Project Development & Environment Study

SR 60 PD&E Study
From Valrico Road to the Polk County Line

Final
Geotechnical Memorandum

WPI Segment No.: 430055-1
Hillsborough County

Prepared for the

Florida Department of Transportation
District Seven

April 2015

Stephanie Pierce
FDOT Project Manager

Project Development & Environment Study

FINAL GEOTECHNICAL MEMORANDUM

State Road (SR) 60
From Valrico Road to the Polk County Line
Project Development and Environment (PD&E) Study
Hillsborough County, Florida

FDOT District 7
FPN: 430055-1-22-01

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SECTION 1 - EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) conducted a Project Development and Environment (PD&E) Study to evaluate alternative improvements for State Road 60 (SR 60) from Valrico Road to the Polk County Line in Hillsborough County. The total project length is approximately 12.3 miles (**Figure 2-1**). Study objectives include the following: determine proposed typical sections and develop preliminary conceptual design plans for proposed improvements, while minimizing impacts to the environment; consider agency and public comments; and ensure project compliance with all applicable federal and state laws. Improvement alternatives will be identified which will improve safety and meet future transportation demand.

A Geotechnical Memorandum has been prepared for the proposed project. The design of the roadway improvements will require geotechnical subsurface explorations. A review of soil data from both the United States Geological Service (USGS) and the United States Department of Agriculture (USDA) indicates that much of the project alignment contains sandy soils. In addition, areas directly adjacent to the project alignment contain mining-related soils. Test borings will be required as part of the roadway design. Variation in both the depth and concentration of organic material within the surficial soils, as well as the mining-related soils, is expected and test borings will need to be used to delineate any deleterious material.

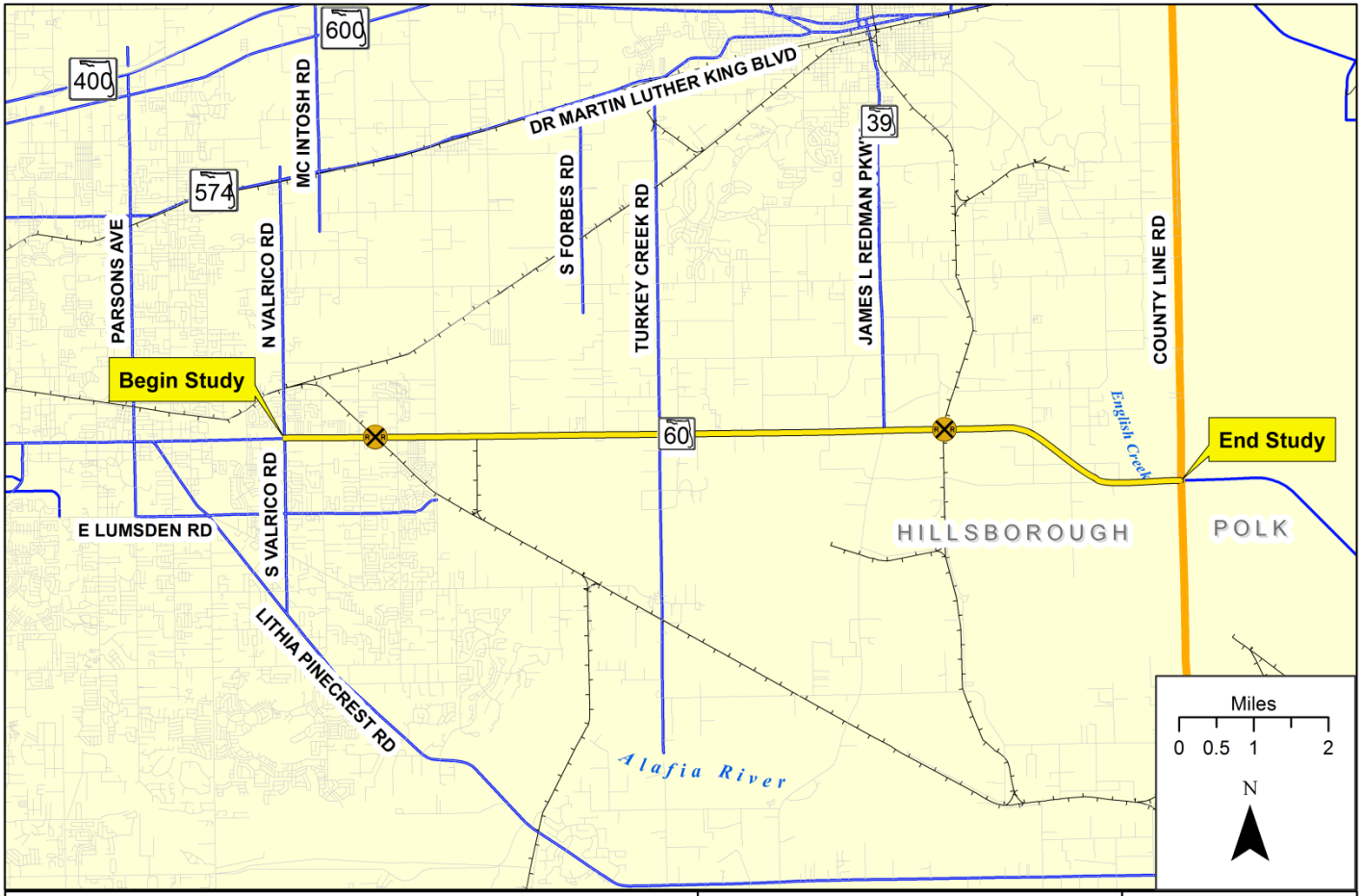
SECTION 2 - INTRODUCTION

2.1 PROJECT DESCRIPTION

The Florida Department of Transportation (FDOT) conducted a Project Development and Environment (PD&E) Study to consider the proposed widening of a portion of SR 60. Located in Hillsborough County, the limits of this study are from Valrico Road at the west end extending eastward to the Polk County Line, a distance of approximately 12.3 miles (**Figure 2-1**). Within the project limits, the existing roadway is a principal arterial, and the improvement will expand the current 4-lane facility to 6-lanes. SR 60 is a major east-west arterial roadway and is part of the Florida Strategic Intermodal System (SIS). The project is within Sections 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30 of Township 29 South, Range 21 East; Sections 19, 20, 21, 22, 25, 26, 27, 28, 29 and 30 of Township 29 South, Range 22 East of the Public Land Survey System (PLSS).

This project was evaluated through the FDOT's Efficient Transportation Decision Making (ETDM) process, designated as ETDM project #4131. An ETDM Programming Screen Summary Report was published on June 8, 2012, containing comments from the Environmental Technical Advisory Team (ETAT) on the project's effects on various natural, physical and social resources. Based on the ETAT comments included in the Summary Report and undertaking the public involvement process to date, it has been determined that the proposed improvements to SR 60 would not create any significant impacts to the environment. Also, when the project went through the ETDM Programming Screen process, the FDOT planned to seek approval of the PD&E study's environmental document by the Federal Highway Administration (FHWA). In the meantime, the FDOT determined that it would instead process the study's environmental document as a State Environmental Impact Report (SEIR). The project is currently fully funded for design in the FDOT's 2024-2040 SIS Cost Feasible Plan and all subsequent phases, right-of-way and construction, are being considered to be added in future updates.

FIGURE 2-1 SR 60 PROJECT LOCATION MAP



2.2 PURPOSE AND NEED

The purpose of the proposed project is to accommodate increases in traffic due to the estimated employment increase for Hillsborough County as a whole and a population increase for unincorporated Hillsborough County. SR 60 is a major east-west arterial roadway and is part of the Florida Strategic Intermodal System (SIS). The SIS is comprised of facilities of statewide and interregional significance that move people and goods and provide for smooth and efficient transfers between modes and major facilities.

SR 60 provides connectivity with many of Florida's major highways, some of which include: US 19, US 41, Interstate 75 (I-75), US 98, US 17, US 27, US 441, Florida's Turnpike, Interstate 95 (I-95) and US 1. SR 60 on the western end terminates as a roundabout with Coronado Drive (CR 699) on Clearwater Beach in Pinellas County and the eastern terminus for SR 60 is SR A1A in Indian River County; therefore, it provides a coast-to-coast route across the state. SR 60 is a vital link in the regional transportation network that connects the Tampa Bay region to the remainder of the state.

The need for two additional lanes on SR 60 in this area is based on current roadway level of service (LOS) combined with future growth projections. The Hillsborough County Level of Service (LOS) Report (March 2011) shows the current LOS of SR 60 between Valrico Road and Dover Road as F. This segment is currently 12% over capacity. The 2011 LOS is C between Dover Road and Turkey Creek Road and also between SR 39 and County Line Road, and the LOS is currently B between the Turkey Creek Road SR 39.

Socioeconomic growth projections from the Hillsborough County Metropolitan Planning Organization’s 2035 Long Range Transportation Plan Socioeconomic Projections estimate an employment increase of 55% and a population increase of 47% for Hillsborough County between 2006 and 2035. Based on the growth projected to occur within the corridor, SR 60 is projected by the Tampa Bay Regional Planning Model (TBRPM) – Cost Feasible Network to have future traffic volumes of approximately 48,800 vehicles east of Valrico Road and 42,500

vehicles west of County Line Road by 2035, which would yield a LOS F for the corridor with the current roadway configuration. These volumes would not meet the acceptable FDOT LOS standards of LOS D for SR 60 between Valrico Road and Horton Road and LOS C for SR 60 between Horton Road and County Line Road.

2.3 PURPOSE OF REPORT

This Geotechnical Memorandum is one of several documents being prepared as part of this PD&E Study. The purpose of this report was to obtain and evaluate information on the existing subsurface conditions along the alignment to assist in the preparation of the PD&E Report for the project. The following services were provided for this summary:

- Reviewed published information on topographic, soils and groundwater conditions. Soil, groundwater and regional geology information was obtained from the Soil Survey of Hillsborough County, Florida published by the United States Department of Agriculture (USDA) – Natural Resource Conservation Service (NRCS). Topographic information was obtained from appropriate topographic maps published by United States Geological Survey (USGS).

- Prepared this Geotechnical Memorandum for the project.

2.4 EXISTING FACILITY AND PROPOSED IMPROVEMENTS

Within the project limits, SR 60 currently has a 4-lane divided urban typical section from Valrico Road to Dover Road and from Sydney Washer Road to Horton Road. It also has a 4-lane rural typical section from Dover Road to Sydney Washer Road and from Horton Road to the Polk County Line (**Figure 2-2**). The existing roadway generally has four 12-foot travel lanes, 4-foot paved outside shoulders, and a 40-foot grassed median.

The posted speed varies from 50 mph to 65 mph. The existing right of way is typically 182 feet.

Expected improvements include widening to six lanes as well as intersection improvements and construction of stormwater management facilities, floodplain compensation sites and bicycle and pedestrian facilities. A “No-Build” Alternative will also be considered. The proposed project is not funded in FDOT’s current 5-year work program.

SECTION 3 - SUBSURFACE CONDITIONS

3.1 USGS TOPOGRAPHIC SURVEY

The United States Geological Survey (USGS) topographic survey maps for the project limits were reviewed for ground surface features. A list of the USGS topographic survey maps reviewed, including Quadrangle titles, is outlined as follows:

- Brandon, Florida;
- Dover, Florida;
- Nichols, Florida;

The natural ground surface elevations appear to be within the range of approximately +35 to +130 feet National Geodetic Vertical Datum of 1929 (NGVD 29) along the project limits. Reproductions of USGS maps are presented in the **Appendix** on **Sheets 1 and 2**.

3.2 REGIONAL GEOLOGY

The following information is as it is presented in the Soil Survey of Hillsborough County, Florida published by the USDA Soil Conservation Service (SCS).

The Suwannee Limestone occurs in the subsurface throughout Hillsborough County and is the oldest geologic formation which is exposed at the surface in the county. The Suwannee is found near the ground surface in the northeastern part of the county and is exposed in the Hillsborough River bed. In all other parts of the county, the Suwannee is overlain by the Tampa Member of the Arcadia Formation. The Suwannee dips to the south and southwest and thickens to the southwest. The thickness of the Suwannee, in the county, ranges from just under 100 feet to more than 300 feet. The top of the Suwannee Limestone is encountered at about 50 feet above

mean sea level in northeastern Hillsborough County and dips to about 300 feet below mean sea level at the southern border.

The Arcadia Formation, Nocatee Member consists of the “lower Tampa” or “Tampa sand and clay unit” of Wilson (1977). The updip limits of the Nocatee are not well-defined at this time, however, the unit extends into southern and eastern most Hillsborough County where it is believed to be present as a thin (several feet) clay layer often described in the past at the base of the Tampa Limestone. The Arcadia Formation, Tampa Member is a white to tan-colored, quartz sandy limestone with a carbonate mud matrix. Varying amounts of clay are usually disseminated throughout the rock (King and Wright, 1979). The Tampa Member is present in the subsurface over most of the county and is exposed in many areas, especially within the Hillsborough River Valley. The Tampa has been removed by erosion in a band along the eastern part of northernmost Hillsborough County. In this area, the Suwannee Limestone is the first formation encountered beneath the surficial sands (Wright and MacGill, 1974). The Tampa dips generally to the southwest and thickens in the downdip direction. The top of the Tampa Member is encountered at just above mean sea level in northern Hillsborough County to approximately 260 feet below mean sea level in the southwestern corner of the county (King, 1979). The uppermost (unnamed) member of the Arcadia Formation includes those sediments which in the past have been referred to as the “Hawthorn carbonate unit” (Scott, 1984, personal communication). Lithologically, these sediments consist of white to yellowish-gray, quartz sandy, phosphatic, sometimes clayey, dolomites and limestones (uncommon). In portions of northwest Hillsborough County and the Hillsborough River Valley, limestones of the Tampa Member of the Arcadia Formation are overlain by irregular thicknesses of sandy calcareous clays. In the past these sediments have been assigned to the Tampa, Hawthorn, Bone Valley, Alachua and Pleistocene by various authors.

The Peace River Formation proposed by Scott (1984) includes two members: a downdip, unnamed member and the updip Bone Valley Member. The unnamed member consists of interbedded sands, clays and dolomite with variable phosphate content which, in the past, have been described as “upper Hawthorn clastics.” In many parts of Hillsborough County, the Peace

River Formation is difficult to differentiate from the uppermost Arcadia due to the gradational nature of the contact and the northward thinning of the Peace River Formation. Both the upper member of the Arcadia Formation and the Peace River Formation pinch out in northern Hillsborough County; however, the Peace River pinches out farther to the south than the upper member of the Arcadia Formation. Bone Valley sediments are present only in the eastern part of Hillsborough County. Bone Valley deposition was restricted to the north by the presence of the Hillsborough High and to the west by the ancestral Valrico Ridge. The Bone Valley Member consists of a series of sands and clays which contain abundant quantities of phosphorite sand and gravel.

Pleistocene terrace sands, deposited during higher sea level stands, blanket most of Hillsborough County. These sands are very fine to medium grained quartz sands with a minor amount of heavy minerals. Generally, the sands are clean and white in color; however, locally they may contain some organic matter and may be iron stained. Thickness of the terrace sands ranges from a few inches to more than 50 feet in the Plant City area (Wright and MacGill, 1974). The Pleistocene terrace sands overlie the clayey residuum of the Hawthorn Group in the northern part of the county. In the southwestern portion of the county, a thin veneer of Pleistocene sand overlies the Pleistocene shell deposits.

Holocene sediments within the county consist of fluvial, lacustrine, mangrove and swamp deposits. Lakes are most prevalent in northwest Hillsborough County. Lacustrine deposits consist of sand, silt and clay washed into lakes by storm water runoff, as well as organic material derived from the decay of aquatic plants within the lakes. Fluvial deposits consist of sand, silt, clay and organic material deposited in the stream beds and flood plains of rivers and streams. The majority of such deposits occur along the Hillsborough, Alafia and Little Manatee Rivers and their tributaries. Mangrove and swamp sediments consist of variable amounts of organic matter and sand, silt and clay.

3.3 HILLSBOROUGH COUNTY SOIL SURVEY

Based on a review of the Hillsborough County Web Soil Survey published by USDA-NRCS, it appears that there are thirty-four (34) soil-mapping units noted along the project limits.

Detailed soil survey maps are shown in the **Appendix** on **Sheets 3 and 4**. Summarized general soil descriptions are presented in each of the following sub-sections, as described in the Web Soil Survey.

3.3.1 ADAMSVILLE FINE SAND (UNIT 2)

The Adamsville component makes up 91 percent of the map unit. Slopes are 0 to 2 percent. This component is on rises on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 33 inches during June, July, August, September, October, and November. Organic matter content in the surface horizon is about 1 percent.

3.3.2 ARCHBOLD FINE SAND (UNIT 3)

The Archbold component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on rises on marine terraces on coastal plains. The parent material consists of eolian or sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is very high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 57 inches during June, July, August, September, October, and November. Organic matter content in the surface horizon is about 1 percent.

3.3.3 ARENTS, NEARLY LEVEL (UNIT 4)

The Arents component makes up 100 percent of the map unit. Slopes are 0 to 5 percent. This component is on rises on marine terraces on coastal plains, fills. The parent material consists of altered marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 27 inches during June, July, August, September, October, and November. Organic matter content in the surface horizon is about 0 percent.

3.3.4 BASINGER, HOLOPAW AND SAMSULA SOILS, DEPRESSIONAL (UNIT 5)

The Basinger component makes up 35 percent of the map unit. Slopes are 0 to 2 percent. This component is on depressions on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during June, July, August, and September. Organic matter content in the surface horizon is about 4 percent.

The Holopaw component makes up 31 percent of the map unit. Slopes are 0 to 2 percent. This component is on depressions on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during June, July, August, and September. Organic matter content in the surface horizon is about 8 percent.

The Samsula component makes up 18 percent of the map unit. Slopes are 0 to 1 percent. This component is on depressions on marine terraces on coastal plains. The parent material consists of herbaceous organic material over sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during June, July, August, September, and October. Organic matter content in the surface horizon is about 60 percent.

3.3.5 CANDLER FINE SAND, 0 TO 5 PERCENT SLOPES (UNIT 7)

The Candler component makes up 90 percent of the map unit. Slopes are 0 to 5 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of eolian deposits and/or sandy and loamy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent.

3.3.6 CANDLER FINE SAND, 5 TO 12 PERCENT SLOPES (UNIT 8)

The Candler component makes up 90 percent of the map unit. Slopes are 5 to 12 percent. This component is on ridges on marine terraces on coastal plains, hill slopes on marine terraces on coastal plains. The parent material consists of eolian deposits and/or sandy and loamy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent.

3.3.7 CANDLER-URBAN LAND COMPLEX, 0 TO 5 PERCENT SLOPES (UNIT 9)

The Candler component makes up 45 percent of the map unit. Slopes are 0 to 5 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of eolian deposits and/or sandy and loamy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent.

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

3.3.8 EATON FINE SAND (UNIT 13)

The Eaton component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on drainageways on marine terraces on coastal plains. The parent material consists of loamy and clayey marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during June, July, August, and September. Organic matter content in the surface horizon is about 0 percent.

3.3.9 EATON MUCKY SAND, DEPRESSIONAL (UNIT 14)

The Eaton, depressional component makes up 89 percent of the map unit. Slopes are 0 to 2 percent. This component is on depressions on marine terraces on coastal plains. The parent material consists of loamy and clayey marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most

restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during June, July, August, and September. Organic matter content in the surface horizon is about 10 percent.

3.3.10 FELDA FINE SAND, OCCASIONALLY FLOODED (UNIT 16)

The Felda, occasionally flooded component makes up 89 percent of the map unit. Slopes are 0 to 2 percent. This component is on stream terraces on flood plains on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during January, February, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 2 percent.

3.3.11 FORT MEADE LOAMY FINE SAND, 0 TO 5 PERCENT SLOPES (UNIT 18)

The Fort Meade component makes up 93 percent of the map unit. Slopes are 0 to 5 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent.

3.3.12 GAINESVILLE LOAMY FINE SAND, 0 TO 5 PERCENT SLOPES (UNIT 19)

The Gainesville component makes up 95 percent of the map unit. Slopes are 0 to 5 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent.

3.3.13 KENDRICK FINE SAND, 2 TO 5 PERCENT SLOPES (UNIT 23)

The Kendrick component makes up 92 percent of the map unit. Slopes are 2 to 5 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of loamy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent.

3.3.14 LAKE FINE SAND, 0 TO 5 PERCENT SLOPES (UNIT 25)

The Lake component makes up 84 percent of the map unit. Slopes are 0 to 5 percent. This component is on ridges, marine terraces, and coastal plains. The parent material consists of eolian deposits or sandy fluvial or marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is very high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent.

3.3.15 MALABAR FINE SAND (UNIT 27)

The Malabar component makes up 86 percent of the map unit. Slopes are 0 to 2 percent. This component is on drainageways on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during June, July, August, September, October, and November. Organic matter content in the surface horizon is about 2 percent.

3.3.16 MILLHOPPER-URBAN LAND COMPLEX, 0 TO 5 PERCENT SLOPES (UNIT 28)

The Millhopper component makes up 50 percent of the map unit. Slopes are 0 to 5 percent. This component is on rises on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 57 inches during January, February, August, September, October, November, and December. Organic matter content in the surface horizon is about 1 percent.

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

3.3.17 MYAKKA FINE SAND (UNIT 29)

The Myakka component makes up 89 percent of the map unit. Slopes are 0 to 2 percent. This component is on flatwoods on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural

drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during June, July, August, and September. Organic matter content in the surface horizon is about 1 percent.

3.3.18 MYAKKA URBAN LAND COMPLEX (UNIT 32)

The Myakka component makes up 50 percent of the map unit. Slopes are 0 to 2 percent. This component is on flatwoods on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during June, July, August, and September. Organic matter content in the surface horizon is about 1 percent.

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

3.3.19 ONA FINE SAND (UNIT 33)

The Ona component makes up 91 percent of the map unit. Slopes are 0 to 2 percent. This component is on flatwoods on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during June, July, August, and September. Organic matter content in the surface horizon is about 3 percent.

3.3.20 ORLANDO FINE SAND, 0 TO 5 PERCENT SLOPES (UNIT 35)

The Orlando component makes up 95 percent of the map unit. Slopes are 0 to 5 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of sandy marine deposits over fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent.

3.3.21 PAISLEY FINE SAND, DEPRESSIONAL (UNIT 37)

The Paisley, depressional component makes up 91 percent of the map unit. Slopes are 0 to 1 percent. This component is on depressions on marine terraces on coastal plains. The parent material consists of clayey marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is high. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during June, July, August, and September. Organic matter content in the surface horizon is about 2 percent.

3.3.22 ARENTS, VERY STEEP (UNIT 39)

The Arents component makes up 100 percent of the map unit. Slopes are 45 to 65 percent. This component is on rises on marine terraces on coastal plains, fills. The parent material consists of altered marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent.

3.3.23 POMELLO FINE SAND, 0 TO 5 PERCENT SLOPES (UNIT 41)

The Pomello component makes up 87 percent of the map unit. Slopes are 0 to 5 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 33 inches during July, August, September, October, and November. Organic matter content in the surface horizon is about 1 percent.

3.3.24 QUARTZIPSAMENTS, NEARLY LEVEL (UNIT 43)

The Quartzipsaments, nearly level component makes up 95 percent of the map unit. Slopes are 0 to 2 percent. This component is on fills on flats on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent.

3.3.25 ST. JOHNS FINE SAND (UNIT 46)

The St. Johns component makes up 87 percent of the map unit. Slopes are 0 to 2 percent. This component is on flats on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during June, July,

August, September, and October. Organic matter content in the surface horizon is about 3 percent.

3.3.26 SEFFNER FINE SAND (UNIT 47)

The Seffner component makes up 92 percent of the map unit. Slopes are 0 to 2 percent. This component is on rises on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during June, July, August, September, October, and November. Organic matter content in the surface horizon is about 3 percent.

3.3.27 HAPLAQUENTS, CLAYEY (UNIT 51)

The Haplaquents, clayey component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on quarries on depressions on marine terraces on coastal plains. The parent material consists of mine spoil or earthy fill. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is high. Shrink-swell potential is high. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 1 percent.

3.3.28 SMYRNA FINE SAND (UNIT 52)

The Smyrna component makes up 95 percent of the map unit. Slopes are 0 to 2 percent. This component is on rises on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage

class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during June, July, August, and September. Organic matter content in the surface horizon is about 3 percent.

3.3.29 TAVARES-MILLHOPPER FINE SANDS, 0 TO 5 PERCENT SLOPES (UNIT 53)

The Tavares component makes up 63 percent of the map unit. Slopes are 0 to 5 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of eolian or sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is very high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 57 inches during June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 1 percent.

The Millhopper component makes up 26 percent of the map unit. Slopes are 0 to 5 percent. This component is on rises on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 57 inches during January, February, August, September, October, November, and December. Organic matter content in the surface horizon is about 1 percent.

3.3.30 TAVARES-MILLHOPPER FINE SANDS, 5 TO 8 PERCENT SLOPES (UNIT 54)

The Tavares component makes up 70 percent of the map unit. Slopes are 5 to 8 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of eolian or sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The

natural drainage class is moderately well drained. Water movement in the most restrictive layer is very high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 57 inches during June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 1 percent.

The Millhopper component makes up 26 percent of the map unit. Slopes are 5 to 8 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 57 inches during January, February, August, September, October, November, and December. Organic matter content in the surface horizon is about 1 percent.

3.3.31 WINDER FINE SAND (UNIT 59)

The Winder component makes up 93 percent of the map unit. Slopes are 0 to 2 percent. This component is on drainageways on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 1 percent.

3.3.32 WINDER FINE SAND, FREQUENTLY FLOODED (UNIT 60)

The Winder, frequently flooded component makes up 88 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains on marine terraces on coastal plains. The parent

material consists of sandy and loamy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during June, July, August, September, October, and November. Organic matter content in the surface horizon is about 2 percent.

3.3.33 ZOLFO FINE SAND (UNIT 61)

The Zolfo component makes up 94 percent of the map unit. Slopes are 0 to 2 percent. This component is on flats on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 33 inches during June, July, August, September, October, and November. Organic matter content in the surface horizon is about 2 percent.

3.3.34 WATER (UNIT 99)

Water is a miscellaneous area including areas of open water.

3.4 GENERAL SOIL PROPERTIES

Additional soils-related information for the roadway alignment from the Hillsborough County Web Soil Survey published by USDA-NRCS is presented in the following tables**.**

TABLE 3-1

SUMMARY OF USDA-NRCS WEB SOIL SURVEY

HILLSBOROUGH COUNTY, FLORIDA

USDA Map Symbol and Soil Name	Depth (in)	Soil Classification		Permeability (in/hr)	pH	Seasonal High Water Table	
		USCS	AASHTO			Depth (feet)	Months
(2) Adamsville	0-6	SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-7.8	2.0-3.5	June-Nov
	6-80	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-7.8		
(3) Archbold	0-2	SP	A-3	20.0 - 50.0	3.5-5.5	3.5-6.0	June-Nov
	2-80	SP	A-3	20.0 - 50.0	3.5-5.5		
(4) Arents	0-10	SP, SP-SM	A-1-b, A-2-4, A-3	6.0 - 20.0	6.6-8.4	1.5-3.0	June-Nov
	10-32	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	5.6-8.4		
	32-60	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	5.6-6.5		
(5) Basinger-Holopaw-Samsula	0-7	SP	A-3	6.0 - 20.0	3.5-7.3	+2-1.0	June-Oct
	7-28	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-7.3		
	28-42	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-7.3		
	42-80	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-7.3		
	0-6	SP, SP-SM	A-3	6.0 - 20.0	5.1-7.3		
	6-52	SP, SP-SM	A-3	6.0 - 20.0	5.1-7.3		
	52-80	SC-SM, SM	A-2-4	0.2 - 2.0	5.1-8.4		
	0-34	PT	A-8	6.0 - 20.0	4.5-5.5		
	34-80	SM, SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-5.5		
(7) Candler	0-6	SP, SP-SM	A-3	6.0 - 20.0	4.5-6.0	>6.0	---
	6-72	SP, SP-SM	A-3	6.0 - 20.0	4.5-6.0		
	72-80	SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.0		
(8) Candler	0-6	SP, SP-SM	A-3	6.0 - 20.0	4.5-6.0	>6.0	Jan-Dec
	6-74	SP, SP-SM	A-3	6.0 - 20.0	4.5-6.0		
	74-80	SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.0		
(9) Candler-Urban Land	0-6	SP, SP-SM	A-3	6.0 - 20.0	4.5-6.0	>6.0	Jan-Dec
	6-76	SP, SP-SM	A-3	6.0 - 20.0	4.5-6.0		
	76-80	SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.0		
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(13) Eaton	0-5	SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-5.5	0.0-1.0	June-Sept
	5-22	SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-5.5		
	22-28	CH, CL, SC	A-6, A-7	0.1 - 0.2	4.5-6.0		
	28-80	CL, SC	A-6, A-7	0.1 - 0.2	4.5-6.0		
(14) Eaton, depressional	0-8	SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-5.5	+2-1.0	June-Sept
	8-22	SM, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.0		
	22-48	CH, CL, SC	A-7	0.1 - 0.2	4.5-6.5		
	48-80	CH, CL, SC	A-7	0.1 - 0.2	4.5-6.5		
(16) Felda, occasionally flooded	0-6	SP, SP-SM	A-3	6.0 - 20.0	5.1-7.8	0.0-1.0	Jan-Feb, July-Dec
	6-22	SP, SP-SM	A-3	6.0 - 20.0	5.1-738		
	22-45	SC, SC-SM, SM	A-2-4, A-2-6	0.6 - 6.0	6.1-7.8		
	45-80	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	6.1-8.4		

USDA Map Symbol and Soil Name	Depth (in)	Soil Classification		Permeability (in/hr)	pH	Seasonal High Water Table	
		USCS	AASHTO			Depth (feet)	Months
(18) Fort Meade	0-26	SM	A-2-4	6.0 - 20.0	5.1-7.3	>6.0	Jan-Dec
	26-80	SM	A-2-4	6.0 - 20.0	4.5-6.0		
(19) Gainesville	0-9	SM	A-2-4	6.0 - 20.0	4.5-6.5	>6.0	Jan-Dec
	9-80	SM	A-2-4	6.0 - 20.0	4.5-6.5		
(23) Kendrick	0-4	SM, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.0	>6.0	Jan-Dec
	4-35	SM, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.0		
	35-68	SC, SC-SM	A-2-4, A-2-6	0.6 - 6.0	4.5-6.0		
	68-80	SC	A-2-6, A-4, A-6	0.1 - 2.0	4.5-6.0		
(25) Lake	0-4	SP-SM	A-2-4, A-3	20.0 - 50.0	4.5-5.5	>6.0	Jan-Dec
	4-80	SP-SM	A-2-4, A-3	20.0 - 50.0	4.5-5.5		
(27) Malabar	0-4	SP, SP-SM	A-3	6.0 - 20.0	5.1-8.4	0.0-1.0	June-Nov
	4-14	SP, SP-SM	A-3	6.0 - 20.0	5.1-8.4		
	14-35	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	5.1-8.4		
	35-50	SP, SP-SM	A-3	6.0 - 20.0	5.1-8.4		
	50-66	SC, SC-SM, SM	A-2, A-4, A-6	0.1 - 0.2	5.1-8.4		
	66-80	SM, SP-SM	A-2-4, A-3	6.0 - 20.0	5.1-8.4		
(28) Millhopper-Urban Land	0-4	SM, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.5	3.5-6.0	Jan-Feb, Aug-Dec
	4-57	SM, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.5		
	57-80	SC, SC-SM, SM	A-2-4, A-4	0.1 - 2.0	4.5-6.0		
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(29) Myakka	0-5	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.5	0.5-1.5	June-Sept
	5-20	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.5		
	20-30	SM, SP-SM	A-2-4, A-3	0.6 - 6.0	3.5-6.5		
	30-80	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.5		
(32) Myakka-Urban Land	0-5	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.5	0.5-1.5	June-Sept
	5-20	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.5		
	20-30	SM, SP-SM	A-2-4, A-3	0.6 - 6.0	3.5-6.5		
	30-80	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.5		
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(33) Ona	0-4	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.0	0.5-1.5	June-Sept
	4-22	SM, SP-SM	A-2-4, A-3	0.6 - 2.0	3.5-6.0		
	22-80	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.0		
(35) Orlando	0-20	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.5	>6.0	Jan-Dec
	20-80	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.0		
(37) Paisley, depressional	0-4	SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-8.4	+2-1.0	June-Sept
	4-80	CH, CL	A-7	0.1 - 0.2	5.6-8.4		
(39) Arents	0-80	SM, SP, SP-SM	A-2-4, A-3	6.0 - 20.0	6.1-8.4	---	Jan-Dec
(41) Pomello	0-3	SP, SP-SM	A-3	20.0 - 50.0	4.5-6.0	2.0-3.5	July-Nov
	3-43	SP, SP-SM	A-3	20.0 - 50.0	4.5-6.0		
	43-55	SM, SP-SM	A-2-4, A-3	2.0 - 6.0	4.5-6.0		
	55-80	SP, SP-SM	A-3	6.0 - 20.0	4.5-6.0		

USDA Map Symbol and Soil Name	Depth (in)	Soil Classification		Permeability (in/hr)	pH	Seasonal High Water Table	
		USCS	AASHTO			Depth (feet)	Months
(43) Quartzipsamments, nearly level	0-80	SP, SP-SM	A-3	6.0 - 20.0	4.5-7.3	---	Jan-Dec
(46) St. Johns	0-12	SP, SP-SM	A-3	6.0 - 20.0	3.5-5.5	0.0-1.0	June-Oct
	12-29	SP, SP-SM	A-3	6.0 - 20.0	3.5-5.5		
	29-46	SM, SP-SM	A-2-4, A-3	0.2 - 2.0	3.5-5.5		
	46-80	SP, SP-SM	A-3	6.0 - 20.0	3.5-5.5		
(47) Seffner	0-13	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-7.3	1.5-3.5	June-Nov
	13-21	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-7.3		
	21-80	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-7.3		
(51) Haplaquents	0-80	CH	A-7	0.0 - 0.1	5.6-7.3	---	Jan-Dec
(52) Smyrna	0-4	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-7.3	0.5-1.5	June-Sept
	4-12	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-7.3		
	12-20	SM, SP-SM	A-2-4, A-3	0.6 - 6.0	3.5-7.3		
	20-80	SP, SP-SM	A-3	6.0 - 20.0	4.5-5.5		
(53) Tavares-Milhopper	0-7	SP, SP-SM	A-3	20.0 - 50.0	3.5-6.0	3.5-6.0	June-Dec
	7-80	SP, SP-SM	A-3	20.0 - 50.0	3.5-6.0		
	0-4	SM, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.5	3.5-6.0	Jan-Feb, Aug-Dec
	4-57	SM, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.5		
	57-80	SC, SC-SM, SM	A-2-4, A-4	0.1 - 2.0	4.5-6.0		
(54) Tavares-Milhopper	0-3	SP, SP-SM	A-3	20.0 - 50.0	3.5-6.0	3.5-6.0	June-Dec
	3-80	SP, SP-SM	A-3	20.0 - 50.0	3.5-6.0		
	0-5	SM, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.5	3.5-6.0	Jan-Feb, Aug-Dec
	5-54	SM, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.5		
	54-64	SM	A-2-4	2.0 - 6.0	4.5-6.		
	64-80	SC, SC-SM, SM	A-2-4, A-4	0.1 - 2.0	4.5-6.0		
(59) Winder	0-4	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	5.6-7.8	0.5-1.5	June-Dec
	4-10	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	5.6-7.8		
	10-14	SM	A-2-4	0.2 - 0.6	6.1-7.8		
	14-30	SC	A-2-4, A-2-6	0.1 - 0.2	6.6-8.4		
	30-58	SC, SC-SM, SM	A-2-4	0.1 - 0.2	7.4-8.4		
	58-80	SC, SC-SM, SM	A-2-4	6.0 - 20.0	7.4-8.4		
(60) Winder, frequently flooded	0-5	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	5.6-7.8	0.0-1.0	June-Nov
	5-14	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	5.6-7.8		
	14-18	SM	A-2-4	0.2 - 0.6	6.1-7.8		
	18-34	GC-HM, SC, SC-SM, SM	A-1-b, A-2-4, A-2-6	0.1 - 0.2	7.4-8.4		
	34-80	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	7.4-8.4		
(61) Zolfo	0-3	SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-7.3	2.0-3.5	June-Nov
	3-60	SM, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-7.3		
	60-80	SM, SP-SM	A-2-4, A-3	0.6 - 2.0	3.5-6.5		
(99) Water	---	---	---	--- - ---	---	---	Jan-Dec

3.5 GROUNDWATER CONDITIONS

According to the USDA-NRSC Soil Survey, portions of Hillsborough County are poorly drained. Many swamps, marshes, lakes and ponds exist throughout the county. The county has numerous small streams. The water table is at or near the surface throughout much of Hillsborough County. Natural drainage systems have been channelized and extensive ditch systems constructed to improve drainage.

Along most of the alignment, Seasonal High Groundwater Table (SHGWT) levels, in their natural condition, are estimated to be at or above the ground surface in the low areas of the project ranging to more than 6 feet below natural ground surface. At some locations, the SHGWT is reported to be above natural ground surface during wet seasons. **Table 3-1** can be referenced for seasonal high groundwater levels reported by the USDA-NRSC Soil Survey for the soil types present within the project vicinity.

SECTION 4 - PRELIMINARY ENGINEERING EVALUATIONS

4.1 GENERAL

Based upon the USDA-NRSC Web Soil Survey for Hillsborough County, sandy soils should be expected within the top 36 to 48 inches for the majority of the alignment with the exception of areas with shallow clayey soils and organic soils. In general, the sandy soils are suitable for supporting the proposed roadway widening after proper subgrade preparation and removal of unsuitable materials as detailed below.

Areas along the project alignment were noted with shallow or above ground Seasonal High Groundwater Table (SHGWT) levels, near surface clayey soils and/or organic materials and phosphate mining activities as detailed below. Areas with organic soils and mining-related soils are the primary areas along the project where subsurface conditions would limit the suitability of the project site for the proposed roadway widening.

4.1.1 SHALLOW OR ABOVE GROUND SEASONAL HIGH GROUNDWATER TABLE (SHGWT)

SHGWT levels along areas of the project in an undrained state are within about one to 1 1/2 feet of the ground surface or above ground (up to 2 feet). There are fourteen (14) soil units with SHGWT levels within about one to 1 1/2 feet of the ground surface or above ground (up to 2 feet) and are summarized as follows:

- Basinger, Holopaw, and Samsula soils, depressional (Unit 5)
- Eaton fine sand (Unit 13)
- Eaton mucky sand, depressional (Unit 14)
- Felda fine sand, occasionally flooded (Unit 16)
- Malabar fine sand (Unit 27)
- Myakka fine sand (Unit 29)
- Myakka-Urban land complex (Unit 32)

- Ona fine sand (Unit 33)
- Paisely fine sand, depressional (Unit 37)
- St. Johns fine sand (Unit 46)
- Haplaquents (Unit 51)
- Smyrna fine sand (Unit 52)
- Winder fine sand (Unit 59)
- Winder fine sand, frequently flooded (Unit 60)

Roadway base to groundwater clearance will need to be evaluated. The roadway grades should be set to provide a minimum separation per the FDOT Plans Preparation Manual (PPM) between the bottom of the base and the estimated seasonal high groundwater levels. Correspondingly, the base should remain equally above sustained water treatment levels in roadside ditches, making positive drainage of the ditches important. In portions of the alignment, the existing SHGWT is above grade in natural conditions. The SHWGT at these locations will have to be established by the project biologist utilizing biological indicators.

4.1.2 NEAR SURFACE CLAYEY SOILS

Relatively shallow clayey soils (A-2-6, A-4, A-6, A-7) within 36 inches of the natural ground surface are identified in several areas along the project alignment as shown below:

- Eaton fine sand (Unit 13)
- Eaton mucky sand, depressional (Unit 14)
- Felda fine sand, occasionally flooded (Unit 16)
- Paisley fine sand, depressional (Unit 37)
- Haplaquents, clayey (Unit 51)
- Winder fine sand (Unit 59)
- Winder fine sand, frequently flooded (Unit 60)

Clayey soils have limitations related base clearance and are also poorly drained. Separation between plastic clayey soils and the roadway pavement sections should be in accordance with FDOT Standard Indices 500 and 505.

4.1.3 ORGANIC MATERIALS

Muck and organic-rich sand are reported within portions of the alignment within the Basinger, Holopaw, and Samsula soils, depressional soil mapping unit (Unit 5).

Based on the Hillsborough County soil survey, the muck and peat depths could be expected to range to depths up to 34 inches below the natural ground surface.

Construction of the roadway within areas of muck will require removal of the muck in accordance with FDOT Index 500. During the project design, detailed design level muck delineation will be required as part of the design-level geotechnical services.

4.1.4 SHALLOW LIMESTONE

The Hillsborough County Soil Survey did not identify a shallow limestone stratum within 60 inches of the ground surface within the project alignment.

4.1.5 PHOSPHATE MINED LAND

Phosphate mining and processing is and has been a major industry in Hillsborough County. Phosphate pebble was mined within portions of the PD&E Study with mining operations dating back to the 1940's. Mining was typically completed with a dragline that removed unconsolidated overburden soils above the "matrix" layer containing the phosphate grains and pebbles. The "matrix" layer was then excavated with draglines, slurried and pumped to a beneficiation processing plant. At the beneficiation processing plant the phosphate grains and pebbles was

separated from the slurry. The remaining sand, silt, and clay were then returned to the mine area typically in a hydraulic manner.

The resulting post mining topography can vary significantly not only in topographic features but also in subsurface materials that remained from the mining process and/or tailings and waste clays, silts and sands that were returned to the mined area.

Resulting topography and soil types from mining operations include, but are not limited to, the following: strip mining cuts; backfill of mined areas with – waste phosphatic clay/slimes and/or tailings; overburden stockpiles; and mining waste product settling/disposal areas.

Based upon the Hillsborough County Soil Survey, soil units that resulted from mining operations that are present along portions of the alignment are as follows:

- Arents, nearly level (Unit 4)
- Arents, very steep (Unit 39)
- Quartzipsaments, nearly level (Unit 43)
- Haplaquents, clayey (Unit 51)

As reported in the Hillsborough County USDA Soil Survey, Haplaquents, clayey (Unit 51) is a soil unit that is a by-product of the phosphate mining beneficiation process. Haplaquents are also known as waste phosphatic clay (slime). The waste phosphatic clay (slime) results from the clay slurry being pumped into holding ponds and, in older mine areas, the slime was pumped into open mine pits. Waste phosphatic clay is generally too weak to support a roadway and/or embankment without improvements to the soils that may include surcharging.

It should be noted that the roadway alignment is in close proximity to several mined areas including areas identified as Haplaquents, clayey (Unit 51) as shown on Sheets 3 and 4.

The remaining soil types associated with mining may or may not include colloidal waste phosphatic clay.

Additionally, depending on the reclamation process, if any, mining impacted areas can be expected to have a high potential for instability and high potential for excessive settlement both total and differential without soil improvement measures such as surcharging or soil strengthening by means of rigid inclusions or other subsurface improvements.

Based upon the USGS Topographic maps and the USDA Hillsborough County Soil Survey, significant portions along the alignment have phosphate mining.

The design and construction of the roadway through mined land will increase the cost and duration of construction due to the poor soil conditions. The magnitude of construction duration and cost increases are a function of the specific landforms, topography, subsurface conditions and roadway geometrics.

Perhaps the most problematic soil type is waste phosphatic clay because this soil type can be very soft, weak and compressible. It should be noted that oftentimes, waste clays are covered during the reclamation process. As such, geotechnical subsurface exploration and testing are warranted to better define the subsurface conditions.

4.2 EMBANKMENT CONSTRUCTION

Embankments should be constructed using materials in accordance with FDOT Standard Index 505. This requires the use of soils with AASHTO Classification of A-1, A-3, or A-2-4 in the upper 4 feet below the bottom of base or asphaltic concrete pavement, while soils with AASHTO Classification A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, and A-7 (all with liquid limits less than 50) may be used in the lower portions of the embankment.

Site preparation should consist of stripping and grubbing of topsoil and surface vegetation followed by compaction of the fill and subgrade soils. Upon completion of stripping and

clearing operations, the resulting subgrade surface should be compacted in accordance with the FDOT Standard Specification for Road and Bridge Construction (SSRBC). Placement of the embankment fill materials may then begin.

With the exception of the areas affected by phosphate mining activities and areas containing organic soils, the existing shallow subsurface soils should be capable of supporting the construction of the proposed roadway widening after proper subgrade preparation. Subgrade preparation will include the removal of any surficial and buried organic soils within the proposed roadway pavement widths and shoulders in accordance with FDOT Index 500.

APPENDIX

SHEETS 1 AND 2

TOPOGRAPHIC MAP AND PROJECT LOCATION

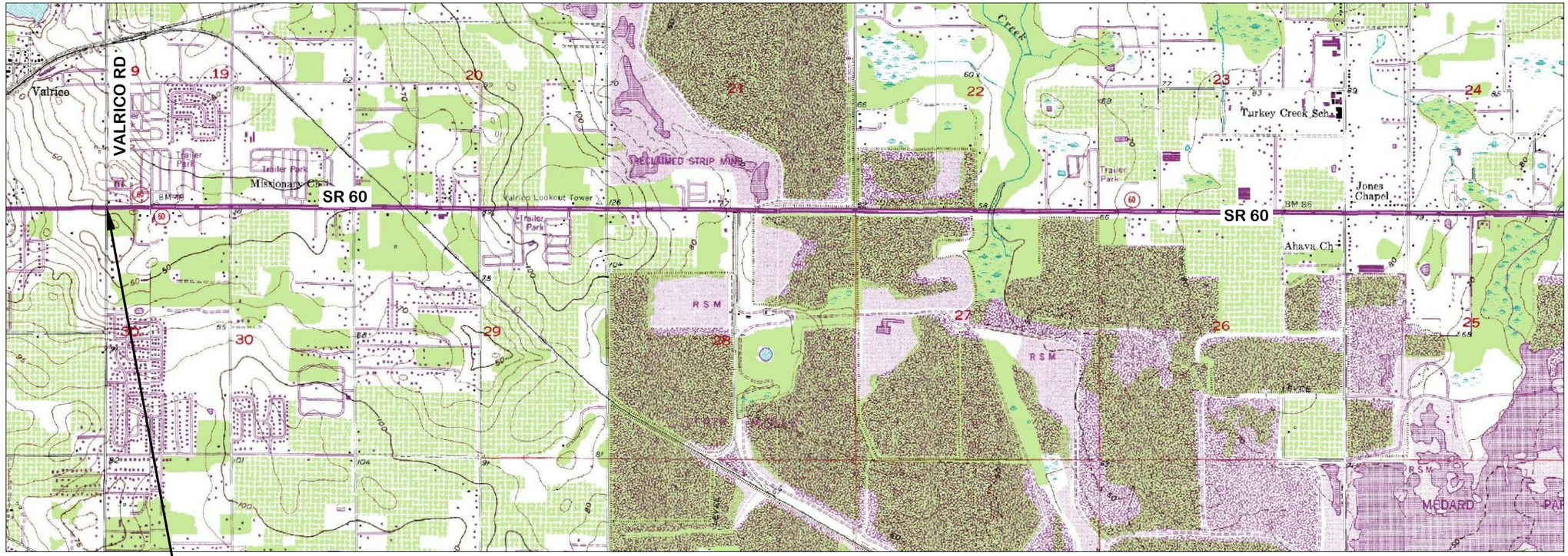
SHEETS 3 AND 4

NRCS SOIL SURVEY MAPS

USGS VICINITY MAP

0 2500'

PLAN SCALE



APPROXIMATE BEGIN PROJECT

REFERENCE: "BRANDON, FLORIDA", "DOVER, FLORIDA", AND "NICHOLS, FLORIDA" USGS QUADRANGLE MAPS

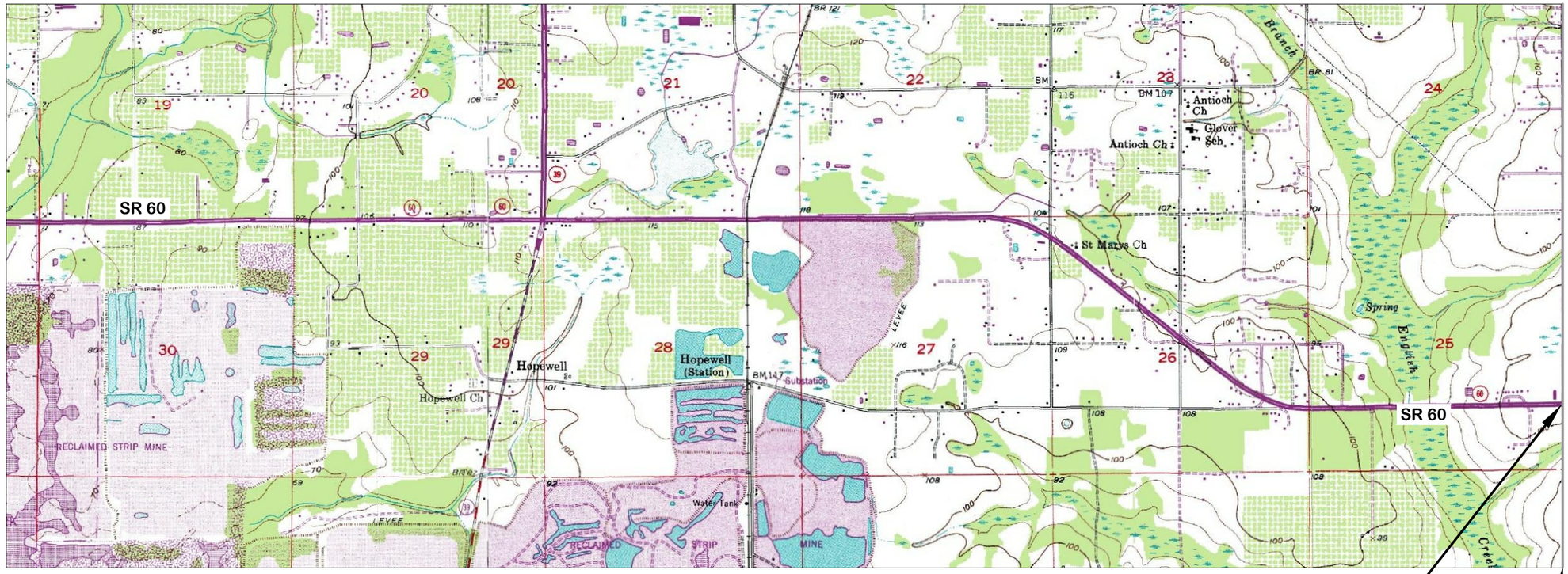
TOWNSHIP:	29S
RANGE:	21 E&22E
SECTION:	19,20,21,22,23,24 25,26,27,28,29&30

DRAWN BY: SW CHECKED BY: SCO	APPROVED BY: LPM DATE: OCT 2012	ENGINEER OF RECORD: LARRY P. MOORE, P.E. FLORIDA LICENSE NO.: 47673	TIERRA 7351 Temple Terrace Highway Tampa, Florida 33637 Phone: 813-989-1354 Fax: 813-989-1355 FL Cert. No.: 6486	SCALE: NOTED	PROJECT NUMBER: 6511-12-056	GEOTECHNICAL ENGINEERING SERVICES SR 60 VALRICO ROAD TO COUNTY LINE ROAD HILLSBOROUGH COUNTY, FLORIDA	SHEET 1

USGS VICINITY MAP

0 2500'

PLAN SCALE



REFERENCE: "BRANDON, FLORIDA", "DOVER, FLORIDA", AND "NICHOLS, FLORIDA" USGS QUADRANGLE MAPS

TOWNSHIP:	29S
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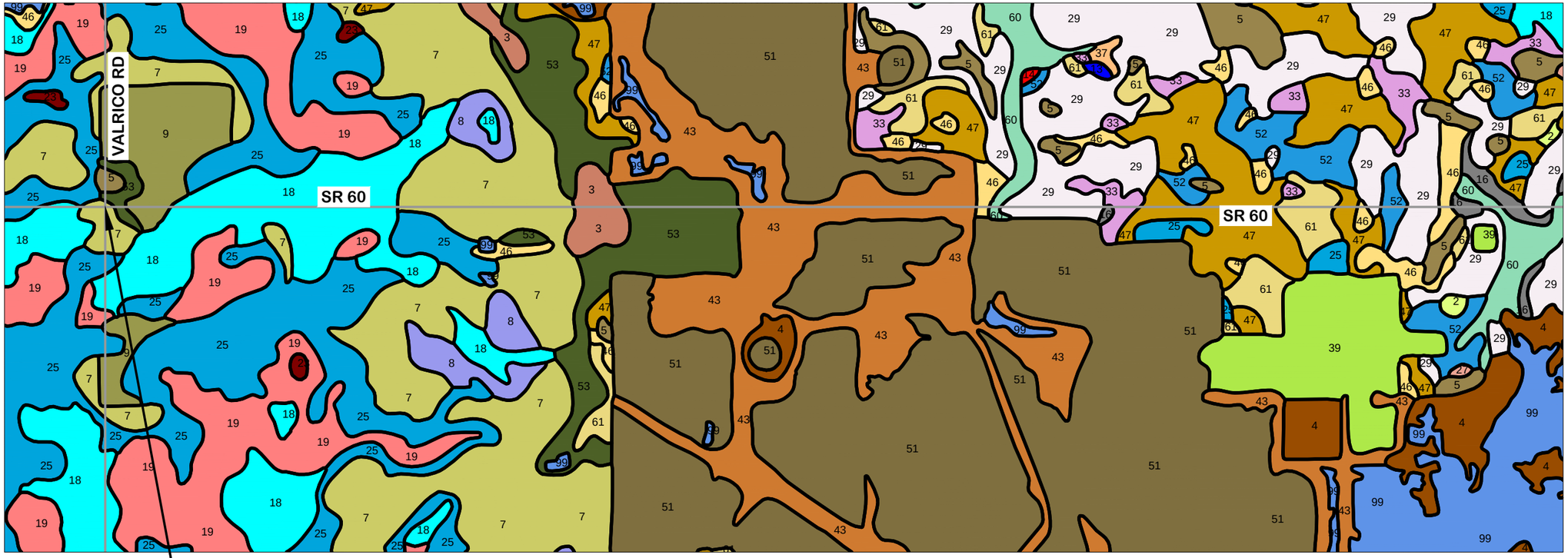
NRCS SOIL SURVEY

0 2500'

PLAN SCALE



MAP UNIT LEGEND - HILLSBOROUGH COUNTY, FL

- 2 - Adamsville fine sand
- 3 - Archbold fine sand
- 4 - Arents, nearly level
- 5 - Basinger, Holopaw, and Samsula soils, depressional
- 7 - Candler fine sand, 0 to 5 percent slopes
- 8 - Candler fine sand, 5 to 12 percent slopes
- 9 - Candler-Urban land complex, 0 to 5 percent slopes
- 13 - Eaton fine sand
- 14 - Eaton mucky sand, depressional
- 16 - Felda fine sand, occasionally flooded
- 18 - Fort Meade loamy fine sand, 0 to 5 percent slopes
- 19 - Gainesville loamy fine sand, 0 to 5 percent slopes
- 23 - Kendrick fine sand, 2 to 5 percent slopes
- 25 - Lake fine sand, 0 to 5 percent slopes
- 27 - Malabar fine sand
- 28 - Millhopper-Urban land complex, 0 to 5 percent slopes
- 29 - Myakka fine sand
- 32 - Myakka-Urban land complex
- 33 - Ona fine sand
- 35 - Orlando fine sand, 0 to 5 percent slopes
- 37 - Paisley fine sand, depressional
- 39 - Arents, very steep
- 41 - Pomello fine sand, 0 to 5 percent slopes
- 43 - Quartzipsaments, nearly level
- 46 - St. Johns fine sand
- 47 - Seffner fine sand
- 51 - Haplaquents, clayey
- 52 - Smyrna fine sand
- 53 - Tavares-Millhopper fine sands, 0 to 5 percent slopes
- 54 - Tavares-Millhopper fine sands, 5 to 8 percent slopes
- 59 - Winder fine sand
- 60 - Winder fine sand, frequently flooded
- 61 - Zolfo fine sand
- 99 - Water

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NRCS SOIL SURVEY

0 2500'

PLAN SCALE

MAP UNIT LEGEND - HILLSBOROUGH COUNTY, FL

- 2 - Adamsville fine sand
- 3 - Archbold fine sand
- 4 - Arents, nearly level
- 5 - Basinger, Holopaw, and Samsula soils, depressional
- 7 - Candler fine sand, 0 to 5 percent slopes
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