Preliminary Geotechnical Report

S.R. 50 PD&E Study Reevaluation

From U.S. 19 (S.R. 55) to the east intersection of S.R. 50 / S.R. 50A [along the Brooksville Bypass]

Hernando County, Florida

WPI Segment No: 407951 1
FAP No: 300-1(7)

Florida Department of Transportation
District 7

December 2003

PRELIMINARY GEOTECHNICAL REPORT

Florida Department of Transportation
Project Development and Environment (PD&E) Reevaluation Study

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WPI No: 407951 1
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Submitted to:

Florida Department of Transportation - District 7
Tampa, Florida

Submitted by:

psi

in association with:

AYRES ASSOCIATES

December 2003

Information To Build On
Engineering • Consulting • Testing

December 31, 2003

Ayres Associates
8875 Hidden River Parkway
Suite 200
Tampa, Florida 33637

Attention: Mr. Daniel Kelly, P.E.

RE: Preliminary Geotechnical Report
Project Development & Environment Study
SR 50 from US 19 (SR55) to the East
SR 50/SR 50A Intersection
Hernando County, Florida
FIN ID No. 407951-1-22-01
PSI Project No. 775-25273

Dear Mr. Kelly:

Professional Service Industries, Inc. (PSI) has completed geotechnical services for the Project Development and Environment (PD&E) Study for the proposed improvements to SR 50 from US 19 (SR 55) to the East SR 50/SR 50A Intersection in Hernando County, Florida. This geotechnical investigation was authorized through a subcontract agreement between Ayres Associates and PSI.

This report presents the results of the preliminary evaluations for the roadway improvements and stormwater management areas based on our review of published information and geotechnical data. Briefly, this preliminary geotechnical study indicates that roadway planning and design should take into consideration shallow clayey soils along the existing roadway and project stormwater management areas should be designed with respect to the expected shallow clayey soil conditions. A preliminary sinkhole/ground subsidence evaluation of the project area is also presented in this report.

PSI appreciates the opportunity of providing our services to Ayres Associates on this project. If you have any questions concerning the contents of this report or need additional information, please do not hesitate to contact our office.

Sincerely,

Professional Service Industries, Inc.

Kirk M. Eastman, P.E.
Senior Project Engineer
Florida License No. 50733

for Ching L. Kuo, Ph.D., P.E.
Chief Engineer
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KME/LPM/CLK/hkd/rgp:77525273g02

Attachments: Appendix A
- Table A – Summary of Laboratory Test Results
- Table B – Summary of Corrosion Test Results
- Table C – Summary of Laboratory Permeability Test Results
- Table D – Hernando County USDA Permeability Data

Appendix B
- Sheet 1 –4 USDA SCA Soil Survey Map
- Sheet 5 – 7 USGS Quadrangle Maps
- Sheet 8 – 14 Boring Location Plan / Soil Profiles
- Sheet 15 – Cross Section Soil Survey Sheet

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- Known New Sinkholes between Weeki Wachee and Brooksville
- Reported Sinkhole Frequency

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APPENDIX

1.0 INTRODUCTION

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study Reevaluation, which evaluates capacity improvement options along S.R. 50 (Cortez Boulevard) in Hernando County, Florida. The proposed project involves widening S.R. 50 from the existing 4-lane typical section to a 6-lane typical section from U.S. 19 to the east intersection of S.R. 50/S.R. 50A [along the Brooksville Bypass], a distance of approximately 13.7 miles. The widening of the segment of S.R. 50 from U.S. 19 (S.R. 55) to the west intersection of S.R. 50/S.R. 50A is proposed to be widened to the outside; whereas the remainder of the project, from the west intersection of S.R. 50/S.R. 50A to the east intersection of S.R. 50/S.R. 50A [along the Brooksville Bypass], is proposed to be widened to the inside.

1.1 Purpose

The purpose of this PD&E study Reevaluation is to review the previous PD&E Study that was performed for the project and document any changes that have occurred since the Federal Highway Administration's (FHWA) approval on 3/22/90. The previous PD&E Study being reevaluated is S.R. 50/S.R. 50 from U.S. 19 (S.R. 55) to the eastern intersection of S.R. 50/S.R. 50A. This PD&E Study Reevaluation includes analyses to determine the type, conceptual design, and location of improvements for accommodating present and future traffic demands, social and economic demands, and conformance to present plans and policies in a safe and efficient manner. This Reevaluation also satisfies the requirements of the National Environmental Policy Act (NEPA) and all other applicable Federal requirements in order to receive federal funding for the design, right-of-way acquisition and construction of the project.

This geotechnical report focuses on providing a review of existing information and field reconnaissance to identify soils-related issues for the project. Using aerial photography, available County and Natural Resource Conservation Services (NRCS) formally known as United States Department of Agriculture (USDA) Soil Conservation Service (SCS) data, United States Geological Survey (USGS) quadrangle mapping, design engineering, and construction projects within the study area, an inventory of the anticipated soil conditions along the roadway and pond sites is presented.

1.2 Project Description

S.R. 50 is an east/west principal arterial facility. This Study Reevaluation examines the section of S.R. 50 from U.S. 19 (S.R. 55) to the east intersection of S.R. 50/S.R. 50A [along the Brooksville Bypass], a distance of approximately 13.7 miles. The majority of the project is located within an unincorporated area of Hernando County; however, portions extend through the City of Weeki Wachee and the City of Brooksville. The project is located in Section 36 of Township 22 South, Range 17 East; Sections 25 through 36 of Township 22 South, Range 18 East; Sections 20, and 25 through 30 of Township 22 South, Range 19 East; and Sections 1 and 2 of Township 23 South, Range 17 East.

Land use along the corridor is generally urbanized and suburban in nature with undeveloped tracts interspersed. The existing land use along S.R. 50 is predominantly commercial with areas of residential use as well as isolated areas of medical, institutional and recreational uses. The proposed project is consistent with future land use plans.

S.R. 50, which is part of the Florida Intrastate Highway System (FIHS), is typically a 4-lane divided roadway with 12-foot travel lanes, which was constructed according to the original Type II Categorical Exclusions approved in 1988 and 1990. The existing posted speed limit along S.R. 50 varies between 45 miles per hour (mph) and 55 mph.

The S.R. 50 project corridor is divided into four segments for analysis purposes based on existing land use, projected traffic volumes, and roadway characteristics (refers to Table 1-1).

Table 1-1: Project Segments

Segment	Limits	Length (Miles)
1	U.S. 19 (S.R. 55) to Mariner Boulevard (C.R. 587)	3.88
2	Mariner Boulevard (C.R. 587) to the Suncoast Parkway	2.02
3	Suncoast Parkway to the west S.R. 50/S.R. 50A intersection	4.00
4	West S.R. 50/S.R. 50A intersection to the east S.R. 50/S.R. 50A intersection [along the Brooksville Bypass]	3.84

Also, up to fifteen (15) stormwater pond sites are currently being considered along the alignment.

The preliminary geotechnical report presented herein is intended to be used to support the feasibility and planning of the roadway improvements and stormwater management areas.

2.0 PROJECT APPROACH AND METHODOLOGY

The services for this project consisted of providing preliminary geotechnical engineering services in general accordance with the Project Development and Environment Study Scope of Services as defined in Exhibit "A" issued by the FDOT. The services included performing a field reconnaissance and a review of published information that is related to the subsurface soil and groundwater conditions in the project area. This geotechnical study began with a review of available subsurface test data, such as the "Soil Survey of Hernando County, Florida" published by the USDA SCS and the USGS topographic maps for the project vicinity. Field services consisting of auger borings were also performed in the proposed pond sites. In addition laboratory tests were performed on the soil samples.

The purpose of this study was to obtain preliminary information concerning the general subsurface conditions within the general vicinity of the proposed pond sites in order to catalog the general subsurface stratigraphy and provide preliminary geotechnical recommendations to guide in the design and construction of the project. The following services were provided in order to achieve the preceding objectives:

1. Conducted a general visual reconnaissance of the project alignment .

2. Reviewed readily available published topographic and soils information. This published information was obtained from the "Weeki Wachee Spring, Florida", the " Brooksville, Florida" and the "Brooksville SE, Florida" Quadrangle Maps published by the USGS and the "Soil Survey of Hernando County, Florida" published by the USDA SCS.

3. Provided the anticipated seasonal high groundwater level (SHGWL) of the shallow soils along the project alignment as published by the USDA SCS.

4. Performed preliminary field services consisting of fourteen (14) power auger borings in fourteen (14) of the proposed pond sites. In addition, one (1) hand auger boring was performed in proposed Pond C.

5. Performed a horizontal and vertical laboratory permeability test in each of the fifteen (15) proposed pond sites.

6. Provided estimated seasonal high groundwater level of the shallow soils in the proposed pond sites.

7. Performed a limited laboratory testing program on some of the sampled soils. Tests included full graduation tests, natural moisture content tests, Atterberg Limits and environmental corrosion tests .

8. Completed a preliminary sinkhole/ground subsidence evaluation for the project.

9. Prepared a preliminary geotechnical engineering report to support the PD&E study for the design of the proposed project.

3.0 SUBSURFACE SOIL CONDITIONS

3.1 United States Geological Survey (USGS) Topographic Survey

The site of the proposed improvements is located in Hernando County, Florida. Specifically, the project is located within Sections 1 and 2 of Township 23 South, Range 17 East, Section 36 of Township 22 South, Range 18 East, Sections 25 through 36 of Township 22 South, Range 18 East and Sections 20 and 26 through 30 of Township 22 South, Range 19 East.

The published USGS topographic survey maps entitled "Weeki Wachee Spring, Florida", "Brooksville, Florida" and "Brooksville SE, Florida were reviewed for ground surface features along the proposed project improvements. Based on this review, the natural ground surface elevations are generally within the range of 20 to 140 feet based on the National Geodetic Vertical Datum of 1929. A reproduction of the quadrangle maps for the project vicinity can be seen on Sheets 5 through 7 in Appendix A.

3.2 Regional Geology

Based on a review of the publication titled "A Geological Overview of Florida" prepared by the State of Florida Department of Natural Resources, 1992, and the USDA Soil Survey, the general project area lies within the area called the Brooksville Ridge, described as follows:

The Brooksville Ridge occupies most of Hernando County. It extends easterly from about U.S. Highway 19 to U.S. Highway 301. The Brooksville Ridge can be divided into two parts. The rolling, deep, sandy ridges on the western and eastern edges are dominated by deep, sandy soils with numerous depressions and sinks. Elevations range from about 75 to 100 feet in the western part and from about 50 to 100 feet in the eastern part. The central part of the Brooksville Ridge ranges in elevation from about 100 to more than 200 feet. These rolling areas consist of poorly drained to well drained, sandy to clayey soils.

Undifferentiated Pleistocene sand and clays exist from the surface to approximately 10 feet below grade. These soils are underlain by soils of the Miocene age Hawthorne Group that typically occur between 10 and 45 feet below grade. These soils are mostly clay with sand seams. Soils in this group frequently comprise the confining unit of the Floridan aquifer. Below this group is the Ocala Limestone formation of the Eocene period which extends to 1,000 feet or more below surface.

3.3 Hernando County Soil Survey

The Soil Survey of Hernando County, Florida, published by the USDA SCS has been reviewed for the project vicinity. The soil survey map for the project vicinity is illustrated on Sheets 1 through 4 in Appendix A of this report. This soil survey map indicates that there are nineteen (19) mapping units along the roadway alignment in Hernando County. The map soil units encountered are as shown in the following table.

Table 3-1
USDA SCS SOIL SURVEY INFORMATION

SR 50 from US 19 (SR 55) to the East SR 50/SR50A Intersection					
Hernando County USDA Soil Series	Seasonal High Groundwater Table		Soil Classification		
	Depth (feet)	Duration (months)	Depth (inches)	Unified	AASHTO
Astatula Fine Sand 0 to 8 Percent Slopes (8)	>6.0	-	0 – 85	SP, SP-SM	A-3
Basinger Fine Sand (9)	0.0 – 1.0	Jun – Nov	0 – 80	SP, SP-SM	A-3, A-2-4
Basinger Fine Sand, Depressional (10)	+2 – 1.0	Jan – Dec	0 – 80	SP, SP-SM	A-3, A-2-4
Blichton Loamy Fine Sand, 0 to 2 Percent Slopes (11)	0 – 1.0	Jun – Sep	0 – 28 28 – 34 34 – 63 63 – 75	SP-SM, SM SC SC SC, CL, CH	A-2-4, A-3 A-2-4, A-6 A-6 A-6, A-7
Blichton Loamy Fine Sand, 2 to 5 Percent Slopes (12)	0 – 1.0	Jun – Sep	0 – 28 28 – 34 34 – 63 63 – 75	SP-SM, SM SC SC SC, CL, CH	A-2-4, A-3 A-2-4, A-6 A-6 A-6, A-7
Candler Fine Sand 0 to 5 Percent Slopes (14)	>6.0	-----	0 – 48 48 - 80	SP, SP-SM SP-SM	A-3 A-3, A-2-4
Candler Fine Sand 5 to 8 Percent Slopes (15)	>6.0	-----	0 – 48 48 - 80	SP, SP-SM SP-SM	A-3 A-3, A-2-4
Candler – Urban Land Complex (16)	>6.0	----	0-48 48-80	SP, SP-SM SP-SM	A-3 A-3, A-2-4
Flemington Fine Sandy Loam, 0 to 2 Percent Slopes (20)	0 – 2.5 (perched)	Jun – Sep	0 – 5 5 – 36 36 – 66 66 – 81	SM SC, CH, CL CH, MH, CL CH, MH	A-2-4 A-7 A-7 A-7
Flemington Fine Sandy Loam, 2 to 5 Percent Slopes (21)	0 – 2.5 (perched)	Jun – Sep	0 – 5 5 – 36 36 – 66 66 – 81	SM SC, CH, CL CH, MH, CL CH, MH	A-2-4 A-7 A-7 A-7
Floridana Variant Loamy Fine Sand (25)	+2 – 1.0	Jun – Feb	0-8 8-22 22-42 42-59 59-80	SM SM SC SM SC, CL, CH	A-2-4 A-2-4 A-2-4, A-2-6, A-4, A-6 A-2-4, A-2-6, A-4 A-4, A-6, A-7

SR 50 from US 19 (SR 55) to the East SR 50/SR50A Intersection					
Hernando County USDA Soil Series	Seasonal High Groundwater Table		Soil Classification		
	Depth (feet)	Duration (months)	Depth (inches)	Unified	AASHTO
Kendrick Fine Sand, 0 to 5 Percent Slopes (29)	>6.0	-----	0 – 28 28 – 34 34 – 63 63 – 80	SP-SM SC, SM-SC SC SC, SM-SC	A-3, A-2-4 A-2-6, A-2-4 A-2-6, A-6 A-2-6, A-2-4
Micanopy Loamy Fine Sand, 0 to 2 Percent Slopes (33)	1.5 – 2.5 (perched)	Jul – Nov	0 – 18 18 – 25 25 – 62	SM, SP-SM SC CH	A-2-4 A-2, A-6, A-7 A-7
Micanopy Loamy Fine Sand, 2 to 5 Percent Slopes (34)	1.5 – 2.5 (perched)	Jul – Nov	0 – 18 18 – 25 25 – 62	SM, SP-SM SC CH	A-2-4 A-2, A-6, A-7 A-7
Myakka Fine Sand (35)	0 – 1.0	Jun – Feb	0 – 23 23 – 37 37 – 80	SP, SP-SM SM, SP-SM SP, SP-SM	A-3 A-3, A-2-4 A-3
Nobleton Fine Sand 0 to 5 Percent Slopes (36)	1.5 – 3.5 (perched)	Jul – Oct	0 – 33 33 – 37 37 – 60 60 – 80 80 – 85	SP-SM, SM SC SC, CL, CH SC SM, SM-SC, SC	A-2-4 A-2-6, A-6 A-6, A-7 A-2-6, A-6 A-2-4, A-2-6, A-6
Paola Fine Sand 0 to 8 Percent Slopes (39)	>6.0	-----	0 – 26 26 – 99	SP SP	A-3 A-3
Sparr Fine Sand 0 to 5 Percent Slopes (47)	1.5 – 3.5 (perched)	Jul – Oct	0 – 61 61 – 64 64 – 80	SP-SM SM-SC, SM SC, SM-SC	A-3, A-2-4 A-2-4 A-2-4, A-2-6, A-4, A-6
Wauchula Fine Sand 0 to 5 Percent Slopes (52)	0 – 1.0	Jun – Feb	0 – 8 8 – 24 24 – 31 31 – 38 38 – 80	SP-SM SP-SM SP-SM, SM SP-SM, SM SM, SM-SC, SC	A-3, A-2-4 A-3, A-2-4 A-3, A-2-4 A-3, A-2-4 A-2-4, A-2-6, A-4, A-6
+ Indicates water table above the surface of the soil.					

In general, the surficial soils consist of fine sands and silty fine sands underlain by clayey fine sands and clays. The seasonal high water table varies from 2 feet above the natural ground surface to greater than 6 feet below the natural ground surface along the alignment. For the much of the alignment, the seasonal high groundwater levels are at or greater than 6 feet deep. Near the eastern end of the alignment, the seasonal high groundwater levels are fairly shallow at depths within 3.5 feet of the natural ground surface and with standing water conditions in some areas. Shallow bedrock may be encountered at depths of 2.5 feet below existing grades in a few areas along the alignment.

3.4 Review of Past Projects

Review of roadway and other geotechnical engineering projects completed within the project vicinity also revealed an upper mantle of predominantly fine sands underlain by clayey fine sands and clays.

4.0 PRELIMINARY EVALUATION OF ROADWAY AREAS

4.1 Soil Usage Summary

The subsurface soil conditions along the project alignment, based on the review of published information and past project reports, generally consist of near-surface sandy soils primarily consisting of A-3 and A-2-4 materials underlain by shallow plastic soils of A-4, A-6, A-7 and A-2-6 materials. Shallow limestone may be encountered in some areas. Organic soils; A-8, may be encountered in depressional areas along the alignment. The existing subsurface soils should be acceptable for construction to support a typical embankment pavement section after proper subgrade preparation. Unsuitable soils predominantly consisting of shallow plastic clayey soils as well as muck or debris, if encountered within the right-of-way during construction, should be removed and replaced with compacted select sands in accordance with FDOT requirements.

Shallow perched groundwater and shallow clays are a concern for the proposed roadway alignment. Roadway grades should be evaluated to make certain that minimum requirements are maintained for separation of roadway base materials and the estimated seasonal high groundwater levels and clayey soils.

Material use and/or removal should be completed in accordance with FDOT Index Nos. 500 and 505. Materials directly beneath the base should be "SELECT" materials. The USDA Soil Conservation Service (SCS) indicates sandy near surface soils along the western portion of the project with near surface clayey soils being encountered along the eastern portion of the roadway corridor. Clayey soils should be delineated during the design phase of the SR 50 project if within the roadway cross-section requiring removal of these soils. If encountered within the right-of-way during construction, plastic and organic soils should be removed and replaced with compacted select sands in accordance with FDOT requirements.

The removal of topsoil and other shallow surficial organic soil deposits should be accomplished in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 110. Organic soils are highly compressible and may cause excessive settlements if left in-place. This material is also susceptible to significant secondary compression settlements.

Backfill should consist of materials conforming to Standard Index No. 505 and compacted in accordance with the Standard Specifications for Road and Bridge Construction.

4.1.1 Earth Embankments

In general, the majority of the fine sands to slightly silty fine sands can be moved and used for grading purposes, site leveling, general engineering fill, structural fill and backfill in other areas, provided the material is free of organic materials, clay, debris or any other material deemed unsuitable for construction. Clayey or silty soils if encountered, may be used as embankment soils as described in FDOT Index 505.

4.1.2 Pavement Design Considerations

The design Limerock Bearing Ratio (LBR) value for pavements constructed on fill should be based on the earthfill material. Based on published information and past experience in the project area, groundwater levels along the corridor may vary from 2 feet above the

natural ground surface to greater than 6 feet below the natural ground surface. The bottom of the base of the proposed improvements should be a minimum of 1.5 feet above sustained water levels in roadside ditches, making positive drainage of the ditches important. The choice of base material would depend upon the relationship of final roadway improvement grades and the bottom of the base to the estimated seasonal high groundwater table levels. Shell base materials can be more resistant to wet conditions than limerock. Crushed concrete is also less sensitive to moisture than limerock. It is generally more favorable to raise grades when shallow water tables are encountered, if possible, than to use less sensitive base materials such as black base.

4.2 Roadway Construction

Site preparation and roadway construction should be in accordance with the latest FDOT Standard Specifications for Road and Bridge Construction and the Roadway and Traffic Design Standards. Along some areas of the roadway alignment, high groundwater conditions may be encountered due primarily to perched water conditions. Depending upon groundwater levels at the time of construction, some form of dewatering may be required in areas for excavation and compaction below the water table.

Along much of the eastern portion of the alignment, excavation of unsuitable near surface soils may be required. Unsuitable near surface soils that may be encountered consist of plastic soils, A-4, A-6, A-7 and A-2-6 materials. Organic soils (A-8) may also be encountered in depressional areas along the alignment. In addition, there is potential to encounter near surface limestone in a few areas of the alignment. Clayey soils, near surface limestone and organic soils, if encountered at depths that will effect the proposed construction, should be delineated during the design phase of the SR 50 project. The project cross-sections should clearly indicate where plastic soils, organic soils and/or limestone may be encountered or required to be over-excavated.

4.3 Geotechnical Considerations

In general, the surficial soils along the subject alignment based on data published by the USDA SCS (Table 3-1, Section 3.3) consist of fine sands and silty fine sands underlain by clayey soils with permeabilities ranging from <1 to >40 feet per day. Seasonal high estimates along the alignment based on USDA SCS data varies from 2 feet above the natural ground surface to 3.5 feet below the natural ground surface in a few areas. However, along the majority of the alignment, USDA seasonal high water levels are greater than 6 feet deep.

5.0 PRELIMINARY EVALUATION OF STORMWATER MANAGEMENT AREAS

5.1 Subsurface Exploration

A total of fifteen (15) stormwater retention ponds are being considered along the subject alignment. Based on information provided by Ayres & Associates, it is anticipated that the proposed pond bottoms will be approximately 3 feet deep. It is currently unknown if the proposed ponds will be wet or dry ponds.

The fifteen (15) proposed pond sites are generally wooded and are located along the north and south sides of SR 50. The areas adjacent to the proposed pond areas include underdeveloped, residential and commercial districts. The proposed pond sites generally vary in area from approximately 0.4 to 2.5 acres.

To evaluate the deeper subsurface conditions in the proposed pond areas, one (1) power auger boring was performed in fourteen (14) of the proposed pond sites. The borings were performed to a depth of 15 feet below existing grades. The auger borings were performed by advancing a rotating flight auger slowly into the ground in a "corkscrew" fashion. The flight auger is then retrieved, soil samples were taken at intervals of approximately 2 feet and were placed in air-tight jars for transportation and returned to the PSI Tampa office for review by a geotechnical engineer and confirmation of the field classification. After performing the auger borings, the boreholes were backfilled with available existing materials for safety.

It should be noted that the property owner of the proposed Pond C site did not allow our drill rig equipment access to his property. Therefore, one (1) hand auger boring to a depth of 10 feet was performed instead. The hand auger boring was performed by manually twisting and advancing a bucket auger into the ground in 4 to 6 inch increments. As each soil type was revealed, representative samples were placed in air-tight jars and returned to the PSI Tampa office for review by a geotechnical engineer and confirmation of the field classification.

In addition, a total of fifteen (15) vertical and fifteen (15) horizontal permeability tests were performed on soils samples collected from the proposed ponds along the subject alignment (one of each test per pond site). These tests were conducted on near surface soils retrieved at the same general location as the auger borings. The soil samples at each location were obtained by excavating the upper soils and pressing a thin-walled metal tube vertically and horizontally into the in-situ soil and were then transported to the laboratory for testing. The tests were completed following falling-head procedures in a permeameter that does not require extraction of the soil sample from the tube so as to preserve the in-situ nature of the soil. The results of the laboratory permeability tests are summarized in **Table C in Appendix A**.

The auger borings performed in the fifteen (15) of the proposed pond sites were not surveyed. The provided color aerials of the pond sites were reviewed and boring locations chosen. The approximate station and offset of each boring was measured using the aerials provided by Ayres Associates. The chosen location was then estimated in the field based on existing land features. The proposed pond sites and boring locations are shown on Sheets 8 through 14 in Appendix B.

5.2 Laboratory Testing

Representative soil samples collected from the auger borings were visually reviewed in the laboratory by a geotechnical engineer to confirm the field classifications. The samples were classified and stratified in general accordance with the AASHTO Classification System. Classification was based on visual observations with the results of the laboratory testing used to confirm the visual classification. Laboratory classification tests consisting of sieve analyses (gradation), Atterberg limits and moisture content determinations were performed on selected soil samples believed to be representative of the materials encountered. Environmental corrosion tests were also performed on selected sandy soils samples. The laboratory test results are summarized on **Table A** in **Appendix A** of this report. The environmental corrosion test results are provided in **Table B** in **Appendix A** of this report.

5.2.1 Sieve Analysis Test

This test was conducted in general accordance with Florida Manual (FM) 1-T088 (ASTM D-422). The sieve analysis test measures the percentage by weight of a dry soil sample passing a series of U.S. standard sieves, including the percent passing the No. 200 sieve. In this manner, the grain size distribution of the soil is measured. The percentage by weight passing the No. 200 sieve is the silt and clay content. The gradation of a soil including the percentage by weight of silt and clay affects its engineering properties, including permeability, suitability as roadway subgrade and suitability as general fill material.

5.2.2 Atterberg Limits Test

This test was conducted in general accordance with FM 1-T089 and 1-T090 (ASTM D-4318). Atterberg plastic limit and liquid limit tests measure the moisture content at which a fine-grained soil changes from a semi-solid to plastic state and from a plastic to a liquid state, respectively. The plasticity index is the difference between the liquid and plastic limits and is a rough indication of the tendency of a soil to absorb water on the particle surfaces. Some clays have a strong affinity for water, and tend to swell when wetted and shrink when dried. The larger the plasticity index, the greater the shrink-swell tendency.

5.2.3 Moisture Content Test

The laboratory moisture content test consists of determining the percentage of moisture in selected samples in general accordance with FDOT test designation 1-T265 (ASTM test designation D-2216). Briefly, natural moisture content is determined by weighing a sample of the selected material and then drying it in a warm oven. Care is taken to use a gentle heat so as not to destroy any organics. The sample is removed from the oven and reweighed. The difference of the two weights is the amount of moisture removed from the sample. The weight of the moisture divided by the weight of the dry soil sample is the percentage by weight of the moisture in the sample.

5.2.4 Environmental Classification

As part of the laboratory testing, limited environmental corrosion tests were performed on soil samples recovered from the pond borings. Environmental

corrosion tests include parameters such as pH, resistivity, sulfate content and chloride content.

5.3 Pond Results

The results of the boring program for the proposed ponds are presented on Sheets 8 through 14 (Appendix B) in the form of soil profiles, along with the profile legend and other pertinent information such as measured groundwater levels. Soil stratification is based on an examination of the recovered soil samples, the laboratory testing, and interpretation of field boring logs by a geotechnical engineer. The stratification lines represent the approximate boundaries between soil types of significantly different engineering properties. The actual transition may be gradual. In some cases, small variations in properties not considered pertinent to our engineering evaluation may have been abbreviated or omitted for clarity. The profiles represent the conditions at the boring locations only and variations across the pond site should be expected.

In general, the borings performed in the pond site areas encountered the following strata.

STRATUM	SOIL DESCRIPTION	AASHTO SOIL CLASSIFICATION
1	Light Gray/ Light Brown/ Brown/Gray fine Sand	A-3
2	Dark Gray Silty Fine Sand	A-2-4
3	Light Gray Clayey Fine Sand	A-2-6
4	Brown Clayey Sand to Sandy Clay	A-6
5	Brown/ Gray Clayey Sand to Clay	A-7-5/ A-7-6
6	Brown Silty Sand to Sandy Silt	A-4

The majority of the fine sands encountered at the ground surface can be moved and used for grading purposes, site leveling, general engineering fill, structural fill and back fill areas provided the fill is free of organic materials, clay, debris or any other material deemed unsuitable for construction. Clayey or silty soils may be used as embankment soils only as described in FDOT Index 505.

The groundwater table was measured at each boring location. The depths to the static water table within the proposed ponds were measured during our drilling operations and found to range from approximately 1.8 to 9 feet below the existing ground surface in four (4) of the borings. The groundwater table was not encountered in the remaining pond borings. The groundwater table depths measured at each boring location during our field survey are presented graphically on Sheets 8 through 14.

Groundwater conditions will change with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, such as existing swales, drainage ponds, and underdrains.

SHGWT depths were estimated at each auger boring location. The results of these borings are presented in Table 5-1. These estimates are based on the soil stratigraphy, measured

groundwater levels in the borings, USDA information and past experience. In areas where subsurface soil conditions were disturbed, normal indicators such as "stain lines" were not evident. It should be noted that perched water conditions should be expected in some areas due to the relatively shallow clayey soils encountered in the eastern portion of the alignment.

It should be noted that the boring stations and offsets presented on sheets 8 through 14 are estimates from the color roadway/pond aerials provided by Ayres Associates. These locations were not surveyed and should therefore be considered approximate.

Table 5-1
Pond Groundwater Table Data

SR 50 from US 19 (SR 55) to the East SR 50/SR50A Intersection					
Pond No.	Boring		Groundwater Table Depth (feet)	Estimated Seasonal High Groundwater Table Depth (feet)	Hernando County USDA Seasonal High Groundwater Data (feet)
	No.	Station & Offset (feet)			
Pond A	P-1	506+40, 255RT	1.8	0.0-0.5	0-1.0
Pond B	P-2	542+50, 325RT	7.0	>5.0	>6.0
Pond C	P-3	579+25, 285RT	5.5	3.5	>6.0
Pond D	P-4	619+65, 2435RT	9.0	>5.0	>6.0
Pond E North	P-5	672+15, 635LT	GNE	>6.0	>6.0
Pond E South	P-6	675+80, 1075RT	GNE	>6.0	>6.0
Pond F South	P-7	743+40, 250RT	GNE	>6.0	>6.0
Pond F North	P-8	744+40, 570LT	GNE	>6.0	>6.0
Pond G	P-9	781+45, 415RT	GNE	>6.0	>6.0
Pond I North	P-10	851+70, 305LT	GNE	>6.0	>6.0
Pond I South	P-11	862+00, 520RT	GNE	>6.0	>6.0
Pond J	P-12	273+60,230RT	GNE	1.0 (perched)	0-1.0
Pond K	P-13	296+00, 140RT	GNE	4.0 (perched)	1.5-3.5 (perched)
Pond L	P-14	331+90, 130LT	GNE	2.0 (perched)	0-1.0
Pond NE Cobb	P-15	365+60, 145LT	GNE	2.0 (perched)	>6.0

GNE -Groundwater Table not encountered within the depth of the boring.

One (1) vertical permeability test and one (1) horizontal permeability test was performed on near surface soils retrieved at the same general location as the power auger borings performed in each of the fifteen (15) proposed pond sites. The permeability tests resulted in measured coefficients of vertical permeability ranging from 0.7 to 26.9 feet per day and measured coefficients of horizontal permeability ranging from 2 to 22.6 feet per day. Measured results of the permeability tests are presented in Table C in the Appendix A. Hernando County USDA permeability data for the soils series indicated in each pond is presented in Table D in Appendix A.

5.4 Geotechnical Considerations

The borings performed in the fifteen (15) proposed pond sites along the SR 50 alignment generally indicated fine sands and silty fine sands. Towards the eastern end of the alignment, the borings encountered fine sands and silty fine sands underlain by shallow clayey soils at depths of 1 to 2 feet below existing grades. The seasonal high groundwater estimates presented in the report for the pond sites are based on soil stratigraphy, measured groundwater levels in the borings, USDA SCS information and past experience. The seasonal high water tables in the ponds were generally estimated at depths of greater than 6 feet deep. However, shallow perched conditions should be expected at depths of 1 to 4 feet near the east portion of the alignment due to the abundance of shallow clayey soils. Vertical and horizontal permeability values for the shallow sandy soils in the pond sites varied from 0.7 to 26.9 feet per day and 2 to 22.6 feet per day, respectfully, based on the laboratory permeability test results.

Based on USDA SCS data, a shallow limestone Stratum may exist along a few areas of the alignment. The shallow depth to limestone, if encountered, may require consideration of alternative design methods for stormwater retention ponds to avoid cross contamination of the shallow aquifer. In addition, excavations within the shallow limestone Stratum can be difficult and therefore design level studies will need to delineate the limits of shallow limestone areas, if encountered, in areas proposed for excavation.

The majority of the fine sands can be moved and used for grading purposes, site leveling, general engineering fill, structural fill and backfill in other areas, provided the fill is free of organic materials, clay, debris or any other material deemed unsuitable for construction. Clayey or silty soils may be used as embankment soils as described in FDOT Index 505.

Environmental corrosion tests were performed on several sandy pond soil samples. Based on the laboratory test results and the FDOT's "Structure Design Guidelines, Section 2.3, Topic 625-020-154-b", the pond subsurface environment is classified as slightly aggressive for both concrete and steel. Test results are summarized in Table B in Appendix A.

6.0 PRELIMINARY CONSTRUCTION CONSIDERATIONS

6.1 General Construction Recommendations

Site preparation and construction should be in accordance with the latest FDOT Standard Specifications for Road and Bridge Construction and Roadway and the Traffic Design Standards. Depending upon groundwater levels at the time of construction, some form of dewatering may be required in areas requiring excavation and compaction below the water table.

6.2 Excavations

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better insure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavations for footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractors "responsible person", as defined in 20 CFR part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination or excavation depth, including utility trench excavation depth, exceed those specified in all local, state and federal safety regulations.

Shallow limestone may be encountered along the alignment which may be difficult to excavate if necessary. Design level studies will need to delineate the limits of shallow limestone in areas proposed for excavation.

6.3 Groundwater Control

Depending upon groundwater levels at the time of construction, some form of dewatering may be required for excavations and/or to achieve the required compaction. Groundwater can normally be controlled in shallow excavations with a sump pump. During subgrade soil preparation, any plastic soils below design grade could become disturbed by construction activities. The contractor may be directed by the Department's representative to remove the disturbed or pumping soils to a depth of 12 to 18 inches below design grade and backfill the area with structural fill in accordance with the latest FDOT Standard Specifications for Roads and Bridge Construction.

Surface water and groundwater control should be used to allow construction to occur in accordance with the Florida Department of Transportation Standard Specifications. The construction area should be maintained to prevent surface water from disturbing the

construction area and water diverted through a temporary ditch or pumped around construction activities. If a pump is used, a standby pump is recommended.

Depending upon groundwater levels at the time of construction, groundwater may also enter from the bottom and sides of excavated areas. Such seepage will act to loosen soils and create difficult working conditions. Therefore, it may be necessary to wellpoint or sump pump and rim ditch excavation areas. Groundwater levels should be at least 2 feet below the lowest anticipated excavation depth to facilitate proper material placement and compaction.

7.0 SINKHOLE/GROUND SUBSIDENCE EVALUATION

7.1 Preliminary Evaluation of Sinkhole Potential

A preliminary sinkhole/ground subsidence evaluation which consisted of a study of available published data and field investigation information was completed. In addition, project specific aerial topographic photographs were reviewed as well as past reports prepared for projects in the vicinity. Subsurface Evaluations, Inc. prepared data showing known new sinkhole locations near the proposed alignment. This data is summarized graphically in Appendix C. Sinkhole frequency data developed by Subsurface Evaluations, Inc. was also reviewed to establish the potential for new sinkhole development along the roadway alignment. Attached in the report Appendix C is a map depicting reported new sinkhole frequency in Central and West- Central Florida. As seen from this map, the roadway alignment is located within areas where the maximum reported new sinkhole frequency is between 0.001 and 0.05 new sinkholes per square mile per year. Accordingly, over a period of 100 years, on the order of 1 to 2 new sinkholes would be expected to form near the length of the 13.5-mile roadway alignment.

It should be recognized that while it may be prudent to conduct geophysical and geotechnical studies at surface depressions in the project vicinity, to evaluate their potential impacts to the performance of the roadway and ponds, it would be necessary to complete detailed ground penetrating radar (GPR) or other geophysical testing along with deep test borings. Even with this type of testing it is difficult to accurately predict the time and extent of ground subsidence activities.

Based on past karst/sinkhole activity in the area, the potential exists for new sinkholes to develop along the roadway alignment and pond areas that are not visually apparent at this time. Geophysical studies could be performed along the proposed roadway alignment and pond sites to provide guidance with respect to selecting the pond locations and sinkhole remediation, but in view of the length of the roadway alignment and the number of ponds, this program of investigation is not generally considered practical during this phase of the project. The risk for sinkhole development along the alignment and in the pond site areas is generally considered moderate as seen by the information in **Appendix C** which was generated based on current data. A higher potential for sinkhole development is present adjacent to existing sinkholes.

It is recognized that the geology and hydrogeologic conditions in this area of Hernando County is conductive for the formation and development of sinkholes. Published data by government and private agencies supports this opinion.

8.0 REPORT LIMITATIONS

Professional services have been performed, findings obtained, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This company is not responsible for the conclusions, opinions or recommendations made by others based on this data.

The preliminary recommendations submitted in this report are based upon the anticipated location and type of construction proposed for this project. If any variations become evident during the course of the design of the project or during construction, a re-evaluation of the recommendations contained in this report will be necessary after we have had an opportunity to observe the characteristics of the conditions encountered.

The report presented herein does not include any field or laboratory testing or any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied. Any statements in this report are intended only as a guide for assessing the feasibility of the proposed project improvements.

Appendix A

TABLE A

SUMMARY OF LABORATORY TEST RESULTS

SR 50 from US 19 (SR55) to the East 50/SR50A Intersection													
BORING LOCATION			SAMPLE DEPTH (feet)	MOISTURE CONTENT (%)	SIEVE ANALYSES (%)					ATTERBERG LIMITS (%)		AASHTO GROUP	STRATUM NUMBER
NO.	STATION (feet)	OFFSET (feet)			#10	#40	#60	#100	#200	LL	PI		
P-1	506 + 40	255RT	8.0 - 10.0	22	100	99	91	69	17	20	6	2	A-2-4
P-2	542 + 50	325RT	9.0 - 11.0	20	100	99	95	79	28	29	13	3	A-2-6
P-4	619 + 65	2435RT	6.0 - 8.0	16	100	100	98	83	27	31	14	3	A-2-6
P-4	619 + 65	2435RT	10.0 - 12.0	18	100	100	98	83	38	-	-	4	A-6
P-6	675 + 80	1075RT	1.0 - 5.0	2	100	95	73	34	4	-	-	1	A-3
P-9	781 + 45	415RT	14.0 - 15.0	13	100	100	98	80	10	-	-	1	A-3
P-10	851 + 70	305LT	12.0 - 14.0	16	100	100	94	74	38	34	17	2	A-6
P-11	862 + 00	520RT	12.0 - 14.0	12	100	100	94	75	26	-	-	2	A-2-4
P-12	273 + 60	230RT	1.0 - 6.0	12	100	100	95	77	37	23	8	6	A-4
P-12	273 + 60	230RT	13.0 - 15.0	38	100	99	95	85	66	77	43	5	A-7-5
P-13	296 + 00	140RT	4.0 - 6.0	19	99	98	93	76	43	-	-	5	A-7-6
P-14	331 + 90	130LT	4.0 - 6.0	19	100	100	96	82	49	38	20	4	A-6

TABLE B

SUMMARY OF CORROSION TEST RESULTS

SR 50 from US 19 (SR55) to the EAST SR 50/ SR50A INTERSECTION										
BORING LOCATION		SAMPLE DEPTH (feet)	STRATUM NUMBER	AASHTO GROUP	Ph	CHLORIDES (ppm)	SULFATES (ppm)	RESISTIVITY (ohm-cm)	ENVIRONMENTAL CLASSIFICATION	
STATION (feet)	OFFSET (feet)								STEEL	CONCRETE
506 + 40	225RT	4.0 - 6.0	1	A-3	6.5*	15	<2.4	130,000	Moderately Aggressive	Moderately Aggressive
619 + 65	2435RT	2.0 - 4.0	1	A-3	6.9	15	<2.4	44,000	Slightly Aggressive	Slightly Aggressive
743 + 40	250RT	3.0 - 9.0	1	A-3	6.9	30	<2.4	28,000	Slightly Aggressive	Slightly Aggressive
781 + 45	415RT	2.0 - 4.0	1	A-3	6.8	30	<2.4	38,000	Slightly Aggressive	Slightly Aggressive
862 + 00	520RT	2.0 - 4.0	1	A-3	7.1	30	<2.4	48,000	Slightly Aggressive	Slightly Aggressive
331 + 90	130LT	0.0 - 2.0	2	A-2-4	7.2	30	<2.4	18,000	Slightly Aggressive	Slightly Aggressive
* Governing factor for Environmental Classification other than Slightly Aggressive.										

Table C
Permeability Test Results

SR 50 from US 19 (SR 55) to the East SR 50/SR50A Intersection					
Pond	**Test Sample Station & Offset (feet)**	**Test Sample Depth (feet)**	**Percent Passing No. 200 Sieve (%)**	**Vertical Permeability (ft/day)**	**Horizontial Permeability (ft/day)**
Pond A	506+40, 255RT	1.5	3	11.6*	9.8*
Pond B	542+50, 325RT	1.5	2	18.8	19.0
Pond C	579+25, 285RT	1.5	4	11.7	11.1
Pond D	619+65, 2435RT	1.5	6	21.1	20.4
Pond E North	672+15, 635LT	1.5	2	22.3	18.0
Pond E South	675+80, 1075RT	1.5	3	26.9	22.6
Pond F South	743+40, 250RT	1.5	4	7.4**	7.6**
Pond F North	744+40, 570LT	1.5	3	19.0	16.8
Pond G	781+45, 415RT	1.5	2	10.0	13.5
Pond I North	851+70, 305LT	1.5	4	17.2	13.1
Pond I South	862+00, 520RT	1.5	8	16.7	21.0
Pond J	273+60,230RT	1.5	21	0.7	5.7
Pond K	296+00, 140RT	1.5	17	1.5	2.0
Pond L	331+90, 130LT	1.5	16	2.7	5.0
Pond NE Cobb	365+60, 145LT	1.5	18	5.8	8.9

* Sample contained roots

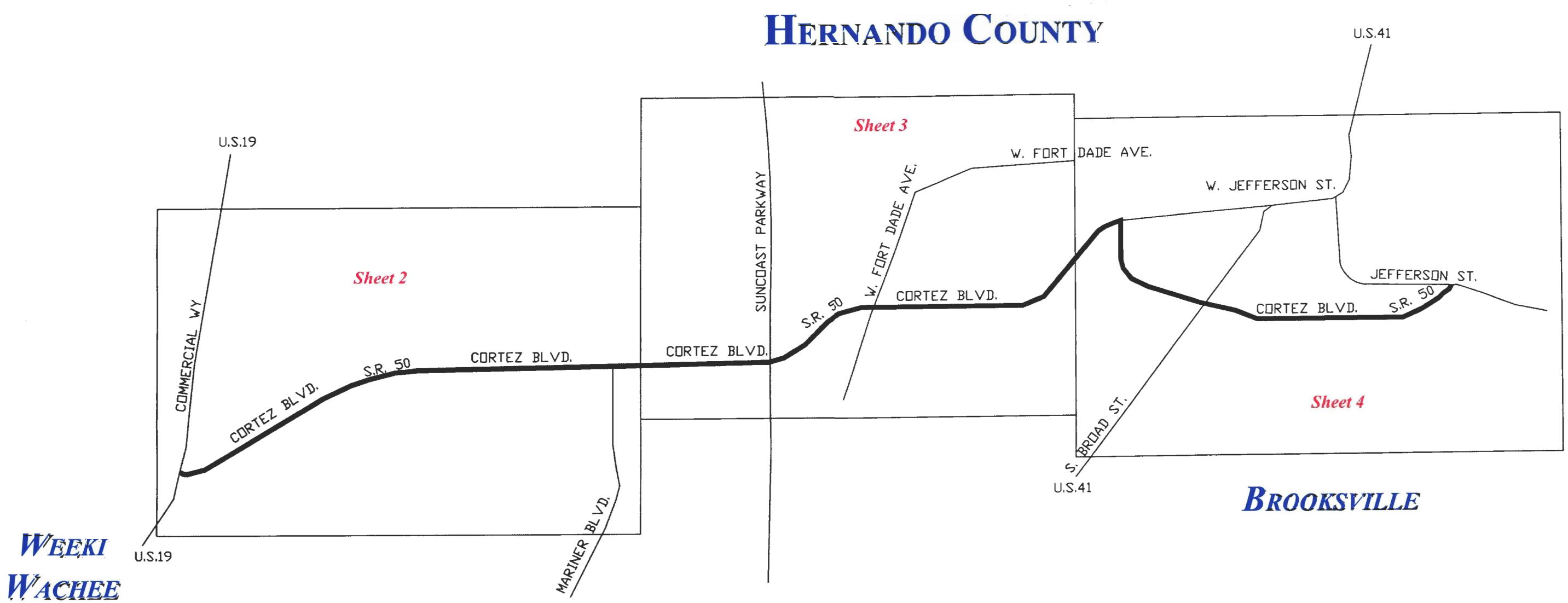
** Sample contained rock fragments

Table D
Hernando County USDA Permeability Data

SR 50 from US 19 (SR 55) to the East SR 50/SR50A Intersection			
Pond	**Hernando County USDA Soil Series**	**Depth (inches)**	**Permeability (ft/day)**
Pond A	Myakka Fine Sand (35)	0-23	12-40
Pond B	Paola Fine Sand 0 to 8 Percent Slopes (39)	0-26	>40
Pond C	Candler Fine Sand 0 to 5 Percent Slopes (14)	0-48	>40
Pond D	Candler Fine Sand 0 to 5 Percent Slopes (14)	0-48	>40
Pond E North	Candler Fine Sand 0 to 5 Percent Slopes (14)	0-48	>40
Pond E South	Candler Fine Sand 0 to 5 Percent Slopes (14)	0-48	>40
Pond F South	Candler Fine Sand 0 to 5 Percent Slopes (14)	0-48	>40
Pond F North	Candler Fine Sand 0 to 5 Percent Slopes (14)	0-48	>40
Pond G	Candler Fine Sand 0 to 5 Percent Slopes (14)	0-48	>40
Pond I North	Candler Fine Sand 0 to 5 Percent Slopes (14)	0-48	>40
Pond I South	Candler Fine Sand 0 to 5 Percent Slopes (14)	0-48	>40
Pond J	Blichton Loamy Fine Sand, 0 to 2 Percent Slopes (11)	0-28	12-40
	Micanopy Loamy Fine Sand, 0 to 2 Percent Slopes (35)	18-25	1.2-4
Pond K	Nobleton Fine Sand, 0 to 5 Percent Slopes (36)	0-33	12-40
Pond L	Blichton Loamy Fine Sand, 2 to 5 Percent Slopes (12)	0-28	12-40
Pond NE Cobb	Kendrick Fine Sand, 0 to 5 Percent Slopes (29)	0-28	12-40

Appendix B

SCS Project Key & Legend



Symbol	
Definition	Project Route

1 3/4 1/2 1/4 0 1 MILE

1 0.5 0 1 KILOMETER

SCALE 1:20 000

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5801 BENJAMIN CENTER DR., SUITE 112
TAMPA, FL 33634
(813)-886-1075
FLORIDA ENGINEERING CERTIFICATE
OF AUTHORIZATION No. 3684

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

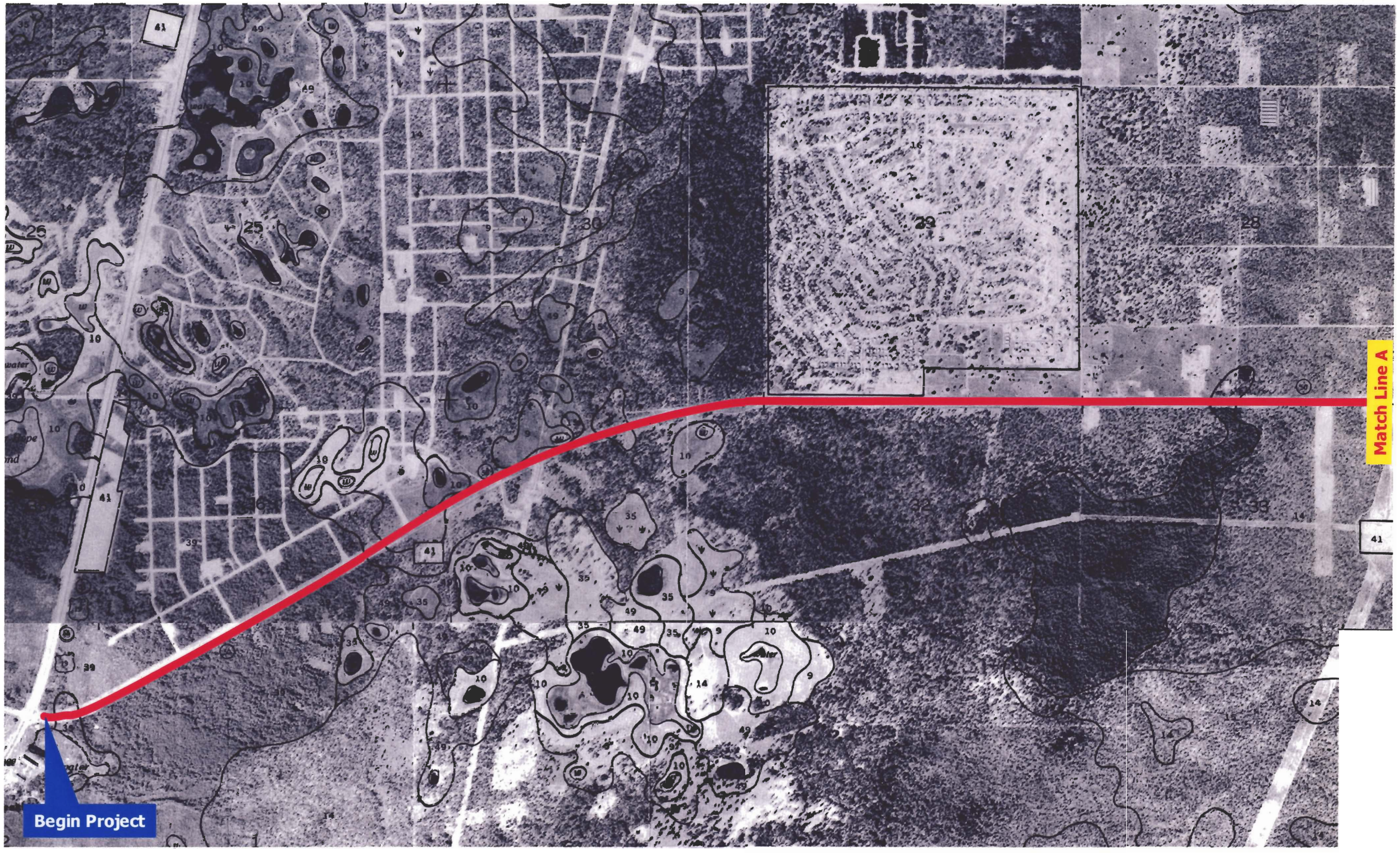
COUNTY	FINANCIAL PROJECT NO.
HERNANDO	407951-1-22-01

PD&E Reevaluation SR50 from US19 (SR55) to the East of SR50/SR50A Intersection

USDA SCA Soil Survey Map

SHEET NO. 1

PSI PROJECT No. 775-25273



1 3/4 1/2 1/4 0 1 MILE

1 0 5 0 1 KILOMETER

SCALE 1:20 000

2	3
	4

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DEPARTMENT OF TRANSPORTATION

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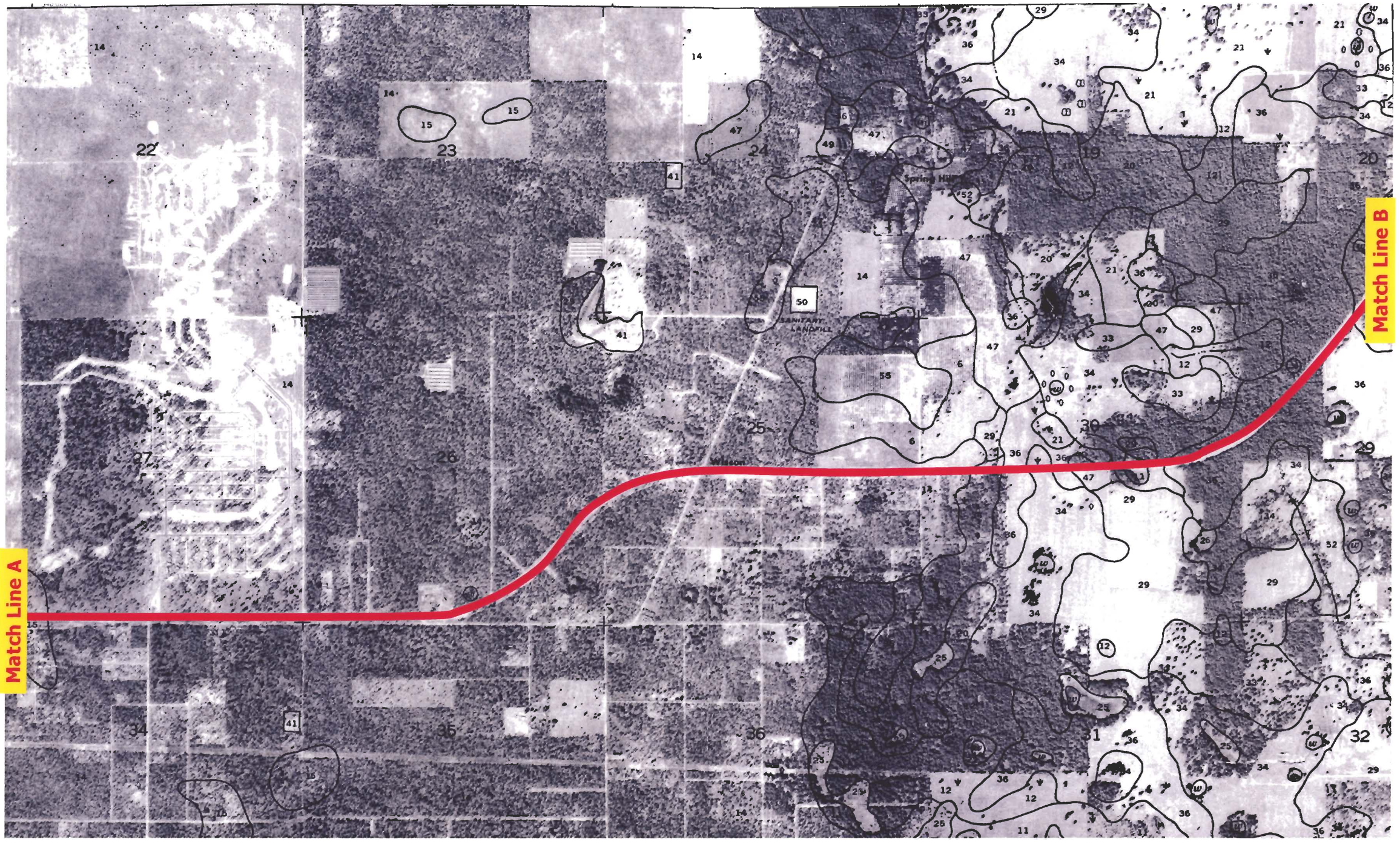
HERNANDO	407951-1-22-01

PD&E REEVALUATION SR50 FROM US19 (SR55) TO THE EAST OF SR50/SR50A INTERSECTION

USDA SCA SOIL SURVEY MAP

SHEET NO. 2



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1 0 5 0 1 KILOMETER

SCALE 1:20 000

2 | 3 | 4

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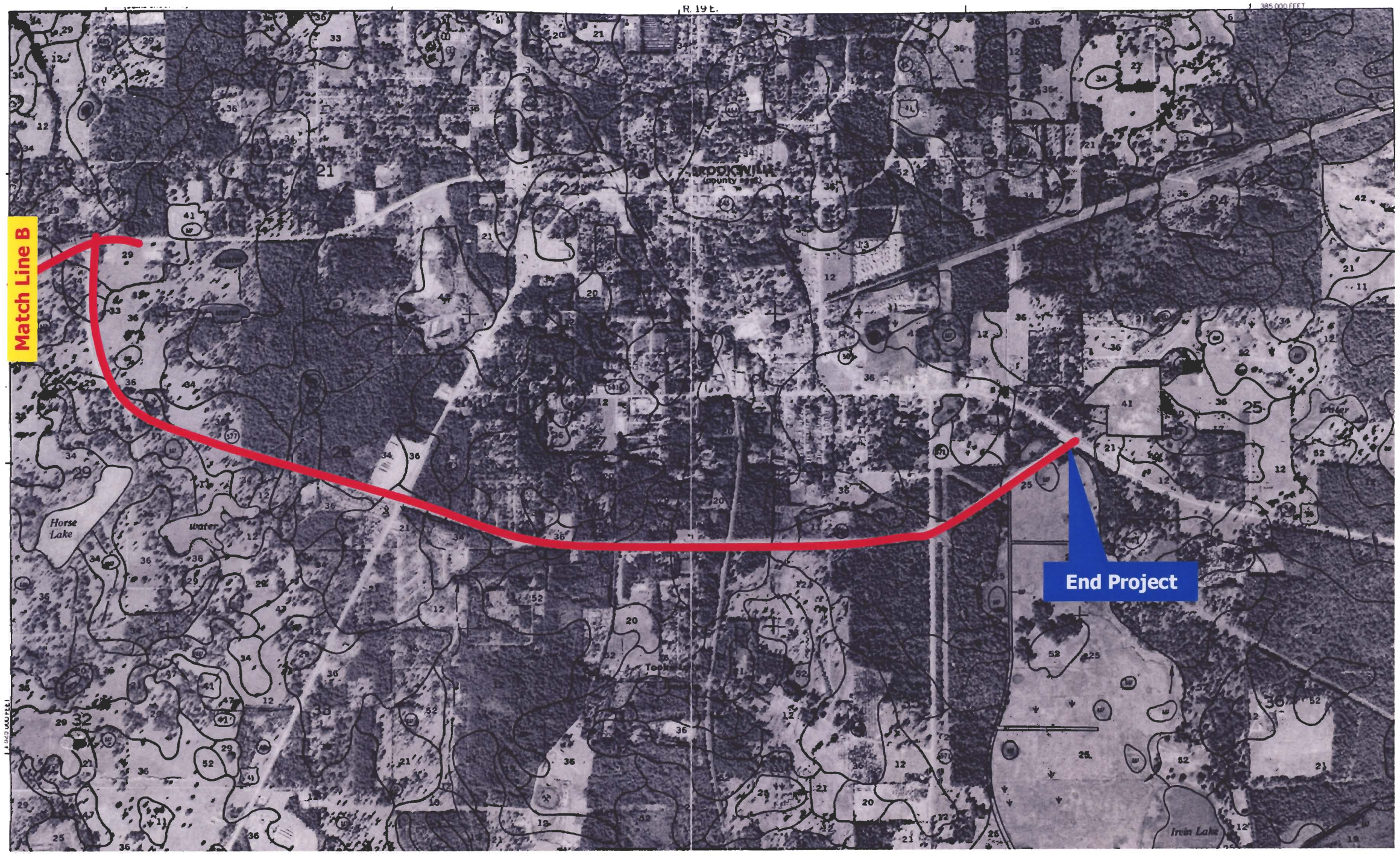
COUNTY	FINANCIAL PROJECT NO.
HERNANDO	407951-1-22-01

PD&E REEVALUATION SR50 FROM US19 (SR55) TO THE EAST OF SR50/SR50A INTERSECTION

USDA SCA SOIL SURVEY MAP

SHEET NO. 3

PSI PROJECT No. 775-25273



1 3/4 1/2 1/4 0 1 MILE

1 0 5 0 1 KILOMETER

SCALE 1:20 000

2 | 3 | 4

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PD&E REEVALUATION SR50 FROM US19 (SR55) TO THE EAST OF SR50/SR50A INTERSECTION

USDA SCA SOIL SURVEY MAP

SHEET NO. 4

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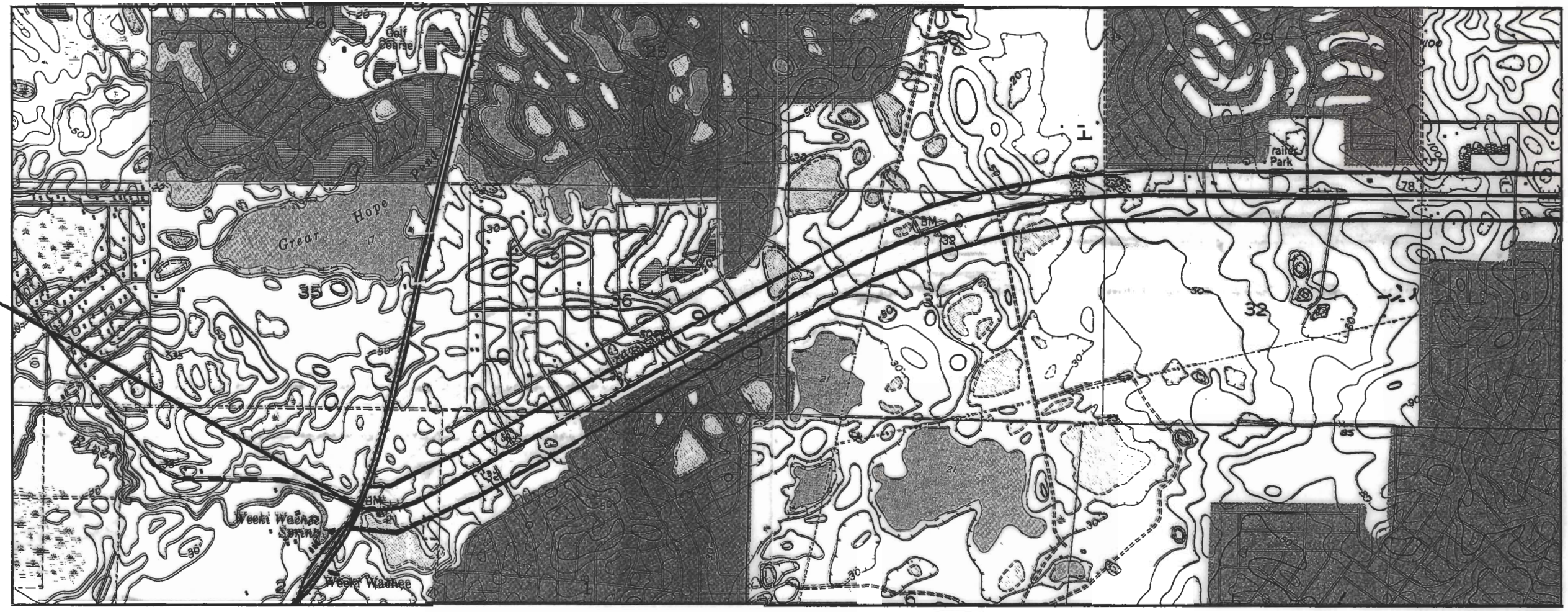

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RANGE: 17 & 18 EAST — PHOTOREVISED: 1988
SECTIONS: 1, 2, 28, 29, 31, 32, 33 & 36 — SCALE: 1" = 2000'

REFERENCE: USGS "BROOKSVILLE, FLORIDA" QUADRANGLE MAP
TOWNSHIP: 22 SOUTH — ISSUED: 1954
RANGE: 18 EAST — PHOTOREVISED: 1988
SECTIONS: 25, 26, 27, 34 & 35 — SCALE: 1" = 2000'
RANGE: 19 EAST
SECTIONS: 20, 26, 27, 28, 29 & 30

REFERENCE: USGS "BROOKSVILLE SE, FLORIDA" QUADRANGLE MAP
TOWNSHIP: 22 SOUTH — ISSUED: 1954
RANGE: 19 EAST — PHOTOREVISED: 1988
SECTION: 26 — SCALE: 1" = 2000'

USGS VICINITY MAP

DRAWN	DJG
CHECKED	KME
APPROVED	CLK
SCALE	NOTED

USGS VICINITY MAP
S.R. 50 FROM U.S. 19 (S.R. 55) TO THE EAST S.R. 50/S.R. 50A INTERSECTION
HERNANDO COUNTY, FLORIDA

PSI Information To Build On
Engineering - Consulting - Testing

DATE	PROJ. NO.	SHEET
JUNE 03	775-25273	SHEET 5

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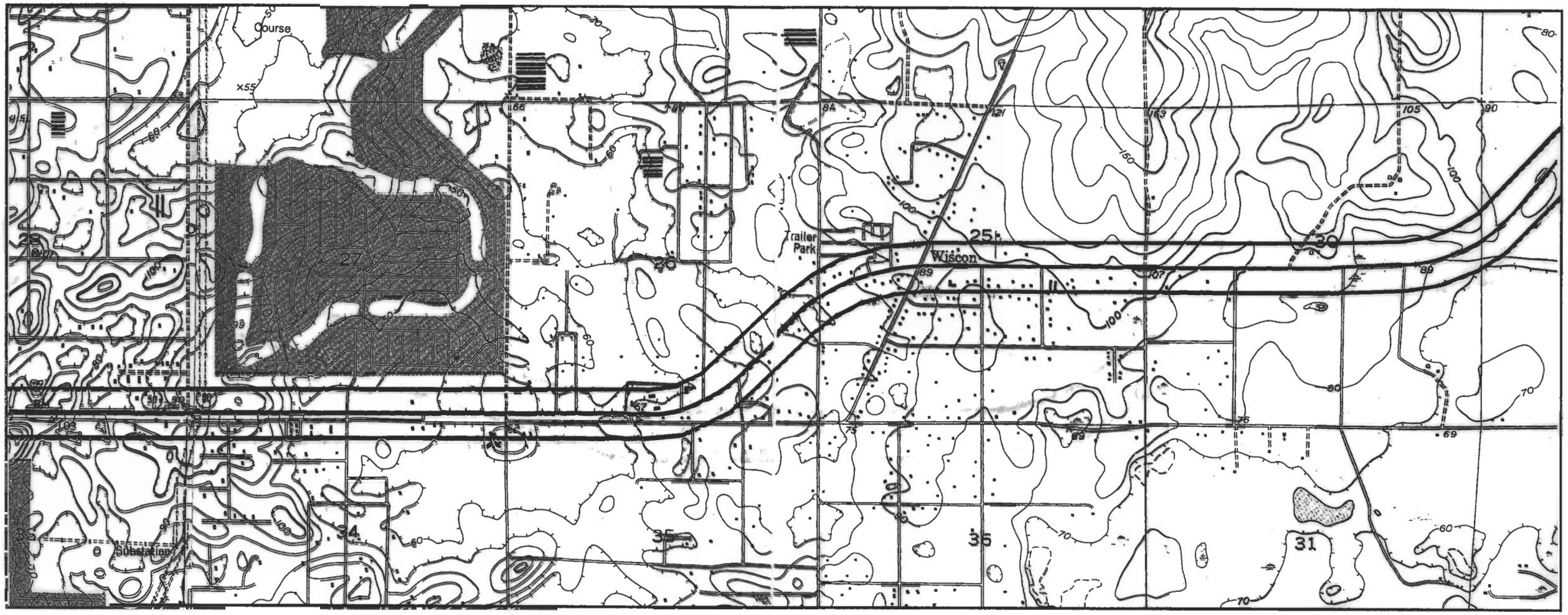
MATCHLINE "A"



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RANGE: 17 & 18 EAST — PHOTOREVISED: 1988
SECTIONS: 1, 2, 28, 29, 31, 32, 33 & 36 — SCALE: 1" = 2000'

REFERENCE: USGS "BROOKSVILLE, FLORIDA" QUADRANGLE MAP
TOWNSHIP: 22 SOUTH — ISSUED: 1954
RANGE: 18 EAST — PHOTOREVISED: 1988
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SECTIONS: 20, 26, 27, 28, 29 & 30

REFERENCE: USGS "BROOKSVILLE SE, FLORIDA" QUADRANGLE MAP
TOWNSHIP: 22 SOUTH — ISSUED: 1954
RANGE: 19 EAST — PHOTOREVISED: 1988
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USGS VICINITY MAP

DRAWN	DJG
CHECKED	KME
APPROVED	CLK
SCALE	NOTED

USGS VICINITY MAP
S.R. 50 FROM U.S. 19 (S.R. 55) TO THE EAST S.R. 50/S.R. 50A INTERSECTION
HERNANDO COUNTY, FLORIDA

PSI Information To Build On
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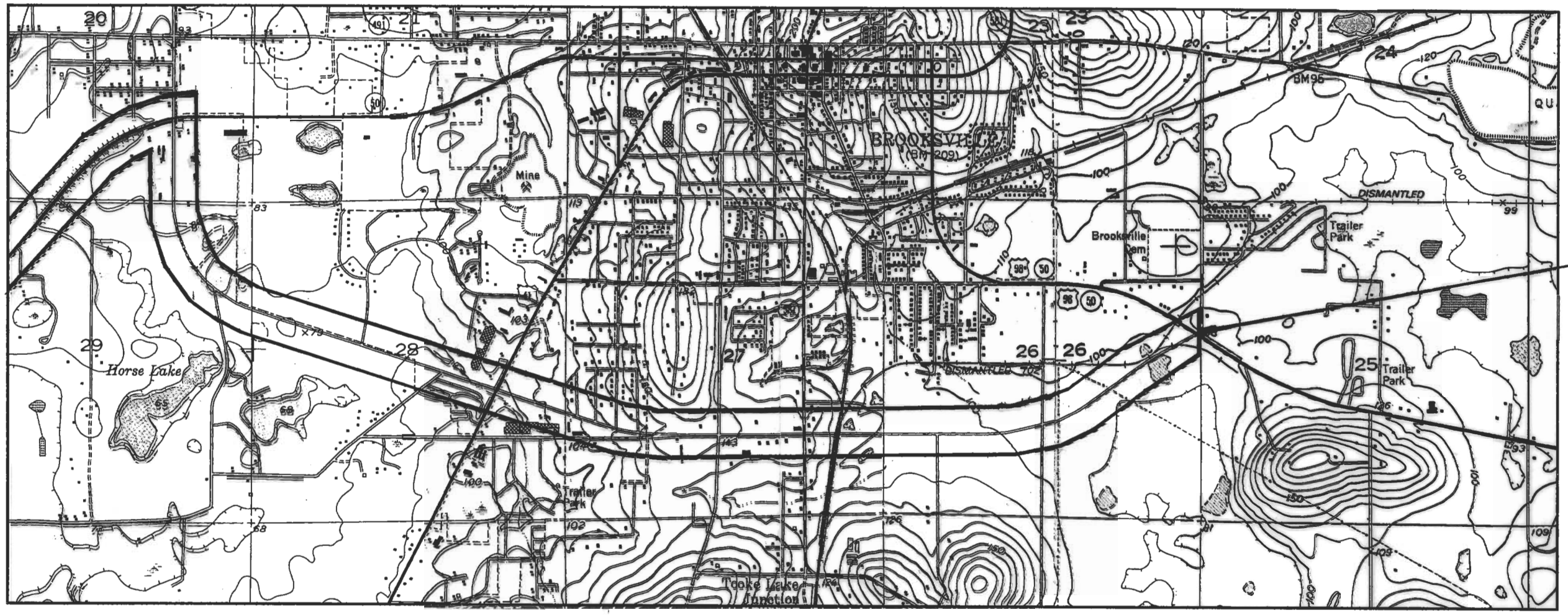

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SECTIONS: 1, 2, 28, 29, 31, 32, 33 & 36 — SCALE: 1" = 2000'

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TOWNSHIP: 22 SOUTH — ISSUED: 1954
RANGE: 19 EAST — PHOTOREVISED: 1988
SECTION: 26 — SCALE: 1" = 2000'

USGS VICINITY MAP

DRAWN	DJG
CHECKED	KME
APPROVED	CLK
SCALE	NOTED

USGS VICINITY MAP
S.R. 50 FROM U.S. 19 (S.R. 55) TO THE EAST S.R. 50/S.R. 50A INTERSECTION
HERNANDO COUNTY, FLORIDA

PSI Information To Build On
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DATE	PROJ. NO.	SHEET
JUNE 03	775-25273	7

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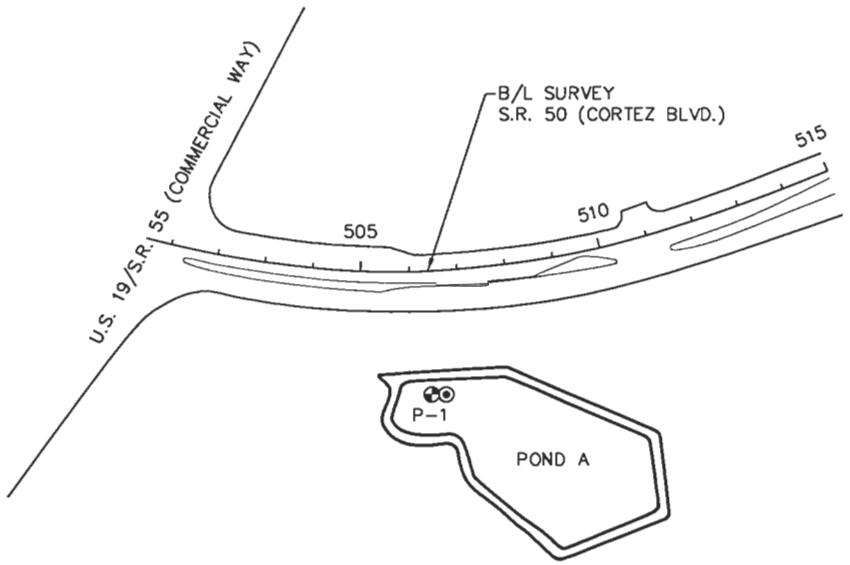

BORING LOCATION PLAN

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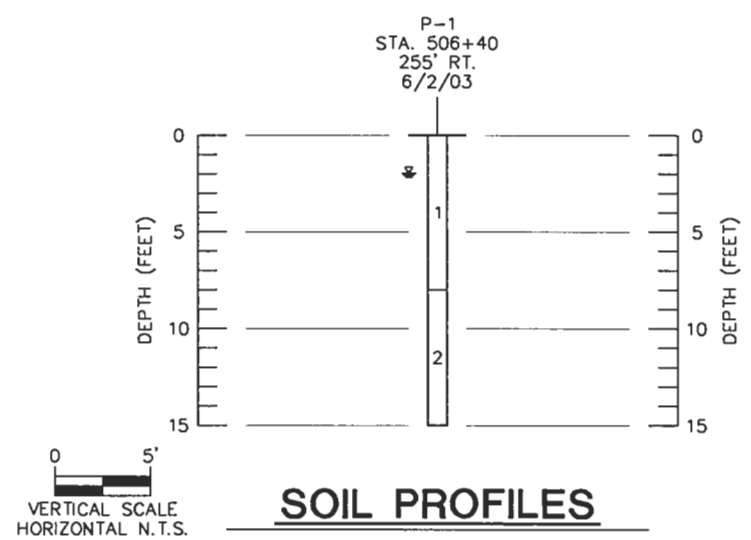
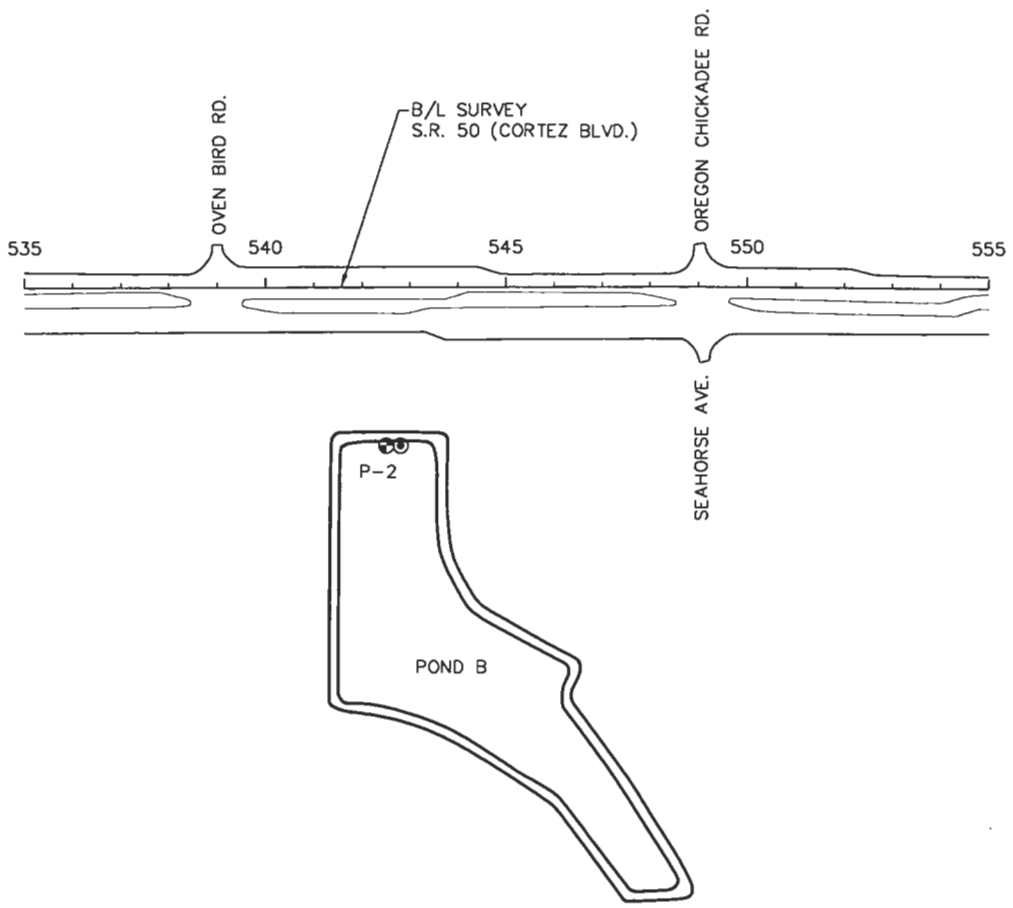
PLAN SCALE



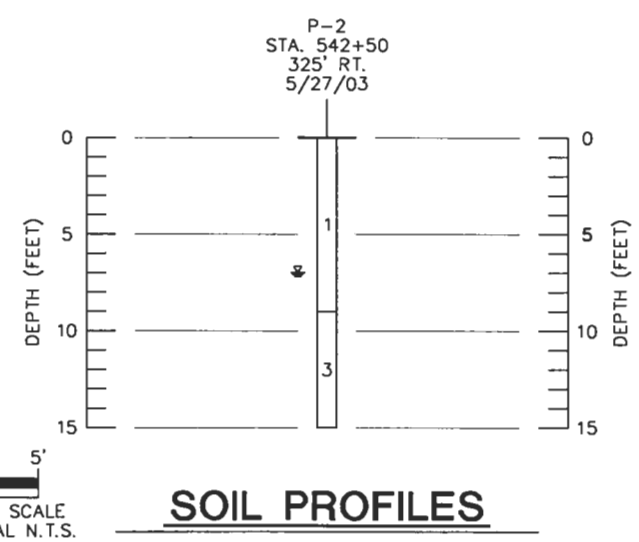
0 5'
VERTICAL SCALE
HORIZONTAL N.T.S.

SOIL PROFILES



BORING LOCATION PLAN

0 200'
PLAN SCALE



0 5'
VERTICAL SCALE
HORIZONTAL N.T.S.

SOIL PROFILES

LEGEND

1. LIGHT GRAY/LIGHT BROWN/ BROWN/GRAY FINE SAND (A-3)
2. DARK GRAY SILTY FINE SAND (A-2-4)
3. LIGHT GRAY CLAYEY FINE SAND (A-2-6)
4. BROWN CLAYEY SAND TO SANDY CLAY (A-6)
5. BROWN/GRAY CLAYEY SAND TO CLAY (A-7-5/A-7-6)
6. BROWN SILTY SAND TO SANDY SILT (A-4)

A-3 AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW

GROUNDWATER LEVEL, DATE OBSERVED

GNE GROUNDWATER LEVEL NOT ENCOUNTERED

APPROXIMATE POWER AUGER BORING LOCATION

APPROXIMATE PERMEABILITY TEST LOCATION

PONDS A & B

REVISIONS					
Date	By	Description	Date	By	Description

PROFESSIONAL SERVICE INDUSTRIES, INC.
5801 BENJAMIN CENTER DR., SUITE 112
TAMPA, FL. 33634
(813)-886-1075
FLORIDA ENGINEERING CERTIFICATE OF AUTHORIZATION No. 3684

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT NO.
S.R. 50	HERNANDO	407951-1-22-01

ROADWAY SOILS SURVEY

S.R. 50 FROM U.S. 19 (S.R. 55) TO THE EAST S.R. 50/S.R. 50A INTERSECTION

SHEET NO.

PSI PROJECT No. 775-25273
SHEET 8

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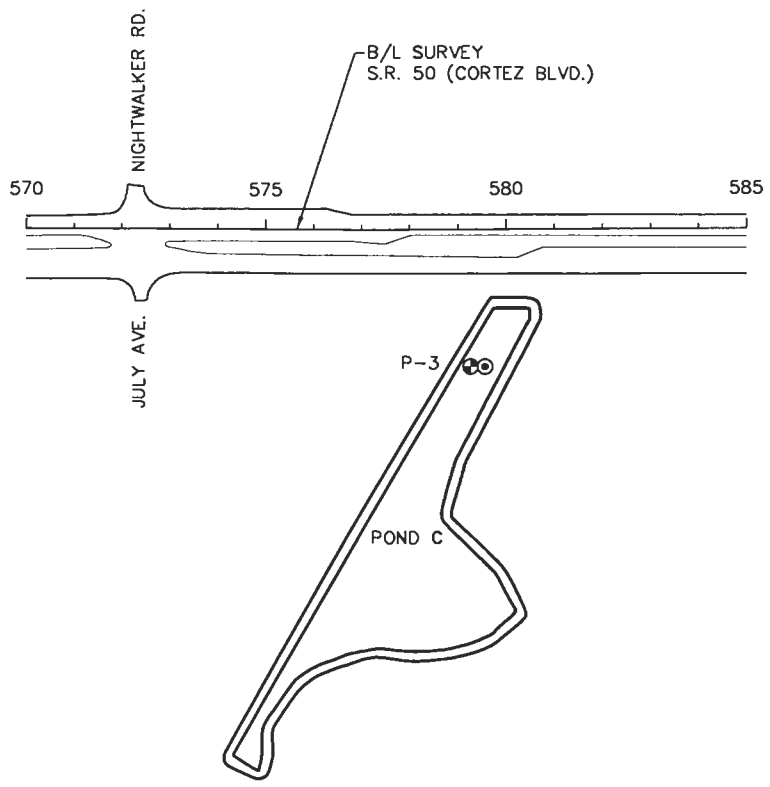
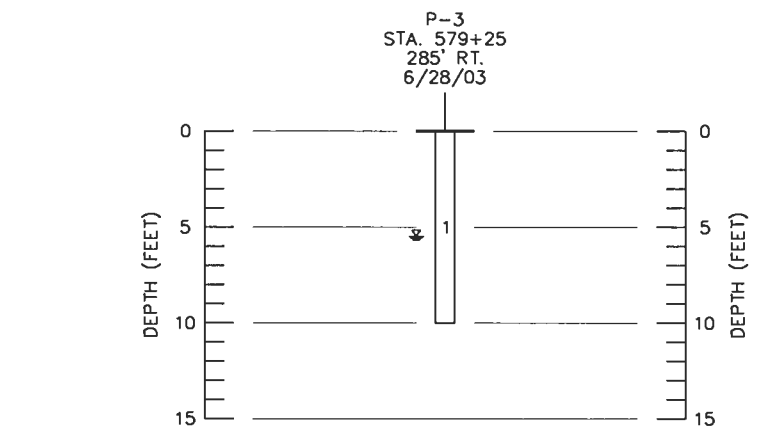


BORING LOCATION PLAN

0 200'
PLAN SCALE



0 5'
VERTICAL SCALE
HORIZONTAL N.T.S.

SOIL PROFILES

LEGEND

1. LIGHT GRAY/LIGHT BROWN/ BROWN/GRAY FINE SAND (A-3)
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A-3 AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW

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GNE GROUNDWATER LEVEL NOT ENCOUNTERED

APPROXIMATE POWER AUGER BORING LOCATION

APPROXIMATE PERMEABILITY TEST LOCATION

POND C

REVISIONS					
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ROAD NO.	COUNTY	FINANCIAL PROJECT NO.
S.R. 50	HERNANDO	407951-1-22-01

ROADWAY SOILS SURVEY

S.R. 50 FROM U.S. 19 (S.R. 55) TO THE EAST S.R. 50/S.R. 50A INTERSECTION

SHEET NO.

PSI PROJECT No. 775-25273
SHEET 9

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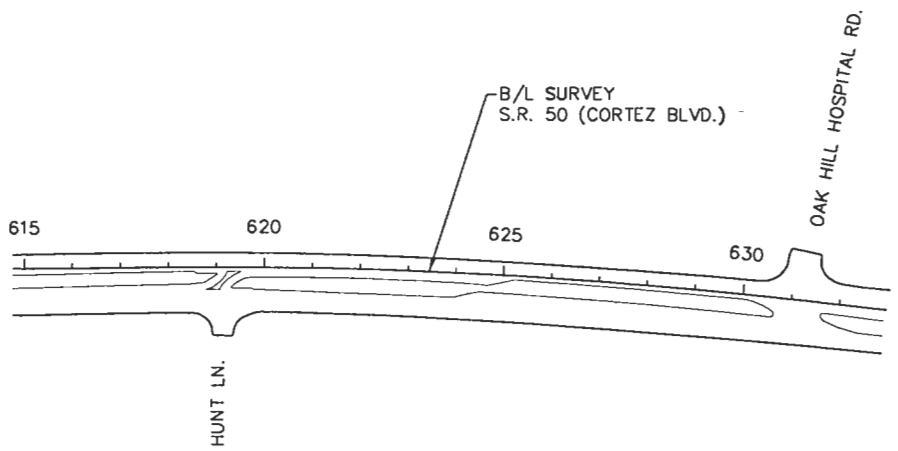
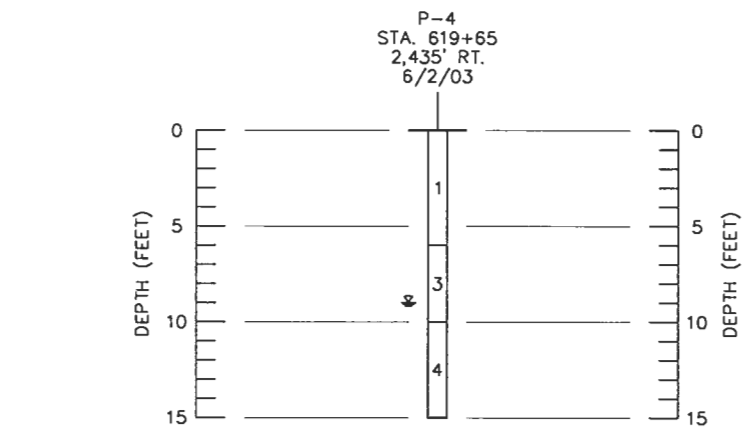


BORING LOCATION PLAN

0 200'
PLAN SCALE



0 5'
VERTICAL SCALE
HORIZONTAL N.T.S.

SOIL PROFILES

LEGEND

1. LIGHT GRAY/LIGHT BROWN/ BROWN/GRAY FINE SAND (A-3)
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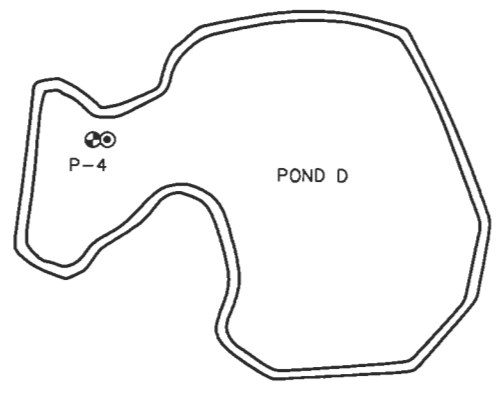
A-3 AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW

GROUNDWATER LEVEL, DATE OBSERVED

GNE GROUNDWATER LEVEL NOT ENCOUNTERED

APPROXIMATE POWER AUGER BORING LOCATION

APPROXIMATE PERMEABILITY TEST LOCATION



POND D

p:\cad\psi_cad\geo\fdot\english\77525273\ponds\2527310

REVISIONS					
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PROFESSIONAL SERVICE INDUSTRIES, INC.
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

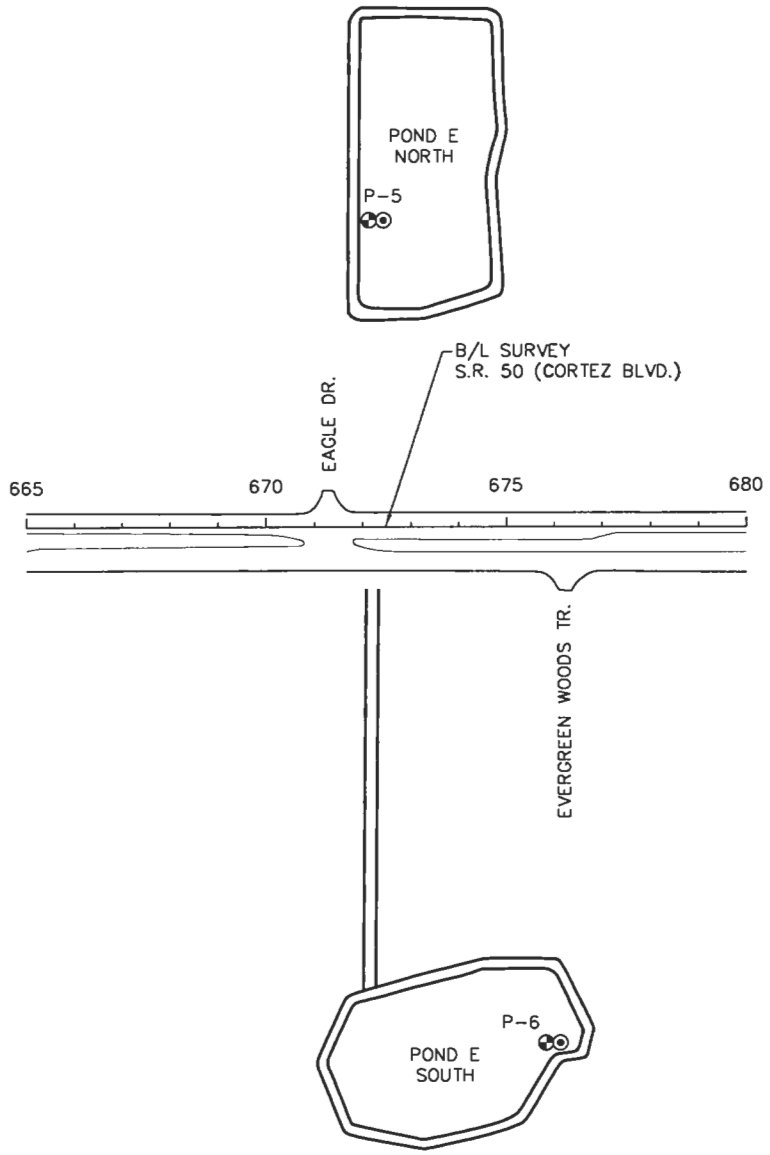
ROAD NO.	COUNTY	FINANCIAL PROJECT NO.
S.R. 50	HERNANDO	407951-1-22-01

ROADWAY SOILS SURVEY

S.R. 50 FROM U.S. 19 (S.R. 55) TO THE EAST S.R. 50/S.R. 50A INTERSECTION

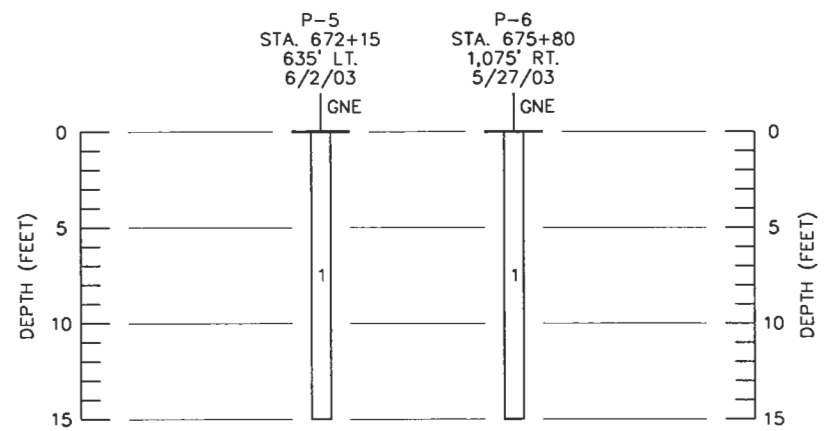
SHEET NO.

PSI PROJECT No. 775-25273
SHEET 10



BORING LOCATION PLAN

0 200'
PLAN SCALE



0 5'
VERTICAL SCALE
HORIZONTAL N.T.S.

SOIL PROFILES

LEGEND

1. LIGHT GRAY/LIGHT BROWN/ BROWN/GRAY FINE SAND (A-3)
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A-3 AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW

GROUNDWATER LEVEL, DATE OBSERVED

GNE GROUNDWATER LEVEL NOT ENCOUNTERED

APPROXIMATE POWER AUGER BORING LOCATION

APPROXIMATE PERMEABILITY TEST LOCATION

PONDS E NORTH & E SOUTH

REVISIONS					
Date	By	Description	Date	By	Description

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DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT NO.
S.R. 50	HERNANDO	407951-1-22-01

ROADWAY SOILS SURVEY

S.R. 50 FROM U.S. 19 (S.R. 55) TO THE EAST S.R. 50/S.R. 50A INTERSECTION

SHEET NO.

PSI PROJECT No. 775-25273
SHEET 11

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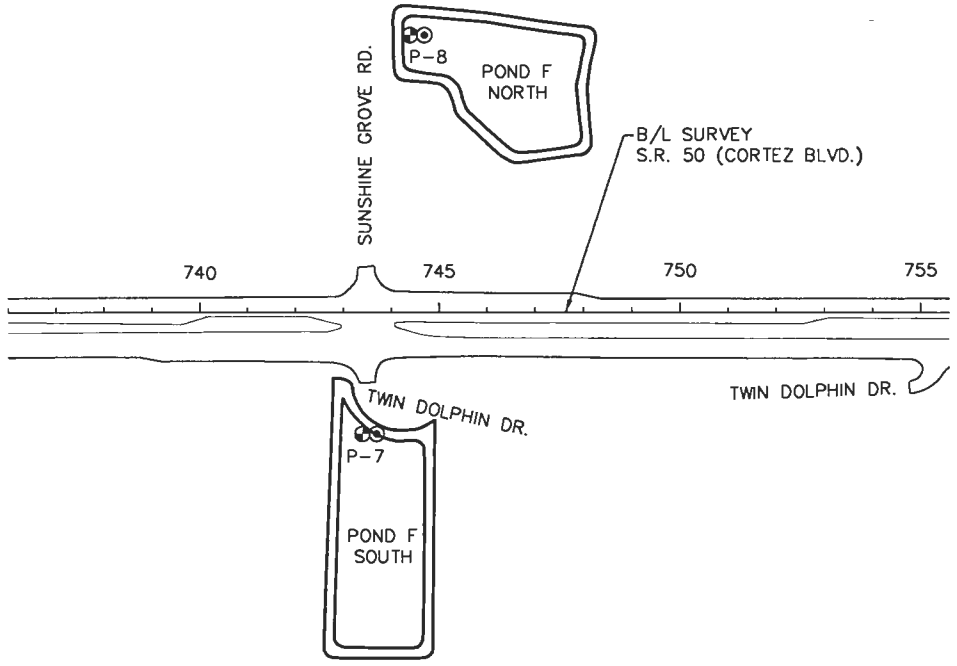
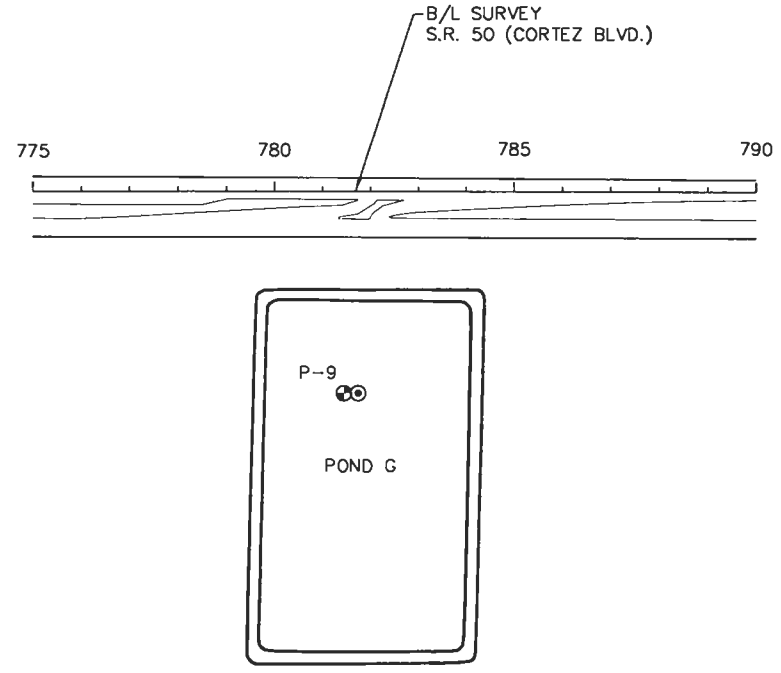


BORING LOCATION PLAN

0 200'
PLAN SCALE



BORING LOCATION PLAN

0 200'
PLAN SCALE

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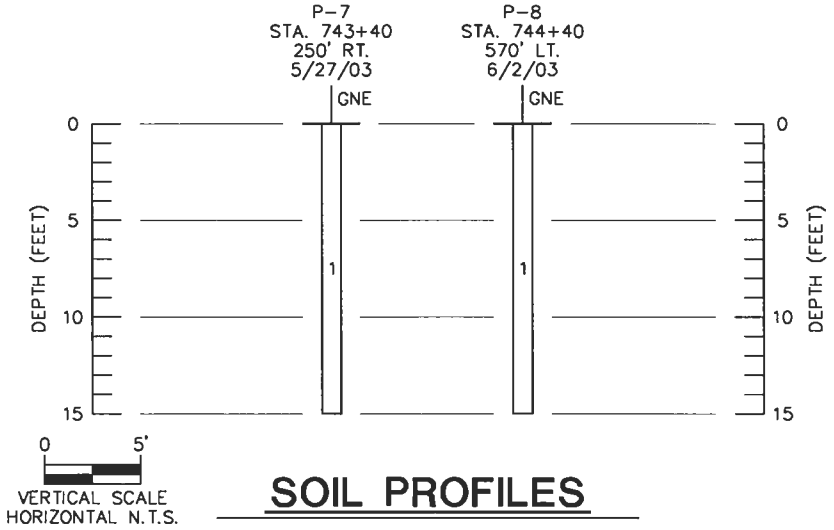
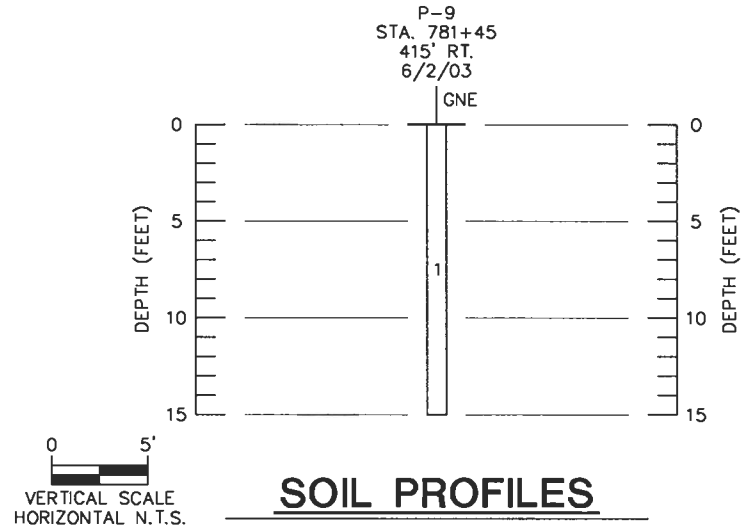
APPROXIMATE POWER AUGER BORING LOCATION

APPROXIMATE PERMEABILITY TEST LOCATION



SOIL PROFILES



SOIL PROFILES

PONDS F SOUTH, F NORTH & G

REVISIONS					
Date	By	Description	Date	By	Description

PROFESSIONAL SERVICE INDUSTRIES, INC.
5801 BENJAMIN CENTER DR., SUITE 112
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT NO.
S.R. 50	HERNANDO	407951-1-22-01

ROADWAY SOILS SURVEY

S.R. 50 FROM U.S. 19 (S.R. 55) TO THE EAST S.R. 50/S.R. 50A INTERSECTION

SHEET NO.

PSI PROJECT No. 775-25273
SHEET 12

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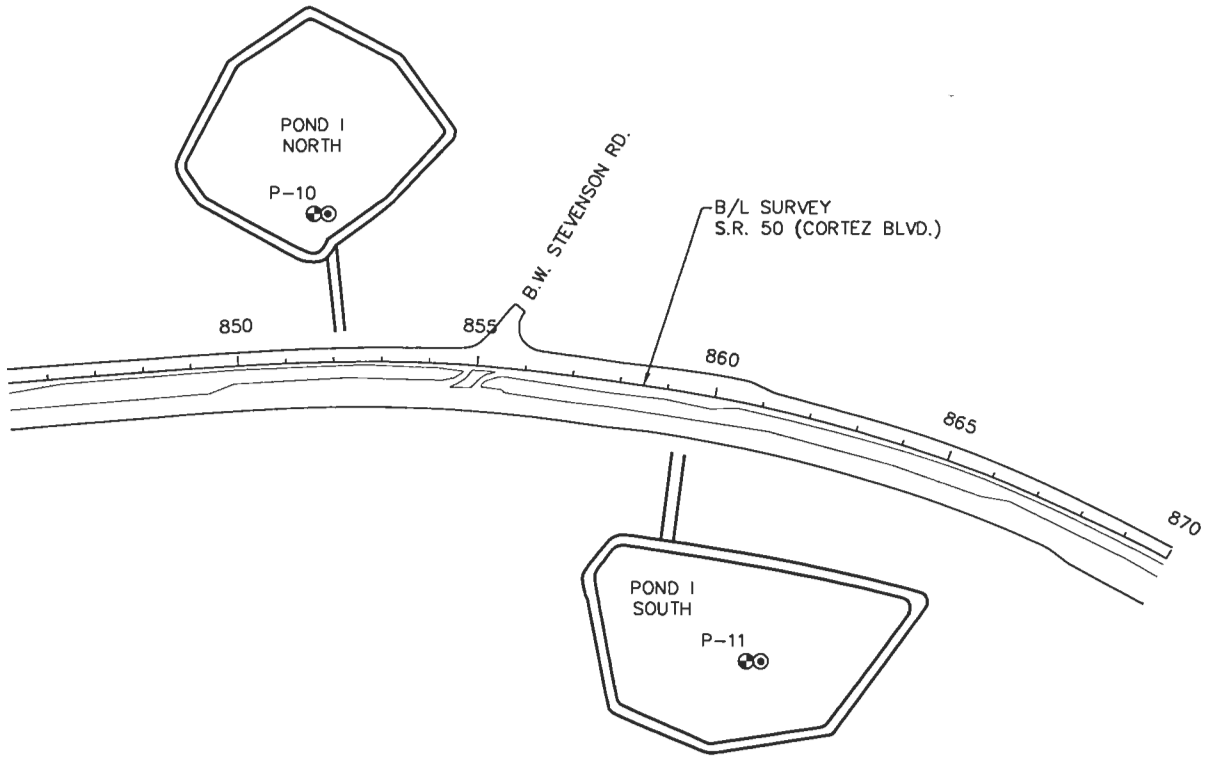
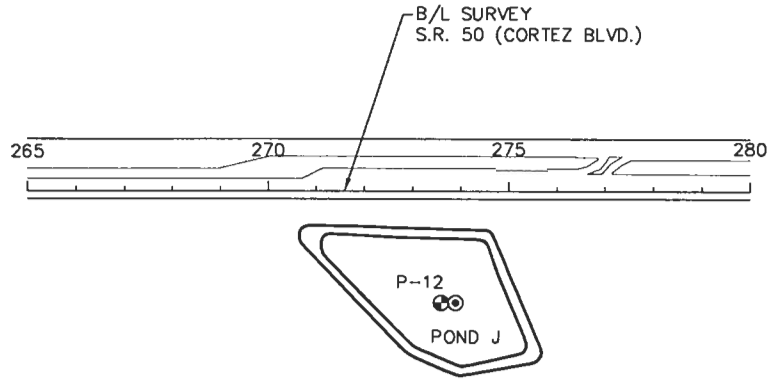


BORING LOCATION PLAN

0 200'
PLAN SCALE



BORING LOCATION PLAN

0 200'
PLAN SCALE

LEGEND

1. LIGHT GRAY/LIGHT BROWN/ BROWN/GRAY FINE SAND (A-3)
2. DARK GRAY SILTY FINE SAND (A-2-4)
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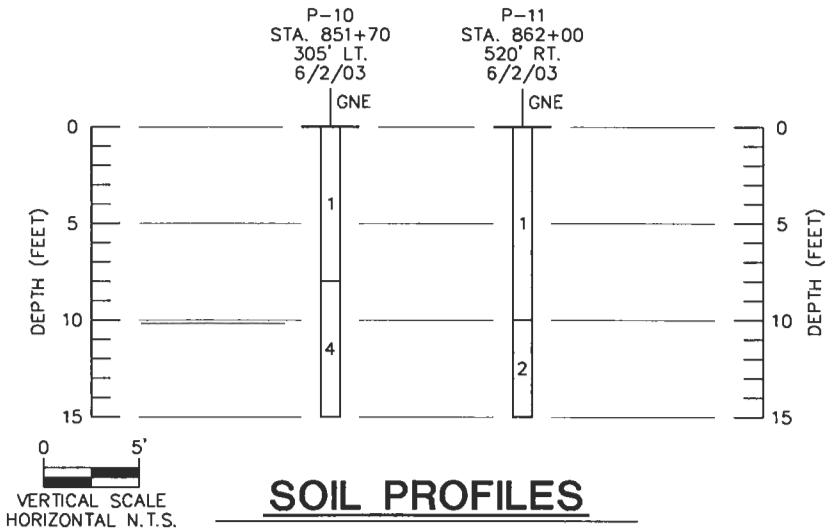
A-3 AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW

GROUNDWATER LEVEL, DATE OBSERVED

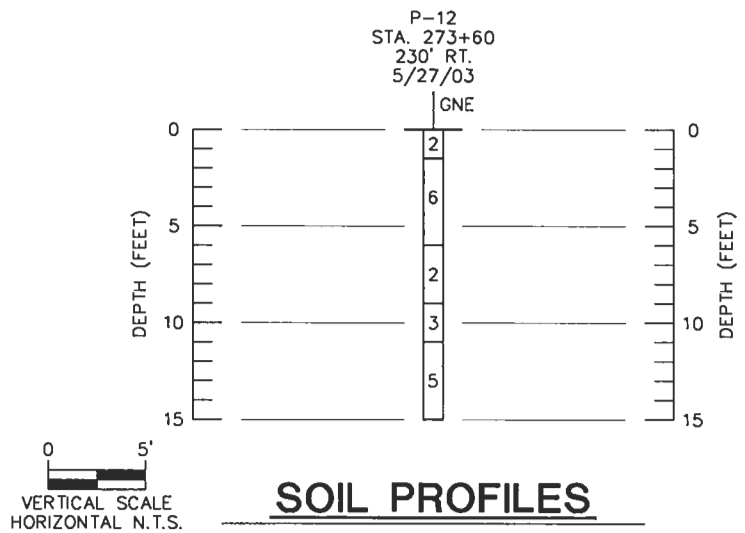
GNE GROUNDWATER LEVEL NOT ENCOUNTERED

APPROXIMATE POWER AUGER BORING LOCATION

APPROXIMATE PERMEABILITY TEST LOCATION



SOIL PROFILES



SOIL PROFILES

PONDS I NORTH, I SOUTH & J

REVISIONS					
Date	By	Description	Date	By	Description

PROFESSIONAL SERVICE INDUSTRIES, INC.
5801 BENJAMIN CENTER DR., SUITE 112
TAMPA, FL. 33634
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FLORIDA ENGINEERING CERTIFICATE OF AUTHORIZATION No. 3684

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT NO.
S.R. 50	HERNANDO	407951-1-22-01

ROADWAY SOILS SURVEY

S.R. 50 FROM U.S. 19 (S.R. 55) TO THE EAST S.R. 50/S.R. 50A INTERSECTION

SHEET NO.

PSI PROJECT No. 775-25273
SHEET 13

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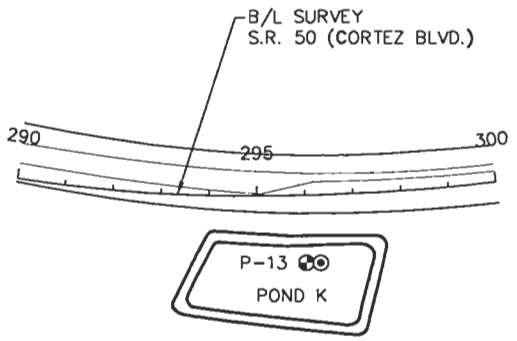
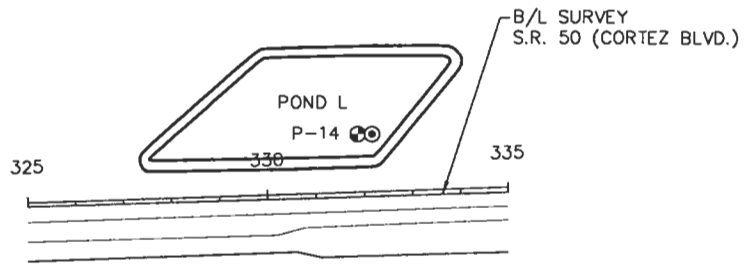


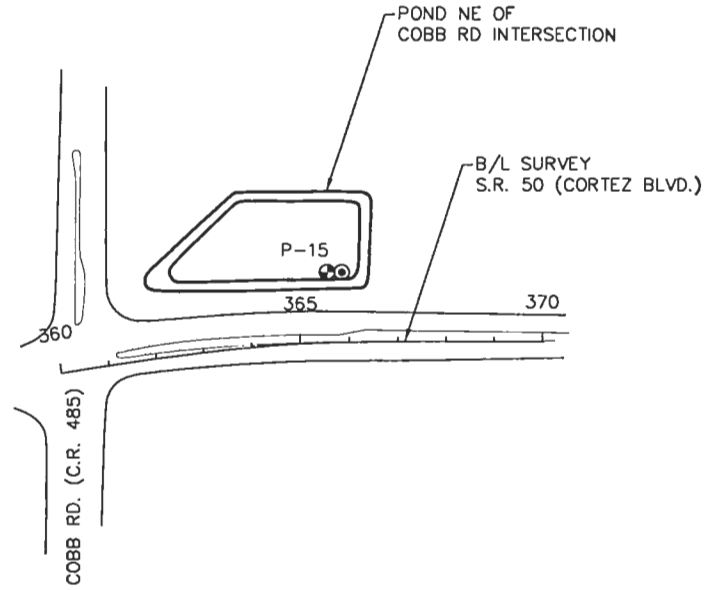
BORING LOCATION PLAN

0 200'
PLAN SCALE



BORING LOCATION PLAN

0 200'
PLAN SCALE



BORING LOCATION PLAN

0 200'
PLAN SCALE

LEGEND

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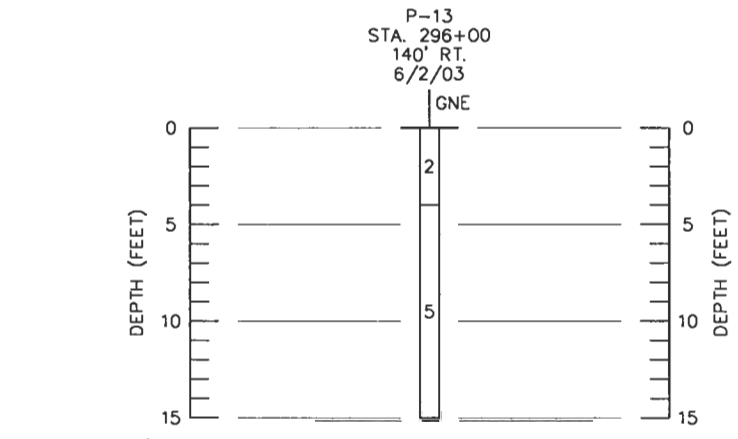
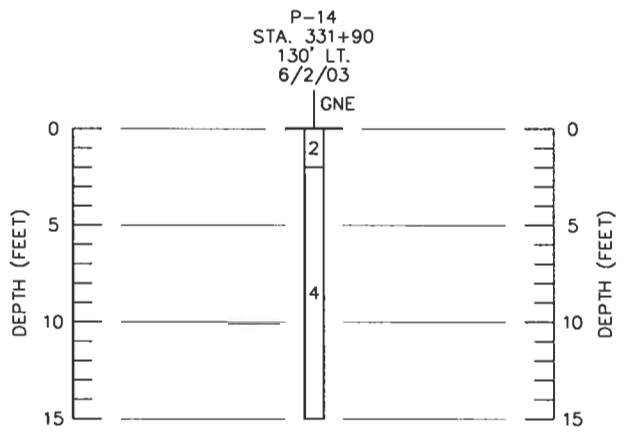


0 5'
VERTICAL SCALE
HORIZONTAL N.T.S.

SOIL PROFILES



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VERTICAL SCALE
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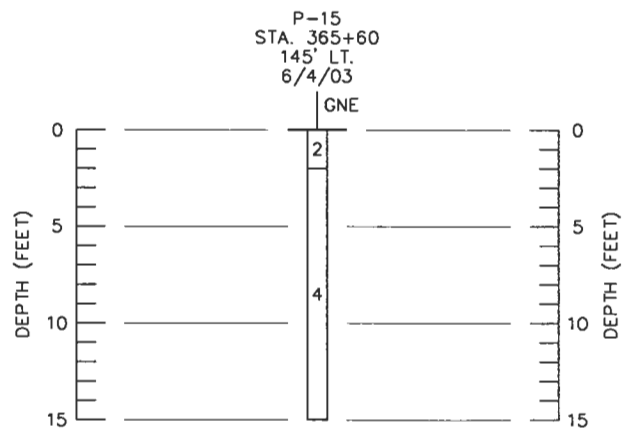

0 5'
VERTICAL SCALE
HORIZONTAL N.T.S.

SOIL PROFILES

PONDS K, L & NE OF COBB RD INTERSECTION

REVISIONS

Date	By	Description	Date	By	Description

PROFESSIONAL SERVICE INDUSTRIES, INC.
5801 BENJAMIN CENTER DR., SUITE 112
TAMPA, FL. 33634
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT NO.
S.R. 50	HERNANDO	407951-1-22-01

ROADWAY SOILS SURVEY

S.R. 50 FROM U.S. 19 (S.R. 55) TO THE EAST S.R. 50/S.R. 50A INTERSECTION

SHEET NO.

PSI PROJECT No. 775-25273
SHEET 14

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
MATERIAL AND RESEARCH

DATE OF SURVEY: MAY TO JUNE 2003
SURVEY MADE BY: PSI
SUBMITTED BY: KIRK M. EASTMAN, P.E.

DISTRICT: VII
ROAD No.: S.R. 50
COUNTY: HERNANDO

PROJECT No. 407951-1-22-01

CROSS SECTION SOIL SURVEY FOR THE DESIGN OF ROADS

SURVEY BEGINS STA. SURVEY ENDS STA.

		ORGANIC CONTENT		MOISTURE CONTENT		SIEVE ANALYSIS RESULTS % PASS						ATTERBERG LIMITS (%)					CORROSION TEST RESULTS				
STRATUM NO.	LBR VALUE (%)	No. OF TESTS	% ORGANIC	No. OF TESTS	MOISTURE CONTENT	No. OF TESTS	10 MESH	40 MESH	60 MESH	100 MESH	200 MESH	NO. OF TESTS	LIQUID LIMIT	PLASTIC INDEX	AASHTO GROUP	DESCRIPTION	NO. OF TESTS	RESISTIVITY OHM-CM	CHLORIDES PPM	SULFATE PPM	pH
1	-----	--	-----	2	2-13	11 (2 -200)	100	95-100	73-98	34-30	2-10	-	-	-	A-3	LIGHT GRAY/LIGHT BROWN/ BROWN/GRAY FINE SAND	5	28,000-130,000	15-30	< 2.4	6.5-7.1
2	-----	--	-----	2	12-22	4 (2 -200)	100	99-100	91-94	69-75	16-26	1	20	6	A-2-4	DARK GRAY SILTY FINE SAND	1	18,000	30	< 2.4	7.2
3	-----	--	-----	2	16-20	2	100	99-100	95-98	79-83	27-28	2	29-31	13-14	A-2-6	LIGHT GRAY CLAYEY FINE SAND	--	-----	-----	-----	-----
4	-----	--	-----	3	16-19	3	100	100	94-98	74-83	38-49	2	34-38	17-20	A-6	BROWN CLAYEY SAND TO SANDY CLAY	--	-----	-----	-----	-----
5	-----	--	-----	2	19-38	2	99-100	98-99	93-95	76-85	43-66	1	77	43	A-7-5/ A-7-6	BROWN/GRAY CLAYEY SAND TO CLAY	--	-----	-----	-----	-----
6	-----	--	-----	1	12	1	100	100	95	77	37	1	23	8	A-4	BROWN SILTY SAND TO SANDY SILT	--	-----	-----	-----	-----

EMBANKMENT AND SUBGRADE MATERIAL

STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY.

GROUNDWATER TABLE ENCOUNTERED

GNE GROUNDWATER TABLE NOT ENCOUNTERED

NOTES:

1. THE MATERIAL FROM STRATUM NUMBER 1 (A-3) APPEARS SATISFACTORY FOR USE IN THE EMBANKMENT WHEN UTILIZED IN ACCORDANCE WITH INDEX 505.
2. THE MATERIAL FROM STRATUM NUMBER 2 APPEARS SATISFACTORY FOR USE IN THE EMBANKMENT WHEN UTILIZED IN ACCORDANCE WITH INDEX 505. HOWEVER, THIS MATERIAL IS LIKELY TO RETAIN EXCESS MOISTURE AND BE DIFFICULT TO DRY AND COMPACT. IT SHOULD BE USED IN THE EMBANKMENT ABOVE THE WATER LEVEL EXISTING AT THE TIME OF CONSTRUCTION.
3. THE MATERIAL FROM STRATA NUMBERS 3, 4 AND 6 IS PLASTIC A-2-6, A-6 AND A-4 MATERIAL AND SHALL BE REMOVED IN ACCORDANCE WITH INDEX 500. IT MAY BE PLACED ABOVE THE EXISTING WATER LEVEL (AT THE TIME OF CONSTRUCTION) TO WITHIN 4 FEET OF THE PROPOSED BASE. IT SHOULD BE PLACED UNIFORMLY IN THE LOWER PORTION OF THE EMBANKMENT FOR SOME DISTANCE ALONG THE PROJECT RATHER THAN FULL DEPTH FOR SHORTER DISTANCES.
4. THE MATERIAL FROM STRATUM NUMBER 5 IS HIGHLY PLASTIC A-7-6 MATERIAL AND SHALLBE REMOVED IN ACCORDANCE WITH INDEX 500. IT MAY BE USED WITHIN THE PROJECT LIMITS AS INDICATED IN INDEX 505 ONLY WHEN EXCAVATED WITHIN THE PROJECT LIMITS AND IS NOT TO BE USED WHEN OBTAINED FROM OUTSIDE THE PROJECT LIMITS.

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REVISIONS

Date	By	Description	Date	By	Description

PROFESSIONAL SERVICE INDUSTRIES, INC.
5801 BENJAMIN CENTER DR., SUITE 112
TAMPA, FL. 33634
(813)-886-1075
FLORIDA ENGINEERING CERTIFICATE OF AUTHORIZATION No. 3684

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT NO.
S.R. 50	HERNANDO	407951-1-22-01

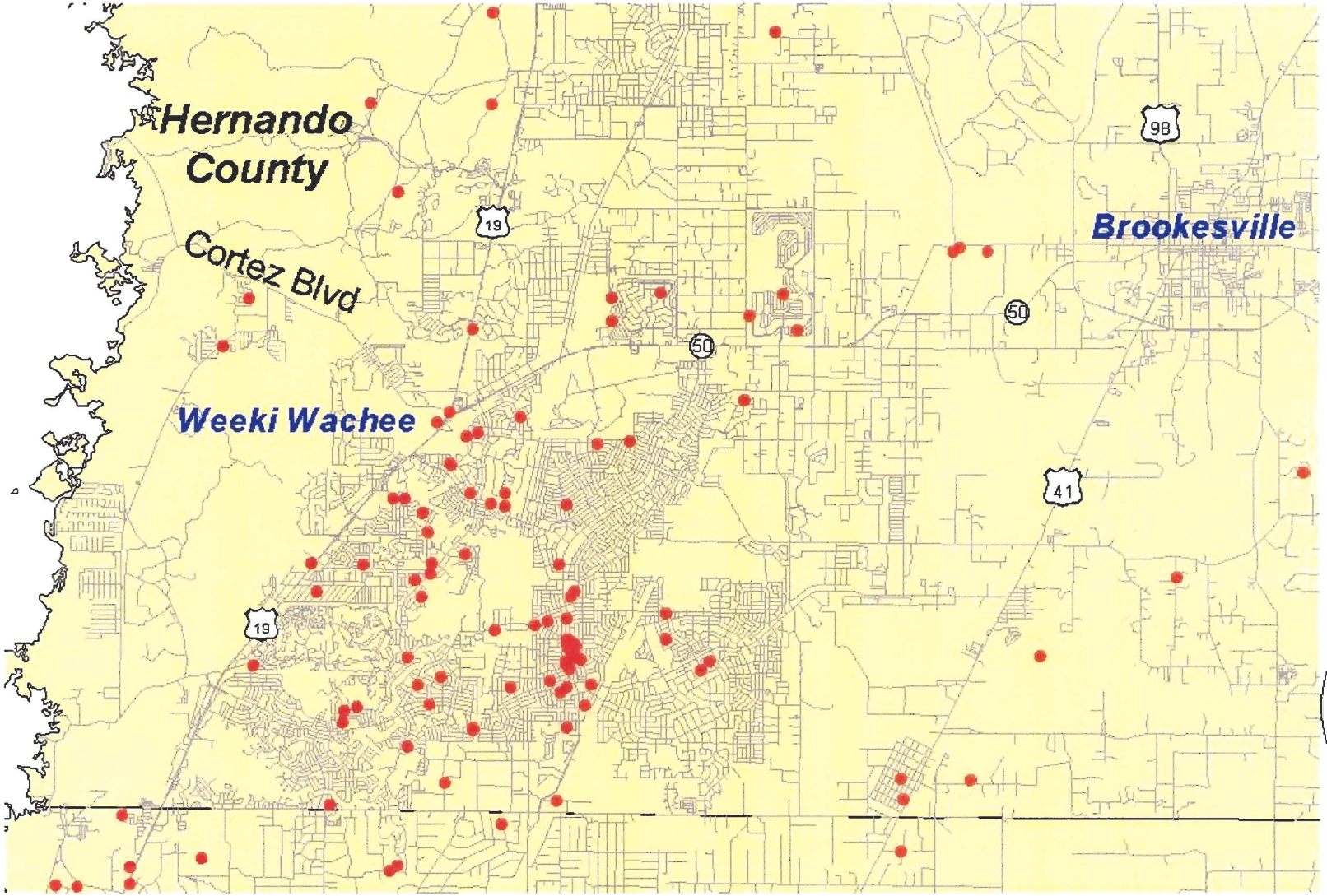
ROADWAY SOILS SURVEY

S.R. 50 FROM U.S. 19 (S.R. 55) TO THE EAST S.R. 50/S.R. 50A INTERSECTION

SHEET NO.

Appendix C

Known New Sinkholes between Weeki Wachee and Brookesville



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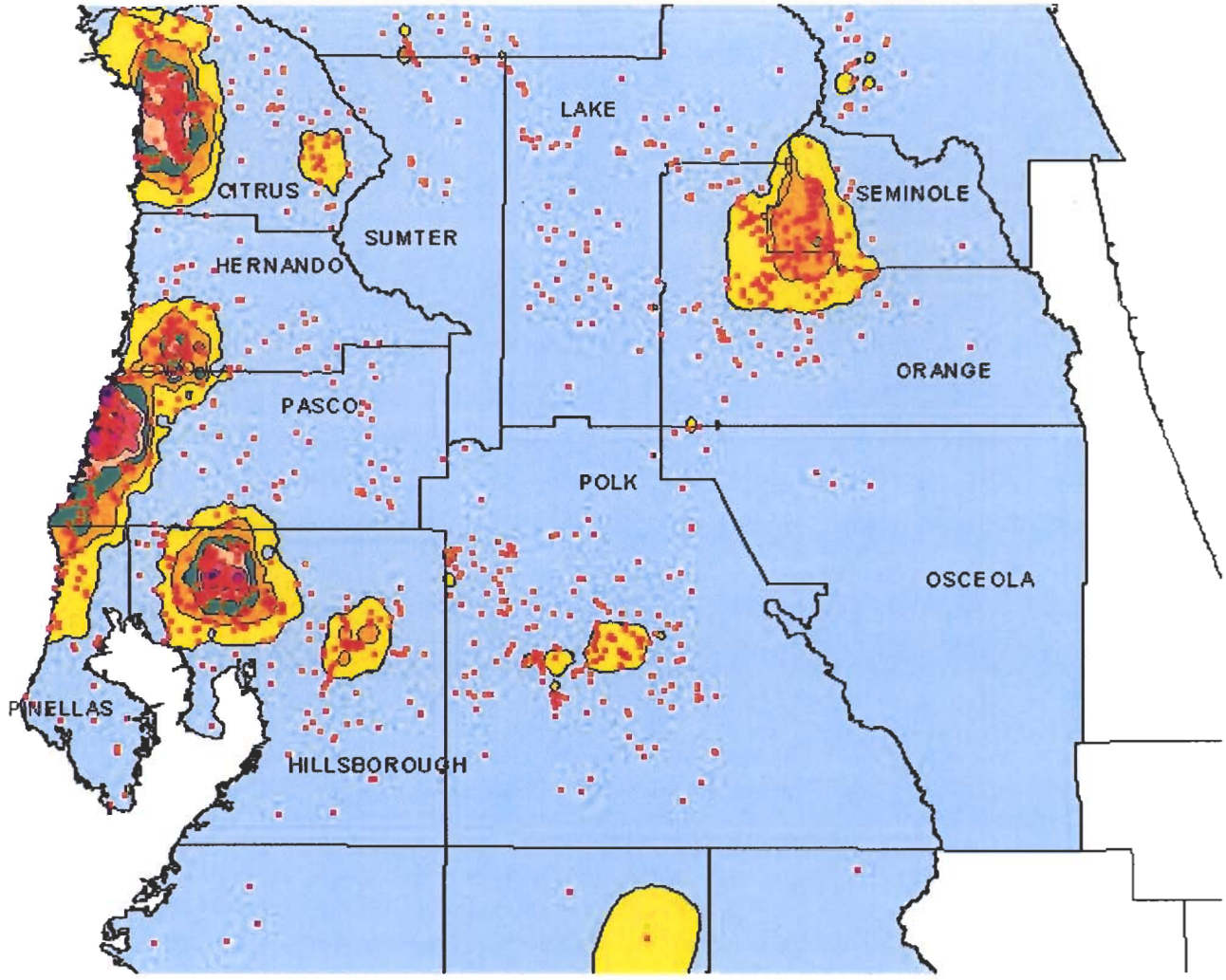
Engineering Geology & Geophysics

kmm 7/03

REPORTED NEW SINKHOLE FREQUENCY
in Central and West-Central Florida



N
W E
S

10 0 10 20 Miles

● Reported sinkhole location

Rate of Occurrence of new sinkholes per square mile per year

	0.00-0.01
	0.01-0.02
	0.02-0.03
	0.03-0.04
	0.04-0.05
	0.05-0.06
	0.06-0.07
	0.07-0.08
	0.08-0.09
	0.09-0.10

*Map depicts the maximum reported new sinkhole frequency and approximately 95% of the reported new sinkhole locations

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