PAVEMENT CORING AND GEOTECHNICAL ENGINEERING EVALUATION
NE 34TH AVENUE, FROM SR-70 TO SR-710
OKEECHOBEE COUNTY, FLORIDA

AACE FILE NO. 16-166

ANDERSEN ANDRE CONSULTING ENGINEERS, INC.

834 SW Swan Avenue
Port St. Lucie, Florida 34983
Ph: 772-807-9191 Fx: 772-807-9192
www.aaceinc.com

ANDERSEN ANDRE CONSULTING ENGINEERS, INC.
Geotechnical Engineering
Construction Materials Testing
Environmental Consulting

AACE File No. 16-166
August 25, 2016

Okeechobee County
804 NW 2nd Street
Okeechobee, FL 34972

Attention: Mr. Lee R. Evett
Public Works Director

PAVEMENT CORING AND GEOTECHNICAL ENGINEERING EVALUATION
NE 34TH AVENUE, FROM SR-70 TO SR-710
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1.0 INTRODUCTION

In accordance with your request and authorization, Andersen Andre Consulting Engineers, Inc. (AACE) has completed a subsurface exploration and geotechnical engineering analyses for the above referenced project. The purpose of this work was to evaluate the existing pavement section and shallow soil conditions within the study area relative to future roadway improvements. Our work included pavement coring, hand auger borings, limited laboratory testing, and engineering analysis. This report documents our explorations and presents our findings, and summarizes our conclusions and recommendations.

2.0 SITE INFORMATION AND PROJECT UNDERSTANDING

2.1 Site Location and Description

The study area (i.e. site) for this evaluation consists of NE 34th Avenue (from SR-70 and extending south to SR-710/Beeline Highway) located on the east side of Okeechobee in Okeechobee County, Florida (within Section 13, Township 37 South, Range 35 East). A Site Vicinity Map (2016 aerial photograph) is presented on Sheet No. 1.

The approximately 0.4-mile long two-lane roadway is intercepted by only a few commercial driveways leading to developed parcels, and is otherwise bordered by undeveloped properties. Based on observations made during our site visits, the roadway appears to be exposed to frequent and relatively heavy truck traffic, associated with the developed parcels and from the connecting larger roadways (i.e. SR-70 and SR-710).

The roadway is currently asphalt-paved with grassed shoulders and side swales. Based on our cursory field observations, the overall condition of the roadway can be considered as "fair to poor" with longitudinal cracking and "alligator" block cracking patterns of varying frequency (especially near driveway turnouts) as well as minor wheel rutting. Representative photographs presenting examples of the current roadway conditions are included in Appendix I.

2.2 USGS Topographic Information

Based on our review of the 1987 U.S. Geological Survey (USGS) Topographic Quadrangle map of Okeechobee, Florida", the site appears to be relatively level with a ground surface elevation of about 25 feet with respect to the National Geodetic Vertical Datum (NGVD) of 1929. Further, what appears to be a natural drainageway or slough is shown crossing the roadway within the southern one-third segment of the roadway; a cursory review of readily available historical aerial photographs confirms the presence of this feature. The portion of the USGS map which includes the subject site has been reproduced on Sheet No. 1.

2.3 USDA Soil Survey

Based on the U.S. Department of Agriculture (USDA) NRCS Web Soil Survey, the majority of the subject roadway is located in an area characterized by the Immokalee fine sand, 0 to 2 percent slopes (Map Unit No. 11) soil type. This soil type is noted to consist of sandy marine deposits originating from flats on marine terraces, with fine sands and loamy fine sand present to depths in excess of 80 inches.

Also identified in the soil survey is a narrow section of the Basinger fine sand, 0 to 2 percent slopes (Map Unit No. 2) soil type which crosses the roadway at the location of the aforementioned slough feature. This soil type is noted to consist of sandy marine deposits originating from drainageways on marine terraces, with fine sands present to depths in excess of 80 inches.

The approximate location of the site is shown superimposed on a copy of the USDA Web Soil Survey aerial photograph, presented on Sheet No. 1, and the summary report obtained from the USDA Web Soil Survey is included in Appendix II.

2.4 Project Understanding

We understand that the subject roadway is scheduled for improvements in the near future, possibly consisting of milling and resurfacing. The proposed roadway improvements are being designed by Johnson Engineering, Inc.

3.0 FIELD EXPLORATION PROGRAM

As requested, to explore the existing pavement conditions and the underlying subgrade soils, nine (9) asphalt cores and shallow hand auger borings (ASTM D1452) were performed at the locations shown on Sheet No. 2. Our field work was performed on August 5, 2016. The auger boreholes were backfilled with accumulated soil cuttings upon completion of the field exploration program, and the pavement core holes were restored using asphalt cold-patch material.

Our borings and pavement cores were field located using obtained aerial photographs, existing site features, and a combination of tape/wheel measurements and a WAAS-enabled GPS instrument. The locations should be considered accurate only to the degree implied by the method of measurement used. We preliminarily anticipate that the borings were performed within 15 feet of the locations noted on Sheet No. 2.

The *Sunshine State One Call of Florida* was notified of our explorations in advance of mobilizing our equipment and cress to allow member utility companies to mark potential conflicts in the field. Further, an Okeechobee County Sheriff's deputy was retained to assist with Maintenance of Traffic operations during our field work.

Samples obtained during performance of the hand auger borings were visually classified in the field, and representative portions of the samples were transported to our laboratory in sealed sample jars for further classification. The soil samples recovered from our explorations will be kept in our laboratory for 60 days, then discarded unless you specifically request otherwise.

4.0 LIMITED LABORATORY TESTING PROGRAM

Our field personnel examined the soil recovered from the auger buckets, placed the recovered soil samples in moisture proof containers, and maintained a log for each boring. The field soil boring logs and recovered soil samples were then returned to our laboratory where they were examined and visually classified by the project geotechnical engineer in general accordance with the AASHTO guidelines.

In addition, three (3) Limerock Bearing Ratio (LBR) samples were collected and tested in accordance with FDOT FM 5-515 procedures. Table 1 below summarizes the LBR sample locations and the test results, and the individual LBR data reports are included in Appendix III.

Table 1 - LBR Test Results

LBR No.	Approximate Location	Soil Description	Optimum Moisture Content (%)	Maximum Dry Density (pcf)	LBR Value
1	Composite of roadway subsoils obtained from pavement cores and hand auger borings	Light brown to tan fine sand (A-3)	12.5	99.8	38
2	East shoulder, approximately 850 feet south of SR-70 (27.24748/-80.79369)	Tan fine sand (A-3)	13.5	99.5	41
3	West shoulder, approximately 500 feet north of SR-710 (27.24524/-80.79379)	Light brown fine sand (A-3)	11.7	100.1	45

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5.0 OBSERVED FIELD CONDITIONS

The following pavement section materials and subgrade soil conditions were encountered at the nine pavement core locations (see Table 2).

Table 2 - Summary of Pavement Cores

CORE ID	CORE LOCATION	FIELD OBSERVATIONS	
		THICKNESS [INCHES]	MATERIAL (AASHTO CLASSIFICATION)
PC-1	Northbound lane 3'W of EOP (27.24463/-80.79369)	0 - 2 2 - 12 12 - 60 EOB	Asphalt (1" asphalt and 1" black base) Light brown shellrock base course Lt. brown/tan fine sand (A-3) GWT encountered 43" below top-of-pavement
PC-2	Southbound lane 4'E of EOP (27.24522/-80.79375)	0 - 2¾ 2¾ - 13 13 - 60 EOB	Asphalt (1½" asphalt and 1¼" black base) Light brown shellrock base course Lt. brown/tan fine sand (A-3) GWT encountered 48" below top-of-pavement
PC-3	Northbound lane 3'W of EOP (27.24579/-80.79369)	0 - 3½ 3½ - 18 18 - 50 50 - 60 EOB	Asphalt Light brown shellrock base course Lt. brown/tan fine sand (A-3), t/o rock and clay [pipe crossing] Brown fine sand (A-3), t/o hardpan frgm GWT encountered 57" below top-of-pavement
PC-4	Northbound lane 1'E of C/L (27.24602/-80.79372)	0 - 2½ 2½ - 13 13 - 26 26 - 60 EOB	Asphalt (1¾" asphalt and ¾" black base) Light brown shellrock base course Light brown/light gray fine sand (A-3) Lt. brown/tan fine sand (A-3) GWT encountered 57" below top-of-pavement
PC-5	Southbound lane 3'W of C/L (27.24660/-80.79375)	0 - 1¾ 1¾ - 13 13 - 60 EOB	Asphalt (¾" asphalt and 1" black base) Light brown shellrock base course Lt. brown/tan fine sand (A-3) GWT encountered 53" below top-of-pavement
PC-6	Southbound lane 2'W of C/L (27.24706/-80.79377)	0 - 1¾ 1¾ - 14 14 - 60 EOB	Asphalt (1" asphalt and ¾" black base) Light brown shellrock base course Lt. brown/tan fine sand (A-3) GWT encountered 53" below top-of-pavement
PC-7	Northbound lane 2'E of C/L (27.24751/-80.79370)	0 - 1¾ 1¾ - 13 13 - 20 20 - 60 EOB	Asphalt (¾" asphalt and 1" black base) Light brown shellrock base course Lt. brown/lt. gray fine sand (A-3) Lt. brown/tan fine sand (A-3) GWT encountered 52" below top-of-pavement
PC-8	Southbound lane 3'W of C/L (27.24816/-80.79374)	0 - 3 3 - 16 16 - 25 25 - 60 EOB	Asphalt (1½" asphalt and 1½" black base) Light brown shellrock base course Lt. brown/lt. gray fine sand (A-3) Lt. brown/tan fine sand (A-3) GWT encountered 52" below top-of-pavement
PC-9	Southbound lane 7'E of EOP (27.24881/-80.79371)	0 - 3½ 3½ - 14 14 - 25 25 - 60 EOB	Asphalt Light brown coquina base course Brown fine sand (A-3), t/o clay nodules [possibly stab. subgrade] Lt. brown/tan fine sand (A-3) GWT encountered 50" below top-of-pavement

It is noted that core PC-9 was completed within a recently improved segment of the road (northern end), while cores PC-1 through PC-8 were completed within the remainder of the roadway.

As can be seen, for cores PC-1 through PC-8, the encountered pavement section consist of approximately 1.75 to 3.5 inches of asphalt (both regular asphalt and apparent black base, as noted) atop approximately 10 to 14.5 inches of shell rock base course materials. We note that LBR sampling/testing was not performed on the encountered shell rock base course materials, however, based on our visual observations and experience with numerous roadway projects, this material would likely yield LBR values in excess of 100, if tested. We remain available to perform such testing, if needed.

For core PC-9, the pavement section consisted of 3.5 inches of asphalt over 11.5 inches of coquina base course materials, in turn followed by 11 inches of apparent stabilized subgrade materials consisting of fine sands (A-3) with clay nodules.

The soils encountered below the pavement section at each core location (to depths of 5 feet) consisted of fine sands (A-3) which are considered "Select Materials" and suitable to support a flexible pavement section, if properly compacted.

Using layer coefficients published in the 2015 Florida Department of Transportation Flexible Pavement Design Manual, the corresponding design structural number of the pavement section at the explored locations varies as summarized in Table 3.

Table 3 - Summary of Existing Flexible Pavement Section Structural Numbers(1)

Core ID	Asphalt Thickness [in]	Layer Coefficient	Base Course (2) Thickness [in]	Layer Coefficient (3)	Structural Number, SN (4)
PC-1	2	0.44	10	0.18	2.7
PC-2	2.75	0.44	10.25	0.18	3.1
PC-3	3.5	0.44	14.5	0.18	4.1
PC-4	2.5	0.44	10.5	0.18	3.0
PC-5	1.75	0.44	11.25	0.18	2.8
PC-6	1.75	0.44	12.25	0.18	3.0
PC-7	1.75	0.44	11.25	0.18	2.8
PC-8	3	0.44	13	0.18	3.7
PC-9	3.5	0.44	10.5	0.18	3.4

The following notes apply to Table 3:

(1) The soils below the base course (and the apparent stabilized subgrade in core PC-9) were neglected from the Structural Number calculations.
(2) Encountered shell rock base course assumed to be "Shell Rock LBR 100" material.
(3) Layer coefficient of apparent black-base conservatively equated to that of the overlying asphalt.
(4) The estimated Structural Numbers are based on design values; aging of the roadway has reduced these values significantly. Reduced layer coefficients should be considered when evaluating the current actual structural numbers.

6.0 ESTIMATED NORMAL SEASONAL HIGH GROUNDWATER TABLE

The groundwater table will fluctuate seasonally, primarily based on rainfall. The normal seasonal high groundwater table (NSHGWT) is likely during the rainy season in Southeast Florida, typically between June and September of each year. The water table elevations associated with a 100-year flood level (or during an extreme storm event) would be much higher than the normal seasonal high water table elevation. The normal seasonal high groundwater table can also be influenced by the presence of relief points such as canals, lakes, ponds, swamps, etc., as well as by the drainage characteristics of the in-situ soils.

Based upon our field exploration, our observation of recovered soil samples and on review of the soil survey, we estimate that the NSHGWT is likely 1 to 2 feet higher than the levels encountered in our borings, possibly closer than 2 feet to the top-of-pavement for portions of the roadway.

The estimated NSHGWT does not provide any assurance that the groundwater levels will not exceed these estimated levels during any given year in the future. Drainage impediments, storm events or other such occurrences may result in groundwater levels exceeding our estimates.

If a more accurate determination of the seasonal groundwater level variations on this site is prudent for the design of the roadway improvements, we would recommend installing a number of piezometers within the roadway shoulders/swales and perform a periodic monitoring of the ambient groundwater levels.

7.0 CLOSURE

We trust the information provided herein will be of assistance to Johnson Engineering, Inc. in their roadway improvement design.

This report has been prepared in accordance with generally accepted geotechnical engineering practices for the exclusive use of Okeechobee County for the subject project. No other warranty, expressed or implied, is made. Limitations and conditions to this report are presented in Appendix IV.

We are pleased to be of assistance to you on this phase of your project. When we may be of further service to you or should you have any questions, please contact us.

ANDERSEN ANDRE CONSULTING ENGINEERS, INC.
Certificate of Authorization No. 26794

PETER G. ANDERSEN LICENSE No. 57956 STATE OF FLORIDA PROFESSIONAL ENGINEER 8-25-2016

Peter G. Andersen, P.E.
Principal Engineer
Fla. Reg. No. 57956

David P. Andre, P.E.
Principal Engineer
Fla. Reg. No. 53969
8/25/16

PGA/DPA:pa

cc (via email): Mr. Ryan Bell, P.E. - Johnson Engineering, Inc.

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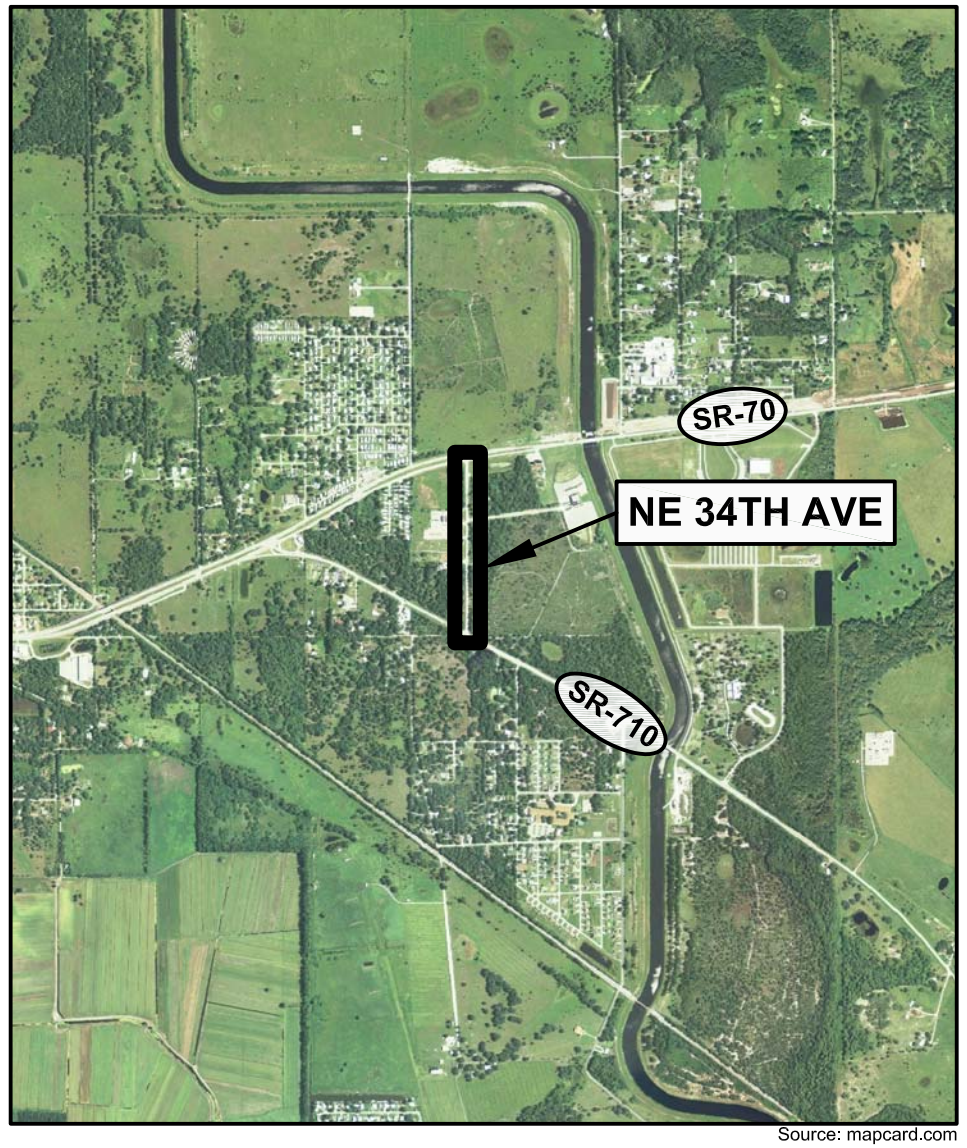
ATTACHMENTS

APPENDICES

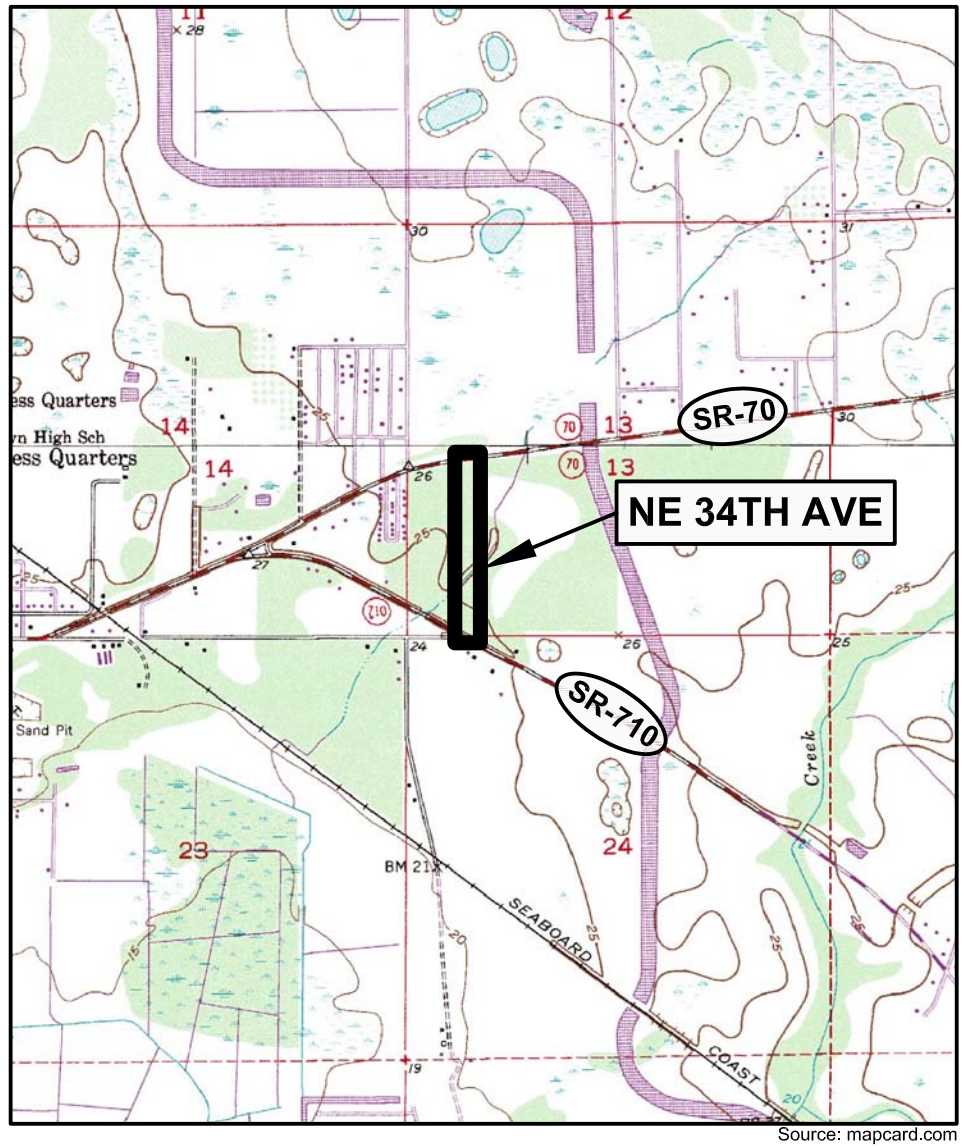
2016 AERIAL PHOTOGRAPH



Source: mapcard.com

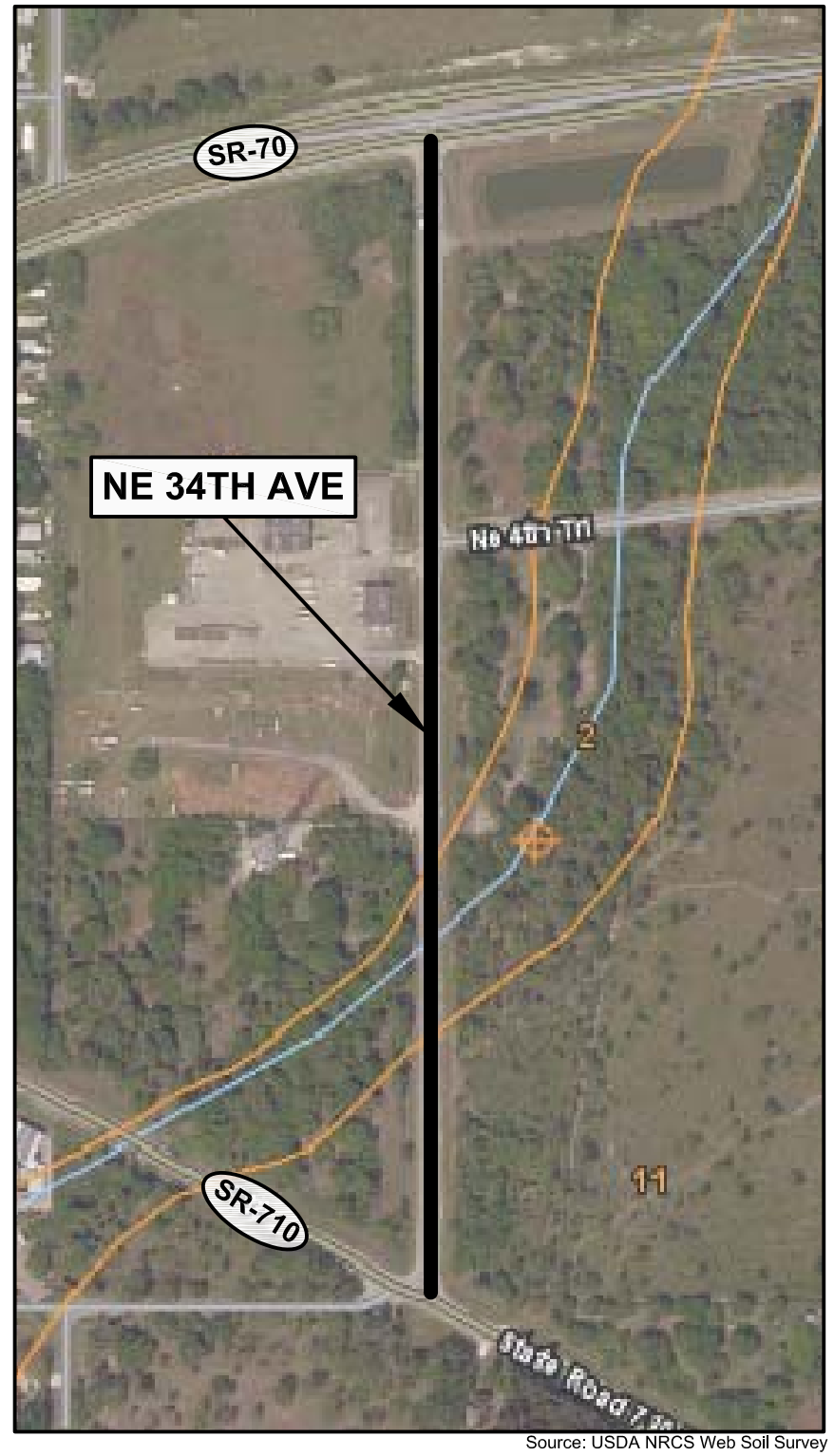
USGS TOPOGRAPHIC MAP

(1987 USGS Quadrangle Map of "Okeechobee, Florida")



Source: mapcard.com

USDA SOIL SURVEY MAP



Source: USDA NRCS Web Soil Survey

USDA NRCS WEB SOIL SURVEY

2 - Basinger fine sand, 0 to 2 percent slopes

11 - Immokalee fine sand, 0 to 2 percent slopes

NORTH

NOT TO SCALE

...within Section 13, Township 37 South, Range 35 East

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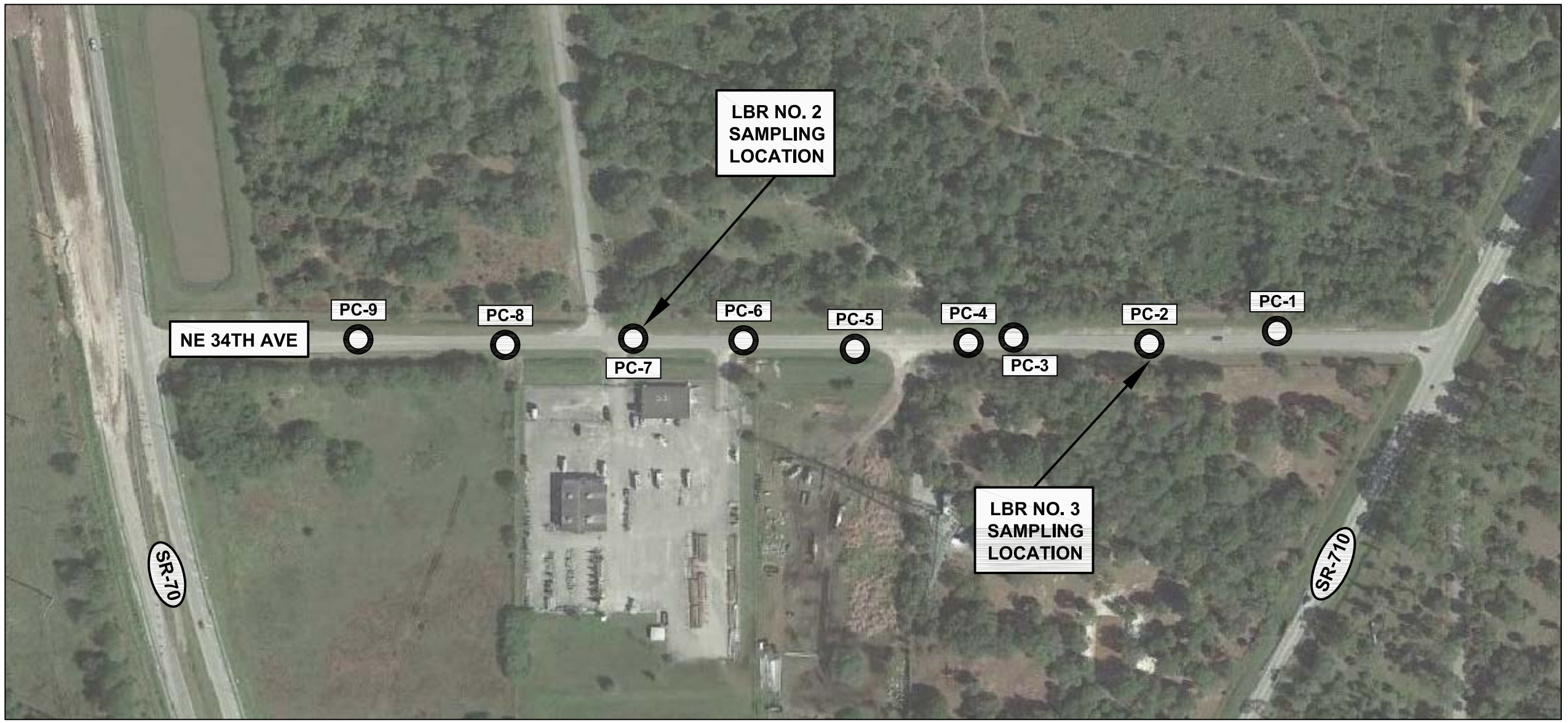
SITE VICINITY MAPS

PAVEMENT CORING AND EVALUATION
NE 34TH AVENUE (SR-70 TO SR-710)
OKEECHOBEE COUNTY, FLORIDA

Drawn by: PGA	Date: August 2016
Checked by: DPA	Date: August 2016
AACE File No: 16-166	Sheet No. 1



LEGEND AND NOTES

NORTH

APPROXIMATE SCALE [11x17]: 1"=200'

0 100 200 400

FEET

PC-# Approximate Location of Pavement Core

Shown and noted field work locations are approximate. All field work locations were located using obtained the provided site plan, aerial photographs, existing site features, and a combination of tape/wheel measurements and a WAAS-enabled GPS instrument. The shown field work locations should be considered accurate only to the degree implied by the method of measurement used.

Sheet No. 2 Source: GoogleEarthPro

LBR Sample No. 1 composited from recovered roadway subgrade soils (i.e. sample location not shown)

LBR Samples No. 2 and No. 3 collected from roadway shoulders.

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FIELD WORK LOCATION PLAN

PAVEMENT CORING AND EVALUATION
NE 34TH AVENUE (SR-70 TO SR-710)
OKEECHOBEE COUNTY, FLORIDA

Drawn by: PGA	Date: August 2016
Checked by: DPA	Date: August 2016
AACE File No: 16-166	**Sheet No. 2**

APPENDIX I:

REPRESENTATIVE SITE PHOTOGRAPHS

Representative Site Photographs
NE 34th Avenue (SR-70 to SR-710)
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Representative Site Photographs
NE 34th Avenue (SR-70 to SR-710)
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APPENDIX II:

USDA WEB SOIL SURVEY SUMMARY REPORT

Soil Map—Okeechobee County, Florida
(NE 34th Avenue (SR-710 to SR-70))

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: Okeechobee County, Florida
Survey Area Data: Version 12, 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: Mar 20, 2015—Mar 21, 2015

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

Okeechobee County, Florida (FL093)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
2	Basinger fine sand, 0 to 2 percent slopes	20.2	14.3%
11	Immokalee fine sand, 0 to 2 percent slopes	121.3	85.7%
Totals for Area of Interest		**141.6**	**100.0%**

Okeechobee County, Florida

2—Basinger fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2svym
Elevation: 0 to 20 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

Basinger and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Basinger

Setting

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

Typical profile

Ag - 0 to 2 inches: fine sand
Eg - 2 to 18 inches: fine sand
Bh/E - 18 to 36 inches: fine sand
Cg - 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): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 2 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 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D

Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Eaugallie
Percent of map unit: 4 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 soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Placid, depressional
Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, convex
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Margate
Percent of map unit: 3 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: Sandy soils on stream terraces, flood plains, or in depressions (G156AC145FL)
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Okeechobee County, Florida
Survey Area Data: Version 12, Nov 19, 2015

Okeechobee County, Florida

11—Immokalee fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2s3lk
Elevation: 10 to 100 feet
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 310 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Immokalee and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Immokalee

Setting

Landform: Flats 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
BC - 54 to 80 inches: loamy 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: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Minor Components

Basinger
Percent of map unit: 5 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Pomona
Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Margate
Percent of map unit: 3 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Convex, linear
Across-slope shape: Linear, concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G156AC145FL)
Hydric soil rating: Yes

Placid, depressional
Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip, talf
Down-slope shape: Concave, convex
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Okeechobee County, Florida
Survey Area Data: Version 12, Nov 19, 2015

APPENDIX III:

LBR TEST REPORTS

ANDERSEN ANDRE CONSULTING ENGINEERS, INC.

834 SW Swan Avenue
Port St. Lucie, Florida 34983
Phone: 772-807-9191 Fax: 772-807-9192
www.aaceinc.com

LIMEROCK BEARING RATIO (FM 5-515)

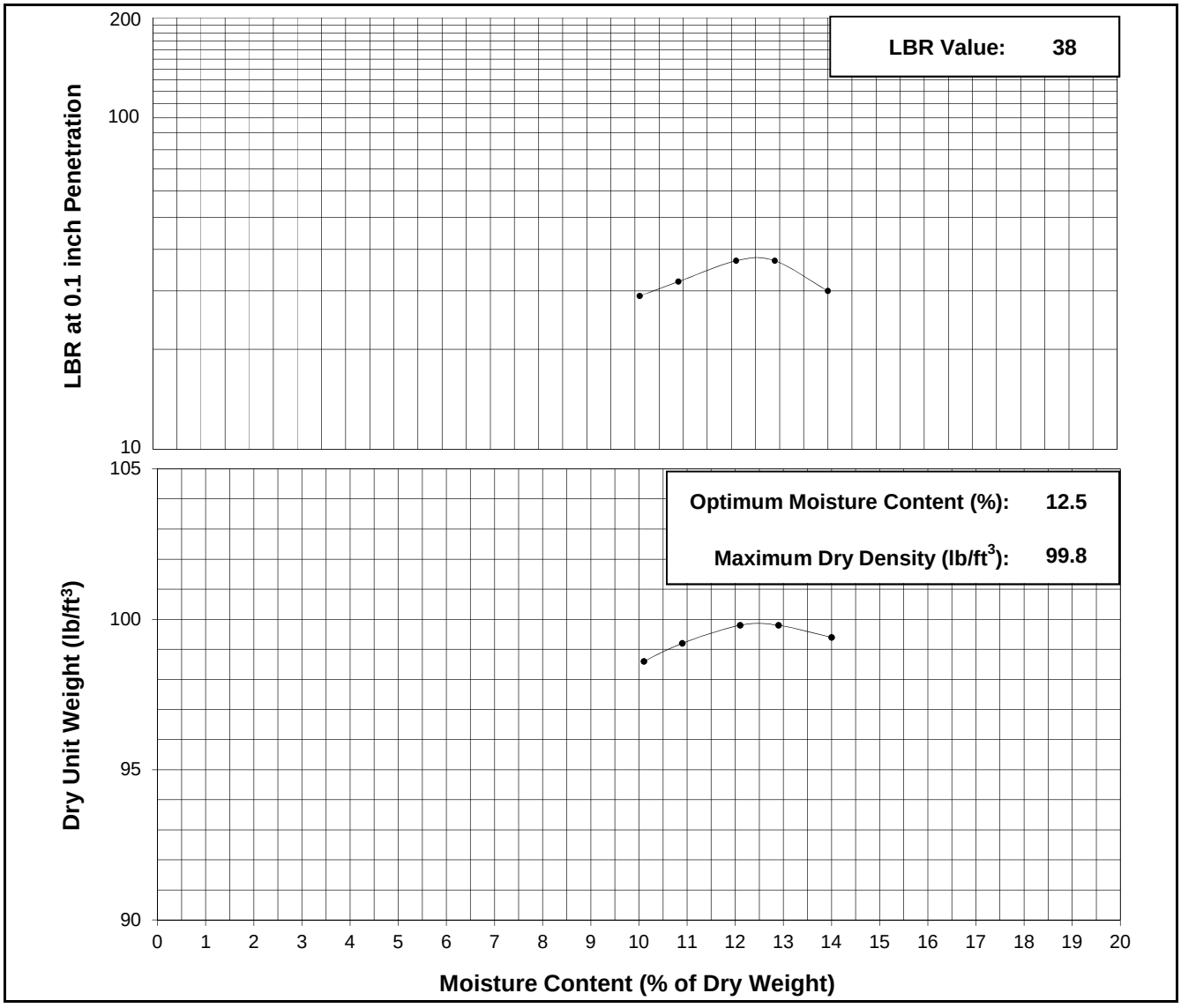
PROJECT: **NE 34th Avenue From SR-710 to SR-70**

FILE NO: **16-166**

REPORTED TO: **Okeechobee County**

REPORT NO: **1**

CC:



SAMPLE NO: 2070 SAMPLE LOCATION: Composite Sample of Roadway Subsoils

DESCRIPTION: Light brown to tan fine sand (from pavement cores/hand auger borings)

PROPOSED USE: NA DATE SAMPLED: 08/05/16 BY: BS

Peter G. Andersen, P.E.
Fla. Reg. No. 57956

ANDERSEN ANDRE CONSULTING ENGINEERS, INC.

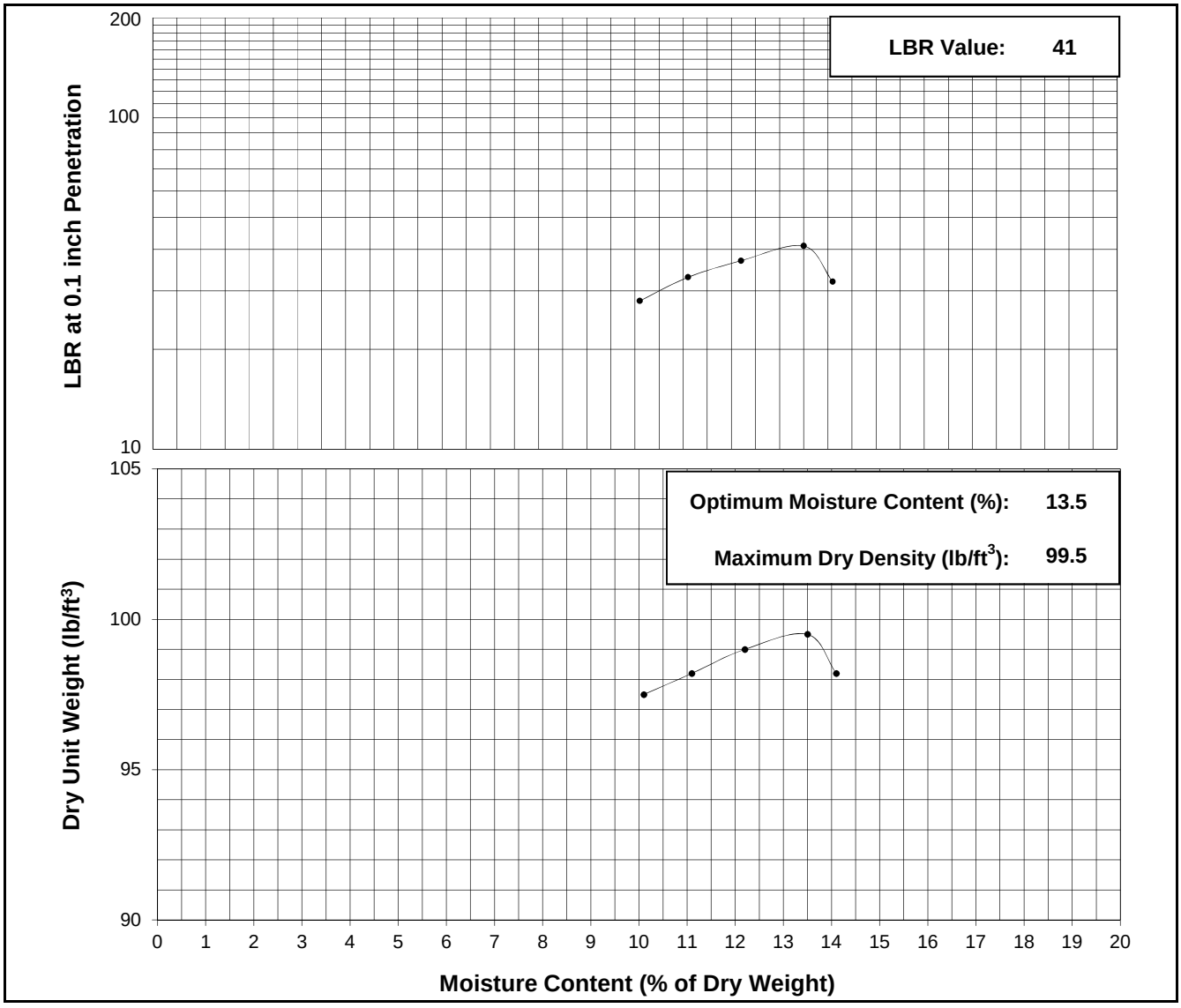
834 SW Swan Avenue
Port St. Lucie, Florida 34983
Phone: 772-807-9191 Fax: 772-807-9192
www.aaceinc.com

LIMEROCK BEARING RATIO (FM 5-515)

PROJECT: **NE 34th Avenue From SR-710 to SR-70**
FILE NO: **16-166**

REPORTED TO: **Okeechobee County**
REPORT NO: **2**

CC:



SAMPLE NO: 2071 SAMPLE LOCATION: Composite Sample, East Shoulder

DESCRIPTION: Tan fine sand (27.24748 / -80.79369)

PROPOSED USE: NA DATE SAMPLED: 08/05/16 BY: BS

Peter G. Andersen, P.E.
Fla. Reg. No. 57956

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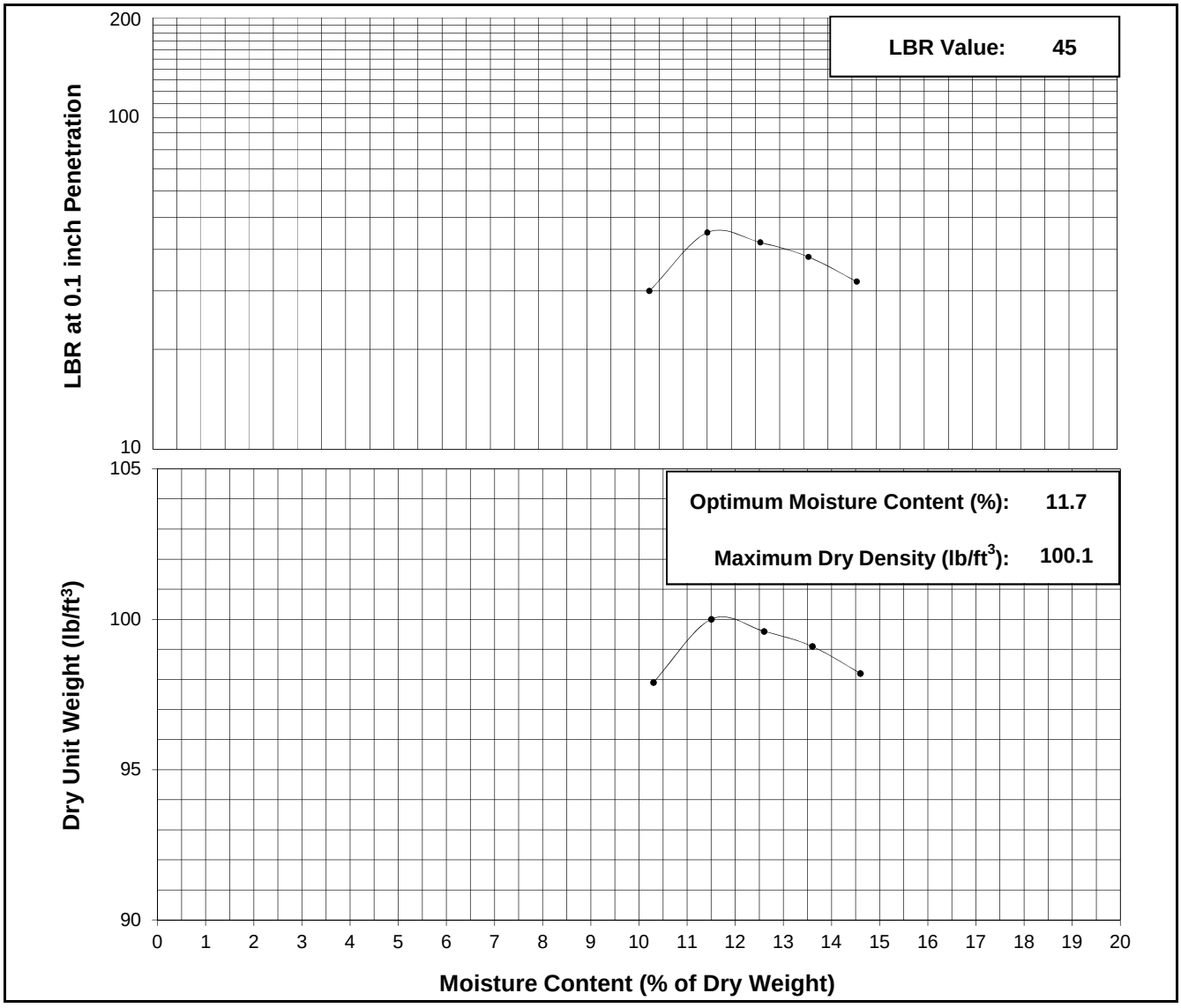
LIMEROCK BEARING RATIO (FM 5-515)

PROJECT: **NE 34th Avenue From SR-710 to SR-70**
FILE NO: **16-166**

REPORTED TO: **Okeechobee County**
REPORT NO: **3**

CC:



SAMPLE NO: 2072 SAMPLE LOCATION: Composite Sample, West Shoulder

DESCRIPTION: Light brown fine sand (27.24524 / -80.79379)

PROPOSED USE: NA DATE SAMPLED: 08/05/16 BY: BS

Peter G. Andersen, P.E.
Fla. Reg. No. 57956

APPENDIX IV:

PROJECT LIMITATIONS AND CONDITIONS

ANDERSEN ANDRE CONSULTING ENGINEERS, INC.
(revised January 24, 2007)

Project Limitations and Conditions

Andersen Andre Consulting Engineers, Inc. has prepared this report for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made herein. Further, the report, in all cases, is subject to the following limitations and conditions:

VARIABLE/UNANTICIPATED SUBSURFACE CONDITIONS

The engineering analysis, evaluation and subsequent recommendations presented herein are based on the data obtained from our field explorations, at the specific locations explored on the dates indicated in the report. This report does not reflect any subsurface variations (e.g. soil types, groundwater levels, etc.) which may occur adjacent or between borings.

The nature and extent of any such variations may not become evident until construction/excavation commences. In the event such variations are encountered, Andersen Andre Consulting Engineers, Inc. may find it necessary to (1) perform additional subsurface explorations, (2) conduct in-the-field observations of encountered variations, and/or re-evaluate the conclusions and recommendations presented herein.

We at Andersen Andre Consulting Engineers, Inc. recommend that the project specifications necessitate the contractor immediately notifying Andersen Andre Consulting Engineers, Inc., the owner and the design engineer (if applicable) if subsurface conditions are encountered that are different from those presented in this report.

No claim by the contractor for any conditions differing from those expected in the plans and specifications, or presented in this report, should be allowed unless the contractor notifies the owner and Andersen Andre Consulting Engineers, Inc. of such differing site conditions. Additionally, we recommend that all foundation work and site improvements be observed by a Andersen Andre Consulting Engineers, Inc. representative.

SOIL STRATA CHANGES

Soil strata changes are indicated by a horizontal line on the soil boring profiles (boring logs) presented within this report. However, the actual strata change may be more gradual and indistinct. Where changes occur between soil samples, the locations of the changes must be estimated using the available information and may not be at the exact depth indicated.

SINKHOLE POTENTIAL

Unless specifically requested in writing, a subsurface exploration performed by Andersen Andre Consulting Engineers, Inc. Is not intended to be an evaluation for sinkhole potential.

MISINTERPRETATION OF SUBSURFACE SOIL EXPLORATION REPORT

Andersen Andre Consulting Engineers, Inc. is responsible for the conclusions and recommendations presented herein, based upon the subsurface data obtained during this project. If others render conclusions or opinions, or make recommendations based upon the data presented in this report, those conclusions, opinions and/or recommendations are not the responsibility of Andersen Andre Consulting Engineers, Inc.

CHANGED STRUCTURE OR LOCATION

This report was prepared to assist the owner, architect and/or civil engineer in the design of the subject project. If any changes in the construction, design and/or location of the structures as discussed in this report are planned, or if any structures are included or added that are not discussed in this report, the conclusions and recommendations contained in this report may not be valid. All such changes in the project plans should be made known to Andersen Andre Consulting Engineers, Inc. for our subsequent re-evaluation.

USE OF REPORT BY BIDDERS

Bidders who are reviewing this report prior to submission of a bid are cautioned that this report was prepared to assist the owners and project designers. Bidders should coordinate their own subsurface explorations (e.g.; soil borings, test pits, etc.) for the purpose of determining any conditions that may affect construction operations. Andersen Andre Consulting Engineers, Inc. cannot be held responsible for any interpretations made using this report or the attached boring logs with regard to their adequacy in reflecting subsurface conditions which may affect construction operations.

IN-THE-FIELD OBSERVATIONS

Andersen Andre Consulting Engineers, Inc. attempts to identify subsurface conditions, including soil stratigraphy, water levels, zones of lost circulation, “hard” or “soft” drilling, subsurface obstructions, etc. However, lack of mention in the report does not preclude the presence of such conditions.

LOCATION OF BURIED OBJECTS

Users of this report are cautioned that there was no requirement for Andersen Andre Consulting Engineers, Inc. to attempt to locate any man-made, underground objects during the course of this exploration, and that no attempts to locate any such objects were performed. Andersen Andre Consulting Engineers, Inc. cannot be responsible for any buried man-made objects which are subsequently encountered during construction.

PASSAGE OF TIME

This report reflects subsurface conditions that were encountered at the time/date indicated in the report. Significant changes can occur at the site during the passage of time. The user of the report recognizes the inherent risk in using the information presented herein after a reasonable amount of time has passed. We recommend the user of the report contact Andersen Andre Consulting Engineers, Inc. with any questions or concerns regarding this issue.

Important Information about Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE THE GEOPROFESSIONAL BUSINESS ASSOCIATION

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

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