PHASE I
GEOTECHNICAL INVESTIGATION

BRIDGE INVESTIGATION
SR 87 CONNECTOR PD&E STUDY
SANTA ROSA COUNTY, FLORIDA
FPID: 416748-3-22-01

Prepared For:

METRIC ENGINEERING, INC.
615 CRESCENT EXECUTIVE COURT
SUITE #524
LAKE MARY, FLORIDA 32746

Prepared By:

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November 2011
28-09-09-04

EGS

ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

November 30, 2011

EGS File Number: 28-09-09-04

Metric Engineering, Inc.
615 Crescent Executive Court
Suite #524
Lake Mary, Florida 32746

ATTN: John Flora, R.A., AICP
Transportation Planning/PD&E Manager

SUBJECT: Report of Geotechnical Investigation
Bridge Development Report (**BDR**) for the Blackwater River Bridge
SR 87 Connector Project Development and Environmental (**PD&E**) Study
Santa Rosa County, Florida
FPID: 416748-3-22-01

Dear John:

Attached is a copy of the Report of Geotechnical Investigation for the above referenced project. Presented in this Report is a summary of the geotechnical investigation and subsurface materials encountered, environmental classification of the subsoils, preliminary geotechnical foundation design parameters, and foundation recommendations.

Environmental and Geotechnical Specialists, Inc. (**EGS**) appreciates the opportunity to be of service on this project. If you have any questions concerning the enclosed Report, please do not hesitate to call.

Sincerely,

Environmental and Geotechnical Specialists, Inc.
Florida Certificate of Engineering Authorization 6222

11/30/11

Derwood C. Sheppard, Jr., P.E.
Consulting Geotechnical Engineer
FL P.E. No. 69228

Enclosure

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1.0 INTRODUCTION

Environmental and Geotechnical Specialists, Inc. (**EGS**) has completed the Preliminary Geotechnical Bridge Investigation associated with the State Road 87 Connector Project Development and Environmental (**PD&E**) Study. The intent of this investigation is to provide data for a preliminary development of the proposed Blackwater River Bridge. This Report contains a summary of the geotechnical investigation and subsurface materials encountered, the subsoil parameters needed for a scour analysis, preliminary geotechnical foundation design parameters, and foundation recommendations.

2.0 GENERAL SITE CONDITIONS

This investigation is part of the SR 87 Connector **PD&E** project which would provide a bypass for SR 87 around the city of Milton, Florida. The proposed bridge location is located approximately four (4) miles east northeast of the city of Milton in the central portion of Santa Rosa County, Florida. A Project Location Map has been provided as **Figure 1**.

A copy of the United States Geological Survey (**USGS**) Topographic Map of the project area has been included as **Figure 2**. As can be seen in **Figure 2**, the project location is located within the Blackwater River watershed basin and has a relatively steep elevation increase to the southeast. The Blackwater River flows to the southwest where it eventually discharges into the Blackwater Bay, approximately six (6) miles downstream.

The general existing site conditions are shown on an aerial photograph of the project location included as **Figure 3**, which also shows the location of the soil borings installed for this investigation. The site is surrounded by heavily forested wetland areas consisting of mature hardwoods, pines, and heavy underbrush. Furthermore, a long range power transmission corridor is located approximately 200 feet east of the proposed bridge alignment.

3.0 PROPOSED STRUCTURE

The existing SR 87 roadway is a four (4) lane rural section, which receives moderate to high volumes of traffic and is a primary north-south corridor. To divert traffic around the city of Milton the corridor will cross the Blackwater River and watershed basin. **EGS** understands the **PD&E** Study is considering a new multi-span concrete bridge structure. Although the proposed structure has not yet been designed, it is likely that the bridge will be founded on pile supported bent caps or piers.

4.0 SUBSURFACE INVESTIGATION

The subsurface investigation for this project was conducted by **EGS** during the month of November 2011. Derwood Sheppard, P.E., of **EGS** served as the field and project engineer, and Myron L. Hayden, P.E., was the supervising Principal Geotechnical Engineer.

Two (2) soil borings were installed for this investigation, which have been labeled as Soil Boring **B-1** and **B-2**. The boring number, depth, Northing, and Easting are provided in **TABLE 1**. It should be noted that due to wet conditions and heavy vegetation the soil borings were not installed directly on the proposed project centerline. Additionally, for future subsurface investigations special attention will need to be given to the amount of vegetation removal (clearing) and rig type (most likely amphibious) needed due to the wet conditions.

In order to evaluate the relative strength and uniformity of the subsurface materials, Standard Penetration Tests (**SPT**) were conducted on two and one-half (2 ½) feet intervals from the ground surface to the boring termination depth. All **SPT** samples were collected using an automatic hammer in accordance with ASTM D6066.

The laboratory testing included water contents, Atterberg Limits, grain-size distributions, and organic contents. The subsurface soils were classified with respect to both the Unified Soil Classification System (**UNIFIED**) and the American Association of State Highway and Transportation Officials (**AASHTO**) Soil Classification System.

A summary of the field and laboratory testing can be seen on the Report of Core Borings Sheet provided as **APPENDIX A**. Copies of the Soil Boring Logs and Soil Classification Data have been provided in **APPENDICES B** and **C**, respectively.

5.0 SUBSURFACE CONDITIONS

5.1 Soils

The "general" subsurface soil conditions encountered, as can be seen in **APPENDIX A**, are as follows:

Soil Boring B-1

- 0.0 – 32.5 feet – Loose to Medium Dense Medium to Fine Sand (**SP-SM**)
- 32.5 – 65.0 feet – Loose to Medium Dense Silty Fine to Clayey Sand (**SM** to **SC**)
- 65.0 – 82.5 feet – Medium Dense to Dense Medium to Fine Sand (**SP-SM**)
- 82.5 – 100.0 feet – Loose to Medium Dense Silty Fine Sand (**SM**)

Soil Boring B-2

- 0.0 – 25.0 feet – Loose Sand and Fibrous Organics (**SP-SM** & **MUCK**)
- 25.0 – 55.0 feet – Loose to Medium Dense Medium to Fine Sand (**SP-SM**)
- 55.0 – 65.0 feet – Dense to Very Dense Medium to Fine Sand (**SP-SM**)
- 65.0 – 100.0 feet – Loose to Medium Dense Silty Fine Sand (**SM**)

5.2 Groundwater Conditions

At the location of the soil borings installed for this investigation, **EGS** encountered surface water at depths between three (3) and five (5) feet below the existing ground surface. **EGS estimates** that the "normal" seasonal high groundwater is at or above the existing ground surface throughout the surrounding area for much of the year.

5.3 Environmental Classification

Two (2) soil samples were collected from soil boring **B-1** and one (1) water sample was collected from the Blackwater River to analyze their aggressiveness with respect to corrosion. The results of the corrosivity tests are summarized in **TABLE 2**. As can be seen in **TABLE 2**, the substructure environmental classification of this site is **MODERATELY AGGRESSIVE** with respect to the corrosion of steel and concrete.

5.4 Scour Considerations

To assist with the evaluation of the scourability of the channel sediments, **EGS** conducted laboratory tests on representative samples of the soil collected from soil boring **B-1**. This testing included grain-size distribution determinations. Copies of the grain-size distribution curves have been provided as **APPENDIX D** along with the pertinent grain-size parameters needed for a scour analysis summarized in **TABLE 3**.

6.0 FOUNDATION OPTIONS

There are generally two (2) basic foundation options available for this type of project. One (1) option would be a shallow foundation option which would distribute the bridge loads to the near surface soils, provided that scour is insignificant or can be mitigated.

The subsurface soils encountered during this investigation are not compatible with a spread footing. The relatively loose nature of the surface soils as well as potential for scour around and beneath a shallow foundation makes spread footings unacceptable for use with this bridge.

The other basic type of foundation is a deep foundation structure that would distribute the structural loads below any potential scourable or loose soils and found the bridge structure on underlying dense sands. For this type of project a deep foundation would consist of either drilled shafts or driven piles.

6.1 Drilled Shafts

Drilled shafts are used when high axial loads and/or lateral capacities are needed or the subsurface materials make pile installation difficult or expensive. A drilled shaft can be installed through the subsurface materials to rest, or be "socketed," into limestone. However, a limestone bearing stratum was not encountered within 100 feet of the existing ground surface nor are the axial and lateral loads for this bridge expected to be sufficiently high to warrant the additional costs associated with a drilled shaft. Therefore, **EGS does not believe that drilled shafts are a cost-effective foundation option for this project**.

6.2 Driven Piles

Driven piles generally consist of either square prestressed concrete or steel piling for a structure of this type. Precast concrete piles are the most widely used foundation option by the **FDOT** and are normally more cost-effective than steel pipe or steel H-piles.

Steel piles, consisting of either open-ended pipe piles or H-piles, are frequently used throughout north Florida where the site conditions are highly variable or prohibit the use of high displacement concrete piles. Driven open-ended pipe piles and H-piles produce significantly less vibrations than concrete piles, and can be more easily adapted to variable subsurface conditions because of the ease and reliability of pile splicing. However, steel pilings are generally more expensive than concrete pilings driven to the same capacity.

Steel H-piles have a considerably lower load carrying capacity than either open-ended pipe piles or displacement piles. It is likely that an H-pile would need to be driven significantly deeper than pipe piles or prestressed concrete piles to achieve comparable load capacities. Therefore, **EGS does not believe that steel H-piles are cost-effective for this project**.

6.3 Recommended Foundation

Based on the soil conditions encountered in this preliminary investigation, **EGS believes** that a deep foundation bridge with square prestressed concrete piles would be the most appropriate and cost effective foundation option.

*It should be noted, if subsurface conditions are encountered during future subsurface investigations that are significantly different than those encountered in this **PD&E** Study, the recommendation to use concrete piles should be reconsidered.*

7.0 GEOTECHNICAL DESIGN RECOMMENDATIONS

7.1 Geotechnical Design Parameters

EGS developed Preliminary Geotechnical Design Parameters to facilitate in the design of a driven pile foundation. The Geotechnical Design Parameters calculated for this Geotechnical Investigation are provided in **TABLES 4** and **5**. Sample calculations used to develop **TABLES 4** and **5** are provided as **APPENDIX E**.

7.2 Driven Pile Axial Capacities

For the purposes of this Preliminary Geotechnical Investigation and for comparison, **EGS** has provided an Axial Capacity analysis for HP 14X73 H-piles, 24-inch open-ended steel pipe piles, 18-inch square concrete, and 24-inch square concrete driven piles. The axial capacities were determined using the Computer Program **FB-Deep** and the **SPT** N-Values obtained during this subsurface investigation.

Based on the results from **FB-Deep**, **EGS** prepared graphs which include the Estimated Davisson Capacity (Nominal Bearing Capacity, **NBR**) versus pile tip depth for each of the pile sizes/types and each boring installed in this investigation. These graphs are provided as **Figures 4** and **5**. The **FB-Deep** computer "outputs" are included in **APPENDIX F**.

It should be noted that the mobilized end bearing predicted for 24-inch "open-ended" steel pipe piles using **FB-Deep** has been neglected. This is believed to be reasonable based on preliminary data from several **FDOT** projects where "open-ended" pipe piles have been driven and dynamically tested. Furthermore, the axial pile capacities were neglected in the top 25 feet of Soil Boring **B-2** due to the large amounts of fibrous organics encountered at this location, which will likely need to be preformed/predrilled to allow for installation of the piles.

7.3 Driven Pile Lateral Capacities

EGS did not provide Lateral Load Capacities for the pile sizes included in this Report. **EGS understands** that the project's Structural Engineer will be performing the lateral stability analysis using the preliminary Geotechnical Design Parameters included in **TABLE 4**.

7.4 Downdrag

EGS does not believe that significant downdrag will be applied to the abutment piles for this project provided that any highly organic compressible soils are removed and no highly plastic soil layers are encountered in any future subsurface investigations. This is due to the sandy nature of the soils encountered; and therefore, no significant long term settlement would be anticipated.

8.0 CLOSURE

The data and results presented in this Geotechnical Investigation Report are intended for the use of **Metric Engineering, Inc.** and the **Florida Department of Transportation** for the preliminary design of the SR 87 Connector over Blackwater River **PD&E** Study, as identified herein. This Report is not intended for any other use and will likely not be applicable. The data and recommendations presented in this Report are based on the soil borings installed at the specific locations and depths noted. Subsurface conditions at other locations may vary significantly from those presented herein. Should data become available which is different from the data presented herein, **Environmental and Geotechnical Specialists, Inc.** requests the opportunity to review the data and make any modifications to the design recommendations that may be appropriate.

9.0 SIGNATURE

ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.
Florida Certification of Engineering Authorization Number: 6222

11/30/11

Derwood C. Sheppard, Jr., P.E.
Geotechnical Engineer II
FL PE Number 69228

TABLES

TABLE 1
SOIL BORING LOCATION DATA
BRIDGE INVESTIGATION
SR 87 CONNECTOR PD&E STUDY
SANTA ROSA COUNTY, FLORIDA

BORING NUMBER	BORING DEPTH [1] (FEET)	ELEVATION OF GROUND SURFACE [2] (FEET)	STATE PLANE COORDINATES		GLOBAL POSITIONING SATELLITE (GPS) COORDINATES SYSTEM			
			NORTHING	EASTING	LATITUDE		LONGITUDE	
					DEG (°)	MIN (')	DEG (°)	MIN (')
B-1	100.0	N/A	610486	1188668	30	39.319	86	58.811
B-2	100.0	N/A	611938	1188809	30	39.559	86	58.790

NOTES: 1. DEPTH IS BELOW EXISTING GROUND SURFACE.
2. ELEVATIONS WERE NOT AVAILABLE AT THE TIME OF THIS PRELIMINARY INVESTIGATION.

TABLE 2
ENVIRONMENTAL CLASSIFICATION DATA
BRIDGE INVESTIGATION
SR 87 CONNECTOR PD&E STUDY
SANTA ROSA COUNTY, FLORIDA

MATERIAL	LOCATION	pH	RESISTIVITY (OHM-CM)	SULFATES (PPM)	CHLORIDES (PPM)	CLASSIFICATION	
						STEEL	CONCRETE
SOIL	B-1 (0.0' - 4.0')	6.2	15,000	6	132	MODERATELY AGGRESSIVE	SLIGHTLY AGGRESSIVE
SOIL	B-1 (5.0' - 11.5')	7.1	2,500	6	124	MODERATELY AGGRESSIVE	MODERATELY AGGRESSIVE
WATER	RIVER	6.5	1,100	69	1300	MODERATELY AGGRESSIVE	MODERATELY AGGRESSIVE
SUBSTRUCTURE						MODERATELY AGGRESSIVE	MODERATELY AGGRESSIVE
SUPERSTRUCTURE						SLIGHTLY AGGRESSIVE	SLIGHTLY AGGRESSIVE

TABLE 3
GRAIN-SIZE DATA FOR SCOUR CONSIDERATION
BRIDGE INVESTIGATION
SR 87 CONNECTOR PD&E STUDY
SANTA ROSA COUNTY, FLORIDA

DEPTH BELOW GROUND SURFACE (FEET)	GRAIN-SIZE PARAMETER	RECOMMENDED VALUE	MATERIAL CLASSIFICATION
0.0 - 17.5	D_{10}	0.09	SP-SM / A-3
	D_{50}	0.16	
	D_{60}	0.17	
	D_{85}	0.25	
	C_u	1.90	
17.5 - 27.5	D_{10}	0.12	SP-SM / A-1-b
	D_{50}	0.55	
	D_{60}	0.60	
	D_{85}	0.77	
	C_u	5.00	
27.5 - 32.5	D_{10}	0.02	SM / A-2-4
	D_{50}	0.42	
	D_{60}	0.49	
	D_{85}	0.70	
	C_u	30.60	

TABLE 4
GEOTECHNICAL DESIGN PARAMETERS
BRIDGE INVESTIGATION
SR 87 CONNECTOR PD&E STUDY
OKALOOSA COUNTY, FLORIDA
SOIL BORING: B-1

FOUNDATION TYPE	DRIVEN
SIZE (in)	24
BASE AREA (ft^2)	4.0
GROUND SURFACE ELEVATION (ft)	N/A
GROUND WATER TABLE DEPTH (ft)	0.0

LAYER NO.	1	2	3	4
SOIL DESCRIPTION	MEDIUM TO FINE SAND (SP-SM)	SILTY FINE TO CLAYEY SAND (SM TO SC)	MEDIUM TO FINE SAND (SP-SM)	SILTY FINE SAND (SM)
SOIL TYPE	COHESIONLESS	COHESIONLESS	COHESIONLESS	COHESIONLESS
TOP OF LAYER DEPTH (ft)	0.0	32.5	65.0	82.5
BOTTOM OF LAYER DEPTH (ft)	32.5	65.0	82.5	100.0
AVERAGE SPT N-VALUE (blows/ft)	9	5	27	6

LATERAL	SOIL MODEL	SAND (REESE)	SAND (REESE)	SAND (REESE)	SAND (REESE)
	INTERNAL FRICTION ANGLE	30°	29°	33°	29°
	TOTAL UNIT WEIGHT (pcf)	115	110	115	110
	LATERAL SOIL MODULUS (pci)	100	80	230	120
	UNDRAINED SHEAR STRENGTH (psf)	--	--	--	--
	MAJOR PRINCIPAL STRAIN @ 50%	0.04	0.04	0.03	0.04
	UNCONFINED COMPRESSIVE STRENGTH (psf)	--	--	--	--
AXIAL	SOIL MODEL	DRIVEN PILE (SAND)	DRIVEN PILE (SAND)	DRIVEN PILE (SAND)	DRIVEN PILE (SAND)
	TOTAL UNIT WEIGHT (pcf)	115	110	115	110
	SHEAR MODULUS (ksi)	5	3	14	3
	POISSON'S RATIO	0.25	0.25	0.20	0.25
	VERTICAL FAILURE SHEAR STRESS (psf)	340	460	1,030	550
	UNDRAINED SHEAR STRENGTH (psf)	--	--	--	--
	ULTIMATE UNIT SKIN FRICTION (psf)	340	460	1,030	550
	MASS MODULUS (ksi)	--	--	--	--
	MODULUS RATIO	--	--	--	--
	SURFACE (ROUGH/SMOOTH)	--	--	--	--
	UNCONFINED COMPRESSIVE STRENGTH (psf)	--	--	--	--
	SPLIT TENSILE STRENGTH (psf)	--	--	--	--
TORSIONAL	SOIL MODEL	HYPERBOLIC	HYPERBOLIC	HYPERBOLIC	HYPERBOLIC
	TOTAL UNIT WEIGHT (pcf)	115	110	115	110
	INTERNAL FRICTION ANGLE	30°	29°	33°	29°
	UNDRAINED SHEAR STRENGTH (psf)	--	--	--	--
	SHEAR MODULUS (ksi)	5	3	14	3
	TORSIONAL SHEAR STRESS (psf)	340	460	1,030	550
TIP	SOIL MODEL	SAND (REESE)	SAND (REESE)	SAND (REESE)	SAND (REESE)
	SHEAR MODULUS (ksi)	5	3	14	3
	POISSON'S RATIO	0.25	0.25	0.20	0.25
	UNIT END BEARING (ksi)	0.4	0.1	1.2	0.1
	UNCORRECTED SPT N-VALUE (blows/ft)	8	6	36	9
	UNDRAINED SHEAR STRENGTH (psf)	--	--	--	--
	IGM MASS MODULUS (ksi)	--	--	--	--

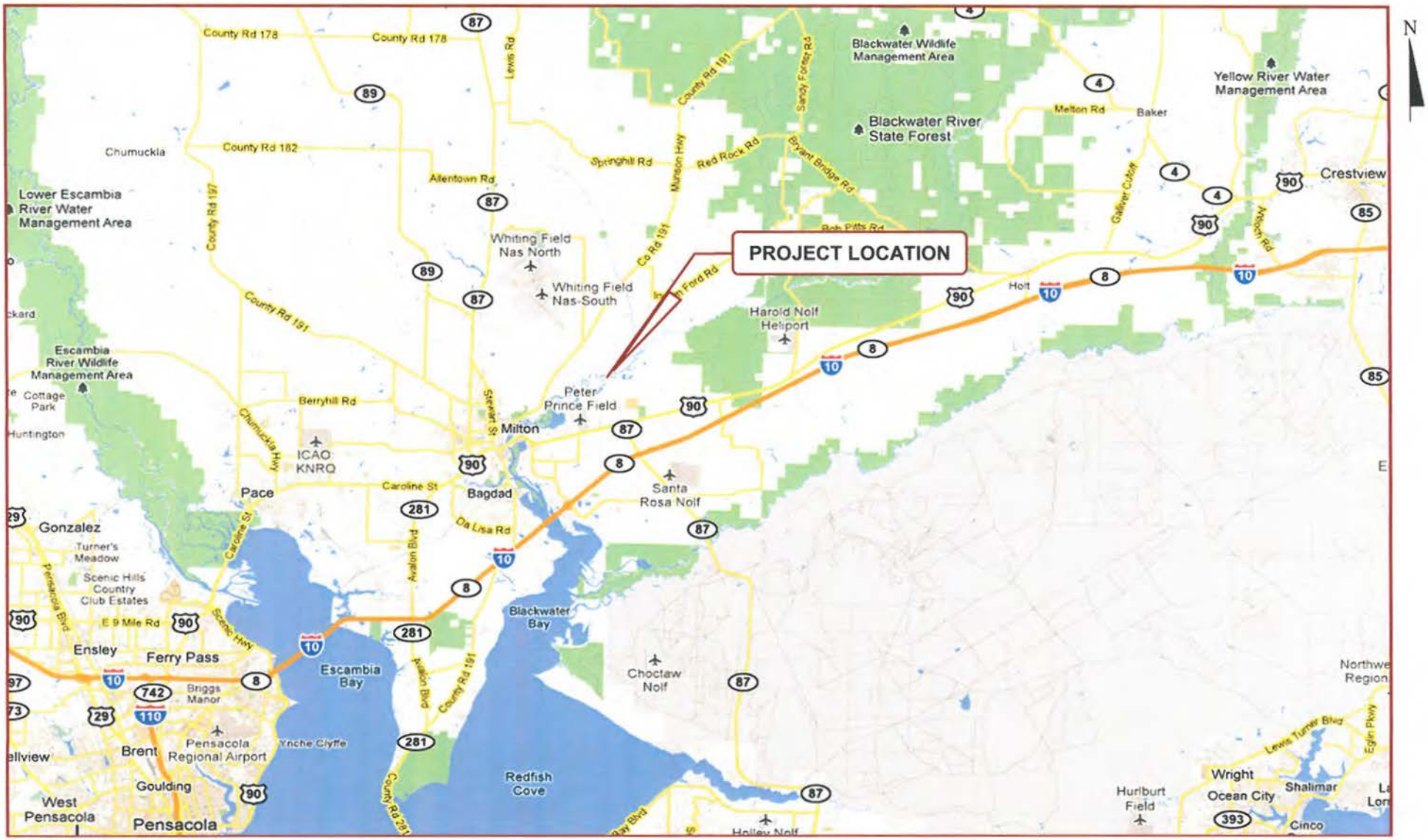
TABLE 5
GEOTECHNICAL DESIGN PARAMETERS
BRIDGE INVESTIGATION
SR 87 CONNECTOR PD&E STUDY
OKALOOSA COUNTY, FLORIDA
SOIL BORING: B-2

FOUNDATION TYPE	DRIVEN
SIZE (in)	24
BASE AREA (ft^2)	4.0
GROUND SURFACE ELEVATION (ft)	N/A
GROUND WATER TABLE DEPTH (ft)	0.0

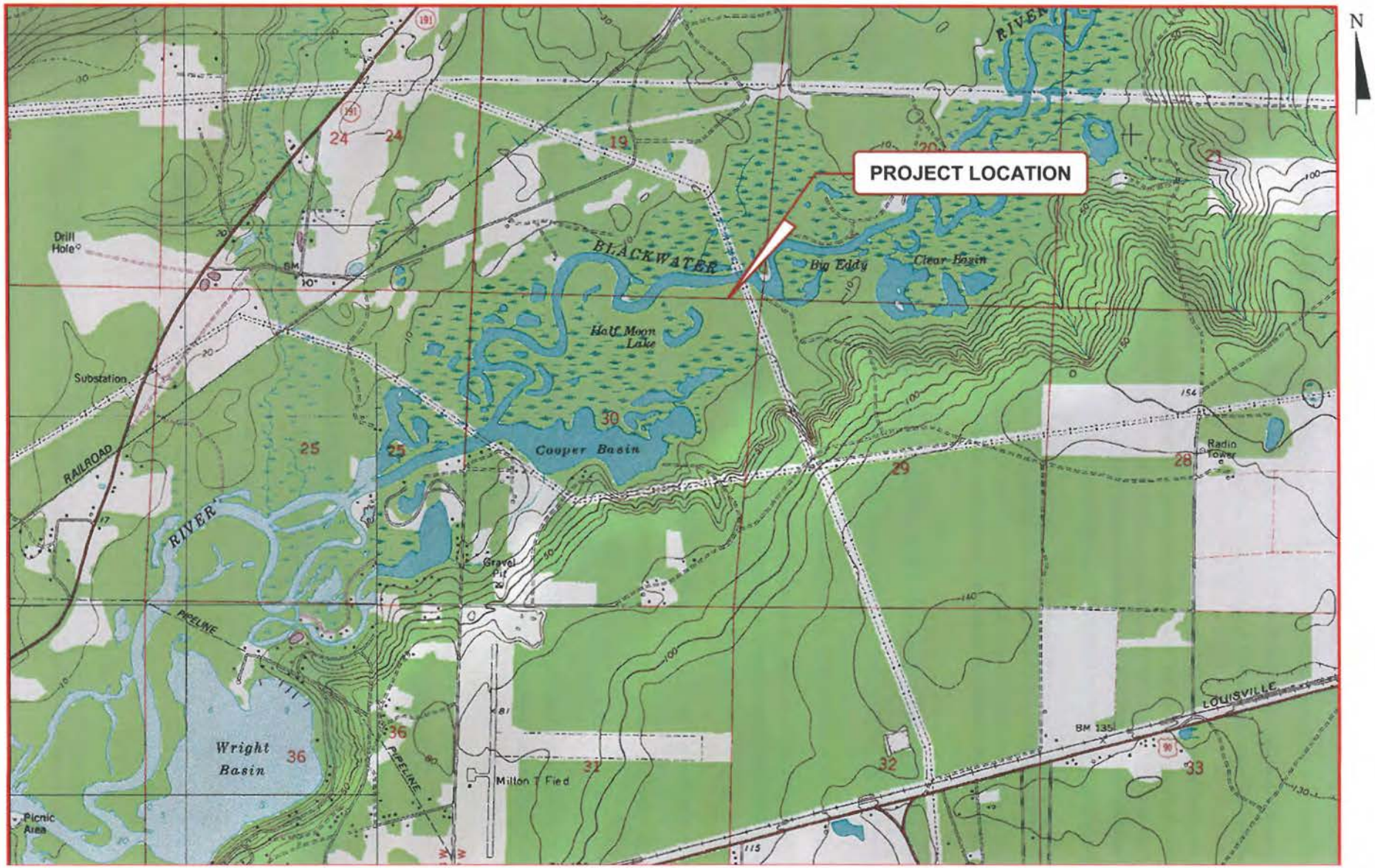
LAYER NO.	1	2	3	4
SOIL DESCRIPTION	SAND AND FIBROUS ORGANICS	MEDIUM TO FINE SAND (SP-SM)	MEDIUM TO FINE SAND (SP-SM)	SILTY FINE SAND (SM)
SOIL TYPE	COHESIONLESS	COHESIONLESS	COHESIONLESS	COHESIONLESS
TOP OF LAYER DEPTH (ft)	0.0	25.0	55.0	65.0
BOTTOM OF LAYER DEPTH (ft)	25.0	55.0	65.0	100.0
AVERAGE SPT N-VALUE (blows/ft)	3	10	25	7

LATERAL	SOIL MODEL	SAND (REESE)	SAND (REESE)	SAND (REESE)	SAND (REESE)
	INTERNAL FRICTION ANGLE	28°	30°	33°	29°
	TOTAL UNIT WEIGHT (pcf)	100	115	115	110
	LATERAL SOIL MODULUS (pci)	20	100	210	110
	UNDRAINED SHEAR STRENGTH (psf)	--	--	--	--
	MAJOR PRINCIPAL STRAIN @ 50%	0.04	0.04	0.03	0.04
	UNCONFINED COMPRESSIVE STRENGTH (psf)	--	--	--	--
AXIAL	SOIL MODEL	DRIVEN PILE (SAND)	DRIVEN PILE (SAND)	DRIVEN PILE (SAND)	DRIVEN PILE (SAND)
	TOTAL UNIT WEIGHT (pcf)	100	115	115	110
	SHEAR MODULUS (ksi)	2	5	13	4
	POISSON'S RATIO	0.50	0.25	0.20	0.25
	VERTICAL FAILURE SHEAR STRESS (psf)	--	380	950	630
	UNDRAINED SHEAR STRENGTH (psf)	--	--	--	--
	ULTIMATE UNIT SKIN FRICTION (psf)	--	380	950	630
	MASS MODULUS (ksi)	--	--	--	--
	MODULUS RATIO	--	--	--	--
	SURFACE (ROUGH/SMOOTH)	--	--	--	--
	UNCONFINED COMPRESSIVE STRENGTH (psf)	--	--	--	--
	SPLIT TENSILE STRENGTH (psf)	--	--	--	--
TORSIONAL	SOIL MODEL	HYPERBOLIC	HYPERBOLIC	HYPERBOLIC	HYPERBOLIC
	TOTAL UNIT WEIGHT (pcf)	100	115	115	110
	INTERNAL FRICTION ANGLE	28°	30°	33°	29°
	UNDRAINED SHEAR STRENGTH (psf)	--	--	--	--
	SHEAR MODULUS (ksi)	2	5	13	4
	TORSIONAL SHEAR STRESS (psf)	--	380	950	630
TIP	SOIL MODEL	SAND (REESE)	SAND (REESE)	SAND (REESE)	SAND (REESE)
	SHEAR MODULUS (ksi)	2	5	13	4
	POISSON'S RATIO	0.50	0.25	0.20	0.25
	UNIT END BEARING (ksi)	--	0.4	1.1	0.2
	UNCORRECTED SPT N-VALUE (blows/ft)	3	11	30	9
	UNDRAINED SHEAR STRENGTH (psf)	--	--	--	--
	IGM MASS MODULUS (ksi)	--	--	--	--

FIGURES

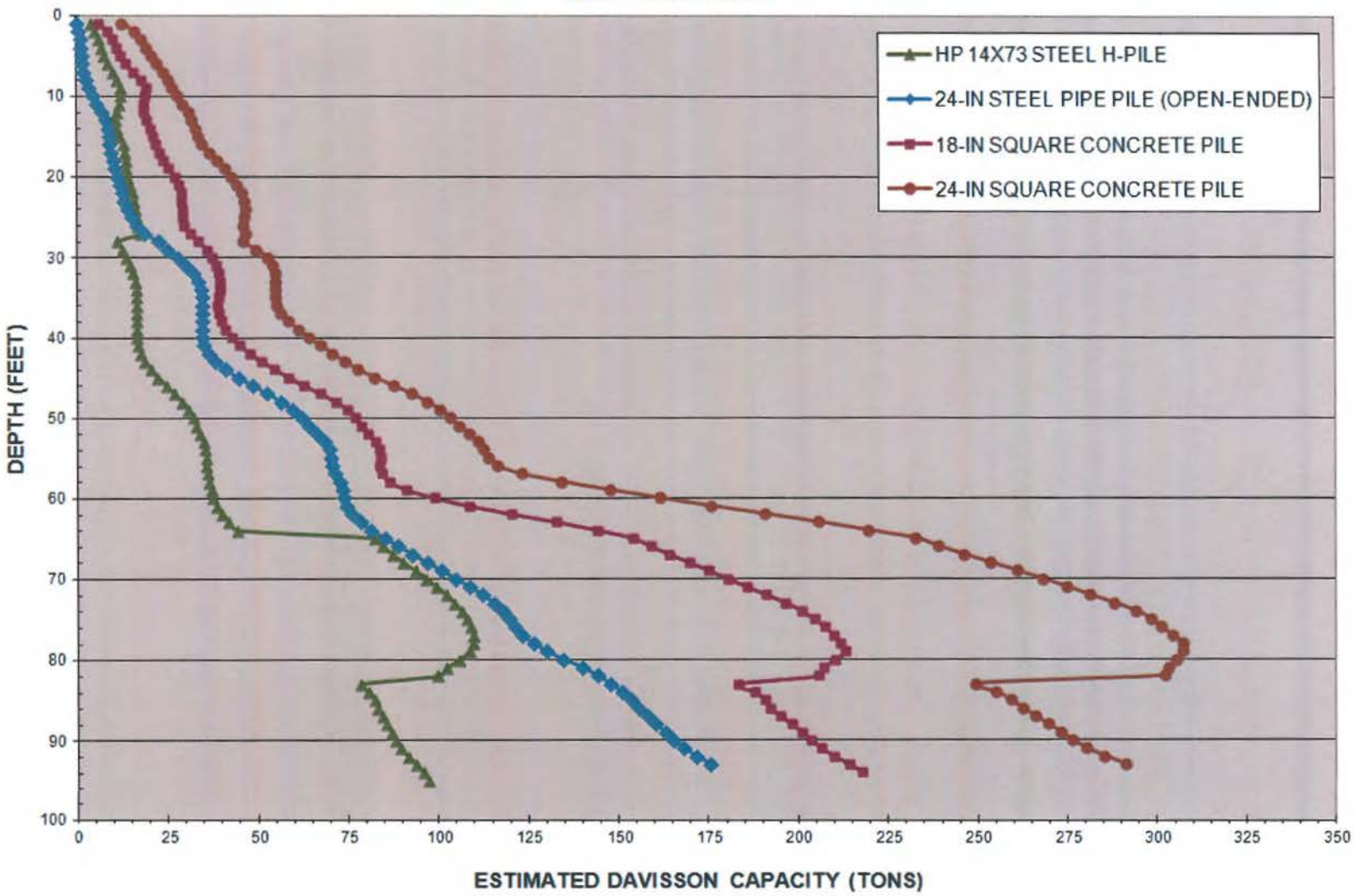


DRAWN: K. CRONIN, E.I.	CHECKED: M. HAYDEN, P.E.	**EGS**	TITLE: PROJECT LOCATION MAP BRIDGE INVESTIGATION SR 87 CONNECTOR PD&E STUDY SANTA ROSA COUNTY, FLORIDA	
ENGINEER: D. SHEPPARD, P.E.		Environmental & Geotechnical Specialists, Inc. 3154 Eliza Road Tallahassee, Florida 32308 Office #: (850) 386-1253 Fax #: (850) 385-8050		
CLIENT: METRIC ENGINEERING, INC.				
PROJ. NO.: 28-09-09-04	SCALE:		DATE: NOVEMBER 2011	FIGURE NO.: 1

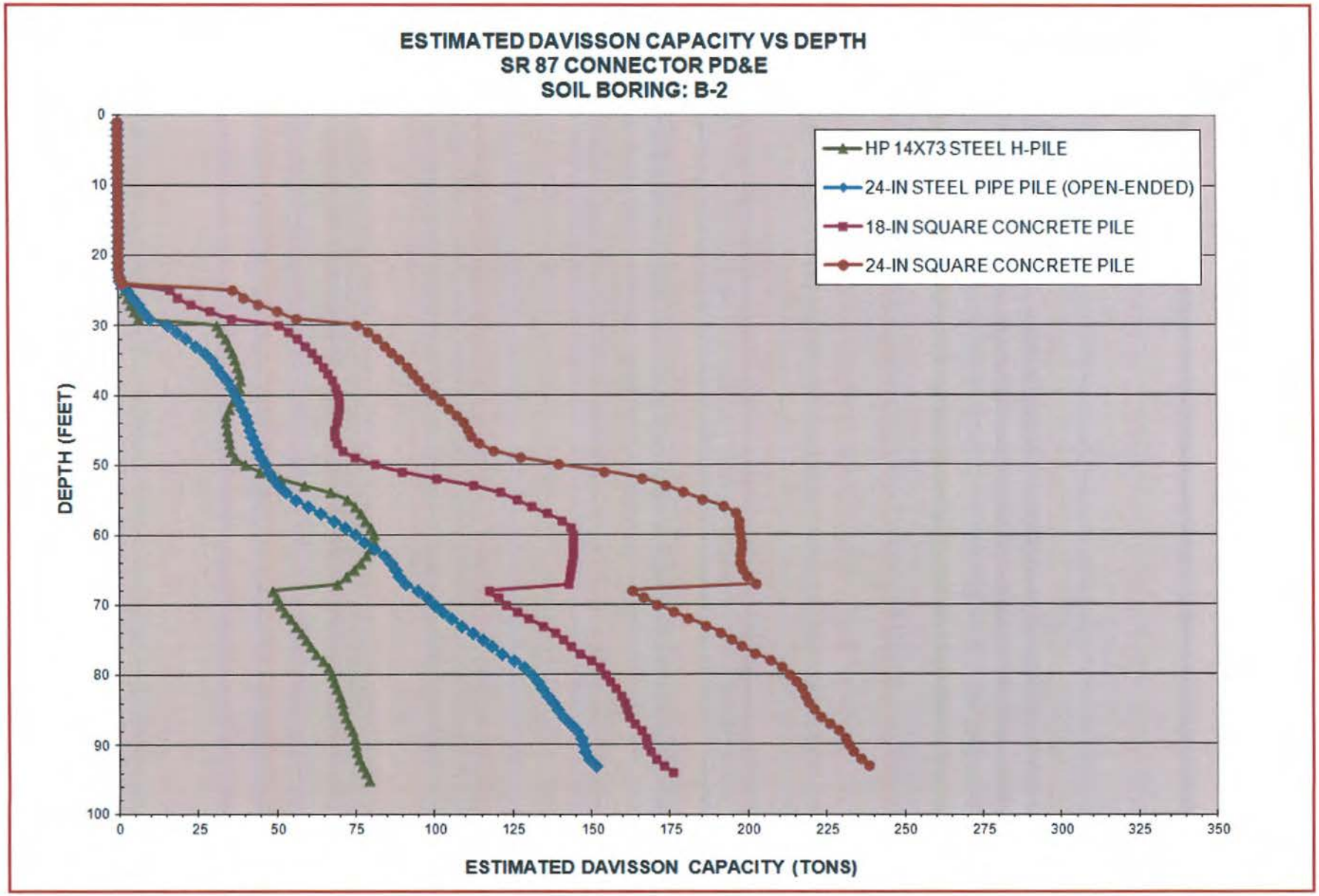


DRAWN: A. ROMANELLI, E.I.	CHECKED: M. HAYDEN, P.E.	**EGS** Environmental & Geotechnical Specialists, Inc. 3154 Eliza Road Tallahassee, Florida 32308 Office #: (850) 386-1253 Fax #: (850) 385-8050	TITLE: USGS TOPOGRAPHIC MAP BRIDGE INVESTIGATION SR 87 CONNECTOR PD&E STUDY SANTA ROSA COUNTY, FLORIDA	
ENGINEER: D. SHEPPARD, P.E.				
CLIENT: METRIC ENGINEERING, INC.				
PROJ. NO.: 28-09-09-04	SCALE:		DATE: NOVEMBER 2011	FIGURE NO.: 2

DRAWN: A. ROMANELLI, E.I.	CHECKED: M. HAYDEN, P.E.	**EGS** Environmental & Geotechnical Specialists, Inc. 3154 Eliza Road Tallahassee, Florida 32308 Office #: (850) 386-1253 Fax #: (850) 385-8050	TITLE: AERIAL PHOTOGRAPH OF PROJECT LOCATION BRIDGE INVESTIGATION SR 87 CONNECTOR PD&E STUDY SANTA ROSA COUNTY, FLORIDA	
ENGINEER: D. SHEPPARD, P.E.				
CLIENT: METRIC ENGINEERING, INC.				
PROJ. NO.: 28-09-09-04	SCALE:		DATE: NOVEMBER 2011	FIGURE NO.: 3



DRAWN BY: K. CRONIN, E.I.	CHECKED: M. HAYDEN, P.E.	EGS Environmental & Geotechnical Specialists, Inc. 3154 Eliza Road Tallahassee, Florida 32308 Office #: (850) 386-1253 Fax #: (850) 385-8050	TITLE: ESTIMATED DAVISSON CAPACITY VS. DEPTH SOIL BORING B-1 BRIDGE INVESTIGATION SR 87 CONNECTOR PD&E STUDY SANTA ROSA COUNTY, FLORIDA
ENGINEER: D. SHEPPARD, P.E.			
CLIENT: METRIC ENGINEERING, INC.			
PROJECT NO.: 28-09-09-04	SCALE:		DATE: NOVEMBER 2011 / FIGURE NO.: 4



DRAWN BY: K. CRONIN, E.I.	CHECKED: M. HAYDEN, P.E.	**EGS** Environmental & Geotechnical Specialists, Inc. 3154 Eliza Road Tallahassee, Florida 32308 Office #: (850) 386-1253 Fax #: (850) 385-8050	TITLE: ESTIMATED DAVISSON CAPACITY VS. DEPTH SOIL BORING B-2 BRIDGE INVESTIGATION SR 87 CONNECTOR PD&E STUDY SANTA ROSA COUNTY, FLORIDA
ENGINEER: D. SHEPPARD, P.E.			
CLIENT: METRIC ENGINEERING, INC.			
PROJECT NO.: 28-09-09-04	SCALE:		DATE: NOVEMBER 2011 / FIGURE NO.: 5

APPENDIX A

REPORT OF CORE BORINGS

NOTES

1. NUMBERS LEFT OF BORINGS INDICATE STANDARD PENETRATION TEST (SPT) N-VALUES FOR 12 IN. PENETRATION (UNLESS OTHERWISE NOTED)
2. WATER ELEVATIONS SHOWN ARE THE WATER ELEVATIONS ENCOUNTERED. FLUCATIONS IN THE ELEVATION OF WATER SHOULD BE EXPECTED.
3. SOIL DESCRIPTIONS, TEST DATA, AND STANDARD PENETRATION VALUES SHOWN ARE FOR THE SOIL BORING ONLY AND MAY NOT APPLY TO ANY OTHER LOCATIONS EXCEPT AT THE LOCATION OF THE SOIL BORING. EXTRAPOLATION OF THE SOIL BORING DATA TO OTHER LOCATIONS IS THE SOLE RESPONSIBILITY OF THE PERSON PERFORMING THE EXTRAPOLATION.

GRANULAR MATERIALS RELATIVE DENSITY	SPT (BLOWS/12 IN.)	SILTS AND CLAYS CONSISTENCY	SPT (BLOWS/12 IN.)
VERY LOOSE	LESS THAN 3	VERY SOFT	LESS THAN 1
LOOSE	3 - 8	SOFT	1 - 3
MEDIUM DENSE	8 - 24	FIRM	3 - 6
DENSE	24 - 40	STIFF	6 - 12
VERY DENSE	GREATER THAN 40	VERY STIFF	12 - 24
		HARD	GREATER THAN 24

SPLIT-SPOON: INSIDE DIAMETER: 1.375 IN
OUTSIDE DIAMETER: 2.0 IN
AVG. HAMMER DROP: 30.0 IN
HAMMER WEIGHT: 140 LBS

LEGEND

MEASURED GROUNDWATER

LABORATORY TESTING RESULTS

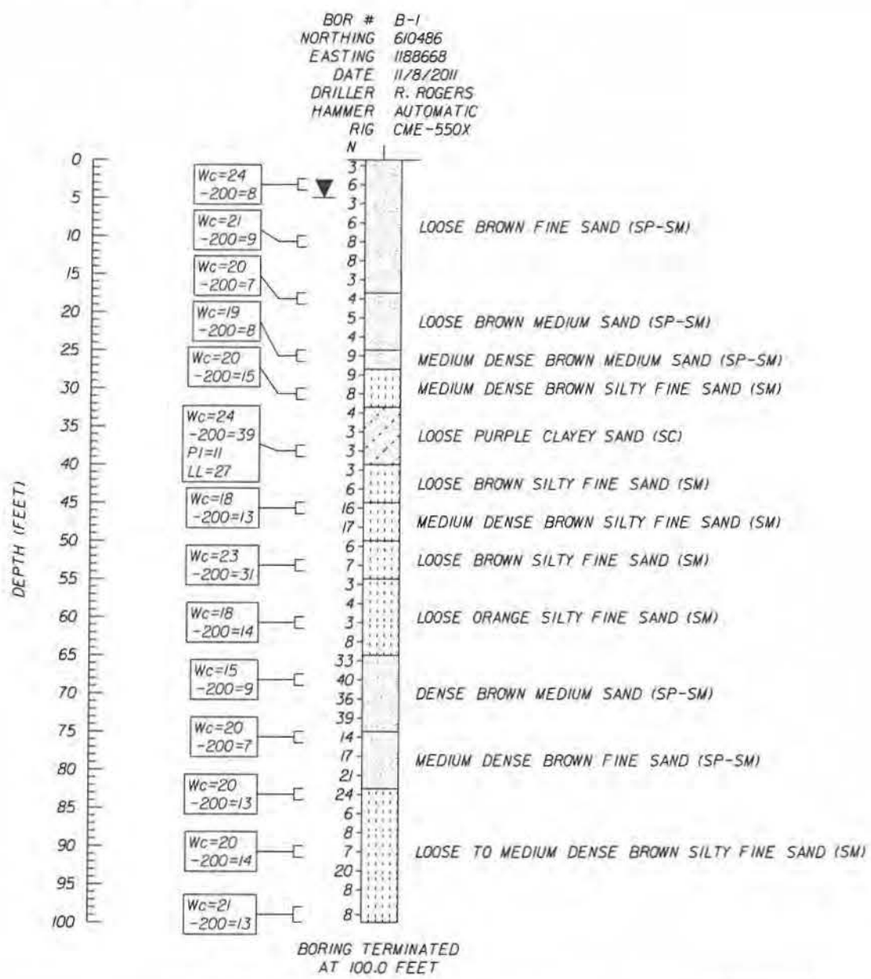
WATER CONTENT (%) Wc=
-200 SIEVE (%) -200=
LIQUID LIMIT LL=
PLASTICITY INDEX PI=

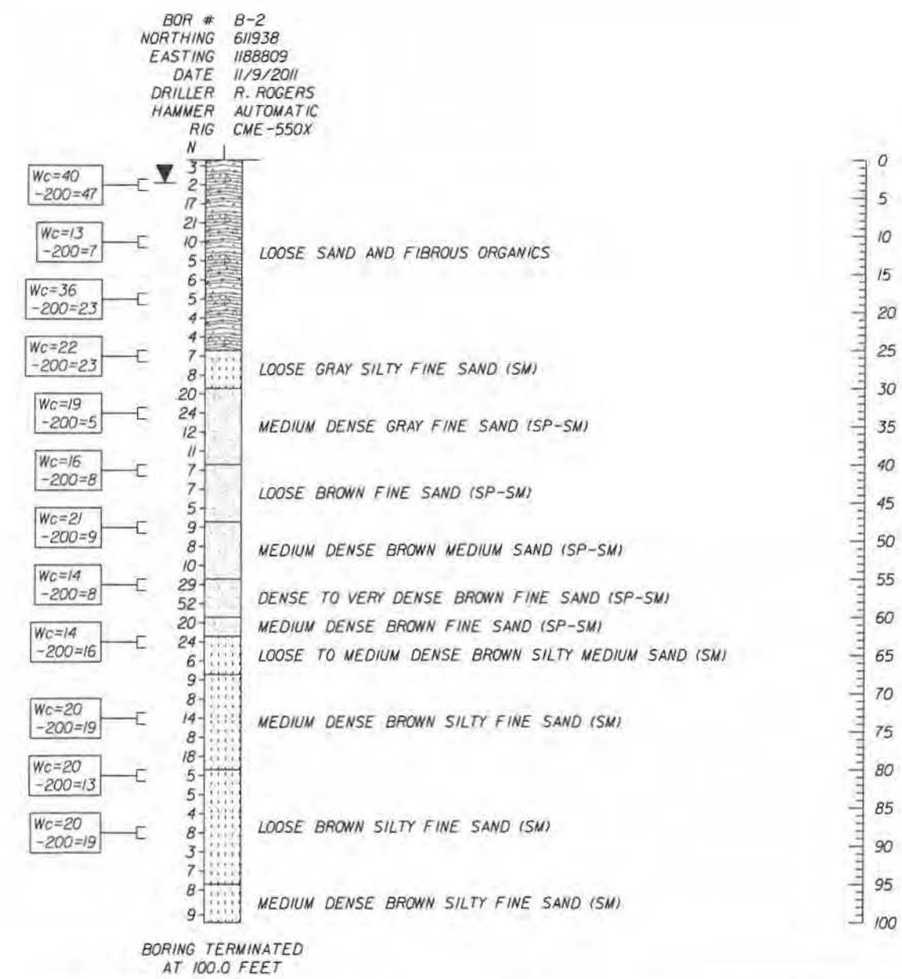
(SM) UNIFIED SOIL CLASSIFICATION GROUP SYMBOL

MEDIUM TO FINE SAND (SP-SM)
SILTY MEDIUM TO SILTY FINE SAND (SM)
SAND AND FIBROUS ORGANICS
CLAYEY SAND (SC)

ENVIRONMENTAL CLASSIFICATION

SUPERSTRUCTURE: SLIGHTLY AGGRESSIVE
SUBSTRUCTURE: MODERATELY AGGRESSIVE FOR STEEL (pH 6.2)
MODERATELY AGGRESSIVE FOR CONCRETE





NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C.

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

DERWOOD C. SHEPPARD, P.E. P.E. NO.: 69228
Environmental & Geotechnical Specialists, Inc.
EGS
3154 Eliza Road
Tallahassee, Florida 32308
Office : (850) 386-1253
Fax : (850) 385-8050
Certificate of Authorization: 6222

DRAWN BY: AMR 11-11
CHECKED BY: KJC 11-11
DESIGNED BY: DCS 11-11
CHECKED BY: MLH 11-11

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 87	SANTA ROSA	416748-3-22-01

SHEET TITLE: REPORT OF CORE BORINGS

PROJECT NAME: SR 87 CONNECTOR PD&E STUDY

REF. DWG. NO.

SHEET NO.

$USER$ $DATE$ $TIME$ $FILE$

APPENDIX B

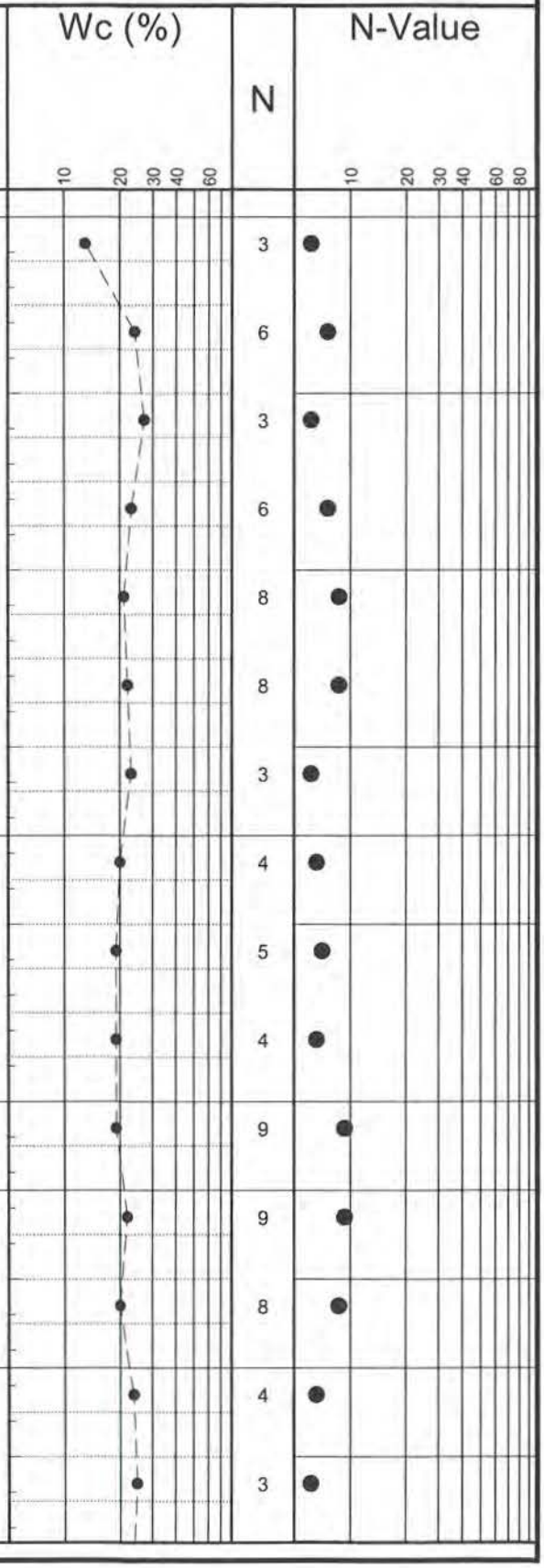
SOIL BORING LOGS

EGS
ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

PROJECT: SR 87 CONNECTOR PD&E STUDY		**HAMMER TYPE:** AUTOMATIC	
CLIENT: METRIC ENGINEERING, INC.		**NORTHING:** 610486	
PROJECT NO.: 28-09-09-04		**EASTING:** 1188668	
PROJECT LOCATION: SANTA ROSA, COUNTY		**ELEVATION (FEET):** N/A	
BORING NO.: B-1		**DATE:** 11/8/2011	
DRILLER: R. ROGERS		**FLUID LOSS:** NONE	
DEPTH TO WATER:	**INITIAL:** 6.0'	**24 HR:** 5.0'	**CAVING:** NONE

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

DESCRIPTION	USCS/ AASHTO	TEST RESULTS	Wc (%)	N
LOOSE BROWN FINE SAND	SP-SM A-3	-200%=8	13	3
			24	6
			27	3
		-200%=9	23	6
			21	8
			22	8
			23	3
LOOSE BROWN MEDIUM SAND	SP-SM A-1-b	-200%=7	20	4
			19	5
			19	4
MEDIUM DENSE BROWN MEDIUM SAND	SP-SM A-1-b	-200%=8	19	9
MEDIUM DENSE BROWN SILTY FINE SAND	SM A-2-4	-200%=15	22	9
			20	8
LOOSE PURPLE CLAYEY SAND	SC A-6		24	4
			25	3

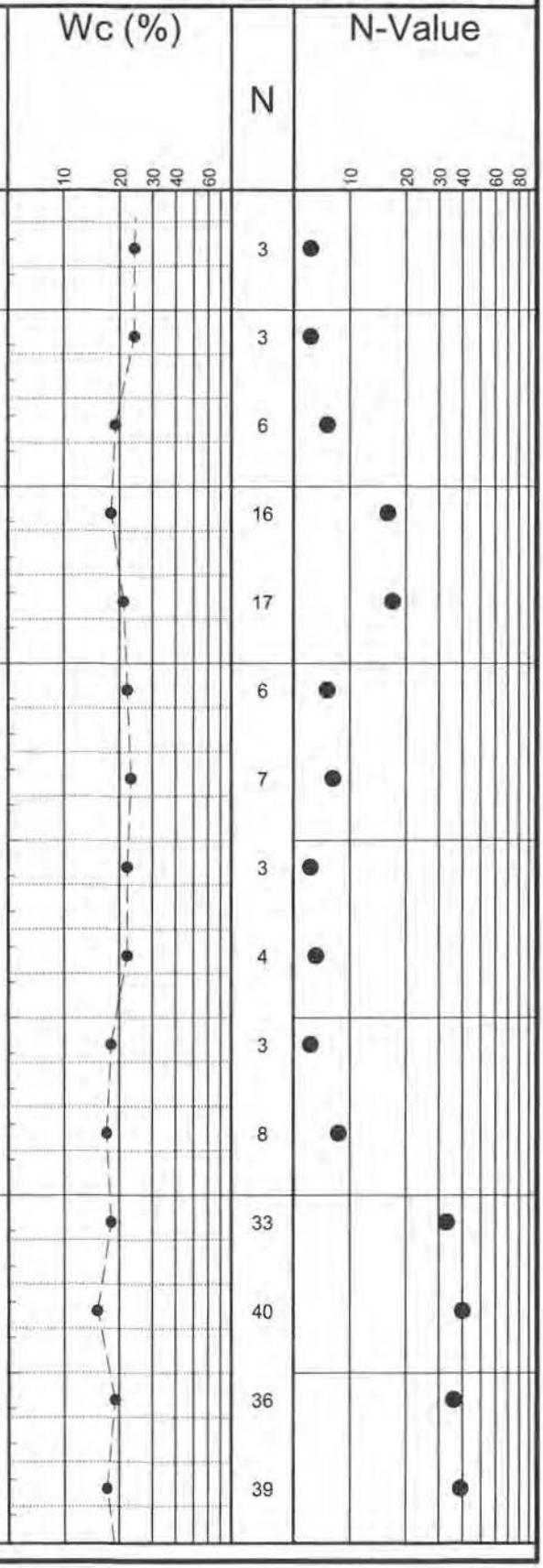


EGS
ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

PROJECT:	SR 87 CONNECTOR PD&E STUDY	**HAMMER TYPE:**	AUTOMATIC
CLIENT:	METRIC ENGINEERING, INC.	**NORTHING:**	610486
PROJECT NO.:	28-09-09-04	**EASTING:**	1188668
PROJECT LOCATION:	SANTA ROSA, COUNTY	**ELEVATION (FEET):**	N/A
BORING NO.:	B-1	**DATE:**	11/8/2011
DRILLER:	R. ROGERS	**FLUID LOSS:**	NONE
DEPTH TO WATER:	**INITIAL:** 6.0' **24 HR:** 5.0'	**CAVING:**	NONE

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

DEPTH (METERS)	DEPTH (FEET)	SAMPLE	SYMBOL	DESCRIPTION	USCS/ AASHTO	TEST RESULTS	Wc (%)	N
						-200%=39 LL=27 PI=11	24	3
	40						24	3
12.5				LOOSE BROWN SILTY FINE SAND	SM A-2-4		19	6
	45					-200%=13	18	16
				MEDIUM DENSE BROWN SILTY FINE SAND	SM A-2-4		21	17
15								
	50						22	6
						-200%=31 LL=21 PI=9	23	7
	55						22	3
17.5				LOOSE BROWN SILTY FINE SAND	SM A-2-4		22	4
	60					-200%=14	18	3
							17	8
	65						18	33
20						-200%=9	15	40
	70			DENSE BROWN MEDIUM SAND	SP-SM A-1-b		19	36
22.5							17	39



EGS
ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

PROJECT: SR 87 CONNECTOR PD&E STUDY		**HAMMER TYPE:** AUTOMATIC	
CLIENT: METRIC ENGINEERING, INC.		**NORTHING:** 610486	
PROJECT NO.: 28-09-09-04		**EASTING:** 1188668	
PROJECT LOCATION: SANTA ROSA, COUNTY		**ELEVATION (FEET):** N/A	
BORING NO.: B-1		**DATE:** 11/8/2011	
DRILLER: R. ROGERS		**FLUID LOSS:** NONE	
DEPTH TO WATER: **INITIAL:** 6.0'	**24 HR:** 5.0'	**CAVING:** NONE	

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

DEPTH (METERS)	DEPTH (FEET)	SAMPLE	SYMBOL	DESCRIPTION	USCS/ AASHTO	TEST RESULTS	Wc (%)	N
	75			MEDIUM DENSE BROWN FINE SAND	SP-SM A-3	-200%=7	20	14
							20	17
	80						19	21
25				MEDIUM DENSE BROWN SILTY FINE SAND	SM A-2-4	-200%=13	20	24
	85			LOOSE BROWN SILTY FINE SAND	SM A-2-4		22	6
							23	8
27.5	90					-200%=14	20	7
				MEDIUM DENSE BROWN SILTY FINE SAND	SM A-2-4		14	20
	95						17	8
30						-200%=13	21	8
	100							
	105							
32.5								
	110							

Wc (%): 10, 20, 30, 40, 60

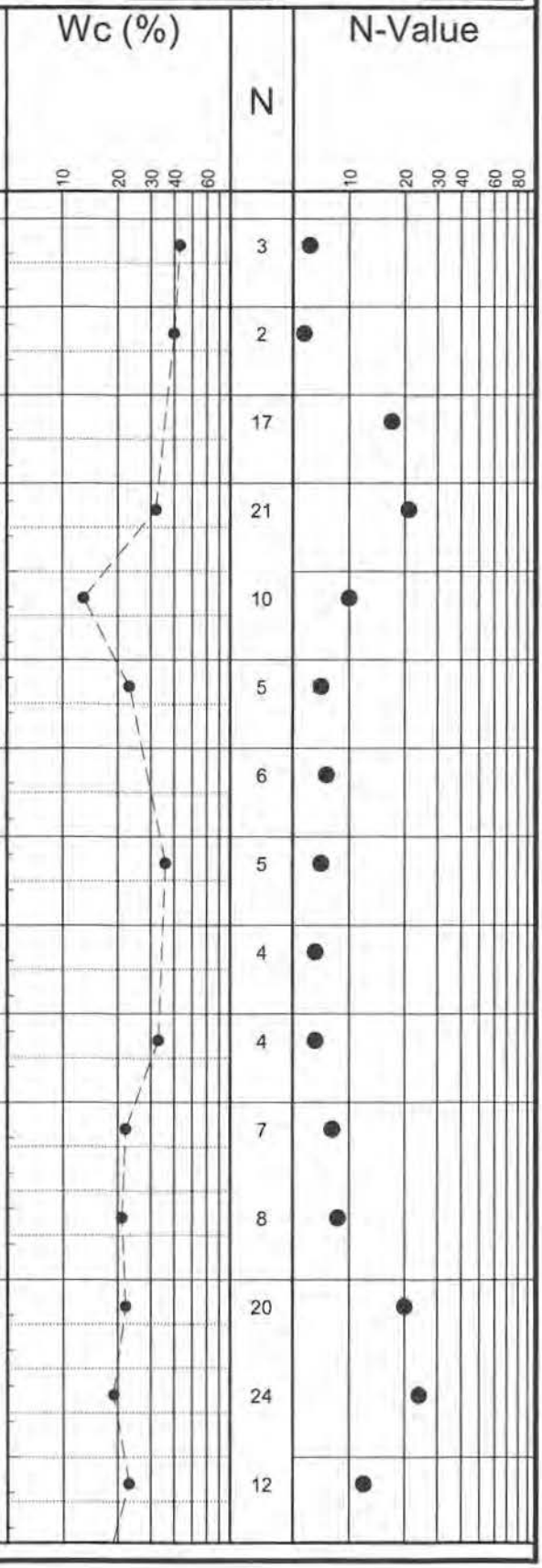
N-Value: 10, 20, 30, 40, 60, 80

EGS
ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

PROJECT: SR 87 CONNECTOR PD&E STUDY		**HAMMER TYPE:** AUTOMATIC	
CLIENT: METRIC ENGINEERING, INC.		**NORTHING:** 611938	
PROJECT NO.: 28-09-09-04		**EASTING:** 1188809	
PROJECT LOCATION: SANTA ROSA, COUNTY		**ELEVATION (FEET):** N/A	
BORING NO.: B-2		**DATE:** 11/9/2011	
DRILLER: R. ROGERS		**FLUID LOSS:** NONE	
DEPTH TO WATER:	**INITIAL:** 3.0'	**24 HR:** N/A	**CAVING:** NONE

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

DEPTH (METERS)	DEPTH (FEET)	DESCRIPTION	USCS/ AASHTO	TEST RESULTS	Wc (%)	N
0	0	LOOSE DARK GRAY SILTY SAND WITH FIBROUS ORGANICS	SM A-4		43	3
		VERY LOOSE DARK GRAY SILTY SAND WITH FIBROUS ORGANICS	SM A-4	-200%=47 ORG%=7.4	40	2
	5	FIBROUS ORGANICS	-- --		--	17
2.5		MEDIUM DENSE DARK GRAY MEDIUM SAND WITH FIBROUS ORGANICS	SP-SM A-1-b	ORG%=1.7	32	21
	10			-200%=7	13	10
		LOOSE DARK GRAY MEDIUM SAND WITH FIBROUS ORGANICS	SP-SM A-1-b		23	5
	15	FIBROUS ORGANICS	-- --		--	6
5		LOOSE DARK GRAY SILTY FINE SAND WITH FIBROUS ORGANICS	SM A-2-4	-200%=23	36	5
	20	FIBROUS ORGANICS	-- --		--	4
		LOOSE DARK GRAY SILTY FINE SAND WITH FIBROUS ORGANICS	SM A-2-4		33	4
7.5	25	LOOSE GRAY SILTY FINE SAND	SM A-2-4	-200%=23	22	7
					21	8
	30	MEDIUM DENSE GRAY FINE SAND	SP-SM A-3		22	20
10				-200%=5	19	24
	35				23	12



EGS
ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

PROJECT: SR 87 CONNECTOR PD&E STUDY		**HAMMER TYPE:** AUTOMATIC	
CLIENT: METRIC ENGINEERING, INC.		**NORTHING:** 611938	
PROJECT NO.: 28-09-09-04		**EASTING:** 1188809	
PROJECT LOCATION: SANTA ROSA, COUNTY		**ELEVATION (FEET):** N/A	
BORING NO.: B-2		**DATE:** 11/9/2011	
DRILLER: R. ROGERS		**FLUID LOSS:** NONE	
DEPTH TO WATER: **INITIAL:** ▽ 3.0'	**24 HR:** ▼ N/A	**CAVING:** ⊏ NONE	

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

DEPTH (METERS)	DEPTH (FEET)	SAMPLE	SYMBOL	DESCRIPTION	USCS/ AASHTO	TEST RESULTS	Wc (%)	N
							17	11
	40					-200%=8	16	7
12.5				LOOSE BROWN FINE SAND	SP-SM A-3		19	7
	45						23	5
						-200%=9	21	9
15	50			MEDIUM DENSE BROWN MEDIUM SAND	SP-SM A-1-b		16	8
							15	10
	55			DENSE BROWN FINE SAND	SP-SM A-3	-200%=8	14	29
17.5				VERY DENSE BROWN FINE SAND	SP-SM A-3		15	52
	60			MEDIUM DENSE BROWN FINE SAND	SP-SM A-3		15	20
				MEDIUM DENSE BROWN SILTY MEDIUM SAND	SM A-1-b	-200%=16	14	24
20	65			LOOSE BROWN SILTY MEDIUM SAND	SM A-1-b		21	6
							20	9
	70						21	8
22.5				MEDIUM DENSE BROWN SILTY FINE SAND	SM A-2-4	-200%=19	20	14

Wc (%) scale: 10, 20, 30, 40, 60

N-Value scale: 10, 20, 30, 40, 60, 80

EGS
ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

PROJECT: SR 87 CONNECTOR PD&E STUDY		**HAMMER TYPE:** AUTOMATIC	
CLIENT: METRIC ENGINEERING, INC.		**NORTHING:** 611938	
PROJECT NO.: 28-09-09-04		**EASTING:** 1188809	
PROJECT LOCATION: SANTA ROSA, COUNTY		**ELEVATION (FEET):** N/A	
BORING NO.: B-2		**DATE:** 11/9/2011	
DRILLER: R. ROGERS		**FLUID LOSS:** NONE	
DEPTH TO WATER: **INITIAL:** 3.0'	**24 HR:** N/A	**CAVING:** NONE	

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

DEPTH (METERS)	DEPTH (FEET)	SAMPLE	SYMBOL	DESCRIPTION	USCS/ AASHTO	TEST RESULTS	Wc (%)	N
	75						18	8
							19	18
	80					-200%=13	20	5
25							25	5
	85						23	4
				LOOSE BROWN SILTY FINE SAND	SM A-2-4	-200%=19	20	8
27.5	90						23	3
							23	7
	95					-200%=19	24	8
				MEDIUM DENSE BROWN SILTY FINE SAND	SM A-2-4			
30							19	9
	100							
	105							
32.5								
	110							

Wc (%): 10, 20, 30, 40, 60

N-Value: 10, 20, 30, 40, 60, 80

APPENDIX C
SOIL CLASSIFICATION DATA

SOIL CLASSIFICATION DATA

Project: SR 87 CONNECTOR PD&E STUDY

Project No.: 28-09-09-04

Client: METRIC ENGINEERING, INC.

Location: SANTA ROSA, COUNTY

Boring: B-1

DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Description
0.0-1.5	13											3	SP-SM	A-3	LOOSE BROWN FINE SAND
2.5-4.0	24	100	100	100	99	91	48	8				6	SP-SM	A-3	LOOSE BROWN FINE SAND
5.0-6.5	27											3	SP-SM	A-3	LOOSE BROWN FINE SAND
7.5-9.0	23											6	SP-SM	A-3	LOOSE BROWN FINE SAND
10.0-11.5	21	100	100	98	89	70	32	9				8	SP-SM	A-3	LOOSE BROWN FINE SAND
12.5-14.0	22											8	SP-SM	A-3	LOOSE BROWN FINE SAND
15.0-16.5	23											3	SP-SM	A-3	LOOSE BROWN FINE SAND
17.5-19.0	20	100	100	95	32	16	11	7				4	SP-SM	A-1-b	LOOSE BROWN MEDIUM SAND
20.0-21.5	19											5	SP-SM	A-1-b	LOOSE BROWN MEDIUM SAND
22.5-24.0	19											4	SP-SM	A-1-b	LOOSE BROWN MEDIUM SAND
25.0-26.5	19	100	100	87	49	22	13	8				9	SP-SM	A-1-b	MEDIUM DENSE BROWN MEDIUM SAND

SOIL CLASSIFICATION DATA

Project: SR 87 CONNECTOR PD&E STUDY

Project No.: 28-09-09-04

Client: METRIC ENGINEERING, INC.

Location: SANTA ROSA, COUNTY

Boring: B-1

DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Description
27.5-29.0	22											9	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND
30.0-31.5	20	100	100	93	52	26	20	15				8	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND
32.5-34.0	24											4	SC	A-6	LOOSE PURPLE CLAYEY SAND
35.0-36.5	25											3	SC	A-6	LOOSE PURPLE CLAYEY SAND
37.5-39.0	24	100	100	99	95	93	68	39	27	11		3	SC	A-6	LOOSE PURPLE CLAYEY SAND
40.0-41.5	24											3	SM	A-2-4	LOOSE BROWN SILTY FINE SAND
42.5-44.0	19											6	SM	A-2-4	LOOSE BROWN SILTY FINE SAND
45.0-46.5	18	100	100	98	76	29	19	13				16	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND
47.5-49.0	21											17	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND
50.0-51.5	22											6	SM	A-2-4	LOOSE BROWN SILTY FINE SAND
52.5-54.0	23	100	100	95	79	56	38	31	21	9		7	SM	A-2-4	LOOSE BROWN SILTY FINE SAND

SOIL CLASSIFICATION DATA

Project: SR 87 CONNECTOR PD&E STUDY

Project No.: 28-09-09-04

Client: METRIC ENGINEERING, INC.

Location: SANTA ROSA, COUNTY

Boring: B-1

DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Description
55.0-56.5	22											3	SM	A-2-4	LOOSE ORANGE SILTY FINE SAND
57.5-59.0	22											4	SM	A-2-4	LOOSE ORANGE SILTY FINE SAND
60.0-61.5	18	100	100	99	82	57	19	14				3	SM	A-2-4	LOOSE ORANGE SILTY FINE SAND
62.5-64.0	17											8	SM	A-2-4	LOOSE ORANGE SILTY FINE SAND
65.0-66.5	18											33	SP-SM	A-1-b	DENSE BROWN MEDIUM SAND
67.5-69.0	15	100	100	94	46	25	15	9				40	SP-SM	A-1-b	DENSE BROWN MEDIUM SAND
70.0-71.5	19											36	SP-SM	A-1-b	DENSE BROWN MEDIUM SAND
72.5-74.0	17											39	SP-SM	A-1-b	DENSE BROWN MEDIUM SAND
75.0-76.5	20	100	100	90	55	30	12	7				14	SP-SM	A-3	MEDIUM DENSE BROWN FINE SAND
77.5-79.0	20											17	SP-SM	A-3	MEDIUM DENSE BROWN FINE SAND
80.0-81.5	19											21	SP-SM	A-3	MEDIUM DENSE BROWN FINE SAND

SOIL CLASSIFICATION DATA

Project: SR 87 CONNECTOR PD&E STUDY

Project No.: 28-09-09-04

Client: METRIC ENGINEERING, INC.

Location: SANTA ROSA, COUNTY

Boring: B-1

DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Description
82.5-84.0	20	100	100	95	77	43	16	13				24	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND
85.0-86.5	22											6	SM	A-2-4	LOOSE BROWN SILTY FINE SAND
87.5-89.0	23											8	SM	A-2-4	LOOSE BROWN SILTY FINE SAND
90.0-91.5	20	100	100	91	73	46	18	14				7	SM	A-2-4	LOOSE BROWN SILTY FINE SAND
92.5-94.0	14											20	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND
95.0-96.5	17											8	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND
98.0-100.0	21	100	100	92	75	62	26	13				8	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND

SOIL CLASSIFICATION DATA

Project: SR 87 CONNECTOR PD&E STUDY

Project No.: 28-09-09-04

Client: METRIC ENGINEERING, INC.

Location: SANTA ROSA, COUNTY

Boring: B-2

DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Description
0.0-1.5	43											3	SM	A-4	LOOSE DARK GRAY SILTY SAND WITH FIBROUS ORGANICS
2.5-4.0	40	100	100	100	99	98	88	47			7.4	2	SM	A-4	VERY LOOSE DARK GRAY SILTY SAND WITH FIBROUS ORGANICS
5.0-6.5	--											17	--	--	FIBROUS ORGANICS
7.5-9.0	32										1.7	21	SP-SM	A-1-b	MEDIUM DENSE DARK GRAY MEDIUM SAND WITH FIBROUS ORGANICS
10.0-11.5	13	100	100	91	49	25	13	7				10	SP-SM	A-1-b	MEDIUM DENSE DARK GRAY MEDIUM SAND WITH FIBROUS ORGANICS
12.5-14.0	23											5	SP-SM	A-1-b	LOOSE DARK GRAY MEDIUM SAND WITH FIBROUS ORGANICS
15.0-16.5	--											6	--	--	FIBROUS ORGANICS
17.5-19.0	36	100	100	99	98	95	56	23				5	SM	A-2-4	LOOSE DARK GRAY SILTY FINE SAND WITH FIBROUS ORGANICS
20.0-21.5	--											4	--	--	FIBROUS ORGANICS
22.5-24.0	33											4	SM	A-2-4	LOOSE DARK GRAY SILTY FINE SAND WITH FIBROUS ORGANICS
25.0-26.5	22	100	100	100	100	97	47	23				7	SM	A-2-4	LOOSE GRAY SILTY FINE SAND
27.5-29.0	21											8	SM	A-2-4	LOOSE GRAY SILTY FINE SAND
30.0-31.5	22											20	SP-SM	A-3	MEDIUM DENSE GRAY FINE SAND

SOIL CLASSIFICATION DATA

Project: SR 87 CONNECTOR PD&E STUDY

Project No.: 28-09-09-04

Client: METRIC ENGINEERING, INC.

Location: SANTA ROSA, COUNTY

Boring: B-2

DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Description
32.5-34.0	19	100	100	97	71	26	8	5				24	SP-SM	A-3	MEDIUM DENSE GRAY FINE SAND
35.0-36.5	23											12	SP-SM	A-3	MEDIUM DENSE GRAY FINE SAND
37.5-39.0	17											11	SP-SM	A-3	MEDIUM DENSE GRAY FINE SAND
40.0-41.5	16	100	100	90	52	17	10	8				7	SP-SM	A-3	LOOSE BROWN FINE SAND
42.5-44.0	19											7	SP-SM	A-3	LOOSE BROWN FINE SAND
45.0-46.5	23											5	SP-SM	A-3	LOOSE BROWN FINE SAND
47.5-49.0	21	100	100	97	43	20	12	9				9	SP-SM	A-1-b	MEDIUM DENSE BROWN MEDIUM SAND
50.0-51.5	16											8	SP-SM	A-1-b	MEDIUM DENSE BROWN MEDIUM SAND
52.5-54.0	15											10	SP-SM	A-1-b	MEDIUM DENSE BROWN MEDIUM SAND
55.0-56.5	14	100	99	82	64	24	14	8				29	SP-SM	A-3	DENSE BROWN FINE SAND
57.5-59.0	15											52	SP-SM	A-3	VERY DENSE BROWN FINE SAND

SOIL CLASSIFICATION DATA

Project: SR 87 CONNECTOR PD&E STUDY

Project No.: 28-09-09-04

Client: METRIC ENGINEERING, INC.

Location: SANTA ROSA, COUNTY

Boring: B-2

DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Description
60.0-61.5	15											20	SP-SM	A-3	MEDIUM DENSE BROWN FINE SAND
62.5-64.0	14	100	100	76	41	27	20	16				24	SM	A-1-b	MEDIUM DENSE BROWN SILTY MEDIUM SAND
65.0-66.5	21											6	SM	A-1-b	LOOSE BROWN SILTY MEDIUM SAND
67.5-69.0	20											9	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND
70.0-71.5	21											8	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND
72.5-74.0	20	100	100	88	68	47	24	19				14	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND
75.0-76.5	18											8	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND
77.5-79.0	19											18	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND
80.0-81.5	20	100	100	90	69	55	21	13				5	SM	A-2-4	LOOSE BROWN SILTY FINE SAND
82.5-84.0	25											5	SM	A-2-4	LOOSE BROWN SILTY FINE SAND
85.0-86.5	23											4	SM	A-2-4	LOOSE BROWN SILTY FINE SAND

SOIL CLASSIFICATION DATA

Project: SR 87 CONNECTOR PD&E STUDY

Project No.: 28-09-09-04

Client: METRIC ENGINEERING, INC.

Location: SANTA ROSA, COUNTY

Boring: B-2

DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Description
87.5-89.0	20	100	100	92	72	58	26	19				8	SM	A-2-4	LOOSE BROWN SILTY FINE SAND
90.0-91.5	23											3	SM	A-2-4	LOOSE BROWN SILTY FINE SAND
92.5-94.0	23											7	SM	A-2-4	LOOSE BROWN SILTY FINE SAND
95.0-96.5	24	100	100	98	94	70	30	19				8	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND
98.0-100.0	19											9	SM	A-2-4	MEDIUM DENSE BROWN SILTY FINE SAND

APPENDIX D

GRAIN-SIZE DISTRIBUTION CURVES

MECHANICAL GRAIN-SIZE ANALYSIS
(ASTM D1140-54)

Project No: 28-09-09-04 Date: 11/17/11

Boring No: B-1 Depth: 2.5 - 4.0 (FEET)

Soil Description BROWN FINE SAND
(SP-SM / A-3)

Sieve No.	Diameter (Millimeters)	Percent Passing (%)
4	4.750	100
10	2.000	100
20	0.840	100
40	0.425	99
60	0.250	91
100	0.150	48
200	0.075	8

D_{10} 0.090 mm

D_{50} 0.16 mm

D_{60} 0.17 mm

D_{85} 0.25 mm

Cu 1.9

Where:

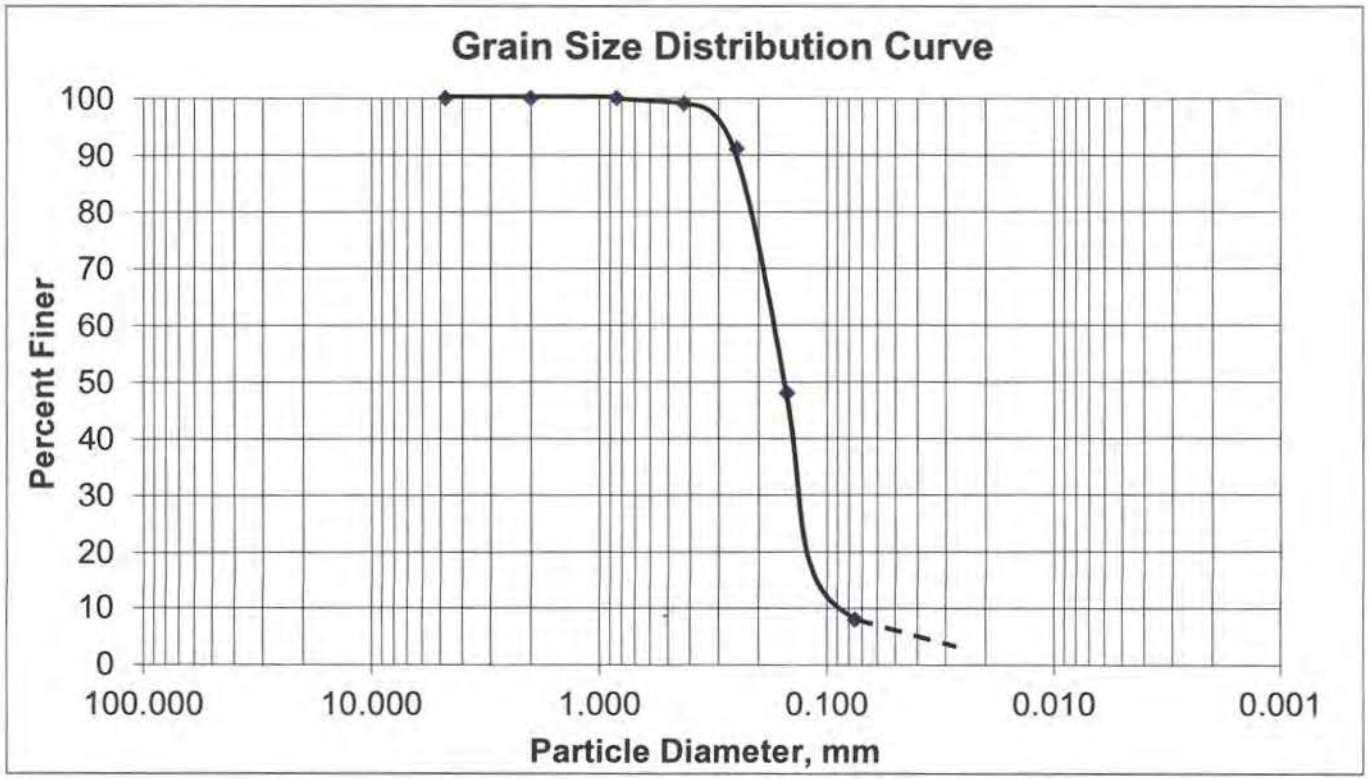
Cu= Coefficient Of Uniformity

MECHANICAL GRAIN-SIZE ANALYSIS
(ASTM D1140-54)

Project No: 28-09-09-04 Date: 11/17/11

Boring No: B-1 Depth: 2.5 - 4.0 (FEET)

Soil Description BROWN FINE SAND
(SP-SM / A-3)



MECHANICAL GRAIN-SIZE ANALYSIS
(ASTM D1140-54)

Project No: 28-09-09-04 Date: 11/17/11

Boring No: B-1 Depth: 17.5-19.0 (FEET)

Soil Description BROWN MEDIUM SAND
(SP-SM / A-1-b)

Sieve No.	Diameter (Millimeters)	Percent Passing (%)
4	4.750	100
10	2.000	100
20	0.840	95
40	0.425	32
60	0.250	16
100	0.150	12
200	0.075	7

D_{10} 0.120 mm

D_{50} 0.55 mm

D_{60} 0.60 mm

D_{85} 0.77 mm

Cu 5.0

Where:

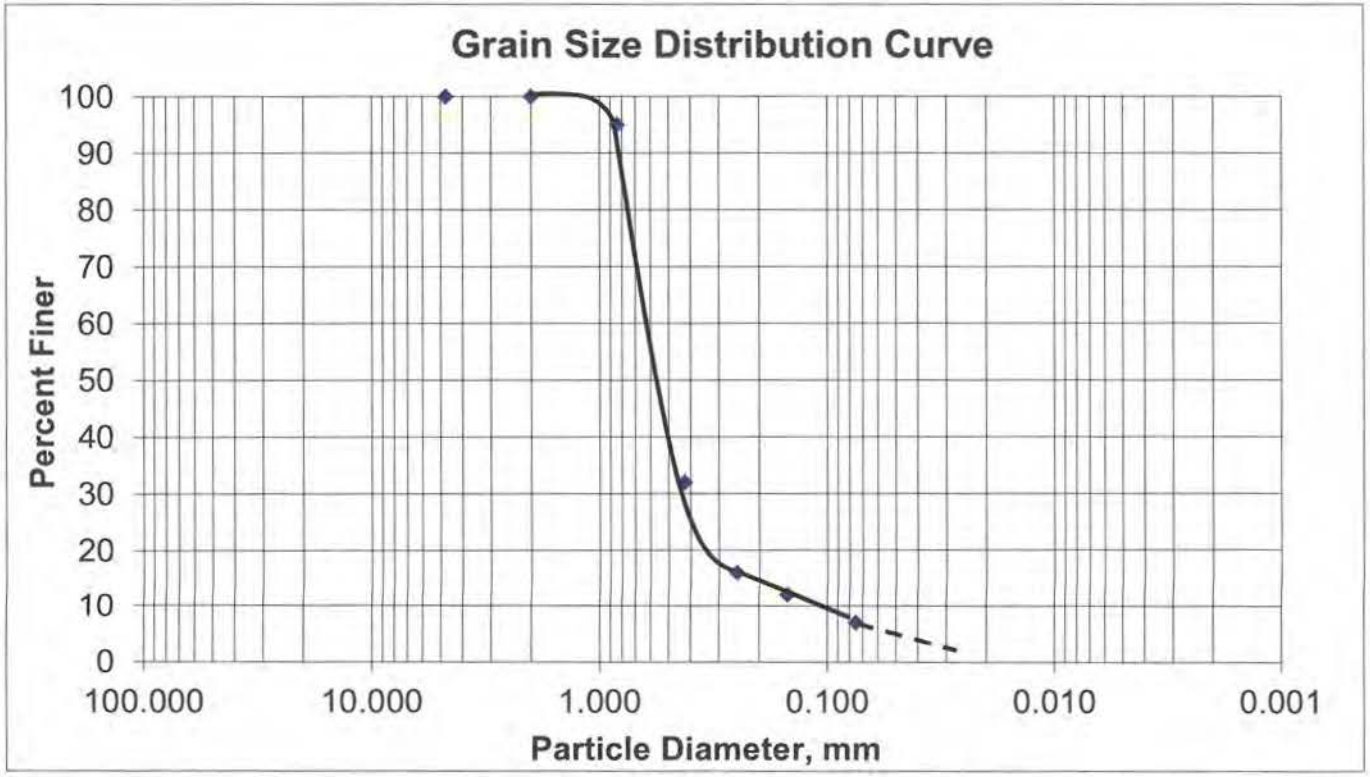
Cu= Coefficient Of Uniformity

MECHANICAL GRAIN-SIZE ANALYSIS
(ASTM D1140-54)

Project No: 28-09-09-04 Date: 11/17/11

Boring No: B-1 Depth: 17.5-19.0 (FEET)

Soil Description BROWN MEDIUM SAND
(SP-SM / A-1-b)



MECHANICAL GRAIN-SIZE ANALYSIS
(ASTM D1140-54)

Project No: 28-09-09-04 Date: 11/17/11

Boring No: B-1 Depth: 30.0 - 31.5 (FEET)

Soil Description BROWN SILTY FINE SAND
(SM / A-2-4)

Sieve No.	Diameter (Millimeters)	Percent Passing (%)
4	4.750	100
10	2.000	100
20	0.840	93
40	0.425	52
60	0.250	26
100	0.150	20
200	0.075	15

D_{10} 0.016 mm

D_{50} 0.42 mm

D_{60} 0.49 mm

D_{85} 0.70 mm

Cu 30.6

Where:

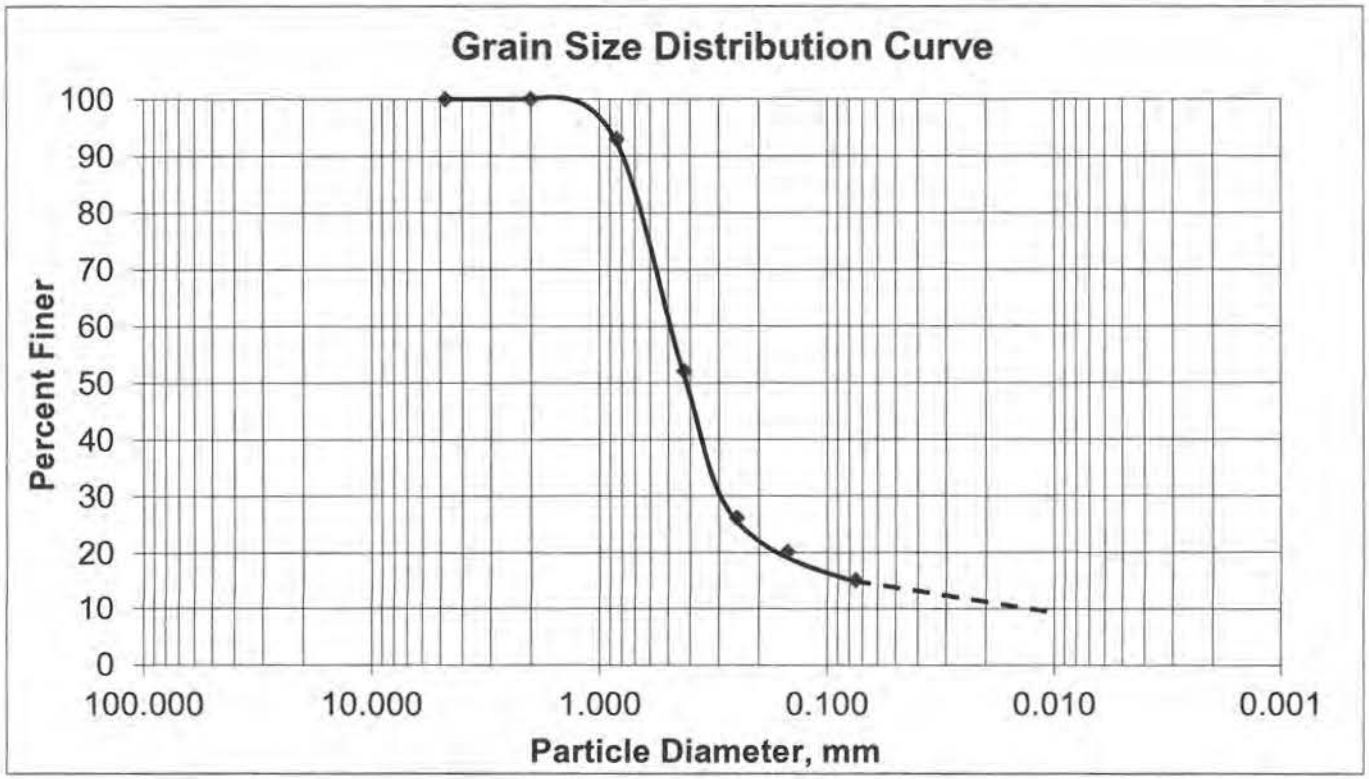
Cu= Coefficient Of Uniformity

MECHANICAL GRAIN-SIZE ANALYSIS
(ASTM D1140-54)

Project No: 28-09-09-04 Date: 11/17/11

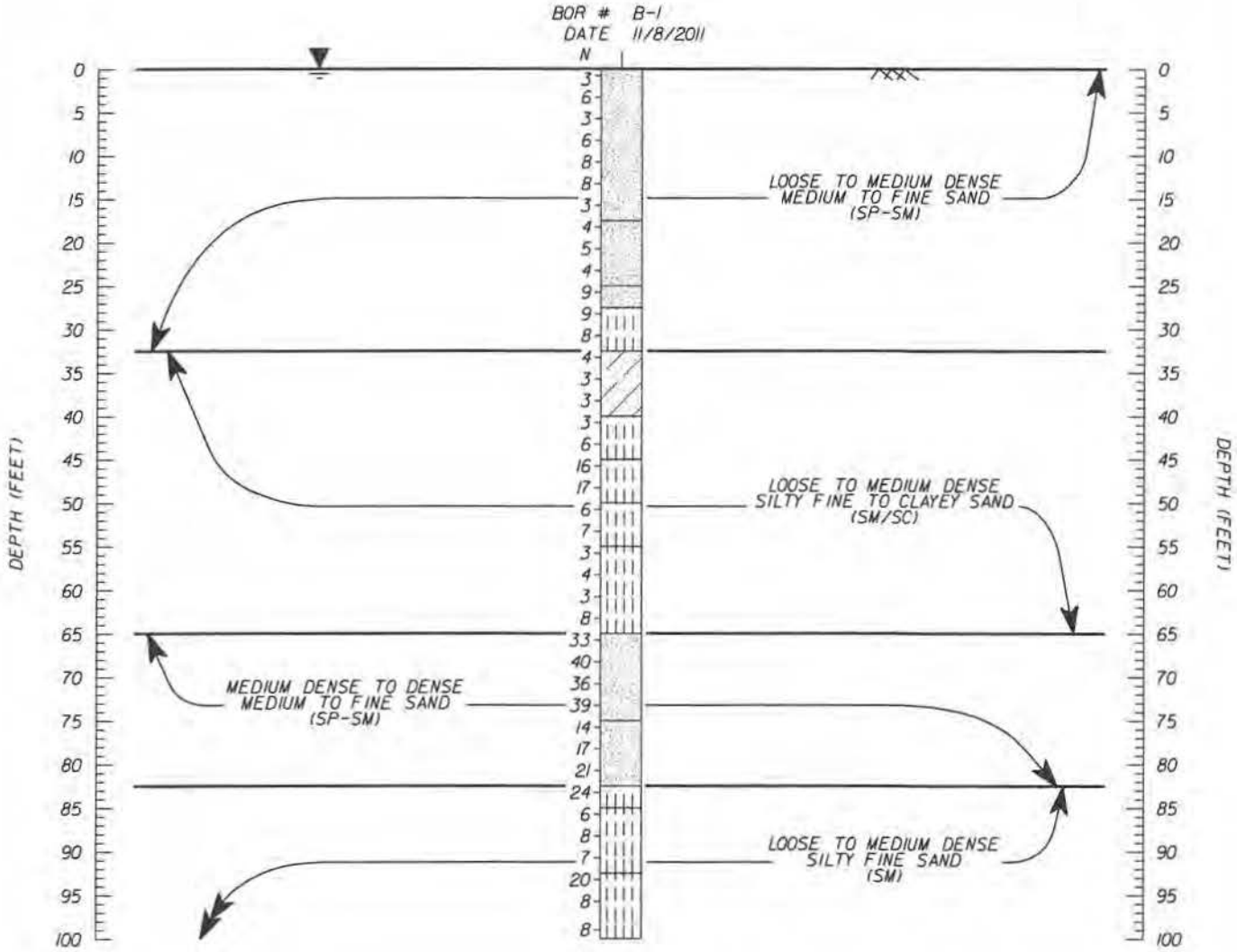
Boring No: B-1 Depth: 30.0 - 31.5 (FEET)

Soil Description BROWN SILTY FINE SAND
(SM / A-2-4)



APPENDIX E
SAMPLE CALCULATIONS

SOIL BORING B-1



DRAWN: A. ROMANELLI, E.I.	CHECKED: M. HAYDEN, P.E.	**EGS** Environmental & Geotechnical Specialists, Inc. 3154 Eliza Road Tallahassee, Florida 32308 Office : (850) 386-1253 Fax : (850) 385-8050	DESIGN FIGURE BRIDGE INVESTIGATION SR 87 CONNECTOR PD&E STUDY SANTA ROSA COUNTY, FLORIDA
ENGINEER: D. SHEPPARD, P.E.			
CLIENT: METRIC ENGINEERING, INC.			
PROJ. NO.: 28-09-09-04	SCALE: 1" = 20'		DATE: NOVEMBER 2011 / FIGURE NO.: E-1

f = COEFFICIENT OF VARIATION OF LATERAL SUBGRADE REACTION WITH DEPTH
B = BASE WIDTH
z = DEPTH
E_S = MODULUS OF ELASTICITY
μ = POISSON'S RATIO

SOIL BORING: B-1

LAYER 1

DEPTH 0.0 to 32.5 FEET

LOOSE TO MEDIUM DENSE - MEDIUM TO FINE SAND (SP-SM)

$N_{cor} := 9$ $\phi := 30 \cdot deg$ $\gamma_1 := 52.6 \cdot \frac{lb}{ft^3}$ $K_a := \frac{1 - \sin(\phi)}{1 + \sin(\phi)}$ $K_a = 0.3$ $K_p := \frac{1 + \sin(\phi)}{1 - \sin(\phi)}$ $K_p = 3$

$B := 24 \cdot in$ $f_1 := 10 \cdot tcf$ $y_1 := 32.5 \cdot ft$ $z_1 := 16.25 \cdot ft$ $E_s := 20(N_{cor}) \cdot ksf$ $\mu_1 := 0.25$

$k_{s_bowles} := \frac{3 \cdot (E_s)}{B}$ $k_{s_bowles} = 156 \frac{lb}{in^3}$ **<~ BOWLES**

$k_{s_navfac} := \frac{f_1 \cdot z_1}{2 \cdot B}$ $k_{s_navfac} = 47 \frac{lb}{in^3}$ **<~ NAVFAC**

OVERBURDEN PRESSURE: $\sigma := \gamma_1 \cdot z_1$ $\sigma = 6 \frac{lb}{in^2}$

$k_{s_flpier} := 100 \cdot \frac{lb}{in^3}$ **<~ FL PIER**

$k_{s_design} := \frac{k_{s_bowles} + k_{s_navfac} + 2 \cdot k_{s_flpier}}{4}$ $k_{s_design} = 101 \frac{lb}{in^3}$

SHEAR MODULUS

$G_s := 0.5 \cdot N_{cor} \cdot \frac{kip}{in^2}$ $G_s = 5 \frac{kip}{in^2}$

VERTICAL SHEAR STRESS

$\tau_s := 0.019 \cdot N_{cor} \cdot tsf$ $\tau_s = 342 \frac{lb}{ft^2}$

ULTIMATE END BEARING

$Q_{tip} := (3.2 \cdot N_{cor}) \cdot tsf$ $Q_{tip} = 0.4 \frac{kip}{in^2}$

RECOMMENDED FBPIER SOIL TYPE

REESE COX KOOP - SAND

f = COEFFICIENT OF VARIATION OF LATERAL SUBGRADE REACTION WITH DEPTH

B = BASE WIDTH

z = DEPTH

E_S = MODULUS OF ELASTICITY

μ = POISSON'S RATIO

LAYER 2

DEPTH 32.5 to 65.0 FEET

LOOSE TO MEDIUM DENSE - SILTY FINE TO CLAYEY SAND (SM/SC)

$N_{cor} := 5$ $\quad \phi := 29 \cdot deg$ $\quad \gamma_2 := 47.6 \cdot \frac{lb}{ft^3}$ $\quad K_a := \frac{1 - \sin(\phi)}{1 + \sin(\phi)}$ $\quad K_a = 0.3$ $\quad K_p := \frac{1 + \sin(\phi)}{1 - \sin(\phi)}$ $\quad K_p = 2.9$

$B := 24 \cdot in \quad f_2 := 6 \cdot tcf \quad y_2 := 32.5 \cdot ft \quad z_2 := 16.25 \cdot ft \quad E_s := 20(N_{cor}) \cdot ksf \quad \mu_2 := 0.25$

$k_{s_bowles} := \frac{3 \cdot (E_s)}{B} \quad k_{s_bowles} = 87 \frac{lb}{in^3}$ **<~ BOWLES**

$k_{s_navfac} := \frac{f_1 \cdot y_1}{2 \cdot B} + \frac{f_2 \cdot z_2}{2 \cdot B} \quad k_{s_navfac} = 122 \frac{lb}{in^3}$ **<~ NAVFAC**

OVERBURDEN PRESSURE: $\sigma := \gamma_1 \cdot y_1 + \gamma_2 \cdot z_2 \quad \sigma = 17 \frac{lb}{in^2}$

$k_{s_flpier} := 50 \cdot \frac{lb}{in^3}$ **<~ FL PIER**

$k_{s_design} := \frac{k_{s_bowles} + k_{s_navfac} + 2 \cdot k_{s_flpier}}{4} \quad k_{s_design} = 77 \frac{lb}{in^3}$

SHEAR MODULUS

$G_s := 0.5 \cdot N_{cor} \cdot \frac{kip}{in^2} \quad G_s = 3 \frac{kip}{in^2}$

VERTICAL SHEAR STRESS

$\tau_s := \frac{N_{cor} \cdot (110 - N_{cor})}{164999} \cdot ksi \quad \tau_s = 458 \frac{lb}{ft^2}$

ULTIMATE END BEARING

$Q_{tip} := (1.6 \cdot N_{cor}) \cdot \frac{ton}{ft^2} \quad Q_{tip} = 0.1 \frac{kip}{in^2}$

RECOMMENDED FBPIER SOIL TYPE

REESE COX KOOP - SAND

f = COEFFICIENT OF VARIATION OF LATERAL SUBGRADE REACTION WITH DEPTH

B = BASE WIDTH

z = DEPTH

E_S = MODULUS OF ELASTICITY

μ = POISSON'S RATIO

LAYER 3

DEPTH 65.0 to 82.5 FEET

MEDIUM DENSE TO DENSE - MEDIUM TO FINE SAND (SP-SM)

$N_{cor} := 27$ $\phi := 33 \cdot deg$ $\gamma_3 := 52.6 \cdot \frac{lb}{ft^3}$ $K_a := \frac{1 - \sin(\phi)}{1 + \sin(\phi)}$ $K_a = 0.3$ $K_p := \frac{1 + \sin(\phi)}{1 - \sin(\phi)}$ $K_p = 3.4$

$B := 24 \cdot in$ $f_3 := 28 \cdot tcf$ $y_3 := 17.5 \cdot ft$ $z_3 := 8.75 \cdot ft$ $E_s := 20(N_{cor}) \cdot ksf$ $\mu_3 := 0.20$

$k_{s_bowles} := \frac{3 \cdot (E_s)}{B}$ $k_{s_bowles} = 469 \frac{lb}{in^3}$ **<~ BOWLES**

$k_{s_navfac} := \frac{f_1 \cdot y_1}{2 \cdot B} + \frac{f_2 \cdot y_2}{2 \cdot B} + \frac{f_3 \cdot z_3}{2 \cdot B}$ $k_{s_navfac} = 221 \frac{lb}{in^3}$ **<~ NAVFAC**

OVERBURDEN PRESSURE: $\sigma := \gamma_1 \cdot y_1 + \gamma_2 \cdot y_2 + \gamma_3 \cdot z_3$ $\sigma = 26 \frac{lb}{in^2}$

$k_{s_flpier} := 120 \cdot \frac{lb}{in^3}$ **<~ FL PIER**

$k_{s_design} := \frac{k_{s_bowles} + k_{s_navfac} + 2 \cdot k_{s_flpier}}{4}$ $k_{s_design} = 233 \frac{lb}{in^3}$

SHEAR MODULUS

$G_s := 0.5 \cdot N_{cor} \cdot \frac{kip}{in^2}$ $G_s = 14 \frac{kip}{in^2}$

VERTICAL SHEAR STRESS

$\tau_s := 0.019 \cdot N_{cor} \cdot tsf$ $\tau_s = 1026 \frac{lb}{ft^2}$

ULTIMATE END BEARING

$Q_{tip} := (3.2 \cdot N_{cor}) \cdot \frac{ton}{ft^2}$ $Q_{tip} = 1.2 \frac{kip}{in^2}$

RECOMMENDED FBPIER SOIL TYPE

REESE COX KOOP - SAND

f = COEFFICIENT OF VARIATION OF LATERAL SUBGRADE REACTION WITH DEPTH

B = BASE WIDTH

z = DEPTH

E_S = MODULUS OF ELASTICITY

μ = POISSON'S RATIO

LAYER 4

DEPTH 82.5 to 100.0 FEET

LOOSE TO MEDIUM DENSE - SILTY FINE SAND (SM)

$N_{cor} := 6$ $\quad \phi := 29 \cdot deg$ $\quad \gamma_4 := 47.6 \cdot \frac{lb}{ft^3}$ $\quad K_a := \frac{1 - \sin(\phi)}{1 + \sin(\phi)}$ $\quad K_a = 0.3$ $\quad K_p := \frac{1 + \sin(\phi)}{1 - \sin(\phi)}$ $\quad K_p = 2.9$

$B := 24 \cdot in \quad f_4 := 7 \cdot tcf \quad y_4 := 17.5 \cdot ft \quad z_4 := 8.75 \cdot ft \quad E_s := 20(N_{cor}) \cdot ksf \quad \mu_4 := 0.25$

$k_{s_bowles} := \frac{3 \cdot (E_s)}{B} \quad k_{s_bowles} = 104 \frac{lb}{in^3}$ **<~ BOWLES**

$k_{s_navfac} := \frac{f_1 \cdot y_1}{2 \cdot B} + \frac{f_2 \cdot y_2}{2 \cdot B} + \frac{f_3 \cdot y_3}{2 \cdot B} + \frac{f_4 \cdot z_4}{2 \cdot B} \quad k_{s_navfac} = 310 \frac{lb}{in^3}$ **<~ NAVFAC**

OVERBURDEN PRESSURE: $\sigma := \gamma_1 \cdot y_1 + \gamma_2 \cdot y_2 + \gamma_3 \cdot y_3 + \gamma_4 \cdot z_4 \quad \sigma = 32 \frac{lb}{in^2}$

$k_{s_flpier} := 30 \cdot \frac{lb}{in^3}$ **<~ FL PIER**

$k_{s_design} := \frac{k_{s_bowles} + k_{s_navfac} + 2 \cdot k_{s_flpier}}{4} \quad k_{s_design} = 119 \frac{lb}{in^3}$

SHEAR MODULUS

$G_s := 0.5 \cdot N_{cor} \cdot \frac{kip}{in^2} \quad G_s = 3 \frac{kip}{in^2}$

VERTICAL SHEAR STRESS

$\tau_s := \frac{N_{cor} \cdot (110 - N_{cor})}{164999} \cdot ksi \quad \tau_s = 545 \frac{lb}{ft^2}$

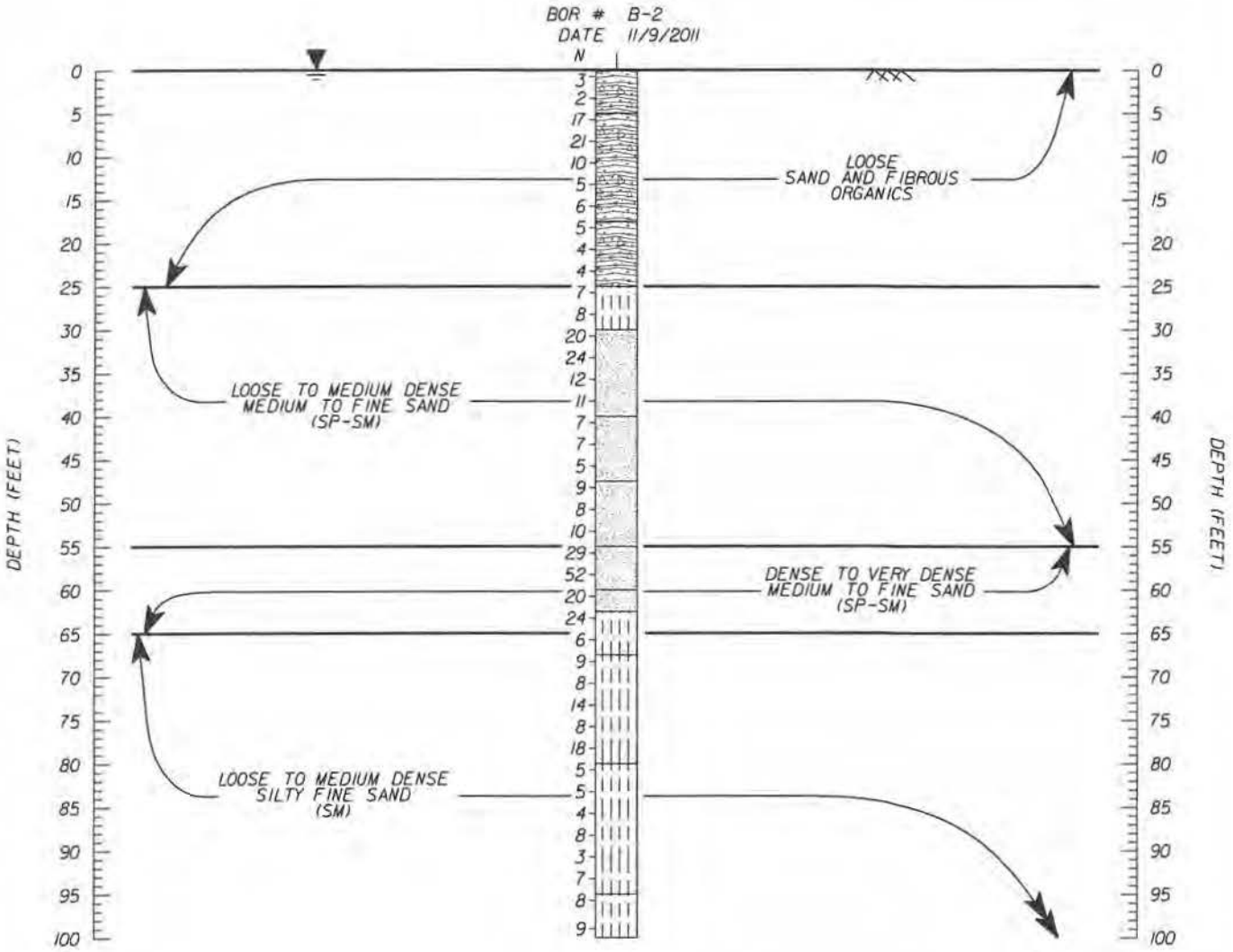
ULTIMATE END BEARING

$Q_{tip} := (1.6 \cdot N_{cor}) \cdot \frac{ton}{ft^2} \quad Q_{tip} = 0.1 \frac{kip}{in^2}$

RECOMMENDED FBPIER SOIL TYPE

REESE COX KOOP - SAND

SOIL BORING B-2



DRAWN: A. ROMANELLI, E.I.	CHECKED: M. HAYDEN, P.E.	**EGS** Environmental & Geotechnical Specialists, Inc. 3154 Eliza Road Tallahassee, Florida 32308 Office : (850) 386-1253 Fax : (850) 385-8050	DESIGN FIGURE BRIDGE INVESTIGATION SR 87 CONNECTOR PD&E STUDY SANTA ROSA COUNTY, FLORIDA
ENGINEER: D. SHEPPARD, P.E.			
CLIENT: METRIC ENGINEERING, INC.			
PROJ. NO.: 28-09-09-04	SCALE: 1" = 20'		DATE: NOVEMBER 2011 / FIGURE NO.: E-2

f = COEFFICIENT OF VARIATION OF LATERAL SUBGRADE REACTION WITH DEPTH
B = BASE WIDTH
z = DEPTH
E_S = MODULUS OF ELASTICITY
μ = POISSON'S RATIO

SOIL BORING: B-2

LAYER 1

DEPTH 0.0 to 25.0 FEET LOOSE - SAND AND FIBROUS ORGANICS

$N_{cor} := 3$ $\phi := 28 \cdot deg$ $\gamma_1 := 37.6 \cdot \frac{lb}{ft^3}$

$B := 24 \cdot in$ $f_1 := 5 \cdot tcf$ $y_1 := 25.0 \cdot ft$ $z_1 := 12.5 \cdot ft$ $E_s := 20(N_{cor}) \cdot ksf$ $\mu_1 := 0.50$

$k_{s_bowles} := \frac{3 \cdot (E_s)}{B}$ $k_{s_bowles} = 52 \frac{lb}{in^3}$ **<~ BOWLES**

$k_{s_navfac} := \frac{f_1 \cdot z_1}{2 \cdot B}$ $k_{s_navfac} = 18 \frac{lb}{in^3}$ **<~ NAVFAC**

OVERBURDEN PRESSURE: $\sigma := \gamma_1 \cdot z_1$ $\sigma = 3 \frac{lb}{in^2}$

$k_{s_flpier} := 45 \cdot \frac{lb}{in^3}$ **<~ FL PIER**

$k_{s_design} := 20 \cdot \frac{lb}{in^3}$ **<~ USE 20 PCI DUE TO ORGANICS**

SHEAR MODULUS

$G_s := 0.5 \cdot N_{cor} \cdot \frac{kip}{in^2}$ $G_s = 2 \frac{kip}{in^2}$

RECOMMENDED FBPIER SOIL TYPE

REESE COX KOOP - SAND

f = COEFFICIENT OF VARIATION OF LATERAL SUBGRADE REACTION WITH DEPTH
B = BASE WIDTH
z = DEPTH
E_S = MODULUS OF ELASTICITY
μ = POISSON'S RATIO
U_{CC} = UNCONFINED COMPRESSION

LAYER 2

DEPTH 25.0 to 55.0 FEET

LOOSE TO MEDIUM DENSE - MEDIUM TO FINE SAND (SP-SM)

$N_{cor} := 10$ $\phi := 30 \cdot deg$ $\gamma_2 := 52.6 \cdot \frac{lb}{ft^3}$ $K_a := \frac{1 - \sin(\phi)}{1 + \sin(\phi)}$ $K_a = 0.33$ $K_p := \frac{1 + \sin(\phi)}{1 - \sin(\phi)}$ $K_p = 3$

$B := 24 \cdot in$ $f_2 := 11.0 \cdot tcf$ $y_2 := 30 \cdot ft$ $z_2 := 15.0 \cdot ft$ $E_s := 20(N_{cor}) \cdot ksf$ $\mu_2 := 0.25$

$k_{s_bowles} := \frac{3 \cdot (E_s)}{B}$ $k_{s_bowles} = 174 \frac{lb}{in^3}$ **<~ BOWLES**

$k_{s_navfac} := \frac{f_1 \cdot y_1}{2 \cdot B} + \frac{f_2 \cdot z_2}{2 \cdot B}$ $k_{s_navfac} = 84 \frac{lb}{in^3}$ **<~ NAVFAC**

OVERBURDEN PRESSURE: $\sigma := \gamma_1 \cdot y_1 + \gamma_2 \cdot z_2$ $\sigma = 12 \frac{lb}{in^2}$

$k_{s_flpier} := 70 \cdot \frac{lb}{in^3}$ **<~ FL PIER**

$k_{s_design} := \frac{k_{s_bowles} + k_{s_navfac} + 2 \cdot k_{s_flpier}}{4}$ $k_{s_design} = 99 \frac{lb}{in^3}$

SHEAR MODULUS

$G_s := 0.5 \cdot N_{cor} \cdot \frac{kip}{in^2}$ $G_s = 5 \frac{kip}{in^2}$

VERTICAL SHEAR STRESS

$\tau_s := 0.019 \cdot N_{cor} \cdot tsf$ $\tau_s = 380 \frac{lb}{ft^2}$

ULTIMATE END BEARING

$Q_{tip} := (3.2 \cdot N_{cor}) \cdot \frac{ton}{ft^2}$ $Q_{tip} = 0.4 \frac{kip}{in^2}$

RECOMMENDED FBPIER SOIL TYPE

REESE COX KOOP - SAND

f = COEFFICIENT OF VARIATION OF LATERAL SUBGRADE REACTION WITH DEPTH

B = BASE WIDTH

z = DEPTH

E_S = MODULUS OF ELASTICITY

μ = POISSON'S RATIO

LAYER 3

DEPTH 55.0 to 65.0 FEET

DENSE TO VERY DENSE - MEDIUM TO FINE SAND (SP-SM)

$N_{cor} := 25$ $\phi := 33 \cdot deg$ $\gamma_3 := 52.6 \cdot \frac{lb}{ft^3}$ $K_a := \frac{1 - \sin(\phi)}{1 + \sin(\phi)}$ $K_a = 0.29$ $K_p := \frac{1 + \sin(\phi)}{1 - \sin(\phi)}$ $K_p = 3.39$

$B := 24 \cdot in$ $f_3 := 26 \cdot tcf$ $y_3 := 10.0 \cdot ft$ $z_3 := 5.0 \cdot ft$ $E_s := 20(N_{cor}) \cdot ksf$ $\mu_3 := 0.20$

$k_{s_bowles} := \frac{3 \cdot (E_s)}{B}$ $k_{s_bowles} = 434 \frac{lb}{in^3}$ **<~ BOWLES**

$k_{s_navfac} := \frac{f_1 \cdot y_1}{2 \cdot B} + \frac{f_2 \cdot y_2}{2 \cdot B} + \frac{f_3 \cdot z_3}{2 \cdot B}$ $k_{s_navfac} = 169 \frac{lb}{in^3}$ **<~ NAVFAC**

OVERBURDEN PRESSURE: $\sigma := \gamma_1 \cdot y_1 + \gamma_2 \cdot y_2 + \gamma_3 \cdot z_3$ $\sigma = 19 \frac{lb}{in^2}$

$k_{s_flpier} := 120 \cdot \frac{lb}{in^3}$ **<~ FL PIER**

$k_{s_design} := \frac{k_{s_bowles} + k_{s_navfac} + 2 \cdot k_{s_flpier}}{4}$ $k_{s_design} = 211 \frac{lb}{in^3}$

SHEAR MODULUS

$G_s := 0.5 \cdot N_{cor} \cdot \frac{kip}{in^2}$ $G_s = 13 \frac{kip}{in^2}$

VERTICAL SHEAR STRESS

$\tau_s := 0.019 \cdot N_{cor} \cdot tsf$ $\tau_s = 950 \frac{lb}{ft^2}$

ULTIMATE END BEARING

$Q_{tip} := (3.2 \cdot N_{cor}) \cdot \frac{ton}{ft^2}$ $Q_{tip} = 1.1 \frac{kip}{in^2}$

RECOMMENDED FBPIER SOIL TYPE

REESE COX KOOP - SAND

f = COEFFICIENT OF VARIATION OF LATERAL SUBGRADE REACTION WITH DEPTH

B = BASE WIDTH

z = DEPTH

E_S = MODULUS OF ELASTICITY

μ = POISSON'S RATIO

U_{CC} = UNCONFINED COMPRESSION

LAYER 4

DEPTH 65.0 to 100.0 FEET

LOOSE TO MEDIUM DENSE - SILTY FINE SAND (SM)

$N_{cor} := 7$ $\quad \phi := 29 \cdot deg$ $\quad \gamma_4 := 47.6 \cdot \frac{lb}{ft^3}$ $\quad K_a := \frac{1 - \sin(\phi)}{1 + \sin(\phi)}$ $\quad K_a = 0.35$ $\quad K_p := \frac{1 + \sin(\phi)}{1 - \sin(\phi)}$ $\quad K_p = 2.88$

$B := 24 \cdot in$ $\quad f_4 := 8 \cdot tcf$ $\quad y_4 := 35.0 \cdot ft$ $\quad z_4 := 17.5 \cdot ft$ $\quad E_s := 20(N_{cor}) \cdot ksf$ $\quad \mu_4 := 0.25$

$k_{s_bowles} := \frac{3 \cdot (E_s)}{B}$ $\quad k_{s_bowles} = 122 \frac{lb}{in^3}$ **<~ BOWLES**

$k_{s_navfac} := \frac{f_1 \cdot y_1}{2 \cdot B} + \frac{f_2 \cdot y_2}{2 \cdot B} + \frac{f_3 \cdot y_3}{2 \cdot B} + \frac{f_4 \cdot z_4}{2 \cdot B}$ $\quad k_{s_navfac} = 247 \frac{lb}{in^3}$ **<~ NAVFAC**

OVERBURDEN PRESSURE: $\sigma := \gamma_1 \cdot y_1 + \gamma_2 \cdot y_2 + \gamma_3 \cdot y_3 + \gamma_4 \cdot z_4$ $\quad \sigma = 27 \frac{lb}{in^2}$

$k_{s_flpier} := 30 \cdot \frac{lb}{in^3}$ **<~ FL PIER**

$k_{s_design} := \frac{k_{s_bowles} + k_{s_navfac} + 2 \cdot k_{s_flpier}}{4}$ $\quad k_{s_design} = 107 \frac{lb}{in^3}$

SHEAR MODULUS

$G_s := 0.5 \cdot N_{cor} \cdot \frac{kip}{in^2}$ $\quad G_s = 4 \frac{kip}{in^2}$

VERTICAL SHEAR STRESS

$\tau_s := \frac{N_{cor} \cdot (110 - N_{cor})}{164999} \cdot ksi$ $\quad \tau_s = 629 \frac{lb}{ft^2}$

ULTIMATE END BEARING

$Q_{tip} := (1.6 \cdot N_{cor}) \cdot \frac{ton}{ft^2}$ $\quad Q_{tip} = 0.2 \frac{kip}{in^2}$

RECOMMENDED FBPIER SOIL TYPE

REESE COX KOOP - SAND

APPENDIX F

AXIAL CAPACITY ANALYSIS
FB DEEP "OUTPUTS"

SOIL BORING B-1

HP 14X73 H-PILES

SOIL BORING: B-1
HP 14X73 STEEL H-PILE

TEST PILE LENGTH (FT)	PILE TIP ELEV (FT)	ULTIMATE SIDE FRICTION (TONS)	MOBILIZED END BEARING (TONS)	ESTIMATED DAVISSON CAPACITY (DC) (TONS)
1.0	N/A	0.08	4.10	**4.18**
2.0	N/A	0.32	4.82	**5.13**
3.0	N/A	0.67	5.48	**6.15**
4.0	N/A	0.91	6.08	**6.99**
5.0	N/A	0.92	6.69	**7.61**
6.0	N/A	0.92	7.73	**8.65**
7.0	N/A	1.08	9.01	**10.10**
8.0	N/A	1.42	9.95	**11.37**
9.0	N/A	1.84	10.38	**12.21**
10.0	N/A	2.30	10.06	**12.36**
11.0	N/A	2.80	9.11	**11.91**
12.0	N/A	3.30	8.00	**11.30**
13.0	N/A	3.78	7.19	**10.98**
14.0	N/A	4.10	7.21	**11.31**
15.0	N/A	4.22	7.92	**12.14**
16.0	N/A	4.30	8.70	**12.99**
17.0	N/A	4.46	9.02	**13.48**
18.0	N/A	4.72	8.90	**13.62**
19.0	N/A	5.01	8.69	**13.70**
20.0	N/A	5.32	8.78	**14.10**
21.0	N/A	5.64	9.25	**14.89**
22.0	N/A	5.92	9.61	**15.54**
23.0	N/A	6.21	9.68	**15.89**
24.0	N/A	6.60	9.55	**16.15**
25.0	N/A	7.11	9.41	**16.52**
26.0	N/A	7.84	9.18	**17.02**
27.0	N/A	8.87	8.88	**17.75**
28.0	N/A	10.61	0.77	**11.38**
29.0	N/A	11.96	0.73	**12.69**
30.0	N/A	13.23	0.65	**13.88**
31.0	N/A	14.35	0.55	**14.90**
32.0	N/A	15.21	0.46	**15.67**
33.0	N/A	15.83	0.38	**16.21**
34.0	N/A	16.20	0.32	**16.52**
35.0	N/A	16.32	0.27	**16.60**
36.0	N/A	16.32	0.24	**16.57**
37.0	N/A	16.32	0.24	**16.56**
38.0	N/A	16.32	0.25	**16.57**
39.0	N/A	16.32	0.29	**16.61**
40.0	N/A	16.32	0.37	**16.70**
41.0	N/A	16.51	0.50	**17.02**
42.0	N/A	17.08	0.64	**17.72**
43.0	N/A	18.03	0.78	**18.81**
44.0	N/A	19.49	0.89	**20.38**
45.0	N/A	21.46	0.93	**22.39**
46.0	N/A	23.71	0.90	**24.61**
47.0	N/A	26.00	0.87	**26.87**
48.0	N/A	28.25	0.84	**29.09**
49.0	N/A	30.03	0.83	**30.85**
50.0	N/A	31.24	0.82	**32.06**
51.0	N/A	32.21	0.78	**32.99**
52.0	N/A	33.25	0.72	**33.97**
53.0	N/A	34.28	0.68	**34.96**
54.0	N/A	34.93	0.63	**35.57**
55.0	N/A	35.15	0.57	**35.73**
56.0	N/A	35.28	0.49	**35.77**
57.0	N/A	35.65	0.42	**36.06**
58.0	N/A	36.20	0.38	**36.58**
59.0	N/A	36.57	0.48	**37.05**
60.0	N/A	36.69	0.87	**37.56**
61.0	N/A	36.94	1.52	**38.46**
62.0	N/A	37.69	2.27	**39.96**
63.0	N/A	38.91	3.05	**41.97**
64.0	N/A	40.53	3.75	**44.28**
65.0	N/A	42.51	39.66	**82.17**
66.0	N/A	44.59	39.91	**84.50**
67.0	N/A	46.57	40.61	**87.18**
68.0	N/A	48.47	41.76	**90.23**
69.0	N/A	50.22	43.29	**93.51**
70.0	N/A	52.05	44.61	**96.66**
71.0	N/A	54.21	45.22	**99.43**
72.0	N/A	56.65	45.36	**102.01**
73.0	N/A	59.24	45.20	**104.44**
74.0	N/A	61.39	44.95	**106.34**
75.0	N/A	62.90	44.83	**107.73**
76.0	N/A	64.07	44.84	**108.91**
77.0	N/A	65.57	44.03	**109.60**
78.0	N/A	67.50	42.05	**109.55**
79.0	N/A	69.64	38.89	**108.53**
80.0	N/A	70.97	34.60	**105.57**
81.0	N/A	72.66	29.65	**102.31**
82.0	N/A	74.97	24.87	**99.83**
83.0	N/A	77.35	1.19	**78.55**
84.0	N/A	79.48	1.20	**80.68**
85.0	N/A	81.18	1.10	**82.28**
86.0	N/A	82.18	0.99	**83.17**
87.0	N/A	83.30	0.98	**84.28**
88.0	N/A	84.52	1.04	**85.56**
89.0	N/A	85.70	1.14	**86.85**
90.0	N/A	86.82	1.20	**88.03**
91.0	N/A	88.22	1.20	**89.42**
92.0	N/A	90.22	1.14	**91.37**
93.0	N/A	92.69	1.02	**93.71**
94.0	N/A	94.75	0.94	**95.69**
95.0	N/A	96.26	0.92	**97.18**

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.2.01d)

Date: November 21, 2011
Time: 17:08:57

General Information:
==========
Input file: ..... SR 87 - BDR\Report\Appendices\APX F - FB-DEEP\B-1\HP14x73.spc
Project number: 28-09-09-04
Job name: SR 87 CONNECTOR PD&E
Engineer: K. CRONIN, E.I.
Units: English

Analysis Information:
==========
Analysis Type: SPT

Soil Information:
==========
Boring date: 11/8/2011, Boring Number: B-1
Station number: Offset:

Ground Elevation: 0.000(ft)

Hammer type: Automatic Hammer, Correction factor = 1.25

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	3.00	3- Clean sand
2	2.50	6.00	3- Clean sand
3	5.00	3.00	3- Clean sand
4	7.50	6.00	3- Clean sand
5	10.00	8.00	3- Clean sand
6	12.50	8.00	3- Clean sand
7	15.00	3.00	3- Clean sand
8	17.50	4.00	3- Clean sand
9	20.00	5.00	3- Clean sand
10	22.50	4.00	3- Clean sand
11	25.00	9.00	3- Clean sand
12	27.50	9.00	2- Clay and silty sand
13	30.00	8.00	2- Clay and silty sand
14	32.50	4.00	2- Clay and silty sand
15	35.00	3.00	2- Clay and silty sand
16	37.50	3.00	2- Clay and silty sand
17	40.00	3.00	2- Clay and silty sand
18	42.50	6.00	2- Clay and silty sand
19	45.00	16.00	2- Clay and silty sand
20	47.50	17.00	2- Clay and silty sand
21	50.00	6.00	2- Clay and silty sand
22	52.50	7.00	2- Clay and silty sand
23	55.00	3.00	2- Clay and silty sand
24	57.50	4.00	2- Clay and silty sand
25	60.00	3.00	2- Clay and silty sand
26	62.50	8.00	2- Clay and silty sand
27	65.00	33.00	3- Clean sand
28	67.50	40.00	3- Clean sand
29	70.00	36.00	3- Clean sand
30	72.50	39.00	3- Clean sand
31	75.00	14.00	3- Clean sand
32	77.50	17.00	3- Clean sand

33	80.00	21.00	3- Clean sand
34	82.50	24.00	2- Clay and silty sand
35	85.00	6.00	2- Clay and silty sand
36	87.50	8.00	2- Clay and silty sand
37	90.00	7.00	2- Clay and silty sand
38	92.50	20.00	2- Clay and silty sand
39	95.00	8.00	2- Clay and silty sand
40	97.50	8.00	2- Clay and silty sand
41	100.00	8.00	2- Clay and silty sand
42	100.01	0.00	5- Cavity layer

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	0.00	-27.50	27.50	5.36	3-Clean Sand
2	-27.50	-65.00	37.50	6.67	2-Clay and Silty Sand
3	-65.00	-82.50	17.50	28.57	3-Clean Sand
4	-82.50	-100.01	17.51	11.57	2-Clay and Silty Sand
5	-100.01	-100.01	0.00	0.00	5-

Driven Pile Data:

Pile unit weight = 490.00(pcf), Section Type: H-Section

Driven Pile Capacity:

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
1.00	14.6	0.08	4.10	4.18	2.09	8.28
2.00	14.6	0.32	4.82	5.13	2.57	9.95
3.00	14.6	0.67	5.48	6.15	3.08	11.64
4.00	14.6	0.91	6.08	6.99	3.49	13.07
5.00	14.6	0.92	6.69	7.61	3.80	14.30
6.00	14.6	0.92	7.73	8.65	4.33	16.38
7.00	14.6	1.08	9.01	10.10	5.05	19.11
8.00	14.6	1.42	9.95	11.37	5.69	21.32
9.00	14.6	1.84	10.38	12.21	6.11	22.59
10.00	14.6	2.30	10.06	12.36	6.18	22.42
11.00	14.6	2.80	9.11	11.91	5.96	21.02
12.00	14.6	3.30	8.00	11.30	5.65	19.31
13.00	14.6	3.78	7.19	10.98	5.49	18.17
14.00	14.6	4.10	7.21	11.31	5.65	18.52
15.00	14.6	4.22	7.92	12.14	6.07	20.06
16.00	14.6	4.30	8.70	12.99	6.50	21.69
17.00	14.6	4.46	9.02	13.48	6.74	22.51
18.00	14.6	4.72	8.90	13.62	6.81	22.52
19.00	14.6	5.01	8.69	13.70	6.85	22.39
20.00	14.6	5.32	8.78	14.10	7.05	22.88
21.00	14.6	5.64	9.25	14.89	7.44	24.14
22.00	14.6	5.92	9.61	15.54	7.77	25.15

23.00	14.6	6.21	9.68	15.89	7.95	25.57
24.00	14.6	6.60	9.55	16.15	8.07	25.70
25.00	14.6	7.11	9.41	16.52	8.26	25.93
26.00	14.6	7.84	9.18	17.02	8.51	26.20
27.00	14.6	8.87	8.88	17.75	8.88	26.63
28.00	14.6	10.61	0.77	11.38	5.69	12.91
29.00	14.6	11.96	0.73	12.69	6.35	14.16
30.00	14.6	13.23	0.65	13.88	6.94	15.18
31.00	14.6	14.35	0.55	14.90	7.45	16.00
32.00	14.6	15.21	0.46	15.67	7.84	16.59
33.00	14.6	15.83	0.38	16.21	8.11	16.97
34.00	14.6	16.20	0.32	16.52	8.26	17.15
35.00	14.6	16.32	0.27	16.60	8.30	17.14
36.00	14.6	16.32	0.24	16.57	8.28	17.05
37.00	14.6	16.32	0.24	16.56	8.28	17.04
38.00	14.6	16.32	0.25	16.57	8.29	17.06
39.00	14.6	16.32	0.29	16.61	8.31	17.18
40.00	14.6	16.32	0.37	16.70	8.35	17.44
41.00	14.6	16.51	0.50	17.02	8.51	18.03
42.00	14.6	17.08	0.64	17.72	8.86	19.01
43.00	14.6	18.03	0.78	18.81	9.41	20.37
44.00	14.6	19.49	0.89	20.38	10.19	22.15
45.00	14.6	21.46	0.93	22.39	11.19	24.24
46.00	14.6	23.71	0.90	24.61	12.31	26.42
47.00	14.6	26.00	0.87	26.87	13.43	28.60
48.00	14.6	28.25	0.84	29.09	14.55	30.77
49.00	14.6	30.03	0.83	30.85	15.43	32.51
50.00	14.6	31.24	0.82	32.06	16.03	33.69
51.00	14.6	32.21	0.78	32.99	16.49	34.54
52.00	14.6	33.25	0.72	33.97	16.99	35.42
53.00	14.6	34.28	0.68	34.96	17.48	36.31
54.00	14.6	34.93	0.63	35.57	17.78	36.84
55.00	14.6	35.15	0.57	35.73	17.86	36.87
56.00	14.6	35.28	0.49	35.77	17.88	36.75
57.00	14.6	35.65	0.42	36.06	18.03	36.90
58.00	14.6	36.20	0.38	36.58	18.29	37.34
59.00	14.6	36.57	0.48	37.05	18.52	38.00
60.00	14.6	36.69	0.87	37.56	18.78	39.30
61.00	14.6	36.94	1.52	38.46	19.23	41.50
62.00	14.6	37.69	2.27	39.96	19.98	44.50
63.00	14.6	38.91	3.05	41.97	20.98	48.07
64.00	14.6	40.53	3.75	44.28	22.14	51.78
65.00	14.6	42.51	39.66	82.17	41.08	121.83
66.00	14.6	44.59	39.91	84.50	42.25	124.40
67.00	14.6	46.57	40.61	87.18	43.59	127.79
68.00	14.6	48.47	41.76	90.23	45.12	131.99
69.00	14.6	50.22	43.29	93.51	46.75	136.80
70.00	14.6	52.05	44.61	96.66	48.33	141.28
71.00	14.6	54.21	45.22	99.43	49.71	144.65
72.00	14.6	56.65	45.36	102.01	51.01	147.38
73.00	14.6	59.24	45.20	104.44	52.22	149.64
74.00	14.6	61.39	44.95	106.34	53.17	151.30
75.00	14.6	62.90	44.83	107.73	53.86	152.56
76.00	14.6	64.07	44.84	108.91	54.45	153.74
77.00	14.6	65.57	44.03	109.60	54.80	153.62
78.00	14.6	67.50	42.05	109.55	54.78	151.60
79.00	14.6	69.64	38.89	108.53	54.26	147.42
80.00	14.6	70.97	34.60	105.57	52.79	140.18
81.00	14.6	72.66	29.65	102.31	51.15	131.96
82.00	14.6	74.97	24.87	99.83	49.92	124.70
83.00	14.6	77.35	1.19	78.55	39.27	80.93
84.00	14.6	79.48	1.20	80.68	40.34	83.07
85.00	14.6	81.18	1.10	82.28	41.14	84.49

86.00	14.6	82.18	0.99	83.17	41.59	85.16
87.00	14.6	83.30	0.98	84.28	42.14	86.23
88.00	14.6	84.52	1.04	85.56	42.78	87.64
89.00	14.6	85.70	1.14	86.85	43.42	89.13
90.00	14.6	86.82	1.20	88.03	44.01	90.43
91.00	14.6	88.22	1.20	89.42	44.71	91.81
92.00	14.6	90.22	1.14	91.37	45.68	93.66
93.00	14.6	92.69	1.02	93.71	46.85	95.75
94.00	14.6	94.75	0.94	95.69	47.84	97.56
95.00	14.6	96.26	0.92	97.18	48.59	99.03

NOTES
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1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.

2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.

3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.

4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
   EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

24-IN STEEL PIPE PILES

SOIL BORING: B-1
24-IN STEEL PIPE PILE (OPEN-ENDED)

TEST PILE LENGTH (FT)	PILE TIP ELEV (FT)	ULTIMATE SIDE FRICTION (TONS)	MOBILIZED END BEARING (TONS)	ESTIMATED DAVISSON CAPACITY (DC) (TONS)
1.0	N/A	0.17	0.00	**0.17**
2.0	N/A	0.63	0.00	**0.63**
3.0	N/A	1.14	0.00	**1.14**
4.0	N/A	1.46	0.00	**1.46**
5.0	N/A	1.55	0.00	**1.55**
6.0	N/A	1.64	0.00	**1.64**
7.0	N/A	2.01	0.00	**2.01**
8.0	N/A	2.70	0.00	**2.70**
9.0	N/A	3.59	0.00	**3.59**
10.0	N/A	4.63	0.00	**4.63**
11.0	N/A	5.74	0.00	**5.74**
12.0	N/A	6.89	0.00	**6.89**
13.0	N/A	7.96	0.00	**7.96**
14.0	N/A	8.67	0.00	**8.67**
15.0	N/A	8.97	0.00	**8.97**
16.0	N/A	9.14	0.00	**9.14**
17.0	N/A	9.50	0.00	**9.50**
18.0	N/A	10.03	0.00	**10.03**
19.0	N/A	10.64	0.00	**10.64**
20.0	N/A	11.30	0.00	**11.30**
21.0	N/A	11.97	0.00	**11.97**
22.0	N/A	12.57	0.00	**12.57**
23.0	N/A	13.16	0.00	**13.16**
24.0	N/A	14.00	0.00	**14.00**
25.0	N/A	15.14	0.00	**15.14**
26.0	N/A	16.69	0.00	**16.69**
27.0	N/A	18.74	0.00	**18.74**
28.0	N/A	22.58	0.00	**22.58**
29.0	N/A	25.13	0.00	**25.13**
30.0	N/A	27.95	0.00	**27.95**
31.0	N/A	30.23	0.00	**30.23**
32.0	N/A	32.10	0.00	**32.10**
33.0	N/A	33.53	0.00	**33.53**
34.0	N/A	34.41	0.00	**34.41**
35.0	N/A	34.70	0.00	**34.70**
36.0	N/A	34.70	0.00	**34.70**
37.0	N/A	34.70	0.00	**34.70**
38.0	N/A	34.70	0.00	**34.70**
39.0	N/A	34.70	0.00	**34.70**
40.0	N/A	34.70	0.00	**34.70**
41.0	N/A	35.10	0.00	**35.10**
42.0	N/A	36.30	0.00	**36.30**
43.0	N/A	38.30	0.00	**38.30**
44.0	N/A	41.06	0.00	**41.06**
45.0	N/A	44.58	0.00	**44.58**
46.0	N/A	48.51	0.00	**48.51**
47.0	N/A	52.49	0.00	**52.49**
48.0	N/A	56.40	0.00	**56.40**
49.0	N/A	59.62	0.00	**59.62**
50.0	N/A	62.03	0.00	**62.03**
51.0	N/A	64.08	0.00	**64.08**
52.0	N/A	66.23	0.00	**66.23**
53.0	N/A	68.36	0.00	**68.36**
54.0	N/A	69.71	0.00	**69.71**
55.0	N/A	70.16	0.00	**70.16**
56.0	N/A	70.45	0.00	**70.45**
57.0	N/A	71.33	0.00	**71.33**
58.0	N/A	72.64	0.00	**72.64**
59.0	N/A	73.52	0.00	**73.52**
60.0	N/A	73.81	0.00	**73.81**
61.0	N/A	74.31	0.00	**74.31**
62.0	N/A	75.80	0.00	**75.80**
63.0	N/A	78.23	0.00	**78.23**
64.0	N/A	81.31	0.00	**81.31**
65.0	N/A	84.99	0.00	**84.99**
66.0	N/A	88.86	0.00	**88.86**
67.0	N/A	92.68	0.00	**92.68**
68.0	N/A	96.69	0.00	**96.69**
69.0	N/A	100.76	0.00	**100.76**
70.0	N/A	104.69	0.00	**104.69**
71.0	N/A	108.43	0.00	**108.43**
72.0	N/A	112.02	0.00	**112.02**
73.0	N/A	115.32	0.00	**115.32**
74.0	N/A	117.75	0.00	**117.75**
75.0	N/A	119.45	0.00	**119.45**
76.0	N/A	121.07	0.00	**121.07**
77.0	N/A	123.32	0.00	**123.32**
78.0	N/A	126.32	0.00	**126.32**
79.0	N/A	130.03	0.00	**130.03**
80.0	N/A	134.67	0.00	**134.67**
81.0	N/A	139.98	0.00	**139.98**
82.0	N/A	143.96	0.00	**143.96**
83.0	N/A	147.64	0.00	**147.64**
84.0	N/A	150.72	0.00	**150.72**
85.0	N/A	153.47	0.00	**153.47**
86.0	N/A	155.60	0.00	**155.60**
87.0	N/A	157.79	0.00	**157.79**
88.0	N/A	160.24	0.00	**160.24**
89.0	N/A	162.75	0.00	**162.75**
90.0	N/A	165.16	0.00	**165.16**
91.0	N/A	167.88	0.00	**167.88**
92.0	N/A	171.36	0.00	**171.36**
93.0	N/A	175.47	0.00	**175.47**

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.2.01d)

Date: November 21, 2011
Time: 17:09:35

General Information:
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Input file: .....) - SR 87 - BDR\Report\Appendices\APX F - FB-DEEP\B-1\PIPE.spc
Project number: 28-09-09-04
Job name: SR 87 CONNECTOR PD&E
Engineer: K. CRONIN, E.I.
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
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Boring date: 11/8/2011, Boring Number: B-1
Station number: Offset:

Ground Elevation: 0.000(ft)

Hammer type: Automatic Hammer, Correction factor = 1.25

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	3.00	3- Clean sand
2	2.50	6.00	3- Clean sand
3	5.00	3.00	3- Clean sand
4	7.50	6.00	3- Clean sand
5	10.00	8.00	3- Clean sand
6	12.50	8.00	3- Clean sand
7	15.00	3.00	3- Clean sand
8	17.50	4.00	3- Clean sand
9	20.00	5.00	3- Clean sand
10	22.50	4.00	3- Clean sand
11	25.00	9.00	3- Clean sand
12	27.50	9.00	2- Clay and silty sand
13	30.00	8.00	2- Clay and silty sand
14	32.50	4.00	2- Clay and silty sand
15	35.00	3.00	2- Clay and silty sand
16	37.50	3.00	2- Clay and silty sand
17	40.00	3.00	2- Clay and silty sand
18	42.50	6.00	2- Clay and silty sand
19	45.00	16.00	2- Clay and silty sand
20	47.50	17.00	2- Clay and silty sand
21	50.00	6.00	2- Clay and silty sand
22	52.50	7.00	2- Clay and silty sand
23	55.00	3.00	2- Clay and silty sand
24	57.50	4.00	2- Clay and silty sand
25	60.00	3.00	2- Clay and silty sand
26	62.50	8.00	2- Clay and silty sand
27	65.00	33.00	3- Clean sand
28	67.50	40.00	3- Clean sand
29	70.00	36.00	3- Clean sand
30	72.50	39.00	3- Clean sand
31	75.00	14.00	3- Clean sand
32	77.50	17.00	3- Clean sand

33	80.00	21.00	3- Clean sand
34	82.50	24.00	2- Clay and silty sand
35	85.00	6.00	2- Clay and silty sand
36	87.50	8.00	2- Clay and silty sand
37	90.00	7.00	2- Clay and silty sand
38	92.50	20.00	2- Clay and silty sand
39	95.00	8.00	2- Clay and silty sand
40	97.50	8.00	2- Clay and silty sand
41	100.00	8.00	2- Clay and silty sand
42	100.01	0.00	5- Cavity layer

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	0.00	-27.50	27.50	5.36	3-Clean Sand
2	-27.50	-65.00	37.50	6.67	2-Clay and Silty Sand
3	-65.00	-82.50	17.50	28.57	3-Clean Sand
4	-82.50	-100.01	17.51	11.57	2-Clay and Silty Sand
5	-100.01	-100.01	0.00	0.00	5-

Driven Pile Data:

Pile unit weight = 490.00(pcf), Section Type: Pipe

Driven Pile Capacity:

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
1.00	24.0	0.17	0.17	0.34	0.17	0.67
2.00	24.0	0.63	0.60	1.23	0.61	2.42
3.00	24.0	1.14	1.09	2.23	1.11	4.41
4.00	24.0	1.46	1.40	2.86	1.43	5.66
5.00	24.0	1.55	1.48	3.03	1.52	6.00
6.00	24.0	1.64	1.57	3.20	1.60	6.34
7.00	24.0	2.01	1.93	3.94	1.97	7.79
8.00	24.0	2.70	2.59	5.29	2.64	10.46
9.00	24.0	3.59	3.44	7.03	3.52	13.92
10.00	24.0	4.63	4.43	9.06	4.53	17.92
11.00	24.0	5.74	5.50	11.24	5.62	22.23
12.00	24.0	6.89	6.61	13.50	6.75	26.71
13.00	24.0	7.96	7.62	15.58	7.79	30.83
14.00	24.0	8.67	8.31	16.98	8.49	33.59
15.00	24.0	8.97	8.59	17.56	8.78	34.75
16.00	24.0	9.14	8.76	17.91	8.95	35.43
17.00	24.0	9.50	9.11	18.61	9.30	36.82
18.00	24.0	10.03	9.61	19.65	9.82	38.88
19.00	24.0	10.64	10.19	20.83	10.42	41.22
20.00	24.0	11.30	10.83	22.14	11.07	43.80
21.00	24.0	11.97	11.47	23.44	11.72	46.38
22.00	24.0	12.57	12.05	24.62	12.31	48.73

23.00	24.0	13.16	12.61	25.78	12.89	51.00
24.00	24.0	14.00	13.42	27.42	13.71	54.26
25.00	24.0	15.14	14.51	29.65	14.83	58.67
26.00	24.0	16.69	15.99	32.68	16.34	64.66
27.00	24.0	18.74	17.28	36.03	18.01	70.59
28.00	24.0	22.58	12.44	35.02	17.51	59.90
29.00	24.0	25.13	12.48	37.61	18.81	62.57
30.00	24.0	27.95	11.89	39.84	19.92	63.63
31.00	24.0	30.23	10.43	40.65	20.33	61.51
32.00	24.0	32.10	9.00	41.10	20.55	59.10
33.00	24.0	33.53	7.72	41.26	20.63	56.70
34.00	24.0	34.41	6.82	41.23	20.61	54.86
35.00	24.0	34.70	6.48	41.18	20.59	54.14
36.00	24.0	34.70	6.73	41.43	20.71	54.88
37.00	24.0	34.70	7.69	42.39	21.20	57.77
38.00	24.0	34.70	9.35	44.05	22.03	62.75
39.00	24.0	34.70	11.42	46.12	23.06	68.95
40.00	24.0	34.70	13.60	48.30	24.15	75.50
41.00	24.0	35.10	15.71	50.81	25.41	82.23
42.00	24.0	36.30	17.09	53.39	26.70	87.57
43.00	24.0	38.30	17.59	55.89	27.95	91.08
44.00	24.0	41.06	17.28	58.34	29.17	92.89
45.00	24.0	44.58	16.52	61.11	30.55	94.15
46.00	24.0	48.51	15.61	64.12	32.06	95.34
47.00	24.0	52.49	14.37	66.86	33.43	95.60
48.00	24.0	56.40	12.83	69.24	34.62	94.91
49.00	24.0	59.62	11.63	71.25	35.63	94.52
50.00	24.0	62.03	11.14	73.17	36.59	95.46
51.00	24.0	64.08	11.11	75.19	37.59	97.40
52.00	24.0	66.23	10.91	77.14	38.57	98.97
53.00	24.0	68.36	10.48	78.83	39.42	99.79
54.00	24.0	69.71	10.36	80.07	40.04	100.79
55.00	24.0	70.16	10.96	81.12	40.56	103.04
56.00	24.0	70.45	12.35	82.80	41.40	107.49
57.00	24.0	71.33	15.79	87.12	43.56	118.70
58.00	24.0	72.64	21.51	94.15	47.07	137.16
59.00	24.0	73.52	28.47	101.99	50.99	158.92
60.00	24.0	73.81	35.42	109.23	54.62	180.07
61.00	24.0	74.31	42.13	116.44	58.22	200.69
62.00	24.0	75.80	48.38	124.18	62.09	220.95
63.00	24.0	78.23	54.14	132.37	66.19	240.65
64.00	24.0	81.31	58.62	139.94	69.97	257.18
65.00	24.0	84.99	61.98	146.97	73.49	270.93
66.00	24.0	88.86	62.09	150.96	75.48	275.14
67.00	24.0	92.68	62.34	155.02	77.51	279.71
68.00	24.0	96.69	62.54	159.22	79.61	284.29
69.00	24.0	100.76	62.65	163.42	81.71	288.73
70.00	24.0	104.69	62.85	167.54	83.77	293.25
71.00	24.0	108.43	63.21	171.64	85.82	298.05
72.00	24.0	112.02	63.76	175.77	87.89	303.28
73.00	24.0	115.32	64.55	179.87	89.94	308.98
74.00	24.0	117.75	65.61	183.36	91.68	314.57
75.00	24.0	119.45	66.74	186.19	93.10	319.68
76.00	24.0	121.07	67.71	188.79	94.39	324.22
77.00	24.0	123.32	68.11	191.43	95.72	327.66
78.00	24.0	126.32	67.68	194.00	97.00	329.35
79.00	24.0	130.03	66.48	196.51	98.25	329.46
80.00	24.0	134.67	64.33	199.00	99.50	327.65
81.00	24.0	139.98	60.94	200.92	100.46	322.81
82.00	24.0	143.96	56.14	200.10	100.05	312.38
83.00	24.0	147.64	21.73	169.37	84.69	212.83
84.00	24.0	150.72	22.27	173.00	86.50	217.54
85.00	24.0	153.47	22.18	175.65	87.83	220.02

86.00	24.0	155.60	22.34	177.94	88.97	222.62
87.00	24.0	157.79	22.69	180.48	90.24	225.87
88.00	24.0	160.24	22.87	183.11	91.56	228.86
89.00	24.0	162.75	22.85	185.61	92.80	231.31
90.00	24.0	165.16	22.85	188.02	94.01	233.72
91.00	24.0	167.88	22.71	190.59	95.30	236.01
92.00	24.0	171.36	22.24	193.60	96.80	238.09
93.00	24.0	175.47	21.47	196.94	98.47	239.89

NOTES
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1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.

2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.

3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.

4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
   EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

18-IN SQUARE CONCRETE PILES

SOIL BORING: B-1
18-IN SQUARE CONCRETE PILE

TEST PILE LENGTH (FT)	PILE TIP ELEV (FT)	ULTIMATE SIDE FRICTION (TONS)	MOBILIZED END BEARING (TONS)	ESTIMATED DAVISSON CAPACITY (DC) (TONS)
1.0	N/A	0.17	6.28	**6.45**
2.0	N/A	0.68	8.25	**8.93**
3.0	N/A	1.29	9.06	**10.35**
4.0	N/A	1.63	9.68	**11.31**
5.0	N/A	1.68	10.61	**12.30**
6.0	N/A	1.74	12.01	**13.75**
7.0	N/A	2.08	13.70	**15.78**
8.0	N/A	2.71	15.26	**17.96**
9.0	N/A	3.56	15.89	**19.45**
10.0	N/A	4.53	14.59	**19.11**
11.0	N/A	5.56	13.19	**18.75**
12.0	N/A	6.61	12.16	**18.77**
13.0	N/A	7.63	11.95	**19.57**
14.0	N/A	8.31	12.01	**20.32**
15.0	N/A	8.61	12.47	**21.08**
16.0	N/A	8.79	13.24	**22.03**
17.0	N/A	9.17	13.93	**23.10**
18.0	N/A	9.72	14.47	**24.19**
19.0	N/A	10.35	15.17	**25.52**
20.0	N/A	11.02	16.07	**27.09**
21.0	N/A	11.70	16.63	**28.33**
22.0	N/A	12.33	16.64	**28.97**
23.0	N/A	12.94	16.24	**29.18**
24.0	N/A	13.78	15.49	**29.26**
25.0	N/A	14.87	14.40	**29.28**
26.0	N/A	16.41	13.47	**29.88**
27.0	N/A	18.54	13.00	**31.55**
28.0	N/A	22.77	10.71	**33.48**
29.0	N/A	25.68	10.49	**36.17**
30.0	N/A	28.36	9.23	**37.59**
31.0	N/A	30.73	7.92	**38.65**
32.0	N/A	32.60	6.70	**39.30**
33.0	N/A	33.97	5.65	**39.61**
34.0	N/A	34.79	4.78	**39.57**
35.0	N/A	35.07	4.14	**39.20**
36.0	N/A	35.07	3.91	**38.97**
37.0	N/A	35.07	4.12	**39.19**
38.0	N/A	35.07	4.82	**39.89**
39.0	N/A	35.07	6.14	**41.20**
40.0	N/A	35.07	7.87	**42.94**
41.0	N/A	35.47	9.57	**45.04**
42.0	N/A	36.68	11.15	**47.83**
43.0	N/A	38.72	12.45	**51.18**
44.0	N/A	41.82	12.94	**54.76**
45.0	N/A	45.99	12.60	**58.59**
46.0	N/A	50.75	12.05	**62.80**
47.0	N/A	55.59	11.63	**67.22**
48.0*	N/A	60.37	11.19	**71.57**
49.0	N/A	64.14	10.68	**74.82**
50.0	N/A	66.74	10.14	**76.88**
51.0	N/A	68.81	9.81	**78.63**
52.0	N/A	71.01	9.68	**80.69**
53.0	N/A	73.20	9.58	**82.78**
54.0	N/A	74.59	9.30	**83.89**
55.0	N/A	75.05	8.88	**83.94**
56.0	N/A	75.33	8.53	**83.86**
57.0	N/A	76.15	8.27	**84.42**
58.0	N/A	77.39	9.03	**86.42**
59.0	N/A	78.22	13.08	**91.30**
60.0	N/A	78.49	20.51	**99.00**
61.0	N/A	79.01	29.63	**108.64**
62.0	N/A	80.59	39.56	**120.14**
63.0	N/A	83.18	49.60	**132.78**
64.0	N/A	86.63	57.54	**144.17**
65.0	N/A	90.91	63.18	**154.09**
66.0	N/A	95.48	63.44	**158.93**
67.0	N/A	99.85	64.24	**164.09**
68.0	N/A	104.18	65.43	**169.61**
69.0	N/A	108.63	66.46	**175.08**
70.0	N/A	113.45	66.91	**180.36**
71.0	N/A	118.55	67.06	**185.61**
72.0	N/A	123.92	67.12	**191.04**
73.0	N/A	129.31	67.16	**196.47**
74.0	N/A	133.00	67.90	**200.90**
75.0	N/A	134.74	69.60	**204.34**
76.0	N/A	136.44	70.81	**207.25**
77.0	N/A	139.38	70.35	**209.73**
78.0	N/A	143.49	68.15	**211.65**
79.0	N/A	148.89	64.26	**213.15**
80.0	N/A	152.55	57.54	**210.09**
81.0	N/A	156.20	50.60	**206.80**
82.0	N/A	161.16	44.55	**205.71**
83.0	N/A	166.19	16.91	**183.09**
84.0	N/A	170.50	17.15	**187.64**
85.0	N/A	174.31	16.46	**190.76**
86.0	N/A	176.65	15.50	**192.15**
87.0	N/A	179.02	15.88	**194.90**
88.0	N/A	181.24	16.87	**198.11**
89.0	N/A	183.57	17.48	**201.04**
90.0	N/A	185.96	17.48	**203.44**
91.0	N/A	188.93	17.23	**206.16**
92.0	N/A	193.17	16.66	**209.83**
93.0	N/A	198.39	15.72	**214.11**
94.0	N/A	202.76	14.96	**217.72**

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.2.01d)

Date: November 21, 2011
Time: 17:06:58

General Information:
==========
Input file: .....SR 87 - BDR\Report\Appendices\APX F - FB-DEEP\B-1\CONCRETE.spc
Project number: 28-09-09-04
Job name: SR 87 CONNECTOR PD&E
Engineer: K. CRONIN, E.I.
Units: English

Analysis Information:
==========
Analysis Type: SPT

Soil Information:
==========
Boring date: 11/8/2011, Boring Number: B-1
Station number: Offset:

Ground Elevation: 0.000(ft)

Hammer type: Automatic Hammer, Correction factor = 1.25

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	3.00	3- Clean sand
2	2.50	6.00	3- Clean sand
3	5.00	3.00	3- Clean sand
4	7.50	6.00	3- Clean sand
5	10.00	8.00	3- Clean sand
6	12.50	8.00	3- Clean sand
7	15.00	3.00	3- Clean sand
8	17.50	4.00	3- Clean sand
9	20.00	5.00	3- Clean sand
10	22.50	4.00	3- Clean sand
11	25.00	9.00	3- Clean sand
12	27.50	9.00	2- Clay and silty sand
13	30.00	8.00	2- Clay and silty sand
14	32.50	4.00	2- Clay and silty sand
15	35.00	3.00	2- Clay and silty sand
16	37.50	3.00	2- Clay and silty sand
17	40.00	3.00	2- Clay and silty sand
18	42.50	6.00	2- Clay and silty sand
19	45.00	16.00	2- Clay and silty sand
20	47.50	17.00	2- Clay and silty sand
21	50.00	6.00	2- Clay and silty sand
22	52.50	7.00	2- Clay and silty sand
23	55.00	3.00	2- Clay and silty sand
24	57.50	4.00	2- Clay and silty sand
25	60.00	3.00	2- Clay and silty sand
26	62.50	8.00	2- Clay and silty sand
27	65.00	33.00	3- Clean sand
28	67.50	40.00	3- Clean sand
29	70.00	36.00	3- Clean sand
30	72.50	39.00	3- Clean sand
31	75.00	14.00	3- Clean sand
32	77.50	17.00	3- Clean sand

33	80.00	21.00	3- Clean sand
34	82.50	24.00	2- Clay and silty sand
35	85.00	6.00	2- Clay and silty sand
36	87.50	8.00	2- Clay and silty sand
37	90.00	7.00	2- Clay and silty sand
38	92.50	20.00	2- Clay and silty sand
39	95.00	8.00	2- Clay and silty sand
40	97.50	8.00	2- Clay and silty sand
41	100.00	8.00	2- Clay and silty sand
42	100.01	0.00	5- Cavity layer

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	0.00	-27.50	27.50	5.36	3-Clean Sand
2	-27.50	-65.00	37.50	6.67	2-Clay and Silty Sand
3	-65.00	-82.50	17.50	28.57	3-Clean Sand
4	-82.50	-100.01	17.51	11.57	2-Clay and Silty Sand
5	-100.01	-100.01	0.00	0.00	5-

Driven Pile Data:

Pile unit weight = 150.00(pcf), Section Type: Square

Driven Pile Capacity:

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
1.00	18.0	0.17	6.28	6.45	3.22	19.01
2.00	18.0	0.68	8.25	8.93	4.47	25.43
3.00	18.0	1.29	9.06	10.35	5.18	28.48
4.00	18.0	1.63	9.68	11.31	5.66	30.67
5.00	18.0	1.68	10.61	12.30	6.15	33.53
6.00	18.0	1.74	12.01	13.75	6.87	37.77
7.00	18.0	2.08	13.70	15.78	7.89	43.19
8.00	18.0	2.71	15.26	17.96	8.98	48.47
9.00	18.0	3.56	15.89	19.45	9.72	51.22
10.00	18.0	4.53	14.59	19.11	9.56	48.28
11.00	18.0	5.56	13.19	18.75	9.37	45.12
12.00	18.0	6.61	12.16	18.77	9.38	43.08
13.00	18.0	7.63	11.95	19.57	9.79	43.47
14.00	18.0	8.31	12.01	20.32	10.16	44.35
15.00	18.0	8.61	12.47	21.08	10.54	46.02
16.00	18.0	8.79	13.24	22.03	11.01	48.50
17.00	18.0	9.17	13.93	23.10	11.55	50.95
18.00	18.0	9.72	14.47	24.19	12.10	53.12
19.00	18.0	10.35	15.17	25.52	12.76	55.85
20.00	18.0	11.02	16.07	27.09	13.54	59.22
21.00	18.0	11.70	16.63	28.33	14.17	61.59
22.00	18.0	12.33	16.64	28.97	14.49	62.26

23.00	18.0	12.94	16.24	29.18	14.59	61.66
24.00	18.0	13.78	15.49	29.26	14.63	60.24
25.00	18.0	14.87	14.40	29.28	14.64	58.09
26.00	18.0	16.41	13.47	29.88	14.94	56.83
27.00	18.0	18.54	13.00	31.55	15.77	57.56
28.00	18.0	22.77	10.71	33.48	16.74	54.90
29.00	18.0	25.68	10.49	36.17	18.08	57.15
30.00	18.0	28.36	9.23	37.59	18.79	56.05
31.00	18.0	30.73	7.92	38.65	19.33	54.50
32.00	18.0	32.60	6.70	39.30	19.65	52.71
33.00	18.0	33.97	5.65	39.61	19.81	50.90
34.00	18.0	34.79	4.78	39.57	19.79	49.14
35.00	18.0	35.07	4.14	39.20	19.60	47.47
36.00	18.0	35.07	3.91	38.97	19.49	46.79
37.00	18.0	35.07	4.12	39.19	19.60	47.44
38.00	18.0	35.07	4.82	39.89	19.94	49.53
39.00	18.0	35.07	6.14	41.20	20.60	53.48
40.00	18.0	35.07	7.87	42.94	21.47	58.69
41.00	18.0	35.47	9.57	45.04	22.52	64.17
42.00	18.0	36.68	11.15	47.83	23.91	70.13
43.00	18.0	38.72	12.45	51.18	25.59	76.08
44.00	18.0	41.82	12.94	54.76	27.38	80.64
45.00	18.0	45.99	12.60	58.59	29.30	83.80
46.00	18.0	50.75	12.05	62.80	31.40	86.90
47.00	18.0	55.59	11.63	67.22	33.61	90.47
48.00	18.0	60.37	11.19	71.57	35.78	93.95
49.00	18.0	64.14	10.68	74.82	37.41	96.18
50.00	18.0	66.74	10.14	76.88	38.44	97.16
51.00	18.0	68.81	9.81	78.63	39.31	98.26
52.00	18.0	71.01	9.68	80.69	40.35	100.06
53.00	18.0	73.20	9.58	82.78	41.39	101.94
54.00	18.0	74.59	9.30	83.89	41.95	102.50
55.00	18.0	75.05	8.88	83.94	41.97	101.70
56.00	18.0	75.33	8.53	83.86	41.93	100.93
57.00	18.0	76.15	8.27	84.42	42.21	100.95
58.00	18.0	77.39	9.03	86.42	43.21	104.47
59.00	18.0	78.22	13.08	91.30	45.65	117.46
60.00	18.0	78.49	20.51	99.00	49.50	140.03
61.00	18.0	79.01	29.63	108.64	54.32	167.89
62.00	18.0	80.59	39.56	120.14	60.07	199.25
63.00	18.0	83.18	49.60	132.78	66.39	231.97
64.00	18.0	86.63	57.54	144.17	72.08	259.24
65.00	18.0	90.91	63.18	154.09	77.05	280.45
66.00	18.0	95.48	63.44	158.93	79.46	285.81
67.00	18.0	99.85	64.24	164.09	82.05	292.57
68.00	18.0	104.18	65.43	169.61	84.81	300.47
69.00	18.0	108.63	66.46	175.08	87.54	308.00
70.00	18.0	113.45	66.91	180.36	90.18	314.18
71.00	18.0	118.55	67.06	185.61	92.81	319.74
72.00	18.0	123.92	67.12	191.04	95.52	325.28
73.00	18.0	129.31	67.16	196.47	98.24	330.80
74.00	18.0	133.00	67.90	200.90	100.45	336.69
75.00	18.0	134.74	69.60	204.34	102.17	343.55
76.00	18.0	136.44	70.81	207.25	103.63	348.88
77.00	18.0	139.38	70.35	209.73	104.87	350.43
78.00	18.0	143.49	68.15	211.65	105.82	347.95
79.00	18.0	148.89	64.26	213.15	106.58	341.67
80.00	18.0	152.55	57.54	210.09	105.04	325.17
81.00	18.0	156.20	50.60	206.80	103.40	307.99
82.00	18.0	161.16	44.55	205.71	102.86	294.81
83.00	18.0	166.19	16.91	183.09	91.55	216.90
84.00	18.0	170.50	17.15	187.64	93.82	221.93
85.00	18.0	174.31	16.46	190.76	95.38	223.68

86.00	18.0	176.65	15.50	192.15	96.07	223.15
87.00	18.0	179.02	15.88	194.90	97.45	226.67
88.00	18.0	181.24	16.87	198.11	99.05	231.85
89.00	18.0	183.57	17.48	201.04	100.52	236.00
90.00	18.0	185.96	17.48	203.44	101.72	238.41
91.00	18.0	188.93	17.23	206.16	103.08	240.63
92.00	18.0	193.17	16.66	209.83	104.91	243.14
93.00	18.0	198.39	15.72	214.11	107.06	245.56
94.00	18.0	202.76	14.96	217.72	108.86	247.64

NOTES
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1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.

2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.

3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.

4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
   EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

24-IN SQUARE CONCRETE PILES

SOIL BORING: B-1
24-IN SQUARE CONCRETE PILE

TEST PILE LENGTH (FT)	PILE TIP ELEV (FT)	ULTIMATE SIDE FRICTION (TONS)	MOBILIZED END BEARING (TONS)	ESTIMATED DAVISSON CAPACITY (DC) (TONS)
1.0	N/A	0.23	12.50	**12.72**
2.0	N/A	0.82	15.39	**16.21**
3.0	N/A	1.50	16.42	**17.91**
4.0	N/A	1.92	17.47	**19.39**
5.0	N/A	2.03	18.64	**20.68**
6.0	N/A	2.15	20.17	**22.32**
7.0	N/A	2.64	21.49	**24.13**
8.0	N/A	3.54	21.99	**25.54**
9.0	N/A	4.70	21.94	**26.65**
10.0	N/A	6.04	21.94	**27.98**
11.0	N/A	7.46	22.07	**29.53**
12.0	N/A	8.94	22.14	**31.08**
13.0	N/A	10.31	21.67	**31.98**
14.0	N/A	11.22	21.66	**32.88**
15.0	N/A	11.60	22.14	**33.74**
16.0	N/A	11.84	22.83	**34.67**
17.0	N/A	12.34	24.40	**36.74**
18.0	N/A	13.08	26.02	**39.11**
19.0	N/A	13.92	27.27	**41.18**
20.0	N/A	14.82	28.04	**42.86**
21.0	N/A	15.72	28.60	**44.32**
22.0	N/A	16.56	29.09	**45.65**
23.0	N/A	17.38	29.13	**46.51**
24.0	N/A	18.49	28.25	**46.75**
25.0	N/A	19.96	26.47	**46.43**
26.0	N/A	22.01	24.23	**46.24**
27.0	N/A	24.87	22.01	**46.88**
28.0	N/A	30.20	15.84	**46.04**
29.0	N/A	33.84	15.89	**49.73**
30.0	N/A	37.81	15.14	**52.95**
31.0	N/A	40.97	13.28	**54.24**
32.0	N/A	43.46	11.46	**54.92**
33.0	N/A	45.29	9.83	**55.12**
34.0	N/A	46.39	8.68	**55.07**
35.0	N/A	46.75	8.25	**55.00**
36.0	N/A	46.75	8.57	**55.32**
37.0	N/A	46.75	9.79	**56.54**
38.0	N/A	46.75	11.90	**58.66**
39.0	N/A	46.75	14.53	**61.29**
40.0	N/A	46.75	17.31	**64.07**
41.0	N/A	47.29	20.00	**67.29**
42.0	N/A	48.90	21.76	**70.66**
43.0	N/A	51.63	22.40	**74.03**
44.0	N/A	55.75	22.00	**77.75**
45.0	N/A	61.32	21.04	**82.36**
46.0	N/A	67.66	19.88	**87.54**
47.0	N/A	74.13	18.30	**92.42**
48.0	N/A	80.50	16.34	**96.84**
49.0	N/A	85.52	14.81	**100.33**
50.0	N/A	88.99	14.19	**103.17**
51.0	N/A	91.75	14.14	**105.90**
52.0	N/A	94.68	13.89	**108.57**
53.0	N/A	97.60	13.34	**110.94**
54.0	N/A	99.45	13.19	**112.65**
55.0	N/A	100.07	13.96	**114.03**
56.0	N/A	100.44	15.87	**116.31**
57.0	N/A	101.54	21.46	**123.00**
58.0	N/A	103.19	31.13	**134.32**
59.0	N/A	104.29	43.46	**147.75**
60.0	N/A	104.66	56.72	**161.37**
61.0	N/A	105.35	70.41	**175.76**
62.0	N/A	107.45	83.17	**190.62**
63.0	N/A	110.90	94.68	**205.59**
64.0	N/A	115.51	103.92	**219.42**
65.0	N/A	121.22	111.44	**232.66**
66.0	N/A	127.42	111.70	**239.11**
67.0	N/A	133.87	112.17	**246.04**
68.0	N/A	141.14	112.32	**253.46**
69.0	N/A	148.75	112.08	**260.82**
70.0	N/A	156.15	111.78	**267.93**
71.0	N/A	163.51	111.48	**274.98**
72.0	N/A	170.74	110.52	**281.26**
73.0	N/A	177.89	109.96	**287.85**
74.0	N/A	183.40	110.76	**294.16**
75.0	N/A	186.55	111.85	**298.40**
76.0	N/A	188.68	112.52	**301.20**
77.0	N/A	191.81	112.46	**304.28**
78.0	N/A	196.02	111.26	**307.29**
79.0	N/A	199.56	107.62	**307.18**
80.0	N/A	203.39	102.06	**305.46**
81.0	N/A	208.26	94.91	**303.17**
82.0	N/A	214.89	87.28	**302.17**
83.0	N/A	221.41	27.67	**249.08**
84.0	N/A	226.65	28.36	**255.01**
85.0	N/A	230.90	28.25	**259.15**
86.0	N/A	233.88	28.44	**262.32**
87.0	N/A	236.91	28.90	**265.81**
88.0	N/A	240.38	29.12	**269.50**
89.0	N/A	243.91	29.10	**273.01**
90.0	N/A	247.27	29.10	**276.37**
91.0	N/A	251.30	28.91	**280.22**
92.0	N/A	256.93	28.32	**285.25**
93.0	N/A	263.85	27.34	**291.19**

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.2.01d)

Date: November 21, 2011
Time: 17:08:01

General Information:
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Input file: .....SR 87 - BDR\Report\Appendices\APX F - FB-DEEP\B-1\CONCRETE.spc
Project number: 28-09-09-04
Job name: SR 87 CONNECTOR PD&E
Engineer: K. CRONIN, E.I.
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
==========
Boring date: 11/8/2011, Boring Number: B-1
Station number: Offset:

Ground Elevation: 0.000(ft)

Hammer type: Automatic Hammer, Correction factor = 1.25

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	3.00	3- Clean sand
2	2.50	6.00	3- Clean sand
3	5.00	3.00	3- Clean sand
4	7.50	6.00	3- Clean sand
5	10.00	8.00	3- Clean sand
6	12.50	8.00	3- Clean sand
7	15.00	3.00	3- Clean sand
8	17.50	4.00	3- Clean sand
9	20.00	5.00	3- Clean sand
10	22.50	4.00	3- Clean sand
11	25.00	9.00	3- Clean sand
12	27.50	9.00	2- Clay and silty sand
13	30.00	8.00	2- Clay and silty sand
14	32.50	4.00	2- Clay and silty sand
15	35.00	3.00	2- Clay and silty sand
16	37.50	3.00	2- Clay and silty sand
17	40.00	3.00	2- Clay and silty sand
18	42.50	6.00	2- Clay and silty sand
19	45.00	16.00	2- Clay and silty sand
20	47.50	17.00	2- Clay and silty sand
21	50.00	6.00	2- Clay and silty sand
22	52.50	7.00	2- Clay and silty sand
23	55.00	3.00	2- Clay and silty sand
24	57.50	4.00	2- Clay and silty sand
25	60.00	3.00	2- Clay and silty sand
26	62.50	8.00	2- Clay and silty sand
27	65.00	33.00	3- Clean sand
28	67.50	40.00	3- Clean sand
29	70.00	36.00	3- Clean sand
30	72.50	39.00	3- Clean sand
31	75.00	14.00	3- Clean sand
32	77.50	17.00	3- Clean sand

33	80.00	21.00	3- Clean sand
34	82.50	24.00	2- Clay and silty sand
35	85.00	6.00	2- Clay and silty sand
36	87.50	8.00	2- Clay and silty sand
37	90.00	7.00	2- Clay and silty sand
38	92.50	20.00	2- Clay and silty sand
39	95.00	8.00	2- Clay and silty sand
40	97.50	8.00	2- Clay and silty sand
41	100.00	8.00	2- Clay and silty sand
42	100.01	0.00	5- Cavity layer

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	0.00	-27.50	27.50	5.36	3-Clean Sand
2	-27.50	-65.00	37.50	6.67	2-Clay and Silty Sand
3	-65.00	-82.50	17.50	28.57	3-Clean Sand
4	-82.50	-100.01	17.51	11.57	2-Clay and Silty Sand
5	-100.01	-100.01	0.00	0.00	5-

Driven Pile Data:

Pile unit weight = 150.00(pcf), Section Type: Square

Driven Pile Capacity:

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
1.00	24.0	0.23	12.50	12.72	6.36	37.71
2.00	24.0	0.82	15.39	16.21	8.11	46.99
3.00	24.0	1.50	16.42	17.91	8.96	50.75
4.00	24.0	1.92	17.47	19.39	9.69	54.32
5.00	24.0	2.03	18.64	20.68	10.34	57.96
6.00	24.0	2.15	20.17	22.32	11.16	62.66
7.00	24.0	2.64	21.49	24.13	12.06	67.10
8.00	24.0	3.54	21.99	25.54	12.77	69.52
9.00	24.0	4.70	21.94	26.65	13.32	70.53
10.00	24.0	6.04	21.94	27.98	13.99	71.86
11.00	24.0	7.46	22.07	29.53	14.77	73.67
12.00	24.0	8.94	22.14	31.08	15.54	75.36
13.00	24.0	10.31	21.67	31.98	15.99	75.33
14.00	24.0	11.22	21.66	32.88	16.44	76.19
15.00	24.0	11.60	22.14	33.74	16.87	78.02
16.00	24.0	11.84	22.83	34.67	17.34	80.33
17.00	24.0	12.34	24.40	36.74	18.37	85.54
18.00	24.0	13.08	26.02	39.11	19.55	91.15
19.00	24.0	13.92	27.27	41.18	20.59	95.71
20.00	24.0	14.82	28.04	42.86	21.43	98.93
21.00	24.0	15.72	28.60	44.32	22.16	101.52
22.00	24.0	16.56	29.09	45.65	22.83	103.84

23.00	24.0	17.38	29.13	46.51	23.26	104.78
24.00	24.0	18.49	28.25	46.75	23.37	103.25
25.00	24.0	19.96	26.47	46.43	23.22	99.38
26.00	24.0	22.01	24.23	46.24	23.12	94.71
27.00	24.0	24.87	22.01	46.88	23.44	90.89
28.00	24.0	30.20	15.84	46.04	23.02	77.72
29.00	24.0	33.84	15.89	49.73	24.86	81.50
30.00	24.0	37.81	15.14	52.95	26.48	83.24
31.00	24.0	40.97	13.28	54.24	27.12	80.80
32.00	24.0	43.46	11.46	54.92	27.46	77.85
33.00	24.0	45.29	9.83	55.12	27.56	74.79
34.00	24.0	46.39	8.68	55.07	27.53	72.42
35.00	24.0	46.75	8.25	55.00	27.50	71.50
36.00	24.0	46.75	8.57	55.32	27.66	72.45
37.00	24.0	46.75	9.79	56.54	28.27	76.12
38.00	24.0	46.75	11.90	58.66	29.33	82.47
39.00	24.0	46.75	14.53	61.29	30.64	90.36
40.00	24.0	46.75	17.31	64.07	32.03	98.70
41.00	24.0	47.29	20.00	67.29	33.65	107.30
42.00	24.0	48.90	21.76	70.66	35.33	114.18
43.00	24.0	51.63	22.40	74.03	37.02	118.83
44.00	24.0	55.75	22.00	77.75	38.88	121.75
45.00	24.0	61.32	21.04	82.36	41.18	124.43
46.00	24.0	67.66	19.88	87.54	43.77	127.29
47.00	24.0	74.13	18.30	92.42	46.21	129.02
48.00	24.0	80.50	16.34	96.84	48.42	129.52
49.00	24.0	85.52	14.81	100.33	50.17	129.95
50.00	24.0	88.99	14.19	103.17	51.59	131.55
51.00	24.0	91.75	14.14	105.90	52.95	134.18
52.00	24.0	94.68	13.89	108.57	54.29	136.36
53.00	24.0	97.60	13.34	110.94	55.47	137.61
54.00	24.0	99.45	13.19	112.65	56.32	139.03
55.00	24.0	100.07	13.96	114.03	57.02	141.94
56.00	24.0	100.44	15.87	116.31	58.16	148.05
57.00	24.0	101.54	21.46	123.00	61.50	165.91
58.00	24.0	103.19	31.13	134.32	67.16	196.59
59.00	24.0	104.29	43.46	147.75	73.88	234.68
60.00	24.0	104.66	56.72	161.37	80.69	274.81
61.00	24.0	105.35	70.41	175.76	87.88	316.57
62.00	24.0	107.45	83.17	190.62	95.31	356.96
63.00	24.0	110.90	94.68	205.59	102.79	394.95
64.00	24.0	115.51	103.92	219.42	109.71	427.25
65.00	24.0	121.22	111.44	232.66	116.33	455.53
66.00	24.0	127.42	111.70	239.11	119.56	462.51
67.00	24.0	133.87	112.17	246.04	123.02	470.38
68.00	24.0	141.14	112.32	253.46	126.73	478.10
69.00	24.0	148.75	112.08	260.82	130.41	484.98
70.00	24.0	156.15	111.78	267.93	133.96	491.48
71.00	24.0	163.51	111.48	274.98	137.49	497.94
72.00	24.0	170.74	110.52	281.26	140.63	502.31
73.00	24.0	177.89	109.96	287.85	143.92	507.77
74.00	24.0	183.40	110.76	294.16	147.08	515.68
75.00	24.0	186.55	111.85	298.40	149.20	522.10
76.00	24.0	188.68	112.52	301.20	150.60	526.25
77.00	24.0	191.81	112.46	304.28	152.14	529.20
78.00	24.0	196.02	111.26	307.29	153.64	529.81
79.00	24.0	199.56	107.62	307.18	153.59	522.42
80.00	24.0	203.39	102.06	305.46	152.73	509.59
81.00	24.0	208.26	94.91	303.17	151.59	493.00
82.00	24.0	214.89	87.28	302.17	151.08	476.74
83.00	24.0	221.41	27.67	249.08	124.54	304.41
84.00	24.0	226.65	28.36	255.01	127.50	311.73
85.00	24.0	230.90	28.25	259.15	129.58	315.64

86.00	24.0	233.88	28.44	262.32	131.16	319.20
87.00	24.0	236.91	28.90	265.81	132.90	323.60
88.00	24.0	240.38	29.12	269.50	134.75	327.75
89.00	24.0	243.91	29.10	273.01	136.51	331.21
90.00	24.0	247.27	29.10	276.37	138.18	334.56
91.00	24.0	251.30	28.91	280.22	140.11	338.04
92.00	24.0	256.93	28.32	285.25	142.63	341.89
93.00	24.0	263.85	27.34	291.19	145.60	345.87

NOTES
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1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.

2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.

3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.

4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
   EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

SOIL BORING B-2

HP 14X73 H-PILES

SOIL BORING: B-2
HP 14X73 STEEL H-PILE

TEST PILE LENGTH (FT)	PILE TIP ELEV (FT)	ULTIMATE SIDE FRICTION (TONS)	MOBILIZED END BEARING (TONS)	ESTIMATED DAVISSON CAPACITY (DC) (TONS)
1.0	N/A	0.00	0.00	**0.00**
2.0	N/A	0.00	0.00	**0.00**
3.0	N/A	0.00	0.00	**0.00**
4.0	N/A	0.00	0.00	**0.00**
5.0	N/A	0.00	0.00	**0.00**
6.0	N/A	0.00	0.00	**0.00**
7.0	N/A	0.00	0.00	**0.00**
8.0	N/A	0.00	0.00	**0.00**
9.0	N/A	0.00	0.00	**0.00**
10.0	N/A	0.00	0.00	**0.00**
11.0	N/A	0.00	0.00	**0.00**
12.0	N/A	0.00	0.00	**0.00**
13.0	N/A	0.00	0.00	**0.00**
14.0	N/A	0.00	0.00	**0.00**
15.0	N/A	0.00	0.00	**0.00**
16.0	N/A	0.00	0.00	**0.00**
17.0	N/A	0.00	0.00	**0.00**
18.0	N/A	0.00	0.00	**0.00**
19.0	N/A	0.00	0.00	**0.00**
20.0	N/A	0.00	0.00	**0.00**
21.0	N/A	0.00	0.00	**0.00**
22.0	N/A	0.00	0.00	**0.00**
23.0	N/A	0.05	0.00	**0.05**
24.0	N/A	0.49	0.00	**0.49**
25.0	N/A	1.37	0.66	**2.02**
26.0	N/A	2.12	0.73	**2.86**
27.0	N/A	2.65	0.99	**3.65**
28.0	N/A	3.28	1.45	**4.74**
29.0	N/A	4.14	2.04	**6.18**
30.0	N/A	7.48	23.51	**30.99**
31.0	N/A	8.83	23.54	**32.38**
32.0	N/A	10.31	23.54	**33.85**
33.0	N/A	11.85	23.25	**35.10**
34.0	N/A	13.11	23.03	**36.14**
35.0	N/A	14.06	22.92	**36.98**
36.0	N/A	14.84	22.75	**37.59**
37.0	N/A	15.59	22.51	**38.10**
38.0	N/A	16.30	22.15	**38.45**
39.0	N/A	16.92	21.33	**38.25**
40.0	N/A	17.43	19.94	**37.38**
41.0	N/A	17.89	18.23	**36.12**
42.0	N/A	18.35	16.56	**34.92**
43.0	N/A	18.81	15.28	**34.09**
44.0	N/A	19.22	14.74	**33.96**
45.0	N/A	19.57	14.67	**34.24**
46.0	N/A	19.95	14.62	**34.57**
47.0	N/A	20.44	14.51	**34.95**
48.0	N/A	21.02	14.48	**35.50**
49.0	N/A	21.58	15.22	**36.80**
50.0	N/A	22.12	17.74	**39.86**
51.0	N/A	22.67	21.92	**44.60**
52.0	N/A	23.28	27.65	**50.93**
53.0	N/A	23.99	34.84	**58.83**
54.0	N/A	25.15	41.76	**66.91**
55.0	N/A	26.81	45.52	**72.33**
56.0	N/A	28.97	45.94	**74.91**
57.0	N/A	31.63	44.88	**76.50**
58.0	N/A	34.63	43.42	**78.05**
59.0	N/A	37.05	42.88	**79.93**
60.0	N/A	38.74	42.22	**80.96**
61.0	N/A	40.10	40.60	**80.71**
62.0	N/A	41.58	38.19	**79.77**
63.0	N/A	43.09	35.32	**78.41**
64.0	N/A	44.19	32.39	**76.58**
65.0	N/A	44.82	29.57	**74.40**
66.0	N/A	45.41	26.48	**71.89**
67.0	N/A	46.40	22.91	**69.31**
68.0	N/A	47.72	0.91	**48.63**
69.0	N/A	48.96	0.92	**49.88**
70.0	N/A	50.13	0.95	**51.08**
71.0	N/A	51.47	0.97	**52.44**
72.0	N/A	53.06	1.01	**54.07**
73.0	N/A	54.91	1.07	**55.98**
74.0	N/A	56.61	1.14	**57.75**
75.0	N/A	58.01	1.16	**59.17**
76.0	N/A	59.49	1.11	**60.60**
77.0	N/A	61.43	1.03	**62.46**
78.0	N/A	63.69	0.93	**64.62**
79.0	N/A	65.46	0.86	**66.32**
80.0	N/A	66.58	0.82	**67.40**
81.0	N/A	67.38	0.79	**68.17**
82.0	N/A	68.18	0.75	**68.93**
83.0	N/A	68.96	0.73	**69.69**
84.0	N/A	69.69	0.73	**70.42**
85.0	N/A	70.35	0.70	**71.05**
86.0	N/A	71.10	0.63	**71.73**
87.0	N/A	72.10	0.53	**72.63**
88.0	N/A	73.25	0.46	**73.71**
89.0	N/A	74.00	0.45	**74.45**
90.0	N/A	74.26	0.49	**74.76**
91.0	N/A	74.49	0.55	**75.05**
92.0	N/A	75.16	0.59	**75.75**
93.0	N/A	76.20	0.63	**76.83**
94.0	N/A	77.36	0.66	**78.02**
95.0	N/A	78.57	0.69	**79.26**

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.2.01d)

Date: November 21, 2011
Time: 17:13:04

General Information:
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Input file: ..... SR 87 - BDR\Report\Appendices\APX F - FB-DEEP\B-2\HP14x73.spc
Project number: 28-09-09-04
Job name: SR 87 CONNECTOR PD&E
Engineer: K. CRONIN, E.I.
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
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Boring date: 11/9/2011, Boring Number: B-2
Station number: Offset:

Ground Elevation: 0.000(ft)

Hammer type: Automatic Hammer, Correction factor = 1.25

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	3.00	5- Cavity layer
2	2.50	2.00	5- Cavity layer
3	5.00	17.00	5- Cavity layer
4	7.50	21.00	5- Cavity layer
5	10.00	10.00	5- Cavity layer
6	12.50	5.00	5- Cavity layer
7	15.00	6.00	5- Cavity layer
8	17.50	5.00	5- Cavity layer
9	20.00	4.00	5- Cavity layer
10	22.50	4.00	5- Cavity layer
11	25.00	7.00	2- Clay and silty sand
12	27.50	8.00	2- Clay and silty sand
13	30.00	20.00	3- Clean sand
14	32.50	24.00	3- Clean sand
15	35.00	12.00	3- Clean sand
16	37.50	11.00	3- Clean sand
17	40.00	7.00	3- Clean sand
18	42.50	7.00	3- Clean sand
19	45.00	5.00	3- Clean sand
20	47.50	9.00	3- Clean sand
21	50.00	8.00	3- Clean sand
22	52.50	10.00	3- Clean sand
23	55.00	29.00	3- Clean sand
24	57.50	52.00	3- Clean sand
25	60.00	20.00	3- Clean sand
26	62.50	24.00	3- Clean sand
27	65.00	6.00	3- Clean sand
28	67.50	9.00	2- Clay and silty sand
29	70.00	8.00	2- Clay and silty sand
30	72.50	14.00	2- Clay and silty sand
31	75.00	8.00	2- Clay and silty sand
32	77.50	18.00	2- Clay and silty sand

33	80.00	5.00	2- Clay and silty sand
34	82.50	5.00	2- Clay and silty sand
35	85.00	4.00	2- Clay and silty sand
36	87.50	8.00	2- Clay and silty sand
37	90.00	3.00	2- Clay and silty sand
38	92.50	7.00	2- Clay and silty sand
39	95.00	8.00	2- Clay and silty sand
40	97.50	9.00	2- Clay and silty sand
41	100.00	9.00	2- Clay and silty sand
42	100.01	0.00	5- Cavity layer

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	0.00	-25.00	25.00	7.70	5-Void
2	-25.00	-30.00	5.00	7.50	2-Clay and Silty Sand
3	-30.00	-67.50	37.50	16.27	3-Clean Sand
4	-67.50	-100.01	32.51	8.15	2-Clay and Silty Sand
5	-100.01	-100.01	0.00	0.00	5-

Driven Pile Data:

Pile unit weight = 490.00(pcf), Section Type: H-Section

Driven Pile Capacity:

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
1.00	14.6	0.00	0.00	0.00	0.00	0.00
2.00	14.6	0.00	0.00	0.00	0.00	0.00
3.00	14.6	0.00	0.00	0.00	0.00	0.00
4.00	14.6	0.00	0.00	0.00	0.00	0.00
5.00	14.6	0.00	0.00	0.00	0.00	0.00
6.00	14.6	0.00	0.00	0.00	0.00	0.00
7.00	14.6	0.00	0.00	0.00	0.00	0.00
8.00	14.6	0.00	0.00	0.00	0.00	0.00
9.00	14.6	0.00	0.00	0.00	0.00	0.00
10.00	14.6	0.00	0.00	0.00	0.00	0.00
11.00	14.6	0.00	0.00	0.00	0.00	0.00
12.00	14.6	0.00	0.00	0.00	0.00	0.00
13.00	14.6	0.00	0.00	0.00	0.00	0.00
14.00	14.6	0.00	0.00	0.00	0.00	0.00
15.00	14.6	0.00	0.00	0.00	0.00	0.00
16.00	14.6	0.00	0.00	0.00	0.00	0.00
17.00	14.6	0.00	0.00	0.00	0.00	0.00
18.00	14.6	0.00	0.00	0.00	0.00	0.00
19.00	14.6	0.00	0.00	0.00	0.00	0.00
20.00	14.6	0.00	0.00	0.00	0.00	0.00
21.00	14.6	0.00	0.00	0.00	0.00	0.00
22.00	14.6	0.00	0.00	0.00	0.00	0.00

23.00	14.6	0.05	0.00	0.05	0.03	0.05
24.00	14.6	0.49	0.00	0.49	0.25	0.49
25.00	14.6	1.37	0.66	2.02	1.01	3.34
26.00	14.6	2.12	0.73	2.86	1.43	4.32
27.00	14.6	2.65	0.99	3.65	1.82	5.64
28.00	14.6	3.28	1.45	4.74	2.37	7.64
29.00	14.6	4.14	2.04	6.18	3.09	10.25
30.00	14.6	7.48	23.51	30.99	15.50	54.51
31.00	14.6	8.83	23.54	32.38	16.19	55.92
32.00	14.6	10.31	23.54	33.85	16.92	57.39
33.00	14.6	11.85	23.25	35.10	17.55	58.35
34.00	14.6	13.11	23.03	36.14	18.07	59.17
35.00	14.6	14.06	22.92	36.98	18.49	59.91
36.00	14.6	14.84	22.75	37.59	18.79	60.34
37.00	14.6	15.59	22.51	38.10	19.05	60.61
38.00	14.6	16.30	22.15	38.45	19.23	60.61
39.00	14.6	16.92	21.33	38.25	19.12	59.58
40.00	14.6	17.43	19.94	37.38	18.69	57.32
41.00	14.6	17.89	18.23	36.12	18.06	54.35
42.00	14.6	18.35	16.56	34.92	17.46	51.48
43.00	14.6	18.81	15.28	34.09	17.05	49.37
44.00	14.6	19.22	14.74	33.96	16.98	48.71
45.00	14.6	19.57	14.67	34.24	17.12	48.91
46.00	14.6	19.95	14.62	34.57	17.29	49.19
47.00	14.6	20.44	14.51	34.95	17.48	49.46
48.00	14.6	21.02	14.48	35.50	17.75	49.98
49.00	14.6	21.58	15.22	36.80	18.40	52.01
50.00	14.6	22.12	17.74	39.86	19.93	57.61
51.00	14.6	22.67	21.92	44.60	22.30	66.52
52.00	14.6	23.28	27.65	50.93	25.47	78.58
53.00	14.6	23.99	34.84	58.83	29.42	93.67
54.00	14.6	25.15	41.76	66.91	33.45	108.66
55.00	14.6	26.81	45.52	72.33	36.16	117.84
56.00	14.6	28.97	45.94	74.91	37.45	120.85
57.00	14.6	31.63	44.88	76.50	38.25	121.38
58.00	14.6	34.63	43.42	78.05	39.03	121.47
59.00	14.6	37.05	42.88	79.93	39.96	122.80
60.00	14.6	38.74	42.22	80.96	40.48	123.18
61.00	14.6	40.10	40.60	80.71	40.35	121.31
62.00	14.6	41.58	38.19	79.77	39.88	117.96
63.00	14.6	43.09	35.32	78.41	39.20	113.73
64.00	14.6	44.19	32.39	76.58	38.29	108.98
65.00	14.6	44.82	29.57	74.40	37.20	103.97
66.00	14.6	45.41	26.48	71.89	35.95	98.37
67.00	14.6	46.40	22.91	69.31	34.66	92.22
68.00	14.6	47.72	0.91	48.63	24.32	50.45
69.00	14.6	48.96	0.92	49.88	24.94	51.73
70.00	14.6	50.13	0.95	51.08	25.54	52.98
71.00	14.6	51.47	0.97	52.44	26.22	54.37
72.00	14.6	53.06	1.01	54.07	27.03	56.08
73.00	14.6	54.91	1.07	55.98	27.99	58.13
74.00	14.6	56.61	1.14	57.75	28.87	60.02
75.00	14.6	58.01	1.16	59.17	29.58	61.48
76.00	14.6	59.49	1.11	60.60	30.30	62.83
77.00	14.6	61.43	1.03	62.46	31.23	64.52
78.00	14.6	63.69	0.93	64.62	32.31	66.48
79.00	14.6	65.46	0.86	66.32	33.16	68.04
80.00	14.6	66.58	0.82	67.40	33.70	69.04
81.00	14.6	67.38	0.79	68.17	34.08	69.74
82.00	14.6	68.18	0.75	68.93	34.46	70.43
83.00	14.6	68.96	0.73	69.69	34.85	71.16
84.00	14.6	69.69	0.73	70.42	35.21	71.87
85.00	14.6	70.35	0.70	71.05	35.53	72.46

86.00	14.6	71.10	0.63	71.73	35.86	72.98
87.00	14.6	72.10	0.53	72.63	36.32	73.69
88.00	14.6	73.25	0.46	73.71	36.85	74.62
89.00	14.6	74.00	0.45	74.45	37.23	75.35
90.00	14.6	74.26	0.49	74.76	37.38	75.74
91.00	14.6	74.49	0.55	75.05	37.52	76.15
92.00	14.6	75.16	0.59	75.75	37.88	76.94
93.00	14.6	76.20	0.63	76.83	38.42	78.09
94.00	14.6	77.36	0.66	78.02	39.01	79.34
95.00	14.6	78.57	0.69	79.26	39.63	80.65

NOTES
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1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.

2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.

3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.

4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
   EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

24-IN STEEL PIPE PILES

SOIL BORING: B-2
24-IN STEEL PIPE PILE (OPEN-ENDED)

TEST PILE LENGTH (FT)	PILE TIP ELEV (FT)	ULTIMATE SIDE FRICTION (TONS)	MOBILIZED END BEARING (TONS)	ESTIMATED DAVISSON CAPACITY (DC) (TONS)
1.0	N/A	0.00	0.00	**0.00**
2.0	N/A	0.00	0.00	**0.00**
3.0	N/A	0.00	0.00	**0.00**
4.0	N/A	0.00	0.00	**0.00**
5.0	N/A	0.00	0.00	**0.00**
6.0	N/A	0.00	0.00	**0.00**
7.0	N/A	0.00	0.00	**0.00**
8.0	N/A	0.00	0.00	**0.00**
9.0	N/A	0.00	0.00	**0.00**
10.0	N/A	0.00	0.00	**0.00**
11.0	N/A	0.00	0.00	**0.00**
12.0	N/A	0.00	0.00	**0.00**
13.0	N/A	0.00	0.00	**0.00**
14.0	N/A	0.00	0.00	**0.00**
15.0	N/A	0.00	0.00	**0.00**
16.0	N/A	0.00	0.00	**0.00**
17.0	N/A	0.00	0.00	**0.00**
18.0	N/A	0.00	0.00	**0.00**
19.0	N/A	0.00	0.00	**0.00**
20.0	N/A	0.00	0.00	**0.00**
21.0	N/A	0.00	0.00	**0.00**
22.0	N/A	0.00	0.00	**0.00**
23.0	N/A	0.11	0.00	**0.11**
24.0	N/A	1.01	0.00	**1.01**
25.0	N/A	2.81	0.00	**2.81**
26.0	N/A	4.68	0.00	**4.68**
27.0	N/A	6.22	0.00	**6.22**
28.0	N/A	7.83	0.00	**7.83**
29.0	N/A	9.69	0.00	**9.69**
30.0	N/A	15.37	0.00	**15.37**
31.0	N/A	18.28	0.00	**18.28**
32.0	N/A	21.35	0.00	**21.35**
33.0	N/A	24.51	0.00	**24.51**
34.0	N/A	27.18	0.00	**27.18**
35.0	N/A	29.26	0.00	**29.26**
36.0	N/A	31.01	0.00	**31.01**
37.0	N/A	32.71	0.00	**32.71**
38.0	N/A	34.33	0.00	**34.33**
39.0	N/A	35.73	0.00	**35.73**
40.0	N/A	36.88	0.00	**36.88**
41.0	N/A	37.91	0.00	**37.91**
42.0	N/A	38.94	0.00	**38.94**
43.0	N/A	39.95	0.00	**39.95**
44.0	N/A	40.84	0.00	**40.84**
45.0	N/A	41.44	0.00	**41.44**
46.0	N/A	42.27	0.00	**42.27**
47.0	N/A	43.10	0.00	**43.10**
48.0	N/A	43.76	0.00	**43.76**
49.0	N/A	45.05	0.00	**45.05**
50.0	N/A	46.28	0.00	**46.28**
51.0	N/A	47.54	0.00	**47.54**
52.0	N/A	48.92	0.00	**48.92**
53.0	N/A	50.51	0.00	**50.51**
54.0	N/A	52.86	0.00	**52.86**
55.0	N/A	56.07	0.00	**56.07**
56.0	N/A	59.85	0.00	**59.85**
57.0	N/A	63.89	0.00	**63.89**
58.0	N/A	68.10	0.00	**68.10**
59.0	N/A	71.81	0.00	**71.81**
60.0	N/A	74.92	0.00	**74.92**
61.0	N/A	77.81	0.00	**77.81**
62.0	N/A	80.87	0.00	**80.87**
63.0	N/A	83.95	0.00	**83.95**
64.0	N/A	86.25	0.00	**86.25**
65.0	N/A	87.61	0.00	**87.61**
66.0	N/A	88.86	0.00	**88.86**
67.0	N/A	90.83	0.00	**90.83**
68.0	N/A	94.81	0.00	**94.81**
69.0	N/A	97.43	0.00	**97.43**
70.0	N/A	99.96	0.00	**99.96**
71.0	N/A	102.49	0.00	**102.49**
72.0	N/A	105.29	0.00	**105.29**
73.0	N/A	108.74	0.00	**108.74**
74.0	N/A	112.22	0.00	**112.22**
75.0	N/A	115.22	0.00	**115.22**
76.0	N/A	118.03	0.00	**118.03**
77.0	N/A	121.51	0.00	**121.51**
78.0	N/A	125.45	0.00	**125.45**
79.0	N/A	128.64	0.00	**128.64**
80.0	N/A	130.86	0.00	**130.86**
81.0	N/A	132.59	0.00	**132.59**
82.0	N/A	134.33	0.00	**134.33**
83.0	N/A	136.06	0.00	**136.06**
84.0	N/A	137.68	0.00	**137.68**
85.0	N/A	139.20	0.00	**139.20**
86.0	N/A	140.87	0.00	**140.87**
87.0	N/A	142.94	0.00	**142.94**
88.0	N/A	145.25	0.00	**145.25**
89.0	N/A	146.74	0.00	**146.74**
90.0	N/A	147.24	0.00	**147.24**
91.0	N/A	147.69	0.00	**147.69**
92.0	N/A	149.04	0.00	**149.04**
93.0	N/A	151.19	0.00	**151.19**

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.2.01d)

Date: November 21, 2011
Time: 17:13:59

General Information:
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Input file: .....) - SR 87 - BDR\Report\Appendices\APX F - FB-DEEP\B-2\PIPE.spc
Project number: 28-09-09-04
Job name: SR 87 CONNECTOR PD&E
Engineer: K. CRONIN, E.I.
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
==========
Boring date: 11/9/2011, Boring Number: B-2
Station number: Offset:

Ground Elevation: 0.000(ft)

Hammer type: Automatic Hammer, Correction factor = 1.25

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	3.00	5- Cavity layer
2	2.50	2.00	5- Cavity layer
3	5.00	17.00	5- Cavity layer
4	7.50	21.00	5- Cavity layer
5	10.00	10.00	5- Cavity layer
6	12.50	5.00	5- Cavity layer
7	15.00	6.00	5- Cavity layer
8	17.50	5.00	5- Cavity layer
9	20.00	4.00	5- Cavity layer
10	22.50	4.00	5- Cavity layer
11	25.00	7.00	2- Clay and silty sand
12	27.50	8.00	2- Clay and silty sand
13	30.00	20.00	3- Clean sand
14	32.50	24.00	3- Clean sand
15	35.00	12.00	3- Clean sand
16	37.50	11.00	3- Clean sand
17	40.00	7.00	3- Clean sand
18	42.50	7.00	3- Clean sand
19	45.00	5.00	3- Clean sand
20	47.50	9.00	3- Clean sand
21	50.00	8.00	3- Clean sand
22	52.50	10.00	3- Clean sand
23	55.00	29.00	3- Clean sand
24	57.50	52.00	3- Clean sand
25	60.00	20.00	3- Clean sand
26	62.50	24.00	3- Clean sand
27	65.00	6.00	3- Clean sand
28	67.50	9.00	2- Clay and silty sand
29	70.00	8.00	2- Clay and silty sand
30	72.50	14.00	2- Clay and silty sand
31	75.00	8.00	2- Clay and silty sand
32	77.50	18.00	2- Clay and silty sand

33	80.00	5.00	2- Clay and silty sand
34	82.50	5.00	2- Clay and silty sand
35	85.00	4.00	2- Clay and silty sand
36	87.50	8.00	2- Clay and silty sand
37	90.00	3.00	2- Clay and silty sand
38	92.50	7.00	2- Clay and silty sand
39	95.00	8.00	2- Clay and silty sand
40	97.50	9.00	2- Clay and silty sand
41	100.00	9.00	2- Clay and silty sand
42	100.01	0.00	5- Cavity layer

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	0.00	-25.00	25.00	7.70	5-Void
2	-25.00	-30.00	5.00	7.50	2-Clay and Silty Sand
3	-30.00	-67.50	37.50	16.27	3-Clean Sand
4	-67.50	-100.01	32.51	8.15	2-Clay and Silty Sand
5	-100.01	-100.01	0.00	0.00	5-

Driven Pile Data:

Pile unit weight = 490.00(pcf), Section Type: Pipe

Driven Pile Capacity:

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
1.00	24.0	0.00	0.00	0.00	0.00	0.00
2.00	24.0	0.00	0.00	0.00	0.00	0.00
3.00	24.0	0.00	0.00	0.00	0.00	0.00
4.00	24.0	0.00	0.00	0.00	0.00	0.00
5.00	24.0	0.00	0.00	0.00	0.00	0.00
6.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
8.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
10.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
12.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
14.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	0.00	0.00	0.00	0.00	0.00
16.00	24.0	0.00	0.00	0.00	0.00	0.00
17.00	24.0	0.00	0.00	0.00	0.00	0.00
18.00	24.0	0.00	0.00	0.00	0.00	0.00
19.00	24.0	0.00	0.00	0.00	0.00	0.00
20.00	24.0	0.00	0.00	0.00	0.00	0.00
21.00	24.0	0.00	0.00	0.00	0.00	0.00
22.00	24.0	0.00	0.00	0.00	0.00	0.00

23.00	24.0	0.11	0.00	0.11	0.06	0.11
24.00	24.0	1.01	0.00	1.01	0.51	1.01
25.00	24.0	2.81	2.70	5.51	2.76	10.90
26.00	24.0	4.68	4.49	9.17	4.58	18.14
27.00	24.0	6.22	5.97	12.19	6.10	24.12
28.00	24.0	7.83	7.50	15.33	7.66	30.33
29.00	24.0	9.69	9.28	18.97	9.49	37.54
30.00	24.0	15.37	14.73	30.10	15.05	59.55
31.00	24.0	18.28	17.51	35.79	17.90	70.82
32.00	24.0	21.35	20.46	41.82	20.91	82.75
33.00	24.0	24.51	23.49	48.00	24.00	94.98
34.00	24.0	27.18	26.04	53.22	26.61	105.30
35.00	24.0	29.26	28.04	57.29	28.65	113.36
36.00	24.0	31.01	29.72	60.74	30.37	120.18
37.00	24.0	32.71	31.35	64.07	32.03	126.77
38.00	24.0	34.33	32.90	67.24	33.62	133.04
39.00	24.0	35.73	34.24	69.97	34.99	138.46
40.00	24.0	36.88	35.35	72.23	36.11	142.92
41.00	24.0	37.91	36.33	74.24	37.12	146.91
42.00	24.0	38.94	37.32	76.26	38.13	150.90
43.00	24.0	39.95	38.29	78.24	39.12	154.82
44.00	24.0	40.84	39.14	79.98	39.99	158.25
45.00	24.0	41.44	39.71	81.15	40.57	160.57
46.00	24.0	42.27	40.51	82.78	41.39	163.79
47.00	24.0	43.10	41.30	84.40	42.20	167.01
48.00	24.0	43.76	41.93	85.69	42.84	169.56
49.00	24.0	45.05	43.17	88.22	44.11	174.57
50.00	24.0	46.28	44.35	90.63	45.32	179.34
51.00	24.0	47.54	45.56	93.10	46.55	184.22
52.00	24.0	48.92	46.88	95.80	47.90	189.56
53.00	24.0	50.51	48.40	98.91	49.46	195.72
54.00	24.0	52.86	50.66	103.52	51.76	204.83
55.00	24.0	56.07	53.73	109.81	54.90	217.27
56.00	24.0	59.85	57.35	117.20	58.60	231.91
57.00	24.0	63.89	61.23	125.12	62.56	247.58
58.00	24.0	68.10	65.26	133.36	66.68	263.88
59.00	24.0	71.81	64.32	136.13	68.07	264.78
60.00	24.0	74.92	61.43	136.35	68.18	259.22
61.00	24.0	77.81	58.59	136.40	68.20	253.57
62.00	24.0	80.87	55.35	136.21	68.11	246.90
63.00	24.0	83.95	51.75	135.70	67.85	239.20
64.00	24.0	86.25	49.15	135.40	67.70	233.71
65.00	24.0	87.61	48.15	135.75	67.88	232.05
66.00	24.0	88.86	48.12	136.98	68.49	233.22
67.00	24.0	90.83	47.90	138.73	69.36	234.52
68.00	24.0	94.81	20.06	114.87	57.44	155.00
69.00	24.0	97.43	20.06	117.49	58.75	157.61
70.00	24.0	99.96	20.72	120.68	60.34	162.12
71.00	24.0	102.49	21.77	124.26	62.13	167.79
72.00	24.0	105.29	22.32	127.61	63.80	172.24
73.00	24.0	108.74	22.42	131.17	65.58	176.02
74.00	24.0	112.22	21.98	134.20	67.10	178.17
75.00	24.0	115.22	21.31	136.52	68.26	179.13
76.00	24.0	118.03	20.53	138.56	69.28	179.62
77.00	24.0	121.51	19.55	141.06	70.53	180.16
78.00	24.0	125.45	18.28	143.74	71.87	180.30
79.00	24.0	128.64	17.24	145.87	72.94	180.35
80.00	24.0	130.86	16.75	147.60	73.80	181.10
81.00	24.0	132.59	16.64	149.24	74.62	182.52
82.00	24.0	134.33	16.21	150.54	75.27	182.96
83.00	24.0	136.06	15.36	151.41	75.71	182.13
84.00	24.0	137.68	14.57	152.25	76.12	181.38
85.00	24.0	139.20	14.28	153.48	76.74	182.03

86.00	24.0	140.87	14.34	155.20	77.60	183.88
87.00	24.0	142.94	14.31	157.25	78.62	185.86
88.00	24.0	145.25	14.09	159.34	79.67	187.52
89.00	24.0	146.74	14.04	160.78	80.39	188.85
90.00	24.0	147.24	14.43	161.67	80.83	190.53
91.00	24.0	147.69	15.05	162.74	81.37	192.83
92.00	24.0	149.04	15.39	164.43	82.21	195.20
93.00	24.0	151.19	15.25	166.44	83.22	196.95

NOTES
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1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.

2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.

3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.

4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
   EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

18-IN SQUARE CONCRETE PILES

SOIL BORING: B-2
18-IN SQUARE CONCRETE PILE

TEST PILE LENGTH (FT)	PILE TIP ELEV (FT)	ULTIMATE SIDE FRICTION (TONS)	MOBILIZED END BEARING (TONS)	ESTIMATED DAVISSON CAPACITY (DC) (TONS)
1.0	N/A	0.00	0.00	**0.00**
2.0	N/A	0.00	0.00	**0.00**
3.0	N/A	0.00	0.00	**0.00**
4.0	N/A	0.00	0.00	**0.00**
5.0	N/A	0.00	0.00	**0.00**
6.0	N/A	0.00	0.00	**0.00**
7.0	N/A	0.00	0.00	**0.00**
8.0	N/A	0.00	0.00	**0.00**
9.0	N/A	0.00	0.00	**0.00**
10.0	N/A	0.00	0.00	**0.00**
11.0	N/A	0.00	0.00	**0.00**
12.0	N/A	0.00	0.00	**0.00**
13.0	N/A	0.00	0.00	**0.00**
14.0	N/A	0.00	0.00	**0.00**
15.0	N/A	0.00	0.00	**0.00**
16.0	N/A	0.00	0.00	**0.00**
17.0	N/A	0.00	0.00	**0.00**
18.0	N/A	0.00	0.00	**0.00**
19.0	N/A	0.00	0.00	**0.00**
20.0	N/A	0.00	0.00	**0.00**
21.0	N/A	0.00	0.00	**0.00**
22.0	N/A	0.00	0.00	**0.00**
23.0	N/A	0.12	0.00	**0.12**
24.0	N/A	1.04	0.00	**1.04**
25.0	N/A	2.90	13.24	**16.14**
26.0	N/A	4.64	14.15	**18.79**
27.0	N/A	5.90	17.03	**22.93**
28.0	N/A	7.23	21.78	**29.00**
29.0	N/A	8.97	26.94	**35.90**
30.0	N/A	15.91	34.89	**50.80**
31.0	N/A	18.87	34.89	**53.76**
32.0	N/A	22.06	34.52	**56.59**
33.0	N/A	25.37	33.81	**59.18**
34.0	N/A	28.10	33.30	**61.40**
35.0	N/A	30.16	33.09	**63.25**
36.0	N/A	31.84	33.02	**64.86**
37.0	N/A	33.46	32.84	**66.30**
38.0	N/A	35.01	32.58	**67.59**
39.0	N/A	36.35	32.31	**68.66**
40.0	N/A	37.46	31.96	**69.42**
41.0	N/A	38.46	31.31	**69.77**
42.0	N/A	39.46	30.31	**69.77**
43.0	N/A	40.44	29.13	**69.57**
44.0	N/A	41.32	27.76	**69.08**
45.0	N/A	42.09	26.32	**68.41**
46.0	N/A	42.92	25.44	**68.36**
47.0	N/A	43.97	25.14	**69.11**
48.0	N/A	45.22	25.72	**70.94**
49.0	N/A	46.44	28.48	**74.93**
50.0	N/A	47.61	33.55	**81.17**
51.0	N/A	48.81	40.94	**89.75**
52.0	N/A	50.12	50.57	**100.70**
53.0	N/A	51.67	60.70	**112.37**
54.0	N/A	54.18	66.71	**120.89**
55.0	N/A	57.77	68.43	**126.19**
56.0	N/A	62.44	68.44	**130.88**
57.0	N/A	68.20	67.79	**135.98**
58.0	N/A	74.70	65.99	**140.69**
59.0	N/A	79.95	63.43	**143.38**
60.0	N/A	83.59	60.51	**144.11**
61.0	N/A	86.56	57.68	**144.24**
62.0	N/A	89.75	54.47	**144.22**
63.0	N/A	93.01	51.02	**144.03**
64.0	N/A	95.41	48.38	**143.79**
65.0	N/A	96.78	46.65	**143.43**
66.0	N/A	98.04	44.93	**142.98**
67.0	N/A	100.13	42.71	**142.84**
68.0	N/A	102.92	14.41	**117.33**
69.0	N/A	105.71	14.60	**120.31**
70.0	N/A	108.39	14.54	**122.92**
71.0	N/A	111.31	14.93	**126.24**
72.0	N/A	114.39	15.66	**130.05**
73.0	N/A	117.88	16.73	**134.61**
74.0	N/A	121.35	17.06	**138.41**
75.0	N/A	124.31	16.55	**140.86**
76.0	N/A	127.44	15.82	**143.26**
77.0	N/A	131.54	14.84	**146.39**
78.0	N/A	136.34	13.58	**149.92**
79.0	N/A	140.10	12.51	**152.61**
80.0	N/A	142.52	11.86	**154.38**
81.0	N/A	144.27	11.66	**155.93**
82.0	N/A	146.01	11.72	**157.73**
83.0	N/A	147.73	11.75	**159.48**
84.0	N/A	149.33	11.23	**160.56**
85.0	N/A	150.80	10.20	**161.00**
86.0	N/A	152.45	9.39	**161.84**
87.0	N/A	154.58	9.00	**163.58**
88.0	N/A	157.02	8.78	**165.80**
89.0	N/A	158.61	8.59	**167.20**
90.0	N/A	159.17	8.54	**167.71**
91.0	N/A	159.67	8.81	**168.48**
92.0	N/A	161.08	9.24	**170.32**
93.0	N/A	163.30	9.67	**172.97**
94.0	N/A	165.74	10.05	**175.79**

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.2.01d)

Date: November 21, 2011
Time: 17:10:25

General Information:
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Input file: .....SR 87 - BDR\Report\Appendices\APX F - FB-DEEP\B-2\CONCRETE.spc
Project number: 28-09-09-04
Job name: SR 87 CONNECTOR PD&E
Engineer: K. CRONIN, E.I.
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
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Boring date: 11/9/2011, Boring Number: B-2
Station number: Offset:

Ground Elevation: 0.000(ft)

Hammer type: Automatic Hammer, Correction factor = 1.25

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	3.00	5- Cavity layer
2	2.50	2.00	5- Cavity layer
3	5.00	17.00	5- Cavity layer
4	7.50	21.00	5- Cavity layer
5	10.00	10.00	5- Cavity layer
6	12.50	5.00	5- Cavity layer
7	15.00	6.00	5- Cavity layer
8	17.50	5.00	5- Cavity layer
9	20.00	4.00	5- Cavity layer
10	22.50	4.00	5- Cavity layer
11	25.00	7.00	2- Clay and silty sand
12	27.50	8.00	2- Clay and silty sand
13	30.00	20.00	3- Clean sand
14	32.50	24.00	3- Clean sand
15	35.00	12.00	3- Clean sand
16	37.50	11.00	3- Clean sand
17	40.00	7.00	3- Clean sand
18	42.50	7.00	3- Clean sand
19	45.00	5.00	3- Clean sand
20	47.50	9.00	3- Clean sand
21	50.00	8.00	3- Clean sand
22	52.50	10.00	3- Clean sand
23	55.00	29.00	3- Clean sand
24	57.50	52.00	3- Clean sand
25	60.00	20.00	3- Clean sand
26	62.50	24.00	3- Clean sand
27	65.00	6.00	3- Clean sand
28	67.50	9.00	2- Clay and silty sand
29	70.00	8.00	2- Clay and silty sand
30	72.50	14.00	2- Clay and silty sand
31	75.00	8.00	2- Clay and silty sand
32	77.50	18.00	2- Clay and silty sand

33	80.00	5.00	2- Clay and silty sand
34	82.50	5.00	2- Clay and silty sand
35	85.00	4.00	2- Clay and silty sand
36	87.50	8.00	2- Clay and silty sand
37	90.00	3.00	2- Clay and silty sand
38	92.50	7.00	2- Clay and silty sand
39	95.00	8.00	2- Clay and silty sand
40	97.50	9.00	2- Clay and silty sand
41	100.00	9.00	2- Clay and silty sand
42	100.01	0.00	5- Cavity layer

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	0.00	-25.00	25.00	7.70	5-Void
2	-25.00	-30.00	5.00	7.50	2-Clay and Silty Sand
3	-30.00	-67.50	37.50	16.27	3-Clean Sand
4	-67.50	-100.01	32.51	8.15	2-Clay and Silty Sand
5	-100.01	-100.01	0.00	0.00	5-

Driven Pile Data:

Pile unit weight = 150.00(pcf), Section Type: Square

Driven Pile Capacity:

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
1.00	18.0	0.00	0.00	0.00	0.00	0.00
2.00	18.0	0.00	0.00	0.00	0.00	0.00
3.00	18.0	0.00	0.00	0.00	0.00	0.00
4.00	18.0	0.00	0.00	0.00	0.00	0.00
5.00	18.0	0.00	0.00	0.00	0.00	0.00
6.00	18.0	0.00	0.00	0.00	0.00	0.00
7.00	18.0	0.00	0.00	0.00	0.00	0.00
8.00	18.0	0.00	0.00	0.00	0.00	0.00
9.00	18.0	0.00	0.00	0.00	0.00	0.00
10.00	18.0	0.00	0.00	0.00	0.00	0.00
11.00	18.0	0.00	0.00	0.00	0.00	0.00
12.00	18.0	0.00	0.00	0.00	0.00	0.00
13.00	18.0	0.00	0.00	0.00	0.00	0.00
14.00	18.0	0.00	0.00	0.00	0.00	0.00
15.00	18.0	0.00	0.00	0.00	0.00	0.00
16.00	18.0	0.00	0.00	0.00	0.00	0.00
17.00	18.0	0.00	0.00	0.00	0.00	0.00
18.00	18.0	0.00	0.00	0.00	0.00	0.00
19.00	18.0	0.00	0.00	0.00	0.00	0.00
20.00	18.0	0.00	0.00	0.00	0.00	0.00
21.00	18.0	0.00	0.00	0.00	0.00	0.00
22.00	18.0	0.00	0.00	0.00	0.00	0.00

23.00	18.0	0.12	0.00	0.12	0.06	0.12
24.00	18.0	1.04	0.00	1.04	0.52	1.04
25.00	18.0	2.90	13.24	16.14	8.07	42.62
26.00	18.0	4.64	14.15	18.79	9.40	47.10
27.00	18.0	5.90	17.03	22.93	11.47	57.00
28.00	18.0	7.23	21.78	29.00	14.50	72.55
29.00	18.0	8.97	26.94	35.90	17.95	89.77
30.00	18.0	15.91	34.89	50.80	25.40	120.59
31.00	18.0	18.87	34.89	53.76	26.88	123.55
32.00	18.0	22.06	34.52	56.59	28.29	125.63
33.00	18.0	25.37	33.81	59.18	29.59	126.80
34.00	18.0	28.10	33.30	61.40	30.70	128.00
35.00	18.0	30.16	33.09	63.25	31.62	129.43
36.00	18.0	31.84	33.02	64.86	32.43	130.89
37.00	18.0	33.46	32.84	66.30	33.15	131.97
38.00	18.0	35.01	32.58	67.59	33.79	132.74
39.00	18.0	36.35	32.31	68.66	34.33	133.27
40.00	18.0	37.46	31.96	69.42	34.71	133.35
41.00	18.0	38.46	31.31	69.77	34.88	132.39
42.00	18.0	39.46	30.31	69.77	34.88	130.40
43.00	18.0	40.44	29.13	69.57	34.78	127.83
44.00	18.0	41.32	27.76	69.08	34.54	124.61
45.00	18.0	42.09	26.32	68.41	34.21	121.05
46.00	18.0	42.92	25.44	68.36	34.18	119.25
47.00	18.0	43.97	25.14	69.11	34.56	119.39
48.00	18.0	45.22	25.72	70.94	35.47	122.38
49.00	18.0	46.44	28.48	74.93	37.46	131.90
50.00	18.0	47.61	33.55	81.17	40.58	148.27
51.00	18.0	48.81	40.94	89.75	44.88	171.64
52.00	18.0	50.12	50.57	100.70	50.35	201.84
53.00	18.0	51.67	60.70	112.37	56.18	233.77
54.00	18.0	54.18	66.71	120.89	60.44	254.31
55.00	18.0	57.77	68.43	126.19	63.10	263.05
56.00	18.0	62.44	68.44	130.88	65.44	267.76
57.00	18.0	68.20	67.79	135.98	67.99	271.55
58.00	18.0	74.70	65.99	140.69	70.35	272.67
59.00	18.0	79.95	63.43	143.38	71.69	270.25
60.00	18.0	83.59	60.51	144.11	72.05	265.14
61.00	18.0	86.56	57.68	144.24	72.12	259.60
62.00	18.0	89.75	54.47	144.22	72.11	253.16
63.00	18.0	93.01	51.02	144.03	72.01	246.06
64.00	18.0	95.41	48.38	143.79	71.89	240.55
65.00	18.0	96.78	46.65	143.43	71.71	236.73
66.00	18.0	98.04	44.93	142.98	71.49	232.85
67.00	18.0	100.13	42.71	142.84	71.42	228.25
68.00	18.0	102.92	14.41	117.33	58.66	146.14
69.00	18.0	105.71	14.60	120.31	60.16	149.51
70.00	18.0	108.39	14.54	122.92	61.46	152.00
71.00	18.0	111.31	14.93	126.24	63.12	156.10
72.00	18.0	114.39	15.66	130.05	65.03	161.37
73.00	18.0	117.88	16.73	134.61	67.31	168.07
74.00	18.0	121.35	17.06	138.41	69.20	172.52
75.00	18.0	124.31	16.55	140.86	70.43	173.97
76.00	18.0	127.44	15.82	143.26	71.63	174.91
77.00	18.0	131.54	14.84	146.39	73.19	176.07
78.00	18.0	136.34	13.58	149.92	74.96	177.09
79.00	18.0	140.10	12.51	152.61	76.30	177.62
80.00	18.0	142.52	11.86	154.38	77.19	178.10
81.00	18.0	144.27	11.66	155.93	77.97	179.26
82.00	18.0	146.01	11.72	157.73	78.86	181.17
83.00	18.0	147.73	11.75	159.48	79.74	182.99
84.00	18.0	149.33	11.23	160.56	80.28	183.02
85.00	18.0	150.80	10.20	161.00	80.50	181.39

86.00	18.0	152.45	9.39	161.84	80.92	180.61
87.00	18.0	154.58	9.00	163.58	81.79	181.57
88.00	18.0	157.02	8.78	165.80	82.90	183.36
89.00	18.0	158.61	8.59	167.20	83.60	184.38
90.00	18.0	159.17	8.54	167.71	83.85	184.78
91.00	18.0	159.67	8.81	168.48	84.24	186.10
92.00	18.0	161.08	9.24	170.32	85.16	188.80
93.00	18.0	163.30	9.67	172.97	86.49	192.32
94.00	18.0	165.74	10.05	175.79	87.90	195.90

NOTES
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1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.

2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.

3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.

4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
   EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

24-IN SQUARE CONCRETE PILES

SOIL BORING: B-2
24-IN SQUARE CONCRETE PILE

TEST PILE LENGTH (FT)	PILE TIP ELEV (FT)	ULTIMATE SIDE FRICTION (TONS)	MOBILIZED END BEARING (TONS)	ESTIMATED DAVISSON CAPACITY (DC) (TONS)
1.0	N/A	0.00	0.00	**0.00**
2.0	N/A	0.00	0.00	**0.00**
3.0	N/A	0.00	0.00	**0.00**
4.0	N/A	0.00	0.00	**0.00**
5.0	N/A	0.00	0.00	**0.00**
6.0	N/A	0.00	0.00	**0.00**
7.0	N/A	0.00	0.00	**0.00**
8.0	N/A	0.00	0.00	**0.00**
9.0	N/A	0.00	0.00	**0.00**
10.0	N/A	0.00	0.00	**0.00**
11.0	N/A	0.00	0.00	**0.00**
12.0	N/A	0.00	0.00	**0.00**
13.0	N/A	0.00	0.00	**0.00**
14.0	N/A	0.00	0.00	**0.00**
15.0	N/A	0.00	0.00	**0.00**
16.0	N/A	0.00	0.00	**0.00**
17.0	N/A	0.00	0.00	**0.00**
18.0	N/A	0.00	0.00	**0.00**
19.0	N/A	0.00	0.00	**0.00**
20.0	N/A	0.00	0.00	**0.00**
21.0	N/A	0.00	0.00	**0.00**
22.0	N/A	0.00	0.00	**0.00**
23.0	N/A	0.15	0.00	**0.15**
24.0	N/A	1.39	0.00	**1.39**
25.0	N/A	3.87	32.19	**36.05**
26.0	N/A	6.44	33.19	**39.64**
27.0	N/A	8.60	35.83	**44.42**
28.0	N/A	10.84	39.32	**50.16**
29.0	N/A	13.41	42.83	**56.24**
30.0	N/A	21.21	54.23	**75.43**
31.0	N/A	25.16	53.90	**79.06**
32.0	N/A	29.42	52.68	**82.10**
33.0	N/A	33.83	50.68	**84.51**
34.0	N/A	37.47	49.23	**86.71**
35.0	N/A	40.21	48.82	**89.02**
36.0	N/A	42.45	48.92	**91.37**
37.0	N/A	44.62	48.83	**93.45**
38.0	N/A	46.68	48.57	**95.25**
39.0	N/A	48.46	48.73	**97.20**
40.0	N/A	49.95	49.65	**99.59**
41.0	N/A	51.28	51.01	**102.29**
42.0	N/A	52.61	52.19	**104.80**
43.0	N/A	53.92	53.20	**107.12**
44.0	N/A	55.08	54.27	**109.34**
45.0	N/A	55.87	54.78	**110.65**
46.0	N/A	56.95	54.90	**111.85**
47.0	N/A	57.79	56.50	**114.29**
48.0	N/A	58.23	60.63	**118.86**
49.0	N/A	59.89	67.41	**127.30**
50.0	N/A	61.48	77.85	**139.32**
51.0	N/A	63.10	91.04	**154.13**
52.0	N/A	64.86	101.12	**165.97**
53.0	N/A	66.92	106.64	**173.56**
54.0	N/A	70.21	108.99	**179.20**
55.0	N/A	74.90	110.55	**185.46**
56.0	N/A	80.99	110.95	**191.94**
57.0	N/A	88.48	107.53	**196.00**
58.0	N/A	96.94	100.23	**197.18**
59.0	N/A	103.80	93.37	**197.17**
60.0	N/A	108.60	88.79	**197.39**
61.0	N/A	112.52	85.17	**197.69**
62.0	N/A	116.74	81.04	**197.79**
63.0	N/A	121.06	76.46	**197.52**
64.0	N/A	124.25	73.16	**197.40**
65.0	N/A	126.11	71.88	**197.98**
66.0	N/A	127.83	71.84	**199.67**
67.0	N/A	130.62	71.56	**202.18**
68.0	N/A	137.23	25.54	**162.77**
69.0	N/A	140.95	25.54	**166.49**
70.0	N/A	144.52	26.38	**170.90**
71.0	N/A	148.19	27.71	**175.90**
72.0	N/A	152.44	28.41	**180.85**
73.0	N/A	157.79	28.55	**186.34**
74.0	N/A	163.02	27.99	**191.02**
75.0	N/A	167.37	27.13	**194.50**
76.0	N/A	171.54	26.14	**197.68**
77.0	N/A	177.06	24.89	**201.95**
78.0	N/A	183.53	23.28	**206.81**
79.0	N/A	188.56	21.95	**210.51**
80.0	N/A	191.75	21.32	**213.07**
81.0	N/A	194.01	21.19	**215.20**
82.0	N/A	196.28	20.64	**216.92**
83.0	N/A	198.52	19.55	**218.07**
84.0	N/A	200.61	18.55	**219.15**
85.0	N/A	202.53	18.16	**220.71**
86.0	N/A	204.69	18.26	**222.95**
87.0	N/A	207.52	18.21	**225.73**
88.0	N/A	210.75	17.94	**228.69**
89.0	N/A	212.85	17.87	**230.72**
90.0	N/A	213.55	18.37	**231.92**
91.0	N/A	214.16	19.16	**233.32**
92.0	N/A	216.02	19.59	**235.61**
93.0	N/A	218.98	19.42	**238.40**

Florida Bridge Software Institute
Shaft and Pile Analysis (FB-Deep v.2.01d)

Date: November 21, 2011
Time: 17:11:40

General Information:
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Input file: .....SR 87 - BDR\Report\Appendices\APX F - FB-DEEP\B-2\CONCRETE.spc
Project number: 28-09-09-04
Job name: SR 87 CONNECTOR PD&E
Engineer: K. CRONIN, E.I.
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
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Boring date: 11/9/2011, Boring Number: B-2
Station number: Offset:

Ground Elevation: 0.000(ft)

Hammer type: Automatic Hammer, Correction factor = 1.25

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	3.00	5- Cavity layer
2	2.50	2.00	5- Cavity layer
3	5.00	17.00	5- Cavity layer
4	7.50	21.00	5- Cavity layer
5	10.00	10.00	5- Cavity layer
6	12.50	5.00	5- Cavity layer
7	15.00	6.00	5- Cavity layer
8	17.50	5.00	5- Cavity layer
9	20.00	4.00	5- Cavity layer
10	22.50	4.00	5- Cavity layer
11	25.00	7.00	2- Clay and silty sand
12	27.50	8.00	2- Clay and silty sand
13	30.00	20.00	3- Clean sand
14	32.50	24.00	3- Clean sand
15	35.00	12.00	3- Clean sand
16	37.50	11.00	3- Clean sand
17	40.00	7.00	3- Clean sand
18	42.50	7.00	3- Clean sand
19	45.00	5.00	3- Clean sand
20	47.50	9.00	3- Clean sand
21	50.00	8.00	3- Clean sand
22	52.50	10.00	3- Clean sand
23	55.00	29.00	3- Clean sand
24	57.50	52.00	3- Clean sand
25	60.00	20.00	3- Clean sand
26	62.50	24.00	3- Clean sand
27	65.00	6.00	3- Clean sand
28	67.50	9.00	2- Clay and silty sand
29	70.00	8.00	2- Clay and silty sand
30	72.50	14.00	2- Clay and silty sand
31	75.00	8.00	2- Clay and silty sand
32	77.50	18.00	2- Clay and silty sand

33	80.00	5.00	2- Clay and silty sand
34	82.50	5.00	2- Clay and silty sand
35	85.00	4.00	2- Clay and silty sand
36	87.50	8.00	2- Clay and silty sand
37	90.00	3.00	2- Clay and silty sand
38	92.50	7.00	2- Clay and silty sand
39	95.00	8.00	2- Clay and silty sand
40	97.50	9.00	2- Clay and silty sand
41	100.00	9.00	2- Clay and silty sand
42	100.01	0.00	5- Cavity layer

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	0.00	-25.00	25.00	7.70	5-Void
2	-25.00	-30.00	5.00	7.50	2-Clay and Silty Sand
3	-30.00	-67.50	37.50	16.27	3-Clean Sand
4	-67.50	-100.01	32.51	8.15	2-Clay and Silty Sand
5	-100.01	-100.01	0.00	0.00	5-

Driven Pile Data:

Pile unit weight = 150.00(pcf), Section Type: Square

Driven Pile Capacity:

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
1.00	24.0	0.00	0.00	0.00	0.00	0.00
2.00	24.0	0.00	0.00	0.00	0.00	0.00
3.00	24.0	0.00	0.00	0.00	0.00	0.00
4.00	24.0	0.00	0.00	0.00	0.00	0.00
5.00	24.0	0.00	0.00	0.00	0.00	0.00
6.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
8.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
10.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
12.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
14.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	0.00	0.00	0.00	0.00	0.00
16.00	24.0	0.00	0.00	0.00	0.00	0.00
17.00	24.0	0.00	0.00	0.00	0.00	0.00
18.00	24.0	0.00	0.00	0.00	0.00	0.00
19.00	24.0	0.00	0.00	0.00	0.00	0.00
20.00	24.0	0.00	0.00	0.00	0.00	0.00
21.00	24.0	0.00	0.00	0.00	0.00	0.00
22.00	24.0	0.00	0.00	0.00	0.00	0.00

23.00	24.0	0.15	0.00	0.15	0.08	0.15
24.00	24.0	1.39	0.00	1.39	0.70	1.39
25.00	24.0	3.87	32.19	36.05	18.03	100.42
26.00	24.0	6.44	33.19	39.64	19.82	106.03
27.00	24.0	8.60	35.83	44.42	22.21	116.08
28.00	24.0	10.84	39.32	50.16	25.08	128.81
29.00	24.0	13.41	42.83	56.24	28.12	141.91
30.00	24.0	21.21	54.23	75.43	37.72	183.88
31.00	24.0	25.16	53.90	79.06	39.53	186.86
32.00	24.0	29.42	52.68	82.10	41.05	187.46
33.00	24.0	33.83	50.68	84.51	42.25	185.87
34.00	24.0	37.47	49.23	86.71	43.35	185.18
35.00	24.0	40.21	48.82	89.02	44.51	186.66
36.00	24.0	42.45	48.92	91.37	45.68	189.20
37.00	24.0	44.62	48.83	93.45	46.73	191.12
38.00	24.0	46.68	48.57	95.25	47.62	192.38
39.00	24.0	48.46	48.73	97.20	48.60	194.66
40.00	24.0	49.95	49.65	99.59	49.80	198.89
41.00	24.0	51.28	51.01	102.29	51.15	204.32
42.00	24.0	52.61	52.19	104.80	52.40	209.18
43.00	24.0	53.92	53.20	107.12	53.56	213.52
44.00	24.0	55.08	54.27	109.34	54.67	217.87
45.00	24.0	55.87	54.78	110.65	55.33	220.22
46.00	24.0	56.95	54.90	111.85	55.92	221.64
47.00	24.0	57.79	56.50	114.29	57.15	227.29
48.00	24.0	58.23	60.63	118.86	59.43	240.11
49.00	24.0	59.89	67.41	127.30	63.65	262.13
50.00	24.0	61.48	77.85	139.32	69.66	295.01
51.00	24.0	63.10	91.04	154.13	77.07	336.20
52.00	24.0	64.86	101.12	165.97	82.99	368.21
53.00	24.0	66.92	106.64	173.56	86.78	386.85
54.00	24.0	70.21	108.99	179.20	89.60	397.18
55.00	24.0	74.90	110.55	185.46	92.73	406.56
56.00	24.0	80.99	110.95	191.94	95.97	413.84
57.00	24.0	88.48	107.53	196.00	98.00	411.05
58.00	24.0	96.94	100.23	197.18	98.59	397.65
59.00	24.0	103.80	93.37	197.17	98.58	383.91
60.00	24.0	108.60	88.79	197.39	98.70	374.98
61.00	24.0	112.52	85.17	197.69	98.85	368.03
62.00	24.0	116.74	81.04	197.79	98.89	359.87
63.00	24.0	121.06	76.46	197.52	98.76	350.45
64.00	24.0	124.25	73.16	197.40	98.70	343.72
65.00	24.0	126.11	71.88	197.98	98.99	341.74
66.00	24.0	127.83	71.84	199.67	99.84	343.35
67.00	24.0	130.62	71.56	202.18	101.09	345.29
68.00	24.0	137.23	25.54	162.77	81.38	213.86
69.00	24.0	140.95	25.54	166.49	83.25	217.58
70.00	24.0	144.52	26.38	170.90	85.45	223.66
71.00	24.0	148.19	27.71	175.90	87.95	231.33
72.00	24.0	152.44	28.41	180.85	90.43	237.68
73.00	24.0	157.79	28.55	186.34	93.17	243.44
74.00	24.0	163.02	27.99	191.02	95.51	247.00
75.00	24.0	167.37	27.13	194.50	97.25	248.75
76.00	24.0	171.54	26.14	197.68	98.84	249.96
77.00	24.0	177.06	24.89	201.95	100.97	251.73
78.00	24.0	183.53	23.28	206.81	103.41	253.37
79.00	24.0	188.56	21.95	210.51	105.25	254.40
80.00	24.0	191.75	21.32	213.07	106.54	255.72
81.00	24.0	194.01	21.19	215.20	107.60	257.58
82.00	24.0	196.28	20.64	216.92	108.46	258.19
83.00	24.0	198.52	19.55	218.07	109.03	257.17
84.00	24.0	200.61	18.55	219.15	109.58	256.24
85.00	24.0	202.53	18.18	220.71	110.35	257.06

86.00	24.0	204.69	18.26	222.95	111.47	259.46
87.00	24.0	207.52	18.21	225.73	112.87	262.16
88.00	24.0	210.75	17.94	228.69	114.35	264.57
89.00	24.0	212.85	17.87	230.72	115.36	266.46
90.00	24.0	213.55	18.37	231.92	115.96	268.66
91.00	24.0	214.16	19.16	233.32	116.66	271.64
92.00	24.0	216.02	19.59	235.61	117.81	274.79
93.00	24.0	218.98	19.42	238.40	119.20	277.24

NOTES
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1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.

2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.

3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.

4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
   EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.