TSF, INC.

March 11, 2021, Revision 3

Florida Department of Transportation
3400 W Commercial Blvd
Fort Lauderdale, FL 33309

Attn: Alexander Estrada, P.E.
FDOT Project Manager

RE: **Roadway Soil Survey Report**
PD&E Services for SR-806/Atlantic Ave from Turnpike to Jog Rd
Palm Beach County, Florida
FPID No. 440575-3-22-02
TSF Project No: 7111-20-119

Dear Mr. Estrada:

Tierra South Florida, Inc. (TSF) has completed a roadway soil survey for the subject project. This geotechnical study was performed in general accordance with FDOT procedures. The results of our exploration program and geotechnical recommendations are presented in this report

If you have any questions or comments regarding this report, please contact our office at your earliest convenience.

Sincerely,

TSF, INC.
This document has been digitally signed and sealed by:

Amy Guisinger
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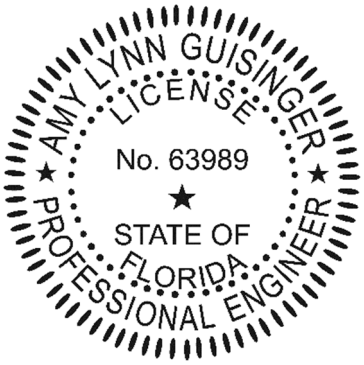

Amy L. Guisinger, P.E.
Principal Engineer
FL Registration No. 63989
On the date adjacent to the seal.
Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Ramakumar Vedula, P.E.
Principal Engineer
FL Registration No. 54873

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1.0 PROJECT DESCRIPTION

The project is a PD&E Study for SR 806/Atlantic Avenue from Turnpike to Jog Road in Palm Beach County, Florida. The study includes developing plans to widen SR 806/Atlantic Avenue from a 4-lane divided facility to a 6-lane divided facility. Atlantic Avenue over LWDD E-2E Canal (Bridge No. 930032) will be widened to the south by approximately 14'-7". The existing Utility Bridge along the south side of the bridge will be relocated further south. The bridge widening and the utility bridge relocation will require pile driving.

The purpose of this study was to provide Geotechnical (i.e. soils and groundwater) input to the design team to assist in evaluation of the merits of the potential roadway improvements.

2.0 SCOPE OF SERVICES

The study was performed to obtain information on the existing subsurface conditions at the proposed project site to assist in the PD&E Study. The following services were provided:

1. Reviewed readily available published topographic and soils information. This information was obtained from the "Soil Survey of Palm Beach County, Florida" published by the United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS), and USGS Topographic Maps.
2. Performed 18 auger and Standard Penetration Test (SPT) borings to depths of 6 to 10 feet below existing grades for roadway improvements.
3. Performed two (2) exfiltration tests at depths of 10, 15 and 20 feet.
4. Performed two (2) SPT borings to depths of 20 feet at each of the exfiltration test locations.
5. Classified soil samples using the AASHTO Soil Classification System and performed a limited laboratory testing to establish the soil properties. The laboratory testing included grain-size analysis, moisture content, organic content, and corrosion series tests.
6. Collected five bulk samples and delivered to FDOT State Material Office for resilient modulus testing.
7. Prepared this roadway soil survey report for the project.

These Geotechnical Services were performed in general accordance with FDOT Soils and Foundations Handbook.

3.0 RESULTS OF SUBSURFACE EXPLORATION

3.1 Review of USDA Soil Survey and USGS Topographic Map

A review of existing information, including the USDA Palm Beach County Soil Survey and the USGS Quadrangle topographic map, was completed. Based on the USDA Soil Survey, the near surface soils in the project area are Myakka fine sands, 0 to 2 percent slopes, and Quartzipsamments, shaped, 0 to 5 percent slopes. Based on the USGS topographic map, the project area is at an approximate elevation of +20 feet, NAVD. Excerpts from the USDA Soil Survey and USGS topographic map are presented in the Appendix.

3.2 Field Explorations

The subsurface conditions along the project corridor were explored by a total of 18 auger and SPT borings, spaced at an approximate interval of 500 feet, to depths of 6 to 10 feet below existing grades for roadway improvements, and two (2) SPT borings to depths of 20 feet at the exfiltration test locations. The auger borings were terminated at 6 feet due to cave-in of the sandy soils within the borehole from groundwater intrusion. The borings locations were marked in the field by TSF personnel using a hand-held GPS system. The approximate boring and test locations are presented

in a table, provided on the soil profiles and shown on the Boring Location Plan in the Appendix. The soil samples were placed in airtight jars and returned to our laboratory for classification by a geotechnical engineer. The samples were visually classified in general accordance with the AASHTO Soil Classification System.

3.3 General Soil Condition

The soil types encountered in the borings for the roadway improvements have been assigned a stratum number. The stratum numbers and soil types encountered are listed below.

Stratum Number	Typical Soil Description	AASHTO Classification	FDOT Soil Designation
1	Topsoil	A-8	Unsuitable
2	Light brown to brown to dark brown slightly silty sand	A-3	Select
3	Light brown sandy limerock	A-1-b	Select
4	Brown silty sand	A-2-4	Select

A Geotechnical engineer basis soil stratification on visual classification of the recovered samples, laboratory testing, and interpretation of the field boring logs. The boring stratification lines represent the approximate boundaries between soil types of significantly different engineering properties. However, the actual transition may be gradual. In some cases, small variations in properties not considered pertinent to our engineering evaluation were abbreviated or omitted for clarity. The soil profiles represent the conditions at each boring location. Soil variations should be expected between boring locations. The soil profiles as encountered in each boring are presented in the Appendix.

4.0 LABORATORY TESTING

4.1 General

Representative soil samples collected from the borings were classified and stratified in general accordance with the AASHTO Soil Classification System. Our classification was based on visual inspection, and laboratory testing on selected samples for confirmation. The laboratory tests performed include moisture content (AASHTO T 265), organic content (AASHTO T 267), and grain-size analysis (AASHTO T 27). Laboratory test results are presented in a table in the Appendix.

4.2 Environmental Corrosion Testing

Environmental corrosion tests were performed on select soil samples in accordance with FM 5-550 (pH), FM 5-551 (resistivity), FM-552 (chloride), and FM-553 (sulfate). These laboratory test results were used to determine the environmental classification in accordance with of FDOT Structures Design Guidelines. Based on the laboratory test results, the environmental classification is moderately aggressive for steel and concrete substructures. The results are provided in a table in the Appendix.

5.0 GROUNDWATER CONDITIONS

5.1 Groundwater

The depth to groundwater was measured at the boring locations following termination of drilling. The groundwater table was measured at depths of 3.3 to 9.3 feet below the existing grade. The groundwater table was not encountered

in boring B-2 within the depth of the boring. Encountered groundwater depths are presented on the Roadway Soil Profiles provided in the Appendix.

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences (i.e. existing canals, swells, drainage ponds, under drains, and areas of covered soils, like paved parking lots and sidewalks). Fluctuations should be anticipated. We recommend that the contractor determine the actual groundwater levels at the time of construction to determine the groundwater impact on construction procedures.

5.2 Seasonal High Groundwater Estimates (SHGWT)

Seasonal high groundwater levels are expected to be controlled by existing drainage features present in the project vicinity. Estimated seasonal high groundwater table levels are expected at elevation about +14 feet, NGVD 1929 (+12.5 feet, NAVD 1988). This estimate is based on the Altitude of Water Table, Surficial Aquifer, Shallow Zone, in Eastern Palm Beach County, Florida, May 16-19, 1988, published by USGS.

6.0 FIELD PERMEABILITY TESTING

6.1 Exfiltration Tests

Exfiltration tests were performed at three locations using the South Florida Water Management District (SFWMD) usual open-hole constant head method. The test locations are shown on the boring location plan in the Appendix. The tests were performed at depths of 10, 15, and 20 feet at each location. Each borehole was drilled using a hollow stem auger (about 6-inches in diameter) to retrieve soil samples for visual classification. The results of the exfiltration tests are attached in the Appendix.

7.0 ENGINEERING EVALUATIONS AND RECOMMENDATIONS

7.1 General

In general, the existing shallow subsurface soils encountered in the borings are suitable for supporting the proposed improvements after proper subgrade preparation. Site preparation should consist of normal clearing and grubbing followed by compactions of subgrade soils.

The removal of topsoil where required should be accomplished in accordance with the Florida Department of Transportation (FDOT) Standard Specifications Section 110 – Clearing and Grubbing. Backfill should consist of materials conforming to FDOT Standard Plans Index 120-001 and compacted in accordance with Section 120-9 of the current Standard Specification for Road and Bridge Construction.

7.2 Permanent Cut and Fill Slopes

If fill or cuts are required for the proposed roadway improvements, we recommend that all proposed permanent side slopes be constructed on a 2H:1V slope or flatter. To prevent minor sloughing at the surface, we recommend that the slopes be seeded, mulched and maintained to enhance slope stability soon after being completed.

7.3 Excavations

All excavations should be performed in accordance with FDOT Standard Plans Index 120-002, the latest Standard Specifications for Road and Bridge Construction, and in accordance with OSHA Standards. We recommend that sides of temporary excavations be sloped to 2H:1V or flatter or supported by temporary shorings.

7.4 Groundwater Control

Depending upon groundwater levels at the time of construction, some forms of dewatering may be required for utility excavations.

7.5 Resilient Modulus Test Results for Pavement Design

A total of five (5) bulk soil samples were collected from the project site and were delivered to FDOT State Materials Office in Gainesville to perform Resilient Modulus (M_R) tests. The results are included in the Appendix. Based on the laboratory test results, the recommended design embankment MR value is 10,200 psi.

7.6 Pavement Design Considerations

We anticipate that the proposed pavement structure will be a semi-flexible asphaltic concrete section. If a stabilized subgrade is required, we recommend a sand-gravel mixture, 12-inches thick, with a minimum design LBR of 40. The base course for the pavement should consist of limerock, shellrock or coquina, meeting the minimum requirements of the FDOT "Standard Specifications for Road and Bridge Construction," Sections 911, 913 or 915, respectively. Limerock (coquina) should have a minimum LBR value of 100. Compact the base and stabilized subgrade to at least 98 percent of maximum dry density (AASHTO T-180).

Determine asphalt thicknesses considering the anticipated traffic loading conditions and life expectancy of the pavement section.

7.7 On-Site Soil Suitability

Stratum 1 consists of topsoil. Topsoil should be removed in accordance with Standard Plans Index 120-002.

Stratum 2 consists of select material (A-3). This material can be used in embankment and should be utilized according to Standard Plans Index 120-001.

Stratum 3 consists of select material (A-1-b). This material can be used in subgrade and embankment support and should be utilized according to Standard Plans Index 120-001.

Stratum 4 consists of select material (A-2-4) and can be used in embankment and should be utilized according to Standard Plans Index 120-001. However, this material may retain excess moisture and may be difficult to dry and compact and should be used in the embankment above the water level existing at the time of construction.

7.8 Construction Considerations

Vibration producing construction activities such sheet pile installation and extraction, drilled shaft casing installation and extraction, drilled shaft excavations, compaction with vibratory rollers can cause vibration and vibration induced settlement and damages to the adjacent structures. Hence, monitoring of existing structures in accordance with Standard Specifications Section 108 will be required.

8.0 REPORT LIMITATIONS

Our Geotechnical engineering evaluation of the site and subsurface conditions with respect to the planned roadway improvements and our recommendations for site preparation and foundation construction are based upon the followings: (1) site observations, (2) the field exploratory test data obtained during the geotechnical study, and (3) our understanding of the project information and anticipated final grades as presented in this report.

If the final grades vary considerably from those stated, or when final cross-sectional data becomes available, please contact our offices so that we can review our recommendations. Furthermore, upon the discovery of any site or subsurface conditions during construction, which appears to deviate from the data obtained during this Geotechnical exploration, please contact us immediately so that we may visit the site, observe the differing conditions, and evaluate the new information with regards to our evaluation and recommendations contained herein.

The recommendations presented previously represent design and construction techniques that we feel are both applicable and feasible for the planned construction. We recommend, however, that we be provided the opportunity to review the final construction plans and the earthwork/roadway embankment construction specifications to evaluate whether our recommendations have been properly interpreted and implemented.

APPENDIX

USDA Soil Survey
USGS Topographic Map
Summary of Boring and Test Locations
Borings Location Plan
Soil Profiles
Roadway Soil Survey
Laboratory Test Results
Corrosion Series Test Results
Exfiltration Test Results
Resilient Modulus Test Results

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Palm Beach County Area, Florida
Survey Area Data: Version 16, Feb 3, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 5, 2018—Jan 9, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
21	Myakka fine sand, 0 to 2 percent slopes	110.1	93.2%
35	Quartzipsamments, shaped, 0 to 5 percent slopes	6.5	5.5%
99	Water	1.4	1.2%
Totals for Area of Interest		**118.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Palm Beach County Area, Florida

21—Myakka fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2s3lg
Elevation: 0 to 130 feet
Mean annual precipitation: 42 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Myakka and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myakka

Setting

Landform: Drainageways on flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 6 inches: fine sand
E - 6 to 20 inches: fine sand
Bh - 20 to 36 inches: fine sand
C - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

Minor Components

Basinger

Percent of map unit: 5 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Wabasso

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

Cassia

Percent of map unit: 3 percent
Landform: Rises on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL)
Hydric soil rating: No

Immokalee

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Riser, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

Satellite

Percent of map unit: 1 percent
Landform: Rises on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, rise, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL)
Hydric soil rating: No

35—Quartzipsamments, shaped, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1j7dm

Mean annual precipitation: 48 to 56 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 358 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Quartzipsamments and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Quartzipsamments

Setting

Landform: Rises on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 6 inches: fine sand
C - 6 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 39.96 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Forage suitability group: Forage suitability group not assigned (G156AC999FL)
Hydric soil rating: No

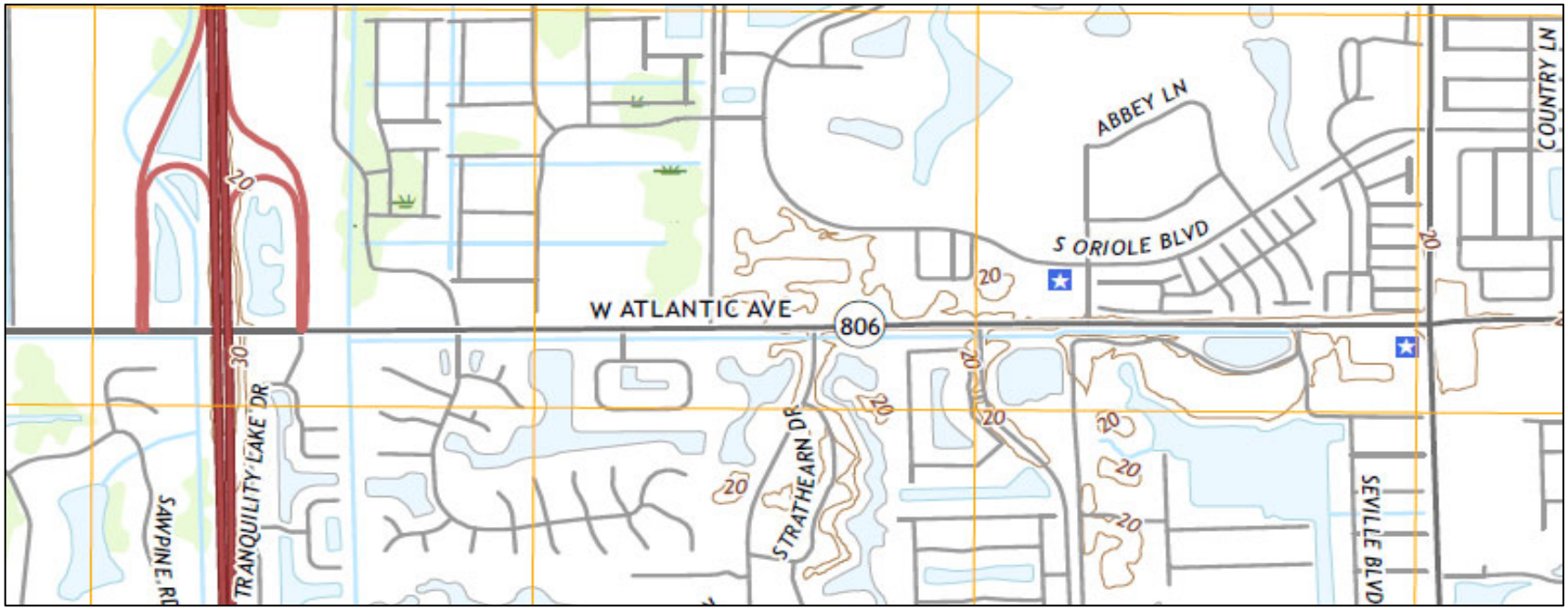
99—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

SR-806/ATLANTIC AVENUE FROM TURNPIKE TO JOG ROAD
PALM BEACH COUNTY, FLORIDA
FPID 440575-3-222-02
TSF PROJECT. NO. 7111-19-119

USGS TOPOGRAPHIC MAP: UNIVERSITY PARK, FL QUADRANGLE, 2018



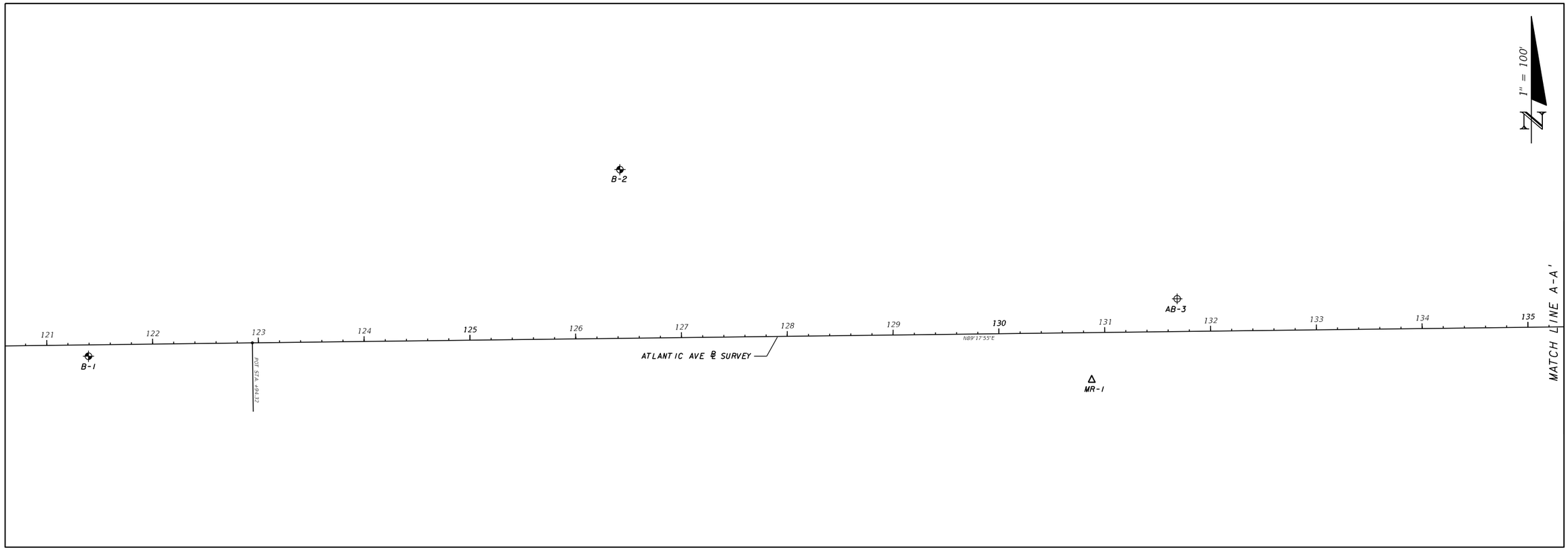
CONTOUR INTERVAL 10 FEET, NAVD 88
NOT TO SCALE

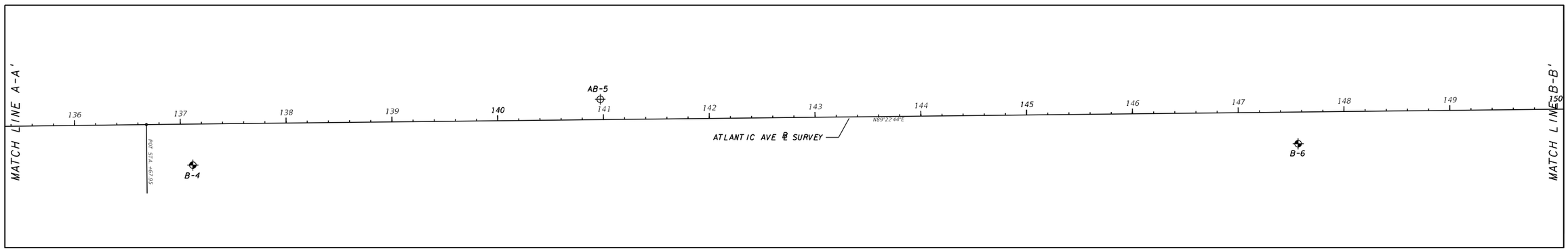
SR-806/ATLANTIC AVENUE FROM TURNPIKE TO JOG ROAD
PALM BEACH COUNTY, FLORIDA
FPID 440575-3-22-02
TSF PROJECT. NO. 7111-20-119

SUMMARY OF BORING AND TEST LOCATIONS

BORING/ TEST NO.	APPROXIMATE TEST LOCATION (FEET)							GROUND SURFACE ELEVATION
	LATITUDE	LONGITUDE	EASTING	NORTHING	STATION	OFFSET	REFERENCE	
B-1	26.45360	-80.17636	582111	2926181	121+40	11 RT	B/L Survey	N/A
B-2	26.45407	-80.17482	582264	2926235	126+64	159.5 LT	B/L Survey	N/A
AB-3	26.45373	-80.17321	582424	2926198	131+69	31 LT	B/L Survey	N/A
B-4	26.45354	-80.17156	582590	2926179	137+11	39 RT	B/L Survey	N/A
AB-5	26.45371	-80.17038	582707	2926197	140+97	19 LT	B/L Survey	N/A
B-6	26.45358	-80.16836	582908	2926185	147+56	30 RT	B/L Survey	N/A
AB-7	26.45375	-80.16674	583069	2926205	182+86	30 LT	B/L Survey	N/A
B-8	26.45358	-80.16511	583232	2926186	158+20	36 RT	B/L Survey	N/A
B-9	26.45395	-80.16362	583381	2926229	163+00	99 LT	B/L Survey	N/A
AB-10	26.45377	-80.16239	583503	2926209	167+10	27 LT	B/L Survey	N/A
B-11	26.45390	-80.15973	583769	2926225	175+82	65 LT	B/L Survey	N/A
AB-12	26.45380	-80.15870	583871	2926215	179+18	25 LT	B/L Survey	N/A
B-13	26.45392	-80.15711	584030	2926229	184+40	62.5 LT	B/L Survey	N/A
B-14	26.45366	-80.15603	584138	2926202	187+93	34 RT	B/L Survey	N/A
AB-15	26.45393	-80.15368	584372	2926233	195+62	59.5 LT	B/L Survey	N/A
AB-16	26.45370	-80.15224	584516	2926208	200+33	27 RT	B/L Survey	N/A
B-17	26.45394	-80.15060	584679	2926236	205+70	59 LT	B/L Survey	N/A
B-18	26.45366	-80.14901	584838	2926206	210+90	45 RT	B/L Survey	N/A
BHP-1	26.45362	-80.16056	583686	2926195	173+09	31.5 RT	B/L Survey	N/A
BHP-2	26.45382	-80.15120	584618	2926223	203+71	17.5 LT	B/L Survey	N/A
MR-1	26.45352	-80.17346	582399	2926174	130+87	44.5 RT	B/L Survey	N/A
MR-2	26.45396	-80.16622	583122	2926228	154+59	105 LT	B/L Survey	N/A
MR-3	26.45363	-80.15951	583790	2926196	176+54	35 RT	B/L Survey	N/A
MR-4	26.45406	-80.15440	584300	2926247	193+30	105 LT	B/L Survey	N/A
MR-5	26.45367	-80.14918	584820	2926207	210+30	40 RT	B/L Survey	N/A

LATITUDE/LONGITUDE, REFERENCE WGS 84
NORTHING/EASTING, REFERENCE UTM WGS 84





Approximate Location of SPT Test

Approximate Location of Auger Boring Test

Approximate Location of MR Test

Approximate Location of BHP Test

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

AMY GUISINGER, P.E.
P.E. LICENSE NUMBER 63989
TIERRA SOUTH FLORIDA, INC.
2765 VISTA PARKWAY, SUITE 10
WEST PALM BEACH, FL 33411

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 806	PALM BEACH	440575-3-22-02

BORINGS LOCATION PLAN

SHEET NO.

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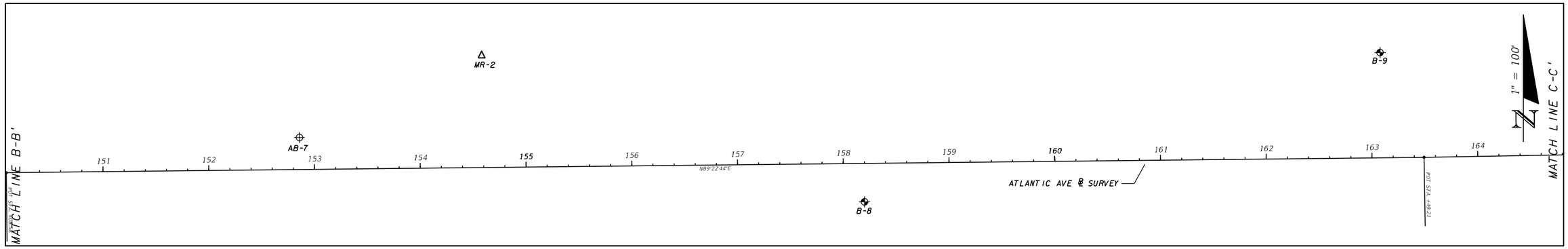

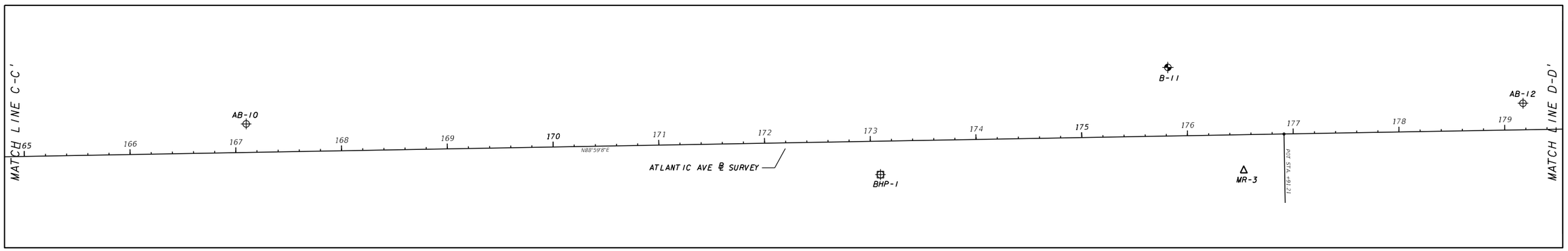

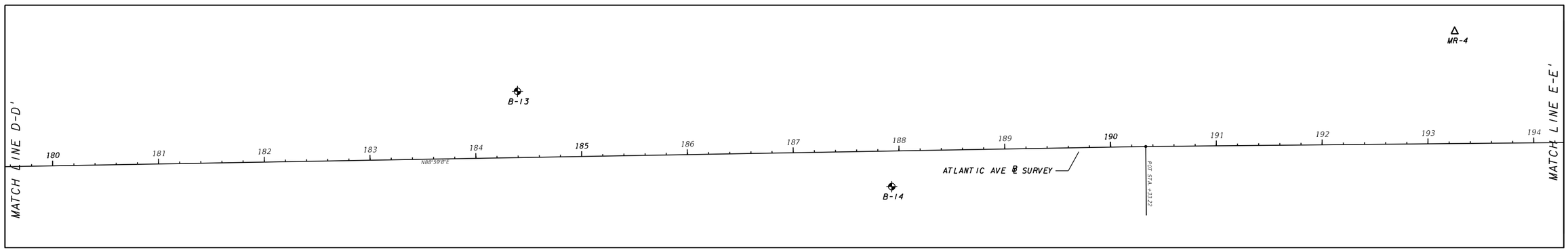

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REVISIONS			
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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 806	PALM BEACH	440575-3-22-02

BORINGS LOCATION PLAN

SHEET NO.

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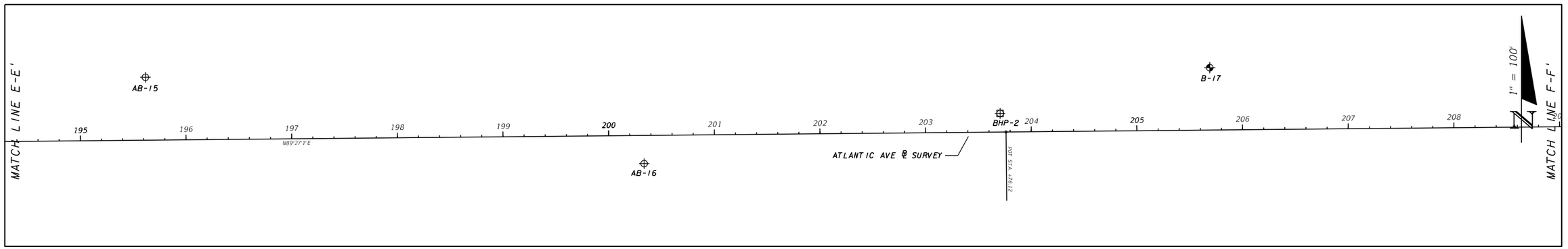

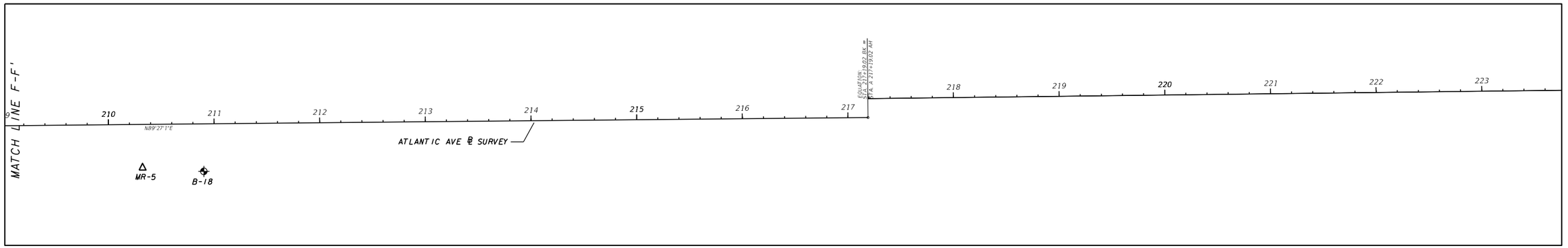

Approximate Location of SPT Test

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DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 806	PALM BEACH	440575-3-22-02

BORINGS LOCATION PLAN

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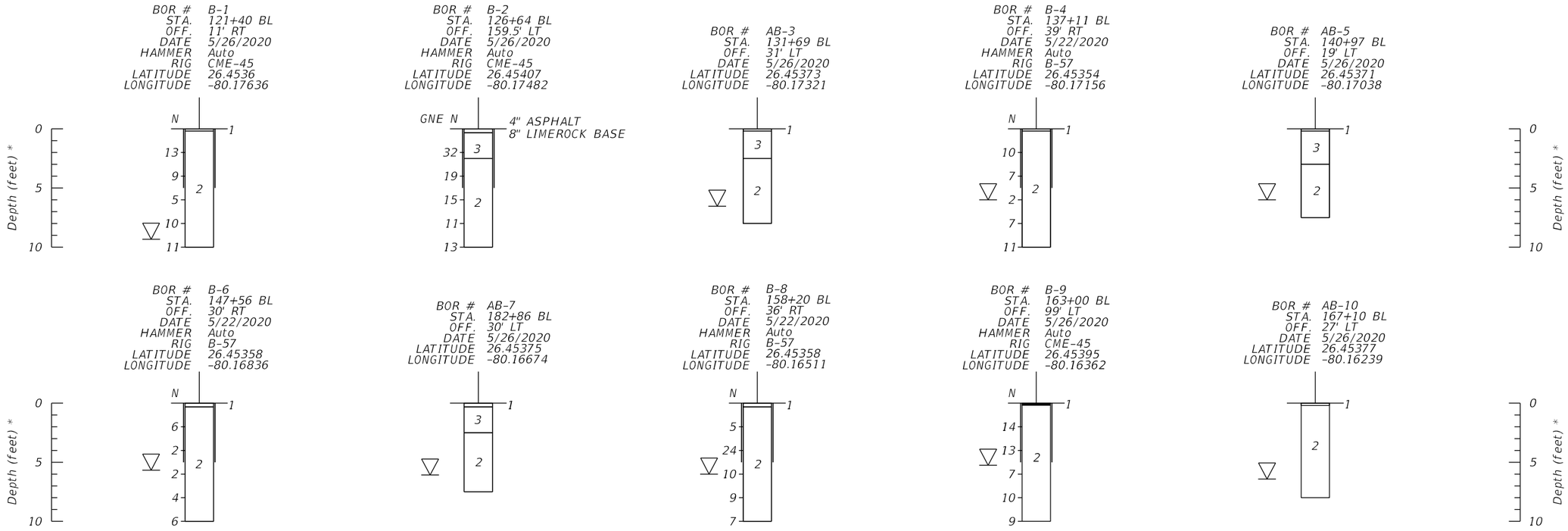

LEGEND

1. TOPSOIL (A-8)
2. LIGHT BROWN TO BROWN TO DARK BROWN SAND TO SLIGHTLY SILTY SAND OCCASIONALLY WITH TRACE TO FEW LIMEROCK OR TRACE SHELL (A-3)
3. LIGHT BROWN SANDY LIMEROCK (A-1-b)
4. BROWN SILTY SAND (A-2-4)

▽ ENCOUNTERED GROUNDWATER TABLE

GNE GROUNDWATER NOT ENCOUNTERED

N NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12" PENETRATION AND THEY WERE OBTAINED USING AN AUTOMATIC HAMMER.

|| CASING

NOTES

* DENOTES DEPTH IN FEET FROM EXISTING GROUND SURFACE

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

AMY GUISINGER, P.E.
P.E. LICENSE NUMBER 63989
TIERRA SOUTH FLORIDA, INC.
2765 VISTA PARKWAY, SUITE 10
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 806	PALM BEACH	440575-3-22-02

SOIL PROFILES

SHEET NO.

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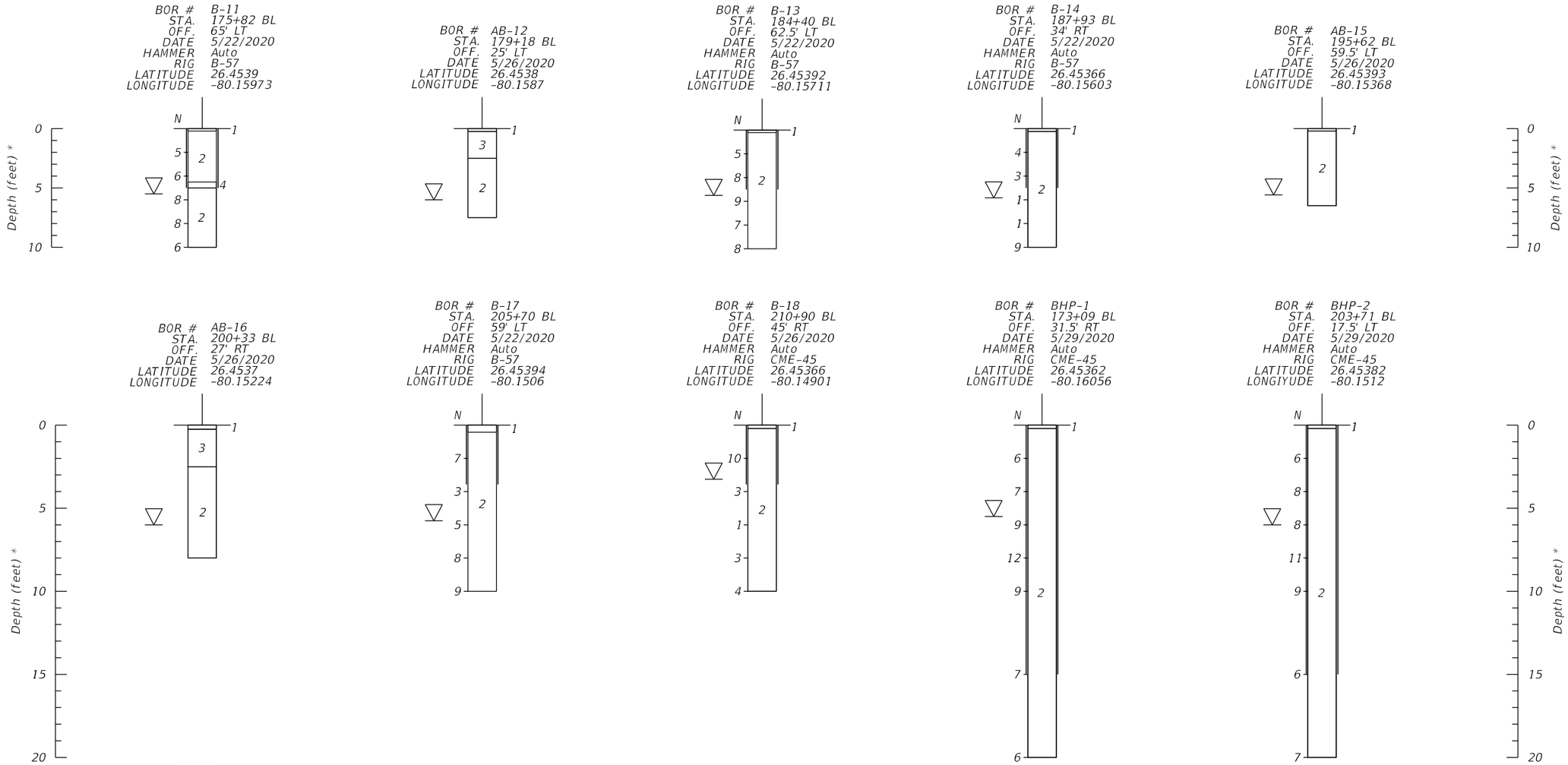

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|| CASING

NOTES

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 806	PALM BEACH	440575-3-22-02

SOIL PROFILES

SHEET NO.

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DATE OF SURVEY: 5/22/2020 - 5/29/2020
SURVEY MADE BY: TIERRA SOUTH FLORIDA, INC.
SUBMITTED BY: TIERRA SOUTH FLORIDA, INC.

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

DISTRICT: 4
ROAD NO.: SR 806
COUNTY: PALM BEACH

PROJECT NAME: SR-806/ ATLANTIC AVE FROM TURNPIKE TO JOG RD

FINANCIAL PROJECT ID: 440575-3-22-02

CROSS SECTION SOIL SURVEY FOR THE DESIGN OF ROADS

SURVEY BEGINS STATION: 121+00 SURVEY ENDS STATION: 215+00

REFERENCE: BL SURVEY

	ORGANIC CONTENT		MOISTURE CONTENT		SIEVE ANALYSIS RESULTS % PASS						ATTERBERG LIMITS (%)					CORROSION TEST RESULTS				
STRATUM NO.	NO. OF TESTS	% ORGANIC	NO. OF TESTS	% MOISTURE	NO. OF TESTS	10 MESH	40 MESH	60 MESH	100 MESH	200 MESH	NO. OF TESTS	LIQUID LIMIT	PLASTIC INDEX	AASHTO GROUP	DESCRIPTION	NO. OF TESTS	RESISTIVITY ohms-cm	CHLORIDE ppm	SULFATES ppm	pH
1	-	-	-	-	-	-	-	-	-	-	-	-	-	A-8	TOPSOIL	-	-	-	-	-
2	2	3-4	2	23-33	2	100	84-89	41	11-12	3	-	-	-	A-3	LIGHT BROWN TO BROWN TO DARK BROWN SLIGHTLY SILTY SAND OCCASIONALLY WITH TRACE TO FEW LIMEROCK OR TRACE SHELL	4	2,800-18,000	30-45	0-228	7.0-8.1
3	-	-	1	12	1	46	39	25	13	7	-	-	-	A-1-b	LIGHT BROWN SANDY LIMEROCK	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	-	A-2-4	BROWN SILTY SAND	-	-	-	-	-

EMBANKMENT AND SUBGRADE MATERIAL

STRATA BOUNDARIES ARE APPROXIMATE. MAKE FINAL CHECK AFTER GRADING.
GNE GROUNDWATER NOT ENCOUNTERED
▽ ENCOUNTERED GRAUNDWATER TABLE

1. STRATUM 1 CONSISTS OF TOPSOIL (A-8) AND SHOULD BE REMOVED IN ACCORDANCE WITH STANDARD PLANS INDEX 120-002.

2. THE MATERIAL FROM STRATA 2 (A-3) AND 3 (A-1-b) APPEAR SUITABLE FOR USE IN THE SUBGRADE AND EMBANKMENT WHEN UTILIZED IN ACCORDANCE WITH STANDARD PLANS INDEX 120-001.

3. THE MATERIAL FROM STRATUM 4 (A-2-4) APPEARS SUITABLE FOR USE IN THE EMBANKMENT WHEN UTILIZED IN ACCORDANCE TO STANDARD PLANS INDEX 120-001. HOWEVER, THIS MATERIAL MAY RETAIN EXCESS MOISTURE AND MAY BE DIFFICULT TO DRY AND COMPACT. IT SHOULD BE USED IN THE EMBANKMENT ABOVE THE WATER LEVEL EXISTING AT THE TIME OF CONSTRUCTION.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

AMY GUISINGER, P.E.
P.E. LICENSE NUMBER 63989
TIERRA SOUTH FLORIDA, INC.
2765 VISTA PARKWAY, SUITE 10
WEST PALM BEACH, FL 33411

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 806	PALM BEACH	440575-3-22-02

ROADWAY SOIL SURVEY

SHEET NO.

Summary of Laboratory Test Results
Atlantic Blvd. PD&E
Palm Beach County, FL

TSF Project No. 7111-20-119

Boring Number	Sample Depth (ft)	Stratum Number	AASHTO Symbol	Sieve Analysis, Percentage Passing								Atterberg Limits			Organic Content (%)	Natural Moisture Content (%)
				3/4"	3/8"	#4	#10	#40	#60	#100	#200	Liquid Limit	Plastic Limit	Plasticity Index		
B-3	0.2-3.5	3	A-1-b	68	55	49	46	39	25	13	7				-	11.6
B-4	6.0-8.0	2	A-3	100	100	100	100	89	41	11	3				4.2	23.0
B-14	4.0-6.0	2	A-3	100	100	100	100	84	41	12	3				3.0	32.7

TIERRA SOUTH FLORIDA

SUMMARY OF CORROSION TEST RESULTS

Atlantic Blvd PD&E
Palm Beach County, Florida
TSF Project No. 7111-20-119

Boring Number	Depth (ft)	pH (FM 5-550)	Resistivity (ohm-cm) (FM 5-551)	Chlorides (ppm) (FM 5-552)	Sulfates (ppm) (FM 5-553)	Environmental Classification* (Soil)	
						Steel	Concrete
B-4	8.0 - 10.0	8.1	18,000	45	87.0	Slightly Aggressive	Slightly Aggressive
B-9	6.0 - 8.0	7.0	2,800	30	0.0	Moderately Aggressive	Moderately Aggressive
B-14	6.0 - 8.0	7.6	5,100	45	0.0	Slightly Aggressive	Slightly Aggressive
B-17	6.0 - 8.0	7.0	12,000	30	228.0	Moderately Aggressive	Slightly Aggressive

* As per FDOT Structures Design Guidelines, Table 1.1, Updated January, 2019
**** Any reading represented as "0.0" is below the detection limit of 4.8 ppm**

Structures Design Guidelines
1 - General Requirements

Topic No. 625-020-018
January 2019

Table 1.3.2-1 Criteria for Substructure Environmental Classifications

Classification	Environmental Condition	Units	Steel		Concrete	
			Water	Soil	Water	Soil
Extremely Aggressive (If any of these conditions exist)	pH		< 6.0		< 5.0	
	Cl	ppm	> 2000		> 2000	
	SO_4	ppm	N.A.		> 1500	> 2000
	Resistivity	Ohm-cm	< 1000		< 500	
Slightly Aggressive (If all of these conditions exist)	pH		> 7.0		> 6.0	
	Cl	ppm	< 500		< 500	
	SO_4	ppm	N.A.		< 150	< 1000
	Resistivity	Ohm-cm	> 5000		> 3000	
Moderately Aggressive	This classification must be used at all sites not meeting requirements for either slightly aggressive or extremely aggressive environments.					
pH = acidity ($-\log_{10}H^+$; potential of Hydrogen), Cl = chloride content, SO_4 = Sulfate content.						

2. Superstructure: Any superstructure located within 2,500 feet of any coal burning

Summary of Borehole Permeability Test Results
PD&E Services for SR-806/Atlantic Ave from Turnpike to Jog Rd
Palm Beach County, Florida

TSF Project No. 7111-20-119

Test Location	Date Performed	Diameter		Depth of Hole	Depth to Groundwater Level Below Ground Surface (Feet)		Hydraulic Head, H_2	Saturated Hole Depth, Ds	Average Flow Rate, Q	Hydraulic Conductivity (K)
		Hole (Inches)	Casing (Inches)	(Feet)	Prior to Test	During Test	(Feet)	(Feet)	(gpm)	($ft^3/sec/ft^2$-ft Head)
BHP-1	5/22/2020	6	4	10.0	5.3	0.0	5.3	4.8	1.10	5.98E-05
BHP-1	5/29/2020	6	4	15.0	5.5	0.0	5.5	9.5	6.00	1.88E-04
BHP-1	5/29/2020	6	4	20.0	5.5	0.0	5.5	14.5	7.00	1.56E-04
BHP-2	5/22/2020	6	4	10.0	6.0	0.0	6.0	4.0	1.20	6.01E-05
BHP-2	5/29/2020	6	4	15.0	5.5	0.0	5.5	9.5	5.00	1.57E-04
BHP-2	5/29/2020	6	4	20.0	5.5	0.0	5.5	14.5	6.00	1.34E-04

Note:

(1) The above hydraulic conductivity values represent an ultimate value. The designer should decide on the required factor of safety

(2) The hydraulic conductivity values were calculated based on the South Florida Water Management Districts's USUAL OPEN HOLE CONSTANT HEAD percolation test procedure.

(3) Casing diameter was used for the calculation of hydraulic conductivity values.

GRAIN SIZE DATA SHEET

PROJECT NAME: Atlantic Blvd. PD&E 5/28/2020

PROJECT #: 7111-20-119

BORING #	B-3	Tare #	8	Tare #	
OFFSET (ft)		Tare Wt.	189.8	Tare Wt.	1.00
DEPTH (ft):	0.2-3.5	Wet Wt.+ Tare	526.5	Wet Wt.+ Tare (bef.)	1.00
		Dry Wt.+ Tare	491.6	Wet Wt.+ Tare (aft.)	1.00
		Water Wt.	34.9	Soil Wt.	1.00
LL-PL-PI		Dry Wt.	301.8	Organic Wt.	0.00
		Moisture Content	11.6%	Organic Content (%)	0.00

Soil Classification: A-1-b

		Tare #	Tare Wt.	Dry Wt + Tare Wt.	Dry Wt. - Tare Wt.	
	Sample				301.8	
Sieve Size	**Sieve Sizes**	**Cumulative Wt. Retained**	**% RETAINED**	**% PASSING**	**% PASSING TOTAL SAMPLE**	**% Passing Spec. Limits**
75	75mm 3"	0	0.0	100.0	100	
50	50mm 2"	0	0.0	100.0	100	
37.5	37.5mm 1.5"	0	0.0	100.0	100	
25	25mm 1"	0	0.0	100.0	100	
19	19mm 3/4"	95.5	31.6	68.4	68	
9.5	9.5mm 3/8"	137.2	45.5	54.5	55	
4.75	4.75mm #4	154.3	51.1	48.9	49	
2	2mm #10	163.2	54.1	45.9	46	
0.425	425um #40	182.6	60.5	39.5	39	
0.25	250um #60	226.2	75.0	25.0	25	
0.15	150um #100	262.7	87.0	13.0	13	
0.075	75um #200	280.6	93.0	7.0	7	

NOTES:

ASTM D 2487 Classification of Soil for Engineering Purposes

Coarse Gravel	< 3" and > 3/4"
Fine Gravel	< 3/4" and > #4

Coarse Sand	< #4 and > #10
Medium Sand	< #10 and > #40
Fine Sand	< #40 and > #200

Cu = D60 / D10

Cc = (D30)^2 / (D10 x D60)

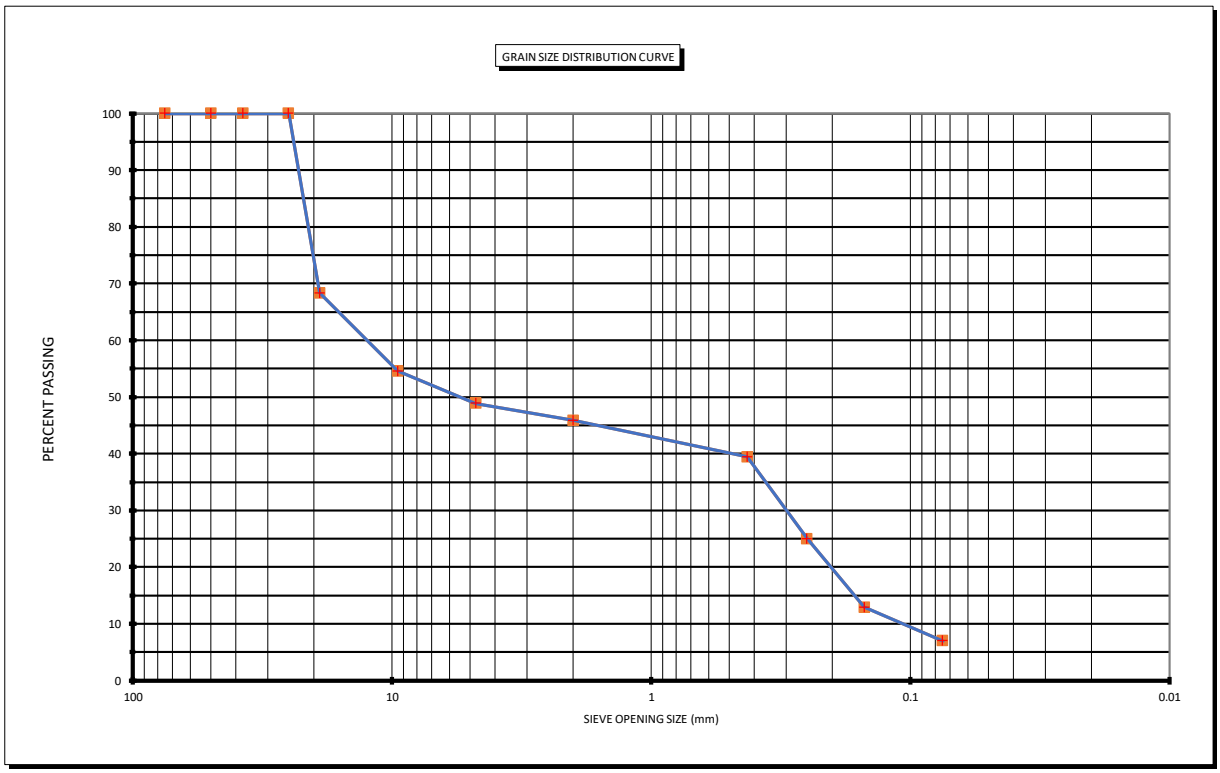
1000 um = 1 mm

tested by: _____ computed by: Max checked by: Harmon

GRAIN SIZE DATA SHEET

PROJECT NAME: Atlantic Blvd. PD&E **DATE:** 5/28/2020

PROJECT #: 7111-20-119



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	$Cu = D_{60} / D_{10}$
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	$Cc = (D_{30})^2 / (D_{10} \times D_{60})$
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # B-3 **OFFSET (ft)** **DEPTH (ft):** 0.2-3.5

SOIL CLASSIFICATION: A-1-b

ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTIC INDEX	

GRAIN SIZE DATA SHEET

PROJECT NAME: Atlantic Blvd. PD&E 5/27/2020

PROJECT #: 7111-20-119

BORING #	B-4	Tare #	22	Tare #	
OFFSET (ft)		Tare Wt.	187.7	Tare Wt.	11.37
DEPTH (ft):	6.0-8.0	Wet Wt.+ Tare	419.0	Wet Wt.+ Tare (bef.)	26.85
		Dry Wt.+ Tare	375.8	Wet Wt.+ Tare (aft.)	26.22
		Water Wt.	43.2	Soil Wt.	14.85
LL-PL-PI		Dry Wt.	188.1	Organic Wt.	0.63
		Moisture Content	23.0%	Organic Content (%)	4.24

Soil Classification: A-3

		Tare #	Tare Wt.	Dry Wt + Tare Wt.	Dry Wt. - Tare Wt.	
	Sample				170.8	
Sieve Size	**Sieve Sizes**	**Cumulative Wt. Retained**	**% RETAINED**	**% PASSING**	**% PASSING TOTAL SAMPLE**	**% Passing Spec. Limits**
75	75mm 3"	0	0.0	100.0	100	
50	50mm 2"	0	0.0	100.0	100	
37.5	37.5mm 1.5"	0	0.0	100.0	100	
25	25mm 1"	0	0.0	100.0	100	
19	19mm 3/4"	0	0.0	100.0	100	
9.5	9.5mm 3/8"	0	0.0	100.0	100	
4.75	4.75mm #4	0	0.0	100.0	100	
2	2mm #10	0.5	0.3	99.7	100	
0.425	425um #40	19.2	11.2	88.8	89	
0.25	250um #60	100.5	58.8	41.2	41	
0.15	150um #100	152.1	89.1	10.9	11	
0.075	75um #200	165.9	97.1	2.9	3	

NOTES:

ASTM D 2487 Classification of Soil for Engineering Purposes

Coarse Gravel	< 3" and > 3/4"
Fine Gravel	< 3/4" and > #4

Coarse Sand	< #4 and > #10
Medium Sand	< #10 and > #40
Fine Sand	< #40 and > #200

Cu = D60 / D10

Cc = (D30)^2 / (D10 x D60)

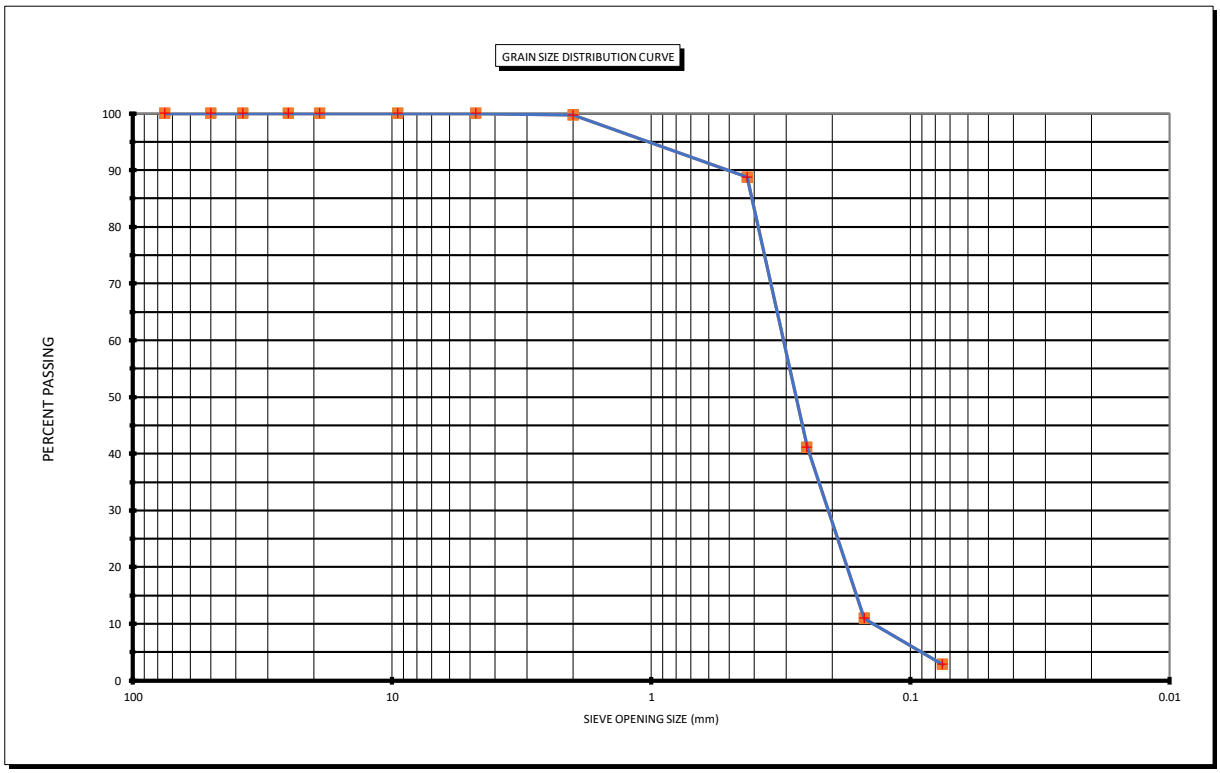
1000 um = 1 mm

tested by: _____ computed by: Max checked by: Harmon

GRAIN SIZE DATA SHEET

PROJECT NAME: Atlantic Blvd. PD&E **DATE:** 5/27/2020

PROJECT #: 7111-20-119



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	$Cu = D_{60} / D_{10}$
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	$Cc = (D_{30})^2 / (D_{10} \times D_{60})$
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # B-4 **OFFSET (ft)** **DEPTH (ft):** 6.0-8.0

SOIL CLASSIFICATION: A-3

ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTIC INDEX	

GRAIN SIZE DATA SHEET

PROJECT NAME: Atlantic Blvd. PD&E 5/27/2020

PROJECT #: 7111-20-119

BORING #	B-14	Tare #	32	Tare #	
OFFSET (ft)		Tare Wt.	181.2	Tare Wt.	11.31
DEPTH (ft):	4.0-6.0	Wet Wt.+ Tare	540.7	Wet Wt.+ Tare (bef.)	29.95
		Dry Wt.+ Tare	452.1	Wet Wt.+ Tare (aft.)	29.40
		Water Wt.	88.6	Soil Wt.	18.09
LL-PL-PI		Dry Wt.	270.9	Organic Wt.	0.55
		Moisture Content	32.7%	Organic Content (%)	3.04

Soil Classification: A-3

		Tare #	Tare Wt.	Dry Wt + Tare Wt.	Dry Wt. - Tare Wt.	
	Sample				246.9	
Sieve Size	**Sieve Sizes**	**Cumulative Wt. Retained**	**% RETAINED**	**% PASSING**	**% PASSING TOTAL SAMPLE**	**% Passing Spec. Limits**
75	75mm 3"	0	0.0	100.0	100	
50	50mm 2"	0	0.0	100.0	100	
37.5	37.5mm 1.5"	0	0.0	100.0	100	
25	25mm 1"	0	0.0	100.0	100	
19	19mm 3/4"	0	0.0	100.0	100	
9.5	9.5mm 3/8"	0	0.0	100.0	100	
4.75	4.75mm #4	0	0.0	100.0	100	
2	2mm #10	0.8	0.3	99.7	100	
0.425	425um #40	39.9	16.2	83.8	84	
0.25	250um #60	146	59.1	40.9	41	
0.15	150um #100	217.9	88.3	11.7	12	
0.075	75um #200	239.7	97.1	2.9	3	

NOTES:

ASTM D 2487 Classification of Soil for Engineering Purposes

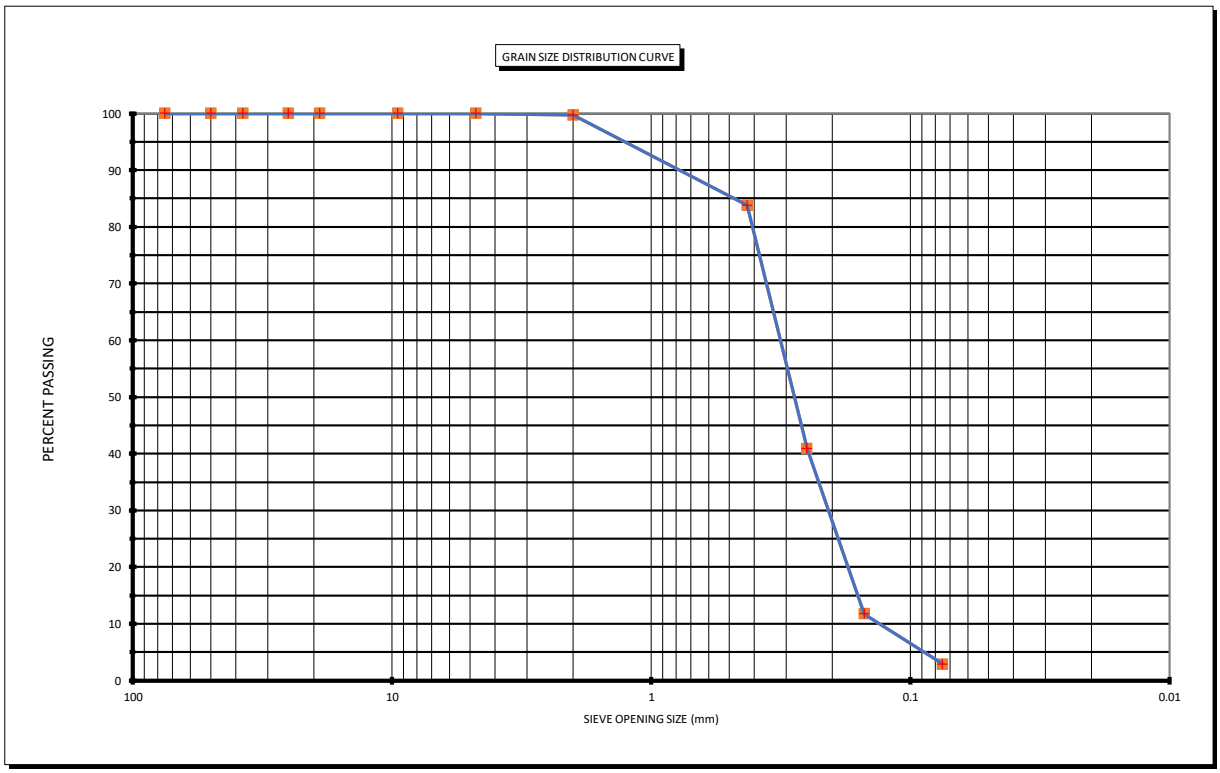
Coarse Gravel	< 3" and > 3/4"	Coarse Sand	< #4 and > #10	Cu = D60 / D10
Fine Gravel	< 3/4" and > #4	Medium Sand	< #10 and > #40	Cc = (D30)^2 / (D10 x D60)
		Fine Sand	< #40 and > #200	1000 um = 1 mm

tested by: computed by: Max checked by: Harmon

GRAIN SIZE DATA SHEET

PROJECT NAME: Atlantic Blvd. PD&E **DATE:** 5/27/2020

PROJECT #: 7111-20-119



ASTM D 2487 Classification of Soil for Engineering Purposes			Coarse Sand	< #4 and > #10	$Cu = D_{60} / D_{10}$
Coarse Gravel	< 3" and > 3/4"		Medium Sand	< #10 and > #40	$Cc = (D_{30})^2 / (D_{10} \times D_{60})$
Fine Gravel	< 3/4" and > #4		Fine Sand	< #40 and > #200	

BORING # B-14 **OFFSET (ft)** **DEPTH (ft):** 4.0-6.0

SOIL CLASSIFICATION: A-3

ATTERBERG LIMIT (- #40 Material)	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTIC INDEX	

Florida Department of Transportation
605 Suwannee Street
Tallahassee, FL 32399-0450

RON DESANTIS
GOVERNOR

KEVIN J. THIBAULT
SECRETARY

MEMORANDUM

DATE: July 2, 2020

TO: Nitin Dave, Geotechnical Design Technologist

FROM: David Horhota, State Geotechnical Materials Engineer

SUBJECT: Embankment Resilient Modulus Pavement Design
District 4, Palm Beach County
FPN 440575-3: SR-806/Atlantic Avenue from Turnpike to Jog Road

Five (5), 2-bag samples were received by the State Materials Office (SMO) for determination of an embankment (roadbed) resilient modulus for pavement design. After visual observation of the five samples, it was determined that the material from each 2-bag sample looked visually similar and the material from each of the bags were combined to form one sample from each location. After combining materials from the bags, samples from each location were obtained for classification tests (Atterberg limits, particle size analysis, and organic content), Proctor density, and resilient modulus. The classification test results are reported in Tables 1 and 2. Information provided for this project by Tierra South Florida, Inc. indicated all samples were collected from between 1.0 and 2.0 feet in depth.

Table 1. Summary of Initial Soil Gradation Results

Sample ID	Passing 3/4" (%)	Passing 1/2" (%)	Passing 3/8" (%)	Passing No. 4 (%)	Passing No. 10 (%)	Passing No. 40 (%)	Passing No. 60 (%)	Passing No. 100 (%)	Passing No. 200 (%)
MR-1	100.0	100.0	99.8	99.7	99.6	88.1	39.4	10.8	3.0
MR-2	100.0	100.0	99.9	99.8	99.6	88.6	44.3	13.0	3.4
MR-3	100.0	100.0	99.9	99.7	99.7	87.8	40.3	12.4	3.5
MR-4	100.0	100.0	100.0	100.0	99.9	87.1	35.1	8.6	2.5
MR-5	100.0	100.0	100.0	99.9	99.8	89.3	40.9	10.8	2.2

Table 2. Summary of Soil Classification and Organic Content Results

Sample ID	Location	Soil Class.	Organic Content (%)	LL/PI
MR-1	26.453518, -80.173463	A-3	0.9	N.P.
MR-2	26.453962, -80.166216	A-3	1.0	N.P.
MR-3	25.453629, -80.159509	A-3	0.8	N.P.
MR-4	26.454058, -80.154398	A-3	0.5	N.P.
MR-5	26.453668, -80.149184	A-3	0.7	N.P.

In addition to the classification testing, the following test program was conducted:

(1) Standard Proctor, AASHTO T 99
(2) Resilient Modulus (M_R), AASHTO T 307.

A summary of laboratory test results is included in Table 3. The resilient modulus values listed in this table were obtained using the relationship developed from each individual test (resilient modulus versus bulk stress - with bulk stress, Θ, defined as $\Theta = \sigma_1 + \sigma_2 + \sigma_3$), and using a bulk stress of 11 psi, which is the recommendation from Dr. Ping's research work in modeling the embankment in-situ stresses for Florida pavement conditions. Two results are listed for each location because two samples were prepared for each location and they represent the individual test result from each sample tested. The resilient modulus samples were compacted to within 1 pound per cubic foot (pcf) of the maximum density and 0.5 percent of the optimum moisture content as determined by AASHTO T99.

Table 3. Summary of T-99 and M_R Test Results

Sample ID	Passing No. 200, %	Standard Proctor Density, pcf	Optimum Moisture Content, %	Resilient Modulus @ Θ=11psi (psi)
MR-1	3	106.7	12.4	10,554
				10,807
MR-2	3	107.4	12.5	10,558
				11,688
MR-3	5	106.4	13.2	11,625
				11,117
MR-4	3	106.1	12.9	10,044
				10,248
MR-5	2	105.8	13.8	10,518
				10,710

To obtain a design embankment resilient modulus, a 90 percent method was used as outlined in both the Flexible Pavement Design Manual and Soils and Foundations Handbook. The resilient modulus values were ranked in ascending order and the percentage of values which were greater than or equal to the individual value

were determined. The results of this analysis are recorded in Table 4 and the corresponding graph of these results is included as Figure 1.

Table 4. Ranked M_R Test Results for 90 Percent Method

Rank	Sample ID	% ≥	M_R (psi)
1	MR-4 (1)	100	10,044
2	MR-4 (2)	90	10,248
3	MR-5 (1)	80	10,518
4	MR-1 (1)	70	10,554
5	MR-2 (1)	60	10,558
6	MR-5 (2)	50	10,710
7	MR-1 (2)	40	10,807
8	MR-3 (2)	30	11,117
9	MR-3 (1)	20	11,625
10	MR-2 (2)	10	11,688

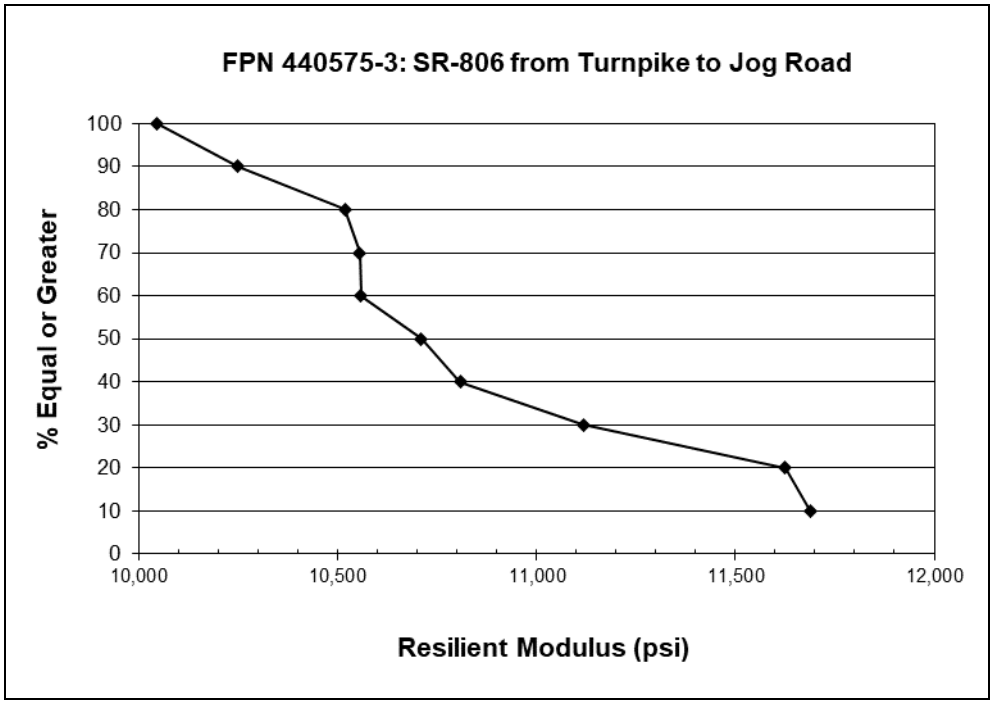


Figure 1. Ranked M_R Test Results for 90% Method

Based on the results shown in Table 4 and Figure 1, the resilient modulus corresponding to a 90th percentile is **10,200 psi**, which would represent the design embankment M_R value.