on sample AARW-10-40 UP-1 63-65 ft

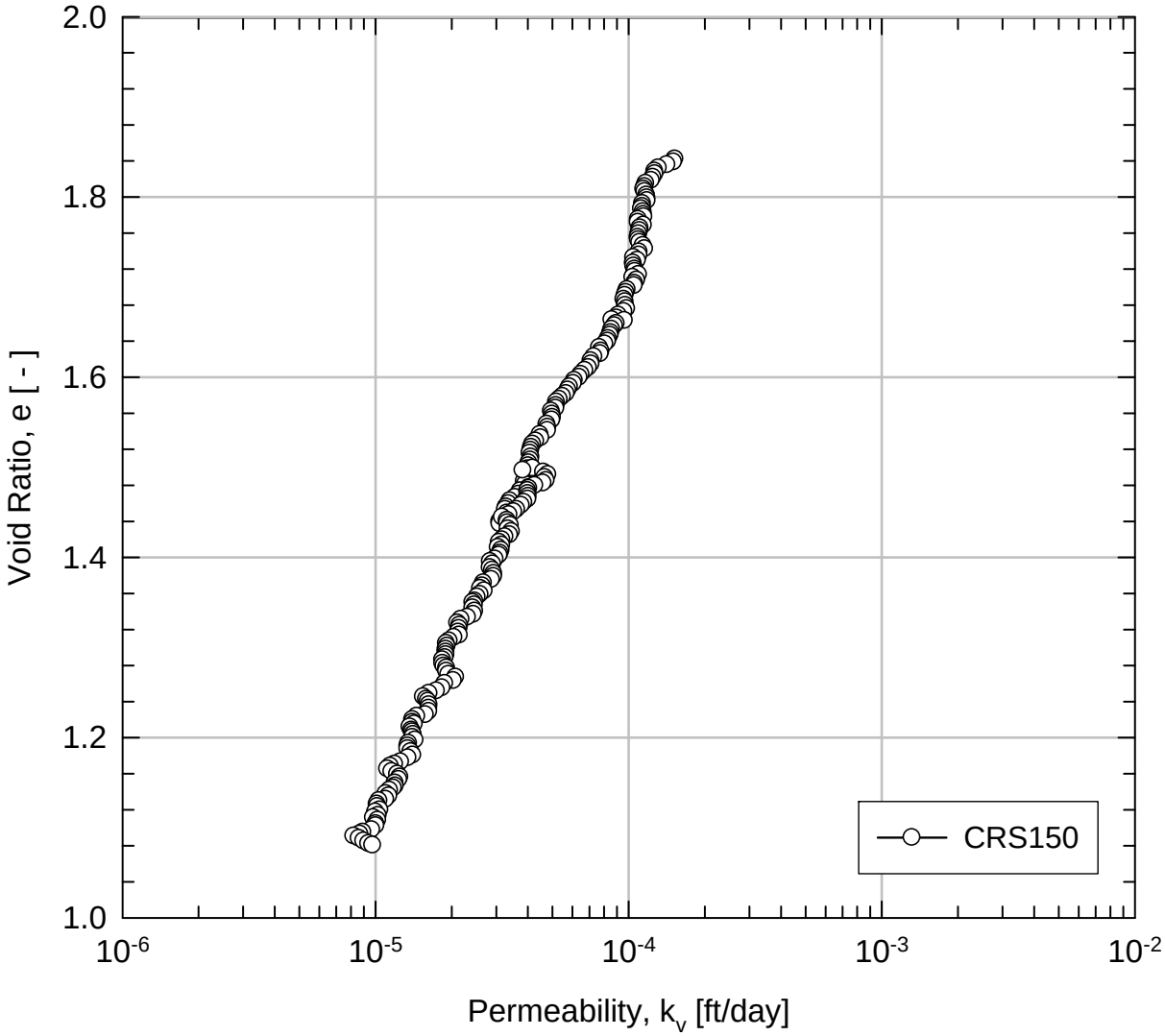

Figure 5.3.19 Void ratio versus permeability for CRS150 on sample AARW-10-40 UP-1 63-65 ft.

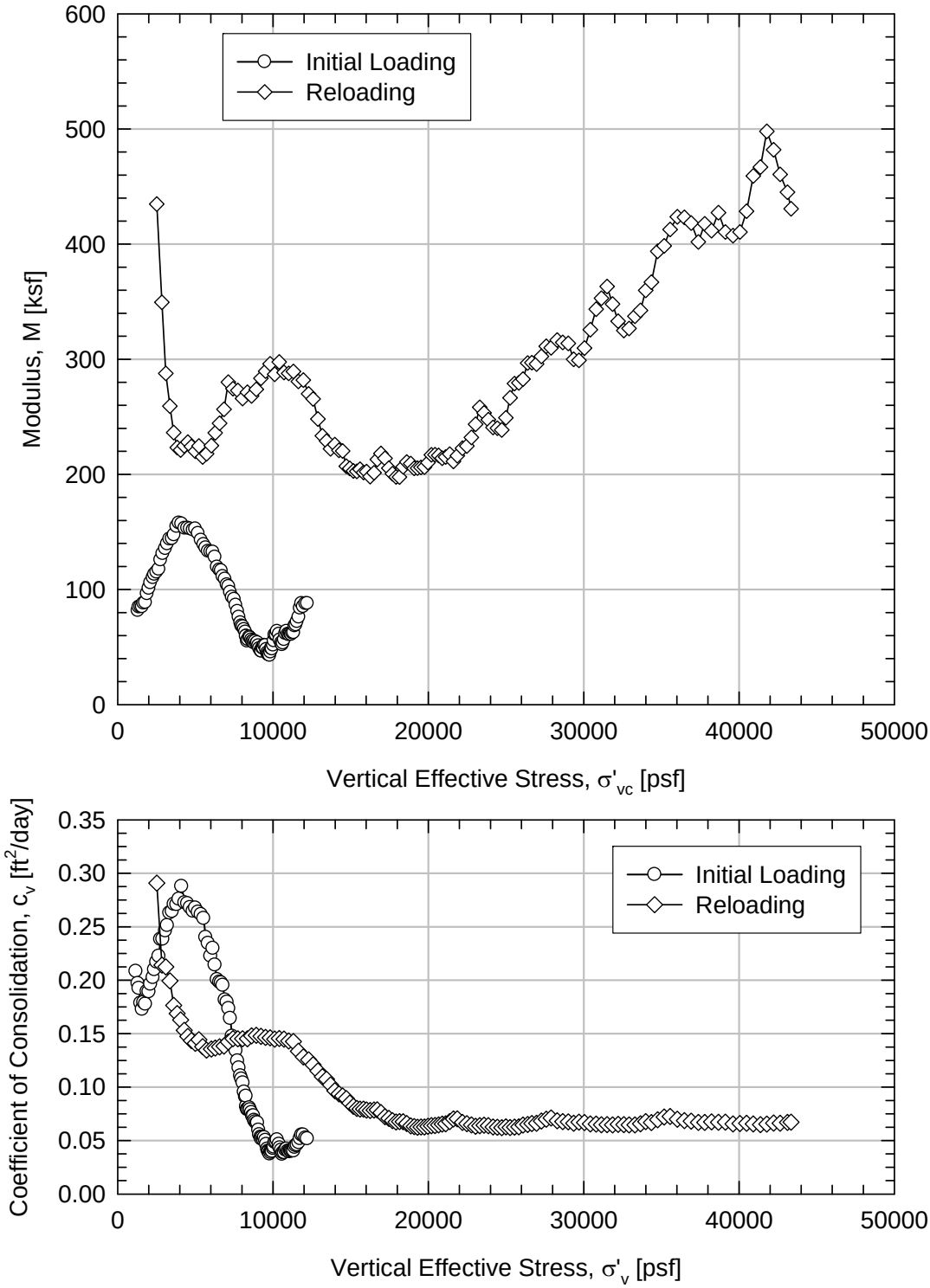

Figure 5.3.20 Modulus and coefficient of consolidation versus vertical effective stress for test CRS150 on sample AARW-10-40 UP-1 63-65 ft

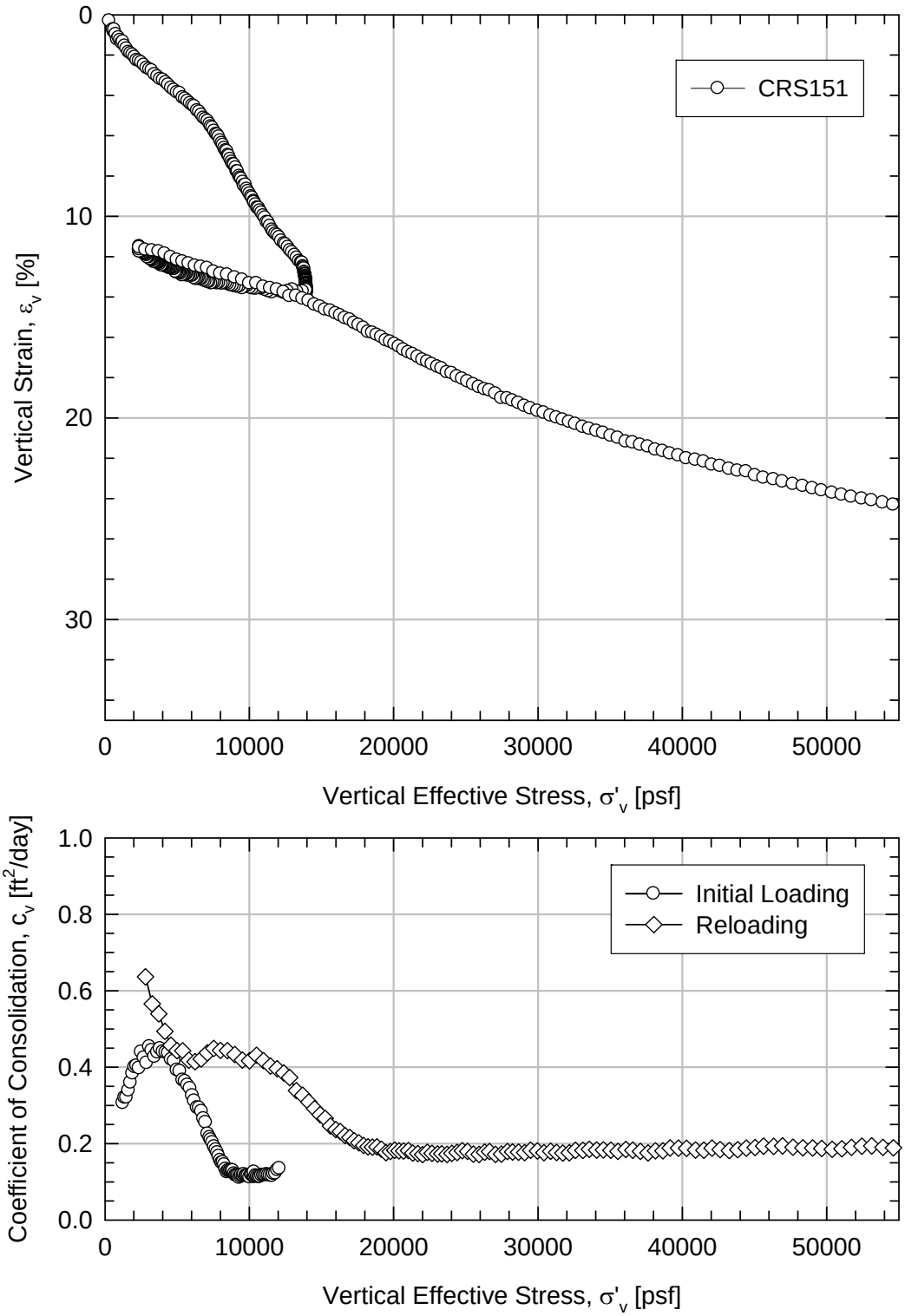

Figure 5.3.21 Vertical strain and coefficient of consolidation versus vertical effective stress for test CRS151 on sample AARW-04-11 UP-2 28-30 ft.

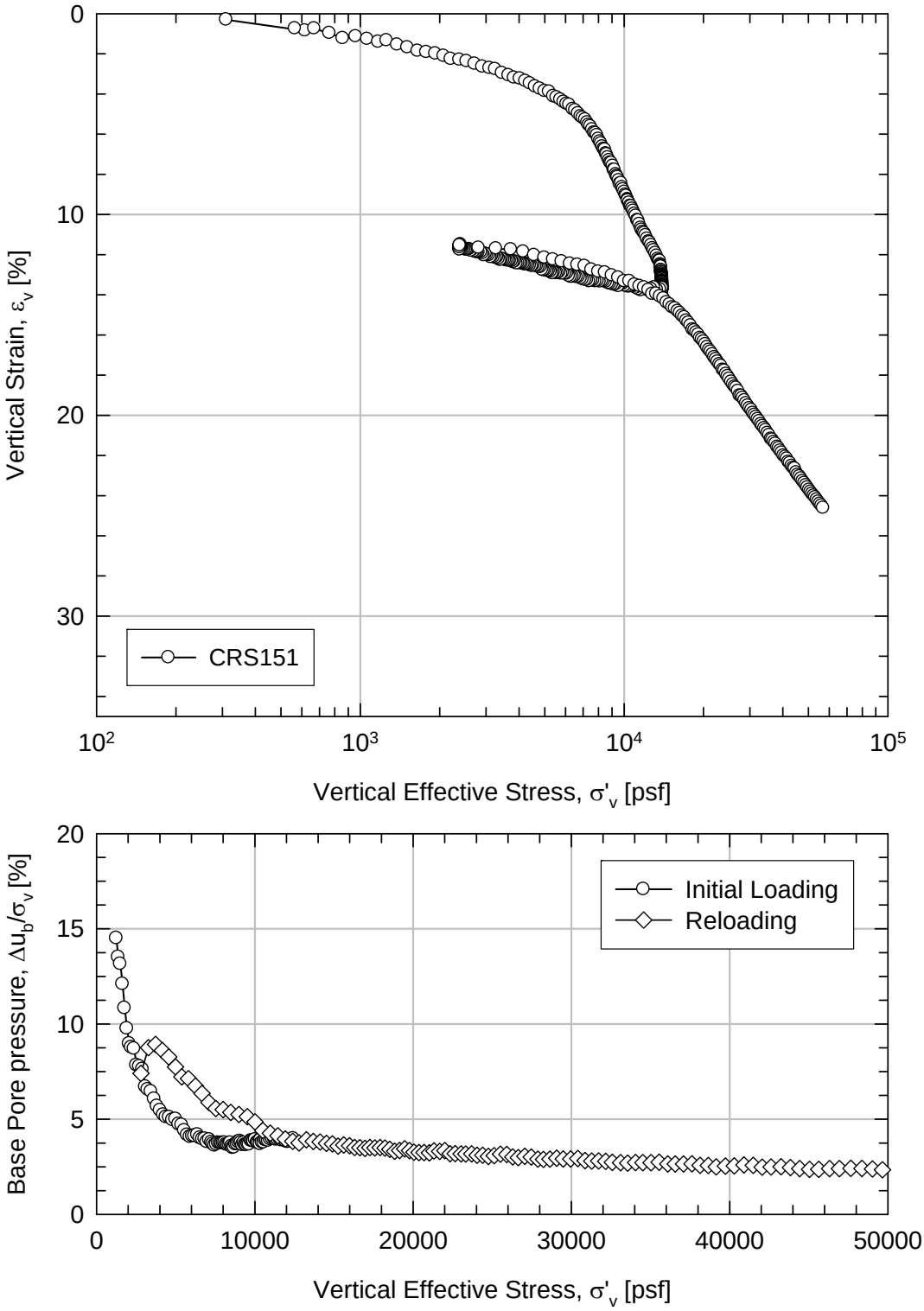

Figure 5.3.22 Vertical strain and normalized base pore pressure versus vertical effective stress for test CRS151 on sample AARW-04-11 UP-2 28-30 ft.

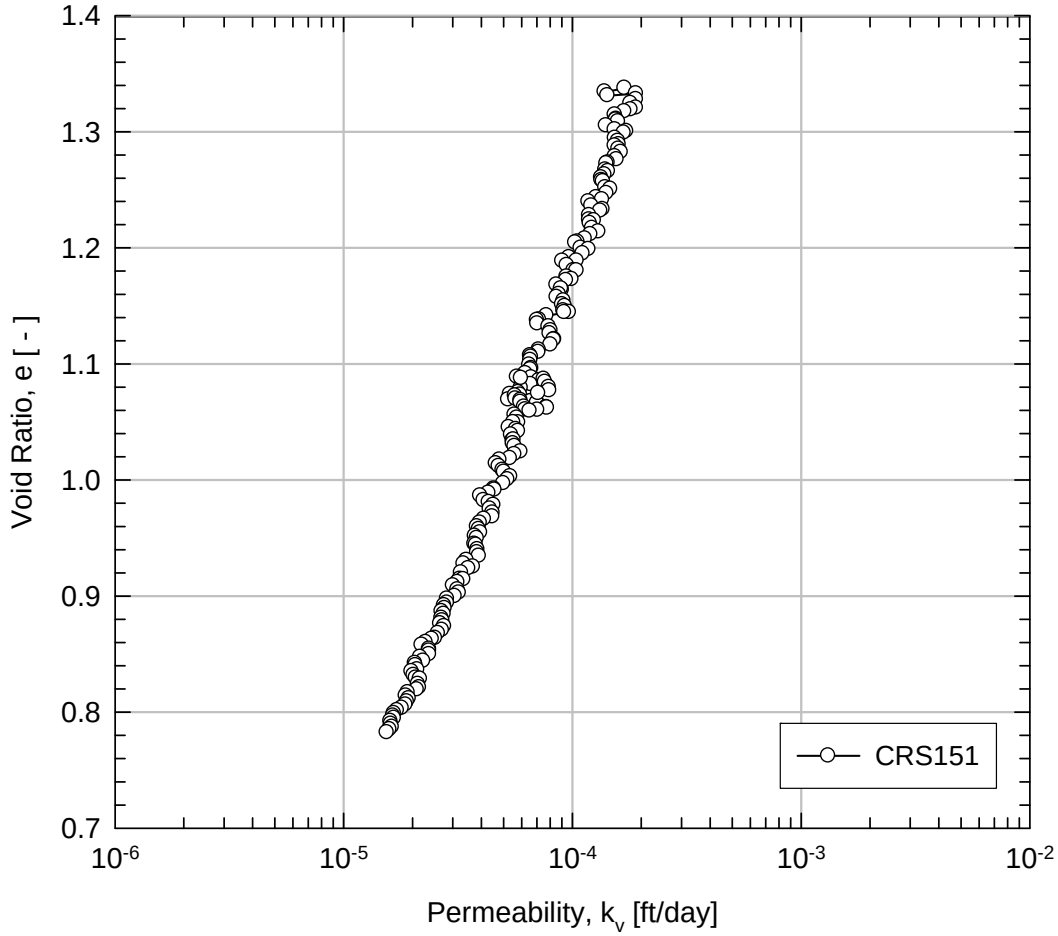

Figure 5.3.23 Void ratio versus permeability for CRS151 on sample AARW-04-11 UP-2 28-30 ft.

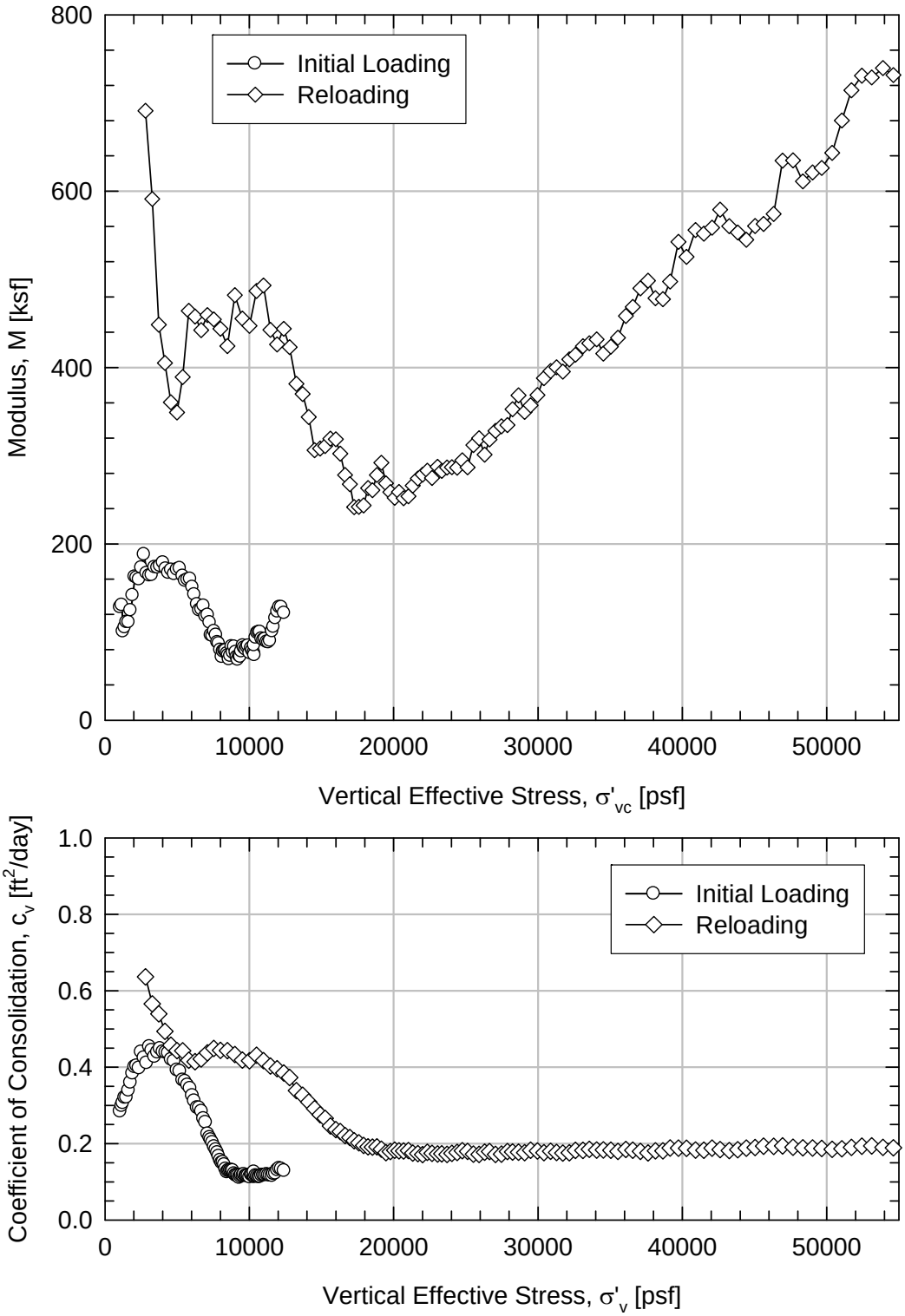

Figure 5.3.24 Modulus and coefficient of consolidation versus vertical effective stress for test CRS151 on sample AARW-04-11 UP-2 28-30 ft.

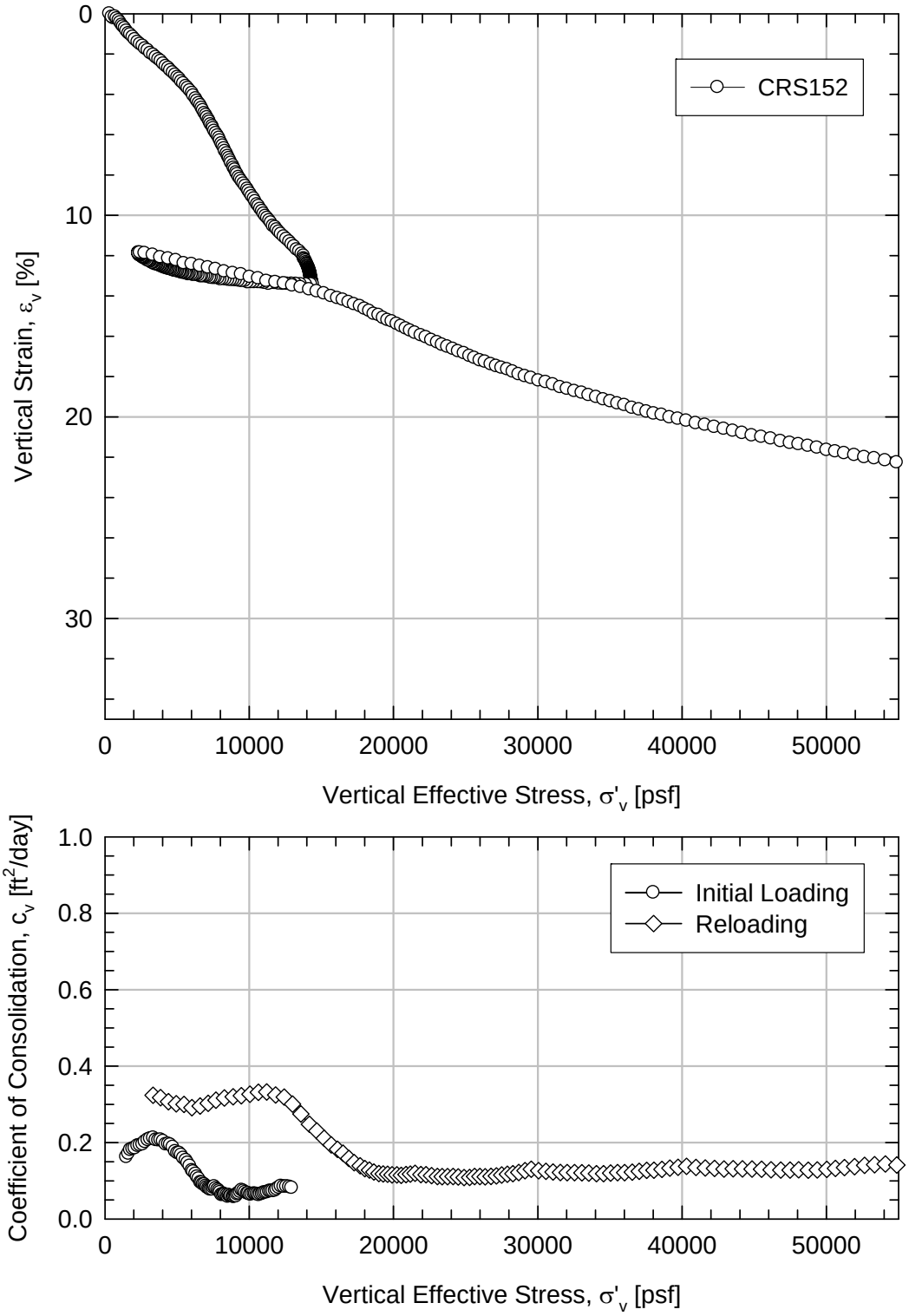

Figure 5.3.25 Vertical strain and coefficient of consolidation versus vertical effective stress for test CRS152 on sample AARW-01-04 UP-2 43-45 ft.

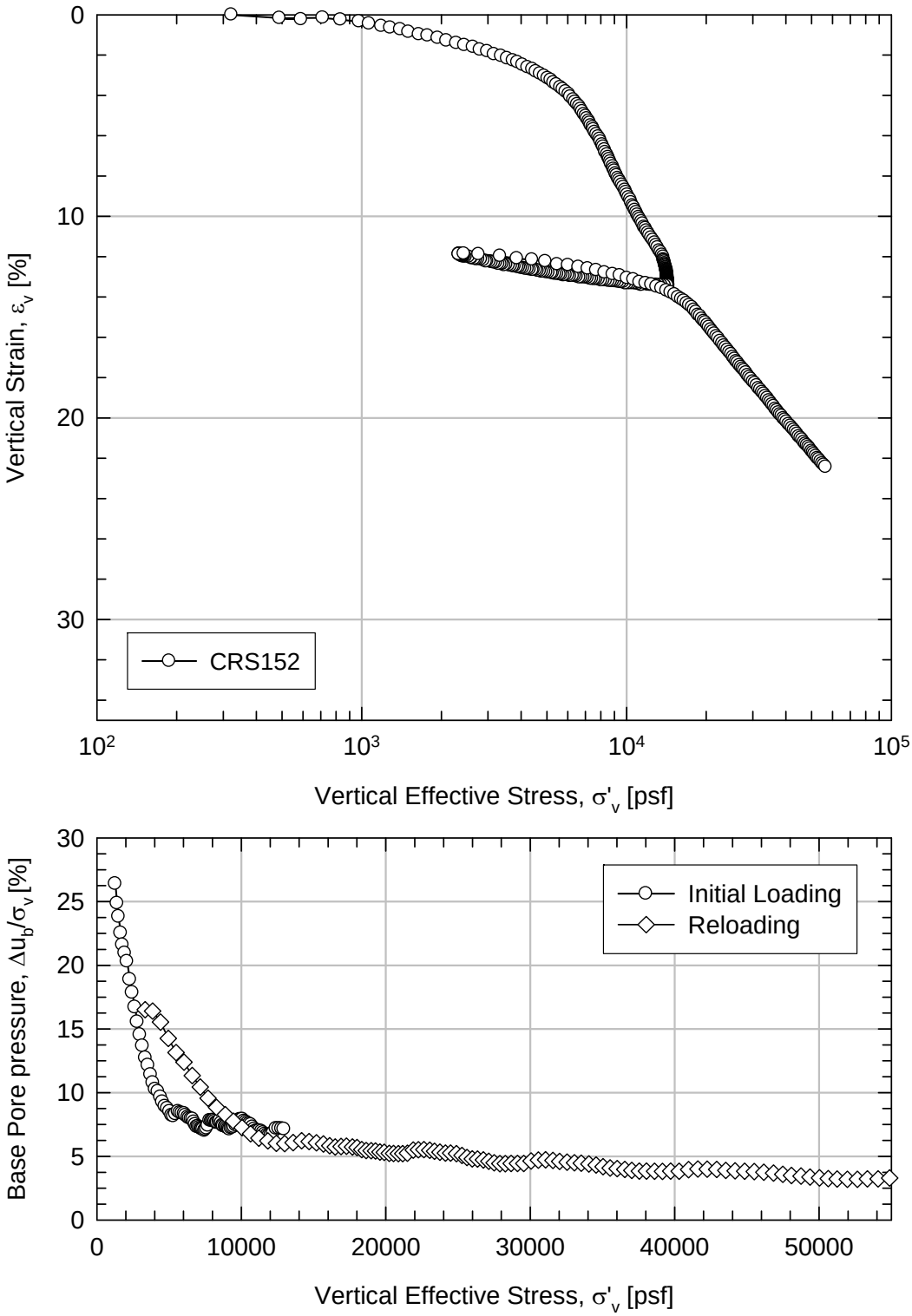

Figure 5.3.26 Vertical strain and normalized base pore pressure versus vertical effective stress for test CRS152 on sample AARW-01-04 UP-2 43-45 ft.

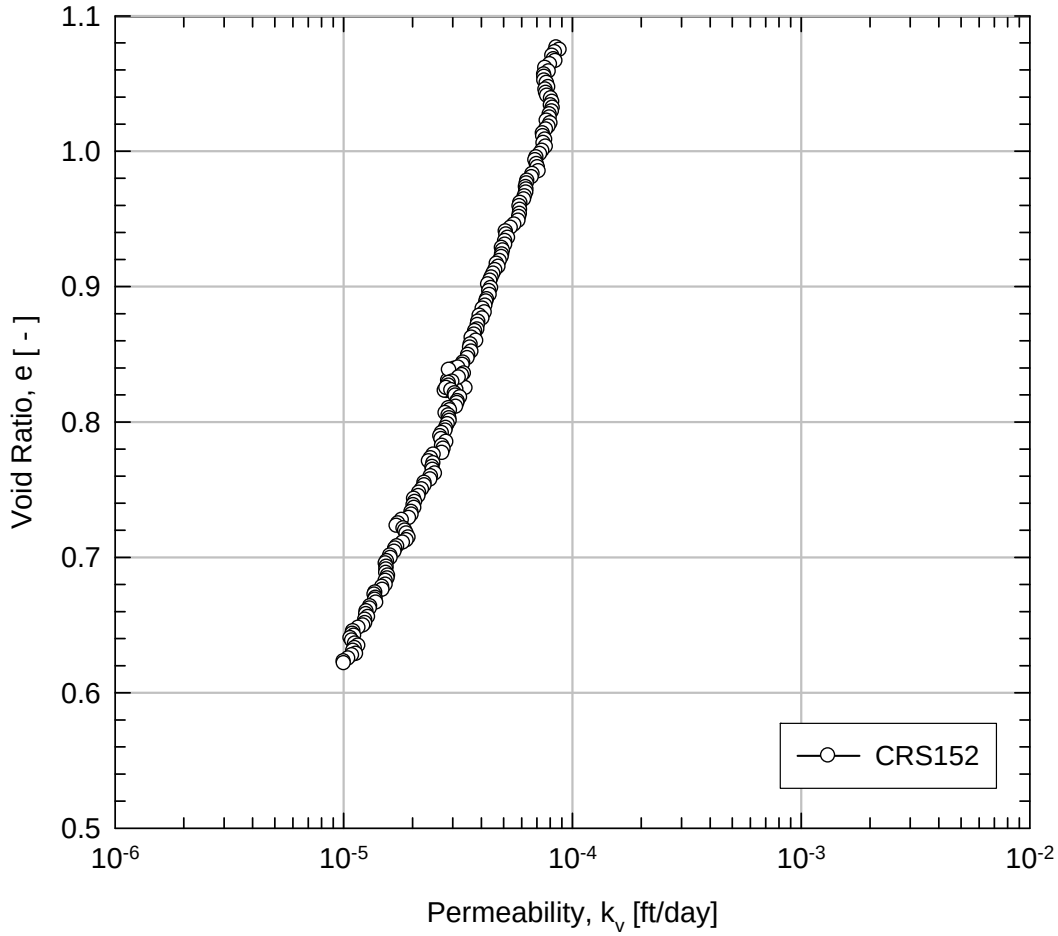

Figure 5.3.27 Void ratio versus permeability for CRS152 on sample AARW-01-04 UP-2 43-45 ft.

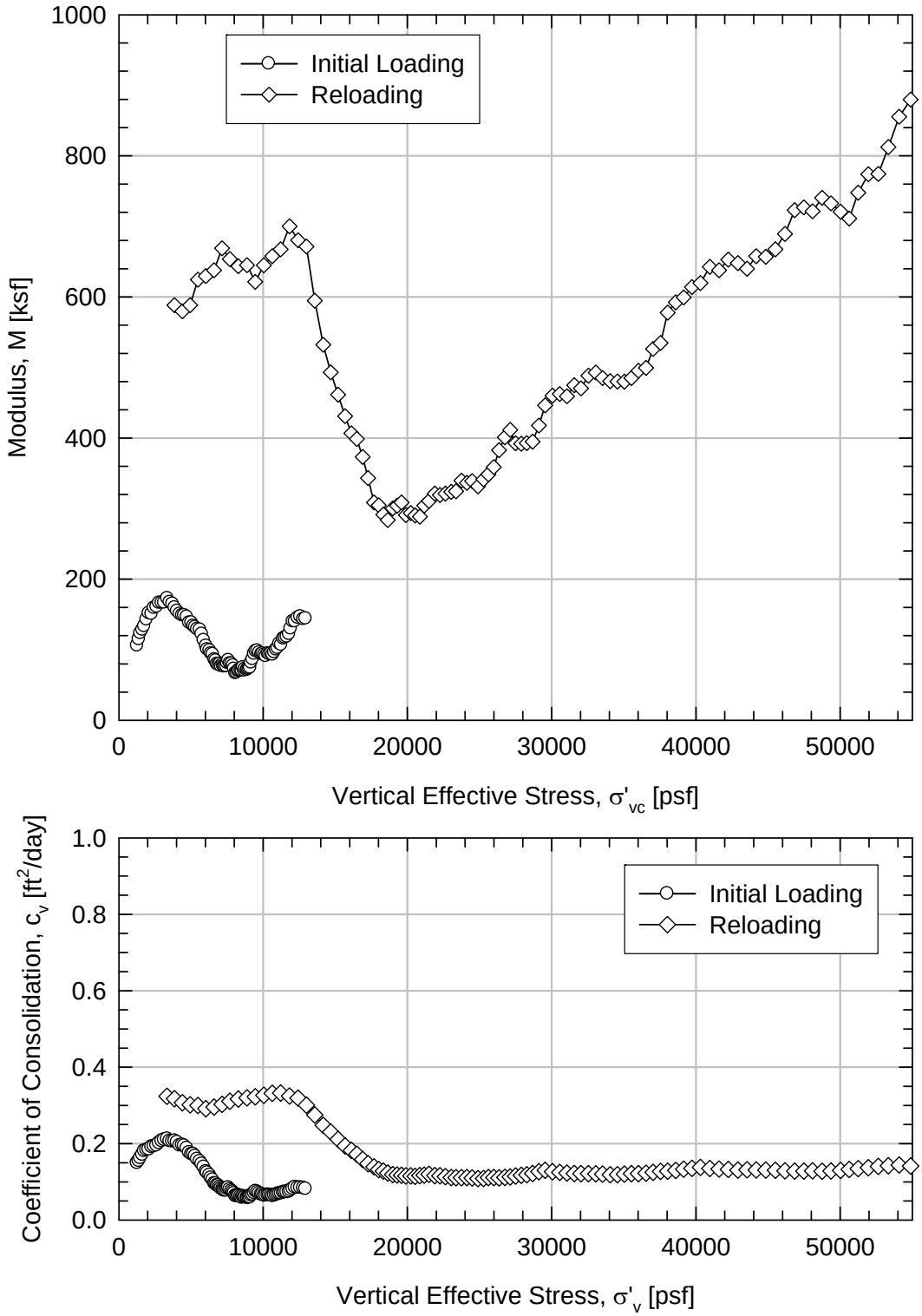

Figure 5.3.28 Modulus and coefficient of consolidation versus vertical effective stress for test CRS152 on sample AARW-01-04 UP-2 43-45 ft.

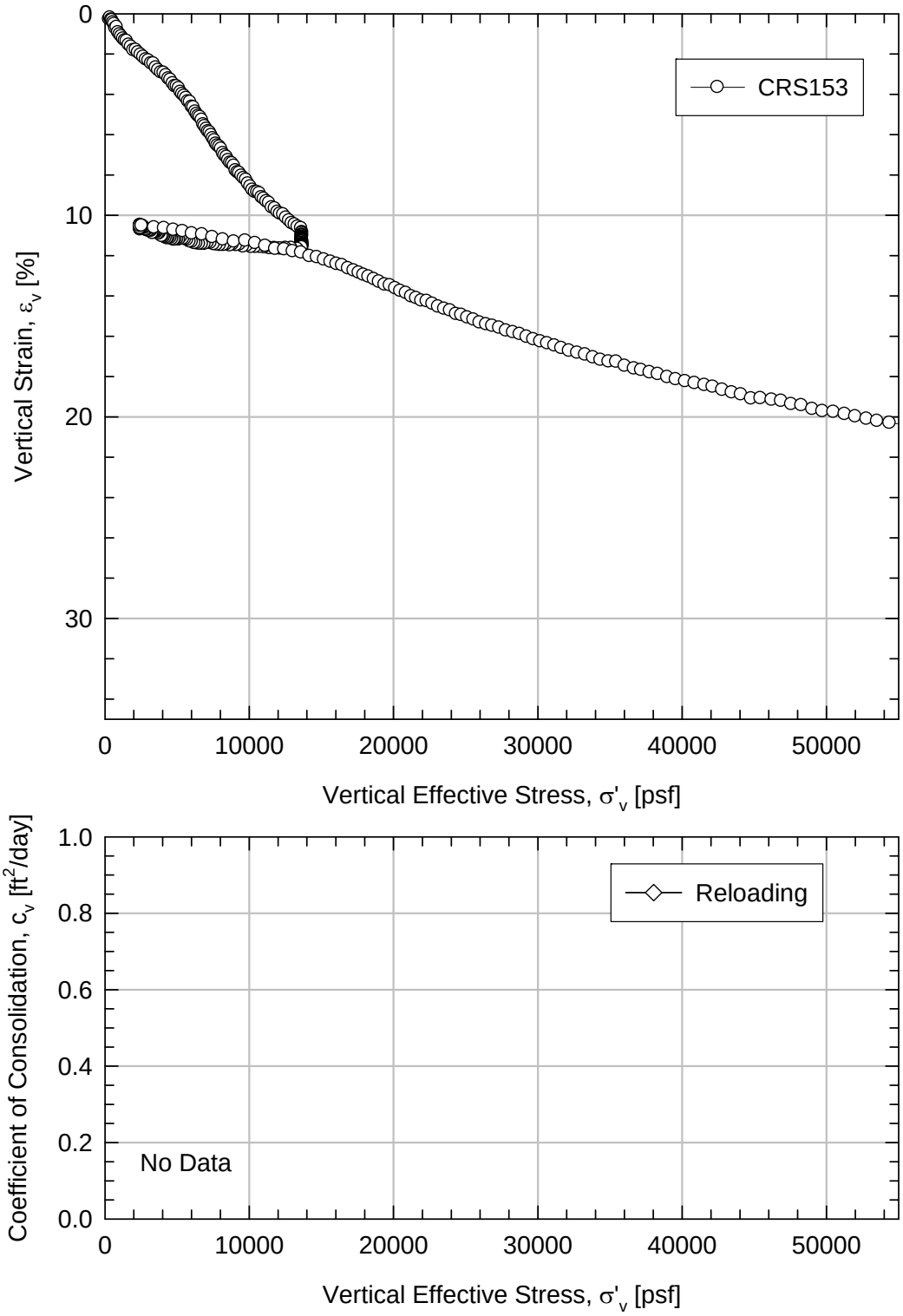

Figure 5.3.29 Vertical strain and coefficient of consolidation versus vertical effective stress for test CRS153 on sample AAB-01-16 UP-1 13-15 ft.

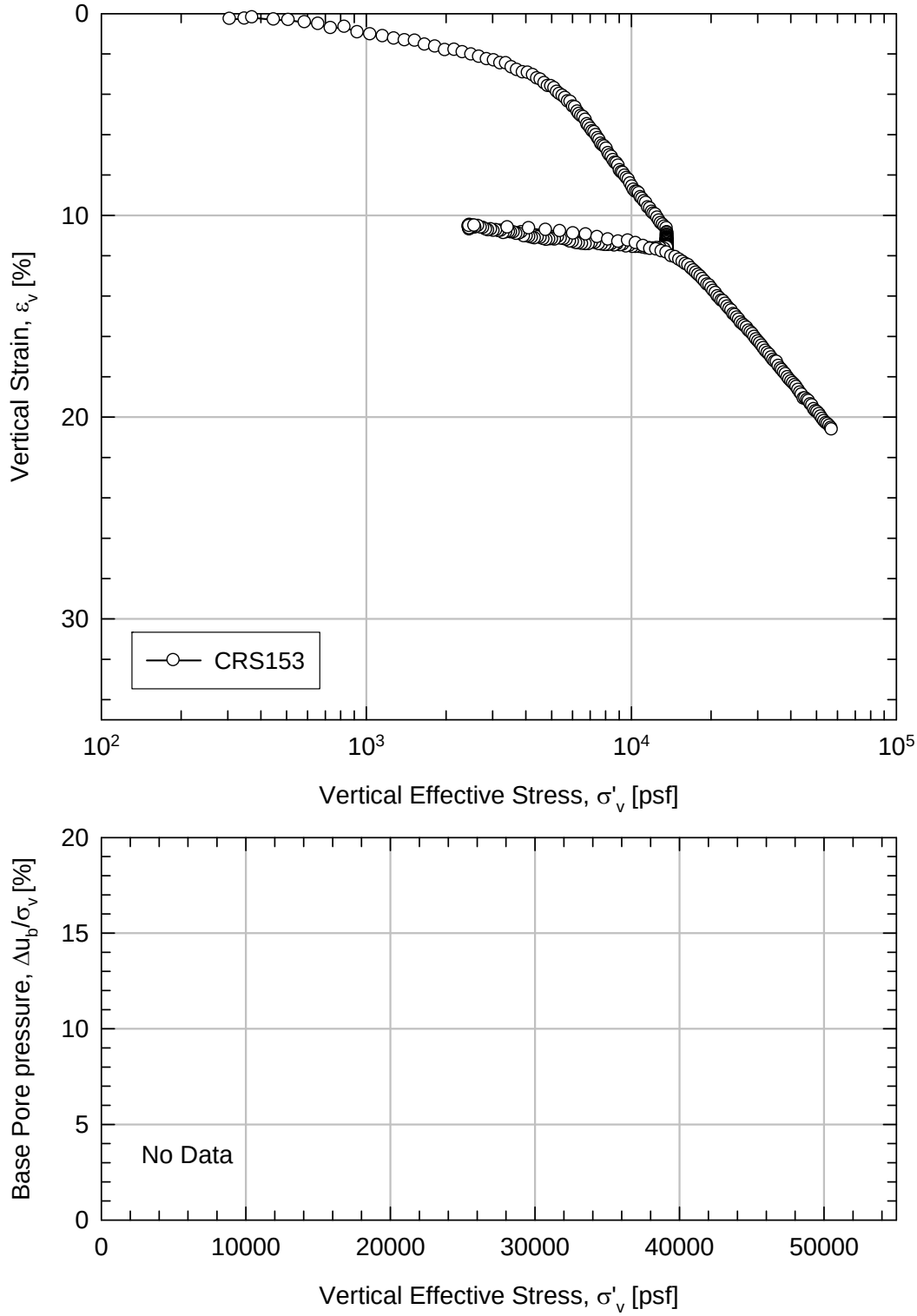

Figure 5.3.30 Vertical strain and normalized base pore pressure versus vertical effective stress for test CRS153 on sample AAB-01-16 UP-1 13-15 ft.

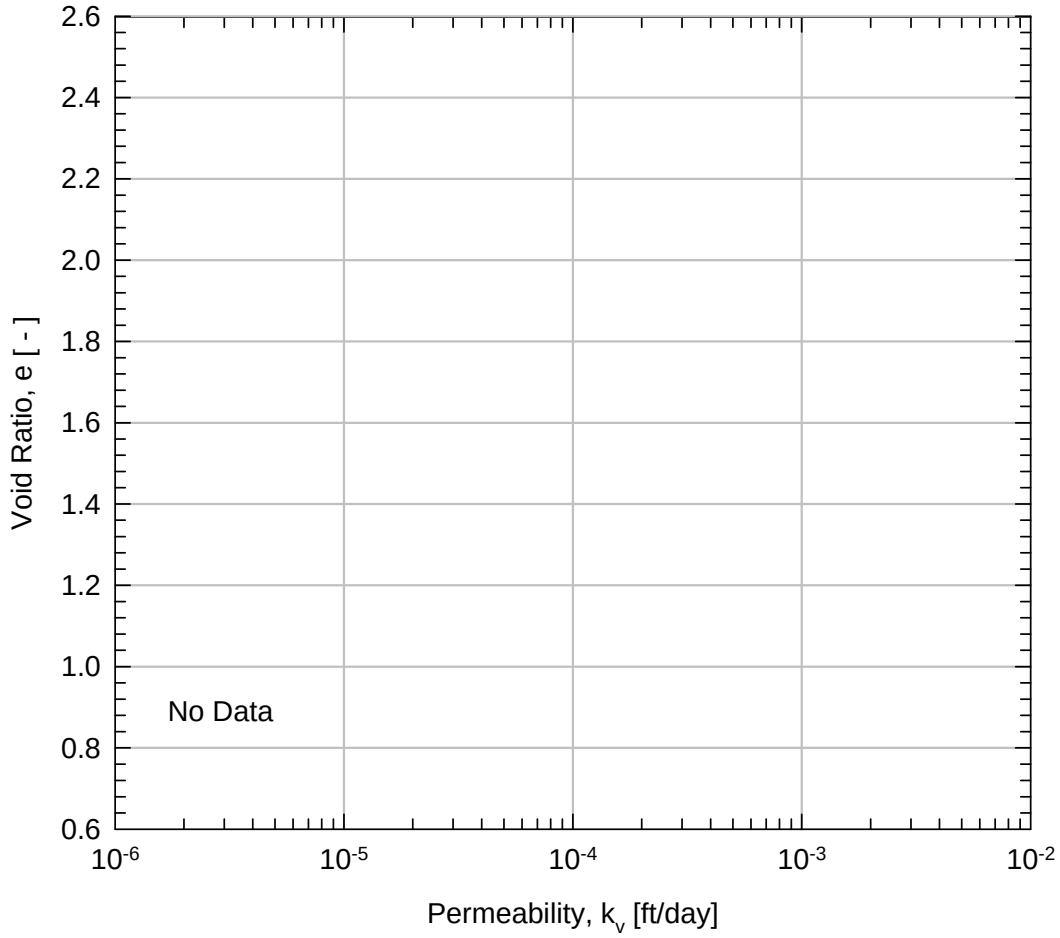

Figure 5.3.31 Void ratio versus permeability for CRS153 on sample AAB-01-16 UP-1 13-15 ft.

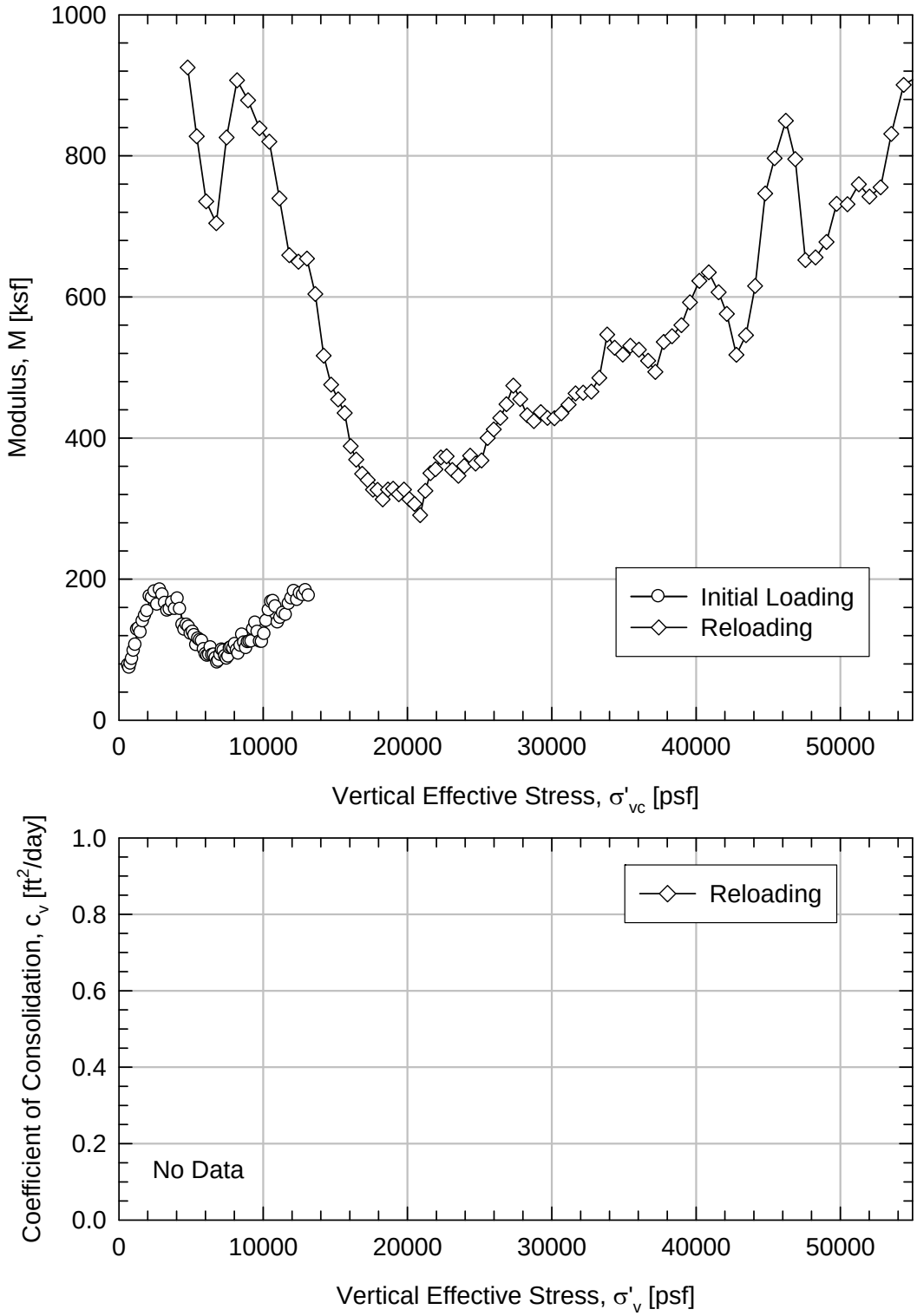

Figure 5.3.32 Modulus and coefficient of consolidation versus vertical effective stress for test CRS153 on sample AAB-01-16 UP-1 13-15 ft.

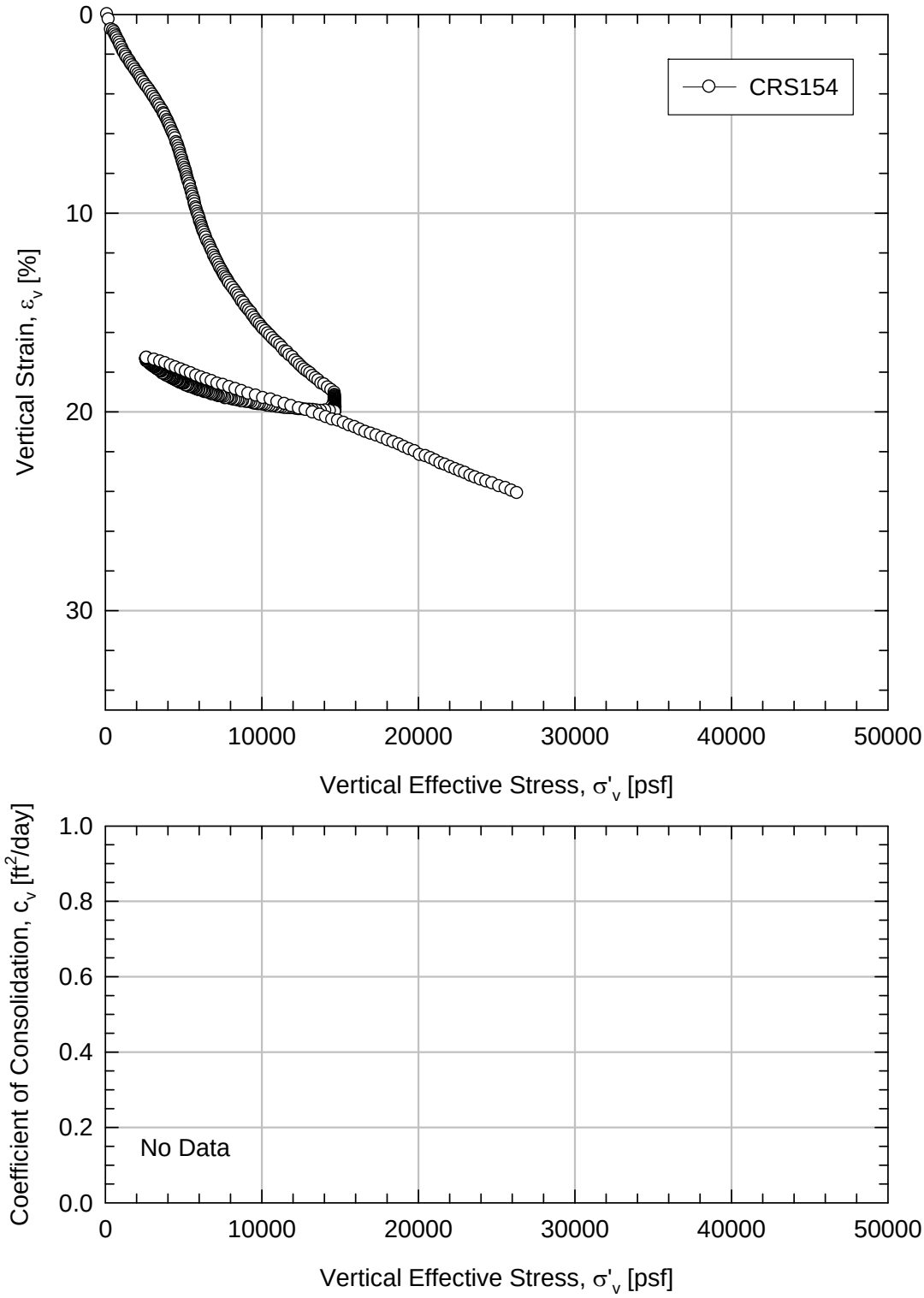

Figure 5.3.33 Vertical strain and coefficient of consolidation versus vertical effective stress for test CRS154 on sample AARW-11-43 UP-2 23-25 ft.

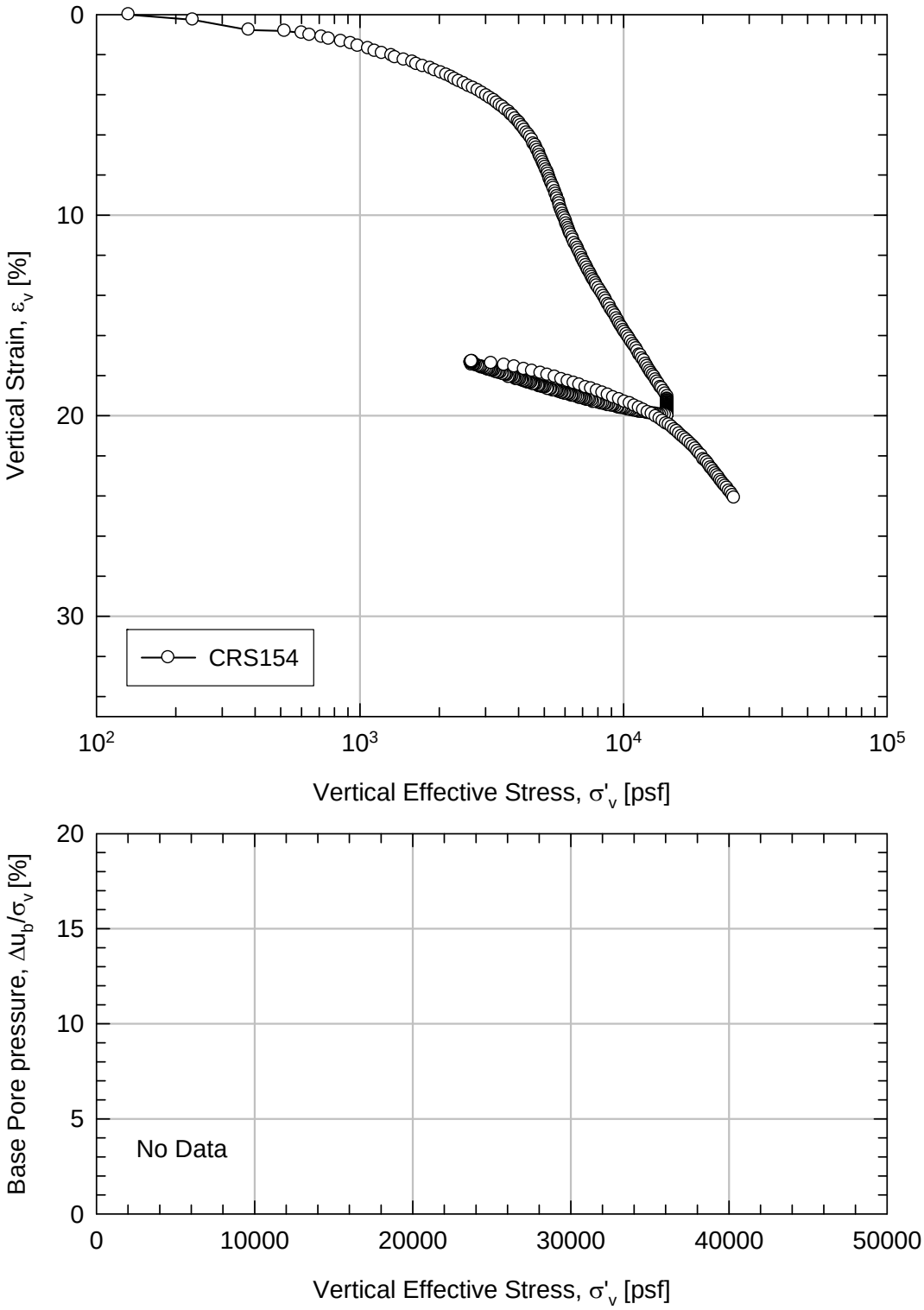

Figure 5.3.34 Vertical strain and normalized base pore pressure versus vertical effective stress for test CRS154 on sample AARW-11-43 UP-2 23-25 ft.

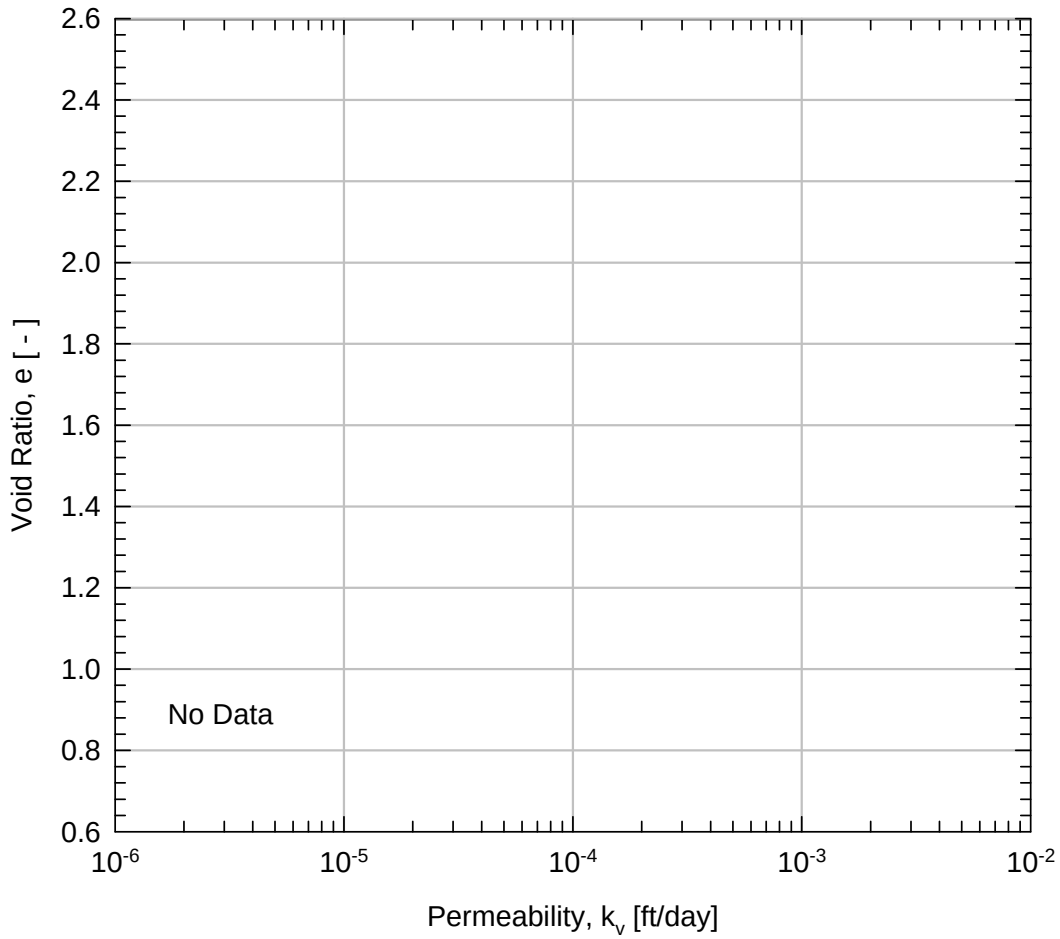

Figure 5.3.35 Void ratio versus permeability for CRS154 on sample AARW-11-43 UP-2 23-25 ft.

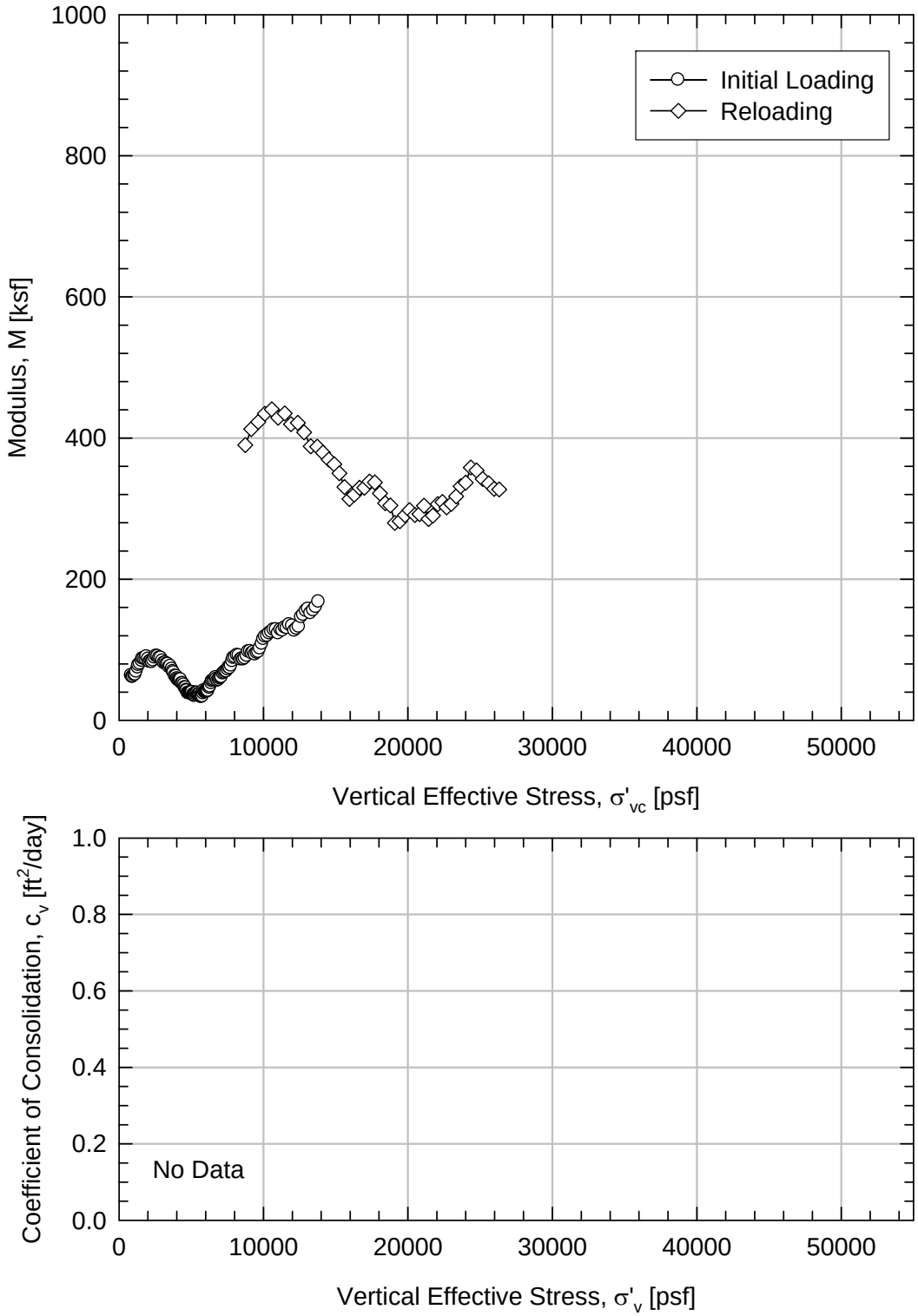

Figure 5.3.36 Modulus and coefficient of consolidation versus vertical effective stress for test CRS154 on sample AARW-11-43 UP-2 23-25 ft.

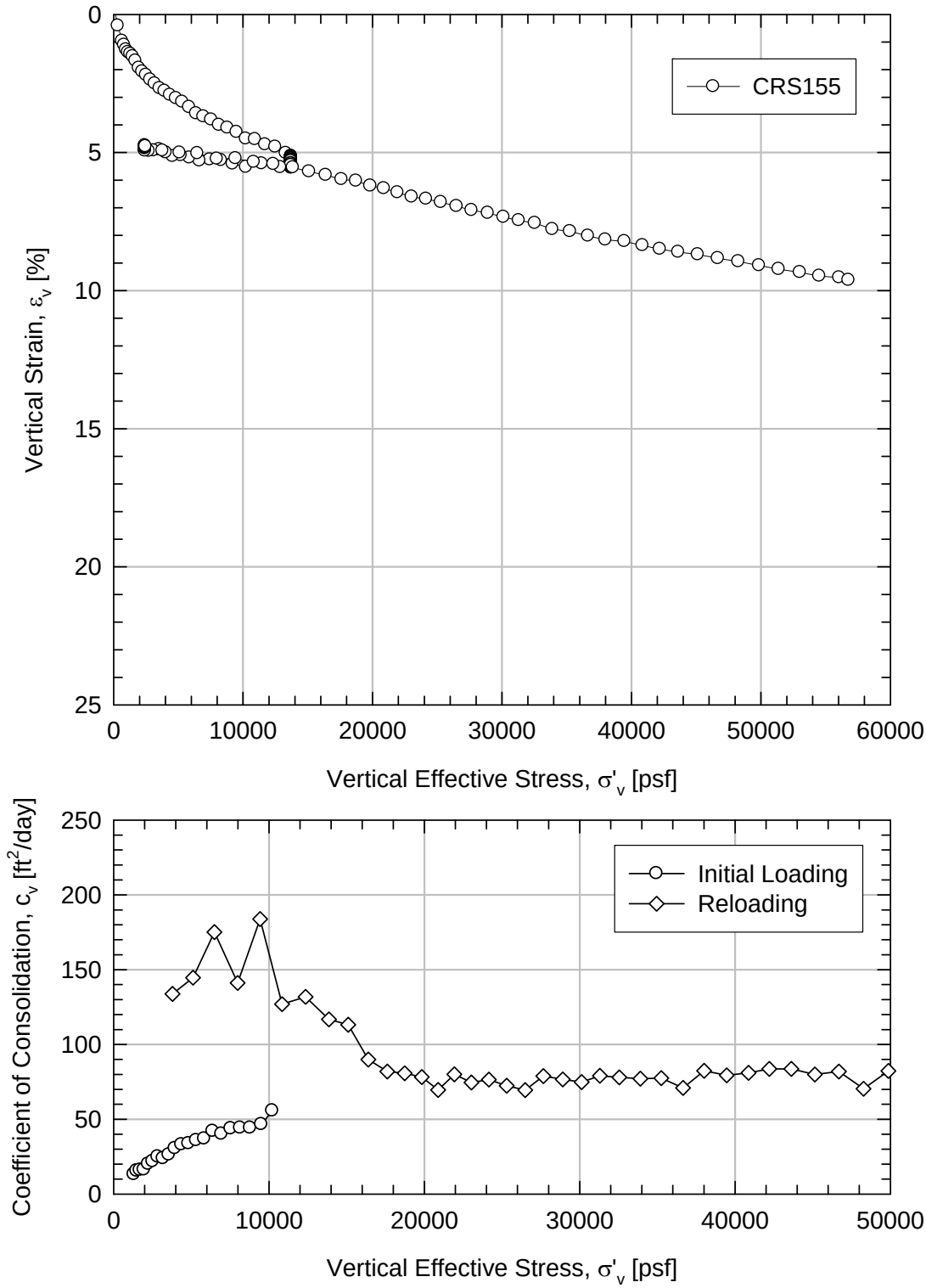

Figure 5.3.37 Vertical strain and coefficient of consolidation versus vertical effective stress for test CRS155 on sample AAB-02-23B UP-2 58-60 ft.

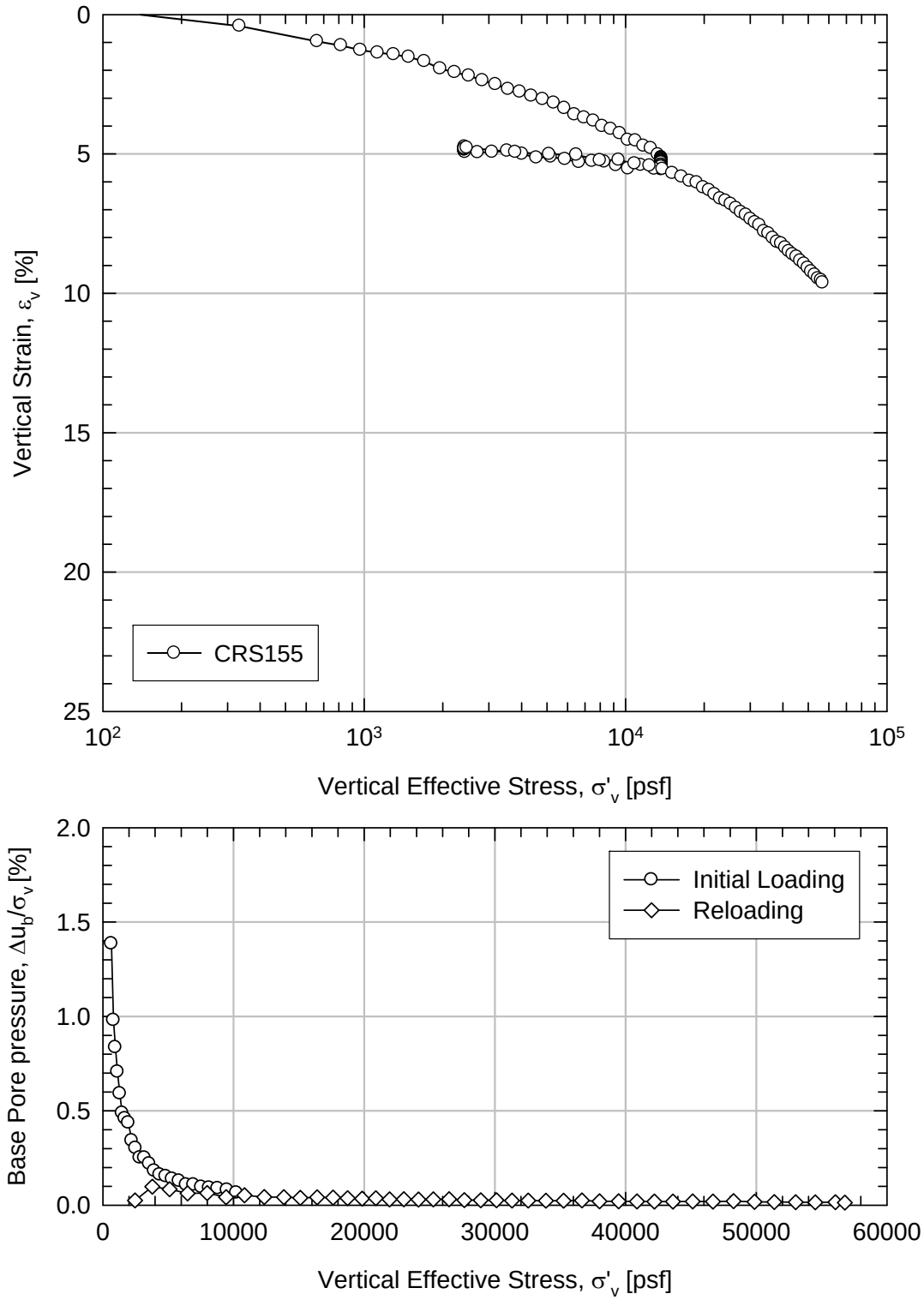

Figure 5.3.38 Vertical strain and normalized base pore pressure versus vertical effective stress for test CRS155 on sample AAB-02-23B UP-2 58-60 ft.

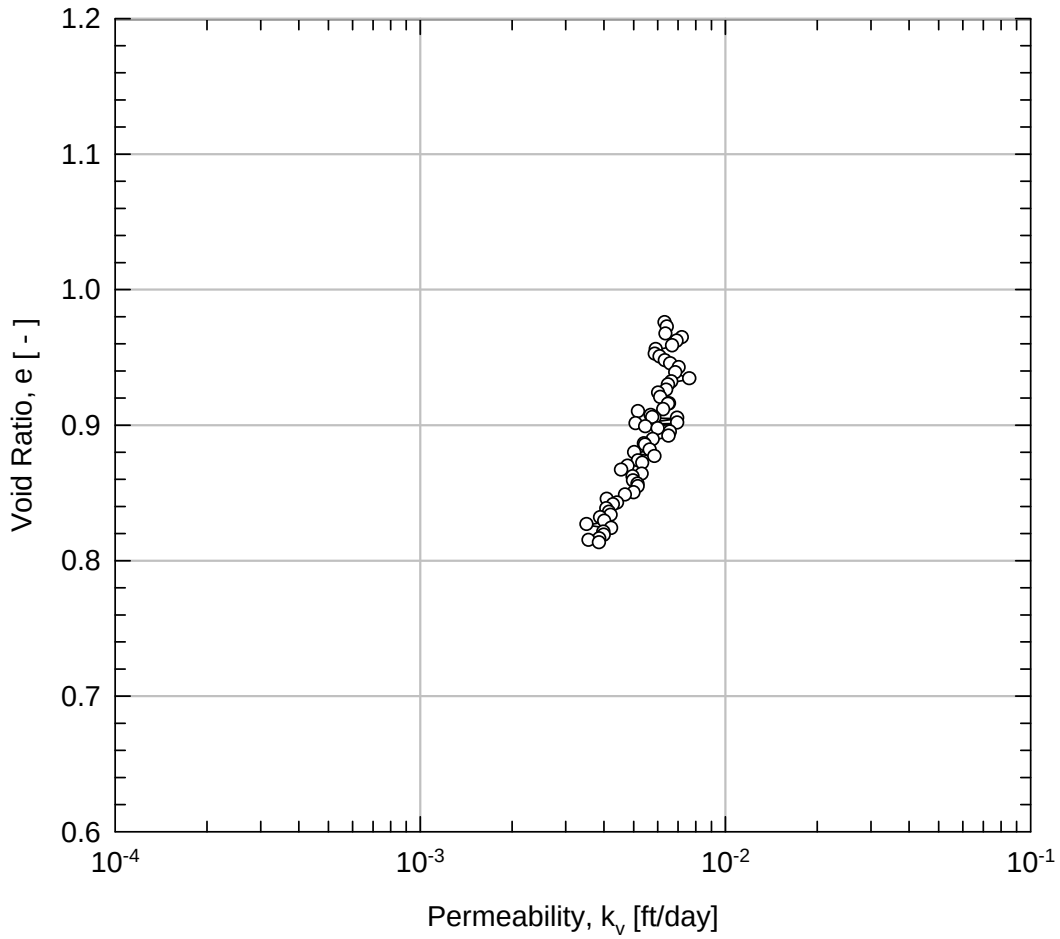

Figure 5.3.39 Void ratio versus permeability for CRS155 on sample AAB-02-23B UP-2 58-60 ft.

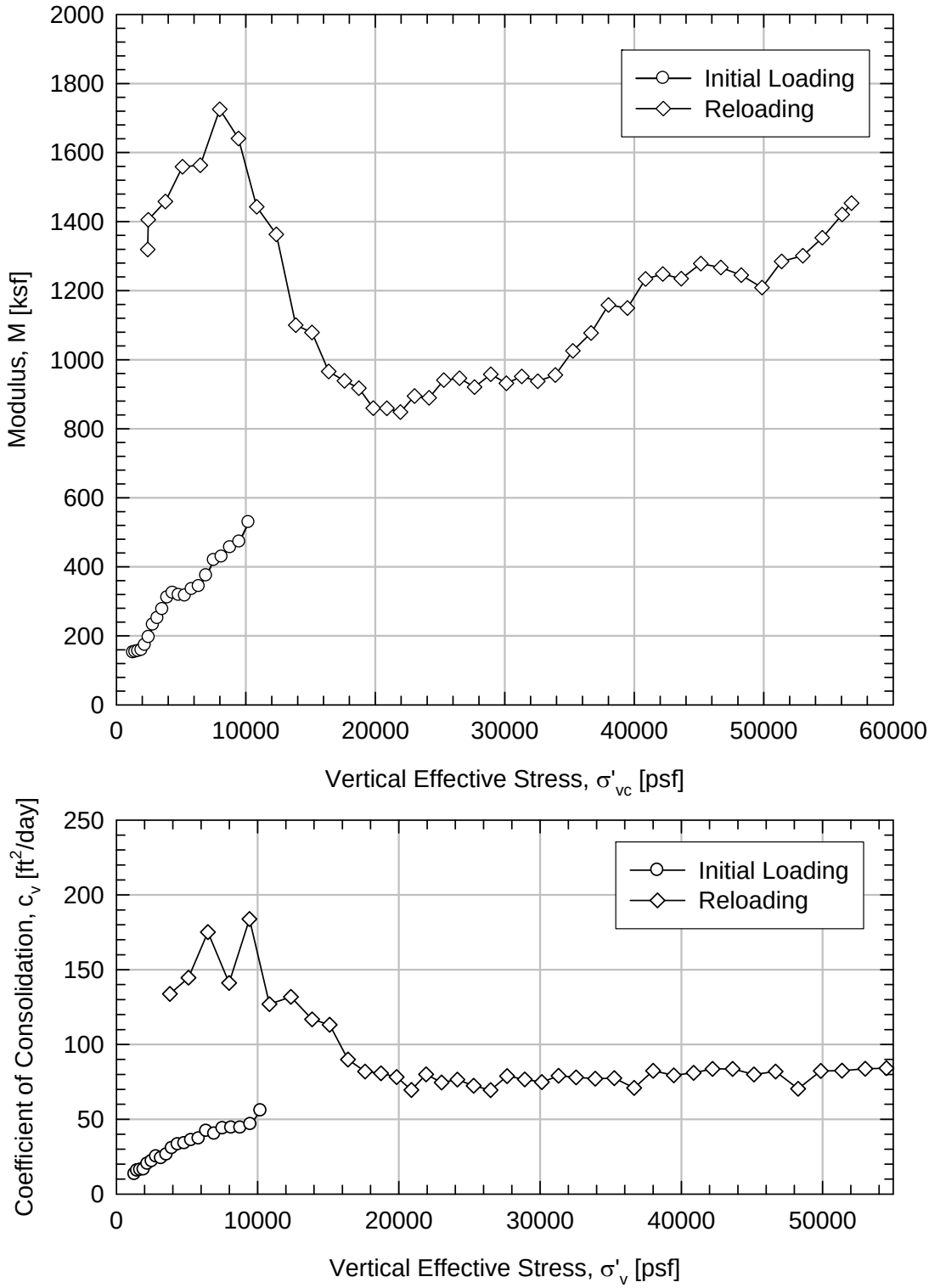

Figure 5.3.40 Modulus and coefficient of consolidation versus vertical effective stress for test CRS155 on sample AAB-02-23B UP-2 58-60 ft.

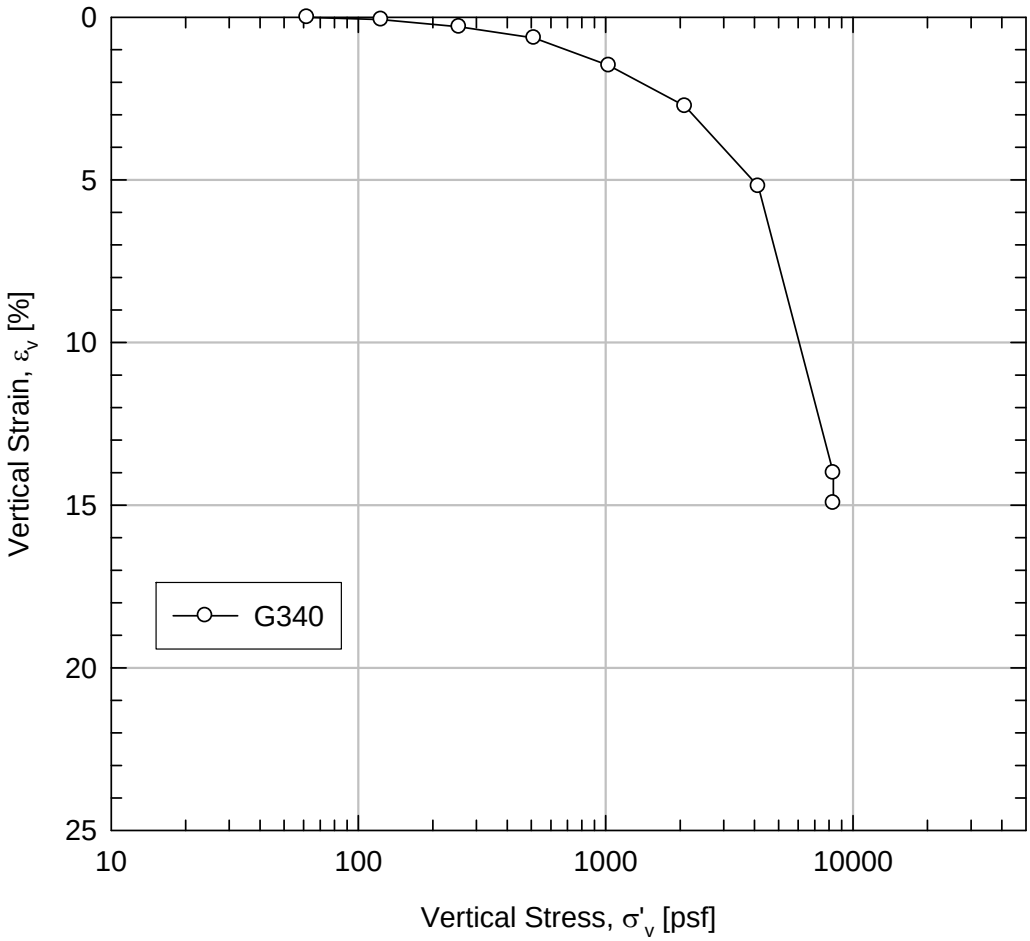

Figure 5.4.1 Vertical strain versus vertical effective stress for test DSS G340 on sample AAB-03-36 UP-2 38-40 ft.

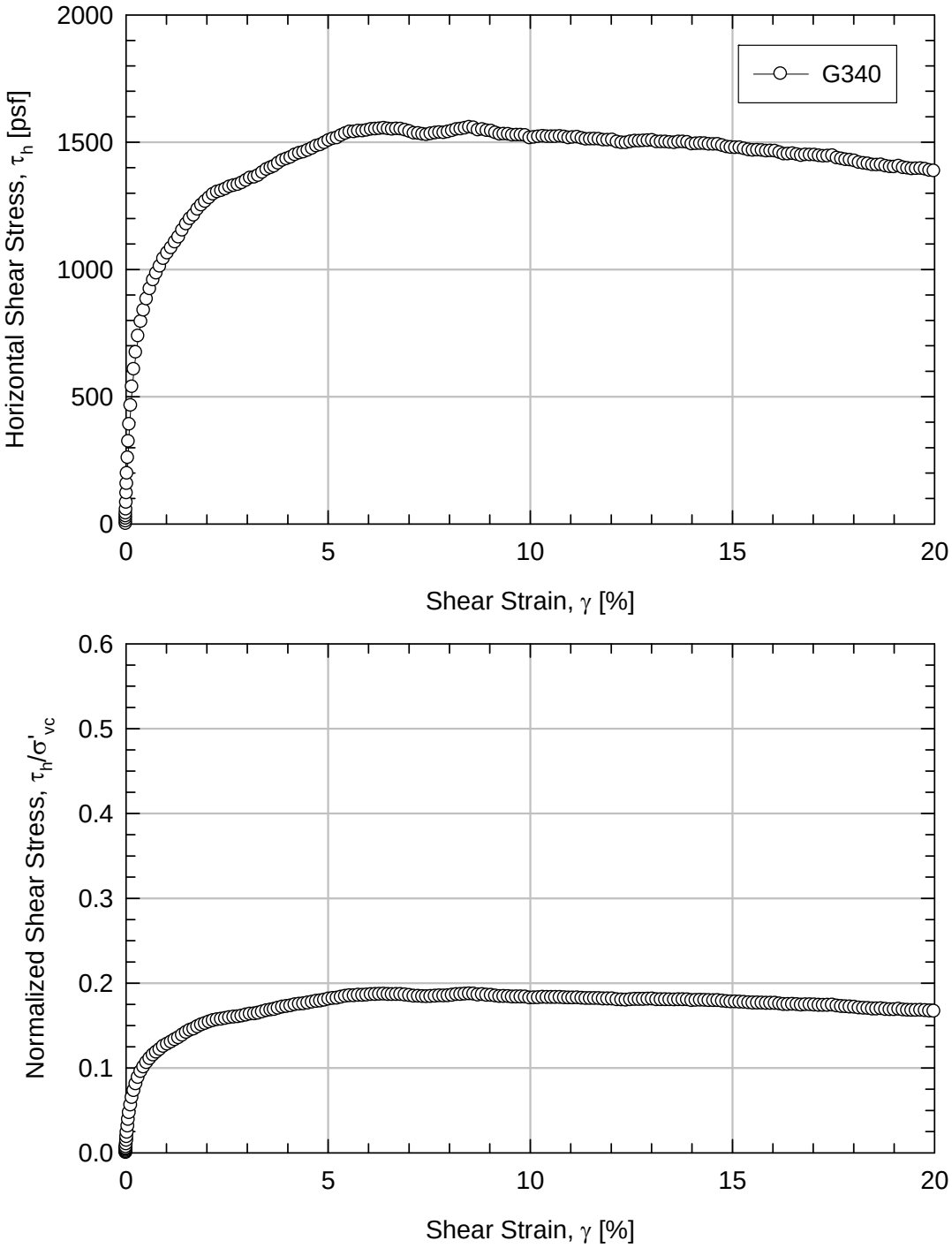

Figure 5.4.2 Horizontal shear stress and normalized shear stress versus shear strain for test DSS G340 on sample AAB-03-36 UP-2 38-40 ft.

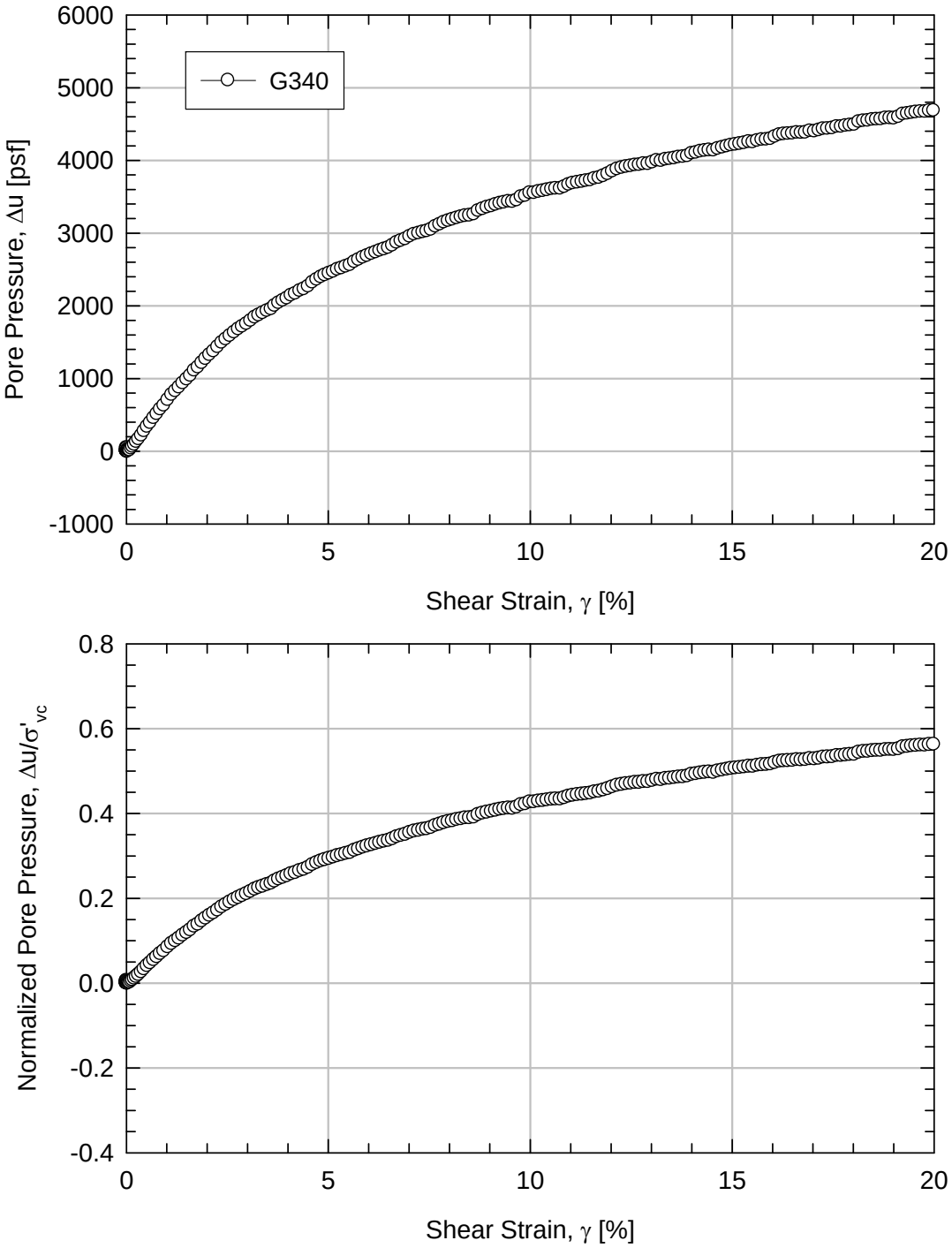

Figure 5.4.3 Pore pressure and normalized pore pressure versus shear strain for test DSS G340 on sample AAB-03-36 UP-2 38-40 ft.

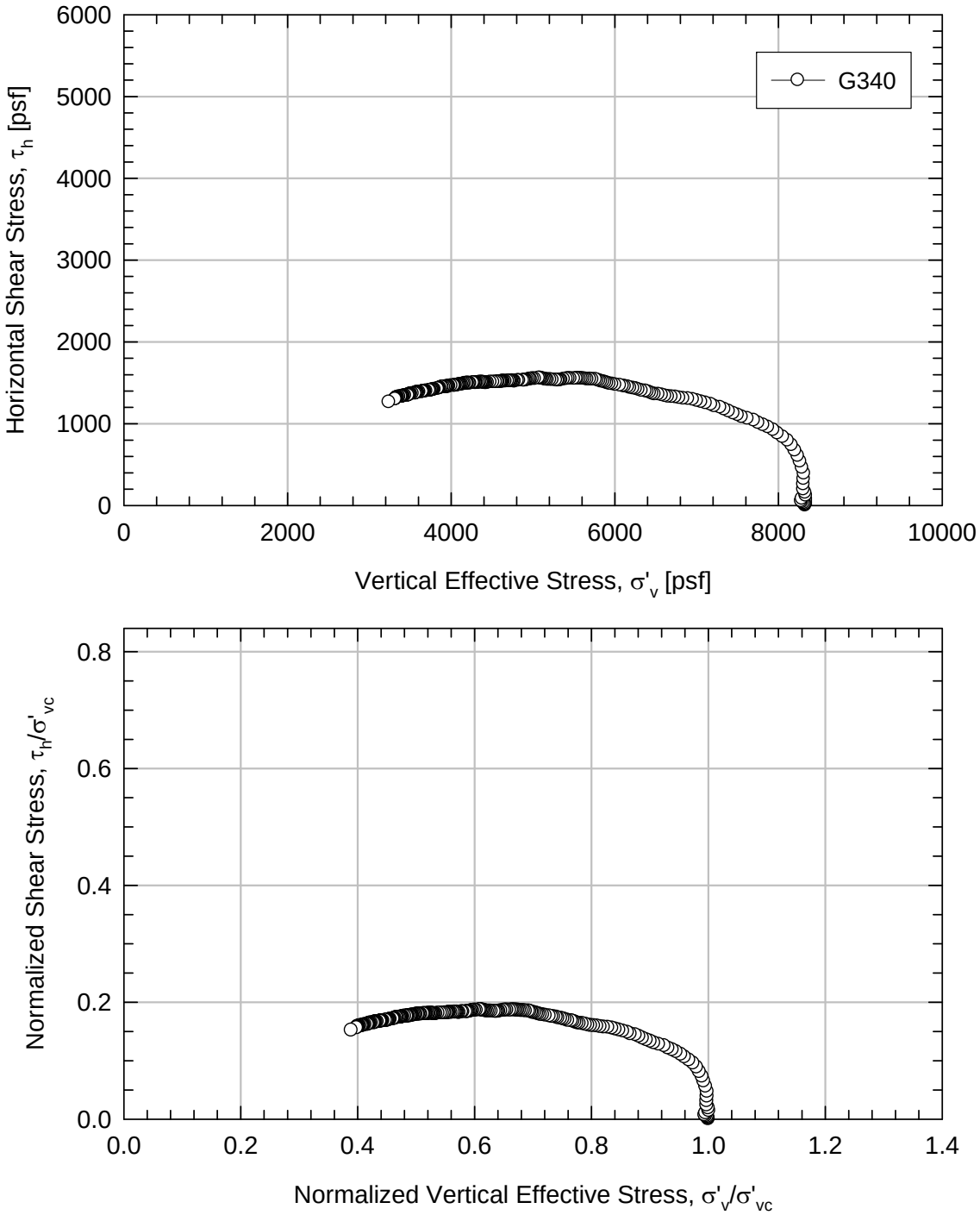

Figure 5.4.4 Horizontal shear stress versus vertical effective stress and normalized shear stress versus normalized vertical effective stress for test DSS G340 on sample AAB-03-36 UP-2 38-40 ft.

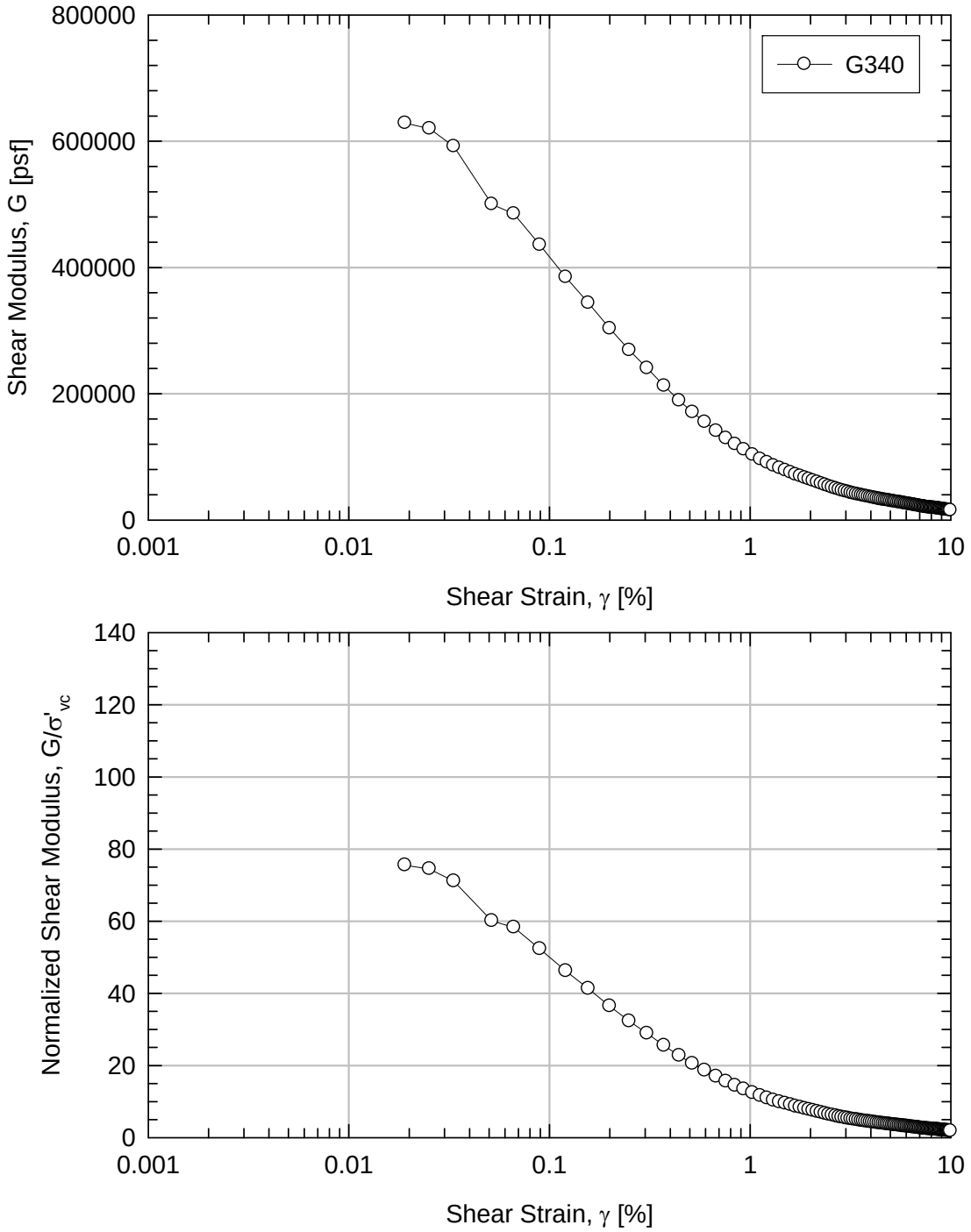

Figure 5.4.5 Shear modulus and normalized shear modulus versus shear strain for test DSS G340 on sample AAB-03-36 UP-2 38-40 ft.

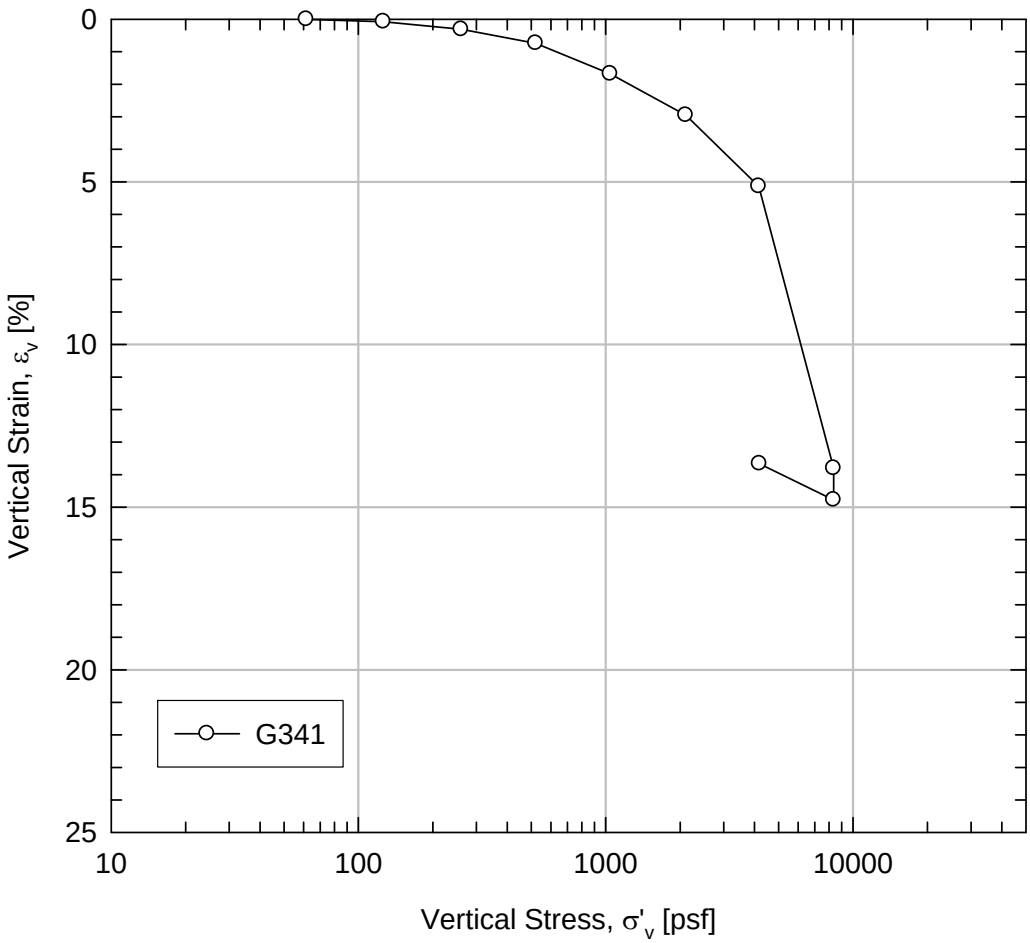

Figure 5.4.6 Vertical strain versus vertical effective stress for test DSS G341 on sample AAB-03-36 UP-2 38-40 ft.

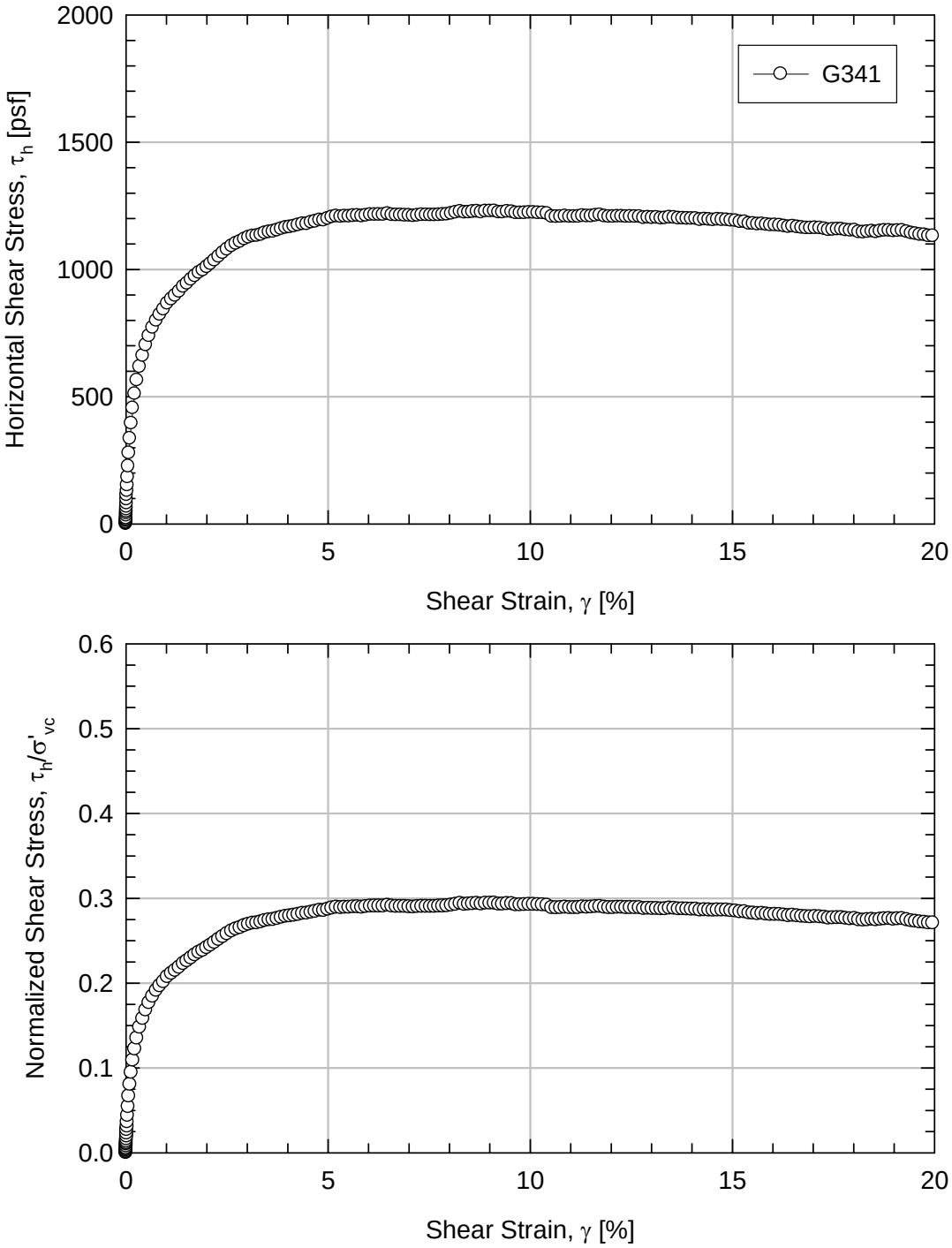

Figure 5.4.7 Horizontal shear stress and normalized shear stress versus shear strain for test DSS G341 on sample AAB-03-36 UP-2 38-40 ft.

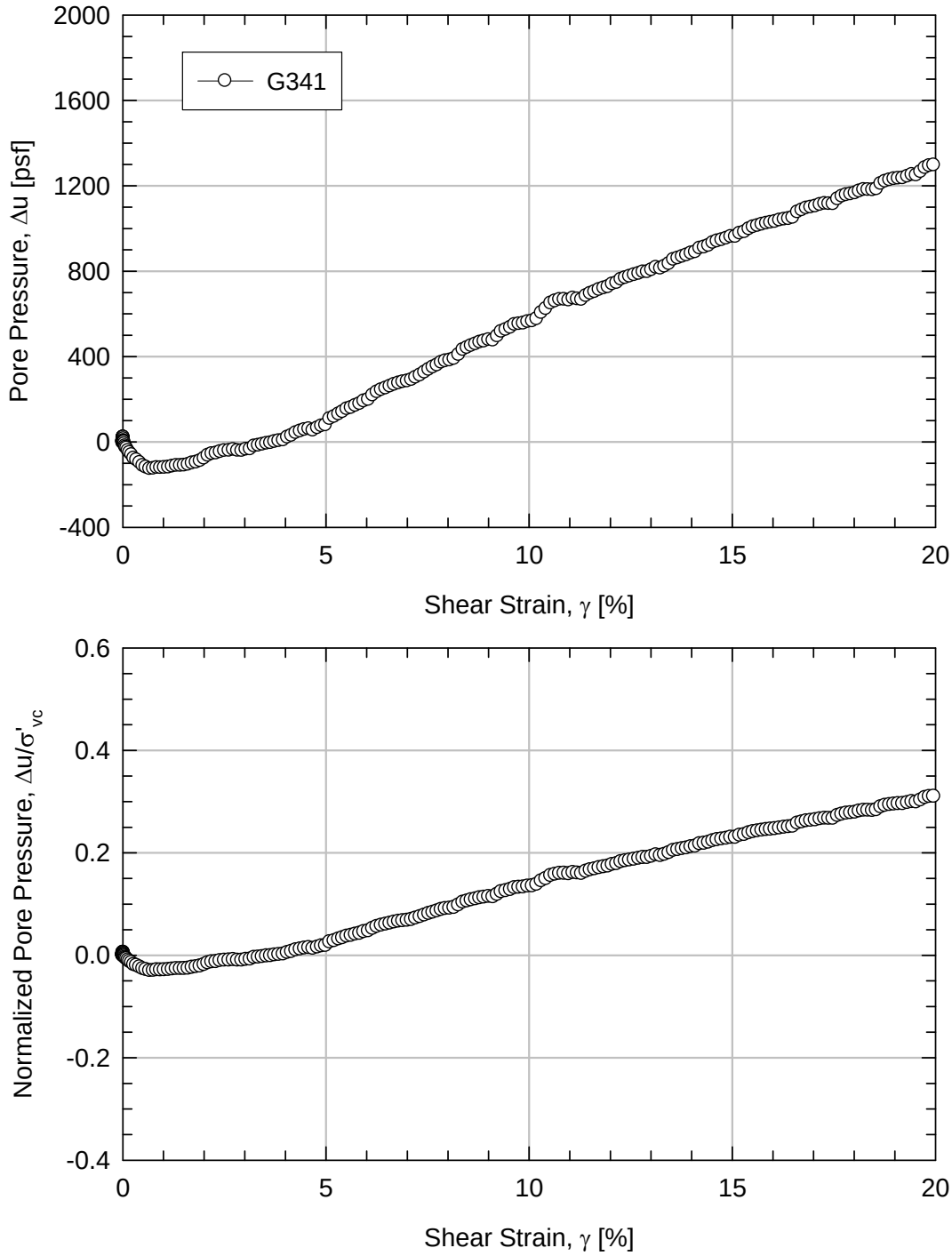

Figure 5.4.8 Pore pressure and normalized pore pressure versus shear strain for test DSS G341 on sample AAB-03-36 UP-2 38-40 ft.

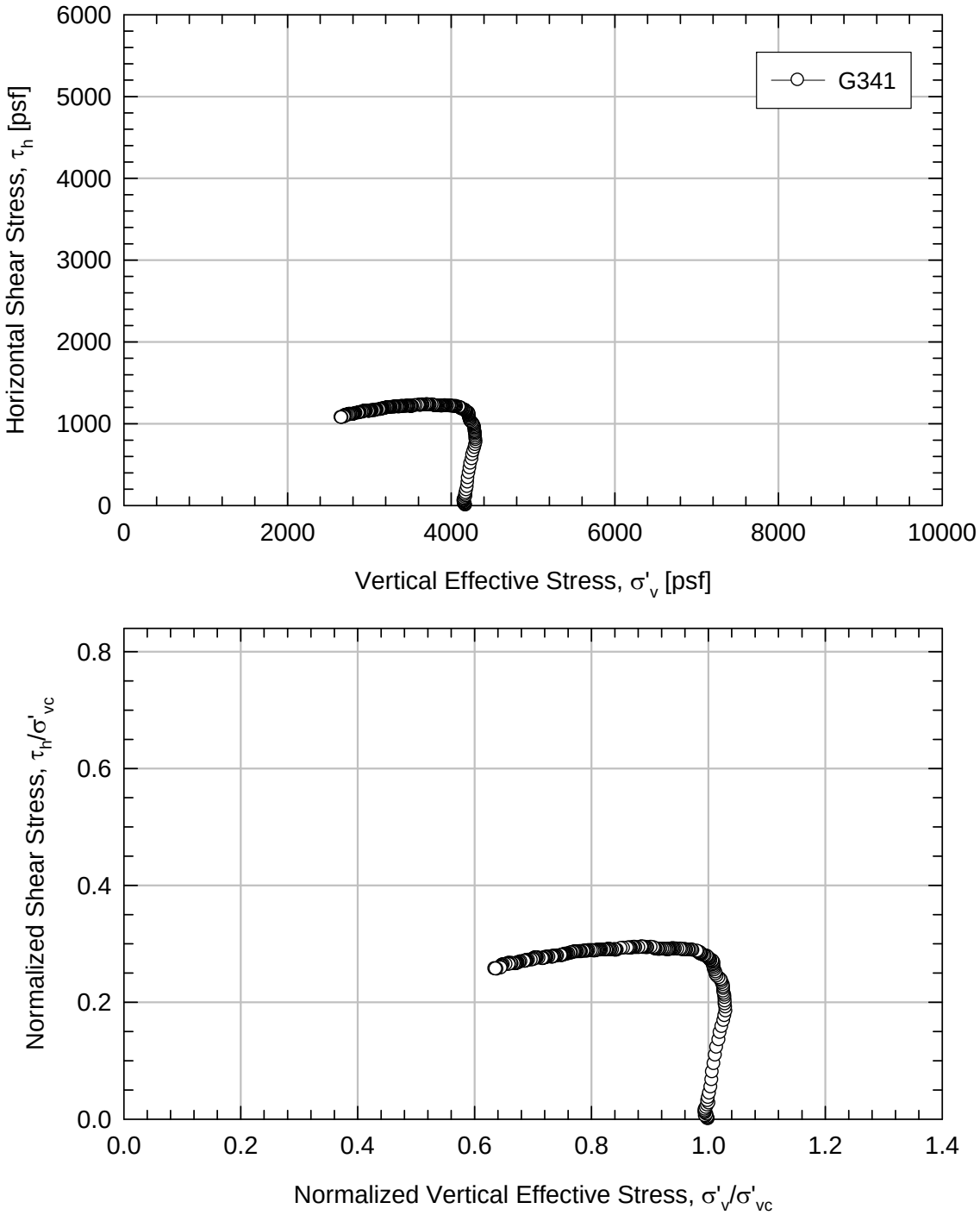

Figure 5.4.9 Horizontal shear stress versus vertical effective stress and normalized shear stress versus normalized vertical effective stress for test DSS G341 on sample AAB-03-36 UP-2 38-40 ft.

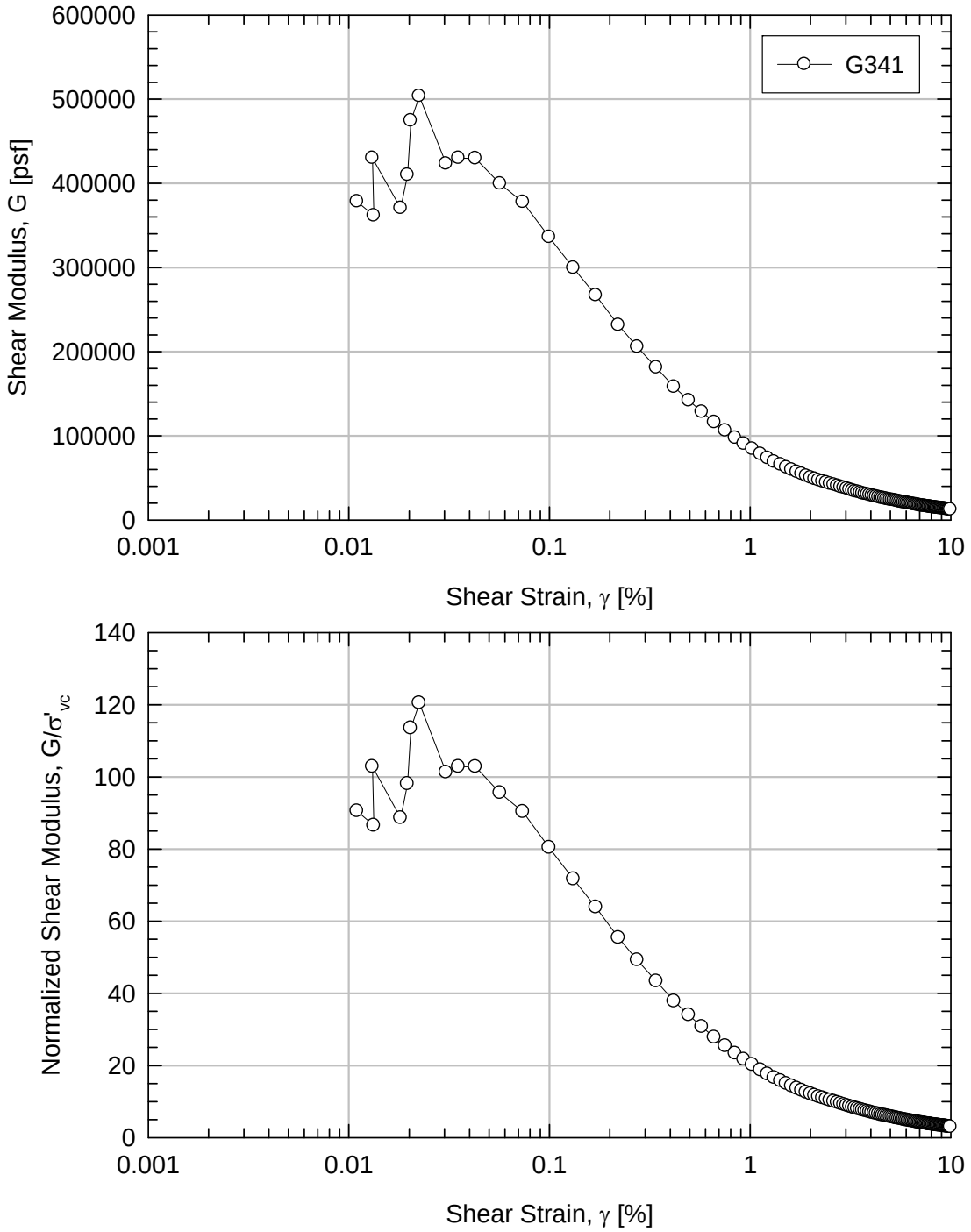

Figure 5.4.10 Shear modulus and normalized shear modulus versus shear strain for test DSS G341 on sample AAB-03-36 UP-2 38-40 ft.

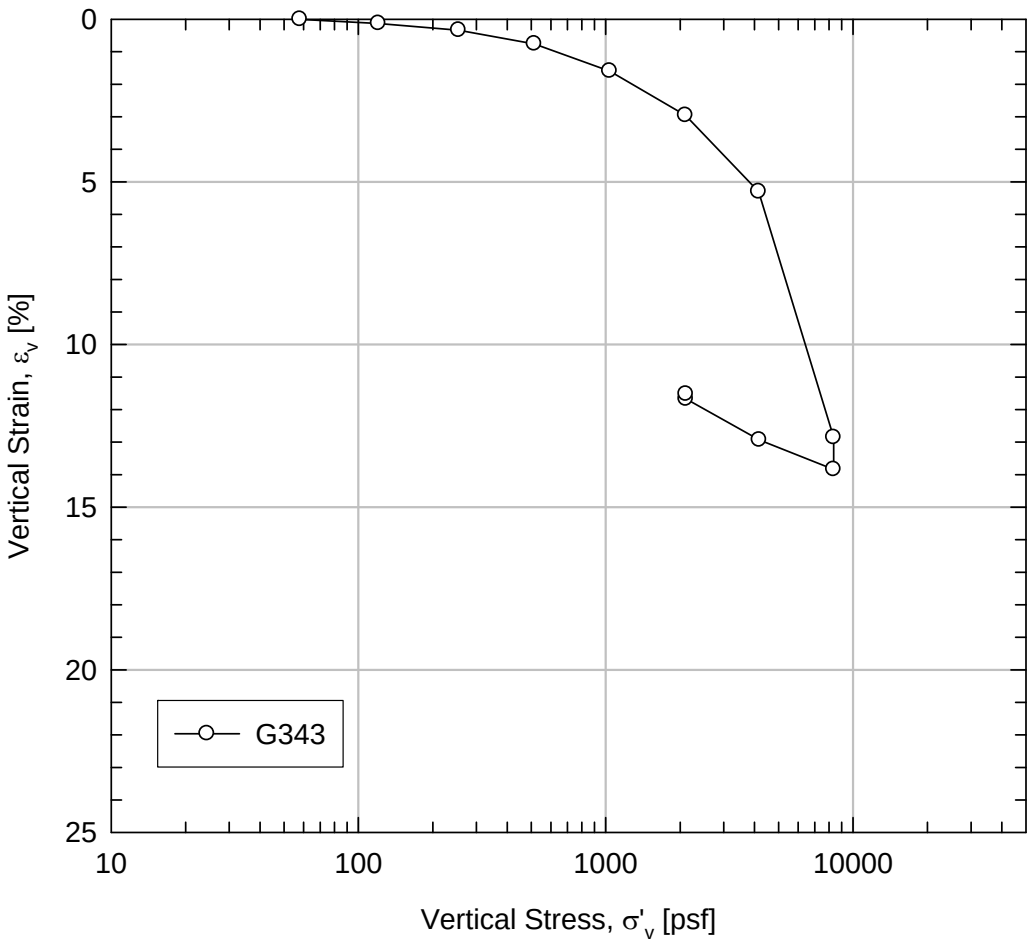

Figure 5.4.11 Vertical strain versus vertical effective stress for test DSS G343 on sample AAB-03-36 UP-2 38-40 ft.

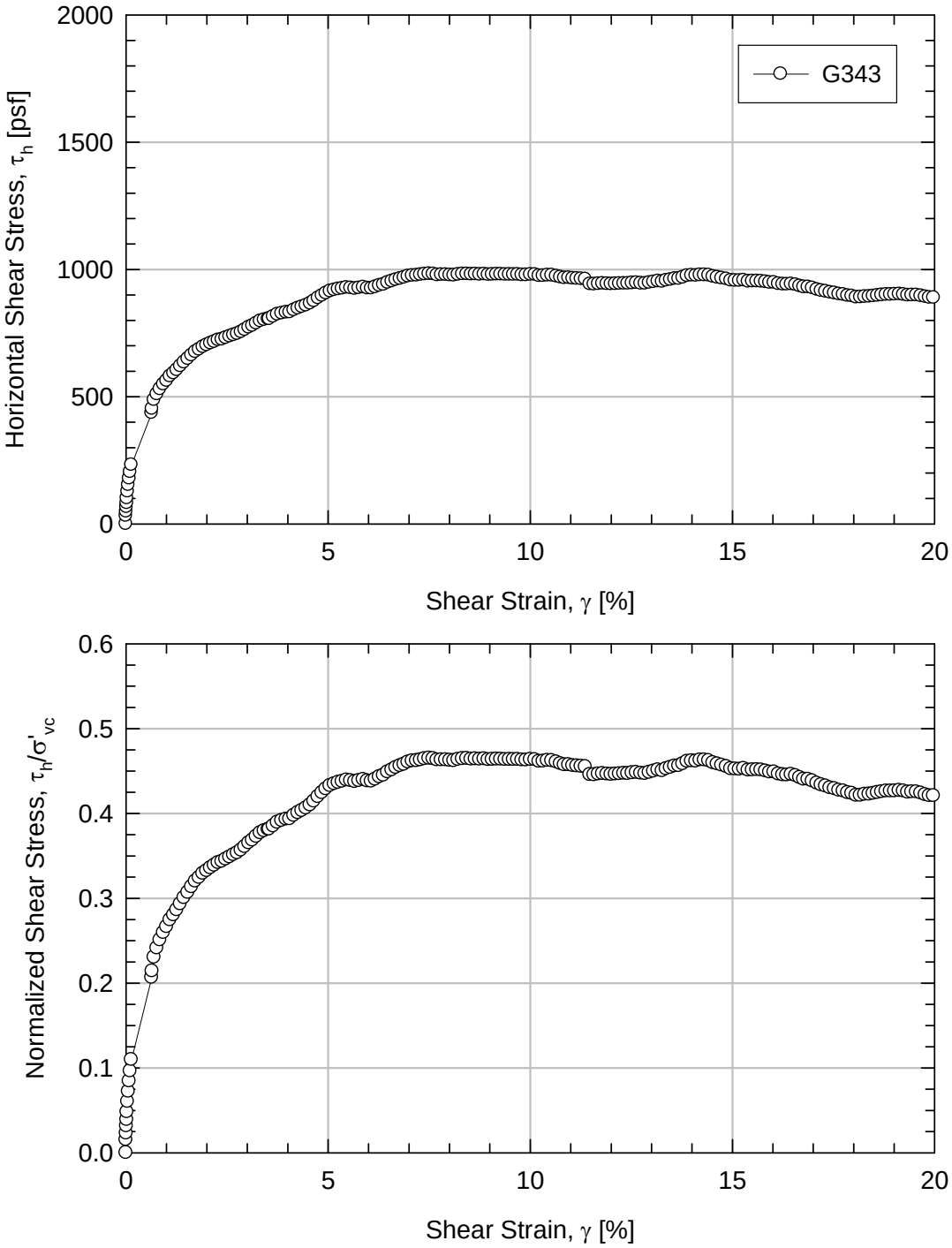

Figure 5.4.12 Horizontal shear stress and normalized shear stress versus shear strain for test DSS G343 on sample AAB-03-36 UP-2 38-40 ft.

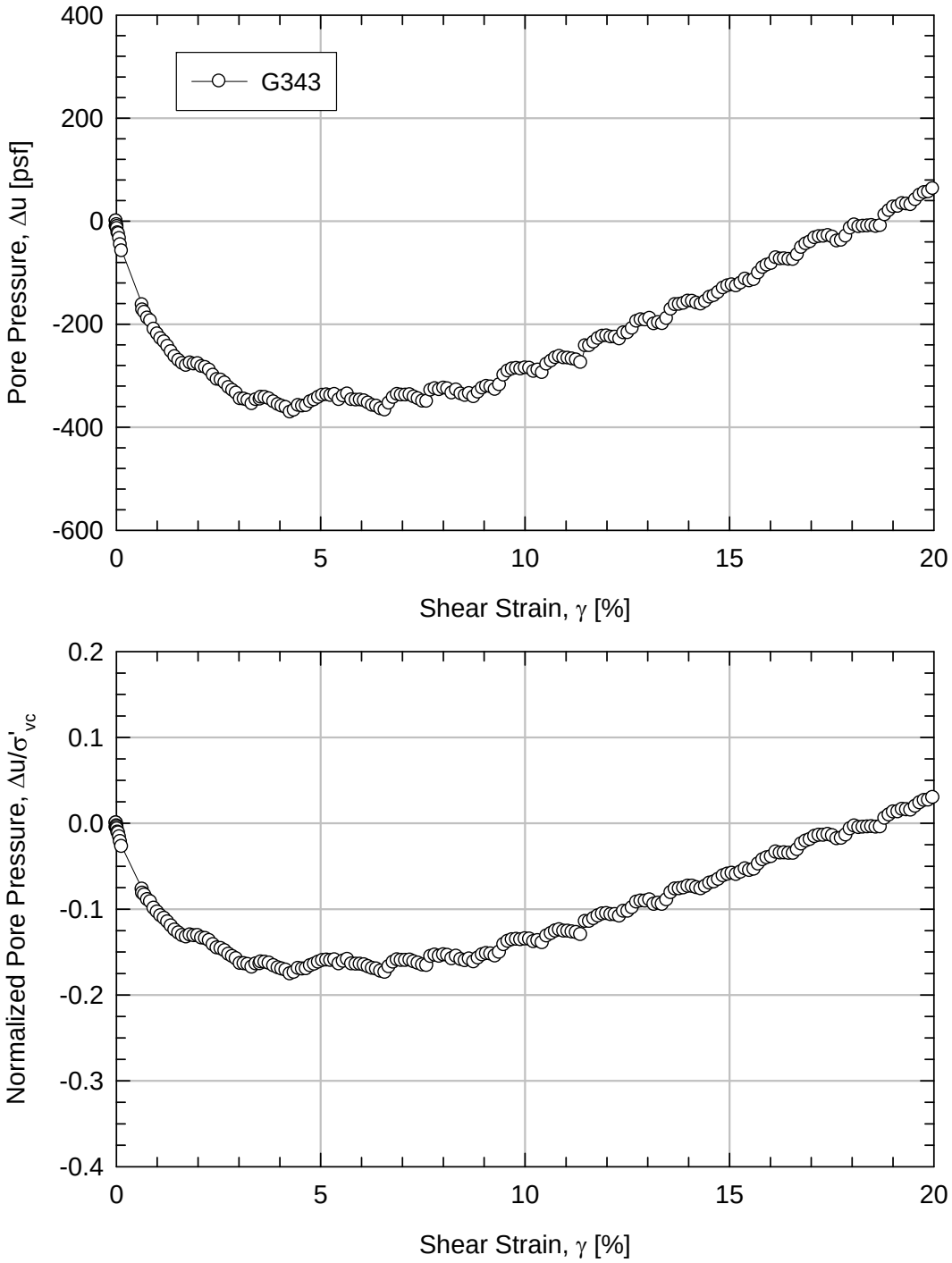

Figure 5.4.13 Pore pressure and normalized pore pressure versus shear strain for test DSS G343 on sample AAB-03-36 UP-2 38-40 ft.

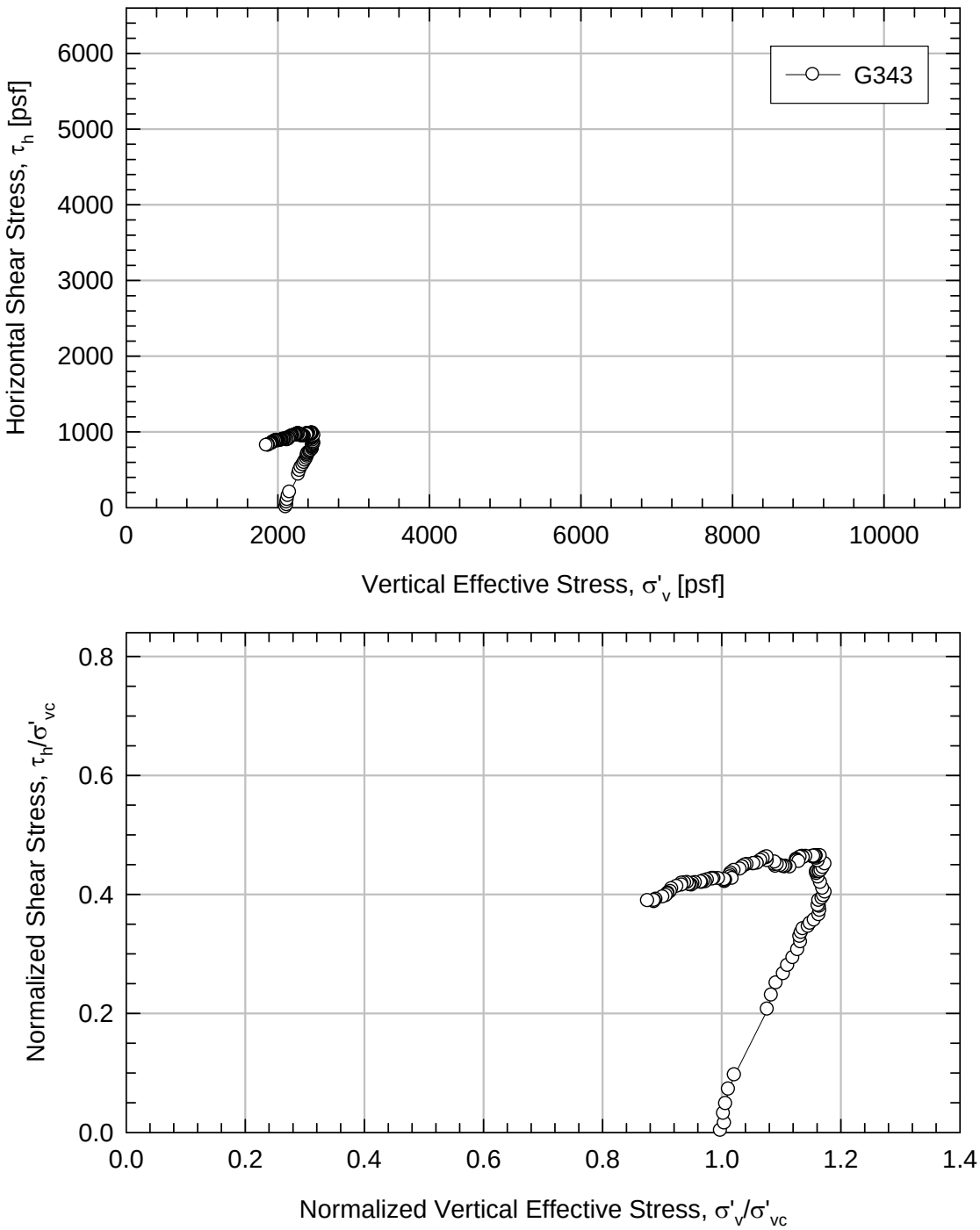

Figure 5.4.14 Horizontal shear stress versus vertical effective stress and normalized shear stress versus normalized vertical effective stress for test DSS G343 on sample AAB-03-36 UP-2 38-40 ft.

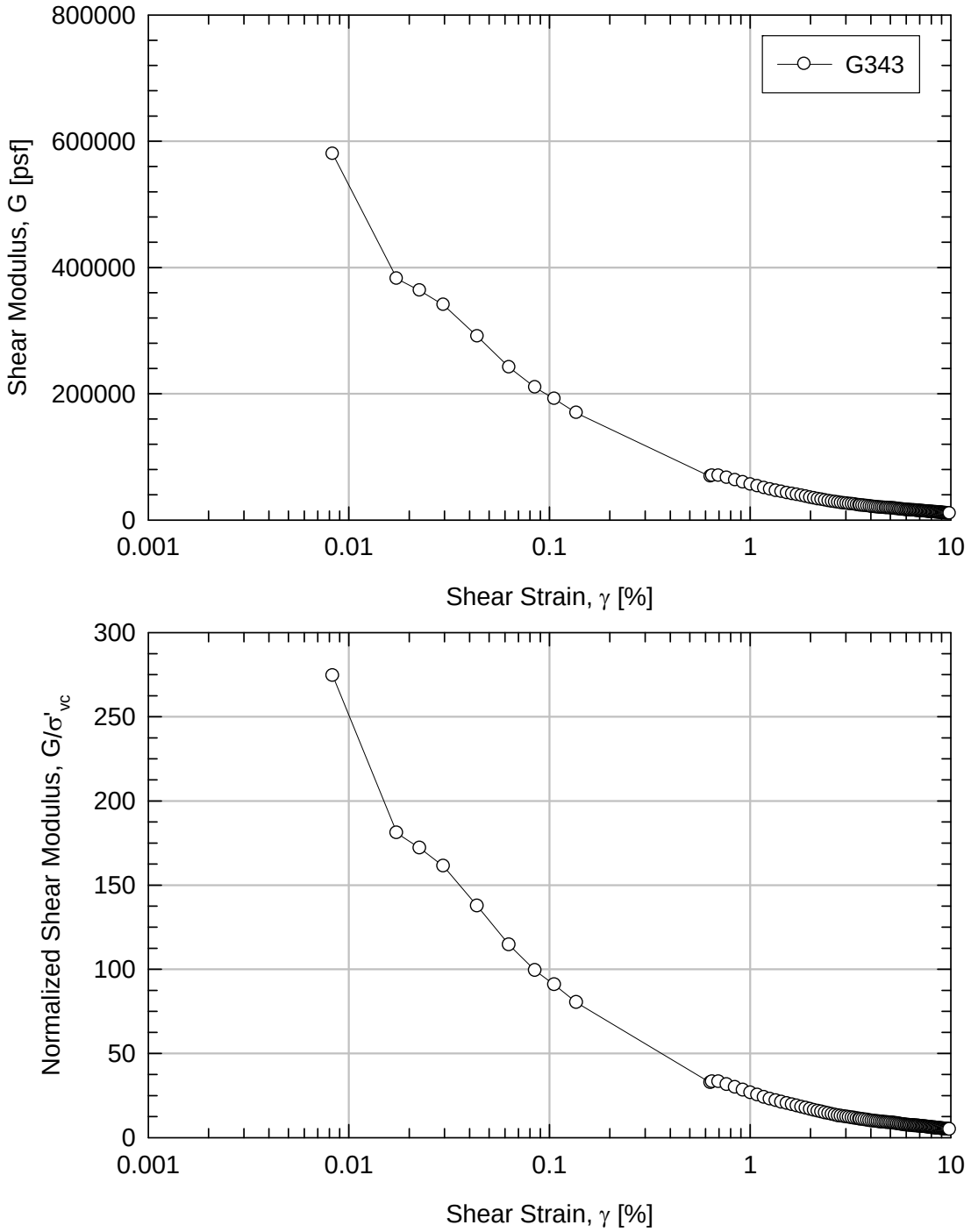

Figure 5.4.15 Shear modulus and normalized shear modulus versus shear strain for test DSS G343 on sample AAB-03-36 UP-2 38-40 ft.

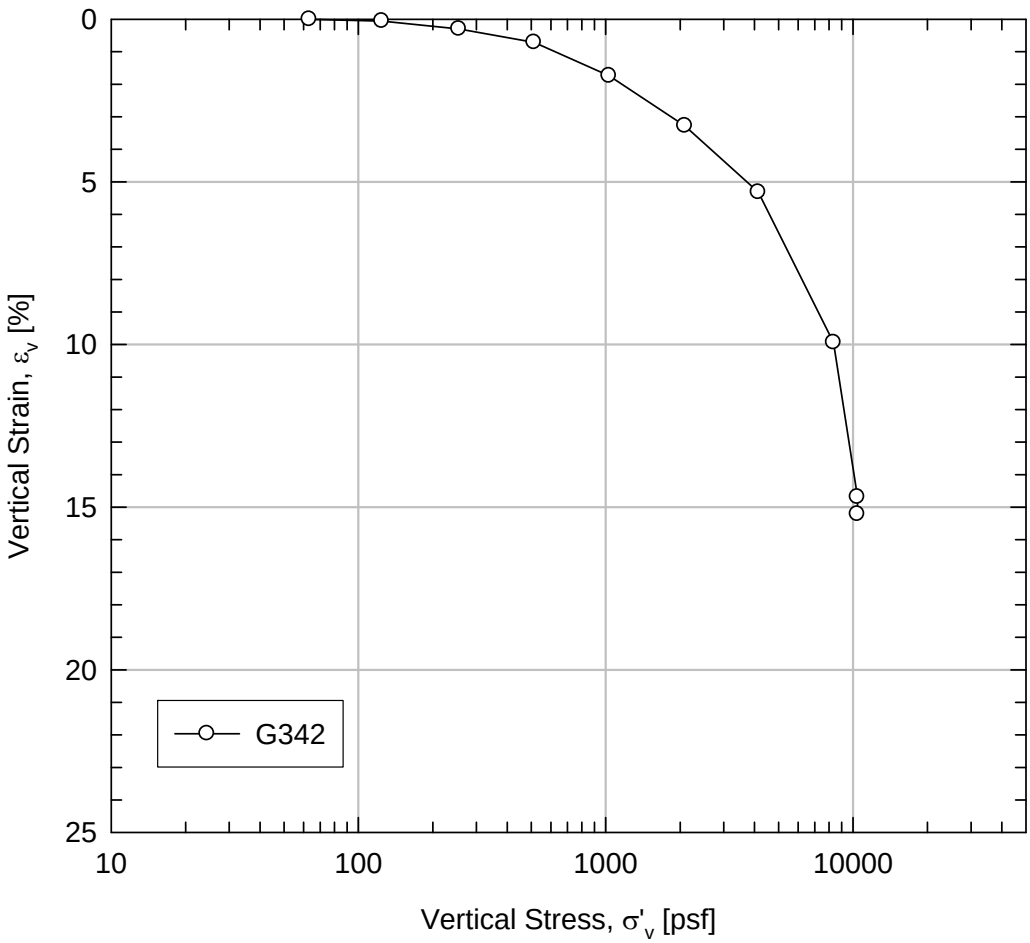

Figure 5.4.16 Vertical strain versus vertical effective stress for test DSS G342 on sample AARW-10-40 UP-1 63-65 ft.

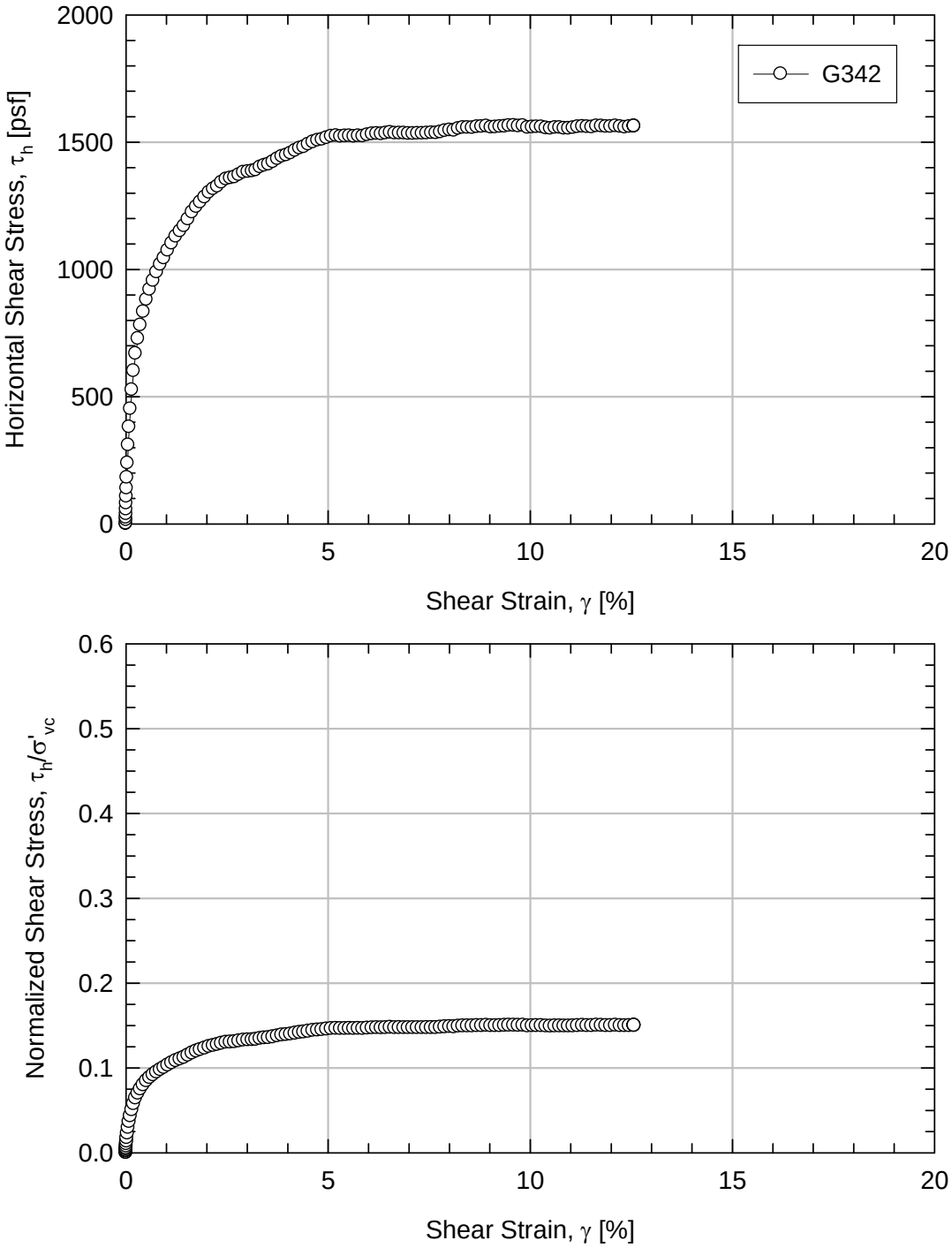

Figure 5.4.17 Horizontal shear stress and normalized shear stress versus shear strain for test DSS G342 on sample AARW-10-40 UP-1 63-65 ft.

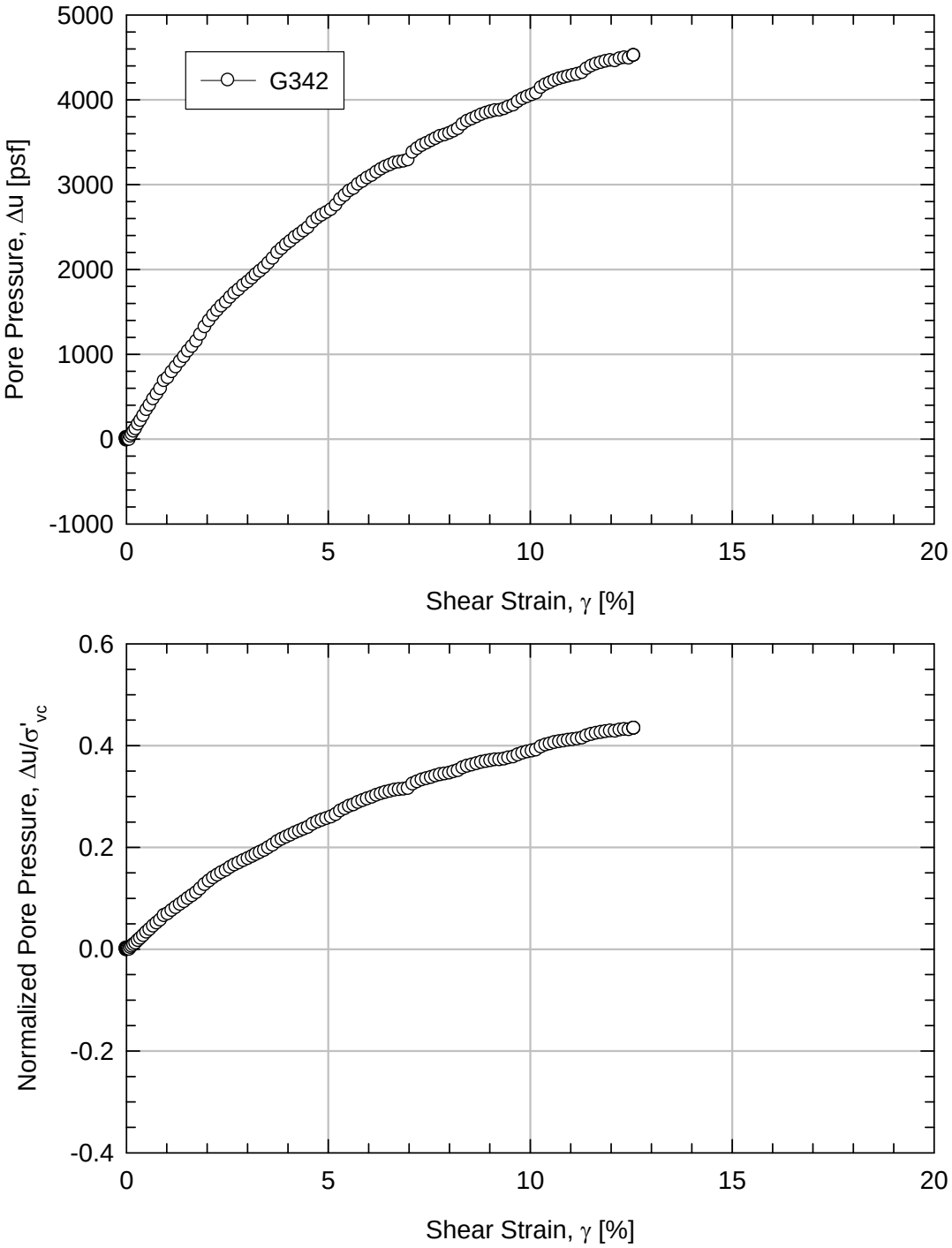

Figure 5.4.18 Pore pressure and normalized pore pressure versus shear strain for test DSS G342 on sample AARW-10-40 UP-1 63-65 ft.

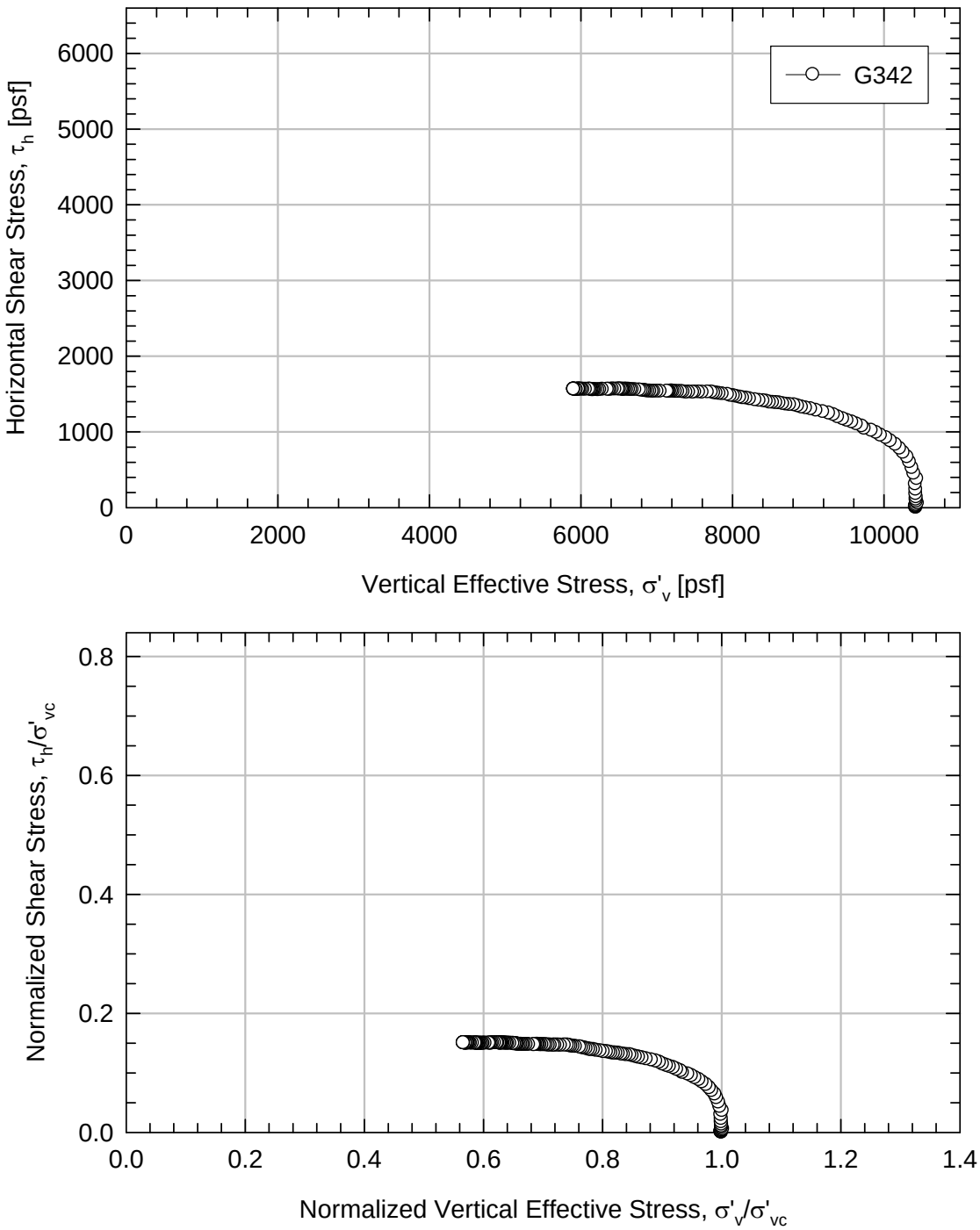

Figure 5.4.19 Horizontal shear stress versus vertical effective stress and normalized shear stress versus normalized vertical effective stress for test DSS G342 on sample AARW-10-40 UP-1 63-65 ft.

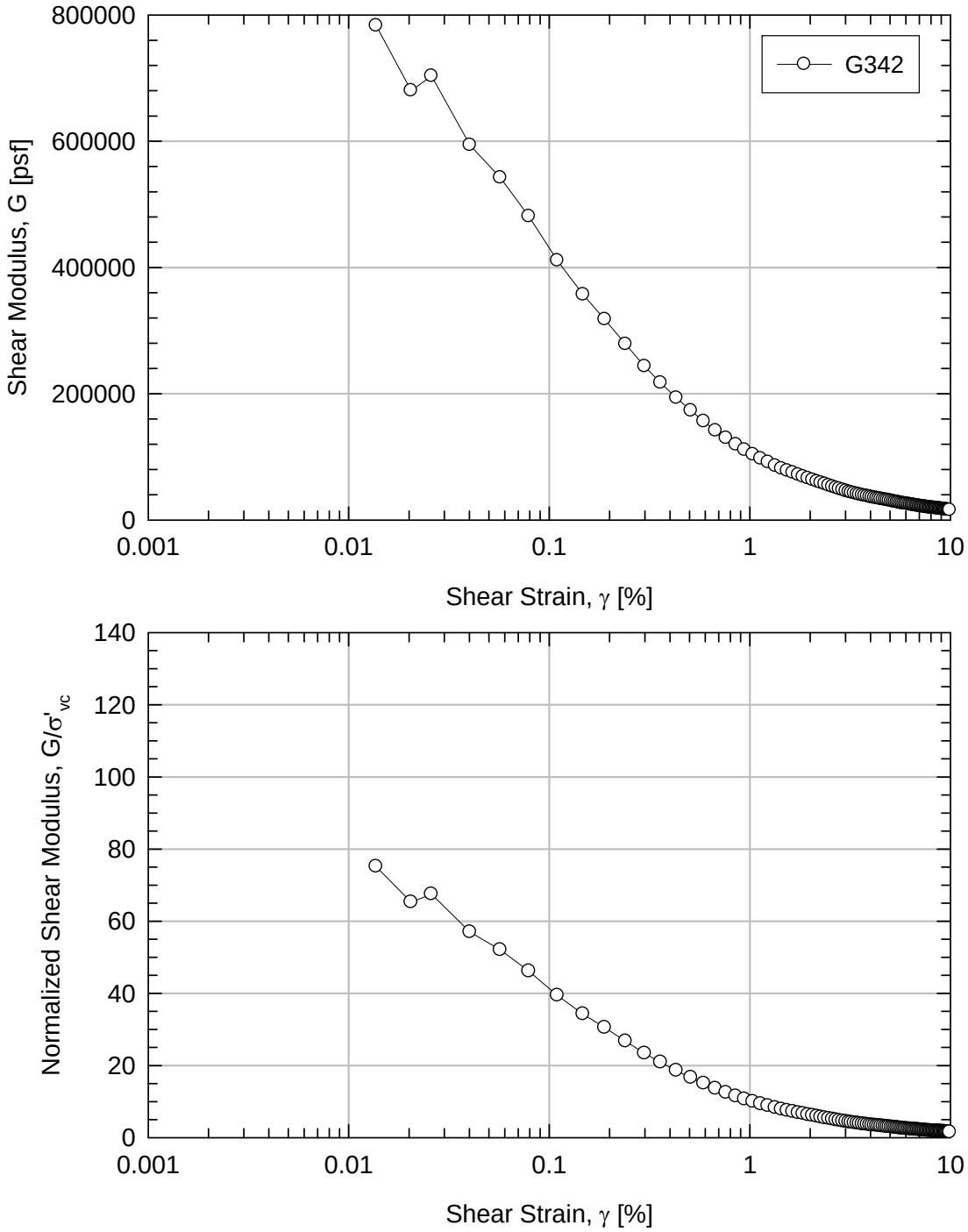

Figure 5.4.20 Shear modulus and normalized shear modulus versus shear strain for test DSS G342 on sample AARW-10-40 UP-1 63-65 ft.

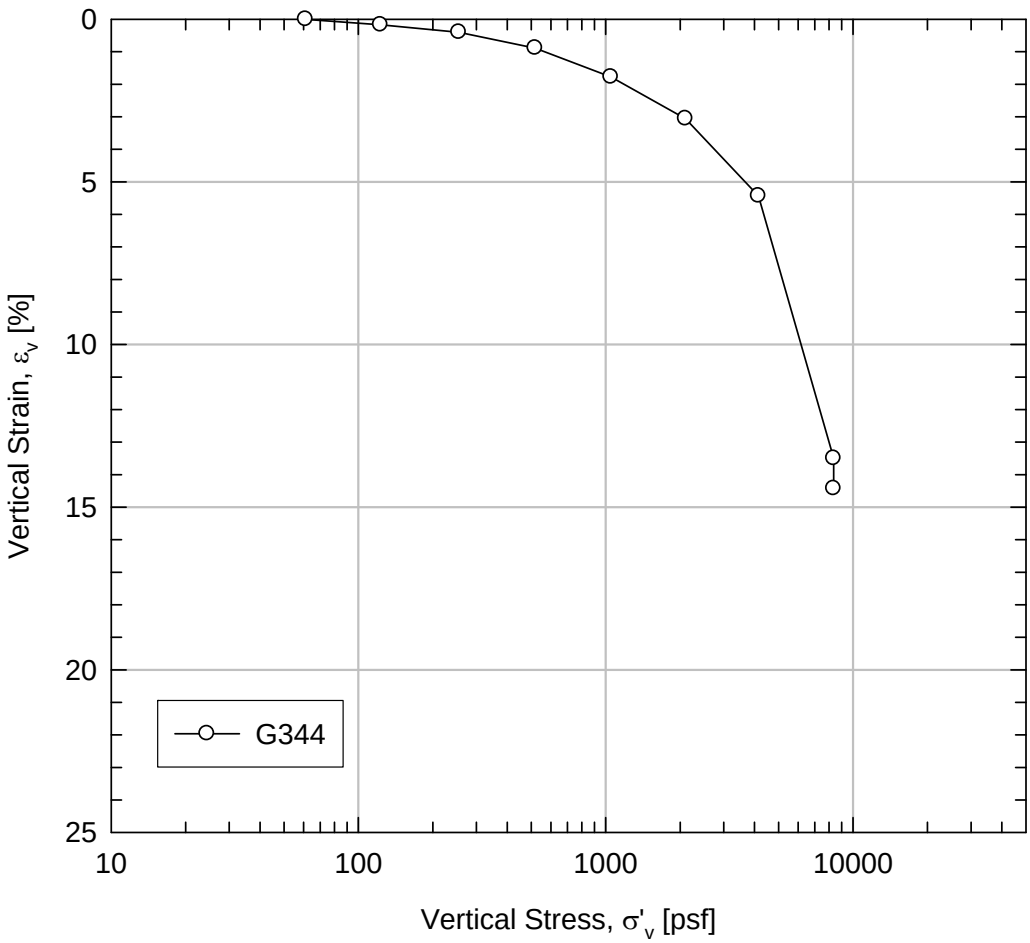

Figure 5.4.21 Vertical strain versus vertical effective stress for test DSS G344 on sample AARW-11-43 UP-2 23-25 ft.

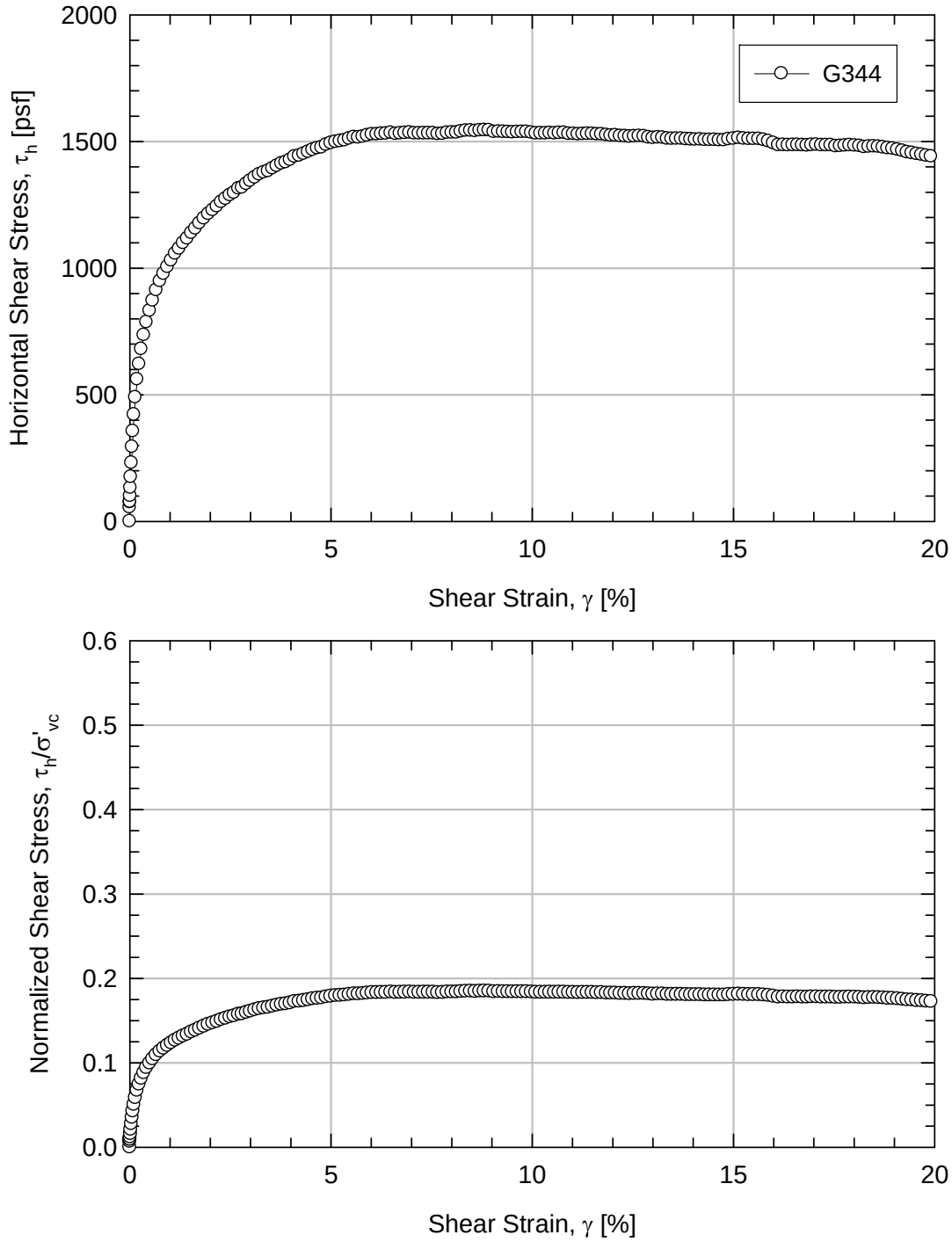

Figure 5.4.22 Horizontal shear stress and normalized shear stress versus shear strain for test DSS G344 on sample AARW-11-43 UP-2 23-25 ft.

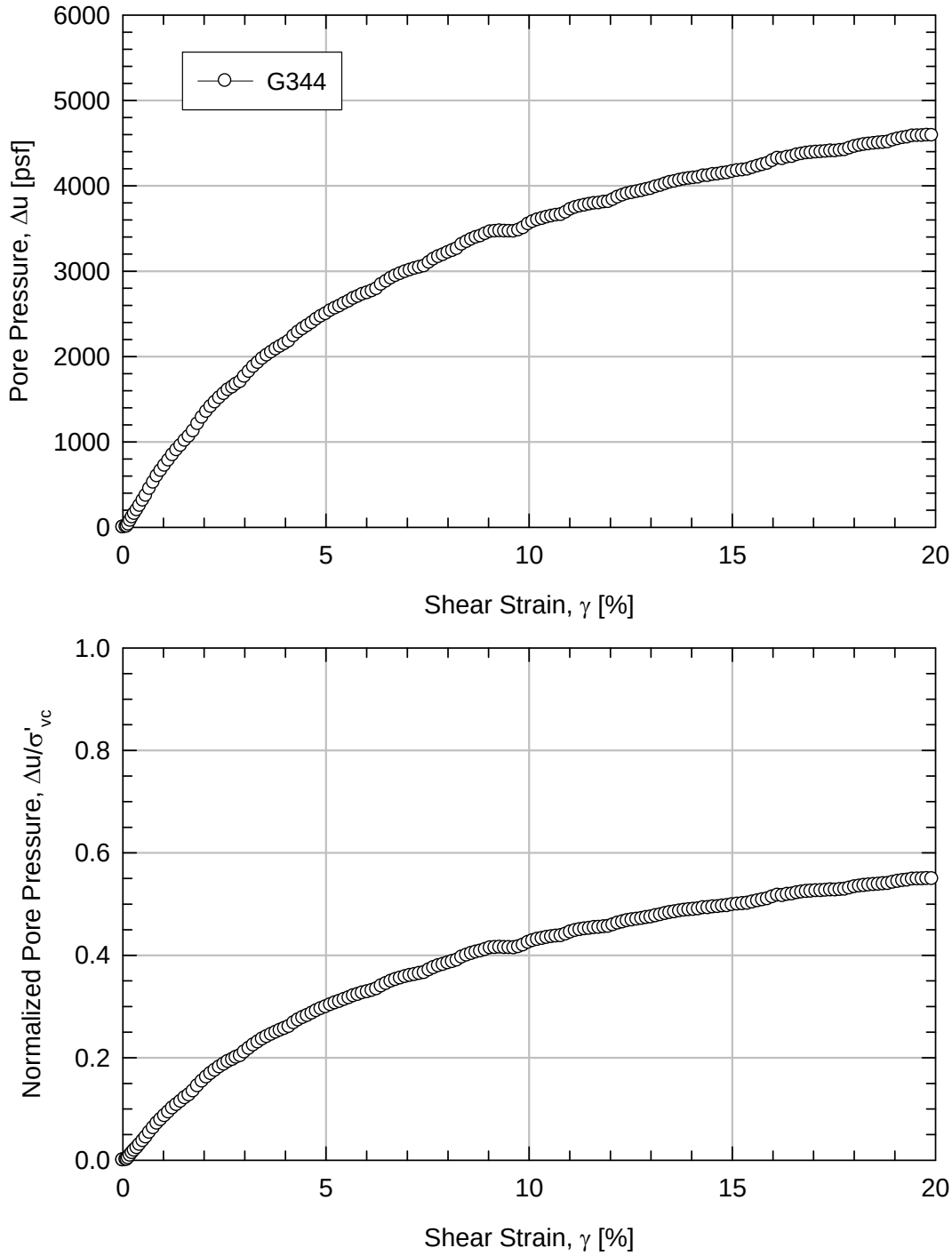

Figure 5.4.23 Pore pressure and normalized pore pressure versus shear strain for test DSS G344 on sample AARW-11-43 UP-2 23-25 ft.

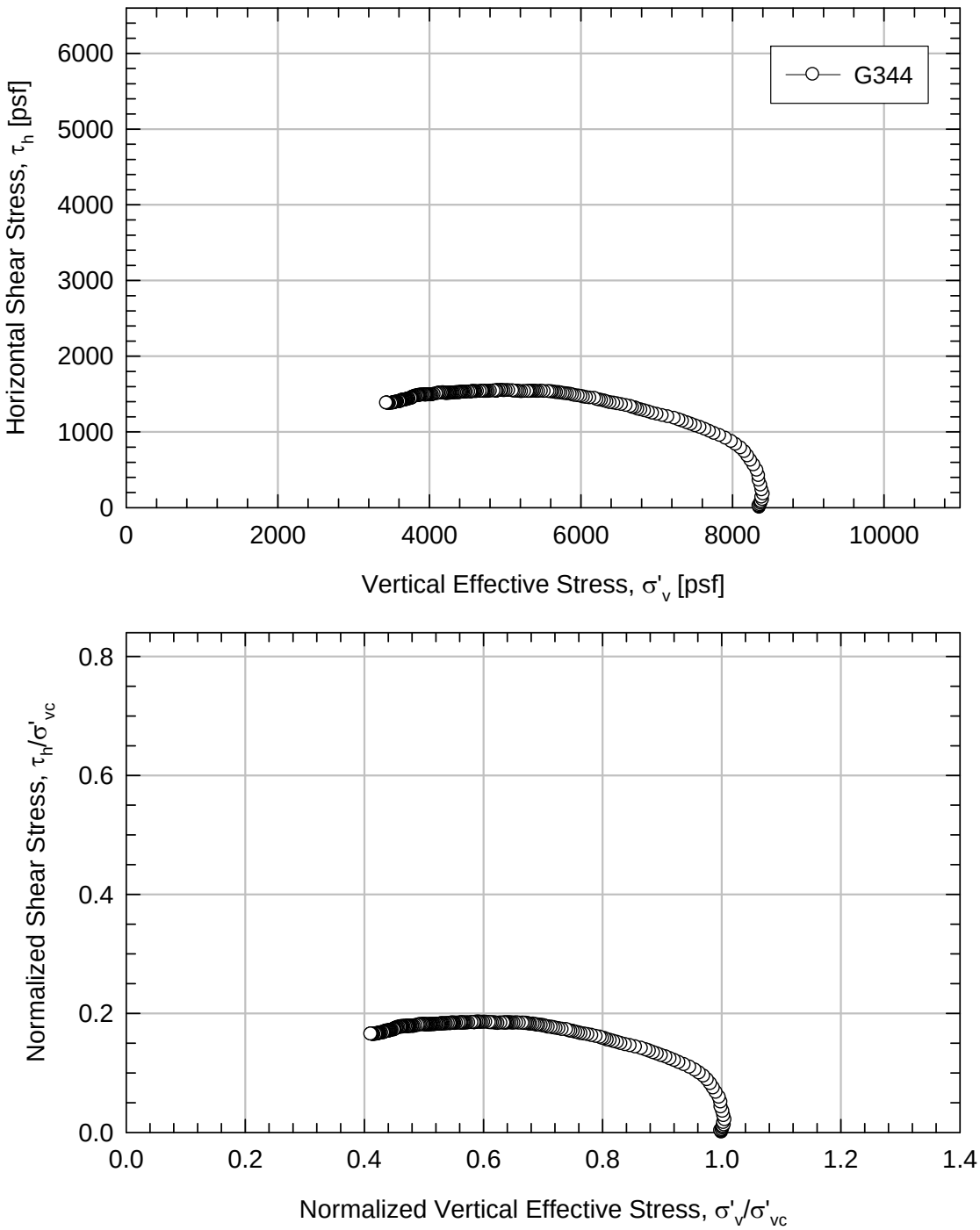

Figure 5.4.24 Horizontal shear stress versus vertical effective stress and normalized shear stress versus normalized vertical effective stress for test DSS G344 on sample AARW-11-43 UP-2 23-25 ft.

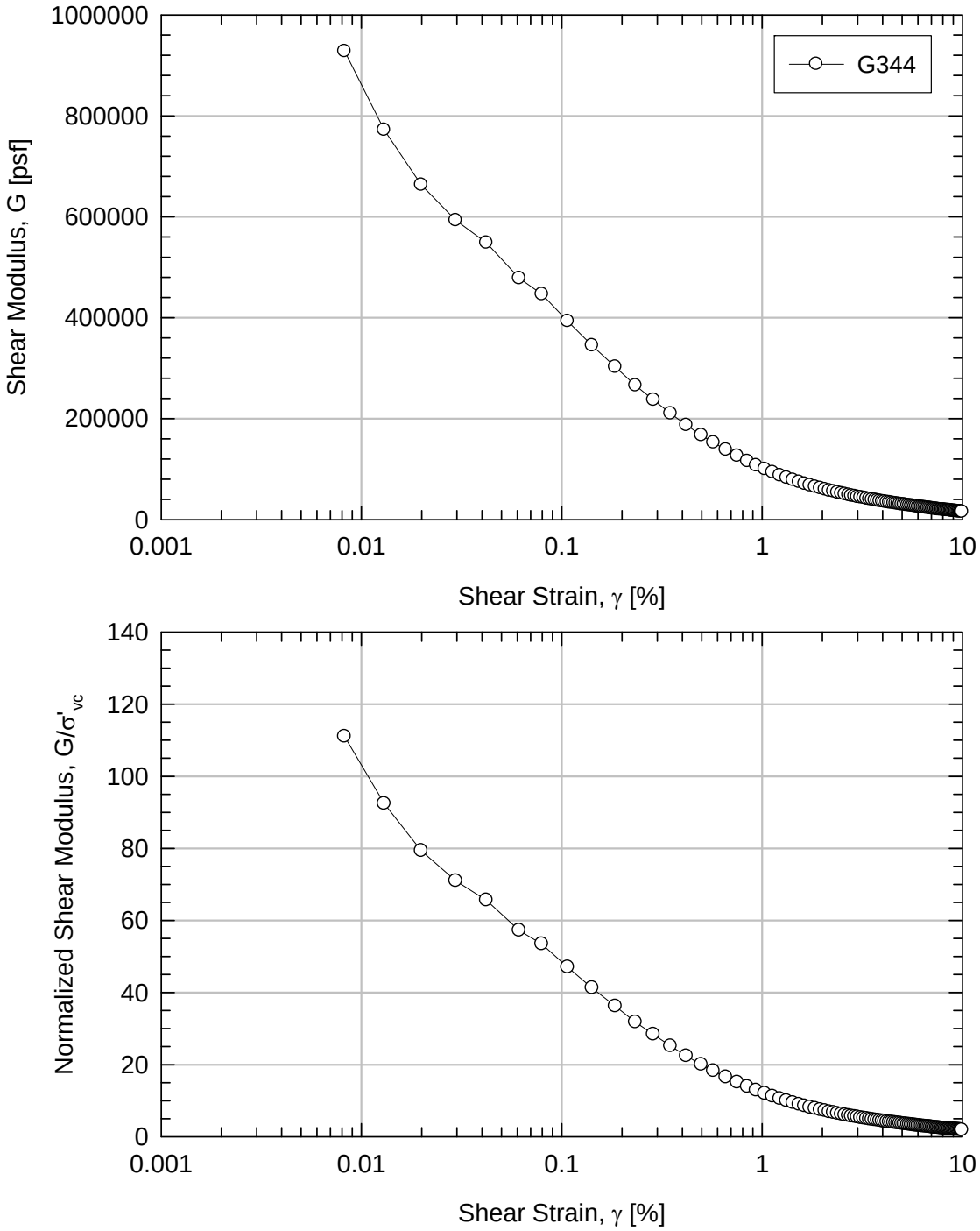

Figure 5.4.25 Shear modulus and normalized shear modulus versus shear strain for test DSS G344 on sample AARW-11-43 UP-2 23-25 ft.

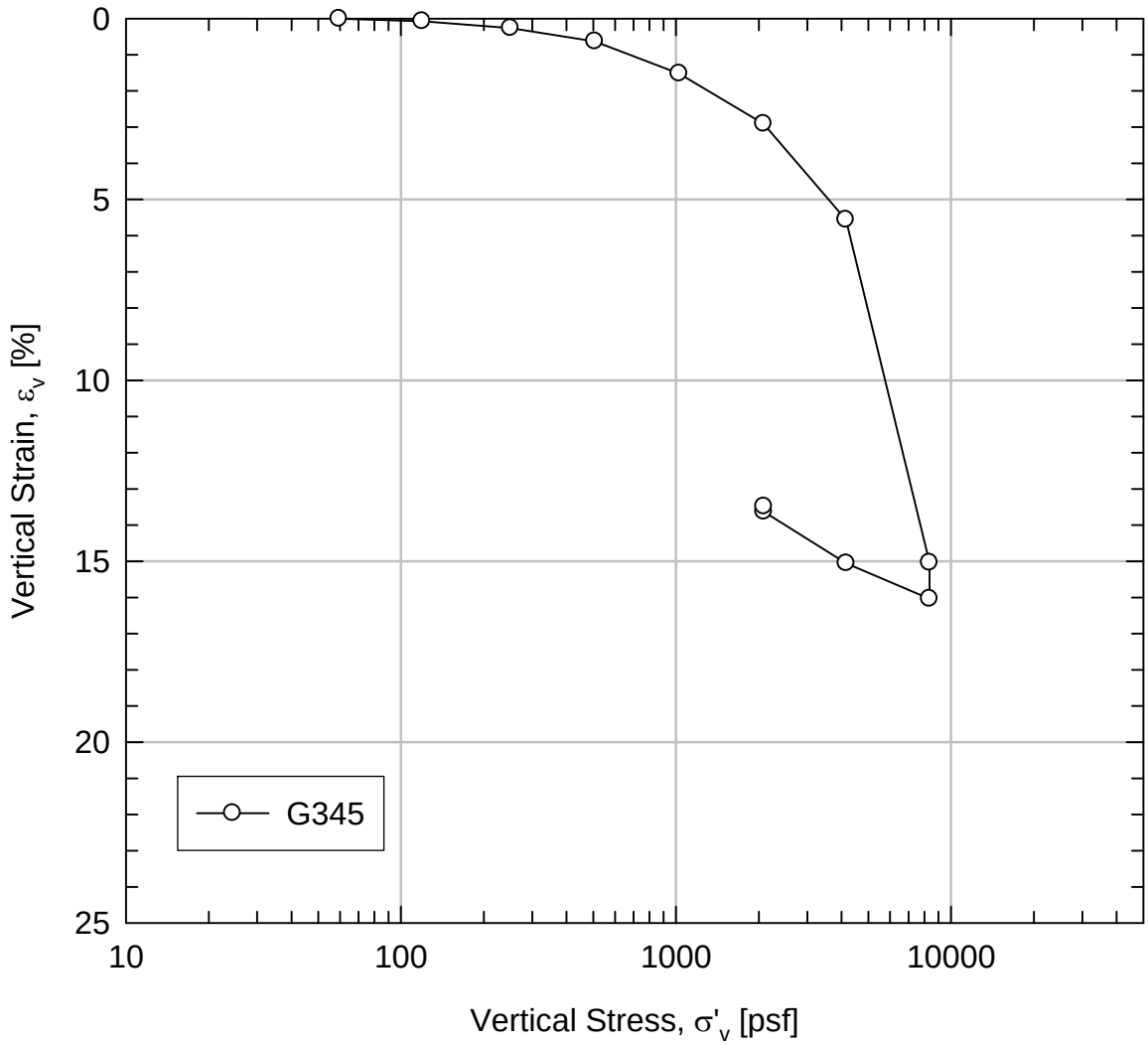

Figure 5.4.26 Vertical strain versus vertical effective stress for test DSS G345 on sample AARW-11-43 UP-2 23-25 ft.

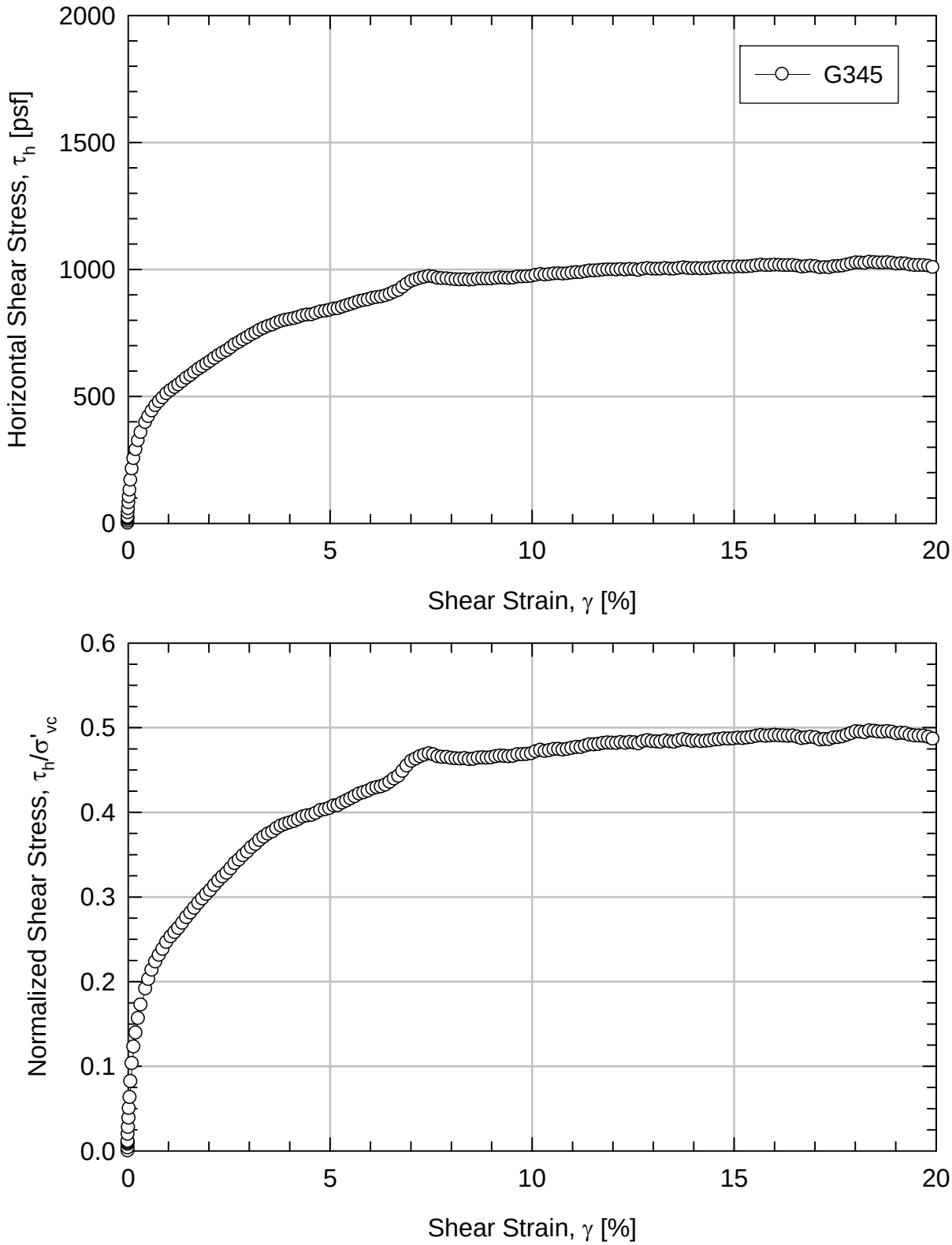

Figure 5.4.27 Horizontal shear stress and normalized shear stress versus shear strain for test DSS G345 on sample AARW-11-43 UP-2 23-25 ft.

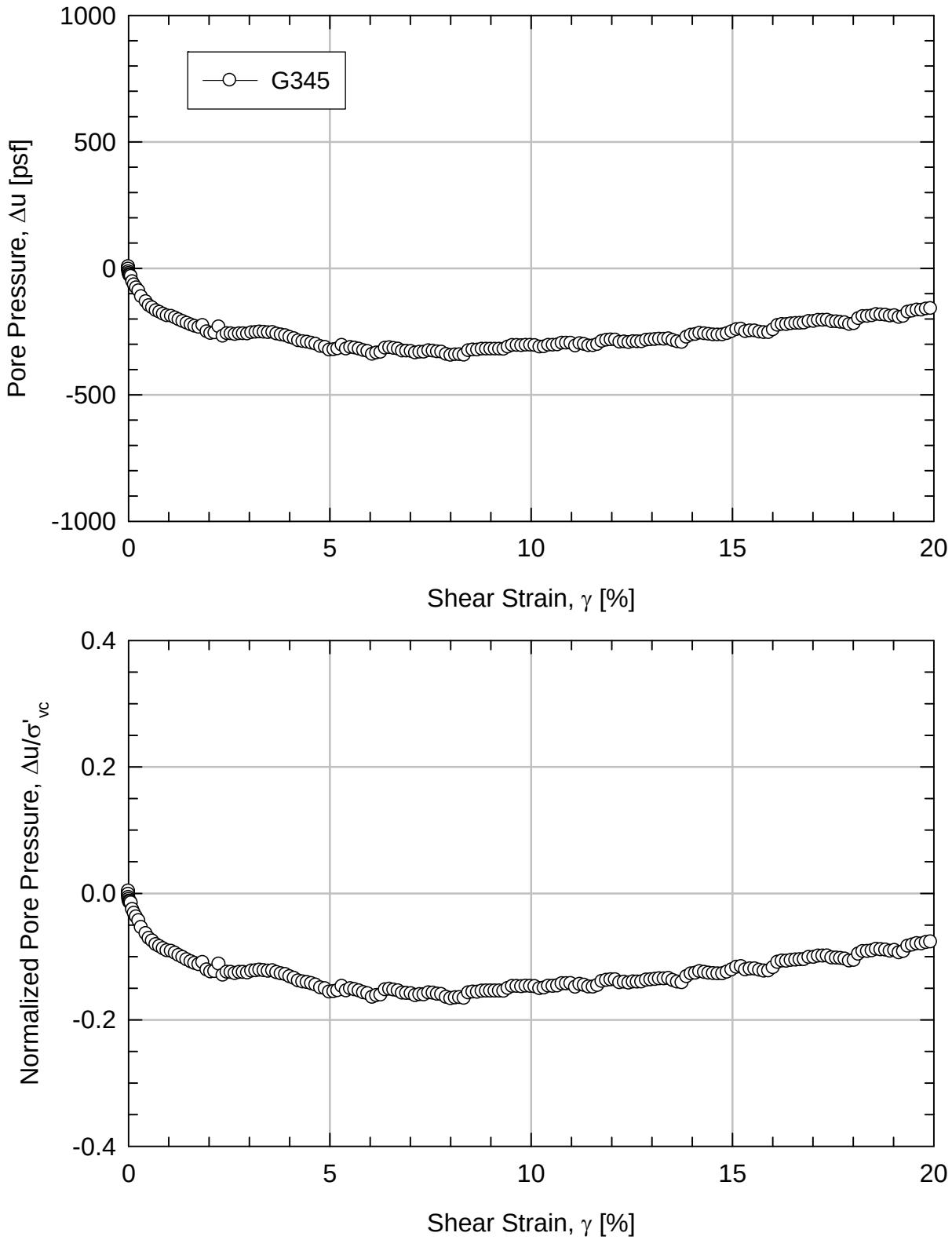

Figure 5.4.28 Pore pressure and normalized pore pressure versus shear strain for test DSS G345 on sample AARW-11-43 UP-2 23-25 ft.

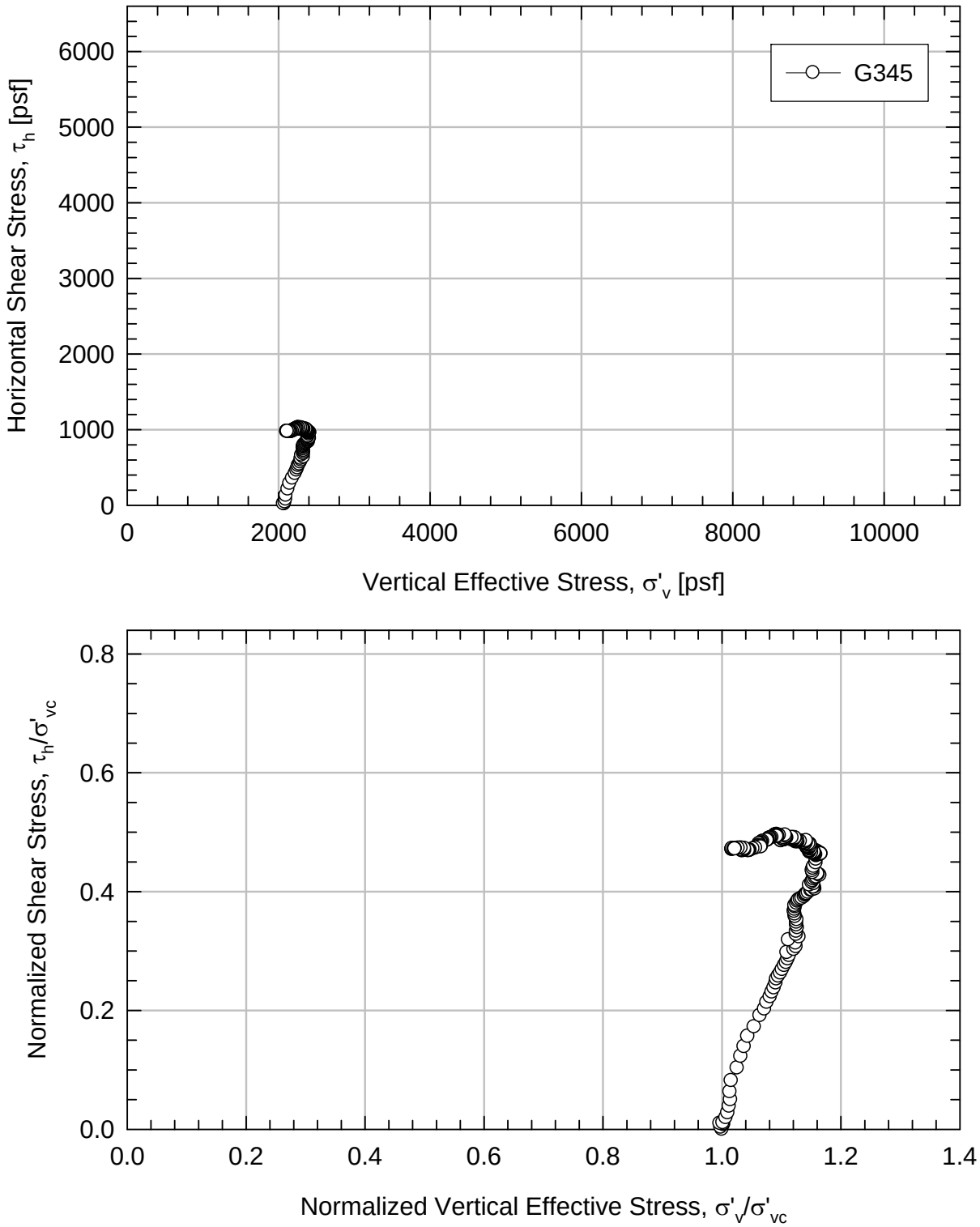

Figure 5.4.29 Horizontal shear stress versus vertical effective stress and normalized shear stress versus normalized vertical effective stress for test DSS G345 on sample AARW-11-43 UP-2 23-25 ft.

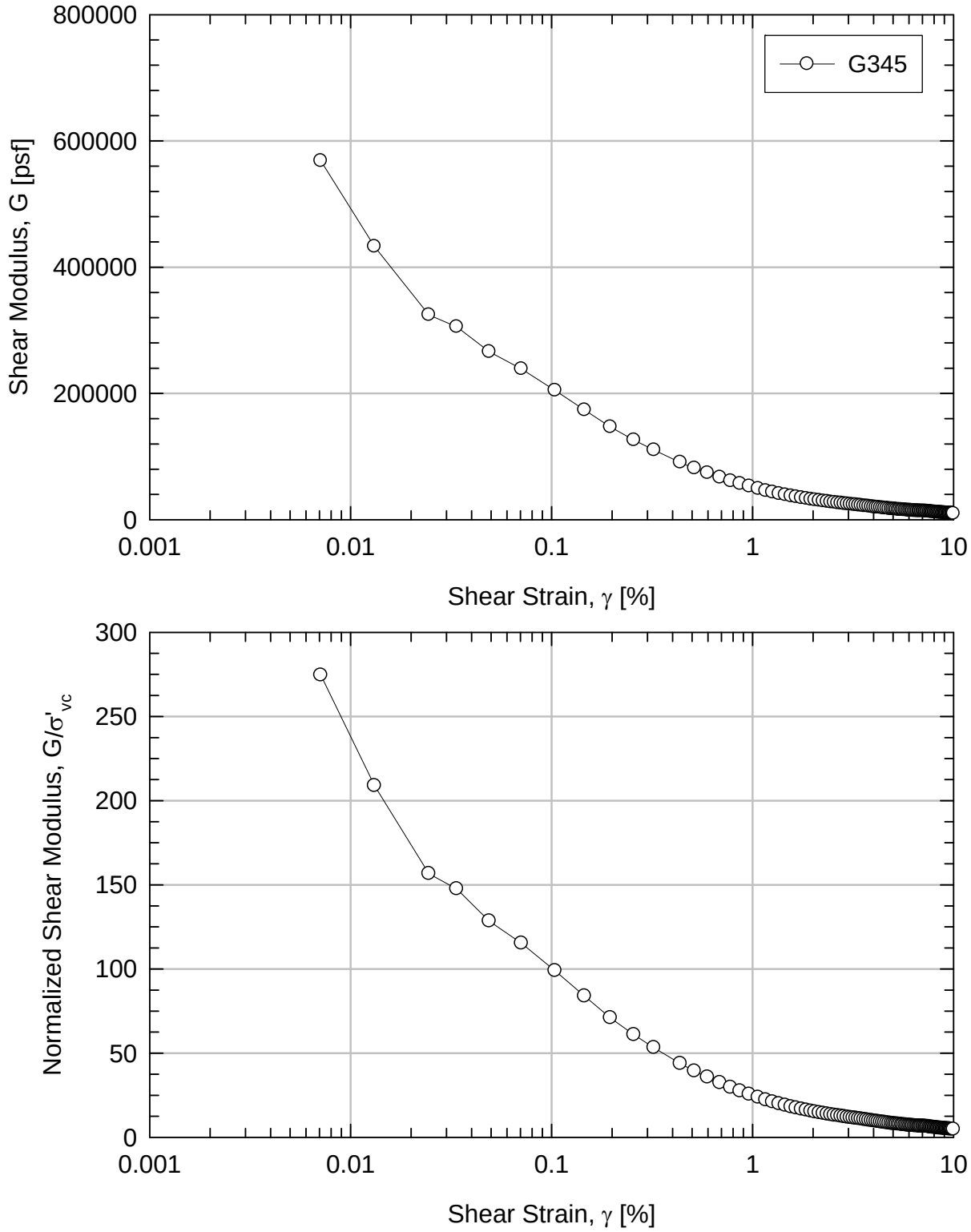

Figure 5.4.30 Shear modulus and normalized shear modulus versus shear strain for test DSS G345 on sample AARW-11-43 UP-2 23-25 ft.

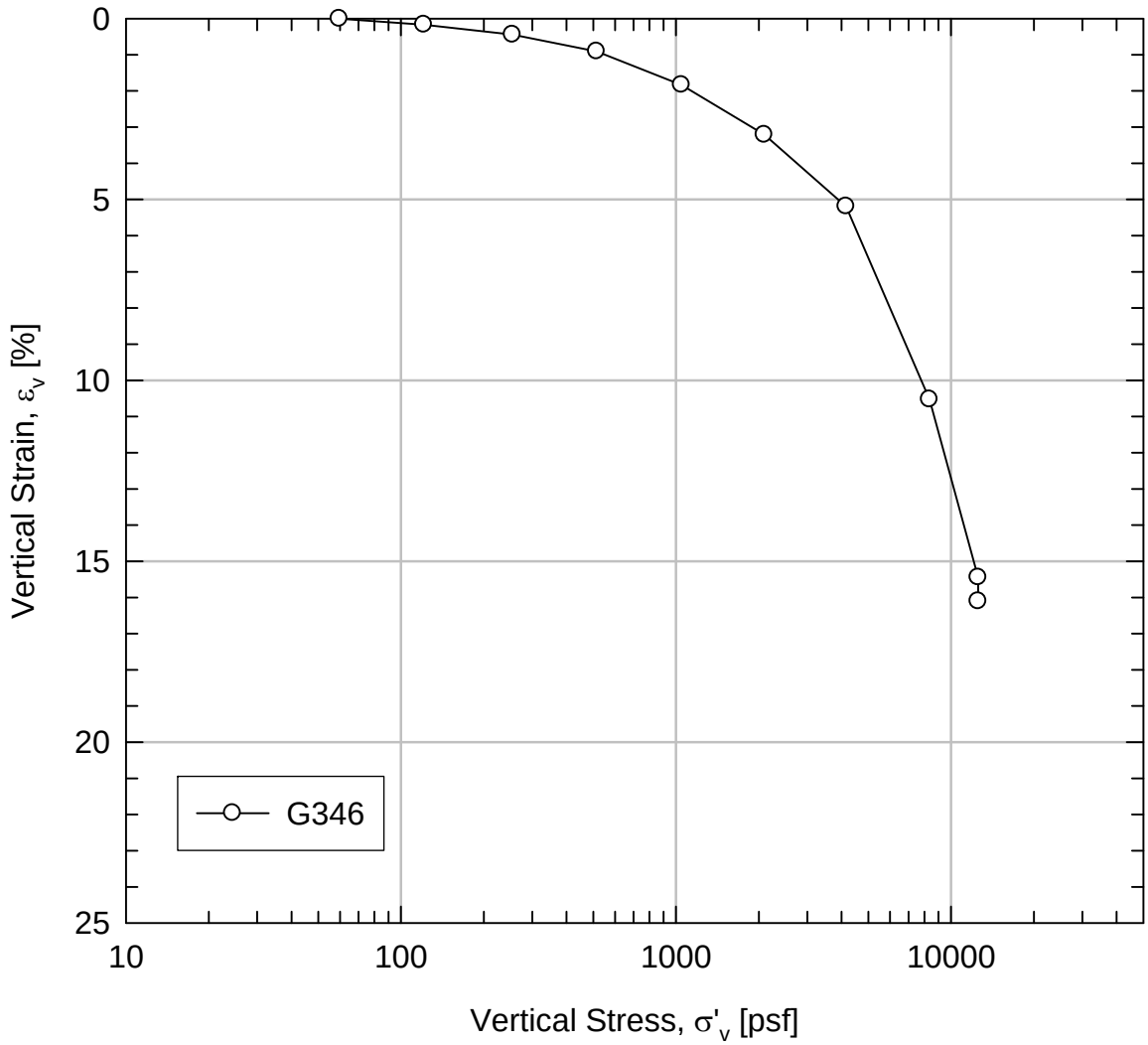

Figure 5.4.31 Vertical strain versus vertical effective stress for test DSS G346 on Sample AAB-01-16 UP-1 13-15 ft.

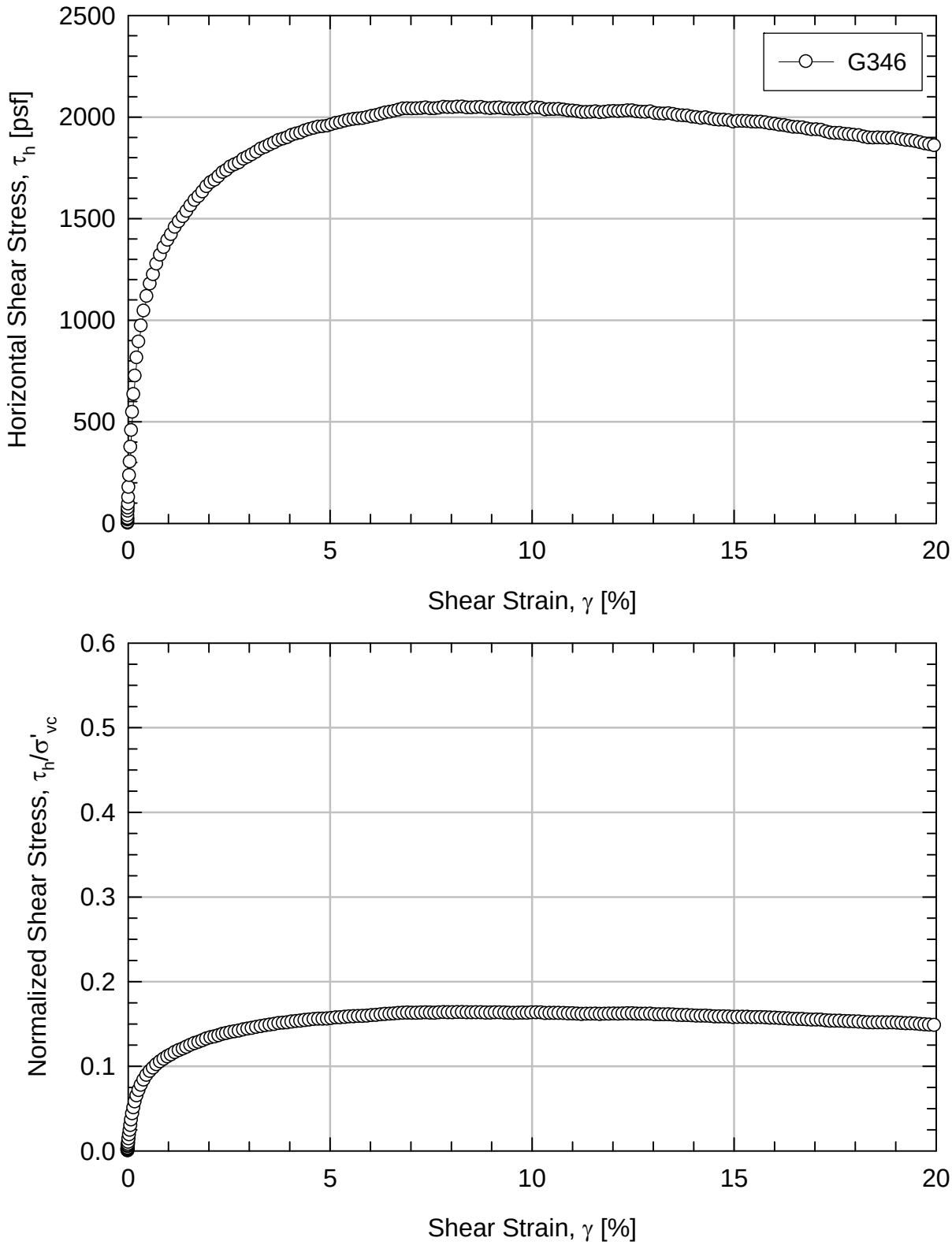

Figure 5.4.32 Horizontal shear stress and normalized shear stress versus shear strain for test DSS G346 on Sample AAB-01-16 UP-1 13-15 ft.

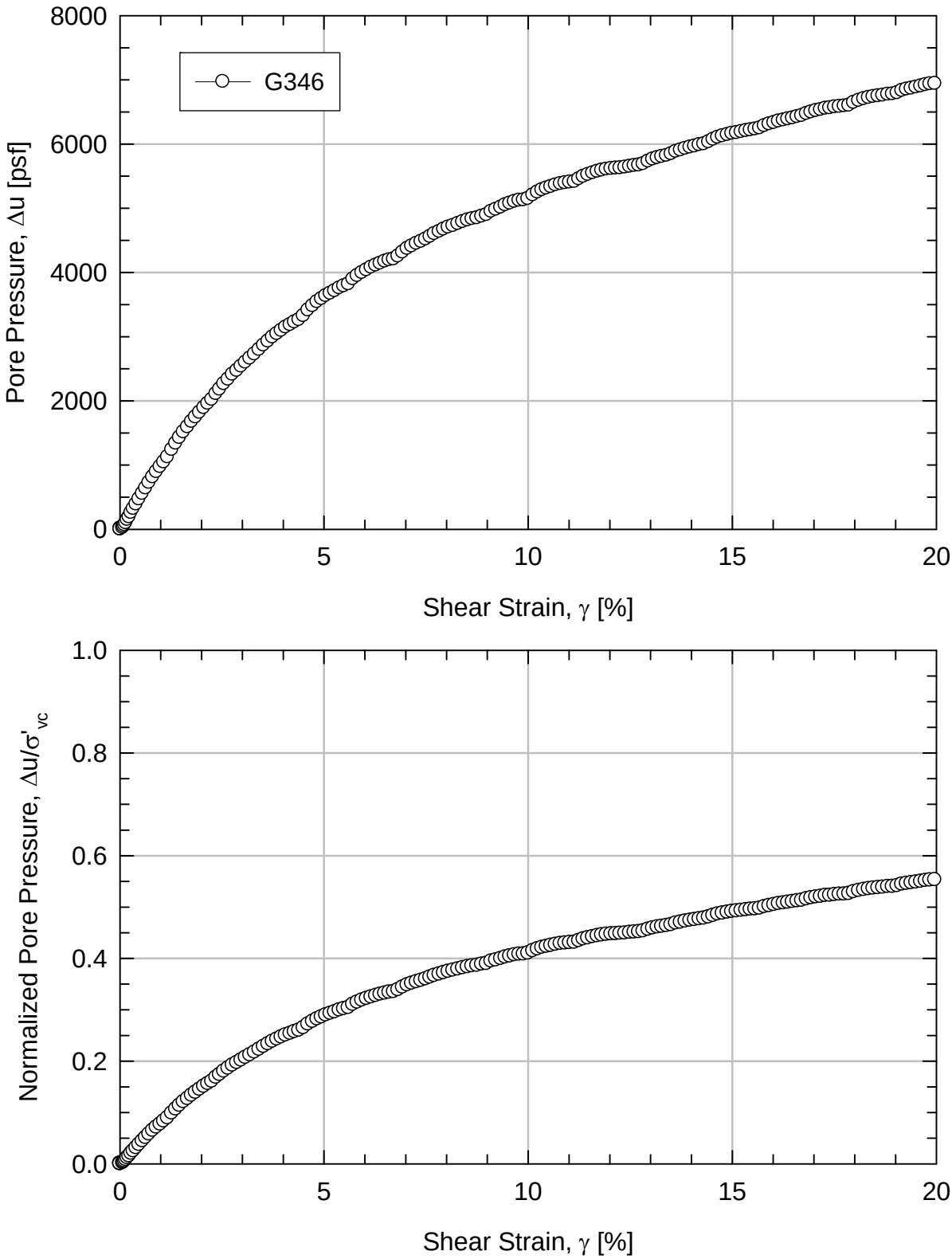

Figure 5.4.33 Pore pressure and normalized pore pressure versus shear strain for test DSS G346 on Sample AAB-01-16 UP-1 13-15 ft.

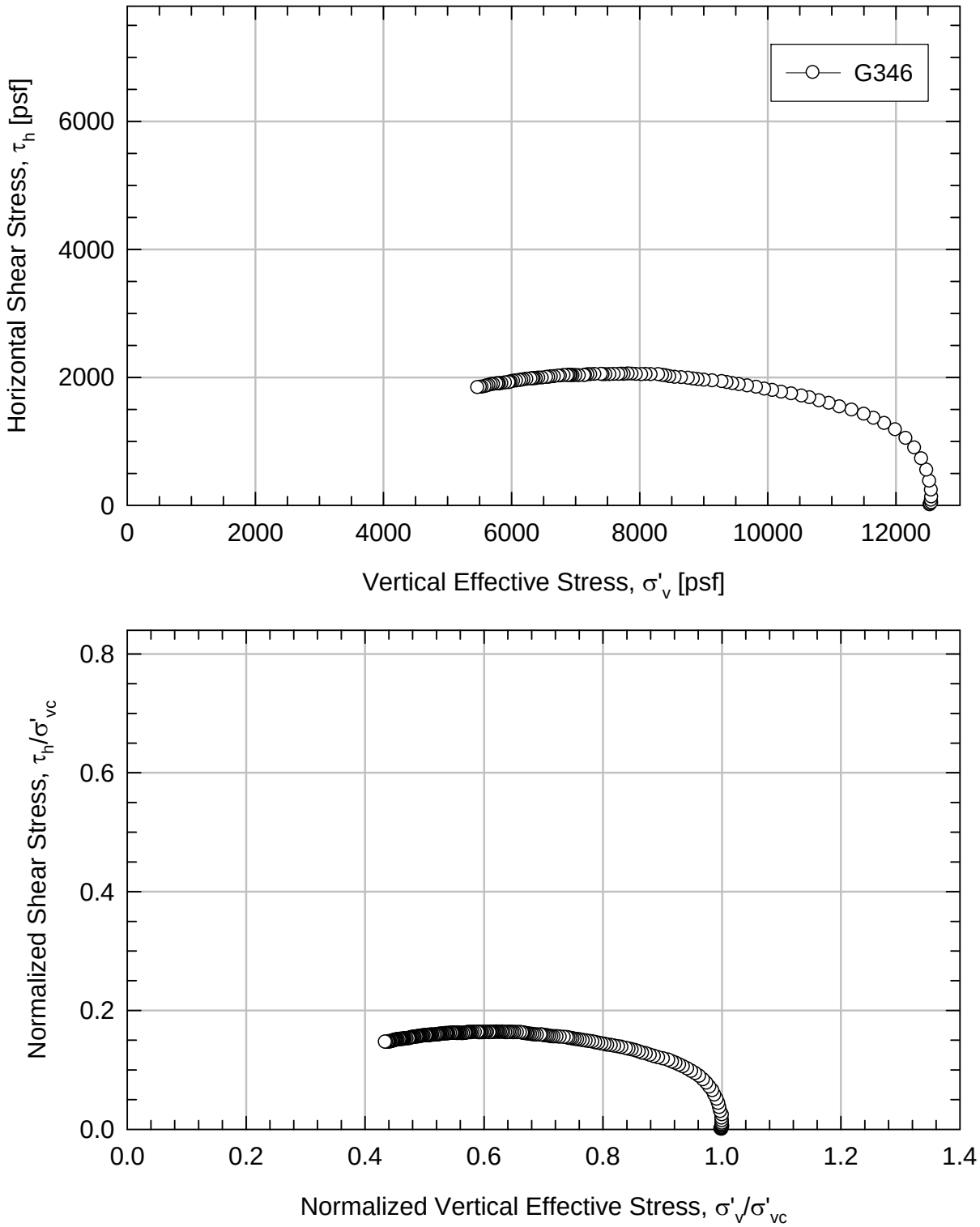

Figure 5.4.34 Horizontal shear stress versus vertical effective stress and normalized shear stress versus normalized vertical effective stress for test DSS G346 on Sample AAB-01-16 UP-1 13-15 ft.

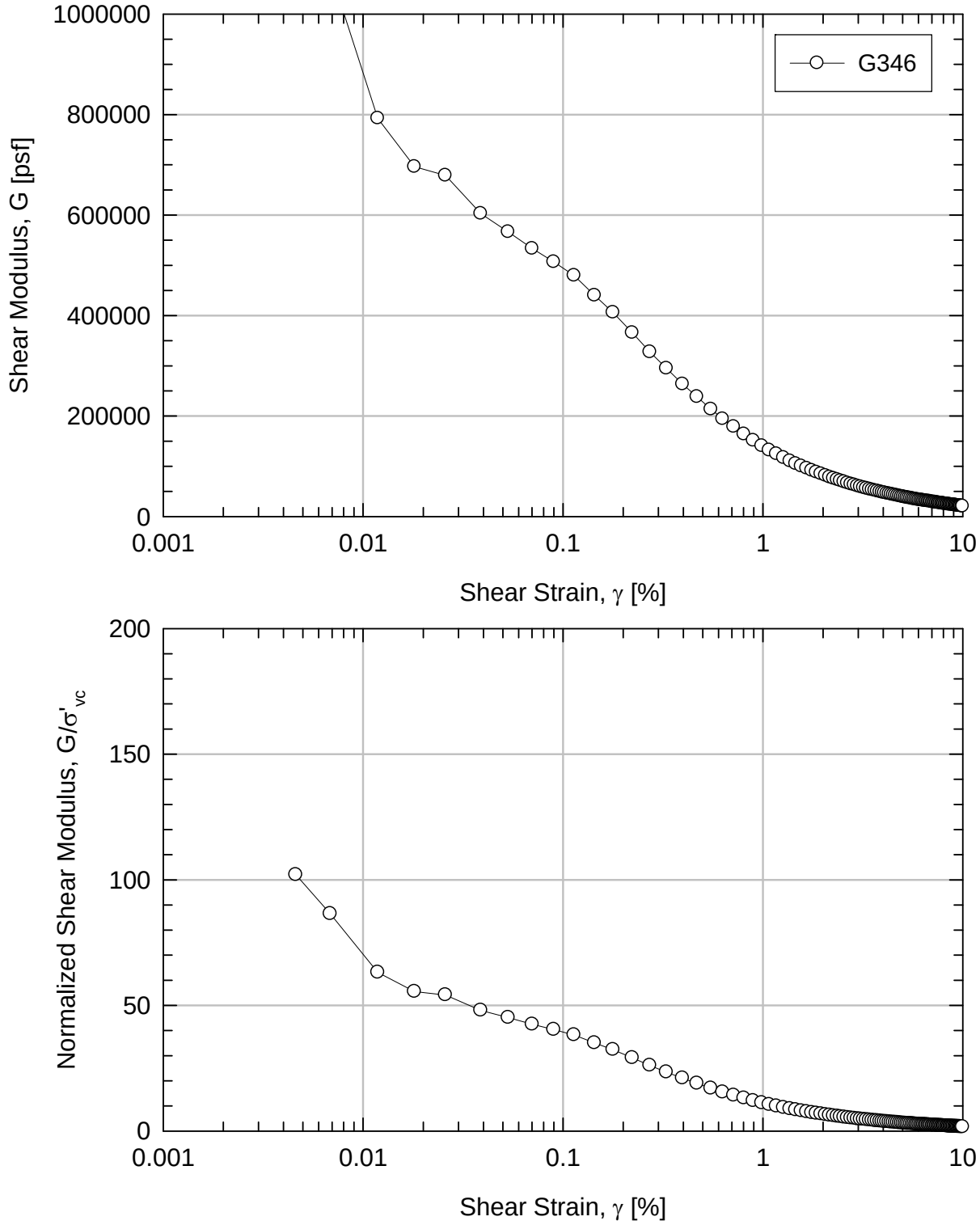

Figure 5.4.35 Shear modulus and normalized shear modulus versus shear strain for test DSS G346 on Sample AAB-01-16 UP-1 13-15 ft.

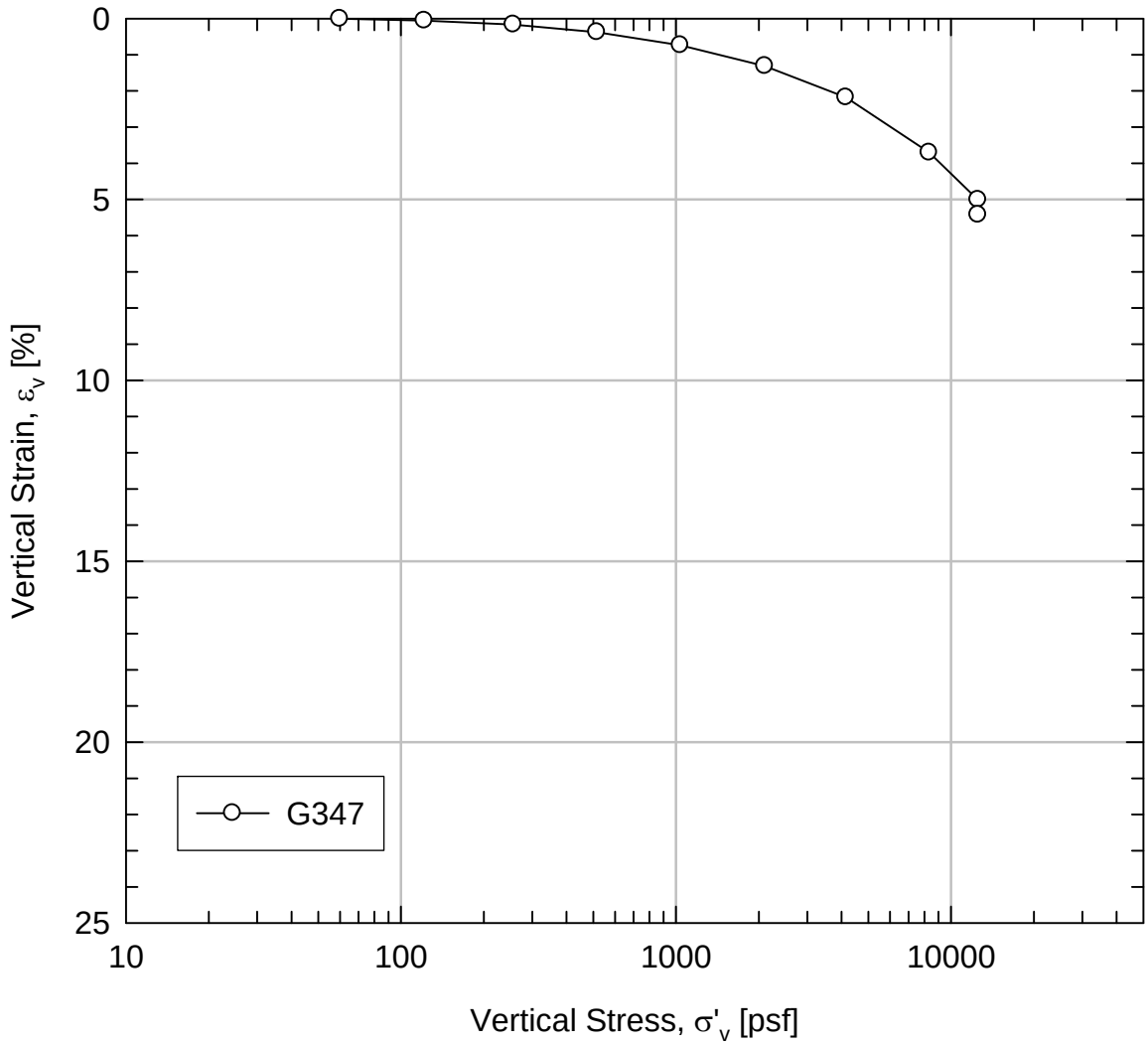

Figure 5.4.36 Vertical strain versus vertical effective stress for test DSS G347 on Sample AARW-01-04 UP-2 43-45 ft.

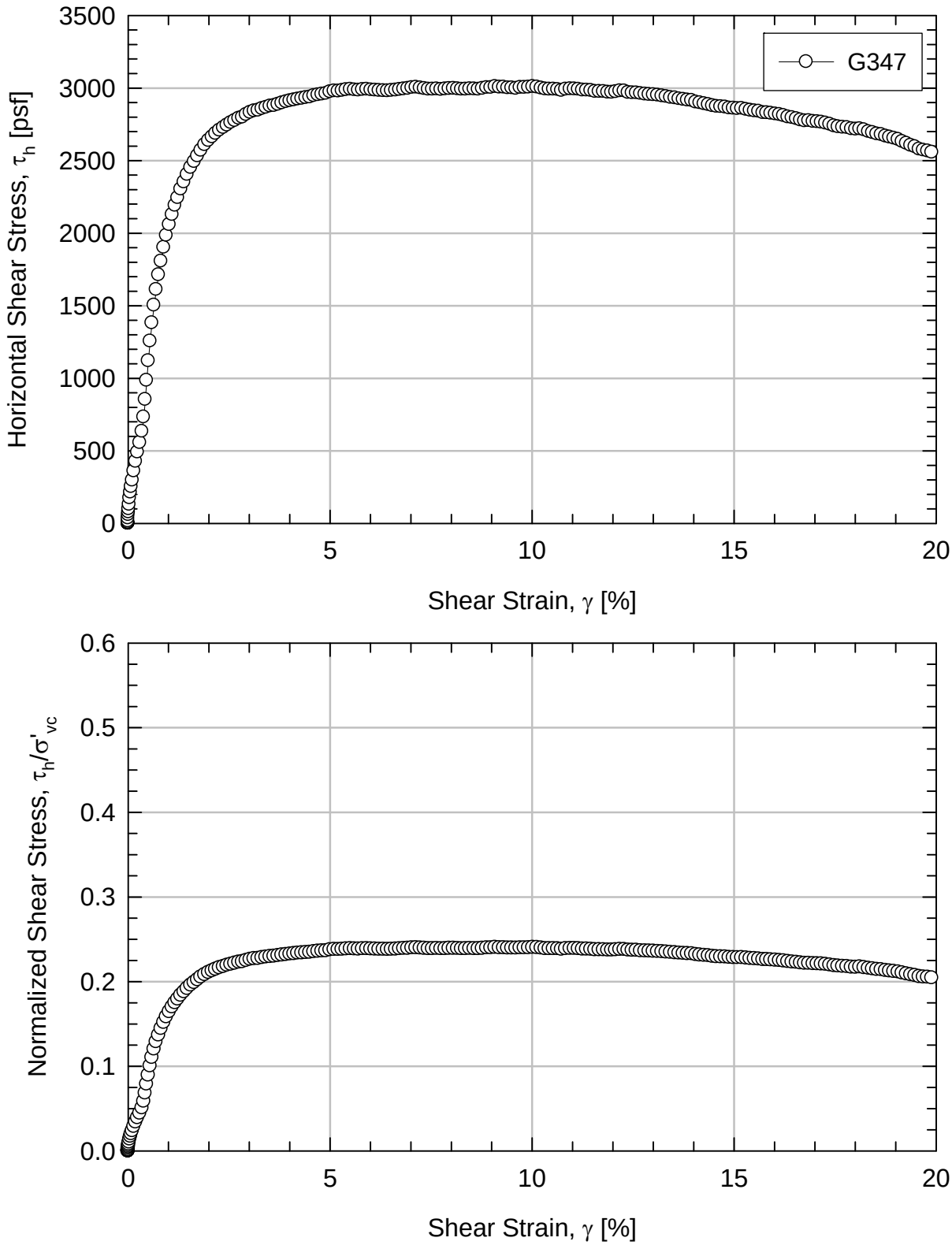

Figure 5.4.37 Horizontal shear stress and normalized shear stress versus shear strain for test DSS G347 on Sample AARW-01-04 UP-2 43-45 ft.

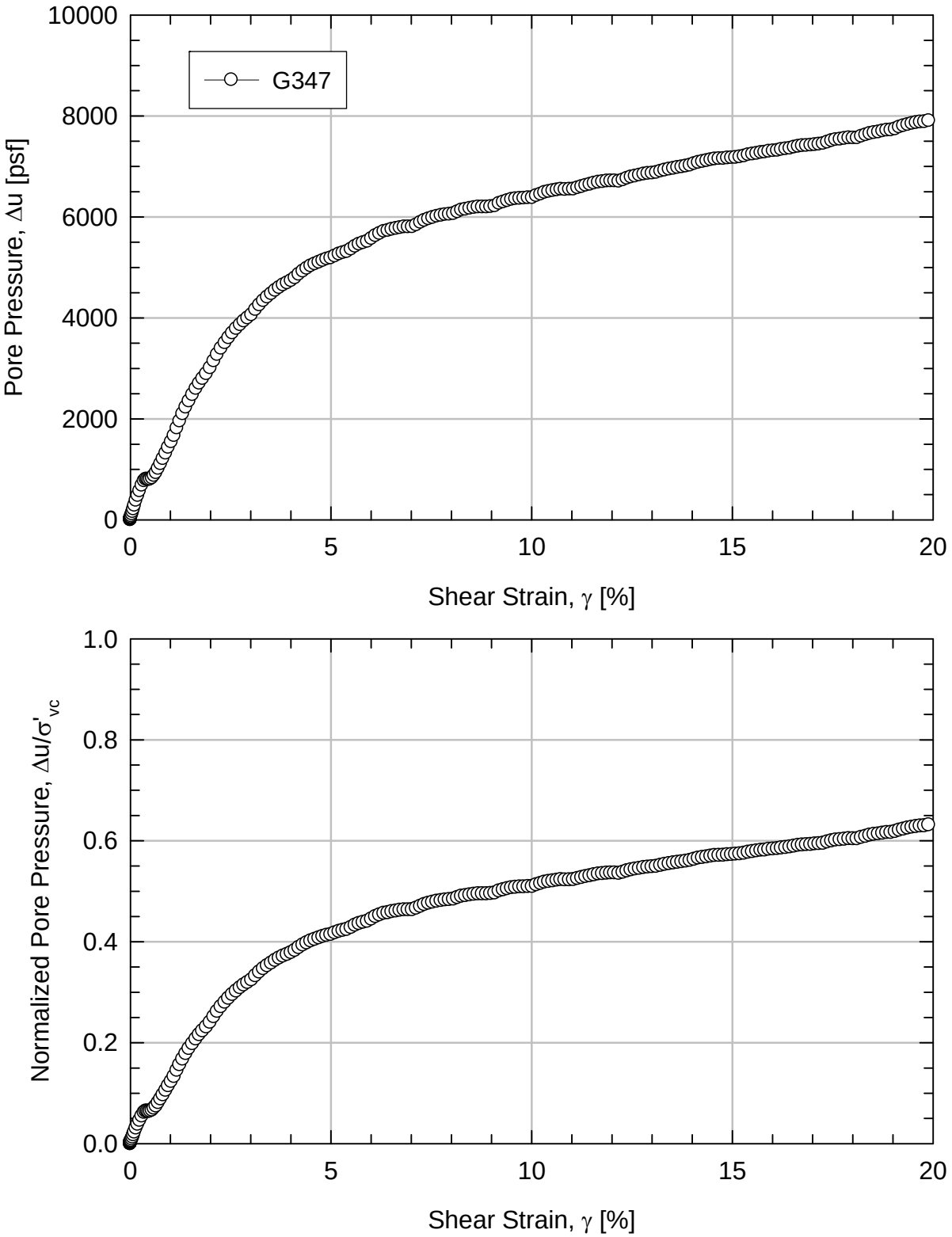

Figure 5.4.38 Pore pressure and normalized pore pressure versus shear strain for test DSS G347 on Sample AARW-01-04 UP-2 43-45 ft.

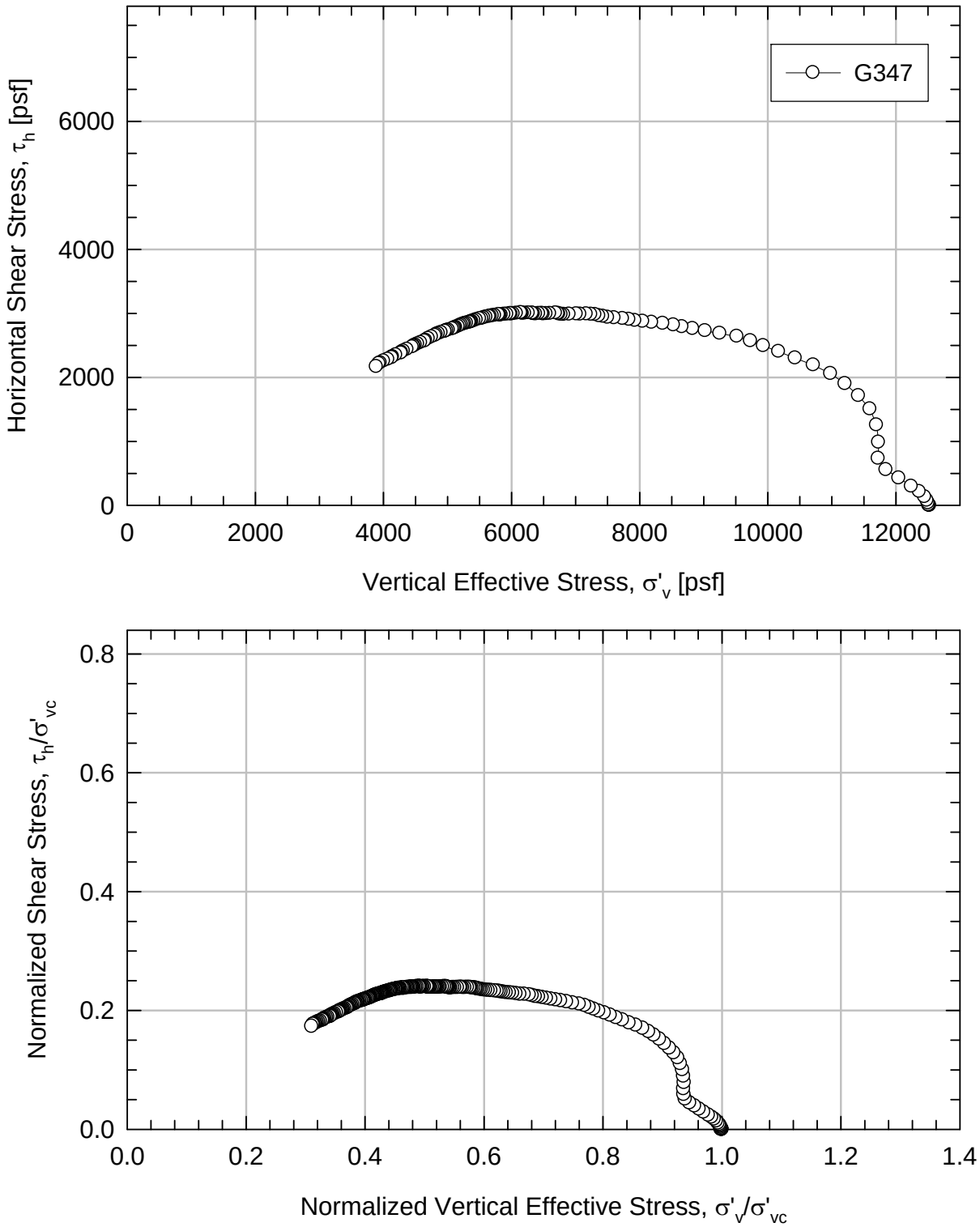

Figure 5.4.39 Horizontal shear stress versus vertical effective stress and normalized shear stress versus normalized vertical effective stress for test DSS G347 on Sample AARW-01-04 UP-2 43-45 ft.

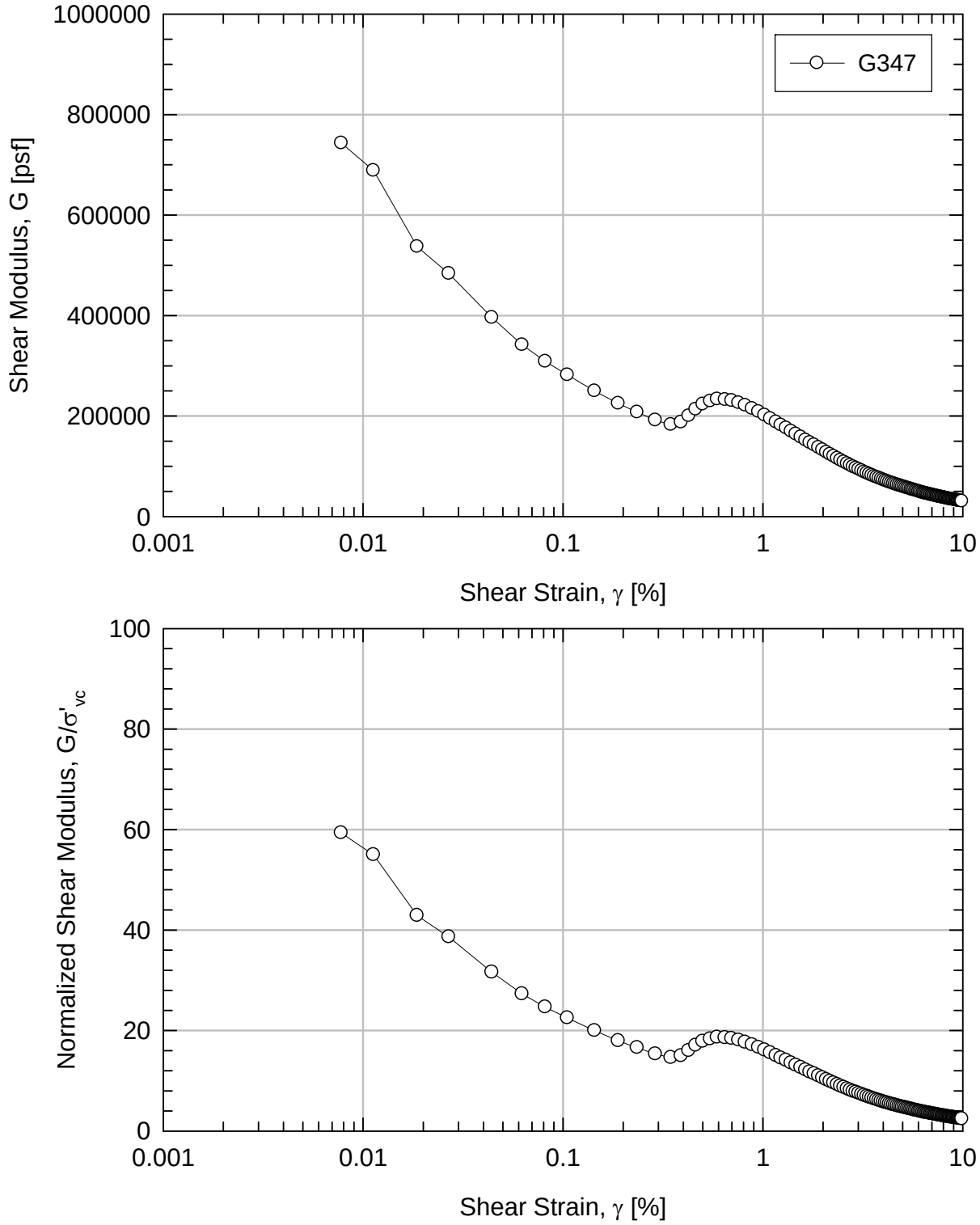

Figure 5.4.40 Shear modulus and normalized shear modulus versus shear strain for test DSS G347 on Sample AARW-01-04 UP-2 43-45 ft.

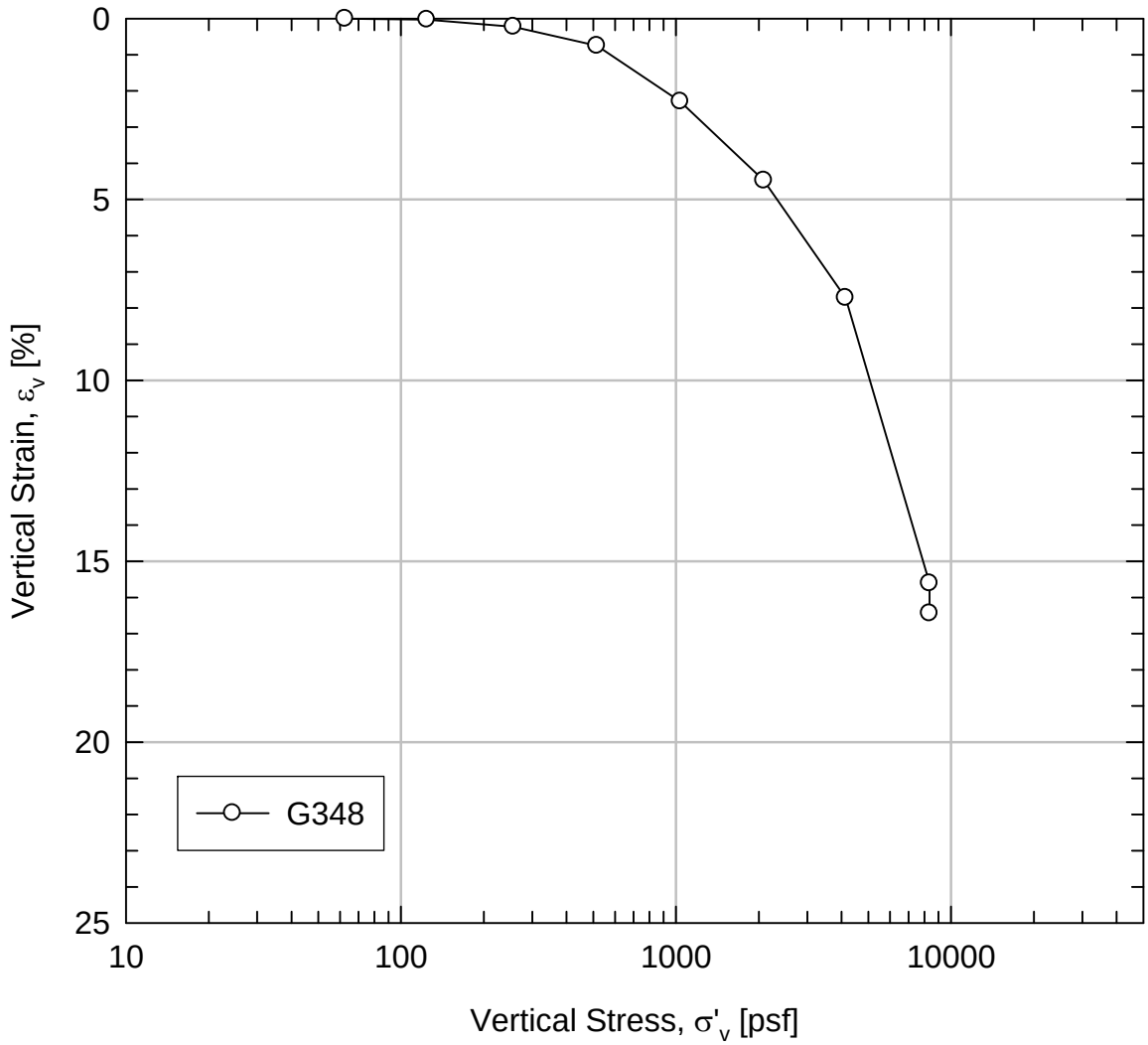

Figure 5.4.41 Vertical strain versus vertical effective stress for test DSS G348 on Sample AAB-02-22A UP-1 43-45 ft.

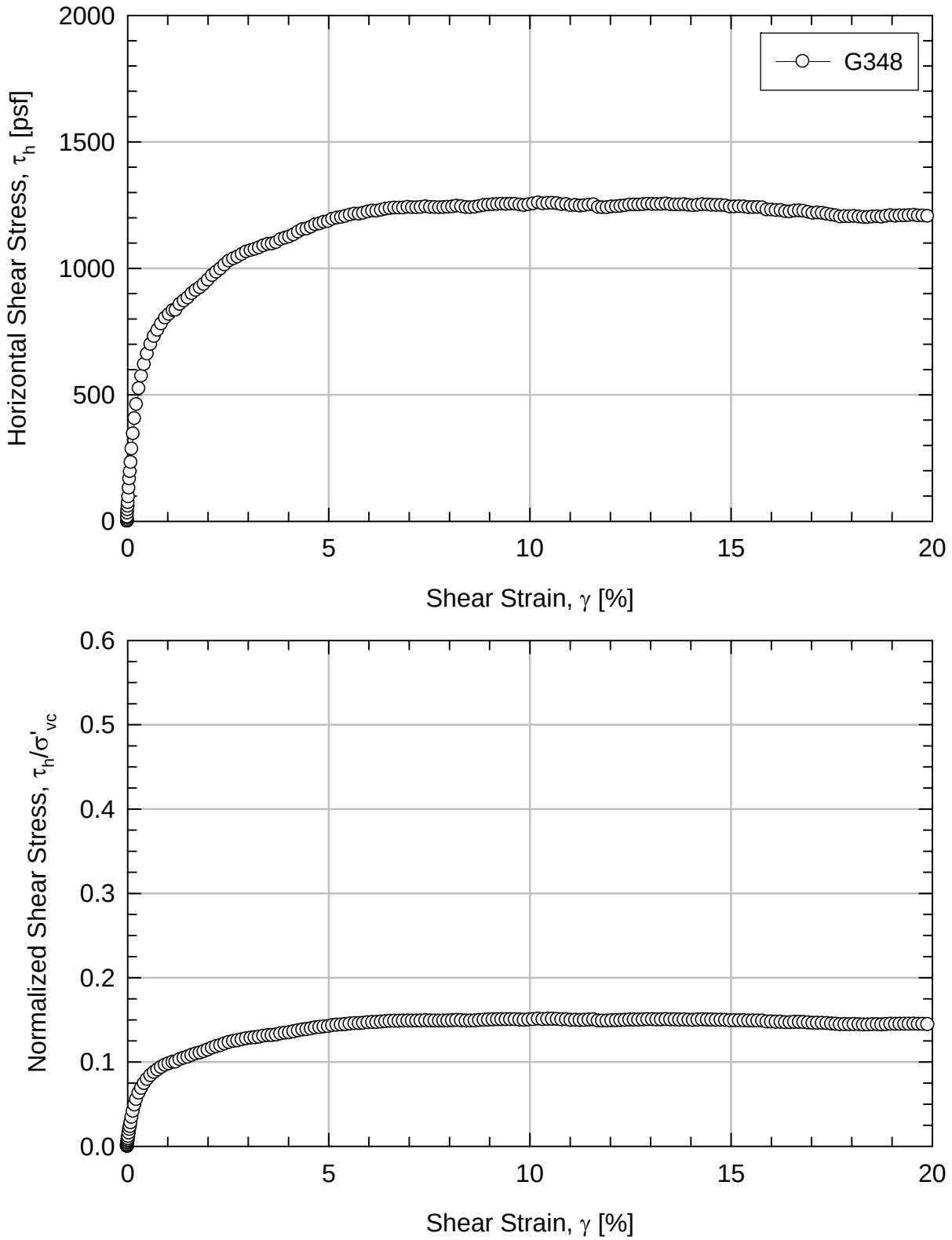

Figure 5.4.42 Horizontal shear stress and normalized shear stress versus shear strain for test DSS G348 on Sample AAB-02-22A UP-1 43-45 ft.

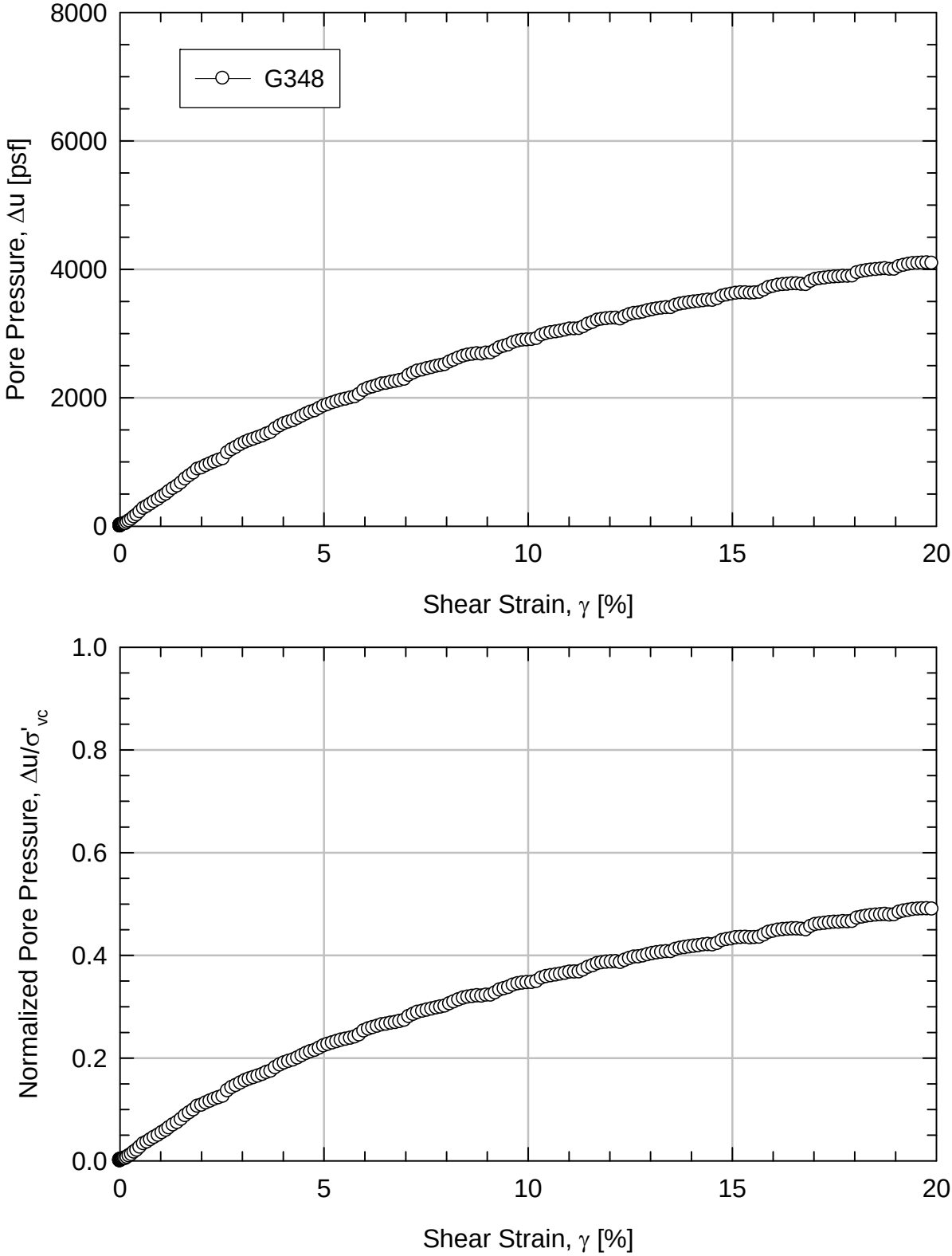

Figure 5.4.43 Pore pressure and normalized pore pressure versus shear strain for test DSS G348 on Sample AAB-02-22A UP-1 43-45 ft.

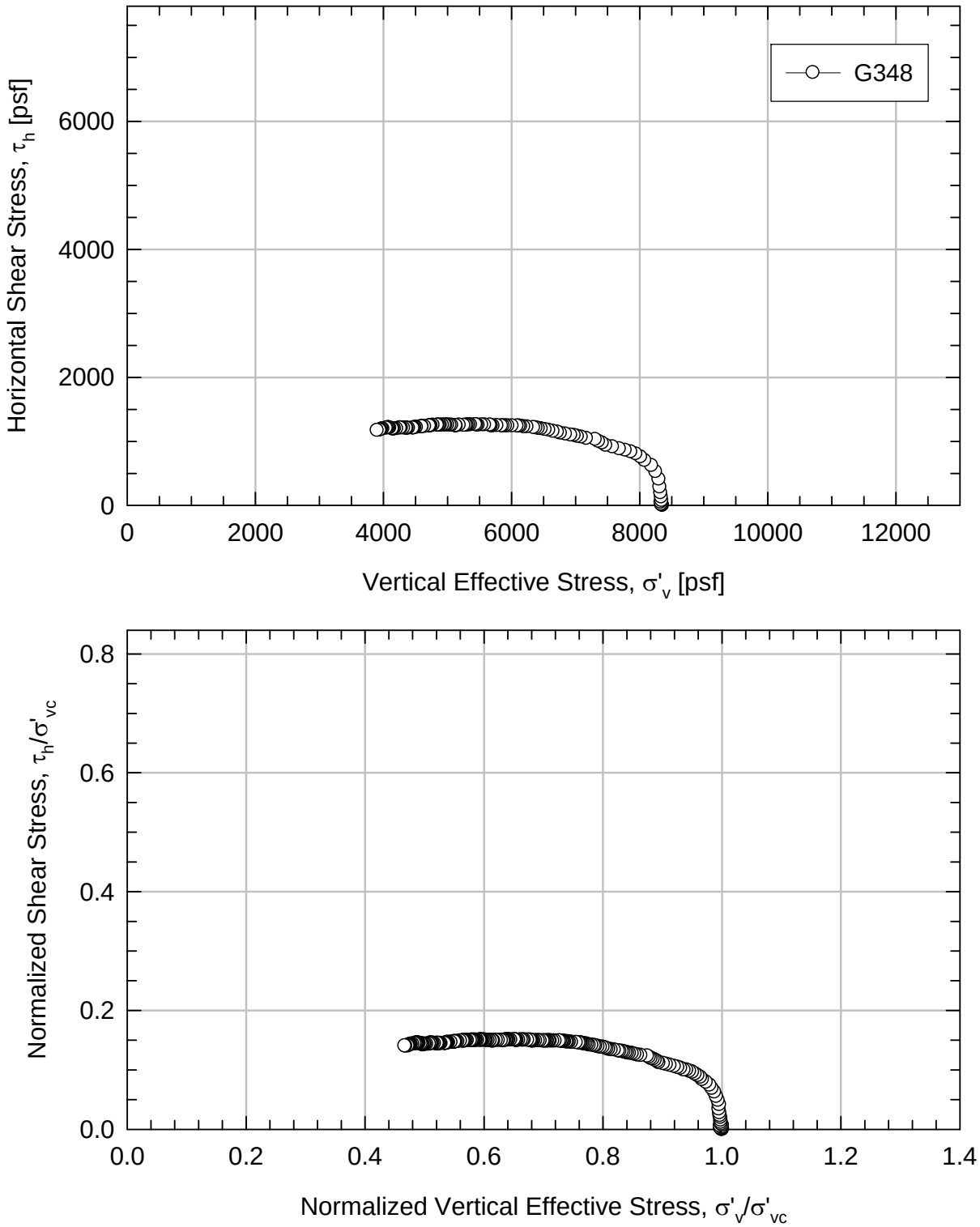

Figure 5.4.44 Horizontal shear stress versus vertical effective stress and normalized shear stress versus normalized vertical effective stress for test DSS G348 on Sample AAB-02-22A UP-1 43-45 ft.

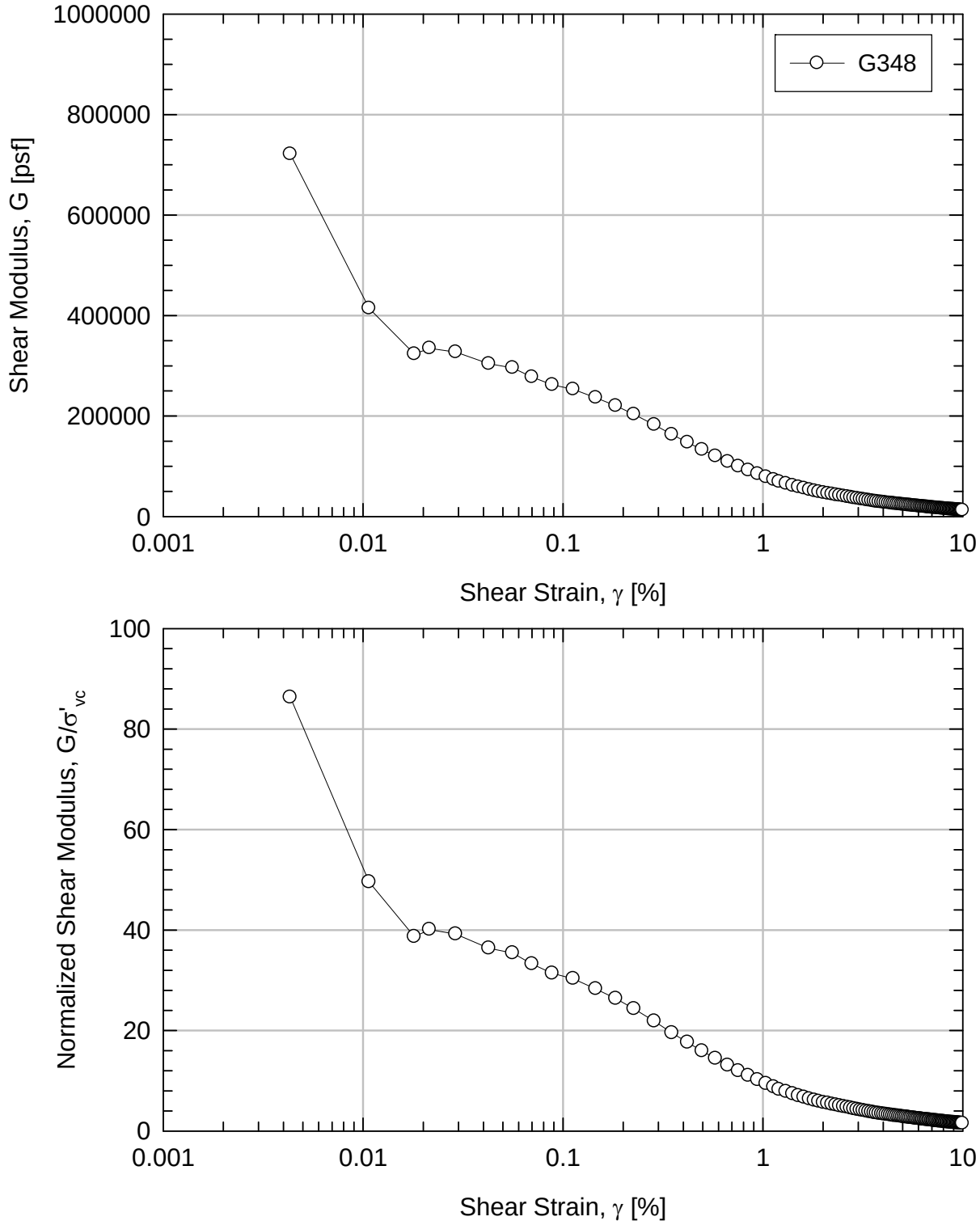

Figure 5.4.45 Shear modulus and normalized shear modulus versus shear strain for test DSS G348 on Sample AAB-02-22A UP-1 43-45 ft.

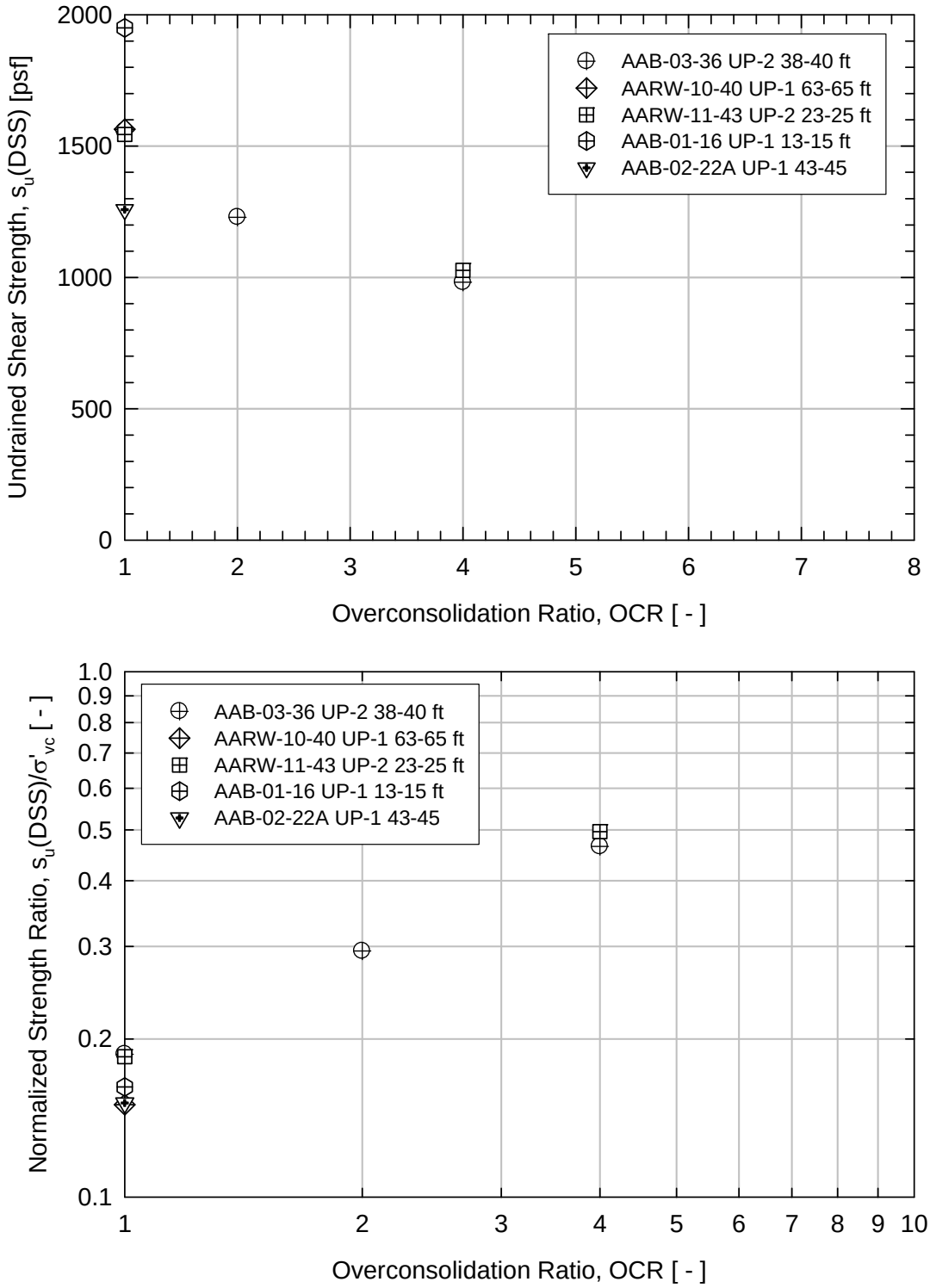

Figure 5.4.46 Summary of undrained shear strength and normalized undrained shear strength values versus OCR from SHANSEP DSS tests

Index Tests

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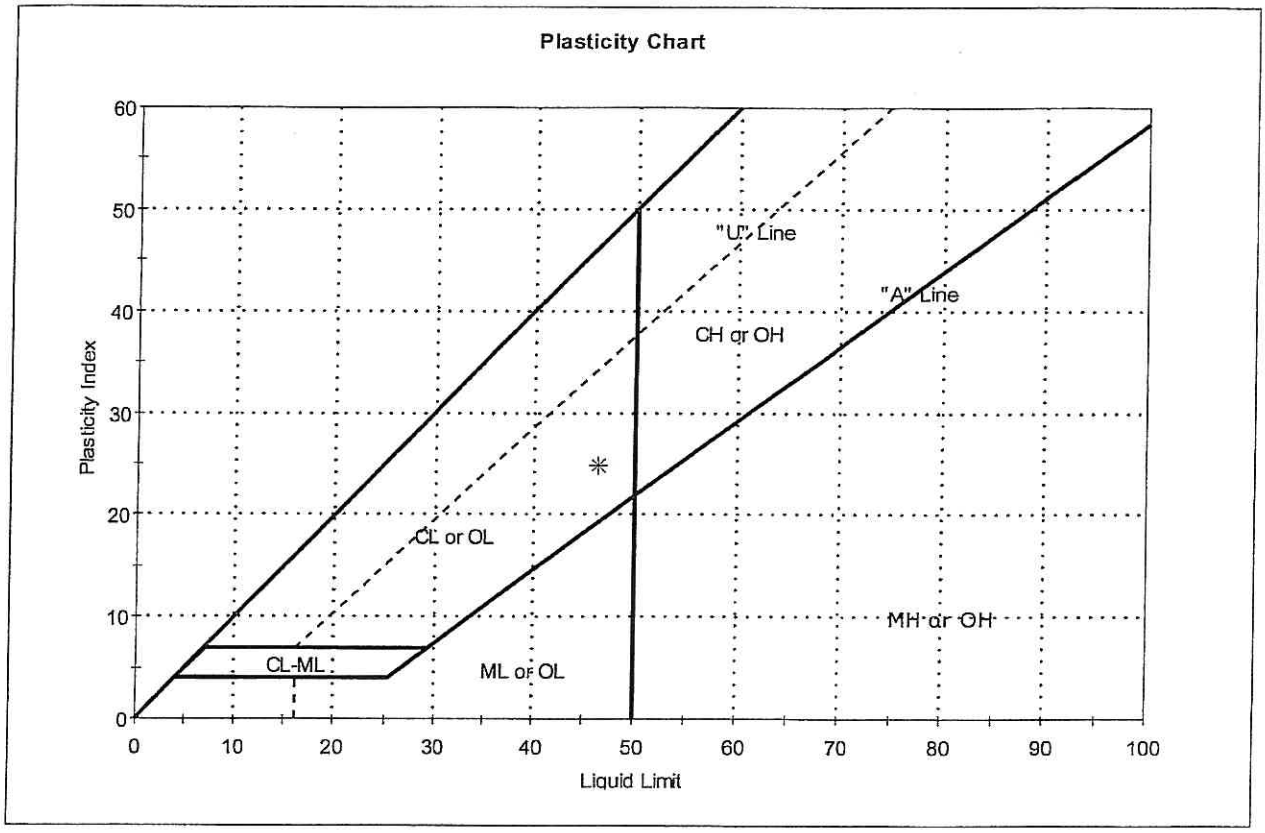
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-01-14	Sample Type: jar	Tested By:	ap
Sample ID:S-7	Test Date: 10/22/08	Checked By:	jdt
Depth : 20-22 ft	Test Id: 139604		
Test Comment:	---		
Sample Description:	Moist, dark brown clay		
Sample Comment:	---		

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-7	AB-01-1	20-22 ft	41	46	22	24	1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:21:18 AM

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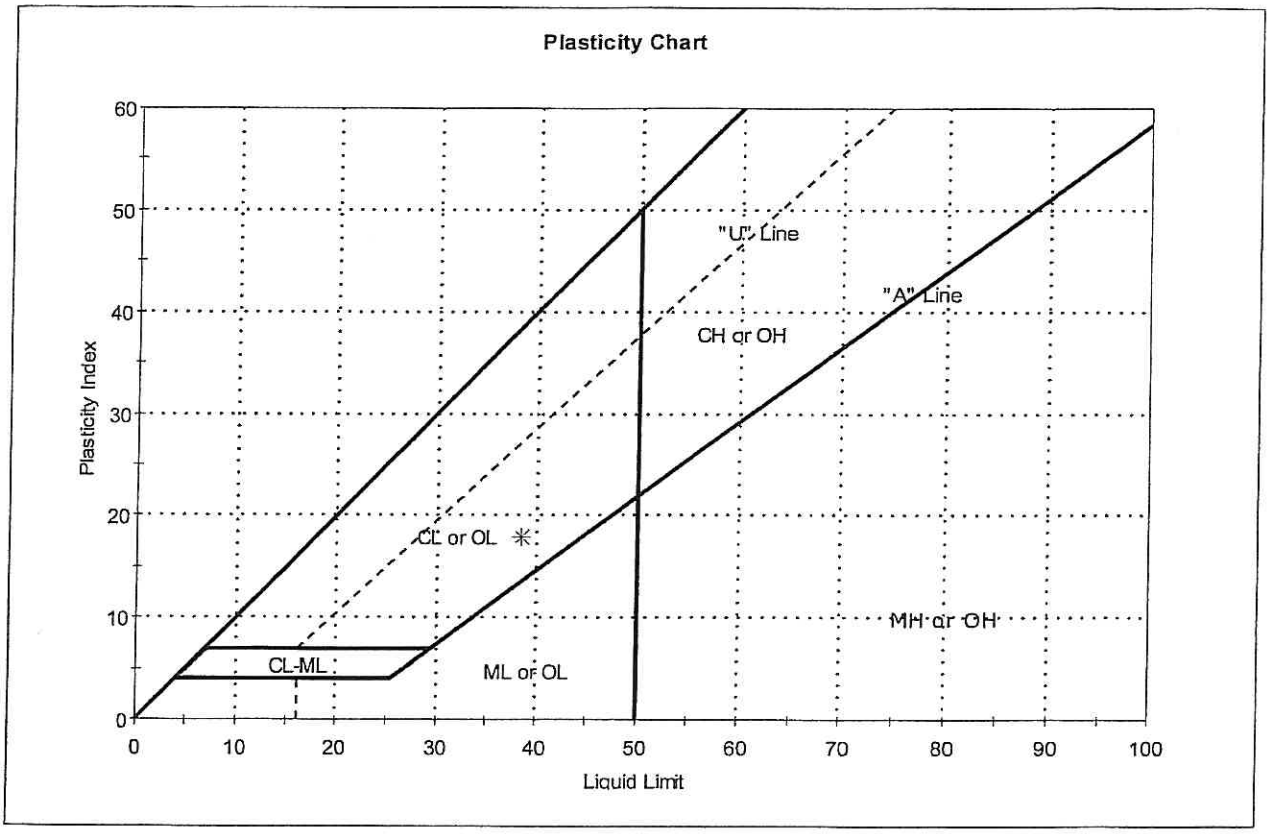
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-01-17	Sample Type: jar	Tested By:	ap
Sample ID:S-8	Test Date: 10/17/08	Checked By:	jdt
Depth : 30-32 ft	Test Id: 139605		
Test Comment: ---			
Sample Description: Moist, dark brown clay			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-8	AAB-01-1	30-32 ft	39	38	21	17	1	

Sample Prepared using the WET method

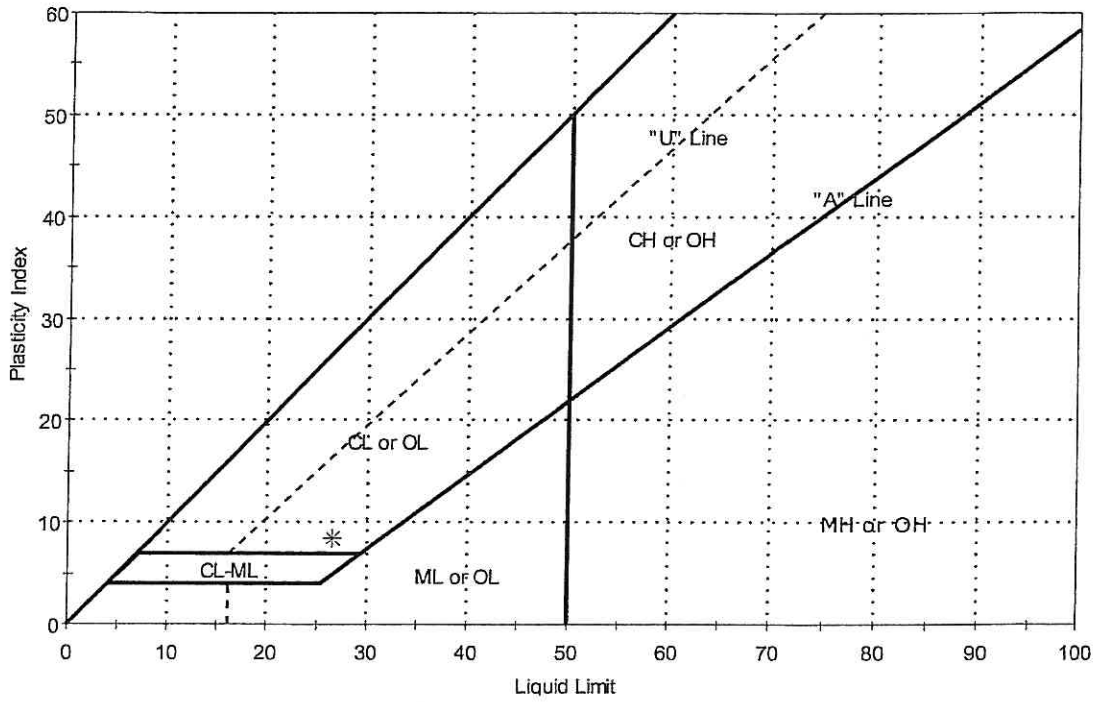
Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:21:36 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-02-22A	Sample Type: jar	Tested By:	ap
Sample ID:S-4	Test Date: 10/14/08	Checked By:	jdt
Depth : 30-32 ft	Test Id: 139606		
Test Comment:	---		
Sample Description:	Moist, reddish gray clay		
Sample Comment:	---		

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-4	AB-02-22	30-32 ft	23	27	18	9	0	

Sample Prepared using the WET method

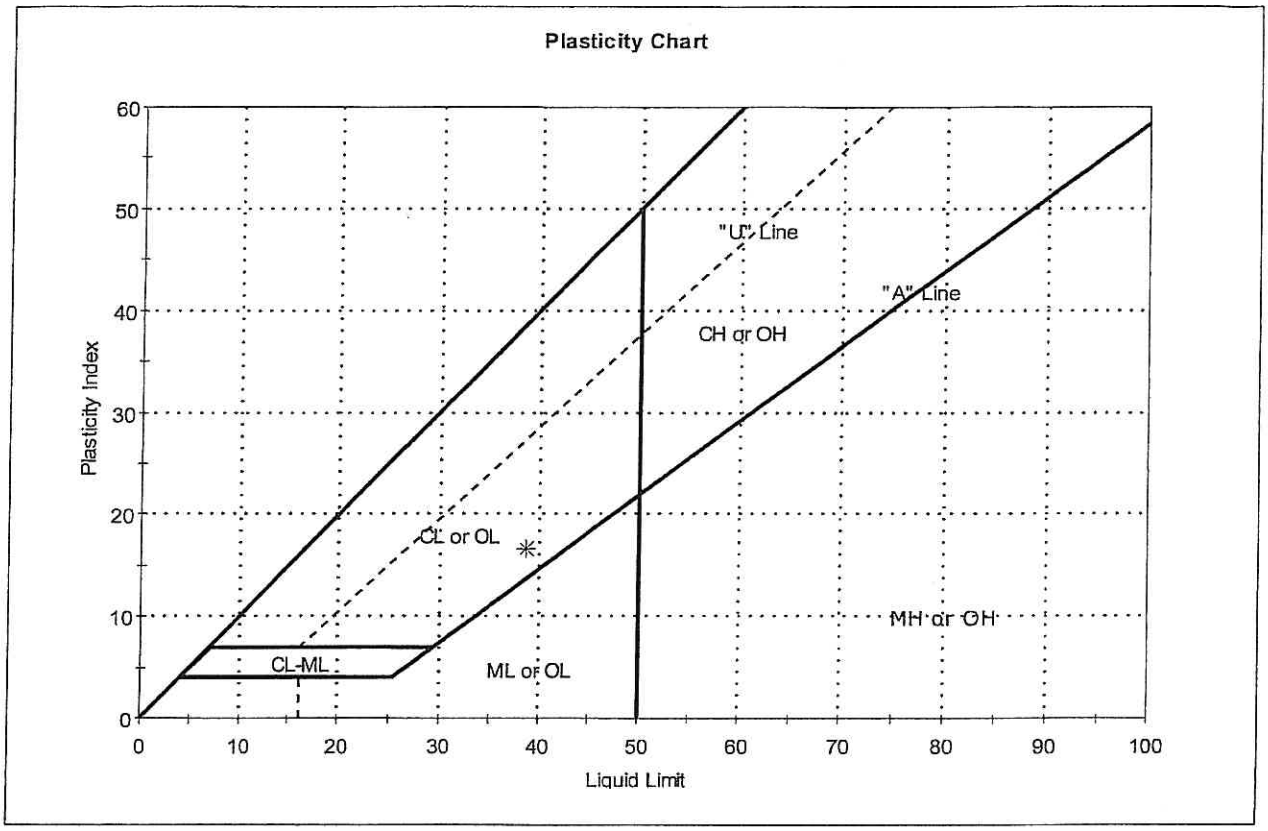
Dry Strength: HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:21:51 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-02-22A	Sample Type: jar	Tested By:	ap
Sample ID:S-6	Test Date: 10/17/08	Checked By:	jdt
Depth : 40-42 ft	Test Id: 140179		
Test Comment:	---		
Sample Description:	Moist, dark brown clay		
Sample Comment:	---		

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-6	AB-02-22	40-42 ft	41	39	22	17	1	

Sample Prepared using the WET method

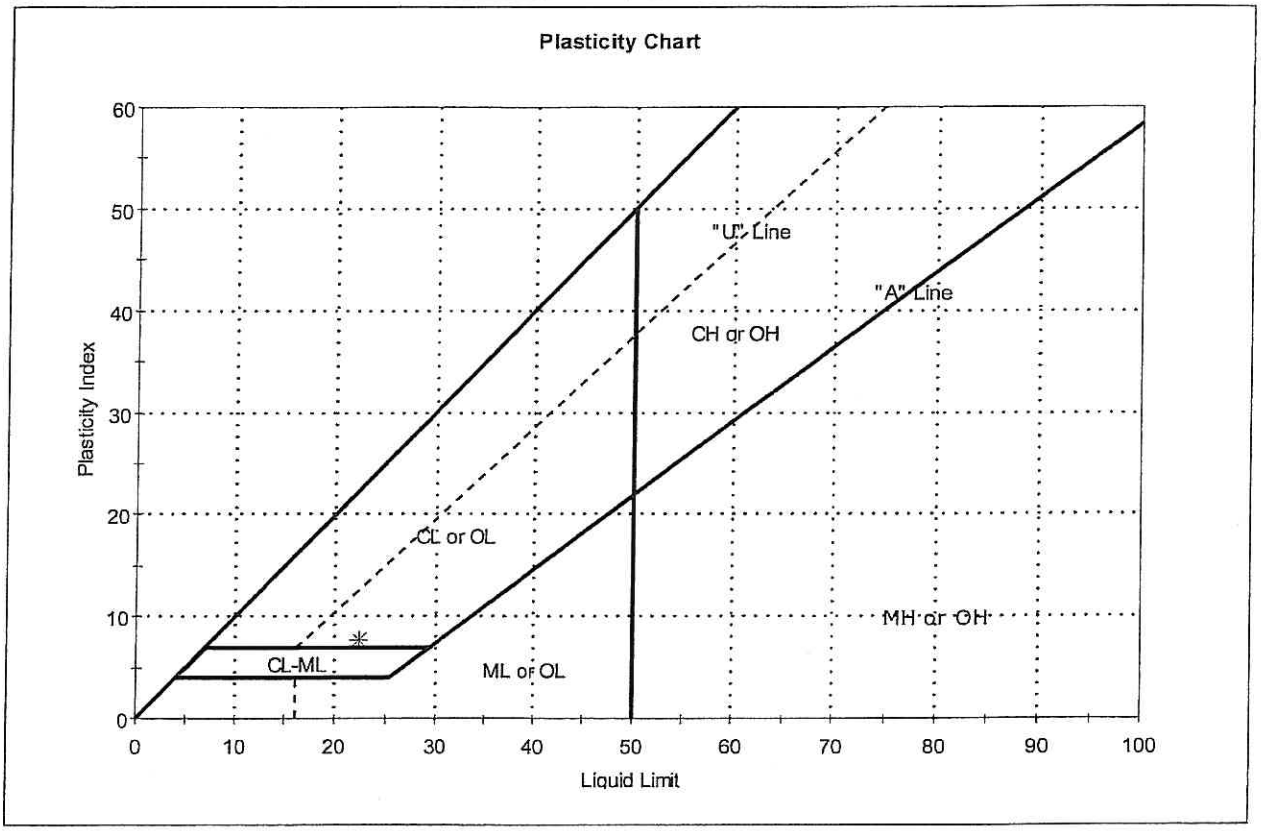
Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:22:07 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-02-23B	Sample Type: jar	Tested By:	ap
Sample ID:S-16	Test Date: 10/22/08	Checked By:	jdt
Depth : 70-72 ft	Test Id: 139607		
Test Comment:	---		
Sample Description:	Moist, reddish brown clay		
Sample Comment:	---		

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-16	AB-02-23	70-72 ft	24	22	15	7	1	

Sample Prepared using the WET method

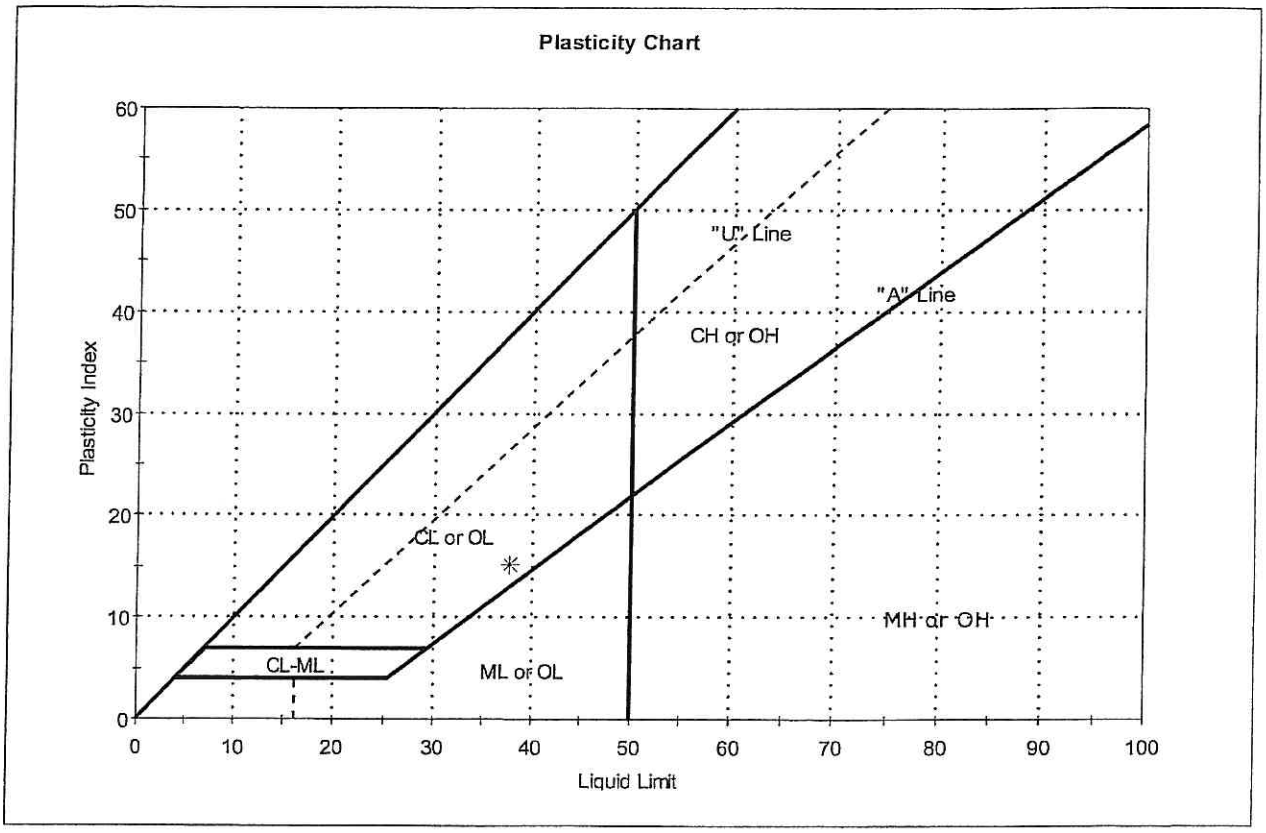
Dry Strength: HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:22:37 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-02-24	Sample Type: jar	Tested By:	ap
Sample ID:S-12	Test Date: 10/17/08	Checked By:	jdt
Depth : 40-42 ft	Test Id: 139608		
Test Comment:	---		
Sample Description:	Moist, dark brown clay		
Sample Comment:	---		

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-12	AB-02-2	40-42 ft	37	38	23	15	1	

Sample Prepared using the WET method

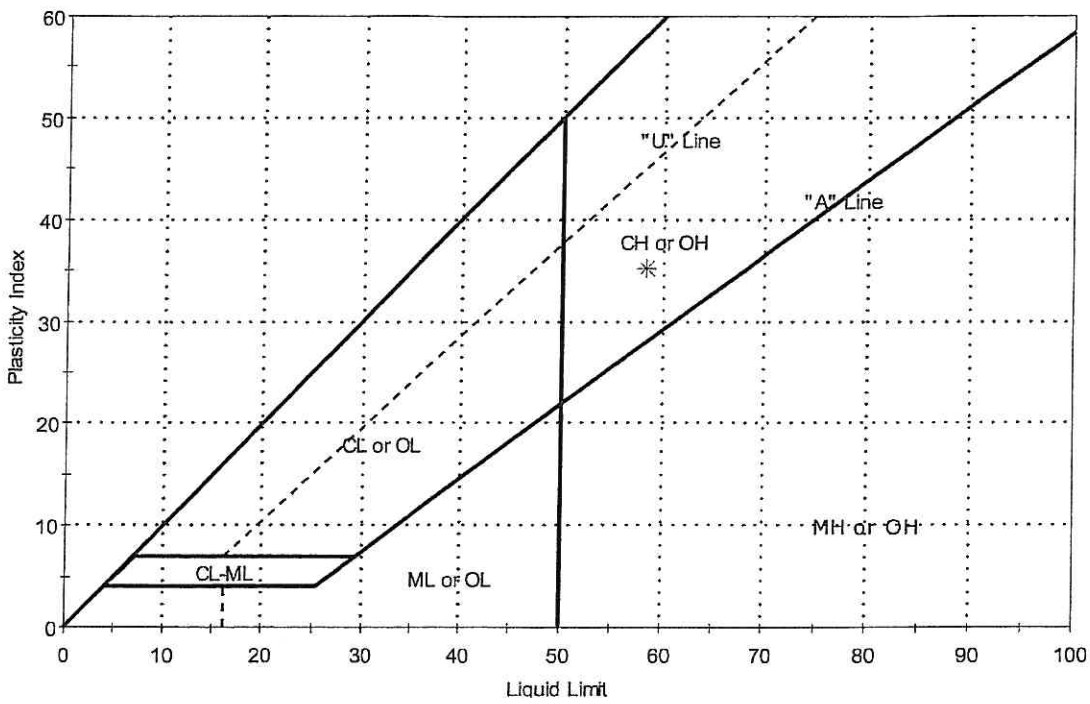
Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:22:50 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-03-36	Sample Type: jar	Tested By:	ap
Sample ID:S-18	Test Date: 10/16/08	Checked By:	jdt
Depth : 70-72 ft	Test Id: 139609		
Test Comment: ---			
Sample Description: Moist, dark yellowish brown clay			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-18	AB-03-3	70-72 ft	54	58	23	35	1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH
Dilentancy: NONE
Toughness: LOW

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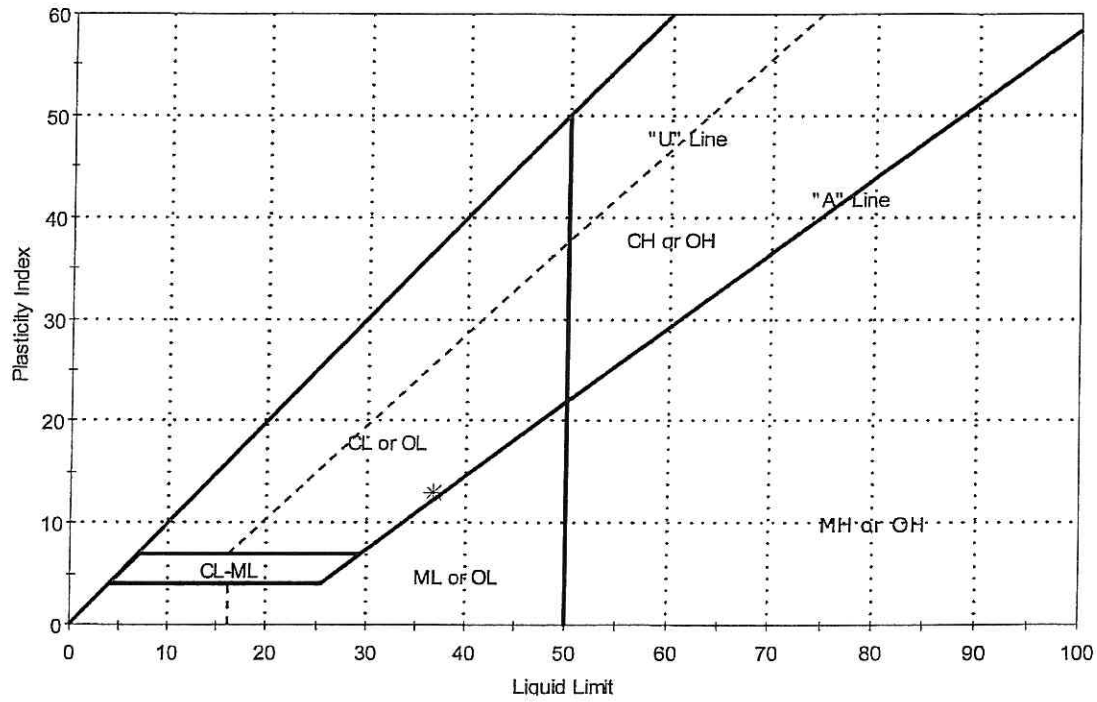
GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-03-36	Sample Type: jar	Tested By:	ap
Sample ID:S-24	Test Date: 10/22/08	Checked By:	jdt
Depth : 100-102 ft	Test Id: 139610		
Test Comment: ---			
Sample Description: Moist, dark brown clay			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-24	AB-03-3	100-102 ft	37	37	24	13	1	

Sample Prepared using the WET method

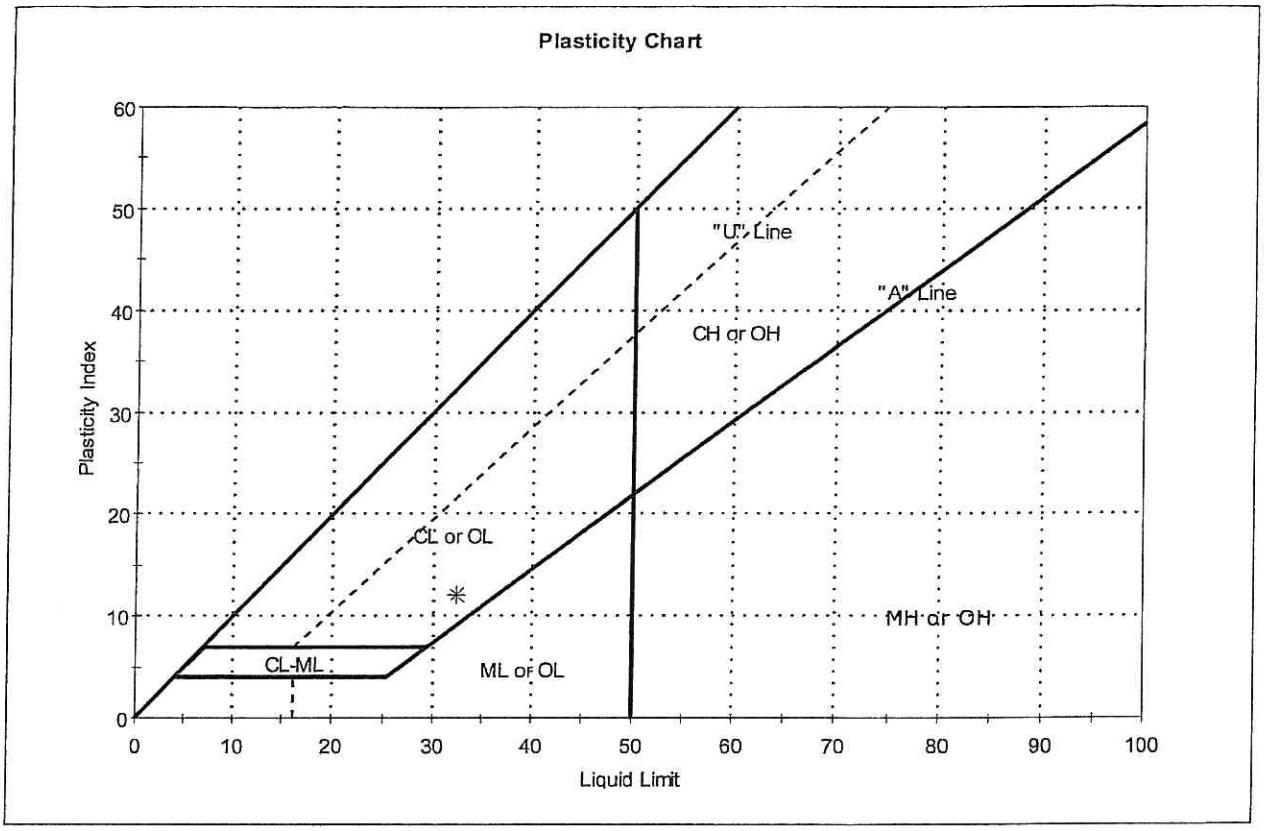
Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:23:21 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-01-04	Sample Type: jar	Tested By:	ap
Sample ID:S-7	Test Date: 10/16/08	Checked By:	jdt
Depth : 15-17 ft	Test Id: 139590		
Test Comment: ---			
Sample Description: Moist, dark reddish brown clay			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-7	ARW-01-0	15-17 ft	25	32	20	12	0	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilentancy: SLOW
Toughness: LOW

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GeoTesting express
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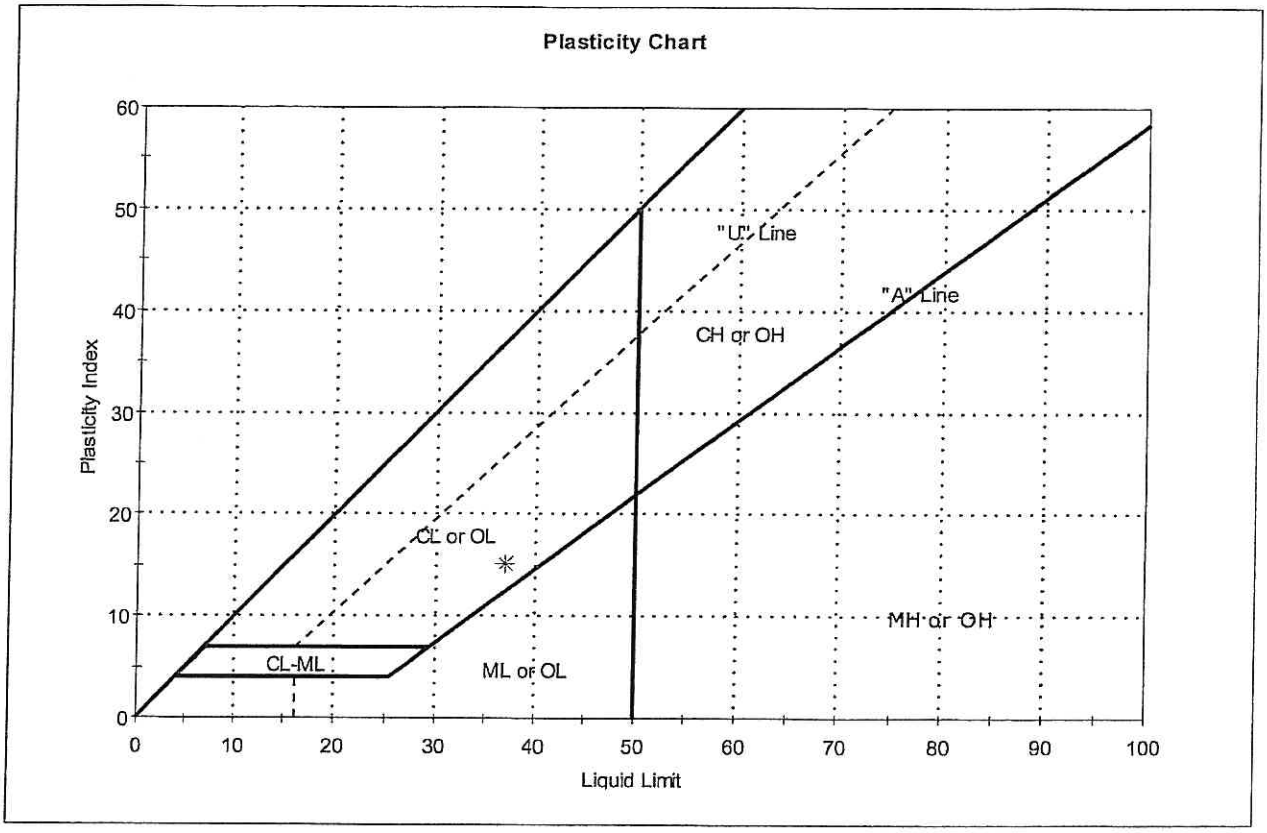
Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-01-14	Sample Type: jar	Tested By:	ap
Sample ID:S-6	Test Date: 10/22/08	Checked By:	jdt
Depth : 15-17 ft	Test Id: 139603		
Test Comment:	---		
Sample Description:	Moist, reddish brown clay		
Sample Comment:	---		

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-6	ARW-01-1	15-17 ft	35	37	22	15	1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

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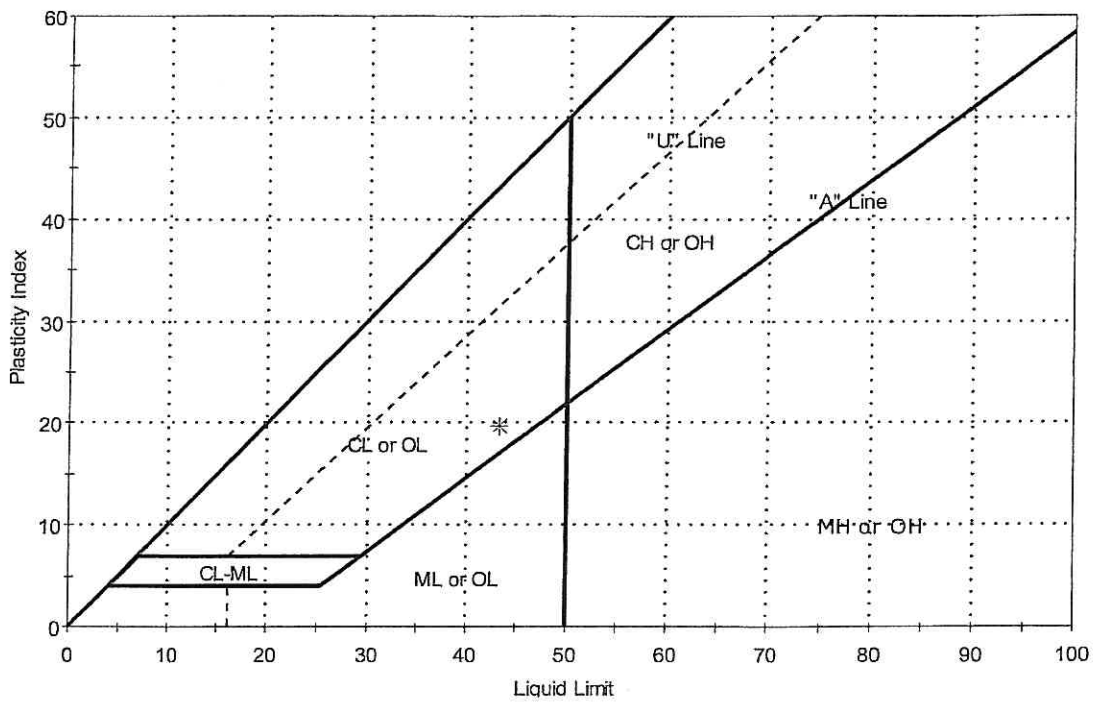
GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-04-11	Sample Type: jar	Tested By:	ap
Sample ID:S-5	Test Date: 10/22/08	Checked By:	jdt
Depth : 15-17 ft	Test Id: 139591		
Test Comment:	---		
Sample Description:	Moist, reddish brown clay		
Sample Comment:	---		

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-5	ARW-04-1	15-17 ft	50	43	24	19	1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

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GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-04-11	Sample Type: jar	Tested By:	ap
Sample ID:S-10	Test Date: 10/17/08	Checked By:	jdt
Depth : 40-42 ft	Test Id: 139592		
Test Comment: ---			
Sample Description: Moist, dark brown silt			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05

Sample Determined to be non-plastic

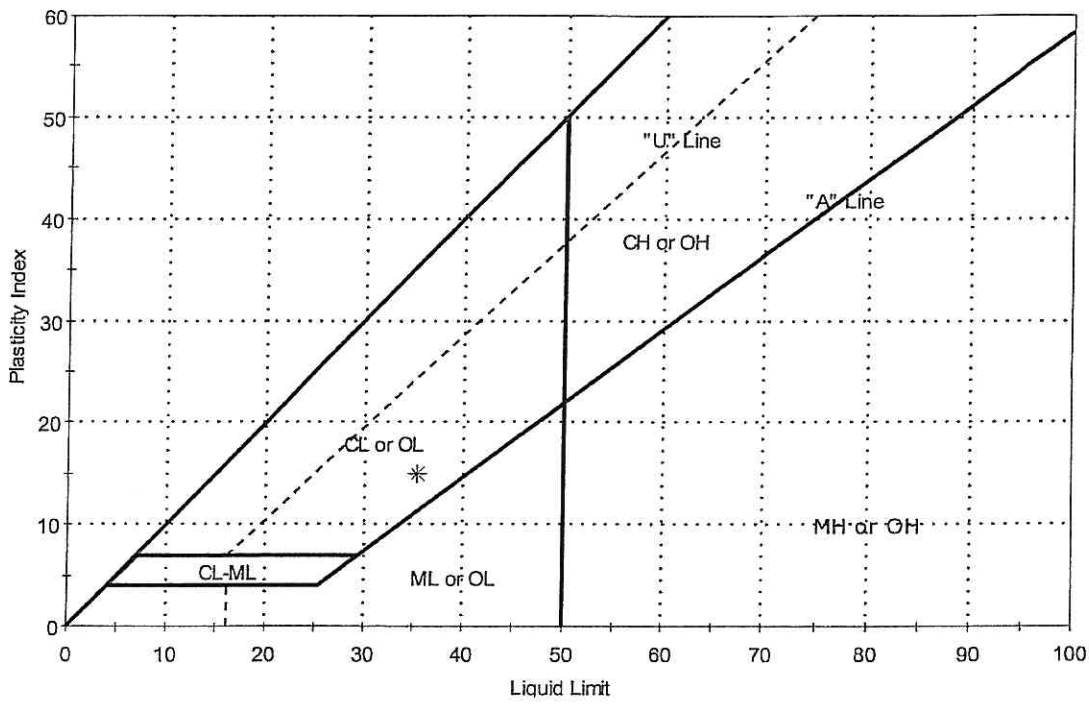
Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-10	ARW-04-1	40-42 ft	25	n/a	n/a	n/a	n/a	

Dry Strength: MEDIUM
Dilentancy: SLOW
Toughness: n/a
The sample was determined to be Non-Plastic

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-04-13	Sample Type: jar	Tested By:	ap
Sample ID:S-7	Test Date: 10/17/08	Checked By:	jdt
Depth : 25-27 ft	Test Id: 139593		
Test Comment:	---		
Sample Description:	Moist, reddish brown clay		
Sample Comment:	---		

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-7	ARW-04-1	25-27 ft	47	36	21	15	2	

Sample Prepared using the WET method

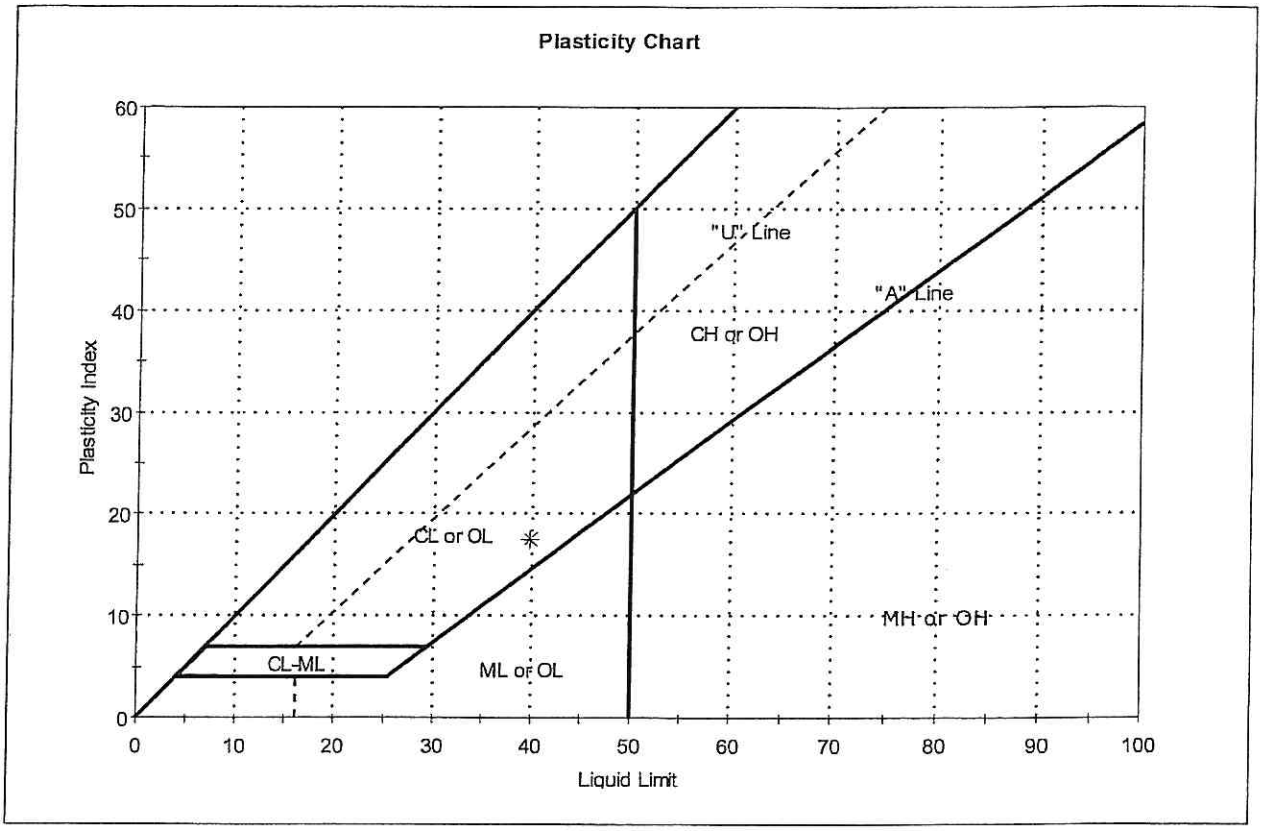
Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:31:04 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-06-26	Sample Type: jar	Tested By:	ap
Sample ID:S-15	Test Date: 10/17/08	Checked By:	jdt
Depth : 50-52 ft	Test Id: 139594		
Test Comment: ---			
Sample Description: Moist, dark brown clay			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-15	ARW-06-2	50-52 ft	44	40	22	18	1	

Sample Prepared using the WET method

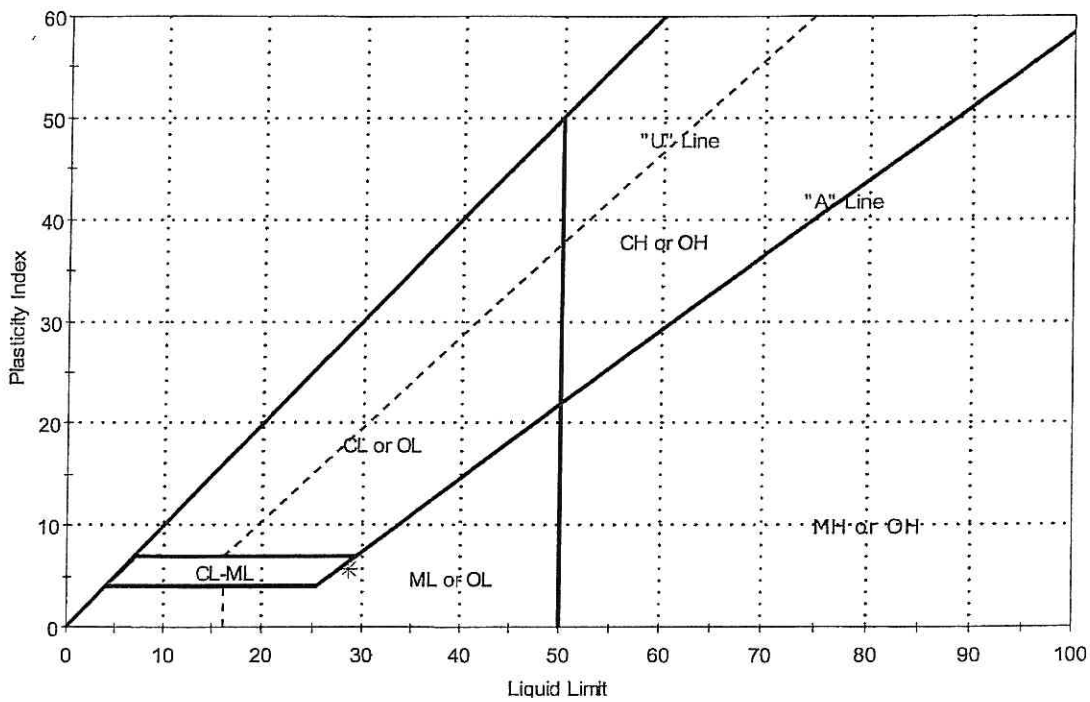
Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:31:19 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-10-40	Sample Type: jar	Tested By:	ap
Sample ID:S-5	Test Date: 10/17/08	Checked By:	jdt
Depth : 10-12 ft	Test Id: 139595		
Test Comment:	---		
Sample Description:	Moist, olive silt		
Sample Comment:	---		

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-5	ARW-10-4	10-12 ft	41	29	23	6	3	

Sample Prepared using the WET method

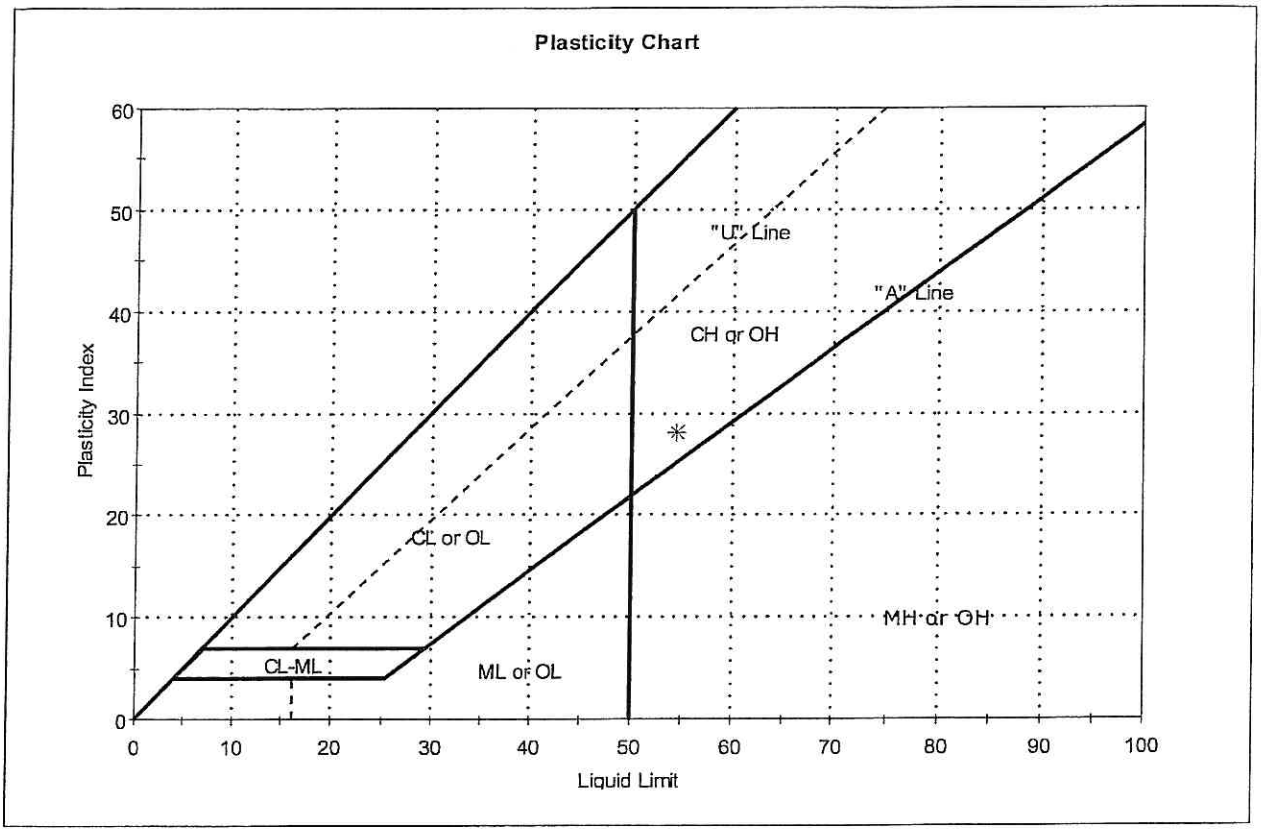
Dry Strength: HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:31:40 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-10-40	Sample Type: jar	Tested By:	ap
Sample ID:S-10	Test Date: 10/17/08	Checked By:	jdt
Depth : 35-37 ft	Test Id: 139596		
Test Comment: ---			
Sample Description: Moist, dark grayish brown clay			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-10	ARW-10-4	35-37 ft	57	54	26	28	1	

Sample Prepared using the WET method

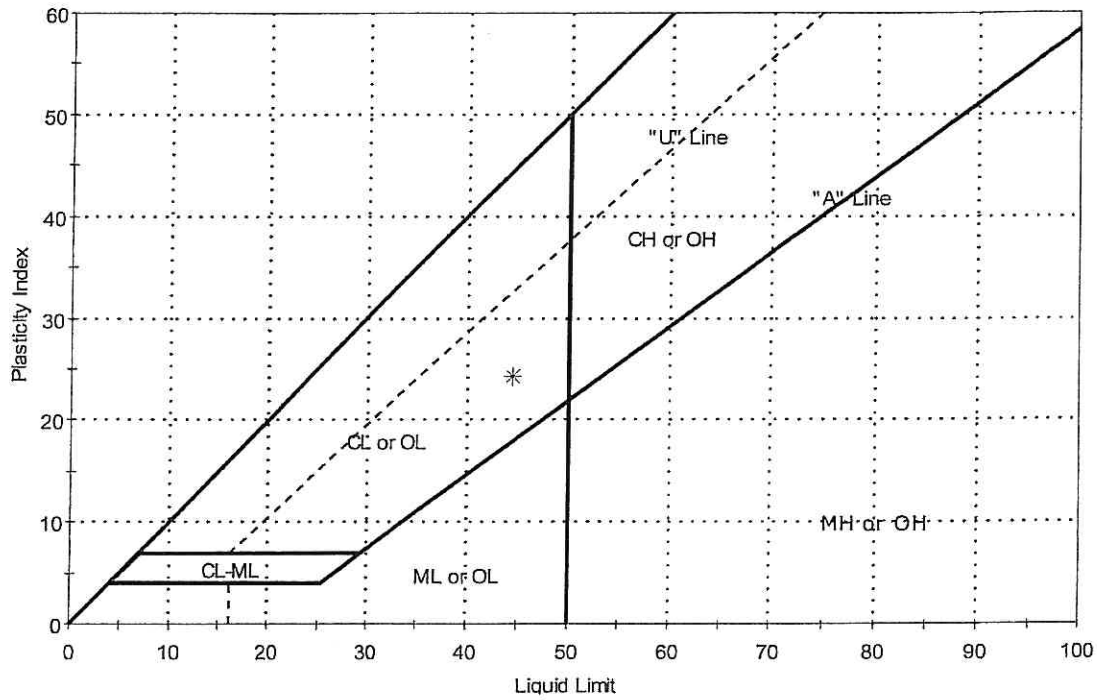
Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:32:01 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-10-40	Sample Type: jar	Tested By:	ap
Sample ID:S-27	Test Date: 10/22/08	Checked By:	jdt
Depth : 120-122 ft	Test Id: 139597		
Test Comment: ---			
Sample Description: Moist, dark brown clay			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-27	ARW-10-4	120-122 ft	39	44	20	24	1	

Sample Prepared using the WET method

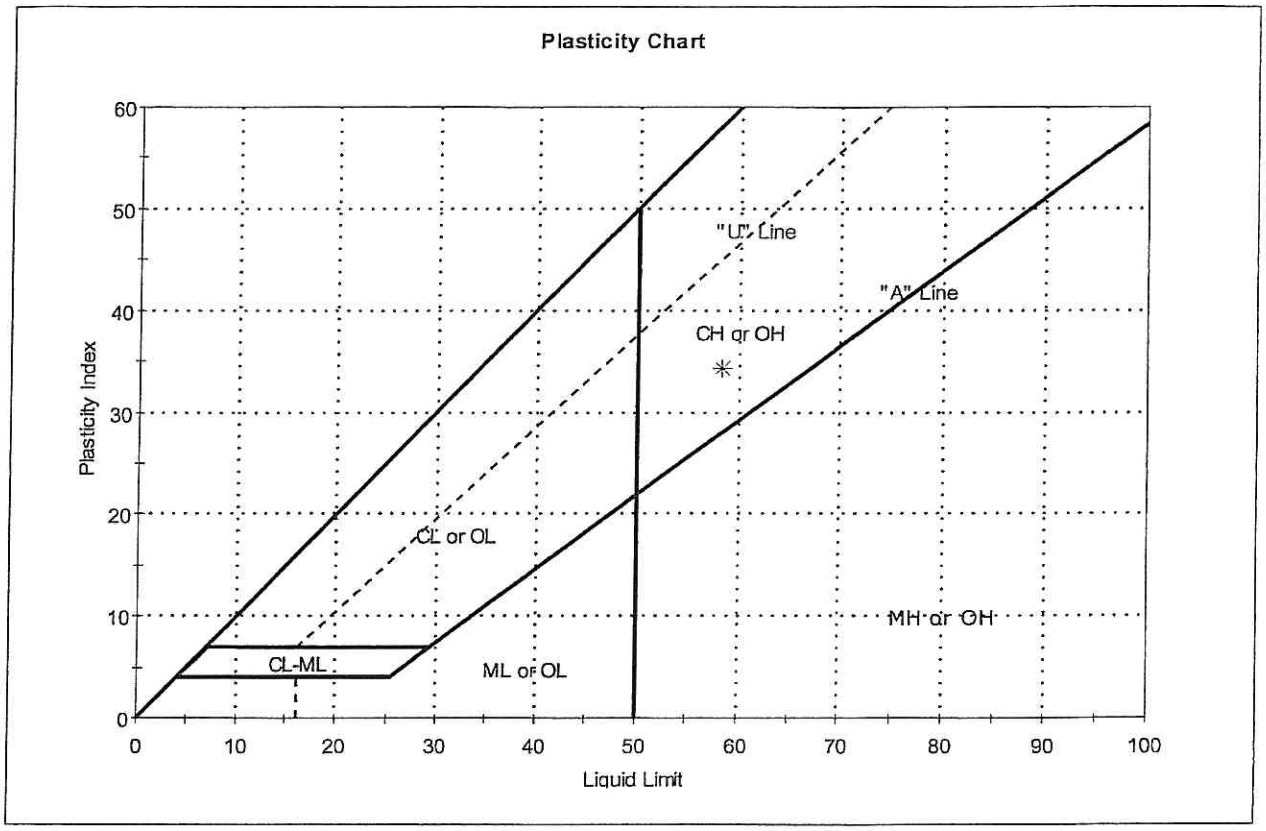
Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:32:20 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-11-41	Sample Type: jar	Tested By:	ap
Sample ID:S-4	Test Date: 10/21/08	Checked By:	jdt
Depth : 10-12 ft	Test Id: 139598		
Test Comment:	---		
Sample Description:	Moist, olive brown clay		
Sample Comment:	---		

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-4	ARW-11-4	10-12 ft	63	58	24	34	1	

Sample Prepared using the WET method

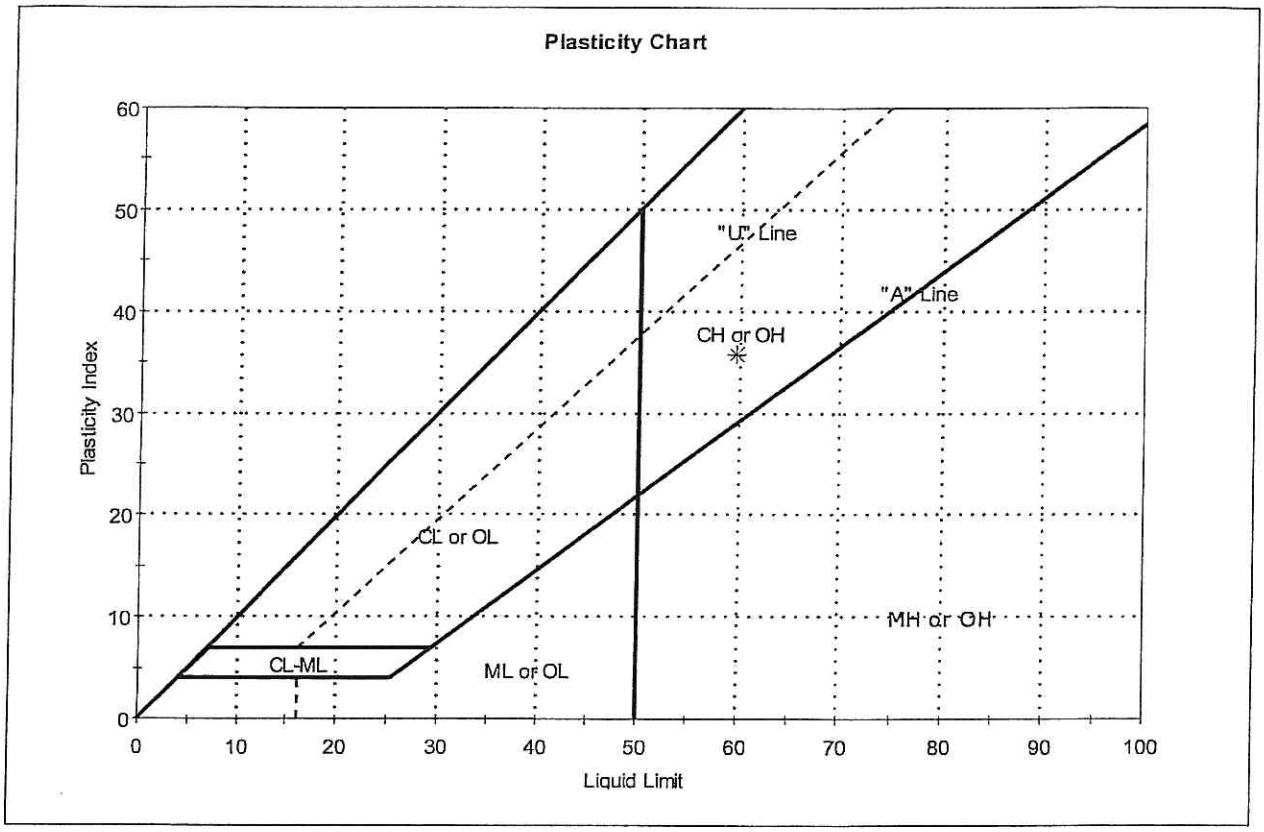
Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:32:39 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-11-41	Sample Type: jar	Tested By:	ap
Sample ID:S-7	Test Date: 10/17/08	Checked By:	jdt
Depth : 25-27 ft	Test Id: 139599		
Test Comment: ---			
Sample Description: Moist, dark brown clay			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-7	ARW-11-4	25-27 ft	62	60	24	36	1	

Sample Prepared using the WET method

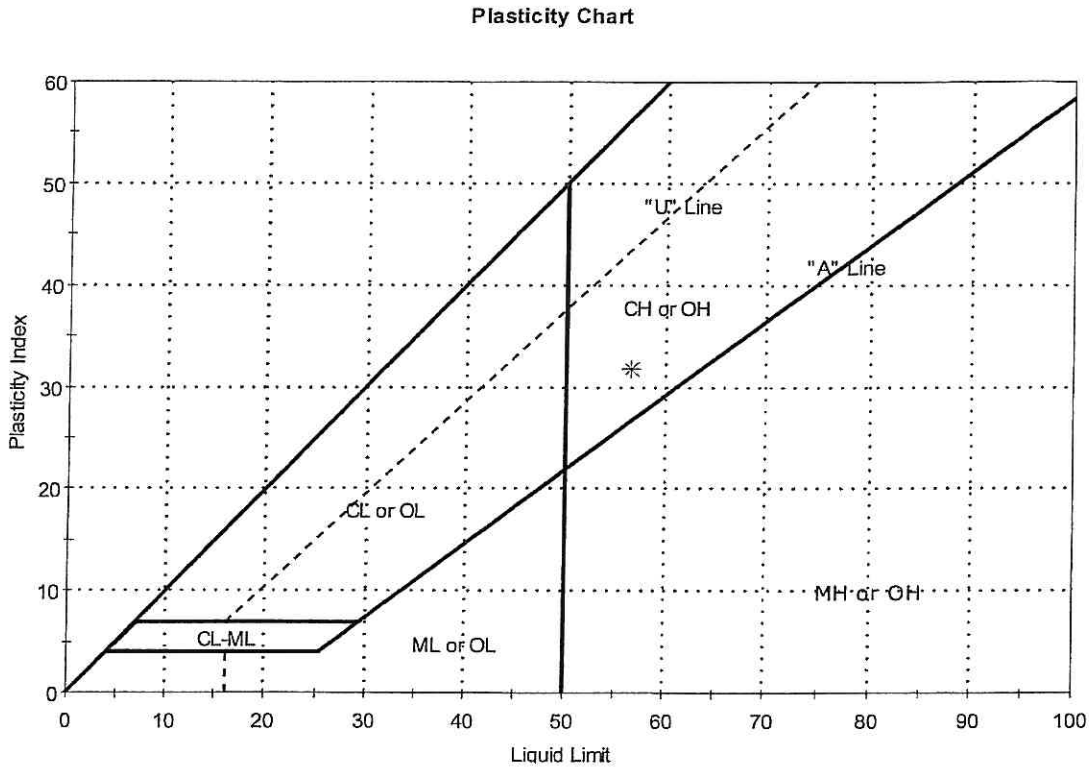
Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:32:57 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-11-43	Sample Type: jar	Tested By:	ap
Sample ID:S-7	Test Date: 10/17/08	Checked By:	jdt
Depth : 20-22 ft	Test Id: 139600		
Test Comment:	---		
Sample Description:	Moist, dark yellowish brown clay		
Sample Comment:	---		

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-7	ARW-11-4	20-22 ft	57	57	25	32	1	

Sample Prepared using the WET method

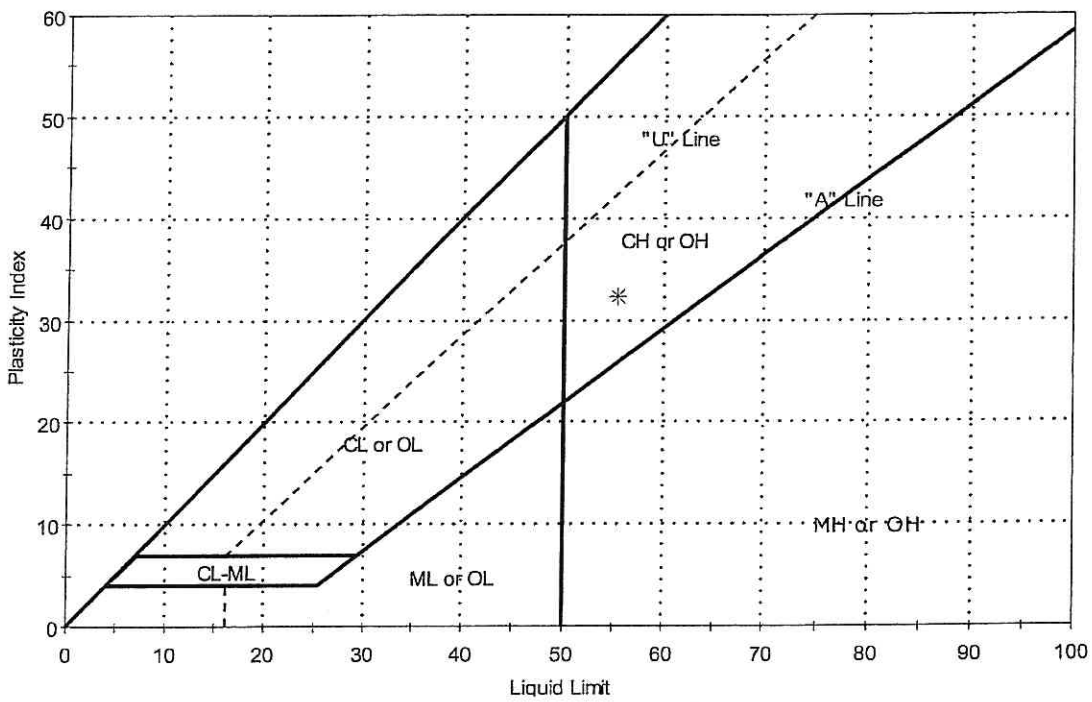
Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:33:13 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-11-43	Sample Type: jar	Tested By:	ap
Sample ID:S-9	Test Date: 10/14/08	Checked By:	jdt
Depth : 30-32 ft	Test Id: 139601		
Test Comment: ---			
Sample Description: Moist, dark yellowish brown clay			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-9	ARW-11-4	30-32 ft	64	55	23	32	1	

Sample Prepared using the WET method

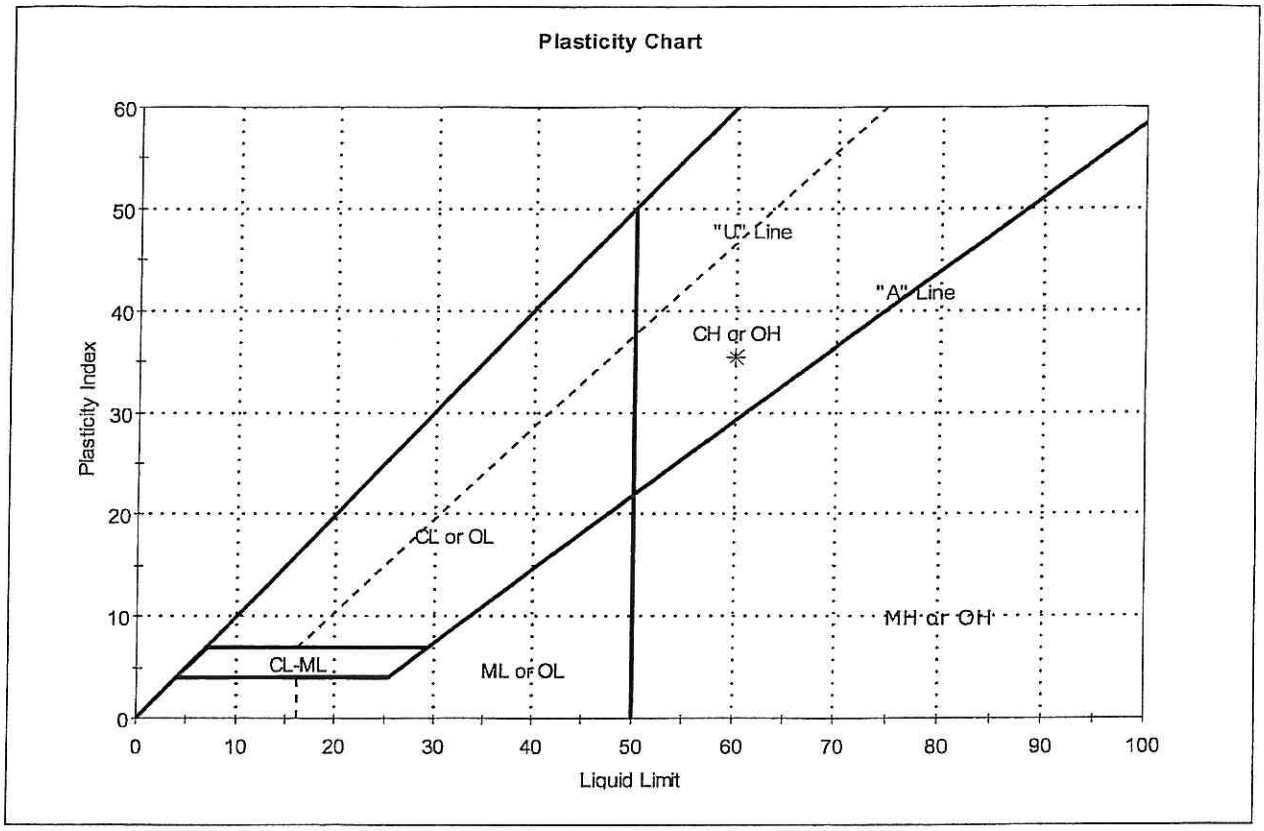
Dry Strength: VERY HIGH
Dilentancy: SLOW
Toughness: LOW

printed 10/23/2008 11:33:29 AM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-11-45	Sample Type: jar	Tested By:	ap
Sample ID:S-5	Test Date: 10/17/08	Checked By:	jdt
Depth : 15-17 ft	Test Id: 139602		
Test Comment: ---			
Sample Description: Moist, dark yellowish brown clay			
Sample Comment: ---			

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	S-5	ARW-11-4	15-17 ft	52	60	25	35	1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH
Dilentancy: NONE
Toughness: LOW

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Gradation (Sieve & Hydrometer)

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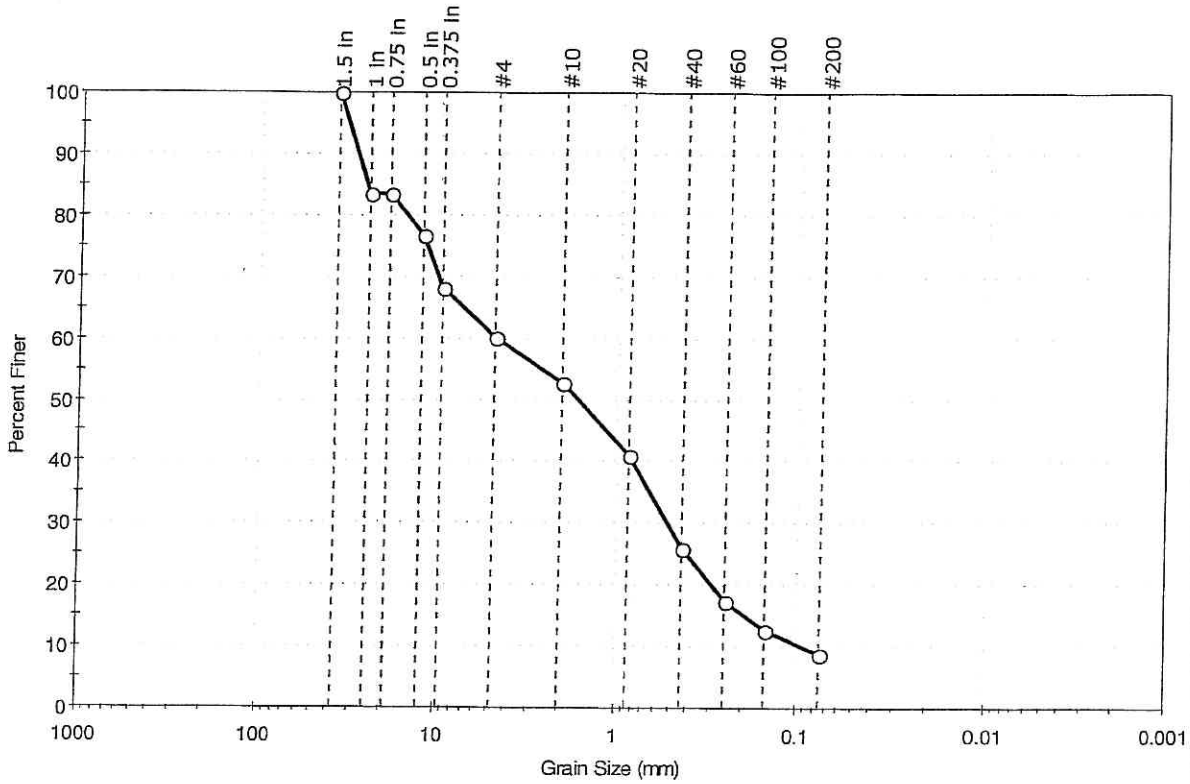
Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-01-16	Sample Type: jar	Tested By:	ap
Sample ID:S-2	Test Date: 10/16/08	Checked By:	mpd
Depth : 2-4 ft	Test Id: 139655		
Test Comment:	---		
Sample Description:	Moist, very dark brown sand with silt and gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	39.8	51.4	8.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	84		
0.75 in	19.00	84		
0.5 in	12.50	77		
0.375 in	9.50	68		
#4	4.75	60		
#10	2.00	53		
#20	0.85	41		
#40	0.42	26		
#60	0.25	17		
#100	0.15	13		
#200	0.075	9		

Coefficients

D_{85} =25.9238 mm	D_{30} =0.5115 mm
D_{60} =4.6542 mm	D_{15} =0.1929 mm
D_{50} =1.6488 mm	D_{10} =0.0933 mm
C_u =49.884	C_c =0.603

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

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GeoTesting express
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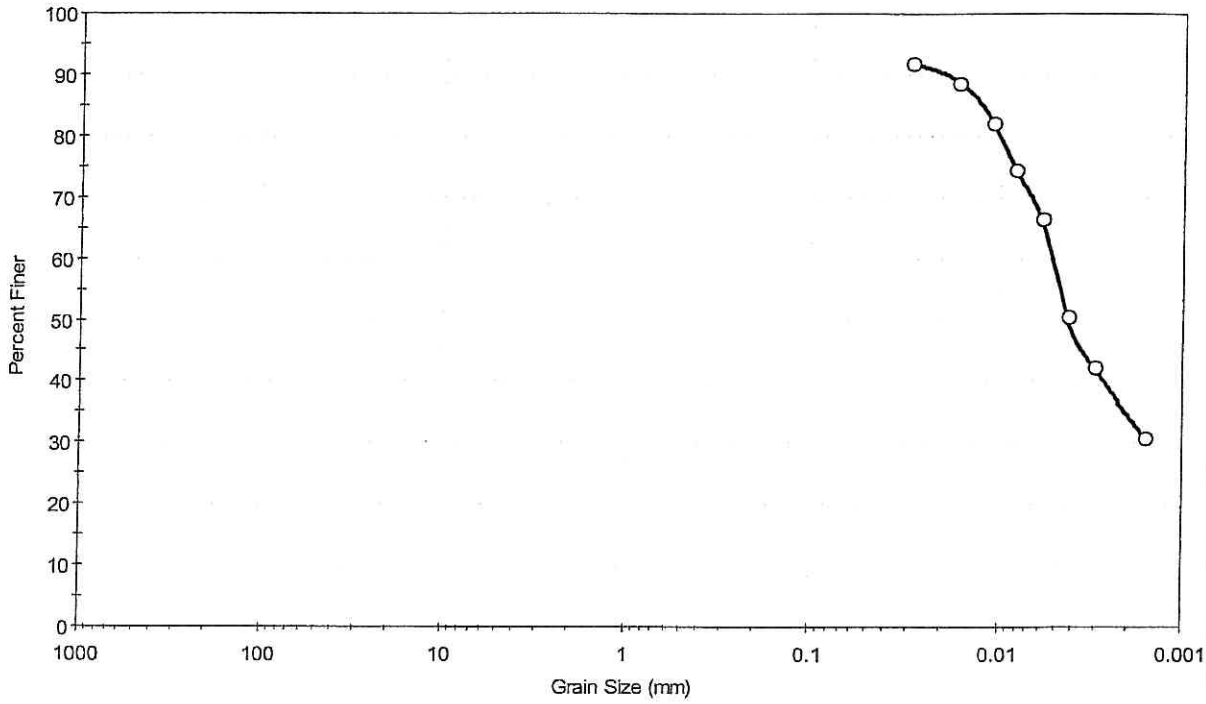
Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-01-16	Sample Type: jar	Tested By:	ap
Sample ID:S-8	Test Date: 10/17/08	Checked By:	mpd
Depth : 25-27 ft	Test Id: 139632		
Test Comment:	---		
Sample Description:	Moist, dark yellowish brown clay		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
–	–	–	–

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0304	92		
---	0.0169	89		
---	0.0112	82		
---	0.0083	74		
---	0.0060	67		
---	0.0043	51		
---	0.0031	42		
---	0.0016	31		

Coefficients

D_{85} =0.0132 mm	D_{30} =N/A
D_{60} =0.0052 mm	D_{15} =N/A
D_{50} =0.0042 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO ()

Sample/Test Description

Sand/Gravel Particle Shape :

Sand/Gravel Hardness :

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GeoTesting express
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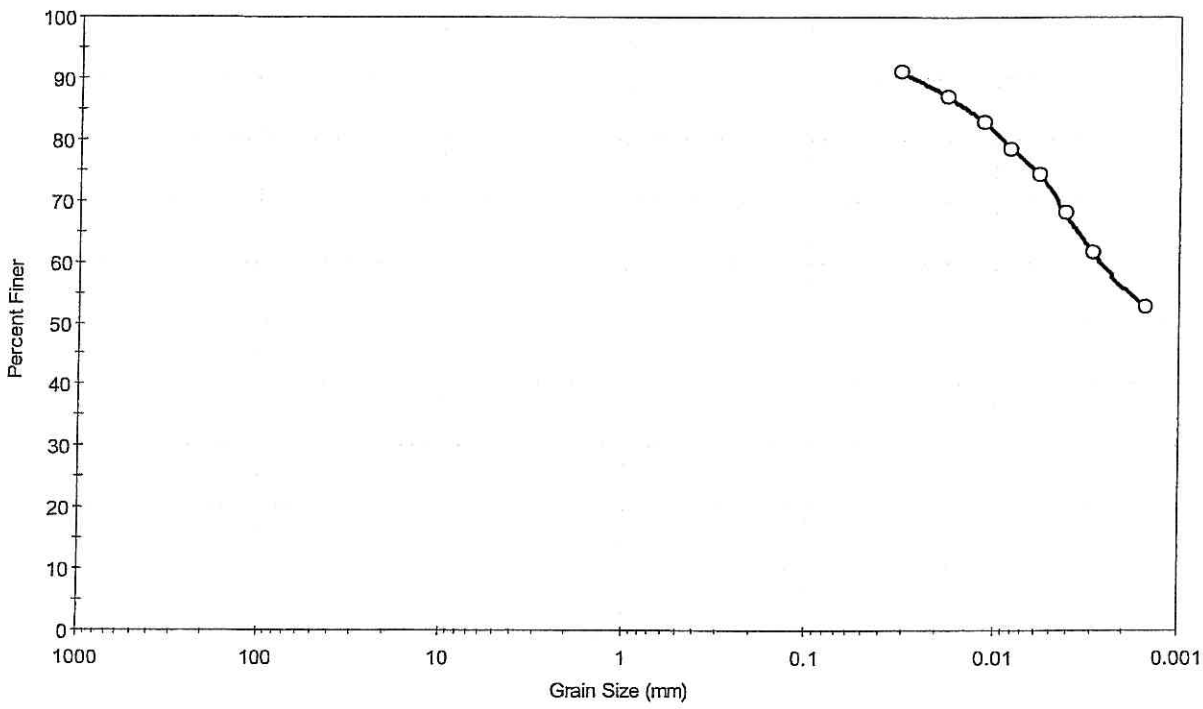
Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-01-17	Sample Type: jar	Tested By:	ap
Sample ID:S-8	Test Date: 10/17/08	Checked By:	mpd
Depth : 30-32 ft	Test Id: 139633		
Test Comment:	---		
Sample Description:	Moist, dark brown clay		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	—	—	—

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0337	91		
---	0.0190	87		
---	0.0120	83		
---	0.0086	79		
---	0.0060	75		
---	0.0043	69		
---	0.0031	62		
---	0.0016	53		

Coefficients

D_{85} =0.0149 mm	D_{30} =N/A
D_{60} =0.0027 mm	D_{15} =N/A
D_{50} =N/A	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO ()

Sample/Test Description

Sand/Gravel Particle Shape :

Sand/Gravel Hardness :

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GeoTesting express
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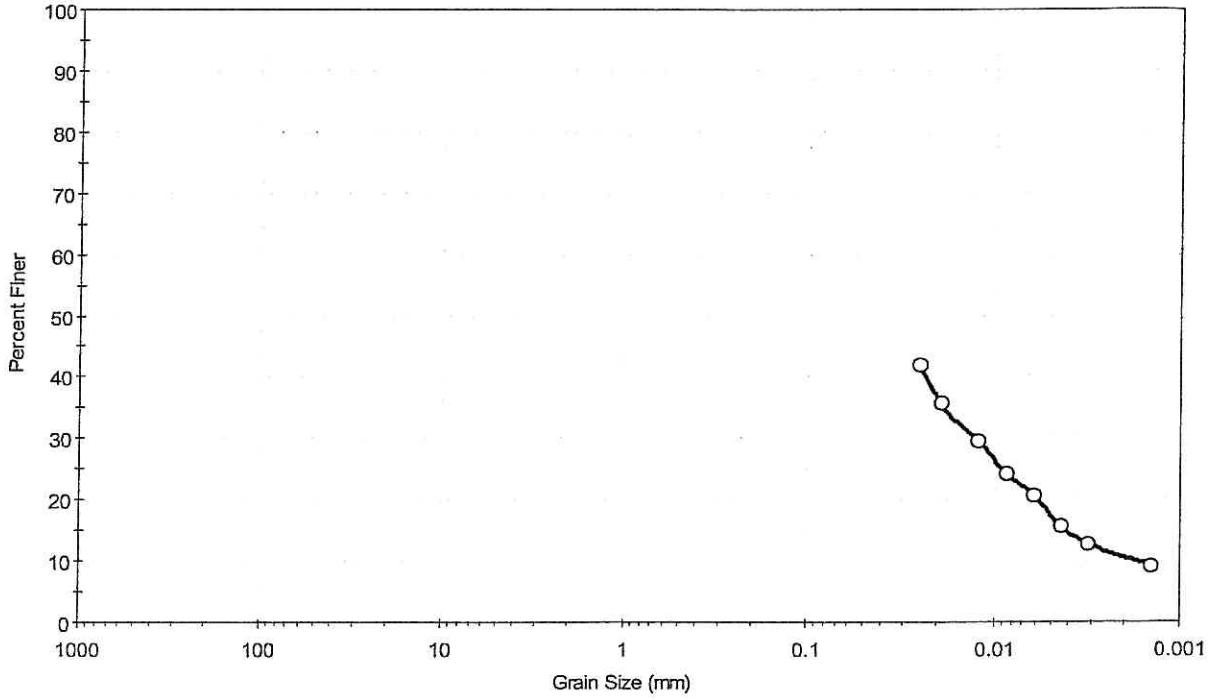
Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-02-22A	Sample Type: jar	Tested By:	ap
Sample ID:S-4	Test Date: 10/17/08	Checked By:	mpd
Depth : 30-32 ft	Test Id: 139634		
Test Comment:	---		
Sample Description:	Moist, reddish gray clay with sand		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	—	—	—

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
—	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0259	42		
---	0.0197	36		
---	0.0125	30		
---	0.0087	24		
---	0.0063	21		
---	0.0045	16		
---	0.0032	13		
---	0.0015	9		

Coefficients

D_{85} =N/A	D_{30} =0.0126 mm
D_{60} =N/A	D_{15} =0.0041 mm
D_{50} =N/A	D_{10} =0.0017 mm
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO ()

Sample/Test Description

Sand/Gravel Particle Shape :

Sand/Gravel Hardness :

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GeoTesting express
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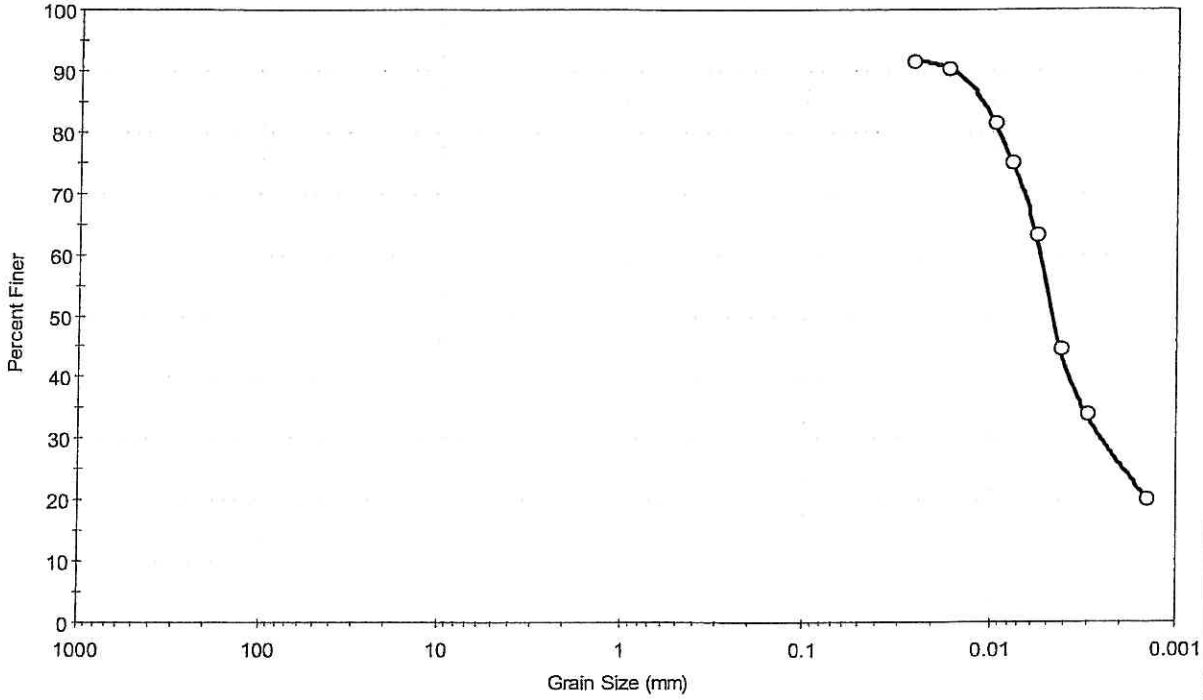
Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-02-24	Sample Type: jar	Tested By:	ap
Sample ID:S-12	Test Date: 10/17/08	Checked By:	mpd
Depth : 40-42 ft	Test Id: 139635		
Test Comment:	---		
Sample Description:	Moist, dark brown clay		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	—	—	—

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0269	92		
---	0.0176	90		
---	0.0099	82		
---	0.0080	75		
---	0.0058	63		
---	0.0043	45		
---	0.0031	34		
---	0.0015	20		

Coefficients

D_{85} =0.0122 mm	D_{30} =0.0025 mm
D_{60} =0.0055 mm	D_{15} =N/A
D_{50} =0.0047 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO ()

Sample/Test Description

Sand/Gravel Particle Shape :

Sand/Gravel Hardness :

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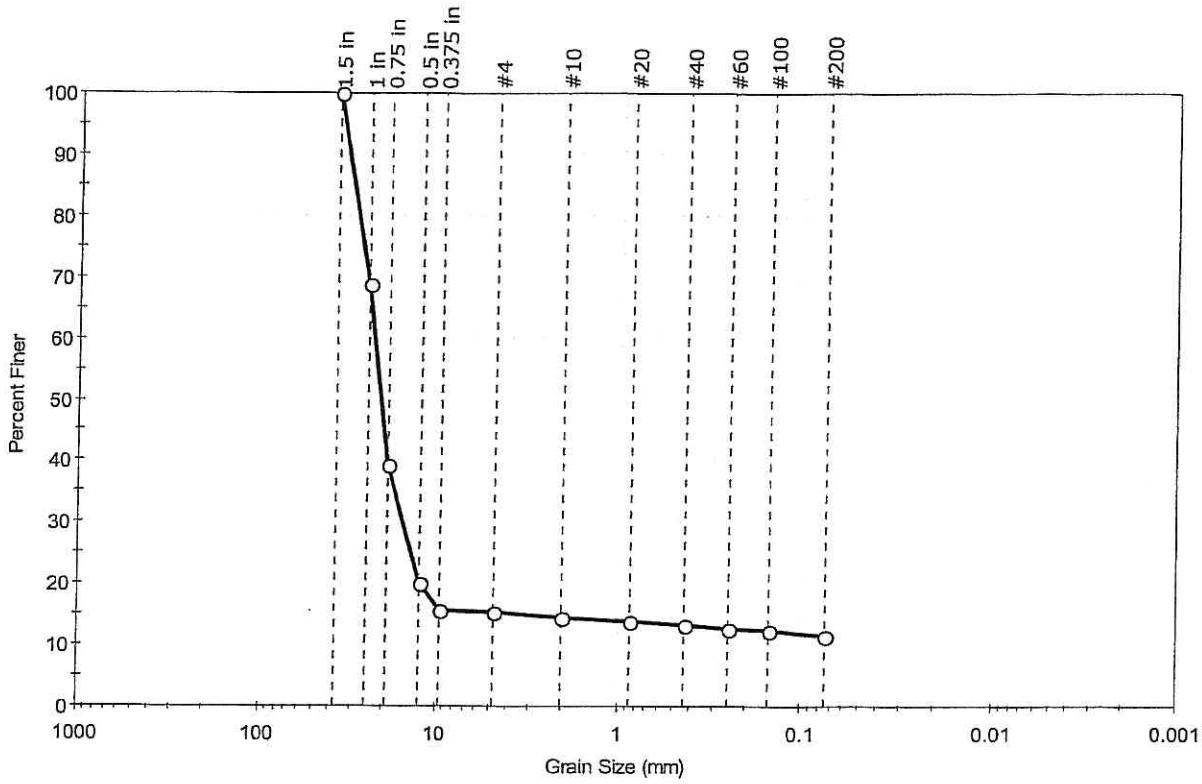
GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-03-34	Sample Type: jar	Tested By:	ap
Sample ID:S-2	Test Date: 10/16/08	Checked By:	jdt
Depth : 2-4 ft	Test Id: 139656		
Test Comment:	---		
Sample Description:	Moist, black gravel with silt		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	84.7	3.7	11.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	69		
0.75 in	19.00	39		
0.5 in	12.50	20		
0.375 in	9.50	16		
#4	4.75	15		
#10	2.00	15		
#20	0.85	14		
#40	0.42	13		
#60	0.25	13		
#100	0.15	12		
#200	0.075	12		

Coefficients

D_{85} =30.8923 mm D_{30} =15.5071 mm
D_{60} =23.0616 mm D_{15} =3.3028 mm
D_{50} =21.0009 mm D_{10} =0.0156 mm
C_u =1478.308 C_c =668.416

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

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GeoTesting express
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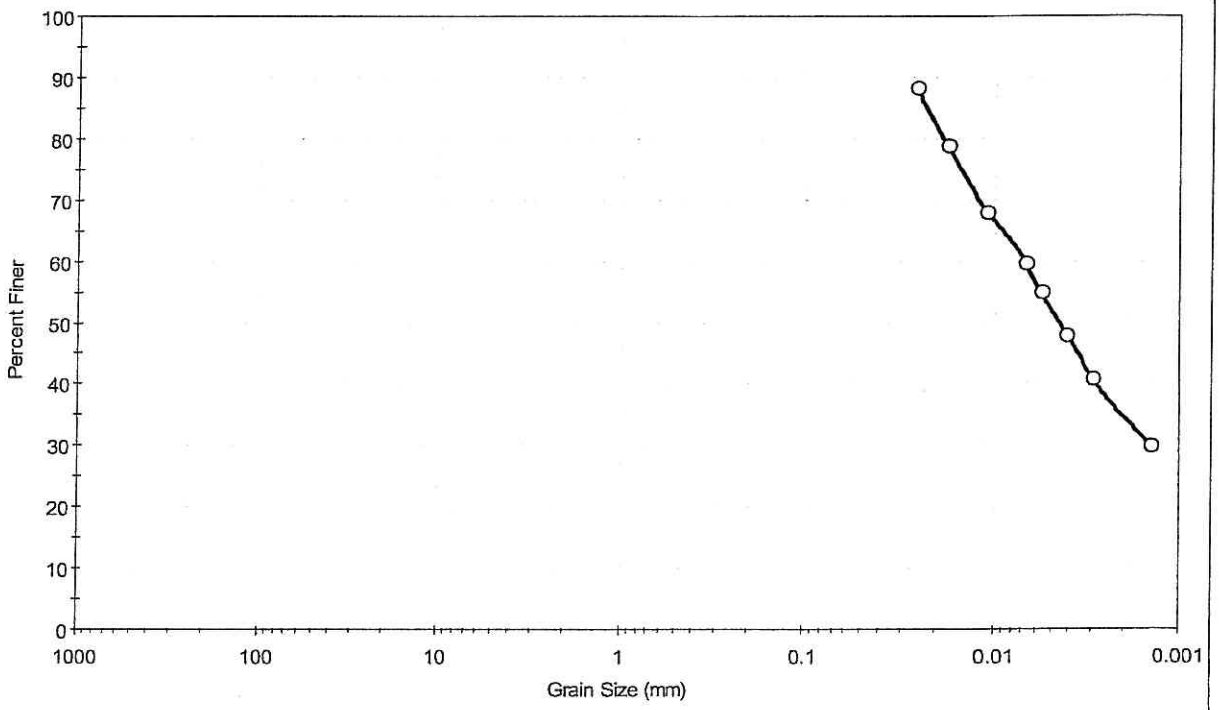
Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-03-34	Sample Type: jar	Tested By:	ap
Sample ID:S-9	Test Date: 10/14/08	Checked By:	mpd
Depth : 24-26 ft	Test Id: 139637		
Test Comment:	---		
Sample Description:	Moist, olive gray clay		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	—	—	—

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0264	88		
---	0.0179	79		
---	0.0111	68		
---	0.0069	60		
---	0.0058	55		
---	0.0042	48		
---	0.0030	41		
---	0.0014	30		

Coefficients

D_{85} =0.0230 mm	D_{30} =N/A
D_{60} =0.0069 mm	D_{15} =N/A
D_{50} =0.0045 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO ()

Sample/Test Description

Sand/Gravel Particle Shape :

Sand/Gravel Hardness :

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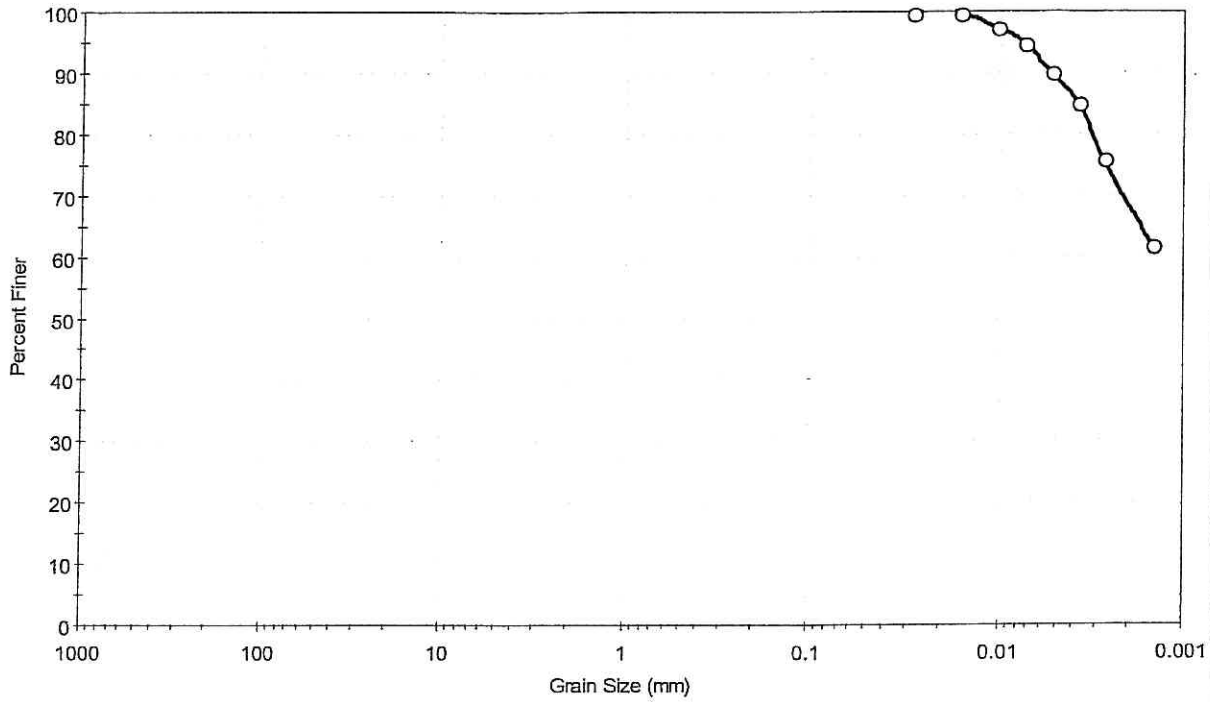
GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-03-34	Sample Type: jar	Tested By:	ap
Sample ID:S-13	Test Date: 10/17/08	Checked By:	mpd
Depth : 44-46 ft	Test Id: 139636		
Test Comment:	---		
Sample Description:	Moist, olive gray clay		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	—	—	—

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0291	100		
---	0.0165	100		
---	0.0103	97		
---	0.0074	95		
---	0.0053	90		
---	0.0038	85		
---	0.0028	76		
---	0.0015	62		

Coefficients

D_{85} =0.0039 mm	D_{30} =N/A
D_{60} =N/A	D_{15} =N/A
D_{50} =N/A	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO ()

Sample/Test Description

Sand/Gravel Particle Shape :

Sand/Gravel Hardness :

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GeoTesting express
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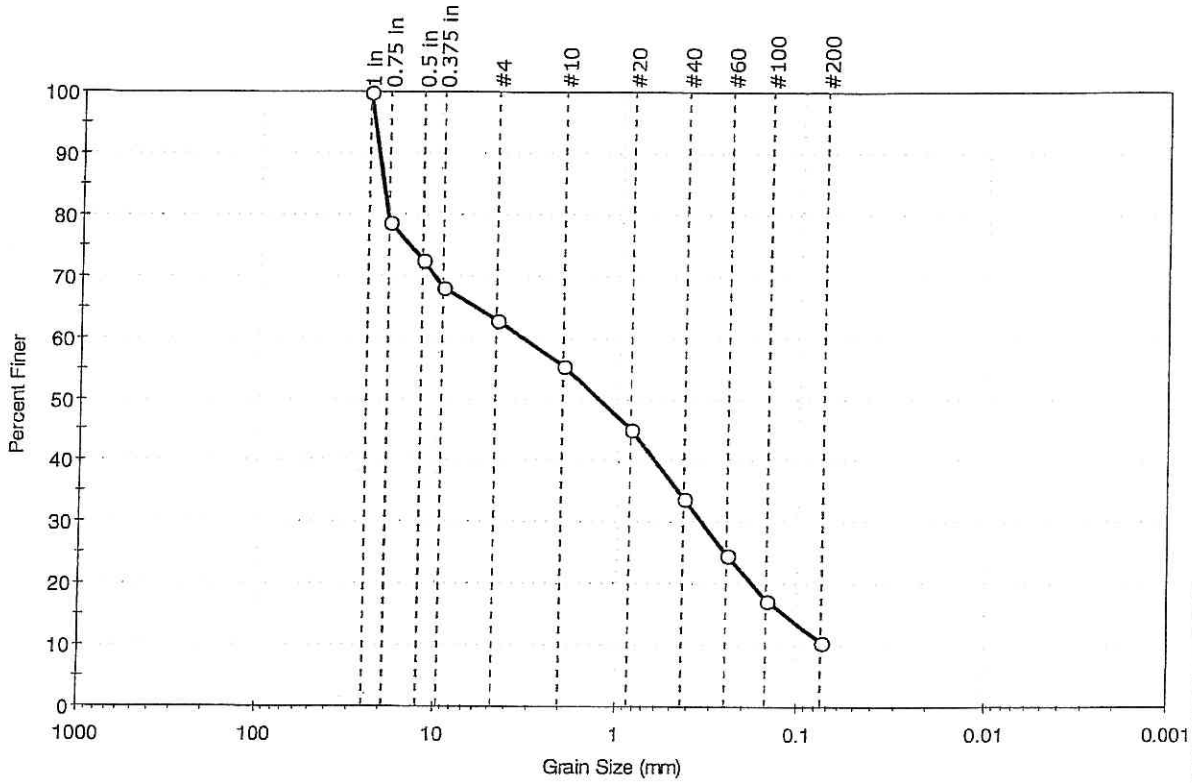
Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-03-35	Sample Type: jar	Tested By:	ap
Sample ID:S-1	Test Date: 10/16/08	Checked By:	mpd
Depth : 0-2 ft	Test Id: 139657		
Test Comment: ---			
Sample Description:	Moist, black sand with silt and gravel		
Sample Comment: ---			

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	37.2	52.0	10.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	79		
0.5 in	12.50	73		
0.375 in	9.50	68		
#4	4.75	63		
#10	2.00	55		
#20	0.85	45		
#40	0.42	34		
#60	0.25	25		
#100	0.15	17		
#200	0.075	11		

Coefficients

D_{85} = 20.6118 mm	D_{30} = 0.3360 mm
D_{60} = 3.4311 mm	D_{15} = 0.1178 mm
D_{50} = 1.2805 mm	D_{10} = 0.0692 mm
C_u = 49.582	C_c = 0.475

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

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GeoTesting express
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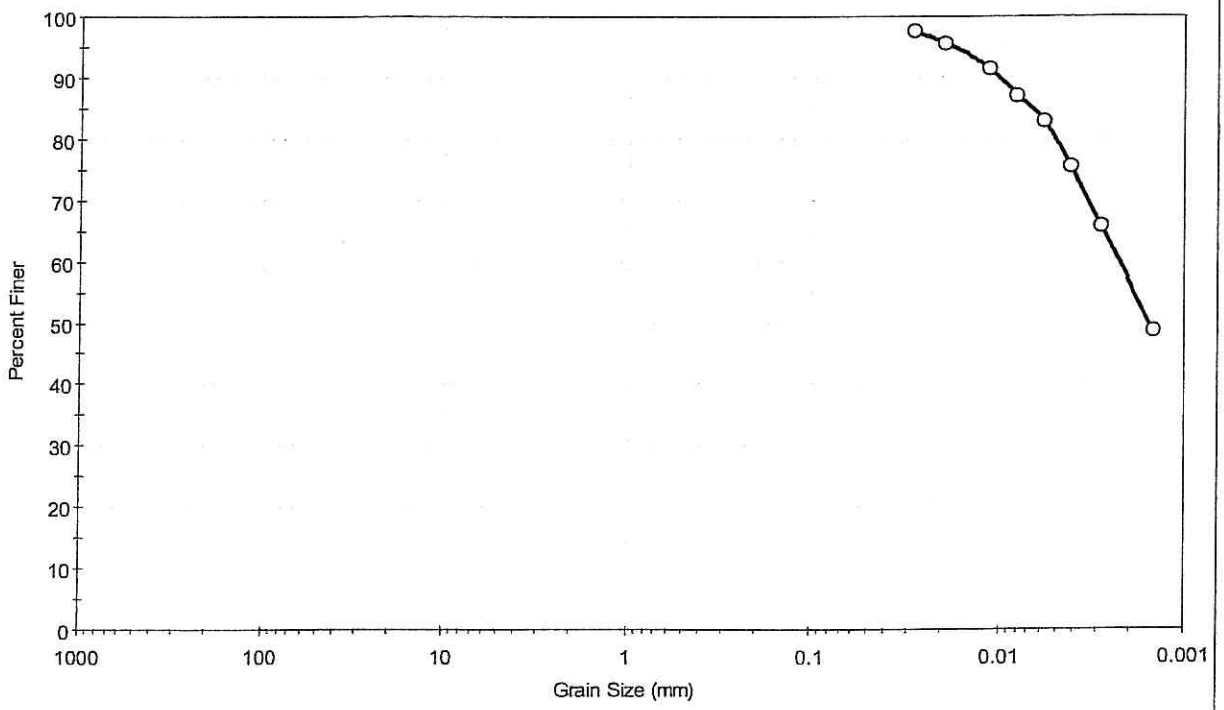
Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AAB-03-36	Sample Type: jar	Tested By:	ap
Sample ID:S-18	Test Date: 10/17/08	Checked By:	mpd
Depth : 70-72 ft	Test Id: 139638		
Test Comment:	---		
Sample Description:	Moist, dark yellowish brown clay		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	—	—	—

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0299	98		
---	0.0204	96		
---	0.0117	92		
---	0.0083	87		
---	0.0060	83		
---	0.0043	76		
---	0.0029	66		
---	0.0015	49		

Coefficients

D_{85} =0.0069 mm D_{30} =N/A
D_{60} =0.0023 mm D_{15} =N/A
D_{50} =0.0016 mm D_{10} =N/A
C_u =N/A C_c =N/A

Classification

ASTM N/A

AASHTO ()

Sample/Test Description

Sand/Gravel Particle Shape :

Sand/Gravel Hardness :

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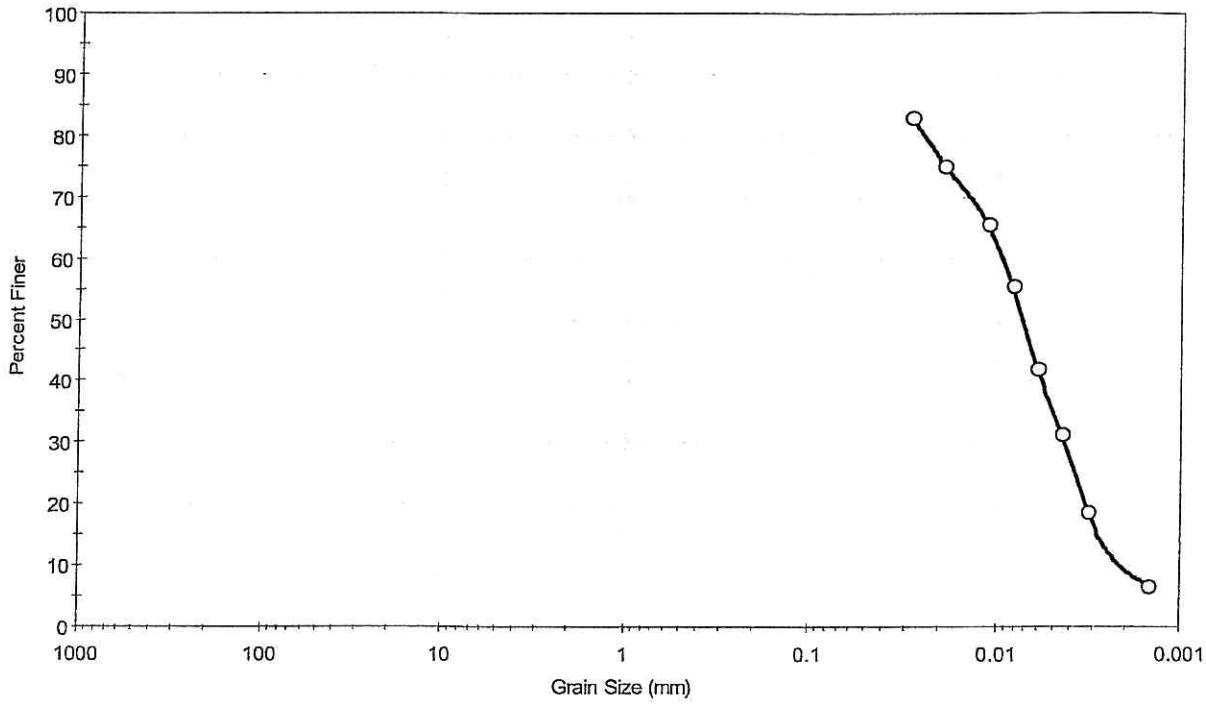
GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-01-04	Sample Type: jar	Tested By:	ap
Sample ID:S-7	Test Date: 10/17/08	Checked By:	mpd
Depth : 15-17 ft	Test Id: 139624		
Test Comment:	---		
Sample Description:	Moist, dark reddish brown clay		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	—	—	—

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
—	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0298	83		
---	0.0196	75		
---	0.0115	66		
---	0.0084	56		
---	0.0062	42		
---	0.0045	32		
---	0.0032	19		
---	0.0015	7		

Coefficients

D_{85} =N/A	D_{30} =0.0043 mm
D_{60} =0.0096 mm	D_{15} =0.0025 mm
D_{50} =0.0074 mm	D_{10} =0.0018 mm
C_u =5.333	C_c =1.070

Classification

ASTM N/A

AASHTO ()

Sample/Test Description

Sand/Gravel Particle Shape :

Sand/Gravel Hardness :

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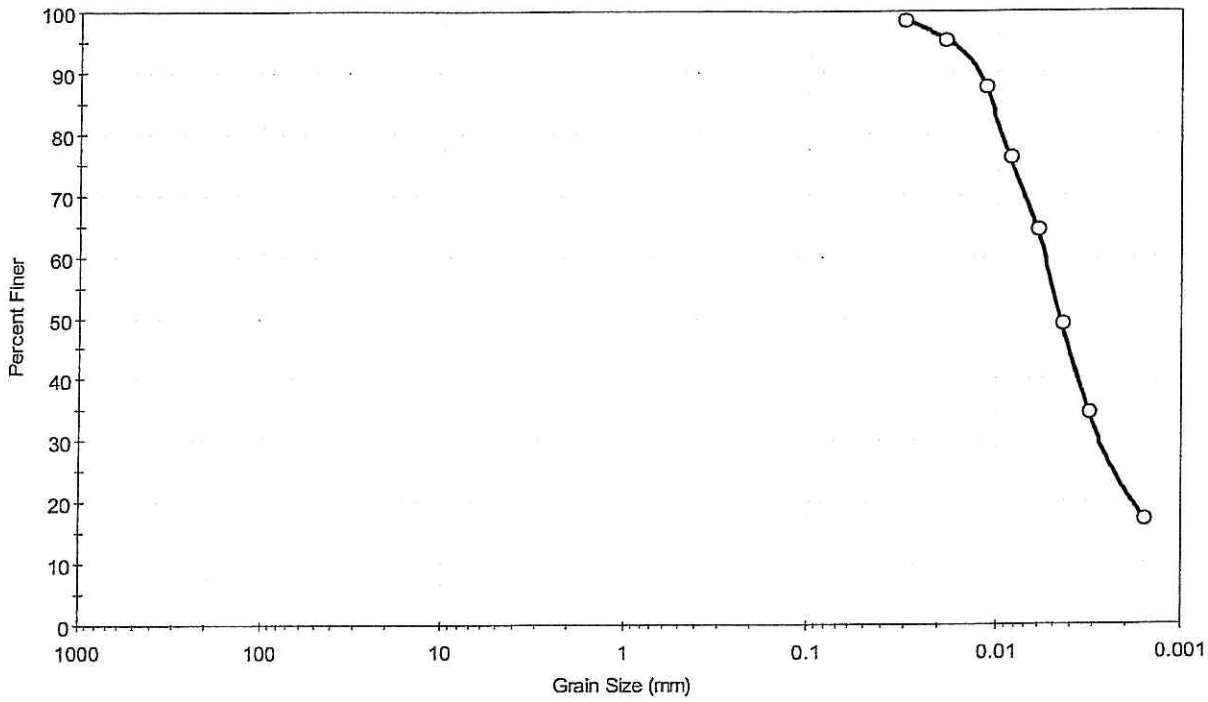
GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-04-11	Sample Type: jar	Tested By:	ap
Sample ID:S-5	Test Date: 10/17/08	Checked By:	mpd
Depth : 15-17 ft	Test Id: 139625		
Test Comment:	---		
Sample Description:	Moist reddish brown clay		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	—	—	—

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
—	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0322	99		
---	0.0194	96		
---	0.0117	88		
---	0.0086	76		
---	0.0062	65		
---	0.0045	49		
---	0.0032	35		
---	0.0016	17		

Coefficients

D_{85} =0.0108 mm D_{30} =0.0027 mm
D_{60} =0.0056 mm D_{15} =N/A
D_{50} =0.0046 mm D_{10} =N/A
C_u =N/A C_c =N/A

Classification

ASTM N/A

AASHTO ()

Sample/Test Description

Sand/Gravel Particle Shape :

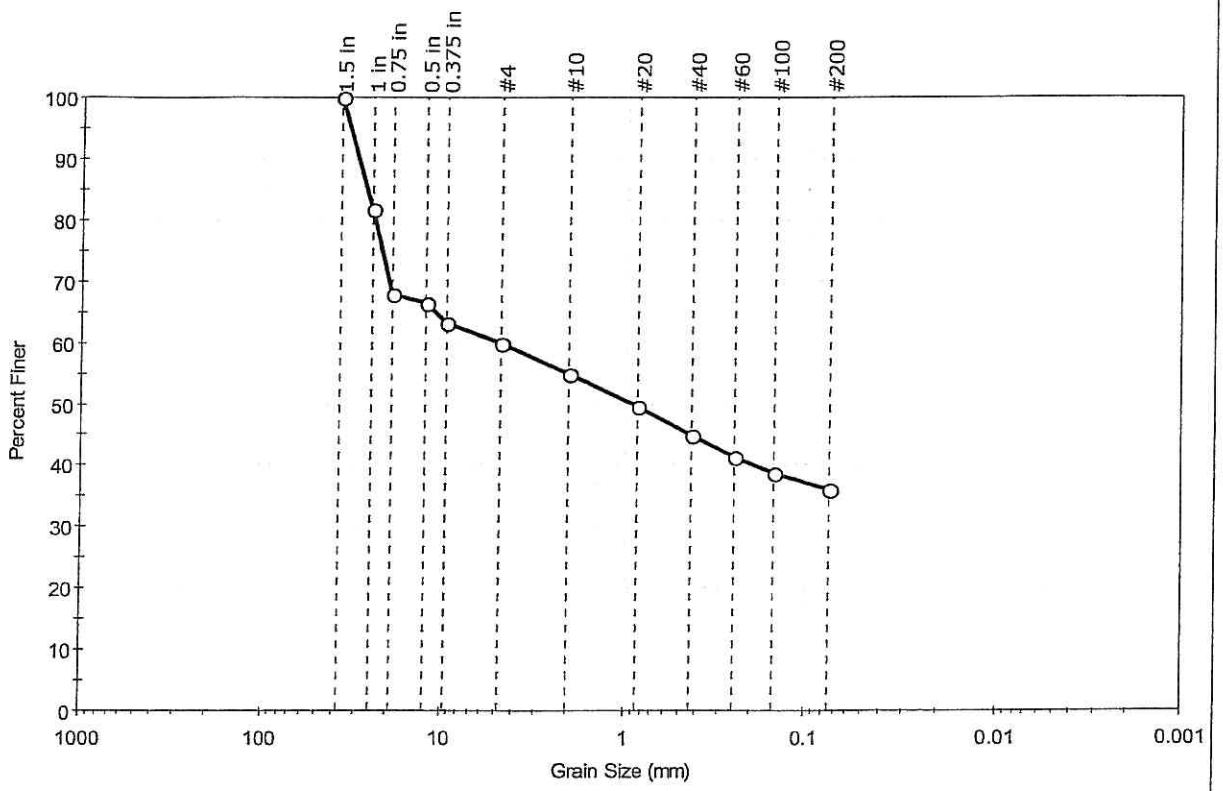
Sand/Gravel Hardness :

printed 10/17/2008 4:17:10 PM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-04-13	Sample Type: jar	Tested By:	ap
Sample ID:S-2	Test Date: 10/15/08	Checked By:	jdt
Depth : 0-2 ft	Test Id: 139653		
Test Comment:	---		
Sample Description:	Moist, dark yellowish brown silty gravel with sand		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	40.1	23.8	36.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	82		
0.75 in	19.00	68		
0.5 in	12.50	66		
0.375 in	9.50	63		
#4	4.75	60		
#10	2.00	55		
#20	0.85	50		
#40	0.42	45		
#60	0.25	41		
#100	0.15	39		
#200	0.075	36		

Coefficients

D_{85} =26.8834 mm D_{30} =N/A
D_{60} =4.8429 mm D_{15} =N/A
D_{50} =0.9123 mm D_{10} =N/A
C_u =N/A C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

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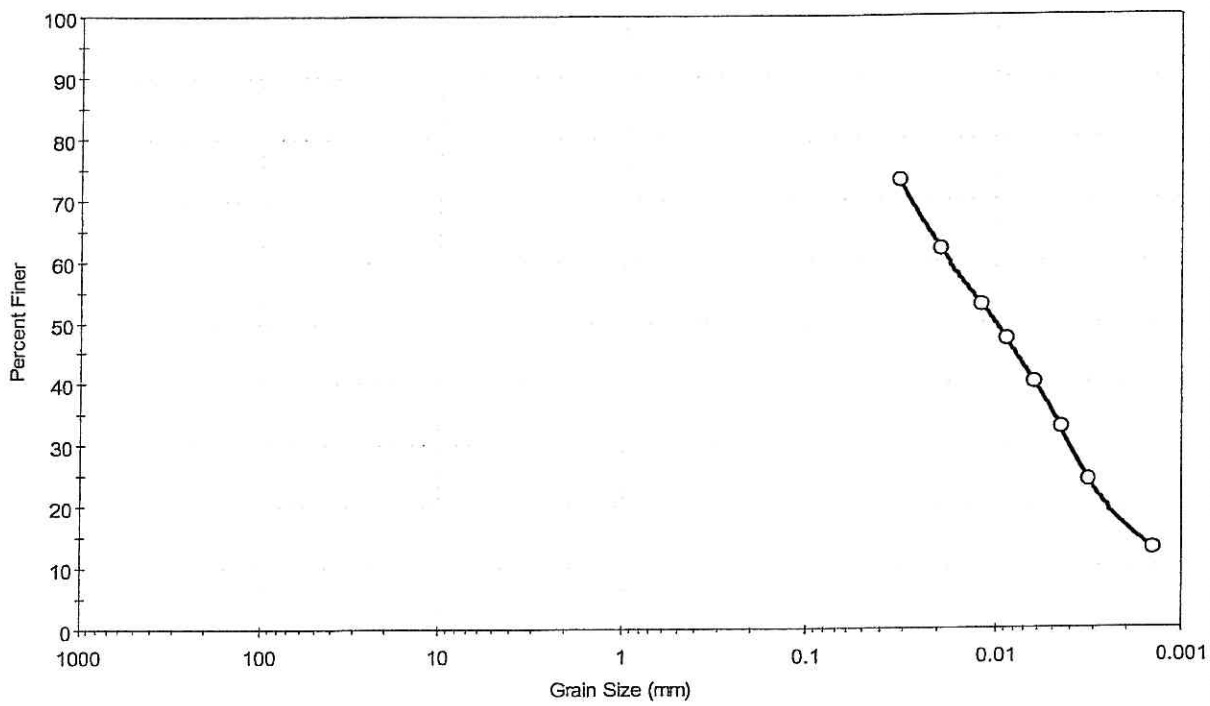
Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-04-13	Sample Type: jar	Tested By:	ap
Sample ID:S-7	Test Date: 10/17/08	Checked By:	mpd
Depth : 25-27 ft	Test Id: 139626		
Test Comment:	---		
Sample Description:	Moist, reddish brown clay		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	—	—	—

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0330	73		
---	0.0200	62		
---	0.0123	53		
---	0.0090	48		
---	0.0064	41		
---	0.0046	33		
---	0.0033	24		
---	0.0015	13		

Coefficients

D_{85} =N/A	D_{30} =0.0041 mm
D_{60} =0.0178 mm	D_{15} =0.0017 mm
D_{50} =0.0103 mm	D_{10} =0.0012 mm
C_u =14.833	C_c =0.787

Classification

ASTM N/A

AASHTO ()

Sample/Test Description

Sand/Gravel Particle Shape :

Sand/Gravel Hardness :

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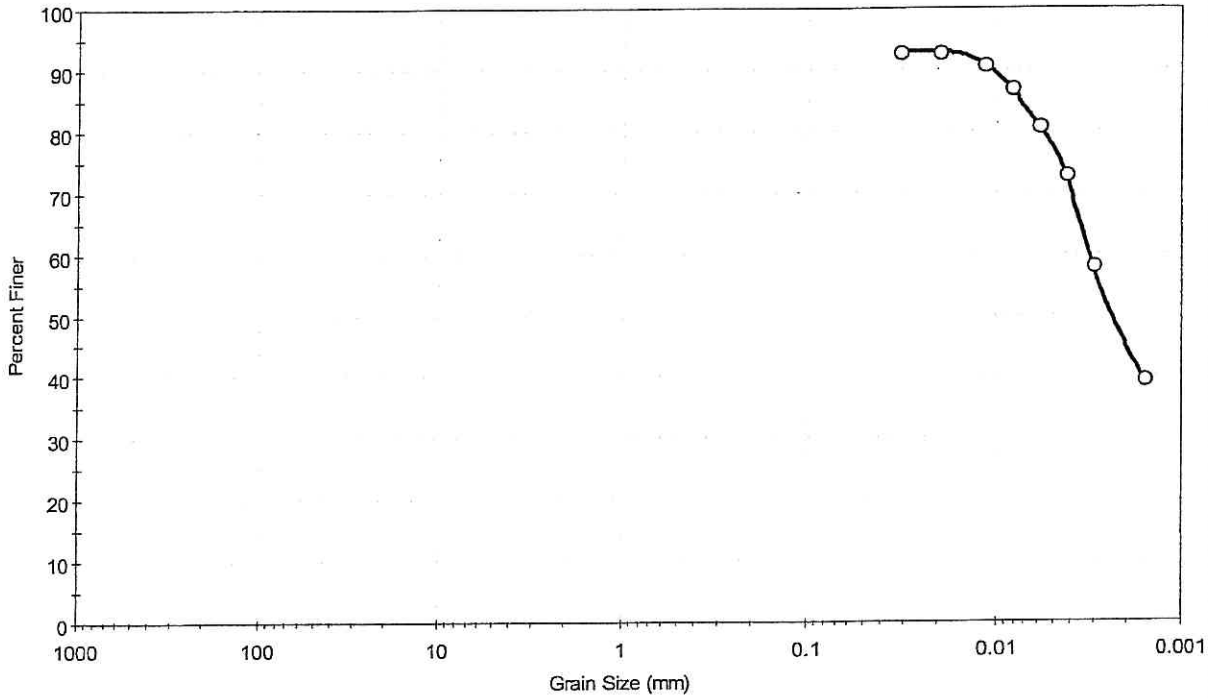
GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: AARW-06-26	Sample Type: jar	Tested By:	ap
Sample ID:S-15	Test Date: 10/17/08	Checked By:	mpd
Depth : 50-52 ft	Test Id: 139627		
Test Comment:	---		
Sample Description:	Moist, dark brown clay		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	—	—	—

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
—	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0326	93		
---	0.0203	93		
---	0.0118	91		
---	0.0084	87		
---	0.0060	81		
---	0.0043	73		
---	0.0031	58		
---	0.0016	39		

Coefficients

D_{85} =0.0076 mm D_{30} =N/A
D_{60} =0.0032 mm D_{15} =N/A
D_{50} =0.0023 mm D_{10} =N/A
C_u =N/A C_c =N/A

Classification

ASTM N/A

AASHTO ()

Sample/Test Description

Sand/Gravel Particle Shape :

Sand/Gravel Hardness :

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Moisture Contents

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Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: ---	Sample Type: ---	Tested By:	ap
Sample ID:---	Test Date: 10/23/08	Checked By:	jdt
Depth : ---	Sample Id: ---		

Moisture Content of Soil - ASTM D 2216-05

Boring ID	Sample ID	Depth	Description	Moisture Content,%
AAB-01-16	S-5	10-12 ft	Moist, dark brown clay	49.3
AAB-02-22A	S-5	35-37 ft	Moist, dark reddish gray clay	46.4
AAB-02-22A	S-8	50-52 ft	Moist, reddish brown silty clay with gravel	36.6
AAB-02-23B	S-15	65-67 ft	Moist, reddish brown silty clay	28.7
AAB-02-24	S-11	35-37 ft	Moist, reddish brown clay	47.6
AAB-03-36	S-15	55-57 ft	Moist, reddish gray clay	60.6
AAB-03-36	S-21	85-87 ft	Moist, reddish brown clay	52.3
AAB-03-36	S-27	115-117 ft	Moist, reddish brown clay	39.4

Notes: Temperature of Drying : 110° Celsius

GeoTesting express
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Client:	GeoDesign, Inc.				
Project:	Amtrak Access Road				
Location:	Newington, West Hartford, & Hartford			Project No:	GTX-8565
Boring ID: ---		Sample Type: ---		Tested By:	ap
Sample ID:---		Test Date:	10/23/08	Checked By:	jdt
Depth : ---		Sample Id:	---		

Moisture Content of Soil - ASTM D 2216-05

Boring ID	Sample ID	Depth	Description	Moisture Content,%
AARW-01-04	S-10	30-32 ft	Moist, dark brown clay	21.4
AARW-01-04	S-14	50-51.7 ft	Moist, dark brown silty clay	24.1
AARW-04-11	S-4	10-12 ft	Moist, brown clay	56.7
AARW-04-11	S-6	20-22 ft	Moist, dark brown clay	48
AARW-04-11	S-9	35-37 ft	Moist, dark brown clay	28.7
AARW-04-11	S-11	45-47 ft	Moist, reddish brown clay	39.2
AARW-04-13	S-6	20-22 ft	Moist, reddish brown clay	41.5
AARW-04-13	S-8	30-32 ft	Moist, dark reddish brown clay	42.3

Notes: Temperature of Drying : 110° Celsius

GeoTesting express
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Client:	GeoDesign, Inc.		
Project:	Amtrak Access Road		
Location:	Newington, West Hartford, & Hartford	Project No:	GTX-8565
Boring ID: ---	Sample Type: ---	Tested By:	ap
Sample ID:---	Test Date: 10/23/08	Checked By:	jdt
Depth : ---	Sample Id: ---		

Moisture Content of Soil - ASTM D 2216-05

Boring ID	Sample ID	Depth	Description	Moisture Content,%
AARW-06-25	S-10	30-32 ft	Moist, reddish brown clay	43.9
AARW-06-26	S-12	35-37 ft	Moist, dark brown clay	0
AARW-06-26	S-18	65-67 ft	Moist, reddish brown clay	29.4
AARW-10-40	S-7	20-22 ft	Moist, gray clay	38.3
AARW-10-40	S-13	50-52 ft	Moist, gray clay	59.8
AARW-10-40	S-18	75-77 ft	Moist, reddish gray clay	50.9
AARW-10-40	S-21	90-92 ft	Moist, reddish brown clay	45.4
AARW-10-40	S-25	110-112 ft	Moist, dark reddish brown silty clay	41.3

Notes: Temperature of Drying : 110° Celsius

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.				
Project:	Amtrak Access Road				
Location:	Newington, West Hartford, & Hartford			Project No:	GTX-8565
Boring ID: ---		Sample Type: ---		Tested By:	ap
Sample ID:---		Test Date:	10/23/08	Checked By:	jdt
Depth : ---		Sample Id:	---		

Moisture Content of Soil - ASTM D 2216-05

Boring ID	Sample ID	Depth	Description	Moisture Content,%
AARW-11-41	S-5	15-17 ft	Moist, reddish gray clay	68.5
AARW-11-43	S-5	10-12 ft	Moist, reddish gray clay	51.6
AARW-11-43	S-8	25-27 ft	Moist, reddish brown clay	55.2
AARW-11-45	S-3	5-7 ft	Moist, dark grayish brown clay	48.5
AARW-11-45	S-7	25-27 ft	Moist, reddish brown clay	58.7

Notes: Temperature of Drying : 110° Celsius

Appendix 4

Pre-Existing Subsurface Data (Boring Logs and Laboratory Data)

RB-32, SB-44, SB-46, SB-52, SB-53, SB-69, R-117, SB-84, RW-24, RW-25, RW-34, RW-31, RW-33, RW-32, RB-4

Existing Boring Logs

Driller: Seth Murkette/GZA	**Connecticut DOT Boring Report**	Hole No.: **RB-32**
Inspector: Rachael Marks	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 825812.4
Start Date: 7-8-03	Route No.:	Easting: 1006195.9
Finish Date: 7-8-03	Bridge No.:	Surface Elevation: 72.5
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. @ 26.0 after: 0 hours, @2.3 after: 24 hours, @2.0 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					72
2	S-1	5 8 5	1.5	0.8			WELL-GRADED SAND WITH GRAVEL (SW) - dark brown to black, fine to medium sand, some fine to medium course angular gravel; moist, medium dense, NP, traprock; (FILL).	71
3								70
4	A-N		1.5					69
5	S-2	2 2 2	1.5	1.5		4.5'	ELEV. 68.0 CLAY WITH SILT (CL) - red to brown clay, trace silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	68
6								67
7	A-N		1.5					66
8	S-3	1 1 1	1.5	1.5			CLAY WITH SILT (CL) - red to brown clay, trace silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	65
9	A-N		1.0					64
10								63
11	S-4	1 1 1	1.5	1.5			CLAY WITH SILT (CL) - red to brown clay, trace silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	62
12	A-N		2.0					61
13								60
14	S-5	1 1 1	1.5	1.5			CLAY WITH SILT (CL) - red to brown clay, trace silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	59
15								58
16	A-N		1.5					57
17	S-6	2 2 2	1.5	1.4			CLAY WITH SILT (CL) - red to brown clay, trace silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	56
18								55
19	A-N		1.5					54
		4					CLAY WITH SILT (CL) - red to brown clay, trace silt;	53

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' No. of Samples: 10	NOTES:	Sheet **1** of **2** SM-001-M REV. 1/02

Driller: Seth Murkette/GZA	**Connecticut DOT Boring Report**	Hole No.: **RB-32**
Inspector: Rachael Marks	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 825812.4
Start Date: 7-8-03	Route No.:	Easting: 1006195.9
Finish Date: 7-8-03	Bridge No.:	Surface Elevation: 72.5
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. @ 26.0 after: 0 hours, @2.3 after: 24 hours, @2.0 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.)
20	S-7	3 2	1.5	1.0			moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	52
21								
22	A-N		1.5					51
23	S-8	1 2 3	1.5	1.4			CLAY WITH SILT (CL) - red to brown clay, little silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	50
24	A-N		1.0					49
25						25.0'	ELEV. 47.5	48
26	S-9	5 12 13	1.5	1.1			CLAYEY SILT (ML) - red to brown silt, trace clay; moist, very stiff, -PL to +PL; (GLACIAL LAKE DEPOSIT).	47
27	A-N		2.0					46
28								45
29	S-10	2 10 15	1.5	1.1			CLAYEY SILT (ML) - red to brown silt, trace clay; moist, very stiff, -PL to +PL; (GLACIAL LAKE DEPOSIT).	44
30							ELEV. 42.5	43
31							END OF BORING AT 30.0'	42
32								41
33								40
34								39
35								38
36								37
37								36
38								35
39								34
								33

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' 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	A-N		1.5					70
1								69
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).	68
3								67
4	A-N		1.5					66
4.5'							Encountered water at 4.5'	
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.)	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	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								33
38	W-N		3.5					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							SILT WITH SAND (ML) - reddish brown silt, little fine sand; wet, very stiff, +PL.	25
46	S-13	6 6 12	1.5	1.1				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.)	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%			
				5.0	2.3	62.4'	SHALE; gray, soft, weathered, vertically fractured throughout	8
63							ELEV. 7.7	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%			
							ELEV. 3.1	3
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	A-N		1.5					68
1								67
2	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).	66
3	A-N		1.5					65
4								64
5	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).	63
6	W-N		1.5					62
7								61
8	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).	60
9	W-N		1.0					59
10	S-4	15 11 8	1.5	0.0			NO RECOVERY ON S-4.	58
11								57
12	W-N		2.0					56
13								55
14	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).	54
15	W-N		1.5					53
16								52
17	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).	51
18	W-N		1.5					50
19								49
		4				19.5'	ELEV. 48.7	

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 Fa l: 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.)
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.)	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
42–44	W-N		3.5					26–24
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
47–49	W-N		3.5					21–19
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
52–54	W-N		3.5					16–14
55–56	S-15	4 10 20	1.5	1.5		55.0'	ELEV. 13.2 SILTY CLAY (CL-ML) - red to brown clay, some silt, trace of fine gravel (in spoon tip); moist, stiff, -PL.	13–12
57–59	W-N		3.5			56.5'	ELEV. 11.7	11–9

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.)
							ELEV. 8.2	
60–61	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).	8–7
62–63	W-N		2.2					6–5
						63.7'	ELEV. 4.5	
64–68	C-1		5.0	5.0 / 100%	1.2 / 24%		SILTSTONE; red to brown; medium hard, fresh; calcite inclusions throughout.	4–0
69–73	C-2		5.0	5.0 / 100%	2.8 / 56%		SILTSTONE; red to brown; medium hard, fresh; calcite inclusions throughout.	-1–-5
							ELEV. -5.5	
74–79							END OF BORING AT 73.7'	-6–-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-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.)
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
10	A-N		1.0					55
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	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
15–16	W-N		1.5					49
17	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
18–19	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.)	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	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								43
22	W-N		1.5					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								4
61	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).	3
62								2
63	W-N		3.5					1
64								0
65								-1
66	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).	-2
67								-3
68	W-N		3.5					-4
69								-5
70						70.0'	ELEV. -5.8	-6
71	S-17	55 80 100/.2	1.2	1.0			SILTY SAND WITH GRAVEL (SM) - red to brown fine to medium sand, little silt, little fine to coarse gravel; moist, very dense, NP (TILL).	-7
72								-8
73	W-N		3.7					-9
74								-10
75	S-18	100/0.1	0.1	0.0			NO RECOVERY	-11
76								-12
77	W-N		4.9					-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.)	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		27				80.0'	ELEV. -15.8	-16
81	S-19	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.)	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				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%			
				4.5	0.0		SILTSTONE WITH INTERBEDDED SANDSTONE; fine-grained, red, hard, fresh to slightly weathered, calcite inclusions present. BASALT SEAM at 105.1'	-41
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: Jeff Leavitt/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-53**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827458.6
Start Date: 7/8/03	Route No.:	Easting: 1007169.0
Finish Date: 7/10/03	Bridge No.:	Surface Elevation: 63.9
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"
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 25.0 after: 0 hours, @26.7 after: 24 hours, @26.6 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					63
2	S-1	6 5 9	1.5	0.5			WELL GRADED SAND WITH SILT (SW-SM) - black, brown and tan fine to coarse sand, little silt; dry, medium dense, NP; (FILL).	62
3								61
4	A-N		1.5					60
5	S-2	8 20 12	1.5	0.7			WELL GRADED SAND WITH SILT (SW-SM) - black, brown and tan fine to coarse sand, little silt, trace coarse gravel; dry, dense, NP; (FILL).	59
6								58
7	A-N		1.5					57
8	S-3	6 9 9	1.5	0.1			WELL GRADED SAND WITH SILT (SW-SM) - brown and tan fine to coarse sand, little silt; dry, medium dense, NP; (FILL).	56
9								55
10	A-N		1.5					54
11	S-4	7 11 12	1.5	0.9			WELL GRADED SAND WITH SILT (SW-SM) - brown and tan fine to coarse sand, little silt; dry, medium dense, NP; (FILL).	53
12								52
13	W-N		1.5					51
14	S-5	10 7 7	1.5	0.0			No recovery in S-5	50
15								49
16	W-N		1.5					48
						16.5'	ELEV. 47.4	
17	S-6	9 11 11	1.5	0.7			POORLY GRADED GRAVEL (GP) - dark gray and black fine to medium gravel; moist, medium dense, NP; (FILL).	47
18								46
19	W-N		1.5					45
						19.5'	ELEV. 44.4	
		6						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: 80.0 Rock: 11.0 No. of Samples: 19	NOTES:	Sheet 1 of 5 SM-001-M REV. 1/02

Driller: Jeff Leavitt/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-53**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827458.6
Start Date: 7/8/03	Route No.:	Easting: 1007169.0
Finish Date: 7/10/03	Bridge No.:	Surface Elevation: 63.9
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"
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 25.0 after: 0 hours, @26.7 after: 24 hours, @26.6 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	0.5			POORLY GRADED SAND WITH SILT (SP-SM) - tan and brown fine to medium sand, little silt; wet, medium dense, NP; (ALLUVIUM).	
21								43
22	W-N		1.5					42
						22.5'	ELEV. 41.4	
23	S-8	5 7 9	1.5	0.2			POORLY GRADED GRAVEL (GP) - dark gray coarse gravel; wet, medium dense, NP (ALLUVIUM).	41
24								40
25	W-N		1.5					39
						25.5'	ELEV. 38.4	
26	S-9	7 8 8	1.5	0.2			POORLY GRADED SAND WITH SILT (SP-SM) - tan and brown fine to medium sand, little silt; moist, medium dense, NP; (ALLUVIUM).	38
27								37
28	W-N		3.0			28.0'	ELEV. 35.9	36
							WOOD TIMBER, no sample possible from 28.5'-30.0'	
29						29.2'	ELEV. 34.7	35
30	S-10	5 6 5	1.5	1.0			POORLY GRADED SAND WITH WOOD (SP) - tan and brown fine to medium sand, some wood; wet, medium dense, NP (ALLUVIUM).	34
31								33
32								32
33	W-N		3.5					31
34								30
35						35.0'	ELEV. 28.9	29
36	S-11	5 7 11	1.5	0.9			LEAN CLAY (CL) - gray and reddish brown clay, trace fine sand; moist, very stiff, +PL; (GLACIAL LAKE DEPOSIT).	28
37								27
38	W-N		3.5					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: 80.0 Rock: 11.0 No. of Samples: 19	NOTES:	Sheet **2** of **5**

Driller: Jeff Leavitt/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-53**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827458.6
Start Date: 7/8/03	Route No.:	Easting: 1007169.0
Finish Date: 7/10/03	Bridge No.:	Surface Elevation: 63.9
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"
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 25.0 after: 0 hours, @26.7 after: 24 hours, @26.6 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	3 2 3	1.5	0.9			LEAN CLAY (CL) - gray and reddish brown clay; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	23
42								22
43	W-N		3.5					21
44								20
45						45.0'	ELEV. 18.9	19
46	S-13	5 11 11	1.5	1.5			SILT (ML) - reddish brown silt, trace clay; wet, very stiff, +PL; (GLACIAL LAKE DEPOSIT).	18
47								17
48	W-N		3.5					16
49								15
50						50.0'	ELEV. 13.9	14
51	S-14	1 1 1	1.5	1.5			LEAN CLAY (CL) - reddish brown clay, trace silt; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	13
52								12
53	W-N		3.5					11
54								10
55								9
56	S-15	2 4 4	1.5	1.5			CLAY WITH SILT (CL) - reddish brown clay, little silt; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	8
57								7
58	W-N		3.5					6
59								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: 80.0 Rock: 11.0 No. of Samples: 19	NOTES:	Sheet **3** of **5**

Driller: Jeff Leavitt/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-53**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827458.6
Start Date: 7/8/03	Route No.:	Easting: 1007169.0
Finish Date: 7/10/03	Bridge No.:	Surface Elevation: 63.9
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"
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 25.0 after: 0 hours, @26.7 after: 24 hours, @26.6 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	S-16	5 6 6	1.5	1.5			CLAY WITH SILT (CL) - reddish brown clay, little silt; moist, stiff, +PL; (GLACIAL LAKE DEPOSIT).	
61								3
62	W-N		3.5					2
63								1
64								0
65	S-17	5 5 6	1.5	1.5			CLAY WITH SILT (CL) - reddish brown clay, little silt; moist, stiff, +PL; (GLACIAL LAKE DEPOSIT).	-1
66								-2
67	W-N		3.5					-3
68								-4
69								-5
70						70.0'	ELEV. -6.1	-6
71	S-18	16 24 23	1.5	1.0			SANDY SILT (ML) - reddish brown silt, some fine sand; wet, dense, NP.	-7
72	W-N		3.5					-8
73								-9
74								-10
75	S-19	18 24 33	1.5	0.8			SILT WITH GRAVEL (ML) - reddish brown silt, little fine gravel; moist, hard, -PL.	-11
76								-12
77	W-N		3.5					-13
78								-14
79								-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: 80.0 Rock: 11.0 No. of Samples: 19	NOTES:	Sheet **4** of **5** SM-001-M REV. 1/02

Driller: Jeff Leavitt/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-53**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 827458.6
Start Date: 7/8/03	Route No.:	Easting: 1007169.0
Finish Date: 7/10/03	Bridge No.:	Surface Elevation: 63.9
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"
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 25.0 after: 0 hours, @26.7 after: 24 hours, @26.6 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.)
80				1.2	0.0			
81								-17
82								-18
83	C-1		5.0					-19
84						83.8'	ELEV. -19.9	-20
85				24%	0%			-21
	C-2		1.0	0.5 / 50%	0.0 / 0%		SILTSTONE, SANDY; reddish brown, medium hard, slightly weathered.	
86				4.7	1.1			-22
87						86.5'	ELEV. -22.6	-23
						87.2'	0.7' - BASALT SEAM AT 86.5' ELEV. -23.3	
88	C-3		5.0				SILTSTONE, SANDY; reddish brown, medium hard, slightly weathered.	-24
89								-25
90								-26
91				94%	22%		ELEV. -27.1	-27
							End of Boring at 91.0'	
92								-28
93								-29
94								-30
95								-31
96								-32
97								-33
98								-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: 80.0 Rock: 11.0 No. of Samples: 19	NOTES:	Sheet **5** of **5** SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-69**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 831752.3
Start Date: 7/16/03	Route No.:	Easting: 1009716.4
Finish Date: 7/17/03	Bridge No.:	Surface Elevation: 68.5
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 3.8 after: 0 hours, @29.3 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					68
1–2	S-1	9 10 9	1.5	0.5			SILTY SAND WITH GRAVEL (SM) - tan and brown fine sand, some silt, little fine gravel; moist, medium dense, NP; (FILL).	67
2–3								66
3–4	A-N		1.5					65
4.5'							ELEV. 64.0	64
4–5	S-2	6 5 7	1.5	1.5			SANDY SILT (ML) - tan, gray, orange and brown silt, some fine sand; moist, medium dense, NP; (ALLUVIUM).	63
5–6								
6–7	A-N		1.5					62
7–8	S-3	7 6 5	1.5	1.5			SANDY SILT (ML) - tan, gray, orange and brown silt, some fine sand; moist, medium dense, NP; (ALLUVIUM).	61
8–9								60
9–10	W-N		1.0					59
10.0'							ELEV. 58.5	
10–11	S-4	2 2 3	1.5	1.5			SILTY CLAY (CL-ML) - gray clay, some silt; moist, medium stiff, +PL; (GLACIAL LAKE DEPOSIT).	58
11–12								57
12–13	W-N		2.0					56
13–14	S-5	1 2 1	1.5	1.5			SILTY CLAY (CL-ML) - gray clay, some silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	55
14–15								54
15–16	W-N		1.5					53
16–17	S-6	WOH 1 1	1.5	1.5			SILTY CLAY (CL-ML) - gray clay, some silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	52
17–18								51
18–19	W-N		1.5					50
19.5'							ELEV. 49.0	49
		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: 151.3' Rock: 0.0' No. of Samples: 34	NOTES:	Sheet **1** of **8** SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-69**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 831752.3
Start Date: 7/16/03	Route No.:	Easting: 1009716.4
Finish Date: 7/17/03	Bridge No.:	Surface Elevation: 68.5
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 3.8 after: 0 hours, @29.3 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.)
20	S-7	1 1	1.5	1.5			LEAN CLAY (CL) - gray clay, little silt; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	48
21								
22	W-N		1.5					47
23	S-8	WOH WOH WOH	1.5	1.0			LEAN CLAY (CL) - gray clay, little silt, trace fine sand varves; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	46
24	W-N		1.0					45
25	S-9	WOH WOH 1	1.5	1.5			LEAN CLAY (CL) - gray clay, little silt, trace fine sand varves; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	44
26								43
27	W-N		2.0					42
28								41
29	S-10	1 1 1	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay, little silt, trace fine sand varves; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	40
30								39
31	W-N		5.0					38
32								37
33								36
34								35
35	S-11	WOR WOR 1	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay, little silt, trace fine sand varves; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	34
36								33
37	W-N		3.5					32
38								31
39								30
								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: 151.3' Rock: 0.0' No. of Samples: 34	NOTES:	Sheet **2** of **8** SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-69**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 831752.3
Start Date: 7/16/03	Route No.:	Easting: 1009716.4
Finish Date: 7/17/03	Bridge No.:	Surface Elevation: 68.5
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 3.8 after: 0 hours, @29.3 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	WOR WOH 1	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay, little silt, trace fine sand varves; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	28
42, 43, 44	W-N		3.5					27, 26, 25, 24
45, 46	S-13	WOH 1 3	1.5	1.5			LEAN CLAY (CL) - reddish brown clay, trace silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	23
47, 48, 49	W-N		3.5					22, 21, 20, 19
50, 51	S-14	WOR 1 1	1.5	1.5			LEAN CLAY (CL) - reddish brown clay, trace silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	18
52, 53, 54	W-N		3.5					17, 16, 15, 14
55, 56	S-15	WOH WOH WOH	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay, trace silt; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	13
57, 58, 59	W-N		3.5					12, 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: 151.3' Rock: 0.0' No. of Samples: 34	NOTES:	Sheet **3** of **8** SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-69**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 831752.3
Start Date: 7/16/03	Route No.:	Easting: 1009716.4
Finish Date: 7/17/03	Bridge No.:	Surface Elevation: 68.5

Project Description: New Britain to Hartford Busway

Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 3.8 after: 0 hours, @29.3 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	1 1 2	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay, trace silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	8
62								7
63	W-N		3.5					6
64								5
65								4
66	S-17	WOR WOH 1	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay, trace silt; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	3
67								2
68	W-N		3.5					1
69								0
70								-1
71	S-18	WOR WOR 1	1.5	1.5			LEAN CLAY (CL) - gray and reddish brown clay, trace silt; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	-2
72								-3
73	W-N		3.5					-4
74								-5
75						75.0'	ELEV. -6.5	-6
76	S-19	WOR WOR WOH	1.5	1.5			SILTY CLAY (CL-ML) - gray and reddish brown clay, some silt; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	-7
77								-8
78	W-N		3.5					-9
79								-10
								-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: 151.3' Rock: 0.0'
No. of Samples: 34

NOTES:

SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-69**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 831752.3
Start Date: 7/16/03	Route No.:	Easting: 1009716.4
Finish Date: 7/17/03	Bridge No.:	Surface Elevation: 68.5
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 3.8 after: 0 hours, @29.3 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	S-20	WOR 1 3	1.5	1.3			SILTY CLAY (CL-ML) - gray and reddish brown clay, some silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	-12
81								
82	W-N		3.5					-13
83								-14
84								-15
85	S-21	1 1 1	1.5	1.5			SILTY CLAY (CL-ML) - gray and reddish brown clay, some silt; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	-16
86								-17
87	W-N		3.5					-18
88								-19
89								-20
90	S-22	1 1 2	1.5	1.5		90.0'	ELEV. -21.5 SILT (ML) - reddish brown silt; wet, soft, +PL.	-21
91								-22
92	W-N		3.5					-23
93								-24
94								-25
95	S-23	7 3 2	1.5	1.5			SILT (ML) - reddish brown silt; wet, medium stiff, +PL.	-26
96								-27
97	W-N		3.5					-28
98								-29
99								-30
								-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: 151.3' Rock: 0.0' No. of Samples: 34	NOTES:	Sheet **5** of **8**

SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-69**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 831752.3
Start Date: 7/16/03	Route No.:	Easting: 1009716.4
Finish Date: 7/17/03	Bridge No.:	Surface Elevation: 68.5
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 3.8 after: 0 hours, @29.3 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								
101	S-24	5 6 7	1.5	1.5			SILT (ML) - reddish brown silt; wet, stiff, +PL.	-32
102								-33
103	W-N		3.5					-34
104								-35
105								-36
106	S-25	7 2 2	1.5	1.5			SILT (ML) - reddish brown silt; wet, soft, +PL.	-37
107								-38
108	W-N		3.5			108.0'	ELEV. -39.5	-39
109								-40
110								-41
111	S-26	16 19 24	1.5	0.7			SILTY SAND (SM) - reddish brown fine sand, some silt; moist, dense, NP.	-42
112								-43
113	W-N		3.5					-44
114								-45
115								-46
116	S-27	14 16 18	1.5	0.8			SILTY SAND (SM) - reddish brown fine sand, some silt, trace fine gravel; moist, dense, NP.	-47
117								-48
118	W-N		3.5					-49
119								-50
								-51

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: 151.3' Rock: 0.0' No. of Samples: 34	NOTES:	Sheet **6** of **8** SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-69**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 831752.3
Start Date: 7/16/03	Route No.:	Easting: 1009716.4
Finish Date: 7/17/03	Bridge No.:	Surface Elevation: 68.5
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 3.8 after: 0 hours, @29.3 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.)
120						120.0'	ELEV. -51.5	
121	S-28	14 13 14	1.5	1.3			WELL GRADED SAND WITH SILT (SW-SM) - reddish brown fine to coarse sand, little silt; moist, medium dense, NP.	-52
122								-53
123	W-N		3.5					-54
124								-55
125								-56
126	S-29	16 15 16	1.5	1.0			WELL GRADED SAND WITH SILT (SW-SM) - reddish brown fine to coarse sand, little silt; moist, dense, NP.	-57
127								-58
128	W-N		3.5					-59
129								-60
130						130.0'	ELEV. -61.5	-61
131	S-30	26 38 44	1.5	1.1			SILTY SAND WITH GRAVEL (SM) - reddish brown fine sand, some silt, little coarse gravel; moist, very dense, NP; (TILL).	-62
132								-63
133	W-N		3.5					-64
134								-65
135						135.0'	ELEV. -66.5	-66
136	S-31	16 22 38	1.5	1.1			SILT (ML) - reddish brown silt; moist, hard, -PL; (TILL).	-67
137								-68
138	W-N		3.5					-69
139								-70
								-71

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: 151.3' Rock: 0.0' No. of Samples: 34	NOTES:	Sheet 7 of 8 SM-001-M REV. 1/02

Driller: Al Augustine/GZA	**Connecticut DOT Boring Report**	Hole No.: **SB-69**
Inspector: Mark Martin	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 831752.3
Start Date: 7/16/03	Route No.:	Easting: 1009716.4
Finish Date: 7/17/03	Bridge No.:	Surface Elevation: 68.5
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 3.8 after: 0 hours, @29.3 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.)
140						140.0'	ELEV. -71.5	
141	S-32	33 24 30	1.5	0.7			SILTY GRAVEL WITH SAND (GM) - reddish brown fine to coarse gravel, some silt, little fine to coarse sand; wet, very dense, NP; (TILL).	-72
142								-73
143	W-N		3.5					-74
144								-75
145								-76
146	S-33	30 32 38	1.5	1.1			SILTY GRAVEL WITH SAND (GM) - reddish brown fine to coarse gravel, some silt, little fine to coarse sand; wet, very dense, NP; (TILL).	-77
147								-78
148	W-N		3.5					-79
149								-80
150						150.0'	ELEV. -81.5	-81
151	S-34	67 55 100/0.3	1.3	1.0			SILTY SAND WITH GRAVEL (SM) - reddish brown fine to coarse sand, little silt, little fine gravel; moist, very dense, NP; (DECOMPOSED ROCK).	-82
152							ELEV. -82.8	-83
							End of Boring at 151.3'	
153								-84
154								-85
155								-86
156								-87
157								-88
158								-89
159								-90
								-91

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: 151.3' Rock: 0.0' No. of Samples: 34	NOTES:	Sheet **8** of **8** SM-001-M REV. 1/02

Driller: Jeff Leavitt/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-84**
Inspector: Rachael Marks	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 836901.4
Start Date: 7/21/03	Route No.:	Easting: 1012781.8
Finish Date: 7/23/03	Bridge No.:	Surface Elevation: 62.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 28.0 after: 0 hours, @17.4 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					62
1–2	S-1	20 20 13	1.5	0.8			WELL GRADED SAND WITH SILT (SW-SM) - black fine to coarse sand, some silt, little fine gravel; dry, dense, NP; (FILL).	61
2–3								60
3–4	A-N		1.5					59
4.5'							ELEV. 58.1	58
4–5	S-2	6 6 7	1.5	1.5			WELL GRADED SAND WITH SILT (SW-SM) - brown fine to coarse sand, some silt; moist, medium dense, NP; (ALLUVIUM).	57
5–6								56
6–7	A-N		1.5					55
7–8	S-3	7 5 7	1.5	0.6			WELL GRADED SAND WITH SILT (SW-SM) - brown fine to coarse sand, some silt; moist, medium dense, NP; (ALLUVIUM).	54
8–9								53
9–10	A-N		1.5					
10.5'							ELEV. 52.1	52
10–11	S-4	9 5 6	1.5	0.6			SILT (ML) - brown to gray silt, trace clay; moist, stiff, - PL: (ALLUVIUM).	51
11–12								50
12–13	W-N		1.5					
13–14	S-5	15 15 11	1.5	0.0			NO RECOVERY ON S-5, COBBLE	49
14–15								48
15–16								47
16–17	W-N		4.5				COBBLE AT 16.5, NO SAMPLE POSSIBLE	46
17–18								45
18–19								44
19.5'							ELEV. 43.1	43
		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: 146.5' Rock: 0.0' No. of Samples: 33	NOTES:	Sheet **1** of **8** SM-001-M REV. 1/02

Driller: Jeff Leavitt/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-84**
Inspector: Rachael Marks	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 836901.4
Start Date: 7/21/03	Route No.:	Easting: 1012781.8
Finish Date: 7/23/03	Bridge No.:	Surface Elevation: 62.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 28.0 after: 0 hours, @17.4 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-6	6 7	1.5	1.5			SILTY CLAY (CL-ML) - brown to gray silt, some clay, trace fine sand; moist, stiff, -PL; (GLACIAL LAKE DEPOSIT).	42
21								
22	W-N		1.5					41
						22.5'	ELEV. 40.1	40
23	S-7	2 2 2	1.5	1.5			LEAN CLAY (CL) - gray clay, little silt, trace fine sand; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	
24								39
25	W-N		1.5					38
26	S-8	2 2 2	1.5	1.5			LEAN CLAY (CL) - gray clay, little silt, trace fine sand; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	37
27								36
28	W-N		1.5					35
29	S-9	WOR WOR 2	1.5	1.5			LEAN CLAY (CL) - gray clay, little silt, trace fine sand; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	34
30								33
31	UP-1		2.0	2.0				32
32								31
33	S-10	1 1 1	1.5	1.5			LEAN CLAY (CL) - gray clay, little silt, trace fine sand; moist, soft, +PL; (GLACIAL LAKE DEPOSIT).	30
34	W-N		1.5					29
35								28
36	S-11	1 WOH WOH	1.5	1.5			LEAN CLAY (CL) - gray clay, little silt, trace fine sand; moist, very soft, +PL; (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: 146.5' Rock: 0.0'
No. of Samples: 33

NOTES:

SM-001-M REV. 1/02

Driller: Jeff Leavitt/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-84**
Inspector: Rachael Marks	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 836901.4
Start Date: 7/21/03	Route No.:	Easting: 1012781.8
Finish Date: 7/23/03	Bridge No.:	Surface Elevation: 62.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 28.0 after: 0 hours, @17.4 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	S-12	1 1 WOH	1.5	1.5			LEAN CLAY (CL) - gray clay, little silt, trace fine sand; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	22
41								
42	W-N		3.5					21
43								20
44								19
45	S-13	1 WOH/1.0	1.5	1.5			LEAN CLAY (CL) - gray clay, little silt, trace fine sand; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	18
46								17
47	W-N		3.5					16
48								15
49								14
50	S-14	1 WOR WOR	1.5	1.3			LEAN CLAY (CL) - gray clay, little silt, trace fine sand; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	13
51								12
52	W-N		3.5					11
53								10
54								9
55	S-15	1 1 WOH	1.5	1.5			LEAN CLAY (CL) - gray clay, little silt, trace fine sand; moist, very soft, +PL; (GLACIAL LAKE DEPOSIT).	8
56								7
57	W-N		3.5					6
58								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: 146.5' Rock: 0.0'
No. of Samples: 33

NOTES:

SM-001-M REV. 1/02

Driller: Jeff Leavitt/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-84**
Inspector: Rachael Marks	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 836901.4
Start Date: 7/21/03	Route No.:	Easting: 1012781.8
Finish Date: 7/23/03	Bridge No.:	Surface Elevation: 62.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 28.0 after: 0 hours, @17.4 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.)
60								
61	S-16	1 WOH WOH	1.5	1.5			LEAN CLAY (CL) - brown to gray clay; wet, very soft, +PL; (GLACIAL LAKE DEPOSIT).	2
62								1
63	W-N		3.5					0
64								-1
65								-2
66	S-17	1 WOH WOH	1.5	1.5			LEAN CLAY (CL) - brown to gray clay; wet, very soft, +PL; (GLACIAL LAKE DEPOSIT).	-3
67								-4
68	W-N		3.5					-5
69								-6
70								-7
71	S-18	WOH/1.5	1.5	1.5			LEAN CLAY (CL) - brown to gray clay; wet, very soft, +PL; (GLACIAL LAKE DEPOSIT).	-8
72								-9
73	W-N		3.5					-10
74								-11
75								-12
76	S-19	WOR WOR WOH	1.5	1.5			LEAN CLAY (CL) - brown to gray clay; wet, very soft, +PL; (GLACIAL LAKE DEPOSIT).	-13
77								-14
78	W-N		3.5					-15
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: 146.5' Rock: 0.0' No. of Samples: 33	NOTES:	Sheet **4** of **8** SM-001-M REV. 1/02

r: Jeff Leavitt/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-84**
ector: Rachael Marks	Town: West Hartford / Hartford, CT	Stat./Offset:
neer: Baker Engineering	Project No.: 171-0305	Northing: 836901.4
Date: 7/21/03	Route No.:	Easting: 1012781.8
sh Date: 7/23/03	Bridge No.:	Surface Elevation: 62.6

ect Description: New Britain to Hartford Busway

sing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
mmer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

ound water Obs. @ 28.0 after: 0 hours, @17.4 after: 48 hours, @ after: hours

er 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	S-20	WOR WOH/1.0	1.5	1.5			LEAN CLAY (CL) - brown to gray clay; wet, very soft, +PL; (GLACIAL LAKE DEPOSIT).	
81								-18
82								-19
83	W-N		3.5					-20
84								-21
85	S-21	WOR WOH WOH	1.5	1.5			LEAN CLAY (CL) - brown to gray clay; wet, very soft, +PL; (GLACIAL LAKE DEPOSIT).	-22
86								-23
87								-24
88	W-N		3.5					-25
89								-26
90	S-22	WOR WOR 1	1.5	1.5			LEAN CLAY (CL) - brown to gray clay; wet, very soft, +PL; (GLACIAL LAKE DEPOSIT).	-27
91								-28
92								-29
93	W-N		3.5					-30
94								-31
95	S-23	WOH WOH 1	1.5	1.5			LEAN CLAY (CL) - brown to gray clay; wet, very soft, +PL; (GLACIAL LAKE DEPOSIT).	-32
96								-33
97								-34
98	W-N		3.5					-35
99								-36
								-37

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: 146.5' Rock: 0.0'
No. of Samples: 33

NOTES:

SM-001-M REV 1/02

Driller: Jeff Leavitt/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-84**
Inspector: Rachael Marks	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 836901.4
Start Date: 7/21/03	Route No.:	Easting: 1012781.8
Finish Date: 7/23/03	Bridge No.:	Surface Elevation: 62.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	
Groundwater Obs. @ 28.0 after: 0 hours, @17.4 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								
101	S-24	WOR/1.5	1.5	1.5			LEAN CLAY (CL) - brown to gray clay; wet, very soft, +PL; (GLACIAL LAKE DEPOSIT).	-38
102								-39
103	W-N		3.5					-40
104								-41
105								-42
106	S-25	WOR/1.5	1.5	1.5			LEAN CLAY (CL) - brown to gray clay; wet, very soft, +PL; (GLACIAL LAKE DEPOSIT).	-43
107								-44
108	W-N		3.5					-45
109								-46
110								-47
111	S-26	WOR/1.5	1.5	1.5			LEAN CLAY (CL) - brown to gray clay; wet, very soft, +PL; (GLACIAL LAKE DEPOSIT).	-48
112								-49
113	W-N		3.5					-50
114								-51
115								-52
116	S-27	WOR/1.5	1.5	1.5			LEAN CLAY (CL) - brown to gray clay; wet, very soft, +PL; (GLACIAL LAKE DEPOSIT).	-53
117								-54
118	W-N		3.5					-55
119								-56
								-57

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: 146.5' Rock: 0.0'
No. of Samples: 33

NOTES:

SM-001-M REV. 1/03

Driller: Jeff Leavitt/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-84**
Inspector: Rachael Marks	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 836901.4
Start Date: 7/21/03	Route No.:	Easting: 1012781.8
Finish Date: 7/23/03	Bridge No.:	Surface Elevation: 62.6
Project Description: New Britain to Hartford Busway		
Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 28.0 after: 0 hours, @17.4 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	S-28	WOR/1.0 1	1.5	1.5			LEAN CLAY (CL) - brown to gray clay; wet, very soft, +PL; (GLACIAL LAKE DEPOSIT).	-58
121								
122	W-N		3.5					-59
123								-60
124								-61
125						125.0'	ELEV. -62.4	-62
	S-29	41 100/0.2	0.7	0.7			SILT WITH GRAVEL (ML) - brown silt, some fine to coarse gravel; moist, very dense, NP; (TILL).	-63
126	W-N		4.3					-64
127								-65
128								-66
129								-67
130	S-30	20 41 74	1.5	0.3			SILT WITH GRAVEL (ML) - brown silt, some fine to coarse gravel; moist, very dense, NP; (TILL).	-68
131	W-N		3.5					-69
132								-70
133								-71
134								-72
135	S-31	35 39 81	1.5	0.5			SILT WITH GRAVEL (ML) - brown silt, some fine to coarse gravel; moist, very dense, NP; (TILL).	-73
136	W-N		3.5					-74
137								-75
138								-76
139								-77

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: 146.5' Rock: 0.0' No. of Samples: 33	NOTES:	Sheet 7 of 8 SM-001-M REV. 1/02

Driller: Jeff Leavitt/NEBC	**Connecticut DOT Boring Report**	Hole No.: **SB-84**
Inspector: Rachael Marks	Town: West Hartford / Hartford, CT	Stat./Offset:
Engineer: Baker Engineering	Project No.: 171-0305	Northing: 836901.4
Start Date: 7/21/03	Route No.:	Easting: 1012781.8
Finish Date: 7/23/03	Bridge No.:	Surface Elevation: 62.6

Project Description: New Britain to Hartford Busway

Casing Type/Size: HW/4"	Sampler Type/Size: SS/1-3/8"	Core Barrel Type:
Hammer Wt.: 300 Fall: 24"	Hammer Wt.: 140 Fall: 30"	

Groundwater Obs. @ 28.0 after: 0 hours, @17.4 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	29 39 46	1.5	0.5			SILT WITH GRAVEL (ML) - brown silt, some fine to coarse gravel; moist, very dense, NP; (TILL).	-78
141								
142								-79
143	W-N		3.5					-80
144								-81
145								-82
146	S-33	31 33 44	1.5	0.6			SILT WITH GRAVEL (ML) - brown silt, some fine to coarse gravel; moist, very dense, NP; (TILL).	-83
							ELEV. -83.9	-84
147							End of Boring at 146.5'	
148								-85
149								-86
150								-87
151								-88
152								-89
153								-90
154								-91
155								-92
156								-93
157								-94
158								-95
159								-96
								-97

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: 146.5' Rock: 0.0'

No. of Samples: 33

NOTES:

SM-001-M REV. 1/02

Existing Lab Data

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: Matthew Palys
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
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: Matthew Palosa
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-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 Boley
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																

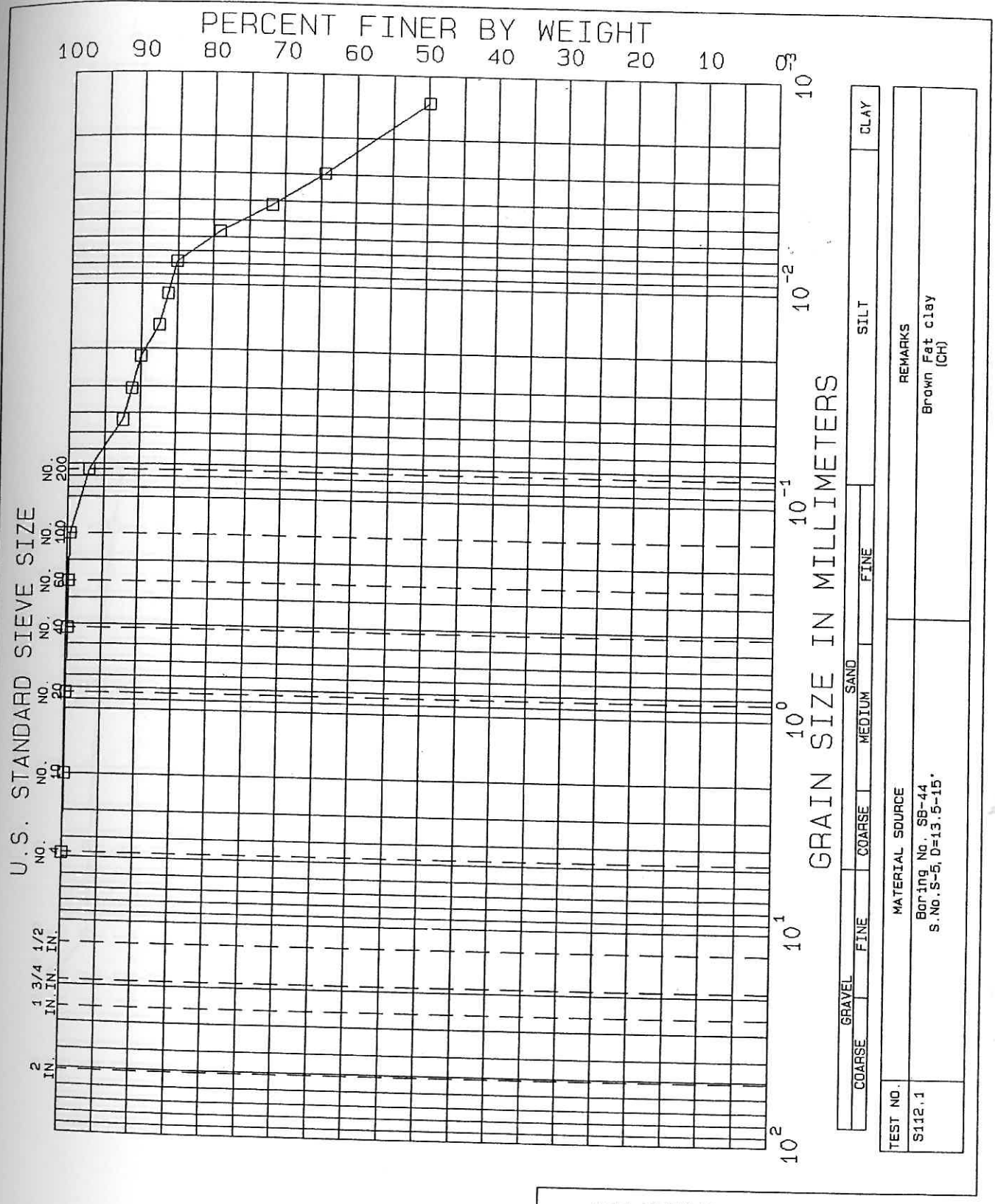
LABORATORY TESTING DATA SHEET

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: 11/10/03

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-40	S-6	16.5-18.0	108	29.8	28	18	93	28												Red-brown Lean clay (CL)
SB-41	S-5	13.5-15.0	109	16.3	22	20	63	15												Red-brown Sandy silt (ML)
SB-42	S-7	19.5-21.0	110	10.6	17	16	10													Brown Poorly graded gravel with silt and sand (GP-GM)
SB-43	S-5	13.5-15.0	111	7.5	22	15	20	10												Red-brown Silty, clayey sand with gravel (SC-SM)
SB-44	S-5	13.5-15.0	112	35.4	51	24	97	57												Brown Fat clay (CH)
SB-44	S-12	40.0-41.5	113	33.8	35	22	92	40												Red-brown Lean clay (CL)
SB-46	S-1,2,3	1.5-9.0	114	5.1	NP	NP	8													Brown Poorly graded gravel with silt and sand (GP-GM)
SB-46	S-16	60.0-61.5	115	13.3	15	14	24													Red-brown Silty sand with gravel (SM)
SB-48	S-13	45.0-46.5	116	25.8	22	21	94	17												Red-brown Silt (ML)



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

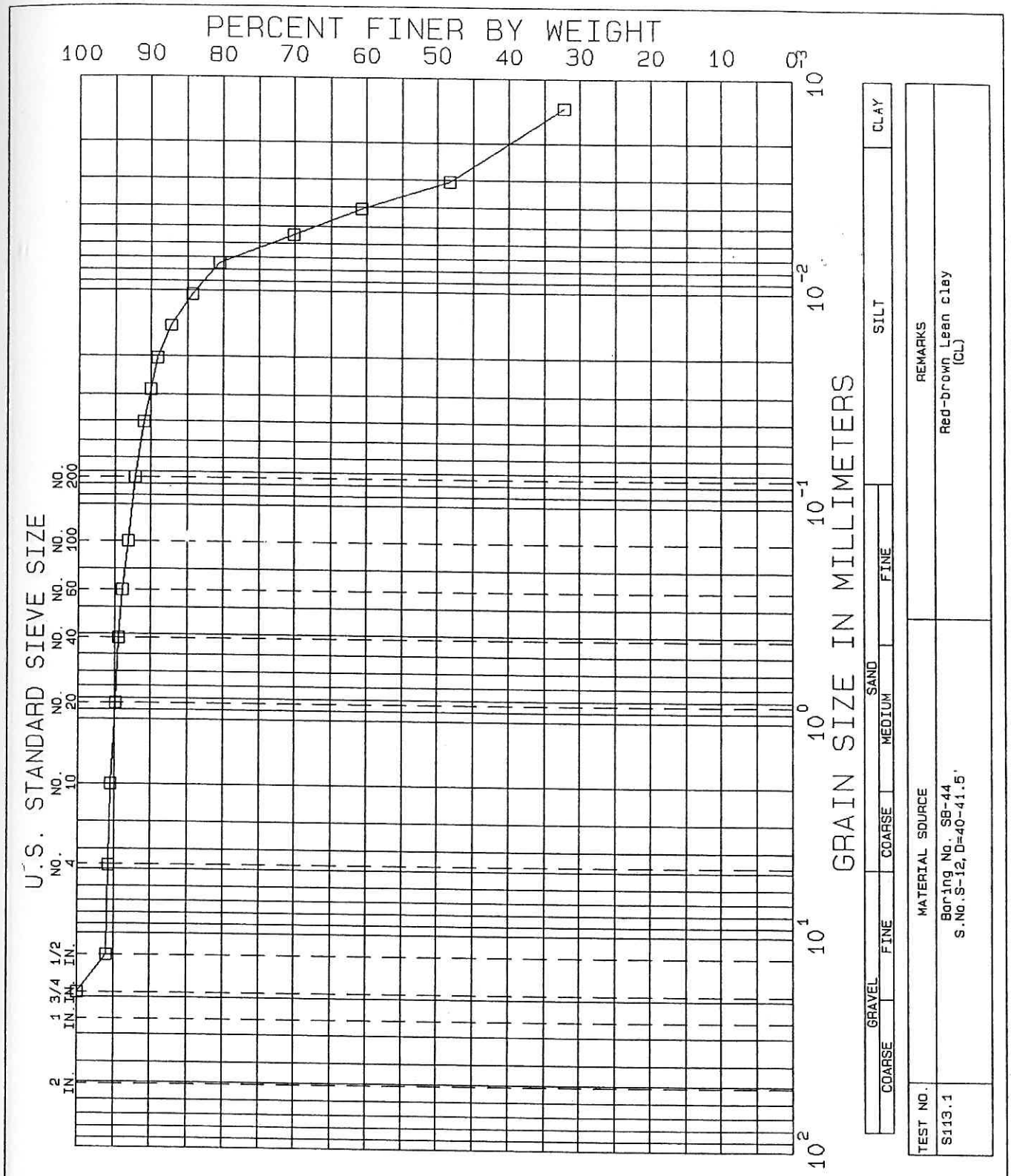
GRADATION TESTS

BORING NO. SB-44
SAMPLE S-5
DEPTH 13.5-15'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO. 112
DATE Nov.03

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



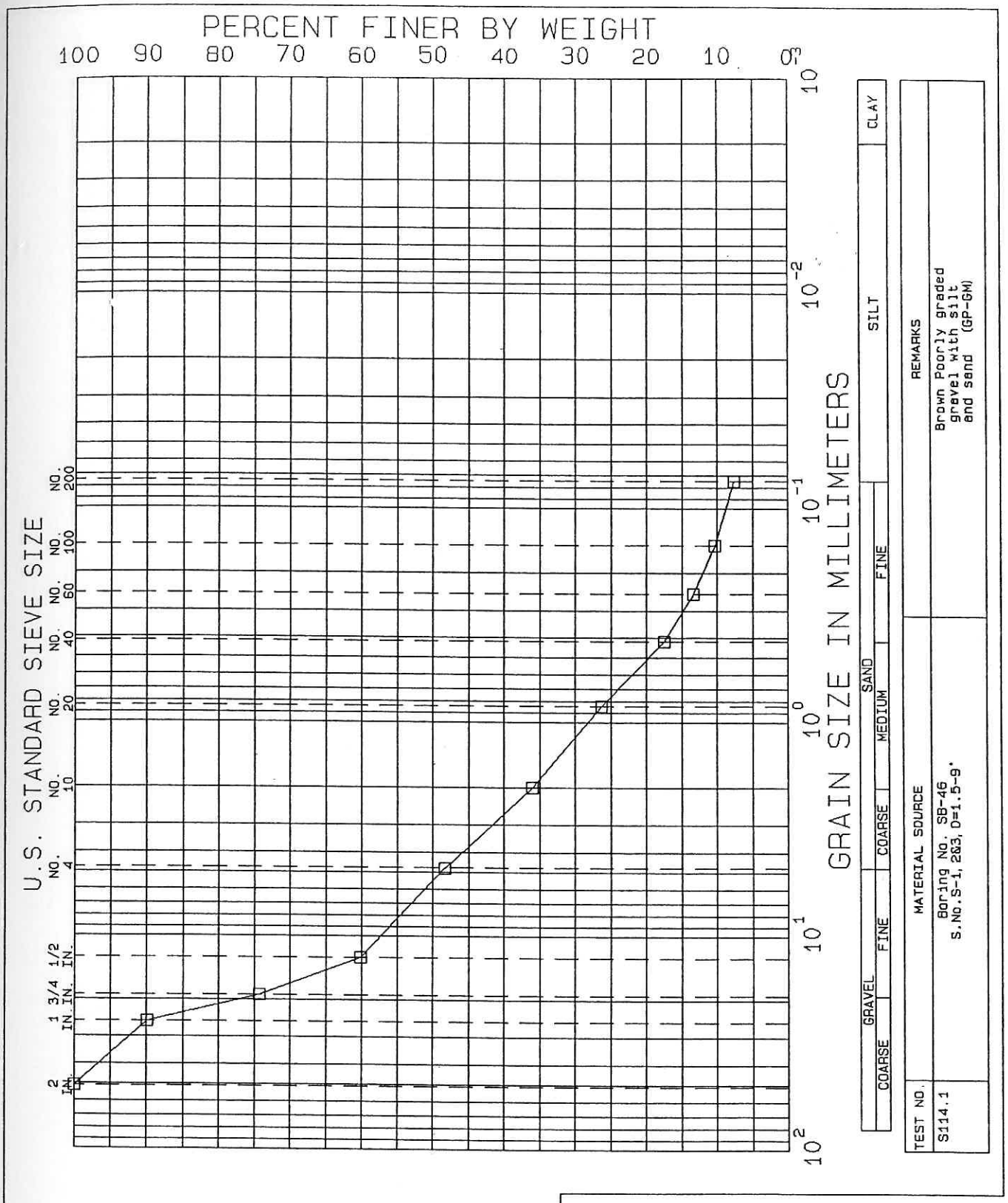
NEW BRITAIN-HARTFORD BUSWAY

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

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

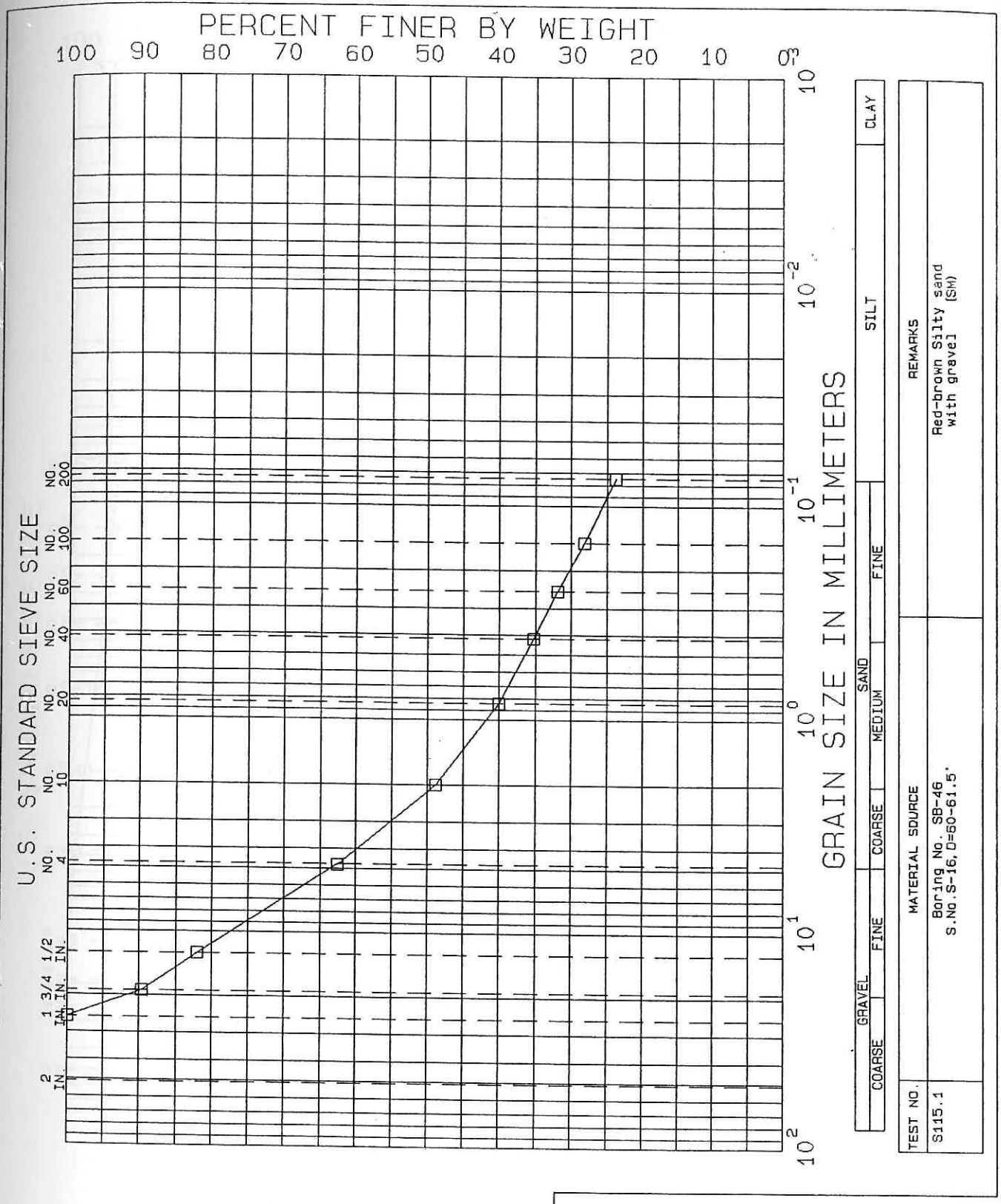


NEW BRITAIN-HARTFORD BUSWAY

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

LABORATORY TESTING DATA SHEET

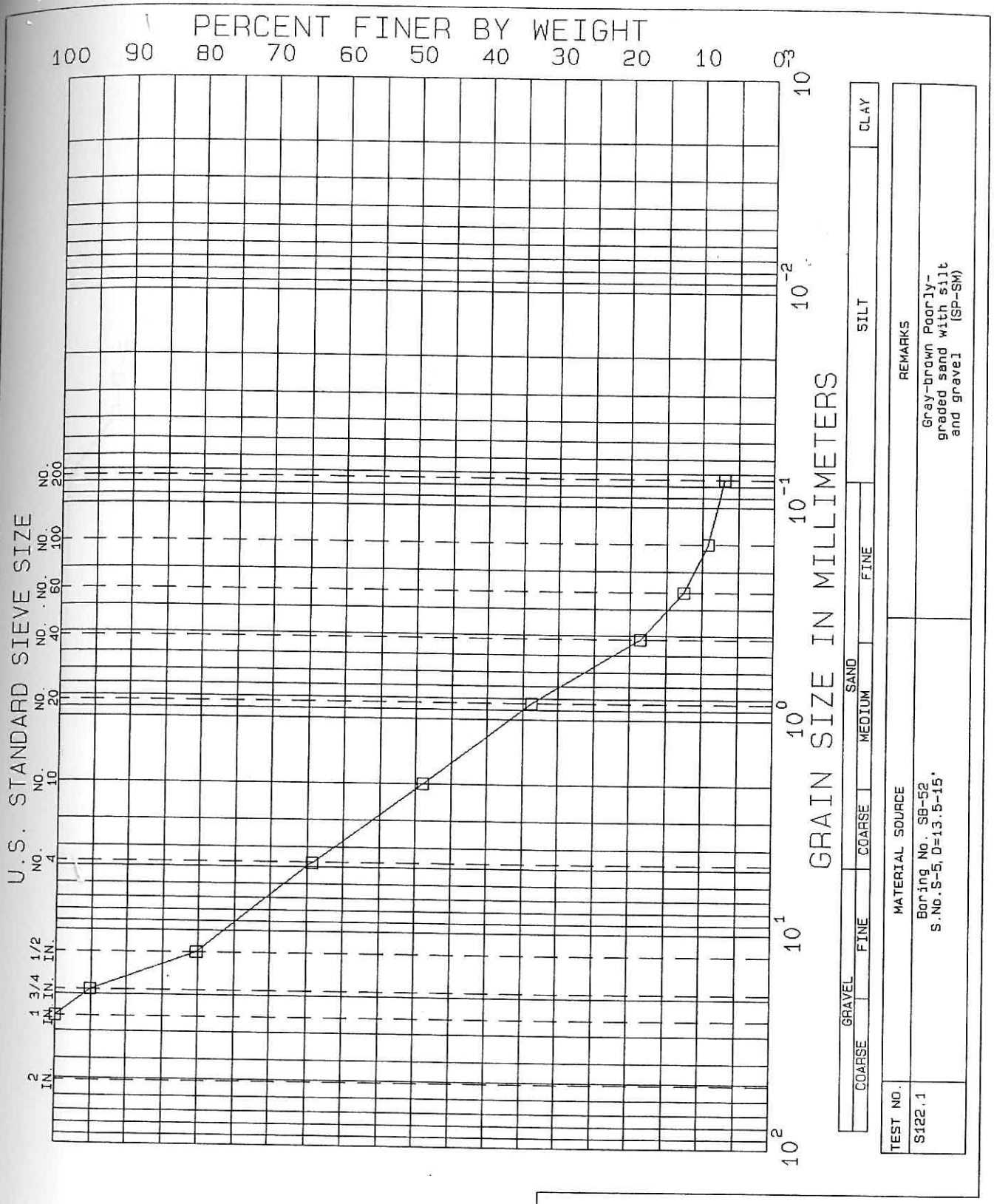
Project Name: NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

Project No.: L17828
Project Engineer: D. SCHULZE

Assigned By: D. GAFFNEY
Date: NOV.03

Reviewed By: Don Schulze
Date Reviewed: 11/14/03

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} (%)	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-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-52	TEST SERIES	
SAMPLE	S-5	NO	122
DEPTH	13.5-15'	DATE	Nov.03
TECH.	PEC		
REVIEWER	MBP	FILE	L17828

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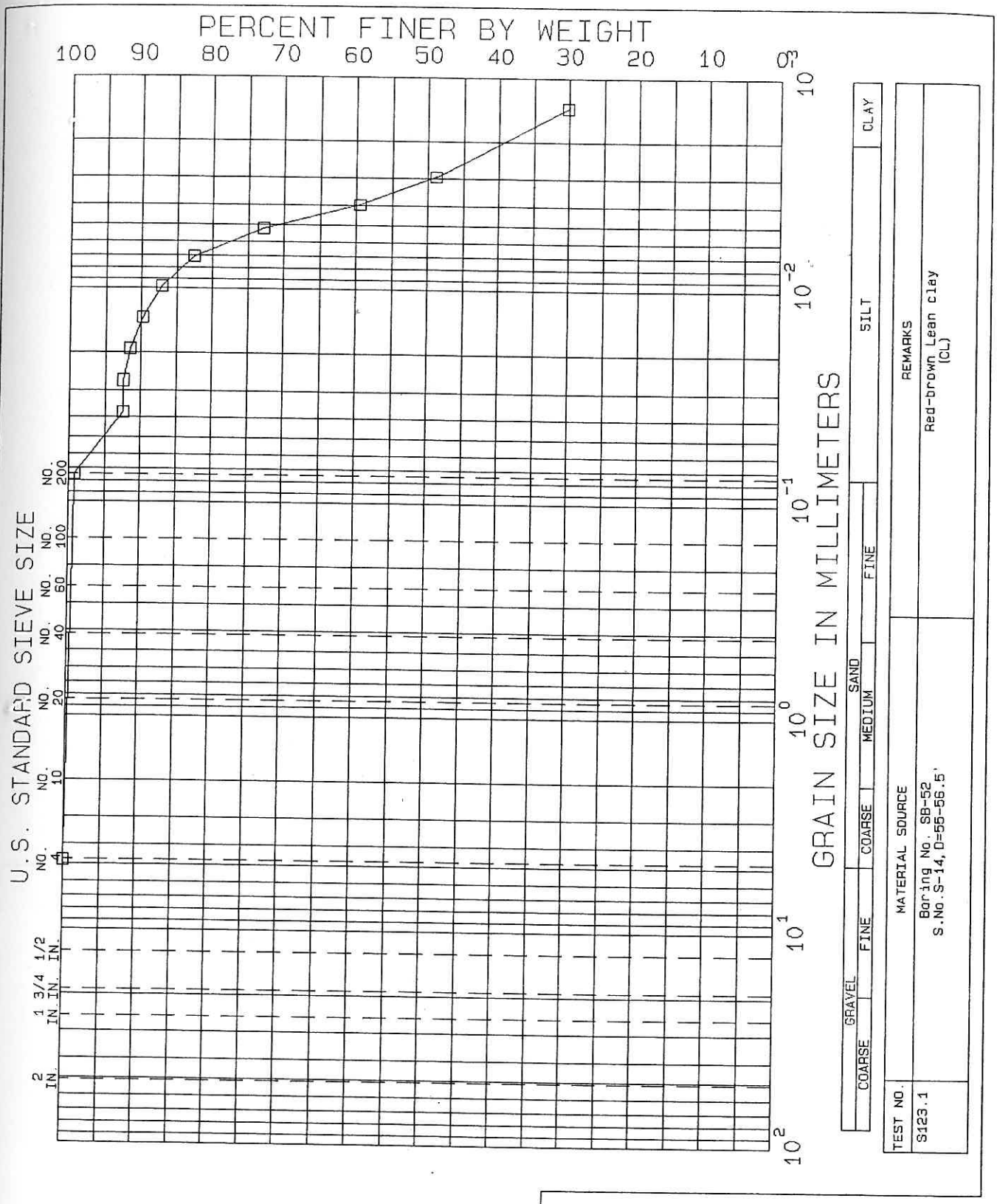
ENGINEERS AND SCIENTISTS



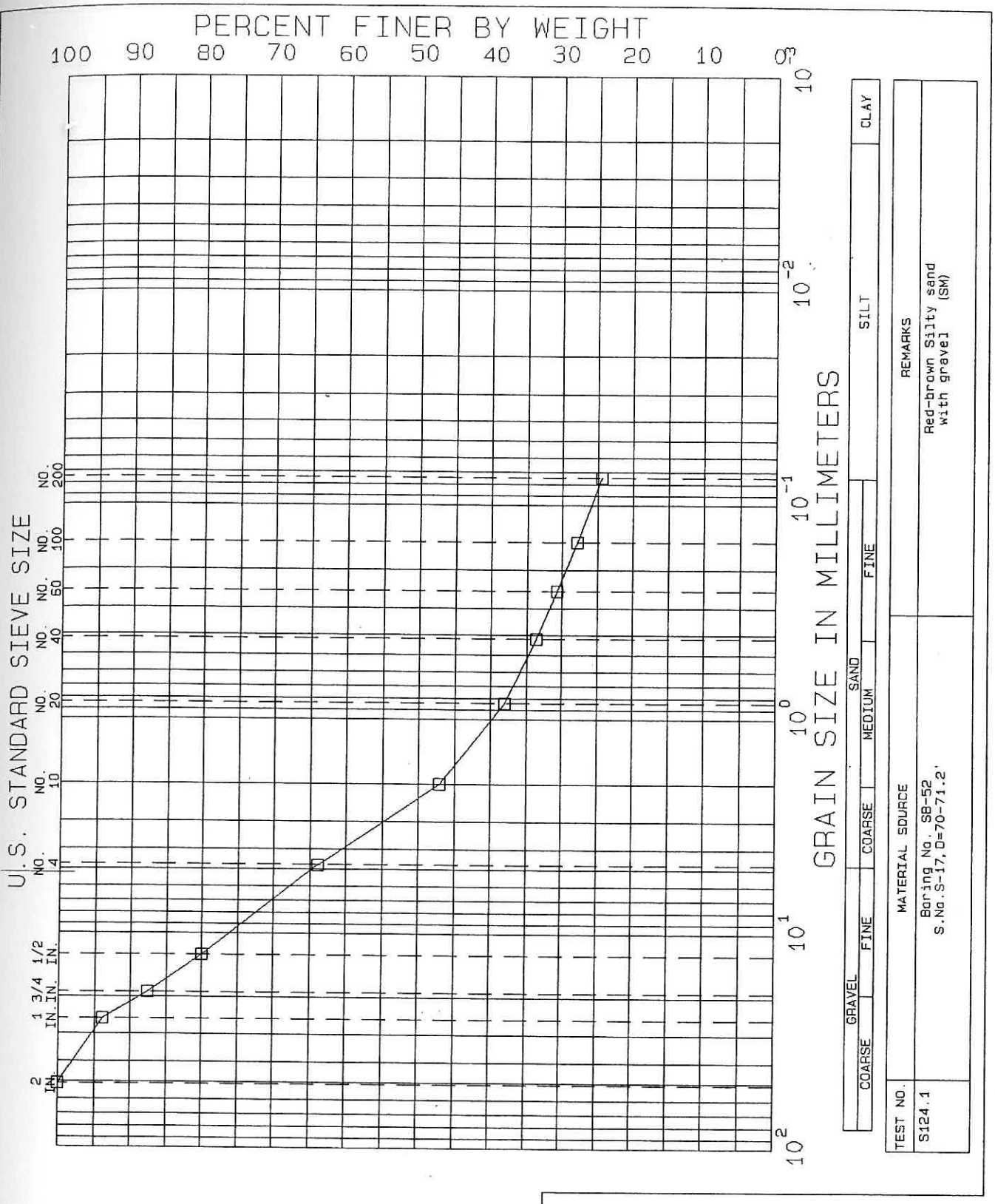
NEW BRITAIN-HARTFORD BUSWAY

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

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

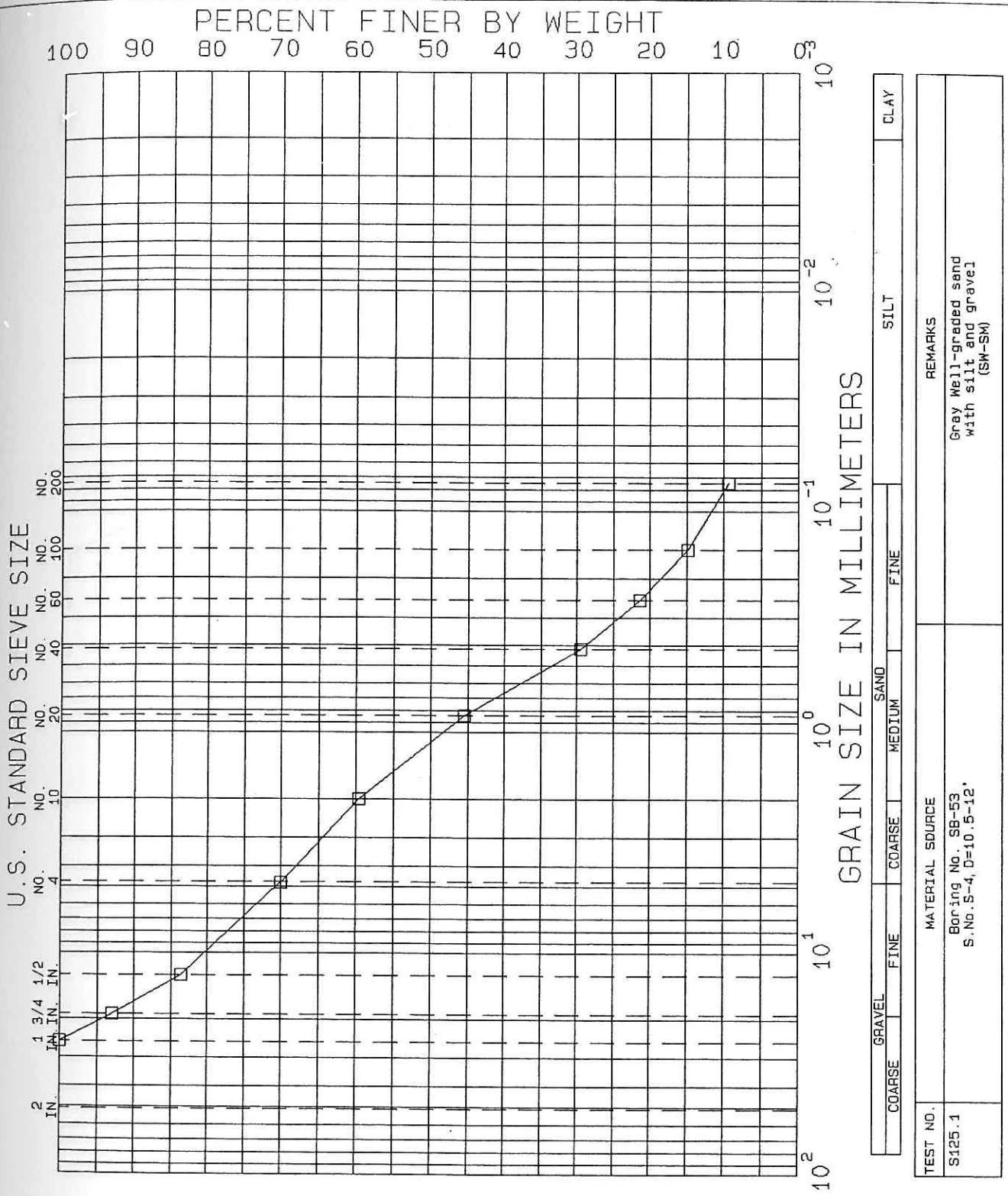


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-52	TEST SERIES	
SAMPLE	S-17	NO.	124
DEPTH	70-71.2'	DATE	Nov.03
TECH.	PEC		
REVIEWER	MBP	FILE	L17828

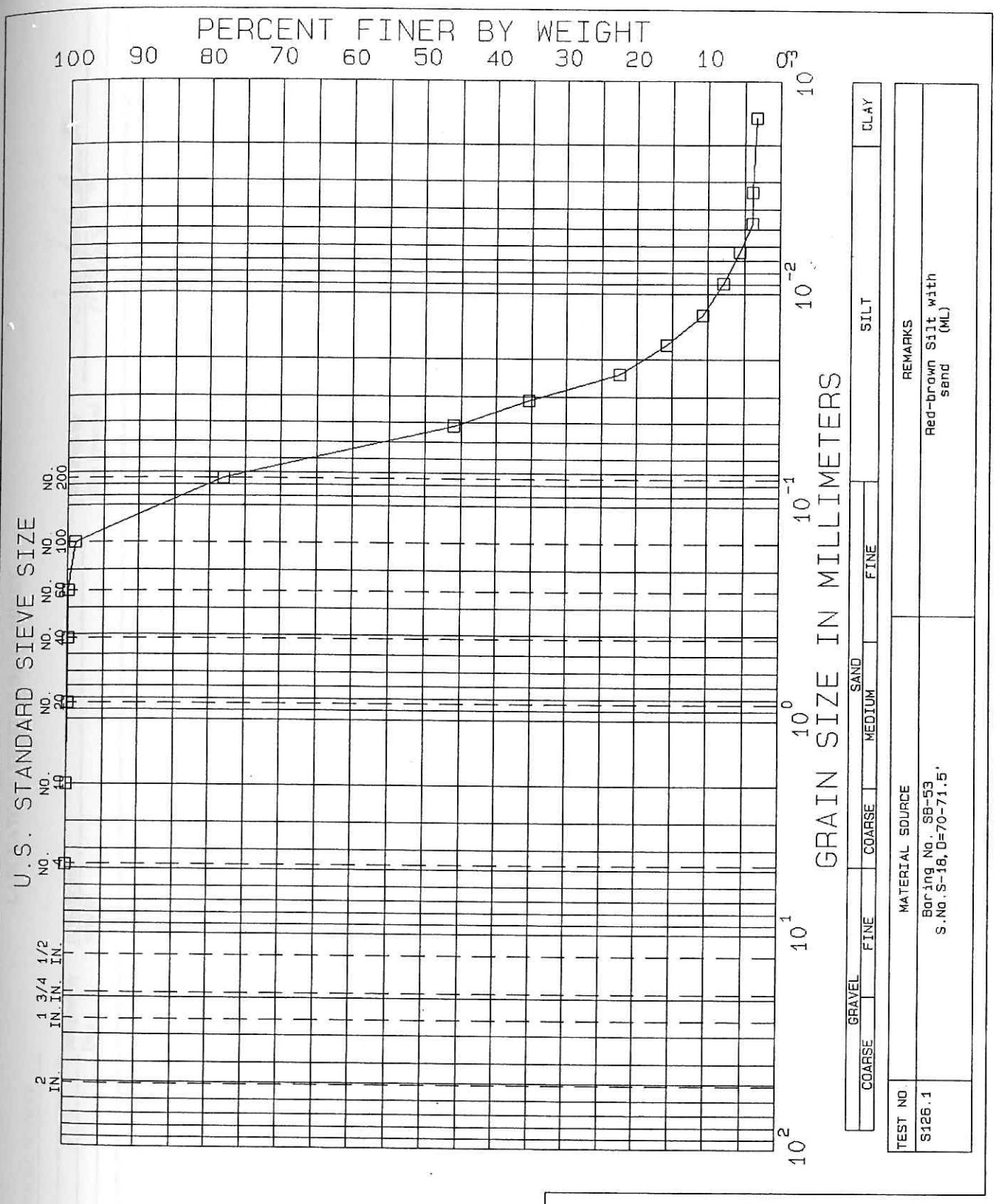


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-53	TEST SERIES	
SAMPLE	S-4	NO.	125
DEPTH	10.5-12'	DATE	Nov.03
TECH.	PEC		
REVIEWER	MBP	FILE	L17828



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

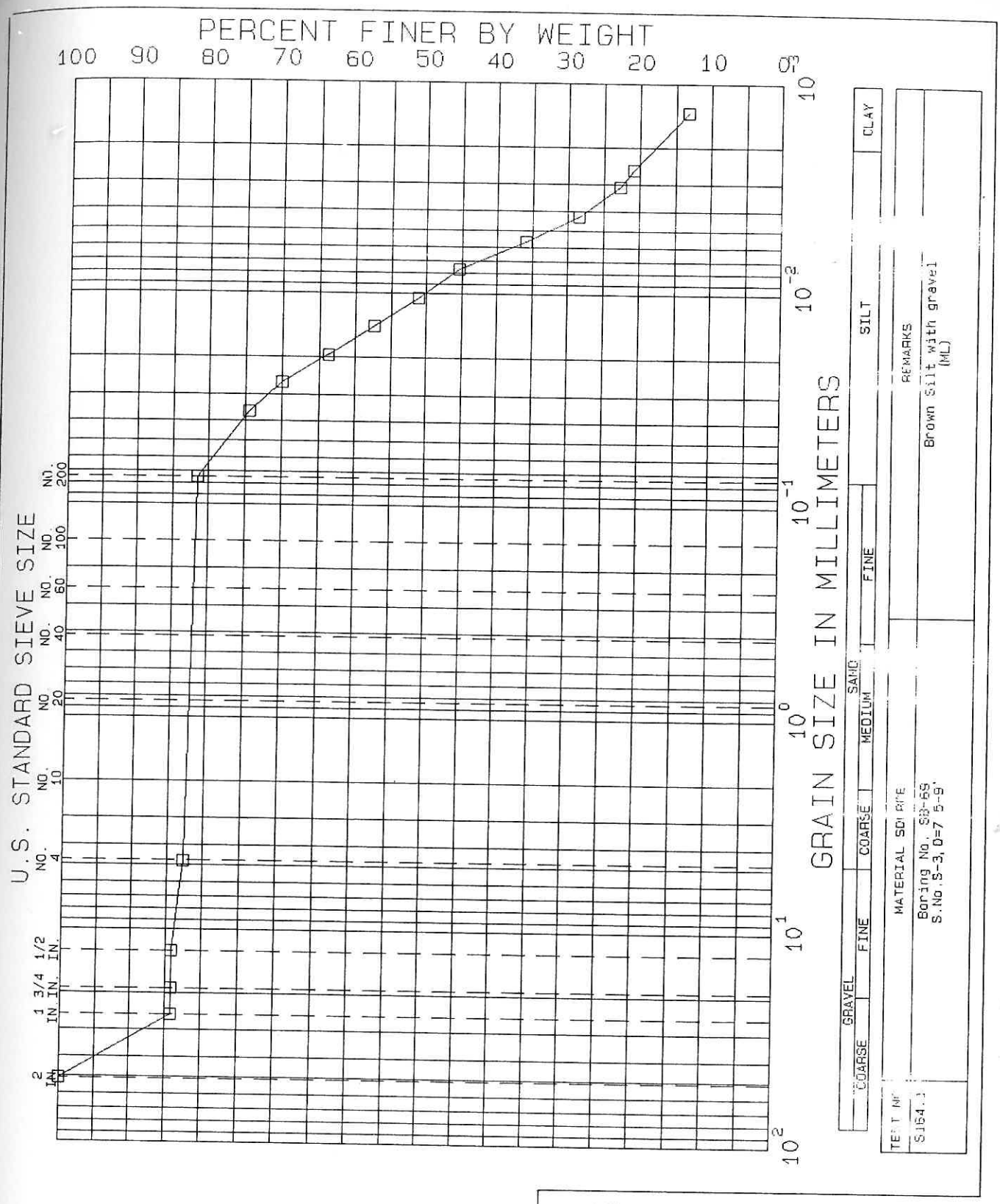
GRADATION TESTS

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.: 117828
Project Engineer: D. SCHULZE
Assigned By: D. GAFFNEY
Date: DEC.03
Reviewed By: Don Schulze
Date Reviewed: 12/3/03

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-66	S-11	35.0-36.5	159	61.1	60	28	100	74												Brown Fat clay (CH)
SB-66	S-18	70.0-71.5	160	47.8	43	24	100	29												Brown Lean clay (CL)
SB-66	S-31	135.0-136.5	161	10.8	21	15	16													Red-brown Silty-clayey sand with gravel (SC-SM)
SB-67	S-13	45.0-46.5	162	54.6	58	27	100	65												Brown Fat clay (CH)
SB-67	S-24 S-25	105.0-112.0	163	20.3	NP	NP	20													Red-brown Silty sand (SM)
SB-69	S-3	7.5-9.0	164	36.7	30	25	81	18												Brown Silt with gravel (SM)
SB-69	S-14	50.0-51.5	165	44.0	56	26	100	67												Brown Fat clay (CH)
SB-69	S-23	95.0-96.5	166	34.3	24	24	100	13												Red-brown Silt (ML)
SB-69	S-33	145.0-146.5	167	12.1	18	15	21													Red-brown Silty gravel with sand (GM)
SB-70	S-15	60.0-61.5	168	48.7	52	23	100	42												Brown Fat clay (CH)



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

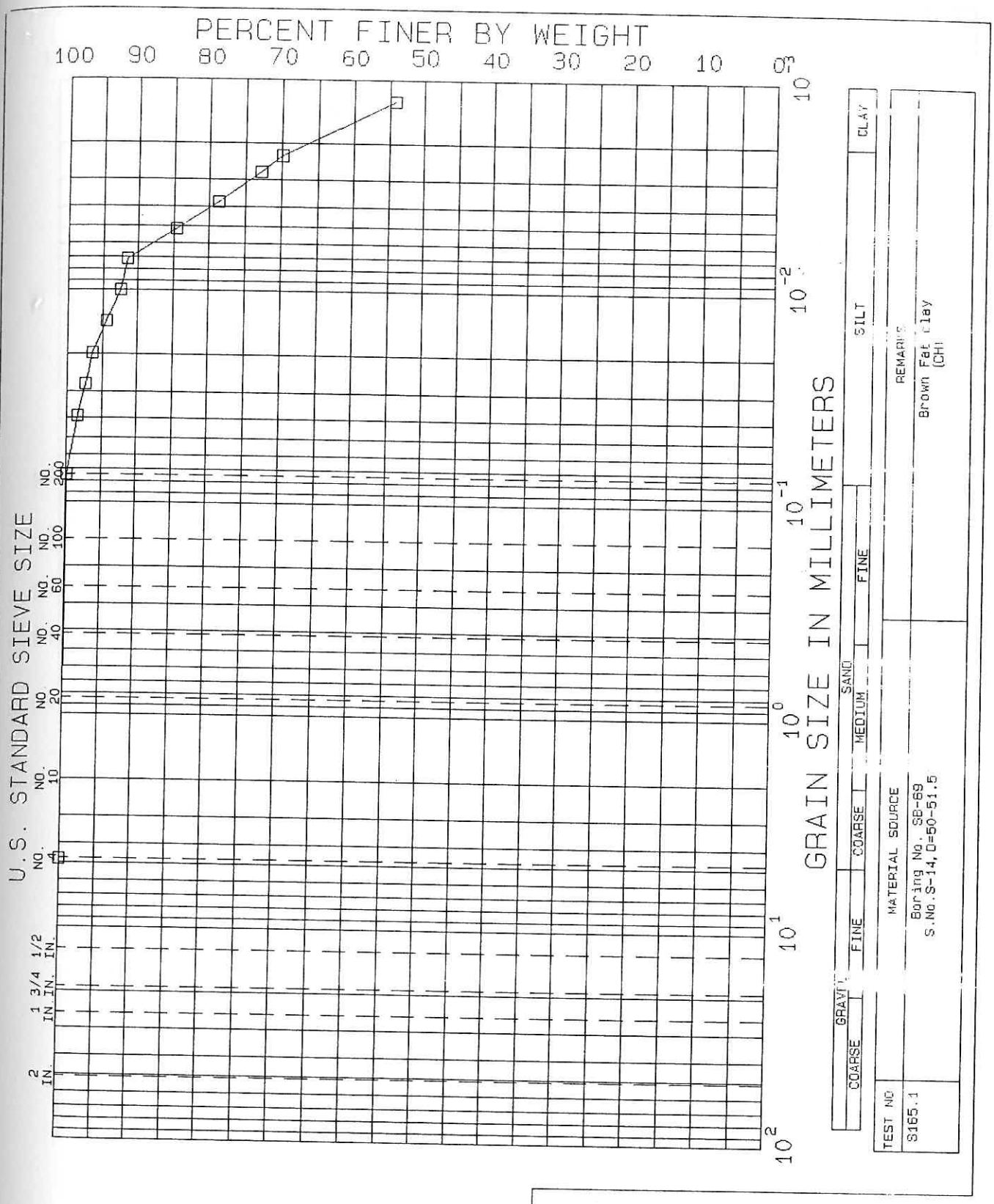
GRADATION TESTS

BORING NO SB-69
SAMPLE S-3
DEPTH 7.5-9'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO. 164
DATE Dec.03

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

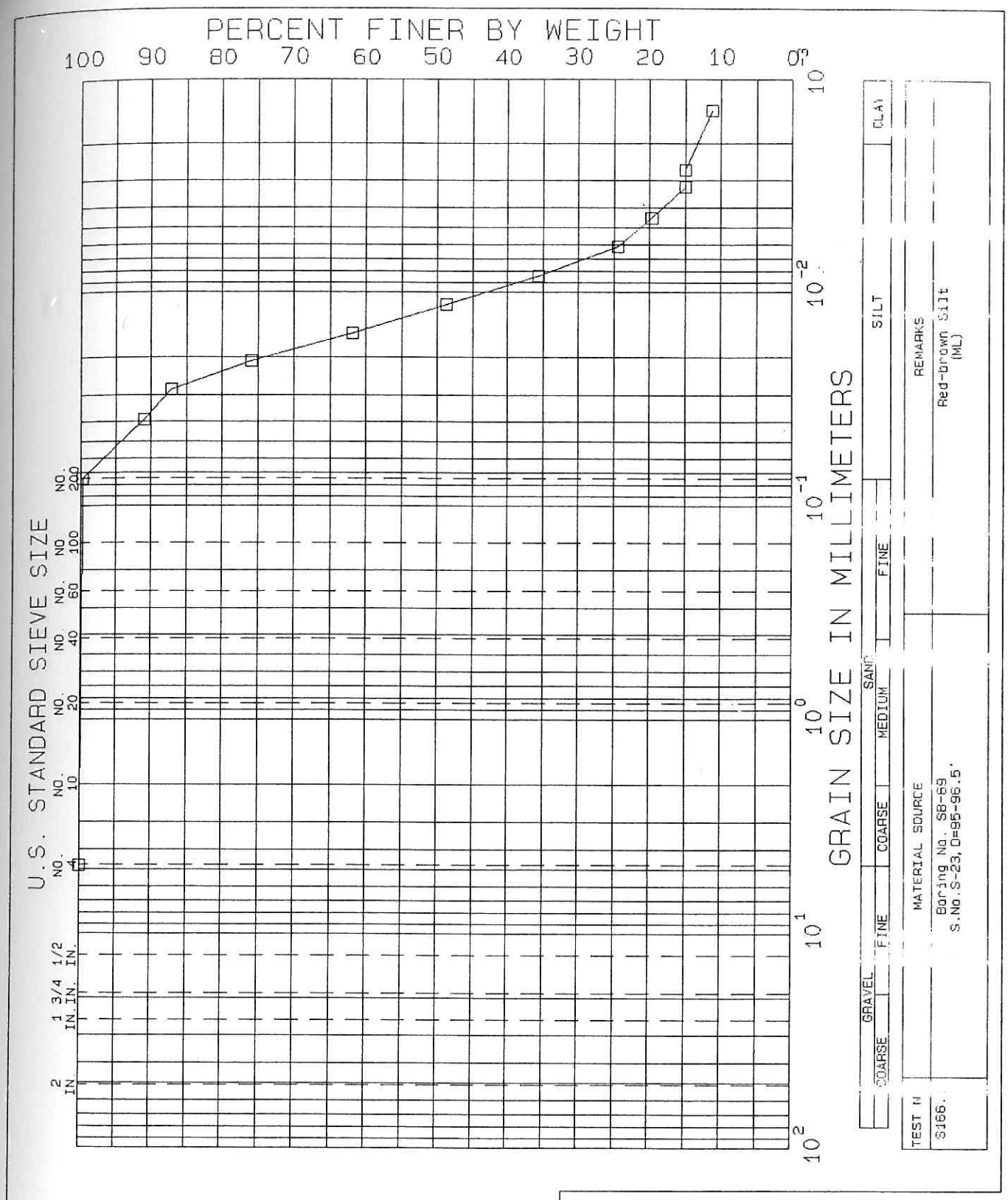
GRADATION TESTS

BORING NO SB-69
SAMPLE S-14
DEPTH 50-51.5'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO 165
DATE Dec 03

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

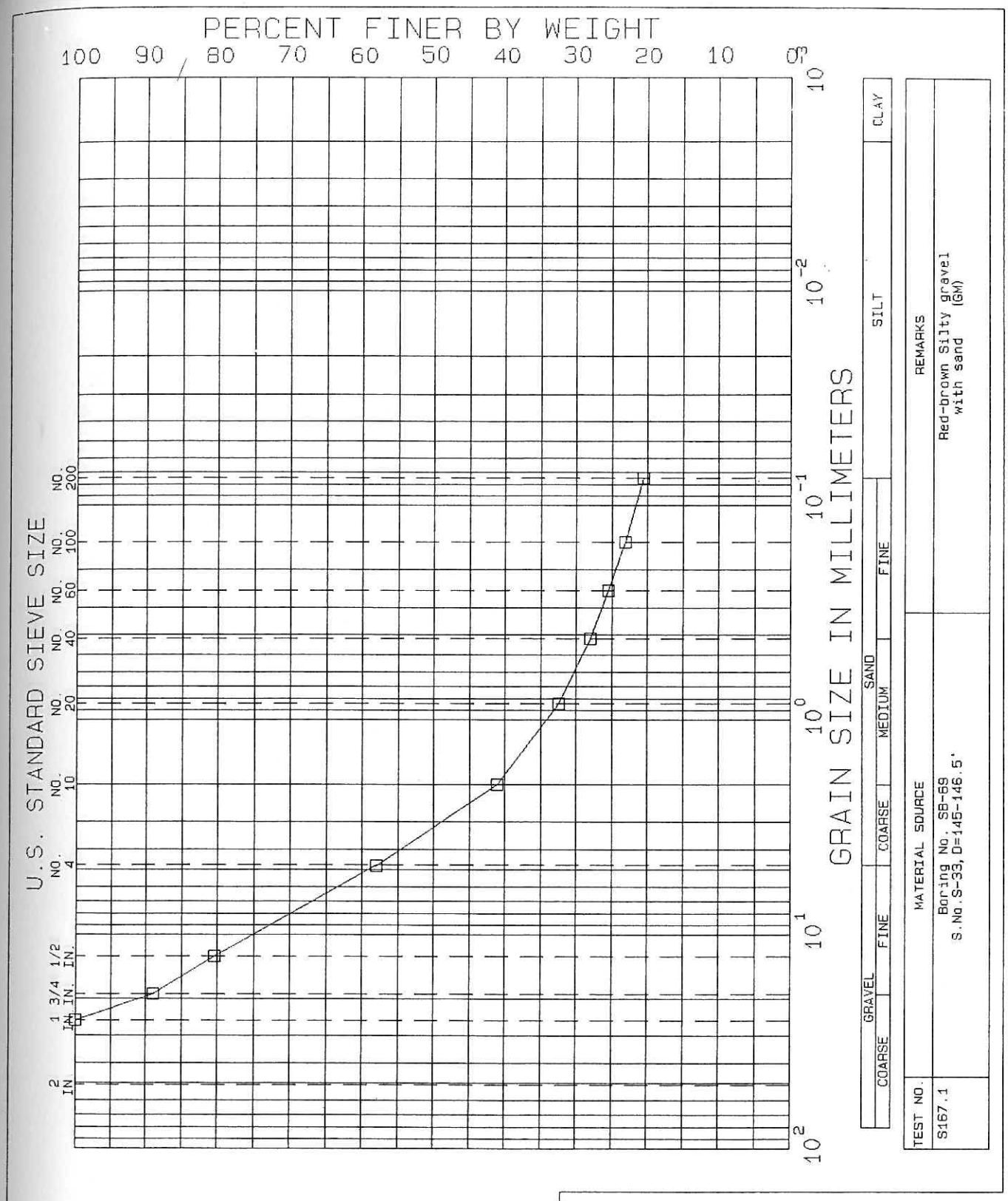


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO	SB-69	TEST SERIES	
SAMPLE	S-23	NO	166
DEPTH	95-96.5'	DATE	Dec.03
TECH	CAG		
REVIEWER	MBP	FILE	L17828



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO	SB-69	TEST SERIES	
SAMPLE	S-33	NO.	167
DEPTH	145-146.5'	DATE	Dec 03
TECH	CAG		
REVIEWER	MBP	FILE	L17828

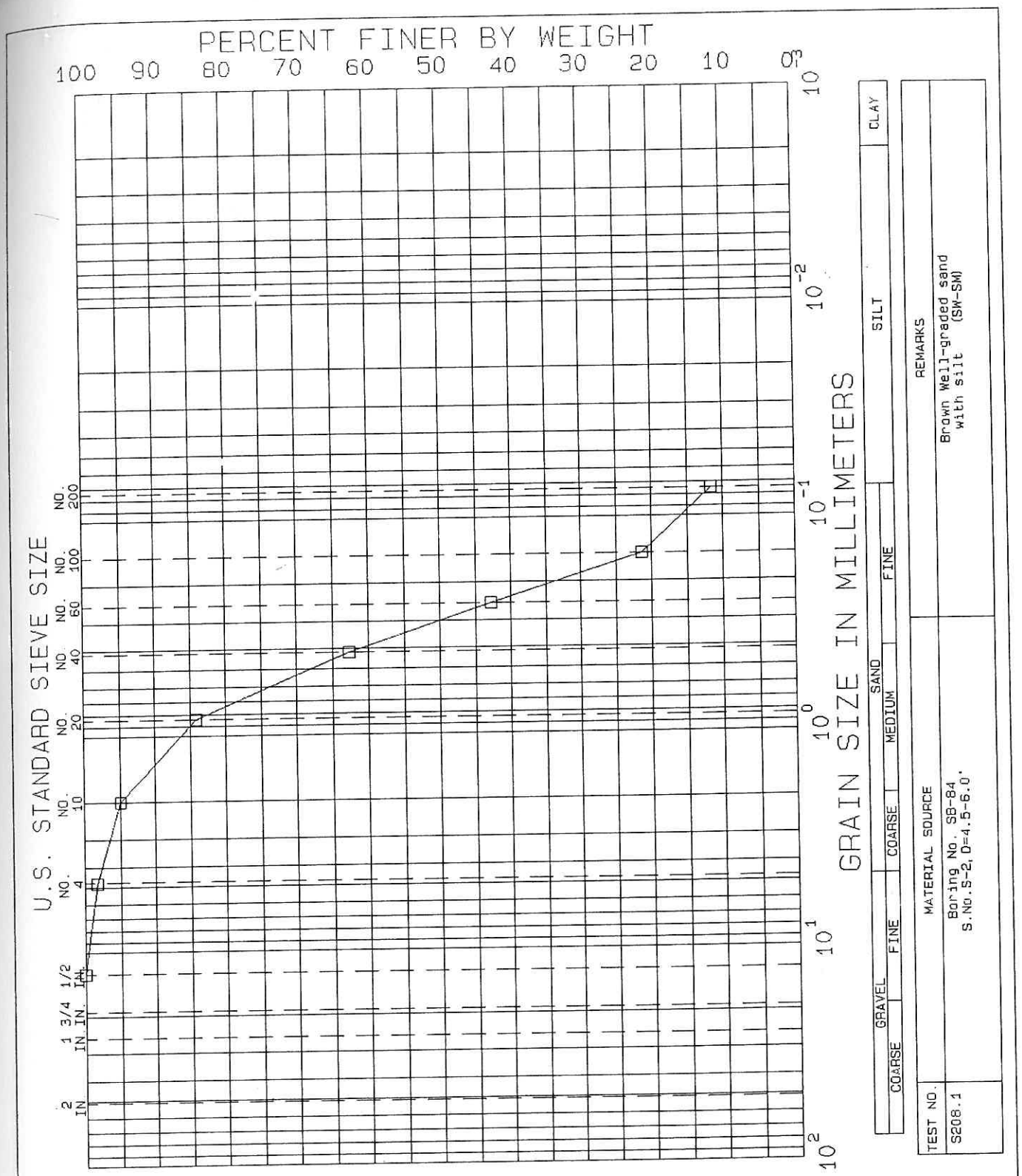
LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

Project No.: L17828 — Assigned By: D. GAFFNEY — Reviewed By: [signature]

Project Engineer: D. SCHULZE — Date: DEC.03 — Date Reviewed: 12/29/03

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.: C_c / $1 + e_0$	Laboratory Log and Soil Description
SB-84	S-2	4.5-6.0	208	4.5	*	*	12		* Insufficient sample for limit test											Red-brown Well-graded sand with silt (SW-SM)
SB-84	S-8	25.5-27.0	209	46.8	44	25	100	45												Gray Lean clay (CL)
SB-84	S-14	50.0-51.5	210	56.5	62	28	100	55												Gray Fat clay (CH)
SB-84	S-22	90.0-91.5	211	46.9	58	26	100	58												Red-brown Fat clay (CH)
SB-84	S-30 S-31	130.0-136.5	212	11.7	21	17	11	3												Red-brown Poorly-graded gravel with silt and sand (GP-GM)
SB-85	S-9	25.0-26.5	213	46.6	59	29	100	62												Gray Fat clay (CH)
SB-85	S-19	75.0-76.5	214	53.1	53	23	100	42												Brown Fat clay (CH)
SB-85	S-26	110.0-111.5	215	10.8	17	16	41	10												Red-brown Gravelly silt with sand (ML)
SB-86	S-5	13.5-15.0	216	35.1	45	25	97	43												Gray Lean clay (CL)
SB-86	S-12	40.0-41.5	217	42.9	56	28	100	72												Gray Fat clay (CH)
SB-86	S-19	75.0-76.5	218	43.3	43	24	100	40												Red-brown Lean clay (CL)
SB-86	S-26	110.0-111.5	219	11.6	15	14	30													Brown Silty sand (SM)



NEW BRITAIN-HARTFORD BUSWAY

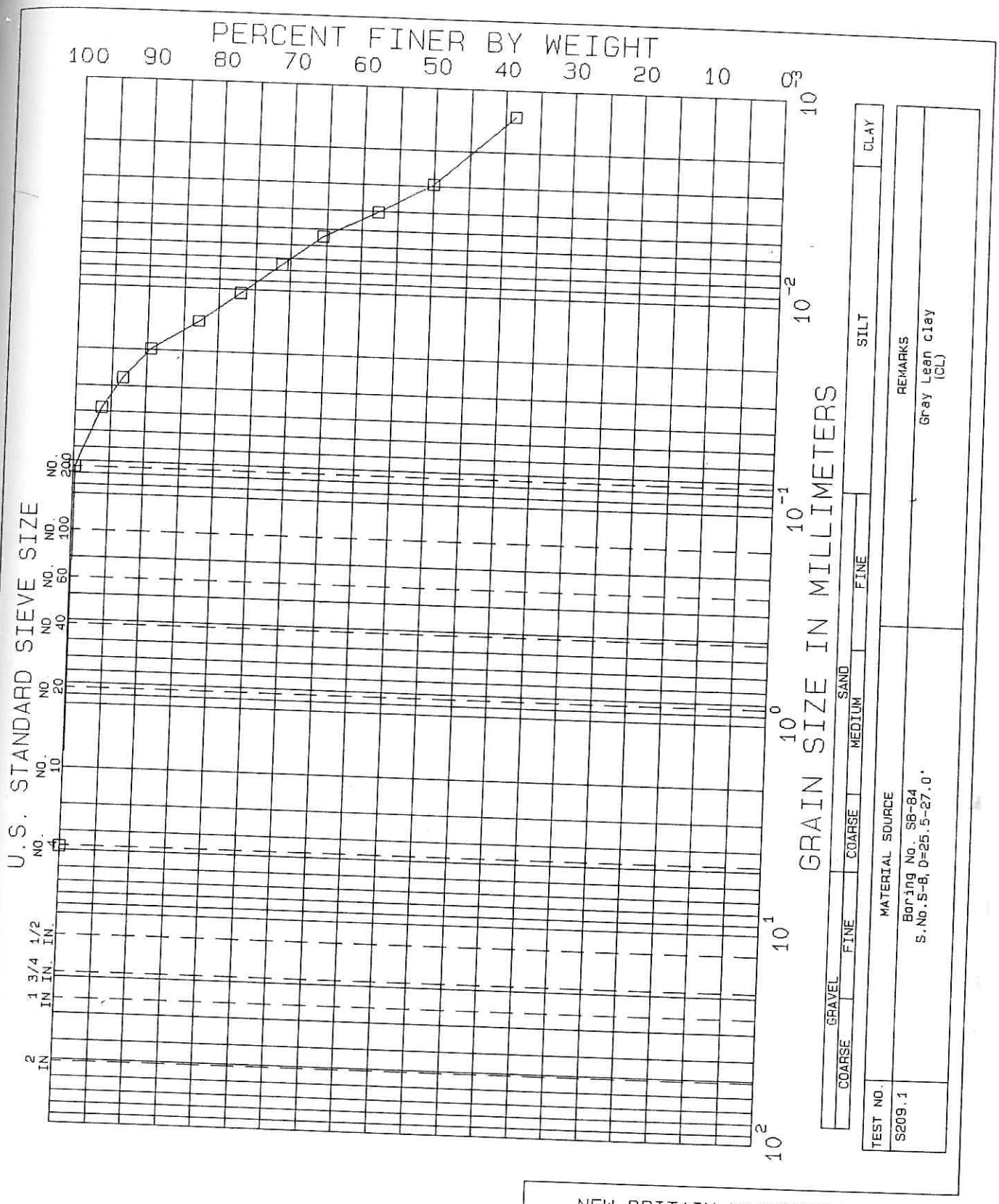
CONNECTICUT

GRADATION TESTS

BORING NO. SB-84
SAMPLE S-2
DEPTH 4.5-6.0'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO 208
DATE Dec.03

FILE L17828



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

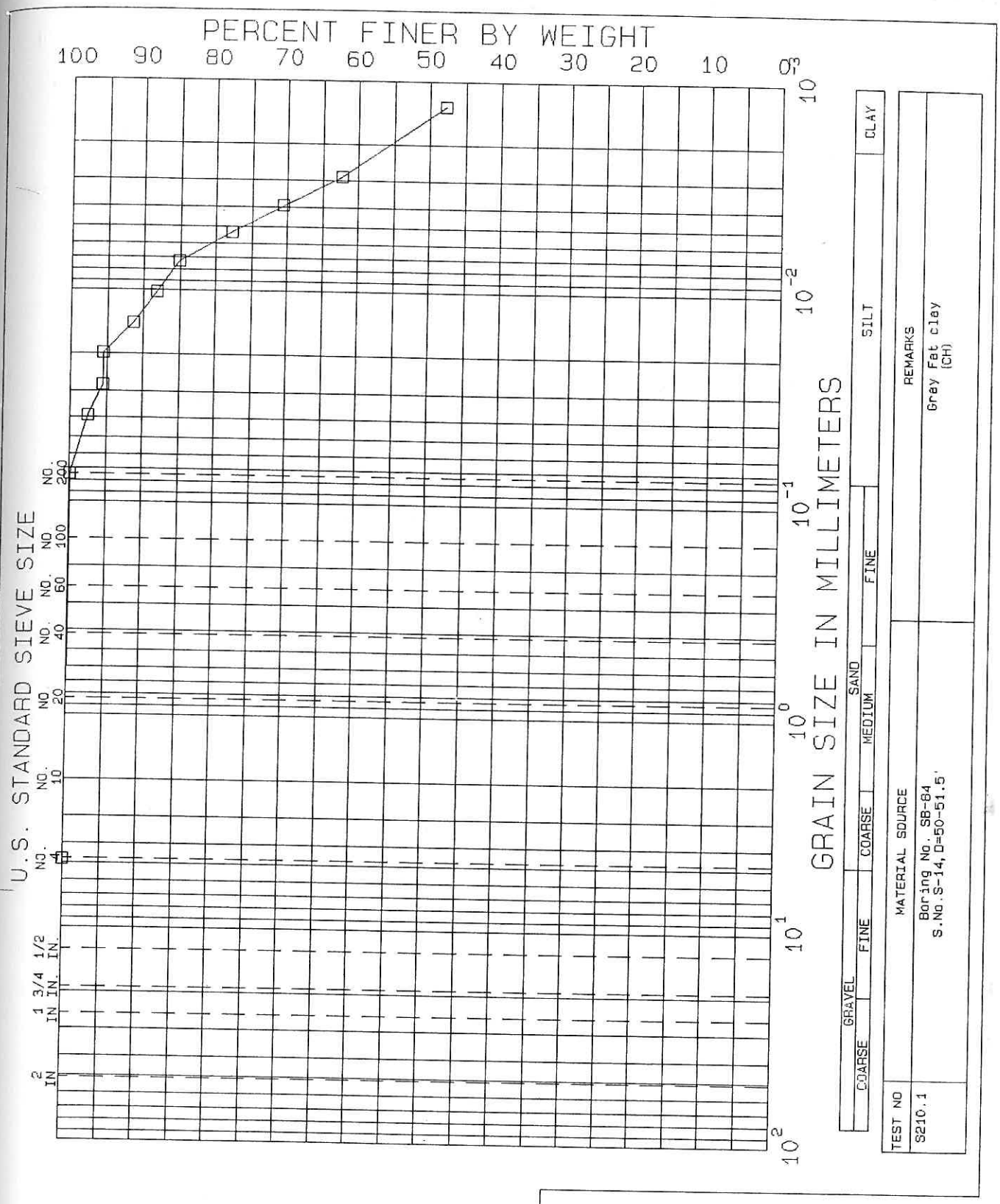
GRADATION TESTS

BORING NO. SB-84
SAMPLE S-8
DEPTH 25.5-27'
TECH CAG
REVIEWER MBP

TEST SERIES
NO. 209
DATE Dec.03

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

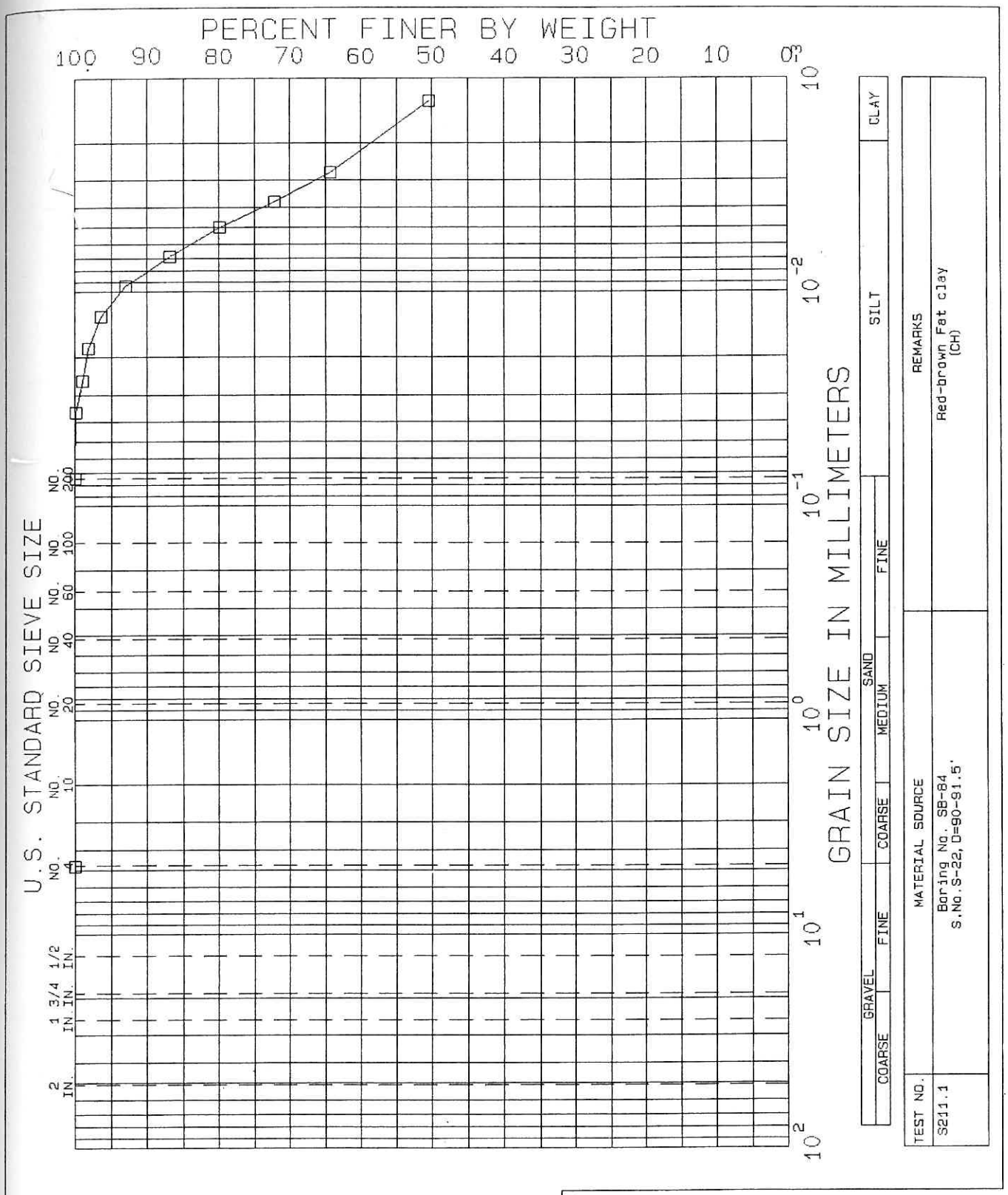
GRADATION TESTS

BORING NO SB-84
SAMPLE S-14
DEPTH 50-51.5'
TECH. CAG
REVIEWER MBP

TEST SERIES
NO. 210
DATE Dec.03

FILE L17828

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

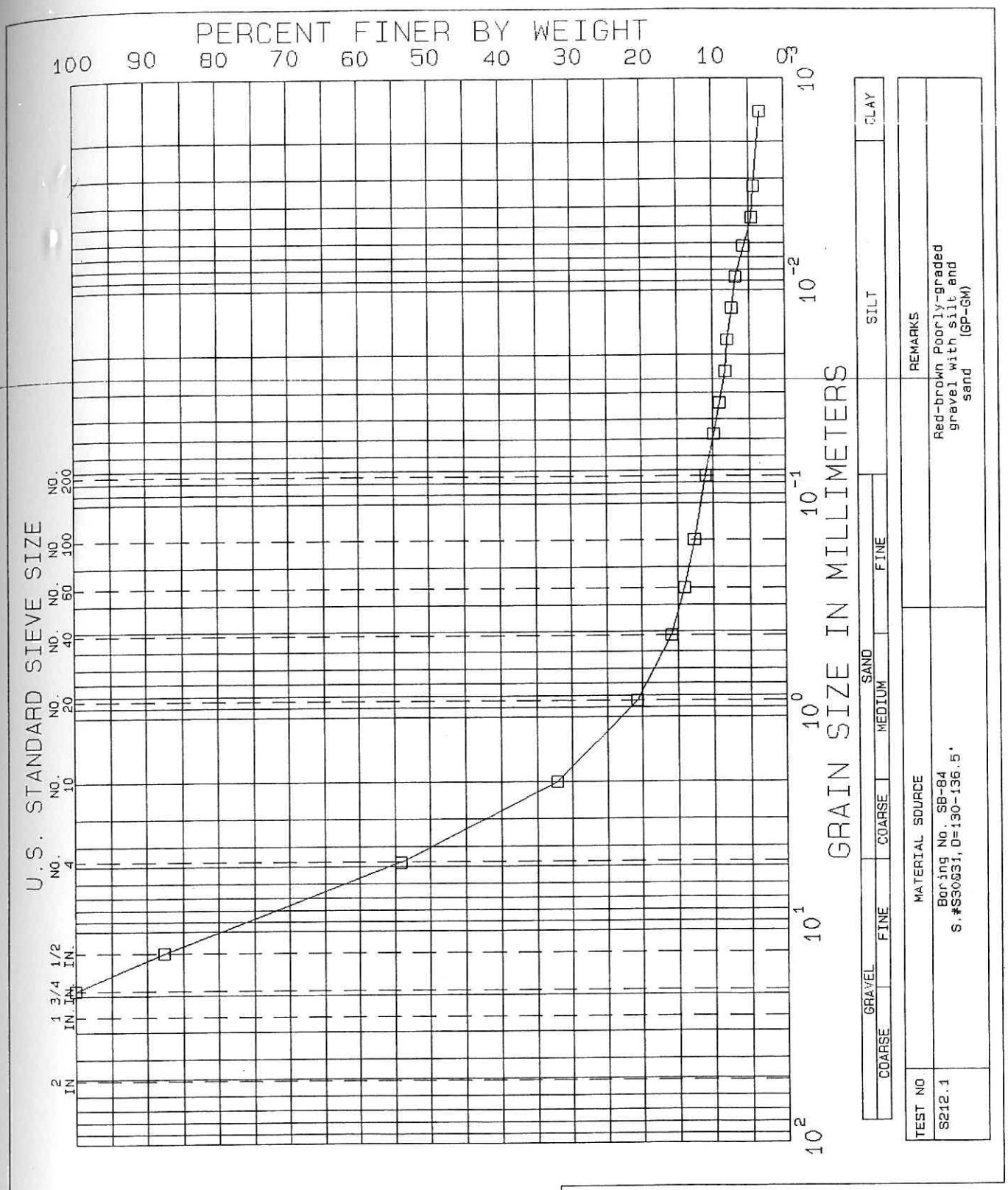


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO	SB-84	TEST SERIES	
SAMPLE	S-22	NO.	211
DEPTH	90-91.5'	DATE	Dec.03
TECH.	CAG		
REVIEWER	MBP	FILE	L17828



NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

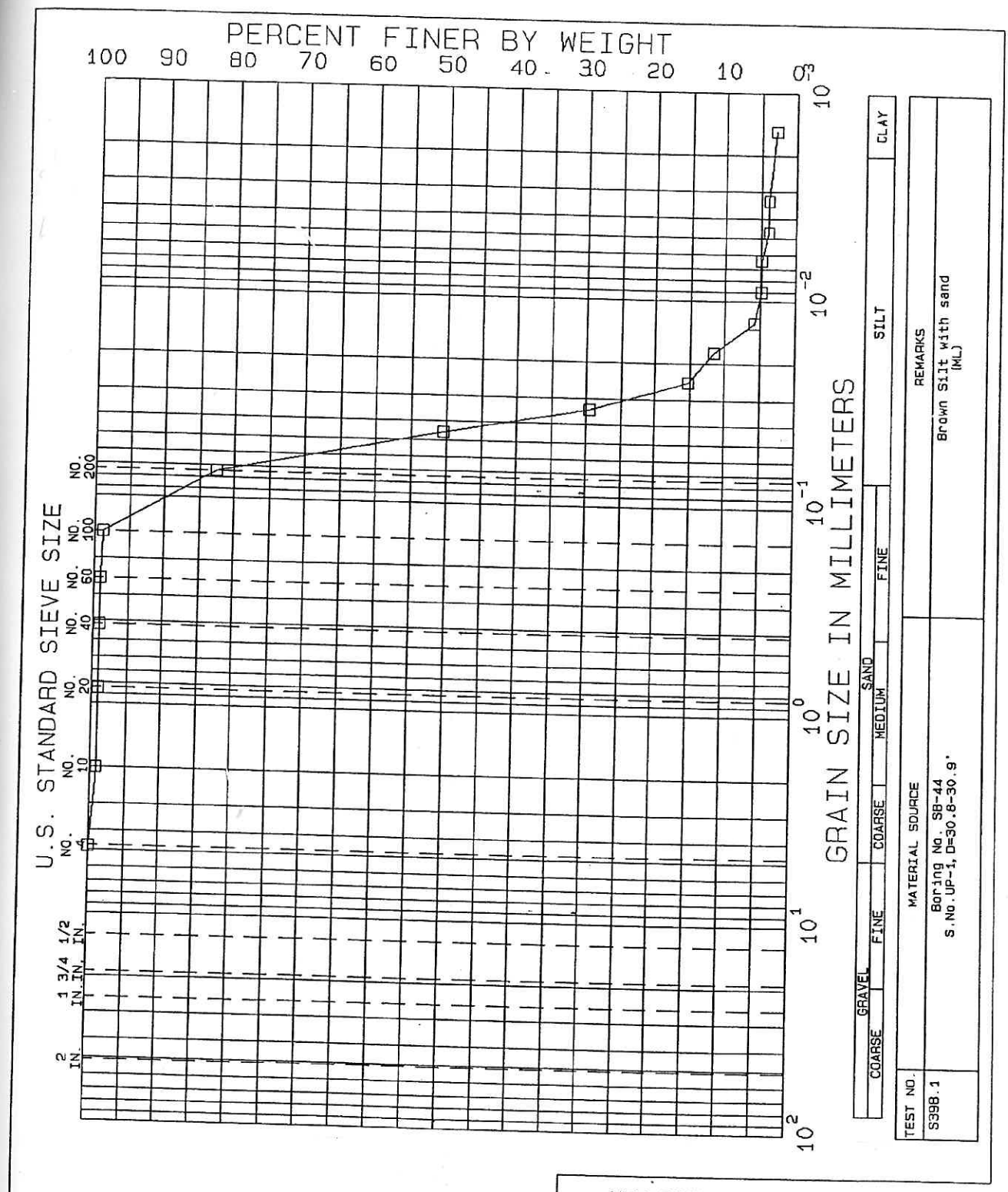
GRADATION TESTS

BORING NO.	SB-84	TEST SERIES	
SAMPLE	S30&31	NO	212
DEPTH	130-136.5'	DATE	Dec.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: [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.: $\frac{C_c}{1+e_0}$	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

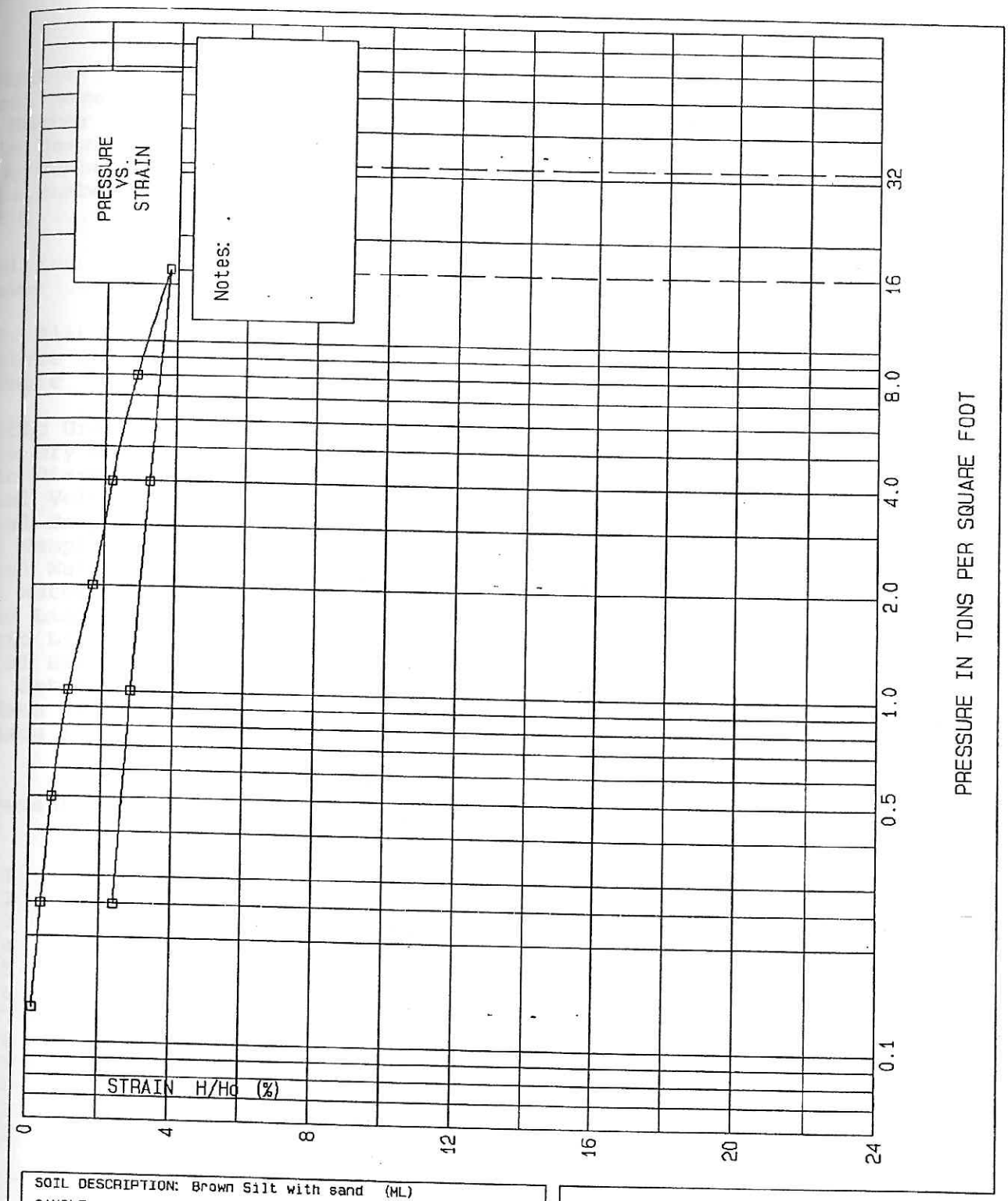
GRADATION TESTS

BORING NO. 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

BORING NO. SB-44
SAMPLE UP-1
DEPTH 30.7-30.8'
TECH. MST
REVIEWER DAS

TEST SERIES NO. C398
DATE 2/12/04
FILE 17828

FIGURE

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	0.0005
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. $\frac{G_s}{1+e_0}$	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			SILT											
		31.1 31.2					100	15												
		31.2-31.3		68.0	88	30			CLAY											
		31.4-31.5					100	87		2.89										

GZA GeoEnvironmental, Inc.
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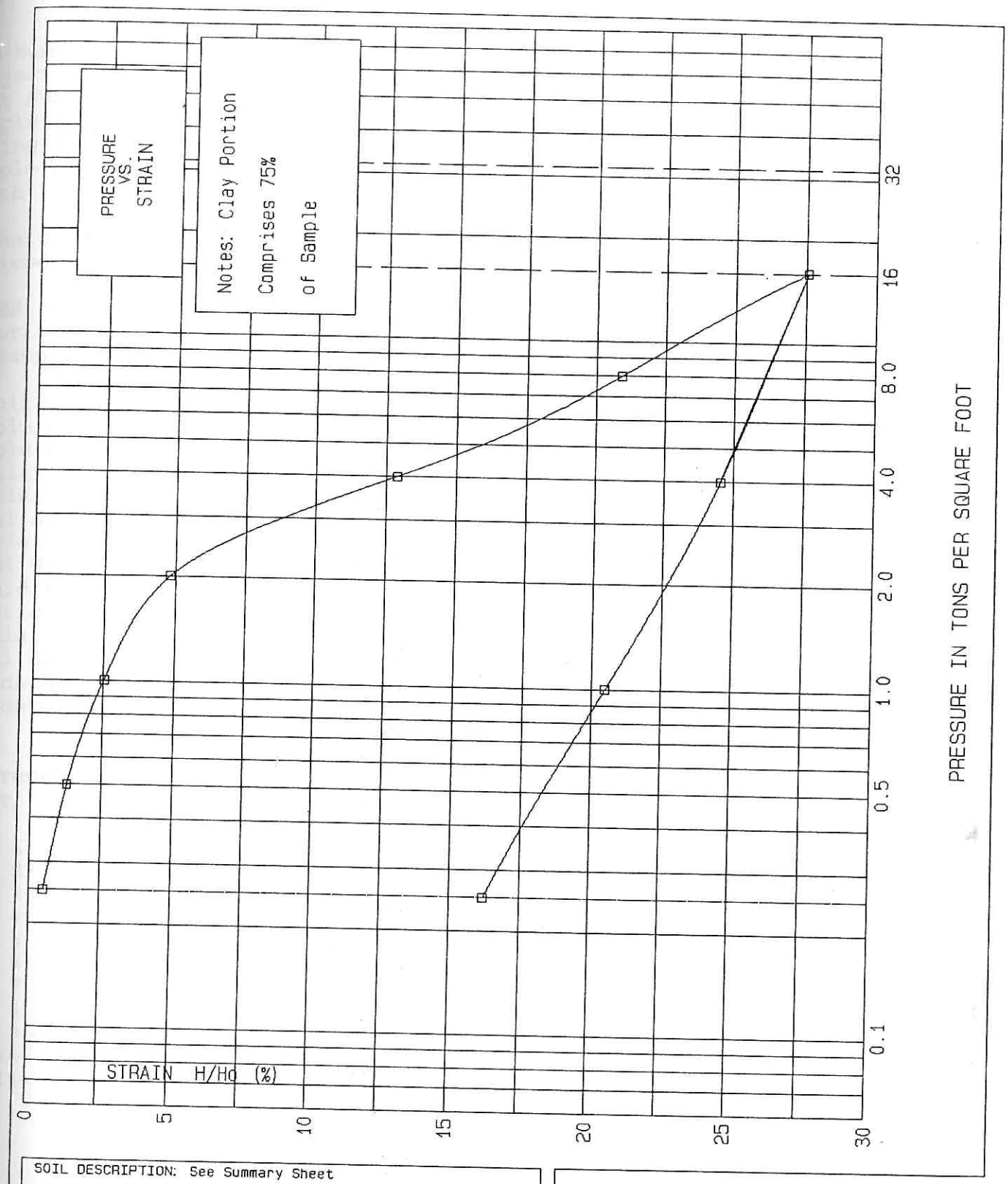
labform1 xls



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

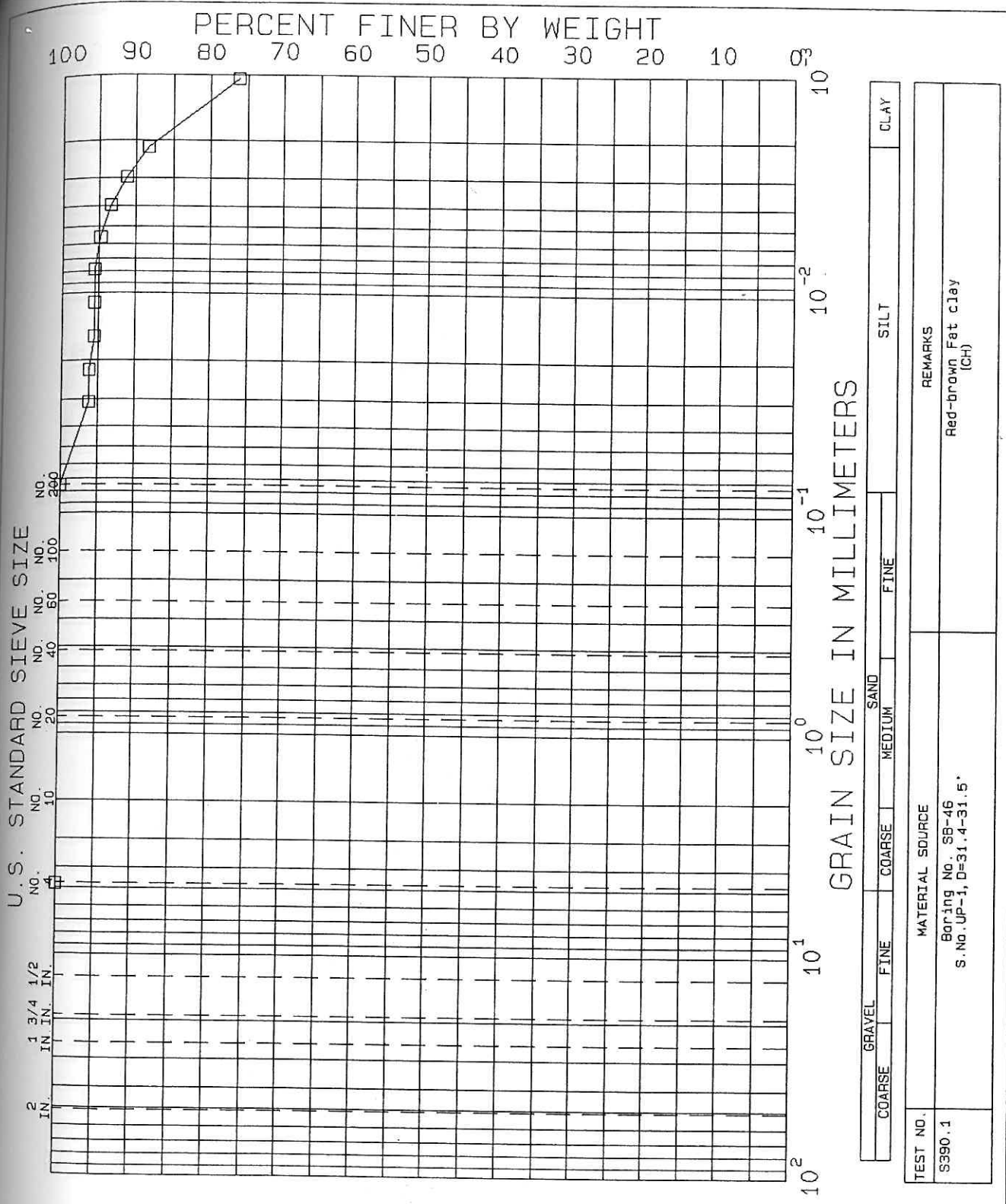
Job Number L17828
Project Name ..... NEW BRITAIN-HARTFORD BUSWAY
Test Number 390.1
Sample Description .. See Summary Sheet
Boring Number SB-46
Sample Number UP-1
Depth ..... 31.0-31.1'

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
50 data excluded
90 data included

Increment Number	Pressure (TSF)	Final Dial	Percent Strain	Void Ratio	T90 (min)	Cv (T90) (/10000) cm²/sec	Cα
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			

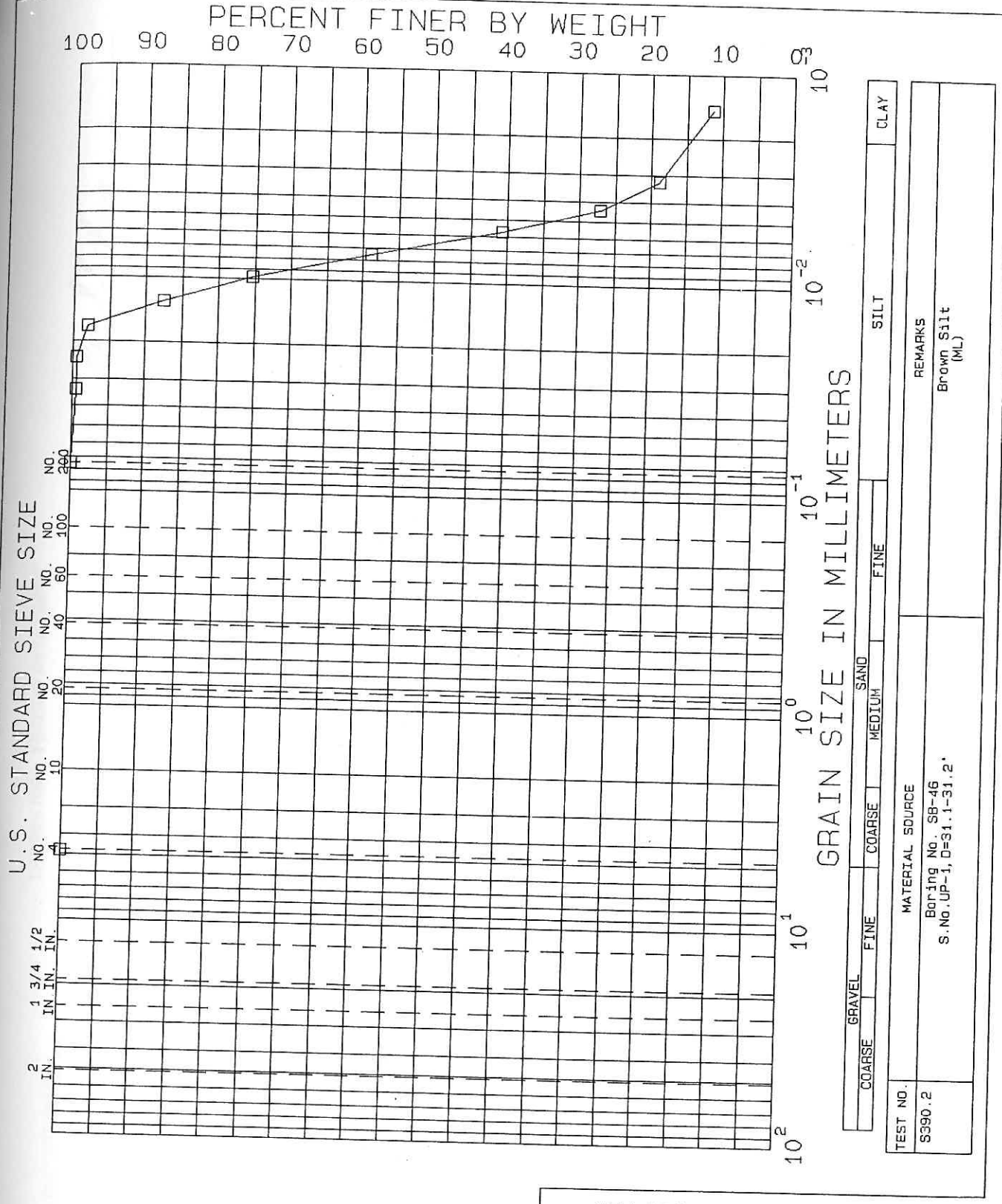


NEW BRITAIN-HARTFORD BUSWAY

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.: $\frac{C_c}{1+e_0}$	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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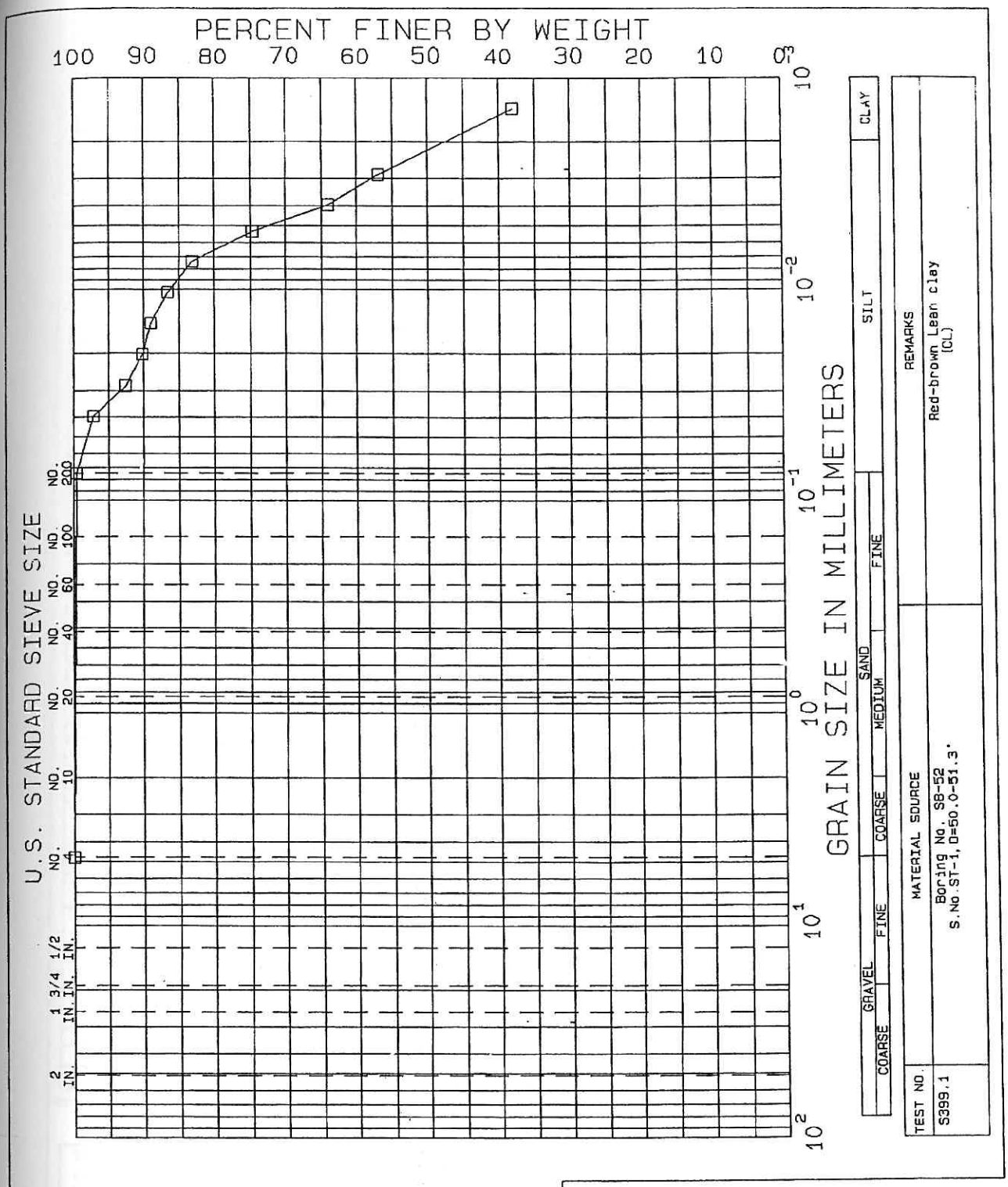
labform1 xls

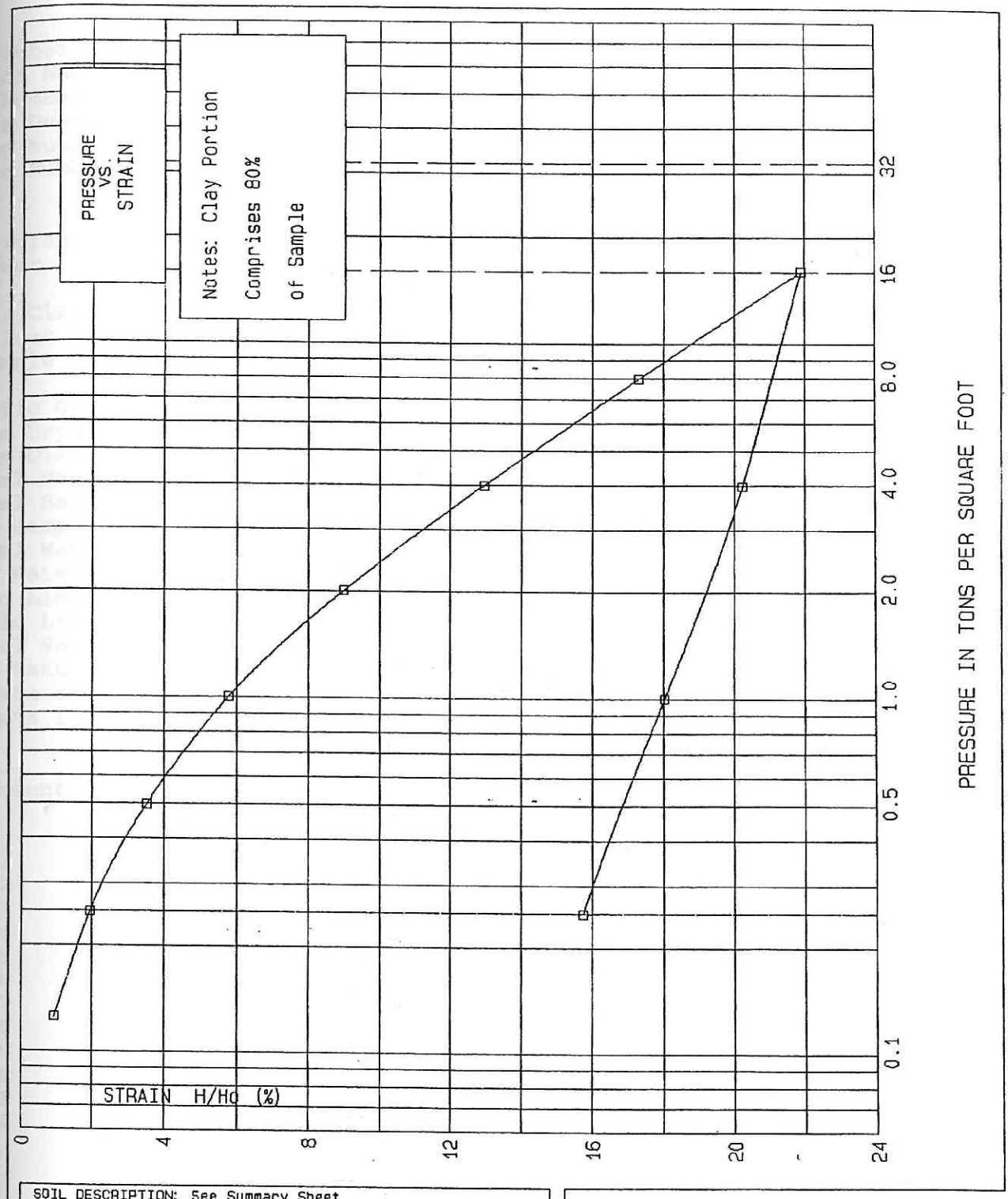


NEW BRITAIN-HARTFORD BUSWAY

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.	LIQUID LIMIT	PLASTIC LIMIT	SPECIFIC GRAVITY
2.5 IN.	0 %	0 %	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
Project Engineer: D. SCHULZE
Assigned By: D. Gaffney
Date: Mar.04
Reviewed By: Dan Schulze
Date Reviewed: 3/5/04

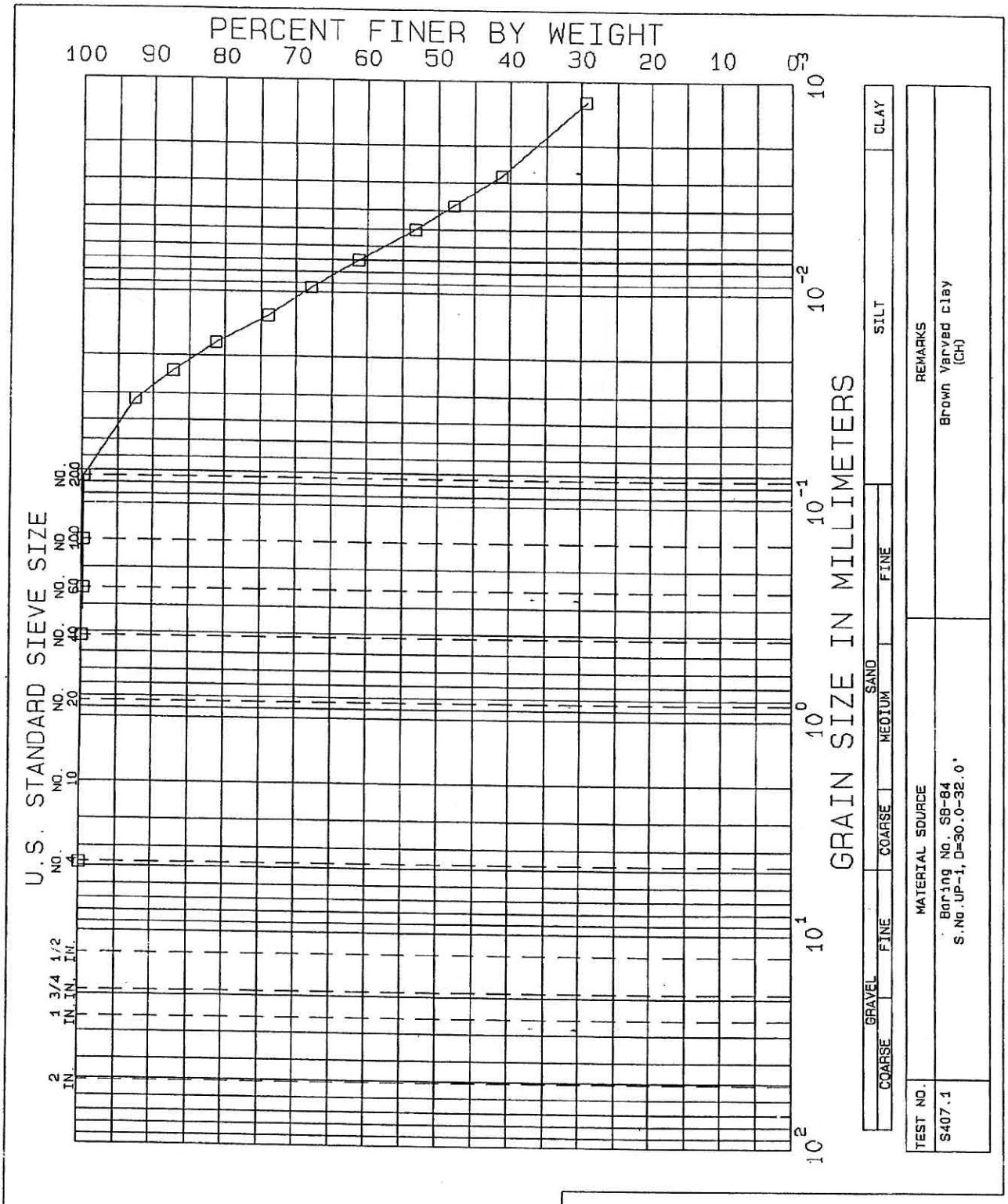
Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) / W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol. $\frac{\Delta e}{1+e_0}$	Laboratory Log and Soil Description
SB-84	UP-1	30.0-32.0	407	Average Total Unit Weight (30.0-32.0') = 106.2 Pcf																
		30.0-30.5		45.3							74.7			CIU	2880	P/A MAX	2223	11.2		Brown Varved Soil as follows: Fat Clay (CH) grading to Silt (ML)
		30.5		68.0	(Clay Portion)									Tv= 0.30 tsf						
		30.6-31.1		50.0							70.7			CIU	4320	P/A MAX	2569	12.5		Varve thickness varies from 0.5-1.5" Clay portion varies from 0.25-1.25" in thickness and comprises approx. 50-75% of total varve
		31.1		30.9	(Silt Portion)									Tv= 0.25 tsf						
		31.1-31.7		50.7							70.6			CIU	5760	P/A MAX	2946	15.5		
		31.5-31.6		47.2	(entire varve)									Tv= 0.27 tsf						
		31.6-31.7		47.1							76.8									
		30.0-32.0					100	37		2.79	(entire varve)								0.16	Note: Specific gravity and sieve/hydrometer run on varve sample
		30.0-32.0		65.4	66	30					(Clay Portion)									

GZA GeoEnvironmental, Inc.

Q:\NEWTON\LAB\LABFORM7.XLS

labform1.xls

SB-84

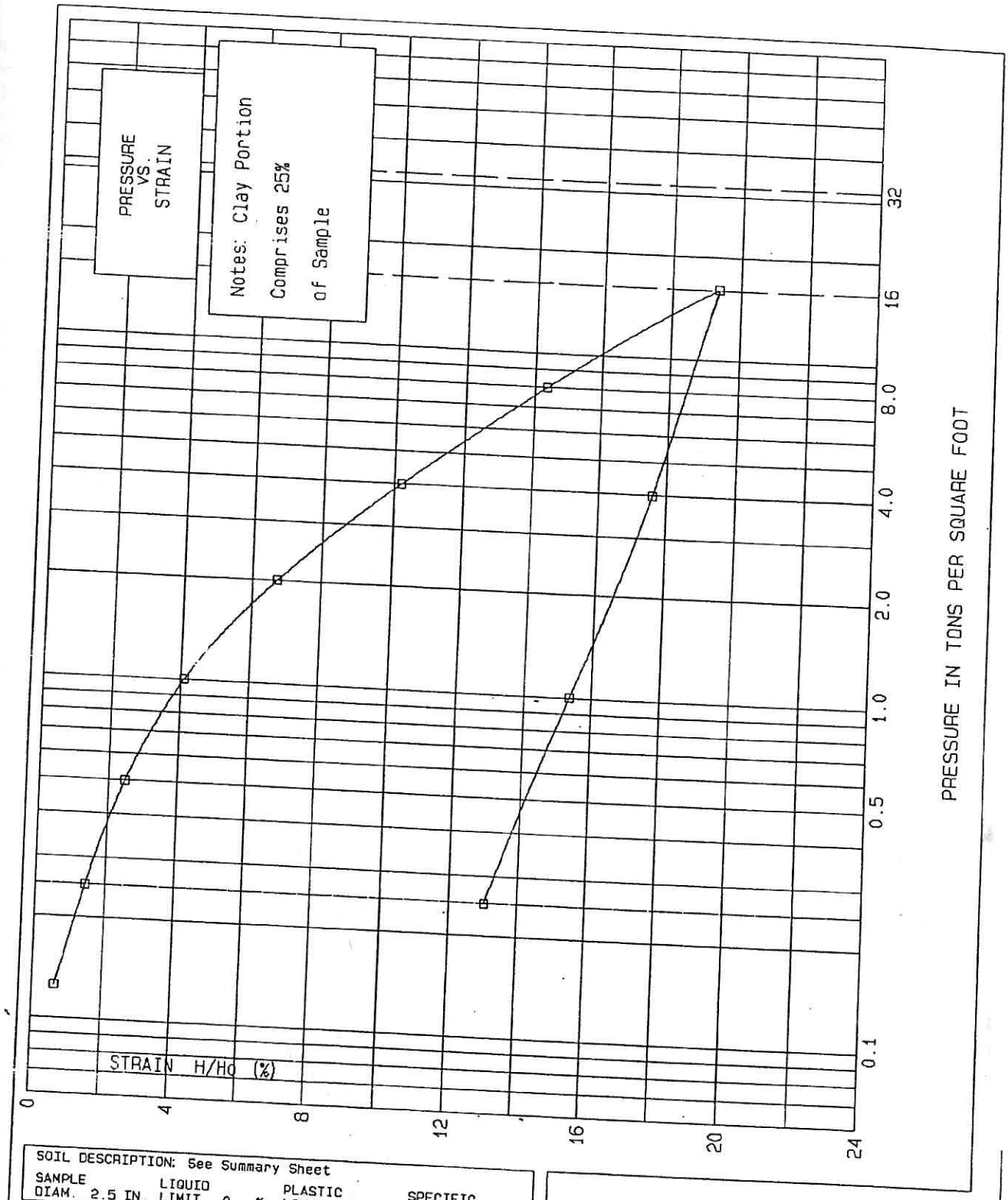


NEW BRITAIN-HARTFORD BUSWAY

CONNECTICUT

GRADATION TESTS

BORING NO.	SB-84	TEST SERIES	
SAMPLE	UP-1	NO	407
DEPTH	30.0-32.0'	DATE	Mar.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 2.79

	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	VOID RATIO	SATURATION, %	SAMPLE HEIGHT, INCH
INITIAL	47.10	76.77			
FINAL	36 70	88 25			0.80
					0.70

New Britain-Hartford Busway

CONSOLIDATION TEST

BORING NO. SB-84
SAMPLE UP-1
DEPTH 31.6-31.7'
TECH. MST
REVIEWER DAS

TEST SERIES NO C407.1
DATE 3/4/04
FILE L17828

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

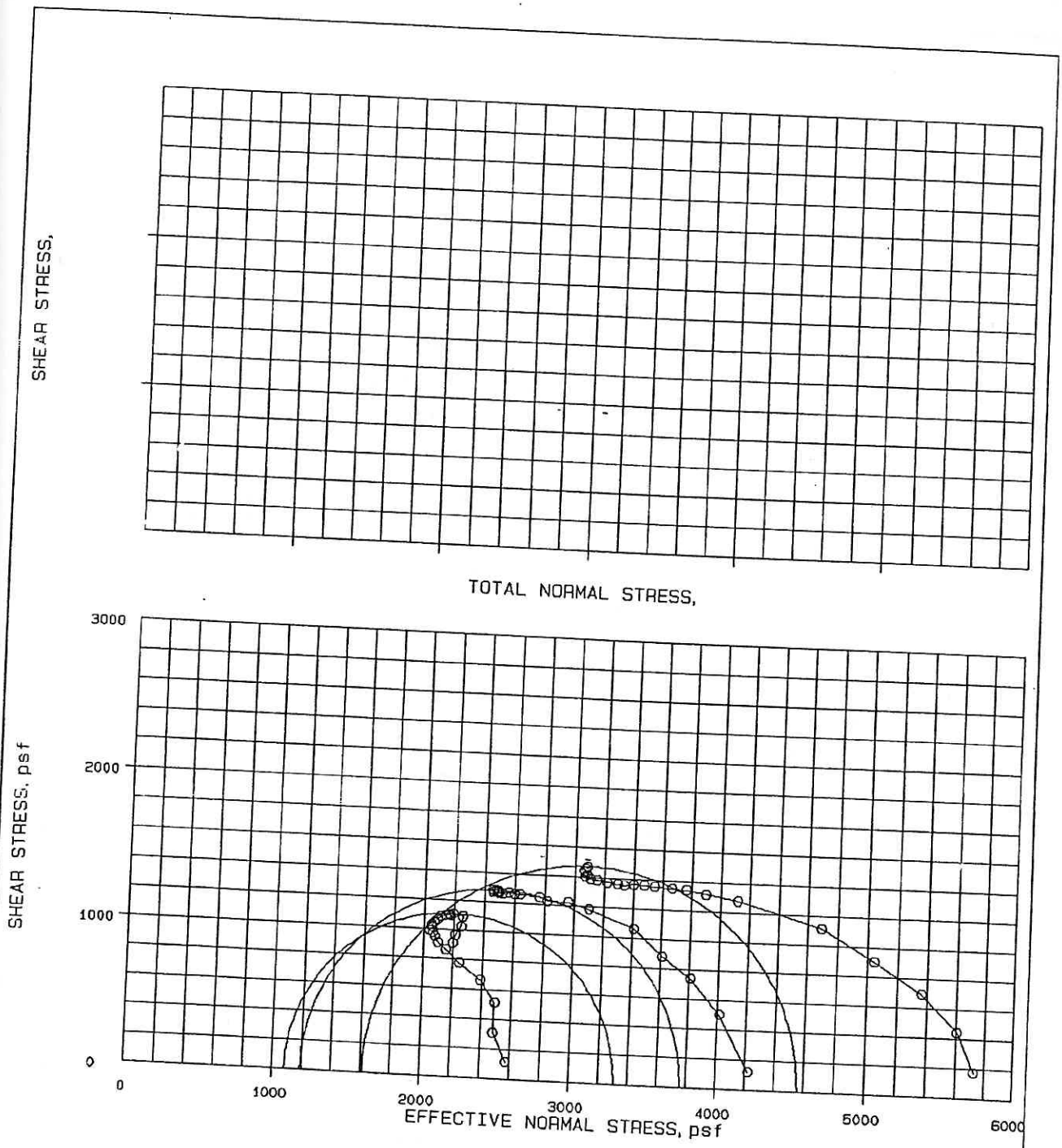
Job Number L17828
Project Name ..... New Britain-Hartford Busway
Test Number C407.1
Sample Description .. See Summary Sheet
Boring Number SB-84
Sample Number UP-1
Depth ..... 31.6-31.7'

Technician ..... MST
Reviewer ..... DAS

NOTES: Clay Portion
Comprises 25%
of Sample

Specific Gravity ..... 2.7900E+00
Sample Dry Weight ..... 7.9140E+01
Sample Diameter ..... 2.5000E+00
Initial Void Ratio ..... 0.0000E+00
Initial Sample Height 8.0000E-01
Final Sample Height 6.9600E-01
Initial Water Content .... 4.7100E+01
Final Water Content ..... 3.6700E+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	1.268			
2	0.125	52.0	0.65	1.253			
3	0.250	115.0	1.44	1.235	1.0	142.86	0.0010
4	0.500	199.0	2.49	1.211	1.0	140.22	
5	1.000	328.0	4.10	1.175	1.7	80.26	0.0016
6	2.000	537.0	6.71	1.115	1.7	76.79	
7	4.000	818.0	10.22	1.036	1.2	101.86	
8	8.000	1149.0	14.36	0.942	1.2	93.52	
9	16.000	1550.0	19.37	0.828	1.0	100.82	0.0030
10	4.000	1408.0	17.60	0.869			
11	1.000	1228.0	15.35	0.920			
12	0.250	1042.0	13.02	0.972			



SOIL DESCRIPTION:	See Summary Sheet				
LIQUID LIMIT	0 %	PLASTIC LIMIT	0	SPECIFIC GRAVITY	2.79

FAILURE CRITERIA $\sigma_1 - \sigma_3$ MAX

REMARKS

NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

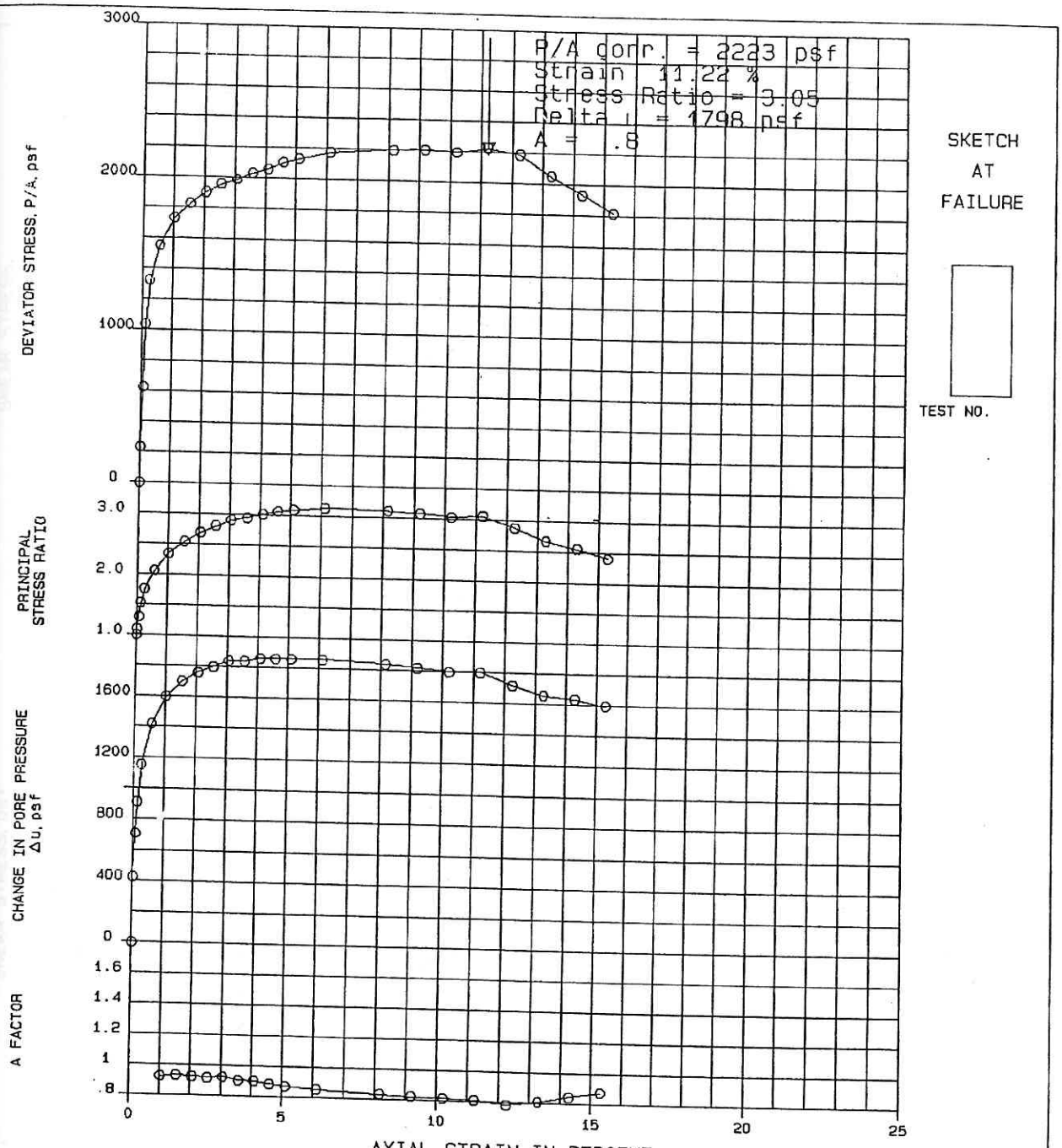
MOHR STRENGTH ENVELOPE

TRIAXIAL COMPRESSION TESTS (CIU)

FIGURE

BORING NO.	SB-84	TEST SERIES NO.	407
SAMPLE	UP-1	DATE	Feb.04
DEPTH	31.1-31.7'		
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
407.1.1	45.3	74.7	3.99 1.99	2.88	11.52	5.2	98	41.2	78.9	.1

SOIL DESCRIPTION: See Summary Sheet

LIQUID LIMIT	0 %	PLASTIC LIMIT	0 %	SPECIFIC GRAVITY	2.79

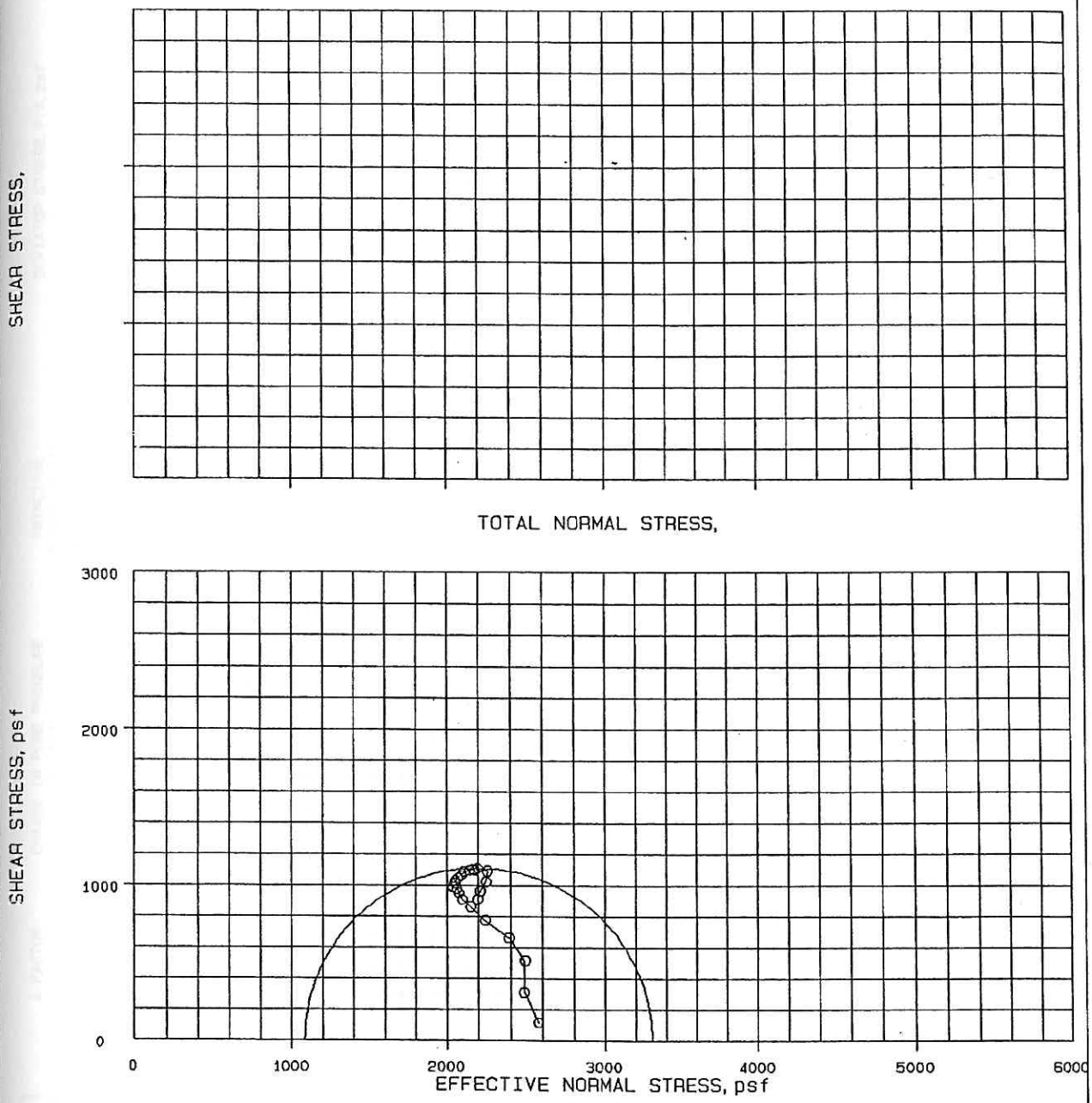
NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
TRIAXIAL COMPRESSION TESTS ($\overline{CIU}$)

BORING NO. SB-84
SAMPLE UP-1
DEPTH 30.0-30.5'
TECH MST
REVIEWER

TEST SERIES NO. 407
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	2.79

FAILURE CRITERIA $\sigma_1 - \sigma_3$ MAX

REMARKS

NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

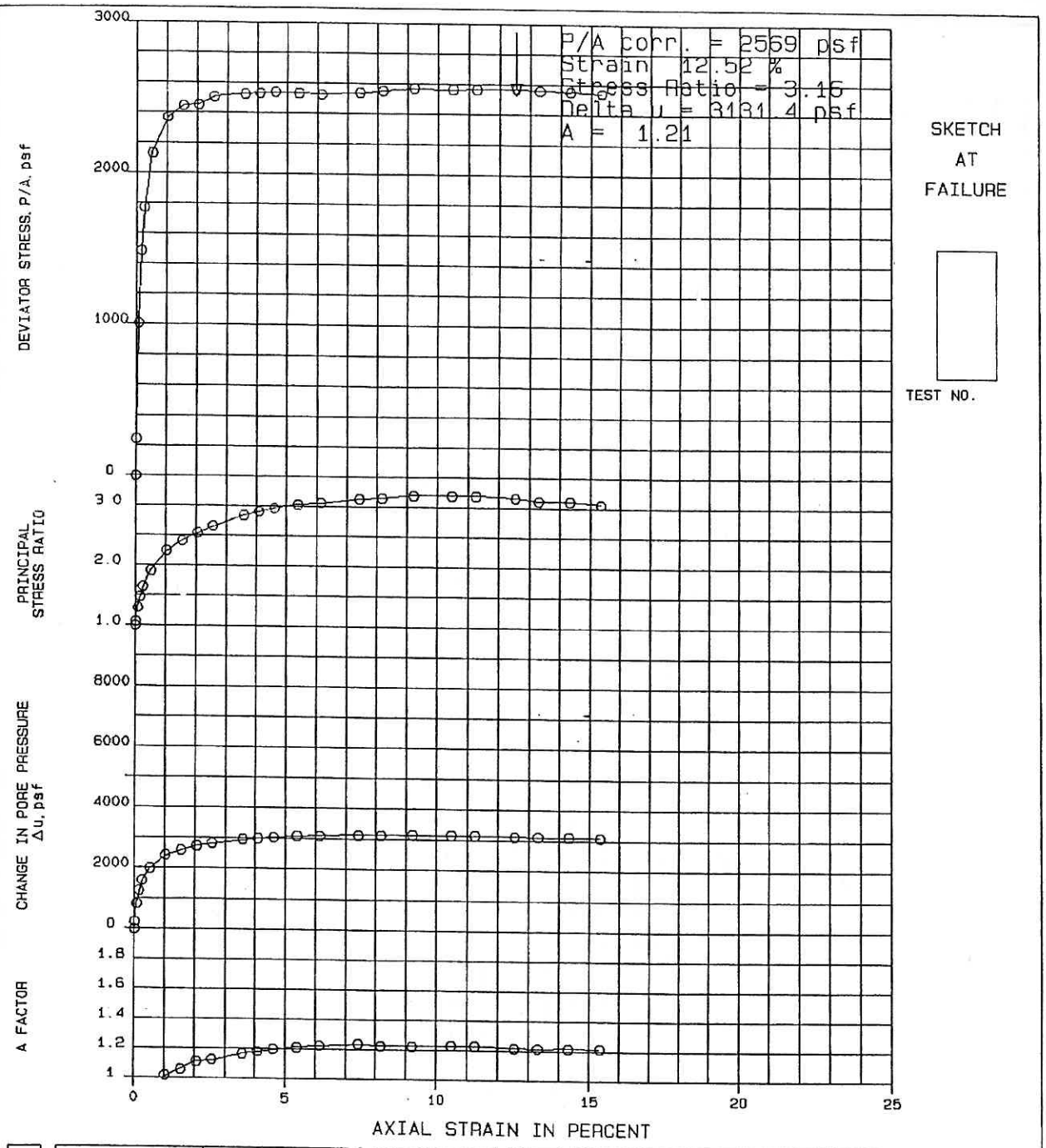
MOHR STRENGTH ENVELOPE

TRIAXIAL COMPRESSION TESTS (CIU)

FIGURE

BORING NO.	SB-84	TEST SERIES NO.	407
SAMPLE	UP-1	DATE	Feb.04
DEPTH	30.0-30.5'		
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
407.1.2	50	70.7	4.001 1.989	4.32	10.08	6.7	96.8	44.3	75.8	.075

SOIL DESCRIPTION: See Summary Sheet

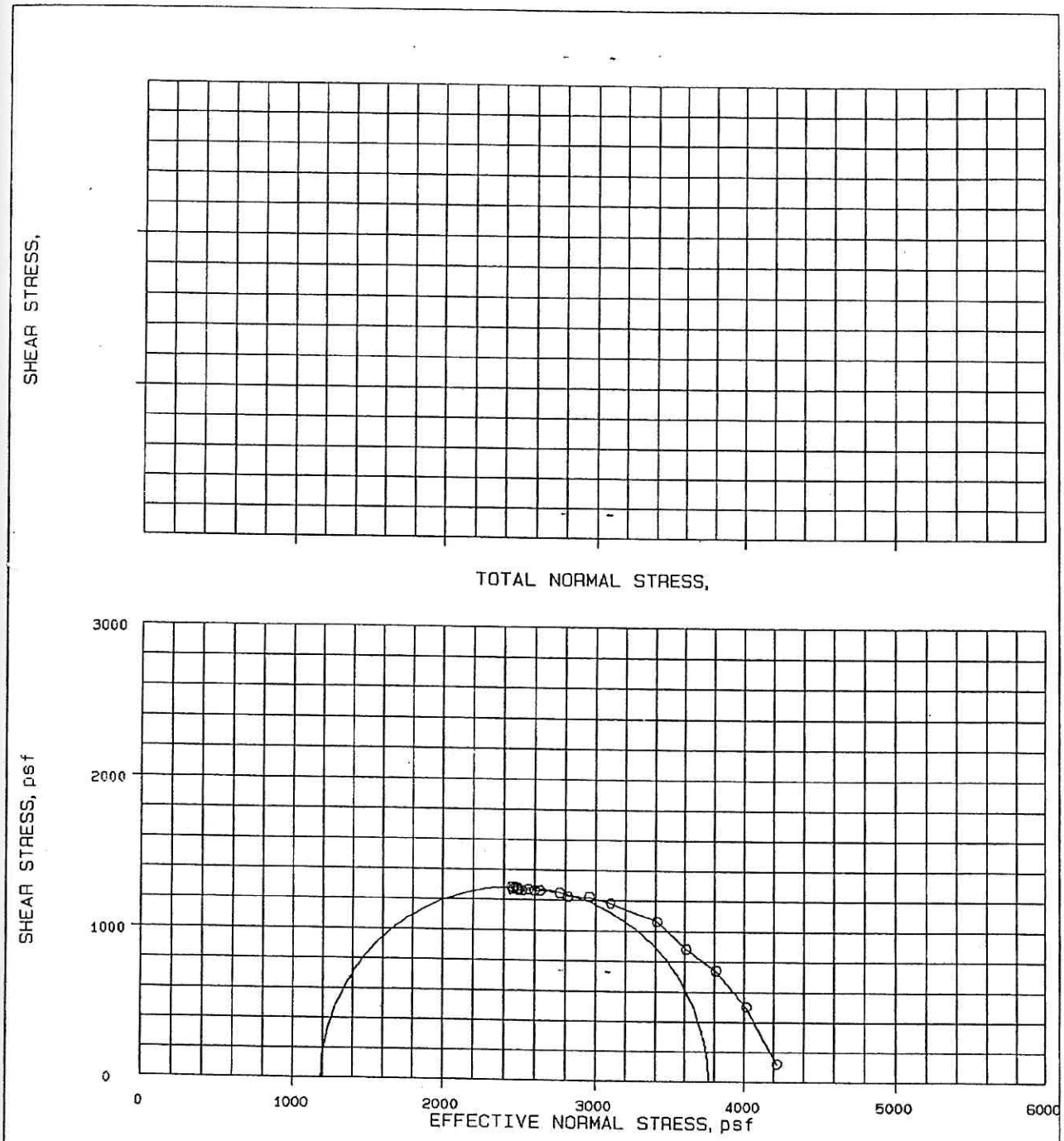
LIQUID LIMIT	0 %	PLASTIC LIMIT	0 %	SPECIFIC GRAVITY	2.79

NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
TRIAXIAL COMPRESSION TESTS ($\overline{CIU}$)

BORING NO.	SB-84	TEST SERIES NO.	407
SAMPLE	UP-1	DATE	Feb.04
DEPTH	30.6-31.1'		
TECH.	MST		
REVIEWER		FILE	L1762B

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



SOIL DESCRIPTION:		See Summary Sheet			
LIQUID LIMIT	0 %	PLASTIC LIMIT	0	SPECIFIC GRAVITY	2.79

FAILURE CRITERIA $\sigma_1 - \sigma_3$ MAX

REMARKS

NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

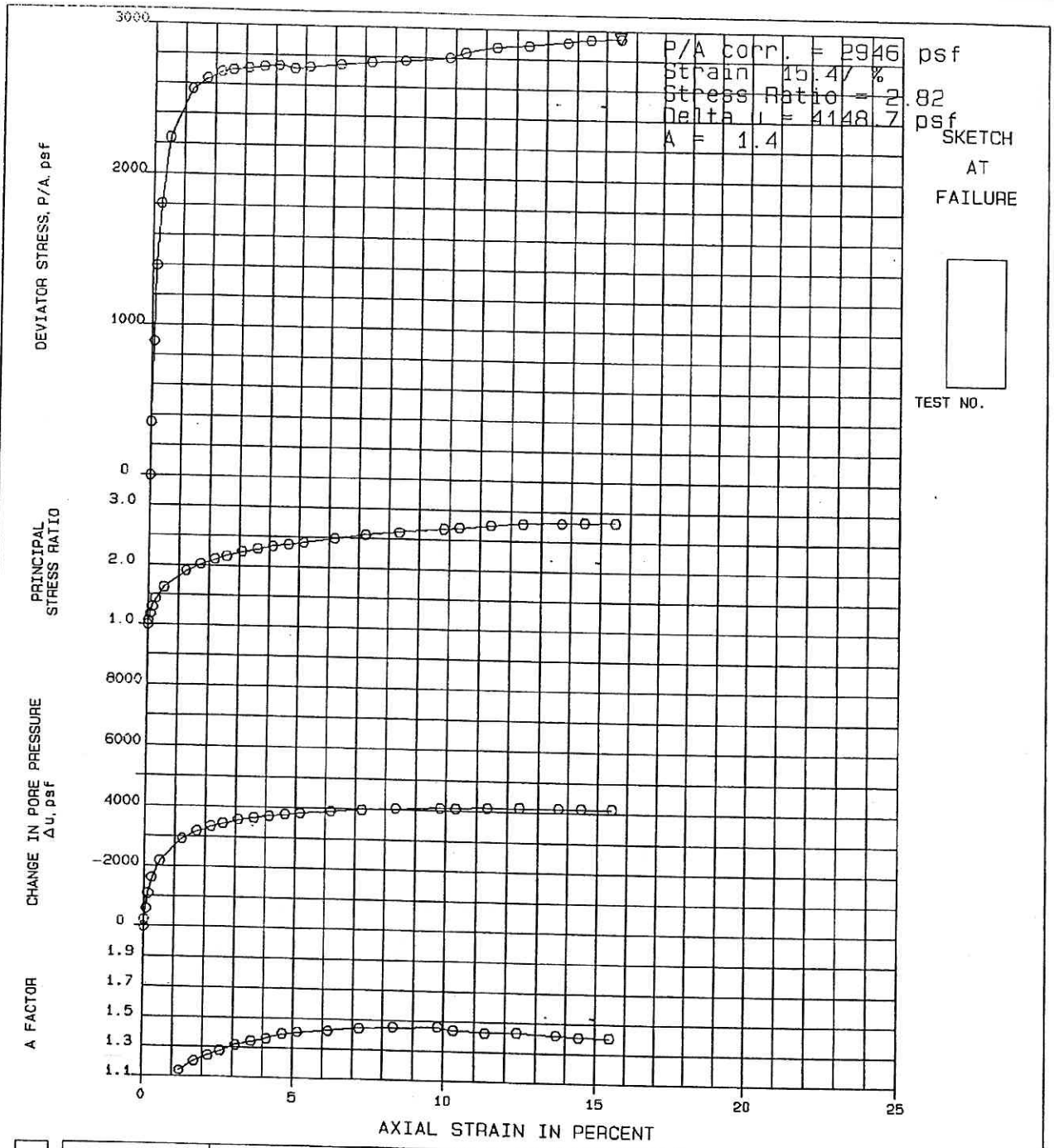
MOHR STRENGTH ENVELOPE

TRIAXIAL COMPRESSION TESTS (CIU)

FIGURE

BORING NO.	SB-84	TEST SERIES NO.	407
SAMPLE	UP-1	DATE	Feb.04
DEPTH	30.5-31.1'		
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 $\sigma_1 = \sigma_3$, 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
407.1.3	50.7	70.6	4 1.969	5.76	8.64	9.2	96	44.1	77.7	.03

SOIL DESCRIPTION: See Summary Sheet

LIQUID LIMIT 0 % PLASTIC LIMIT 0 % SPECIFIC GRAVITY 2.79

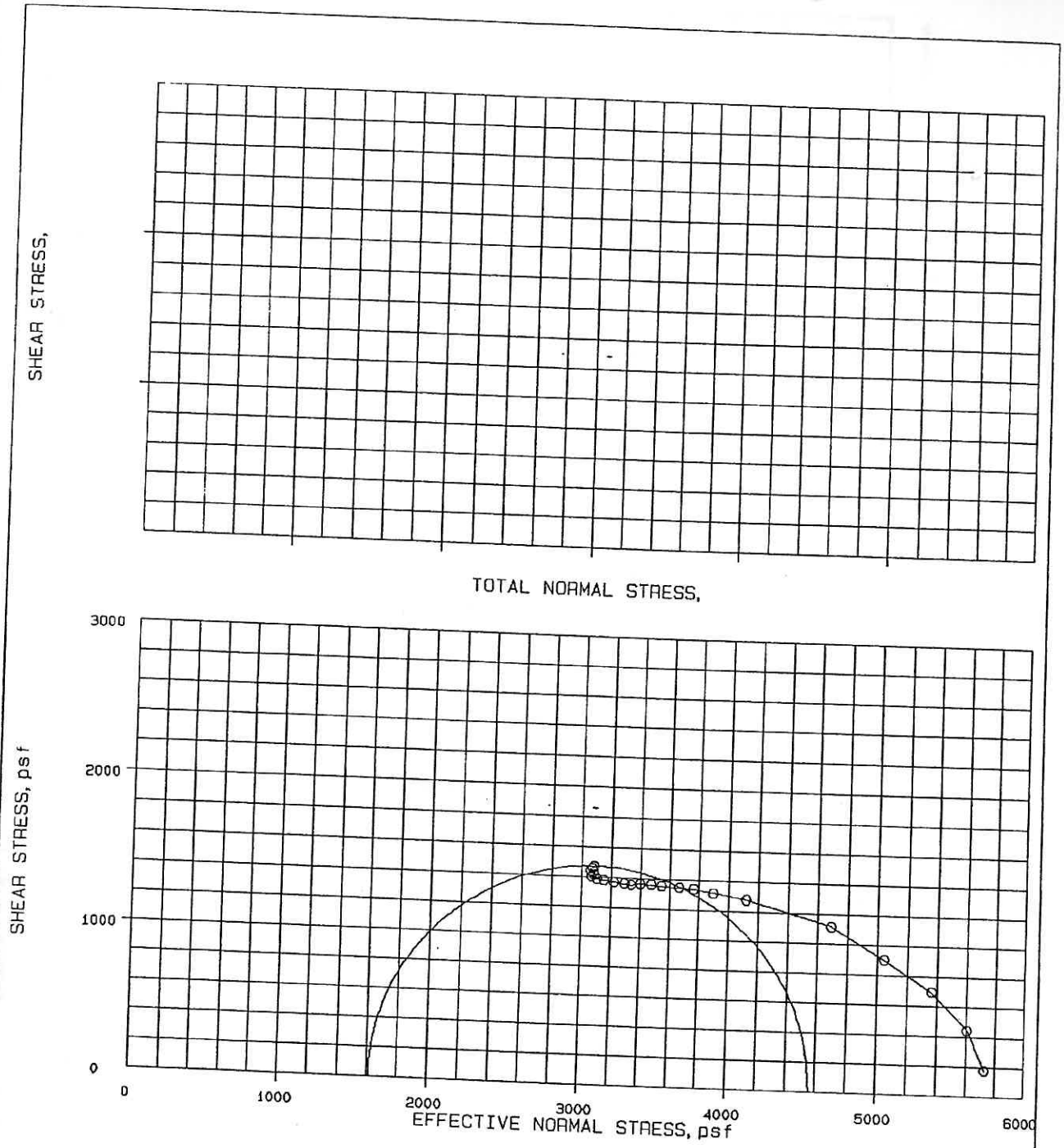
NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT
TRIAXIAL COMPRESSION TESTS (CIU)

BORING NO. SB-84
SAMPLE UP-1
DEPTH 31.1-31.7'
TECH. MST
REVIEWER

TEST SERIES NO. 407
DATE Feb.04
FILE L17628

FIGURE

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS



SOIL DESCRIPTION:	See Summary Sheet				
LIQUID LIMIT	0 %	PLASTIC LIMIT	0	SPECIFIC GRAVITY	2.79

FAILURE CRITERIA $\sigma_1 - \sigma_3$ MAX

REMARKS

NEW BRITAIN-HARTFORD BUSWAY
CONNECTICUT

MOHR STRENGTH ENVELOPE

TRIAXIAL COMPRESSION TESTS (CIU)

FIGURE

BORING NO.	SB-84	TEST SERIES NO.	407
SAMPLE	UP-1	DATE	Feb.04
DEPTH	31.1-31.7'		
TECH.	MST		
REVIEWER		FILE	L1782B

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

LABORATORY TESTING DATA SHEET

Project Name: NEW BRITAIN-HARTFORD BUSWAY CONNECTICUT
Project No.: 1.17828
Project Engineer: D. SCHULZE
Assigned By: D. Gaffney
Date: Mar.04
Reviewed By: Don Schulze
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	στ 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

Appendix 5

Limitations

GEOTECHNICAL LIMITATIONS

Explorations and Data Review

1. The analyses and recommendations submitted in this report are based in part upon data obtained from widely spaced subsurface explorations. The nature and extent of variations between these explorations may not become evident until further explorations are made and construction occurs. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

2. The analyses and recommendations submitted in this report are based in part upon review of plans and reports prepared by others. Plans and reports were transmitted as digital copies and drawings were reproduced at different scales than originally drawn. Plans may be incomplete and date back to approximately 100 years. Actual as-built foundation conditions may be different than represented on historic plans provided and as inferred by Geo**Design**.

3. The generalized soil and bedrock profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil and bedrock transitions are probably more erratic. For specific information, refer to the boring logs.

4. The geologic and geomorphologic settings at this site are complex and the uncertain historic site usage have resulted in the varied distribution and stress history of cohesive strata across the site. Limited spacing of borings and lab testing can at best, only allow for estimates to be developed for duration and magnitude of consolidation settlements.

5. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in stream levels, rainfall, temperature, and other factors occurring since the time measurements were made. As with any site, there can be shallow perched groundwater conditions resulting from natural and manmade causes, that may exist at the site.

Review

6. In the event that any changes in the nature, design or location of the proposed structure or roadway, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by Geo**Design**, Inc. It is recommended that this firm be provided the opportunity for a general review of design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications.

Use of Report

7. This report has been prepared for the exclusive use Michael Baker Corporation (Baker), the Connecticut Department of Transportation (ConnDOT), and other members of the design team for specific application to the construction of Retaining Walls along the proposed

Amtrak Access Roadway, located in Newington, West Hartford, and Hartford, Connecticut, in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made.

8. This final design soil and foundation engineering report has been prepared for this project by Geo**Design**. This report is for design purposes only and is not sufficient to prepare an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to design considerations only.