TIERRA SOUTH FLORIDA, INC.

May 26, 2016

Inwood Consulting Engineers
3000 Dovera Dr., Suite 200
Oviedo, FL 32765

Attn: Alex B. Hull, PE
Principal

RE: **Preliminary Roadway Soil Survey Report**
PD&E Study for Midway Road (CR 712)
From Glades Cut Off Road (CR 709) to Selvitz Road (CR 615)
St. Lucie County, Florida
FPID No. 231440-3-22-01
TSF Project No.: 7111-15-154

Dear Alex:

Tierra South Florida, Inc. (TSF) has completed a preliminary roadway soil survey for the subject roadway improvement PD&E Study project. The preliminary soil survey was performed in general accordance with FDOT procedures. The results of our preliminary geotechnical study and subsequent preliminary 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,

TIERRA SOUTH FLORIDA, INC.

Raj Krishnasamy, P.E.
Principal Engineer/President
FL Registration No. 53567

N. Manoharan, Ph.D.
Senior Specialist

2765 VISTA PARKWAY, SUITE 10; WEST PALM BEACH, FLORIDA 33411
(561) 687-8539; FAX (561) 687-8570
State of Florida Professional Engineers License #28073

Table of Contents

1.0 PROJECT DESCRIPTION

The Florida Department of Transportation District Four is conducting a Project Development and Environment (PD&E) study in an effort to provide improvements (widening) of Midway Road (CR 712) from Glades cut off Road (CR 709) to Selvitz Road (CR 615) in St. Lucie County.

The purpose of this preliminary geotechnical study was to provide preliminary geotechnical information to assist in the PD&E Study.

2.0 SCOPE OF SERVICES

The study was performed to obtain information on the existing subsurface conditions along the project alignment to assist in the design and preparation of construction plans for the proposed construction. The following services were provided:

1. Reviewed readily available published topographic and soils information. This information was obtained from the "Soil Survey of St. Lucie County, Florida" published by the United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS), and USGS Maps.

2. Performed a preliminary geotechnical exploration along the project corridor which included a total of sixteen (16) roadway soil borings (14 Standard Penetration Test (SPT) borings to 10 feet deep below existing grades + 2 hand auger borings 6 to 10ft deep). Hand auger borings were performed at difficult site access conditions locations.

3. 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 and organic determination and Atterberg Limit tests.

4. Prepared this Preliminary Roadway Soil Survey Report for the project.

These Geotechnical Services were performed in general accordance with FDOT's Soils and Foundations Handbook (2016)

3.0 RESULTS OF SUBSURFACE EXPLORATION

3.1 Review of USDA Soil Survey, St. Lucie County, Florida

Based on a review of the St. Lucie County Soil Survey, the project corridor is mapped as:

25—Nettles and Oldsmar sands
31—Pepper and EauGallie sands
38—Riviera fine sand, 0 to 2 percent slopes
44—Tantile and Pomona sands
48—Wabasso sand, 0 to 2 percent slopes
50—Waveland and Immokalee fine sands

A Site Vicinity Map and USDA soil survey map are presented in the Appendix.

3.2 Field Explorations

The subsurface conditions along the project corridor were explored by a total of 16 soil borings as follows:

- A total of 14 SPT borings to 10 feet deep below existing grades (borings RD-1 thru RD-5, RD-7 thru RD-10, RD-12 thru RD-15, and RD-18).
- A total of 2 hand auger borings (RD-6 and RD-7) at difficult site access conditions.

During our field work the east end of the project was a construction zone and borings RD-16 and RD-17 planned in this area could not be performed.

The borings were located in the field by TSF personnel using a hand-held GPS system. The SPT borings were drilled using a truck-mounted CME-55 drill rig and mud rotary procedures. In the borings samples of the in-place materials were obtained continuously in the upper 10 feet. At a few locations, due to difficult site access conditions, borings were performed using hand augers (about 6 to 10 feet below existing grades). Approximate locations of the borings are presented in the boring location plan included in the Appendix. The soil samples were 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 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	Brown to light brown sand, occasionally few to trace silt and trace limerock	A-3	Select
3	Brown silty sand occasionally trace shell	A-2-4	Select
4	Dark brown organic stained silty sand	A-2-4	Select

Soil profiles encountered in the borings are presented in the Appendix.

A Geotechnical engineer bases soil stratification on a visual review 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 may have been abbreviated or omitted for clarity. The boring profiles represent the conditions at the particular boring location and variations do occur and should be expected among the borings.

4.0 LABORATORY TESTING

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, using the results from the laboratory testing as confirmation. The laboratory tests performed include natural moisture content and organic content tests, grain size analysis and Atterberg Limit tests. Laboratory test results are presented in the Appendix.

5.0 GROUNDWATER CONDITIONS

5.1 Groundwater

Encountered groundwater depth was measured at the boring locations following termination of drilling. The groundwater table measured in the borings generally ranged from about 3.3 to 5.5 feet below existing grades (elevations approximately from +12.7 to +17.8 feet, NAVD 1988). Encountered groundwater depths measured in the boring are presented in the roadway soils survey in the Appendix. Some of the borings did not encounter groundwater within the boring termination depths.

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). Fluctuation should be anticipated. We recommend that the contractor determine the actual groundwater levels at the time of construction to determine groundwater impact on his construction procedure.

5.2 Seasonal High Groundwater Estimates

Seasonal high groundwater levels are expected to be controlled by existing drainage features present in the project vicinity. A summary of encountered groundwater elevations and estimated seasonal high groundwater levels are included in the Appendix. Based on the preliminary soil borings, estimated seasonal high groundwater table levels within the project limits are expected to range approximately from elevation +13 to +18 feet, NAVD 1988.

6.0 ENGINEERING EVALUATIONS AND PRELIMINARY RECOMMENDATIONS

6.1 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 compaction 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. Buried organic soils, plastic soils, debris, or unsuitable fills encountered during construction, which are not shown on the boring profiles should be removed and replaced with properly compacted suitable fill. The removal organic soils and plastic soils where required should be accomplished in accordance with FDOT Standard Index 500. Backfill should consist of materials conforming to FDOT Standard Index 505 and compacted in accordance with Section 120-9 of the Standard Specification for Road and Bridge Construction, latest edition.

6.2 Permanent Cut and Fill Slopes

We anticipate that fills will be required for the proposed roadway widening. Assuming proper subgrade preparation and adequate fill materials are utilized, we recommend that all proposed permanent side slopes be constructed on 2.0 horizontal to 1.0 vertical (2H:1V) 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.

6.3 Excavations

All excavations should be performed in accordance with FDOT Standard Index 500, 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 shoring.

6.4 Groundwater Control

Groundwater may not have impact on the proposed roadway widening if the proposed roadway elevations are kept at or above the existing road level. However, depending upon groundwater levels at the time of construction, some form of dewatering may be required for utility excavations.

6.5 On-Site Soil Suitability

Stratum 1 consists of topsoil. Topsoil should be stripped from the proposed widening areas in accordance with Standard Specifications Section 110 - Clearing and Grubbing.

Stratum 2 consists of select material (A-3). This material appears to be suitable to use in embankment and should be utilized according to Standard Index 505.

Strata 3 and 4 consist of select material (A-2-4). This material is likely to retain excess moisture and may be difficult to dry and compact. It may be used in the embankment above water level at the time of construction and should be utilized according to Standard Index 505. It may be used in the subgrade portion of the roadbed when approved by the District Materials Engineer. Material placed below the existing water level must be non-plastic and contain less than 15% passing the 15% the No. 200 U.S. Standard Sieve.

7.0 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.

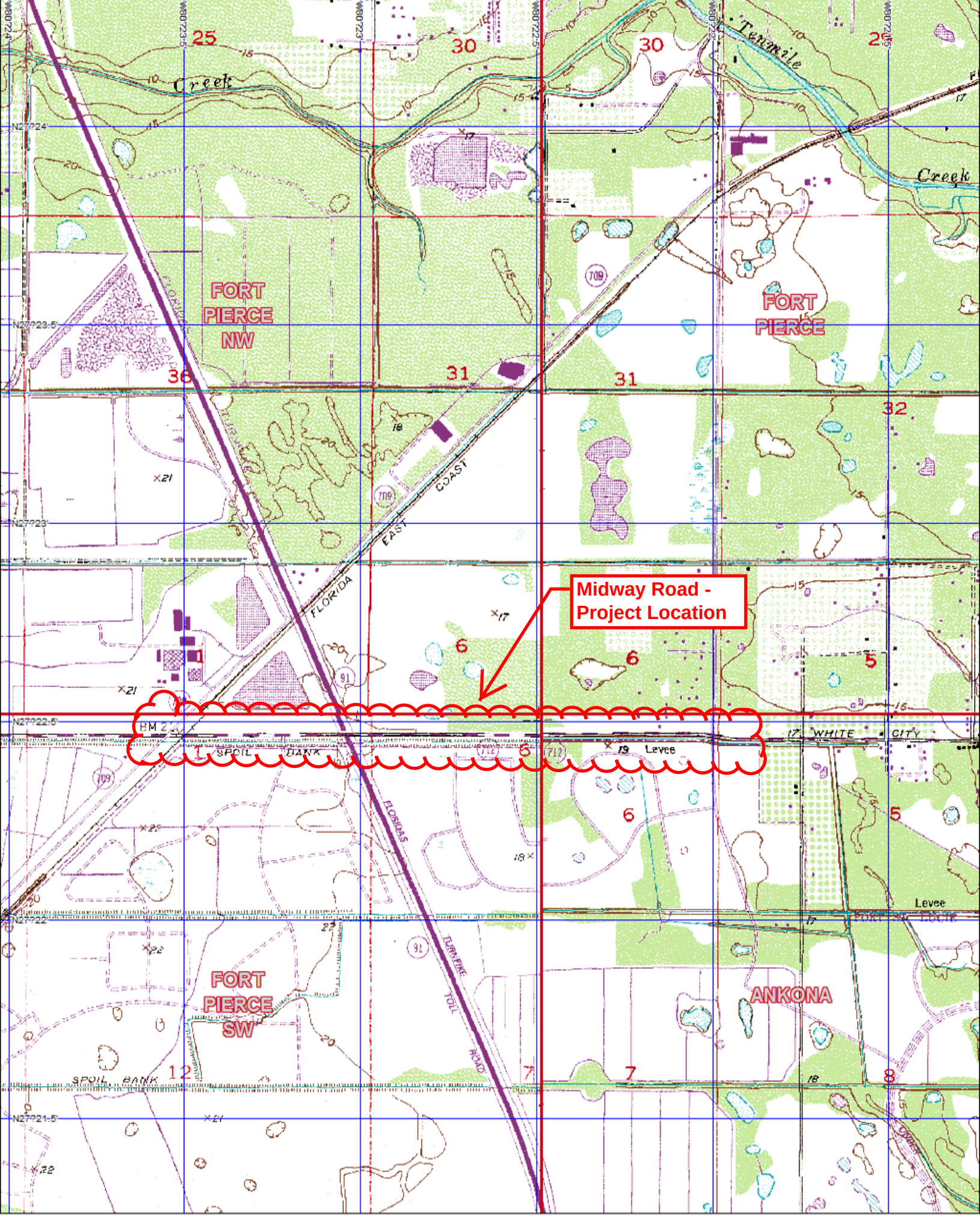
If the final grades vary considerably from those stated, or when final cross-sectional data becomes available, please contact our offices so that we can review our recommendations. Furthermore, upon the discovery of any site or subsurface conditions during construction, which appears to deviate from 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.

A detail roadway soil survey is required during design phase of the project to meet project requirements and the guidelines presented in the FDOT Soils and Foundation Handbook.

APPENDIX

Vicinity Map
USDA Soil Survey Map
Boring Location Plan
Roadway Soil Survey
Soil Profiles
Groundwater Level Data
Laboratory Test Results



850 ft Scale: 1 : 24,000 Detail: 13-1 Datum: WGS84

Soil Map—St. Lucie County, Florida
(Midway Road)

80° 23' 49" W
80° 21' 45" W
27° 22' 58" N
27° 21' 57" N
559700
560000
560300
560600
560900
561200
561500
561800
562100
562400
562700
563000
3029000
3028700
3028400
3028100
3027800
3027500
3027200

Glades Cut Off Rd
Floridas Tpke
709
W Milner Dr
Devine Rd
Selvitz
Favorite Rd
48
25
W Midway Rd
712
48
31
38
50
44
31
25
Pinson Ct
W Rugby Dr
Selvitz Rd
Nw Conley Dr
Torino
Nw Jannebo St
N Monoco Cir
E Rugby Dr
S Monoco Cir
S Milner Dr
S Rugby Dr
Nassau Ln

Map Scale: 1:9,200 if printed on B landscape (17" x 11") sheet.

N

Meters
0 100 200 400 600

Feet
0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

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 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
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: St. Lucie County, Florida
Survey Area Data: Version 8, Nov 19, 2015

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

Date(s) aerial images were photographed: Dec 15, 2010—Mar 13, 2011

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

St. Lucie County, Florida (FL111)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
25	Nettles and Oldsmar sands	25.2	29.9%
31	Pepper and EauGallie sands	18.1	21.5%
38	Riviera fine sand, 0 to 2 percent slopes	0.2	0.2%
44	Tantile and Pomona sands	0.3	0.3%
48	Wabasso sand, 0 to 2 percent slopes	29.6	35.1%
50	Waveland and Immokalee fine sands	10.9	13.0%
Totals for Area of Interest		**84.3**	**100.0%**

St. Lucie County, Florida

25—Nettles and Oldsmar sands

Map Unit Setting

National map unit symbol: 1jpvl
Mean annual precipitation: 49 to 58 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Oldsmar and similar soils: 40 percent
Nettles and similar soils: 40 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nettles

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 8 inches: sand
E - 8 to 33 inches: sand
Bh1 - 33 to 39 inches: sand
Bh2 - 39 to 55 inches: sand
Btg - 55 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 31 to 50 inches to ortstein
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 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: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Description of Oldsmar

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: sand
E - 5 to 32 inches: sand
Bh - 32 to 42 inches: sand
Btg - 42 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 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 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Minor Components

Pineda

Percent of map unit: 4 percent
Landform: Drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G156BC241FL)

Pepper

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Oldsmar

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G156BC145FL)

Wabasso

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Ankona

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

31—Pepper and EauGallie sands

Map Unit Setting

National map unit symbol: 1jpvs
Mean annual precipitation: 49 to 58 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Pepper and similar soils: 45 percent
Eaugallie and similar soils: 45 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eaugallie

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: sand
E - 5 to 26 inches: sand
Bh - 26 to 47 inches: sand
Btg - 47 to 62 inches: sandy loam
Cg - 62 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 1.98 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: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Description of Pepper

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 23 inches: sand
Bh1 - 23 to 33 inches: sand
Bh2 - 33 to 57 inches: sand
Btg - 57 to 80 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 16 to 31 inches to ortstein
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 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: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Minor Components

Wabasso

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Pineda

Percent of map unit: 2 percent
Landform: Drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G156BC241FL)

Tantile

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Lawnwood

Percent of map unit: 2 percent
Landform: Marine terraces on flatwoods
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Nettles

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

38—Riviera fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tzw2
Elevation: 0 to 80 feet
Mean annual precipitation: 44 to 59 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Riviera and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riviera

Setting

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

Typical profile

A - 0 to 6 inches: fine sand
E - 6 to 28 inches: fine sand
Bt/E - 28 to 36 inches: sandy loam
Btg - 36 to 42 inches: sandy clay loam
2C - 42 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 (0.60 to 6.00 in/hr)
Depth to water table: About 0 to 12 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: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D

Ecological site: Slough (R155XY011FL)
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)

Minor Components

Wabasso
Percent of map unit: 8 percent
Landform: Drainageways on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear, concave
Ecological site: South Florida Flatwoods (R155XY003FL)
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156AC141FL)

Pinellas
Percent of map unit: 4 percent
Landform: Drainageways on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear, concave
Ecological site: Cabbage Palm Flatwoods (R155XY005FL)
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G156AC241FL)

Hallandale
Percent of map unit: 4 percent
Landform: Drainageways on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear, concave
Ecological site: Slough (R155XY011FL)
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156AC141FL)

Oldsmar
Percent of map unit: 2 percent
Landform: Drainageways on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear, concave
Ecological site: South Florida Flatwoods (R155XY003FL)
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156AC141FL)

Floridana
Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave, linear
Ecological site: Freshwater Marshes and Ponds (R155XY010FL)
Other vegetative classification: Sandy over loamy soils on stream terraces, flood plains, or in depressions (G156BC245FL)

44—Tantile and Pomona sands

Map Unit Setting

National map unit symbol: 1jpw6
Elevation: 20 to 120 feet
Mean annual precipitation: 49 to 58 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Pomona and similar soils: 44 percent
Tantile and similar soils: 44 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tantile

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: sand
Eg - 5 to 26 inches: sand
Bh - 26 to 34 inches: sand
Bt - 34 to 49 inches: loamy sand
E'g - 49 to 69 inches: sand
Btg - 69 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 18 to 31 inches to ortstein
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 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: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w

Hydrologic Soil Group: A/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Description of Pomona

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: sand
E - 5 to 26 inches: sand
Bh - 26 to 39 inches: sand
E' - 39 to 51 inches: sand
Btg - 51 to 72 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 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: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Minor Components

Lawnwood

Percent of map unit: 3 percent
Landform: Marine terraces on flatwoods
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Nettles

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear

Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Ankona

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Pepper

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

48—Wabasso sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2svyr
Elevation: 10 to 50 feet
Mean annual precipitation: 38 to 62 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Wabasso and similar soils: 89 percent
Minor components: 11 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wabasso

Setting

Landform: — error in exists on —
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy over loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 25 inches: sand
Bh - 25 to 30 inches: sand

Btg - 30 to 58 inches: sandy clay loam
Cg - 58 to 80 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 9 to 50 inches to strongly contrasting textural stratification
Natural drainage class: Poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
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 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)

Minor Components

Hallandale

Percent of map unit: 6 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Convex, linear
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)

Boca

Percent of map unit: 5 percent
Landform: — error in exists on —
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: South Florida Flatwoods (R155XY003FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)

50—Waveland and Immokalee fine sands

Map Unit Setting

National map unit symbol: 1jpwd

Elevation: 20 to 200 feet
Mean annual precipitation: 49 to 58 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Waveland and similar soils: 44 percent
Immokalee and similar soils: 44 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Immokalee

Setting

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

Typical profile

A - 0 to 6 inches: fine sand
E - 6 to 35 inches: fine sand
Bh - 35 to 54 inches: fine sand
Cg - 54 to 72 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: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 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 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Description of Waveland

Setting

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

Typical profile

A - 0 to 4 inches: fine sand
Eg - 4 to 32 inches: sand
Bh1 - 32 to 40 inches: loamy sand
Bh2 - 40 to 53 inches: sand
Cg1 - 53 to 66 inches: sand
Cg2 - 66 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 31 to 50 inches to ortstein
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 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: Very low (about 0.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Minor Components

Lawnwood

Percent of map unit: 3 percent
Landform: Marine terraces on flatwoods
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)

Electra

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G156BC131FL)

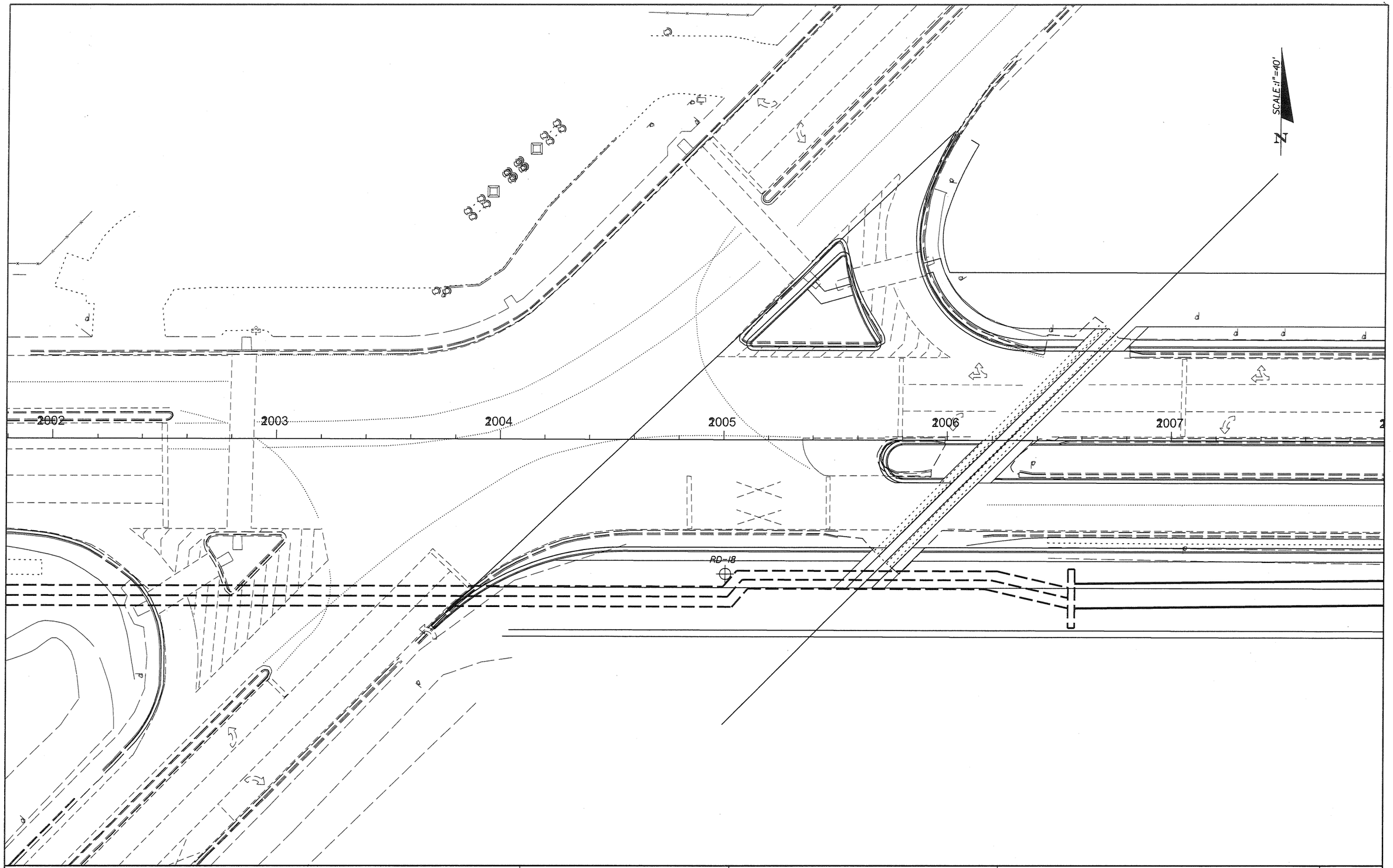
Jonathan

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G156BC121FL)

Salerno

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

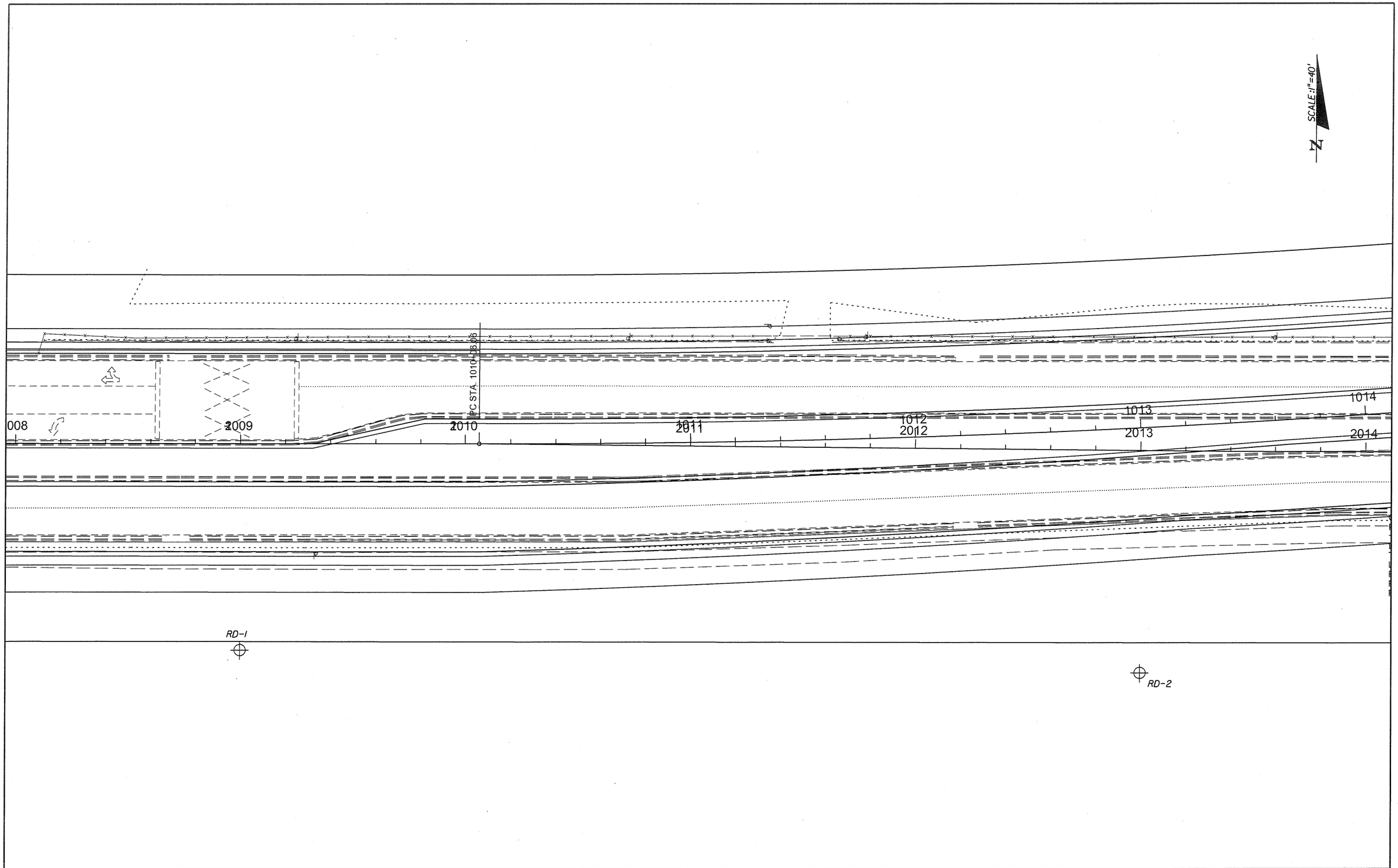
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR712	ST. LUCIE	231440-3-22-01

BORINGS LOCATION PLAN

SHEET NO.

ngonzalez 5/24/2016 1:45:42 PM J:\Tierra Documents\Projects\TSF 2015\7111-15-154.Midway Road from Glades Cutoff to Selvitz Rd (Inwood)\geotech\RDGE002.DGN



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR712	ST. LUCIE	231440-3-22-01

BORINGS LOCATION PLAN

SHEET NO.

ngonzalez 5/26/2016 2:12:50 PM J:\Tierra Documents\Projects\TSF 2015\111-15-154.Midway Road from Glades Cutoff to Selvitz Rd (Inwood)\geotech\RDGE003.DGN

SCALE: 1"=40'

N

RD-3

1015 1016 1017 1018 1019 1020

2015 2016 2017 2018 2019 2020

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR712	ST. LUCIE	231440-3-22-01

BORINGS LOCATION PLAN

SHEET NO.

ngonzalez 5/24/2016 1:11:45 PM J:\Tierra Documents\Projects\TSF 2015\VIII-15-154.Midway Road from Glades Cutoff to Selvitz Rd (Inwood)\geotech\RDGE004.DGN

SCALE: 1"=40'

N

1021 1022 1023 1024 1025 1026

2021 2022 2023 2024 2025 2026

RD-4

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

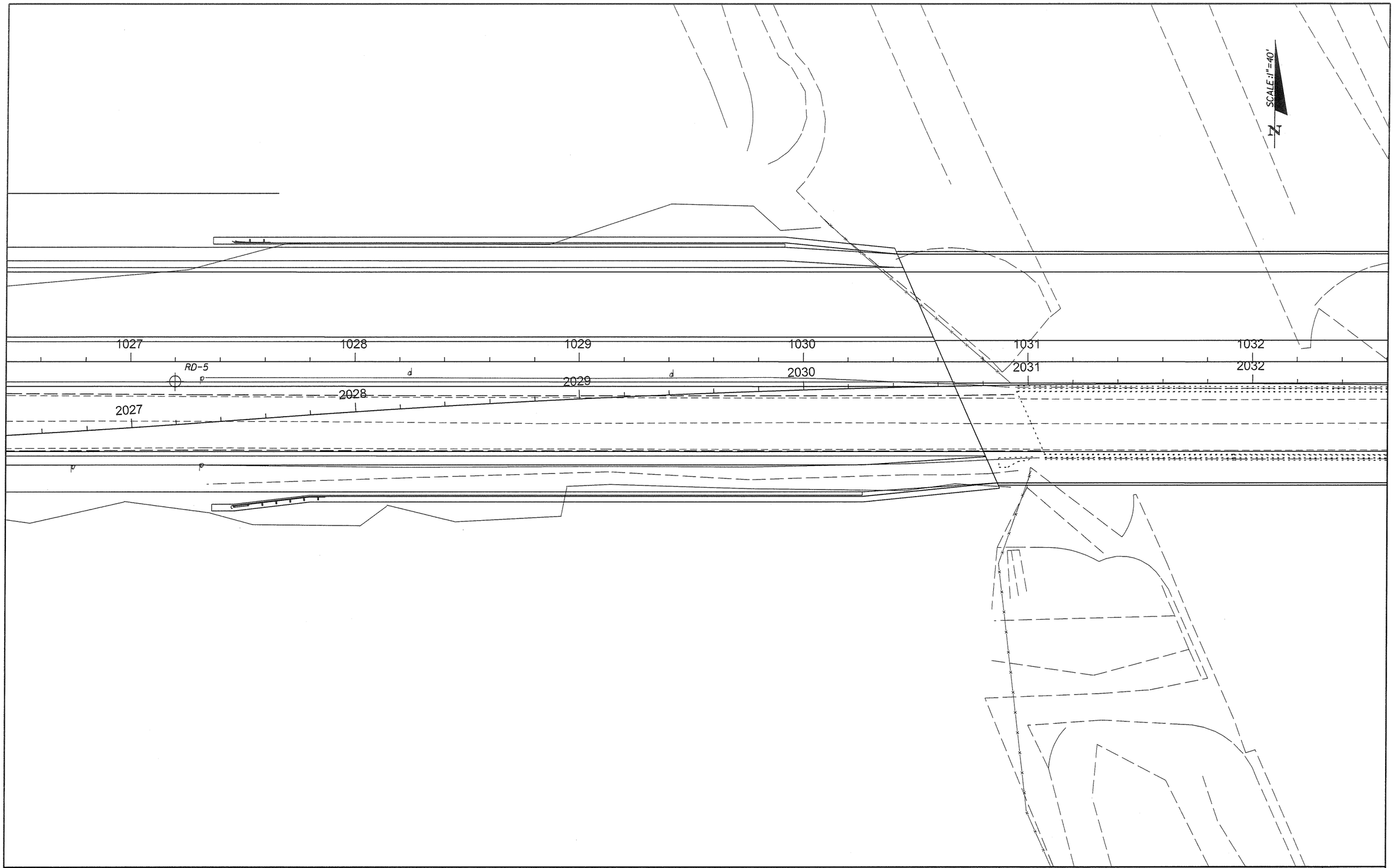
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR712	ST. LUCIE	231440-3-22-01

BORINGS LOCATION PLAN

SHEET NO.

ngonzalez 5/24/2016 1:11:58 PM J:\Tierra Documents\Projects\TSF 2015\7111-15-154.Midway Road from Glades Cutoff to Selvitz Rd (Inwood)\geotech\RDGE005.DGN



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

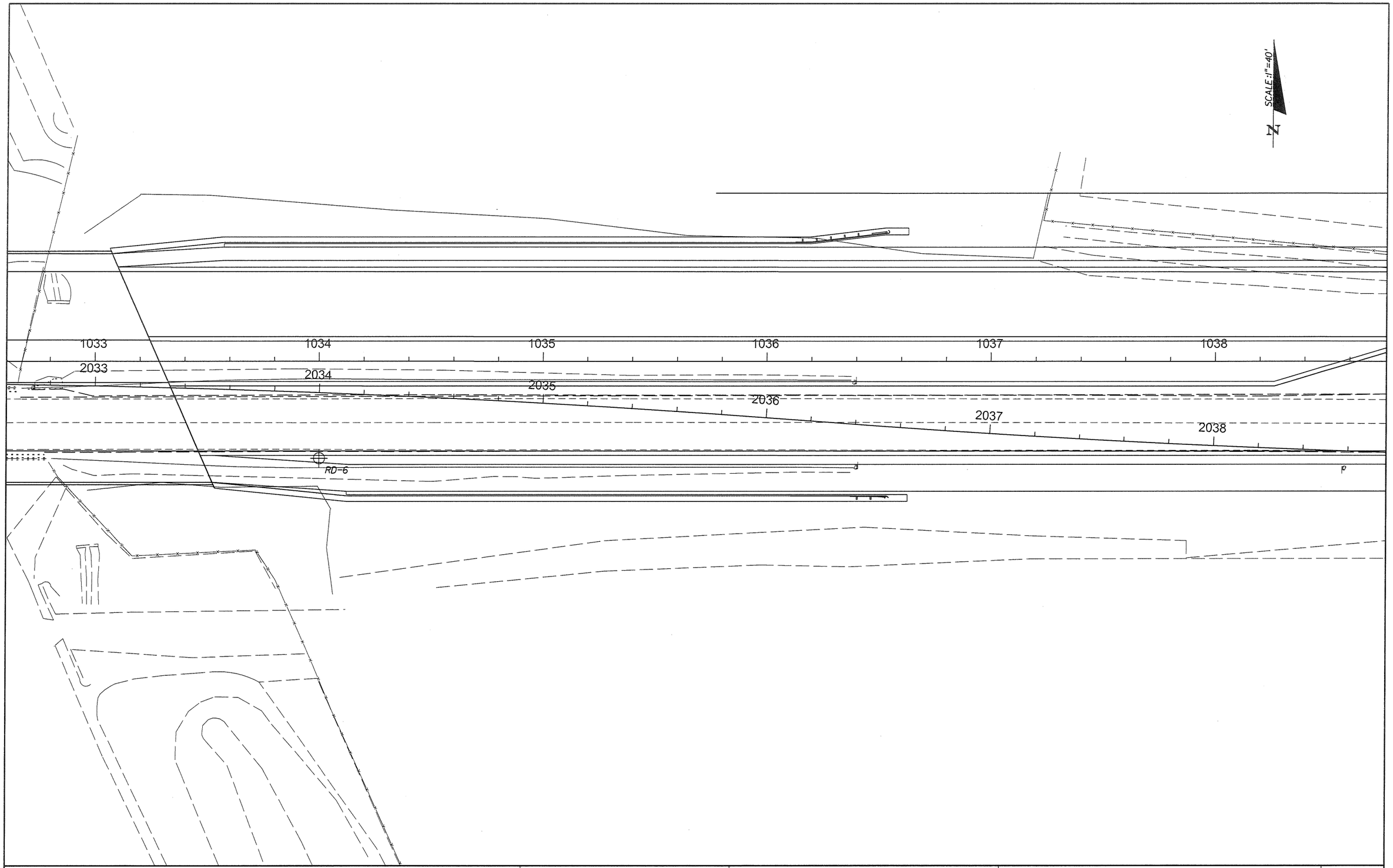
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR712	ST. LUCIE	231440-3-22-01

BORINGS LOCATION PLAN

SHEET NO.

ngonzalez 5/24/2016 1:12:12 PM J:\Tierra Documents\Projects\TSF 2015\7111-15-154.Midway Road from Glades Cuttoff to Selvitz Rd (Inwood)\geotech\RDGE006.DGN



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR712	ST. LUCIE	231440-3-22-01

BORINGS LOCATION PLAN

SHEET NO.

ngonzalez 5/24/2016 1:12:26 PM J:\Tierra Documents\Projects\TSF 2015\7111-15-154.Midway Road from Glades Cutoff to Selvitz Rd (Inwood)\geotech\RDGE007.DGN

SCALE: 1"=40'

RD-7

1039 1040 1041 1042 1043 1044

2039 2040 2041 2042 2043 2044

RD-8

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

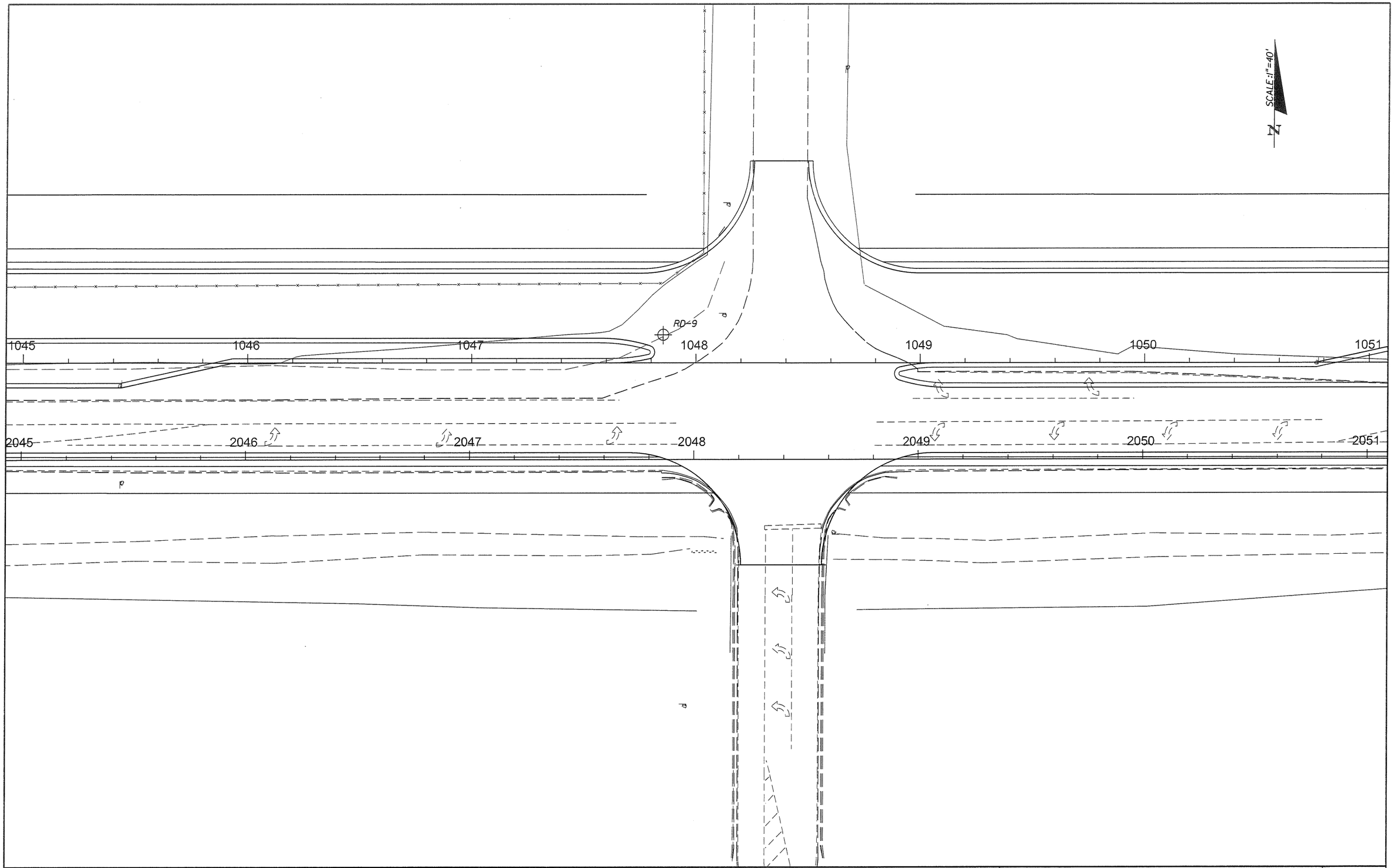
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR712	ST. LUCIE	231440-3-22-01

BORINGS LOCATION PLAN

SHEET NO.

ngonzalez 5/24/2016 1:12:40 PM J:\Tierra Documents\Projects\TSF 2015\7111-15-154.Midway Road from Glades Cutoff to Selvitz Rd (Inwood)\geotech\RDGE008.DGN



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

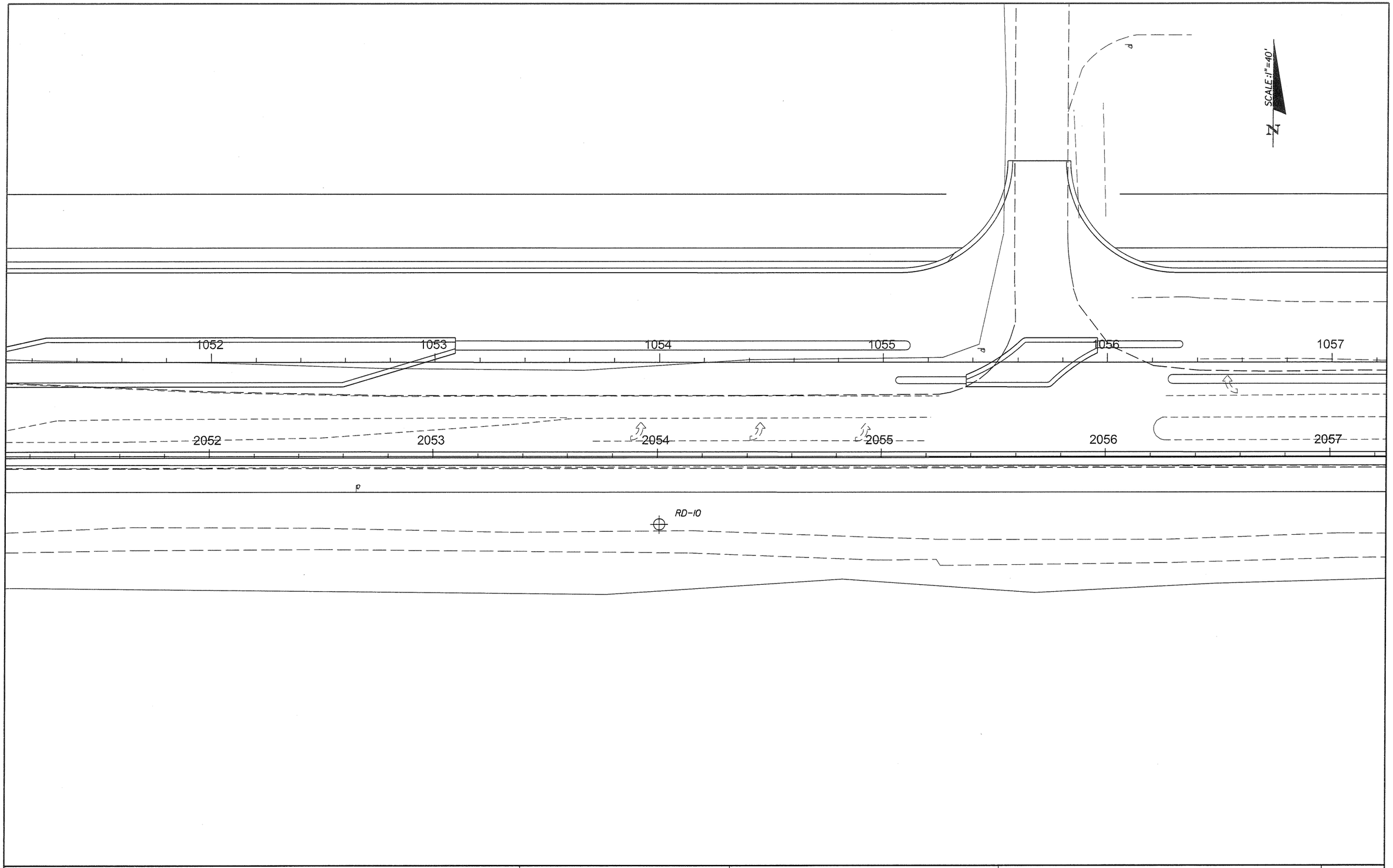
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR712	ST. LUCIE	231440-3-22-01

BORINGS LOCATION PLAN

SHEET NO.

ngonzalez 5/24/2016 1:12:54 PM J:\Tierra Documents\Projects\TSF 2015\7111-15-154.Midway Road from Glades Cutoff to Selvitz Rd (Inwood)\geotech\RDGE009.DGN



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR712	ST. LUCIE	231440-3-22-01

BORINGS LOCATION PLAN

SHEET NO.

ngonzalez 5/24/2016 1:13:08 PM J:\Tierra Documents\Projects\TSF 2015\7111-15-154.Midway Road from Glades Cuttoff to Selvitz Rd (Inwood)\geotech\RDGEO10.DGN

SCALE: 1"=40'

N

1058 1059 1060 1061 1062 1063

RD-II

2058 2059 2060 2061 2062 2063

P

P

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

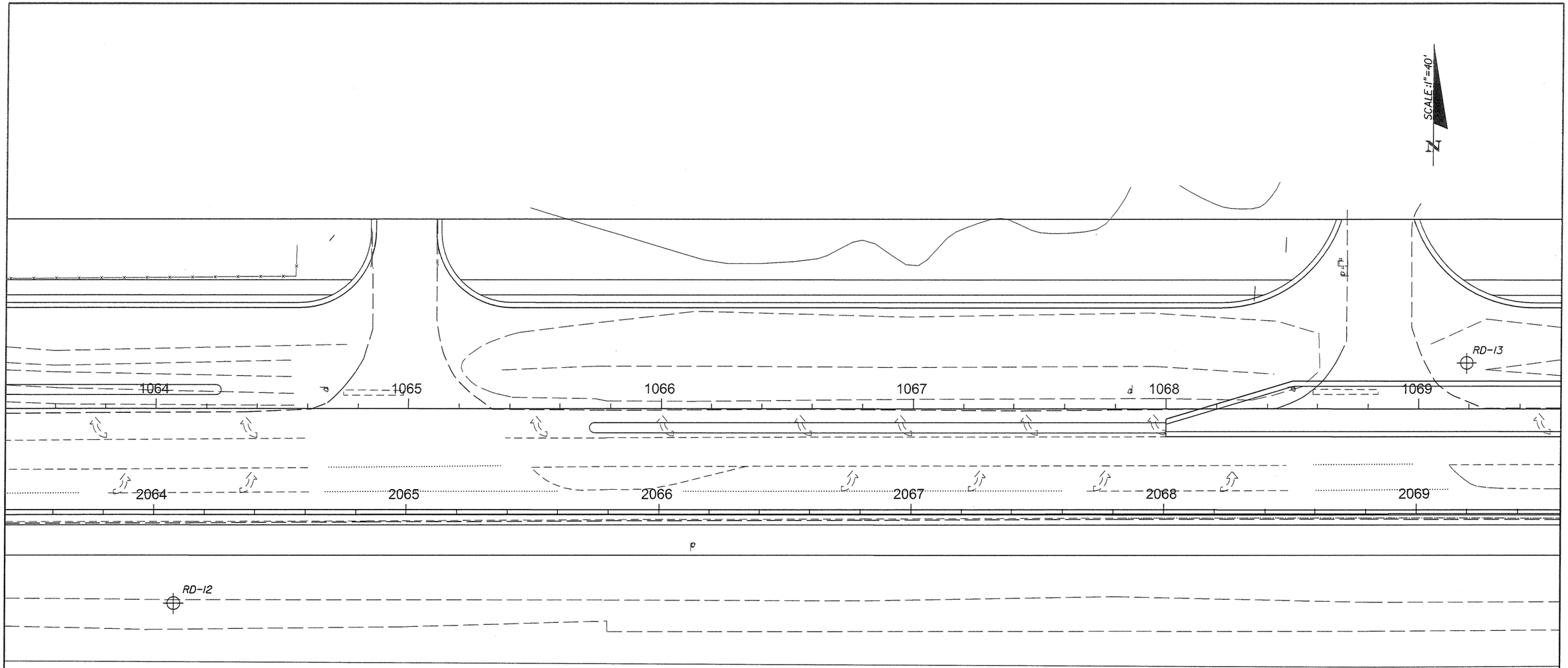
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR712	ST. LUCIE	231440-3-22-01

BORINGS LOCATION PLAN

SHEET NO.

nganzalez 5/24/2016 1:13:21 PM J:\Tierra Documents\Projects\TSF 2015\7111-15-154.Midway Road from Glades Cuttoff to Selvitz Rd (Inwood)\geotech\RDGE011.DGN



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

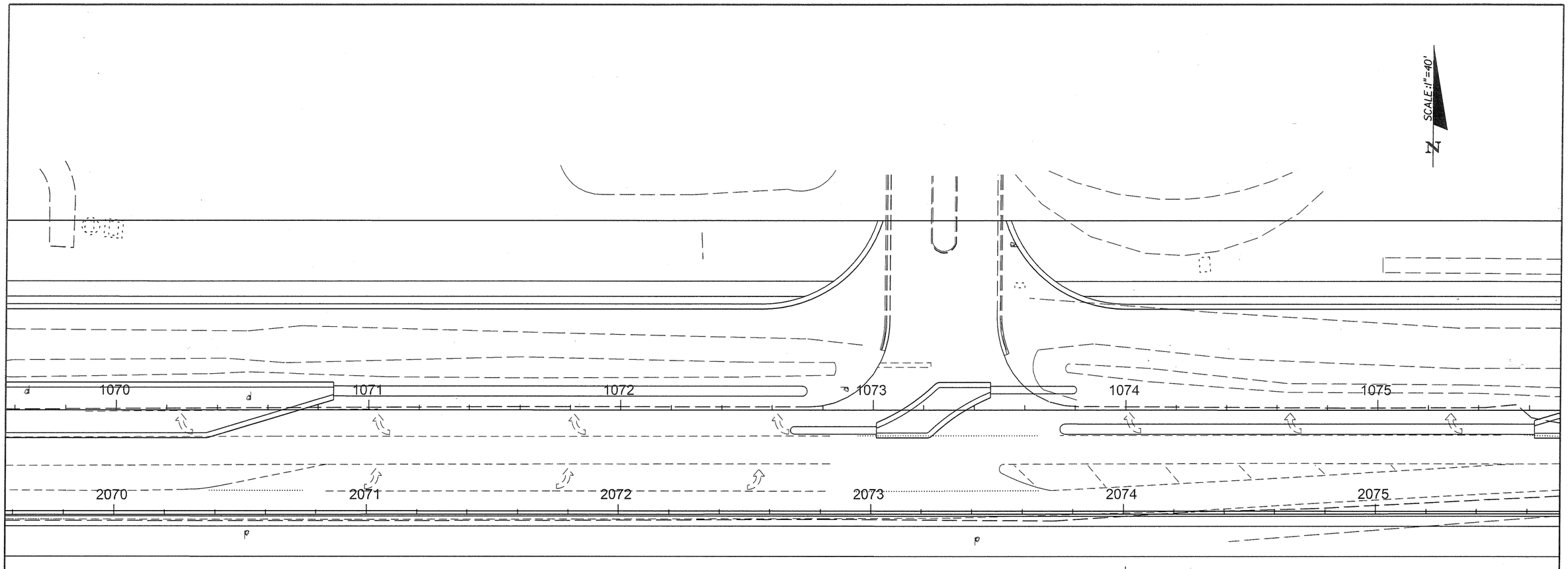
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR712	ST. LUCIE	231440-3-22-01

BORINGS LOCATION PLAN

SHEET NO.

nganzalez 5/24/2016 1:13:34 PM J:\Tierra Documents\Projects\TSF 2015\7111-15-154.Midway Road from Glades Cuttoff to Selvitz Rd (Inwood)\geotech\RDGE012.DGN



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR712	ST. LUCIE	231440-3-22-01

BORINGS LOCATION PLAN

SHEET NO.

ngonzalez 5/24/2016 1:35:51 PM J:\Tierra Documents\Projects\TSF 2015\7111-15-154.Midway Road from Glades Cutoff to Selvitz Rd (Inwood)\geotech\RDGE013.DGN

SCALE: 1"=40'

N

RD-15

1076 1077 1078 1079 1080 1083

2076 2077 2078 2079 2080 2081

PC STA. 1076+17.51

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

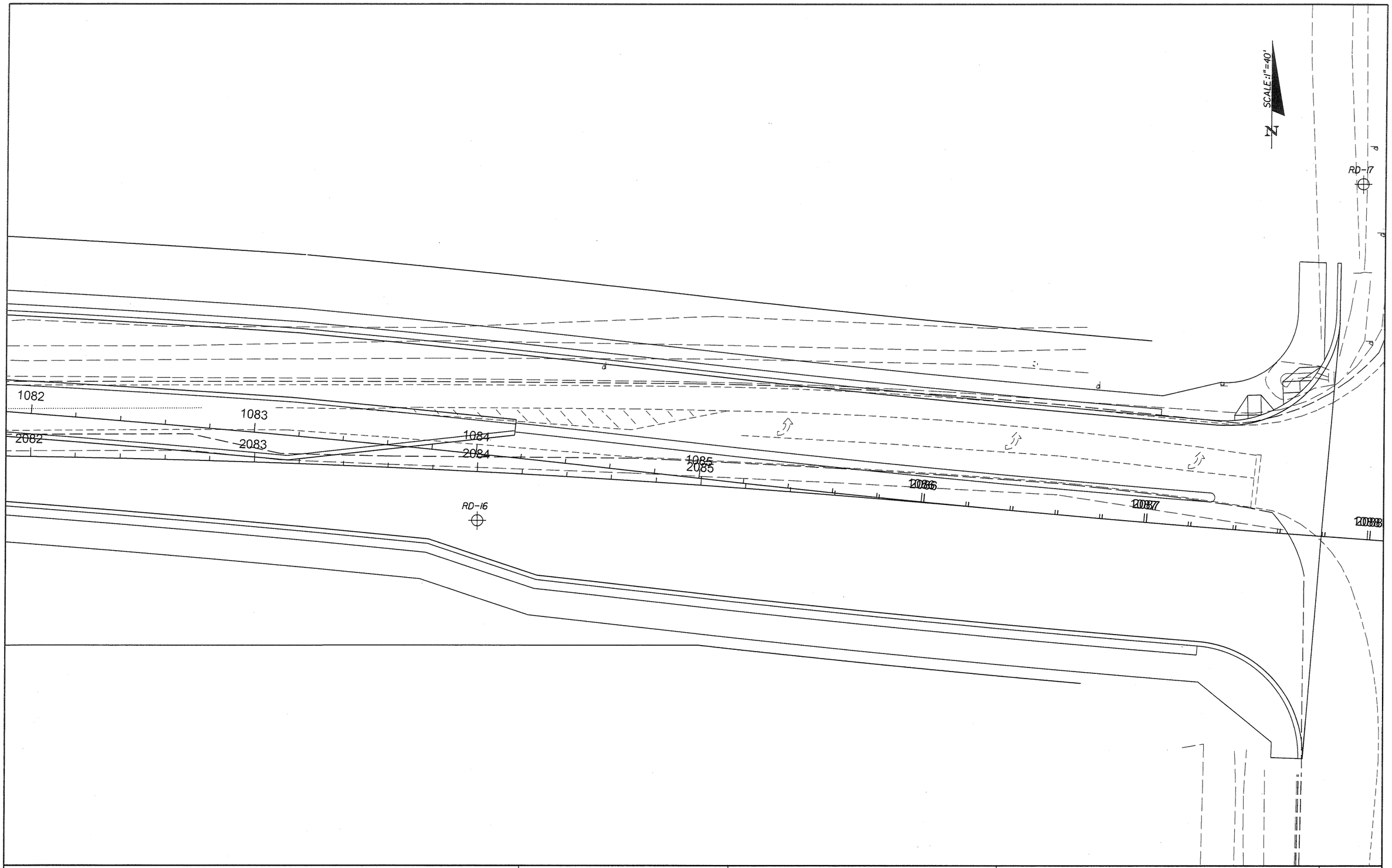
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR712	ST. LUCIE	231440-3-22-01

BORINGS LOCATION PLAN

SHEET NO.

ngonzalez 5/24/2016 1:36:17 PM J:\Tierra Documents\Projects\TSF 2015\111-15-154.Midway Road from Glades Cuttoff to Selvitz Rd (Inwood)\geotech\RDGE014.DGN



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR712	ST. LUCIE	231440-3-22-01

BORINGS LOCATION PLAN

SHEET NO.

ngonzalez 5/24/2016 1:40:20 PM J:\Tierra Documents\Projects\TSF 2015\7111-15-154.Midway Road from Glades Cuttoff to Selvitz Rd (Inwood)\geotech\RDGE0115.DGN

DATE OF SURVEY: APRIL 2016
SURVEY MADE BY: TIERRA SOUTH FLORIDA
SUBMITTED BY: RAJ KRISHNASAMY, P.E.

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

DISTRICT: IV
COUNTY: ST LUCIE

FINANCIAL PROJECT ID : 231440-3-22-01

PROJECT NAME: MIDWAY ROAD (CR 712) FROM GLADES CUT OFF ROAD (CR 709) TO SELVITZ ROAD (CR 615)-PD&E STUDY

CROSS SECTION SOIL SURVEY FOR THE DESIGN OF ROADS

SURVEY BEGINS STA. : 1005+00.00 SURVEY ENDS STA. : 1088+00.00 CL ALT1

	ORGANIC CONTENT		MOISTURE CONTENT		SIEVE ANALYSIS RESULTS PERCENT PASS						ATTERBERG LIMITS (%)					CORROSION TEST RESULTS				
STRATUM NO.	NO. OF TESTS	% ORGANIC	NO. OF TESTS	MOISTURE CONTENT	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 ohm-cm	CHLORIDE ppm	SULFATES ppm	pH
1	-	-	-	-	-	-	-	-	-	-	-	-	-	A-8	TOPSOIL	-	-	-	-	-
2	1	4.0	3	15-30	3	100	87-92	45-61	18-35	2-9	-	-	-	A-3	BROWN TO LIGHT BROWN SAND OCCASIONALLY FEW TO TRACE SILT AND TRACE LIMEROCK	-	-	-	-	-
3	1	0.9	3	9-17	3	93-100	81-94	41-72	27-46	11-21	2	NP	NP	A-2-4	BROWN SILTY SAND OCCASIONALLY TRACE SHELL	-	-	-	-	-
4	2	2.7-3.9	2	20-23	2	100	82-88	39-53	20-30	12-17	1	NP	NP	A-2-4	DARK BROWN ORGANIC STAINED SILTY SAND	-	-	-	-	-

EMBANKMENT AND SUBGRADE MATERIAL

STRATA BOUNDARIES ARE APPROXIMATE. MAKE FINAL CHECK AFTER GRADING.

∇ - ENCOUNTERED GROUNDWATER LEVEL

GNE - GROUNDWATER NOT ENCOUNTERED

NP - NON-PLASTIC

NOTES

1- STRATUM 1 CONSISTS OF TOPSOIL AND SHOULD BE STRIPPED FROM PROPOSED CONSTRUCTION AREAS IN ACCORDANCE WITH THE FDOT STANDARD SPECIFICATIONS SECTION 110 CLEARING AND GRUBBING.

2- STRATUM 2 CONSISTS OF SELECT MATERIAL (A-3). THIS MATERIAL APPEARS TO BE SUITABLE TO USE IN EMBANKMENT AND SHOULD BE UTILIZED ACCORDING TO STANDARD INDEX 505.

3- STRATA 3 AND 4 CONSIST OF SELECT MATERIAL (A-2-4). THIS MATERIAL IS LIKELY TO RETAIN EXCESS MOISTURE AND MAY BE DIFFICULT TO DRY AND COMPACT. IT SHOULD BE USED IN THE EMBANKMENT ABOVE THE WATER LEVEL AT THE TIME OF CONSTRUCTION. IT MAY BE USED IN THE SUBGRADE PORTION OF THE ROADBED WHEN APPROVED BY THE DISTRICT MATERIALS ENGINEER. MATERIAL PLACED BELOW THE EXISTING WATER LEVEL MUST BE NON-PLASTIC AND CONTAIN LESS THAN 15% PASSING THE No. 200 U.S. STANDARD SIEVE.

4- A FINAL ROADWAY SOIL SURVEY IS REQUIRED DURING DESIGN PHASE OF THE PROJECT TO MEET PROJECT REQUIREMENTS AND GUIDELINES PRESENTED IN THE FDOT SOILS AND FOUNDATIONS HANDBOOK.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

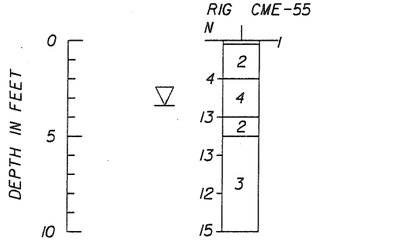
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 712	ST. LUCIE	231440-3-22-01

ROADWAY SOIL SURVEY

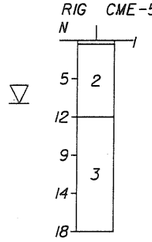
SHEET NO.

ngonzalez 5/25/2016 11:12:24 AM J:\Tierra Documents\Projects\TSF 2015\7111-15-154.Midway Road from Glades Cuttoff to Selvitz Rd (Inwood)\geotech\rdssgeo00.dgn

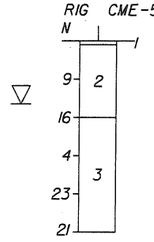
BOR # RD-1
STA. 1009+00.00 CL-ALT1
OFF. 91.7' RT
DATE 4/21/2016
HAMMER Auto
RIG CME-55



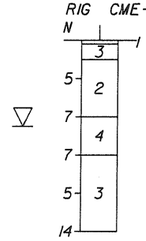
BOR # RD-2
STA. 1012+94.63 CL-ALT1
OFF. 108.8' RT
DATE 4/21/2016
HAMMER Auto
RIG CME-55



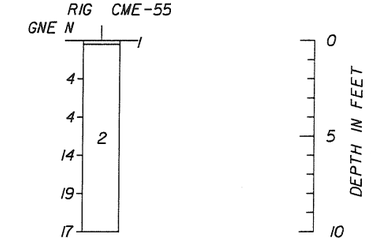
BOR # RD-3
STA. 1018+01.13 CL-ALT1
OFF. 26.6' LT
DATE 4/30/2016
HAMMER Auto
RIG CME-55



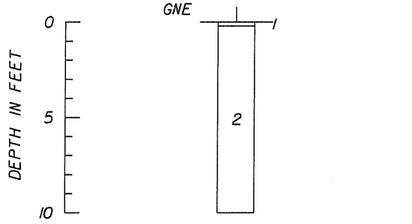
BOR # RD-4
STA. 1023+00.00 CL-ALT1
OFF. 127.3' RT
DATE 4/21/2016
HAMMER Auto
RIG CME-55



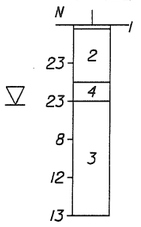
BOR # RD-5
STA. 1027+20.00 CL-ALT1
OFF. 8.8' RT
DATE 4/30/2016
HAMMER Auto
RIG CME-55



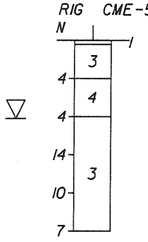
BOR # RD-6
STA. 1034+00.00 CL-ALT1
OFF. 43.3' RT
DATE 4/30/2016



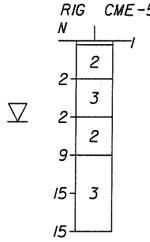
BOR # RD-7
STA. 1039+00.00 CL-ALT1
OFF. 8.7' LT
DATE 4/30/2016
HAMMER Auto
RIG CME-55



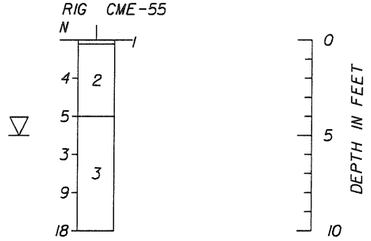
BOR # RD-8
STA. 1044+00.00 CL-ALT1
OFF. 69.4' RT
DATE 4/21/2016
HAMMER Auto
RIG CME-55



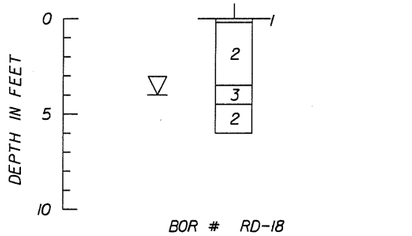
BOR # RD-9
STA. 1047+85.38 CL-ALT1
OFF. 12.5' LT
DATE 4/30/2016
HAMMER Auto
RIG CME-55



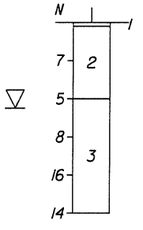
BOR # RD-10
STA. 1054+00.00 CL-ALT1
OFF. 72.3' RT
DATE 4/21/2016
HAMMER Auto
RIG CME-55



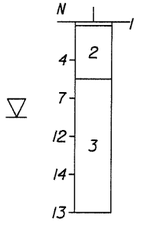
BOR # RD-11
STA. 1059+00.00 CL-ALT1
OFF. 2.5' RT
DATE 4/30/2016



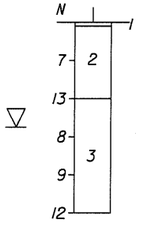
BOR # RD-12
STA. 1064+07.32 CL-ALT1
OFF. 77.8' RT
DATE 4/21/2016
HAMMER Auto
RIG CME-55



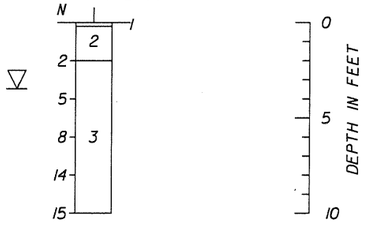
BOR # RD-13
STA. 1069+19.06 CL-ALT1
OFF. 18.2' LT
DATE 4/30/2016
HAMMER Auto
RIG CME-55



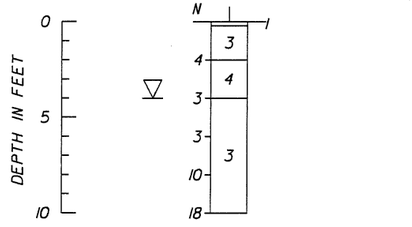
BOR # RD-14
STA. 1074+00.00 CL-ALT1
OFF. 65.8' RT
DATE 4/21/2016
HAMMER Auto
RIG CME-55



BOR # RD-15
STA. 1079+00.00 CL-ALT1
OFF. 27.1' LT
DATE 4/21/2016
HAMMER Auto
RIG CME-55



BOR # RD-18
STA. 1005+00.00 CL-ALT1
OFF. 59.9' RT
DATE 4/21/2016
HAMMER Auto
RIG CME-55



LEGEND
1. TOPSOIL (A-8)
2. BROWN TO LIGHT BROWN SAND OCCASIONALLY FEW TO TRACE SILT AND TRACE LIMEROCK (A-3)
3. BROWN SILTY SAND OCCASIONALLY TRACE SHELL (A-2-4)
4. DARK BROWN ORGANIC STAINED SILTY SAND (A-2-4)

NOTES
▽ ENCOUNTERED GROUNDWATER TABLE
N NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12" PENETRATION AND THEY WERE OBTAINED USING AN AUTOMATIC HAMMER.
GNE GROUNDWATER NOT ENCOUNTERED

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RAJ KRISHNASAMY, P.E.
P.E. LICENSE NUMBER 53567
TIERRA SOUTH FLORIDA
2765 VISTA PARKWAY, S-10
WEST PALM BEACH, FL 33411
CERTIFICATE OF AUTHORIZATION 28073

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 712	ST. LUCIE	231440-3-22-01

SOIL PROFILES

SHEET NO.

Midway Road (CR 712)
St. Lucier County, Florida
FPID NO. 231440-3-22-01
TSF Project No. 7111-15-154

Summary of Groundwater Level and Estimate of SHGWT

Broing Number	Station No. (BL Survey)	Ground Elevation (feet, NAVD 1988)	Groundwater Depth (feet)	Groundwater Elevation (feet, NAVD 1988)	Estimated SHGWT (feet, NAVD 1988)
RD-18	1005+00	21.8	4	17.8	18
RD-1	1009+00	20.6	3.4	17.2	
RD-2	1012+95	20.4	3.3	17.1	
RD-3	1018+01	20.9	3.3	17.6	
RD-4	1023+00	21	4.5	16.5	17
RD-5	1027+20	27.7	GNE	#VALUE!	
RD-6	1034+00	37.2	GNE	#VALUE!	
RD-7	1039+00	19.8	4.2	15.6	16
RD-8	1044+00	18.6	4.1	14.5	15
RD-9	1047+85	18	4.3	13.7	14
RD-10	1054+00	18.2	5	13.2	
RD-11	1059+00	17.4	4	13.4	
RD-12	1064+07	17.2	4.5	12.7	13
RD-13	1069+19	17.7	5	12.7	
RD-14	1074+00	18.3	5.5	12.8	
RD-15	1079+00	16.3	3.5	12.8	

Summary of Laboratory Test Results
Midway Roadd from Glades Cut Off Road to Selvitz Road
St. Lucie County
TSF Project No: 7111-15-154

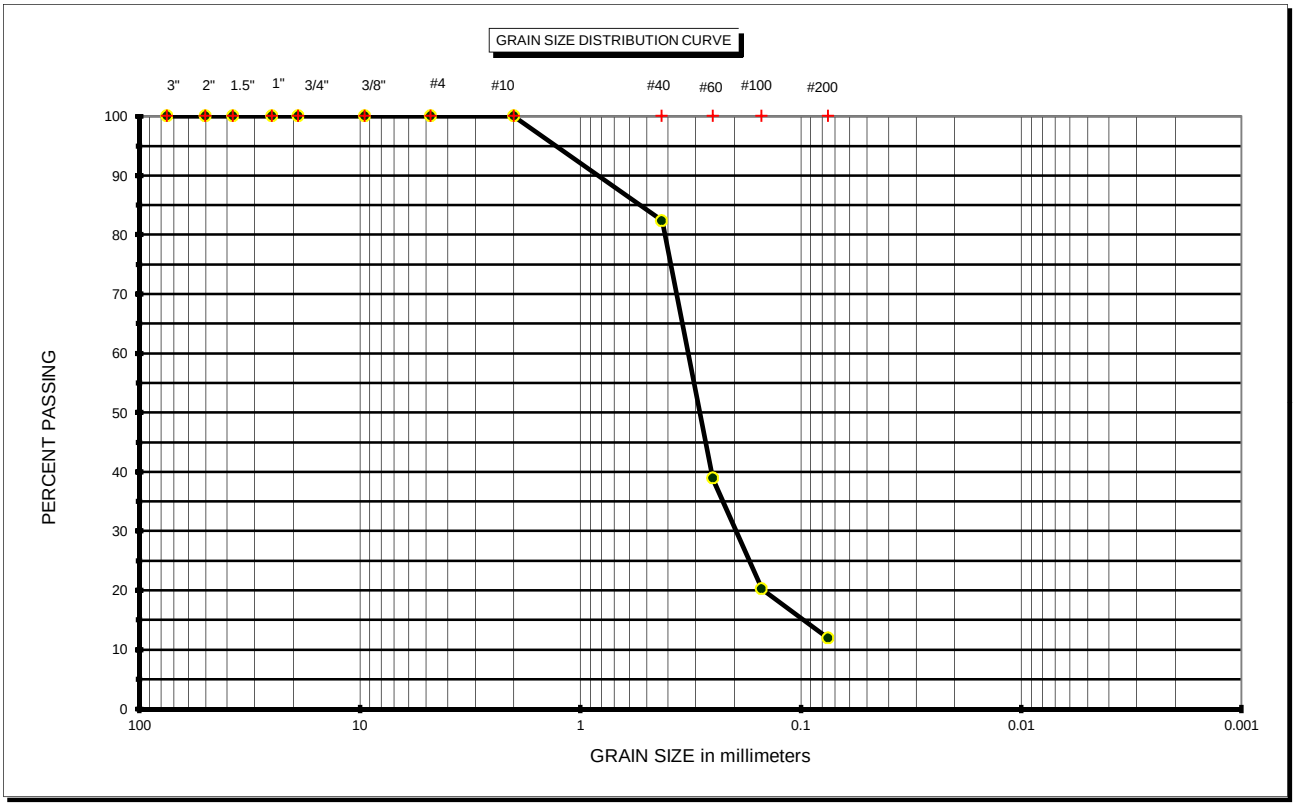
Boring Number	Sample Depth (ft)	Stratum Number	AASHTO Symbol	Sieve Analysis, Percentage Passing								Atterberg Limits			Organic Content (%)	Natural Moisture Content (%)
				3/4"	3/8"	#4	#10	#40	#60	#100	#200	Liquid Limit	Plastic Limit	Plasticity Index		
RD-1	2.0-4.0	4	A-2-4				100	82	39	20	12				3.9	20
RD-4	2.0-4.0	2	A-3				100	87	45	18	2					15
RD-4	4.0-6.0	4	A-2-4				100	88	53	30	17	NP	NP	NP	2.7	23
RD-8	0.3-2.0	3	A-2-4	95	94	93	93	82	50	29	11				0.9	9
RD-12	8.0-10.0	3	A-2-4				100	94	72	46	21	NP	NP	NP		17
RD-14	2.0-4.0	2	A-3				100	91	60	33	7					18
RD-15	0.3-1.0	2	A-3				100	92	61	35	9				4.0	30
RD-18	6.0-8.0	3	A-2-4				100	81	41	27	18	NP	NP	NP		16

NP = Non Plastic

GRAIN SIZE DATA SHEET

PROJECT NAME: Midway Road **DATE:** 5/2/2016

PROJECT #: 7111-15-154



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} x D_{60})**
Fine Gravel	**< 3/4" and > #4**		**Fine Sand**	**< #40 and > #200**	

BORING # RD-1 **OFFSET (ft)** **DEPTH (ft):** 2.0-4.0

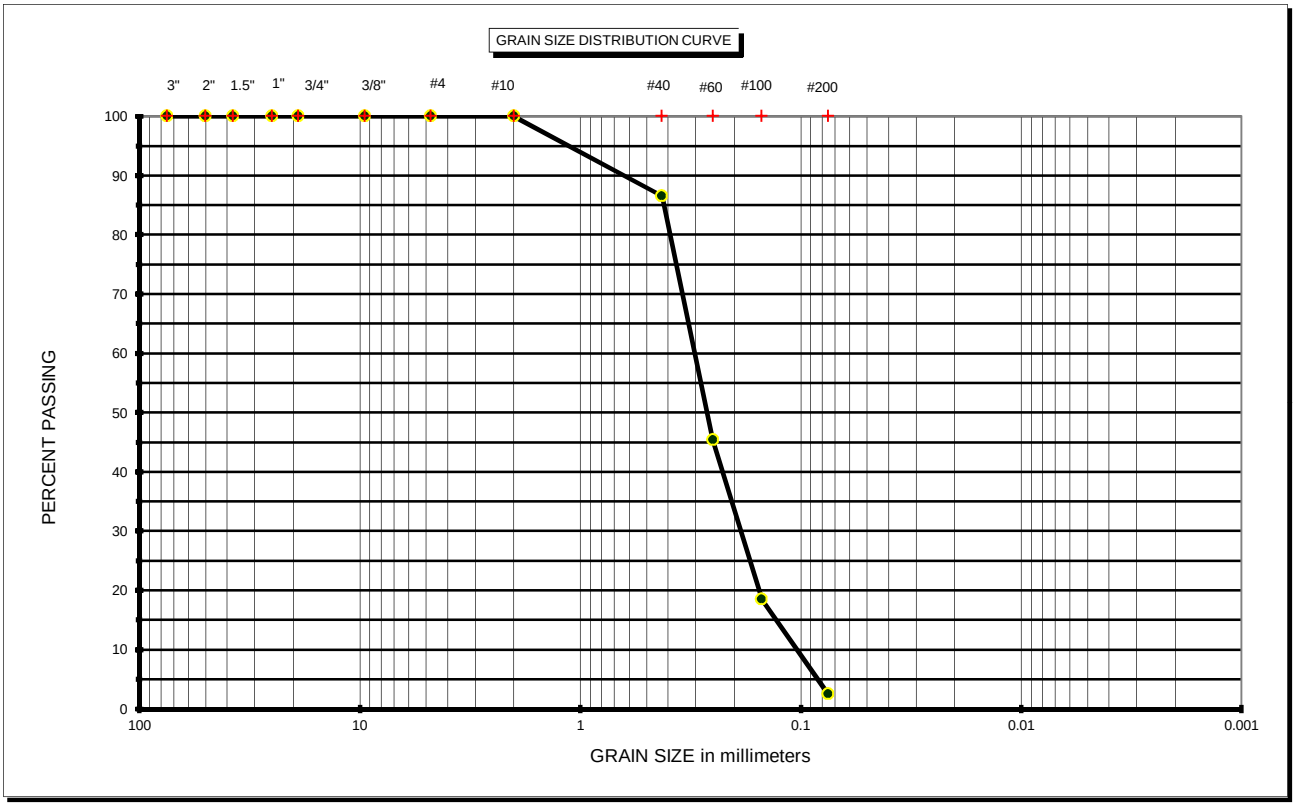
SOIL CLASSIFICATION: A-2-4

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

GRAIN SIZE DATA SHEET

PROJECT NAME: Midway Road **DATE:** 5/2/2016

PROJECT #: 7111-15-154



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 # RD-4 **OFFSET (ft)** **DEPTH (ft):** 2.0-4.0

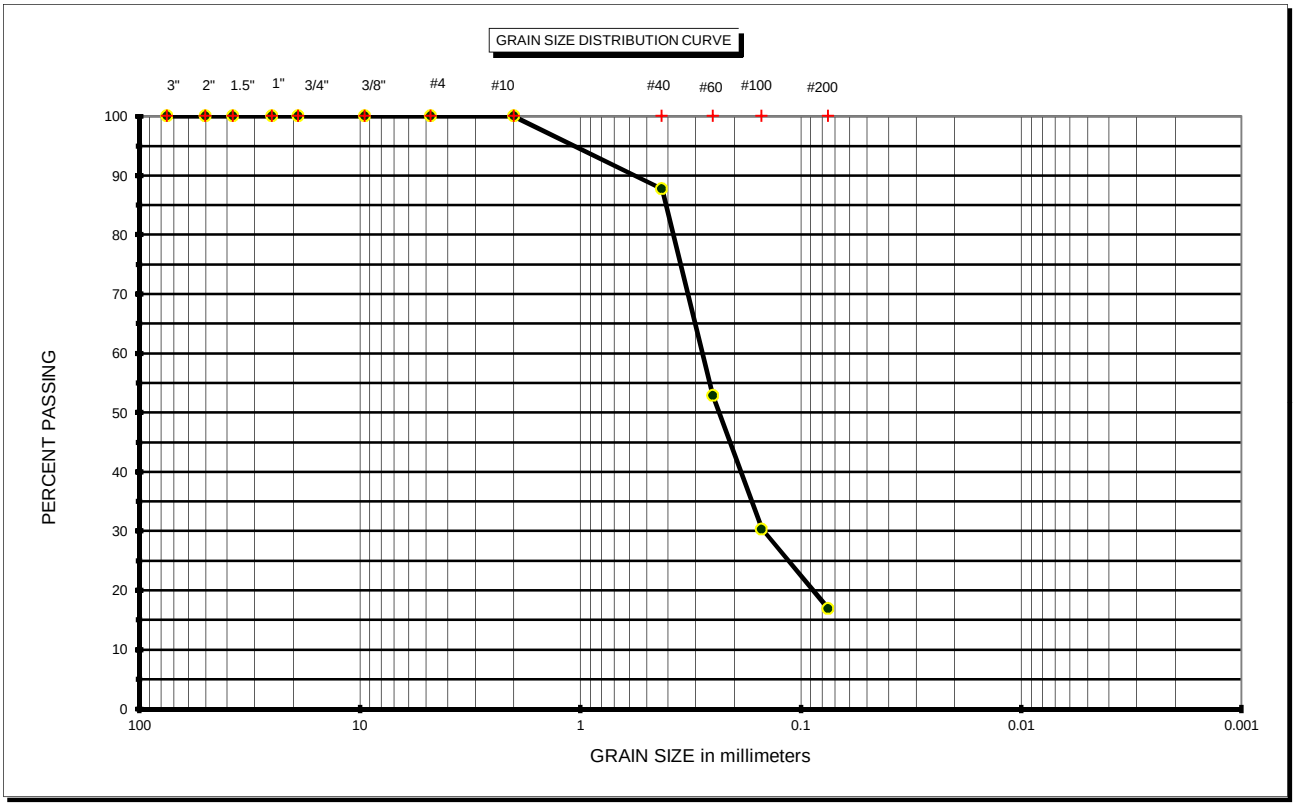
SOIL CLASSIFICATION: A-3

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

GRAIN SIZE DATA SHEET

PROJECT NAME: Midway Road **DATE:** 5/2/2016

PROJECT #: 7111-15-154



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 # RD-4 **OFFSET (ft)** **DEPTH (ft):** 4.0-6.0

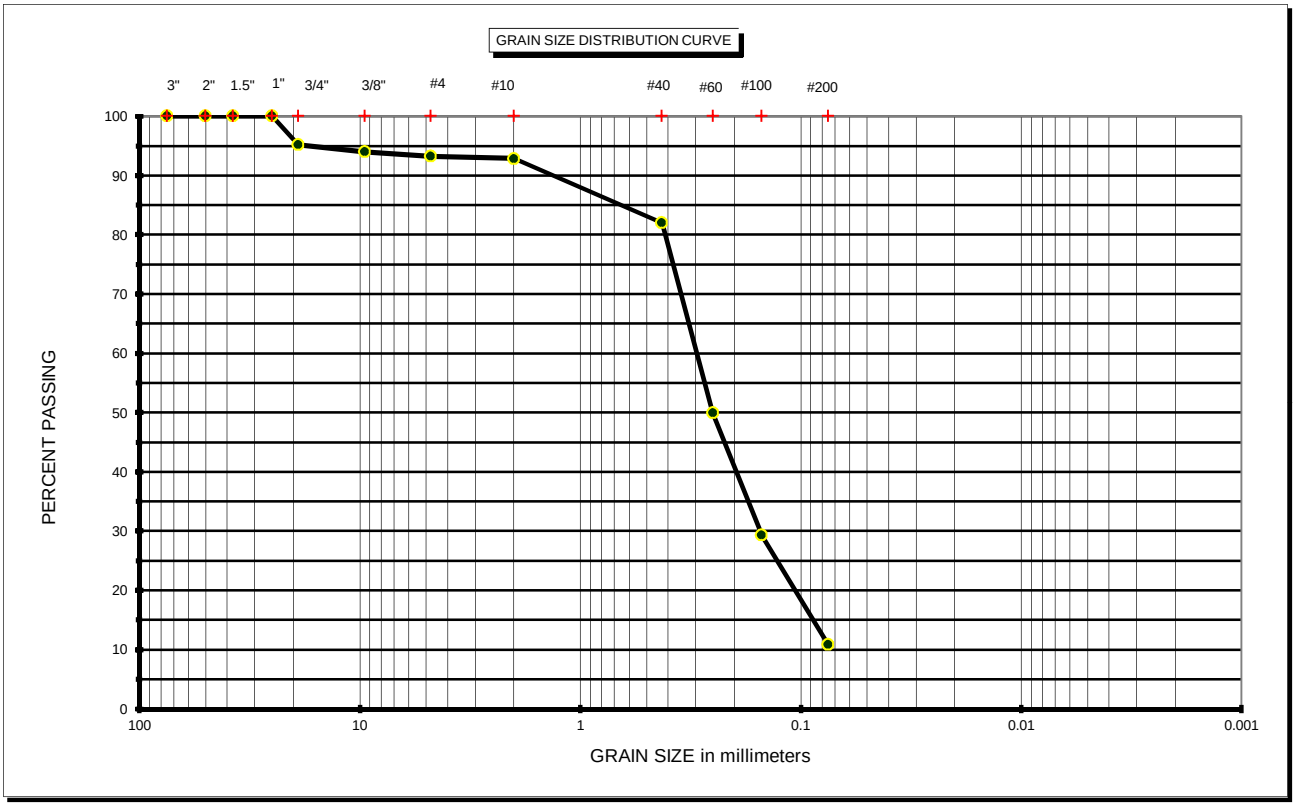
SOIL CLASSIFICATION: A-2-4

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

GRAIN SIZE DATA SHEET

PROJECT NAME: Midway Road **DATE:** 5/2/2016

PROJECT #: 7111-15-154



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 # RD-8 **OFFSET (ft)** **DEPTH (ft):** 0.3-2.0

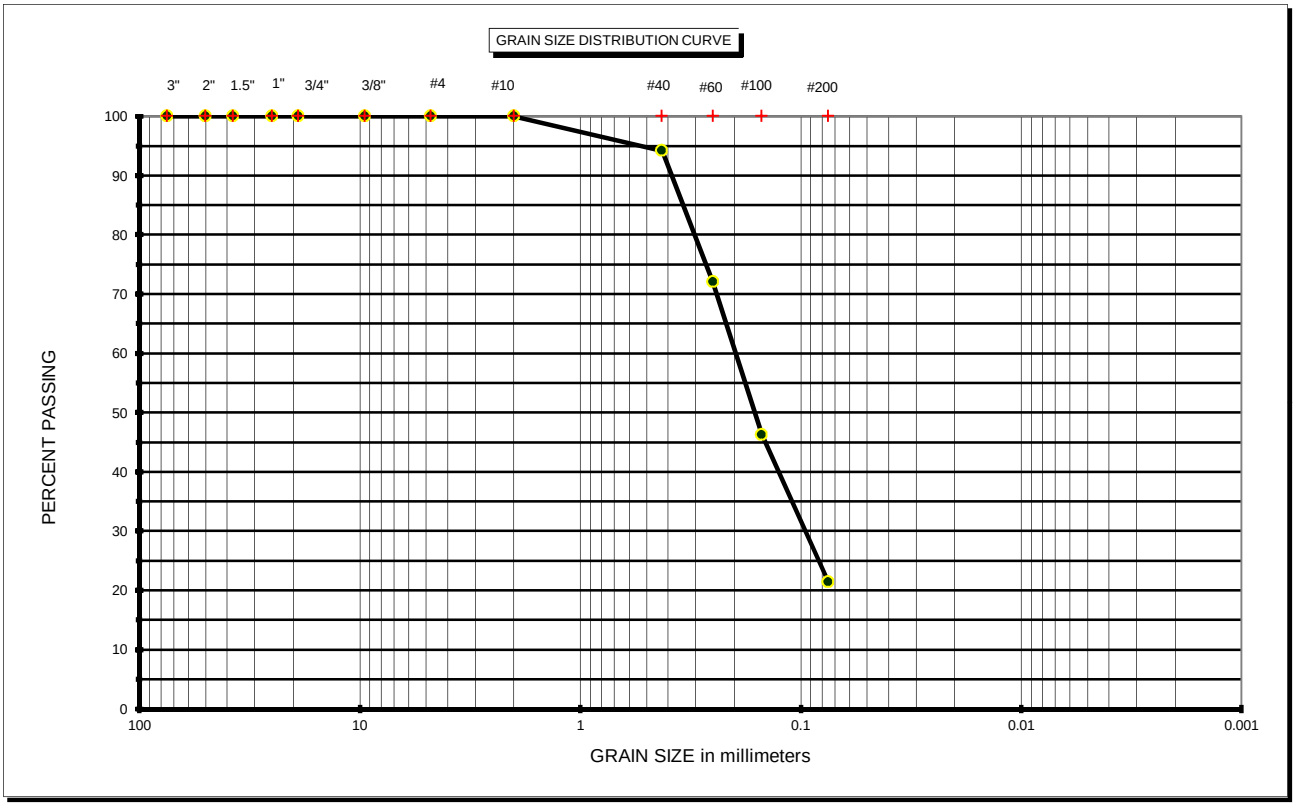
SOIL CLASSIFICATION: A-2-4

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

GRAIN SIZE DATA SHEET

PROJECT NAME: Midway Road **DATE:** 5/2/2016

PROJECT #: 7111-15-154



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 # RD-12 **OFFSET (ft)** **DEPTH (ft):** 8.0-10.0

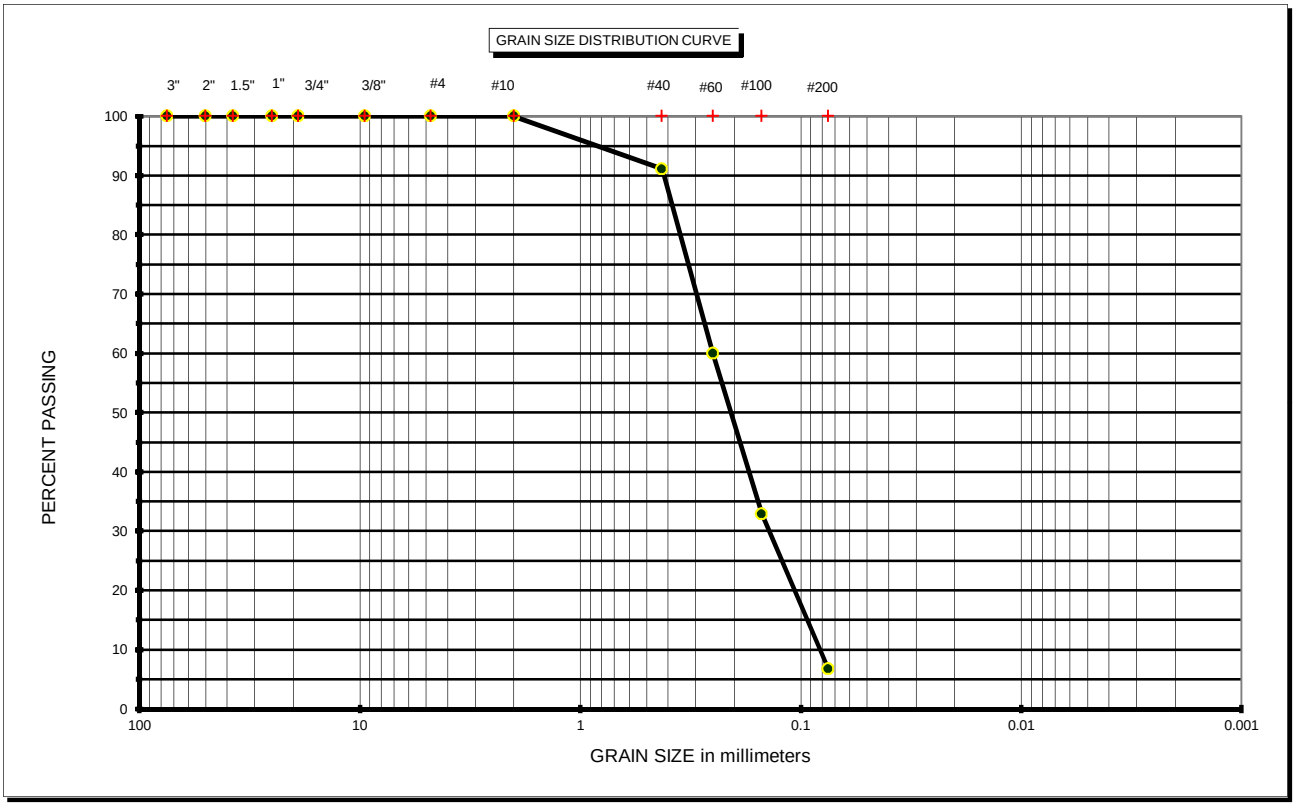
SOIL CLASSIFICATION: A-2-4

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

GRAIN SIZE DATA SHEET

PROJECT NAME: Midway Road **DATE:** 5/2/2016

PROJECT #: 7111-15-154



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 # RD-14 **OFFSET (ft)** **DEPTH (ft):** 2.0-4.0

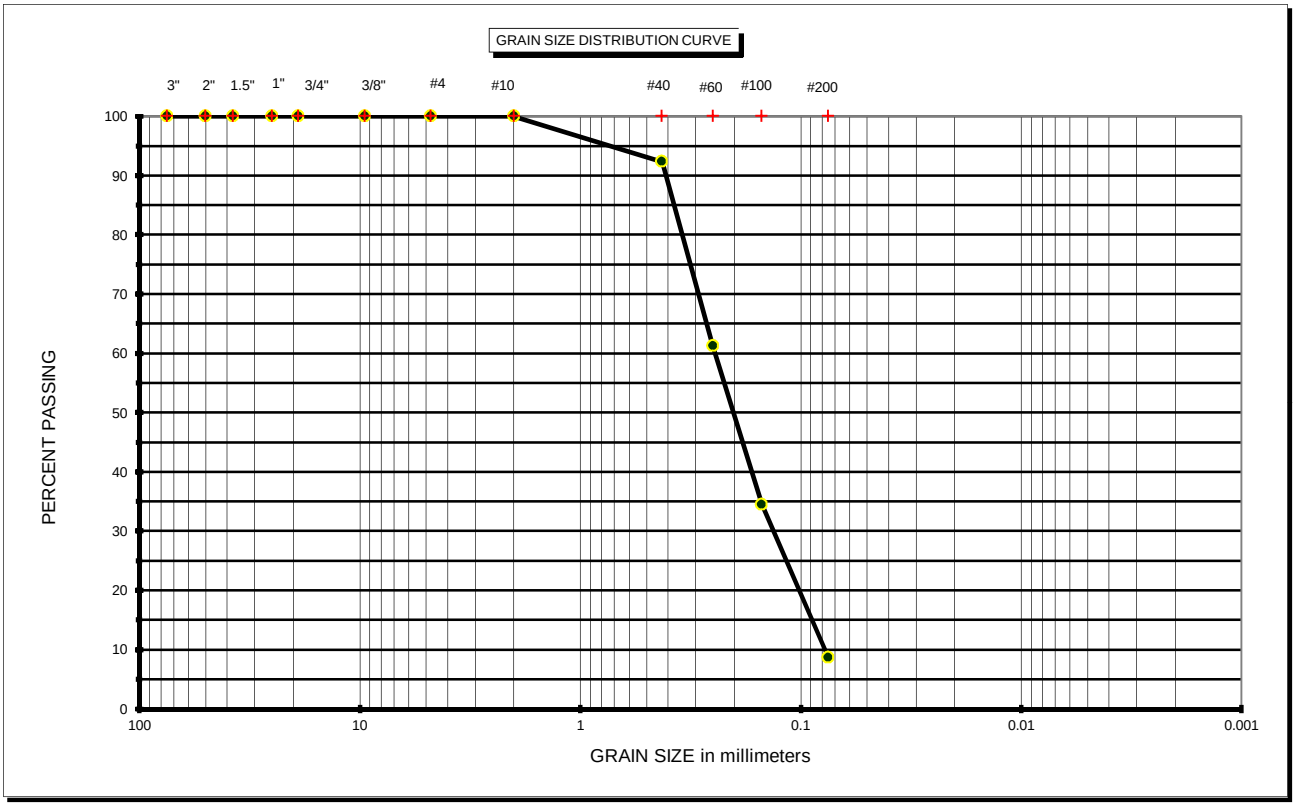
SOIL CLASSIFICATION: A-3

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

GRAIN SIZE DATA SHEET

PROJECT NAME: Midway Road **DATE:** 5/2/2016

PROJECT #: 7111-15-154



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 # RD-15 **OFFSET (ft)** **DEPTH (ft):** 0.3-1

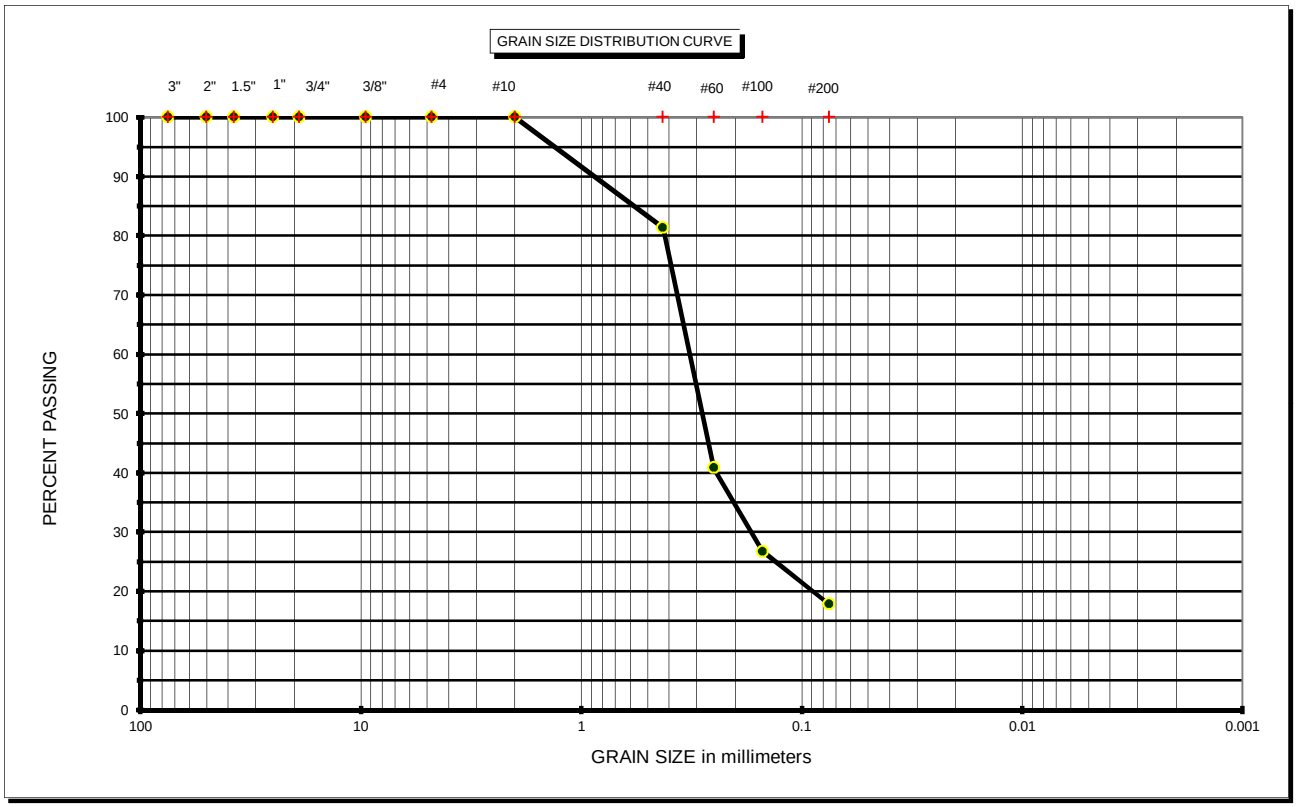
SOIL CLASSIFICATION: A-3

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

GRAIN SIZE DATA SHEET

PROJECT NAME: Midway Road **DATE:** 5/2/2016

PROJECT #: 7111-15-154



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 # RD-18 **OFFSET (ft)** **DEPTH (ft):** 6.0-8.0

SOIL CLASSIFICATION: A-2-4

ATTERBERG LIMIT (- #40 Material)

LIQUID LIMIT	NP
PLASTIC LIMIT	NP
PLASTIC INDEX	NP