INDIAN RIVER INLET BRIDGE

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FINAL BRIDGE SUBSTRUCTURE REPORT

REPLACEMENT OF 3-156, SR 1 OVER THE INDIAN RIVER INLET

DelDOT PROJECT NO. 1204

MACTEC PROJECT NO. 3530-03-1245

December 24, 2003

Prepared By

MACTEC

For

Figg Engineering Group

In Cooperation With

DelDOT

FINAL GEOTECHNICAL
BRIDGE SUBSTRUCTURE REPORT

INDIAN RIVER INLET BRIDGE

SUSSEX COUNTY, DELAWARE

DelDOT PROJECT NO. 1204

Prepared for:

FIGG BRIDGE ENGINEERS, INC.
Tallahassee, Florida

MACTEC PROJECT NO. 3530-03-1245.02
December 24, 2003

MACTEC

December 24, 2003

Mr. W. Denney Pate, P.E.
Figg Bridge Engineers, Inc.
424 North Calhoun Street
Tallahassee, Florida 32301

SUBJECT: **Final Geotechnical Bridge Substructure Report**
Indian River Inlet Bridge
Sussex County, Delaware
MACTEC Project No. 3530-03-1245.02

Dear Mr. Pate:

MACTEC Engineering and Consulting, Inc. is pleased to present this *Final Geotechnical Bridge Substructure Report* for the Indian River Inlet Bridge project. This report presents a review of the project information provided to us, a discussion of the site and subsurface conditions relevant to the bridge substructures, our geotechnical recommendations, and construction recommendations. The appendices contain site and boring location plans, estimated subsurface profiles, and our field and laboratory test results.

We have enjoyed working with you on this stage of the project and look forward to continuing to assist you on the remainder of the project. If you have any questions concerning this report, please feel free to call us.

Sincerely,

MACTEC ENGINEERING AND CONSULTING, INC.

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1.0 INTRODUCTION

1.1 GENERAL

The Indian River Inlet Bridge replacement project consists of the design and construction of a replacement structure for the existing State Route 1 (SR1) bridge over the Indian River Inlet located in Sussex County, Delaware. The purpose of this study is to provide geotechnical information for the design of bridge pier foundations and approach abutment foundations. The evaluations and recommendations developed for this report are based on project information supplied by Figg Bridge Engineers, Inc. (FIGG). Additional information was obtained from the Delaware Department of Transportation (DelDOT), including various as-built plans and boring logs for the existing bridge over the inlet. This report contains the results of our subsurface exploration, laboratory testing program, site characterization, engineering analyses, and geotechnical recommendations for the design and construction of the new bridge. Recommendations for the roadway portion of the project are provided in MACTEC's *Final Geotechnical Roadway Report* dated December 24, 2003.

1.2 SCOPE OF SERVICES

The scope of services for this stage of the project is described in detail in MACTEC's recommended scope of work dated August 22, 2003. In summary, the purpose of this study was to utilize existing subsurface information, provide detailed information concerning the subsurface materials, and provide geotechnical design and construction recommendations for use in the design of bridge substructures. In order to provide the necessary information to perform these tasks, a total of forty standard penetration test (SPT) soil test borings and twenty piezocone penetration test (CPTu) soundings were performed at selected locations along the proposed alignment including eight soil test borings and two CPTu soundings in the vicinity of the planned bridge piers and abutments.

In general, these borings and soundings were located in areas of geotechnical interest identified from review of existing subsurface data, preliminary plans, and information provided by FIGG. A laboratory-testing program was established to characterize the physical and chemical parameters of the subsurface soils. An in-situ testing program was also implemented consisting of pressuremeter tests, field vane shear tests, seismic shear wave velocity tests, and pore-pressure dissipation tests to

aid in the characterization of the engineering parameters of the subsurface soils. The results of the field exploration and laboratory testing programs for both the bridge and roadway portions of the project were used in developing the recommendations contained in this report.

This report discusses our exploratory and testing procedures, presents our findings and evaluations, and includes the following:

- An overview of the project information provided to us, including a summary of the historical development of the existing bridge over the Inlet.
- A general review of surface topographical features and site conditions.
- A general review of area site and geologic conditions.
- A review of the field exploration and testing procedures.
- A review of the subsurface soil stratigraphy with pertinent available physical parameters, including final logs of our soil test borings, and the results of laboratory strength, consolidation, index/classification and physiochemical testing on the soil samples obtained.
- A summary of engineering parameters for typical subsurface strata.
- A generalized estimated subsurface profile to illustrate subsurface conditions encountered along planned alignment.
- Geotechnical recommendations for bridge pier and abutment foundations, including an evaluation of various foundation types, recommended foundations, estimated bearing elevations, allowable axial and uplift capacities, lateral loading design parameters, settlement estimates, and load testing recommendations.
- Geotechnical recommendations for bridge abutment walls, including recommended design earth pressure coefficients.
- Recommendations regarding foundation construction, including monitoring and mitigation of construction induced vibrations on the adjacent existing bridge.

1.3 AUTHORIZATION

Our services were provided in general accordance with the Agreement for Subconsulting Services between MACTEC and FIGG dated June 18, 2003. The scope of services developed by MACTEC for the Final Geotechnical Study phase of this project was outlined in our memorandum dated August 22, 2003.

2.0 PROJECT INFORMATION

2.1 PROJECT OVERVIEW

The Indian River Inlet Bridge project consists of replacing the existing SR1 bridge over the Indian River Inlet, and constructing approximately 3,500 feet of new roadway to tie the new bridge into the existing alignment of SR1. The new bridge will be located to the west of the existing bridge, near a prior bridge alignment. A map showing the general location of the project site is presented in Figure 1 of Appendix A.

The proposed bridge will be a three-span, segmental precast concrete, cable-stayed arch bridge with a main span of approximately 1,000 feet and two backspans of approximately 150 feet. The new bridge will have two 12-foot wide travel lanes with 10-foot wide outside shoulders and 4-foot wide inside shoulders in each direction, a 12-foot wide protected sidewalk on the east side, and an 18-foot wide median. Substantial bridge pier and abutment foundations are planned to support the bridge superstructure. Both piers will be located on land, allowing the inlet to potentially be widened to 800 feet in the future. The vertical clearance under the new bridge will be increased to a minimum of 45 feet. The construction sequence for the project will be designed to minimize traffic disruptions.

2.2 BACKGROUND INFORMATION

We have been provided with portions of the as-built drawings for the existing bridge and some of the previous bridge structures which crossed the Indian River Inlet. Additional information regarding the previous structures crossing the inlet was provided by FIGG and DelDOT. The sections below describe relevant information for the existing and previous bridges.

2.2.1 Previous Structures

Several structures have been constructed to span the Indian River Inlet since the early part of the 20th century. Little information has been provided on the early structures that spanned the inlet, except that they were in close proximity to the current alignment, and were generally constructed close to existing grade.

1938 Bridge

In 1938, a swing-span bridge was constructed to the east of the bridge existing at that time. This new bridge was supported by twenty-seven piers, both on land and in the Inlet. The piers were founded on timber pile groups, with spacings ranging from 3 feet to 3.5 feet and lengths of approximately 30 feet below the pile caps. This corresponded to an approximate pile tip elevation of -60 feet. The design load per pile specified on the plans was 18.8 tons. No significant grade changes were made along this alignment of the bridge. The longest span of this bridge was approximately 90 feet, which was the distance from the pivot pier to the rest pier for the swing span. The approach spans appear to have been constructed with an approximately 16-foot center-to-center spacing. The maximum clearance below this bridge was about 18 feet at low tide.

1963 Bridge

The northbound lanes of the existing Indian River Inlet Bridge were constructed in 1963 as a replacement for the 1938 bridge. This bridge is located to the east of the 1938 bridge. It is supported on four piers, two on land and two in the inlet. The abutments are supported on 12BP63 steel piles and the piers are supported on 14BP89 piles. Battered piles at 4(V):1(H) were installed at the abutments and piers to carry lateral loads. Information regarding design capacities or pile tip elevations was not available. Spans and clearance were not specified in these plans, but are assumed to be similar to that of the 1975 bridge below.

Embankments with maximum heights of approximately 30 feet were constructed to achieve the proposed grade for this bridge. The embankments were constructed to accommodate a future widening on the west side. The plans provided indicate that significant settlements due to the approach fills were anticipated; however, detailed information from the settlement monitoring program was not available.

1975 Bridge

The southbound lanes of the bridge existing today were constructed several years after the northbound lanes, in 1975. The land piers of the 1963 bridge were widened to support the additional lanes. These new piers were founded on groups of 16-inch diameter, cast-in-place (CIP) concrete piles, with spacings ranging from 4 feet to 5 feet, and maximum tip elevations of about -90 feet. The pile groups were capped with a 4 foot thick reinforced concrete pile cap. Piles on the perimeter of the groups were installed with a 4(V):1(H) batter. The design load per pile was specified on the plans as 65 tons.

No additional grade changes were required for this construction. The longest span of this bridge is approximately 250 feet, along with two spans of about 186 feet, and two spans of about 126 feet. The maximum clearance under the bridge is about 35 feet at low tide.

2.2.2 Existing Subsurface Information

Plans for the 1938 bridge include a subsurface profile of eight soil test borings located along the proposed alignment of this bridge. This profile indicates that the subsurface conditions at that location consist of layers of fine to coarse sand from elevations of about +10 feet to -18 feet. One of these borings encountered clay and fine sand beginning at elevation -18 feet and was terminated at elevation -25 feet in that material.

The 1963 plans include a table summarizing information from five soil test borings located in the inlet, west of the bridge. This table indicates a layer of fine sand, approximately 20 feet to 30 feet thick, overlying "organic" clay. No elevation information was included in the table.

The 1975 plans for the existing bridge include boring logs summarizing the information from eighteen soil test borings located along the alignment of the existing bridge. This diagram indicates that the subsurface conditions along this alignment consist of approximately 30 to 40 feet of loose to very dense, fine to coarse sands overlying 25 to 60 feet of very soft to medium stiff "organic" clays and peat, which decrease in thickness to the north. These borings were terminated in dense to very dense, fine to coarse sands and gravels beneath the organic clay layer. The upper boundary between the sand and clay was located from about elevation -28 to -40 feet, while the lower boundary was located from about elevation -65 to -96 feet.

Copies of the available boring logs from these plan sets are provided in Appendix B.

2.3 DESIGN INFORMATION

The following paragraphs summarize the design information regarding each aspect of this project relating to bridge substructure design and construction. Specific design recommendations for the bridge substructure sections of the project are provided in Section 5.0.

2.3.1 Bridge Pier Foundations

The proposed replacement structure crossing the Indian River inlet will have a span of approximately 1,000 feet. This will allow the structure to span the entire inlet with no piers in the water, and also allow future widening of the inlet. The magnitude of this span will require the bridge pier foundations to support axial loads of approximately 1,000 kips per foundation element. Also, the thermal expansion/contraction, and concrete shrinkage anticipated for the span will require the bridge pier foundations to accommodate lateral deflections of up to about 3 inches near the ground surface.

2.3.2 Bridge Abutment Foundations

The proposed replacement structure crossing the Indian River inlet will have backspans of approximately 150 feet between the piers and abutments. The approach embankments for the bridge are expected to cause significant settlements in the soft clay layer below as discussed in the *Final Geotechnical Roadway Report*. This settlement will result in the relative downward movement of the upper dense sands, which may induce significant downdrag loads on the abutment foundation elements. Unless these downdrag loads are mitigated, the abutment foundation elements will need to support them along with the axial load of the bridge backspan and the abutment itself. The abutment foundations will also be required to resist uplift loads in the early stages of construction, as they will provide anchorage for temporary towers used during construction of the bridge arch.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 SITE CONDITIONS

Site reconnaissances were performed by MACTEC personnel at various times from September through December 2003 to observe and document site conditions. The site exists on a peninsula bounded by the Atlantic Ocean on the east and Rehoboth and Indian River Bays on the west. The area around the proposed bridge is part of the 2,825-acre Delaware Seashore State Park. SR1 travels down the peninsula, connecting the towns of Rehoboth Beach and Dewey Beach to the north, and Bethany Beach to the south. Dunes and beaches dominate the landscape to the east of SR1, while tidal marshes and wetlands are located to the west. Maximum elevations of the natural ground surface across the site generally do not exceed about +10 to +15 feet, with typical elevations ranging from about +3 to +8 feet. Several park facilities such as marinas, bathhouses, campgrounds and parking lots are located around the inlet on both the north and south sides. Paved roadways paralleling existing SR1 adjacent to the existing bridge and at about natural grades provide access to these facilities.

3.1.1 South Approach

Existing SR1 on the south side is fairly level following natural grades until it encounters the approach embankment south of the existing bridge. This embankment begins at approximately Station 285+00 and rises to approximately 35 feet at its highest point around Station 295+00. An access road (Route 50A) runs around the base of the embankment, connecting SR1 with the park facilities on either side of SR1. West of SR1, an unpaved parking lot for the campground runs from approximately Stations 293+00 to 297+00. South of the campground, Route 50A runs through a flat, narrow grassy area approximately from Stations 284+00 to 293+00. Adjacent to Route 50A and SR1 to the west are wetlands and tidal marshes with tall cattails, grass, and periodic standing water, extending south past the project boundary. East of SR1, Route 50A separates SR1 from a paved bathhouse parking lot, located from about Stations 287+00 to 295+00. South of this parking lot, the landscape rises with grass covered dunes that slope down to the east, giving way to beach and ocean.

3.1.2 North Approach

Existing SR1 on the north side is also quite level and appears to follow natural grades until it encounters the approach embankment north of the existing bridge. This embankment begins at approximately Station 316+00 and rises to approximately 35 feet at its highest point around Station 305+00. West of SR1, an access road runs approximately from Stations 311+00 to 317+00, connecting SR1 with a large paved parking lot. This parking lot extends approximately from Stations 305+00 to 310+00 and provides parking for beachgoers, campers, and the park office. Adjacent to this parking lot to the west is a flat campground. The land between the access road and SR1 is flat, dry, and sandy with short juniper brush and dune grass. Adjacent to the access road and SR1 to the west are wetlands and tidal marshes with tall cattails, grass, and periodic standing water, extending north past the project boundary. East of SR1, the landscape rises with grass-covered dunes that slope down to the east, giving way to beach and ocean.

3.2 GEOLOGIC CONDITIONS

3.2.1 Regional Geology

The project site is located in the Coastal Plain Physiographic Province. The Coastal Plain consists mainly of marine sediments which were deposited during successive periods of fluctuating sea level and moving shoreline. The formations dip slightly seaward and several are exposed at the surface in bands paralleling the coast. Many beds exist only as fragmental erosional remnants sandwiched between more continuous strata above and below.

The soils in this province are typical of those laid down in a shallow sloping sea bottom; sands, silts, and clays with irregular deposits of shells. Some of the existing formations contain predominantly plastic clays interbedded with strata of sands and poorly consolidated limestone. Others contain predominantly sands and chalky or porous limestone with local lenticular deposits of highly plastic clays.

3.2.2 Site Geology

General subsurface information was obtained from a geologic cross section entitled, *Cross Section of Pliocene and Holocene Deposits Along the Atlantic Coast of Delaware*, by Kelvin W. Ramsey in 1999. Based on this cross section, there are three major formations mapped at the site: Holocene alluvial sand deposits, which are underlain by the Omar Formation, which is in turn underlain by the Beaverdam Formation.

The Holocene alluvial deposits at the site consist of fine to coarse sands, silty sands, and thin layers of organic rich silts with abundant plant fragments. The Omar formation consists of lagoonal, tidal, mash, and spit deposits, in which the dominant lithology is gray clayey sand with scattered shell and organic deposits. The Beaverdam Formation was deposited in fluvial to estuarine environments, and primarily consists of fine to coarse sand interbedded with silty sands, and clayey silts.

3.3 FIELD EXPLORATION PROGRAM

The field exploration program for Stage II of this project was developed with the intention of characterizing the geotechnical parameters of the subsurface soils at the site such that geotechnical issues associated with the construction of the bridge pier and abutment foundations for this project could be evaluated. Borings were located along the proposed roadway alignment with two goals in mind: to refine the general stratigraphy of the site obtained during Stage I; and to gain additional information about the subsurface conditions at specific locations, such as those for proposed bridge piers and abutments.

The field exploration program for this stage of the project consisted of SPT soil test borings, piezocone penetration test (CPTu) soundings, seismic shear wave velocity tests, in-situ pore-pressure dissipation tests, pressuremeter tests, and field vane shear tests. A summary of each is provided in the following sections. The locations of each of the borings and soundings from this stage of the project, as well as those from Stage I, are presented on Figures 2a and 2b in Appendix A.

3.3.1 Soil Test Borings

The field exploration program for this stage of the project consisted of forty SPT soil test borings, drilled by MACTEC and Free State Drilling, Inc. under the field supervision of a geotechnical engineer from our office. The drilling operations were performed in general accordance with ASTM standards, described in Appendix B. The borings ranged in depth from 20 to 175 feet below the existing ground surface. Table 3.3.1.1 presents coordinates, elevations, nearby structures, boring depths, and completion date of the as-drilled boring locations. The soil test borings from Stage I of this project are included in Table 3.3.1.1, as they were also used in the developing our recommendations.

Table 3.3.1.1 As-Drilled Boring Coordinates and Elevations

Boring Number	Nearby Structure	As Drilled Easting (ft)	As Drilled Northing (ft)	As Drilled Elevation (ft)	Depth Completed (ft)	Date Completed
BII-1	Roadway	757458.3	218467.0	+4.0	25	10/02/03
BII-2	Roadway	757433.5	218809.2	+4.0	25	10/02/03
BII-3	Roadway	757301.7	219016.6	+3.5	25	10/17/03
BII-4	Roadway	757277.8	219296.2	+3.5	25	10/16/03
BII-5	Roadway	757483.6	219163.1	+6.0	25	10/20/03
BII-6	Roadway	757258.7	219391.6	+3.5	25	10/16/03
BII-8	Roadway	757397.4	219619.6	+0.5	25	10/16/03
BII-9	Road./Embank	757364.7	219897.0	+2.1	105	10/20/03
BII-10	Road./Embank	757200.5	220090.1	+2.8	110	10/02/03
BII-12	Road./Embank	757173.6	220360.6	+3.0	120	10/16/03
BII-13	Roadway	757393.2	220387.3	+3.8	25	10/13/03
BII-14	Road./Embank	757101.6	220687.4	+0.8	110	10/28/03
BII-15	Road./Embank	757099.4	220482.3	+1.3	94	10/28/03
BII-16	Roadway	757386.9	220924.9	+5.7	25	10/13/03
BII-17	Abutment	757193.1	220968.3	+27.9	125	10/15/03
BII-18	Abutment	757071.7	220990.7	+2.0	170	10/23/03
BII-19	Pier	757094.9	21061.4	+2.9	175	10/31/03
BII-20	Pier	757096.4	221216.6	+3.8	170	12/01/03
BII-21	Pier	757000.1	222088.4	+8.5	60	11/13/03
BII-22	Pier	756978.6	222233.1	+5.1	175	11/04/03
BII-23	Abutment	757066.8	222323.9	+29.5	125	10/14/03
BII-24	Abutment	756910.5	222322.4	+5.6	175	11/25/03
BII-25	Road./Embank	756867.0	222625.6	+4.5	75	10/02/03
BII-26	Road./Embank	756761.1	223122.6	+4.0	75	10/07/03
BII-27	Roadway	756677.6	223639.5	+4.5	25	10/15/03
BII-28	Roadway	756740.2	223859.3	+3.6	20	10/07/03
BII-29	Roadway	756576.5	223920.6	+2.5	25	10/10/03
BII-30	Roadway	756650.3	224267.5	+1.3	25	10/14/03
BII-31	Roadway	756612.1	224661.8	+1.5	25	10/14/03
BII-32	Roadway	756469.8	224842.0	+4.4	25	10/09/03
BII-33	Roadway	756365.2	225040.5	+2.2	25	10/09/03
BII-34	Roadway	756347.3	225215.1	+1.8	25	10/09/03
BII-35	Roadway	756497.4	225251.2	+4.1	25	10/14/03
BII-36	Roadway	756370.2	225654.4	+4.5	25	10/15/03

Table 3.3.1.1 As-Drilled Boring Coordinates and Elevations (con't)

Boring Number	Nearby Structure	As Drilled Easting (ft)	As Drilled Northing (ft)	As Drilled Elevation (ft)	Depth Completed (ft)	Date Completed
SWM-1	S.W.M.	757441.1	219265.7	+4.8	20	10/20/03
SWM-2	S.W.M.	757243.3	219509.7	+2.0	20	10/16/03
SWM-3	S.W.M.	756507.9	224322.6	+1.8	25	10/10/03
SWM-4	S.W.M.	756373.1	225129.5	+2.0	25	10/09/03
BI-1	R.W./EMB	757236.7	219760.5	+2.6	105	8/5/2003
BI-2	R.W./EMB	757226.1	219998.6	+2.6	125	7/21/2002
BI-3	R.W./EMB	757218.9	220224.8	+2.5	110	7/22/2003
BI-4	R.W./EMB	757158.4	220554.4	+2.5	115	7/28/2003
BI-5	ABUTMENT	757163.4	220813.1	+2.6	147	7/31/2003
BI-6	PIER	757050.7	221218.7	+5.6	175	7/16/2003
BI-7	PIER	756953.6	222178.4	+5.8	175	7/16/2003
BI-8	ABUTMENT	756900.4	222500.1	+5.1	100	7/2/2003
BI-9	R.W./EMB	756859.4	222755.1	+4.6	90	6/30/2003
BI-10	R.W./EMB	756807.2	223030.3	+4.0	70	7/20/2003
BI-11	R.W./EMB	756786.5	223228.3	+2.8	100	7/8/2003
BI-12	R.W./EMB	756715.4	223554	+3.5	85	7/25/2003

Standard penetration tests (SPT) were conducted at regular intervals in the borings in general accordance with ASTM D 1586. Ten undisturbed samples were taken during this stage of the project at various depths of 33.5 to 162 feet below existing ground surface.

Visual classification of soil samples was performed in accordance with the Unified Soil Classification System (ASTM D 2488) and AASHTO Classification System (AASHTO M 145). Field classifications were verified by review of the samples brought to our laboratory and by laboratory classification tests. Samples from each split-spoon were also provided to DelDOT for their in-house testing and evaluation.

The subsurface conditions encountered at the boring locations are shown on the soil test boring records in Appendix B and the estimated subsurface profile (Figure 3) in Appendix A. These test boring records and estimated subsurface profile represent our interpretation of the subsurface conditions based on visual examination of field samples by a geotechnical engineer and laboratory tests of the field samples. The lines designating the interfaces between various strata on the test boring records and profiles represent the approximate interface locations. However, the actual transitions between strata may be gradual. Water levels shown on the soil test borings and the profiles represent the conditions only at the time of our exploration unless otherwise stated.

3.3.2 Piezocone Pentration Soundings

Twenty piezocone penetration test (CPTu) soundings were performed by ConeTec, Inc. under subcontract to MACTEC to supplement the SPT soil test borings. CPTu testing consisted of pushing a series of cylindrical rods with a standard size cone at the base into the soil at a constant rate of 2 cm/sec. Continuous measurements of penetration resistance on the cone tip and friction on a friction sleeve were recorded with depth during the penetration. The CPTu includes a pore-pressure transducer to record pore pressures in addition to point (tip) and friction (sleeve) resistance. The CPTu soundings were completed with a 10 cm^2 cone with the pore pressure filter located in the u_2 position.

The near continuous data profile obtained from CPTu soundings has been used to assist in evaluating general stratigraphy, soil type, and various engineering properties of the subsurface materials. A summary of the CPTu soundings, including sounding location and elevation, nearby structures, sounding depths, and completion date is presented in Table 3.3.2.1. The CPTu test reports are provided in Appendix B and CPTu sounding locations are presented in Figures 2a and 2b of Appendix A.

Table 3.3.1.1 Piezocone Sounding Coordinates and Elevations

Boring Number	Nearby Structure	Easting (ft)	Northing (ft)	Elevation (ft)	Depth Completed (ft)	Date Completed
CII-1	Roadway	757350.8	218620.8	+4.0	72	10/02/03
CII-2	Roadway	757421.9	219122.3	+4.0	91	10/02/03
CII-3	Roadway	757399.4	219457.3	+4.0	94	10/02/03
CII-4	Roadway	757376.6	219788.1	+4.0	100	10/02/03
CII-5	Roadway	757225.2	219828.8	+2.5	100	10/02/03
CII-6	Roadway	757372.8	219993.4	+2.5	100	10/02/03
CII-7	R.W./EMB	757168.7	220177.6	+3.0	72	10/01/03
CII-8	R.W./EMB	757340.1	220273.3	+3.7	107	10/02/03
CII-9	R.W./EMB	757047.3	220872.0	+2.0	97	10/01/03
CII-10	R.W./EMB	757198.6	220557.2	+2.7	100	10/01/03
CII-11	R.W./EMB	757158.3	220808.7	+2.1	100	10/01/03
CII-12	PIER/ABUT	757114.8	221063.8	+3.5	104	10/01/03
CII-13	PIER/ABUT	756946.6	222230.5	+5.3	83	09/30/03
CII-14	R.W./EMB	756969.4	222508.1	+3.9	87	09/29/03
CII-15	R.W./EMB	756831.4	222879.5	+4.0	56	09/30/03
CII-16	R.W./EMB	756758.2	223399.9	+4.0	114	09/30/03
CII-17	Roadway	756574.4	224057.7	+4.8	60	09/30/03
CII-18	Roadway	756510.0	224446.5	+4.8	61	09/30/03
CII-19	Roadway	756519.2	225089.4	+4.1	75	09/30/03
CII-20	Roadway	756477.2	225473.0	+4.6	91	09/30/03

3.3.3 Seismic Shear Wave Velocity Testing

Seismic shear wave velocity tests were performed in two of the cone soundings (CII-12 and CII-13). These tests were used to characterize the small strain shear modulus of the subgrade soils. Seismic testing was performed at 1 m intervals over the length of each seismic CPTu sounding. The seismic signals were recorded using a geophone mounted in the cone and a remote digital oscilloscope. A beam hit with a sledgehammer was used as the seismic source. The normal reaction was provided by the weight of the rig resting on the beam. The results of these tests are presented in Appendix C.

3.3.4 Pore-Pressure Dissipation Testing

Six porewater pressure dissipation tests were conducted at selected locations (CII-07, CII-09, CII-10, CII-11 (2 tests), and CII-13) to evaluate the in-situ excess pore-pressure dissipation of the soft clays. The results of these tests are presented in Appendix C.

3.3.5 Pressuremeter Testing

Pressuremeter testing was performed during this stage of the project, as well as during Stage I of the project. The tests were performed by MACTEC at selected elevations in the sands and clays on both the north and south sides of the inlet, ranging in depth from about 16 feet to 108 feet below existing ground surface. These tests were performed in borings BII-19, BII-22, BI-3, and BI-10.

The procedures used to perform these tests, along with summaries of the test results are presented in Appendix C. The data from these tests was used to aid in characterizing the horizontal subgrade reaction of the sands and clays at the site.

3.3.6 Field Vane Shear Testing

Vane shear testing was performed during this stage of the project by MACTEC at selected elevations within the soft clays on both the north and south sides of the inlet, ranging in depth from 43 to 73 feet below existing ground surface. Three of these tests were performed in boring BII-14, and one test in boring BII-22.

The procedures used to perform these tests, along with summaries of the test results are presented in Appendix C. The data from these tests was used to aid in characterizing the shear strength of the soft clays at the site.

3.3.7 Ground-Water Monitoring

Monitoring wells consisting of 1.5-inch diameter slotted PVC pipe were installed at eight locations across the site: four on the north side of the inlet, and four on the south side. These wells were installed in or near borings BI-2, BI-6, BI-7, BI-11, SWM-1, SWM-2, SWM-3, and SWM-4. Ground-water measurements were taken in each of these wells after a period of time sufficient for stabilization of the ground-water level. These measurements are given below in Table 3.3.6.1.

Table 3.3.6.1 Ground-Water Level Measurements

Well ID	Date of Reading	Water Level Depth (feet)	Water Level Elevation (feet)
BI-2	August 2003	2.0	+0.6
	September 2003	1.4	+0.0
	November 2003	1.6	+0.2
BI-6	August 2003	5.5	+0.1
	September 2003	2.5	+3.1
	November 2003	No Reading	No Reading
BI-7	August 2003	No Reading	No Reading
	September 2003	1.1	+4.7
	November 2003	No Reading	No Reading
BI-11	August 2003	1.6	+1.2
	September 2003	2.6	+0.2
	November 2003	1.4	+1.4
SWM-1	November 2003	1.4	3.4
SWM-2	November 2003	0.9	1.1
SWM-3	November 2003	1.0	0.8
SWM-4	November 2003	1.1	0.9

3.4 LABORATORY TESTING PROGRAM

The laboratory testing performed by MACTEC for this stage of the project consisted of the following tests on samples obtained during our drilling operations:

- Classification and index property tests
- Consolidation testing
- Shear strength testing
- Physiochemical testing

The following paragraphs discuss the five types of laboratory testing performed. The results of the laboratory tests performed during this stage of the project along with brief descriptions of the laboratory test procedures used are presented in Appendix C. Laboratory test results from Stage I of this project are also presented in Appendix C.

3.4.1 Classification and Index Property Testing

The classification and index property tests were performed on representative soil samples obtained from the test borings in order to aid in classifying the soils according to the Unified Soil Classification System and AASHTO Classification System and to quantify and correlate engineering parameters. Table 3.4.1.1 summarizes the classification and index property tests performed for this phase of the project.

Table 3.4.1.1 – Summary of Classification and Index Testing

Test Description	Number of Tests Performed	
	Stage I	Stage II
Water Content	39	106
Atterberg Limits (Liquid and Plastic Limits)	30	37
Sieve Analysis	30	33
Organic Content	4	6

3.4.2 Consolidation Testing

One-dimensional consolidation tests were performed on six undisturbed soil samples obtained during Stage II and four undisturbed samples obtained during Stage I of this project. The consolidation tests were performed to evaluate the compression characteristics of the soft clay soils encountered during the exploration under applied vertical stress. One undisturbed sample from boring BI-7 was trimmed and compressed in the horizontal direction to evaluate the possible differences in horizontal and vertical consolidation characteristics of the clay.

3.4.3 Shear Strength Testing

Consolidated-undrained (CU) triaxial shear tests were performed on four undisturbed soil samples obtained during Stage II and three undisturbed soil samples obtained during Stage I of this project. The CU triaxial shear tests were performed to evaluate the stress-strain characteristics and strength values of the soft clay soils encountered during the exploration.

3.4.4 Physiochemical Testing

Sulfate and chloride ion content tests were performed on selected samples from three borings completed during Stage II of this project. Resistivity and pH tests were performed on two selected samples from Stage I. These tests used to characterize the corrosive/reactivity effects which the soils may have on concrete and metal, respectively.

4.0 SOIL STRATIGRAPHY

4.1 GENERAL

The soil test borings encountered four distinct soil strata within each respective termination depth. The soils encountered on the site consisted of both fine-grained (cohesive) and granular (cohesionless) soils of widely varying stiffness and relative density. The following section describes the type and general nature of each stratum.

4.2 STRATIFICATION

A review of the general subsurface conditions is presented in the following subsections. This review describes the general characteristics encountered in the borings for the major soil strata encountered.

4.2.1 Upper Sands (Stratum 1)

The soils of Stratum 1 are alluvial sand deposits consisting mainly of medium dense to dense fine to coarse sands (SP), and silty sands (SM). These soils were encountered directly beneath the ground surface or a thin layer of topsoil in each boring. Thin (<1 inch), organic-rich silt beds were encountered in some of the borings. Fine to coarse gravel and shell fragments in varying amounts were common constituents. SPT N-values ranged in Stratum 1 from 2 blows per foot (bpf) to 97 bpf, and averaged about 32 bpf. Stratum 1 ranged in thickness from about 23 feet to about 46 feet, generally thickening slightly to the north.

Laboratory classification tests were performed on samples obtained from this stratum. These tests indicate that the percent fines ranged approximately from 1 percent to 38 percent, with an average of approximately 8 percent. Natural moisture contents in this stratum ranged approximately from 3 percent to 32 percent, and averaged about 18 percent. Samples tested from this stratum were non-plastic.

4.2.2 Soft Clays (Stratum 2)

The soils of Stratum 2 were encountered beneath Stratum 1 in each of the borings extended to sufficient depths. These soils are lagoonal, tidal, and/or marsh deposits consisting of dark gray highly plastic clay (CH), lean clay (CL), and elastic silt (MH). Fine to coarse sand, shell fragments, and plant fragments in varying amounts were common constituents. Occasional relatively thin layers of peat were encountered near the bottom of this stratum. SPT N-values in Stratum 2 ranged from weight of hammer (WOH) to 12 bpf. However, typical values ranged from WOH to 4 bpf and averaged about 2 bpf, except at the far northern portion of the site where higher blow counts were encountered. Stratum 2 ranged in thickness from about 5 feet to about 30 feet on the north side of the inlet tapering out to the north. On the south side of the inlet, the thickness of Stratum 2 was fairly consistent, ranging approximately from 50 feet to 63 feet thick.

Laboratory classification tests were performed on selected samples obtained from this stratum. These tests indicate that the percent fines ranged approximately from 74 percent to 100 percent, with an average of approximately 94 percent. Natural moisture contents in this stratum ranged approximately from 26 percent to 68 percent, and averaged about 52 percent. Liquid limits (LL) in Stratum 2 ranged approximately from 32 to 93, and averaged about 55. Plasticity indices (PI) ranged approximately from 11 to 64, and averaged about 38. Organic content tests performed on samples from Stratum 2 show organic contents ranging from approximately 7 percent to 9 percent. The organic content of a peat layer encountered near the bottom of Stratum 2 on the north side of the inlet was about 42 percent.

4.2.3 Lower Sands (Stratum 3)

The soils of Stratum 3 were encountered beneath Stratum 2 in several borings. These soils are fluvial to estuarine deposits consisting mainly of medium dense to very dense fine to coarse sands (SP) and silty sands (SM or SP-SM). Thin beds of sandy silt and clay were encountered in Stratum 3 in various borings. Fine to coarse gravel and shell fragments in varying amounts were common constituents. SPT N-values in Stratum 3 ranged from 2 bpf to more than 100 bpf, and averaged about 30 bpf.

Laboratory classification tests were performed on selected samples obtained from this stratum. These tests indicate that the percent fines ranged approximately from 5 percent to 29 percent, with an average of approximately 14 percent. Natural moisture contents in this stratum ranged approximately from 17 percent to 35 percent, and averaged about 22 percent. The samples tested from this stratum were non-plastic.

4.2.4 Sandy/Silty Clays (Stratum 4)

The soils of Stratum 4 were encountered beneath Stratum 3 in the deeper borings. These soils consist mainly of loose to medium-dense clayey sands (SC) and firm to stiff sandy clays (CL) with a few samples near the boundary between Stratum 3 and Stratum 4 classifying as fat clay (CH). SPT N-values in Stratum 4 ranged from 1 bpf to 15 bpf, and averaged about 7 bpf.

Laboratory classification tests were performed on samples obtained from this stratum. These tests indicate that the percent fines ranged approximately from 32 percent to 94 percent, with an average of approximately 59 percent. Natural moisture contents in this stratum ranged approximately from 16 percent to 30 percent, and averaged about 23 percent. LL values ranged approximately from 21 percent to 51, averaging about 29 percent. PI values ranged approximately from 8 percent to 18, averaging about 13 percent.

5.0 GEOTECHNICAL RECOMMENDATIONS

5.1 EVALUATION OF FOUNDATION ALTERNATIVES

Based on the loading conditions imposed by the bridge on the foundations, we expect that the proposed piers and abutments will require deep foundations to support the substructure loads due to the compressible clay layer underlying the site. Several deep foundation types are feasible for support of the bridge, including drilled shafts or large-diameter driven piles bearing in the dense sands beneath the clay layer. The following subsections provide an evaluation of the various possible foundation types to assist the structural engineer and owner in the selection of the most appropriate foundation system for the project.

5.1.1 Axial Capacity

As indicated previously, each pier for the new bridge will be required to support a vertical axial load of approximately 60,000 kips. Maximum axial loads at the abutments have not been provided at this time; however, the 30 percent plans indicate that eighteen large-diameter foundation elements are planned at each abutment. We understand that FIGG originally was assuming approximately 1,000 kips capacity per foundation element for preliminary design, so this would correspond to a maximum axial load of about 18,000 kips at each abutment.

Various sizes of drilled shafts, driven steel pipe piles and large-diameter cylinder piles were analyzed to determine allowable axial capacities. Drilled shaft capacities were evaluated using various methods, including FHWA's *Drilled Shafts: Construction Procedures and Design Methods* (FHWA-IF-99-025). Empirical methods proposed by Touma and Reese, Quiros and Reese, and Reese and O'Neill were also considered. In addition, several "direct" methods of drilled shaft capacity analyses based on CPT data were evaluated. These included methods proposed by Fiorvante et al. for end bearing and Mayne; Takesue; Fiorvante et al.; and Elslami and Fellenius for side resistance. The results of these analyses were plotted verses depth to determine the range and average values. Based on the results of these analyses, recommended design parameters were developed for unit side resistance and end bearing.

Driven pile analyses were performed for various sizes of steel pipe piles and concrete cylinder piles. The side resistance for the piles was determined using FHWA's *Design and Construction of Driven Pile Foundations* (FHWA-HI-97-013). Based on discussions with various contractors, we anticipate that it may be necessary to jet large diameter cylinder piles (and possibly the pipe piles) to close to the required tip elevation before driving them to the acceptance criteria with an impact hammer. Limited research published on the impacts of jetting indicate that disturbance can extend to 15 to 20 feet or more beyond the pile perimeter depending on soil type. This will result in significant disturbance to the soils around the piles being installed as well as previously installed piles. As such, we have used a reduced side resistance value in determining the allowable pile capacities. It is anticipated these piles will be driven open ended and filled with concrete at the completion of driving. Since this in effect creates a permanently cased drilled shaft, unit end bearing capacities were determined based on the drilled shaft methods listed above.

Drilled shaft and pile allowable design capacities verses depth (elevation) are presented for each abutment and pier in Figures 4 through 7 in Appendix A. The pier capacity plots assume that a "flexible" foundation system is utilized as discussed in Section 5.1.2, and the abutment capacity plots include reductions for downdrag as discussed in Section 5.1.4. A factor of safety of 2.0 was used in developing the allowable design capacities based on the assumption that a load test program similar to that recommended in Section 5.2.3.3 is implemented. Note that the capacity plots for the abutments indicate that some capacity is available above the soft clay layer; however, foundation elements should extend through the clay and bear in the Stratum 3 sands as the approach fills will create significant settlements of the clay of Stratum 2.

5.1.2 Lateral Loading

As mentioned previously, maximum lateral deflections on the order of 3 inches are anticipated at the bridge piers. The medium-dense to dense sands of Stratum 1 will provide significant resistance to the deflections imposed at each pier. In order to reduce the force that these deflections will induce on the bridge superstructure, we recommend that a "flexible" foundation system be utilized such that minimal lateral resistance is provided in the longitudinal direction above the Stratum 2 clay layer. This can be done by various means, such as providing a "free-standing column" within the Stratum 1 sand, installing sets of sheet piles along either side of the foundation elements and excavating between them, utilizing foundation elements that are more flexible in the longitudinal direction (i.e., barrette foundation), etc. Based on the site conditions

and deflection requirements, we anticipate that the "free-standing" column similar to the schematic presented in Figure 8 of Appendix A will be the most practical option from a constructability standpoint. We understand that a similar foundation system was used on the Charles River Bridge in Boston to eliminate the potential for lateral forces on a subway tunnel located about 60 feet below the ground surface. The drilled shaft and driven pile capacity plots presented in Figures 5 and 6 in Appendix A assume that no side resistance is available above the Stratum 3 sands due to the implementation of the flexible foundation system.

The planned pile cap for the piers will also be required to support a crane during construction of the arch. We understand that current plans call for an 85-foot wide, 155-foot long, and 10-foot thick cap with bottom elevation at around -5 feet. This massive cap will also provide significant resistance to lateral deflections if no measures are taken to isolate it from the Stratum 1 sands in the longitudinal direction. We anticipate that this isolation can be provided by installing sheet piles on either side of the footing in the longitudinal direction approximately 6 to 12 inches beyond the dimensions required. Temporary forms (or some other compressible materal) can be placed against the sheet pile walls in the longitudinal direction so that adequate flexibility is provided. A schematic of this system is presented in Figure 9 in Appendix A; however, actual details for this system should be developed during final design. A detail will also need to be developed to ensure that the outer casing of the "flexible" foundation element is not structurally connected to the foundation cap.

Analyses of lateral loading conditions are soil-structure interaction problems that generally require finite element or finite difference software programs to evaluate. Various programs have been developed to perform these analyses, including GROUP (Ensoft, Inc.) and FB-Pier (Bridge Software Institute). FB-Pier has the advantage that it allows modeling of the substructure and superstructure at the same time. Given the complexity of the foundation system, loading, and deflections induced, we recommend that the FB-Pier program be used to design the foundations for lateral loading. Recommended soil design parameters are provided in Table 5.1.2.1 to assist the structural engineer in this process.

Table 5.1.2.1 Summary of Design Soil Parameters

Soil Layer	Stratum	Side of Inlet	Elevation (ft) Top	Elevation (ft) Base	Soil Layer Thickness (ft)	Effective Unit Weight (pcf)	Effective Friction Angle φ′ (deg)	Undrained Shear Strength (psf)	Horizontal Subgrade Modulus k_h (pci)	Soil Strain ε_{50}	Soil Shear Modulus (ksf)	Poisson's Ratio υ	Allowable Side Resistance (ksf)	FB-Pier Soil Model No.
Med. Dense Sand (unsat.)	1	NS	+5	0	5	120	32	0	90	N/A	850	0.32	0.36	1 or 2
		SS	+5	0							1200			
Med. Dense Sand (sat.)	1	NS	0	-15	15	55	32	0	60	N/A	850	0.32	0.95	1 or 2
		SS	0	-15							1200			
Dense Sand	1	NS	-15	-25	10	65	34	0	125	N/A	2250	0.30	1.35	1 or 2
		SS	-15	-30	15						2050			
Soft Clay	2	NS	-25	-50	25	40	0	400	20	0.02	600	0.45	0.17	4
		SS	-30	-85	55						750			
Med. Dense Sand	3	NS	-50	-63	13	60	32	0	60	N/A	3350	0.32	1.00	1 or 2
		SS	N/A	N/A	N/A						N/A			
Dense Sand	3	NS	-63	-133	70	65	38	0	125	N/A	4300	0.30	1.50	1 or 2
		SS	-85	-131	46						3650			
Clayey Sand	4	NS	-133	-143	10	55	35	N/A	500	0.005	1600	0.3	1.00	5
		NS	-154	-170	16									
		SS	-131	-160	29									
Dense Sand	3	NS	-143	-154	11	75	40	0	125	N/A	2000	0.3	1.50	1 or 2
		SS	-160	-170	10									

5.1.3 Uplift Loading

We understand that the abutment foundations will be used as support anchors during construction of the arch and may be subjected to uplift loads. Recommended allowable uplift capacities were determined based on a minimum factor of safety of 3.0. Figures 4b, 4d, 7b and 7d provide recommended allowable uplift capacities for the various foundation types considered.

5.1.4 Downdrag Considerations

The approach embankments for the bridge will be on the order of 40 feet high at the abutments. These fills will result in significant consolidation of the soft clays of Stratum 2. Preconsolidation and surcharging with prefabricated-vertical drains will be used to improve the soils and minimize post-construction settlements. However, we understand that the construction schedule will require the abutments to be constructed before settlements are complete so that construction of the arch can proceed. As such, the soils above and within the clay layer will move down relative to the abutment foundation elements and will induce additional downdrag loads. The allowable axial capacity plots in Figures 4a, 4c, 7a, and 7c include reductions for these anticipated downdrag loads. If additional axial capacity is required, then measures to minimize or mitigate downdrag loads can be employed. Our analyses indicate that towndrag loads at the pier foundations are not anticipated due to the distance from the approach embankments.

5.1.5 Constructability Considerations

The foundation systems planned for the piers will be complex and will require experienced contractors to successfully construct. Also, we understand that DelDOT has limited experience with drilled shaft foundations. It will be necessary to develop detailed special provisions for these foundations that adequately address the construction and functional capability requirements of the project. Details for the “flexible” foundation system will also need to be developed. Given the complexity of the construction required, consideration should be given to pre-qualifying foundation subcontractors or at least imposing minimum experience requirements for the subcontractor firm and crew.

If piles are used and jetting is required, then the impacts of the jetting operations on existing facilities should be considered. While the existing bridge is outside the zone of influence of the piles, the jetting operations will result in disturbance of the Stratum 2 clays and may cause additional consolidation to occur beneath the existing bridge approach embankment and adjacent access roads and parking lots. These settlements could present traffic hazards, impact existing utilities, etc. Therefore, consideration will need to be given to specific locations where jetting operations may be allowed.

5.1.6 Cost Estimates

Very limited to no historical cost data is available for the various foundation types due to the complexity of construction and/or limited local experience. We have spoken to selected pile and drilled shaft contractors to get a "ballpark" estimate of anticipated unit costs in order to compare the foundation systems being considered. Based on these discussions, we anticipate that the cost of 1-inch thick permanent steel casings will on the order of $550 to $650 per foot for a 5- to 6-foot diameter drilled shaft. The cost to install large-diameter steel pipe piles is estimated to be on the order of $600 to $650 per foot for similar diameter piles. Cylinder piles may be on the order of $200 to $300 per foot installed for 54- and 66-inch diameter piles; however, this cost could increase significantly if jetting is not allowed. The cost to excavate the drilled shafts or inside of the driven piles and backfill with concrete is expected to be on the order of $500 to $600 per foot. Note that these costs do not include mobilization costs.

Due to the complexity of the foundation systems required, cost alone should not be the ultimate consideration on the selection of the foundation system. If the unit rates above are used in developing the engineer's estimate for the project, we recommend that a contingency of at least 25 percent be added to these costs to account for uncertainties in bids, limited experience by contractors, etc.

5.2 FOUNDATION RECOMMENDATIONS

The information presented above has been considered in the evaluation of the various foundation types and in preparation of our recommendations. The following sections provide detailed recommendations for the pier and abutment foundations.

5.2.1 Pier Foundations

We recommend that the piers be supported on constant diameter drilled shafts bearing in the dense sands of Stratum 3. Based on discussions with FIGG, we recommend that 6-foot diameter shafts be used with 5-foot diameter "free standing" columns above the clay layer. We recommend that these shafts be installed to obtain a minimum allowable axial capacity of 1,000 kips. This corresponds to a minimum tip elevation of -110 feet at both pier locations. Our analyses indicate that shafts bearing at this elevation will be above the zone of influence of Stratum 4, where lenses of softer and/or looser sandy clays and clayey sands were encountered. It is possible to increase the length of the pier shafts to obtain higher capacities if desired; however, we recommend that shafts bear above elevation -120 to -125 to minimize the potential to induce additional settlements in the Stratum 4 soils.

5.2.2 Abutment Foundations

We recommend that 6-foot constant diameter drilled shafts also be used to support the abutments. These shafts should be able to obtain an allowable axial capacity of 1,000 kips bearing at a minimum tip elevation of -125 feet at the south pier and -95 feet at the north pier. These allowable working loads have been reduced to account for anticipated downdrag forces on the shafts. The shafts at these locations will need to provide uplift resistance as well since they will be used to anchor temporary towers during construction of the precast bridge segments. We anticipate that allowable uplift capacities on the order of 800 kips per shaft at each abutment. The allowable uplift values include the buoyant weight of the shafts, but do not include downdrag forces since these will act to resist the uplift loads.

Higher capacities and/or shallower tip elevations may be achieved if measures are taken to minimize or mitigate the downdrag forces on the shafts. This could be achieved by applying bitumen to the casing through the Stratum 1 sands, constructing a "free standing" column system similar to that proposed for the piers, or by other means. However, these mitigation methods will also reduce the uplift capacities of the shafts as side resistance will be reduced or eliminated within the upper sands.

5.2.3 Foundation Construction Recommendations

5.2.3.1 Drilled Shaft Installation

Drilled shaft capacities are greatly affected by construction methodology. Most design procedures, including the FHWA methods, are based on empirical data from load tests of shafts installed with conventional construction methods. Inexperienced contractors and/or poor construction techniques can result in significantly reduced capacities from those calculated by current design procedures. As discussed above, prequalification and/or minimal experience requirements for drilled shaft contractors should be considered given the complexities and limited drilled shaft experience in this area.

We anticipate that drilled shafts will be constructed using a "wet" or slurry method due to the high ground water and sandy soils at the site. The wet method of drilled shaft construction utilizes bentonite or polymer slurry to stabilize the shaft excavation prior to concrete placement. Concrete will need to be placed by tremie to reduce the potential for segregation of the aggregate when using the wet method of construction.

Temporary artesian conditions were encountered on the north side of the bridge at boring BII-21 directly beneath the Stratum 2 clay (at about elevation -55 feet). In addition, gravels and cobbles were encountered in this area from about elevation -90 to -100 feet. The drilled shaft contractor should be aware of these issues and prepared to address them if encountered during construction.

5.2.3.2 Drilled Shaft Inspection

Direct inspection of the shaft excavation is not possible when using the wet method; however, it is possible to use various remote inspection methods to ensure quality construction. We recommend that consideration be given to using a system such as the Shaft Inspection Device (SID) or Mini-SID developed by the Florida Department of Transportation. As with drilled shaft contractors, experienced drilled shaft inspectors are critical to the success of most drilled shaft projects. Procedures for inspecting drilled shaft construction will vary by project depending on construction methodology, the contractor's crew's experience, subsurface conditions, load test results, etc. Therefore, it is important that the drilled shaft inspector be well experienced in various construction methodologies so that the best inspection procedures for this project can be developed to ensure the successful installation of the drilled shafts.

Close observation and monitoring by a geotechnical engineer familiar with the subsurface conditions at the site and considerable experience with foundation installation procedures is considered necessary during construction in order to confirm that the foundations are installed satisfactorily to meet the design intent and criteria.

During shaft installation, the engineer should:

- Confirm that the shafts are within the tolerances for location and verticality
- Measure and record the shaft dimensions, including elevations of top and bottom of casing
- Record the shaft tip elevation
- Confirm that the shaft slurry or drilling fluid has been properly cleaned of cuttings prior to concreting
- Confirm that soil and ground-water intrusion is properly controlled
- Monitor concreting of the shaft for any unexpected loss of concrete into voids. The drilled shaft inspector should also log and record the soil and rock strata encountered by the drilling process to confirm that the shafts have penetrated the anticipated load bearing materials. Reinforcing steel placed in the shafts should be checked by the geotechnical engineer prior to installation into the shaft for compliance with plans and specifications.

Particular attention is required during concrete placement in order to confirm that a structurally sound and continuous shaft has been constructed. A representative number of concrete test cylinders should be formed each day of installation, with a minimum of one set of four test cylinders per shaft for subsequent laboratory compressive strength testing.

Crosshole sonic logging (CSL) testing should be performed on a representative number of shafts and in instances where questions arise about the shaft integrity during or after installation. We recommend that a minimum of 10 percent of the drilled shafts be CSL tested to provide a baseline for comparison with shafts with potential anomalies. In addition, CSL testing should be performed on all technique and load test shafts. CSL test results should be reviewed by a qualified engineer experienced in the interpretation of non-destructive testing results.

5.2.3.3 Technique Shafts and Load Testing

We recommend that the contractor be required to construct one technique shaft on each side of the bridge to verify that his proposed installation method can achieve the required results. Technique shafts should be constructed prior to installation of dedicated load test shafts or production shafts and should utilize the same means and methods to be used for production shafts. One technique shaft should be constructed using the "free-standing" column method planned for the piers, and the other technique shaft should use conventional construction methods as planned for the abutments. CSL testing should be performed on these shafts prior to approving the contractor's method of installation.

Drilled shaft capacities and corresponding lengths may vary significantly based on designs from load test data versus conventional design procedures. Axial load tests should be performed to verify that the contractor's construction methods can produce the required minimum shaft capacities and confirm the design assumptions. A full-scale, instrumented production-phase load testing program for drilled shafts is highly recommended for this project for the following reasons:

- To confirm the minimum factor of safety with regard to the recommended drilled shaft design.
- To confirm that the installation techniques employed by the selected drilled shaft contractor can successfully produce a drilled shaft that will support the anticipated design loads in accordance with the project specifications.
- To provide settlement information of the tested shafts under various test loads which may be used to confirm or refine the predicted settlement estimates for remaining production shafts under the design working loads.

The test shafts should be instrumented with strain gauges to allow delineation of the side resistance components of the various strata. The test loads should be provided by Osterberg cells (O-CELLs). Installation and testing should be performed under the direction of the geotechnical engineer by a specialty subcontractor experienced in O-CELL load testing. The load test results should be reviewed by the geotechnical engineer prior to approving the contractor to begin installation of production shafts.

We recommend that Statnamic tests not be used for this project. Statnamic testing may result in significant load shed in the Stratum 1 sands (of which the capacity contribution is being neglected in design due to downdrag) for the conventional abutment test shaft, and adequate load may not reach the base of the shaft. In addition, it is possible that the loading from the Statnamic test could damage the "free-standing" column portion of the pier test shaft, particularly if loading is not in complete alignment with the centerline of the column.

5.3 ABUTMENT WALLS

The proposed abutment walls will be required to resist lateral soil pressure. These walls may be designed to resist an active earth pressure condition assuming that the top of the walls can rotate and/or translate. For a 40-foot high wall, we anticipate that rotation of about 1 ½ to 2 inches will be necessary at the top of the wall to fully mobilize active conditions. We recommend using an active earth pressure coefficient of 0.33 assuming a sandy backfill with minimum friction angle of 30 degrees and unit weight of 125 pounds per cubic foot.

If the top of the wall is not permitted to rotate or translate, or in areas where corners are fixed, the walls should be designed to withstand at-rest earth pressures. We recommend that an at-rest earth pressure coefficient of 0.5 be used in these cases. Where rotation or translation is between 0 and 1 ½ inches, then earth pressures will be between the at-rest and active state.

We recommend that passive earth pressures be neglected in design of the abutment walls due to the potential for scour and the magnitude of movement required to fully mobilize these pressures.

5.4 OTHER GEOTECHNICAL CONSIDERATIONS

5.4.1 Scour

MACTEC was provided with a draft Scour Evaluation Report prepared by FIGG and dated December 9, 2003. Based on this report, we understand that maximum scour depths for the 100-year event are anticipated to be around 11 feet at the abutments and 23 feet at the piers. Scour depths for the 500-year event were not provided; however, based on our experience, we anticipate that these values will be no more than 70 percent higher than the 100-year scour depths.

The bridge foundations will need to be designed based on the 100-year scour depths and checked for stability (i.e., factor of safety ≥ 1.0) with the 500-year scour depths. Scour at the abutments will be limited to the upper sands of Stratum 1 for both the 100- and 500-year events. Scour at the piers will extend to about elevation -20 feet for the 100-year event and about -40 feet for the 500-year event. The soils above these scour depths are not contributing to the capacity of the abutment foundations so scour is not a controlling factor in design. If design scour depths increase significantly at the piers, we should be notified so as to review the foundation design capacities and make modifications as necessary.

5.4.2 Construction Impacts on Adjacent Facilities

Based on the locations of the proposed bridge abutments and piers, we do not anticipate significant impacts on the existing bridge or other nearby structures during construction. However, as discussed previously, activities such as jetting of piles (if performed) can induce settlements that may impact the approach roadways for the existing bridge, adjacent roads, parking areas, and existing utilities.

Although we do not anticipate impacts to the existing nearby structures, we recommend that a pre-existing condition survey be performed for the bridge and park facilities in close proximity to the proposed bridge. This survey should include photographs and documentation of existing cracks, distress, and/or other damage to these facilities prior to initiation of construction activities. This survey can then serve as a baseline in assessing possible damage claims during construction.

5.4.3 Seismic Considerations

Based on the map of horizontal acceleration (A) presented in AASHTO's Standard Specifications for Highway Bridges, 17th Edition, the project site is located in a zone with mapped acceleration coefficient of 0.05 g. This value represents the peak horizontal ground acceleration in rock with a 10 percent probability of exceedence in 50 years (10%/50), corresponding to a recurrence interval of about 500 years. The USGS Earthquake Hazard Program website indicates that the peak ground acceleration for "soft rock" is about 0.02 g for the 10%/50 value and 0.06 g for the 2%/50 value (corresponding to a recurrence interval of about 2,500 years). The medium-dense to dense sandy soils of Stratum 1 are not considered to be susceptible to liquefaction. However, the soft clays at the site may amplify ground motions at the surface, and the potential effects of this amplification should be considered in the design of the structure.

5.4.4 Soil Corrosivity/Reactivity Considerations

Corrosivity and reactivity of the site soils were evaluated from laboratory resistivity, pH, chlorides, and sulfates content tests. The results of these tests indicate that the soils at the site are generally relatively neutral (pH from about 6 to 8), although resistivity values are rather low (approximately 200 to 500 ohm cm for in-situ moisture contents). Chloride contents range from about 30 to 100 parts per million (ppm), and sulfates range from about 30 to 2,000 ppm within the sands of Stratum 1. The potential for corrosion of metal structures, such as the steel pipe piles or casing, should be considered in the final design of the bridge foundations.

6.0 BASIS FOR RECOMMENDATIONS

The recommendations provided are based in part on project information provided to us, and they only apply to the specific project and site discussed in this report. If this information is incorrect or if additional information is available, the correct or additional information should be conveyed to us for review and possible modification to our report.

Regardless of the thoroughness of a geotechnical exploration, there is always a possibility that conditions between borings will be different from those at specific boring locations and that conditions will not be as anticipated by the designers or contractors. In addition, the construction process may itself alter soil conditions. Therefore, experienced geotechnical personnel should observe and document the construction procedures used and the conditions encountered during construction. Unanticipated conditions and inadequate procedures should be reported to the design team along with timely recommendations to solve the problems created.

We recommend that this complete report be provided to the various design team members, the contractors and the project owner. Potential contractors should be informed of this report in the "Instructions to bidders" section of the bid documents. The report should not be included or referenced in the actual contract documents.

7.0 REFERENCES

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Scale: Not To Scale.

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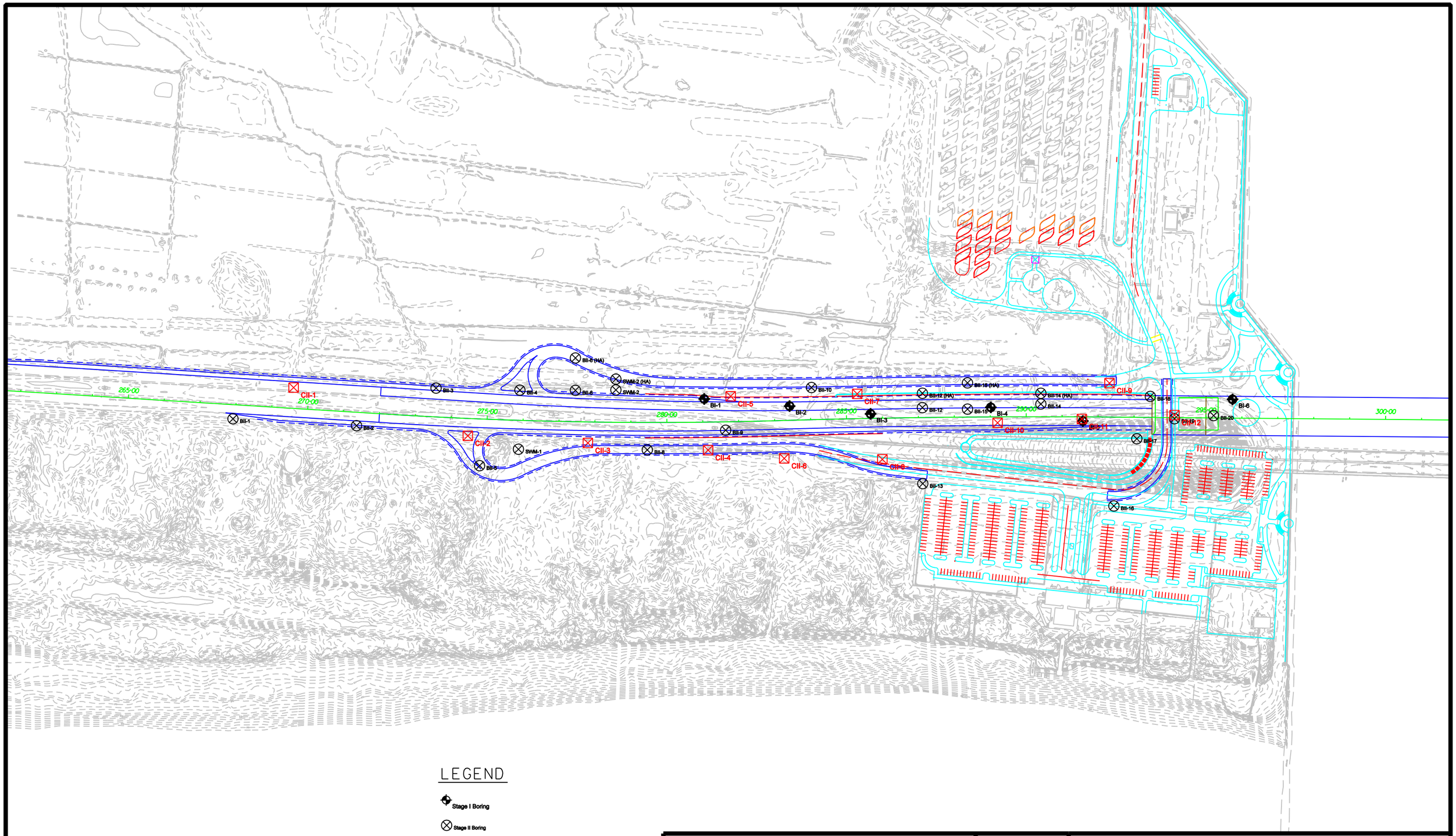
FIGURE 1

SITE VICINITY MAP
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003



LEGEND

Stage I Boring

Stage II Boring

Stage II Cone Sounding

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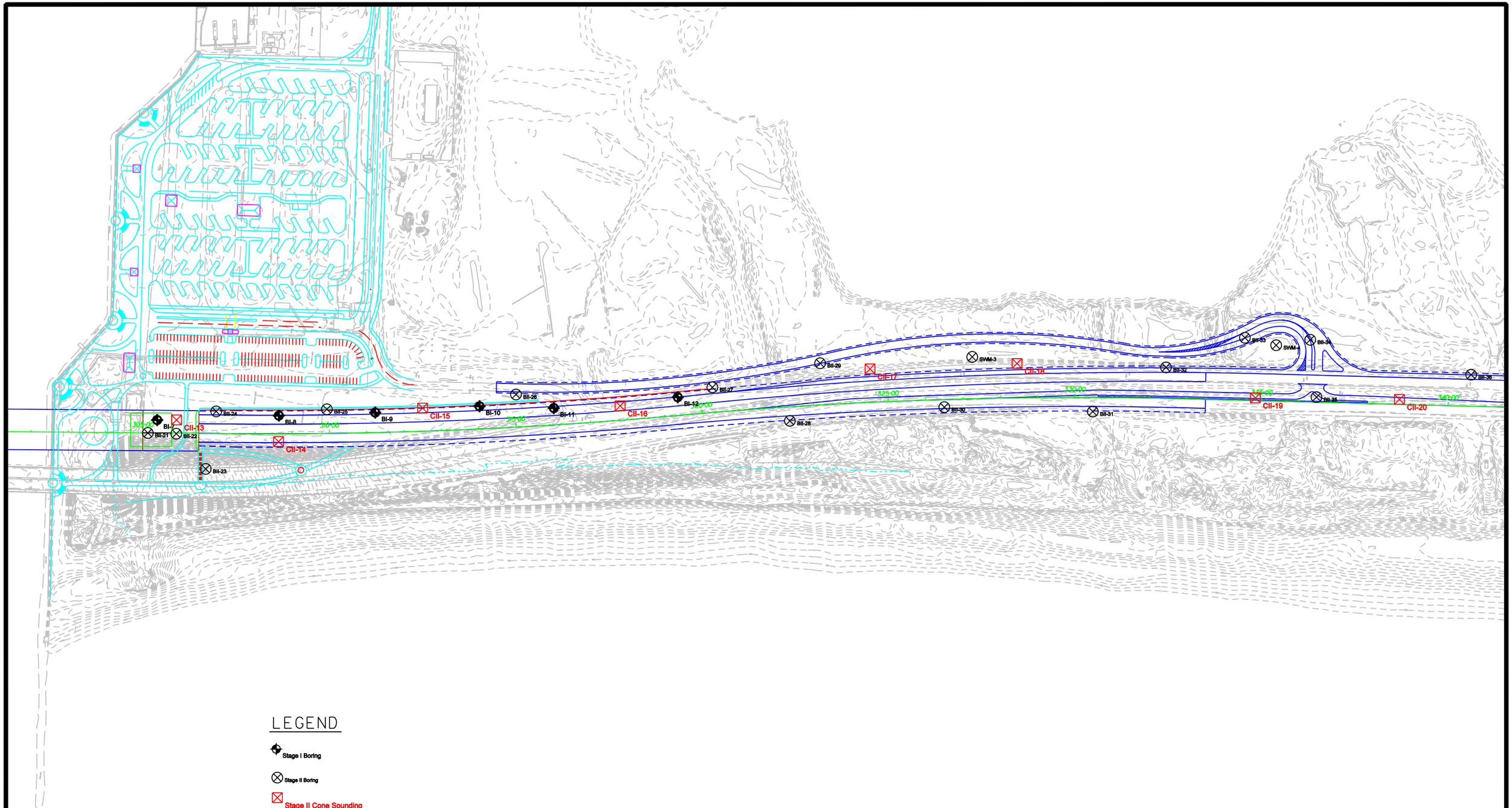
Des. by	C.E.B.
Drn. by	A.J.A.
Rev. by	C.E.B.

FIGURE 2a
BORING LOCATION PLAN - SOUTH

3530-03-1245.02	December 24, 2003	1" = 250'

...\Site Layout.dgn 12/19/2003 11:48:12 AM



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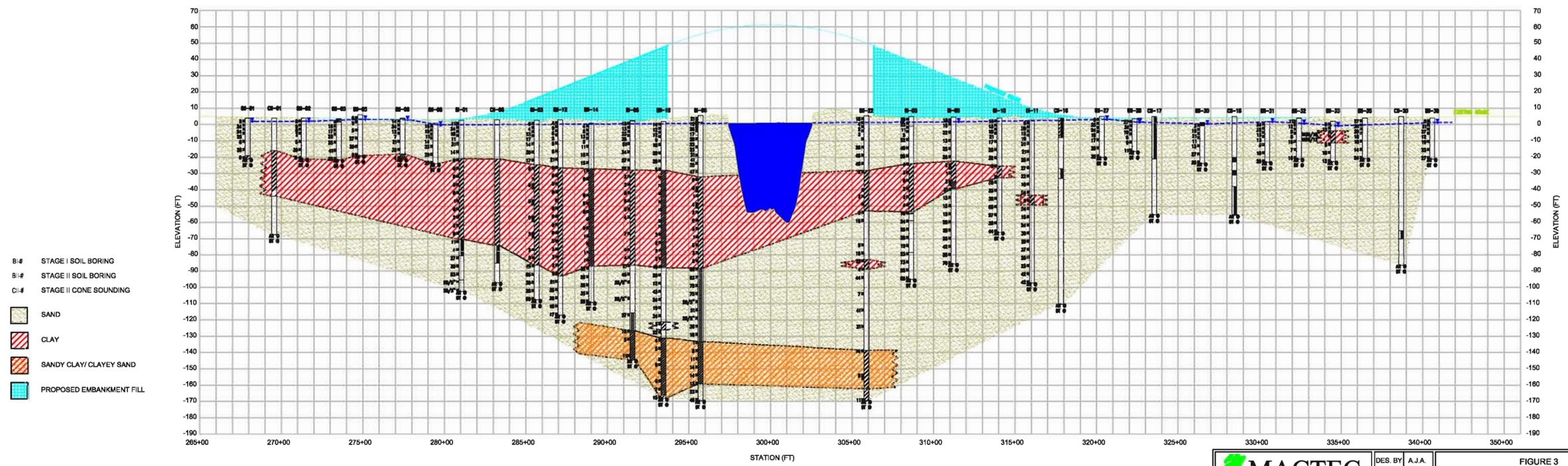
Des. by	C.E.B.
Dm. by	A.J.A.
Rev. by	C.E.B.

FIGURE 2b
BORING LOCATION PLAN - NORTH

3530-03-1245.02	December 24, 2003	1" = 250'

...\Site Layout.dgn 12/19/2003 11:51:52 AM



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1606 OWNBY LANE RICHMOND, VIRGINIA

DES. BY	A.J.A.	FIGURE 3 ESTIMATED SUBSURFACE PROFILE
DRN. BY	C.W.A.	
REV. BY	C.E.B.	3530-03-1245.02 / 12/24/03 / NOT TO SCALE

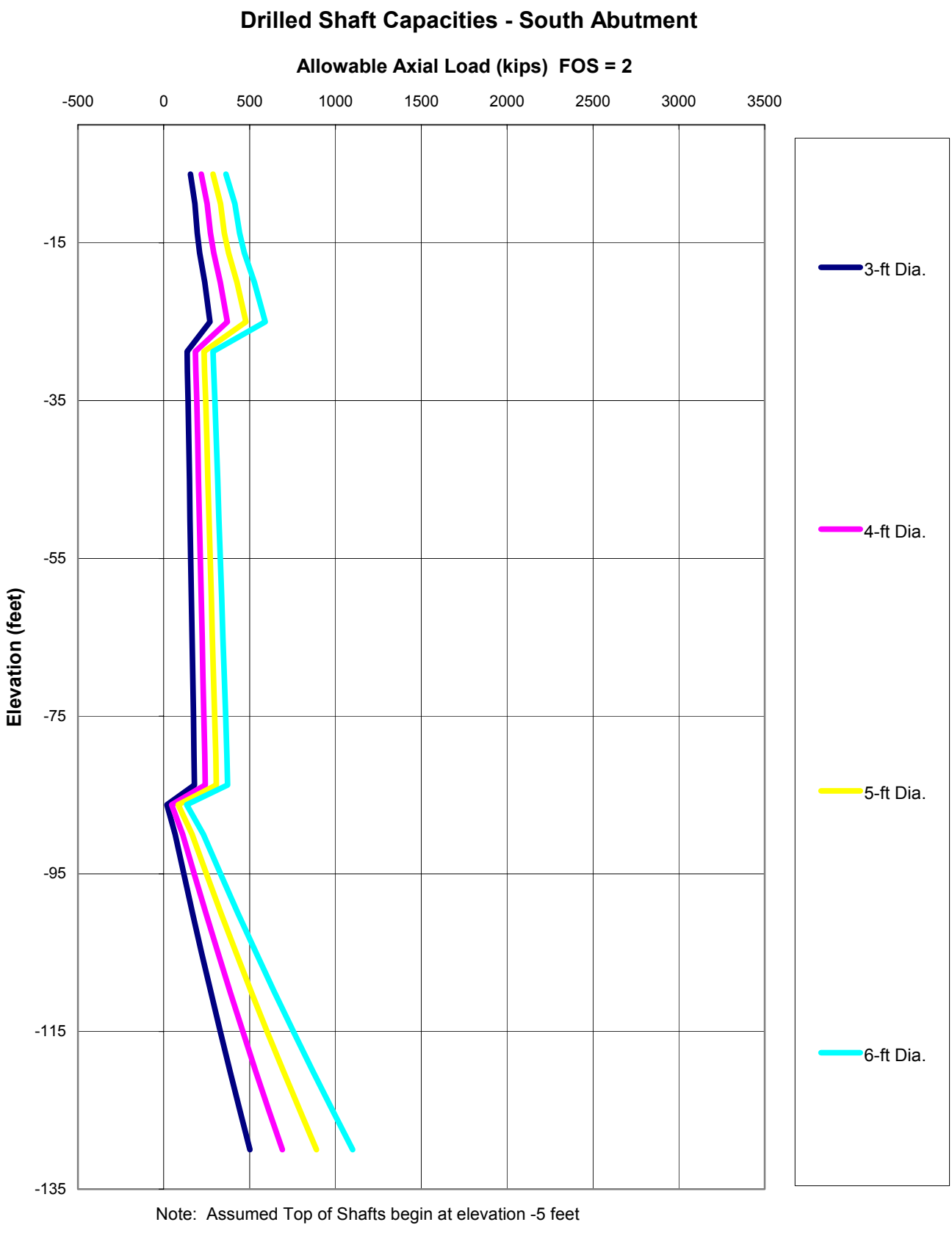

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FIGURE 4a

DRILLED SHAFT AXIAL CAPACITIES
SOUTH ABUTMENT
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003

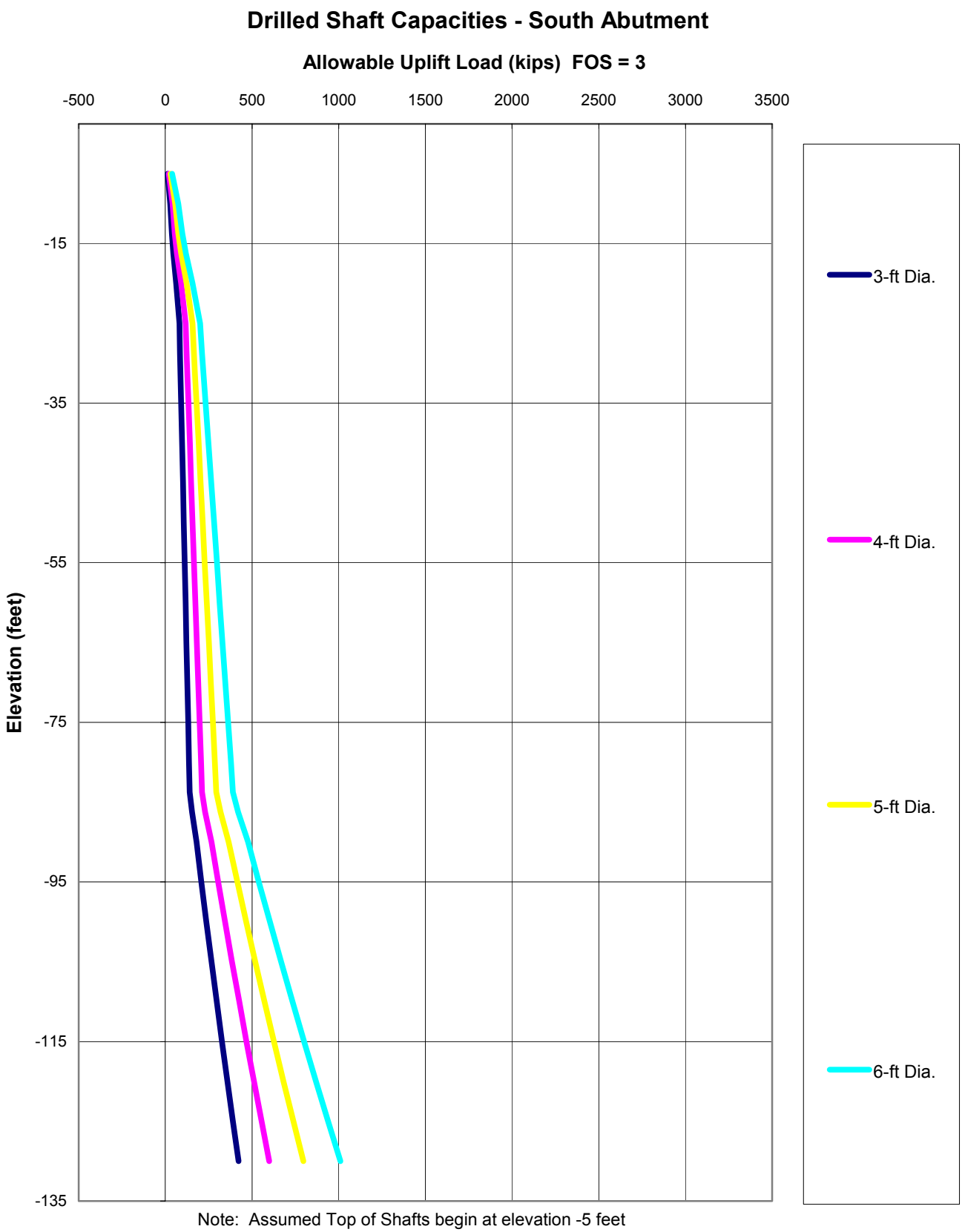

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FIGURE 4b

DRILLED SHAFT UPLIFT CAPACITIES
SOUTH ABUTMENT
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003

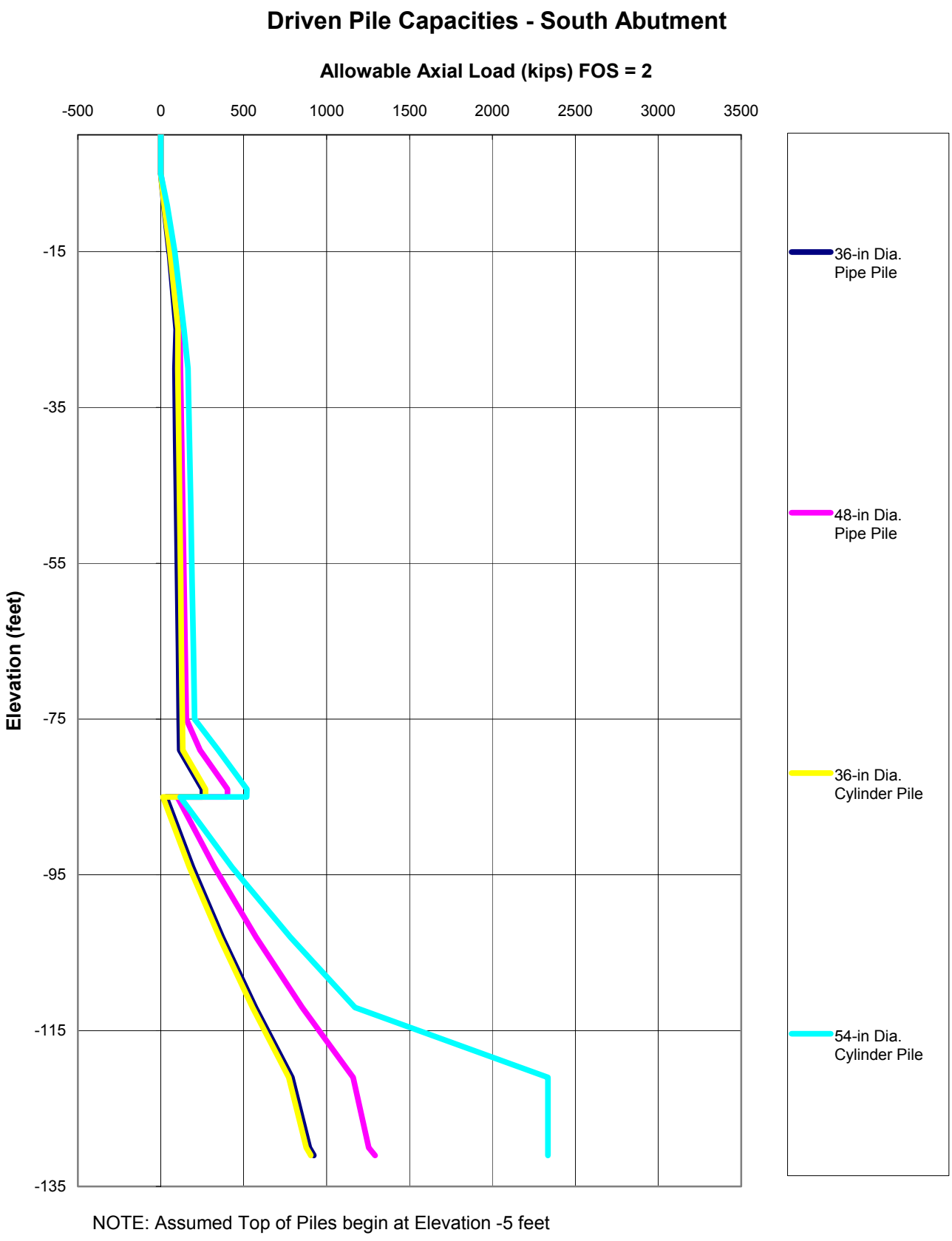

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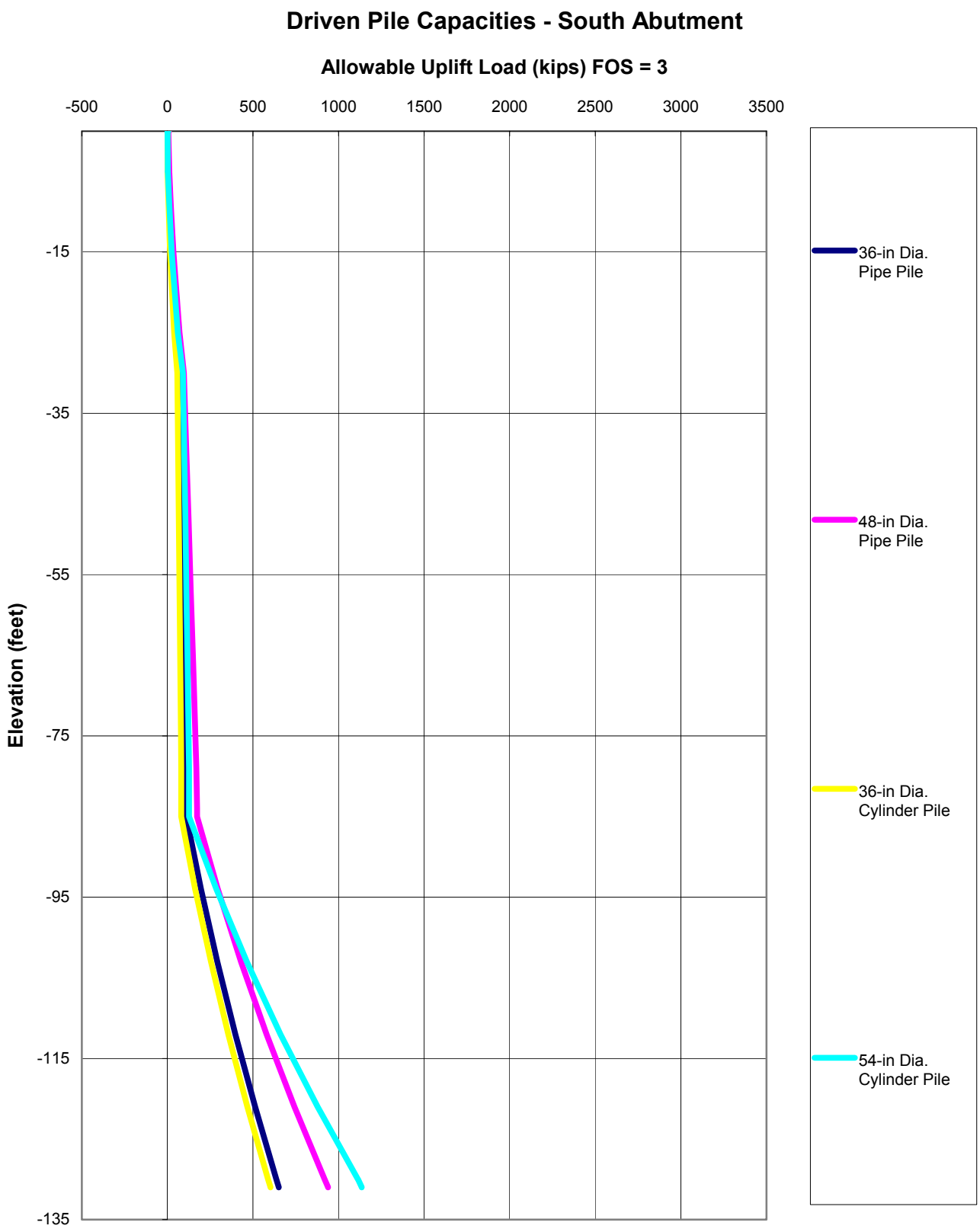
FIGURE 4c

DRIVEN PILE AXIAL CAPACITIES
SOUTH ABUTMENT
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003



NOTE: Assumed Top of Piles begin at Elevation -5 feet

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FIGURE 4d

DRIVEN PILE UPLIFT CAPACITIES
SOUTH ABUTMENT
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003

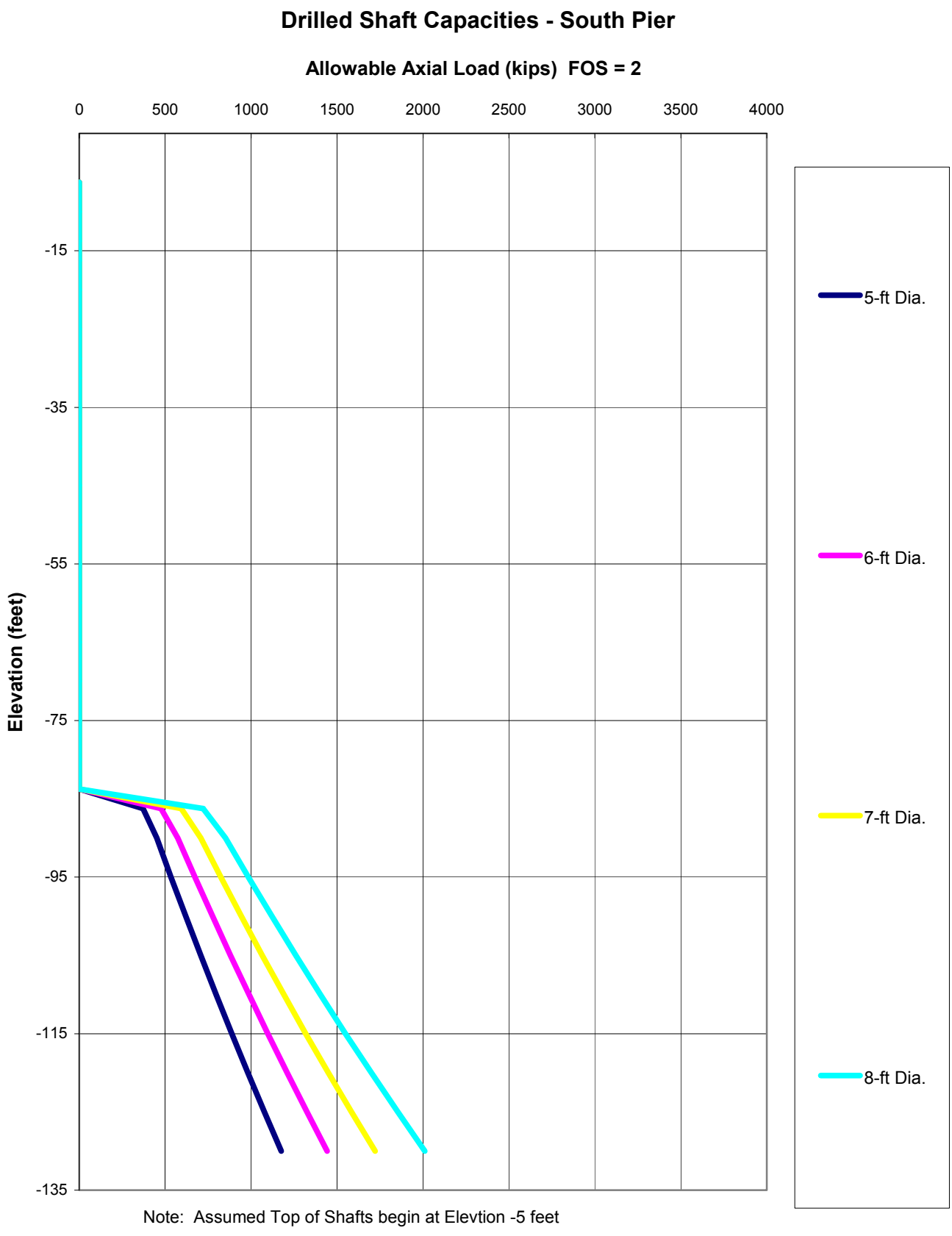

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FIGURE 5a

DRILLED SHAFT AXIAL CAPACITIES
SOUTH PIER
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003

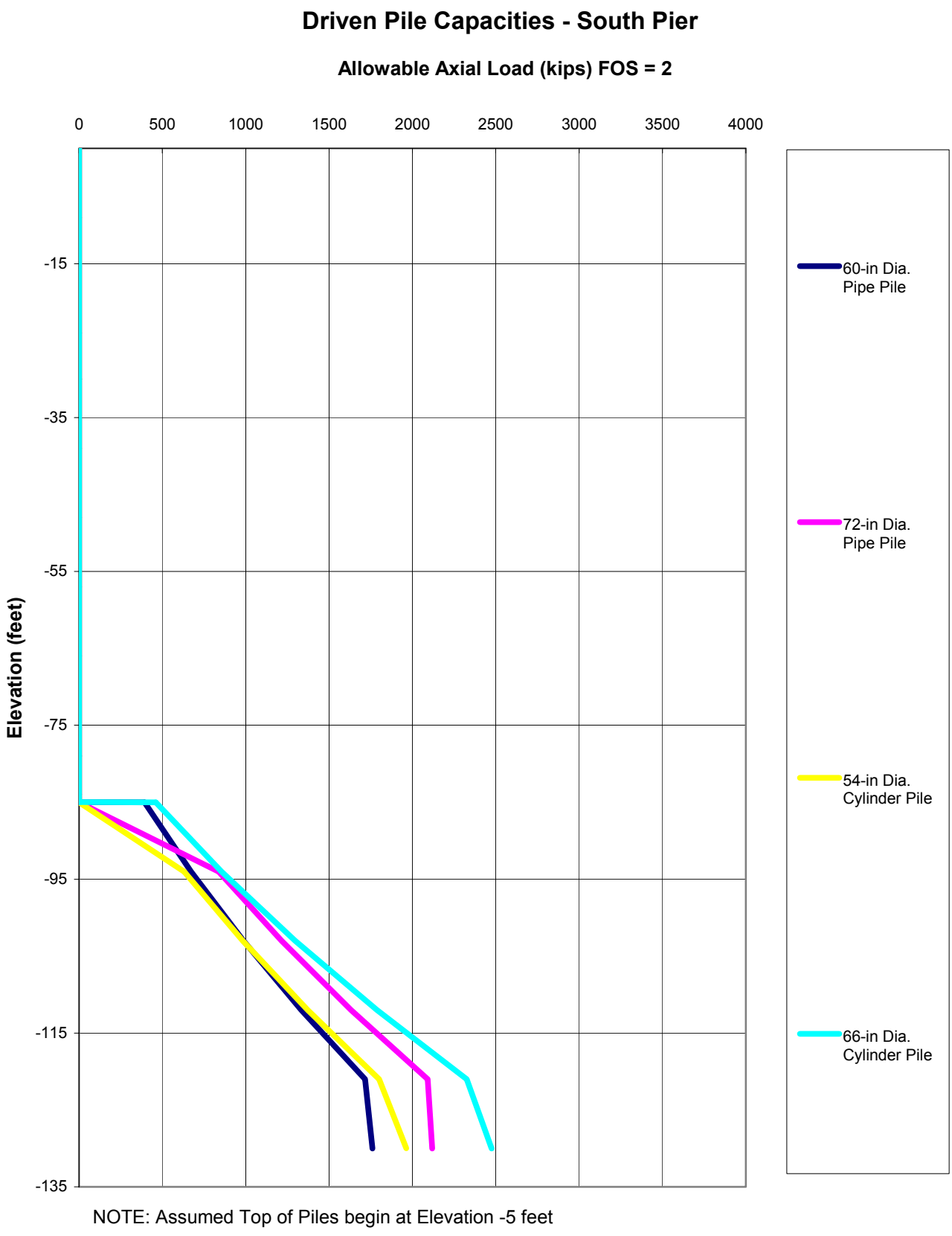

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FIGURE 5b

DRIVEN PILE AXIAL CAPACITIES
SOUTH PIER
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003

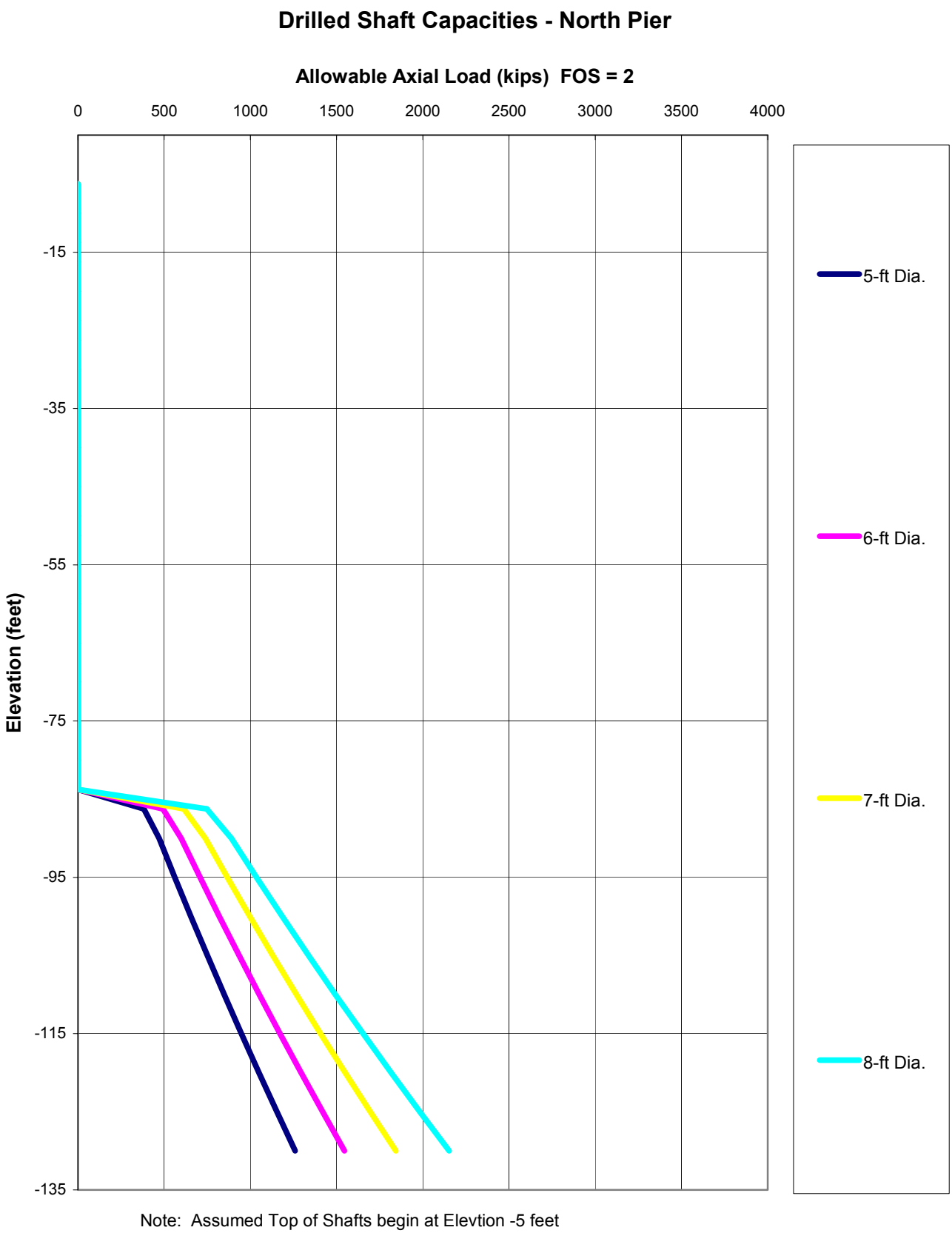

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FIGURE 6a

DRILLED SHAFT AXIAL CAPACITIES
NORTH PIER
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003

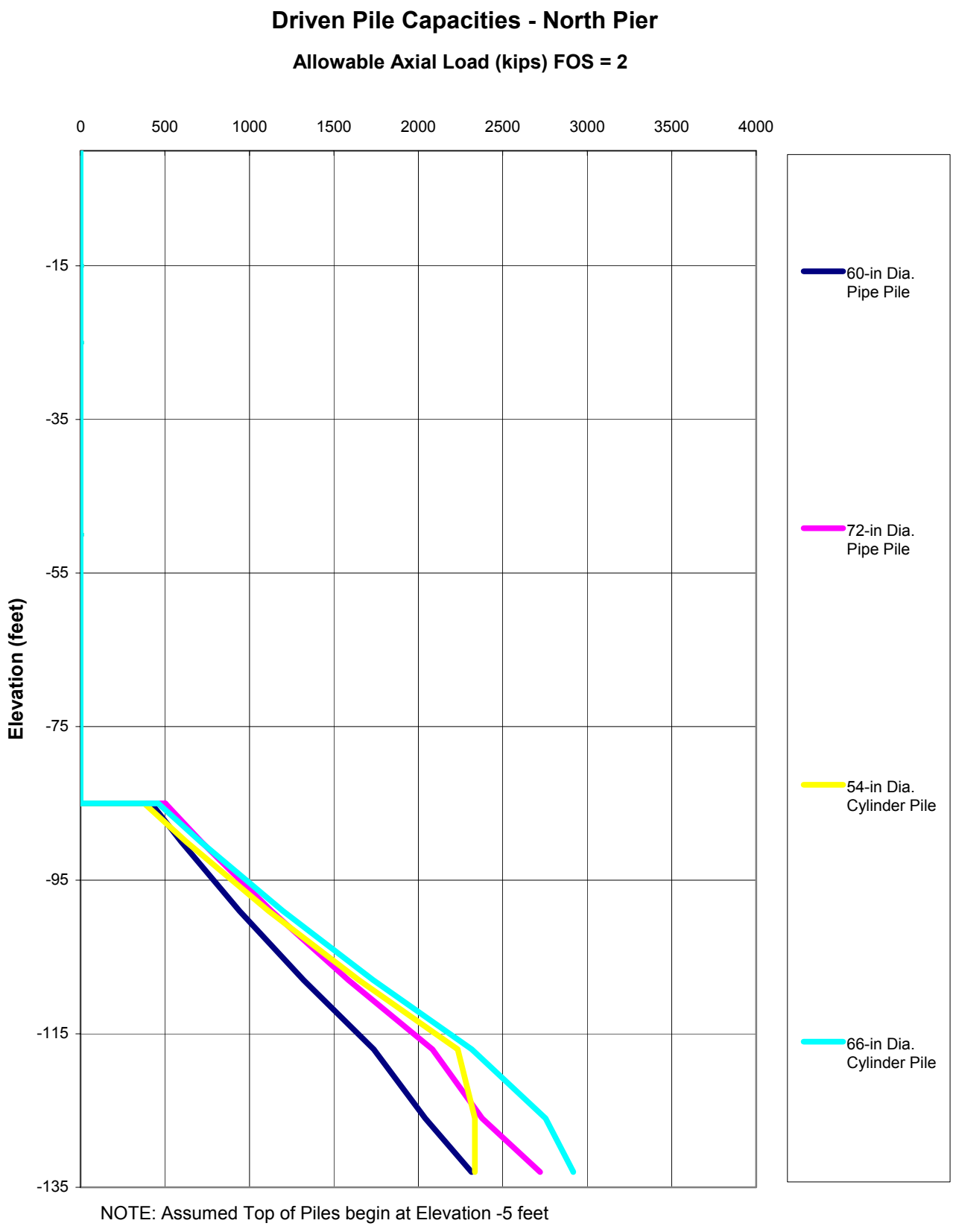

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FIGURE 6b

DRIVEN PILE AXIAL CAPACITIES
NORTH PIER
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003

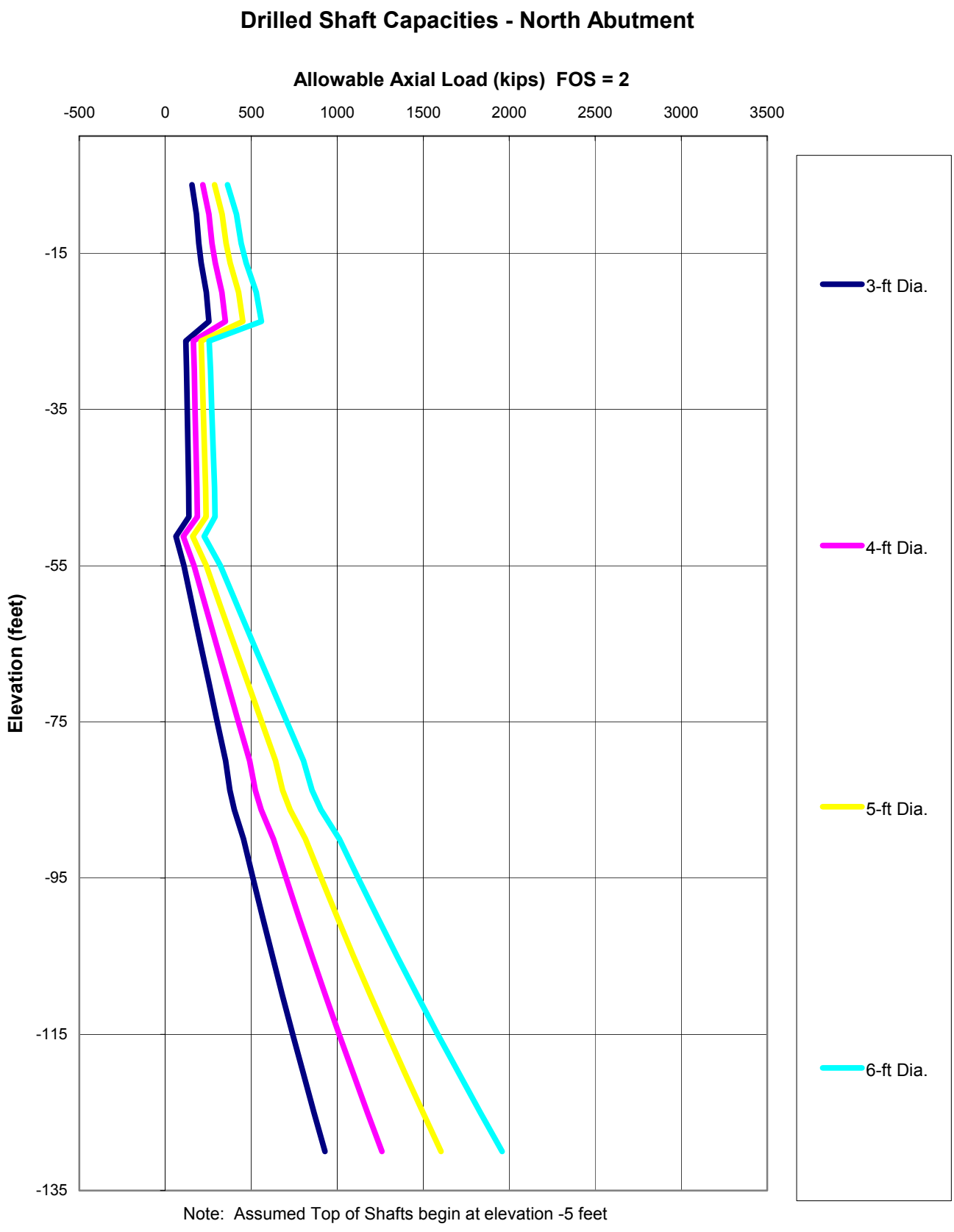

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FIGURE 7a

DRILLED SHAFT AXIAL CAPACITIES
NORTH ABUTMENT
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003

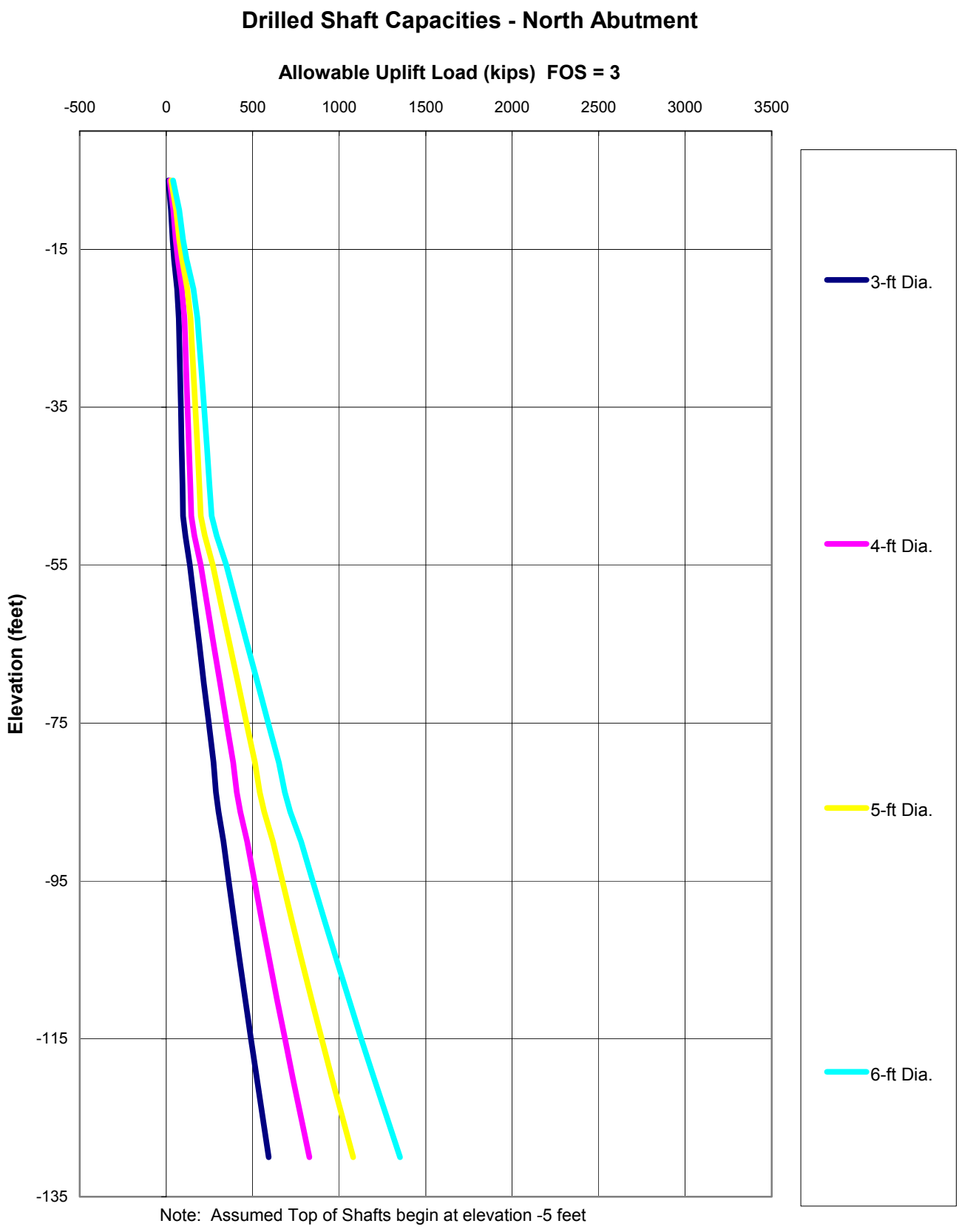

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FIGURE 7b

DRILLED SHAFT UPLIFT CAPACITIES
NORTH ABUTMENT
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003

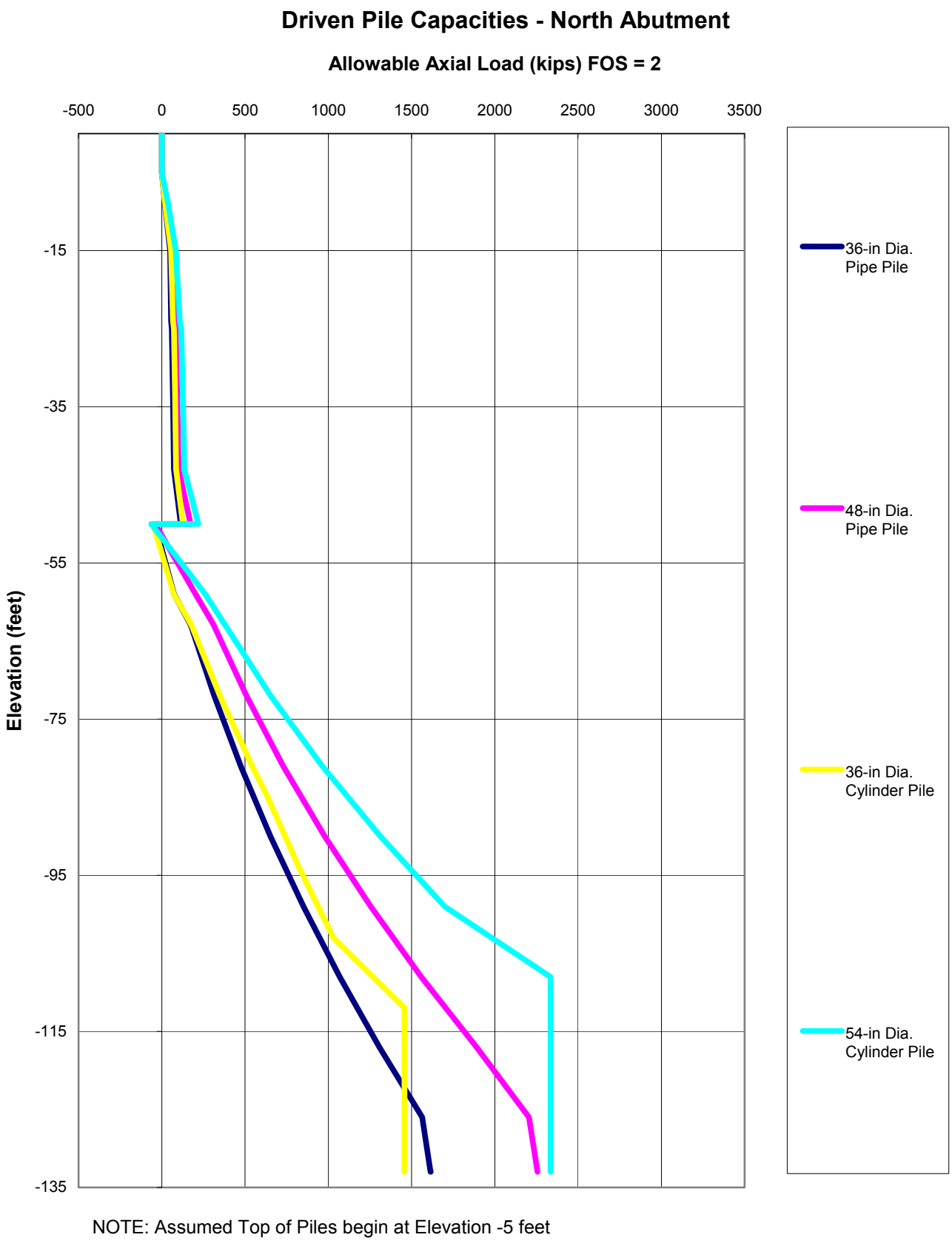

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FIGURE 7c

DRIVEN PILE AXIAL CAPACITIES
NORTH ABUTMENT
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003

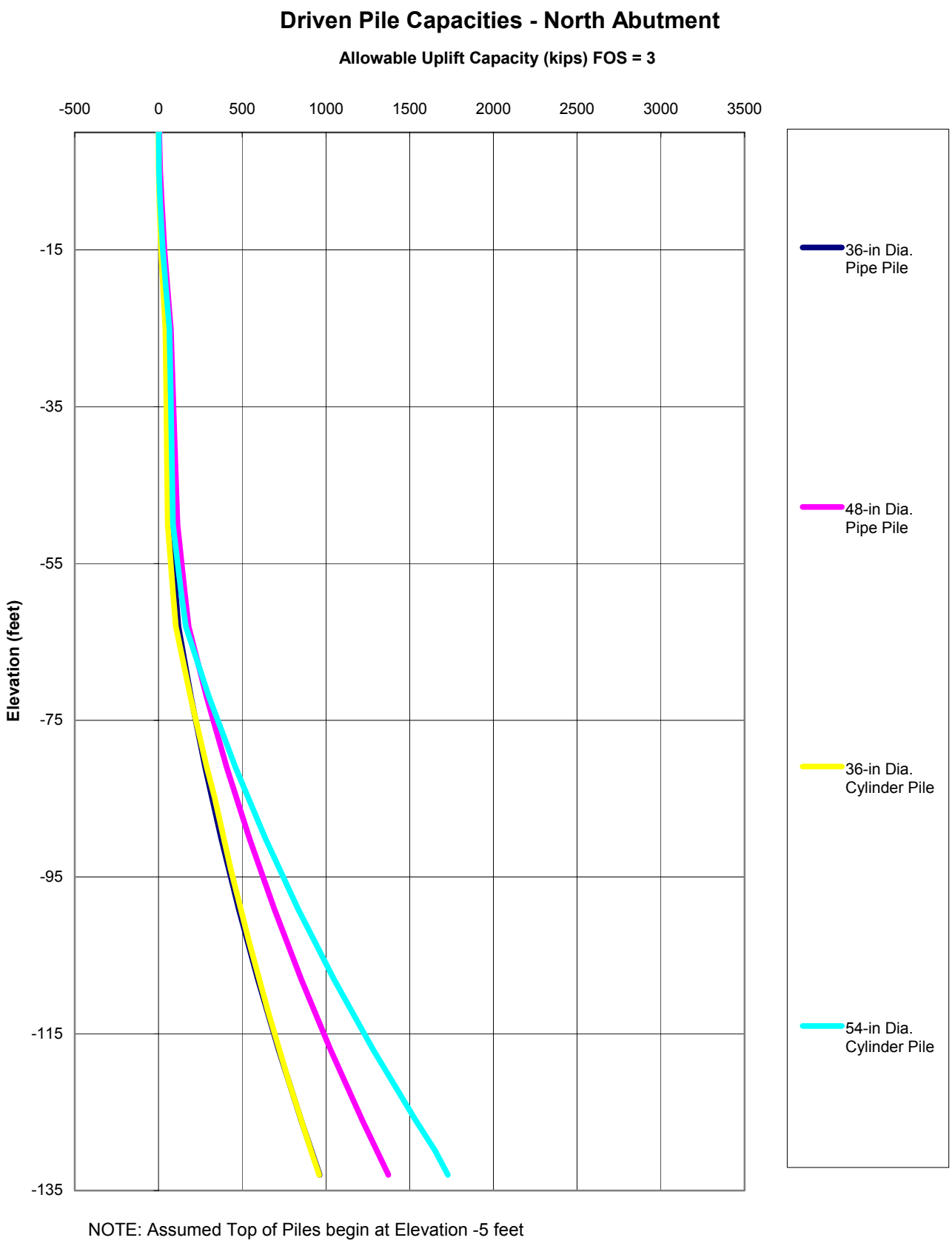

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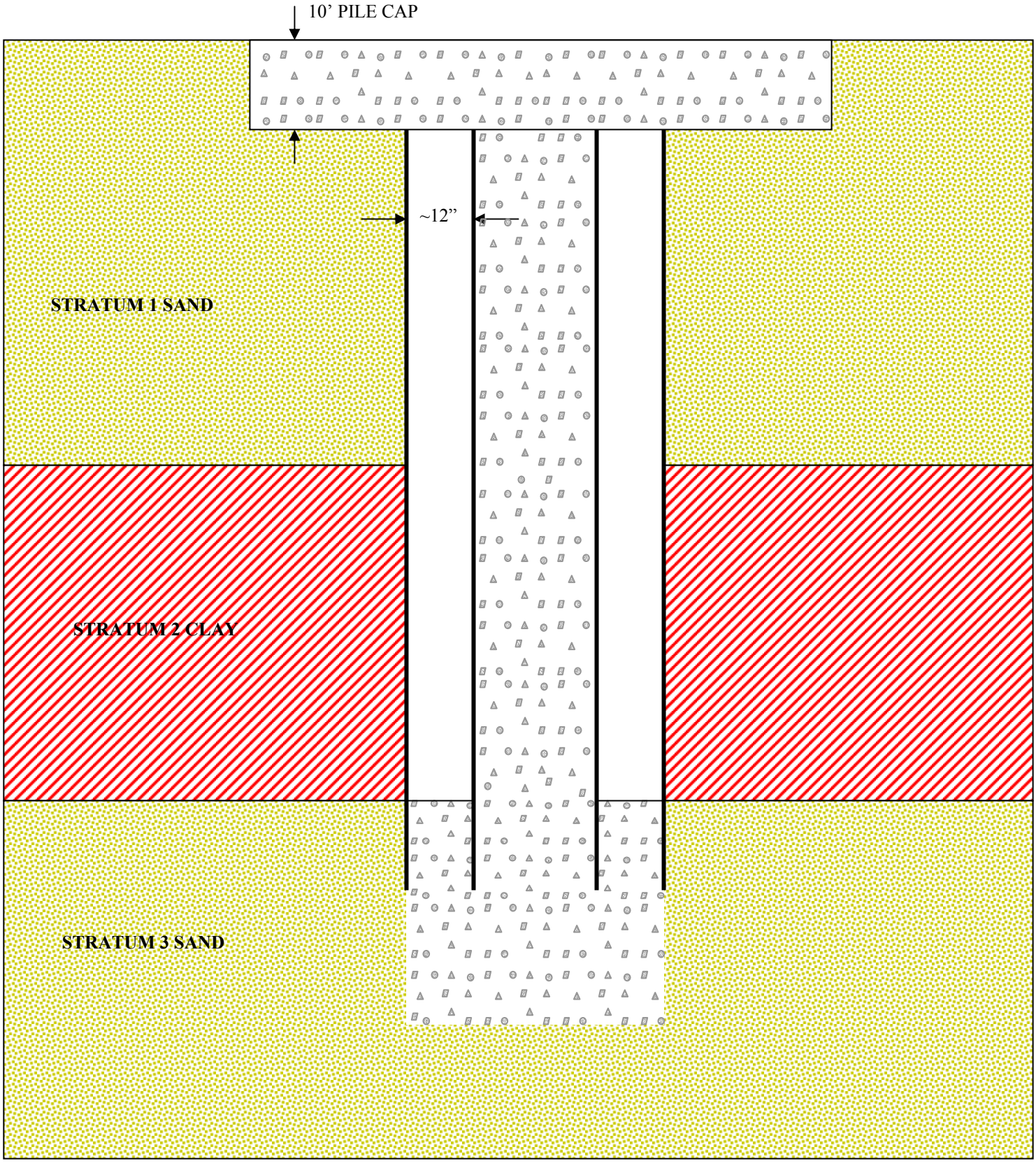
FIGURE 7d

DRIVEN PILE UPLIFT CAPACITIES
NORTH ABUTMENT
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003



Scale: Not To Scale.

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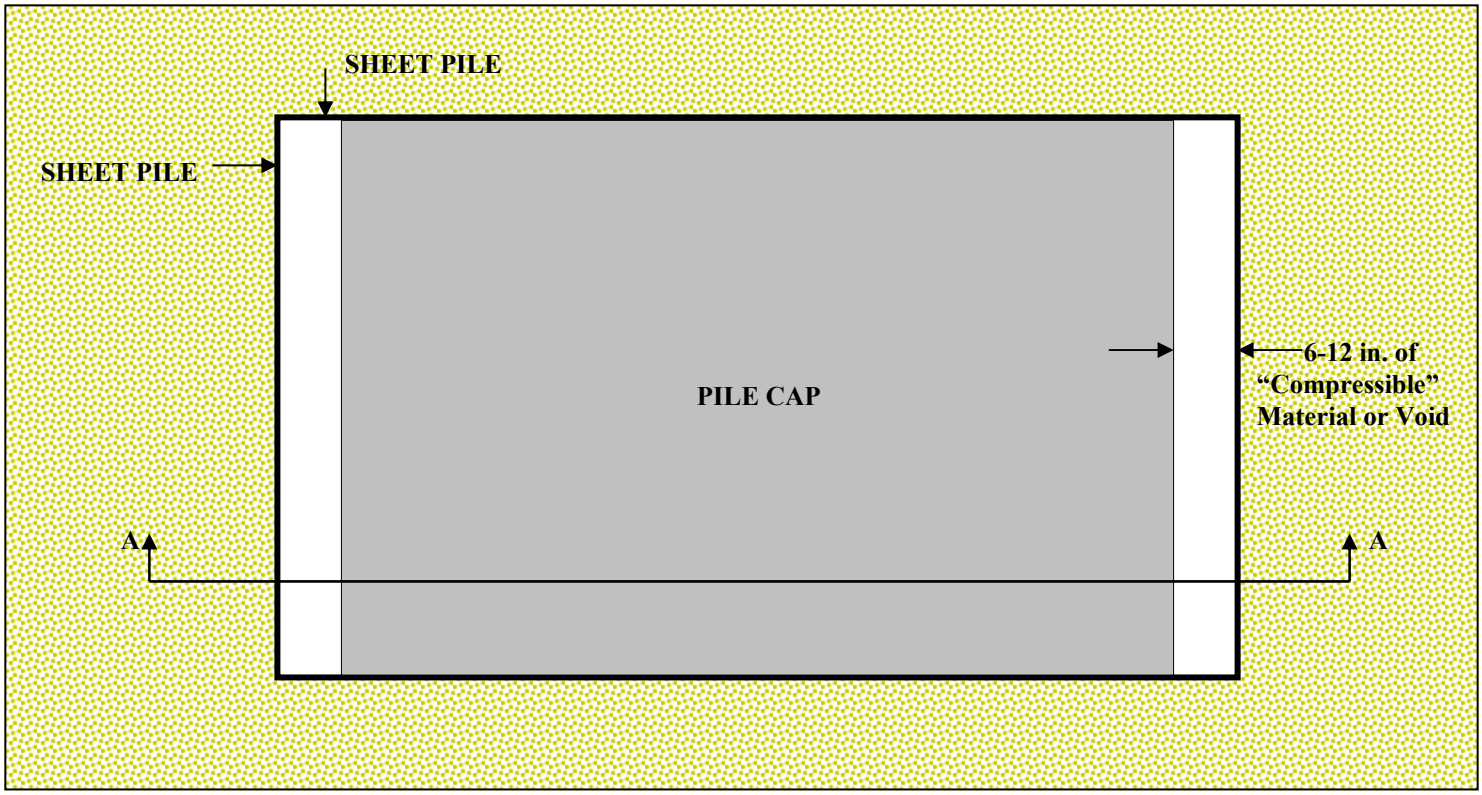
FIGURE 8

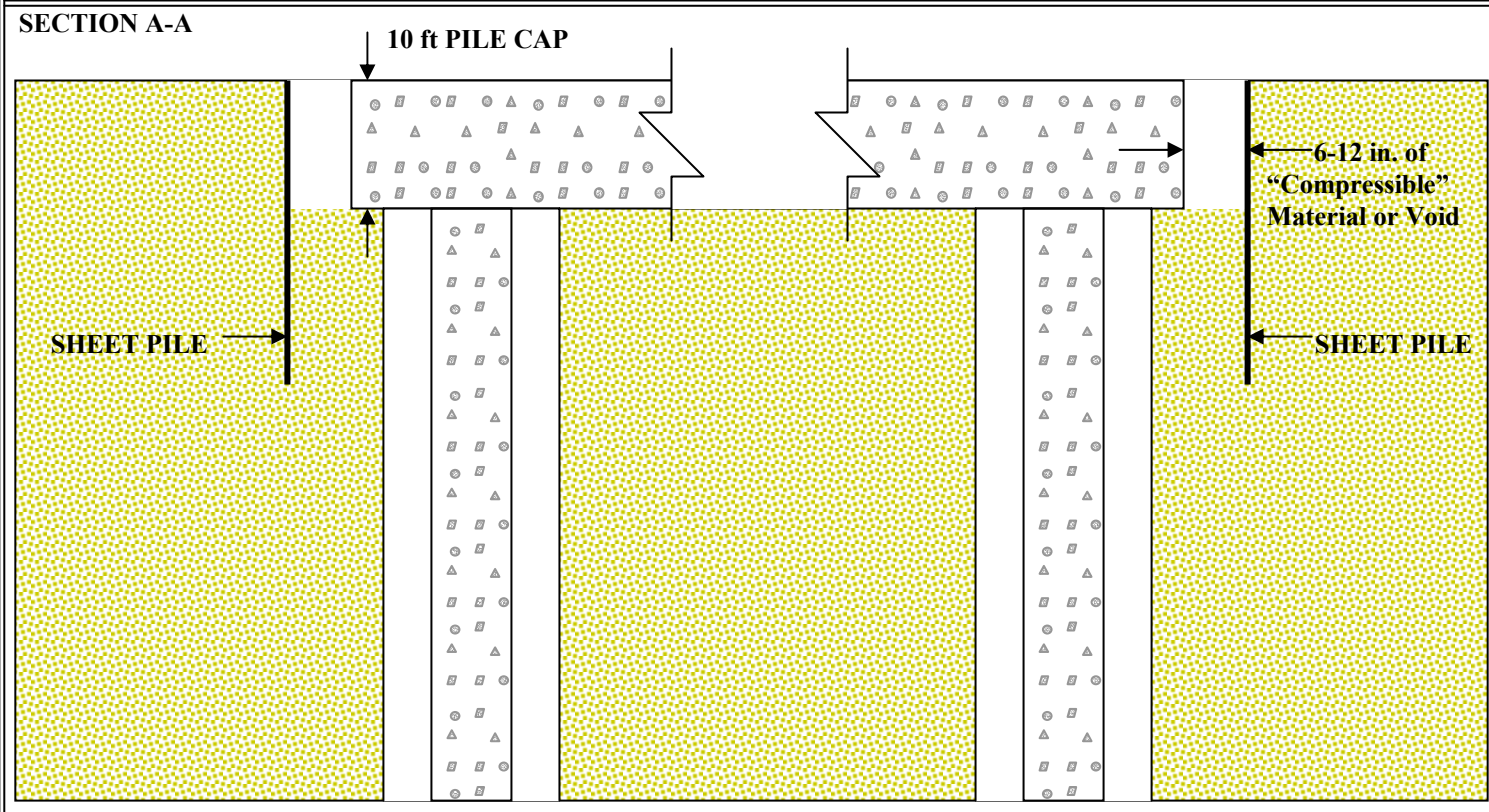
"FLEXIBLE" FOUNDATION SCHEMATIC
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003



PLAN VIEW

SECTION A-A



Scale: Not To Scale.

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FIGURE 9

"FLEXIBLE" PILE CAP SCHEMATIC
INDIAN RIVER INLET BRIDGE
SUSSEX COUNTY, DELAWARE

Project# 3530-03-1245.02 December 24, 2003

FIELD OPERATIONS

The general field procedures employed by MACTEC are summarized in ASTM Specification D 420 entitled "Investigating and Sampling Soils and Rocks for Engineering Purposes." This recommended practice lists recognized methods for determining soil and rock distribution and ground-water conditions. These methods include geophysical and in-situ methods as well as borings.

Borings are advanced to obtain subsurface samples using one of several alternate techniques depending upon the site and subsurface conditions. These techniques are:

(a) Continuous hollow-stem augers;
(b) Wash borings using roller cone or drag bits (mud or water);
(c) Continuous flight augers (ASTM D 1452);
(d) Continuous sampling using a Tripod-mounted drill rig.
(e) Hand augers

These drilling and hand augering methods are not capable of penetrating through material designated as "refusal materials." Refusal may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

The subsurface conditions encountered during drilling and hand augering are reported on a field test boring or hand auger boring record by the Driller. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observation of ground water. It also contains the driller's interpretation of the soil conditions between samples. Therefore, these boring records contain both factual and interpretive information.

The soil and rock samples plus the field boring records are reviewed by a geotechnical engineer. The engineer classifies the soils in general accordance with the procedures outlined in ASTM Specification D 2488 and prepares the final boring records which are the basis for all evaluations and recommendations.

The final test boring and hand auger boring records represent our interpretation of the contents of the field records based on the results of the engineering examination and tests of the field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled or hand augered. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and ground-water conditions at these boring locations. The lines designating the interface between soil or refusal materials on the records and on profiles represent approximate boundaries. The actual transition between materials may be gradual. The final Test Boring Record and Hand Auger Boring Records are included in this appendix.

SOIL SAMPLING PROCEDURES

Penetration Test and Split-barrel Sampling

The borings were drilled using wash boring techniques. Penetration testing and split-barrel sampling were conducted in the borings at regular intervals as indicated on the Soil Test Boring Records.

The standard penetration test (SPT) provides an indication of the soil strength and compressibility. The SPT resistances and split-barrel sampling are conducted simultaneously according to ASTM Specification D 1586. At regular intervals, soil samples are obtained with a standard split-tube sampler. The sampler is first seated six inches to penetrate any loose cuttings, then driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the 12-inch increment is recorded and is designated the "penetration resistance."

Representative portions of the soil samples obtained from each split-barrel sample are placed in glass jars, sealed, and transported to our laboratory. Descriptions of the split-tube samples and the penetration resistances are shown on the attached Test Boring Records.

Water Level Measurements

Water level readings and caved depths were measured in completed borings as noted on the Soil Test Boring Records. These water level readings indicate the approximate location of the ambient ground-water table at the time of our field investigation. In some instances, the caved depths may possibly indicate ground-water activity.

Temporary piezometers were installed at selected boring locations by inserting pipe to the desired depth in the borings. A slotted well screen was attached to the bottom of the pipe to allow subsurface water to enter the piezometer. Clean sand or pea gravel was backfilled around the bottom of the well screen. The remainder of the hole was backfilled with an impervious material, using a bentonite or cement grout cap to seal out surface water. The top of the pipe has a removable cover to seal out rainwater.

The time of drilling water level reported on the Soil Test Boring Records is determined by field crews as the drilling tools are advanced. Additional water table readings are generally obtained approximately one day after the borings are completed. The time lag is used to permit stabilization of the ground-water table that has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using an electrical probe to detect the water level surface.

Undisturbed Sampling

For quantitative testing, relatively undisturbed samples are obtained by pushing sections of thin-walled steel or brass tubing (Shelby tube) into the soil at the desired sampling levels. This procedure is described by ASTM Specification D 1587. Each tube is carefully removed from the ground, sealed, and transported to the laboratory for specialized testing. Locations and depths of undisturbed samples are shown on the Test Boring Records.

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel - sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel - sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel - sand - silt mixtures.
			GC	Clayey gravels, gravel - sand - clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 Sieve Size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand - silt mixtures
			SC	Clayey sands, sand - clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts and with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts.
DECOMPOSED ROCK			DR	Residual material that retains the relict structure of the parent bedrock & exhibits SPT resistances consistently over 60 bpf.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

SILT OR CLAY	SAND			GRAVEL		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

No.200 No.40 No.10 No.4 3/4" 3" 12"

U.S. STANDARD SIEVE SIZE

Reference: The Unified Soil Classification System, Corps of Engineers, U.S. Army Technical Memorandum No. 3-357, Vol. 1, March, 1953 (Revised April, 1960)

Undisturbed Sample	Auger Cuttings
Split Spoon Sample	Bulk Sample
Rock Core	Grab Sample
Dilatometer	Pressure Meter
Packer	No Recovery
Water Table at time of drilling	Water Table after 24 hours

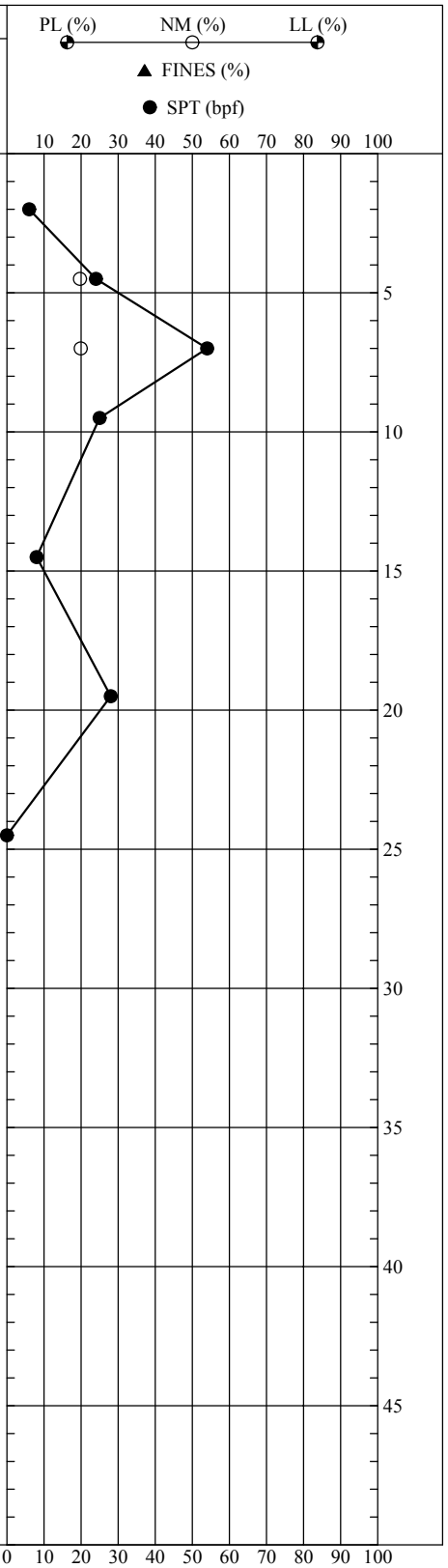
Correlation of Penetration Resistance with Relative Density and Consistency

SAND & GRAVEL		SILT & CLAY	
No. of Blows	Relative Density	No. of Blows	Consistency
0 - 4	Very Loose	0 - 1	Very Soft
5 - 10	Loose	2 - 4	Soft
11 - 20	Firm	5 - 8	Firm
21 - 30	Very Firm	9 - 15	Stiff
31 - 50	Dense	16 - 30	Very Stiff
Over 50	Very Dense	Over 31	Hard

KEY TO SYMBOLS AND DESCRIPTIONS

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to very dense, tan to light gray, fine to medium SAND (SP). Wet.		4	SPT-1		2-2-4 (N = 6)
5	Little coarse sand around 4 feet bgs.		-1	SPT-2		7-11-13 (N = 24)
				SPT-3		9-35-19 (N = 54)
10			-6	SPT-4		9-12-13 (N = 25)
15			-11	SPT-5		2-3-5 (N = 8)
20			-16	SPT-6		9-12-16 (N = 28)
23	Very soft dark gray CLAY (CH). Strong organic odor					
25	Boring terminated at 25 feet bgs.		-21	SPT-7		WOH-0-0 (N = 0)
30			-26			
35			-31			
40			-36			
45			-41			
50			-46			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-75
METHOD: HSA
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY: AJA
REMARKS:

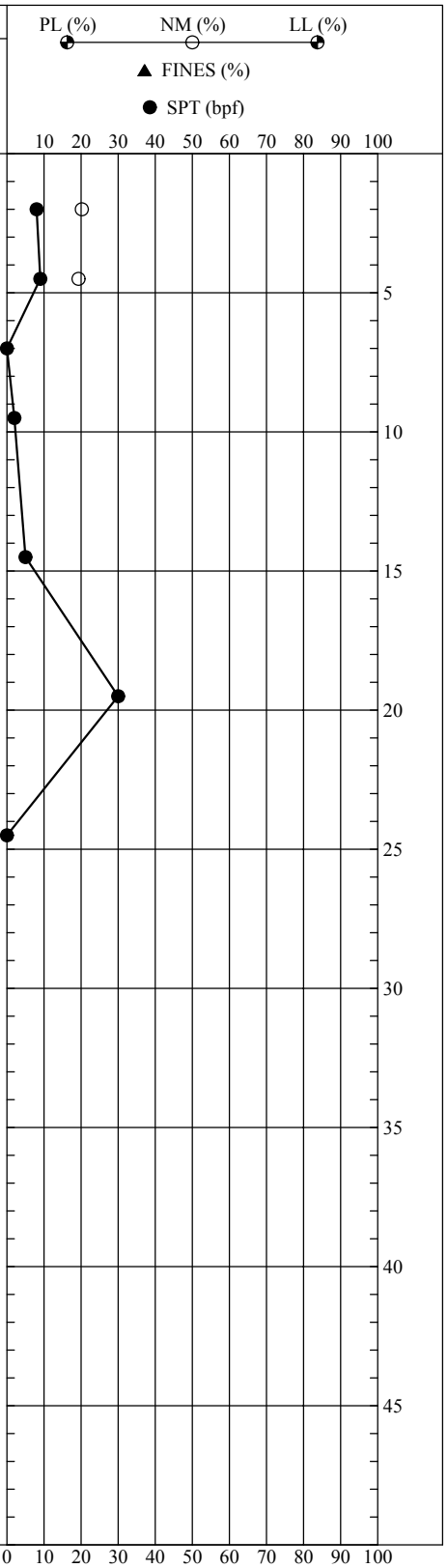
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-01
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 218467,757458.3
DRILLED: October 2, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to dense, tan to light gray, fine to medium SAND (SP) with trace coarse sand. Wet.		4			
				SPT-1		3-3-5 (N = 8)
				SPT-2		3-3-6 (N = 9)
5			-1			
				SPT-3		1-0-0 (N = 0)
				SPT-4		1-1-1 (N = 2)
10			-6			
				SPT-5		3-2-3 (N = 5)
15			-11			
				SPT-6		24-15-15 (N = 30)
20			-16			
				SPT-7		WOH-0-0 (N = 0)
	Very loose sand at 25 feet bgs.					
25	Boring terminated at 25 feet bgs.		-21			
30			-26			
35			-31			
40			-36			
45			-41			
50			-46			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	HSA
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 10 feet E

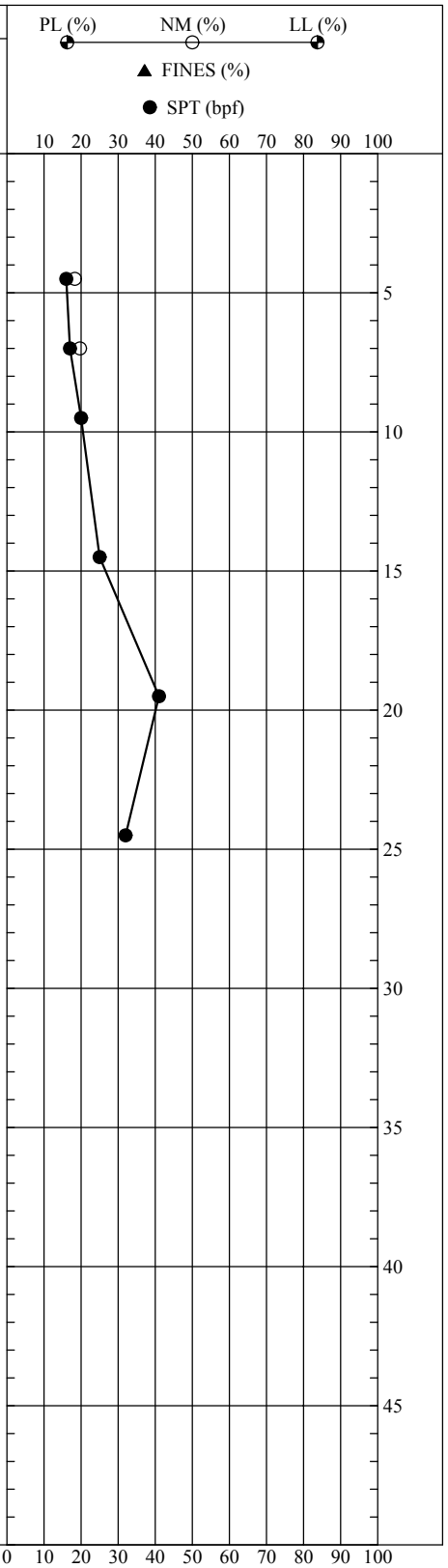
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-02
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 218809,757434
DRILLED: October 2, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Asphalt	4			
	Subbase aggregate				
	Medium dense to dense, light gray to tan, fine to medium SAND (SP), wet.		SPT-1		
5	Trace root fragments at 5 feet bgs.	-1	SPT-2		8-8-8 (N = 16)
			SPT-3		8-7-10 (N = 17)
10		-6	SPT-4		6-9-11 (N = 20)
15		-11	SPT-5		9-12-13 (N = 25)
20		-16	SPT-6		12-20-21 (N = 41)
25	Boring Terminated at 25.0 feet bgs.	-21	SPT-7		10-11-21 (N = 32)
30		-26			
35		-31			
40		-36			
45		-41			
50		-46			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: MLH
CHECKED BY: AJA
REMARKS:

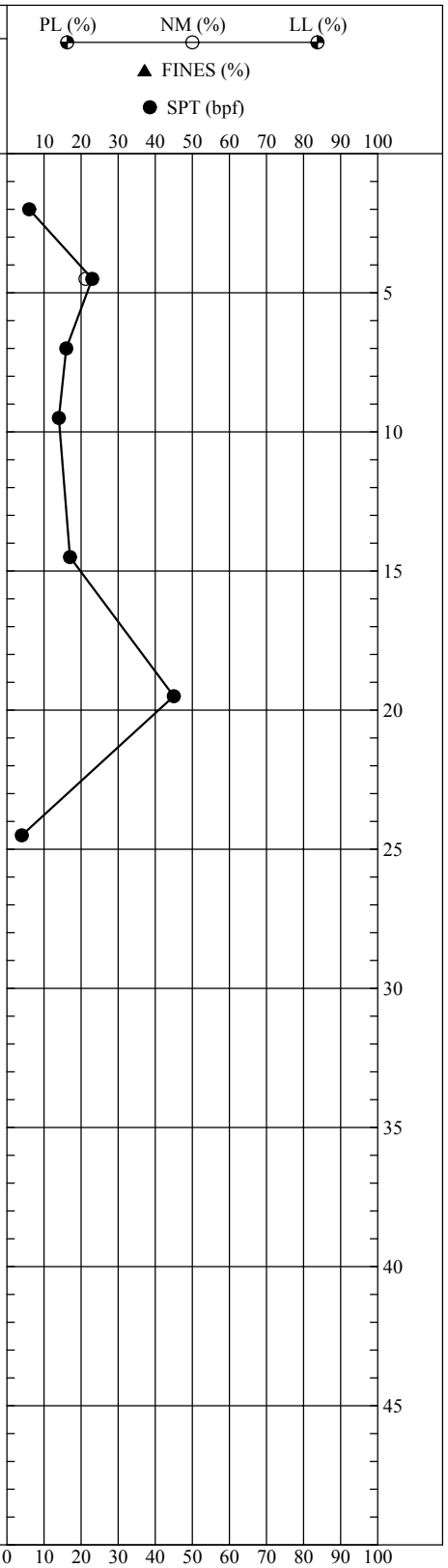
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-03
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219016.6,757301.7
DRILLED: October 17, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	LEGEND	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to dense, light gray to tan, fine to medium SAND (SP). Moist.		4	SPT-1		3-4-2 (N = 6)
5	Trace coarse sand, trace root fragments, and little silt at 5 feet bgs.		-1	SPT-2		15-11-12 (N = 23)
				SPT-3		7-8-8 (N = 16)
10			-6	SPT-4		6-7-7 (N = 14)
15	Little coarse sand at 15 feet bgs.		-11	SPT-5		6-9-8 (N = 17)
20	Trace shell fragments at 20 feet bgs.		-16	SPT-6		12-18-27 (N = 45)
25	No Recovery of sample #7. Boring Terminated at 25.0 feet bgs.		-21	SPT-7		2-2-2 (N = 4)
30			-26			
35			-31			
40			-36			
45			-41			
50			-46			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Offset approximately 20 feet E

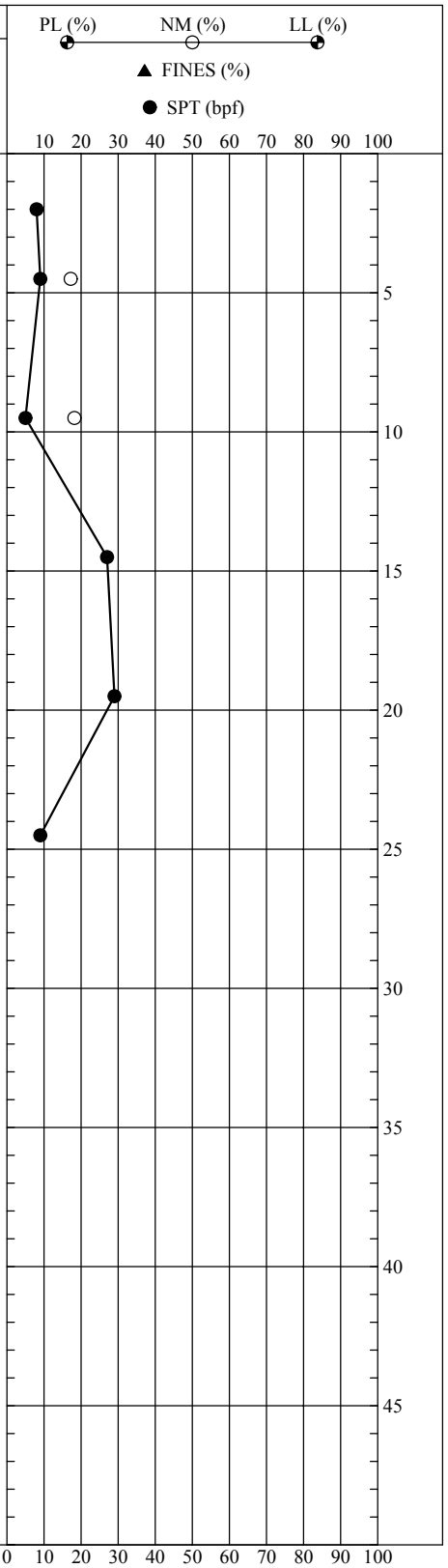
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-04
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219296,757278
DRILLED: October 16, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to medium dense, light gray to tan, fine to medium SAND (SP). Moist.		6	SPT-1		2-3-5 (N = 8)
	Little coarse sand at 3.5 feet bgs.			SPT-2		3-3-6 (N = 9)
5			1			
	Sample at 7.5 feet bgs skipped. Trace coarse sand from 10 feet to 20 feet bgs			SPT-4		1-2-3 (N = 5)
10			-4			
				SPT-5		9-9-18 (N = 27)
15			-9			
				SPT-6		9-10-19 (N = 29)
20			-14			
	Trace shell fragments at 25 feet bgs.			SPT-7		3-3-6 (N = 9)
25	Boring terminated at 25 feet bgs.		-19			
30			-24			
35			-29			
40			-34			
45			-39			
50			-44			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: MLH
CHECKED BY: AJA
REMARKS: Offset approximately 130 feet S

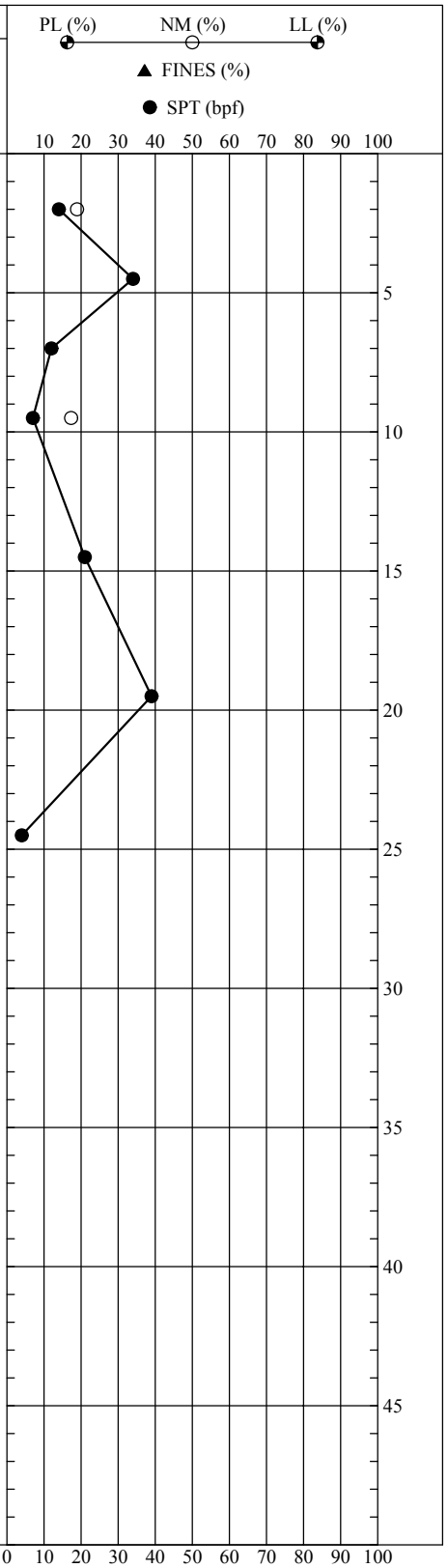
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-05
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219163,757484
DRILLED: October 20, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Topsoil with root fragments	4			
	Loose to dense, light gray to tan, fine to medium SAND (SP). Moist.		SPT-1		3-5-9 (N = 14)
			SPT-2		8-13-21 (N = 34)
5	Little coarse sand at 5 feet bgs.	-1			
			SPT-3		6-6-6 (N = 12)
			SPT-4		3-3-4 (N = 7)
10	Trace coarse sand at 10 feet bgs.	-6			
			SPT-5		8-10-11 (N = 21)
15		-11			
			SPT-6		11-18-21 (N = 39)
20		-16			
	Soft, dark gray, silty CLAY (CL), trace organic odor, moist.				
			SPT-7		1-2-2 (N = 4)
25	Boring Terminated at 25.0 feet bgs.	-21			
30		-26			
35		-31			
40		-36			
45		-41			
50		-46			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Offset approximately 90 feet E

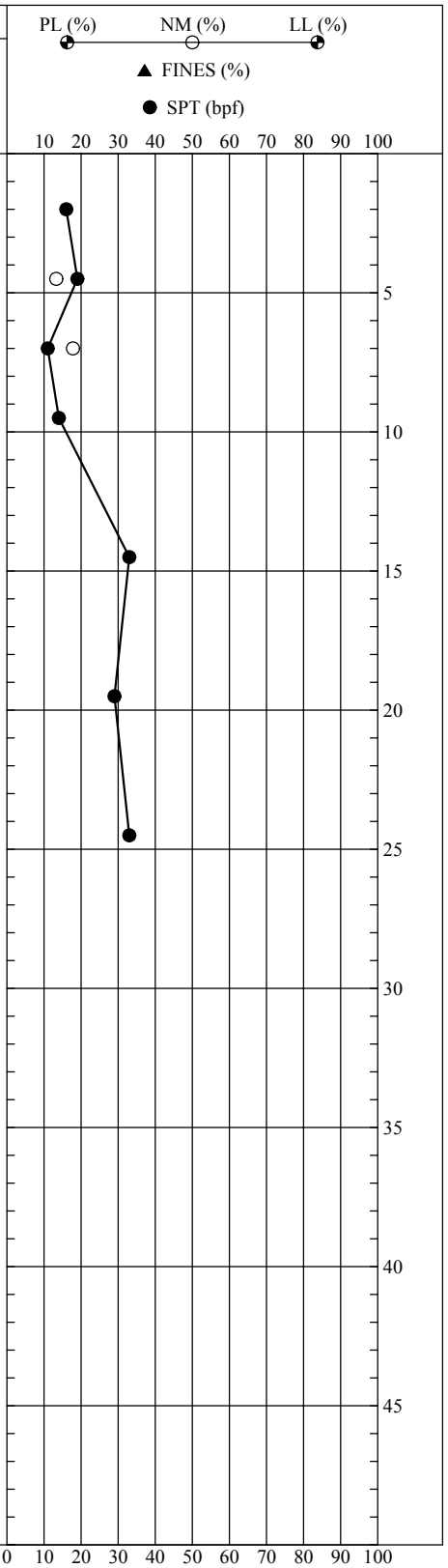
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-06
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219392,757259
DRILLED: October 16, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense, tan, fine to medium SAND (SP), wet.		1			
				SPT-1		3-6-10 (N = 16)
5			-4	SPT-2		10-13-6 (N = 19)
				SPT-3		2-4-7 (N = 11)
	Trace silt at 7.5 feet bgs.					
10	Trace coarse sand at 10 feet bgs.		-9	SPT-4		5-7-7 (N = 14)
15			-14	SPT-5		11-14-19 (N = 33)
20	Some coarse sand at 19 feet bgs.		-19	SPT-6		8-14-15 (N = 29)
25	Boring Terminated at 25.0 feet bgs.		-24	SPT-7		16-18-15 (N = 33)
30			-29			
35			-34			
40			-39			
45			-44			
50			-49			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Offset approximately 15 feet E

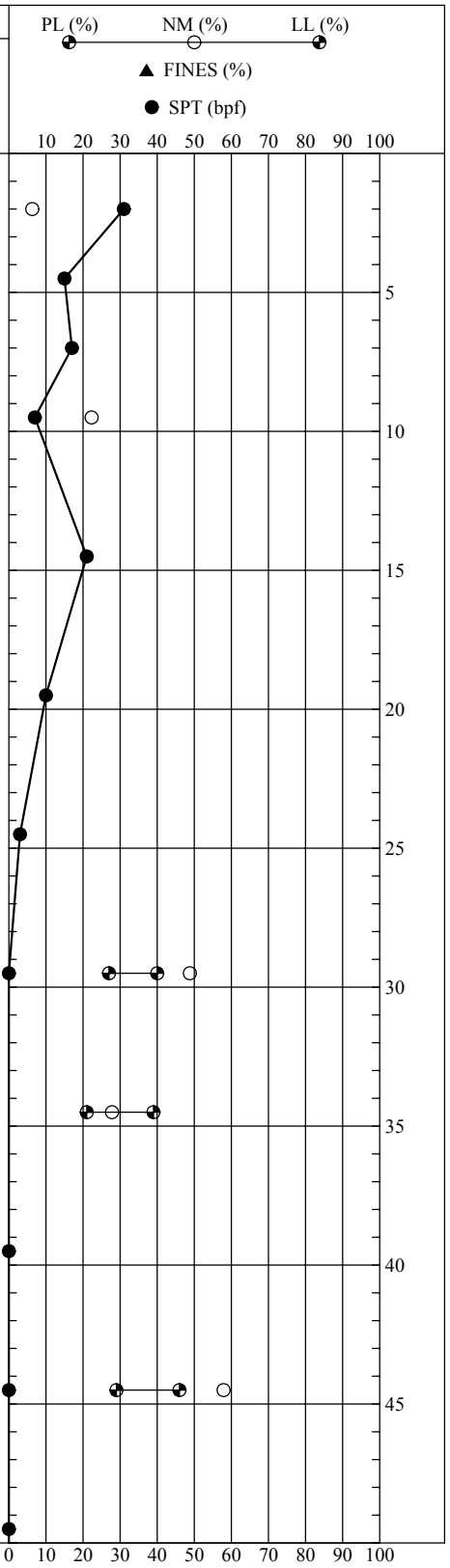
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-08
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219620,757397
DRILLED: October 16, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	LEGEND	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to medium dense, tan to light gray, fine to medium SAND (SP). Wet. 4 inch layer of concrete at 6 inches bgs.		2	SPT-1		4-20-11 (N = 31)
				SPT-2		9-8-7 (N = 15)
5	Trace silt and root fragments at 5 feet bgs.		-3	SPT-3		4-8-9 (N = 17)
	Slight organic odor at 7.5 feet bgs.			SPT-4		4-4-3 (N = 7)
10			-8			
15			-13	SPT-5		6-9-12 (N = 21)
20	Some coarse sand and trace shell fragments at 20 feet bgs.		-18	SPT-6		3-5-5 (N = 10)
	Very soft, dark gray CLAY (CH)					
25			-23	SPT-7		5-2-1 (N = 3)
30			-28	SPT-8		WOH-0-0 (N = 0)
35			-33	UD-3		
40			-38	SPT-10		WOH-0-0 (N = 0)
45			-43	SPT-11		WOH-0-0 (N = 0)
50			-48	SPT-12		WOH-0-0



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Offset approximately 60 feet S, 50 feet W.

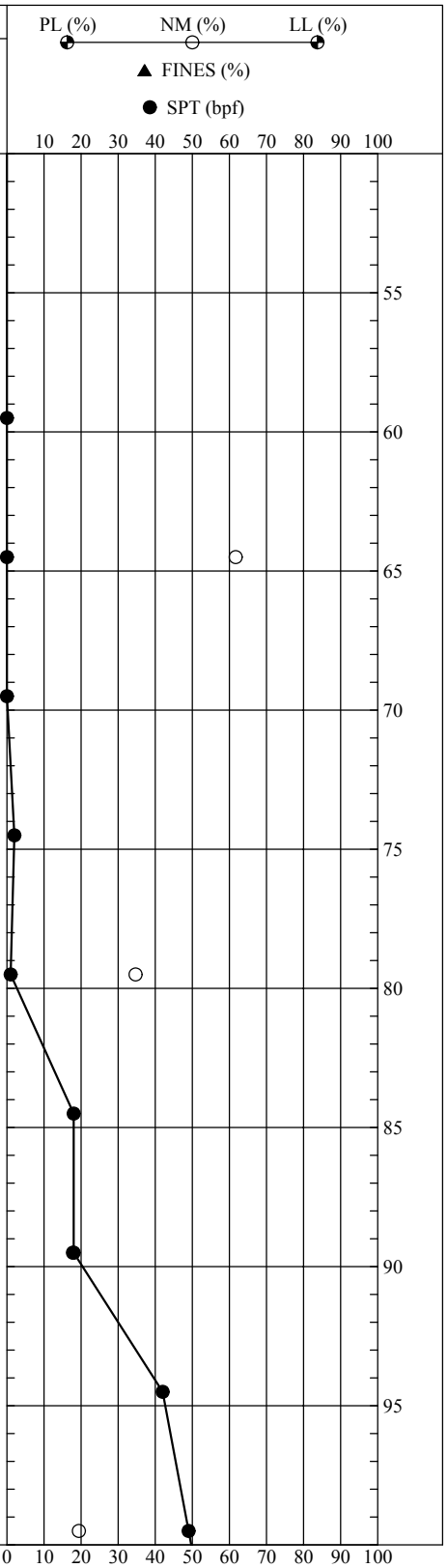
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-09
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219837,757315
DRILLED: October 20, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft, dark gray CLAY (CH)		-48			(N = 0)
				UD-4		
55			-53			
				SPT-14		WOH-0-0 (N = 0)
60			-58			
				SPT-15		WOH-0-0 (N = 0)
65			-63			
				SPT-16		WOH-0-0 (N = 0)
70	No recovery of sample #16.		-68			
				SPT-17		1-1-1 (N = 2)
75			-73			
				SPT-18		0-0-1 (N = 1)
80			-78			
	Medium dense, light gray, fine to medium SAND (SP). Wet.			SPT-19		7-10-8 (N = 18)
85	Trace coarse sand and some fine gravel at 85 feet bgs		-83			
				SPT-20		4-7-11 (N = 18)
90			-88			
	Dense to very dense, light gray to orange-brown, fine to medium silty SAND (SM)			SPT-21		10-27-15 (N = 42)
95			-93			
				SPT-22		11-17-32
100			-98			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Offset approximately 60 feet S, 50 feet W.

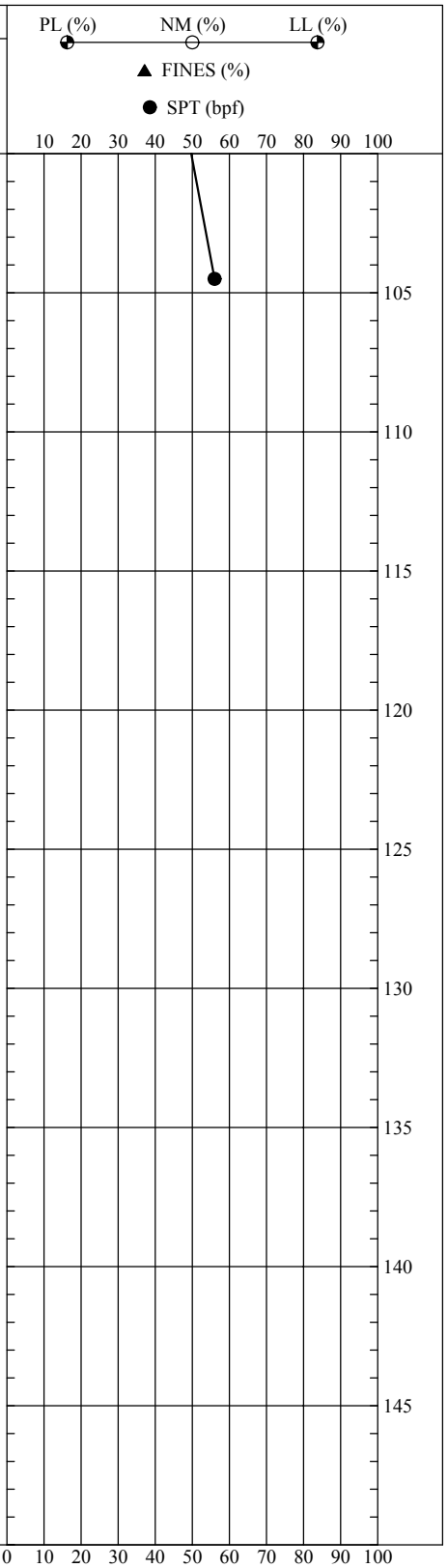
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-09
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219837,757315
DRILLED: October 20, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Dense to very dense, light gray to orange-brown, fine to medium silty SAND (SM)		-98			(N = 49)
	Trace coarse sand and shell fragments at 104 feet bgs.			SPT-23		26-27-29 (N = 56)
105	Boring terminated at 105 feet bgs.		-103			
110			-108			
115			-113			
120			-118			
125			-123			
130			-128			
135			-133			
140			-138			
145			-143			
150			-148			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Offset approximately 60 feet S, 50 feet W.

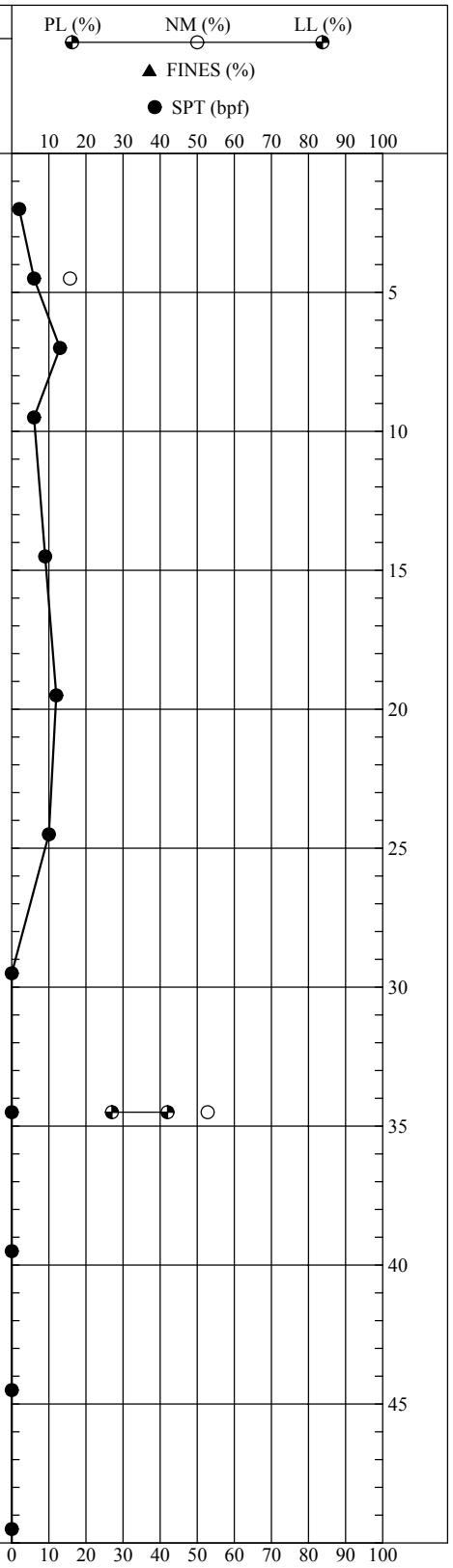
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-09
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219837,757315
DRILLED: October 20, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	ELEV (ft)	IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Six inches of topsoil.	3			
	Loose to medium dense, tan to light gray, fine to medium SAND (SP) with trace silt and trace coarse sand. Wet.		SPT-1	X	3-1-1 (N = 2)
			SPT-2	X	3-3-3 (N = 6)
5	Trace silt and trace coarse sand at 5 feet bgs.	-2			
			SPT-3	X	1-6-7 (N = 13)
			SPT-4	X	1-3-3 (N = 6)
10		-7			
			SPT-5	X	4-5-4 (N = 9)
15		-12			
			SPT-6	X	5-7-5 (N = 12)
20		-17			
			SPT-7	X	5-5-5 (N = 10)
25	Trace coarse sand at 25 feet bgs.	-22			
	Very soft, dark gray CLAY (CH)		SPT-8	X	WOH-0-0 (N = 0)
30	Strong organic odor and trace shell fragments at 30 feet bgs.	-27			
			SPT-9	X	WOH-0-0 (N = 0)
35		-32			
			SPT-10	X	WOH-0-0 (N = 0)
40	No recovery of sample #10.	-37			
			SPT-11	X	WOH-0-0 (N = 0)
45	No organic Odor	-42			
			SPT-12	X	WOH-0-0
50		-47			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 20 feet SW

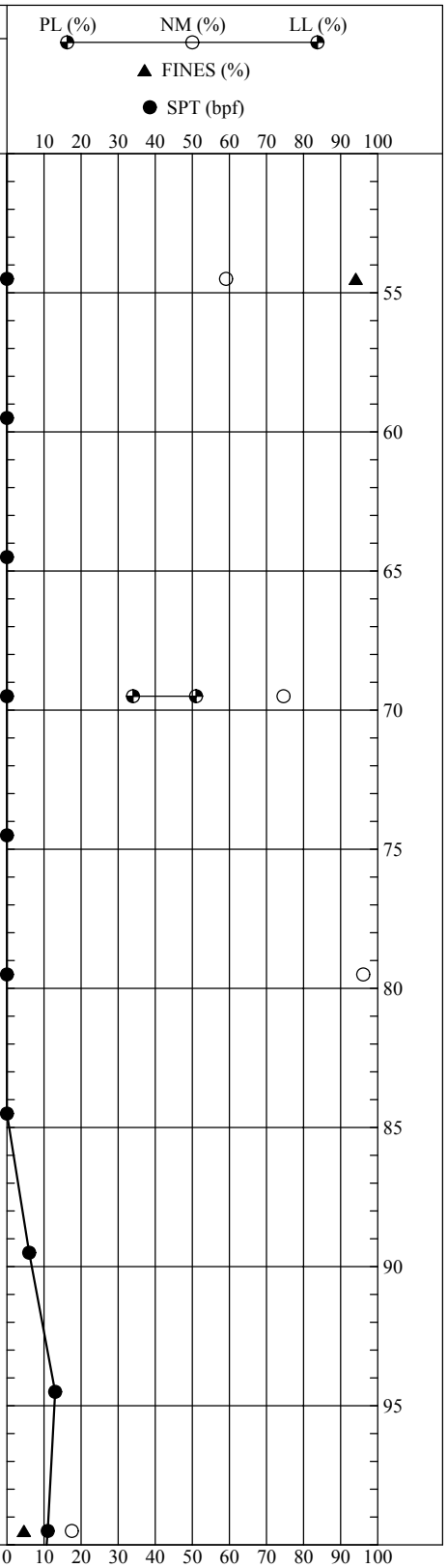
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-10
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220090,757201
DRILLED: October 2, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft, dark gray CLAY (CH)		-47			(N = 0)
55			-52	SPT-13		WOH-0-0 (N = 0)
60			-57	SPT-14		WOH-0-0 (N = 0)
65	No recovery of sample #15.		-62	SPT-15		WOH-0-0 (N = 0)
70			-67	SPT-16		WOH-0-0 (N = 0)
75			-72	SPT-17		WOH-0-0 (N = 0)
80			-77	SPT-18		WOH-0-0 (N = 0)
85			-82	SPT-19		WOH-0-0 (N = 0)
90	Loose, dark gray clayey SAND (SC). Wet, no odor.		-87	SPT-20		2-3-3 (N = 6)
95	Medium dense, light gray, fine to medium SAND (SP) with trace coarse sand and some fine gravel, Wet.		-92	SPT-21		4-4-9 (N = 13)
100			-97	SPT-22		4-5-6



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 20 feet SW

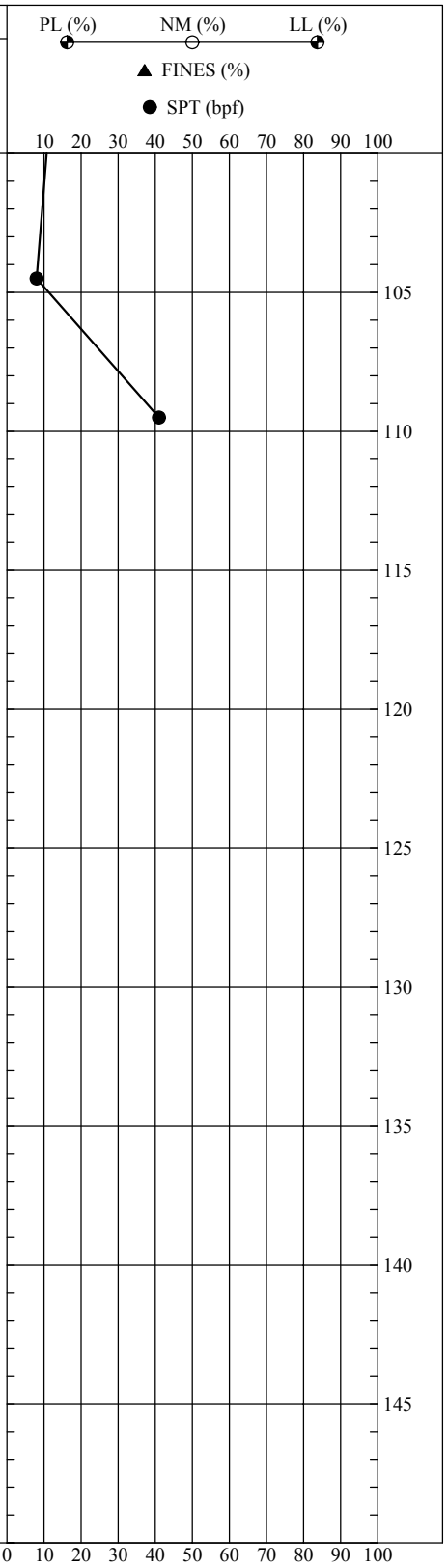
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-10
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220090,757201
DRILLED: October 2, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Medium dense, light gray, fine to medium SAND (SP) with trace coarse sand and some fine gravel, Wet.		-97			(N = 11)
105	Medium dense to very dense, yellow to orange-brown, fine to medium silty SAND (SM)		-102	SPT-23		4-4-4 (N = 8)
110	Very dense orange-brown to dark gray clayey SAND (SC). Wet.		-107	SPT-24		15-18-23 (N = 41)
	Boring terminated at 110 feet bgs.					
115			-112			
120			-117			
125			-122			
130			-127			
135			-132			
140			-137			
145			-142			
150			-147			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 20 feet SW

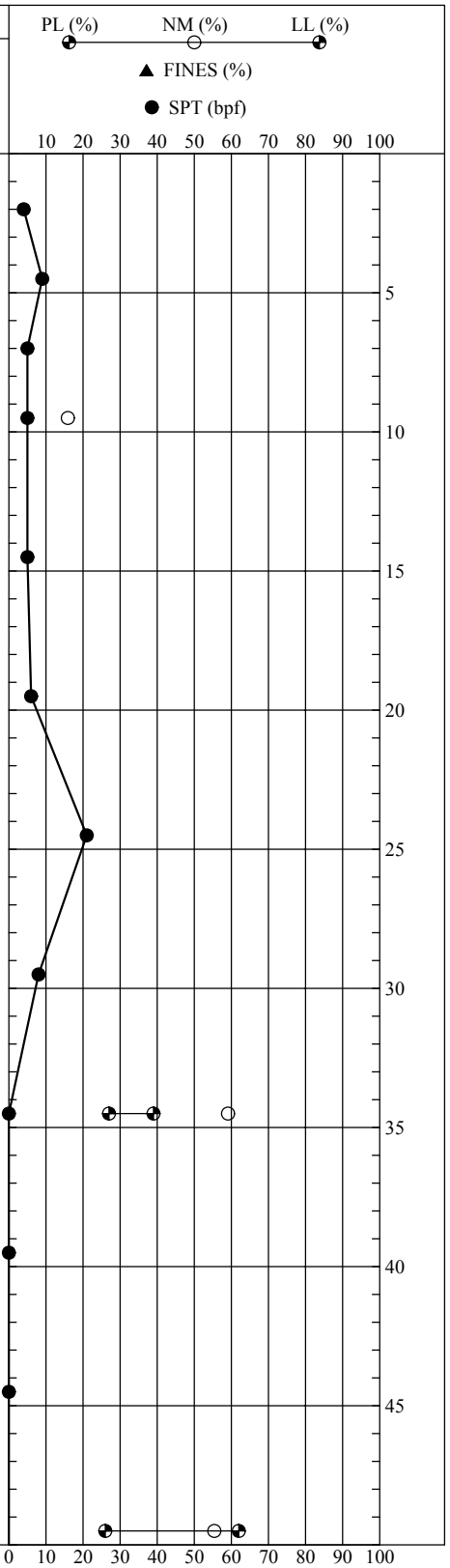
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-10
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220090,757201
DRILLED: October 2, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to medium dense, tan to light gray, fine to medium SAND (SP). Moist to wet.		3			
				SPT-1	X	1-2-2 (N = 4)
				SPT-2	X	2-3-6 (N = 9)
5			-2			
				SPT-3	X	3-3-2 (N = 5)
				SPT-4	X	2-3-2 (N = 5)
10			-7			
				SPT-5	X	3-3-2 (N = 5)
15			-12			
				SPT-6	X	3-3-3 (N = 6)
20			-17			
				SPT-7	X	5-7-14 (N = 21)
25			-22			
				SPT-8	X	8-7-1 (N = 8)
30	Very soft to soft, dark gray CLAY (CH). Strong organic odor around 30 feet bgs.		-27			
				SPT-9	X	WOH-0-0 (N = 0)
35			-32			
				SPT-10	X	WOH-0-0 (N = 0)
40			-37			
				SPT-11	X	WOH-0-0 (N = 0)
45			-42			
				UD-2	■	
50			-47			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	MP
CHECKED BY:	AJA
REMARKS:	

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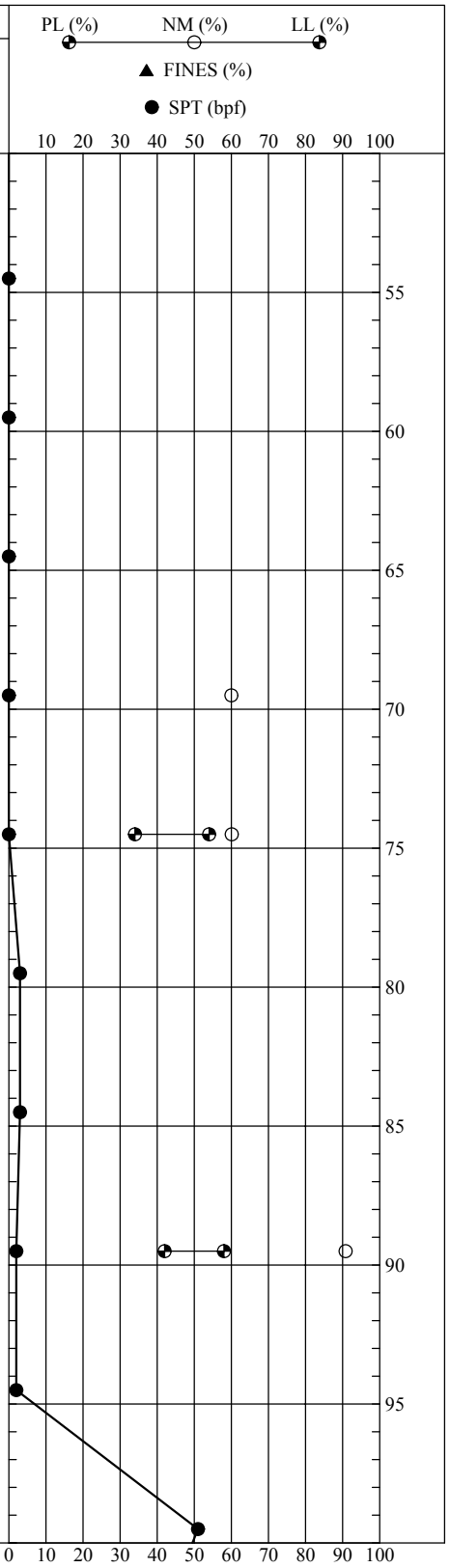
SOIL TEST BORING RECORD

BORING NO.: BII-12
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220361,757174
DRILLED: October 16, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft to soft, dark gray CLAY (CH).		-47			
55			-52	SPT-12		WOH-0-0 (N = 0)
60			-57	SPT-13		WOH-0-0 (N = 0)
65	No recovery of sample #14		-62	SPT-14		WOH-0-0 (N = 0)
70			-67	SPT-15		WOH-0-0 (N = 0)
75			-72	SPT-16		WOH-0-0 (N = 0)
80	No recovery of sample #17		-77	SPT-17		0-1-2 (N = 3)
85			-82	SPT-18		1-1-2 (N = 3)
90			-87	SPT-19		0-1-1 (N = 2)
95			-92	SPT-20		1-1-1 (N = 2)
100	Very dense to medium dense, light gray to yellow, fine to medium SAND (SP). Wet.		-97	SPT-21		14-26-25



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3.25"
LOGGED BY: MP
CHECKED BY: AJA
REMARKS:

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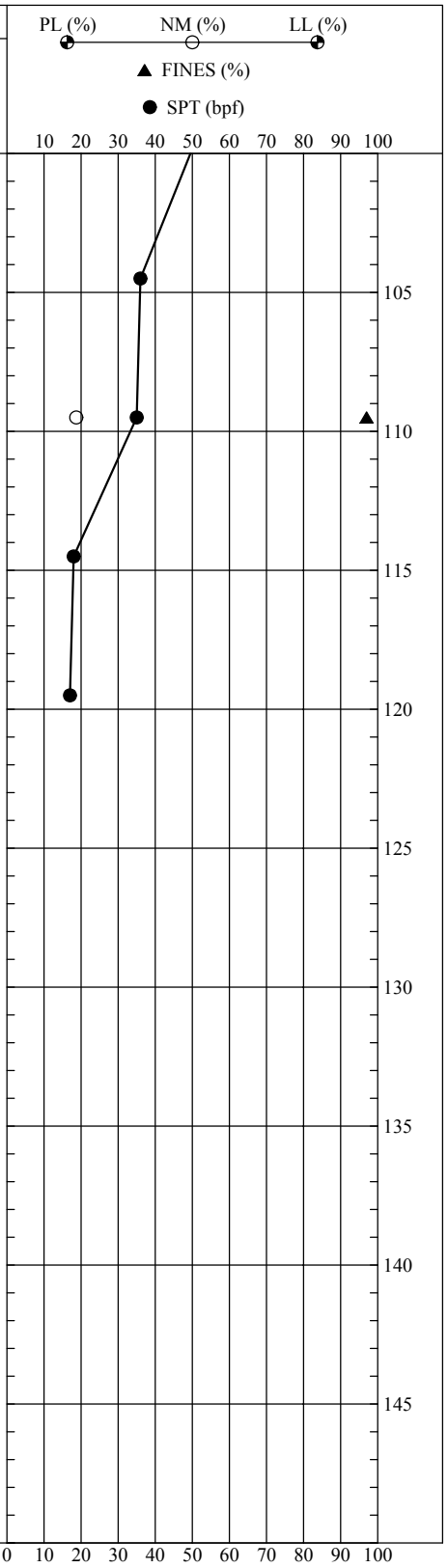
SOIL TEST BORING RECORD

BORING NO.: BII-12
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220361,757174
DRILLED: October 16, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Very dense to medium dense, light gray to yellow, fine to medium SAND (SP). Wet.		-97			(N = 51)
105			-102	SPT-22		11-17-19 (N = 36)
110			-107	SPT-23		13-15-20 (N = 35)
115			-112	SPT-24		5-7-11 (N = 18)
120	Boring terminated at 120 feet bgs.		-117	SPT-25		6-4-13 (N = 17)
125			-122			
130			-127			
135			-132			
140			-137			
145			-142			
150			-147			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3.25"
LOGGED BY: MP
CHECKED BY: AJA
REMARKS:

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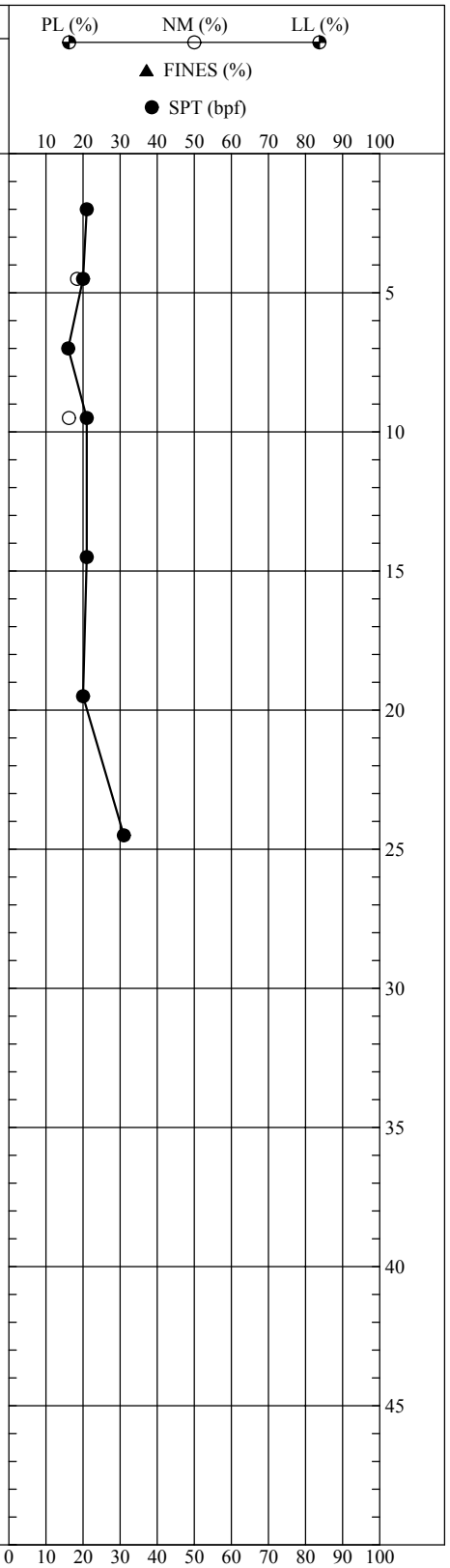
SOIL TEST BORING RECORD

BORING NO.: BII-12
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220361,757174
DRILLED: October 16, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense, tan to light gray, fine to medium SAND (SP). Wet.		4			
				SPT-1		4-7-14 (N = 21)
				SPT-2		6-7-13 (N = 20)
5			-1			
				SPT-3		5-7-9 (N = 16)
				SPT-4		6-9-12 (N = 21)
10			-6			
				SPT-5		13-9-12 (N = 21)
15			-11			
				SPT-6		5-7-13 (N = 20)
20			-16			
	Trace coarse sand and shell fragments around 23 feet bgs.					
				SPT-7		10-13-18 (N = 31)
25	boring terminated at 25 feet bgs.		-21			
30			-26			
35			-31			
40			-36			
45			-41			
50			-46			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-75
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 50 feet E

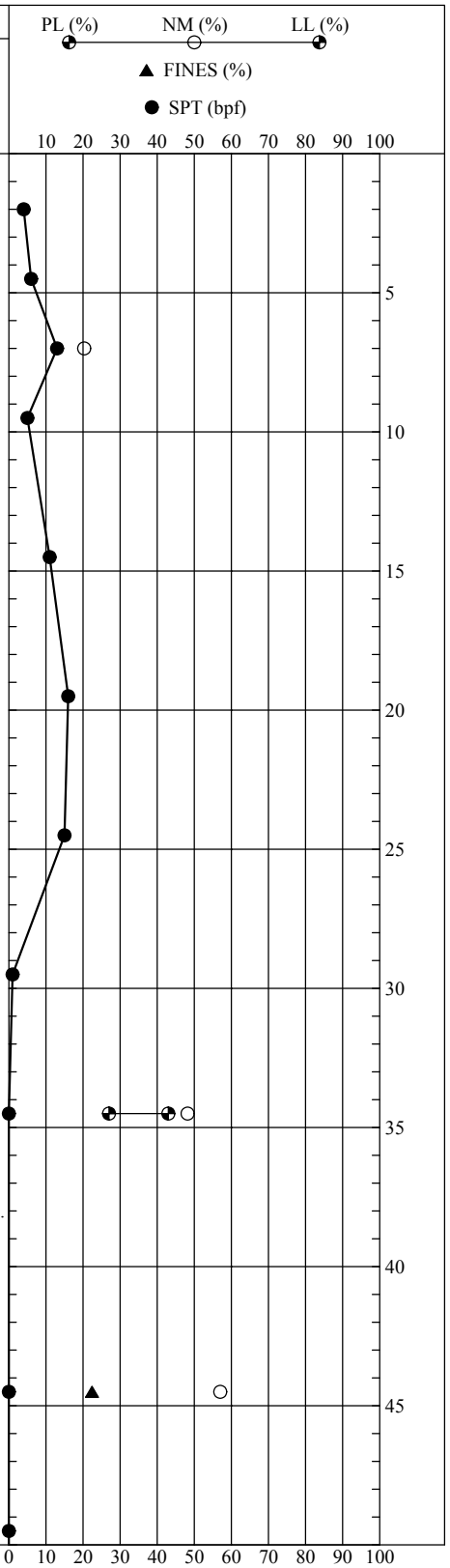
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-13
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220387,757393
DRILLED: October 13, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to medium dense, tan to light gray, fine to medium SAND (SP). Wet.		1			
				SPT-1	X	2-2-2 (N = 4)
				SPT-2	X	4-3-3 (N = 6)
5			-4			
				SPT-3	X	4-6-7 (N = 13)
				SPT-4	X	1-2-3 (N = 5)
10			-9			
				SPT-5	X	4-5-6 (N = 11)
15			-14			
				SPT-6	X	8-8-8 (N = 16)
20			-19			
				SPT-7	X	4-6-9 (N = 15)
25			-24			
	Very soft, dark gray, silty CLAY (CL). Moist.					
				SPT-8	X	0-0-1 (N = 1)
30			-29			
				SPT-9	X	WOH-0-0 (N = 0)
35			-34			
	Shelby tube sample attempt, zero recovery.					UD Zero Rec.
40			-39			
	Vane shear test VS-1 at 41 feet bgs.					
				SPT-11	X	WOH-0-0 (N = 0)
45			-44			
				SPT-12	X	WOH-0-0
50			-49			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 30 feet E

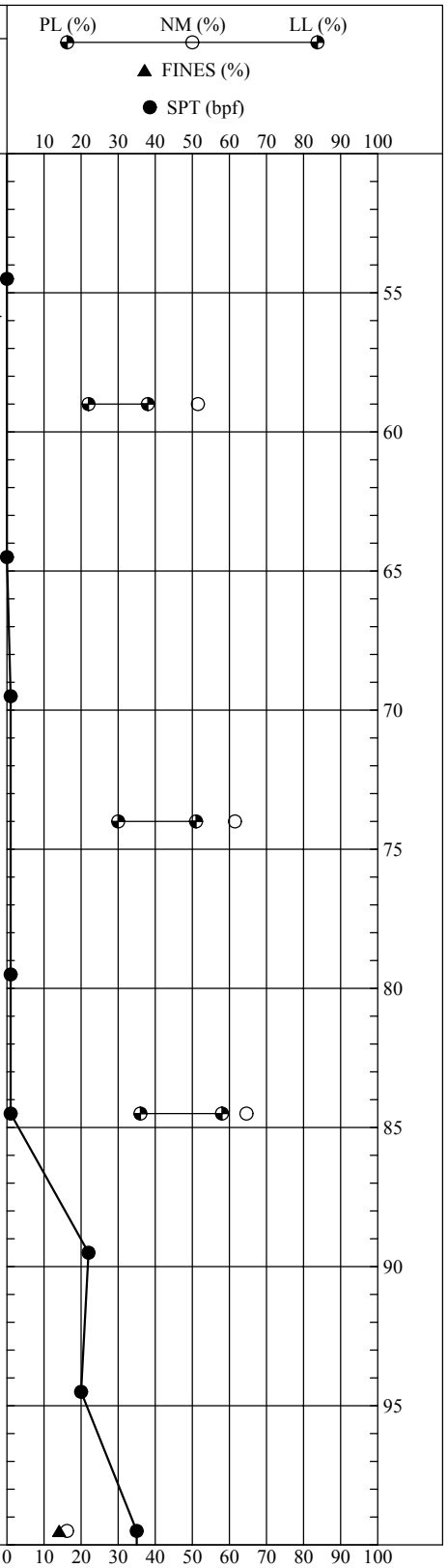
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-14
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220687,757072
DRILLED: October 28, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft, dark gray, silty CLAY (CL). Moist.		-49			(N = 0)
				SPT-13		WOH-0-0 (N = 0) UD Zero Rec.
55	Shelby tube sample attempt, zero recovery.		-54			
	Vane shear test VS-2 at 57 feet bgs.			UD-7		
60			-59			
				SPT-15		WOH-0-0 (N = 0)
65	No recovery of sample #15		-64			
				SPT-16		0-0-1 (N = 1)
70			-69			
	Vane shear test VS-3 at 71.5 feet bgs.			UD-8		
75			-74			
				SPT-18		0-0-1 (N = 1)
80			-79			
				SPT-19		0-0-1 (N = 1)
85			-84			
	Medium dense to very dense, light gray to yellow, fine to medium SAND (SP). Wet.			SPT-20		2-6-16 (N = 22)
90	Some silt at 90 feet bgs.		-89			
				SPT-21		5-9-11 (N = 20)
95			-94			
				SPT-22		6-17-18
100			-99			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 30 feet E

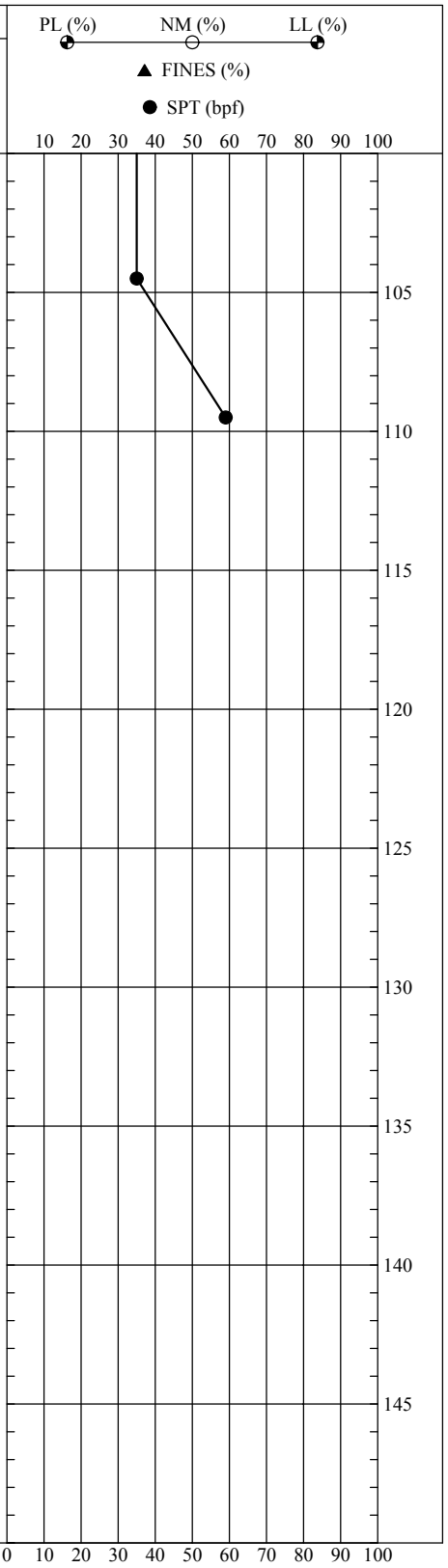
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-14
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220687,757072
DRILLED: October 28, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Medium dense to very dense, light gray to yellow, fine to medium SAND (SP). Wet.		-99			(N = 35)
105	Little to some coarse sand from 100 feet to 110 feet bgs.		-104	SPT-23		11-17-18 (N = 35)
110	Boring terminated at 110 feet bgs.		-109	SPT-24		19-27-32 (N = 59)
115			-114			
120			-119			
125			-124			
130			-129			
135			-134			
140			-139			
145			-144			
150			-149			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 30 feet E

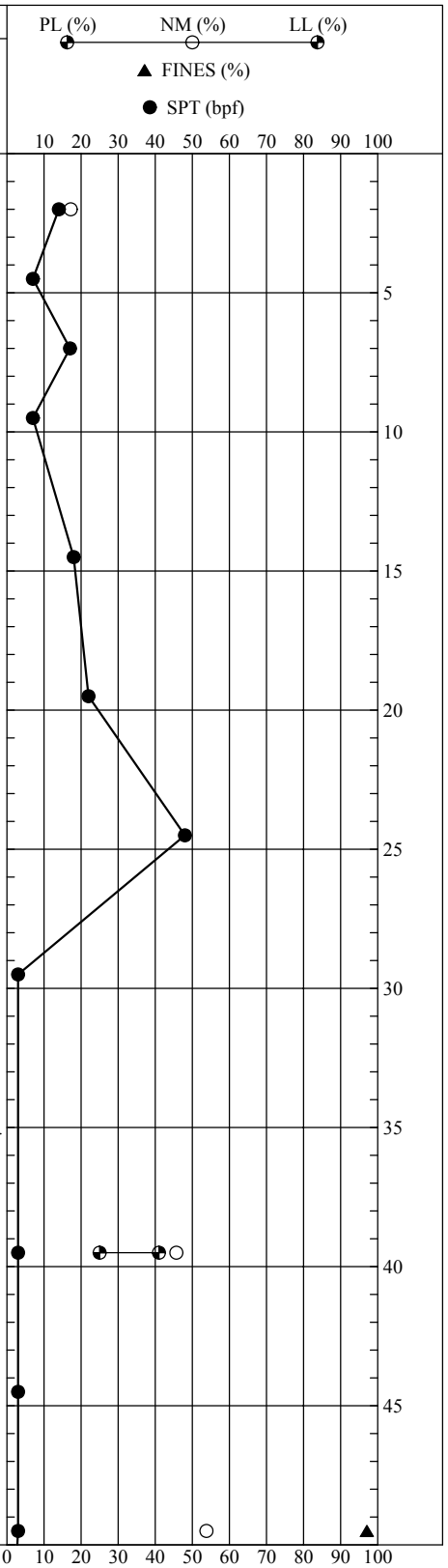
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-14
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220687,757072
DRILLED: October 28, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to medium dense, tan to light gray fine to medium SAND (SP). Wet.		1			
				SPT-1	X	5-3-11 (N = 14)
				SPT-2	X	4-3-4 (N = 7)
5			-4			
				SPT-3	X	4-7-10 (N = 17)
				SPT-4	X	2-3-4 (N = 7)
10			-9			
				SPT-5	X	8-7-11 (N = 18)
15			-14			
				SPT-6	X	7-10-12 (N = 22)
20			-19			
				SPT-7	X	16-20-28 (N = 48)
25			-24			
	Soft to medium stiff, dark gray CLAY (CH). Moist.					
				SPT-8	X	1-1-2 (N = 3)
30			-29			
35	Shelby tube sample attempt, zero recovery		-34	UD		UD Zero Rec.
				SPT-10	X	2-1-2 (N = 3)
40			-39			
				SPT-11	X	1-2-1 (N = 3)
45			-44			
				SPT-12	X	0-1-2
50			-49			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-75
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 73 feet E.

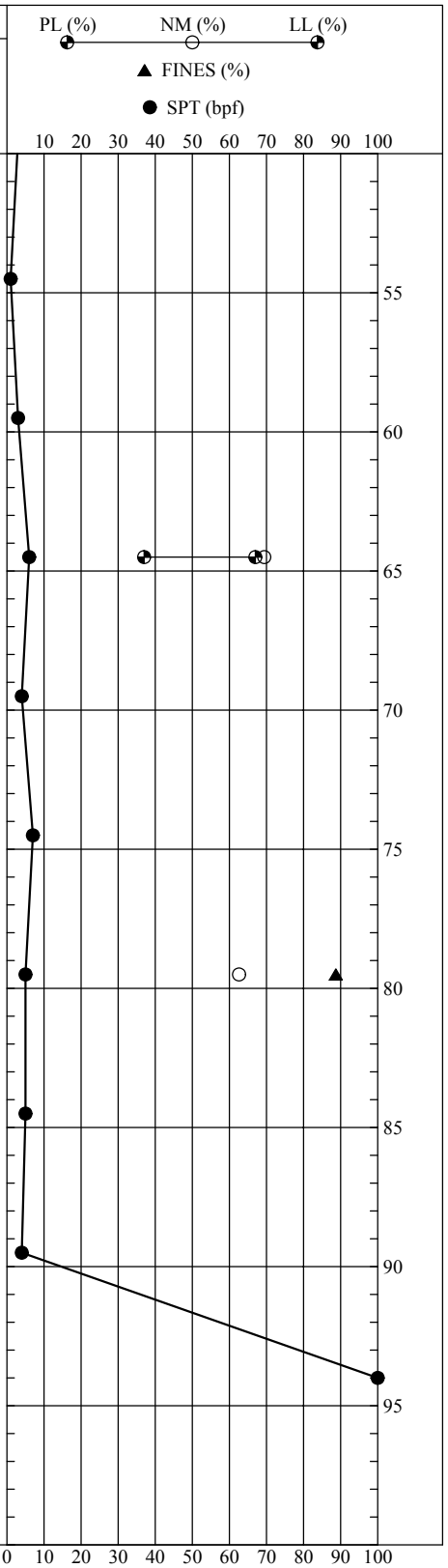
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-15
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220482,757026
DRILLED: October 28, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Soft to medium stiff, dark gray CLAY (CH). Moist.		-49			(N = 3)
	Trace shell fragments from 48.5 to 55 feet bgs.					
55			-54	SPT-13		0-0-1 (N = 1)
60			-59	SPT-14		1-1-2 (N = 3)
	Significant water loss at 63 feet bgs (possible sand lens).					
65			-64	SPT-15		2-3-3 (N = 6)
70			-69	SPT-16		2-2-2 (N = 4)
	Trace organic fragments from 68.5 to 75 feet bgs.					
75			-74	SPT-17		2-3-4 (N = 7)
80			-79	SPT-18		2-3-2 (N = 5)
85			-84	SPT-19		1-3-2 (N = 5)
	Soft, dark gray, fine SANDY CLAY (CL). Moist.					
90			-89	SPT-20		0-1-3 (N = 4)
	Gray, fine to medium SAND (SP). Wet Some coarse sand and trace fine gravel at 93.5 to 94 feet bgs. Piece of gravel was stuck in shoe during pounding of sample #21. Blowcounts questionable. Boring terminated at 95 feet bgs.			SPT-21		21-20/0"
95			-94			
100			-99			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-75
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 73 feet E.

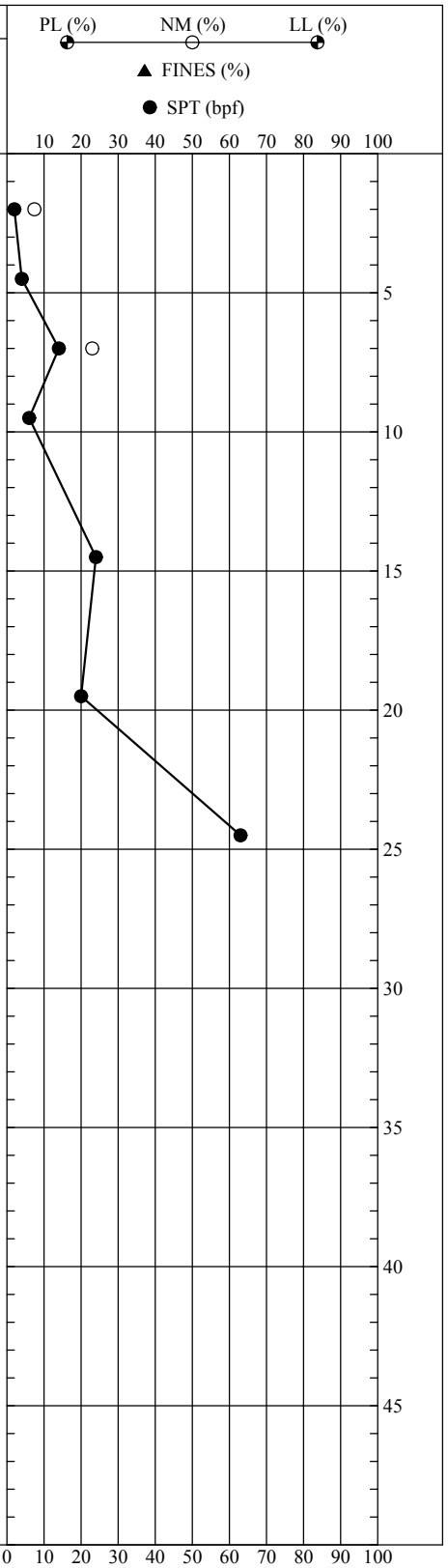
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-15
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220482,757026
DRILLED: October 28, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to very dense, tan to light gray, fine to medium SAND (SP). Wet.		6	SPT-1		1-1-1 (N = 2)
				SPT-2		1-1-3 (N = 4)
5			1	SPT-3		5-5-9 (N = 14)
				SPT-4		2-3-3 (N = 6)
10			-4			
				SPT-5		12-11-13 (N = 24)
15			-9			
				SPT-6		10-10-10 (N = 20)
20	Trace coarse sand around 20 feet bgs.		-14			
				SPT-7		20-28-35 (N = 63)
25	Boring terminated at 25 feet bgs.		-19			
30			-24			
35			-29			
40			-34			
45			-39			
50			-44			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-75
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 30 feet E

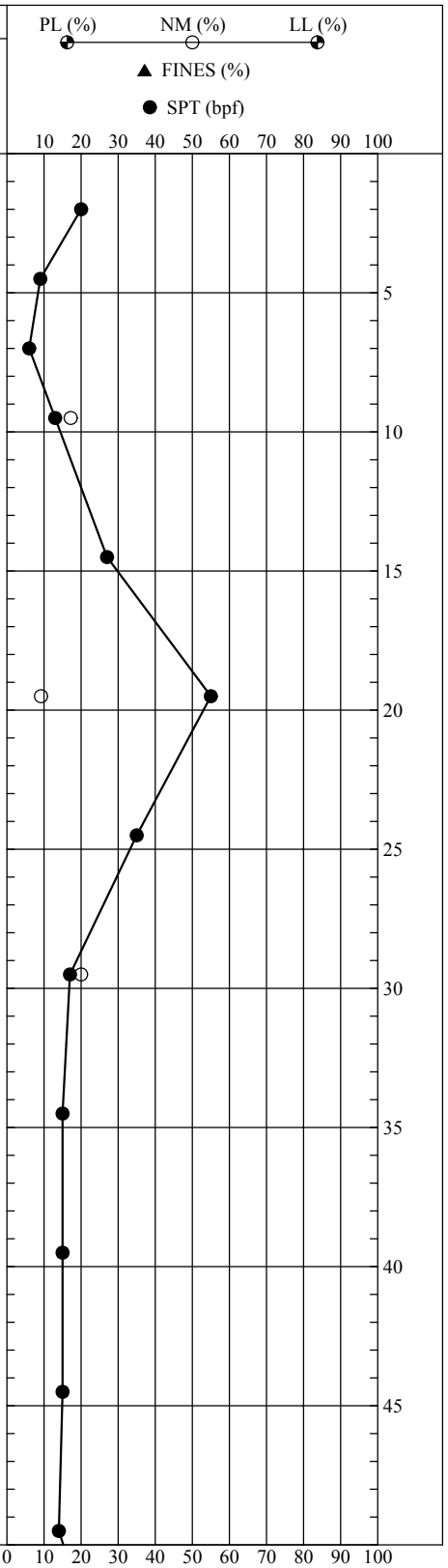
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-16
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220925,757387
DRILLED: October 13, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to very dense, light gray to light tan, fine to medium SAND (SP). Moist to wet.		28	SPT-1	X	7-8-12 (N = 20)
				SPT-2	X	1-4-5 (N = 9)
5	Trace silt and trace fine gravel at 5 feet bgs.		23	SPT-3	X	1-3-3 (N = 6)
				SPT-4	X	2-6-7 (N = 13)
10			18			
				SPT-5	X	5-12-15 (N = 27)
15			13			
				SPT-6	X	10-19-36 (N = 55)
20			8			
				SPT-7	X	9-15-20 (N = 35)
25			3			
				SPT-8	X	7-9-8 (N = 17)
30	Trace silt at 30 feet bgs.		-2			
	Trace shell fragments and little plant fragments at 33.5 feet bgs. 1 inch thick organic silt layer with trace clay at 34.3 feet bgs.			SPT-9	X	3-6-9 (N = 15)
35			-7			
				SPT-10	X	5-6-9 (N = 15)
40	Trace coarse sand at 40 feet bgs.		-12			
	Trace shell fragments at 43.5 feet bgs.			SPT-11	X	4-7-8 (N = 15)
45			-17			
				SPT-12	X	5-6-8
50			-22			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	

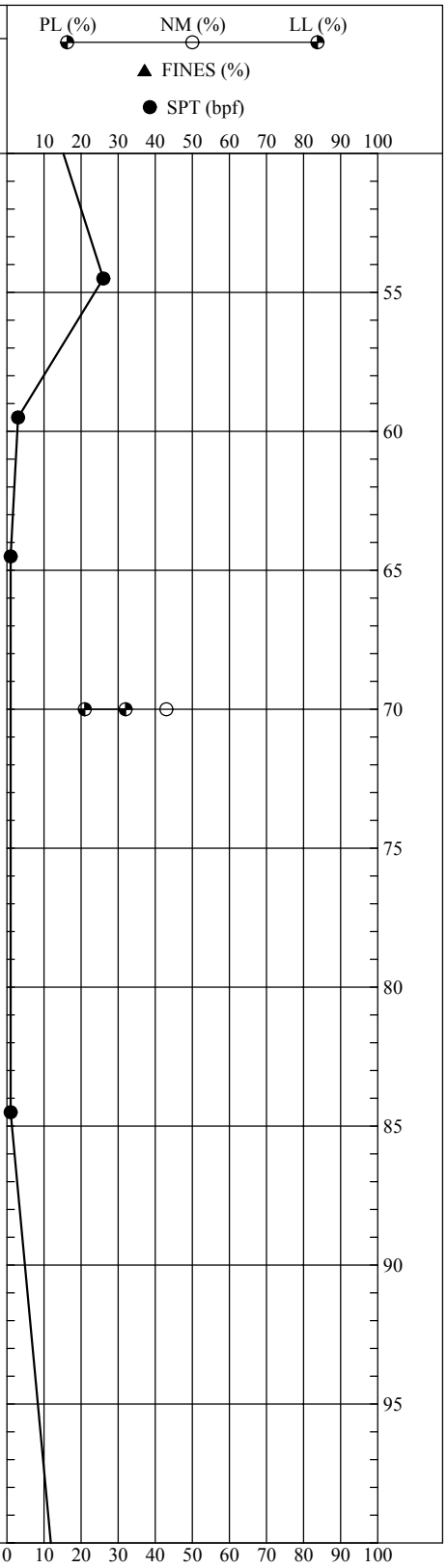
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-17
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220968.3,757193.1
DRILLED: October 15, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Loose to very dense, light gray to light tan, fine to medium SAND (SP). Moist to wet.	-22			(N = 14)
55		-27	SPT-13		7-12-14 (N = 26)
60	Very soft, dark gray CLAY (CL). Moist.	-32	SPT-14		1-2-1 (N = 3)
65	Trace shell fragments at 63.5 feet bgs.	-37	SPT-15		0-0-1 (N = 1)
70		-42	UD-1		
75		-47			
80		-52			
85	No Recovery of sample #19.	-57	SPT-19		0-0-1 (N = 1)
90		-62			
95		-67			
100		-72			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3.25"
LOGGED BY: MLH
CHECKED BY: AJA
REMARKS:

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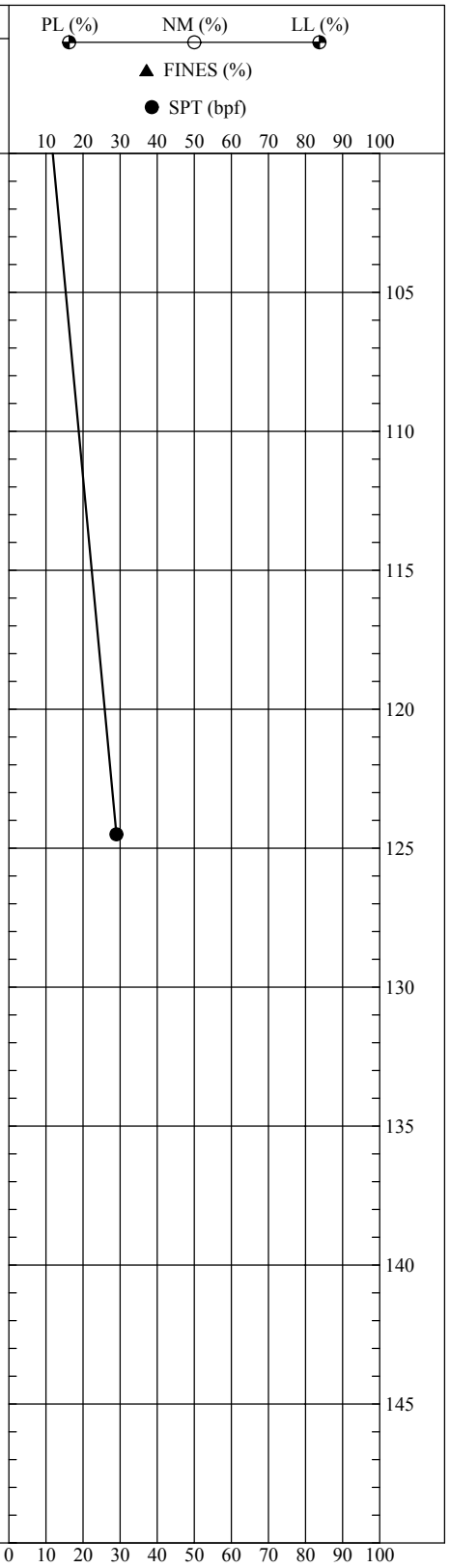
SOIL TEST BORING RECORD

BORING NO.: BII-17
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220968.3,757193.1
DRILLED: October 15, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Very soft, dark gray CLAY (CL). Moist.		-72			
105			-77			
110			-82			
115			-87			
120	Medium dense, light gray to tan, fine to medium SAND (SP), trace silt. Wet.		-92			
				SPT-27		14-14-15 (N = 29)
125	Boring Terminated at 125.0 feet bgs.		-97			
130			-102			
135			-107			
140			-112			
145			-117			
150			-122			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3.25"
LOGGED BY: MLH
CHECKED BY: AJA
REMARKS:

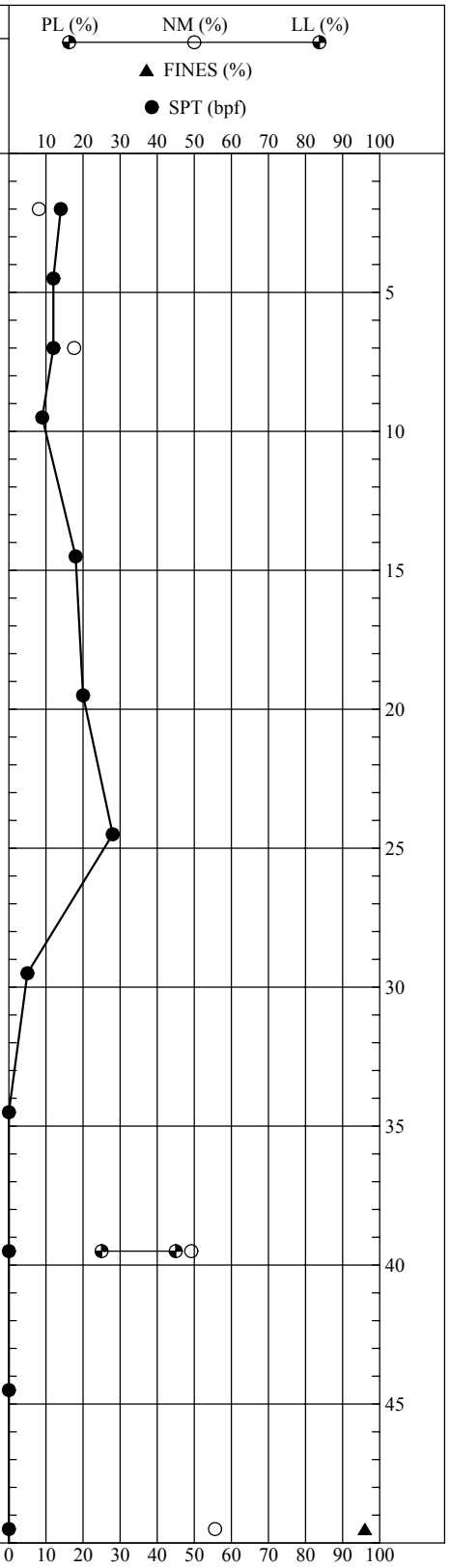
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-17
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220968.3,757193.1
DRILLED: October 15, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense to dense, tan to light gray, fine to medium SAND (SP) with trace silt and trace coarse sand. Wet. Some root fragments at 5 feet bgs.		2	SPT-1	X	6-4-10 (N = 14)
				SPT-2	X	2-5-7 (N = 12)
5	Trace silt and root fragments at 5 feet bgs. Slight organic Odor.		-3	SPT-3	X	4-6-6 (N = 12)
				SPT-4	X	3-4-5 (N = 9)
10			-8			
				SPT-5	X	5-9-9 (N = 18)
15			-13			
				SPT-6	X	6-8-12 (N = 20)
20			-18			
				SPT-7	X	8-12-16 (N = 28)
25	Trace shell fragments at 25 feet bgs.		-23			
				SPT-8	X	5-3-2 (N = 5)
30	Very soft, dark gray CLAY (CH)		-28			
				SPT-9	X	WOH-0-0 (N = 0)
35			-33			
				SPT-10	X	WOH-0-0 (N = 0)
40			-38			
				SPT-11	X	WOH-0-0 (N = 0)
45			-43			
				SPT-12	X	WOH-0-0
50			-48			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Offset approximately 20 feet SW

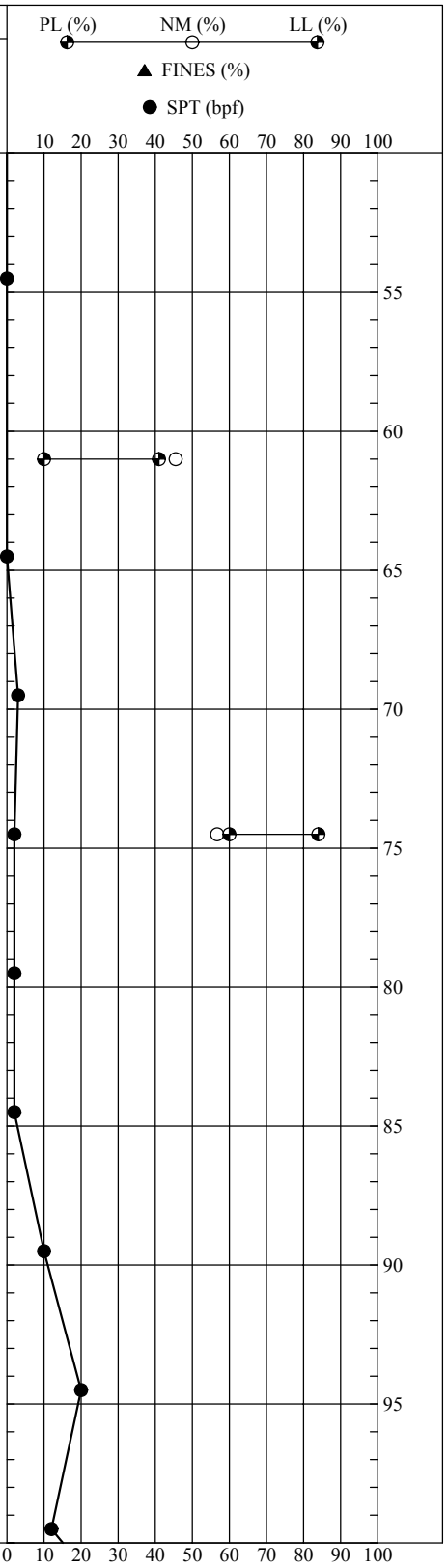
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-18
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220991,757072
DRILLED: October 23, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft, dark gray CLAY (CH)		-48			(N = 0)
55			-53	SPT-13		WOH-0-0 (N = 0)
60			-58	UD-5		
65			-63	SPT-15		WOH-0-0 (N = 0)
70			-68	SPT-16		1-2-1 (N = 3)
75	Some silt and dark brown mottling at 75 feet bgs.		-73	SPT-17		1-1-1 (N = 2)
80			-78	SPT-18		0-1-1 (N = 2)
85			-83	SPT-19		0-1-1 (N = 2)
90	Medium dense to dense, light gray to light yellow, fine to medium SAND (SP) with trace silt and trace coarse sand. Wet.		-88	SPT-20		1-4-6 (N = 10)
95			-93	SPT-21		6-9-11 (N = 20)
100			-98	SPT-22		2-3-9



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Offset approximately 20 feet SW

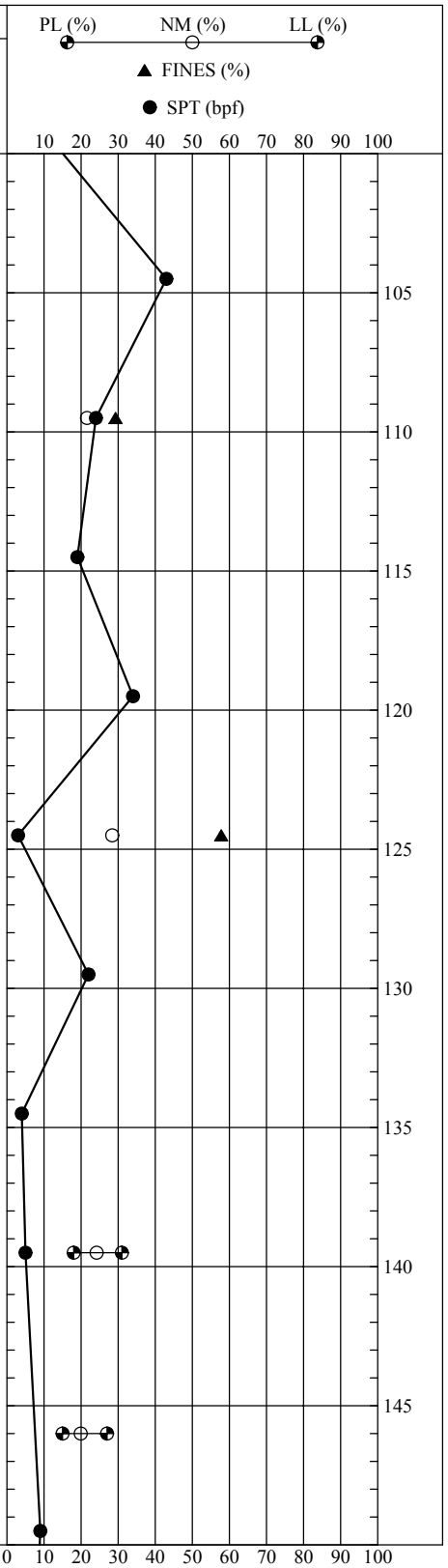
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-18
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220991,757072
DRILLED: October 23, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Medium dense to dense, light gray to light yellow, fine to medium SAND (SP) with trace silt and trace coarse sand. Wet.		-98			(N = 12)
105			-103	SPT-23		12-17-26 (N = 43)
110			-108	SPT-24		15-12-12 (N = 24)
115			-113	SPT-25		8-8-11 (N = 19)
120			-118	SPT-26		9-15-19 (N = 34)
125	Very loose, gray, clayey fine SAND (SC). Wet.		-123	SPT-27		3-1-2 (N = 3)
130	Medium dense, light gray, fine SAND (SP) with some clay. Moist.		-128	SPT-28		3-12-10 (N = 22)
135	Medium stiff to stiff, dark gray, lean CLAY (CL) with sand. Moist		-133	SPT-29		3-2-2 (N = 4)
140			-138	SPT-30		0-1-4 (N = 5)
145			-143	UD-6		
150			-148	SPT-32		1-5-4



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Offset approximately 20 feet SW

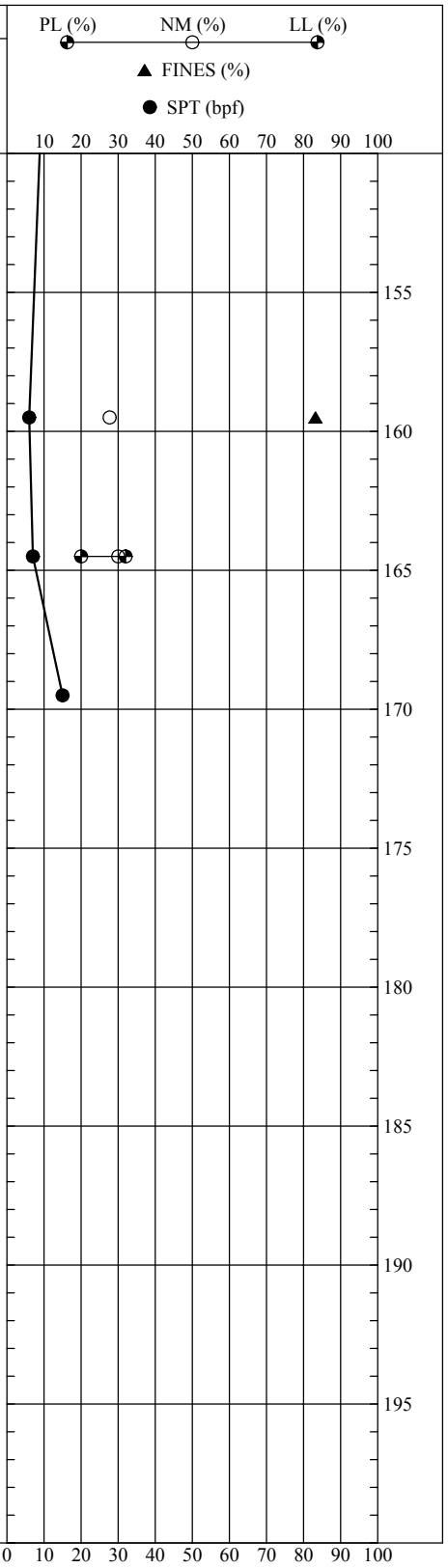
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-18
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220991,757072
DRILLED: October 23, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
150	Medium stiff to stiff, dark gray, lean CLAY (CL) with sand. Moist		-148			(N = 9)
155	No recovery of sample #33.		-153	SPT-33		
160			-158	SPT-34		2-3-3 (N = 6)
165			-163	SPT-35		2-3-4 (N = 7)
	Medium dense, dark gray clayey SAND (SC)					
170	Boring terminated at 170 feet bgs.		-168	SPT-36		6-7-8 (N = 15)
175			-173			
180			-178			
185			-183			
190			-188			
195			-193			
200			-198			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Offset approximately 20 feet SW

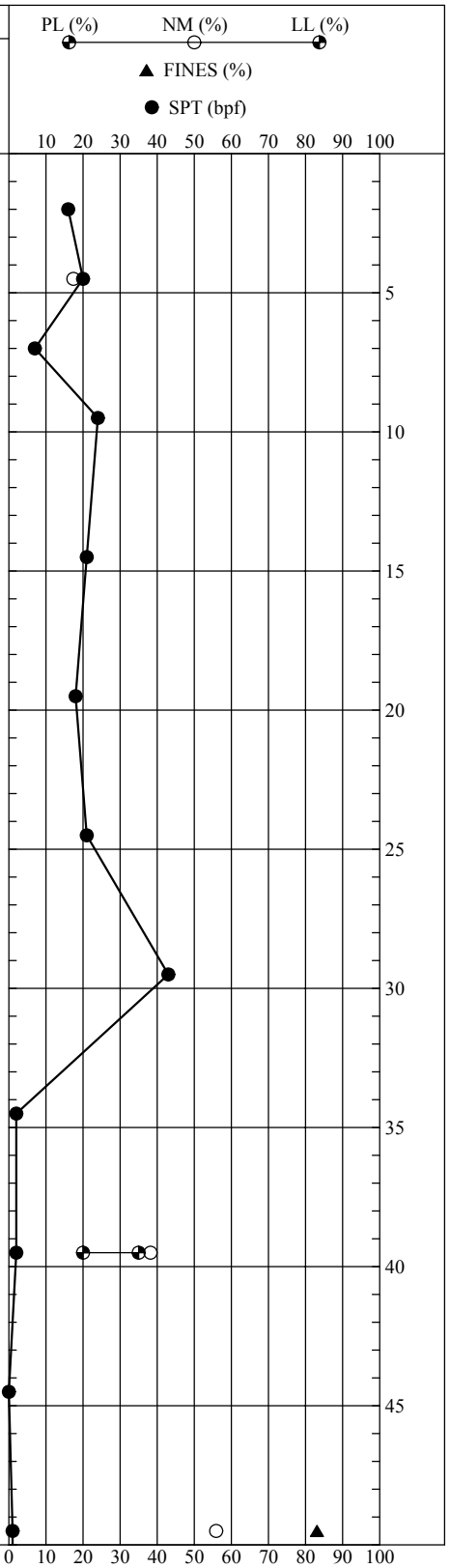
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-18
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220991,757072
DRILLED: October 23, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to dense, light brown to light gray, fine to medium SAND (SP) with trace to little silt. Wet.		4			
				SPT-1		5-8-8 (N = 16)
				SPT-2		5-10-10 (N = 20)
5			-2			
				SPT-3		6-4-3 (N = 7)
				SPT-4		6-10-14 (N = 24)
10			-7			
				SPT-5		8-10-11 (N = 21)
15			-12			
	Pressure meter PM2-1 at 16 feet bgs.					
				SPT-6		6-8-10 (N = 18)
20			-17			
	Pressure meter PM2-2 at 21 feet bgs.					
				SPT-7		7-10-11 (N = 21)
25			-22			
	Pressure meter PM2-3 at 26 feet bgs.					
				SPT-8		8-18-25 (N = 43)
30			-27			
	Very soft to soft, dark gray CLAY (CH). Moist to wet.					
				SPT-9		1-1-1 (N = 2)
35	Slight organic odor at 35 feet bgs.		-32			
				SPT-10		1-1-1 (N = 2)
40			-37			
				SPT-11		WOH-0-0 (N = 0)
45			-42			
				SPT-12		0-0-1
50			-47			



SOIL TEST BORING INDIAN RIVER STAGES 1+2.GPJ LAW_GIBB.GDT 1/15/04

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	
CHECKED BY:	
REMARKS:	Offset approximately 20 feet E

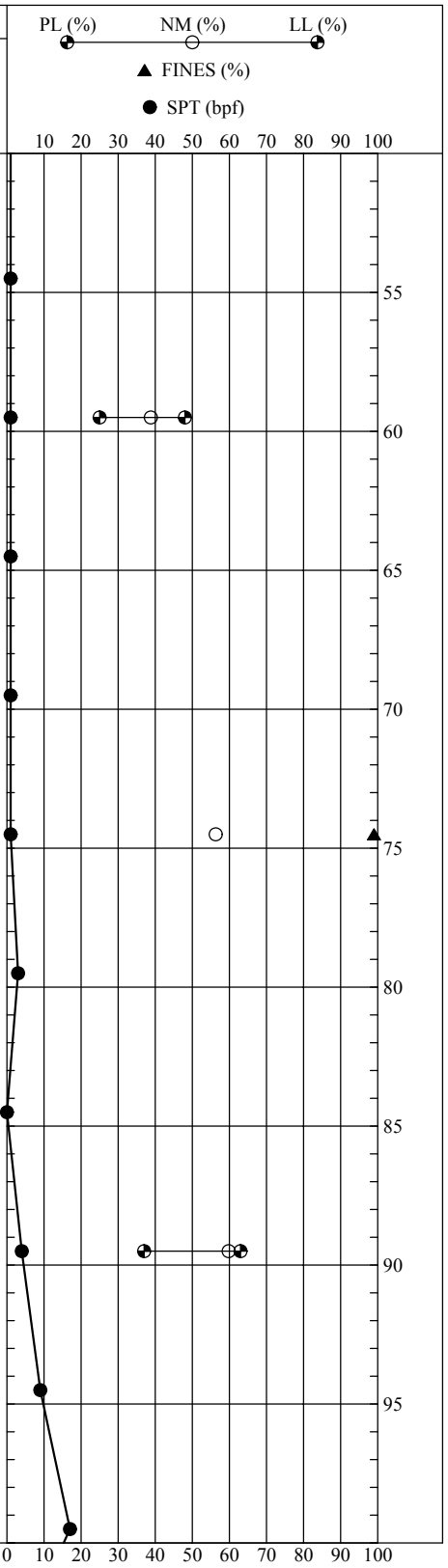
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-19
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 221061,757125
DRILLED: October 31, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft to soft, dark gray CLAY (CH). Moist to wet.		-47			(N = 1)
55	Trace shell fragments from 38.5 to 75 feet bgs.		-52	SPT-13		0-0-1 (N = 1)
60			-57	SPT-14		0-0-1 (N = 1)
65			-62	SPT-15		0-0-1 (N = 1)
70			-67	SPT-16		0-0-1 (N = 1)
75			-72	SPT-17		0-0-1 (N = 1)
80	Trace decomposed wood fragments from 78.5 to 80 feet bgs.		-77	SPT-18		1-1-2 (N = 3)
85			-82	SPT-19		WOH-0-0 (N = 0)
90	Some coarse sand and trace fine gravel from 88.5 to 95 feet bgs.		-87	SPT-20		WOH-2-2 (N = 4)
95	Loose to very dense, light gray to yellowish orange, fine to medium SAND (SP). Moist.		-92	SPT-21		2-3-6 (N = 9)
100			-97	SPT-22		7-13-4



SOIL TEST BORING INDIAN RIVER STAGES 1+2.GPJ LAW_GIBB.GDT 1/15/04

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3.25"
LOGGED BY:
CHECKED BY:
REMARKS: Offset approximately 20 feet E

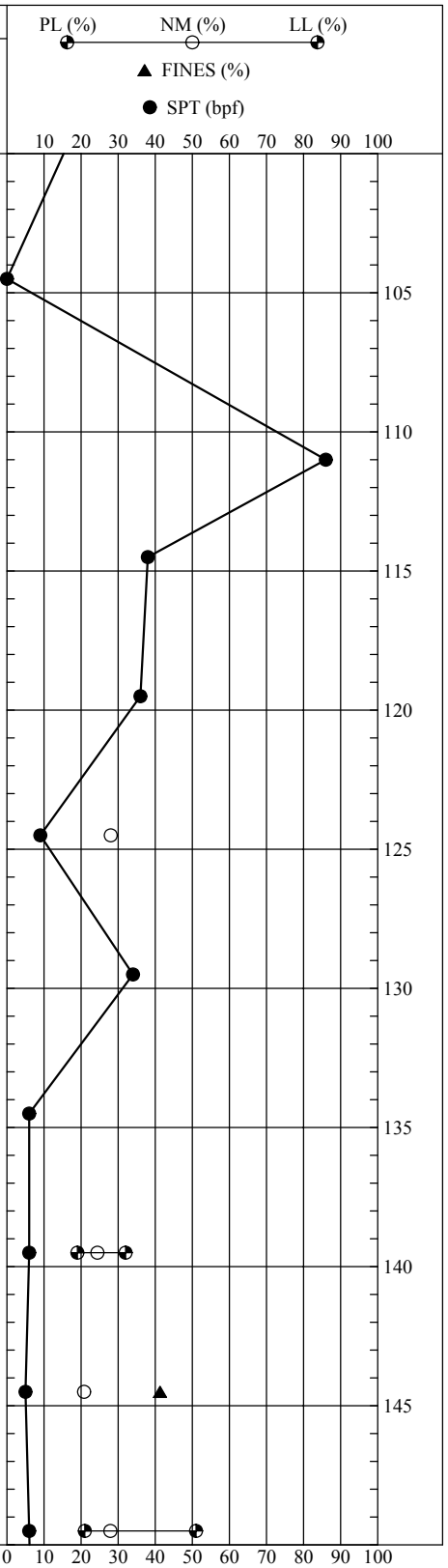
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-19
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 221061,757125
DRILLED: October 31, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Loose to very dense, light gray to yellowish orange, fine to medium SAND (SP). Moist. Pressure meter PM2-4 at 101.5 feet bgs.		-97			(N = 17)
105			-102	SPT-23		WOH-0-0 (N = 0)
110	1 inch lens of coarse sand and fine gravel at 111 feet bgs.		-107	SPT-24		30-41-45 (N = 86)
115			-112	SPT-25		10-17-21 (N = 38)
120	Little silt from 110 to 125 feet bgs.		-117	SPT-26		11-20-16 (N = 36)
125	Loose to dense, light gray fine clayey SAND (SC). Moist.		-122	SPT-27		3-4-5 (N = 9)
130	Loose to very dense, light gray to yellowish orange, fine to medium SAND (SP). Moist.		-127	SPT-28		12-17-17 (N = 34)
135	1/2 inch lens of decomposed wood fragments at 134.5 feet bgs. Medium stiff, dark gray sandy CLAY (CL). Dry to moist.		-132	SPT-29		1-2-4 (N = 6)
140			-137	SPT-30		0-3-3 (N = 6)
145			-142	SPT-31		1-3-2 (N = 5)
150			-147	SPT-32		3-3-3



SOIL TEST BORING INDIAN RIVER STAGES 1+2.GPJ LAW_GIBB.GDT 1/15/04

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	
CHECKED BY:	
REMARKS:	Offset approximately 20 feet E

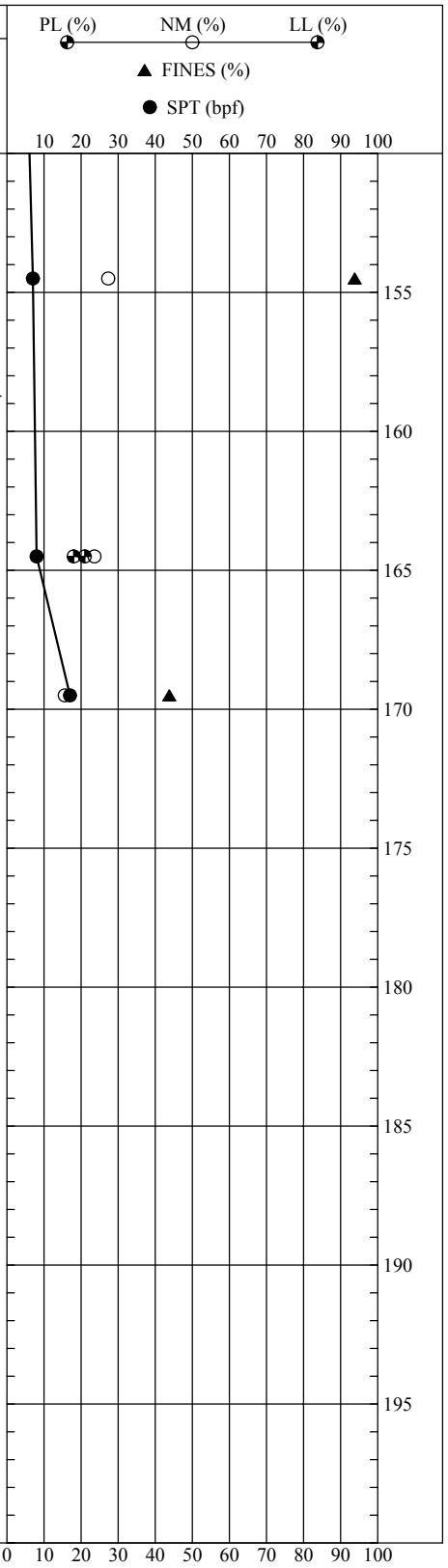
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-19
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 221061,757125
DRILLED: October 31, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
150	Medium stiff, dark gray sandy CLAY (CL). Dry to moist.		-147			(N = 6)
155	Trace coarse sand and some fine to medium sand around 154 feet bgs.		-152	SPT-33		2-3-4 (N = 7)
	Shelby tube sample attempt, zero recovery					UD Zero Rec.
160	Loose to medium dense, gray, fine silty SAND (SM). Moist.		-157			
165			-162	SPT-35		3-3-5 (N = 8)
170	Boring terminated at 170 feet bgs.		-167	SPT-36		7-7-10 (N = 17)
175			-172			
180			-177			
185			-182			
190			-187			
195			-192			
200			-197			



SOIL TEST BORING INDIAN RIVER STAGES 1+2.GPJ LAW_GIBB.GDT 1/15/04

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3.25"
LOGGED BY:	
CHECKED BY:	
REMARKS:	Offset approximately 20 feet E

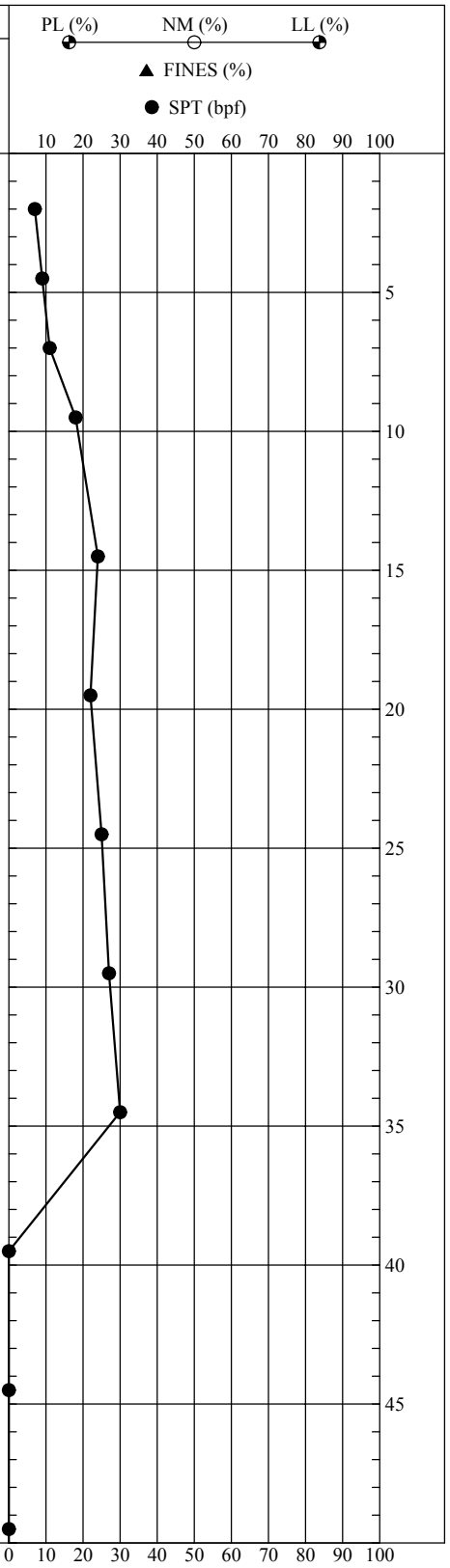
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-19
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 221061,757125
DRILLED: October 31, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense to dense, light tan to light gray, fine to medium SAND (SP) with trace to little silt. Wet.		4	SPT-1		5-4-3 (N = 7)
5			-2	SPT-2		4-4-5 (N = 9)
				SPT-3		7-6-5 (N = 11)
10	Trace root fragments at 10 feet bgs.		-7	SPT-4		10-10-8 (N = 18)
15			-12	SPT-5		3-11-13 (N = 24)
20	Trace shell fragments at 10 feet bgs.		-17	SPT-6		7-9-13 (N = 22)
25	Some coarse sand at 25 feet bgs		-22	SPT-7		8-12-13 (N = 25)
30	Trace shell fragments at 30 feet bgs.		-27	SPT-8		7-12-15 (N = 27)
35	Slight organic odor at 35 feet bgs.		-32	SPT-9		7-12-18 (N = 30)
	Very soft to soft, dark gray CLAY (CH). Moist to wet.					
40			-37	SPT-10		WOH-0-0 (N = 0)
45			-42	SPT-11		WOH-0-0 (N = 0)
50			-47	SPT-12		WOH-0-0



SOIL TEST BORING INDIAN RIVER STAGES 1+2.GPJ LAW_GIBB.GDT 1/15/04

DRILLER:	Free State Drilling
EQUIPMENT:	Track Mount CME-45
METHOD:	Casing/Wash
HOLE DIA.:	3"
LOGGED BY:	
CHECKED BY:	
REMARKS:	Offset approximately 30 feet N

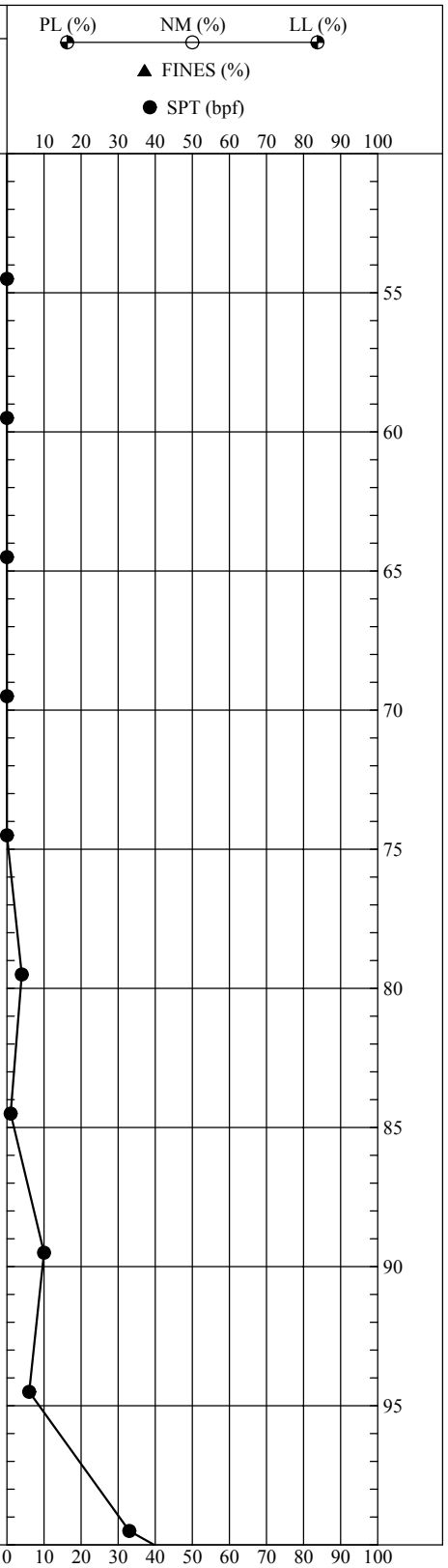
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-20
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 221190,757096
DRILLED: December 1, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft to soft, dark gray CLAY (CH). Moist to wet.		-47			(N = 0)
55			-52	SPT-13		WOH-0-0 (N = 0)
60			-57	SPT-14		WOH-0-0 (N = 0)
65	Trace shell fragments at 65 feet bgs.		-62	SPT-15		WOH-0-0 (N = 0)
70			-67	SPT-16		WOH-0-0 (N = 0)
75			-72	SPT-17		WOH-0-0 (N = 0)
80	Trace decomposed wood fragments from 78.5 to 80 feet bgs.		-77	SPT-18		0-2-2 (N = 4)
85			-82	SPT-19		0-0-1 (N = 1)
90	Loose light gray fine to medium SAND (SP). Wet. Medium stiff dark gray CLAY (CH), with some fine sand and silt. Moist.		-87	SPT-20		4-5-5 (N = 10)
95	Medium dense to very dense light gray to tan fine to medium SAND (SP). Wet.		-92	SPT-21		2-2-4 (N = 6)
100			-97	SPT-22		13-17-16



SOIL TEST BORING INDIAN RIVER STAGES 1+2.GPJ LAW_GIBB.GDT 1/15/04

DRILLER:	Free State Drilling
EQUIPMENT:	Track Mount CME-45
METHOD:	Casing/Wash
HOLE DIA.:	3"
LOGGED BY:	
CHECKED BY:	
REMARKS:	Offset approximately 30 feet N

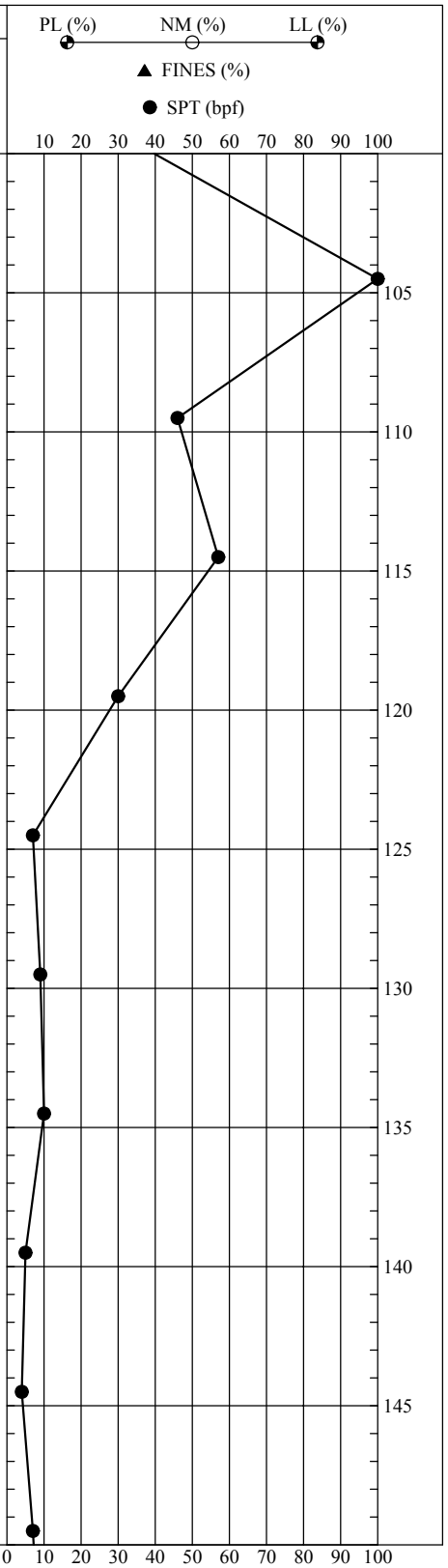
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-20
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 221190,757096
DRILLED: December 1, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	ELEV (ft)	IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Medium dense to very dense light gray to tan fine to medium SAND (SP). Wet.	-97			(N = 33)
105	Little coarse sand and trace fine gravel at 105 feet bgs.	-102	SPT-23	X	34-44-50/5"
110		-107	SPT-24	X	14-19-27 (N = 46)
115	Trace fine gravel at 115 feet bgs.	-112	SPT-25	X	14-23-34 (N = 57)
120	Loose to dense, light gray fine silty SAND (SM). Moist.	-117	SPT-26	X	9-13-17 (N = 30)
125		-122	SPT-27	X	11-4-3 (N = 7)
130		-127	SPT-28	X	6-4-5 (N = 9)
135	Medium stiff to stiff, dark gray sandy CLAY (CL). Moist.	-132	SPT-29	X	6-6-4 (N = 10)
140		-137	SPT-30	X	2-3-2 (N = 5)
145		-142	SPT-31	X	0-2-2 (N = 4)
150		-147	SPT-32	X	2-3-4



SOIL TEST BORING INDIAN RIVER STAGES 1+2.GPJ LAW_GIBB.GDT 1/15/04

DRILLER: Free State Drilling
EQUIPMENT: Track Mount CME-45
METHOD: Casing/Wash
HOLE DIA.: 3"
LOGGED BY:
CHECKED BY:
REMARKS: Offset approximately 30 feet N

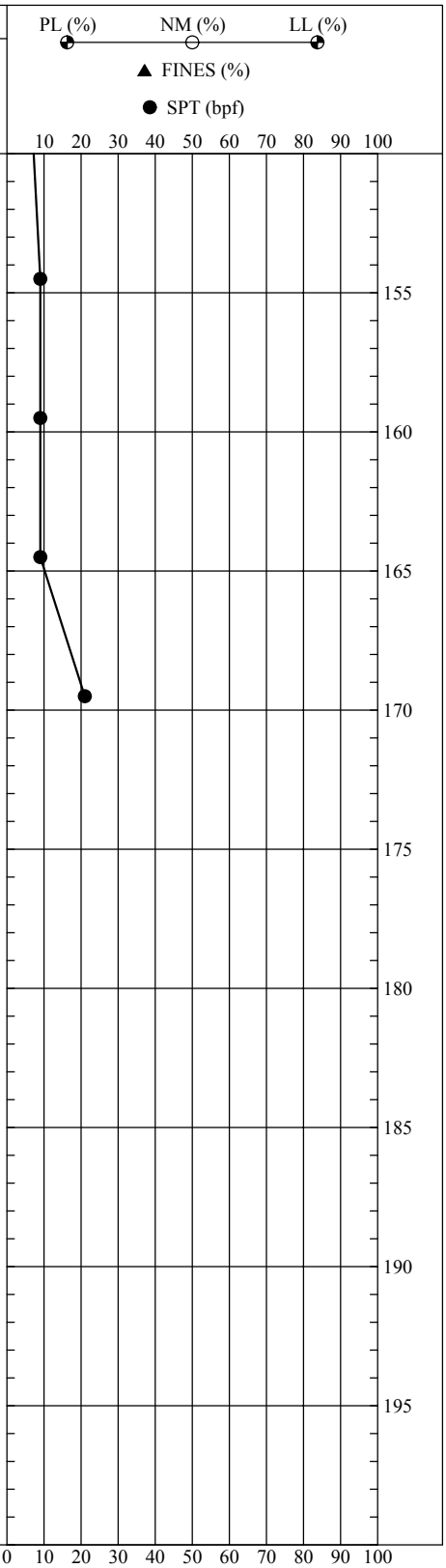
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-20
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 221190,757096
DRILLED: December 1, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
150	Medium stiff to stiff, dark gray sandy CLAY (CL). Moist. No recovery of sample #32.		-147			(N = 7)
155			-152	SPT-33		0-3-6 (N = 9)
160	No recovery of sample #34.		-157	SPT-34		3-4-5 (N = 9)
165	No recovery of sample #35.		-162	SPT-35		4-4-5 (N = 9)
	Medium dense gray fine clayey SAND (SC). Moist.					
170	Boring terminated at 170 feet bgs.		-167	SPT-36		8-11-10 (N = 21)
175			-172			
180			-177			
185			-182			
190			-187			
195			-192			
200			-197			



SOIL TEST BORING INDIAN RIVER STAGES 1+2.GPJ LAW_GIBB.GDT 1/15/04

DRILLER:	Free State Drilling
EQUIPMENT:	Track Mount CME-45
METHOD:	Casing/Wash
HOLE DIA.:	3"
LOGGED BY:	
CHECKED BY:	
REMARKS:	Offset approximately 30 feet N

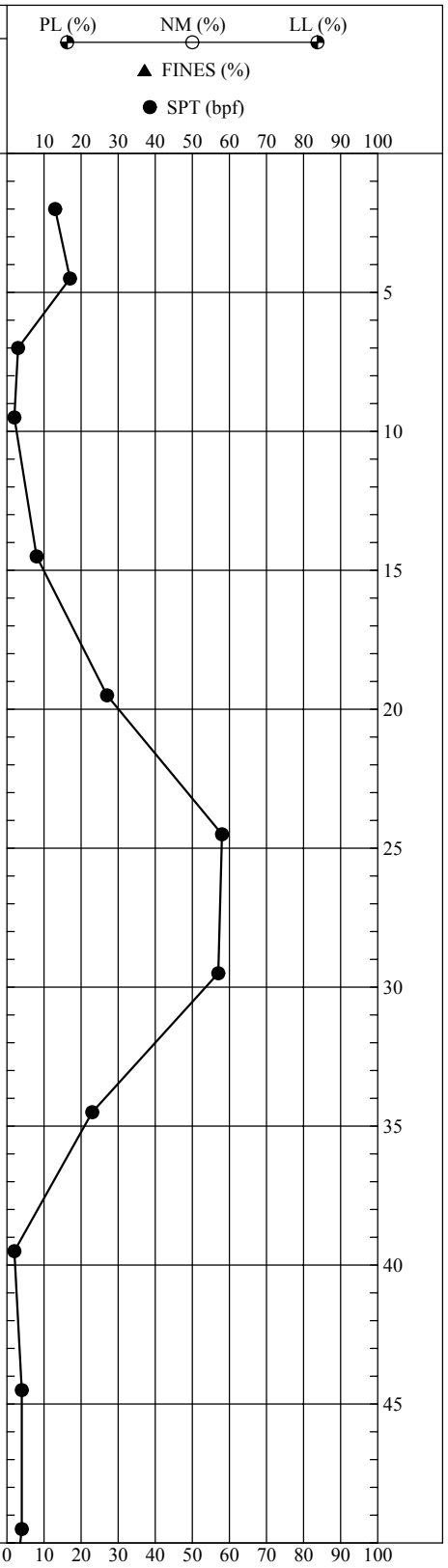
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-20
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 221190,757096
DRILLED: December 1, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to medium dense, tan to light gray, fine to medium SAND (SP). Wet.		8			
				SPT-1	X	4-6-7 (N = 13)
				SPT-2	X	4-6-11 (N = 17)
5			3			
				SPT-3	X	3-2-1 (N = 3)
				SPT-4	X	1-1-1 (N = 2)
10			-2			
				SPT-5	X	3-4-4 (N = 8)
15			-7			
				SPT-6	X	12-13-14 (N = 27)
20			-12			
				SPT-7	X	15-26-32 (N = 58)
25			-17			
	Little silt from 18.5 to 35.0 feet bgs.					
				SPT-8	X	20-26-31 (N = 57)
30			-22			
				SPT-9	X	15-17-6 (N = 23)
35			-27			
	Very soft to soft, dark gray CLAY (CH). Moist.					
	Strong organic odor and little shell fragments at 38.5 feet bgs.			SPT-10	X	2-1-1 (N = 2)
40			-32			
				SPT-11	X	0-2-2 (N = 4)
45			-37			
	Trace decomposed wood fragments at 48.5 feet bgs.			SPT-12	X	2-2-2
50			-42			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	Free State Drilling
EQUIPMENT:	Track Mount CME-45
METHOD:	Casing/Wash
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 30 feet N

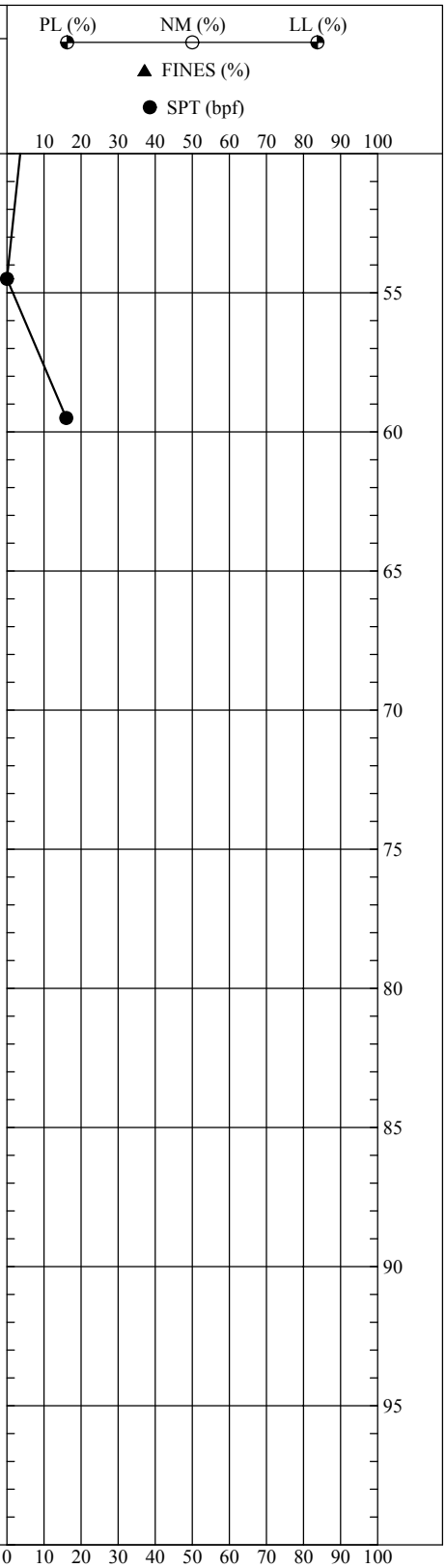
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-21
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222160,757000
DRILLED: November 13, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft to soft, dark gray CLAY (CH). Moist.		-42			(N = 4)
55			-47	SPT-13		WOH-0-0 (N = 0)
	Medium dense, light tan to gray SAND (SP). Wet.					
	Some fine gravel at 58.5 feet bgs.			SPT-14		5-6-10 (N = 16)
60	Boring terminated at 60.0 feet bgs due to water spouting from borehole (artesian conditions).		-52			
65			-57			
70			-62			
75			-67			
80			-72			
85			-77			
90			-82			
95			-87			
100			-92			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	Free State Drilling
EQUIPMENT:	Track Mount CME-45
METHOD:	Casing/Wash
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 30 feet N

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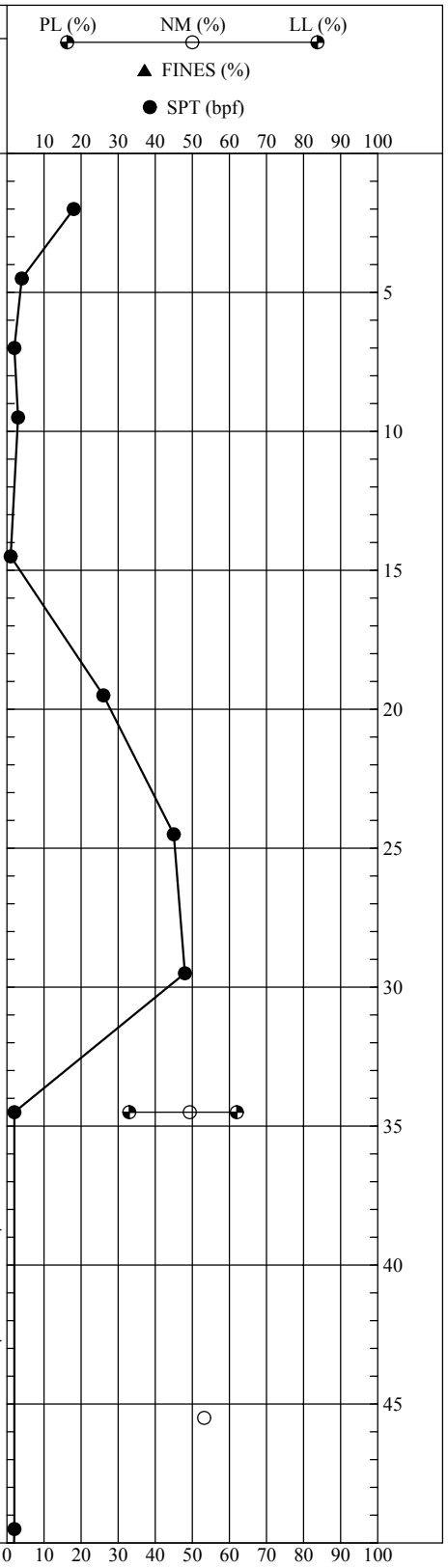
SOIL TEST BORING RECORD

BORING NO.: BII-21
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222160,757000
DRILLED: November 13, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Very loose to dense, light tan to light gray, fine to medium SAND (SP). Dry to wet.		6	SPT-1	X	10-9-9 (N = 18)
5			1	SPT-2	X	2-2-2 (N = 4)
				SPT-3	X	1-1-1 (N = 2)
10	Trace coarse sand and shell fragments from 8.5 to 10 feet bgs.		-5	SPT-4	X	0-2-1 (N = 3)
15	Little root fragments from 13.5 to 15 feet bgs.		-10	SPT-5	X	0-0-1 (N = 1)
20	Trace shell fragments from 18.5 to 20 feet bgs. Pressure meter PM2-5 at 21 feet bgs.		-15	SPT-6	X	4-10-16 (N = 26)
25			-20	SPT-7	X	9-21-24 (N = 45)
30			-25	SPT-8	X	11-20-28 (N = 48)
35	Very soft to soft, dark gray CLAY (CH). Moist. 1 inch lens of shell fragments with organic odor at 33.8 feet bgs. Trace shell fragments from 33.5 to 35 feet bgs.		-30	SPT-9	X	1-1-1 (N = 2)
40	Shelby tube sample attempt, zero recovery		-35			UD Zero Rec.
45	Vane shear test VS-4 at 42 feet bgs. Shelby tube sample attempt, zero recovery		-40	UD-9	■	UD Zero Rec.
50			-45	SPT-13	X	0-1-1



SOIL TEST BORING INDIAN RIVER STAGES 1+2.GPJ LAW_GIBB.GDT 1/15/04

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3.25"
LOGGED BY:
CHECKED BY:
REMARKS:

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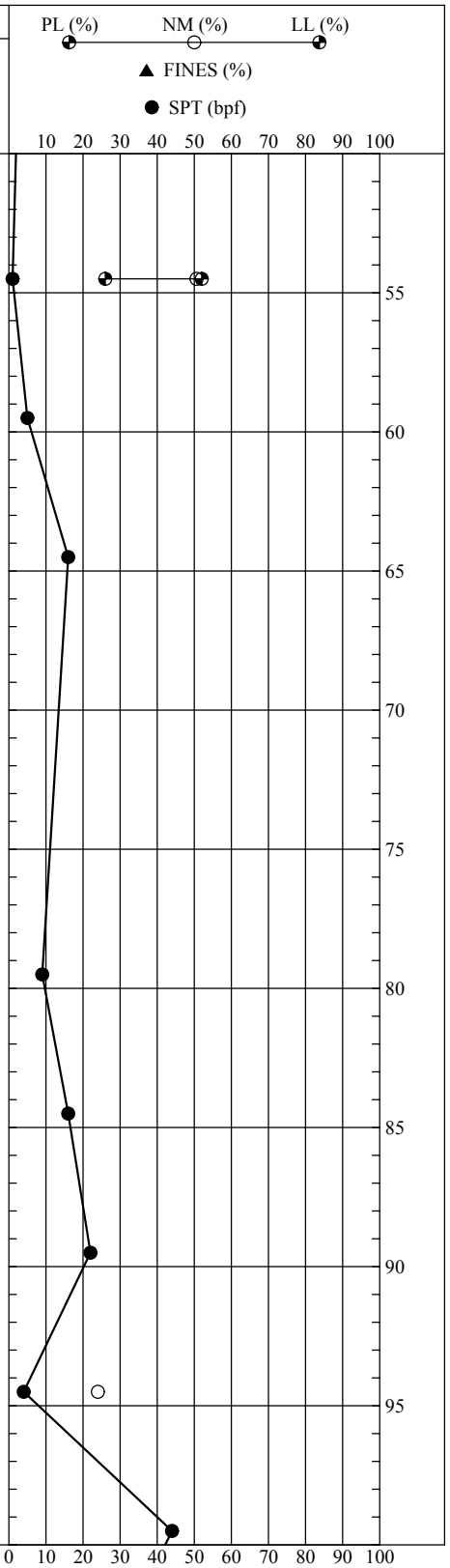
SOIL TEST BORING RECORD

BORING NO.: BII-22
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222233,756985
DRILLED: November 4, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft to soft, dark gray CLAY (CH). Moist.	-45			(N = 2)
55		-50	SPT-14		0-0-1 (N = 1)
60	Loose to medium dense, light gray to light tan, fine to medium SAND (SP). Moist to wet. Trace to little silt and trace fine gravel from 58.5 to 65 feet bgs.	-55	SPT-15		2-2-3 (N = 5)
65	Pressure meter PM2-6 at 67 feet bgs.	-60	SPT-16		5-7-9 (N = 16)
70	Vane shear test.	-65			
75		-70			
80	Pressure meter PM2-7 at 81 feet bgs.	-75	SPT-17		3-3-6 (N = 9)
85	Trace clay and silt from 84.7 to 85 feet bgs.	-80	SPT-18		4-6-10 (N = 16)
90	Soft to medium dense, light gray to light yellow, fine sandy CLAY (CL). Moist.	-85	SPT-19		2-4-18 (N = 22)
95	Very loose to dense, light gray to light tan, fine to medium SAND (SP). Moist.	-90	SPT-20		1-2-2 (N = 4)
100	Trace clay and coarse sand from 98.5 to 100 feet bgs.	-95	SPT-21		11-19-25



SOIL TEST BORING INDIAN RIVER STAGES 1+2.GPJ LAW_GIBB.GDT 1/15/04

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3.25"
LOGGED BY:
CHECKED BY:
REMARKS:

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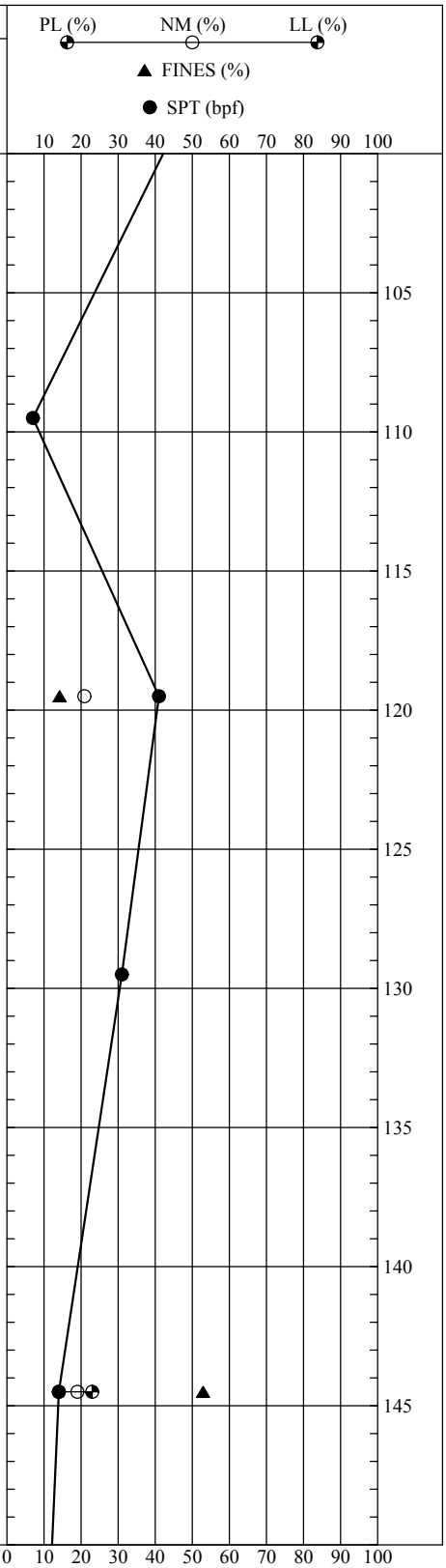
SOIL TEST BORING RECORD

BORING NO.: BII-22
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222233,756985
DRILLED: November 4, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Very loose to dense, light gray to light tan, fine to medium SAND (SP). Moist.		-95			(N = 44)
105			-100			
110			-105	SPT-22		3-3-4 (N = 7)
115			-110			
120	Trace to some silt from 108.5 to 130 feet bgs.		-115	SPT-23		12-19-22 (N = 41)
125			-120			
130			-125	SPT-24		2-14-17 (N = 31)
135			-130			
140			-135			
145	Stiff, dark gray sandy CLAY (CL). Moist to wet.		-140	SPT-25		2-4-10 (N = 14)
150			-145			



SOIL TEST BORING INDIAN RIVER STAGES 1+2.GPJ LAW_GIBB.GDT 1/15/04

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3.25"
LOGGED BY:
CHECKED BY:
REMARKS:

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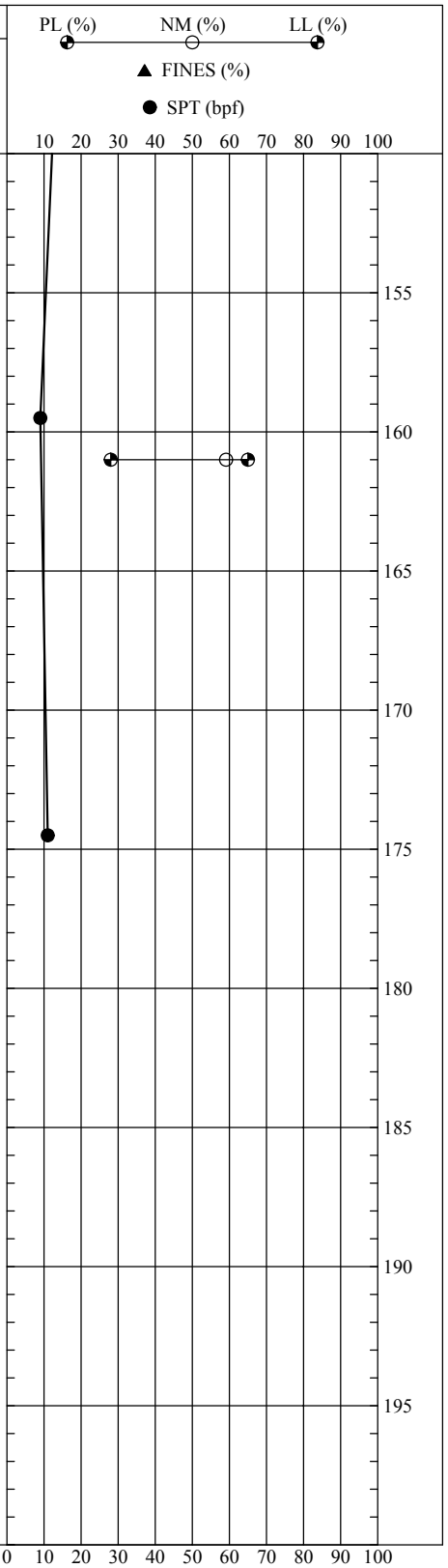
SOIL TEST BORING RECORD

BORING NO.: BII-22
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222233,756985
DRILLED: November 4, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
150	Stiff, dark gray sandy CLAY (CL). Moist to wet.		-145			
155			-150			
160	Lens of higher plasticity material around 160 feet bgs.		-155	SPT-26 UD-10		4-4-5 (N = 9)
165			-160			
170	Medium dense, dark gray, fine silty SAND (SM). Moist.		-165			
175	Boring terminated at 175 feet bgs.		-170	SPT-28		4-5-6 (N = 11)
180			-175			
185			-180			
190			-185			
195			-190			
200			-195			



SOIL TEST BORING INDIAN RIVER STAGES 1+2.GPJ LAW_GIBB.GDT 1/15/04

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3.25"
LOGGED BY:
CHECKED BY:
REMARKS:

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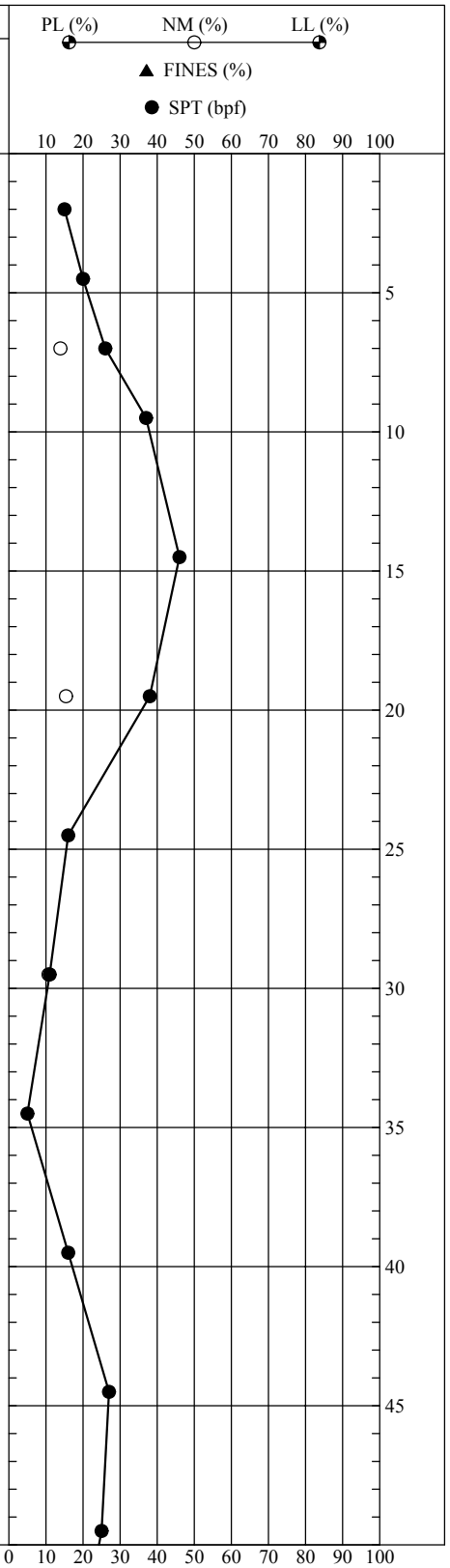
SOIL TEST BORING RECORD

BORING NO.: BII-22
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222233,756985
DRILLED: November 4, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense to very dense, tan to light gray, fine to medium SAND (SP), moist to wet.		30	SPT-1	X	5-6-9 (N = 15)
5			25	SPT-2	X	9-9-11 (N = 20)
				SPT-3	X	8-11-15 (N = 26)
10			20	SPT-4	X	15-14-23 (N = 37)
15			15	SPT-5	X	23-21-25 (N = 46)
20			10	SPT-6	X	11-18-20 (N = 38)
25			5	SPT-7	X	3-7-9 (N = 16)
30	Little coarse sand, trace silt and shell fragments at 28.5 feet bgs.		-1	SPT-8	X	8-5-6 (N = 11)
35	Trace coarse sand at 33.5 feet bgs.		-6	SPT-9	X	2-2-3 (N = 5)
40	Trace silt at 38.5 feet bgs.		-11	SPT-10	X	5-7-9 (N = 16)
45	Little silt, 1 inch thick lens of shell fragments at 44.0 feet bgs.		-16	SPT-11	X	5-11-16 (N = 27)
50	Trace silt and coarse sand at 48.5 feet bgs.		-21	SPT-12	X	9-11-14



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: MLH
CHECKED BY: AJA
REMARKS:

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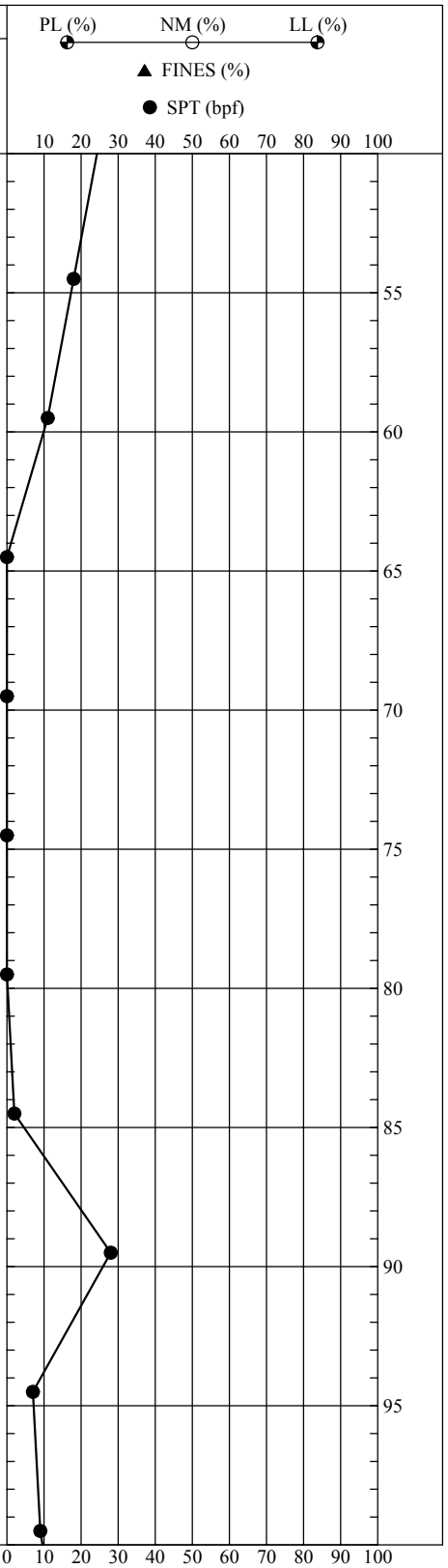
SOIL TEST BORING RECORD

BORING NO.: BII-23
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222323.9,757066.8
DRILLED: October 14, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Medium dense to very dense, tan to light gray, fine to medium SAND (SP), moist to wet.		-21			(N = 25)
55			-26	SPT-13		6-8-10 (N = 18)
60	Very soft, dark gray, silty CLAY (CL), little fine to medium sand, slight organic odor, moist.		-31	SPT-14		7-8-3 (N = 11)
65			-36	SPT-15		WOH-0-0 (N = 0)
70			-41	SPT-16		WOH-0-0 (N = 0)
75	Trace fine to medium sand at 73.5 feet bgs.		-46	SPT-17		WOH-0-0 (N = 0)
80			-51	SPT-18		WOH-0-0 (N = 0)
85	Little fine to medium sand, some silt, moist at 83.5 feet bgs.		-56	SPT-19		0-0-2 (N = 2)
90	Loose to medium dense, light gray to tan, fine to medium SAND (SP). Trace silt, moist.		-61	SPT-20		13-14-14 (N = 28)
95			-66	SPT-21		4-3-4 (N = 7)
100			-71	SPT-22		4-4-5



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: MLH
CHECKED BY: AJA
REMARKS:

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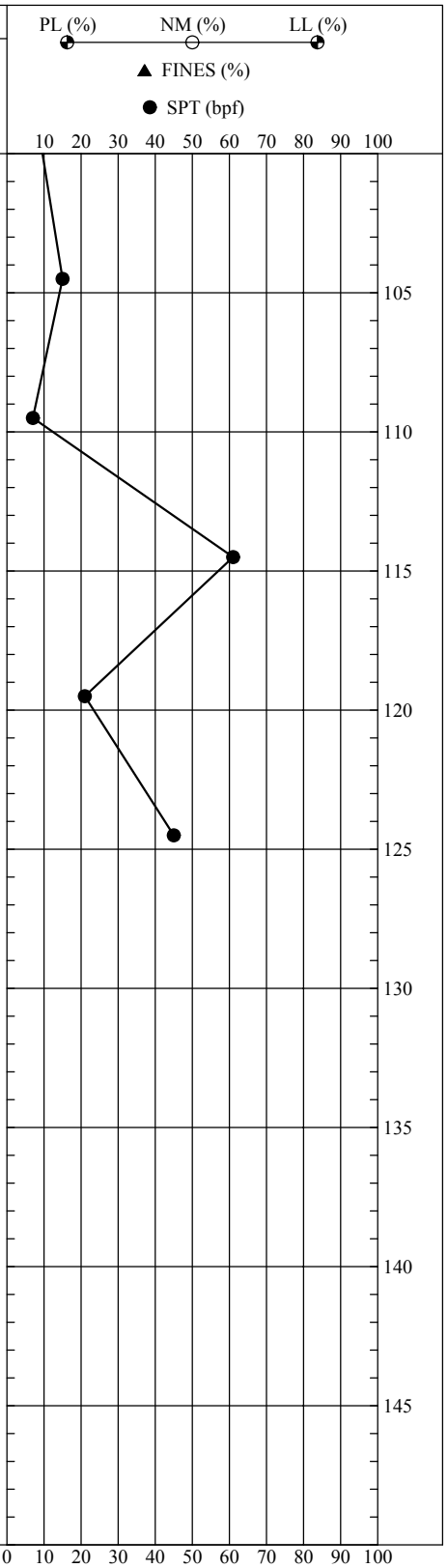
SOIL TEST BORING RECORD

BORING NO.: BII-23
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222323.9,757066.8
DRILLED: October 14, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Loose to medium dense, light gray to tan, fine to medium SAND (SP). Trace silt, moist.		-71			(N = 9)
105	1 inch thick lens of clayey sand at 104.8 feet bgs.		-76	SPT-23		4-7-8 (N = 15)
	Medium stiff, light gray to yellow orange, silty CLAY (CL), some fine to medium sand, moist.					
110			-81	SPT-24		5-3-4 (N = 7)
	Medium dense to very dense, light gray to light tan, fine to medium SAND (SP), little coarse sand, moist to wet.					
115			-86	SPT-25		21-34-27 (N = 61)
120			-91	SPT-26		6-4-17 (N = 21)
	Some clay at 123.5 feet bgs.					
125	Boring Terminated at 125.0 feet bgs.		-96	SPT-27		15-23-22 (N = 45)
130			-101			
135			-106			
140			-111			
145			-116			
150			-121			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: MLH
CHECKED BY: AJA
REMARKS:

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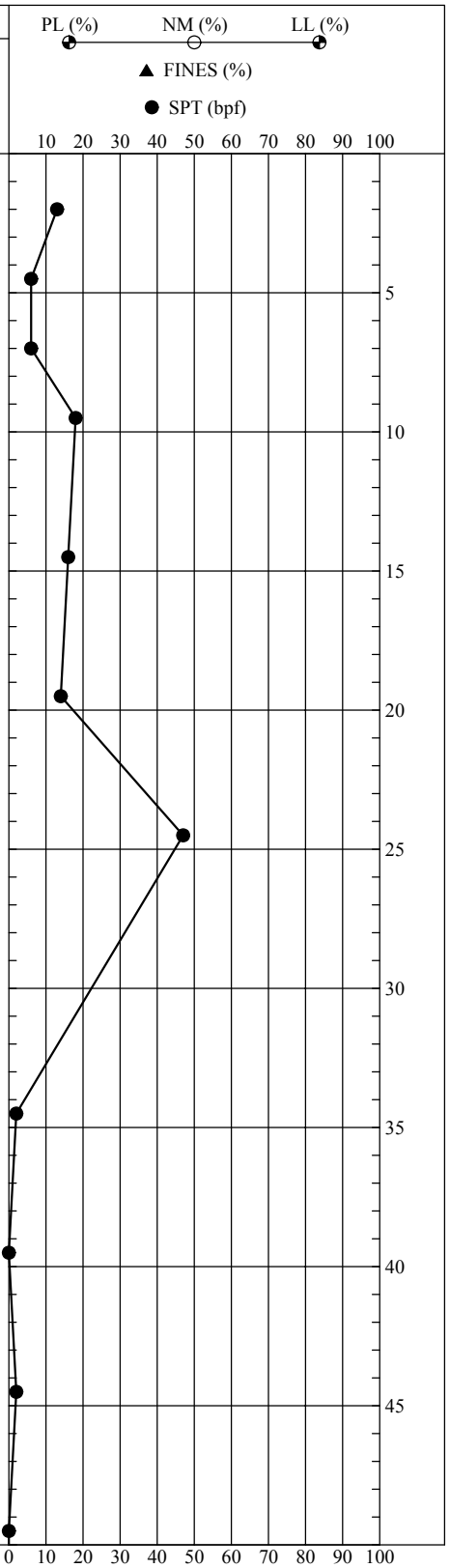
SOIL TEST BORING RECORD

BORING NO.: BII-23
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222323.9,757066.8
DRILLED: October 14, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	ELEV (ft)	IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to dense, light tan to light gray, fine to medium SAND (SP). Dry to wet.	6	SPT-1		5-6-7 (N = 13)
	Little coarse sand at 3.5 feet bgs.		SPT-2		4-3-3 (N = 6)
5		1	SPT-3		4-3-3 (N = 6)
10		-4	SPT-4		7-9-9 (N = 18)
	Trace shell fragments from 8.5 to 15 feet bgs.				
15		-9	SPT-5		8-9-7 (N = 16)
	Little coarse sand at 18.5 feet bgs.				
20		-14	SPT-6		5-7-7 (N = 14)
25	Trace silt and fine gravel from 23.5 to 25 feet bgs.	-19	SPT-7		14-24-23 (N = 47)
30	Very soft to soft, dark gray CLAY (CH). Moist.	-24	SPT-8		
35		-29	SPT-9		0-0-2 (N = 2)
40	Trace to little shell fragments from 33.5 to 45 feet bgs.	-34	SPT-10		WOH-0-0 (N = 0)
45	Encountered artesian pressures at 45 feet bgs.	-39	SPT-11		0-1-1 (N = 2)
50		-44	SPT-12		WOH-0-0



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	Free State Drilling
EQUIPMENT:	Track Mount CME-45
METHOD:	Casing/Wash
HOLE DIA.:	3"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Samples 17, 18 & 19 were not collected due to collapsing borehole

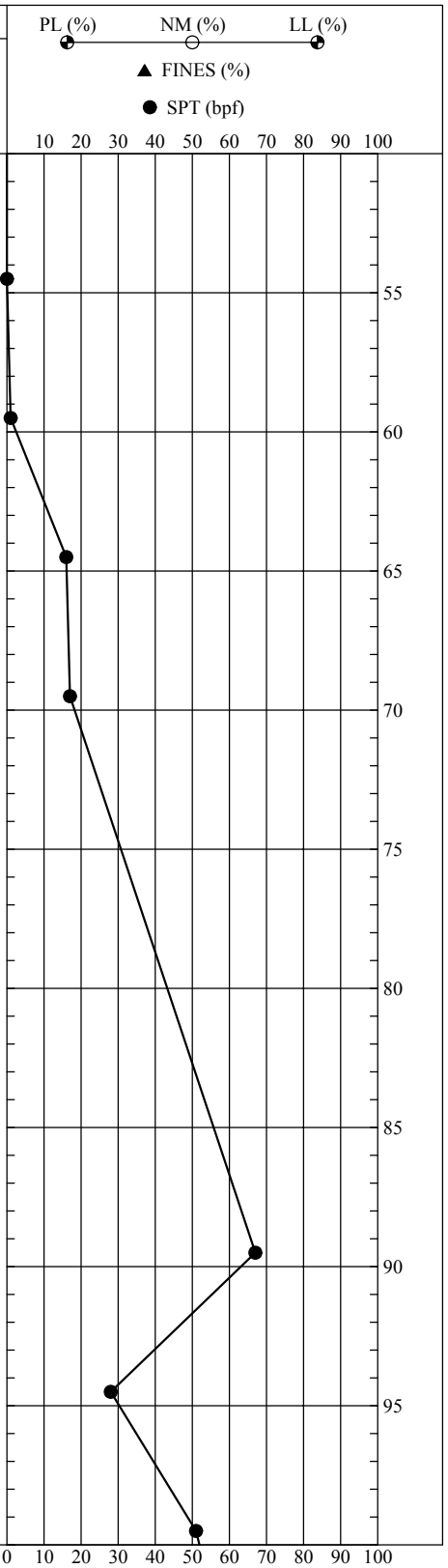
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-24
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222322.4,756910.5
DRILLED: November 25, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft to soft, dark gray CLAY (CH). Moist.		-44			(N = 0)
55			-49	SPT-13		WOH-0-0 (N = 0)
60			-54	SPT-14		0-0-1 (N = 1)
	Medium dense to very dense, light gray to yellowish orange SAND (SP) with trace to some coarse sand and fine gravel, and trace silt. Wet.					
65			-59	SPT-15		7-8-8 (N = 16)
70			-64	SPT-16		47-9-8 (N = 17)
75			-69			
80			-74			
85			-79			
90			-84	SPT-20		20-33-34 (N = 67)
95			-89	SPT-21		13-16-12 (N = 28)
100			-94	SPT-22		15-25-26



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	Free State Drilling
EQUIPMENT:	Track Mount CME-45
METHOD:	Casing/Wash
HOLE DIA.:	3"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Samples 17, 18 & 19 were not collected due to collapsing borehole

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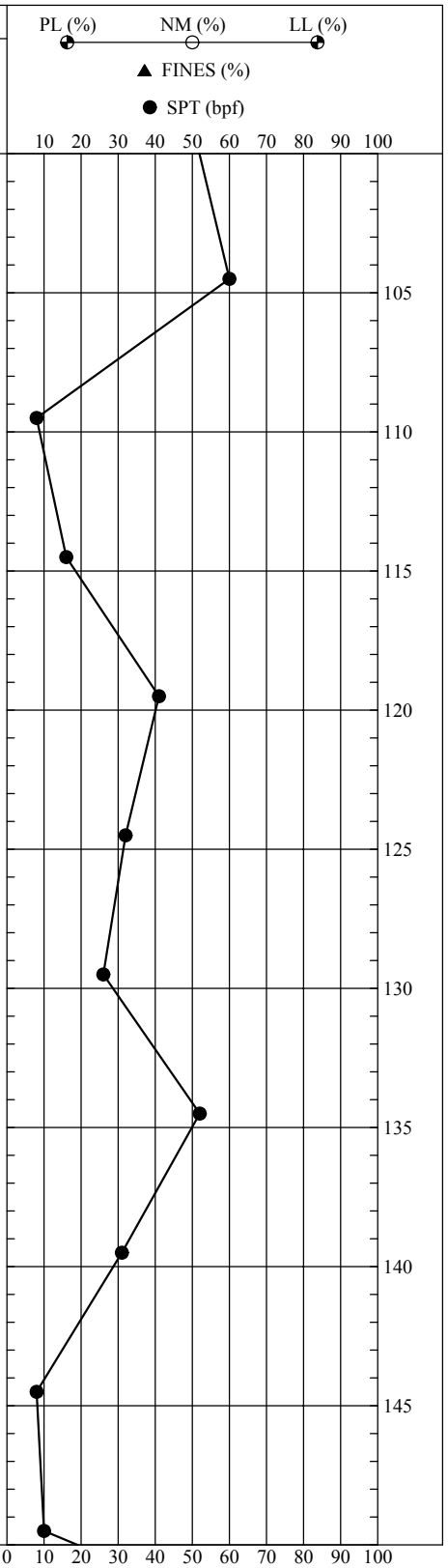
SOIL TEST BORING RECORD

BORING NO.: BII-24
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222322.4,756910.5
DRILLED: November 25, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Medium dense to very dense, light gray to yellowish orange SAND (SP) with trace to some coarse sand and fine gravel, and trace silt. Wet.		-94			(N = 51)
105			-99	SPT-23		13-28-32 (N = 60)
110			-104	SPT-24		6-5-3 (N = 8)
115			-109	SPT-25		5-5-11 (N = 16)
120			-114	SPT-26		18-20-21 (N = 41)
125			-119	SPT-27		13-15-17 (N = 32)
130			-124	SPT-28		5-10-16 (N = 26)
135			-129	SPT-29		15-22-30 (N = 52)
140	Medium stiff to stiff, dark gray, sandy CLAY (CL). Moist.		-134	SPT-30		18-18-13 (N = 31)
145			-139	SPT-31		2-4-4 (N = 8)
150			-144	SPT-32		3-4-6



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	Free State Drilling
EQUIPMENT:	Track Mount CME-45
METHOD:	Casing/Wash
HOLE DIA.:	3"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Samples 17, 18 & 19 were not collected due to collapsing borehole

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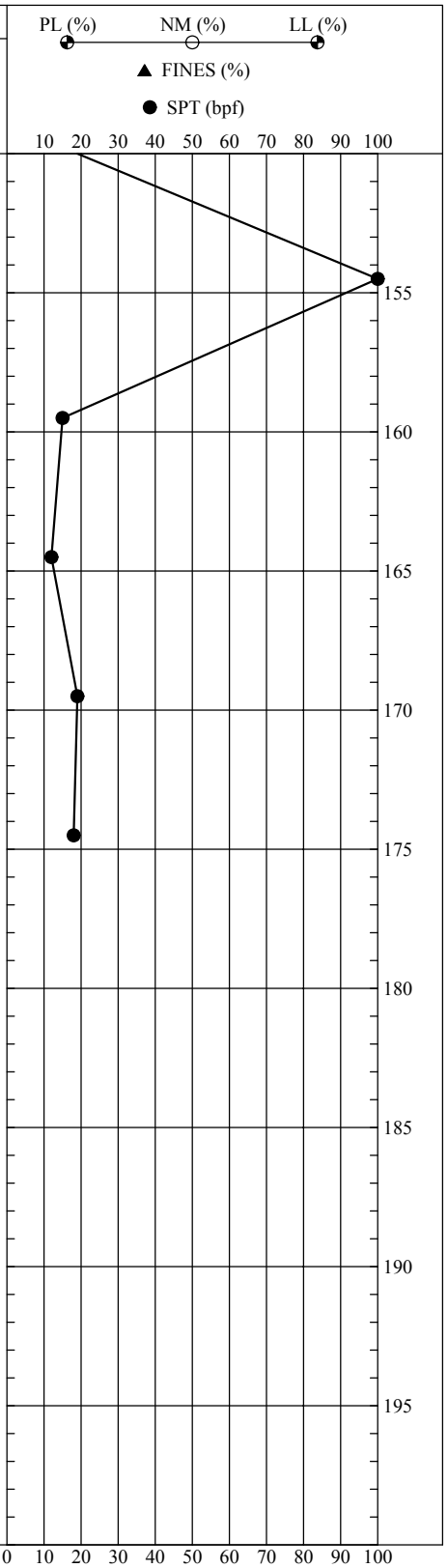
SOIL TEST BORING RECORD

BORING NO.: BII-24
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222322.4,756910.5
DRILLED: November 25, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
150	Very dense, light gray to light tan, fine to medium sand SAND (SP) with trace coarse sand. Moist.		-144			(N = 10)
155			-149	SPT-33		41-50/5"
160			-154	SPT-34		2-7-8 (N = 15)
	Stiff to very stiff, dark gray, silty CLAY (CL) with little fine sand. Moist.					
165			-159	SPT-35		3-6-6 (N = 12)
170			-164	SPT-36		4-9-10 (N = 19)
	Note: Lens of decomposed wood at 173.5 feet bgs.					
175	Boring terminated at 175 feet bgs.		-169	SPT-37		7-8-10 (N = 18)
180			-174			
185			-179			
190			-184			
195			-189			
200			-194			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	Free State Drilling
EQUIPMENT:	Track Mount CME-45
METHOD:	Casing/Wash
HOLE DIA.:	3"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Samples 17, 18 & 19 were not collected due to collapsing borehole

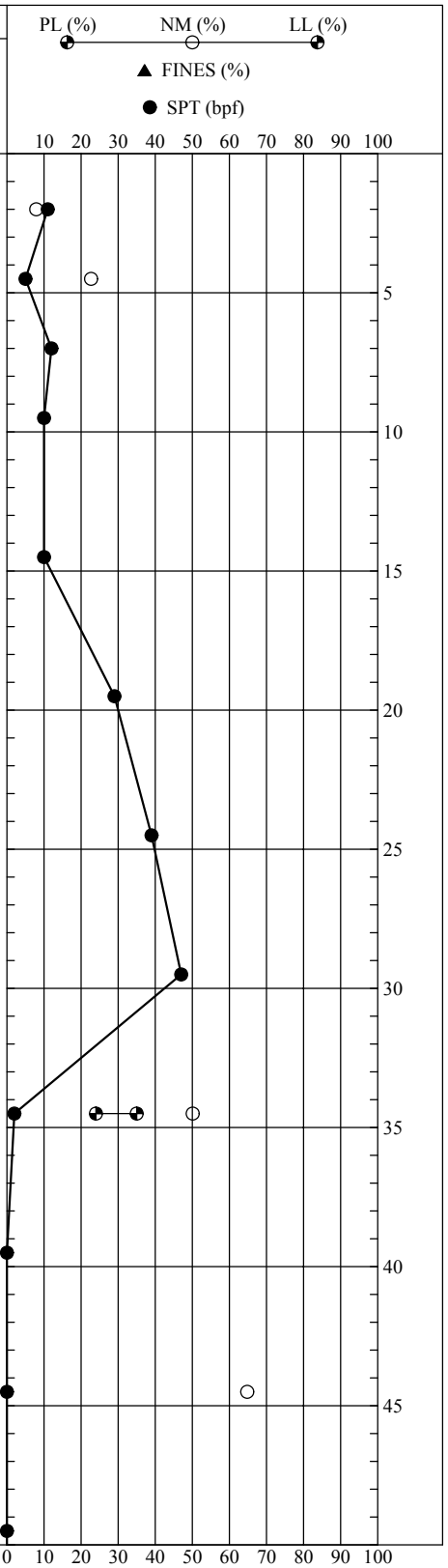
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-24
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222322.4,756910.5
DRILLED: November 25, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to very dense, tan to light gray, fine to medium SAND (SP). Wet.		4	SPT-1		2-4-7 (N = 11)
5	2 inch thick lens of dark brown silt at 4 feet bgs.		-1	SPT-2		1-2-3 (N = 5)
				SPT-3		7-6-6 (N = 12)
10			-6	SPT-4		2-4-6 (N = 10)
15	Trace silt at 15 feet bgs.		-11	SPT-5		2-4-6 (N = 10)
20			-16	SPT-6		6-11-18 (N = 29)
25			-21	SPT-7		14-18-21 (N = 39)
30			-26	SPT-8		15-22-25 (N = 47)
35	Very soft, dark gray CLAY (CH). Strong organic odor		-31	SPT-9		1-1-1 (N = 2)
40	No organic odor. No recovery of sample #10.		-36	SPT-10		WOH-0-0 (N = 0)
45			-41	SPT-11		WOH-0-0 (N = 0)
50			-46	SPT-12		WOH-0-0



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	

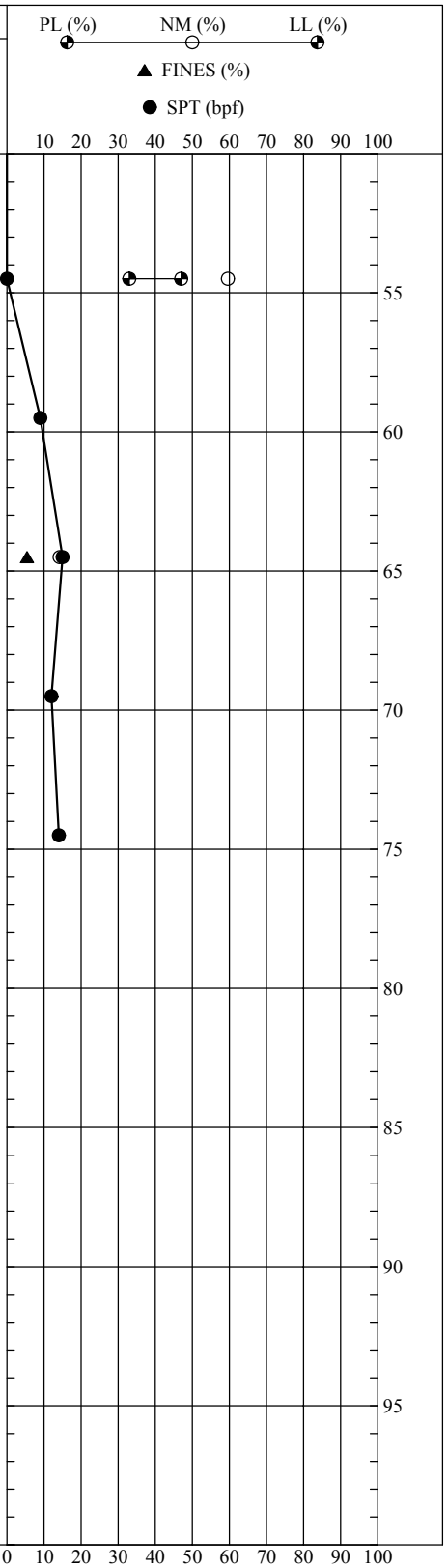
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-25
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222625.6,756867
DRILLED: October 2, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft, dark gray CLAY (CH). Strong organic odor		-46			(N = 0)
55			-51	SPT-13		WOH-0-0 (N = 0)
	Loose to medium dense, light gray to brown, fine to medium silty SAND (Sm). Wet.					
60			-56	SPT-14		2-4-5 (N = 9)
65			-61	SPT-15		7-7-8 (N = 15)
70	Some coarse sand at 70 feet bgs.		-66	SPT-16		5-6-6 (N = 12)
75	Boring terminated at 75 feet bgs.		-71	SPT-17		5-8-6 (N = 14)
80			-76			
85			-81			
90			-86			
95			-91			
100			-96			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	

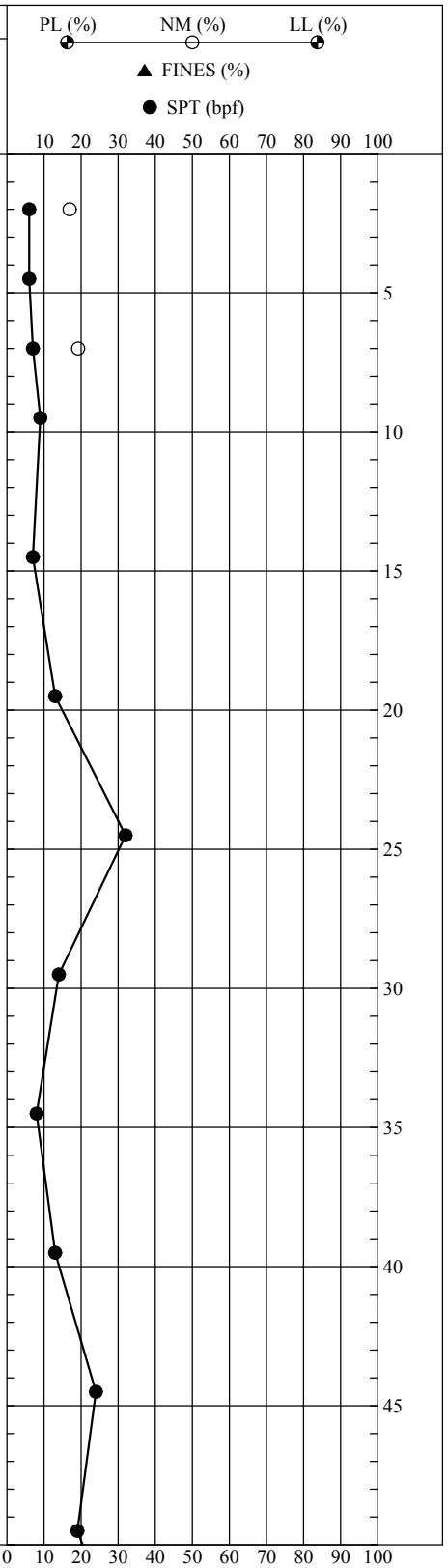
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-25
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222625.6,756867
DRILLED: October 2, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to very dense, tan to light gray, fine to medium SAND (SP). Wet.		4	SPT-1		2-3-3 (N = 6)
				SPT-2		3-3-3 (N = 6)
5			-1	SPT-3		2-4-3 (N = 7)
				SPT-4		4-5-4 (N = 9)
10			-6			
				SPT-5		3-4-3 (N = 7)
15	Some coarse sand at 15 feet bgs.		-11			
				SPT-6		3-6-7 (N = 13)
20			-16			
				SPT-7		27-17-15 (N = 32)
25			-21			
				SPT-8		4-6-8 (N = 14)
30			-26			
				SPT-9		4-4-4 (N = 8)
35			-31			
				SPT-10		3-5-8 (N = 13)
40			-36			
				SPT-11		6-11-13 (N = 24)
45			-41			
				SPT-12		8-8-11
50			-46			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	

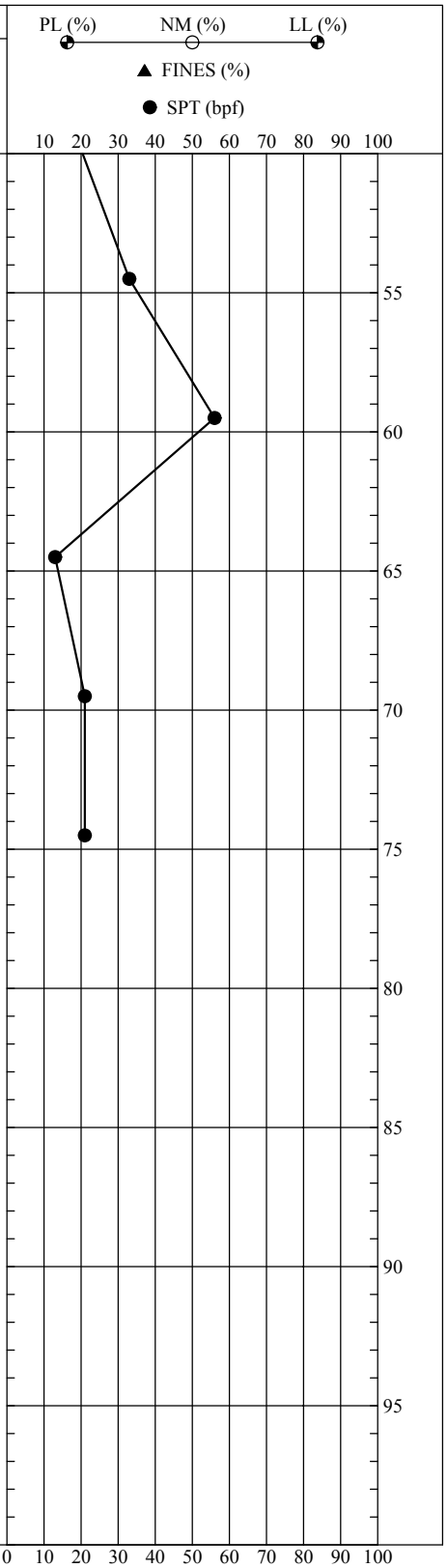
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-26
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 223123,756761
DRILLED: October 7, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Loose to very dense, tan to light gray, fine to medium SAND (SP). Wet. Little to some silt and clay at 50 feet bgs.		-46			(N = 19)
55			-51	SPT-13		9-14-19 (N = 33)
60	Little coarse sand and trace fine gravel at 60 feet bgs.		-56	SPT-14		14-21-35 (N = 56)
65			-61	SPT-15		6-6-7 (N = 13)
70	Little to some silt and clay at 70 feet bgs.		-66	SPT-16		8-10-11 (N = 21)
75	Boring terminated at 75 feet bgs.		-71	SPT-17		9-10-11 (N = 21)
80			-76			
85			-81			
90			-86			
95			-91			
100			-96			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY: AJA
REMARKS:

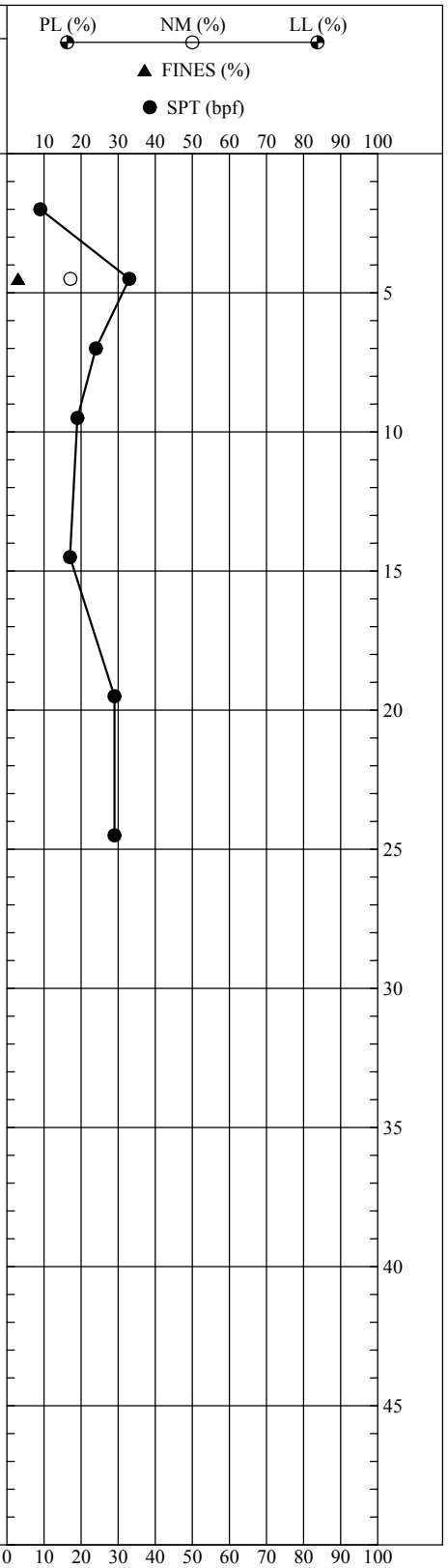
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-26
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 223123,756761
DRILLED: October 7, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense to dense, tan to light gray, fine to medium SAND (SP). Wet.		5	SPT-1		2-3-6 (N = 9)
5			0	SPT-2		25-16-17 (N = 33)
				SPT-3		7-11-13 (N = 24)
10			-5	SPT-4		8-8-11 (N = 19)
15			-10	SPT-5		3-7-10 (N = 17)
20			-15	SPT-6		11-13-16 (N = 29)
25	Boring terminated at 25 feet bgs.		-20	SPT-7		11-13-16 (N = 29)
30			-25			
35			-30			
40			-35			
45			-40			
50			-45			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-75
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 50 feet E

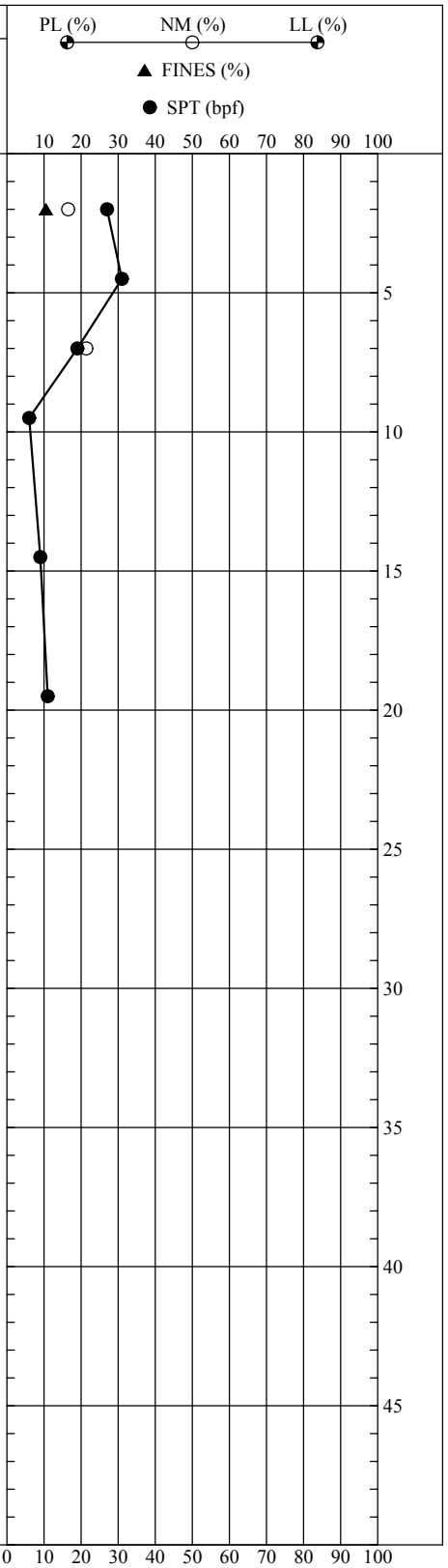
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-27
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 223640,756678
DRILLED: October 15, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense, light gray to tan, fine to medium SAND (SP). Wet.		4			
	Indicated water level from 24 hour reading.			SPT-1		8-13-14 (N = 27)
	Trace silt, wet at 3.5 feet bgs.			SPT-2		12-14-17 (N = 31)
5			-1			
	Little silt, wet at 6 feet bgs.			SPT-3		10-10-9 (N = 19)
	Little silt, wet at 8.5 feet bgs.			SPT-4		2-1-5 (N = 6)
10			-6			
	Trace coarse sand at 14 feet bgs.			SPT-5		7-4-5 (N = 9)
15			-11			
				SPT-6		5-5-6 (N = 11)
20	Boring terminated at 20 feet bgs.		-16			
25			-21			
30			-26			
35			-31			
40			-36			
45			-41			
50			-46			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-75
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 5 feet E. Cave depth at 3.2 feet bgs

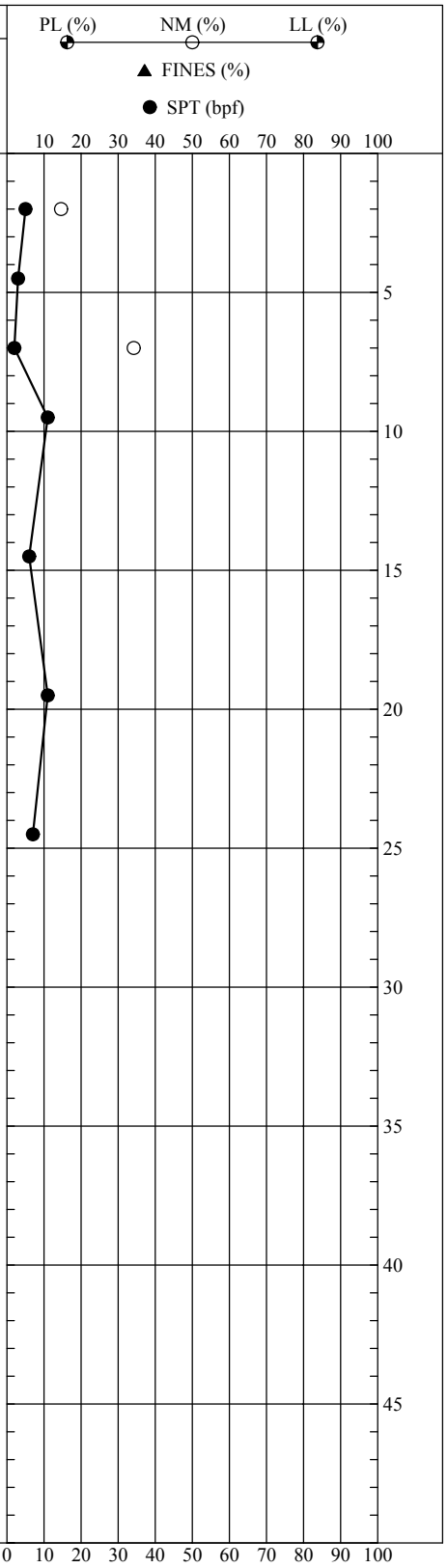
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-28
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 223859.3,756740.2
DRILLED: October 7, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose, fine to medium, yellow to light gray sand (SP) with trace fine gravel. Possible fill. Moist.		3	SPT-1		3-2-3 (N = 5)
5			-3	SPT-2		1-1-2 (N = 3)
	Soft dark gray clayey sand (SC). Wet. Strong organic odor.			SPT-3		0-0-2 (N = 2)
	Medium dense, light gray, fine to medium sand (SP). Wet.			SPT-4		3-5-6 (N = 11)
10			-8			
15			-13	SPT-5		2-3-3 (N = 6)
20			-18	SPT-6		4-5-6 (N = 11)
25	Boring terminated at 25 feet bgs.		-23	SPT-7		2-3-4 (N = 7)
30			-28			
35			-33			
40			-38			
45			-43			
50			-48			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 5 feet E. Cave depth at 3.2 feet bgs

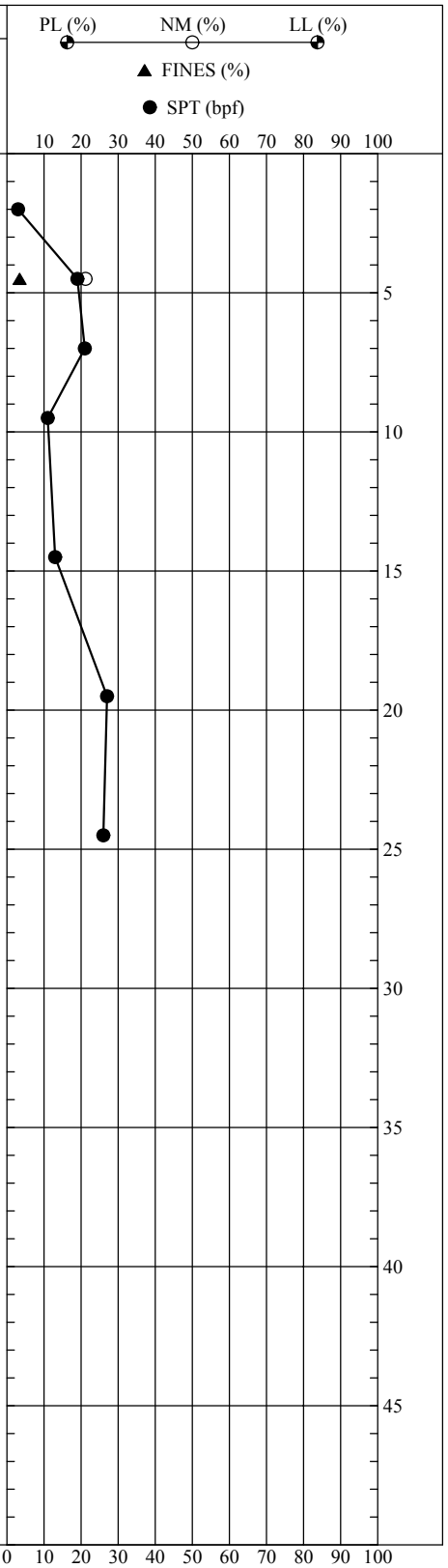
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-29
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 223920.6,756576.5
DRILLED: October 10, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Asphalt		1			
	Medium dense, tan to light gray, fine to medium SAND (SP). Wet.			SPT-1		8-2-1 (N = 3)
5			-4	SPT-2		6-9-10 (N = 19)
				SPT-3		3-10-11 (N = 21)
10			-9	SPT-4		3-4-7 (N = 11)
15			-14	SPT-5		5-6-7 (N = 13)
20	Little coarse sand and shell fragments around 20 feet bgs.		-19	SPT-6		9-11-16 (N = 27)
25	Boring terminated at 25 feet bgs.		-24	SPT-7		9-12-14 (N = 26)
30			-29			
35			-34			
40			-39			
45			-44			
50			-49			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-75
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 50 feet E

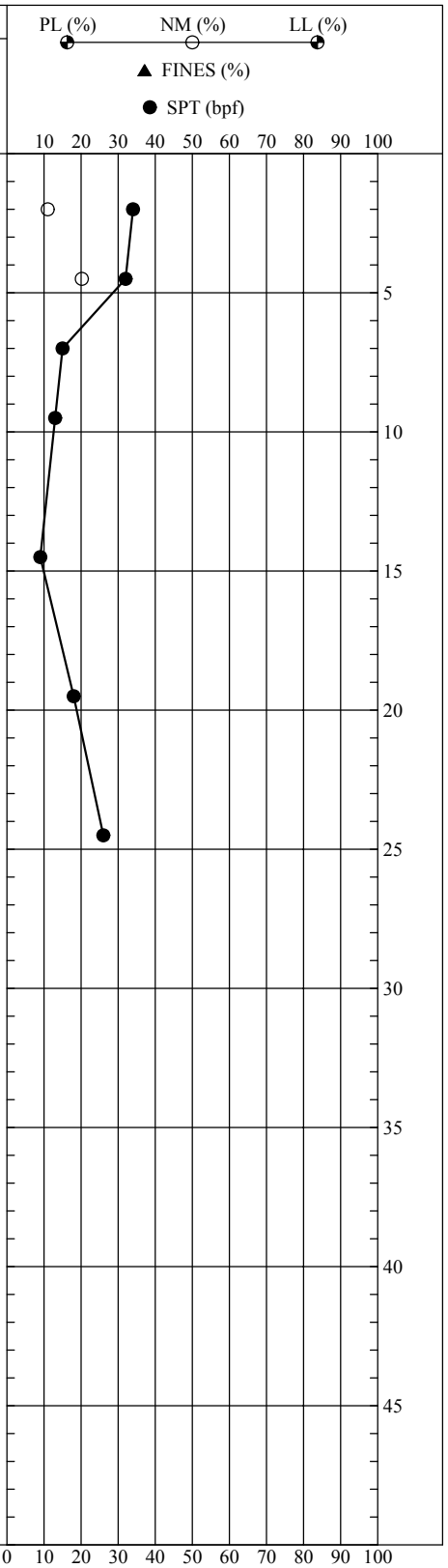
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-30
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 224267.5,756650.3
DRILLED: October 14, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense, tan to light gray, fine to medium SAND (SP). - Wet.		2	SPT-1		9-17-17 (N = 34)
5			-3	SPT-2		15-16-16 (N = 32)
				SPT-3		7-7-8 (N = 15)
10			-8	SPT-4		6-6-7 (N = 13)
15			-13	SPT-5		3-4-5 (N = 9)
20	Trace fine gravel around 20 feet bgs.		-18	SPT-6		7-8-10 (N = 18)
25	Boring terminated at 25 feet bgs.		-23	SPT-7		11-11-15 (N = 26)
30			-28			
35			-33			
40			-38			
45			-43			
50			-48			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-75
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 50 feet E

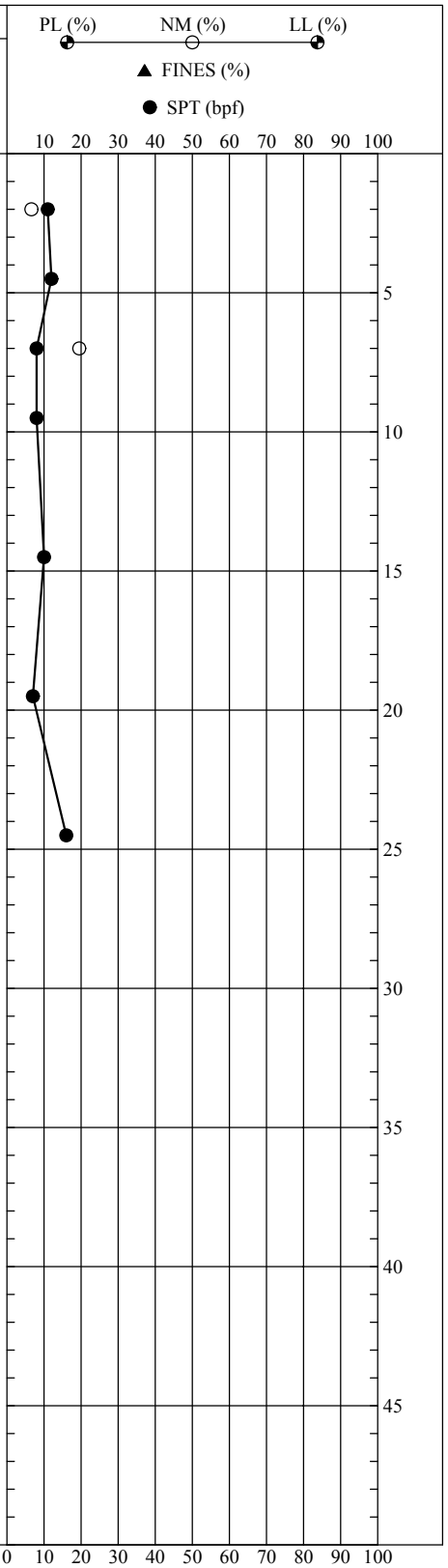
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-31
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 224662,756612
DRILLED: October 14, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Approximately 1" of topsoil. Loose to medium dense, tan to red-brown, fine to medium SAND (SP), moist (possible fill).		4	SPT-1		4-5-6 (N = 11)
	3" thick seam of dark gray clay with some plant material from 4 to 4.3 feet bgs.			SPT-2		1-4-8 (N = 12)
5			-1	SPT-3		1-4-4 (N = 8)
				SPT-4		3-4-4 (N = 8)
10			-6			
				SPT-5		2-4-6 (N = 10)
15			-11			
	Thin beds of organic silt and shell fragments at 18.5 feet bgs.			SPT-6		3-3-4 (N = 7)
20			-16			
				SPT-7		5-7-9 (N = 16)
25	Boring terminated at 25 feet bgs.		-21			
30			-26			
35			-31			
40			-36			
45			-41			
50			-46			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY: AJA
REMARKS: Offset approximately 6 feet E

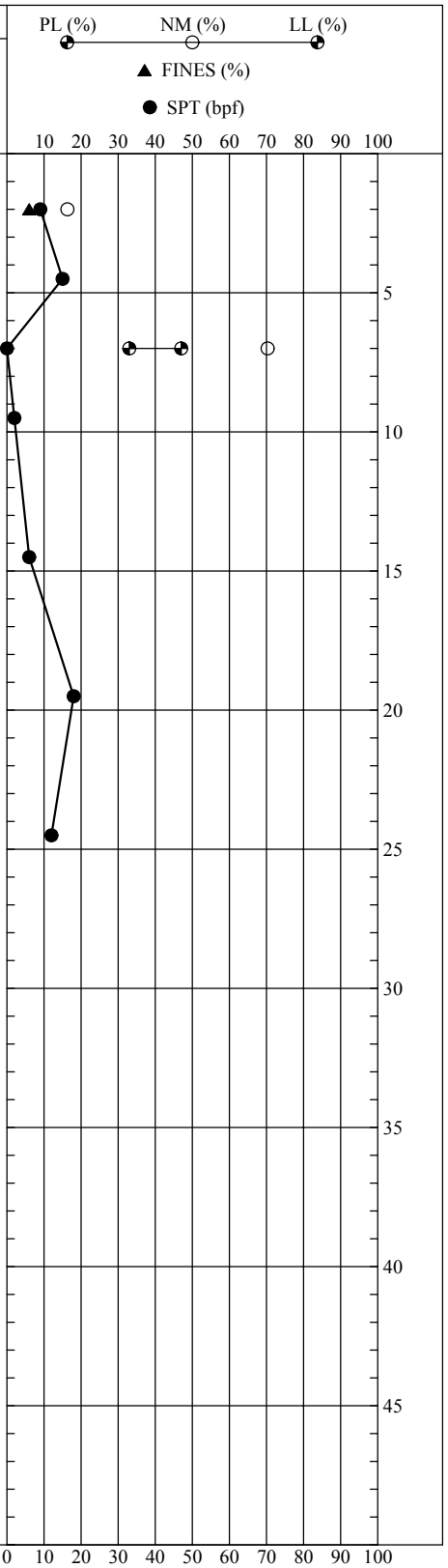
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-32
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 224842,756470
DRILLED: October 9, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Approximately 2" of topsoil. Loose to medium dense, light gray to tan, fine to medium SAND (SP/SM), little silt, trace root fragments.		2	SPT-1		2-3-6 (N = 9)
5			-3	SPT-2		5-9-6 (N = 15)
	Very soft, dark gray CLAY (CH), strong organic odor.			SPT-3		WOH-0-0 (N = 0)
10	Sandy clay in bottom of sample at 10 feet bgs.		-8	SPT-4		0-0-2 (N = 2)
15	Loose to medium dense, light gray, fine to medium SAND (SP), trace silt and shell fragments.		-13	SPT-5		2-2-4 (N = 6)
20			-18	SPT-6		5-9-9 (N = 18)
	Little to some silt at 23.5 feet bgs.			SPT-7		5-5-7 (N = 12)
25	Boring terminated at 25 feet bgs.		-23			
30			-28			
35			-33			
40			-38			
45			-43			
50			-48			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY: AJA
REMARKS:

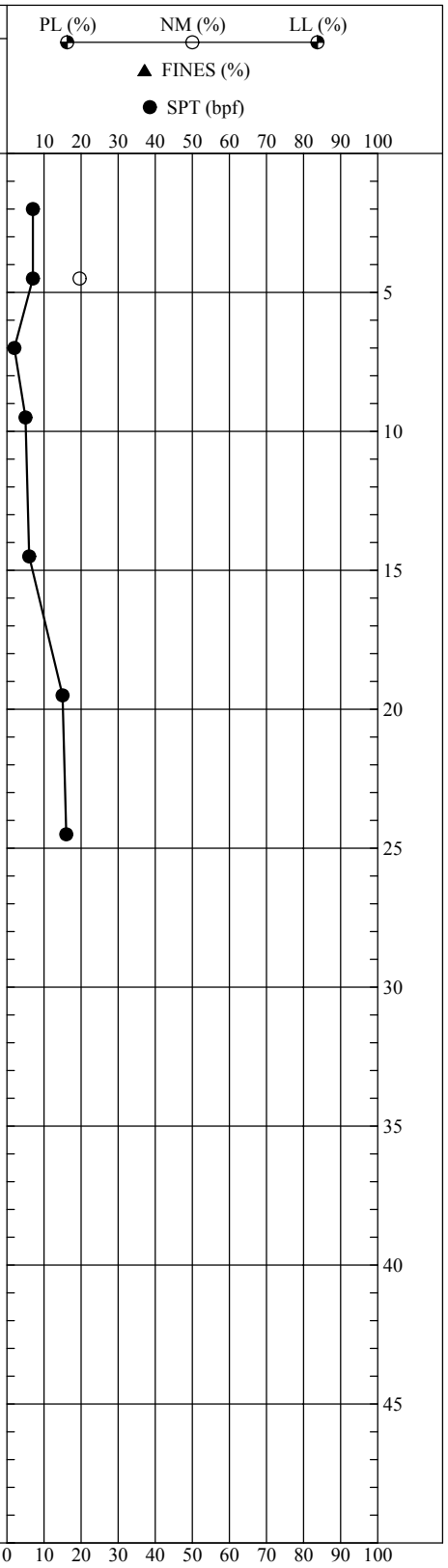
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-33
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 225040.5,756365.2
DRILLED: October 9, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Approximately 2" of topsoil. Loose to medium dense, light gray to tan, fine to medium SAND (SP). 1" seam of dark gray clay (CH) and root fragments at 1 foot bgs.		2			
				SPT-1		3-3-4 (N = 7)
				SPT-2		6-4-3 (N = 7)
5			-3			
				SPT-3		1-1-1 (N = 2)
				SPT-4		2-2-3 (N = 5)
10			-8			
				SPT-5		2-3-3 (N = 6)
15			-13			
				SPT-6		5-6-9 (N = 15)
20			-18			
				SPT-7		5-8-8 (N = 16)
25	Boring terminated at 25 feet bgs.		-23			
30			-28			
35			-33			
40			-38			
45			-43			
50			-48			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY: AJA
REMARKS:

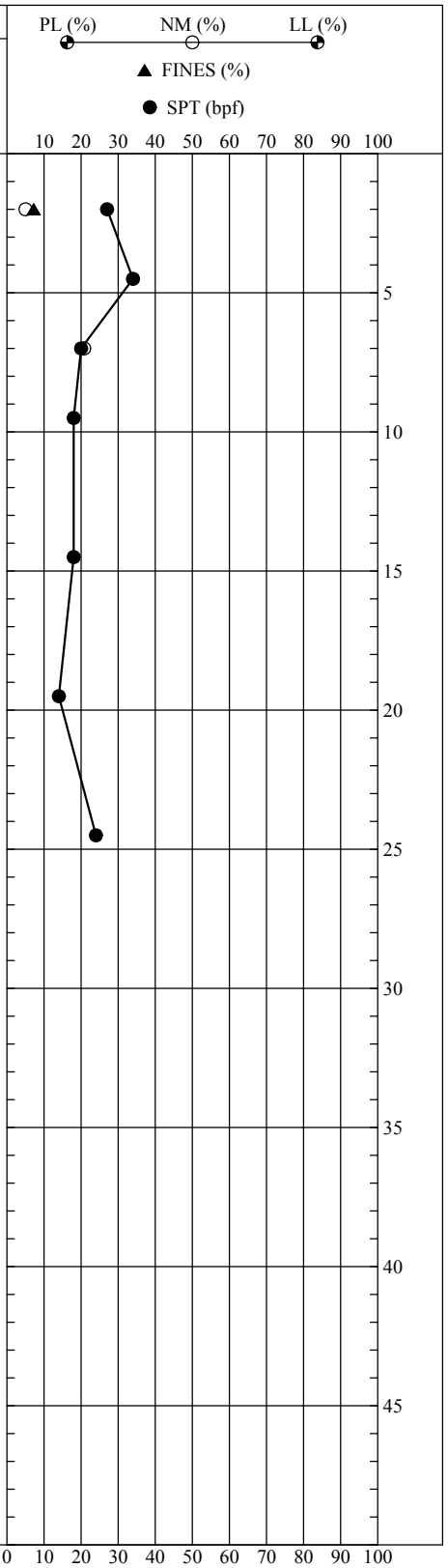
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-34
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 225215.2,756347.3
DRILLED: October 9, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense, tan to light gray, fine to medium SAND (SP). Wet.		4	SPT-1		6-10-17 (N = 27)
				SPT-2		17-17-17 (N = 34)
5			-1	SPT-3		7-8-12 (N = 20)
				SPT-4		7-8-10 (N = 18)
10			-6			
				SPT-5		7-8-10 (N = 18)
15			-11			
				SPT-6		3-6-8 (N = 14)
20	Trace fine gravel around 20 feet bgs.		-16			
				SPT-7		10-12-12 (N = 24)
25	Boring terminated at 25 feet bgs.		-21			
30			-26			
35			-31			
40			-36			
45			-41			
50			-46			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-75
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY: AJA
REMARKS: Offset approximately 50 feet E

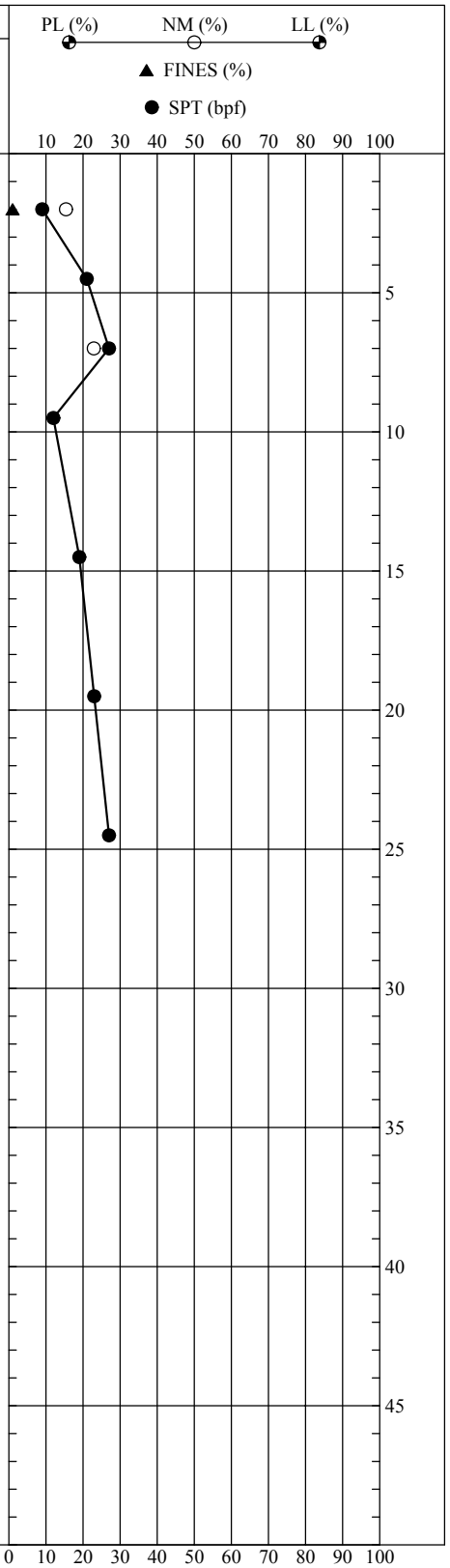
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-35
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 225251.2,756497.4
DRILLED: October 14, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense, tan to light gray, fine to medium SAND (SP). Wet.		4			
				SPT-1		5-4-5 (N = 9)
5			-1	SPT-2		4-5-16 (N = 21)
				SPT-3		11-13-14 (N = 27)
10			-6	SPT-4		4-6-6 (N = 12)
15			-11	SPT-5		6-8-11 (N = 19)
20			-16	SPT-6		9-12-11 (N = 23)
25	Boring terminated at 25 feet bgs.		-21	SPT-7		9-12-15 (N = 27)
30			-26			
35			-31			
40			-36			
45			-41			
50			-46			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-75
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 50 feet E

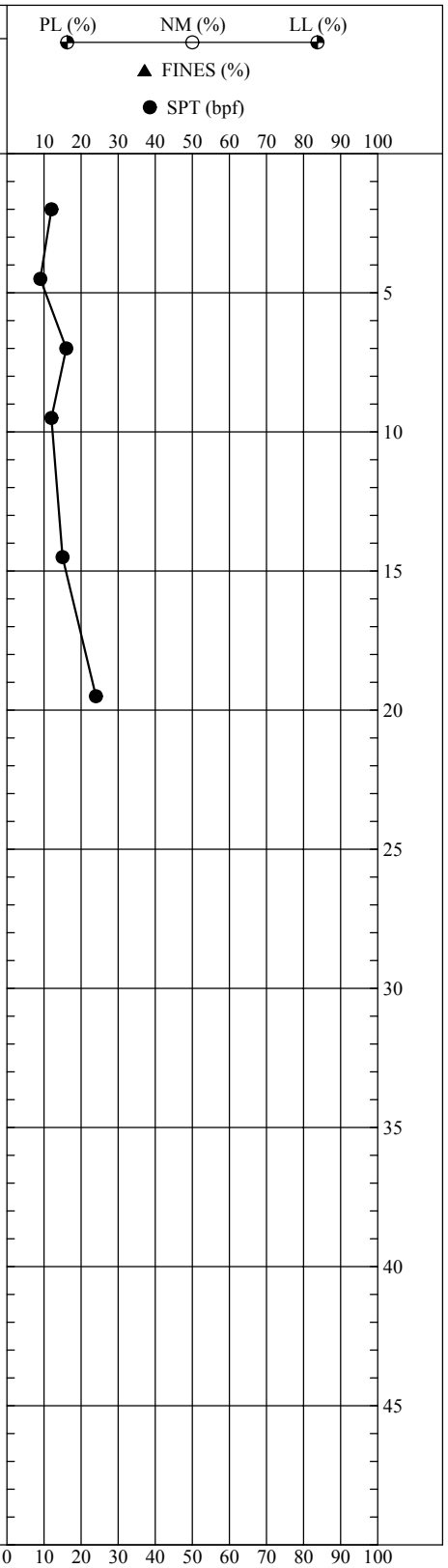
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BII-36
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 225654,756370
DRILLED: October 15, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense, tan to gray, fine to medium SAND (SP), moist.		5			
	Little silt, wet at 3.5 feet bgs.			SPT-1		2-3-9 (N = 12)
5			0	SPT-2		6-4-5 (N = 9)
				SPT-3		4-6-10 (N = 16)
10			-5	SPT-4		5-6-6 (N = 12)
	Trace coarse sand at 13.5 feet bgs.					
15			-10	SPT-5		5-7-8 (N = 15)
				SPT-6		8-11-13 (N = 24)
20	Boring Terminated at 20.0 feet bgs.		-15			
25			-20			
30			-25			
35			-30			
40			-35			
45			-40			
50			-45			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY: AJA
REMARKS:

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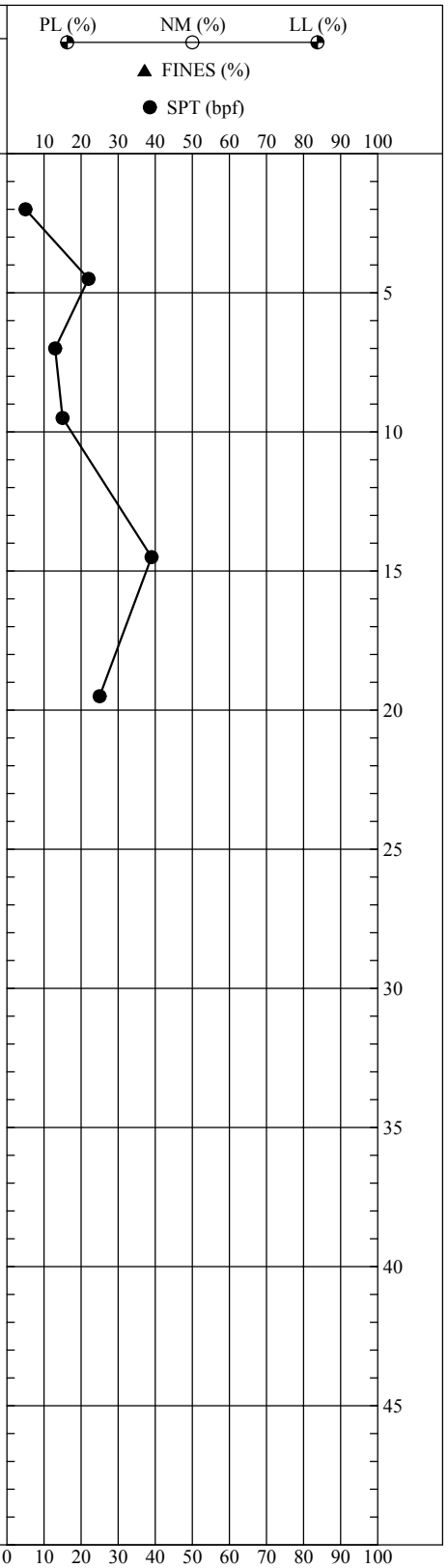
SOIL TEST BORING RECORD

BORING NO.: SWM-1
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219265.7,757441.1
DRILLED: October 20, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose, light gray to tan, fine to medium SAND (SP), moist.		2			
				SPT-1		3-2-3 (N = 5)
	Trace coarse sand at 3.5 feet bgs.					
5			-3	SPT-2		7-10-12 (N = 22)
				SPT-3		6-5-8 (N = 13)
				SPT-4		4-5-10 (N = 15)
10			-8			
	Trace coarse sand at 13.5 feet bgs.					
15			-13	SPT-5		9-16-23 (N = 39)
				SPT-6		8-13-12 (N = 25)
20	Boring Terminated at 20.0 feet bgs.		-18			
25			-23			
30			-28			
35			-33			
40			-38			
45			-43			
50			-48			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	MLH
CHECKED BY:	AJA
REMARKS:	Offset approximately 30 feet E

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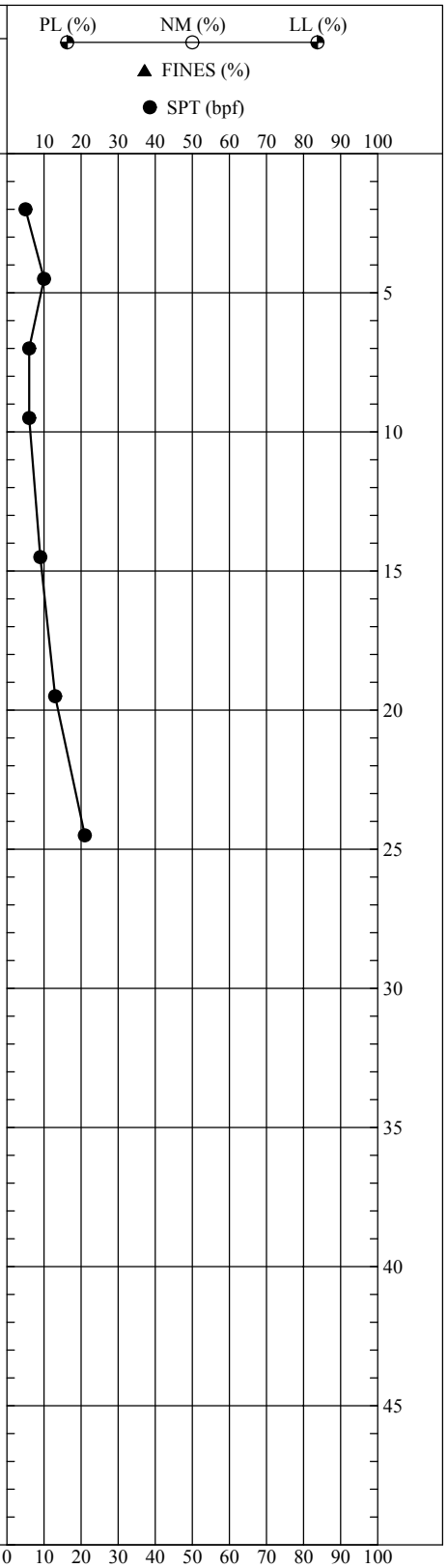
SOIL TEST BORING RECORD

BORING NO.: SWM-2
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219510,757243
DRILLED: October 16, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to medium dense, light gray fine to medium sand. Moist to wet.		2			
	Thin lenses of clay and root fragments from 2.0 to 2.5 feet bgs.			SPT-1		2-4-1 (N = 5)
5			-3	SPT-2		5-4-6 (N = 10)
				SPT-3		1-3-3 (N = 6)
10			-8	SPT-4		3-3-3 (N = 6)
15			-13	SPT-5		5-5-4 (N = 9)
20			-18	SPT-6		4-6-7 (N = 13)
25	Medium dense, yellow to reddish brown, silty fine sand (SM) with trace coarse sand. Wet. 6" seam of red brown silty clay with wood fragments at 23.5 to 24 feet bgs. Boring terminated at 25 feet bgs.		-23	SPT-7		6-13-8 (N = 21)
30			-28			
35			-33			
40			-38			
45			-43			
50			-48			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER: MACTEC/Sterling
EQUIPMENT: Truck Mount CME-55
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY: AJA
REMARKS:

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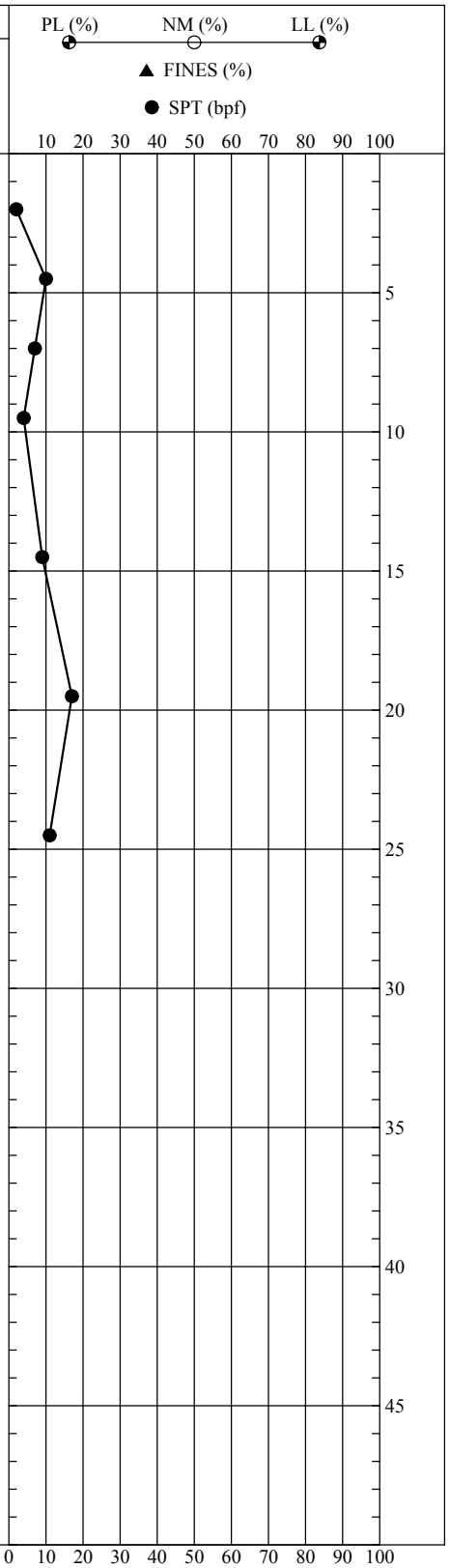
SOIL TEST BORING RECORD

BORING NO.: SWM-3
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 224322.6,756507.9
DRILLED: October 10, 2003
PROJECT NO.: 3530-03-1245.02

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Approximately 2" of topsoil.	2			
	Very loose to medium dense, light gray, fine to medium, silty SAND (SM). Wet.				
	2" seam of dark gray clay at 1 foot bgs.		SPT-1		1-1-1 (N = 2)
5		-3	SPT-2		4-5-5 (N = 10)
			SPT-3		2-3-4 (N = 7)
			SPT-4		1-1-3 (N = 4)
10	5" layer of dark gray clay (CH) from 7.6 to 10 feet bgs.	-8			
	Loose to medium dense light to dark gray, fine to medium, silty SAND (SM). Wet.				
			SPT-5		3-4-5 (N = 9)
15		-13			
			SPT-6		6-8-9 (N = 17)
20		-18			
	Little coarse sand and fine gravel at 23.5 feet bgs.		SPT-7		2-4-7 (N = 11)
25	Boring terminated at 25 feet bgs.	-23			
30		-28			
35		-33			
40		-38			
45		-43			
50		-48			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 12/24/03

DRILLER:	MACTEC/Sterling
EQUIPMENT:	Truck Mount CME-55
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	AJA
REMARKS:	Offset approximately 25 feet W

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: SWM-4
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 225130,756373
DRILLED: October 9, 2003
PROJECT NO.: 3530-03-1245.02

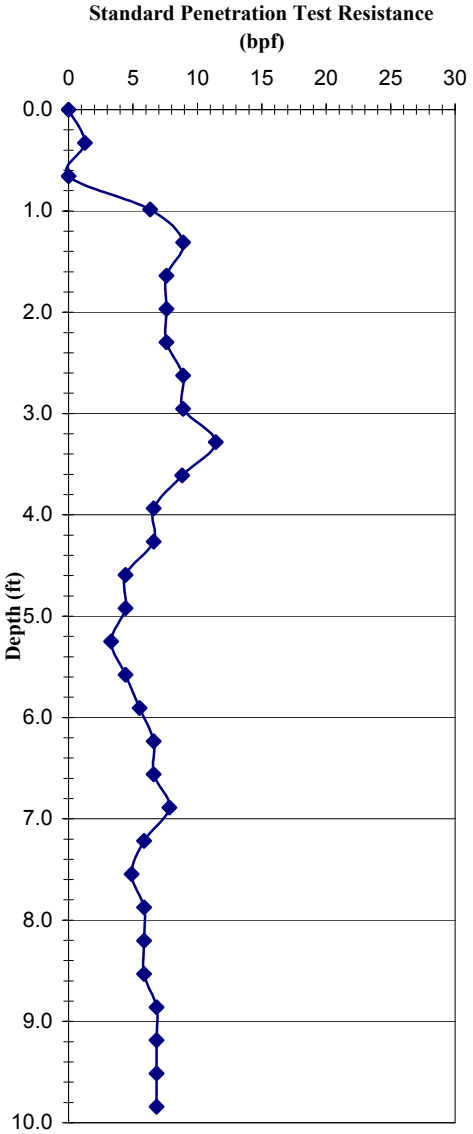
MACTEC

MACTEC ENGINEERING AND CONSULTING, INC.
1606 Ownby Lane, Richmond, Virginia 23220

Dynamic Cone Penetration Resistance Log

Project Name:	Indian River Inlet Bridge	Manufacturer:	TRIGGS
Project Number:	3530-03-1245.02	Equipment:	Wildcat Dynamic Cone Penetrometer
Crew:	AJA	Hammer Wt.:	15.9 kg
Boring Location:	BII-6 (HA)	Cone Area:	10 cm^2
Date:	11/4/2003		

Soil Classification and Remarks	Samples	Depth (feet)	Blows per 10 cm	SPT - N'
Soft, dark brown to gray SILT (ML), with some root fragments. Wet.	HA-1	0.0	0	0
		0.3	1	1
		0.7	0	0
		1.0	5	6
	HA-2	1.3	7	9
		1.6	6	8
		2.0	6	8
Medium dense to loose, brown to light gray SAND (SP). Wet.	HA-3	2.3	6	8
		2.6	7	9
		3.0	7	9
	HA-4	3.3	9	11
		3.6	8	9
		3.9	6	7
		4.3	6	7
		4.6	4	4
		4.9	4	4
		5.2	3	3
		5.6	4	4
		5.9	5	6
		6.2	6	7
		6.6	6	7
		6.9	8	8
		7.2	6	6
		7.5	5	5
		7.9	6	6
		8.2	6	6
		8.5	6	6
		8.9	7	7
Note: Groundwater encountered at 1 foot bgs.		9.2	7	7
		9.5	7	7
		9.8	7	7



Static cone penetration resistance (q_c) and SPT N-value based on manufacturer's recommended correlations.

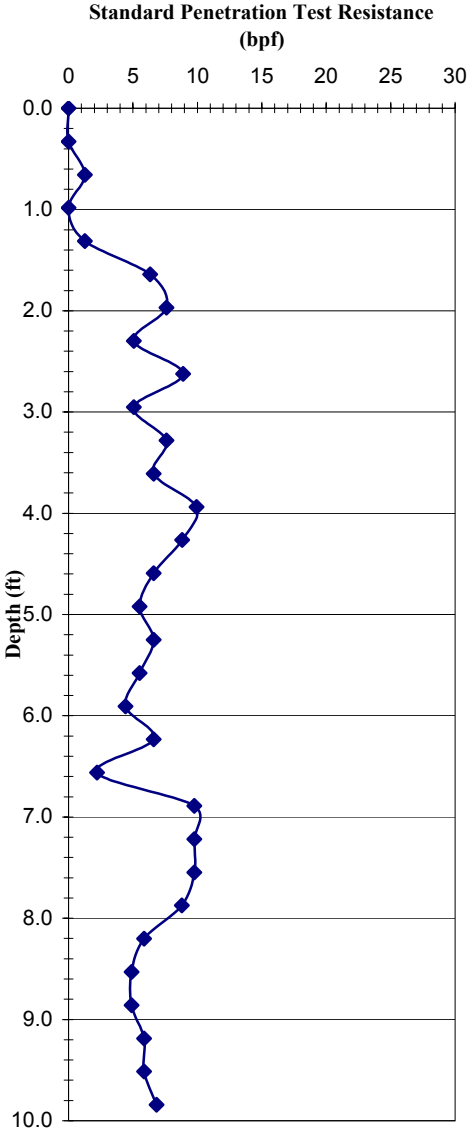
P:\1200\1245 Indian River Inlet Bridge\Stage II Final Design\Field Exploration\[Wildcat DCP Results2.xls]BII-6 (HA)

MACTEC ENGINEERING AND CONSULTING, INC.
1606 Ownby Lane, Richmond, Virginia 23220

Dynamic Cone Penetration Resistance Log

Project Name:	Indian River Inlet Bridge	Manufacturer:	TRIGGS
Project Number:	3530-03-1245.02	Equipment:	Wildcat Dynamic Cone Penetrometer
Crew:	AJA	Hammer Wt.:	15.9 kg
Boring Location:	BII-12 (HA)	Cone Area:	10 cm^2
Date:	11/4/2003		

Soil Classification and Remarks	Samples	Depth (feet)	Blows per 10 cm	SPT - N'
Soft, dark brown to gray SILT (ML), with some root fragments. Wet.	HA-1	0.0	0	0
		0.3	0	0
		0.7	1	1
		1.0	0	0
Loose, dark brown silty SAND (SM). Wet.	HA-2	1.3	1	1
		1.6	5	6
		2.0	6	8
Medium dense to loose, brown to light gray SAND (SP). Wet.	HA-3	2.3	4	5
		2.6	7	9
		3.0	4	5
	HA-4	3.3	6	8
		3.6	6	7
		3.9	9	10
		4.3	8	9
		4.6	6	7
		4.9	5	6
		5.2	6	7
		5.6	5	6
		5.9	4	4
		6.2	6	7
		6.6	2	2
		6.9	10	10
		7.2	10	10
		7.5	10	10
		7.9	9	9
		8.2	6	6
		8.5	5	5
		8.9	5	5
Note: Groundwater encountered at 1 foot bgs.		9.2	6	6
		9.5	6	6
		9.8	7	7



Static cone penetration resistance (q_c) and SPT N-value based on manufacturer's recommended correlations.

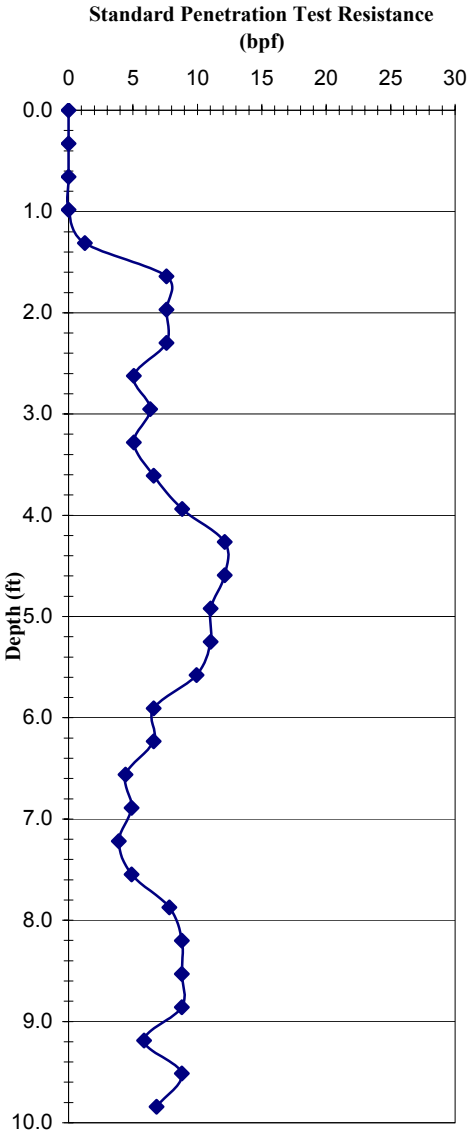
P:\1200\1245 Indian River Inlet Bridge\Stage II Final Design\Field Exploration\[Wildcat DCP Results2.xls]BII-12 (HA)

MACTEC ENGINEERING AND CONSULTING, INC.
1606 Ownby Lane, Richmond, Virginia 23220

Dynamic Cone Penetration Resistance Log

Project Name:	Indian River Inlet Bridge	Manufacturer:	TRIGGS
Project Number:	3530-03-1245.02	Equipment:	Wildcat Dynamic Cone Penetrometer
Crew:	AJA	Hammer Wt.:	15.9 kg
Boring Location:	BII-14 (HA)	Cone Area:	10 cm^2
Date:	11/4/2003		

Soil Classification and Remarks	Samples	Depth (feet)	Blows per 10 cm	SPT - N'
Soft, dark brown to gray SILT (ML), with some root fragments. Wet.	HA-1	0.0	0	0
		0.3	0	0
		0.7	0	0
		1.0	0	0
		1.3	1	1
	HA-2	1.6	6	8
		2.0	6	8
Medium dense to loose, brown to light gray SAND (SP). Wet.		2.3	6	8
	HA-3	2.6	4	5
		3.0	5	6
		3.3	4	5
	HA-4	3.6	6	7
		3.9	8	9
		4.3	11	12
		4.6	11	12
		4.9	10	11
		5.2	10	11
		5.6	9	10
		5.9	6	7
		6.2	6	7
		6.6	4	4
		6.9	5	5
		7.2	4	4
		7.5	5	5
		7.9	8	8
		8.2	9	9
		8.5	9	9
		8.9	9	9
Note: Groundwater encountered at 1 foot bgs.		9.2	6	6
		9.5	9	9
		9.8	7	7



Static cone penetration resistance (q_c) and SPT N-value based on manufacturer's recommended correlations.

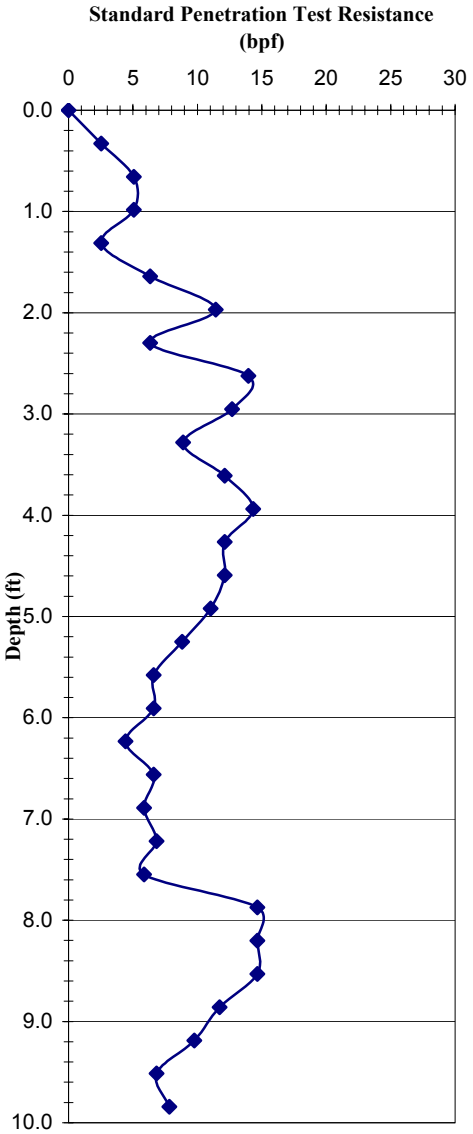
P:\1200\1245 Indian River Inlet Bridge\Stage II Final Design\Field Exploration\[Wildcat DCP Results2.xls]BII-14 (HA)

MACTEC ENGINEERING AND CONSULTING, INC.
1606 Ownby Lane, Richmond, Virginia 23220

Dynamic Cone Penetration Resistance Log

Project Name:	Indian River Inlet Bridge	Manufacturer:	TRIGGS
Project Number:	3530-03-1245.02	Equipment:	Wildcat Dynamic Cone Penetrometer
Crew:	AJA	Hammer Wt.:	15.9 kg
Boring Location:	BII-15 (HA)	Cone Area:	10 cm^2
Date:	11/4/2003		

Soil Classification and Remarks	Samples	Depth (feet)	Blows per 10 cm	SPT - N'
Loose to medium dense, dark brown to light tan, silty SAND (SM). Wet. Some silt and root fragments from 0 to 1 foot bgs.	HA-1	0.0	0	0
		0.3	2	3
		0.7	4	5
		1.0	4	5
	HA-2	1.3	2	3
		1.6	5	6
		2.0	9	11
	HA-3	2.3	5	6
		2.6	11	14
		3.0	10	13
	HA-4	3.3	7	9
		3.6	11	12
		3.9	13	14
		4.3	11	12
		4.6	11	12
		4.9	10	11
		5.2	8	9
		5.6	6	7
		5.9	6	7
		6.2	4	4
		6.6	6	7
		6.9	6	6
		7.2	7	7
		7.5	6	6
		7.9	15	15
		8.2	15	15
		8.5	15	15
		8.9	12	12
Note: Groundwater encountered at 1 foot bgs.		9.2	10	10
		9.5	7	7
		9.8	8	8



Static cone penetration resistance (q_c) and SPT N-value based on manufacturer's recommended correlations.

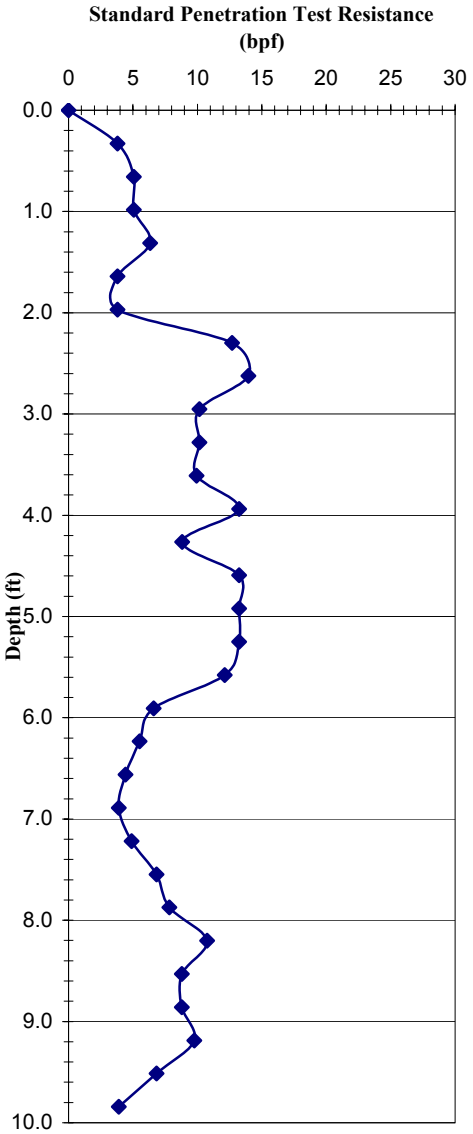
P:\1200\1245 Indian River Inlet Bridge\Stage II Final Design\Field Exploration\[Wildcat DCP Results2.xls]BII-15 (HA)

MACTEC ENGINEERING AND CONSULTING, INC.
1606 Ownby Lane, Richmond, Virginia 23220

Dynamic Cone Penetration Resistance Log

Project Name:	Indian River Inlet Bridge	Manufacturer:	TRIGGS
Project Number:	3530-03-1245	Equipment:	Wildcat Dynamic Cone Penetrometer
Crew:	AJA	Hammer Wt.:	15.9 kg
Boring Location:	SWM-2 (HA)	Cone Area:	10 cm^2
Date:	11/4/2003		

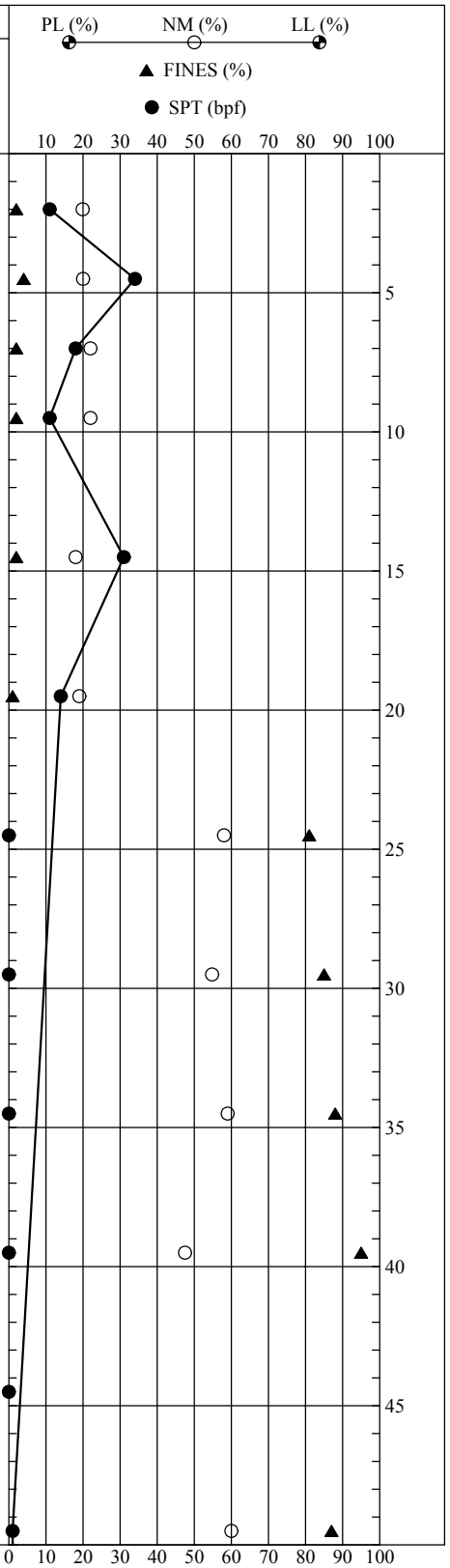
Soil Classification and Remarks	Samples	Depth (feet)	Blows per 10 cm	SPT - N'
Loose to medium dense, dark brown to light tan, silty SAND (SM). Wet.	HA-1	0.0	0	0
		0.3	3	4
		0.7	4	5
		1.0	4	5
		1.3	5	6
	HA-2	1.6	3	4
		2.0	3	4
		2.3	10	13
	HA-3	2.6	11	14
		3.0	8	10
		3.3	8	10
	HA-4	3.6	9	10
		3.9	12	13
		4.3	8	9
	HA-5	4.6	12	13
		4.9	12	13
		5.2	12	13
		5.6	11	12
		5.9	6	7
		6.2	5	6
		6.6	4	4
		6.9	4	4
		7.2	5	5
		7.5	7	7
		7.9	8	8
		8.2	11	11
		8.5	9	9
		8.9	9	9
Note: Groundwater encountered at 1 foot bgs.		9.2	10	10
		9.5	7	7
		9.8	4	4



Static cone penetration resistance (q_c) and SPT N-value based on manufacturer's recommended correlations.

P:\1200\1245 Indian River Inlet Bridge\Stage II Final Design\Field Exploration\[Wildcat DCP Results2.xls]SWM-2 (HA)

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense light gray fine to medium sand (SP), (A-3). Moist to wet		3	SPT-1		4-5-6 (N = 11)
5			-2	SPT-2		10-17-17 (N = 34)
				SPT-3		7-9-9 (N = 18)
10			-7	SPT-4		6-5-6 (N = 11)
	Trace shell fragments at 13.5 feet bgs.					
15			-12	SPT-5		9-13-18 (N = 31)
20			-17	SPT-6		8-7-7 (N = 14)
25	Very soft dark gray clay (CH), (A-7-6) with. Trace shell fragments, strong to weak organic odor.		-22	SPT-7		WOH
30			-27	SPT-8		WOH
35			-32	SPT-9		WOH
40			-37	SPT-10		WOH
45	No sample 11 (zero recovery).		-42	SPT-11		WOH
50			-47	SPT-12		0-0-1



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER: MACTEC-Raleigh
EQUIPMENT: Diedrich D-50
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY:
REMARKS:

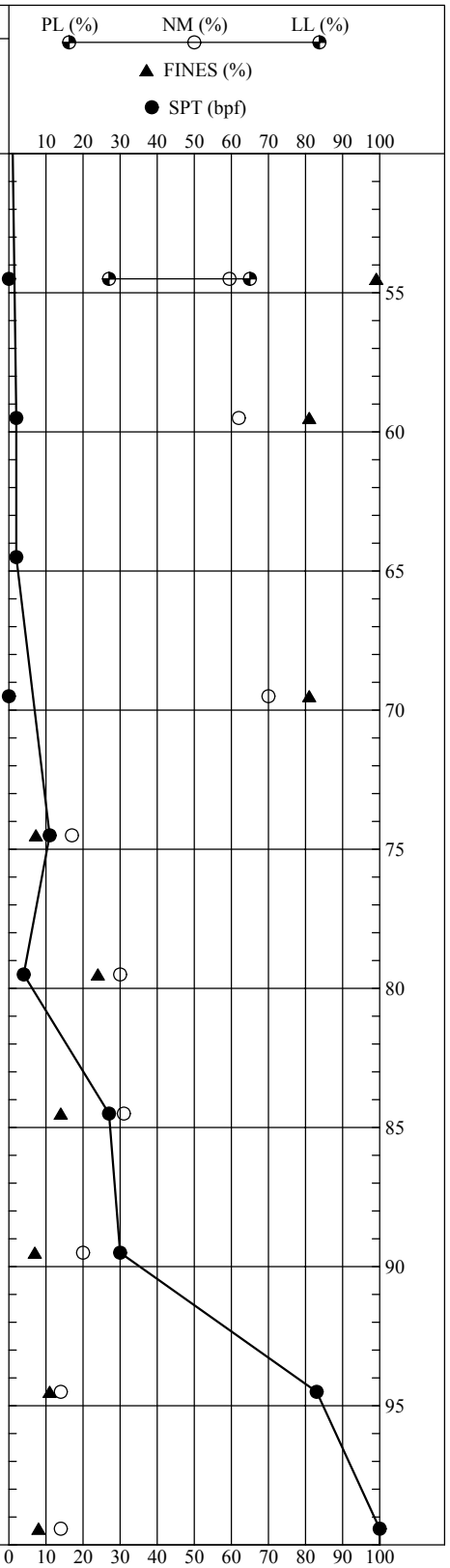
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-1
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219760.5,757236.7
DRILLED: August 5, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft dark gray clay (CH), (A-7-6) with. Trace shell fragments, strong to weak organic odor.	-47			(N = 1)
55		-52	SPT-13		WOH
60		-57	SPT-14		0-1-1 (N = 2)
65	No sample 15 (zero recovery).	-62	SPT-15		0-0-2 (N = 2)
70		-67	SPT-16		WOH
75	Loose to medium dense black poorly graded fine to medium sand (SP-SM), (A-2-4) with silt.	-72	SPT-17		4-5-6 (N = 11)
80		-77	SPT-18		1-2-2 (N = 4)
85	Medium to very dense, light to dark gray, fine to medium sand (SP), (A-2-4). Little silt from 83 to 85 feet bgs.	-82	SPT-19		7-11-16 (N = 27)
90		-87	SPT-20		7-14-16 (N = 30)
95		-92	SPT-21		27-40-43 (N = 83)
100	Very dense orangish brown fine to medium sand (SP), (A-1-b). Lens of medium to coarse gravel from 98.5 to 98.7 feet bgs.	-97	SPT-22		41-50/5"



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER: MACTEC-Raleigh
EQUIPMENT: Diedrich D-50
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY:
REMARKS:

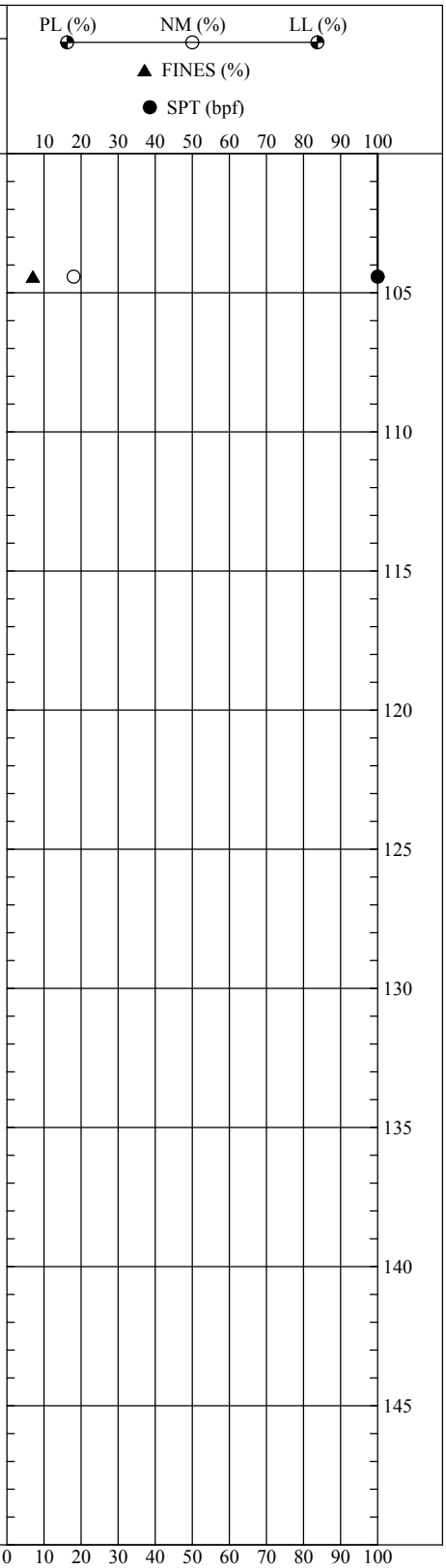
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-1
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219760.5,757236.7
DRILLED: August 5, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf)
100	Very dense orangish brown fine to medium sand (SP), (A-1-b).		-97				
				SPT-23	☒	46-50/5"	
105	Boring terminated at 105 feet bgs.		-102				
110			-107				
115			-112				
120			-117				
125			-122				
130			-127				
135			-132				
140			-137				
145			-142				
150			-147				



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER: MACTEC-Raleigh
EQUIPMENT: Diedrich D-50
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY:
REMARKS:

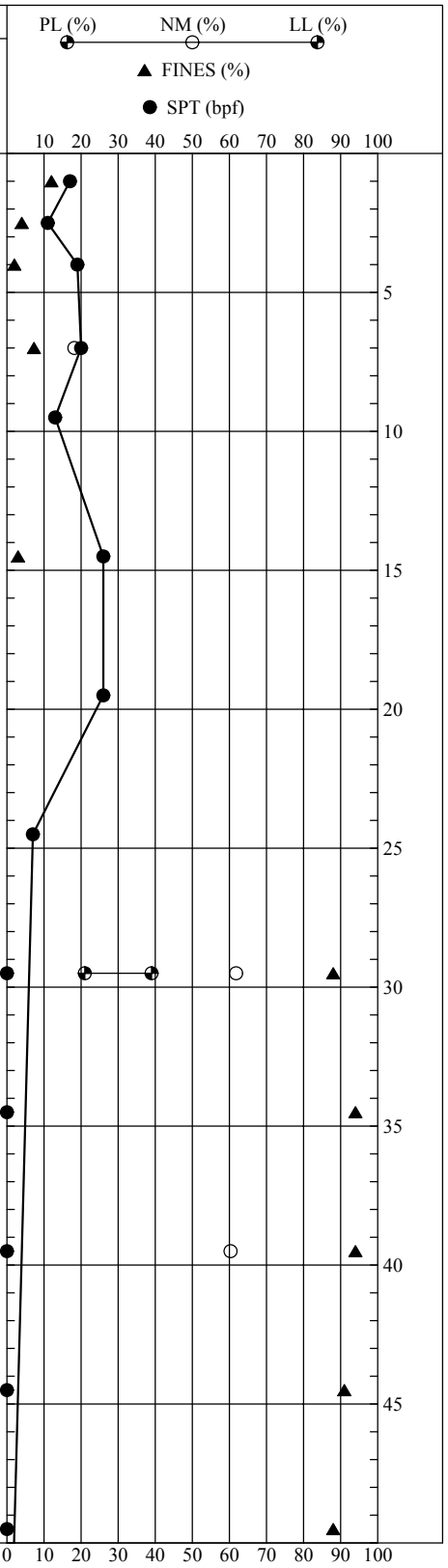
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-1
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219760.5,757236.7
DRILLED: August 5, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense, light dark tan, poorly graded fine to medium SAND (SP-SM), (A-1-b) with silt, dry to wet. Some medium gravel at 1.5 to 3.0 feet bgs.	3	SPT-1		5-6-11 (N = 17)
			SPT-2		3-5-6 (N = 11)
			SPT-3		6-9-10 (N = 19)
5		-2	SPT-4		7-7-13 (N = 20)
			SPT-5		4-3-10 (N = 13)
10		-7			
15	Little medium gravel at 14.0 to 14.5 feet bgs.	-12	SPT-6		9-12-14 (N = 26)
20		-17	SPT-7		11-11-15 (N = 26)
25		-22	SPT-8		6-3-4 (N = 7)
	Very soft, dark gray, CLAY (CL), (A-6), trace shell fragments.				
30		-27	SPT-9		WOH
35		-32	SPT-10		WOH
40		-37	SPT-11		WOH
45		-42	SPT-12		WOH
50		-47	SPT-13		WOH



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Piezometer installed ~ 5 feet south of boring immediately
REMARKS:	after completion.

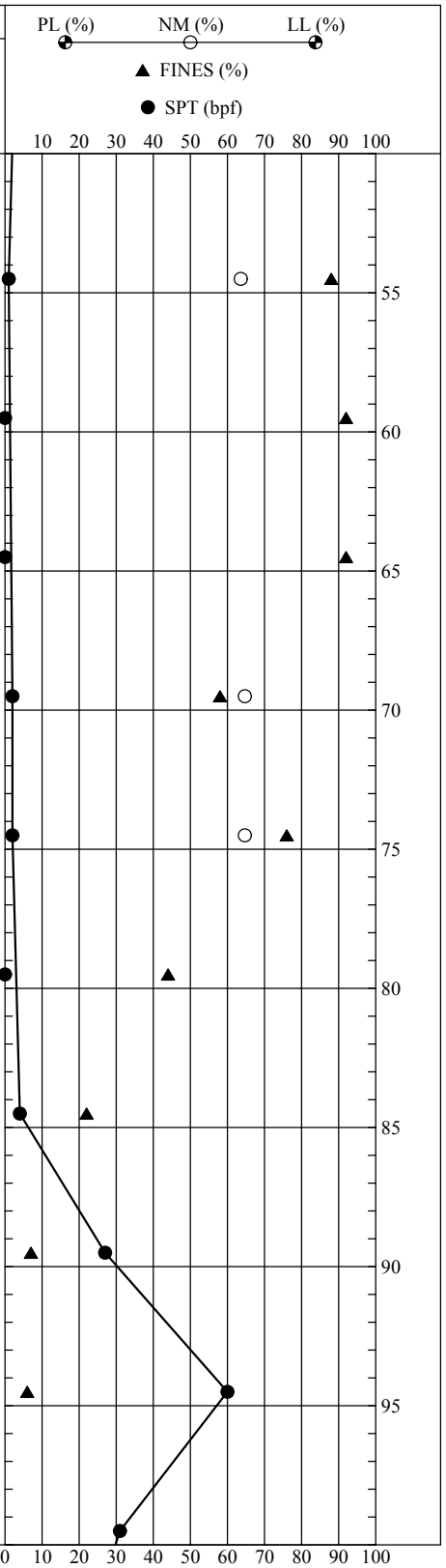
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-2
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219998.6,757226.1
DRILLED: July 21, 2002
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft, dark gray, CLAY (CL), (A-6), trace shell fragments.		-47			
55			-52	SPT-14		0-0-1 (N = 1)
60			-57	SPT-15		WOH
65			-62	SPT-16		WOH
70			-67	SPT-17		0-1-1 (N = 2)
75			-72	SPT-18		0-0-2 (N = 2)
80			-77	SPT-19		WOH
85	Loose to dense, light and dark gray to tan, fine to medium SAND (SP-SM), (A-1-b) and silt, moist to wet.		-82	SPT-20		0-1-3 (N = 4)
90			-87	SPT-21		11-14-13 (N = 27)
95	Some medium to coarese gravel at 93.5 to 95.0 feet bgs.		-92	SPT-22		18-30-30 (N = 60)
100			-97	SPT-23		18-17-14



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Piezometer installed ~ 5 feet south of boring immediately
REMARKS:	after completion.

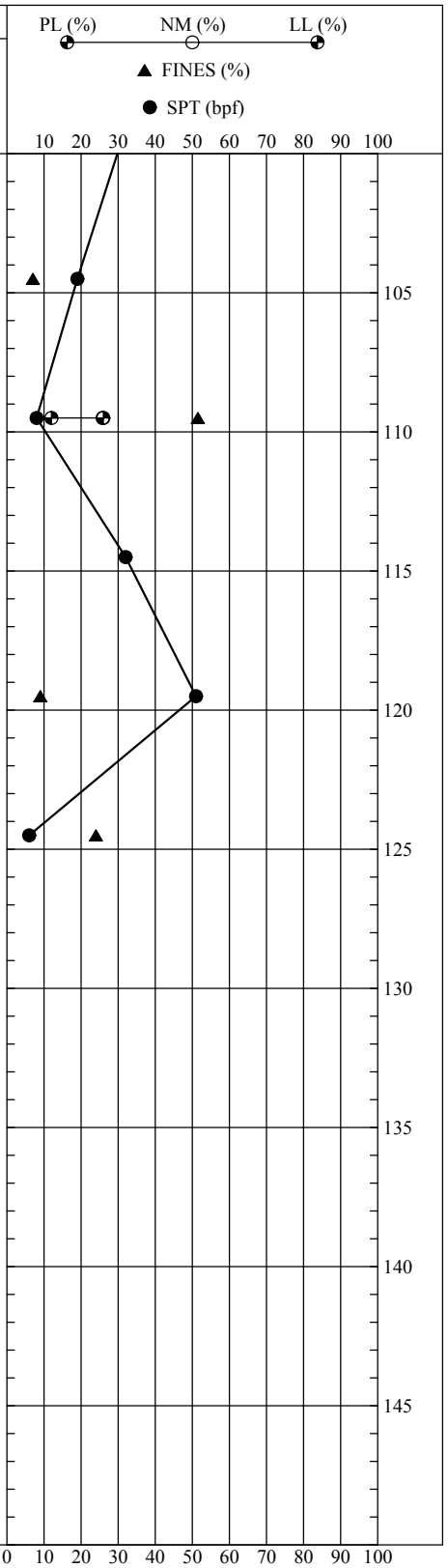
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-2
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219998.6,757226.1
DRILLED: July 21, 2002
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Loose to dense, light and dark gray to tan, fine to medium SAND (SP-SM), (A-1-b) and silt, moist to wet.		-97			(N = 31)
	Little medium gravel at 103.5 to 105.0 feet bgs.			SPT-24		14-11-8 (N = 19)
105			-102			
	Medium stiff, dark gray, sandy CLAY (CL), (A-6) little fine sand.			SPT-25		2-4-4 (N = 8)
110			-107			
	Loose to dense, light to dark gray and orange, fine to medium SAND (SP-SM), (A-2-4) some silt, wet.			SPT-26		18-18-14 (N = 32)
115			-112			
				SPT-27		17-25-26 (N = 51)
120			-117			
				SPT-28		5-3-3 (N = 6)
125	Boring terminated at 125		-122			
130			-127			
135			-132			
140			-137			
145			-142			
150			-147			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Piezometer installed ~ 5 feet south of boring immediately
REMARKS:	after completion.

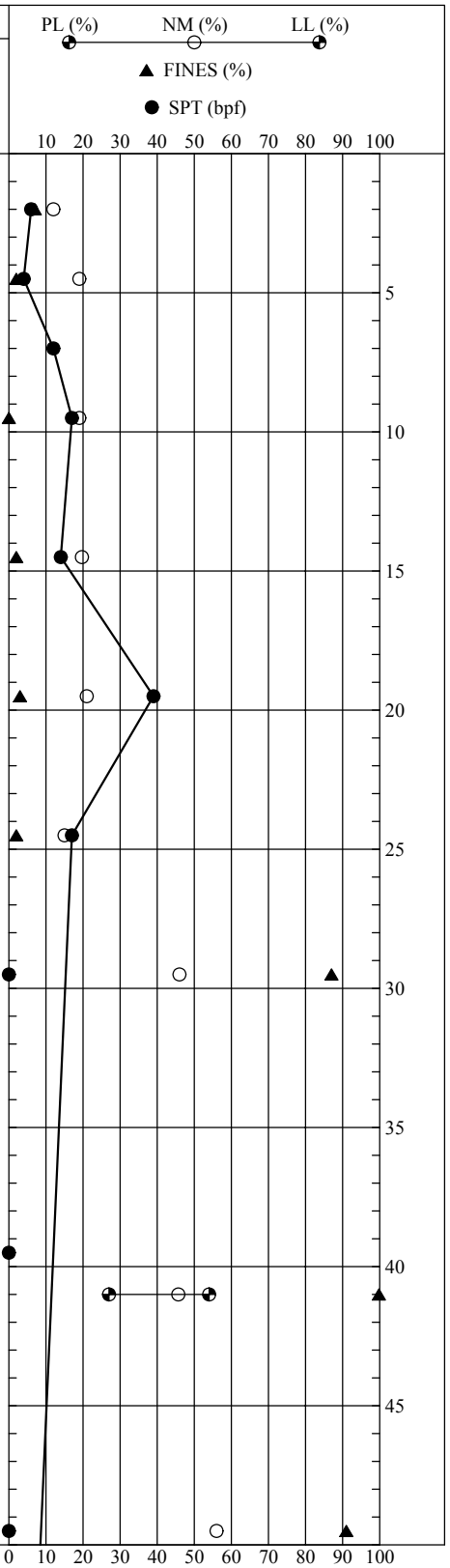
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-2
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 219998.6,757226.1
DRILLED: July 21, 2002
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	ELEV (ft)	IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to medium dense, light tan, fine to medium SAND (SP), (A-1-b) moist to wet.	2	SPT-1		4-3-3 (N = 6)
5	Lens of clean stone fill from 4.2 to 4.5 feet bgs.	-3	SPT-2		3-2-2 (N = 4)
			SPT-3		4-4-8 (N = 12)
10		-8	SPT-4		8-9-8 (N = 17)
15		-13	SPT-5		7-7-7 (N = 14)
20		-18	SPT-6		11-19-20 (N = 39)
25		-23	SPT-7		6-9-8 (N = 17)
30	Very soft, dark gray, organic CLAY (CH), (A-7-6) little shell fragments, moist.	-28	SPT-8		WOH
35	Pressure meter test 1 (PMT-1) at 33.0 feet bgs.	-33	UD-7		
40		-38	SPT-9		WOH
			UD-8		
45	PMT-2 at 43.0 feet bgs.	-43			
50		-48	SPT-10		WOH



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Offset ~ 35 feet south after sewer line strike at 13.5 feet in
REMARKS:	original boring. Advance to 13.5 feet bgs and begin resampling.

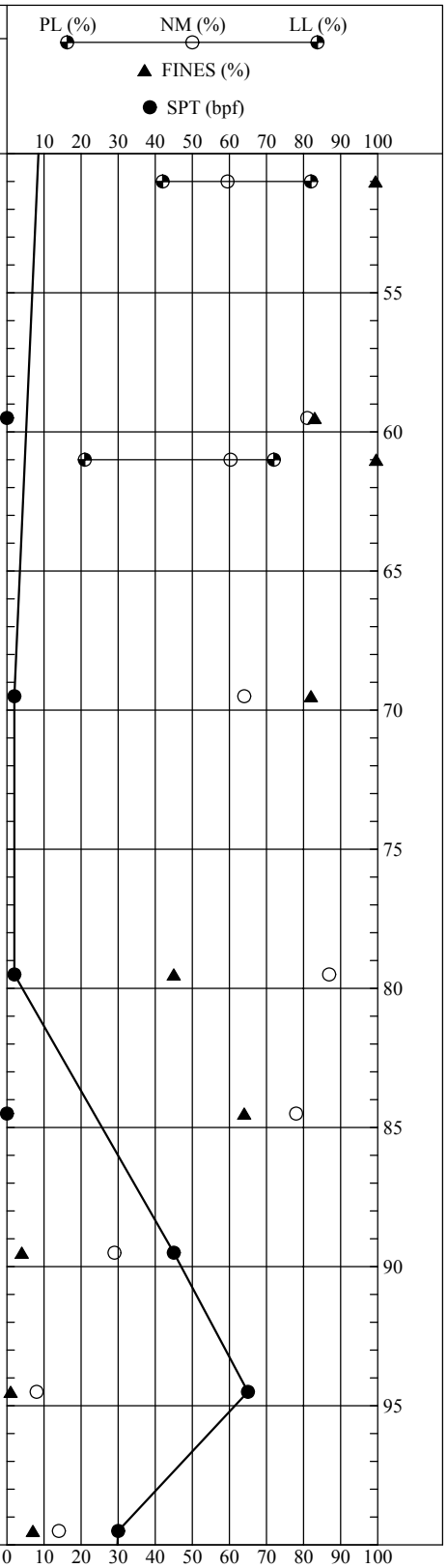
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-3
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220224.8,757218.9
DRILLED: July 22, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft, dark gray, organic CLAY (CH), (A-7-6) little shell fragments, moist.		-48	UD-9		
	PMT-3 at 53.0 feet bgs.					
55			-53			
60			-58	SPT-11		WOH
				UD-10		
	PMT-4 at 63.0 feet bgs.					
65			-63			
70			-68	SPT-12		0-0-2 (N = 2)
				UD-11		
	PMT-5 at 73.0 feet bgs.					
75			-73			
80			-78	SPT-13		0-0-2 (N = 2)
85			-83	SPT-14		WOH
90	Dense, light gray to orange yellow, fine to medium SAND (SP), (A-1-a) occasional coarse gravel, moist to wet.		-88	SPT-15		3-25-20 (N = 45)
95			-93	SPT-16		20-29-36 (N = 65)
100			-98	SPT-17		14-14-16



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Offset ~ 35 feet south after sewer line strike at 13.5 feet in original boring. Advance to 13.5 feet bgs and begin resampling.
REMARKS:	

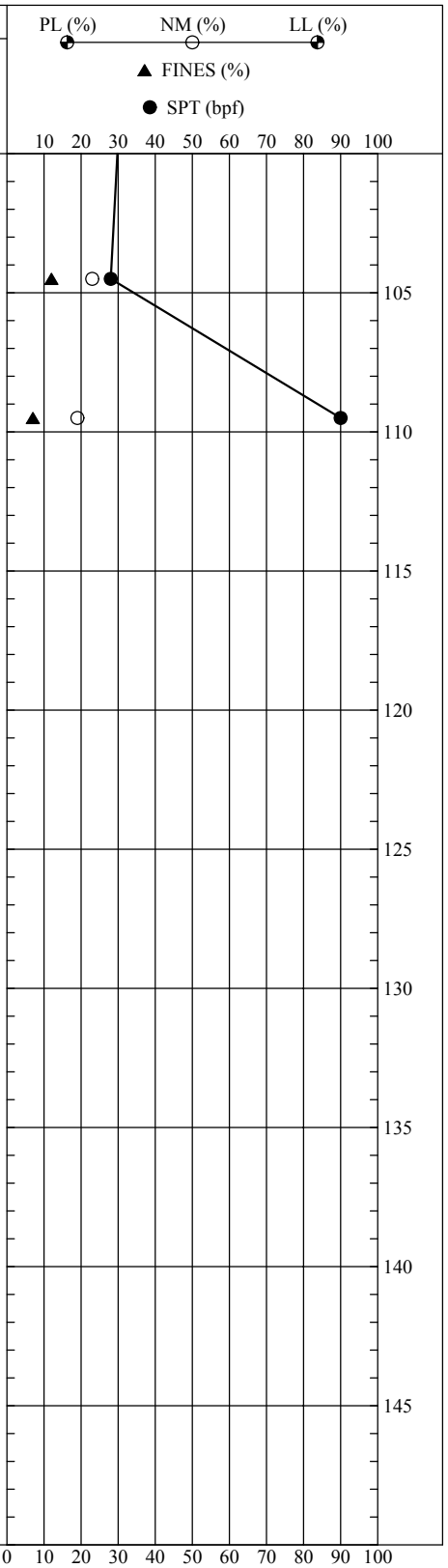
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-3
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220224.8,757218.9
DRILLED: July 22, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Dense, light gray to orange yellow, fine to medium SAND (SP), (A-1-a) occasional coarse gravel, moist to wet.		-98			(N = 30)
105			-103	SS-18		6-10-18 (N = 28)
110			-108	SPT-19		31-40-50 (N = 90)
	Boring terminated at 110 feet bgs.					
115			-113			
120			-118			
125			-123			
130			-128			
135			-133			
140			-138			
145			-143			
150			-148			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Offset ~ 35 feet south after sewer line strike at 13.5 feet in
REMARKS:	original boring. Advance to 13.5 feet bgs and begin resampling.

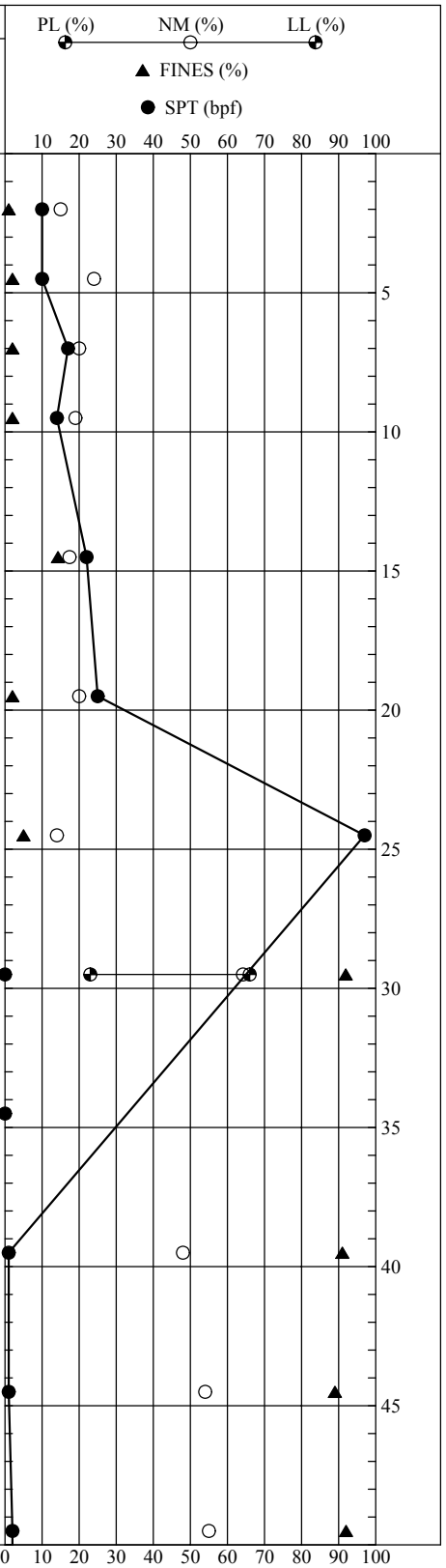
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-3
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220224.8,757218.9
DRILLED: July 22, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Brown silty sand topsoil with some root fragments.	3			
	Medium dense to very dense, light gray to dark yellowish brown, silty fine to medium sand (SM), (A-1-b). Moist to wet		SPT-1		2-3-7 (N = 10)
			SPT-2		2-3-7 (N = 10)
5	Soft dark gray clay seam (approx. 1 inch thick) with some root fragments and strong organic odor at 4.5 feet bgs.	-2	SPT-3		5-8-9 (N = 17)
	Trace coarse sand at 8.5 feet bgs.		SPT-4		6-6-8 (N = 14)
10		-7			
	Trace medium gravel at 13.5 feet bgs.		SPT-5		9-12-10 (N = 22)
15		-12			
			SPT-6		9-11-14 (N = 25)
20		-17			
			SPT-7		27-48-49 (N = 97)
25		-22			
	Very soft to soft dark greenish gray clay (CH), (A-7-6). Strong to weak organic odor, trace shell fragments.		SPT-8		WOH
30		-27			
	No sample 9 (zero recovery).		SPT-9		WOH
35		-32			
			SPT-10		0-0-1 (N = 1)
40		-37			
			SPT-11		0-0-1 (N = 1)
45		-42			
			SPT-12		0-0-2
50		-47			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	
REMARKS:	

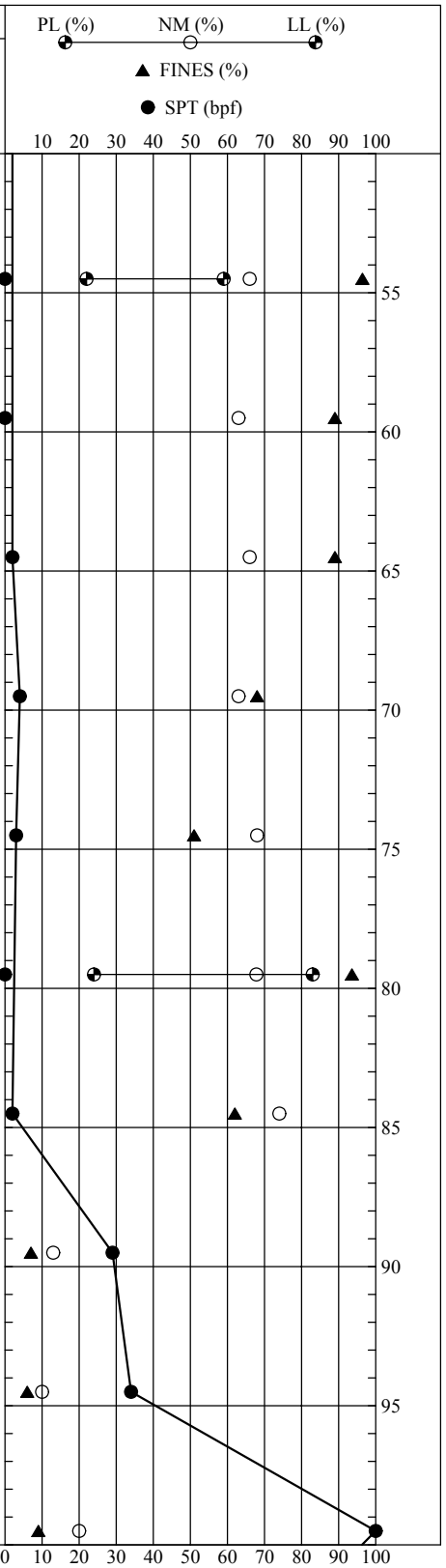
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-4
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220554.4,757158.4
DRILLED: July 28, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft to soft dark greenish gray clay (CH), (A-7-6). Strong to weak organic odor, trace shell fragments.		-47			(N = 2)
55			-52	SPT-13		WOH
60			-57	SPT-14		WOH
65			-62	SPT-15		0-0-2 (N = 2)
70			-67	SPT-16		0-2-2 (N = 4)
75			-72	SPT-17		0-0-3 (N = 3)
80			-77	SPT-18		WOH
85			-82	SPT-19		0-0-2 (N = 2)
90	Medium dark gray fine to coarse sand (SP), (A-1-b) with little medium to coarse gravel. Wet.		-87	SPT-20		4-11-18 (N = 29)
95			-92	SPT-21		17-17-17 (N = 34)
100	Very dense light gray fine to medium sand (SP), (A-3). Wet.		-97	SPT-22		20-42-50/5"



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER: MACTEC-Raleigh
EQUIPMENT: Diedrich D-50
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY:
REMARKS:

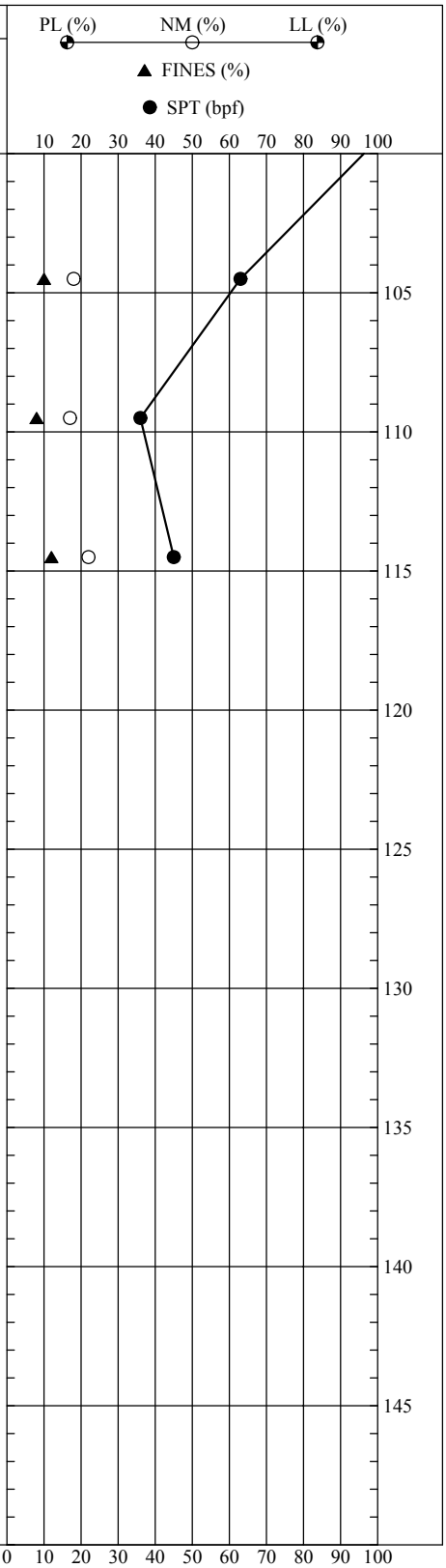
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-4
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220554.4,757158.4
DRILLED: July 28, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Very dense light gray fine to medium sand (SP), (A-3). Wet.		-97			
105			-102	SPT-23		25-27-36 (N = 63)
110	Dense yellowish orange fine to coarse sand (SP), (A-2-4) with trace medium gravel and little fines. Wet.		-107	SPT-24		15-17-19 (N = 36)
115			-112	SPT-25		20-20-25 (N = 45)
	Boring terminated at 115 feet bgs.					
120			-117			
125			-122			
130			-127			
135			-132			
140			-137			
145			-142			
150			-147			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER: MACTEC-Raleigh
EQUIPMENT: Diedrich D-50
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY:
REMARKS:

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SOIL TEST BORING RECORD

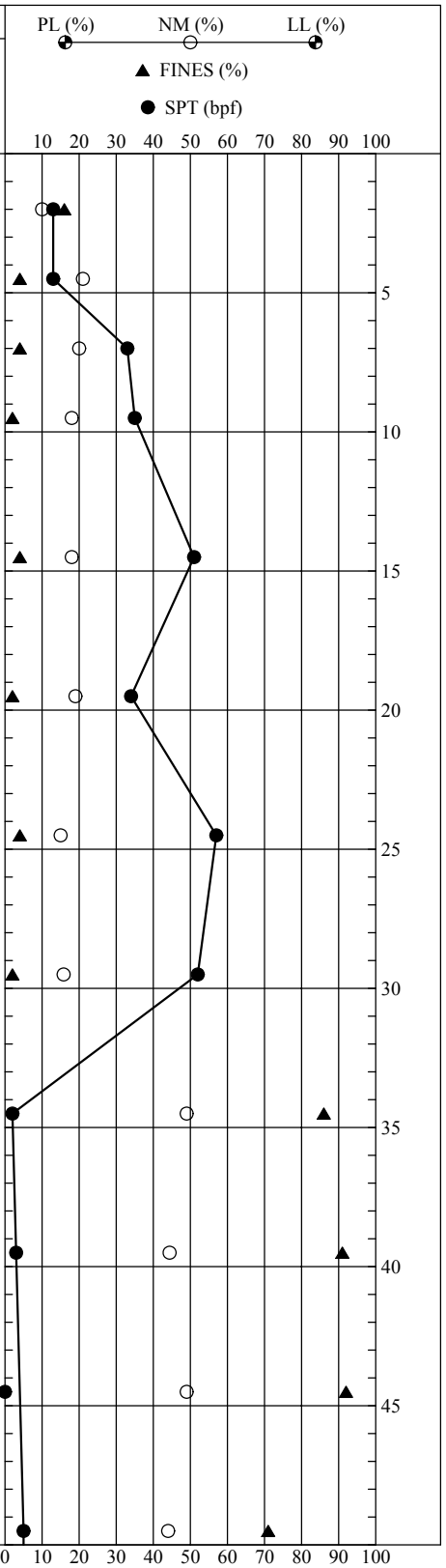
BORING NO.: BI-4
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220554.4,757158.4
DRILLED: July 28, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)
0	Loose silty sand topsoil with little root fragments.		3
	Medium dense to very dense light gray fine to medium sand (SP), (A-1-b). Moist to wet. Layer of oily asphaltic sand (approx. 2 inches thick) at 2 feet bgs. Some root fragments at 3.5 feet bgs.		
5			-2
10			-7
	Trace coarse sand at 13.5 feet bgs.		
15			-12
20			-17
	Little shell fragments at 23.5 feet bgs.		
25			-22
30			-27
	Very soft to medium stiff dark greenish gray clay (CH), (A-7-6). Strong to weak organic odor.		
35			-32
40			-37
45			-42
50			-47

SAMPLES

IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
SPT-1	X	6-7-6 (N = 13)
SPT-2	X	6-6-7 (N = 13)
SPT-3	X	9-15-18 (N = 33)
SPT-4	X	8-16-19 (N = 35)
SPT-5	X	16-24-27 (N = 51)
SPT-6	X	7-14-20 (N = 34)
SPT-7	X	25-21-36 (N = 57)
SPT-8	X	21-30-22 (N = 52)
SPT-9	X	0-0-2 (N = 2)
SPT-10	X	0-1-2 (N = 3)
SPT-11	X	WOH
SPT-12	X	1-2-3



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Boring offset ~ 60 feet east due to traffic and utility
REMARKS:	issues.

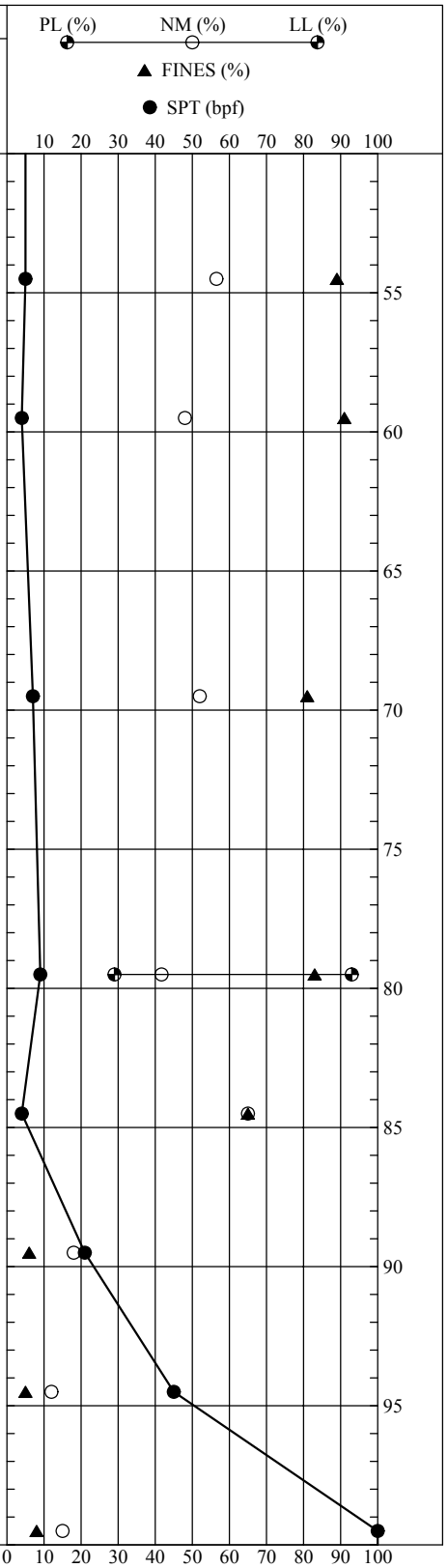
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-5
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220813.1,757163.4
DRILLED: July 31, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft to medium stiff dark greenish gray clay (CH), (A-7-6). Strong to weak organic odor.		-47			(N = 5)
55			-52	SPT-13		0-2-3 (N = 5)
60			-57	SPT-14		0-2-2 (N = 4)
65			-62			
70			-67	SPT-15		1-3-4 (N = 7)
75			-72			
80			-77	SPT-16		0-3-6 (N = 9)
85			-82	SPT-17		0-0-4 (N = 4)
90	Medium to very dense, dark to light gray, fine to coarse sand (SP), (A--1-b) with little medium to coarse gravel. Wet.		-87	SPT-18		4-5-16 (N = 21)
95			-92	SPT-19		20-25-20 (N = 45)
100			-97	SPT-20		38-50/6"



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Boring offset ~ 60 feet east due to traffic and utility
REMARKS:	issues.

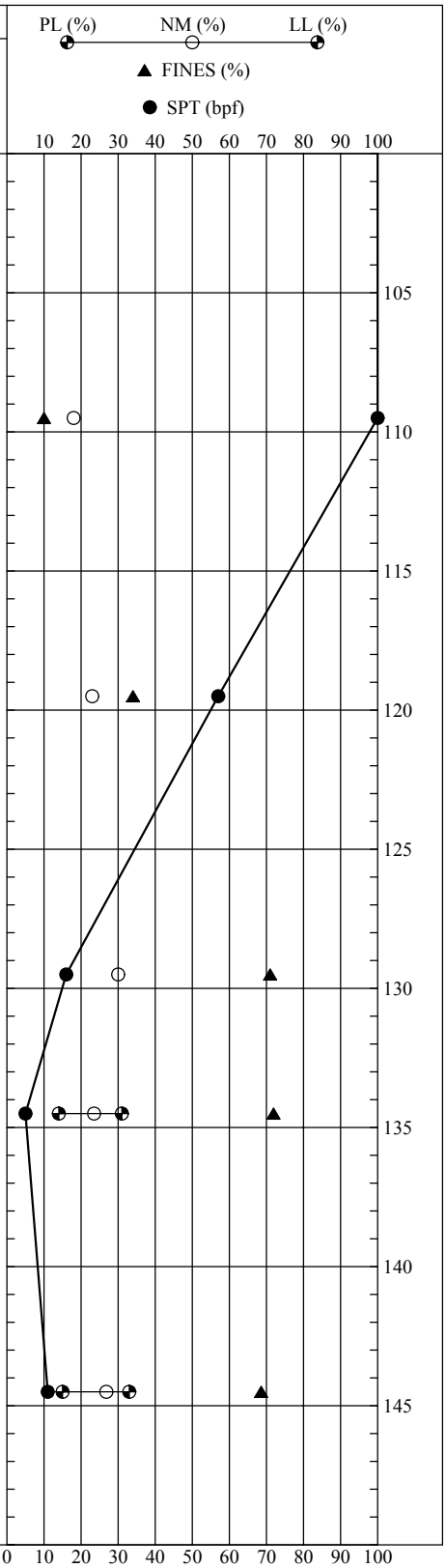
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-5
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220813.1,757163.4
DRILLED: July 31, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Medium to very dense, dark to light gray, fine to coarse sand (SP), (A--1-b) with little medium to coarse gravel. Wet.		-97			
105			-102			
110			-107	SPT-21		40-50/5"
115			-112			
120	Very dense tan silty silty fine sand (SM), (A-2-4) with trace organic material.		-117	SPT-22		8-17-40 (N = 57)
125			-122			
130	Medium stiff to stiff brown to dark gray silty clay (CL), (A-6) with little fine sand.		-127	SPT-23		4-8-8 (N = 16)
135			-132	SPT-24		0-0-5 (N = 5)
140	Medium stiff light brown to dark greenish gray clay (CL), (A-6).		-137			
145			-142	SPT-25		4-5-6 (N = 11)
				UNDIST-14		
150	Boring terminated at 147 feet bgs.		-147			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Boring offset ~ 60 feet east due to traffic and utility
REMARKS:	issues.

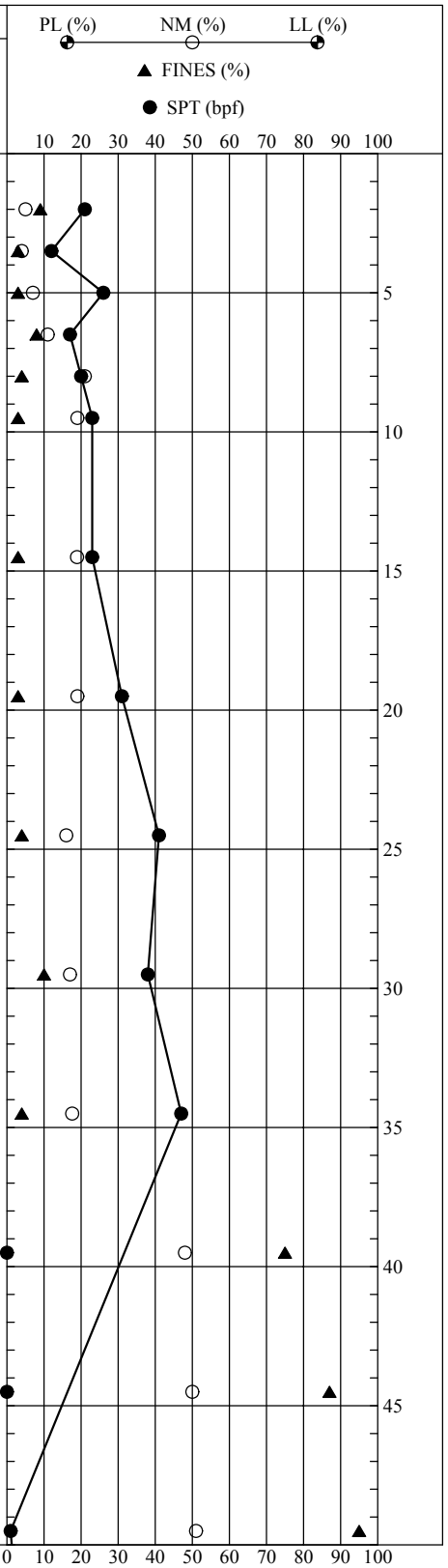
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-5
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 220813.1,757163.4
DRILLED: July 31, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense, light tan, fine to medium SAND (SP), (A-3) moist.		6	SPT-1		6-10-11 (N = 21)
				SPT-2		8-6-6 (N = 12)
	Stiff, light gray, SILT (ML) moist to wet.					
5	Medium dense to dense, light gray, fine to medium SAND (SP), (A-1-b) trace medium gravel, moist.		1	SPT-3		9-11-15 (N = 26)
				SPT-4		14-11-6 (N = 17)
	Lens of organic black SILT, little root fragment, from 7.2 to 7.5 feet bgs.			SPT-5		5-8-12 (N = 20)
				SPT-6		8-11-12 (N = 23)
10			-4			
15			-9	SPT-7		6-11-12 (N = 23)
20			-14	SPT-8		12-14-17 (N = 31)
25			-19	SPT-9		14-19-22 (N = 41)
30			-24	SPT-10		14-19-19 (N = 38)
35			-29	SPT-11		14-21-26 (N = 47)
	Very soft to medium stiff, dark gray to black, CLAY (CH), (A-7-6) trace shell fragments, weak to strong organic odor.					
40			-34	SPT-12		WOH
45			-39	SPT-13		WOH
				UD-5		
50			-44	SPT-14		0-0-1



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Boring offset ~ 30 feet NW due to traffic and utility
REMARKS:	issues. Piezometer installed ~ 45 feet east of boring immediately after completion.

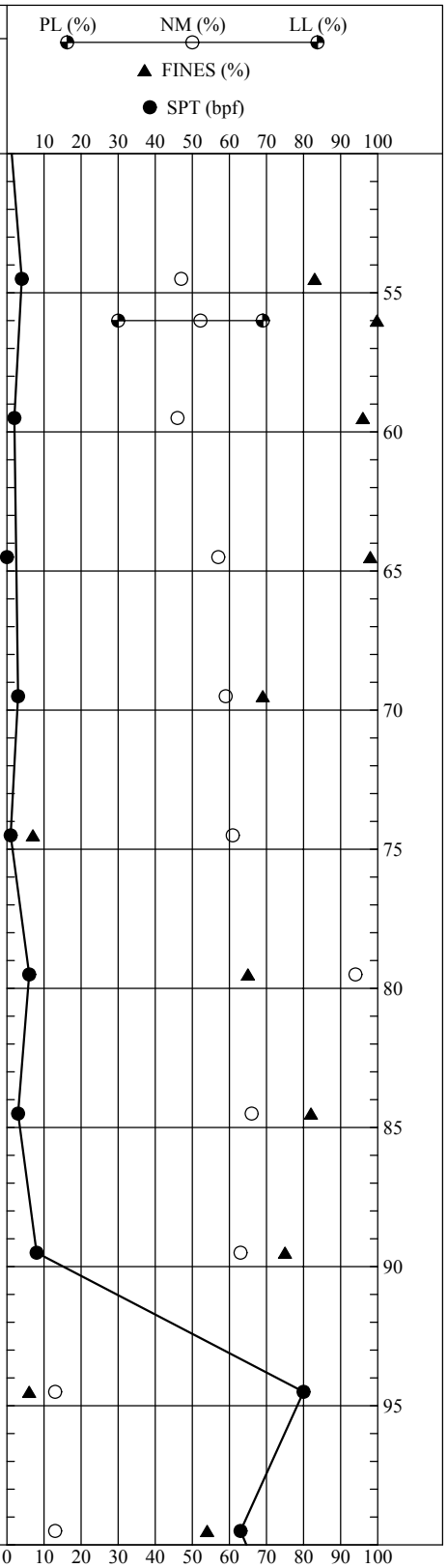
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-6
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 221218.7,757050.7
DRILLED: July 16, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft to medium stiff, dark gray to black, CLAY (CH), (A-7-6) trace shell fragments, weak to strong organic odor.		-44			(N = 1)
55			-49	SPT-15		0-2-2 (N = 4)
				UD-6		
60			-54	SPT-16		0-0-2 (N = 2)
65			-59	SPT-17		WOH
70			-64	SPT-18		0-1-2 (N = 3)
75			-69	SPT-19		0-0-1 (N = 1)
80			-74	SPT-20		2-2-4 (N = 6)
85			-79	SPT-21		0-1-2 (N = 3)
90			-84	SPT-22		1-4-4 (N = 8)
95	Very dense, light and dark gray to dark yellowish brown, fine to medium silty SAND (SM), (A-1-b) with some medium gravel, wet.		-89	SPT-23		17-46-34 (N = 80)
100			-94	SPT-24		16-19-44



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Boring offset ~ 30 feet NW due to traffic and utility
REMARKS:	issues. Piezometer installed ~ 45 feet east of boring immediately after completion.

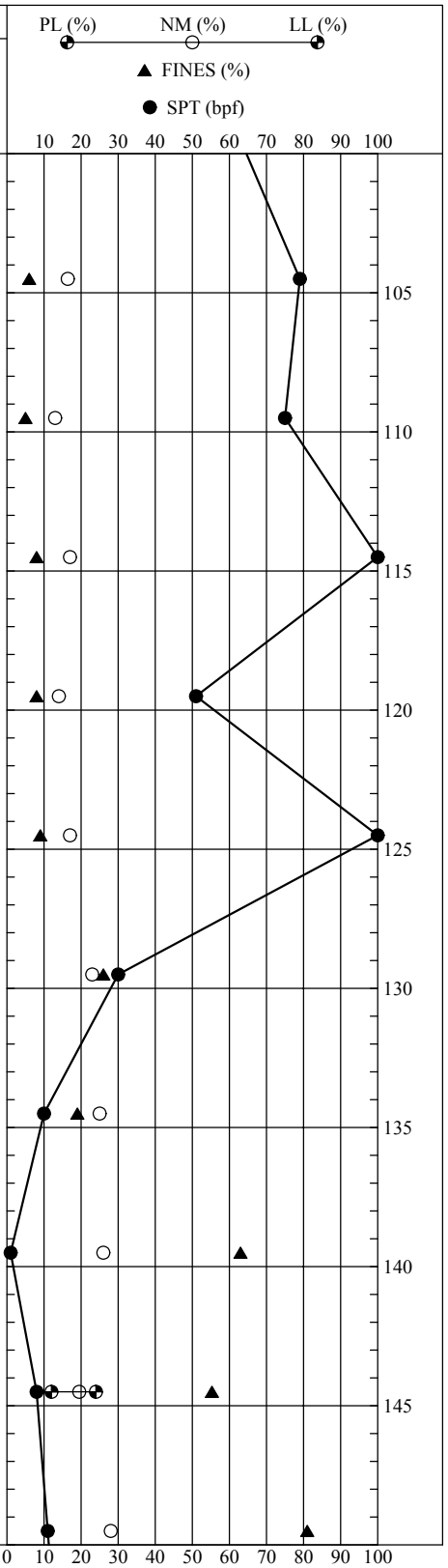
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-6
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 221218.7,757050.7
DRILLED: July 16, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Very dense, light and dark gray to dark yellowish brown, fine to medium silty SAND (SM), (A-1-b) with some medium gravel, wet.		-94			(N = 63)
105			-99	SPT-25		25-33-46 (N = 79)
110			-104	SPT-26		30-35-40 (N = 75)
115			-109	SPT-27		26-46-50/5"
120			-114	SPT-28		17-25-26 (N = 51)
125			-119	SPT-29		22-40-50/5"
130	Lens of dark gray, sandy silt from 127 to 129 feet bgs.		-124	SPT-30		3-9-21 (N = 30)
135			-129	SPT-31		8-6-4 (N = 10)
140	Very soft to stiff, brown to dark greenish gray, sandy CLAY (CL), (A-6) trace to little fine sand, wet.		-134	SPT-32		2-0-1 (N = 1)
145			-139	SPT-33		0-2-6 (N = 8)
150			-144	SPT-34		4-4-7



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Boring offset ~ 30 feet NW due to traffic and utility
REMARKS:	issues. Piezometer installed ~ 45 feet east of boring immediately after completion.

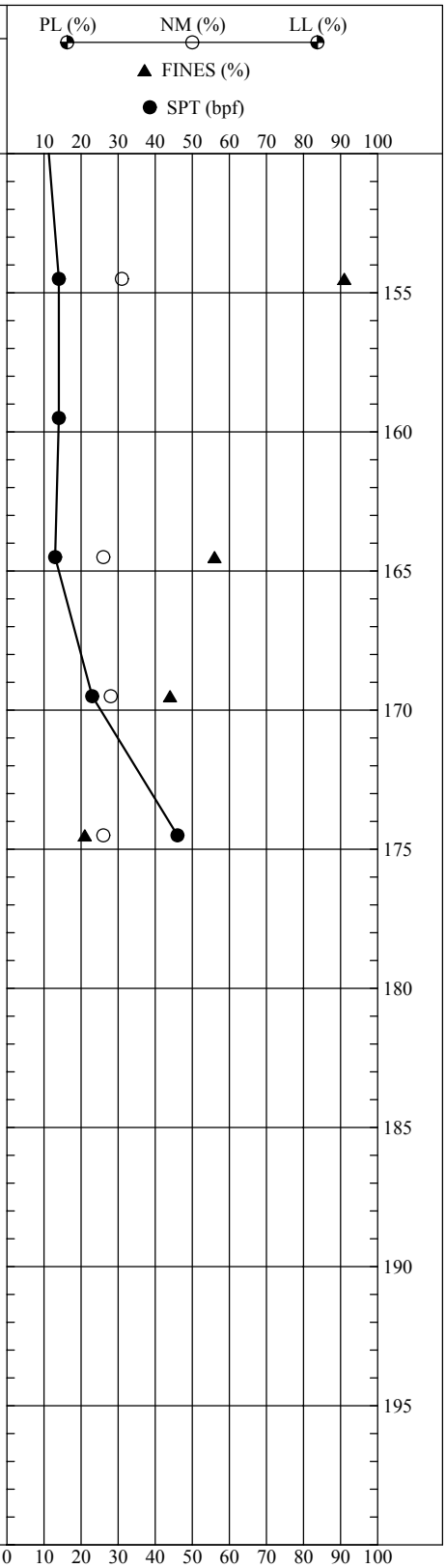
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-6
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 221218.7,757050.7
DRILLED: July 16, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
150	Very soft to stiff, brown to dark greenish gray, sandy CLAY (CL), (A-6) trace to little fine sand, wet.		-144			(N = 11)
155			-149	SPT-35		4-6-8 (N = 14)
160			-154	SPT-36		6-7-7 (N = 14)
165	Medium dense, brown, fine SAND (SP), (A-3) and silt, trace coarse sand, wet.		-159	SPT-37		5-5-8 (N = 13)
170			-164	SPT-38		6-8-15 (N = 23)
175	Boring Terminated at 175 feet bgs.		-169	SPT-39		14-24-22 (N = 46)
180			-174			
185			-179			
190			-184			
195			-189			
200			-194			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Boring offset ~ 30 feet NW due to traffic and utility
REMARKS:	issues. Piezometer installed ~ 45 feet east of boring immediately after completion.

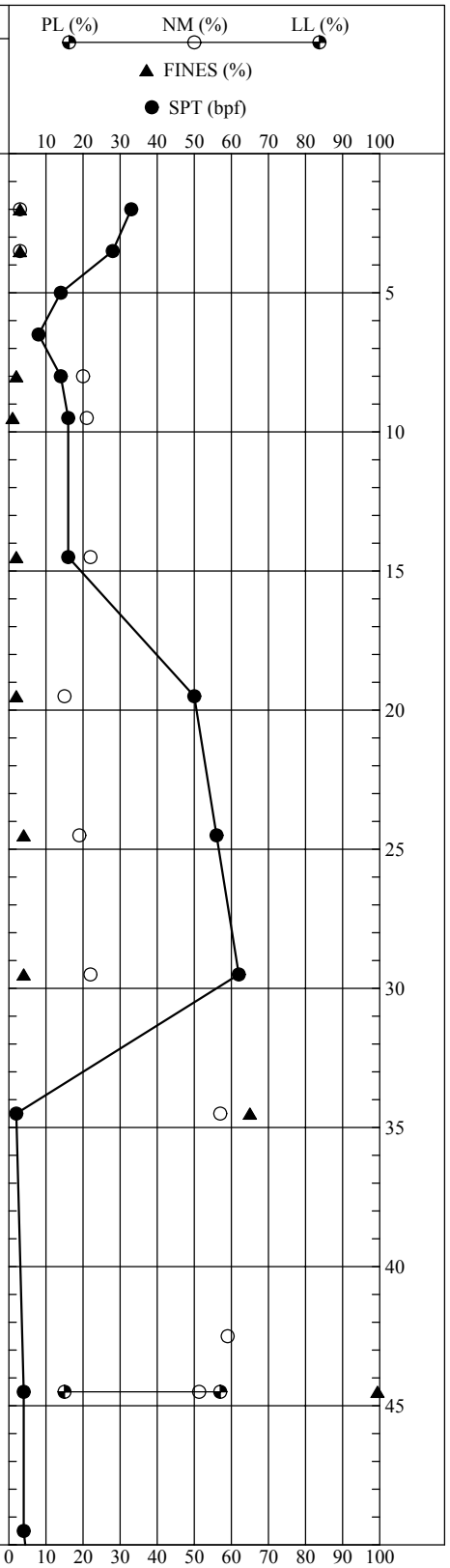
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-6
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 221218.7,757050.7
DRILLED: July 16, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Asphalt	6			
	Dense, light yellow, fine to medium SAND (SP), (A-1-b) dry.		SPT-1	X	11-15-18 (N = 33)
			SPT-2	X	15-14-14 (N = 28)
	Stiff, light gray, SILT (ML).				
5	Medium dense, light yellow, fine to medium SAND (SP).	1	SPT-3	X	9-7-7 (N = 14)
			SPT-4	X	2-3-5 (N = 8)
	Dark brown Peat (PT).				
	Loose, brown, fine to medium SAND (SP), some root fragments.		SPT-5	X	4-6-8 (N = 14)
	Medium dense to very dense, light tan to light gray, fine to medium SAND (SP), (A-3) wet.		SPT-6	X	7-7-9 (N = 16)
10		-4			
			SPT-7	X	7-8-8 (N = 16)
15		-9			
			SPT-8	X	15-20-30 (N = 50)
20	Lens of little medium to coarse gravel and trace shell fragments from 19.2 to 19.5 feet bgs.	-14			
			SPT-9	X	17-25-31 (N = 56)
25		-19			
			SPT-10	X	17-26-36 (N = 62)
30		-24			
	Soft, dark greenish gray, CLAY (CH), (A-7-6) weak to strong organic odor, little to some shell fragments.		UNDIST-3		
			SPT-11	X	0-0-2 (N = 2)
35		-29			
40		-34			
			UNDIST-4		
			SPT-12	X	0-0-4 (N = 4)
45		-39			
	Lens of sand, weaker organic odor, little shell fragments from 48.5 to 48.6 feet bgs.		SPT-13	X	0-0-4
50		-44			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Attempted to push UD-4 from 38.5 to 40.5 ft, but no
REMARKS:	recovery. Also no SPT sample from that interval. Peizometer installed ~ 5 feet north of boring immediately after completion. Boring offset ~35 feet East.

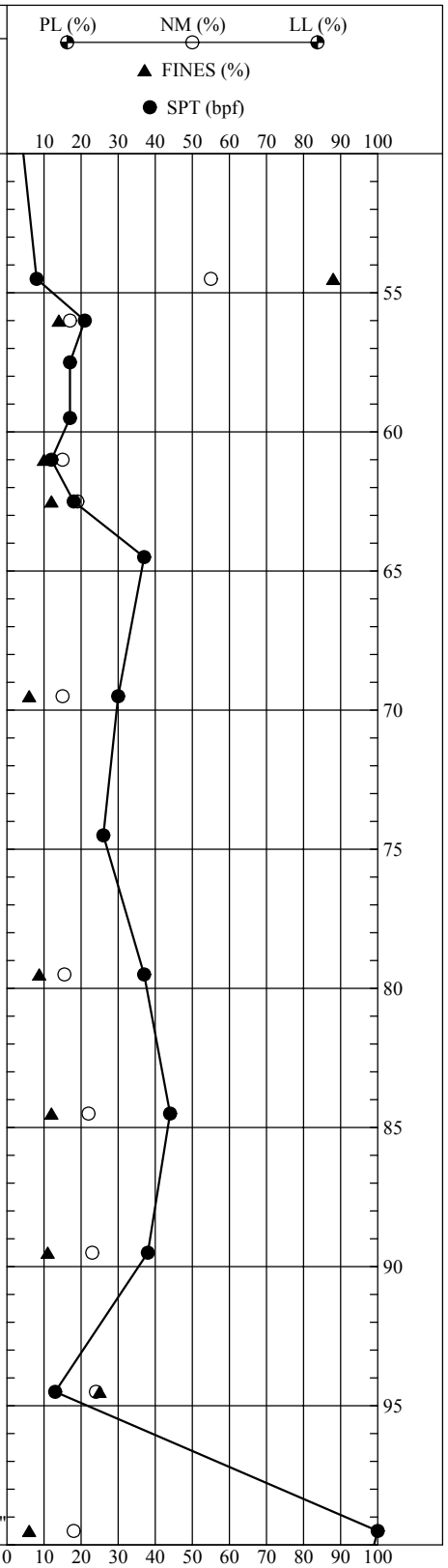
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-7
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222178.4,756953.6
DRILLED: July 16, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Soft, dark greenish gray, CLAY (CH), (A-7-6) weak to strong organic odor, little to some shell fragments.		-44			(N = 4)
				SPT-14		0-3-5 (N = 8)
55	Lens of dark brown, SILT (ML) and sand, with organics from 54.8 to 55 feet bgs.		-49	SPT-15		9-10-11 (N = 21)
	Firm to dense, light to dark gray, poorly graded fine to coarse SAND (SP-SM), (A-2) with silt, little medium to coarse gravel, trace shell fragments.			SPT-16		7-7-10 (N = 17)
				SPT-17		7-9-8 (N = 17)
60			-54	SPT-18		5-7-5 (N = 12)
				SPT-19		5-7-11 (N = 18)
				SPT-20		13-18-19 (N = 37)
65			-59			
				SPT-21		14-14-16 (N = 30)
70			-64			
				SPT-22		11-12-14 (N = 26)
75			-69			
				SPT-23		14-19-18 (N = 37)
80			-74			
	Dense, light gray, fine SAND (SP), wet. Lens of light tan CLAY (CL) from 83.7 to 83.9 feet bgs.			SPT-24		17-23-21 (N = 44)
85			-79			
	Lens of light tan CLAY (CL) from 89 to 89.5 feet bgs.			SPT-25		14-9-29 (N = 38)
90			-84			
	Lenses of light tan CLAY (CL) from 93.8 to 94.3 feet bgs.			SPT-26		4-6-7 (N = 13)
95			-89			
	Very dense, light gray, fine to medium SAND (SP), trace medium gravel, wet.			SPT-27		23-50/6"-50/6"
100			-94			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	
REMARKS:	Attempted to push UD-4 from 38.5 to 40.5 ft, but no recovery. Also no SPT sample from that interval. Peizometer installed ~ 5 feet north of boring immediately after completion. Boring offset ~35 feet East.

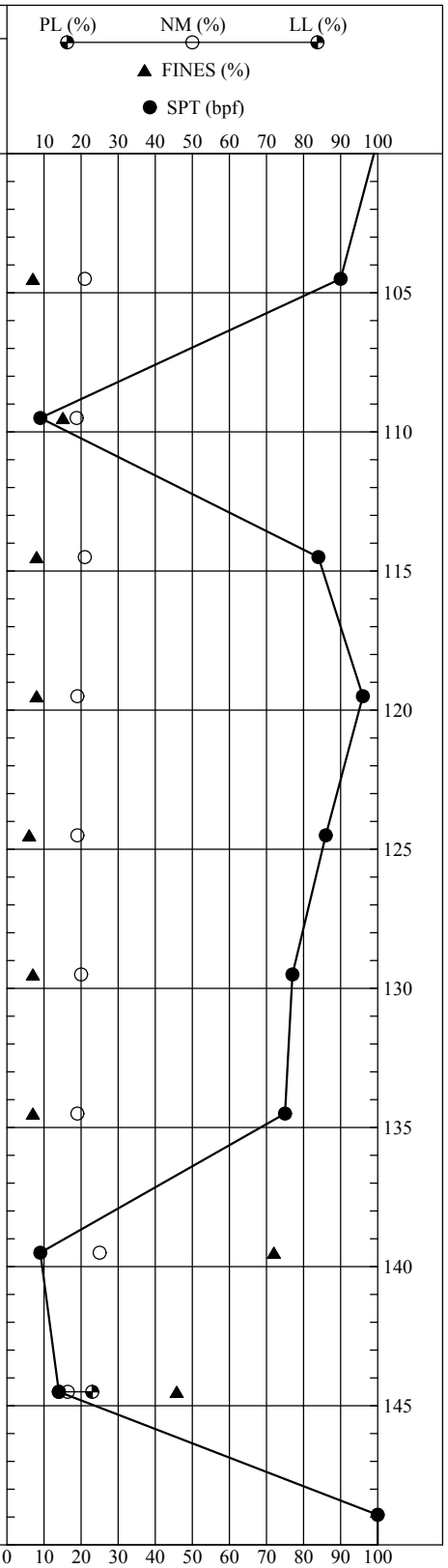
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-7
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222178.4,756953.6
DRILLED: July 16, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100	Firm to dense, light to dark gray, poorly graded fine to coarse SAND (SP-SM), (A-2) with silt, little medium to coarse gravel, trace shell fragments.		-94			
105			-99	SPT-28		34-44-46 (N = 90)
	Loose, light gray to yellowish brown, silty fine to medium SAND (SM), (A-3) trace medium gravel.					
110			-104	SPT-29		2-3-6 (N = 9)
	Very dense, light gray fine to medium SAND (SP), (A-3) trace medium gravel, trace silt and clay, occasional iron staining.					
115			-109	SPT-30		24-34-50 (N = 84)
120			-114	SPT-31		31-45-51 (N = 96)
125			-119	SPT-32		31-41-45 (N = 86)
130			-124	SPT-33		26-31-46 (N = 77)
135			-129	SPT-34		25-33-42 (N = 75)
	Stiff dark gray to yellowish brown, clayey sand (SC), (A-4) little fine to medium sand.					
140			-134	SPT-35		4-5-4 (N = 9)
145			-139	SPT-36		4-4-10 (N = 14)
	Very dense, dark gray, fine to medium SAND (SP), (A-2).					
150			-144	SPT-37		50/5"



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	
REMARKS:	Attempted to push UD-4 from 38.5 to 40.5 ft, but no recovery. Also no SPT sample from that interval. Peizometer installed ~ 5 feet north of boring immediately after completion. Boring offset ~35 feet East.

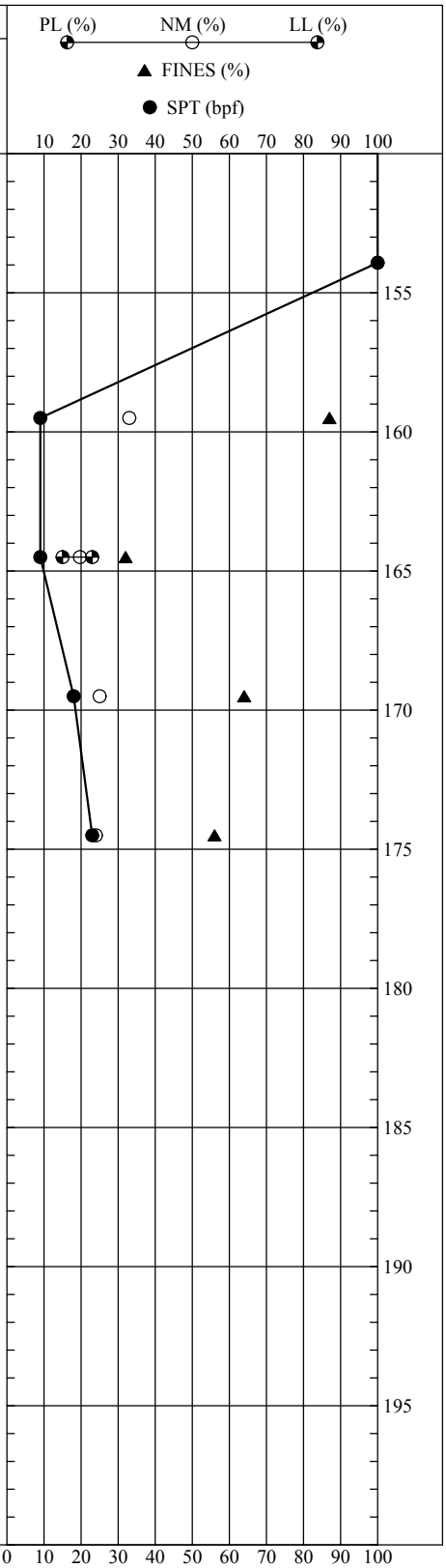
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-7
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222178.4,756953.6
DRILLED: July 16, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
150	Very dense, dark gray, fine to medium SAND (SP), (A-2).		-144			
				SPT-38		50/5"
155			-149			
	Stiff, dark grayish brown, clayey sand (SC), (A-2-4).					
				SPT-39		3-4-5 (N = 9)
160			-154			
				SPT-40		4-4-5 (N = 9)
165			-159			
				SPT-41		8-8-10 (N = 18)
170			-164			
				SPT-42		8-10-13 (N = 23)
175			-169			
	Boring terminated at 175 feet bgs.					
180			-174			
185			-179			
190			-184			
195			-189			
200			-194			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	
REMARKS:	Attempted to push UD-4 from 38.5 to 40.5 ft, but no recovery. Also no SPT sample from that interval. Peizometer installed ~ 5 feet north of boring immediately after completion. Boring offset ~35 feet East.

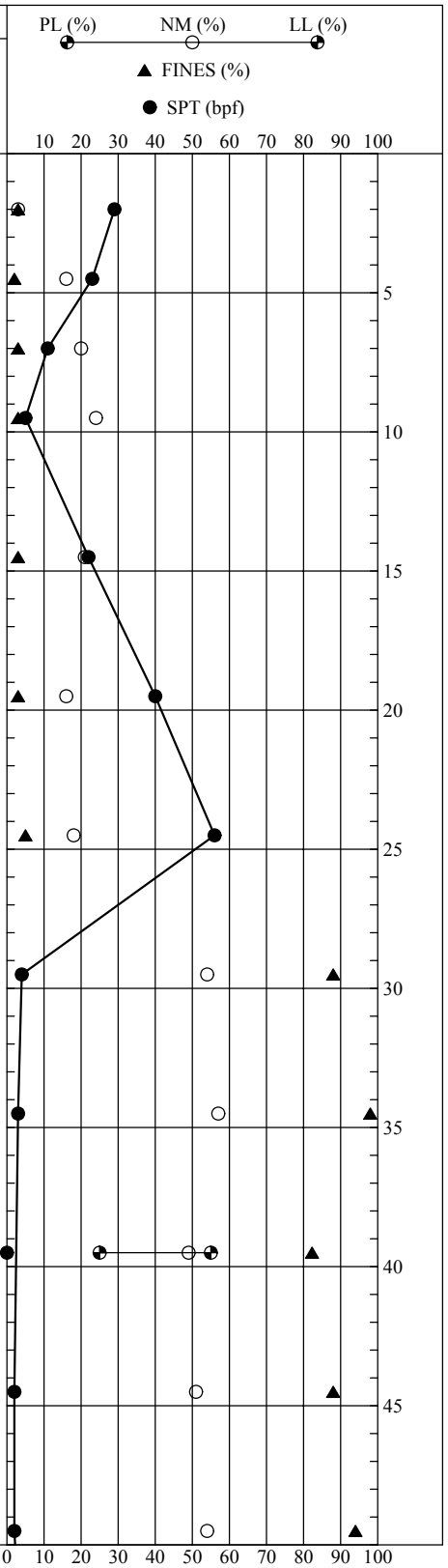
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-7
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222178.4,756953.6
DRILLED: July 16, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense tan fine to medium SAND (SP), (A-3) moist.		5	SPT-1	X	8-12-17 (N = 29)
				SPT-2	X	10-12-11 (N = 23)
5	Loose to very dense dark gray fine to medium SAND (SP), (A-3) trace silt, wet.		0	SPT-3	X	6-5-6 (N = 11)
				SPT-4	X	2-2-3 (N = 5)
10			-5			
				SPT-5	X	10-11-11 (N = 22)
15			-10			
	Little coarse sand at 18.5 feet bgs.			SPT-6	X	13-16-24 (N = 40)
20			-15			
				SPT-7	X	12-26-30 (N = 56)
25			-20			
	Very soft to soft dark grayish brown clay (CH), (A-7-5) with sand, organic odor, trace shell fragments.			SPT-8	X	9-2-2 (N = 4)
30			-25			
				SPT-9	X	2-1-2 (N = 3)
35			-30			
				SPT-10	X	WOH
40			-35			
				SPT-11	X	0-0-2 (N = 2)
45			-40			
				SPT-12	X	0-0-2
50			-45			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER: MACTEC-Raleigh
EQUIPMENT: Diedrich D-50
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY:
REMARKS:

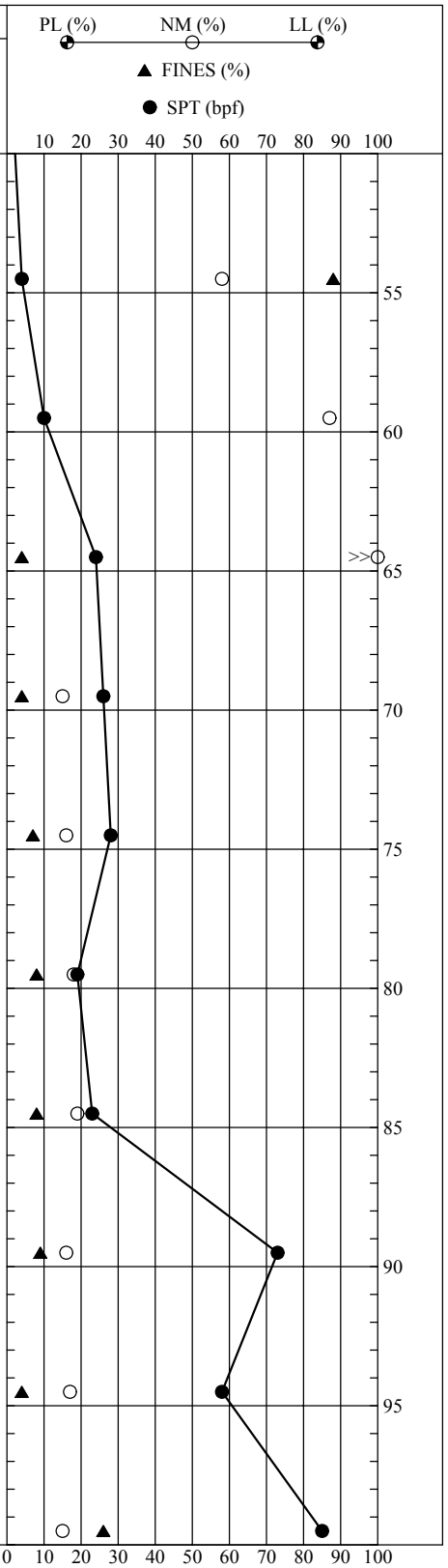
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-8
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222500.1,756900.4
DRILLED: July 2, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	ELEV (ft)	IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Very soft to soft dark grayish brown clay (CH), (A-7-5) with sand, organic odor, trace shell fragments.	-45			(N = 2)
55		-50	SPT-13	X	1-2-2 (N = 4)
	Lens of stiff dark brown to black organic silt (OL), very strong organic odor.				
60	Interbedded sand, and organic silt and clay from 59.4 to 59.9 feet bgs. Medium dense dark gray fine to medium SAND (SP), (A-1-b) wet.	-55	SPT-14	X	3-5-5 (N = 10)
65	Medium dense light gray fine to medium SAND (SP), (A-1-b) with little gravel, wet.	-60	SPT-15	X	8-12-12 (N = 24)
70		-65	SPT-16	X	7-11-15 (N = 26)
75		-70	SPT-17	X	14-12-16 (N = 28)
80		-75	SPT-18	X	10-9-10 (N = 19)
85	Medium dense to very dense light tan fine to medium SAND (SP), (A-1-b) wet.	-80	SPT-19	X	12-10-13 (N = 23)
90		-85	SPT-20	X	20-33-40 (N = 73)
95	Trace coarse sand at 93.5 feet bgs.	-90	SPT-21	X	22-28-30 (N = 58)
100	Boring terminated at 100.0 feet bgs.	-95	SPT-22	X	32-38-47



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER: MACTEC-Raleigh
EQUIPMENT: Diedrich D-50
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY:
REMARKS:

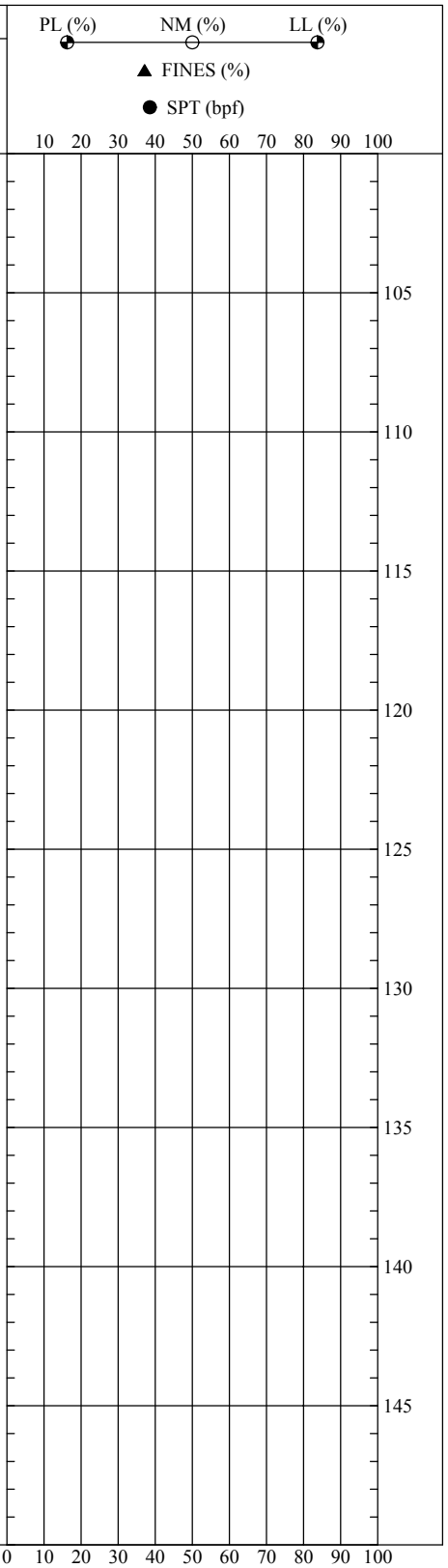
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-8
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222500.1,756900.4
DRILLED: July 2, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
100			-95			(N = 85)
105			-100			
110			-105			
115			-110			
120			-115			
125			-120			
130			-125			
135			-130			
140			-135			
145			-140			
150			-145			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER: MACTEC-Raleigh
EQUIPMENT: Diedrich D-50
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY:
REMARKS:

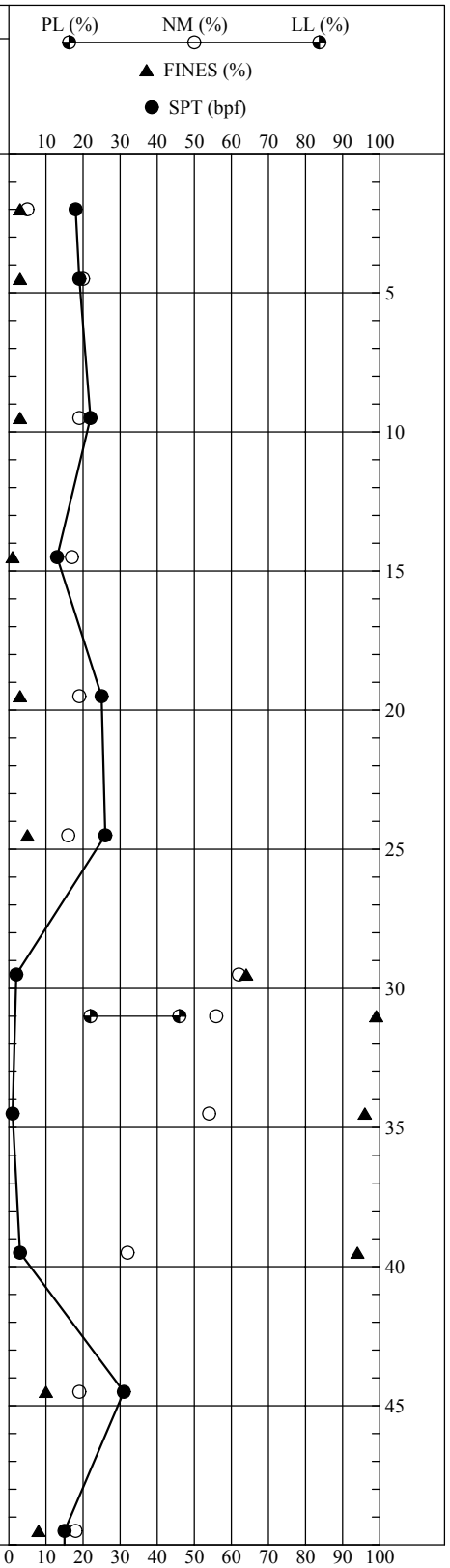
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-8
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222500.1,756900.4
DRILLED: July 2, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense, tan, fine to medium SAND (SP), (A-3) trace coarse sand, moist.		5	SPT-1		5-8-10 (N = 18)
	Indicated water level from 24 hour reading. Trace root fragments and wet at 3.5 feet below ground surface (bgs).			SPT-2		5-8-11 (N = 19)
5			0			
	Sand changes to gray in color at 8.5 feet bgs.			SPT-3		7-11-11 (N = 22)
10			-5			
				SPT-4		4-6-7 (N = 13)
15			-10			
				SPT-5		9-11-14 (N = 25)
20			-15			
	Trace gravel and shell fragments at 23.5 feet bgs.			SPT-6		13-13-13 (N = 26)
25			-20			
	Soft to very soft, dark gray, CLAY (CH), (A-7-5) trace shell fragments, wet.			SPT-7		1-1-1 (N = 2)
30			-25	UD-1		
				SPT-8		0-0-1 (N = 1)
35			-30			
				SPT-9		2-1-2 (N = 3)
40	Soft, dark gray, CLAY (CL), (A-7-5) some sand, wet.		-35	SH-2		
	Medium dense to very dense, light gray, fine to medium SAND (SP), (A-1-b) wet.			SPT-10		7-14-17 (N = 31)
45			-40			
	Tan color from 47 to 57 feet bgs.			SPT-11		9-8-7
50			-45			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER: MACTEC-Raleigh
EQUIPMENT: Diedrich D-50
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY:
REMARKS:

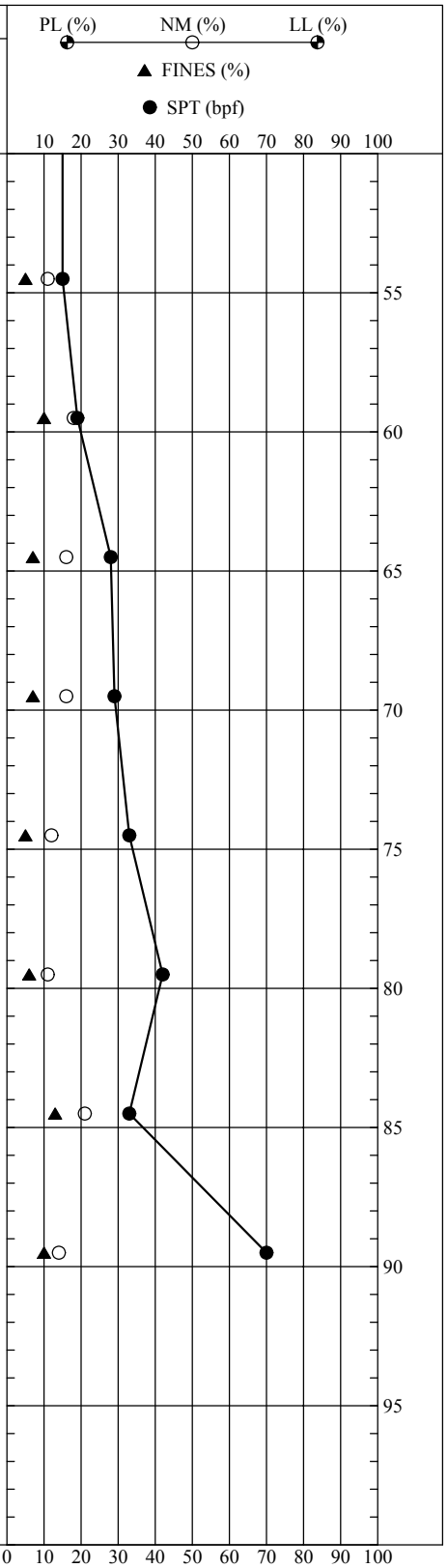
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-9
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222755.1,756859.4
DRILLED: June 30, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Medium dense to very dense, light gray, fine to medium SAND (SP), (A-1-b) wet.		-45			(N = 15)
55			-50	SPT-12		7-5-10 (N = 15)
	Light green color from 57 to 72 feet bgs.					
60			-55	SPT-13		12-10-9 (N = 19)
	Trace gravel and little coarse sand at 63.5 feet bgs.					
65			-60	SPT-14		17-14-14 (N = 28)
70			-65	SPT-15		12-14-15 (N = 29)
	Some coarse sand at 72 feet bgs.					
75			-70	SPT-16		17-16-17 (N = 33)
80			-75	SPT-17		19-18-24 (N = 42)
85			-80	SPT-18		23-17-16 (N = 33)
90	Boring Terminated at 90.0 feet bgs.		-85	SPT-19		18-30-40 (N = 70)
95			-90			
100			-95			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER: MACTEC-Raleigh
EQUIPMENT: Diedrich D-50
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY:
REMARKS:

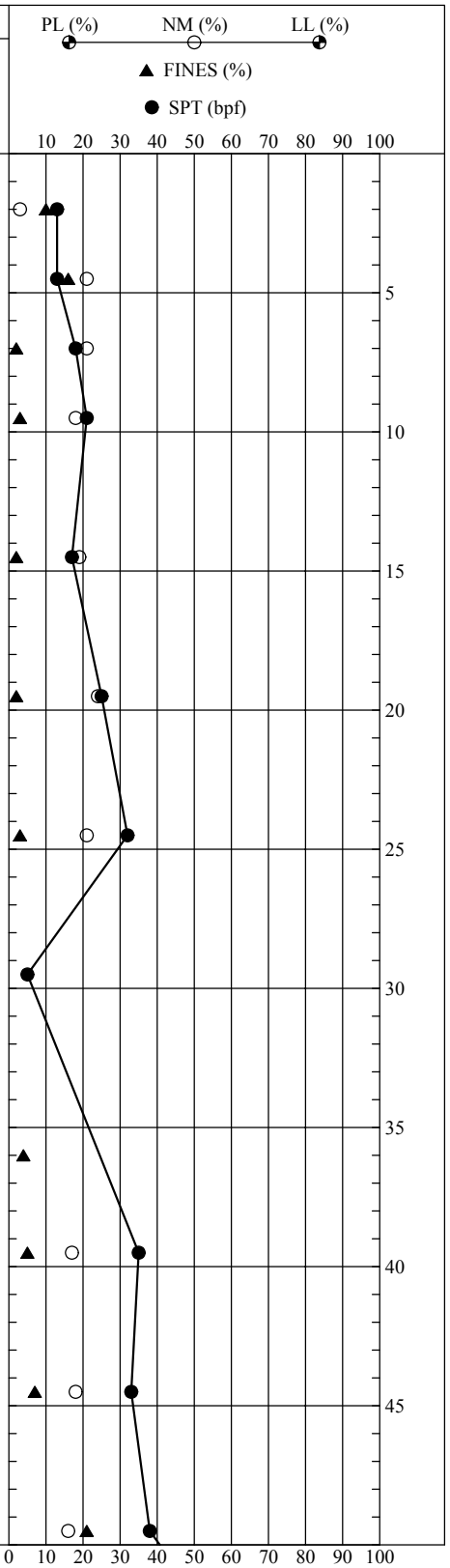
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-9
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 222755.1,756859.4
DRILLED: June 30, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense light tan to light to dark gray, fine to medium SAND (SP), (A-3) moist to wet.		4	SPT-1	X	3-5-8 (N = 13)
	Lens of dark gray, clay, trace organics at 3.5 to 4.0 feet bgs.			SPT-2	X	2-5-8 (N = 13)
5			-1	SPT-3	X	7-7-11 (N = 18)
	Trace medium gravel at 7.5 to 15 feet bgs.			SPT-4	X	9-9-12 (N = 21)
10			-6			
				SPT-5	X	7-8-9 (N = 17)
15			-11			
				SPT-6	X	8-10-15 (N = 25)
20			-16			
				SPT-7	X	11-14-18 (N = 32)
25			-21			
	Sandy clay lens at 29-29.5 feet.			SPT-8	X	7-2-3 (N = 5)
30	Medium stiff, dark gray CLAY (CH).		-26			
	PMT-6 at 34 feet bgs					
35			-31	UD-12		
	Dense, light gray to tan, fine to medium SAND (SP), (A-3) and silt, wet.					
				SPT-9	X	7-14-21 (N = 35)
40			-36			
				SPT-10	X	9-16-17 (N = 33)
45			-41			
				SPT-11	X	8-17-21
50			-46			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER: MACTEC-Raleigh
EQUIPMENT: Diedrich D-50
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY:
REMARKS:

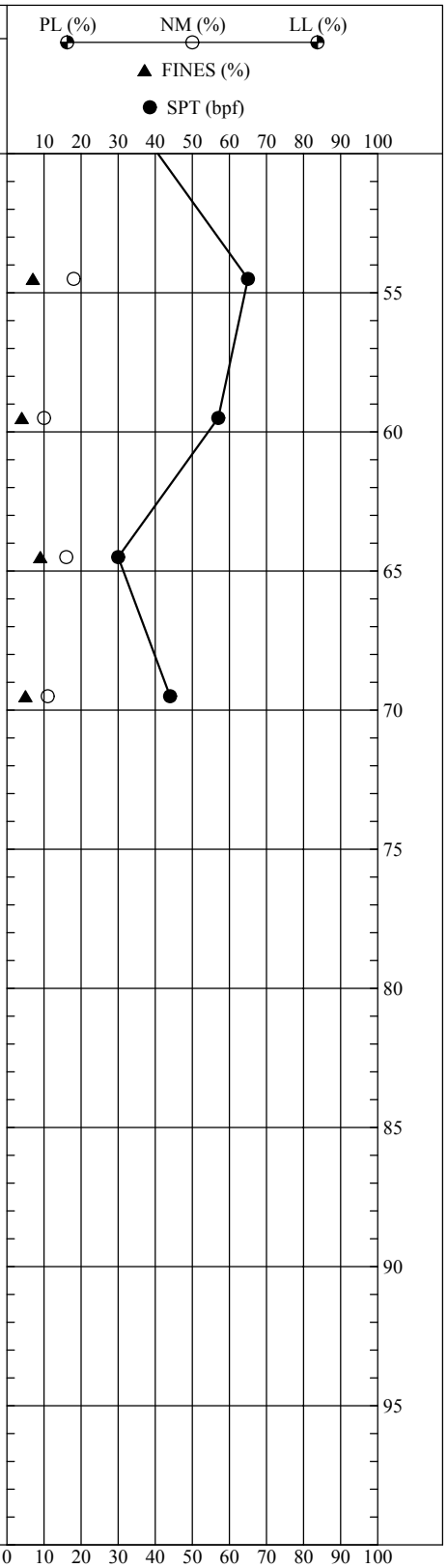
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-10
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 223030.3,756807.2
DRILLED: July 20, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Dense, light gray to tan, fine to medium SAND (SP), (A-3) and silt, wet.		-46			(N = 38)
55			-51	SPT-12		15-27-38 (N = 65)
60	Dense, light gray to tan, fine to coarse SAND (SP), (A-1-a) and silt, little medium to coarse gravel, wet.		-56	SPT-13		27-37-20 (N = 57)
65	Trace medium gravel at 63.5 to 65.0 feet bgs.		-61	SPT-14		13-13-17 (N = 30)
70			-66	SPT-15		17-20-24 (N = 44)
75	Boring terminated at 70 feet bgs.		-71			
80			-76			
85			-81			
90			-86			
95			-91			
100			-96			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER: MACTEC-Raleigh
EQUIPMENT: Diedrich D-50
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY:
REMARKS:

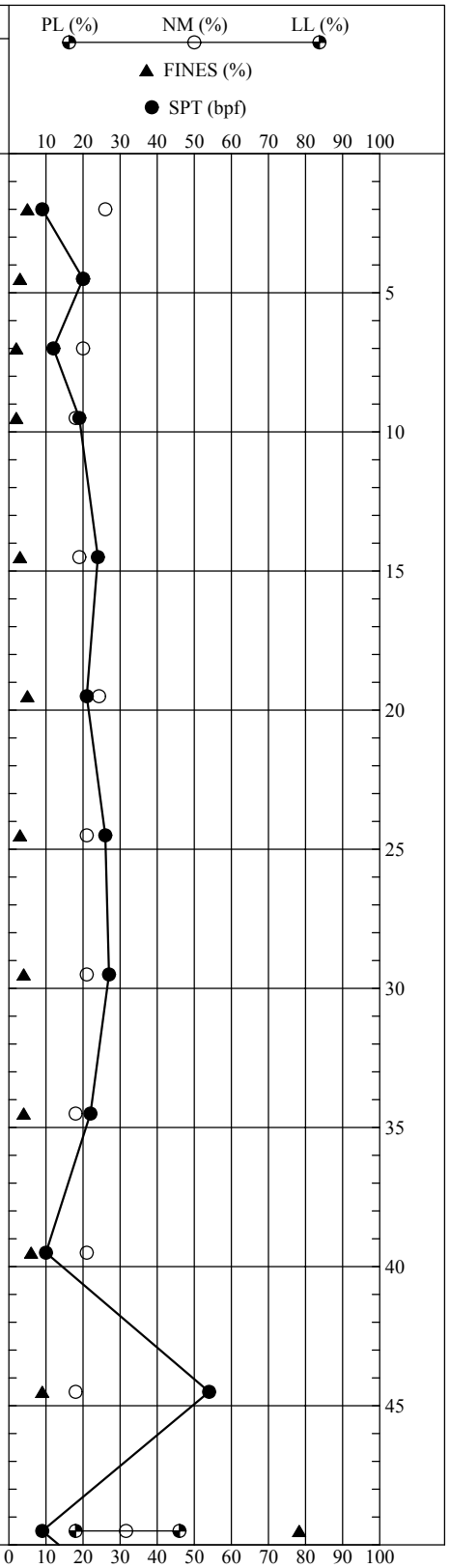
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-10
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 223030.3,756807.2
DRILLED: July 20, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.)	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Loose to medium dense light gray poorly graded fine to medium sand (SP), (A-3) wet	3	SPT-1	X	4-5-4 (N = 9)
5		-2	SPT-2	X	5-9-11 (N = 20)
			SPT-3	X	8-5-7 (N = 12)
10	Trace coarse sand and shell fragments at 8.5 feet bgs.	-7	SPT-4	X	7-9-10 (N = 19)
15		-12	SPT-5	X	7-12-12 (N = 24)
20	Trace wood fragments at 18.5 feet bgs.	-17	SPT-6	X	9-11-10 (N = 21)
25		-22	SPT-7	X	11-12-14 (N = 26)
30		-27	SPT-8	X	10-12-15 (N = 27)
35	Trace medium gravel at 33.5 feet bgs.	-32	SPT-9	X	9-10-12 (N = 22)
40	Trace shell fragments at 38.5 feet bgs. Artesian pressures noticed approximately between 40 and 45 feet bgs.	-37	SPT-10	X	5-4-6 (N = 10)
45		-42	SPT-11	X	13-27-27 (N = 54)
50	Stiff reddish gray clay (CL), (A-7-5) with sand.	-47	SPT-12	X	5-4-5



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Boring was offset ~ 40 feet south as original location is in
REMARKS:	roadway. Piezometer installed in hole after drilling completed.

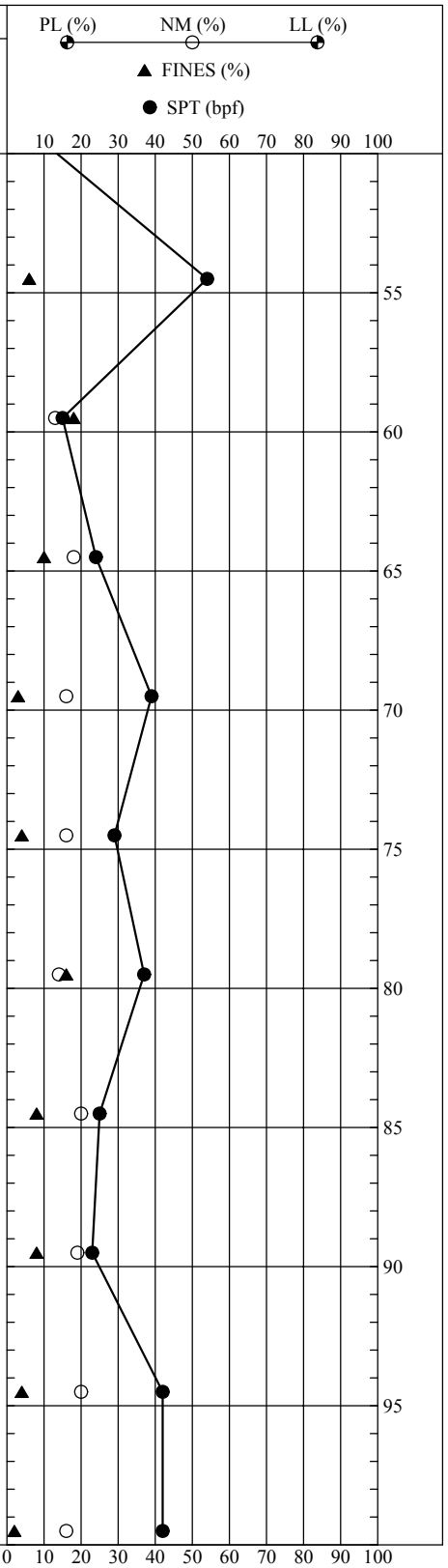
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-11
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 223228.3,756786.5
DRILLED: July 8, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Iron staining in clay at 49.5 feet bgs. Stiff reddish gray clay (CL), (A-7-5) with sand.		-47			(N = 9)
	Medium dense to very dense light gray fine to medium sand (SP), (A-1-b) wet					
55	Some coarse gravel at 54.8 feet bgs.		-52	SPT-13		4-17-37 (N = 54)
60	Little silt at 58.5 feet bgs		-57	SPT-14		7-5-10 (N = 15)
65	Little coarse sand and medium to coarse gravel at 63.5 feet bgs.		-62	SPT-15		3-8-16 (N = 24)
70	Medium to coarse sand (SP) from 68.5 to 83.5 feet bgs.		-67	SPT-16		15-18-21 (N = 39)
75	Little medium gravel at 73.5.		-72	SPT-17		13-13-16 (N = 29)
80			-77	SPT-18		9-14-23 (N = 37)
85			-82	SPT-19		9-11-14 (N = 25)
90	Trace medium gravel at 88.5 feet bgs.		-87	SPT-20		6-10-13 (N = 23)
95			-92	SPT-21		11-21-21 (N = 42)
100			-97	SPT-22		13-20-22



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Boring was offset ~ 40 feet south as original location is in
REMARKS:	roadway. Piezometer installed in hole after drilling completed.

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-11
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 223228.3,756786.5
DRILLED: July 8, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
100	Yellowish orange coloring at 99.75 feet bgs.		-97			(N = 42)	
	Boring terminated at 100.0 feet bgs.						
105			-102				105
110			-107				110
115			-112				115
120			-117				120
125			-122				125
130			-127				130
135			-132				135
140			-137				140
145			-142				145
150			-147				0 10 20 30 40 50 60 70 80 90 100

SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER:	MACTEC-Raleigh
EQUIPMENT:	Diedrich D-50
METHOD:	Mud Rotary
HOLE DIA.:	3"
LOGGED BY:	AJA
CHECKED BY:	Boring was offset ~ 40 feet south as original location is in
REMARKS:	roadway. Piezometer installed in hole after drilling completed.

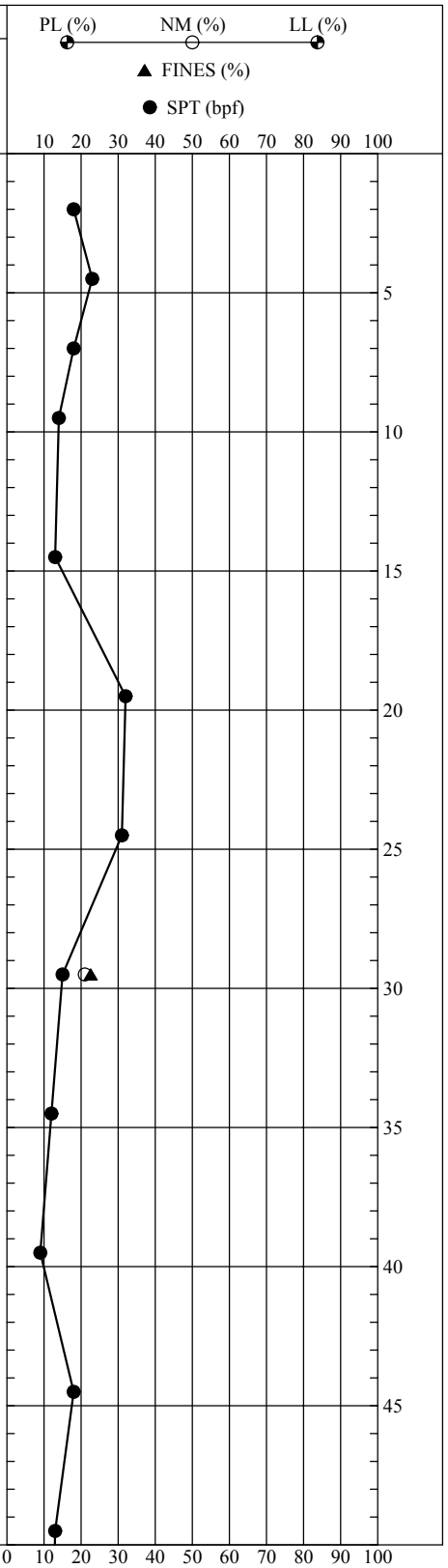
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

BORING NO.: BI-11
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 223228.3,756786.5
DRILLED: July 8, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Medium dense, tan to light gray, fine to medium SAND (SP), (A-2) trace medium to coarse gravel, moist to wet.		3			
				SPT-1		7-8-10 (N = 18)
5			-2	SPT-2		9-10-13 (N = 23)
				SPT-3		4-7-11 (N = 18)
10			-7	SPT-4		5-6-8 (N = 14)
15			-12	SPT-5		5-6-7 (N = 13)
20			-17	SPT-6		11-15-17 (N = 32)
25			-22	SPT-7		10-14-17 (N = 31)
30	Medium dense, grayish brown, silty fine to coarse SAND (SM), (A-2) trace medium to fine gravel.		-27	SPT-8		4-5-10 (N = 15)
35			-32	SPT-9		4-4-8 (N = 12)
40	Lens of black peat at 38.9 to 39.0 feet bgs. Loose to medium dense, orange-brown to dark gray, fine to medium SAND (SP), (A-2) wet.		-37	SPT-10		0-3-6 (N = 9)
45			-42	SPT-11		5-9-9 (N = 18)
50			-47	SPT-12		11-9-4



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER: MACTEC-Raleigh
EQUIPMENT: Diedrich D-50
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY:
REMARKS:

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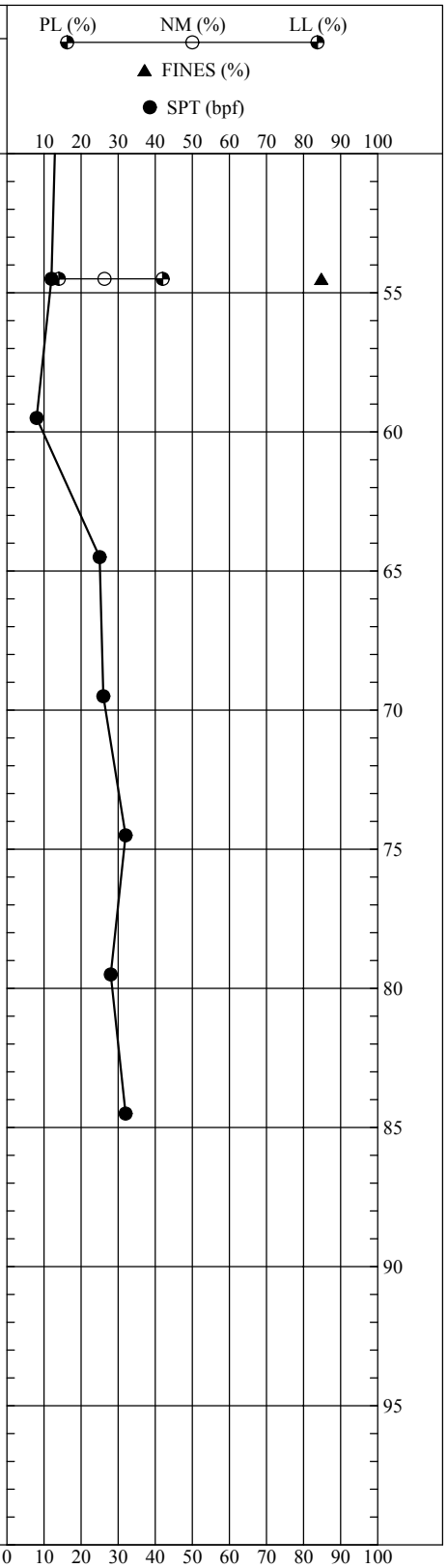
SOIL TEST BORING RECORD

BORING NO.: BI-12
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 223554,756715.4
DRILLED: July 25, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
50	Loose to medium dense, orange-brown to dark gray, fine to medium SAND (SP), (A-2) wet.		-47			(N = 13)
	Stiff, dark grayish brown, CLAY (CL), (A-7-5) with sand.			SPT-13		4-5-7 (N = 12)
55			-52			
	Medium stiff, dark gray to brown SILT (ML), (A-4) and sand, wet.			SPT-14		4-4-4 (N = 8)
60			-57			
	Medium dense, light gray, fine to medium SAND (SP), (A-2) trace silt and clay, wet.			SPT-15		16-13-12 (N = 25)
65			-62			
				SPT-16		11-13-13 (N = 26)
70			-67			
				SPT-17		12-13-19 (N = 32)
75			-72			
				SPT-18		13-13-15 (N = 28)
80			-77			
				SPT-19		15-15-17 (N = 32)
85	Boring terminated at 85 feet bgs.		-82			
90			-87			
95			-92			
100			-97			



SOIL TEST BORING INDIAN RIVER.GPJ LAW_GIBB.GDT 9/29/03

DRILLER: MACTEC-Raleigh
EQUIPMENT: Diedrich D-50
METHOD: Mud Rotary
HOLE DIA.: 3"
LOGGED BY: AJA
CHECKED BY:
REMARKS:

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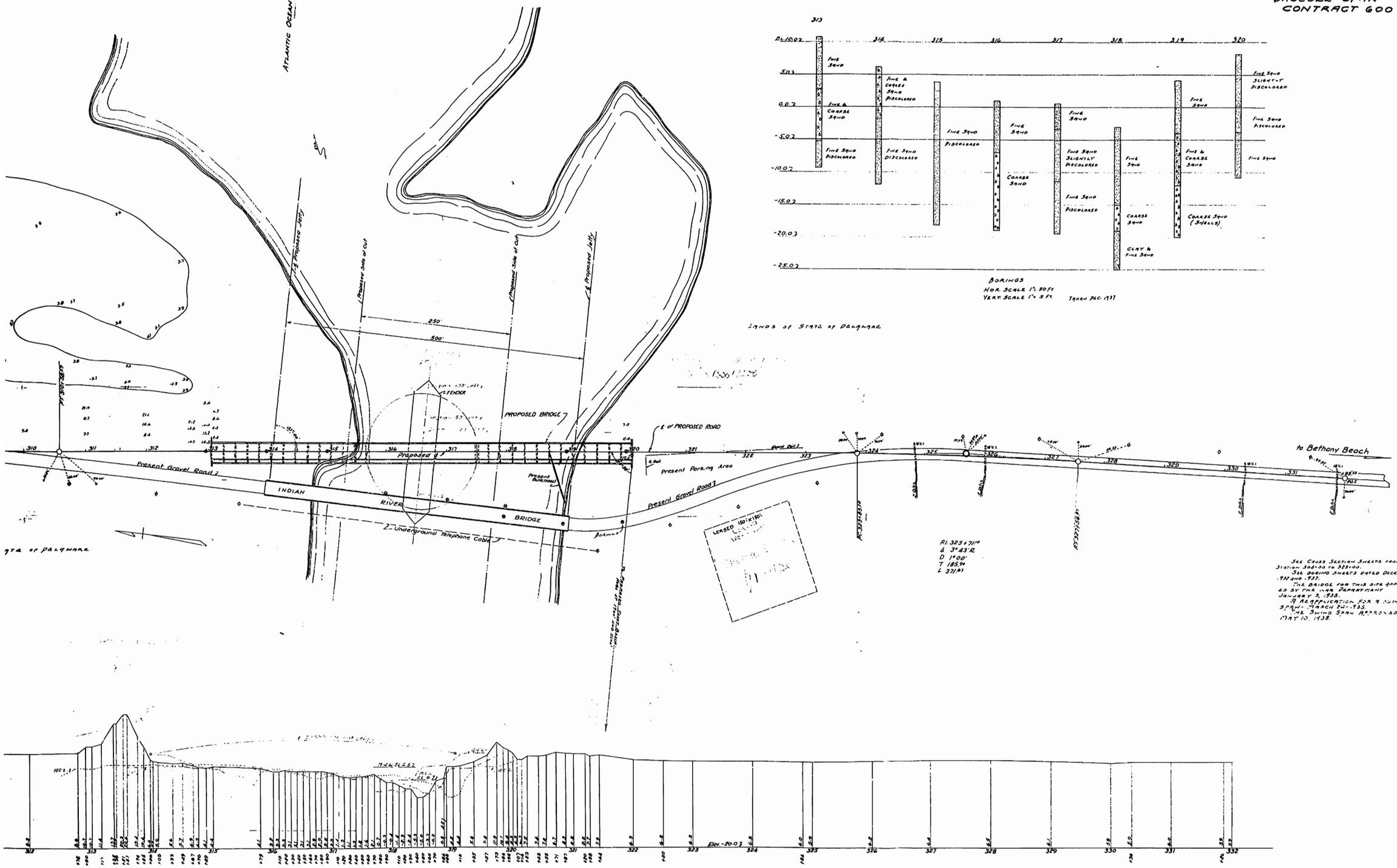
SOIL TEST BORING RECORD

BORING NO.: BI-12
PROJECT: Indian River Inlet Bridge
NORTHING/EASTING: 223554,756715.4
DRILLED: July 25, 2003
PROJECT NO.: 3530-03-1245.01

MACTEC

INDIAN RIVER INLET
BASCULE SPAN
CONTRACT 600

Bridge Built in 1938



INDIAN RIVER INLET

CONTRACT 600
HIGHWAY DEPARTMENT

COUNTY	CONTRACT	F.P.A. DIV. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
SUSSEX	1880-3	2	DEL.	F-113 (7)		1	9

INDIAN RIVER INLET
BRIDGE APPROACHES - FILL

THE STATE OF DELAWARE

As Built Plans 3-25-77

STATE HIGHWAY DEPARTMENT

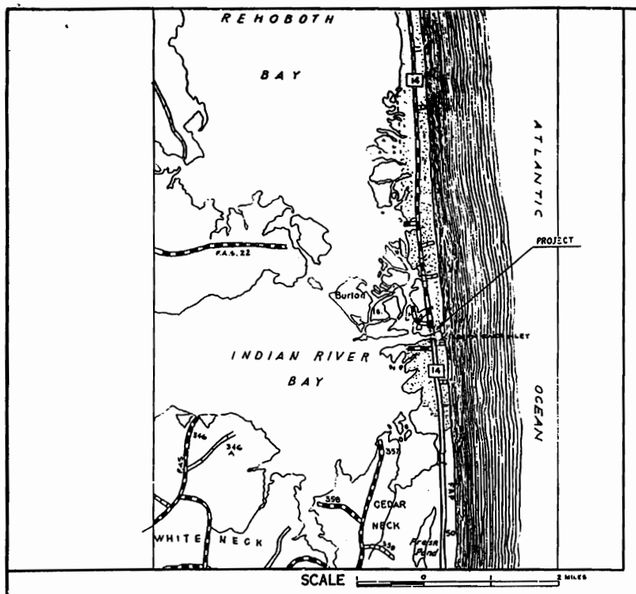
PLAN
FOR
CONSTRUCTION OF CONTRACT № 1880-3

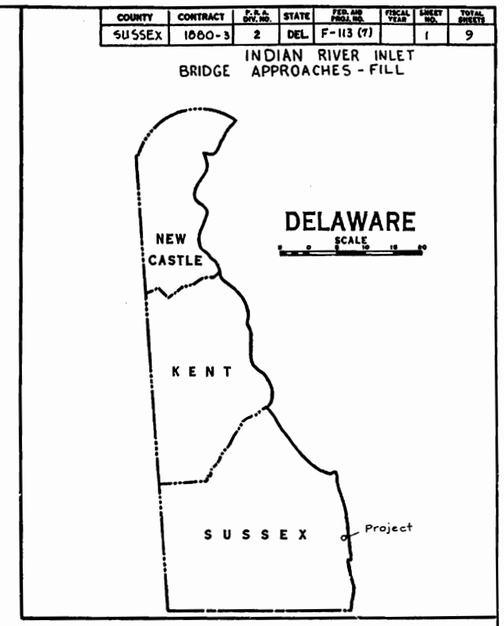
STA. 264+00 / 263+74.50 **TO STA.** 274+59.50 / 292+00

1,885.00 **FEET:** 0.357 **MILES**

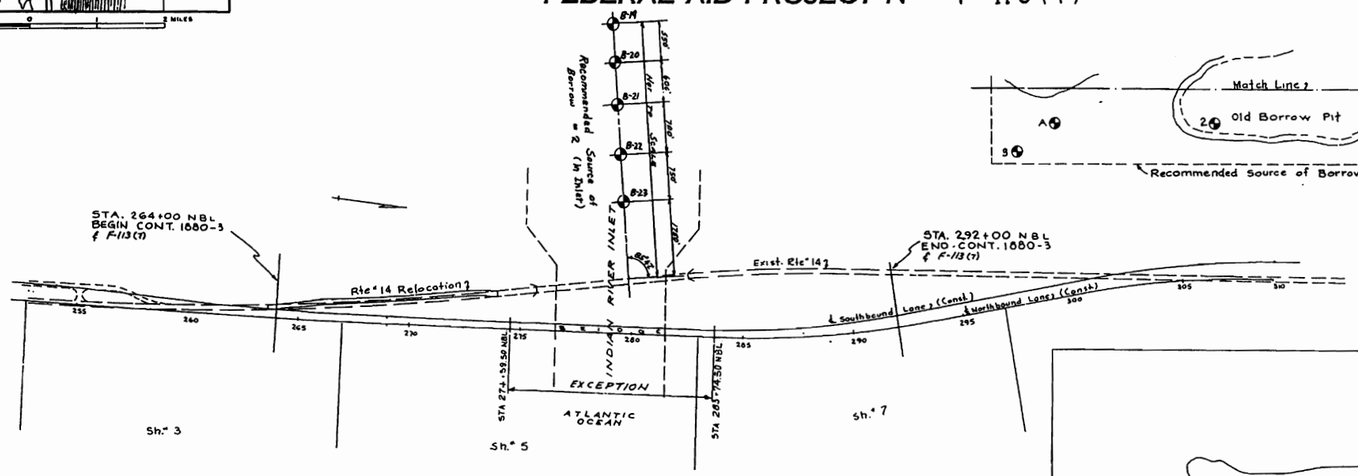
SCALE: PLAN: 1 IN. = 50 FT.
PROFILE: HOR. 1 IN. = 50 FT.
VERT. 1 IN. = 10 FT.

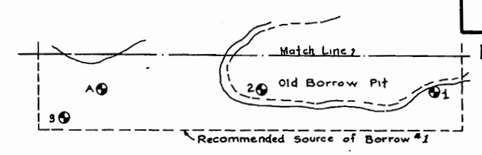
FEDERAL AID PROJECT № F-113 (7)

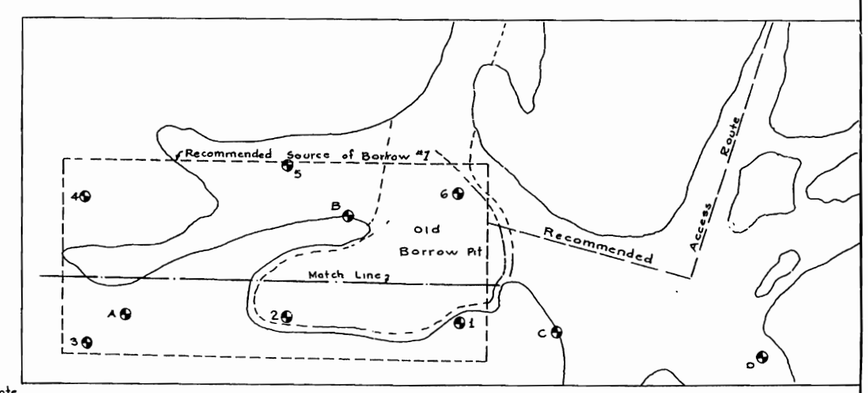




BOOK NUMBER 3591 - 3592 - 3881 - 4138 - L.L.







BORING DATA - SOURCE #2

B-19		B-20		B-21		B-22		B-23	
4'-24'	F	6'-27'	F	6'-30'	F	11'-30'	F	12'-31'	F
24'-38'	O	27'-29'	O	30'-32'	O	30'-32'	O	31'-33'	O

SYMBOLS
F - Fine Sand
O - Organic Clay

BORING DATA - SOURCE #1

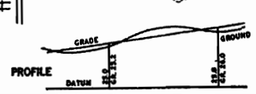
A		B		C		D		1		2		3		4		5		6	
3'-6'	M	2'-4'	FM	2½'-4½'	M	4½'-6½'	FM	5'-6½'	CM	4½'-6½'	FM	5'-6½'	FM	4'-6'	FM	4'-6½'	FM	4½'-6½'	FM
8'-9'	MC	7'-8'	MC	4½'-8½'	CM	8½'-10½'	CM	10½'-12½'	MF	9½'-12'	M	11'-12½'	MC	11½'-15'	C	11'-12'	C	10'-12½'	MC
11'-15'	MC	10½'-12½'	CM	10'-12'	FM	12½'-13½'	FM	12'-15½'	M	12½'-15½'	M	16'-17'	MF	17½'-18½'	CM	17'-18½'	CF	15½'-16'	F
14'-14½'	MF	15'-18'	C	14'-15'	M	15'-20'	M	23'-24½'	C			17'-18'	FM	22'-29'	F	23'-24½'	FM	16'-17'	MF
17'-18'	M	18'-20'	CM	15'-16'	FM							21½'-24½'	FM					17'-18'	FM
18'-20'	MC			17½'-20½'	FM													18'-18½'	C

SYMBOLS
C - Coarse Sand
M - Medium Sand
F - Fine Sand
O - Organic Clay

NOTES
Where both Symbols are used Sand of both nature exists, with that of the first symbol being predominate

CONVENTIONAL SIGNS

COUNTY LINE
CITY OR TOWN LINE
RIGHT OF WAY LINE
CENTRE LINE, PROPOSED ROAD (240)
MACADAM, TRAVELLED ROAD
TROLLEY OR RAILROAD
WIRE FENCE
PRESENT CULVERT
PROPOSED CULVERT
TELEGRAPH POLE
TREE



UTILITIES
Delaware Light + Power Co. ∅" DP+L
Diamond State Telephone Co. ∅" D.S.T.
United States Coast Guard ∅" U.S.C.G.

INDEX OF SHEETS

SHEET № 1 TITLE SHEET
2-3 TYPICAL SECTION
4-9 PLAN AND PROFILE
~~BRIDGES~~
9 QUANTITIES
~~STANDARDS~~

RECOMMENDED 3-26 1963 — Chief Planning and Design Div.
RECOMMENDED 3/26 1963 — Assistant Chief Engineer
APPROVED 3-26 1963 — Chief Engineer
APPROVED 3-26 1963 — Director of Operations

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

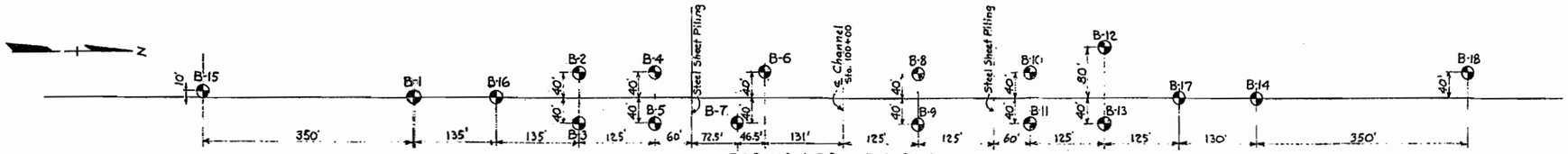
APPROVED:

DIVISION ENGINEER DATE

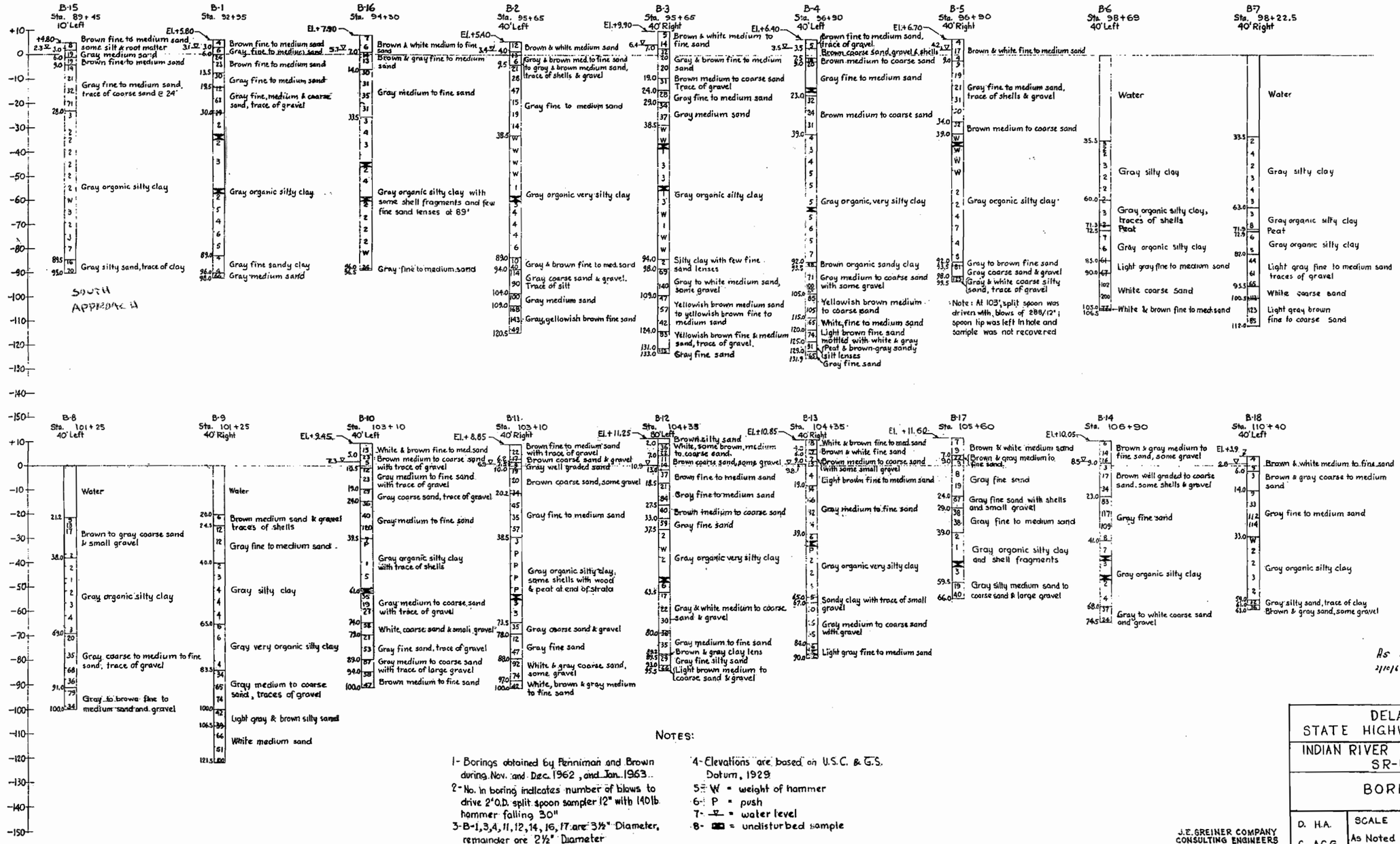
"Imperial" 230 W. B. & B.

COUNTY	CONTRACT	F.R.A. INV. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
SUSSEX	1880	2	DEL.	F-113(6)	...	14	14

INDIAN RIVER INLET BRIDGE



BORING LOCATION PLAN
1" = 100'



NOTES:

1- Borings obtained by Penniman and Brown during Nov. and Dec. 1962, and Jan. 1963.
2- No. in boring indicates number of blows to drive 2" O.D. split spoon sampler 12" with 140 lb. hammer falling 30"
3- B-1, 3, 4, 11, 12, 14, 16, 17 are 3½" Diameter, remainder are 2½" Diameter
4- Elevations are based on U.S.C. & G.S. Datum, 1929
5- W = weight of hammer
6- P = push
7- ▽ = water level
8- ▭ = undisturbed sample

As Built Plan
2/10/65 R.K.P.

J.E. GREINER COMPANY
CONSULTING ENGINEERS
BALTIMORE, MARYLAND

DELAWARE
STATE HIGHWAY DEPARTMENT

INDIAN RIVER INLET BRIDGE
SR-14

BORINGS

D. H.A.	SCALE	APPROVED BY:
C. A.C.G.	As Noted	J. M. Fox BRIDGE ENGINEER

D C B A 1 5 10 A B C D

me: Cd 015.CAL

STATIC CONE PENETROMETER TEST

The cone penetration test (CPT) measures the resistance of a 60° apex cone forced into the ground. Static cone soundings are the most widely used tool for subsurface exploration throughout the world. Theoretical and correlative methods for CPT data provide information on soil bearing capacity, shear strength, density, and compressibility.

The primary measurement is the cone point resistance (q_c). A standard drill rig is used to hydraulically push the cone and rods according to ASTM D 3441 specifications. In addition, a friction sleeve measurement (f_s) is often obtained to provide supplementary data. The calculated friction ratio ($FR = f_s/q_c$) may be used to estimate the soil type. Mechanical and electrical equipment are available which provide relatively continuous profiles of subsurface data at the sounding locations.

CONETEC

MACTEC

Site:CII-01
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:02:03 08:51

Max. Depth: 71.52 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

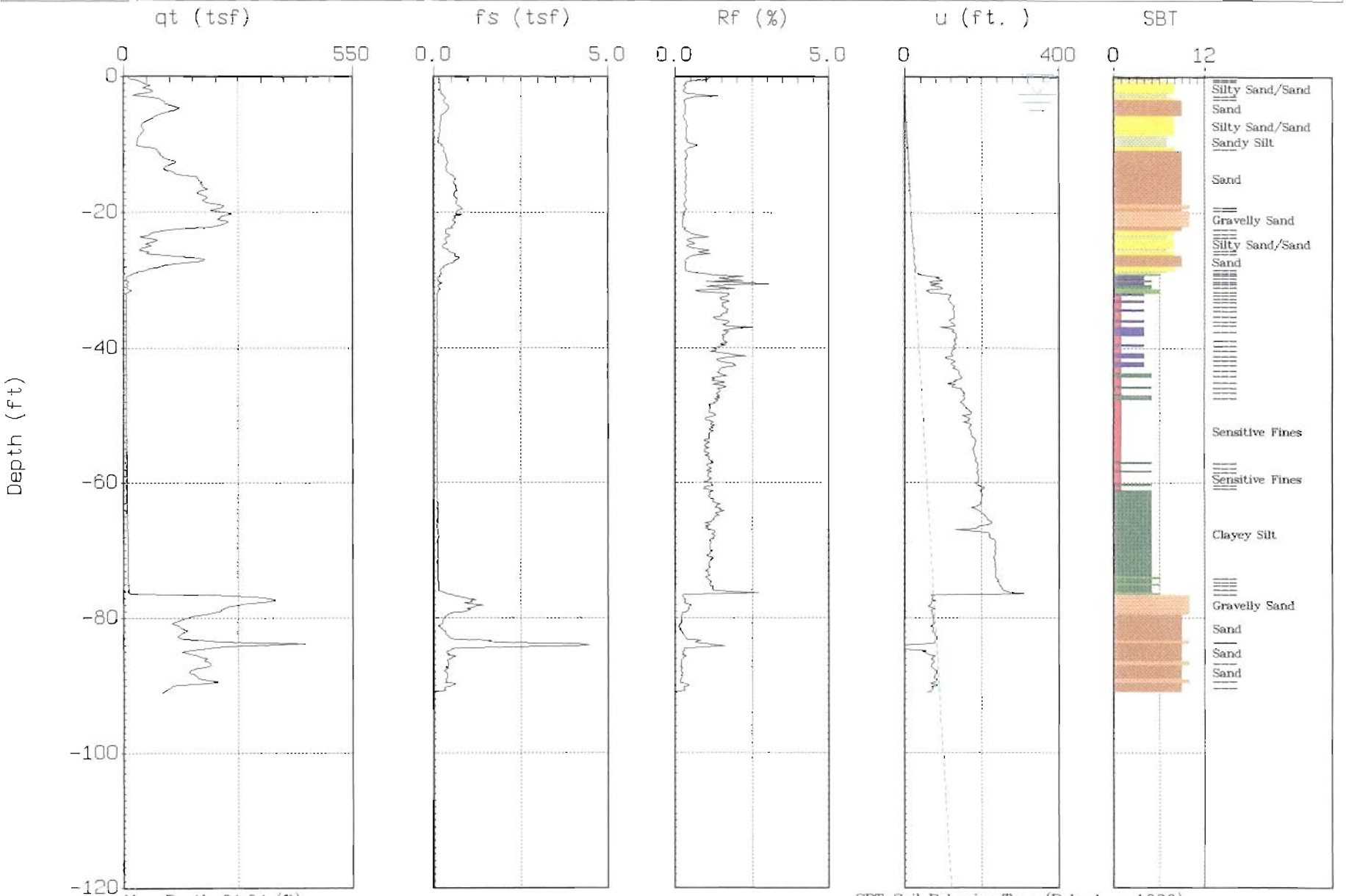
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-02
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:02:03 09:42



Max. Depth: 91.04 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

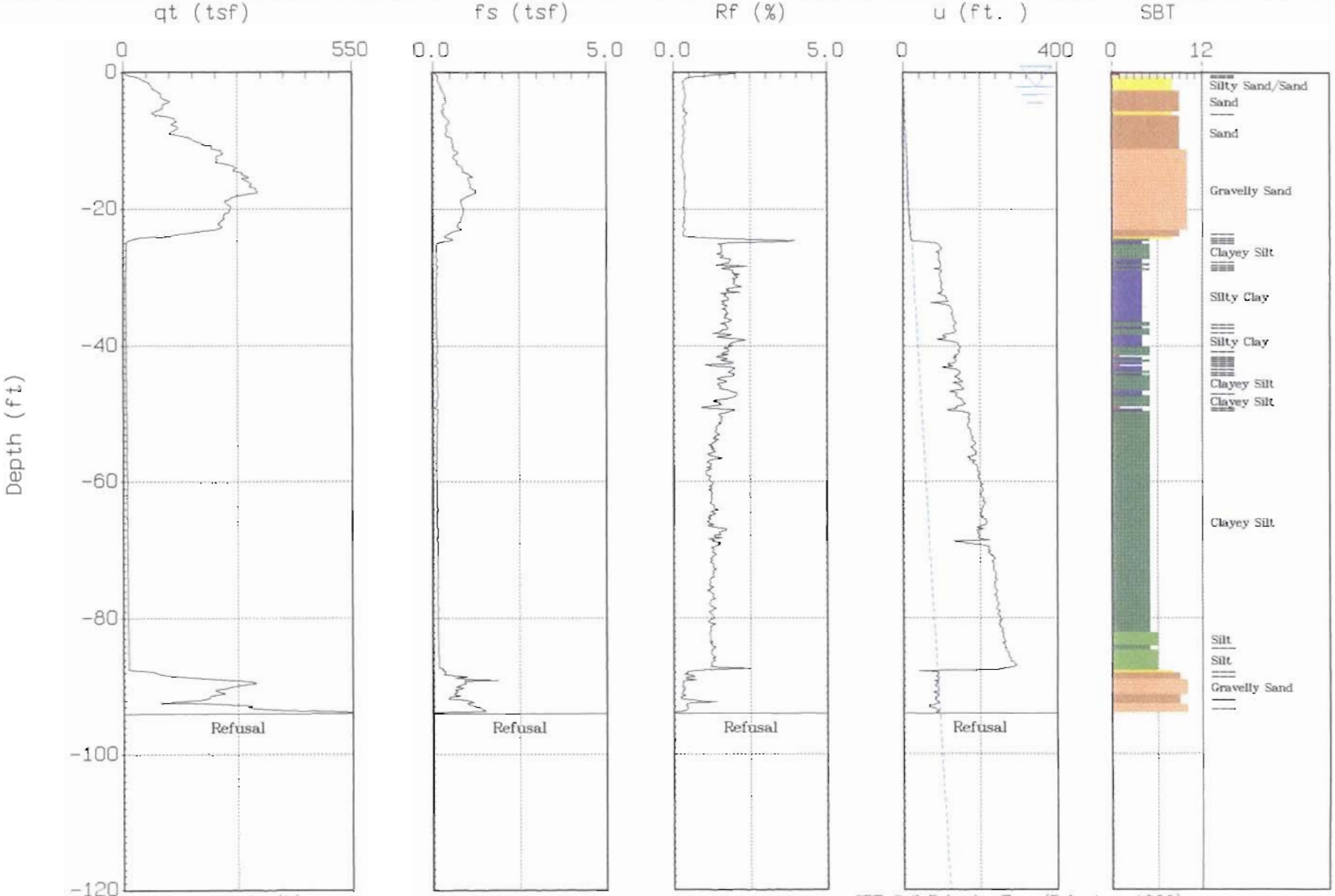
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-03
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:02:03 10:46



Max. Depth: 93.99 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

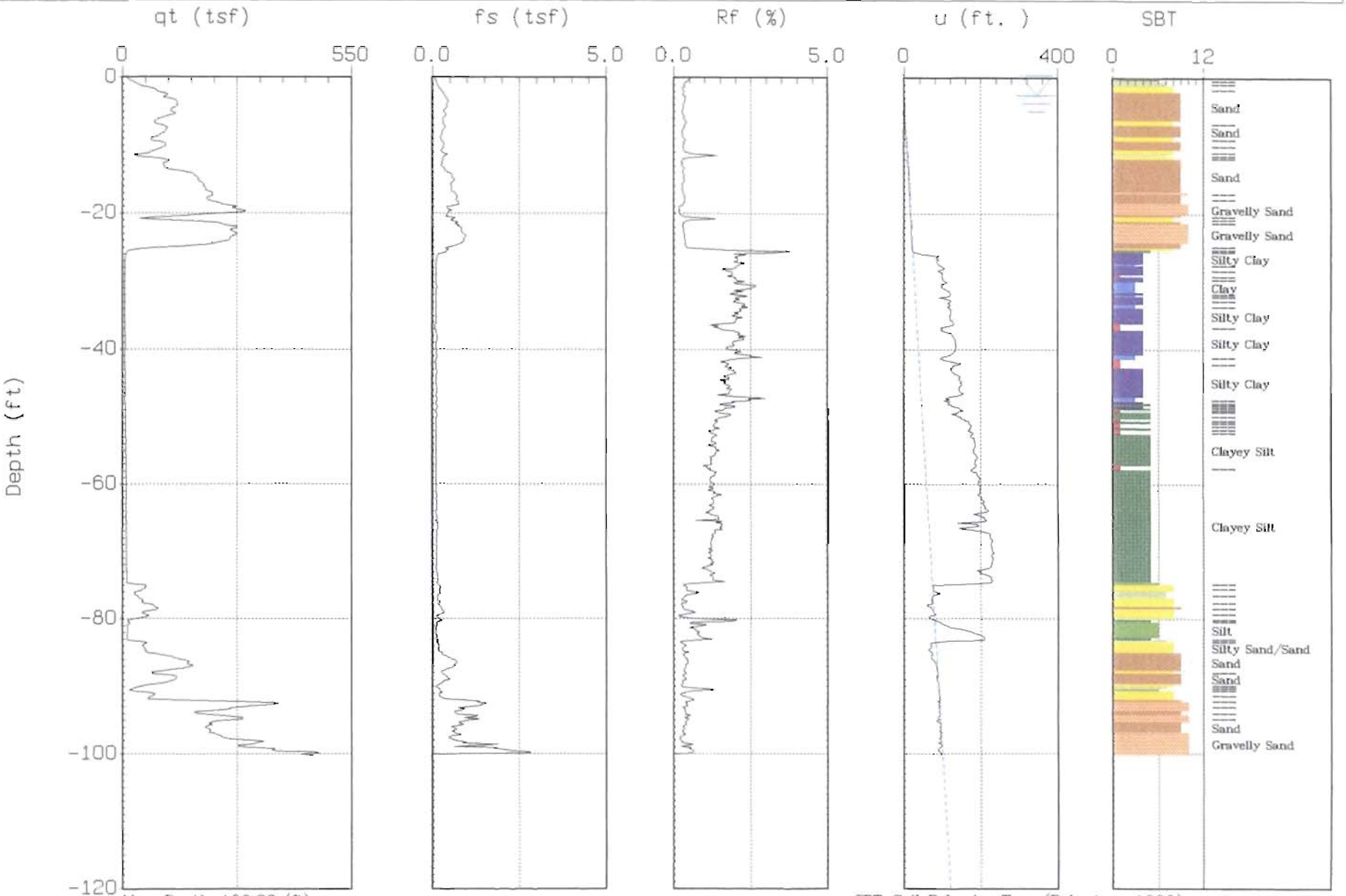
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-04
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:02:03 11:41



Max. Depth: 100.23 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

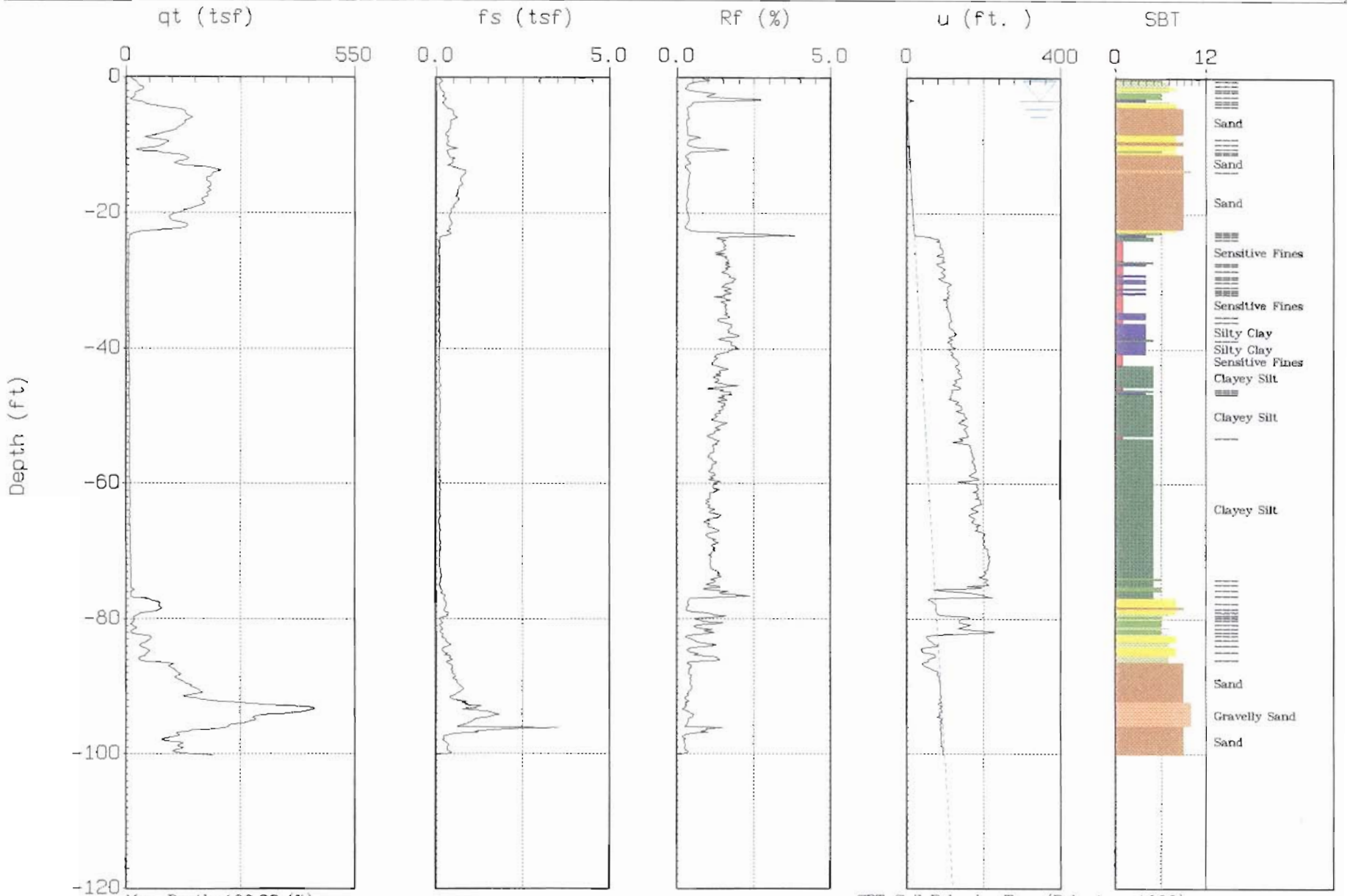
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-05
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:02:03 07:54



Max. Depth: 100.23 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

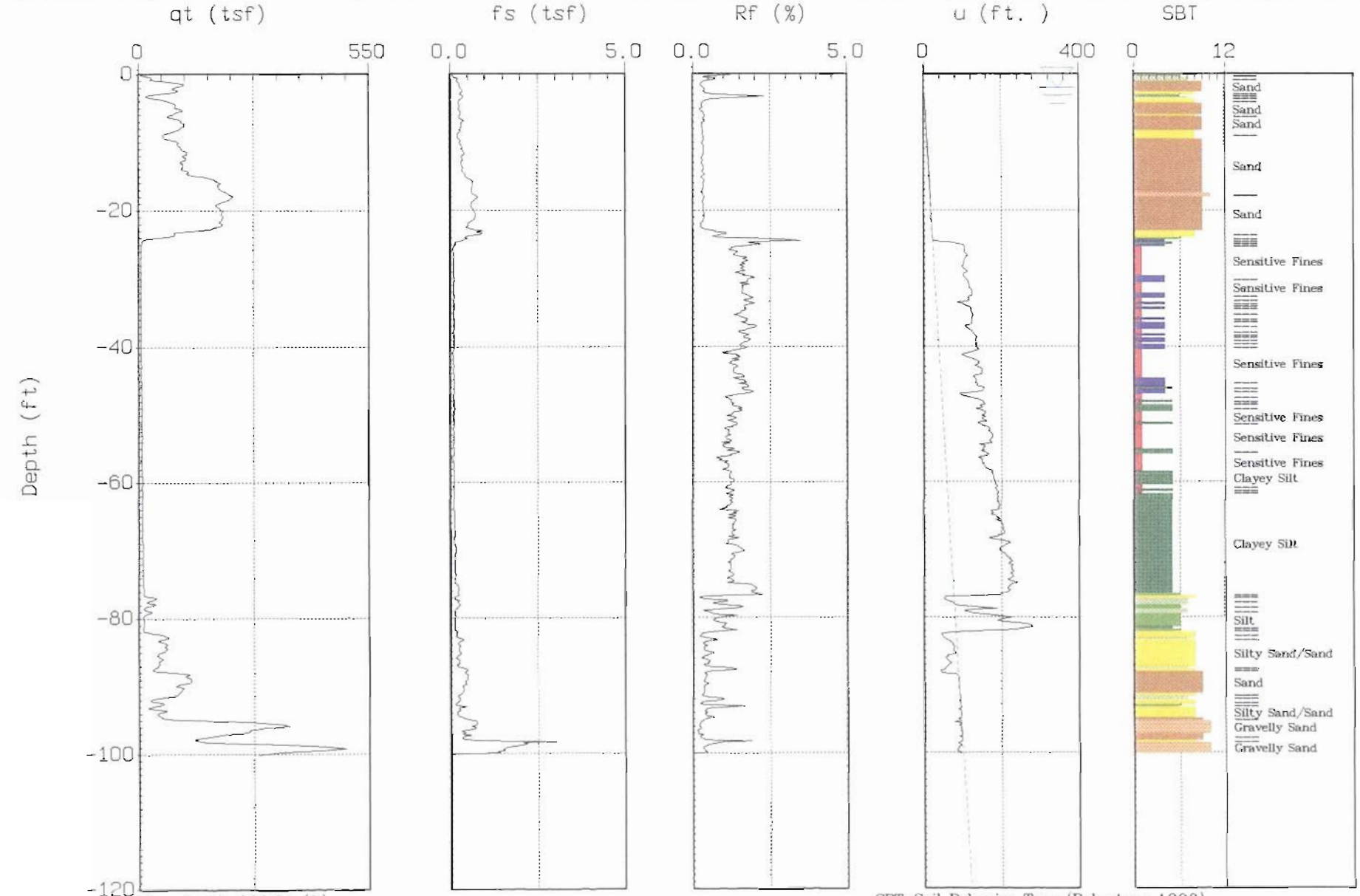
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-06
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:02:03 12:42



Max. Depth: 100.23 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

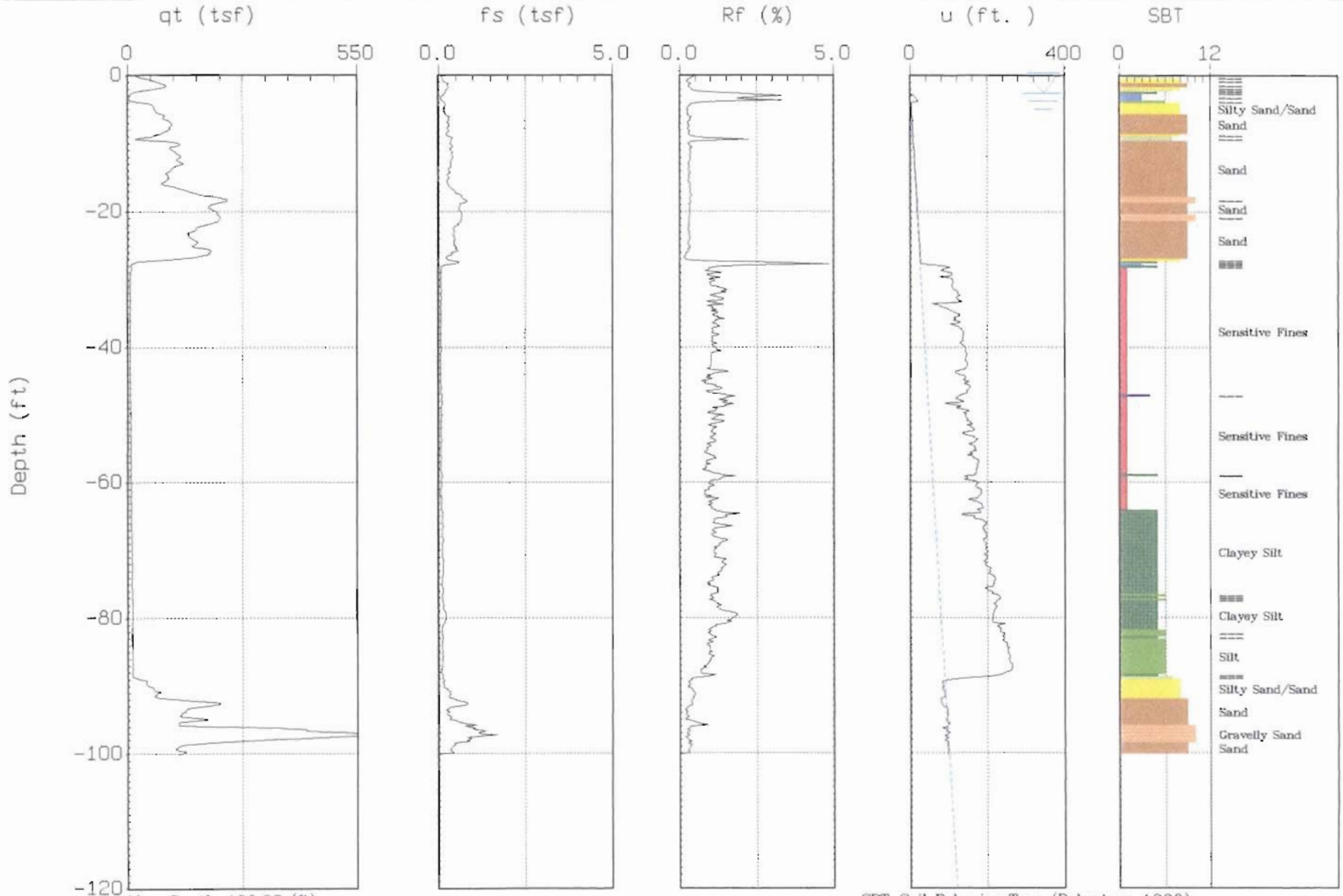
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-07
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:01:03 14:26



Max. Depth: 100.23 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

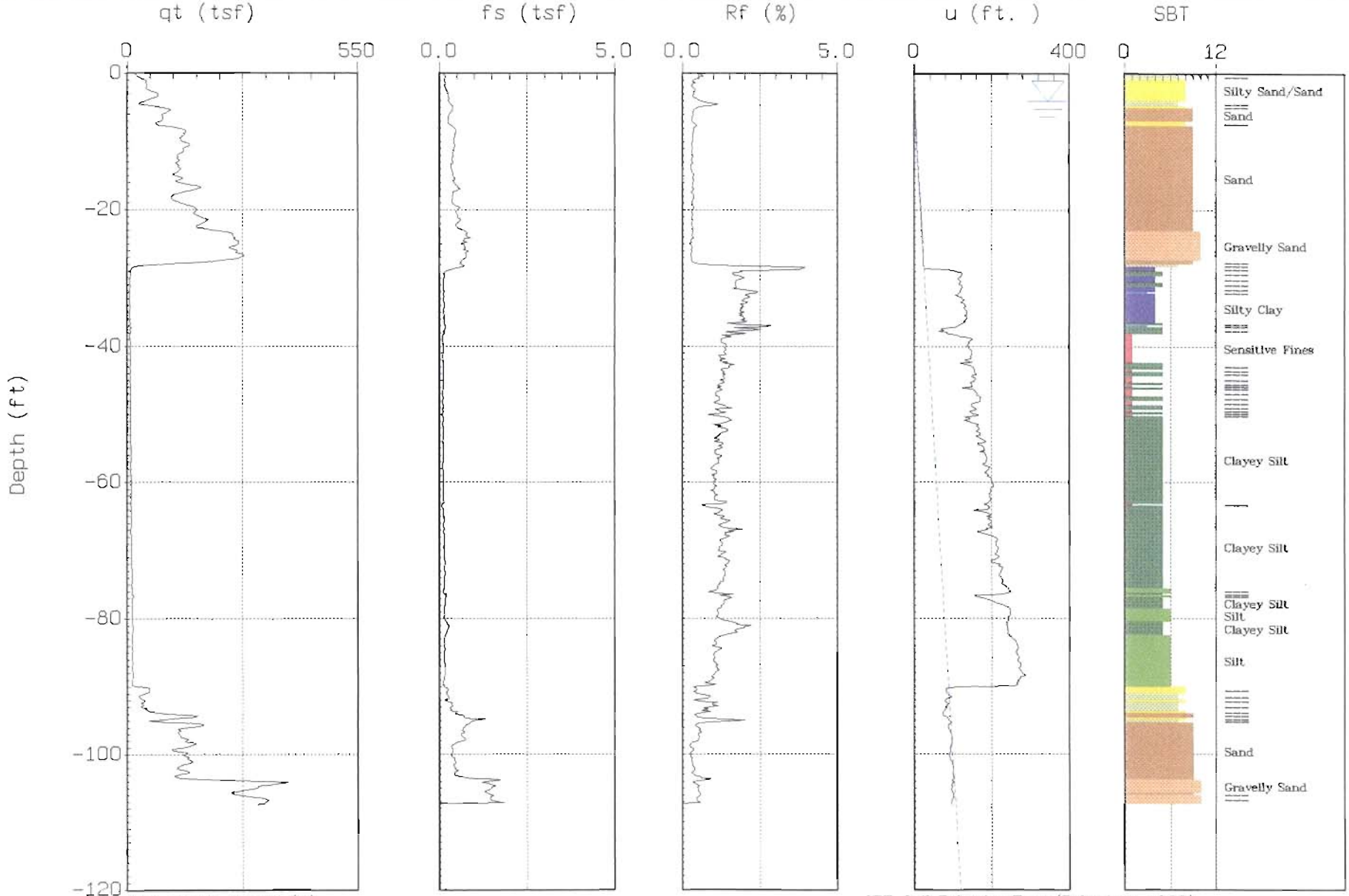
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-08
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:02:03 13:37



Max. Depth: 107.45 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

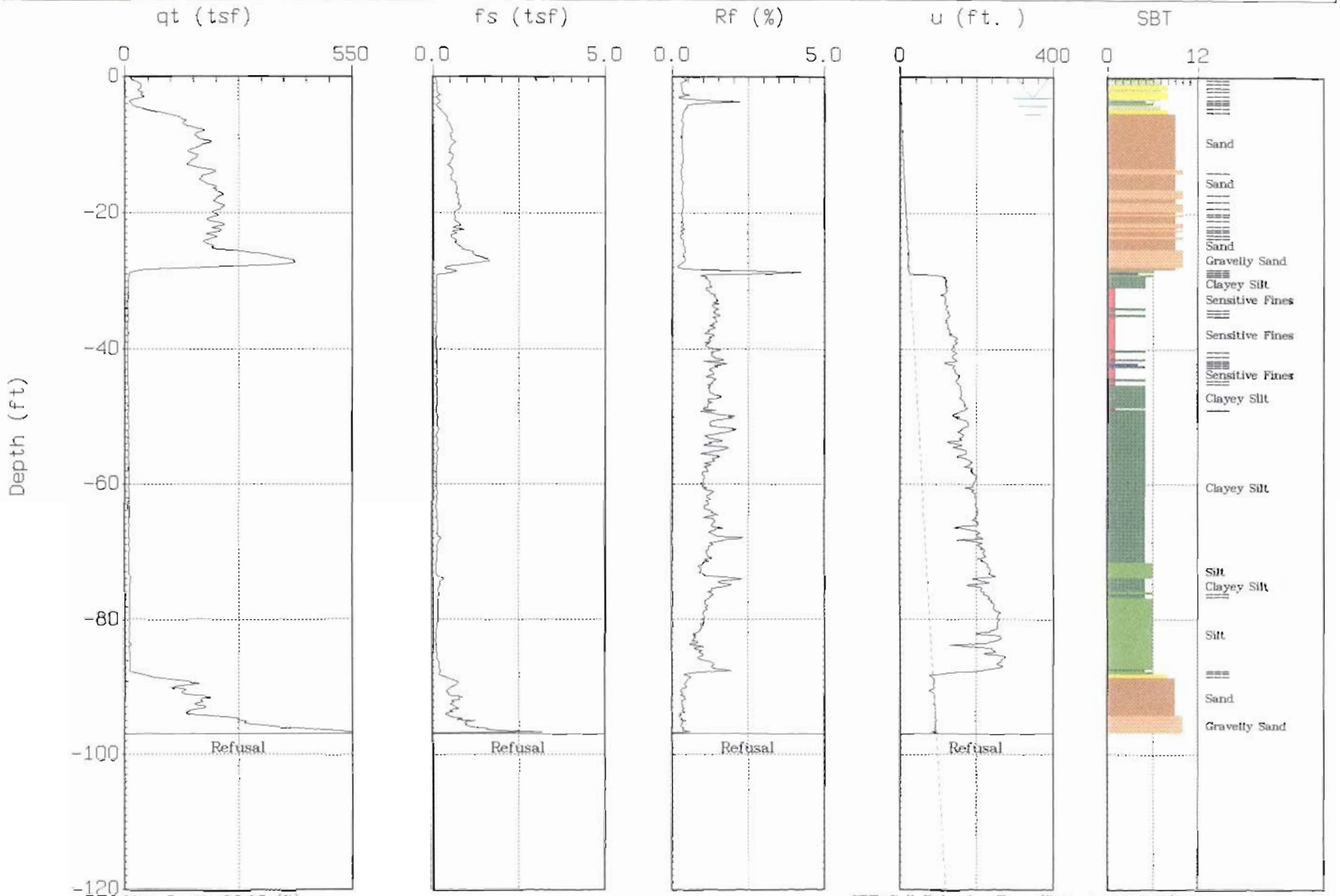
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-09
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:01:03 16:01



Max. Depth: 96.95 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

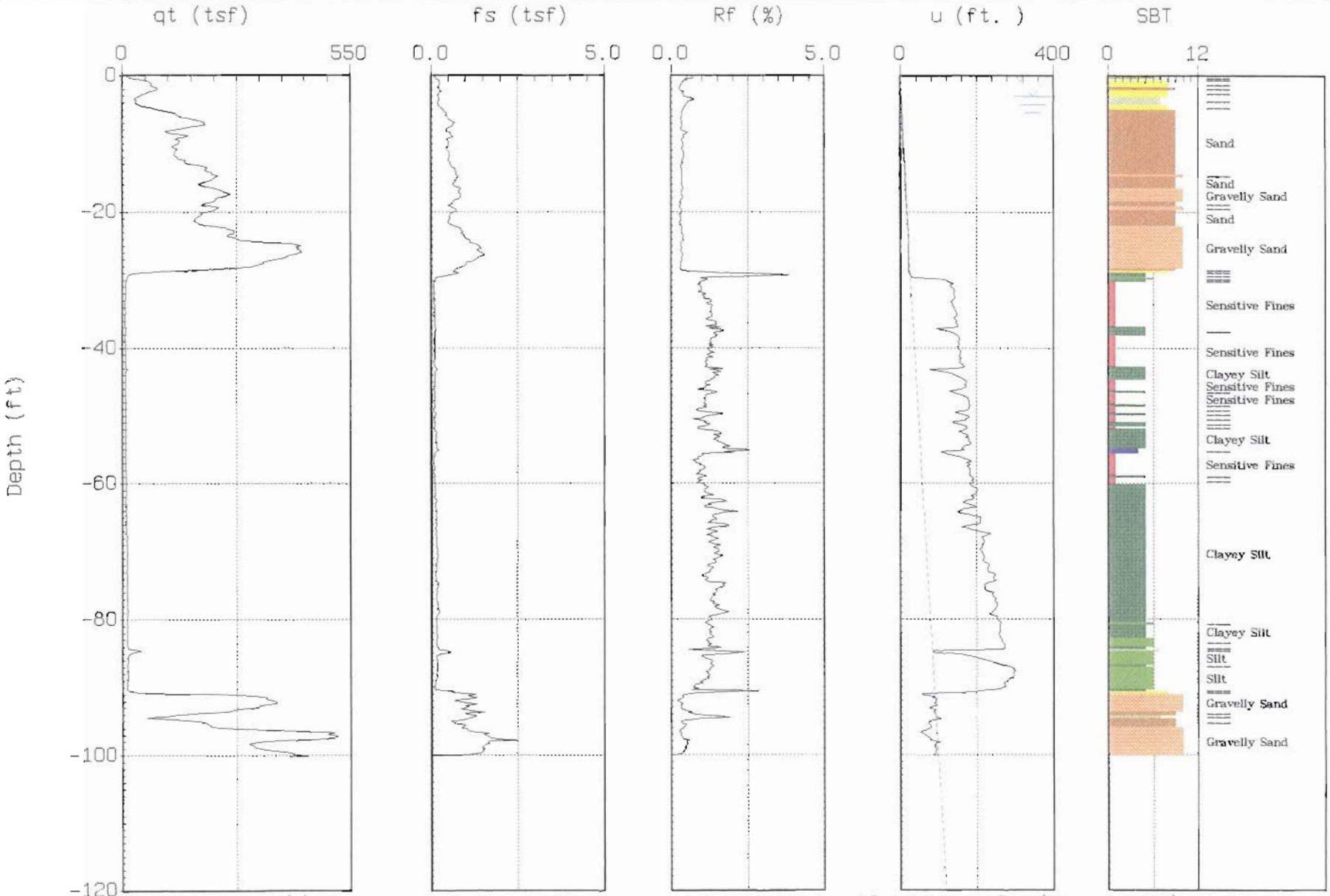
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-10
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:01:03 12:30



Max. Depth: 100.23 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

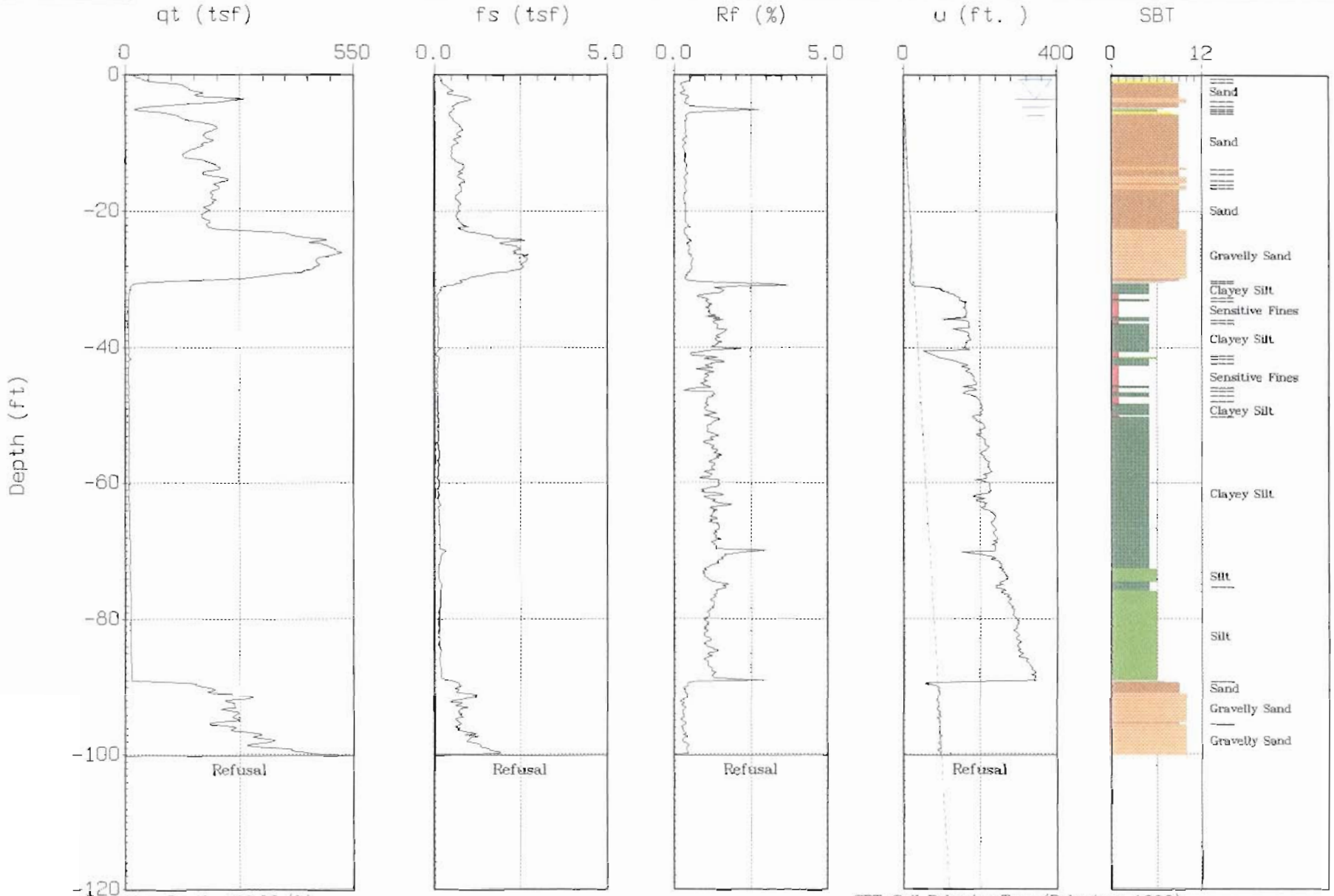
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-11
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:01:03 09:50



Max. Depth: 100.23 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

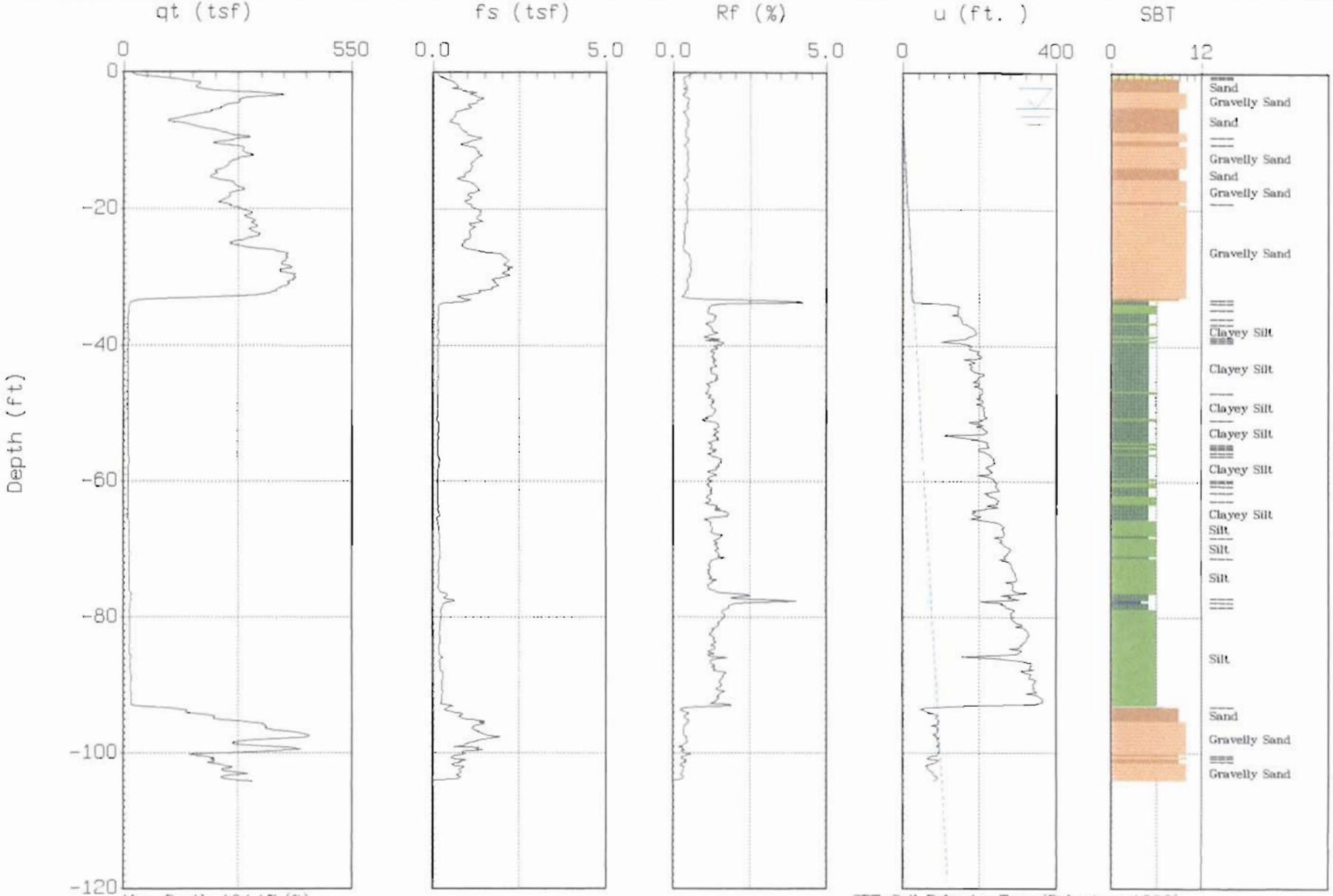
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-12
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:01:03 08:07



Max. Depth: 104.17 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

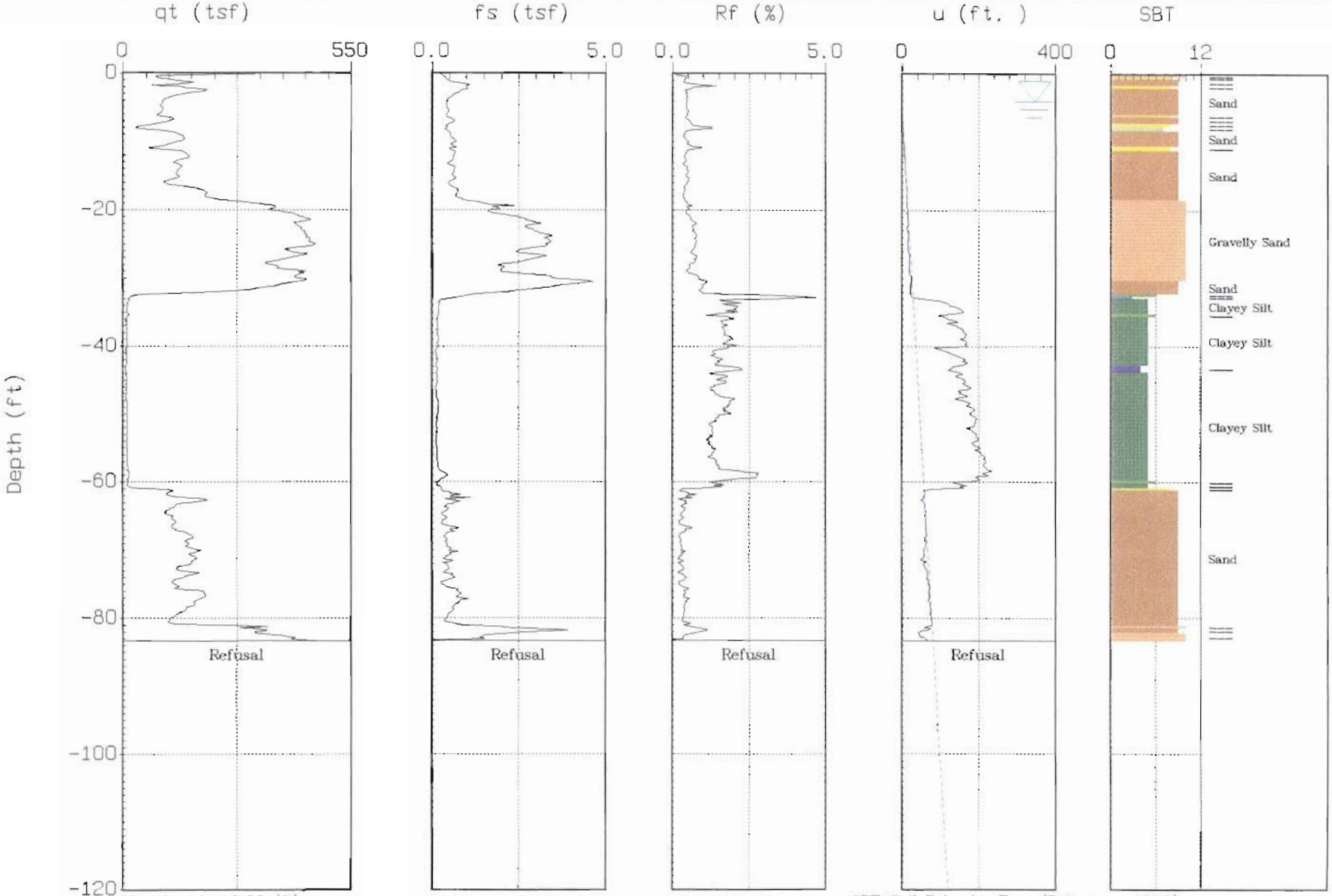
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-13
Location:Indian River Br.

Cone:20 Ton AD139
Date:09:30:03 12:03



Max. Depth: 83.33 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

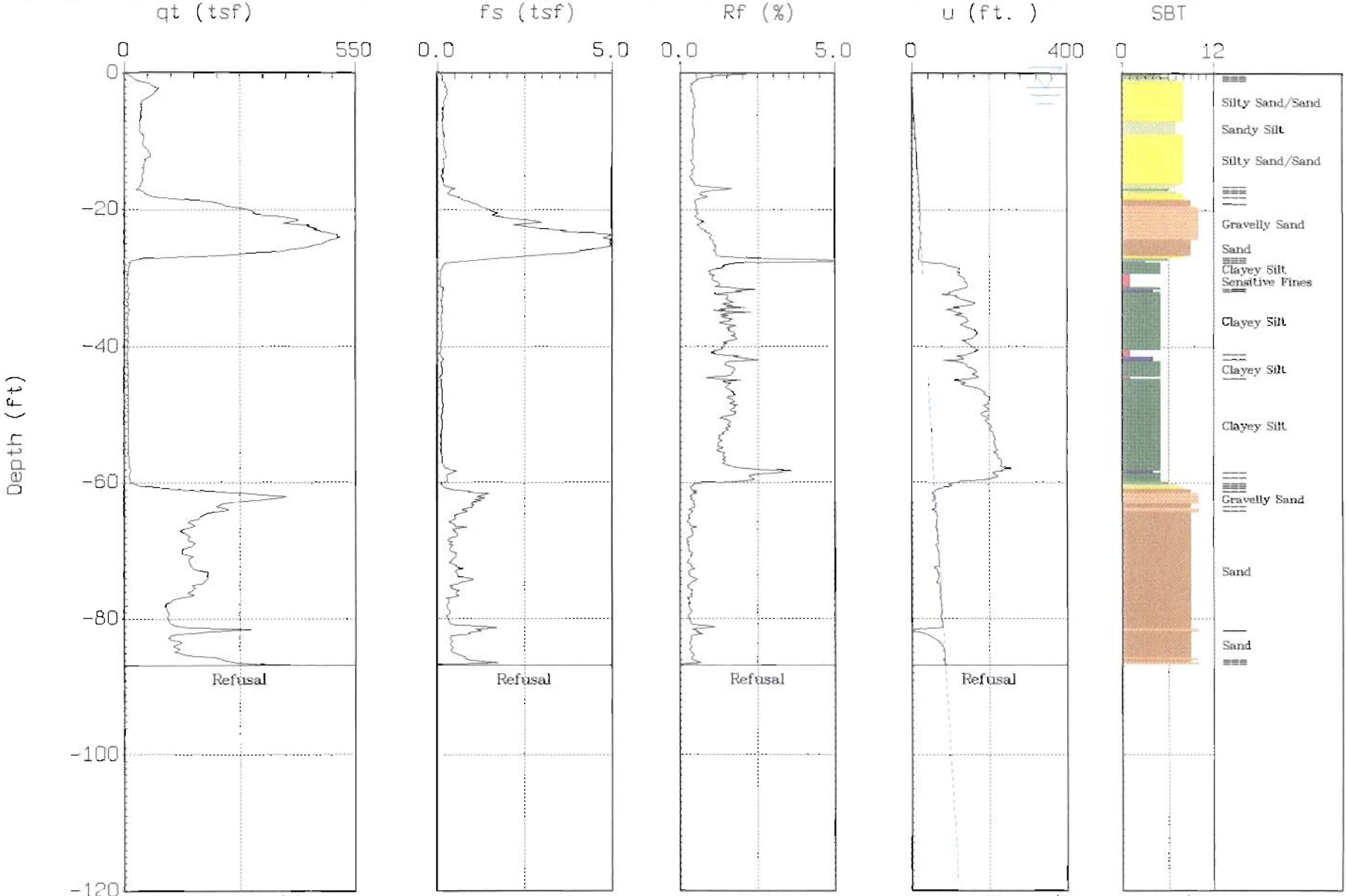
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-14
Location:Indian River Br.

Cone:20 Ton AD139
Date:09:29:03 10:58



Max. Depth: 86.78 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

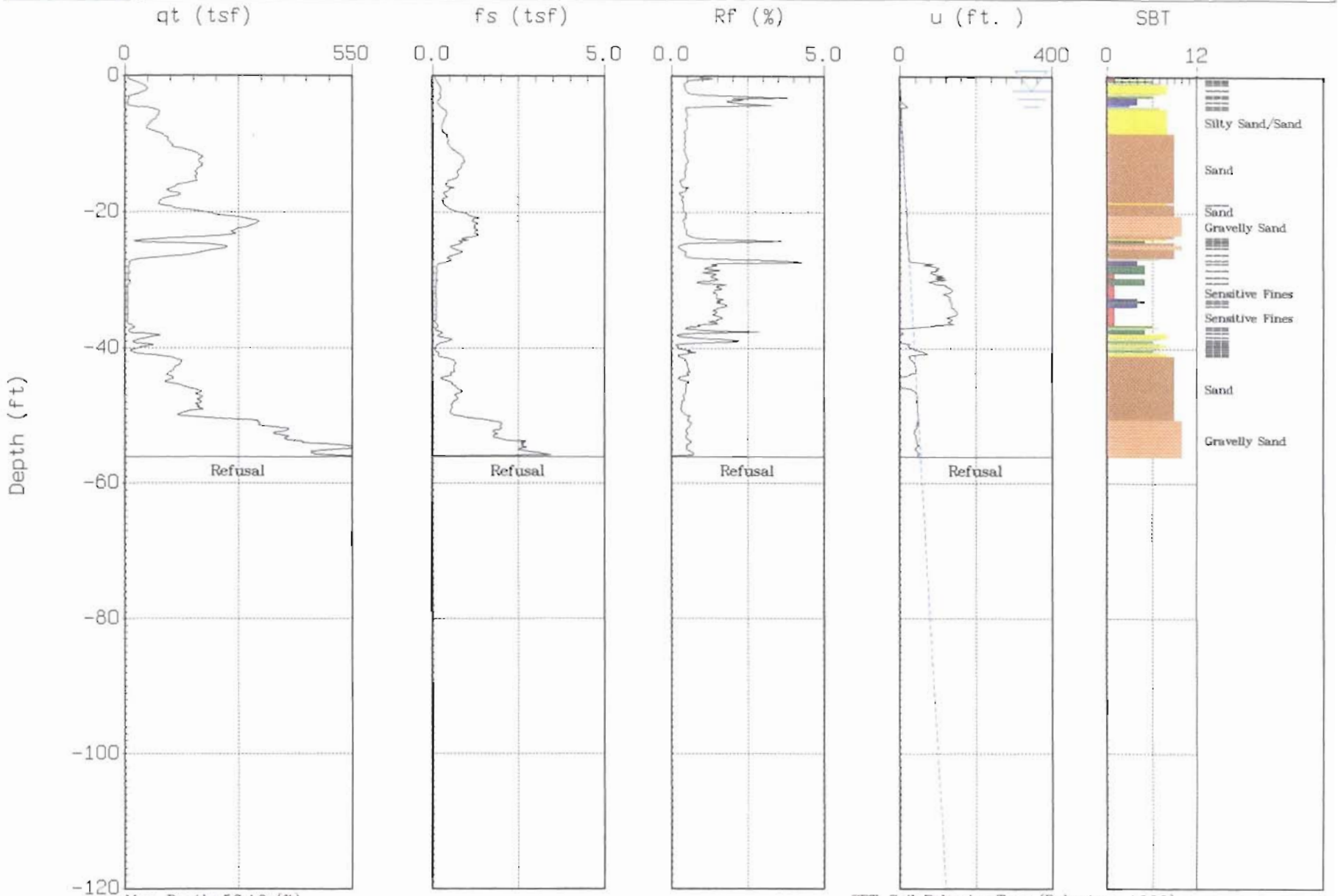
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-15
Location:Indian River Br.

Cone:20 Ton AD139
Date:09:30:03 14:11



Max. Depth: 56.10 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

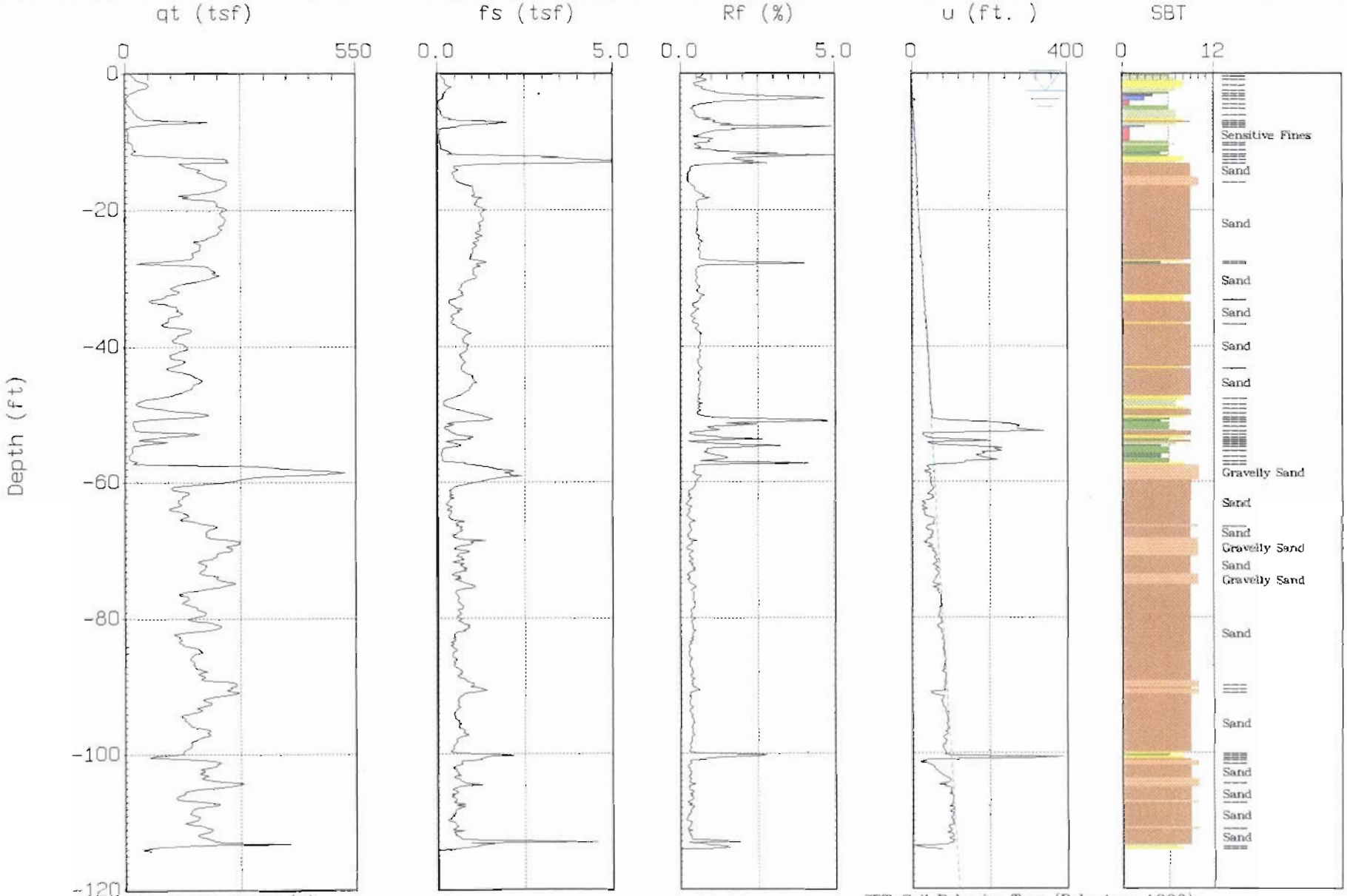
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-16
Location:Indian River Br.

Cone:20 Ton AD139
Date:09:30:03 14:59



Max. Depth: 114.34 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

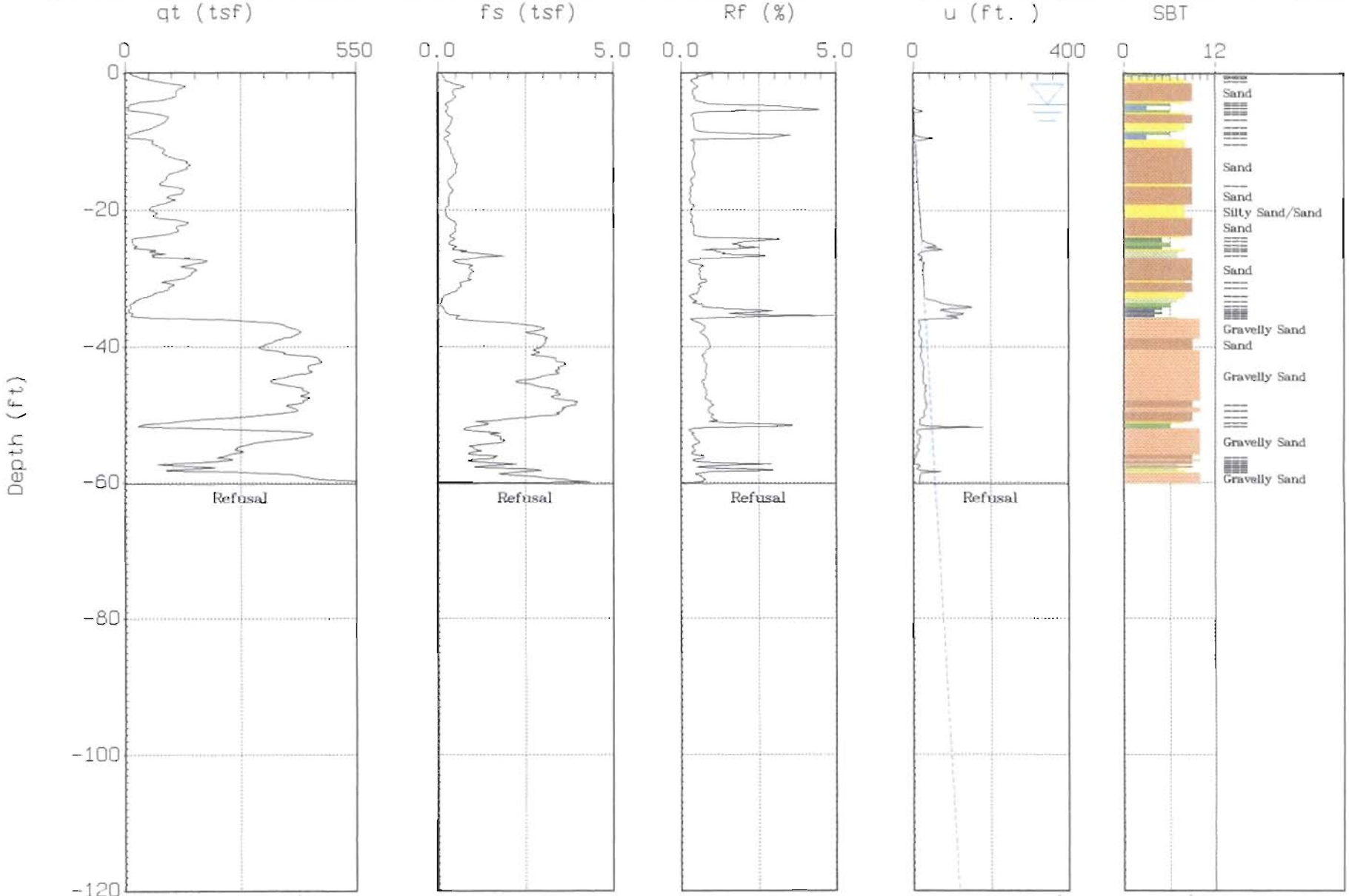
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-17
Location:Indian River Br.

Cone:20 Ton AD139
Date:09:30:03 16:59



Max. Depth: 60.20 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

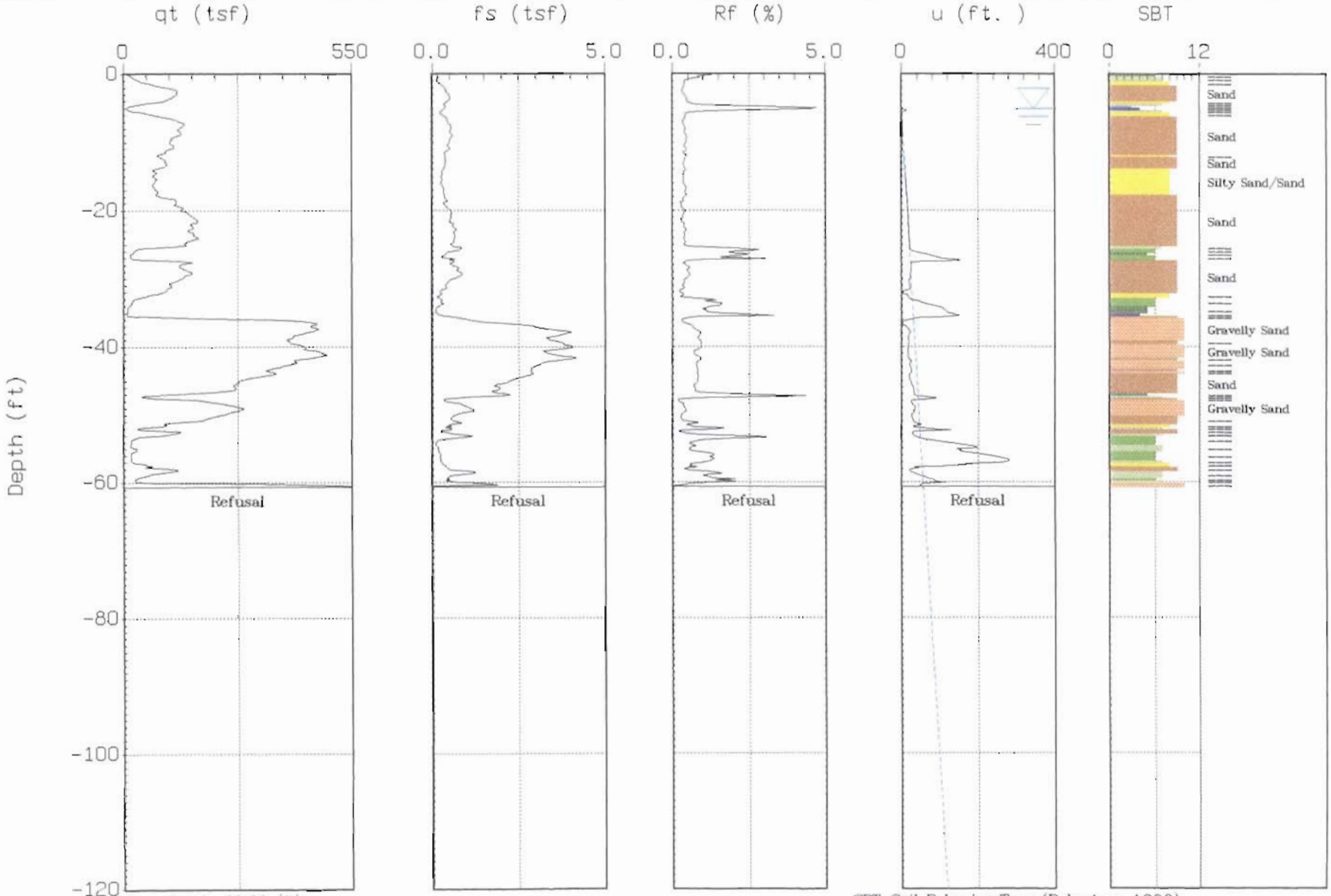
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-18
Location:Indian River Br.

Cone:20 Ton AD139
Date:09:30:03 16:17



Max. Depth: 60.69 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

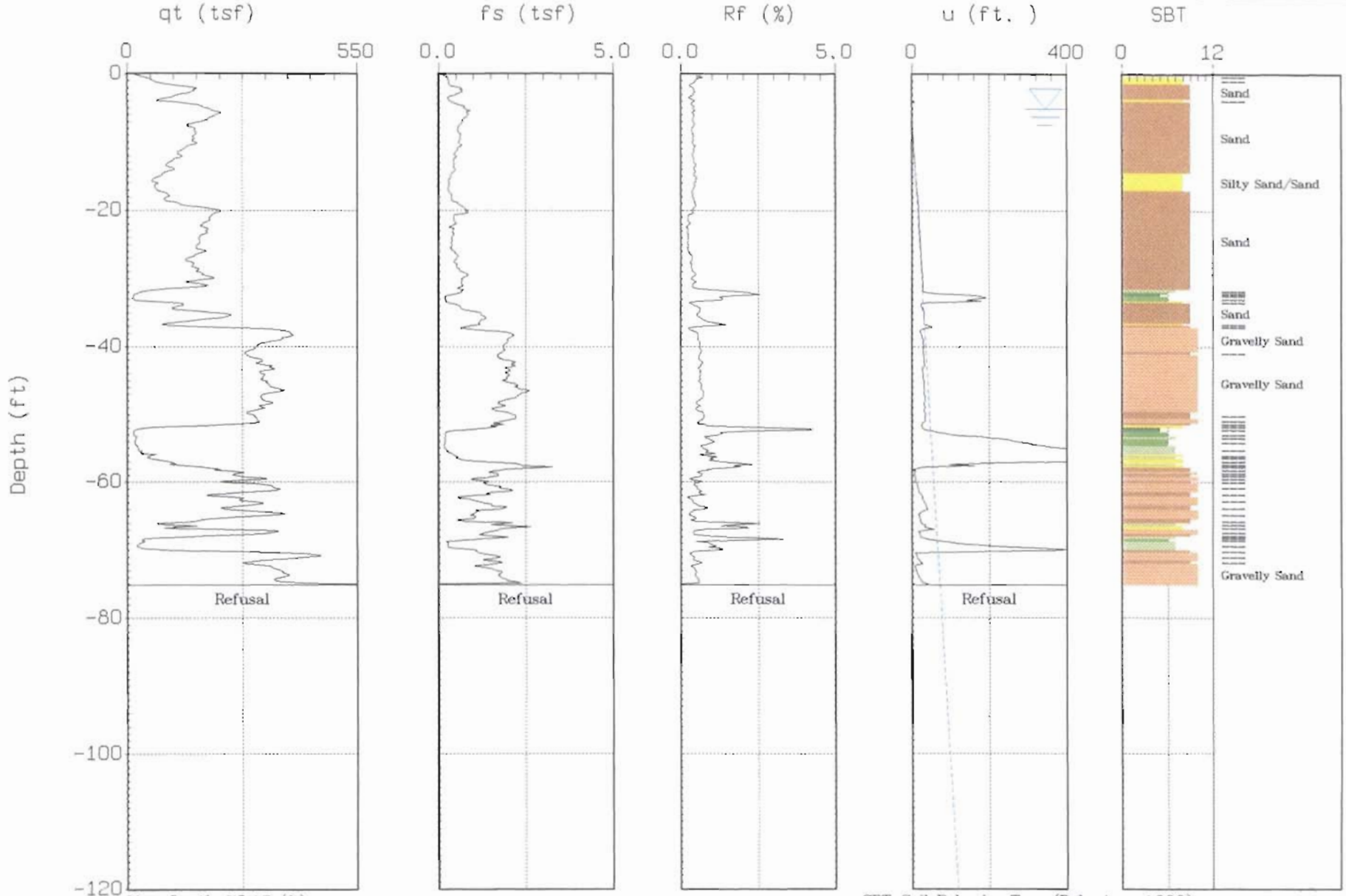
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-19
Location:Indian River Br.

Cone:20 Ton AD139
Date:09:30:03 17:39



Max. Depth: 75.13 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

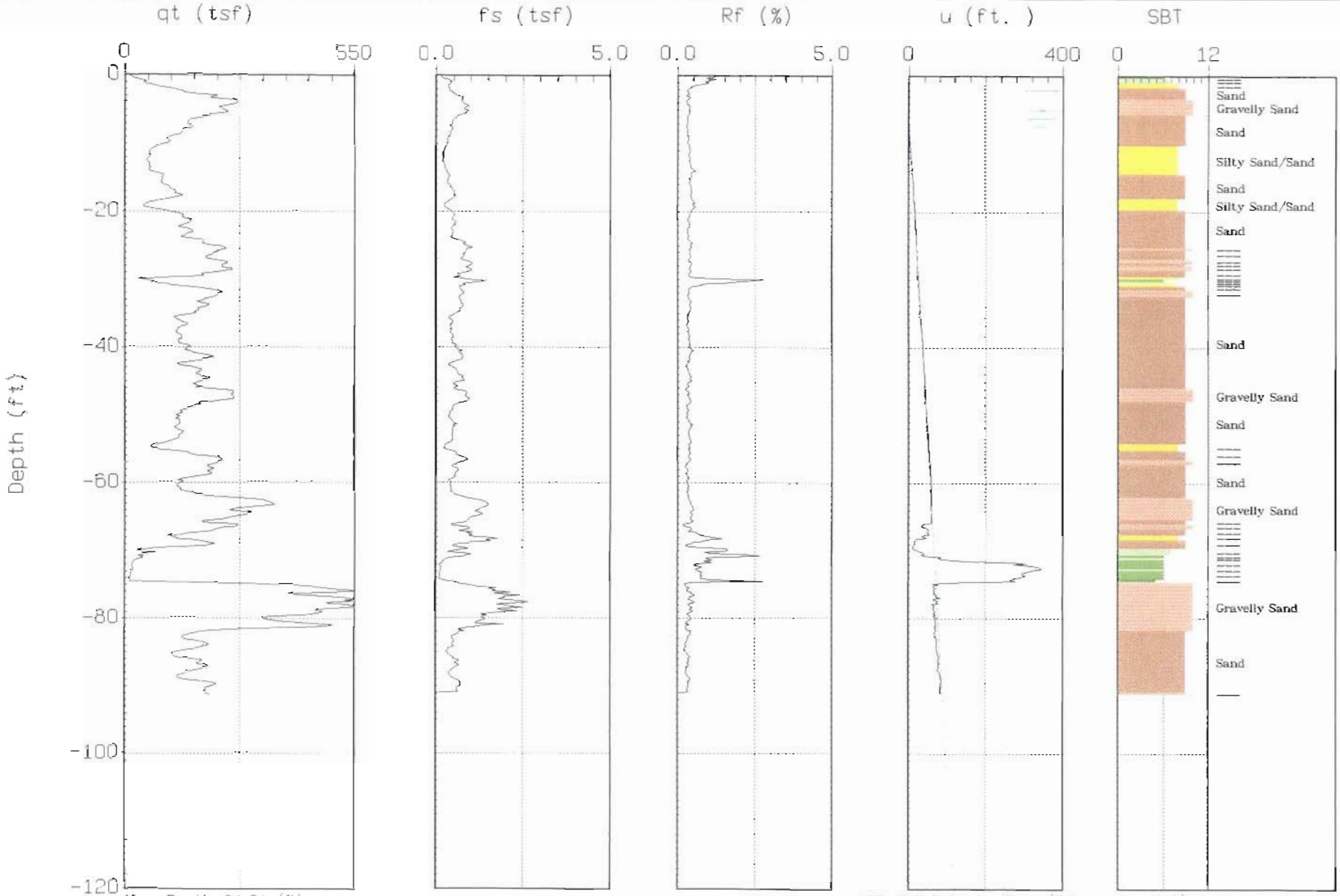
Estimated Phreatic Surface

CONETEC

MACTEC

Site:CII-20
Location:Indian River Br.

Cone:20 Ton AD139
Date:09:30:03 18:19



Max. Depth: 91.21 (ft)
Depth Inc: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

Estimated Phreatic Surface

PRESSUREMETER TEST

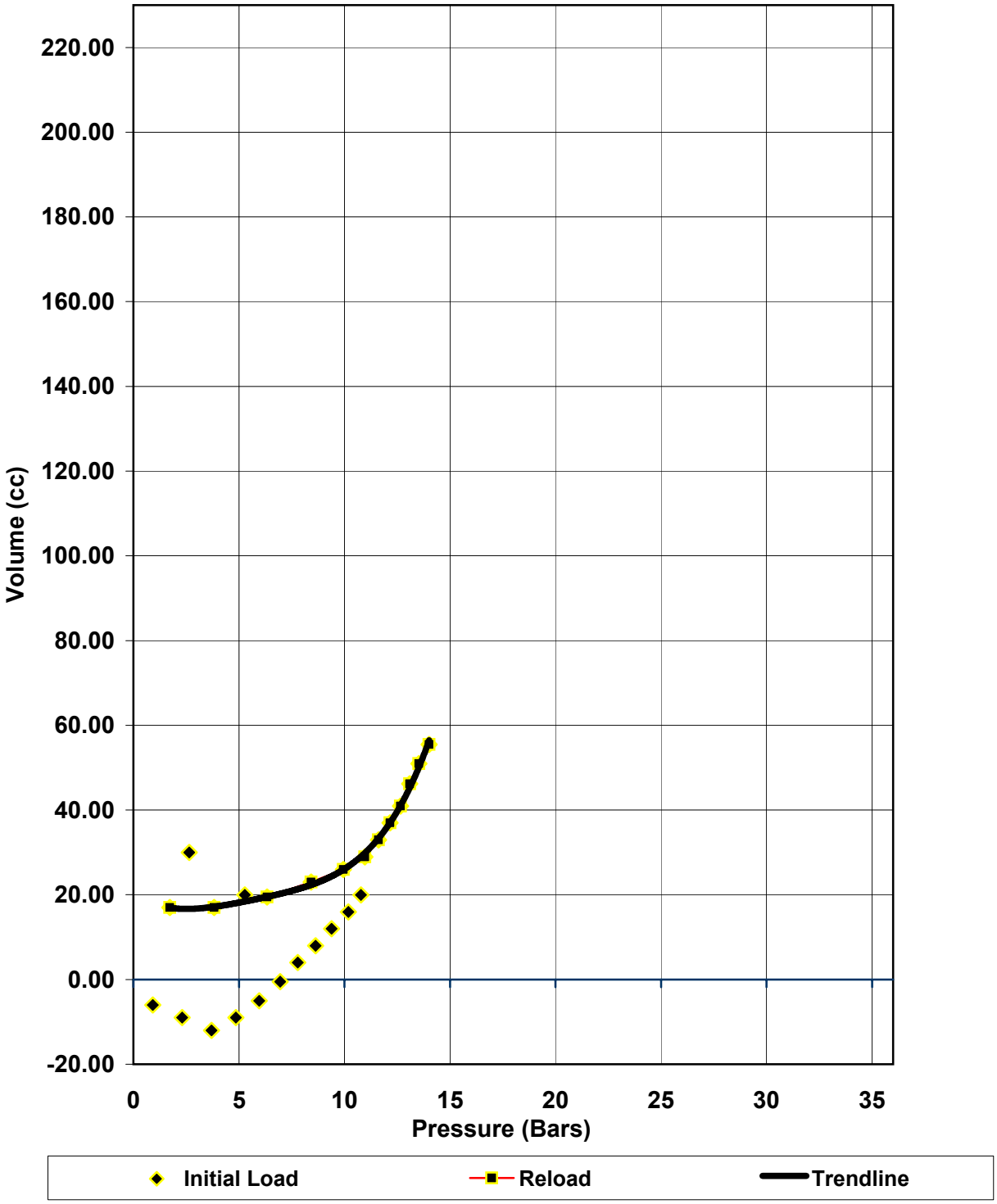
Pressuremeter tests were performed in general accordance with ASTM D 4719. The pressuremeter test (PMT) is an instrument used for the determination of in-situ soil strength and deformation characteristics. The essential features of the instrument provide for radial expansion of the borehole as a function of increasing radial pressure applied to the borehole wall. Soil properties are calculated utilizing elastic-plastic theory or empirical relationships. Typical data derived from PMT are the pressuremeter modulus and limit pressure which are measures of compressibility and soil strength, respectively.

The principal components of the pressuremeter system are the control unit, the probe and the coaxial tubing. The control unit registers and displays changes in pressures and volumes. The probe is a borehole expansion device consisting of two rubber membranes. One membrane forms an upper and lower guard cell and the second membrane forms an inner measuring cell. Water is supplied under pressure through the inner coaxial tubing to the measuring cell and the resulting volume change of the cell is considered equivalent to the volume change of the borehole. Pressurized gas in the outer coaxial tubing simultaneously expands the upper and lower guard cells to help minimize end effects of the measuring cell.

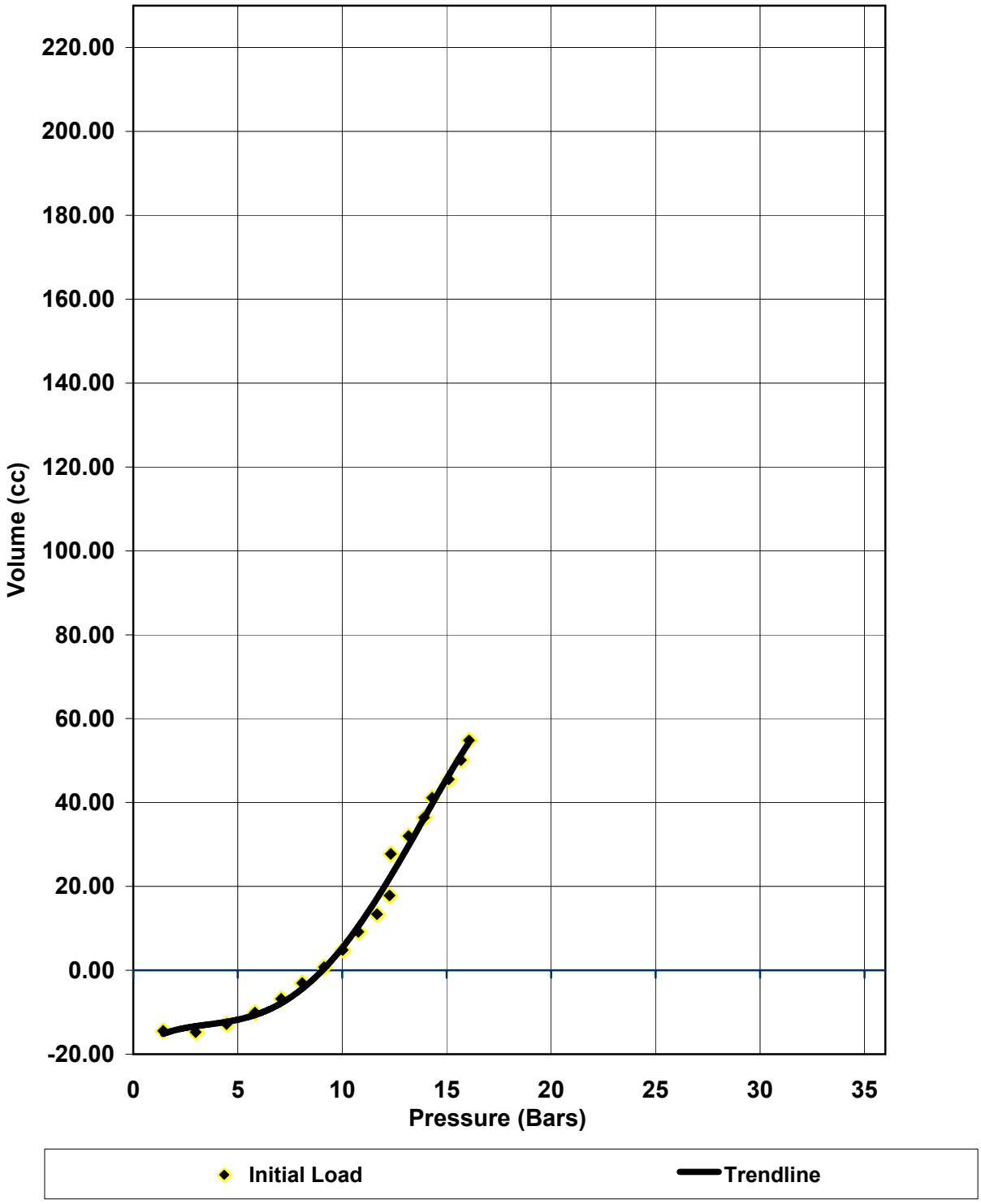
Tests are conducted concurrently with the drilling of an NX-size hole (3-inch diameter) in soil or rock. After each test, the pressuremeter apparatus is removed from the hole, the hole is advanced to the next sampling level and the procedures repeated until testing of each level has been completed.

Testing is performed by applying incremental pressure and recording the resulting deformations at set time intervals. The direct variables utilized from the test are the pressure applied to the measuring cell and the volume of cell expansion due to each incremental pressure increase. These values are used to determine radial expansion of the borehole diameter under each increment of pressure.

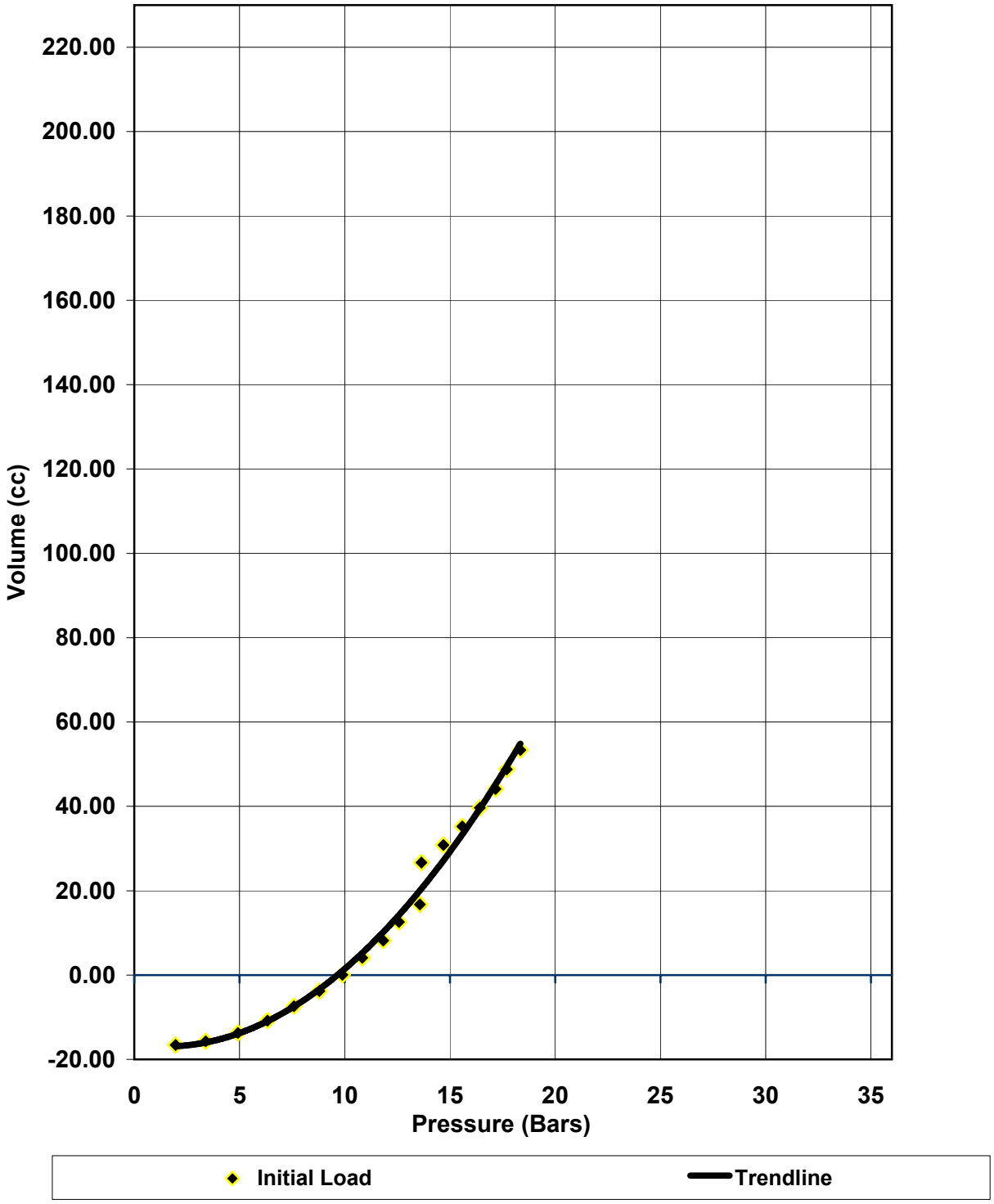
Pressuremter Plot
Boring: BII-19 Test: PM2-1 Depth: 16 feet



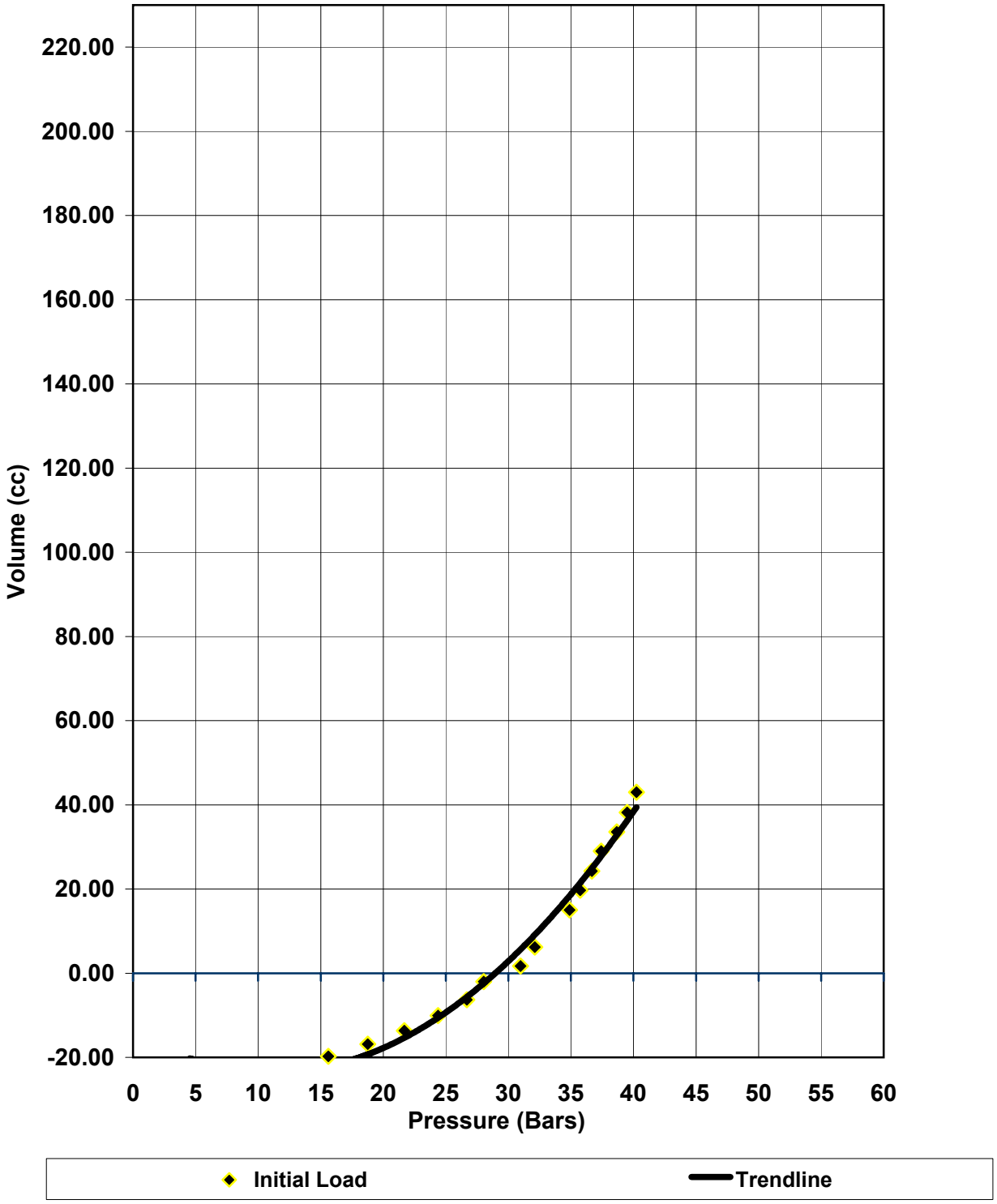
Pressuremter Plot
Boring: BII-19 Test: PM2-2 Depth: 21 feet



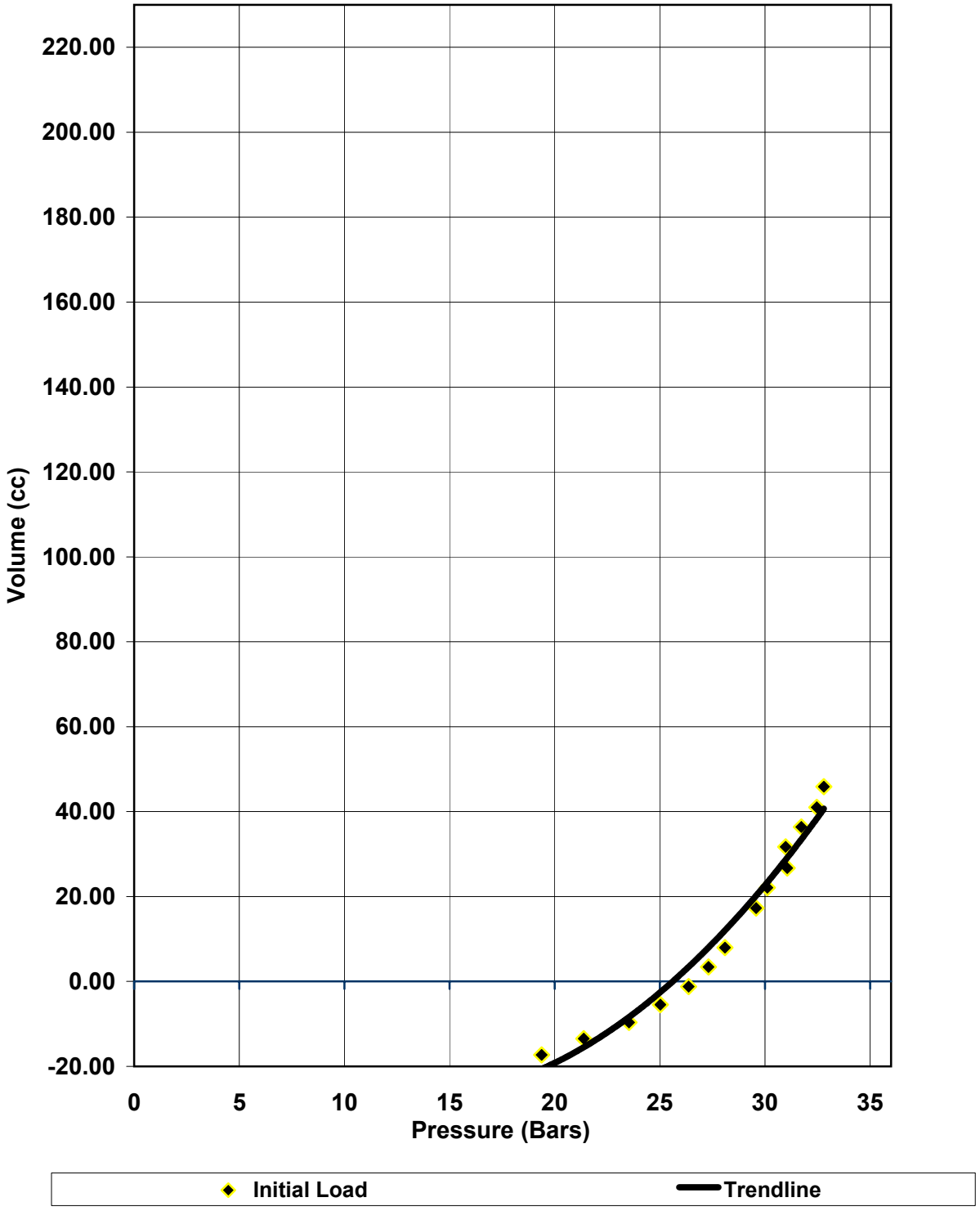
Pressuremter Plot
Boring: BII-19 Test: PM2-3 Depth: 26 feet



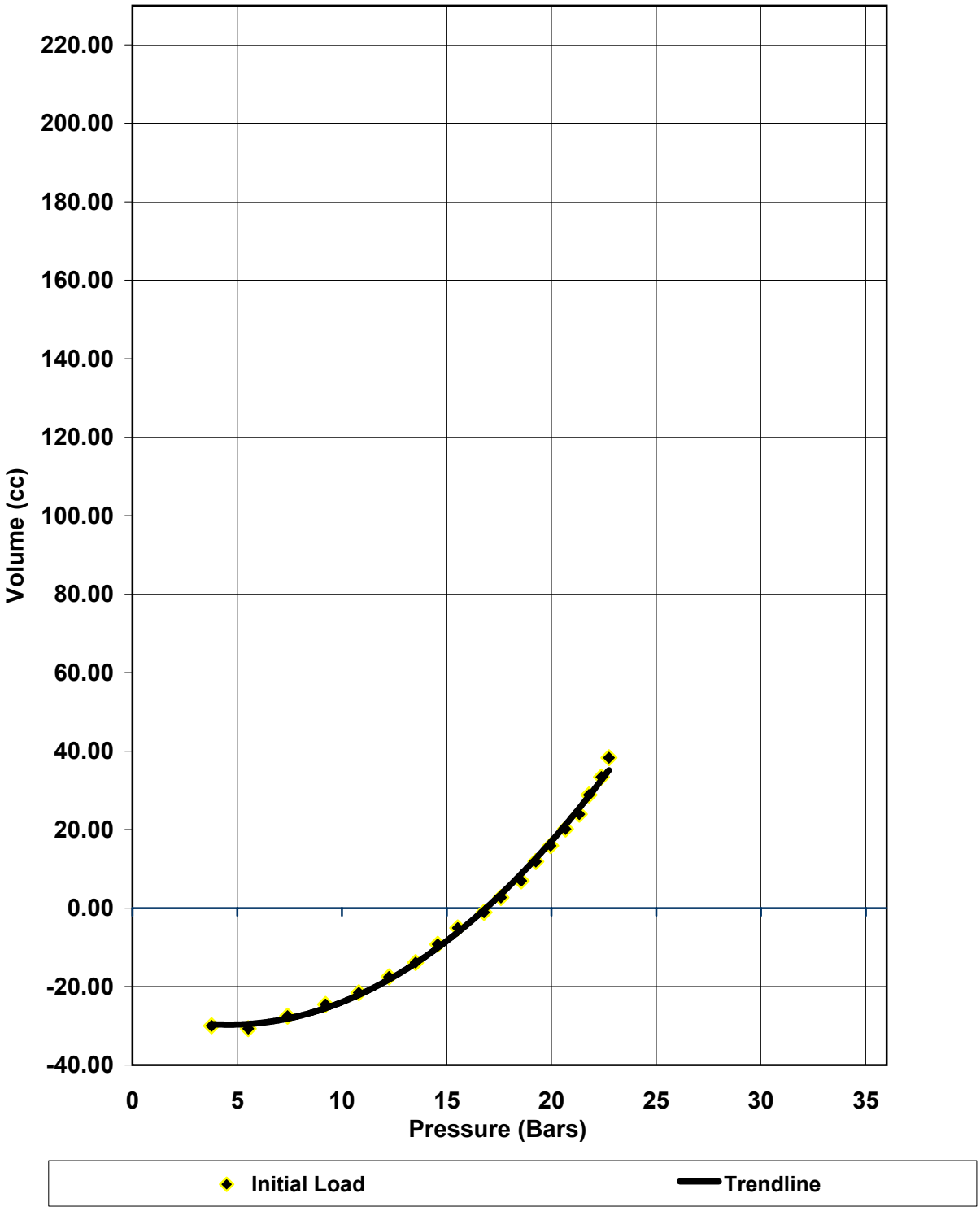
Pressuremter Plot
Boring: BII-19 Test: PM2-4 Depth: 101.5 feet



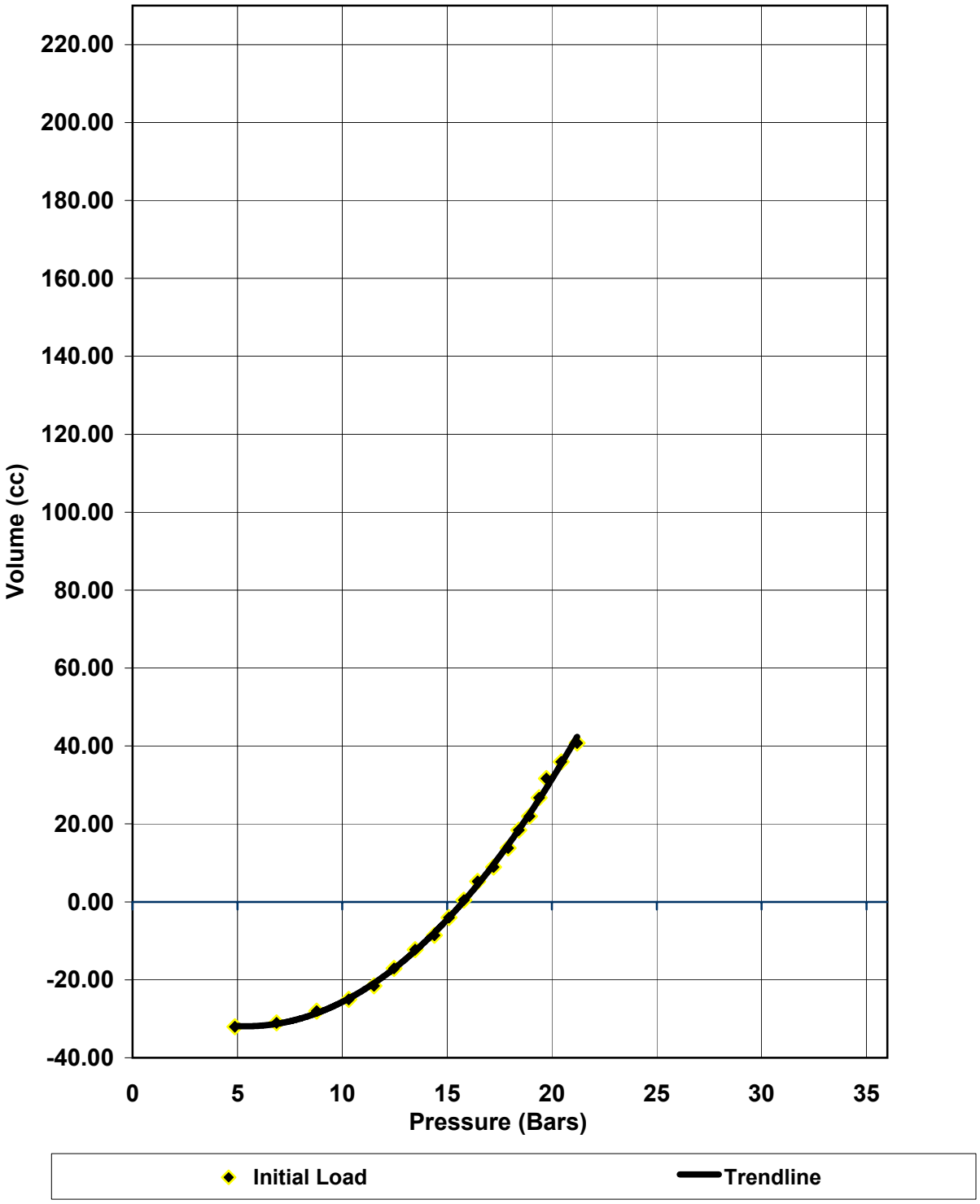
Pressuremter Plot
Boring: BII-19 Test: PM2-5 Depth: 108.5 feet



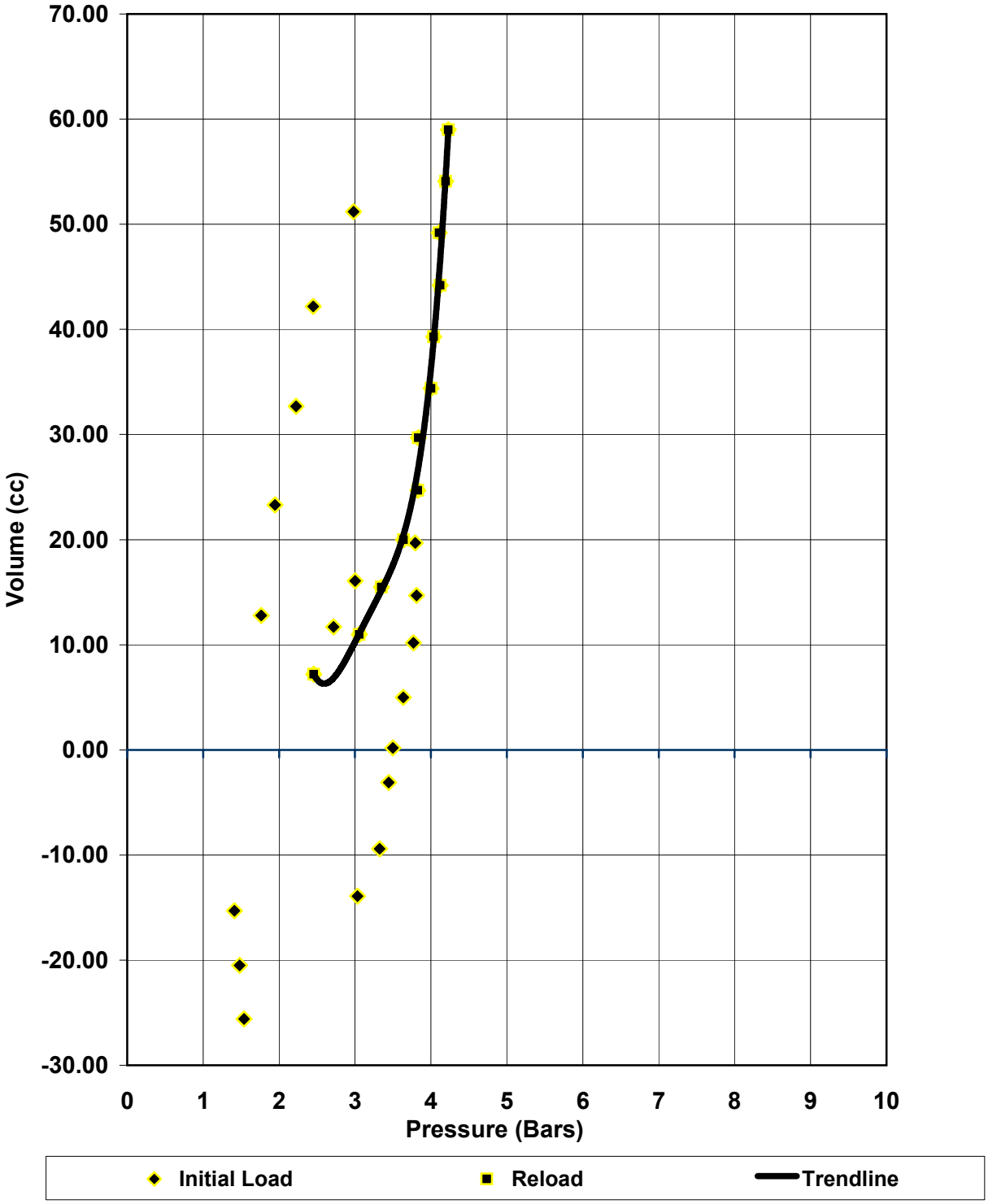
Pressuremter Plot
Boring: BII-22 Test: PM2-6 Depth: 67 feet



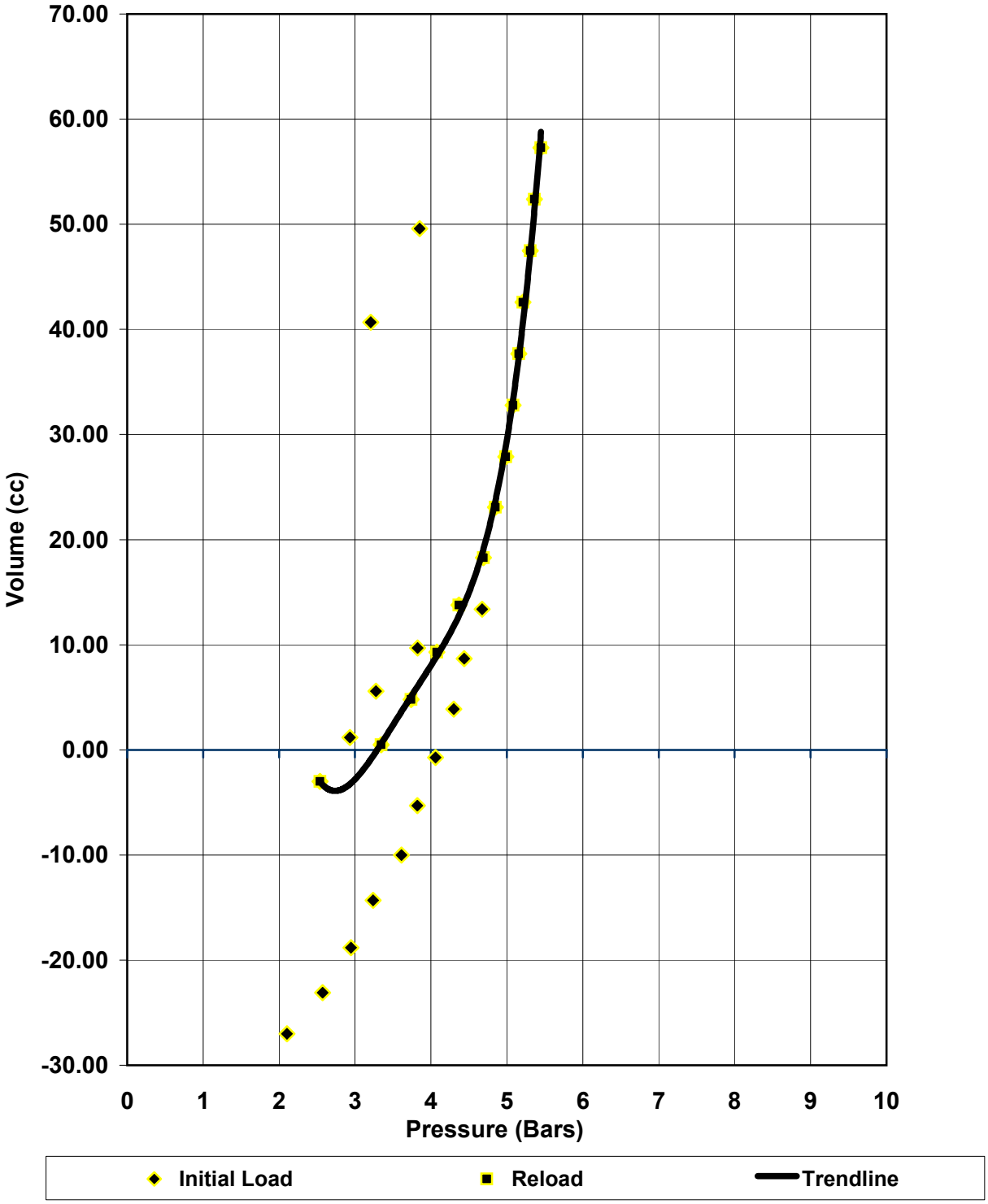
Pressuremter Plot
Boring: BII-22 Test: PM2-7 Depth: 81.5 feet



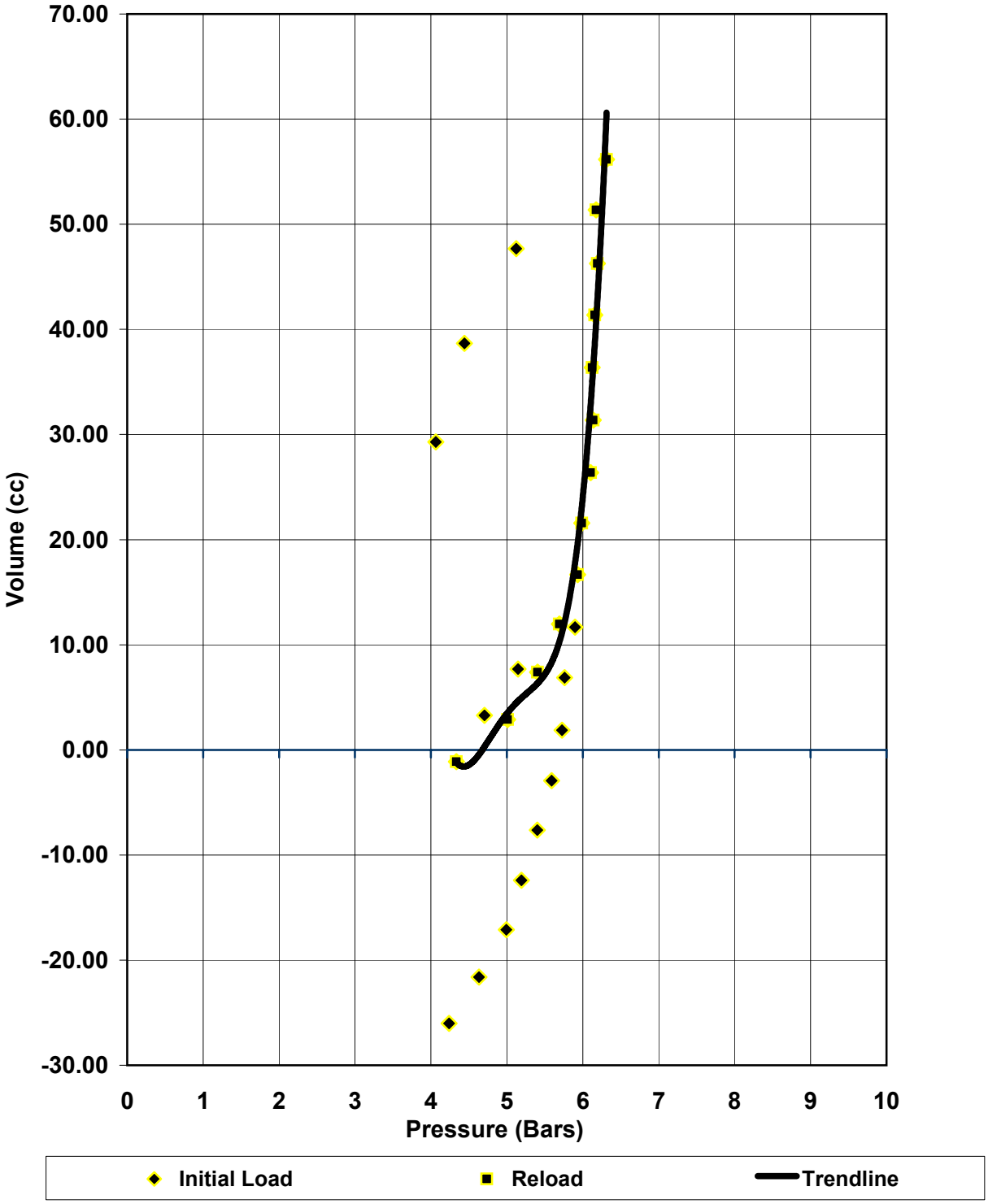
Pressuremter Plot
Boring: BI-3 Test: PMT-1 Depth: 33 feet



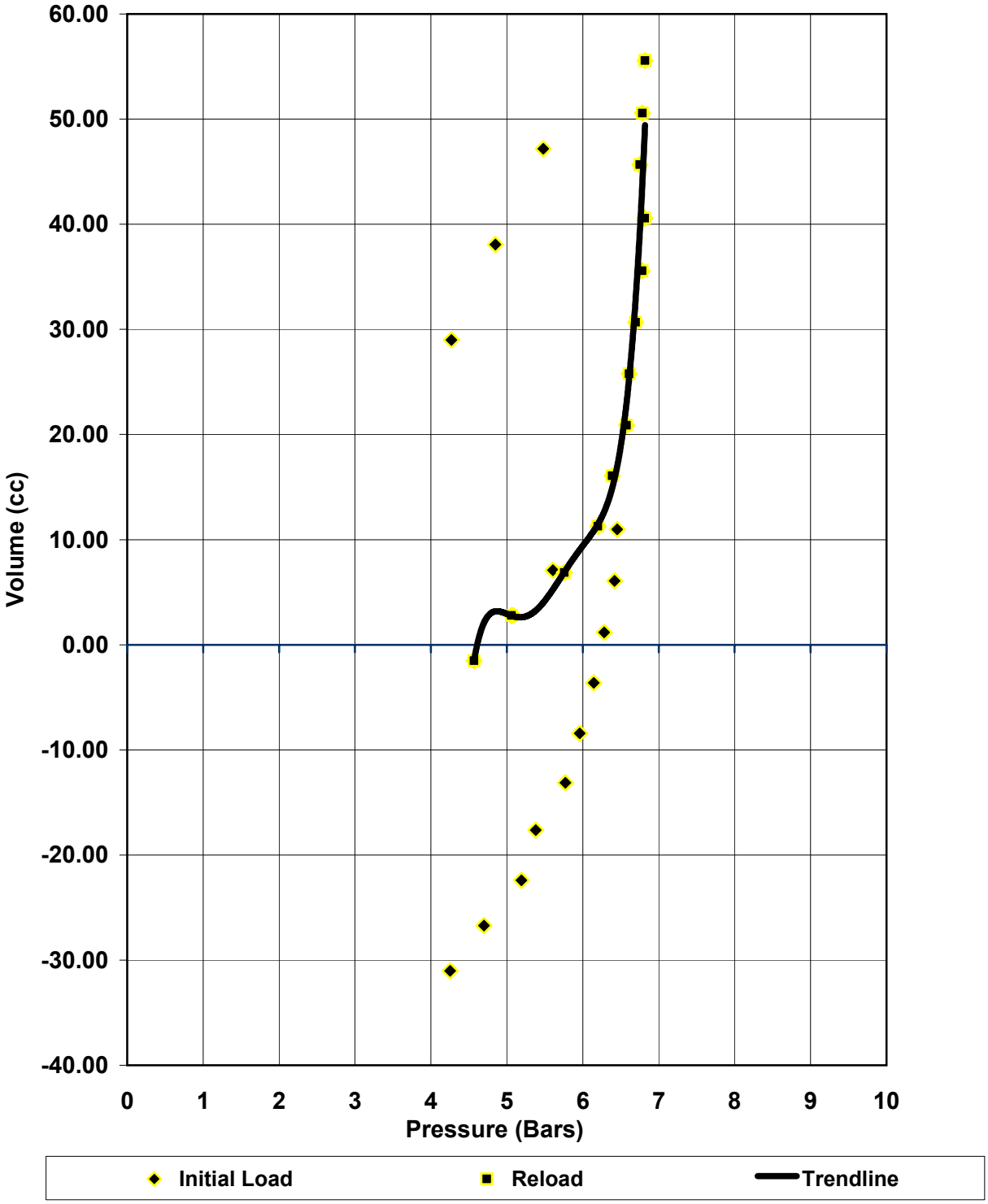
Pressuremter Plot
Boring: BI-3 Test: PMT-2 Depth: 43 feet



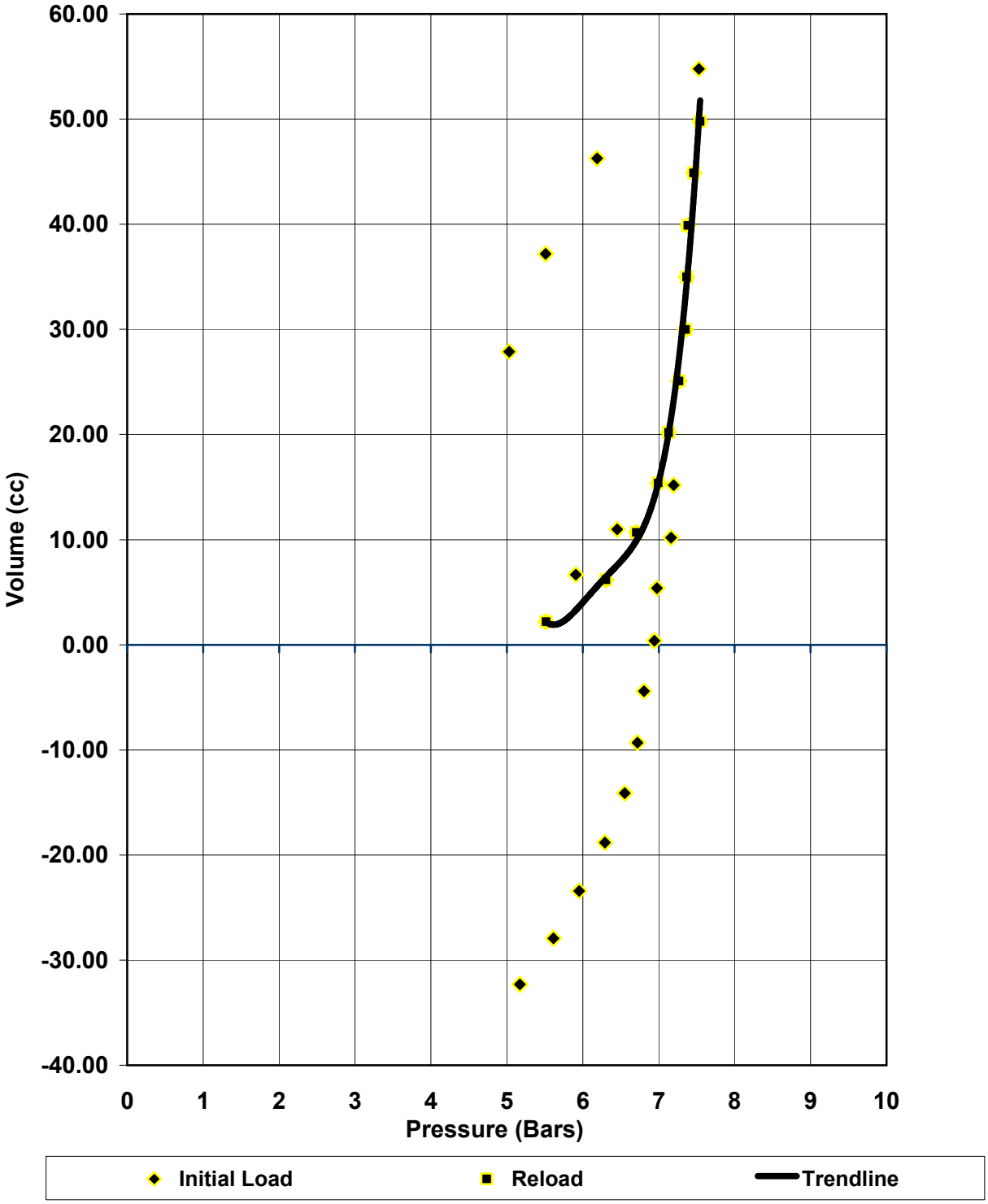
Pressuremter Plot
Boring: BI-3 Test: PMT-3 Depth: 53 feet



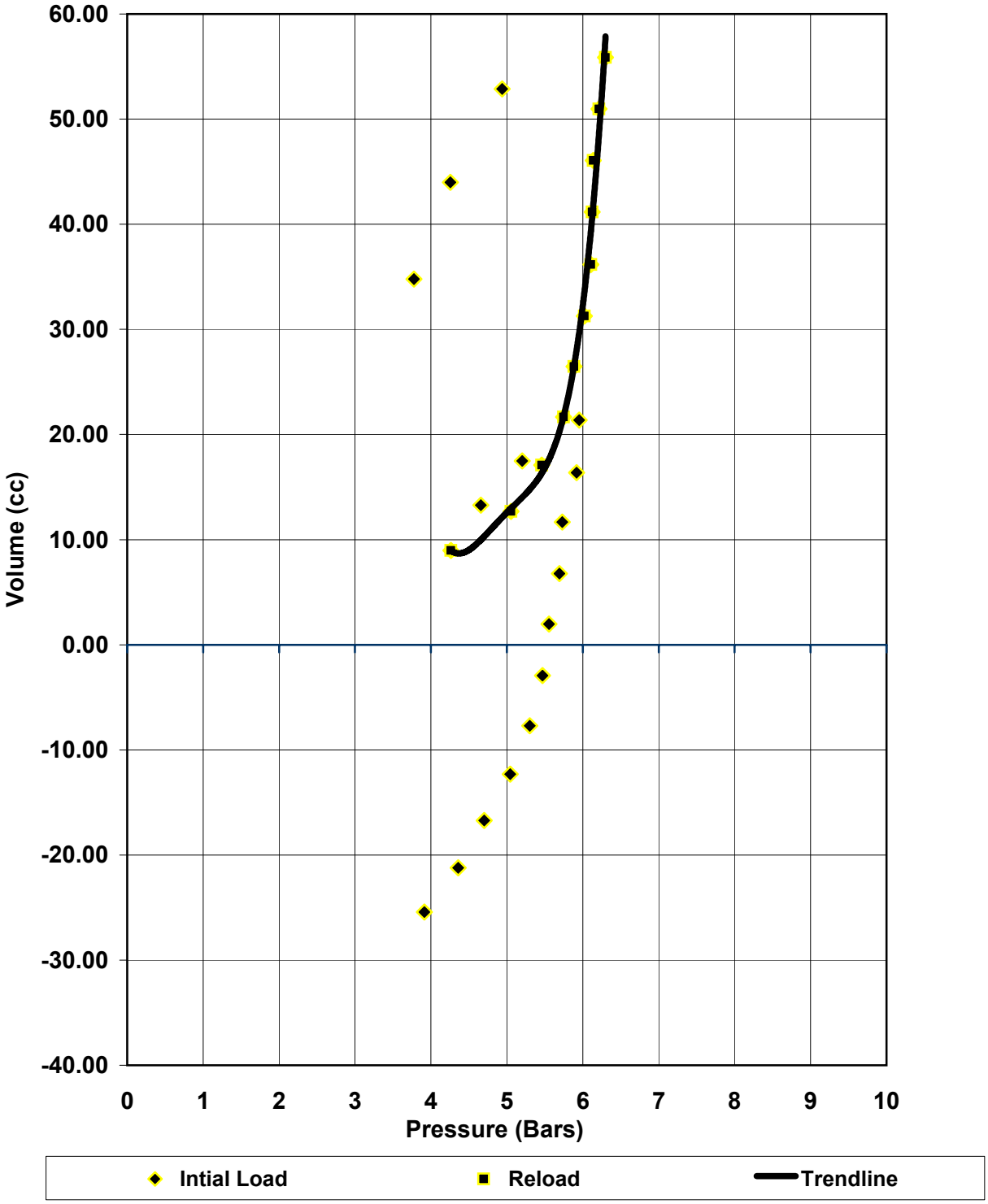
Pressuremter Plot
Boring: BI-3 Test: PMT-4 Depth: 63 feet

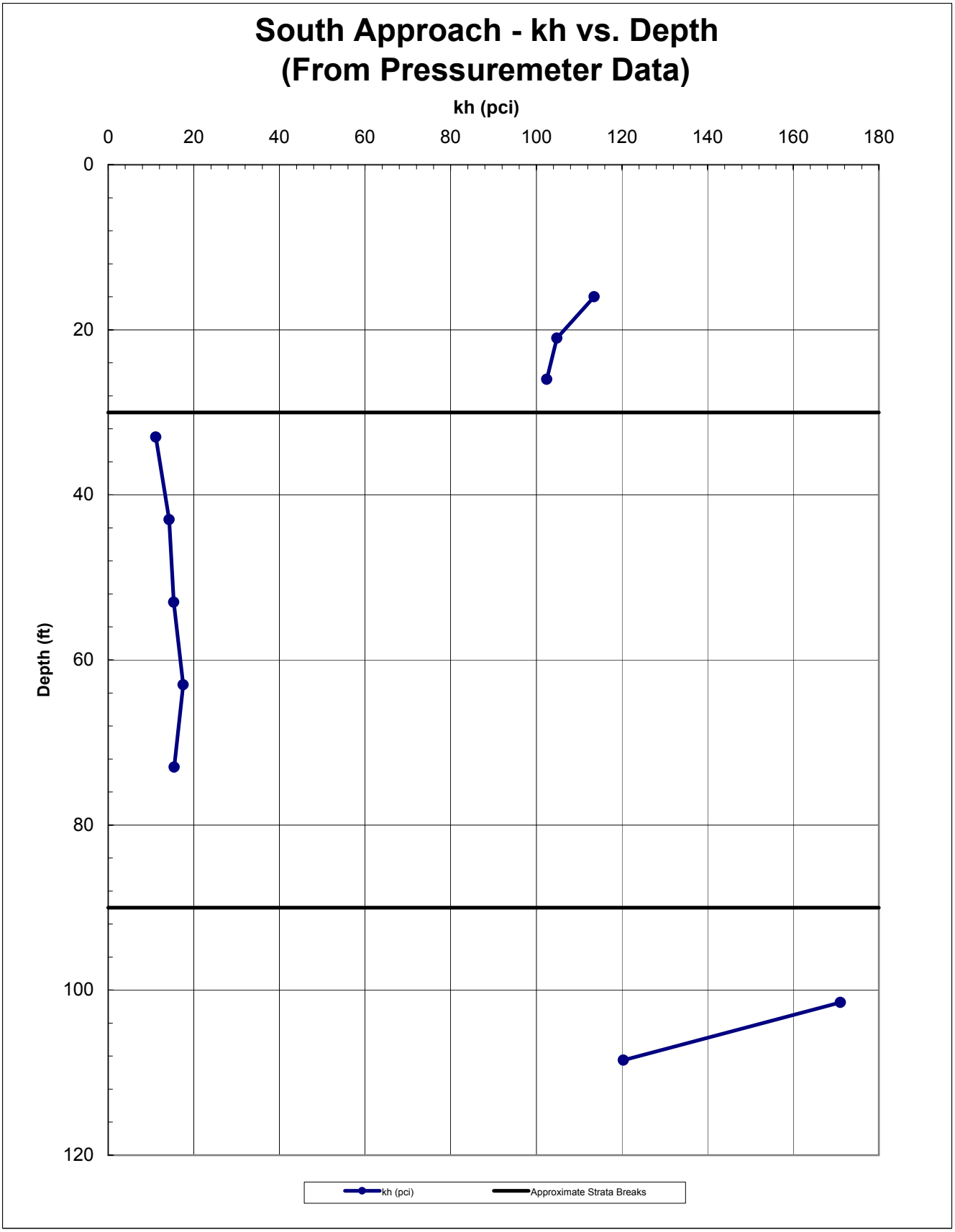


Pressuremter Plot
Boring: BI-3 Test: PMT-5 Depth: 73 feet

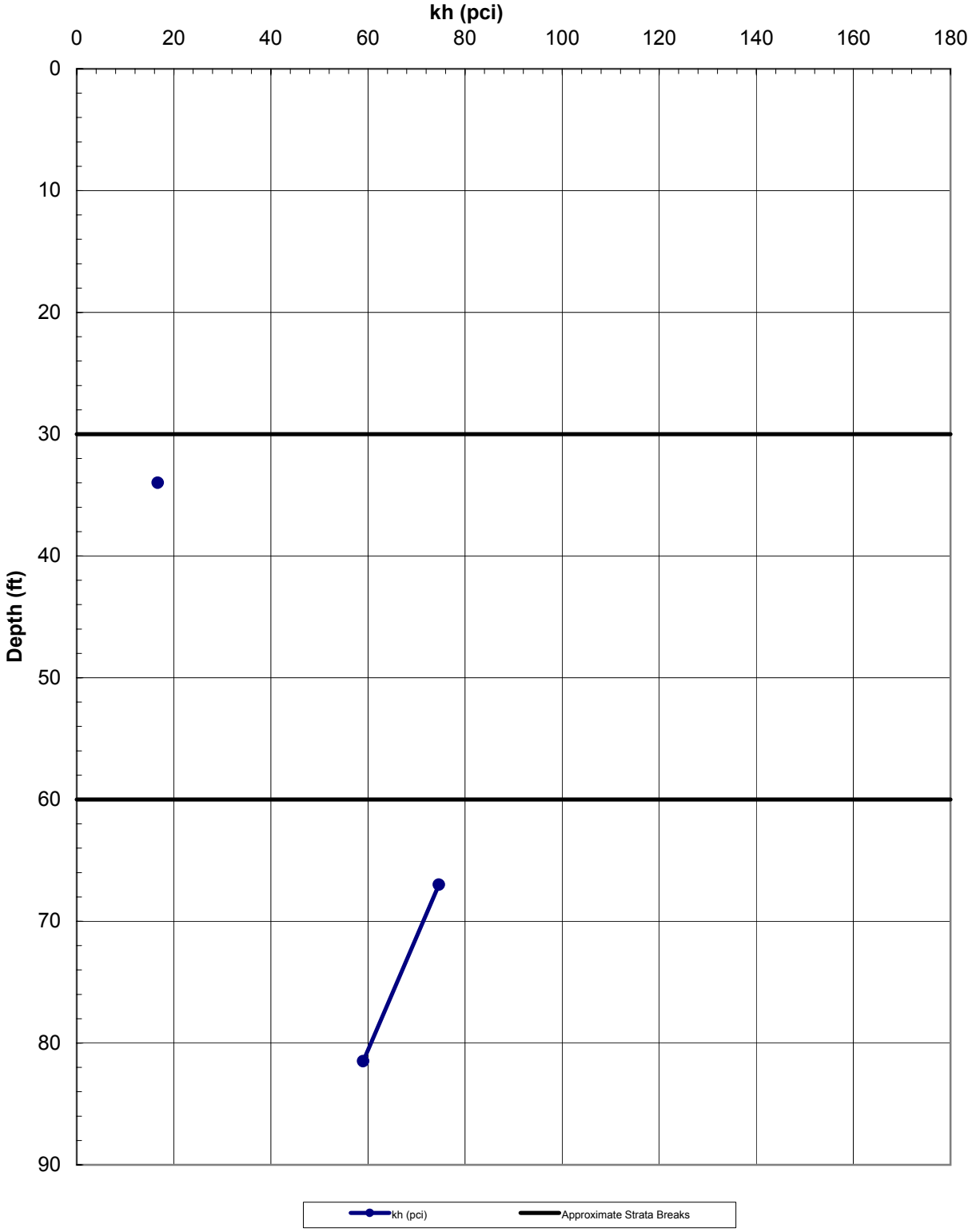


Pressuremter Plot
Boring: BI-10 Test: PMT-6 Depth: 34 feet




South Approach - kh vs. Depth
(From Pressuremeter Data)
kh (pci)
0
20
40
60
80
100
120
140
160
180
Depth (ft)
0
20
40
60
80
100
120
kh (pci)
Approximate Strata Breaks

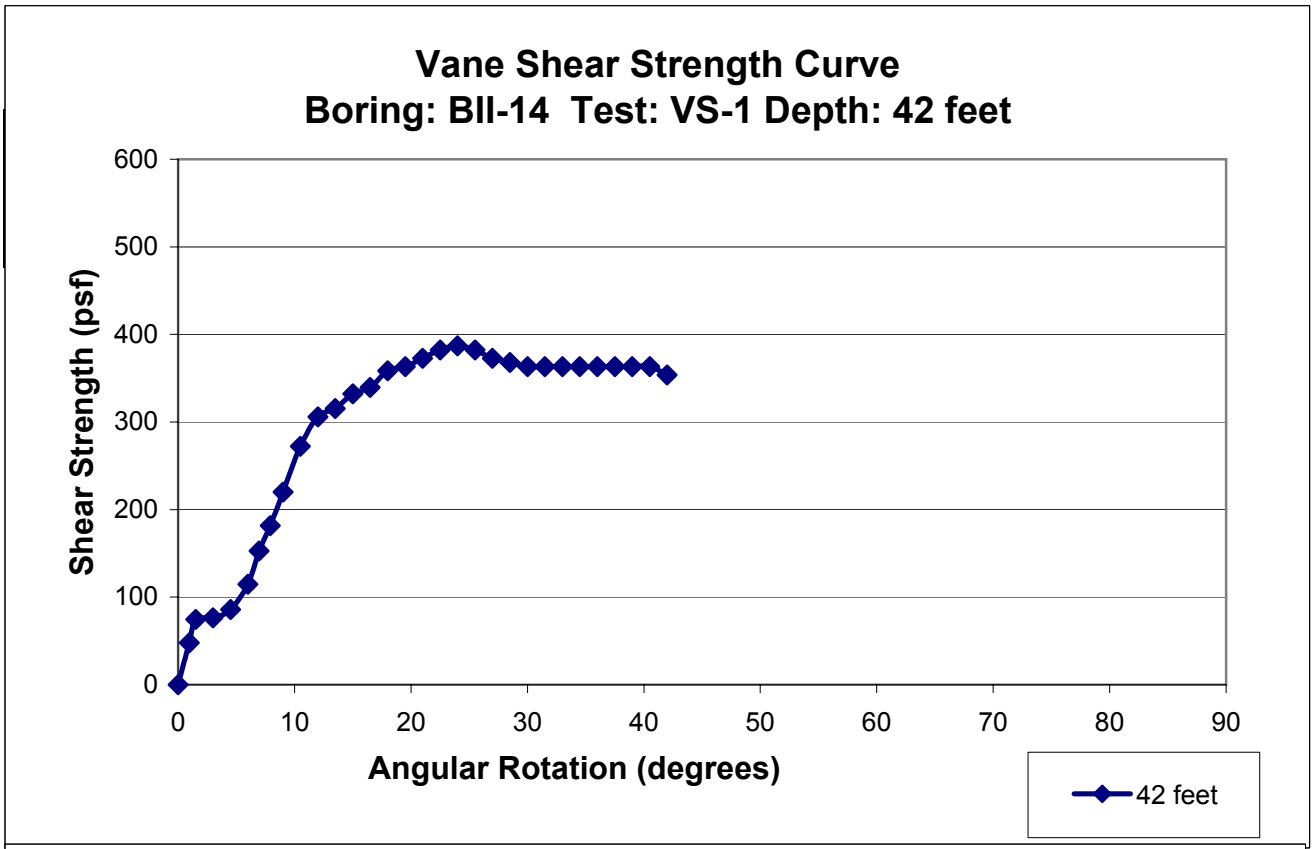
North Approach - kh vs. Depth
(From Pressuremeter Data)

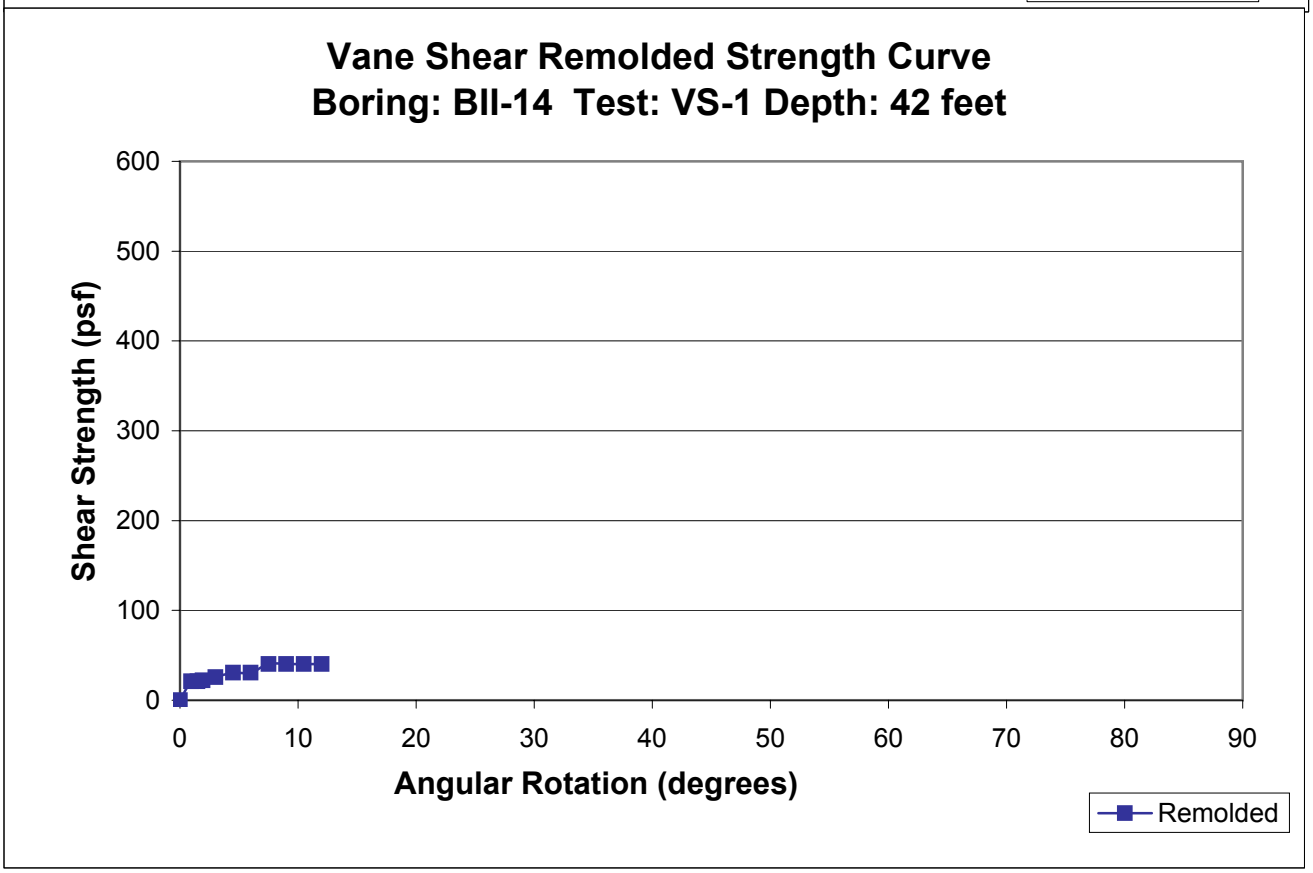


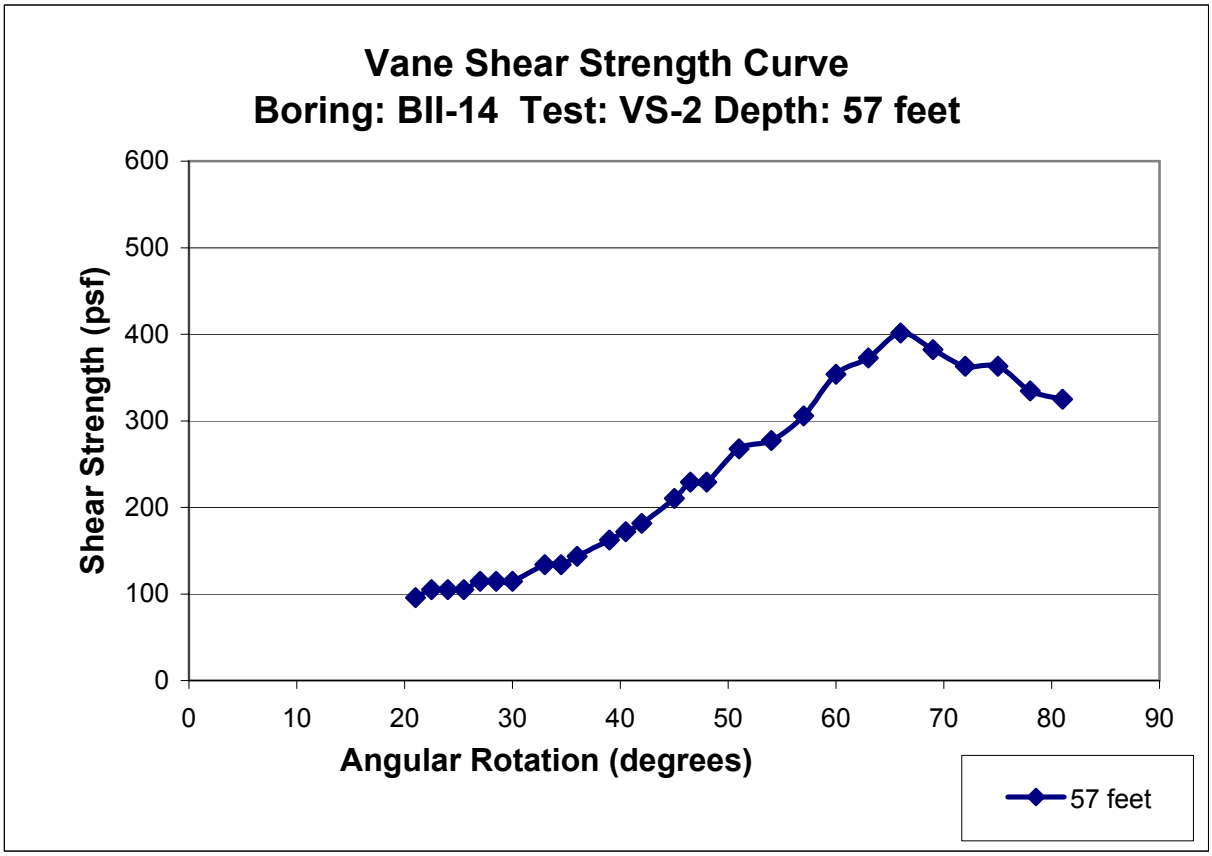
FIELD VANE SHEAR TESTS

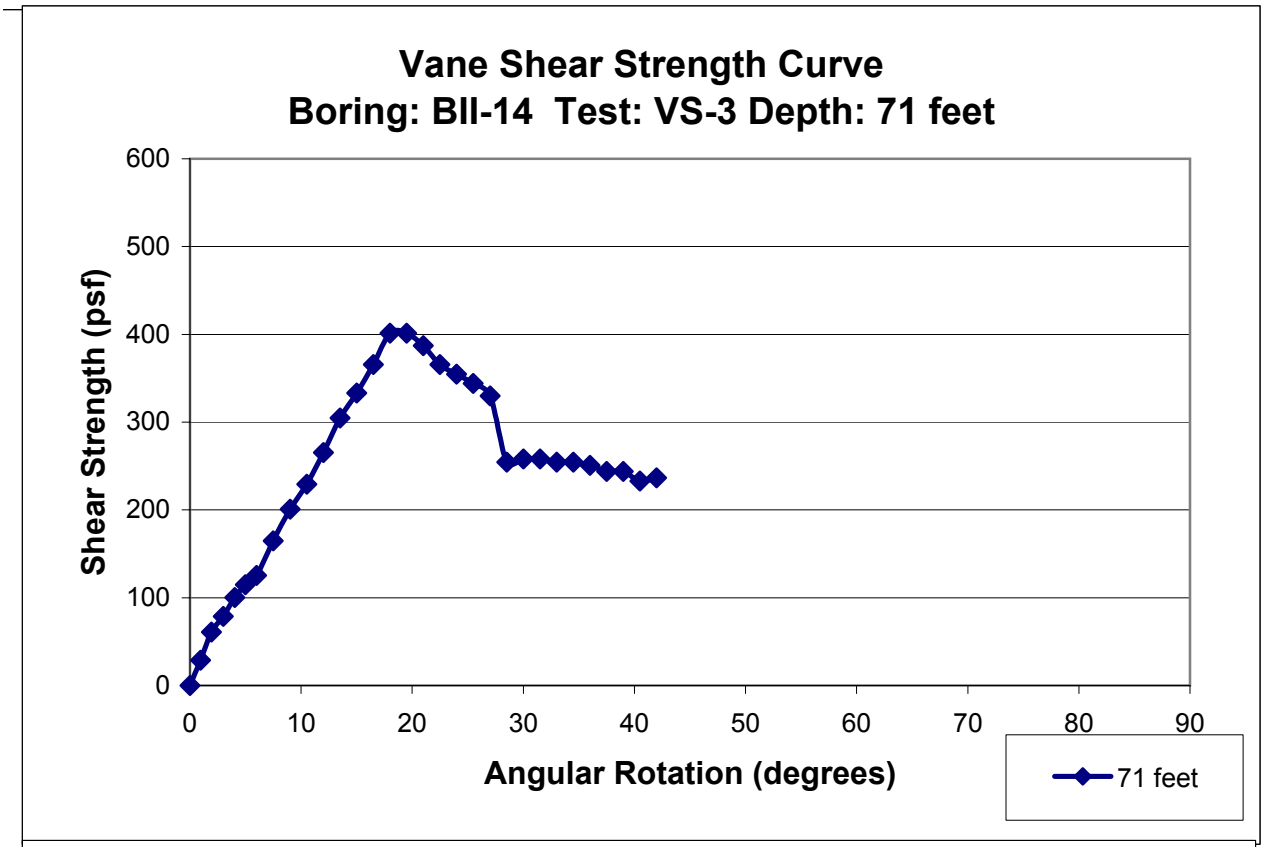
A field vane shear test is performed on in-situ soil to measure the in-situ soil strength. The vane shear test consists of placing a four-bladed vane in the undisturbed soil and rotating it from the surface. The torsional force required to shear the soil by the vane is recorded at each test interval.

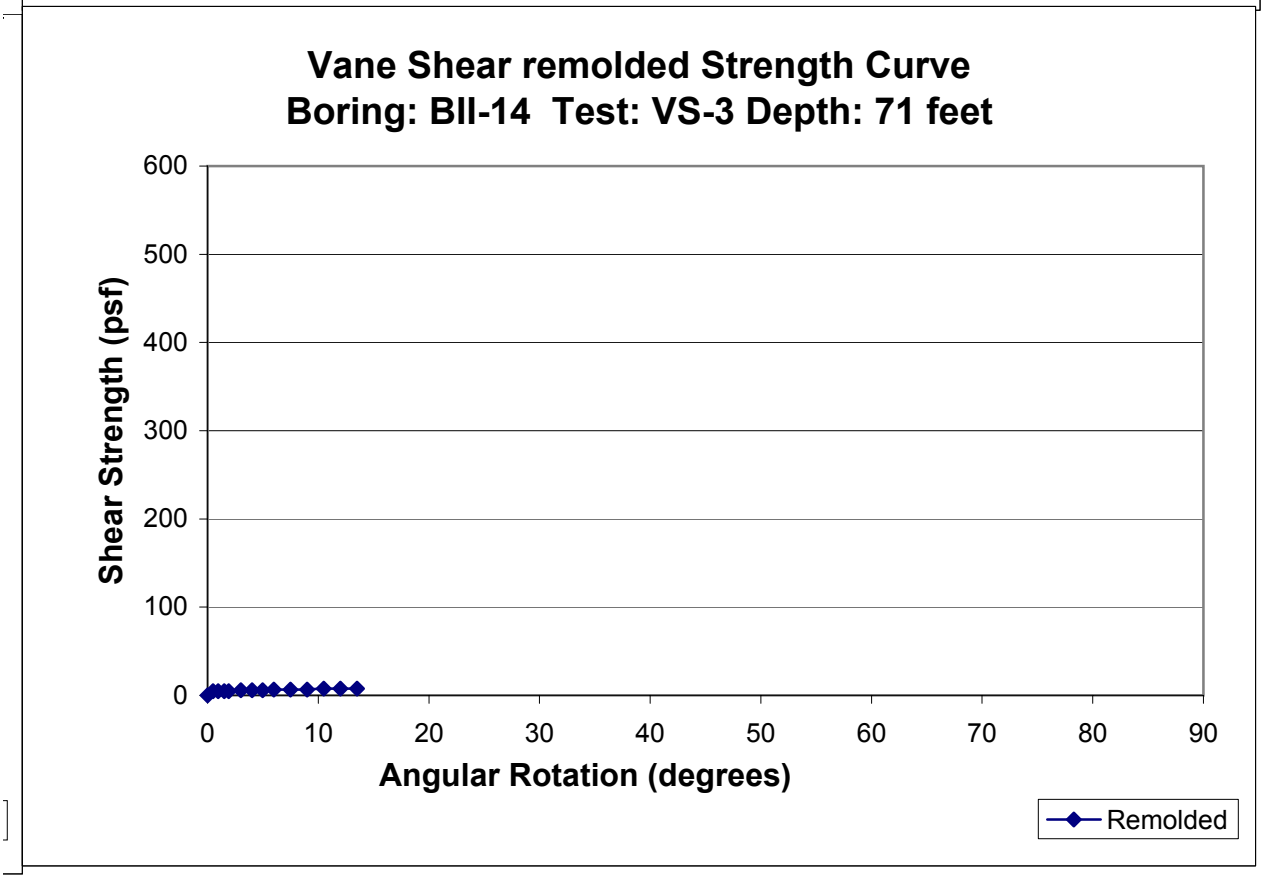
The testing is usually done in conjunction with the drilling of a borehole. At the desired depth, the boring is cleaned out and the drilling tools are removed from the boring. The vane device is pushed several inches below the bottom of the borehole into the undisturbed soil. Torque is applied until shearing failure occurs, and the shear strength of the soil is computed from the torque reading. Detailed procedures for performing a vane shear test are outlined in ASTM D 2578.

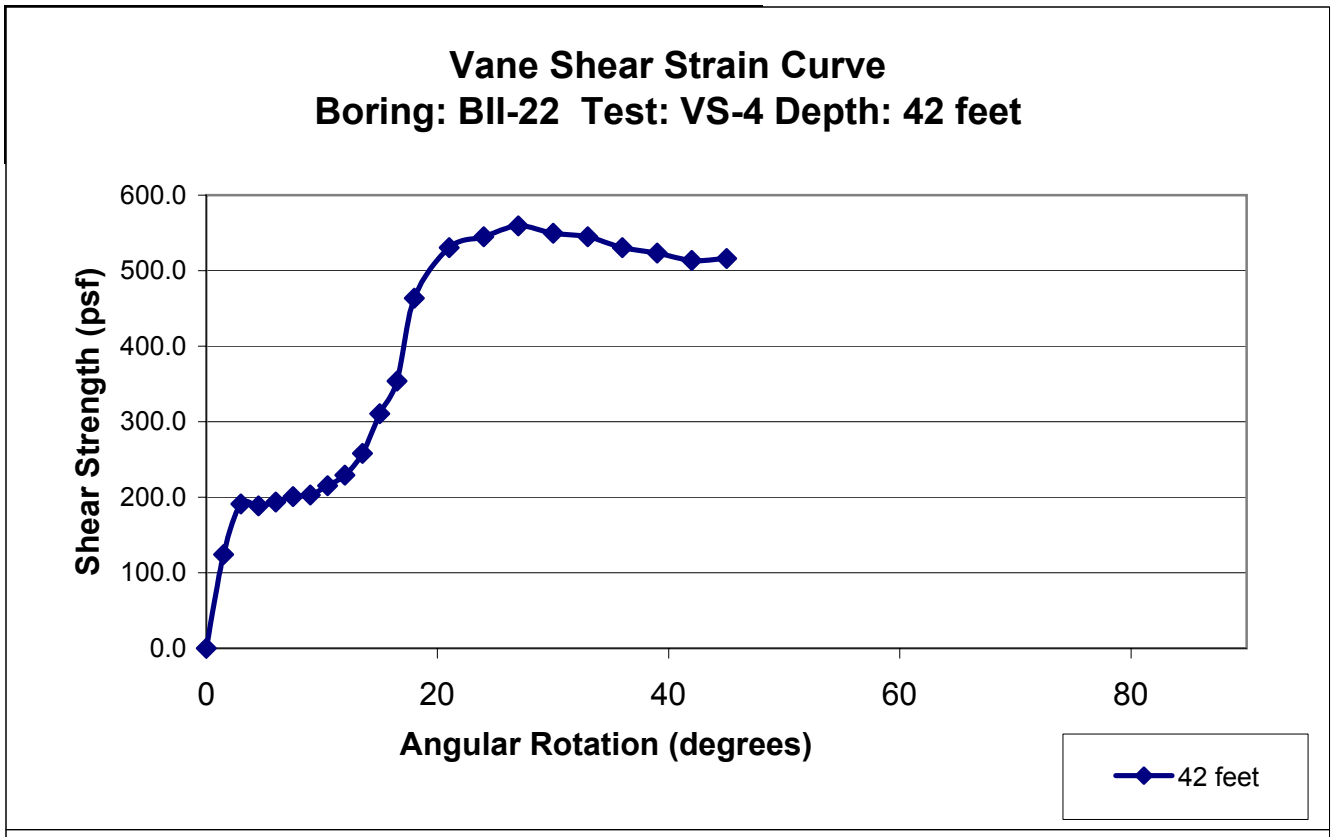

Vane Shear Strength Curve
Boring: BII-14 Test: VS-1 Depth: 42 feet
Shear Strength (psf)
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
Angular Rotation (degrees)
42 feet

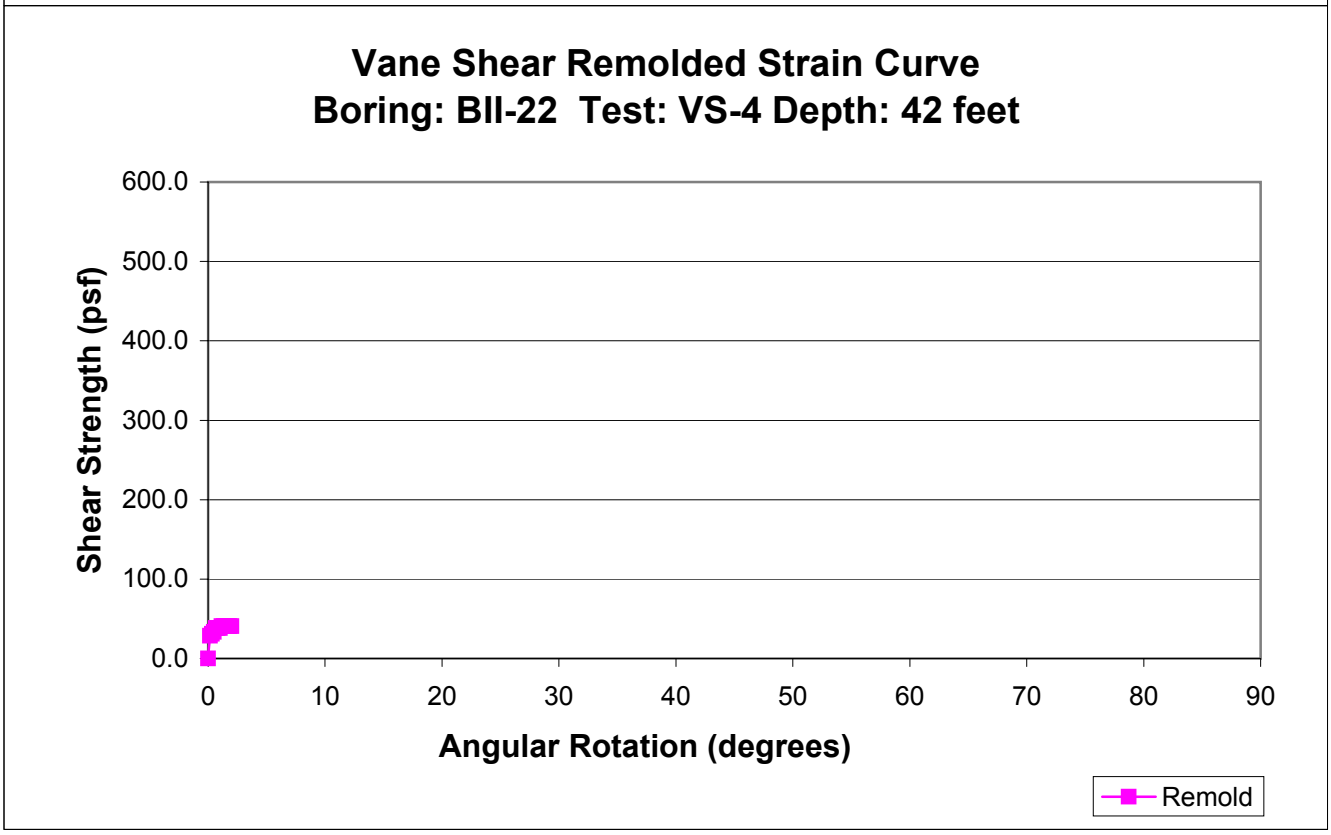

Vane Shear Remolded Strength Curve
Boring: BII-14 Test: VS-1 Depth: 42 feet
Shear Strength (psf)
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
Angular Rotation (degrees)
Remolded

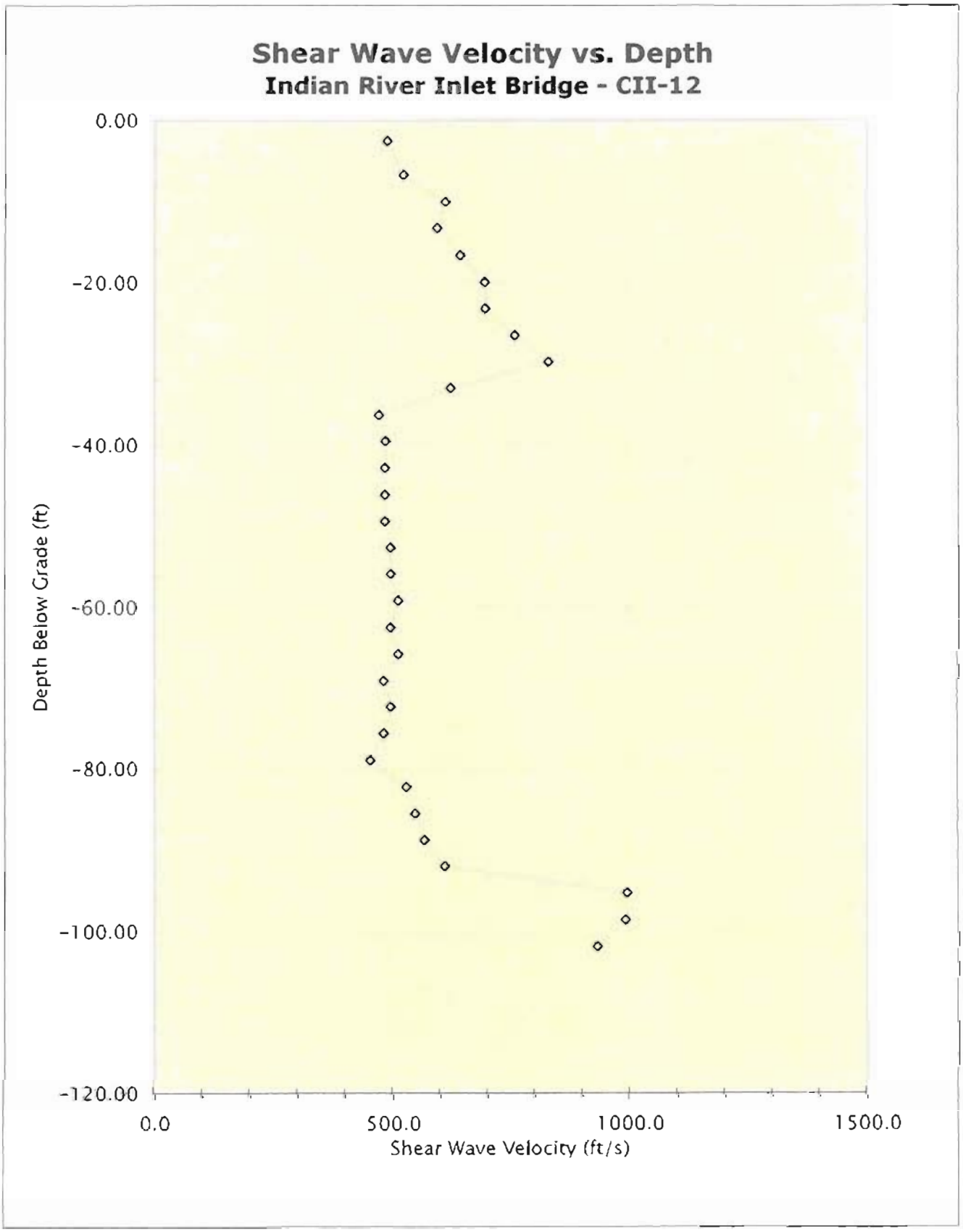

Vane Shear Strength Curve
Boring: BII-14 Test: VS-2 Depth: 57 feet
Shear Strength (psf)
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
Angular Rotation (degrees)
57 feet

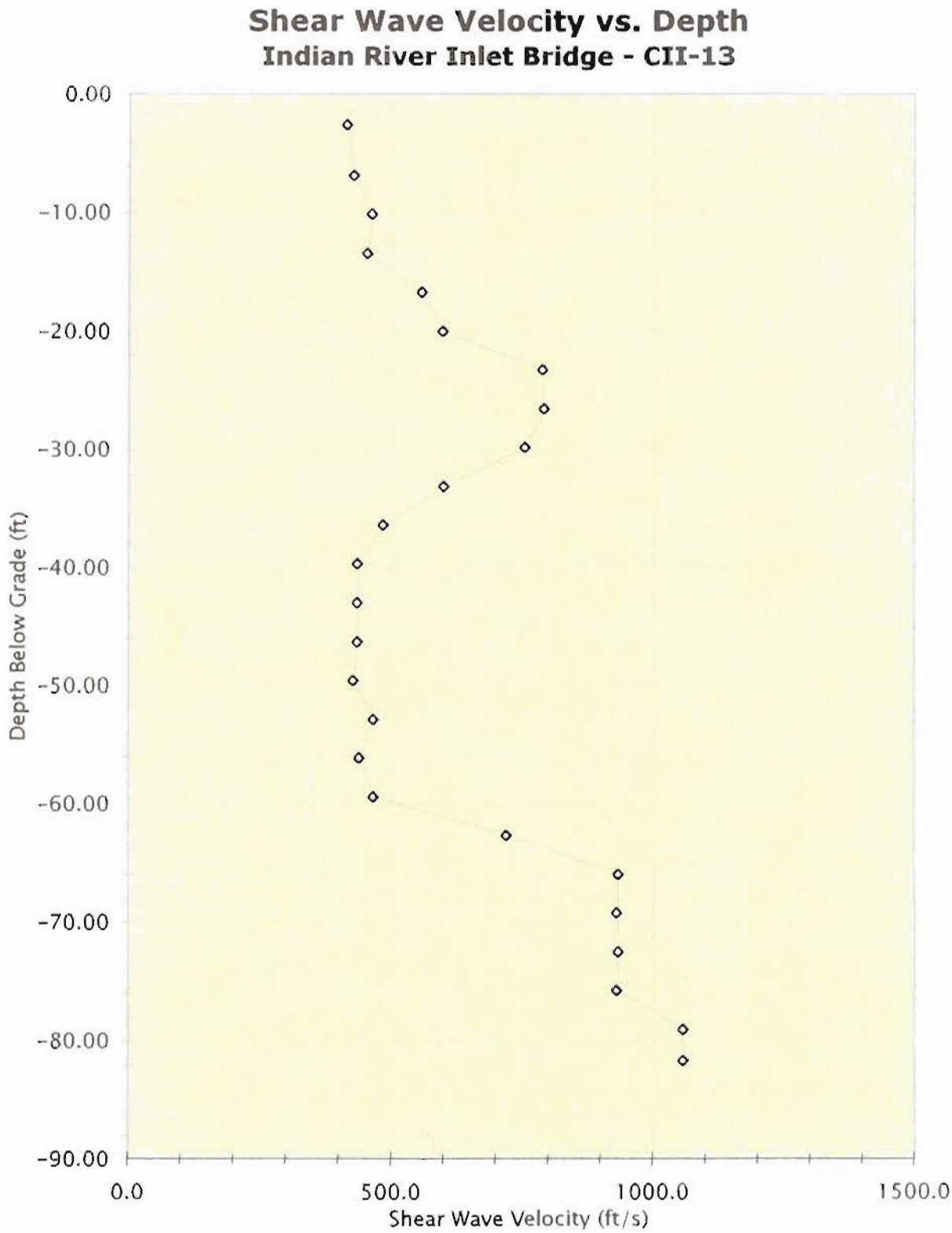

Vane Shear Strength Curve
Boring: BII-14 Test: VS-3 Depth: 71 feet
Shear Strength (psf)
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
Angular Rotation (degrees)
71 feet


Vane Shear remolded Strength Curve
Boring: BII-14 Test: VS-3 Depth: 71 feet
Shear Strength (psf)
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
Angular Rotation (degrees)
Remolded


Vane Shear Strain Curve
Boring: BII-22 Test: VS-4 Depth: 42 feet
Shear Strength (psf)
600.0
500.0
400.0
300.0
200.0
100.0
0.0
0
20
40
60
80
Angular Rotation (degrees)
42 feet


Vane Shear Remolded Strain Curve
Boring: BII-22 Test: VS-4 Depth: 42 feet
Shear Strength (psf)
600.0
500.0
400.0
300.0
200.0
100.0
0.0
0
10
20
30
40
50
60
70
80
90
Angular Rotation (degrees)
Remold

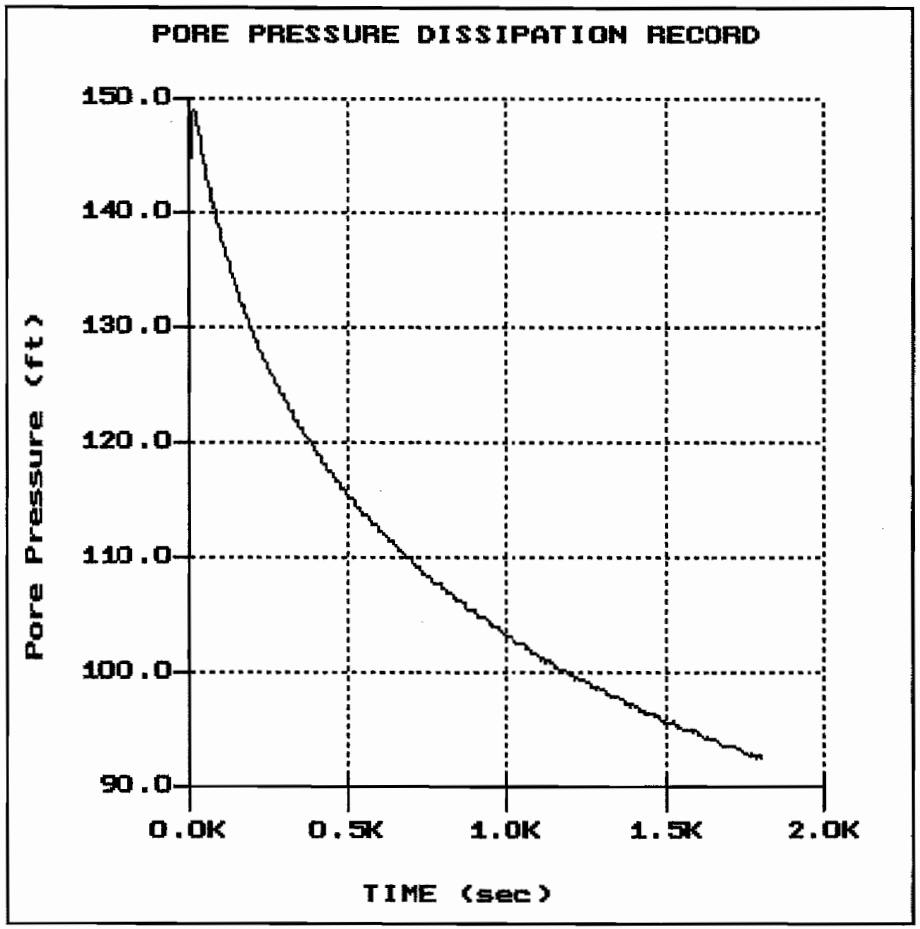

Shear Wave Velocity vs. Depth
Indian River Inlet Bridge - CII-12
0.00
-20.00
-40.00
-60.00
-80.00
-100.00
-120.00
Depth Below Grade (ft)
0.0
500.0
1000.0
1500.0
Shear Wave Velocity (ft/s)


Shear Wave Velocity vs. Depth
Indian River Inlet Bridge - CII-13
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
-60.00
-70.00
-80.00
-90.00
Depth Below Grade (ft)
0.0
500.0
1000.0
1500.0
Shear Wave Velocity (ft/s)

MACTEC

Hole:CII-07
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:01:03 14:26

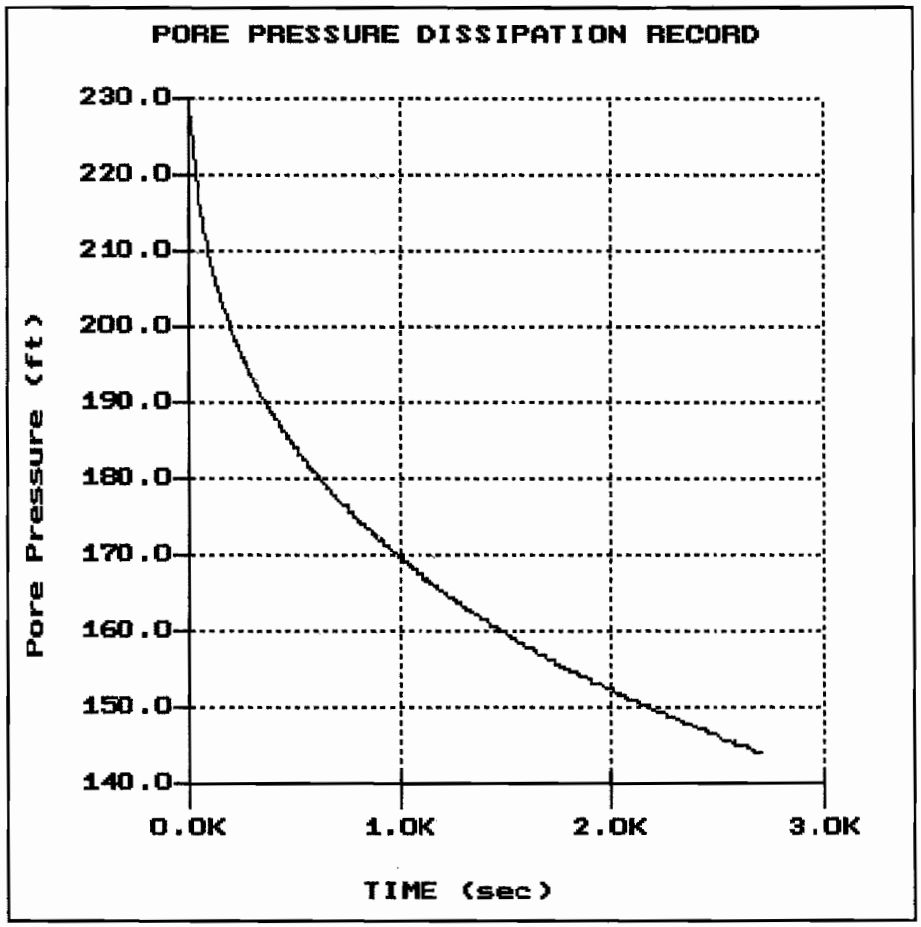


File: 762CP007.PPD
Depth (m): 14.65
(ft): 48.06
Duration : 1800.0s
U-min: 92.54 1800.0s
U-max: 149.00 15.0s

MACTEC

Hole:CII-09
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:01:03 16:01

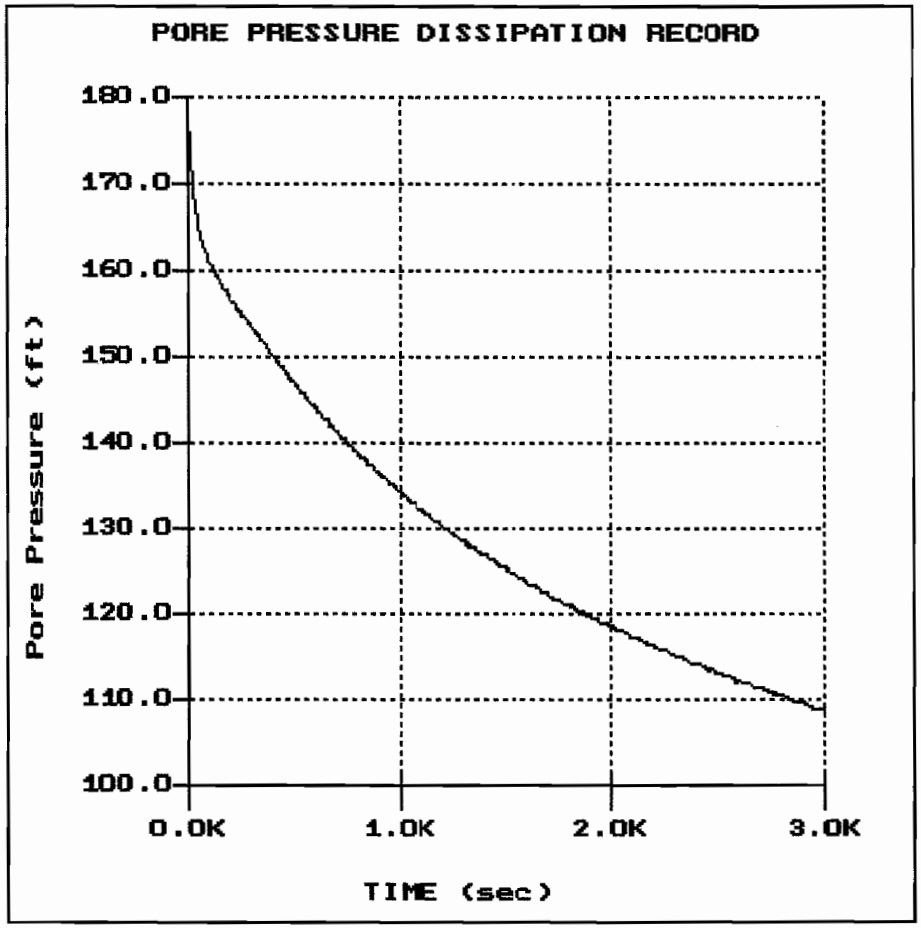


File: 762CP009.PPD
Depth (m): 20.75
(ft): 68.08
Duration : 2700.0s
U-min: 143.98 2700.0s
U-max: 227.60 5.0s

MACTEC

Hole:CII-10
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:01:03 12:30

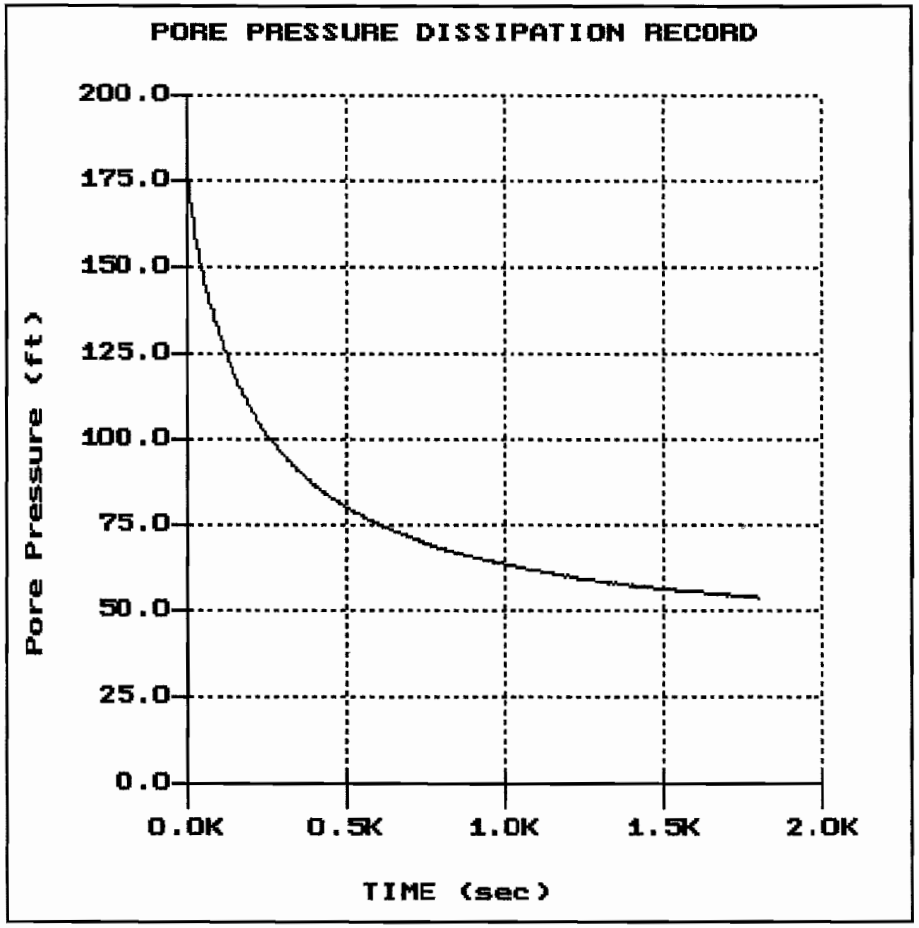


File: 762CP010.PPD
Depth (m): 16.80
(ft): 55.12
Duration : 3000.0s
U-min: 108.73 3000.0s
U-max: 175.80 10.0s

MACTEC

Hole:CII-11
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:01:03 09:50



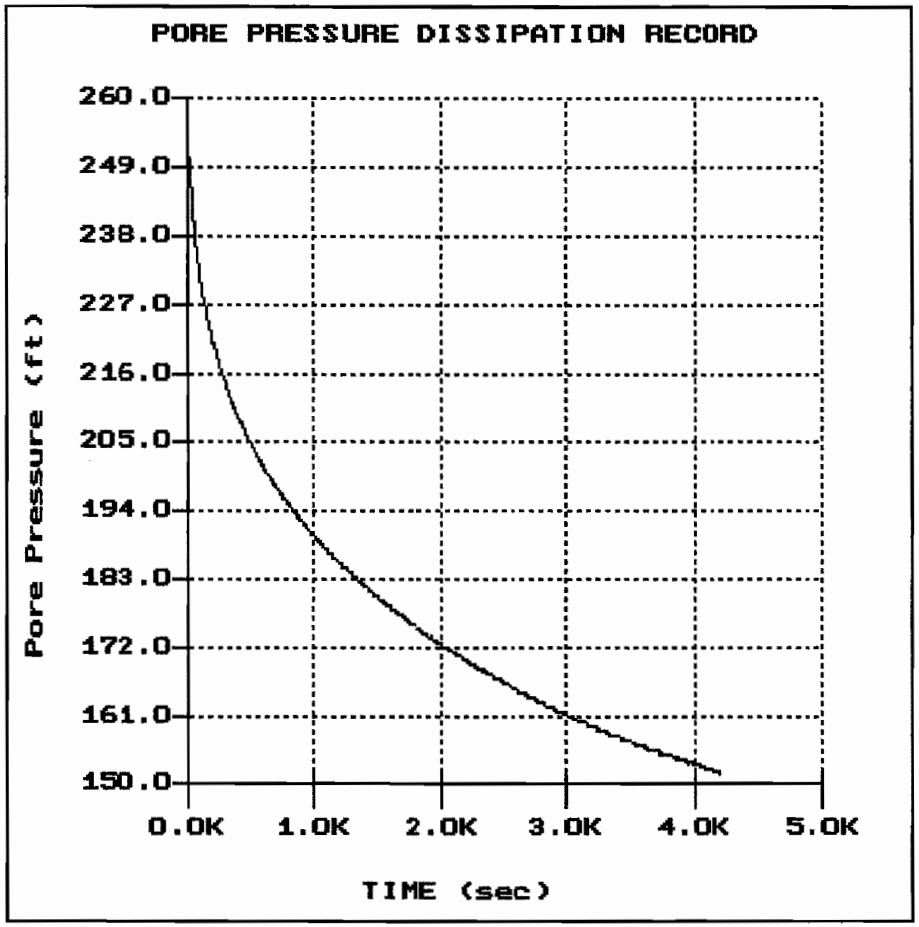
File: 762CP011.PPD
Depth (m): 12.30
(ft): 40.35
Duration : 1800.0s
U-min: 53.64 1800.0s
U-max: 175.00 5.0s

MACTEC

Hole:CII-11
Location:Indian River Br.

Cone:20 Ton AD139
Date:10:01:03 09:50

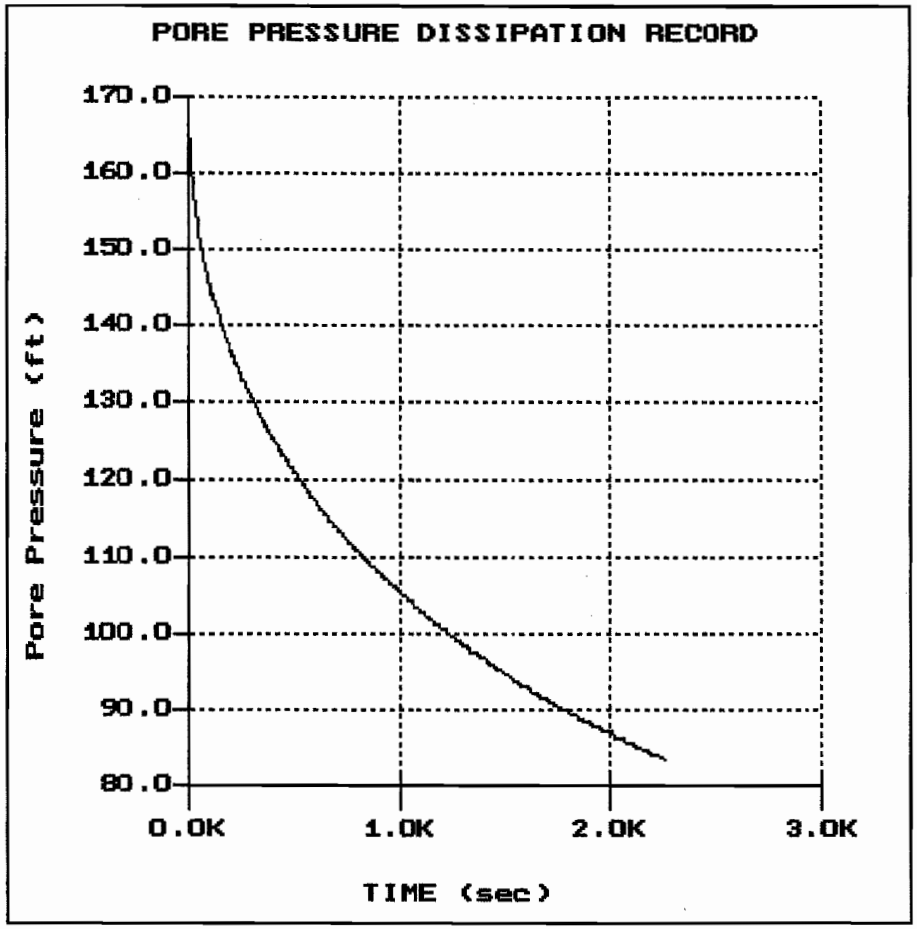
File: 762CP011.PPD
Depth (m): 21.35
(ft): 70.05
Duration : 4200.0s
U-min: 151.67 4200.0s
U-max: 250.32 10.0s



MACTEC

Hole:CII-13
Location:Indian River Br.

Cone:20 Ton AD139
Date:09:30:03 12:03



File: 762CP013.PPD
Depth (m): 12.20
(ft): 40.03
Duration : 2250.0s
U-min: 83.35 2245.0s
U-max: 166.64 0.0s

LABORATORY TESTS

SOIL CLASSIFICATION

Soil classifications provide a general guide to the engineering properties of various soil types. Representative samples obtained during drilling operations are examined in our laboratory by an engineer. Soils are visually classified according to ASTM D 2488 based on color, texture, and consistency (determined from the number of blows per foot in standard penetration tests).

The classification system discussed above is primarily qualitative. For detailed soil classification, two laboratory tests are required: grain size analysis and index tests. Using these test results, soil can be classified according to the AASHTO, FAA, or UNIFIED Classification Systems (ASTM D 2487). Soil classifications, along with in-place physical soil properties, provide an index for estimating the behavior of a soil.

GRAIN SIZE ANALYSIS

Grain size analysis (ASTM D 422) are performed to determine the distribution of particle sizes in soil. Samples are prepared for testing according to ASTM D 2217. Particles passing the No. 200 sieve (0.074 mm opening) are labeled as fines (silts and clays). Particles retained on the No. 200 sieve are labeled the coarse fraction of the sample (sands and gravels). Further differentiation is possible by passing the sample through a standard set of nested sieves and/or by performing hydrometer tests, in which particles are suspended in water and the particle size distribution is calculated from the measured settlement rate.

INDEX TESTS

Index tests (ASTM D 4318) are performed to determine the moisture content boundaries between the liquid, plastic, and solid states of soils. These boundaries are called the Liquid Limit (LL) and Plastic Limit (PL). From these we derive the Plasticity Index (PI). Together, the LL, PL, and PI are referred to as the Atterberg Limits.

MOISTURE CONTENT

The natural moisture content is determined in accordance with ASTM D 854 by oven-drying and weighing the sample.

MACTEC Engineering and Consulting Services, Inc.
22455 Davis Drive, Suite 100
Sterling, Virginia 20164

Summary of Soil Classification Test Data

PROJECT NAME: Indian River Inlet Bridge
PROJECT NUMBER: **3530-03-1245 Task 02**
DATE: **12/08/03**

SAMPLE			NAT. MOIST.	ATTERBERG LIMITS			
ID	DEPTH (ft.)	TYPE	(%)	L.L.	P.L.	P.I.	COMMENT
BII-9	28.5-30	Jar	48.8	40	27	13	
BII-9	43.5-45	Jar	57.9	46	29	17	
BII-9	78.5-80	Jar	34.7	NLL	NP	---	
BII-9	88.5-90	Jar	17.8	NLL	NP	---	
BII-10	33.5-35	Jar	52.8	42	27	15	
BII-10	68.5-70	Jar	74.6	51	34	17	
BII-12	33.5-35	Jar	59.1	39	27	12	
BII-12	73.5-75	Jar	60.1	54	34	20	
BII-12	88.5-90	Jar	90.8	58	42	16	
BII-14	33.5-35	Jar	48.2	43	27	16	
BII-14	83.5-85	Jar	64.6	58	36	22	
BII-15	38.5-40	Jar	45.7	41	25	16	
BII-15	63.5-65	Jar	69.4	67	37	30	
BII-18	38.5-40	Jar	49.2	45	25	20	
BII-18	73.5-75	Jar	56.7	84	60	24	
BII-18	138.5-140	Jar	24.2	31	18	13	
BII-18	163.5-165	Jar	30.0	32	20	12	
BII-19	38.5-40	Jar	38.2	35	20	15	
BII-19	58.5-60	Jar	38.8	48	25	23	
BII-19	88.5-90	Jar	59.8	63	37	26	
BII-19	123.5-125	Jar	28.0	NLL	NP	---	
BII-19	138.5-140	Jar	24.4	32	19	13	
BII-19	148.5-150	Jar	27.9	51	21	30	
BII-19	163.5-165	Jar	23.6	21	18	3	
BII-22	33.5-35	Jar	49.3	62	33	29	
BII-22	53.5-55	Jar	50.6	52	26	26	
BII-22	93.5-95	Jar	24.0	NLL	NP	---	
BII-22	143.5-145	Jar	19.0	23	14	9	
BII-25	33.5-35	Jar	50.1	35	24	11	

NOTES: 1. L.L.= Liquid Limit
P.L.= Plastic Limit
P.I. = Plasticity Index

12/9/03

Reviewed
Chan Tin
Manager, Laboratory Services

Atterberg Summary.xls

MACTEC Engineering and Consulting Services, Inc.
22455 Davis Drive, Suite 100
Sterling, Virginia 20164

Summary of Atterberg Limits Test Data

PROJECT NAME: Indian River Inlet Bridge
PROJECT NUMBER: **3530-03-1245 Task 02**
DATE: **12/08/03**

SAMPLE			NAT. MOIST.	ATTERBERG LIMITS			
ID	DEPTH (ft.)	TYPE	(%)	L.L.	P.L.	P.I.	COMMENT
BII-25	53.5-55	Jar	59.6	47	33	14	
BII-33	6-7.5	Jar	70.3	47	33	14	
BII-6 (HA-1)	0-1	Jar	11.1	NLL	NP	--	
BII-6 (HA-2)	1-2	Jar	30.5	NLL	NP	--	
BII-14 (HA-1)	0-1	Jar	88.7	NLL	NP	--	
BII-14 (HA-2)	1-2	Jar	55.8	29	22	7	
BII-15 (HA-1)	0-1	Jar	24.3	NLL	NP	--	
BII-15 (HA-2)	1-2	Jar	25.1	NLL	NP	--	

NOTES: 1. L.L.= Liquid Limit
P.L.= Plastic Limit
P.I. = Plasticity Index

12/23/03

Reviewed
Chan Tin
Manager, Laboratory Services

MACTEC

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22455 Davis Drive, Suite 100
Sterling, Virginia 20164

Summary of Percent than #200 Sieve Test Data

PROJECT NAME: Indian River Inlet Bridge
PROJECT NUMBER: **3530-03-1245 Task 02**
DATE: **12/08/03**

SAMPLE			NAT.	% RETAINED	% FINER	
ID	DEPTH (ft.)	TYPE	MOIST. (%)	NO. 4 SIEVE	NO. 200 SIEVE	COMMENT
BII-9	63.5-65	Jar	61.7	0.0	97.3	
BII-9	98.5-100	Jar	19.4	0.0	8.0	
BII-10	53.5-55	Jar	59.1	0.3	94.1	
BII-10	98.5-100	Jar	17.5	17.5	4.6	
BII-12	108.5-110	Jar	18.7	0.0	97.0	
BII-14	43.5-45	Jar	57.0	0.0	22.4	
BII-14	98.5-100	Jar	16.2	2.4	14.1	
BII-15	48.5-50	Jar	53.8	1.1	97.1	
BII-15	78.5-80	Jar	62.6	0.0	88.7	
BII-18	48.5-50	Jar	55.6	0.0	96.0	
BII-18	108.5-110	Jar	21.6	0.6	29.3	
BII-18	123.5-125	Jar	28.4	0.0	57.8	
BII-18	158.5-160	Jar	27.7	0.0	83.2	
BII-19	48.5-50	Jar	55.9	0.0	83.1	
BII-19	73.5-75	Jar	56.3	0.0	99.0	
BII-19	143.5-145	Jar	20.8	0.0	41.3	
BII-19	153.5-155	Jar	27.3	0.0	93.8	
BII-19	168.5-170	Jar	15.6	0.0	43.8	
BII-22	118.5-120	Jar	20.9	0.0	14.2	
BII-25	63.5-65	Jar	14.2	14.0	5.4	
BII-27	3.5-5	Jar	17.1	1.1	3.0	
BII-28	1-2.5	Jar	16.5	0.0	10.5	
BII-30	3.5-5	Jar	21.2	0.0	3.4	
BII-33	1-2.5	Jar	16.3	0.1	6.0	
BII-35	1-2.5	Jar	5.0	0.0	7.2	
BII-36	1-2.5	Jar	15.4	1.3	1.0	
BII-6 (HA)	2-3	Jar		0.0	2.2	
BII-6 (HA)	3-4	Jar		0.0	3.6	
BII-14 (HA)	2-3	Jar		0.0	3.2	

NOTES:

Reviewed by: 12/20/03

MACTEC Engineering and Consulting Services, Inc.
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Sterling, Virginia 20164

Summary of Percent than #200 Sieve Test Data

PROJECT NAME: Indian River Inlet Bridge
PROJECT NUMBER: **3530-03-1245 Task 02**
DATE: **12/08/03**

SAMPLE ID	DEPTH (ft.)	TYPE	NAT. MOIST. (%)	% RETAINED NO. 4 SIEVE	% FINER NO. 200 SIEVE	COMMENT
BII-14 (HA)	3-4	Jar		0.0	27.8	
BII-15 (HA)	2-3	Jar		0.0	17.9	
BII-15 (HA)	3-4	Jar		0.0	1.9	

NOTES:

Reviewed by: 12/23/03

MACTEC ENGINEERING AND CONSULTING, INC
22455 Davis Drive, Suite 100
Sterling, Virginia 20164

Moisture Content Worksheet

ASTM D2216

Project Name: Indian River Inlet Bridge
Project Number: 3530-03-1245 Task 02
Date: 12/07/03

Reviewed by: 12/8/03

Sample ID	BII-1	BII-1	BII-2	BII-2	BII-3	BII-3	BII-4	BII-5
Depth (ft)	3.5 - 5	6 - 7.5	1 - 2.5	3.5 - 5	3.5 - 5	6 - 7.5	3.5 - 5	3.5 - 5
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	19.7	19.9	20.2	19.3	18.3	19.7	21.2	17.2

Sample ID	BII-5	BII-6	BII-6	BII-8	BII-8	BII-9	BII-9	BII-9
Depth (ft)	8.5 - 10	1 - 2.5	8.5 - 10	3.5 - 5	6 - 7.5	1 - 2.5	8.5 - 10	28.5 - 30
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	18.2	18.9	17.3	13.3	17.8	6.3	22.3	48.8

Sample ID	BII-9	BII-9	BII-9	BII-9	BII-9	BII-10	BII-10	BII-10
Depth (ft)	43.5 - 45	63.5 - 65	78.5 - 80	88.5 - 90	98.5 - 100	3.5 - 5	33.5 - 35	53.5 - 55
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	57.9	61.7	34.7	17.8	19.4	15.7	52.8	59.1

Sample ID	BII-10	BII-10	BII-10	BII-12	BII-12	BII-12	BII-12	BII-12
Depth (ft)	68.5 - 70	78.5 - 80	98.5 - 100	8.5 - 10	33.5 - 35	68.5 - 70	73.5 - 75	88.5 - 90
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	74.6	96.1	17.5	15.9	59.1	60.0	60.1	90.8

Sample ID	BII-12	BII-13	BII-13	BII-14	BII-14	BII-14	BII-14	BII-14
Depth (ft)	108.5 - 110	3.5 - 5	8.5 - 10	6 - 7.5	33.5 - 35	43.5 - 45	83.5 - 85	98.5 - 100
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	18.7	18.4	16.2	20.3	48.2	57.0	64.6	16.2

Sample ID	BII-15	BII-15	BII-15	BII-15	BII-15	BII-16	BII-16	BII-17
Depth (ft)	1 - 2.5	38.5 - 40	48.5 - 50	63.5 - 65	78.5 - 80	1 - 2.5	6 - 7.5	8.5 - 10
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	17.2	45.7	53.8	69.4	62.6	7.4	23.0	17.2

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Moisture Content Worksheet

ASTM D2216

Project Name: Indian River Inlet Bridge
Project Number: 3530-03-1245 Task 02
Date: 12/07/03

Reviewed by: 12/23/03

Sample ID	BII-17	BII-17	BII-18	BII-18	BII-18	BII-18	BII-18	BII-18
Depth (ft)	18.5 - 20	28.5 - 30	1 - 2.5	6 - 7.5	38.5 - 40	48.5 - 50	73.5 - 75	108.5 - 110
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	9.2	20.0	8.1	17.6	49.2	55.6	56.7	21.6

Sample ID	BII-18	BII-18	BII-18	BII-18	BII-19	BII-19	BII-19	BII-19
Depth (ft)	123.5 - 125	138.5 - 140	158.5 - 160	163.5 - 165	3.5 - 5	38.5 - 40	48.5 - 50	58.5 - 60
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	28.4	24.2	27.7	30.0	17.4	38.2	55.9	38.8

Sample ID	BII-19	BII-19	BII-19	BII-19	BII-19	BII-19	BII-19	BII-19
Depth (ft)	73.5 - 75	88.5 - 90	123.5 - 125	138.5 - 140	143.5 - 145	148.5 - 150	153.5 - 155	163.5 - 165
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	56.3	59.8	28.0	24.4	20.8	27.9	27.3	23.6

Sample ID	BII-19	BII-22	BII-22	BII-22	BII-22	BII-22	BII-23	BII-23
Depth (ft)	168.5 - 170	33.5 - 35	53.5 - 55	93.5 - 95	118.5 - 120	143.5 - 145	6 - 7.5	18.5 - 20
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	15.6	49.3	50.6	24.0	20.9	19.0	13.9	15.4

Sample ID	BII-23	BII-25	BII-25	BII-25	BII-25	BII-25	BII-25	BII-26
Depth (ft)	28.5 - 30	1 - 2.5	3.5 - 5	33.5 - 35	43.5 - 45	53.5 - 55	63.5 - 65	1 - 2.5
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	10.7	7.9	22.7	50.1	64.8	59.6	14.2	16.9

Sample ID	BII-26	BII-27	BII-28	BII-28	BII-29	BII-29	BII-30	BII-31
Depth (ft)	6 - 7.5	3.5 - 5	1 - 2.5	6 - 7.5	1 - 2.5	6 - 7.5	3.5 - 5	1 - 2.5
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	19.2	17.1	16.5	21.4	14.6	34.2	21.2	11.0

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Moisture Content Worksheet

ASTM D2216

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Date: 12/07/03

Reviewed by: 12/8/03

Sample ID	BII-31	BII-32	BII-32	BII-33	BII-33	BII-34	BII-35	BII-35
Depth (ft)	3.5 - 5	1 - 2.5	6 - 7.5	1 - 2.5	6 - 7.5	3.5 - 5	1 - 2.5	6 - 7.5
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	20.2	6.6	19.5	16.3	70.3	19.6	5.0	20.8

Sample ID	BII-36	BII-36						
Depth (ft)	1 - 2.5	6 - 7.5						
Sample Type	Jar	Jar						
Moisture Content (%)	15.4	22.9						

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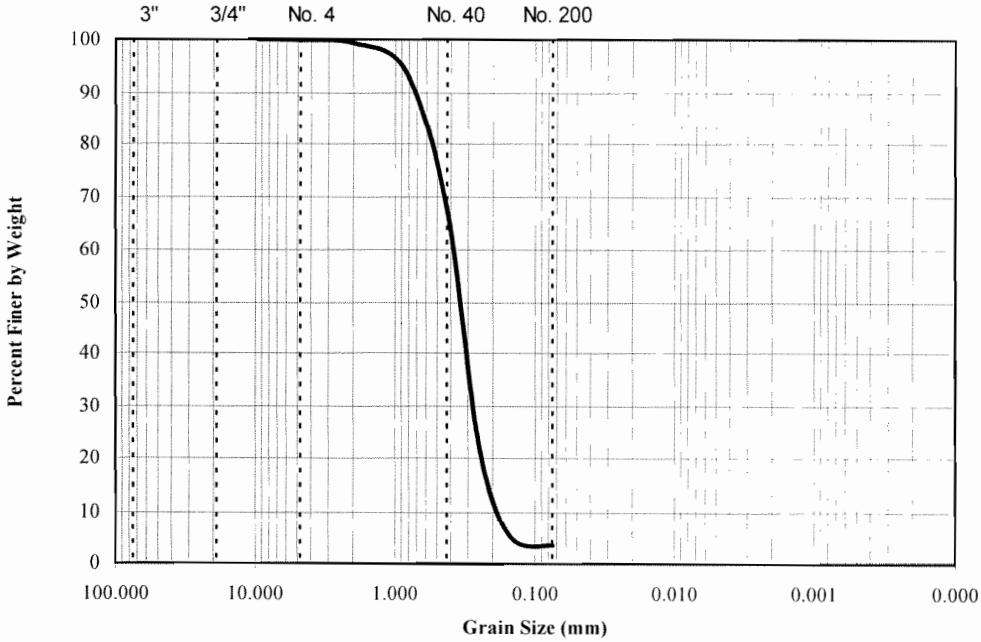
Project Name: Indian River Inlet Bridges
Project Number: 3530-03-1245 Task 02
Report Date: 12/7/2003

Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-1 @ 3.5' - 5.0'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	0.10	0.1	99.9
# 10	1.27	1.2	99.3
# 20	10.89	9.6	94.1
# 40	59.75	48.9	67.5
# 60	143.11	83.4	22.1
# 100	174.42	31.3	5.1
# 200	177.47	3.1	3.4
Wt. of Soil, g	183.81		

Particle Size Analysis
U.S. Standard Sieve Sizes



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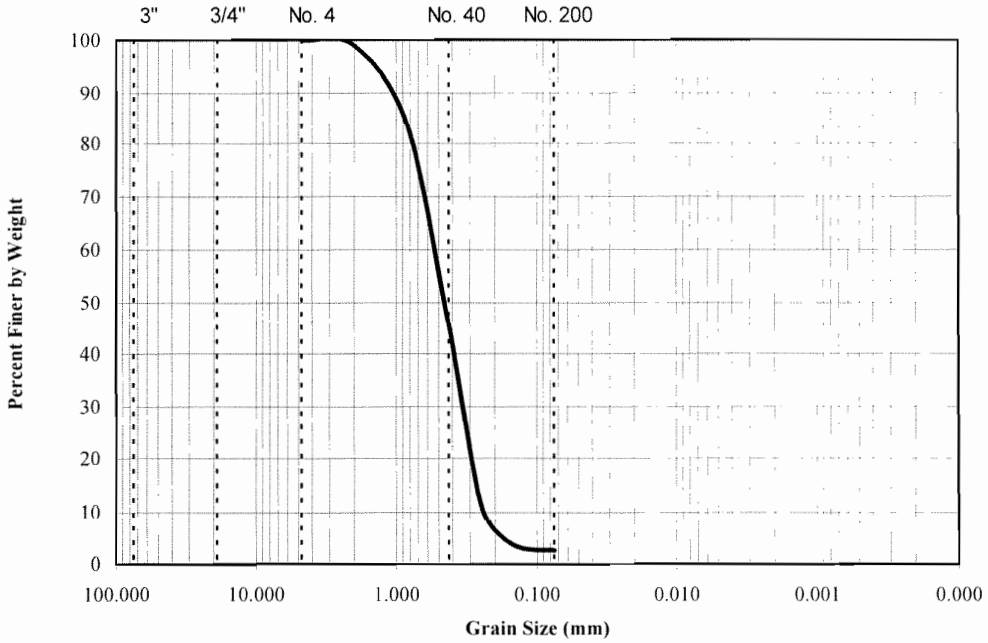
Report Date: 12/7/2003

Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-3 @ 3.5' - 5.0'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
# 4	0.00	0.0	100.0
# 10	2.06	2.1	99.0
# 20	32.41	30.4	84.1
# 40	110.60	78.2	45.6
# 60	180.60	70.0	11.2
# 100	195.95	15.4	3.7
# 200	198.39	2.4	2.5
Wt. of Soil, g	203.42		

Particle Size Analysis
U.S. Standard Sieve Sizes



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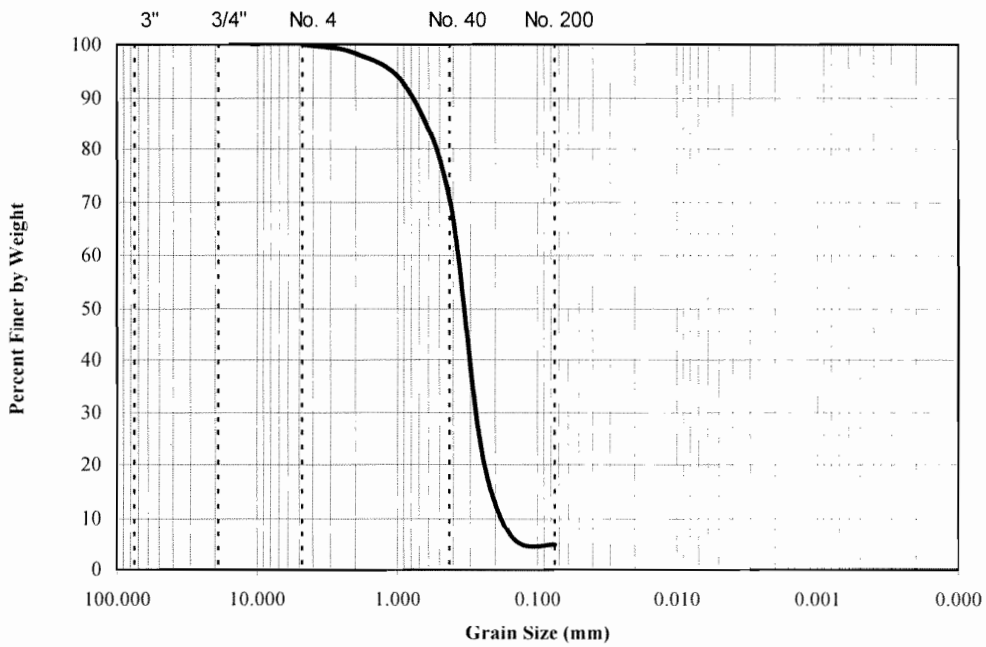
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: **BII-4 @ 3.5' - 5.0'**

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
# 4	0.00	0.0	100.0
# 10	3.13	3.1	98.3
# 20	15.64	12.5	91.6
# 40	54.86	39.2	70.6
# 60	144.36	89.5	22.6
# 100	175.13	30.8	6.1
# 200	177.52	2.4	4.8
Wt. of Soil, g	186.44		

Particle Size Analysis
U.S. Standard Sieve Sizes



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Washed Particle Size/Gradation Test Report
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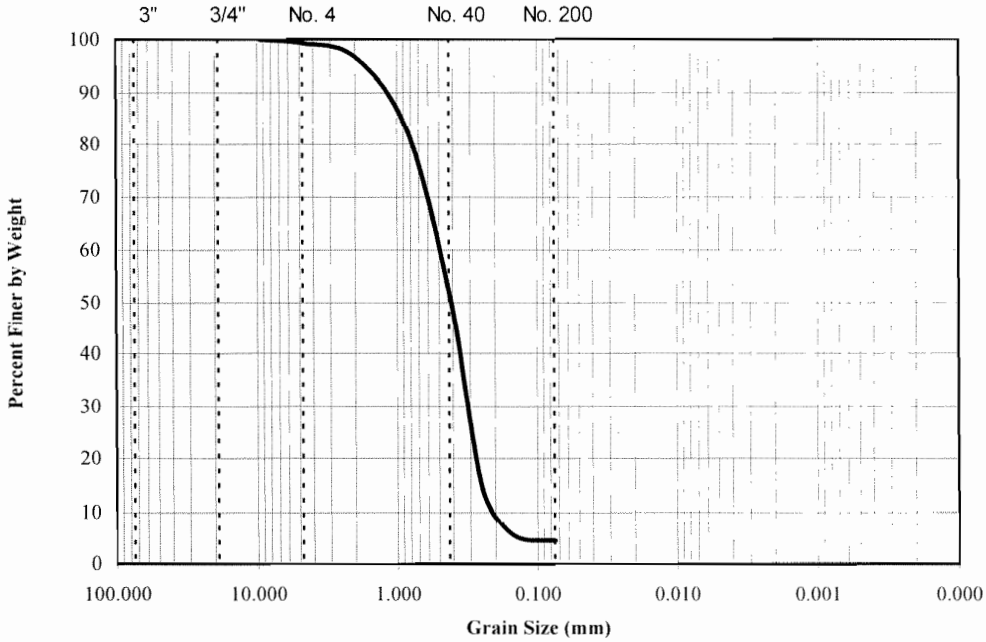
Sample Number: BII-5 @ 3.5' - 5.0'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	1.17	1.2	99.3
# 10	5.72	4.6	96.7
# 20	30.29	24.6	82.8
# 40	84.37	54.1	52.0
# 60	149.61	65.2	14.9
# 100	166.15	16.5	5.5
# 200	168.11	2.0	4.4
Wt. of Soil, g	175.85		

Particle Size Analysis
U.S. Standard Sieve Sizes



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Washed Particle Size/Gradation Test Report
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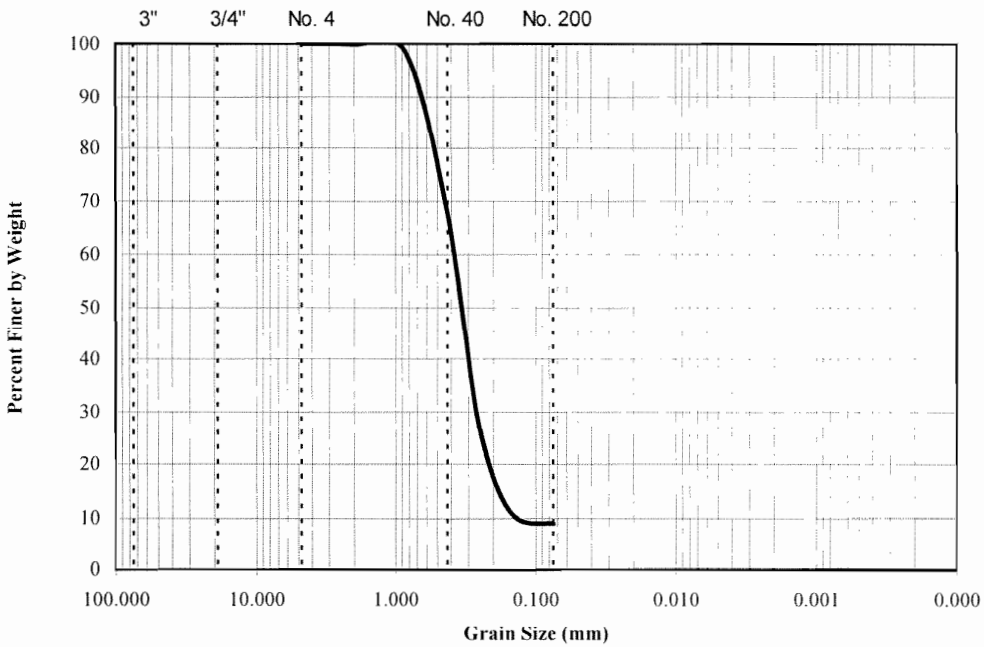
Sample Number: BII-6 @ 1' - 2.5'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
# 4	0.00	0.0	100.0
# 10	0.15	0.2	99.9
# 20	2.66	2.5	98.4
# 40	53.87	51.2	67.5
# 60	121.37	67.5	26.8
# 100	147.60	26.2	11.0
# 200	150.83	3.2	9.0
Wt. of Soil, g	165.80		

Particle Size Analysis
U.S. Standard Sieve Sizes



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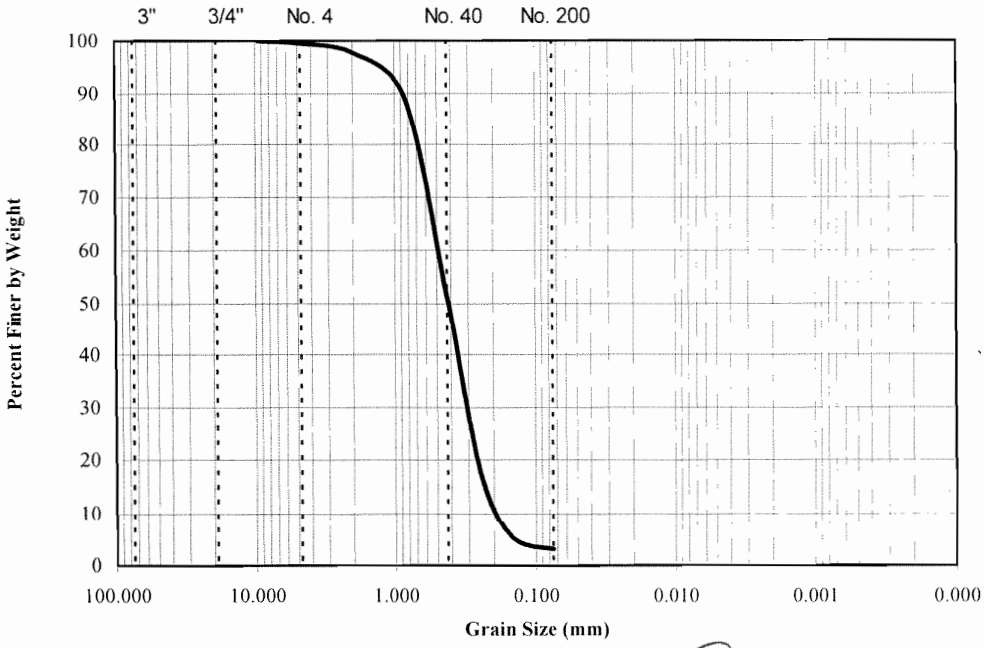
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-15 @ 1' - 2.5'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	0.87	0.9	99.5
# 10	4.04	3.2	97.7
# 20	19.13	15.1	89.3
# 40	87.18	68.1	51.2
# 60	146.63	59.5	18.0
# 100	168.92	22.3	5.5
# 200	173.47	4.6	3.0
Wt. of Soil, g	178.82		

Particle Size Analysis
U.S. Standard Sieve Sizes



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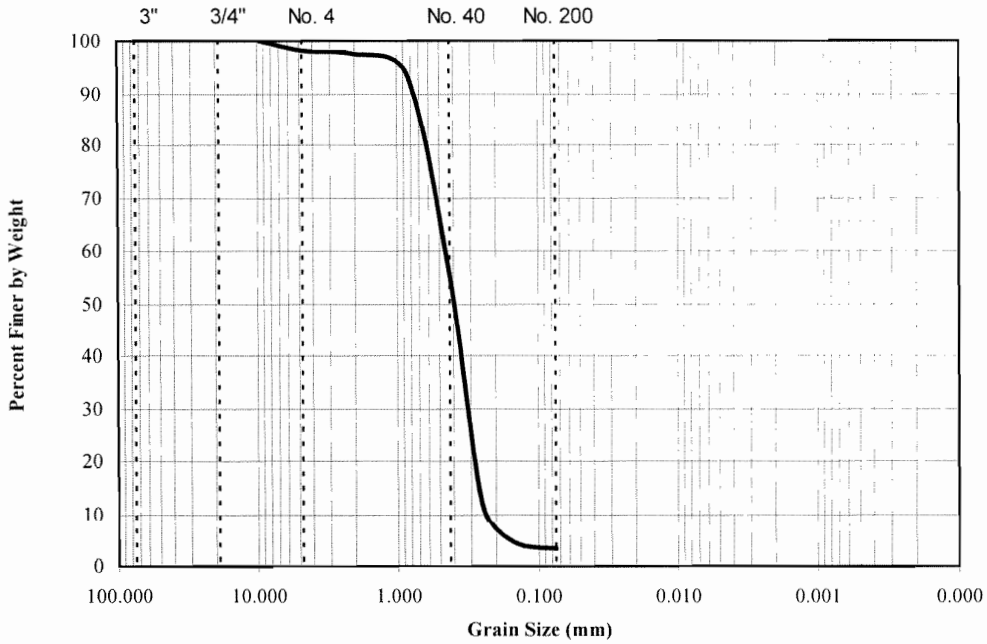
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-16 @ 1' - 2.5'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	2.94	2.9	98.2
# 10	4.07	1.1	97.5
# 20	10.19	6.1	93.7
# 40	72.55	62.4	55.3
# 60	143.03	70.5	11.9
# 100	154.88	11.9	4.6
# 200	156.87	2.0	3.3
Wt. of Soil, g	162.27		

Particle Size Analysis
U.S. Standard Sieve Sizes



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Project Number: 3530-03-1245 Task 02
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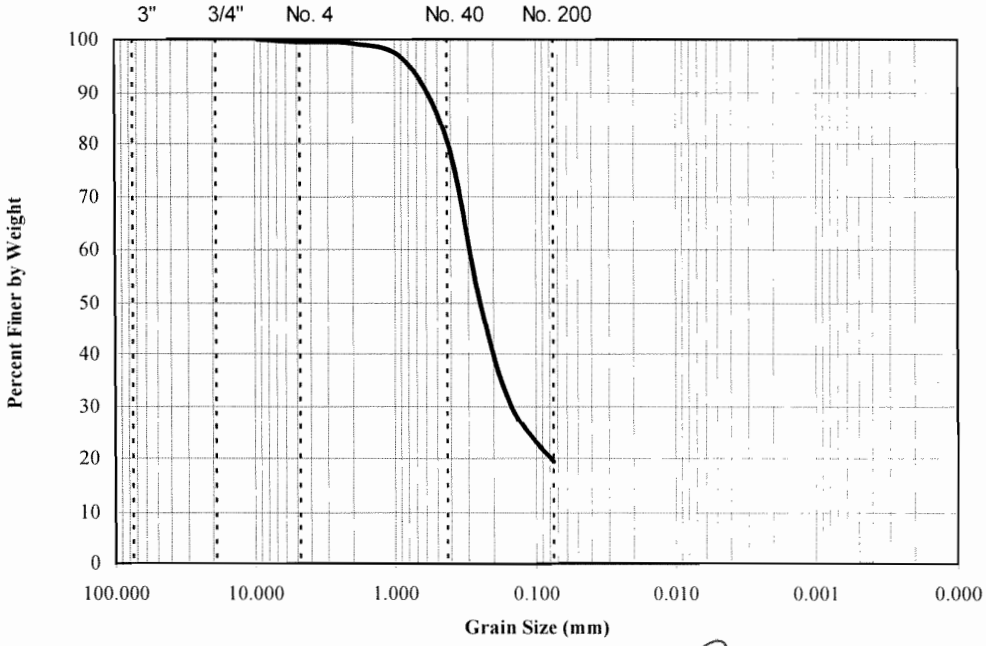
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: **BII-17 @ 1' - 2.5'**

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	0.88	0.9	99.5
# 10	1.29	0.4	99.2
# 20	6.66	5.4	96.0
# 40	31.78	25.1	80.7
# 60	82.08	50.3	50.2
# 100	115.40	33.3	30.0
# 200	132.89	17.5	19.4
Wt. of Soil, g	164.82		

Particle Size Analysis
U.S. Standard Sieve Sizes



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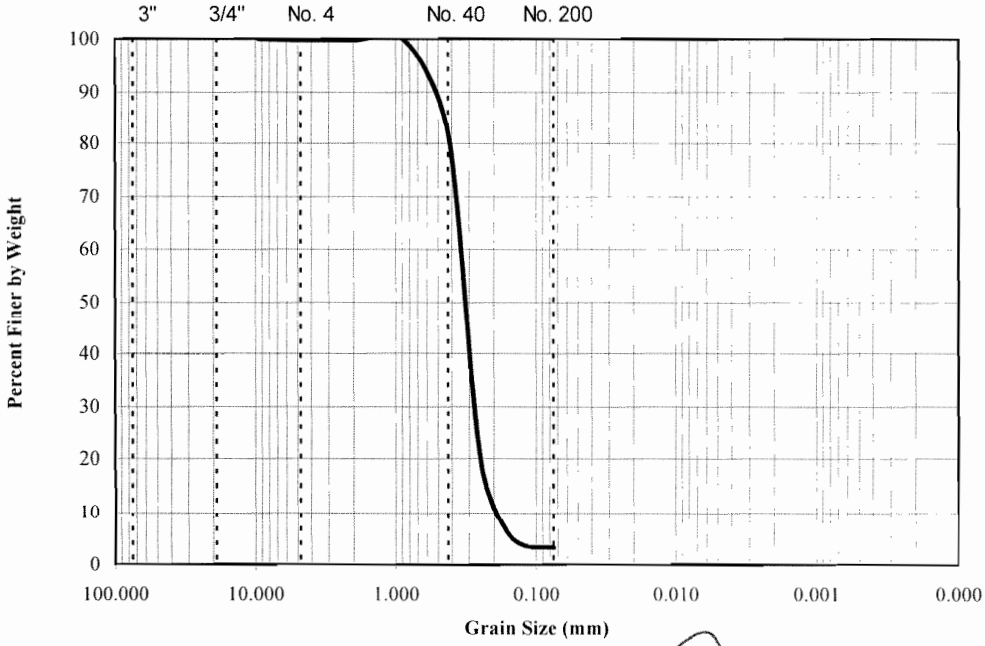
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-17 @ 3.5' - 5.0'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	0.32	0.3	99.8
# 10	0.32	0.0	99.8
# 20	0.80	0.5	99.5
# 40	31.89	31.1	81.9
# 60	141.23	109.3	20.0
# 100	167.41	26.2	5.2
# 200	170.92	3.5	3.2
Wt. of Soil, g	176.59		

Particle Size Analysis
U.S. Standard Sieve Sizes



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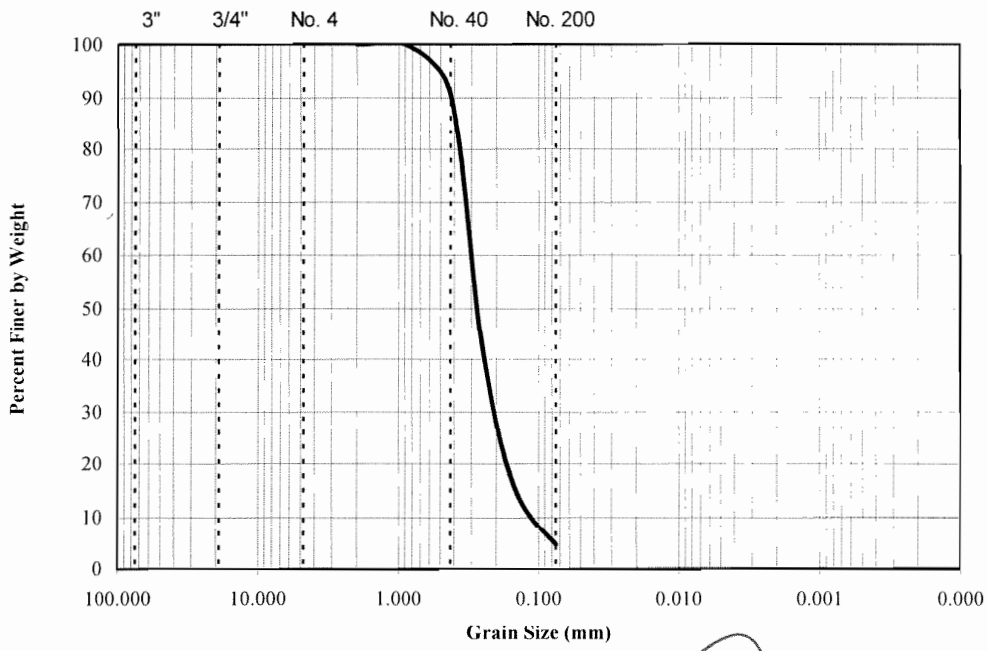
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-17 @ 6' - 7.5'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
# 10	0.00	0.0	100.0
# 20	0.32	0.3	99.7
# 40	11.21	10.9	90.5
# 60	68.67	57.5	42.0
# 100	99.75	31.1	15.8
# 200	112.93	13.2	4.7
Wt. of Soil, g	118.48		

Particle Size Analysis
U.S. Standard Sieve Sizes



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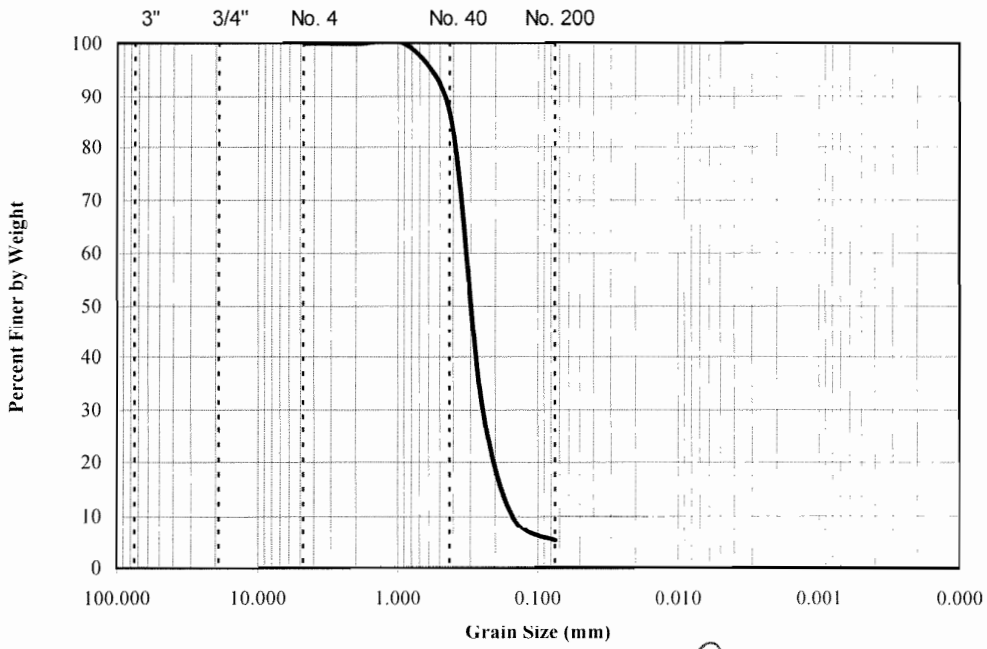
Project Name: Indian River Inlet Bridges
Project Number: 3530-03-1245 Task 02
Report Date: 12/7/2003

Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-17 @ 8.5' - 10'

Sieve Size	Cumulative Wt. Retained (g)	Wt Retained Each Sieve (g)	Cumulative % Passing
# 4	0.00	0.0	100.0
# 10	0.10	0.1	99.9
# 20	0.73	0.6	99.5
# 40	18.76	18.0	86.9
# 60	98.61	79.9	31.2
# 100	129.26	30.7	9.8
# 200	135.83	6.6	5.2
Wt. of Soil, g	143.28		

Particle Size Analysis
U.S. Standard Sieve Sizes



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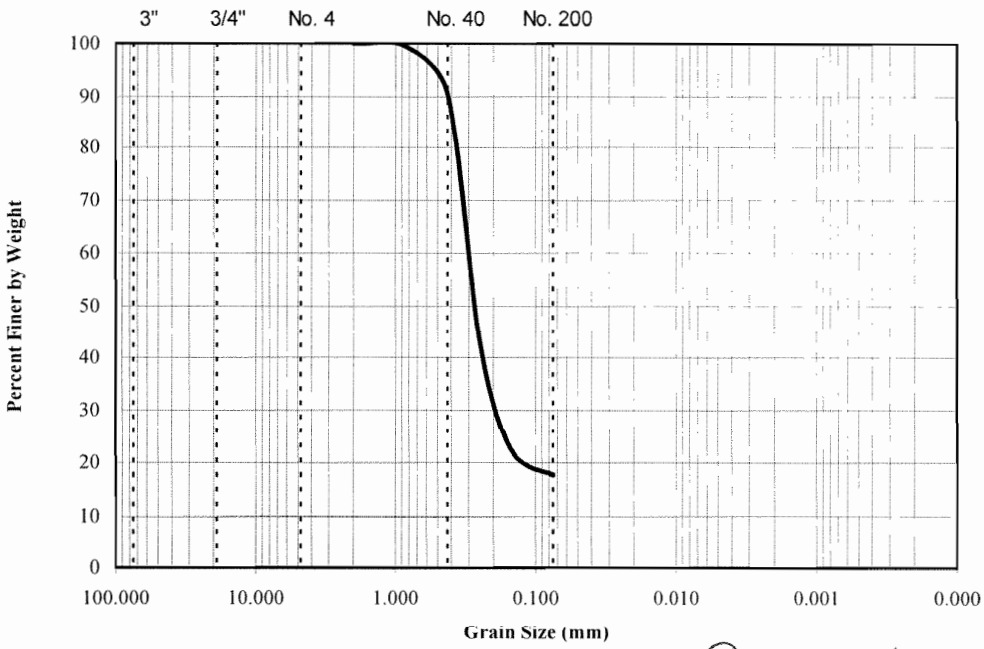
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-17 @ 13.5' - 15'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
# 10	0.00	0.0	100.0
# 20	0.71	0.7	99.5
# 40	14.92	14.2	90.3
# 60	87.36	72.4	43.0
# 100	118.87	31.5	22.5
# 200	126.11	7.2	17.7
Wt. of Soil, g	153.29		

Particle Size Analysis
U.S. Standard Sieve Sizes



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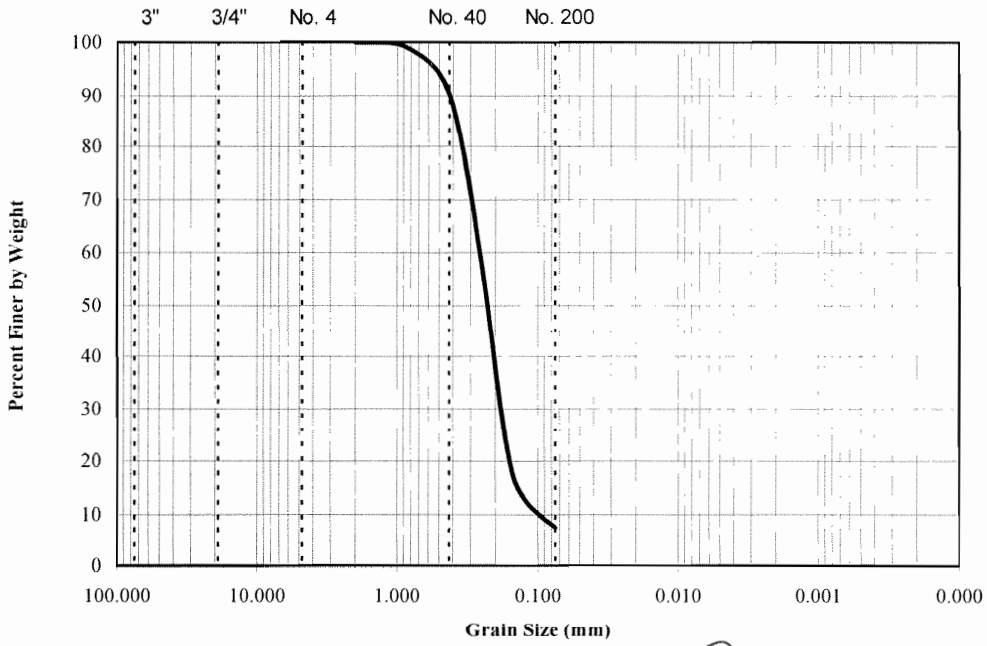
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-17 @ 18.5' - 20'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
# 10	0.00	0.0	100.0
# 20	1.34	1.3	99.0
# 40	13.45	12.1	90.2
# 60	58.21	44.8	57.7
# 100	113.97	55.8	17.2
# 200	127.20	13.2	7.6
Wt. of Soil, g	137.64		

Particle Size Analysis
U.S. Standard Sieve Sizes



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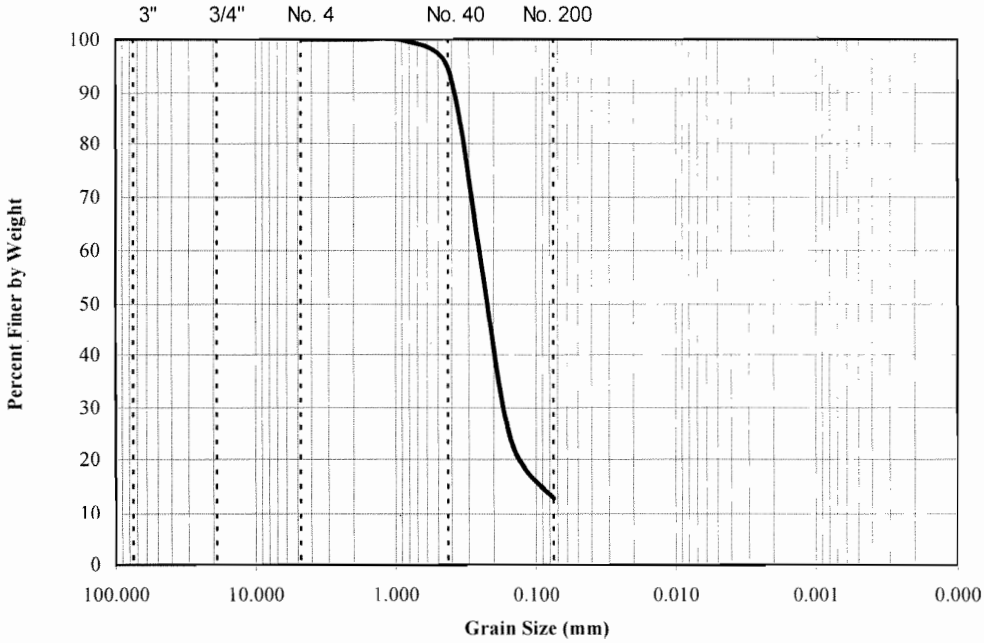
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-17 @ 23.5' - 25'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
# 4	0.00	0.0	100.0
# 10	0.02	0.0	100.0
# 20	0.30	0.3	99.7
# 40	6.39	6.1	94.5
# 60	47.72	41.3	58.9
# 100	88.88	41.2	23.4
# 200	101.20	12.3	12.8
Wt. of Soil, g	116.02		

Particle Size Analysis
U.S. Standard Sieve Sizes



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MACTEC ENGINEERING AND CONSULTING, INC
22455 Davis Drive, Suite 100
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(703) 404 7000

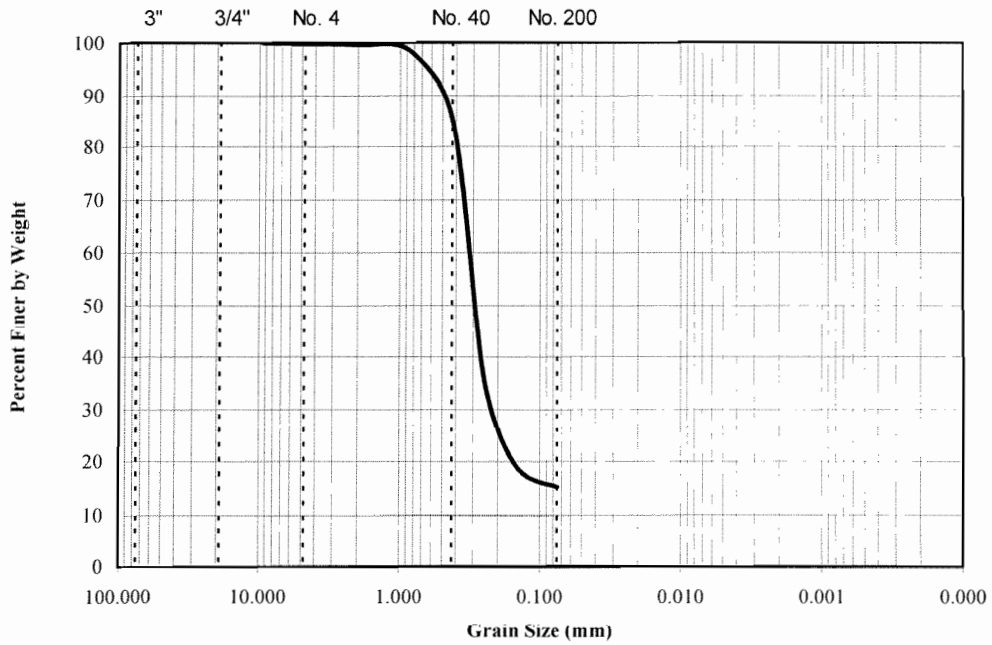
Project Name: Indian River Inlet Bridges
Project Number: 3530-03-1245 Task 02
Report Date: 12/7/2003

Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-17 @ 28.5' - 30'

Sieve Size	Cumulative Wt. Retained (g)	Wt Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	0.21	0.2	99.8
# 10	0.43	0.2	99.6
# 20	1.75	1.3	98.4
# 40	16.40	14.7	85.4
# 60	72.31	55.9	35.8
# 100	90.91	18.6	19.3
# 200	95.46	4.6	15.2
Wt. of Soil, g	112.63		

Particle Size Analysis
U.S. Standard Sieve Sizes



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Project Name: Indian River Inlet Bridges
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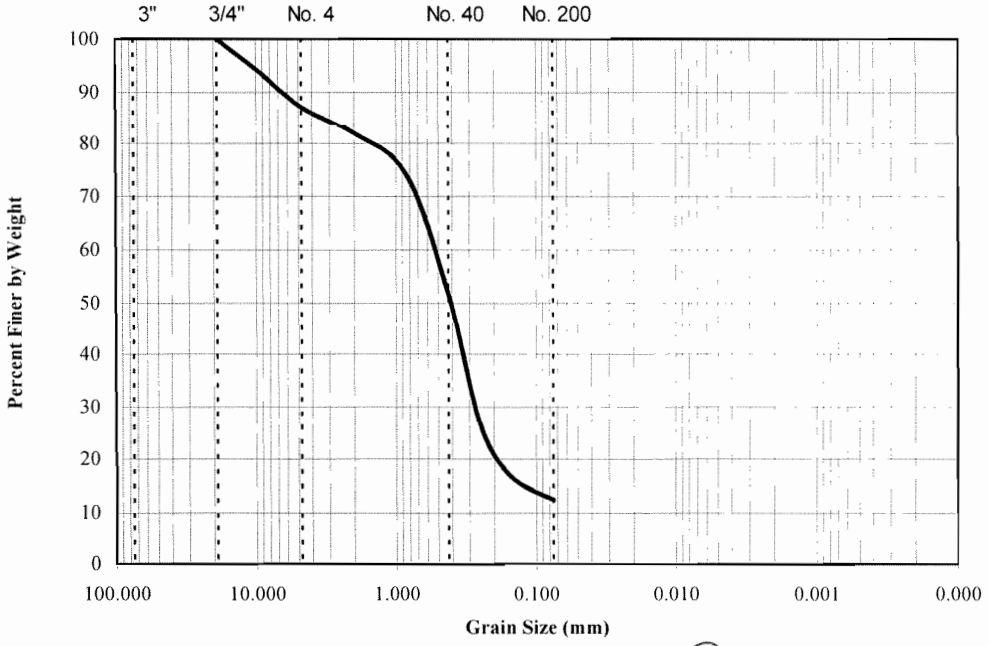
Report Date: 12/7/2003

Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-18 @ 1.0' - 2.5'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/4 in.	0.00	0.0	100.0
3/8 in.	12.72	12.7	93.8
# 4	26.51	13.8	87.1
# 10	36.76	10.3	82.0
# 20	52.77	16.0	74.2
# 40	99.02	46.3	51.6
# 60	150.88	51.9	26.3
# 100	170.56	19.7	16.7
# 200	179.39	8.8	12.4
Wt. of Soil, g	204.75		

Particle Size Analysis
U.S. Standard Sieve Sizes



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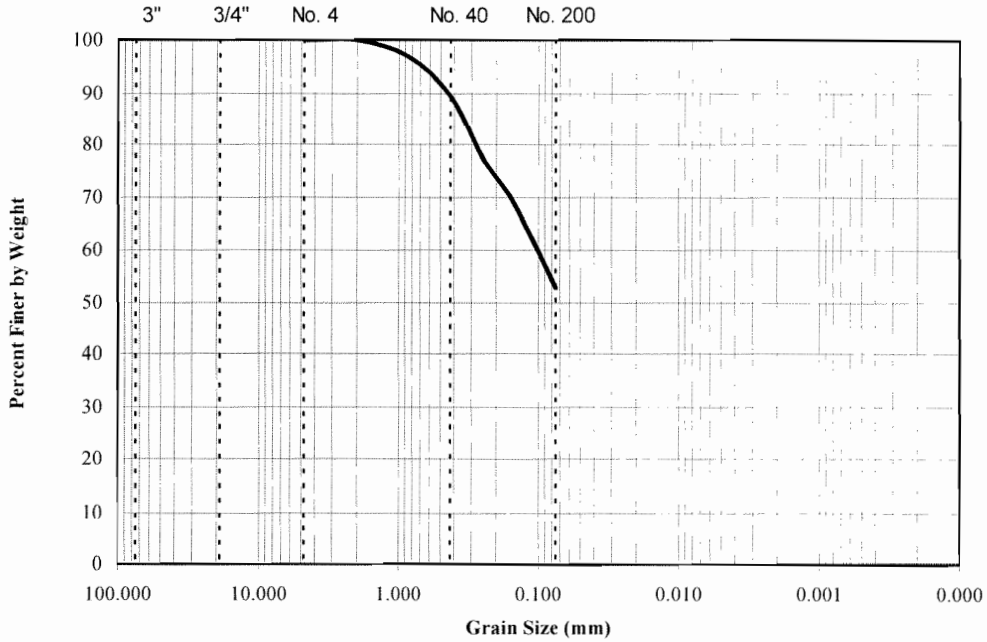
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: **BII-122 @ 143.5' - 145'**

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
# 4	0.00	0.0	100.0
# 10	0.03	0.0	100.0
# 20	2.90	2.9	96.8
# 40	9.77	6.9	89.4
# 60	20.69	10.9	77.5
# 100	28.56	7.9	69.0
# 200	43.31	14.8	52.9
Wt. of Soil, g	91.99		

Particle Size Analysis
U.S. Standard Sieve Sizes



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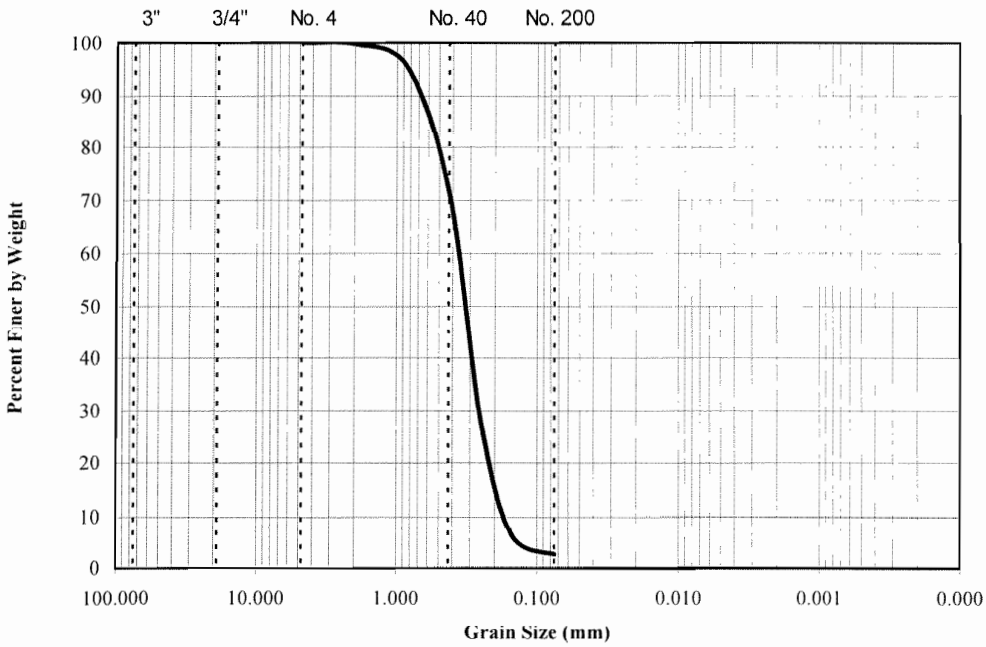
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-23 @ 1' - 2.5'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
# 4	0.00	0.0	100.0
# 10	0.12	0.1	99.8
# 20	3.66	3.5	95.4
# 40	22.74	19.1	71.5
# 60	57.61	34.9	27.7
# 100	74.61	17.0	6.4
# 200	77.65	3.0	2.6
Wt. of Soil, g	79.69		

Particle Size Analysis
U.S. Standard Sieve Sizes



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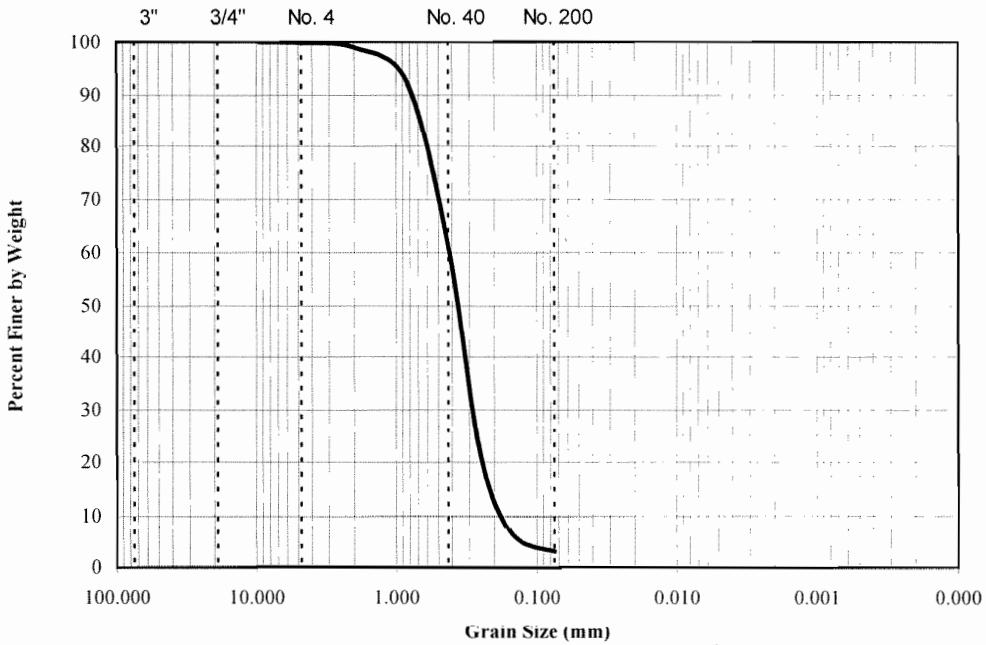
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: **BII-23 @ 3.5' - 5.0'**

Sieve Size	Cumulative Wt. Retained (g)	Wt Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	0.14	0.1	99.9
# 10	2.79	2.7	99.0
# 20	19.52	16.7	92.7
# 40	105.02	85.5	61.0
# 60	212.01	107.0	21.2
# 100	251.59	39.6	6.5
# 200	261.20	9.6	3.0
Wt. of Soil, g	269.17		

Particle Size Analysis
U.S. Standard Sieve Sizes



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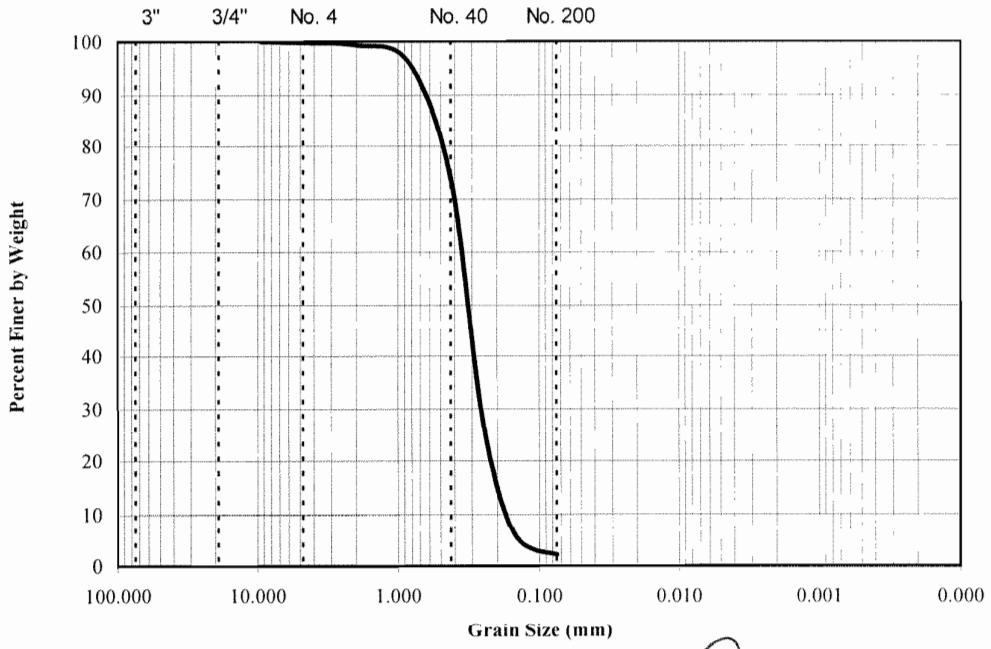
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-23 @ 6.0' - 7.5'

Sieve Size	Cumulative Wt. Retained (g)	Wt Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	0.70	0.7	99.8
# 10	2.01	1.3	99.3
# 20	11.88	9.9	96.1
# 40	79.99	68.1	73.9
# 60	222.92	142.9	27.2
# 100	287.22	64.3	6.1
# 200	299.71	12.5	2.1
Wt. of Soil, g	306.03		

Particle Size Analysis
U.S. Standard Sieve Sizes



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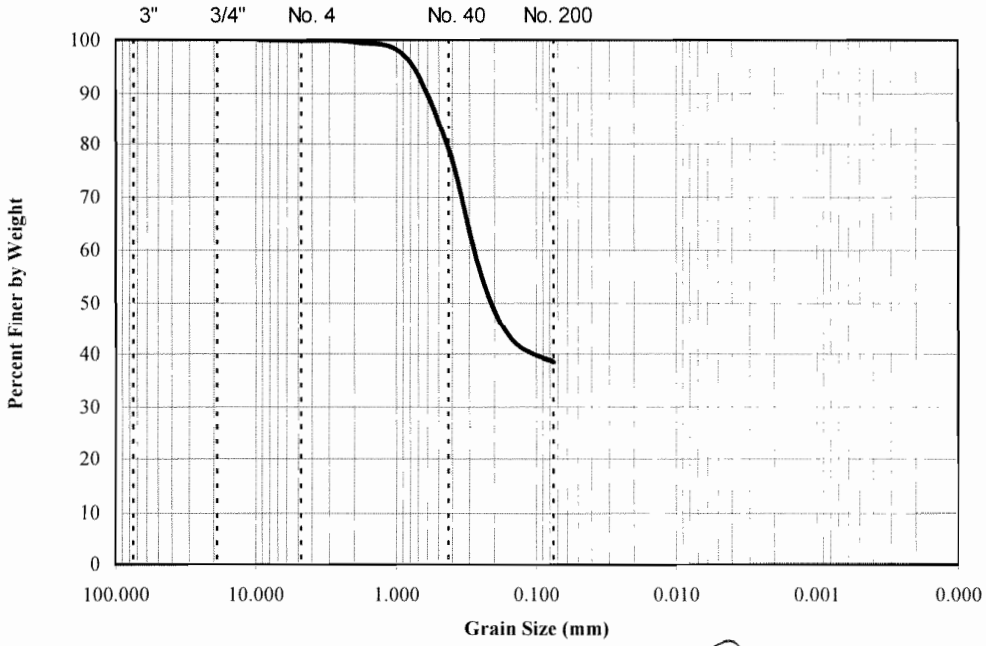
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-23 @ 8.5' - 10'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	0.23	0.2	99.9
# 10	1.32	1.1	99.6
# 20	10.42	9.1	96.6
# 40	64.31	53.9	79.0
# 60	136.13	71.8	55.5
# 100	175.03	38.9	42.8
# 200	188.08	13.1	38.5
Wt. of Soil, g	306.03		

Particle Size Analysis
U.S. Standard Sieve Sizes



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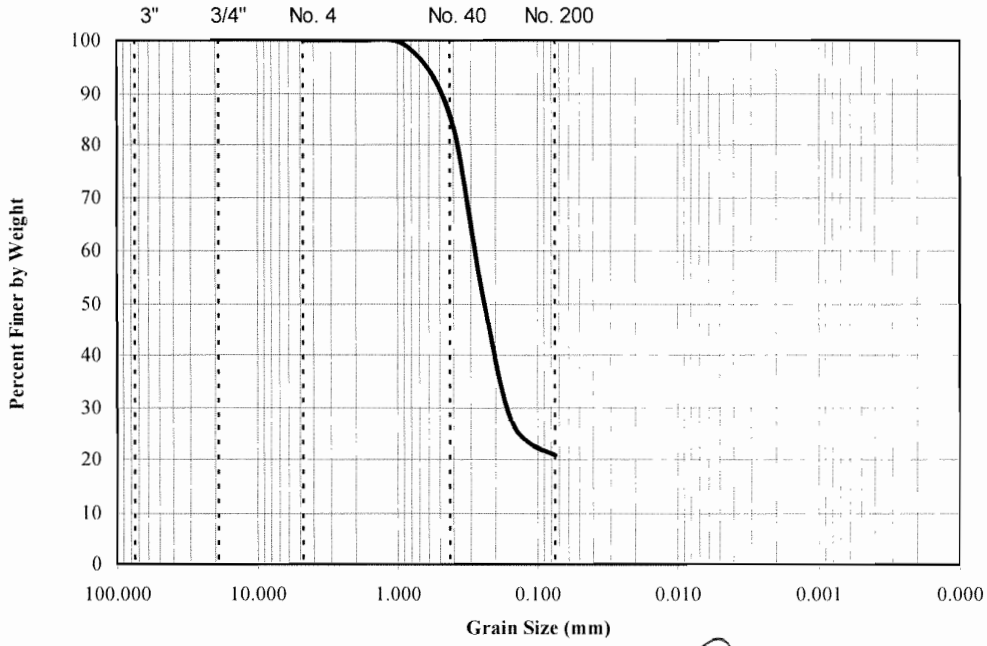
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-23 @ 13.5' - 15'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
# 4	0.00	0.0	100.0
# 10	0.06	0.1	100.0
# 20	2.23	2.2	98.8
# 40	26.00	23.8	85.9
# 60	87.80	61.8	52.4
# 100	135.12	47.3	26.7
# 200	146.07	11.0	20.8
Wt. of Soil, g	184.43		

Particle Size Analysis
U.S. Standard Sieve Sizes



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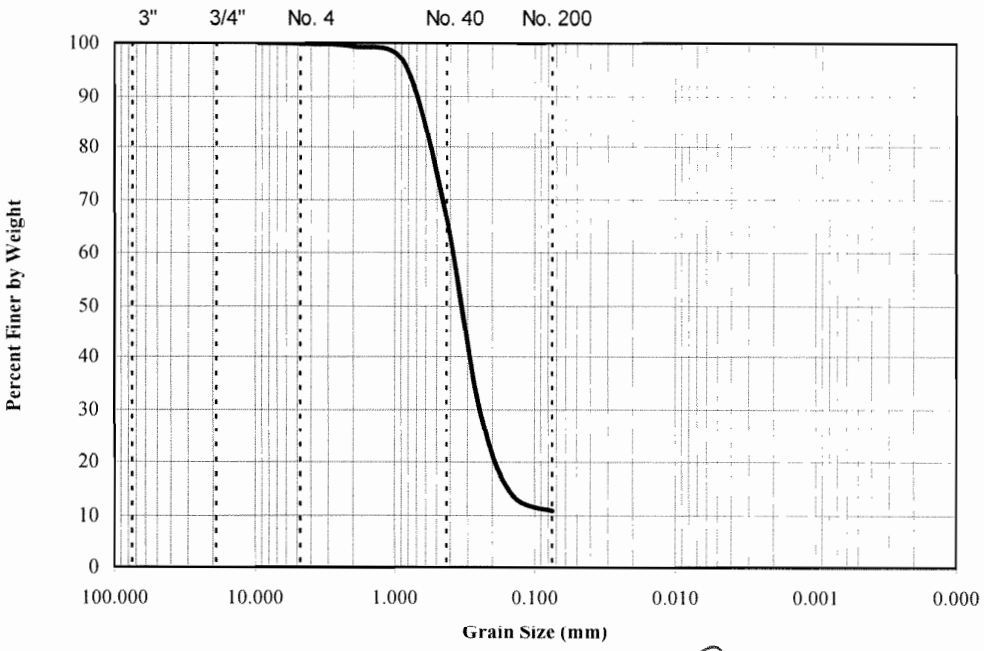
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-23 @ 18.5' - 20'

Sieve Size	Cumulative Wt. Retained (g)	Wt Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	0.16	0.2	99.9
# 10	0.86	0.7	99.3
# 20	5.24	4.4	96.0
# 40	44.53	39.3	66.2
# 60	91.21	46.7	30.8
# 100	112.74	21.5	14.5
# 200	117.42	4.7	10.9
Wt. of Soil, g	131.80		

Particle Size Analysis
U.S. Standard Sieve Sizes



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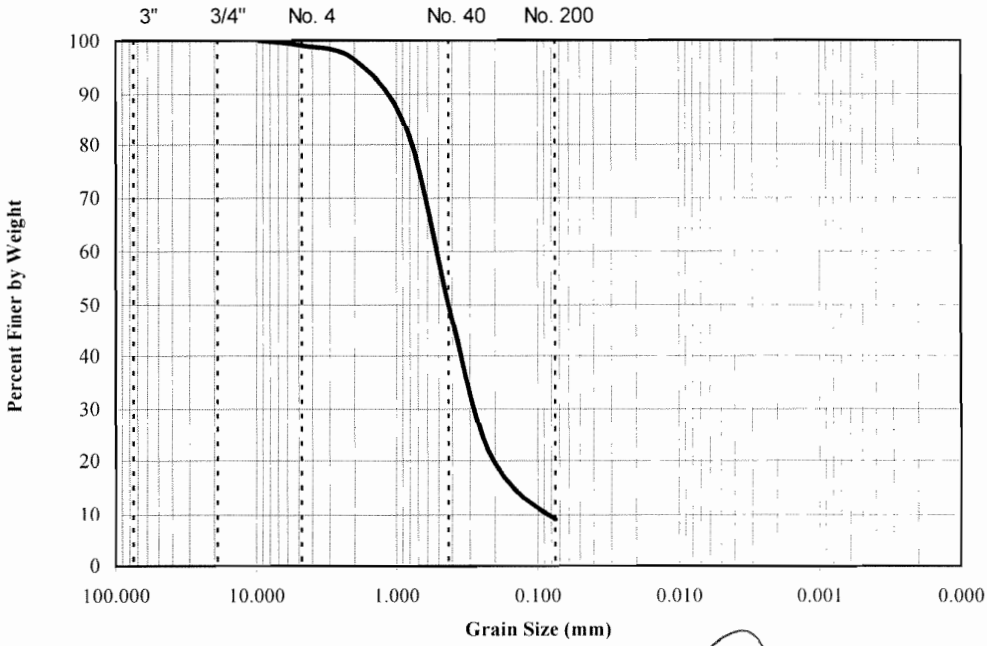
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: **BII-23 @ 23.5' - 25'**

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	1.49	1.5	99.1
# 10	5.73	4.2	96.4
# 20	26.35	20.6	83.3
# 40	79.20	52.9	49.8
# 60	117.83	38.6	25.3
# 100	133.83	16.0	15.1
# 200	143.27	9.4	9.1
Wt. of Soil, g	157.69		

Particle Size Analysis
U.S. Standard Sieve Sizes



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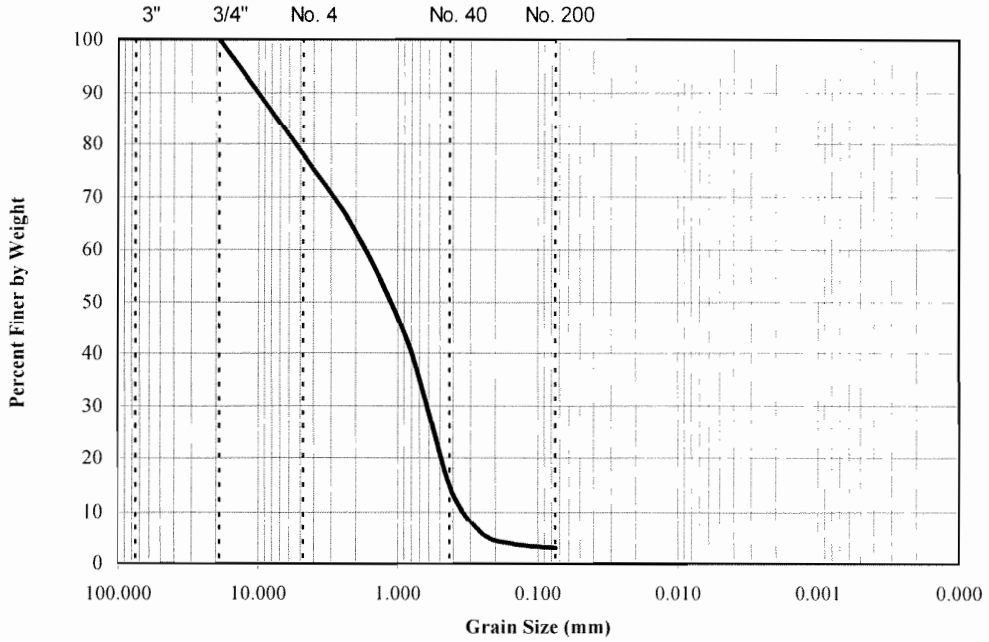
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: **BII-23 @ 28.5' - 30'**

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/4 in.	0.00	0.0	100.0
3/8 in.	16.77	16.8	89.1
# 4	33.96	17.2	77.9
# 10	56.35	22.4	63.3
# 20	88.84	32.5	42.1
# 40	130.86	42.0	14.8
# 60	144.73	13.9	5.8
# 100	147.89	3.2	3.7
# 200	149.03	1.1	2.9
Wt. of Soil, g	153.56		

Particle Size Analysis
U.S. Standard Sieve Sizes



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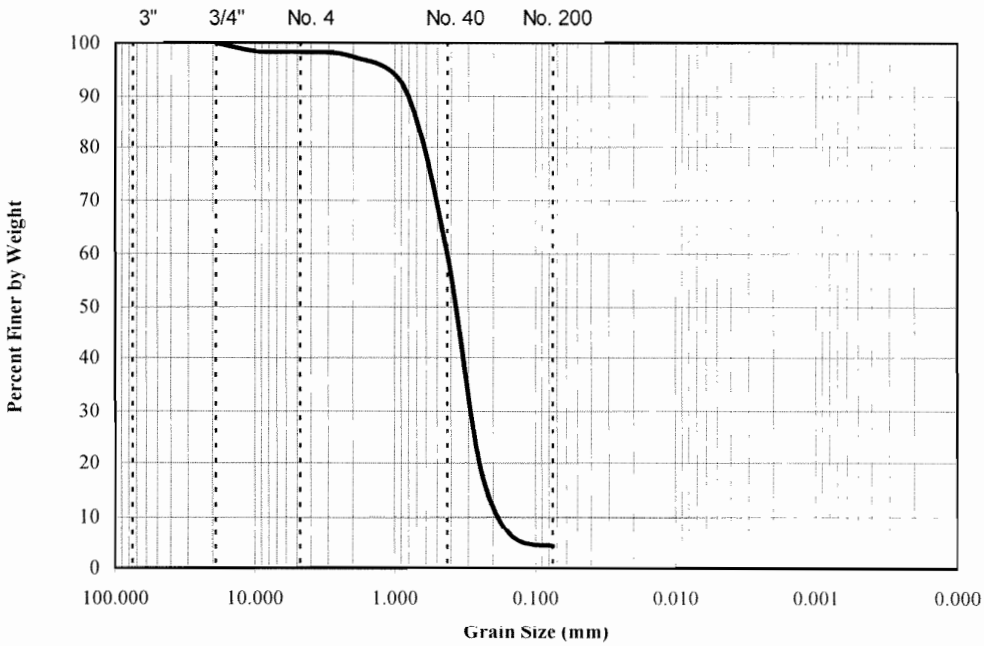
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-25 @ 1' - 2.5'

Sieve Size	Cumulative Wt. Retained (g)	Wt Retained Each Sieve (g)	Cumulative % Passing
3/4 in.	0.00	0.0	100.0
3/8 in.	2.57	2.6	98.4
# 4	2.79	0.2	98.3
# 10	4.33	1.5	97.4
# 20	14.41	10.1	91.3
# 40	66.14	51.7	59.8
# 60	132.15	66.0	19.8
# 100	154.16	22.0	6.4
# 200	157.83	3.7	4.2
Wt. of Soil, g	164.69		

Particle Size Analysis
U.S. Standard Sieve Sizes



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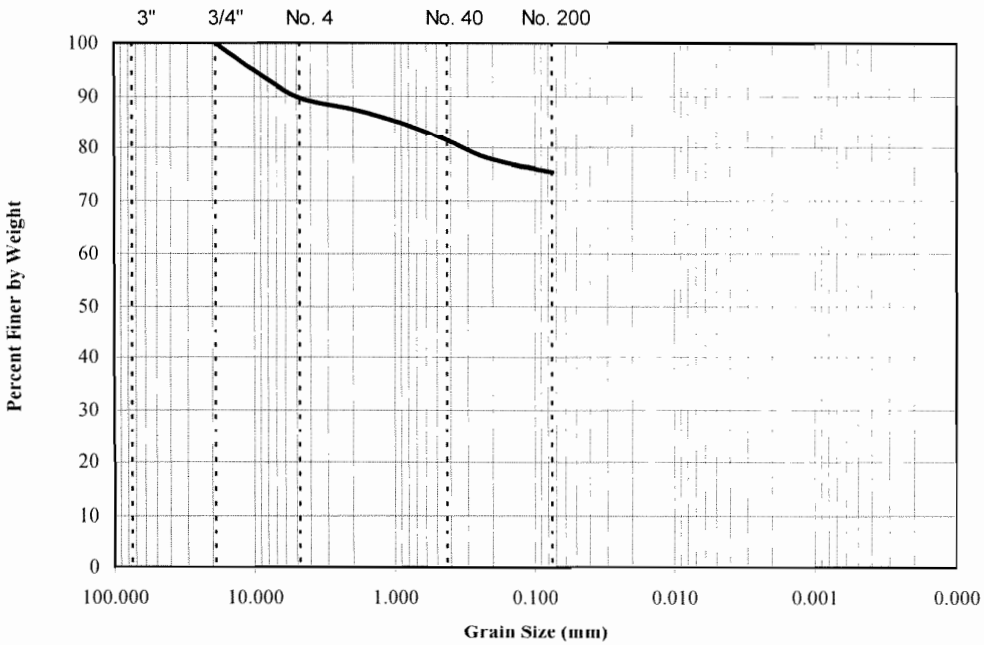
Report Date: 12/7/2003

Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-25 @ 43.5' - 45'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/4 in.	0.00	0.0	100.0
3/8 in.	4.93	4.9	94.4
# 4	9.10	4.2	89.7
# 10	11.04	1.9	87.5
# 20	13.59	2.6	84.7
# 40	16.48	2.9	81.4
# 60	18.96	2.5	78.6
# 100	20.46	1.5	76.9
# 200	21.76	1.3	75.4
Wt. of Soil, g	88.56		

Particle Size Analysis
U.S. Standard Sieve Sizes



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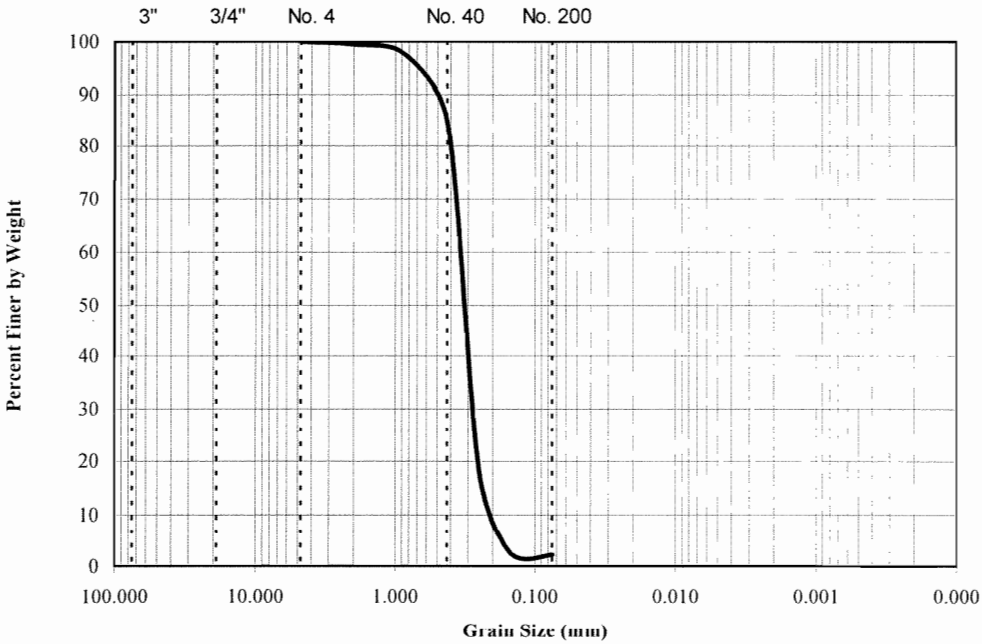
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-6 (HA) @ 2' - 3'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
# 4	0.00	0.0	100.0
# 10	0.96	1.0	99.5
# 20	4.84	3.9	97.5
# 40	29.80	25.0	84.7
# 60	159.11	129.3	18.2
# 100	189.27	30.2	2.7
# 200	190.27	1.0	2.2
Wt. of Soil, g	194.59		

Particle Size Analysis
U.S. Standard Sieve Sizes



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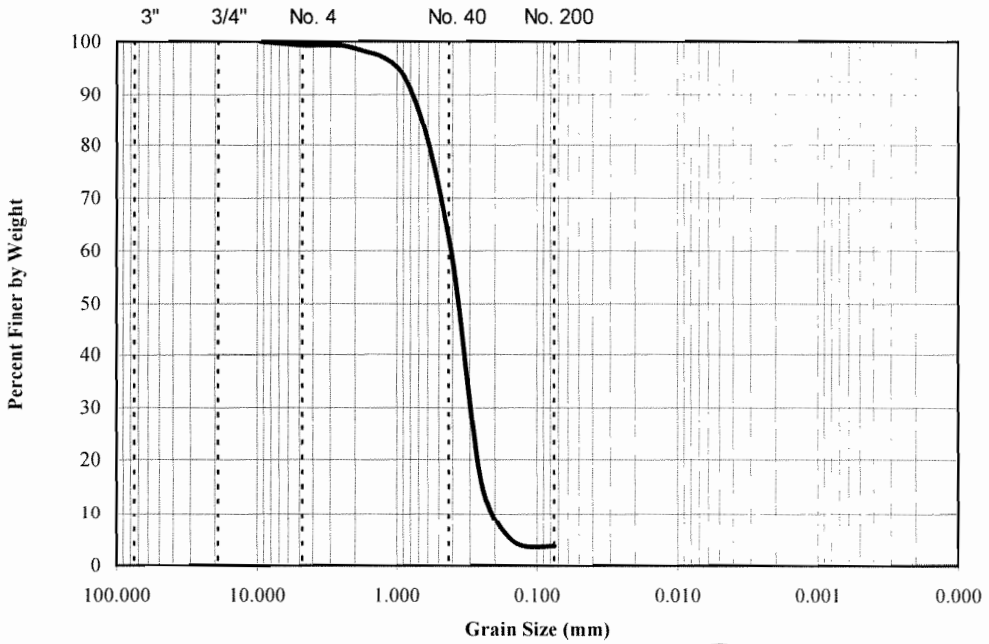
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-6 (HA) @ 3' - 4'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	1.83	1.8	99.3
# 10	3.43	1.6	98.7
# 20	19.63	16.2	92.4
# 40	96.62	77.0	62.4
# 60	215.99	119.4	15.8
# 100	244.50	28.5	4.7
# 200	247.34	2.8	3.6
Wt. of Soil, g	256.67		

Particle Size Analysis
U.S. Standard Sieve Sizes



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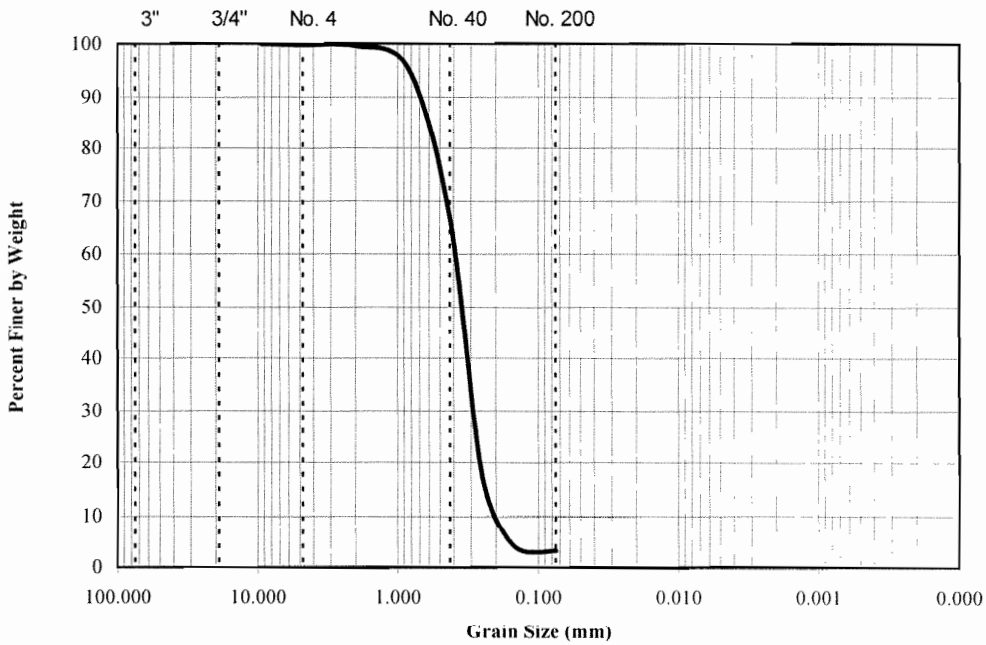
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: **BII-14 (HA) @ 2' - 3'**

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	0.44	0.4	99.8
# 10	0.96	0.5	99.6
# 20	11.57	10.6	95.6
# 40	87.41	75.8	66.7
# 60	216.83	129.4	17.4
# 100	251.68	34.9	4.2
# 200	254.12	2.4	3.2
Wt. of Soil, g	262.61		

Particle Size Analysis
U.S. Standard Sieve Sizes



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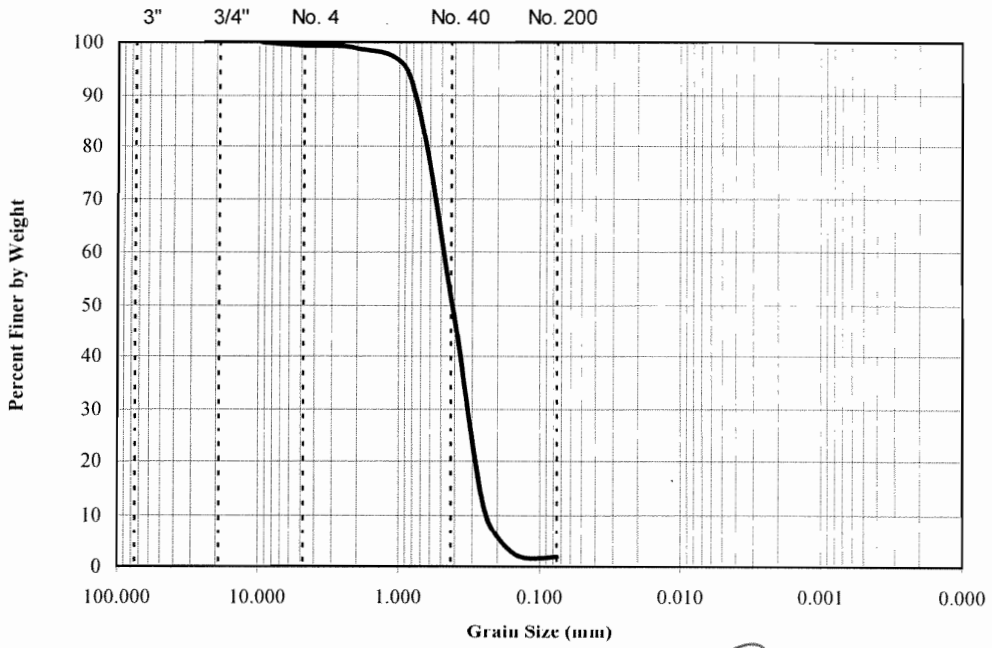
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-14 @ 3' - 4'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	1.10	1.1	99.4
# 10	2.27	1.2	98.8
# 20	11.92	9.7	93.8
# 40	94.40	82.5	51.2
# 60	171.08	76.7	11.5
# 100	188.60	17.5	2.4
# 200	189.60	1.0	1.9
Wt. of Soil, g	193.28		

Particle Size Analysis
U.S. Standard Sieve Sizes



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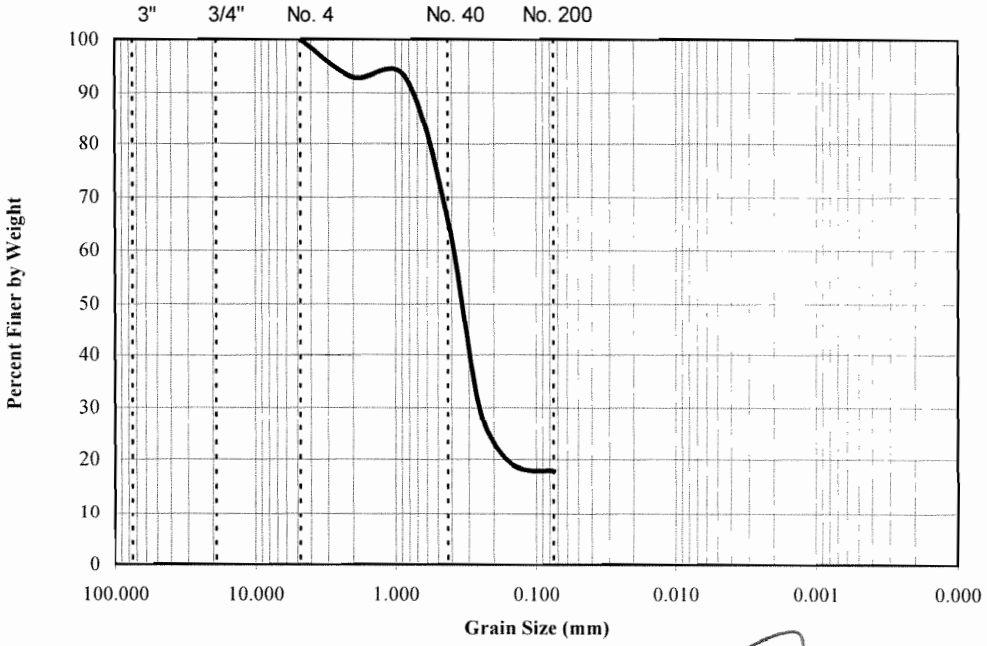
Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-15 (HA) @ 2' - 3'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
# 4	0.00	0.0	100.0
# 10	10.58	10.6	92.8
# 20	10.58	0.0	92.8
# 40	50.69	40.1	65.6
# 60	104.20	53.5	29.3
# 100	119.20	15.0	19.2
# 200	121.13	1.9	17.9
Wt. of Soil, g	147.45		

Particle Size Analysis
U.S. Standard Sieve Sizes



Reviewed by: 12/23/03

MACTEC ENGINEERING AND CONSULTING, INC
22455 Davis Drive, Suite 100
Sterling, Virginia 20164
(703) 404 7000

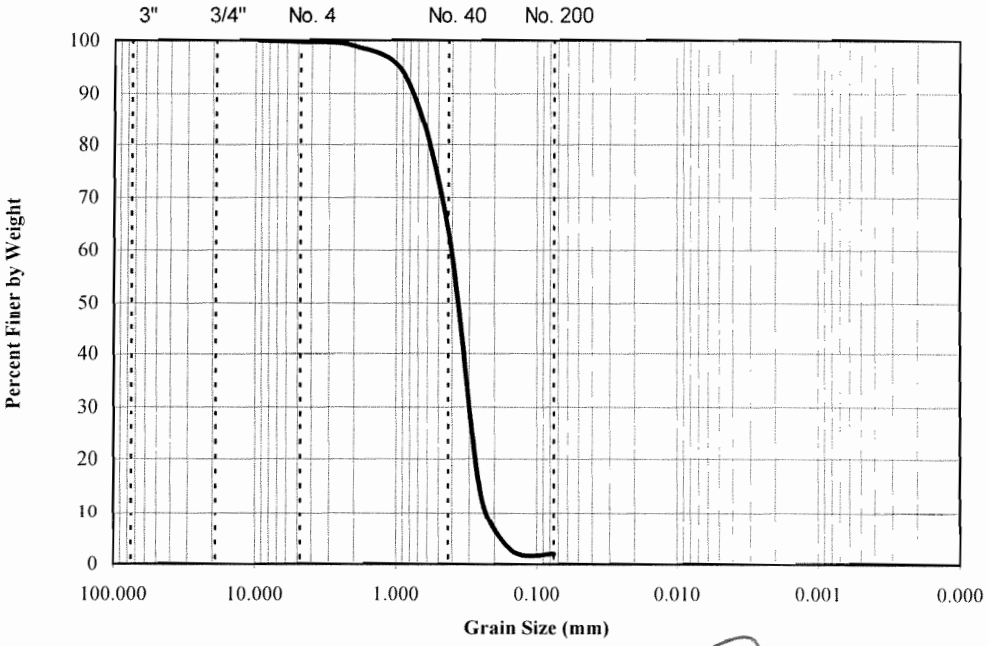
Project Name: Indian River Inlet Bridges
Project Number: 3530-03-1245 Task 02
Report Date: 12/7/2003

Washed Particle Size/Gradation Test Report
ASTM D422

Sample Number: BII-15 (HA) @ 3' - 4'

Sieve Size	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
3/8 in.	0.00	0.0	100.0
# 4	0.59	0.6	99.7
# 10	2.39	1.8	98.9
# 20	15.87	13.5	92.8
# 40	79.94	64.1	63.5
# 60	189.63	109.7	13.4
# 100	213.58	24.0	2.5
# 200	214.79	1.2	1.9
Wt. of Soil, g	219.03		

Particle Size Analysis
U.S. Standard Sieve Sizes



Reviewed by: 12/22/03

Boring Number	BII-12	BII-18
VGS Sample Number	**9697**	**9698**
Sample Depth (ft)	**49.0**	**143.5**
Natural Moisture Content (%)	55.0	22.1
Atterberg Limits		
Liquid Limit	62	27
Plastic Limit	26	15
Plasticity Index	36	12
Gradation Analysis		
% Finer by Weight		
Sieve: 1 inch		
3/4 inch		
1/2 inch		
3/8 inch		
No. 4		100.0
No. 10		99.7
No. 40		81.0
No. 100		41.3
No. 200	98.7	27.8
USCS Soil Classification	**CH**	**SC**

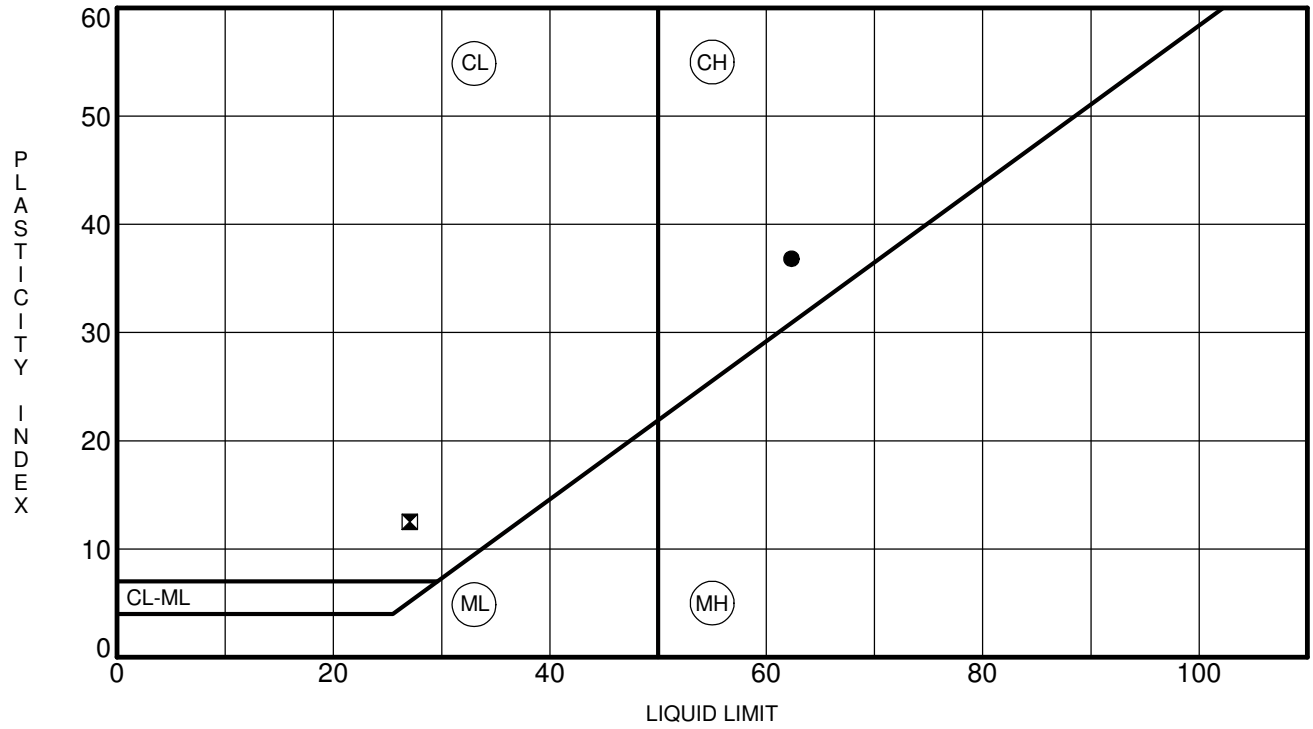
Virginia Geotechnical Services, P.C.
8211 Hermitage Road
Richmond, Virginia 23228
Telephone: (804)-266-2199
Fax: (804)-261-5569

LABORATORY SUMMARY TABLE

Project: Indian River Inlet Bridge Lab Testing

Location: Sussex County, Delaware

Number: LB1952



	Specimen Identification			LL	PL	PI	Fines	MC	Classification
●	**BII-12**	**9697**	**49.0**	**62**	**26**	**36**	**99**	**55.0**	**FAT CLAY CH**
⧗	**BII-18**	**9698**	**143.5**	**27**	**15**	**12**	**28**	**22.1**	**CLAYEY SAND SC**

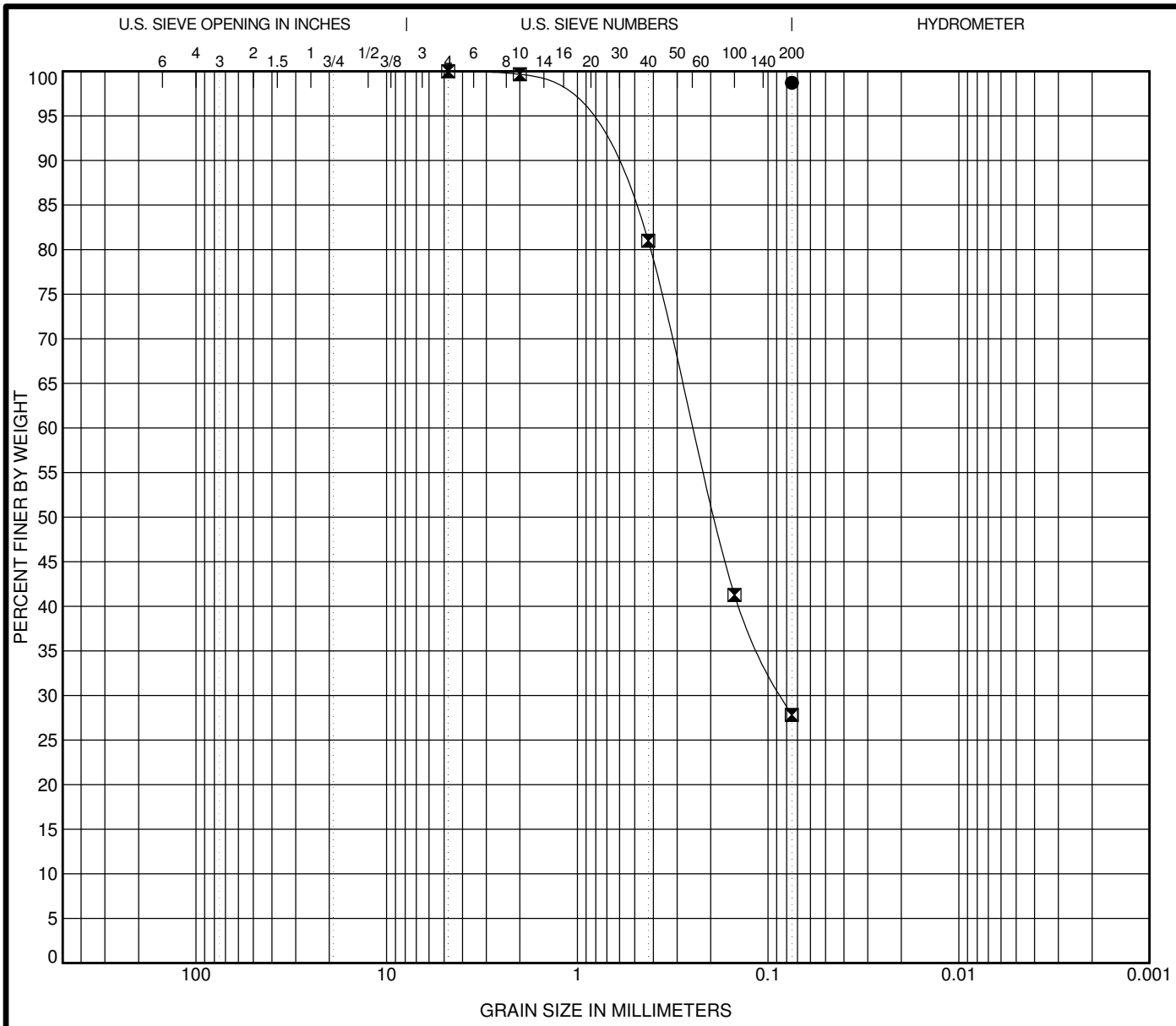
Virginia Geotechnical Services, P.C.
8211 Hermitage Road
Richmond, Virginia 23228
Telephone: (804)-266-2199
Fax: (804)-261-5569

ATTERBERG LIMITS RESULTS

Project: Indian River Inlet Bridge Lab Testing

Location: Sussex County, Delaware

Number: LB1952



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	**BII-12**	**9697**	**49.0**	**FAT CLAY CH**	**62**	**26**	**36**		
⧗	**BII-18**	**9698**	**143.5**	**CLAYEY SAND SC**	**27**	**15**	**12**		

	Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BII-12**	**9697**	**49.0**	**0.075**				**0.0**	**0.0**	**98.7**	
⧗	**BII-18**	**9698**	**143.5**	**4.75**	**0.245**	**0.084**		**0.0**	**72.2**	**27.8**	

Virginia Geotechnical Services, P.C.
8211 Hermitage Road
Richmond, Virginia 23228
Telephone: (804)-266-2199
Fax: (804)-261-5569

GRAIN SIZE DISTRIBUTION

Project: Indian River Inlet Bridge Lab Testing

Location: Sussex County, Delaware

Number: LB1952

MACTEC

Mactec Engineering and Consulting, Inc.
22455 Davis Drive, Suite 100
Sterling, Virginia 20164

PERCENT ORGANIC

Project Name: Indian River Inlet Bridges
Project Number: 3530-03-1245 Task 02
Date: 12/22/2003

Sample ID	Sample Depth, ft	Percent Organic
BII-6	0-1	25.48
BII-6	1-2	1.58
BII-14	0-1	10.51
BII-14	1-2	7.90
BII-15	0-1	0.56
BII-15	1-2	0.83

Reviewed by: [illegible] 12/23/03

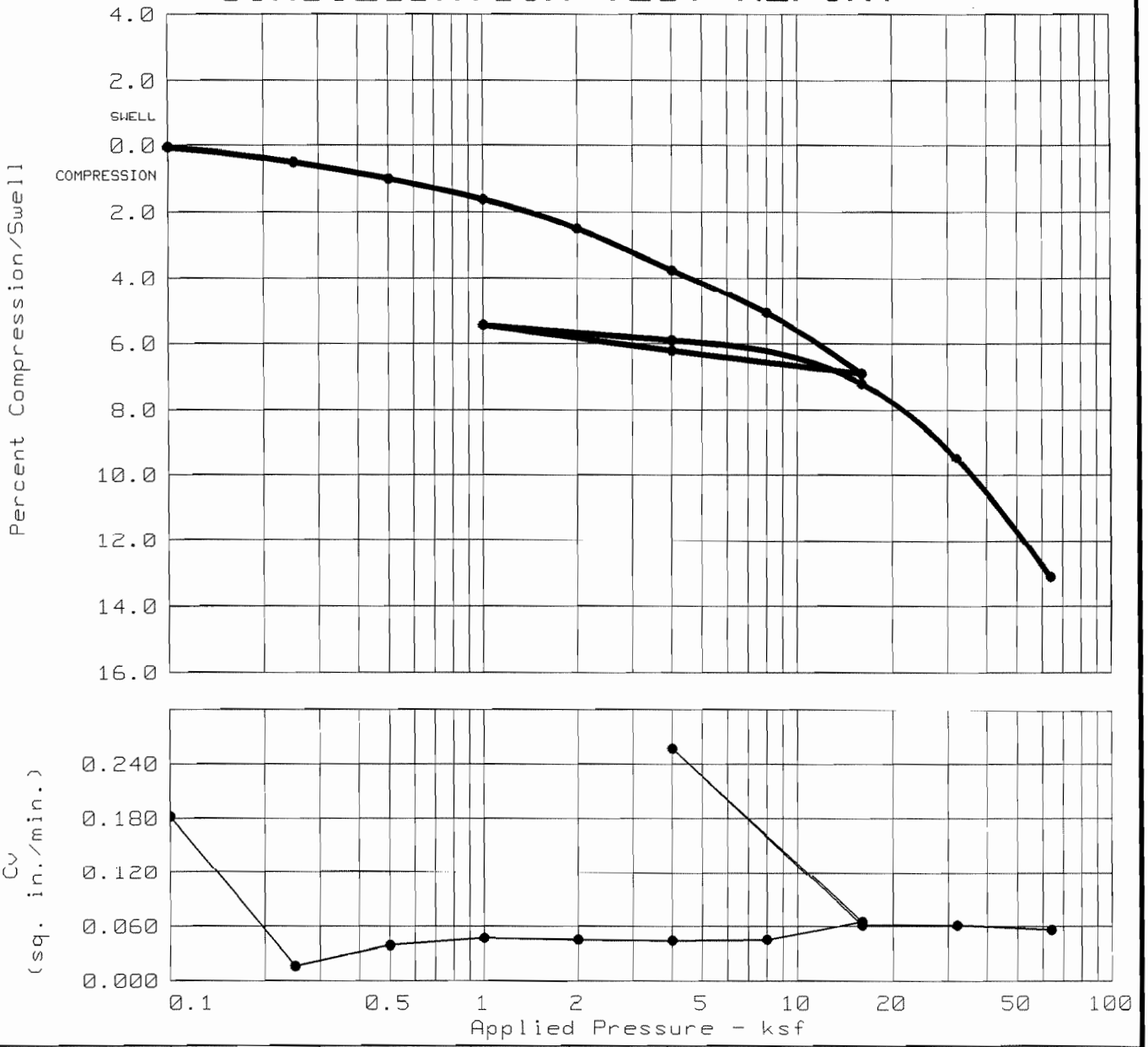
CONSOLIDATION TESTS

One-dimensional consolidation tests are conducted to determine the compression characteristics of soils under applied vertical stresses. Test results may provide information including the magnitude of settlement, the time-rate effects, and the past stress history of the soil.

Tests are conducted in general accordance with ASTM D 2435. A soil sample 2.5 inches in diameter and 1.0 inch thick is fitted into a stainless steel ring, with porous stones above and below the soil. The sample is then placed in a loading device and subjected to a series of increasing vertical stresses under conditions of no lateral strain. Time-deformation readings are recorded for each applied stress, and the resultant strain or void ratio is calculated.

Typically, test results include a plot of void ratio or percent strain versus the log of the applied stress. The virgin compression index (C_c), the rebound or swelling index (C_s), the coefficient of consolidation (C_V), the constrained modulus ($M=1/m_v$), and the preconsolidation stress (P'_c) are all important parameters obtained from this test.

CONSOLIDATION TEST REPORT



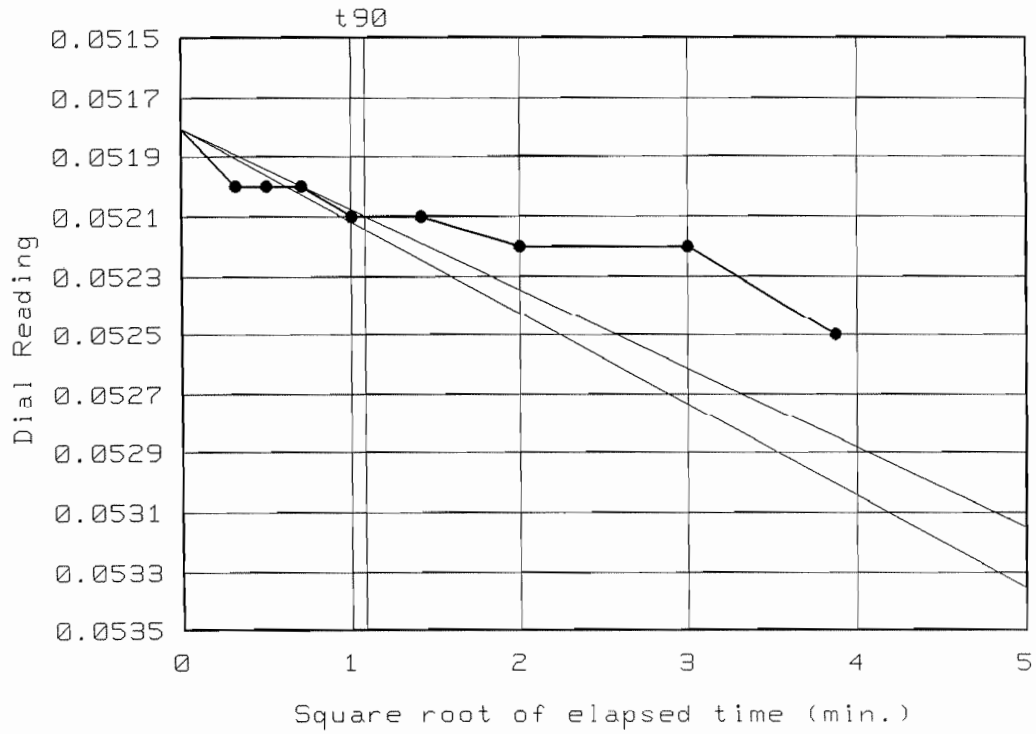
Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
89.5 %	27.8 %	93.3	39	18	2.700	0.0382

TEST RESULTS	MATERIAL DESCRIPTION
	Dark gray lean CLAY Class: (CL)
Project No.: 3530-03-1245 Phase 02 Project: Indian River Inlet Bridges Location: Boring BII-9 @ 33.5' - 35' Date: 12/22/03	Remarks: Dm 1/23/3
CONSOLIDATION TEST REPORT LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.	Fig. No. 1 1

Dial Reading vs. Time

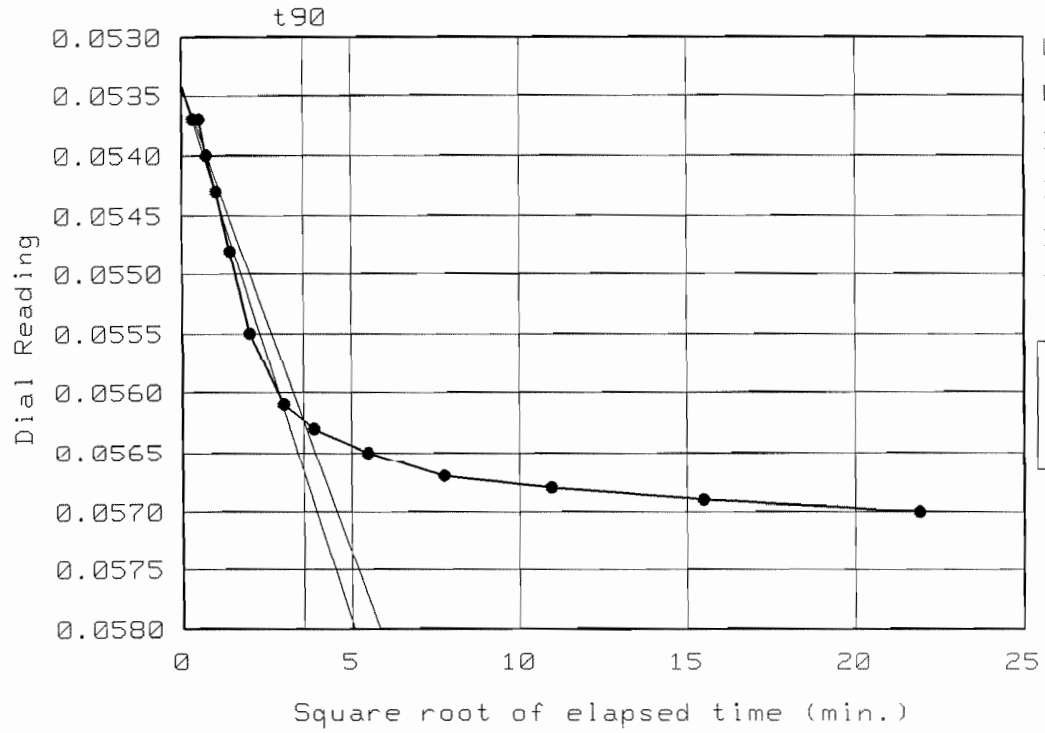
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-9 @ 33.5' - 35'

Date: 12/22/03



Load No.= 1
Load= 0.10 ksf
D_0 = 0.0518
D_{90} = 0.0521
D_{100}= 0.0521
T_{90}= 1.17 min.

C_v @ T_{90} =
.182 in.^{2}/min.



Load No.= 2
Load= 0.25 ksf
D_0 = 0.0534
D_{90} = 0.0562
D_{100}= 0.0565
T_{90}= 12.85 min.

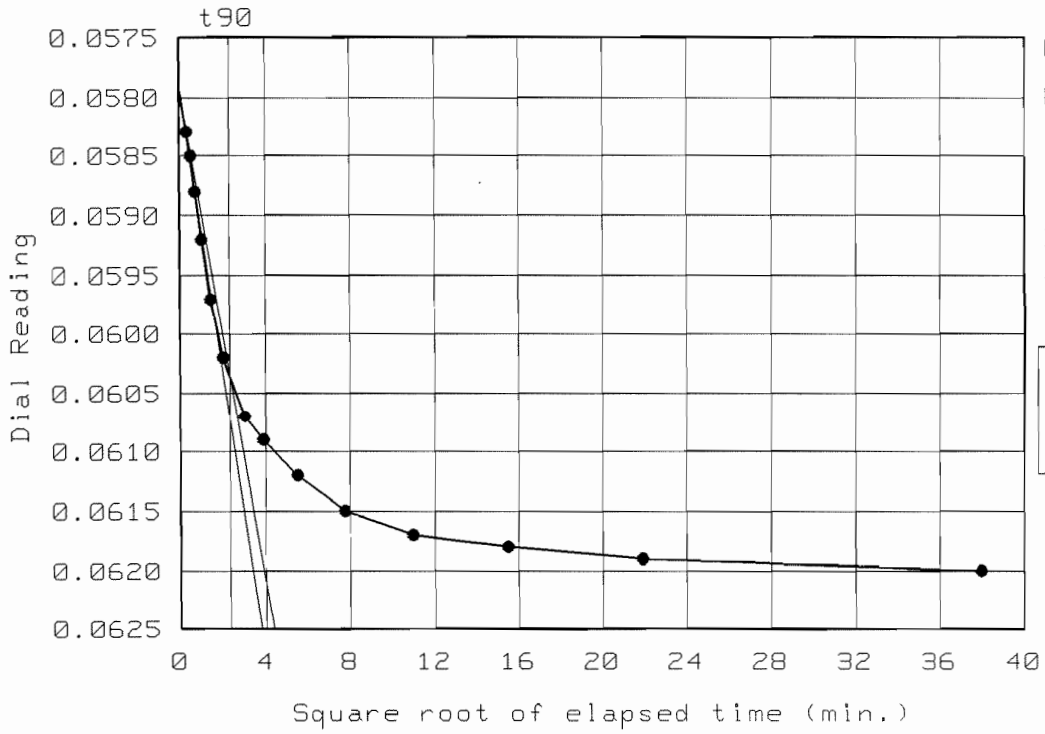
C_v @ T_{90} -
.016 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

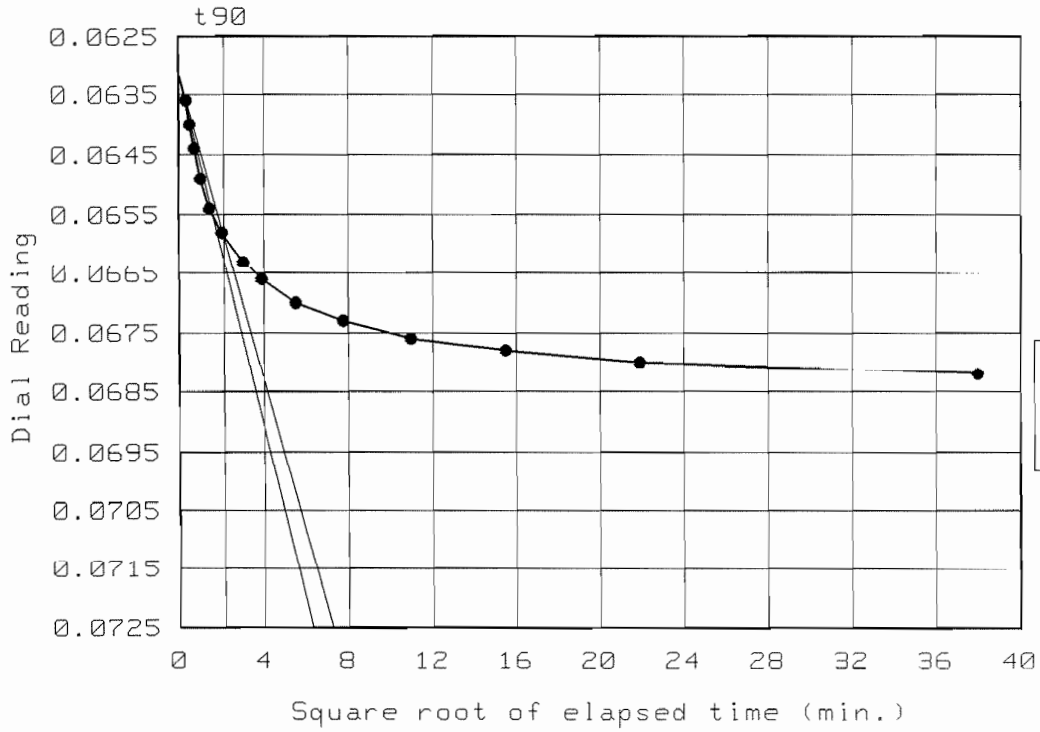
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-9 @ 33.5' - 35'

Date: 12/22/03



Load No.= 3
Load= 0.50 ksf
D_0 = 0.0579
D_{90} = 0.0604
D_{100}= 0.0606
T_{90}= 5.40 min.

C_v @ T_{90} =
.039 in.^{2}/min.



Load No.= 4
Load= 1.00 ksf
D_0 = 0.0631
D_{90} = 0.0658
D_{100}= 0.0662
T_{90}= 4.39 min.

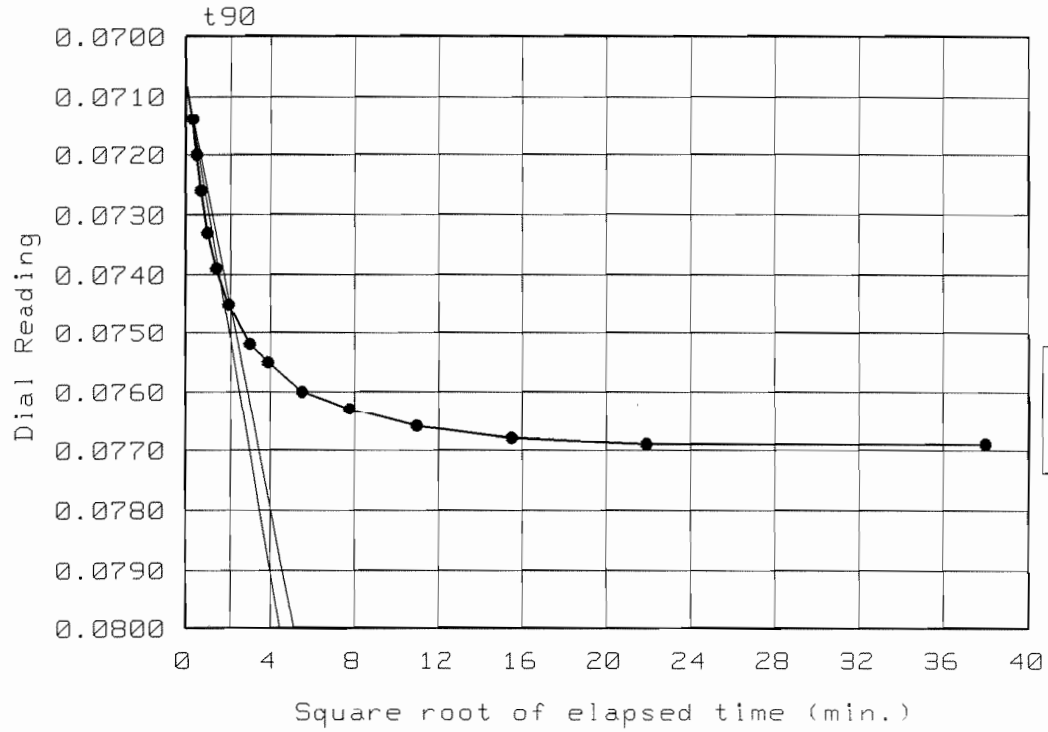
C_v @ T_{90} =
.047 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

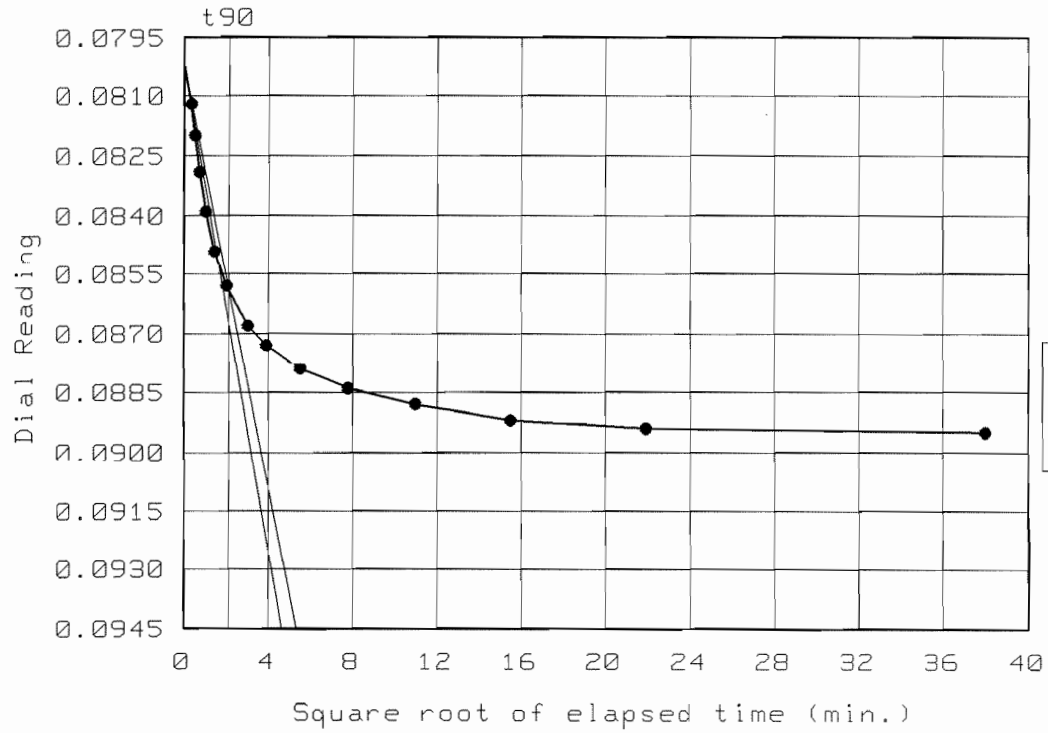
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-9 @ 33.5' - 35'

Date: 12/22/03



Load No.= 5
Load= 2.00 ksf
D_0 = 0.0707
D_{90} = 0.0746
D_{100}= 0.0750
T_{90}= 4.50 min.

C_v @ T_{90} =
.045 in.^{2}/min.



Load No.= 6
Load= 4.00 ksf
D_0 = 0.0802
D_{90} = 0.0859
D_{100}= 0.0866
T_{90}= 4.51 min.

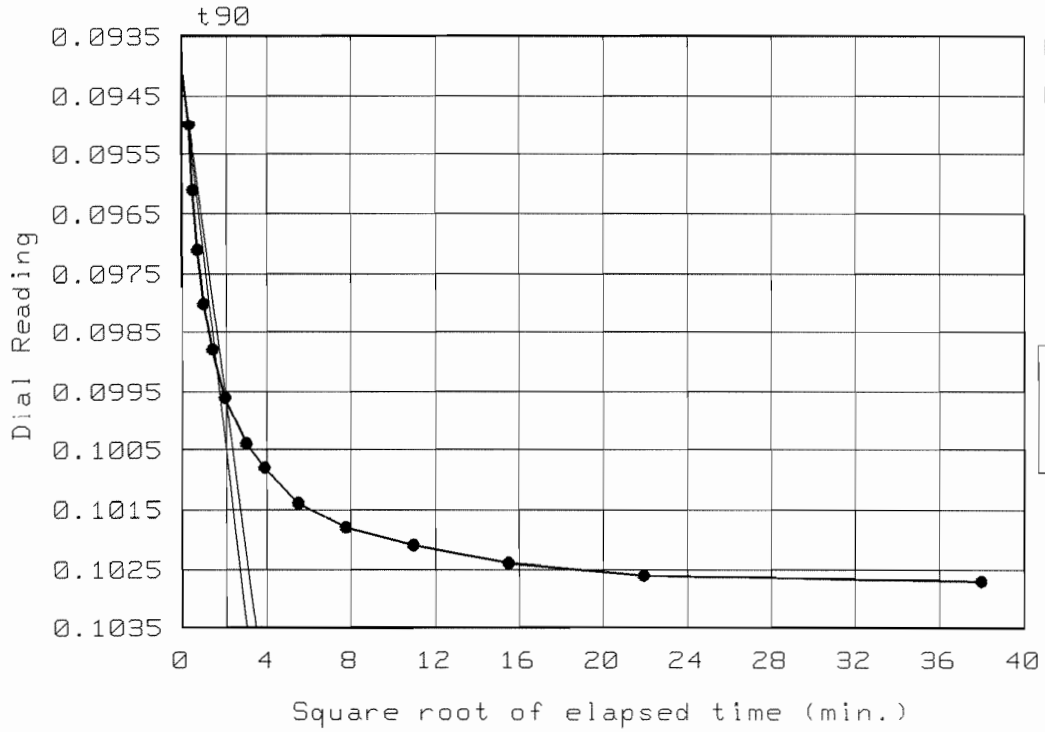
C_v @ T_{90} =
.044 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

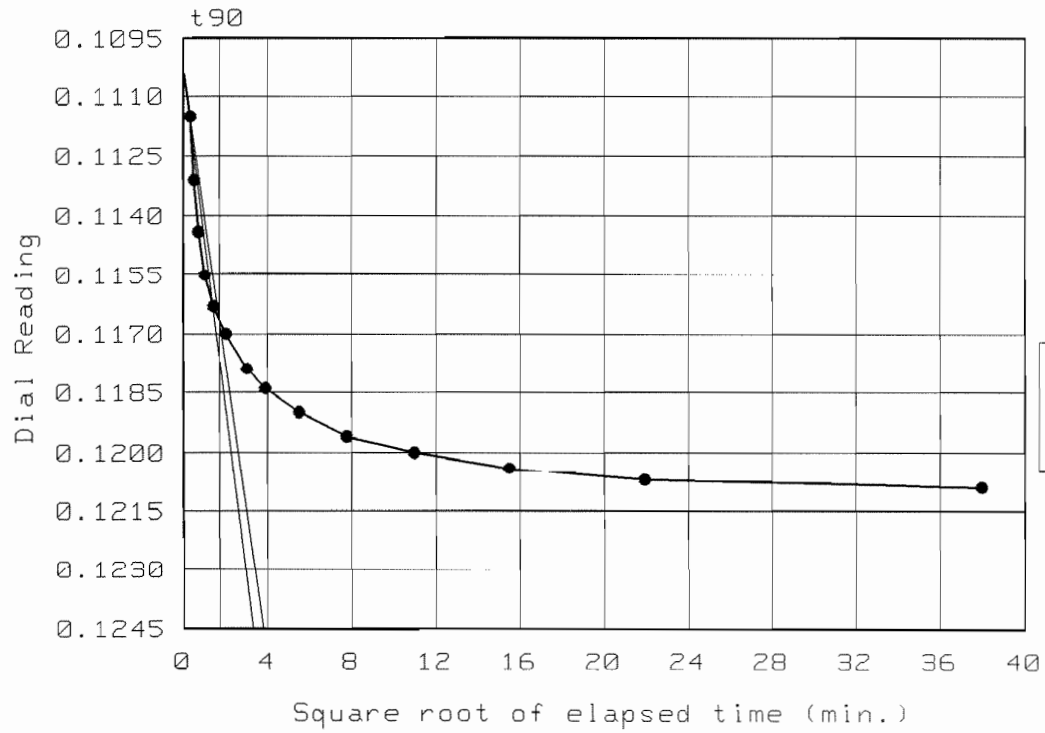
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-9 @ 33.5' - 35'

Date: 12/22/03



Load No. = 7
Load = 8.00 ksf
D_0 = 0.0940
D_{90} = 0.0997
D_{100} = 0.1003
T_{90} = 4.28 min.

C_v @ T_{90} = .045 in.^{2}/min.



Load No. = 8
Load = 16.00 ksf
D_0 = 0.1103
D_{90} = 0.1166
D_{100} = 0.1173
T_{90} = 2.88 min.

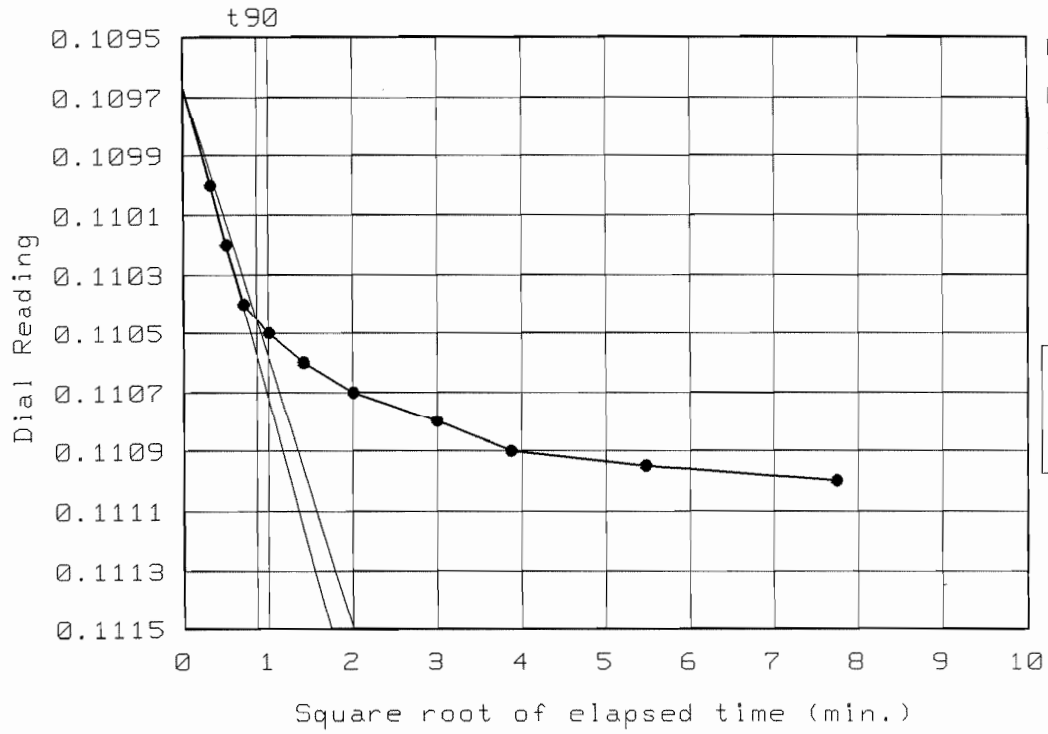
C_v @ T_{90} = .065 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

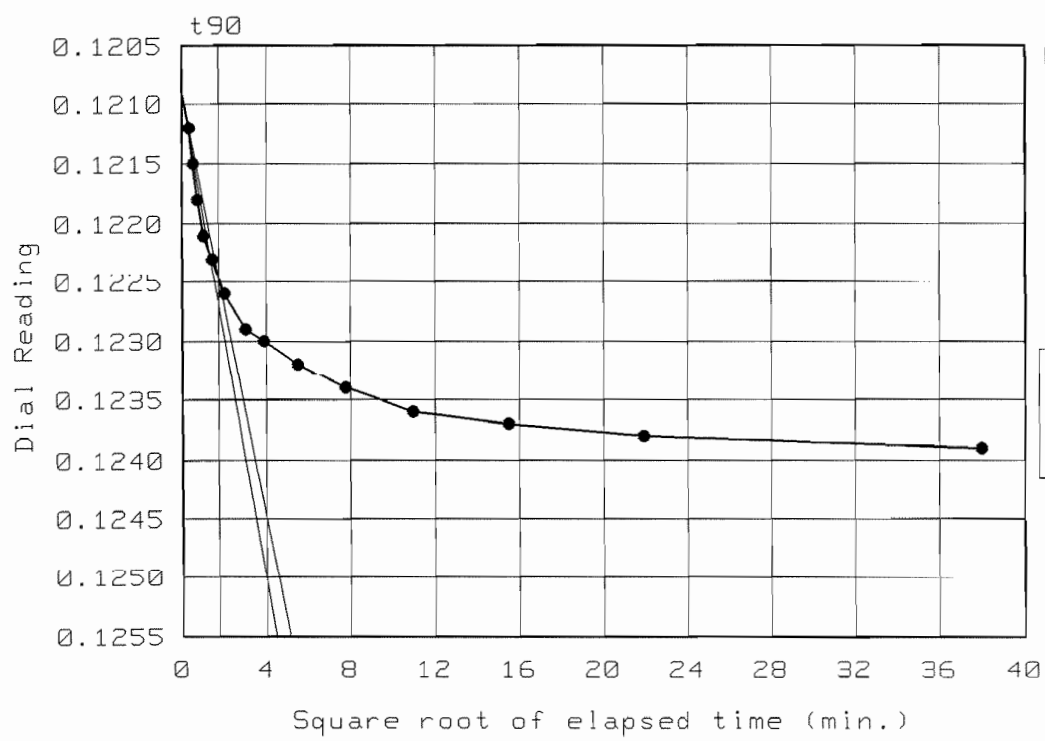
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-9 @ 33.5' - 35'

Date: 12/22/03



Load No.= 11
Load= 4.00 ksf
D_0 = 0.1097
D_{90} = 0.1105
D_{100}= 0.1105
T_{90}= 0.73 min.

C_v @ T_{90} =
.257 in.^{2}/min.



Load No.= 12
Load= 16.00 ksf
D_0 = 0.1209
D_{90} = 0.1225
D_{100}= 0.1226
T_{90}= 3.04 min.

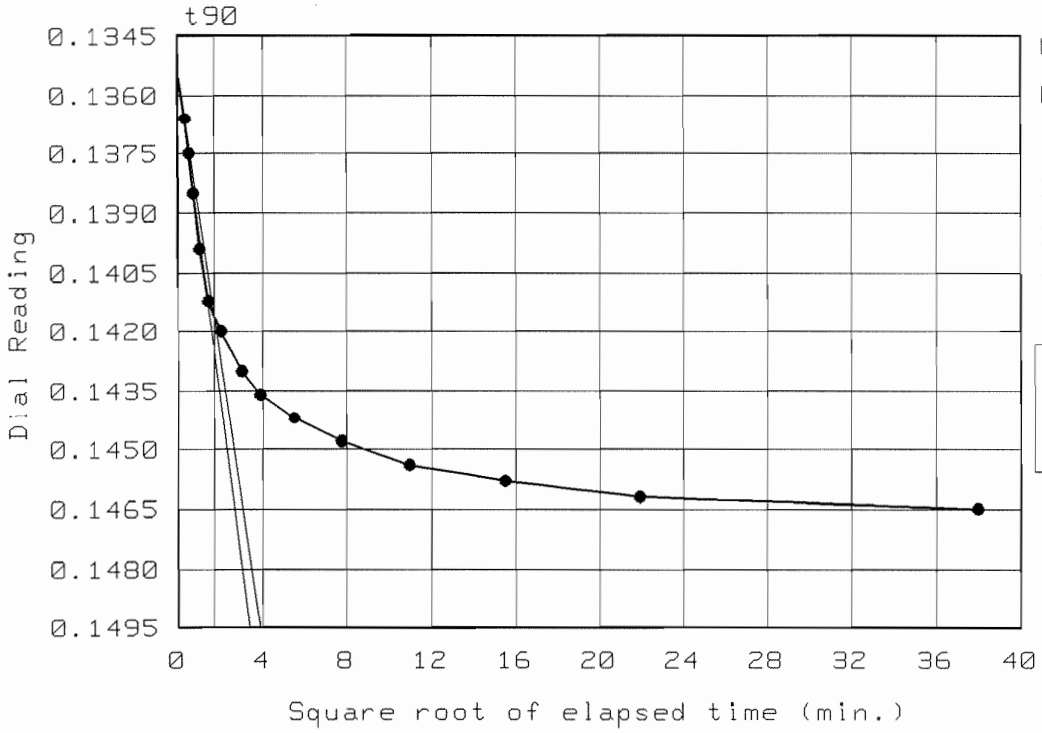
C_v @ T_{90} =
.061 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

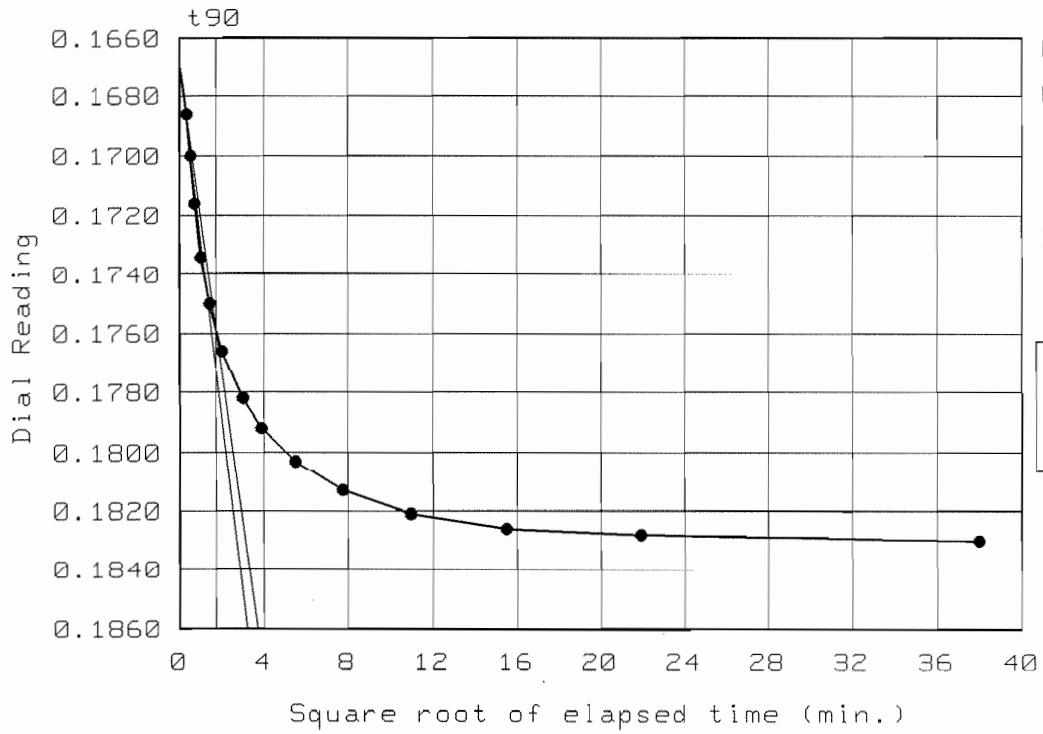
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-9 @ 33.5' - 35'

Date: 12/22/03



Load No.= 13
Load= 32.00 ksf
D_0 = 0.1354
D_{90} = 0.1416
D_{100}= 0.1423
T_{90}= 2.91 min.

C_v @ T_{90} =
.061 in.^{2}/min.



Load No.= 14
Load= 64.00 ksf
D_0 = 0.1669
D_{90} = 0.1759
D_{100}= 0.1769
T_{90}= 3.00 min.

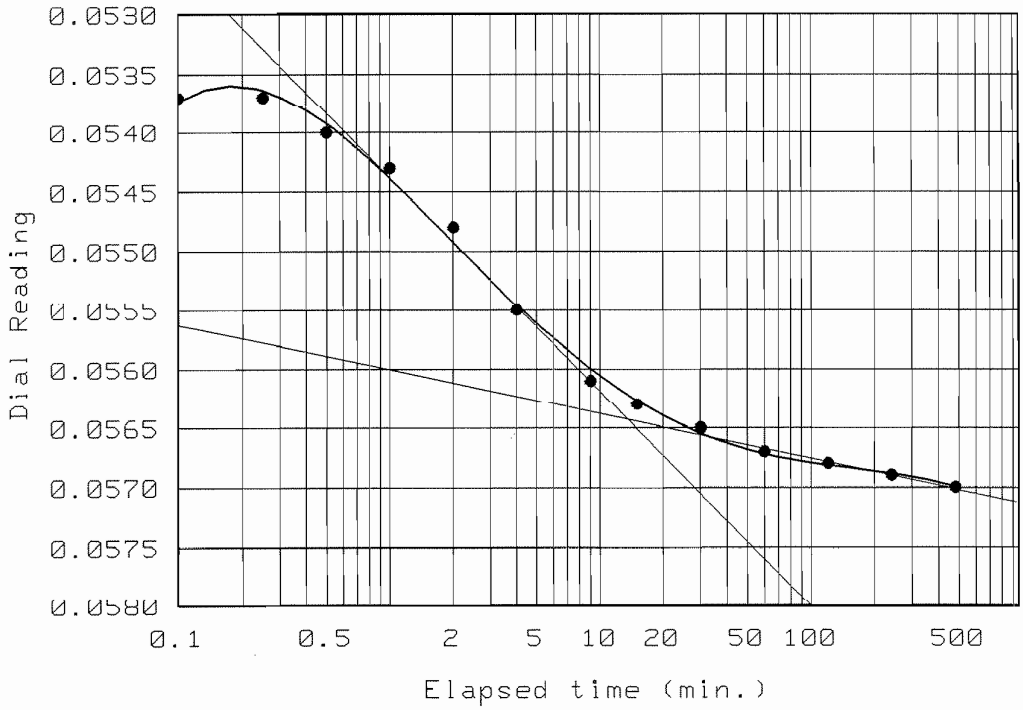
C_v @ T_{90} =
.056 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-9 @ 33.5' - 35'

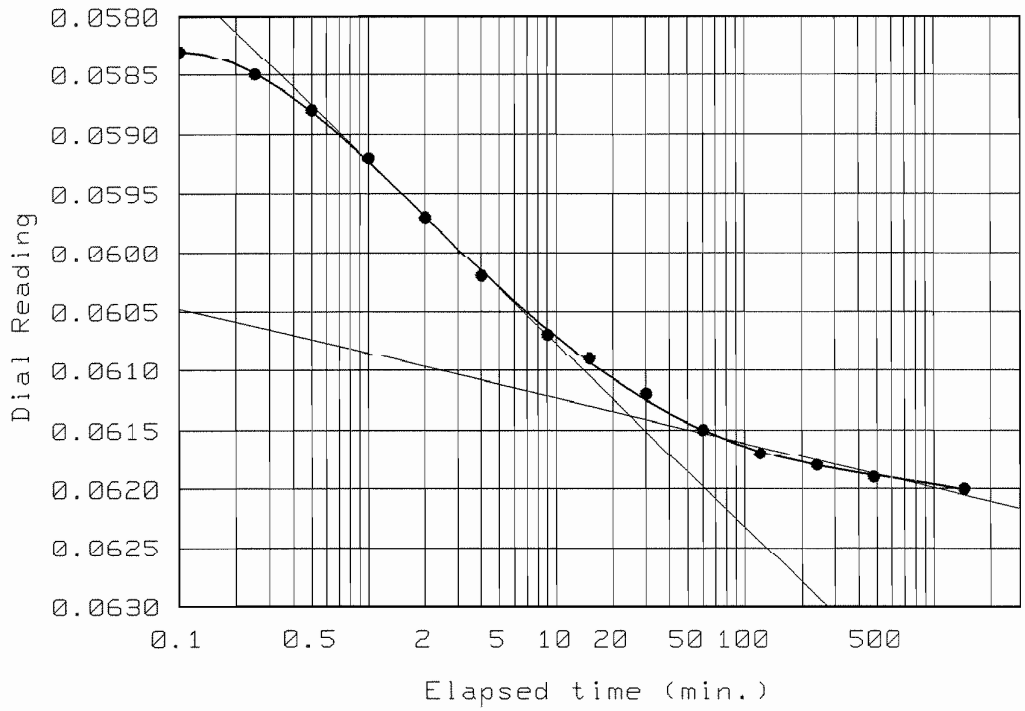
Date: 12/22/03



Load No.= 2
Load= 0.25 ksf
D_0 = 0.0537
D_{50} = 0.0550
D_{100}= 0.0564
T_{50}= 2.34 min.

C_v @ T_{50} =
.021 in.^{2}/min.

C_α= 0.000



Load No.= 3
Load= 0.50 ksf
D_0 = 0.0579
D_{50} = 0.0596
D_{100}= 0.0614
T_{50}= 1.85 min.

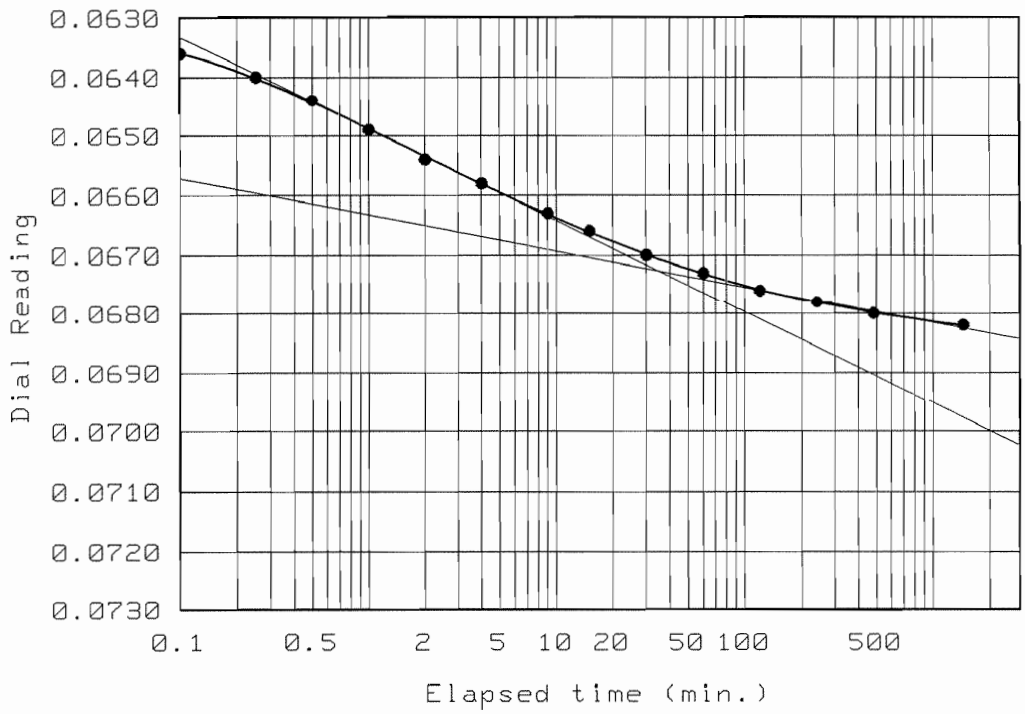
C_v @ T_{50} =
.026 in.^{2}/min.

C_α= 0.000

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-9 @ 33.5' - 35'

Date: 12/22/03



Load No.= 4

Load= 1.00 ksf

D_0 = 0.0629

D_{50} = 0.0651

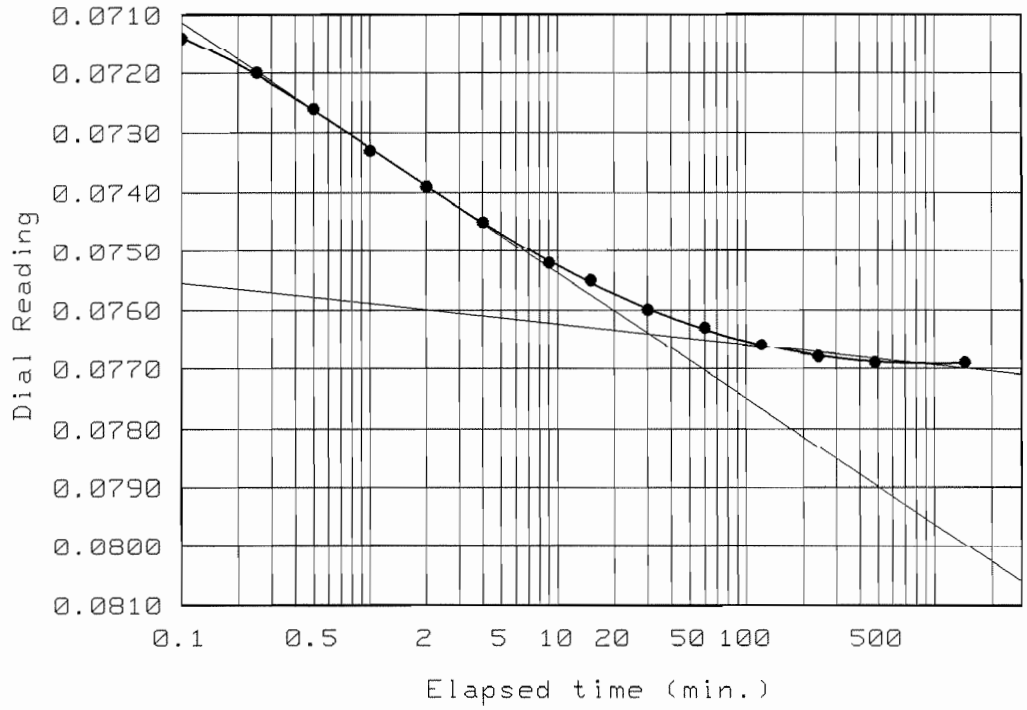
D_{100}= 0.0673

T_{50}= 1.33 min.

C_v @ T_{50} =

.036 in.^{2}/min.

C_α= 0.001



Load No.= 5

Load= 2.00 ksf

D_0 = 0.0703

D_{50} = 0.0734

D_{100}= 0.0764

T_{50}= 1.14 min.

C_v @ T_{50} =

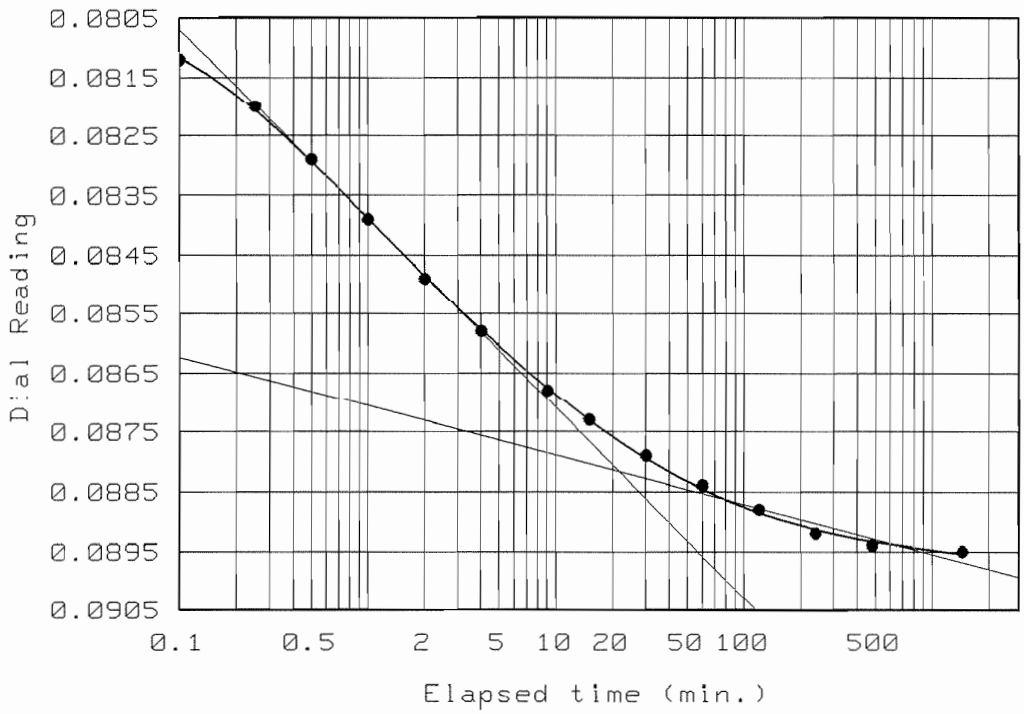
.042 in.^{2}/min.

C_α= 0.000

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-9 @ 33.5' - 35'

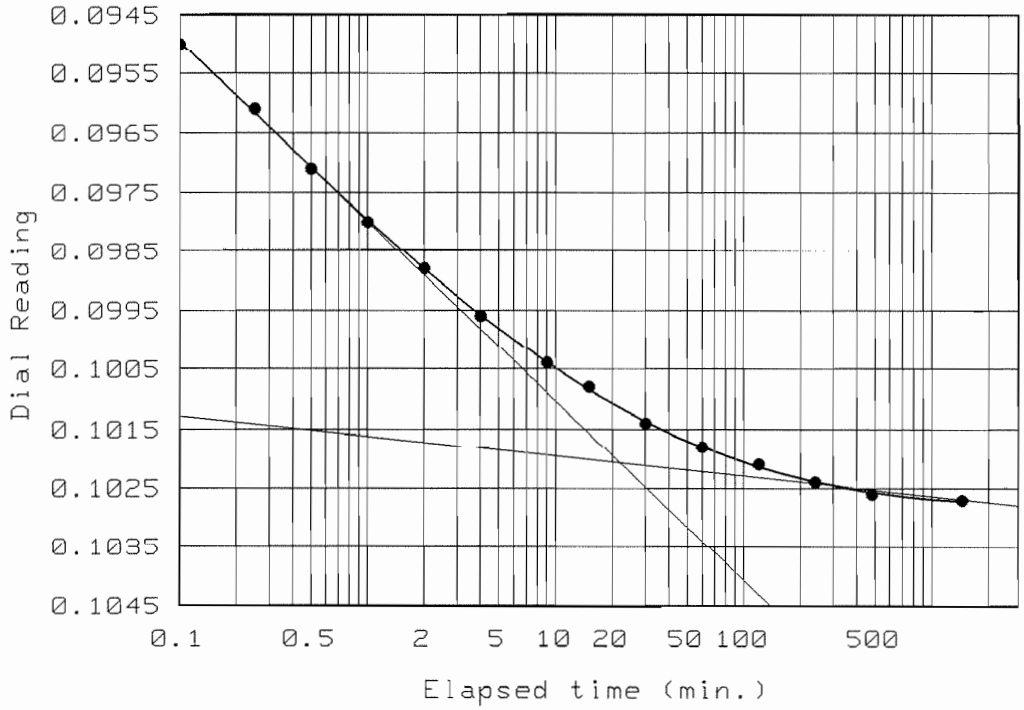
Date: 12/22/03



Load No.= 6
Load= 4.00 ksf
D_0 = 0.0797
D_{50} = 0.0839
D_{100}= 0.0882
T_{50}= 1.02 min.

C_v @ T_{50} = .045 in.^{2}/min.

C_α= 0.001



Load No.= 7
Load= 8.00 ksf
D_0 = 0.0932
D_{50} = 0.0976
D_{100}= 0.1021
T_{50}= 0.76 min.

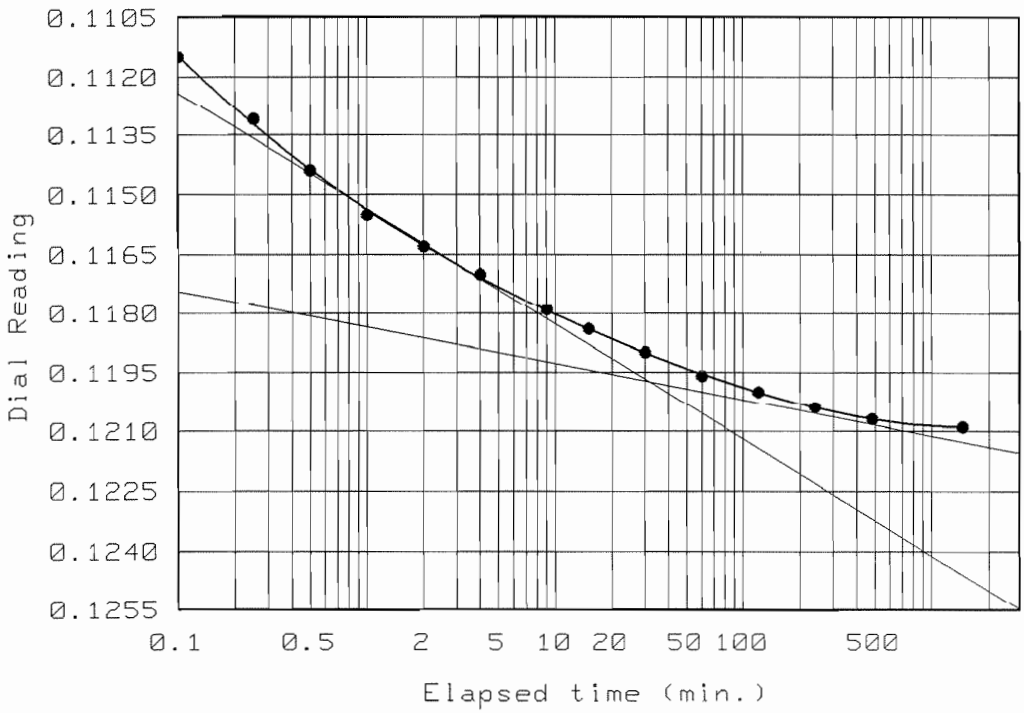
C_v @ T_{50} = .059 in.^{2}/min.

C_α= 0.000

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-9 @ 33.5' - 35'

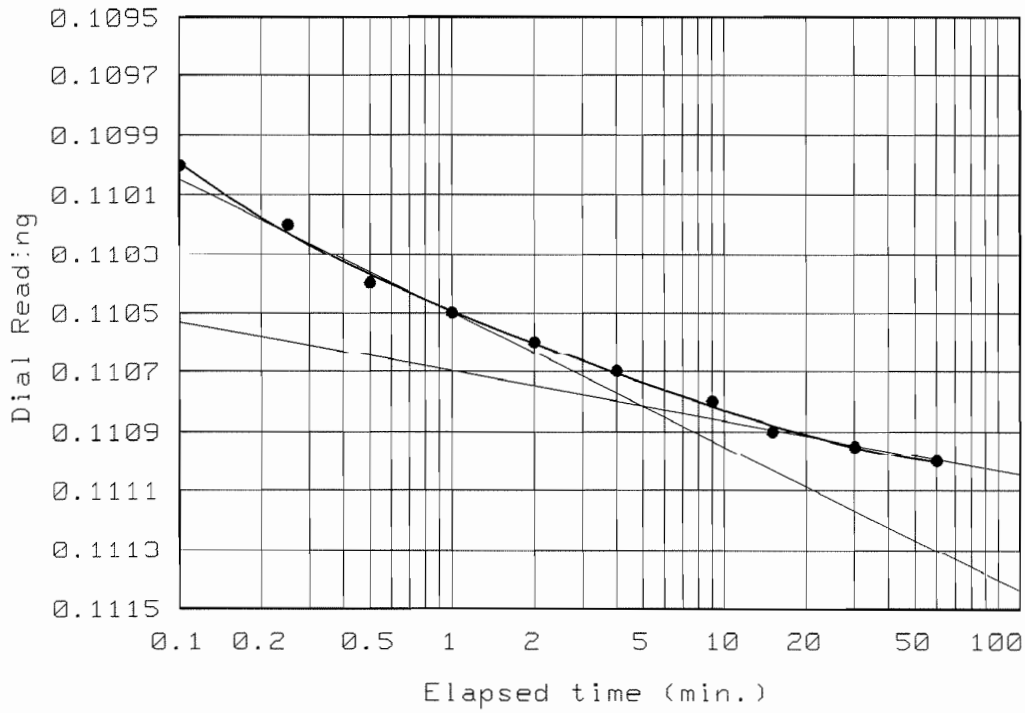
Date: 12/22/03



Load No.= 8
Load= 16.00 ksf
D_0 = 0.1089
D_{50} = 0.1143
D_{100}= 0.1197
T_{50}= 0.48 min.

C_v @ T_{50} =
.091 in.^{2}/min.

C_α= 0.001



Load No.= 11
Load= 4.00 ksf
D_0 = 0.1097
D_{50} = 0.1102
D_{100}= 0.1108
T_{50}= 0.26 min.

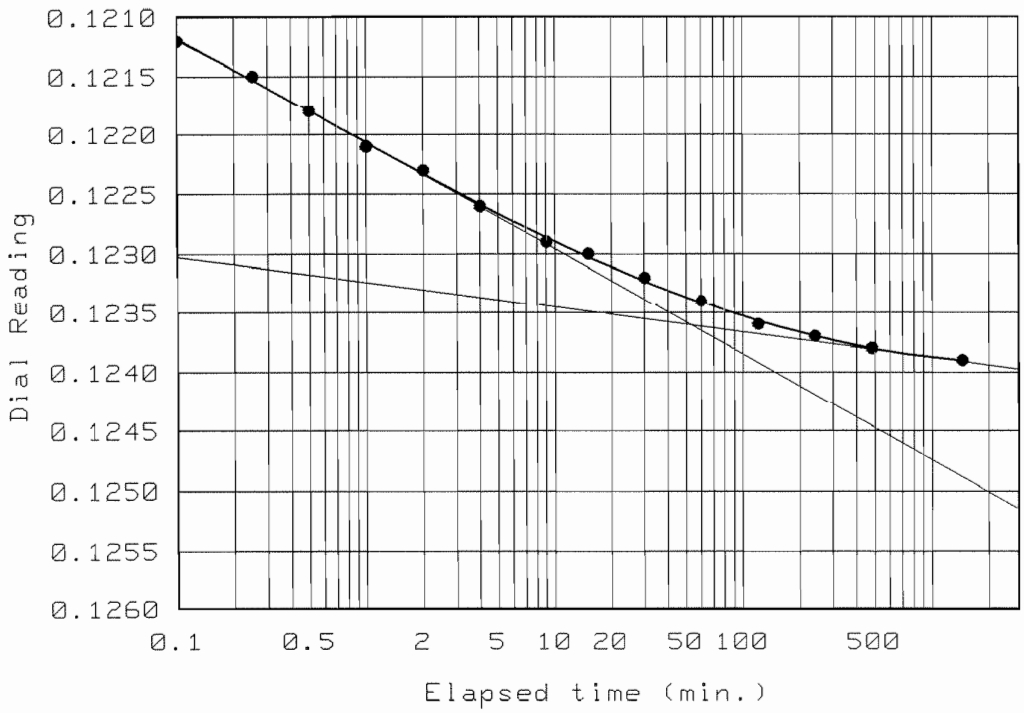
C_v @ T_{50} =
.170 in.^{2}/min.

C_α= 0.000

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-9 @ 33.5' - 35'

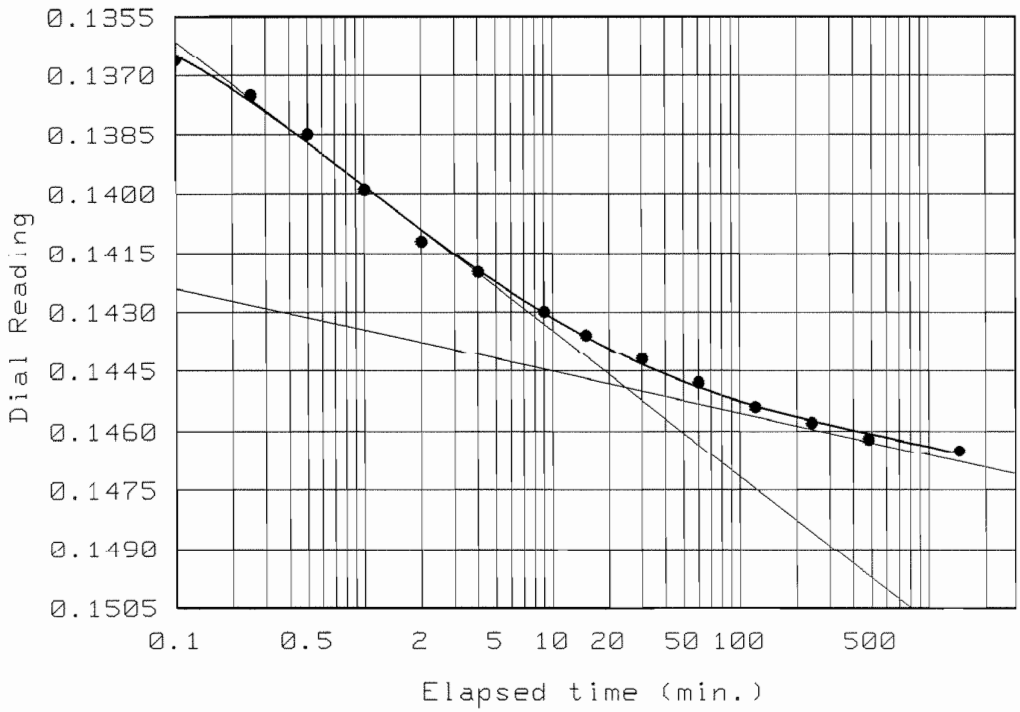
Date: 12/22/03



Load No.= 12
Load= 16.00 ksf
D_0 = 0.1207
D_{50} = 0.1221
D_{100}= 0.1236
T_{50}= 1.19 min.

C_v @ T_{50} =
.036 in.^{2}/min.

C_α= 0.000



Load No.= 13
Load= 32.00 ksf
D_0 = 0.1346
D_{50} = 0.1398
D_{100}= 0.1449
T_{50}= 0.96 min.

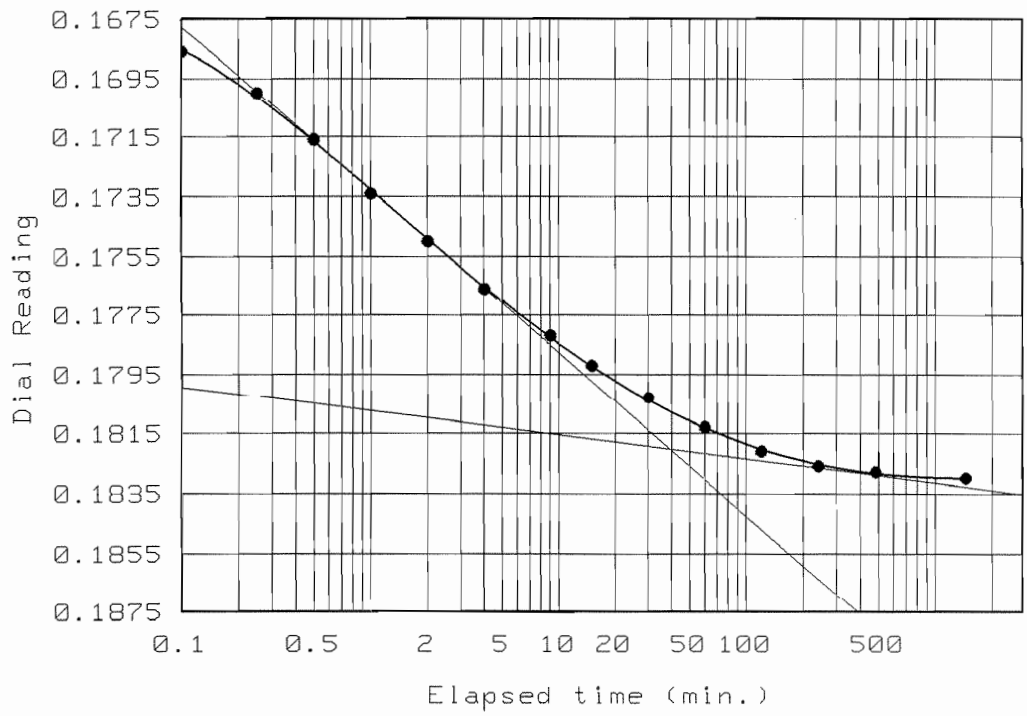
C_v @ T_{50} =
.043 in.^{2}/min.

C_α= 0.001

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-9 @ 33.5' - 35'

Date: 12/22/03



Load No.= 14

Load= 64.00 ksf

D_0 = 0.1659

D_{50} = 0.1740

D_{100}= 0.1820

T_{50}= 1.33 min.

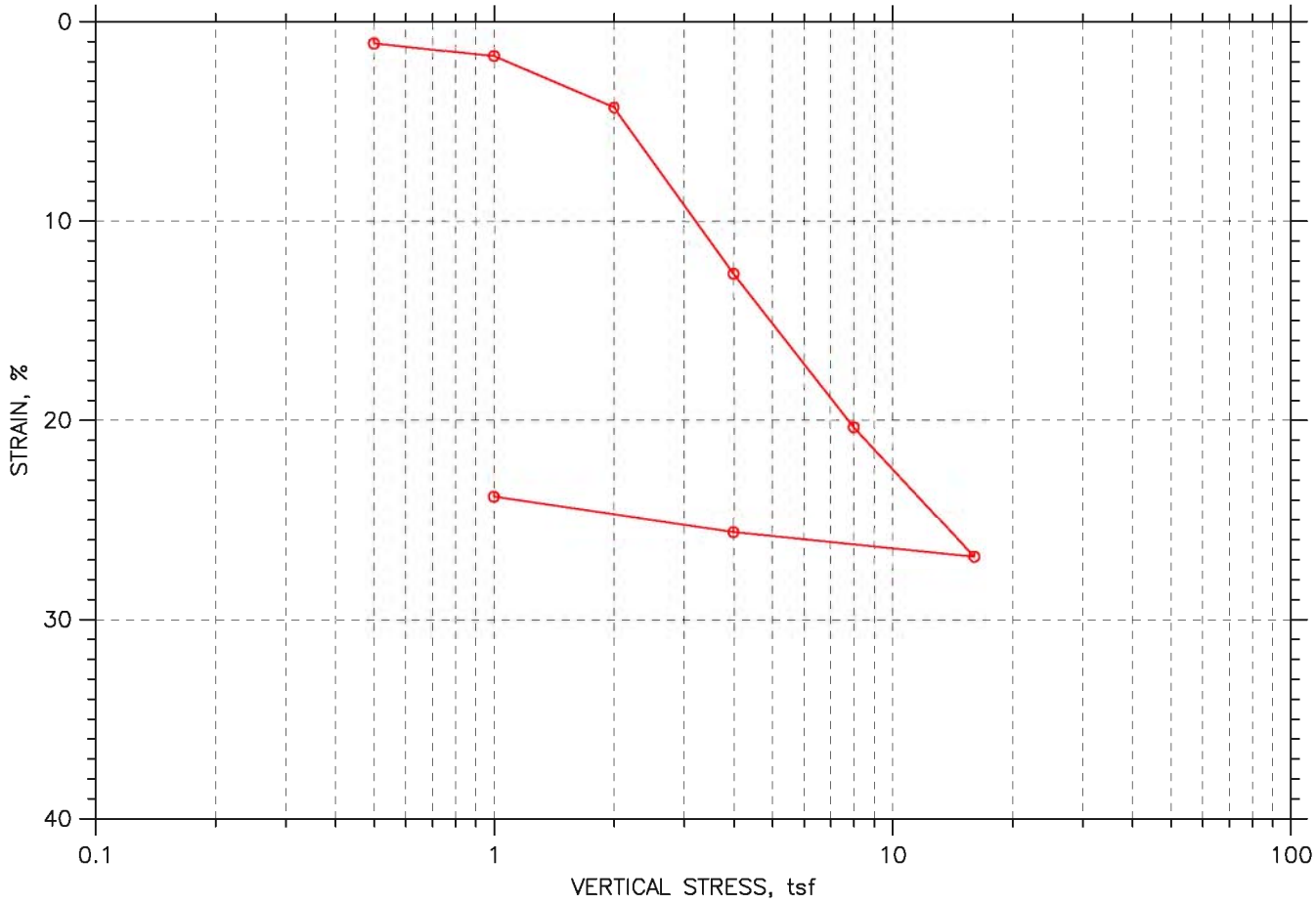
C_v @ T_{50} =

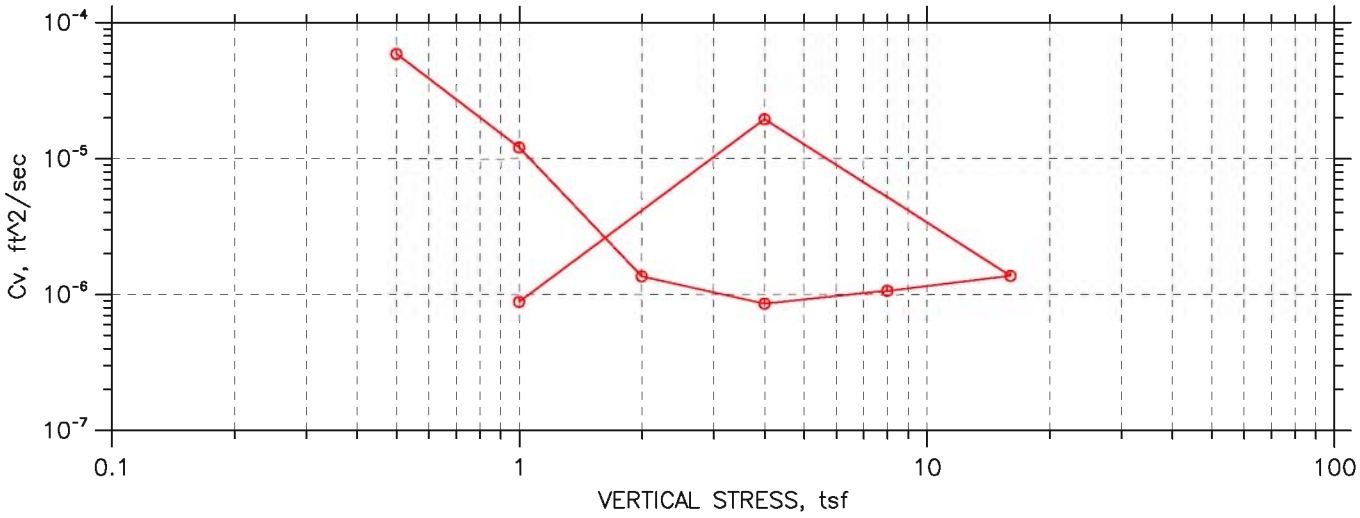
.029 in.^{2}/min.

C_α= 0.001

CONSOLIDATION TEST DATA

SUMMARY REPORT



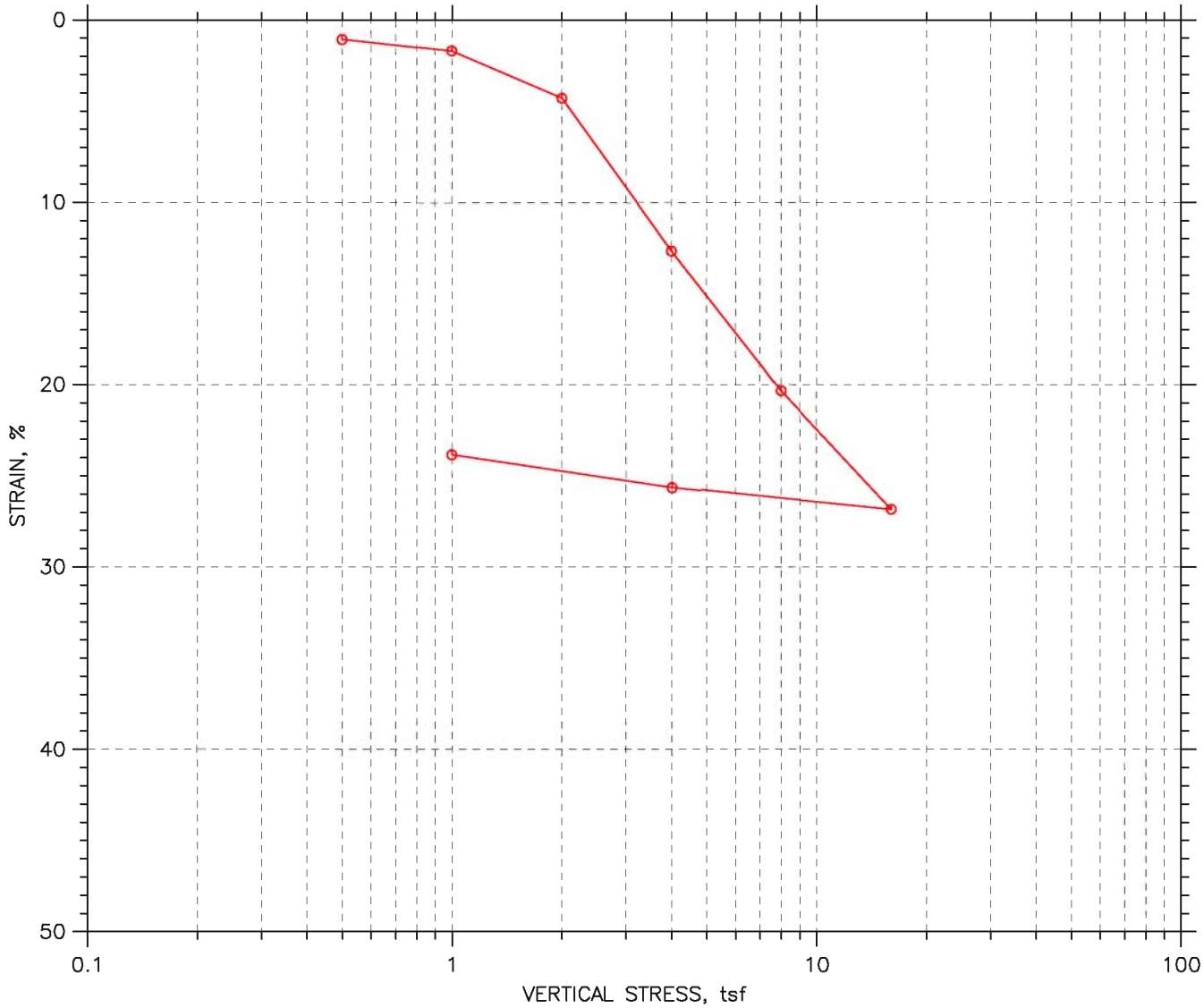


Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-12	Tested By: MLT	Checked By: JAC
Sample No.: 9697	Test Date: 11-21-03	Depth: 49-51'
Test No.: UII-2	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, FAT CLAY (CH)		
Remarks: None.		

Tue, 02-DEC-2003 10:58:52

CONSOLIDATION TEST DATA

SUMMARY REPORT



					Before Test	After Test
Overburden Pressure, tsf:				Water Content, %	55.38	34.51
Preconsolidation Pressure, tsf:				Dry Unit Weight, pcf	67.341	88.433
Compression Index:				Saturation, %	99.97	103.68
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.48	0.89
LL: 62	PL: 26	PI: 36	GS: 2.68			

Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-12	Tested By: MLT	Checked By: JAC
Sample No.: 9697	Test Date: 11-21-03	Depth: 49-51'
Test No.: UII-2	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, FAT CLAY (CH)		
Remarks: None.		

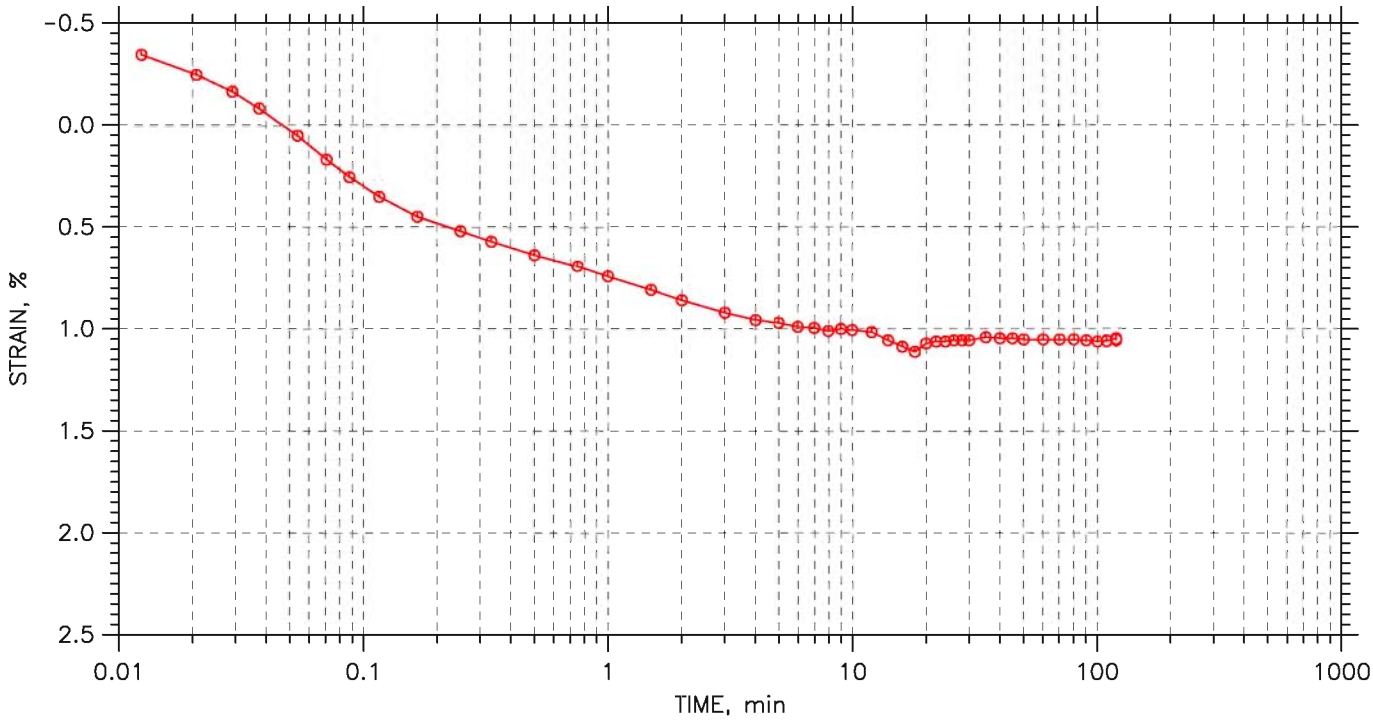
Tue, 02-DEC-2003 10:58:52

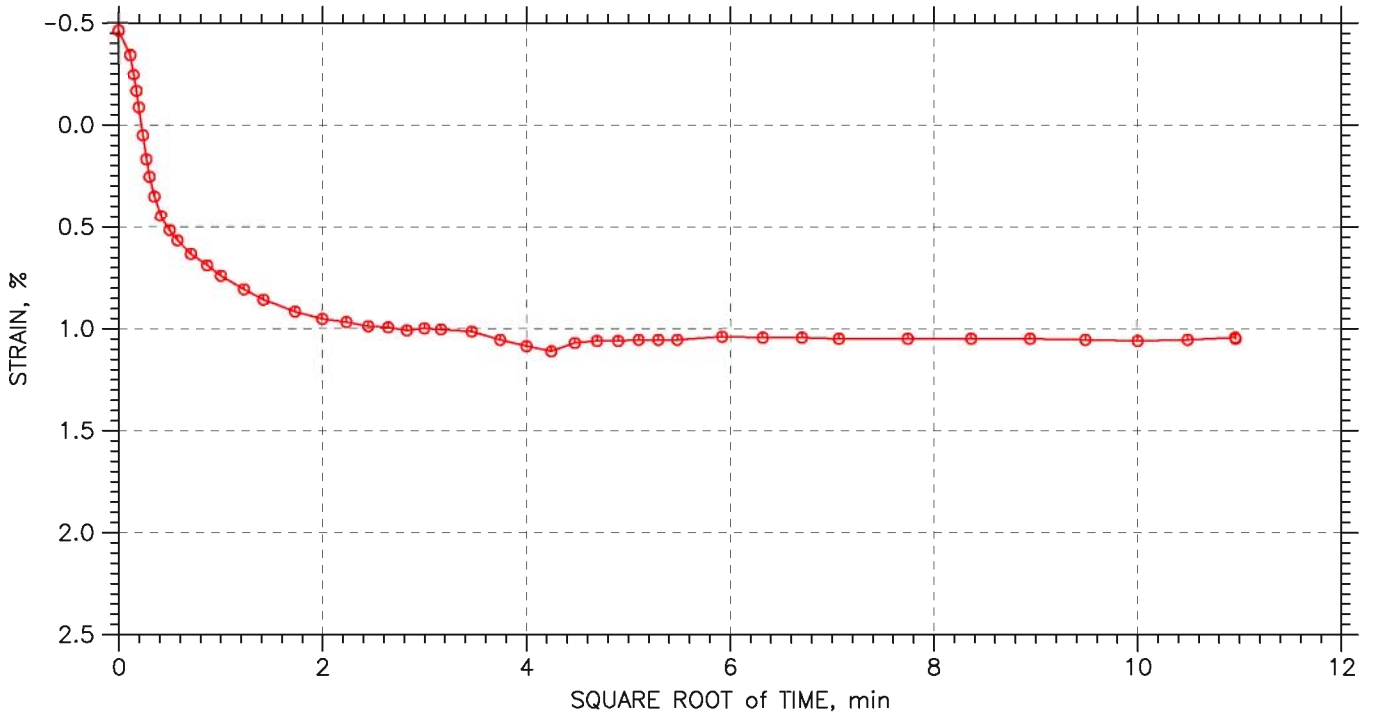
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 8

Stress: 0.5 tsf





Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-12	Tested By: MLT	Checked By: JAC
Sample No.: 9697	Test Date: 11-21-03	Depth: 49-51'
Test No.: UII-2	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, FAT CLAY (CH)		
Remarks: None.		

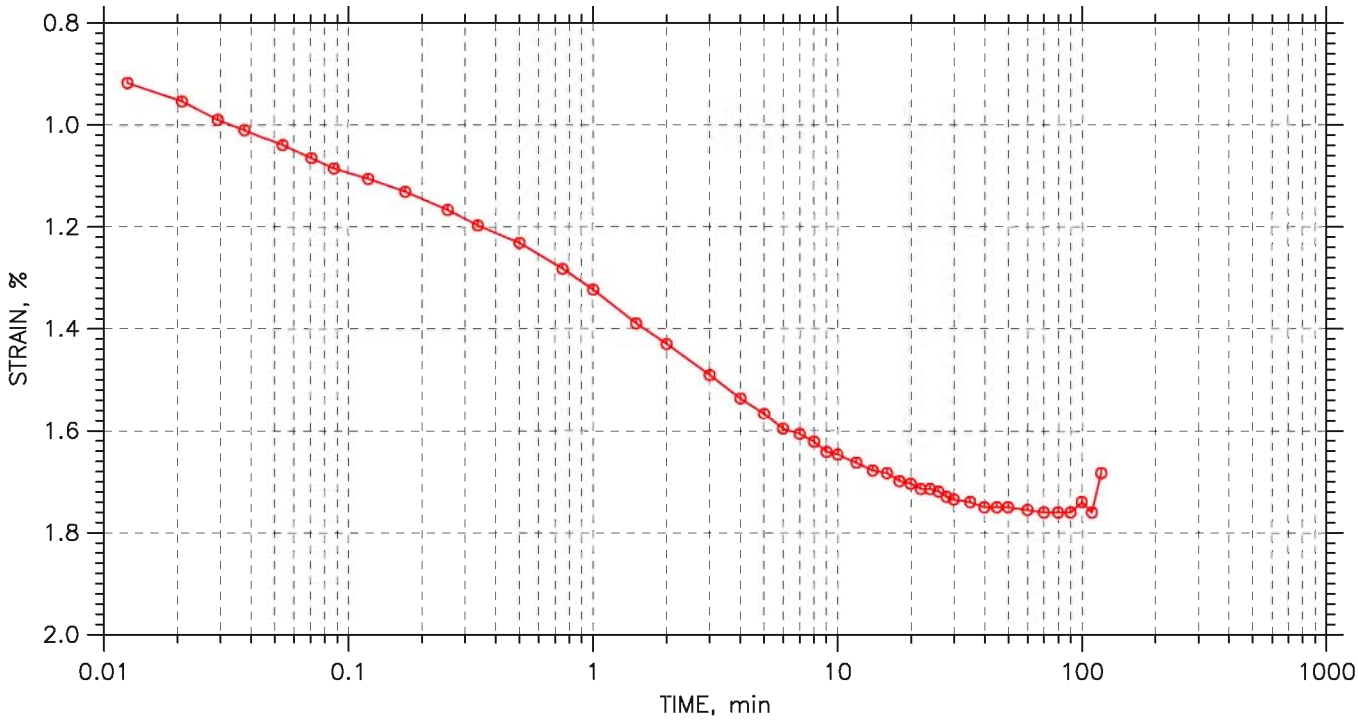
Tue, 02-DEC-2003 10:58:52

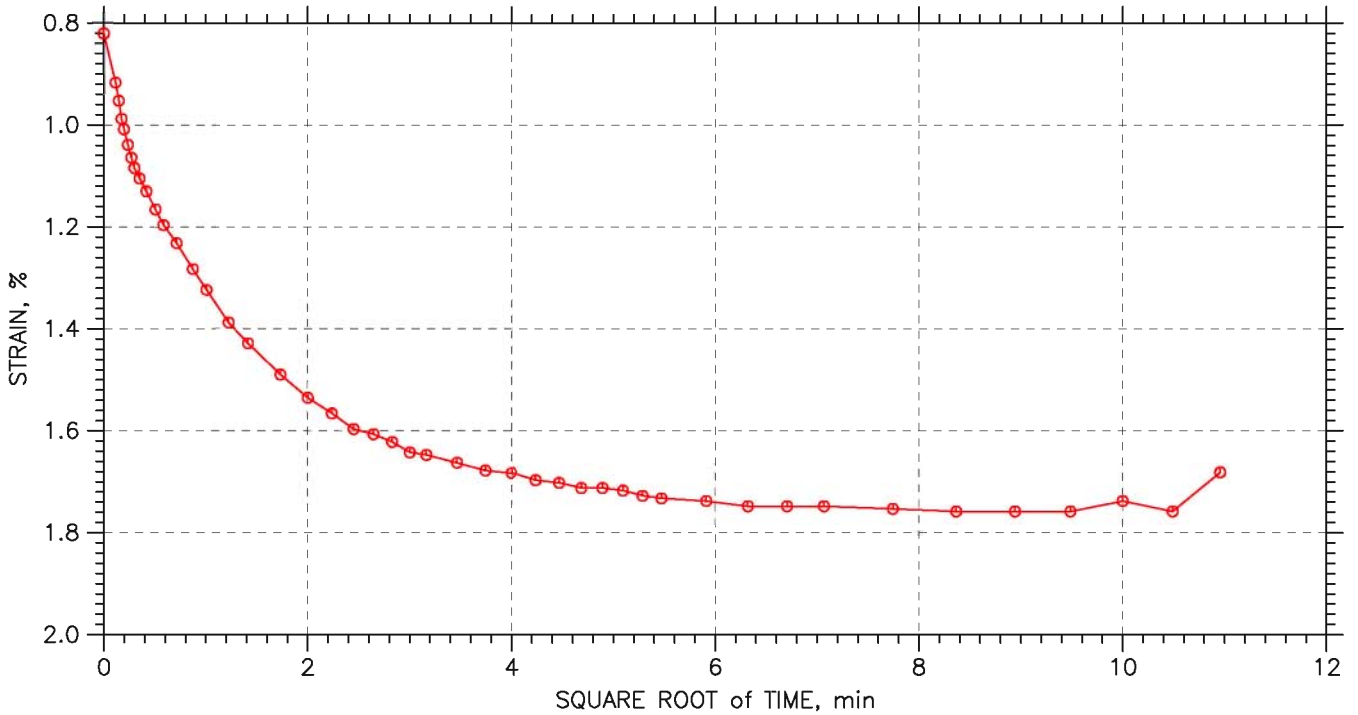
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 8

Stress: 1. tsf





Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-12	Tested By: MLT	Checked By: JAC
Sample No.: 9697	Test Date: 11-21-03	Depth: 49-51'
Test No.: UII-2	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, FAT CLAY (CH)		
Remarks: None.		

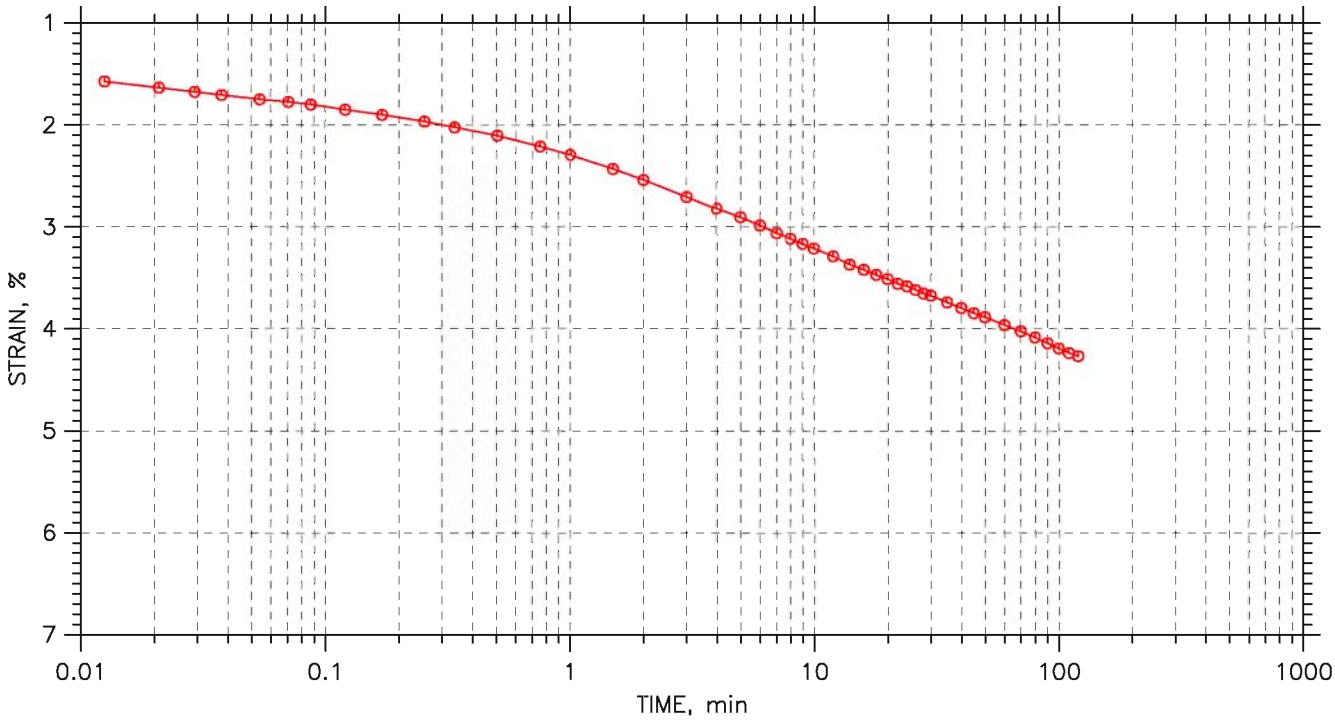
Tue, 02-DEC-2003 10:58:52

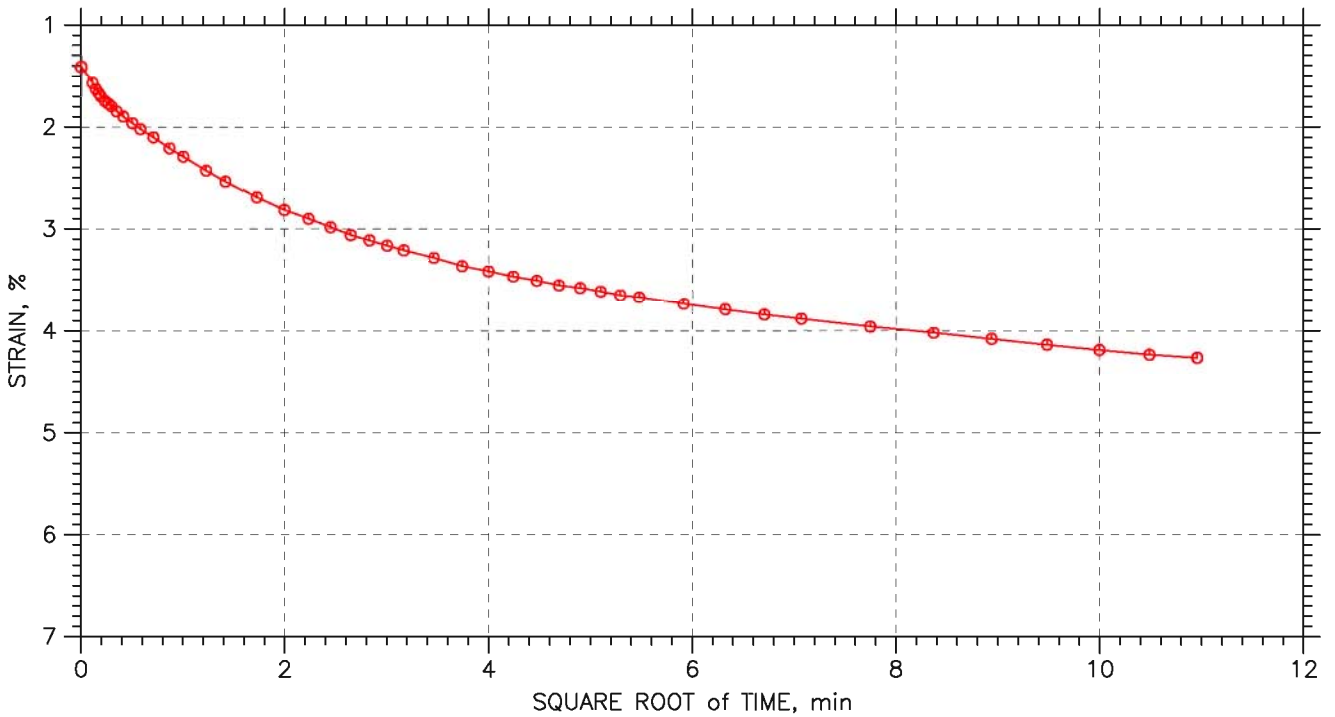
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 8

Stress: 2. tsf





Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-12	Tested By: MLT	Checked By: JAC
Sample No.: 9697	Test Date: 11-21-03	Depth: 49-51'
Test No.: UII-2	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, FAT CLAY (CH)		
Remarks: None.		

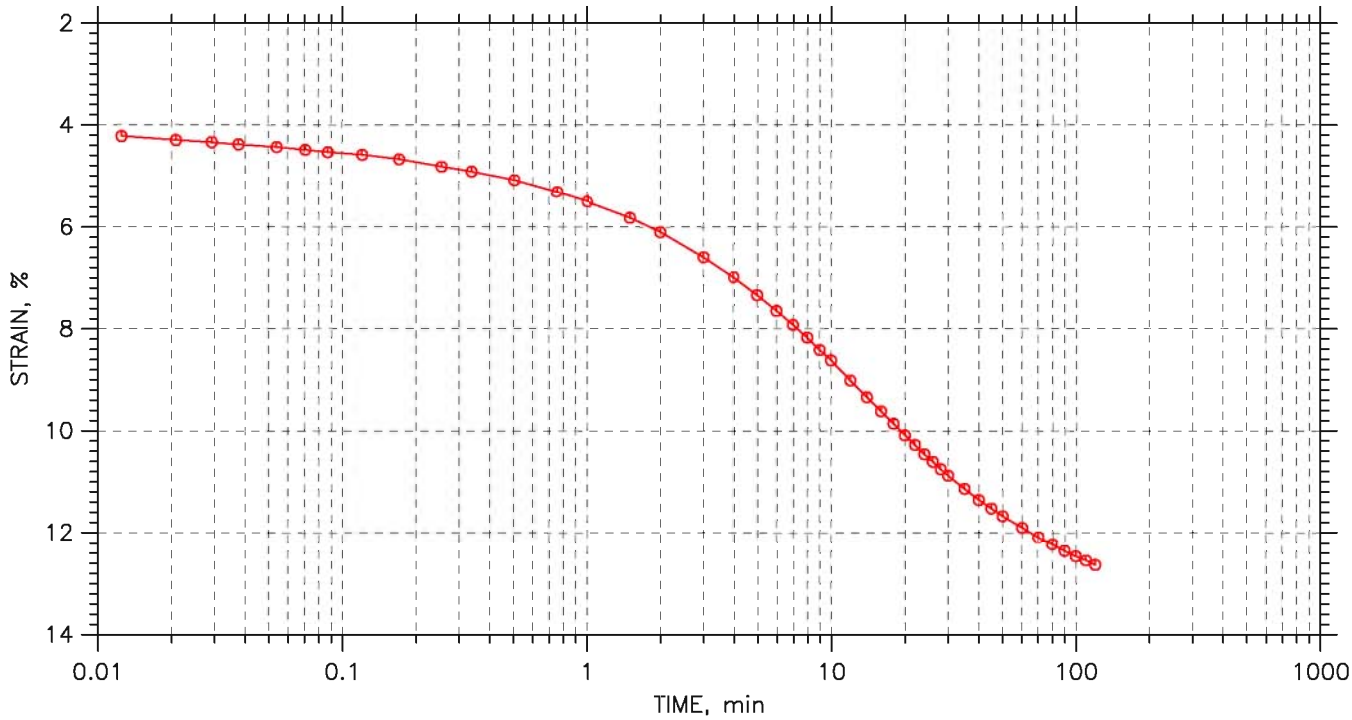
Tue, 02-DEC-2003 10:58:53

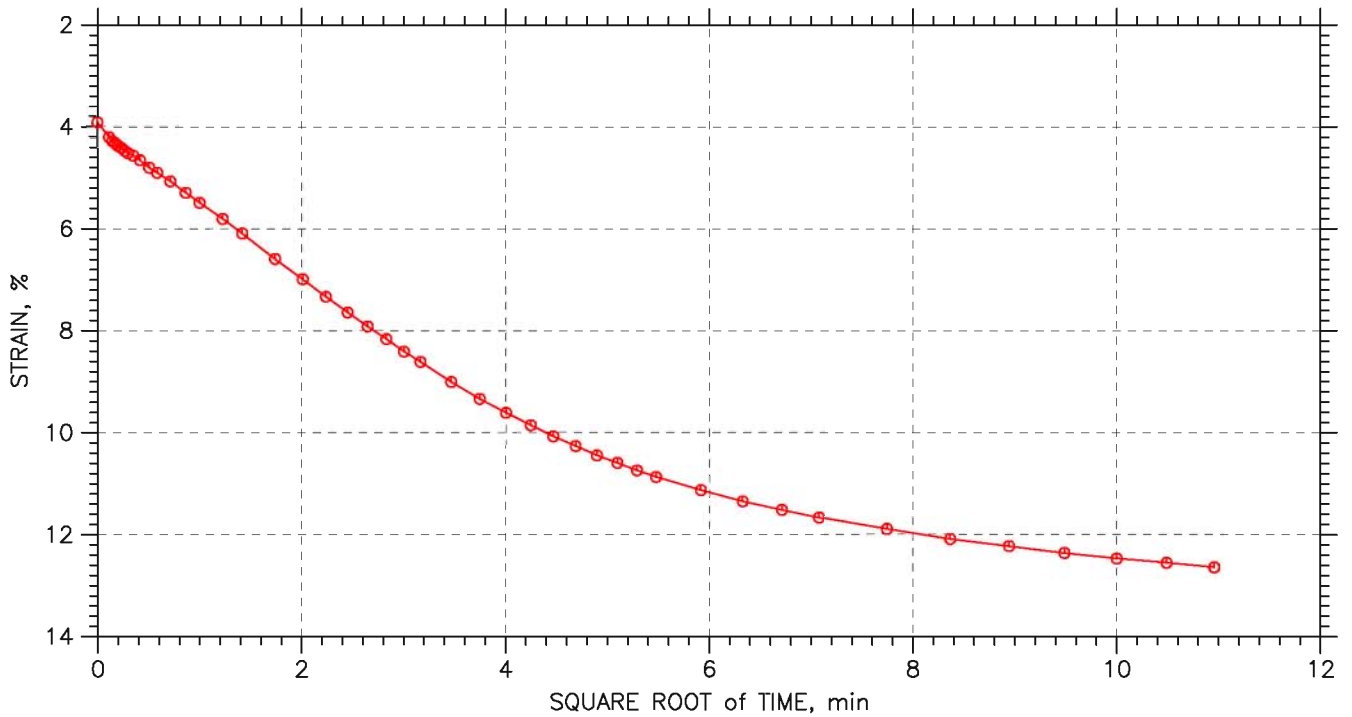
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 8

Stress: 4. tsf





Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-12	Tested By: MLT	Checked By: JAC
Sample No.: 9697	Test Date: 11-21-03	Depth: 49-51'
Test No.: UII-2	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, FAT CLAY (CH)		
Remarks: None.		

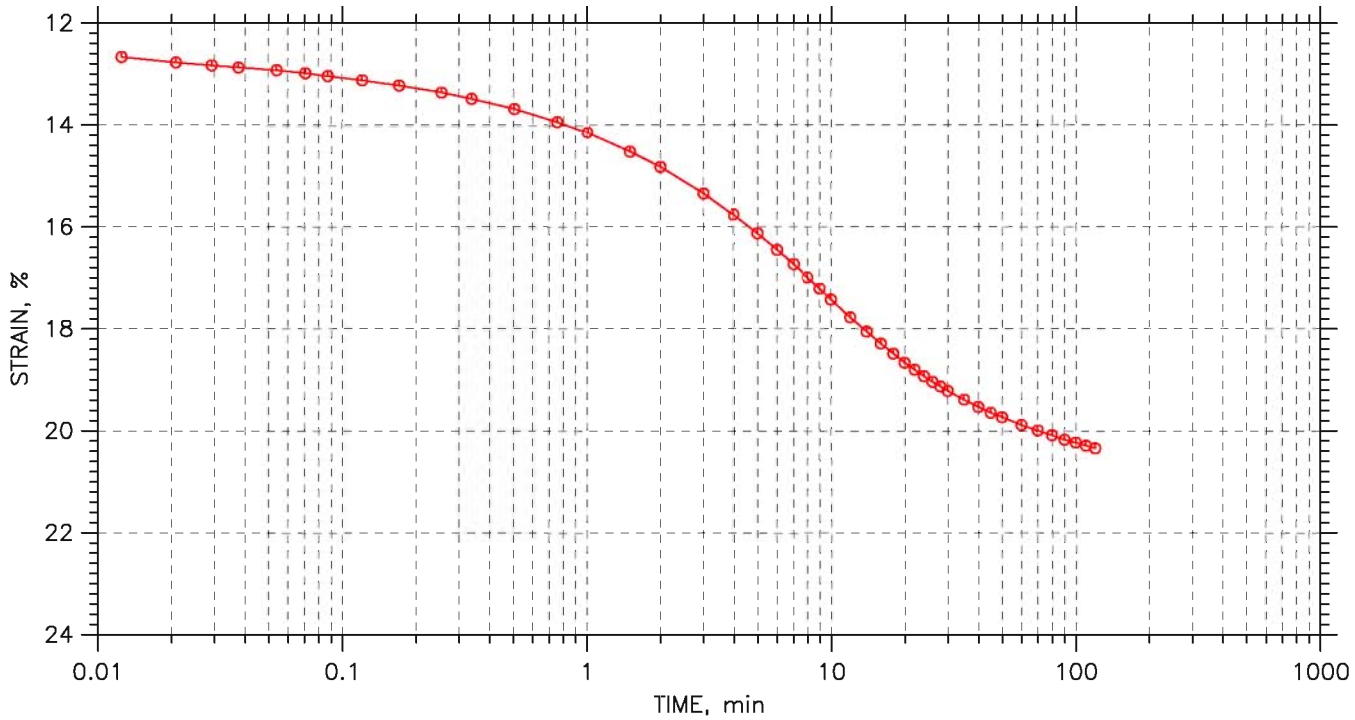
Tue, 02-DEC-2003 10:58:53

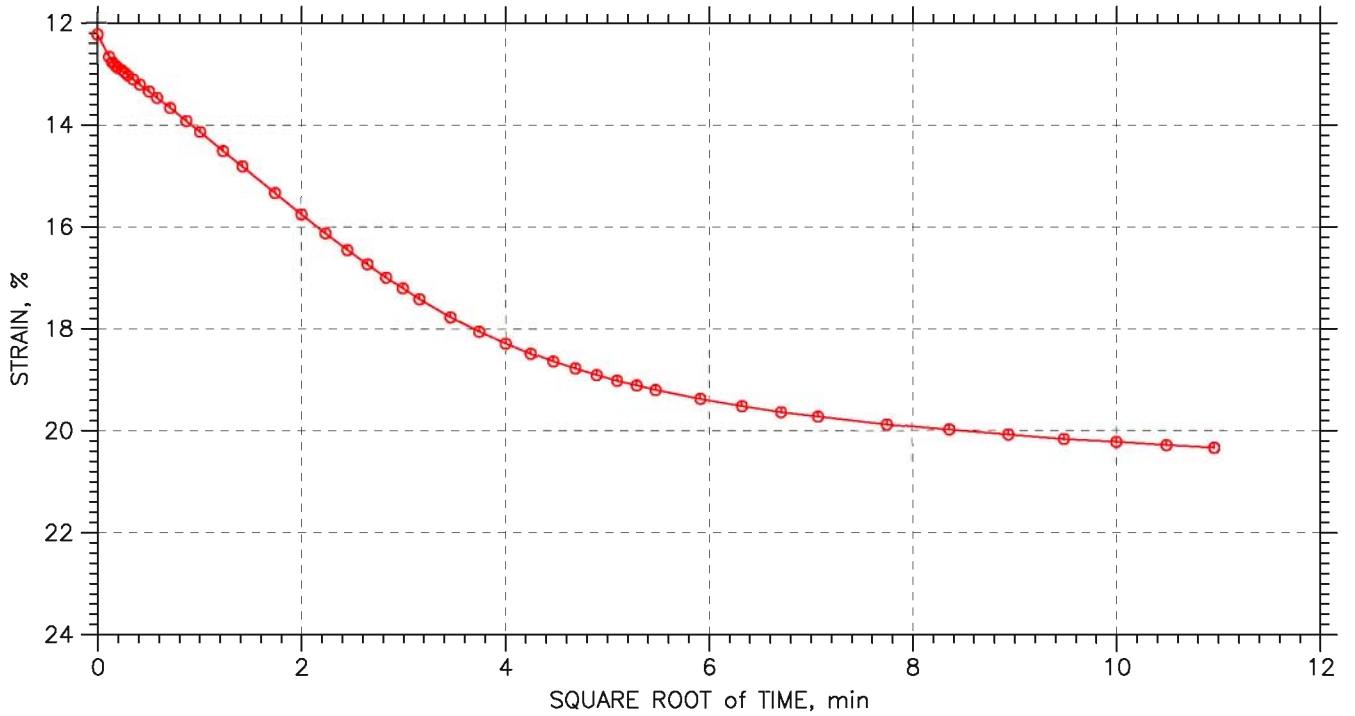
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 8

Stress: 8. tsf





Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-12	Tested By: MLT	Checked By: JAC
Sample No.: 9697	Test Date: 11-21-03	Depth: 49-51'
Test No.: UII-2	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, FAT CLAY (CH)		
Remarks: None.		

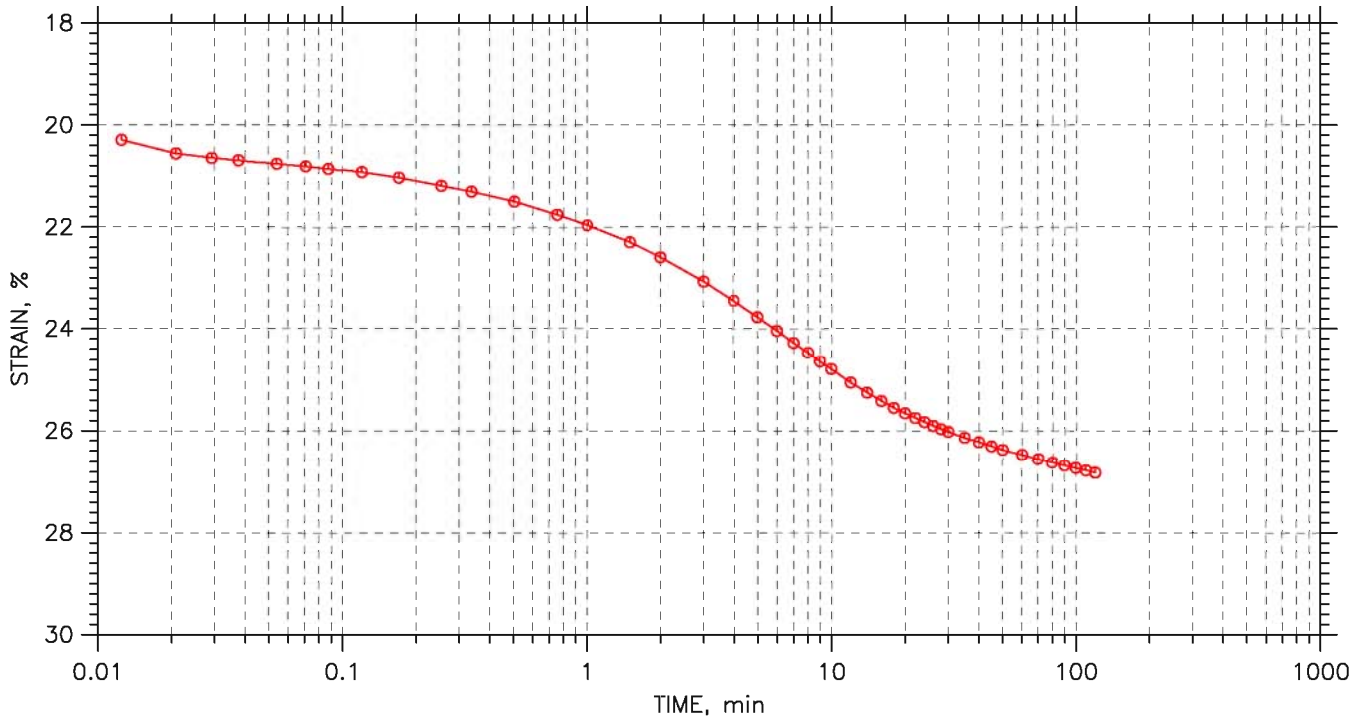
Tue, 02-DEC-2003 10:58:53

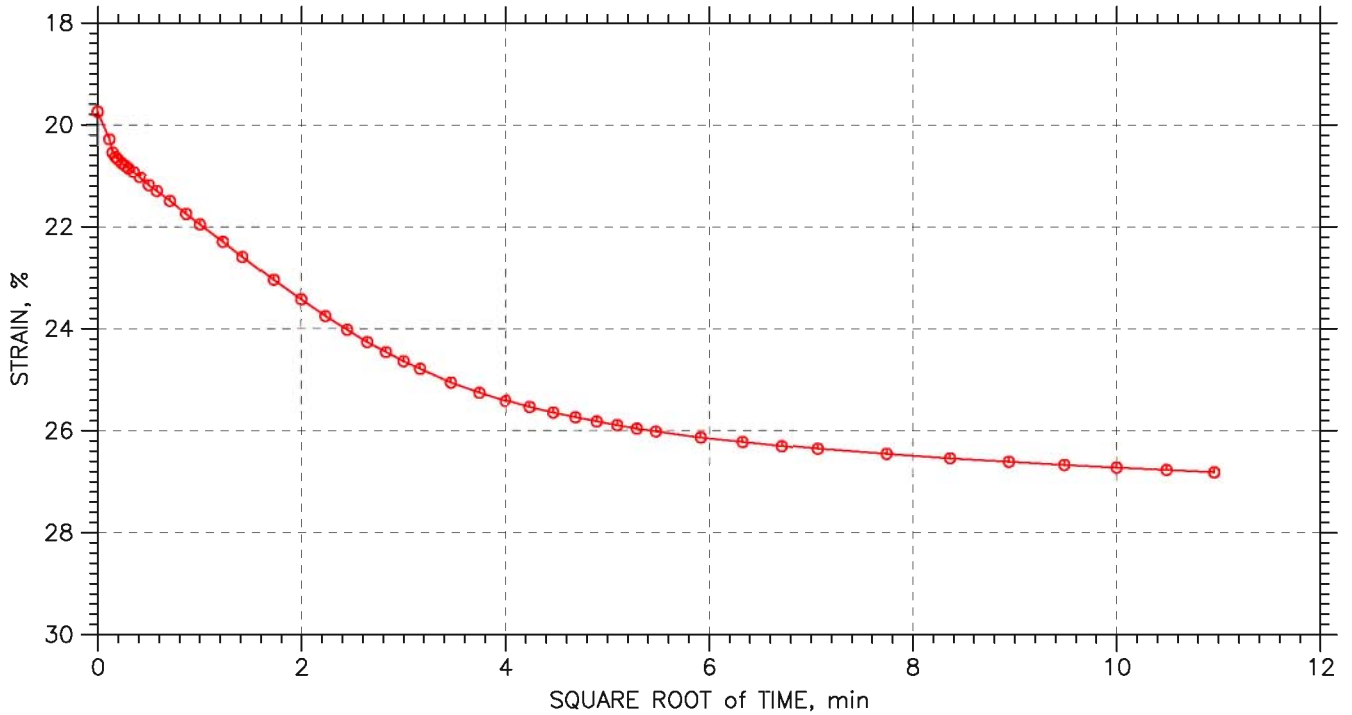
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 8

Stress: 16. tsf





Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-12	Tested By: MLT	Checked By: JAC
Sample No.: 9697	Test Date: 11-21-03	Depth: 49-51'
Test No.: UII-2	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, FAT CLAY (CH)		
Remarks: None.		

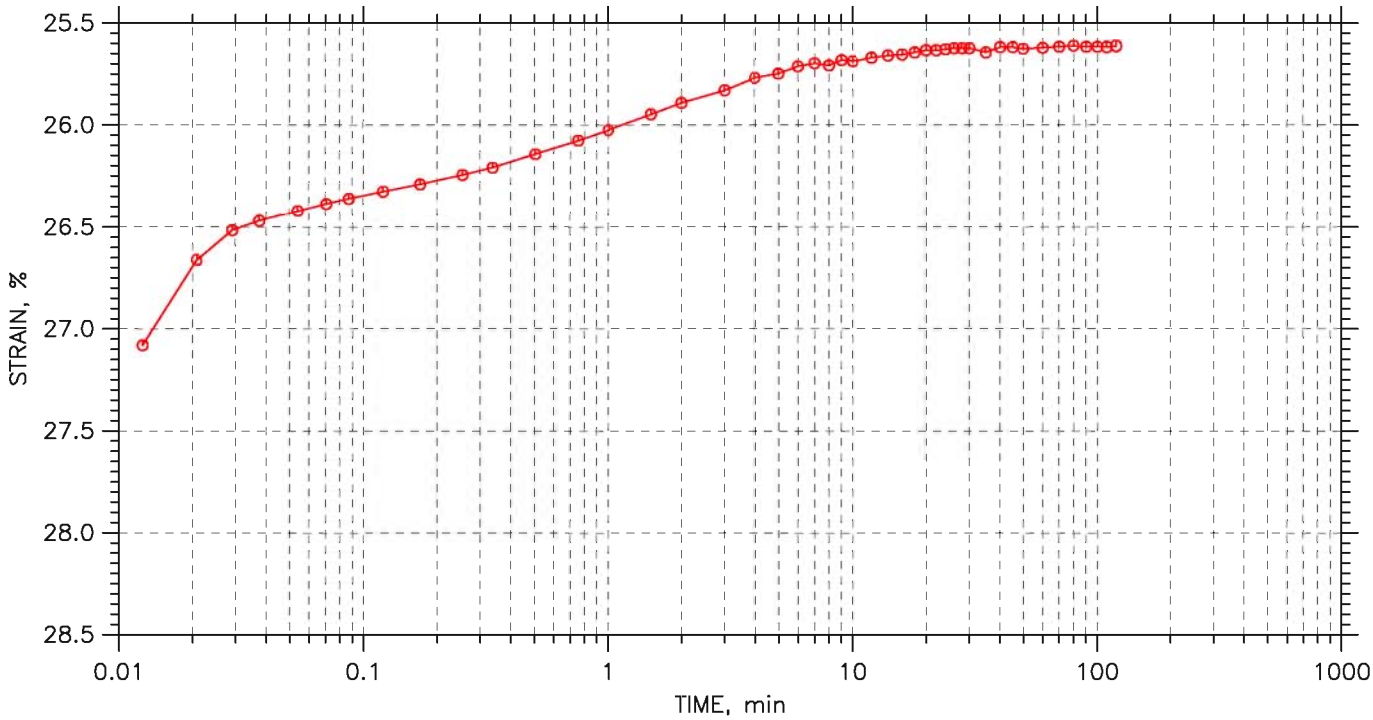
Tue, 02-DEC-2003 10:58:53

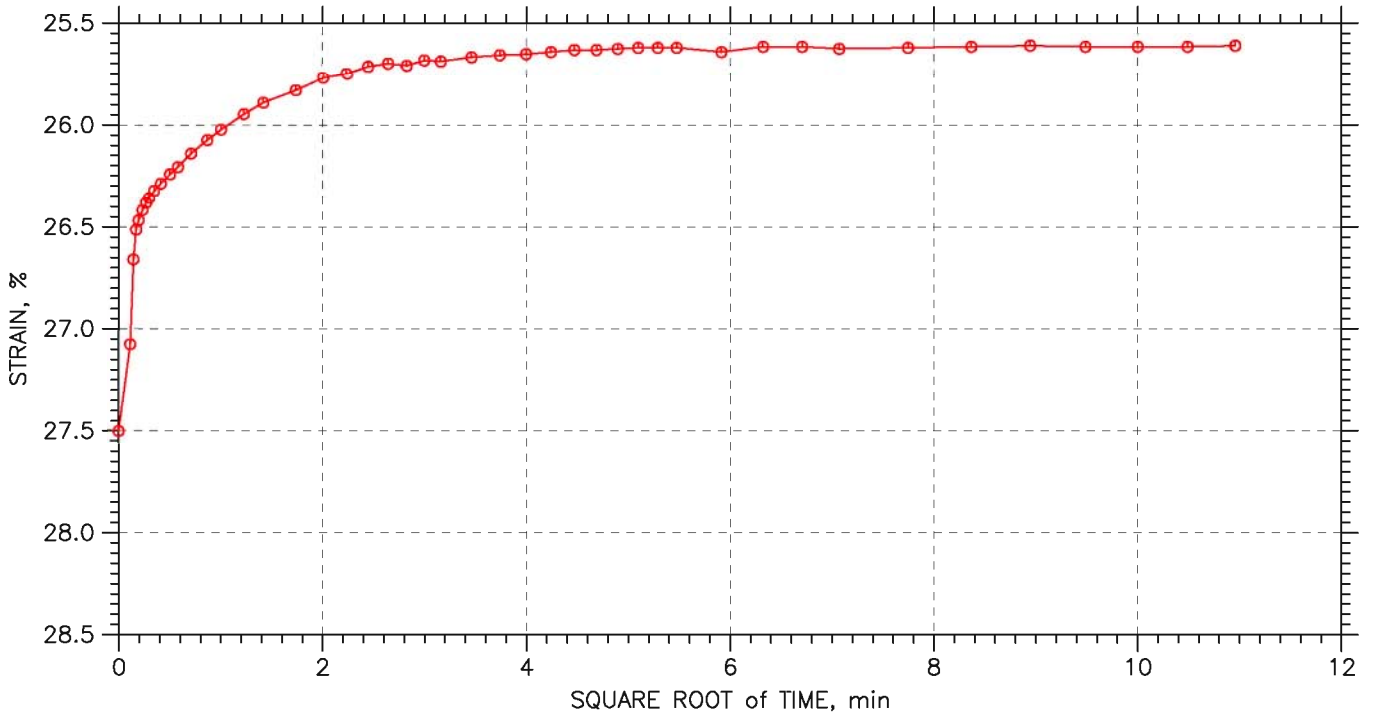
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 8

Stress: 4. tsf





Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-12	Tested By: MLT	Checked By: JAC
Sample No.: 9697	Test Date: 11-21-03	Depth: 49-51'
Test No.: UII-2	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, FAT CLAY (CH)		
Remarks: None.		

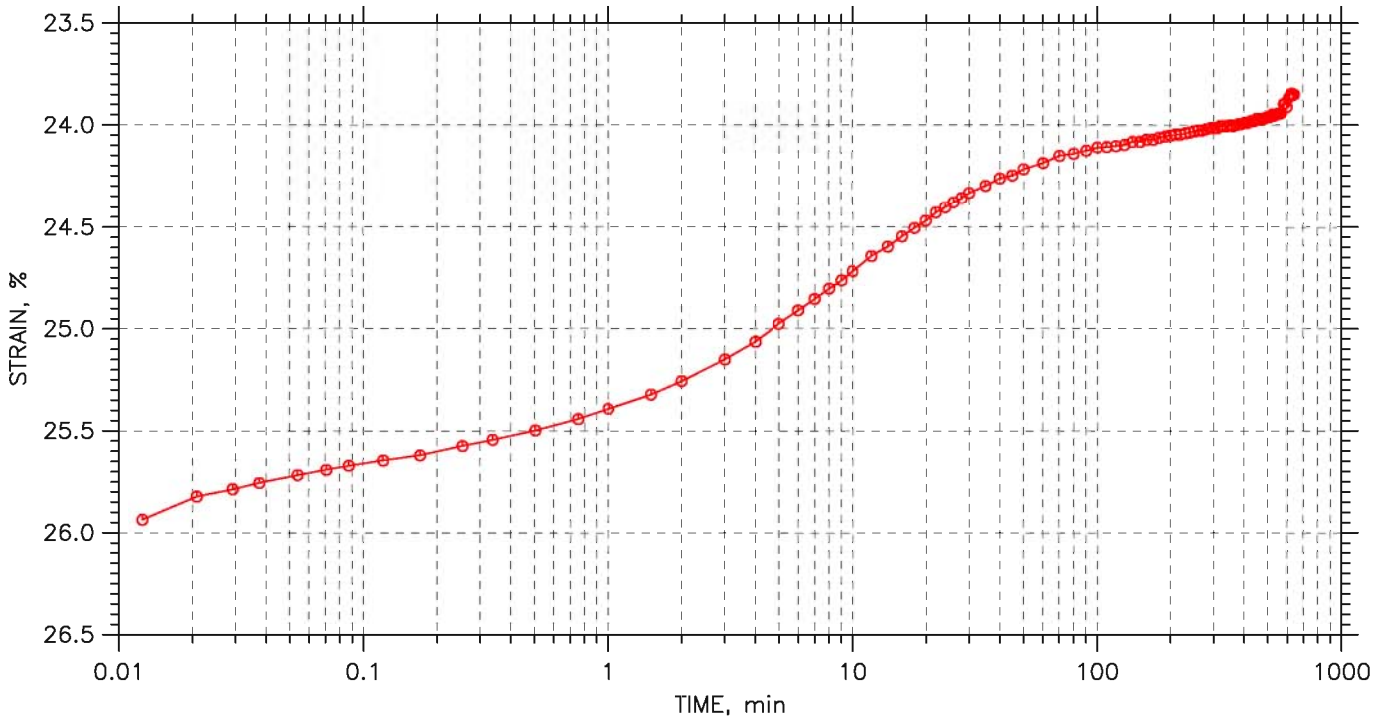
Tue, 02-DEC-2003 10:58:53

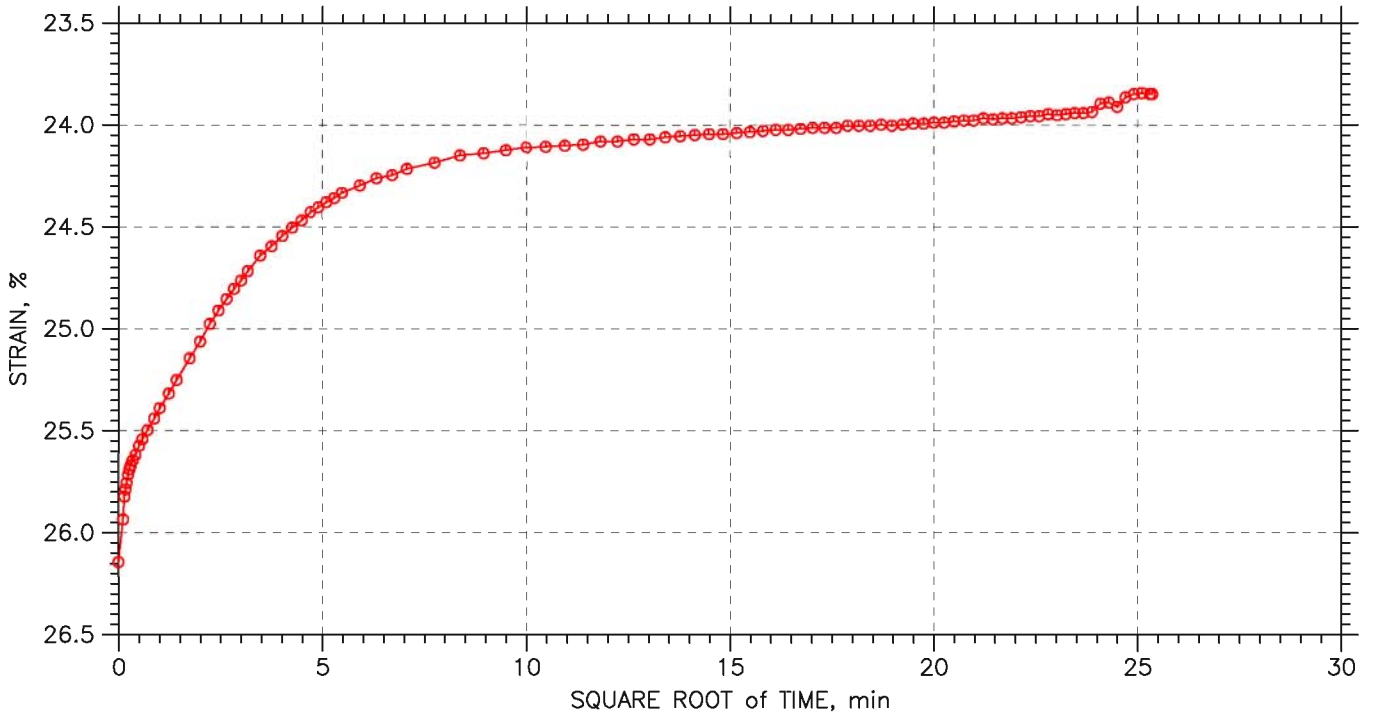
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 8

Stress: 1. tsf

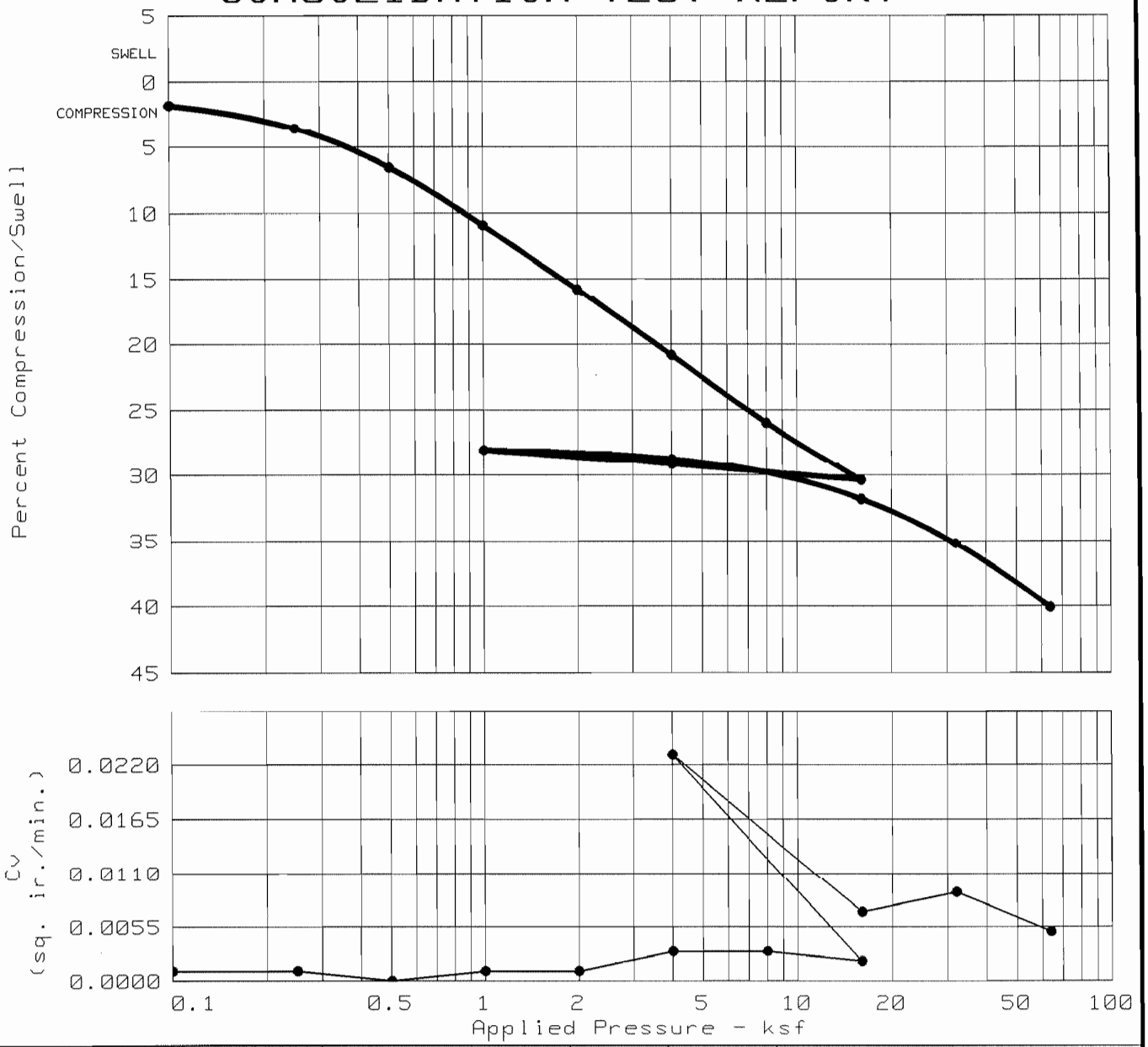




Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-12	Tested By: MLT	Checked By: JAC
Sample No.: 9697	Test Date: 11-21-03	Depth: 49-51'
Test No.: UII-2	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, FAT CLAY (CH)		
Remarks: None.		

Tue, 02-DEC-2003 10:58:53

CONSOLIDATION TEST REPORT



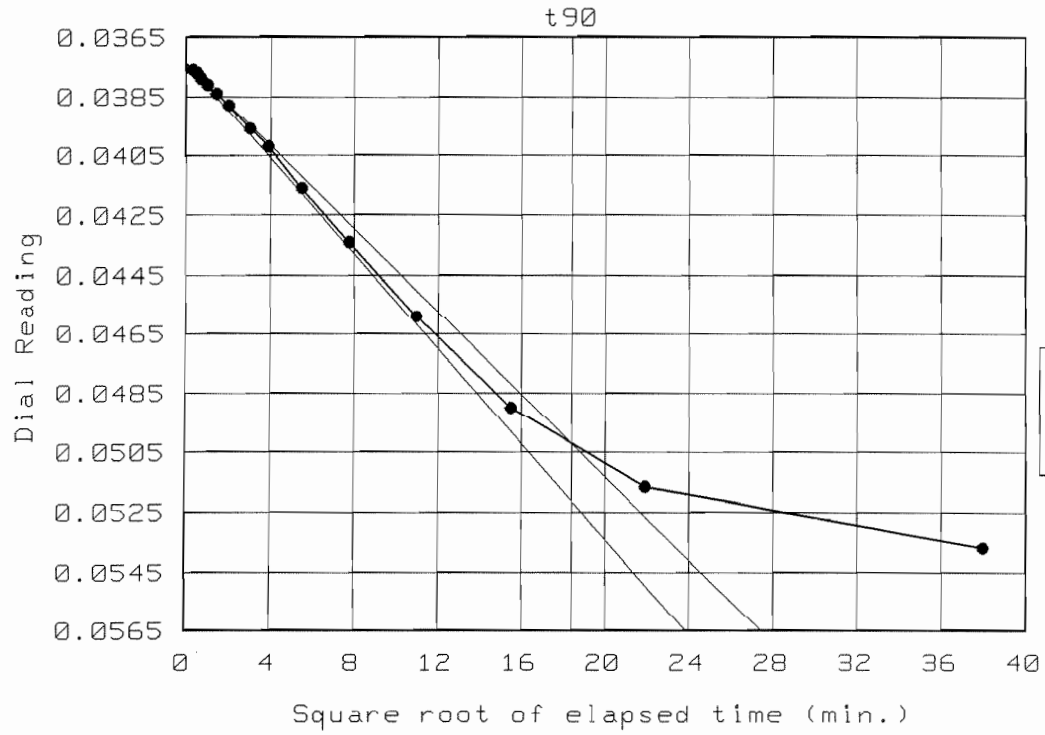
Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
90.6 %	61.5 %	62.1	51	21	2.700	1.8309

TEST RESULTS	MATERIAL DESCRIPTION
	Dark gray elastic SILT (MH)
Project No.: 3530-03-1245 Phase 02 Project: Indian River Inlet Bridges Location: Boring BII-14 @ 73' - 75' Date: 12/16/03	Class: (MH)
CONSOLIDATION TEST REPORT LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.	Remarks: Da 12/30/03. Fig. No. 1 1

Dial Reading vs. Time

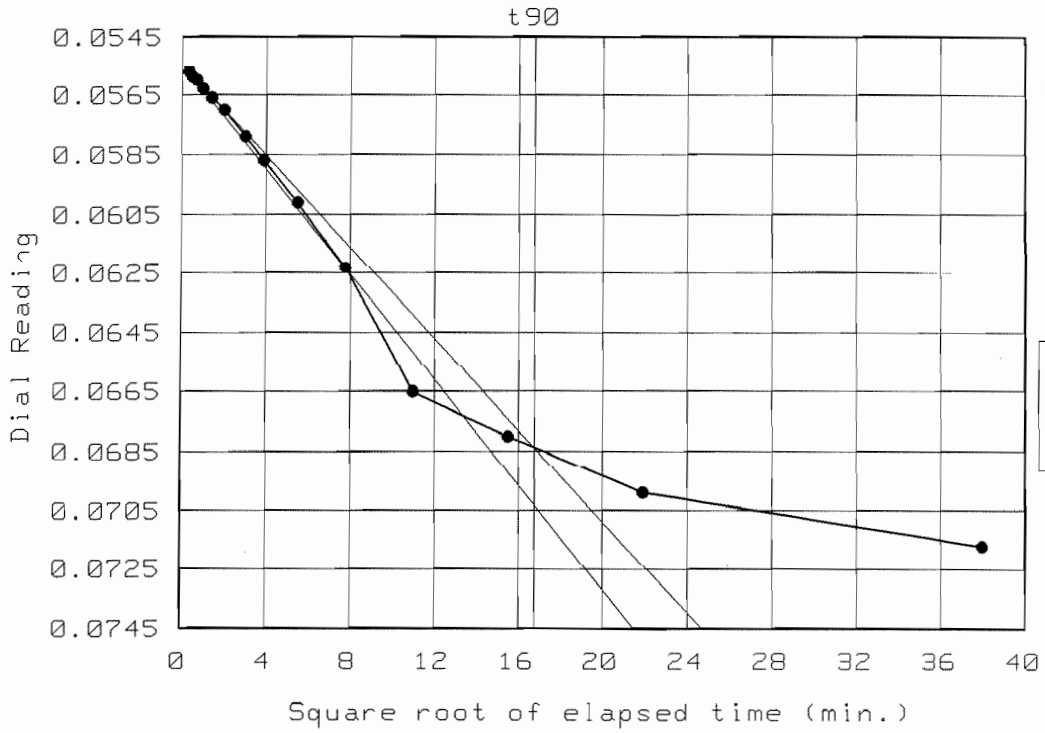
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-14 @ 73' - 75'

Date: 12/16/03



Load No.= 1
Load= 0.10 ksf
D_0 = 0.0374
D_{90} = 0.0502
D_{100}= 0.0516
T_{90}= 339.29 min.

C_v @ T_{90} =
.001 in.^{2}/min.



Load No.= 2
Load= 0.25 ksf
D_0 = 0.0554
D_{90} = 0.0684
D_{100}= 0.0698
T_{90}= 280.64 min.

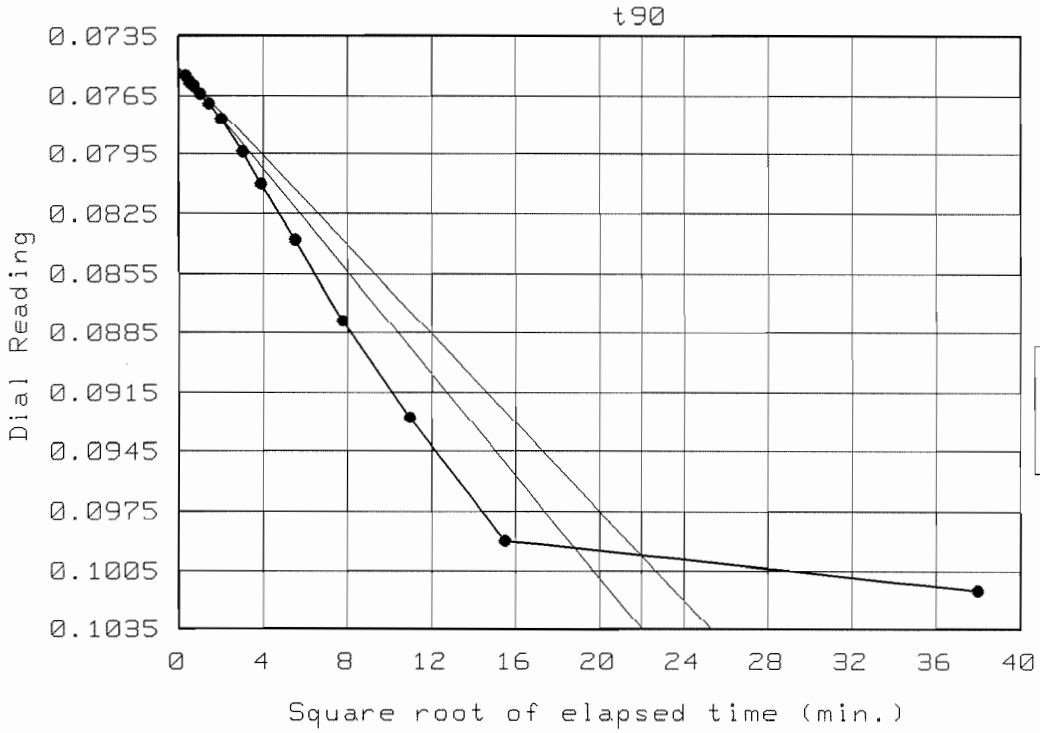
C_v @ T_{90} =
.001 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

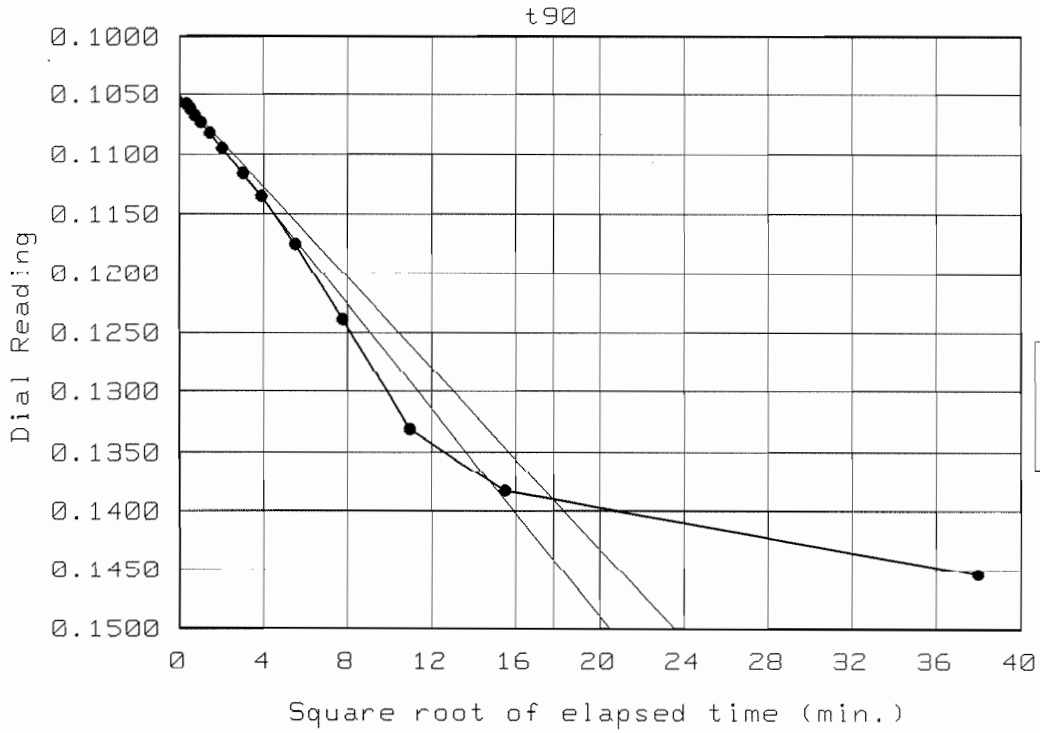
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-14 @ 73' - 75'

Date: 12/16/03



Load No. = 3
Load = 0.50 ksf
D_0 = 0.0751
D_{90} = 0.0997
D_{100} = 0.1025
T_{90} = 482.81 min.

C_v @ T_{90} =
.000 in.^{2}/min.



Load No. = 4
Load = 1.00 ksf
D_0 = 0.1051
D_{90} = 0.1390
D_{100} = 0.1428
T_{90} = 317.07 min.

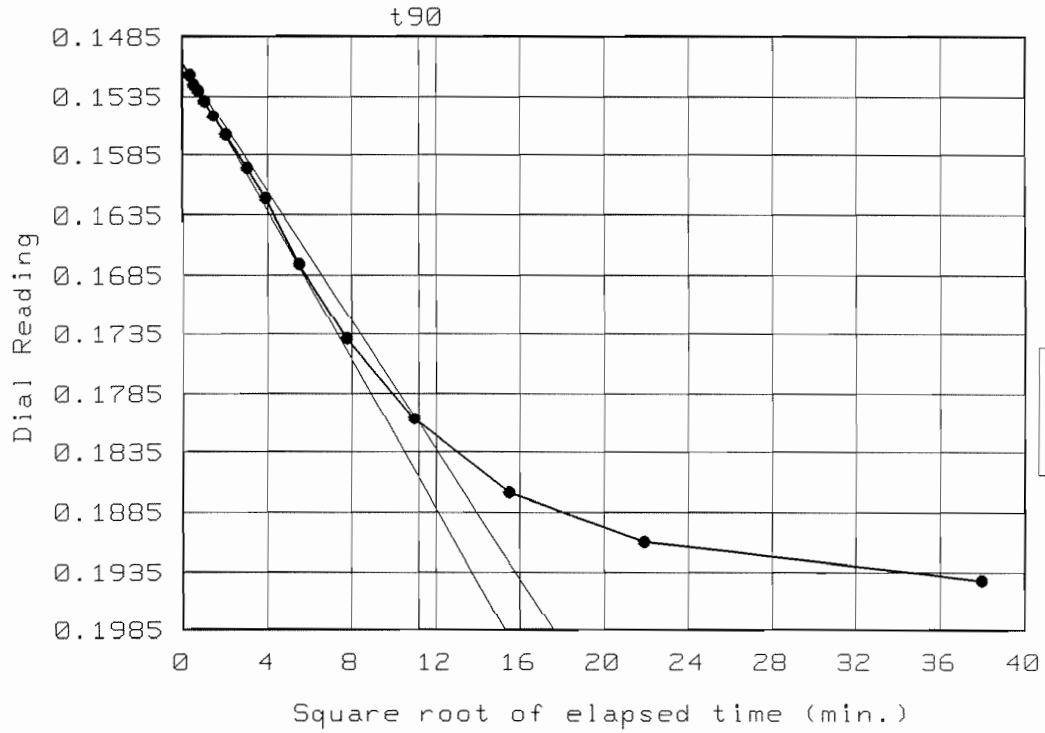
C_v @ T_{90} =
.001 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

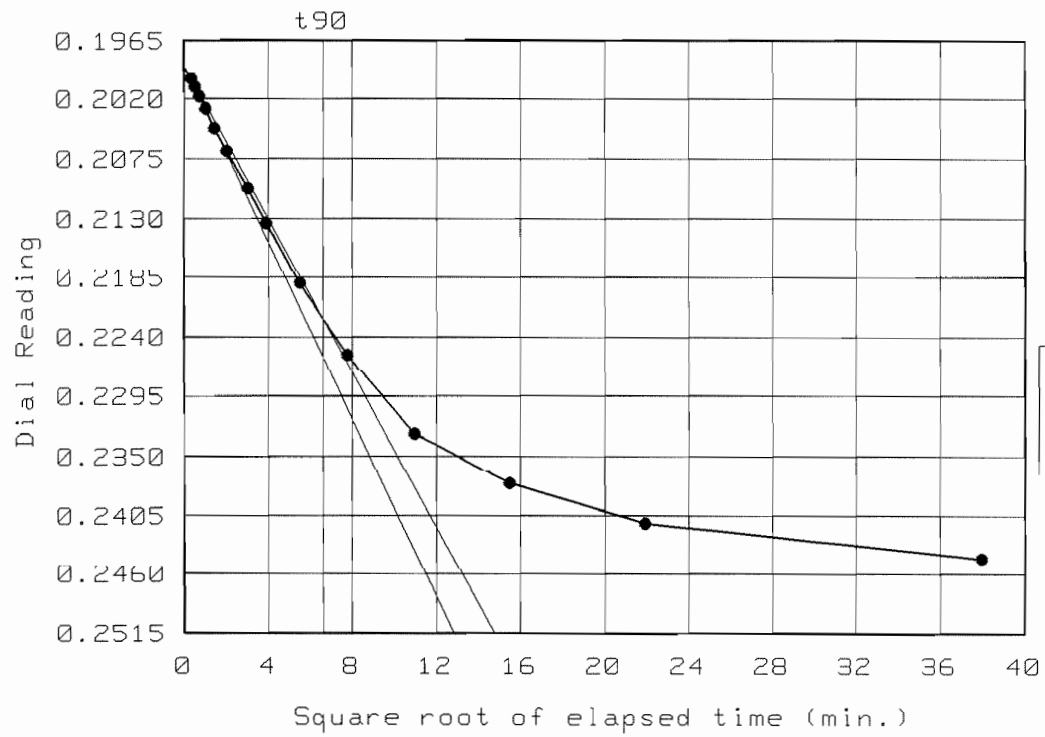
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-14 @ 73' - 75'

Date: 12/16/03



Load No.= 5
Load= 2.00 ksf
D_0 = 0.1507
D_{90} = 0.1810
D_{100}= 0.1844
T_{90}= 124.79 min.

C_v @ T_{90} =
.001 in.^{2}/min.



Load No.= 6
Load= 4.00 ksf
D_0 = 0.1988
D_{90} = 0.2223
D_{100}= 0.2249
T_{90}= 43.56 min.

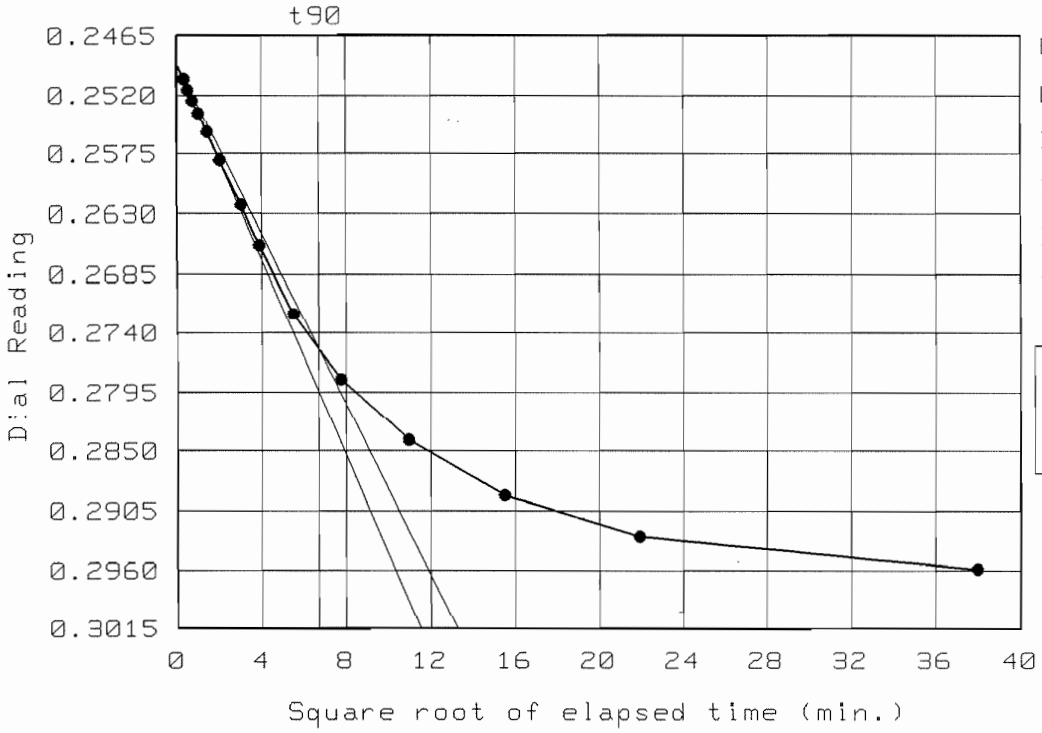
C_v @ T_{90} -
.003 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

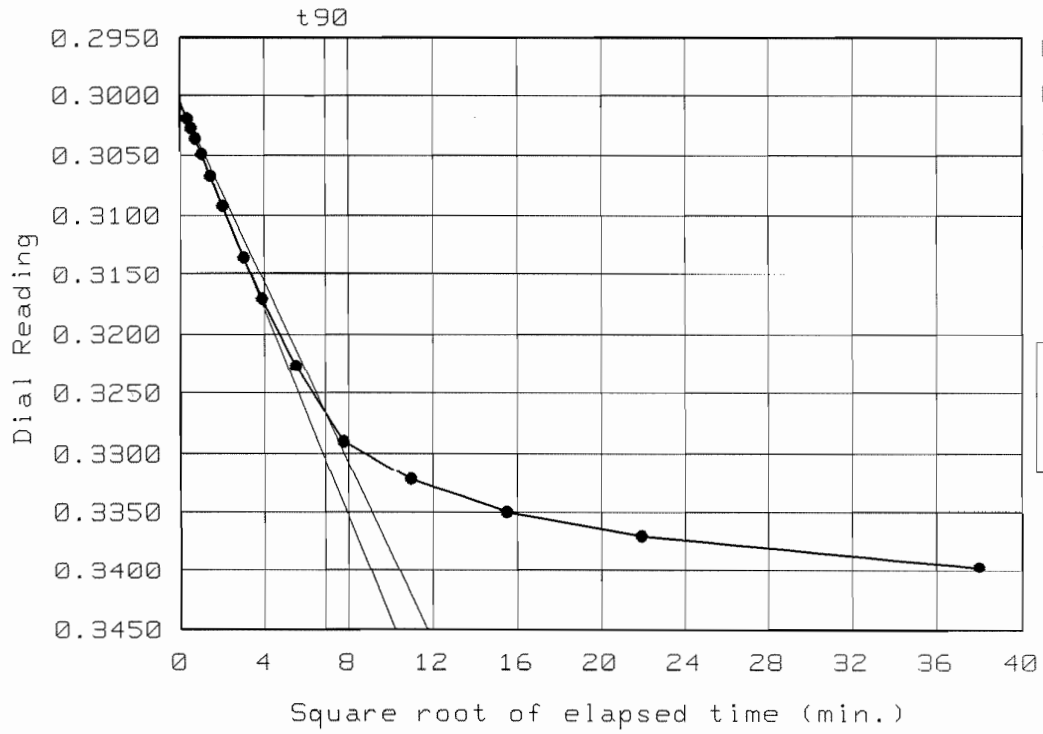
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-14 @ 73' - 75'

Date: 12/16/03



Load No. = 7
Load = 8.00 ksf
D_0 = 0.2491
D_{90} = 0.2755
D_{100} = 0.2784
T_{90} = 44.83 min.

C_v @ T_{90} =
.003 in.^{2}/min.



Load No. = 8
Load = 16.00 ksf
D_0 = 0.3005
D_{90} = 0.3266
D_{100} = 0.3295
T_{90} = 47.53 min.

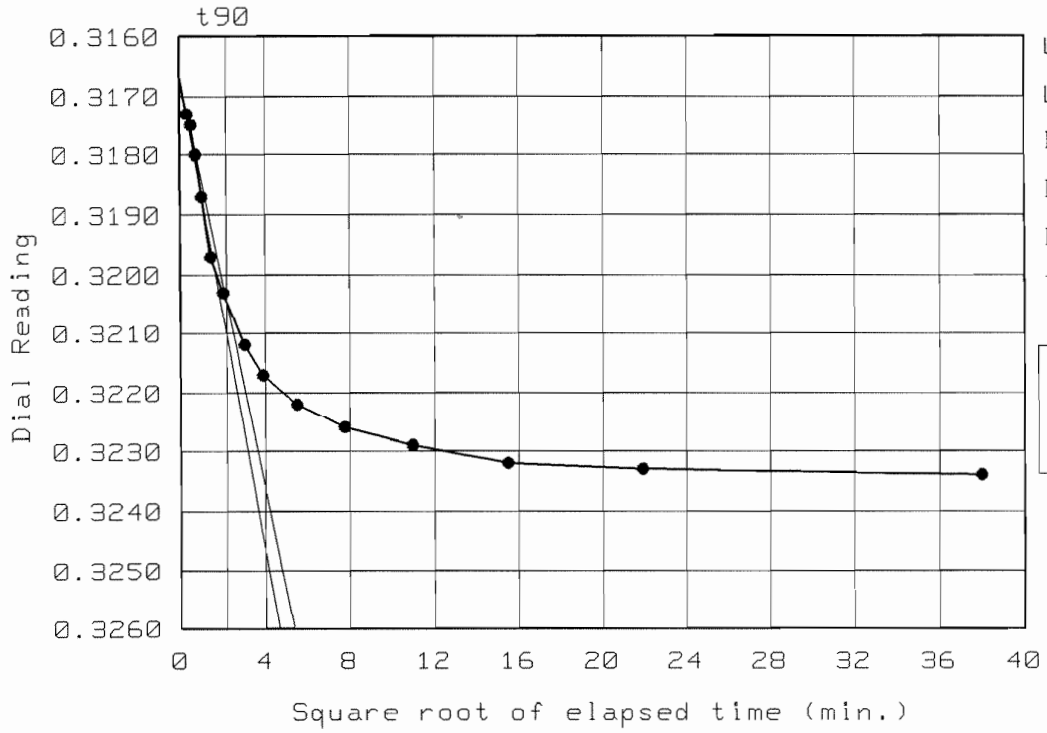
C_v @ T_{90} =
.002 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

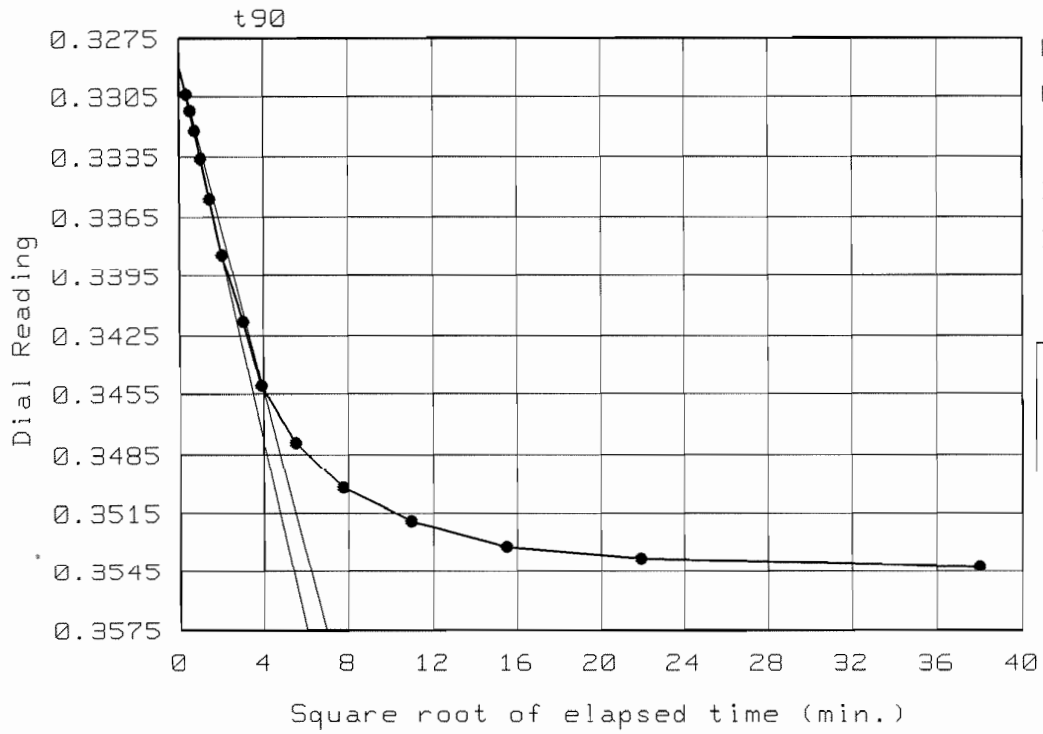
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-14 @ 73' - 75'

Date: 12/16/03



Load No.= 11
Load= 4.00 ksf
D_0 = 0.3167
D_{90} = 0.3205
D_{100}= 0.3209
T_{90}= 4.71 min.

C_v @ T_{90} =
.023 in.^{2}/min.



Load No.= 12
Load= 16.00 ksf
D_0 = 0.3289
D_{90} = 0.3453
D_{100}= 0.3471
T_{90}= 15.75 min.

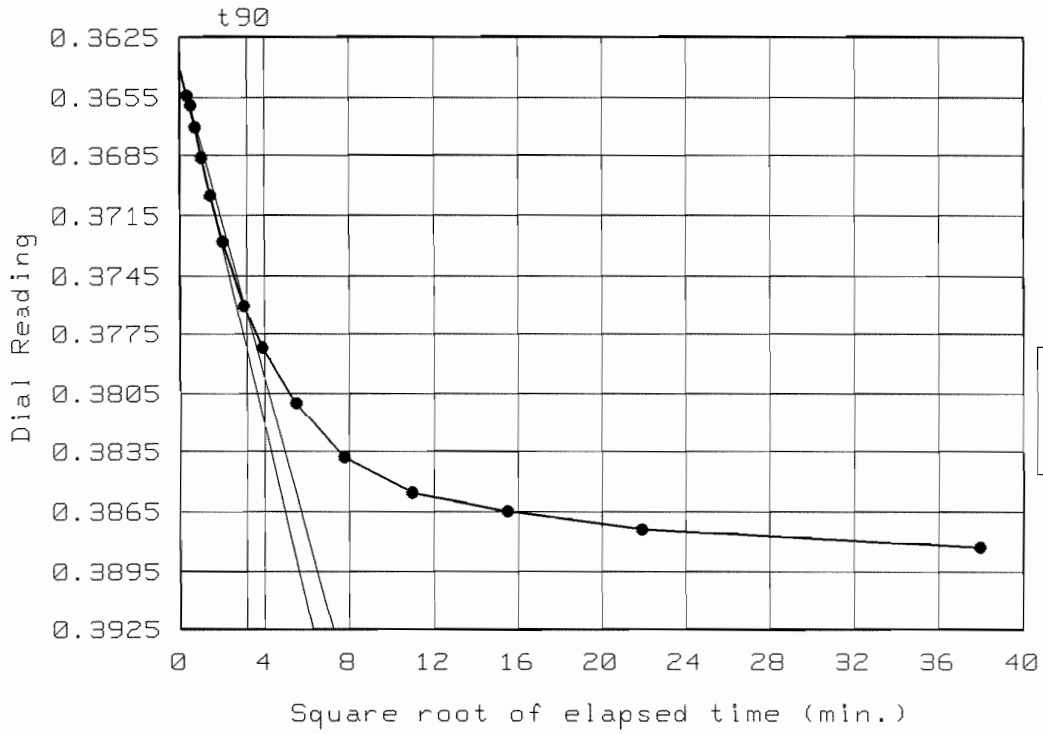
C_v @ T_{90} -
.007 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

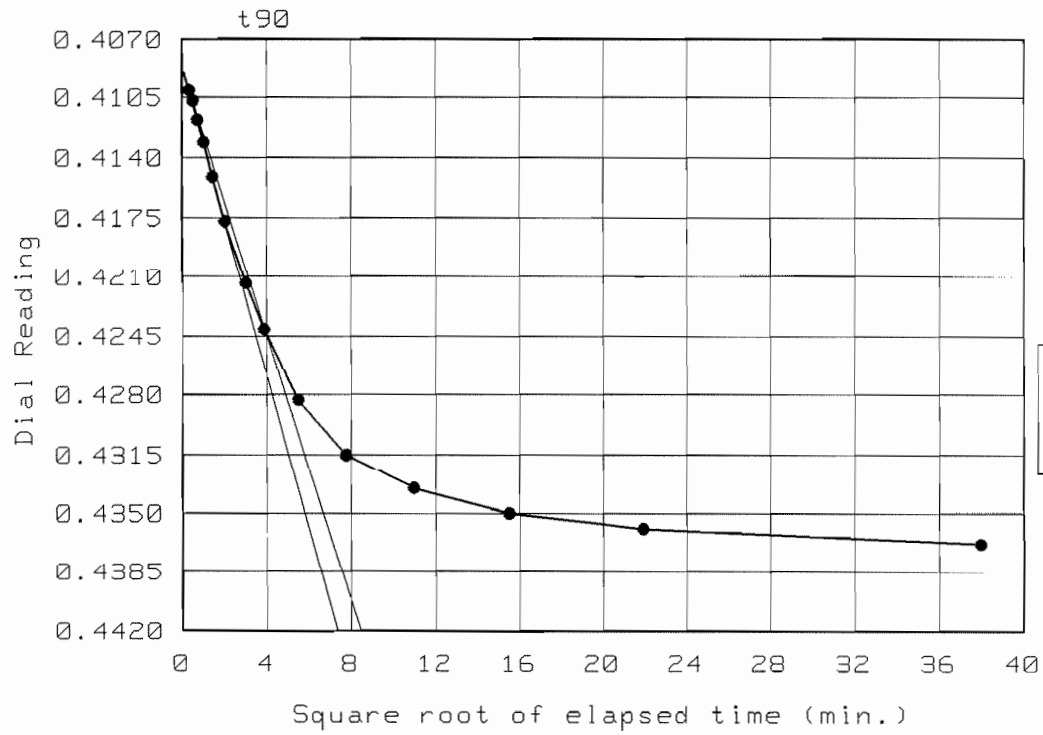
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-14 @ 73' - 75'

Date: 12/16/03



Load No.= 13
Load= 32.00 ksf
D_0 = 0.3640
D_{90} = 0.3764
D_{100}= 0.3777
T_{90}= 9.88 min.

C_v @ T_{90} =
.009 in.^{2}/min.



Load No.= 14
Load= 64.00 ksf
D_0 = 0.4087
D_{90} = 0.4244
D_{100}= 0.4262
T_{90}= 15.94 min.

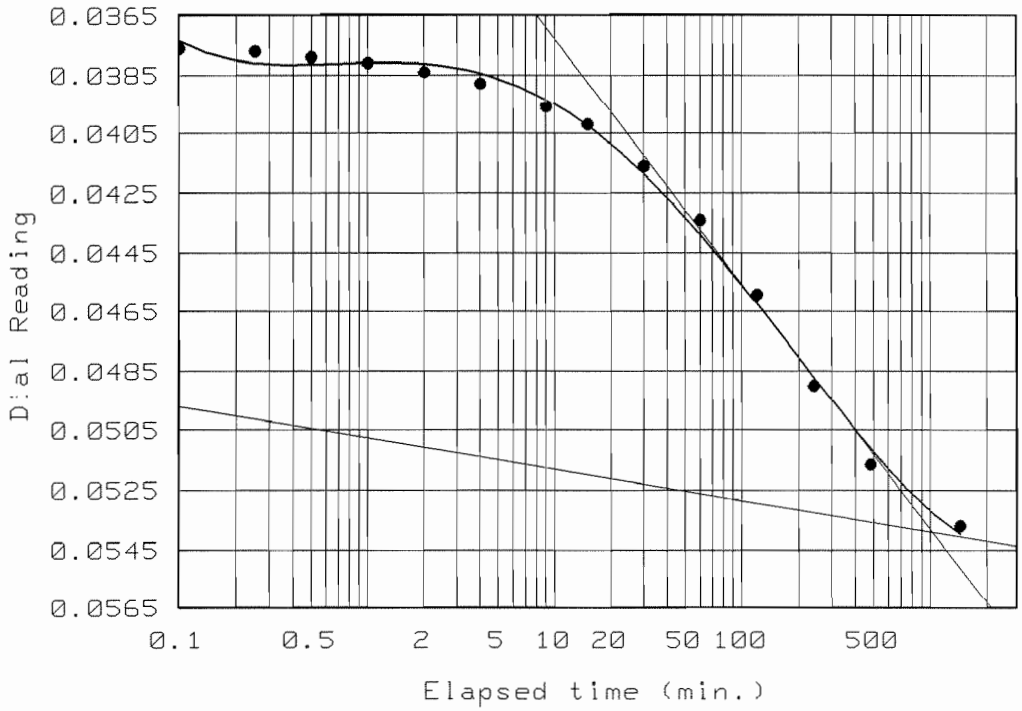
C_v @ T_{90} =
.005 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-14 @ 73' - 75'

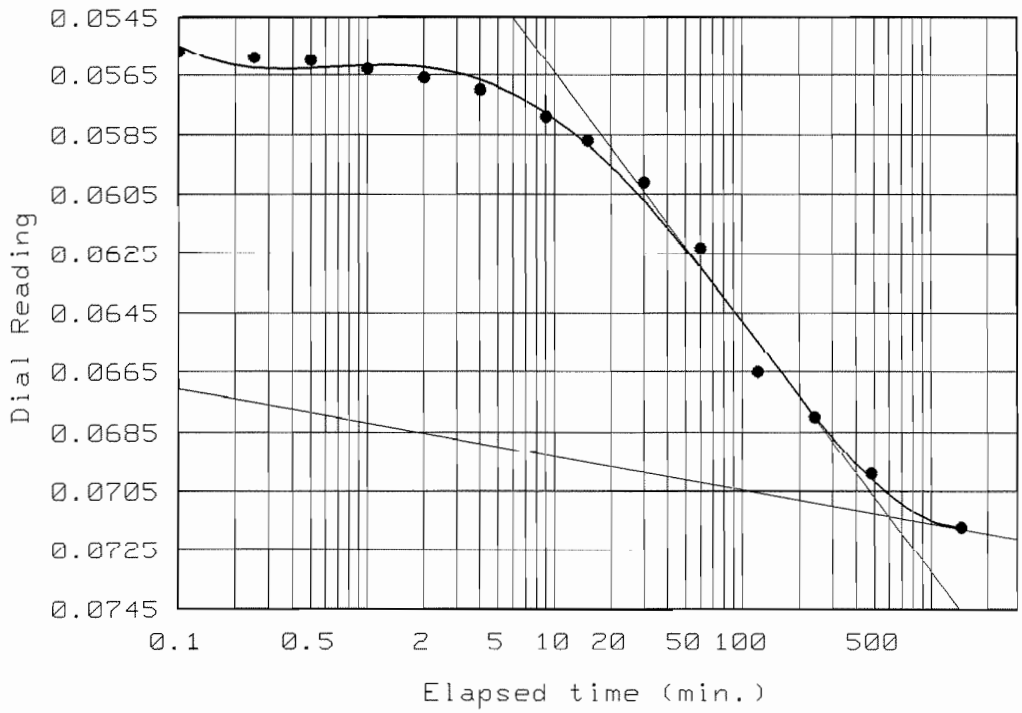
Date: 12/16/03



Load No.= 1
Load= 0.10 ksf
D_0 = 0.0365
D_{50} = 0.0452
D_{100}= 0.0539
T_{50}= 89.85 min.

C_v @ T_{50} =
.001 in.^{2}/min.

C_α= 0.001



Load No.= 2
Load= 0.25 ksf
D_0 = 0.0546
D_{50} = 0.0630
D_{100}= 0.0713
T_{50}= 60.15 min.

C_v @ T_{50} =
.001 in.^{2}/min.

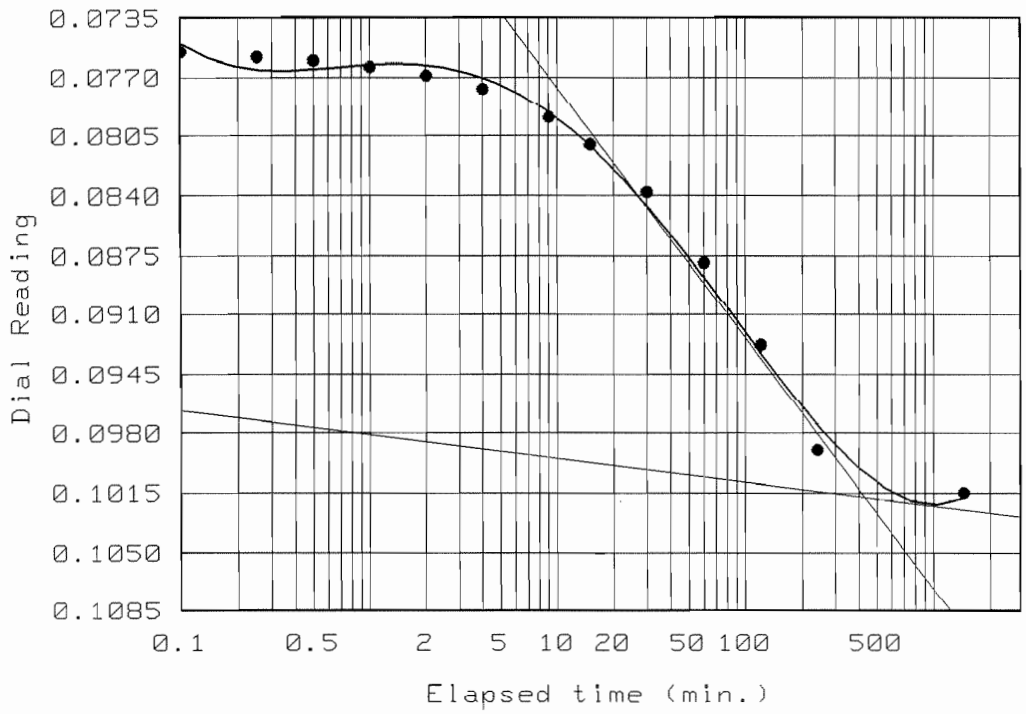
C_α= 0.001

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-14 @ 73' - 75'

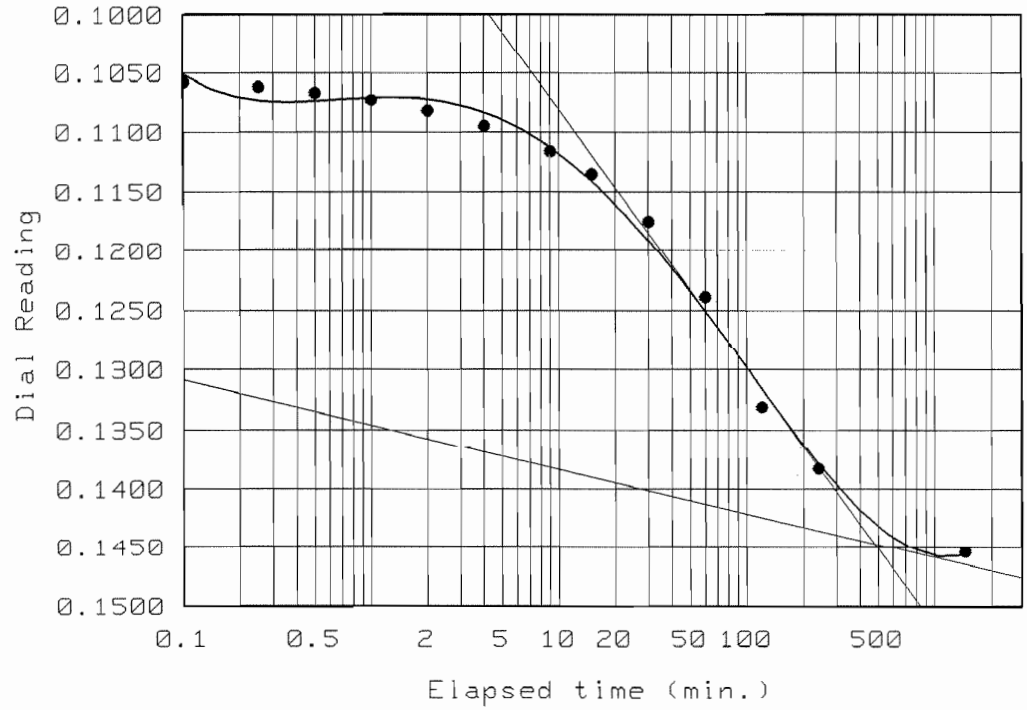
Date: 12/16/03



Load No.= 3
Load= 0.50 ksf
D_0 = 0.0734
D_{50} = 0.0876
D_{100}= 0.1018
T_{50}= 49.89 min.

C_v @ T_{50} = .001 in.^{2}/min.

C_α= 0.001



Load No.= 4
Load= 1.00 ksf
D_0 = 0.1027
D_{50} = 0.1237
D_{100}= 0.1447
T_{50}= 51.74 min.

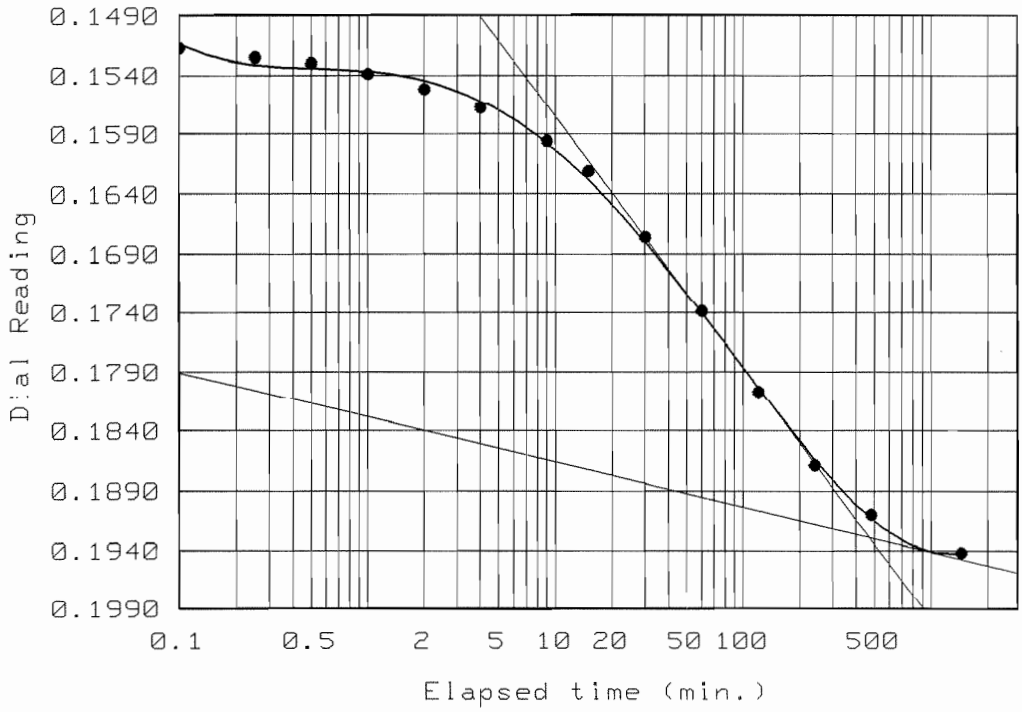
C_v @ T_{50} = .001 in.^{2}/min.

C_α= 0.004

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-14 @ 73' - 75'

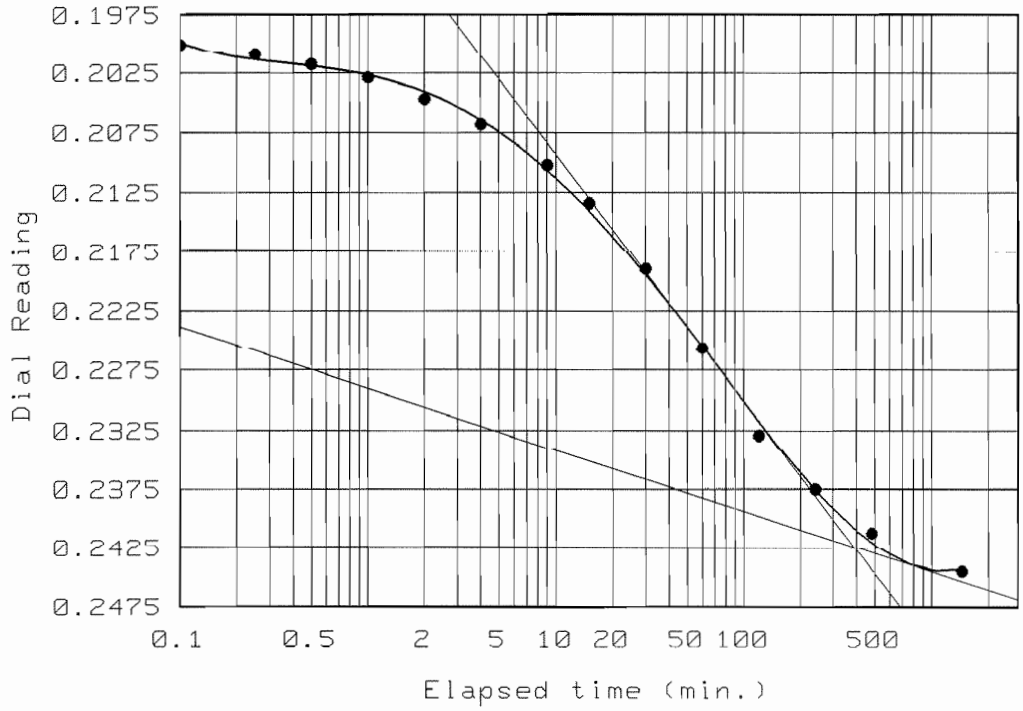
Date: 12/16/03



Load No.= 5
Load= 2.00 ksf
D_0 = 0.1493
D_{50} = 0.1711
D_{100}= 0.1929
T_{50}= 43.36 min.

C_v @ T_{50} = .001 in.^{2}/min.

C_α= 0.004



Load No.= 6
Load= 4.00 ksf
D_0 = 0.1980
D_{50} = 0.2202
D_{100}= 0.2424
T_{50}= 32.82 min.

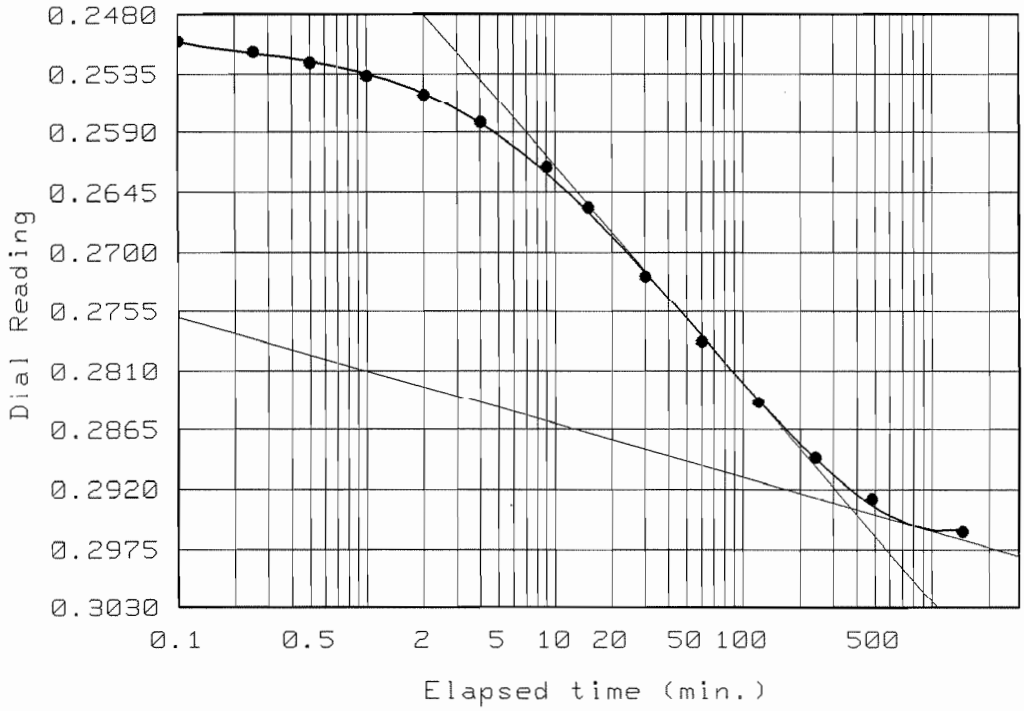
C_v @ T_{50} = .001 in.^{2}/min.

C_α= 0.006

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-14 @ 73' - 75'

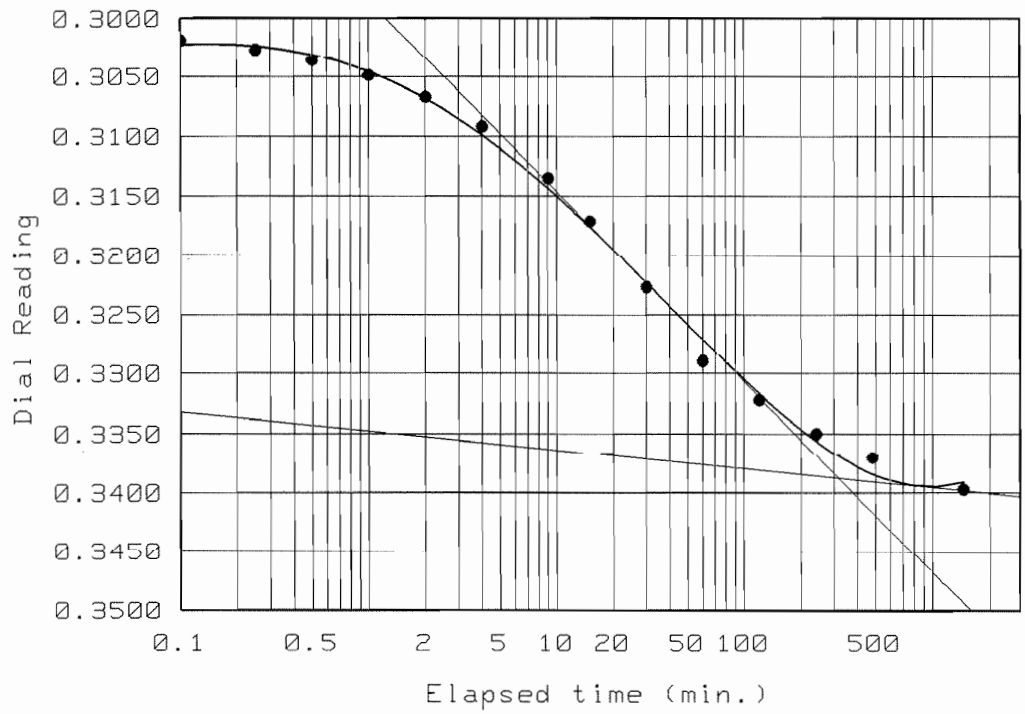
Date: 12/16/03



Load No.= 7
Load= 8.00 ksf
D_0 = 0.2489
D_{50} = 0.2713
D_{100}= 0.2937
T_{50}= 28.39 min.

C_v @ T_{50} = .001 in.^{2}/min.

C_α= 0.006



Load No.= 8
Load= 16.00 ksf
D_0 = 0.3017
D_{50} = 0.3202
D_{100}= 0.3388
T_{50}= 22.21 min.

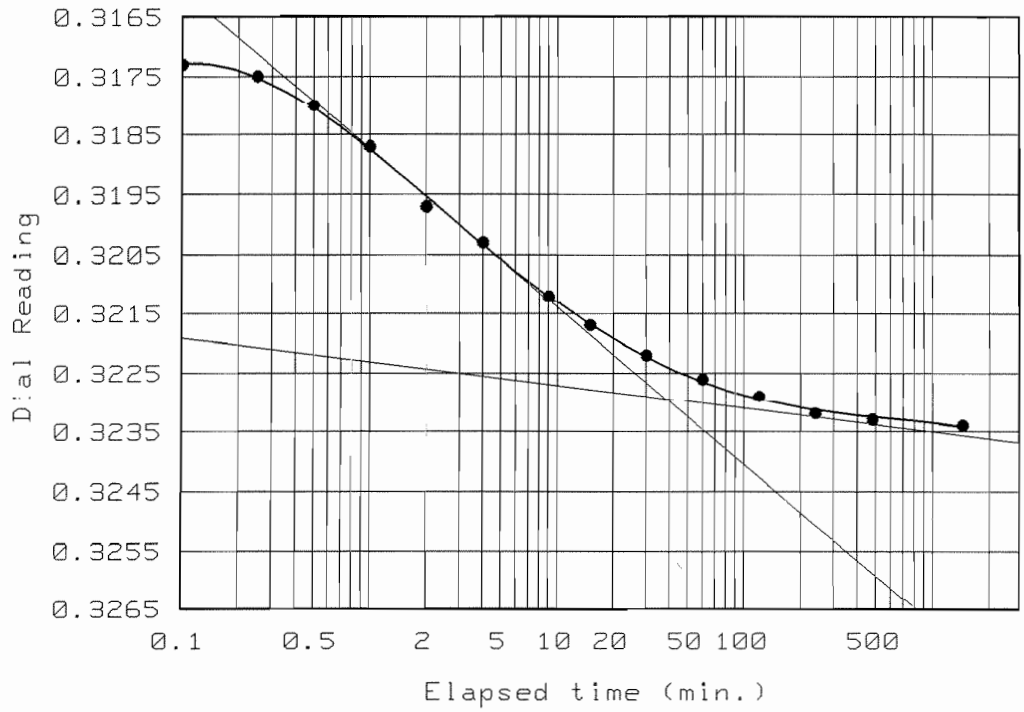
C_v @ T_{50} = .001 in.^{2}/min.

C_α= 0.002

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-14 @ 73' - 75'

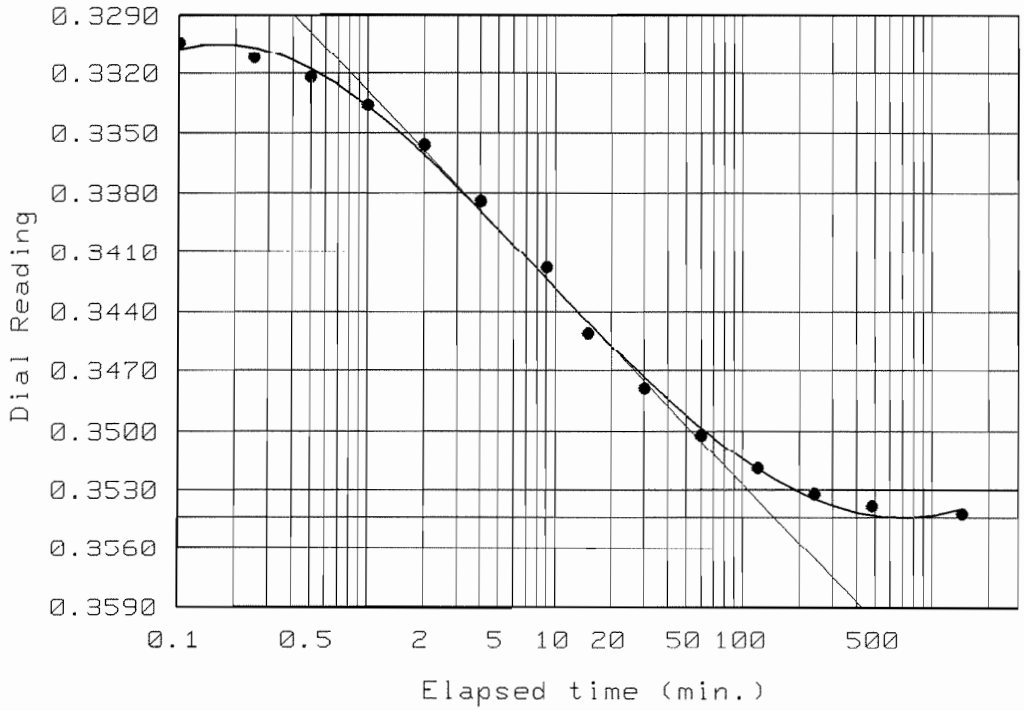
Date: 12/16/03



Load No.= 11
Load= 4.00 ksf
D_0 = 0.3167
D_{50} = 0.3198
D_{100}= 0.3229
T_{50}= 2.54 min.

C_v @ T_{50} = .010 in.^{2}/min.

C_α= 0.001



Load No.= 12
Load= 16.00 ksf
D_0 = 0.3302
D_{50} = 0.3423
D_{100}= 0.3544
T_{50}= 8.85 min.

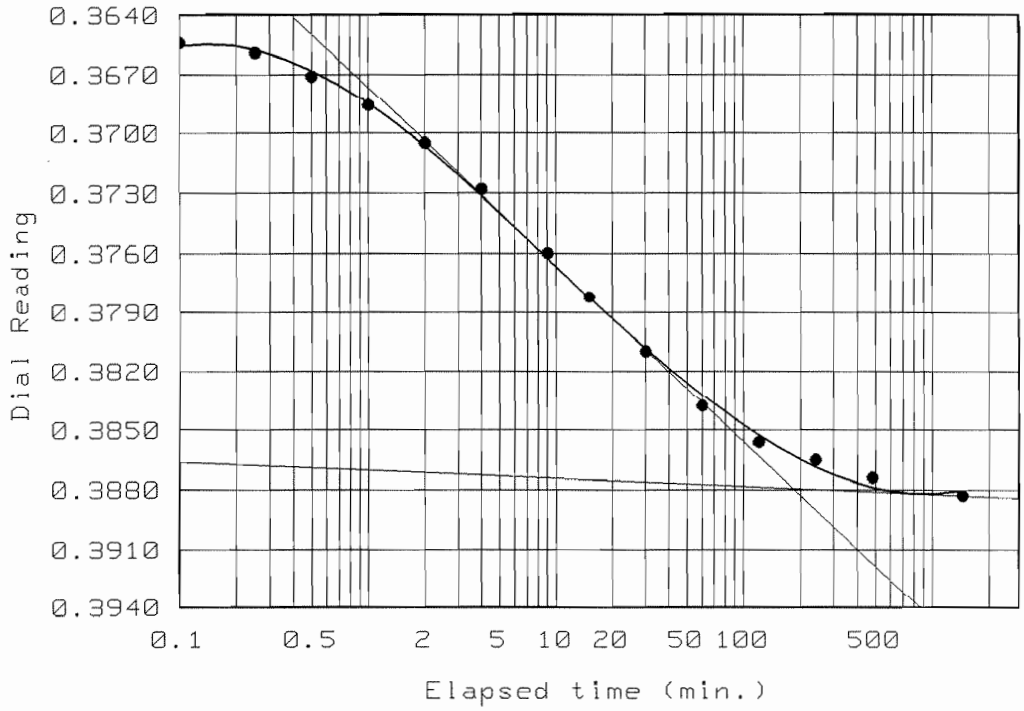
C_v @ T_{50} = .003 in.^{2}/min.

C_α= 0.000

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-14 @ 73' - 75'

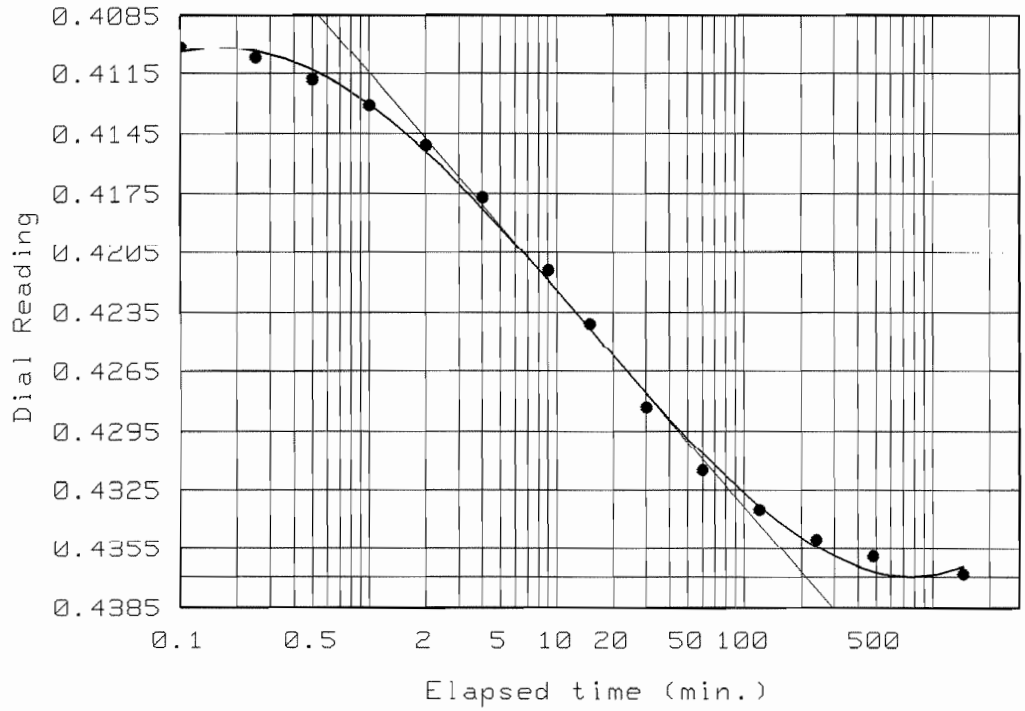
Date: 12/16/03



Load No.= 13
Load= 32.00 ksf
D_0 = 0.3647
D_{50} = 0.3763
D_{100}= 0.3879
T_{50}= 9.18 min.

C_v @ T_{50} =
.002 in.^{2}/min.

C_α= 0.001

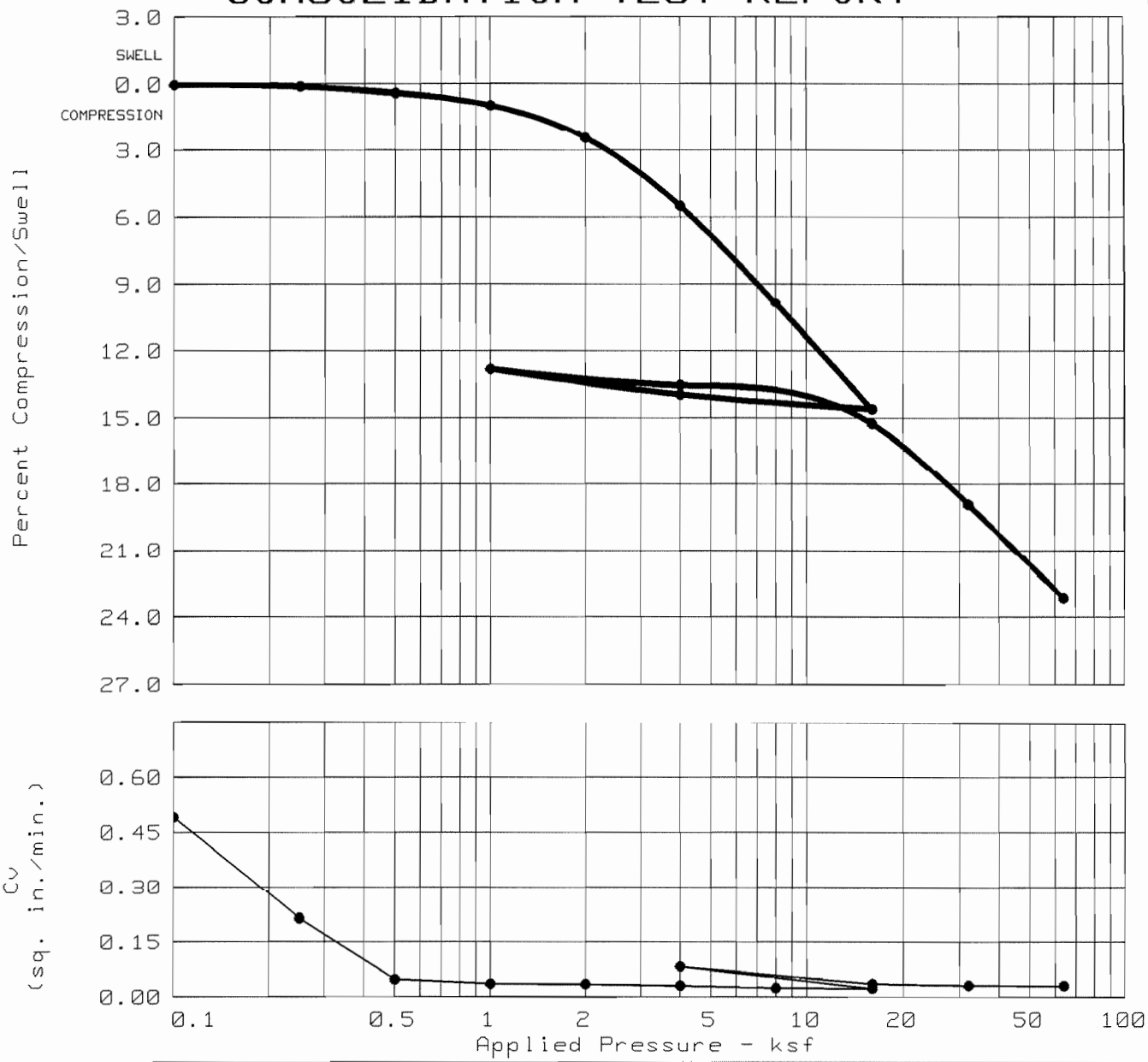


Load No.= 14
Load= 64.00 ksf
D_0 = 0.4099
D_{50} = 0.4234
D_{100}= 0.4369
T_{50}= 12.41 min.

C_v @ T_{50} =
.002 in.^{2}/min.

C_α= 0.000

CONSOLIDATION TEST REPORT



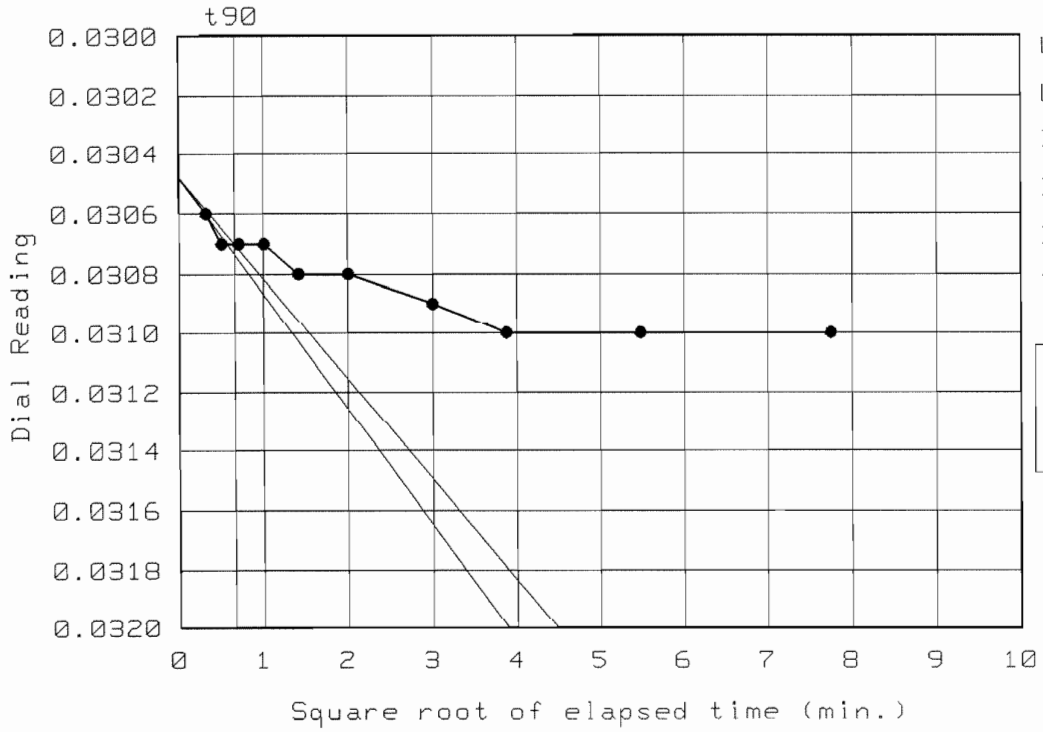
Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
82.4 %	36.3 %	88.3	32	11	2.700	1.1901

TEST RESULTS	MATERIAL DESCRIPTION
	Dark gray lean CLAY
Project No.: 3530-03-1245 Phase 02 Project: Indian River Inlet Bridges Location: Boring BII-17 @ 69' - 71' Date: 11/18/03	Class: (CL) Remarks: 12/4/03
CONSOLIDATION TEST REPORT LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.	Fig. No. 11

Dial Reading vs. Time

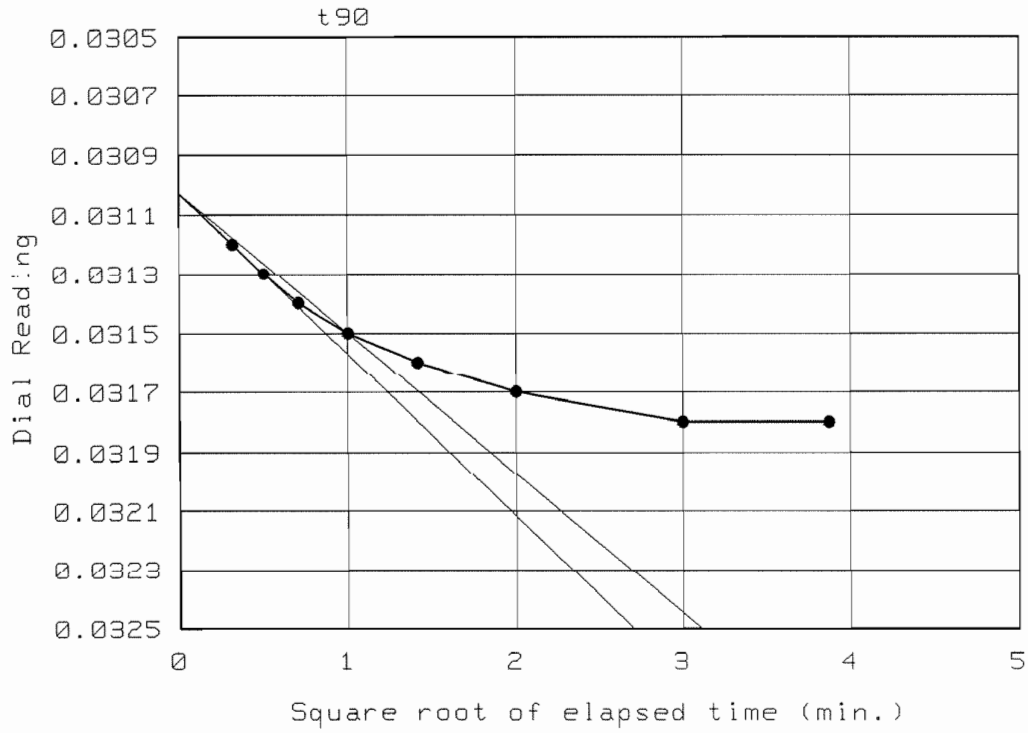
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-17 @ 69' - 71'

Date: 11/18/03



Load No.= 1
Load= 0.10 ksf
D_0 = 0.0305
D_{90} = 0.0307
D_{100}= 0.0307
T_{90}= 0.43 min.

C_v @ T_{90} =
.491 in.^{2}/min.



Load No.= 2
Load= 0.25 ksf
D_0 = 0.0310
D_{90} = 0.0315
D_{100}= 0.0316
T_{90}= 0.99 min.

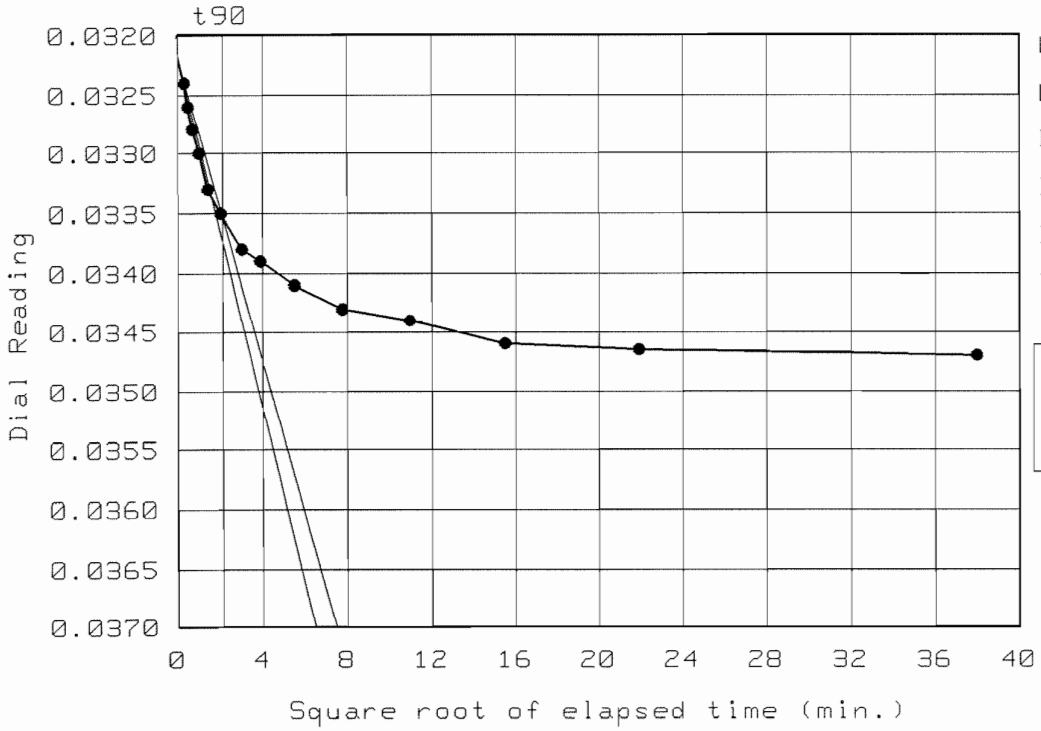
C_v @ T_{90} =
.213 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

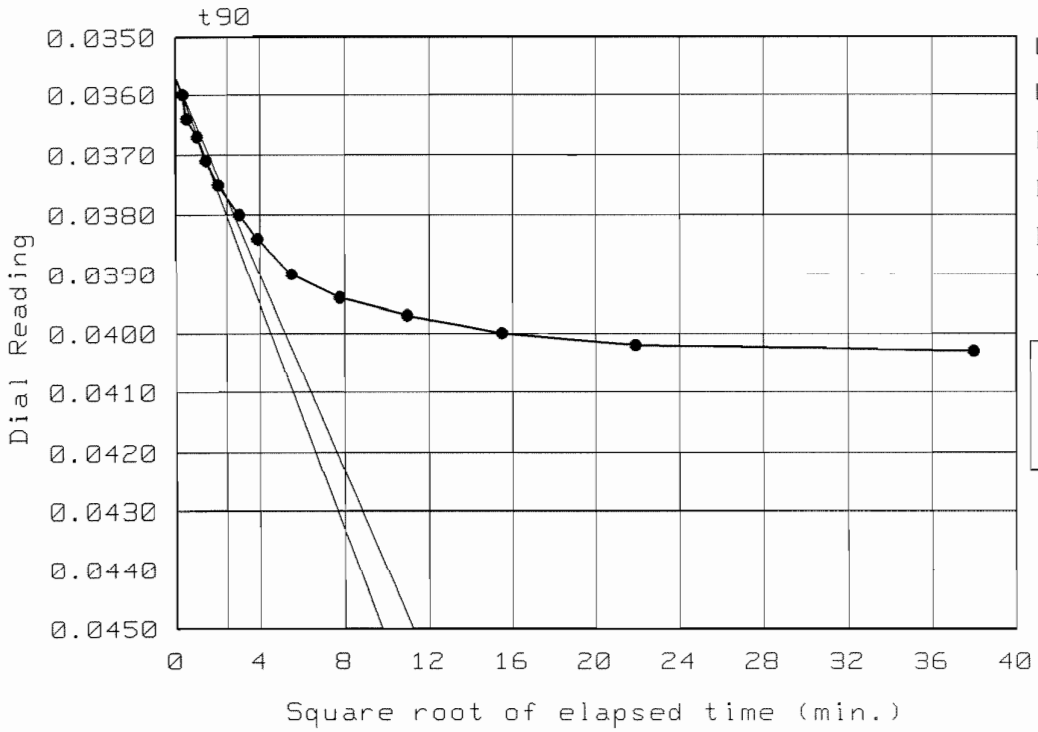
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-17 @ 69' - 71'

Date: 11/18/03



Load No. = 3
Load = 0.50 ksf
D_0 = 0.0322
D_{90} = 0.0335
D_{100} = 0.0337
T_{90} = 4.44 min.

C_v @ T_{90} =
.047 in.^{2}/min.



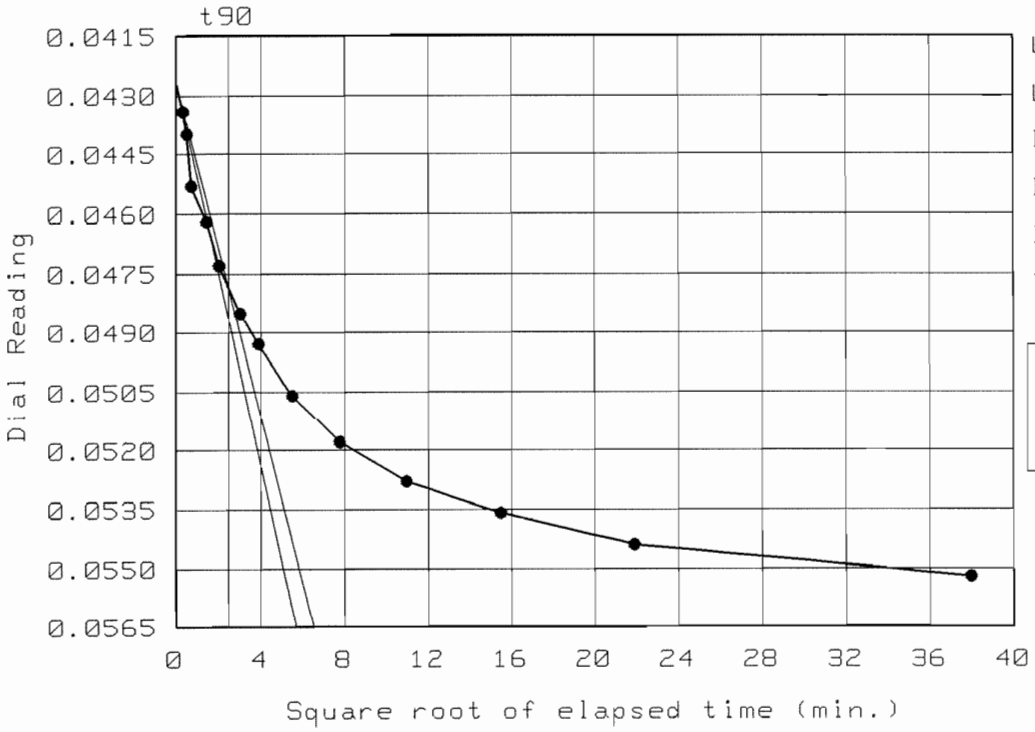
Load No. = 4
Load = 1.00 ksf
D_0 = 0.0357
D_{90} = 0.0377
D_{100} = 0.0379
T_{90} = 5.95 min.

C_v @ T_{90} =
.035 in.^{2}/min.

Dial Reading vs. Time

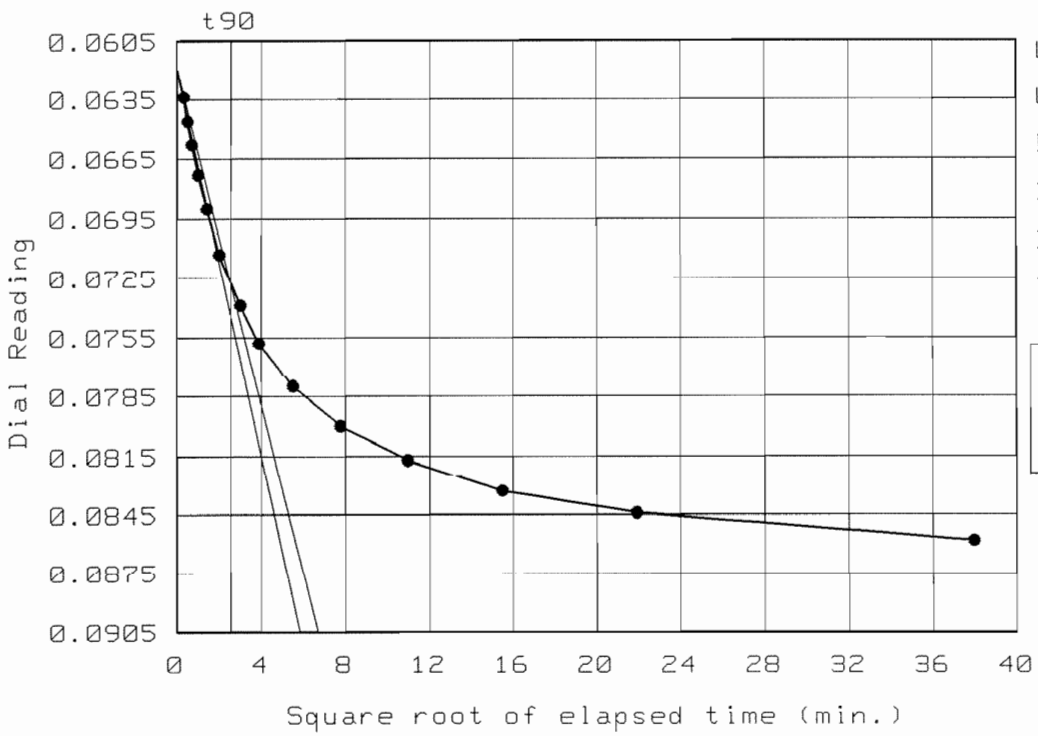
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-17 @ 69' - 71'

Date: 11/18/03



Load No. = 5
Load = 2.00 ksf
D_0 = 0.0426
D_{90} = 0.0478
D_{100} = 0.0484
T_{90} = 6.01 min.

C_v @ T_{90} = .034 in.^{2}/min.



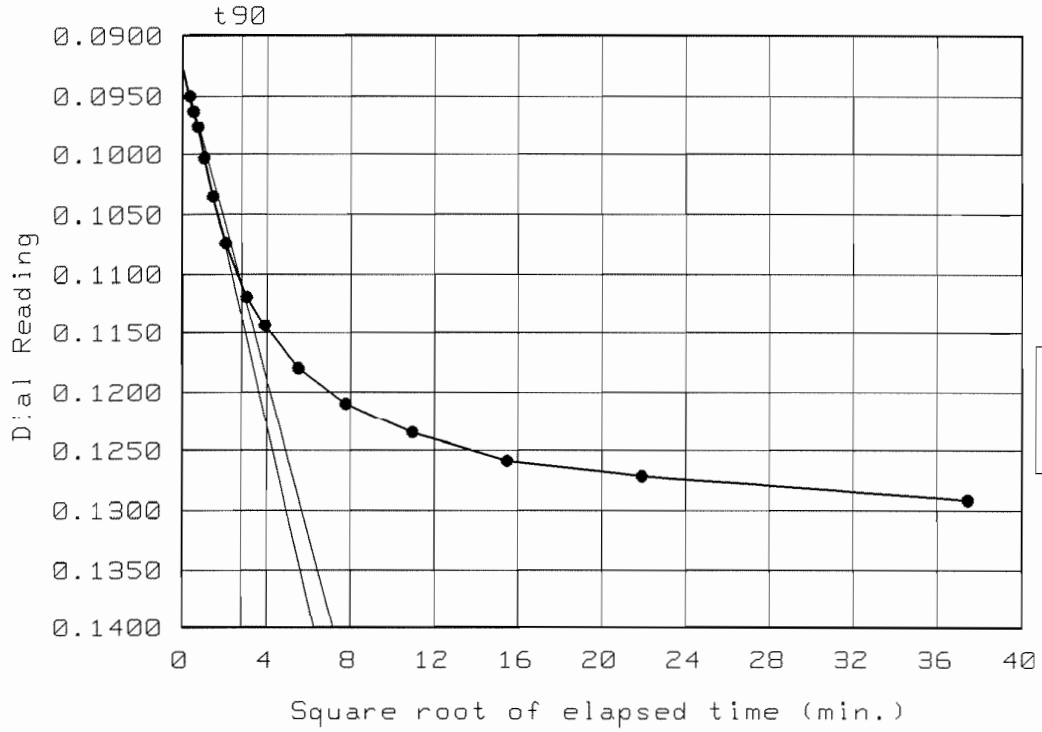
Load No. = 6
Load = 4.00 ksf
D_0 = 0.0618
D_{90} = 0.0727
D_{100} = 0.0739
T_{90} = 6.43 min.

C_v @ T_{90} = .030 in.^{2}/min.

Dial Reading vs. Time

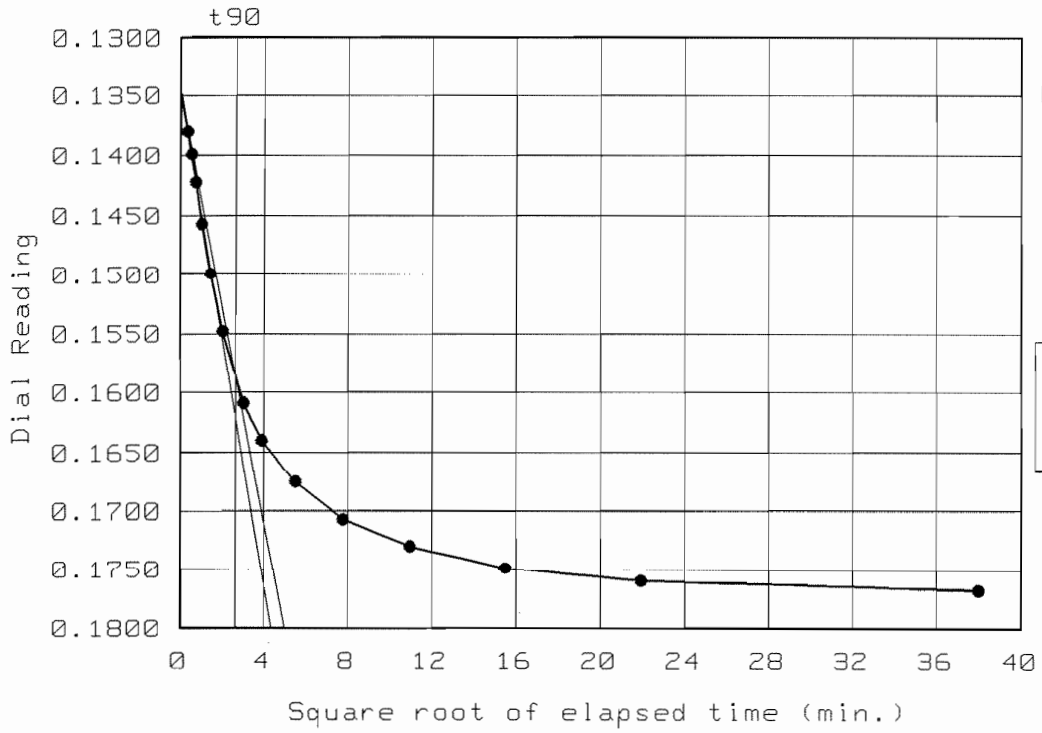
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-17 @ 69' - 71'

Date: 11/18/03



Load No.= 7
Load= 8.00 ksf
D_0 = 0.0926
D_{90} = 0.1108
D_{100}= 0.1129
T_{90}= 7.64 min.

C_v @ T_{90} =
.024 in.^{2}/min.



Load No.= 8
Load= 16.00 ksf
D_0 = 0.1347
D_{90} = 0.1587
D_{100}= 0.1614
T_{90}= 6.98 min.

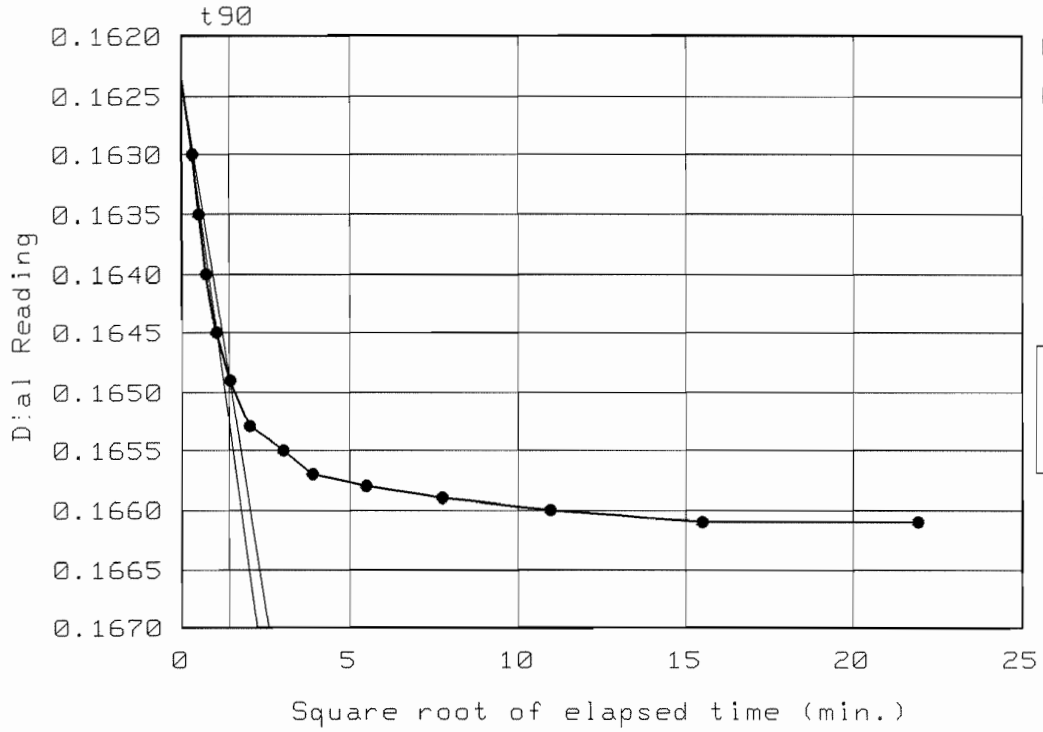
C_v @ T_{90} =
.023 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

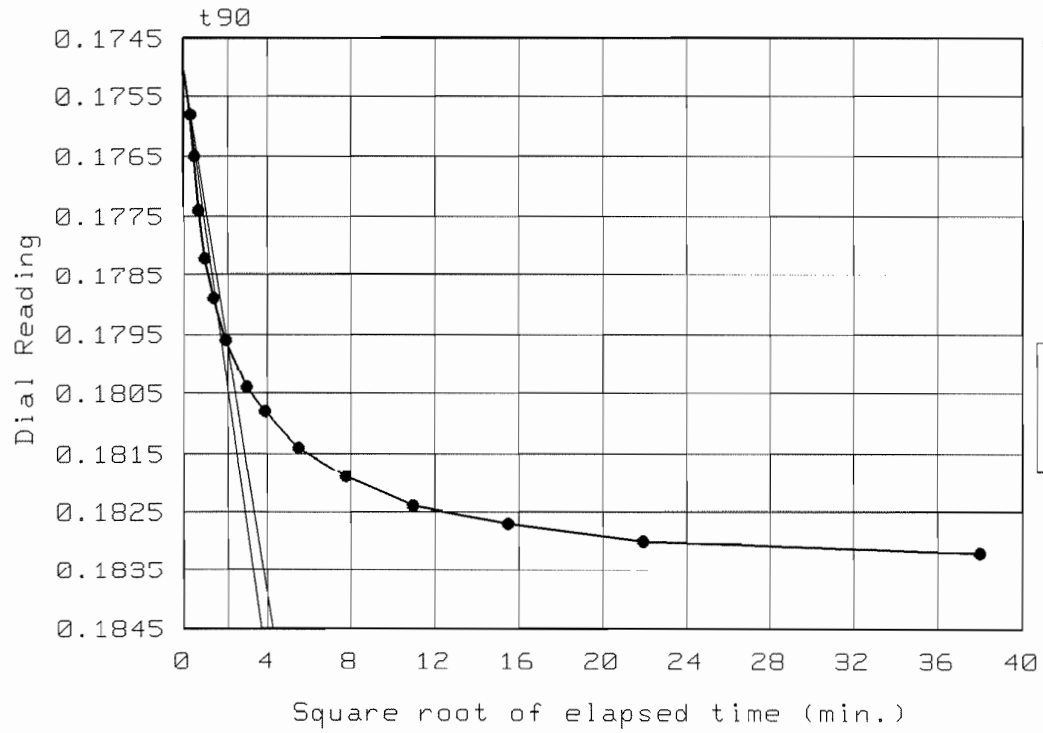
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-17 @ 69' - 71'

Date: 11/18/03



Load No.= 11
Load= 4.00 ksf
D_0 = 0.1623
D_{90} = 0.1649
D_{100}= 0.1652
T_{90}= 1.96 min.

C_v @ T_{90} =
.082 in.^{2}/min.



Load No.= 12
Load= 16.00 ksf
D_0 = 0.1750
D_{90} = 0.1797
D_{100}= 0.1802
T_{90}= 4.39 min.

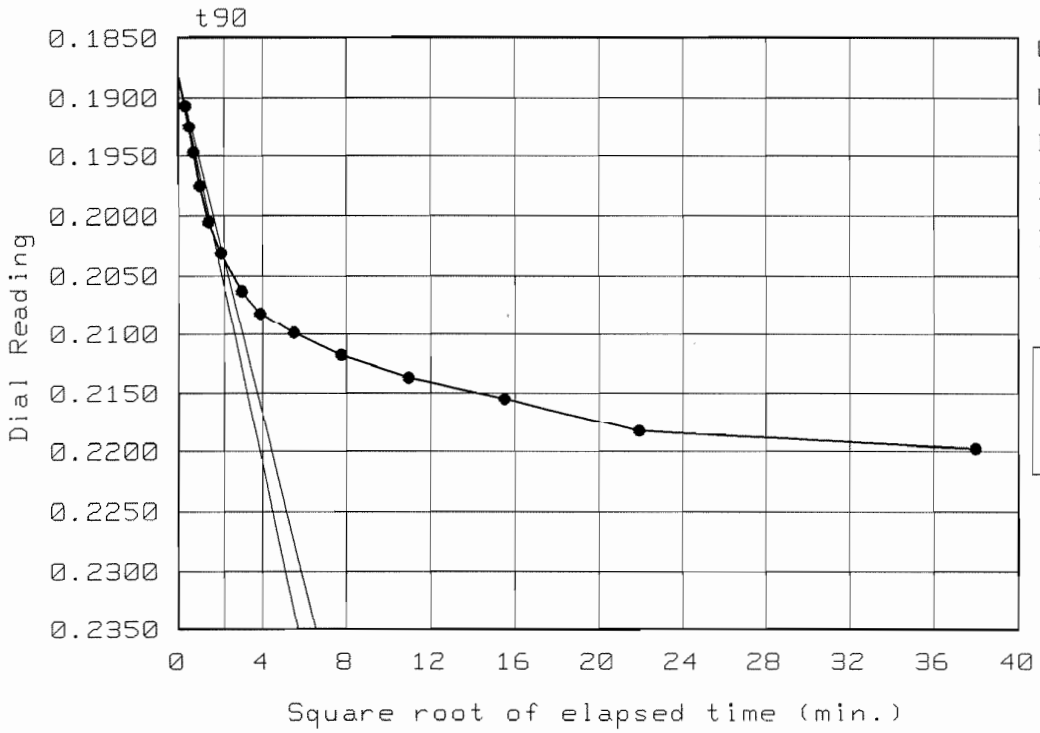
C_v @ T_{90} =
.035 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

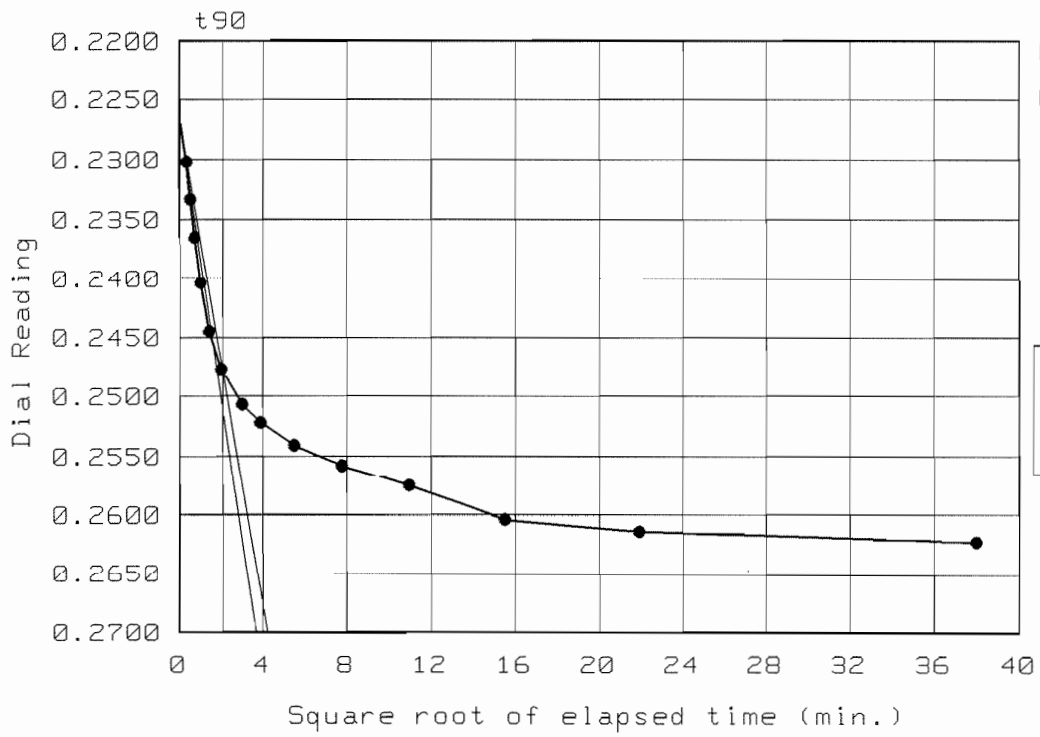
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-17 @ 69' - 71'

Date: 11/18/03



Load No.= 13
Load= 32.00 ksf
D_0 = 0.1881
D_{90} = 0.2037
D_{100}= 0.2054
T_{90}= 4.72 min.

C_v @ T_{90} =
.031 in.^{2}/min.



Load No.= 14
Load= 64.00 ksf
D_0 = 0.2264
D_{90} = 0.2480
D_{100}= 0.2503
T_{90}= 4.35 min.

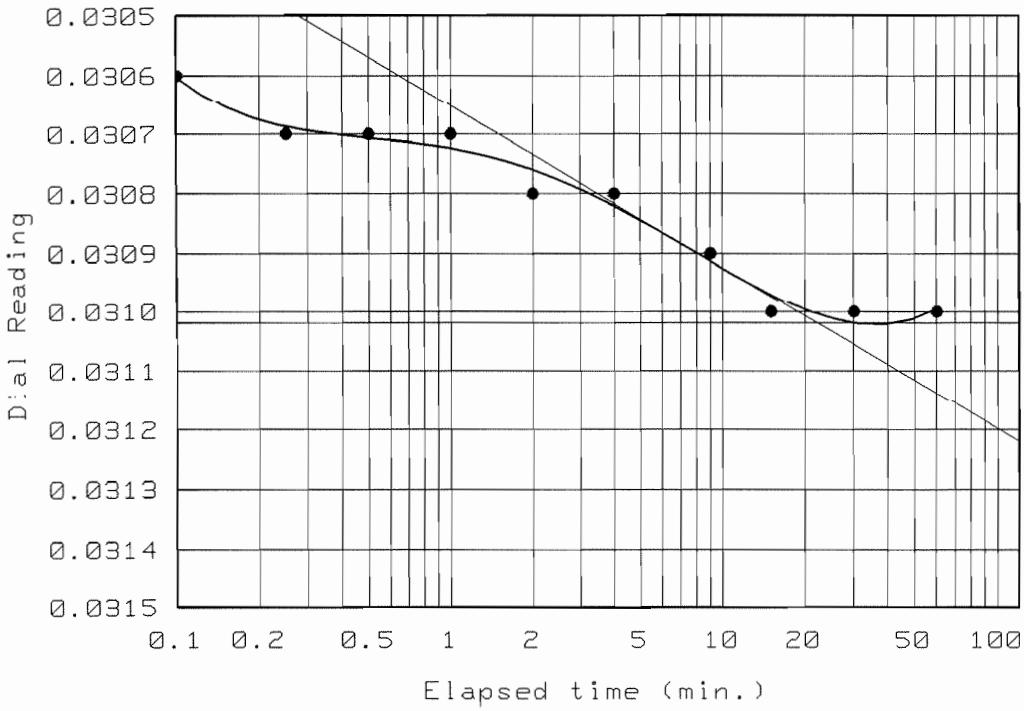
C_v @ T_{90} =
.030 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-17 @ 69' - 71'

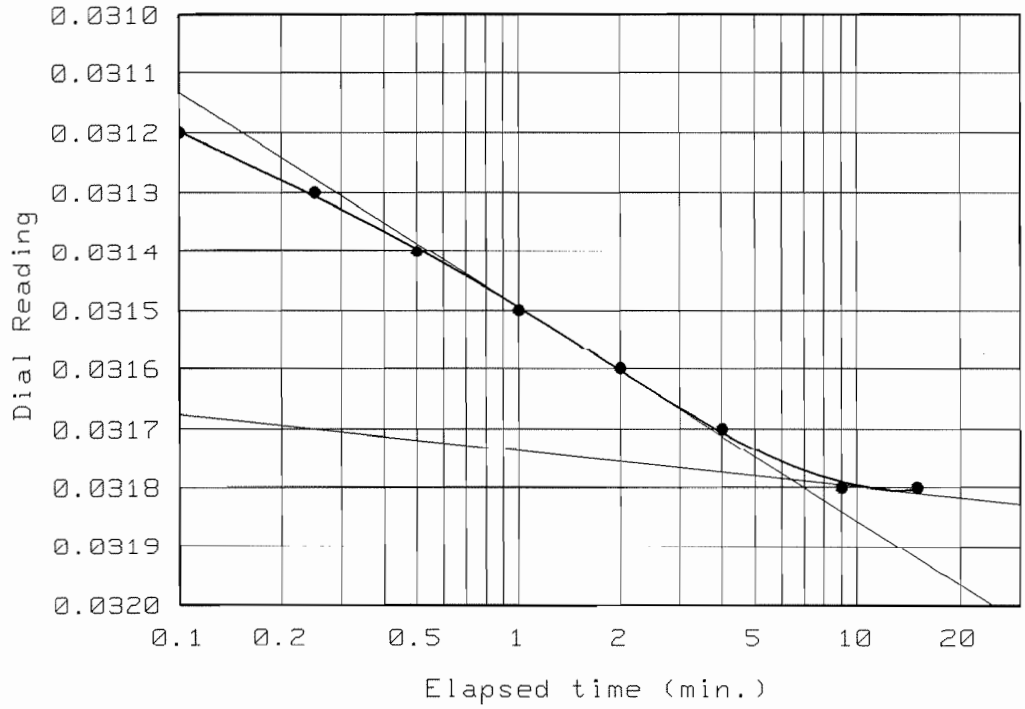
Date: 11/18/03



Load No.= 1
Load= 0.10 ksf
D_0 = 0.0305
D_{50} = 0.0308
D_{100}= 0.0310
T_{50}= 2.05 min.

C_v @ T_{50} = .024 in.^{2}/min.

C_α= 0.000



Load No.= 2
Load= 0.25 ksf
D_0 = 0.0310
D_{50} = 0.0314
D_{100}= 0.0318
T_{50}= 0.55 min.

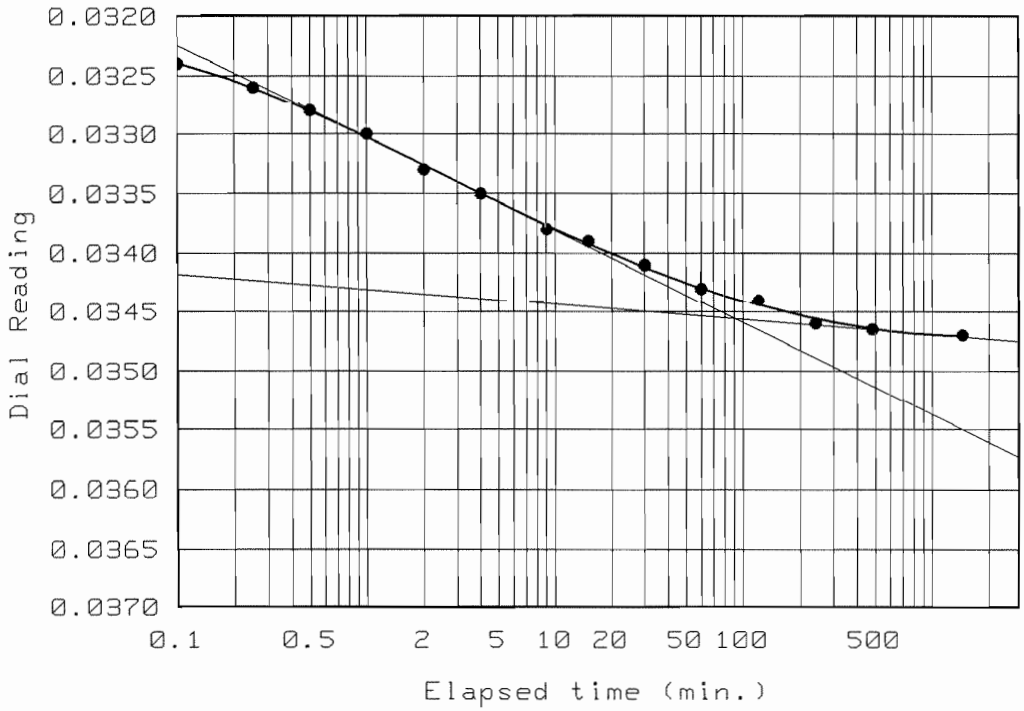
C_v @ T_{50} = .089 in.^{2}/min.

C_α= 0.000

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-17 @ 69' - 71'

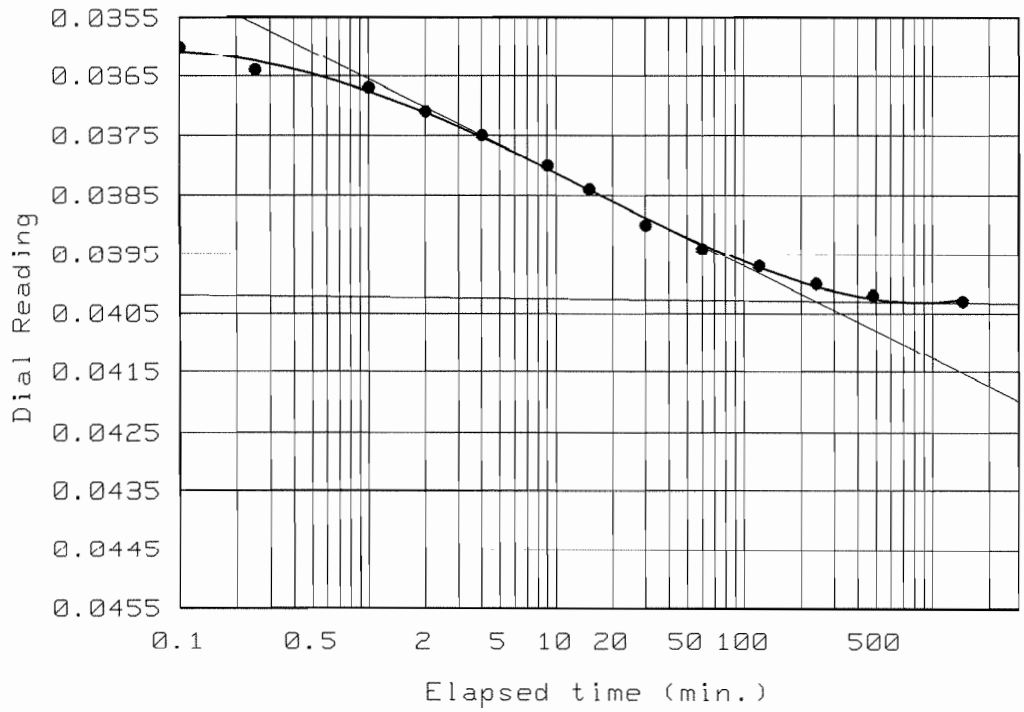
Date: 11/18/03



Load No.= 3
Load= 0.50 ksf
D_0 = 0.0320
D_{50} = 0.0333
D_{100}= 0.0346
T_{50}= 2.24 min.

C_v @ T_{50} = .022 in.^{2}/min.

C_α= 0.000



Load No.= 4
Load= 1.00 ksf
D_0 = 0.0357
D_{50} = 0.0380
D_{100}= 0.0403
T_{50}= 8.51 min.

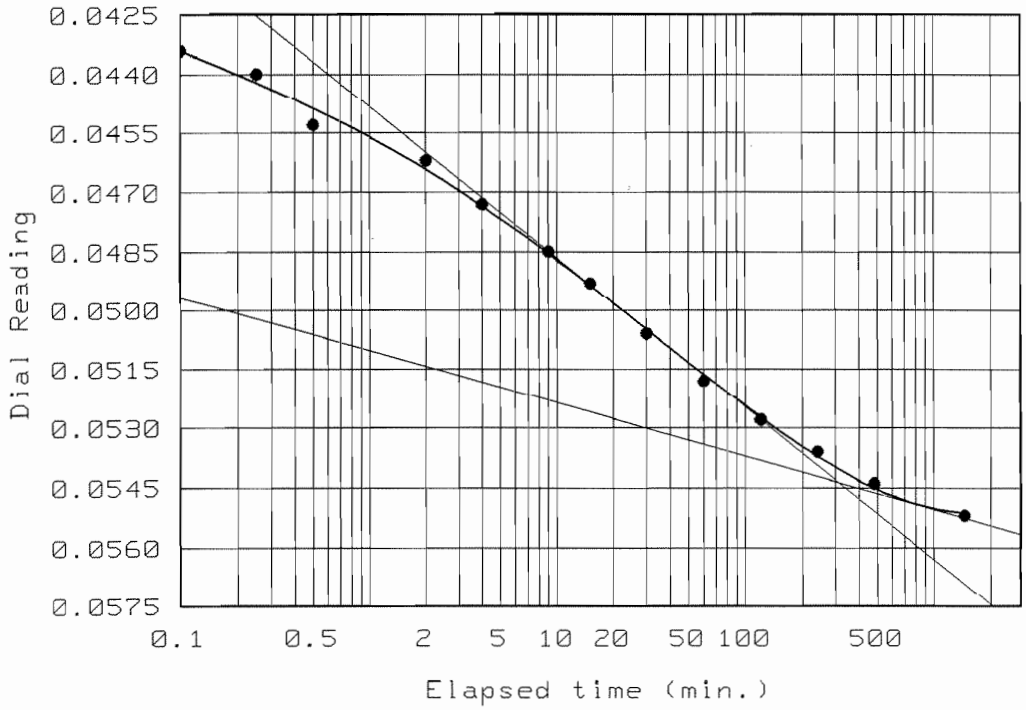
C_v @ T_{50} = .006 in.^{2}/min.

C_α= 0.000

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-17 @ 69' - 71'

Date: 11/18/03



Load No.= 5

Load= 2.00 ksf

D_0 = 0.0421

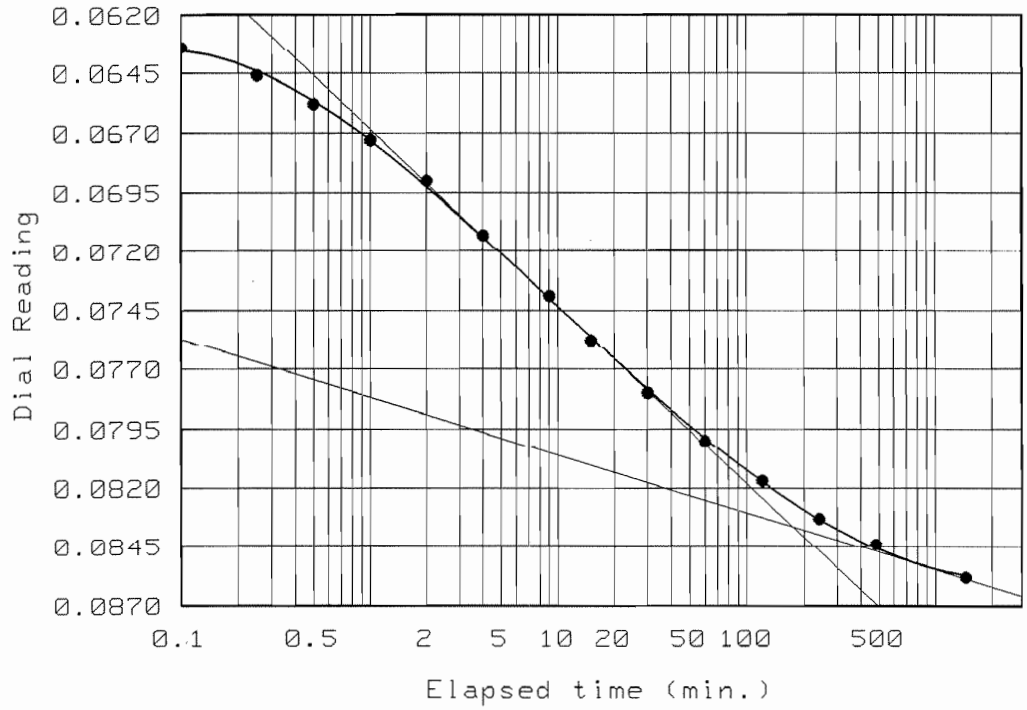
D_{50} = 0.0482

D_{100}= 0.0544

T_{50}= 7.41 min.

C_v @ T_{50} = .006 in.^{2}/min.

C_α= 0.001



Load No.= 6

Load= 4.00 ksf

D_0 = 0.0618

D_{50} = 0.0727

D_{100}= 0.0836

T_{50}= 6.08 min.

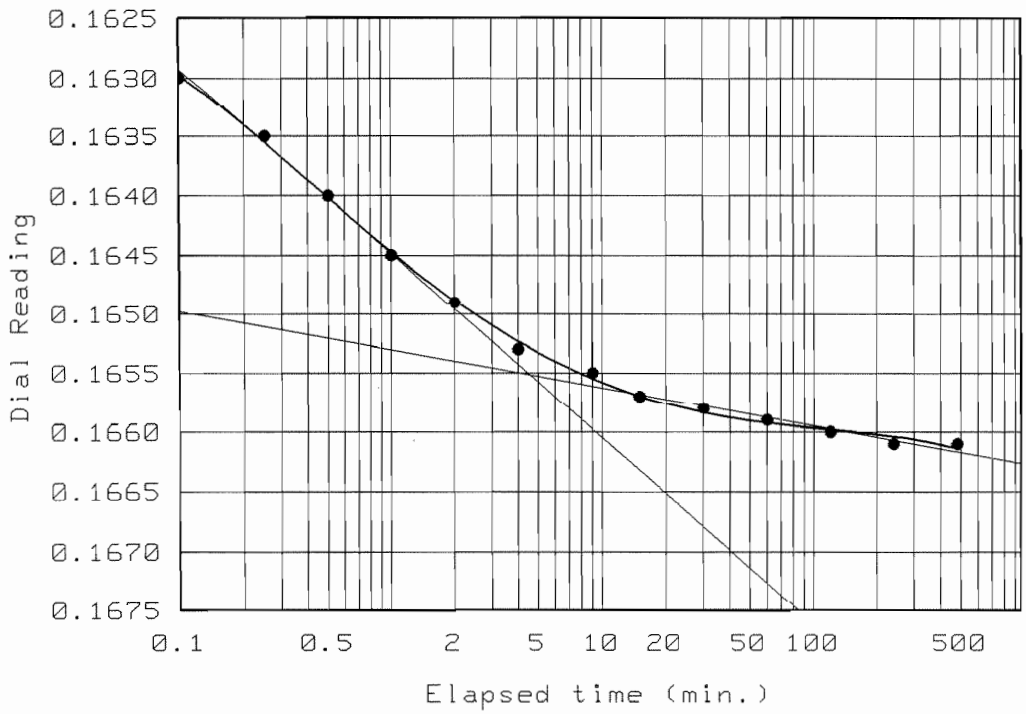
C_v @ T_{50} = .007 in.^{2}/min.

C_α= 0.002

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-17 @ 69' - 71'

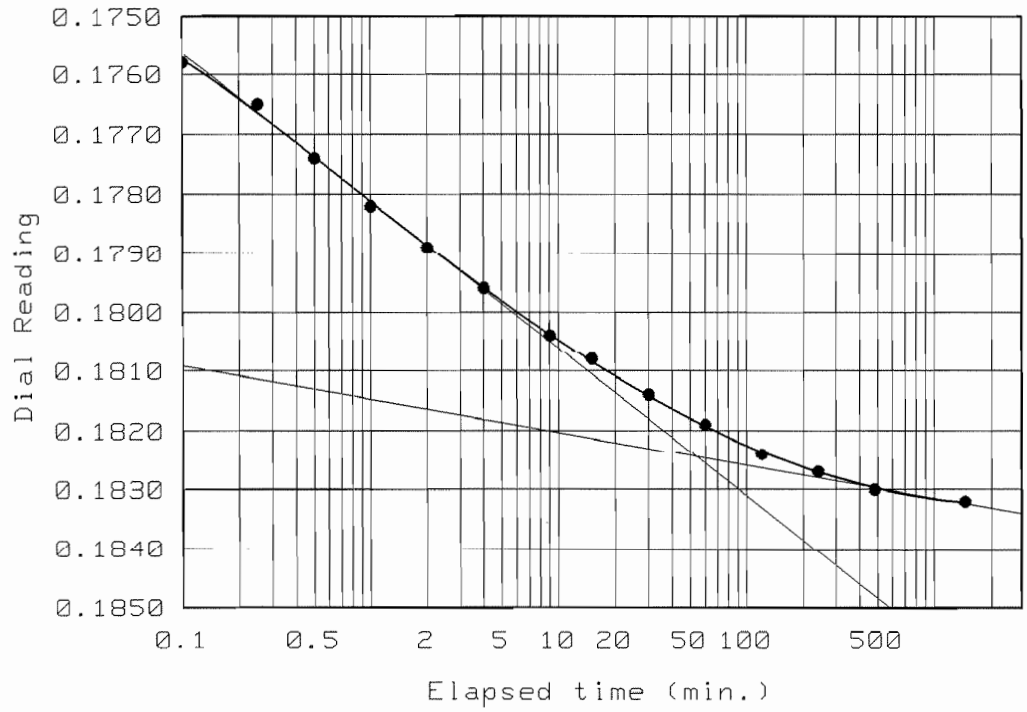
Date: 11/18/03



Load No.= 11
Load= 4.00 ksf
D_0 = 0.1621
D_{50} = 0.1638
D_{100}= 0.1655
T_{50}= 0.36 min.

C_v @ T_{50} =
.103 in.^{2}/min.

C_α= 0.000



Load No.= 12
Load= 16.00 ksf
D_0 = 0.1743
D_{50} = 0.1784
D_{100}= 0.1824
T_{50}= 1.28 min.

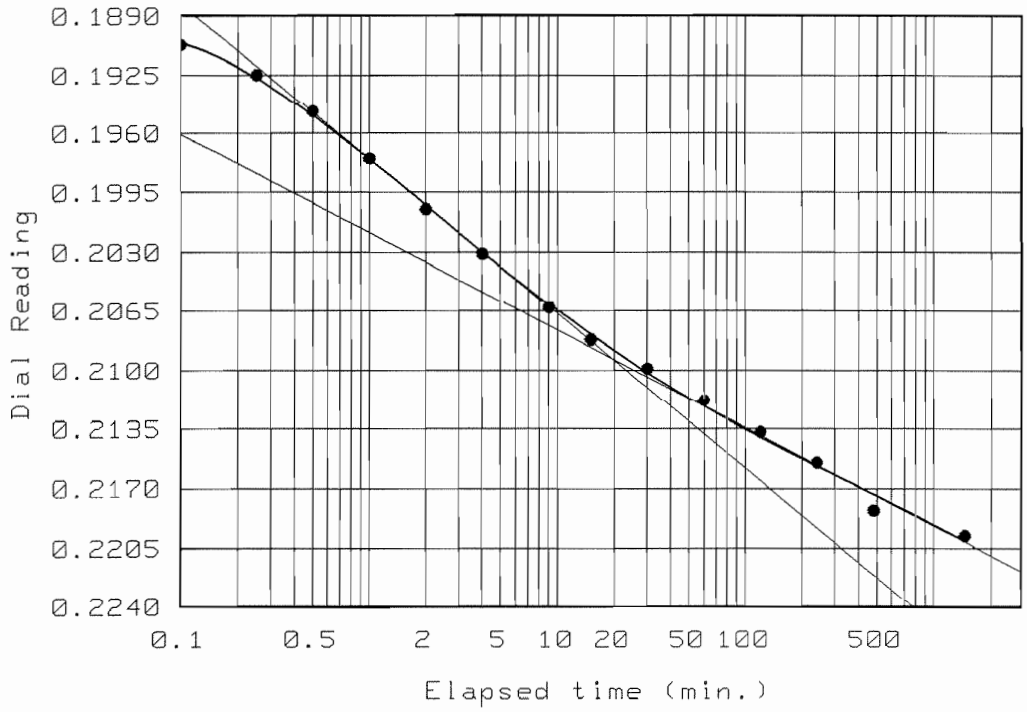
C_v @ T_{50} =
.028 in.^{2}/min.

C_α= 0.001

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-17 @ 69' - 71'

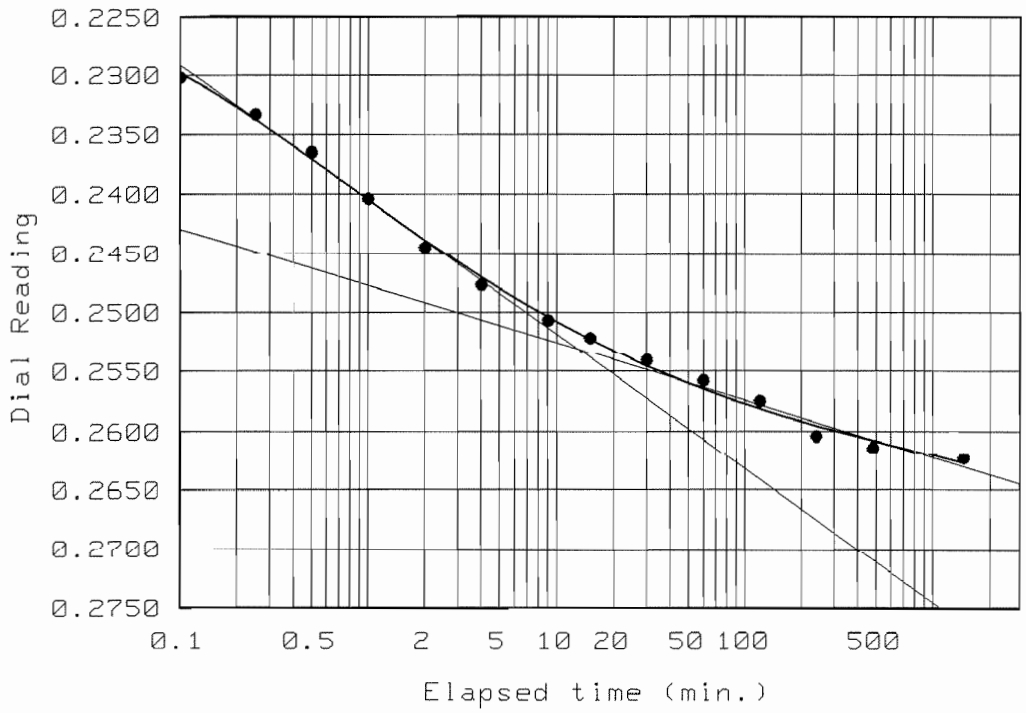
Date: 11/18/03



Load No.= 13
Load= 32.00 ksf
D_0 = 0.1869
D_{50} = 0.1981
D_{100}= 0.2093
T_{50}= 1.16 min.

C_v @ T_{50} =
.029 in.^{2}/min.

C_α= 0.007



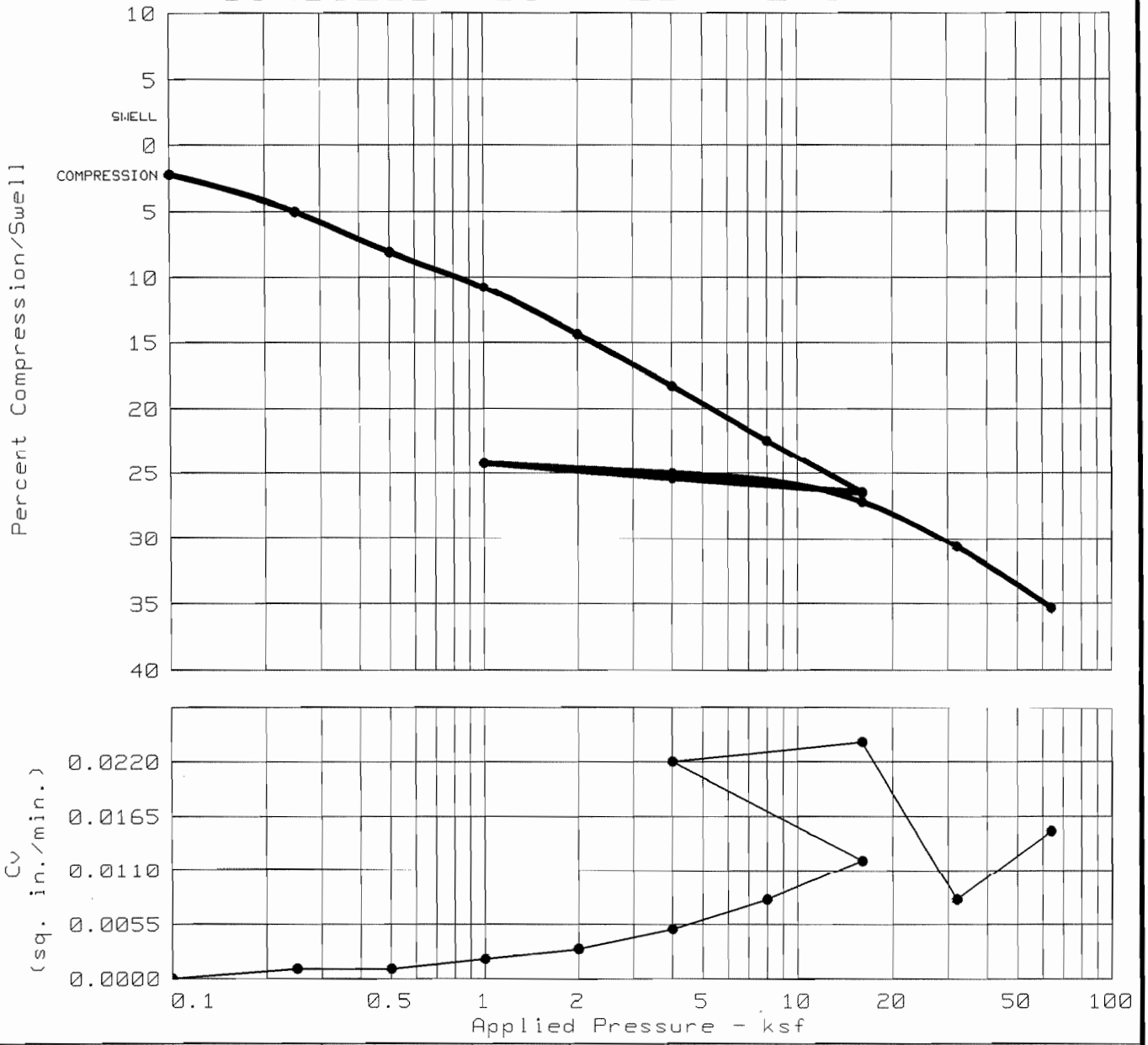
Load No.= 14
Load= 64.00 ksf
D_0 = 0.2236
D_{50} = 0.2384
D_{100}= 0.2531
T_{50}= 0.65 min.

C_v @ T_{50} =
.047 in.^{2}/min.

C_α= 0.006

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

CONSOLIDATION TEST REPORT



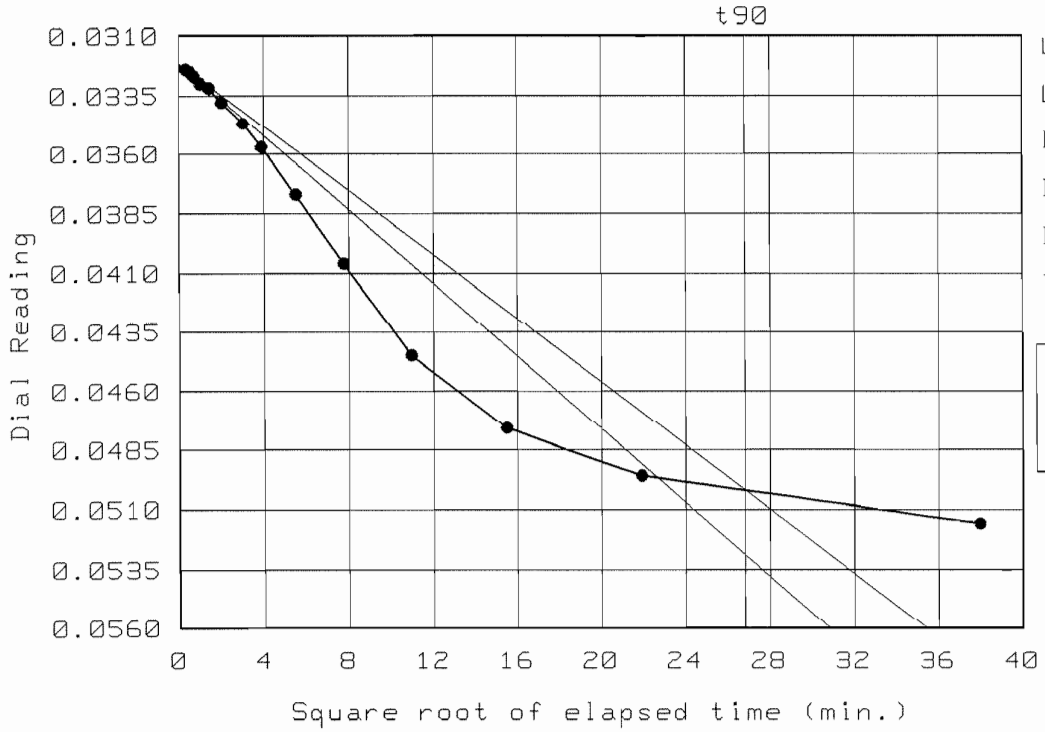
Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
71.0 %	45.5 %	75.8	41	31	2.700	1.7200

TEST RESULTS	MATERIAL DESCRIPTION
	Dark gray SILT Class: (ML)
Project No.: 3530-03-1245 Phase 02 Project: Indian River Inlet Bridges Location: Boring BII-18 @ 60'- 62' Date: 12/1/03	Remarks: 12/23/03
CONSOLIDATION TEST REPORT LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.	Fig. No. 1 1

Dial Reading vs. Time

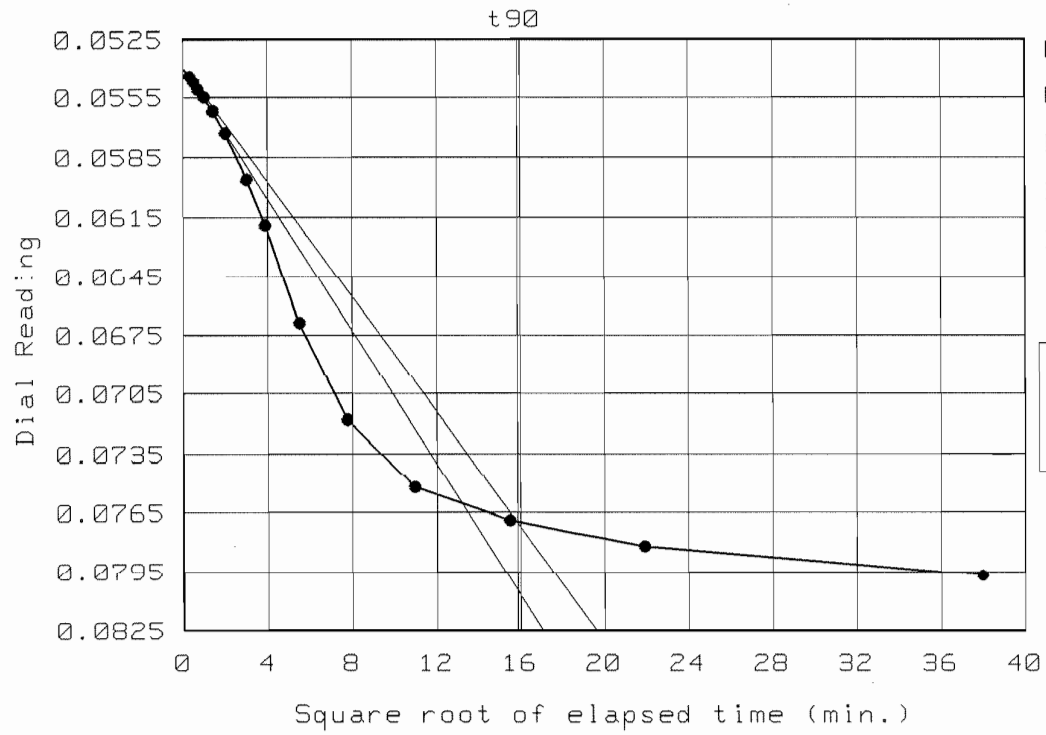
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-18 @ 60'- 62'

Date: 12/1/03



Load No. = 1
Load = 0.10 ksf
D_0 = 0.0322
D_{90} = 0.0502
D_{100} = 0.0522
T_{90} = 719.64 min.

C_v @ T_{90} =
.000 in.^{2}/min.



Load No. = 2
Load = 0.25 ksf
D_0 = 0.0539
D_{90} = 0.0770
D_{100} = 0.0795
T_{90} = 251.28 min.

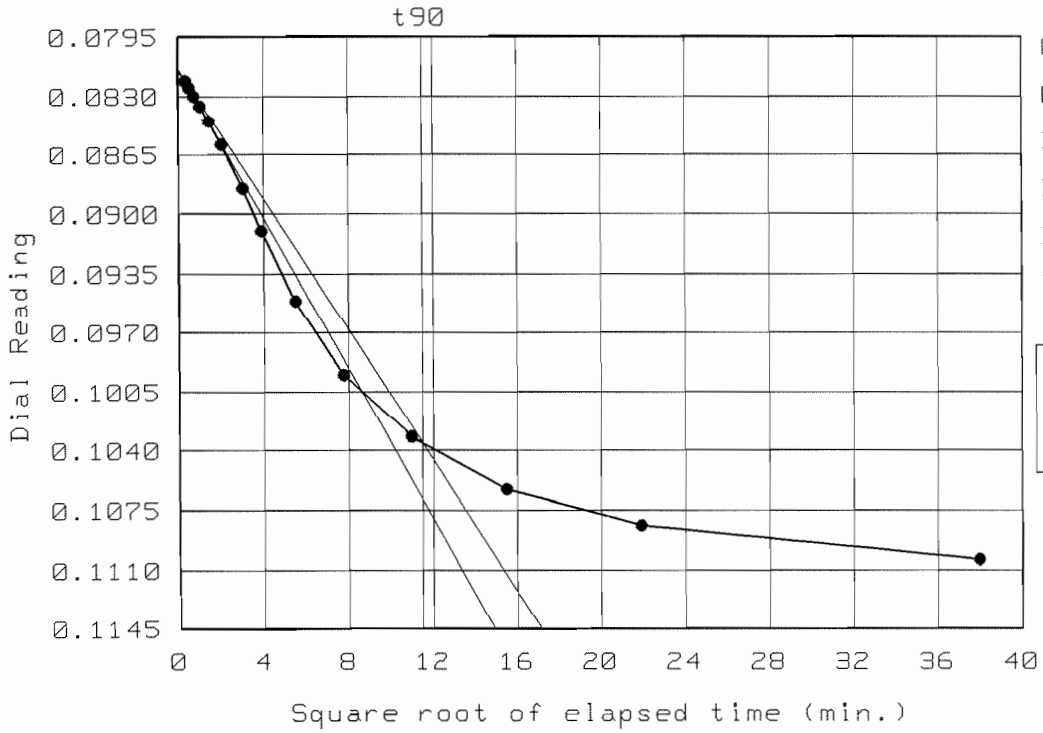
C_v @ T_{90} =
.001 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

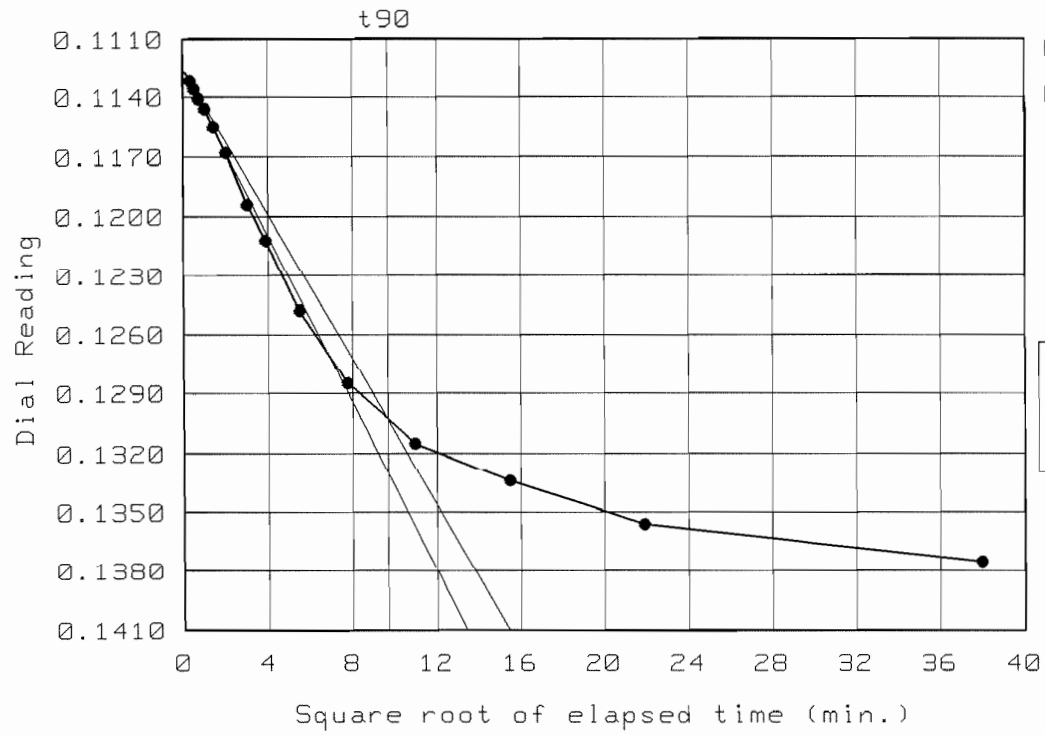
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-18 @ 60'- 62'

Date: 12/1/03



Load No.= 3
Load= 0.50 ksf
D_0 = 0.0814
D_{90} = 0.1036
D_{100}= 0.1060
T_{90}= 132.29 min.

C_v @ T_{90} =
.001 in.^{2}/min.



Load No.= 4
Load= 1.00 ksf
D_0 = 0.1125
D_{90} = 0.1303
D_{100}= 0.1323
T_{90}= 93.35 min.

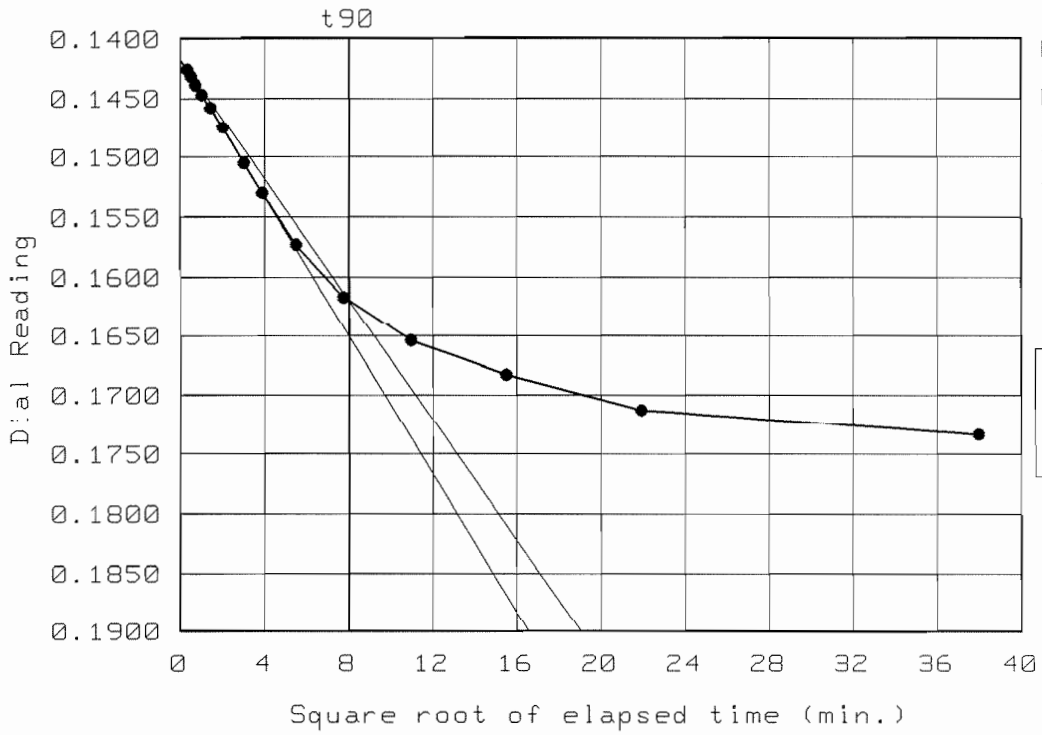
C_v @ T_{90} =
.002 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

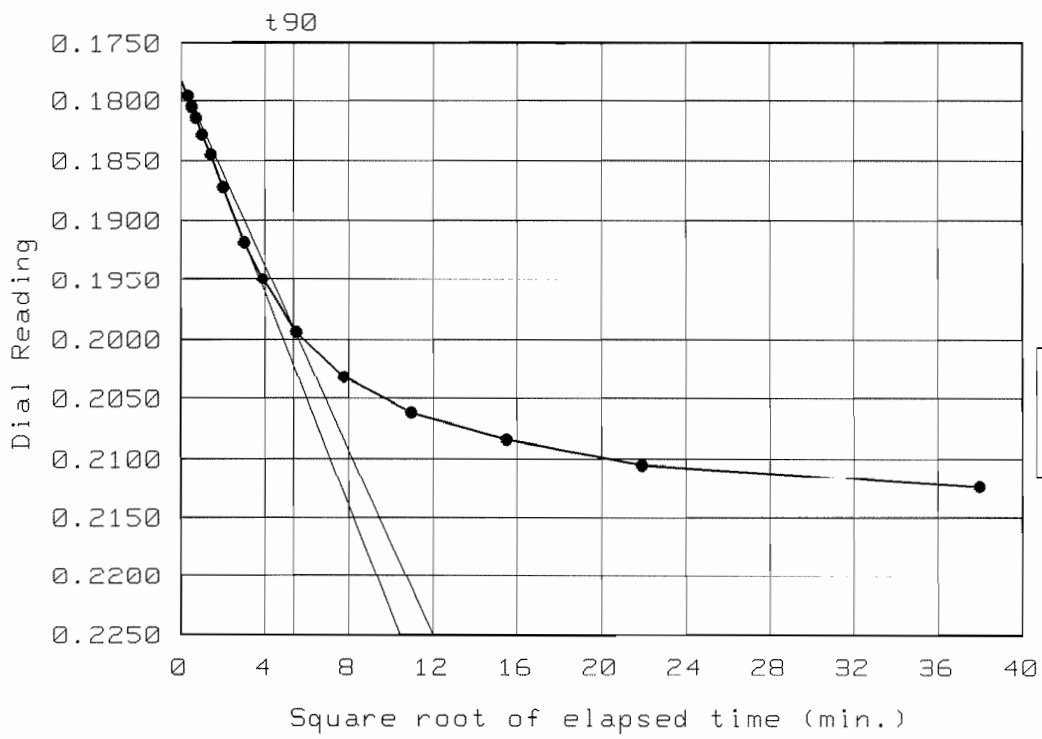
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-18 @ 60'- 62'

Date: 12/1/03



Load No.= 5
Load= 2.00 ksf
D_0 = 0.1417
D_{90} = 0.1620
D_{100}= 0.1643
T_{90}= 64.61 min.

C_v @ T_{90} =
.003 in.^{2}/min.



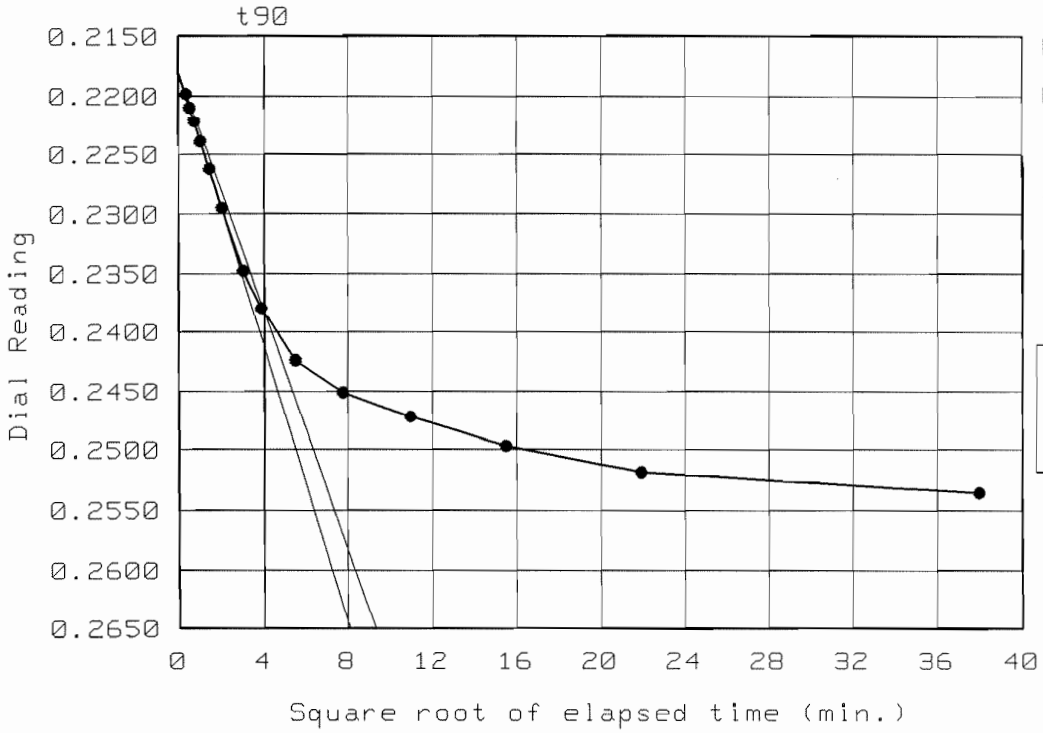
Load No.= 6
Load= 4.00 ksf
D_0 = 0.1782
D_{90} = 0.1990
D_{100}= 0.2013
T_{90}= 28.58 min.

C_v @ T_{90} =
.005 in.^{2}/min.

Dial Reading vs. Time

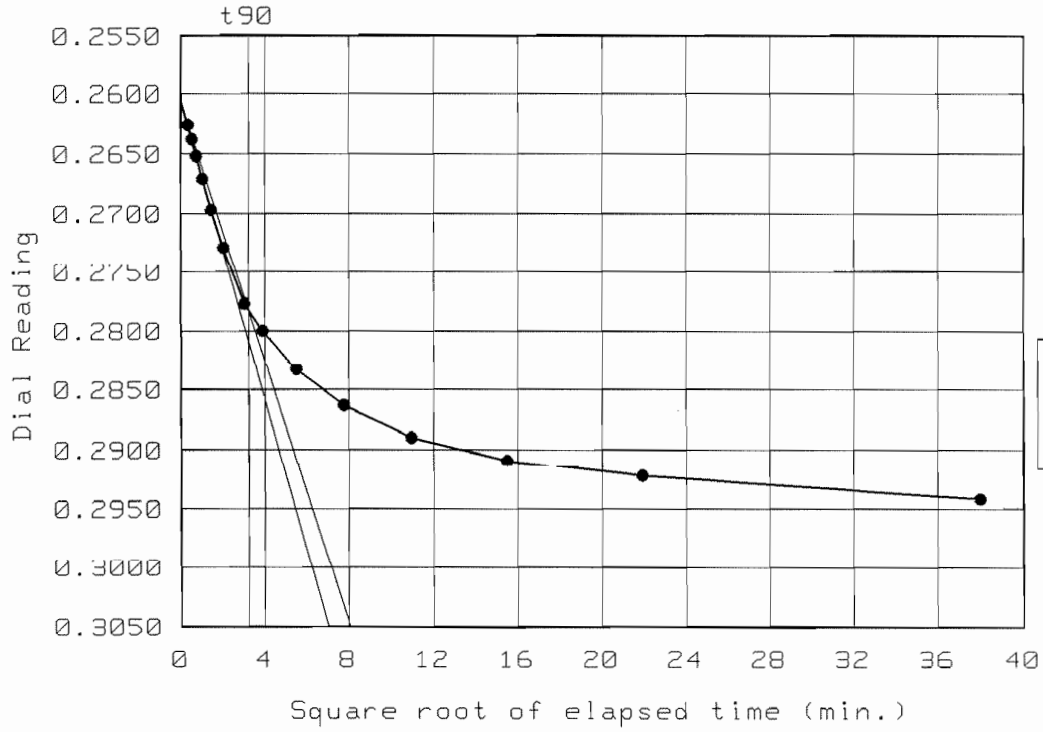
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-18 @ 60'- 62'

Date: 12/1/03



Load No.= 7
Load= 8.00 ksf
D_0 = 0.2180
D_{90} = 0.2384
D_{100}= 0.2407
T_{90}= 16.43 min.

C_v @ T_{90} =
.008 in.^{2}/min.



Load No.= 8
Load= 16.00 ksf
D_0 = 0.2606
D_{90} = 0.2783
D_{100}= 0.2802
T_{90}= 10.37 min.

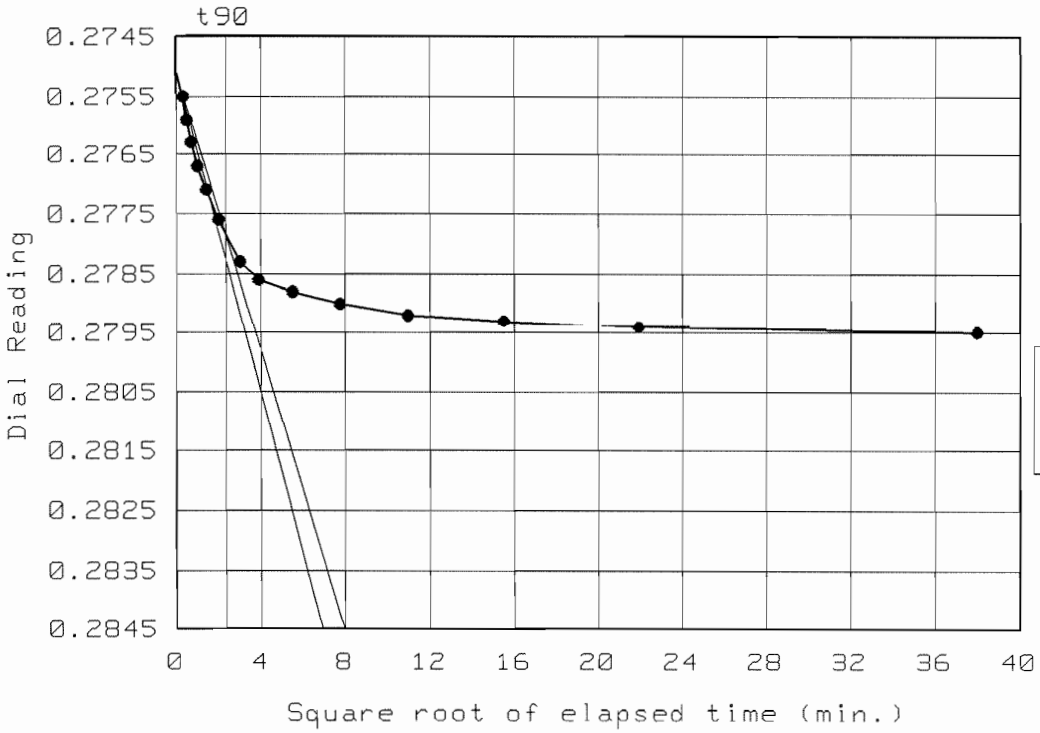
C_v @ T_{90} =
.012 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

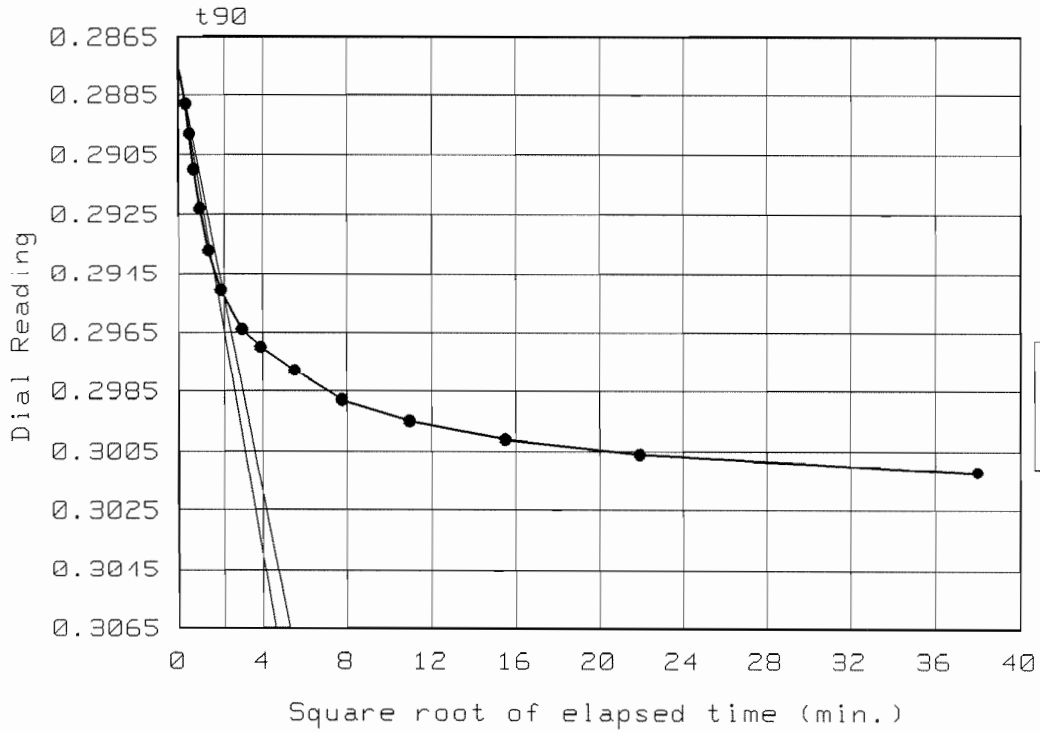
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-18 @ 60'- 62'

Date: 12/1/03



Load No.= 11
Load= 4.00 ksf
D_0 = 0.2751
D_{90} = 0.2778
D_{100}= 0.2781
T_{90}= 5.42 min.

C_v @ T_{90} =
.022 in.^{2}/min.



Load No.= 12
Load= 16.00 ksf
D_0 = 0.2875
D_{90} = 0.2953
D_{100}= 0.2962
T_{90}= 4.73 min.

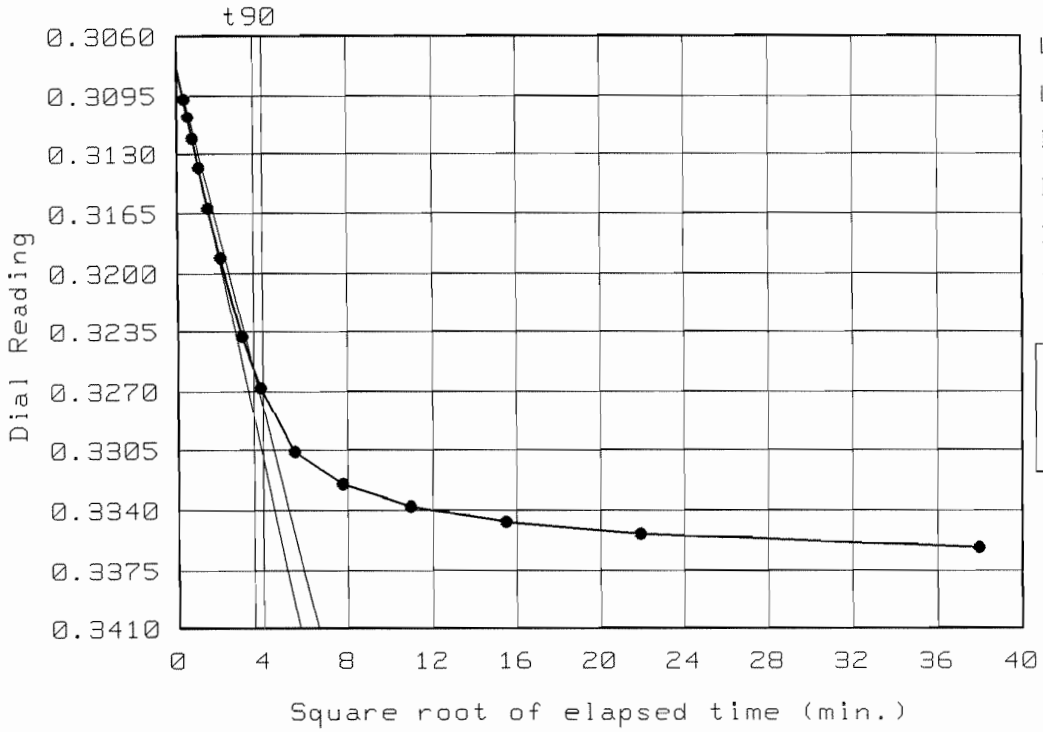
C_v @ T_{90} =
.024 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

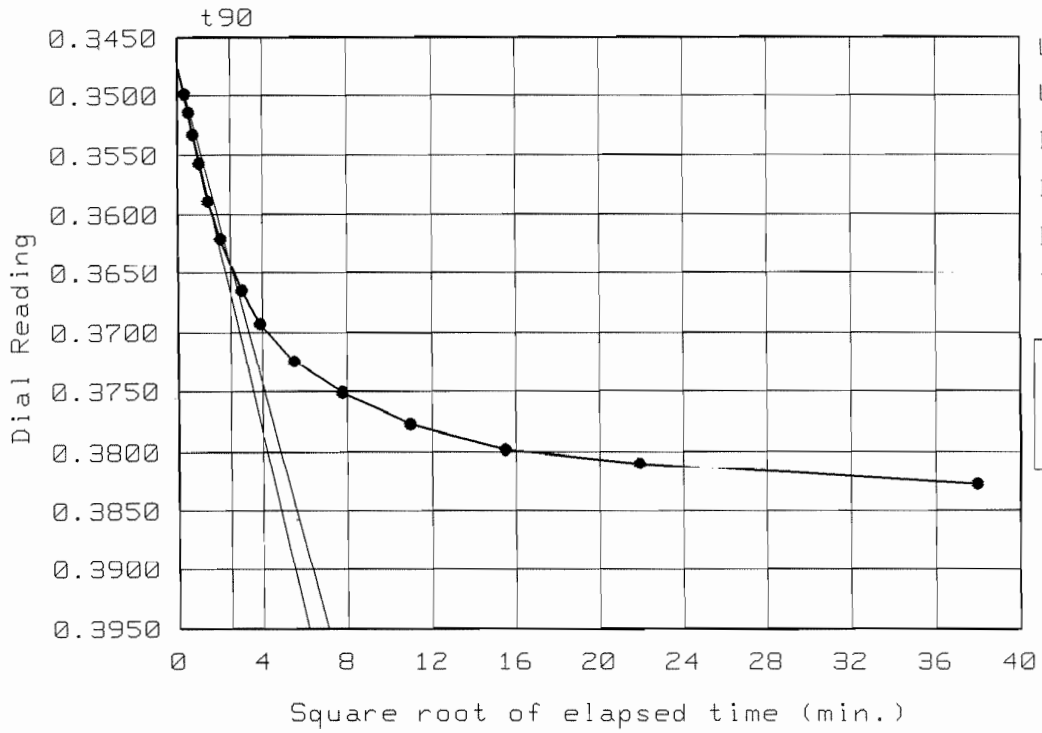
Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-18 @ 60'- 62'

Date: 12/1/03



Load No.= 13
Load= 32.00 ksf
D_0 = 0.3079
D_{90} = 0.3257
D_{100}= 0.3277
T_{90}= 12.60 min.

C_v @ T_{90} =
.008 in.^{2}/min.



Load No.= 14
Load= 64.00 ksf
D_0 = 0.3474
D_{90} = 0.3642
D_{100}= 0.3660
T_{90}= 6.14 min.

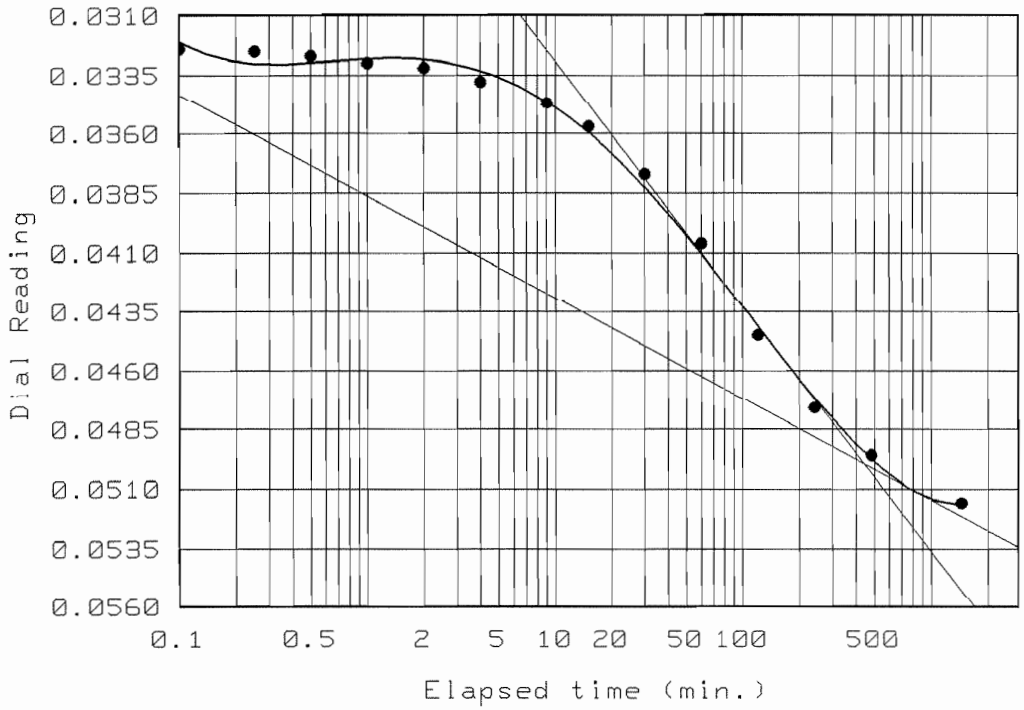
C_v @ T_{90} =
.015 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-18 @ 60'- 62'

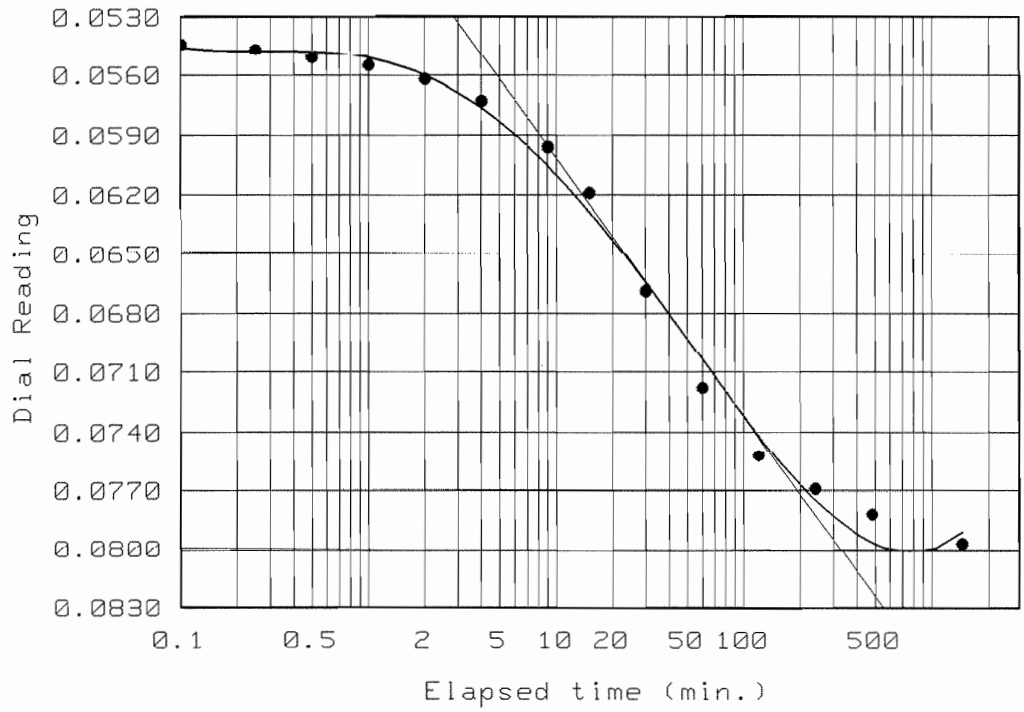
Date: 12/1/03



Load No.= 1
Load= 0.10 ksf
D_0 = 0.0312
D_{50} = 0.0406
D_{100}= 0.0500
T_{50}= 53.94 min.

C_v @ T_{50} =
.001 in.^{2}/min.

C_α= 0.004



Load No.= 2
Load= 0.25 ksf
D_0 = 0.0544
D_{50} = 0.0672
D_{100}= 0.0801
T_{50}= 34.72 min.

C_v @ T_{50} =
.001 in.^{2}/min.

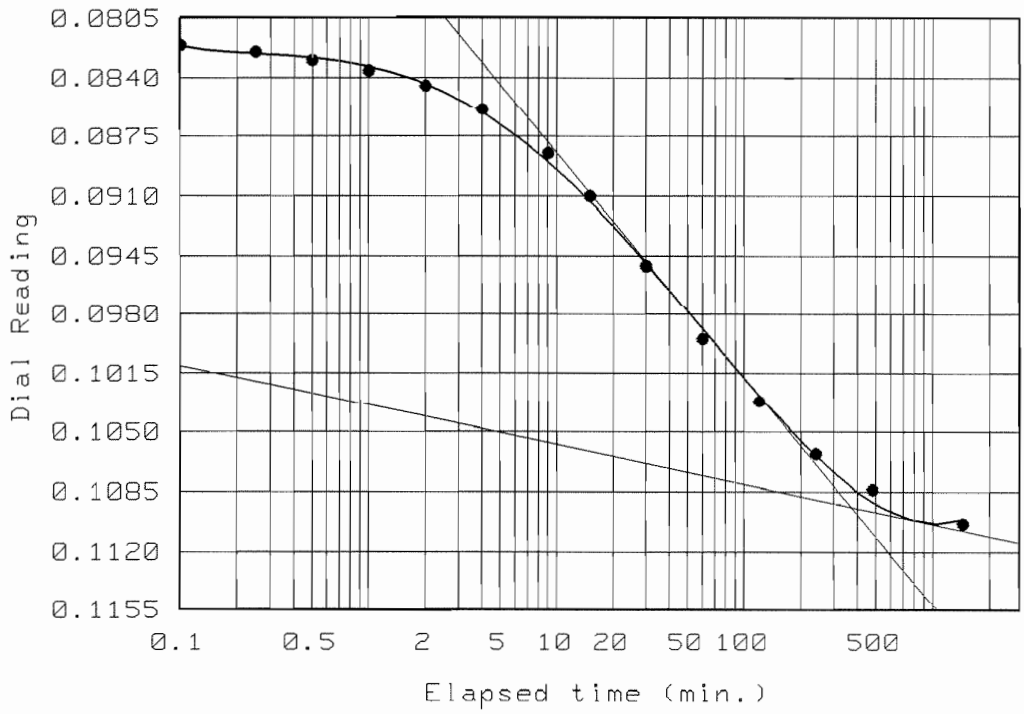
C_α= 0.000

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-18 @ 60'- 62'

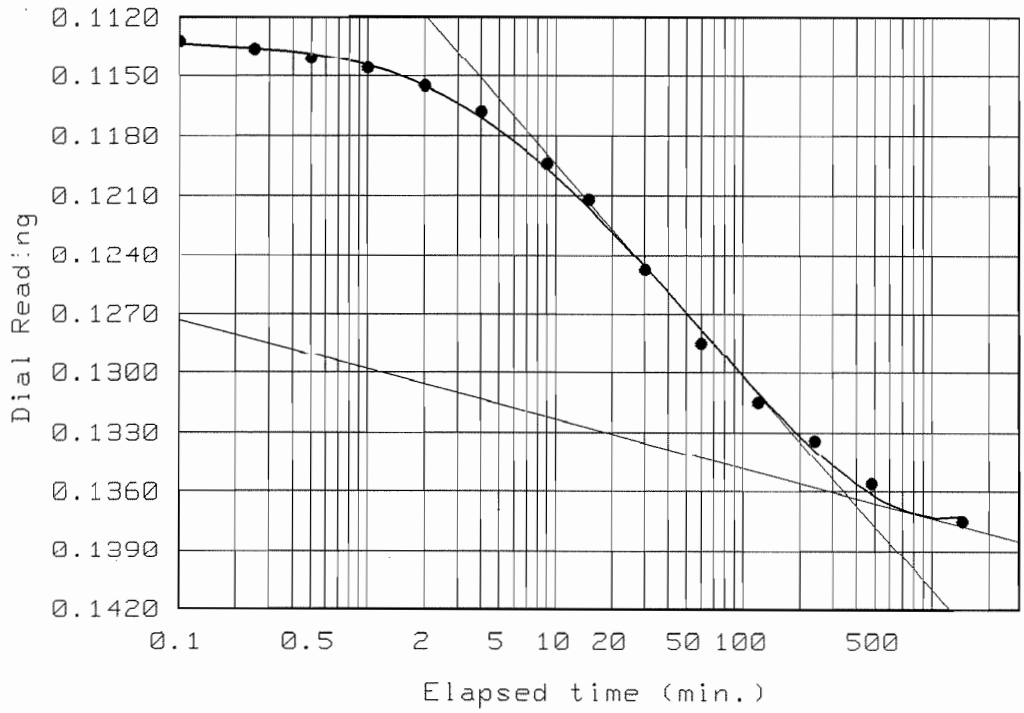
Date: 12/1/03



Load No.= 3
Load= 0.50 ksf
D_0 = 0.0815
D_{50} = 0.0955
D_{100}= 0.1094
T_{50}= 33.27 min.

C_v @ T_{50} = .001 in.^{2}/min.

C_α= 0.002



Load No.= 4
Load= 1.00 ksf
D_0 = 0.1129
D_{50} = 0.1246
D_{100}= 0.1362
T_{50}= 29.84 min.

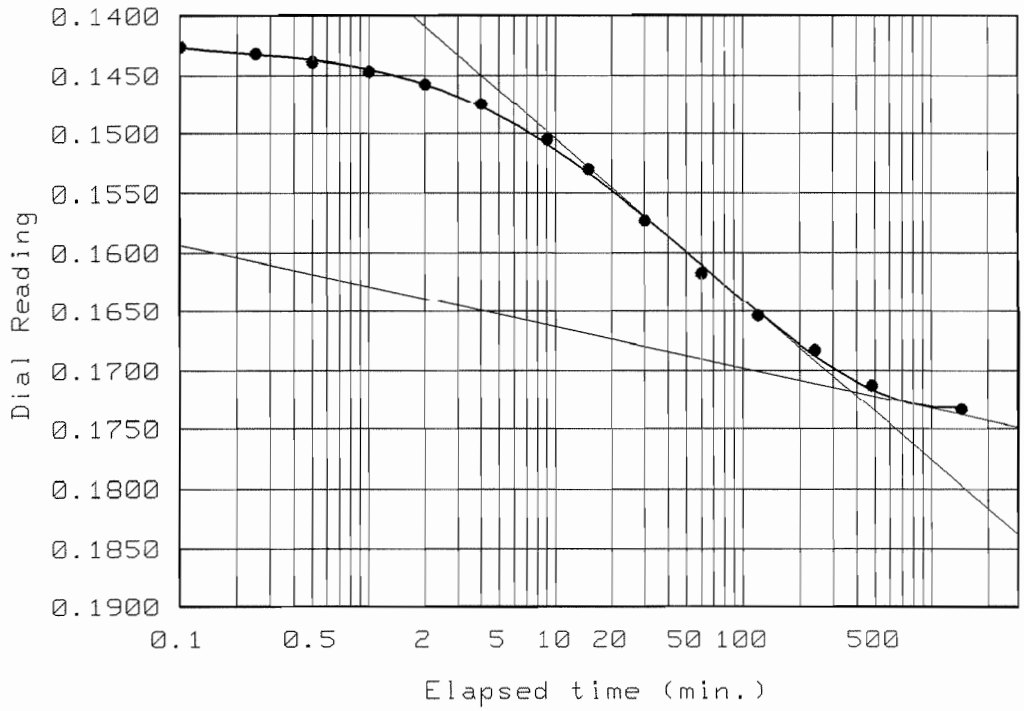
C_v @ T_{50} = .001 in.^{2}/min.

C_α= 0.003

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-18 @ 60'- 62'

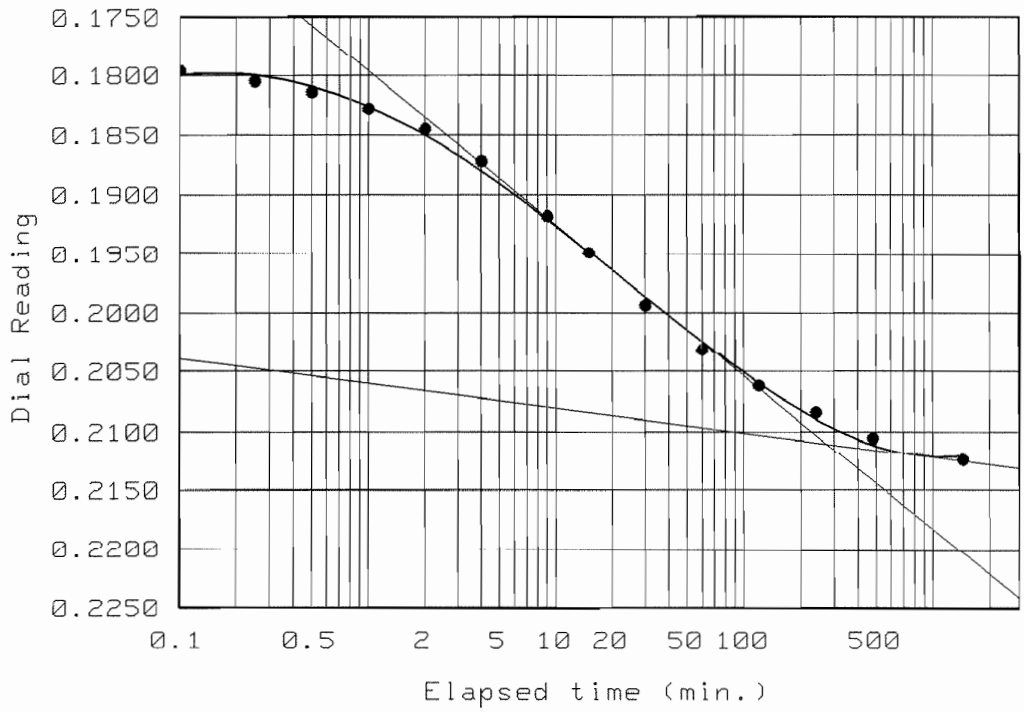
Date: 12/1/03



Load No.= 5
Load= 2.00 ksf
D_0 = 0.1418
D_{50} = 0.1568
D_{100}= 0.1718
T_{50}= 28.76 min.

C_v @ T_{50} = .001 in.^{2}/min.

C_α= 0.004



Load No.= 6
Load= 4.00 ksf
D_0 = 0.1794
D_{50} = 0.1952
D_{100}= 0.2110
T_{50}= 16.11 min.

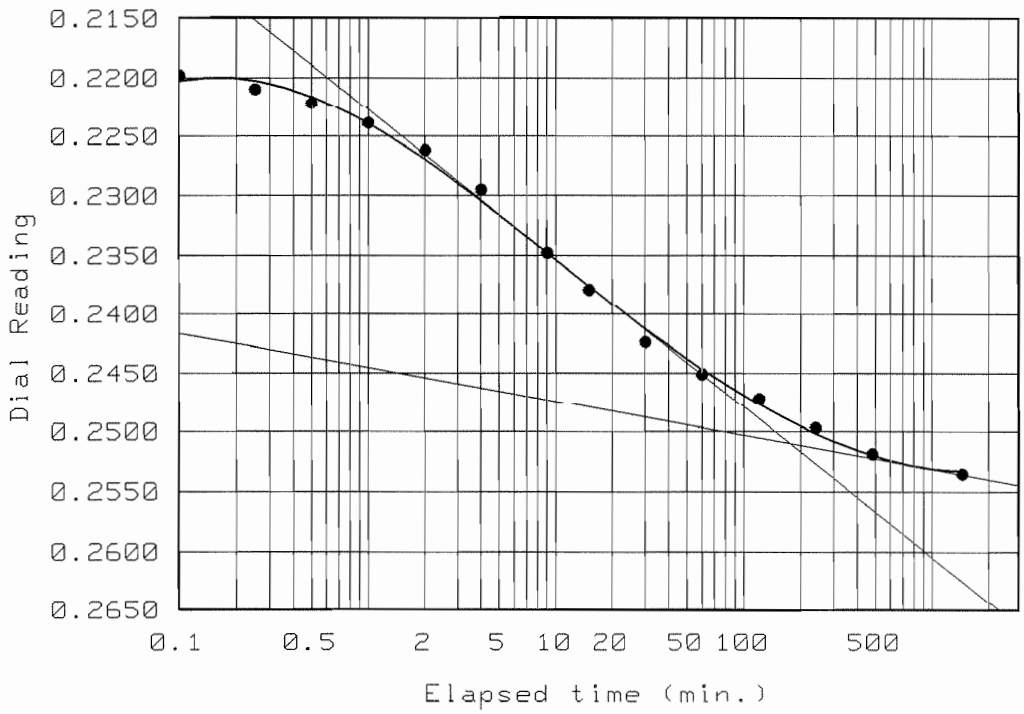
C_v @ T_{50} = .002 in.^{2}/min.

C_α= 0.002

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-18 @ 60'- 62'

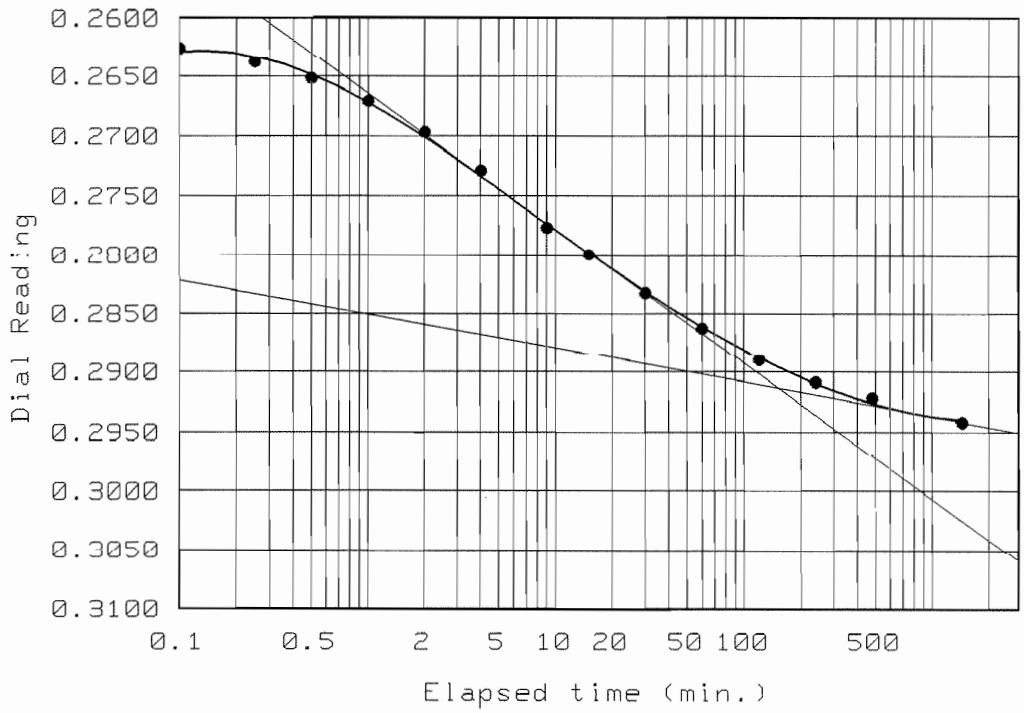
Date: 12/1/03



Load No.= 7
Load= 8.00 ksf
D_0 = 0.2195
D_{50} = 0.2352
D_{100}= 0.2510
T_{50}= 9.75 min.

C_v @ T_{50} =
.003 in.^{2}/min.

C_α= 0.004



Load No.= 8
Load= 16.00 ksf
D_0 = 0.2615
D_{50} = 0.2764
D_{100}= 0.2914
T_{50}= 7.43 min.

C_v @ T_{50} =
.004 in.^{2}/min.

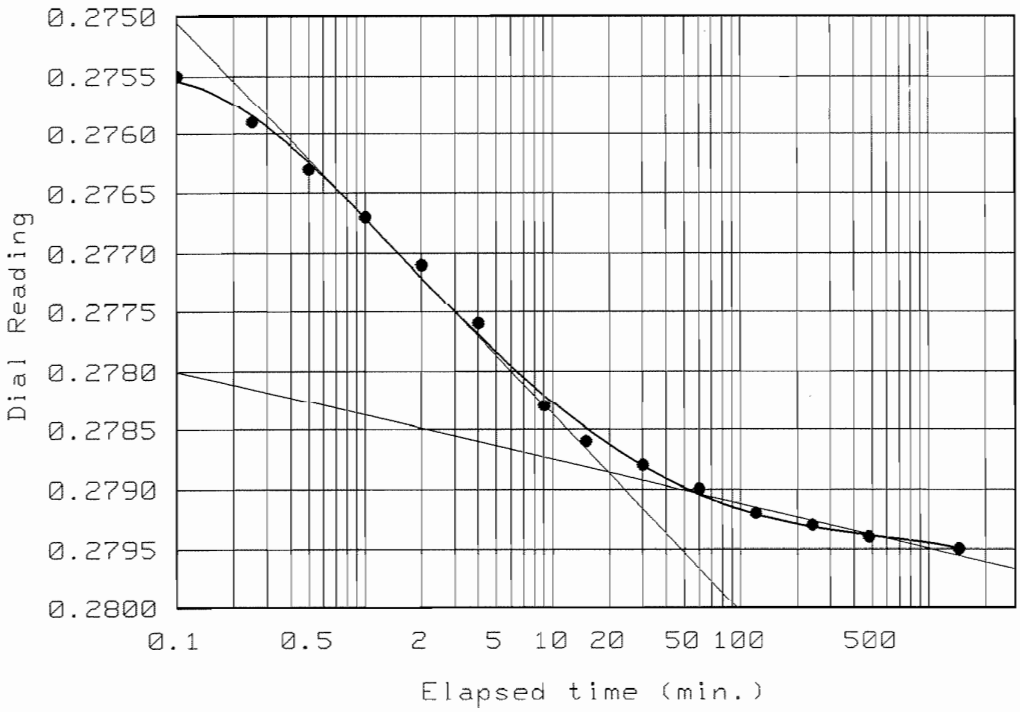
C_α= 0.004

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-18 @ 60'- 62'

Date: 12/1/03



Load No.= 11

Load= 4.00 ksf

D_0 = 0.2750

D_{50} = 0.2769

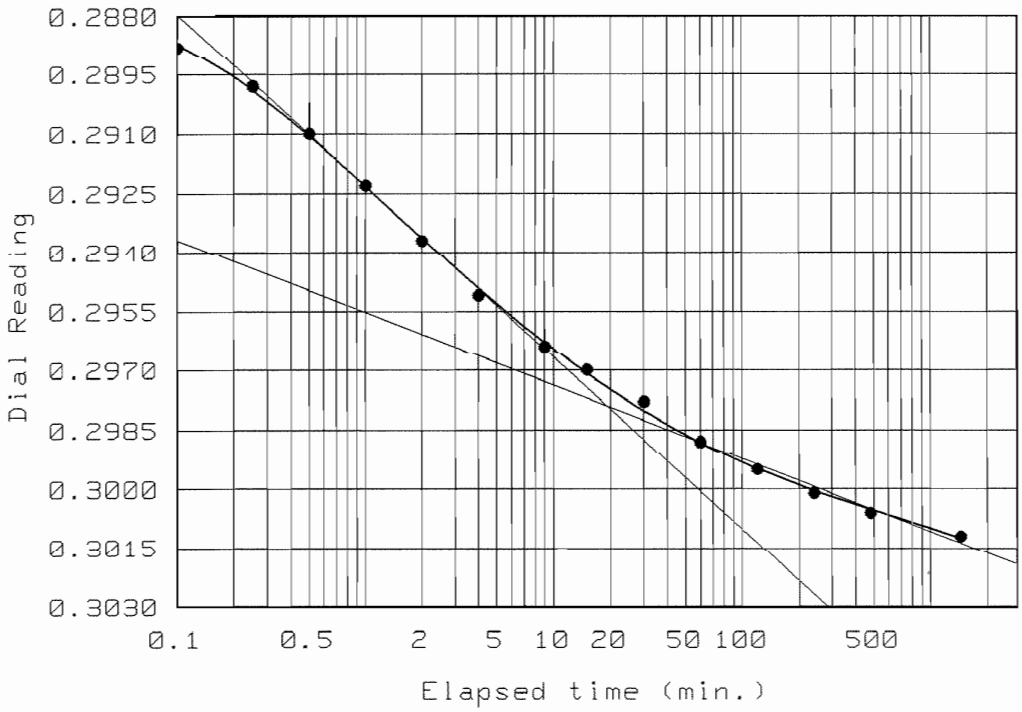
D_{100}= 0.2789

T_{50}= 1.33 min.

C_v @ T_{50} =

.021 in.^{2}/min.

C_α= 0.000



Load No.= 12

Load= 16.00 ksf

D_0 = 0.2868

D_{50} = 0.2923

D_{100}= 0.2979

T_{50}= 1.00 min.

C_v @ T_{50} =

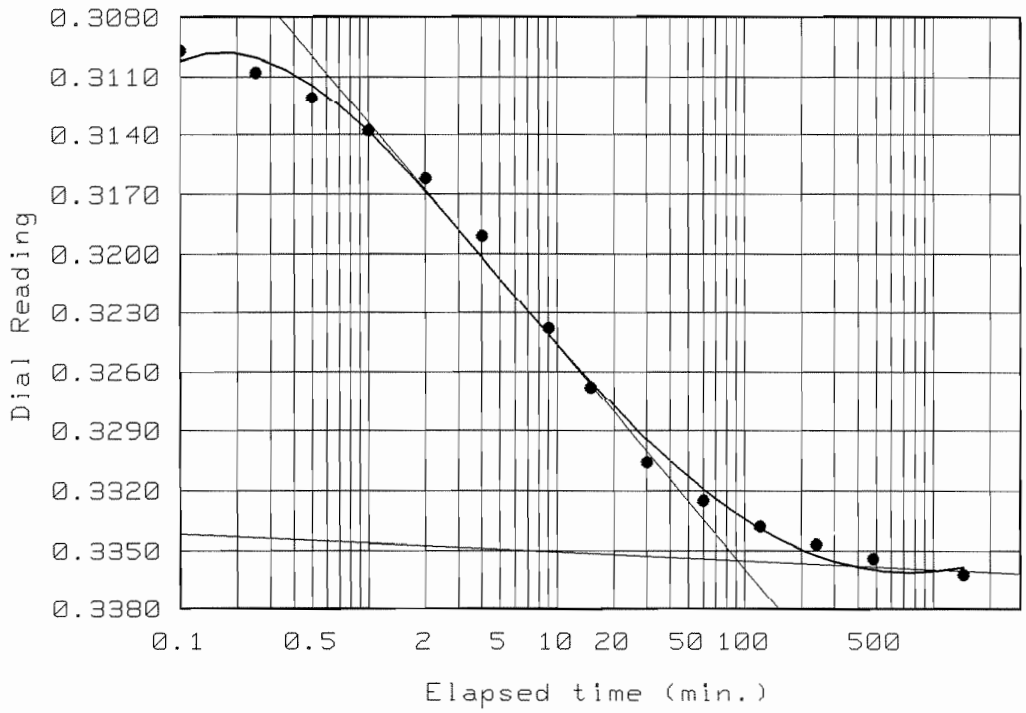
.027 in.^{2}/min.

C_α= 0.002

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 02
Project: Indian River Inlet Bridges
Location: Boring BII-18 @ 60'- 62'

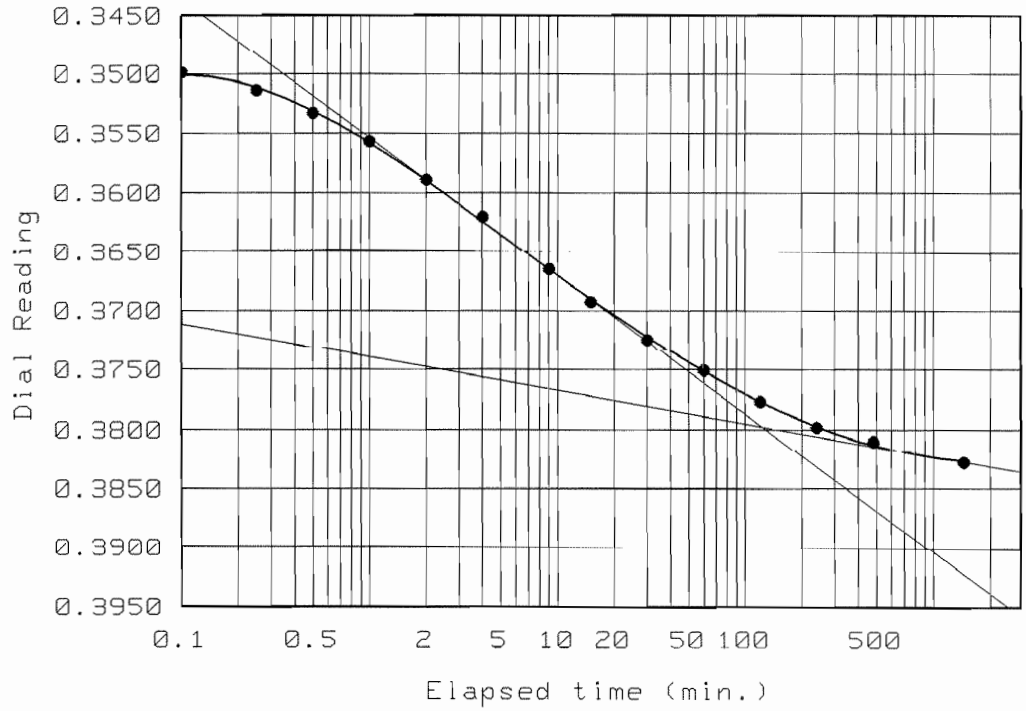
Date: 12/1/03



Load No.= 13
Load= 32.00 ksf
D_0 = 0.3096
D_{50} = 0.3225
D_{100}= 0.3355
T_{50}= 6.50 min.

C_v @ T_{50} =
.004 in.^{2}/min.

C_α= 0.001



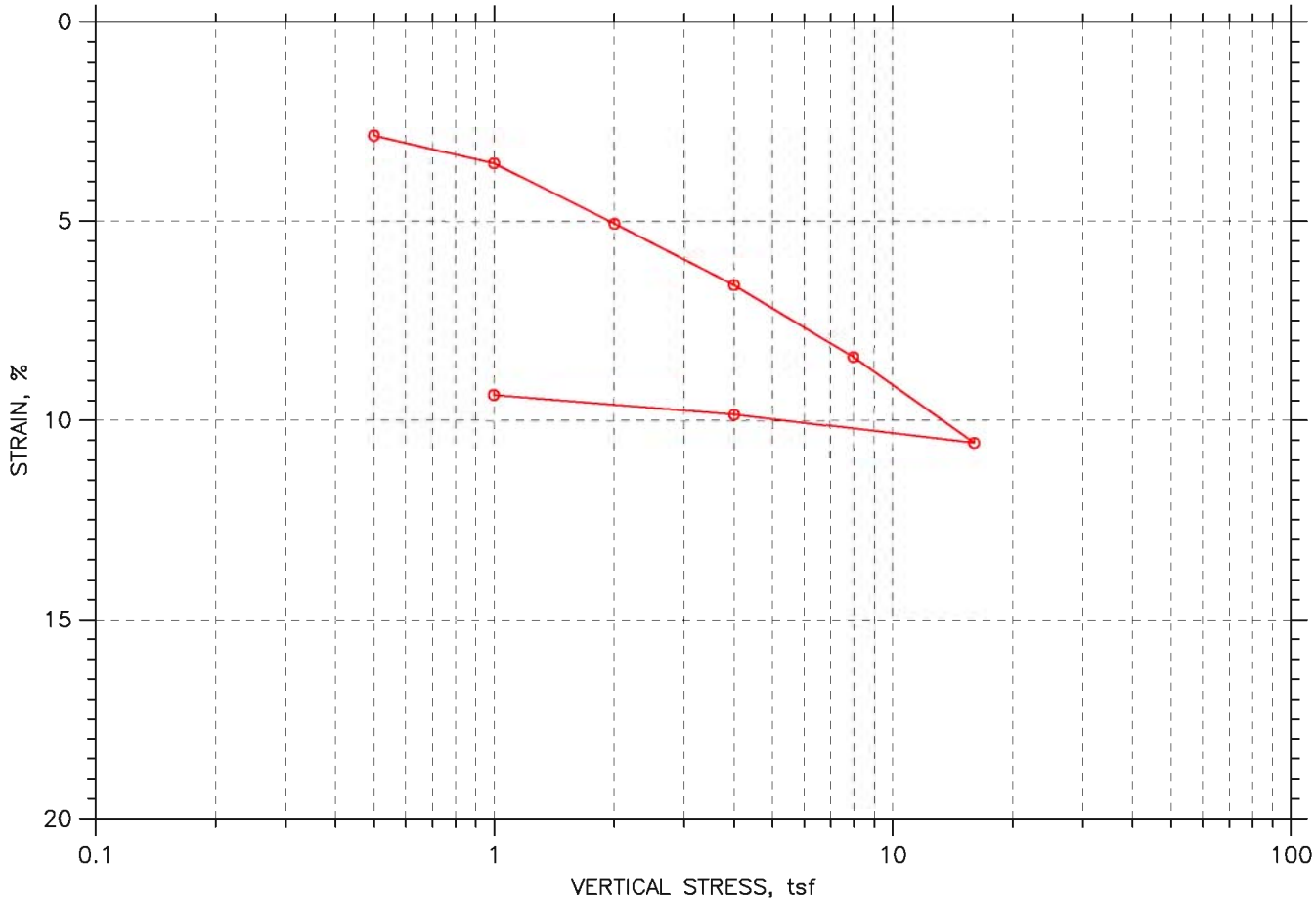
Load No.= 14
Load= 64.00 ksf
D_0 = 0.3477
D_{50} = 0.3637
D_{100}= 0.3798
T_{50}= 5.21 min.

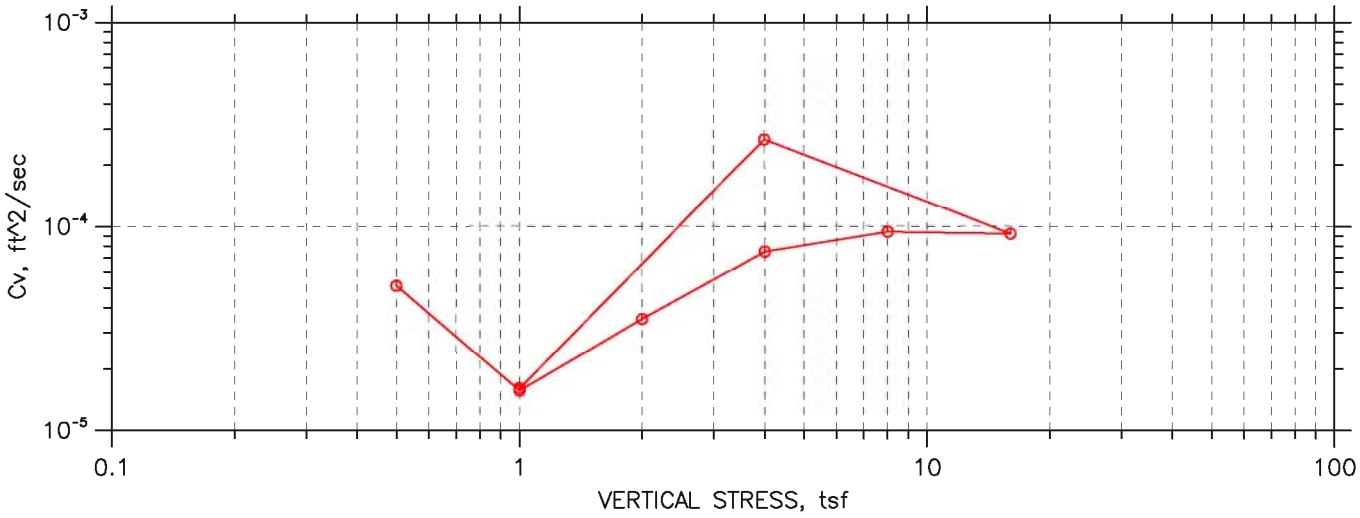
C_v @ T_{50} =
.004 in.^{2}/min.

C_α= 0.004

CONSOLIDATION TEST DATA

SUMMARY REPORT



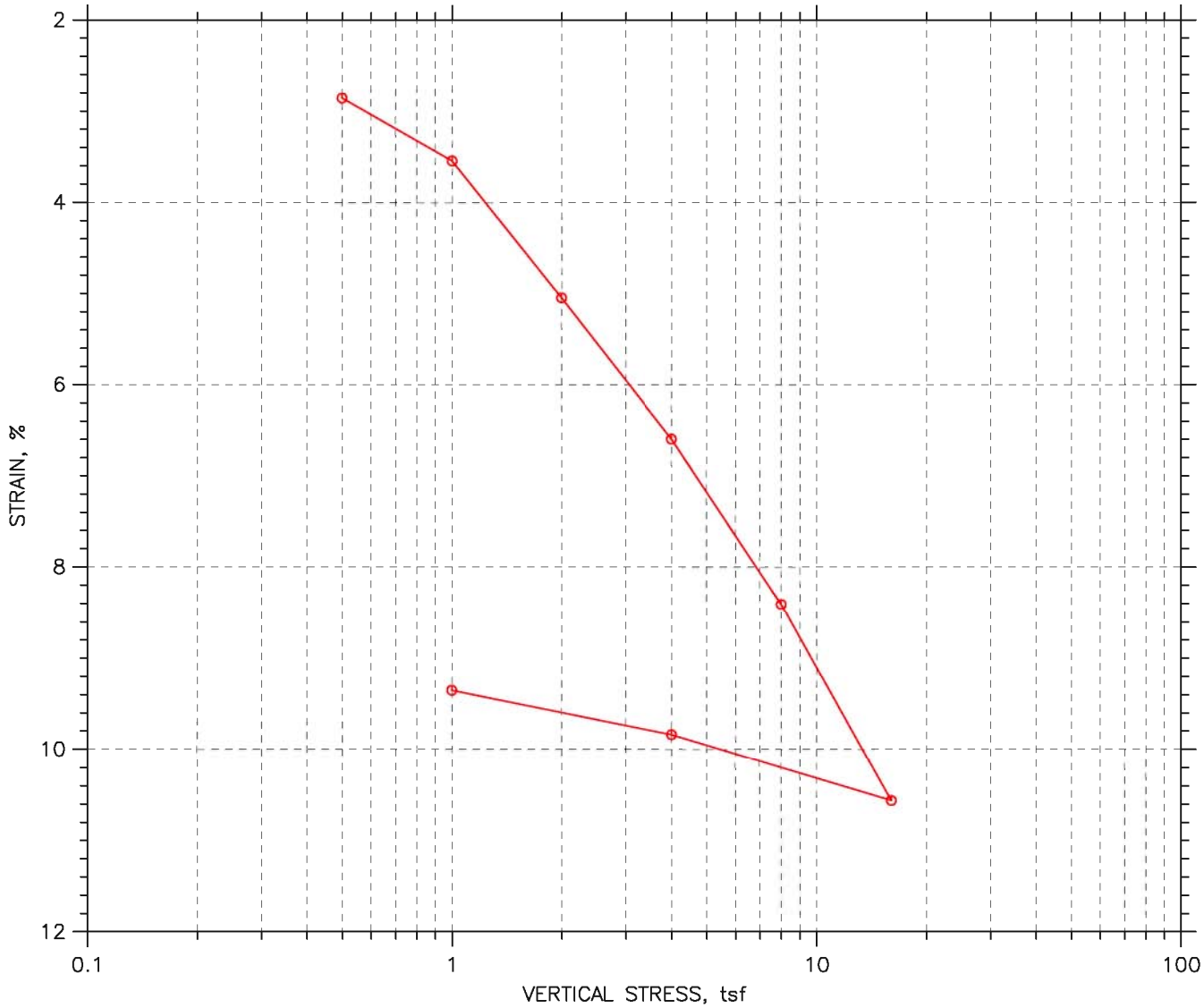


Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-18	Tested By: MLT	Checked By: JAC
Sample No.: 9698	Test Date: 11-21-03	Depth: 143.5-145
Test No.: UII-6	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, CLAYEY SAND (SC)		
Remarks: Material possibly disturbed. Refer to VGS shelby tube log BII-18 and digital photographs BII-18 a & b.		

Tue, 02-DEC-2003 11:00:24

CONSOLIDATION TEST DATA

SUMMARY REPORT



					Before Test	After Test
Overburden Pressure, tsf:				Water Content, %	19.94	18.30
Preconsolidation Pressure, tsf:				Dry Unit Weight, pcf	104.87	115.69
Compression Index:				Saturation, %	89.75	109.93
Diameter: 2.5 in		Height: 1 in		Void Ratio	0.60	0.45
LL: 27	PL: 15	PI: 12	GS: 2.68			

Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-18	Tested By: MLT	Checked By: JAC
Sample No.: 9698	Test Date: 11-21-03	Depth: 143.5-145
Test No.: UII-6	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, CLAYEY SAND (SC)		
Remarks: Material possibly disturbed. Refer to VGS shelby tube log BII-18 and digital photographs BII-18 a & b.		

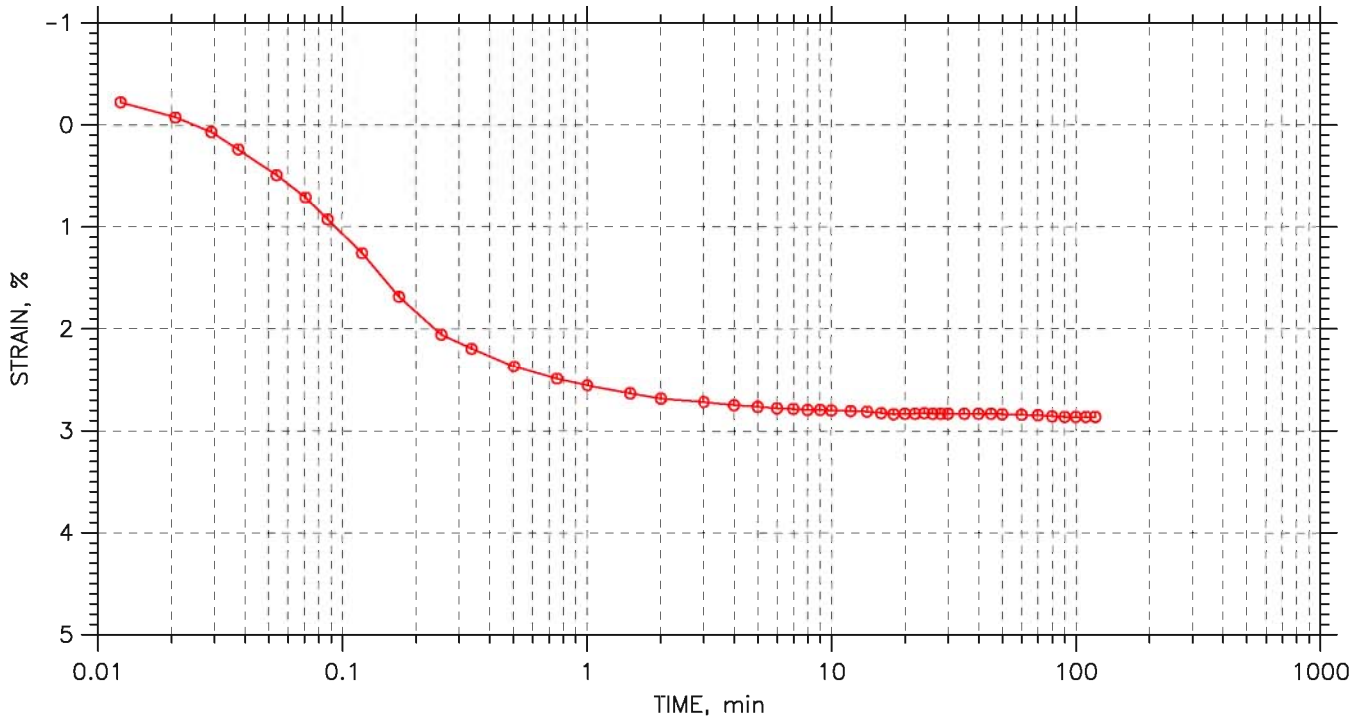
Tue, 02-DEC-2003 11:00:24

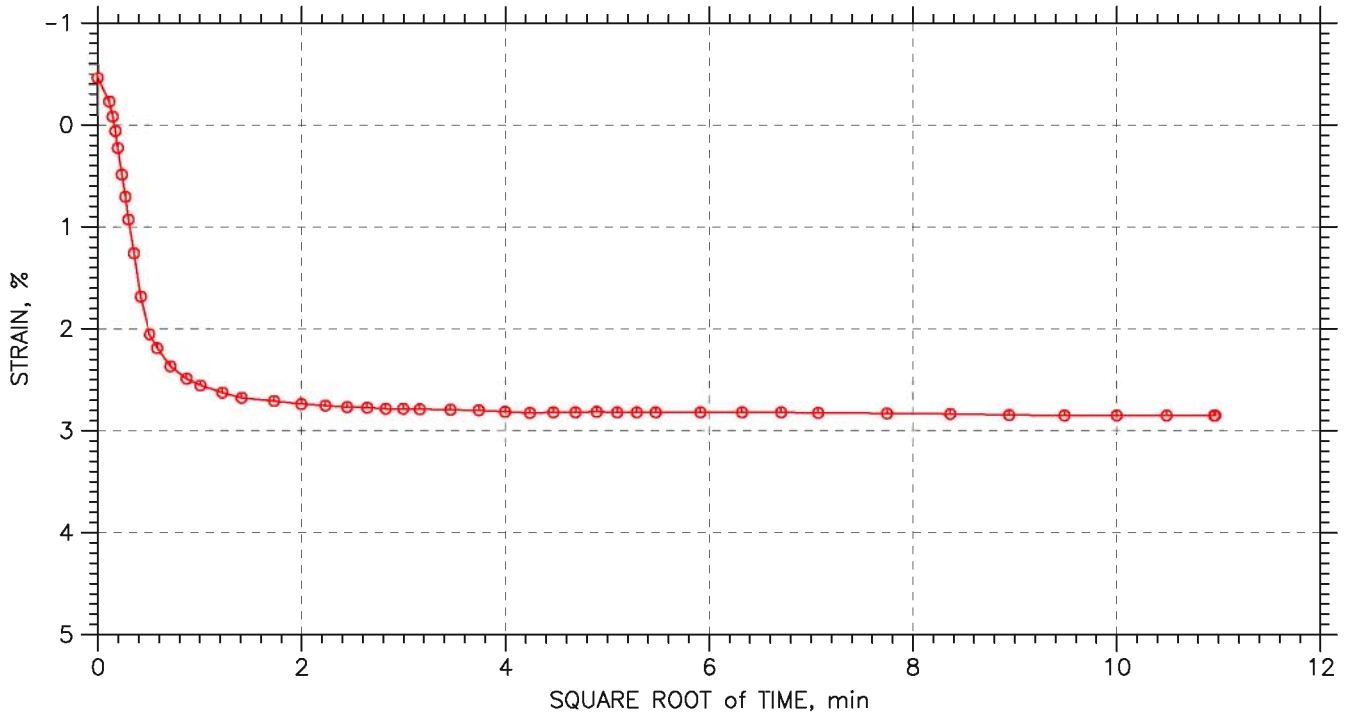
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 8

Stress: 0.5 tsf





Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-18	Tested By: MLT	Checked By: JAC
Sample No.: 9698	Test Date: 11-21-03	Depth: 143.5-145
Test No.: UII-6	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, CLAYEY SAND (SC)		
Remarks: Material possibly disturbed. Refer to VGS shelby tube log BII-18 and digital photographs BII-18 a & b.		

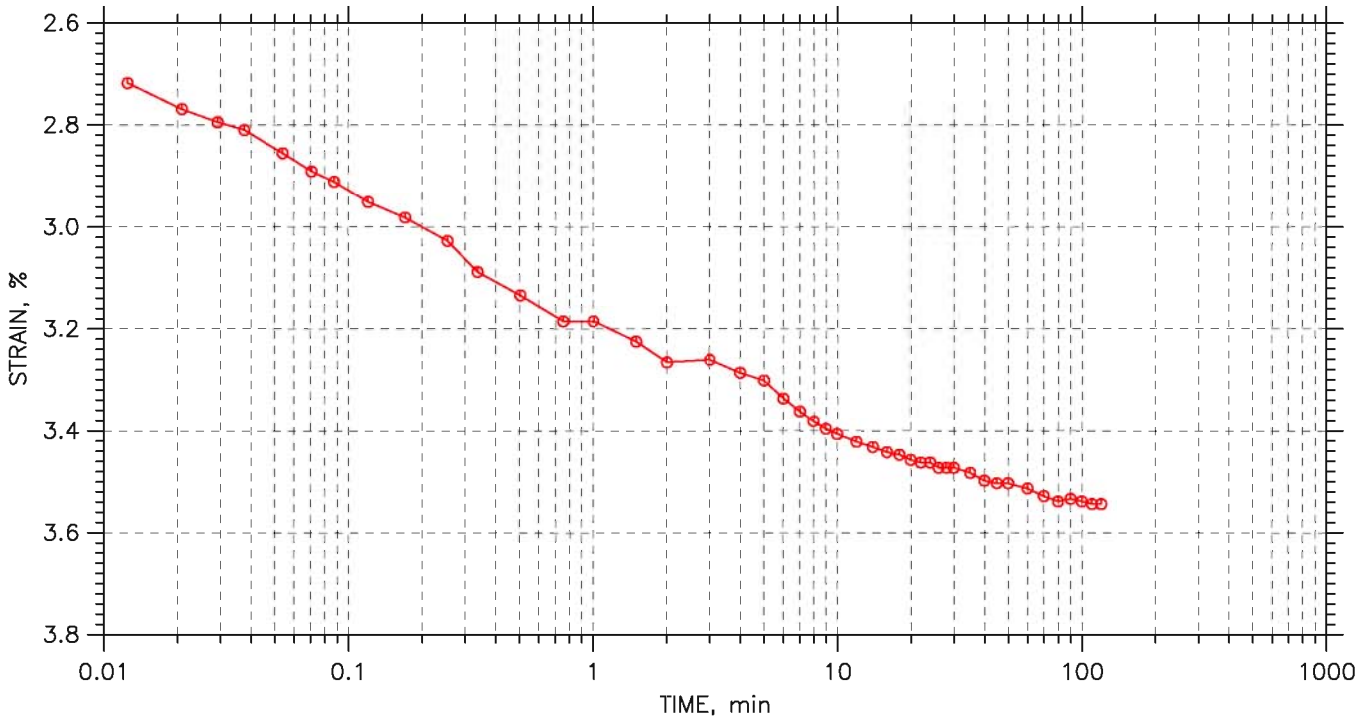
Tue, 02-DEC-2003 11:00:24

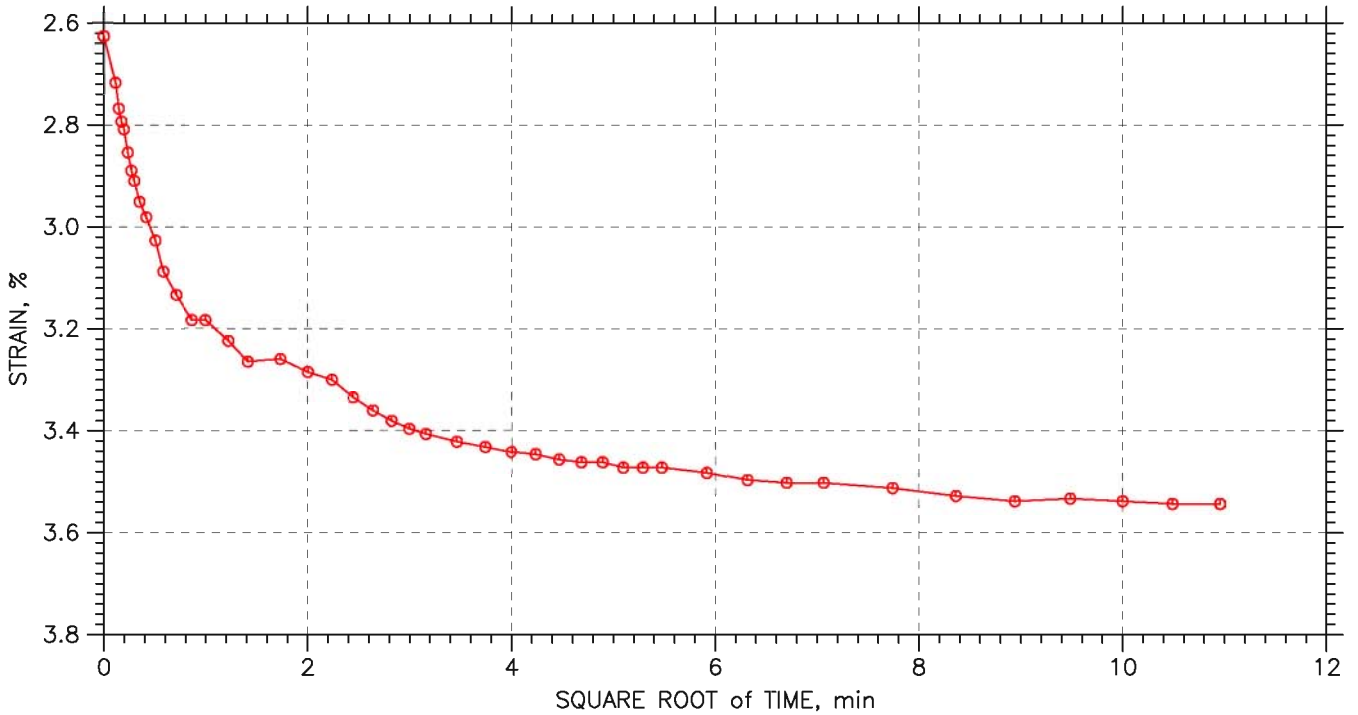
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 8

Stress: 1. tsf





Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-18	Tested By: MLT	Checked By: JAC
Sample No.: 9698	Test Date: 11-21-03	Depth: 143.5-145
Test No.: UII-6	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, CLAYEY SAND (SC)		
Remarks: Material possibly disturbed. Refer to VGS shelby tube log BII-18 and digital photographs BII-18 a & b.		

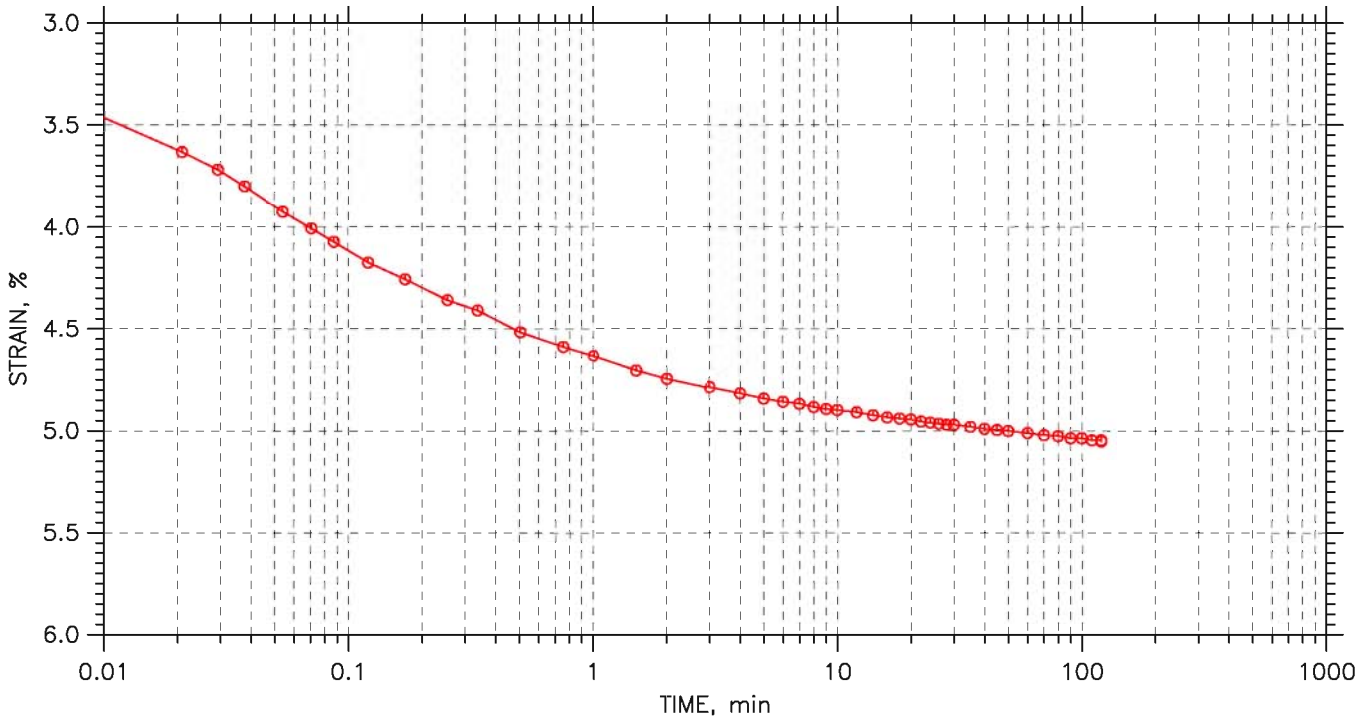
Tue, 02-DEC-2003 11:00:24

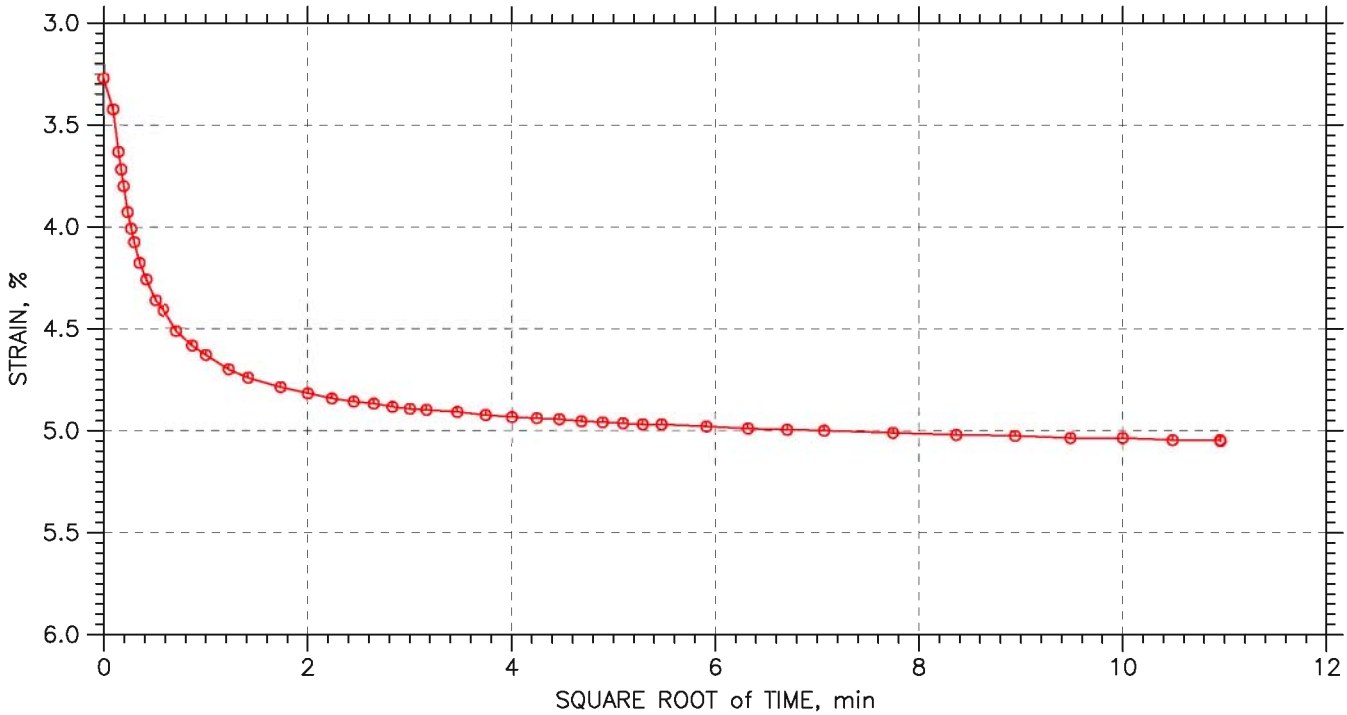
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 8

Stress: 2. tsf





Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-18	Tested By: MLT	Checked By: JAC
Sample No.: 9698	Test Date: 11-21-03	Depth: 143.5-145
Test No.: UII-6	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, CLAYEY SAND (SC)		
Remarks: Material possibly disturbed. Refer to VGS shelby tube log BII-18 and digital photographs BII-18 a & b.		

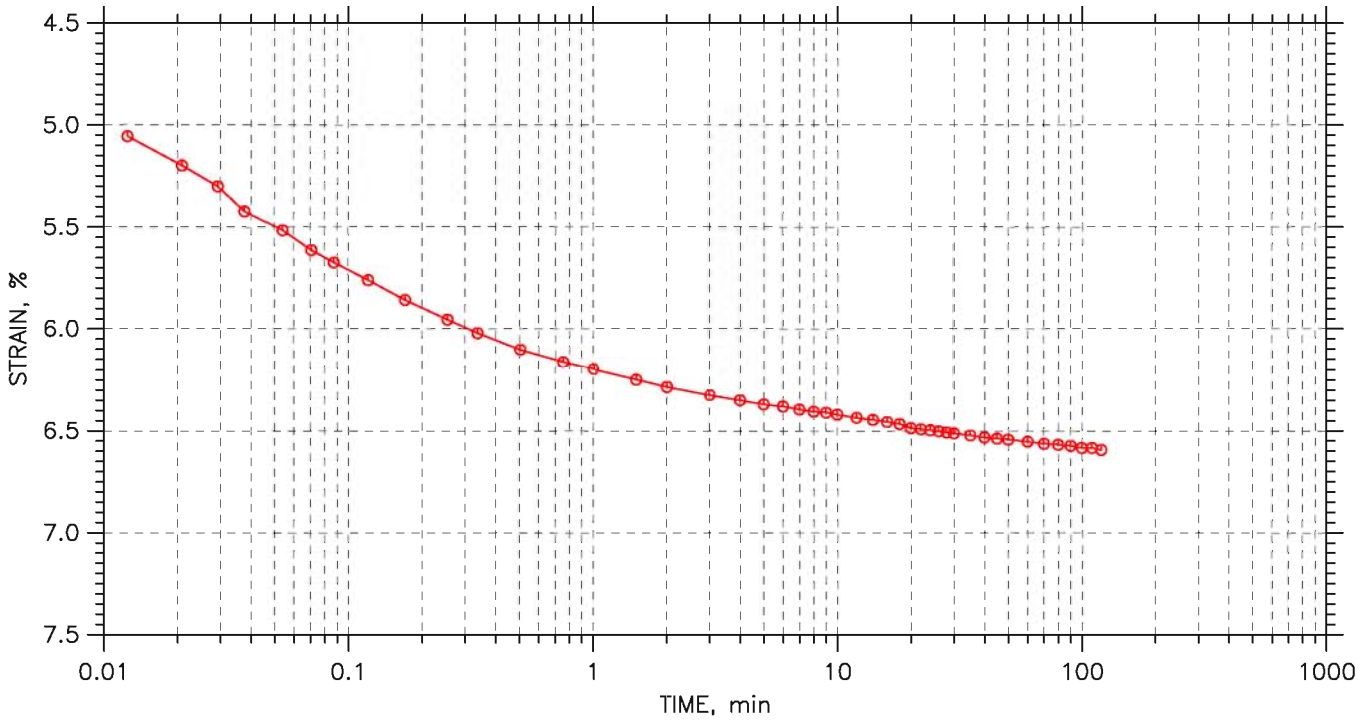
Tue, 02-DEC-2003 11:00:25

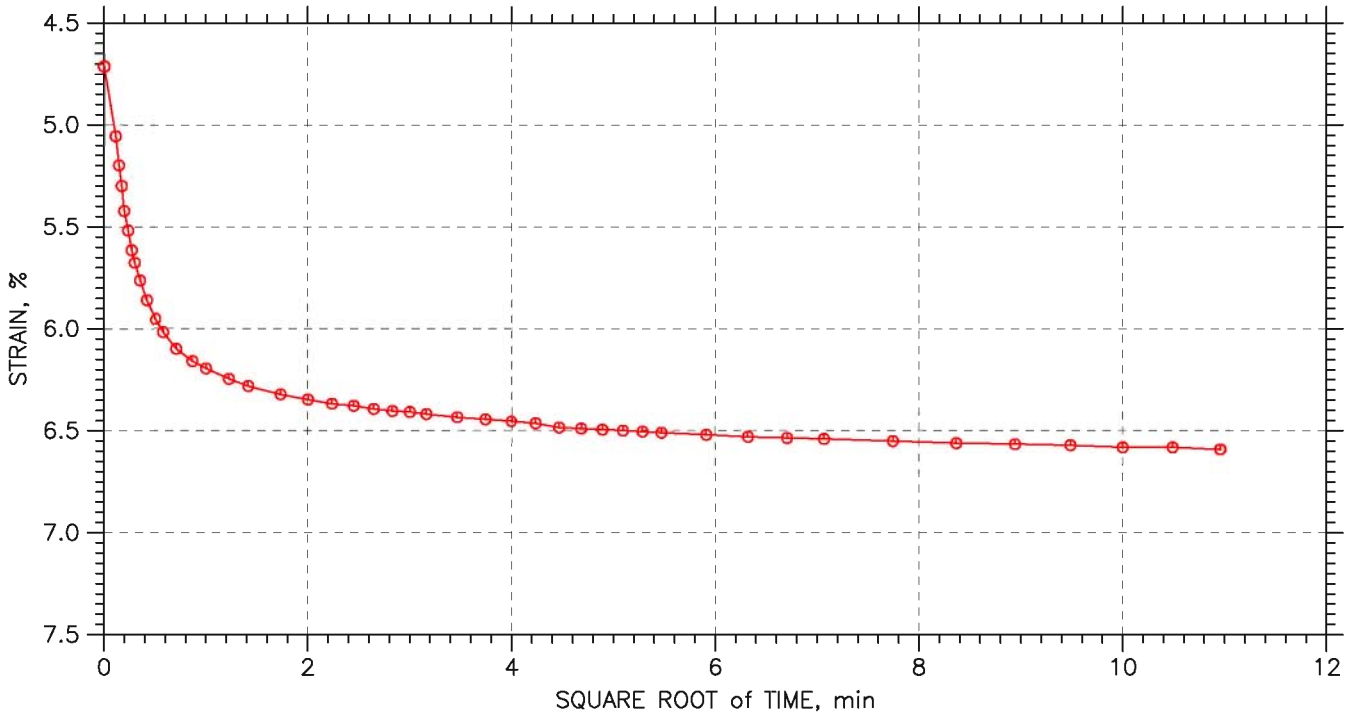
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 8

Stress: 4. tsf





Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-18	Tested By: MLT	Checked By: JAC
Sample No.: 9698	Test Date: 11-21-03	Depth: 143.5-145
Test No.: UII-6	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, CLAYEY SAND (SC)		
Remarks: Material possibly disturbed. Refer to VGS shelby tube log BII-18 and digital photographs BII-18 a & b.		

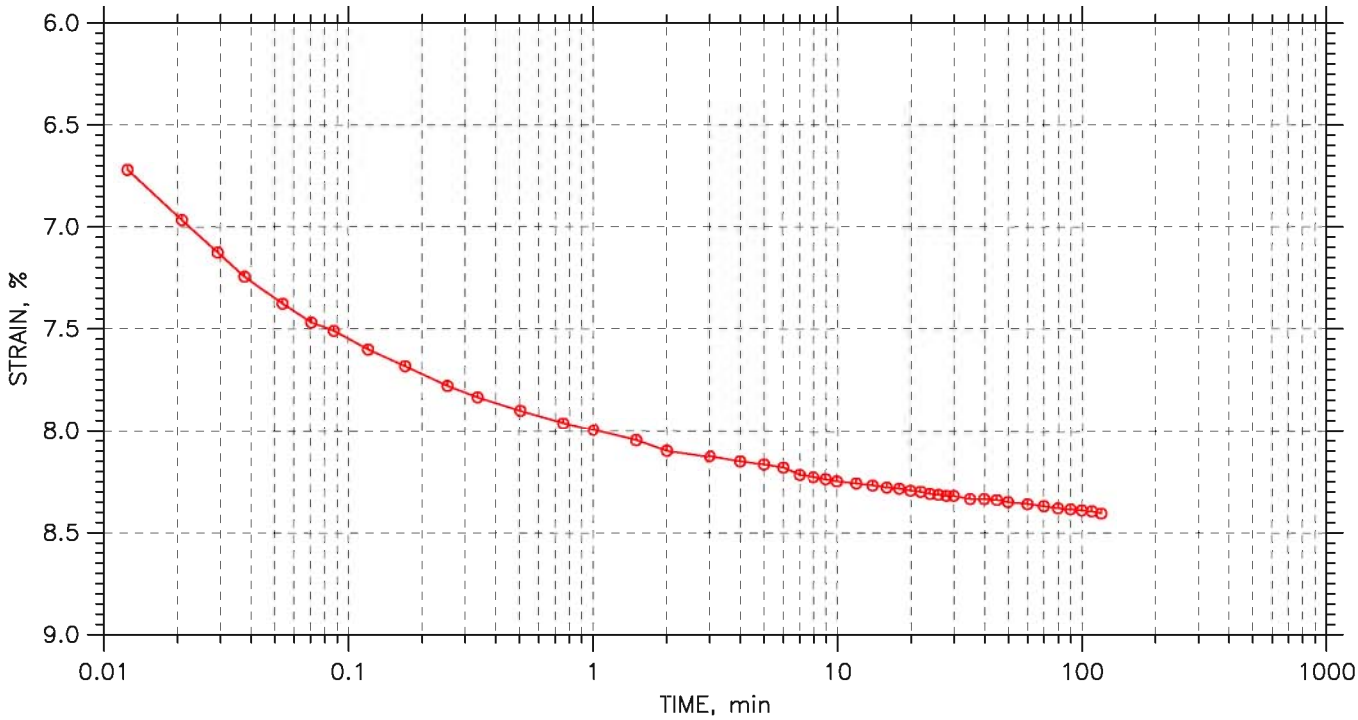
Tue, 02-DEC-2003 11:00:25

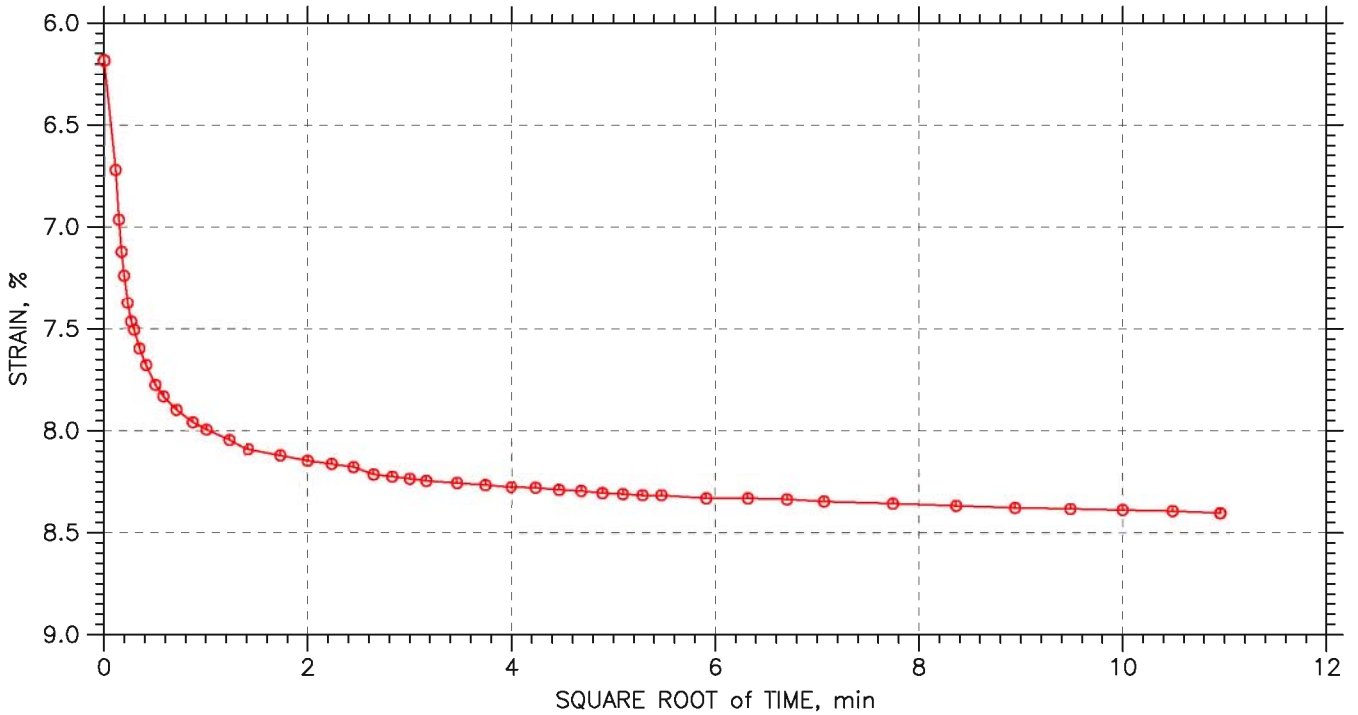
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 8

Stress: 8. tsf





Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-18	Tested By: MLT	Checked By: JAC
Sample No.: 9698	Test Date: 11-21-03	Depth: 143.5-145
Test No.: UII-6	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, CLAYEY SAND (SC)		
Remarks: Material possibly disturbed. Refer to VGS shelby tube log BII-18 and digital photographs BII-18 a & b.		

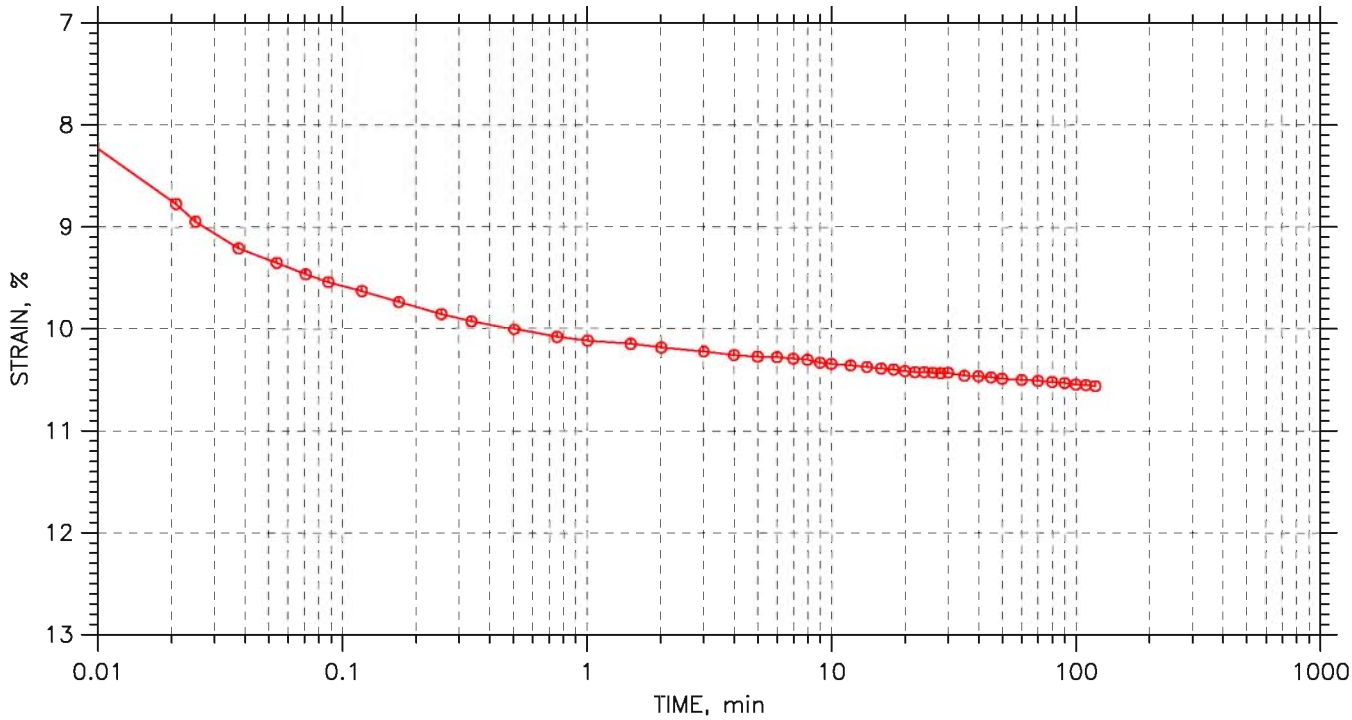
Tue, 02-DEC-2003 11:00:25

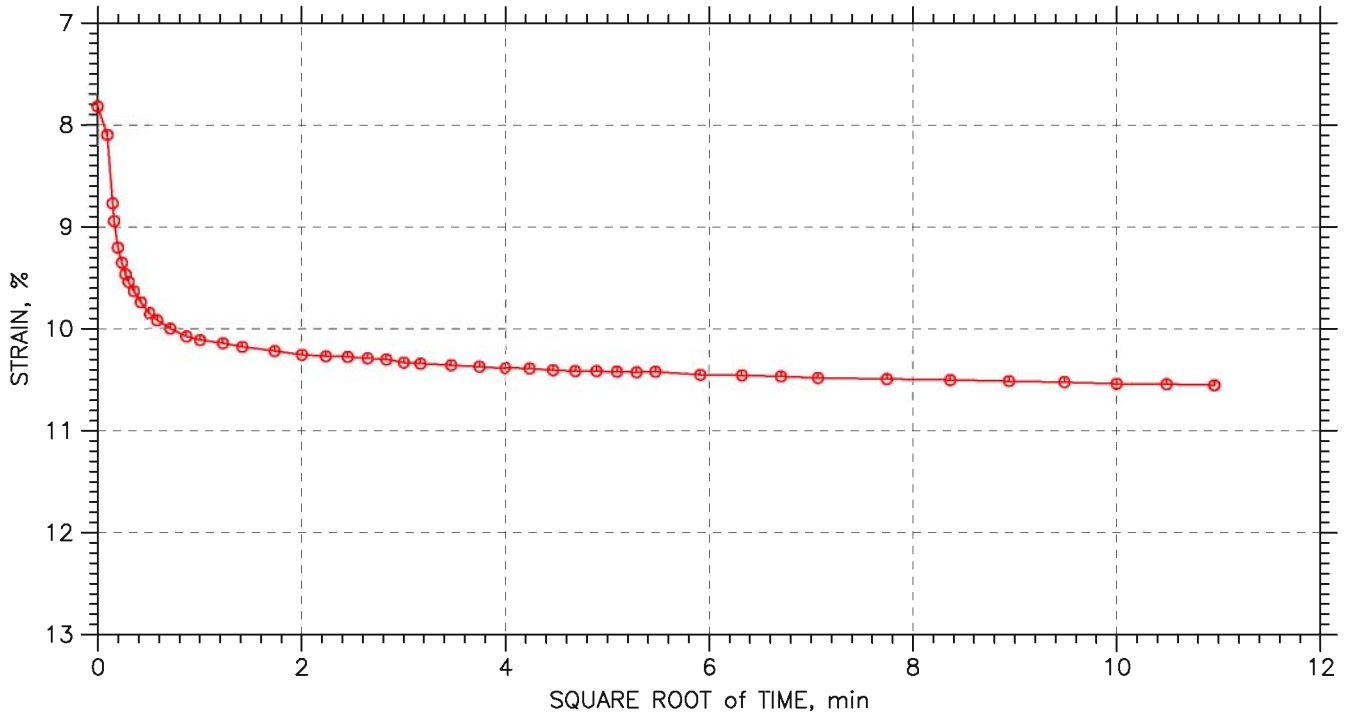
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 8

Stress: 16. tsf





Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-18	Tested By: MLT	Checked By: JAC
Sample No.: 9698	Test Date: 11-21-03	Depth: 143.5-145
Test No.: UII-6	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, CLAYEY SAND (SC)		
Remarks: Material possibly disturbed. Refer to VGS shelby tube log BII-18 and digital photographs BII-18 a & b.		

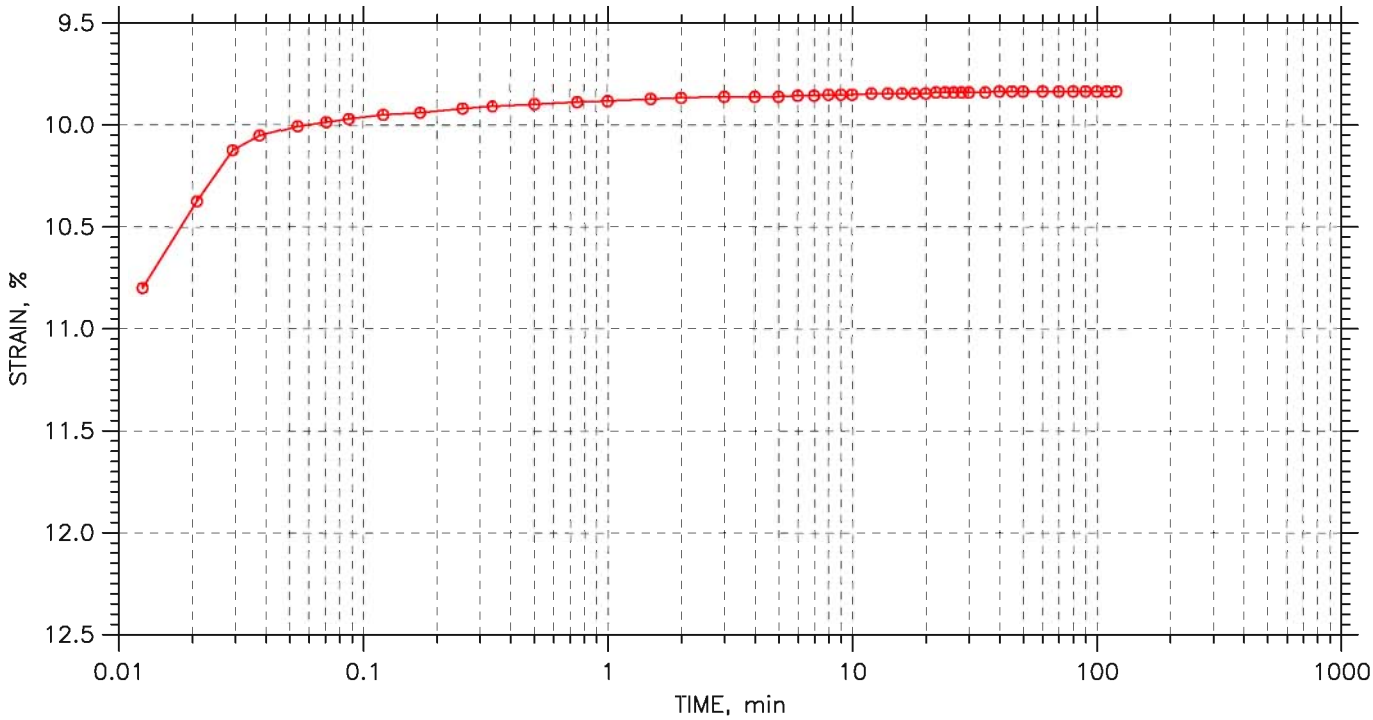
Tue, 02-DEC-2003 11:00:25

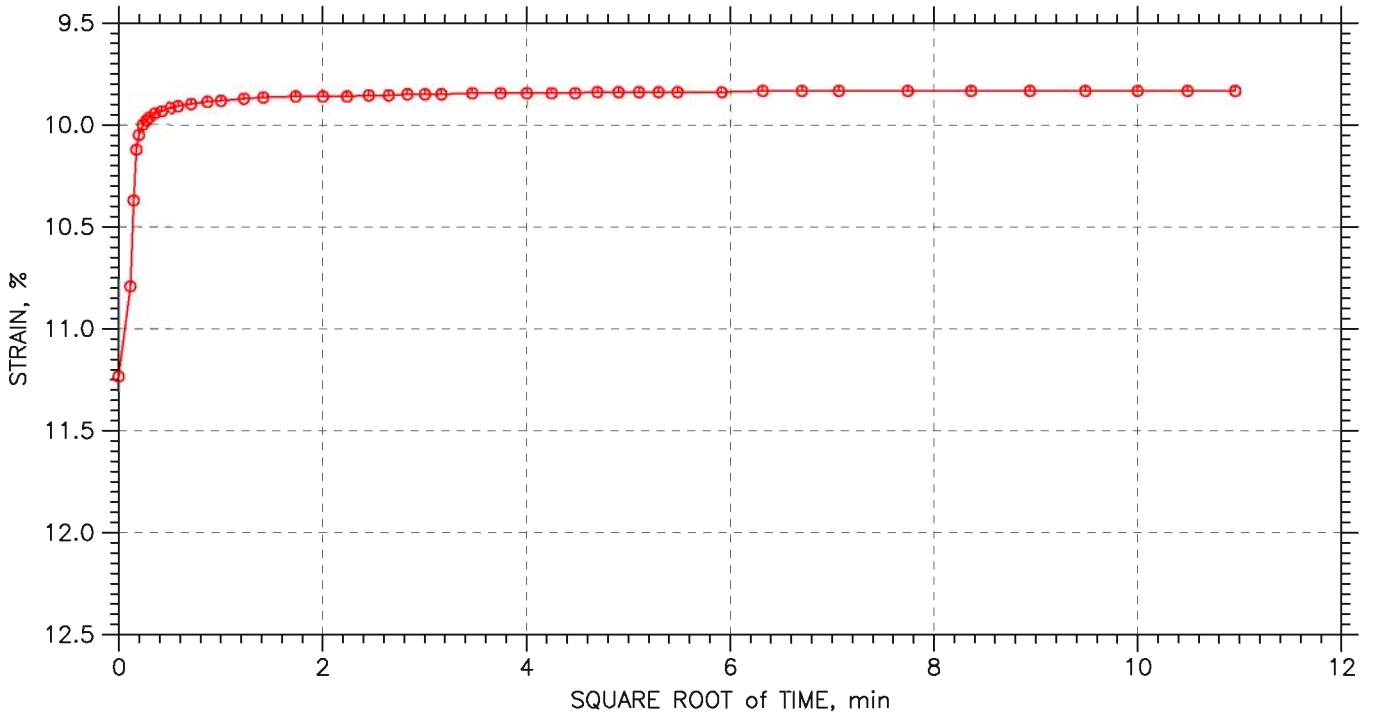
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 8

Stress: 4. tsf





Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-18	Tested By: MLT	Checked By: JAC
Sample No.: 9698	Test Date: 11-21-03	Depth: 143.5-145
Test No.: UII-6	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, CLAYEY SAND (SC)		
Remarks: Material possibly disturbed. Refer to VGS shelby tube log BII-18 and digital photographs BII-18 a & b.		

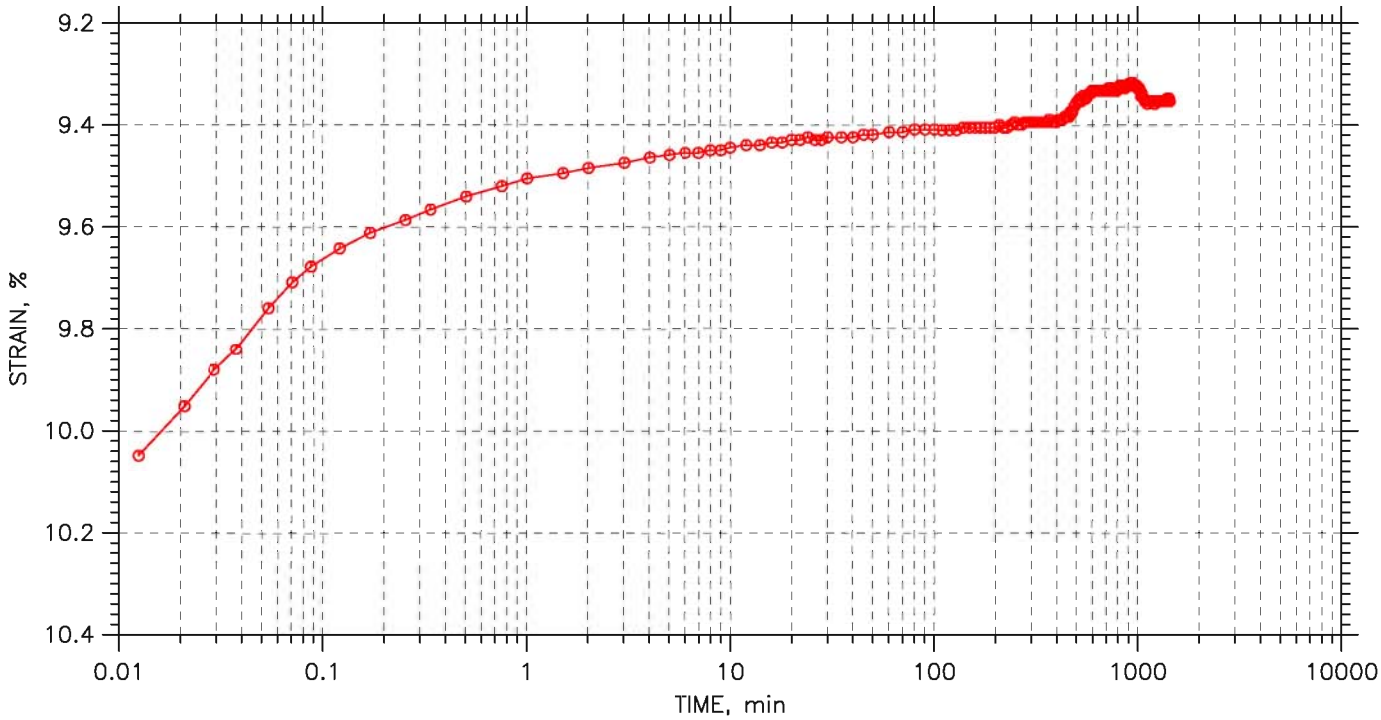
Tue, 02-DEC-2003 11:00:25

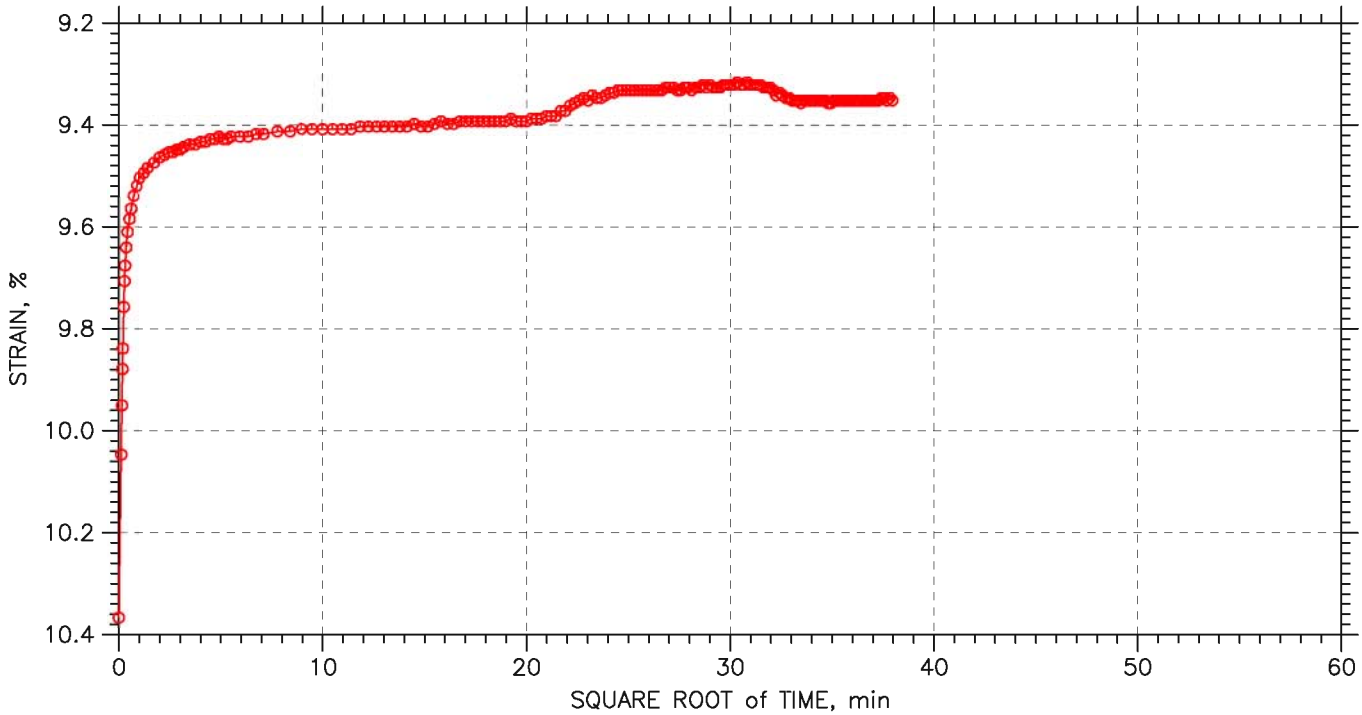
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 8

Stress: 1. tsf

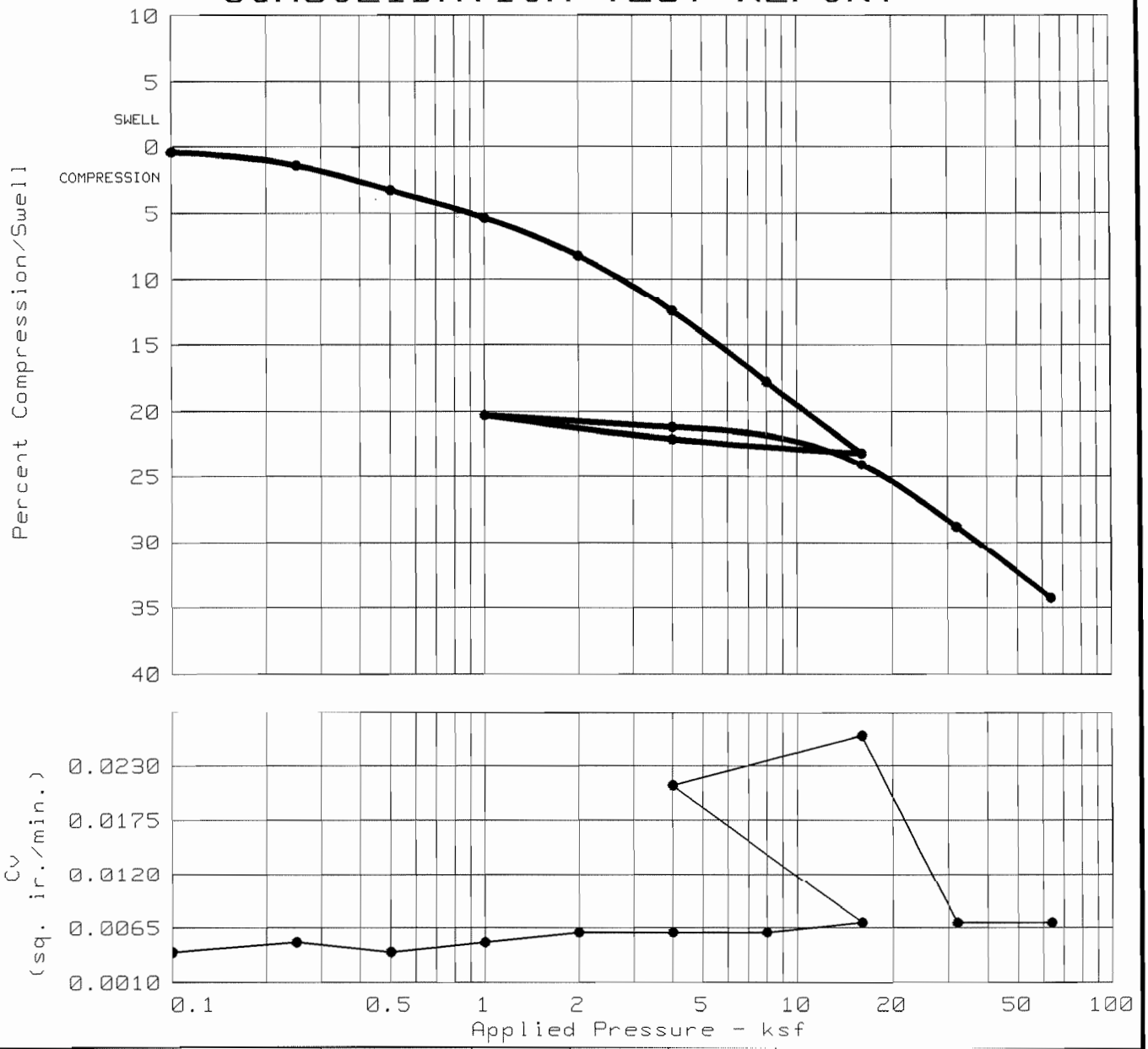




Project: Indian River Inlet Bridge	Location: Sussex County, Delaware	Project No.: LB1952
Boring No.: BII-18	Tested By: MLT	Checked By: JAC
Sample No.: 9698	Test Date: 11-21-03	Depth: 143.5-145
Test No.: UII-6	Sample Type: 3 inch Tube	Elevation: Not given
Description: Gray, CLAYEY SAND (SC)		
Remarks: Material possibly disturbed. Refer to VGS shelby tube log BII-18 and digital photographs BII-18 a & b.		

Tue, 02-DEC-2003 11:00:25

CONSOLIDATION TEST REPORT



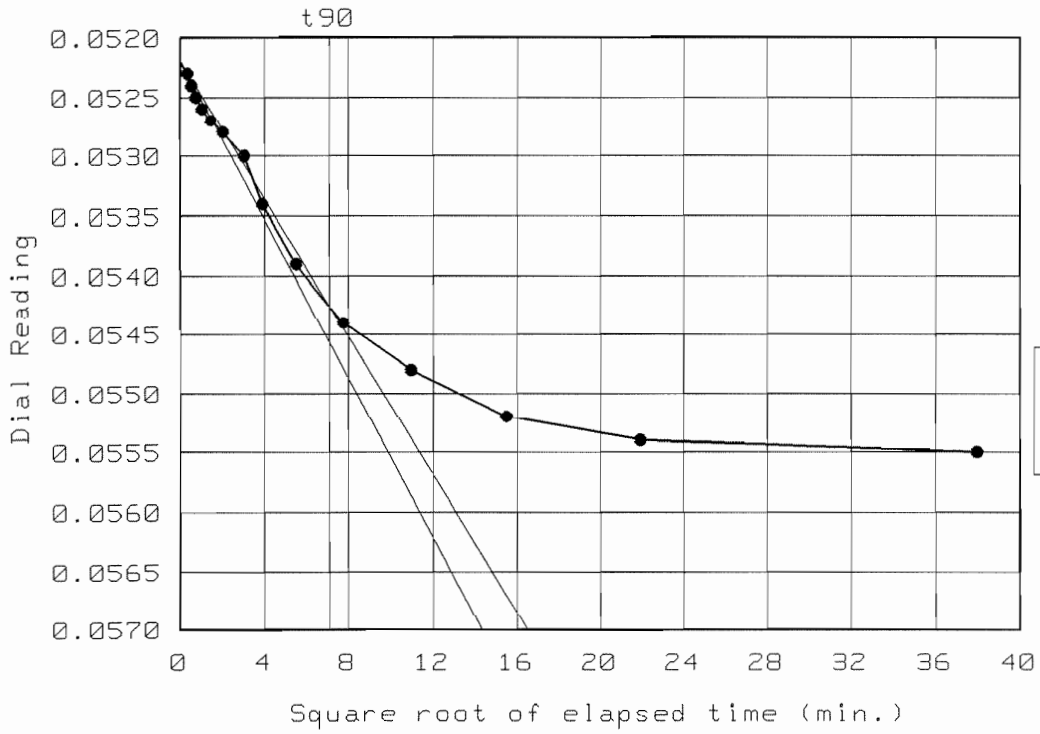
Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
89.1 %	51.5 %	67.1	59	24	2.700	1.5615

TEST RESULTS	MATERIAL DESCRIPTION
	12/4/03
Project No.: 3530-03-1245 Phase 01 Project: Indian River Inlet Bridges Location: Boring BI- 7 @ 41.5' - 43.3' Date: 11/19/03	Remarks:
CONSOLIDATION TEST REPORT LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.	Fig. No. 1 1

Dial Reading vs. Time

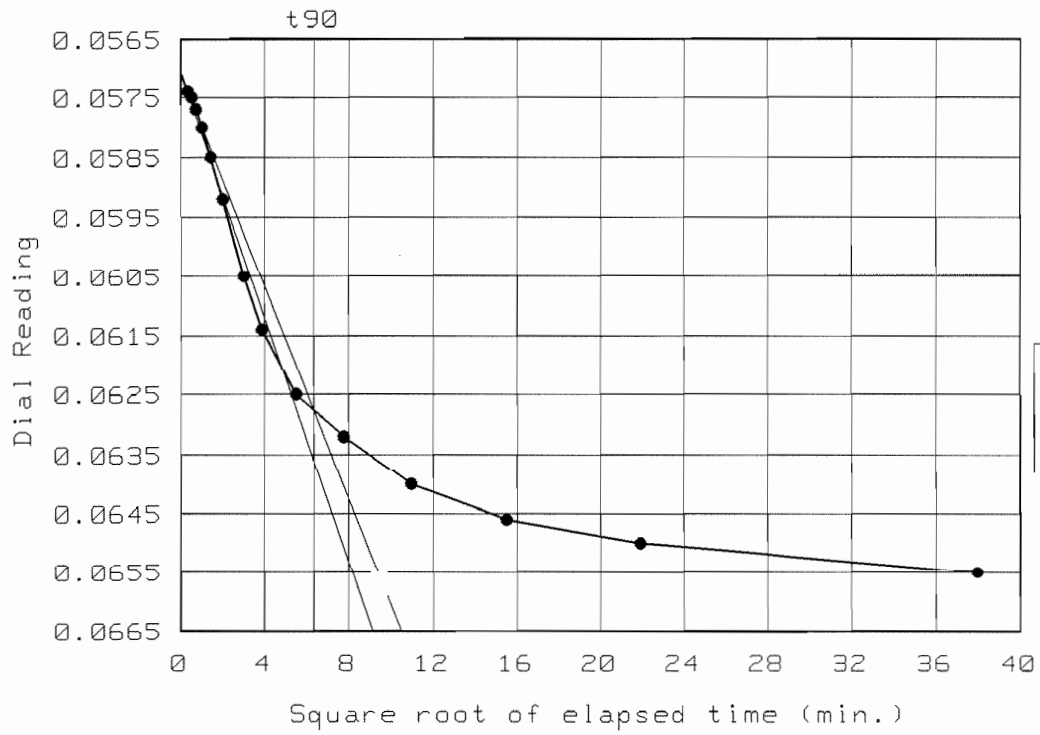
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI- 7 @ 41.5' - 43.3'

Date: 11/19/03



Load No. = 1
Load= 0.10 ksf
D_0 = 0.0522
D_{90} = 0.0543
D_{100} = 0.0545
T_{90} = 50.10 min.

C_v @ T_{90} =
.004 in.^{2}/min.



Load No. = 2
Load= 0.25 ksf
D_0 = 0.0571
D_{90} = 0.0628
D_{100} = 0.0634
T_{90} = 40.29 min.

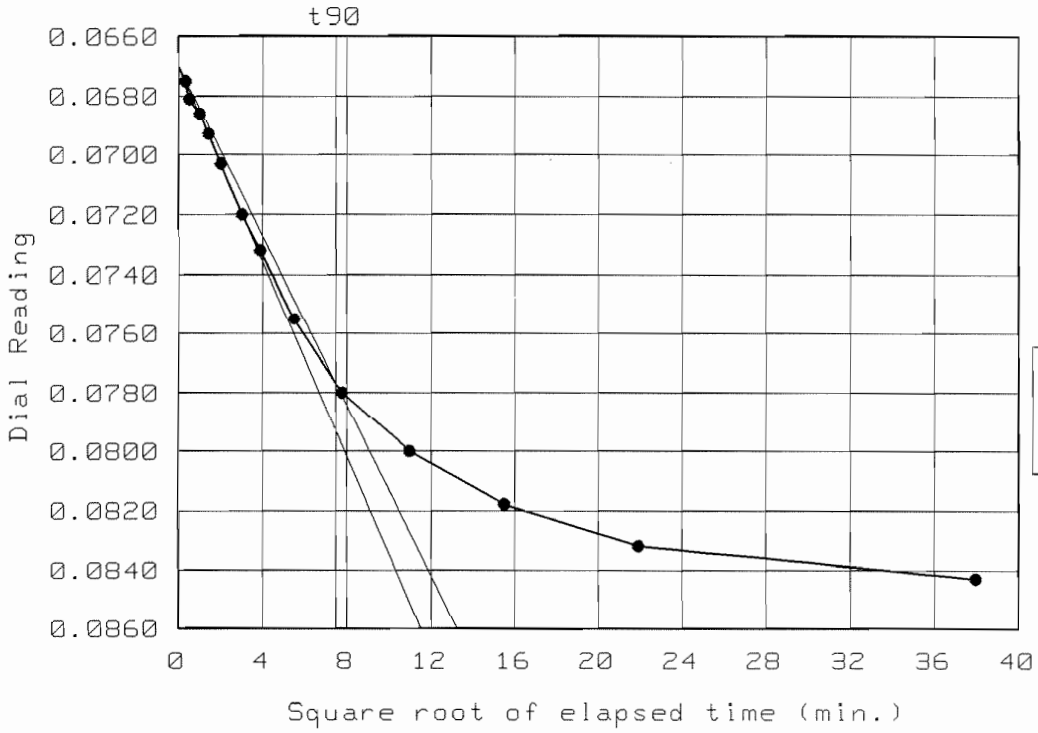
C_v @ T_{90} -
.005 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

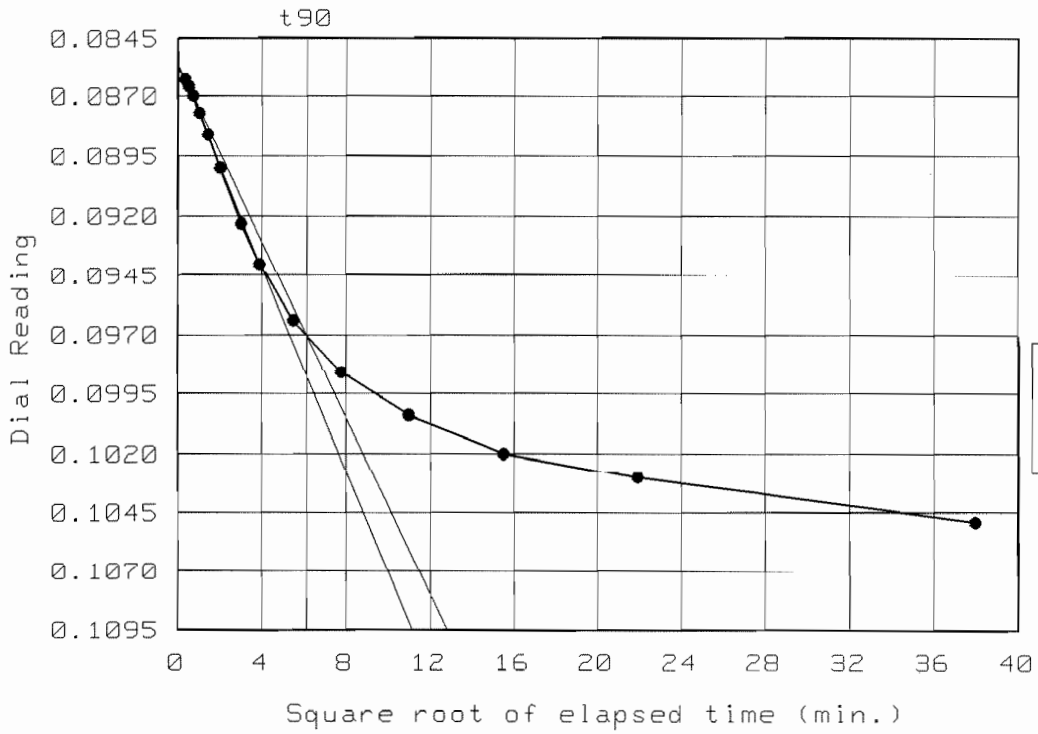
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI- 7 @ 41.5' - 43.3'

Date: 11/19/03



Load No. = 3
Load = 0.50 ksf
D_0 = 0.0670
D_{90} = 0.0777
D_{100} = 0.0789
T_{90} = 55.85 min.

C_v @ T_{90} =
.004 in.^{2}/min.



Load No. = 4
Load = 1.00 ksf
D_0 = 0.0856
D_{90} = 0.0970
D_{100} = 0.0983
T_{90} = 37.60 min.

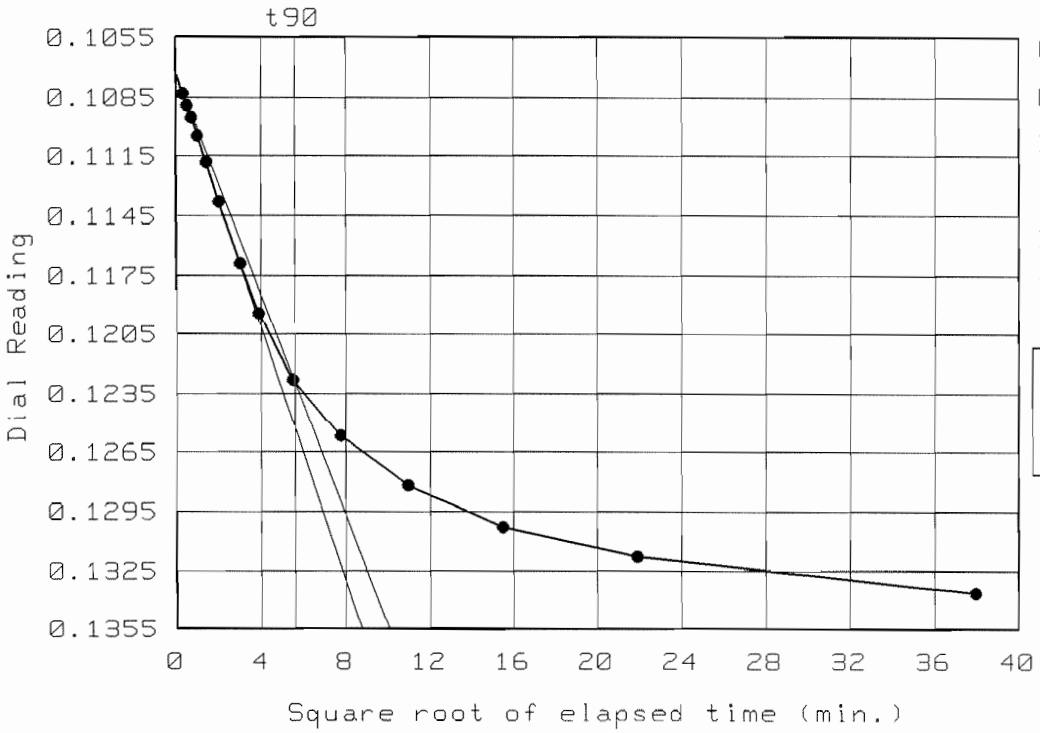
C_v @ T_{90} =
.005 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

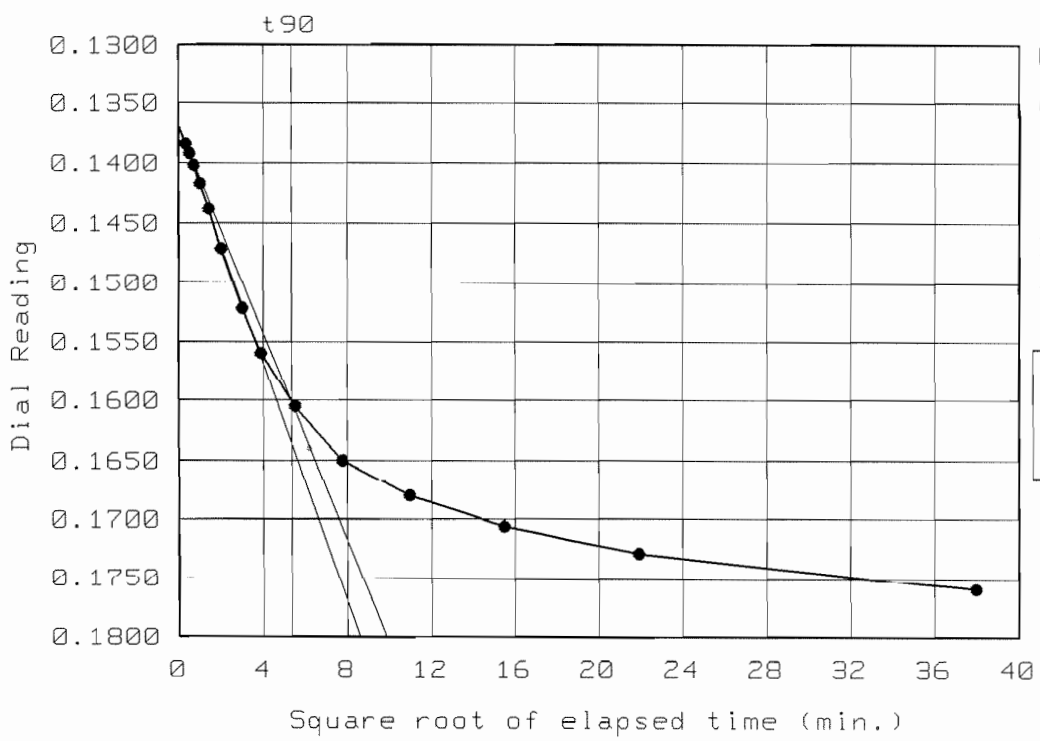
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI- 7 @ 41.5' - 43.3'

Date: 11/19/03



Load No. = 5
Load = 2.00 ksf
D_0 = 0.1073
D_{90} = 0.1229
D_{100} = 0.1247
T_{90} = 31.25 min.

C_v @ T_{90} = .006 in.^{2}/min.



Load No. = 6
Load = 4.00 ksf
D_0 = 0.1368
D_{90} = 0.1600
D_{100} = 0.1626
T_{90} = 28.23 min.

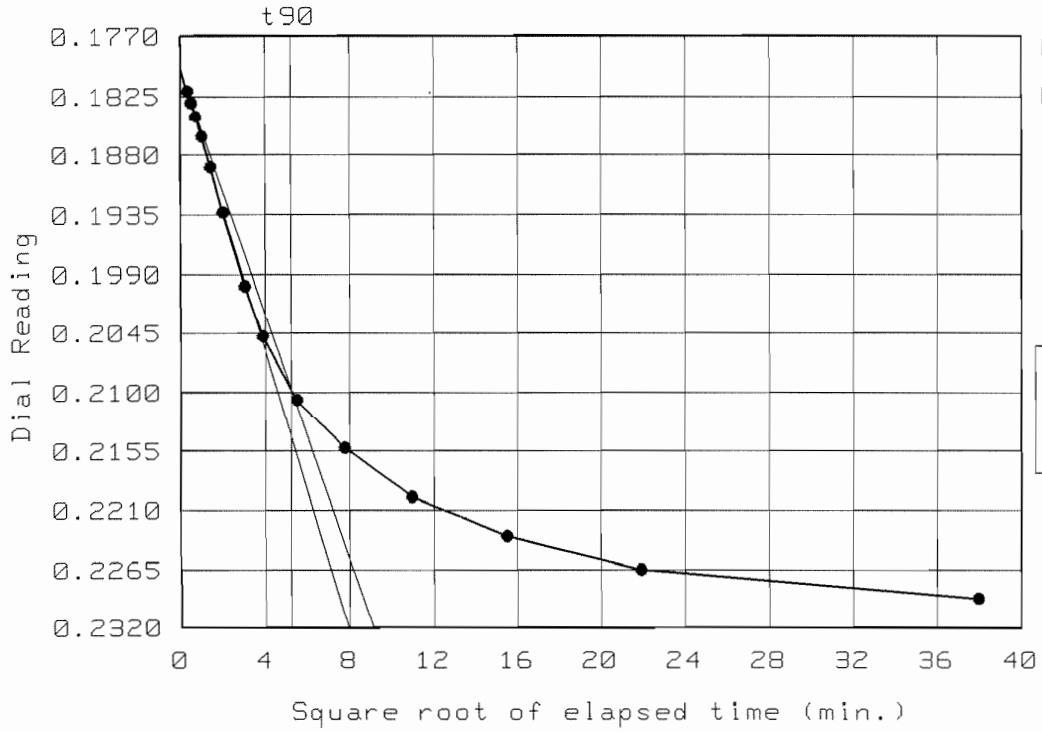
C_v @ T_{90} = .006 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

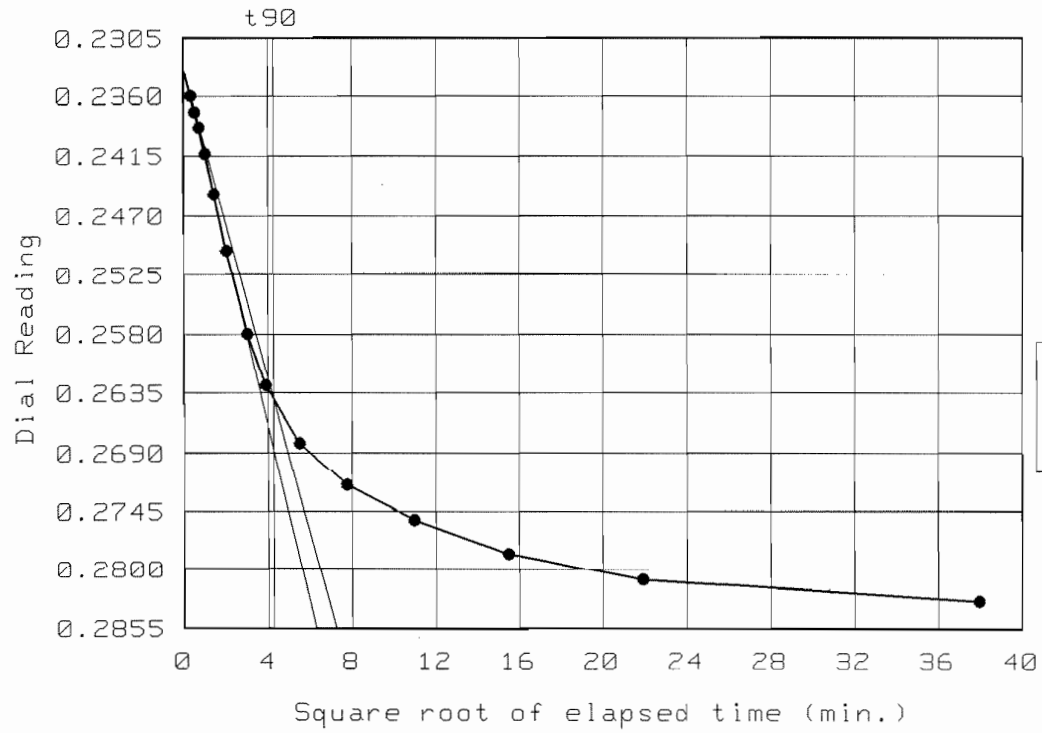
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI- 7 @ 41.5' - 43.3'

Date: 11/19/03



Load No.= 7
Load= 8.00 ksf
D_0 = 0.1799
D_{90} = 0.2097
D_{100}= 0.2130
T_{90}= 27.20 min.

C_v @ T_{90} =
.006 in.^{2}/min.



Load No.= 8
Load= 16.00 ksf
D_0 = 0.2334
D_{90} = 0.2640
D_{100}= 0.2674
T_{90}= 18.04 min.

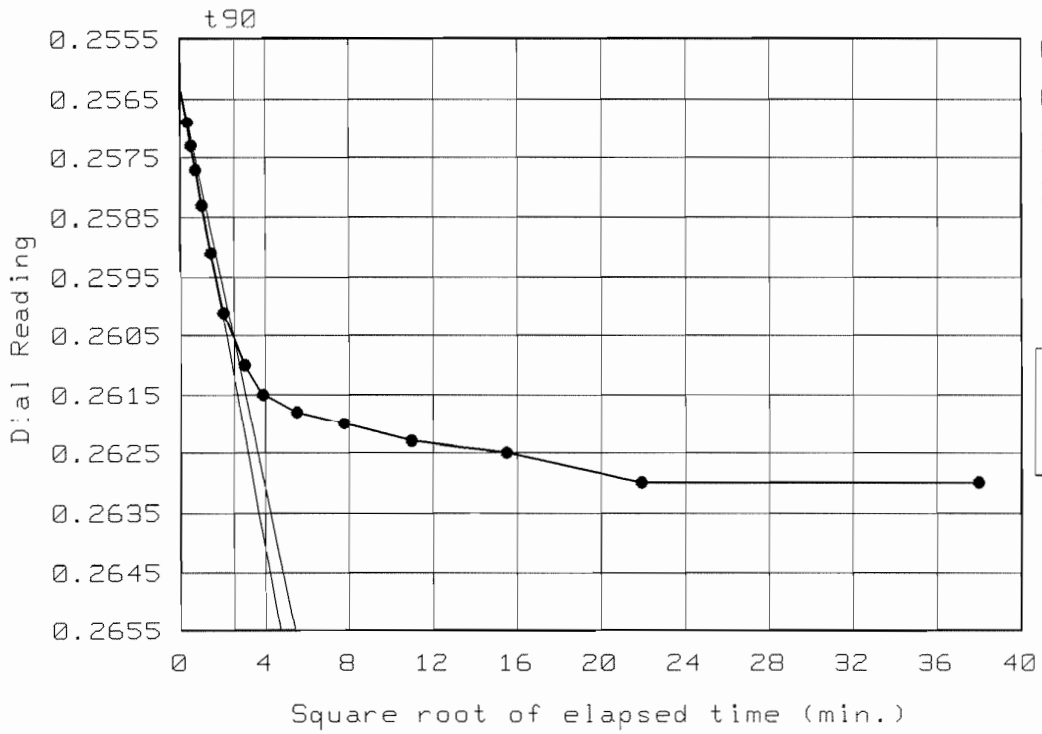
C_v @ T_{90} =
.007 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

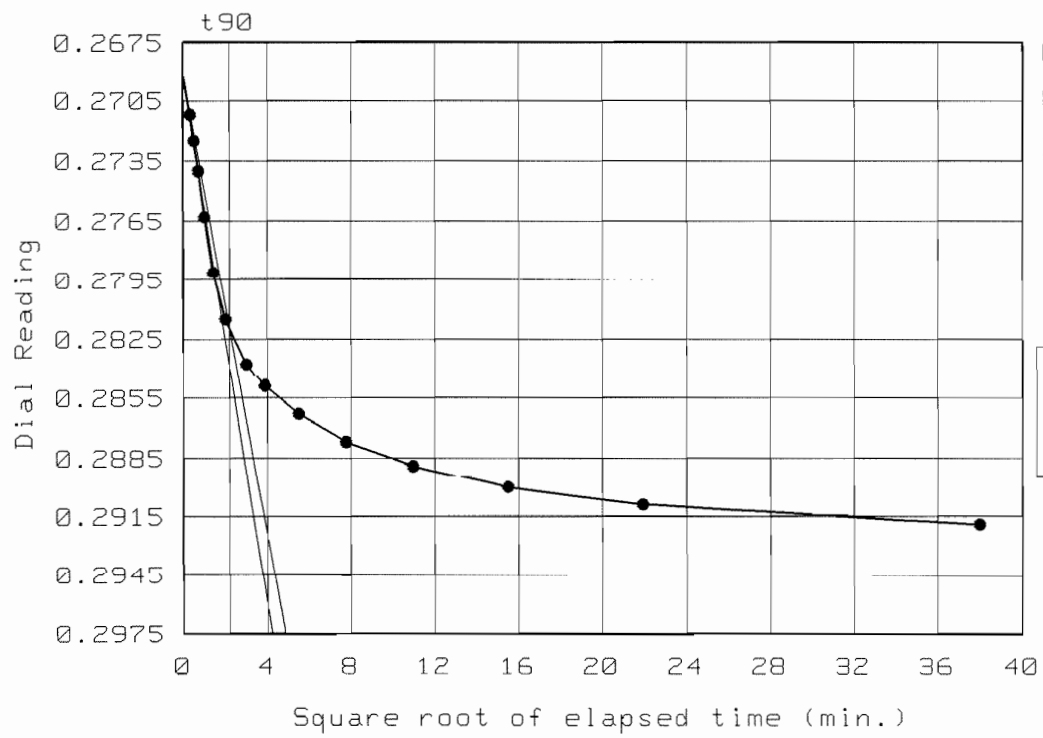
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI- 7 @ 41.5' - 43.3'

Date: 11/19/03



Load No.= 11
Load= 4.00 ksf
D_0 = 0.2563
D_{90} = 0.2606
D_{100}= 0.2610
T_{90}= 6.33 min.

C_v @ T_{90} =
.021 in.^{2}/min.



Load No.= 12
Load= 16.00 ksf
D_0 = 0.2691
D_{90} = 0.2820
D_{100}= 0.2834
T_{90}= 4.88 min.

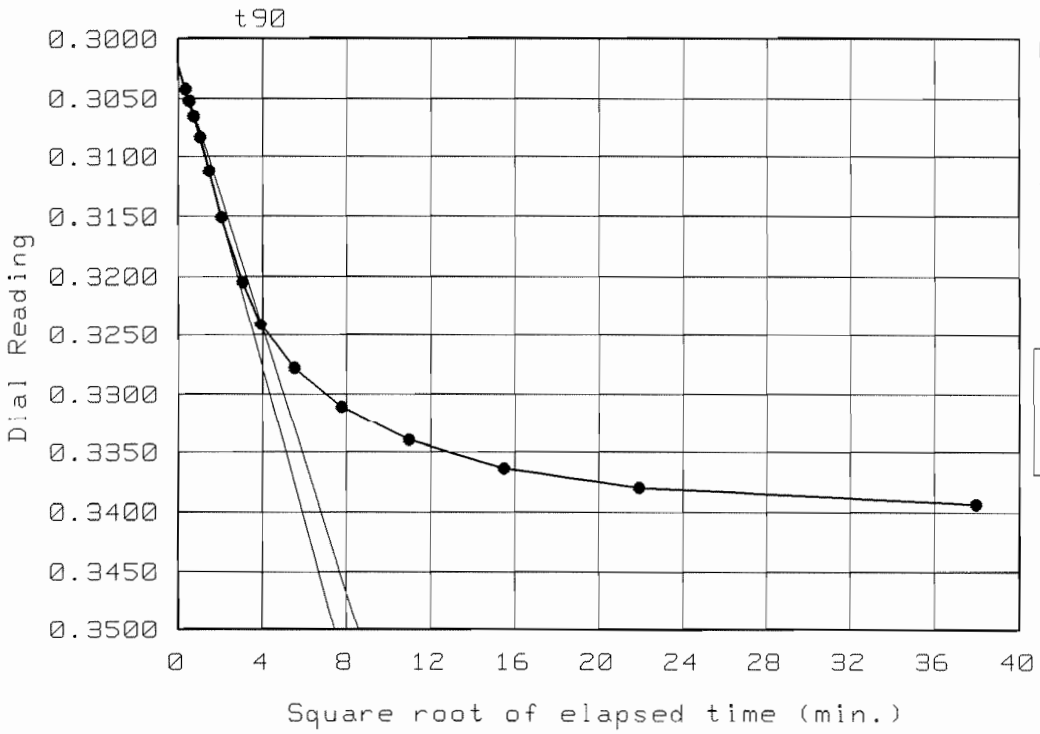
C_v @ T_{90} =
.026 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

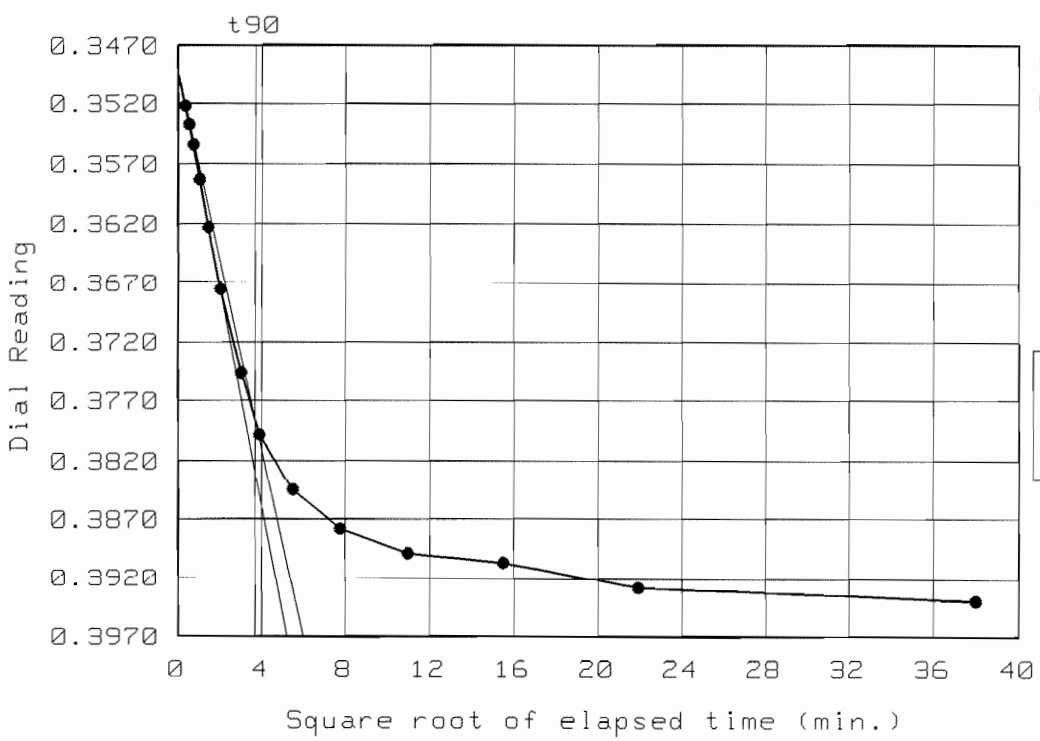
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI- 7 @ 41.5' - 43.3'

Date: 11/19/03



Load No.= 13
Load= 32.00 ksf
D_0 = 0.3022
D_{90} = 0.3243
D_{100}= 0.3268
T_{90}= 15.75 min.

C_v @ T_{90} =
.007 in.^{2}/min.



Load No.= 14
Load= 64.00 ksf
D_0 = 0.3493
D_{90} = 0.3786
D_{100}= 0.3819
T_{90}= 13.51 min.

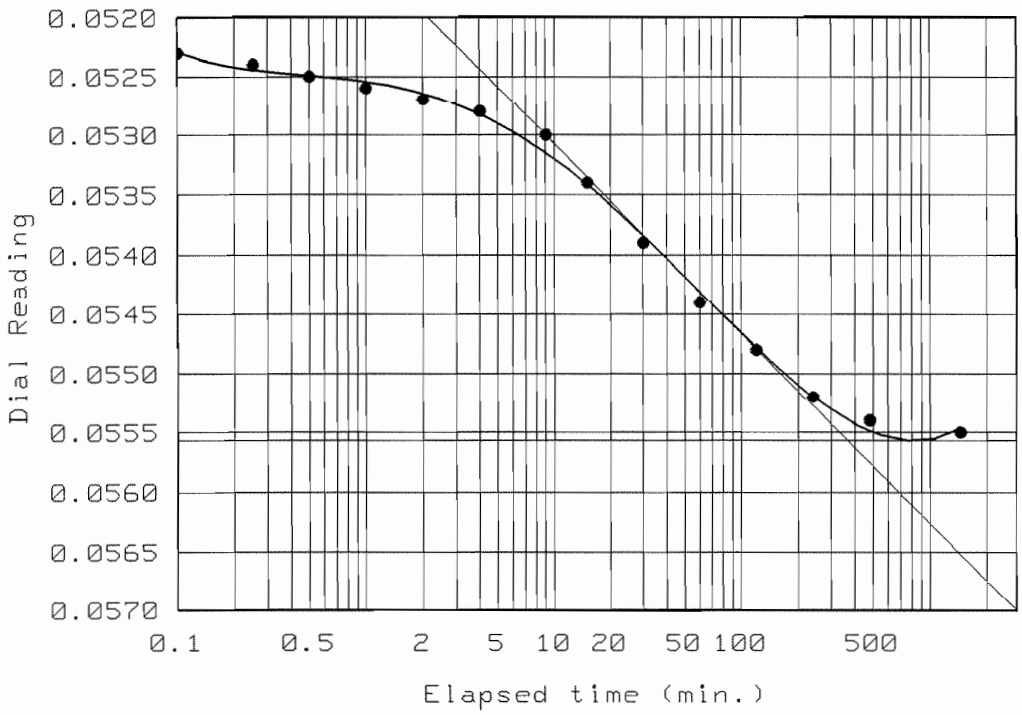
C_v @ T_{90} =
.007 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI- 7 @ 41.5' - 43.3'

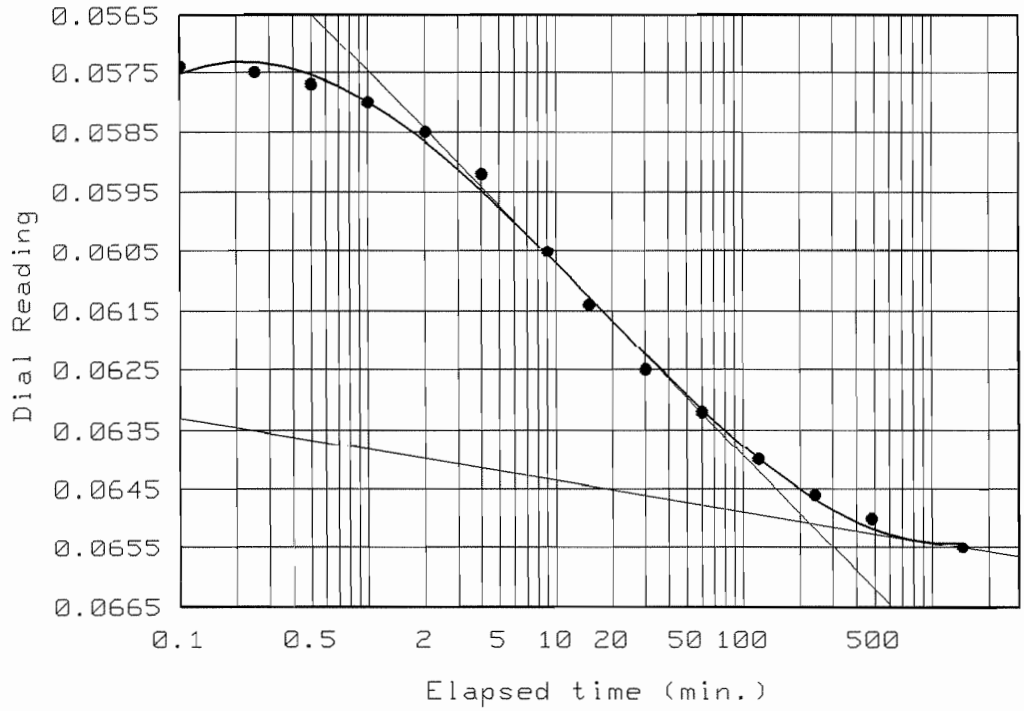
Date: 11/19/03



Load No.= 1
Load= 0.10 ksf
D_0 = 0.0521
D_{50} = 0.0538
D_{100}= 0.0556
T_{50}= 29.93 min.

C_v @ T_{50} =
.002 in.^{2}/min.

C_α= 0.000



Load No.= 2
Load= 0.25 ksf
D_0 = 0.0576
D_{50} = 0.0613
D_{100}= 0.0651
T_{50}= 15.76 min.

C_v @ T_{50} -
.003 in.^{2}/min.

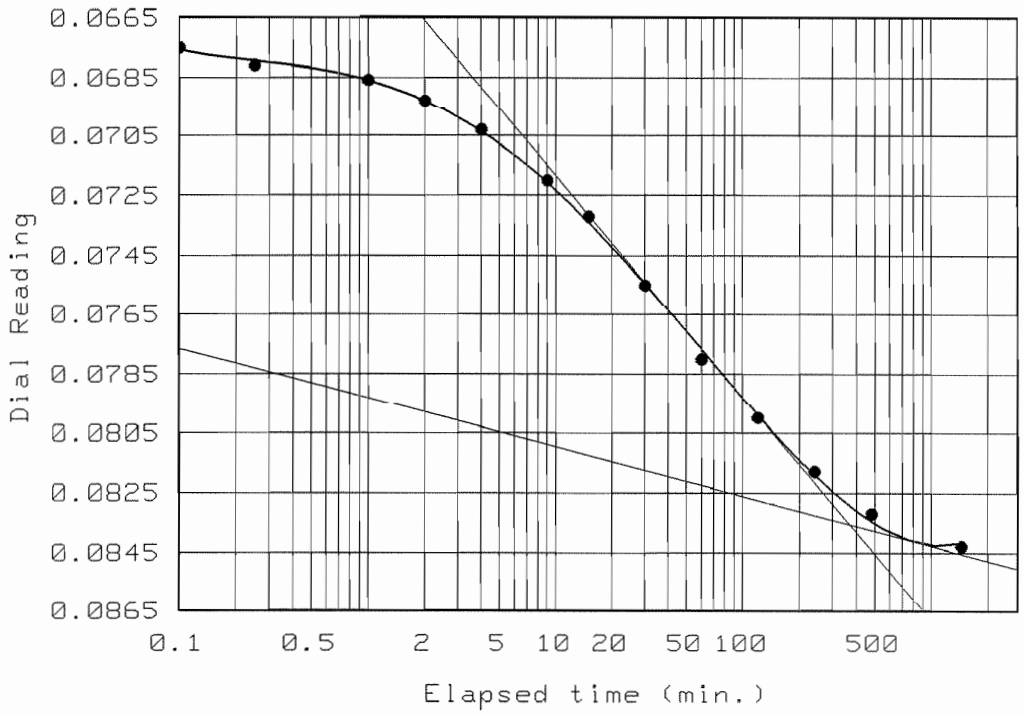
C_α= 0.001

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI- 7 @ 41.5' - 43.3'

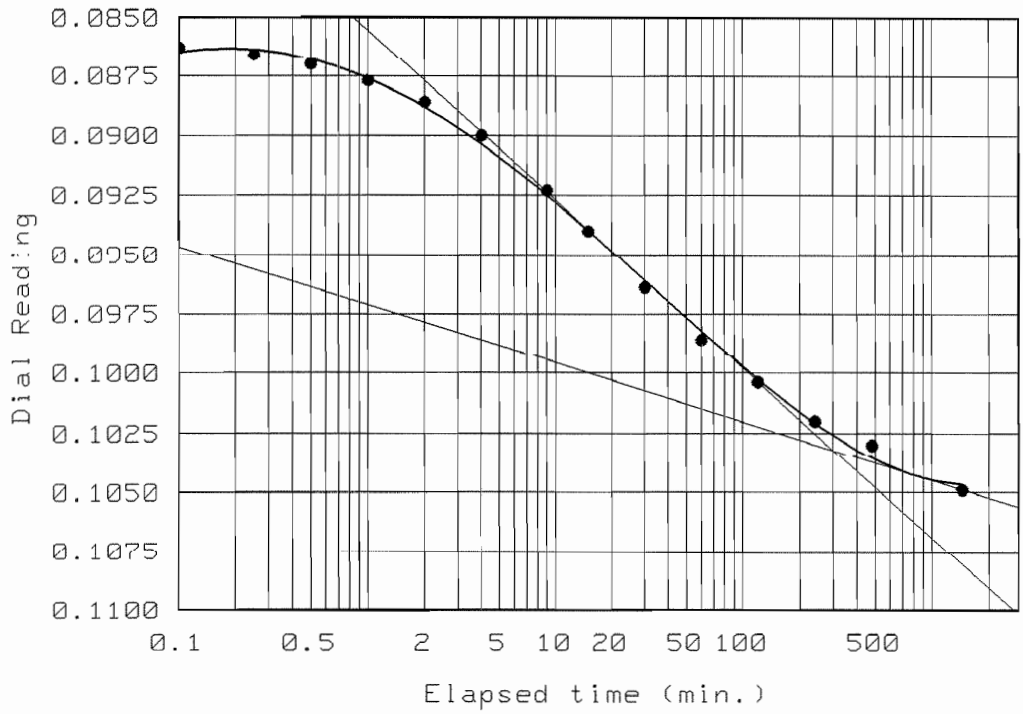
Date: 11/19/03



Load No.= 3
Load= 0.50 ksf
D_0 = 0.0671
D_{50} = 0.0753
D_{100}= 0.0836
T_{50}= 28.80 min.

C_v @ T_{50} = .002 in.^{2}/min.

C_α= 0.002



Load No.= 4
Load= 1.00 ksf
D_0 = 0.0864
D_{50} = 0.0948
D_{100}= 0.1032
T_{50}= 19.55 min.

C_v @ T_{50} = .002 in.^{2}/min.

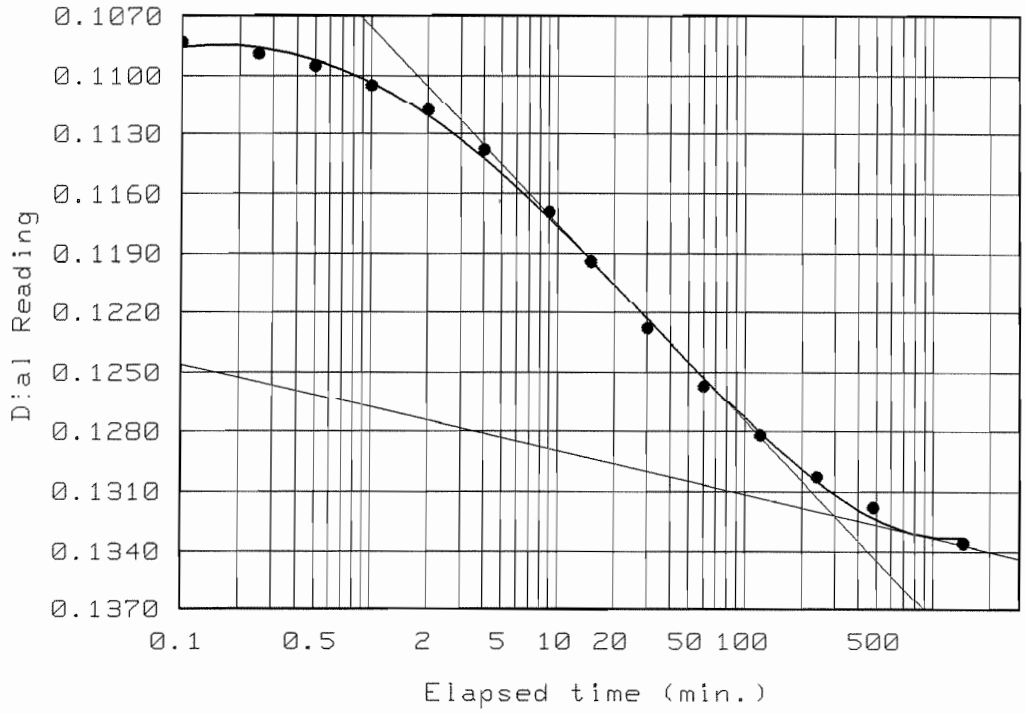
C_α= 0.003

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI- 7 @ 41.5' - 43.3'

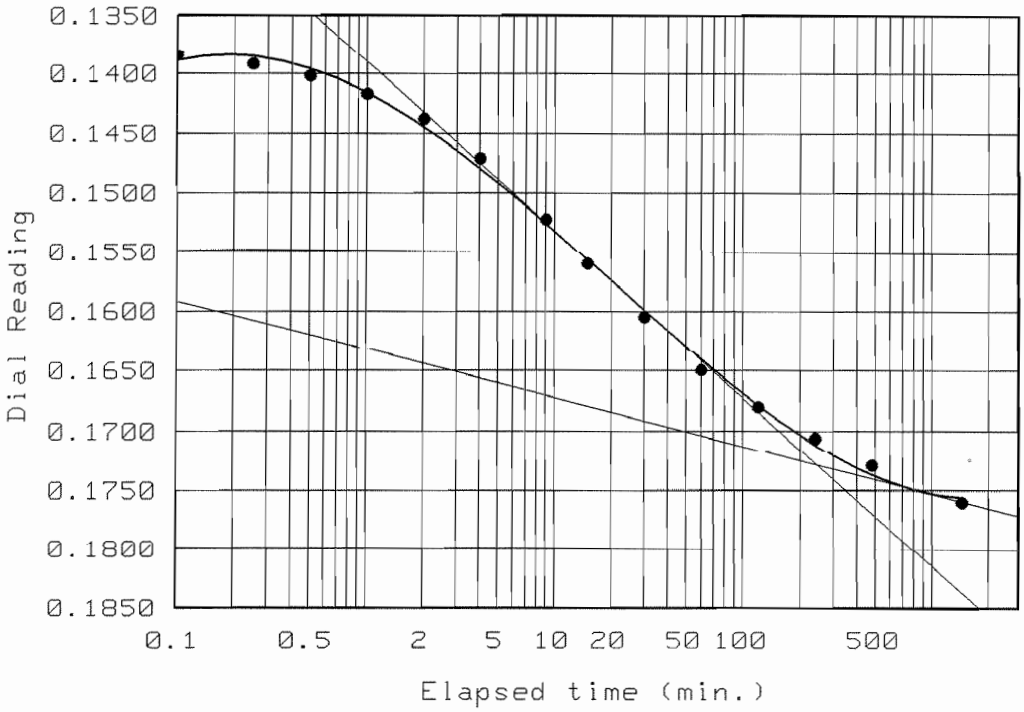
Date: 11/19/03



Load No.= 5
Load= 2.00 ksf
D_0 = 0.1081
D_{50} = 0.1202
D_{100}= 0.1322
T_{50}= 18.28 min.

C_v @ T_{50} =
.002 in.^{2}/min.

C_α= 0.002



Load No.= 6
Load= 4.00 ksf
D_0 = 0.1386
D_{50} = 0.1557
D_{100}= 0.1728
T_{50}= 15.17 min.

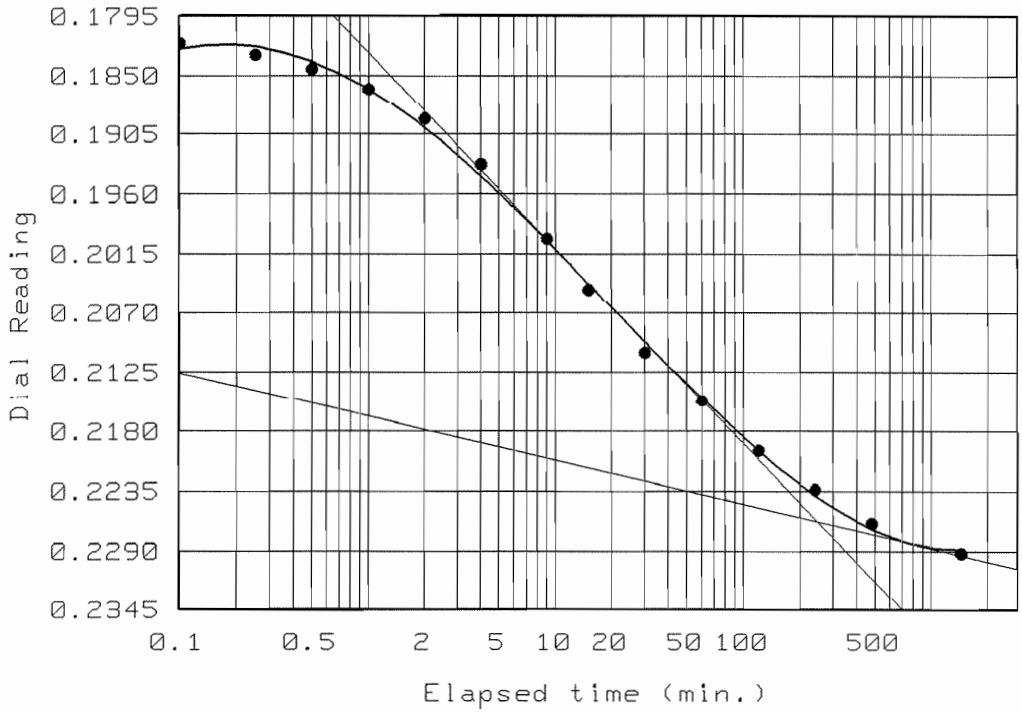
C_v @ T_{50} =
.003 in.^{2}/min.

C_α= 0.004

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI- 7 @ 41.5' - 43.3'

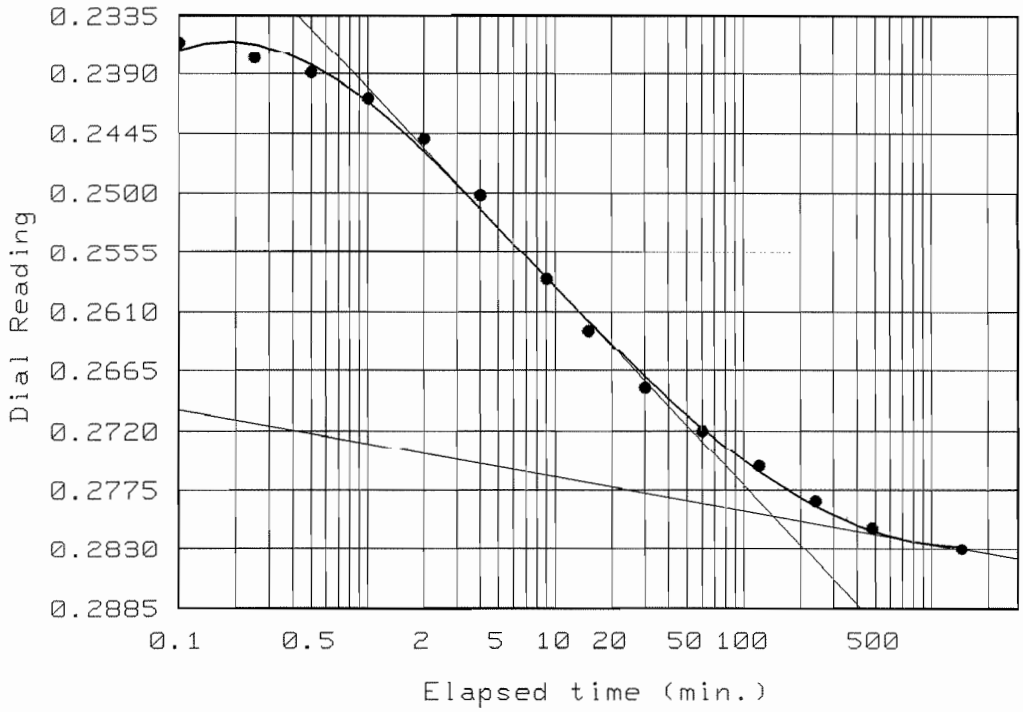
Date: 11/19/03



Load No.= 7
Load= 8.00 ksf
D_0 = 0.1820
D_{50} = 0.2041
D_{100}= 0.2263
T_{50}= 14.87 min.

C_v @ T_{50} =
.002 in.^{2}/min.

C_α= 0.005



Load No.= 8
Load= 16.00 ksf
D_0 = 0.2361
D_{50} = 0.2580
D_{100}= 0.2799
T_{50}= 9.23 min.

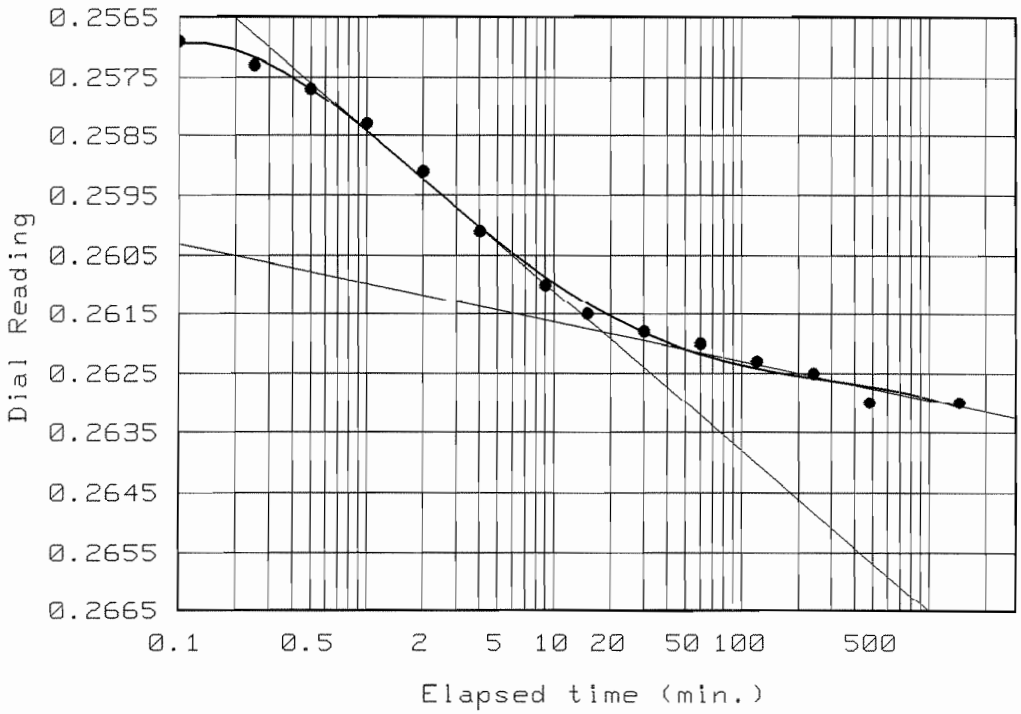
C_v @ T_{50} =
.003 in.^{2}/min.

C_α= 0.004

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI- 7 @ 41.5' - 43.3'

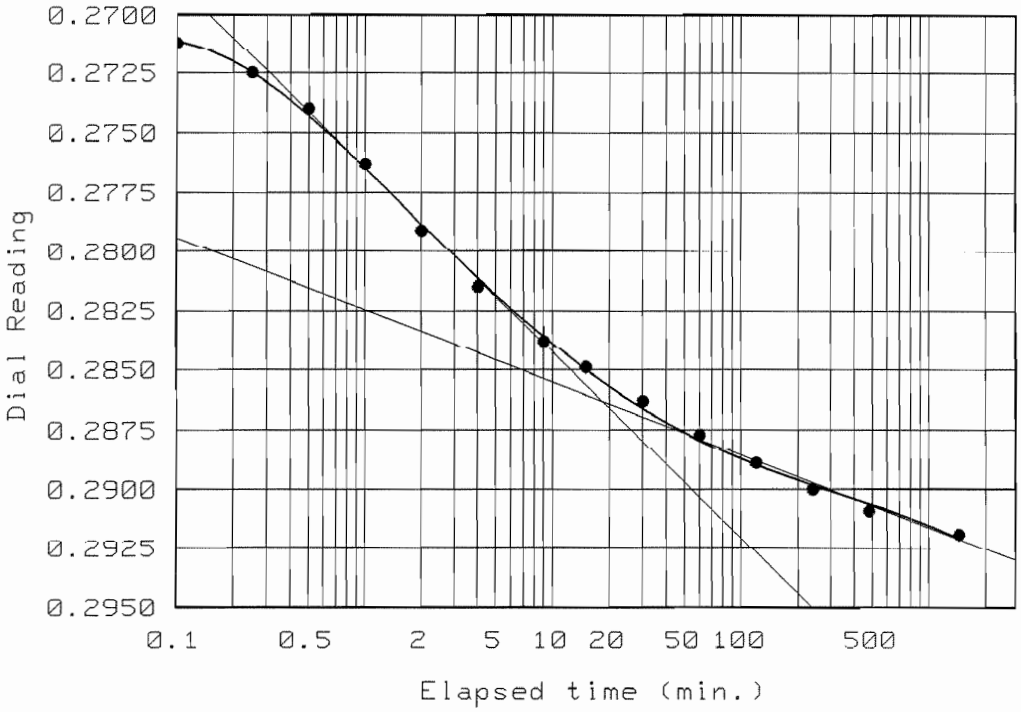
Date: 11/19/03



Load No.= 11
Load= 4.00 ksf
D_0 = 0.2564
D_{50} = 0.2591
D_{100}= 0.2618
T_{50}= 1.76 min.

C_v @ T_{50} = .018 in.^{2}/min.

C_α= 0.001



Load No.= 12
Load= 16.00 ksf
D_0 = 0.2685
D_{50} = 0.2774
D_{100}= 0.2863
T_{50}= 1.32 min.

C_v @ T_{50} = .022 in.^{2}/min.

C_α= 0.004

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

TRIAXIAL SHEAR TESTS

Triaxial shear tests are used to measure the stress-strain characteristics and strength of soils under various loading conditions expected in the field. Tests may be undrained, semi-drained or fully-drained to simulate field behavior. Triaxial shear tests are performed in accordance with ASTM D 4767.

Triaxial shear tests are conducted either on relatively undisturbed samples or on remolded/compacted specimens of soil. Diameters of specimens range between 1.4 and 6.0 inches and a minimum length/diameter ratio of 2 is standard. Either stress-controlled or strain-controlled tests are performed. Loads are measured using proving rings or electronic load cells, deformations are monitored using electronic LVDT's or dial indicators, and pore water pressure is measured with transducers. Normally, samples are saturated, consolidated and sheared to failure under compression loading, although extension loading is also possible.

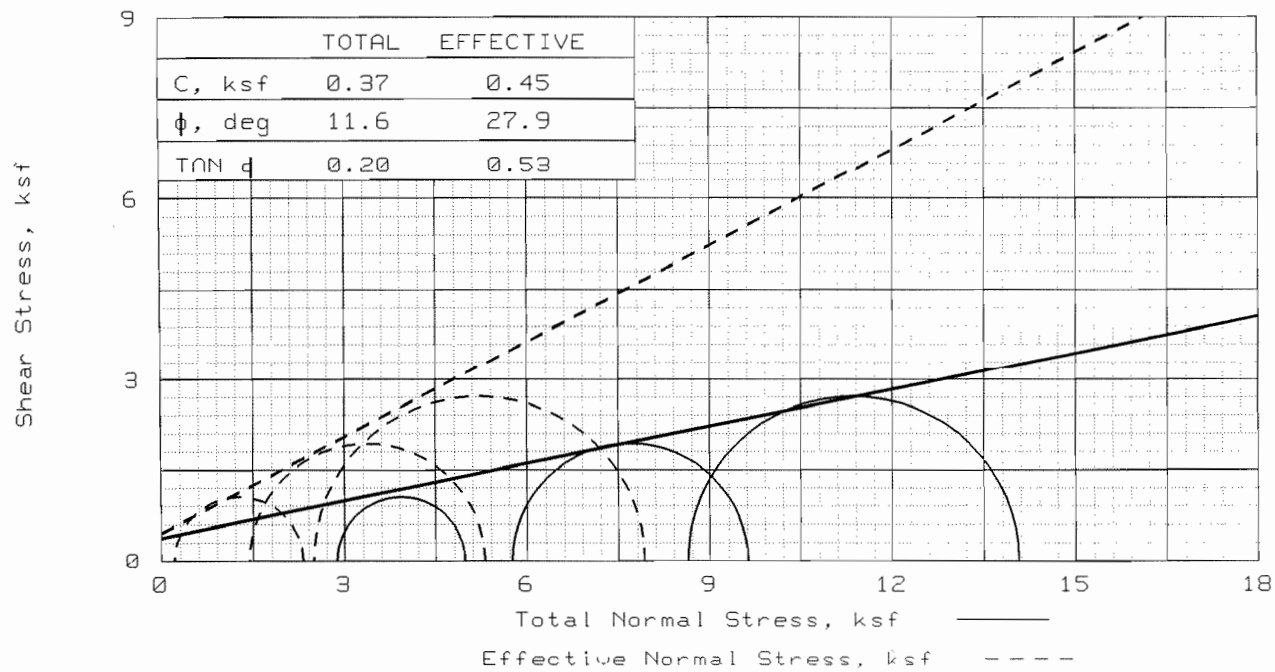
Various consolidation conditions may be implemented in the triaxial apparatus. Stress and deformation occur in three dimensions under triaxial conditions. The three most common types of triaxial compression tests in routine use include:

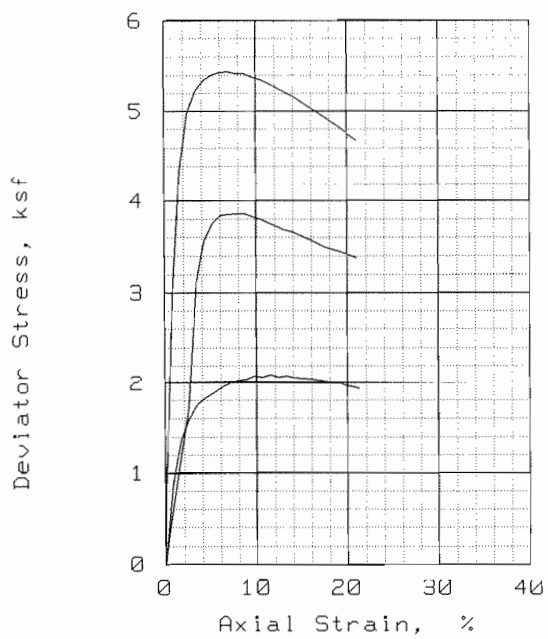
CU = isotropically-consolidated undrained (i.e., CIU)

CD = isotropically-consolidated drained (i.e., CID)

UU = unconsolidated-undrained shear tests

The results of the tests are presented in terms of stress-strain curves and stress paths to failure. Alternatively, the strength may be represented by Mohr-Coulomb circles at failure. Short-term undrained strengths may be represented by total stress parameters (ϕ and C) or by undrained shear strengths (Su). The long-term drained strengths (condition of zero excess pore pressure response) are described by the effective stress parameters (ϕ and C').





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	53.9	57.4	51.5
	DRY DENSITY, pcf	68.3	65.1	70.0
	SATURATION, %	99.1	97.0	98.8
	VOID RATIO	1.467	1.608	1.408
	DIAMETER, in	2.85	2.86	2.86
	HEIGHT, in	5.50	5.53	5.54
AT TEST	WATER CONTENT, %	47.1	43.2	36.9
	DRY DENSITY, pcf	73.7	77.0	84.0
	SATURATION, %	98.8	97.7	99.0
	VOID RATIO	1.288	1.205	1.006
	DIAMETER, in	2.74	2.63	2.61
	HEIGHT, in	5.50	5.53	5.54
Strain rate, in/min		0.0001	0.0016	0.0016
BACK PRESSURE, ksf		2.88	4.18	4.18
CELL PRESSURE, ksf		5.76	9.94	12.82
FAILURE STRESS, ksf		2.10	3.86	5.44
TOTAL PORE PR., ksf		5.54	8.50	10.32
ULTIMATE STRESS, ksf				
TOTAL PORE PR., ksf				
$\bar{\sigma}_1$ FAILURE, ksf		2.32	5.30	7.93
$\bar{\sigma}_3$ FAILURE, ksf		0.22	1.44	2.49

TYPE OF TEST:
CU with Pore Pressures
SAMPLE TYPE: Undisturbed
DESCRIPTION: Dark gray lean CLAY (CL)
LL= 38 PL= 22 PI= 16
SPECIFIC GRAVITY= 2.7
REMARKS:

CLIENT:

PROJECT: Indian River Inlet Bridges

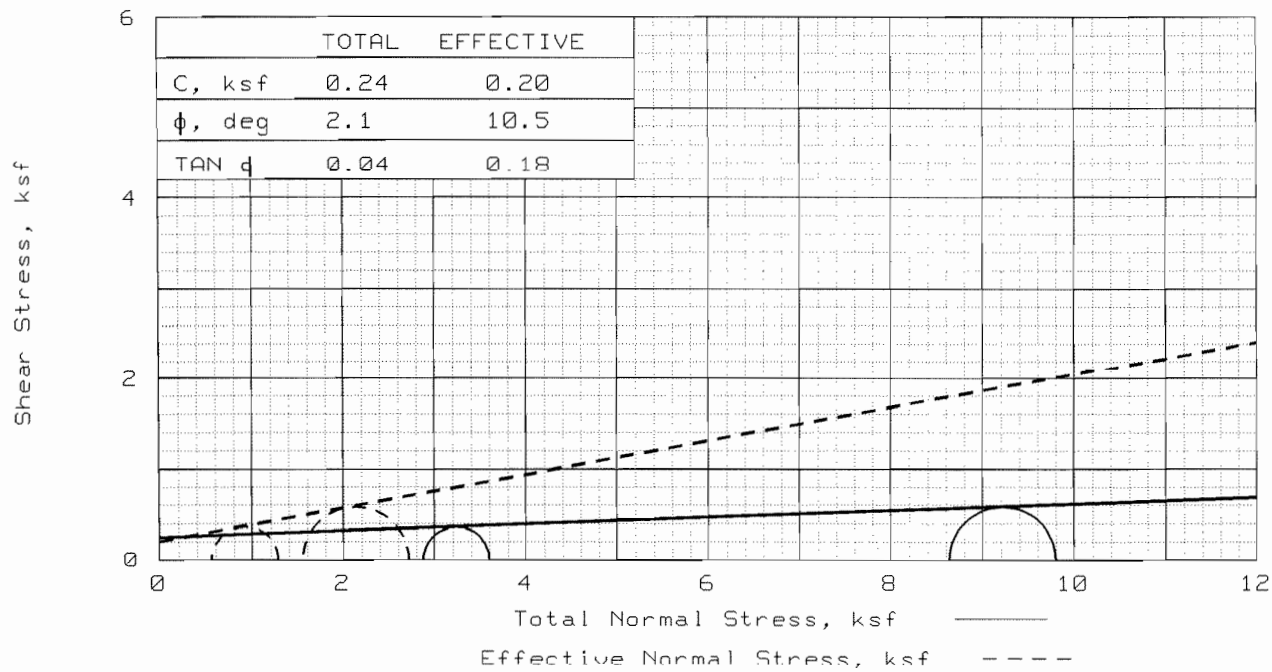
SAMPLE LOCATION: Boring BII-11 @ 58' - 60'

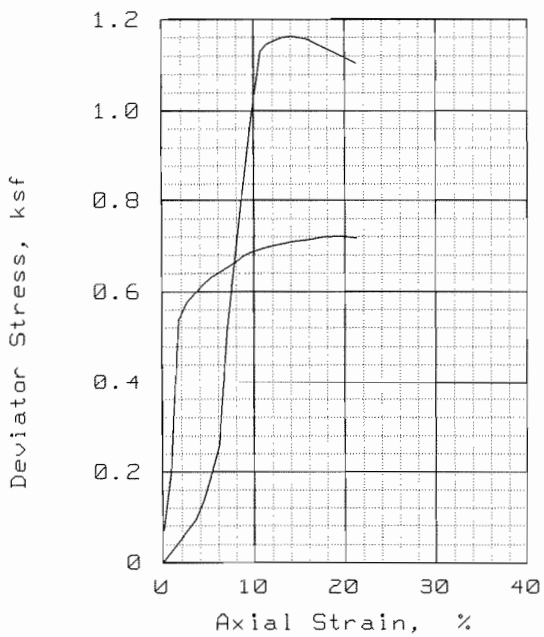
PROJ. NO.: 3530-03-1245 Task 02 DATE: 12/22/03

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES

Fig. No.: 1





SAMPLE NO.:		1	2
INITIAL	WATER CONTENT, %	54.9	43.0
	DRY DENSITY, pcf	66.2	76.0
	SATURATION, %	95.9	95.5
	VOID RATIO	1.545	1.217
	DIAMETER, in	2.87	2.87
	HEIGHT, in	5.50	5.50
AT TEST	WATER CONTENT, %	31.0	29.2
	DRY DENSITY, pcf	91.2	93.4
	SATURATION, %	98.9	98.1
	VOID RATIO	0.847	0.805
	DIAMETER, in	2.45	2.59
	HEIGHT, in	5.50	5.50
Strain rate, in/min		0.0016	0.0016
BACK PRESSURE, ksf		4.18	4.18
CELL PRESSURE, ksf		7.06	12.82
FAILURE STRESS, ksf		0.72	1.16
TOTAL PORE PR., ksf		6.49	11.26
ULTIMATE STRESS, ksf			
TOTAL PORE PR., ksf			
$\bar{\sigma}_1$ FAILURE, ksf		1.28	2.72
$\bar{\sigma}_3$ FAILURE, ksf		0.56	1.56

TYPE OF TEST:
CU with Pore Pressures
SAMPLE TYPE: Undisturbed
DESCRIPTION: Dark brown lean CLAY (CL)
LL= 32 PL= 21 PI= 11
SPECIFIC GRAVITY- 2.7
REMARKS:

CLIENT:

PROJECT: Indian River Inlet Bridges

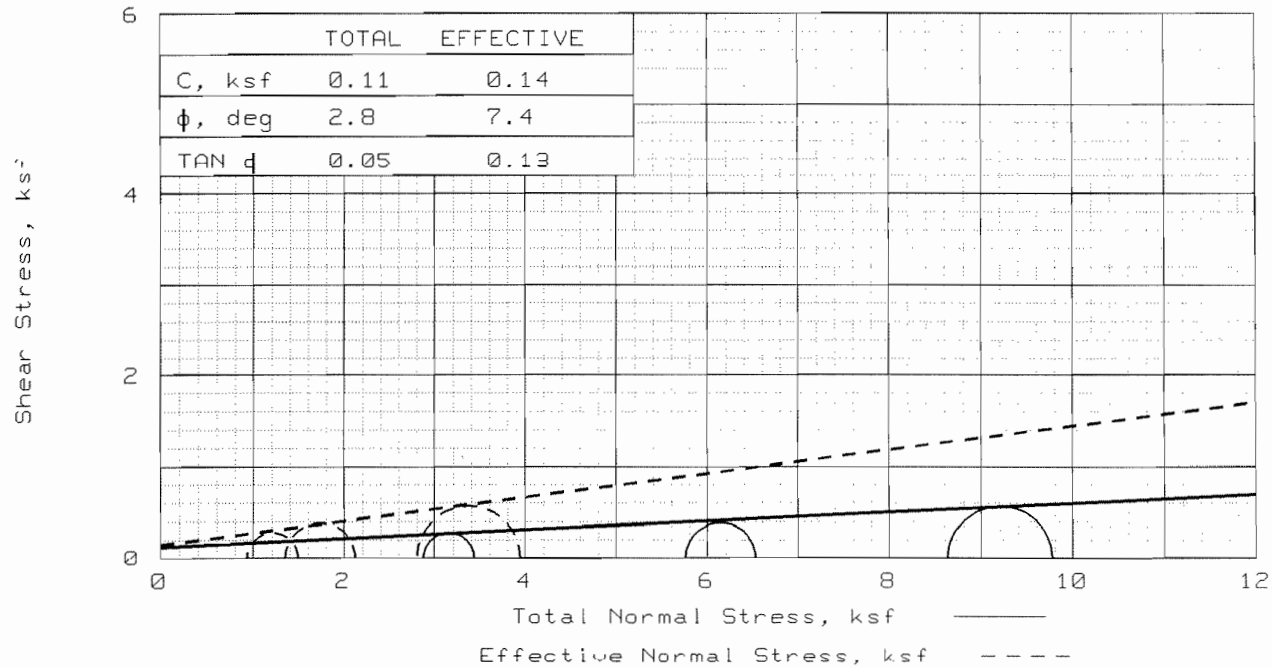
SAMPLE LOCATION: Boring BII-17 @ 69' - 71'

PROJ. NO.: 3530-03-1245 Task 02 DATE: 11/20/03

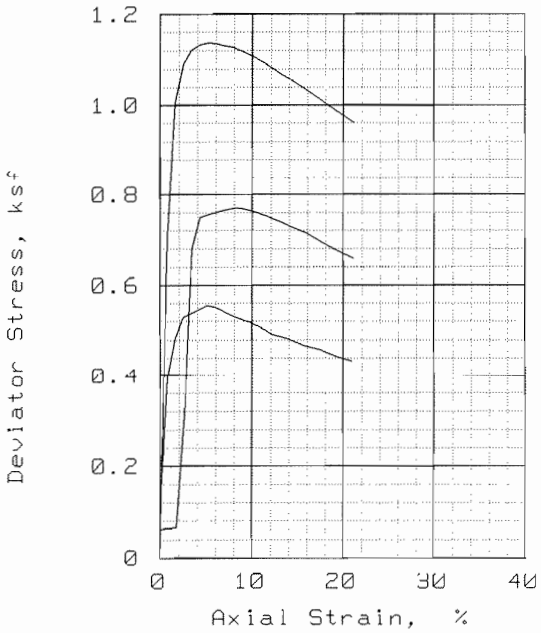
TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES

Fig. No.: 1



	TOTAL	EFFECTIVE
C, ksf	0.11	0.14
ϕ, deg	2.8	7.4
TAN ϕ	0.05	0.13



	SAMPLE NO.:	1	2	3
INITIAL	WATER CONTENT, %	53.2	50.0	50.1
	DRY DENSITY, pcf	68.8	69.2	71.4
	SATURATION, %	99.0	93.9	99.5
	VOID RATIO	1.451	1.437	1.360
	DIAMETER, in	2.85	2.87	2.84
	HEIGHT, in	5.56	5.50	5.51
AT TEST	WATER CONTENT, %	48.7	40.5	38.2
	DRY DENSITY, pcf	73.2	78.4	82.5
	SATURATION, %	100.9	95.3	98.9
	VOID RATIO	1.303	1.149	1.044
	DIAMETER, in	2.76	2.70	2.64
	HEIGHT, in	5.56	5.50	5.51
Strain rate, in/min		0.0017	0.0016	0.0016
BACK PRESSURE, ksf		5.62	4.18	4.18
CELL PRESSURE, ksf		8.50	9.94	12.82
FAILURE STRESS, ksf		0.56	0.77	1.14
TOTAL PORE PR., ksf		7.56	8.58	10.01
ULTIMATE STRESS, ksf				
TOTAL PORE PR., ksf				
$\bar{\sigma}_1$ FAILURE, ksf		1.49	2.12	3.94
$\bar{\sigma}_3$ FAILURE, ksf		0.94	1.35	2.81

TYPE OF TEST:
CU with Pore Pressures
SAMPLE TYPE: Undisturbed
DESCRIPTION: Dark gray lean CLAY (CL)
LL= 35 PL= 18 PI= 17
SPECIFIC GRAVITY= 2.7
REMARKS:

CLIENT:

PROJECT: Indian River Inlet Bridges

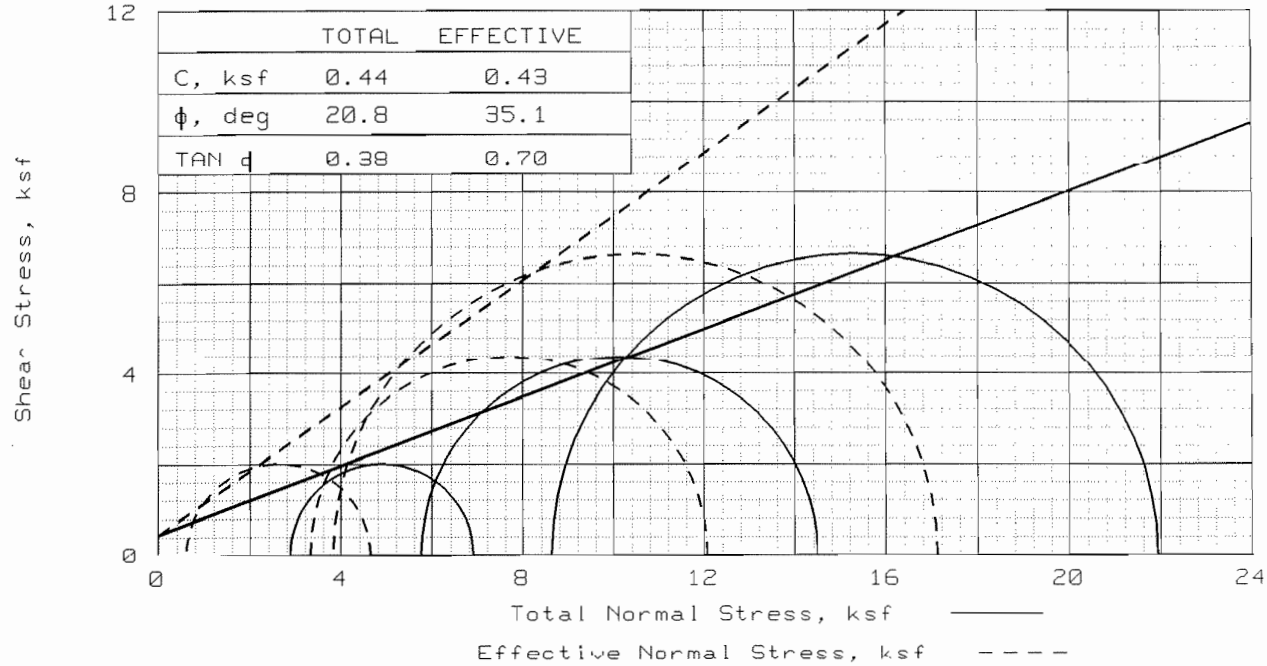
SAMPLE LOCATION: Boring BII-22 @ 44.5-46.5

PROJ. NO.: 3530-03-1245 Task 02 DATE: 12/1/03 12/22/03

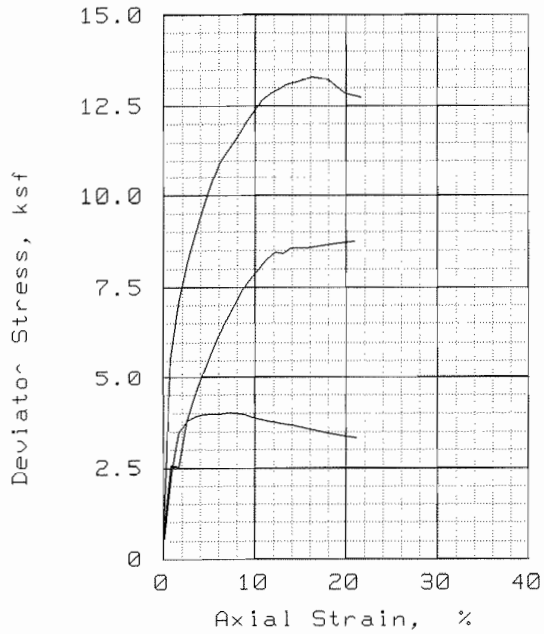
TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES

Fig. No.: 1



	TOTAL	EFFECTIVE
C, ksf	0.44	0.43
ϕ, deg	20.8	35.1
TAN ϕ	0.38	0.70



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	59.1	30.8	29.3
	DRY DENSITY, pcf	64.8	91.3	93.5
	SATURATION, %	99.8	98.2	98.7
	VOID RATIO	1.600	0.846	0.802
	DIAMETER, in	2.83	2.86	2.85
	HEIGHT, in	5.53	5.53	5.38
AT TEST	WATER CONTENT, %	56.2	27.8	23.3
	DRY DENSITY, pcf	66.9	96.1	103.4
	SATURATION, %	99.9	99.4	99.9
	VOID RATIO	1.520	0.755	0.630
	DIAMETER, in	2.79	2.78	2.71
	HEIGHT, in	5.53	5.53	5.38
Strain rate, in/min		0.0016	0.0016	0.0016
BACK PRESSURE, ksf		4.2	5.6	5.6
CELL PRESSURE, ksf		7.1	11.4	14.3
FAILURE STRESS, ksf		4.0	8.7	13.3
TOTAL PORE PR., ksf		6.4	8.0	10.4
ULTIMATE STRESS, ksf				
TOTAL PORE PR., ksf				
$\bar{\sigma}_1$ FAILURE, ksf		4.6	12.1	17.1
$\bar{\sigma}_3$ FAILURE, ksf		0.6	3.3	3.8

TYPE OF TEST:
CU with Pore Pressures
SAMPLE TYPE: Undisturbed
DESCRIPTION: Gray fat CLAY

LL= 65 PL= 28 PI= 37
SPECIFIC GRAVITY= 2.7
REMARKS:

CLIENT:

PROJECT: Indian River Inlet Bridge

14/22/23

SAMPLE LOCATION: Doring BII-22 @ 160 - 162

PROJ. NO.: 3530-03-1245.02 DATE: 12/11/03.

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES

Fig. No.: 1

METHOD OF DETERMINATION OF SULFATE ION CONTENT

The sulfate ion content of soil is determined in accordance with California Department of Transportation Method 417. The test results are used in determining the corrosive nature of the environment for concrete structures as well as for other purposes.

The sulfate ion is precipitated with barium chloride, in an acidic medium, to barium sulfate crystals of uniform size. The barium sulfate present in suspension is determined by a measurement of its turbidity with a calibrated photometer or turbidometer. This result is then compared to a known standardization curve. Results are typically presented as parts per million or mg/kg.

METHOD OF DETERMINATION OF CHLORIDE ION CONTENT

The chloride ion content of water and or soil is determined in accordance with California Department of Transportation Method 422. The test results are used in determining the corrosive nature of the environment for embedded metallic materials as well as for other purposes.

The chloride ion is quantified through titration with a silver nitrate solution in the presence of a potassium chromate indicator solution. Water samples are normally tested as is, while soil samples are digested in a known volume of distilled water, filtered, and the filtrate is titrated. Results are typically presented as parts per million on a moisture-free basis.

MACTEC

MACTEC ENGINEERING AND CONSULTING, INC.
22455 Davis Drive, Suite 100
Sterling, Virginia 20164
Telephone: (703) 404 7000 Fax: (703) 404 7071

Project No.: 3530-03-1245 Task 02
Project Name: Indian River Inlet Bridges
Date: 12/22/03

CHLORIDE AND SULFATE IN SOIL ASTM D-512M & D-516M

Sample Number	Depth (ft)	Chloride mg/Kg	Sulfate mg/Kg
BII-19	23.5' - 30'	41	247
BII-19	53.5' - 65'	100	1749
BII-21	43.5' - 50'	98	2016
BII-24	8.5' - 15'	32	41

Reviewed by: [illegible] 12/23/03

Mactec Engineering and Consulting, Inc.
22455 Davis Drive, Suite 100
Sterling, Virginia 20164
(703) 404-7000

Summary of Soil Classification Test Data

PROJECT NAME: Indian River Inlet Bridge
PROJECT NUMBER: **3530-03-1245 Phase 01**
DATE: **09/06/03**

SAMPLE ID	DEPTH (ft.)	TYPE	SOIL DESCRIPTION	SOIL CLASS.	% RETAINED NO. 4 SIEVE	% FINER NO. 200 SIEVE	NAT. MOIST. (%)	ATTERBERG LIMITS L.L.	P.L.	P.I.	ORGANIC CONTENT (%)
BI-1	53.5 - 55	Jar	Very dark gray fat CLAY	CH	0.0	99.1	59.4	65	27	38	
BI-1	73.5 - 75	Jar	Black poorly graded sand with silt	SP-SM	0.0	7.3	17.0	NLL	NP	---	
BI-2	6 - 7.5	Jar	Dark poorly graded SAND with silt	SP-SM	0.0	7.3	18.2	NLL	NP	---	
BI-2	28.5 - 30	Jar	Dark gray lean CLAY	CL	0.8	88.0	61.8	39	21	18	
BI-2	108.5 - 110	Jar	Very dark gray sandy lean CLAY	CL	0.0	51.5	25.8	26	12	14	
BI-3	40 - 42	UD	Dark gray fat CLAY	CH	0.0	99.8	45.7	54	27	27	
BI-3	50 - 52	UD	Dark greenish gray elastic SILT	MH	0.0	99.4	59.5	82	42	40	
BI-3	60 - 62	UD	Very dark greenish gray fat CLAY	CH	0.0	99.6	60.3	72	21	51	
BI-4	13.5 - 15	Jar	Dark yellowish brown silty SAND	SM	0.0	14.3	17.4	NLL	NP	---	
BI-4	28.5 - 30	Jar	Very dark gray fat CLAY	CH	0.0	91.9	64.2	66	23	43	8.0
BI-4	53.5 - 55	Jar	Dark greenish gray fat CLAY	CH	0.0	96.4	66.0	59	22	37	6.7
BI-4	78.5 - 80	Jar	Very dark greenish gray fat CLAY	CH	0.0	93.6	67.8	83	24	59	8.6
BI-5	78.5 - 80	Jar	Very dark greenish gray fat CLAY	CH	0.0	99.7	62.6	93	29	64	
BI-5	133.5 - 135	Jar	Dark gray lean CLAY with sand	CL	0.0	71.9	23.5	31	14	17	
BI-5	143.5 - 145	Jar	Dark greenish gray sandy lean CLAY	CL	0.0	68.6	26.8	33	15	18	

NOTES:
1. Soil classification and testing in accordance with USCS, ASTM D2487, D421, D422 & D4318
2. L.L.= Liquid Limit N.P.= Non-Plastic
   P.L.= Plastic Limit N.L.L.=No Liquid Limit
   P.I. = Plasticity Index
3. Soil color determined from Munsell Soil Chart

9/10/03
Reviewed
Chan Tin
Manager, Laboratory Services

Mactec Engineering and Consulting, Inc.
22455 Davis Drive, Suite 100
Sterling, Virginia 20164
(703) 404-7000

Summary of Soil Classification Test Data

PROJECT NAME: Indian River Inlet Bridge
PROJECT NUMBER: 3530-03-1245 Phase 01
DATE: 9/6/2003

SAMPLE ID	SAMPLE DEPTH (ft.)	SAMPLE TYPE	SOIL DESCRIPTION	SOIL CLASS.	% RETAINED NO. 4 SIEVE	% FINER NO. 200 SIEVE	NAT. MOIST. (%)	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.L.	ATTERBERG LIMITS P.I.	ORGANIC CONTENT (%)
BI-6	55 - 57	UD	Dark greenish gray fat CLAY	CH	0.0	99.8	52.2	69	30	39	
BI-6	103.5 - 105	Jar	Dark yellowish brown silty SAND	SM	0.0	6.0	16.4	NLL	NP	---	
BI-6	143.5 - 145	Jar	Dark greenish gray sandy lean CLAY	CL	0.0	55.3	19.5	24	12	12	
BI-7	43.5 - 45	Jar	Dark greenish gray fat CLAY	CH	0.0	99.4	51.3	57	15	42	
BI-7	78.5 - 80	Jar	Gray poorly graded SAND with silt	SP-SM	9.3	8.7	15.5	NLL	NP	---	
BI-7	108.5 - 110	Jar	Yellowish brown silty SAND	SM	2.7	15.1	18.8	NLL	NP	---	
BI-7	143.5 - 145	Jar	Yellowish brown clayey SAND	SC	0.0	45.8	16.4	23	14	9	
BI-7	163.5 - 165	Jar	Dark grayish brown clayey SAND	SC	0.6	32.0	19.7	23	15	8	
BI-8	38.5 - 40	Jar	Dark grayish brown fat CLAY with sand	CH	0.0	82.3	48.6	55	25	30	
BI-9	30 - 32	UD	Grayish brown lean CLAY	CL	0.0	99.1	55.9	46	22	24	
BI-10	35 - 37	UD	Yellowish brown poorly graded SAND	SP	0.0	3.9		NLL	NP	---	
BI-11	18.5 - 20	Jar	Gray poorly graded SAND	SP	0.0	4.5	24.3	NLL	NP	---	
BI-11	48.5 - 50	Jar	Reddish gray lean CLAY with sand	CL	0.0	78.3	31.6	46	18	28	
BI-12	28.5 - 30	Jar	Grayish brown silty SAND	SM	1.0	22.6	21.0	NLL	NP	---	
BI-12	53.5 - 55	Jar	Dark grayish brown lean CLAY with sand	CL	0.0	84.8	26.3	42	14	28	

NOTES:
1. Soil Classification in accordance with USCS or AASHTO standards
2. L.L.= Liquid Limit
   P.L.= Plastic Limit
   P.I. = Plasticity Index
3. Soil color determined from Munsell Soil Chart

Reviewed
Chan Tin
Manager, Laboratory Services

USCS Summary IRIB.xls

Mactec Engineering and Consulting, Inc.
22455 Davis Drive, Suite 100
Sterling, Virginia 20164
(703) 404-7000

Summary of Soil Classification Test Data

PROJECT NAME: Indian River Inlet Bridge
PROJECT NUMBER: 3530-03-'245 Phase 01
DATE: 9/6/2003

SAMPLE								ATTERBERG LIMITS			
ID	DEPTH (ft.)	TYPE	SOIL DESCRIPTION	SOIL CLASS.	% RETAINED NO. 4 SIEVE	% FINER NO. 200 SIEVE	NAT. MOIST. (%)	L.L.	P.L.	P.I.	ORGANIC CONTENT (%)
BI-8	58.5 - 59	Jar									41.8

NOTES:
1. Soil Classification in accordance with USCS or AASHTO standards
2. L.L.= Liquid Limit
   P.L.= Plastic Limit
   P.I. = Plasticity Index
3. Soil color determined from Munsell Soil Chart

9/11/03
Reviewed
Chan Tin
Manager, Laboratory Services

MACTEC ENGINEERING AND CONSULTING, INC
22455 Davis Drive, Suite 100
Sterling, Virginia 20164

Moisture Content Worksheet

ASTM D2216

Project Name: Indian River Inlet Bridge
Project Number: 3530-3-1245.01LAB
Date: 09/29/03

Reviewed by:

Sample ID	BI-1	BI-1	BI-1	BI-1	BI-1	BI-2	BI-2	BI-2
Depth (ft)	1 - 2.5	28.5 - 30	38.5 - 40	53.5 - 55	73.5 - 75	6 - 7.5	28.5 - 30	38.5 - 40
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	**19.9**	**54.8**	**47.5**	**59.5**	**17.0**	**18.2**	**61.9**	**60.3**

Sample ID	BI-2	BI-2	BI-2	BI-3	BI-3	BI-4	BI-4	BI-4
Depth (ft)	53.5 - 55	68.5 - 70	108.5 - 110	13.5 - 15	78.5 - 80	13.5 - 15	28.5 - 30	53.5 - 55
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	**63.6**	**64.7**	**25.8**	**19.7**	**86.9**	**17.4**	**64.2**	**66.0**

Sample ID	BI-4	BI-5	BI-5	BI-5	BI-5	BI-5	BI-5	BI-6
Depth (ft)	78.5 - 80	28.5 - 30	38.5 - 40	53.5 - 55	78.5 - 80	133.5 - 135	143.5 - 145	13.5 - 15
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	**67.8**	**15.8**	**44.4**	**56.5**	**41.7**	**23.5**	**26.8**	**18.9**

Sample ID	BI-6	BI-6	BI-6	BI-6	BI-6	BI-7	BI-7	BI-7
Depth (ft)	33.5 - 35	73.5 - 75	88.5 - 90	103.5 - 105	143.5 - 145	43.5 - 45	78.5 - 80	108.5 - 110
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	Jar
Moisture Content (%)	**17.6**	**60.9**	**63.0**	**16.4**	**19.5**	**51.3**	**15.5**	**18.8**

Sample ID	BI-7	BI-7	BI-8	BI-11	BI-11	BI-12	BI-12	
Depth (ft)	143.5 - 145	163.5 - 165	38.5 - 40	18.5 - 20	48.5 - 49.5	28.5 - 30	53.5 - 55.0	
Sample Type	Jar	Jar	Jar	Jar	Jar	Jar	Jar	
Moisture Content (%)	**16.4**	**19.7**	**44.8**	**24.3**	**31.6**	**21.0**	**26.3**	

Sample ID								
Depth (ft)								
Sample Type								
Moisture Content (%)								

METHOD OF TEST FOR pH OF SOILS

The pH level measures the degree of alkalinity or acidity of a soil. The pH gives an indication of corrosion potential to buried structures. A scale of 1 (very acidic) to 14 (very alkaline), is used where a pH of 7 indicates neutral conditions.

The electrometric measurement of the pH of soils in suspension in distilled water is made with a potentiometer using a glass calomel electrode system. Standard pH buffer solutions are used to calibrate the meter prior to each test. Approximately 50 grams of soil are mixed with 50 ml of distilled water in a 100-ml beaker, the solution is stirred occasionally for five minutes, and the pH read in the meter. This method is California Division of Highways Method 643-C.

Standard pH buffer solutions are used to calibrate the meter prior to each test.

METHOD OF LABORATORY MEASUREMENT OF SOIL RESISTIVITY

The resistivity of soil is a measure of its electrical conductivity and corrosion potential. The method used by MACTEC Engineering and Consulting, Inc., is the California Division of Highways Test Method No. 643-C, 1972.

The test apparatus consists of a Plexiglas box 6.5 inches long by 4.5 inches wide by 2 inches deep. Two stainless steel electrodes line opposite sides of the test box. A representative soil sample passing the No. 8 sieve is thoroughly mixed with a small amount of distilled water and lightly compacted in the test box. The resistance of the soil is then measured with an ohmmeter. Based on the geometry of the test box the resistance is then converted to resistivity. A small amount of distilled water is again added to the soil and the test repeated. This procedure is repeated until a curve of moisture content versus resistivity is established. The reported resistivity value is the minimum value of soil resistivity at any moisture content.

MACTEC ENGINEERING AND CONSULTING, INC

CHEMICAL TEST RESULTS

PROJECT NAME: Indian River Inlet Bridges

PROJECT NUMBER: 3530-03-1245 Task 01

DATE: 9/22/03

SAMPLE			RESISTIVITY	MC	
ID	DEPTH (ft.)	TYPE	(ohm cm)	(%)	pH
BI-6	33.5-35	Jar	3,100	1.2	8.2
			1,200	3.3	
			800	5.3	
			600	8.1	
			310	12.0	
			250	16.0	
			230	20.5	

NOTES: *ND = Not Detected*

Reviewed by: 9/23/03

BI-6 Chem.xls

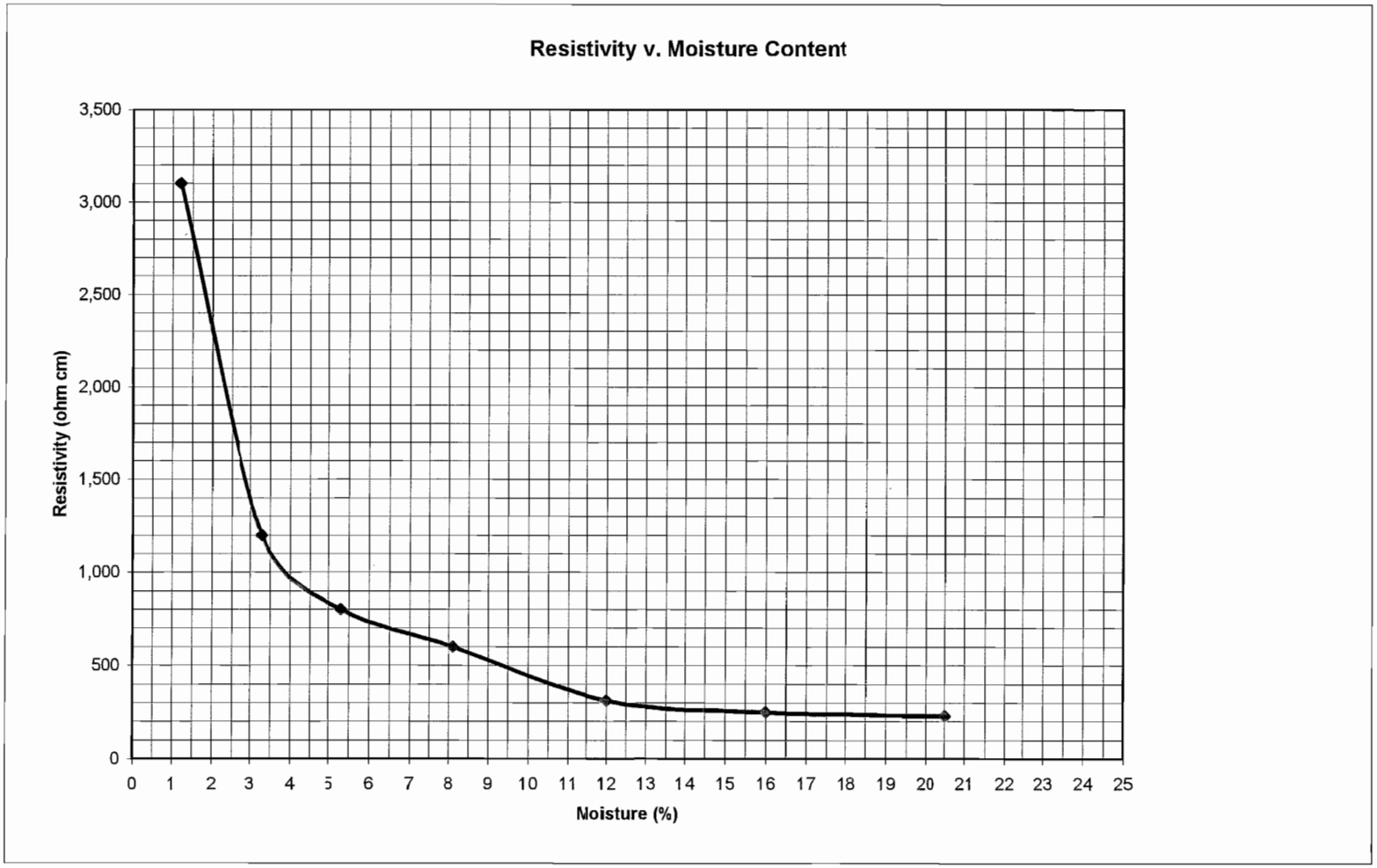
MACTEC ENGINEERING AND CONSULTING, INC.

CHEMICAL TEST RESULTS

PROJECT NAME: Indian River Inlet Bridges

PROJECT NUMBER: 3530-03-1245 Task 01

DATE: 9/22/2003



MACTEC ENGINEERING AND CONSULTING, INC

CHEMICAL TEST RESULTS

PROJECT NAME: Indian River Inlet Bridges

PROJECT NUMBER: 3530-03-1245 Task 01

DATE: 9/23/03

SAMPLE			RESISTIVITY	MC	
ID	DEPTH (ft.)	TYPE	(ohm cm)	(%)	pH
BI-7	48.5	50	3,400	14.1	6.1
			1,600	20.5	
			410	27.3	
			170	33.9	
			150	40.7	
			150	47.4	
			170	54.1	

NOTES: *ND = Not Detected*

Reviewed by: 9/25/03

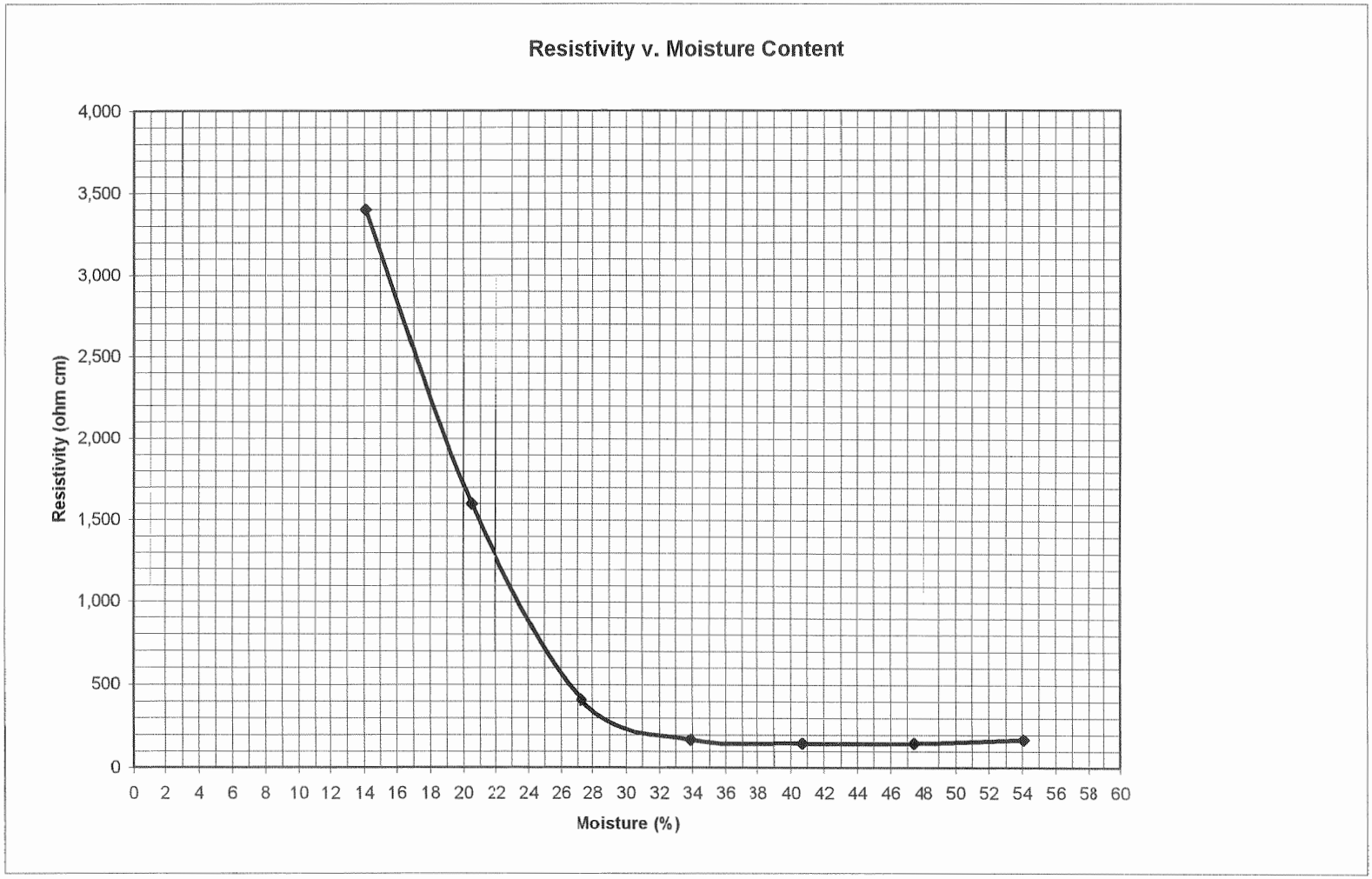
MACTEC ENGINEERING AND CONSULTING, INC.

CHEMICAL TEST RESULTS

PROJECT NAME: Indian River Inlet Bridges

PROJECT NUMBER: 3530-03-1245 Task 01

DATE: 9/23/2003



TRIAXIAL SHEAR TESTS

Triaxial shear tests are used to measure the stress-strain characteristics and strength of soils under various loading conditions expected in the field. Tests may be undrained, semi-drained or fully-drained to simulate field behavior. Triaxial shear tests are performed in accordance with ASTM D 4767.

Triaxial shear tests are conducted either on relatively undisturbed samples or on remolded/compacted specimens of soil. Diameters of specimens range between 1.4 and 6.0 inches and a minimum length/diameter ratio of 2 is standard. Either stress-controlled or strain-controlled tests are performed. Loads are measured using proving rings or electronic load cells, deformations are monitored using electronic LVDT's or dial indicators, and pore water pressure is measured with transducers. Normally, samples are saturated, consolidated and sheared to failure under compression loading, although extension loading is also possible.

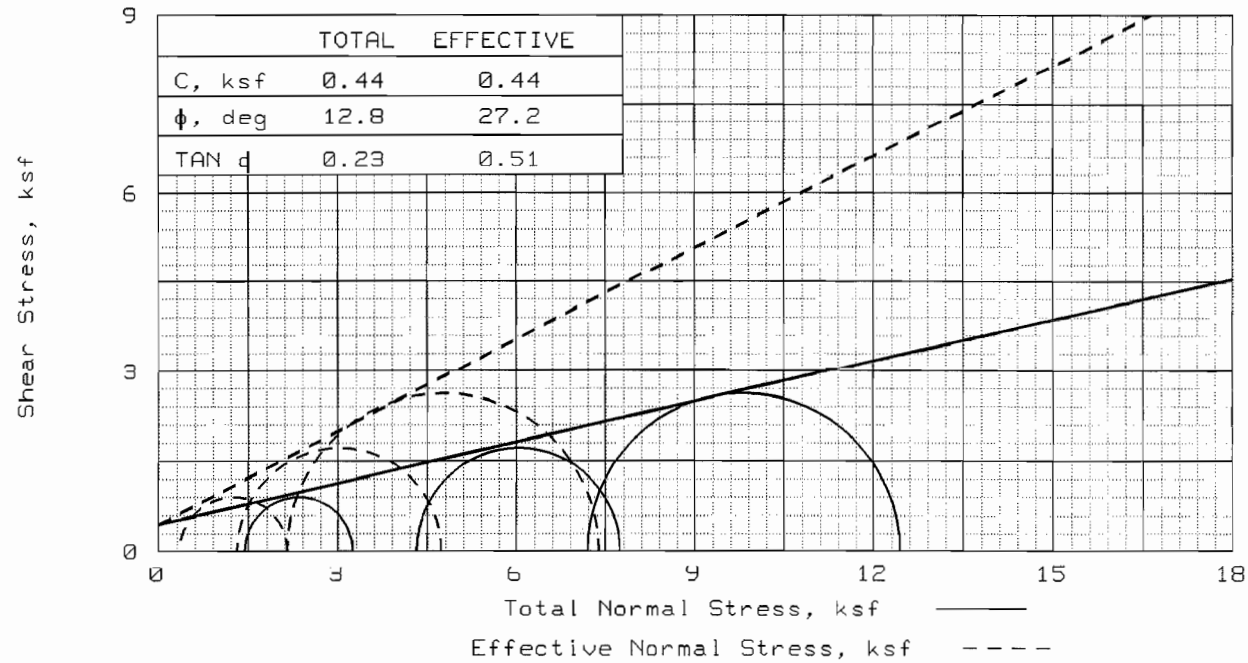
Various consolidation conditions may be implemented in the triaxial apparatus. Stress and deformation occur in three dimensions under triaxial conditions. The three most common types of triaxial compression tests in routine use include:

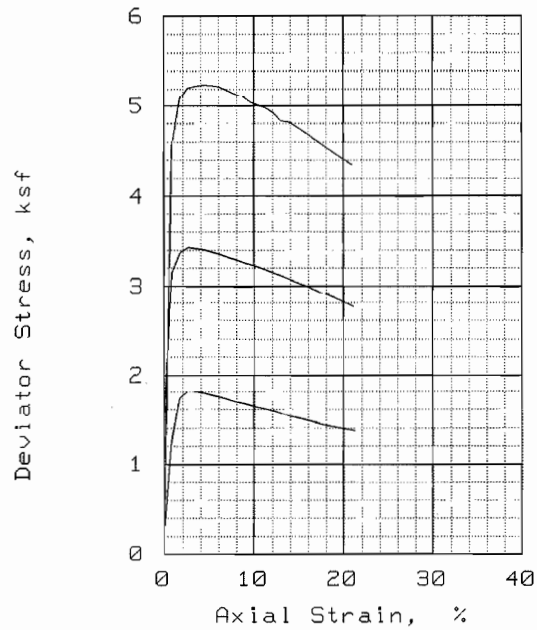
CU = isotropically-consolidated undrained (i.e., CIU)

CD = isotropically-consolidated drained (i.e., CID)

UU = unconsolidated-undrained shear tests

The results of the tests are presented in terms of stress-strain curves and stress paths to failure. Alternatively, the strength may be represented by Mohr-Coulomb circles at failure. Short-term undrained strengths may be represented by total stress parameters (ϕ and C) or by undrained shear strengths (Su). The long-term drained strengths (condition of zero excess pore pressure response) are described by the effective stress parameters (ϕ and C').





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	49.2	51.7	53.7
	DRY DENSITY, pcf	71.3	69.9	68.9
	SATURATION, %	96.8	98.9	100.0
	VOID RATIO	1.383	1.411	1.448
	DIAMETER, in	2.85	2.84	2.85
	HEIGHT, in	5.50	5.50	5.58
AT TEST	WATER CONTENT, %	46.8	42.7	38.1
	DRY DENSITY, pcf	73.8	78.2	81.9
	SATURATION, %	97.8	99.7	97.1
	VOID RATIO	1.302	1.156	1.059
	DIAMETER, in	2.80	2.68	2.61
	HEIGHT, in	5.50	5.50	5.58
Strain rate, in/min		0.0016	0.0016	0.0016
BACK PRESSURE, ksf		5.62	5.62	5.62
CELL PRESSURE, ksf		7.06	9.94	12.82
FAILURE STRESS, ksf		1.81	3.43	5.25
TOTAL PORE PR., ksf		6.71	8.63	10.67
ULTIMATE STRESS, ksf		1.37	2.76	4.35
TOTAL PORE PR., ksf		6.81	9.03	11.13
$\bar{\sigma}_1$ FAILURE, ksf		2.16	4.74	7.39
$\bar{\sigma}_3$ FAILURE, ksf		0.35	1.31	2.15

TYPE OF TEST:
CU with Pore Pressures
SAMPLE TYPE: Undisturbed
DESCRIPTION: Dark gray fat CLAY (CH)
LL= 54 PL= 27 PI= 27
SPECIFIC GRAVITY= 2.72
REMARKS:

9/10/03

Fig. No.: 1

CLIENT:

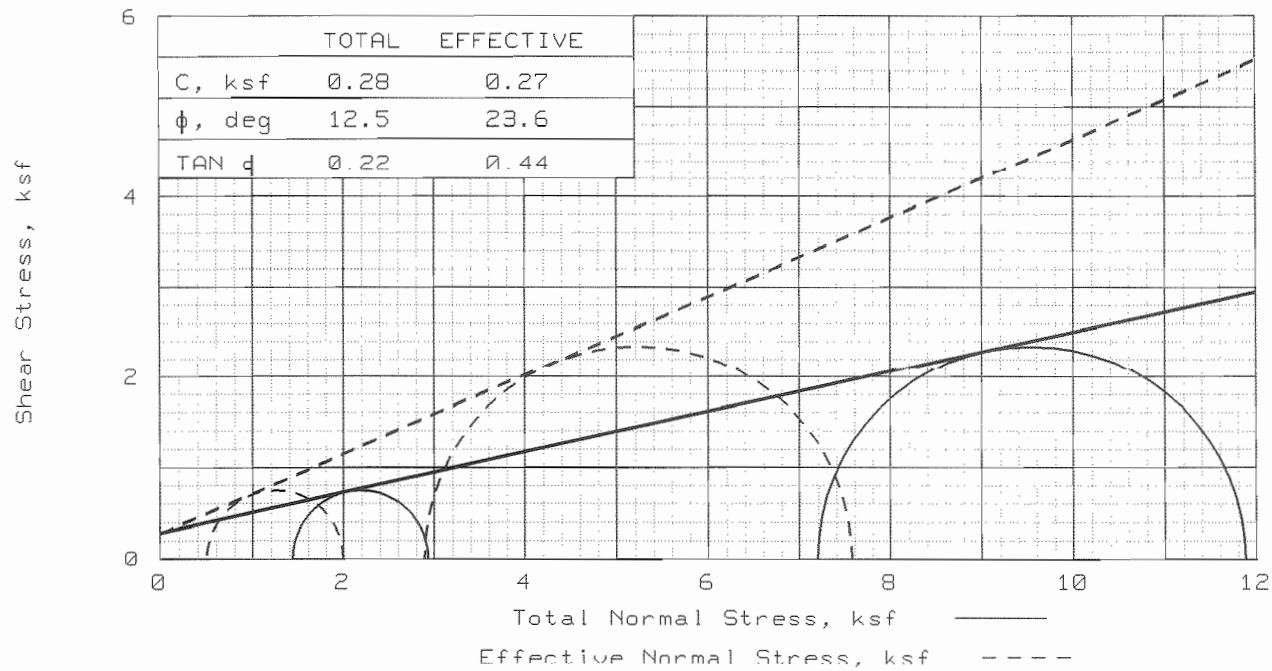
PROJECT: Indian River Inlet Bridges

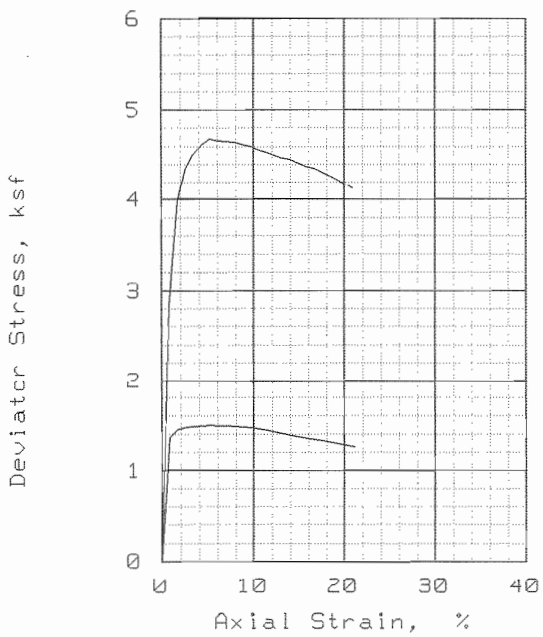
SAMPLE LOCATION: BI-3 UD-8 @ 40' - 42'

PROJ. NO.: 3530-03-1245 Phase 01 DATE: 9/3/03

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES





SAMPLE NO.:		1	2
INITIAL	WATER CONTENT, %	59.5	58.9
	DRY DENSITY, pcf	62.1	62.9
	SATURATION, %	93.7	94.6
	VOID RATIO	1.714	1.680
	DIAMETER, in	2.84	2.85
	HEIGHT, in	5.50	5.55
AT TEST	WATER CONTENT, %	59.8	42.8
	DRY DENSITY, pcf	62.7	76.5
	SATURATION, %	95.8	96.0
	VOID RATIO	1.686	1.202
	DIAMETER, in	2.83	2.58
	HEIGHT, in	5.50	5.55
Strain rate, in/min		0.0016	0.0016
BACK PRESSURE, ksf		5.62	4.18
CELL PRESSURE, ksf		7.06	11.38
FAILURE STRESS, ksf		1.49	4.68
TOTAL PORE PR., ksf		6.55	8.48
ULTIMATE STRESS, ksf		1.26	4.12
TOTAL PORE PR., ksf		6.47	8.77
$\bar{\sigma}_1$ FAILURE, ksf		2.00	7.58
$\bar{\sigma}_3$ FAILURE, ksf		0.50	2.80

TYPE OF TEST:
CU with Pore Pressures
SAMPLE TYPE: Undisturbed
DESCRIPTION: Dark greenish gray elastic SILT (MH)
LL= 82 PL= 42 PI= 40
SPECIFIC GRAVITY- 2.7
REMARKS: 9/24/03

CLIENT:

PROJECT: Indian River Inlet Bridges

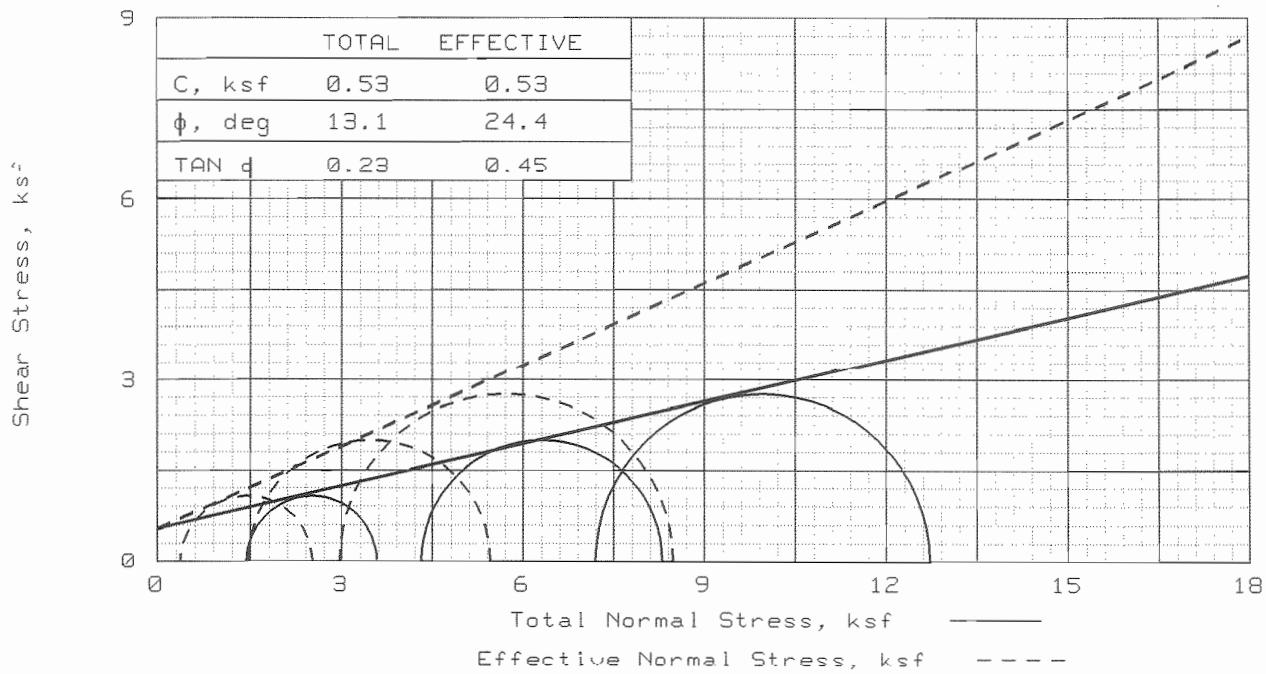
SAMPLE LOCATION: Boring BI-3 @ 50' - 52'

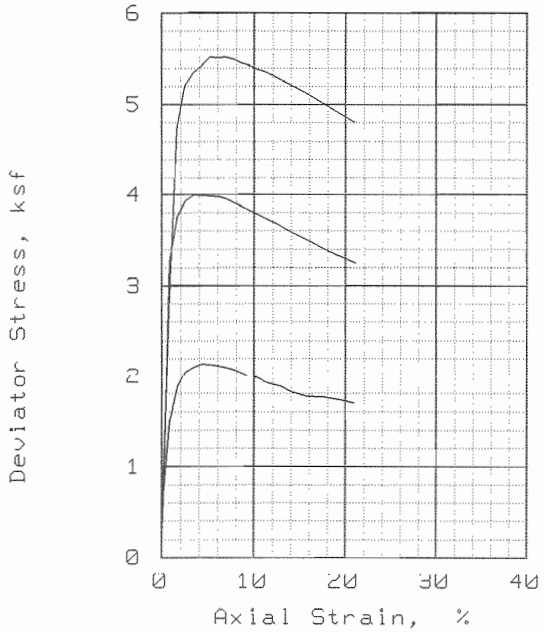
PROJ. NO.: 3530-03-1245 Task 01 DATE: 9/18/03

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES

Fig. No.: 1





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	52.2	48.1	52.0
	DRY DENSITY, pcf	68.6	73.2	68.9
	SATURATION, %	96.7	99.6	97.1
	VOID RATIO	1.457	1.304	1.447
	DIAMETER, in	2.86	2.84	2.83
	HEIGHT, in	5.56	5.53	5.57
AT TEST	WATER CONTENT, %	48.5	39.1	40.2
	DRY DENSITY, pcf	72.6	81.9	80.7
	SATURATION, %	99.1	99.8	99.6
	VOID RATIO	1.321	1.059	1.090
	DIAMETER, in	2.78	2.69	2.61
	HEIGHT, in	5.56	5.53	5.57
Strain rate, in/min		0.0016	0.0016	0.0016
BACK PRESSURE, ksf		4.18	5.62	5.62
CELL PRESSURE, ksf		5.62	9.94	12.82
FAILURE STRESS, ksf		2.14	3.99	5.52
TOTAL PORE PR., ksf		5.24	8.47	9.85
ULTIMATE STRESS, ksf		1.70	3.24	4.81
TOTAL PORE PR., ksf		5.37	8.83	10.32
$\bar{\sigma}_1$ FAILURE, ksf		2.51	5.46	8.49
$\bar{\sigma}_3$ FAILURE, ksf		0.37	1.47	2.97

TYPE OF TEST:
CU with Pore Pressures
SAMPLE TYPE: Undisturbed
DESCRIPTION: Dark gray fat CLAY (CH)

SPECIFIC GRAVITY= 2.7
REMARKS:

9/23/03

CLIENT:

PROJECT: Indian River Inlet Bridges

SAMPLE LOCATION: Boring DI G @ 55' - 57'

PROJ. NO.: 3530-03-1245 Phase 01 DATE: 9/22/03

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES

Fig. No.: 1

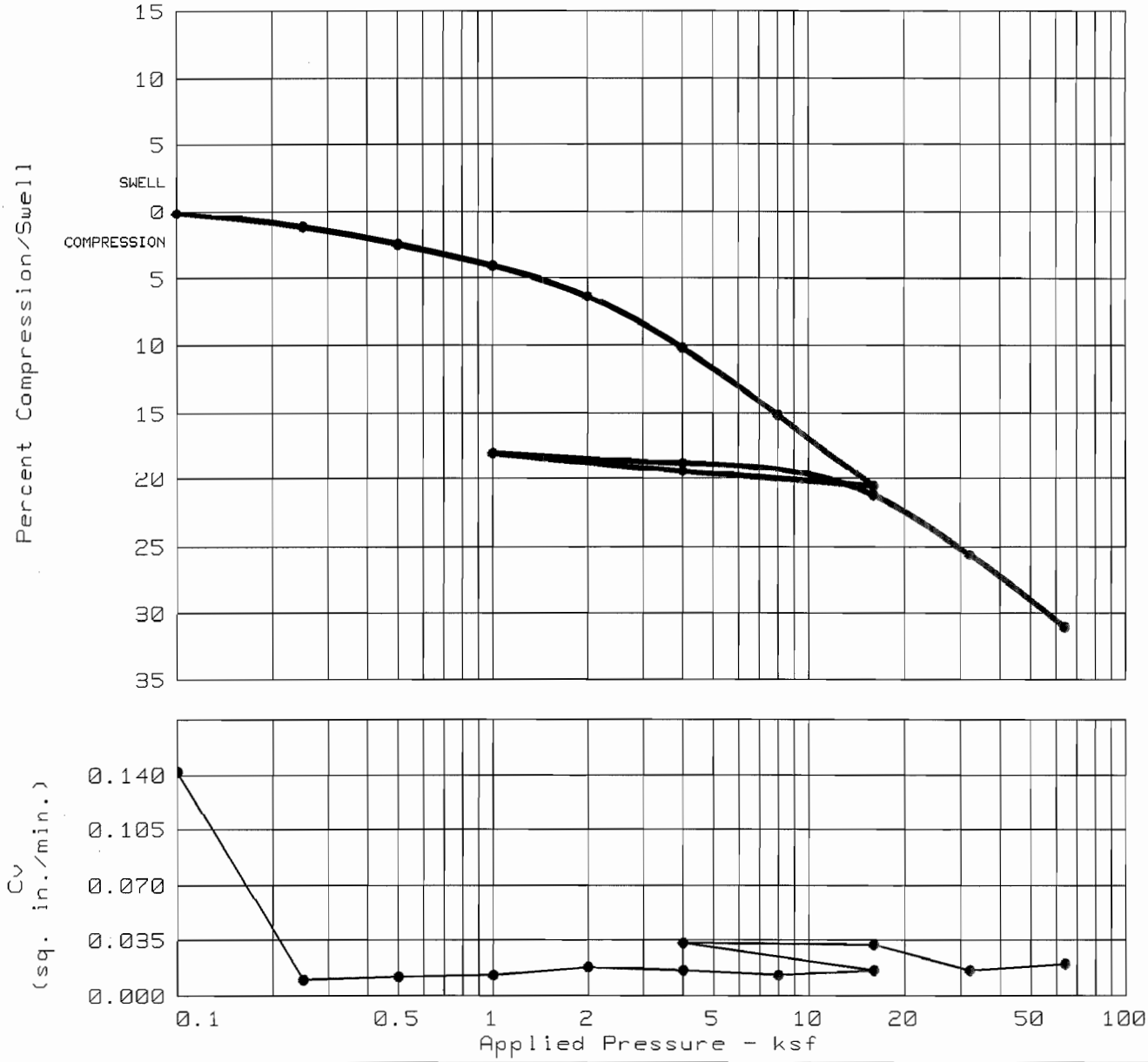
CONSOLIDATION TESTS

One-dimensional consolidation tests are conducted to determine the compression characteristics of soils under applied vertical stresses. Test results may provide information including the magnitude of settlement, the time-rate effects, and the past stress history of the soil.

Tests are conducted in general accordance with ASTM D 2435. A soil sample 2.5 inches in diameter and 1.0 inch thick is fitted into a stainless steel ring, with porous stones above and below the soil. The sample is then placed in a loading device and subjected to a series of increasing vertical stresses under conditions of no lateral strain. Time-deformation readings are recorded for each applied stress, and the resultant strain or void ratio is calculated.

Typically, test results include a plot of void ratio or percent strain versus the log of the applied stress. The virgin compression index (C_c), the rebound or swelling index (C_s), the coefficient of consolidation (C_V), the constrained modulus ($M=1/m_v$), and the preconsolidation stress (P'_c) are all important parameters obtained from this test.

CONSOLIDATION TEST REPORT



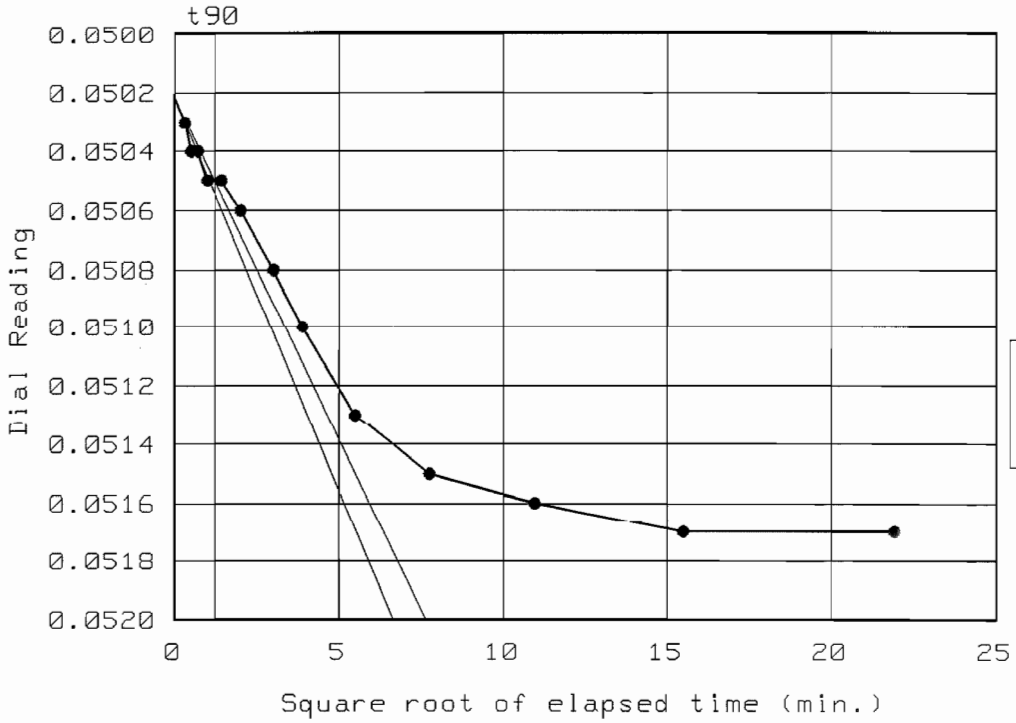
Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
87.8 %	45.7 %	72.9	54	27	2.700	1.4060

TEST RESULTS	MATERIAL DESCRIPTION
	Dark gray fat CLAY (CH)
Project No.: 3530-03-1245 Phase 01 Project: Indian River Inlet Bridges Location: Boring BI-3 @ 40' - 42' Date: 9/3/03	Class: Fat CLAY (CH) Remarks: 9/23/03
CONSOLIDATION TEST REPORT **LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.**	Fig. No. 1 1

Dial Reading vs. Time

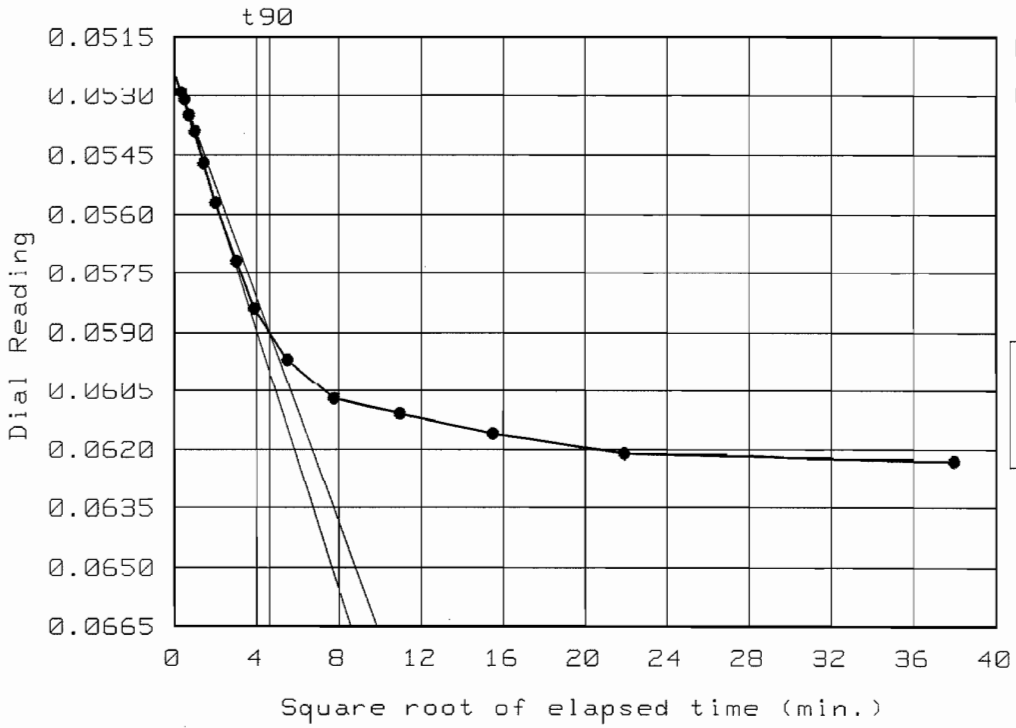
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 40' - 42'

Date: 9/3/03



Load No.= 1
Load= 0.10 ksf
D_0 = 0.0502
D_{90} = 0.0505
D_{100}= 0.0505
T_{90}= 1.50 min.

C_v @ T_{90} =
.142 in.^{2}/min.



Load No.= 2
Load= 0.25 ksf
D_0 = 0.0524
D_{90} = 0.0590
D_{100}= 0.0597
T_{90}= 21.33 min.

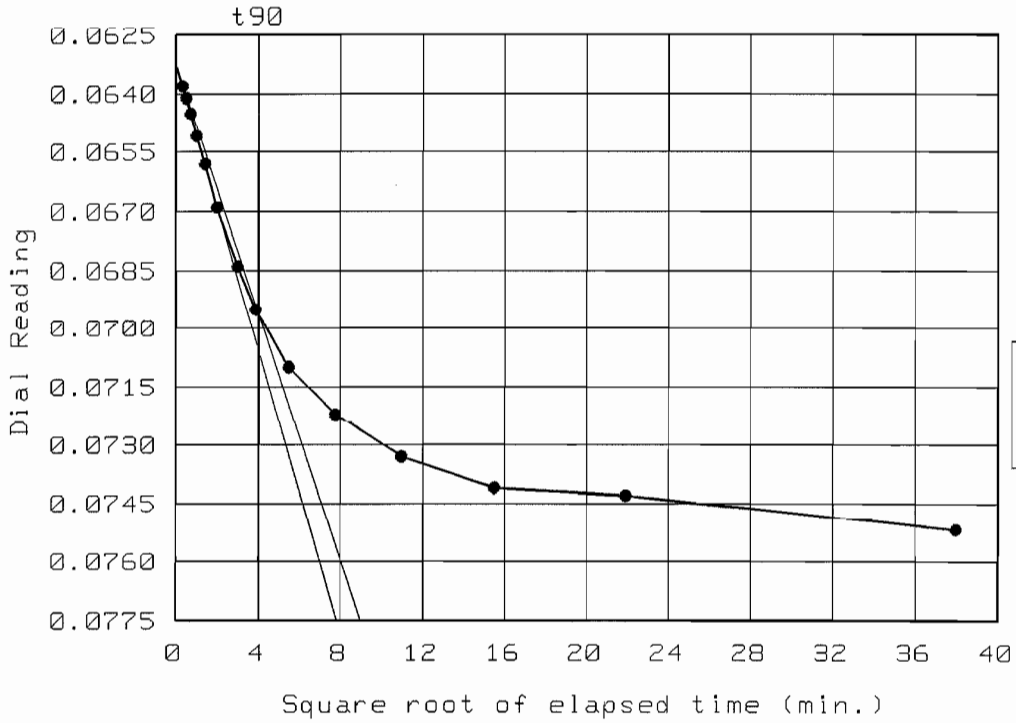
C_v @ T_{90} =
.010 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

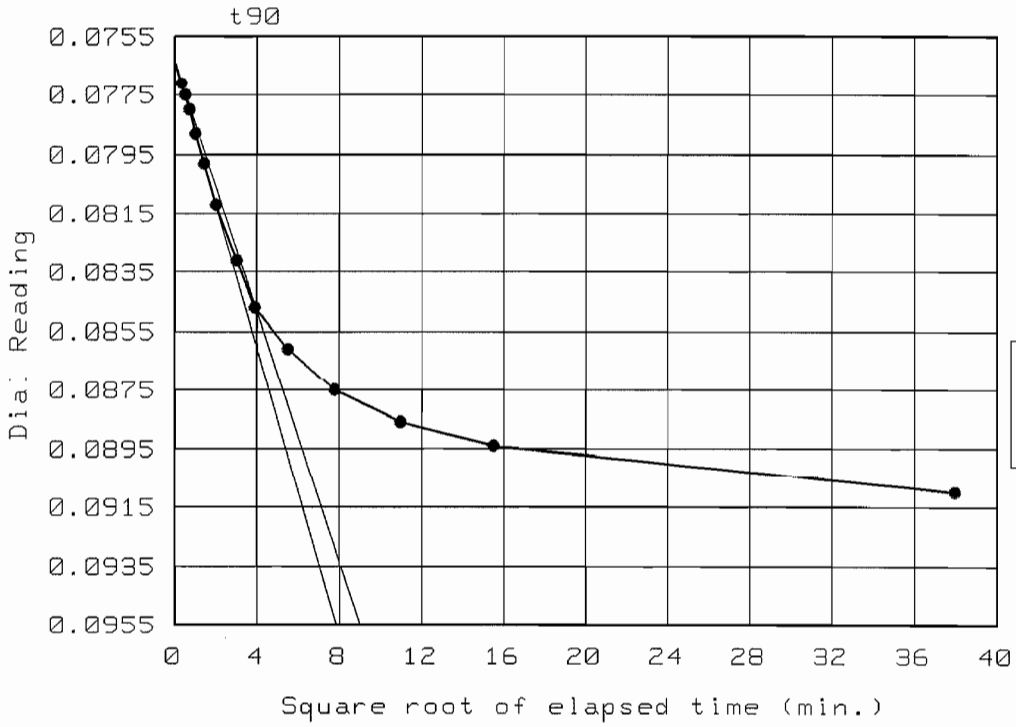
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 40' - 42'

Date: 9/3/03



Load No.= 3
Load= 0.50 ksf
D_0 = 0.0632
D_{90} = 0.0697
D_{100}= 0.0704
T_{90}= 16.39 min.

C_v @ T_{90} =
.012 in.^{2}/min.



Load No.= 4
Load= 1.00 ksf
D_0 = 0.0763
D_{90} = 0.0848
D_{100}= 0.0857
T_{90}= 15.80 min.

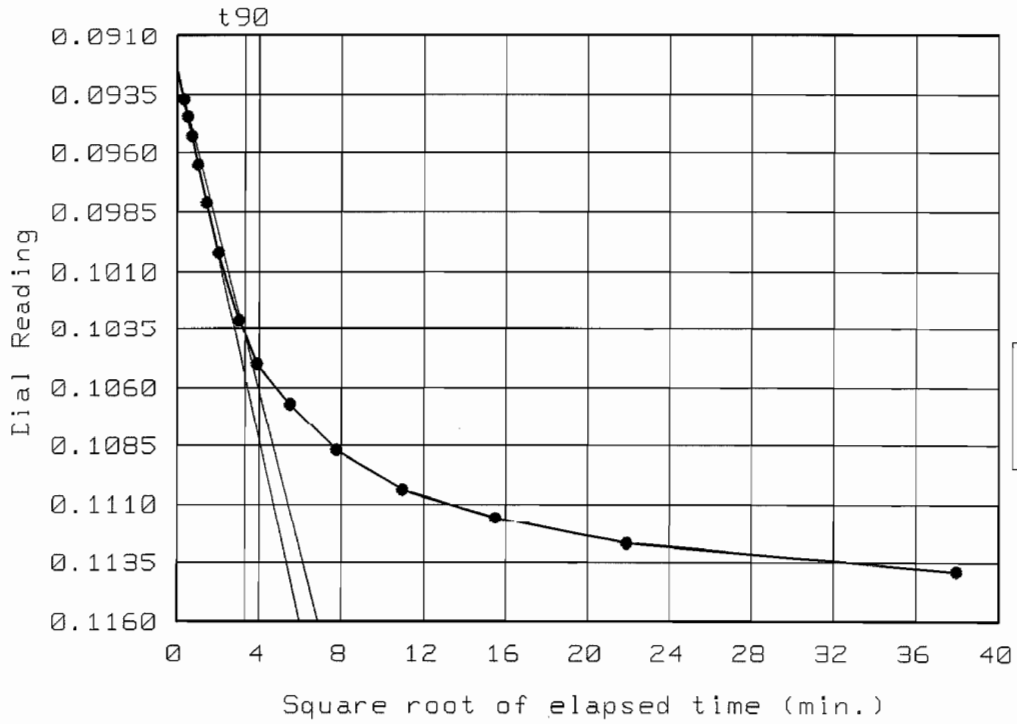
C_v @ T_{90} =
.013 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

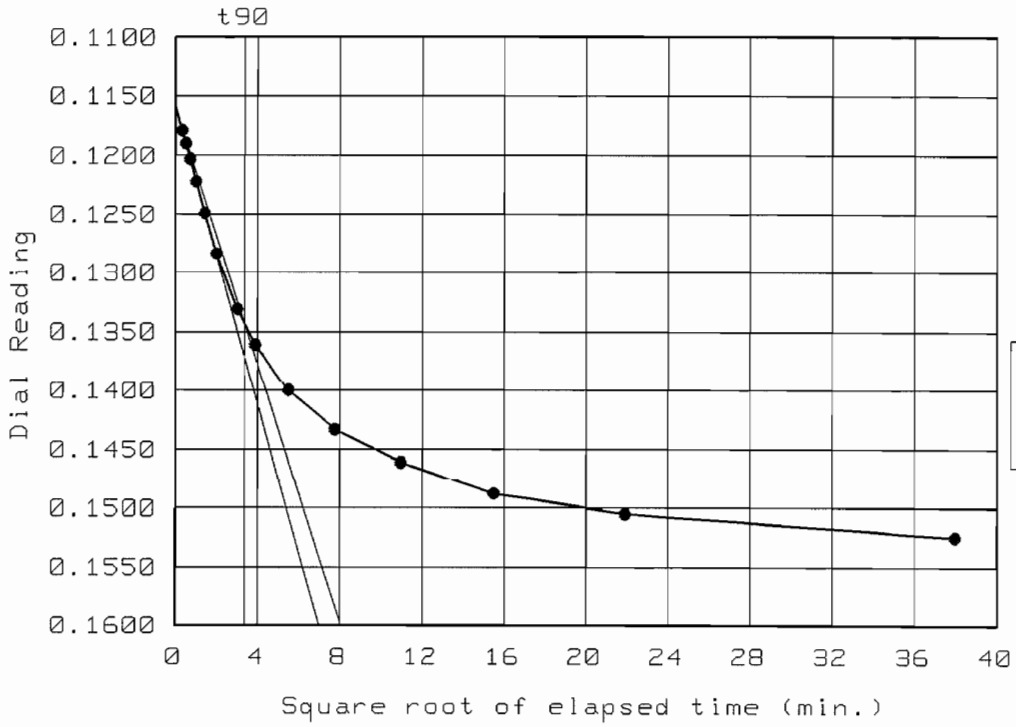
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 40' - 42'

Date: 9/3/03



Load No.= 5
Load= 2.00 ksf
D_0 = 0.0925
D_{90} = 0.1037
D_{100}= 0.1050
T_{90}= 10.82 min.

C_v @ T_{90} =
.018 in.^{2}/min.



Load No.= 6
Load= 4.00 ksf
D_0 = 0.1159
D_{90} = 0.1343
D_{100}= 0.1364
T_{90}= 11.25 min.

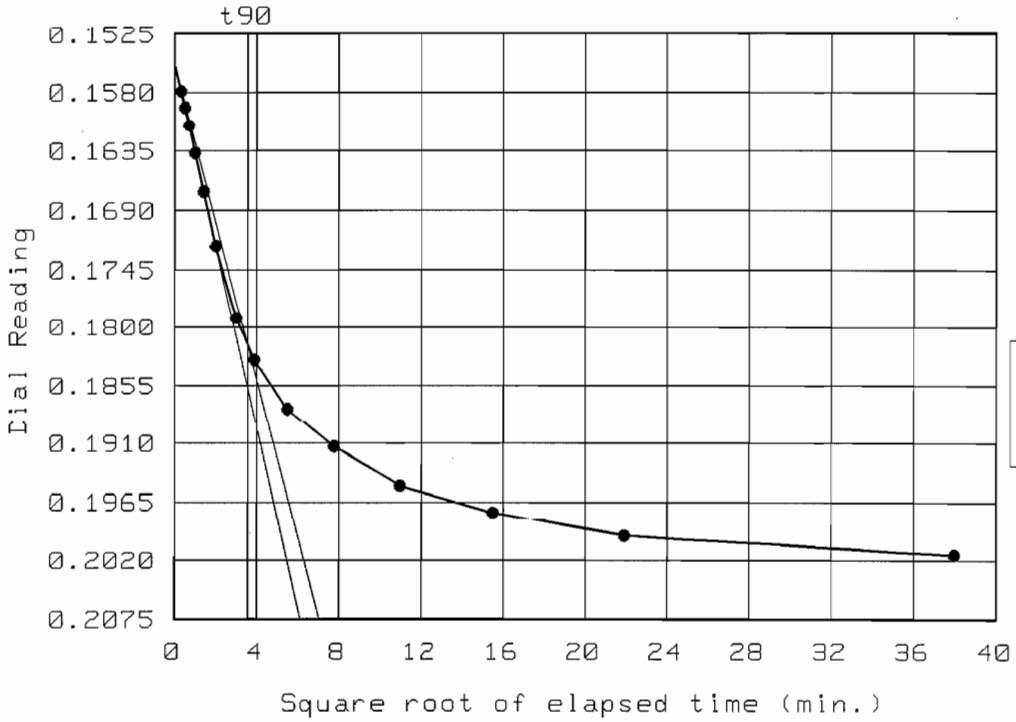
C_v @ T_{90} =
.016 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

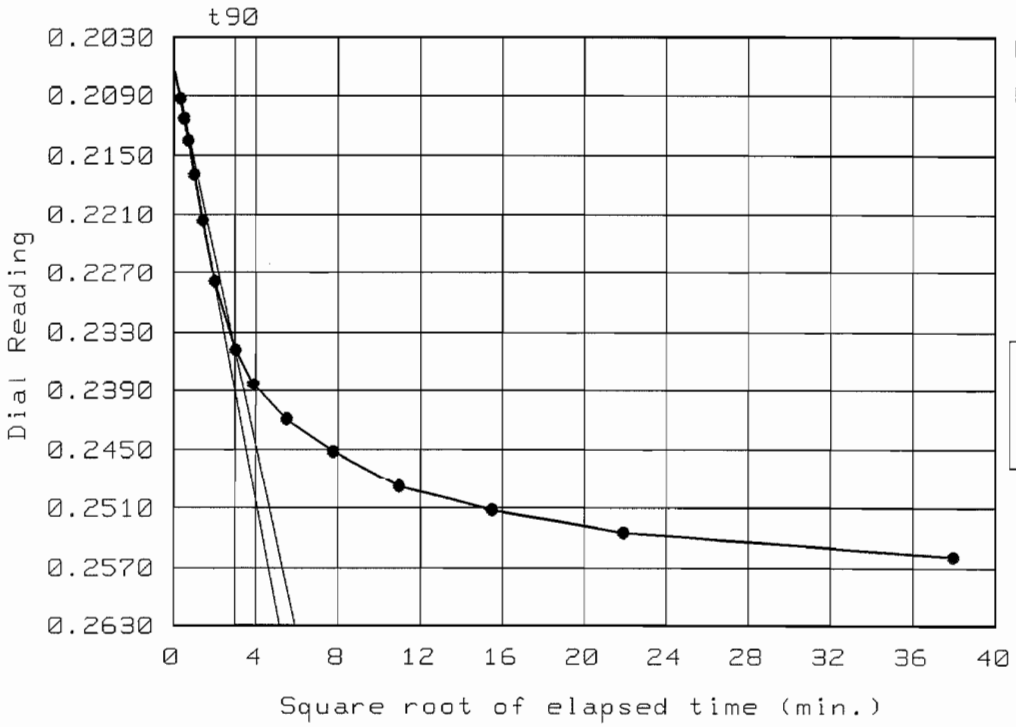
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 40' - 42'

Date: 9/3/03



Load No.= 7
Load= 8.00 ksf
D_0 = 0.1552
D_{90} = 0.1816
D_{100}= 0.1846
T_{90}= 12.63 min.

C_v @ T_{90} =
.013 in.^{2}/min.



Load No.= 8
Load= 16.00 ksf
D_0 = 0.2058
D_{90} = 0.2347
D_{100}= 0.2380
T_{90}= 8.95 min.

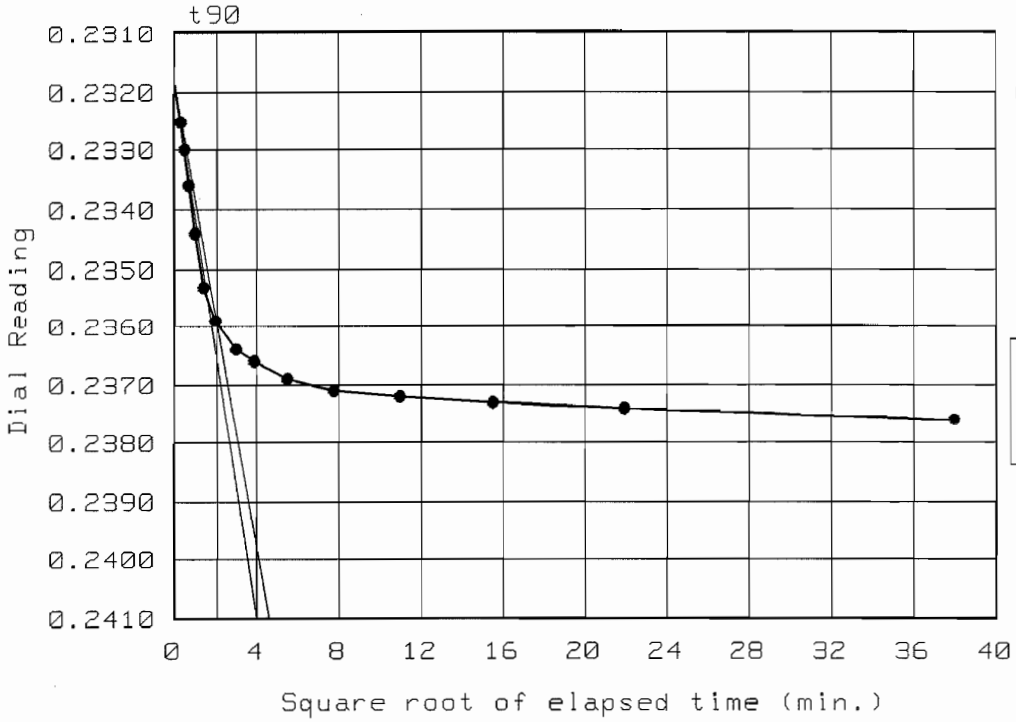
C_v @ T_{90} =
.016 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

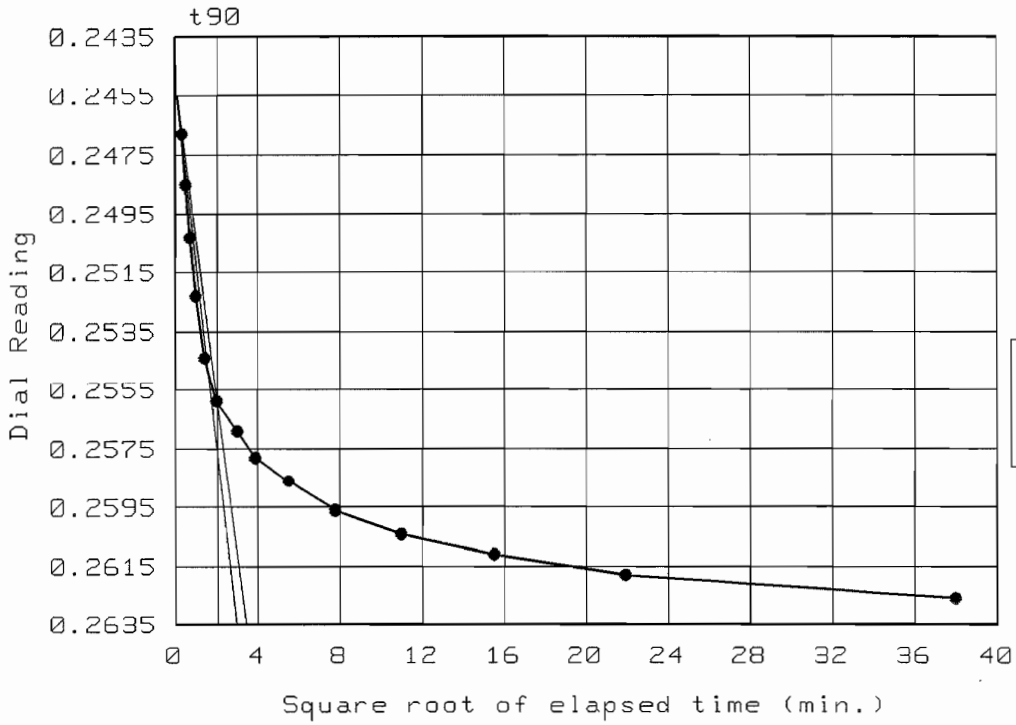
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 40' - 42'

Date: 9/3/03



Load No.= 11
Load= 4.00 ksf
D_0 = 0.2318
D_{90} = 0.2359
D_{100}= 0.2364
T_{90}= 4.28 min.

C_v @ T_{90} =
.033 in.^{2}/min.



Load No.= 12
Load= 16.00 ksf
D_0 = 0.2448
D_{90} = 0.2559
D_{100}= 0.2572
T_{90}= 4.19 min.

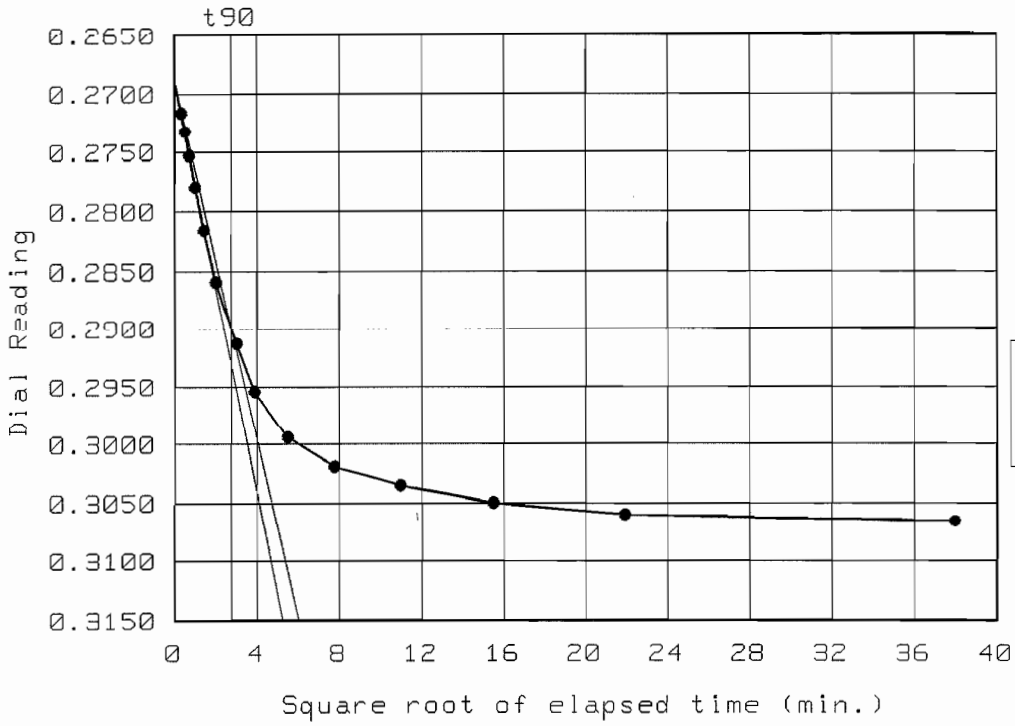
C_v @ T_{90} =
.032 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

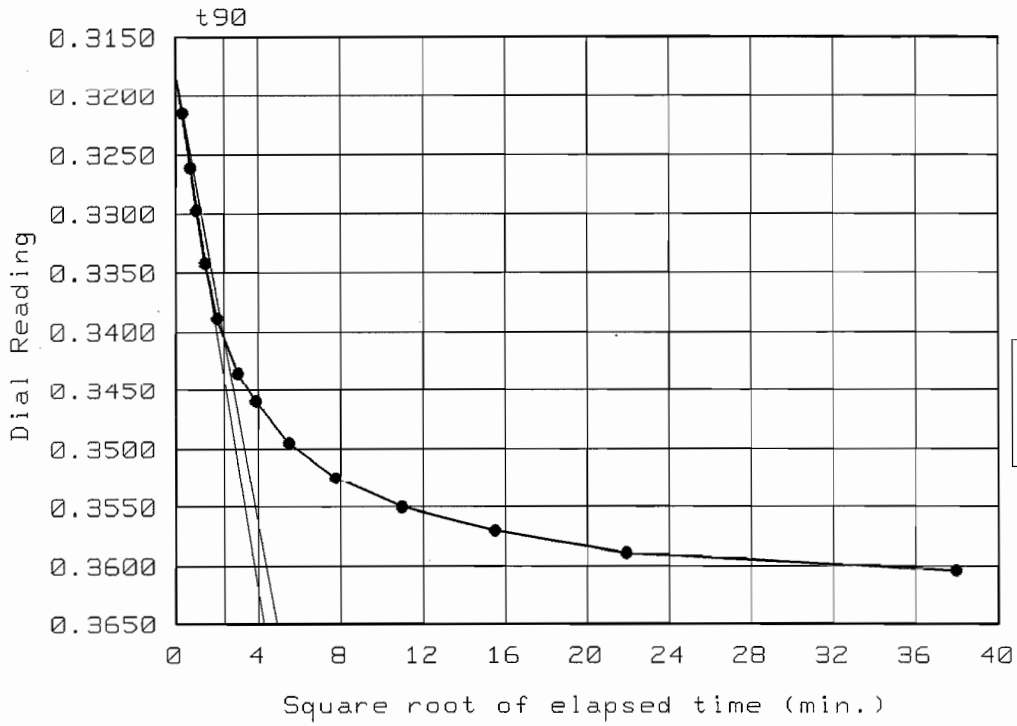
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 40' - 42'

Date: 9/3/03



Load No.= 13
Load= 32.00 ksf
D_0 = 0.2688
D_{90} = 0.2900
D_{100}= 0.2923
T_{90}= 7.60 min.

C_v @ T_{90} =
.016 in.^{2}/min.



Load No.= 14
Load= 64.00 ksf
D_0 = 0.3180
D_{90} = 0.3405
D_{100}= 0.3430
T_{90}= 5.50 min.

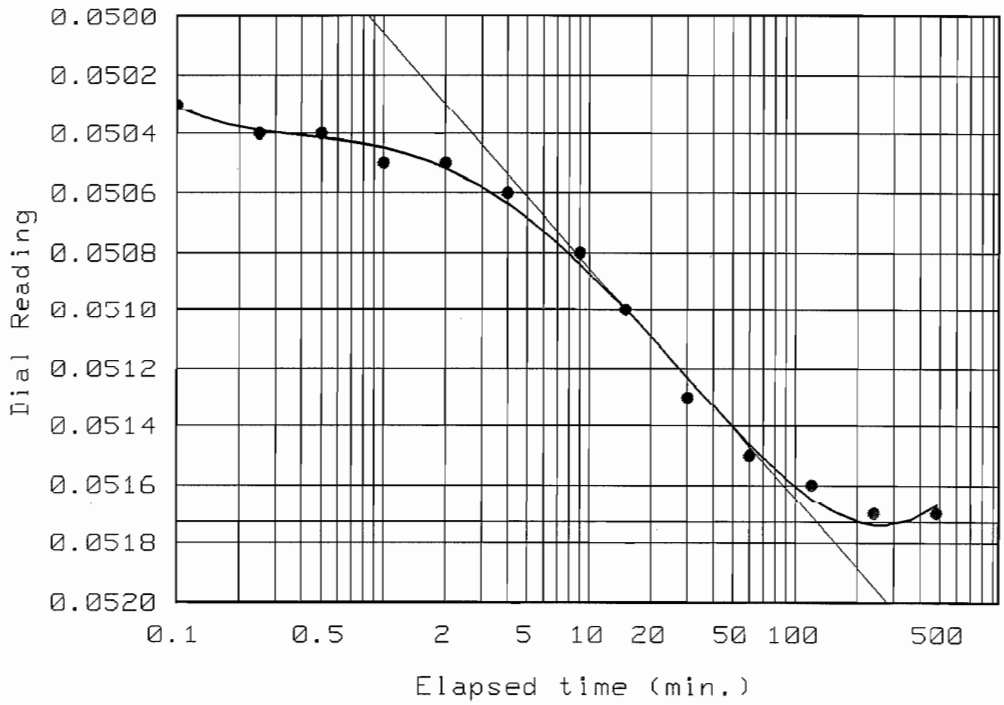
C_v @ T_{90} =
.020 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 40' - 42'

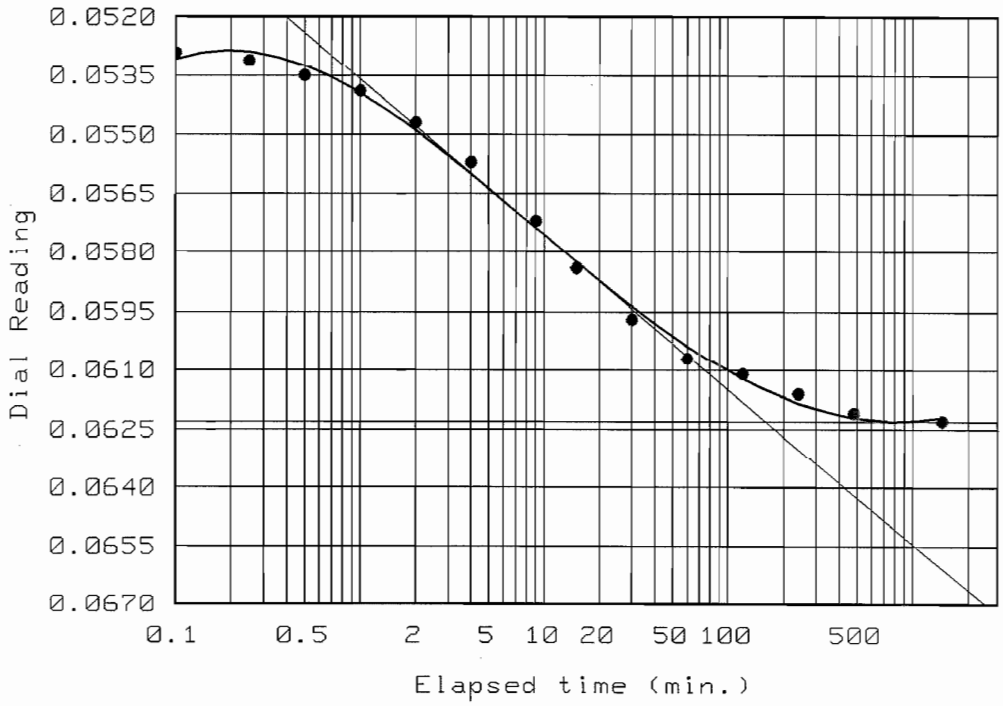
Date: 9/3/03



Load No.= 1
Load= 0.10 ksf
D_0 = 0.0502
D_{50} = 0.0510
D_{100}= 0.0517
T_{50}= 13.77 min.

C_v @ T_{50} = .004 in.^{2}/min.

C_α= 0.000



Load No.= 2
Load= 0.25 ksf
D_0 = 0.0530
D_{50} = 0.0577
D_{100}= 0.0623
T_{50}= 10.66 min.

C_v @ T_{50} = .005 in.^{2}/min.

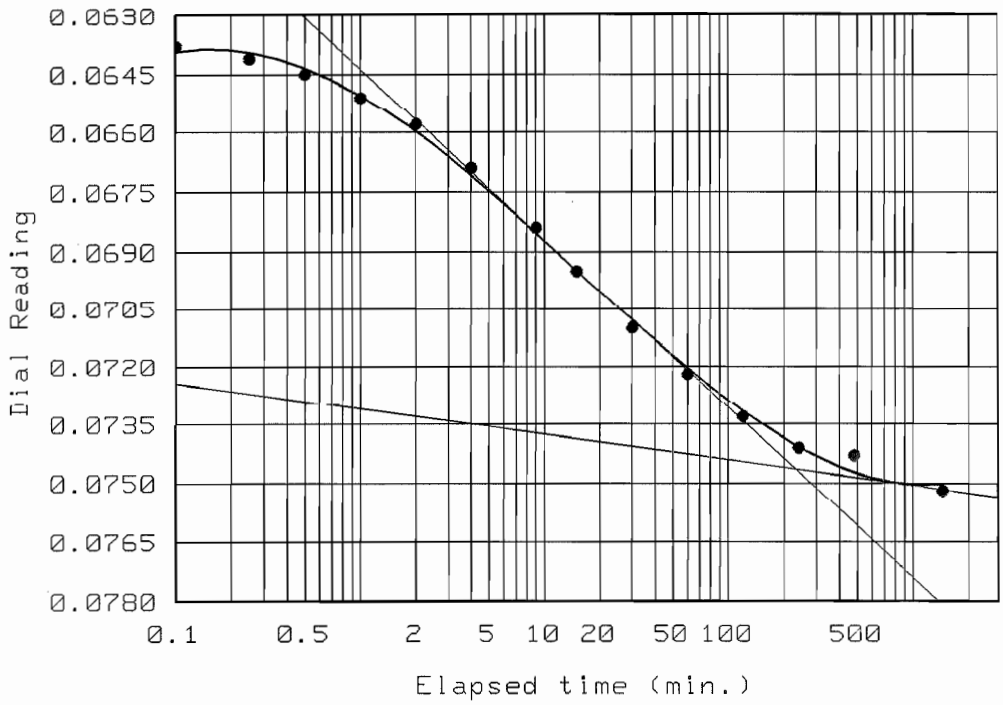
C_α= 0.000

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 40' - 42'

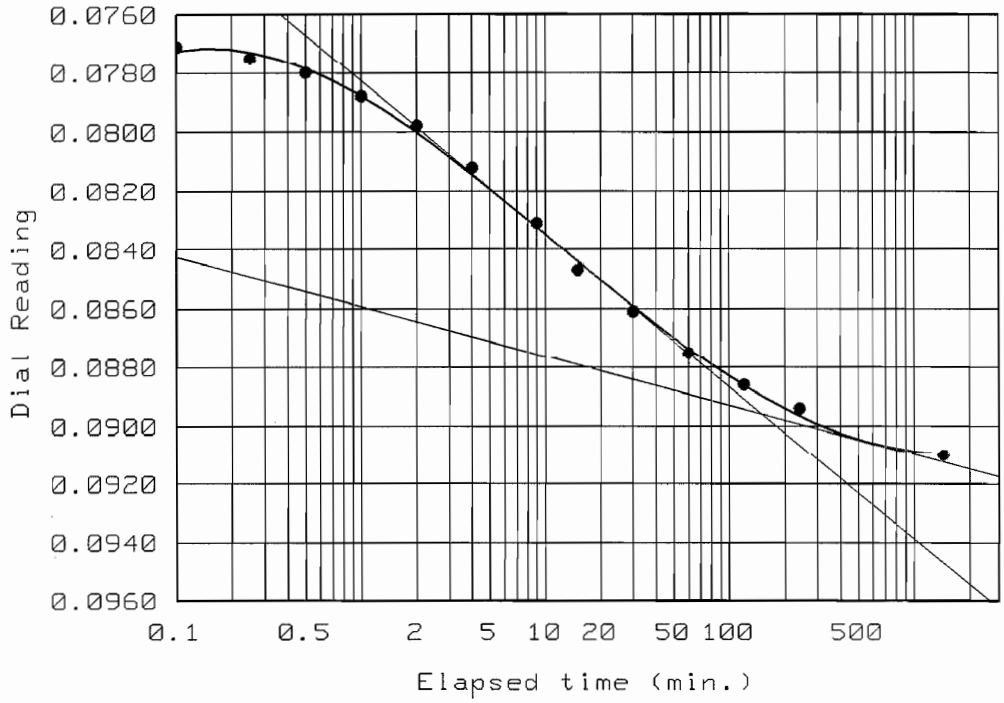
Date: 9/3/03



Load No.= 3
Load= 0.50 ksf
D_0 = 0.0637
D_{50} = 0.0692
D_{100}= 0.0746
T_{50}= 12.50 min.

C_v @ T_{50} =
.004 in.^{2}/min.

C_α= 0.001



Load No.= 4
Load= 1.00 ksf
D_0 = 0.0769
D_{50} = 0.0832
D_{100}= 0.0896
T_{50}= 8.92 min.

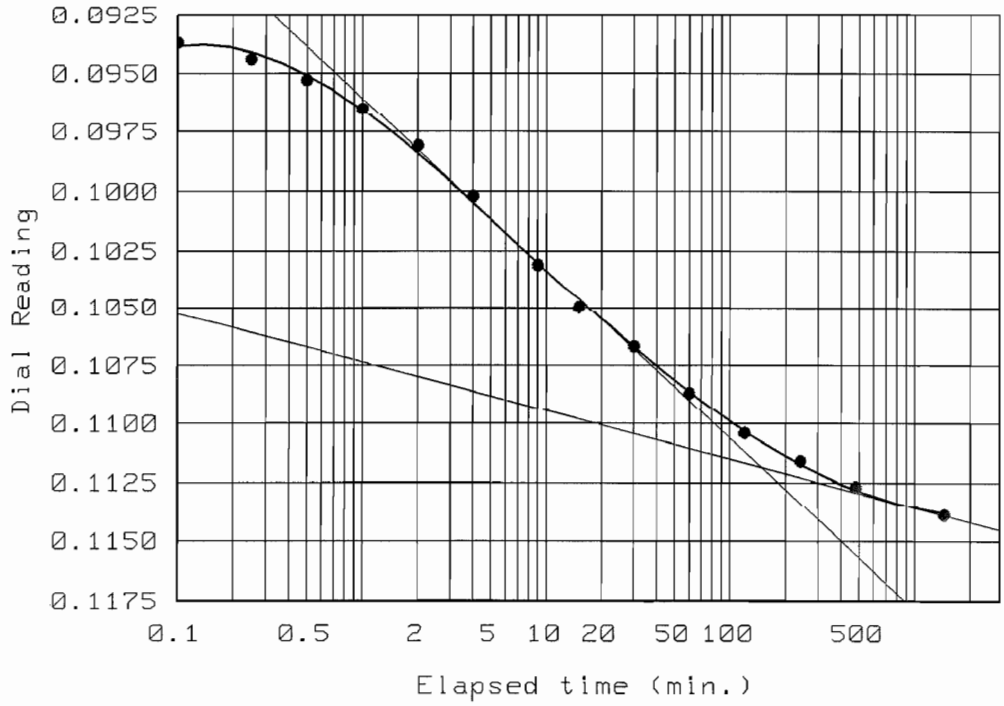
C_v @ T_{50} =
.005 in.^{2}/min.

C_α= 0.002

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 40' - 42'

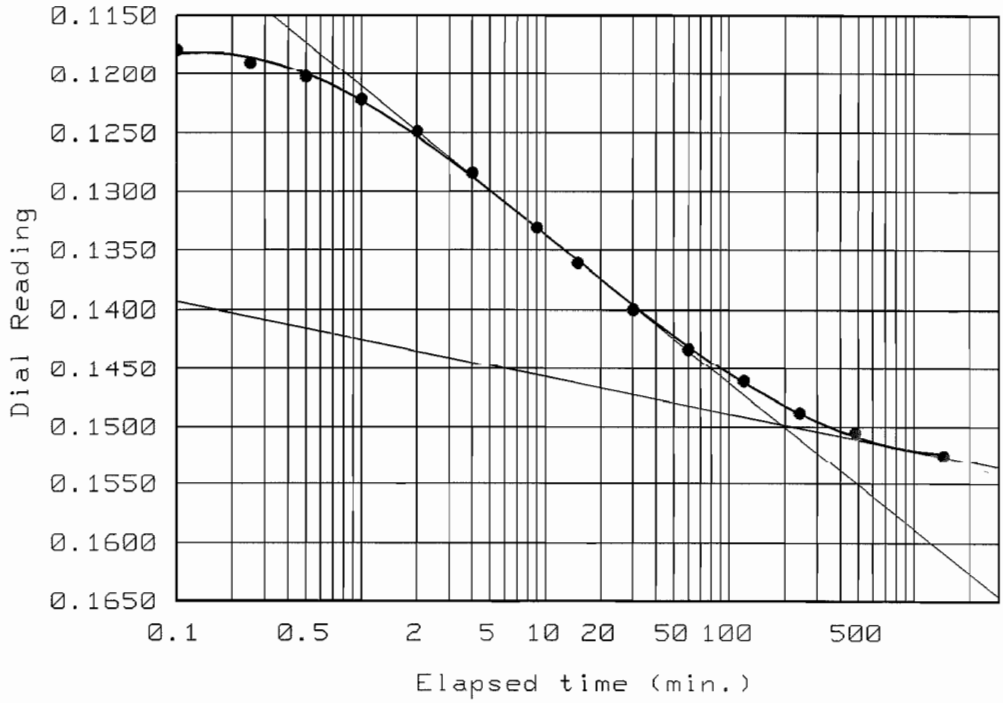
Date: 9/3/03



Load No.= 5
Load= 2.00 ksf
D_0 = 0.0930
D_{50} = 0.1025
D_{100}= 0.1119
T_{50}= 7.50 min.

C_v @ T_{50} = .006 in.^{2}/min.

C_α= 0.002



Load No.= 6
Load= 4.00 ksf
D_0 = 0.1169
D_{50} = 0.1334
D_{100}= 0.1498
T_{50}= 9.48 min.

C_v @ T_{50} = .004 in.^{2}/min.

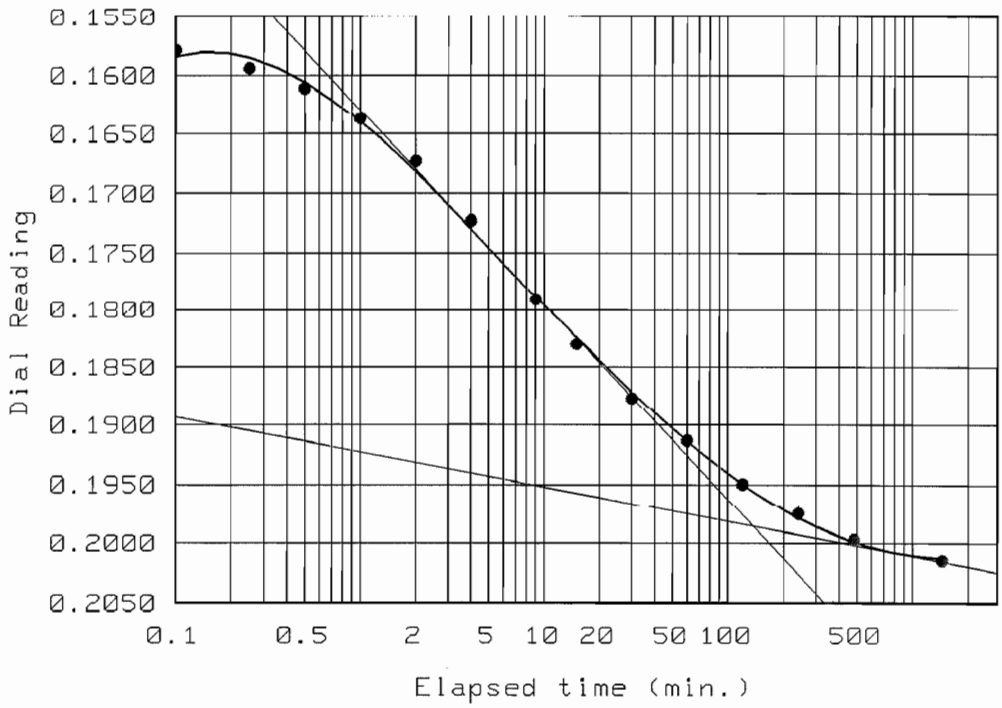
C_α= 0.003

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 40' - 42'

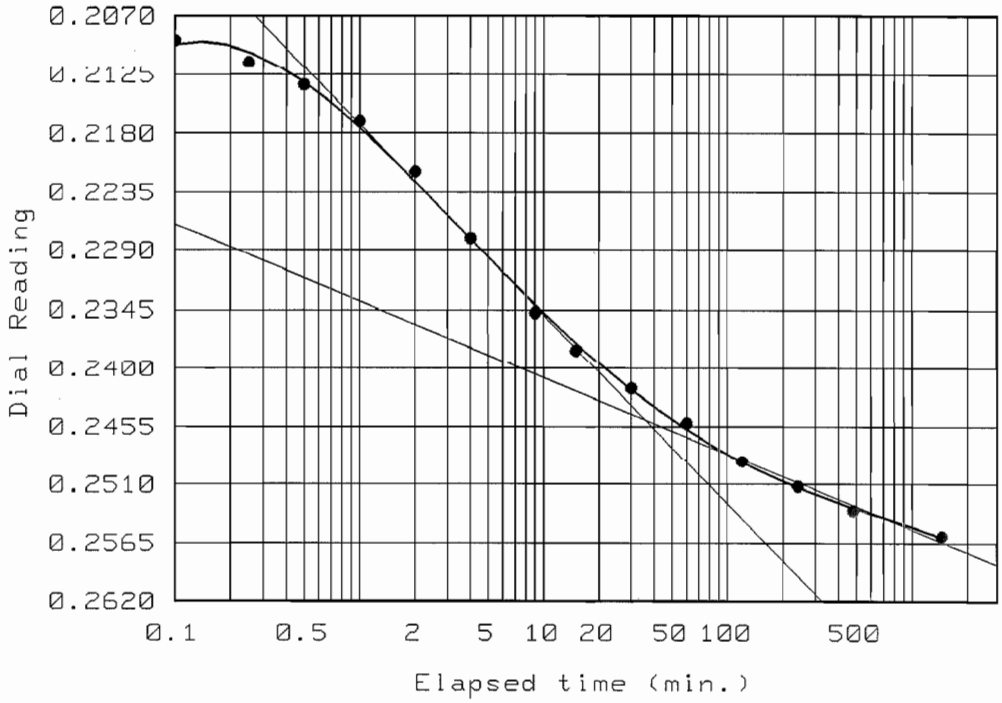
Date: 9/3/03



Load No.= 7
Load= 8.00 ksf
D_0 = 0.1570
D_{50} = 0.1778
D_{100}= 0.1986
T_{50}= 7.81 min.

C_v @ T_{50} =
.005 in.^{2}/min.

C_α= 0.003



Load No.= 8
Load= 16.00 ksf
D_0 = 0.2072
D_{50} = 0.2261
D_{100}= 0.2449
T_{50}= 3.17 min.

C_v @ T_{50} =
.010 in.^{2}/min.

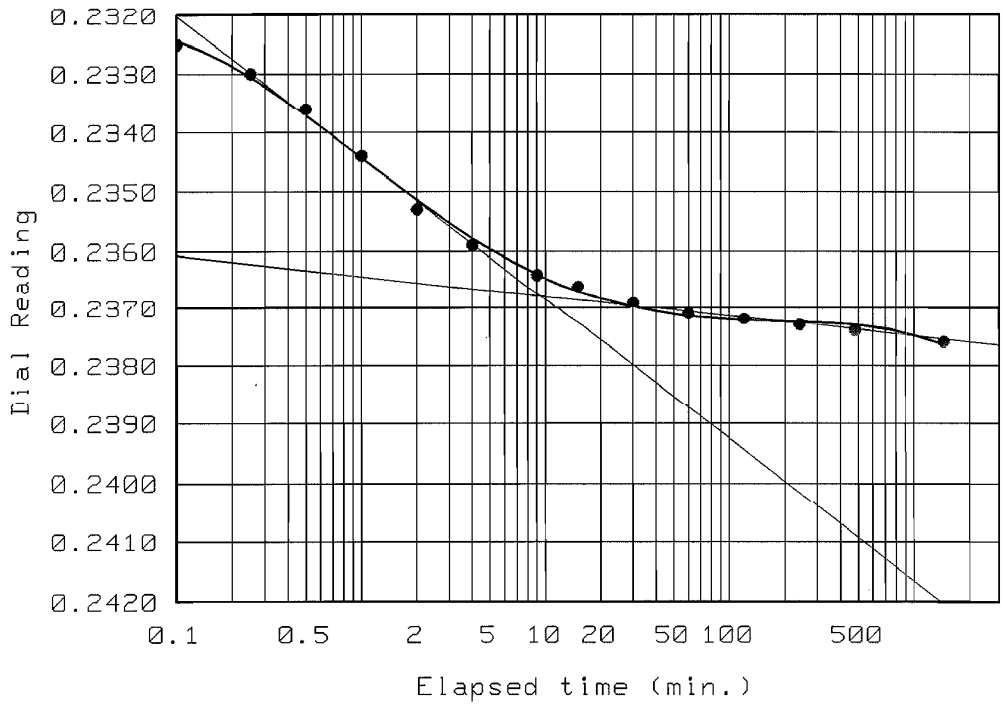
C_α= 0.008

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 40' - 42'

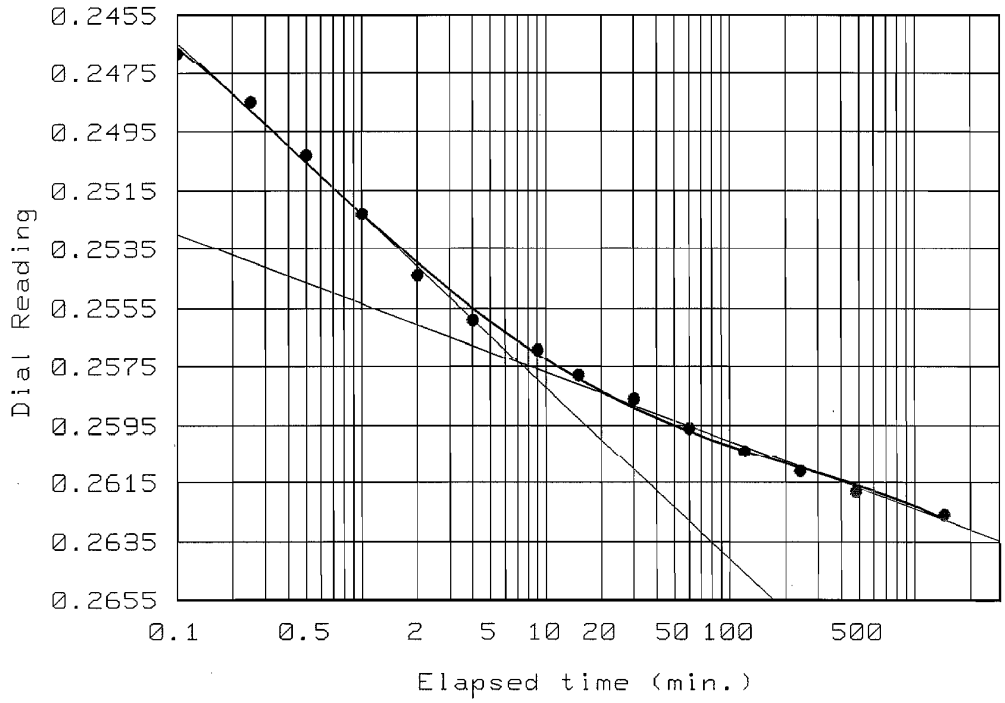
Date: 9/3/03



Load No.= 11
Load= 4.00 ksf
D_0 = 0.2314
D_{50} = 0.2341
D_{100}= 0.2368
T_{50}= 0.72 min.

C_v @ T_{50} =
.046 in.^{2}/min.

C_α= 0.000



Load No.= 12
Load= 16.00 ksf
D_0 = 0.2432
D_{50} = 0.2503
D_{100}= 0.2574
T_{50}= 0.45 min.

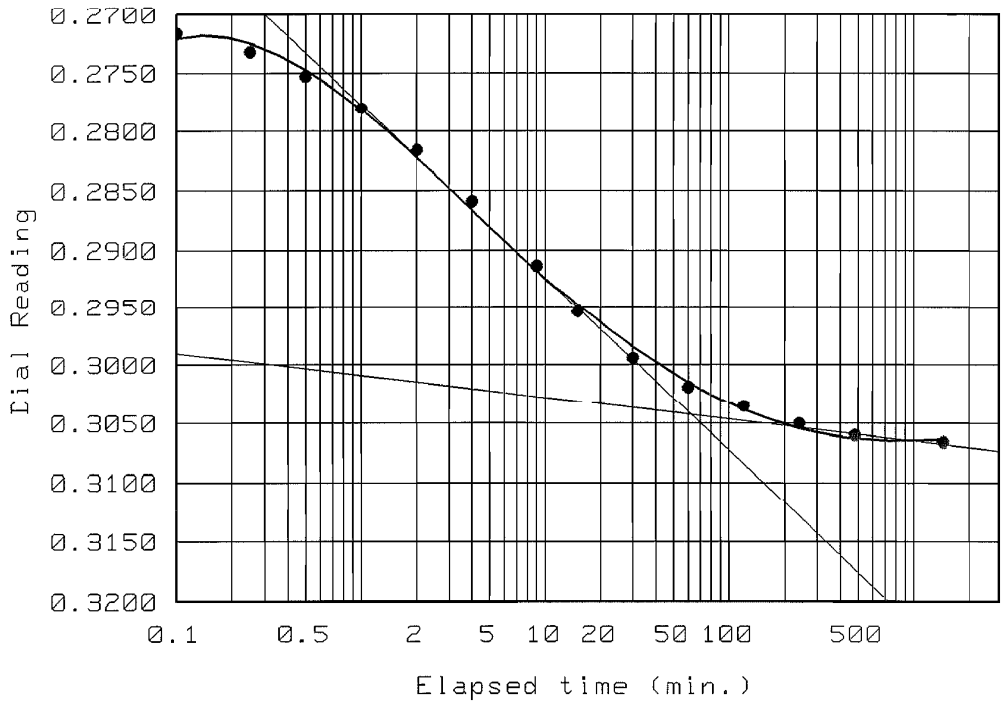
C_v @ T_{50} =
.070 in.^{2}/min.

C_α= 0.003

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 40' - 42'

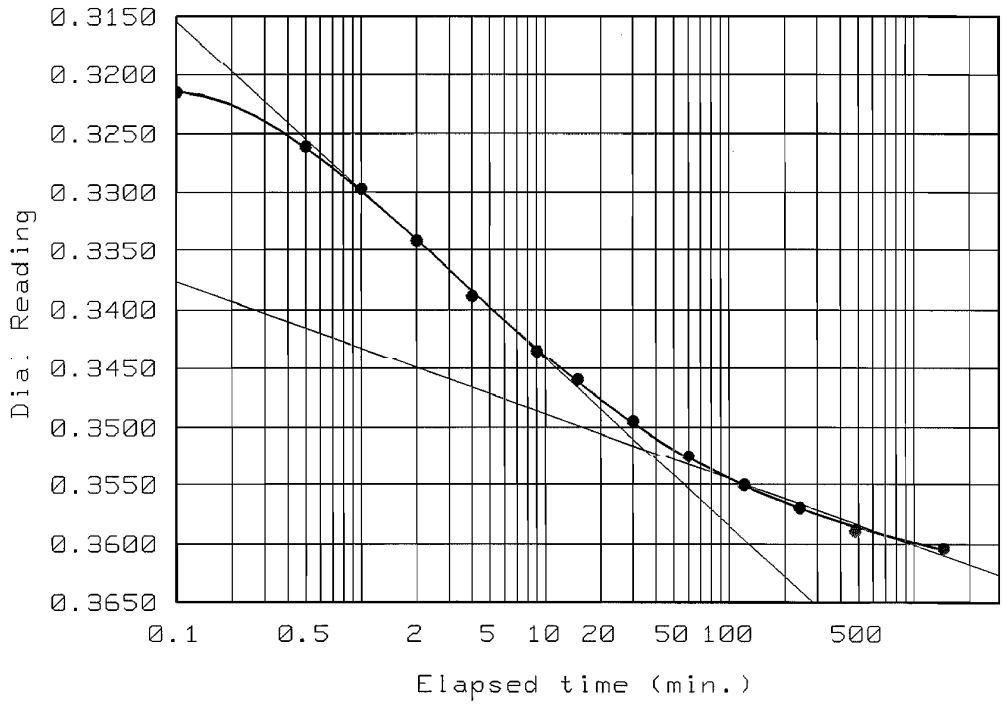
Date: 9/3/03



Load No.= 13
Load= 32.00 ksf
D_0 = 0.2703
D_{50} = 0.2873
D_{100}= 0.3043
T_{50}= 4.41 min.

C_v @ T_{50} =
.007 in.^{2}/min.

C_α= 0.002



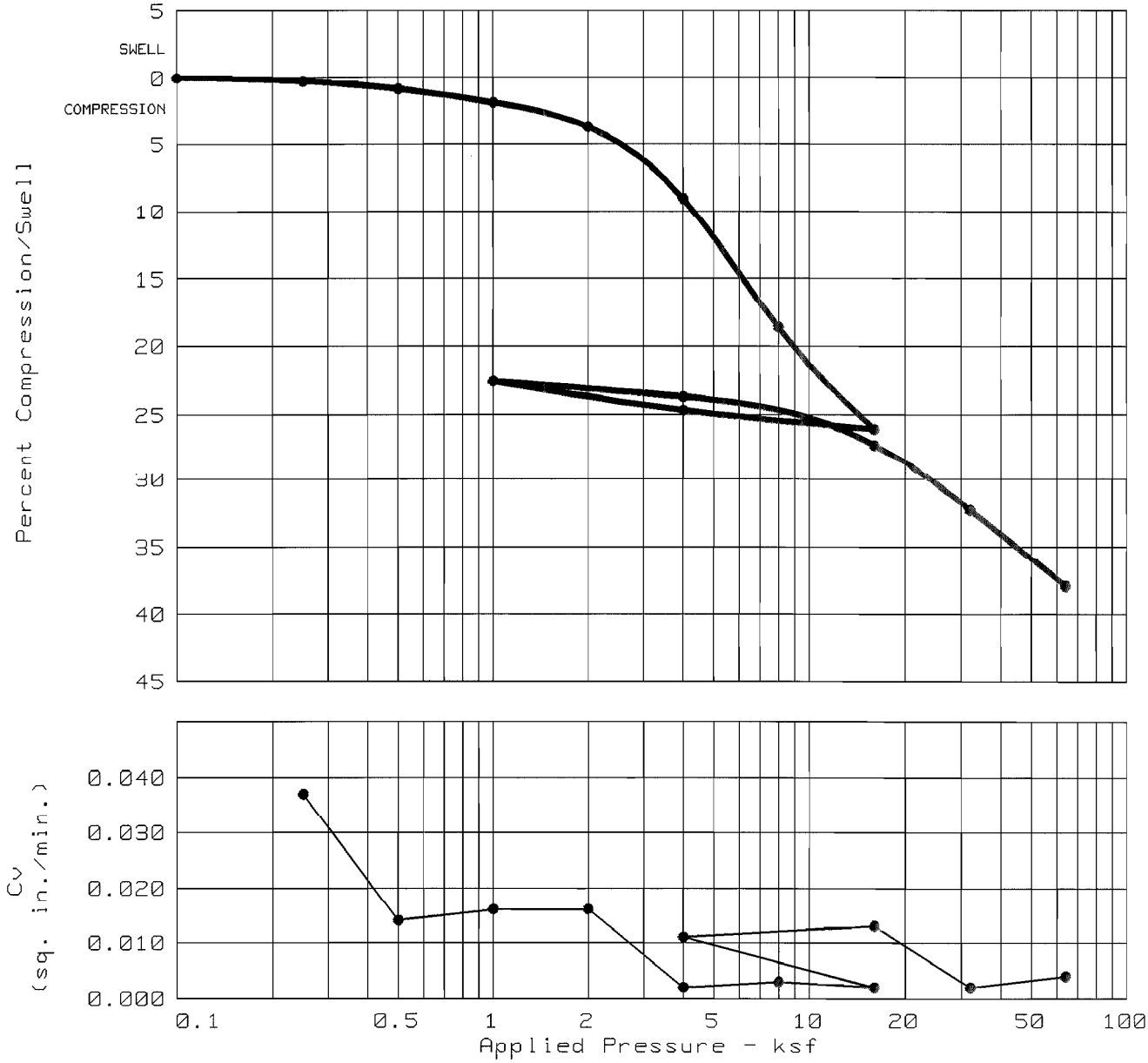
Load No.= 14
Load= 64.00 ksf
D_0 = 0.3177
D_{50} = 0.3348
D_{100}= 0.3519
T_{50}= 2.23 min.

C_v @ T_{50} =
.011 in.^{2}/min.

C_α= 0.008

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

CONSOLIDATION TEST REPORT



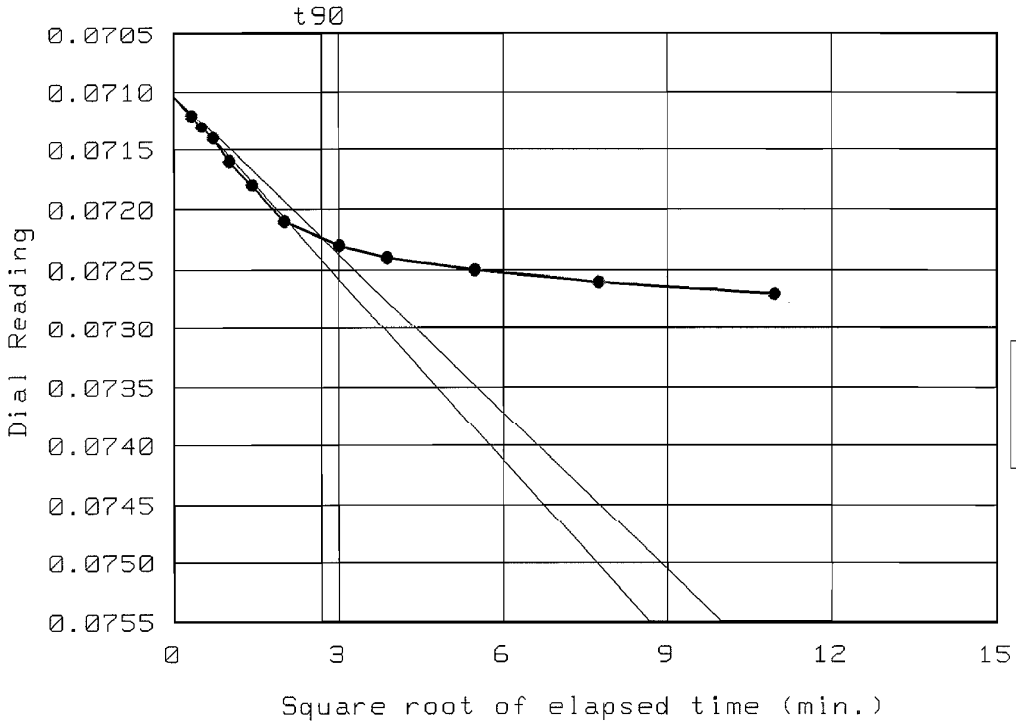
Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
88.6 %	60.3 %	61.2	72	51	2.700	1.8379

TEST RESULTS	MATERIAL DESCRIPTION
	Very dark greenish gray fat CLAY Class: (CH)
Project No.: 3530-03-1245 Phase 01 Project: Indian River Inlet Bridges Location: Boring BI-3 @ 60' - 62' Date: 9/3/03	Remarks: 9/23/03
CONSOLIDATION TEST REPORT **LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.**	Fig. No. 1 1

Dial Reading vs. Time

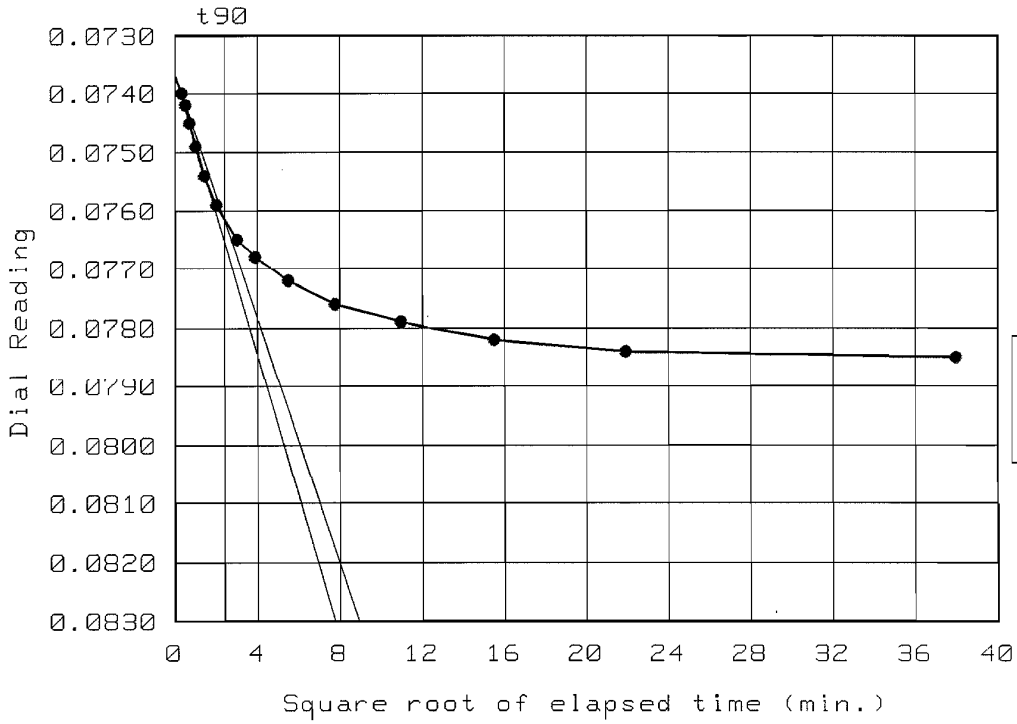
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 60' - 62'

Date: 9/3/03



Load No. = 2
Load = 0.25 ksf
D_0 = 0.0710
D_{90} = 0.0722
D_{100} = 0.0724
T_{90} = 7.21 min.

C_v @ T_{90} =
.029 in.^{2}/min.



Load No. = 3
Load = 0.50 ksf
D_0 = 0.0736
D_{90} = 0.0761
D_{100} = 0.0764
T_{90} = 5.72 min.

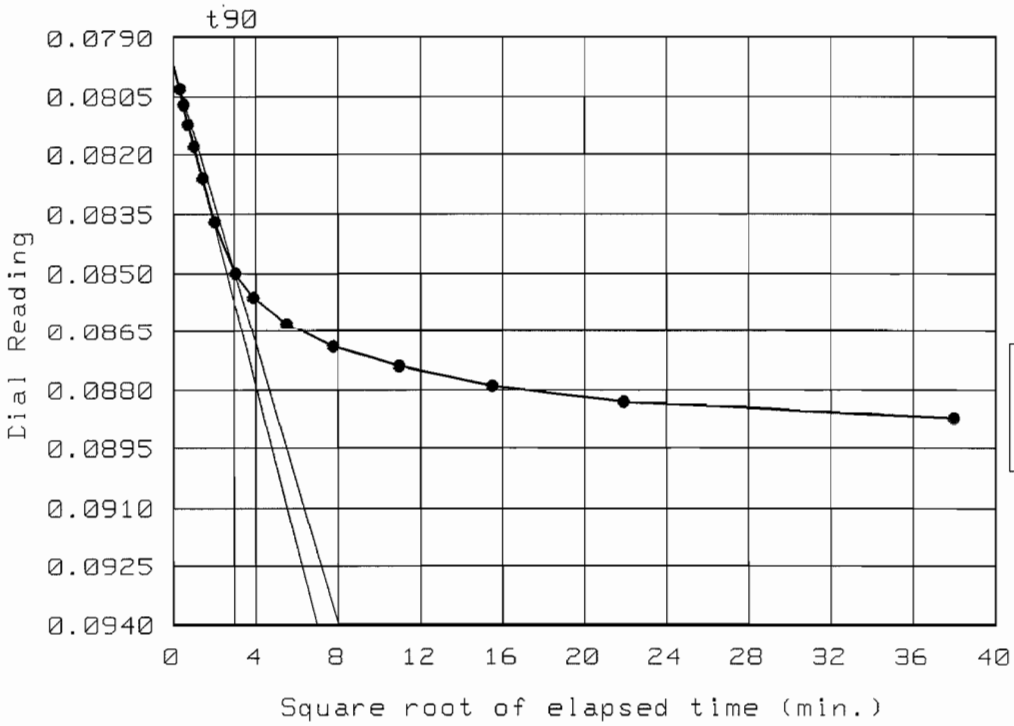
C_v @ T_{90} =
.037 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

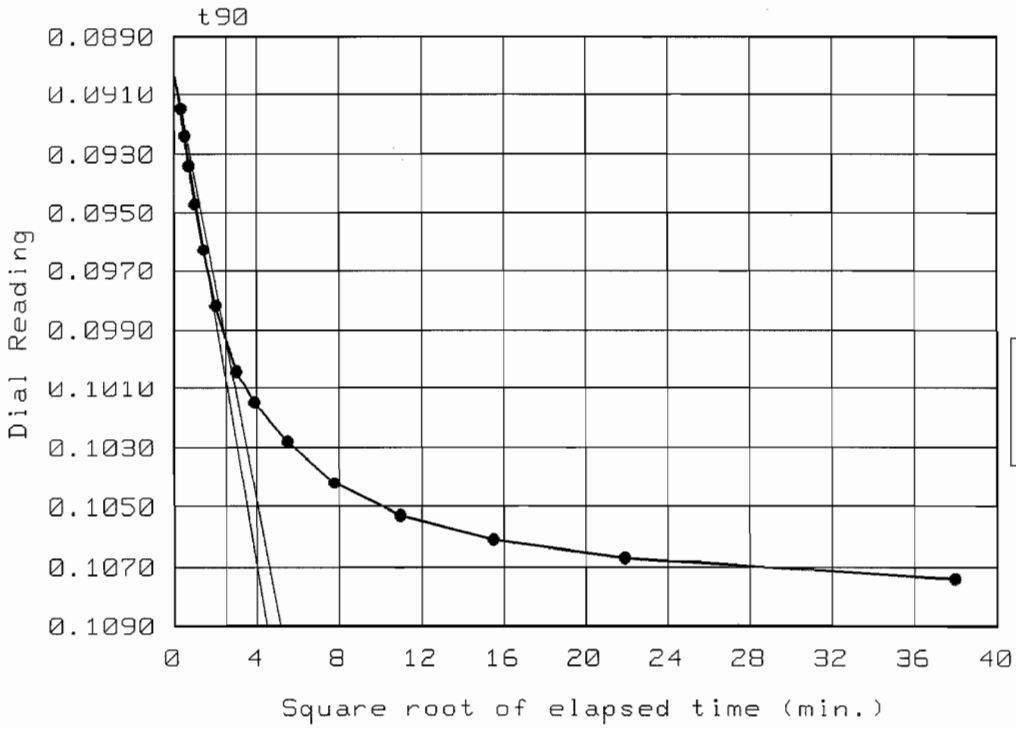
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 60' - 62'

Date: 9/3/03



Load No. = 4
Load= 1.00 ksf
D_0 = 0.0796
D_{90} = 0.0849
D_{100}= 0.0855
T_{90}= 8.69 min.

C_v @ T_{90} =
.024 in.^{2}/min.



Load No. = 5
Load= 2.00 ksf
D_0 = 0.0902
D_{90} = 0.0993
D_{100}= 0.1003
T_{90}= 6.25 min.

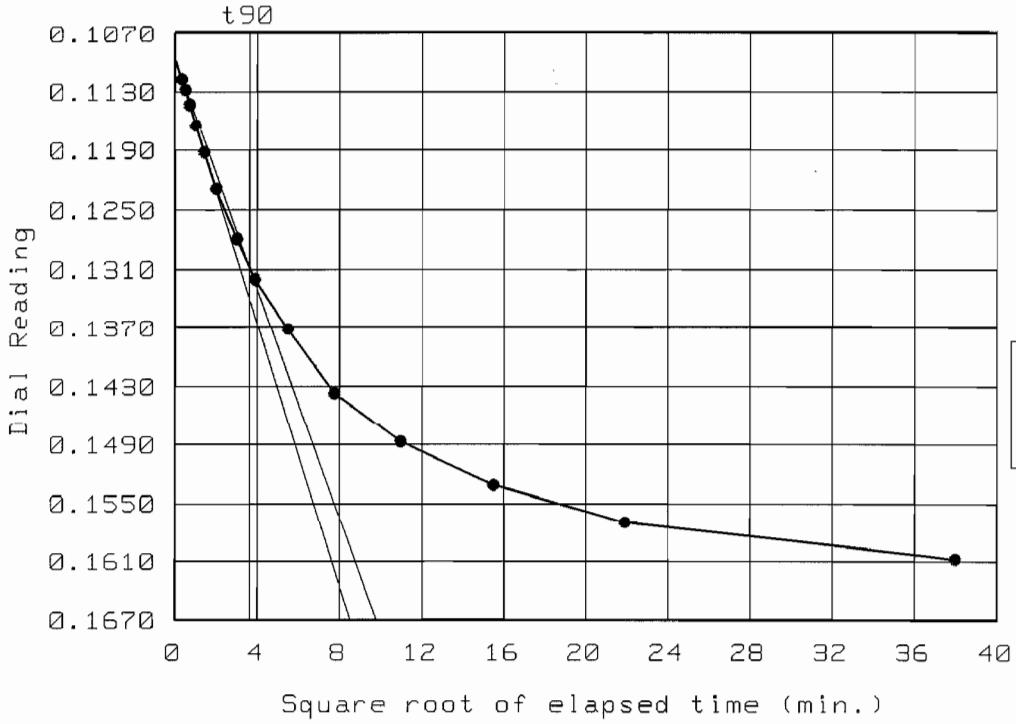
C_v @ T_{90} =
.032 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

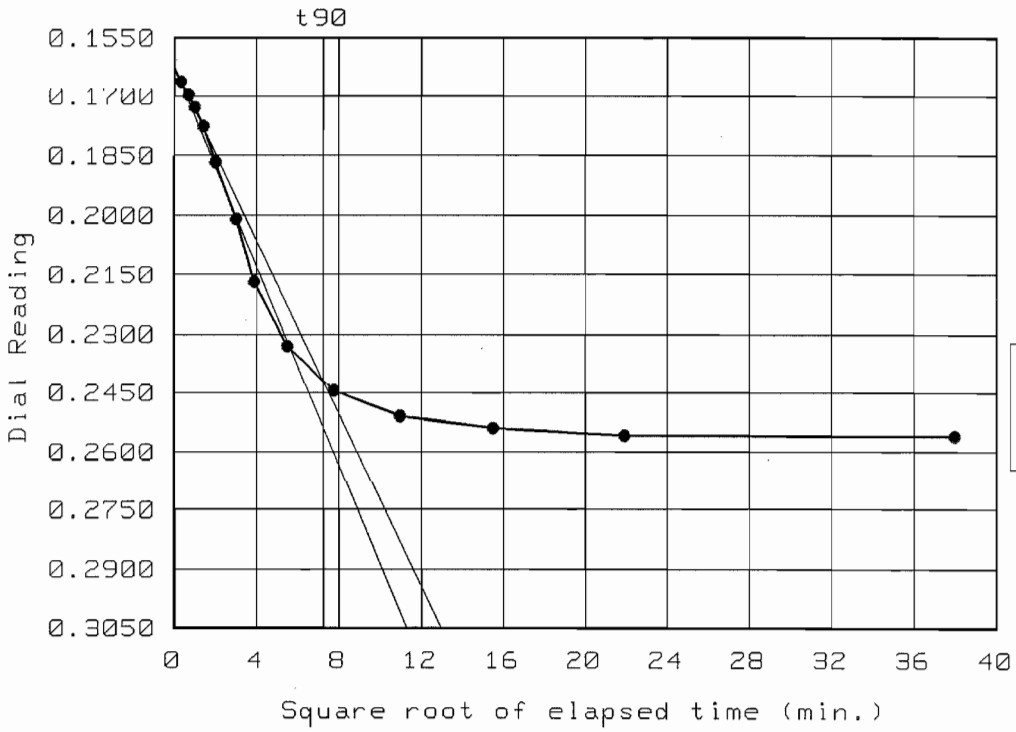
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 60' - 62'

Date: 9/3/03



Load No.= 6
Load= 4.00 ksf
D_0 = 0.1096
D_{90} = 0.1308
D_{100}= 0.1331
T_{90}= 13.06 min.

C_v @ T_{90} =
.014 in.^{2}/min.



Load No.= 7
Load= 8.00 ksf
D_0 = 0.1624
D_{90} = 0.2419
D_{100}= 0.2507
T_{90}= 52.24 min.

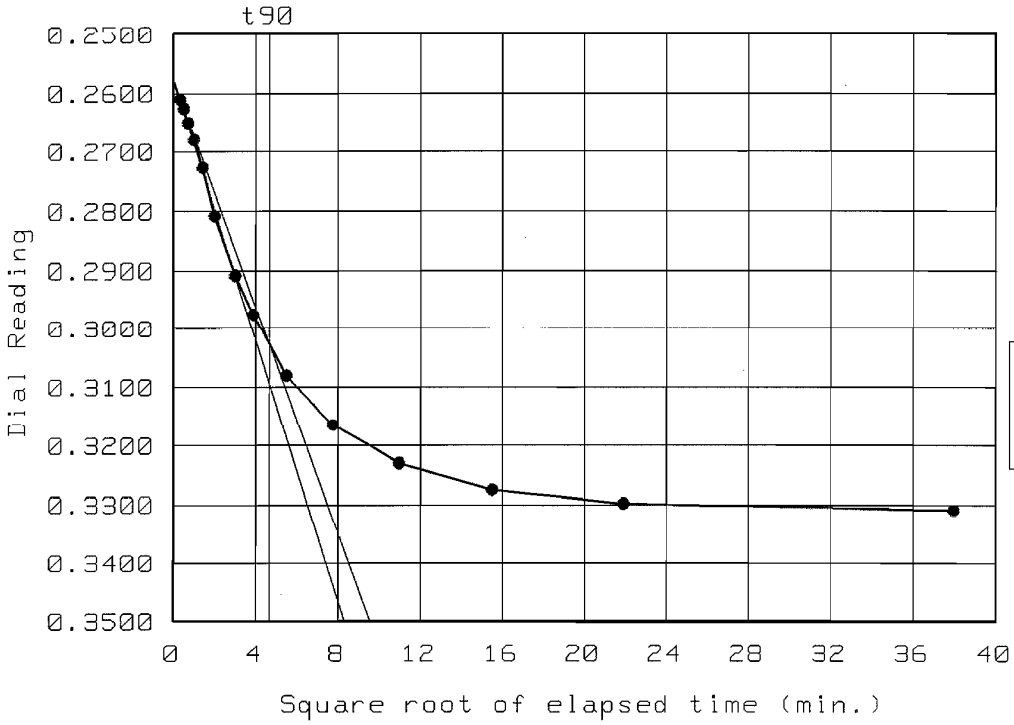
C_v @ T_{90} =
.003 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

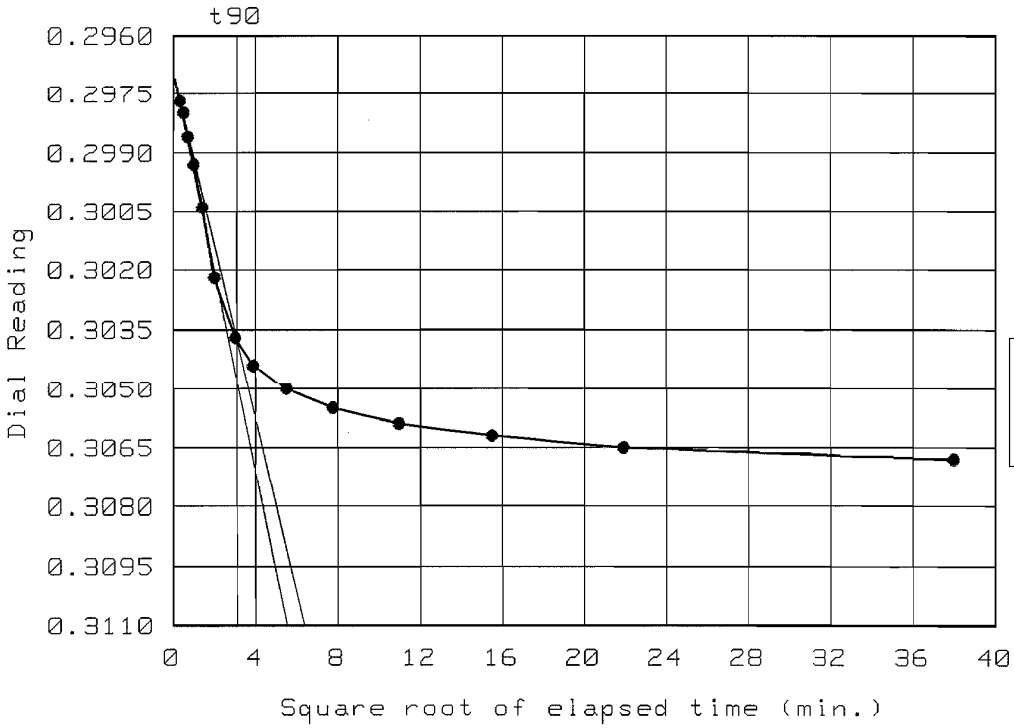
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 60' - 62'

Date: 9/3/03



Load No.= 8
Load= 16.00 ksf
D_0 = 0.2575
D_{90} = 0.3027
D_{100}= 0.3077
T_{90}= 21.77 min.

C_v @ T_{90} =
.006 in.^{2}/min.



Load No.= 11
Load= 4.00 ksf
D_0 = 0.2969
D_{90} = 0.3038
D_{100}= 0.3045
T_{90}= 9.63 min.

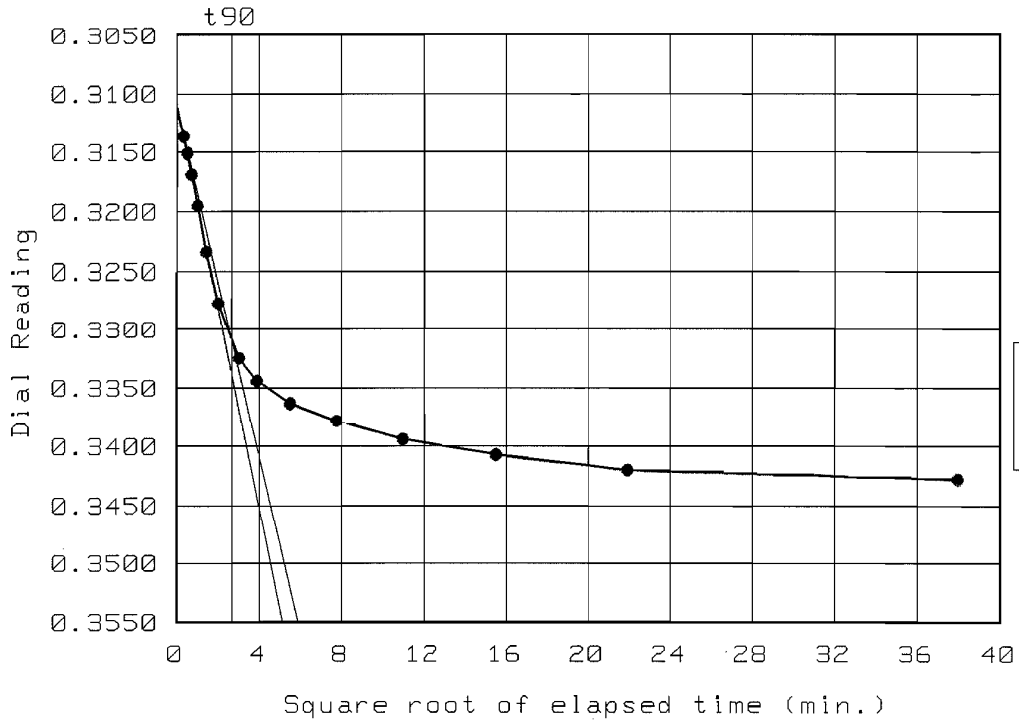
C_v @ T_{90} =
.013 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

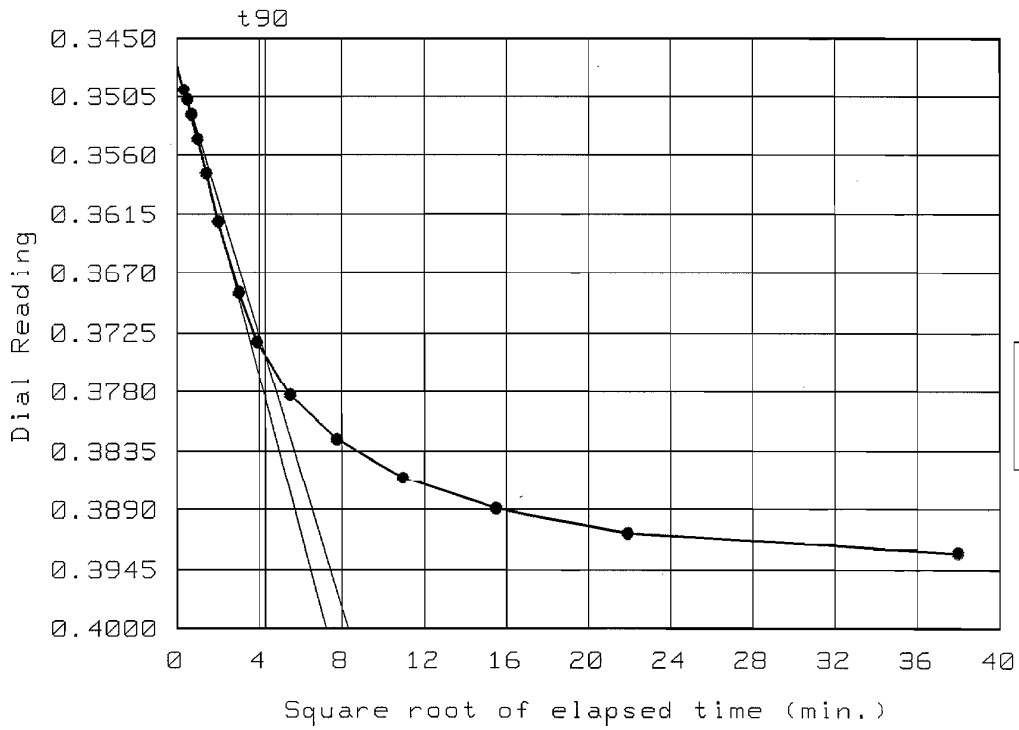
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 60' - 62'

Date: 9/3/03



Load No.= 12
Load= 16.00 ksf
D_0 = 0.3110
D_{90} = 0.3308
D_{100}= 0.3331
T_{90}= 7.05 min.

C_v @ T_{90} =
.017 in.^{2}/min.



Load No.= 13
Load= 32.00 ksf
D_0 = 0.3475
D_{90} = 0.3746
D_{100}= 0.3776
T_{90}= 18.35 min.

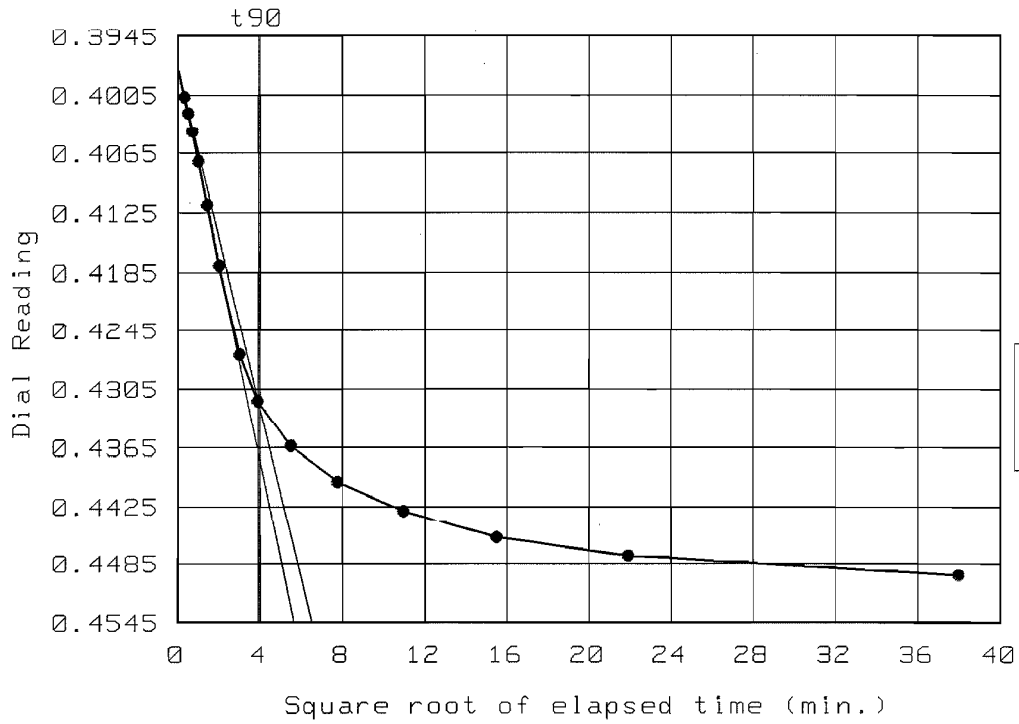
C_v @ T_{90} =
.006 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 60' - 62'

Date: 9/3/03



Load No.= 14

Load= 64.00 ksf

D_0 = 0.3975

D_{90} = 0.4318

D_{100}= 0.4356

T_{90}= 15.32 min.

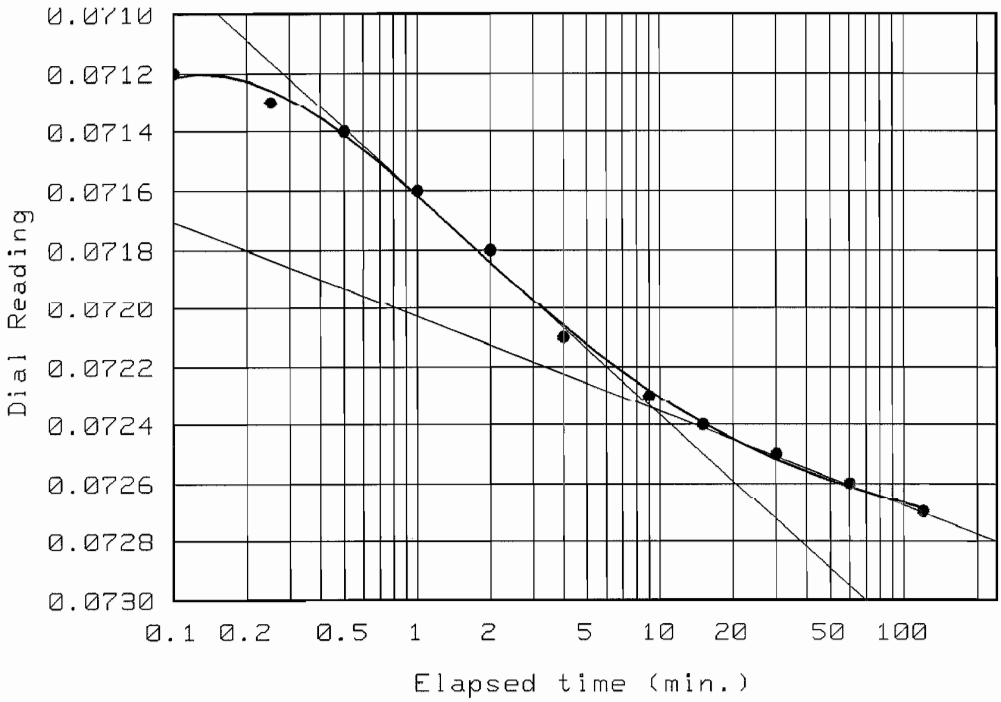
C_v @ T_{90} =

.006 in.²/min.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 60' - 62'

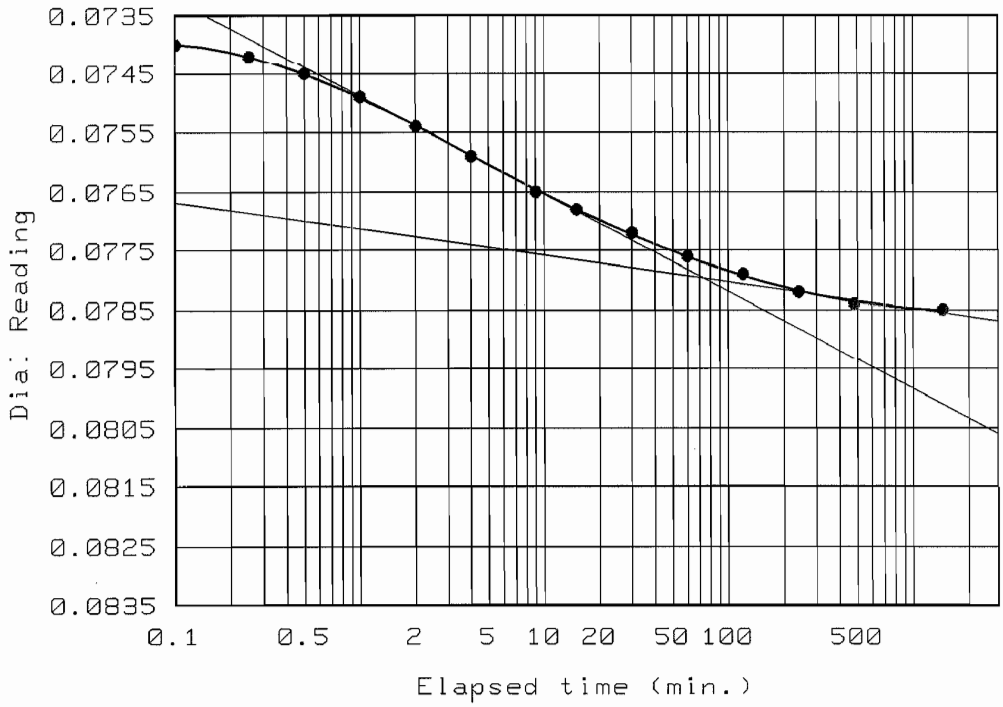
Date: 9/3/03



Load No.= 2
Load= 0.25 ksf
D_0 = 0.0711
D_{50} = 0.0717
D_{100}= 0.0723
T_{50}= 1.32 min.

C_v @ T_{50} =
.037 in.^{2}/min.

C_α= 0.000



Load No.= 3
Load= 0.50 ksf
D_0 = 0.0736
D_{50} = 0.0758
D_{100}= 0.0780
T_{50}= 3.46 min.

C_v @ T_{50} =
.014 in.^{2}/min.

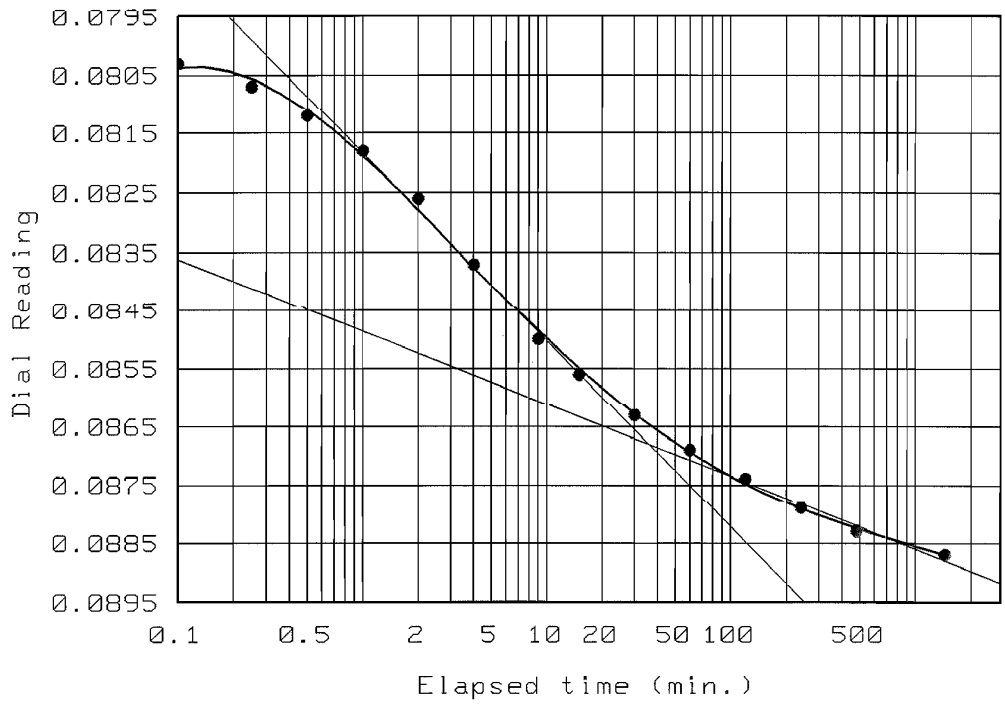
C_α= 0.000

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 60' - 62'

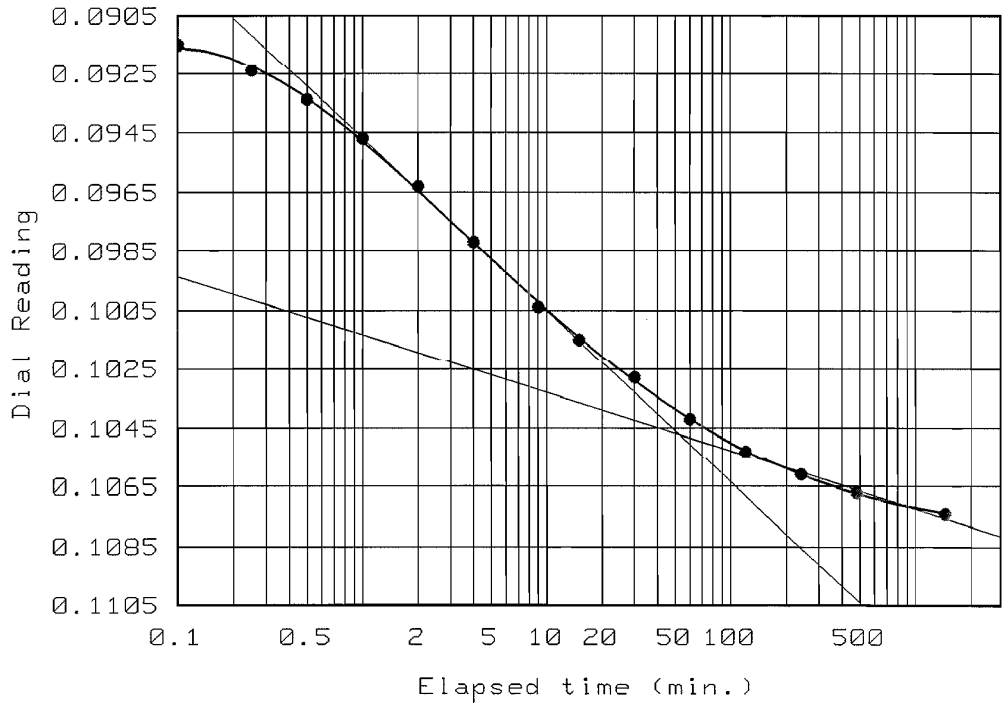
Date: 9/3/03



Load No.= 4
Load= 1.00 ksf
D_0 = 0.0798
D_{50} = 0.0833
D_{100}= 0.0868
T_{50}= 2.93 min.

C_v @ T_{50} =
.016 in.^{2}/min.

C_α= 0.001



Load No.= 5
Load= 2.00 ksf
D_0 = 0.0902
D_{50} = 0.0975
D_{100}= 0.1047
T_{50}= 2.97 min.

C_v @ T_{50} =
.016 in.^{2}/min.

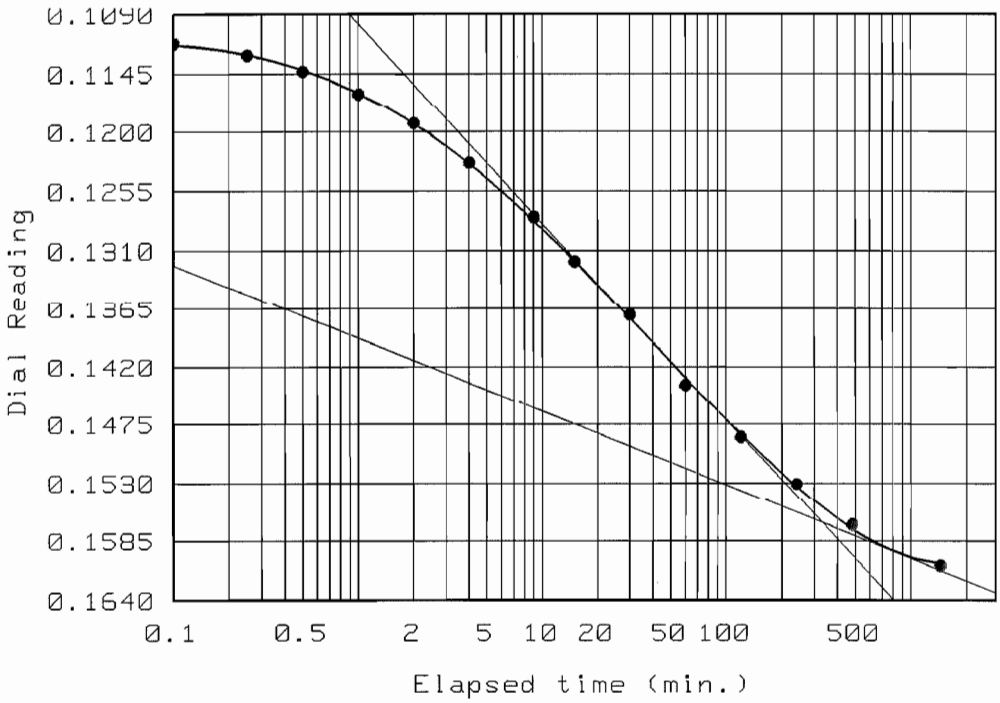
C_α= 0.002

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 60' - 62'

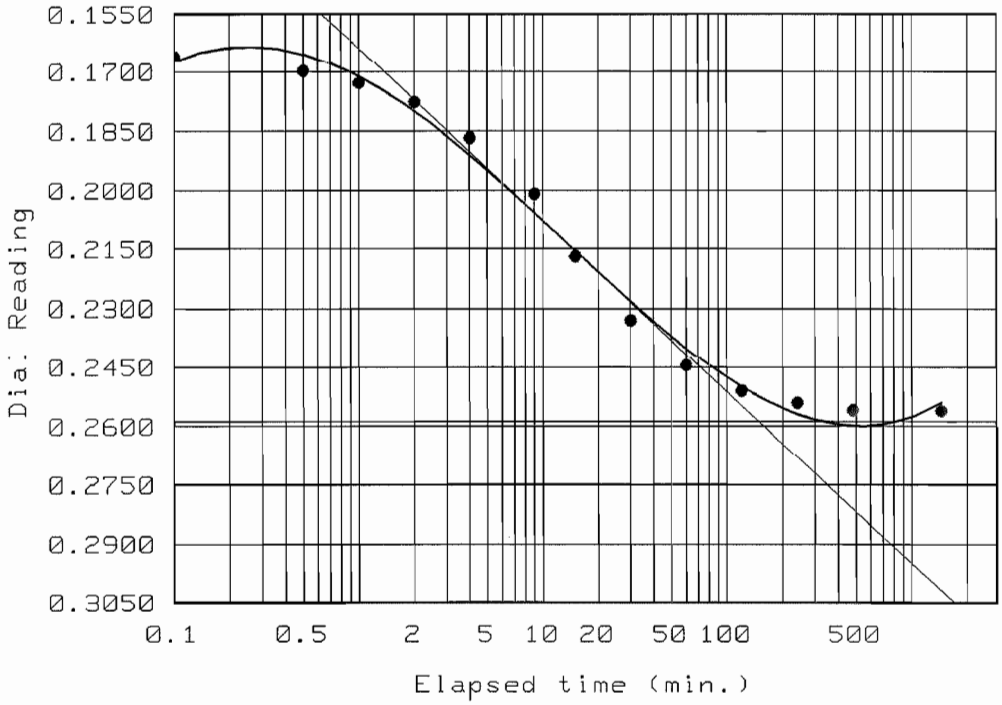
Date: 9/3/03



Load No.= 6
Load= 4.00 ksf
D_0 = 0.1099
D_{50} = 0.1334
D_{100}= 0.1568
T_{50}= 18.05 min.

C_v @ T_{50} =
.002 in.^{2}/min.

C_α= 0.007



Load No.= 7
Load= 8.00 ksf
D_0 = 0.1704
D_{50} = 0.2146
D_{100}= 0.2587
T_{50}= 14.37 min.

C_v @ T_{50} =
.003 in.^{2}/min.

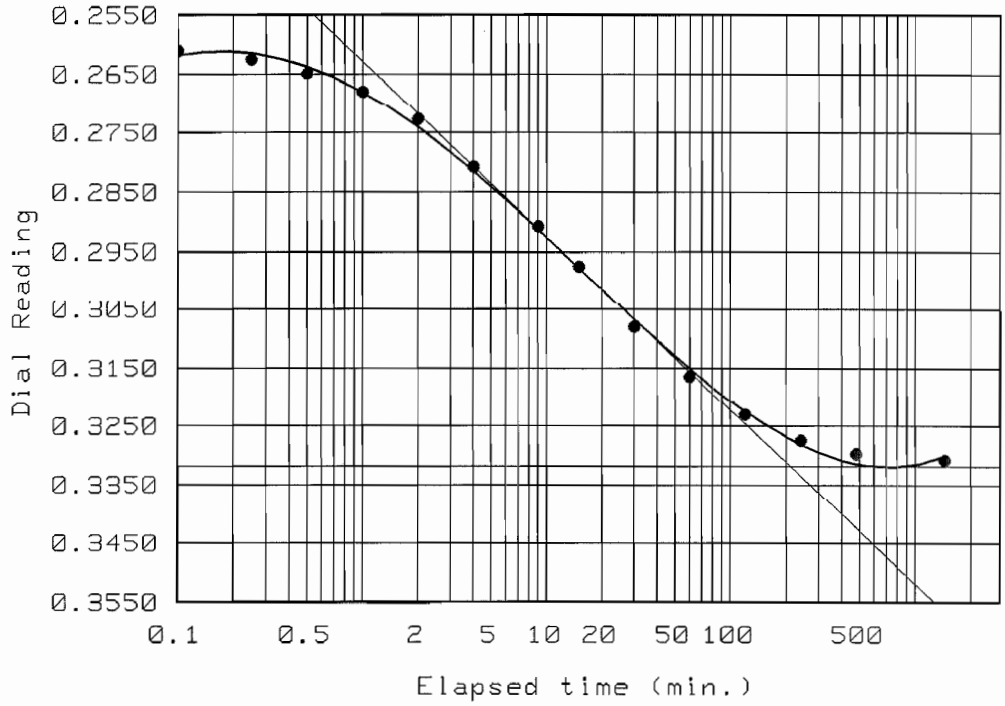
C_α= 0.000

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 60' - 62'

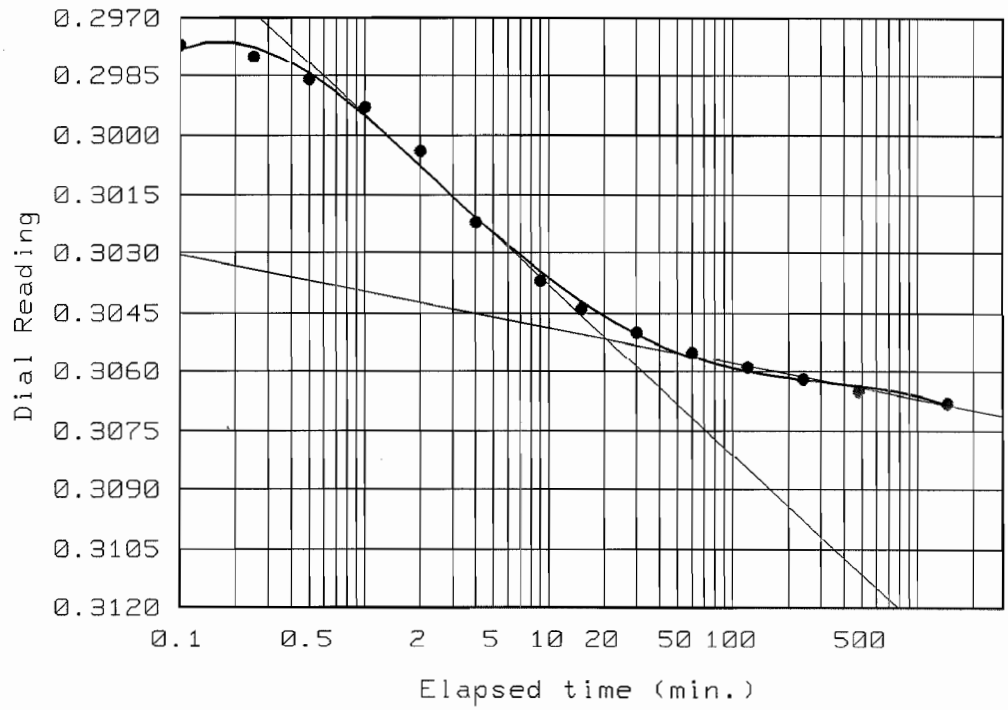
Date: 9/3/03



Load No.= 8
Load= 16.00 ksf
D_0 = 0.2608
D_{50} = 0.2964
D_{100}= 0.3319
T_{50}= 13.42 min.

C_v @ T_{50} =
.002 in.^{2}/min.

C_α= 0.000



Load No.= 11
Load= 4.00 ksf
D_0 = 0.2975
D_{50} = 0.3013
D_{100}= 0.3052
T_{50}= 2.64 min.

C_v @ T_{50} =
.011 in.^{2}/min.

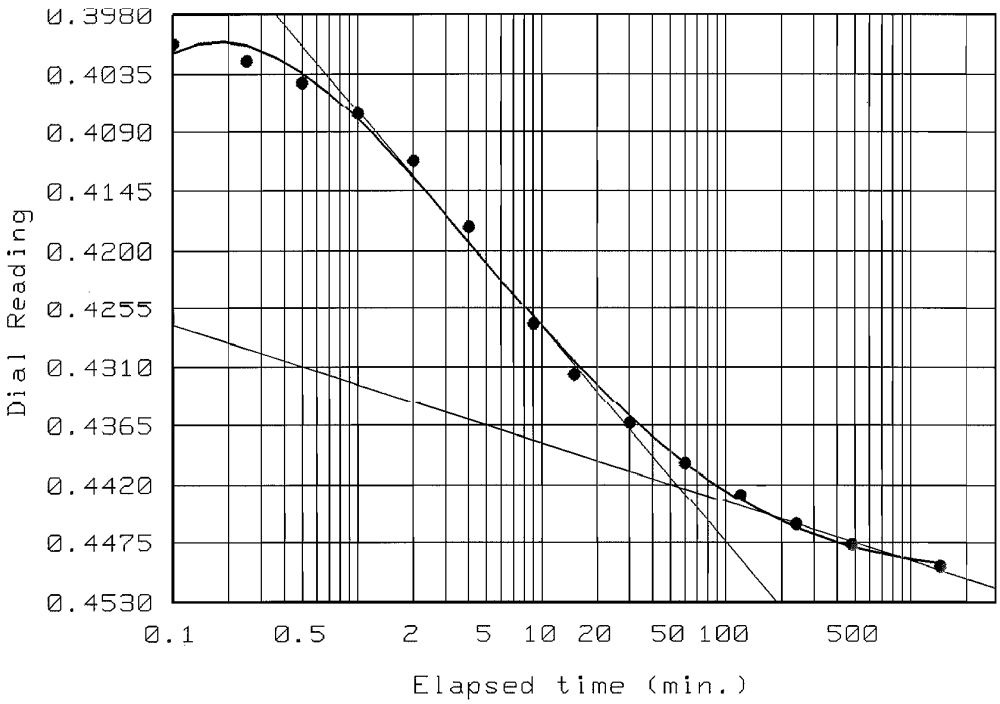
C_α= 0.001

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-3 @ 60' - 62'

Date: 9/3/03



Load No.= 14

Load= 64.00 ksf

D_0 = 0.4006

D_{50} = 0.4215

D_{100}= 0.4423

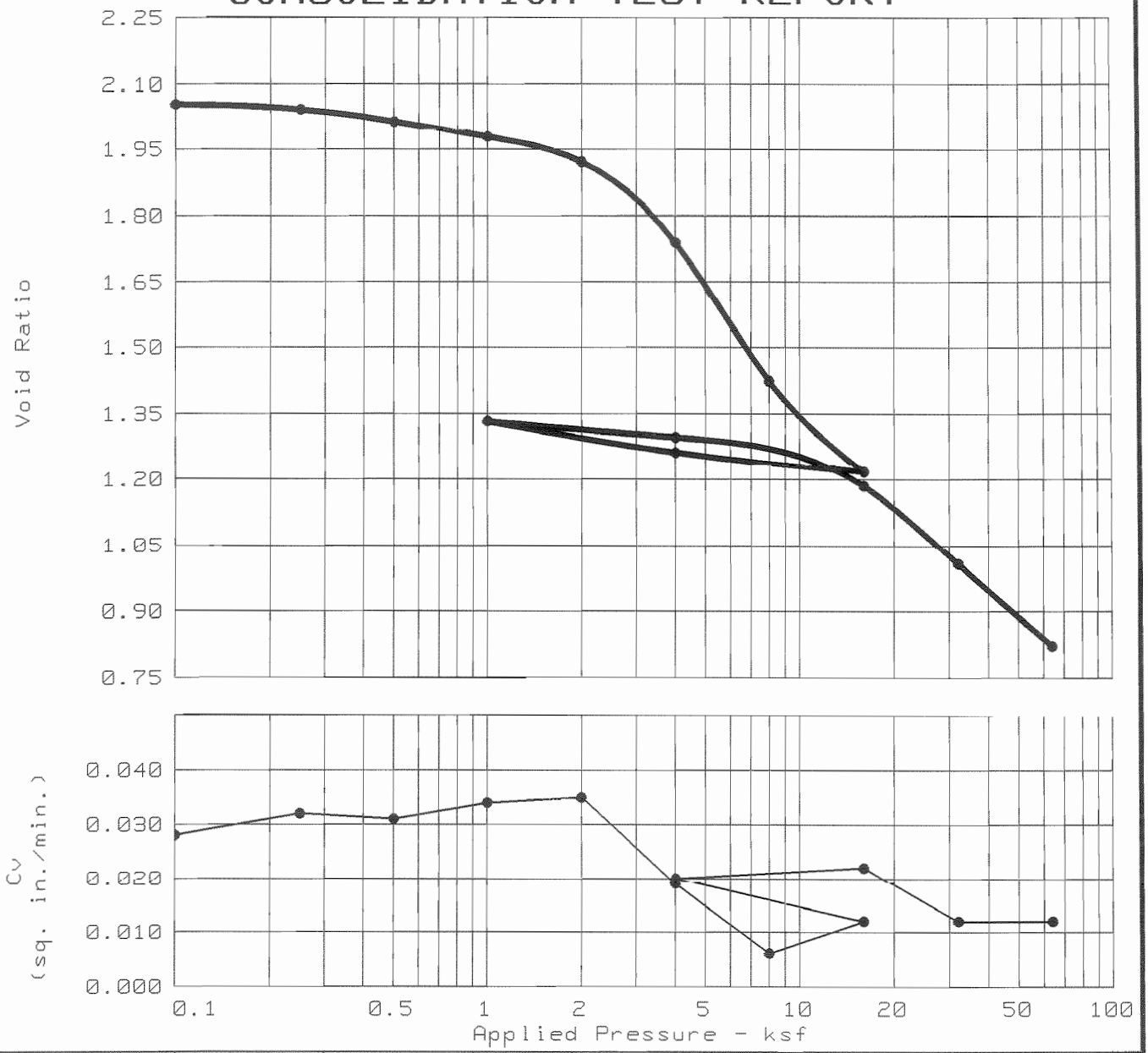
T_{50}= 5.18 min.

C_v @ T_{50} =

.004 in.^{2}/min.

C_α= 0.008

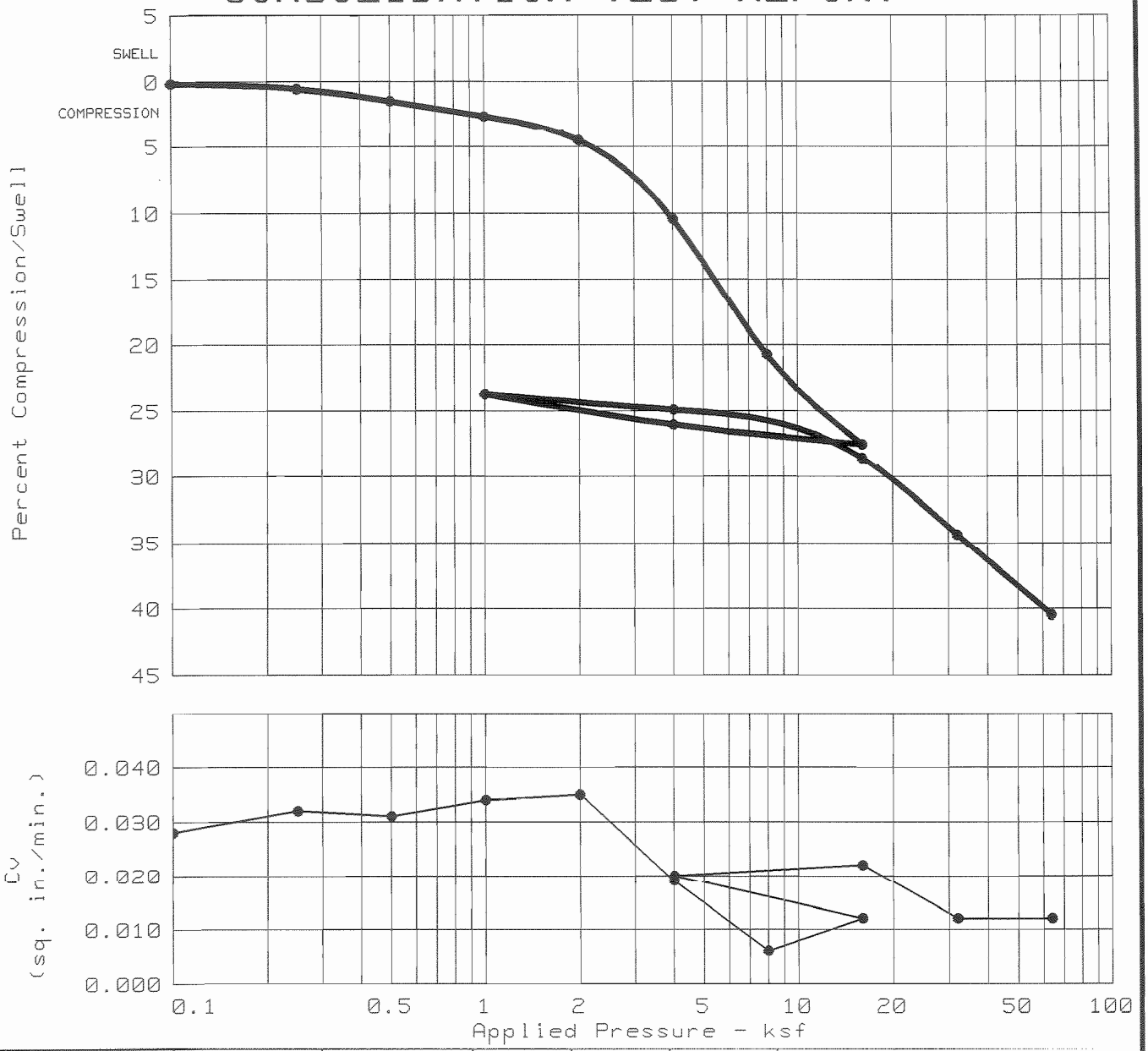
CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
73.4 %	55.9 %	61.2	46	24	2.700	2.0590

TEST RESULTS	MATERIAL DESCRIPTION
	Grayish brown lean CLAY
	Class: (CL)
Project No.: 3530-03-1245 Phase 01 Project: Indian River Inlet Bridges Location: Boring BI-9 @ 30' - 32' Date: 9/29/03	Remarks: 9/29/03
CONSOLIDATION TEST REPORT LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.	Fig. No. 1 1

CONSOLIDATION TEST REPORT



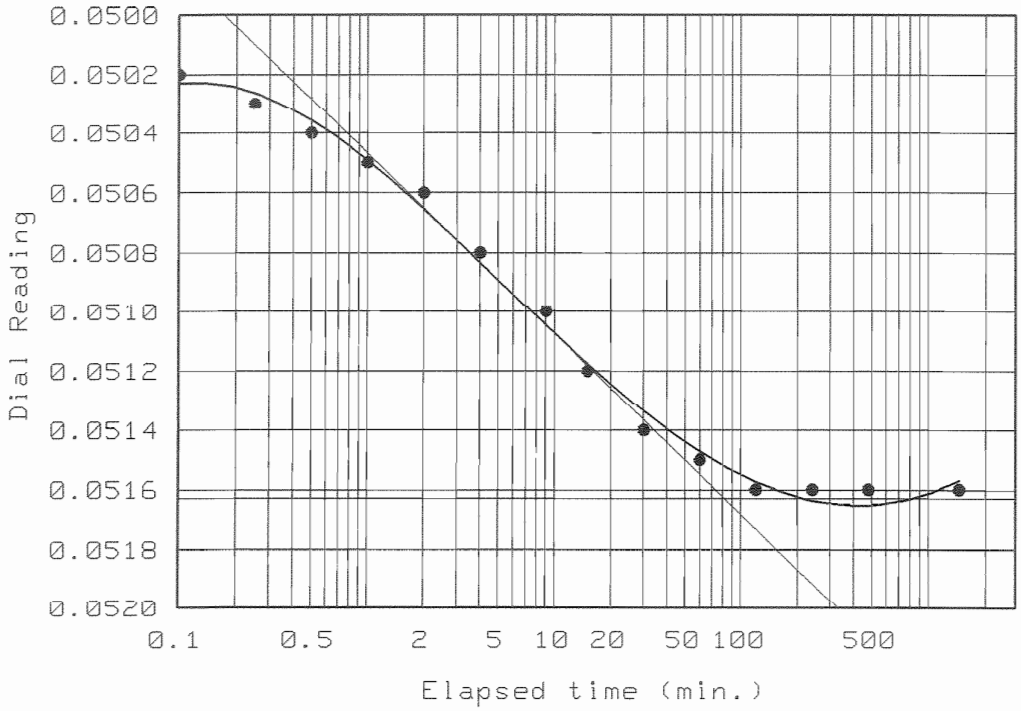
Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Initial void ratio
73.4 %	55.9 %	61.2	46	24	2.700	2.0590

TEST RESULTS	MATERIAL DESCRIPTION
	Grayish brown lean CLAY
Project No.: 3530-03-1245 Phase 01 Project: Indian River Inlet Bridges Location: Boring BI-9 @ 30' - 32' Date: 9/29/03	Class: (CL) Remarks: 9/29/03
CONSOLIDATION TEST REPORT LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.	Fig. No. 1 1

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-9 @ 30' - 32'

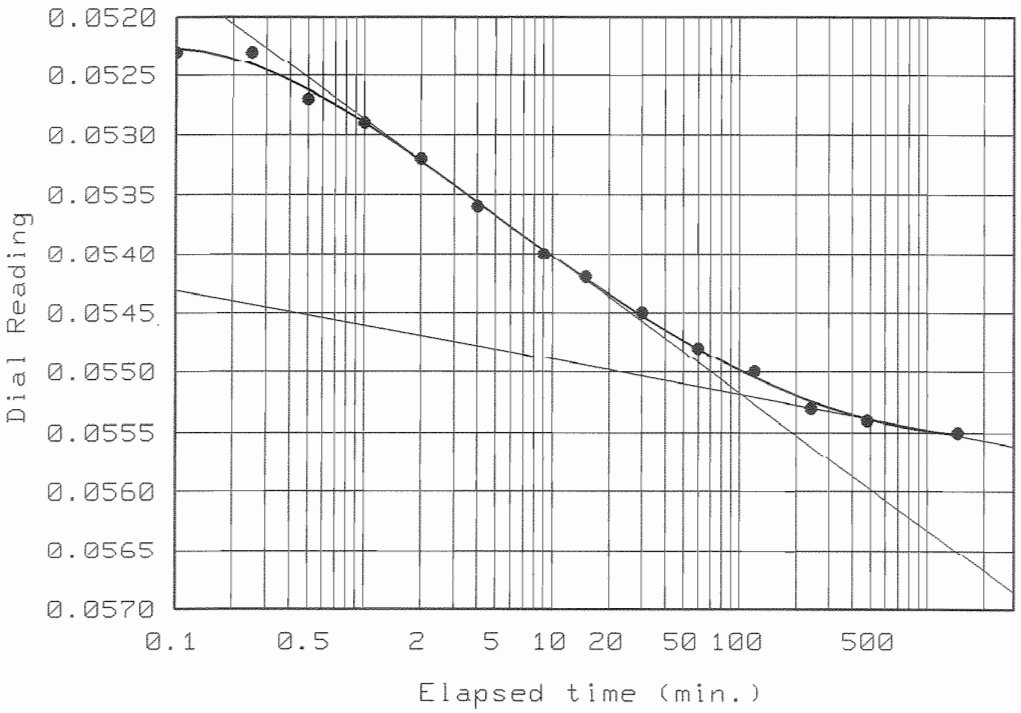
Date: 9/29/03



Load No.= 1
Load= 0.10 ksf
D_0 = 0.0501
D_{50} = 0.0509
D_{100}= 0.0516
T_{50}= 4.81 min.

C_v @ T_{50} = .022 in.^{2}/min.

C_α= 0.000



Load No.= 2
Load= 0.25 ksf
D_0 = 0.0520
D_{50} = 0.0536
D_{100}= 0.0552
T_{50}= 4.19 min.

C_v @ T_{50} = .025 in.^{2}/min.

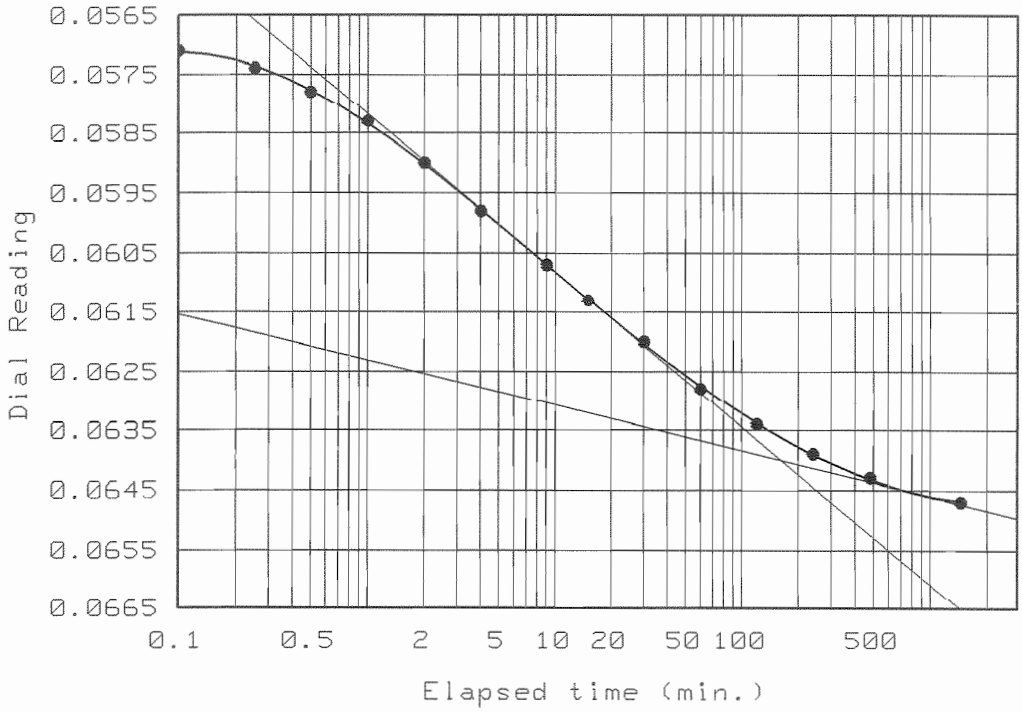
C_α= 0.000

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-9 @ 30' - 32'

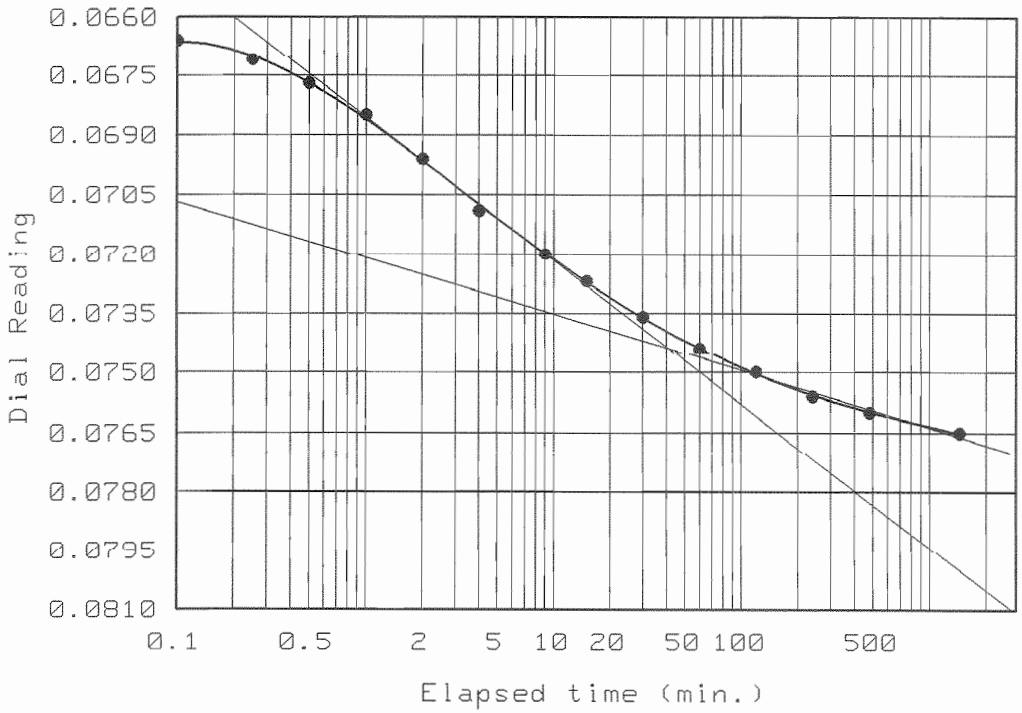
Date: 9/29/03



Load No.= 3
Load= 0.50 ksf
D_0 = 0.0566
D_{50} = 0.0603
D_{100}= 0.0640
T_{50}= 6.41 min.

C_v @ T_{50} = .016 in.^{2}/min.

C_α= 0.001



Load No.= 4
Load= 1.00 ksf
D_0 = 0.0658
D_{50} = 0.0701
D_{100}= 0.0744
T_{50}= 2.66 min.

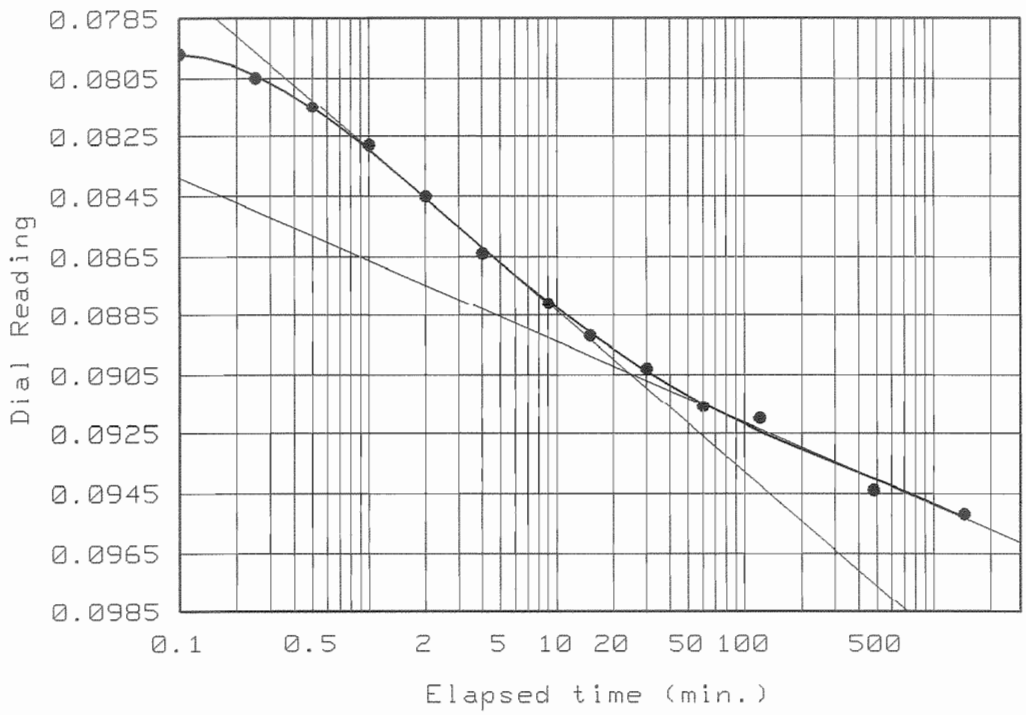
C_v @ T_{50} = .038 in.^{2}/min.

C_α= 0.001

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-9 @ 30' - 32'

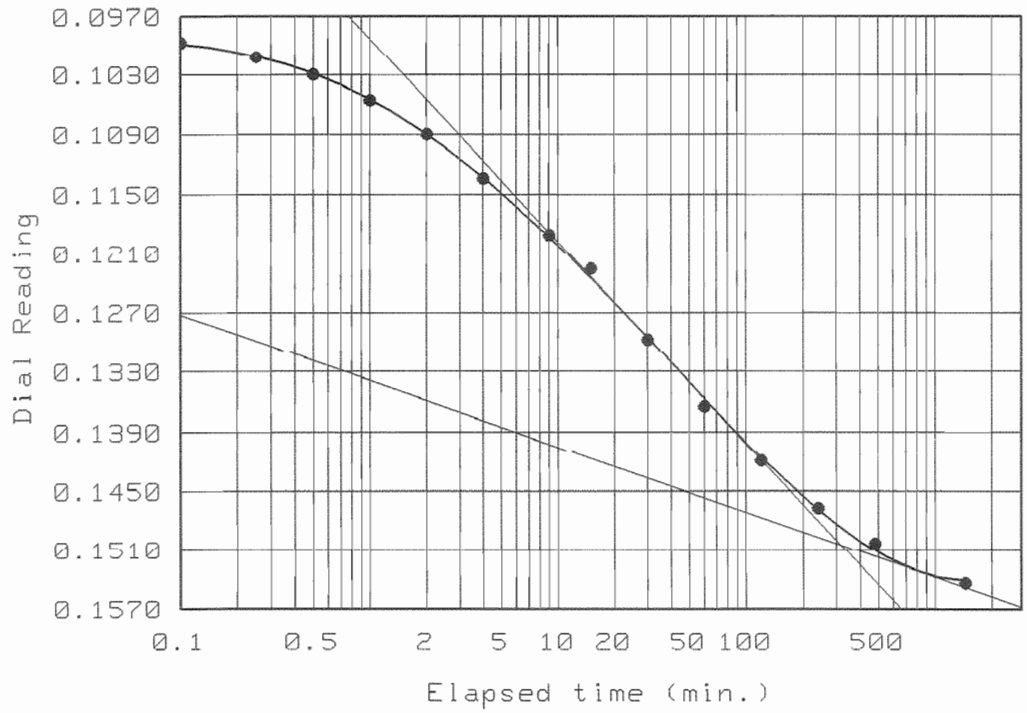
Date: 9/29/03



Load No.= 5
Load= 2.00 ksf
D_0 = 0.0783
D_{50} = 0.0844
D_{100}= 0.0904
T_{50}= 1.83 min.

C_v @ T_{50} = .054 in.^{2}/min.

C_α= 0.002



Load No.= 6
Load= 4.00 ksf
D_0 = 0.0974
D_{50} = 0.1239
D_{100}= 0.1505
T_{50}= 15.76 min.

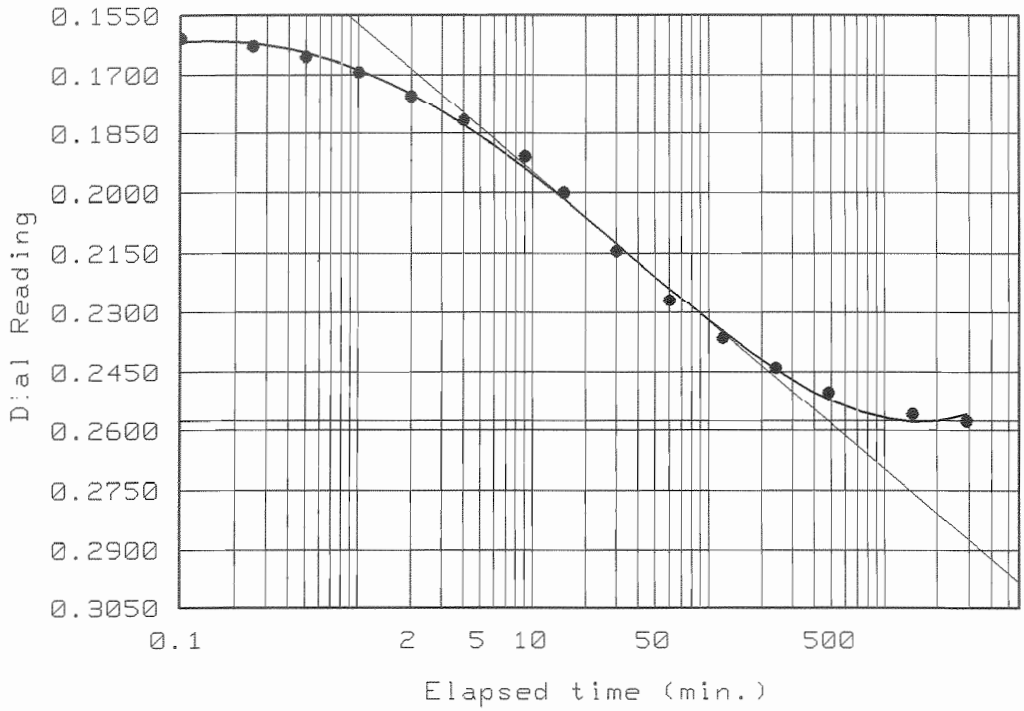
C_v @ T_{50} = .006 in.^{2}/min.

C_α= 0.005

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-9 @ 30' - 32'

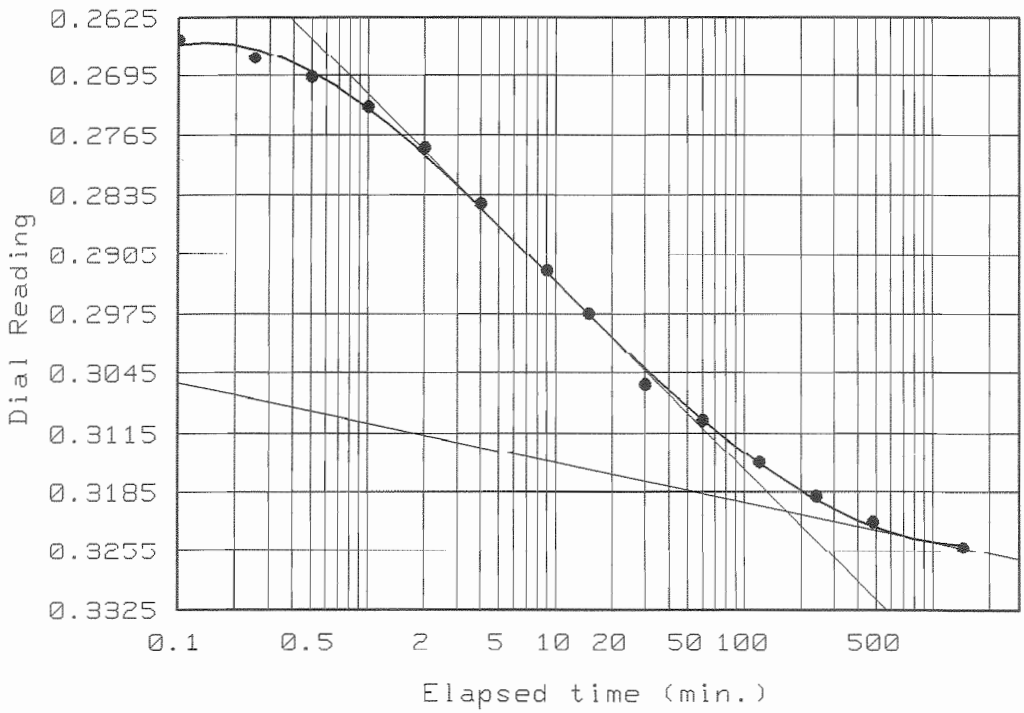
Date: 9/29/03



Load No. = 7
Load = 8.00 ksf
D_0 = 0.1598
D_{50} = 0.2087
D_{100} = 0.2576
T_{50} = 23.43 min.

C_v @ T_{50} = .004 in.^{2}/min.

C_α = 0.000



Load No. = 8
Load = 16.00 ksf
D_0 = 0.2634
D_{50} = 0.2921
D_{100} = 0.3208
T_{50} = 8.40 min.

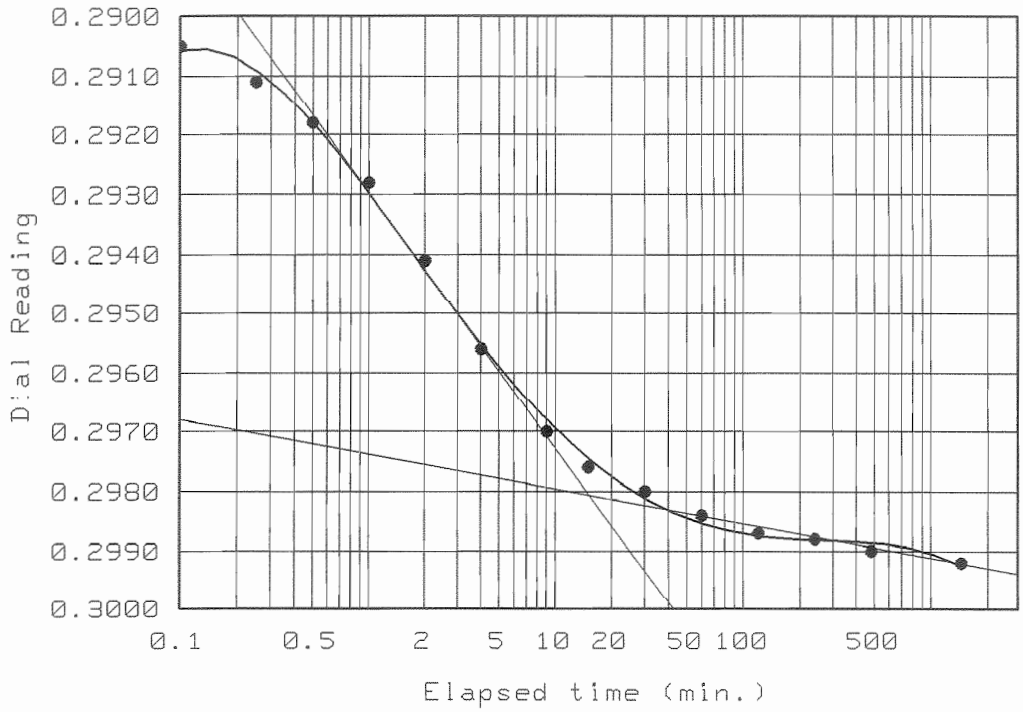
C_v @ T_{50} = .009 in.^{2}/min.

C_α = 0.004

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-9 @ 30' - 32'

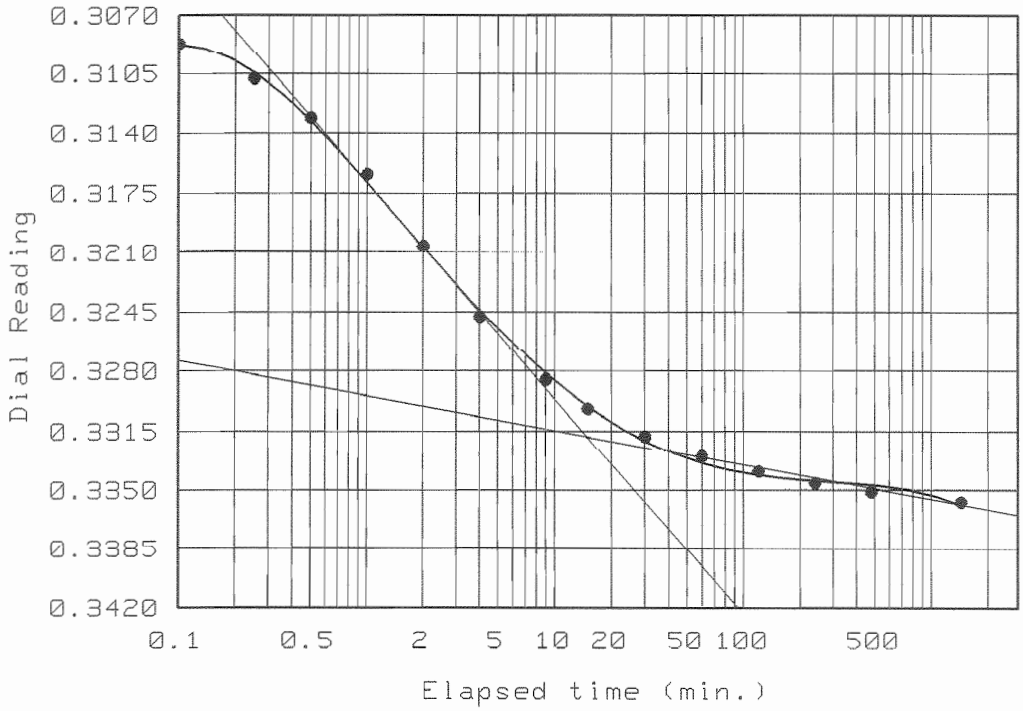
Date: 9/29/03



Load No.= 11
Load= 4.00 ksf
D_0 = 0.2897
D_{50} = 0.2939
D_{100}= 0.2981
T_{50}= 1.62 min.

C_v @ T_{50} = .044 in.^{2}/min.

C_α= 0.000



Load No.= 12
Load= 16.00 ksf
D_0 = 0.3053
D_{50} = 0.3185
D_{100}= 0.3318
T_{50}= 1.35 min.

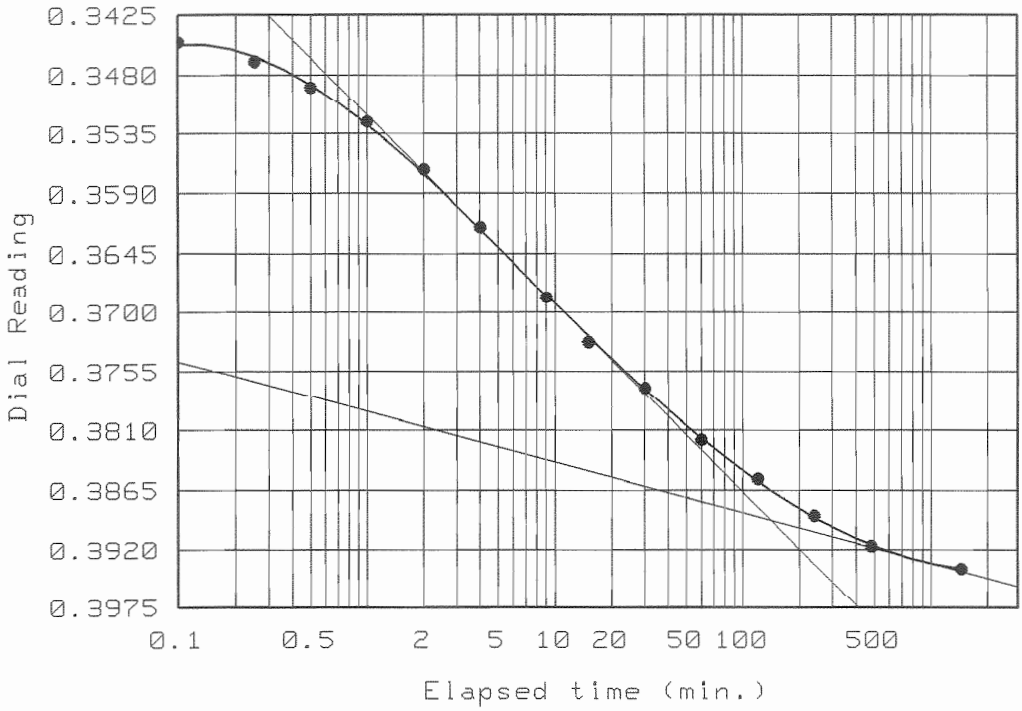
C_v @ T_{50} = .051 in.^{2}/min.

C_α= 0.002

Dial Reading vs. Time

Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-9 @ 30' - 32'

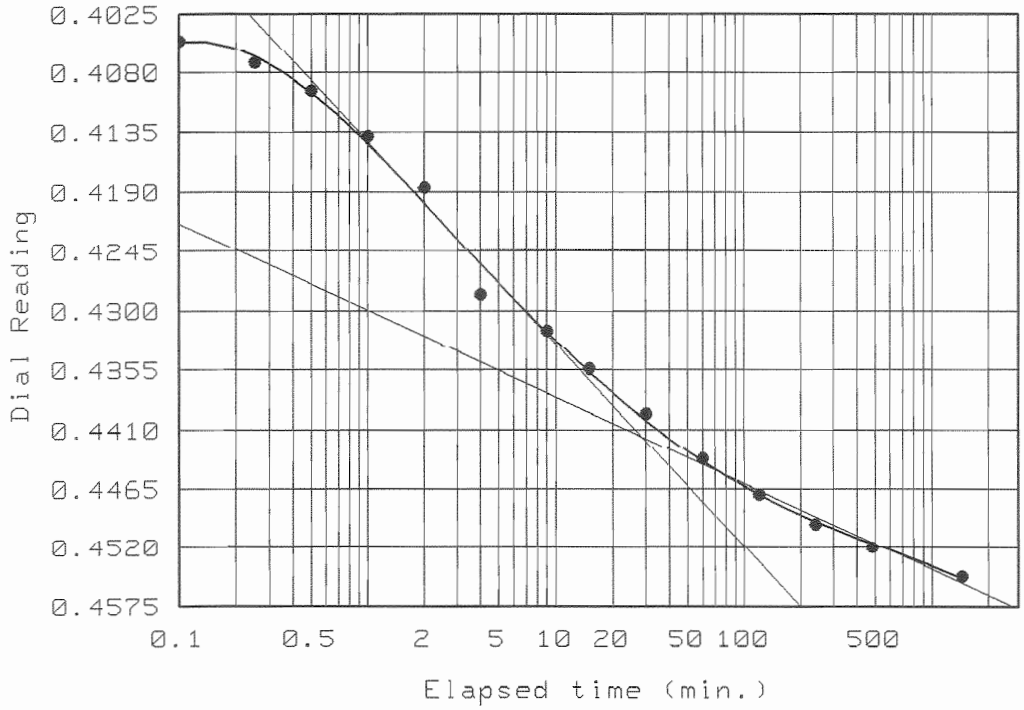
Date: 9/20/03



Load No.= 13
Load= 32.00 ksf
D_0 = 0.3425
D_{50} = 0.3659
D_{100}= 0.3894
T_{50}= 6.49 min.

C_v @ T_{50} =
.010 in.^{2}/min.

C_α= 0.004



Load No.= 14
Load= 64.00 ksf
D_0 = 0.4016
D_{50} = 0.4216
D_{100}= 0.4417
T_{50}= 2.44 min.

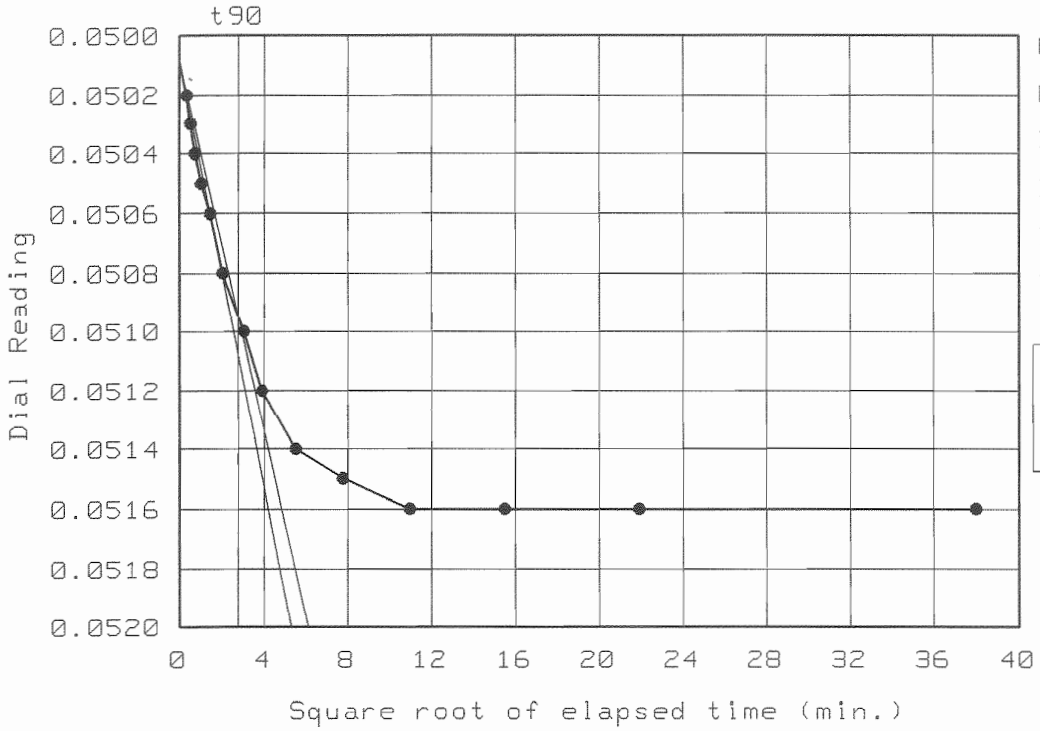
C_v @ T_{50} =
.023 in.^{2}/min.

C_α= 0.007

Dial Reading vs. Time

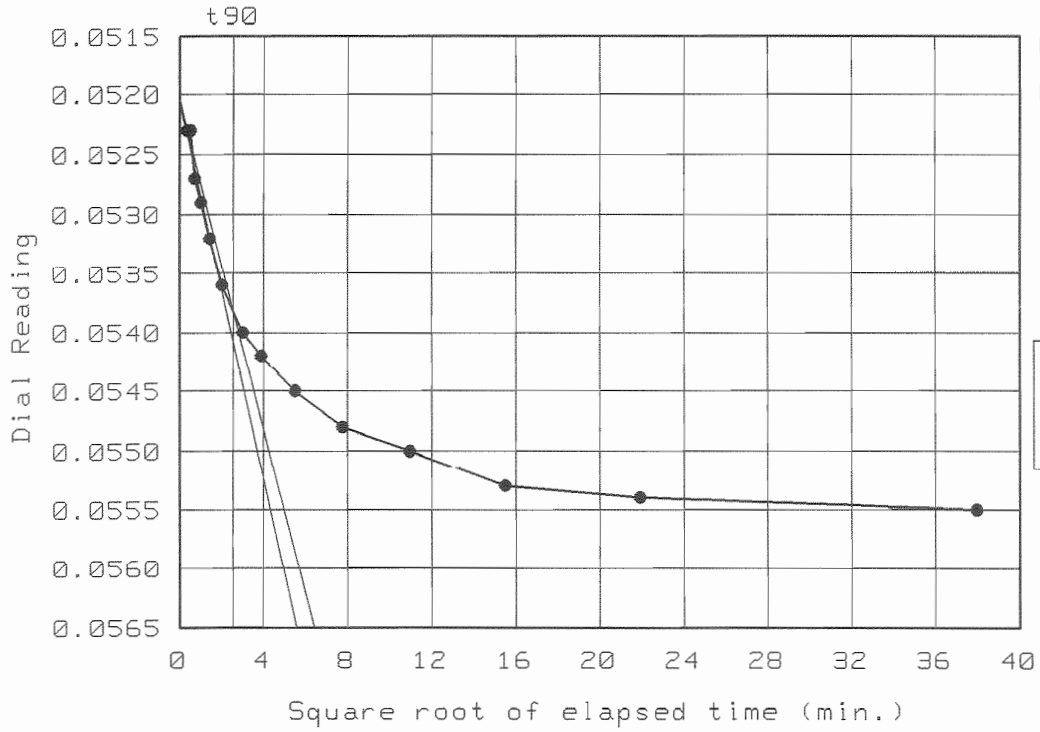
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-9 @ 30' - 32'

Date: 9/29/03



Load No.= 1
Load= 0.10 ksf
D_0 = 0.0501
D_{90} = 0.0510
D_{100}= 0.0510
T_{90}= 7.62 min.

C_v @ T_{90} =
.028 in.^{2}/min.



Load No.= 2
Load= 0.25 ksf
D_0 = 0.0520
D_{90} = 0.0538
D_{100}= 0.0540
T_{90}= 6.54 min.

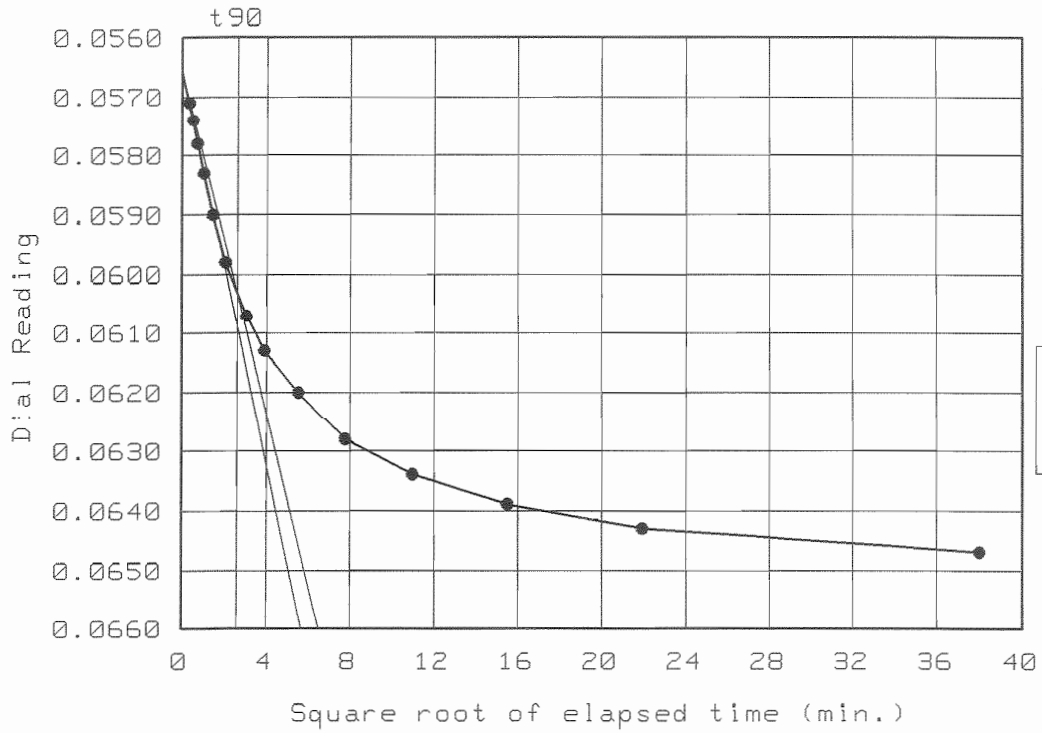
C_v @ T_{90} -
.032 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

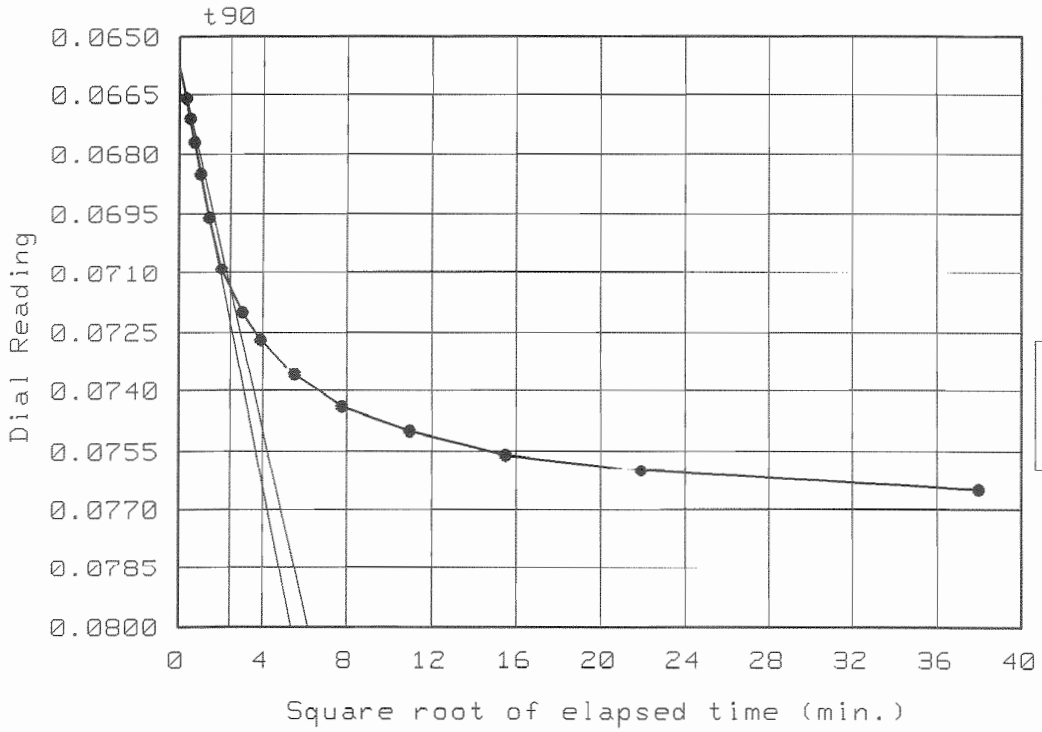
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-9 @ 30' - 32'

Date: 9/29/03



Load No.= 3
Load= 0.50 ksf
D_0 = 0.0566
D_{90} = 0.0603
D_{100}= 0.0607
T_{90}= 6.61 min.

C_v @ T_{90} =
.031 in.^{2}/min.



Load No.= 4
Load= 1.00 ksf
D_0 = 0.0658
D_{90} = 0.0714
D_{100}= 0.0720
T_{90}= 5.92 min.

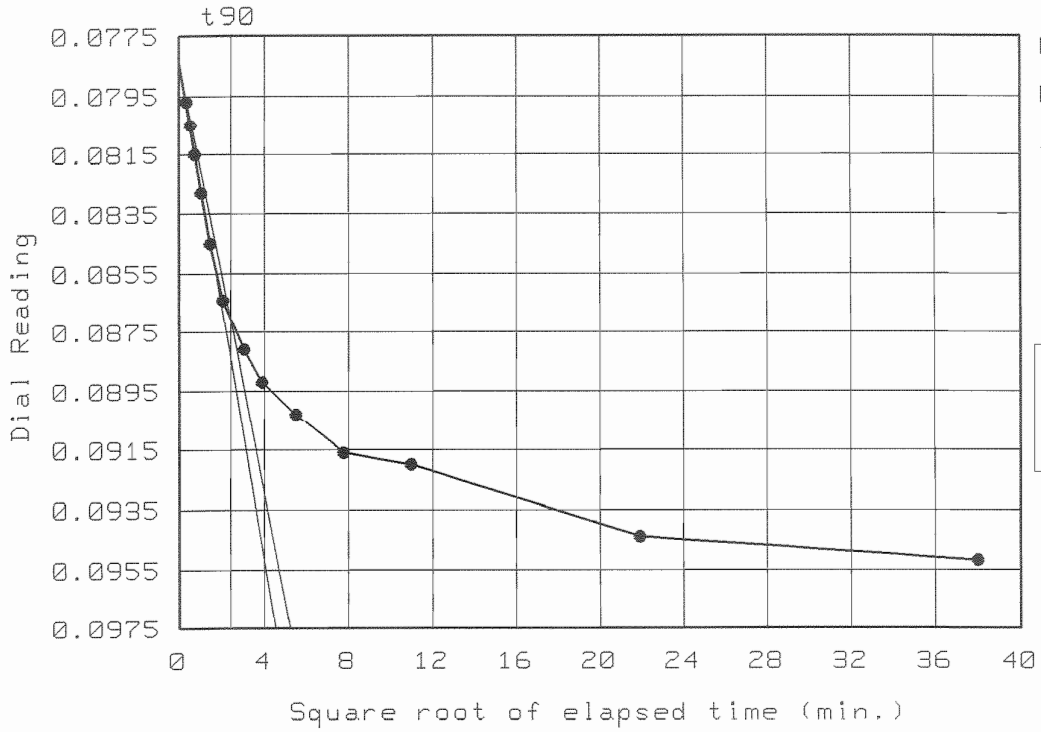
C_v @ T_{90} -
.034 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

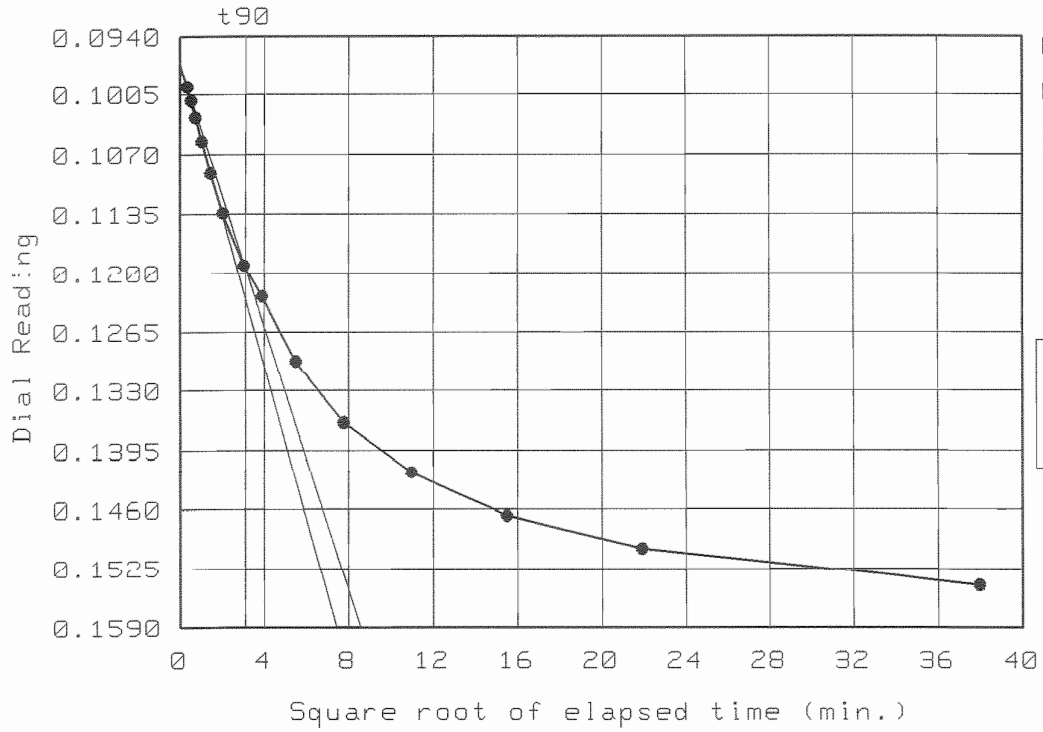
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-9 @ 30' - 32'

Date: 9/29/03



Load No. = 5
Load = 2.00 ksf
D_0 = 0.0784
D_{90} = 0.0870
D_{100} = 0.0880
T_{90} = 5.63 min.

C_v @ T_{90} = .035 in.^{2}/min.



Load No. = 6
Load = 4.00 ksf
D_0 = 0.0971
D_{90} = 0.1195
D_{100} = 0.1220
T_{90} = 9.61 min.

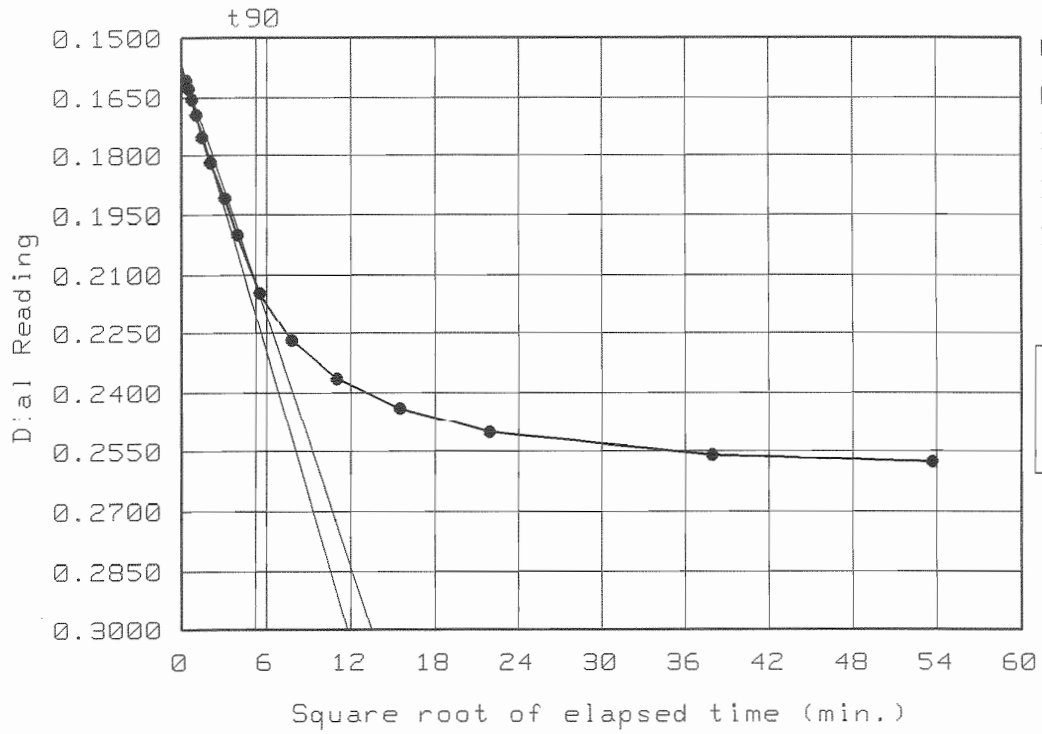
C_v @ T_{90} = .019 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

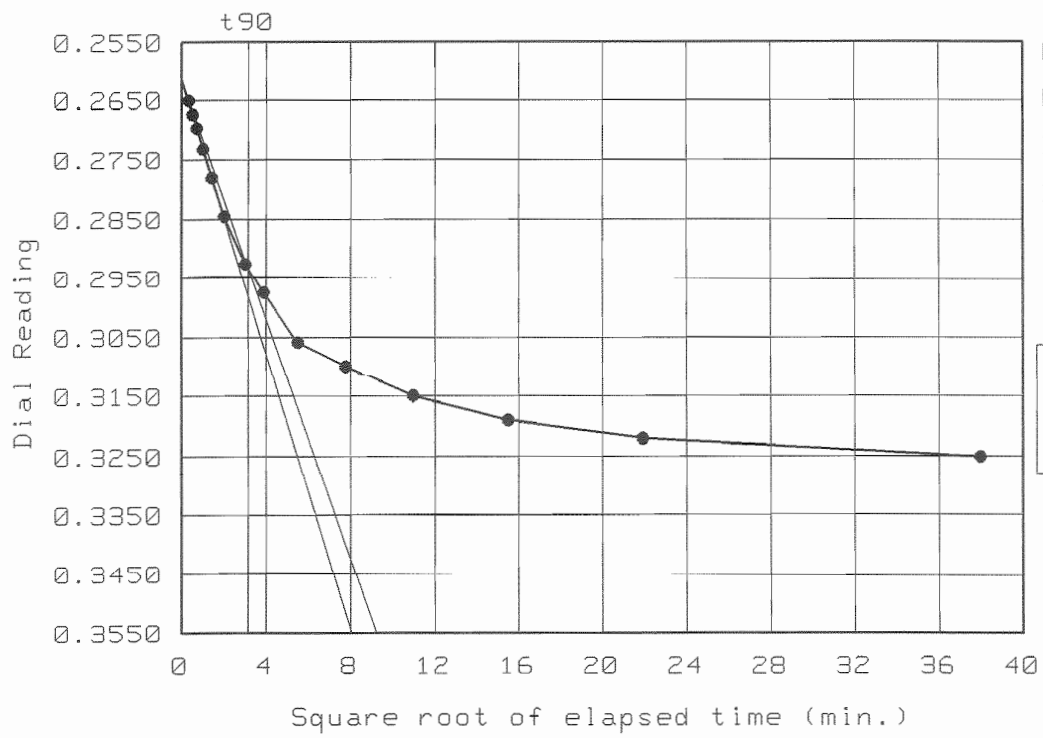
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-9 @ 30' - 32'

Date: 9/29/03



Load No.= 7
Load= 8.00 ksf
D_0 = 0.1569
D_{90} = 0.2119
D_{100}= 0.2180
T_{90}= 26.91 min.

C_v @ T_{90} =
.006 in.^{2}/min.



Load No.= 8
Load= 16.00 ksf
D_0 = 0.2614
D_{90} = 0.2934
D_{100}= 0.2970
T_{90}= 9.97 min.

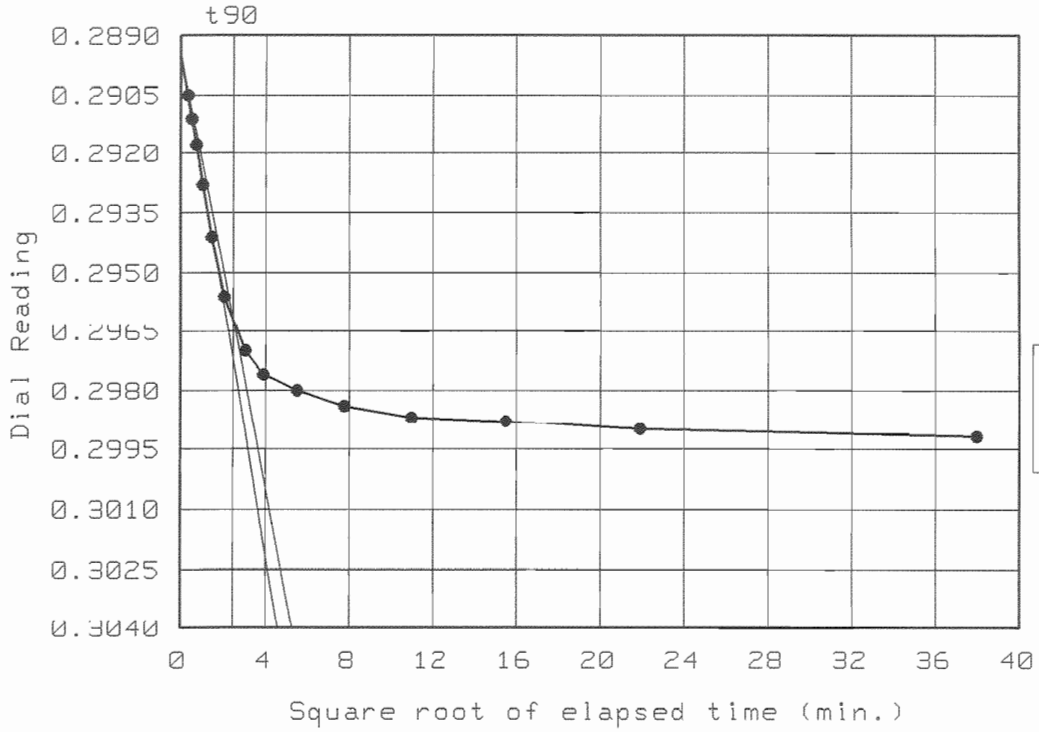
C_v @ T_{90} =
.012 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

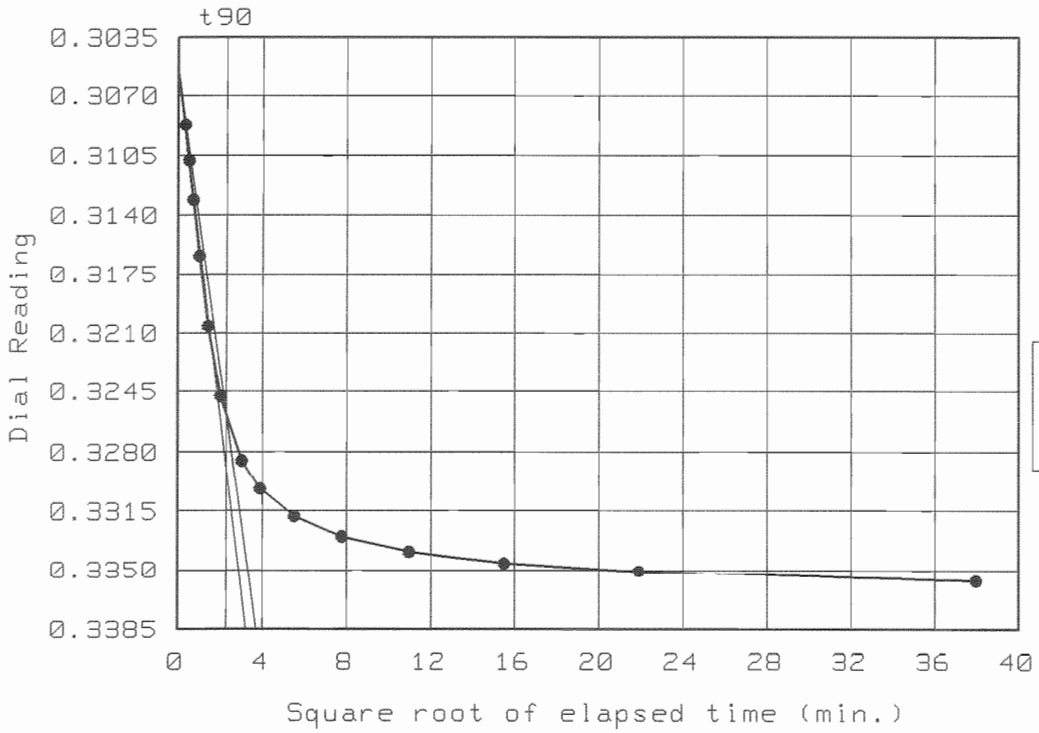
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-9 @ 30' - 32'

Date: 9/29/03



Load No.= 11
Load= 4.00 ksf
D_0 = 0.2895
D_{90} = 0.2962
D_{100}= 0.2970
T_{90}= 5.94 min.

C_v @ T_{90} =
.020 in.^{2}/min.



Load No.= 12
Load= 16.00 ksf
D_0 = 0.3055
D_{90} = 0.3258
D_{100}= 0.3281
T_{90}= 5.21 min.

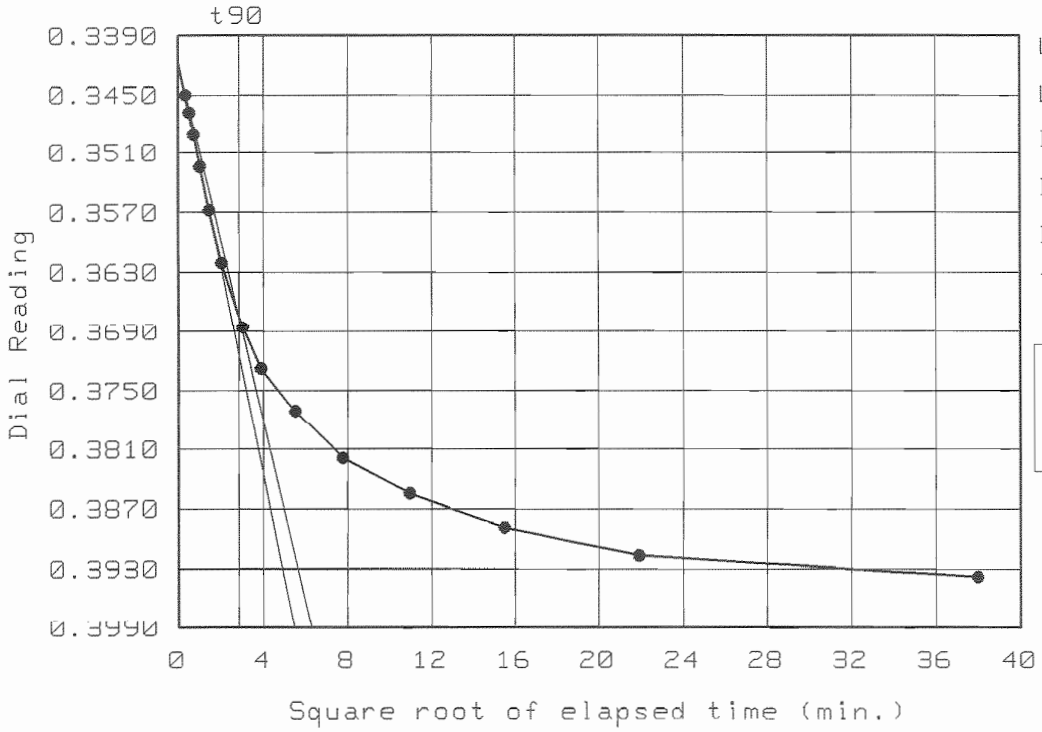
C_v @ T_{90} =
.022 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

Dial Reading vs. Time

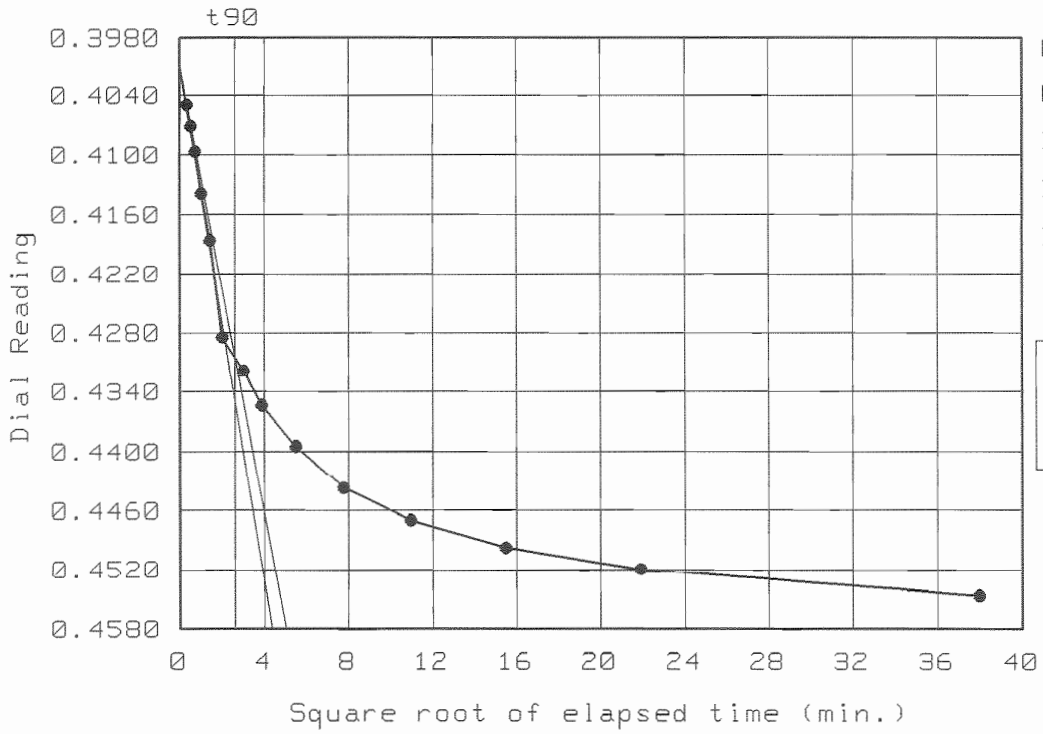
Project No.: 3530-03-1245 Phase 01
Project: Indian River Inlet Bridges
Location: Boring BI-9 @ 30' - 32'

Date: 9/29/03



Load No.= 13
Load= 32.00 ksf
D_0 = 0.3417
D_{90} = 0.3675
D_{100}= 0.3704
T_{90}= 8.03 min.

C_v @ T_{90} =
.012 in.^{2}/min.



Load No.= 14
Load= 64.00 ksf
D_0 = 0.4009
D_{90} = 0.4306
D_{100}= 0.4339
T_{90}= 6.83 min.

C_v @ T_{90} =
.012 in.^{2}/min.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 20, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
B # BI-1	S#1 1.0- 2.5	100	100	100	100	100	100	71	2	--	--	18	--	NP	A-3	0
	S#2 3.5- 5.0	100	100	100	100	100	100	76	4	--	--	20	--	NP	A-3	0
	S#3 6.0- 7.5	100	100	100	100	100	100	87	2	--	--	22	--	NP	A-3	0
	S#4 8.5-10.0	100	100	100	100	100	99	82	2	--	--	22	--	NP	A-3	0
	S#5 13.5-15.0	100	100	100	98	96	92	60	2	--	--	18	--	NP	A-3	0
	S#6 18.5-20.0	100	100	100	100	99	95	37	1	--	--	19	--	NP	A-1-b	0
	S#7 23.5-25.0	100	100	100	100	100	100	95	81	34	21	58	5	13	A-6	10
	S#8 28.5-30.0	100	100	100	99	99	98	95	85	33	19	57	4	14	A-6	11
	S#9 33.5-35.0	100	100	100	100	100	100	92	88	36	21	59	4	15	A-6	13
	S#10 38.5-40.0	100	100	100	100	100	100	97	95	33	20	54	4	13	A-6	12
	S#11 43.5-45.0	NO SAMPLE RECOVERY														
	S#12 48.5-50.0	100	100	100	100	100	97	92	87	42	23	60	4	19	A-7-6	17
	S#13 53.5-55.0	100	100	100	100	100	100	91	89	37	20	57	4	17	A-6	15
	S#14 58.5-60.0	100	100	100	100	100	99	85	81	44	24	62	4	20	A-7-6	17
	S#15 63.5-65.0	NO SAMPLE RECOVERY														
	S#16 68.5-70.0	100	100	100	100	100	100	83	81	51	28	70	5	23	A-7-6	20
	S#17 73.5-75.0	100	100	100	100	100	99	43	11	--	--	20	--	NP	A-1-b	0

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 2
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 20, 2003

		********** PERCENT PASSING **********														
LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
	S#18															
	78.5-80.0	100	100	100	100	100	100	76	24	--	--	30	1	NP	A-2-4	0
	S#19															
	83.5-85.0	100	100	100	100	100	99	95	14	--	--	31	3	NP	A-2-4	0
	S#20															
	88.5-90.0	100	100	100	100	99	99	43	7	--	--	20	--	NP	A-1-b	0
	S#21															
	93.5-95.0	100	100	100	87	84	79	59	11	--	--	14	--	NP	A-2-4	0
	S#22															
	98.5-100.0	100	100	100	100	96	86	38	8	--	--	14	--	NP	A-1-b	0
	S#23															
	103.5-105.0	100	100	100	100	98	96	29	7	--	--	18	--	NP	A-1-b	0
	END															

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 16, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
B # BI-2	S#1 0.0- 1.5	100	100	100	95	95	93	66	12	--	--	--	--	NP	A-2-4	0
	S#2 1.5- 3.0	100	100	100	90	78	64	22	4	--	--	--	--	NP	A-1-b	0
	S#3 3.5- 5.0	100	100	100	100	100	97	55	2	--	--	--	--	NP	A-3	0
	S#4 6.0- 7.5	100	100	100	98	97	95	79	8	--	--	--	--	NP	A-3	0
	S#5 8.5-10.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#6 13.5-15.0	100	100	100	99	97	93	43	3	--	--	--	--	NP	A-1-b	0
	S#7 18.5-20.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#8 23.5-25.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#9 28.5-30.0	100	100	100	100	100	100	99	88	32	19	--	4	13	A-6	11
	S#10 33.5-35.0	100	100	100	100	100	100	99	94	35	20	--	4	15	A-6	14
	S#11 38.5-40.0	100	100	100	100	100	100	96	94	37	21	--	4	16	A-6	16
	S#12 43.5-45.0	100	100	100	100	100	100	95	91	36	21	--	4	15	A-6	14
	S#13 48.5-50.0	100	100	100	100	100	99	93	88	41	22	--	4	19	A-7-6	17
	S#14 53.5-55.0	100	100	100	100	100	100	91	88	41	21	--	4	20	A-7-6	18
	S#15 58.5-60.0	100	100	100	100	100	100	94	92	45	24	--	4	21	A-7-6	21
	S#16 63.5-65.0	100	100	100	100	100	100	94	92	48	26	--	4	22	A-7-6	23
	S#17 68.5-70.0	100	100	100	100	100	100	68	58	48	27	--	5	21	A-7-6	10

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 2
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 16, 2003

		********** PERCENT PASSING **********														
LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
	S#18 73.5-75.0	100	100	100	100	100	100	96	76	46	31	--	6	15	A-7-5	12
	S#19 78.5-80.0	100	100	100	100	100	100	72	44	44	27	--	6	17	A-7-6	4
	S#20 83.5-85.0	100	100	100	100	100	100	99	22	--	--	--	3	NP	A-2-4	0
	S#21 88.5-90.0	100	100	100	100	100	100	83	7	--	--	--	--	NP	A-3	0
	S#22 93.5-95.0	100	100	100	100	99	96	38	6	--	--	--	--	NP	A-1-b	0
	S#23 98.5-100.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#24 103.5-105.0	100	100	100	100	98	91	49	7	--	--	--	1	NP	A-1-b	0
	S#25 108.5-110.0	100	100	100	100	100	100	99	61	23	--	--	2	NP	A-4	0
	S#26 113.5-115.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#27 118.5-120.0	100	100	100	100	100	100	96	9	--	--	--	--	NP	A-3	0
	S#28 123.5-125.0	100	100	100	100	100	100	97	24	--	--	--	1	NP	A-2-4	0
	END															

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 16, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
B # BI-3	S#1															
	1.0- 2.5	100	100	100	99	98	95	60	7	--	--	12	--	NP	A-3	0
	S#2															
	3.5- 5.0	100	100	100	100	100	99	26	2	--	--	19	--	NP	A-1-b	0
	S#3															
	6.0- 7.5	ENTIRE SAMPLE KEPT BY MACTEC														
	S#4															
	8.5-10.0	100	100	100	100	100	99	49	0	--	--	19	--	NP	A-1-b	0
	S#5															
	13.5-15.0	100	100	100	100	100	100	41	2	--	--	21	--	NP	A-1-b	0
	S#6															
	18.5-20.0	100	100	100	100	100	100	61	3	--	--	21	--	NP	A-3	0
	S#7															
	23.5-25.0	100	100	100	100	91	75	25	2	--	--	15	--	NP	A-1-b	0
	S#8															
	28.5-30.0	100	100	100	100	100	100	98	87	30	20	46	3	10	A-4	8
	UD-7															
	35.0-36.0	NO SIEVE ANALYSIS - PRESS SAMPLE														
	S#9															
	38.5-40.0	NO SIEVE ANALYSIS - SMALL SAMPLE								30	22	49	3	8	-----	--
	UD-8															
	40.0-42.0	NO SIEVE ANALYSIS - PRESS SAMPLE														
	S#10															
	48.5-50.0	100	100	100	100	100	97	96	91	39	22	56	3	17	A-6	16
	UD-9															
	50.0-52.0	NO SIEVE ANALYSIS - PRESS SAMPLE														
	S#11															
	58.5-60.0	100	100	100	100	100	100	88	83	53	27	81	4	26	A-7-6	24
	UD-10															
	60.0-62.0	NO SIEVE ANALYSIS - PRESS SAMPLE														
	S#12															
	68.5-70.0	100	100	100	100	100	100	91	82	49	27	64	5	22	A-7-6	20
	UD-11															
	70.0-72.0	NO SIEVE ANALYSIS - PRESS SAMPLE														

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 16, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
	S#13 78.5-80.0	100	100	100	100	100	100	66	45	56	41	90	6	15	A-7-5	4
	S#14 83.5-85.0	100	100	100	100	100	100	83	64	56	38	78	6	18	A-7-5	12
	S#15A 89.0-89.5	NO SIEVE ANALYSIS - SMALL SAMPLE								17	--	29	1	--	-----	--
	S#15B 89.5-90.0	100	100	100	70	51	29	19	4	--	--	10	--	NP	A-1-a	0
	S#16 93.5-95.0	100	100	100	79	62	43	15	1	--	--	8	--	NP	A-1-a	0
	S#17 98.5-100.0	100	100	100	94	90	78	32	7	--	--	14	--	NP	A-1-b	0
	S#18 103.5-105.0	100	100	100	100	100	99	92	12	--	--	23	--	NP	A-2-4	0
	S#19 108.5-110.0	100	100	100	100	100	100	74	7	--	--	19	--	NP	A-3	0
	END															

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 1
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 19, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
B # BI-4	S#1 1.0- 2.5	100	100	100	100	100	98	46	1	--	--	15	--	NP	A-1-b	0
	S#2 3.5- 5.0	100	100	100	100	100	100	91	2	--	--	24	--	NP	A-3	0
	S#3 6.0- 7.5	100	100	100	100	100	99	77	2	--	--	20	--	NP	A-3	0
	S#4 8.5-10.0	100	100	100	100	100	98	33	2	--	--	19	--	NP	A-1-b	0
	S#5 13.5-15.0	100	100	100	100	100	97	70	3	--	--	19	--	NP	A-3	0
	S#6 18.5-20.0	100	100	100	100	100	100	41	2	--	--	20	--	NP	A-1-b	0
	S#7 23.5-25.0	100	100	100	99	96	90	27	5	--	--	14	--	NP	A-1-b	0
	S#8 28.5-30.0	100	100	100	100	100	100	87	71	40	25	61	4	15	A-6	10
	S#9 33.5-35.0	NO SAMPLE RECOVERY														
	S#10 38.5-40.0	100	100	100	100	100	100	94	91	32	21	48	3	11	A-6	10
	S#11 43.5-45.0	100	100	100	100	100	100	92	89	38	22	54	3	16	A-6	15
	S#12 48.5-50.0	100	100	100	100	100	100	95	92	42	22	55	3	20	A-7-6	20
	S#13 53.5-55.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#14 58.5-60.0	100	100	100	100	100	100	92	89	43	23	63	3	20	A-7-6	19
	S#15 63.5-65.0	100	100	100	100	100	100	93	89	50	27	66	4	23	A-7-6	23
	S#16 68.5-70.0	100	100	100	100	100	100	81	68	50	28	63	5	22	A-7-6	15
	S#17 73.5-75.0	100	100	100	100	100	100	71	51	52	29	68	5	23	A-7-6	9

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 19, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
	S#18															
	78.5-80.0	100	100	100	100	100	100	76	57	50	30	67	4	20	A-7-5	10
	UD-13															
	80.0-82.0	NO SIEVE ANALYSIS - PRESS SAMPLE														
	S#19															
	83.5-85.0	100	100	100	100	100	100	82	62	55	33	74	5	22	A-7-5	13
	S#20															
	88.5-90.0	100	100	100	88	81	69	27	7	--	--	13	--	NP	A-1-b	0
	S#21															
	93.5-95.0	100	100	100	86	76	58	23	6	--	--	10	--	NP	A-1-b	0
	S#22															
	98.5-100.0	100	100	100	100	100	98	87	9	--	--	20	--	NP	A-3	0
	S#23															
	103.5-105.0	100	100	100	100	100	98	79	10	--	--	18	--	NP	A-3	0
	S#24															
	108.5-100.0	100	100	100	100	100	94	45	8	--	--	17	--	NP	A-1-b	0
	S#25															
	113.5-115.0	100	100	100	100	100	100	97	12	--	--	22	--	NP	A-2-4	0
	END															

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS
AASHTO TESTS:T-89,T-90, & T-265

PAGE 1

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 21, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
B # BI-5	S#1 1.0- 2.5	100	100	100	100	100	92	71	16	--	--	10	--	NP	A-2-4	0
	S#2 3.5- 5.0	100	100	100	100	100	99	41	4	--	--	21	--	NP	A-1-b	0
	S#3 6.0- 7.5	100	100	100	100	100	100	68	4	--	--	20	--	NP	A-3	0
	S#4 8.5-10.0	100	100	100	100	100	98	32	2	--	--	18	--	NP	A-1-b	0
	S#5 13.5-15.0	100	100	100	100	99	99	64	4	--	--	18	--	NP	A-3	0
	S#6 18.5-20.0	100	100	100	100	100	100	59	2	--	--	19	--	NP	A-3	0
	S#7 23.5-25.0	100	100	100	100	98	95	32	4	--	--	15	--	NP	A-1-b	0
	S#8 28.5-30.0	100	100	100	100	97	88	15	2	--	--	93	--	NP	A-1-b	0
	S#9 33.5-35.0	100	100	100	100	100	100	95	86	35	23	49	4	12	A-6	10
	S#10 38.5-40.0	100	100	100	100	100	100	95	91	31	22	44	3	9	A-4	8
	S#11 43.5-45.0	100	100	100	100	100	100	94	92	34	19	49	3	15	A-6	14
	S#12 48.5-50.0	100	100	100	100	100	99	76	71	38	21	44	3	17	A-6	11
	S#13 53.5-55.0	100	100	100	100	99	99	95	89	42	22	50	4	20	A-7-6	19
	S#14 58.5-60.0	100	100	100	100	100	100	95	91	40	22	48	3	18	A-6	17
	63.5-65.0	SKIPPED SAMPLE - NO SAMPLE TAKEN														
	S#15 68.5-70.0	100	100	100	100	100	100	91	81	47	25	52	5	22	A-7-6	19
	S#16 78.5-80.0	100	100	100	100	100	100	94	83	54	29	61	4	25	A-7-6	23
	S#17 83.5-85.0	100	100	100	100	100	100	85	65	53	32	65	5	21	A-7-5	13

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 2
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 21, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
	S#18															
	88.5-90.0	100	100	100	94	86	79	57	6	--	--	18	--	NP	A-3	0
	S#19															
	93.5-95.0	100	100	100	86	76	67	24	5	--	--	12	--	NP	A-1-b	0
	S#20															
	98.5-100.0	100	100	100	100	100	95	48	8	--	--	15	--	NP	A-1-b	0
	103.5-105.0	SKIPPED SAMPLE - NO SAMPLE TAKEN														
	S#21															
	108.5-110.0	100	100	100	100	100	95	75	10	--	--	18	--	NP	A-3	0
	113.5-115.0	SKIPPED SAMPLE - NO SAMPLE TAKEN														
	S#22															
	118.5-120.0	100	100	100	100	100	100	99	34	17	--	23	1	NP	A-2-4	0
	123.5-125.0	SKIPPED SAMPLE - NO SAMPLE TAKEN														
	S#23															
	128.5-130.0	100	100	100	100	100	100	99	71	26	17	30	5	9	A-4	4
	S#24															
	133.5-135.0	100	100	100	100	100	100	65	27	26	17	26	2	9	A-2-4	0
	138.5-140.0	SKIPPED SAMPLE - NO SAMPLE TAKEN														
	S#25															
	143.5-145.0	100	100	100	100	100	100	100	67	23	--	29	2	NP	A-4	0
	UD-14	SHELBY TUBE														
	145.0-147.0	NO SIEVE ANALYSIS - PRESS SAMPLE														
	END															

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 1
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 9, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
B # BI-6	S#1															
	1.0- 2.5	100	100	100	100	98	96	65	9	--	--	5	--	NP	A-3	0
	S#2															
	2.5- 4.0	100	100	100	100	100	99	59	3	--	--	4	--	NP	A-3	0
	S#3															
	4.0- 5.5	100	100	100	100	100	100	57	3	--	--	7	--	NP	A-3	0
	S#4															
	5.5- 7.0	100	100	100	98	91	81	48	8	--	--	11	--	NP	A-1-b	0
	S#5															
	7.0- 8.5	100	100	100	100	96	94	68	4	--	--	21	--	NP	A-3	0
	S#6															
	8.5-10.0	100	100	100	100	100	98	52	3	--	--	19	--	NP	A-3	0
	S#7															
	13.5-15.0	100	100	100	100	100	95	62	3	--	--	20	--	NP	A-3	0
	S#8															
	18.5-20.0	100	100	100	100	100	96	44	3	--	--	19	--	NP	A-1-b	0
	S#9															
	23.5-25.0	100	100	100	99	97	93	32	4	--	--	16	--	NP	A-1-b	0
	S#10															
	28.5-30.0	100	100	100	100	98	96	39	10	--	--	17	--	NP	A-1-b	0
	S#11															
	33.5-35.0	100	100	100	100	100	98	39	4	--	--	19	--	NP	A-1-b	0
	S#12															
	38.5-40.0	100	100	100	100	100	100	98	75	29	18	48	--	11	A-6	6
	S#13															
	43.5-45.0	100	100	100	100	100	100	98	87	33	19	50	--	14	A-6	11
	UD-5 SHELBY TUBE															
	45.0-47.0	NO SIEVE ANALYSIS - PRESS SAMPLE														
	S#14															
	48.5-50.0	100	100	100	100	100	100	98	95	35	20	51	--	15	A-6	15
	S#15															
	53.5-55.0	100	100	100	100	100	100	90	83	36	20	47	--	16	A-6	13
	UD-6 SHELBY TUBE															
	55.0-57.0	NO SIEVE ANALYSIS - PRESS SAMPLE														

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 2
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 9, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
	S#16 58.5-60.0	100	100	100	100	100	100	97	96	38	20	46	--	18	A-6	18
	S#17 63.5-65.0	100	100	100	100	100	100	100	98	43	23	57	--	20	A-7-6	22
	S#18 68.5-70.0	100	100	100	100	100	100	78	69	46	25	59	5	21	A-7-6	14
	S#19 73.5-75.0	100	100	100	100	100	100	17	7	--	--	61	5	NP	A-1-b	0
	S#20 78.5-80.0	100	100	100	100	100	100	85	65	65	42	94	13	23	A-7-5	16
	S#21 83.5-85.0	100	100	100	100	100	100	87	82	54	30	66	5	24	A-7-5	22
	S#22 88.5-90.0	100	100	100	100	100	100	89	75	52	30	62	6	22	A-7-5	18
	S#23 93.5-95.0	100	100	100	95	87	75	56	6	--	--	13	--	NP	A-3	0
	S#24 98.5-100.0	100	100	100	96	86	67	55	54	--	--	13	--	NP	A-4	0
	S#25 103.5- 105.0	100	100	100	100	97	90	37	7	--	--	17	--	NP	A-1-b	0
	S#26 108.5- 110.0	100	100	100	98	94	83	18	5	--	--	13	--	NP	A-1-b	0
	S#27 113.5- 115.0	100	100	100	99	98	95	49	8	--	--	17	--	NP	A-1-b	0
	S#28 118.5-120.0	100	100	100	100	99	85	49	8	--	--	14	--	NP	A-1-b	0
	S#29 123.5- 125.0	100	100	100	97	94	90	71	9	--	--	17	--	NP	A-3	0
	S#30 128.5- 130.0	100	100	100	100	100	100	91	26	--	--	23	--	NP	A-2-4	0
	S#31 133.5- 135.0	100	100	100	100	100	100	96	19	--	--	25	--	NP	A-2-4	0
	S#32 138.5- 140.0	100	100	100	100	100	100	98	63	25	18	26	--	7	A-4	2
	S#33 143.5- 145.0	100	100	100	100	100	100	99	55	24	17	22	--	7	A-4	1

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 3
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 9, 2003

		********** PERCENT PASSING **********														
LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
	S#34															
148.5- 150.0		100	100	100	100	100	100	96	81	31	17	28	--	14	A-6	10
	S#35															
153.5- 155.0		100	100	100	100	100	100	99	91	34	20	31	--	14	A-6	13
	S#37A															
163.5- 165.0		100	100	100	100	100	100	92	56	25	21	26	--	4	A-4	0
	S#38															
168.5- 170.0		100	100	100	100	100	100	99	44	21	--	28	--	NP	A-4	0
	S#39															
173.5- 175.0		100	100	100	100	100	99	98	21	--	--	26	--	NP	A-2-4	0
	END															

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 1
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 11, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
B # EI-7	S#1															
	1.0- 2.5	100	100	100	100	100	97	47	3	--	--	3	--	NP	A-1-b	0
	S#2															
	2.5- 4.0	100	100	100	100	100	98	64	3	--	--	3	--	NP	A-3	0
	S#3															
	4.0- 5.5	ENTIRE SAMPLE KEPT BY MACTEC														
	S#4															
	5.5- 7.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#5															
	7.0- 8.5	100	100	100	100	100	100	52	2	--	--	20	--	NP	A-3	0
	S#6															
	8.5-10.0	100	100	100	100	100	99	59	1	--	--	21	--	NP	A-3	0
	S#7															
	13.5-15.0	100	100	100	100	100	99	92	2	--	--	22	--	NP	A-3	0
	S#8															
	18.5-20.0	100	100	100	95	90	84	49	2	--	--	15	--	NP	A-1-b	0
	S#9															
	23.5-25.0	100	100	100	100	100	98	58	4	--	--	19	--	NP	A-3	0
	S#10															
	28.5-30.0	100	100	100	100	97	94	76	4	--	--	22	--	NP	A-3	0
	UD-3 SHELBY TUBE															
	31.5-32.1	NO SIEVE ANALYSIS - PRESS SAMPLE														
	S#11															
	33.5-35.0	100	100	100	94	86	79	72	65	43	25	57	4	18	A-7-6	10
	UD-4 SHELBY TUBE															
	41.5-43.3	NO SIEVE ANALYSIS - PRESS SAMPLE														
	S#12															
	40.5-42.0	100	100	100	99	98	97	96	90	40	24	59	4	16	A-6	16
	S#13															
	43.5-45.0	100	100	100	100	100	99	98	97	37	22	47	3	15	A-6	16
	UD-5 SHELBY TUBE															
	50.0-52.0	NO SAMPLE RECOVERY - PRESS SAMPLE														
	S#14															
	53.5-54.8	100	100	100	100	100	100	96	88	45	28	55	4	17	A-7-6	17

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 11, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
	S#15 55.0-56.5	100	100	100	99	97	90	55	14	--	--	17	1	NP	A-2-4	0
	S#16 56.5-58.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#17 58.5-60.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#18 60.0-61.5	100	100	100	89	80	71	31	10	--	--	15	--	NP	A-1-b	0
	S#19 61.5-63.0	100	100	100	95	93	90	43	12	--	--	19	--	NP	A-1-b	0
	S#20 63.5-65.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#21 68.5-70.0	100	100	100	90	89	77	18	6	--	--	15	--	NP	A-1-b	0
	S#22 73.5-75.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#23 78.5-80.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#24 83.5-85.0	100	100	100	98	97	94	88	12	--	--	22	--	NP	A-2-4	0
	S#25 88.5-90.0	100	100	100	100	97	94	93	11	--	--	23	--	NP	A-2-4	0
	S#26 93.5-93.8	100	100	100	100	100	100	100	25	--	--	24	--	NP	A-2-4	0
	S#26A 93.8-94.3	100	100	100	100	100	98	97	59	22	17	26	--	5	A-4	0
	S#27 98.5-100.0	100	100	100	100	98	96	53	6	--	--	18	--	NP	A-3	0
	S#28 103.5-105.0	100	100	100	99	97	93	63	7	--	--	21	--	NP	A-3	0
	S#29 108.5-110.0	100	100	100	100	98	78	60	17	20	--	18	--	NP	A-2-4	0
	S#30 113.5-115.0	100	100	100	100	99	97	72	8	--	--	21	--	NP	A-3	0
	S#31 118.5-120.0	100	100	100	100	100	99	60	8	--	--	19	--	NP	A-3	0

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 3
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 11, 2003

		********** PERCENT PASSING **********														
LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
	S#32															
	123.5-125.0	100	100	100	100	99	96	71	6	--	--	19	--	NP	A-3	0
	S#33															
	128.5-130.0	100	100	100	99	96	94	71	7	--	--	20	--	NP	A-3	0
	S#34															
	133.5-135.0	100	100	100	100	100	98	55	7	--	--	19	--	NP	A-3	0
	S#35															
	138.5-140.0	100	100	100	100	100	100	97	72	27	20	25	2	7	A-4	3
	S#36															
	143.5-145.0	100	100	100	100	100	100	92	53	21	17	19	2	4	A-4	0
	S#37															
	148.5-150.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#38															
	153.5-155.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#39															
	158.5-160.0	100	100	100	100	99	98	96	87	26	--	33	2	NP	A-4	0
	S#40															
	163.5-165.0	100	100	100	100	100	100	90	58	25	18	23	2	7	A-4	2
	S#41															
	168.5-170.0	100	100	100	99	99	98	95	64	23	--	25	1	NP	A-4	0
	S#42															
	173.5-175.0	100	100	100	100	100	100	98	56	22	18	24	3	4	A-4	0
	END															

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 1
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 12, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
B # BI-8	S#1 1.0- 2.5	100	100	100	100	100	98	61	3	--	--	3	--	NP	A-3	0
	S#2 3.5- 5.0	100	100	100	100	100	99	46	2	--	--	16	--	NP	A-1-b	0
	S#3 6.0- 7.5	100	100	100	100	100	99	64	3	--	--	20	--	NP	A-3	0
	S#4 8.5-10.0	100	100	100	100	100	100	70	3	--	--	24	--	NP	A-3	0
	S#5 13.5-15.0	100	100	100	100	100	99	91	3	--	--	21	--	NP	A-3	0
	S#6 18.5-20.0	100	100	100	99	99	96	36	3	--	--	16	--	NP	A-1-b	0
	S#7 23.5-25.0	100	100	100	100	100	100	81	5	--	--	18	--	NP	A-3	0
	S#8 28.5-30.0	100	100	100	100	100	100	98	88	37	21	54	4	16	A-6	14
	S#9 33.5-35.0	100	100	100	100	100	100	100	98	38	23	57	4	15	A-6	16
	S#10 38.5-40.0	100	100	100	100	100	100	100	96	35	21	50	3	14	A-6	14
	S#11 43.5-45.0	100	100	100	100	100	95	93	88	38	22	51	4	16	A-6	14
	S#12 48.5-50.0	100	100	100	100	100	100	98	94	38	22	54	4	16	A-6	16
	S#13 53.5-55.0	100	100	100	100	100	100	98	88	44	24	58	4	20	A-7-6	19
	S#14A 58.5-59.0	NO SIEVE ANALYSIS								47	34	87	16	13	-----	--
	S#14B 59.0-60.0	100	100	100	100	100	99	80	25	--	--	25	1	NP	A-2-4	0
	S#15A 63.5-64.0	NO SIEVE ANALYSIS								--	--	159	28	--	-----	--
	S#15B 64.0-65.0	100	100	100	97	91	71	11	4	--	--	13	--	NP	A-1-b	0

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 12, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
	S#16 68.5-70.0	100	100	100	96	91	84	19	4	--	--	15	--	NP	A-1-b	0
	S#17 73.5-75.0	100	100	100	99	96	87	19	7	--	--	16	--	NP	A-1-b	0
	S#18 78.5-80.0	100	100	100	100	100	97	55	8	--	--	18	--	NP	A-3	0
	S#19 83.5-85.0	100	100	100	95	90	86	67	8	--	--	19	--	NP	A-3	0
	S#20 88.5-90.0	100	100	100	100	99	97	61	9	--	--	16	--	NP	A-3	0
	S#21 93.5-95.0	100	100	100	100	98	93	42	4	--	--	17	--	NP	A-1-b	0
	S#22 98.5-100.0	100	100	100	100	99	91	55	26	--	--	15	--	NP	A-2-4	0
	END															

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 11, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
B # BI-9	S#1															
	1.0- 2.5	100	100	100	100	100	98	56	3	--	--	5	--	NP	A-3	0
	S#2															
	3.5- 5.0	100	100	100	100	100	100	73	3	--	--	20	--	NP	A-3	0
	S#3															
	8.5-10.0	100	100	100	100	99	99	64	3	--	--	19	--	NP	A-3	0
	S#4															
	13.5-15.0	100	100	100	99	97	90	40	1	--	--	17	--	NP	A-1-b	0
	S#5															
	18.5-20.0	100	100	100	100	100	99	82	3	--	--	19	--	NP	A-3	0
	S#6															
	23.5-25.0	100	100	100	99	97	89	56	5	--	--	16	--	NP	A-3	0
	S#7															
	28.5-30.0	100	100	100	100	100	84	79	64	40	23	62	--	17	A-6	9
	UD-1 SHELBY TUBE															
	30.0-32.0	NO SIEVE ANALYSIS - PRESS SAMPLE														
	S#8															
	33.5-35.0	100	100	100	100	100	100	100	96	40	22	54	--	18	A-6	19
	S#9															
	38.5-40.0	100	100	100	100	100	100	100	94	24	--	32	--	NP	A-4	0
	UD-2 SHELBY TUBE															
	40.0-42.0	NO SIEVE ANALYSIS - PRESS SAMPLE														
	S#10															
	43.5-45.0	100	100	100	100	99	99	86	10	--	--	19	--	NP	A-3	0
	S#11															
	48.5-50.0	100	100	100	100	100	99	71	8	--	--	18	--	NP	A-3	0
	S#12															
	53.5-55.0	100	100	100	92	77	55	18	5	--	--	11	--	NP	A-1-b	0
	S#13															
	58.5-60.0	100	100	100	100	97	94	54	10	--	--	18	--	NP	A-3	0
	S#14															
	63.5-65.0	100	100	100	96	94	83	21	7	--	--	16	--	NP	A-1-b	0
	S#15															
	68.5-70.0	100	100	100	97	95	81	24	7	--	--	16	--	NP	A-1-b	0

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 2
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 11, 2003

		********** PERCENT PASSING **********														
LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
	S#16															
	73.5-75.0	100	100	100	88	71	43	12	5	--	--	12	--	NP	A-1-a	0
	S#17															
	78.5-80.0	100	100	100	82	72	53	17	6	--	--	11	--	NP	A-1-b	0
	S#18															
	83.5-85.0	100	100	100	100	100	100	94	13	--	--	21	--	NP	A-2-4	0
	S#19															
	88.5-90.0	100	100	100	100	100	99	65	10	--	--	14	--	NP	A-3	0
	END															

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS
AASHTO TESTS:T-89,T-90, & T-265

PAGE 1

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 19, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
B# BI-10	S#1															
	1.0- 2.5	100	100	100	100	100	98	59	10	--	--	3	--	NP	A-3	0
	S#2															
	3.5- 4.0	ENTIRE SAMPLE KEPT BY MACTEC														
	S#2A															
	4.0- 4.5	ENTIRE SAMPLE KEPT BY MACTEC														
	S#2B															
	4.5- 5.0	100	100	100	100	100	99	48	16	--	--	21	--	NP	A-1-b	0
	S#3															
	6.0- 7.5	100	100	100	100	100	98	57	2	--	--	21	--	NP	A-3	0
	S#4															
	8.5-10.0	100	100	100	99	99	97	57	3	--	--	18	--	NP	A-3	0
	S#5															
	13.5-15.0	100	100	100	100	99	92	32	2	--	--	19	--	NP	A-1-b	0
	S#6															
	18.5-20.0	100	100	100	100	100	100	98	2	--	--	24	--	NP	A-3	0
	S#7															
	23.5-25.0	100	100	100	100	100	100	55	3	--	--	21	--	NP	A-3	0
	S#8															
	28.5-30.0	ENTIRE SAMPLE KEPT BY MACTEC														
	UD-12															
	35.0-37.0	NO SIEVE ANALYSIS - PRESS SAMPLE														
	S#9															
	38.5-40.0	100	100	100	100	100	95	77	5	--	--	17	--	NP	A-3	0
	S#10															
	43.5-45.0	100	100	100	100	100	96	78	7	--	--	18	--	NP	A-3	0
	S#11															
	48.5-50.0	100	100	100	100	100	99	82	21	--	--	16	--	NP	A-2-4	0
	S#12															
	53.5-55.0	100	100	100	100	100	98	73	7	--	--	18	--	NP	A-3	0
	S#13															
	58.5-60.0	100	100	100	82	67	50	20	4	--	--	10	--	NP	A-1-a	0
	S#14															
	63.5-65.0	100	100	100	99	95	82	37	9	--	--	16	--	NP	A-1-b	0
	S#15															
	68.5-70.0	100	100	100	90	70	51	16	5	--	--	11	--	NP	A-1-b	0
	END															

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 12, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
B# BI-11	S#1 1.0- 2.5	100	100	100	100	100	100	75	5	--	--	26	--	NP	A-3	0
	S#2 3.5- 5.0	100	100	100	100	100	100	57	3	--	--	20	--	NP	A-3	0
	S#3 6.0- 7.5	100	100	100	100	100	98	29	2	--	--	20	--	NP	A-1-b	0
	S#4 8.5-10.0	100	100	100	100	99	95	34	2	--	--	18	--	NP	A-1-b	0
	S#5 13.5-15.0	100	100	100	100	99	98	75	3	--	--	19	--	NP	A-3	0
	S#6 18.5-20.0	100	100	100	100	100	100	97	4	--	--	24	--	NP	A-3	0
	S#7 23.5-25.0	100	100	100	100	100	97	83	3	--	--	21	--	NP	A-3	0
	S#8 28.5-30.0	100	100	100	100	100	100	77	4	--	--	21	--	NP	A-3	0
	S#9 33.5-35.0	100	100	100	98	97	95	58	4	--	--	18	--	NP	A-3	0
	S#10 38.5-40.0	100	100	100	100	100	99	73	6	--	--	21	--	NP	A-3	0
	S#11 43.5-45.0	100	100	100	100	100	98	88	9	--	--	18	--	NP	A-3	0
	S#12A 48.5-49.5	100	100	100	100	100	100	96	89	32	18	26	--	14	A-6	12
	S#12B 49.5-50.0	100	100	100	96	96	96	94	88	37	20	29	--	17	A-6	15
	S#13 53.5-55.0	100	100	100	83	73	62	46	6	--	--	13	--	NP	A-1-b	0
	S#14 48.5-60.0	100	100	100	100	100	100	99	18	--	--	28	--	NP	A-2-4	0
	S#15 63.5-65.0	100	100	100	96	94	91	51	10	--	--	18	--	NP	A-3	0
	S#16 68.5-70.0	100	100	100	100	98	91	10	3	--	--	16	--	NP	A-1-b	0

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 2
AASHTO TESTS:T-89,T-90, & T-265

CONTRACT- 23-073-03 NAME--- INDIAN RIVER INLET BRIDGE
DATE----- AUGUST 12, 2003

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		********** PERCENT PASSING **********														
	S#17															
	73.5-75.0	100	100	100	98	92	78	12	4	--	--	16	--	NP	A-1-b	0
	S#18															
	78.5-80.0	100	100	100	97	93	84	65	16	--	--	14	--	NP	A-2-4	0
	S#19															
	83.5-85.0	100	100	100	100	99	97	61	8	--	--	20	--	NP	A-3	0
	S#20															
	88.5-90.0	100	100	100	96	91	86	61	8	--	--	19	--	NP	A-3	0
	S#21															
	93.5-95.0	100	100	100	100	100	100	32	4	--	--	20	--	NP	A-1-b	0
	S#22															
	98.5-100.0	100	100	100	100	98	90	14	2	--	--	16	--	NP	A-1-b	0
	END															