

S.R. 33 PD&E STUDY

From Old Combee Road to North of Tomkow Road

Polk County, Florida
Financial Project Number: 430185-1-22-01

CONCEPTUAL Pond Siting Report

Prepared For:



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Professional Engineer Certificate

I hereby certify that I am a registered professional engineer in the State of Florida practicing with Inwood Consulting Engineers, Inc., a corporation authorized to operate as an engineering business, FEID No. 59-3216593, by the State of Florida, Department of Professional Regulation, and Board of Professional Engineers. I have reviewed or approved the evaluation, findings, opinions and conclusions as reported in this Draft Pond Siting Report.

The Conceptual Pond Siting Report includes a summary of data collection efforts and design analysis for the pond sites, and other possible secondary drainage system alternatives for the S.R. 33 PD&E Study. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of civil engineering as applied through design standards and criteria set forth by the federal, state, and local regulatory agencies as well as professional judgment and experience.

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EXECUTIVE SUMMARY

The SR 33 Project Development and Environment (PD&E) Study is being conducted by the Florida Department of Transportation (FDOT) to evaluate roadway and interchange improvement alternatives. The project limits of the SR 33 PD&E Study are from Old Combee Road to north of Tomkow Road in Polk County, a distance of approximately 4.33 miles. The existing roadway is generally a two-lane rural roadway that is a designated Emergency Evacuation Route.

SR 33 is currently classified by FDOT as an urban minor arterial through the study limits. Although a preferred roadway typical section and interchange alternative have not been determined yet, a four-lane divided roadway with four through lanes under I-4 is proposed. The existing SR 33 road right-of-way is 200 feet in width which should accommodate the proposed widening of SR 33. Improvements to the I-4 interchange will consist of ultimate interchange improvements that will involve replacing the I-4 bridges over SR 33. The proposed roadway typical section used for the purposes of this report consists of the pavement savings roadway typical section; a four-lane divided roadway with a raised median, a 10-foot shared-use path, a 5-foot sidewalk, and roadside ditches for stormwater conveyance.

Existing Drainage Conditions

The project is located entirely within the Withlacoochee River sub-basin of the Orange Hammock River Watershed as defined by the Southwest Florida Water Management District (SWFWMD). Although the project lies entirely within the Withlacoochee River sub-basin, SR 33 currently outfalls to three different sub-basins within the project limits: Lake Deeson, Withlacoochee River, and Saddle Creek. Lake Deeson is a closed basin located north of SR 33 near Old Combee road. The general flow pattern within the Withlacoochee River basin is north towards the Withlacoochee River. Saddle Creek is located south of SR 33 and the general flow pattern for this basin is south towards Peace River. Each outfall sub-basin has its own Waterbody ID (WBID), which are summarized below. It should be noted that Lake Deeson and Saddle Creek are verified as Impaired based on the current FDEP 303(d) list.

- WBID 1449A – Lake Deeson – Per the current 303(d) list, this WBID is listed as impaired for Nutrients. With the Group 4 assessment, it was assessed for Dissolved Oxygen as not impaired.
- WBID 1449 – Orange Hammock – Per the current 303(d) list, this WBID is not listed as Impaired for Nutrients or Dissolved Oxygen. With the Group 3, Cycle 2 assessment, it was assessed for Dissolved Oxygen and Nutrients (Chlorophyll-a) as having insufficient data, although Chl-a indicate this waterbody is not impaired.
- WBID 1497 – Saddle Creek – Per the current 303(d) list, this WBID is listed as Impaired for Nutrients and Dissolved Oxygen within the Group 3 assessment.

There are eight (8) existing cross drains and two (2) existing bridge culverts within the project limits allowing for conveyance of offsite and onsite runoff. Thirteen (13) existing roadway

drainage basins have been identified within the project limits. At the beginning of the project, the stormwater runoff in Basin E (Permitted Basin) is collected in a dry linear treatment swale that treats and contains the runoff for the 100yr/24hr storm event (closed system). The stormwater runoff in Basin 1A is collected in roadside ditches and discharges towards CD-1 with no outfall. The stormwater runoff in Basins 1B, 5, and 6 is collected in roadside ditches discharging into wetland systems north of SR 33 that flow toward the Withlacoochee River. The stormwater runoff for Basins 2 through 4 is collected in roadside ditches and discharges south into wetland systems and existing ponds south of SR 33 that flow toward Saddle Creek. Some degree of water quality treatment is currently provided by the existing grass ditches. A portion of the onsite runoff sheet flows directly to adjacent wetland systems.

Future Drainage Conditions

The proposed stormwater management alternatives consist of offsite ponds, joint use ponds, and linear dry retention systems that will treat and attenuate the stormwater runoff from the widening project. The design of the stormwater management facilities for the project is governed by the rules and criteria set forth by SWFWMD and FDOT. According to SWFWMD, the post development peak rate for open basins must not exceed the pre-development peak rate of discharge from the site for the 25-year/24-hour design storm event. For water quality treatment of the stormwater runoff, 1" of runoff from the directly connected impervious area (DCIA) will be used for wet detention. For dry retention, 0.5" of runoff from the DCIA for water quality. The SWFWMD treatment criterion is per the ERP, Part B, Basis of Review, Section 5.8 "Alterations to Existing Public Roadway Projects."

The project has been divided into a total of eight (8) roadway drainage basins, one (1) existing/permitted basin and seven (7) proposed basins, within the project limits. One (1) offsite pond alternative for basins 1 through 4 and 6 has been analyzed to determine the location of stormwater treatment sites. The ponds were sized to accommodate the onsite and offsite runoff within the stormwater management facility. It should be noted that for Basin 2, it is proposed to use the existing pond south of SR 33 as a joint use facility as an additional alternative to accommodate the onsite and offsite runoff.

In addition to the offsite pond alternative, dry linear treatment for each basin was analyzed to determine the feasibility of using dry linear retention swales along the roadway within the existing FDOT right of way. The linear ponds were sized to accommodate the onsite and offsite runoff and were analyzed for recovery in order to meet the SWFWMD criteria; total treatment volume to recover within 72 hours. Please note that for this pond alternative, only the pavement savings roadway typical section option was considered.

Floodplain impacts have been quantified for the SR 33 alignment and the I-4/SR 33 interchange improvements and are included in the **SR 33 Location Hydraulic Report**.

The following parameters were considered in the selection of potential offsite pond sites:

- Hydrologic and hydraulic factors such as existing ground elevation, soil types, estimated seasonal high water table (SHWT), stormwater conveyance feasibility, allowable hydraulic grade line (HGL);

- Environmental resource impacts including wetlands and threatened or endangered species;
- Floodplain impacts;
- Major utility conflict potential;
- Estimated right-of-way acquisition;
- Impacts to cultural resources; and
- Hazardous Materials Contamination

Summary

Potential offsite pond sites, joint use pond, and dry linear retention swales have been identified and analyzed along the project limits. The analysis estimates right-of-way needs using a volumetric analysis, which accounts for water quality treatment and water quantity for runoff attenuation. Please note that the recommendations were based on pond sizes and locations determined from preliminary data calculations, reasonable engineering judgment, and assumptions. Pond sizes and configurations may change during final design as more detailed information on SHWT, wetland hydrologic information, and final roadway profile become available. Please refer to **Table 1** for a summary of the stormwater pond alternatives.

Table 1 – Summary of Stormwater Pond Alternatives

Basin	Pond Alternative	Offsite Pond Right-of-Way Area (ac) (Including Access Easement)
**E	Linear Swale	N/A
1	Pond 1	1.89
	Linear Swale	N/A
2	Pond 2	3.02
	Joint Use	N/A
	Linear Swale	N/A
3	Pond 3	2.1
	Linear Swale	N/A
4	Pond 4	1.06
	Linear Swale	N/A
5	Ponds 5A, 5B, 5C	*N/A
6	Pond 6	1.39
	Linear Swale	N/A
**7	Linear Swale	N/A
Total		9.46
*Pond area consists of combined infield pond areas within the proposed I-4/SR 33 Interchange. **There are no proposed offsite ponds for these basins. It is proposed to use only dry linear treatment. Highlighted ponds are recommended.		

SECTION 1 INTRODUCTION

The SR 33 Project Development and Environment (PD&E) Study is being conducted by the Florida Department of Transportation (FDOT) to evaluate roadway and interchange improvement alternatives. The project limits of the SR 33 PD&E Study are from Old Combee Road to north of Tomkow Road in Polk County, a distance of approximately 4.33 miles. The existing roadway is generally a two-lane rural roadway that is a designated Emergency Evacuation Route.

SR 33 is currently classified by FDOT as an urban minor arterial through the study limits. Although a preferred roadway typical section and bridge alternative have not been determined yet, a four-lane divided roadway with four through lanes under I-4 is proposed. The existing SR 33 road right-of-way is 200 feet in width which should accommodate the proposed widening of SR 33. Improvements to the I-4 interchange will consist of ultimate interchange improvements that will involve replacing the I-4 bridges over SR 33. The limits of the project are shown on the [Project Location Map](#) as shown in [Figure 1, Appendix 1](#).

The project is located entirely within the Withlacoochee River sub-basin of the Orange Hammock River Watershed as defined by SWFWMD. The project site is within Sections 10, 11, 15, 21, 22, 28, and 29 of Township 27 South, Range 24 East. Please refer to [Appendix 5](#) for the [SWFWMD Basin Map](#). A reproduction of the [United States Geological Survey \(USGS\) Quadrangle Maps](#) for the project vicinity is shown in [Figure 2](#).

The purpose of this Pond Siting Report is to discuss, analyze, and identify the stormwater management plan for the proposed roadway alignment based on environmental, hydrology and hydraulics, and economic factors. Stormwater management for water quality treatment and runoff attenuation will be provided using both wet detention and dry retention stormwater management facilities. The design of the drainage and stormwater facilities will comply with the standards set forth by the FDOT Drainage Manual and the SWFWMD Environmental Resource Permit (ERP) manual. The pond siting analysis for the alternative pond sites is found in [Section 6](#) of this report. All figures for this report are included in [Appendix 1](#). For the ease of review, [Drainage Criteria Matrix](#), [Pond Design Calculations](#), and [Pond Sites Evaluation Matrix](#) are included in [Appendices 2, 3, and 4](#). Other supporting information and data is included in the remaining appendices. Please note that the datum used for this project is NAVD 88, unless otherwise specified.

SECTION 2 PROJECT DESCRIPTION

The existing roadway typical section for SR 33 within the project limits is a two-lane rural roadway constructed within a right-of-way that is 200 feet in width. It includes two twelve-foot lanes with five-foot paved shoulders along both sides of the road. Stormwater runoff is collected in roadside swales and drains towards different outfalls consisting of adjacent wetlands, an existing pond, and an existing canal. The posted speed limit along SR 33 ranges from 45 mph near the Old Combee Road intersection and increases to 50 and then 60 mph

west of SR 659 heading northward. The existing roadway typical section is provided in **Figure 7, Appendix 1**.

The proposed roadway typical section used for the purposes of this report consist of the pavement savings roadway typical section; a four-lane divided roadway with a raised median, a 10-foot shared-use path, a 5-foot sidewalk, and roadside ditches for stormwater conveyance. Please refer to **Figure 8, Appendix 1** for the proposed roadway typical section.

SECTION 3 DESIGN CRITERIA

The design of the stormwater management facilities for the project is governed by the rules set forth by the SWFWMD and FDOT. Please refer to **Appendix 2** for the **Drainage Criteria Matrix** compiled from both SWFWMD and FDOT criterion and used for this project.

Wet detention and dry retention ponds will provide for water quality improvements as well as water quantity attenuation for the project runoff. The stormwater ponds are designed and sized for the most conservative four-lane roadway configuration for each segment. Please refer to the summary below for the water quality, water quantity, and detention pond facilities configuration criterion used for the project:

- **Water Quality** – Treatment will be provided for one inch (1”) over the DCIA for wet detention ponds. For dry retention, treatment will be provided for one half inch (0.5”) over the DCIA. Although the project lies entirely within the Withlacoochee River sub-basin, SR 33 currently outfalls to three different sub-basins and WBIDs within the project limits: Lake Deeson (WBID 1449A), Withlacoochee River (WBID 1449), and Saddle Creek (WBID 1497). Lake Deeson and Saddle Creek are verified as impaired for Nutrients on the current FDEP 303(d) list. Therefore, a pre versus post pollutant loading analysis will be required for those basins that outfall to these WBIDs. The analysis will comply with the guidelines set forth by FDOT’s Memorandum, “Nutrient Loading Calculations for FDOT Projects” dated July 7, 2011 and FDEP’s March 2010 draft Stormwater Quality Applicant’s Handbook (SQAH), or any subsequent updates or revisions. Please refer to **Appendix 11** for the **SR 33 WBID Map**.
- **Water Quantity** – The SWFWMD requires that the post development peak discharge for open basins shall be at or below pre-development peak discharge for the 25-year/24-hour storm event. For closed basins, the 100-year/24-hour storm event is used.
- **Dry Retention Recovery** – For dry retention, SWFWMD requires that the total treatment volume recover within 72 hours.
- **Detention Pond Facilities Configuration** – The pond will include a 20-foot minimum maintenance berm width, minimum 1:4 (Vertical:Horizontal) for pond side slopes and tie up/down slopes to existing ground, and a minimum 1-foot freeboard from the inside maintenance berm to the Design High Water (DHW) stage. It should also include a minimum 35 percent littoral zone concentrated at the outfall, for biological assimilation of pollutants. The percentage of littoral zone is based on the ratio of

vegetated littoral zone to the surface area of the pond at the control elevation. The littoral zone shall be no deeper than 3.5 feet below the design overflow elevation.

SECTION 4 DATA COLLECTION

The design team collected and reviewed data from the following sources:

- FDOT Drainage Manual, July 2013
- FDOT Drainage Handbook – Hydrology, July 2013
- SR 33 Plans – Final As-Built Plans, FPID 197152-5-52-01, M.P. 5.098 to M.P. 8.598, 2003
- SR 400 (I-4) Plans – Final Plans, FPID 201209-2-52-01, 2003
- SWFWMD Environmental Resource Permit Basis of Review, Part B, 2010
- Federal Emergency Management Agency (FEMA), Panel Nos. 12105C0310F and 12105C0175F, Polk County, Florida dated December 20, 2000
- U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey of Polk County, Florida, 1990
- USDA NRCS Soil Survey Geographic (SSURGO) Database from SWFWMD, 2010
- United States Geological Survey (USGS) Quadrangle Maps
- 1-foot contours from Southwest Florida Water Management District LiDAR, 2007
- Polk County Property Appraiser’s Website (GIS parcel lines), 2012
- FDOT Straight Line Diagrams (SLD’s) of Road Inventory for SR 33
- Field Reconnaissance (January 2013)
- National Wetland Inventory (NWI) from U.S. Fish and Wildlife Service (USFWS), 2008 (GIS data)
- Interviews with FDOT Maintenance Staff
- SWFWMD Environmental Resource Permits: No. 2832 (SR 33 from I-4 to Old Combee Road), No. 7112 (East West Road), No. 21375 (Firstpark at Bridgewater), No. 40908 (Tomkow Road)
- Cultural Resource Assessment Survey (CRAS) End of Fieldwork Memo by Southeastern Archaeological Research Inc. (SEARCH), July 2013
- Pond Siting Report Wetland Assessment Memo by Inwood Consulting Engineers, Inc., 7/25/2013
- Protected Species Assessment by Scheda Ecological Services, Inc. , July 2013
- Geotechnical Memorandum by Tierra, Inc., July 2013
- PSR CSER “Memo” Report by Tierra, Inc., July 2013

SECTION 5 EXISTING DRAINAGE CONDITIONS

5.1 Topography & Hydrologic Features

The topography of the project area is relatively flat with elevations ranging from a high of 160 feet to a low of 135 feet NAVD 88. Please refer to [USGS Quadrangle Map, Figure 2](#) in [Appendix 1](#). There are eight (8) existing cross drains and two (2) bridge culverts within the project limits allowing for conveyance of offsite and onsite runoff. The size and geometry of all cross drains and bridges have been verified from the FDOT SLD's, 1-foot LiDAR contours, SR 33 plans, as well as during field reconnaissance. Please refer to [Table 2](#) for a summary of existing cross drains and bridge culverts and [Appendix 2](#) for pictures and review checklists.

Table 2 – Summary of Existing Cross Drains and Bridge Culverts

Structure Number	FDOT Milepost	Description
CD-1	5.309	Single 30" RCP
CD-2	5.694	Single 30" RCP
CD-3 (Bridge No. 160142)	6.693	Double 10'x3' Bridge Culvert
CD-4	6.996	Single 36" RCP
CD-5	7.416	Single 6'x2' Concrete Box Culvert
CD-6 (Bridge No. 160143)	8.123	Double 10'x3' Bridge Culvert
CD-7	8.275	Double 48" RCP
CD-8	8.284	Single 15" RCP
CD-9	8.656	Single 4'x2' Concrete Box Culvert
CD-10	9.036	Single 4'x2' Concrete Box Culvert

5.2 Existing Permits

There are four existing SWFWMD permits within the project limits. The permit letters and applicable information can be found in [Appendix 12](#). The type of information extracted from the existing permits includes seasonal high water data, control elevations, drainage areas, and permitted systems. Please see below for a description of each existing permit and the information that applies to the project.

5.2.1 Permit No. 2832 (SR 33 from I-4 to Old Combee Road)

The existing permit for the SR 33 four-lane widening from I-4 to Old Combee Road includes open and closed basins where linear dry retention swales were used for treatment and attenuation. Due to the overlap of the project limits, the permit will need to be modified with the final design of SR 33 due to the additional impervious areas to Basin E (closed basin). Please refer to [Section 6.3.1](#) of the PSR report for the summary and analysis of the modified basin.

5.2.2 Permit No. 21375 (Firstpark at Bridgewater)

This permit was issued for the surface water management system that would serve the multi-land use development including industrial, commercial, and residential that is located along both sides of SR 33 from Huron Way to I-4. In general, the treatment and attenuation of stormwater runoff was accomplished via sixteen detention ponds and one retention pond. Based on the permitted calculations for Basin 1800, 0.30 acre-feet of SR 33 is currently being treated in Pond 1800. The permit may need to be modified with the final design of SR 33 widening to include additional impervious area for SR 33 and North Combee Road (CR 659) intersection and additional lanes.

5.2.3 Permit No. 7112 (East West Road)

The permit for East West Road (University Boulevard) was originally issued in November 2009 and was modified by VHB MillerSellen, Inc. in July 2010 due to the revised alignment and typical section of the proposed roadway and changes to the wetland impacts in the permitted alignment. University Boulevard intersects SR 33 just south of the SR 33 and I-4 Interchange. The permit includes turn lane improvements within the SR 33 roadway. Water quality treatment for the SR 33 improvements and portions of University Boulevard is currently provided within the SR 33 treatment swales. Due to the roadway improvements to SR 33 and Universal Boulevard intersection, the existing treatment swales are expected to be impacted; however, treatment and attenuation for the roadway improvements would be provided within the proposed SR 33 stormwater management systems.

5.2.4 Permit No. 40908 (Tomkow Road Driveway)

The permit for the Tomkow Road Driveway was issued in August 2012 and includes a 780-foot long proposed driveway from Tomkow Road as part of a cost to cure from the right-of-way taking in Polk County. The proposed driveway consists of two 12-foot travel lanes, 6-foot unpaved outside shoulders, and roadside swales for treatment and attenuation within an existing 60 foot right-of-way. The project is located northwest of the intersection of SR 33 and Tomkow Road and it is not expected to be impacted by the SR 33 roadway improvements.

5.3 Soils Data and Geotechnical Investigations

The Soil Survey of Polk County, Florida, published by the USDA NRCS (dated 1984) has been reviewed for the project vicinity. USDA SSURGO was also obtained from SWFWMD to create soils map in the project area using GIS ArcMap. SSURGO data was compared to Soil Survey by USDA NRCS and found no deviation. The soil survey map for the project vicinity is illustrated in **Figure 3** of **Appendix 1**.

The soils encountered along the project limits consists of Hydrological Soil Group (HSG) A, B, B/D, C, and D soils. Type A soils have a high infiltration rate with a low water table. Type B soils have a moderate infiltration rate with a low water table. Type C soils are considered to have a slow infiltration rate with a moderate water table level. Type B/D and D soils are very poorly drained or poorly drained soils with high water tables. According to the Soil Survey, there are thirteen (13) different soil types located along the project limits. **Table 3 – USDA**

NRCS Soil Survey Information summarizes and lists the soil types and relevant information. The ground water depth varies from >6' below - +2.0' above the existing ground throughout the project. According to the soil survey, there are some areas on SR 33 where the high water table is above the ground surface during certain months of the year.

A geotechnical evaluation study was performed by Tierra, Inc. along the proposed roadway improvements. A copy of the **Geotechnical Memorandum** is provided in **Appendix 10**, which includes on-site soil suitability and construction recommendations.

Table 3 – USDA NRCS Soil Survey Information

Soil No.	Polk County USDA Soil Name	Seasonal High Ground Water		HSG	Soil Classification		
		Depth* (feet)	Duration (months)		Depth (inches)	Unified	AASHTO
3	Candler sand, 0 to 5 percent slopes	>6.0	N/A	A	0-80	SP, SP-SM	A-3
6	Eaton mucky fine sand, depressional	+2-0	Jun-Oct	D	0-6 6-29 29-33 33-80	SP-SM SM, SP-SM SC SC, CL, CH	A-3, A-2-4 A-2-4, A-3 A-7, A-4, A-6 A-7
7	Pomona fine sand	0-1.0	June-Oct	B/D	0-6 6-21 21-26 26-48 48-73 73-80	SP, SP-SM SP, SP-SM SP-SM, SM SP, SP-SM, SM SC, SM-SC, SM N/A	A-3, A-2-4 A-3, A-2-4 A-3, A-2-4 A-3, A-2-4 A-2, A-4, A-6 N/A
9	Lynee sand	0-1.0	June-Oct	B/D	0-5 5-21 21-28 28-33 33-80	SP, SP-SM SP, SP-SM SP-SM, SM SP-SM SC, CH, CL	A-3 A-3 A-3, A-2-4 A-3, A-2-4 A-6, A-7
12	Neilhurst sand, 1 to 5 percent slopes	>6.0	N/A	A	0-80	SP, SP-SM	A-3, A-2-4
15	Tavares fine sand, 0 to 5 percent slopes	3.5-6.0	June-Dec	A	0-80	SP, SP-SM	A-3
17	Smyrna and Myakka fine sands	0-1.0	Jun-Oct	B/D	0-12 12-25 25-42 42-48 48-80	SP, SP-SM SM, SP-SM SP, SP-SM SM, SP-SM SP, SP-SM	A-3, A-2-4 A-3, A-2-4 A-3 A-3, A-2-4 A-3
22	Pomello fine sand	2.0-3.5	Jul-Nov	C	0-48 48-63 63-80	SP, SP-SM SP-SM, SM SP, SP-SM	A-3 A-3, A-2-4 A-3
29	St. Lucie fine sand, 0 to 5 percent sands	>6.0	N/A	A	0-80	SP	A-3
35	Hontoon muck	+2-0	Jan-Dec	B/D	0-75 75-80	PT N/A	A-8 N/A
51	Pomona-Urban land complex	0-1.0	Jun-Oct	B/D	0-6 6-21 21-26 26-48 48-73 73-80	SP, SP-SM SP, SP-SM SP-SM, SM SP, SP-SM SC, SM-SC, SM N/A	A-3, A-2-4 A-3, A-2-4 A-3, A-2-4 A-3, A-2-4 A-2, A-4, A-6 N/A
68	Arents, 0 to 5 percent slopes	4.0-6.0	Jun-Oct	B	Not Available	Not Available	Not Available

Soil No.	Polk County USDA Soil Name	Seasonal High Ground Water		HSG	Soil Classification		
		Depth* (feet)	Duration (months)		Depth (inches)	Unified	AASHTO
99	Water	N/A	N/A	N/A	N/A	N/A	N/A

*Seasonal High Groundwater Table: Depth is referenced below existing grade, except where indicated as "+".

5.4 Environmental Characteristics

5.4.1 Land Use Data

The project corridor is a mixture of residential, commercial, and industrial land uses interspersed with native wetland and upland habitat. Please refer to **Table 4** for a summary of the existing utilities located throughout the project corridor.

Table 4 – Summary of Existing Utilities

Utility Company	Facility	Description
Bright House Networks	Coax Cable and Fiber	Bright House maintains aerial cable and fiber on the City of Lakeland's pole line with buried service facilities throughout the project.
Verizon Florida	Communications	Verizon maintains buried communication facilities along the east side of SR 33 throughout the project.
City of Lakeland –Electric	Transmissions and Distribution Power	The City maintains transmission facilities along the west and east sides of SR 33 from Old Combee Road to just north of Spanish Oaks Boulevard where transmission continues along the east side of SR 33 to Tomkow Road. The City also has distribution facilities under built on the transmission poles located along the east side of SR 33 for the project limits.
City of Lakeland – Water/Sewer	Water/Sewer	The City maintains a 16-inch ductile iron water main along the east side of SR 33 from Old Combee Road to North Combee where it transitions to a 36-inch and travels along the west side of SR 33 to the I-4 Interchange. A 18-inch PVC force main enters the project just north of Spanish Oaks Boulevard and travels along the west side of SR 33 to approximately North Combee Road where it transitions to 12-inch and continues through the project limits.
City of Lakeland – Gas	Gas Main	The City of Lakeland has a 16-inch gas main that enters the project just north of Spanish Oaks Boulevard and continues along the west side of SR 33 to Tomkow Road.
Cox Cable	Coax Cable and Fiber	Cox Cable maintains aerial cable and fiber from Old Combee Road to Spanish Oaks Boulevard where it transitions to underground and terminates at Long Lake Circle. Cox cable also crosses SR 33 at the North Combee Road Intersection.

The widening of SR 33 from Old Combee Road to north of Tomkow Road does not alter the existing or future land uses in the area. Future land uses adjacent to the project limits will include urban community, suburban, public facilities, and rural lands. Please see **Figures 4 and 5** for **Existing and Future Land Use Maps** in **Appendix 1**.

5.4.2 Cultural Features

Cultural features preserve and enhance the cultural nature of a community and include parks, schools, churches and other religious institutions. Also included are historic sites, archaeologically significant sites and neighborhood gathering places. Community services include facilities that provide necessary services such as fire stations, police stations, public and private schools, hospitals, cemeteries, public buildings, and civic facilities. All of these resources represent commonly occurring types of architecture for the locale, and available data did not indicate any significant historical associations.

A total of 82 shovel tests were excavated within the project Area of Potential Effect (APE), including 12 within the proposed pond areas. Three of the proposed ponds in the vicinity of the I-4/SR 33 interchange were not subjected to archaeological survey due to their very low archaeological potential (e.g., existing pavement, subsurface disturbance, standing water). None of the shovel tests within the project APE yielded cultural material. Additionally, SEARCH architectural historians documented 50 resources within the APE. These included 32 previously recorded above-ground resources, sixteen newly recorded above-ground resources, one previously recorded resource group, and one newly recorded resource group; none will be recommended eligible for National Register inclusion in the forthcoming technical report. No NRHP-eligible or listed resources were identified within the SR 33 project APE, and no further work is recommended. Thus, the construction of the pond sites will have no effect on any significant cultural resources. Please refer to the **CRAS End of Field Memo** prepared by Southeastern Archaeological Research (SEARCH) located in **Appendix 6**.

5.4.3 Natural and Biological Features

Roadside swales exist along SR 33 to convey roadway and offsite runoff to the wetlands and cross drains. In addition, wetland systems, as well as isolated wetlands, are adjacent to the roadway. It is anticipated that the proposed roadway widening will result in minimal wetland impacts. Stormwater Treatment Pond alternative recommendations will be based on avoidance of wetland impacts whenever possible.

Based on the results of preliminary data collection and field reconnaissance, it has been determined that one of the SMF alternatives (Ponds 5A, 5B, and 5C) has the potential to result in adverse impacts to wetlands and other surface waters. These impacts will occur to the outer fringe of existing, roadside forested wetlands and other surface waters. A qualitative assessment of wetland/surface water impacts utilizing the Uniform Mitigation Assessment Methodology (UMAM) will be conducted as part of the ongoing PD&E Study. The UMAM analysis will provide estimates of the amount of mitigation that will be required to offset adverse impacts to wetlands and other surface waters resulting from the project. Please refer to the **Pond Siting Report Wetland Evaluation Memo** in **Appendix 7** for more information.

Several species have been observed within the project area or could potentially occur within the project area based on the literature and database review as stated in the **Protected Species Assessment** in **Appendix 8**. Based on the protected species data collection and field reviews, it was determined that pond sites 2 through 6 sites will have low impacts to protected species. Pond 1 was determined to have medium impacts; an indication of species where mitigation is reasonable and possible. At the Pond 1 site, two potentially occupied gopher tortoise burrows were observed; one within pond site 1 and one immediately west of the western boundary. Also, the state listed plant garberia (*Garberia heterophylla*) was located in the pond site.

No protected species were observed in pond sites 2 through 6. However, pond sites 2 and 3 could potentially support gopher tortoise, gopher frog, Florida mouse, burrowing owl, and crested caracara. Pond Site 5C has the potential to support the gopher tortoise, indigo snake, wood stork and state-listed wading birds. Pond site 6 has the potential to support the wood stork, and state-listed wading birds.

5.4.4 Contamination Screening

The information presented in the Contamination Screening Evaluation Report (CSER) is intended to provide a risk ranking of all proposed ponds to support the **Pond Siting Report**. The contamination screening evaluation presented is based on historical aerial photograph and topographic map reviews, governmental database reviews and site reconnaissance. Based on the information provided by the CSER, it has been determined that Ponds 1 and 6 were given a risk ranking of "No"; no additional work is recommended at this time. Ponds 2, 3, and 4 were given a risk ranking of "Medium"; Level II field screening is recommended to determine if environmental impacts exist at the preferred pond sites. Ponds 5A, 5B, and 5C were given a risk ranking of "Low"; no additional work is recommended at this time. Please refer to the **PSR CSER "Memo" Report** prepared by Tierra, Inc. located in **Appendix 9**.

5.4.5 Existing Drainage Conditions

The project is located entirely within the Withlacoochee River sub-basin of the Orange Hammock River Watershed as defined by the Southwest Florida Water Management District (SWFWMD). Although the project lies entirely within the Withlacoochee River sub-basin, SR 33 currently outfalls to three different sub-basins within the project limits: Lake Deeson, Withlacoochee River, and Saddle Creek. Lake Deeson is a closed basin located north of SR 33 near Old Combee road. The Withlacoochee River basin is also located north of SR 33 and the general flow pattern for the basin area drains north towards the Withlacoochee River. Saddle Creek is located south of SR 33 and the general flow pattern for the basin is south towards Peace River. Each outfall sub-basin has its own WBID, which are summarized below. It should be noted that Lake Deeson and Saddle Creek are verified as Impaired based on the current FDEP 303(d) list.

- WBID 1449A – Lake Deeson – Per the current 303(d) list, this WBID is listed as impaired for Nutrients. With the Group 4 assessment, it was assessed for Dissolved Oxygen as not impaired.

- WBID 1449 – Orange Hammock – Per the current 303(d) list, this WBID is not listed as Impaired for Nutrients or Dissolved Oxygen. With the Group 3, Cycle 2 assessment, it was assessed for Dissolved Oxygen and Nutrients (Chlorophyll-a) as having insufficient data, although Chl-a indicate this waterbody is not impaired.
- WBID 1497 – Saddle Creek – Per the current 303(d) list, this WBID is listed as Impaired for Nutrients and Dissolved Oxygen within the Group 3 assessment.

Thirteen (13) existing basins have been identified within the project limits. The limits of the basins are shown in **Table 5 - Summary of Existing Drainage Basins** and are also included on the **Basin Exhibits** in **Appendix 3**. Some degree of water quality treatment is currently provided by the existing grass ditches. A portion of the onsite runoff sheet flows directly to adjacent wetland systems. A brief description of the existing drainage basins is provided in the following sections.

Table 5 – Summary of Existing Drainage Basins

Basin Name	From Station	To Station	Outfall Location
E	265+50 (RT)	278+42 (RT)	Offsite Depression
1A	278+42 (RT) 281+00 (LT/RT)	292+65 (LT/RT)	Lake Deeson
1B	292+65 (LT/RT) 315+00 (LT)	315+00 (LT/RT) 320+00 (LT)	Wetland System north of SR 33 (Withlacoochee River)
2	315+00 (RT) 320+00 (LT/RT)	320+00 (RT) 394+55 (LT/RT)	CD-3 & CD-5 (Saddle Creek)
3A	394+55 (LT/RT) 407+15 (LT)	407+15 (LT/RT) 412+50 (LT)	CD-5 (Saddle Creek)
3B	407+15 (RT)	418+75 (RT)	CD-6 (Saddle Creek)
3C	412+50 (LT)	418+75 (LT)	Existing Canal via existing outfall control structure (Saddle Creek)
4A	418+75 (LT)	438+00 (LT)	CD-6 (Saddle Creek)
4B	418+75 (RT)	438+29 (RT)	Existing Canal via existing outfall control structure (Saddle Creek)
5	438+00 (LT) 438+29 (RT)	460+00	Withlacoochee River (Orange Hammock)
6A	460+00	471+10	Wetlands - Withlacoochee River (Orange Hammock)
6B	471+10	489+00	Wetlands - Withlacoochee River (Orange Hammock)
7	489+00	494+17	Wetlands - Withlacoochee River (Orange Hammock)

5.4.5.1 Basin E

Basin E begins at Old Combee Road (Station 265+50 RT) and continues east to Station 278+42 (RT). This closed basin is an existing permitted basin (SWFWMD Permit No. 2832) that will be impacted by the roadway widening and the addition of the 10-foot shared-use path. Roadway runoff flows to a linear treatment swale located south of SR 33 and is currently designed to retain the 100 yr-24 hr storm event. There is currently an outfall control structure with an overflow weir above the 100 yr-24 hr peak stage that outfalls to a depressional area to the south of SR 33. This existing basin is expected to be impacted from the proposed roadway widening project. Please refer to **Appendix 12** for more information regarding Permit No. 2832.

5.4.5.2 Basin 1A

Basin 1A begins west of CD-1 at Station 278+42 (RT) and Station 281+00 (LT) and continues to Lake Luther Road at Station 292+65. Roadway runoff drains to roadside ditches that flows to a 30" RCP (CD-1) at Station 283+00 and discharges north to Lake Deeson. It should be noted that at the north end of CD-1, there is a small local depression where runoff must overtop in order to outfall to Lake Deeson. Lake Deeson is considered a landlocked basin, thus classifying Basin 1A as a closed basin. It should be noted that approximately 13.67 acres of offsite runoff also drains to CD-1. The offsite land-use consists mostly of residential area.

5.4.5.3 Basin 1B

Basin 1B begins at Lake Luther Road at Station 292+65 and continues to Huron Way at Station 315+00 (RT) and Station 320+00 (LT). Roadway runoff drains to roadside ditches and adjacent wetlands and flows to a 30" RCP (CD-2) at Station 303+45. The culvert crosses under SR 33 and discharges north to a wetland system that ultimately flows to the Withlacoochee River. Adjacent wetland systems and the 100-year floodplain are not expected to be impacted from the proposed roadway widening project. It should be noted that approximately 4.54 acres of offsite runoff also drains to CD-2. The offsite land-use consists mostly of residential area.

5.4.5.4 Basin 2

Basin 2 begins at Huron Way at Station 315+00 (RT) and Station 320+00 (LT) and continues northeast to CD-5 at Station 394+55. Roadway runoff drains to roadside ditches and adjacent wetlands and flows to a double 10'x3' bridge culvert (Bridge Number 160142, CD-3) at Station 356+00 and a 6'x2' concrete box culvert (CBC) (CD-5) at Station 394+55 that discharges south to Saddle Creek. Per existing SWFWMD Permit No. 21375, 0.30 acre-feet of SR 33 runoff is treated in the SWM Pond 1800 located south of SR 33 and CD-3. At Station 372+10, an existing 36" RCP (CD-4) crosses SR 33 and discharges east into an adjacent canal that runs parallel to SR 33. Please note that this pipe serves as an existing outfall structure west of SR 33 for the Bridgewater Water Management System and does not drain offsite runoff. Adjacent wetland systems are expected to be impacted from the proposed roadway widening project. Furthermore, approximately 14.10 acres of combined open space offsite flows toward the SR 33 roadside ditches from both sides of the road. Please refer to **Appendix 12** for more information regarding the SWFWMD Permit No. 21375.

5.4.5.5 Basin 3A

Basin 3A begins at CD-5 at Station 394+55 and continues north of Firstpark Blvd at Station 407+15 (RT) and Station 412+50 (LT). Roadway runoff from the southbound travel lane drains to the roadside ditch and flows to the 6'x2' CBC (CD-5) at Station 394+55. The culvert discharges east to an existing canal that runs parallel to the road and ultimately flows south to Saddle Creek. Roadway runoff from the northbound travel lane directly discharges to the same canal east of SR 33. Adjacent wetland systems are expected to be impacted from the proposed roadway widening project.

5.4.5.6 Basin 3B

Basin 3B begins at Station 407+15 (RT) north of Firstpark Blvd and continues to University Blvd at Station 418+75 (RT). This basin is an existing permitted basin (SWFWMD Permit No. 7112) that will be impacted by the roadway widening and the addition of the 10-foot shared-use path. Roadway runoff from the northbound travel lane and right turn lane flows to a linear treatment swale (Pond 1B) located east of SR 33 providing water quality treatment. There is currently an outfall control structure located east of SR 33 at Station 415+00 that outfalls to the existing canal east of SR 33 that ultimately outfalls to Saddle Creek. The existing basin and Pond 1B are expected to be impacted from the proposed roadway widening project. Please refer to [Appendix 12](#) for more information regarding Permit No. 7112. Adjacent wetland systems are expected to have minor impacts from the proposed roadway widening project.

5.4.5.7 Basin 3C

Basin 3C begins at Station 412+50 (LT) and continues to Lakeland Hills Blvd. at 418+75 (LT). Roadway runoff from the southbound travel lane and left turn lane drains to the roadside ditch that flows north to the 19"x30" sidedrain underneath Lakeland Hills Blvd. that ultimately flows to a double 10'x3' bridge culvert (Bridge No. 160143, CD-6). The culvert discharges to an existing canal east of SR 33 that runs parallel to the road and ultimately flows south to Saddle Creek.

5.4.5.8 Basin 4A

Basin 4A begins at Lakeland Hills Blvd. at Station 418+75 (LT) and continues north to Station 438+00 (LT). Roadway runoff from the southbound travel lane and right turn lane drains to the roadside ditch that flows to the double 10'x3' bridge culvert (Bridge No. 160143, CD-6). The culvert discharges to an existing canal east of SR 33 that runs parallel to the road and ultimately flows south to Saddle Creek.

5.4.5.9 Basin 4B

Basin 4B begins at University Blvd. at Station 418+75 (RT) and continues north to Station 438+29 (RT). This basin is an existing permitted basin (SWFWMD Permit No. 7112) that will be impacted by the roadway widening and the addition of the 10-foot shared-use path. A portion of the roadway runoff from the northbound travel lane and left turn lane flows to a linear treatment swale (Pond 1A) located east of SR 33 providing water quality treatment. There is

currently an outfall control structure located east of SR 33 at Station 420+50 that outfalls to the existing canal east of SR 33 that ultimately outfalls to Saddle Creek. Another portion of the roadway runoff from the northbound travel lane directly discharges to the same existing canal east of SR 33. The existing basin and Pond 1A are expected to be impacted from the proposed roadway widening project. Please refer to **Appendix 12** for more information regarding Permit No. 7112. Adjacent wetland systems are expected to be impacted from the proposed roadway widening project.

5.4.5.10 Basin 5

Basin 5 begins at Station 438+00 (LT) and 438+29 (RT) and continues north to CD-9 (Station 460+00). The Basin 5 area consists of the I-4 and SR 33 Interchange. The existing basin has been divided into 5 sub-basins. Basins 5B, 5C, 5D, and 5E are all existing permitted FDOT basins that outfall to existing FDOT ponds. Furthermore, the limits of these sub-basins extend to the areas impacted by the proposed I-4 and SR 33 Interchange. Basin 5A consists of the interchange areas that is currently not draining to FDOT ponds, but instead directly discharging to offsite systems that ultimately outfall to the Withlacoochee River. The following is the descriptions for all the sub-basins:

5.4.5.10.1 Basin 5A

The basin 5A limits includes all the roadway area within the I-4 and SR 33 Interchange that is not conveyed to existing FDOT ponds. Multiple outfalls are located within this basin that include a double 6'x4' CBC west of SR 33 that crosses underneath I-4 and adjacent wetlands on the northeast side of the I-4 and SR 33 Interchange. Adjacent wetland systems and the 100-year floodplain are expected to be impacted from the proposed roadway widening project.

5.4.5.10.2 Basin 5B

Basin 5B consists of the I-4 eastbound travel lanes west of SR 33 up to the existing double 6'x4' CBC. A total of 3.2 acres of roadway runoff is conveyed into shoulder gutter inlets and is piped to FDOT SWM Pond 13, located on the southwest quadrant of the interchange. It should be noted that 2.58 acres of roadway runoff is estimated within the limits of the proposed I-4 and SR 33 Interchange. With a control elevation of 135.85 feet, FDOT SWM Pond 13 outfalls via a control structure and pipe to the upstream end of the double 6'x4' CBC that ultimately outfalls to the Withlacoochee River.

5.4.5.10.3 Basin 5C

Basin 5C consists of the I-4 westbound travel lanes west of SR 33 up to the existing double 6'x4' CBC, Ramp E, and a portion of the SR 33 northbound travel lane. A total of 6.68 acres of roadway runoff is conveyed into shoulder gutter inlets and is piped to the infield area between the I-4 westbound lanes and Ramp E that discharges to FDOT SWM Pond 14, located northwest of the interchange. With a control elevation of 132.45 feet, FDOT SWM Pond 14 outfalls via a control structure and pipe to the downstream end of the double 6'x4' CBC that ultimately outfalls to the Withlacoochee River.

5.4.5.10.4 Basin 5D

Basin 5D consists of the I-4 westbound travel lanes east of SR 33 up to SR 33, Ramp H, and a portion of the SR 33 southbound travel lane. A total of 7.65 acres of roadway runoff is conveyed into a roadside ditch along I-4 that discharges to FDOT SWM Pond 15, located northeast of the interchange. The infield area between the I-4 westbound lanes and Ramp H is used for conveyance towards the I-4 roadside ditch. With a control elevation of 134.15 feet, FDOT SWM Pond 15 outfalls via a control structure and pipe northwest to an existing wetland with a seasonal high water elevation of 133.65 feet. This existing wetland ultimately outfalls northwest to a cross drain under Tomkow Road and to the Withlacoochee River.

5.4.5.10.5 Basin 5E

Basin 5E consists of the I-4 eastbound travel lanes east of SR 33. A total of 17.60 acres of roadway runoff is conveyed into a roadside ditch along I-4 that discharges to FDOT SWM Pond 16, located southeast of the interchange. It should be noted that 3.70 acres of roadway runoff is estimated within the limits of the proposed I-4 and SR 33 Interchange. With a control elevation of 136.95 feet, FDOT SWM Pond 16 outfalls via a broad crested weir east to an existing wetland. This existing wetland ultimately outfalls north to a cross drain under I-4 and to the Withlacoochee River.

5.4.5.11 Basin 6A

Basin 6A begins northeast of the I-4/SR 33 interchange at CD-9 (Station 460+00) and continues to Station 471+10. Roadway runoff drains to roadside ditches and adjacent wetlands and flows to a 4'x2' CBC (CD-9) at Station 460+00. The culvert crosses under SR 33 and discharges northwest to a wetland system that flows to the Withlacoochee River. Adjacent wetland systems are expected to be impacted from the proposed roadway widening project.

5.4.5.12 Basin 6B

Basin 6B begins at Station 471+10 and continues east to the Lakeland Motorsports Park entrance at Station 489+00. Roadway runoff drains to roadside ditches and adjacent wetlands and flows to a 4'x2' CBC (CD-10) which crosses under SR 33 and discharges north to an existing wetland system that ultimately flows to the Withlacoochee River. Adjacent wetland systems are expected to be impacted from the proposed roadway widening project.

5.4.5.13 Basin 7

Basin 7 begins at Station 489+00 and continues east to the end of the PD&E Study at Station 494+17. Roadway runoff drains to roadside ditches and flows north and south to adjacent wetlands. The adjacent wetland systems are not expected to be impacted from the proposed roadway widening project.

5.5 Floodplains/Floodways

The Federal Emergency Management Agency (FEMA) has developed a Flood Insurance Rate Map (FIRM) for the study area. The relevant FIRM panel numbers are 12105C0175F and 12105C0310F for Polk County, Florida dated December 20, 2000. The majority of the project and potential pond sites lies outside of the FEMA floodplain areas. A portion of the project area is located within six designated floodplain areas: FIA-1, FIA-2, FIA-3, FIA-4, FIA-5, and FIA-6 (Zone A - 100 year floodplain with no base flood elevations determined). Please refer to **Figure 6 – FEMA Floodplain Map** located in **Appendix 1**. Floodplain impacts are to be expected due to the SR 33 widening and the proposed I-4 and SR 33 interchange. It should also be noted that per a telephone conversation with Scott Presson (Bartow Operation Maintenance Center Manager), SR 33 has no historical flooding issues within the project limits. For information regarding floodplain impacts, please refer to the **SR 33 Location Hydraulic Report**.

SECTION 6 PROPOSED DRAINAGE CONDITIONS

The stormwater runoff from the project limits will be collected and conveyed in roadside ditches or closed drainage systems to the proposed pond alternatives: offsite ponds, joint use ponds, or dry linear retention swales along SR 33. The pond alternatives will discharge at or near the same cross drains that carry the roadway runoff in the existing condition. The water quality treatment and water quantity attenuation will be achieved through the construction of offsite dry and wet ponds alternative, which will require the acquisition of additional right-of-way. For dry linear retention swales alternative, water quality treatment and water quantity attenuation will be achieved within the existing FDOT Right of Way, which will not require the acquisition of additional right-of-way.

6.1 Proposed Ponds

6.1.1 Stormwater Ponds

The ponds were sized to accommodate the four-lane improvement with the assumption that for Basin 1, offsite runoff from large areas would be drained through separate bypass ditch systems. For the other remaining basins, according to House Bill 599, offsite flows may be accepted into the stormwater management system without providing additional water quality treatment for such flows. There are a total of eight (8) proposed roadway drainage basins, one (1) existing/permitted basin and seven (7) proposed basins, within the project limits. One (1) offsite pond alternative for basins 1 through 4 and 6 has been analyzed. It should be noted that for Basin 2, it is proposed to use the existing pond south of SR 33 as a joint use facility as an alternative to accommodate the onsite and offsite runoff.

In addition to the offsite pond alternatives, dry linear treatment for each basin was analyzed to determine the feasibility of using dry linear retention swales along the roadway within the existing FDOT right of way. The linear ponds were sized to accommodate the onsite and offsite runoff and were analyzed for recovery in order to meet the SWFWMD criteria, total treatment

volume to recover within 72 hours. Please note that for this pond alternative, only the pavement savings roadway typical section option was used.

Please refer to **Basin Exhibits** in **Appendix 3** for the offsite pond locations and the offsite drainage basin areas.

For the proposed basin limits, many of the existing basins were combined and their limits were adjusted in order to minimize the number of offsite ponds. The pond alternatives have been properly sized to accommodate the increased attenuation volume due to the proposed basin size increases. **Table 6 – Summary of Proposed Drainage Basins** provides a summary of the proposed basin limits and their outfall locations.

Table 6 – Summary of Proposed Drainage Basins

Basin Name	From Station	To Station	Outfall Location
E	265+50	278+42	Offsite Depression
1	278+42	320+00	Wetland System north of SR 33 (Withlacoochee River)
2	320+00	394+55	CD-3 (Saddle Creek)
3	394+55	418+75	Existing Canal (Saddle Creek)
4	418+75	440+00	Existing Canal (Saddle Creek)
5	440+00	460+00	Withlacoochee River (Orange Hammock)
6	460+00	489+00	Wetlands - Withlacoochee River (Orange Hammock)
7	489+00	494+17	Wetlands - Withlacoochee River (Orange Hammock)

6.1.2 Floodplain Impacts

Floodplain compensation for impacts will be required; however, they will not require the acquisition of additional right-of-way. Floodplain compensation is expected to be achieved within the existing FDOT right-of-way along SR 33 and at the SR 33 and I-4 Interchange. Please refer to the **SR 33 Location Hydraulic Report**.

Table 7 – Summary of Floodplain Impact Areas

Floodplain Impact Area (FIA)	Side	From Station	To Station	Estimated 100-yr Flood Stage (ft)
FIA-1	RT	435+30	442+00	Zone A: EL 134.00 NAVD
FIA-2	LT	448+65	454+70	Zone A: EL 134.00 NAVD
FIA-3	LT	436+50	438+90	Zone A: EL 134.00 NAVD
FIA-4	LT/RT	453+00	465+00	Zone A: EL 134.00 NAVD
FIA-5	LT/RT	471+20	478+00	Zone A: EL 138.00 NAVD
FIA-6	LT	479+55	480+65	Zone A: EL 136.00 NAVD

6.2 Methodology of Pond Determination

6.2.1 Offsite Pond Alternative

The offsite pond siting analysis assumes that all ponds will be designed using both wet detention and dry retention pond design criteria. The following parameters were considered in the selection of potential pond sites:

- Hydrologic and hydraulic factors such as existing ground elevation, soil types, estimated seasonal high water (ESHW), stormwater conveyance feasibility, allowable hydraulic grade line (HGL);
- Environmental resource impacts including wetlands and threatened or endangered species;
- Floodplain impacts;
- Major utility conflict potential;
- Estimated right-of-way acquisition;
- Impacts to cultural resources; and
- Hazardous Materials Contamination

Please note that the information for environmental impacts, hazardous materials contamination impacts, estimated SHWT, and cultural resources impacts are included in **Appendices 6 through 10**. All the information were gathered and in incorporated into the **Pond Sites Evaluation Matrix in Appendix 4**.

6.2.2 Dry Linear Pond Assumptions

For the onsite dry linear treatment pond analysis, the following parameters were considered in the design of the potential pond sites:

- The pavement savings roadway typical section option was used for the linear treatment geometrics.
- Unless nearby permitted soil data was available, average values from the NRCS Soil Survey was used for the input data for the recovery analysis for each basin model.
- 1-foot LiDAR data and the pavement savings roadway typical section was used to verify that the proposed linear swale would fit within the existing FDOT right-of-way.
- Linear swale geometry includes a 1:6 front slope and a 1:4 back slope.
- Assume no environmental impacts since the linear pond is within the existing FDOT right-of-way.

6.3 Stormwater Pond Evaluation

6.3.1 Basin E

Basin E begins at Old Combee Road (Station 265+50 RT) and continues east to Station 278+42 (RT). The revised permitted dry linear pond (Pond E) will serve as the treatment and attenuation pond for Basin E (closed system). With a combined proposed swale length of 1097 ft, the proposed pond bottom was lowered to elevation 138.5 ft, 0.5 ft below the permitted pond bottom elevation in order to gain the volume lost with the proposed roadway widening. It should be noted that the proposed pond bottom elevation is still 3.2 ft above the SHGWT elevation of 135.3 ft. ICPR was used for the recovery analysis to match the permitted conditions. The permitted Pond E geotech data was used for the geotech inputs for the revised model. Based on the revised ICPR recovery analysis, the total treatment volume in the revised Pond E recovers in 1.5 hours (less than 72 hours), thus meeting recovery requirements per SWFWMD BOR Section 5.2. No offsite pond alternative is proposed for this existing basin. It is expected that a permit modification will be required during the design phase of the project.

6.3.2 Basin 1

6.3.2.1 Offsite Alternative

Basin 1 begins at Station 278+42 and continues east of Huron Way at Station 320+00. Pond 1 will serve as the treatment and attenuation pond for Basin 1. It should be noted that existing basins 1A and 1B were combined as the proposed Basin 1 in order to minimize the number of offsite ponds. Pond 1 is located north of SR 33 and the Spanish Oaks community. The existing ground elevation is at approximately 140.00 ft NAVD based on 1-ft contours. The pond site is situated on HSG A soil (St. Lucie fine sand, 0 to 5 percent slopes) with an estimated SHWT depth of 6.5 ft below ground based on NRCS Soil Survey. Given the soil type and depth of the SHWT, the pond was designed as a dry retention pond. The pond bottom elevation was estimated to be 1 ft above the SHWT at elevation 134.5 ft. The total required pond right-of-way area for Pond 1 is 1.89 acres.

According to the **Protected Species Assessment** in **Appendix 8**, the Pond 1 site was determined to have medium impacts; an indication of species where mitigation is reasonable and possible. At the Pond 1 site, two potentially occupied gopher tortoise burrows were observed; one within pond site 1 and one immediately west of the western boundary. Also, the state listed plant garberia (*Garberia heterophylla*) was located in the pond site. According to the **Wetland Assessment Memo** in **Appendix 7**, there are no direct impacts to wetlands associated with this pond site.

6.3.2.2 Dry Linear Retention Alternative

The dry linear retention swale alternative will serve as the treatment and attenuation pond for basin 1. The average existing ground elevation is at approximately 143.5 ft NAVD based on 1-ft contours. The linear pond site is situated on HSG A soil (St. Lucie fine sand, 0 to 5 percent slopes) with an estimated SHWT elevation at 134.00 ft based on permitted soil boring TH-17 (SWFWMD Permit No. 2832). With a combined proposed pond length of 3303 ft and a top width of 40 ft, the pond bottom was set 6.5 ft above the SHWT at elevation 140.5 ft. POND 3.3 was used for the recovery analysis. The data used for the soil input was taken from the Pond C-3 Soil boring (SWFWMD Permit No. 2832) since the permitted pond is in close proximity to the basin 1 dry linear swale. Based on the POND 3.3 model, the total treatment volume in the dry retention swale recovers in 2.4 hours (less than 72 hours), thus meeting recovery requirements per SWFWMD.

6.3.3 Basin 2

6.3.3.1 Offsite Alternative

Basin 2 begins east of Huron Way at Station 320+00 and continues northeast to Station 394+55 at CD-5. Pond 2 will serve as the treatment and attenuation pond for Basin 2. Pond 2 is located southeast of SR 33 at the downstream end of CD-3. The existing ground elevation is at approximately 136.00 ft NAVD based on 1-ft contours. The pond site is situated on HSG B soil (Arents, 0 to 5 percent slopes) with an estimated SHWT depth of 3.0 ft below ground based on NRCS Soil Survey. Based on the surrounding permitted wet detention ponds and SWFWMD Permit No. 21375, the control elevation of this pond was estimated to be at elevation of 132.65 ft NAVD. Given the soil type and depth of the SHWT, the pond was designed as a wet detention pond. Pond 2 discharges into Saddle Creek that is located within WBID 1497, which is listed as Impaired for Nutrients and Dissolved Oxygen within the Group 3 assessment per the current 303(d) list. Therefore, preliminary pollutant loading calculations are provided in **Appendix 3 – Pond Design Calculations** to show a net reduction in pollutant loading. The total required pond right-of-way area for Pond 2 is 3.02 acres.

According to the **Protected Species Assessment** in **Appendix 8**, the Pond 2 site was determined to have low impacts; potential but unlikely presence of protected species. At the Pond 2 site, no protected species were observed. Two American alligators and one tricolored heron were observed in the pond immediately adjacent to pond site 2. The actively grazed pasture has the potential to support the gopher tortoise, gopher frog, Florida mouse, burrowing owl, and crested caracara. According to the **Wetland Assessment Memo** in **Appendix 7**, there are no direct impacts to wetlands associated with this pond site.

6.3.3.2 Joint Use Alternative

As another viable alternative, it is proposed to utilize a joint use pond (Pond 2 – Joint Use) with the Bridgewater SWM Pond 1800 (See Permit No. 21375). SWM Pond 1800 is located southeast of SR 33 at the downstream end of CD-3 and Fork Creek. Based on volumetric analysis of the existing pond, an additional 1.09 acre-ft of treatment volume would only increase the permitted weir elevation to 0.02 ft. The design high water elevation would also still be contained within the pond with an additional 2.56 acre-ft of attenuation and treatment volume. Based on these results, SWM Pond 1800 would only see minimal impacts if it utilized as a joint use pond with SR 33 roadway runoff and the Bridgewater facility. Coordination with the Bridgewater and SWFWMD will be required during the design phase if this alternative is chosen as the preferred alternative.

6.3.3.3 Dry Linear Retention Alternative

The dry linear retention swale alternative will serve as the treatment and attenuation pond for basin 2. The average existing ground elevation is at approximately 137.0 ft NAVD based on 1-ft contours. The linear pond site is situated on HSG B soil (Arents, 0 to 5 percent slopes) with an estimated SHWT depth of 2.0 ft below ground based on geotech boring SH-2 and SH-3 performed on 11/19/2012 (See [Appendix 10](#)). With a combined proposed pond length of 5250 ft and a top width of 32 ft, the pond bottom was set 1 ft above the SHWT at elevation 136 ft. POND3.3 was used for the recovery analysis. The data used for the soil input was taken from the NRCS Soil Survey since there is no permitted soil information within the vicinity of the proposed linear pond. Based on the POND3.3 model, the total treatment volume in the dry retention swale recovers in 2.4 hours (less than 72 hours), thus meeting recovery requirements per SWFWMD.

6.3.4 Basin 3

6.3.4.1 Offsite Alternative

Basin 3 begins at CD-5 (Station 394+55) and continues north to Lakeland Hills Blvd/University Blvd at Station 418+75. Pond 3 will serve as the treatment and attenuation pond for Basin 3. Pond 3 is located on the southeast corner of the intersection of SR 33 and University Blvd. The existing ground elevation varies from approximately 140.00 ft NAVD to 158 ft NAVD based on 1-ft contours. The pond site is primarily situated on HSG B soil (Arents, 0 to 5 percent slopes) with an estimated SHWT depth of 2.0 ft below ground based on NCRCS Soil Survey. The pond is also situated on Neilhurst soil; mine spoil soils consisting of sandy mine spoil. Based on discussions with the Geotechnical Engineer, the proposed pond site is still viable as long as the pond berm does not exceed the existing ground, thus preventing a failure to the pond berm. Based on the permitted boundary condition (SWFWMD Permit No. 7112) at the existing canal outfall, the control elevation of this pond was estimated to be at elevation of 133.85 ft NAVD. It should be noted that an impermeable liner will be required in order to control the pond at this elevation. Given the soil type and depth of the SHWT, the pond was designed as a wet detention pond. Pond 3 discharges into Saddle Creek that is located within WBID 1497, which is listed as Impaired for Nutrients and Dissolved Oxygen within the Group 3 assessment per the current 303(d) list. Therefore, preliminary pollutant loading calculations are provided in

Appendix 3 – Pond Design Calculations to show a net reduction in pollutant loading. The total required pond right-of-way area for Pond 3 is 2.10 acres.

According to the **Protected Species Assessment** in **Appendix 8**, the Pond 3 site was determined to have low impacts; potential but unlikely presence of protected species. At the Pond 3 site, no protected species were observed. The actively grazed pasture has the potential to support the gopher tortoise, gopher frog, Florida mouse, burrowing owl, and crested caracara. According to the **Wetland Assessment Memo** in **Appendix 7**, there are no direct impacts to wetlands associated with this pond site.

6.3.4.2 Dry Linear Retention Alternative

The dry linear retention swale alternative will serve as the treatment and attenuation pond for basin 3. The average existing ground elevation is at approximately 134.0 ft NAVD based on 1-ft contours. The linear pond site is situated on HSG B soil (Arents, 0 to 5 percent slopes) with an estimated SHWT elevation of 130.80 ft based on Pond 100B geotech data from SWFWMD Permit No. 7112. With a combined proposed pond length of 1785 ft and a top width of 30 ft, the pond bottom was set at elevation 134 ft to match permitted conditions. POND 3.3 was used for the recovery analysis. The data used for the soil input was taken from the Pond 100B geotech data from SWFWMD Permit No. 7112 since the permitted pond is in close proximity to the basin 3 dry linear swale. Based on the POND 3.3 model, the total treatment volume in the dry retention swale recovers in 6.0 hours (less than 72 hours), thus meeting recovery requirements per SWFWMD.

6.3.5 Basin 4

6.3.5.1 Offsite Alternative

Basin 4 begins at Lakeland Hills Blvd/University Blvd (Station 418+75) and continues to CD-7 at Station 440+00. Pond 4 will serve as the treatment and attenuation pond for Basin 4. Pond 4 is located west of SR 33 and south of I-4. The existing ground elevation is at approximately 136.00 ft NAVD based on 1-ft contours. The pond site is primarily situated on HSG B soil (Arents, 0 to 5 percent slopes) with an estimated SHWT depth of 3.0 ft below ground based on NRCS Soil Survey. The control elevation of this pond was estimated to be 6 inches below the SHWT at elevation of 132.50 ft NAVD. Given the soil type and depth of the SHWT, the pond was designed as a wet detention pond. Pond 4 discharges into Saddle Creek that is located within WBID 1497, which is listed as Impaired for Nutrients and Dissolved Oxygen within the Group 3 assessment per the current 303(d) list. Therefore, preliminary pollutant loading calculations are provided in **Appendix 3 – Pond Design Calculations** to show a net reduction in pollutant loading. The total required pond right-of-way area for Pond 4 is 1.06 acres.

According to the **Protected Species Assessment** in **Appendix 8**, the Pond 4 site was determined to have low impacts; potential but unlikely presence of protected species. At the Pond 4 site, no protected species were observed. Pond 4 is currently being used as a construction staging area. It is devoid of vegetation therefore no protected species are

anticipated to occur. According to the **Wetland Assessment Memo** in **Appendix 7**, there are no direct impacts to wetlands associated with this pond site.

6.3.5.2 Dry Linear Retention Alternative

The dry linear retention swale alternative will serve as the treatment and attenuation pond for basin 4. The average existing ground elevation is at approximately 134.0 ft NAVD based on 1-ft contours. The linear pond site is situated on HSG B soil (Arents, 0 to 5 percent slopes) with an estimated SHWT elevation of 130.80 ft based on Pond 100A geotech data from SWFWMD Permit No. 7112. With a combined proposed pond length of 1200 ft and a top width of 35 ft, the pond bottom was set at elevation 134 ft to match permitted conditions. PONDS 3.3 was used for the recovery analysis. The data used for the soil input was taken from the Pond 100A geotech data from SWFWMD Permit No. 7112 since the permitted pond is in close proximity to the basin 4 dry linear swale. Based on the PONDS 3.3 model, the total treatment volume in the dry retention swale recovers in 6.0 hours (less than 72 hours), thus meeting recovery requirements per SWFWMD.

6.3.6 Basin 5

Basin 5 begins at CD-7 (Station 440+00) and continues north to CD-9 at Station 460+00. Basin 5 consists of the I-4 and SR 33 Interchange improvements. Ponds 5A, 5B, and 5C are located within the interchange and will serve as the treatment and attenuation ponds for Basin 5. The average existing ground elevation is at approximately 135.00 ft NAVD based on 1-ft contours. The pond site is primarily situated on HSG B/D soil (Pomona fine sand) with an estimated SHWT depth of 2.0 ft below ground based on soil borings SH-4, SH-5, and AB-4 performed on 11/19/12 and 01/03/12 (See **Appendix 10**). The control elevation of these ponds was estimated to be 6 inches below the SHWT at elevation of 132.50 ft NAVD. Given the soil type and depth of the SHWT, the ponds were designed as wet detention ponds. The ponds were also designed to accommodate the I-4 PD&E Recommended ultimate I-4 typical section.

According to the **Protected Species Assessment** in **Appendix 8**, the Pond 5 sites were determined to have low impacts; potential but unlikely presence of protected species. At the Pond 5A, 5B, and 5C sites, no protected species were observed. For Ponds 5A and 5B, the roads and highways do not have the potential to support protected species. For Pond 5C, the shrub and brushland has the potential to support the gopher tortoise and the indigo snake. The wetland hardwood forest has the potential to support the wood stork and state-listed wading birds. According to the **Wetland Assessment Memo** in **Appendix 7**, there are no direct impacts to wetlands associated with this pond site.

6.3.7 Basin 6

6.3.7.1 Offsite Alternative

Basin 6 begins at CD-9 (Station 460+00) and continues east to the Lakeland Motorsports Park entrance at Station 489+00. Pond 6 will serve as the treatment and attenuation pond for Basin 6. Pond 6 is located on the northeast corner of SR 33 and Tomkow Road. The average existing ground elevation is at approximately 134.00 ft NAVD based on 1-ft contours. The pond site is

situated on HSG B/D soil (Pomona fine sand) and HSG D soil (Eaton mucky fine sand, depressional) with an estimated SHWT depth of 1.0 ft below ground based on NRCS Soil Survey. The control elevation of this pond was estimated to be 6 inches below the SHWT at elevation of 132.50 ft NAVD. Given the soil type and depth of the SHWT, the pond was designed as a wet detention pond. Pond 6 discharges north into existing wetlands that ultimately outfall to the Withlacoochee River. The total required pond right-of-way area for Pond 6 is 1.39 acres.

It should be noted that in the predevelopment condition, Basin 6A drains to a wetland on the west side of Tomkow Road and Basin 6B drains to another wetland 1500 ft east of Tomkow Road. In the proposed condition, the pond was sized initially based upon the fact that these wetlands ultimately connect and are part of a larger wetland system, thus, overattenuating would not be a concern, however; locally, there could be a concern in respect to each wetland system. During the design phase, this concern can be alleviated by putting a split discharge system from the offsite pond to each wetland system, thus meeting attenuation requirements.

According to the **Protected Species Assessment** in **Appendix 8**, the Pond 6 site was determined to have low impacts; potential but unlikely presence of protected species. At the Pond 6 site, no protected species were observed. The wetland forested mix has the potential to support the wood stork and state-listed wading birds. The shrub and brushland are inundated by exotic grass therefore no protected species are anticipated to occur. According to the **Wetland Assessment Memo** in **Appendix 7**, there are no direct impacts to wetlands associated with this pond site.

6.3.7.2 Dry Linear Retention Alternative

The dry linear retention swale alternative will serve as the treatment and attenuation pond for basin 6. The average existing ground elevation is at approximately 138.0 ft NAVD based on 1-ft contours. The linear pond site is situated primarily on HSG B/D soil (Pomona fine sand) with an estimated SHWT depth 1 ft below ground based on geotech boring SH-7 performed on 11/19/2012 (See **Appendix 10**). With a total proposed pond length of 1325 ft and a top width of 35 ft, the pond bottom was set 1 ft above the SHWT at elevation 138 ft. POND 3.3 was used for the recovery analysis. The data used for the soil input was taken from the NRCS Soil Survey since there is no permitted soil information within the vicinity of the proposed linear pond. Based on the POND 3.3 model, the total treatment volume in the dry retention swale recovers in 12.0 hours (less than 72 hours), thus meeting recovery requirements per SWFWMD.

6.3.8 Basin 7

Basin 7 begins at the Lakeland Motorsports Park entrance (Station 489+00) and continues east to the end of the PD&E Study at Station 494+17. The proposed roadway improvements within the basin consist of the proposed roadway typical section transitioning back to the existing roadway typical section and a right turn lane for the Lakeland Motorsports Park entrance. The majority of the new pavement is proposed on the north side of SR 33 (right turn lane). Due to the small basin size and the amount of small net new impervious area, only a dry linear retention swale was evaluated for this basin.

The dry linear retention swale alternative will serve as the treatment and attenuation pond for basin 7. The average existing ground elevation is at approximately 136.0 ft NAVD based on 1-ft contours. The linear pond site is situated primarily on HSG B/D soil (Lynne sand) with an estimated SHWT depth 0.5 ft below ground based on NRCS soil survey. With a total proposed pond length of 320 ft and a top width of 30 ft, the pond bottom was set 1 ft above the SHWT at elevation 136.5 ft. PONDS 3.3 was used for the recovery analysis. The data used for the soil input was taken from the NRCS Web Soil Survey since there is no permitted soil information within the vicinity of the proposed linear pond. Based on the PONDS 3.3 model, the total treatment volume in the dry retention swale recovers in 6.0 hours (less than 72 hours), thus meeting recovery requirements per SWFWMD BOR Section 5.2.

SECTION 7 CONCLUSIONS AND RECOMMENDATIONS

Potential offsite pond sites, joint use pond, and dry linear retention swales have been identified along the project limits for this PD&E Study.

For Basin E only one option was investigated which was the dry linear swale option because this basin is already permitted with a linear swale, thus, this is the recommended alternative.

For Basin 1, 2, 3, 4 and 6, after comparing all of the alternatives previously discussed, the linear swale option is the recommended alternative because no additional right of way is required for this option.

For Basin 5, only one option was investigated which was the infield ponds within the interchange right of way. This is the recommended alternative because no additional right of way is required for this option.

For Basin 7, only one option was investigated, which was the dry linear swale option because of the relative small basin area (2.33 ac). The linear swale option is the recommended alternative because no additional right of way is required.

The analysis estimates right-of-way needs using a volumetric analysis, which accounts for water quality treatment and water quantity for runoff attenuation. Pond sizing calculations as well as graphics showing the roadway alignment and associated pond sites are included in **Appendix 3** of this Pond Siting Report. Please note that the recommendations were based on pond sizes and locations determined from preliminary data calculations, reasonable engineering judgment, and assumptions. Pond sizes and configurations may change during final design as more detailed information on SHWT, wetland normal pool elevation, final roadway profile design, geotech data, etc. become available. Please refer to **Table 8** for a summary of the stormwater pond alternatives.

Table 8 – Summary of Stormwater Pond Alternatives

Basin	Pond Alternative	Offsite Pond Right-of-Way Area (ac) (Including Access Easement)
**E	Linear Swale	N/A
1	Pond 1	1.89
	Linear Swale	N/A
2	Pond 2	3.02
	Joint Use	N/A
	Linear Swale	N/A
3	Pond 3	2.1
	Linear Swale	N/A
4	Pond 4	1.06
	Linear Swale	N/A
5	Ponds 5A, 5B, 5C	*N/A
6	Pond 6	1.39
	Linear Swale	N/A
**7	Linear Swale	N/A
Total		9.46
<p>*Pond area consists of combined infield pond areas within the proposed I-4/SR 33 Interchange.</p> <p>**There are no proposed offsite ponds for these basins. It is proposed to use only dry linear treatment.</p> <p> Highlighted ponds are recommended.</p>		

Appendix 1

Figures

- Figure 1 – Project Location Map
- Figure 2 – USGS Quadrangle Map
- Figure 3 – SSURGO Soils Map
- Figure 4 – Existing Landuse Map
- Figure 5 – Future Landuse Map
- Figure 6 – FEMA Floodplain Map
- Figure 7 – Existing Typical Section
- Figure 8 – Proposed Typical Section

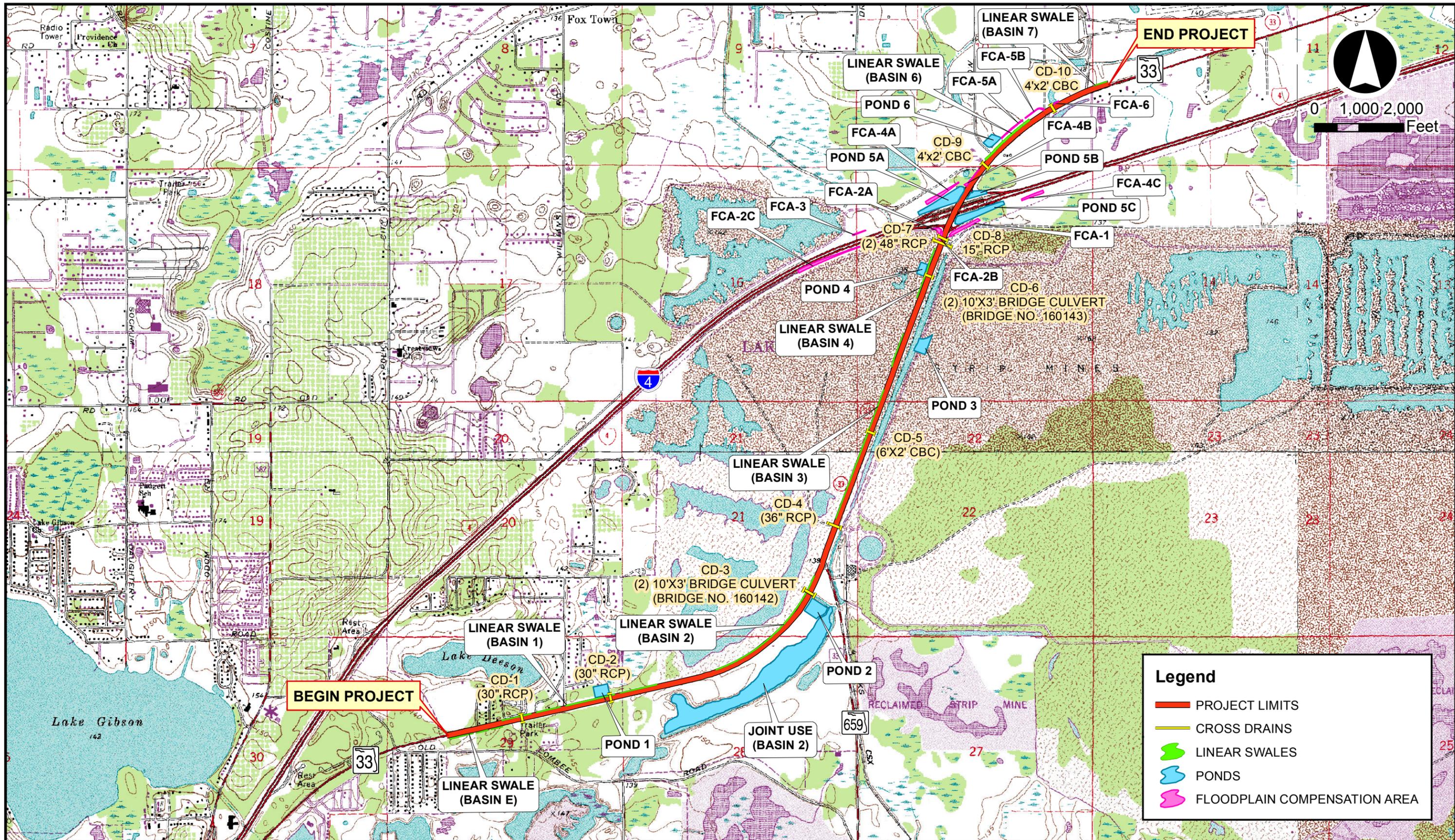


State Road 33 PD&E Study
 from Old Combee Road
 to North of Tomkow Road
 Polk County, Florida
 Financial Project ID: 430185-1-22-01
 Federal Project No: N/A

**PROJECT LOCATION MAP
 (WITH PROPOSED POND ALTERNATIVES)**

**Figure
 1**





Florida Department of Transportation
District 1

State Road 33 PD&E Study

from Old Combee Road to North of Tomkow Road
Polk County, Florida

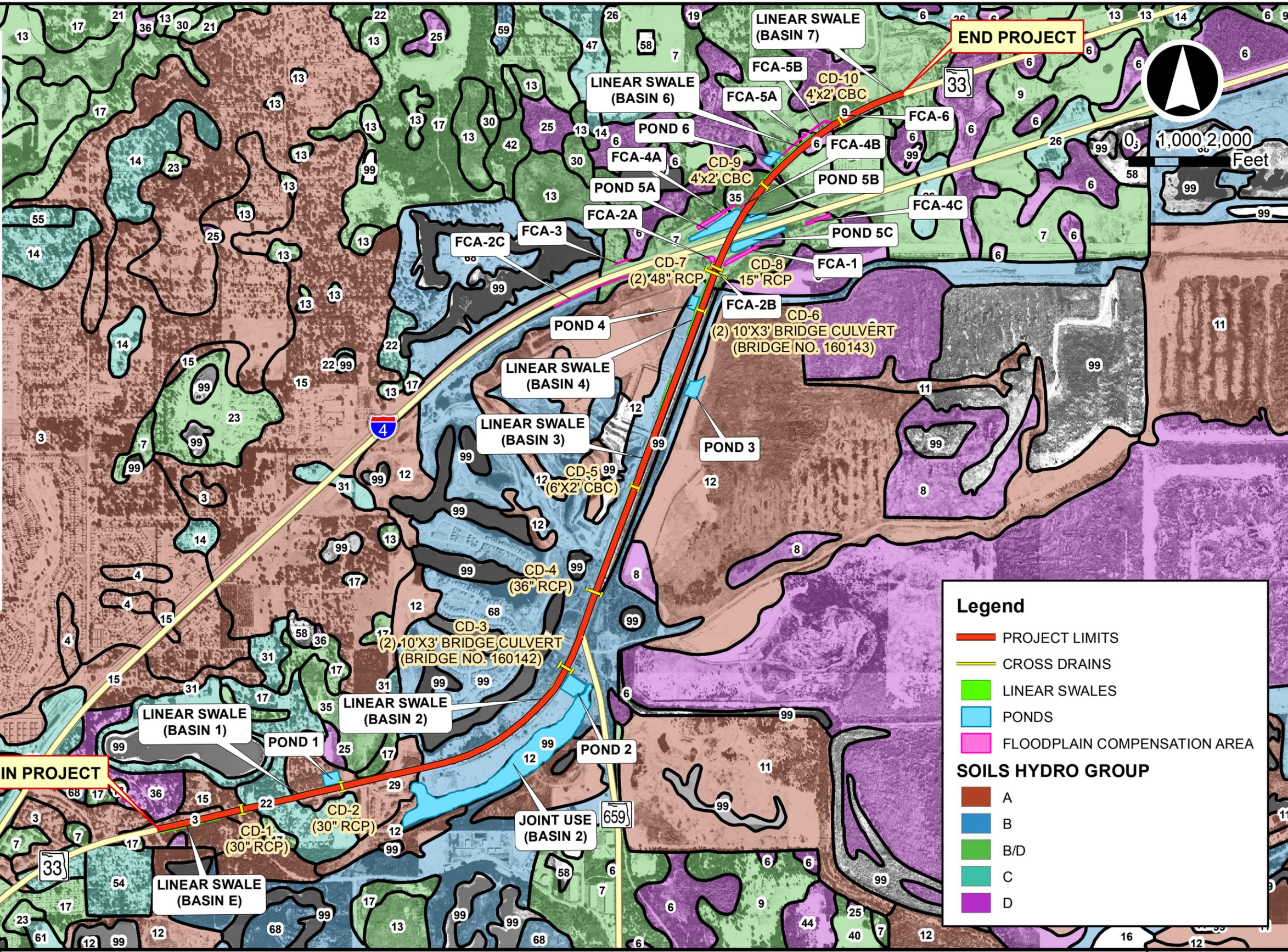
Financial Project ID: 430185-1-22-01
Federal Project No: N/A

**USGS QUAD MAP
(WITH PROPOSED POND ALTERNATIVES)**

Figure

2

MUSYM	MUNAME	HYDGRP
2	Apopka fine sand, 0 to 5 percent slopes	A
3	Candler sand, 0 to 5 percent slopes	A
4	Candler sand, 5 to 8 percent slopes	A
5	EauGalle fine sand	B/D
6	Eaton mucky fine sand, depressional	D
7	Pomona fine sand	B/D
8	Hydraquents, clayey	D
9	Lynne sand	B/D
11	Arents-Water complex	A
12	Neilhurst sand, 1 to 5 percent slopes	A
13	Samsula muck	B/D
13	Samsula muck	B/D
14	Sparr sand, 0 to 5 percent slopes	C
15	Tavares fine sand, 0 to 5 percent slopes	A
16	Urban land	
17	Smyrna and Myakka fine sands	B/D
19	Floridana mucky fine sand, depressional	D
21	Immokalee sand	B/D
22	Pomello fine sand	C
23	Ona fine sand	B/D
25	Placid and Myakka fine sands, depressional	D
26	Lochloosa fine sand	C
29	St. Lucie fine sand, 0 to 5 percent slopes	A
29	St. Lucie fine sand, 0 to 5 percent slopes	A
30	Pompano fine sand	B/D
31	Adamsville fine sand	C
33	Holopaw fine sand, depressional	D
35	Horton muck	B/D
36	Basinger mucky fine sand, depressional	D
40	Wauchula fine sand	B/D
41	St. Johns sand	B/D
42	Felda fine sand	B/D
43	Oldsmar fine sand	B/D
44	Paisley fine sand	D
47	Zolfo fine sand	C
48	Chobee fine sandy loam, depressional	D
49	Adamsville-Urban land complex	C
51	Pomona-Urban land complex	B/D
53	Myakka-Immokalee-Urban land complex	B/D
54	Pomello-Urban land complex	C
55	Sparr-Urban land complex, 0 to 5 percent slopes	C
57	Haplaquents clayey	D
58	Udorhents, excavated	
59	Arents-Urban land complex, 0 to 5 percent slopes	B
60	Arents, sandy	B
61	Arents, organic substratum-Urban land complex	C
63	Tavares-Urban land complex	A
68	Arents, 0 to 5 percent slopes	B
99	Water	



Legend

- PROJECT LIMITS
- CROSS DRAINS
- LINEAR SWALES
- PONDS
- FLOODPLAIN COMPENSATION AREA

SOILS HYDRO GROUP

- A
- B
- B/D
- C
- D

BEGIN PROJECT

END PROJECT



1,000 2,000 Feet

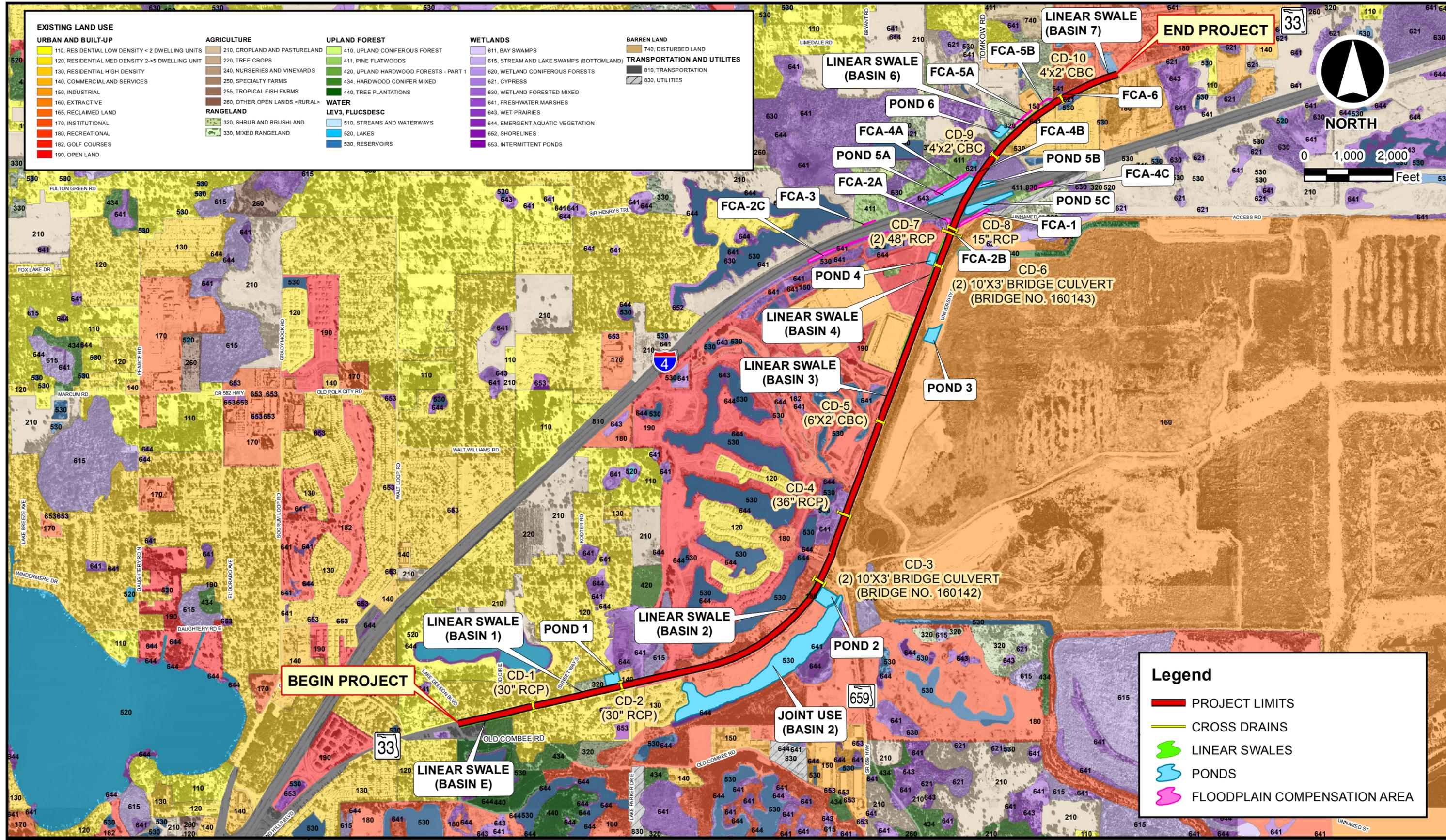


FDOT Florida Department of Transportation
District 1

State Road 33 PD&E Study
from Old Combee Road to North of Tomkow Road
Polk County, Florida
Financial Project ID: 430185-1-22-01
Federal Project No: N/A

**SSURGO SOILS TYPE MAP
(WITH PROPOSED POND ALTERNATIVES)**

Figure 3



EXISTING LAND USE		WETLANDS		TRANSPORTATION AND UTILITIES	
URBAN AND BUILT-UP	AGRICULTURE	WETLANDS	WETLANDS	TRANSPORTATION AND UTILITIES	TRANSPORTATION AND UTILITIES
110, RESIDENTIAL LOW DENSITY < 2 DWELLING UNITS	210, CROPLAND AND PASTURELAND	611, BAY SWAMPS	615, STREAM AND LAKE SWAMPS (BOTTOMLAND)	810, TRANSPORTATION	830, UTILITIES
120, RESIDENTIAL MED DENSITY 2->5 DWELLING UNIT	220, TREE CROPS	615, STREAM AND LAKE SWAMPS (BOTTOMLAND)	620, WETLAND CONIFEROUS FORESTS		
130, RESIDENTIAL HIGH DENSITY	240, NURSERIES AND VINEYARDS	621, CYPRESS	630, WETLAND FORESTED MIXED		
140, COMMERCIAL AND SERVICES	250, SPECIALTY FARMS	641, FRESHWATER MARSHES	643, WET PRAIRIES		
150, INDUSTRIAL	255, TROPICAL FISH FARMS	644, EMERGENT AQUATIC VEGETATION	652, SHORELINES		
160, EXTRACTIVE	260, OTHER OPEN LANDS <RURAL>	653, INTERMITTENT PONDS			
165, RECLAIMED LAND					
170, INSTITUTIONAL	RANGELAND				
180, RECREATIONAL	320, SHRUB AND BRUSHLAND				
182, GOLF COURSES	330, MIXED RANGELAND				
190, OPEN LAND					
	WATER				
	LEV3, FLUCDESC				
	510, STREAMS AND WATERWAYS				
	520, LAKES				
	530, RESERVOIRS				

Legend	
	PROJECT LIMITS
	CROSS DRAINS
	LINEAR SWALES
	PONDS
	FLOODPLAIN COMPENSATION AREA

State Road 33 PD&E Study

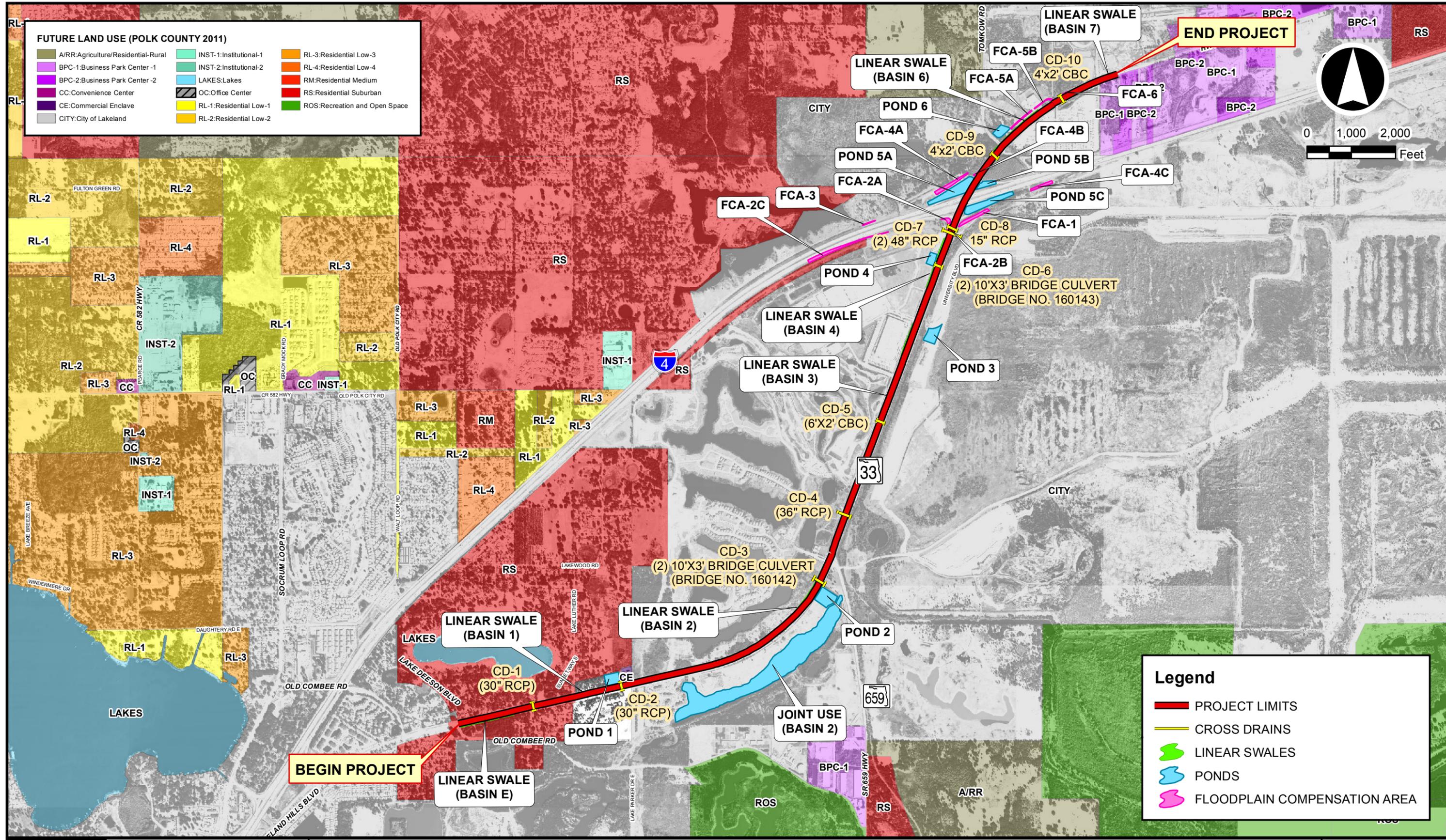
from Old Combee Road to North of Tomkow Road
Polk County, Florida

Financial Project ID: 430185-1-22-01
Federal Project No: N/A

**EXISTING LANDUSE MAP
(WITH PROPOSED POND ALTERNATIVES)**

**Figure
4**



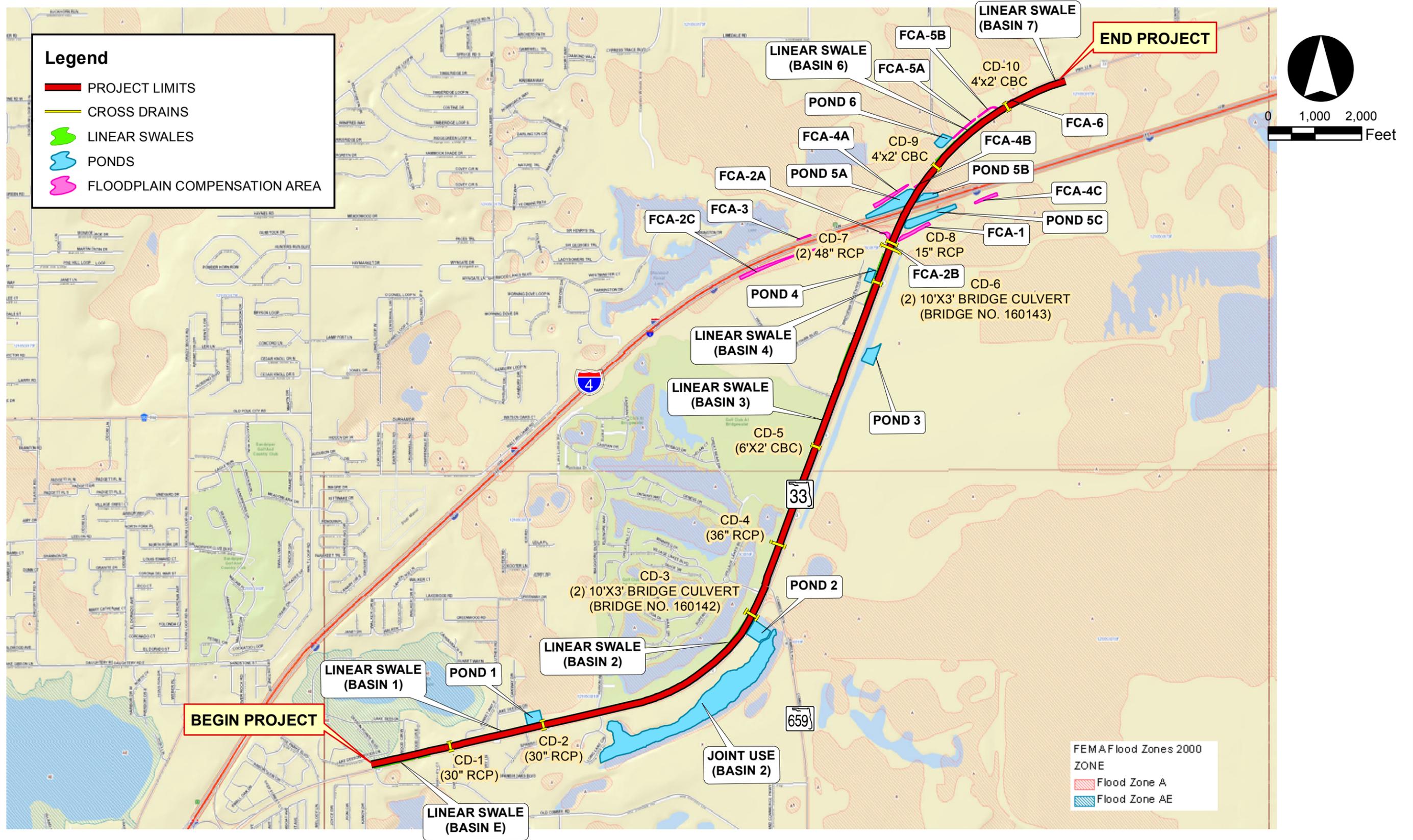


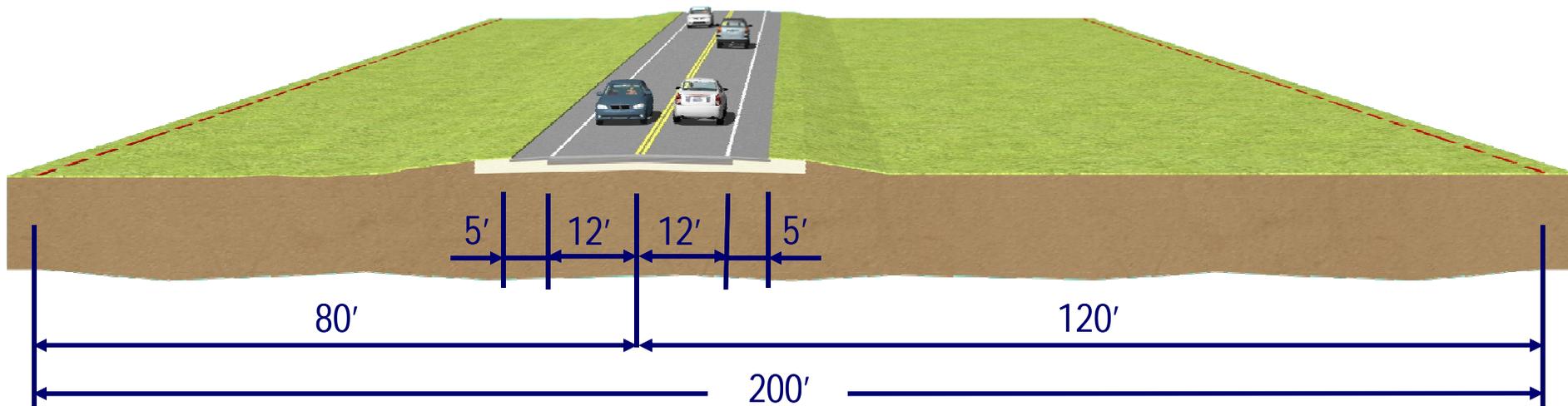
FUTURE LAND USE (POLK COUNTY 2011)

A/RR: Agriculture/Rural	INST-1: Institutional-1	RL-3: Residential Low-3
BPC-1: Business Park Center -1	INST-2: Institutional-2	RL-4: Residential Low-4
BPC-2: Business Park Center -2	LAKES: Lakes	RM: Residential Medium
CC: Convenience Center	OC: Office Center	RS: Residential Suburban
CE: Commercial Enclave	RL-1: Residential Low-1	ROS: Recreation and Open Space
CITY: City of Lakeland	RL-2: Residential Low-2	

Legend

	PROJECT LIMITS
	CROSS DRAINS
	LINEAR SWALES
	PONDS
	FLOODPLAIN COMPENSATION AREA





Florida Department of
Transportation
District 1

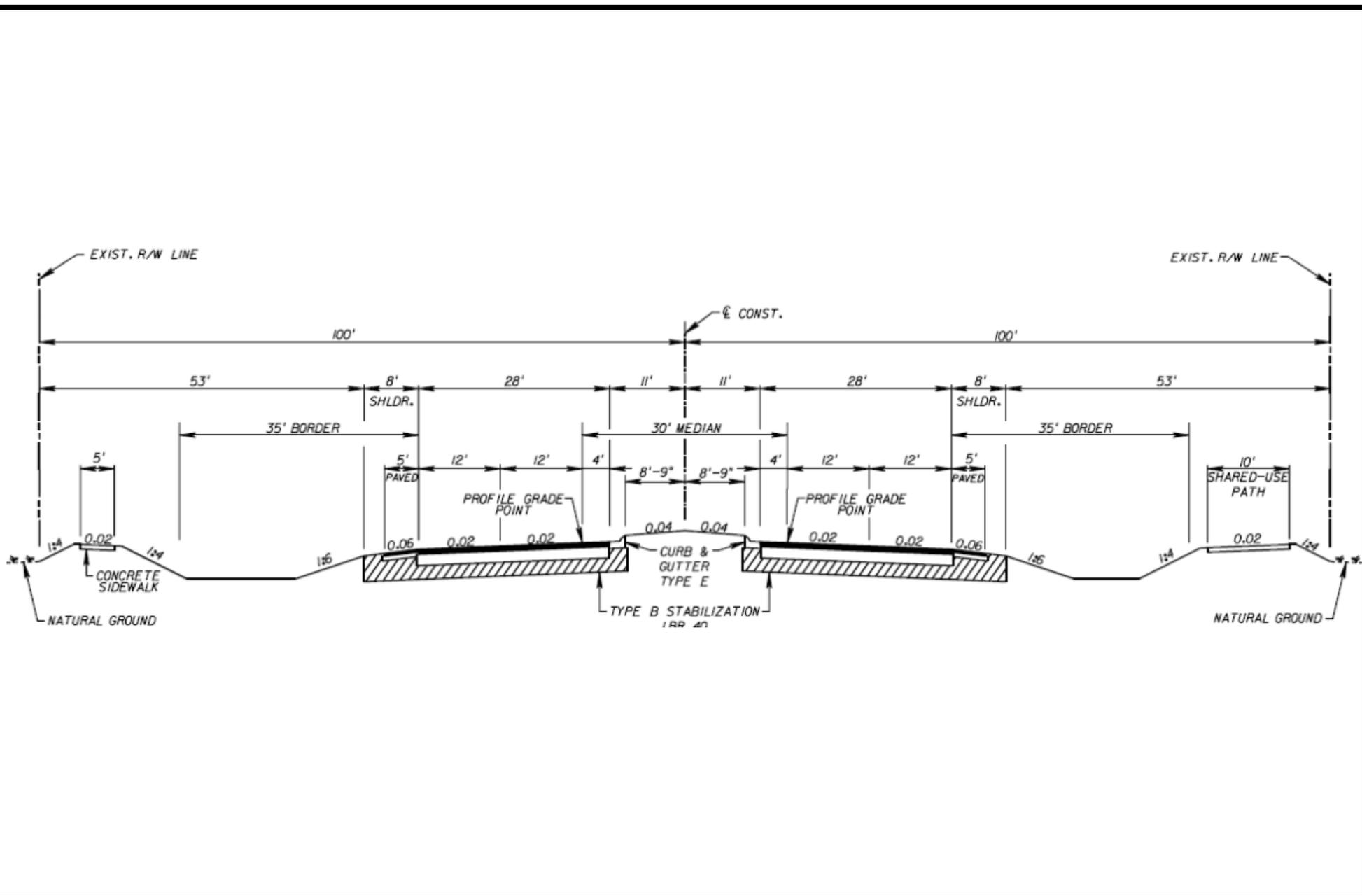
State Road 33 PD&E Study

from Old Combee Road
to North Tomkow Road
Polk County, Florida

Financial Project ID: 430185-22-01
Federal Project No: N/A

**EXISTING TYPICAL
SECTION**

**Figure
7**



Florida Department of
Transportation
District 1

State Road 33 PD&E Study

from Old Combee Road
to North Tomkow Road
Polk County, Florida

Financial Project ID: 430185-22-01
Federal Project No: N/A

PROPOSED TYPICAL SECTION

Figure
8

Appendix 2

Drainage Criteria Matrix



Drainage Design Criteria Matrix
SR 33 PD and E Study
From Old Combee Road to North of Tomkow Road
Polk County, Florida

FPID 430185-1-22-01

Design Parameter		SWFWMD Criteria	FDOT Criteria	Drainage Criteria to be Used
Storm Sewer	Design Frequency and Analysis for Pipe Hydraulics	N/A	Rational Method required. General design = 10-year/24-hour (P=7.5 in) Composite C-value - Impervious=0.95, Pervious=0.20. 10yr/24hr for pipe systems in rural ditch sections.	FDOT
	Spread	N/A	Analyze with 4 in./hr. rainfall intensity. Based on design speed, 1/2 of lane shall remain clear (45mph or less). Keep 8' of lane clear (between 45 mph to 55 mph). With shoulder gutter, 10-year freq. storm shall not exceed 1'-3" outside gutter toward front slope.	FDOT
	Inlet Types	N/A	FDOT Inlets (Design Standards 2013)	FDOT
	Inlet Placement	N/A	Inlets shall be placed at all low points in the gutter grade. For curb inlets on a continuous grade, a maximum spacing of 300 feet shall be used unless spread calculations indicate a greater spacing is acceptable. Curb inlets shall be placed at the critical section prior to the level section in superelevated transitions. Refer to the FDOT Drainage Manual Section 3.7.1.1	FDOT
Storm Sewer	System Velocity	N/A	Min. velocity = 2.5 fps when flowing full	FDOT
	Pipe Lengths	N/A	18" Pipe - max. 300 ft. 24" to 36" - max 400 ft. 42" and larger - max. 500 ft.	FDOT
	Hydraulic Grade Line	N/A	Friction and energy losses due to pollution control and utility conflict structures shall be considered for the storm sewer design event (10-year/24-hour). If minor losses are not considered in addition to the above losses, the HGL for the design storm shall be at least 1 ft. below the theoretical gutter elevation. If all minor losses are considered, the HGL elevation can reach the gutter elevation. This criteria does not apply to DBI's or structures where temporary ponding is not objectionable.	FDOT (minor losses will be considered in the storm sewer design)



Drainage Design Criteria Matrix
SR 33 PD and E Study
From Old Combee Road to North of Tomkow Road
Polk County, Florida

FPID 430185-1-22-01

Design Parameter		SWFWMD Criteria	FDOT Criteria	Drainage Criteria to be Used
Storm Sewer	Design Tailwater	N/A	When discharging to stormwater ponds, the tailwater shall be the elevation of the pond at the peak stage into the pond for the storm sewer design event (10-year/24-hour). For free flowing ditches - normal depth in the ditch at the storm drain outlet for storm drain design event (may differ from ditch design event). For ditches with downstream control - the higher of either the stage due to free flow conditions or the maximum stage at the storm drain outlet due to backwater from the downstream control using flows from the storm drain design event. When discharging to existing storm drain systems - the tailwater shall be the elevation of the HGL of the existing system at the location of the connection for the storm drain design storm event.	FDOT
Storm Sewer	Pipe Clearance	N/A	When flexible pavement is used, the minimum distance between the bottom of the roadway base material and the top of the pipe (outside edge) is 7" for concrete pipe and at least 12" for other pipe materials as specified in the FDOT Standard Index 205. Utilities - If utility has been accurately located, clearance between the outside of the storm drain pipe and the utility shall not be less than 6 in. If the location of the utility has been estimated, the clearance should not be less than 1ft.	FDOT
	Pipe Material	N/A	Optional Material Analysis to be performed for this project.	FDOT
	Pipe Size	N/A	Trunk line and lateral, min. = 18". Does not apply to discharge systems from Stormwater Mgmt. Facilities	FDOT



Drainage Design Criteria Matrix
SR 33 PD and E Study
From Old Combee Road to North of Tomkow Road
Polk County, Florida

FPID 430185-1-22-01

Design Parameter	SWFWMD Criteria	FDOT Criteria	Drainage Criteria to be Used	
Culvert Design	Minimum Size and Length	N/A	Crossdrain = 18"; Median Drain = 15"/18"; Side Drain = 15"/18"; Box Culvert = 3' x 3' (Precast) 4' x 4' (Cast in Place). Pipe lengths shall follow the criteria for storm sewers. Max. Length for box culverts=500 feet.	FDOT
	Design Procedure	N/A	Refer to the FDOT Drainage Manual Chapter 4 and the FDOT Drainage Handbook Culvert Design.	FDOT
Hydrologic and Hydraulic Calculations for all other Drainage Features	Peak Discharge and Runoff Volume	Use one of the following methods: 1.) SCS Curve Number and Unit Hydrograph Method, 2.) Santa Barbara Urban Hydrograph Method, or 3.) USACOE HEC-1 Programs 4.) Other hydrographs methods approved by the District	For Open Channels and Crossdrains- Use gauge data when available. If not available, use regional or local regression equations (USGS) or use the rational equation for drainage areas up to 600 acres. For Stormwater Management Facilities, one of the following is acceptable: (1) for basins with a tc of 15 minutes or less, the modified rational method shall be used OR (2) the SCS Unit Hydrograph method shall be used.	SWFWMD - SCS Curve Number and Unit Hydrograph Method
	Design Frequency	25-year storm for Stormwater Mgmt Facilities	Roadside Ditches-10-yr.; Outfall Ditches and Canals-25-yr.; Off-site crossdrains-50-yr (High use or essential).; Stormwater Management Facilities	SWFWMD
	Time of Concentration (tc)	TR-55 (Overland flow, storm sewer flow, channel flow). Minimum Tc=10 minutes.	Velocity Method (Overland flow using Kinematic Wave equation, Shallow Channel Flow using $V=kS^{0.5}$, main channel flow using Manning's equation). Minimum Tc=10 minutes. TR-55 methodology acceptable.	TR-55 methodology (SWFWMD and FDOT accepted)
	Design Storm Duration	24-hour storm duration for stormwater mgmt facilities	24-hour storm duration for closed drainage systems and roadside ditches.	SWFWMD
	Rainfall Distributions	Soil Conservation Service Type II Florida Modified 24-hour	FDOT Rainfall Distributions	SWFWMD



Drainage Design Criteria Matrix
SR 33 PD and E Study
From Old Combee Road to North of Tomkow Road
Polk County, Florida

FPID 430185-1-22-01

Design Parameter	SWFWMD Criteria	FDOT Criteria	Drainage Criteria to be Used	
Hydrologic and Hydraulic Calculations for all Other Drainage Features	Water Quality/Treatment (Wet Detention)	Required treatment volume = 1" runoff from the DCIA-alteration of existing public roads.	Specified by the Regulatory Agency (SWFWMD)	SWFWMD
	Water Quality/Treatment (Dry Retention-Linear Swales)	Required treatment volume = 0.5" of runoff from the DCIA-alteration of existing public roads.	Specified by the Regulatory Agency (SWFWMD)	SWFWMD
	Water Quantity/Attenuation	Open Basins: Post-development peak discharges shall be at or below pre-development peak discharges for the 25-year/24-hour storm event. Closed basins: retain the runoff volume difference between the pre and post development for the 100-year/24-hour storm event. The total post development volume leaving the site shall be no more than the total pre development volume leaving the site for the design 100-year storm.	FDOT Critical Duration not Required (Per FDOT District One)	SWFWMD
	Off-site Flows	N/A	Commingling with onsite flow acceptable (House Bill 599)	FDOT
Retention and Detention Facilities	Pond Configuration - Wet Ponds (for additional info, see Open Drainage Facilities)	Wet Detention: Width shall be designed with a 100 ft for linear areas in excess of 200 ft in length. (To be waived if operated by a single owner). Depth - Shall no be excavated to a depth that breaches an aquitard (impermeable or confined aquifers).	Pond Depth specified by Regulatory Agency (SWFWMD).	SWFWMD
	Residence Time (Wet Detention)	N/A	Specified by the Regulatory Agency (SWFWMD)	SWFWMD
Retention and Detention Facilities	Littoral Zone (Wet Detention)	Min. 35% littoral zone, conc. at the outfall. % littoral zone = vegetated area/ pond area at control EL. Shall be no deeper than 3.5 feet below the design overflow EL.	Specified by the Regulatory Agency (SWFWMD)	SWFWMD
	Water Quality/Quantity Volume Recovery Rate (Wet Detention/Dry Retention)	Wet Detention: Treatment volume shall be discharged in no less than 120 hours (5 days) with no more than 1/2 total volume being discharged within the first 60 hours (2.5 days) Retention Systems: drawdown the required treatment volume within 72 hours following a storm event.	Specified by the Regulatory Agency (SWFWMD)	SWFWMD



Drainage Design Criteria Matrix
SR 33 PD and E Study
From Old Combee Road to North of Tomkow Road
Polk County, Florida

FPID 430185-1-22-01

Design Parameter		SWFWMD Criteria	FDOT Criteria	Drainage Criteria to be Used
Retention and Detention Facilities	Orifice/Bleeder Devices (Wet Detention)	Drawdown devices smaller than 6 square inches of cross-section area that is 2 inches wide or less than 20° for "V" notches shall include a device to eliminate clogging. Shall be designed to discharge 1/2 of the detention volume within 24 hours.	Specified by the Regulatory Agency (SWFWMD)	SWFWMD
	Skimmer	N/A	Oil skimmer is required and should be designed to function from an elevation 6 in. below the elevation of inflow to the outfall control structure to an elevation 6 in. above the DHW of the pond. It should also cover all directions of inflow to the outfall control structure.	FDOT
	Erosion Control Measures	N/A	Sod from the Pond Berm up to the Control Elevation (NWL)	FDOT



Drainage Design Criteria Matrix
SR 33 PD and E Study
 From Old Combee Road to North of Tomkow Road
 Polk County, Florida

FPID 430185-1-22-01

Design Parameter	SWFWMD Criteria	FDOT Criteria	Drainage Criteria to be Used
Open Drainage Facilities (Ponds, Ditches, Canals)	Minimum Requirement for Maintenance Berms on Ditches/Canals (based on top width)	N/A	N/A
	Minimum Requirement for Maintenance Berms around Perimeter of Ponds	Min. width of 20 ft and slopes no steeper than 1:4. Widths less than 20 ft are allowed when it can be demonstrated that equipment can enter and perform the necessary maintenance for the system.	Ponds - 20 ft. clearance between top edge of normal pool elevation and R/W line. At least 15 ft. of berm adjacent to the pond shall be at a 1:8 slope or flatter. For wet ponds, keep the lowest point of the maintenance berm at least 1 foot above the top of the treatment volume to minimize saturation of the maintenance berm. 1 ft. of freeboard is required above the maximum DHW. Inside edge of the berm shall have a minimum 30 ft. radius to accommodate the largest maintenance equipment.
	Maximum Side Slopes for Ditches/Canals		Based on FDOT Clear Zone Criteria
	Maximum Side Slopes for Ponds	All detention or retention system, side slopes can be no steeper than 1:4 out to a depth of 2-feet below the control elevation. 6 foot chain link fence or other protection is required if slopes are steeper than 1:4	Use a 1:4 side slope for ease with maintenance. Side slopes steeper than 1:3 require special equipment for mowing.



Drainage Design Criteria Matrix
SR 33 PD and E Study
From Old Combee Road to North of Tomkow Road
Polk County, Florida

FPID 430185-1-22-01

Design Parameter		SWFWMD Criteria	FDOT Criteria	Drainage Criteria to be Used
Open Drainage Facilities (Ponds, Ditches, Canals)	Minimum Longitudinal Slope	N/A	0.0005 ft./ft.	FDOT
	Minimum Bottom Width	N/A	Where possible, V-bottom shall be avoided.	FDOT
	Tailwater Conditions for Ponds	Must follow one of the following conditions: 1.)Max. stage in receiving water for the mean annual 24-hour storm. (Figure 9-2, SWFWMD Applicant's Handbook). Lower stages may be utilized if the applicant can demonstrate that the flow from the pond will reach the receiving water prior to the maximum stage of the receiving water. or 2.)Mean annual seasonal high water table elevation determined by water lines on vegetation or structures, historical data, adventitious roots or other hydrological or biological indicators.	Free flowing ditches - normal depth in the ditch at the storm drain outlet for storm drain design event (may differ from ditch design event). For ditches with downstream control - the higher of the stage due to free flow conditions or the maximum stage at the storm drain outlet due to backwater from the downstream control using flows from the storm drain design event. When discharging to existing storm drain systems - the tailwater shall be the elevation of the HGL of the existing system at the location of the connection for the storm drain design storm event.	SWFWMD and FDOT
	Erosion Control Measures (by max. velocity)	N/A	Grass with Mulch - Bare Soil, Sod - 4 fps max vel., Riprap (rubble) ditch lining - 6 fps max vel. (refer to FDOT Drainage Manual, Table 2.4)	FDOT



Drainage Design Criteria Matrix
SR 33 PD and E Study
From Old Combee Road to North of Tomkow Road
Polk County, Florida

FPID 430185-1-22-01

Design Parameter		SWFWMD Criteria	FDOT Criteria	Drainage Criteria to be Used
Open Drainage Facilities (Ponds, Ditches, Canals)	Minimum Freeboard	N/A	1 ft. between inside maintenance berm EL. and DHW elevation.	FDOT
	Swales	Treatment volume: Refer to dry retention systems (linear swales criteria)	Swale drainage permitted on soils conducive to meet drawdown requirements established by SWFWMD.	SWFWMD and FDOT
Flood plain encroachment		Any required compensating storage shall be equivalently provided between the seasonal high water level and the 100-year flood level		

Criteria Sources:

1. SWFWMD - Environmental Resource Permit Applicant's Handbook Volume II (10/01/2013)
2. FDOT - Drainage Manual (07/2013), Drainage Handbook Culvert Design (01/2004), Drainage Handbook Hydrology (01/2004), Drainage Handbook Erosion and Sediment Control (02/2002), Drainage Handbook Storm Drains (02/2012), Drainage Handbook Stormwater Mgmt. Facility (01/2004), Drainage Handbook Temporary Drainage Design (10/2001)

SR 33 Dry Linear Pond Soil Summary							
Basin	Pond	Water Table Elev. (ft)	Base of Aquifer Elev. (ft)	Horizontal Saturated Hydraulic Conductivity - Factor of Safety 2 (Kh) (ft/day)	Fillable Porosity (n) (%)	Vertical Infiltration Rate (v) (ft/day)	Source of Geotech Data Used for Recovery
E	E	135.3	120.3	17.0	20	11.3	Pond E Geotech from SWFWMD Permit No. 2832
1	1	134	119	11.5	20	7.7	Pond C-3 Geotech Data (Soil boring TH-18) from SWFWMD Permit No. 2832
2	2	135	120	20.0	25	20.0	Soil boring SH-2 & SH-3 used for the Water Table Elevation (2 feet below existing ground). All other data are average values extracted from NRCS Web Soil Survey.
3	3	130.8	130	6.0	25	4.0	Pond 100B Geotech Data from SWFWMD Permit No. 7112
4	4	130.8	130	6.0	25	4.0	Pond 100A Geotech Data from SWFWMD Permit No. 7112
6	6	137	122	6.0	25	6.0	Soil boring SH-7 used for the Water Table Elevation (1 foot below existing ground). All other data are average values extracted from NRCS Web Soil Survey.
7	7	135.5	122	6.0	25	6.0	NRCS Web Soil Survey was used for all geotech data including the water table elevation (0.5 foot below existing ground).

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

TWENTY FOUR HOUR
TWENTY FIVE YEAR
RETURN PERIOD
RAINFALL MAP

SWFWMD Rainfall
(25yr/24hr): P = 7.5 in



- LEGEND
- RAINFALL CONTOUR IN INCHES.
 - BOUNDARY OF THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
 - - - COUNTY BOUNDARY

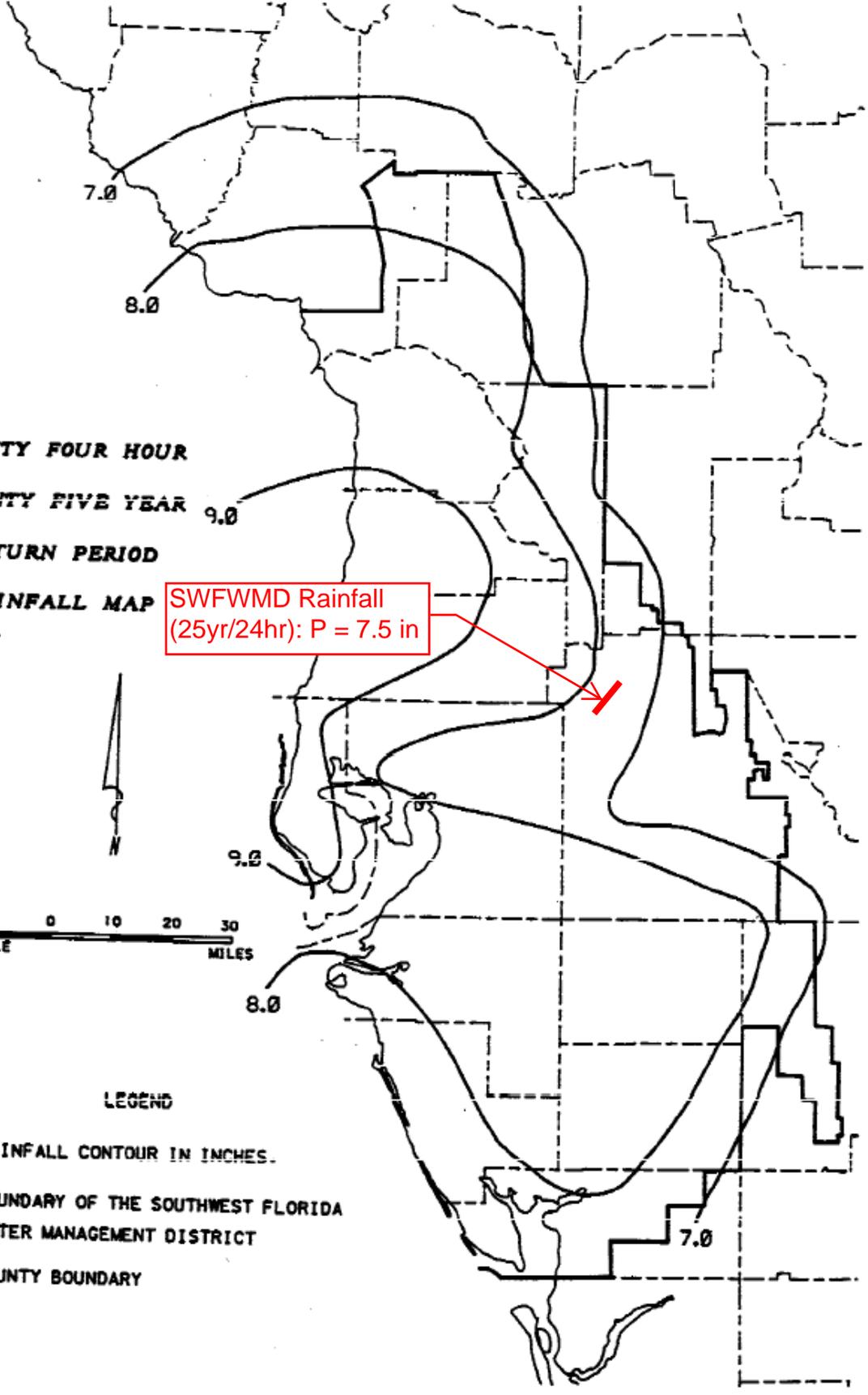
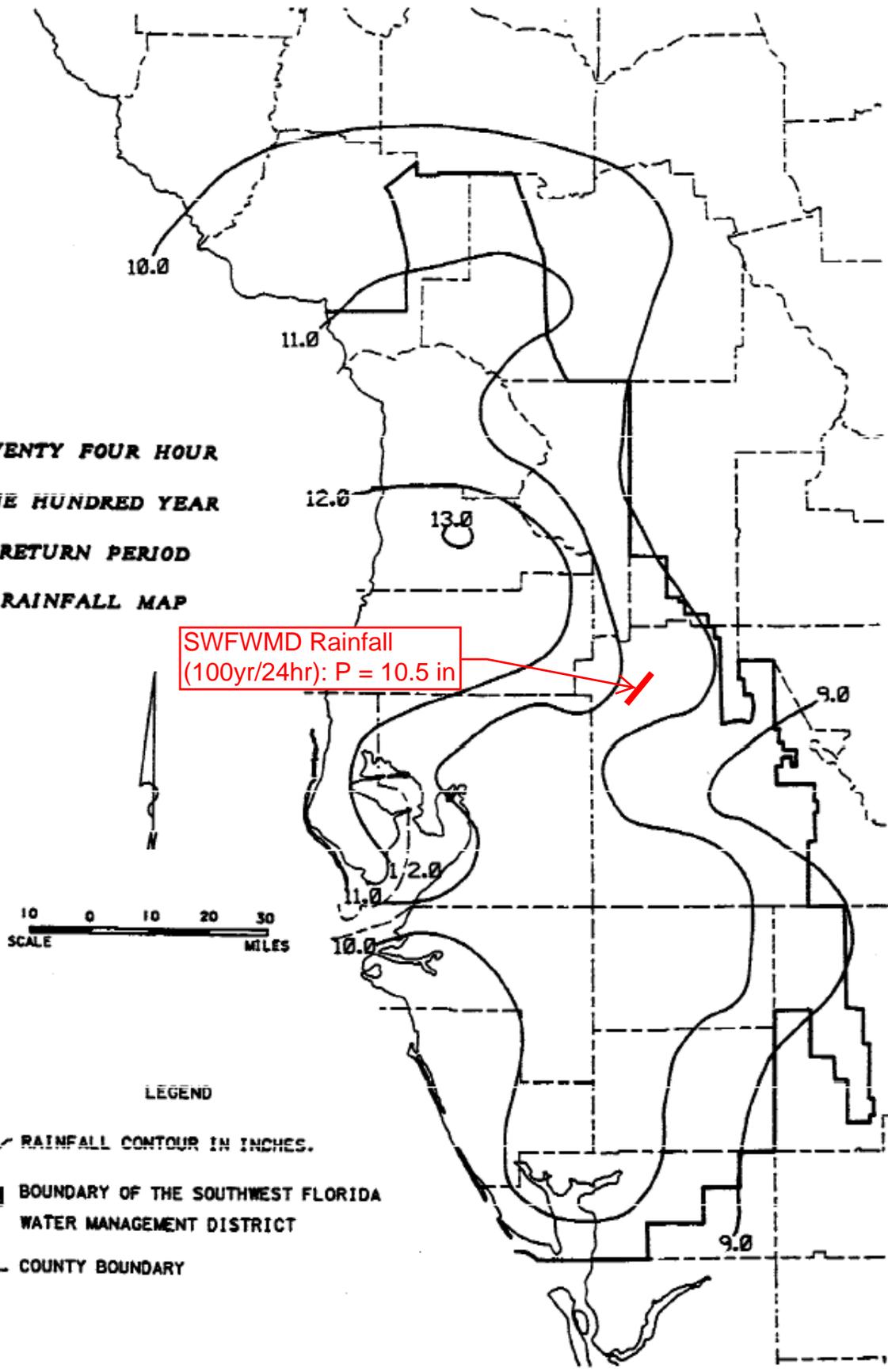


FIGURE D-5

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

**TWENTY FOUR HOUR
ONE HUNDRED YEAR
RETURN PERIOD
RAINFALL MAP**



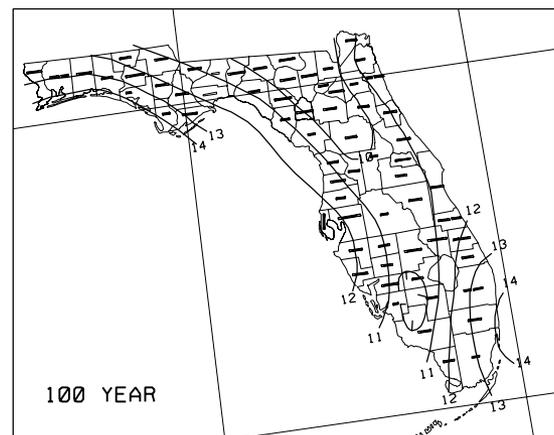
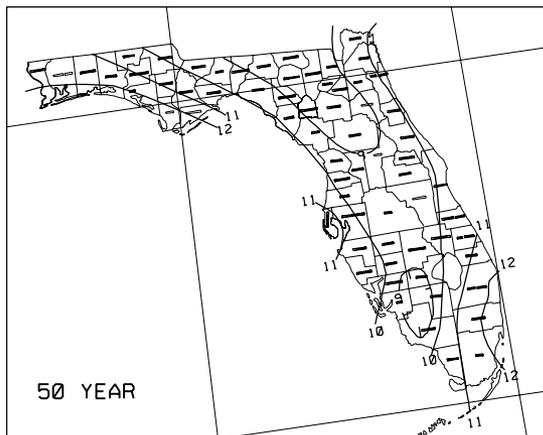
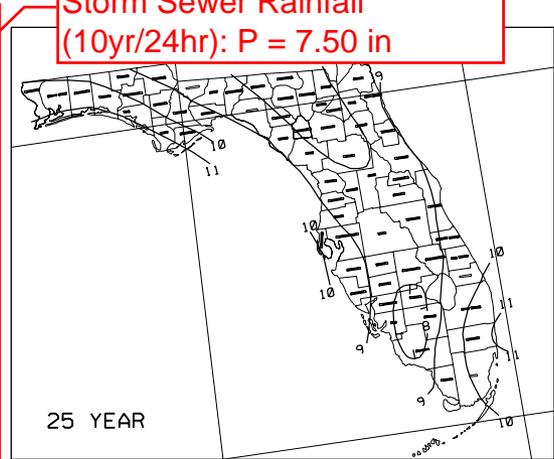
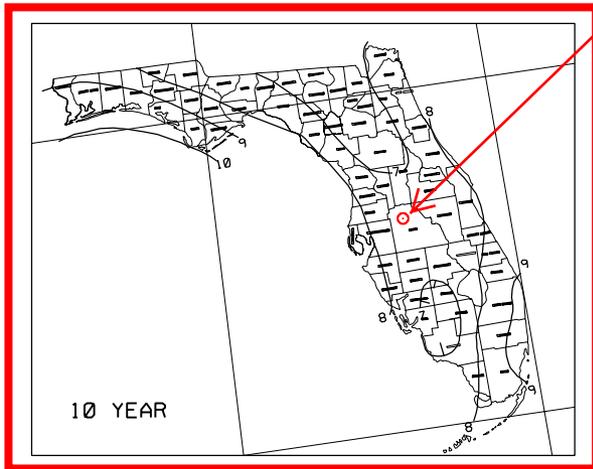
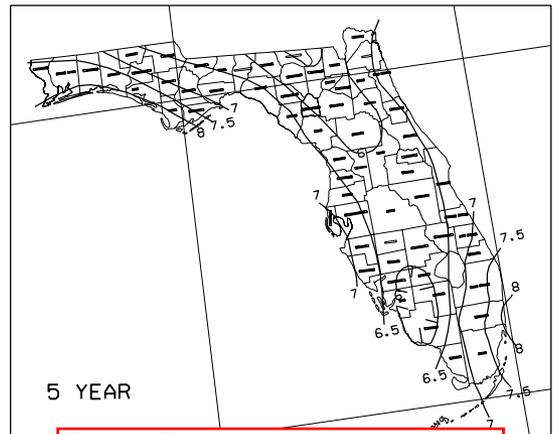
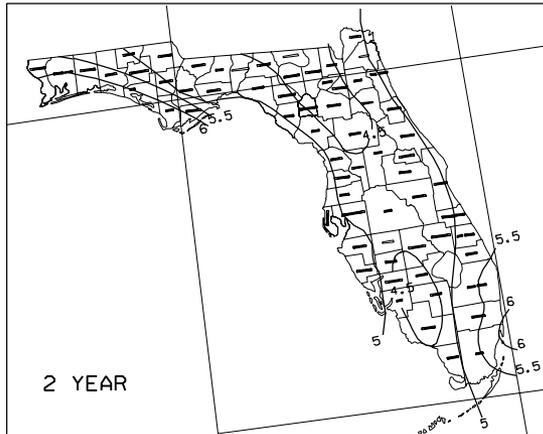
SWFWMD Rainfall
(100yr/24hr): P = 10.5 in

- LEGEND**
- 10- RAINFALL CONTOUR IN INCHES.
 - BOUNDARY OF THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
 - COUNTY BOUNDARY

FIGURE D-7

PRECIPITATION DEPTH DATA FOR 2-, 5-, 10-, 25-, 50-, AND 100-YEAR FREQUENCIES

1 DAY



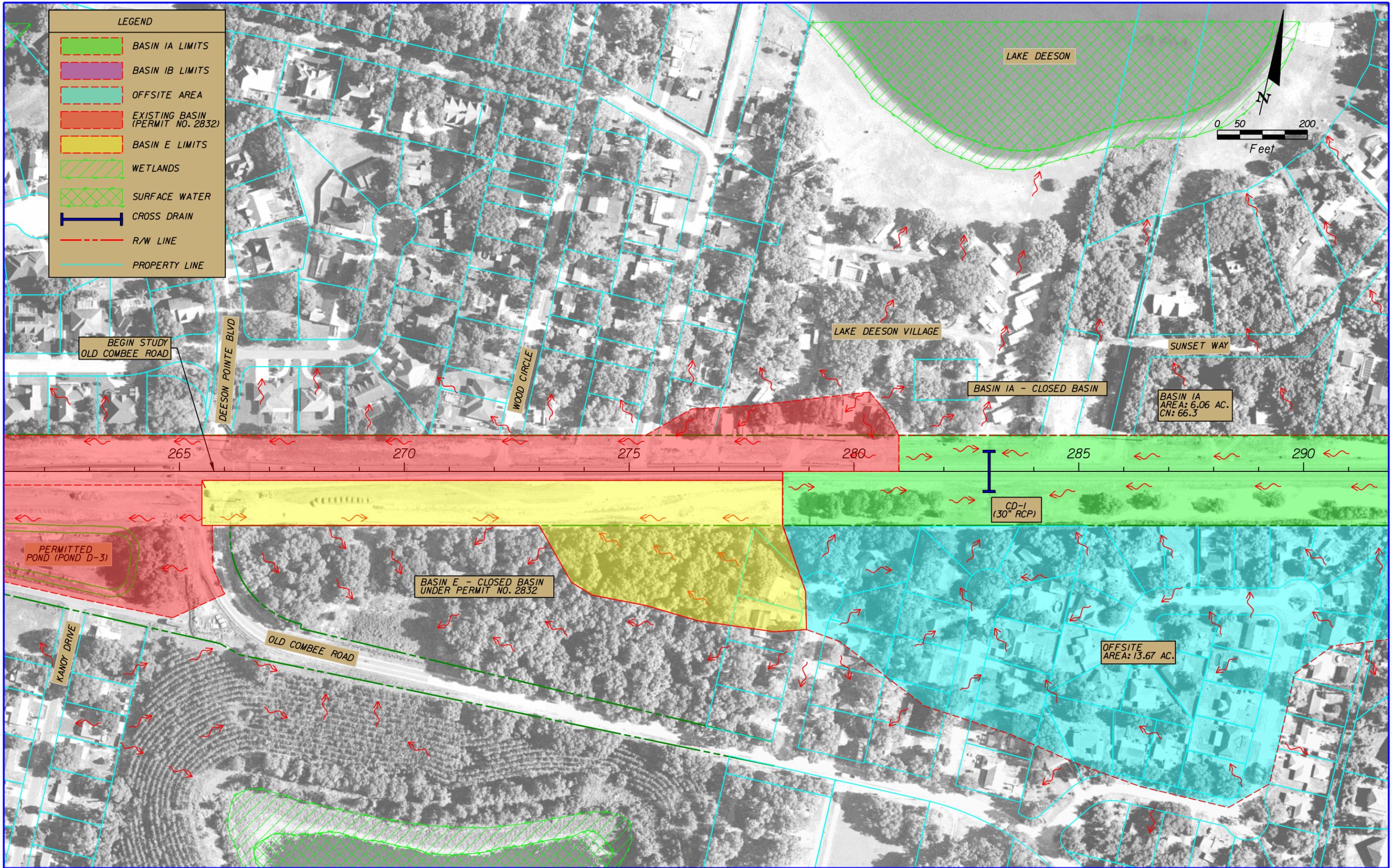
Storm Sewer Rainfall
(10yr/24hr): P = 7.50 in

ALL DEPTH CONTOURS IN INCHES

Appendix 3

Pond Design Calculations and Basin Exhibits

Basin E and Basin 1



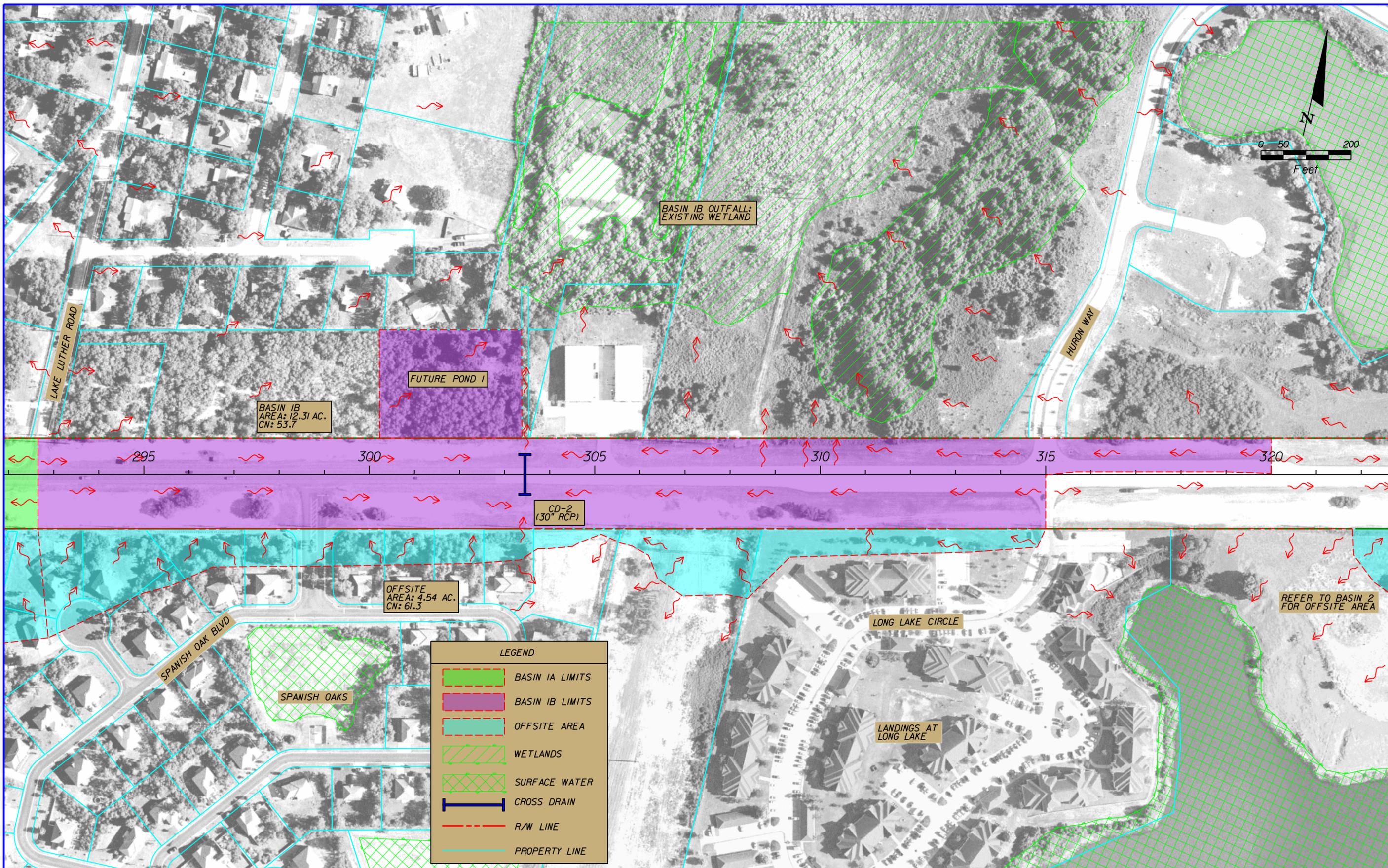
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

Inwood Consulting Engineers, Inc.
 3000 Dovera Drive, Suite 200, Oviedo, Florida 32765
 P 407.971.8850

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

**PRE-DEVELOPMENT
 BASIN E & 1 MAP (1 OF 2)**

SHEET NO.



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

Inwood Consulting Engineers, Inc.
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 P 407.971.8850

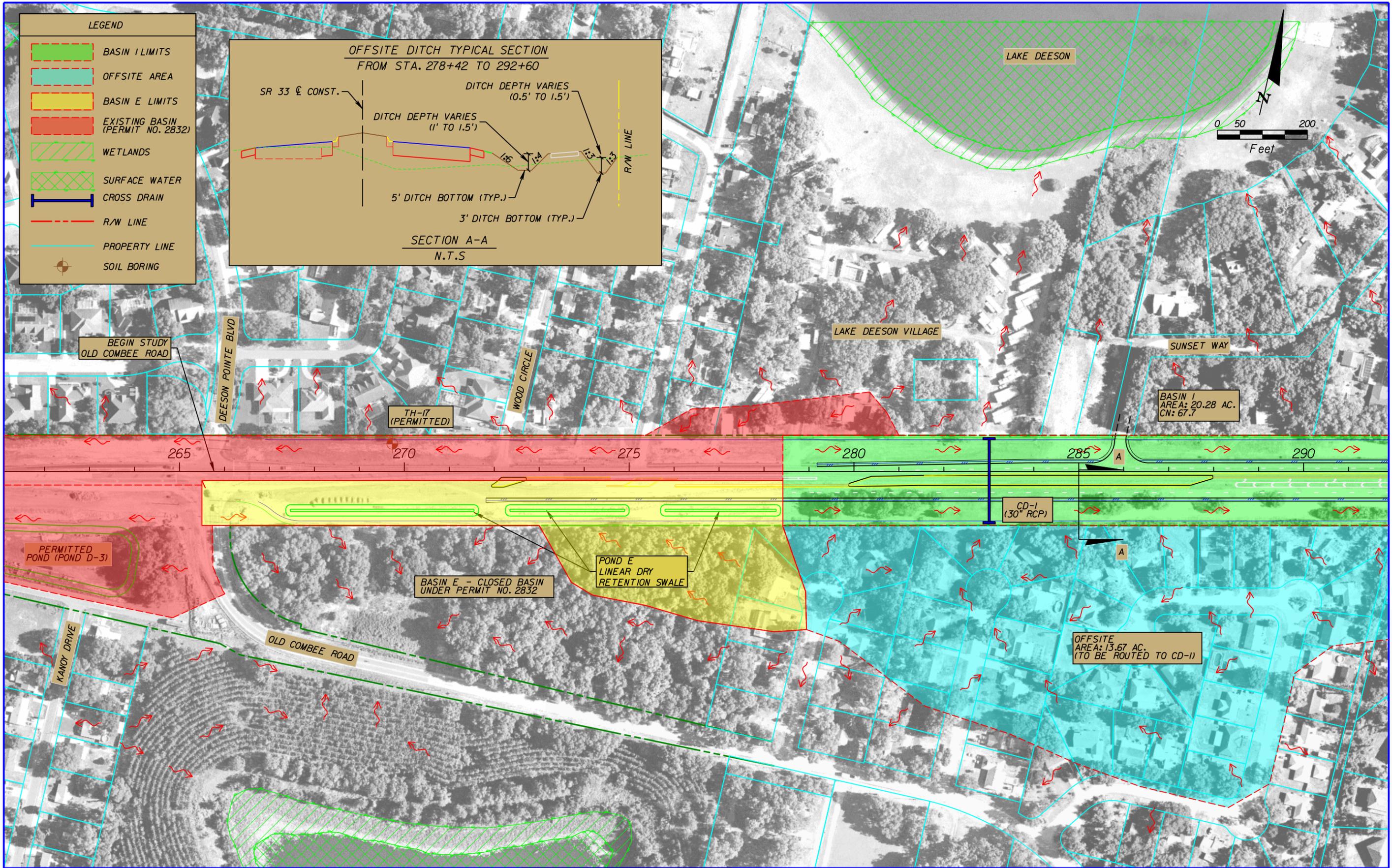
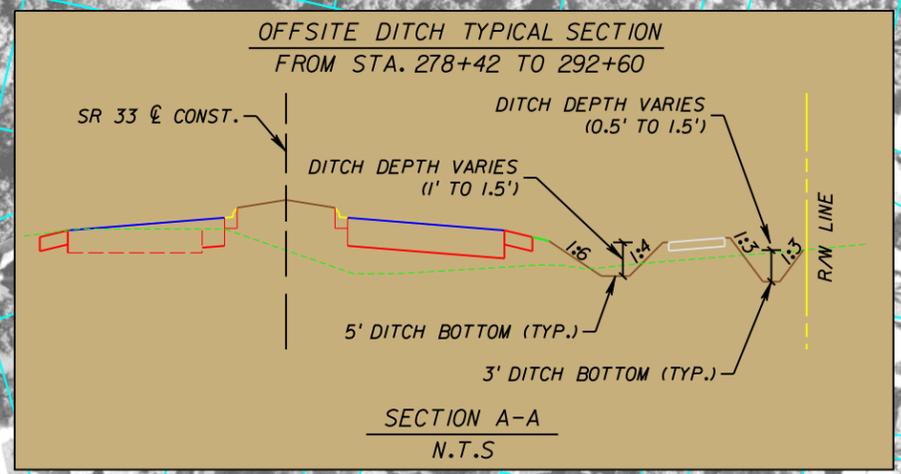
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

PRE-DEVELOPMENT
BASIN E & 1 MAP (2 OF 2)

SHEET NO.

LEGEND

- BASIN I LIMITS
- OFFSITE AREA
- BASIN E LIMITS
- EXISTING BASIN (PERMIT NO. 2832)
- WETLANDS
- SURFACE WATER
- CROSS DRAIN
- R/W LINE
- PROPERTY LINE
- SOIL BORING



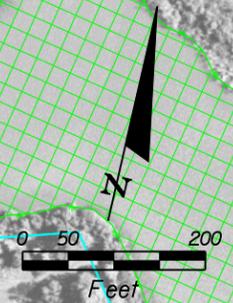
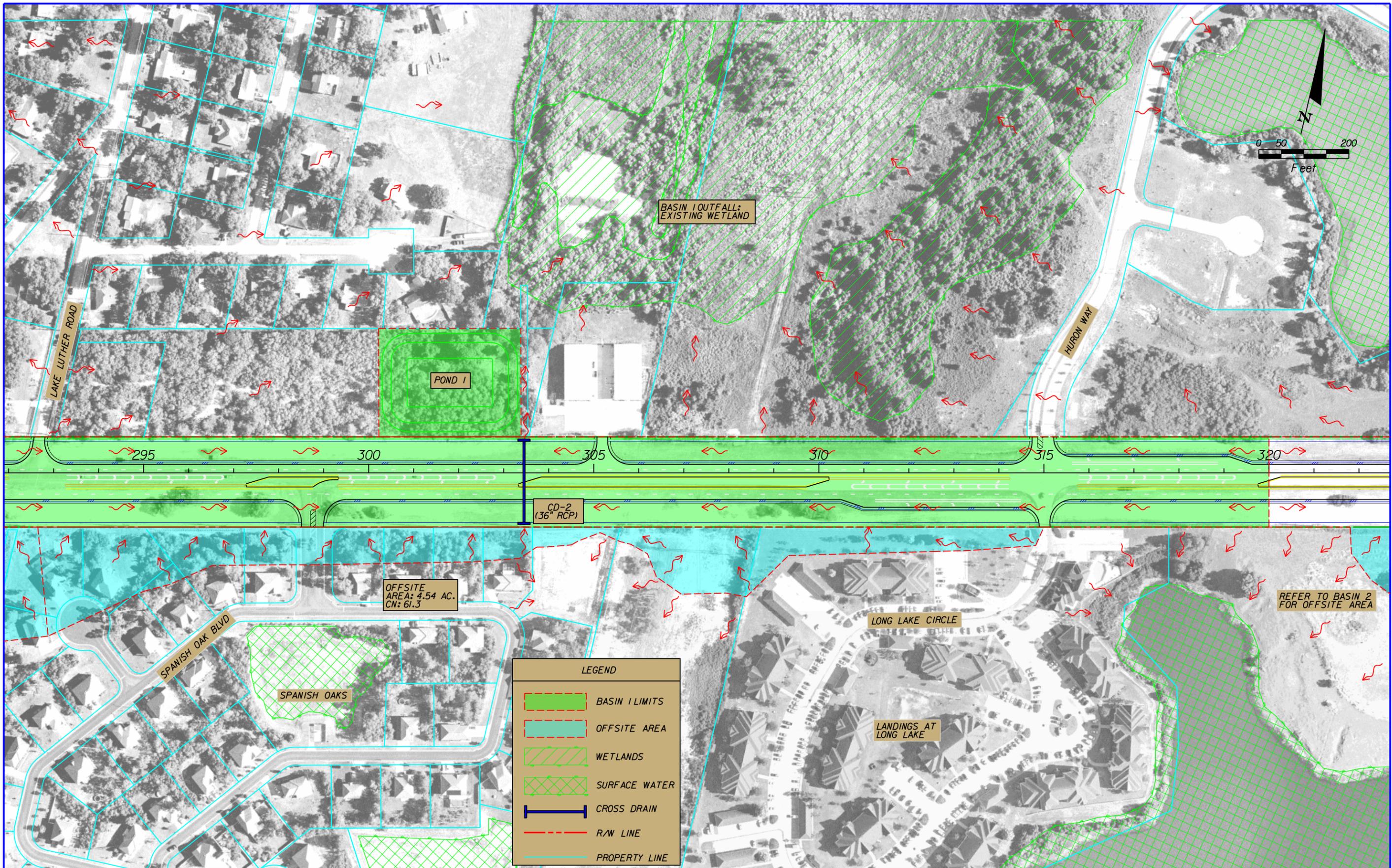
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
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**POST-DEVELOPMENT
BASIN E & 1 MAP (1 OF 2)**

SHEET
NO.



LEGEND	
	BASIN 1 LIMITS
	OFFSITE AREA
	WETLANDS
	SURFACE WATER
	CROSS DRAIN
	R/W LINE
	PROPERTY LINE

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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**POST-DEVELOPMENT
 BASIN E & 1 MAP (2 OF 2)**

SHEET NO.

Basin E

Inwood Consulting Engineers
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 (407) 971-8955 (fax)

Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **E**
 POND NAME : **Swale E**

EXISTING CONDITION (BASIN E-1)

(Refer to Permit No. 2832 for Existing Basin Area)

Total Area: Impervious Area: **0.51 ac**
 Pervious Area: **1.37 ac**
 Total Area: **1.88 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	0.51 ac	50.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	1.37 ac	53.4
			Total:	103.4
			1.88 ac	

CN = Total CN*Area / Total Area = **55.0**

Runoff:

SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)
------------------------	-------------------------------

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **8.18 in**

Precipitation (P) = **10.30 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **4.46 in** | **2.45 in**

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 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **E**
 POND NAME : **Swale E**

EXISTING CONDITION (Basin E-2)

(Refer to Permit No. 2832 for Existing Basin Area)

Total Area: Impervious Area: **0.25 ac**
 Pervious Area: **1.43 ac**
 Total Area: **1.68 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	0.25 ac	24.5
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	1.43 ac	55.8
			Total:	80.3
			1.68 ac	

CN = Total CN*Area / Total Area = **47.8**

Runoff:

SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)
------------------------	-------------------------------

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **10.93 in**

Precipitation (P) = **10.30 in** **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **3.46 in** **1.74 in**

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 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **E**
 POND NAME : **Swale E**

Total Offsite Area (OS-2): Impervious Area: **0.10 ac**
 Pervious Area: **2.28 ac**
 Total Area: **2.38 ac** (Refer to Permit No. 2832 for Existing Basin Area)

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	0.10 ac	9.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	2.28 ac	88.9
			Total:	98.7
			2.38 ac	

CN = Total CN*Area / Total Area = **41.5**

Runoff:

SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)
------------------------	-------------------------------

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **14.11 in**

Precipitation (P) = **10.30 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **2.59 in** | **1.16 in**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **E**
 POND NAME : **Swale E**

Station Limits: From: 265+50 Roadway Length = 1292 ft
 To: 278+42 Basin Width = 100.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	2	24.0 ft
Paved Shoulder	9.0	1	9.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	0	0.0 ft
Curb & Gutter	2.25	1	2.3 ft
Shared-Use Path	10.0	1	10.0 ft
Barrier Wall			
Total Impervious Width:			45.3 ft

Impervious Roadway Area: 1.34 ac
 *Additional Impervious Roadway Area: 0.42 ac
 Pervious Roadway Area: 1.20 ac
 Total Roadway Area: 2.97 ac

*Note: Additional area such as turn lanes, intersection layouts, and etc. are measured in microstation.

Total Area: Impervious Area: 1.76 ac
 Pervious Area: 1.20 ac
 Water Surface Area: 0.00 ac
 Total Area: 2.97 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	1.76 ac	172.7
Proposed Roadway Pervious	A	39	1.20 ac	47.0
Total:			2.97 ac	219.6

CN = Total CN*Area / Total Area = **74.1**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **3.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)
------------------------	-------------------------------

Precipitation (P) = **10.30 in** | **7.50 in**

Runoff (Q) = **7.03 in** | **4.49 in**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **E**
 POND NAME : **Swale E**

Total Offsite Area (OS-2):
 Impervious Area: **0.10 ac**
 Pervious Area: **2.28 ac**
 Total Area: **2.38 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	0.10 ac	9.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	2.28 ac	88.9
			Total:	98.7
			2.38 ac	

CN = Total CN*Area / Total Area = **41.5**

Runoff:

SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)
------------------------	-------------------------------

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **14.11 in**

Precipitation (P) = **10.30 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **2.59 in** | **1.16 in**

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Made by: SF
 Checked by: REC

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 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **E**
 POND NAME : **Swale E**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	SWFWMD
StormW.Mgmt.	Dry Retention
Online/Offline	Online
Impaired Water/OFW	No
Open/Closed Basin	Open

Dry Retention	0.50 in	x DCIA =	0.07 ac-ft
----------------------	----------------	----------	------------

(Directly Connected Impervious Area)

Treatment V_{req} = Largest of Trt. Vol. = **0.07 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)
Q_{pre} =	1.70 ac-ft	0.86 ac-ft
Q_{post} =	2.25 ac-ft	1.34 ac-ft
ΔQ =	0.56 ac-ft	0.48 ac-ft

Attenuation V_{req} = **0.56 ac-ft**

Inwood Consulting Engineers
 3000 Dovera Drive Suite 200, Oviedo, FL 32765
 (407) 971-8850 (phone)
 (407) 971-8955 (fax)

Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **E**
 POND NAME : **Swale E**

Pond Stage / Storage Calculations

Swale E Limits

from Station	266+10	to Station	271+65
from Station	272+25	to Station	275+00
from Station	275+70	to Station	278+37

Total Proposed Swale Length = 1097.0 ft

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
140.50	Top of Bank	0.63 ac	1097.0 ft	25.0 ft	0.75 ac-ft
140.20	Provided Attenuation Vol.	0.55 ac	1094.6 ft	22.0 ft	0.58 ac-ft
140.18	Required Attenuation Vol.	0.55 ac	1094.4 ft	21.8 ft	0.56 ac-ft
140.02	Estimated Storm Sewer TW	0.51 ac	1093.2 ft	20.2 ft	0.48 ac-ft
138.90	Top of Treatment Vol.	0.22 ac	1084.2 ft	9.0 ft	0.07 ac-ft
138.50	Pond Bottom	0.12 ac	1081.0 ft	5.0 ft	0.00 ac-ft

Required Attenuation Vol. = 0.56 ac-ft
 Required Attenuation Stage = 140.02 ft

Provided Attenuation Vol. = 0.58 ac-ft
 Provided Attenuation Stage = 140.20 ft

Storm Sewer Att.= 0.48 ac-ft
 Estimated Storm Sewer TW EL.= 138.90 ft

HGL requirements met

Pond Recovery:	1.5 hrs	< 72 hrs
(Recovery requirements per SWFWMD BOR Section 5.2)		

- Note: (1) Linear swale top width calculated using 1:6 FS, 1:4 BS, & 5-foot ditch bottom.
 (2) Proposed Pond Bottom lowered 0.5' from exist. pond bottom. Proposed Pond bottom 3.2' above SHGWT.
 (3) Please refer to ICPR data for Recovery Analysis.

Name: Filter Group: BASE
 Type: Rating Curve
 Function: US Stage vs. Discharge

US Stage(ft)	Discharge(cfs)
136.500	0.00
138.500	0.28
139.500	0.63
140.500	1.11
141.500	1.75
142.500	2.50

==== Drop Structures =====

```

Name: Post OF E                      From Node: Swale E                      Length(ft): 25.00
Group: BASE                            To Node: Post OS-2                      Count: 1

          UPSTREAM                    DOWNSTREAM                      Friction Equation: Average Conveyance
Geometry: Circular                    Circular                          Solution Algorithm: Automatic
Span(in): 18.00                       18.00                              Flow: Both
Rise(in): 18.00                       18.00                              Entrance Loss Coef: 0.000
Invert(ft): 137.500                   137.400                            Exit Loss Coef: 1.000
Manning's N: 0.012000                0.012000                          Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000                   0.000                              Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000                   0.000                              Solution Incs: 10
  
```

Upstream FHWA Inlet Edge Description:
 Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
 Circular Concrete: Square edge w/ headwall

Revised Outfall Structure to Type C-Mod to accommodate for future 10-foot trail.

*** Weir 1 of 1 for Drop Structure Post OF E ***

```

Count: 1                              Bottom Clip(in): 0.000                      TABLE
Type: Horizontal                      Top Clip(in): 0.000
Flow: Both                            Weir Disc Coef: 3.200
Geometry: Rectangular                Orifice Disc Coef: 0.600

Span(in): 49.00                       Invert(ft): 140.200
Rise(in): 37.00                       Control Elev(ft): 140.200
  
```

==== Weirs =====

```

Name: Post OF OS-2                    From Node: Post OS-2
Group: BASE                            To Node: Post TW-E
Flow: Both                            Count: 1
Type: Vertical: Mavis                 Geometry: Trapezoidal

Bottom Width(ft): 60.00
Left Side Slope(h/v): 30.00
Right Side Slope(h/v): 30.00
Invert(ft): 139.500
Control Elevation(ft): 139.500
Struct Opening Dim(ft): 9999.00

                                      TABLE
Bottom Clip(ft): 0.000
Top Clip(ft): 0.000
Weir Discharge Coef: 3.200
Orifice Discharge Coef: 0.600
  
```

==== Percolation Links =====

```

Name: PER E                            From Node: Swale E                      Flow: Both
Group: BASE                            To Node: GWT E                         Count: 1

Surface Area Option: Vary based on Stage/Area Table
Vertical Flow Termination: Horizontal Flow Algorithm
Aquifer Base Elev(ft): 120.300                      Perimeter 1(ft): 2334.000
Water Table Elev(ft): 135.300                      Perimeter 2(ft): 2648.000
Ann Recharge Rate(in/year): 0.000                   Perimeter 3(ft): 4533.000
  
```

Horiz Conductivity(ft/day): 17.000	Distance 1 to 2(ft): 50.000
Vert Conductivity(ft/day): 34.000	Distance 2 to 3(ft): 300.000
Effective Porosity(dec): 0.200	Num Cells 1 to 2: 10
Suction Head(in): 4.170	Num Cells 2 to 3: 40
Layer Thickness(ft): 3.700	

Modified PER E based on SR 33 Widening

Name: PER OS-2	From Node: Post OS-2	Flow: Both
Group: BASE	To Node: GWT E	Count: 1

Surface Area Option: Vary based on Stage/Area Table	
Vertical Flow Termination: Horizontal Flow Algorithm	
Aquifer Base Elev(ft): 120.300	Perimeter 1(ft): 325.000
Water Table Elev(ft): 135.300	Perimeter 2(ft): 760.000
Ann Recharge Rate(in/year): 0.000	Perimeter 3(ft): 1520.000
Horiz Conductivity(ft/day): 17.000	Distance 1 to 2(ft): 50.000
Vert Conductivity(ft/day): 34.000	Distance 2 to 3(ft): 300.000
Effective Porosity(dec): 0.200	Num Cells 1 to 2: 10
Suction Head(in): 4.170	Num Cells 2 to 3: 40
Layer Thickness(ft): 3.700	

==== Hydrology Simulations =====

Name: 100YR24HR
 Filename: F:\Projects\DT1-017-01\admin\drainage\PSR\Appendix 3 - Pond Design Calculations\ICPR\Basin E\Post - Permitted\100

Override Defaults: Yes
 Storm Duration(hrs): 24.00
 Rainfall File: Flmod
 Rainfall Amount(in): 10.30

Time(hrs)	Print Inc(min)
-----	-----
72.000	5.00

Name: 100YR72HR
 Filename: F:\Projects\DT1-017-01\admin\drainage\PSR\Appendix 3 - Pond Design Calculations\ICPR\Basin E\Post - Permitted\100

Override Defaults: Yes
 Storm Duration(hrs): 24.00
 Rainfall File: Flmod
 Rainfall Amount(in): 13.40

Time(hrs)	Print Inc(min)
-----	-----
80.000	5.00

==== Routing Simulations =====

Name: 100YR24HR Hydrology Sim: 100YR24HR
 Filename: F:\Projects\DT1-017-01\admin\drainage\PSR\Appendix 3 - Pond Design Calculations\ICPR\Basin E\Post - Permitted\100

Execute: Yes Restart: No Patch: No
 Alternative: No

Max Delta Z(ft): 1.00	Delta Z Factor: 0.00500
Time Step Optimizer: 10.000	
Start Time(hrs): 0.000	End Time(hrs): 72.00
Min Calc Time(sec): 0.5000	Max Calc Time(sec): 60.0000
Boundary Stages:	Boundary Flows:

Time(hrs)	Print Inc(min)
-----	-----
999.000	15.000

Group	Run
-----	-----
BASE	Yes

Name: 100YR72HR Hydrology Sim: 100YR72HR
 Filename: F:\Projects\DT1-017-01\admin\drainage\PSR\Appendix 3 - Pond Design Calculations\ICPR\Basin E\Post - Permitted\100

Execute: Yes	Restart: No	Patch: No
Alternative: No		
Max Delta Z(ft): 1.00		Delta Z Factor: 0.00500
Time Step Optimizer: 10.000		
Start Time(hrs): 0.000		End Time(hrs): 80.00
Min Calc Time(sec): 0.5000	Max	Calc Time(sec): 60.0000
Boundary Stages:		Boundary Flows:

Time(hrs)	Print Inc(min)
-----	-----
999.000	15.000
Group	Run
-----	-----
BASE	Yes

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
GWT E	BASE	100YR24HR	0.00	0.00	0.00	0.0000	0	12.31	6.05	0.00	0.00
Post OS-2	BASE	100YR24HR	13.69	139.51	140.00	0.0033	10590	12.17	3.13	12.43	2.69
Post TW-E	BASE	100YR24HR	0.00	139.00	141.00	0.0000	0	13.69	0.29	0.00	0.00
Swale E	BASE	100YR24HR	12.86	140.19	140.25	0.0050	23883	12.00	15.74	12.12	3.65
GWT E	BASE	100YR72HR	0.00	0.00	0.00	0.0000	0	12.28	7.92	0.00	0.00
Post OS-2	BASE	100YR72HR	12.53	139.63	140.00	0.0032	11774	12.37	12.21	12.40	12.10
Post TW-E	BASE	100YR72HR	0.00	139.00	141.00	0.0000	0	12.53	9.04	0.00	0.00
Swale E	BASE	100YR72HR	12.40	140.49	140.25	0.0050	27299	12.00	22.04	12.38	10.18

Name: Filter Group: BASE
 Type: Rating Curve
 Function: US Stage vs. Discharge

US Stage(ft)	Discharge(cfs)
136.500	0.00
138.500	0.28
139.500	0.63
140.500	1.11
141.500	1.75
142.500	2.50

==== Drop Structures =====

```

Name: Post OF E                      From Node: Swale E                      Length(ft): 25.00
Group: BASE                            To Node: Post OS-2                      Count: 1

          UPSTREAM                    DOWNSTREAM                      Friction Equation: Average Conveyance
Geometry: Circular                    Circular                          Solution Algorithm: Automatic
Span(in): 18.00                       18.00                              Flow: Both
Rise(in): 18.00                       18.00                              Entrance Loss Coef: 0.000
Invert(ft): 137.500                   137.400                            Exit Loss Coef: 1.000
Manning's N: 0.012000                0.012000                          Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000                   0.000                              Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000                   0.000                              Solution Incs: 10
  
```

Upstream FHWA Inlet Edge Description:
 Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
 Circular Concrete: Square edge w/ headwall

Revised Outfall Structure to Type C-Mod to accommodate for future 10-foot trail.

*** Weir 1 of 1 for Drop Structure Post OF E ***

```

Count: 1                              Bottom Clip(in): 0.000                      TABLE
Type: Horizontal                      Top Clip(in): 0.000
Flow: Both                            Weir Disc Coef: 3.200
Geometry: Rectangular                Orifice Disc Coef: 0.600

Span(in): 49.00                       Invert(ft): 140.200
Rise(in): 37.00                       Control Elev(ft): 140.200
  
```

==== Weirs =====

```

Name: Post OF OS-2                    From Node: Post OS-2
Group: BASE                            To Node: Post TW-E
Flow: Both                            Count: 1
Type: Vertical: Mavis                 Geometry: Trapezoidal

Bottom Width(ft): 60.00
Left Side Slope(h/v): 30.00
Right Side Slope(h/v): 30.00
          Invert(ft): 139.500
Control Elevation(ft): 139.500
Struct Opening Dim(ft): 9999.00

                                      TABLE
Bottom Clip(ft): 0.000
Top Clip(ft): 0.000
Weir Discharge Coef: 3.200
Orifice Discharge Coef: 0.600
  
```

==== Percolation Links =====

```

Name: PER E                            From Node: Swale E                      Flow: Both
Group: BASE                            To Node: GWT E                         Count: 1

Surface Area Option: Vary based on Stage/Area Table
Vertical Flow Termination: Horizontal Flow Algorithm
Aquifer Base Elev(ft): 120.300                      Perimeter 1(ft): 2334.000
Water Table Elev(ft): 135.300                      Perimeter 2(ft): 2648.000
Ann Recharge Rate(in/year): 0.000                   Perimeter 3(ft): 4533.000
  
```

Horiz Conductivity(ft/day): 17.000	Distance 1 to 2(ft): 50.000
Vert Conductivity(ft/day): 34.000	Distance 2 to 3(ft): 300.000
Effective Porosity(dec): 0.200	Num Cells 1 to 2: 10
Suction Head(in): 4.170	Num Cells 2 to 3: 40
Layer Thickness(ft): 3.700	

Modified PER E based on SR 33 Widening

 Name: PER OS-2 From Node: Post OS-2 Flow: Both
 Group: BASE To Node: GWT E Count: 1

Surface Area Option: Vary based on Stage/Area Table
 Vertical Flow Termination: Horizontal Flow Algorithm
 Aquifer Base Elev(ft): 120.300 Perimeter 1(ft): 325.000
 Water Table Elev(ft): 135.300 Perimeter 2(ft): 760.000
 Ann Recharge Rate(in/year): 0.000 Perimeter 3(ft): 1520.000
 Horiz Conductivity(ft/day): 17.000 Distance 1 to 2(ft): 50.000
 Vert Conductivity(ft/day): 34.000 Distance 2 to 3(ft): 300.000
 Effective Porosity(dec): 0.200 Num Cells 1 to 2: 10
 Suction Head(in): 4.170 Num Cells 2 to 3: 40
 Layer Thickness(ft): 3.700

=====
 Routing Simulations =====
 =====

Name: 100YR24HR Hydrology Sim:
 Filename: F:\Projects\DT1-017-01\admin\drainage\PSR\Appendix 3 - Pond Design Calculations\ICPR\Basin E\Post - Modified\RECO

Execute: Yes	Restart: No	Patch: No
Alternative: No		
Max Delta Z(ft): 1.00		Delta Z Factor: 0.00500
Time Step Optimizer: 10.000		End Time(hrs): 72.00
Start Time(hrs): 0.000		Max Calc Time(sec): 60.0000
Min Calc Time(sec): 0.5000		Boundary Flows:
Boundary Stages:		

Time(hrs)	Print Inc(min)
-----	-----
999.000	15.000
Group	Run
-----	-----
BASE	Yes

SR 33 Basin E Permitted Model - SWFWMD Permit No. 2832
 BASIN E MODIFIED - RECOVERY RESULTS

Simulation	Node	Group	Time hrs	Stage ft	Warning Stage ft	Surface Area ft2	Total Inflow cfs	Total Outflow cfs	Total Vol In af	Total Vol Out af
100YR24HR	Swale E	BASE	0.00	140.20	140.25	23958	0.00	0.00	0.0	0.0
100YR24HR	Swale E	BASE	0.25	139.85	140.25	20091	0.00	7.91	0.0	0.1
100YR24HR	Swale E	BASE	0.50	139.49	140.25	16169	0.00	6.36	0.0	0.2
100YR24HR	Swale E	BASE	0.75	139.14	140.25	12301	0.00	4.84	0.0	0.3
100YR24HR	Swale E	BASE	1.00	138.80	140.25	8571	0.00	2.85	0.0	0.4
100YR24HR	Swale E	BASE	1.25	138.51	140.25	5373	0.00	1.75	0.0	0.5
100YR24HR	Swale E	BASE	1.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	1.75	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	2.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	2.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	2.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	2.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	3.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	3.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	3.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	3.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	4.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	4.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	4.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	4.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	5.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	5.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	5.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	5.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	6.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	6.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	6.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	6.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	7.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	7.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	7.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	7.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	8.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	8.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	8.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	8.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	9.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	9.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	9.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	9.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	10.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	10.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	10.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	10.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	11.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	11.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	11.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	11.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	12.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	12.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	12.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	12.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	13.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	13.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	13.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	13.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	14.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	14.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	14.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	14.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	15.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	15.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	15.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	15.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	16.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	16.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	16.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	16.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	17.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	17.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	17.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	17.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	18.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	18.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	18.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	18.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	19.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	19.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	19.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	19.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	20.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	20.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	20.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	20.76	138.50	140.25	5227	0.00	0.00	0.0	0.5

SR 33 Basin E Permitted Model - SWFWMD Permit No. 2832
 BASIN E MODIFIED - RECOVERY RESULTS

Simulation	Node	Group	Time hrs	Stage ft	Warning Stage ft	Surface Area ft2	Total Inflow cfs	Total Outflow cfs	Total Vol In af	Total Vol Out af
100YR24HR	Swale E	BASE	63.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	63.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	63.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	63.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	64.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	64.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	64.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	64.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	65.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	65.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	65.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	65.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	66.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	66.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	66.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	66.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	67.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	67.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	67.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	67.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	68.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	68.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	68.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	68.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	69.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	69.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	69.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	69.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	70.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	70.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	70.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	70.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	71.01	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	71.26	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	71.51	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	71.76	138.50	140.25	5227	0.00	0.00	0.0	0.5
100YR24HR	Swale E	BASE	72.01	138.50	140.25	5227	0.00	0.00	0.0	0.5

Basin 1 **(Offsite Alternative)**

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 (407) 971-8850 (phone)
 (407) 971-8955 (fax)

Made by: SF
 Checked by: REC

DATE: December 10, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **1A**
 POND NAME : **1**

EXISTING CONDITION (BASIN 1A)

Station Limits: From: **278+42** Roadway Length = 258 ft
 To: **281+00** R/W Width = **120.0 ft**

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder	5.0 ft	1	5 ft
Total Impervious Width:			17 ft

Station Limits: From: **281+00** Roadway Length = 1165 ft
 To: **292+65** R/W Width = **200.0 ft**

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	2	24 ft
Paved Shoulder	5.0 ft	2	10 ft
Total Impervious Width:			34 ft

Impervious Roadway Area: 1.01 ac
 *Misc. Impervious Roadway Area: 0.07 ac
 Pervious Roadway Area: 4.98 ac
 Total Roadway Area: 6.06 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = **0.00 ac**

Total Area: Impervious Area: **1.08 ac**
 Pervious Area: **4.98 ac**
 Total Area: **6.06 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	1.08 ac	105.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	2.07 ac	80.7
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	2.91 ac	215.3
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	0.00 ac	0.0
Total:			6.06 ac	401.9

CN = Total CN*Area / Total Area = **66.3**

Denotes Pond Area

Runoff:

SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)
------------------------	-------------------------------

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **5.08 in**

Precipitation (P) = **10.50 in** **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **6.18 in** **3.64 in**

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DATE: December 10, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **1B**
 POND NAME : **1**

EXISTING CONDITION (Basin 1B)

Station Limits: From: 292+65 Roadway Length = 2235 ft
 To: 315+00 R/W Width = 200.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	2	24 ft
Paved Shoulder	5.0 ft	2	10 ft
Total Impervious Width:			34 ft

Station Limits: From: 315+00 Roadway Length = 500 ft
 To: 320+00 R/W Width = 75.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder	5.0 ft	1	5 ft
Total Impervious Width:			17 ft

Impervious Roadway Area: 1.94 ac
 *Misc. Impervious Roadway Area: 0.85 ac
 Pervious Roadway Area: 8.33 ac
 Total Roadway Area: 11.12 ac

*Note: Measured in MicroStation.

Pond Area: Exist. Land = Open Space = 1.31 ac

Total Area: Impervious Area: 2.79 ac
 Pervious Area: 9.64 ac
 Total Area: 12.43 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	2.79 ac	273.4
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	7.87 ac	307.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	0.46 ac	34.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	1.31 ac	51.0
Total:			12.43 ac	665.6

CN = Total CN*Area / Total Area = **53.5**

Denotes Pond Area

Runoff:

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **8.68 in**

Precipitation (P) =

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
7.50 in	7.50 in

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) =

2.30 in	2.30 in
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Made by: SF
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DATE: December 10, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **1B**
 POND NAME : **1**

Total Offsite Area:
 Impervious Area: **0.10 ac**
 Pervious Area: **4.44 ac**
 Total Area: **4.54 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	0.10 ac	9.8
Residential Areas (1/2 acre, 25% Impervious)	A	54	3.34 ac	180.4
Residential Areas (1/2 acre, 25% Impervious)	C	80	1.10 ac	88.0
			Total:	278.2
			4.54 ac	

CN = Total CN*Area / Total Area = **61.3**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **6.32 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = **3.10 in** | **3.10 in**

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DATE: December 10, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : 1
 POND NAME : 1

Station Limits: From: 278+42 Roadway Length = 4158 ft
 To: 320+00 R/W Width = 200.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	4	48.0 ft
Paved Shoulder	9.0	2	18.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	1	5.0 ft
Curb & Gutter	2.25	2	4.5 ft
Shared-Use Path	10.0	1	10.0 ft
Barrier Wall			
Total Impervious Width:			85.5 ft

Impervious Roadway Area: 8.16 ac
 *Additional Impervious Roadway Area: 1.71 ac
 Pervious Roadway Area: 9.22 ac
 Total Roadway Area: 19.09 ac

*Note: Additional area such as turn lanes, intersection layouts, and etc. are measured in microstation.

Pond Area: Pervious Pond Area : 1.31 ac Dry Pond
 Water Surface Area: 0.00 ac
 Total Pond Area: 1.31 ac

Total Area: Impervious Area: 9.87 ac
 Pervious Area: 10.53 ac
 Water Surface Area: 0.00 ac
 Total Area: 20.40 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	9.87 ac	967.4
Proposed Roadway Pervious	A	39	9.22 ac	359.6
Proposed Pond Pervious	A	39	1.31 ac	51.0
Total:			20.40 ac	1378.0

CN = Total CN*Area / Total Area = **67.5**

Runoff:

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **4.80 in**

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **3.77 in** | **3.77 in**

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
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DATE: December 10, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **1**
 POND NAME : **1**

Total Offsite Area:
 Impervious Area: **0.10 ac**
 Pervious Area: **4.44 ac**
 Total Area: **4.54 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	0.10 ac	9.8
Residential Areas (1/2 acre, 25% Impervious)	A	54	3.34 ac	180.4
Residential Areas (1/2 acre, 25% Impervious)	C	80	1.10 ac	88.0
			Total: 4.54 ac	278.2

CN = Total CN*Area / Total Area = **61.3**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **6.32 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
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Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = **3.10 in** | **3.10 in**

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DATE: December 10, 2013
 Job Number: DT1-017-01

PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 1
 POND NAME : 1

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	SWFWMD
StormW.Mgmt.	Dry Retention
Online/Offline	Online
Impaired Water/OFW	No
Open/Closed Basin	Open

Dry Retention **0.50 in** x DCIA = 0.41 ac-ft
 (Directly Connected Impervious Area)

Treatment V_{req} = Largest of Trt. Vol. = **0.41 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Q_{pre} =	3.56 ac-ft	3.56 ac-ft
Q_{post} =	7.58 ac-ft	7.58 ac-ft
ΔQ =	4.02 ac-ft	4.02 ac-ft

Attenuation V_{req} = **4.02 ac-ft**

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **1**
 POND NAME : **1**

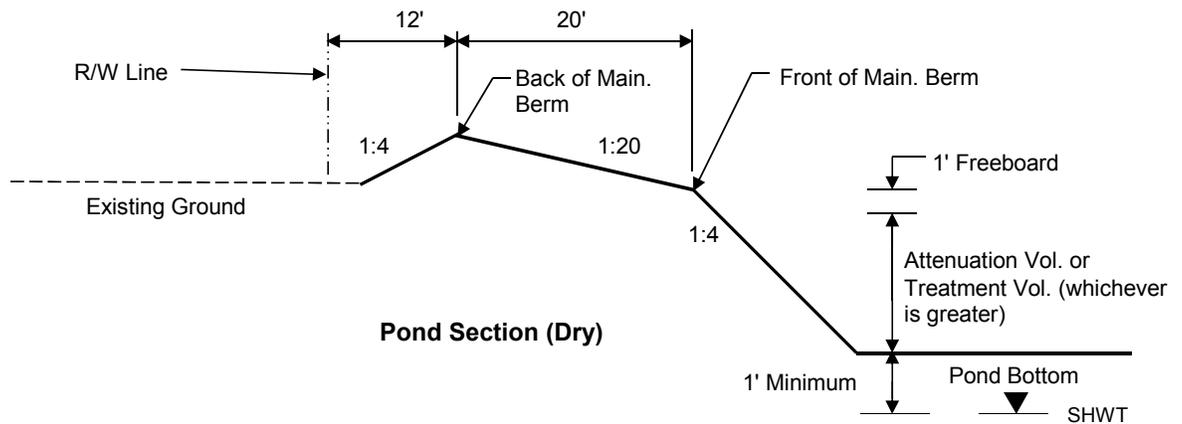
Maintenance Area Width = 20.0 ft @ 1:20
 Pond Tie-In Width = 11.6 ft @ 1:4
 Maximum Storage Depth (SD) = 6.34 ft with 1.0 ft freeboard

Existing Ground Elevation = 140.00
 *Normal Water Elevation = 133.50
 Lowest EOP Elevation = 143.00

Hydraulic Grade Line (HGL) check

**Note: NWL based on NRCS Web Soil Survey*

HGL Slope = 0.050% Use 0.05% for very flat terrain to 0.1% for flat terrain
 Distance from Pond to Lowest EOP = 200 ft
 Estimated Energy Losses = 0.10 ft
 HGL Clearance = 2.0 ft Open drainage (ditch) system.
 Maximum Storm Sewer Tailwater EL = 140.90 ft



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DATE: December 10, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **1**
 POND NAME : **1**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
140.00	Pond R/W	1.58 ac	262.0 ft	262.0 ft	
142.90	Back of Main. Berm	1.31 ac	238.8 ft	238.8 ft	6.06 ac-ft
142.40		1.10 ac	218.7 ft	218.7 ft	5.45 ac-ft
141.90	Front of Main. Berm	0.91 ac	198.8 ft	198.8 ft	4.95 ac-ft
140.84	Provided Attenuation Vol.	0.83 ac	190.3 ft	190.3 ft	4.03 ac-ft
140.83	Required Attenuation Vol.	0.83 ac	190.2 ft	190.2 ft	4.02 ac-ft
140.83	Estimated Storm Sewer TW	0.83 ac	190.2 ft	190.2 ft	4.02 ac-ft
135.37	Top of Treatment Vol.	0.49 ac	146.5 ft	146.5 ft	0.41 ac-ft
134.50	Pond Bottom	0.45 ac	139.6 ft	139.6 ft	0.00 ac-ft

Required Attenuation Vol. = 4.02 ac-ft
 Required Attenuation Stage = 140.83 ft

Provided Attenuation Vol. = 4.03 ac-ft
 Provided Attenuation Stage = 140.84 ft

Estimated Storm Sewer Att. = 4.02 ac-ft
 Estimated Storm Sewer TW EL = 140.83 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) =	1.89 ac
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Basin 1 **(Dry Linear Retention Alternative)**

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 (407) 971-8955 (fax)

Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **1A**
 POND NAME : **1 - Dry Linear Swale**

EXISTING CONDITION (BASIN 1A)

Station Limits: From: **278+42** Roadway Length = 258 ft
 To: **281+00** R/W Width = **120.0 ft**

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder	5.0 ft	1	5 ft
Total Impervious Width:			17 ft

Station Limits: From: **281+00** Roadway Length = 1165 ft
 To: **292+65** R/W Width = **200.0 ft**

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	2	24 ft
Paved Shoulder	5.0 ft	2	10 ft
Total Impervious Width:			34 ft

Impervious Roadway Area: 1.01 ac
 *Misc. Impervious Roadway Area: 0.07 ac
 Pervious Roadway Area: 4.98 ac
 Total Roadway Area: 6.06 ac

**Note: Measured in MicroStation.*

Total Area: Impervious Area: **1.08 ac**
 Pervious Area: **4.98 ac**
 Total Area: **6.06 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	1.08 ac	105.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	2.07 ac	80.7
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	2.91 ac	215.3
Total:			6.06 ac	401.9

CN = Total CN*Area / Total Area = **66.3**

Runoff:

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **5.08 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Precipitation (P) = **10.50 in** (SWFWMD) / **7.50 in** (Storm Sewer)

Runoff (Q) = **6.18 in** (SWFWMD) / **3.64 in** (Storm Sewer)

SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)
------------------------	-------------------------------

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Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **1B**
 POND NAME : **1 - Dry Linear Swale**

EXISTING CONDITION (Basin 1B)

Station Limits: From: **292+65** Roadway Length = 2235 ft
 To: **315+00** R/W Width = **200.0 ft**

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	2	24 ft
Paved Shoulder	5.0 ft	2	10 ft
Total Impervious Width:			34 ft

Station Limits: From: **315+00** Roadway Length = 500 ft
 To: **320+00** R/W Width = **75.0 ft**

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder	5.0 ft	1	5 ft
Total Impervious Width:			17 ft

Impervious Roadway Area: 1.94 ac
 *Misc. Impervious Roadway Area: 0.85 ac
 Pervious Roadway Area: 8.33 ac
 Total Roadway Area: 11.12 ac

**Note: Measured in MicroStation.*

Total Area: Impervious Area: **2.79 ac**
 Pervious Area: **8.33 ac**
 Total Area: **11.12 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	2.79 ac	273.4
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	7.87 ac	307.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	0.46 ac	34.0
Total:			11.12 ac	614.5

CN = Total CN*Area / Total Area = **55.3**

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Soil Capacity (S) = $\frac{1000}{CN} - 10 =$	8.10 in	Precipitation (P) = 7.50 in	7.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) = 2.47 in	2.47 in

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **1B**
 POND NAME : **1 - Dry Linear Swale**

Total Offsite Area:
 Impervious Area: **0.10 ac**
 Pervious Area: **4.44 ac**
 Total Area: **4.54 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	0.10 ac	9.8
Residential Areas (1/2 acre, 25% Impervious)	A	54	3.34 ac	180.4
Residential Areas (1/2 acre, 25% Impervious)	C	80	1.10 ac	88.0
			Total:	278.2
			4.54 ac	

CN = Total CN*Area / Total Area = **61.3**

Runoff:

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **6.32 in**

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **3.10 in** | **3.10 in**

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 (407) 971-8850 (phone)
 (407) 971-8955 (fax)

Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : 1
 POND NAME : **1 - Dry Linear Swale**

Station Limits: From: **278+42** Roadway Length = 4158 ft
 To: **320+00** R/W Width = 200.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	4	48.0 ft
Paved Shoulder	9.0	2	18.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	1	5.0 ft
Curb & Gutter	2.25	2	4.5 ft
Shared-Use Path	10.0	1	10.0 ft
Barrier Wall			
Total Impervious Width:			85.5 ft

Impervious Roadway Area: 8.16 ac
 *Additional Impervious Roadway Area: 1.71 ac
 Pervious Roadway Area: 9.22 ac
 Total Roadway Area: 19.09 ac

**Note: Additional area such as turn lanes, intersection layouts, and etc. are measured in microstation.*

Total Area: Impervious Area: **9.87 ac**
 Pervious Area: **9.22 ac**
 Total Area: **19.09 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	9.87 ac	967.4
Proposed Roadway Pervious	A	39	9.22 ac	359.6
Proposed Pond Pervious	A	39	0.00 ac	0.0
Total:			19.09 ac	1327.0

CN = Total CN*Area / Total Area = **69.5**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 = 4.39 \text{ in}$

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Precipitation (P) = **7.50 in** **7.50 in**

Runoff (Q) = **3.98 in** **3.98 in**

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Made by: SF
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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **1**
 POND NAME : **1 - Dry Linear Swale**

Total Offsite Area:
 Impervious Area: **0.10 ac**
 Pervious Area: **4.44 ac**
 Total Area: **4.54 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	0.10 ac	9.8
Residential Areas (1/2 acre, 25% Impervious)	A	54	3.34 ac	180.4
Residential Areas (1/2 acre, 25% Impervious)	C	80	1.10 ac	88.0
			Total:	278.2
			4.54 ac	

CN = Total CN*Area / Total Area = **61.3**

Runoff:

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **6.32 in**

Precipitation (P) = **7.50 in** **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **3.10 in** **3.10 in**

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Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **1**
 POND NAME : **1 - Dry Linear Swale**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	SWFWMD
StormW. Mgmt.	Dry Retention
Online/Offline	Online
Impaired Water/OFW	No
Open/Closed Basin	Open

Dry Retention **0.50 in** x DCIA = 0.41 ac-ft
 (Directly Connected Impervious Area)
Treatment V_{req} = Largest of Trt. Vol. = 0.41 ac-ft

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Q _{pre} =	3.46 ac-ft	3.46 ac-ft
Q _{post} =	7.51 ac-ft	7.51 ac-ft
ΔQ =	4.04 ac-ft	4.04 ac-ft

Attenuation V_{req} = 4.04 ac-ft

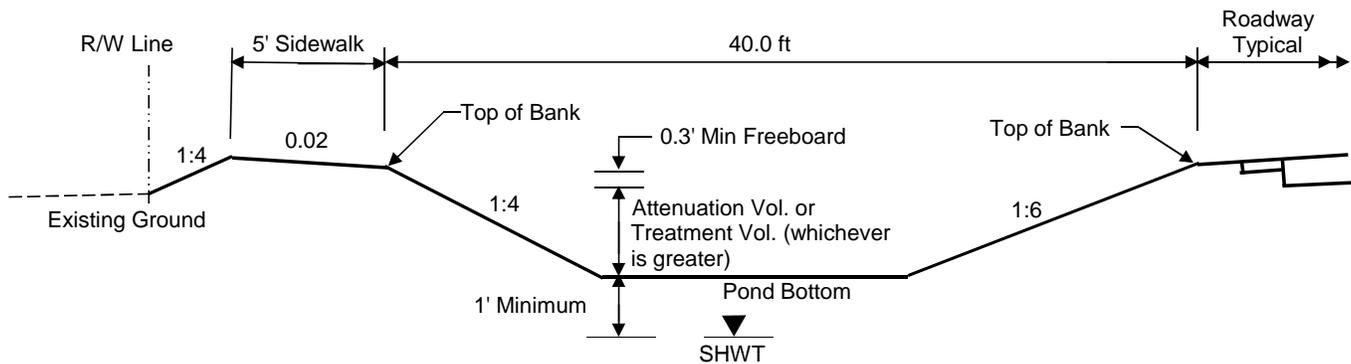
PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : 1
 POND NAME : **1 - Dry Linear Swale**

Pond Stage / Storage Calculations

Pond 1 Limits

from Station	278+52	to Station	282+90
from Station	282+90	to Station	285+40
from Station	286+30	to Station	292+10
from Station	293+20	to Station	303+36
from Station	303+56	to Station	304+70
from Station	305+70	to Station	314+75

Total Proposed Swale Length = 3303.0 ft



Linear Pond Section (Dry)

ELEVATION	DESCRIPTION	AREA (ft ²)	DIMENSIONS		STORAGE (ft ³)
			LENGTH	*WIDTH	
143.00	Top of Bank	132120.0	3303.0 ft	40.0 ft	226572.08
142.70	Provided Attenuation Vol.	122122.2	3300.6 ft	37.0 ft	188435.75
142.60	Required Attenuation Vol.	118626.4	3299.8 ft	36.0 ft	175796.45
142.60	Estimated Storm Sewer TW	118626.4	3299.8 ft	36.0 ft	175796.45
140.83	Top of Treatment Vol.	60127.2	3285.6 ft	18.3 ft	18046.41
140.50	Pond Bottom	49245.0	3283.0 ft	15.0 ft	0.00

Required Attenuation Vol. = 4.04 ac-ft
 Required Attenuation Stage = 142.60 ft

Provided Attenuation Vol. = 4.33 ac-ft
 Provided Attenuation Stage = 142.70 ft

Storm Sewer Att.= 4.04 ac-ft

Total Treatment Volume Recovery (Dry Retention)	2.4 hrs	< 72 hrs
	(Recovery requirements per SWFWMD BOR Section 5.2)	

Design Notes: (1) Linear swale top width calculated using 1:6 FS, 1:4 BS, & 15-foot ditch bottom.

- (2) Proposed linear swale to be located on the left side of the proposed roadway typical section. Runoff from the right side of the roadway is to be conveyed to the proposed linear swale on the left side via roadside ditch and pipe. Assume 1-foot sump in order to maintain roadway base clearance.
- (3) Pond Bottom >1' above SHWT. SHWT approximately 4 feet below existing ground based on permitted soil boring TH-17 for existing linear Pond C-3 (Permit No. 2832). Assume SHWT elevation is 4-feet below existing ground since majority of soils are the same as the soil boring.
- (4) Please refer to the PONDS model data for the Recovery Analysis. Input data for soil recovery taken from Pond C-3 soil boring (Permit No. 2832) since permitted pond is in close proximity to the Pond 1 linear dry pond.

PONDS Version 3.3.0233
Retention Pond Recovery - Refined Method
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Devo Seereeram, Ph.D., P.E.

Project Data

Project Name: SR 33 from Old Combee Road to North of Tomkow Road
Simulation Description: Pond 1 -Dry Linear Retention Alternative
Project Number: FPID No. 430185-1-22-01
Engineer : SF
Supervising Engineer: REC
Date: 08-01-2013

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 119.00
Water Table Elevation, [WT] (ft datum): 134.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 11.50
Fillable Porosity, [n] (%): 20.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 7.7
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 49245.0

Geometry Data

Equivalent Pond Length, [L] (ft): 3285.6
Equivalent Pond Width, [W] (ft): 18.3
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)
140.50	49245.0
142.70	122122.2
143.00	132120.0

Discharge Structures

Discharge Structure #1 is inactive
Discharge Structure #2 is inactive
Discharge Structure #3 is inactive

PONDS Version 3.3.0233
Retention Pond Recovery - Refined Method
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Scenario Input Data

Scenario 1 :: Dry Linear Pond Slug Load

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 18046.41

Initial ground water level (ft datum) 134.00 (default)

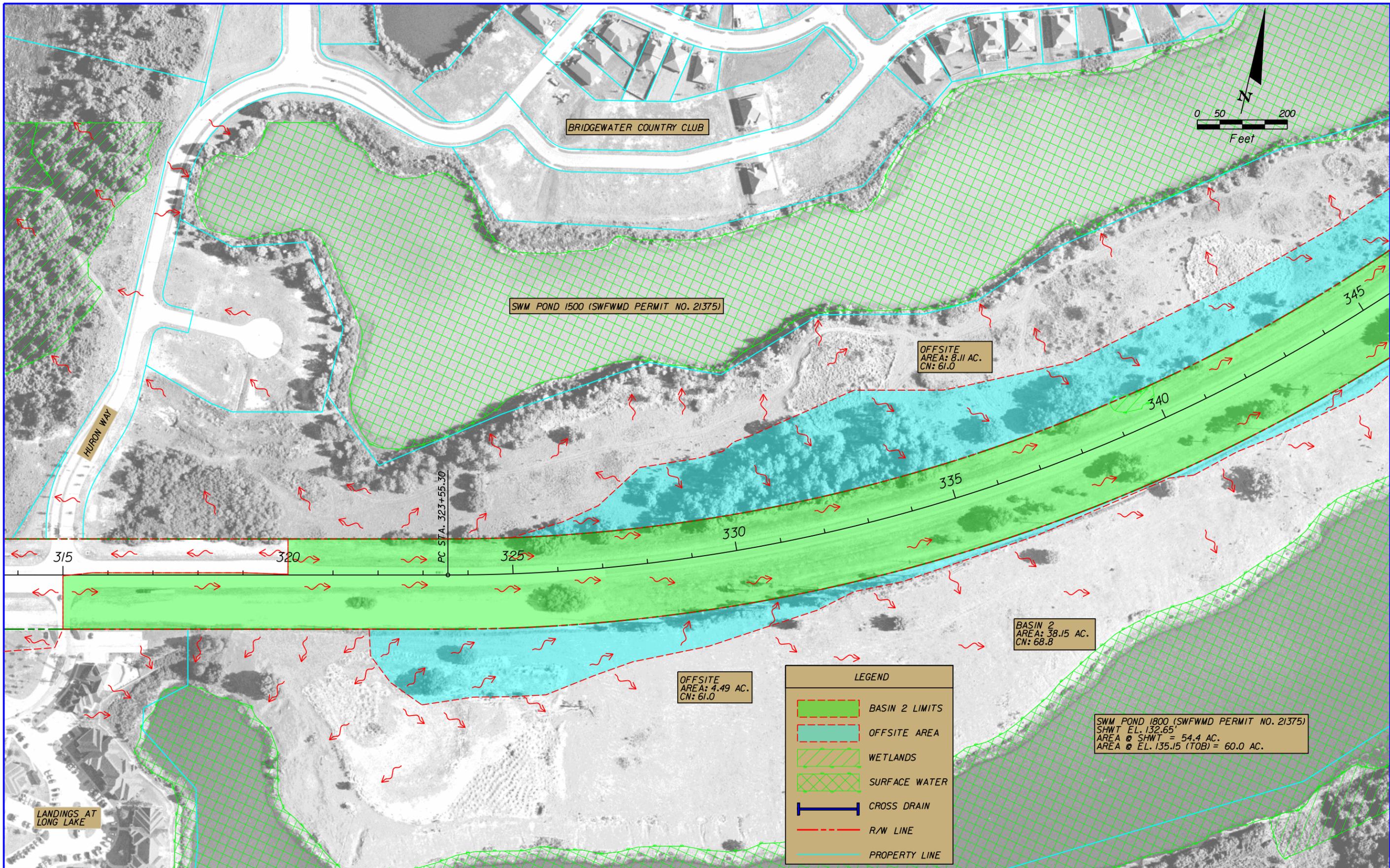
<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>
0.100	2.000
0.250	2.500
0.500	3.000
1.000	3.500
1.500	4.000

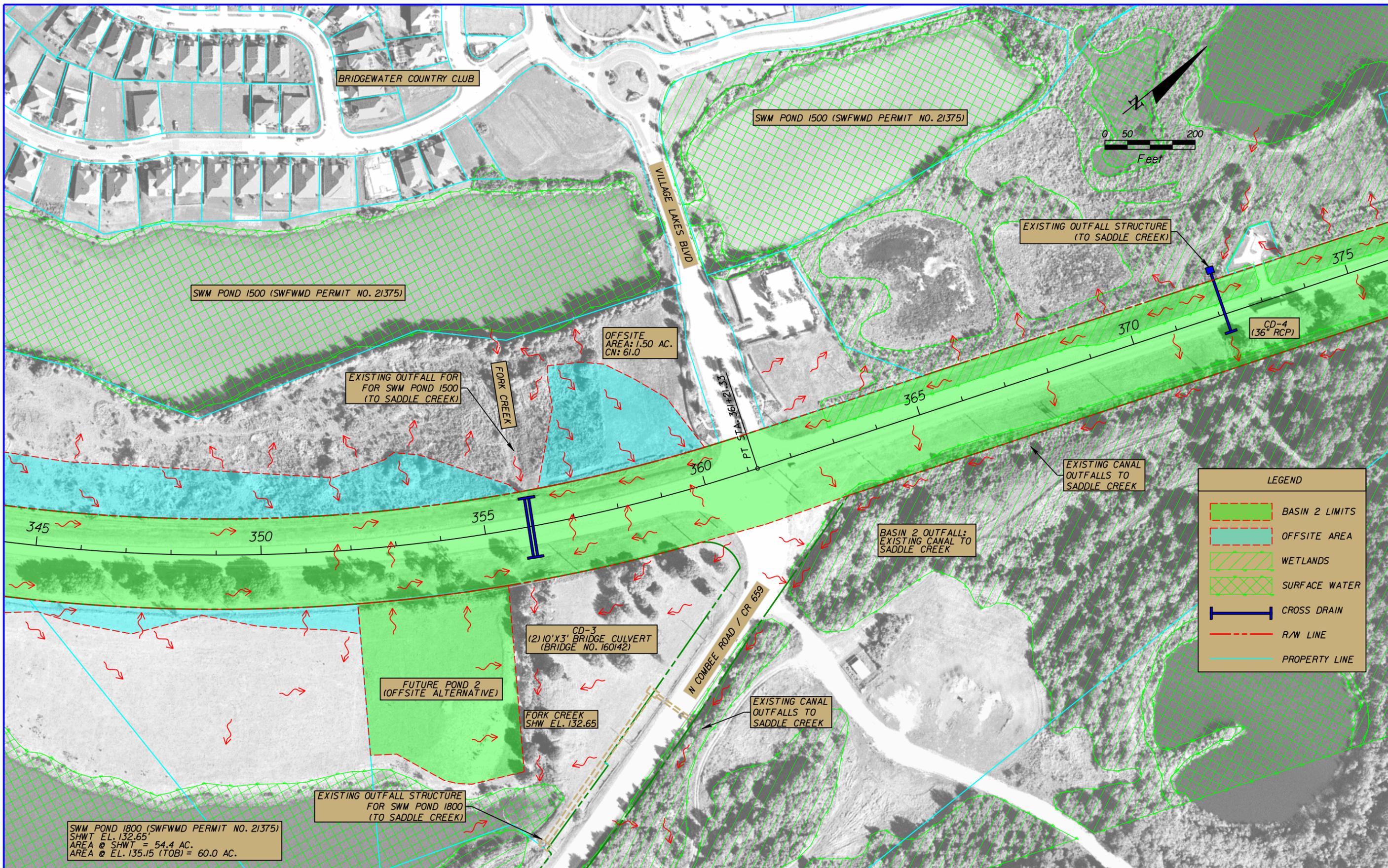
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Detailed Results :: Scenario 1 :: Dry Linear Pond Slug Load

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	3007.7350	0.0000	134.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	3007.7350	0.0000	140.829	4.38569	0.00000	18046.4	26.3	0.0	U/P
2.400	0.0000	0.0000	----	----	----	18046.4	18046.4	0.0	dry
6.000	0.0000	0.0000	----	----	----	18046.4	18046.4	0.0	dry
12.000	0.0000	0.0000	----	----	----	18046.4	18046.4	0.0	dry
24.000	0.0000	0.0000	----	----	----	18046.4	18046.4	0.0	dry
36.000	0.0000	0.0000	----	----	----	18046.4	18046.4	0.0	dry
48.000	0.0000	0.0000	----	----	----	18046.4	18046.4	0.0	dry
60.000	0.0000	0.0000	----	----	----	18046.4	18046.4	0.0	dry
72.000	0.0000	0.0000	----	----	----	18046.4	18046.4	0.0	dry
84.000	0.0000	0.0000	----	----	----	18046.4	18046.4	0.0	dry
96.000	0.0000	0.0000	----	----	----	18046.4	18046.4	0.0	dry

Basin 2





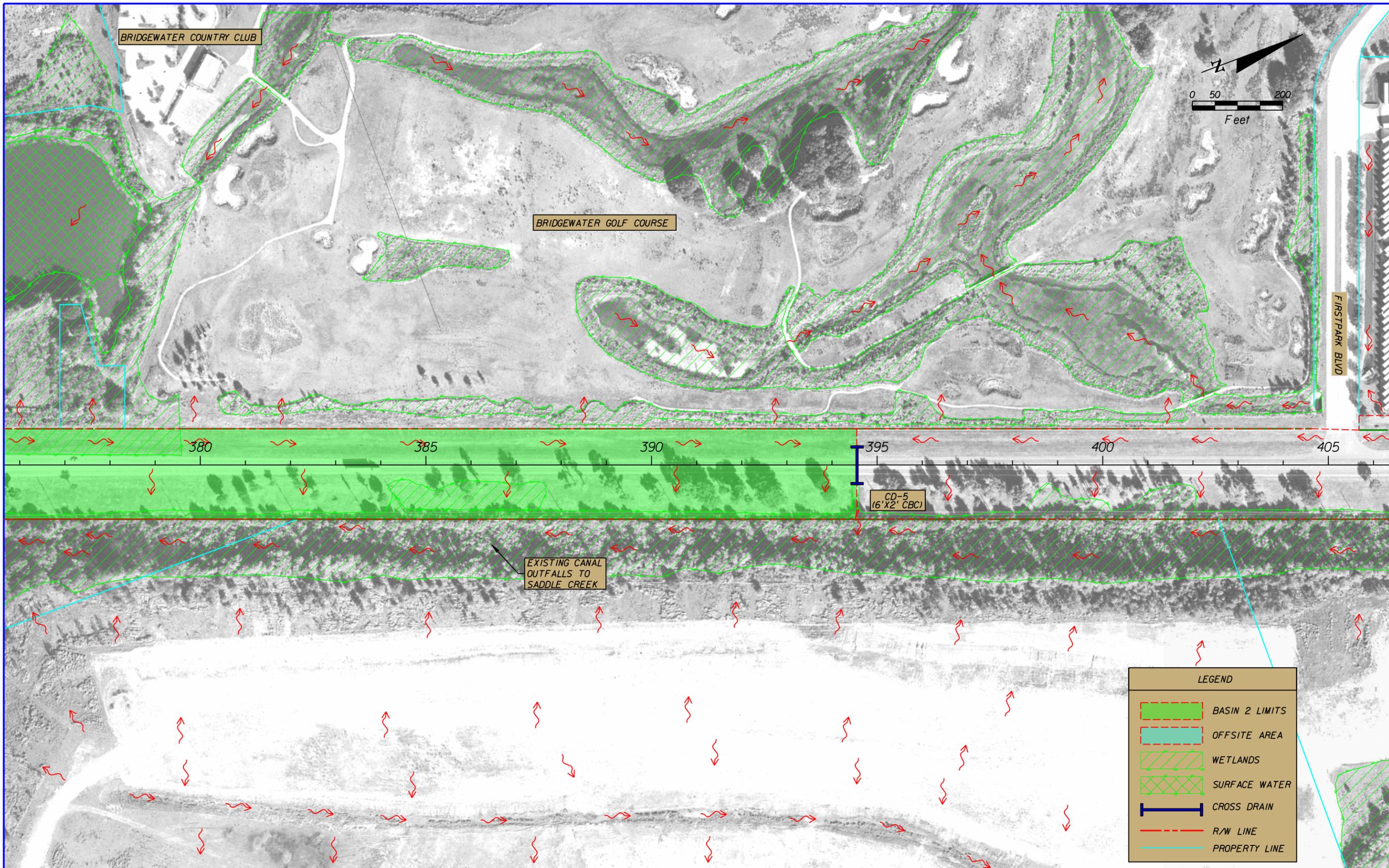
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

**PRE-DEVELOPMENT
BASIN 2 MAP (2 OF 3)**

SHEET NO.



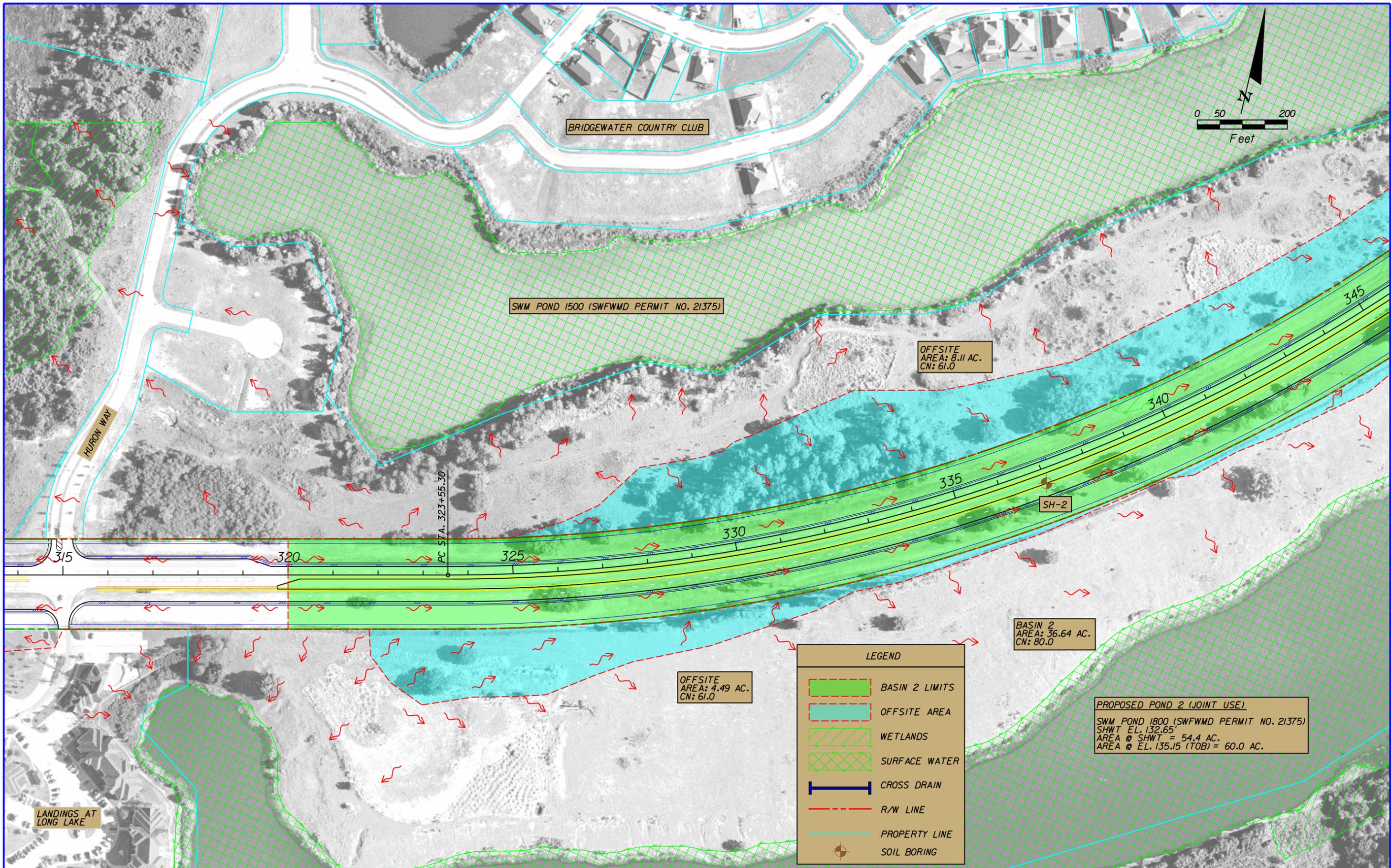
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

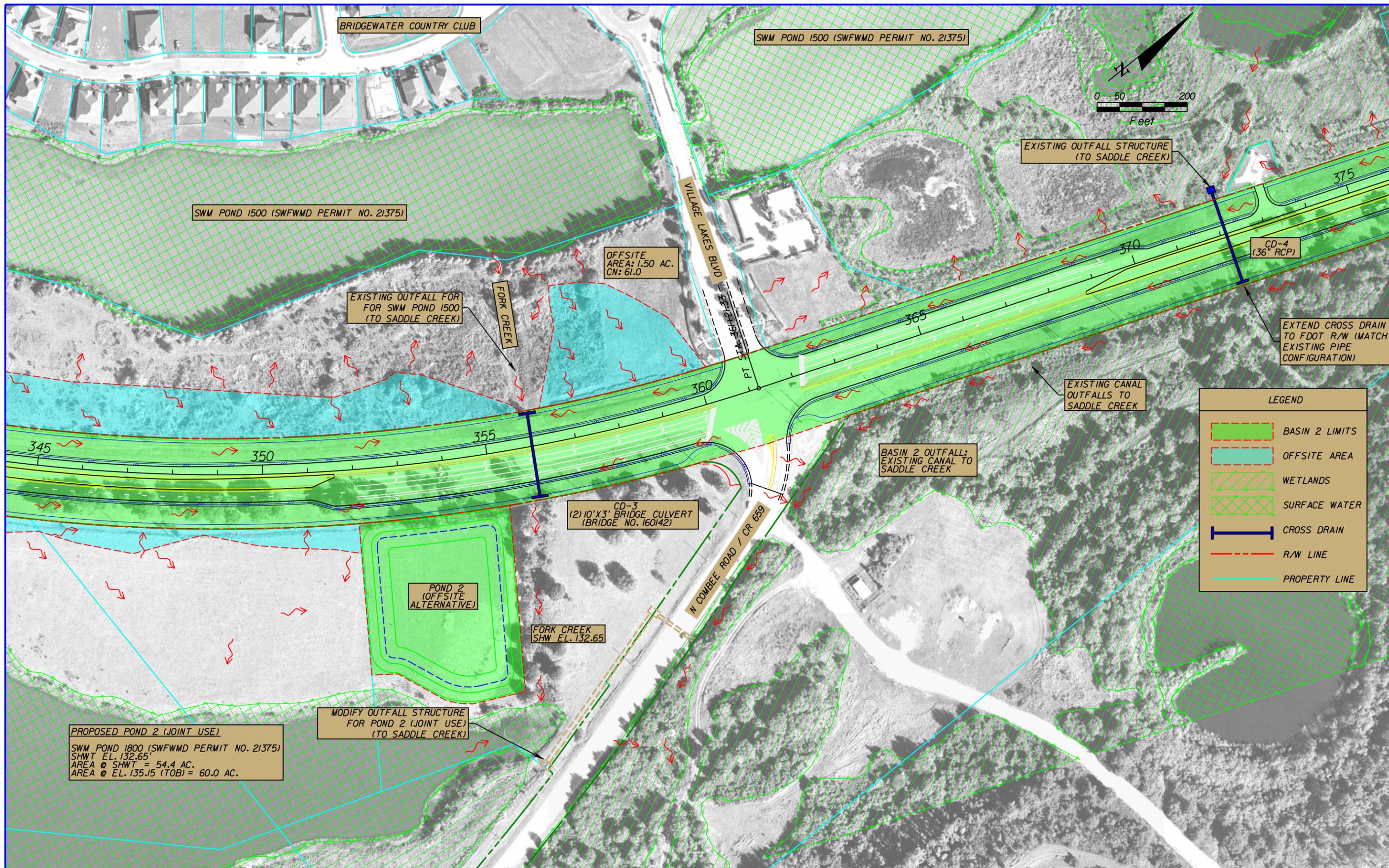
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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

**PRE-DEVELOPMENT
 BASIN 2 MAP (3 OF 3)**

SHEET NO.





PROPOSED POND 2 (JOINT USE)
 SWM POND 1800 (SWFWMD PERMIT NO. 21375)
 SHWT EL. 132.65'
 AREA @ SHWT = 54.4 AC.
 AREA @ EL. 135.15 (TOB) = 60.0 AC.

MODIFY OUTFALL STRUCTURE
 FOR POND 2 (JOINT USE)
 (TO SADDLE CREEK)

CD-3
 (2) 10'X3' BRIDGE CULVERT
 (BRIDGE NO. 160142)

FORK CREEK
 SHW EL. 132.65

LEGEND	
	BASIN 2 LIMITS
	OFFSITE AREA
	WETLANDS
	SURFACE WATER
	CROSS DRAIN
	R/W LINE
	PROPERTY LINE

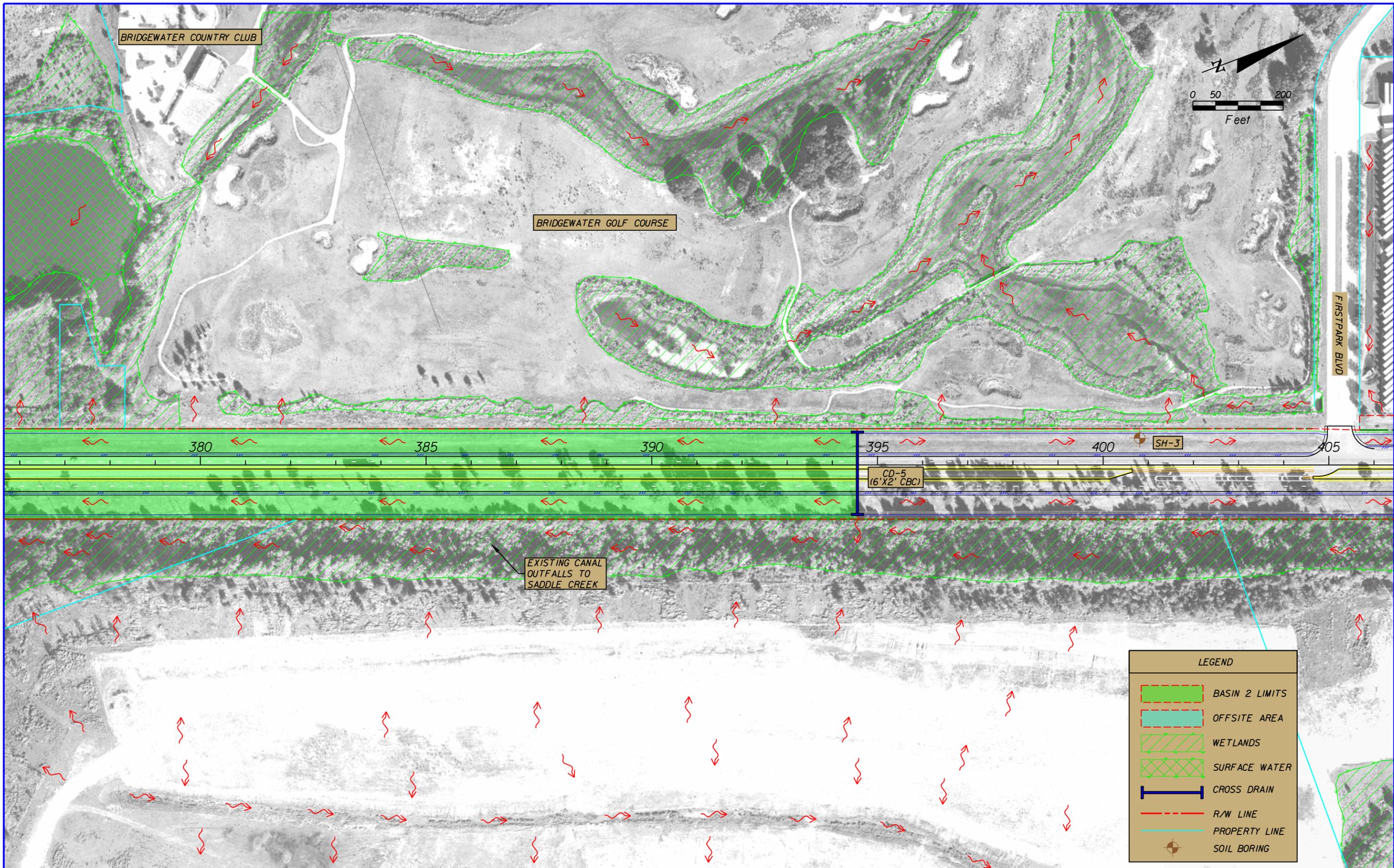
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

**POST-DEVELOPMENT
 BASIN 2 MAP (2 OF 3)**

SHEET NO.



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

**POST-DEVELOPMENT
 BASIN 2 MAP (3 OF 3)**

SHEET NO.

Basin 2 **(Offsite Alternative)**

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Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **2**
 POND NAME : **2 (Offsite Alternative)**

EXISTING CONDITION

Station Limits: From: 315+00 Roadway Length = 500 ft
 To: 320+00 R/W Width = 131.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder	5.0 ft	1	5 ft
Total Impervious Width:			17 ft

Station Limits: From: 320+00 Roadway Length = 7455 ft
 To: 394+55 R/W Width = 200.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	2	24 ft
Paved Shoulder	5.0 ft	2	10 ft
Total Impervious Width:			34 ft

Impervious Roadway Area: 6.01 ac
 *Misc. Impervious Roadway Area: 2.08 ac
 Pervious Roadway Area: 27.64 ac
 Total Roadway Area: 35.73 ac

*Note: Measured in MicroStation.

Pond Area: Exist. Land = Open Space = 2.41 ac

Total Area: Impervious Area: 8.09 ac
 Pervious Area: 30.05 ac
 Total Area: 38.15 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	8.09 ac	793.2
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	27.64 ac	1685.9
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	2.41 ac	147.2
Total:			38.15 ac	2626.3

CN = Total CN*Area / Total Area = **68.8**

Denotes Pond Area

Runoff:

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **4.53 in**

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **3.91 in** | **3.91 in**

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Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **2**
 POND NAME : **2 (Offsite Alternative)**

Total Offsite Area:
 Impervious Area: **0.00 ac**
 Pervious Area: **14.10 ac**
 Total Area: **14.10 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	0.00 ac	0.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	14.10 ac	860.1
			Total:	
			14.10 ac	860.1

CN = Total CN*Area / Total Area = **61.0**

Runoff:

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Soil Capacity (S) = $\frac{1000 - 10}{\text{CN}}$ = **6.39 in**

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **3.07 in** | **3.07 in**

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Made by: SF
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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **2**
 POND NAME : **2 (Offsite Alternative)**

Station Limits:

From: 320+00
 To: 394+55

Roadway Length = 7455 ft
 R/W Width = 200.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	4	48.0 ft
Paved Shoulder	9.0	2	18.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	1	5.0 ft
Curb & Gutter	2.25	2	4.5 ft
Shared-Use Path	10.0	1	10.0 ft
Barrier Wall			
Total Impervious Width:			85.5 ft

Impervious Roadway Area: 14.63 ac
 *Additional Impervious Roadway Area: 1.99 ac
 Pervious Roadway Area: 17.61 ac
 Total Roadway Area: 34.23 ac

*Note: Additional area such as turn lanes, intersection layouts, and etc. are measured in microstation.

Pond Area:

Pervious Pond Area : 0.37 ac
 Water Surface Area: 2.05 ac Wet Pond
 Total Pond Area: 2.41 ac

Total Area:

Impervious Area: 16.62 ac
 Pervious Area: 17.97 ac
 Water Surface Area: 2.05 ac
 Total Area: 36.64 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	16.62 ac	1629.0
Proposed Roadway Pervious	B	61	17.61 ac	1074.0
Proposed Pond Pervious	B	61	0.37 ac	22.3
Proposed Ponds (Water Surface)	B	100	2.05 ac	204.7
Total:			36.64 ac	2930.0

CN = Total CN*Area / Total Area = **80.0**

Runoff:

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **2.51 in**

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **5.15 in** | **5.15 in**

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Made by: SF
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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **2**
 POND NAME : **2 (Offsite Alternative)**

Total Offsite Area:
 Impervious Area: **0.00 ac**
 Pervious Area: **14.10 ac**
 Total Area: **14.10 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	0.00 ac	0.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	14.10 ac	860.1
			Total:	860.1
			14.10 ac	

CN = Total CN*Area / Total Area = **61.0**

Runoff:

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **6.39 in**

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **3.07 in** | **3.07 in**

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Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **2**
 POND NAME : **2 (Offsite Alternative)**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	SWFWMD
StormW. Mgmt.	Wet Detention
Online/Offline	Online
Impaired Water/OFW	No
Open/Closed Basin	Open

Wet Detention	1.00 in	x DCIA =	1.39 ac-ft
----------------------	----------------	----------	------------

(Directly Connected Impervious Area)

Treatment V_{req} = Largest of Trt. Vol. = **1.39 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Q_{pre} =	16.04 ac-ft	16.04 ac-ft
Q_{post} =	19.34 ac-ft	19.34 ac-ft
ΔQ =	3.31 ac-ft	3.31 ac-ft

Attenuation V_{req} = **3.31 ac-ft**

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **2**
 POND NAME : **2 (Offsite Alternative)**

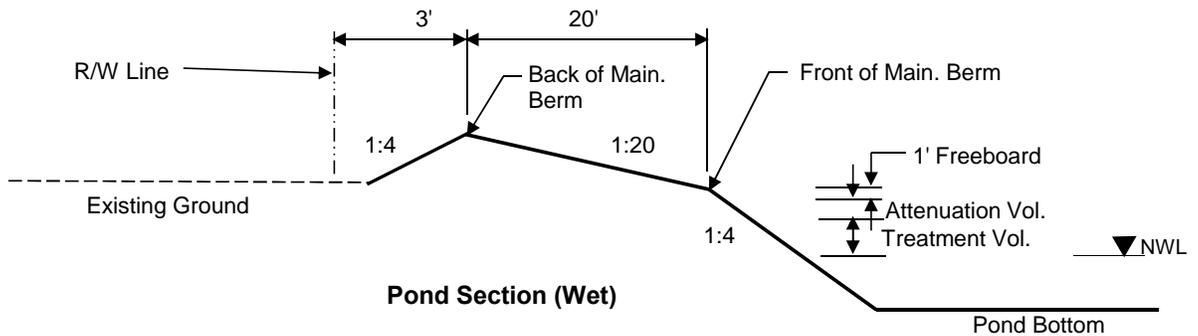
Maintenance Area Width = 20.0 ft @ 1:20
 Pond Tie-In Width = 3.4 ft @ 1:4
 Maximum Storage Depth (SD) = 2.20 ft with 1.0 ft freeboard

Existing Ground Elevation = 136.00
 *Normal Water Elevation = 132.65
 Lowest EOP Elevation = 137.00

Hydraulic Grade Line (HGL) check

*Note: NWL based on SWFWMD Permit No. 21375

HGL Slope = 0.050% Use 0.05% for very flat terrain to 0.1% for flat terrain
 Distance from Pond to Lowest EOP = 300 ft
 Estimated Energy Losses = 0.15 ft
 HGL Clearance = 2.0 ft Open drainage (ditch) system.
 Maximum Storm Sewer Tailwater EL = 134.85 ft



Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
136.00	Pond R/W	2.52 ac	331.0 ft	331.0 ft	
136.85	Back of Main. Berm	2.41 ac	324.2 ft	324.2 ft	9.40 ac-ft
136.35		2.12 ac	304.2 ft	304.2 ft	8.26 ac-ft
135.85	Front of Main. Berm	2.41 ac	324.2 ft	324.2 ft	7.13 ac-ft
134.85	Provided Treat.Vol.+Att.Vol	2.30 ac	316.2 ft	316.2 ft	4.77 ac-ft
134.82	Req'd Treat.Vol+Att. Vol	2.29 ac	315.9 ft	315.9 ft	4.70 ac-ft
134.82	Estimated Storm Sewer TW	2.29 ac	315.9 ft	315.9 ft	4.70 ac-ft
133.32	Top of Treatment Vol.	2.12 ac	303.9 ft	303.9 ft	1.39 ac-ft
132.65	Normal Water Level	2.05 ac	298.6 ft	298.6 ft	0.00 ac-ft
126.65		1.44 ac	250.6 ft	250.6 ft	
120.65	Pond Bottom	0.94 ac	202.6 ft	202.6 ft	

Required Treatment+Attenuation Vol.= 4.70 ac-ft
 Required Treatment+Attenuation Stage= 134.82 ft

Provided Treatment+Attenuation Vol.= 4.77 ac-ft
 Provided Treatment+Attenuation Stage= 134.85 ft

Estimated Treat. Vol.+Storm Sewer Att.= 4.70 ac-ft
 Estimated Storm Sewer TW EL.= 134.82 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 3.02 ac

Note: Treatment depth is less than 1.5-feet because of stormsewer TW requirements.

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 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 2
 POND NAME : 2

PERMANENT POOL VOLUME CALCULATIONS

Basin Characteristics (Proposed Conditions)

Land Use	Area (ac)	Runoff Coeff.	Product
Roadway Impervious Area	16.62	0.95	15.79
Roadway Pervious Area	17.61	0.20	3.52
Pond Pervious Area	0.37	0.20	0.07
Pond Area at NWL	2.05	1.00	2.05
Total	36.64		21.43

Composite C = **0.58**

Annual Rainfall (P) = **50.00 in**

Min. Permanent Pool Vol. = (Area x Composite C x P x 14) / (365 x 12) = **3.43 ac-ft**

Stage Storage Calc. for Permanent Pool

ELEV. (ft)	AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
132.65	2.05				17.70
		1.91	3.00	5.73	
129.65	1.77				11.97
		1.61	3.00	4.82	
126.65	1.44				7.15
		1.19	6.00	7.15	
120.65	0.94				0.00

Permanent Pool Volume Provided = 17.70 ac-ft
Resident Time Provided = 72.3 Days
 = (Perm. Pool Vol. Provided x 365 x 12) / (Area x C x P) =

Mean Depth = 8.65 ft
Anoxic Depth Elev. = 121.18 ft
 = Permanent Pool Volume / Area at NWL =
 = Permanent Pool Elev. - Anoxic Depth from WQ worksheet =

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN: **2**
 POND: **2 (Offsite Option)**

EXISTING AND PROPOSED CONDITIONS POLLUTANT LOADING CALCULATIONS

The following Pollutant Loading equations are referenced from the March 2010 draft of the Stormwater Quality Applicant's Handbook by FDEP.

Annual Rainfall : **50.00** in/yr

Meteorological Zone : **2**

Description	Area (ac)	
	Pre-Dev	*Post-Dev
DCIA	8.09	14.06
Impervious Area (Non-DCIA)	0.00	0.00
Proposed Pervious Pond Area	2.41	0.37
Proposed Pond Water Surface Area	0.00	2.05
Pervious Roadway Area	27.64	20.17
Total Roadway Area Within R/W:	35.73	34.23
Impervious DCIA %	22.65	41.06
Total Basin Area:	38.15	36.64

*Note: DCIA area (Post-Dev) excludes the 5-foot sidewalk and 12-foot shared use path for Pollutant Loading Analysis

- Annual Runoff (AR) = P/12 (in/ft)xComposite CxA
- Pollutant Loading (TP) = AR x 43560 (ft²/ac) x 7.48 (gal/ft³) x 3.785 (L/gal) x EMC(TP) (mg/L) x 1 (kg/10⁶ mg)
- Permanent Pool: Proposed permanent pool volume were determined using the permanent pool calculations spreadsheets
See Permanent Pool Volume Calculations for proposed pond PPV details
- Resident Time = PPV/AR x 365 (days/yr)
- Mean Pond Conc = Pollutant Loading x 1yr/(Pond Volume + Annual Runoff) x 1 ac/43560 ft² x 1ft³/7.48 gal x 1 gal/L x 10⁶mg/kg x 1000ug/mg.
- Mean Chlorophyll Conc: ln(chyl-a) = 1.058 ln(TP)-0.934.
- Mean Secchi Disk Depth: SD = (24.2386+(0.3041)(chyl-a))/(6.0632 + chyl-a).
- Anoxic Depth: Depth of DO < 1 = 3.305(SD) = 0.02164(chyl-a) -0.004979(TP). Anoxic Depth is the maximum depth of PPV that can be counted for water quality.
- Required Reduction = (1-(PreDev Loading [kg/yr]/PostDev Loading [kg/yr]) x 100
- Removal Efficiency: TP (% Removal) = 44.53 + 6.145 x ln(t_d) + 0.145 x (ln(t_d))²
TN (% Removal) = (43.75 x t_d)/(4.38 + t_d)
- Event Mean Concentration values are referenced from Table 3.4 of the March 2010 draft ERP Stormwater Quality Applicant's Handbook by FDEP.
- Roadway Event Mean Concentration values are referenced from the July 2011 Nutrient Loading Calculations Consultants Memo.

PRE-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	35.73	22.65	61.0	0.2085	31.040	1.19	45.554	0.155	5.933
Proposed Pond Area - Low-Density Residential	2.41	0	61	0.0324	0.326	1.50	0.603	0.18	0.072
Total:	38.15				31.37		46.16		6.01

POST-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	34.23	41.06	61.0	0.3517	50.153	1.19	73.603	0.155	9.587
Pond Pervious Area	0.37	0.00	61	0.0324	0.049	1.19	0.073	0.155	0.009
Pond Water Surface	2.05	0	100	1.0000	8.529	0.00	0.000	0.00	0.000
Total:	36.64				58.73		73.68		9.60

* Determined from the Mean annual Runoff Coefficients (C Values) as a Function of DCIA Percentage and Non-DCIA Curve Number Table

TREATMENT REQUIRED

Condition	Annual Runoff ¹ (ac-ft/yr)	Pollutant Loading ² (Kg/Yr)		Required Removal Efficiency (%)	
		TN	TP	TN	TP
Pre-Development	31.37	46.16	6.01	37.35	37.42
Post-Development	58.73	73.68	9.60		

TREATMENT PROVIDED

Pond ID	Permanent Pool Volume ³ PPV (ac-ft)	Residence Time ⁴ t _d (days)	Mean Pond Concentration ⁵ (ug TPL)	Mean Chlorophyll Concentration ⁶ (mg TP/m ³)	Mean Secchi Disk Depth ⁷ (m)	Anoxic Depth ⁸ (ft)	Removal Efficiency ¹⁰ (%)		Pollutant Loading (Kg/Yr)	
							TN	TP	TN	TP
Pond 2	17.70	72.33	26.98	12.84	1.49	11.47	41.25	73.50	43.28	2.54

Condition	Pollutant	
	TN	TP
Pre-Development	46.16	6.01
Post-Development	43.28	2.54

Basin 2 **(Joint Use Alternative)**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **2**
 POND NAME : **2 (Joint Use)**

EXISTING CONDITION

Station Limits: From: **315+00** Roadway Length = 500 ft
 To: **320+00** R/W Width = **131.0 ft**

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder	5.0 ft	1	5 ft
Total Impervious Width:			17 ft

Station Limits: From: **320+00** Roadway Length = 7455 ft
 To: **394+55** R/W Width = **200.0 ft**

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	2	24 ft
Paved Shoulder	5.0 ft	2	10 ft
Total Impervious Width:			34 ft

Impervious Roadway Area: 6.01 ac
 *Misc. Impervious Roadway Area: 2.08 ac
 Pervious Roadway Area: 27.64 ac
 Total Roadway Area: 35.73 ac

**Note: Measured in MicroStation.*

Total Area: Impervious Area: **8.09 ac**
 Pervious Area: **27.64 ac**
 Total Area: **35.73 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	8.09 ac	792.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	27.64 ac	1685.9
Total:			35.73 ac	2478.8

CN = Total CN*Area / Total Area = **69.4**

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Soil Capacity (S) = $\frac{1000 - 10}{CN}$	4.41 in	Precipitation (P) = 7.50 in	7.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) = 3.97 in	3.97 in

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 BASIN NAME : **2**
 POND NAME : **2 (Joint Use)**

Total Offsite Area:
 Impervious Area: **0.00 ac**
 Pervious Area: **14.10 ac**
 Total Area: **14.10 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	0.00 ac	0.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	14.10 ac	860.1
			Total:	860.1

CN = Total CN*Area / Total Area = **61.0**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **6.39 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Precipitation (P) =	7.50 in	7.50 in

Runoff (Q) = **3.07 in** **3.07 in**

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PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **2**
 POND NAME : **2 (Joint Use)**

Station Limits: From: **320+00** Roadway Length = 7455 ft
 To: **394+55** R/W Width = **200.0 ft**

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	4	48.0 ft
Paved Shoulder	9.0	2	18.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	1	5.0 ft
Curb & Gutter	2.25	2	4.5 ft
Shared-Use Path	10.0	1	10.0 ft
Barrier Wall			
Total Impervious Width:			85.5 ft

Impervious Roadway Area: 14.63 ac
 *Additional Impervious Roadway Area: 1.99 ac
 Pervious Roadway Area: 17.61 ac
 Total Roadway Area: 34.23 ac

*Note: Additional area such as turn lanes, intersection layouts, and etc. are measured in microstation.

Total Area: Impervious Area: **16.62 ac**
 Pervious Area: **17.61 ac**
 Total Area: **34.23 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	16.62 ac	1629.0
Proposed Roadway Pervious	B	61	17.61 ac	1074.0
Total:			34.23 ac	2703.0

CN = Total CN*Area / Total Area = **79.0**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **2.66 in**

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **5.04 in** | **5.04 in**

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

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 BASIN NAME : **2**
 POND NAME : **2 (Joint Use)**

Total Offsite Area:
 Impervious Area: **0.00 ac**
 Pervious Area: **14.10 ac**
 Total Area: **14.10 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	0.00 ac	0.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	14.10 ac	860.1
			Total:	860.1
			14.10 ac	

CN = Total CN*Area / Total Area = **61.0**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **6.39 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Precipitation (P) = 7.50 in	7.50 in

Runoff (Q) = **3.07 in** **3.07 in**

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PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **2**
 POND NAME : **2 (Joint Use)**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	SWFWMD
StormW.Mgmt.	Wet Detention
Online/Offline	Online
Impaired Water/OFW	No
Open/Closed Basin	Open

Note: DCIA = Directly Connected Impervious Area

Wet Detention **1.00 in** x DCIA = 1.39 ac-ft

Current Treatment Vol. to SR 33 per Permit No. 21375: 0.30 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = **1.09 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Q_{pre} =	15.42 ac-ft	15.42 ac-ft
Q_{post} =	17.98 ac-ft	17.98 ac-ft
ΔQ =	2.56 ac-ft	2.56 ac-ft

Attenuation V_{req} = 2.56 ac-ft

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BASIN NAME : **2**
POND NAME : **2 (Joint Use)**

Maintenance Area Width =

0.0 ft

 @ 1:20
Pond Tie-In Width =

0.0 ft

 @ 1:4

Permitted Top of Bank Elevation =

135.15

Permitted SHW Elevation =

132.65

Lowest EOP Elevation =

137.00

Hydraulic Grade Line (HGL) check

Note: Please refer to SWFWMD Permit No. 21375

HGL Slope =

0.050%

 Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =

600 ft

Estimated Energy Losses =

0.30 ft

HGL Clearance =

2.0 ft

 Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =

134.70 ft

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PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 2
 POND NAME : 2 (Joint Use)

Pond Stage / Storage Calculations

Elevation	Description	AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
135.15	Top of Bank	60.00				143.00
			59.45	0.49	29.38	
134.66	Proposed SS TW El.	58.89				113.62
			58.82	0.06	3.65	
134.59	Proposed DHW El.	58.75				109.97
			58.70	0.04	2.57	
134.55	Permitted DHW El.	58.66				107.40
			57.11	1.38	78.83	
133.17	Proposed Weir El.	55.56				28.57
			55.54	0.02	1.09	
133.15	Permitted Weir El.	55.52				27.48
			54.96	0.50	27.48	
132.65	Permitted SHW El.	54.40				0.00

*Note: Elevations were converted from NGVD29 (given in Permit No. 21375) to NAVD88. Conversion: NAVD88 = NGVD29 - 0.85'

Required Treatment Vol.= 1.09 ac-ft
 Required Treatment Stage= 133.17 ft

Required Treatment+Attenuation Vol.= 2.56 ac-ft
 Required Treatment+Attenuation Stage= 134.59 ft

Estimated Treat. Vol.+Storm Sewer Att.= 3.65 ac-ft
 Estimated Storm Sewer TW EL.= 134.66 ft

HGL requirements met

Stage/Storage Calculations show that the additional project treatment and attenuation volume requirements is contained in the permitted Pond (Pond 1800 in Permit No. 21375).

PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 2
 POND NAME : 2 (Joint Use)

PERMANENT POOL VOLUME CALCULATIONS

Basin Characteristics (Proposed Conditions)

Land Use	Area (ac)	Runoff Coeff.	Product
Roadway Impervious Area	16.62	0.95	15.79
Roadway Pervious Area	17.61	0.20	3.52
Pond Pervious Area	0.00	0.20	0.00
Pond Area at NWL	0.00	1.00	0.00
Total	34.23		19.31

Composite C = **0.56**

Annual Rainfall (P) = **50.00 in**

Min. Permanent Pool Vol. = (Area x Composite C x P x 14) / (365 x 12) = **3.09 ac-ft**

Stage Storage Calc. for Permanent Pool

ELEV. (ft)	AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
132.65	54.40				160.68
		53.94	1.65	89.00	
131.00	53.48				71.68
		53.20	1.00	53.20	
130.00	52.92				18.49
		52.82	0.35	18.49	
129.65	52.72				0.00

Note: Pond bottom area was calculated using 1:4 side slopes from the permitted SHWT elevation to the pond bottom.

Permanent Pool Volume Provided = 160.68 ac-ft
Resident Time Provided = 728.8 Days
 = (Perm. Pool Vol. Provided x 365 x 12) / (Area x C x P) =

Mean Depth = 2.95 ft
Anoxic Depth Elev. = 107.73 ft
 = Permanent Pool Volume / Area at NWL =
 = Permanent Pool Elev. - Anoxic Depth from WQ worksheet =

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN: **2**
 POND: **2 (Joint Use)**

EXISTING AND PROPOSED CONDITIONS POLLUTANT LOADING CALCULATIONS

The following Pollutant Loading equations are referenced from the March 2010 draft of the Stormwater Quality Applicant's Handbook by FDEP.

Annual Rainfall : **50.00** in/yr

Meteorological Zone : **2**

Description	Area (ac)	
	Pre-Dev	Post-Dev
Pervious Roadway Area	27.64	20.17
Total Offsite Area	14.10	14.10
DCIA	8.09	14.06
Total Roadway Area Within R/W:	35.73	34.23
Impervious DCIA %	22.64	41.06
Total Basin Area:	49.83	48.33

*Note: DCIA area (Post-Dev) excludes the 5-foot sidewalk and 12-foot shared use path for Pollutant Loading Analysis

- Annual Runoff (AR) = P/12 (in/ft)xComposite CxA
- Pollutant Loading (TP) = AR x 43560 (ft²/ac) x 7.48 (gal/ft³) x 3.785 (L/gal) x EMC(TP) (mg/L) x 1 (kg/10⁶ mg)
- Permanent Pool: Proposed permanent pool volume were determined using the permanent pool calculations spreadsheets
See Permanent Pool Volume Calculations for proposed pond PPV details
- Resident Time = PPV/AR x 365 (days/yr)
- Mean Pond Conc = Pollutant Loading x 1yr/(Pond Volume + Annual Runoff) x 1 ac/43560 ft² x 1ft³/7.48 gal x 1 gal/L x 10⁶mg/kg x 1000ug/mg.
- Mean Chlorophyll Conc: ln(chyl-a) = 1.058 ln(TP)-0.934.
- Mean Secchi Disk Depth: SD = (24.2386+(0.3041)(chyl-a))/(6.0632 + chyl-a).
- Anoxic Depth: Depth of DO < 1 = 3.305(SD) = 0.02164(chyl-a) -0.004979(TP). Anoxic Depth is the maximum depth of PPV that can be counted for water quality.
- Required Reduction = (1-(PreDev Loading [kg/yr]/PostDev Loading [kg/yr]) x 100
- Removal Efficiency: TP (% Removal) = 44.53 + 6.145 x ln(t_d) + 0.145 x (ln(t_d))²
TN (% Removal) = (43.75 x t_d)/(4.38 + t_d)
- Event Mean Concentration values are referenced from Table 3.4 of the March 2010 draft ERP Stormwater Quality Applicant's Handbook by FDEP.
- Roadway Event Mean Concentration values are referenced from the July 2011 Nutrient Loading Calculations Consultants Memo.

PRE-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	35.73	22.64	61	0.2084	31.027	1.19	45.534	0.155	5.931
Offsite Area (Multi-Family Land Area)	14.10	0	61	0.0324	1.904	1.91	4.484	0.46	1.080
Total:	49.83				32.93		50.02		7.01

POST-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	34.23	41.06	61	0.3517	50.153	1.19	73.603	0.155	9.587
Offsite Area (Multi-Family Land Area)	14.10	0	61	0.0324	1.904	1.91	4.484	0.00	0.000
Total:	48.33				52.06		78.09		9.59

* Determined from the Mean annual Runoff Coefficients (C Values) as a Function of DCIA Percentage and Non-DCIA Curve Number Table

TREATMENT REQUIRED

Condition	Annual Runoff ¹ (ac-ft/yr)	Pollutant Loading ² (Kg/Yr)		Required Removal Efficiency (%)	
		TN	TP	TN	TP
Pre-Development	32.93	50.02	7.01	35.95	26.87
Post-Development	52.06	78.09	9.59		

TREATMENT PROVIDED

Pond ID	Permanent Pool Volume ³ PPV (ac-ft)	Residence Time ⁴ t _d (days)	Mean Pond Concentration ⁵ (ug TP/L)	Mean Chlorophyll Concentration ⁶ (mg TP/m ³)	Mean Secchi Disk Depth ⁷ (m)	Anoxic Depth ⁸ (ft)	Removal Efficiency ¹⁰ (%)		Pollutant Loading (Kg/Yr)	
							TN	TP	TN	TP
Pond 2	160.68	728.82	3.17	1.33	3.33	24.92	43.49	91.33	44.13	0.83

FINAL LOADINGS

Condition	Pollutant	
	TN	TP
Pre-Development	50.02	7.01
Post-Development	44.13	0.83

Basin 2 **(Dry Linear Retention Alternative)**

Inwood Consulting Engineers
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 (407) 971-8850 (phone)
 (407) 971-8955 (fax)

Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **2**
 POND NAME : **2 - Dry Linear Swale**

EXISTING CONDITION

Station Limits: From: 315+00 Roadway Length = 500 ft
 To: 320+00 R/W Width = 131.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder	5.0 ft	1	5 ft
Total Impervious Width:			17 ft

Station Limits: From: 320+00 Roadway Length = 7455 ft
 To: 394+55 R/W Width = 200.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	2	24 ft
Paved Shoulder	5.0 ft	2	10 ft
Total Impervious Width:			34 ft

Impervious Roadway Area: 6.01 ac
 *Misc. Impervious Roadway Area: 2.08 ac
 Pervious Roadway Area: 27.64 ac
 Total Roadway Area: 35.73 ac

**Note: Measured in MicroStation.*

Total Area: Impervious Area: **8.09 ac**
 Pervious Area: **27.64 ac**
 Total Area: **35.73 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	8.09 ac	793.2
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	27.64 ac	1685.9
Total:			35.73 ac	2479.1

CN = Total CN*Area / Total Area = **69.4**

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Soil Capacity (S) = $\frac{1000 - 10}{CN}$	4.41 in	Precipitation (P) = 7.50 in	7.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) = 3.97 in	3.97 in

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Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **2**
 POND NAME : **2 - Dry Linear Swale**

Total Offsite Area:
 Impervious Area: **0.00 ac**
 Pervious Area: **14.10 ac**
 Total Area: **14.10 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	0.00 ac	0.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	14.10 ac	860.1
			Total:	860.1
			14.10 ac	

CN = Total CN*Area / Total Area = **61.0**

Runoff:

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **6.39 in**

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **3.07 in** | **3.07 in**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **2**
 POND NAME : **2 - Dry Linear Swale**

Station Limits:

From: **320+00**
 To: **394+55**

Roadway Length = **7455 ft**
 R/W Width = **200.0 ft**

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	4	48.0 ft
Paved Shoulder	9.0	2	18.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	1	5.0 ft
Curb & Gutter	2.25	2	4.5 ft
Shared-Use Path	10.0	1	10.0 ft
Barrier Wall			
Total Impervious Width:			85.5 ft

Impervious Roadway Area: 14.63 ac
 *Additional Impervious Roadway Area: 1.99 ac
 Pervious Roadway Area: 17.61 ac
 Total Roadway Area: 34.23 ac

**Note: Additional area such as turn lanes, intersection layouts, and etc. are measured in microstation.*

Total Area:

Impervious Area: **16.62 ac**
 Pervious Area: **17.61 ac**
 Water Surface Area: **0.00 ac**
 Total Area: **34.23 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	16.62 ac	1629.0
Proposed Roadway Pervious	B	61	17.61 ac	1074.0
Proposed Pond Pervious	B	61	0.00 ac	0.0
Proposed Ponds (Water Surface)	B	100	0.00 ac	0.0
Total:			34.23 ac	2703.0

CN = Total CN*Area / Total Area = **79.0**

Runoff:

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **2.66 in**

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **5.04 in** | **5.04 in**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **2**
 POND NAME : **2 - Dry Linear Swale**

Total Offsite Area:
 Impervious Area: **0.00 ac**
 Pervious Area: **14.10 ac**
 Total Area: **14.10 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	0.00 ac	0.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	14.10 ac	860.1
			Total:	860.1
			14.10 ac	

CN = Total CN*Area / Total Area = **61.0**

Runoff:

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **6.39 in**

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **3.07 in** | **3.07 in**

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Made by: SF
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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 2
 POND NAME : 2 - Dry Linear Swale

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	SWFWMD
StormW.Mgmt.	Dry Retention
Online/Offline	Online
Impaired Water/OFW	No
Open/Closed Basin	Open

Dry Retention	0.50 in	x DCIA =	0.69 ac-ft
----------------------	----------------	----------	------------

(Directly Connected Impervious Area)

Treatment V_{req} = Largest of Trt. Vol. = **0.69 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Q_{pre} =	15.43 ac-ft	15.43 ac-ft
Q_{post} =	17.98 ac-ft	17.98 ac-ft
ΔQ =	2.56 ac-ft	2.56 ac-ft

Attenuation V_{req} = **2.56 ac-ft**

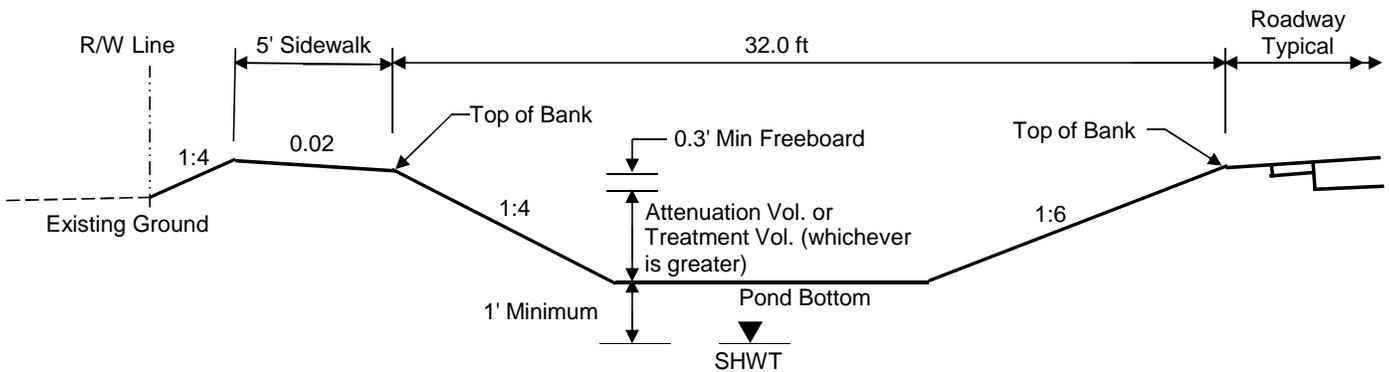
PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **2**
 POND NAME : **2 - Dry Linear Swale**

Pond Stage / Storage Calculations

Pond 2 Limits

from Station	328+00	to Station	355+80
from Station	356+20	to Station	360+00
from Station	373+55	to Station	394+45

Total Proposed Swale Length = 5250.0 ft



Linear Pond Section (Dry)

ELEVATION	DESCRIPTION	AREA (ft ²)	DIMENSIONS		STORAGE (ft ³)
			LENGTH	*WIDTH	
137.50	Top of Bank	168000.0	5250.0 ft	32.0 ft	192745.43
137.00	Provided Attenuation Vol.	141642.0	5246.0 ft	27.0 ft	115334.93
136.97	Required Attenuation Vol.	140167.1	5245.8 ft	26.7 ft	111389.60
136.97	Estimated Storm Sewer TW	140167.1	5245.8 ft	26.7 ft	111389.60
136.31	Top of Treatment Vol.	105333.6	5240.5 ft	20.1 ft	30128.85
136.00	Pond Bottom	89046.0	5238.0 ft	17.0 ft	0.00

Required Attenuation Vol. = 2.56 ac-ft
 Required Attenuation Stage = 136.97 ft

Provided Attenuation Vol. = 2.65 ac-ft
 Provided Attenuation Stage = 137.00 ft

Storm Sewer Att.= 2.56 ac-ft

Total Treatment Volume Recovery (Dry Retention)	2.4 hrs < 72 hrs (Recovery requirements per SWFWMD BOR Section 5.2)
--	--

Design Notes: (1) Linear swale top width calculated using 1:6 FS, 1:4 BS, & 17-foot ditch bottom.

- (2) Proposed linear swale to be located on the left side of the proposed roadway typical section. Runoff from the right side of the roadway is to be conveyed to the proposed linear swale on the left side via roadside ditch and pipe. Assume 1-foot sump in order to maintain roadway base clearance.
- (3) Pond Bottom >1' above SHWT. SHWT approximately 2 feet below existing ground based on geotech soil boring SH-2 and SH-3 performed on 11/19/2012. Assume SHWT elevation is 2-feet below existing ground since majority of soils are the same as the soil boring.
- (4) Please refer to the PONDS model data for the Recovery Analysis. Input data for soil recovery taken from NRCS Web Soil Survey.

PONDS Version 3.3.0233
Retention Pond Recovery - Refined Method
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Project Data

Project Name: SR 33 from Old Combee Road to North of Tomkow Road
Simulation Description: Pond 2 -Dry Linear Retention Alternative
Project Number: FPID No. 430185-1-22-01
Engineer : SF
Supervising Engineer: REC
Date: 08-01-2013

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 120.00
Water Table Elevation, [WT] (ft datum): 135.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 20.0
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 89046.0

Geometry Data

Equivalent Pond Length, [L] (ft): 5240.5
Equivalent Pond Width, [W] (ft): 20.1
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)
136.00	89046.0
137.00	141642.0
137.50	168000.0

Discharge Structures

Discharge Structure #1 is inactive
Discharge Structure #2 is inactive
Discharge Structure #3 is inactive

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Retention Pond Recovery - Refined Method
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Scenario Input Data

Scenario 1 :: Dry Linear Pond Slug Load

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 30128.85

Initial ground water level (ft datum) 135.00 (default)

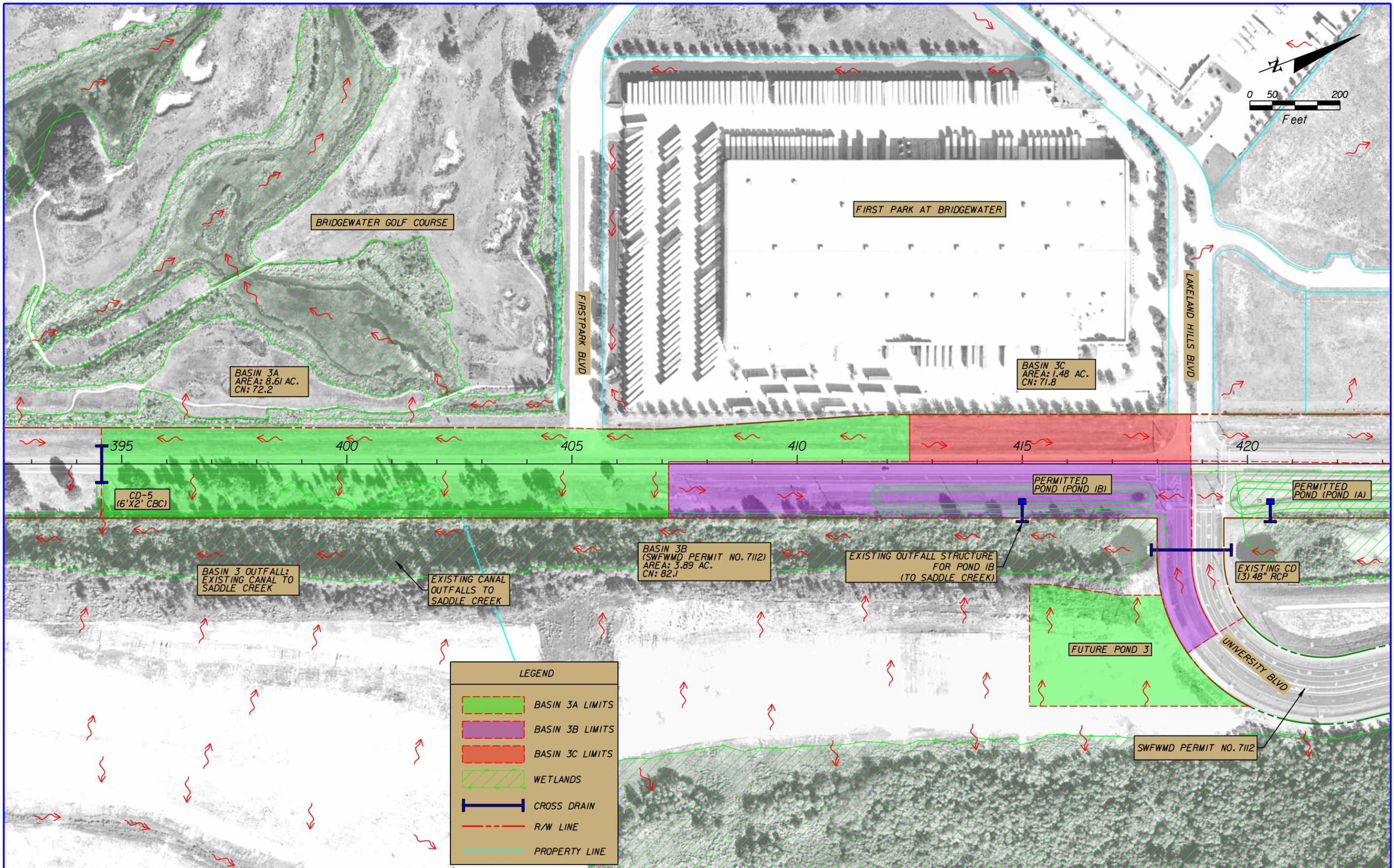
<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>
0.100	2.000
0.250	2.500
0.500	3.000
1.000	3.500
1.500	4.000

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Retention Pond Recovery - Refined Method
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Detailed Results :: Scenario 1 :: Dry Linear Pond Slug Load

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	5021.4750	0.0000	135.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	5021.4750	0.0000	136.309	20.60060	0.00000	30128.9	123.7	0.0	U/P
2.400	0.0000	0.0000	135.617	2.08572	0.00000	30128.9	30128.9	0.0	U/S
6.000	0.0000	0.0000	135.420	0.00000	0.00000	30128.9	30128.9	0.0	S
12.000	0.0000	0.0000	135.308	0.00000	0.00000	30128.9	30128.9	0.0	S
24.000	0.0000	0.0000	135.224	0.00000	0.00000	30128.9	30128.9	0.0	S
36.000	0.0000	0.0000	135.182	0.00000	0.00000	30128.9	30128.9	0.0	S
48.000	0.0000	0.0000	135.156	0.00000	0.00000	30128.9	30128.9	0.0	S
60.000	0.0000	0.0000	135.138	0.00000	0.00000	30128.9	30128.9	0.0	S
72.000	0.0000	0.0000	135.125	0.00000	0.00000	30128.9	30128.9	0.0	S
84.000	0.0000	0.0000	135.115	0.00000	0.00000	30128.9	30128.9	0.0	S
96.000	0.0000	0.0000	135.107	----	----	30128.9	30128.9	0.0	N.A.

Basin 3



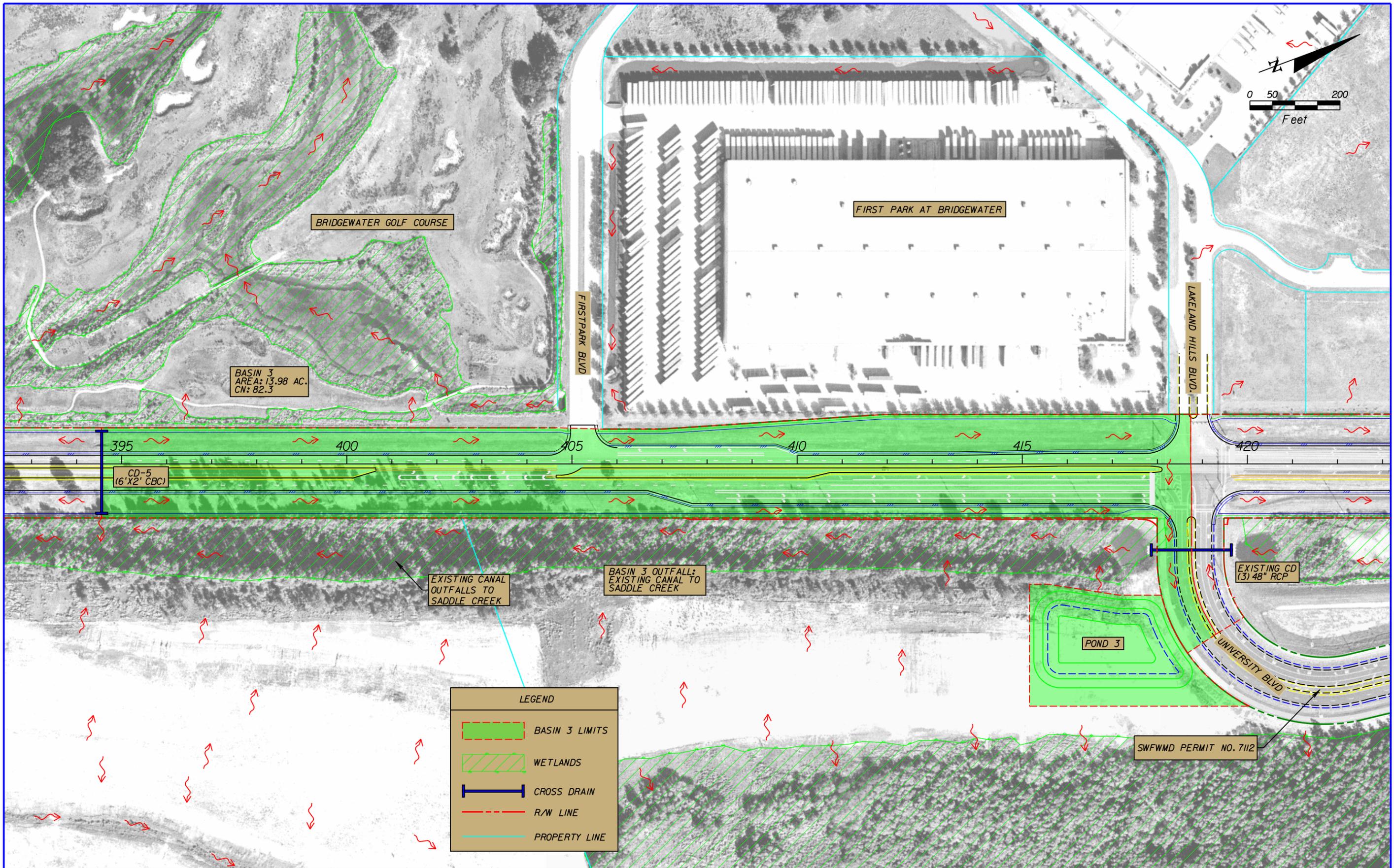
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

**PRE-DEVELOPMENT
BASIN 3 MAP**

SHEET NO.



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

POST-DEVELOPMENT
 BASIN 3 MAP

SHEET NO.

Basin 3 **(Offsite Alternative)**

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Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **3A**
 POND NAME : **3**

EXISTING CONDITION (BASIN 3A)

Station Limits:

From: 394+55 Roadway Length = 1145 ft
 To: 406+00 R/W Width = 200.0 ft
 From: 406+00 Roadway Length = 115 ft
 To: 407+15 Average R/W Width = 215.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	2	24 ft
Paved Shoulder	5.0 ft	2	10 ft
Total Impervious Width:			34 ft

Station Limits:

From: 407+15 Roadway Length = 535 ft
 To: 412+50 Average R/W Width = 84.5 ft

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder	5.0 ft	1	5 ft
Total Impervious Width:			17 ft

Impervious Roadway Area: 1.19 ac
 *Misc. Impervious Roadway Area: 0.71 ac
 Pervious Roadway Area: 4.96 ac
 Total Roadway Area: 6.86 ac

**Note: Measured in MicroStation.*

Pond Area:

Exist. Land = Open Space = 1.75 ac

Total Area:

Impervious Area: 1.90 ac
 Pervious Area: 6.71 ac
 Total Area: 8.61 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	1.90 ac	186.2
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	2.97 ac	181.2
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	1.99 ac	147.3
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	1.75 ac	106.7
Total:			8.61 ac	621.3

CN = Total CN*Area / Total Area = **72.2**

Denotes Pond Area

Runoff:

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **3.86 in**

Precipitation (P) = **7.50 in** **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **4.28 in** **4.28 in**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **3C**
 POND NAME : **3**

Station Limits:

From: 412+50 Roadway Length = 625 ft
 To: 418+75 R/W Width = 103.5 ft

EXISTING CONDITION (BASIN 3C)

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder	5.0 ft	1	5 ft
Imperv. Median			
Sidewalk or Trail			
Curb&Gutter Type F			
Shldr Gutter			
Barrier Wall			
Total Impervious Width:			17 ft

Impervious Roadway Area: 0.24 ac
 *Misc. Impervious Roadway Area: 0.19 ac
 Pervious Roadway Area: 1.05 ac
 Total Roadway Area: 1.48 ac

*Note: Measured in MicroStation.

Total Area:

Impervious Area: 0.43 ac
 Pervious Area: 1.05 ac
 Total Area: 1.48 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	0.43 ac	42.1
Proposed Roadway Pervious	B	61	1.05 ac	64.1
Total:			1.48 ac	106.2

CN = Total CN*Area / Total Area = **71.8**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **3.94 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Precipitation (P) = **7.50 in** **7.50 in**

Runoff (Q) = **4.23 in** **4.23 in**

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Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **3**
 POND NAME : **3**

Station Limits:

From: 394+55 Roadway Length = 1145 ft
 To: 406+00 R/W Width = 200.0 ft
 From: 406+00 Roadway Length = 1275 ft
 To: 418+75 Average R/W Width = 219.5 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	4	48.0 ft
Paved Shoulder	9.0	2	18.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	1	5.0 ft
Curb & Gutter	2.25	2	4.5 ft
Shared-Use Path	10.0	1	10.0 ft
Barrier Wall			
Total Impervious Width:			85.5 ft

Impervious Roadway Area: 4.75 ac
 *University Blvd. Impervious: 0.28 ac
 *University Blvd. Pervious: 0.27 ac
 Pervious Roadway Area: 5.40 ac
 *Additional Impervious Roadway Area: 1.53 ac
 Total Roadway Area: 12.23 ac
 *Note: Additional area such as University Blvd., turn lanes, intersection layouts, and etc. are measured in microstation.

Pond Area:

Pervious Pond Area : 0.88 ac
 Water Surface Area: 0.87 ac Wet Pond
 Total Pond Area: 1.75 ac

Total Area:

Impervious Area: 6.56 ac
 Pervious Area: 6.55 ac
 Water Surface Area: 0.87 ac
 Total Area: 13.98 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	6.56 ac	642.9
Proposed Roadway Pervious	B	61	4.02 ac	245.3
Proposed Roadway Pervious	C	74	1.65 ac	122.1
Proposed Pond Pervious	B	61	0.88 ac	53.5
Proposed Ponds (Water Surface)	B	100	0.87 ac	87.1
Total:			13.98 ac	1150.9

CN = Total CN*Area / Total Area = **82.3**

Runoff:

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **2.15 in**

Precipitation (P) = **7.50 in** **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **5.42 in** **5.42 in**

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

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Made by: SF
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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **3**
 POND NAME : **3**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	SWFWMD
StormW.Mgmt.	Wet Detention
Online/Offline	Online
Impaired Water/OFW	No
Open/Closed Basin	Open

Wet Detention **1.00 in** x DCIA = 0.55 ac-ft
 (Directly Connected Impervious Area)

Treatment V_{req} = Largest of Trt. Vol. = **0.55 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Q_{pre} =	5.34 ac-ft	5.34 ac-ft
Q_{post} =	6.32 ac-ft	6.32 ac-ft
ΔQ =	0.97 ac-ft	0.97 ac-ft

Attenuation V_{req} = **0.97 ac-ft**

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Made by: SF
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DATE: August 1, 2013
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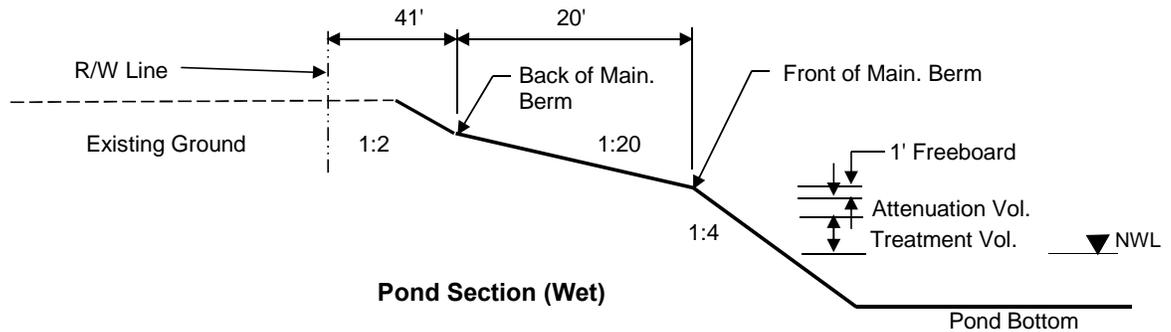
PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **3**
 POND NAME : **3**

Maintenance Area Width =	<u>20.0 ft</u>	@ 1:20	Existing Ground Elevation =	<u>140.00</u>
Pond Tie-In Width =	<u>40.8 ft</u>	@ 1:2	*Normal Water Elevation =	<u>133.85</u>
Maximum Storage Depth (SD) =	<u>1.75 ft</u>	with 1.0 ft freeboard	Lowest EOP Elevation =	<u>138.00</u>

Hydraulic Grade Line (HGL) check

*Note: NWL is based on tailwater elevation (boundary condition) from outfall based on Permit No. 7112

HGL Slope =	<u>0.050%</u>	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	<u>800 ft</u>	
Estimated Energy Losses =	<u>0.40 ft</u>	
HGL Clearance =	<u>2.0 ft</u>	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	<u>135.60 ft</u>	



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 Job Number: DT1-017-01

PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 3
 POND NAME : 3

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
158.00	East Pond R/W	1.75 ac	280.0 ft	272.0 ft	
140.00	West Pond R/W	1.29 ac	280.0 ft	200.0 ft	
137.60	Back of Main. Berm	1.08 ac	260.8 ft	180.8 ft	3.67 ac-ft
137.10		0.89 ac	240.8 ft	160.8 ft	3.17 ac-ft
136.60	Front of Main. Berm	1.08 ac	260.8 ft	180.8 ft	2.68 ac-ft
135.60	Provided Treat.Vol.+Att.Vol	1.00 ac	252.8 ft	172.8 ft	1.64 ac-ft
135.48	Req'd Treat.Vol+Att. Vol	0.99 ac	251.8 ft	171.8 ft	1.52 ac-ft
135.48	Estimated Storm Sewer TW	0.99 ac	251.8 ft	171.8 ft	1.52 ac-ft
134.47	Top of Treatment Vol.	0.92 ac	243.8 ft	163.8 ft	0.55 ac-ft
133.85	Normal Water Level	0.87 ac	238.8 ft	158.8 ft	0.00 ac-ft
127.85		0.49 ac	190.8 ft	110.8 ft	
121.85	Pond Bottom	0.21 ac	142.8 ft	62.8 ft	

Required Treatment+Attenuation Vol.= 1.52 ac-ft
 Required Treatment+Attenuation Stage= 135.48 ft

Provided Treatment+Attenuation Vol.= 1.64 ac-ft
 Provided Treatment+Attenuation Stage= 135.60 ft

Estimated Treat. Vol.+Storm Sewer Att.= 1.52 ac-ft
 Estimated Storm Sewer TW EL.= 135.48 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 2.10 ac

Note: Treatment depth is less than 1.5-feet because of stormsewer TW requirements.

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PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 3
 POND NAME : 3

PERMANENT POOL VOLUME CALCULATIONS

Basin Characteristics (Proposed Conditions)

Land Use	Area (ac)	Runoff Coeff.	Product
Roadway Impervious Area	6.56	0.95	6.23
Roadway Pervious Area	5.67	0.20	1.13
Pond Pervious Area	0.88	0.20	0.18
Pond Area at NWL	0.87	1.00	0.87
Total	13.98		8.41

Composite C = **0.60**

Annual Rainfall (P) = **50.00 in**

Min. Permanent Pool Vol. = (Area x Composite C x P x 14) / (365 x 12) = **1.34 ac-ft**

Stage Storage Calc. for Permanent Pool

ELEV. (ft)	AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
133.85	0.87				6.22
		0.79	3.00	2.36	
130.85	0.70				3.86
		0.59	3.00	1.78	
127.85	0.49				2.07
		0.35	6.00	2.07	
121.85	0.21				0.00

Permanent Pool Volume Provided = 6.22 ac-ft
Resident Time Provided = 64.8 Days
 = (Perm. Pool Vol. Provided x 365 x 12) / (Area x C x P) =

Mean Depth = 7.15 ft
Anoxic Depth Elev. = 122.76 ft
 = Permanent Pool Volume / Area at NWL =
 = Permanent Pool Elev. - Anoxic Depth from WQ worksheet =

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN: **3**
 POND: **3**

EXISTING AND PROPOSED CONDITIONS POLLUTANT LOADING CALCULATIONS

The following Pollutant Loading equations are referenced from the March 2010 draft of the Stormwater Quality Applicant's Handbook by FDEP.

Annual Rainfall : **50.00** in/yr

Meteorological Zone : **2**

Description	Area (ac)	
	Pre-Dev (3A,3B,3C)	*Post-Dev
DCIA	3.65	5.73
Impervious Area (Non-DCIA)	0.00	0.00
Proposed Pervious Pond Area	1.75	0.88
Proposed Pond Water Surface Area	0.00	0.87
Pervious Roadway Area	8.58	6.51
Total Roadway Area Within R/W:	12.23	12.23
Impervious DCIA %	29.84	46.82
Total Basin Area:	13.98	13.98

*Note: DCIA area (Post-Dev) excludes the 5-foot sidewalk and 12-foot shared use path for Pollutant Loading Analysis

- 1 Annual Runoff (AR) = P/12 (in/ft)xComposite CxA
- 2 Pollutant Loading (TP) = AR x 43560 (ft²/ac) x 7.48 (gal/ft³) x 3.785 (L/gal) x EMC(TP) (mg/L) x 1 (kg/10⁶ mg)
- 3 Permanent Pool: Proposed permanent pool volume were determined using the permanent pool calculations spreadsheets
See Permanent Pool Volume Calculations for proposed pond PPV details
- 4 Resident Time = PPV/AR x 365 (days/yr)
- 5 Mean Pond Conc = Pollutant Loading x 1yr/(Pond Volume + Annual Runoff) x 1 ac/43560 ft² x 1 ft³/7.48 gal x 1 gal/L x 10⁶mg/kg x 1000ug/mg.
- 6 Mean Chlorophyll Conc: ln(chyl-a) = 1.058 ln(TP)-0.934.
- 7 Mean Secchi Disk Depth: SD = (24.2386+(0.3041)(chyl-a))/(6.0632 + chyl-a).
- 8 Anoxic Depth: Depth of DO < 1 = 3.305(SD) = 0.02164(chyl-a) -0.004979(TP). Anoxic Depth is the maximum depth of PPV that can be counted for water quality.
- 9 Required Reduction = (1-(PreDev Loading [kg/yr]/PostDev Loading [kg/yr]) x 100
- 10 Removal Efficiency: TP (% Removal) = 44.53 + 6.145 x ln(t_d) + 0.145 x (ln(t_d))²
TN (% Removal) = (43.75 x t_d)/(4.38 + t_d)
- 11 Event Mean Concentration values are referenced from Table 3.4 of the March 2010 draft ERP Stormwater Quality Applicant's Handbook by FDEP.
- 12 Roadway Event Mean Concentration values are referenced from the July 2011 Nutrient Loading Calculations Consultants Memo.

PRE-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	12.23	29.84	67.6	0.2765	14.092	1.19	20.681	0.155	2.694
Proposed Pond Area - Mining/Extractive	1.75	0	61	0.0324	0.236	1.18	0.344	0.15	0.044
Total:	13.98				14.33		21.02		2.74

POST-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	12.23	46.82	69.4	0.4085	20.817	1.19	30.551	0.155	3.979
Pond Pervious Area	0.88	0	61	0.0324	0.119	1.19	0.174	0.155	0.023
Pond Water Surface	0.87	0	100	1.0000	3.627	0.00	0.000	0.00	0.000
Total:	13.98				24.56		30.73		4.00

* Determined from the Mean annual Runoff Coefficients (C Values) as a Function of DCIA Percentage and Non-DCIA Curve Number Table

TREATMENT REQUIRED

Condition	Annual Runoff ¹ (ac-ft/yr)	Pollutant Loading ² (Kg/Yr)		Required Removal Efficiency (%)	
		TN	TP	TN	TP
Pre-Development	14.33	21.02	2.74	31.57	31.60
Post-Development	24.56	30.73	4.00		

TREATMENT PROVIDED

Pond ID	Permanent Pool Volume ³ PPV (ac-ft)	Residence Time ⁴ t _d (days)	Mean Pond Concentration ⁵ (ug TP/L)	Mean Chlorophyll Concentration ⁶ (mg TP/m ³)	Mean Secchi Disk Depth ⁷ (m)	Anoxic Depth ⁸ (ft)	Removal Efficiency ¹⁰ (%)		Pollutant Loading (Kg/Yr)	
							TN	TP	TN	TP
Pond 3	6.22	64.78	28.80	13.75	1.43	11.09	40.98	72.68	18.13	1.09

Condition	Pollutant	
	TN	TP
Pre-Development	21.02	2.74
Post-Development	18.13	1.09

Basin 3 **(Dry Linear Retention Alternative)**

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **3A**
 POND NAME : **3 - Dry Linear Swale**

EXISTING CONDITION (BASIN 3A)

Station Limits:
 From: 394+55 Roadway Length = 1145 ft
 To: 406+00 R/W Width = 200.0 ft
 From: 406+00 Roadway Length = 115 ft
 To: 407+15 Average R/W Width = 215.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	2	24 ft
Paved Shoulder	5.0 ft	2	10 ft
Total Impervious Width:			34 ft

Station Limits:
 From: 407+15 Roadway Length = 535 ft
 To: 412+50 Average R/W Width = 84.5 ft

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder	5.0 ft	1	5 ft
Total Impervious Width:			17 ft

Impervious Roadway Area: 1.19 ac
 *Misc. Impervious Roadway Area: 0.71 ac
 Pervious Roadway Area: 4.96 ac
 Total Roadway Area: 6.86 ac

**Note: Measured in MicroStation.*

Total Area:
 Impervious Area: 1.90 ac
 Pervious Area: 4.96 ac
 Total Area: 6.86 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	1.90 ac	186.2
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	2.97 ac	181.2
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	1.99 ac	147.3
Total:			6.86 ac	514.6

CN = Total CN*Area / Total Area = **75.0**

Runoff:

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **3.33 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Precipitation (P) = 7.50 in	7.50 in

Runoff (Q) = **4.60 in** **4.60 in**

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 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **3B**
 POND NAME : **3 - Dry Linear Swale**

Station Limits: From: **407+15** Roadway Length = 1160 ft
 To: **418+75** R/W Width = **125.0 ft**

EXISTING CONDITION (BASIN 3B)

Roadway Area: Note: Existing Condition based on Permit No. 7112 Basin No. 100B (Post-Development)

Impervious Roadway Area: 1.32 ac
 Pervious Roadway Area: 2.57 ac
 Total Roadway Area: 3.89 ac

Total Area: Impervious Area: **1.32 ac**
 Pervious Area: **2.57 ac**
 Total Area: **3.89 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	1.32 ac	129.4
Proposed Roadway Pervious	C	74	2.57 ac	190.2
Total:			3.89 ac	319.5

CN = Total CN*Area / Total Area = **82.1**

Includes Linear Pond Area

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **2.17 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Precipitation (P) = **7.50 in** **7.50 in**

Runoff (Q) = **5.40 in** **5.40 in**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **3C**
 POND NAME : **3 - Dry Linear Swale**

Station Limits:

From: 412+50
 To: 418+75

Roadway Length = 625 ft
 R/W Width = 103.5 ft

EXISTING CONDITION (BASIN 3C)

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder	5.0 ft	1	5 ft
Imperv. Median			
Sidewalk or Trail			
Curb&Gutter Type F			
Shldr Gutter			
Barrier Wall			
Total Impervious Width:			17 ft

Impervious Roadway Area: 0.24 ac
 *Misc. Impervious Roadway Area: 0.19 ac
 Pervious Roadway Area: 1.05 ac
 Total Roadway Area: 1.48 ac

**Note: Measured in MicroStation.*

Total Area:

Impervious Area: 0.43 ac
 Pervious Area: 1.05 ac
 Total Area: 1.48 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	0.43 ac	42.1
Proposed Roadway Pervious	B	61	1.05 ac	64.1
Total:			1.48 ac	106.2

CN = Total CN*Area / Total Area = **71.8**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **3.94 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Precipitation (P) = 7.50 in	7.50 in

Runoff (Q) = **4.23 in** **4.23 in**

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 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **3**
 POND NAME : **3 - Dry Linear Swale**

Station Limits:

From: 394+55 Roadway Length = 1145 ft
 To: 406+00 R/W Width = 200.0 ft
 From: 406+00 Roadway Length = 1275 ft
 To: 418+75 Average R/W Width = 219.5 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	4	48.0 ft
Paved Shoulder	9.0	2	18.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	1	5.0 ft
Curb & Gutter	2.25	2	4.5 ft
Shared-Use Path	10.0	1	10.0 ft
Barrier Wall			
Total Impervious Width:			85.5 ft

Impervious Roadway Area: 4.75 ac
 *University Blvd. Impervious: 0.28 ac
 *University Blvd. Pervious: 0.27 ac
 Pervious Roadway Area: 5.40 ac
 *Additional Impervious Roadway Area: 1.53 ac
 Total Roadway Area: 12.23 ac
 *Note: Additional area such as University Blvd., turn lanes, intersection layouts, and etc. are measured in microstation.

Total Area:

Impervious Area: **6.56 ac**
 Pervious Area: **5.67 ac**
 Water Surface Area: **0.00 ac**
 Total Area: **12.23 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	6.56 ac	642.9
Proposed Roadway Pervious	B	61	4.02 ac	245.3
Proposed Roadway Pervious	C	74	1.65 ac	122.1
Total:			12.23 ac	1010.3

CN = Total CN*Area / Total Area = **82.6**

Runoff:

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **2.11 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Precipitation (P) = **7.50 in** **7.50 in**

Runoff (Q) = **5.45 in** **5.45 in**

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PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **3**
 POND NAME : **3 - Dry Linear Swale**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	SWFWMD
StormW.Mgmt.	Dry Retention
Online/Offline	Online
Impaired Water/OFW	No
Open/Closed Basin	Open

Dry Retention **0.50 in** x DCIA = 0.27 ac-ft
 (Directly Connected Impervious Area)

Treatment V_{req} = Largest of Trt. Vol. = 0.27 ac-ft

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Q_{pre} =	4.90 ac-ft	4.90 ac-ft
Q_{post} =	5.56 ac-ft	5.56 ac-ft
ΔQ =	0.66 ac-ft	0.66 ac-ft

Attenuation V_{req} = 0.66 ac-ft

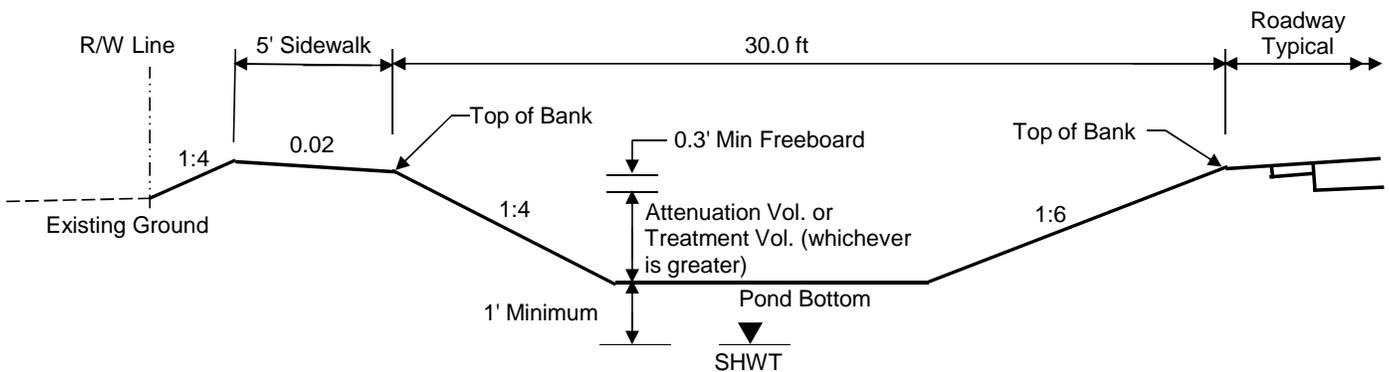
PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **3**
 POND NAME : **3 - Dry Linear Swale**

Pond Stage / Storage Calculations

Pond 3 Limits

from Station	394+65	to Station	404+50
from Station	410+00	to Station	418+00

Total Proposed Swale Length = 1785.0 ft



Linear Pond Section (Dry)

ELEVATION	DESCRIPTION	AREA (ft ²)	DIMENSIONS		STORAGE (ft ³)
			LENGTH	*WIDTH	
136.00	Top of Bank	53550.0	1785.0 ft	30.0 ft	71145.55
135.40	Provided Attenuation Vol.	42724.8	1780.2 ft	24.0 ft	42263.11
135.35	Required Attenuation Vol.	41825.3	1779.8 ft	23.5 ft	40149.36
135.35	Estimated Storm Sewer TW	41825.3	1779.8 ft	23.5 ft	40149.36
134.53	Top of Treatment Vol.	27130.6	1773.2 ft	15.3 ft	11877.45
134.00	Pond Bottom	17690.0	1769.0 ft	10.0 ft	0.00

Required Attenuation Vol. = 0.66 ac-ft
 Required Attenuation Stage = 135.35 ft

Provided Attenuation Vol. = 0.97 ac-ft
 Provided Attenuation Stage = 135.40 ft

Storm Sewer Att.= 0.66 ac-ft

Total Treatment Volume Recovery (Dry Retention)	6.0 hrs < 72 hrs (Recovery requirements per SWFWMD BOR Section 5.2)
--	--

Design Notes: (1) Linear swale top width calculated using 1:6 FS, 1:4 BS, & 10-foot ditch bottom.

- (2) Proposed linear swale to be located on the left side of the proposed roadway typical section. Runoff from the right side of the roadway is to be conveyed to the proposed linear swale on the left side via roadside ditch and pipe. Assume 1-foot sump in order to maintain roadway base clearance.
- (3) Pond Bottom >1' above SHWT. SHWT is elevation 130.8 feet per permitted soil boring (Permit No. 7112). Assume SHWT elevation is at same elevation since the proposed linear pond is in close proximity with the permitted pond.
- (4) Please refer to the PONDS model data for the Recovery Analysis. Input data for soil recovery taken from Pond 100B boring (Permit No. 7112) since the permitted pond is in close proximity to the Pond 3 linear dry pond.

PONDS Version 3.3.0233
Retention Pond Recovery - Refined Method
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Project Data

Project Name: SR 33 from Old Combee Road to North of Tomkow Road
Simulation Description: Pond 3 -Dry Linear Retention Alternative
Project Number: FPID No. 430185-1-22-01
Engineer : SF
Supervising Engineer: REC
Date: 08-01-2013

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 130.00
Water Table Elevation, [WT] (ft datum): 130.80
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 6.00
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 4.0
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 17690.0

Geometry Data

Equivalent Pond Length, [L] (ft): 1773.2
Equivalent Pond Width, [W] (ft): 15.3
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)
134.00	17690.0
135.40	42724.8
136.00	53550.0

Discharge Structures

Discharge Structure #1 is inactive
Discharge Structure #2 is inactive
Discharge Structure #3 is inactive

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Scenario Input Data

Scenario 1 :: Dry Linear Pond Slug Load

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 11877.45

Initial ground water level (ft datum) 130.80 (default)

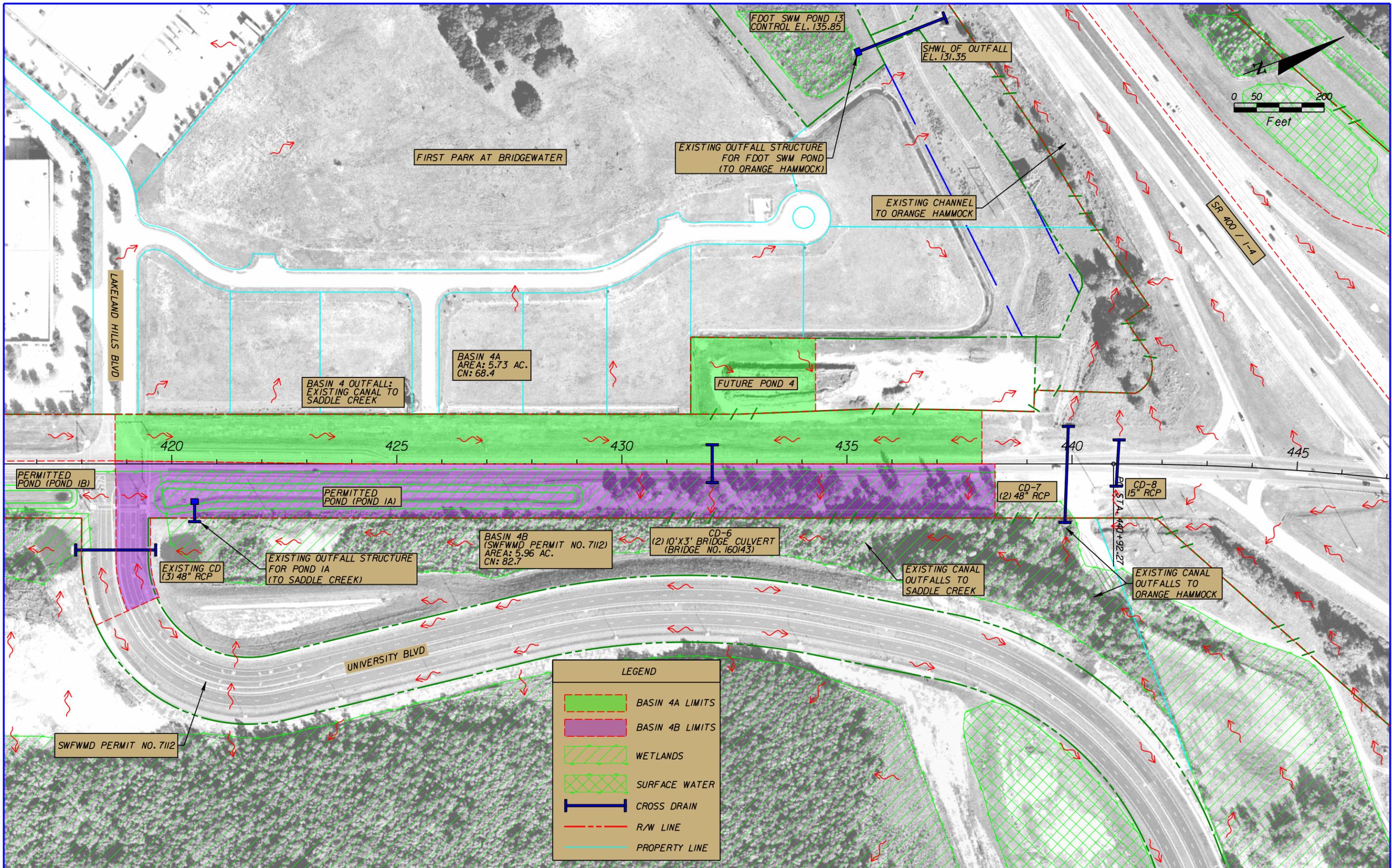
<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>
0.100	2.000
0.250	2.500
0.500	3.000
1.000	3.500
1.500	4.000

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Detailed Results :: Scenario 1 :: Dry Linear Pond Slug Load

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	1979.5750	0.0000	130.800	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	1979.5750	0.0000	134.530	0.81898	0.00000	11877.5	4.9	0.0	U/P
2.400	0.0000	0.0000	134.242	0.49153	0.00000	11877.5	7076.0	0.0	U/P
6.000	0.0000	0.0000	----	----	----	11877.5	11877.5	0.0	dry
12.000	0.0000	0.0000	----	----	----	11877.5	11877.5	0.0	dry
24.000	0.0000	0.0000	----	----	----	11877.5	11877.5	0.0	dry
36.000	0.0000	0.0000	----	----	----	11877.5	11877.5	0.0	dry
48.000	0.0000	0.0000	----	----	----	11877.5	11877.5	0.0	dry
60.000	0.0000	0.0000	----	----	----	11877.5	11877.5	0.0	dry
72.000	0.0000	0.0000	----	----	----	11877.5	11877.5	0.0	dry
84.000	0.0000	0.0000	----	----	----	11877.5	11877.5	0.0	dry
96.000	0.0000	0.0000	----	----	----	11877.5	11877.5	0.0	dry

Basin 4



LEGEND	
	BASIN 4A LIMITS
	BASIN 4B LIMITS
	WETLANDS
	SURFACE WATER
	CROSS DRAIN
	R/W LINE
	PROPERTY LINE

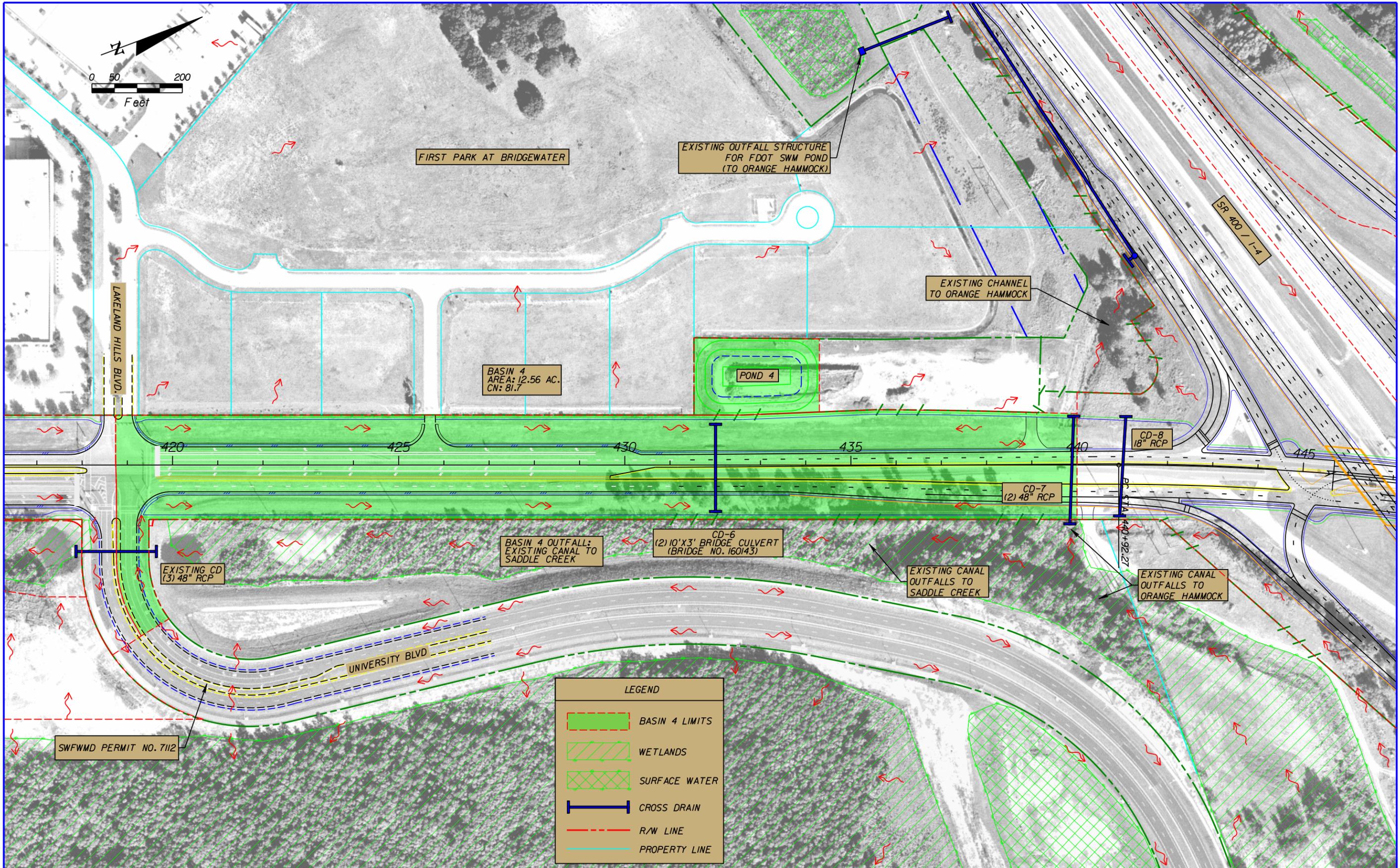
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

Inwood Consulting Engineers, Inc.
 3000 Dovera Drive, Suite 200, Oviedo, Florida 32765
 P 407.971.8850

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

**PRE-DEVELOPMENT
BASIN 4 MAP**

SHEET NO.



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

**POST-DEVELOPMENT
BASIN 4 MAP**

SHEET NO.

Basin 4 **(Offsite Alternative)**

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 (407) 971-8850 (phone)
 (407) 971-8955 (fax)

Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **4A**
 POND NAME : **4**

Station Limits: From: 418+75 Roadway Length = 1178 ft
 To: 430+53 *R/W Width = 111.0 ft

EXISTING CONDITION

From: 430+53 Roadway Length = 747 ft
 To: 438+00 *R/W Width = 112.5 ft

(BASIN 4A)

Note: R/W Widths vary. Used average value.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder	5.0 ft	1	5 ft
Imperv. Median			
Sidewalk or Trail			
Curb&Gutter Type F			
Shldr Gutter			
Barrier Wall			
Total Impervious Width:			17 ft

Impervious Roadway Area: 0.75 ac
 *Misc. Impervious Roadway Area: 0.39 ac
 Pervious Roadway Area: 3.79 ac
 Total Roadway Area: 4.93 ac

*Note: Measured in MicroStation.

Pond Area: Exist. Land = Open Space = 0.80 ac

Total Area: Impervious Area: 1.14 ac
 Pervious Area: 4.59 ac
 Total Area: 5.73 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	1.14 ac	111.7
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	3.79 ac	231.2
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	0.80 ac	48.8
Total:			5.73 ac	391.7

CN = Total CN*Area / Total Area = **68.4**

Denotes Pond Area

Runoff:

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **4.63 in**

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
7.50 in	7.50 in

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **3.86 in** Runoff (Q) = **3.86 in**

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Made by: SF
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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **4**
 POND NAME : **4**

Station Limits:

From: **418+75** Roadway Length = 1178 ft
 To: **430+53** R/W Width = **230.0 ft**
 From: **430+53** Roadway Length = 947 ft
 To: **440+00** Average R/W Width = **239.0 ft**

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	4	48.0 ft
Paved Shoulder	9.0	2	18.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	1	5.0 ft
Curb & Gutter	2.25	2	4.5 ft
Shared-Use Path	10.0	1	10.0 ft
Barrier Wall			
Total Impervious Width:			85.5 ft

Impervious Roadway Area: 4.17 ac
 *University Blvd. Impervious: 0.24 ac
 *University Blvd. Pervious: 0.11 ac
 Pervious Roadway Area: 5.92 ac
 *Additional Impervious Roadway Area: 1.32 ac
 Total Roadway Area: 11.76 ac
 *Note: Additional area such as University Blvd., turn lanes, intersection layouts, and etc. are measured in microstation.

Pond Area:

Pervious Pond Area : 0.23 ac
 Water Surface Area: 0.57 ac Wet Pond
 Total Pond Area: 0.80 ac

Total Area:

Impervious Area: **5.73 ac**
 Pervious Area: **6.27 ac**
 Water Surface Area: **0.57 ac**
 Total Area: **12.57 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	5.73 ac	561.5
Proposed Roadway Pervious	B	61	4.02 ac	245.4
Proposed Roadway Pervious	C	74	2.01 ac	148.7
Proposed Pond Pervious	B	61	0.23 ac	14.3
Proposed Ponds (Water Surface)	B	100	0.57 ac	56.7
Total:			12.56 ac	1026.7

CN = Total CN*Area / Total Area = **81.7**

Runoff:

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **2.24 in**

Precipitation (P) = **7.50 in** **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **5.35 in** **5.35 in**

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **4**
 POND NAME : **4**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	SWFWMD
StormW.Mgmt.	Wet Detention
Online/Offline	Online
Impaired Water/OFW	No
Open/Closed Basin	Open

Wet Detention **1.00 in** x DCIA = 0.48 ac-ft
 (Directly Connected Impervious Area)

Treatment V_{req} = Largest of Trt. Vol. = **0.48 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Q_{pre} =	4.56 ac-ft	4.56 ac-ft
Q_{post} =	5.61 ac-ft	5.61 ac-ft
ΔQ =	1.05 ac-ft	1.05 ac-ft

Attenuation V_{req} = **1.05 ac-ft**

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Made by: SF
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 Job Number: DT1-017-01

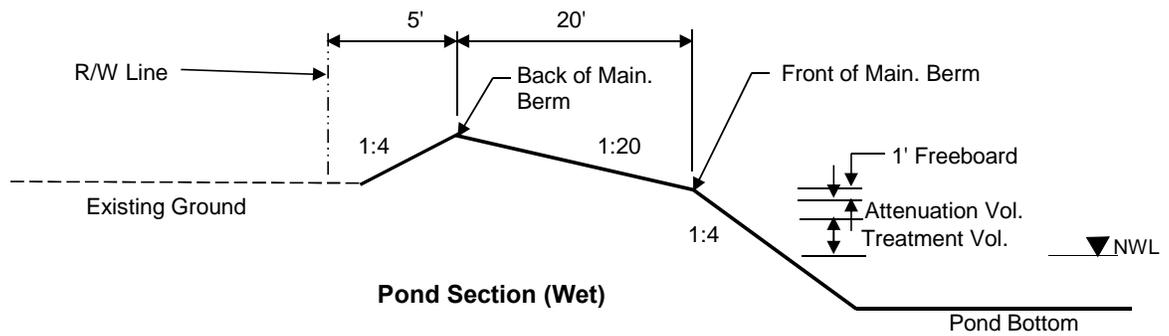
PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **4**
 POND NAME : **4**

Maintenance Area Width =	<u>20.0 ft</u>	@ 1:20	Existing Ground Elevation =	<u>136.00</u>
Pond Tie-In Width =	<u>4.8 ft</u>	@ 1:4	*Normal Water Elevation =	<u>132.50</u>
Maximum Storage Depth (SD) =	<u>2.70 ft</u>	with 1.0 ft freeboard	Lowest EOP Elevation =	<u>137.00</u>

Hydraulic Grade Line (HGL) check

*Note: NWL 6" below SHW based on NRCS Web Soil Survey

HGL Slope =	<u>0.050%</u>	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	<u>200 ft</u>	
Estimated Energy Losses =	<u>0.10 ft</u>	
HGL Clearance =	<u>2.0 ft</u>	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	<u>134.90 ft</u>	



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Made by: SF
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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 4
 POND NAME : 4

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
136.00	Pond R/W	0.89 ac	204.0 ft	189.0 ft	
137.20	Back of Main. Berm	0.80 ac	194.4 ft	179.4 ft	3.24 ac-ft
136.70		0.64 ac	174.4 ft	159.4 ft	2.88 ac-ft
136.20	Front of Main. Berm	0.80 ac	194.4 ft	179.4 ft	2.52 ac-ft
135.20	Provided Treat.Vol.+Att.Vol	0.73 ac	186.4 ft	171.4 ft	1.75 ac-ft
134.89	Req'd Treat.Vol+Att. Vol	0.71 ac	183.9 ft	168.9 ft	1.53 ac-ft
134.89	Estimated Storm Sewer TW	0.71 ac	183.9 ft	168.9 ft	1.53 ac-ft
133.31	Top of Treatment Vol.	0.61 ac	171.3 ft	156.3 ft	0.48 ac-ft
132.50	Normal Water Level	0.57 ac	164.8 ft	149.8 ft	0.00 ac-ft
126.50		0.27 ac	116.8 ft	101.8 ft	
120.50	Pond Bottom	0.08 ac	68.8 ft	53.8 ft	

Required Treatment+Attenuation Vol.= 1.53 ac-ft
 Required Treatment+Attenuation Stage= 134.89 ft

Provided Treatment+Attenuation Vol.= 1.75 ac-ft
 Provided Treatment+Attenuation Stage= 135.20 ft

Estimated Treat. Vol.+Storm Sewer Att.= 1.53 ac-ft
 Estimated Storm Sewer TW EL.= 134.89 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) =	1.06 ac
---	----------------

Note: Treatment depth is less than 1.5-feet because of stormsewer TW requirements.

PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 4
 POND NAME : 4

PERMANENT POOL VOLUME CALCULATIONS

Basin Characteristics (Proposed Conditions)

Land Use	Area (ac)	Runoff Coeff.	Product
Roadway Impervious Area	5.73	0.95	5.44
Roadway Pervious Area	6.03	0.20	1.21
Pond Pervious Area	0.23	0.20	0.05
Pond Area at NWL	0.57	1.00	0.57
Total	12.56		7.26

Composite C = **0.58**

Annual Rainfall (P) = **50.00 in**

Min. Permanent Pool Vol. = (Area x Composite C x P x 14) / (365 x 12) = **1.16 ac-ft**

Stage Storage Calc. for Permanent Pool

ELEV. (ft)	AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
132.50	0.57				3.67
		0.51	3.00	1.52	
129.50	0.45				2.15
		0.36	3.00	1.08	
126.50	0.27				1.07
		0.18	6.00	1.07	
120.50	0.08				0.00

Permanent Pool Volume Provided = 3.67 ac-ft
Resident Time Provided = 44.3 Days
 = (Perm. Pool Vol. Provided x 365 x 12) / (Area x C x P) =

Mean Depth = 6.48 ft
Anoxic Depth Elev. = 122.49 ft
 = Permanent Pool Volume / Area at NWL =
 = Permanent Pool Elev. - Anoxic Depth from WQ worksheet =

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN: **4**
 POND: **4**

EXISTING AND PROPOSED CONDITIONS POLLUTANT LOADING CALCULATIONS

The following Pollutant Loading equations are referenced from the March 2010 draft of the Stormwater Quality Applicant's Handbook by FDEP.

Annual Rainfall : **50.00** in/yr

Meteorological Zone : **2**

Description	Area (ac)	
	Pre-Dev (4A & 4B)	*Post-Dev
DCIA	3.30	5.00
Impervious Area (Non-DCIA)	0.00	0.00
Proposed Pervious Pond Area	0.80	0.23
Proposed Pond Water Surface Area	0.00	0.57
Pervious Roadway Area	7.59	6.77
Total Roadway Area Within R/W:	10.89	11.77
Impervious DCIA %	30.30	42.48
Total Basin Area:	11.69	12.57

*Note: DCIA area (Post-Dev) excludes the 5-foot sidewalk and 12-foot shared use path for Pollutant Loading Analysis

- Annual Runoff (AR) = P/12 (in/ft)xComposite Cx_A
- Pollutant Loading (TP) = AR x 43560 (ft²/ac) x 7.48 (gal/ft³) x 3.785 (L/gal) x EMC(TP) (mg/L) x 1 (kg/10⁶ mg)
- Permanent Pool: Proposed permanent pool volume were determined using the permanent pool calculations spreadsheets
See Permanent Pool Volume Calculations for proposed pond PPV details
- Resident Time = PPV/AR x 365 (days/yr)
- Mean Pond Conc = Pollutant Loading x 1yr/(Pond Volume + Annual Runoff) x 1 ac/43560 ft² x 1ft³/7.48 gal x 1 gal/L x 10⁶mg/kg x 1000ug/mg.
- Mean Chlorophyll Conc: ln(chyl-a) = 1.058 ln(TP)-0.934.
- Mean Secchi Disk Depth: SD = (24.2386+(0.3041)(chyl-a))/(6.0632 + chyl-a).
- Anoxic Depth: Depth of DO < 1 = 3.305(SD) = 0.02164(chyl-a) -0.004979(TP). Anoxic Depth is the maximum depth of PPV that can be counted for water quality.
- Required Reduction = (1-(PreDev Loading [kg/yr]/PostDev Loading [kg/yr])) x 100
- Removal Efficiency: TP (% Removal) = 44.53 + 6.145 x ln(t_d) + 0.145 x (ln(t_d))²
TN (% Removal) = (43.75 x t_d)/(4.38 + t_d)
- Event Mean Concentration values are referenced from Table 3.4 of the March 2010 draft ERP Stormwater Quality Applicant's Handbook by FDEP.
- Roadway Event Mean Concentration values are referenced from the July 2011 Nutrient Loading Calculations Consultants Memo.

PRE-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	10.89	30.30	67.6	0.2801	12.707	1.19	18.649	0.155	2.429
Proposed Pond Area - Mining/Extractive	0.80	0	61	0.0324	0.108	1.18	0.157	0.15	0.020
Total:	11.69				12.82		18.81		2.45

POST-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	11.77	42.48	68.4	0.3740	18.340	1.19	26.916	0.155	3.506
Pond Pervious Area	0.23	0.00	61	0.0324	0.000	1.19	0.000	0.155	0.000
Pond Water Surface	0.57	0	100	1.0000	2.361	0.00	0.000	0.00	0.000
Total:	12.57				20.70		26.92		3.51

* Determined from the Mean annual Runoff Coefficients (C Values) as a Function of DCIA Percentage and Non-DCIA Curve Number Table

TREATMENT REQUIRED

Condition	Annual Runoff ¹ (ac-ft/yr)	Pollutant Loading ² (Kg/Yr)		Required Removal Efficiency (%)	
		TN	TP	TN	TP
Pre-Development	12.82	18.81	2.45	30.13	30.14
Post-Development	20.70	26.92	3.51		

TREATMENT PROVIDED

Pond ID	Permanent Pool Volume ³ PPV (ac-ft)	Residence Time ⁴ t _d (days)	Mean Pond Concentration ⁵ (ug TP/L)	Mean Chlorophyll Concentration ⁶ (mg TP/m ³)	Mean Secchi Disk Depth ⁷ (m)	Anoxic Depth ⁸ (ft)	Removal Efficiency ¹⁰ (%)		Pollutant Loading (Kg/Yr)	
							TN	TP	TN	TP
Pond 4	3.67	44.29	35.10	16.95	1.28	10.01	39.81	69.91	16.20	1.06

Condition	Pollutant	
	TN	TP
Pre-Development	18.81	2.45
Post-Development	16.20	1.06

Basin 4 **(Dry Linear Retention Alternative)**

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 (407) 971-8955 (fax)

Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **4A**
 POND NAME : **4 - Dry Linear Swale**

Station Limits: From: 418+75 Roadway Length = 1178 ft
 To: 430+53 *R/W Width = 111.0 ft

EXISTING CONDITION

From: 430+53 Roadway Length = 747 ft
 To: 438+00 *R/W Width = 112.5 ft

(BASIN 4A)

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder	5.0 ft	1	5 ft
Imperv. Median			
Sidewalk or Trail			
Curb&Gutter Type F			
Shldr Gutter			
Barrier Wall			
Total Impervious Width:			17 ft

Note: R/W Widths vary. Used average value.

Impervious Roadway Area: 0.75 ac
 *Misc. Impervious Roadway Area: 0.39 ac
 Pervious Roadway Area: 3.79 ac
 Total Roadway Area: 4.93 ac

*Note: Measured in MicroStation.

Total Area: Impervious Area: 1.14 ac
 Pervious Area: 3.79 ac
 Total Area: 4.93 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	1.14 ac	111.7
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	3.79 ac	231.2
Total:			4.93 ac	342.9

CN = Total CN*Area / Total Area = **69.6**

Runoff:

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **4.38 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = **3.99 in** | **3.99 in**

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Made by: SF
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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **4**
 POND NAME : **4 - Dry Linear Swale**

Station Limits:

From: 418+75 Roadway Length = 1178 ft
 To: 430+53 R/W Width = 230.0 ft
 From: 430+53 Roadway Length = 947 ft
 To: 440+00 Average R/W Width = 239.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	4	48.0 ft
Paved Shoulder	9.0	2	18.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	1	5.0 ft
Curb & Gutter	2.25	2	4.5 ft
Shared-Use Path	10.0	1	10.0 ft
Barrier Wall			
Total Impervious Width:			85.5 ft

Impervious Roadway Area: 4.17 ac
 *University Blvd. Impervious: 0.24 ac
 *University Blvd. Pervious: 0.11 ac
 Pervious Roadway Area: 5.92 ac
 *Additional Impervious Roadway Area: 1.32 ac
 Total Roadway Area: 11.76 ac
 *Note: Additional area such as University Blvd., turn lanes, intersection layouts, and etc. are measured in microstation.

Total Area:

Impervious Area: 5.73 ac
 Pervious Area: 6.03 ac
 Water Surface Area: 0.00 ac
 Total Area: 11.76 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	5.73 ac	561.5
Proposed Roadway Pervious	B	61	4.02 ac	245.2
Proposed Roadway Pervious	C	74	2.01 ac	148.7
Total:			11.76 ac	955.5

CN = Total CN*Area / Total Area = **81.3**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 = 2.31$ in

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Precipitation (P) = 7.50 in

Runoff (Q) = 5.30 in

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

7.50 in	7.50 in
---------	---------

5.30 in	5.30 in
---------	---------

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 4
 POND NAME : 4 - Dry Linear Swale

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	SWFWMD
StormW. Mgmt.	Dry Retention
Online/Offline	Online
Impaired Water/OFW	No
Open/Closed Basin	Open

Dry Retention **0.50 in** x DCIA = 0.24 ac-ft
 (Directly Connected Impervious Area)

Treatment V_{req} = Largest of Trt. Vol. = **0.24 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Q_{pre} =	4.36 ac-ft	4.36 ac-ft
Q_{post} =	5.19 ac-ft	5.19 ac-ft
ΔQ =	0.83 ac-ft	0.83 ac-ft

Attenuation V_{req} = **0.83 ac-ft**

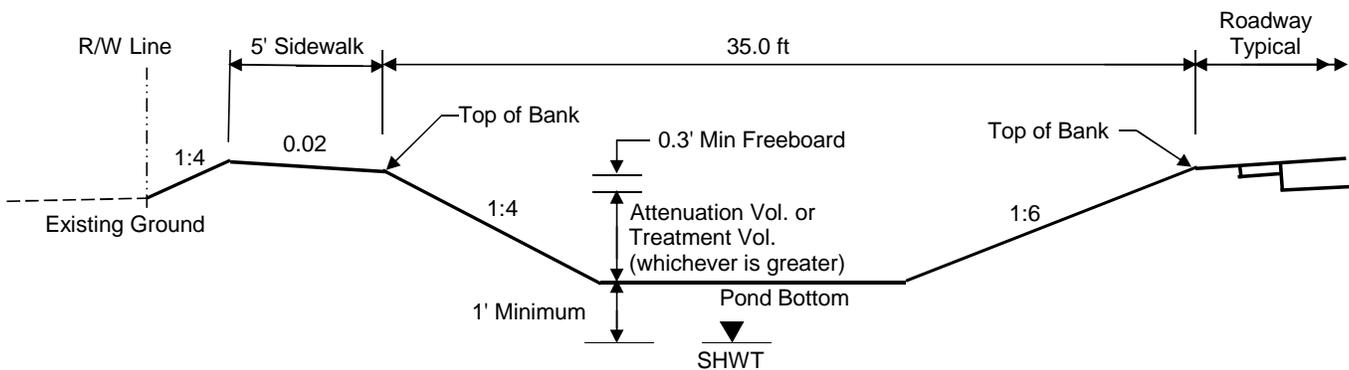
PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **4**
 POND NAME : **4 - Dry Linear Swale**

Pond Stage / Storage Calculations

Pond 4 Limits

from Station	426+25	to Station	431+80
from Station	432+20	to Station	438+65

Total Proposed Swale Length = 1200.0 ft



Linear Pond Section (Dry)

ELEVATION	DESCRIPTION	AREA (ft ²)	DIMENSIONS		STORAGE (ft ³)
			LENGTH	*WIDTH	
136.50	Top of Bank	42000.0	1200.0 ft	35.0 ft	67061.02
136.00	Provided Attenuation Vol.	35880.0	1196.0 ft	30.0 ft	47591.02
135.66	Required Attenuation Vol.	31741.2	1193.3 ft	26.6 ft	36095.41
135.66	Estimated Storm Sewer TW	31741.2	1193.3 ft	26.6 ft	36095.41
134.66	Top of Treatment Vol.	19675.6	1185.3 ft	16.6 ft	10386.96
134.00	Pond Bottom	11800.0	1180.0 ft	10.0 ft	0.00

Required Attenuation Vol. = 0.83 ac-ft
 Required Attenuation Stage = 135.66 ft

Provided Attenuation Vol. = 1.09 ac-ft
 Provided Attenuation Stage = 136.00 ft

Storm Sewer Att. = 0.83 ac-ft

Total Treatment Volume Recovery (Dry Retention)	6.0 hrs < 72 hrs (Recovery requirements per SWFWMD BOR Section 5.2)
--	--

Design Notes: (1) Linear swale top width calculated using 1:6 FS, 1:4 BS, & 10-foot ditch bottom.

- (2) Proposed linear swale to be located on the left side of the proposed roadway typical section. Runoff from the right side of the roadway is to be conveyed to the proposed linear swale on the left side via roadside ditch and pipe. Assume 1-foot sump in order to maintain roadway base clearance.
- (3) Pond Bottom >1' above SHWT. SHWT is elevation 130.8 feet per permitted soil boring (Permit No. 7112). Assume SHWT elevation is at same elevation since the proposed linear pond is in close proximity with the permitted pond.
- (4) Please refer to the PONDS model data for the Recovery Analysis. Input data for soil recovery taken from Pond 100A boring (Permit No. 7112) since the permitted pond is in close proximity to the Pond 4 linear dry pond.

PONDS Version 3.3.0233
Retention Pond Recovery - Refined Method
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Devo Seereeram, Ph.D., P.E.

Project Data

Project Name: SR 33 from Old Combee Road to North of Tomkow Road
Simulation Description: Pond 4 -Dry Linear Retention Alternative
Project Number: FPID No. 430185-1-22-01
Engineer : SF
Supervising Engineer: REC
Date: 07-24-2013

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 130.00
Water Table Elevation, [WT] (ft datum): 130.80
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 6.00
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 4.0
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 11800.0

Geometry Data

Equivalent Pond Length, [L] (ft): 1185.3
Equivalent Pond Width, [W] (ft): 16.6
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)
134.00	11800.0
136.00	35880.0
136.50	42000.0

Discharge Structures

Discharge Structure #1 is inactive
Discharge Structure #2 is inactive
Discharge Structure #3 is inactive

PONDS Version 3.3.0233
Retention Pond Recovery - Refined Method
Copyright 2008
Devo Seereeram, Ph.D., P.E.

Scenario Input Data

Scenario 1 :: Dry Linear Pond Slug Load

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 10386.96

Initial ground water level (ft datum) 130.80 (default)

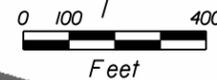
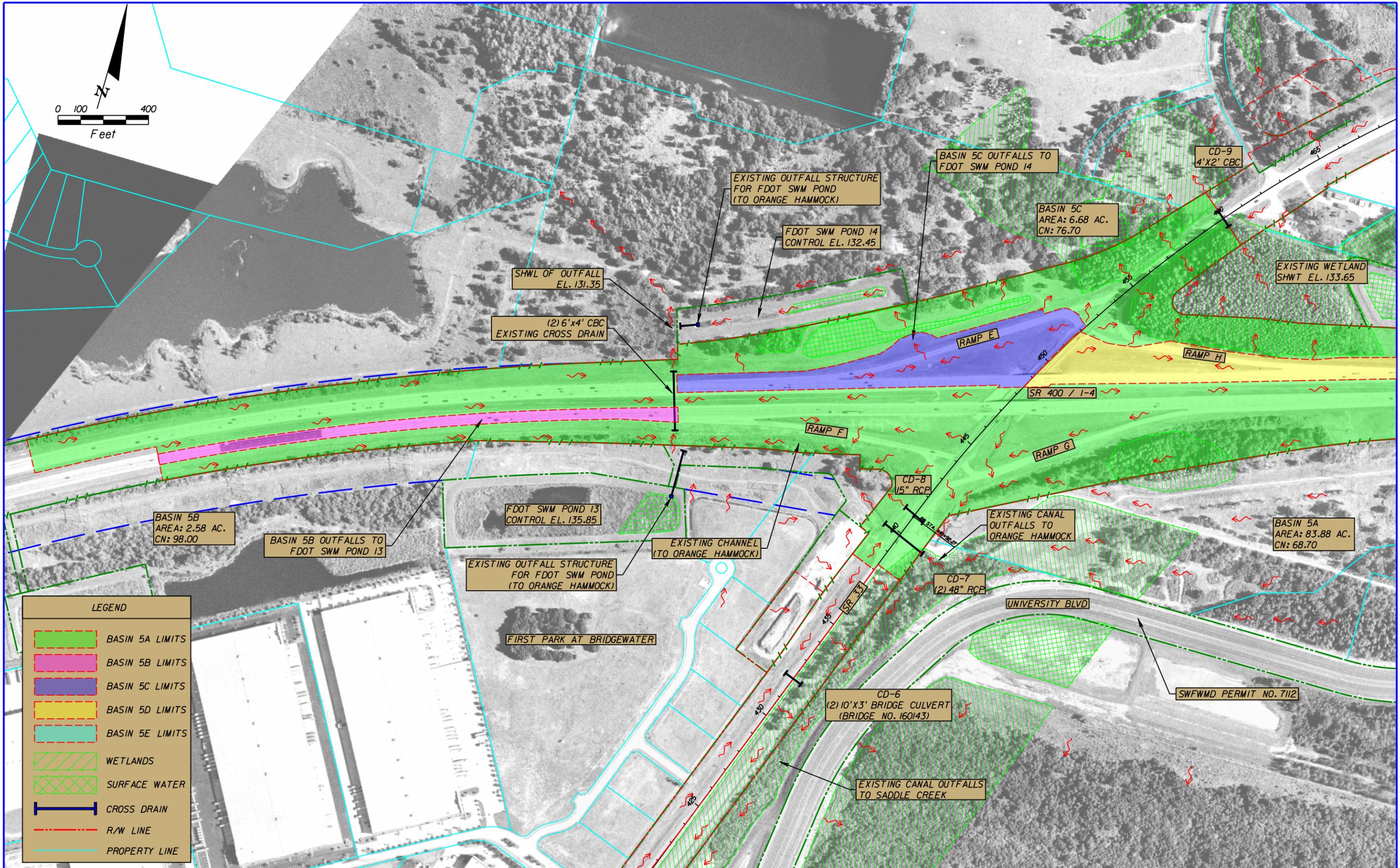
<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>
0.100	2.000
0.250	2.500
0.500	3.000
1.000	3.500
1.500	4.000

PONDS Version 3.3.0233
Retention Pond Recovery - Refined Method
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Detailed Results :: Scenario 1 :: Dry Linear Pond Slug Load

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	1731.1600	0.0000	130.800	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	1731.1600	0.0000	134.659	0.54630	0.00000	10387.0	3.3	0.0	U/P
2.400	0.0000	0.0000	134.399	0.50270	0.00000	10387.0	4720.0	0.0	U/P
6.000	0.0000	0.0000	133.349	0.27329	0.00000	10387.0	10387.0	0.0	U/S
12.000	0.0000	0.0000	132.900	0.00000	0.00000	10387.0	10387.0	0.0	S
24.000	0.0000	0.0000	132.542	0.00000	0.00000	10387.0	10387.0	0.0	S
36.000	0.0000	0.0000	132.338	0.00000	0.00000	10387.0	10387.0	0.0	S
48.000	0.0000	0.0000	132.199	0.00000	0.00000	10387.0	10387.0	0.0	S
60.000	0.0000	0.0000	132.097	0.00000	0.00000	10387.0	10387.0	0.0	S
72.000	0.0000	0.0000	132.018	0.00000	0.00000	10387.0	10387.0	0.0	S
84.000	0.0000	0.0000	131.953	0.00000	0.00000	10387.0	10387.0	0.0	S
96.000	0.0000	0.0000	131.899	----	----	10387.0	10387.0	0.0	N.A.

Basin 5



LEGEND	
	BASIN 5A LIMITS
	BASIN 5B LIMITS
	BASIN 5C LIMITS
	BASIN 5D LIMITS
	BASIN 5E LIMITS
	WETLANDS
	SURFACE WATER
	CROSS DRAIN
	R/W LINE
	PROPERTY LINE

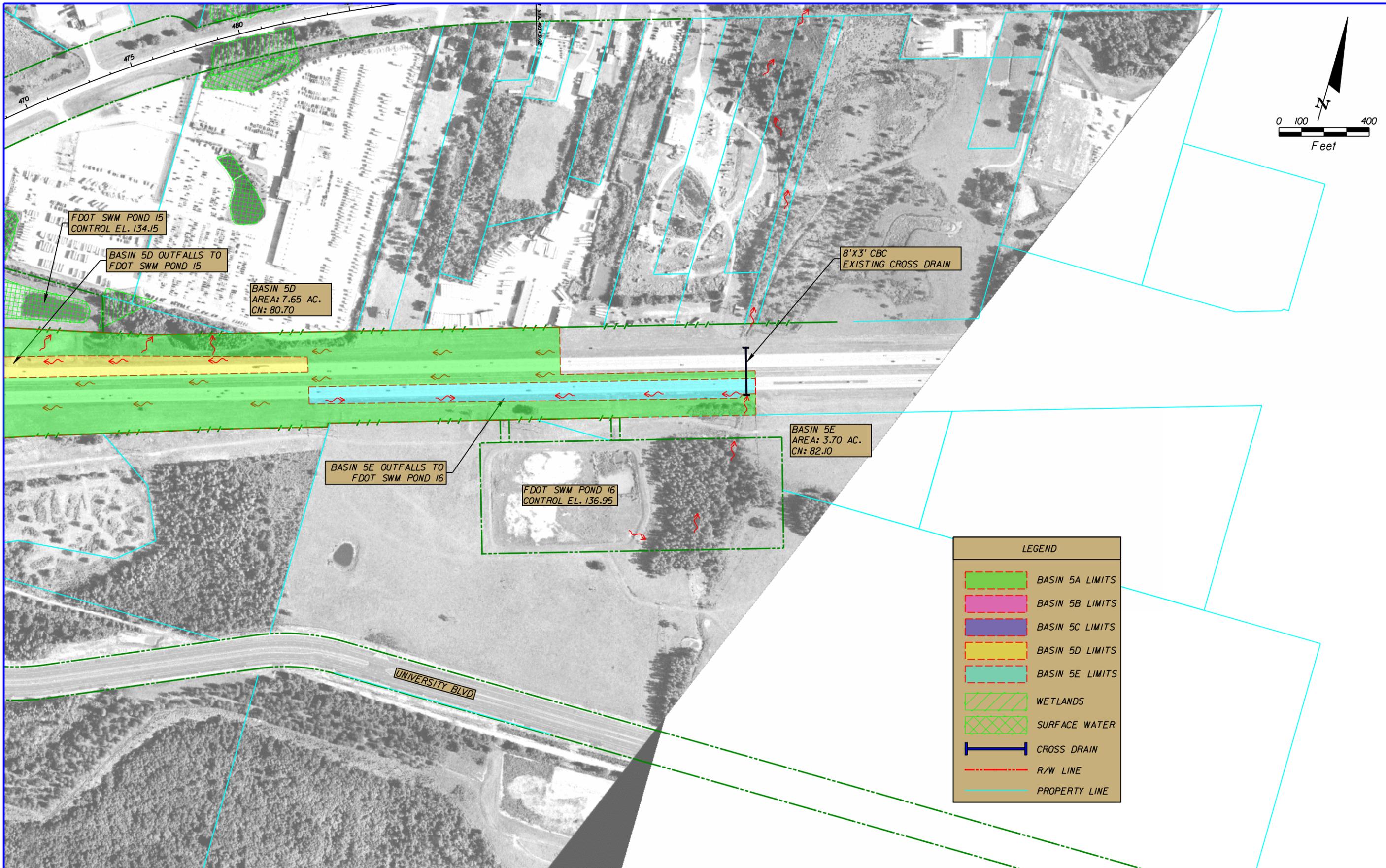
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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

**PRE-DEVELOPMENT
 BASIN 5 MAP (1 OF 2)**

SHEET NO.



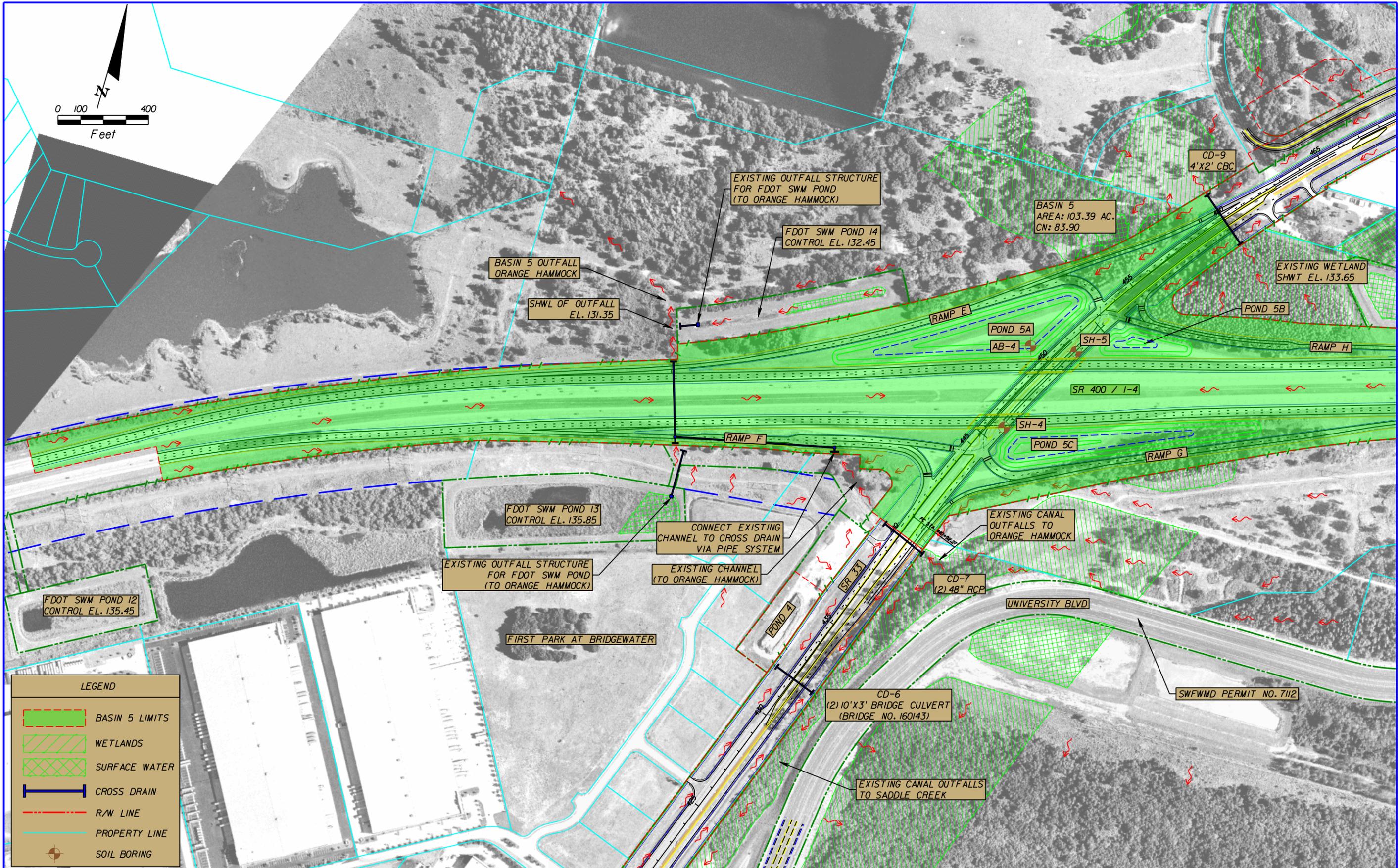
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**PRE-DEVELOPMENT
 BASIN 5 MAP (2 OF 2)**

SHEET NO.



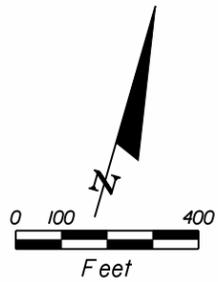
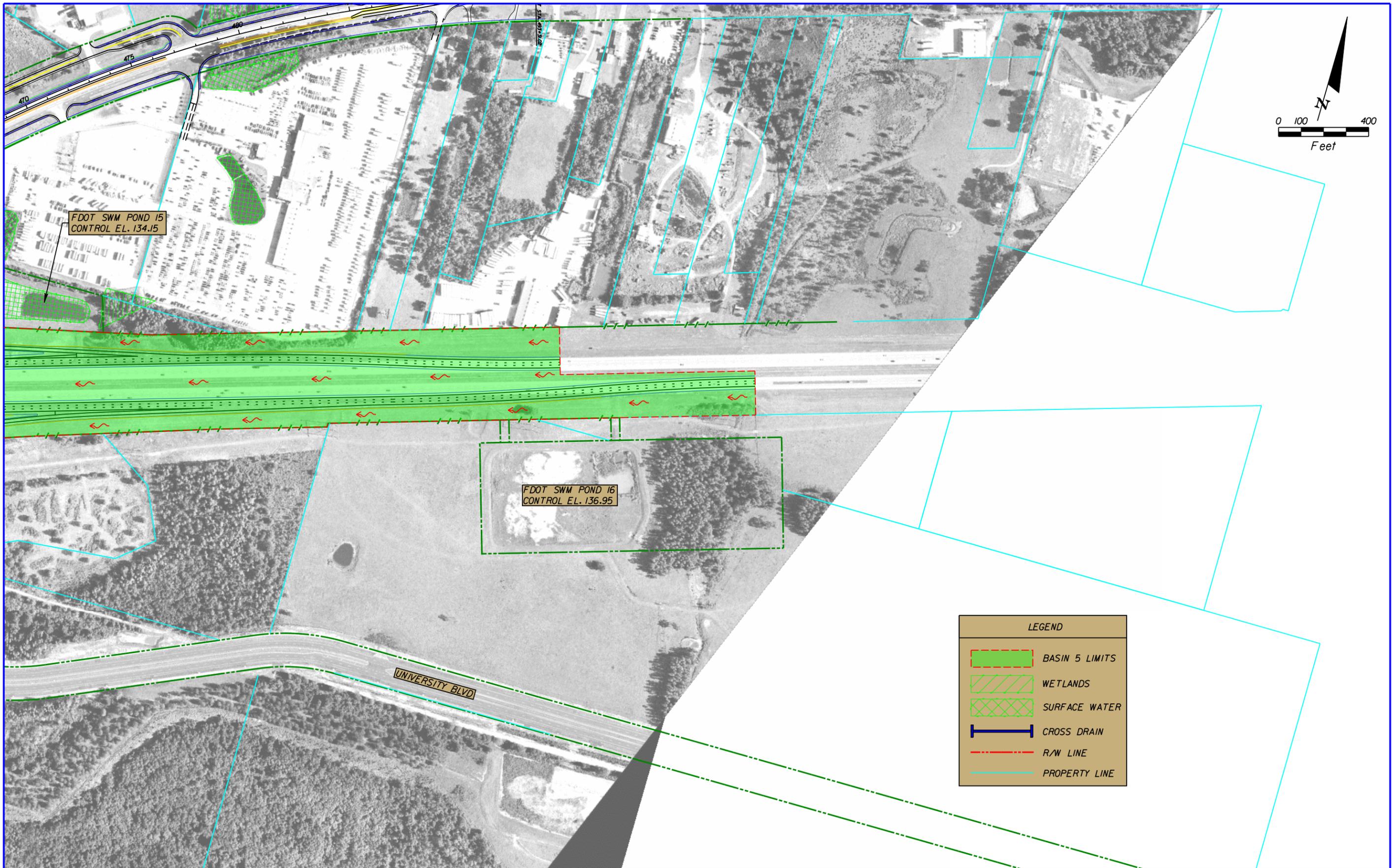
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**POST-DEVELOPMENT
 BASIN 5 MAP (1 OF 2)**

SHEET NO.



FDOT SWM POND 15
CONTROL EL. 134.15

FDOT SWM POND 16
CONTROL EL. 136.95

UNIVERSITY BLVD

LEGEND	
	BASIN 5 LIMITS
	WETLANDS
	SURFACE WATER
	CROSS DRAIN
	R/W LINE
	PROPERTY LINE

REVISIONS			
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**POST-DEVELOPMENT
BASIN 5 MAP (2 OF 2)**

SHEET NO.

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 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **5 (SR 33/I-4 Interchange)**
 POND NAME : **5**

EXISTING CONDITION

Basin 5A - Existing area untreated

SR 33 Station Limits:

From: 438+00
 To: 460+00

Roadway Length = 2200 ft
 R/W Width = **Varies**

I-4 Roadway Area (per direction of travel):

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	3	36 ft
Inside Paved Shoulder	10.0 ft	1	10 ft
Out. Paved Shoulder	12.0 ft	1	12 ft
Total Impervious Width:			58 ft

*I-4 Impervious Roadway Area: 13.03 ac
 *SR 33 Impervious Roadway Area: 1.84 ac
 *Ramp E Impervious Roadway Area: 0.25 ac
 *Ramp F Impervious Roadway Area: 0.85 ac
 *Ramp G Impervious Roadway Area: 1.19 ac
 *Ramp H Impervious Roadway Area: 0.29 ac
 *Pervious Roadway Area: 66.43 ac
 Total Roadway Area: 83.88 ac

**Note: Measured in MicroStation.*

Total Area:
 Impervious Area: **17.45 ac**
 Pervious Area: **66.43 ac**
 Total Area: **83.88 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	17.45 ac	1710.1
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	66.43 ac	4052.2
Total:			83.88 ac	5762.3

CN = Total CN*Area / Total Area = **68.7**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **4.56 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	----------------------------

Precipitation (P) = **7.50 in** **7.50 in**

Runoff (Q) = **3.89 in** **3.89 in**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **5 (SR 33/I-4 Interchange)**
 POND NAME : **5**

Basin 5B

Existing Basin 13-1 to FDOT Pond 13

*I-4 Impervious Roadway Area: 2.46 ac
 *Ramp F Impervious Roadway Area: 0.12 ac
 *Pervious Roadway Area: 0.00 ac
 Total Roadway Area: 2.58 ac

Note: The total FDOT basin area that drains to FDOT Pond 13 is 3.2 acres. Only 2.58 acres is evaluated for pre-post comparison since it is the area that is impacted by the I-4 and SR 33 Interchange.

**Note: Measured in MicroStation.*

Total Area: Impervious Area: **2.58 ac**
 Pervious Area: **0.00 ac**
 Total Area: **2.58 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	2.58 ac	252.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	0.00 ac	0.0
			Total:	252.8
			2.58 ac	

CN = Total CN*Area / Total Area = **98.0**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **0.20 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	----------------------------

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = **7.26 in** | **7.26 in**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 5 (SR 33/I-4 Interchange)
 POND NAME : 5

Basin 5C

Existing Basin 14-1 to FDOT Pond 14

*I-4 Impervious Roadway Area: 1.58 ac
 *SR 33 Impervious Roadway Area: 0.18 ac
 *Ramp E Impervious Roadway Area: 1.07 ac
 *Pervious Roadway Area: 3.85 ac
 Total Roadway Area: 6.68 ac

**Note: Measured in MicroStation.*

Total Area: Impervious Area: **2.83 ac**
 Pervious Area: **3.85 ac**
 Total Area: **6.68 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	2.83 ac	277.3
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	3.85 ac	234.9
			Total:	512.2
			6.68 ac	

CN = Total CN*Area / Total Area = **76.7**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **3.04 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	----------------------------

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = **4.78 in** | **4.78 in**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **5 (SR 33/I-4 Interchange)**
 POND NAME : **5**

Basin 5D

Existing Basin 15-1 to FDOT Pond 15

*I-4 Impervious Roadway Area: 3.17 ac
 *SR 33 Impervious Roadway Area: 0.18 ac
 *Ramp H Impervious Roadway Area: 0.72 ac
 *Pervious Roadway Area: 3.58 ac
 Total Roadway Area: 7.65 ac

**Note: Measured in MicroStation.*

Total Area: Impervious Area: **4.07 ac**
 Pervious Area: **3.58 ac**
 Total Area: **7.65 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	4.07 ac	398.9
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	3.58 ac	218.4
			Total:	617.2
			7.65 ac	

CN = Total CN*Area / Total Area = **80.7**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **2.39 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	----------------------------

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = **5.24 in** | **5.24 in**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **5 (SR 33/I-4 Interchange)**
 POND NAME : **5**

Basin 5E

Existing Basin 16-1 to FDOT Pond 16

*I-4 Impervious Roadway Area: 2.11 ac
 *Pervious Roadway Area: 1.59 ac
 Total Roadway Area: 3.70 ac

**Note: Measured in MicroStation.*

Note: The total FDOT basin area that drains to FDOT Pond 16 is 17.60 acres. Only 3.70 acres is evaluated for pre-post comparison since it is the area that is impacted by the I-4 and SR 33 Interchange.

Total Area: Impervious Area: **2.11 ac**
 Pervious Area: **1.59 ac**
 Total Area: **3.70 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	2.11 ac	206.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	1.59 ac	97.0
			Total:	303.8
			3.70 ac	

CN = Total CN*Area / Total Area = **82.1**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **2.18 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = **5.40 in** | **5.40 in**

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	----------------------------

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **5 (SR 33/I-4 Interchange)**
 POND NAME : **5**

PROPOSED CONDITION

SR 33 Station Limits: From: **440+00** Roadway Length = 2000 ft
 To: **460+00** R/W Width = **Varies**

I-4 Eastbound Reconstruction Roadway Length = 8826 ft
 I-4 Westbound Reconstruction Roadway Length = 8543 ft

I-4 Roadway Area (per direction of travel):

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	3	36 ft
*Special Use Lane	12.0 ft	2	24 ft
Inside Paved Shoulder	10.0 ft	1	10 ft
*Traffic Barrier Wall	26.0 ft	1	26 ft
Out. Paved Shoulder	12.0 ft	1	12 ft
Retaining Wall	2.0	1	2 ft
Total Impervious Width:			110.0 ft

I-4 Impervious Roadway Area: 43.86 ac
 *SR 33 Impervious Roadway Area: 4.06 ac
 *SR 33 Impervious Sidewalk/Trail Area: 0.44 ac
 *Ramp E Impervious Roadway Area: 2.94 ac
 *Ramp F Impervious Roadway Area: 2.19 ac
 *Ramp G Impervious Roadway Area: 2.90 ac
 *Ramp H Impervious Roadway Area: 1.75 ac
 *Pervious Roadway Area: 45.25 ac
 Total Roadway Area: 103.39 ac

*Note: Special Use Lanes and Traffic Barrier Wall width based on 1998 I-4 PD&E Typical Section.

*Note: Areas such as turn lanes, intersection layouts, ramps, and etc. are measured in microstation.

Pond Area: Pervious Pond Area : 2.21 ac
 Water Surface Area: 5.44 ac Wet Pond
 Total Pond Area: 7.65 ac

Total Area: Impervious Area: 58.14 ac
 Pervious Area: 45.25 ac
 Total Area: 103.39 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	58.14 ac	5697.8
Proposed Roadway Pervious	B	61	37.60 ac	2293.6
Proposed Pond Pervious	B	61	2.21 ac	134.7
Proposed Ponds (Water Surface)	B	100	5.44 ac	544.1
Total:			103.39 ac	8670.2

CN = Total CN*Area / Total Area = **83.9**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 = 1.92 \text{ in}$

Precipitation (P) = **7.50 in** (SWFWMD) / **7.50 in** (Storm Sewer)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **5.60 in** (SWFWMD) / **5.60 in** (Storm Sewer)

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 5 (SR 33/I-4 Interchange)
 POND NAME : 5

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	SWFWMD
StormW. Mgmt.	Wet Detention
Online/Offline	Online
Impaired Water/OFW	No
Open/Closed Basin	Open

Total Existing DCIA: 11.59 ac.
 Proposed DCIA: 58.14 ac
ΔDCIA = 46.55 ac

Wet Detention **1.00 in** x ΔDCIA = 3.88 ac-ft
 (Directly Connected Impervious Area)

Treatment V_{req} = Largest of Trt. Vol. = 3.88 ac-ft

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Q _{pre} =	36.42 ac-ft	36.42 ac-ft
Q _{post} =	48.25 ac-ft	48.25 ac-ft
ΔQ =	11.83 ac-ft	11.83 ac-ft

Attenuation V_{req} = 11.83 ac-ft

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 Job Number: DT1-017-01

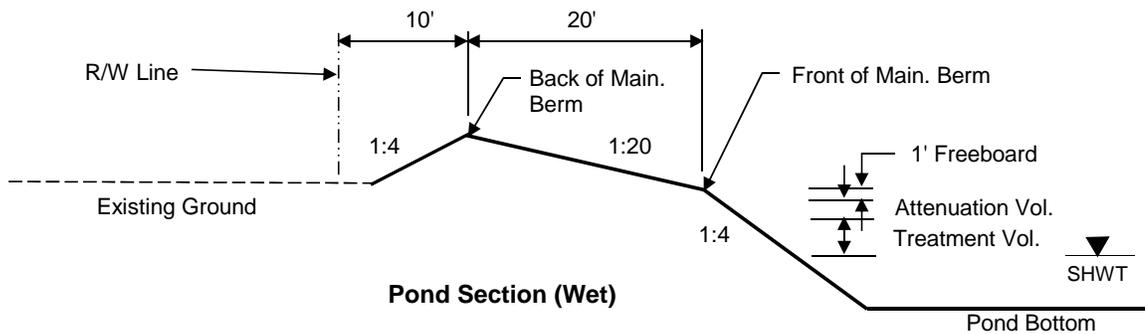
PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **5 (SR 33/I-4 Interchange)**
 POND NAME : **5**

Maintenance Area Width =	<u>20.0 ft</u>	@ 1:20	Existing Ground Elevation =	<u>135.00</u>
Pond Tie-In Width =	<u>9.6 ft</u>	@ 1:4	*Normal Water Elevation =	<u>132.50</u>
Maximum Storage Depth (SD) =	<u>2.90 ft</u>	with 1.0 ft freeboard	Lowest EOP Elevation =	<u>139.00</u>

Hydraulic Grade Line (HGL) check

*Note: NWL 6" below SHW based on soil borings SH-4, SH-5, & AB-4

HGL Slope =	<u>0.050%</u>	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	<u>2500 ft</u>	
Estimated Energy Losses =	<u>1.25 ft</u>	
HGL Clearance =	<u>1.0 ft</u>	Use 1.0 foot as a standard HGL clearance (no junction losses)
Maximum Storm Sewer Tailwater EL =	<u>136.75 ft</u>	



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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 5 (SR 33/I-4 Interchange)
 POND NAME : 5

Pond Stage / Storage Calculations (Combined Ponds 5A, 5B, & 5C)

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
135.00	Pond R/W	7.65 ac	577.5 ft	577.0 ft	
137.40	Back of Main. Berm	7.15 ac	558.3 ft	557.8 ft	29.26 ac-ft
136.90		6.65 ac	538.3 ft	537.8 ft	25.81 ac-ft
136.40	Front of Main. Berm	6.16 ac	518.3 ft	517.8 ft	22.61 ac-ft
135.40	Provided Treat.Vol.+Att.Vol	5.97 ac	510.3 ft	509.8 ft	16.55 ac-ft
135.26	Req'd Treat.Vol+Att. Vol	5.95 ac	509.2 ft	508.7 ft	15.71 ac-ft
135.26	Estimated Storm Sewer TW	5.95 ac	509.2 ft	508.7 ft	15.71 ac-ft
133.21	Top of Treatment Vol.	5.57 ac	492.7 ft	492.2 ft	3.88 ac-ft
132.50	Normal Water Level	5.44 ac	487.1 ft	486.6 ft	0.00 ac-ft
126.50		4.42 ac	439.1 ft	438.6 ft	
120.50	Pond Bottom	3.51 ac	391.1 ft	390.6 ft	

Required Treatment+Attenuation Vol.= 15.71 ac-ft
 Required Treatment+Attenuation Stage= 135.26 ft

Provided Treatment+Attenuation Vol.= 16.55 ac-ft
 Provided Treatment+Attenuation Stage= 135.40 ft

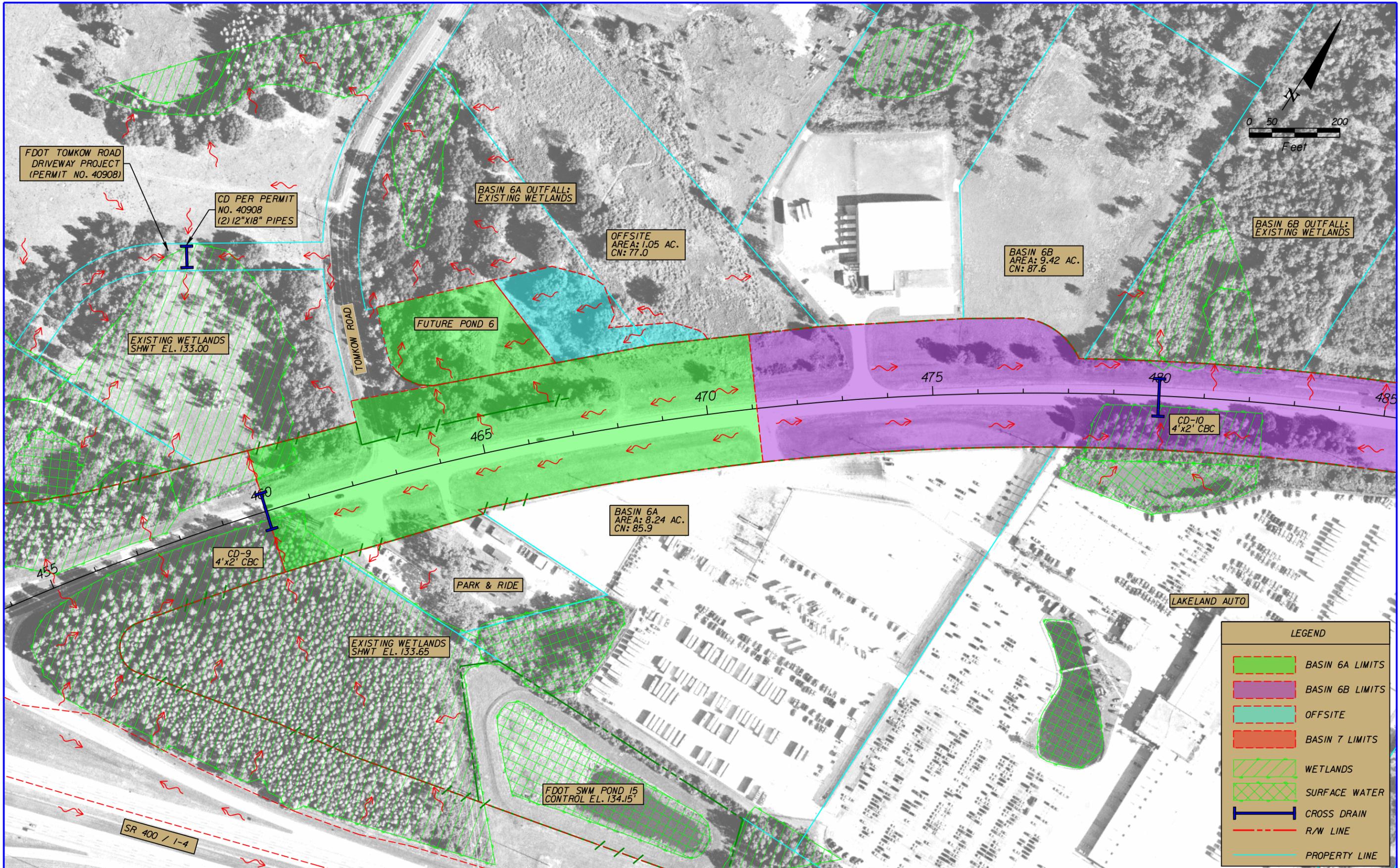
Estimated Treat. Vol.+Storm Sewer Att.= 15.71 ac-ft
 Estimated Storm Sewer TW EL.= 135.26 ft

HGL requirements met

PROPOSED POND FOOTPRINT AREA WITHIN SR 33 & I-4 INTERCHANGE (Safety Factor of 20%) = 9.18 ac

Design Notes: (1) Proposed Pond footprint is the combined pond area within the SR 33/I-4 Interchange between Ponds 5A, 5B, & 5C.

Basin 6 and 7



LEGEND	
	BASIN 6A LIMITS
	BASIN 6B LIMITS
	OFFSITE
	BASIN 7 LIMITS
	WETLANDS
	SURFACE WATER
	CROSS DRAIN
	R/W LINE
	PROPERTY LINE

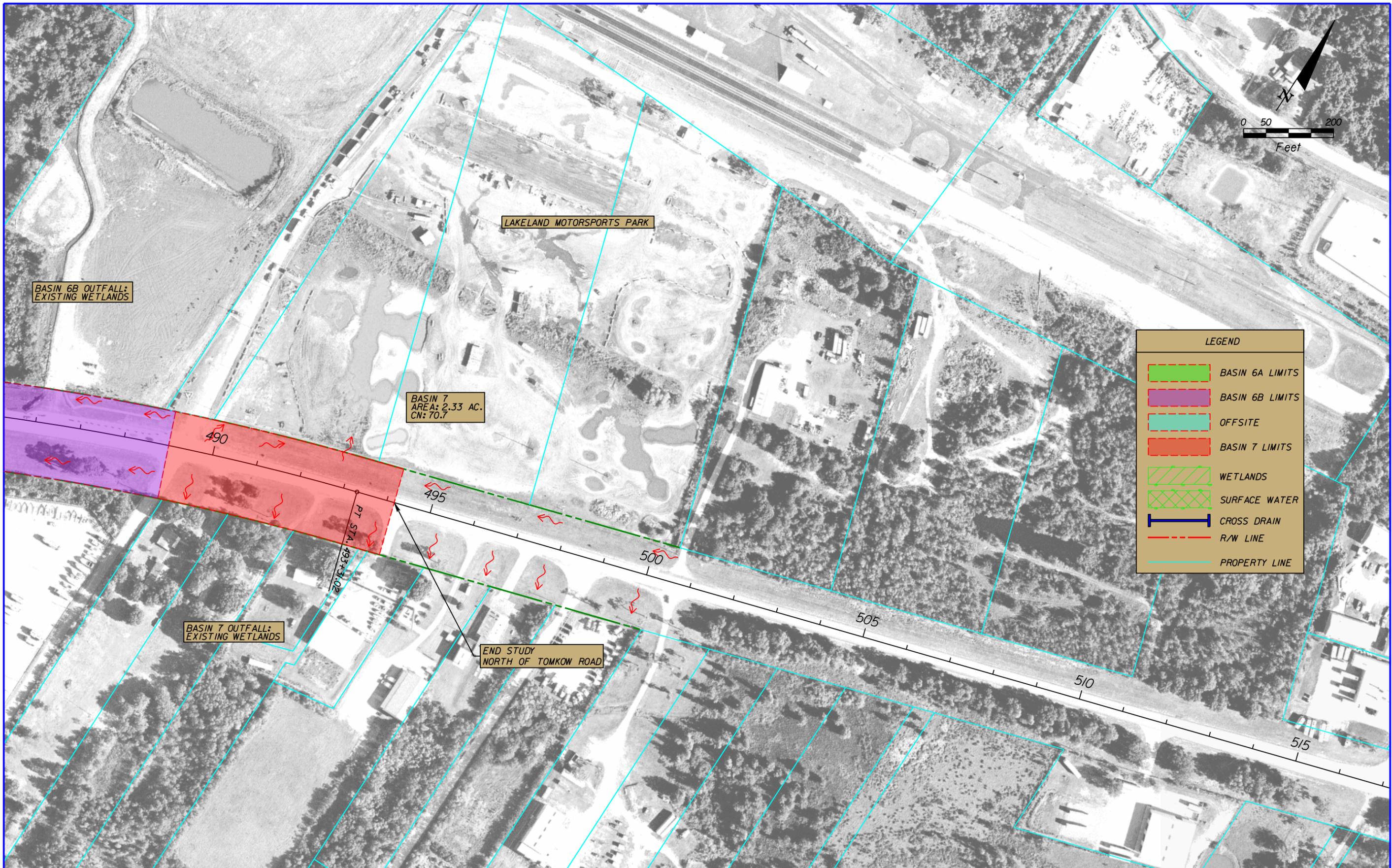
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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

PRE-DEVELOPMENT
BASIN 6 & 7 MAP (1 OF 2)

SHEET NO.



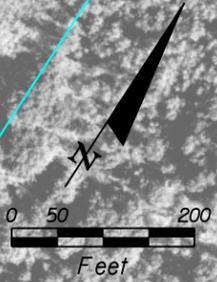
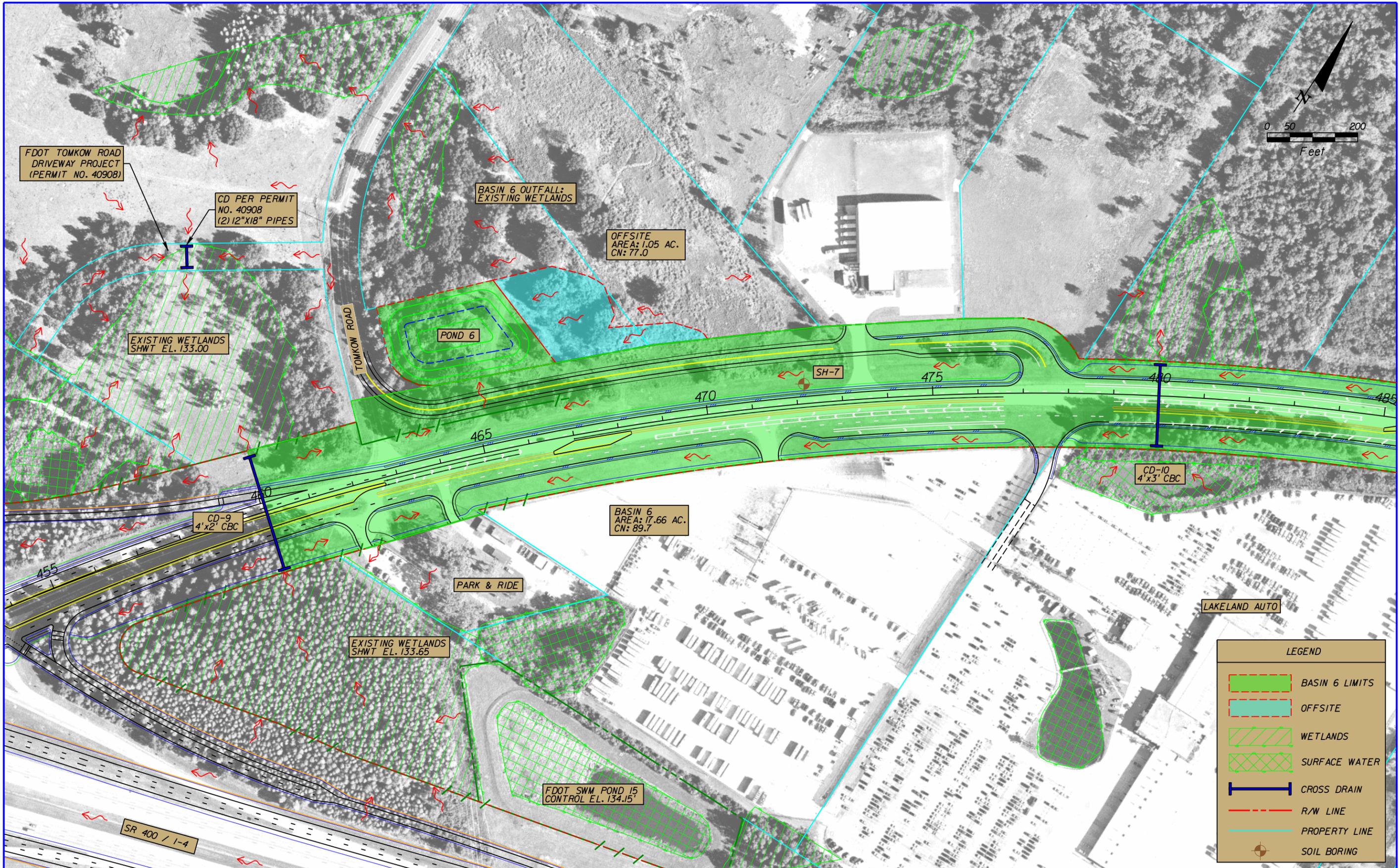
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

**PRE-DEVELOPMENT
 BASIN 6 & 7 MAP (2 OF 2)**

SHEET NO.



LEGEND	
	BASIN 6 LIMITS
	OFFSITE
	WETLANDS
	SURFACE WATER
	CROSS DRAIN
	R/W LINE
	PROPERTY LINE
	SOIL BORING

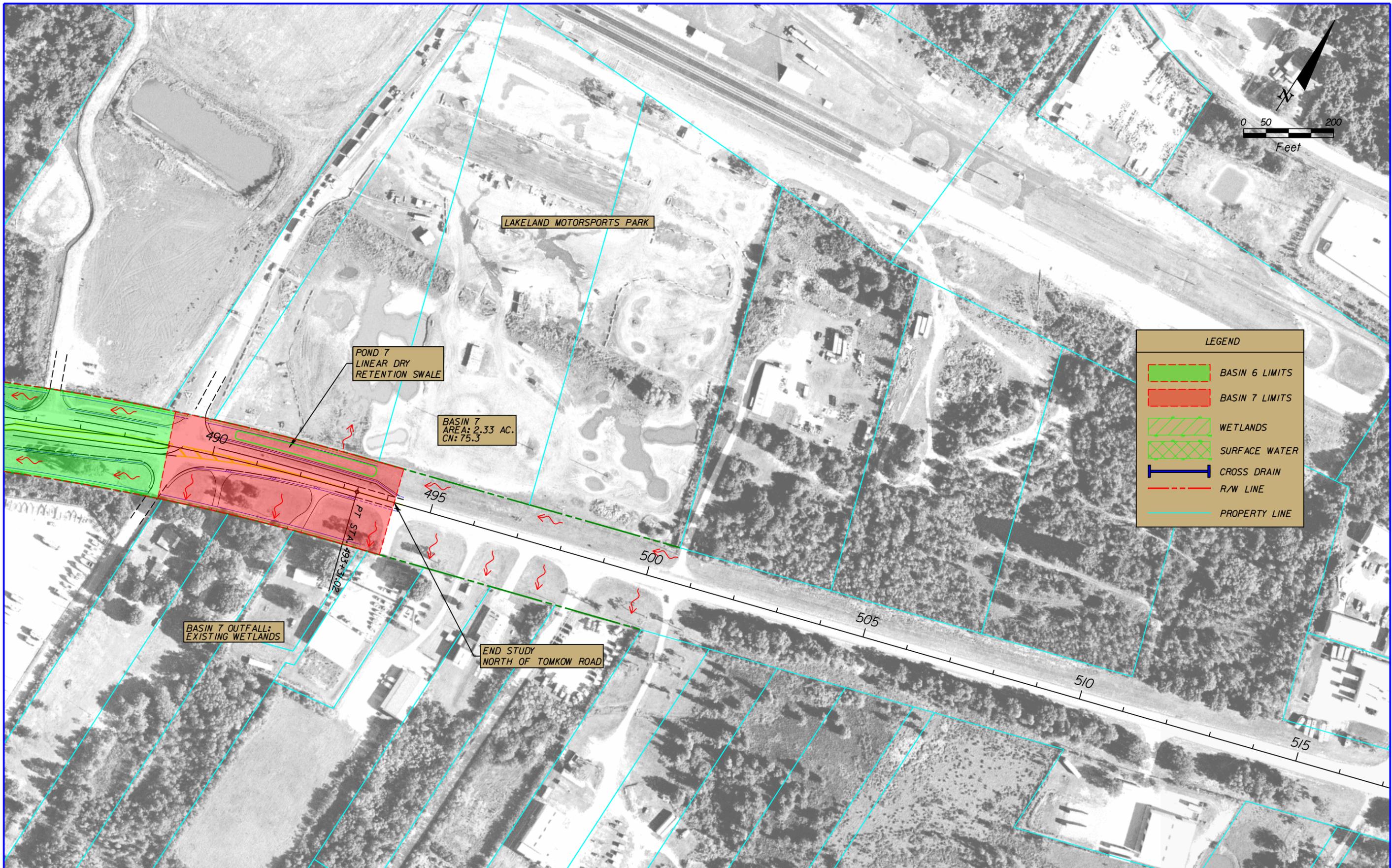
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

**POST-DEVELOPMENT
 BASIN 6 & 7 MAP (1 OF 2)**

SHEET NO.



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
33	POLK	430185-1-22-01

**POST-DEVELOPMENT
 BASIN 6 & 7 MAP (2 OF 2)**

SHEET NO.

Basin 6 **(Offsite Alternative)**

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 (407) 971-8850 (phone)
 (407) 971-8955 (fax)

Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **6A**
 POND NAME : **6**

Station Limits: From: **460+00** Roadway Length = 1110 ft
 To: **471+10** R/W Width = **Varies**

EXISTING CONDITION (BASIN 6A)

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	2	24 ft
Paved Shoulder	5.0 ft	2	10 ft
Imperv. Median			
Sidewalk or Trail			
Curb&Gutter Type F			
Shldr Gutter			
Barrier Wall			
Total Impervious Width:			34 ft

Impervious Roadway Area: 0.87 ac
 *Misc. Impervious Roadway Area: 0.65 ac
 *Pervious Roadway Area: 5.83 ac
 Total Roadway Area: 7.35 ac

*Note: Measured in MicroStation.

Pond Area: Exist. Land = Open Space = 0.89 ac

Total Area: Impervious Area: 1.52 ac
 Pervious Area: 6.72 ac
 Total Area: 8.24 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	1.52 ac	149.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	D	84	5.83 ac	490.0
Woods; Good condition (Woods are protected from grazing and covered with forest litter and brush)	D	77	0.89 ac	68.6
Total:			8.24 ac	707.6

CN = Total CN*Area / Total Area = **85.9**

Denotes Pond Area

Runoff:

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **1.65 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = **5.83 in** | **5.83 in**

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Made by: SF
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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **6B**
 POND NAME : **6**

Station Limits: From: **471+10** Roadway Length = 1790 ft
 To: **489+00** R/W Width = **Varies**

EXISTING CONDITION (BASIN 6B)

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	2	24 ft
Paved Shoulder	5.0 ft	2	10 ft
Imperv. Median			
Sidewalk or Trail			
Curb&Gutter Type F			
Shldr Gutter			
Barrier Wall			
Total Impervious Width:			34 ft

Impervious Roadway Area: 1.40 ac
 *Misc. Impervious Roadway Area: 1.03 ac
 *Pervious Roadway Area: 6.99 ac
 Total Roadway Area: 9.42 ac

*Note: Measured in MicroStation.

Pond Area: Exist. Land = Open Space = 0.00 ac

Total Area: Impervious Area: 2.43 ac
 Pervious Area: 6.99 ac
 Total Area: 9.42 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	2.43 ac	238.1
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	D	84	6.99 ac	587.4
Total:			9.42 ac	825.5

CN = Total CN*Area / Total Area = **87.6**

Denotes Pond Area

Runoff:

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **1.41 in**

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **6.04 in** | **6.04 in**

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Made by: SF
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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **6B**
 POND NAME : **6**

Total Offsite Area:
 Impervious Area: **0.00 ac**
 Pervious Area: **1.05 ac**
 Total Area: **1.05 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	0.00 ac	0.0
Woods; Good condition (Woods are protected from grazing and covered with forest litter and brush)	D	77	1.05 ac	80.9
Total:			1.05 ac	80.9

$CN = \text{Total CN*Area} / \text{Total Area} = \boxed{77.0}$

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 = \boxed{2.99 \text{ in}}$

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Precipitation (P) = $\boxed{7.50 \text{ in}}$ $\boxed{7.50 \text{ in}}$

Runoff (Q) = $\boxed{4.82 \text{ in}}$ $\boxed{4.82 \text{ in}}$

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **6**
 POND NAME : **6**

Station Limits: From: **460+00** Roadway Length = 2900 ft
 To: **489+00** R/W Width = **Varies**

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	4	48.0 ft
Paved Shoulder	9.0	2	18.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	1	5.0 ft
Curb & Gutter	2.25	2	4.5 ft
Shared-Use Path	10.0	1	10.0 ft
Barrier Wall			
Total Impervious Width:			85.5 ft

Impervious Roadway Area: 5.69 ac
 *Additional Impervious Roadway Area: 3.47 ac
 *Pervious Roadway Area: 7.61 ac
 Total Roadway Area: 16.77 ac

**Note: Additional area such as the frontage road to Tomkow Road, end project transition, turn lanes, intersection layouts, and etc. are measured in microstation.*

Pond Area: Pervious Pond Area : 0.53 ac
 Water Surface Area: 0.36 ac Wet Pond
 Total Pond Area: 0.89 ac

Total Area: Impervious Area: 9.16 ac
 Pervious Area: 8.14 ac
 Water Surface Area: 0.36 ac
 Total Area: 17.66 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	9.16 ac	897.9
Proposed Roadway Pervious	D	80	7.61 ac	608.6
Proposed Pond Pervious	D	80	0.53 ac	42.6
Proposed Ponds (Water Surface)	D	100	0.36 ac	35.9
Total:			17.66 ac	1585.0

CN = Total CN*Area / Total Area = **89.7**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 = 1.14$ in

Precipitation (P) = **7.50 in** (SWFWMD 25yr/24hr) / **7.50 in** (Storm Sewer 10yr/24hr)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **6.28 in**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **6**
 POND NAME : **6**

Total Offsite Area:
 Impervious Area: **0.00 ac**
 Pervious Area: **1.05 ac**
 Total Area: **1.05 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	0.00 ac	0.0
Woods; Good condition (Woods are protected from grazing and covered with forest litter and brush)	D	77	1.05 ac	80.9
			Total:	1.05 ac
				80.9

CN = Total CN*Area / Total Area = **77.0**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **2.99 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Precipitation (P) =	7.50 in	7.50 in

Runoff (Q) = **4.82 in** **4.82 in**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 6
 POND NAME : 6

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	SWFWMD
StormW.Mgmt.	Wet Detention
Online/Offline	Online
Impaired Water/OFW	No
Open/Closed Basin	Open

Wet Detention **1.00 in** x DCIA = 0.76 ac-ft
 (Directly Connected Impervious Area)

Treatment V_{req} = Largest of Trt. Vol. = **0.76 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Q_{pre} =	9.17 ac-ft	9.17 ac-ft
Q_{post} =	9.66 ac-ft	9.66 ac-ft
ΔQ =	0.49 ac-ft	0.49 ac-ft

Attenuation V_{req} = **0.49 ac-ft**

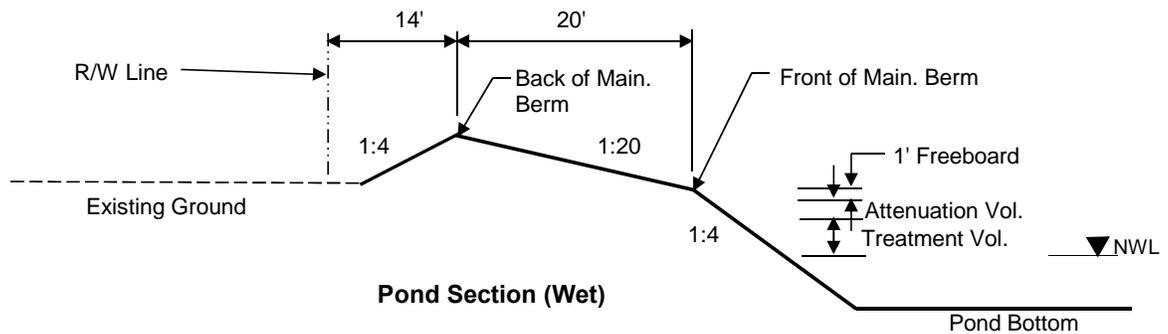
PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **6**
 POND NAME : **6**

Maintenance Area Width =	<u>20.0 ft</u>	@ 1:20	*Avg Existing Ground Elevation =	<u>134.00</u>
Pond Tie-In Width =	<u>14.0 ft</u>	@ 1:4	*Normal Water Elevation =	<u>132.50</u>
Maximum Storage Depth (SD) =	<u>3.00 ft</u>	with 1.0 ft freeboard	Lowest EOP Elevation =	<u>139.00</u>

Hydraulic Grade Line (HGL) check

*Note: NWL 6" below SHW based on NRCS Web Soil Survey

HGL Slope =	<u>0.050%</u>	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	<u>2300 ft</u>	
Estimated Energy Losses =	<u>1.15 ft</u>	
HGL Clearance =	<u>2.0 ft</u>	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	<u>135.85 ft</u>	



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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road
 BASIN NAME : 6
 POND NAME : 6

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
134.00	Pond R/W	1.16 ac	225.0 ft	225.0 ft	
137.50	Back of Main. Berm	0.89 ac	197.0 ft	197.0 ft	2.56 ac-ft
137.00		0.72 ac	177.0 ft	177.0 ft	2.16 ac-ft
136.50	Front of Main. Berm	0.57 ac	157.0 ft	157.0 ft	1.84 ac-ft
135.50	Provided Treat.Vol.+Att.Vol	0.51 ac	149.0 ft	149.0 ft	1.30 ac-ft
135.40	Req'd Treat.Vol+Att. Vol	0.50 ac	148.2 ft	148.2 ft	1.25 ac-ft
135.40	Estimated Storm Sewer TW	0.50 ac	148.2 ft	148.2 ft	1.25 ac-ft
134.39	Top of Treatment Vol.	0.45 ac	140.1 ft	140.1 ft	0.76 ac-ft
132.50	Normal Water Level	0.36 ac	125.0 ft	125.0 ft	0.00 ac-ft
126.50		0.14 ac	77.0 ft	77.0 ft	
120.50	Pond Bottom	0.02 ac	29.0 ft	29.0 ft	

Required Treatment+Attenuation Vol.= 1.25 ac-ft
 Required Treatment+Attenuation Stage= 135.40 ft

Provided Treatment+Attenuation Vol.= 1.30 ac-ft
 Provided Treatment+Attenuation Stage= 135.50 ft

Estimated Treat. Vol.+Storm Sewer Att.= 1.25 ac-ft
 Estimated Storm Sewer TW EL.= 135.40 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) =	1.39 ac
---	----------------

Basin 6 **(Dry Linear Retention Alternative)**

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Made by: SF
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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **6A**
 POND NAME : **6 - Dry Linear Swale**

Station Limits: From: **460+00** Roadway Length = 1110 ft
 To: **471+10** R/W Width = **Varies**

EXISTING CONDITION (BASIN 6A)

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	2	24 ft
Paved Shoulder	5.0 ft	2	10 ft
Imperv. Median			
Sidewalk or Trail			
Curb&Gutter Type F			
Shldr Gutter			
Barrier Wall			
Total Impervious Width:			34 ft

Impervious Roadway Area: 0.87 ac
 *Misc. Impervious Roadway Area: 0.65 ac
 *Pervious Roadway Area: 5.83 ac
 Total Roadway Area: 7.35 ac

**Note: Measured in MicroStation.*

Total Area: Impervious Area: **1.52 ac**
 Pervious Area: **5.83 ac**
 Total Area: **7.35 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	1.52 ac	149.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	D	84	5.83 ac	490.0
Total:			7.35 ac	639.0

CN = Total CN*Area / Total Area = **86.9**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **1.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = **5.96 in** | **5.96 in**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **6B**
 POND NAME : **6 - Dry Linear Swale**

Station Limits:

From: 471+10
 To: 489+00

Roadway Length = 1790 ft
 R/W Width = Varies

EXISTING CONDITION (BASIN 6B)

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	2	24 ft
Paved Shoulder	5.0 ft	2	10 ft
Imperv. Median			
Sidewalk or Trail			
Curb&Gutter Type F			
Shldr Gutter			
Barrier Wall			
Total Impervious Width:			34 ft

Impervious Roadway Area: 1.40 ac
 *Misc. Impervious Roadway Area: 1.03 ac
 *Pervious Roadway Area: 6.99 ac
 Total Roadway Area: 9.42 ac

**Note: Measured in MicroStation.*

Total Area:

Impervious Area: **2.43 ac**
 Pervious Area: **6.99 ac**
 Total Area: **9.42 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	2.43 ac	238.1
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	D	84	6.99 ac	587.4
Total:			9.42 ac	825.5

CN = Total CN*Area / Total Area = **87.6**

Runoff:

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **1.41 in**

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **6.04 in** | **6.04 in**

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DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **6**
 POND NAME : **6 - Dry Linear Swale**

Station Limits: From: 460+00 Roadway Length = 2900 ft
 To: 489+00 R/W Width = **Varies**

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	4	48.0 ft
Paved Shoulder	9.0	2	18.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	1	5.0 ft
Curb & Gutter	2.25	2	4.5 ft
Shared-Use Path	10.0	1	10.0 ft
Barrier Wall			
Total Impervious Width:			85.5 ft

Impervious Roadway Area: 5.69 ac
 *Additional Impervious Roadway Area: 3.47 ac
 *Pervious Roadway Area: 7.61 ac
 Total Roadway Area: 16.77 ac

**Note: Additional area such as the frontage road to Tomkow Road, end project transition, turn lanes, intersection layouts, and etc. are measured in microstation.*

Total Area: Impervious Area: **9.16 ac**
 Pervious Area: **7.61 ac**
 Water Surface Area: **0.00 ac**
 Total Area: **16.77 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	9.16 ac	897.9
Proposed Roadway Pervious	D	80	7.61 ac	608.6
Total:			16.77 ac	1506.5

CN = Total CN*Area / Total Area = **89.8**

Runoff:

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **1.13 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Precipitation (P) = **7.50 in** **7.50 in**

Runoff (Q) = **6.29 in** **6.29 in**

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Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **6**
 POND NAME : **6 - Dry Linear Swale**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	SWFWMD
StormW.Mgmt.	Dry Retention
Online/Offline	Online
Impaired Water/OFW	No
Open/Closed Basin	Open

Dry Retention	0.50 in	x DCIA =	0.38 ac-ft
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(Directly Connected Impervious Area)

Treatment V_{req} = Largest of Trt. Vol. = **0.38 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Q_{pre} =	8.39 ac-ft	8.39 ac-ft
Q_{post} =	8.79 ac-ft	8.79 ac-ft
ΔQ =	0.40 ac-ft	0.40 ac-ft

Attenuation V_{req} = 0.40 ac-ft

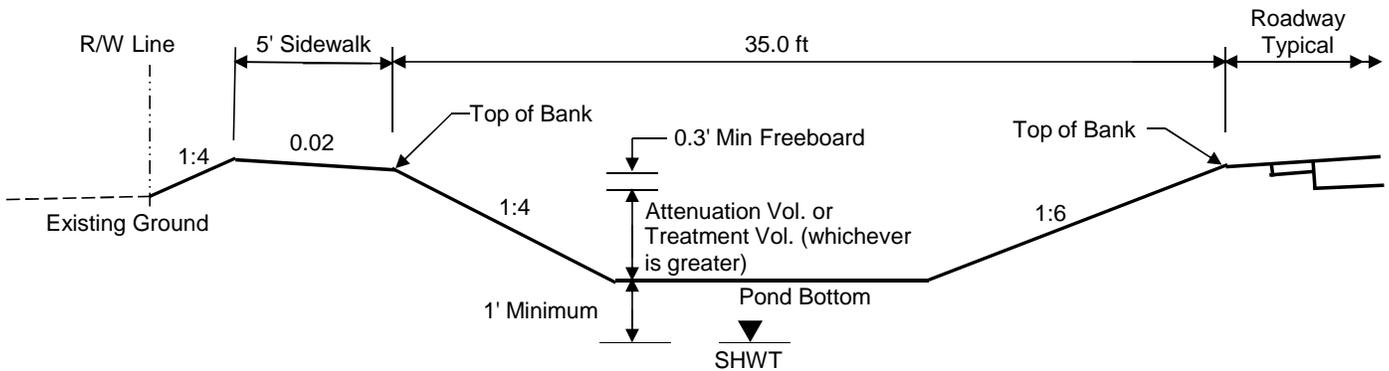
PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **6**
 POND NAME : **6 - Dry Linear Swale**

Pond Stage / Storage Calculations

Pond 6 Limits

from Station	461+00	to Station	474+25
--------------	---------------	------------	---------------

Total Proposed Swale Length = 1325.0 ft



Linear Pond Section (Dry)

ELEVATION	DESCRIPTION	AREA (ft ²)	DIMENSIONS		STORAGE (ft ³)
			LENGTH	*WIDTH	
139.50	Top of Bank	46375.0	1325.0 ft	35.0 ft	54436.12
139.00	Provided Attenuation Vol.	39630.0	1321.0 ft	30.0 ft	32934.87
138.58	Required Attenuation Vol.	33995.1	1317.6 ft	25.8 ft	17473.60
138.58	Estimated Storm Sewer TW	33995.1	1317.6 ft	25.8 ft	17473.60
138.55	Required Treatment Vol.	33593.7	1317.4 ft	25.5 ft	16459.77
138.00	Pond Bottom	26260.0	1313.0 ft	20.0 ft	0.00

Required Attenuation Vol. = 0.40 ac-ft
 Required Attenuation Stage = 138.58 ft

Provided Attenuation Vol. = 0.76 ac-ft
 Provided Attenuation Stage = 139.00 ft

Storm Sewer Att.= 0.40 ac-ft

Total Treatment Volume Recovery (Dry Retention)	12.0 hrs < 72 hrs (Recovery requirements per SWFWMD BOR Section 5.2)
--	---

Design Notes: (1) Linear swale top width calculated using 1:6 FS, 1:4 BS, & 20-foot ditch bottom.

- (2) Proposed linear swale to be located on the left side of the proposed roadway typical section. Runoff from the right side of the roadway is to be conveyed to the proposed linear swale on the left side via roadside ditch and pipe. Assume 1-foot sump in order to maintain roadway base clearance.
- (3) Pond Bottom 1' above SHWT. SHWT approximately 1 foot below existing ground based on geotech soil boring SH-7 performed on 11/19/2012. Assume SHWT elevation is 1-foot below existing ground since majority of soils are the same as the soil boring.
- (4) Please refer to the PONDS model data for the Recovery Analysis. Input data for soil recovery taken from NRCS Web Soil Survey.

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Project Data

Project Name: SR 33 from Old Combee Road to North of Tomkow Road
Simulation Description: Pond 6 -Dry Linear Retention Alternative
Project Number: FPID No. 430185-1-22-01
Engineer : SF
Supervising Engineer: REC
Date: 08-01-2013

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 122.00
Water Table Elevation, [WT] (ft datum): 137.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 6.00
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 6.0
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 26260.0

Geometry Data

Equivalent Pond Length, [L] (ft): 1317.4
Equivalent Pond Width, [W] (ft): 25.5
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)
138.00	26260.0
139.00	39630.0
139.50	46375.0

Discharge Structures

Discharge Structure #1 is inactive
Discharge Structure #2 is inactive
Discharge Structure #3 is inactive

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Scenario Input Data

Scenario 1 :: Dry Linear Pond Slug Load

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 16459.77

Initial ground water level (ft datum) 137.00 (default)

<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>
0.100	2.000
0.250	2.500
0.500	3.000
1.000	3.500
1.500	4.000

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Detailed Results :: Scenario 1 :: Dry Linear Pond Slug Load

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	2743.2950	0.0000	137.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	2743.2950	0.0000	138.550	1.82326	0.00000	16459.8	10.9	0.0	U/P
2.400	0.0000	0.0000	138.184	0.88016	0.00000	16459.8	11410.6	0.0	U/S
6.000	0.0000	0.0000	138.082	0.17544	0.00000	16459.8	14254.8	0.0	S
12.000	0.0000	0.0000	137.965	0.06806	0.00000	16459.8	16459.8	0.0	S
24.000	0.0000	0.0000	137.743	0.00000	0.00000	16459.8	16459.8	0.0	S
36.000	0.0000	0.0000	137.621	0.00000	0.00000	16459.8	16459.8	0.0	S
48.000	0.0000	0.0000	137.543	0.00000	0.00000	16459.8	16459.8	0.0	S
60.000	0.0000	0.0000	137.487	0.00000	0.00000	16459.8	16459.8	0.0	S
72.000	0.0000	0.0000	137.445	0.00000	0.00000	16459.8	16459.8	0.0	S
84.000	0.0000	0.0000	137.412	0.00000	0.00000	16459.8	16459.8	0.0	S
96.000	0.0000	0.0000	137.385	----	----	16459.8	16459.8	0.0	N.A.

Basin 7

Inwood Consulting Engineers
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 (407) 971-8850 (phone)
 (407) 971-8955 (fax)

Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **7**
 POND NAME : **7**

Station Limits:

From: **489+00**
 To: **494+17**

Roadway Length = 517 ft
 R/W Width = **196.7 ft**

EXISTING CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	2	24 ft
Paved Shoulder	5.0 ft	2	10 ft
Imperv. Median			
Sidewalk or Trail			
Curb&Gutter Type F			
Shldr Gutter			
Barrier Wall			
Total Impervious Width:			34 ft

Impervious Roadway Area: 0.40 ac
 *Misc. Impervious Roadway Area: 0.21 ac
 Pervious Roadway Area: 1.72 ac
 Total Roadway Area: 2.33 ac

**Note: Measured in MicroStation.*

Total Area:

Impervious Area: **0.61 ac**
 Pervious Area: **1.72 ac**
 Total Area: **2.33 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	0.61 ac	59.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	1.72 ac	105.0
Total:			<u>2.33 ac</u>	<u>164.8</u>

CN = Total CN*Area / Total Area = **70.7**

Runoff:

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **4.14 in**

Precipitation (P) = **7.50 in** | **7.50 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **4.12 in** | **4.12 in**

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Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **7**
 POND NAME : **7**

Station Limits: From: 489+00 Roadway Length = 517 ft
 To: 494+17 R/W Width = 196.7 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	4	48.0 ft
Paved Shoulder	9.0	2	18.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	1	5.0 ft
Curb & Gutter	2.25	2	4.5 ft
Shared-Use Path	10.0	1	10.0 ft
Barrier Wall			
Total Impervious Width:			85.5 ft

*Impervious Roadway Area: 0.90 ac
 *Pervious Roadway Area: 1.43 ac
 Total Roadway Area: 2.33 ac

**Note: Areas such as the end project transition, turn lanes, intersection layouts, and etc. are measured in microstation.*

Total Area: Impervious Area: 0.90 ac
 Pervious Area: 1.43 ac
 Water Surface Area: 0.00 ac
 Total Area: 2.33 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	B	98	0.90 ac	88.2
Proposed Roadway Pervious	B	61	1.43 ac	87.2
Total:			2.33 ac	175.4

CN = Total CN*Area / Total Area = **75.3**

Runoff:

Soil Capacity (S) = $\frac{1000 - 10}{CN}$ = **3.28 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
-----------------------	-------------------------------

Precipitation (P) = **7.50 in** **7.50 in**

Runoff (Q) = **4.63 in** **4.63 in**

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Made by: SF
 Checked by: REC

DATE: August 1, 2013
 Job Number: DT1-017-01

PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **7**
 POND NAME : **7**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	SWFWMD
StormW.Mgmt.	Dry Retention
Online/Offline	Online
Impaired Water/OFW	No
Open/Closed Basin	Open

Dry Retention	0.50 in	x DCIA =	0.04 ac-ft
----------------------	----------------	----------	------------

(Directly Connected Impervious Area)

Treatment V_{req} = Largest of Trt. Vol. = **0.04 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)
Q_{pre} =	0.80 ac-ft	0.80 ac-ft
Q_{post} =	0.90 ac-ft	0.90 ac-ft
ΔQ =	0.10 ac-ft	0.10 ac-ft

Attenuation V_{req} = **0.10 ac-ft**

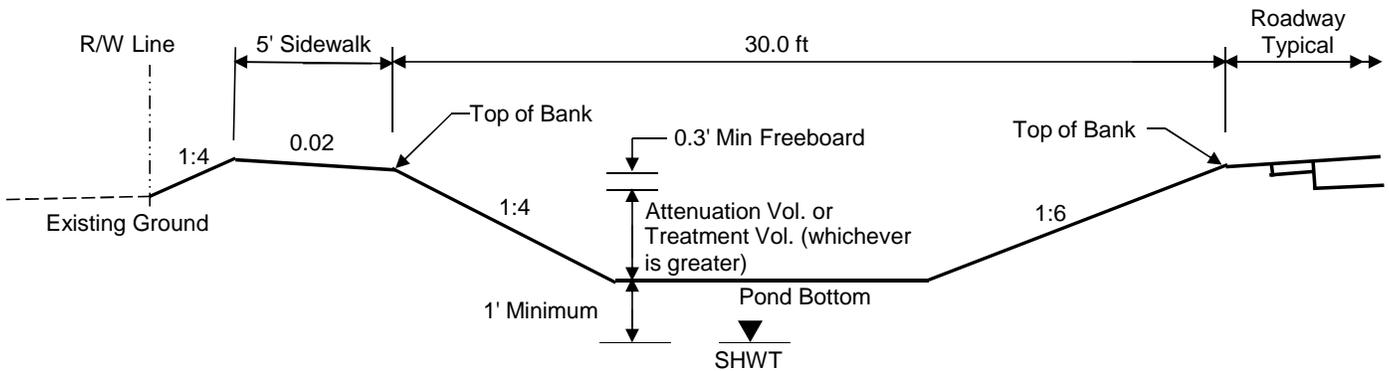
PROJECT : **SR 33 PD&E Study - From Old Combee Road to North of Tomkow Road**
 BASIN NAME : **7**
 POND NAME : **7**

Pond Stage / Storage Calculations

Pond 7 Limits

from Station	490+40	to Station	493+60
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Total Proposed Swale Length = 320.0 ft



Linear Pond Section (Dry)

ELEVATION	DESCRIPTION	AREA (ft ²)	DIMENSIONS		STORAGE (ft ³)
			LENGTH	*WIDTH	
138.50	Top of Bank	9600.0	320.0 ft	30.0 ft	12540.02
138.00	Provided Attenuation Vol.	7900.0	316.0 ft	25.0 ft	8165.02
137.48	Required Attenuation Vol.	6174.4	311.8 ft	19.8 ft	4505.66
137.48	Estimated Storm Sewer TW	6174.4	311.8 ft	19.8 ft	4505.66
137.00	Required Treatment Vol.	4620.0	308.0 ft	15.0 ft	1915.00
136.50	Pond Bottom	3040.0	304.0 ft	10.0 ft	0.00

Required Attenuation Vol. = 0.10 ac-ft
 Required Attenuation Stage = 137.48 ft

Provided Attenuation Vol. = 0.19 ac-ft
 Provided Attenuation Stage = 138.00 ft

Storm Sewer Att.= 0.10 ac-ft

Total Treatment Volume Recovery (Dry Retention)	6.0 hrs < 72 hrs (Recovery requirements per SWFWMD BOR Section 5.2)
--	--

Design Notes: (1) Linear swale top width calculated using 1:6 FS, 1:4 BS, & 10-foot ditch bottom.

- (2) Proposed linear swale to be located on the left side of the proposed roadway typical section. Runoff from the right side of the roadway is to be conveyed to the proposed linear swale on the left side via roadside ditch and pipe. Assume 1-foot sump in order to maintain roadway base clearance.
- (3) Pond Bottom 1' above SHWT. SHWT approximately 0.5 foot below existing ground based on NRCS Web Soil Survey. Assume SHWT elevation is 0.5-foot below existing ground since majority of soils are the same as the web soil survey.
- (4) Please refer to the PONDS model data for the Recovery Analysis. Input data for soil recovery taken from NRCS Web Soil Survey.

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Project Data

Project Name: SR 33 from Old Combee Road to North of Tomkow Road
Simulation Description: Pond 7 -Dry Linear Retention Alternative
Project Number: FPID No. 430185-1-22-01
Engineer : SF
Supervising Engineer: REC
Date: 08-01-2013

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 122.00
Water Table Elevation, [WT] (ft datum): 135.50
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 6.00
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 6.0
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 3040.0

Geometry Data

Equivalent Pond Length, [L] (ft): 308.0
Equivalent Pond Width, [W] (ft): 15.0
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)
136.50	3040.0
137.00	4620.0
138.00	7900.0
138.50	9600.0

Discharge Structures

Discharge Structure #1 is inactive
Discharge Structure #2 is inactive
Discharge Structure #3 is inactive

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Scenario Input Data

Scenario 1 :: Dry Linear Pond Slug Load

Hydrograph Type:	Slug Load
Modflow Routing:	Routed with infiltration
Treatment Volume (ft ³)	1915
Initial ground water level (ft datum)	135.50 (default)
<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>
0.100	2.000
0.250	2.500
0.500	3.000
1.000	3.500
1.500	4.000

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Detailed Results :: Scenario 1 :: Dry Linear Pond Slug Load

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	319.1667	0.0000	135.500	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	319.1667	0.0000	137.000	0.21111	0.00000	1915.0	1.3	0.0	U/P
2.400	0.0000	0.0000	136.552	0.12680	0.00000	1915.0	1753.9	0.0	U/S
6.000	0.0000	0.0000	136.294	0.00777	0.00000	1915.0	1915.0	0.0	S
12.000	0.0000	0.0000	136.091	0.00000	0.00000	1915.0	1915.0	0.0	S
24.000	0.0000	0.0000	135.931	0.00000	0.00000	1915.0	1915.0	0.0	S
36.000	0.0000	0.0000	135.846	0.00000	0.00000	1915.0	1915.0	0.0	S
48.000	0.0000	0.0000	135.794	0.00000	0.00000	1915.0	1915.0	0.0	S
60.000	0.0000	0.0000	135.758	0.00000	0.00000	1915.0	1915.0	0.0	S
72.000	0.0000	0.0000	135.731	0.00000	0.00000	1915.0	1915.0	0.0	S
84.000	0.0000	0.0000	135.710	0.00000	0.00000	1915.0	1915.0	0.0	S
96.000	0.0000	0.0000	135.694	----	----	1915.0	1915.0	0.0	N.A.

Appendix 4

Pond Sites Evaluation Matrix

SR 33 PD&E Study - from Old Combee Road to North of Tomkow Road

Inwood Consulting Engineers, Inc.

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POND SITES EVALUATION

IMPACT ANALYSIS

Basin	Pond Alternatives	Roadway Floodplain Impacts (ac)	Pond Floodplain Impacts (ac)	Total Floodplain Impacts (ac)	Arch. / Historical Impact Potential (Arch. / Hist.)	Wetland Impacts	Surface Water Impacts (ac)	Threatened or Endangered Species Impacts	Hazardous Materials & Contamination Potential	Major Utility Conflict Potential (Y/N)	Existing Land Use	Required Pond Area Including Access
**E	Linear Swale	0.00	0.00	0.00	None	None	None	Low	No	N	Roads and Highways	N/A
1	Offsite Pond 1	0.00	0.00	0.00	None	None	None	Medium	No	N	Upland Scrub, Pine and Hardwoods	1.89
	Linear Swale	0.00	0.00	0.00	None	None	None	Low	No	N	Roads and Highways	N/A
2	Offsite Pond 2	0.00	0.00	0.00	None	None	None	Low	Medium	N	Improved Pastures	3.02
	Joint Use	0.00	0.00	0.00	None	None	None	Low	No	N	Treatment Pond	N/A
	Linear Swale	0.00	0.00	0.00	None	None	None	Low	No	N	Roads and Highways	N/A
3	Offsite Pond 3	0.00	0.00	0.00	None	None	None	Low	Medium	N	Improved Pastures	2.10
	Linear Swale	0.00	0.00	0.00	None	None	None	Low	No	N	Roads and Highways	N/A
4	Offsite Pond 4	0.00	0.00	0.00	None	None	None	Low	Medium	N	Rural Lands in Transition without Positive Indicators of Intended Activity	1.06
	Linear Swale	0.00	0.00	0.00	None	None	None	Low	No	N	Roads and Highways	N/A
5	Ponds 5A, 5B, 5C within I/C	5.67	0.00	5.67	None	Minor	Minor	Low	Low	N	Roads and Highways, Shrub and Brushland, Wetland Hardwood Forests	*9.18

*Note: Pond Area consists of combined infield pond areas within the proposed I-4/SR 33 Interchange.

**Note: There are no proposed offsite ponds for these basins. It is proposed to use only dry linear treatment.

SR 33 PD&E Study - from Old Combee Road to North of Tomkow Road

Inwood Consulting Engineers, Inc.
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POND SITES EVALUATION

IMPACT ANALYSIS

Basin	Pond Alternatives	Roadway Floodplain Impacts (ac)	Pond Floodplain Impacts (ac)	Total Floodplain Impacts (ac)	Arch. / Historical Impact Potential (Arch. / Hist.)	Wetland Impacts	Surface Water Impacts (ac)	Threatened or Endangered Species Impacts	Hazardous Materials & Contamination Potential	Major Utility Conflict Potential (Y/N)	Existing Land Use	Required Pond Area Including Access
6	Offsite Pond 6	1.31	0.17	1.48	None	None	None	Low	No	N	Wetland Forested Mix, Freshwater Marsh, Other Shrubs and Brush	1.39
	Linear Swale	0.00	0.00	0.00	None	None	None	Low	No	N	Roads and Highways	N/A
**7	Linear Swale	0.00	0.00	0.00	None	None	None	Low	No	N	Roads and Highways	N/A

*Note: Pond Area consists of combined infield pond areas within the proposed I-4/SR 33 Interchange.
 **Note: There are no proposed offsite ponds for these basins. It is proposed to use only dry linear treatment.

Appendix 5

Cross Drain Review

Review Checklist

Date:	1-16-2013		
Project:	SR 33 PD&E STUDY		
Location:	283+00 (CD-1)	Size / Type	30" RCP
Road surface / Leaking joints?	NONE		
Recent development in basin?	NONE		
Overtopping?	Roadway	Basin Divide	<u>In roadway ditch</u>
	NONE		
Concerns with culvert extension?	NO	Limited R/W	Wetlands
Normal high water marks:	Pipe is dry. NHW approximately 0.25' above downstream FL of pipe.		
Tailwater:	<u>Ditch</u>	Piped outfall	Overland flow Swamp
	No apparent outfall for pipe.		
Erosion / Sedimentation:	Minor sedimentation both upstream and downstream.		
Misc. Comments:	Based on field investigation, Basin 1 is a closed basin. Runoff for Basin 1 flows to CD-1 and would need to stage up to R/W and then would outfall to Lake Deason.		

CD-1



Upstream



Downstream

Review Checklist

Date: 1-16-2013

Project: SR 33 PD&E STUDY

Location: 303+45 (CD-2) Size / Type 30" RCP

Road surface / Leaking joints? NONE

Recent development in basin? Yes. Landings at Long Lake development southeast of CD-2.

Overtopping? *Roadway* *Basin Divide* *In roadway ditch*
NONE

Concerns with culvert extension? *NO* *Limited R/W* *Wetlands*

Normal high water marks: Pipe is dry. No apparent stain line marks.

Tailwater: *Ditch* *Piped outfall* *Overland flow* *Swamp*
CD outfalls northeast via ditch to existing wetland north of SR 33.

Erosion / Sedimentation: Minor sedimentation and debri.

Misc. Comments: None.

CD-2



Upstream



Downstream

Review Checklist

Date:	<u>1-16-2013</u>
Project:	<u>SR 33 PD&E STUDY</u>
Location:	<u>356+00 (CD-3)</u> Size / Type <u>(2) 10'x3' Bridge Culvert</u>
Road surface / Leaking joints?	<u>NONE</u>
Recent development in basin?	<u>Yes. Bridgwater Development North and South of CD.</u>
Overtopping?	<u>Roadway Basin Divide In roadway ditch</u> <u>NONE</u>
Concerns with culvert extension?	<u>Yes Limited R/W Wetlands</u>
Normal high water marks:	<u>Stain line is 15" above upstream FL.</u>
Tailwater:	<u>Ditch Piped outfall Overland flow Swamp</u> <u>CD outfalls south via ditch to existing Pond south of SR 33.</u>
Erosion / Sedimentation:	<u>Sedimentation and vegetation exists at DS end.</u>
Misc. Comments:	<u>Bridge number for Culvert is 160142. Bridge Culvert</u> <u>is in good condition. Field investigation confirms</u> <u>that SR 33 runoff is conveyed to CD-3 and outfalls</u> <u>to pond.</u>

CD-3



Upstream



Downstream



Bridge Number



Upstream Ditch Looking North



Stain Line Measurement

Review Checklist

Date:	<u>1-16-2013</u>			
Project:	<u>SR 33 PD&E STUDY</u>			
Location:	<u>372+00 (CD-4)</u>	Size / Type	<u>36" RCP</u>	
Road surface / Leaking joints?	<u>NONE</u>			
Recent development in basin?	<u>Yes. Bridgwater Development North of CD.</u>			
Overtopping?	<i>Roadway</i>	<i>Basin Divide</i>	<u><i>In roadway ditch</i></u>	
	<u>NONE</u>			
Concerns with culvert extension?	<i>Yes Limited R/W</i>		<u><i>Wetlands</i></u>	
Normal high water marks:	<u>N/A</u>			
Tailwater:	<u><i>Ditch</i></u>	<i>Piped outfall</i>	<i>Overland flow</i>	<i>Swamp</i>
	<u>Pipe outfalls southeast via ditch to existing canal southeast of SR 33.</u>			
Erosion / Sedimentation:	<u>Sedimentation and vegetation exists at DS end.</u>			
Misc. Comments:	<u>Pipe underneath SR 33 is not a CD. It is an outfall</u>			
	<u>pipe connection from a control structure northwest</u>			
	<u>of SR 33. Pipe will need to be extended for proposed</u>			
	<u>roadway widening. Also, SLD diagram indicates a 24"</u>			
	<u>RCP whereas field measurements show 36" RCP.</u>			

CD-4



Upstream Control Structure



Downstream



Downstream Ditch Looking Southeast

Review Checklist

Date: 1-16-2013

Project: SR 33 PD&E STUDY

Location: 394+50 (CD-5) Size / Type 6'x2' CBC

Road surface / Leaking joints? NONE

Recent development in basin? NONE

Overtopping? *Roadway* *Basin Divide* *In roadway ditch*
NONE

Concerns with culvert extension? Yes *Limited R/W* *Wetlands*

Normal high water marks: No apparent stain line marks.

Tailwater: *Ditch* *Piped outfall* *Overland flow* *Swamp*

Pipe outfalls southeast via ditch to existing canal southeast of SR 33.

Erosion / Sedimentation: Sedimentation and vegetation exists at DS end.

Misc. Comments: None

CD-5



Upstream



Downstream



Downstream Ditch Looking Southeast

Review Checklist

Date:	<u>1-16-2013</u>
Project:	<u>SR 33 PD&E STUDY</u>
Location:	<u>432+00 (CD-6) Size / Type (2)10'x3' Bridge Culvert</u>
Road surface / Leaking joints?	<u>NONE</u>
Recent development in basin?	<u>Yes. East West road southeast of SR 33 was recently constructed.</u>
Overtopping?	<u>Roadway Basin Divide In roadway ditch</u> <u>NONE</u>
Concerns with culvert extension? Yes	<u>Limited R/W Wetlands</u>
Normal high water marks:	<u>No apparent stain line marks.</u>
Tailwater:	<u>Ditch Piped outfall Overland flow Swamp</u>
	<u>Pipe outfalls southeast via ditch to existing canal southeast of SR 33.</u>
Erosion / Sedimentation:	<u>Sedimentation and vegetation exists at DS end.</u>
Misc. Comments:	<u>Bridge Culvert bridge number was documented in the</u> <u>field to be 160143. Although survey FL elevations</u> <u>indicate flow to the north, field observation shows</u> <u>the runoff flowing south.</u>

CD-6



Upstream



Downstream



Downstream Ditch Looking Southeast



Bridge Number

Review Checklist

Date:	<u>1-16-2013</u>
Project:	<u>SR 33 PD&E STUDY</u>
Location:	<u>440+00 (CD-7) Size / Type (2) 48" RCP</u>
Road surface / Leaking joints?	<u>NONE</u>
Recent development in basin?	<u>Yes. East West road southeast of SR 33 was recently constructed.</u>
Overtopping?	<u>Roadway Basin Divide In roadway ditch</u> <u>NONE</u>
Concerns with culvert extension? Yes	<u>Limited R/W Wetlands</u>
Normal high water marks:	<u>Crown of pipe.</u>
Tailwater:	<u>Ditch Piped outfall Overland flow Swamp</u> <u>Pipe outfalls north via ditch to towards I-4 & SR 33 interchange.</u>
Erosion / Sedimentation:	<u>Major Sedimentation and vegetation exists at both ends of the CD.</u>
Misc. Comments:	<u>The upstream end of the culvert was not accessible</u> <u>due to major vegetation buildup near the culvert.</u> <u></u> <u></u> <u></u>

CD-7



Upstream (Culvert not accessible due to vegetation)



Downstream Ditch Looking North

Review Checklist

Date:	<u>1-16-2013</u>		
Project:	<u>SR 33 PD&E STUDY</u>		
Location:	<u>441+00 (CD-8)</u>	Size / Type	<u>15" RCP</u>
Road surface / Leaking joints?	<u>NONE</u>		
Recent development in basin?	<u>Yes. East West road southeast of SR 33 was recently constructed.</u>		
Overtopping?	<i>Roadway</i>	<i>Basin Divide</i>	<i>In roadway ditch</i>
	<u>NONE</u>		
Concerns with culvert extension?	<i>No</i>	<i>Limited R/W</i>	<i>Wetlands</i>
Normal high water marks:	<u>Crown of pipe.</u>		
Tailwater:	<i>Ditch</i>	<i>Piped outfall</i>	<i>Overland flow</i>
	<u>Swamp</u>		
	<u>Pipe outfalls north and sheet flows towards CD-7.</u>		
Erosion / Sedimentation:	<u>NONE</u>		
Misc. Comments:	<u>Only minor amount of SR 33 roadway runoff is</u>		
	<u>conveyed to this cross drain based on field</u>		
	<u>observation.</u>		
	<u></u>		

CD-8



Upstream



Upstream Overland Area



Downstream Overland Area

Review Checklist

Date: 1-16-2013

Project: SR 33 PD&E STUDY

Location: 460+00 (CD-9) Size / Type 2'x4' CBC

Road surface / Leaking joints? NONE

Recent development in basin? NONE

Overtopping? *Roadway* *Basin Divide* *In roadway ditch*
NONE

Concerns with culvert extension? YES *Limited R/W* *Wetlands*

Normal high water marks: Crown of pipe.

Tailwater: *Ditch* *Piped outfall* *Overland flow* *Swamp*
Pipe outfalls north and sheet flows towards wetlands.

Erosion / Sedimentation: NONE

Misc. Comments: NONE

CD-9



Upstream



Downstream



Downstream Overland Area Looking North

Review Checklist

Date: 7-23-2013

Project: SR 33 PD&E STUDY

Location: 480+00 (CD-10) Size / Type 2'x4' CBC

Road surface / Leaking joints? NONE

Recent development in basin? NONE

Overtopping? *Roadway* *Basin Divide* *In roadway ditch*
NONE

Concerns with culvert extension? YES *Limited R/W* *Wetlands*

Normal high water marks: Crown of pipe.

Tailwater: *Ditch* *Piped outfall* *Overland flow* *Swamp*
Pipe outfalls north and sheet flows towards wetlands.

Erosion / Sedimentation: NONE

Misc. Comments: NONE

CD-10



Upstream



Downstream



Upstream Overland Area Looking South



Downstream Overland Area Looking North

Appendix 6

Cultural Resource Assessment End of Fieldwork Memo



July 30, 2013

David S. Dangel, PE
Associate Principal
Director of PD&E and Environmental Services
Inwood Consulting Engineers
3000 Dovera Drive, Suite 200
Oviedo, FL 32765

**Re: End of Fieldwork Memo: Cultural Resources Assessment Survey of State Road 33 from Old Combee Road to North of Tomkow Road, Polk County, Florida
Financial Management # 430185-1-22-01**

Dear Mr. Dangel,

The following represents an End of Fieldwork Memo relative to the completion of the *Cultural Resources Assessment Survey (CRAS) of State Road 33 from Old Combee Road to North of Tomkow Road, Polk County, Florida* (Financial Management # 430185-1-22-01). In June 2013 Southeastern Archaeological Research, Inc. (SEARCH) conducted a CRAS of the State Road 33 Project PD&E study corridor (**Figure 1**). The CRAS included archaeological survey and architectural history survey along the project corridor and in and around six proposed pond locations.

The purpose of the survey was to locate, identify, and bound any archaeological resources, historic structures, and potential historic districts within the project area and to assess their potential for listing in the National Register of Historic Places (NRHP). This study complied with Chapter 267 of the Florida Statutes and Rule Chapter 1A-46, Florida Administrative Code. All work was performed in accordance with Part 2, Chapter 12, of the Florida Department of Transportation (FDOT) PD&E Manual (revised January 1999) and the Cultural Resource Management Handbook (revised November 2004), as well as the Florida Division of Historical Resources (FDHR) recommendations for such projects as stipulated in the FDHR's Cultural Resource Management Standards & Operations Manual, Module Three: Guidelines for Use by Historic Preservation Professionals. The Principal Investigator for this project meets the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716-42). This study also complies with Section 106 of the National Historic Preservation Act (as amended) and its implementing regulation, 36 CFR Part 800 (Protection of Historic Properties).

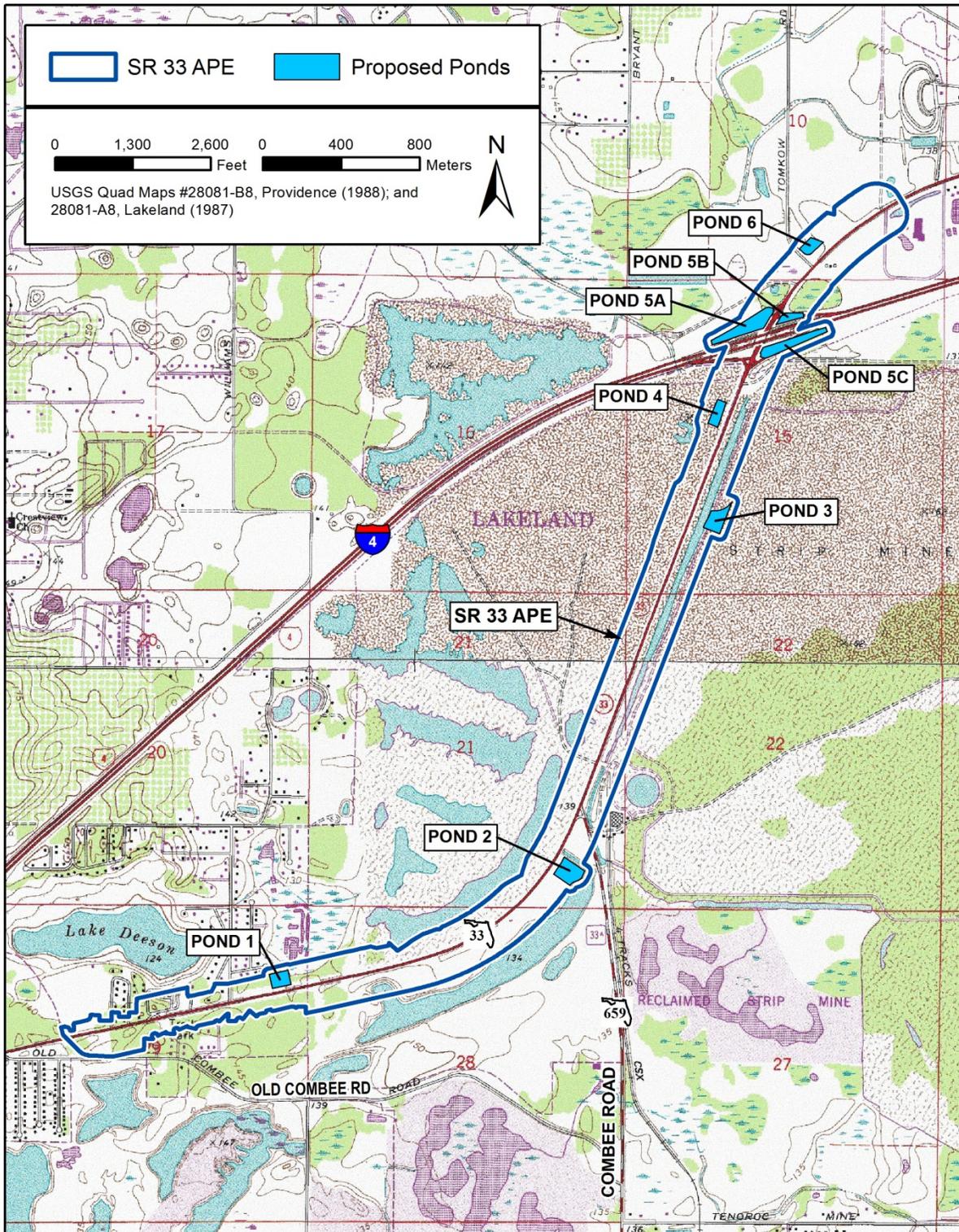


Figure 1. Project Location Map and Area of Potential Effect.

The Area of Potential Effect (APE) was developed to consider any visual, audible, and atmospheric effects that the project may have on historic properties. The APE defined for this project includes the six proposed pond footprints and a 100-meter buffer extending from the outer edges of the current Right-of-Way or the back or side property lines of adjacent parcels (see **Figure 1**).

A total of 82 shovel tests were excavated within the project APE, including 12 within the proposed pond areas (**Figure 2**). Three of the proposed ponds in the vicinity of the I-4/SR 33 interchange were not subjected to archaeological survey due to their very low archaeological potential (e.g., existing pavement, subsurface disturbance, standing water). None of the shovel tests within the project APE yielded cultural material. Additionally, SEARCH architectural historians documented 50 resources within the APE (**Figure 3**). These included 32 previously recorded above-ground resources, sixteen newly recorded above-ground resources, one previously recorded resource group, and one newly recorded resource group; none will be recommended eligible for National Register inclusion in the forthcoming technical report.

No NRHP-eligible or listed resources were identified within the SR 33 project APE, and no further work is recommended.

Please feel free to contact me directly if there are any questions regarding our preliminary findings.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael A. Arbuthnot". The signature is fluid and cursive, with a long horizontal stroke at the end.

Michael A. Arbuthnot, M.S., RPA
Principal Investigator

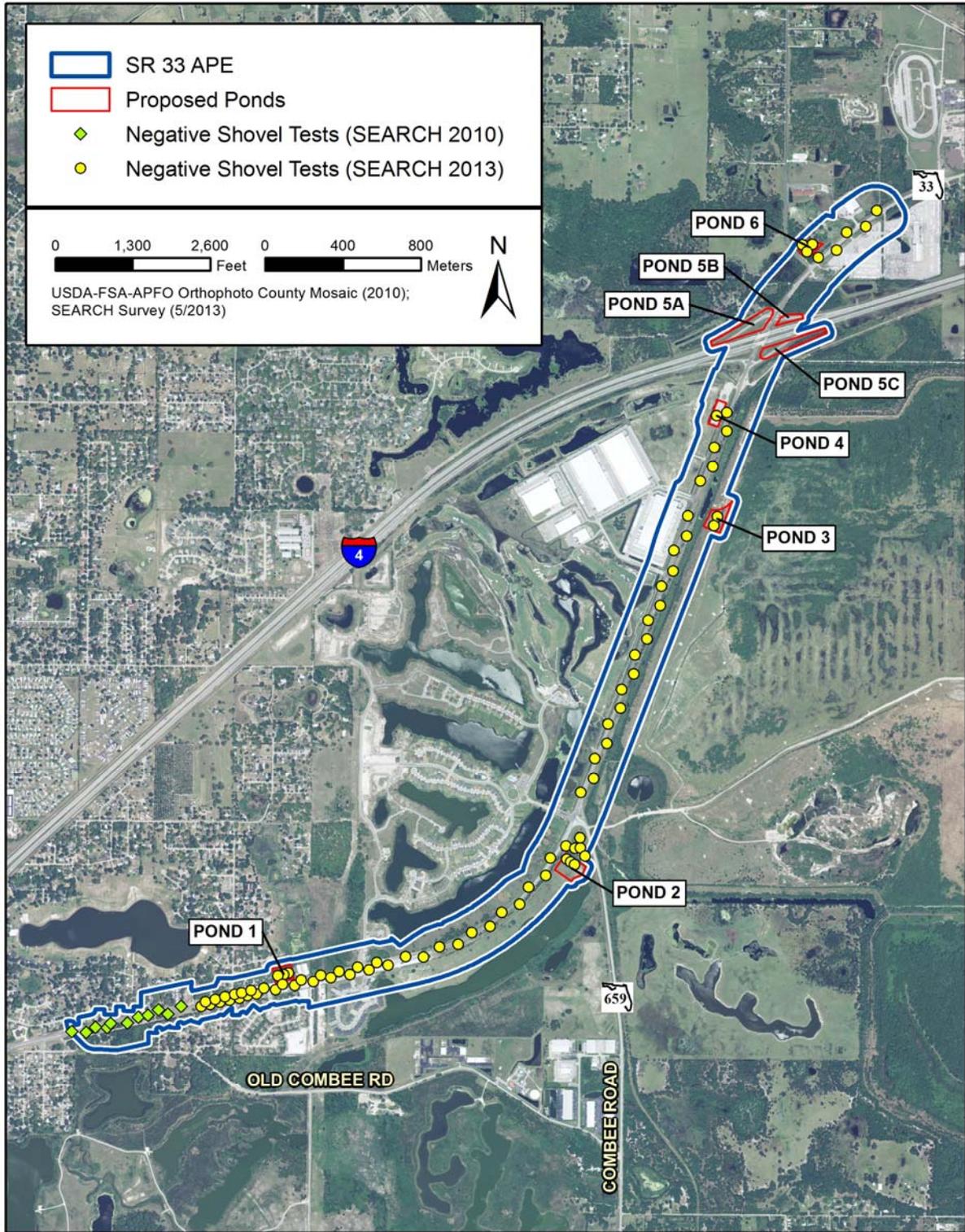


Figure 2. Results of shovel testing.

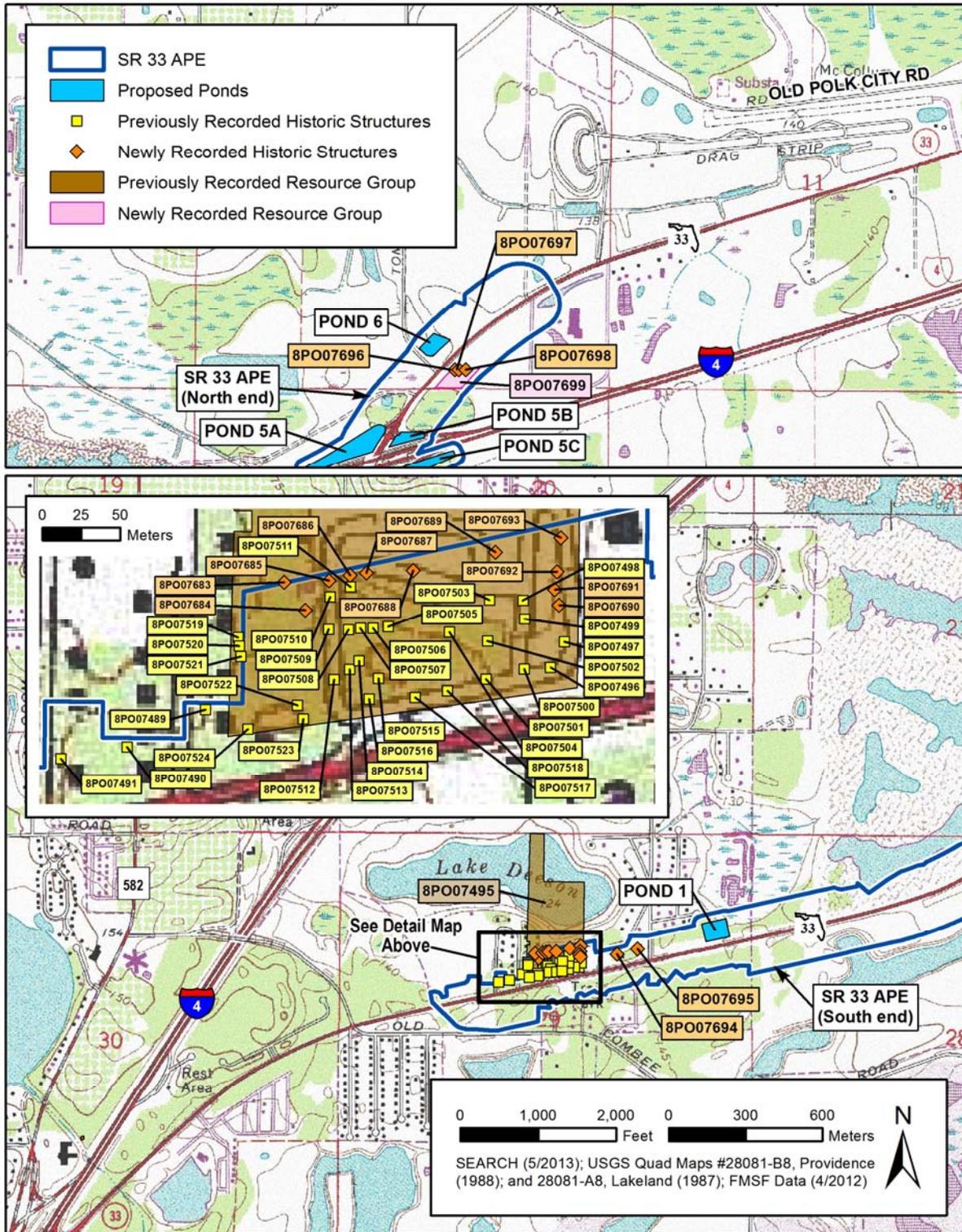


Figure 3. Results of architectural history survey.

Appendix 7

Pond Siting Report

Wetland Assessment Memo



MEMO

3000 Dovera Drive, Suite 200, Oviedo, FL 32765 | P: 407-971-8850 | F: 407-971-8955 | www.inwoodinc.com

DATE: 7/25/2013

TO: David Dangel, P.E.

FROM: Nathan E. Chambers

RE: **Pond Siting Report**
Wetland Assessment

SR 33 Project Development & Environment (PD&E) Study

From Old Combee Road to Tomkow Road

Polk County, Florida

Financial Project ID: 430185-1-22-01

CC: Renato Chuw, P.E.

INTRODUCTION

Inwood Consulting Engineers, Inc. staff completed a preliminary review of the wetlands within and abutting the project ROW including the six (6) stormwater management facility (SMF) alternatives included in the Pond Siting Report. The project is located in Sections 10, 15, 21, 22, 28 and 29; Township 27 South; Range 24 East in Polk County, Florida. The project limits are located from Old Combee Road to north of Tomkow Road; a distance of approximately 4.33 miles. This memorandum includes the methods and results of data acquisition and field reviews used to document the jurisdictional limits of wetlands within and adjacent to the proposed SMFs. It should be noted that the jurisdictional limits of wetland identified in this memorandum are based solely on the opinion of Inwood Staff, utilizing the criteria established in the US Army Corps of Engineers Wetland Delineation Manual (1987) accompanied by the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (2008), and in accordance with Chapter 62-340.300 of the Florida Administrative Code. To-date, none of the wetlands within the project corridor have been reviewed by state or federal regulatory agencies.

DATA ACQUISITION

Prior to conducting field reconnaissance, several site-specific mapping resources were reviewed. Data obtained for review included aerial photography of the project corridor (2011). USDA NRCS SCS Soil Survey of Polk County, Florida (1986), Southwest Florida Water Management District Land Use/Land Cover Layers (2010), and the US Fish and Wildlife Service National Wetlands Inventory maps.

FIELD REVIEW

Subsequent to the desktop review, field reviews were conducted on January 23 and 31, 2013 in order to identify the presence of wetland vegetation, evidence of wetland hydrology, and hydric soil indicators within the project ROW and SMF alternatives. Each SMF alternative was evaluated using pedestrian transects to determine the location and extent of wetlands within the SMF limits. The following is a description of the conditions encountered within each SMF alternative. The SMF alternatives reviewed, and extent of land cover using the FDOT Florida Land Use, Cover and Forms Classification System (FLUCFCS) are included in the attached Figures 1-1 through 1-4.

Pond 1

Pond 1 is located within an area that was classified as xeric oak (FLUCFCS #421). This pond site occurs entirely within uplands, and no wetland impacts are anticipated as a result of construction.

Pond 2

Pond 2 occurs within uplands classified as cropland and pastureland (FLUCFCS #210). No wetlands were identified within the SMF boundaries. A manmade surface water (FLUCFCS #530) is located offsite, to the west and south of the proposed SMF. No impacts to this surface water are anticipated as a result of construction.

Pond 3

This SMF alternative is located within two upland FLUCFCS categories, identified as extractive (FLUCFCS #160) and transportation (FLUCFCS #810). No wetlands were identified within these developed/disturbed areas. A wetland area identified as stream and lake swamps (bottomland) is located to the west of Pond 3, however no wetland impacts are anticipated to result from the construction of this SMF alternative.

Pond 4

Pond 4 occurs within an area defined as open land (FLUCFCS #190). This area has been cleared and graded in association with the adjacent industrial park. A manmade drainage ditch is located along the western boundary of the SMF alternative, however no wetlands or surface waters were identified within the SMF boundaries, and no wetland impacts will result from the construction of Pond 4.

Pond 5

Pond 5 includes three separate, connected SMFs identified as Ponds 5A, 5B, and 5C. These three sites are located within the infield areas of the proposed SR 33/Interstate 4 interchange improvements. Land uses within these SMF sites include open land, reservoirs, utilities, transportation, pine flatwoods, and cypress. The proposed interchange improvements include on and off-ramp configurations that will expand the infield areas. The wetland habitats that will be impacted by the construction of Ponds 5A, 5B, and 5C include the outer fringe of three separate cypress systems that will be fragmented by the proposed interchange ramps. All three SMFs will involve minor impacts to these forested wetlands, and construction of Pond 5A will result in minor impacts to other surface waters.

Pond 6

This SMF alternative is located within an upland area that was classified as shrub and brushland (FLUCFCS #320). No wetlands were identified within or immediately adjacent to Pond 6, and no wetland impacts are anticipated to result from its construction.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of preliminary data collection and field reconnaissance, it has been determined that one of the SMF alternatives has the potential to result in adverse impacts to wetlands and other surface waters. These impacts will occur to the outer fringe of existing, roadside forested wetlands and other surface waters. A qualitative assessment of wetland/surface water impacts utilizing the Uniform Mitigation Assessment Methodology (UMAM) will be conducted as part of the ongoing PD&E Study. The UMAM analysis will provide estimates of the amount of mitigation that will be required to offset adverse impacts to wetlands and other surface waters resulting from the project.

Appendix 8

Protected Species Assessment







Legend		
EXISTING LAND USE	AGRICULTURE	WETLANDS
URBAN AND BUILT-UP	210, CROPLAND AND PASTURELAND	615, STREAM AND LAKE SWAMPS (BOTTOMLAND)
110, RESIDENTIAL LOW DENSITY < 2 DWELLING UNITS	RANGELAND	621, CYPRESS
120, RESIDENTIAL MED DENSITY 2->5 DWELLING UNIT	320, SHRUB AND BRUSHLAND	630, WETLAND FORESTED MIXED
130, RESIDENTIAL HIGH DENSITY	UPLAND FOREST	641, FRESHWATER MARSHES
140, COMMERCIAL AND SERVICES	411, PINE FLATWOODS	643, WET PRAIRIES
150, INDUSTRIAL	421, XERIC OAK	644, EMERGENT AQUATIC VEGETATION
160, EXTRACTIVE	434, HARDWOOD CONIFER MIXED	653, INTERMITTENT PONDS
180, RECREATIONAL	440, TREE PLANTATIONS	BARREN LAND
182, GOLF COURSES	WATERBODIES	740, DISTURBED LAND
190, OPEN LAND	520, LAKES	TRANSPORTATION AND UTILITIES
	530, RESERVOIRS	810, TRANSPORTATION
		830, UTILITIES



FDOT Florida Department of Transportation
District 1

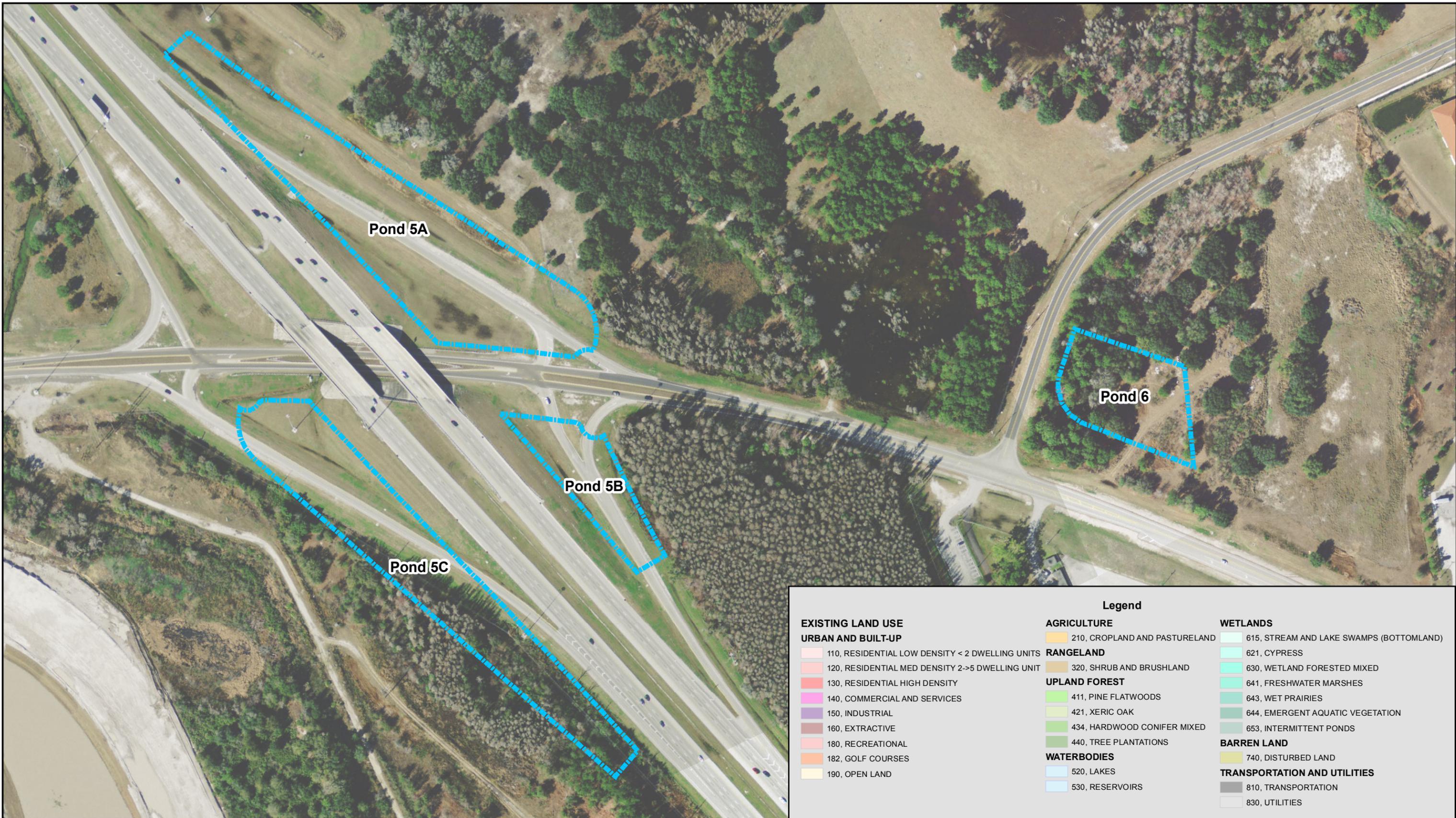
State Road 33 PD&E Study
from Old Combee Road
to North of Tomkow Road
Polk County, Florida
Financial Project ID: 430185-1-22-01

Figure
1-3

EXISTING LAND USE MAP



0 50 100 200
Feet
1 inch = 200 feet



M E M O R A N D U M

TO: David Dangel, P.E., Inwood Consulting Engineers, Inc.
CC: Renato Chuw, P.E., Inwood Consulting Engineers, Inc.

FROM: Christine Sciarrino, Scheda Ecological Associates, Inc.

RE: **POND SITING REPORT FOR POND ALTERNATIVES
PROTECTED SPECIES ASSESSMENT**
SR 33 PD&E Study from Old Combee Road to North of Tomkow Road
Polk County, Florida
Financial Project ID No. 430185-1-22-01
Scheda Project No. 002323.10.C

DATE: July 29, 2013

INTRODUCTION

Scheda Ecological Associates, Inc. (Scheda) has completed a review of the eight stormwater management facilities (SMFs) developed by Inwood Consulting Engineers for the SR 33 PD&E Study. The approximate 3.8 mile project extends from Old Combee Road to north of Tomkow Road in Polk County, Florida (Figure 1). The project is located within the following sections: Sections 10, 15, 21, 22, 28, 29, and 30, Township 27 South, Range 24 East. This memorandum presents the methods and results of data collection and field investigation for potential impacts to threatened and endangered species associated with developing the proposed SMFs.

DATA COLLECTION

Readily available data sources were initially reviewed to determine if protected species or their habitats occur within or adjacent to the proposed SMF locations. The primary sources utilized included:

- 2011 Florida Department of Revenue (FDOR) Digital Orthographic imagery;
- National Resource Conservation Service (NRCS) soil survey for Polk County;

- 2009 Southwest Florida Water Management District (SWFWMD) Florida Land Use, Cover and Forms Classification System (FLUCFCS) data, field-verified by Scheda;
- Florida Natural Areas Inventory (FNAI) element occurrence records and protected resources data;
- United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) data, listed species Consultation Areas (CA), protected species occurrence records, breeding atlas of herons and their allies; and
- Florida Fish and Wildlife Conservation Commission (FWC) bald eagle nest sites, wading bird rookeries, wildlife observation database, protected species occurrence records, managed areas, and wildlife management areas.

METHODOLOGY

Following the in-house data collection effort, Scheda scientists conducted field surveys of the eight SMF sites on May 9 and July 12, 2013 to verify the preliminary data previously obtained and to assess existing ecological conditions present at each site. Observations were recorded to characterize vegetative communities present and evaluate the potential of the sites to support protected wildlife species. The existing land use / land cover was initially classified in accordance with 2009 SWFWMD FLUCFCS data. During the field review the FLUCFCS data within each SMF was field verified.

For comparison purposes, a rating scale was used for each SMF reviewed. A rating of None, Low, Medium, or High is provided to identify the potential for protected species involvement. Scoring for potential impacts to protected species was based on the type of habitat and its relative condition for supporting wildlife, if the proposed pond site is located within a USFWS listed species CA, if habitat for those protected species is present within the pond site, if particular species were observed in the area, and the ease and cost of protected species mitigation. A rating of "None" means no protected species anticipated; a "Low" rating is for potential but unlikely presence of protected species; a rating of "Medium" is for indication of protected species presence where mitigation is reasonable and possible; and a "High" rating is for indication of protected species presence where mitigation is difficult, costly, or not possible.

RESULTS

Existing land use / land cover within each SMF alternative is depicted in Figure 2. The locations of protected species observations during field surveys and previously documented species occurrences within approximately 1,500 feet of the project corridor are shown in Figure 3. Protected species capable of utilizing habitat within each SMF and the rating for each SMF is shown in Table 1.

Based on the literature and database review, potential federally listed or federally protected faunal species within the project area include: crested caracara (*Caracara cheriway*), snail kite (*Rostrhamus sociabilis*), Florida grasshopper sparrow (*Ammodramus savannarum floridanus*), Florida scrub-jay (*Aphelocoma coerulescens*), wood stork (*Mycteria americana*), American alligator (*Alligator mississippiensis*), bluetail mole skink (*Eumeces egregious lividus*), eastern indigo snake (*Drymarchon corais couperi*), sand skink (*Neoseps reynoldsi*), Florida bonneted bat (*Eumops floridanus*).

Although no longer listed by the USFWS or FWC, the bald eagle (*Haliaeetus leucocephalus*) remains protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d), as amended, the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712), and Chapter 68A-16.002, F.S. The bald eagle has the potential to occur within the project area.

Potential state listed faunal species in the project area include Florida pine snake (*Pituophis melanoleucus mugitus*), Sherman's fox squirrel (*Sciurus niger shermani*), gopher tortoise (*Gopherus polyphemus*) and its associated commensal species the gopher frog (*Rana capito*), and the Florida mouse (*Podomys floridanus*), Florida burrowing owl (*Athene cunicularia floridana*), southeastern American kestrel (*Falco sparverius paulus*), Florida sandhill crane (*Grus canadensis pratensis*), limpkin (*Aramus guarauna*), little blue heron (*Egretta aerulea*), roseate spoonbill (*Platalea ajaja*), snowy egret (*Egretta thula*), tricolored heron (*Egretta tricolor*), and white ibis (*Eudocimus albus*).

Potential state listed floral species in the project area include: Ashe's savory (*Calamintha ashei*), Avon Park harebells (*Crotalaria avonensis*), Britton's beargrass (*Nolina brittoniana*), Carter's mustard (*Warea carteri*), Catesby's lily (*Lilium catesbaei*), Curtiss' milkweed (*Asclepias curtissii*), cutthroat grass (*Panicum abscissium*), Florida

bonamia (*Bonamia floridana*), Florida milkvine (*Matelea floridana*), Florida zizphus (*Ziziphus celata*), giant coco (*Pteroglossaspis ecristata*), Highlands scrub hypericum (*Hypericum cumulicola*), Lewton's polygala (*Polygala lewtonii*), nodding pinweed (*Lechea cernua*), papery whitlow-wort (*Paronychia chartacea*), pigeon wings (*Clitoria fragrans*), pinescrub bluestem (*Schizachyrium niveum*), pygmy fringe-tree (*Chionanthus pygmaeus*), sand butterfly pea (*Centrosema arenicola*), sandlace (*Polygonella myriophylla*), scrub blazing star (*Liatris ohlingerae*), scrub buckwheat (*Erigonum longifolium* var. *gnaphalifolium*), scrub lupine (*Lupinus aridorum*), scrub mint (*Dicerandra frutescens*), scrub plum (*Prunus geniculata*), short-leaved rosemary (*Conradina brevifolia*), showy dawnflower (*Stylisma abdita*), Simpson's zephyr lily (*Zephyranthes simpsonii*), wedge-leaved button snakeroot (*Eryngium cunefolium*), wide-leaf warea (*Warea amplexifolia*), wireweed (*Polygonella basiramia*), yellow fringeless orchis (*Platanthera integra*), and Florida perforate cladonia (*Cladonia perforata*).

All eight alternative pond sites are located within the USFWS CA for the following federally listed species: Florida scrub-jay, Florida grasshopper sparrow, crested caracara, snail kite, bluetail mole skink, and sand skink. However, there is no appropriate habitat for the Florida grasshopper sparrow or snail kite within the project limits, and only very limited habitat for the Florida scrub-jay and the crested caracara. None of these federally listed species have been previously documented within the pond sites and none were observed during field surveys.

No wood storks were observed in the project area. However, six SMF sites (Ponds 1, 2, 3, 4, 5B, and 5C) are located within the Core Foraging Area (CFA) of five wood stork colonies: Lone Palm, #612316 Lake John, #616117, #616114, and NE Mulberry. Two SMF sites (Ponds 5A and 6) are located within the CFA of six wood stork colonies: Lone Palm, #612316 Lake John, #616117, #616114, NE Mulberry, and #611024 Little Gator Creek.

No bald eagle nests were previously documented within 660 feet of the SMFs. One bald eagle was observed flying over the project area during field surveys (Figure 3). The closest, active bald eagle nest (PO050) is located 0.3 miles to the north of the project.

Following USFWS survey guidelines, potential Florida scrub-jay habitat was identified within the project area. Field surveys were conducted on October 9th and 15th, 2012, March 7th, 22nd, 26th, 27th, and April 15th 2013 using a Florida scrub-jay call-back tape at 16 stations within 8 segments of potential scrub-jay habitat. No individuals were observed during call-back surveys. The nearest recorded Florida scrub jay sighting is approximately 11 miles to the northwest of the project area.

Following USFWS survey guidelines, pedestrian surveys for sand skinks were conducted on May 9 and July 12, 2013. All ponds are located within the sand skink consultation area and occur at 82 feet above sea level however, Pond 1 is the only site with skink soils (St. Lucie soils). No individuals were observed during pedestrian surveys at any pond sites.

Pond Descriptions

Pond 1

Pond 1 is located approximately 81 feet northwest of SR 33 and approximately 674 feet east of Lake Luther Road. This site falls within the USFWS consultation area for the snail kite, Florida scrub-jay, Florida grasshopper sparrow, crested caracara, bluetail mole skink, and sand skink. This pond contains the following types of land use / land cover categories: Upland Scrub, Pine and Hardwoods (FLUCFCS 4360).

Pond 1 is dominated primarily by saw palmetto (*Serenoa repens*), sand live oak (*Quercus geminata*), and sand pine (*Pinus clausa*). Other vegetation observed includes laurel oak (*Quercus laurifolia*), garberia (*Garberia heterophylla*), prickly pear (*Opuntia sp.*) non-dominant species include smilax (*Smilax sp.*) and muscadine vine (*Vitis rotundifolia*). Garberia, which is common in Pond 1, is a state-listed threatened plant in the Preservation of Native Flora of Florida Act (5B-40.0055).

Pond 1 provides potential habitat for the gopher tortoise, gopher frog, Florida mouse, Florida scrub-jay, Florida pine snake, and eastern indigo snake. Two potentially occupied gopher tortoises were observed during field surveys; one within the pond site and one within 15 feet of the western edge (Figure 3). No other state or federally listed protected species were previously documented in Pond 1 and none were observed

during field surveys. Pond 1 was given a rating of “Medium” for protected species involvement.

Pond 2

Pond 2 is located approximately 120 feet southeast of SR 33 and approximately 199 feet west of North Combee Road. This site falls within the USFWS consultation area for the snail kite, Florida scrub-jay, Florida grasshopper sparrow, crested caracara, bluetail mole skink, and sand skink. This pond contains the following types of land use / land cover categories: Improved Pasture (FLUCFCS 2110).

The pond site is dominated by bahia grass (*Paspalum notatum*). This site is actively grazed by cattle and slopes down towards a nearby pond. Two American alligators and one tricolored heron were observed in this nearby pond.

Pond 2 provides potential habitat for the gopher tortoise, gopher frog, Florida mouse, burrowing owl, and crested caracara. No state or federally listed protected species were previously documented in Pond 2 and none were observed during field surveys. Pond 2 was given a rating of “Low” for protected species involvement.

Pond 3

Pond 3 is located approximately 265 feet southeast of SR 33 and 72 feet south of University Boulevard. This site falls within the USFWS consultation area for the snail kite, Florida scrub-jay, Florida grasshopper sparrow, crested caracara, bluetail mole skink, and sand skink. This pond contains the following types of land use / land cover categories: Improved Pasture (FLUCFCS 2110).

The dominant vegetation is planted bahia grass. Scattered invasive tropical soda apple (*Solanum viarum*) is also present. Soils are highly compacted; ground cover by grasses is approximately 50 percent while the remaining 50 percent is non-vegetated soils.

Pond 3 provides potential habitat for the gopher tortoise, gopher frog, Florida mouse, burrowing owl, and crested caracara. No state or federally listed protected species were previously documented in Pond 3 and none were observed during field surveys. Pond 3 was given a rating of “Low” for protected species involvement.

Pond 4

Pond 4 is located approximately 115 feet northwest of SR 33 and 184 feet southeast of Bridgewater Center Drive. This site falls within the USFWS consultation area for the snail kite, Florida scrub-jay, Florida grasshopper sparrow, crested caracara, bluetail mole skink, and sand skink. This pond contains the following types of land use / land cover categories: Rural Lands in Transition without Positive Indicators of Intended Activity (FLUCFCS 7410).

This SMF is currently being used as a staging area for nearby construction activities; contains numerous construction vehicles and spoil mounds; and is devoid of vegetation. The staging area is fenced off from nearby improved pastures which are actively being grazed by cattle.

Due to the absence of vegetation, no protected species are anticipated to occur at Pond 4. No state or federally listed protected species were previously documented at Pond 4 and none were observed during field surveys. Pond 4 was given a rating of "Low" for protected species involvement.

Pond 5

Pond 5 consists of three ponds, Pond 5A, Pond 5B, and Pond 5C which are located within the interchange of SRR 33 and I-4. Pond 5A, Pond 5B, and Pond 5C fall within the USFWS consultation area for the snail kite, Florida scrub-jay, Florida grasshopper sparrow, crested caracara, bluetail mole skink, and sand skink.

Pond 5A

Pond 5A is located approximately 48 feet to the northwest of SR 33 and 100 feet to the northwest of I-4. This pond contains the following types of land use / land cover categories: Roads and Highways (FLUCFCS 8140).

The entire pond site consists of routinely-mowed bahia grass and existing roadway which is an entrance ramp to I-4. The northwestern corner of this site is nearby an offsite forested wetland of bald cypress (*Taxodium distichum*) and red maple (*Acer rubrum*). Standing water and a foraging white ibis were observed in this bordering wetland.

Due to routine mowing and extensive vehicular traffic, no protected species are anticipated to occur at Pond 5A. No state or federally listed protected species were previously documented at Pond 5A and none were observed during field surveys. Pond 5A was given a rating of “Low” for protected species involvement.

Pond 5B

Pond 5B is located approximately 90 feet to the southeast of SR 33 and 102 feet to the northwest of I-4. This pond contains the following types of land use / land cover categories: Roads and Highways (FLUCFCS 8140).

The entire pond site consists of routinely-mowed bahia grass and existing roadway which is an exit ramp to SR 33 from I-4. Nearby Pond 5B is a forested wetland composed of bald cypress, red maple, and Carolina willow (*Salix caroliniana*).

Due to the routine mowing and extensive vehicular traffic, no protected species are anticipated to occur at Pond 5B. No state or federally listed protected species were previously documented at Pond 5B and none were observed during field surveys. Pond 5B was given a rating of “Low” for protected species involvement.

Pond 5C

Pond 5C is located approximately 93 feet to the southeast of SR 33 and 104 to the southeast of I-4. This pond contains the following types of land use / land cover categories: Roads and Highways (FLUCFCS 8140), Shrub and Brushland (FLUCFCS 3200), and Cypress (FLUCFCS 6210).

The western portion of this pond consists of mowed bahia grass and existing road which is an entrance ramp to I-4. A small portion of the southern edge contains saw palmetto, slash pine (*Pinus elliottii*) and oak (*Quercus sp.*). The eastern portion of this pond is a forested wetland consisting of bald cypress, red maple, Peruvian primrose willow (*Ludwigia peruviana*), and Carolina willow.

The small upland area within this pond site has the potential to provide habitat for the gopher tortoise and the indigo snake. The wetland forest has the potential to provide habitat for the wood stork, and state-listed wading birds. No state or federally listed protected species were previously documented in Pond 5C and none were observed

during field surveys. Pond 5C was given a rating of “Low” for protected species involvement.

Pond 6

Pond 6 is located approximately 168 feet northwest of SR 33 and approximately 60 feet to the northeast of Tomkow Road. This site falls within the USFWS consultation area for the snail kite, Florida scrub-jay, Florida grasshopper sparrow, crested caracara, bluetail mole skink, and sand skink. This pond contains the following types of land use/land cover categories: Wetland Forested Mix (FLUCFCS 6300), Wetland Marsh (FLUCFCS 6410), and Shrub and Brushland (FLUCFCS 3200).

The majority of the site consists of forested wetland which is dominated by water oak (*Quercus nigra*), red maple (*Acer rubrum*), and slash pine (*Pinus elliottii*) with muscadine vine (*Vitis rotundifolia*) as the primary ground cover to the southeastern portion. The remainder of the site in the northeastern portion consists of live oak (*Quercus virginiana*), laurel oak (*Quercus laurifolia*), cogon grass (*Imperata cylindrica*), eastern baccharis (*Baccharis halimifolia*), redroot (*Lachnanthes caroliniana*), soft rush (*Juncus effuses*), and Caesar’s weed (*Urena lobata*).

This site provides potential habitat for the wood stork and state-listed wading birds. No state or federally listed protected species were previously documented in Pond 6 and none were observed during field surveys. Pond 6 was given a rating of “Low” for protected species involvement.

CONCLUSIONS AND RECOMMENDATIONS

Protected Species

Based on results of preliminary data collection and field reviews, we have determined that one of the SMF sites (Pond 1) has a medium rating for protected species involvement, and seven of the SMF sites (Ponds 2, 3, 4, 5A, 5B, 5C, and 6) have a low rating for protected species involvement. Mitigation for wetland impacts affecting listed wading bird species habitat is anticipated to be provided pursuant to S.373.4137 F.S. to satisfy Part IV, Chapter 373 F.S. and 33 U.S.C., § 1344.

One potentially occupied gopher tortoise burrow was identified within Pond 1 and one was identified immediately outside of Pond 1. Based on our database research and field review, none of the remaining SMF sites (Ponds 2, 3, 4, 5A, 5B, 5C, and 6) have been found to support nests, burrows, or dens of any federal or state protected species and no state or federally listed species were observed.

REFERENCES

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- Moler, Paul E. (Editor). 1992. Rare and Endangered Biota of Florida: Volume III Amphibians and Reptiles. University Press of Florida. 291 pp.
- Myers, Ronald L. and John J. Ewel (Editors). 1990. Ecosystems of Florida. University of Central Florida Press. 765 pp.
- Rodgers Jr., James A., Herbert W. Kale II, and Henry T. Smith. (Editors). 1996. Rare and Endangered Biota of Florida: Volume V Birds

TABLES

Table 1. Protected Species Involvement and Land Use Characteristics for Alternative Pond Sites SR 33 PDandE Study from Old Combee Road to North of Tomkow Road FPID #430185-1-22-01

Pond	USFWS Consultation Areas	Land Use (FLUCFCS Code)		Protected Species and Habitat Type	Protected Species Score
		Description	Code		
1 1.74 ac	Snail kite, Florida scrub-jay, Florida grasshopper sparrow, crested caracara, bluetail mole skink, sand skink	Upland Scrub, Pine and Hardwoods	4360	Two potentially occupied gopher tortoise burrows were observed; one within pond site 1 and one immediately west of the western boundary. The state listed plant garberia (<i>Garberia heterophylla</i>) was located in the pond site. The site has habitat to support the gopher tortoise, gopher frog, Florida mouse, Florida scrub-jay, Florida pine snake, and eastern indigo snake.	Medium
2 3.02 ac	Snail kite, Florida scrub-jay, Florida grasshopper sparrow, crested caracara, bluetail mole skink, sand skink	Improved Pastures	2110	No protected species were observed within pond site 2. Two American alligators and one tricolored heron were observed in the pond immediately adjacent to pond site 2. The actively grazed pasture has the potential to support the gopher tortoise, gopher frog, Florida mouse, burrowing owl, and crested caracara.	Low
3 2.50 ac	Snail kite, Florida scrub-jay, Florida grasshopper sparrow, crested caracara, bluetail mole skink, sand skink	Improved Pastures	2110	No protected species were observed. The actively grazed pasture has the potential to support the gopher tortoise, gopher frog, Florida mouse, burrowing owl, and crested caracara.	Low
4 1.63 ac	Snail kite, Florida scrub-jay, Florida grasshopper sparrow, crested caracara, bluetail mole skink, sand skink	Rural Lands in Transition without Positive Indicators of Intended Activity	7410	No protected species were observed. Pond 4 is currently being used as a construction staging area. It is devoid of vegetation therefore no protected species are anticipated to occur.	Low

Table 1. Protected Species Involvement and Land Use Characteristics for Alternative Pond Sites SR 33 PDandE Study from Old Combee Road to North of Tomkow Road FPID #430185-1-22-01

Pond	USFWS Consultation Areas	Land Use (FLUCFCS Code)		Protected Species and Habitat Type	Protected Species Score
		Description	Code		
5A 4.58 ac	Snail kite, Florida scrub-jay, Florida grasshopper sparrow, crested caracara, bluetail mole skink, sand skink	Roads and Highways	8140	No protected species were observed. The routinely mowed right-of-way and roads and highways have limited potential to support protected species.	Low
5B 1.06 ac	Snail kite, Florida scrub-jay, Florida grasshopper sparrow, crested caracara, bluetail mole skink, sand skink	Roads and Highways	8140	No protected species were observed. The routinely mowed right-of-way and roads and highways have limited potential to support protected species.	Low
5C 3.54 ac	Snail kite, Florida scrub-jay, Florida grasshopper sparrow, crested caracara, bluetail mole skink, sand skink	Roads and Highways, Shrub and Brushland, Cypress	8140, 3200, 6210	No protected species were observed. The roads and highways do not have the potential to support protected species. The shrub and brushland has the potential to support the gopher tortoise and the indigo snake. The wetland hardwood forest has the potential to support the wood stork, and state-listed wading birds.	Low
6 1.39 ac	Snail kite, Florida scrub-jay, Florida grasshopper sparrow, crested caracara, bluetail mole skink, sand skink	Wetland Forested Mix, Shrub and Brushland	6300, 3200	No protected species were observed. The wetland forested mix has the potential to support the wood stork and state-listed wading birds. The shrub and brushland is inundated by exotic grass therefore no protected species are anticipated to occur.	Low

NOTES

None

Low

Medium

High

No protected species anticipated to occur based on habitat quality, no observations or records.

Potential but unlikely presence of protected species.

Indication of species where mitigation is reasonable and possible.

Indication of species where mitigation is difficulty, costly, or not possible.

FIGURES

Date: 07/24/2013 Rev. Date: n/a PM: CS GIS Analyst: GJA Map Document: SR33_PSR_location_A_gja_20130724.mxd Project Number: 2323 PDF Document: SR33_PSR_location_A_gja_20130724.pdf Plot Size: 8.5 x 11



Figure 1 - Alternative Pond Sites Location Map

FPID #: 430185-1-22-01
 SR 33 from Old Combee Road to North of Tomkow Road
 Polk County, Florida



Data Source:
 -Scheda Scientists
 -Inwood Engineers
 Imagery Source:
 -2011 FDOR

Coordinate System:
 NAD 1983 Florida
 State Plane West

Date: 07/24/2013 Rev. Date: n/a PM: CS Analyst: GJA Map Document: SR33_PSR_Landuse_A_gda_20130724.mxd Project Number: 2323 PDF Document: SR33_PSR_Landuse_A_gda_20130724.pdf Plot Size: 8.5 x 11

Project Location
 Project Location

Pond Sites
 Pond Sites

Field Verified Land Use

-  2110 - IMPROVED PASTURES
-  3200 - SHRUB AND BRUSHLAND
-  4360 - UPLAND SCRUB, PINE AND HARDWOODS
-  6210 - CYPRESS
-  6300 - WETLAND FORESTED MIXED
-  7410 - RURAL LAND IN TRANSITION
-  8140 - TRANSPORTATION

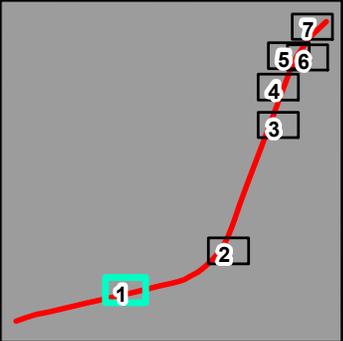
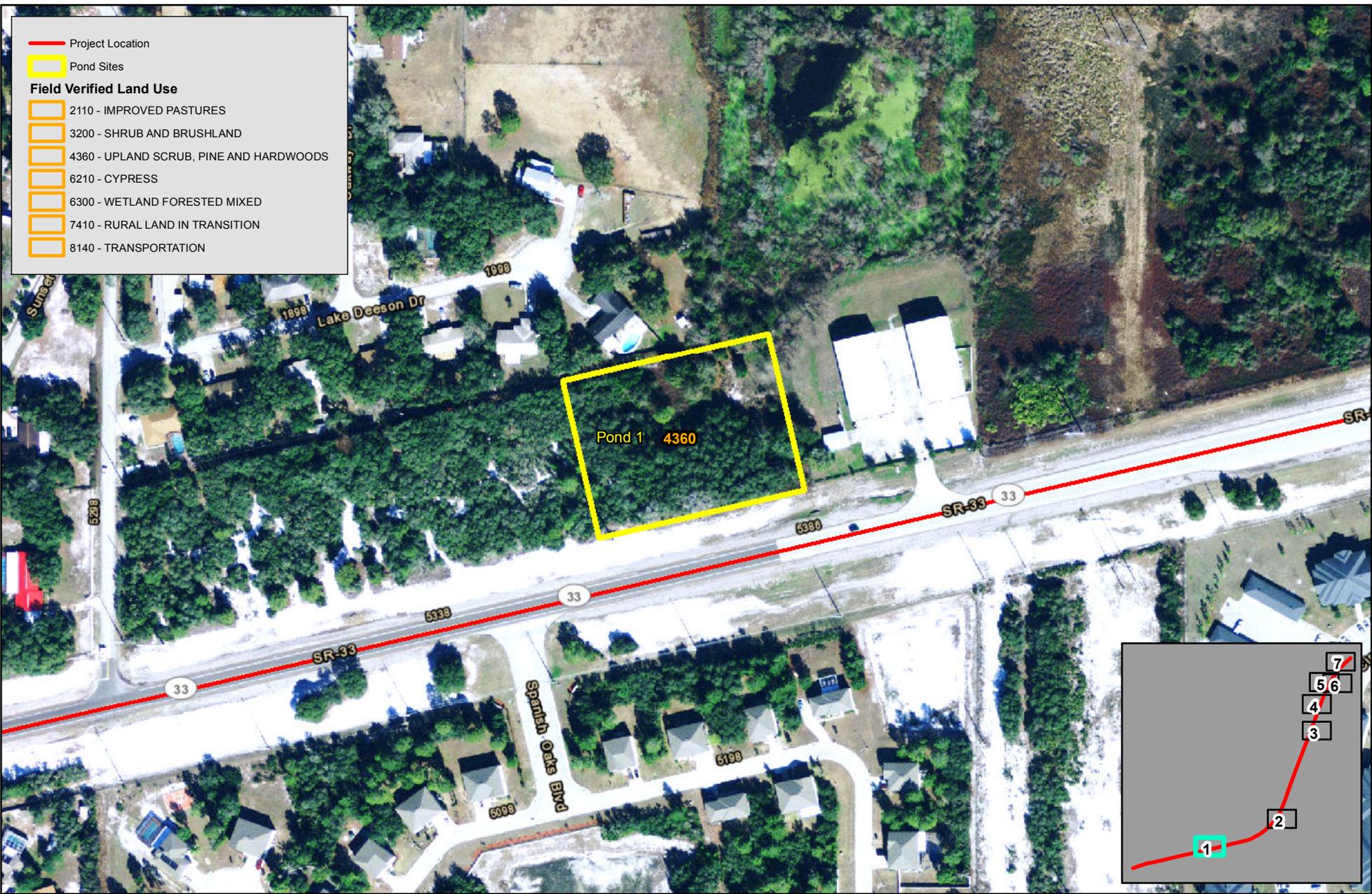
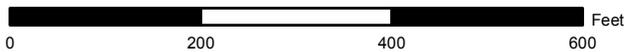


Figure 2 - Field Verified Land Use / Land Cover within Alternative Pond Sites Map

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FPID #: 430185-1-22-01
 SR 33 from Old Combee Road to North of Tomkow Road
 Polk County, Florida



Data Source:
 -Scheda Scientists
 -Inwood Engineers
 -SWFWMD
 Imagery Source:
 -2011 FDOR

Coordinate System:
 NAD 1983 Florida
 State Plane West

Date: 07/24/2013 Rev. Date: n/a PM: CS GIS Analyst: GJA Map Document: SR33_PSR_Landuse_A_gda_20130724.mxd Project Number: 2323 PDF Document: SR33_PSR_Landuse_A_gda_20130724.pdf Plot Size: 8.5 x 11

— Project Location
 Pond Sites
Field Verified Land Use
 2110 - IMPROVED PASTURES
 3200 - SHRUB AND BRUSHLAND
 4360 - UPLAND SCRUB, PINE AND HARDWOODS
 6210 - CYPRESS
 6300 - WETLAND FORESTED MIXED
 7410 - RURAL LAND IN TRANSITION
 8140 - TRANSPORTATION

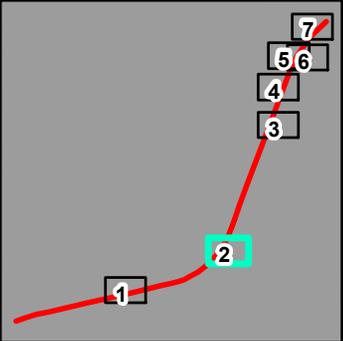
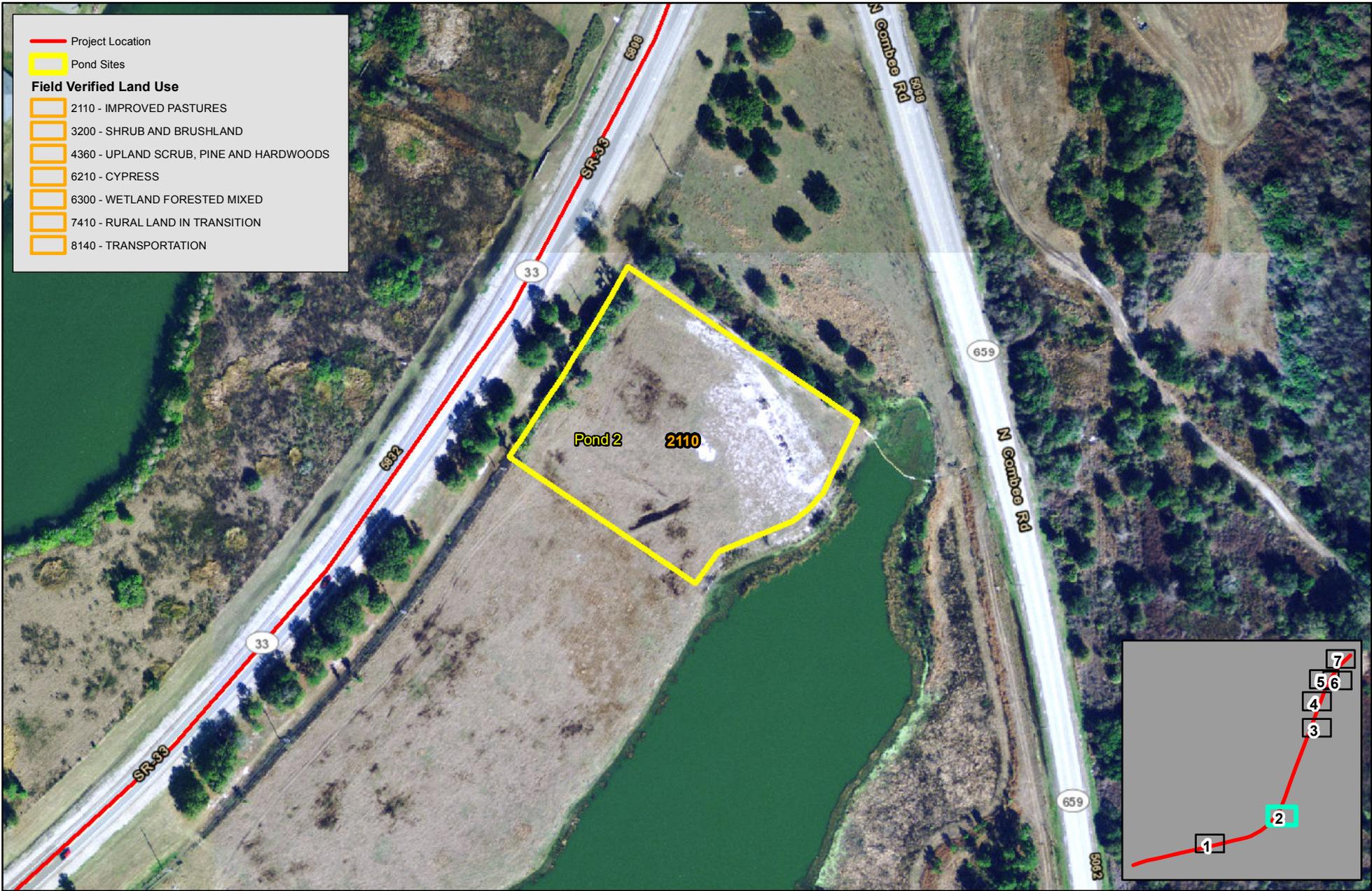
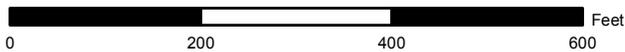


Figure 2 - Field Verified Land Use / Land Cover within Alternative Pond Sites Map

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FPID #: 430185-1-22-01
 SR 33 from Old Combee Road to North of Tomkow Road
 Polk County, Florida



Data Source:
 -Scheda Scientists
 -Inwood Engineers
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 Imagery Source:
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Project Location

Pond Sites

Field Verified Land Use

- 2110 - IMPROVED PASTURES
- 3200 - SHRUB AND BRUSHLAND
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- 6210 - CYPRESS
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- 7410 - RURAL LAND IN TRANSITION
- 8140 - TRANSPORTATION

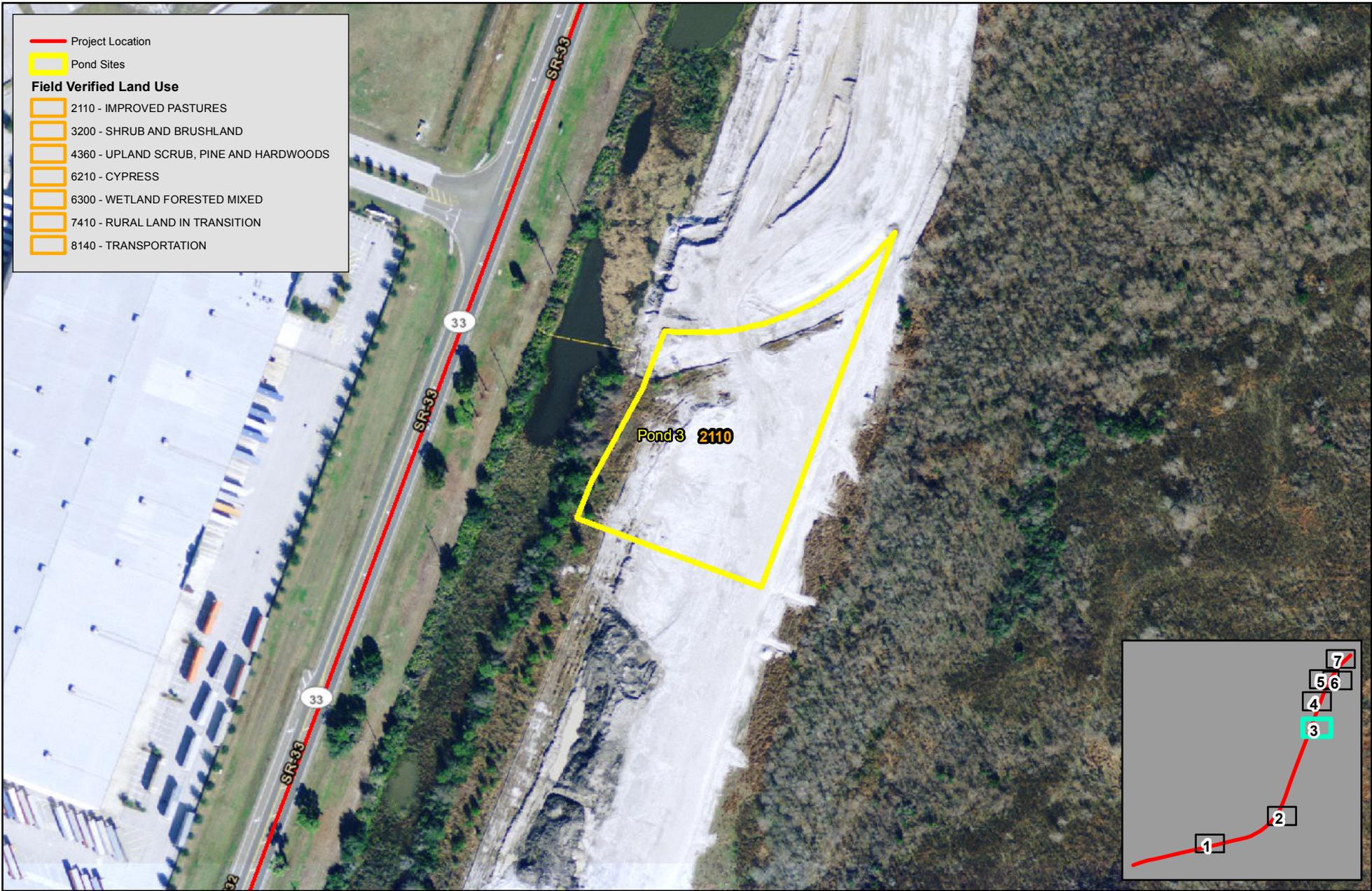
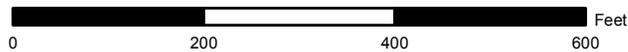


Figure 2 - Field Verified Land Use / Land Cover within Alternative Pond Sites Map

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FPID #: 430185-1-22-01
SR 33 from Old Combee Road to North of Tomkow Road
Polk County, Florida



Data Source:
 -Scheda Scientists
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Date: 07/24/2013 Rev. Date: n/a PM: CS GIS Analyst: GJA Map Document: SR33_PSR_Landuse_A_gda_20130724.mxd Project Number: 2323 PDF Document: SR33_PSR_Landuse_A_gda_20130724.pdf Plot Size: 8.5 x 11

Project Location
 Project Location

Pond Sites
 Pond Sites

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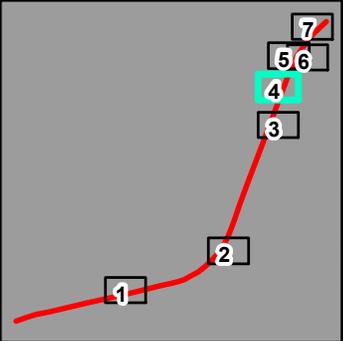
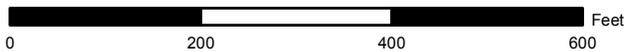


Figure 2 - Field Verified Land Use / Land Cover within Alternative Pond Sites Map

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FPID #: 430185-1-22-01
SR 33 from Old Combee Road to North of Tomkow Road
Polk County, Florida



Data Source:
-Scheda Scientists
-Inwood Engineers
-SWFWMMD
Imagery Source:
-2011 FDOR

Coordinate System:
NAD 1983 Florida
State Plane West

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Project Location
 Project Location

Pond Sites
 Pond Sites

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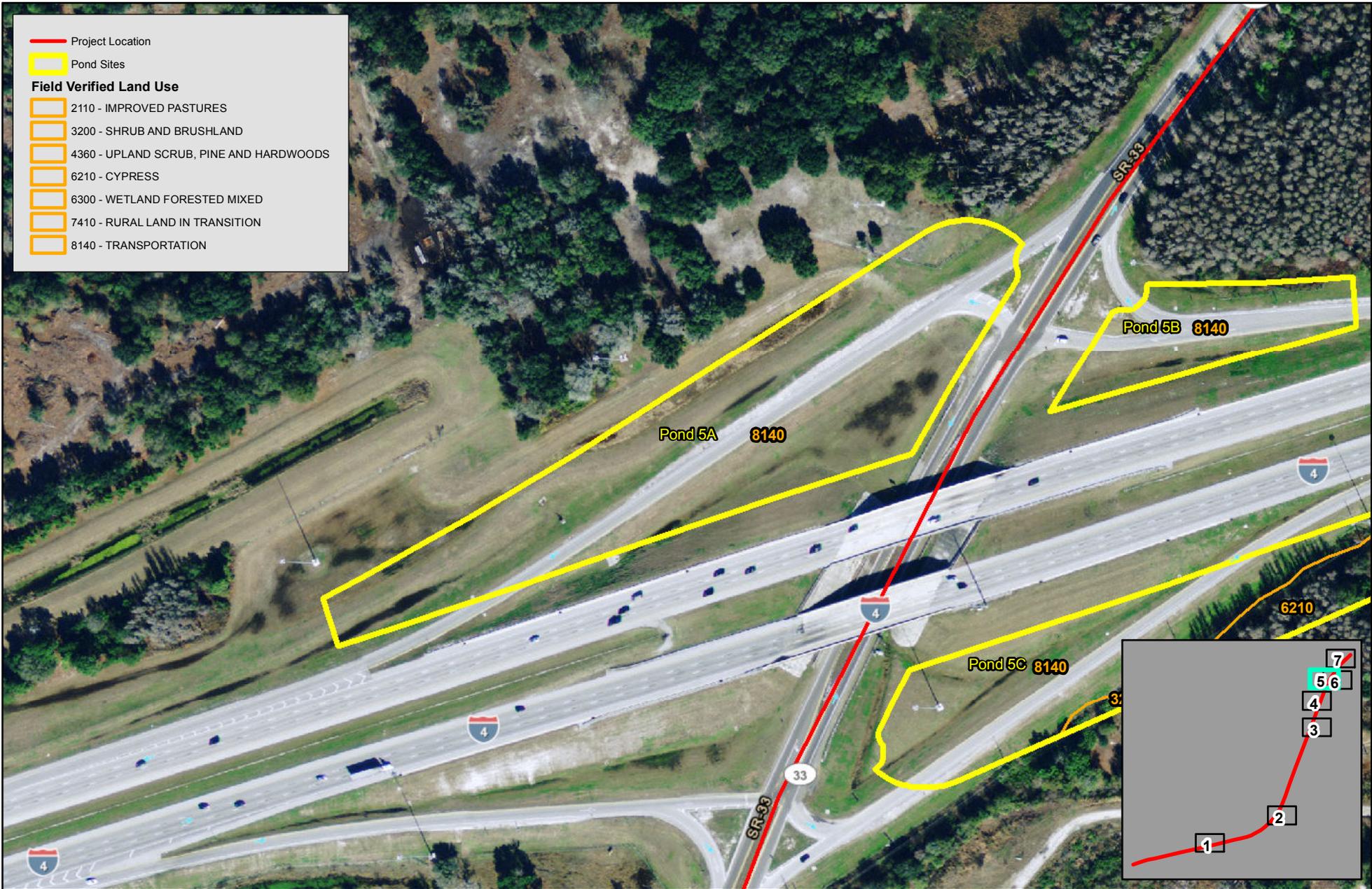
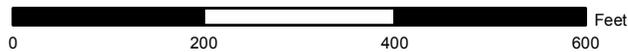


Figure 2 - Field Verified Land Use / Land Cover within Alternative Pond Sites Map

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FPID #: 430185-1-22-01
SR 33 from Old Combee Road to North of Tomkow Road
Polk County, Florida



Data Source:
 -Scheda Scientists
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 -SWFWMD
 Imagery Source:
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Project Location
 Project Location

Pond Sites
 Pond Sites

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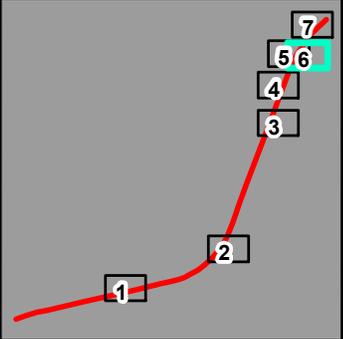
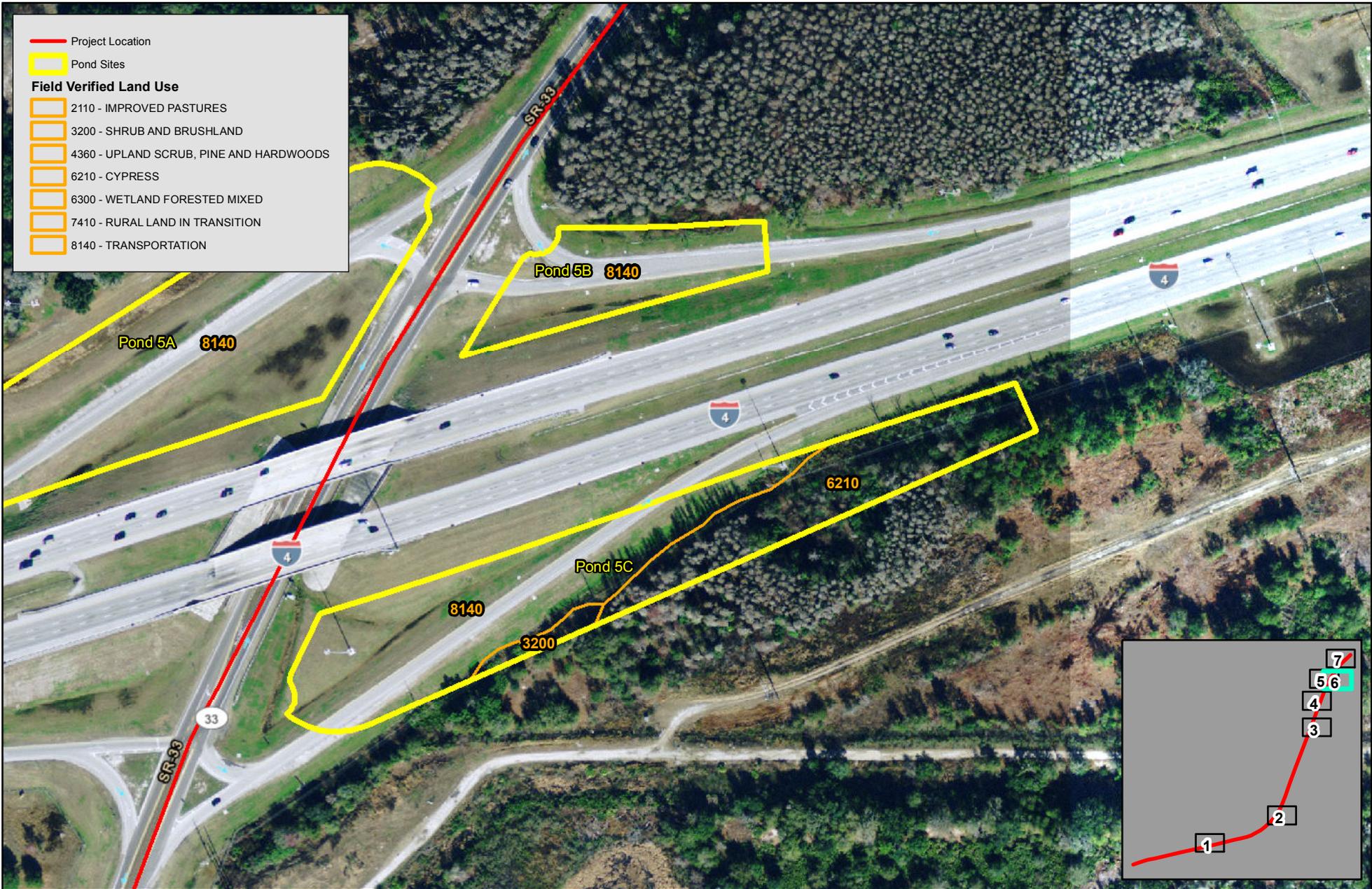
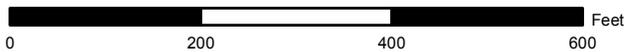


Figure 2 - Field Verified Land Use / Land Cover within Alternative Pond Sites Map

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FPID #: 430185-1-22-01
 SR 33 from Old Combee Road to North of Tomkow Road
 Polk County, Florida



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Project Location

Pond Sites

Field Verified Land Use

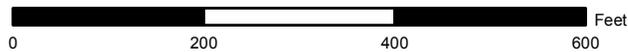
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- 3200 - SHRUB AND BRUSHLAND
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Figure 2 - Field Verified Land Use / Land Cover within Alternative Pond Sites Map

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FPID #: 430185-1-22-01
SR 33 from Old Combee Road to North of Tomkow Road
Polk County, Florida



Data Source:
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-SWFWMD
Imagery Source:
-2011 FDOR

Coordinate System:
NAD 1983 Florida
State Plane West

Date: 07/24/2013 Rev. Date: n/a PM: CS GIS Analyst: GJA Map Document: SR33_PSR_protected_species_A_gdi_20130724.mxd Project Number: 20130724.pdf Plot Size: 8.5 x 11

Project Location

- Project Location
- 1,500-foot Buffer
- Pond Sites
- FNAI Element Occurrence

Scheda Observations

- Bald Eagle
- Florida Sandhill Crane
- Wood Stork
- Gopher Tortoise

This project is entirely within the following USFWS Consultation Areas:

- Snail Kite
- Florida Scrub-Jay
- Grasshopper Sparrow
- Crested Caracara
- Sand Skink
- Blue-Tailed Mole Skink

The project is located within the following Wood Stork Core Foraging Areas:

- 611024 Little Gator Creek
- Lone Palm
- 612316 Lake John
- 616117
- 616114
- NE Mulberry

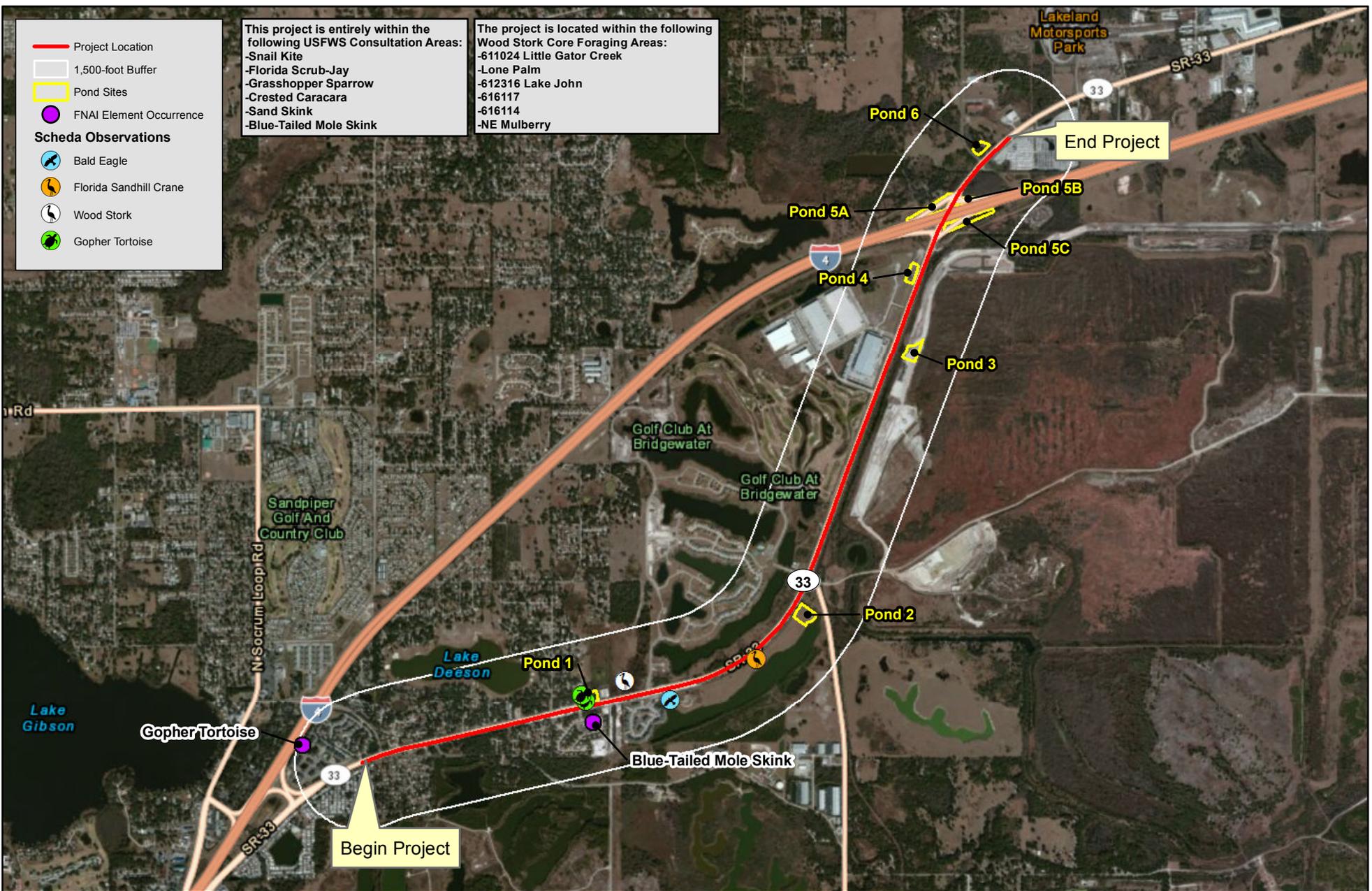
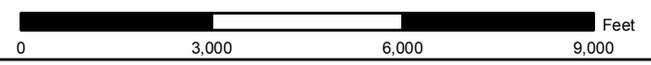


Figure 3 - Protected Species Occurrence Map

FPID #: 430185-1-22-01
 SR 33 from Old Combee Road to North of Tomkow Road
 Polk County, Florida



Data Source:

- Scheda Scientists
- Inwood Engineers
- FNAI

Imagery Source:

- 2010 ESRI

Coordinate System:

- NAD 1983 Florida State Plane West

Appendix 9

PSR CSER "Memo" Report

July 31, 2013

Inwood Consulting Engineers
3000 Dovera Drive, Suite 200
Oviedo, FL 32765

Attn: Mr. David Dangel, P.E.

**RE: Draft PSR CSER "Memo" Report – Proposed Ponds
SR 33 PD&E Study from Old Combee Road to North of Tomkow Road
Polk County, Florida
FPN: 430185-1-22-01
Tierra Project No.: 6511-12-026A**

Mr. Dangle:

Tierra, Inc. (Tierra) has performed a pond site Contamination Screening Evaluation Report (CSER) based on the proposed pond alternatives received in July 2013 for the project referenced above. The information presented is intended to provide a risk ranking of all proposed ponds to support the Pond Siting Report (PSR). The contamination screening evaluation presented herein is based on historical aerial photograph and topographic map reviews, governmental database reviews and site reconnaissance.

This "Memo" Report has been provided for use by Inwood Consulting Engineers, in anticipation of completion and submittal of the Draft PSR CSER to follow on August 9, 2013.

Should you have any questions, please contact us at (813) 989-1354.

Respectfully Submitted,

TIERRA, INC.



Clare E. Kramer, PG
Senior Scientist



Donald R. Polanis, PSSC, CGC
Chief Scientist

Executive Summary

Tierra, Inc. (Tierra) has prepared this pond site Contamination Screening Evaluation Report (CSER) for the project referenced above. The information presented is intended to provide a risk ranking of all proposed ponds to support the Pond Siting Report (PSR). The contamination screening evaluation presented herein is based on historical aerial photograph and topographic map reviews, governmental database reviews and site reconnaissance. The Proposed Pond Alternative locations are presented on a recent aerial photograph included in **Appendix A**.

The contamination screening evaluation has resulted in the following risk rankings for the proposed pond alternatives:

Proposed Pond Alternative	Risk Ranking	Comment
Pond 1	No	Undeveloped/Wooded
Pond 2	Medium	Pastureland, Reclaimed Phosphate Strip Mine
Pond 3	Medium	Partially Cleared Woodland, Reclaimed Phosphate Strip Mine
Pond 4	Medium	Pastureland, Reclaimed Phosphate Strip Mine
Pond 5A	Low	I-4 Infield Pond
Pond 5B	Low	I-4 Infield Pond
Pond 5C	Low	I-4 Infield Pond
Pond 6	No	Wooded/Pastureland

For sites ranked “No” or “Low”, no additional work is recommended at this time. Should a facility’s permitting or regulatory status change between now and the time acquisitions are initiated, additional screening should be conducted. For the preferred pond sites with risk rankings of “Medium” or “High”, Tierra recommends Level II field screening to determine if environmental impacts exist at the preferred pond sites.

Definitions, Acronyms, and Abbreviations

HAZARDOUS MATERIAL: Any material which has, or, when combined with other materials will have a deleterious effect on people or the environment. As further discussed and defined in Title 42 United States Code (USC), Section 9601, et seq.

HAZARDOUS WASTE: There are 80 pages in the Code of Federal Regulations (CFR) devoted to the definition and identification of Hazardous Waste. Briefly, the CFR defines hazardous waste as a solid waste (could be a liquid) that has not been excluded from regulation and meets the criteria as defined and discussed in Title 40, CFR, Part 261.3, et seq.

CONTAMINATION: The presence of any regulated material / chemical contained within the soil, surface water or groundwater on or adjacent to Department property, or proposed property, that may require assessment, remediation, or special handling, or that has a potential for liability. These materials would include, but not be limited to, those substances normally referred to as petroleum or petroleum products.

SIGNIFICANT CONTAMINATION: The presence of any contamination that would meet the definition of "hazardous materials" or "hazardous waste" and be regulated under CERCLA or RCRA. Petroleum contamination from underground storage tanks is not regulated by CERCLA or RCRA.

AST	Aboveground Storage Tank
BLS	Below Land Surface
CDV	Cattle Dip Vat
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
De minimis	Lacking significance or of minimum importance as to merit disregard
FDEP	Florida Department of Environmental Protection
EPA	United States Environmental Protection Agency
EROS	Earth Resource Observation and Science Center
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
GCTL	Groundwater Clean-up Target Levels
LUST	Leaking Underground Storage Tank
NADC	Natural Attenuation Default Concentrations
NEPA	National Environmental Policy Act
NFA	Notice of No Further Action
NGVD	National Geodetic Vertical Datum of 1929
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
PD&E	Project Development and Environment
RCRA	Resource Conservation and Recovery Act
ROW	Right-of-Way
SCS	Soil Conservation Service
SCTL	Soil Clean-up Target Levels
SRCO	Site Rehabilitation Completion Order
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UST	Underground Storage Tank

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Appendices

Appendix A Proposed Pond Alternatives Location Map

Pond 1

The proposed pond alternative is located north of SR 33 and east of Lake Luther Road in Lakeland, Florida. The specific location is shown in **Appendix A**. During site reconnaissance, the pond site was observed as undeveloped and wooded land. Site photographs are included in **Appendix B**.

Historical Land Use Summary

Historical aerial photographs dated 1941, 1949, 1952, 1960, 1968, 1971, 1977, 1980, 1993, 1994, 1999, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012 and 2013 were reviewed from University of Florida Map & Imagery Library (UF), USGS Earth Resources Observation and Science (EROS) Center, FDOT Survey & Mapping (FDOT) and Google Earth. A summary of our review is depicted in the table below. Copies of select aerial photographs are included in **Appendix C**.

Table 1		
Year	Comment	Source
1941 to 2013	Undeveloped/Woodland	UF, EROS, FDOT & Google Earth

The USGS 7.5-Minute "Lakeland, Florida" Quadrangle, published in 1994 and the "Providence, Florida" Quadrangle, published in 1975 (photorevised 1988) topographic maps were reviewed. Pond 1 is shaded green indicating undeveloped or wooded land. No structures are depicted. SR 33 is depicted to the south. A copy of the topographic map is included in **Appendix D**.

Regulatory Review

An environmental database search using FirstSearch Technology Corporation was conducted in March 2012, to identify sites onsite or within close proximity to the proposed pond alternatives containing documented or suspected petroleum contamination or other hazardous materials. The regulatory review of federal and state environmental records utilizes an integrated geographic information system database. The search was conducted as a preliminary screening tool to identify facilities that are registered with various county, state, and federal agencies. A copy of the Environmental FirstSearch™ Report is included in **Appendix E**. Supplemental regulatory documentation was reviewed from the EPA and FDEP online resources for additional information in July 2013.

No regulated sites were identified on or within close proximity to the proposed pond alternative.

Risk Ranking

Based on the historical use as undeveloped and wooded land, Pond 1 is given a potential risk ranking of "No".

Pond 2

The proposed pond alternative is located east of SR 33 and south of the intersection of SR 33 and Village Lakes Boulevard in Lakeland, Florida. The specific location is shown in **Appendix A**. During site reconnaissance, the pond site was observed as pastureland with a drainage ditch along the northern boundary and a man-made lake to the south. Site photographs are included in **Appendix B**.

Historical Land Use Summary

Historical aerial photographs dated 1941, 1949, 1952, 1960, 1968, 1971, 1977, 1980, 1993, 1994, 1999, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012 and 2013 were reviewed from University of Florida Map & Imagery Library (UF), USGS Earth Resources Observation and Science (EROS) Center, FDOT Survey & Mapping (FDOT) and Google Earth. A summary of our review is depicted in the table below. Copies of select aerial photographs are included in **Appendix C**.

Table 2		
Year	Comment	Source
1941 to 1960	Undeveloped/Pastureland/Woodland	UF, EROS & FDOT
1968 to 1971	Disturbed land surface/Earthmoving activities	FDOT
1977 to 2013	Pastureland	FDOT & Google Earth

The USGS 7.5-Minute “Lakeland, Florida” Quadrangle, published in 1994 and the “Providence, Florida” Quadrangle, published in 1975 (photorevised 1988) topographic maps were reviewed. Pond 2 is shaded white indicating undeveloped or vacant land. No structures are depicted. SR 33 is depicted to the west and a lake is depicted adjacent to the southeast. A copy of the topographic map is included in **Appendix D**.

Regulatory Review

No regulated sites were identified on or within close proximity to the proposed pond alternative.

The former Saddle Creek Phosphate Mine was located adjacent to the northeast and east of Pond 2. Disturbed land surfaces on peripheral properties to the strip mining operation were a result of earthmoving activities in the 1960s and 1970s. Although, there are no regulated facilities identified in the vicinity of this pond site, there exists the possibility that undesirable fill material was used as backfill during reclamation activities in this area.

Historically, the benefaction process used many types of chemical reagents, in addition to physical techniques, to separate out the phosphate. The sludge or tailings (including any used chemicals or petroleum-based reagents) were often pumped back into the excavations. It was not routine to perform direct sampling or laboratory analysis on the waste material. Therefore, there is the potential for petroleum hydrocarbon contaminants to exist in the soils and groundwater at former mining facilities.

Risk Ranking

Based on the historical use as pastureland and disturbed land surface at periphery of adjacent strip mine, Pond 2 is given a potential risk ranking of “Medium”.

Pond 3

The proposed pond alternative is located east of SR 33 and south of the intersection of SR 33 and University Boulevard in Lakeland, Florida. The specific location is shown in **Appendix A**. During site reconnaissance, the pond site was observed as partially cleared grass land with a drainage ditch along the western boundary. Site photographs are included in **Appendix B**.

Historical Land Use Summary

Historical aerial photographs dated 1941, 1949, 1952, 1960, 1968, 1971, 1977, 1980, 1993, 1994, 1999, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012 and 2013 were reviewed from University of Florida Map & Imagery Library (UF), USGS Earth Resources Observation and Science (EROS) Center, FDOT Survey & Mapping (FDOT) and Google Earth. A summary of our review is depicted in the table below. Copies of select aerial photographs are included in **Appendix C**.

Table 3		
Year	Comment	Source
1941 to 1952	Undeveloped/Pastureland	UF & EROS
1960 to 1971	Mining/Earthmoving activities, drainage ditch appears along the western pond boundary and SR 33	FDOT
1977 to 2013	Various stages of vegetative regrowth and land clearing, drainage ditch appears along the western pond boundary and SR 33	FDOT & Google Earth

The USGS 7.5-Minute “Lakeland, Florida” Quadrangle, published in 1994 and the “Providence, Florida” Quadrangle, published in 1975 (photorevised 1988) topographic maps were reviewed. Pond 3 is shaded mottled-pink indicating a reclaimed strip mine. A linear water body followed by SR 33 is apparent along the western pond boundary. No structures are depicted. A copy of the topographic map is included in **Appendix D**.

Regulatory Review

No regulated sites were identified on or within close proximity to the proposed pond alternative.

The former Saddle Creek Phosphate Mine was located on and surrounding this proposed pond alternative. Disturbed land surfaces due to the strip mining operation were a result of earthmoving activities in the 1960s and 1970s. Although, there are no regulated facilities identified in the vicinity of this pond site, there exists the possibility that undesirable fill material was used as backfill during reclamation activities in this area.

Historically, the benefaction process used many types of chemical reagents, in addition to physical techniques, to separate out the phosphate. The sludge or tailings (including any used chemicals or petroleum-based reagents) were often pumped back into the excavations. It was not routine to perform direct sampling or laboratory analysis on the waste material. Therefore, there is the potential for petroleum hydrocarbon contaminants to exist in the soils and groundwater at former mining facilities.

Risk Ranking

Based on the land use of Pond 3 as a reclaimed phosphate strip mine, it is given a potential risk ranking of “Medium”.

Pond 4

The proposed pond alternative is located west of SR 33 and south of I-4 in Lakeland, Florida. The specific location is shown in **Appendix A**. During site reconnaissance, the pond site was observed as cleared and vacant land. Site photographs are included in **Appendix B**.

Historical Land Use Summary

Historical aerial photographs dated 1941, 1949, 1952, 1960, 1968, 1971, 1977, 1980, 1993, 1994, 1999, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012 and 2013 were reviewed from University of Florida Map & Imagery Library (UF), USGS Earth Resources Observation and Science (EROS) Center, FDOT Survey & Mapping (FDOT) and Google Earth. A summary of our review is depicted in the table below. Copies of select aerial photographs are included in **Appendix C**.

Table 4		
Year	Comment	Source
1941 to 1952	Undeveloped/Pastureland	UF & EROS
1960 to 1980	Mining/Earthmoving activities	FDOT
1993 to 1999	Pastureland	FDOT & Google Earth
2004 to 2013	Various stages of vegetative regrowth and land clearing	FDOT & Google Earth

The USGS 7.5-Minute “Lakeland, Florida” Quadrangle, published in 1994 and the “Providence, Florida” Quadrangle, published in 1975 (photorevised 1988) topographic maps were reviewed. Pond 4 is shaded mottled-pink indicating a reclaimed strip mine. No structures are depicted. SR 33 is depicted to the east. A copy of the topographic map is included in **Appendix D**.

Regulatory Review

No regulated sites were identified on or within close proximity to the proposed pond alternative.

The former Saddle Creek Phosphate Mine was located on and surrounding this proposed pond alternative. Disturbed land surfaces due to the strip mining operation were a result of earthmoving activities in the 1960s and 1970s. Although, there are no regulated facilities identified in the vicinity of this pond site, there exists the possibility that undesirable fill material was used as backfill during reclamation activities in this area.

Historically, the benefaction process used many types of chemical reagents, in addition to physical techniques, to separate out the phosphate. The sludge or tailings (including any used chemicals or petroleum-based reagents) were often pumped back into the excavations. It was not routine to perform direct sampling or laboratory analysis on the waste material. Therefore, there is the potential for petroleum hydrocarbon contaminants to exist in the soils and groundwater at former mining facilities.

Risk Ranking

Based on the land use of Pond 4 as a reclaimed phosphate strip mine, it is given a potential risk ranking of “Medium”.

Ponds 5A, 5B and 5C

The proposed pond alternatives are located at the intersection of SR 33 and I-4 in Lakeland, Florida. The specific locations are shown in **Appendix A**. During site reconnaissance, the pond sites were observed as grass covered existing infield pond locations and entrance/exit ramps to I-4 and SR 33. Site photographs are included in **Appendix B**.

Historical Land Use Summary

Historical aerial photographs dated 1941, 1949, 1952, 1960, 1968, 1971, 1977, 1980, 1993, 1994, 1999, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012 and 2013 were reviewed from University of Florida Map & Imagery Library (UF), USGS Earth Resources Observation and Science (EROS) Center, FDOT Survey & Mapping (FDOT) and Google Earth. A summary of our review is depicted in the table below. Copies of select aerial photographs are included in **Appendix C**.

Table 5		
Year	Comment	Source
1941 to 1960	Undeveloped/Pastureland/Woodland	UF, EROS & FDOT
1968 to 2013	I-4 and SR 33 Intersection and Infield Ponds	FDOT & Google Earth

The USGS 7.5-Minute “Lakeland, Florida” Quadrangle, published in 1994 and the “Providence, Florida” Quadrangle, published in 1975 (photorevised 1988) topographic maps were reviewed. Ponds 5A, 5B and 5C are shaded white indicating undeveloped or vacant land. No structures are depicted on the pond sites. SR 33 and I-4 are depicted. A copy of the topographic map is included in **Appendix D**.

Regulatory Review

No regulated sites were identified on or within close proximity to the proposed pond alternative.

Disturbed land surfaces on peripheral properties to the strip mining operation were a result of earthmoving activities in the 1960s and 1970s. Although, there are no regulated facilities identified in the vicinity of this pond site, there exists the possibility that undesirable fill material was used as backfill during reclamation activities in this area. However, with construction of I-4 in the 1960s it is probable that any undesirable fill materials were removed prior to construction.

Risk Ranking

Based on the historical use as undeveloped and wooded land, Pond 5A, Pond 5B and Pond 5C, are given potential risk rankings of “Low”.

Pond 6

The proposed pond alternative is located west of SR 33 and north of Tomkow Road in Lakeland, Florida. The specific location is shown in **Appendix A**. During site reconnaissance, the pond site was observed as undeveloped and wooded land. Site photographs are included in **Appendix B**.

Historical Land Use Summary

Historical aerial photographs dated 1941, 1949, 1952, 1960, 1968, 1971, 1977, 1980, 1993, 1994, 1999, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012 and 2013 were reviewed from University of Florida Map & Imagery Library (UF), USGS Earth Resources Observation and Science (EROS) Center, FDOT Survey & Mapping (FDOT) and Google Earth. A summary of our review is depicted in the table below. Copies of select aerial photographs are included in **Appendix C**.

Table 6		
Year	Comment	Source
1941 to 1960	Undeveloped/Pastureland	UF, EROS & FDOT
1968 to 1971	Disturbed land surface is apparent	FDOT
1977 to 2013	Pastureland/Woodland	FDOT & Google Earth

The USGS 7.5-Minute “Lakeland, Florida” Quadrangle, published in 1994 and the “Providence, Florida” Quadrangle, published in 1975 (photorevised 1988) topographic maps were reviewed. Pond 6 is shaded white indicating undeveloped or vacant land. No structures are depicted. SR 33 is depicted to the south. A copy of the topographic map is included in **Appendix D**.

Regulatory Review

No regulated sites were identified on the proposed pond alternative.

One regulated site was identified on non-adjointing property, approximately 150 feet to the south across SR 33. One storage tank is registered to an FDOT facility, listed as ‘closed”, at HWY 33 N OF HWY 400. No records of discharge, release, violations or enforcement actions were identified and the tank location was not observed during site reconnaissance. Based on this information and the separation distance to the pond alternative, the former presence of a storage tank is not considered to be a potential contamination concern.

Risk Ranking

Based on the historical use as undeveloped and wooded land, Pond 6 is given a potential risk ranking of “No”.

Risk Ranking Summary

Proposed Pond Alternative	Risk Ranking	Comment
Pond 1	No	Undeveloped/Wooded
Pond 2	Medium	Pastureland, Reclaimed Phosphate Strip Mine
Pond 3	Medium	Partially Cleared Woodland, Reclaimed Phosphate Strip Mine
Pond 4	Medium	Pastureland, Reclaimed Phosphate Strip Mine
Pond 5A	Low	I-4 Infield Pond
Pond 5B	Low	I-4 Infield Pond
Pond 5C	Low	I-4 Infield Pond
Pond 6	No	Wooded/Pastureland

For sites ranked “No” or “Low”, no additional work is recommended at this time. Should a facility’s permitting or regulatory status change between now and the time acquisitions are initiated, additional screening should be conducted. For the preferred pond sites with risk rankings of “Medium” or “High”, Tierra recommends Level II field screening to determine if environmental impacts exist at the preferred pond sites. Regardless of the risk ranking, all ponds sites selected for final design will require Level II field screening. The field screening scope of work should include, at a minimum, soil borings to the proposed depth of the pond and soil sampling for total arsenic. Additional sample analyses may be required based on historical land use of the pond site and surrounding properties. The District Contamination Impact Coordinator should be consulted regarding the field screening scope of work for all final pond sites.

Appendix A

Proposed Pond Alternatives Location Map



SOURCE: FDOT SURVEY AND MAPPING DATED 2011

POND ALTERNATIVES LOCATION MAP



DRAWN BY:

BJS

CHECKED BY:

CEK

APPROVED BY:

DRP

DATE:

JULY 2013

FPN/FPID: 430185-1-22-01



TIERRA

7351 Temple Terrace Highway
Tampa, Florida 33637
Phone: 813-989-1354 Fax: 813-989-1355
FL Cert. No.: 6486

SCALE:

NOTED

PROJECT NUMBER:

6511-12-026A

SR 33 PD&E STUDY
FROM OLD CROMBEE ROAD TO TOMKOW ROAD
POLK COUNTY, FLORIDA

FIGURE A

Appendix 10

Geotechnical Memorandum

August 12, 2013

Inwood Consulting Engineers
3000 Dovera Drive, Suite 200
Oviedo, FL 32765

Attn: David S. Dangel, P.E.
Associate Principle

**RE: SR 33 PD&E Study
From Old Combee Road to North of Tomkow Road
Polk County, Florida
FPID No. 430185-1-22-01
Tierra Project No. 6511-12-026**

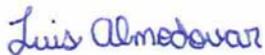
Mr. Dangel:

Tierra, Inc. (Tierra) has completed a Geotechnical Memorandum Report to support the PD&E Study for the above referenced project. The results of our review of available existing soils information and our preliminary field exploration program along with preliminary geotechnical recommendations are presented in this report.

Tierra, Inc. appreciates the opportunity to be of service to Inwood Consulting Engineers and the Florida Department of Transportation on this project. If you have any questions or comments regarding this information, please contact our office at (813) 989-1354.

Sincerely,

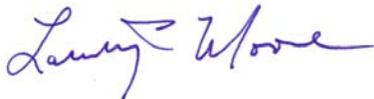
TIERRA, INC.



Luis (Tony) Almodovar, E.I.
Geotechnical Engineer Intern



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APPENDIX A

Project Location Map Figure 1-1
NRCS Soil Survey Map Figure 1
USGS Vicinity Map Figure 2
Roadway Soil Survey Sheet 1 Sheet
Boring Location Plan Sheets 6 Sheets
Roadway Soil Profiles Sheets 1 Sheet

APPENDIX B

Summary of Seasonal High Groundwater Table Estimates for Roadway
Summary of Laboratory Classification Test Results

1.1 PROJECT DESCRIPTION

The Florida Department of Transportation, District One, is conducting a Project Development and Environmental (PD&E) Study regarding the proposed widening of State Road (SR) 33 in Polk County. The limits of this project on SR 33 are from Old Combee Road to north of Tomkow Road, which is a distance of approximately 4.3 miles. The location and limits of this study are shown in the project location map as **Figure 1-1** in **Appendix A**.

The recommended action includes capacity improvements consisting of widening SR 33 from a two-lane undivided roadway to a four-lane divided roadway. Reconstruction of the SR 33 interchange with I-4 is also proposed. The interchange improvements will involve replacing the I-4 bridges over SR 33 and reconstructing portions of I-4 approaching the interchange.

1.2 PROJECT PURPOSE AND NEED

SR 33 serves as a primary north-south connection between Lakeland and Interstate 4 (I-4). The project will improve the functional viability of SR 33 as a local regional travel alternative to I-4. SR 33 provides connectivity to University Boulevard which serves the planned Williams DRI, Polk Commerce Center DRI and the future Florida Polytechnic campus. University Boulevard and SR 33 will serve as the most direct link between these new residential and commercial centers and north and central Lakeland. The project provides increased capacity along SR 33 to meet the project future travel demand.

Improvements to the SR 33 interchange with I-4 are also required. Currently, I-4 crosses over SR 33 with two parallel, three lane bridges. There are deficiencies with the existing interchange. First, the existing vertical clearance over SR 33 does not meet the minimum required 16.5 feet of clearance and is as low as 14.9 feet. Maintaining this substandard vertical clearance would require the approval of a design exception which will not be approved by the Federal Highway Administration. Second, the pier footings have less than the minimum required depth of cover of three feet with cover depths as shallow as 1.892 feet. The horizontal clearance between the center pier and the intermediate piers will not accommodate the future four lane roadway. Finally, the existing k-values for the crest and sag vertical curves on I-4 approaching SR 33 are appropriate for 55 miles per hour (mph) and 60 mph design speeds, not for the 70 mph design speed required for the interstate.

1.3 TYPICAL SECTION ALTERNATIVES

The proposed roadway typical section for this project is a suburban typical section that would include two 12-foot travel lanes in each direction separated by a 30-foot median. The proposed improvements also include a four-foot inside paved shoulder and a five-foot outside paved shoulder in each direction. An open drainage system will collect stormwater runoff and convey it to off-site ponds and/or linear ponds. A 10-foot-wide multi-use path is proposed along the south side of the road between SR 659 (Combee Road) and University Boulevard. A five-foot sidewalk is planned along the north side of the road from University Boulevard to north of Tomkow Road. This typical section can be constructed within the existing 200 feet right-of-way. The design speed for this typical section is 55 mph. Two variations of this typical section are being considered. These include full reconstruction of the roadway and a concept to save the existing roadway to serve as half of the future four-lane roadway.

Section 2.0

PROJECT PURPOSE AND SCOPE OF SERVICES

The geotechnical PD&E study was performed to obtain information on the existing subsurface conditions along the roadway alignment to assist in the preparation of the PD&E Report for the project. The following services were provided:

- Reviewed published information on topographic, soils and groundwater conditions. Soil, groundwater and regional geology information was obtained from the Web Soil Survey of Polk County, Florida published by the United States Department of Agriculture (USDA) – Natural Resource Conservation Service (NRCS). Topographic information was obtained from “Lakeland, Florida” and “Providence, Florida” Quadrangle maps published by United States Geological Survey (USGS).
- Conducted a visual reconnaissance of the project site, located and coordinated utility clearance.
- The geotechnical services were performed in general accordance with FDOT guidelines and the project scope of services.
- Performed a preliminary geotechnical field study for the proposed roadway consisting of hand auger borings and subsurface sampling. A total of thirteen (13) hand auger borings were performed along the project alignment to depths of approximately 5 to 9.5 feet below the existing ground surface.
- Visually examined the recovered soil samples in the laboratory. Performed laboratory tests on selected representative samples to develop the soil legend for the project using the American Association of State Highway and Transportation Officials (AASHTO) Soil Classification System.
- Prepared this Geotechnical Memorandum Report summarizing the course of study pursued for the PD&E Corridor Study.

Section 3.0
REVIEW OF AVAILABLE DATA

3.1 REGIONAL GEOLOGY

The following information is as presented in the Soil Survey of Polk County, Florida published by the USDA/SCS.

The surface and near surface sediments in Polk County consist of quartz sand, clay, phosphorite, limestone and dolomite. These sediments range in age from late Eocene age to Holocene age. The Eocene Series consists of the Oldsmar, Avon Park, and Ocala Group limestones. Essentially all of Polk County is underlain by limestone of the Ocala Group. The Suwannee limestone is throughout the western part of Polk County but does not extend to the northern and eastern parts because of the erosion on the flanks of the Ocala uplift. Above the Suwannee Limestone and the Ocala Group is the Hawthorn Group, which consists of the Arcadia Formation and the Peace River formation. Above the Hawthorn Group are the undifferentiated surficial sand, clayey sand and clay, which blanket essentially all of Polk County.

3.2 USGS TOPOGRAPHIC SURVEY

The USGS topographic survey maps titled “Lakeland, Florida” and “Providence, Florida” were reviewed. The natural ground surface elevations appear to be within a range of about +130 to +150 feet National Geodetic Vertical Datum of 1929 (NGVD29). A reproduction of the USGS maps is presented on **Figure 2** in **Appendix A**.

3.3 USDA SOIL SURVEY

Based on a review of the Soil Survey for Polk County published by the USDA NRCS, it appears that there are seventeen primary (17) soil-mapping units noted along the project corridor. The general soil descriptions as described in the Soil Survey are presented in the table below.

SUMMARY OF USDA SOIL SURVEY POLK COUNTY, FLORIDA									
USDA Map Symbol and Soil Name	Depth (in)	Soil Classification		Permeability (in/hr)	pH	Seasonal High Water Table		Risk of Corrosion	
		USCS	AASHTO			Depth (feet)	Months	Uncoated Steel	Concrete
(3) Candler Sand	0-6	SP, SP-SM	A-3	6.0 - 20.0	4.5-6.0	>6.0	Jan-Dec	Low	High
	6-63	SP, SP-SM	A-3	6.0 - 20.0	4.5-6.0				
	63-80	SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.0				
(6) Eaton Mucky Fine Sand, Depressional	0-6	SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.0	+2.0-0	June-Feb	High	High
	6-29	SM, SP-SM	A-2-4, A-3	6.0 - 20.0	4.5-6.0				
	29-33	SC	A-4, A-6, A-7	0.06 - 0.2	4.5-6.0				
	33-80	CH, CL, SC	A-7	0.06 - 0.2	4.5-6.0				

**SUMMARY OF USDA SOIL SURVEY
POLK COUNTY, FLORIDA**

USDA Map Symbol and Soil Name	Depth (in)	Soil Classification		Permeability (in/hr)	pH	Seasonal High Water Table		Risk of Corrosion	
		USCS	AASHTO			Depth (feet)	Months	Uncoated Steel	Concrete
(7) Pomona Fine Sand	0-6	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-6.0	0.0-1.5	June-Oct	High	High
	6-21	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-6.0				
	21-26	SM, SP-SM	A-2-4, A-3	0.6 - 6.0	3.5-6.0				
	26-48	SP, SP-SM	A-2-4, A-3	2.0 - 20.0	3.5-6.0				
	48-73	SC, SP-SM, SM	A-2, A-4, A-6	0.2 - 2.0	3.5-6.0				
	73-80	SM, SP-SM	A-2-4, A-3	0.6 - 6.0	3.5-6.0				
(8) Hydraquents, Clayey	0-80	CH	A-7	0.001 - 0.06	7.9-8.4	+2.0-0.0	Jan-Dec	High	Low
(9) Lynne Sand	0-5	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.5	0.0-1.5	June-Oct	High	High
	5-21	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.5				
	21-28	SM, SP-SM	A-2-4, A-3	0.6 - 2.0	3.5-6.5				
	28-33	SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-6.5				
	33-80	CH, CL, SC	A-6, A-7	0.2 - 2.0	3.5-6.5				
(12) Neilhurst Sand	0-3	SP, SP-SM	A-2-4, A-3	20.0 - 50.0	5.1-6.5	>6.0	Jan-Dec	Low	High
	3-80	SP, SP-SM	A-2-4, A-3	20.0 - 50.0	5.1-6.5				
(15) Tavares Fine Sand	0-8	SP, SP-SM	A-3	6.0 - 50.0	3.5-6.0	3.5->6.0	June-Dec	Low	High
	8-80	SP, SP-SM	A-3	6.0 - 50.0	3.5-6.0				
(17) Symrna and Myakka Fine Sands	0-7	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.5	0.5-1.5	June-Oct	High	High
	7-25	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.5				
	25-36	SM, SP-SM	A-2-4, A-3	0.6 - 6.0	3.5-6.5				
	36-80	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.5				
	0-4	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-7.3	0.0-1.5	June-Dec	High	High
	4-12	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-7.3				
	12-25	SM, SP-SM	A-2-4, A-3	0.6 - 6.0	3.5-7.3				
	25-42	SP, SP-SM	A-3	6.0 - 20.0	3.5-7.3				
	42-48	SM, SP-SM	A-2-4, A-3	0.6 - 6.0	3.5-7.3				
48-80	SM, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-7.3					
(22) Pomello Fine Sand	0-5	SP, SP-SM	A-3	20.0 - 50.0	4.5-6.0	2.0-3.5	July-Nov	Low	High
	5-48	SP, SP-SM	A-3	20.0 - 50.0	4.5-6.0				
	48-63	SM, SP-SM	A-2-4, A-3	2.0 - 6.0	4.5-6.0				
	63-80	SP, SP-SM	A-3	6.0 - 20.0	4.5-6.0				
(25) Placid and Myakka Fine Sands, Depressional	0-18	SM, SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-5.5	+2.0-0.0	Jan-Dec	High	High
	18-80	SM, SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-5.5				
	0-3	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.5				
	3-25	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.5	+2.0-0.0	Jan-Dec	High	High
	25-35	SM, SP-SM	A-2-4, A-3	0.6 - 6.0	3.5-6.5				
	35-80	SP, SP-SM	A-3	6.0 - 20.0	3.5-6.5				

**SUMMARY OF USDA SOIL SURVEY
POLK COUNTY, FLORIDA**

USDA Map Symbol and Soil Name	Depth (in)	Soil Classification		Permeability (in/hr)	pH	Seasonal High Water Table		Risk of Corrosion	
		USCS	AASHTO			Depth (feet)	Months	Uncoated Steel	Concrete
(29) St. Lucie Fine Sand	0-3	SP	A-3	20.0 - 50.0	3.5-7.3	>6.0	Jan-Dec	Low	Moderate
	3-80	SP	A-3	20.0 - 50.0	3.5-7.3				
(35) Hontoon Muck	0-75	PT	A-8	6.0 - 20.0	2.0-4.4	+2.0-0.0	Jan-Dec	High	High
	75-80	SM, SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.3-5.5				
(36) Basinger Mucky Fine Sand, Depressional	0-7	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-7.6	+2.0-0.0	June-Feb	High	Moderate
	7-35	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-7.6				
	35-45	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-7.6				
	45-80	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-7.6				
(51) Pomona Urban land complex	0-6	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-5.5	0.0 - 1.5	June-Oct	High	High
	6-21	SP, SP-SM	A-2-4, A-3	6.0 - 20.0	3.5-5.5				
	21-26	SM, SP-SM	A-2-4, A-3	0.6 - 6.0	3.5-5.5				
	26-48	SP, SP-SM	A-2-4, A-3	2.0 - 20.0	3.5-6.0				
	48-73	SC, SC-SM, SM	A-2, A-4, A-6	0.2 - 2.0	3.5-5.5				
(54) Pomello Urban land complex	0-5	SP, SP-SM	A-3	20.0 - 50.0	4.5-6.0	2.0 - 3.5	July-Nov	Low	High
	5-48	SP, SP-SM	A-3	20.0 - 50.0	4.5-6.0				
	48-63	SM, SP-SM	A-2-4, A-3	2.0 - 6.0	4.5-6.0				
	63-80	SP, SP-SM	A-3	6.0 - 20.0	4.5-6.0				
(68) Arents	-	-	-	-	-	-	-	-	-
(99) Water	-	-	-	-	-	-	-	-	-

Section 4.0
SUBSURFACE EXPLORATION

4.1 BORING LOCATION PLAN, UTILITY CLEARANCE AND TRAFFIC CONTROL

The boring location plan was generated based on our engineering judgment and discussions with project personnel. Generally, the borings were located in the field using hand-held Global Positioning System (GPS) equipment at the time of the field activities and the location of each boring was staked. Generally, the borings were performed at the proposed boring locations. When not possible, due to access or utility constraints, the boring locations were altered and the relocated GPS coordinates were recorded on the field boring logs.

Utility clearances were coordinated by Tierra and updated as required prior to performing the soil borings in order to reduce the potential for damage to the underground utilities during the boring process. Subsurface explorations were performed in general compliance with the applicable FDOT Roadway and Traffic Design Standard Indices.

4.2 ROADWAY BORINGS

To evaluate the subsurface conditions along the proposed project alignment, a total of thirteen (13) hand auger borings were performed to depths of approximately 5 to 9.5 feet below the existing ground surface. The hand auger borings were performed by manually twisting and advancing a bucket auger into the ground, typically in 4 to 6 inch increments. As each soil type was revealed, representative soil samples were placed in air-tight containers and returned to our office for confirmation of the field classification by a geotechnical engineer.

The GPS coordinates recorded in the field at the time of drilling along with the soil profile of each boring performed are shown on the **Roadway Soil Profiles Sheets** in **Appendix A**.

5.1 GENERAL

Representative soil samples collected from the borings were classified and stratified in general accordance with the AASHTO Soil Classification System. Our classification was based on visual observations using the results from the laboratory testing as confirmation. These tests included grain-size analyses, organic content, Atterberg Limits and natural moisture content determination.

5.2 TEST DESIGNATION

The following list summarizes the laboratory tests performed and respective test methods.

- Grain-Size Analyses. The grain-size analyses were conducted in general accordance with the AASHTO test designation T-088 (ASTM test designation D-422).
- Atterberg Limits - The liquid limit and the plastic limit tests ("Atterberg Limits") were conducted in general accordance with the AASHTO test designations T-089 and T-090, respectively (ASTM test designation D-4318).
- Organic Content - The organic content test consists of determining the percentage of organics in selected samples in general accordance with the AASHTO test designation T-267 (ASTM test designation D-2974).
- Natural Moisture Content - The laboratory moisture content test consists of determining the percentage of moisture in selected samples in general accordance with the AASHTO test designation T-265 (ASTM test designation D-2216).

A summary of the laboratory test results for each soil stratum is presented on the **Roadway Soils Survey Sheet** in **Appendix A**. This sheet includes ranges of laboratory test results for different stratum soil samples collected from borings included in this report. A detailed summary of the laboratory tests with the corresponding results is also presented in **Appendix B**.

Section 6.0
RESULTS OF SUBSURFACE EXPLORATION

6.1 GENERAL SOIL CONDITION

The soil types encountered during exploration have been assigned a stratum number. The stratum numbers and soil types associated with this project are listed in the following table.

Stratum Number	Typical Soil Description	AASHTO Classification
1	Pale Brown to Gray SAND to SAND with SILT	A-3
2	Gray to Brown Silty to Clayey SAND	A-2-4/A-2-6
3	Dark Brown Slightly Organic Silty SAND	A-2-4/A-8
4	Brown to Gray Brown Clayey SAND to Sandy CLAY	A-2-6/A-6
5	Light Gray to Dark Brown Fine SAND with SILT to Silty SAND with CLAY Nodules, Cemented SAND, Limerock Fragments and Rocks, (FILL)	A-3/A-2-4

A geotechnical engineer bases soil stratification on a visual review of the recovered samples, laboratory testing and interpretation of the field boring logs. The boring stratification lines represent the approximate boundaries between soil types of significantly different engineering properties; however, the actual transition may be gradual. In some cases, small variations in properties not considered pertinent to our engineering evaluation may have been abbreviated or omitted for clarity. The boring profiles represent the conditions at the particular boring location and variations do occur among the borings.

The results of the borings performed for this project along with the boring location plans are presented on the **Roadway Soil Profiles Sheet** in **Appendix A** of this report.

6.2 GROUNDWATER

The groundwater table, when encountered, was measured at the boring locations during our field exploration. The depths to the encountered groundwater table at the roadway boring locations along the project alignment were found to range from 2.5 to 6 feet below the existing ground surface. As an exception, groundwater was not encountered at Borings SH-1 and AB-3 within the boring termination depths. The groundwater table measured at each of the boring locations is presented on the **Roadway Soil Profiles Sheet** in **Appendix A**.

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences (i.e. existing water management canals, swales, drainage ponds, underdrains and areas of covered soils, such as paved parking lots and sidewalks).

Section 7.0
PRELIMINARY ENGINEERING EVALUATIONS AND
RECOMMENDATIONS

7.1 GENERAL

In general, the existing shallow subsurface soils encountered in the borings performed are suitable for supporting the proposed roadway construction after proper subgrade preparation. If buried organic soils, debris or unsuitable fills are encountered during construction, they should be removed and replaced with clean, compacted, sandy (SELECT) soils in accordance with the FDOT Standard Indices 500 and 505.

Similarly, plastic soils encountered within the embankment section should be removed and placed in areas not affecting pavement performance. The removal of top-soils and other surficial organic soils should be accomplished in accordance with the FDOT Standard Indices 500 and 505. Site preparation should consist of normal clearing and grubbing followed by compaction of subgrade soils. Backfill should consist of materials conforming to FDOT Standard Index 505 and compacted in accordance with Section 120-9 of the FDOT Standard Specifications for Road and Bridge Construction (SSRBC), latest edition.

7.2 ORGANIC SOILS

Muck (A-8)/Organic soils should be expected to occur on both sides of the alignment to the north side of the SR 33 and I-4 interchange. Based on the Polk County soil survey, muck depths could be expected to be approximately 75 inches below the natural ground surface at the following Soil Unit.

- Hontoon Muck (Unit 35)

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.

7.3 NEAR SURFACE CLAYEY SOILS

Near-surface, plastic/clayey soils (A-2-6, A-6 and A-7) were noted within 36 inches of the natural ground surface in several areas along the project. The following soil mapping units noted plastic/clayey soils within 36 inches:

- Eaton Mucky Fine Sand, Depressional (Unit 6)
- Hydraquents, Clayey (Unit 8)
- Lynne Sand (Unit 9)

Construction of the roadway within areas of clayey soils will require removal and embankment utilization in accordance with FDOT Index 500 and 505.

7.4 MINE SPOILS

The USDA Soil Survey identified four soil mapping units along the project corridor which are indicative of mine spoil soils resulting from past phosphate mining operations. The following soil mapping unit is associated with mine spoil waste consisting of phosphatic clay:

- Hydraquents, Clayey (Unit 8)

The following soil mapping units are typically associated with mine spoils consisting of sandy mine spoil and unidentified mine spoil:

- Neilhurst Sand, 1 to 5 Percent Slopes (Unit 12)
- Arents, 0 to 5 Percent Slopes (Unit 68)

The landform numbered 99 includes areas with water at the ground surface. Many of the water features in the project area are past mine cuts associated with phosphate mining that occurred in the project area.

The mine spoils are identified for a portion of the alignment extending from the south side of the SR 33/I-4 interchange heading south for approximately 2.2 miles on both sides of the alignment. Mine spoil soils with waste phosphatic clay can be very soft, weak and compressible. These soils can also be expected to have 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 ground improvements. During the project design, detailed design level delineation will be required as part of the design-level geotechnical services for the areas of the project that will encroach upon the mined land.

7.5 ESTIMATED SEASONAL HIGH GROUNDWATER

Seasonal high groundwater table levels were estimated at the boring locations along the roadway alignment. The estimated seasonal high groundwater table (SHGWT) levels ranged from above the ground surface to greater than 6 feet below the existing ground surface. Estimated Seasonal High Groundwater (SHGWT) levels along the proposed roadway alignment are summarized in **Appendix B**.

Roadway base to groundwater clearance will need to be evaluated. In several areas of the project alignment the existing SHGWT is above grade in natural areas. The SHWGT at these locations will have to be established by the project biologist utilizing biological indicators.

The SHGWT level was estimated based on a review of the soil samples, measured groundwater levels in the borings, the Polk County, Florida USDA Soil Survey information and the surrounding topography.

7.6 EMBANKMENT SETTLEMENT

As the project progresses to the design phase, and cross-sections are established, settlement analyses should be performed, if necessary, for representative critical embankment heights.

7.7 SLOPE STABILITY

As the project progresses to the design phase, and cross-sections are established, slope stability analyses should be performed for representative critical slopes.

7.8 CUT AND FILL SLOPES

It is anticipated that fills will be required for the proposed roadway construction. Fills heights are not known at this time. Once this information becomes available, slope stability construction recommendations should be completed during the project design.

7.9 TEMPORARY SIDE SLOPES

Side slopes for temporary excavations above the water table may stand near 1H:1.5V for short dry periods of time; however, it is recommended that temporary excavations below a 4-foot depth be cut on slopes of 2H:1V or flatter. Where restrictions will not permit slopes to be laid back as recommended above, the excavation should be shored in accordance with OSHA requirements. Furthermore, open-cut excavations exceeding 10 feet in depth should be properly dewatered and sloped 2H:1V or flatter or be benched using a bracing plan approved by a professional engineer licensed in the State of Florida. Excavated materials should not be stockpiled at the top of the slope within a horizontal distance equal to the excavation depth.

7.10 GROUNDWATER CONTROL

As the project progresses to the design phase, profile and grade lines should be established to meet the base to seasonal high groundwater clearance requirements as presented in the current FDOT Plans Preparation Manual (PPM).

7.11 PAVEMENT DESIGN CONSIDERATIONS

It is recommended that the subgrade soils be stabilized in accordance with the FDOT Design and Construction Specifications. It is likely that the amount of stabilizing material required will vary depending on the embankment fill borrow sources.

In accordance with FDOT guidelines, grades for this type of roadway should be set to provide a minimum separation per FDOT, 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. 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.

7.12 GENERAL ROADWAY CONSTRUCTION

The overall site preparation and mechanical densification work for the construction of the proposed roadway should be in accordance with the FDOT SSRBC and Standard Index requirements.

Section 8.0

REPORT LIMITATIONS

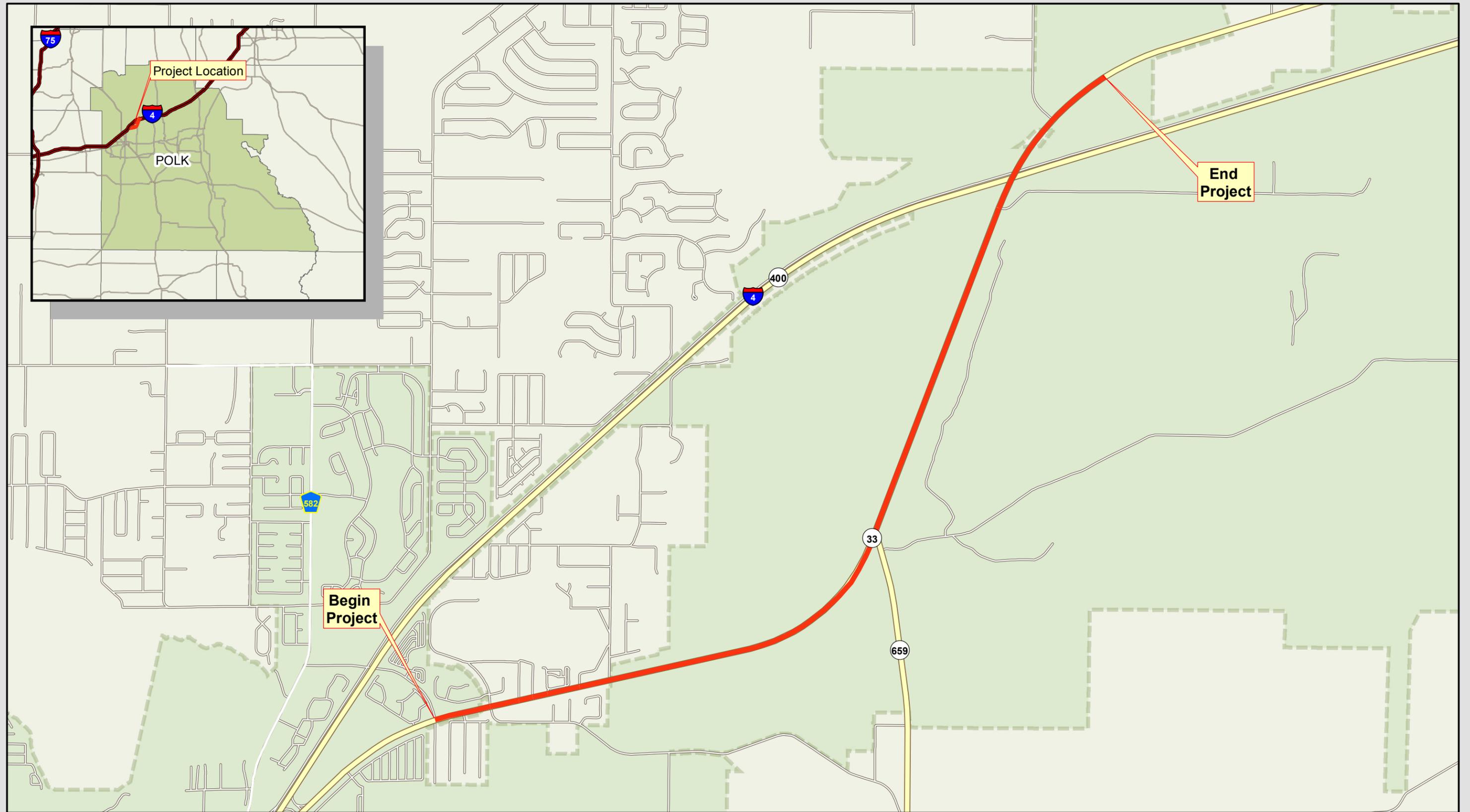
Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices at the time of this report. Our geotechnical engineering evaluation of the site and subsurface conditions with respect to the planned roadway improvements, and our recommendations for site preparation and foundation construction are based upon the following: (1) site observations, (2) the field exploratory test data obtained during the geotechnical study, and (3) our understanding of the project information and anticipated grades as presented in this report. This company is not responsible for the conclusions, opinions or recommendations made by others based on these data.

The scope of the exploration was intended to allow a preliminary evaluation of the soil conditions within the influence of the proposed roadway alignment. The analyses and recommendations submitted in this report are based upon the anticipated location and type of construction and data obtained from the soil borings performed at the locations indicated and does not reflect any variations which may occur among these borings. Because the scope of the field exploration was very limited and preliminary in nature, design-level geotechnical explorations are necessary to be completed during project design.

The scope of services, included herein, did not include any environmental assessment for the presence or absence of hazardous or toxic materials in the soil, surface water, groundwater, air, on the site, below and around the site. Any statements in this report or on the boring logs regarding odors, colors, unusual or suspicious items and conditions are strictly for the information of Inwood Consulting Engineers and the FDOT.

APPENDIX A

- Project Location Map (**Figure 1-1**)
- NRCS Soil Survey Maps (**Figure 1**)
- USGS Vicinity Map (**Figure 2**)
- Roadway Soil Survey Sheet (**1 Sheet**)
- Boring Location Plan Sheets (**6 Sheets**)
- Roadway Soil Profiles Sheet (**1 Sheet**)





NRCS SOIL SURVEY



MAP UNIT LEGEND POLK COUNTY, FL

- | | |
|---|---|
| 3 - Candler sand, 0 to 5 percent slopes | 22 - Pomello fine sand |
| 6 - Eaton mucky fine sand, depressional | 25 - Placid and Myakka fine sands, depressional |
| 7 - Pomona fine sand | 29 - St. Lucie fine sand, 0 to 5 percent slopes |
| 8 - Hydraquents, clayey | 35 - Hontoon muck |
| 9 - Lynne sand | 36 - Basinger mucky fine sand, depressional |
| 12 - Neilhurst sand, 1 to 5 percent slopes | 68 - Arents, 0 to 5 percent slopes |
| 15 - Tavares fine sand, 0 to 5 percent slopes | 99 - Water |
| 17 - Smyrna and Myakka fine sands | |

DRAWN BY:
BJS

CHECKED BY:
JAS

APPROVED BY:
LPM

DATE:
JAN 2013

ENGINEER OF RECORD:
JEREMY A. SEWELL, P.E.
FLORIDA LICENSE NO.:
62951

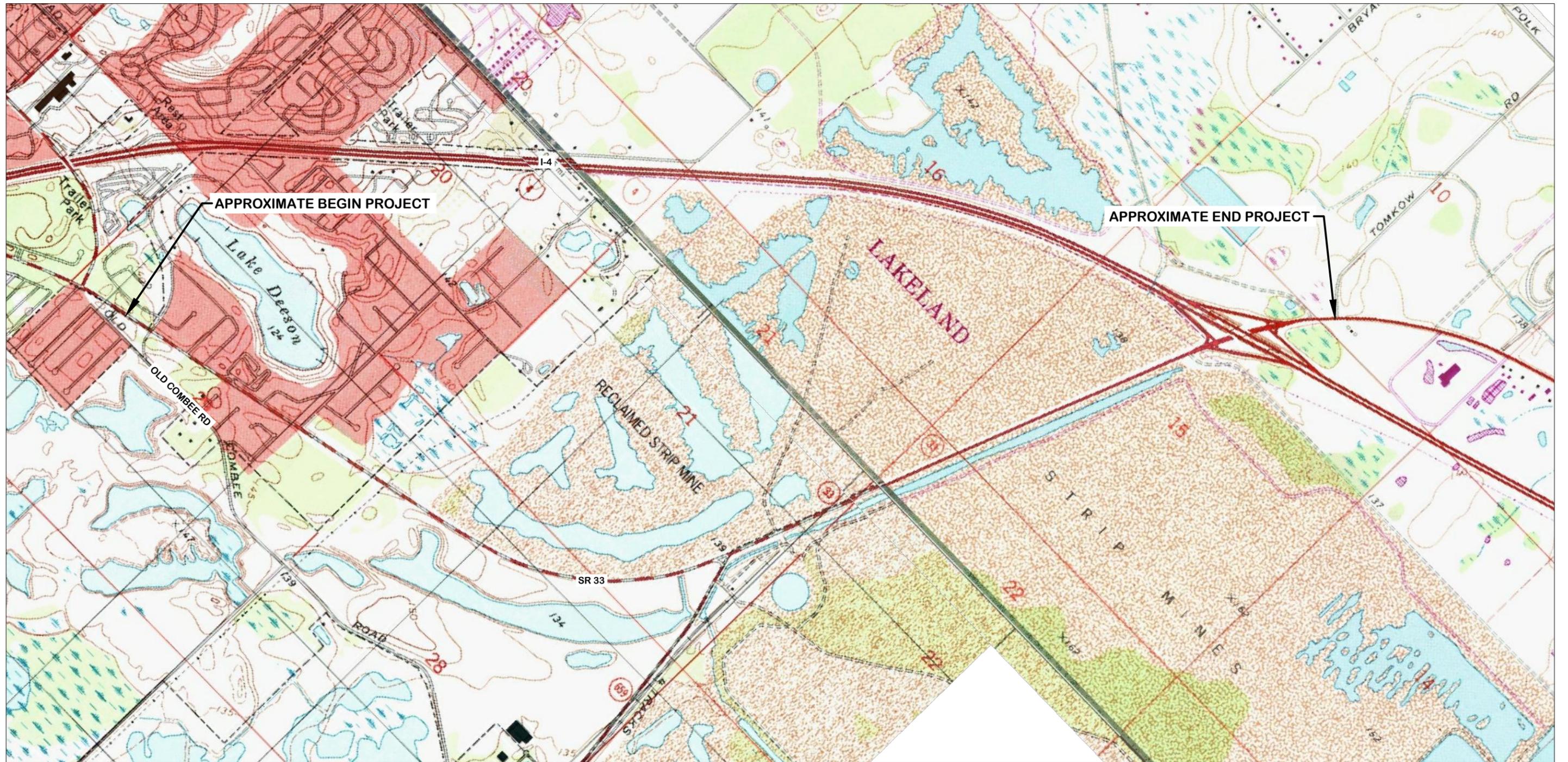
Tierra, Inc.
7351 Temple Terrace Highway
Tampa, Florida 33637
Phone: 813-989-1354 Fax: 813-989-1355
FL Cert. No.: 6486

SCALE:
NOTED

PROJECT NUMBER:
6511-12-026

GEOTECHNICAL ENGINEERING SERVICES
SR 33 FROM OLD COMBEE ROAD
TO NORTH OF TOMKOW ROAD
POLK COUNTY, FLORIDA

FIGURE 1



USGS VICINTY MAP

REFERENCE: "LAKELAND & PROVIDENCE, FLORIDA" USGS QUADRANGLE MAP



TOWNSHIP: 27 SOUTH
 RANGE: 24 EAST
 SECTION: 10,15,16,21,22,28 AND 29

DRAWN BY:
BJS

CHECKED BY:
JAS

APPROVED BY:
LPM

DATE:
JAN 2013

ENGINEER OF RECORD:
JEREMY A. SEWELL, P.E.
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GEOTECHNICAL ENGINEERING SERVICES
SR 33 FROM OLD COMBEE ROAD
TO NORTH OF TOMKOW ROAD
POLK COUNTY, FLORIDA

FIGURE 2

DATE OF SURVEY: JANUARY & NOVEMBER 2012
 SURVEY MADE BY: TIERRA, INC.
 SUBMITTED BY: JEREMY A. SEWELL, P.E.

STATE OF FLORIDA
 DEPARTMENT OF TRANSPORTATION
 MATERIALS AND RESEARCH

DISTRICT: 1
 ROAD NO.: 33
 COUNTY: POLK

FINANCIAL PROJECT ID : 430185-1-22-01
 PROJECT NAME: S.R. 33 FROM OLD COMBEE ROAD TO NORTH OF TOMKOW ROAD

CROSS SECTION SOIL SURVEY FOR THE DESIGN OF ROADS

SURVEY BEGINS STA. : 1261+74 SURVEY ENDS STA. : 1747+32

REFERENCE: SR 33

STRATUM NO.	ORGANIC CONTENT		MOISTURE CONTENT		NO. OF TESTS	SIEVE ANALYSIS RESULTS PERCENT PASS (%)					ATTERBERG LIMITS (%)			DESCRIPTION	CORROSION TEST RESULTS					
	NO. OF TESTS	% ORGANIC	NO. OF TESTS	MOISTURE CONTENT		10 MESH	40 MESH	60 MESH	100 MESH	200 MESH	NO. OF TESTS	LIQUID LIMIT	PLASTIC INDEX		AASHTO GROUP	NO. OF TESTS	RESISTIVITY ohm-cm	CHLORIDE ppm	SULFATES ppm	pH
1	--	--	--	--	1	100	96	84	62	9	--	--	A-3	PALE BROWN TO GRAY SAND TO SAND WITH SILT	--	--	--	--	--	
2	--	--	3	16-18	3	100	96-97	77-81	51-61	22-35	3	NP-24	NP-10	A-2-4/A-2-6	GRAY TO BROWN SILTY TO CLAYEY SAND	--	--	--	--	--
3	3	4-5	3	20-39	3	--	--	--	--	17-20	--	--	A-2-4/A-8	DARK BROWN SLIGHTLY ORGANIC SILTY SAND	--	--	--	--	--	
4	--	--	1	18	1	100	97	84	63	39	1	24	11	A-2-6/A-6	BROWN TO GRAY BROWN CLAYEY SAND TO SANDY CLAY	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--	--	--	--	A-3/A-2-4	LIGHT GRAY TO DARK BROWN FINE SAND WITH SILT TO SILTY SAND WITH CLAY NODULES, CEMENTED SAND, LIMEROCK FRAGMENTS AND ROCKS, (FILL)	--	--	--	--	--	

EMBANKMENT AND SUBGRADE MATERIAL

STRATA BOUNDARIES ARE APPROXIMATE. MAKE FINAL CHECK AFTER GRADING.

▽ - WATER TABLE ENCOUNTERED

GNE - GROUNDWATER NOT ENCOUNTERED

▼ - ESTIMATED SEASONAL HIGH GROUNDWATER TABLE

▼⁺ - ESTIMATED SEASONAL HIGH GROUNDWATER TABLE AT OR ABOVE EXISTING GRADE

NP - NON-PLASTIC

NOTES:

1. THE MATERIAL FROM STRATA 1 AND 5 (A-3/A-2-4) APPEARS SATISFACTORY FOR USE IN THE EMBANKMENT WHEN UTILIZED IN ACCORDANCE WITH INDEX 505.
2. THE MATERIAL FROM STRATA 2 AND 4 IS PLASTIC MATERIAL (A-2-4/A-2-6/A-6) AND SHALL BE REMOVED IN ACCORDANCE WITH INDEX 500. IT MAY REMAIN IN PLACE ABOVE THE EXISTING WATER LEVEL (AT THE TIME OF CONSTRUCTION) TO WITHIN 2 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 SHORT DISTANCES.
3. THE MATERIAL FROM STRATUM NUMBER 3 (A-2-4) APPEARS SATISFACTORY FOR USE IN THE EMBANKMENT WHEN UTILIZED IN ACCORDANCE WITH INDEX 505. HOWEVER, THIS MATERIAL IS LIKELY TO RETAIN EXCESS MOISTURE AND MAY BE DIFFICULT TO DRY AND COMPACT. IT SHOULD BE USED IN THE EMBANKMENT ABOVE THE WATER LEVEL EXISTING AT THE TIME OF CONSTRUCTION.

THE MATERIAL FROM STRATUM 3 SHALL NOT BE USED IN THE SUBGRADE PORTION OF THE ROADBED DUE TO ORGANIC CONTENT.

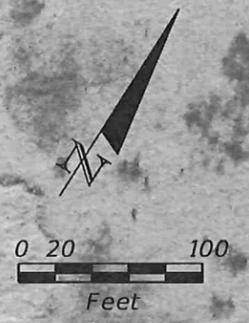
REVISIONS				JEREMY A SEWELL, P.E. P.E. LICENSE NUMBER 62951 TIERRA, INC. 1133 CROWN PARK CIRCLE WINTER GARDEN, FLORIDA 34787 CERTIFICATE OF AUTHORIZATION 6486	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			ROADWAY SOIL SURVEY	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
					33	POLK	430185-1-22-01		



LEGEND

⊕ APPROXIMATE AUGER BORING LOCATION

REVISIONS				JEREMY A SEWELL, P.E. P.E. LICENSE NUMBER 62951 TIERRA, INC. 1133 CROWN PARK CIRCLE WINTER GARDEN, FLORIDA 34787 CERTIFICATE OF AUTHORIZATION 6486	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			BORING LOCATION PLAN (1 OF 6)	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
					33	POLK	430185-1-22-01		



LEGEND

⊕ APPROXIMATE AUGER BORING LOCATION

REVISIONS				JEREMY A SEWELL, P.E. P.E. LICENSE NUMBER 62951 TIERRA, INC. 1133 CROWN PARK CIRCLE WINTER GARDEN, FLORIDA 34787 CERTIFICATE OF AUTHORIZATION 6486	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			BORING LOCATION PLAN (2 OF 6)	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
				33	POLK	430185-1-22-01			



LEGEND

⊕ APPROXIMATE AUGER BORING LOCATION

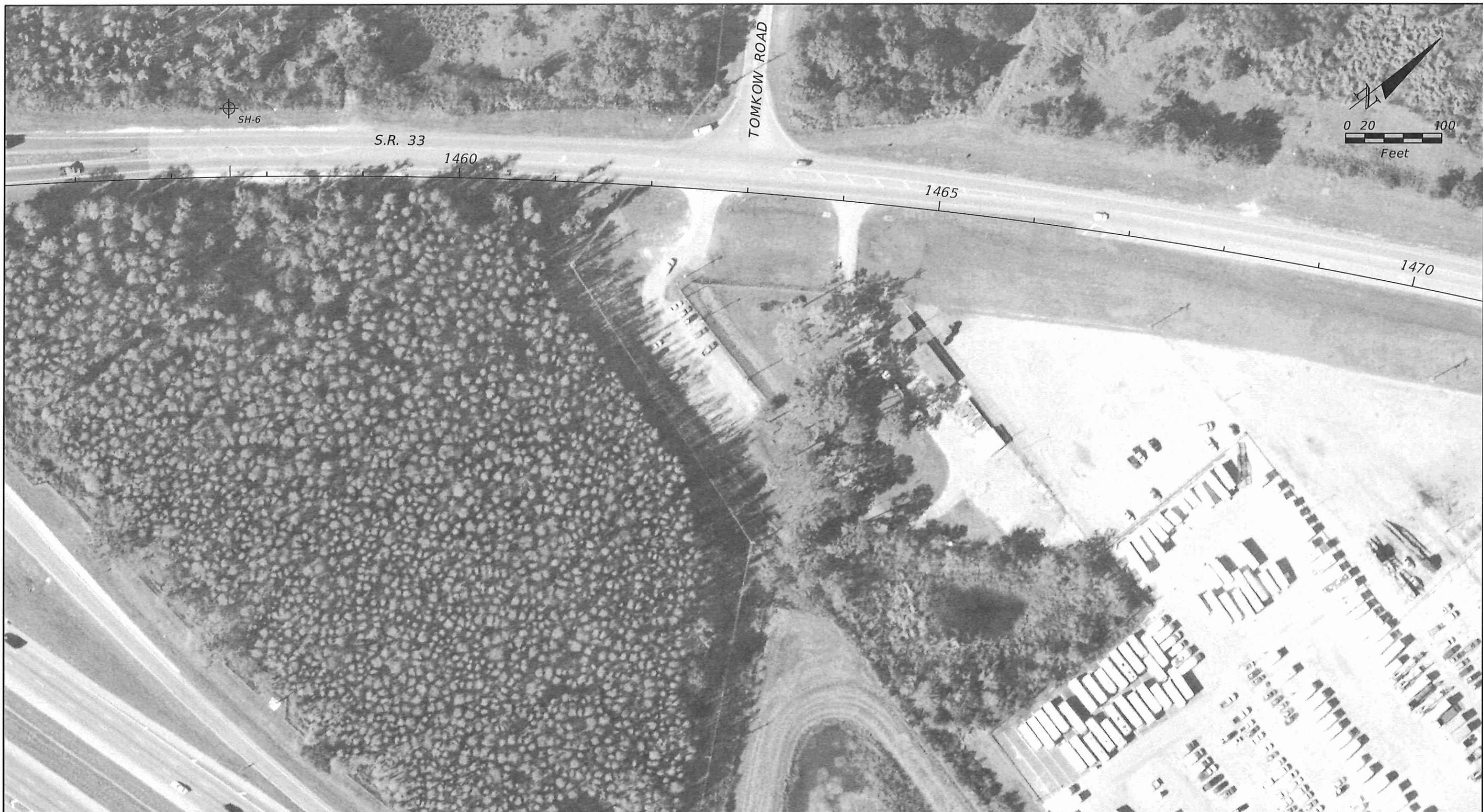
REVISIONS				JEREMY A SEWELL, P.E. P.E. LICENSE NUMBER 62951 TIERRA, INC. 1133 CROWN PARK CIRCLE WINTER GARDEN, FLORIDA 34787 CERTIFICATE OF AUTHORIZATION 6486	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			BORING LOCATION PLAN (3 OF 6)	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
				33	POLK	430185-1-22-01			



LEGEND

⊕ APPROXIMATE AUGER BORING LOCATION

REVISIONS				JEREMY A SEWELL, P.E. P.E. LICENSE NUMBER 62951 TIERRA, INC. 1133 CROWN PARK CIRCLE WINTER GARDEN, FLORIDA 34787 CERTIFICATE OF AUTHORIZATION 6486	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			BORING LOCATION PLAN (1 OF 6)	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
					33	POLK	430185-1-22-01		



LEGEND

⊕ APPROXIMATE AUGER BORING LOCATION

REVISIONS				JEREMY A SEWELL, P.E. P.E. LICENSE NUMBER 62951 TIERRA, INC. 1133 CROWN PARK CIRCLE WINTER GARDEN, FLORIDA 34787 CERTIFICATE OF AUTHORIZATION 6486	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			BORING LOCATION PLAN (5 OF 6)	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
				33	POLK	430185-1-22-01			

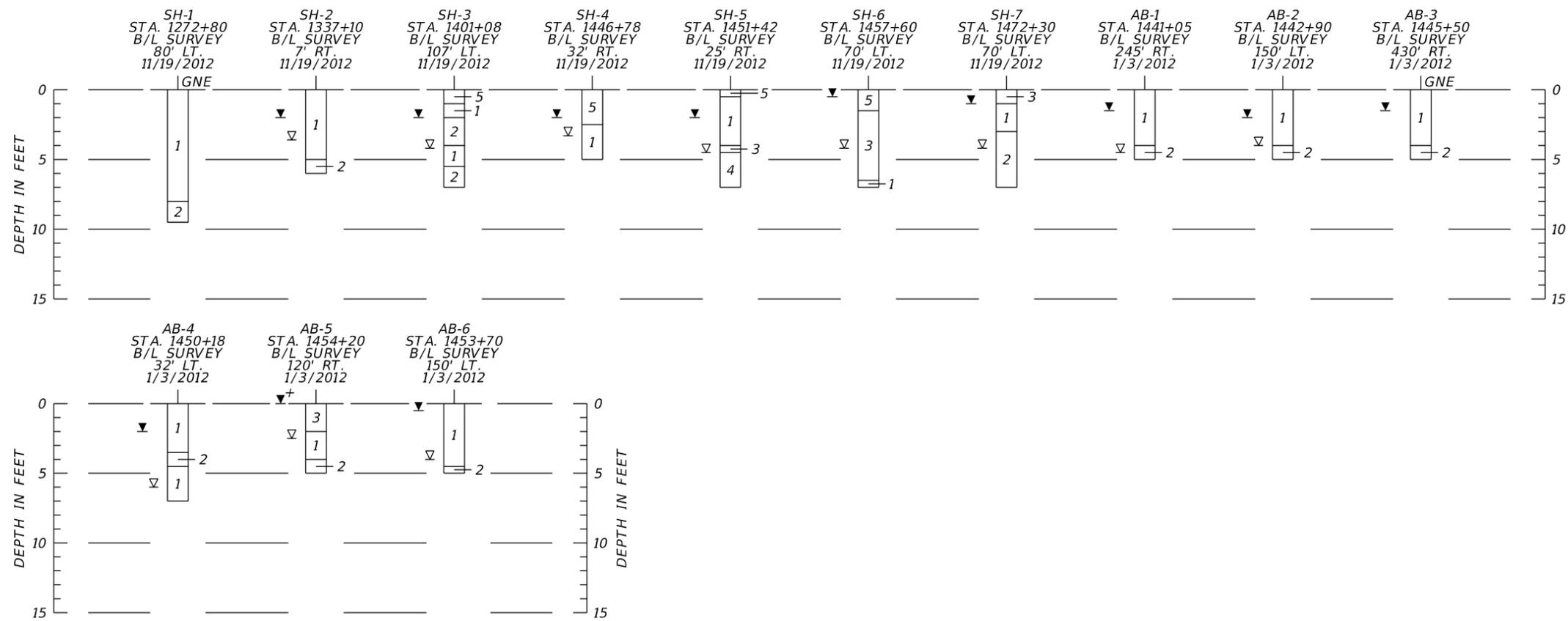


LEGEND

 APPROXIMATE AUGER BORING LOCATION

REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	
				33	POLK	430185-1-22-01	BORING LOCATION PLAN (6 OF 6)

JEREMY A SEWELL, P.E.
 P.E. LICENSE NUMBER 62951
 TIERRA, INC.
 1133 CROWN PARK CIRCLE
 WINTER GARDEN, FLORIDA 34787
 CERTIFICATE OF AUTHORIZATION 6486



LEGEND

1. PALE BROWN TO GRAY SAND TO SAND WITH SILT (A-3)
 2. GRAY TO BROWN SILTY TO CLAYEY SAND (A-2-4/A-2-6)
 3. DARK BROWN SLIGHTLY ORGANIC SILTY SAND (A-2-4/A-8)
 4. BROWN TO GRAY BROWN CLAYEY SAND TO SANDY CLAY (A-2-6/A-6)
 5. LIGHT GRAY TO DARK BROWN FINE SAND WITH SILT TO SILTY SAND WITH CLAY NODULES, CEMENTED SAND, LIMEROCK FRAGMENTS AND ROCKS, (FILL) (A-3/A-2-4)
- A-3 AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW AND LABORATORY TESTING ON SELECTED SAMPLES FOR CONFIRMATION OF VISUAL REVIEW.
- ▽ GROUNDWATER LEVEL ENCOUNTERED DURING FIELD EXPLORATIONS
- ▼ ESTIMATED SEASONAL HIGH GROUNDWATER TABLE
- ▼⁺ ESTIMATED SEASONAL HIGH GROUNDWATER TABLE AT OR ABOVE EXISTING GROUND SURFACE
- GNE GROUNDWATER NOT ENCOUNTERED

B/L SURVEY BASELINE OF SURVEY SR 33

REVISIONS				JEREMY A SEWELL, P.E. P.E. LICENSE NUMBER 62951 TIERRA, INC. 1133 CROWN PARK CIRCLE WINTER GARDEN, FLORIDA 34787 CERTIFICATE OF AUTHORIZATION 6486	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			ROADWAY SOIL PROFILES	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
					33	POLK	430185-1-22-01		

APPENDIX B

- Summary of Seasonal High Groundwater Table Estimates for Roadway
- Summary of Laboratory Classification Test Results

**SUMMARY OF SEASONAL HIGH GROUNDWATER TABLE ESTIMATES FOR ROADWAY
SR 33 FROM OLD COMBEE ROAD TO NORTH OF TOMKOW ROAD
POLK COUNTY, FLORIDA
FPN: 430185-1-22-01
TIERRA PROJECT NO: 6511-12-026**

Boring Number	Boring Location ⁽¹⁾		Boring Depth ⁽²⁾ (feet)	Date Boring Performed/ Groundwater Table Recorded	Groundwater Table Depth Below Ground Surface (feet)	Estimated Seasonal High Groundwater Table Depth Below Ground Surface (feet) ⁽⁴⁾	USDA Soil Survey		Ground Surface Depth Below Edge of Pavement (feet)	Groundwater Table Depth Below Edge of Pavement (feet)	Estimated Seasonal High Groundwater Table Depth Below Edge of Pavement (feet)
	Station	Offset					Soil Map Unit	Seasonal High Groundwater Table Depth ⁽³⁾ (feet)			
SH-1	1272+80	80 LT	9.5	11/19/2012	GNE ⁽⁵⁾	>6.0	3	>6.0	4.3 ⁽⁷⁾	>10 ⁽⁷⁾	>10 ⁽⁷⁾
SH-2	1337+10	7 RT	6	11/19/2012	3.6	2.0	68	2.0-4.0	3.2 ⁽⁷⁾	6.8 ⁽⁷⁾	5.2 ⁽⁷⁾
SH-3	1401+08	107 LT	7	11/19/2012	4.2	2.0	68	2.0-4.0	3.2 ⁽⁷⁾	7.4 ⁽⁷⁾	5.2 ⁽⁷⁾
AB-1	1441+05	245 RT	5	1/3/2012	4.5	1.5	7	3.5-6.0	3.8 ⁽⁷⁾	8.3 ⁽⁷⁾	5.3 ⁽⁷⁾
AB-2	1442+90	150 LT	5	1/3/2012	4.0	2.0	7	3.5-6.0	5.3 ⁽⁸⁾	9.3 ⁽⁸⁾	7.3 ⁽⁸⁾
AB-3	1445+50	430 RT	5	1/3/2012	GNE ⁽⁵⁾	1.5	7	3.5-6.0	4.2 ⁽⁸⁾	>9.2 ⁽⁸⁾	5.7 ⁽⁸⁾
SH-4	1446+78	32 RT	5	11/19/2012	3.4	2.0	7	3.5-6.0	2.0 ⁽⁷⁾	5.4 ⁽⁷⁾	4.0 ⁽⁷⁾
AB-4	1450+18	32 LT	7	1/3/2012	6.0	2.0	7	3.5-6.0	0.8 ⁽⁷⁾	6.8 ⁽⁷⁾	2.8 ⁽⁷⁾
SH-5	1451+42	25 RT	7	11/19/2012	4.4	2.0	7	3.5-6.0	1.4 ⁽⁷⁾	5.8 ⁽⁷⁾	3.4 ⁽⁷⁾
AB-5	1454+20	120 RT	5	1/3/2012	2.5	ABG ⁽⁶⁾	35	+2.0-0	3.6 ⁽⁸⁾	6.1 ⁽⁸⁾	<3.6 ⁽⁸⁾
AB-6	1453+70	115 LT	5	1/3/2012	4.0	0.5	35	+2.0-0	4.4 ⁽⁸⁾	8.4 ⁽⁸⁾	4.9 ⁽⁸⁾
SH-6	1457+60	70 LT	7	11/19/2012	4.2	0.5	35	+2.0-0	3.5 ⁽⁷⁾	7.7 ⁽⁷⁾	4.0 ⁽⁷⁾
SH-7	1472+30	70 LT	7	11/19/2012	4.2	1.0	6	+2.0-0	3.3 ⁽⁷⁾	7.5 ⁽⁷⁾	4.3 ⁽⁷⁾

⁽¹⁾ Station and Offset of the borings were estimated from the S.R. 33 survey baseline provided by Inwood Consulting Engineers.

⁽²⁾ Depth below existing grades at time of field services.

⁽³⁾ Seasonal high groundwater table depth as reported in the Soil Survey of Polk County, Florida published by the USDA NRCS.

⁽⁴⁾ Seasonal high groundwater table depth estimated based on soil stratigraphy, measured groundwater levels from the borings, and the Polk County, Florida USDA NRCS Soil Survey information.

⁽⁵⁾ GNE indicates groundwater table not encountered within depth of boring performed.

⁽⁶⁾ ABG: At or above existing ground surface (SHGWT should be determined by the project biologist utilizing biological indicators).

⁽⁷⁾ Referenced from SR 33 EOP.

⁽⁸⁾ Referenced from adjacent ramp EOP.

Summary of Laboratory Test Results for Soil Classification
SR 33 PD&E Study from Old Combee Road to north of Tomkow Road PD&E
Polk County, Florida
FPID: 430185-1-22-01
Tierra Project No. 6511-12-026

Boring Number	Sample Depth (ft)	Stratum Number	AASHTO Symbol	Sieve Analysis					Atterberg Limits			Organic Content (%)	Natural Moisture Content (%)
				#10	#40	#60	#100	#200	Liquid Limit	Plastic Limit	Plasticity Index		
SH-1	1.0 - 2.0	1	A-3	100	96	84	62	9	-	-	-	-	-
SH-2	5.0 - 6.0	2	A-2-4	-	-	-	-	26	NP	NP	NP	-	16
SH-3	5.0 - 7.0	2	A-2-4	100	96	77	51	22	NP	NP	NP	-	18
SH-7	4.0 - 5.0	2	A-2-4	100	97	81	61	35	24	14	10	-	17
SH-6	3.0 - 3.5	3	A-2-4	-	-	-	-	20	-	-	-	4	20
SH-6	5.5 - 6.0	3	A-2-4	-	-	-	-	19	-	-	-	4	39
SH-7	0.0 - 0.5	3	A-2-4/A-8	-	-	-	-	17	-	-	-	5	20
SH-5	4.5 - 5.0	4	A-6	100	97	84	63	39	24	13	11	-	18

Appendix 11

Correspondence

- Meeting Minutes
- Telephone Logs
- District Basin Maps
- Straight Line Diagram

Meeting Minutes

Sergio Figueroa

From: David Ledgerwood
Sent: Wednesday, February 13, 2013 11:36 AM
To: Sergio Figueroa; Renato Chuw
Subject: FW: FPID:430185-1-22-01, Study of the Widening of SR 33
Attachments: SKMBT_C45213020712240.pdf
 FYI...

Sounds like OUC may or may not allow the ponds at this location. Let me know when we would like to meet with them to discuss.

David Ledgerwood, PE

INWOOD CONSULTING ENGINEERS

P: 407-971-8850 ext. 6609

From: Easterling, Chuck [mailto:CEasterling@ouc.com]
Sent: Wednesday, February 13, 2013 11:35 AM
To: David Ledgerwood
Cc: Parker, Rick; Spivey, Jason; Willis, Adonis T.; Easterling, Chuck; Ben Symons (B&V)
Subject: RE: FPID:430185-1-22-01, Study of the Widening of SR 33

David,
 OUC just went through that area with a project for access roads and pads for our facilities. We filled a portion of what you are requesting to dig out. We also permitted driveways off of SR33 for our access that must be maintained.
 Additionally, we just upgraded our wire and structures in this area.
 At a minimum, OUC will not allow for any ponds under the transmission lines, as we view them as structures that impede our ingress/egress to our facilities. We should probably find a time to sit down with your plans and our plans (possibly on-site to see our actual improvements) to see what we can live with...or not.
 Thanks,
 Chuck

Charles H. Easterling, PE
 Manager, Transmission Engineering & Construction, and System Maintenance
 Orlando Utilities Commission
 6003 Pershing Avenue
 Orlando, FL 32822

407-434-4123 office
 407-434-4356 fax

From: David Ledgerwood [mailto:dledgerwood@inwoodinc.com]
Sent: Wednesday, February 13, 2013 9:25 AM
To: Easterling, Chuck
Subject: FW: FPID:430185-1-22-01, Study of the Widening of SR 33

Chuck,

Please see the email string below. We are currently working on a PD&E study for SR 33 and trying to determine our proposed pond alternatives for the project. We are looking at a parcel owned by the City of Lakeland which has existing OUC Transmission lines on it. Two of our proposed pond alternatives are currently located under the existing OUC transmission lines, as shown in the attached graphic. These pond sites will not impact the existing poles or the access road for the transmission facilities. I wanted to see if OUC has any concerns or thoughts with the pond site at this location. Both pond are being designed to be dry ponds.

Any help is appreciated. Thanks.

David Ledgerwood, PE

INWOOD CONSULTING ENGINEERS

P: 407-971-8850 ext. 6609

From: Vann, Michael [mailto:Michael.Vann@lakelandelectric.com]
Sent: Monday, February 11, 2013 11:03 AM
To: David Ledgerwood
Cc: Fox, Richard; Hayes, Kris; Maxwell, Jeremy; Pennell, Matt
Subject: FPID:430185-1-22-01, Study of the Widening of SR 33

David,
 Please see attached mark-ups of the conceptual plan for the above project.

General relocation costs per mile:
 Overhead Transmission \$600k
 Overhead Transmission and Distribution on the same pole \$900k
 Overhead Distribution \$300k
 Underground Distribution \$1M

Please see attached pdf. The north/south transmission line shown on the east side of the pond is owned and maintained by Orlando Utilities Commission (OUC). Contact Chuck Easterling @ ceasterling@ouc.com or 407-434-4123 and he

can either assist you or point you in the right direction. The other line is owned by Lakeland Electric (LE). I do not foresee any issues with our transmission line and the pond as long as it does not impact the location or the access (as noted). Lakeland Electric will also be building a substation on the City of Lakeland parcel shown on the west side of Huron Way. Tentative in service date of summer 2014. I am also attaching a preliminary layout of the substation site and our right-of-way department has marked-up easement information.

Please continue to submit requests through Kris Hayes for Lakeland Electric, but Richard Fox will be the point of contact for Lakeland Electric's transmission and distribution facilities. Questions in reference to the future substation can be directed to Matt Pennell at matt.pennell@lakelandelectric.com or 863-834-6489.

Thanks,

Michael G. Vann

LAKELAND ELECTRIC
Transmission & Distribution Engineering Supervisor
863-834-6311
michael.vann@lakelandelectric.com

Markup Transmission Line Future Substation Easement Info

From: David Ledgerwood [<mailto:dledgerwood@inwoodinc.com>]
Sent: Monday, February 04, 2013 1:40 PM
To: Durbin, John
Cc: Lindsey, Ken; Kniss, Robert; Hayes, Kris; Sergio Figueroa
Subject: RE: FP ID:430185-1-22-01, Study of the Widening of SR 33

John,

Will you also be providing information regarding the electric facilities?

We have a proposed pond site we are looking at that is located on a parcel that is owned by the City and has existing transmission electric facilities on it. We currently have two adjacent basins with two separate ponds, but are looking at the option on combining the basins and having a single pond located on the City's property, which is just west of Huron Way. I have included a graphic showing the proposed pond site and pond expansion for combining the basins. The pond will be a dry pond and will be located under the existing transmission lines, but will not impact any existing transmission poles or the existing access road currently on the property. I wanted to see if the City has any concerns or thoughts with the pond site at this location. We have looked at placing the pond site on the east side of the property adjacent to Huron Way, but we will encounter substantial wetland impacts at this location.

If there is another person that I need to coordinate the pond site with, please forward me their contact information. Thanks in advance for your help.

David Ledgerwood, PE



INWOOD CONSULTING ENGINEERS
P: 407-971-8850 ext. 6609



From: David Ledgerwood
Sent: Monday, February 04, 2013 11:12 AM
To: 'Durbin, John'
Cc: Lindsey, Ken; Kniss, Robert; Hayes, Kris
Subject: RE: FP ID:430185-1-22-01, Study of the Widening of SR 33

John

This project is in the PD&E Study phase and there is no current schedule for construction in the near future. At this point we are just studying alternative alignments and evaluating any right-of-way needs.

Feel free to contact me should you have any other questions. Thanks.

David Ledgerwood, PE



INWOOD CONSULTING ENGINEERS
P: 407-971-8850 ext. 6609



From: Durbin, John [<mailto:John.Durbin@lakelandelectric.com>]
Sent: Monday, February 04, 2013 8:31 AM
To: David Ledgerwood
Cc: Lindsey, Ken; Kniss, Robert; Hayes, Kris
Subject: FP ID:430185-1-22-01, Study of the Widening of SR 33



Mr. Ledgerwood;

We are preparing a response to your letter of January 30, 2013, for the CORRIDOR ANALYSIS OF EXISTING CONDITIONS.

The City of Lakeland, Lakeland Gas maintains a 16" high pressure gas line the runs from Tomkow Road to approx. 5000' North of Old Combee Road where it crosses under S.R. 33 and goes south to our power plant.

Could you please provide us with a project schedule, so that we can budget for the relocation of our gas line, if needed?

Thank you for time.

John E. Durbin
Engineering Technician
(863)834-8600



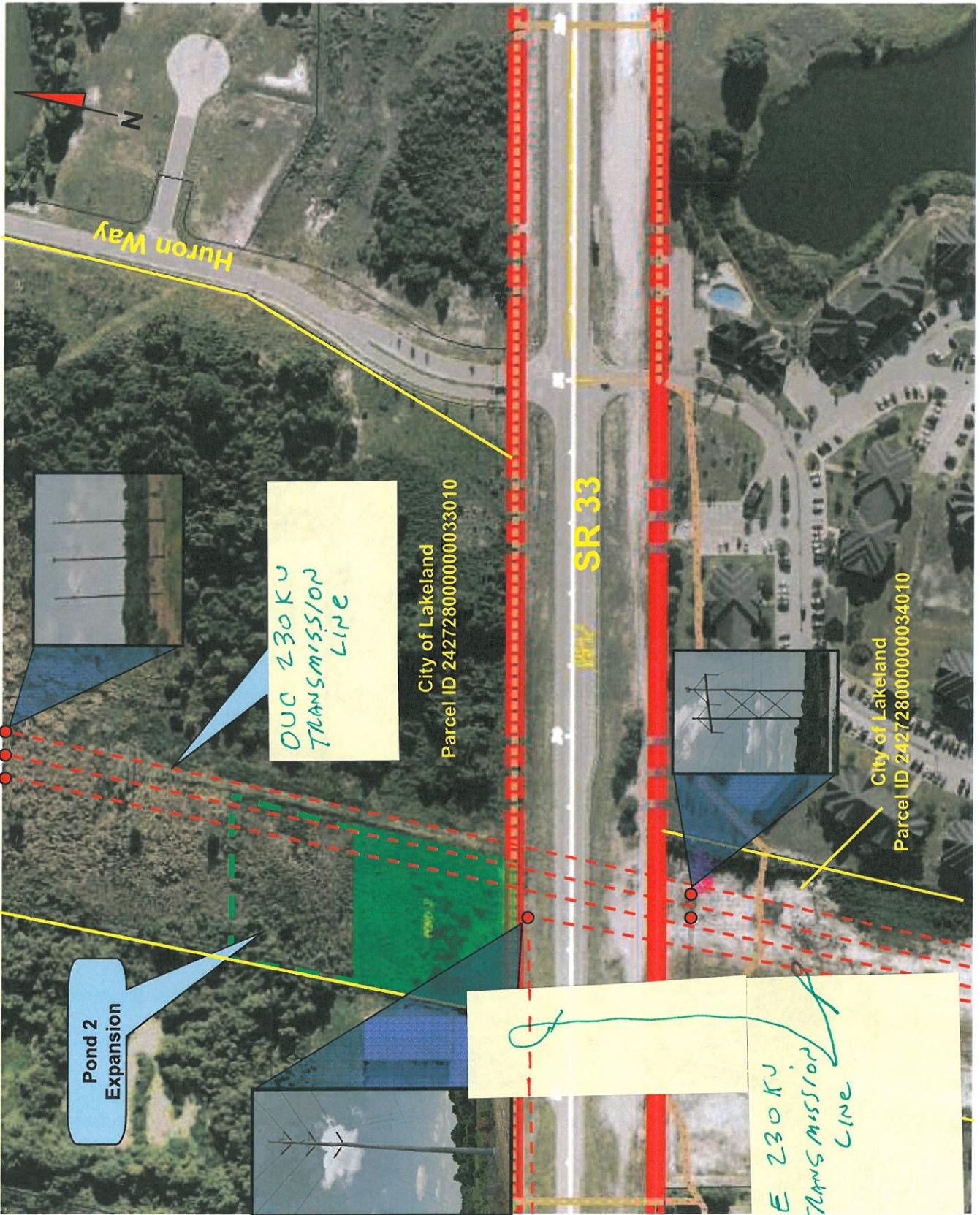
3030 E. Lake Parker Drive
Lakeland FL. 33805-9513

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Huron Way

SR 33

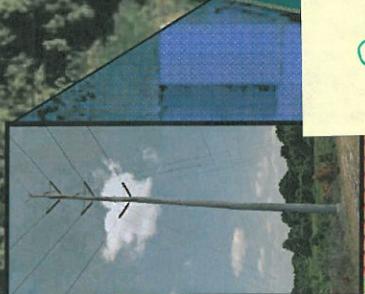
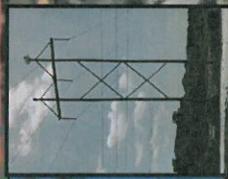
Pond 2 Expansion

OUC 230KV
TRANSMISSION
LINE

City of Lakeland
Parcel ID 24272800000033010

City of Lakeland
Parcel ID 24272800000034010

LE 230KV
TRANSMISSION
LINE



MEETING MINUTES

DATE: August 21, 2012

TO: Tony Sherrard – FDOT Project Manager

FROM: Sergio Figueroa, PE

RE: **Drainage Kickoff Meeting with FDOT** – FPID 430185-1-22-01 (SR 33 PD&E from Old Combee Road to north of Tomkow Road)

CC: All Attendees (via email), File

A meeting was held on August 21, 2012 at the FDOT District 1 office to discuss the drainage design approach for the SR 33 Project Development and Environment Study (PD&E). The purpose of the meeting was to discuss the requirements, procedures, and expectations from the Department on the drainage for the project. Attendees included the Inwood design team (David Dangel, Renato Chuw and Sergio Figueroa) and FDOT staff (Tony Sherrard, Jeffrey James, Carlton Spirio, Brent Setchell and Bill Hartmann).

The meeting began with an overview of the PD&E proposed improvements to SR 33. An aerial graphic was provided for visual clarity during the discussion. Listed below is a summary of topics discussed at the meeting.

Existing Drainage

- The project limits of the study is mostly located within the Orange Hammock local drainage basin and only partially located within the Lake Deeson basin (closed). These are part of the much larger Green Swamp Basin and Peace River Basin
 - Only Lake Deeson (WBID 1449A) is impaired for nutrients.
 - Inwood indicated that the WBID for the Orange Hammock Drain (WBID 1449) contained insufficient data for verification of impairment. It was agreed by both Inwood and FDOT that no pollutant loading analysis will be required within the Orange Hammock Basin.
- There are minimum floodplain impacts within the project study limits.
 - Only minor impacts are to be expected at the I-4 Interchange per the FEMA Floodplain Map.
 - The FEMA FIRM maps indicate that the majority of the project corridor is within Zone X.
 - Inwood is to verify with SWFWMD that there are no current floodplain studies within the project corridor.
- FDOT suggested looking at existing permits and coordinating with the landowners at the southwest corner of the SR 33 and I-4 interchange (FirstPark at Bridgewater). It was also mentioned that there are existing permits for the East West Road (University Boulevard) located at the southeast corner of the SR 33 and I-4 Interchange.
 - Inwood concurred and will research this area during the study.
 - FDOT indicated that the property owner at the southwest corner of the interchange approached the Department for potential development on this corner, including modifications to the existing FDOT pond.
 - Inwood is also to contact Leanna O'Reagan (PB – FDOT permit connection) for coordination with FirstPark at Bridgewater.
- Wetland Mitigation
 - FDOT suggested to look into the new wetland language for the PD&E reports that discusses the use of wetland mitigation bank as a preferred alternative and to only use senate billing as a last resort. Brent has forwarded this new language to Brooke Botterill.



Proposed Drainage Approach

- Based on existing topography and the cross drain locations, eight roadway drainage basins are anticipated within the project corridor.
 - As the PD&E study moves forward, Inwood indicated that they will look at these basins in more detail.
- Stormwater Management Options
 - Since the majority of the project corridor is within Type A Soils, dry treatment is proposed for both offsite ponds and linear swales for all the basins except for Basin 8.
 - FDOT confirmed to Inwood that in the Pond Siting Report (PSR), Inwood is to identify one offsite pond per basin and discuss the dry linear swale option in the report. The offsite pond option will be required to get clearances from FHWA and is the conservative approach.
 - Basin 4
 - Inwood is to verify that the current proposed offsite pond location will fit within the existing topographic area and have a positive outfall to the boundary condition. In addition, Inwood will check the existing pond at Bridgewater and compare to the proposed pond elevation.
 - Basin 5
 - Inwood explained to FDOT that there are limited options available to locate an offsite pond within this basin and that they will be looking at options for this basin such as compensating treatment.
 - Basin 7
 - The proposed approach will be to utilize the existing infield areas of the interchange for stormwater management. Inwood will also investigate the available capacity for the existing FDOT ponds for I-4.
 - Basin 8
 - FDOT informed Inwood that there is a driveway connection that is currently in the permitting phase on the west side of Tomkow Road. It was suggested to Inwood to move the current offsite pond location to the east side of Tomkow Road to avoid future conflicts with the driveway connection permit. Inwood concurred.
- FDOT recommended to commingle the offsite and the onsite runoff whenever possible to avoid having dual ditches for offsite bypass. Regarding no treatment of the offsite runoff and the new House Bill 599, FDOT suggested to discuss this with SWFWMD.
- Although FDOT critical duration is no longer applicable, FDOT suggested to still look at the 100-year storms with shorter durations to make sure there will be no adverse impacts.
- Brent provided a copy of the high speed rail plans through the I-4 and SR 33 Interchange. These plans did not propose any improvements to the SR 33 interchange.
- Initial traffic numbers indicated that there was no need for a four-lane facility; however, AIM will be investigating the traffic model and providing updated numbers. A six-lane facility is not anticipated to be justified.

Attachments: Meeting Agenda
Meeting Sign-in Sheet

Note: The above reflects the writer's understanding of the contents of the meeting. If any misinterpretations or inaccuracies are included, please contact Sergio Figueroa at (407) 971-8850 or sfigueroa@inwoodinc.com as soon as possible for resolution and revisions if necessary.

**State Road 33
Project Development and Environment Study
From Old Combee Road to north of Tomkow Road
Polk County, Florida
Financial Project ID: 430185-1-22-01**

FDOT Drainage Kickoff Meeting

1. Project Overview
 - a. Limits from Old Combee Road to North of Tomkow Road
 - b. Widening from two lane rural to four lane suburban or rural
 - i. Pavement savings are an option
2. Existing Drainage
 - a. Green Swamp and Peace River Basin
 - i. Orange Hammock local drainage basin
 - ii. Lake Deeson – closed basin
 - b. No formal water quality treatment
 - i. Exception is south of Old Combee Road and intersection with East-West Road
 - c. Nine existing cross drains
 - i. Evaluation as part of the LHR
 - ii. Two are bridge culverts (Pit Creek and Fork Creek)
 - d. Minimal floodplain impacts – majority within Zone X
 - i. Potential impacts within I-4 Interchange
 - e. WBID identification
 - i. Orange Hammock Drain (WBID 1449) – insufficient data
 - ii. Lake Deeson (WBID 1449A) – impaired for nutrients
3. Proposed Drainage Approach
 - a. Eight roadway drainage basins
 - b. Stormwater Management Options
 - i. Offsite ponds – dry (Basins 1 through 7), wet (Basin 8)
 - ii. Linear swales within right of way – Type A soils
 - c. Criteria for Pond Sizing
 - i. SWFWMD
 - o No OFW
 - o 1” of runoff over DCIA (Wet Detention)
 - o 0.5” of runoff over DCIA (Dry Retention)
 - o Pre vs Post Vol. Attenuation (25yr/24hr – open, 100yr/24hr – closed basin)
 - ii. FDOT
 - o Critical duration no longer applicable
 - o Offsite / Onsite areas commingling
 - d. I-4 Interchange drainage / infield areas for stormwater
4. Schedule

- a. Drainage data collection – Summer 2012
 - b. Draft LHR – May 2013
 - c. Draft PSR – August 2013
5. Other Items
- a. East West Road Project
 - b. Mine spoil soils – “slime”

Telephone Logs



TELEPHONE LOG

3000 Dovera Drive, Suite 200, Oviedo, FL 32765 | P: 407-971-8850 | F: 407-971-8955 | www.inwoodinc.com

DATE: 2/6/2013

CALL TO: Scott Presson (Bartow Operations Center Manager)

CALL FROM: Sergio Figueroa, P.E.

RE: FPID 430185-1-22-01 (SR 33 PD&E from Old Combee Road to north of Tomkow Road)

CC: File

Scott Presson returned Sergio Figueroa's phone call on February 5, 2013 to discuss the SR 33 PD&E Study project from Old Combee Road to north of Tomkow Road. Mr. Presson stated that the Bartow maintenance office has no records of historical flooding issues within the SR 33 project limits. Mr. Figueroa asked Mr. Presson if the maintenance office had any knowledge of the FDOT owned land southwest of the SR 33 and I-4 Interchange and notified him that the apparent vacant space could be a potential pond site for the SR 33 widening. Mr. Presson informed Mr. Figueroa that the Bartow maintenance office uses that open space to store equipment and excess fill material for nearby FDOT projects. He also mentioned that the maintenance office would prefer the future pond site not to be at that location. Mr. Figueroa stated that he appreciated Mr. Presson's discussion regarding the flooding issues for SR 33 and comments regarding the potential pond site and that his comments will be taken under consideration during the SR 33 PD&E project.

*****End of Telephone Log*****



TELEPHONE LOG

3000 Dovera Drive, Suite 200, Oviedo, FL 32765 | P: 407-971-8850 | F: 407-971-8955 | www.inwoodinc.com

DATE: 7/31/2013

CALL TO: Frank Ritchie (SWFWMD Staff Engineer – Tampa Office)

CALL FROM: Sergio Figueroa, P.E.

RE: FPID 430185-1-22-01 (SR 33 PD&E from Old Combee Road to north of Tomkow Road)

CC: File

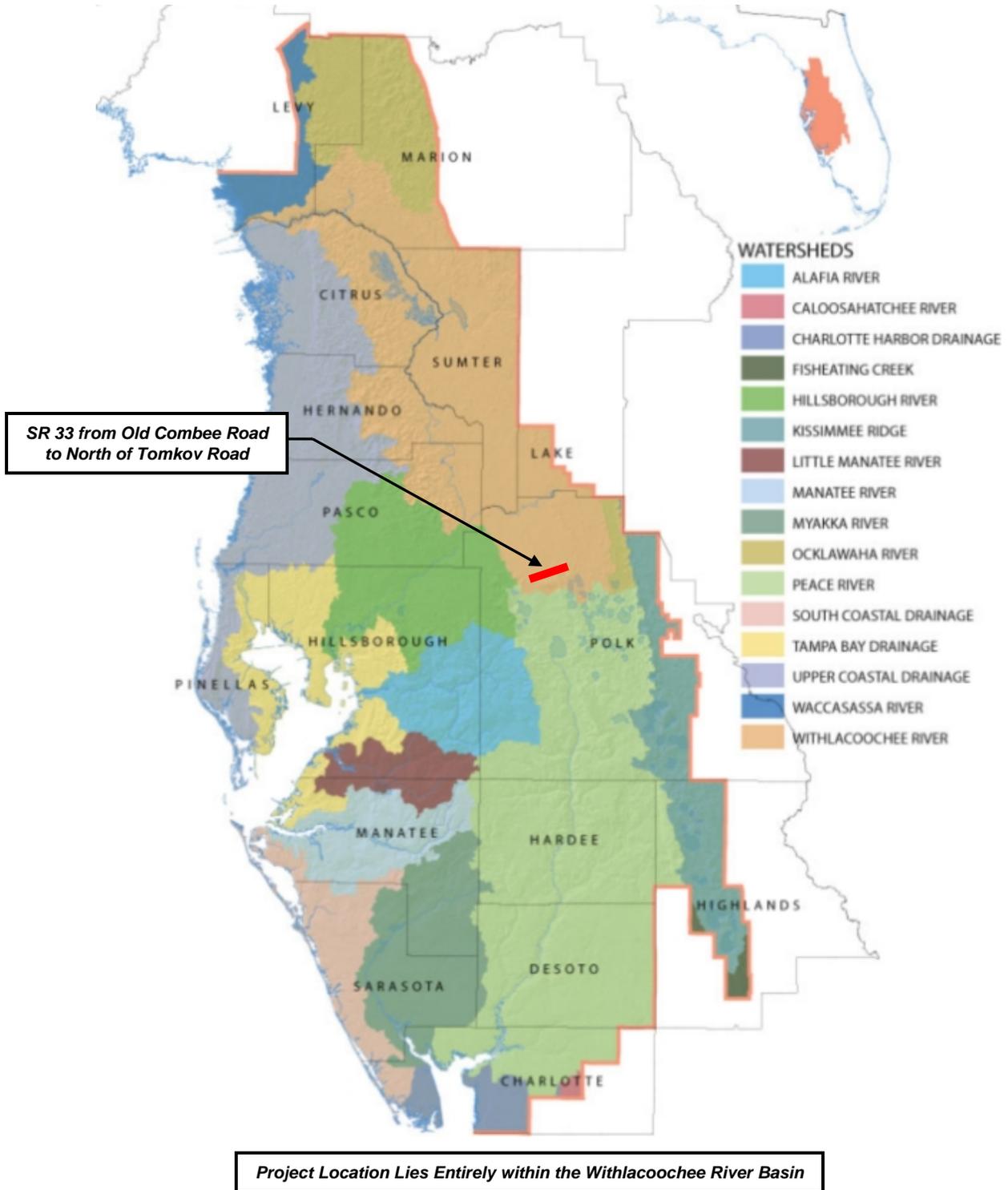
Sergio Figueroa made a phone call to Frank Ritchie with Southwest Florida Water Management District (SWFWMD) on July 30, 2013 to discuss the SR 33 PD&E Study project from Old Combee Road to north of Tomkow Road. Mr. Figueroa asked Mr. Ritchie if there are any floodplain watershed models currently being developed that would include the drainage area within the SR 33 project limits. Mr. Ritchie stated that SWFWMD is currently developing the Polk City Watershed Model; however, the parameters of the model are just outside the SR 33 project limits. Mr. Ritchie also verified with Mr. Figueroa that the FEMA Floodplain boundary lines dated in December 20, 2000 within the SR 33 Project Limits are the most current effective FEMA Floodplain boundary lines at this time. Mr. Ritchie did mention further that when the Polk City Watershed Model is approved at some point next year, the FEMA floodplain lines within the SR 33 project limits may change slightly to more accurately reflect the 100 year floodplain based existing land use and soils data. Mr. Figueroa acknowledged the disclaimer and also stated that he appreciated Mr. Ritchie's discussion regarding the FEMA Floodplain boundaries within the SR 33 Project limits.

*****End of Telephone Log*****

District Basin Maps:

- SWFWMD Watershed Basin Map
- FDEP WBID Map

SWFWMD Basin Map

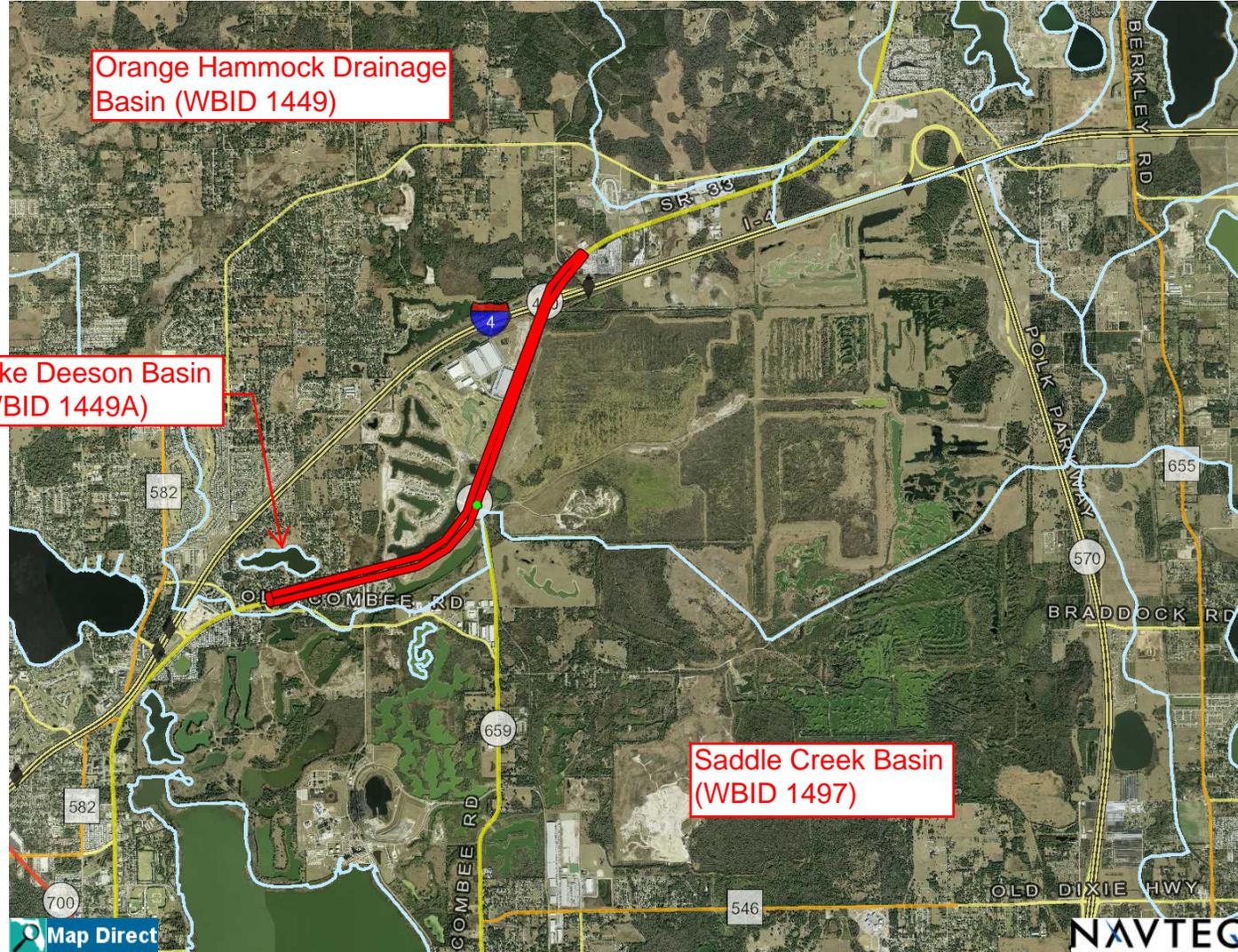




SR 33 from Old Combee Road to North of Tomkov Rd. WBID Map

28°10'26.5852", -81°57'52.7976"

28°10'18.2226", -81°48'39.5563"



28°4'10.6972", -81°57'59.8224"

28°4'2.3425", -81°48'47.1114"



Scale 1:81,172

Aerial Imagery 2004-2009

 Waterbody Ids (WBIDs)

 Counties

Aerial Imagery Flight Dates
2004-2009

Florida Department of Environmental Protection Disclaimer: This map created in Map Direct on Thu, 15 Nov 2012 20:07:55 UTC is intended for display purposes only. It was created using data from different sources collected at different scales, with different levels of accuracy, and/or covering different periods of time. NAVTEQ road data is provided "AS IS" and without warranties of any kind, either express or implied, including, but not limited to, the implied warranties of merchantability, fitness for a particular purpose, satisfactory quality and non-infringement. YOU SHOULD THEREFORE VERIFY ANY INFORMATION OBTAINED FROM THE SITE BEFORE ACTING ON IT.

Project outfalls to Orange Hammock, Saddle Creek, and Lake Deeson Basin. Only Saddle Creek and Lake Deeson Basin are verified for impaired nutrients.

Straight Line Diagram

STRAIGHT LINE DIAGRAM OF ROAD INVENTORY
FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT ONE MAINTENANCE STATISTICS OFFICE

INT. or US ROUTE NO. STATE ROAD NO. COUNTY DISTRICT ROADWAY ID SHEET NO. OF.

2
4

DATE BY	5 YR INV FTE	SLD REV RWC	BMP	EMP	INTERIM REVISIONS INV	SLD REV
12/20/07		01/08/08				

ROADWAY FEATURES										
	LANE WIDTHS ARE AVERAGED									
	<p>48.0' - 24.0' 2 - 12.0' RDWY 2+5.0' PVD SHLD1 2+7.0' LWN SHLD2</p> <p>8.259 66.0' - 24.0' 2 - 12.0' RDWY 18.0' C&G/LWN MED 2+5.0' PVD SHLD1 2+7.0' LWN SHLD2 2+2.0' CRG INSHLD1</p> <p>8.332 RP+16320092 8.359 TURN OUT 8.513 TURN OUT 8.543 RP+16320091 8.529 RP+16320093</p> <p>8.590 60.0' - 24.0' 2 - 12.0' RDWY 12.0' PVD MED 2+5.0' PVD SHLD1 2+7.0' LWN SHLD2</p> <p>8.775 44.0' - 24.0' 2 - 12.0' RDWY 2+5.0' PVD SHLD1 2+7.0' LWN SHLD2</p> <p>8.949 56.0' - 24.0' 2 - 12.0' RDWY 12.0' PVD MED 2+5.0' PVD SHLD1 2+5.0' LWN SHLD2</p> <p>9.001 AUTO AUCTION</p> <p>9.259 44.0' - 24.0' 2 - 12.0' RDWY 2+5.0' PVD SHLD1 2+5.0' LWN SHLD2</p> <p>9.620 56.0' - 24.0' 2 - 12.0' RDWY 12.0' PVD MED 2+5.0' PVD SHLD1 2+5.0' LWN SHLD2</p> <p>9.802 48.0' - 24.0' 2 - 12.0' RDWY 2+5.0' PVD SHLD1 2+6.0' LWN SHLD2</p> <p>11.294 58.0' - 24.0' 2 - 12.0' RDWY 2+5.0' PVD SHLD1 2+6.0' LWN SHLD2</p> <p>11.584 48.0' - 24.0' 2 - 12.0' RDWY 2+5.0' PVD SHLD1 2+6.0' LWN SHLD2</p>									
	ROADWAY COMPOSITION									
	HORIZONTAL ALIGNMENT									
	STRUCTURE DESCRIPTION									
DISTRICT USE										
SIS										
FUN CLASS										

ROADWAY FEATURES										
	LANE WIDTHS ARE AVERAGED									
	<p>60.0' - 24.0' 2 - 12.0' RDWY 12.0' PVD MED 2+6.0' PVD SHLD1 2+6.0' LWN SHLD2</p> <p>13.291</p> <p>48.0' - 24.0' 2 - 12.0' RDWY 2+6.0' PVD SHLD1 2+6.0' LWN SHLD2</p> <p>13.609</p> <p>58.0' - 24.0' 2 - 12.0' RDWY 10.0' PVD MED 2+12.0' PVD SHLD1</p> <p>14.149</p> <p>43.0' - 24.0' 2 - 12.0' RDWY 15.0' PVD MED 2+2.0' C&G SHLD1</p> <p>14.250</p> <p>48.0' - 24.0' 2 - 12.0' RDWY 2+6.0' PVD SHLD1 2+6.0' LWN SHLD2</p> <p>14.603</p>									
	ROADWAY COMPOSITION									
	HORIZONTAL ALIGNMENT									
	STRUCTURE DESCRIPTION									
DISTRICT USE										
SIS										
FUN CLASS										

DATE	5 YR INV	SLD REV	BMP	EMP	INTERIM REVISIONS	SLD REV
BY	FTE	RWC			INV	
12/20/07		07/08/08				

STRAIGHT LINE DIAGRAM OF ROAD INVENTORY
 FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT ONE MAINTENANCE STATISTICS OFFICE

INT. of US ROUTE NO	STATE ROAD NO.	COUNTY	DISTRICT	ROADWAY ID	SHEET NO.
	SR 33	POLK	1	16070000	3
					OF 4

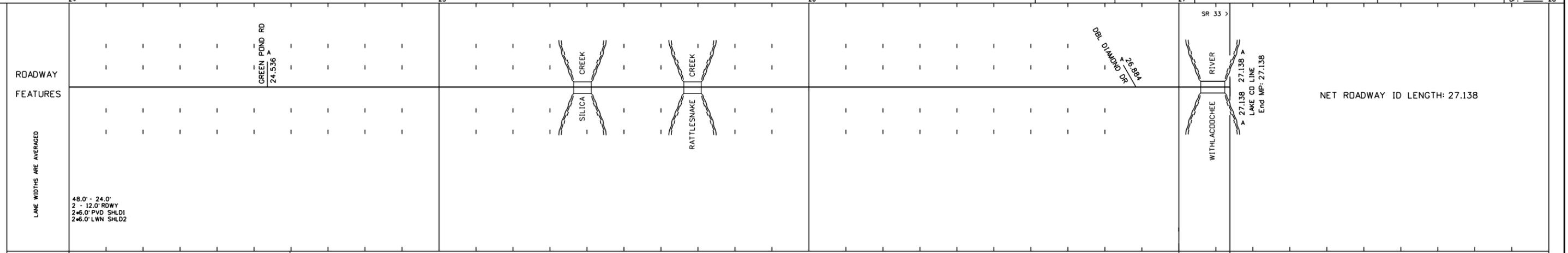
ROADWAY FEATURES	ROADWAY	16	17	18	19	20	
	FEATURES						
ROADWAY COMPOSITION	COMPOSITION	28/FC-2					
	HORIZONTAL ALIGNMENT	CURVE DATA IS NOT FIELD VERIFIED					
STRUCTURE DESCRIPTION	DESCRIPTION						
	DISTRICT USE	RURAL MINOR ARTERIAL					

ROADWAY FEATURES	ROADWAY	20	21	22	23	24	
	FEATURES						
ROADWAY COMPOSITION	COMPOSITION	28/FC-2					
	HORIZONTAL ALIGNMENT	CURVE DATA IS NOT FIELD VERIFIED					
STRUCTURE DESCRIPTION	DESCRIPTION						
	DISTRICT USE	RURAL MINOR ARTERIAL					

5 YR INV	SLD REV	BMP	EMP	INTERIM REVISIONS	SLD REV
DATE	12/20/07	07/08/08		INV	
BY	FTE	RWC			

STRAIGHT LINE DIAGRAM OF ROAD INVENTORY
 FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT ONE MAINTENANCE STATISTICS OFFICE

INT. of US ROUTE NO	STATE ROAD NO.	COUNTY	DISTRICT	ROADWAY ID	SHEET NO.
	SR 33	POLK	1	16070000	4
					OF 4



HORIZONTAL ALIGNMENT	CURVE DATA IS NOT FIELD VERIFIED	PC=24.967 PI=25.171 PT=25.171 D=1° 00'00.00 Δ=21° 30'00"	B=N26° 31'00"E
STRUCTURE DESCRIPTION	24.394 1-30' X 95' CC	*0146 25.379 25.384 25.452 2-5' X 5' X 35' CBC	*0209 25.680 25.705 26.152 1-3' X 2' X 45' CBC
DISTRICT USE			
SIS			
FUN CLASS	RURAL MINOR ARTERIAL		

Appendix 12

Existing Permits

- SWFWMD Permit No. 2832
(SR 33 from I-4 to Old Combee)
- SWFWMD Permit No. 7112
(East West Road)
- SWFWMD Permit No. 21375
(Firstpark at Bridgewater)
- SWFWMD Permit No. 40908
(Tomkow Road Driveway)

SWFWMD Permit No. 2832
(SR 33 from I-4 to Old Combee)



Southwest Florida Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
SUNCOM 628-4150 TDD only 1-800-231-6103 (FL only)
On the Internet at: WaterMatters.org

An Equal
Opportunity
Employer

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

Sarasota Service Office
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

January 21, 2011

Florida Department of Transportation
Post Office Box 1249
Bartow, FL 33831-1249

Subject: **Notice of Final Agency Action for Approval**
ERP General Construction
Project Name: FDOT SR 33 Widening I-4 to Old Combee Road
App ID/Permit No: 639310 / 44002832.001
County: POLK
Sec/Twp/Rge: 31/27S/24E, 21/27S/24E, 30/27S/24E, 29/27S/24E,
28/27S/24E

Dear Permittee(s):

This letter constitutes notice of Final Agency Action for **approval** of the permit referenced above. Final approval is contingent upon no objection to the District's action being received by the District within the time frames described below.

You or any person whose substantial interests are affected by the District's action regarding a permit may request an administrative hearing in accordance with Sections 120.569 and 120.57, Florida Statutes, (F.S.), and Chapter 28-106, Florida Administrative Code, (F.A.C.), of the Uniform Rules of Procedure. *A request for hearing must: (1) explain how the substantial interests of each person requesting the hearing will be affected by the District's action, or proposed action, (2) state all material facts disputed by the person requesting the hearing or state that there are no disputed facts, and (3) otherwise comply with Chapter 28-106, F.A.C.* Copies of Sections 28-106.201 and 28-106.301, F.A.C. are enclosed for your reference. A request for hearing must be filed with (received by) the Agency Clerk of the District at the District's Brooksville address within 21 days of receipt of this notice. Receipt is deemed to be the fifth day after the date on which this notice is deposited in the United States mail. Failure to file a request for hearing within this time period shall constitute a waiver of any right you or such person may have to request a hearing under Sections 120.569 and 120.57, F.S. Mediation pursuant to Section 120.573, F.S., to settle an administrative dispute regarding the District's action in this matter is not available prior to the filing of a request for hearing.

Enclosed is a "Noticing Packet" that provides information regarding the District Rule 40D-1.1010, F.A.C., which addresses the notification of persons whose substantial interests may be affected by the District's action in this matter. The packet contains guidelines on how to provide notice of the District's action, and a notice that you may use.

Approved construction plans are part of the permit, and construction must be in accordance with these plans. *These drawings are available for viewing or downloading at www.watermatters.org.*

If you have questions, please contact Robert Dasta, at the Bartow Service Office, extension 6105. For assistance with environmental concerns, please contact Cory Catts, extension 6104.

Sincerely,

Brian S. Starford, P.G.

Authorized Signature

Director, Bartow Regulation Department

Enclosures: Approved Permit w/Conditions Attached
 [Statement of Completion](#)
 Notice of Authorization of Commence Construction
 Noticing Packet (42.00-039)
 Section 28-106.201 and 28-106.301, F.A.C

cc: Richard Lilyquist, P.E.
 City of Lakeland
 Brent Setchell, P.E.
 Donald Brown, P.E., DYER RIDDLE MILLS & PRECOURT INC

**SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
ENVIRONMENTAL RESOURCE
GENERAL CONSTRUCTION
PERMIT NO. 44002832.001**

EXPIRATION DATE: January 21, 2016

PERMIT ISSUE DATE: January 21, 2011

This permit is issued under the provisions of Chapter 373, Florida Statutes, (F.S.), and the Rules contained in Chapters 40D-4 and 40D-40, Florida Administrative Code, (F.A.C.). The permit authorizes the Permittee to proceed with the construction of a surface water management system in accordance with the information outlined herein and shown by the application, approved drawings, plans, specifications, and other documents, attached hereto and kept on file at the Southwest Florida Water Management District (District). Unless otherwise stated by permit specific condition, permit issuance constitutes certification of compliance with state water quality standards under Section 401 of the Clean Water Act, 33 U.S.C. 1341. All construction, operation and maintenance of the surface water management system authorized by this permit shall occur in compliance with Florida Statutes and Administrative Code and the conditions of this permit.

PROJECT NAME: FDOT SR 33 Widening I-4 to Old Combee Road

GRANTED TO: Florida Department of Transportation
Post Office Box 1249
Bartow, FL 33831-1249

OTHER PERMITTEES: N/A

ABSTRACT: This permit authorization is for the construction of a surface water management system to serve a 30.05-acre roadway improvement project, as named above and as shown on the approved construction plans. The construction activities include the widening from a two-lane road to a four-lane divided roadway with curb and gutter, sidewalks, and ten stormwater ponds. The project extends approximately 1.4 miles along State Road 33 from its intersection with Interstate 4 to just north of its intersection with Deeson Pointe Boulevard in Polk County.

The majority of the project discharges to hydrologically open drainage basins where the surface water management system has been designed such that the post-development discharge rate for a 25-year, 24-hour storm event does not exceed the pre-development condition. The remaining portion of the project discharges to a closed basin where the surface water management system has been designed to retain the entire 100-year, 24-hour storm event without surface water discharge. Flood Insurance Rate Map Community Panel Nos. 12105C0302F, 12105C0304F, and 12105C0310F indicate that the project does not lie within a floodplain. No adverse off-site/on-site water quantity impacts are expected.

Compliance with Chapter 40D-4, F.A.C., water quality requirements, are assured as the retention ponds will treat the first one-half inch of stormwater runoff from the new and existing impervious areas through natural infiltration. This is consistent with Part B, Environmental Resource Permitting Information Manual, Subsections 5.2(c.). The discharge structure for the down gradient ponds will be equipped with a skimmer to ensure that oils, greases, and floating pollutants are not discharged into down gradient receiving waters. No adverse on-site/off-site water quality impacts are expected.

There are no wetlands or surface waters within the project area.

OP. & MAIN. ENTITY: Florida Department of Transportation

OTHER OP. & MAIN. ENTITY: N/A

COUNTY: POLK

SEC/TWP/RGE: 31/27S/24E, 21/27S/24E, 30/27S/24E, 29/27S/24E, 28/27S/24E

TOTAL ACRES OWNED OR UNDER CONTROL:	60.10
PROJECT SIZE:	30.05 Acres
LAND USE:	Road Projects
DATE APPLICATION FILED:	September 16, 2010
AMENDED DATE:	N/A

I. Water Quantity/Quality

POND No.	Area Acres @ Top of Bank	Treatment Type
D-1	0.24	ON-LINE RETENTION
A-1	0.09	ON-LINE RETENTION
A-3	0.27	ON-LINE RETENTION
B-2	0.34	ON-LINE RETENTION
C-1	0.07	NO TREATMENT SPECIFIED
C-2	0.49	ON-LINE RETENTION
C-3	0.30	ON-LINE RETENTION
D-2	0.10	NO TREATMENT SPECIFIED
D-3	1.01	ON-LINE RETENTION
E	0.57	ON-LINE RETENTION
Total: 3.48		

Ponds C-1 and D-2 are attenuation-only ponds.

A mixing zone is not required.

A variance is not required.

II. 100-Year Floodplain

Encroachment (Acre-Feet of fill)	Compensation (Acre-Feet of excavation)	Compensation Type	Encroachment Result* (feet)
0.00	0.00	No Encroachment	N/A

*Depth of change in flood stage (level) over existing receiving water stage resulting from floodplain encroachment caused by a project that claims Minimal Impact type of compensation.

III. Environmental Considerations

Wetland/Other Surface Water Information

Wetland/Other Surface Water Comments:

No wetlands or surface waters within the project area.

Mitigation Information

Mitigation Comments:

Mitigation is not required.

A regulatory conservation easement is not required.

A proprietary conservation easement is not required.

Specific Conditions

1. If the ownership of the project area covered by the subject permit is divided, with someone other than the Permittee becoming the owner of part of the project area, this permit shall terminate, pursuant to Rule 40D-1.6105, F.A.C. In such situations, each land owner shall obtain a permit (which may be a modification of this permit) for the land owned by that person. This condition shall not apply to the division and sale of lots or units in residential subdivisions or condominiums.

2. Unless specified otherwise herein, two copies of all information and reports required by this permit shall be submitted to:

Bartow Regulation Department
Southwest Florida Water Management District
170 Century Boulevard
Bartow, FL 33830

The permit number, title of report or information and event (for recurring report or information submittal) shall be identified on all information and reports submitted.

3. The Permittee shall retain the design engineer, or other professional engineer registered in Florida, to conduct on-site observations of construction and assist with the as-built certification requirements of this project. The Permittee shall inform the District in writing of the name, address and phone number of the professional engineer so employed. This information shall be submitted prior to construction.
4. Within 30 days after completion of construction of the permitted activity, the Permittee shall submit to the Bartow Service Office a written statement of completion and certification by a registered professional engineer or other appropriate individual as authorized by law, utilizing the required Statement of Completion and Request for Transfer to Operation Entity form identified in Chapter 40D-1, F.A.C., and signed, dated, and sealed as-built drawings. The as-built drawings shall identify any deviations from the approved construction drawings.
5. The District reserves the right, upon prior notice to the Permittee, to conduct on-site research to assess the pollutant removal efficiency of the surface water management system. The Permittee may be required to cooperate in this regard by allowing on-site access by District representatives, by allowing the installation and operation of testing and monitoring equipment, and by allowing other assistance measures as needed on site.
6. All construction is prohibited within the permitted project area until the Permittee acquires legal ownership or legal control of the project area as delineated in the permitted construction drawings.
7. The Permittee, the Florida Department of Transportation, shall submit to the District a site-specific plan for erosion and sediment control best management practices, pursuant to Section 104, F.D.O.T. Standard Specifications for Road and Bridge Construction. The Permittee shall submit this plan and receive District approval prior to construction commencement.
8. For dry bottom retention systems, the retention area(s) shall become dry within 72 hours after a rainfall event. If a retention area is regularly wet, this situation shall be deemed to be a violation of this permit.
9. The operation and maintenance entity shall submit inspection reports in the form required by the District, in accordance with the following schedule. For systems utilizing retention or wet detention, the inspections shall be performed two (2) years after operation is authorized and every two (2) years thereafter.

GENERAL CONDITIONS

1. The general conditions attached hereto as Exhibit "A" are hereby incorporated into this permit by reference and the Permittee shall comply with them.

Brian S. Starford, P.G.

Authorized Signature

EXHIBIT A

GENERAL CONDITIONS:

1. All activities shall be implemented as set forth in the plans, specifications and performance criteria as approved by this permit. Any deviation from the permitted activity and the conditions for undertaking that activity shall constitute a violation of this permit.
2. This permit or a copy thereof, complete with all conditions, attachments, exhibits, and modifications, shall be kept at the work site of the permitted activity. The complete permit shall be available for review at the work site upon request by District staff. The permittee shall require the contractor to review the complete permit prior to commencement of the activity authorized by this permit.
3. For general permits authorizing incidental site activities, the following limiting general conditions shall also apply:
 - a. If the decision to issue the associated individual permit is not final within 90 days of issuance of the incidental site activities permit, the site must be restored by the permittee within 90 days after notification by the District. Restoration must be completed by re-contouring the disturbed site to previous grades and slopes re-establishing and maintaining suitable vegetation and erosion control to provide stabilized hydraulic conditions. The period for completing restoration may be extended if requested by the permittee and determined by the District to be warranted due to adverse weather conditions or other good cause. In addition, the permittee shall institute stabilization measures for erosion and sediment control as soon as practicable, but in no case more than 7 days after notification by the District.
 - b. The incidental site activities are commenced at the permittee's own risk. The Governing Board will not consider the monetary costs associated with the incidental site activities or any potential restoration costs in making its decision to approve or deny the individual environmental resource permit application. Issuance of this permit shall not in any way be construed as commitment to issue the associated individual environmental resource permit.
4. Activities approved by this permit shall be conducted in a manner which does not cause violations of state water quality standards. The permittee shall implement best management practices for erosion and a pollution control to prevent violation of state water quality standards. Temporary erosion control shall be implemented prior to and during construction, and permanent control measures shall be completed within 7 days of any construction activity. Turbidity barriers shall be installed and maintained at all locations where the possibility of transferring suspended solids into the receiving waterbody exists due to the permitted work. Turbidity barriers shall remain in place at all locations until construction is completed and soils are stabilized and vegetation has been established. Thereafter the permittee shall be responsible for the removal of the barriers. The permittee shall correct any erosion or shoaling that causes adverse impacts to the water resources.
5. Water quality data for the water discharged from the permittee's property or into the surface waters of the state shall be submitted to the District as required by the permit. Analyses shall be performed according to procedures outlined in the current edition of Standard Methods for the Examination of Water and Wastewater by the American Public Health Association or Methods for Chemical Analyses of Water and Wastes by the U.S. Environmental Protection Agency. If water quality data are required, the permittee shall provide data as required on volumes of water discharged, including total volume discharged during the days of sampling and total monthly volume dis-charged from the property or into surface waters of the state.
6. District staff must be notified in advance of any proposed construction dewatering. If the dewatering activity is likely to result in offsite discharge or sediment transport into wetlands or surface waters, a written dewatering plan must either have been submitted and approved with the permit application or submitted to the District as a permit prior to the dewatering event as a permit modification. A water use permit may be required prior to any use exceeding the thresholds in Chapter 40D-2, F.A.C.

7. Stabilization measures shall be initiated for erosion and sediment control on disturbed areas as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 7 days after the construction activity in that portion of the site has temporarily or permanently ceased.
8. Off-site discharges during construction and development shall be made only through the facilities authorized by this permit. Water discharged from the project shall be through structures having a mechanism suitable for regulating upstream stages. Stages may be subject to operating schedules satisfactory to the District.
9. The permittee shall complete construction of all aspects of the surface water management system, including wetland compensation (grading, mulching, planting), water quality treatment features, and discharge control facilities prior to beneficial occupancy or use of the development being served by this system.
10. The following shall be properly abandoned and/or removed in accordance with the applicable regulations:
 - a. Any existing wells in the path of construction shall be properly plugged and abandoned by a licensed well contractor.
 - b. Any existing septic tanks on site shall be abandoned at the beginning of construction.
 - c. Any existing fuel storage tanks and fuel pumps shall be removed at the beginning of construction.
11. All surface water management systems shall be operated to conserve water in order to maintain environmental quality and resource protection; to increase the efficiency of transport, application and use; to decrease waste; to minimize unnatural runoff from the property and to minimize dewatering of offsite property.
12. At least 48 hours prior to commencement of activity authorized by this permit, the permittee shall submit to the District a written notification of commencement indicating the actual start date and the expected completion date.
13. Each phase or independent portion of the permitted system must be completed in accordance with the permitted plans and permit conditions prior to the occupation of the site or operation of site infrastructure located within the area served by that portion or phase of the system. Each phase or independent portion of the system must be completed in accordance with the permitted plans and permit conditions prior to transfer of responsibility for operation and maintenance of that phase or portion of the system to a local government or other responsible entity.
14. Within 30 days after completion of construction of the permitted activity, the permittee shall submit a written statement of completion and certification by a registered professional engineer or other appropriate individual as authorized by law, utilizing the required Statement of Completion and Request for Transfer to Operation Entity form identified in Chapter 40D-1, F.A.C. Additionally, if deviation from the approved drawings are discovered during the certification process the certification must be accompanied by a copy of the approved permit drawings with deviations noted.
15. This permit is valid only for the specific processes, operations and designs indicated on the approved drawings or exhibits submitted in support of the permit application. Any substantial deviation from the approved drawings, exhibits, specifications or permit conditions, including construction within the total land area but outside the approved project area(s), may constitute grounds for revocation or enforcement action by the District, unless a modification has been applied for and approved. Examples of substantial deviations include excavation of ponds, ditches or sump areas deeper than shown on the approved plans.
16. The operation phase of this permit shall not become effective until the permittee has complied with the requirements of the conditions herein, the District determines the system to be in compliance with the permitted plans, and the entity approved by the District accepts responsibility for operation and maintenance of the system. The permit may not be transferred to the operation and maintenance entity approved by the

District until the operation phase of the permit becomes effective. Following inspection and approval of the permitted system by the District, the permittee shall request transfer of the permit to the responsible operation and maintenance entity approved by the District, if different from the permittee. Until a transfer is approved by the District, the permittee shall be liable for compliance with the terms of the permit.

17. Should any other regulatory agency require changes to the permitted system, the District shall be notified of the changes prior to implementation so that a determination can be made whether a permit modification is required.
18. This permit does not eliminate the necessity to obtain any required federal, state, local and special District authorizations including a determination of the proposed activities' compliance with the applicable comprehensive plan prior to the start of any activity approved by this permit.
19. This permit does not convey to the permittee or create in the permittee any property right, or any interest in real property, nor does it authorize any entrance upon or activities on property which is not owned or controlled by the permittee, or convey any rights or privileges other than those specified in the permit and Chapter 40D-4 or Chapter 40D-40, F.A.C.
20. The permittee shall hold and save the District harmless from any and all damages, claims, or liabilities which may arise by reason of the activities authorized by the permit or any use of the permitted system.
21. Any delineation of the extent of a wetland or other surface water submitted as part of the permit application, including plans or other supporting documentation, shall not be considered binding unless a specific condition of this permit or a formal determination under section 373.421(2), F.S., provides otherwise.
22. The permittee shall notify the District in writing within 30 days of any sale, conveyance, or other transfer of ownership or control of the permitted system or the real property at which the permitted system is located. All transfers of ownership or transfers of a permit are subject to the requirements of Rule 40D-4.351, F.A.C. The permittee transferring the permit shall remain liable for any corrective actions that may be required as a result of any permit violations prior to such sale, conveyance or other transfer.
23. Upon reasonable notice to the permittee, District authorized staff with proper identification shall have permission to enter, inspect, sample and test the system to insure conformity with District rules, regulations and conditions of the permits.
24. If historical or archaeological artifacts are discovered at any time on the project site, the permittee shall immediately notify the District and the Florida Department of State, Division of Historical Resources.
25. The permittee shall immediately notify the District in writing of any previously submitted information that is later discovered to be inaccurate.

SOUTHWEST FLORIDA
WATER MANAGEMENT DISTRICT

**NOTICE OF
AUTHORIZATION
TO COMMENCE CONSTRUCTION**

FDOT SR 33 Widening I-4 to Old Combee Road

PROJECT NAME

Road Projects

PROJECT TYPE

POLK

COUNTY

31/27S/24E...

See Permit for additional STR listings

SEC(S)/TWP(S)/RGE(S)

Florida Department of Transportation

PERMITTEE

APPLICATION ID/PERMIT NO: 639310 / 44002832.001

DATE ISSUED: January 21, 2011



Brian S. Starford, P.G.

Issuing Authority

**THIS NOTICE SHOULD BE CONSPICUOUSLY
DISPLAYED AT THE SITE OF THE WORK**

**PART II HEARINGS INVOLVING
DISPUTED ISSUES OF MATERIAL FACT**

28-106.201 Initiation of Proceedings.

(1) Unless otherwise provided by statute, and except for agency enforcement and disciplinary actions that shall be initiated under Rule 28-106.2015, F.A.C., initiation of proceedings shall be made by written petition to the agency responsible for rendering final agency action. The term "petition" includes any document that requests an evidentiary proceeding and asserts the existence of a disputed issue of material fact. Each petition shall be legible and on 8 1/2 by 11 inch white paper. Unless printed, the impression shall be on one side of the paper only and lines shall be doublespaced.

(2) All petitions filed under these rules shall contain:

(a) The name and address of each agency affected and each agency's file or identification number, if known;
(b) The name, address, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination;

(c) A statement of when and how the petitioner received notice of the agency decision;

(d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;

(e) A concise statement of the ultimate facts alleged, including the specific facts the petitioner contends warrant reversal or modification of the agency's proposed action;

(f) A statement of the specific rules or statutes the petitioner contends require reversal or modification of the agency's proposed action, including an explanation of how the alleged facts relate to the specific rules or statutes; and

(g) A statement of the relief sought by the petitioner, stating precisely the action petitioner wishes the agency to take with respect to the agency's proposed action.

(3) Upon receipt of a petition involving disputed issues of material fact, the agency shall grant or deny the petition, and if granted shall, unless otherwise provided by law, refer the matter to the Division of Administrative Hearings with a request that an administrative law judge be assigned to conduct the hearing. The request shall be accompanied by a copy of the petition and a copy of the notice of agency action.

Specific Authority 120.54(3), (5) FS. Law Implemented 120.54(5), 120.569, 120.57 FS. History-New 4-1-97, Amended 9-17-98, 1-15-07.

**PART III PROCEEDINGS AND HEARINGS
NOT INVOLVING DISPUTED ISSUES OF
MATERIAL FACT**

28-106.301 Initiation of Proceedings

(1) Unless otherwise provided by statute and except for agency enforcement and disciplinary actions initiated under subsection 28-106.2015(1), F.A.C., initiation of a proceeding shall be made by written petition to the agency responsible for rendering final agency action. The term "petition" includes any document which requests a proceeding. Each petition shall be legible and on 8 1/2 by 11 inch white paper or on a form provided by the agency. Unless printed, the impression shall be on one side of the paper only and lines shall be doubled-spaced.

(2) All petitions filed under these rules shall contain:

(a) The name and address of each agency affected and each agency's file or identification number, if known;

(b) The name, address, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination;

(c) An explanation of how the petitioner's substantial interests will be affected by the agency determination;

(d) A statement of when and how the petitioner received notice of the agency decision;

(e) A concise statement of the ultimate facts alleged, including the specific facts the petitioner contends warrant reversal or modification of the agency's proposed action;

(f) A statement of the specific rules or statutes that the petitioner contends require reversal or modification of the agency's proposed action;

(g) A statement of the relief sought by the petitioner, stating precisely the action petitioner wishes the agency to take with respect to the agency's proposed action; and

(h) A statement that no material facts are in dispute.

Specific Authority 120.54(5) FS. Law Implemented 120.54(5), 120.569, 120.57 FS. History-New 4-1-97, Amended 9-17-98, 1-15-07, 12-24-07.



An Equal
Opportunity
Employer

Southwest Florida Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
SUNCOM 628-4150 TDD only 1-800-231-6103 (FL only)
On the Internet at: WaterMatters.org

Bartow Service Office

170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

Sarasota Service Office

6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

Tampa Service Office

7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

NOTICING PACKET PUBLICATION INFORMATION

PLEASE SEE THE NEXT PAGE OF THIS NOTICE FOR A LIST OF FREQUENTLY ASKED QUESTIONS (FAQ)

The District's action regarding the issuance or denial of a permit, a petition or qualification for an exemption only becomes closed to future legal challenges from members of the public ("third parties"), if 1.) "third parties" have been properly notified of the District's action regarding the permit or exemption, and 2.) no "third party" objects to the District's action within a specific period of time following the notification.

Notification of "third parties" is provided through publication of certain information in a newspaper of general circulation in the county or counties where the proposed activities are to occur. Publication of notice informs "third parties" of their right to challenge the District's action. If proper notice is provided by publication, "third parties" have a 21-day time limit in which to file a petition opposing the District's action. A shorter 14-day time limit applies to District action regarding Environmental Resource Permits linked with an authorization to use Sovereign Submerged Lands. However, if no notice to "third parties" is published, there is no time limit to a party's right to challenge the District's action. The District has not published a notice to "third parties" that it has taken or intends to take final action on your application. If you want to ensure that the period of time in which a petition opposing the District's action regarding your application is limited to the time frames stated above, you must publish, at your own expense, a notice in a newspaper of general circulation. A copy of the Notice of Agency Action the District uses for publication and guidelines for publishing are included in this packet.

Guidelines for Publishing a Notice of Agency Action

1. Prepare a notice for publication in the newspaper. The District's Notice of Agency Action, included with this packet, contains all of the information that is required for proper noticing. However, you are responsible for ensuring that the form and **the content** of your notice comply with the applicable statutory provisions.
2. Your notice must be published in accordance with Chapter 50, Florida Statutes. A copy of the statute is enclosed.
3. Select a newspaper that is appropriate considering the location of the activities proposed in your application, and contact the newspaper for further information regarding their procedures for publishing.
4. You only need to publish the notice for one day.
5. Obtain an "affidavit of publication" from the newspaper after your notice is published.
6. Immediately upon receipt send the **ORIGINAL** affidavit to the District at the address below, for the file of record. **Retain a copy of the affidavit for your records.**

Southwest Florida Water Management District
Records and Data Supervisor
2379 Broad Street
Brooksville, Florida 34604-6899

Note: If you are advertising a notice of the District's proposed action, and the District's final action is different, publication of an additional notice may be necessary to prevent future legal challenges. If you need additional assistance, please contact us at ext. 4360, at the Brooksville number listed above. **(Your question may be on the FAQ list).**

FAQ ABOUT NOTICING

1. **Q.** Do I have to do this noticing, and what is this notice for?
A. You do not have to do this noticing, unless you are issued a permit classified as an "Individual". You need to publish a notice if you want to ensure that a "third party" cannot challenge the District's action on your permit, exemption, or petition at some future date. If you choose not to publish, there is no time limit to a third party's right to challenge the District's action.
2. **Q.** What do I need to send to the newspaper?
A. The enclosed one page notice form entitled "Notice of Final Agency Action (or Proposed Agency Action) By The Southwest Florida Water Management District." You must fill in the blanks before sending it.
3. **Q.** Do I have to use the notice form, or can I make up my own form?
A. You do not have to use our form. However, your notice must contain all information that is in the form.
4. **Q.** Do I send the newspaper the whole form (one page) or just the top portion that has blanks?
A. Send the full page form which includes the NOTICE OF RIGHTS section on the bottom half.
5. **Q.** The section 50.051, F.S. (enclosed) proof of publication form of uniform affidavit has blanks in the text. Do I fill in these blanks and send that to the newspaper?
A. No. That section shows the affidavit the newspaper will send you. They will fill in the blanks.
6. **Q.** If someone objects, is my permit or exemption no good?
A. If you publish a notice and a "third party" files a request for administrative hearing within the allotted time, the matter is referred to an administrative hearing. While the case is pending, generally, you may not proceed with activities under the challenged agency action. When the hearing is complete, the administrative law judge's (ALJ) recommendation is returned to the District Governing Board, and the Governing Board will take final action on the ALJ's recommendation. There is no time limit for a "third party" to object and file a request for administrative hearing if you do not publish a notice.

CHAPTER 50, FLORIDA STATUTES

LEGAL AND OFFICIAL ADVERTISEMENTS

50.011	Where and in what language legal notices to be published.
50.021	Publication when no newspaper in county.
50.031	Newspapers in which legal notices and process may be published.
50.041	Proof of publication; uniform affidavits required.
50.051	Proof of publication; form of uniform affidavit.
50.061	Amounts chargeable.
50.0711	Court docket fund; service charges; publications.

50.011 Where and in what language legal notices to be published.-

Whenever by statute an official or legal advertisement or a publication, or notice in a newspaper has been or is directed or permitted in the nature of or in lieu of process, or for constructive service, or in initiating, assuming, reviewing, exercising or enforcing jurisdiction or power, or for any purpose, including all legal notices and advertisements of sheriffs and tax collectors, the contemporaneous and continuous intent and meaning of such legislation all and singular, existing or repealed, is and has been and is hereby declared to be and to have been, and the rule of interpretation is and has been, a publication in a newspaper printed and published periodically once a week or oftener, containing at least 25 percent of its words in the English language, entered or qualified to be admitted and entered as periodicals matter at a post office in the county where published, for sale to the public generally, available to the public generally for the publication of official or other notices and customarily containing information of a public character or of interest or of value to the residents or owners of property in the county where published, or of interest or of value to the general public.

History.--s. 2, ch. 3022, 1877; RS 1296; GS 1727; s. 1, ch. 5610, 1907; RGS 2942; s. 1, ch. 12104, 1927; CGL 4666, 4901; s. 1, ch. 63-387; s. 6, ch. 67-254; s. 21, ch. 99-2.

Note.--Former s. 49.01.

50.021 Publication when no newspaper in county.

When any law, or order or decree of court, shall direct advertisements to be made in any county and there be no newspaper published in the said county, the advertisement may be made by posting three copies thereof in three different places in said county, one of which shall be at the front door of the courthouse, and by publication in the nearest county in which a newspaper is published.

History.--RS 1297; GS 1728; RGS 2943; CGL 4667; s. 6, ch. 67-254.

Note.--Former s. 49.02.

50.031 Newspapers in which legal notices and process may be published.

No notice or publication required to be published in a newspaper in the nature of or in lieu of process of any kind, nature, character or description provided for under any law of the state, whether heretofore or hereafter enacted, and whether pertaining to constructive service, or the initiating, assuming, reviewing, exercising or enforcing jurisdiction or power, by any court in this state, or any notice of sale of property, real or personal, for taxes, state, county or municipal, or sheriff's, guardian's or administrator's or any sale made pursuant to any judicial order, decree or statute or any other publication or notice pertaining to any affairs of the state, or any county, municipality or other political subdivision thereof, shall be deemed to have been published in accordance with the statutes providing for such publication, unless the same shall have been published for the prescribed period of time required for such publication, in a newspaper which at the time of such publication shall have been in existence for 1 year and shall have been entered as periodicals matter at a post office in the county where published, or in a newspaper which is a direct successor of a newspaper which together have been so published; provided, however, that nothing herein contained shall apply where in any county there shall be no newspaper in existence which shall have been published for the length of time above prescribed. No legal publication of any kind, nature or description, as herein defined, shall be valid or binding or held to be in compliance with the statutes providing for such publication unless the same shall have been published in accordance with the provisions of this section. Proof of such publication shall be made by uniform affidavit.

History.--ss. 1-3, ch. 14830, 1931; CGL 1936 Supp. 4274(1); s. 7, ch. 22858, 1945; s. 6, ch. 67-254; s. 1, ch. 74-221; s. 22, ch. 99-2.

Note.--Former s. 49.03.

50.041 Proof of publication; uniform affidavits required.

(1) All affidavits of publishers of newspapers (or their official representatives) made for the purpose of establishing proof of publication of public notices or legal advertisements shall be uniform throughout the state.

(2) Each such affidavit shall be printed upon white bond paper containing at least 25 percent rag material and shall be 8.5 inches in width and of convenient length, not less than 5.5 inches. A white margin of not less than 2.5 inches shall be left at the right side of each affidavit form and upon or in this space shall be substantially pasted a clipping which shall be a true copy of the public notice or legal advertisement for which proof is executed.

(3) In all counties having a population in excess of 450,000 according to the latest official decennial census, in addition to the charges which are now or may hereafter be established by law for the publication of every official notice or legal advertisement, there may be a charge not to exceed \$2 for the preparation and execution of each such proof of publication or publisher's affidavit.

History.--s. 1, ch. 19290, 1939; CGL 1940 Supp. 4668(1); s. 1, ch. 63-49; s. 26, ch. 67-254; s. 1, ch. 76-58.

Note.--Former s. 49.04.

50.051 Proof of publication; form of uniform affidavit.-

The printed form upon which all such affidavits establishing proof of publication are to be executed shall be substantially as follows:

NAME OF NEWSPAPER
Published (Weekly or Daily)
(Town or City) (County) FLORIDA

STATE OF FLORIDA

COUNTY OF _____:

Before the undersigned authority personally appeared _____, who on oath says that he or she is _____ of the _____, a _____ newspaper published at _____ in _____ County, Florida; that the attached copy of advertisement, being a _____ in the matter of _____ in the _____ Court, was published in said newspaper in the issues of _____.

Affiant further says that the said _____ is a newspaper published at _____, in said _____ County, Florida, and that the said newspaper has heretofore been continuously published in said _____ County, Florida, each _____ and has been entered as periodicals matter at the post office in _____, in said _____ County, Florida, for a period of 1 year next preceding the first publication of the attached copy of advertisement; and affiant further says that he or she has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Sworn to and subscribed before me this _____ day of _____ (year)____, by _____, who is personally known to me or who has produced (type of identification) as identification.

_____(Signature of Notary Public)____

_____(Print, Type, or Stamp Commissioned Name of Notary Public)____

_____(Notary Public)____

History.-s. 2, ch. 19290, 1939; CGL 1940 Supp. 4668(2); s. 6, ch. 67-254; s. 1, ch. 93-62; s. 291, ch. 95-147; s.23, ch 99-2; s. 3, ch. 99-6.

Note.-Former s. 49.05.

50.061 Amounts chargeable.-

(1) The publisher of any newspaper publishing any and all official public notices or legal advertisements shall charge therefore the rates specified in this section without rebate, commission or refund.

(2) The charge for publishing each such official public notice or legal advertisement shall be 70 cents per square inch for the first insertion and 40 cents per square inch for each subsequent insertion, except that:

(a) In all counties having a population of more than 304,000 according to the latest official decennial census, the charge for publishing each such official public notice or legal advertisement shall be 80 cents per square inch for the first insertion and 60 cents per square inch for each subsequent insertion.

(b) In all counties having a population of more than 450,000 according to the latest official decennial census, the charge for publishing each such official public notice or legal advertisement shall be 95 cents per square inch for the first insertion and 75 cents per square inch for each subsequent insertion.

(3) Where the regular established minimum commercial rate per square inch of the newspaper publishing such official public notices or legal advertisements is in excess of the rate herein stipulated, said minimum commercial rate per square inch may be charged for all such legal advertisements or official public notices for each insertion, except that a governmental agency publishing an official public notice or legal advertisement may procure publication by soliciting and accepting written bids from newspapers published in the county, in which case the specified charges in this section do not apply.

(4) All official public notices and legal advertisements shall be charged and paid for on the basis of 6-point type on 6-point body, unless otherwise specified by statute.

(5) Any person violating a provision of this section, either by allowing or accepting any rebate, commission, or refund, commits a misdemeanor of the second degree, punishable as provided in s. [775.082](#) or s. [775.083](#).

(6) Failure to charge the rates prescribed by this section shall in no way affect the validity of any official public notice or legal advertisement and shall not subject same to legal attack upon such grounds.

History.-s. 3, ch. 3022, 1877; RS 1298; GS 1729; RGS 2944; s. 1, ch. 12215, 1927; CGL 4668; ss. 1, 2, 2A, 2B, ch. 20264, 1941; s. 1, ch. 23663, 1947; s. 1, ch. 57-160; s. 1, ch. 63-50; s. 1, ch. 65-569; s. 6, ch. 67-254; s. 15, ch. 71-136; s. 35, ch. 73-332; s. 1, ch. 90-279.

Note.-Former s. 49.06.

50.0711 Court docket fund; service charges; publications.-

(1) The clerk of the court in each county may establish a court docket fund for the purpose of paying the cost of publication of the fact of the filing of any civil case in the circuit court of the county by the style and of the calendar relating to such cases. This court docket fund shall be funded by \$1 mandatory court cost for all civil actions, suits, or proceedings filed in the circuit court of the county. The clerk shall maintain such funds separate and apart, and the proceeds from this court cost shall not be diverted to any other fund or for any purpose other than that established in this section. The clerk of the court shall dispense the fund to the designated record newspaper in the county on a quarterly basis.

(2) A newspaper qualified under the terms of s. 50.011 shall be designated as the record newspaper for such publication by an order of the majority of the judges in the judicial circuit in which such county is located, and such order shall be filed and recorded with the clerk of the circuit court for such county. The designated record newspaper may be changed at the end of any fiscal year of the county by a majority vote of the judges of the judicial circuit of the county ordering such change 30 days prior to the end of the fiscal year, notice of which order shall be given to the previously designated record newspaper.

(3) The publishers of any designated record newspapers receiving payment from this court docket fund shall publish, without additional charge, the fact of the filing of any civil case, suit, or action filed in such county in the circuit. Such publication shall be in accordance with a schedule agreed upon between the record newspaper and the clerk of the court in such county.

(4) The publishers of any designated record newspapers receiving revenues from the court docket fund established in subsection (1) shall, without charge, accept legal advertisements for the purpose of service of process by publication under s. 49.011(4), (10), and (11) when such publication is required of persons authorized to proceed as indigent persons under s. 57.081.

History.--s. 46, ch. 2004-265.

**NOTICE OF FINAL AGENCY ACTION BY
THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT**

Notice is given that the District's Final Agency Action is approval of the ERP STANDARD GENERAL on 30.05 acres to serve COUNTY, STATE, CITY known as FDOT SR 33 Widening I-4 to Old Combee Road.

The project is located in POLK County, Section/Township/Range 31/27S/24E, 21/27S/24E, 30/27S/24E, 29/27S/24E, 28/27S/24E. The permit applicant is Florida Department of Transportation who address is Post Office Box 1249 Bartow, FL 33831-1249. The permit No. is 44002832.001.

The file(s) pertaining to the project referred to above is available for inspection Monday through Friday except for legal holidays, 8:00 a.m. to 5:00 p.m., at the Southwest Florida Water Management District 170 Century Boulevard, Bartow, Florida 33830-7700.

NOTICE OF RIGHTS

Any person whose substantial interests are affected by the District's action regarding this permit may request an administrative hearing in accordance with Sections 120.569 and 120.57, Florida Statutes (F.S.), and Chapter 28-106, Florida Administrative Code (F.A.C.), of the Uniform Rules of Procedure. *A request for hearing must (1) explain how the substantial interests of each person requesting the hearing will be affected by the District's action, or final action; (2) state all material facts disputed by each person requesting the hearing or state that there are no disputed facts; and (3) otherwise comply with Chapter 28-106, F.A.C.* A request for hearing must be filed with and received by the Agency Clerk of the District at the District's Brooksville address, 2379 Broad Street, Brooksville, FL 34604-6899 within 21 days of publication of this notice (or within 14 days for an Environmental Resource Permit with Proprietary Authorization for the use of Sovereign Submerged Lands). Failure to file a request for hearing within this time period shall constitute a waiver of any right such person may have to request a hearing under Sections 120.569 and 120.57, F.S.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the District's final action may be different from the position taken by it in this notice of final agency action. Persons whose substantial interests will be affected by any such final decision of the District on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Mediation pursuant to Section 120.573, F.S., to settle an administrative dispute regarding the District's final action in this matter is not available prior to the filing of a request for hearing.

SWFWM ENGINEERING WORKSHEET

PERMIT #: 44002832.001

PERMIT NAME: FDOT SR 33 Widening I-4 to Old Combee Road

BASIN NO. - POND NO.		Open or Closed	to A-1				to D-1				TOTALS		
			A-1	A-3	B-2	C-1	C-2	C-3	D-1	D-2	D-3	E	c
POND DATA	POND BOTTOM ELEVATION		136.00	137.00	137.00	139.50	139.00	139.00	137.30	137.00	137.00	139.00	
	SEASONAL HIGH WATER ELEVATION		135.00	135.00	136.00	--	136.90	134.00	136.80	--	135.50	135.30	
	CONTROL DEVICE ELEVATION		136.00	137.00	137.00	--	139.00	139.00	137.30	--	137.00	139.00	
	DESIGN LOW WATER ELEVATION		136.00	137.00	137.00	139.28	139.00	139.00	137.30	--	137.08	139.00	
	WEIR INVERT ELEVATION		137.00	138.25	138.45	139.80	139.55	Pipe to C-2 at 139.55	137.80	Pipe to D-1/D-3 at 138.05	138.05	139.80	
	DESIGN HIGH WATER ELEVATION		137.48	138.97	139.14	139.90	139.91	139.98	138.55	138.56	138.57	139.55 (100yr)	
	TOP OF BANK ELEVATION		137.50	139.00	139.50	140.00	140.50	140.50	139.00	139.00	139.00	140.50	
	AREA AT TOP OF BANK (ac)		0.09	0.27	0.34	0.07	0.49	0.30	0.24	0.10	1.01	0.57	3.48
	Add'l Impervious Area Added within basin		0.12	0.39	0.64	0.09	0.19	0.14	0.33	0.55	0.09	0.79	
	VOLUME AT TOB (ac-ft)		0.07	0.27	0.47	0.02	0.58	0.35	0.27	0.10	1.84	0.63	
QUANTITY	25YR/24HR DISCHARGE RATES	WEIR WIDTH (ft)	8.00	3.00	4 ft Trap.	Type D	1.00	24 in dia.	16 in	24/18 in dia.	Through D-1	5 ft Trap.	
		PRE-DEVELOPED (cfs)	See Comments below										Retention
		POST-DEVELOPED (cfs)	to TW-A				to TW-B-C-D						
	100YR/24HR RETENTION VOLUMES	PROVIDED (ac-ft)											24-hr event
REQUIRED (ac-ft)												w/no SW disch.	
QUALITY	TREATMENT AREA	OFW ? Y OR N	1.03	2.46	4.13	1.15	1.87	1.72	2.96	1.30	2.22	2.90	
	TREATMENT VOL. REQUIRED (ac-ft)		0.04		0.06	0.03			0.06			0.04	
	TREATMENT VOL. PROVIDED (ac-ft)		0.03	0.10	0.17	0.28			0.75 (in D-1 and D-3)			0.28	
	METHOD OF TREATMENT		Retention	Retention	Retention	N/A-Attn Only	Retention	Retention	Retention	N/A-Attn Only	Retention	Retention	
	CONTROL DEVICE TYPE		NI	NI	NI		NI	NI	NI		NI	NI	
	CONTROL DEVICE DIMENSIONS		3.4/6.8	3.4/6.8	2.7/5.4		12.8/25.5	11.5/23	12.8/25.5		14.2/28.3	17/34	
	RECOVERY TIME (hrs)		<36	<36	<36		<36	<36	<36		<72	<36	
100-YEAR FLOODPLAIN	ENCROACHMENT (ac-ft)		0.00										
	COMPENSATION (ac-ft)		0.00										
	COMPENSATION TYPE		NE										
	ENCROACH'T RESULT (ft)		N/A										

COMMENTS:	Qpre	Qpost	NAVD88
	TW-A	9.67	7.6
	TW-B-C-D	30.72	29.52

Appendix B
Predevelopment Calculations and
Documentation

Southwest Florida Water
Management District

SEP 16 2010

RECEIVED

Predevelopment Basin E-1

Description: Existing Road

Existing Weighted CN

Land Use	Hydrologic Condition	Soil Class	Area (Acres)	CN	Product
Pervious (Open Space)		A	1.37	39	53.39
Pervious (Open Space)		B/D		80	0.00
Pervious (Open Space)		C		74	0.00
Impervious			0.51	98	50.34
Total Area =			1.88		103.73
				Total Weighted CN =	55
				% Impervious Area	27.28%

Time of Concentration

SHEET FLOW

Length (ft) =	12	288
n =	0.011	0.15
US elevation =	144.3	144.00
DS elevation =	144	141.25
Slope (ft/ft) =	0.025	0.010
Rainfall (2yr-24hr) (in) =	4.9	4.9
Time of conc. (hr) =	0.003	0.413

CONCENTRATED FLOW

Length (ft) =	378
US elevation =	141.25
DS elevation =	141.00
Slope (ft/ft) =	0.001
Paved or unpaved =	Unpaved
Velocity (ft/s) =	0.41
Time of conc. (hr) =	0.253

$T_C = 0.669$ hrs

$T_C = 40$ min

Southwest Florida Water
Management District

SEP 16 2010

RECEIVED

9/1/2010

Predevelopment Basin E-2

Description: Existing Road

Existing Weighted CN

Land Use	Hydrologic Condition	Soil Class	Area (Acres)	CN	Product
Pervious (Open Space)		A	1.43	39	55.74
Pervious (Open Space)		B/D		80	0.00
Pervious (Open Space)		C		74	0.00
Impervious			0.25	98	24.67
Total Area =			1.68		80.41
				Total Weighted CN =	48
				% Impervious Area	14.97%

Time of Concentration

SHEET FLOW

Length (ft) =	12	288
n =	0.011	0.15
US elevation =	144.3	143.75
DS elevation =	143.75	142.00
Slope (ft/ft) =	0.046	0.006
Rainfall (2yr-24hr) (in) =	4.9	4.9
Time of conc. (hr) =	0.002	0.495

CONCENTRATED FLOW

Length (ft) =	194
US elevation =	142.00
DS elevation =	138.75
Slope (ft/ft) =	0.017
Paved or unpaved =	Unpaved
Velocity (ft/s) =	2.09
Time of conc. (hr) =	0.026

T_C = 0.523 hrs

T_C = 31 min

Stage Storage - Pre E-2

Stage (NGVD) (FT)	Area (Ac)	Incremental Storage (Ac-Ft)	Cumulative Storage (Ac-Ft)
139.75	0.40	0.09	0.19
139.5	0.31	0.06	0.10
139.25	0.21	0.04	0.04
139.0	0.09		

Predevelopment Basin OS-1

Description: Offsite area RT

Existing Weighted CN

Land Use	Hydrologic Condition	Soil Class	Area (Acres)	CN	Product
Pervious (Open Space)		A		39	0.00
Pervious (Open Space)		B/D		80	0.00
Pervious (Open Space)		C	0.88	74	64.89
Impervious (Residential)			0.53	98	52.12
Total Area =			1.41		117.01
				Total Weighted CN =	83
				% Impervious Area	37.75%

Time of Concentration

SHEET FLOW

Length (ft) =	300
n =	0.15
US elevation =	145.00
DS elevation =	144.50
Slope (ft/ft) =	0.002
Rainfall (2yr-24hr) (in) =	4.9
Time of conc. (hr) =	0.859

CONCENTRATED FLOW

Length (ft) =	170
US elevation =	144.50
DS elevation =	140.15
Slope (ft/ft) =	0.026
Paved or unpaved =	Unpaved
Velocity (ft/s) =	2.58
Time of conc. (hr) =	0.018

$T_c = 0.877$ hrs

$T_c = 53$ min

Southwest Florida Water
Management District

SEP 16 2010

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Predevelopment Basin OS-2

Description: Offsite area RT

Existing Weighted CN

Land Use	Hydrologic Condition	Soil Class	Area (Acres)	CN	Product
Pervious (Open Space)		A	2.28	39	88.89
Pervious (Open Space)		B/D		80	0.00
Pervious (Open Space)		C		74	0.00
Impervious			0.10	98	10.27
Total Area =			2.38		99.16
				Total Weighted CN =	42
				% Impervious Area	4.40%

Time of Concentration

SHEET FLOW

Length (ft) =	300
n =	0.15
US elevation =	151.00
DS elevation =	145.00
Slope (ft/ft) =	0.020
Rainfall (2yr-24hr) (in) =	4.9
Time of conc. (hr) =	0.318

CONCENTRATED FLOW

Length (ft) =	160
US elevation =	145.00
DS elevation =	138.75
Slope (ft/ft) =	0.039
Paved or unpaved =	Unpaved
Velocity (ft/s) =	3.19
Time of conc. (hr) =	0.014

T_c = 0.332 hrs

T_c = 20 min

Southwest Florida Water
Management District

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Predevelopment Basin OS-3

Description: Offsite area LT

Existing Weighted CN

Land Use	Hydrologic Condition	Soil Class	Area (Acres)	CN	Product
Pervious (Open Space)		A	0.41	39	15.98
Pervious (Open Space)		B/D		80	0.00
Pervious (Open Space)		C		74	0.00
Impervious			0.41	98	40.29
Total Area =			0.82		56.27
				Total Weighted CN =	69
				% Impervious Area	50.08%

Time of Concentration

SHEET FLOW

Length (ft) =	126
n =	0.15
US elevation =	150.00
DS elevation =	145.50
Slope (ft/ft) =	0.036
Rainfall (2yr-24hr) (in) =	4.9
Time of conc. (hr) =	0.126

$T_c = 0.126$ hrs

$T_c = 8$ min

Use 10 mins

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Appendix C

**Post Development Calculations and
Documentation**

Southwest Florida Water
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Post Development Basin E Station 265+50 to 278+60

Description:

Proposed Weighted CN

Land Use	Hydrologic Condition	Soil Class	Area (Acres)	CN	Product
Pervious (Open Space)		A	1.90	39	74.09
Pervious (Open Space)		B/D		80	0.00
Pervious (Open Space)		C		74	0.00
Existing Impervious			0.21	98	20.92
Proposed Impervious			0.79	98	76.98
Total Area =			2.90		171.99
				Total Weighted CN =	59
				% Impervious Area	34.46%

Time of Concentration

SHEET FLOW

Length (ft) =	70	40
n =	0.011	0.15
US elevation =	-	143.20
DS elevation =	-	139.00
Slope (ft/ft) =	0.030	0.105
Rainfall (2yr-24hr) (in) =	4.9	4.9
Time of conc. (hr) =	0.010	0.033

$T_C = 0.043$ hrs

$T_C = 3$ min

Use 10 minutes

**SR 33
Proposed Conditions**

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Water Quality Volumes

SWFWMD Required Water Quality Volume

	Area (ac.)	c-value	
Pervious onsite =	1.90	0.20	0.38
Impervious Area =	<u>1.00</u>	0.95	<u>0.95</u>
Total =	2.90		1.33

Runoff Coefficient = 0.46

Runoff from First Inch of Rainfall = 0.11 ac-ft

Total Basin Area

Use the lesser of:

First half inch of runoff = 0.12 ac-ft

Runoff from First Inch of Rainfall = 0.11 ac-ft

Required Water Quality Volume = **0.11** ac-ft

First half inch of runoff from new impervious area = 0.033 ac-ft

Use 0.04 ac-ft

Proposed Weir Elevation = 139.8

Water Quality Volume Provided = **0.28** ac-ft **O.K.**

Stage Storage - Swale E

	Stage (NGVD) (FT)	Area (Ac)	Incremental Storage (Ac-Ft)	Cumulative Storage (Ac-Ft)
	140.5	0.57	0.26	0.63
Top of bank	140.0	0.47	0.09	0.37
	139.8	0.43	0.28	0.28
Swale Bottom	139.0	0.26		

Post Development Basin OS-1

Description: Offsite area RT

Existing Weighted CN

Land Use	Hydrologic Condition	Soil Class	Area (Acres)	CN	Product
Pervious (Open Space)		A		39	0.00
Pervious (Open Space)		B/D		80	0.00
Pervious (Open Space)		C	0.88	74	64.89
Impervious			0.53	98	52.12
Total Area =			1.41		117.01
				Total Weighted CN =	83
				% Impervious Area	37.75%

Time of Concentration

SHEET FLOW

Length (ft) = 300
 n = 0.15
 US elevation = 145.00
 DS elevation = 144.50
 Slope (ft/ft) = 0.002
 Rainfall (2yr-24hr) (in) = 4.9
 Time of conc. (hr) = 0.859

CONCENTRATED FLOW

Length (ft) = 170
 US elevation = 144.50
 DS elevation = 140.15
 Slope (ft/ft) = 0.026
 Paved or unpaved = Unpaved
 Velocity (ft/s) = 2.58
 Time of conc. (hr) = 0.018

T_c = 0.877 hrs

T_c = 53 min

Post Development Basin OS-2

Description: Offsite area RT

Existing Weighted CN

Land Use	Hydrologic Condition	Soil Class	Area (Acres)	CN	Product
Pervious (Open Space)		A	2.28	39	88.89
Pervious (Open Space)		B/D		80	0.00
Pervious (Open Space)		C		74	0.00
Impervious			0.10	98	10.27
Total Area =			2.38		99.16
				Total Weighted CN =	42
				% Impervious Area	4.40%

Time of Concentration

SHEET FLOW

Length (ft) =	300
n =	0.15
US elevation =	151.00
DS elevation =	145.00
Slope (ft/ft) =	0.020
Rainfall (2yr-24hr) (in) =	4.9
Time of conc. (hr) =	0.318

CONCENTRATED FLOW

Length (ft) =	160
US elevation =	145.00
DS elevation =	138.75
Slope (ft/ft) =	0.039
Paved or unpaved =	Unpaved
Velocity (ft/s) =	3.19
Time of conc. (hr) =	0.014

T_C = 0.332 hrs

T_C = 20 min

Stage Storage - OS-3

Stage (NGVD) (FT)	Area (Ac)	Incremental Storage (Ac-Ft)	Cumulative Storage (Ac-Ft)
139.75	0.30	0.07	0.15
139.5	0.24	0.05	0.08
139.25	0.17	0.03	0.03
139.0	0.07		

Post Development Basin OS-3

Description: Offsite area LT

Existing Weighted CN

Land Use	Hydrologic Condition	Soil Class	Area (Acres)	CN	Product
Pervious (Open Space)		A	0.41	39	15.98
Pervious (Open Space)		B/D		80	0.00
Pervious (Open Space)		C		74	0.00
Impervious			0.41	98	40.29
Total Area =			0.82		56.27
				Total Weighted CN =	69
				% Impervious Area	50.08%

Time of Concentration

SHEET FLOW

Length (ft) = 126
 n = 0.15
 US elevation = 150.00
 DS elevation = 145.50
 Slope (ft/ft) = 0.036
 Rainfall (2yr-24hr) (in) = 4.9
 Time of conc. (hr) = 0.126

$T_C = 0.126$ hrs

$T_C = 8$ min

Use 10 mins

SR 33
Geotechnical Input

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Boring ID	Pond	Estimated Station	SHGWT Depth	Estimated Confining Layer	Ground Elevation	Estimated SHGWT Elevation	Estimated Confining Layer Elevation	Measured Horizontal Conductivity (cm/sec)	Measured Horizontal Conductivity (ft/day)
TH-8	A-1/A-3	231+00	1.5	15	136.5	135.00	120.00	2.4E-03	6.8
TH-9	B	248+00	3	15	139.0	136.00	121.00	1.9E-03	5.4
TH-11	D-1	254+70	3.5	15	139.8	136.30	121.30	6.0E-03	17.0
TH-12	D-1	258+40	4	15	141.2	137.20	122.20	1.2E-02	34.0
TH-13	C-2	259+70	1	15	139.0	138.00	123.00	8.6E-03	24.4
TH-14	D-3	260+80	1	15	136.5	135.50	120.50	1.0E-02	28.3
TH-15	C-2	263+50	6	15	141.8	135.80	120.80	9.4E-03	26.6
TH-16	E	268+90	6	15	143.0	137.00	122.00	1.3E-02	36.9
TH-17	C-3	269+90	6	15	140.0	134.00	119.00	8.1E-03	23.0
TH-18	E	275+50	6	15	139.6	133.60	118.60	1.1E-02	31.2

Pond ID	Pond Bottom	Average Estimated SHGWT Elevation	Average Estimated Confining Layer Elevation	Aquifer Base Elevation	Water Table Elevation	Annual Recharge Rate	Average Horizontal Conductivity Kh (ft/day)	Factor of Safety of 2 Horizontal Conductivity Kh (ft/day)	Vertical Conductivity Kv (ft/day) Kv = 2*Kh	Effective Porosity	Suction Head	Layer Thickness (ft)
A-1	136	135.0	120.0	120.0	135.0	0	6.8	3.4	6.8	0.2	4.17	1.0
A-3	137	135.0	120.0	120.0	135.0	0	6.8	3.4	6.8	0.2	4.17	2.0
B	137	136.0	121.0	121.0	136.0	0	5.4	2.7	5.4	0.2	4.17	1.0
C-2	139	136.9	121.9	121.9	136.9	0	25.5	12.8	25.5	0.2	4.17	2.1
C-3	139	134.0	119.0	119.0	134.0	0	23.0	11.5	23.0	0.2	4.17	5.0
D-1	138	136.8	121.8	121.8	136.8	0	25.5	12.8	25.5	0.2	4.17	1.3
D-3	137	135.5	120.5	120.5	135.5	0	28.3	14.2	28.3	0.2	4.17	1.5
E	139	135.3	120.3	120.3	135.3	0	34.0	17.0	34.0	0.2	4.17	3.7


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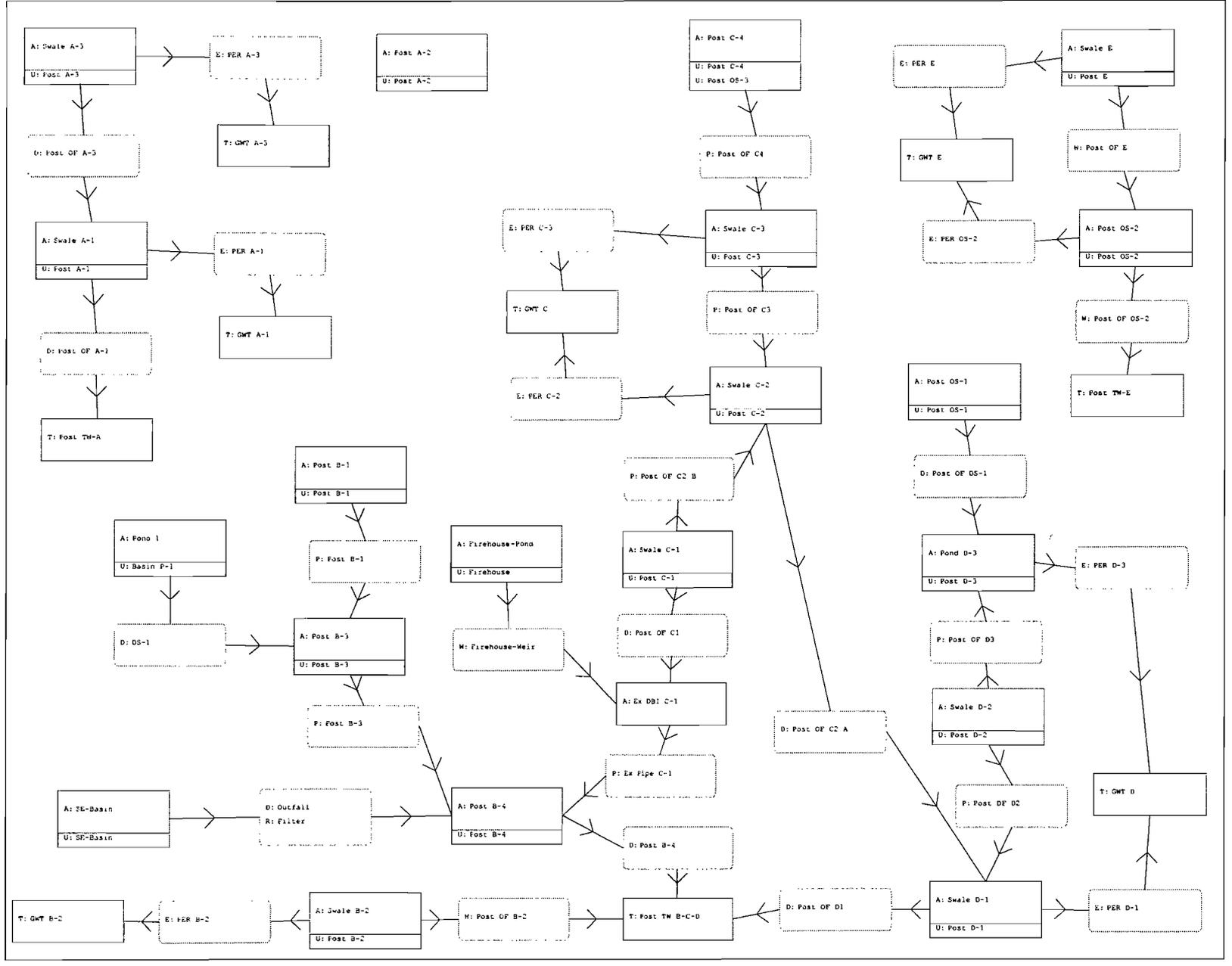
Water Quality Model

Southwest Florida Water
Management District

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- Nodes**
 A Stage/Area
 V Stage/Volume
 T Time/Stage
 M Manhole
- Basins**
 O Overland Flow
 U SCS Unit CN
 S SBUH CN
 Y SCS Unit GA
 Z SBUH GA
- Links**
 P Pipe
 W Weir
 C Channel
 D Drop Structure
 B Bridge
 R Rating Curve
 H Breach
 E Percolation
 F Filter
 X Exfil Trench



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Water Quality Model
 Node Time Series
 By: Gene McClendon Date: 9/01/10

Simulation	Node	Group	Time hrs	Stage ft	Warning Stage ft	Surface Area ft2	Total Inflow cfs	Total Outflow cfs	Total Vol In af	Total Vol Out af
WQ	Swale E	BASE	0.00	139.50	140.25	15899	0.00	0.00	0.0	0.0
WQ	Swale E	BASE	0.25	139.14	140.25	12651	0.00	4.98	0.0	0.1
WQ	Swale E	BASE	0.50	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	0.75	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	1.01	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	1.25	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	1.50	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	1.76	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	2.01	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	2.26	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	2.50	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	2.75	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	3.01	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	3.26	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	3.51	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	3.75	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	4.00	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	4.26	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	4.51	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	4.75	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	5.00	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	5.25	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	5.50	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	5.75	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	6.00	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	6.25	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	6.50	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	6.76	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	7.01	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	7.26	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	7.50	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	7.76	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	8.00	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	8.26	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	8.50	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	8.76	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	9.01	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	9.25	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	9.50	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	9.76	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	10.00	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	10.26	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	10.52	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	10.77	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	11.02	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	11.27	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	11.52	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	11.77	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	12.02	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	12.27	139.00	140.25	11326	0.00	0.00	0.0	0.1
WQ	Swale E	BASE	12.52	139.00	140.25	11326	0.00	0.00	0.0	0.1

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 GENE MCCLENDON

Post Development Model

Southwest Florida Water
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Nodes

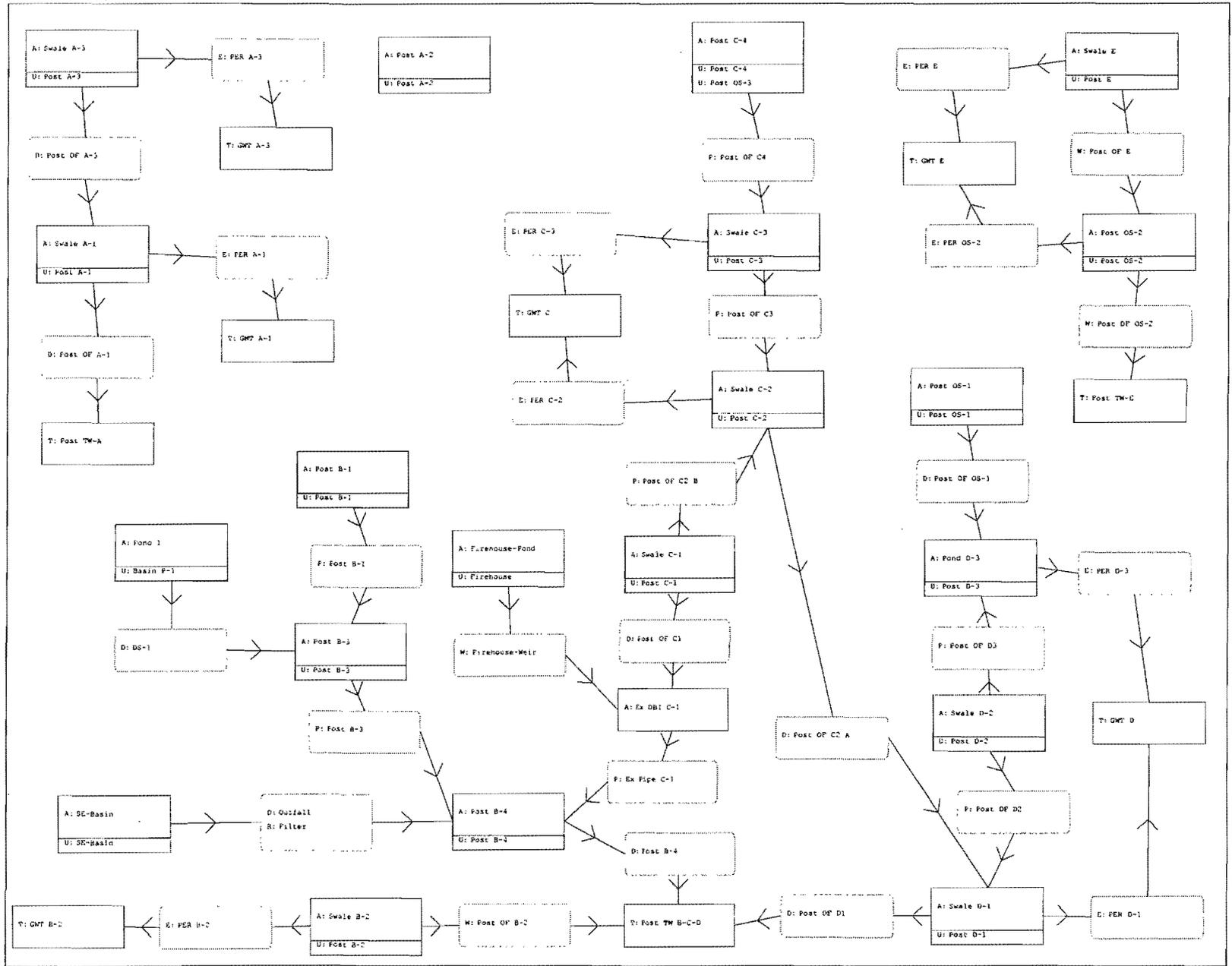
A Stage/Area
 V Stage/Volume
 T Time/Stage
 M Manhole

Basins

O Overland Flow
 U SCS Unit CN
 S SBUH CN
 Y SCS Unit GA
 Z SBUH GA

Links

P Pipe
 W Weir
 C Channel
 D Drop Structure
 B Bridge
 R Rating Curve
 H Breach
 E Percolation
 F Filter
 X Exfil Trench



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Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
Post TW-A	BASE	100YR72HR	0.00	135.40	136.00	0.0000	0	12.60	11.78	0.00	0.00
Post TW-E	BASE	100YR72HR	0.00	139.00	141.00	0.0000	0	12.56	6.15	0.00	0.00
SE-Basin	BASE	100YR72HR	12.91	143.72	140.98	0.0050	51779	12.08	88.44	12.87	16.44
Swale A-1	BASE	100YR72HR	12.60	138.87	137.50	-0.0050	7512	12.18	16.34	12.57	12.13
Swale A-3	BASE	100YR72HR	12.51	139.70	139.00	-0.0036	15743	12.08	16.49	12.21	10.44
Swale B-2	BASE	100YR72HR	12.26	139.46	139.25	0.0033	14582	12.17	24.97	12.26	23.59
Swale C-1	BASE	100YR72HR	13.07	141.03	140.00	0.0019	8500	12.17	4.78	12.32	2.30
Swale C-2	BASE	100YR72HR	13.07	141.03	140.25	0.0029	25088	12.08	17.54	12.43	9.53
Swale C-3	BASE	100YR72HR	12.85	141.31	140.25	0.0044	16653	12.08	18.45	12.44	10.15
Swale D-1	BASE	100YR72HR	13.79	140.05	138.75	0.0024	14116	12.30	17.34	13.55	11.81
Swale D-2	BASE	100YR72HR	13.99	140.08	138.75	0.0022	7192	12.17	7.98	12.19	5.25
Swale E	BASE	100YR72HR	12.49	140.10	140.25	0.0021	21337	12.00	16.69	12.41	6.68
Ex DBI C-1	BASE	10YR24HR	12.58	139.54	140.00	0.0050	2137	13.66	0.40	14.81	0.72
Firehouse-Pond	BASE	10YR24HR	13.66	141.90	142.50	0.0022	9040	12.08	4.01	13.66	0.40
GWT A-1	BASE	10YR24HR	0.00	0.00	0.00	0.0000	0	12.14	0.17	0.00	0.00
GWT A-3	BASE	10YR24HR	0.00	0.00	0.00	0.0000	0	12.29	0.83	0.00	0.00
GWT B-2	BASE	10YR24HR	0.00	0.00	0.00	0.0000	0	12.19	0.41	0.00	0.00
GWT C	BASE	10YR24HR	0.00	0.00	0.00	0.0000	0	11.90	5.54	0.00	0.00
GWT D	BASE	10YR24HR	0.00	0.00	0.00	0.0000	0	0.01	11.94	0.00	0.00
GWT E	BASE	10YR24HR	0.00	0.00	0.00	0.0000	0	12.08	4.81	0.00	0.00
Pond 1	BASE	10YR24HR	14.72	145.28	147.00	0.0030	14547	12.00	10.00	14.72	0.65
Pond D-3	BASE	10YR24HR	14.68	138.31	138.75	0.0050	41310	12.31	12.12	0.01	11.94
Post A-2	BASE	10YR24HR	24.83	139.89	141.00	0.0019	12719	12.00	2.70	0.00	0.00
Post B-1	BASE	10YR24HR	12.42	141.38	143.00	0.0050	1548	12.08	1.83	12.12	1.41
Post B-3	BASE	10YR24HR	12.45	141.35	143.00	-0.0028	7066	12.10	4.87	12.45	3.72
Post B-4	BASE	10YR24HR	12.60	139.54	141.00	0.0049	900	12.51	12.17	12.60	12.41
Post C-4	BASE	10YR24HR	12.35	142.40	144.00	-0.0024	3798	12.08	3.32	12.35	2.96
Post OS-1	BASE	10YR24HR	12.52	140.32	141.00	0.0016	1682	12.50	2.24	12.52	2.24
Post OS-2	BASE	10YR24HR	12.73	139.00	140.00	-0.0006	3070	12.33	0.64	12.34	0.64
Post TW B-C-D	BASE	10YR24HR	0.00	137.00	138.00	0.0000	0	12.42	22.64	0.00	0.00
Post TW-A	BASE	10YR24HR	0.00	135.40	136.00	0.0000	0	12.32	6.18	0.00	0.00
Post TW-E	BASE	10YR24HR	0.00	139.00	141.00	0.0000	0	0.00	0.00	0.00	0.00
SE-Basin	BASE	10YR24HR	12.85	140.43	140.98	0.0027	43322	12.08	31.66	12.87	7.45
Swale A-1	BASE	10YR24HR	12.32	137.26	137.50	0.0015	3301	12.28	6.36	12.31	6.34
Swale A-3	BASE	10YR24HR	12.42	138.82	139.00	-0.0020	10725	12.08	6.79	12.40	4.68
Swale B-2	BASE	10YR24HR	12.33	139.06	139.25	0.0019	12529	12.17	10.69	12.33	9.54
Swale C-1	BASE	10YR24HR	12.37	139.79	140.00	-0.0012	2015	12.25	1.21	12.36	1.14
Swale C-2	BASE	10YR24HR	12.99	139.67	140.25	0.0018	16173	12.08	5.91	11.90	3.61
Swale C-3	BASE	10YR24HR	12.62	139.71	140.25	0.0016	9925	12.08	5.96	12.56	3.68
Swale D-1	BASE	10YR24HR	12.37	138.33	138.75	-0.0014	8212	12.17	3.77	12.34	2.03
Swale D-2	BASE	10YR24HR	14.67	138.31	138.75	-0.0050	2664	12.17	3.34	12.28	3.13
Swale E	BASE	10YR24HR	12.60	139.00	140.25	-0.0004	11333	12.08	4.41	12.04	4.46
Ex DBI C-1	BASE	2-1	0.92	139.30	140.00	0.0050	120	0.00	0.00	1.00	0.59
Firehouse-Pond	BASE	2-1	1.00	140.62	142.50	0.0012	7159	0.67	2.62	0.00	0.00
GWT A-1	BASE	2-1	0.00	0.00	0.00	0.0000	0	0.85	0.23	0.00	0.00
GWT A-3	BASE	2-1	0.00	0.00	0.00	0.0000	0	1.00	0.65	0.00	0.00
GWT B-2	BASE	2-1	0.00	0.00	0.00	0.0000	0	1.00	0.64	0.00	0.00
GWT C	BASE	2-1	0.00	0.00	0.00	0.0000	0	0.76	4.53	0.00	0.00
GWT D	BASE	2-1	0.00	0.00	0.00	0.0000	0	0.01	11.94	0.00	0.00
GWT E	BASE	2-1	0.00	0.00	0.00	0.0000	0	0.83	1.09	0.00	0.00
Pond 1	BASE	2-1	1.00	143.30	147.00	0.0024	10244	0.67	7.21	1.00	0.03

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Southwest Florida Water Management District

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
Post OS-1	BASE	25-72	59.97	140.23	141.00	0.0018	1339	59.92	0.74	59.97	0.74
Post OS-2	BASE	25-72	60.02	139.52	140.00	0.0017	10662	60.00	0.68	60.02	0.68
Post TW B-C-D	BASE	25-72	0.00	137.00	138.00	0.0000	0	60.10	16.05	0.00	0.00
Post TW-A	BASE	25-72	0.00	135.40	136.00	0.0000	0	60.00	1.71	0.00	0.00
Post TW-E	BASE	25-72	0.00	139.00	141.00	0.0000	0	60.02	0.54	0.00	0.00
SE-Basin	BASE	25-72	60.11	140.19	140.98	0.0021	42483	60.00	6.67	60.12	5.98
Swale A-1	BASE	25-72	60.00	137.11	137.50	0.0050	2906	60.00	1.74	60.00	1.74
Swale A-3	BASE	25-72	60.01	138.50	139.00	0.0020	8919	60.00	1.30	60.01	1.30
Swale B-2	BASE	25-72	60.01	138.72	139.25	0.0043	10718	60.00	2.21	60.01	2.21
Swale C-1	BASE	25-72	60.05	139.91	140.00	0.0007	2693	60.00	0.49	60.01	0.48
Swale C-2	BASE	25-72	60.07	140.00	140.25	0.0011	18079	56.87	1.81	60.03	1.23
Swale C-3	BASE	25-72	60.06	140.06	140.25	0.0014	11298	60.00	1.97	60.03	1.92
Swale D-1	BASE	25-72	60.49	138.64	138.75	0.0026	9290	60.08	3.59	60.40	3.45
Swale D-2	BASE	25-72	60.65	138.66	138.75	0.0047	3535	59.91	0.69	60.05	0.60
Swale E	BASE	25-72	64.14	139.70	140.25	0.0013	17710	60.00	1.23	60.03	0.66
Ex DBI C-1	BASE	25-8	5.27	139.62	140.00	0.0050	3033	5.26	1.62	5.34	1.65
Firehouse-Pond	BASE	25-8	5.12	141.99	142.50	0.0023	9177	4.00	3.05	5.12	1.03
GWT A-1	BASE	25-8	0.00	0.00	0.00	0.0000	0	4.11	0.26	0.00	0.00
GWT A-3	BASE	25-8	0.00	0.00	0.00	0.0000	0	4.19	0.84	0.00	0.00
GWT B-2	BASE	25-8	0.00	0.00	0.00	0.0000	0	4.16	0.77	0.00	0.00
GWT C	BASE	25-8	0.00	0.00	0.00	0.0000	0	3.49	5.52	0.00	0.00
GWT D	BASE	25-8	0.00	0.00	0.00	0.0000	0	0.01	11.94	0.00	0.00
GWT E	BASE	25-8	0.00	0.00	0.00	0.0000	0	4.00	4.24	0.00	0.00
Pond 1	BASE	25-8	7.23	145.76	147.00	0.0031	15589	4.00	7.51	7.23	0.74
Pond D-3	BASE	25-8	6.54	138.53	138.75	0.0050	42164	4.07	11.67	0.01	11.94
Post A-2	BASE	25-8	8.00	139.88	141.00	0.0050	12668	4.00	1.77	0.00	0.00
Post B-1	BASE	25-8	4.22	141.36	143.00	0.0045	1516	4.00	1.44	4.08	1.26
Post B-3	BASE	25-8	4.24	141.33	143.00	-0.0029	6962	4.08	4.28	4.24	3.64
Post B-4	BASE	25-8	5.13	139.57	141.00	0.0050	1218	5.12	13.91	5.13	13.90
Post C-4	BASE	25-8	4.16	142.37	144.00	-0.0029	3689	4.00	3.06	4.16	2.81
Post OS-1	BASE	25-8	4.34	140.32	141.00	0.0010	1675	4.33	2.20	4.34	2.20
Post OS-2	BASE	25-8	7.23	139.03	140.00	0.0005	3527	4.17	0.75	4.17	0.75
Post TW B-C-D	BASE	25-8	0.00	137.00	138.00	0.0000	0	4.21	22.01	0.00	0.00
Post TW-A	BASE	25-8	0.00	135.40	136.00	0.0000	0	4.11	5.92	0.00	0.00
Post TW-E	BASE	25-8	0.00	139.00	141.00	0.0000	0	0.00	0.00	0.00	0.00
SE-Basin	BASE	25-8	5.15	140.68	140.98	-0.0031	44178	4.00	25.19	5.15	8.69
Swale A-1	BASE	25-8	4.11	137.26	137.50	0.0046	3281	4.08	6.20	4.11	6.17
Swale A-3	BASE	25-8	4.19	138.81	139.00	0.0029	10690	4.00	5.43	4.19	4.70
Swale B-2	BASE	25-8	4.16	139.02	139.25	0.0043	12302	4.08	9.07	4.16	8.77
Swale C-1	BASE	25-8	5.37	139.86	140.00	0.0010	2408	4.08	1.15	4.21	1.10
Swale C-2	BASE	25-8	5.42	139.86	140.25	0.0020	17294	4.00	5.18	3.49	3.60
Swale C-3	BASE	25-8	5.37	139.89	140.25	0.0017	10616	4.00	5.41	4.34	3.65
Swale D-1	BASE	25-8	6.37	138.52	138.75	0.0049	8848	5.32	3.59	6.23	2.81
Swale D-2	BASE	25-8	6.51	138.53	138.75	0.0047	3208	4.08	2.80	4.06	2.70
Swale E	BASE	25-8	5.00	139.00	140.25	-0.0004	11339	4.00	3.62	4.00	3.62
Ex DBI C-1	BASE	25YR24HR	12.90	139.78	140.00	-0.0050	4649	12.79	2.63	12.95	2.54
Firehouse-Pond	BASE	25YR24HR	12.75	142.02	142.50	0.0021	9222	12.00	4.88	12.75	1.27
GWT A-1	BASE	25YR24HR	0.00	0.00	0.00	0.0000	0	12.30	0.17	0.00	0.00
GWT A-3	BASE	25YR24HR	0.00	0.00	0.00	0.0000	0	12.15	0.76	0.00	0.00
GWT B-2	BASE	25YR24HR	0.00	0.00	0.00	0.0000	0	12.18	0.38	0.00	0.00
GWT C	BASE	25YR24HR	0.00	0.00	0.00	0.0000	0	11.76	5.29	0.00	0.00

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 10:45 AM
 Florida Water Management District

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
GWT D	BASE	25YR24HR	0.00	0.00	0.00	0.0000	0	0.01	11.94	0.00	0.00
GWT E	BASE	25YR24HR	0.00	0.00	0.00	0.0000	0	12.25	5.96	0.00	0.00
Pond 1	BASE	25YR24HR	14.83	145.83	147.00	0.0031	15757	12.00	12.07	14.83	0.75
Pond D-3	BASE	25YR24HR	14.18	138.57	138.75	0.0050	42302	12.26	14.78	0.01	11.94
Post A-2	BASE	25YR24HR	24.83	140.08	141.00	0.0021	14086	12.00	3.17	0.00	0.00
Post B-1	BASE	25YR24HR	12.44	141.55	143.00	0.0050	1895	12.08	2.29	12.13	1.72
Post B-3	BASE	25YR24HR	12.46	141.52	143.00	-0.0029	8072	12.09	6.07	12.45	4.48
Post B-4	BASE	25YR24HR	12.73	139.65	141.00	0.0045	1950	12.73	17.60	12.73	17.60
Post C-4	BASE	25YR24HR	12.35	142.58	144.00	-0.0028	4493	12.08	4.49	12.35	3.94
Post OS-1	BASE	25YR24HR	12.51	140.34	141.00	0.0017	1778	12.50	2.75	12.51	2.75
Post OS-2	BASE	25YR24HR	13.75	139.04	140.00	0.0004	3764	12.33	1.20	12.28	1.20
Post TW B-C-D	BASE	25YR24HR	0.00	137.00	138.00	0.0000	0	12.40	29.52	0.00	0.00
Post TW-A	BASE	25YR24HR	0.00	135.40	136.00	0.0000	0	12.40	7.47	0.00	0.00
Post TW-E	BASE	25YR24HR	0.00	139.00	141.00	0.0000	0	0.00	0.00	0.00	0.00
SE-Basin	BASE	25YR24HR	12.83	140.91	140.98	-0.0032	45006	12.08	40.38	12.86	9.67
Swale A-1	BASE	25YR24HR	12.40	137.43	137.50	-0.0024	3732	12.25	7.94	12.40	7.63
Swale A-3	BASE	25YR24HR	12.43	138.97	139.00	-0.0025	11609	12.08	8.32	12.40	5.65
Swale B-2	BASE	25YR24HR	12.30	139.14	139.25	0.0019	12952	12.17	12.96	12.30	11.86
Swale C-1	BASE	25YR24HR	12.80	139.90	140.00	0.0009	2599	12.17	1.71	12.26	1.68
Swale C-2	BASE	25YR24HR	12.85	139.91	140.25	0.0019	17562	12.08	7.98	11.76	3.40
Swale C-3	BASE	25YR24HR	12.64	139.98	140.25	0.0019	10967	12.08	7.91	12.49	4.80
Swale D-1	BASE	25YR24HR	14.02	138.55	138.75	0.0013	8959	12.08	4.75	13.83	2.99
Swale D-2	BASE	25YR24HR	14.16	138.56	138.75	0.0020	3297	12.17	4.07	12.21	3.71
Swale E	BASE	25YR24HR	12.22	139.09	140.25	-0.0013	12115	12.08	6.12	12.22	4.77
Ex DBI C-1	BASE	5-1	0.92	139.34	140.00	0.0050	120	0.00	0.00	1.00	0.40
Firehouse-Pond	BASE	5-1	1.00	140.82	142.50	0.0015	7417	0.67	3.45	0.00	0.00
GWT A-1	BASE	5-1	0.00	0.00	0.00	0.0000	0	1.00	0.24	0.00	0.00
GWT A-3	BASE	5-1	0.00	0.00	0.00	0.0000	0	1.00	0.73	0.00	0.00
GWT B-2	BASE	5-1	0.00	0.00	0.00	0.0000	0	1.00	0.71	0.00	0.00
GWT C	BASE	5-1	0.00	0.00	0.00	0.0000	0	0.89	5.57	0.00	0.00
GWT D	BASE	5-1	0.00	0.00	0.00	0.0000	0	0.01	11.94	0.00	0.00
GWT E	BASE	5-1	0.00	0.00	0.00	0.0000	0	0.75	1.94	0.00	0.00
Pond 1	BASE	5-1	1.00	143.64	147.00	0.0029	10969	0.67	9.26	1.00	0.13
Pond D-3	BASE	5-1	1.00	137.22	138.75	-0.0050	37055	0.94	7.90	0.01	11.94
Post A-2	BASE	5-1	1.00	139.00	141.00	0.0050	7424	0.67	3.08	0.00	0.00
Post B-1	BASE	5-1	0.99	141.09	143.00	0.0050	1044	0.75	1.34	0.84	1.06
Post B-3	BASE	5-1	1.00	141.06	143.00	0.0023	5323	0.81	3.26	1.00	2.36
Post B-4	BASE	5-1	0.92	139.33	141.00	0.0050	363	0.92	4.95	0.92	4.52
Post C-4	BASE	5-1	0.97	142.07	144.00	0.0015	2486	0.83	1.68	0.97	1.34
Post OS-1	BASE	5-1	1.00	140.27	141.00	-0.0011	1506	1.00	1.45	1.00	1.40
Post OS-2	BASE	5-1	1.00	139.00	140.00	-0.0000	3049	1.00	0.01	1.00	0.01
Post TW B-C-D	BASE	5-1	0.00	137.00	138.00	0.0000	0	1.00	9.22	0.00	0.00
Post TW-A	BASE	5-1	0.00	135.40	136.00	0.0000	0	1.00	3.36	0.00	0.00
Post TW-E	BASE	5-1	0.00	139.00	141.00	0.0000	0	0.00	0.00	0.00	0.00
SE-Basin	BASE	5-1	1.00	139.30	140.98	0.0016	39672	0.75	20.86	1.00	0.45
Swale A-1	BASE	5-1	1.00	137.17	137.50	0.0031	3071	0.97	3.62	1.00	3.60
Swale A-3	BASE	5-1	1.00	138.56	139.00	0.0025	9256	0.75	5.52	1.00	2.37
Swale B-2	BASE	5-1	1.00	138.83	139.25	0.0030	11325	0.83	9.09	1.00	4.67
Swale C-1	BASE	5-1	1.00	139.60	140.00	0.0009	1007	0.92	0.50	1.00	0.46
Swale C-2	BASE	5-1	0.80	139.01	140.25	-0.0002	12310	0.71	3.83	0.80	3.61
Swale C-3	BASE	5-1	1.00	139.14	140.25	0.0005	7564	0.83	3.06	1.00	2.00

APPROVED
 SEP 16 2010
 SOUTH FLORIDA WATER
 MANAGEMENT DISTRICT

Name: Post D-3	Post E	Post OS-1	Post OS-2	Post OS-3
Group: BASE	BASE	BASE	BASE	BASE
Simulation: 25YR24HR	25YR24HR	25YR24HR	25YR24HR	25YR24HR
Node: Pond D-3	Swale E	Post OS-1	Post OS-2	Post C-4
Type: SCS	SCS	SCS	SCS	SCS
Unit Hydrograph: Uh323	Uh323	Uh323	Uh323	Uh323
Peaking Factor: 323.0	323.0	323.0	323.0	323.0
Spec Time Inc(min): 1.60	1.33	7.07	2.67	1.33
Comp Time Inc(min): 1.60	1.33	7.07	2.67	1.33
Rain File: Flmod	Flmod	Flmod	Flmod	Flmod
Rain Amount(in): 7.500	7.500	7.500	7.500	7.500
Duration(hrs): 24.00	24.00	24.00	24.00	24.00
Status: Onsite	Onsite	Onsite	Onsite	Onsite
TC(min): 12.00	10.00	53.00	20.00	10.00
Time Shift(hrs): 0.00	0.00	0.00	0.00	0.00
Area(ac): 2.220	2.900	1.410	2.380	0.820
Vol of Unit Hyd(in): 1.000	1.000	1.000	1.000	1.000
Curve Num: 62.000	59.000	83.000	42.000	69.000
DCIA(%): 0.000	0.000	0.000	0.000	0.000
Time Max(hrs): 12.05	12.04	12.48	12.31	12.04
Flow Max(cfs): 5.10	6.35	2.76	1.21	2.52
Runoff Volume(in): 3.175	2.860	5.497	1.211	3.930
Runoff Volume(ft3): 25587	30107	28136	10461	11697

Name: SE-Basin
Group: BASE
Simulation: 25YR24HR
Node: SE-Basin
Type: SCS
Unit Hydrograph: Uh256
Peaking Factor: 256.0
Spec Time Inc(min): 1.33
Comp Time Inc(min): 1.33
Rain File: Flmod
Rain Amount(in): 7.500
Duration(hrs): 24.00
Status: Onsite
TC(min): 10.00
Time Shift(hrs): 0.00
Area(ac): 13.440
Vol of Unit Hyd(in): 1.000
Curve Num: 73.000
DCIA(%): 0.000
Time Max(hrs): 12.04
Flow Max(cfs): 41.48
Runoff Volume(in): 4.368
Runoff Volume(ft3): 213109

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Unit Hydrograph: Uh323 Peaking Factor: 323.0
Rainfall File: Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 10.00
Area(ac): 1.720 Time Shift(hrs): 0.00
Curve Number: 67.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Name: Post C-4 Node: Post C-4 Status: Onsite
Group: BASE Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323 Peaking Factor: 323.0
Rainfall File: Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 30.00
Area(ac): 1.780 Time Shift(hrs): 0.00
Curve Number: 61.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Name: Post D-1 Node: Swale D-1 Status: Onsite
Group: BASE Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323 Peaking Factor: 323.0
Rainfall File: Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 25.00
Area(ac): 2.960 Time Shift(hrs): 0.00
Curve Number: 85.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Name: Post D-2 Node: Swale D-2 Status: Onsite
Group: BASE Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323 Peaking Factor: 323.0
Rainfall File: Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 22.00
Area(ac): 1.300 Time Shift(hrs): 0.00
Curve Number: 84.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Name: Post D-3 Node: Pond D-3 Status: Onsite
Group: BASE Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323 Peaking Factor: 323.0
Rainfall File: Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 12.00
Area(ac): 2.220 Time Shift(hrs): 0.00
Curve Number: 62.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Name: Post E Node: Swale E Status: Onsite
Group: BASE Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323 Peaking Factor: 323.0
Rainfall File: Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 10.00
Area(ac): 2.900 Time Shift(hrs): 0.00
Curve Number: 59.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

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Name: Post OS-1 Node: Post OS-1 Status: Onsite
Group: BASE Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323 Peaking Factor: 323.0
Rainfall File: Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 53.00
Area(ac): 1.410 Time Shift(hrs): 0.00
Curve Number: 83.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Name: Post OS-2 Node: Post OS-2 Status: Onsite
Group: BASE Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323 Peaking Factor: 323.0
Rainfall File: Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 20.00
Area(ac): 2.380 Time Shift(hrs): 0.00
Curve Number: 42.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Name: Post OS-3 Node: Post C-4 Status: Onsite
Group: BASE Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323 Peaking Factor: 323.0
Rainfall File: Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 10.00
Area(ac): 0.820 Time Shift(hrs): 0.00
Curve Number: 69.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Name: SE-Basin Node: SE-Basin Status: Onsite
Group: BASE Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh256 Peaking Factor: 256.0
Rainfall File: Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 10.00
Area(ac): 13.440 Time Shift(hrs): 0.00
Curve Number: 73.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Permitted Park 33 Basin

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Nodes
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Name: Ex DBI C-1 Base Flow(cfs): 0.000 Init Stage(ft): 136.290
Group: BASE Warn Stage(ft): 140.000
Type: Stage/Area

Stage(ft)	Area(ac)
136.290	0.0010
139.400	0.0010
139.500	0.0400
140.000	0.1600

Name: Firehouse-Pond Base Flow(cfs): 0.000 Init Stage(ft): 140.000
Group: BASE Warn Stage(ft): 142.500
Type: Stage/Area

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Time (hrs)	Stage (ft)
0.00	0.000
9999.00	0.000

Name: Pond 1	Base Flow(cfs): 0.000	Init Stage(ft): 142.000
Group: BASE		Warn Stage(ft): 147.000
Type: Stage/Area		

Permitted Arbor Glen Apartments

Stage (ft)	Area (ac)
142.000	0.1800
143.000	0.2200
144.000	0.2700
145.000	0.3200
146.000	0.3700
147.000	0.4200

Name: Pond D-3	Base Flow(cfs): 0.000	Init Stage(ft): 137.080
Group: BASE		Warn Stage(ft): 138.750
Type: Stage/Area		

Initial Stage set at 36hr stage - See Water Quality Model

Stage (ft)	Area (ac)
136.450	0.0010
136.990	0.0010
137.000	0.8300
138.000	0.9200
139.000	1.0100

Name: Post A-2	Base Flow(cfs): 0.000	Init Stage(ft): 137.500
Group: BASE		Warn Stage(ft): 141.000
Type: Stage/Area		

Stage (ft)	Area (ac)
137.500	0.0100
138.000	0.0500
138.500	0.1100
139.000	0.1700
139.500	0.2300
140.000	0.3100
140.500	0.3900
141.000	0.4900
141.500	0.6000
142.000	0.7300

Name: Post B-1	Base Flow(cfs): 0.000	Init Stage(ft): 139.090
Group: BASE		Warn Stage(ft): 143.000
Type: Stage/Area		

Stage (ft)	Area (ac)
139.090	0.0010
139.990	0.0010
140.000	0.0100
140.500	0.0100
141.000	0.0200
141.500	0.0400
142.000	0.0700
142.500	0.1000
143.000	0.1500

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Name: Post TW B-C-D Base Flow(cfs): 0.000 Init Stage(ft): 137.000
Group: BASE Warn Stage(ft): 138.000
Type: Time/Stage

Top of bank of the outfall ditch was used as tailwater
There is no evidence of overtopping

Time (hrs)	Stage (ft)
0.00	137.000
30.00	137.000

Name: Post TW-A Base Flow(cfs): 0.000 Init Stage(ft): 135.400
Group: BASE Warn Stage(ft): 136.000
Type: Time/Stage

Crown of outfall pipe to Lakeland Harbor Pond

Time (hrs)	Stage (ft)
0.00	135.400
30.00	135.400

Name: Post TW-E Base Flow(cfs): 0.000 Init Stage(ft): 139.000
Group: BASE Warn Stage(ft): 141.000
Type: Time/Stage

Time (hrs)	Stage (ft)
0.00	139.000
30.00	139.000

Name: SE-Basin Base Flow(cfs): 0.000 Init Stage(ft): 138.500
Group: BASE Warn Stage(ft): 140.980
Type: Stage/Area

Permitted Park 33 Pond
Warning Stage set to permitted peak stage

Stage (ft)	Area (ac)
138.500	0.8600
139.000	0.8900
140.000	0.9600
141.000	1.0400
142.000	1.1200
142.500	1.1400

Name: Swale A-1 Base Flow(cfs): 0.000 Init Stage(ft): 136.000
Group: BASE Warn Stage(ft): 137.500
Type: Stage/Area

Stage (ft)	Area (ac)
136.000	0.0100
136.500	0.0300
137.000	0.0600
137.500	0.0900

Name: Swale A-3 Base Flow(cfs): 0.000 Init Stage(ft): 137.000
Group: BASE Warn Stage(ft): 139.000
Type: Stage/Area

Stage (ft)	Area (ac)
------------	-----------

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139.000 0.2400

 Name: Swale D-2 Base Flow(cfs): 0.000 Init Stage(ft): 137.080
 Group: BASE Warn Stage(ft): 138.750
 Type: Stage/Area

Initial Stage set at 36hr stage - See Water Quality Model

Stage(ft)	Area(ac)
137.000	0.0100
138.000	0.0400
139.000	0.1000

 Name: Swale E Base Flow(cfs): 0.000 Init Stage(ft): 139.000
 Group: BASE Warn Stage(ft): 140.250
 Type: Stage/Area

Stage(ft)	Area(ac)
139.000	0.2600
140.000	0.4700
140.500	0.5700

==== Operating Tables =====

Name: Filter Group: BASE
 Type: Rating Curve
 Function: US Stage vs. Discharge

US Stage(ft)	Discharge(cfs)
136.500	0.00
138.500	0.28
139.500	0.63
140.500	1.11
141.500	1.75
142.500	2.50

==== Pipes =====

Name: Ex Pipe C-1	From Node: Ex DBI C-1	Length(ft): 180.00
Group: BASE	To Node: Post B-4	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Automatic
Geometry: Circular	Circular	Solution Algorithm: Most Restrictive
Span(in): 18.00	18.00	Flow: Both
Rise(in): 18.00	18.00	Entrance Loss Coef: 0.50
Invert(ft): 136.290	136.150	Exit Loss Coef: 1.00
Manning's N: 0.012000	0.012000	Bend Loss Coef: 0.00
Top Clip(in): 0.000	0.000	Outlet Ctrl Spec: Use dc or tw
Bot Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dc
		Stabilizer Option: None

Upstream FHWA Inlet Edge Description:
 Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
 Circular Concrete: Square edge w/ headwall

 Name: Post B-1 From Node: Post B-1 Length(ft): 103.00

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Count: 1 Bottom Clip(in): 0.000
Type: Vertical: Mavis Top Clip(in): 0.000
Flow: Both Weir Disc Coef: 3.200
Geometry: Rectangular Orifice Disc Coef: 0.600
Span(in): 16.00 Invert(ft): 137.800
Rise(in): 14.40 Control Elev(ft): 137.800

*** Weir 2 of 2 for Drop Structure Post OF D1 ***

Count: 1 Bottom Clip(in): 0.000
Type: Horizontal Top Clip(in): 0.000
Flow: Both Weir Disc Coef: 3.200
Geometry: Rectangular Orifice Disc Coef: 0.600
Span(in): 37.00 Invert(ft): 139.000
Rise(in): 24.00 Control Elev(ft): 139.000

TABLE

Name: Post OF OS-1 From Node: Post OS-1 Length(ft): 92.00
Group: BASE To Node: Pond D-3 Count: 1

UPSTREAM DOWNSTREAM Friction Equation: Automatic
Geometry: Circular Circular Solution Algorithm: Most Restrictive
Span(in): 18.00 18.00 Flow: Both
Rise(in): 18.00 18.00 Entrance Loss Coef: 0.500
Invert(ft): 136.690 136.450 Exit Loss Coef: 1.000
Manning's N: 0.012000 0.012000 Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000 0.000 Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000 0.000 Solution Incs: 10

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

*** Weir 1 of 1 for Drop Structure Post OF OS-1 ***

Count: 1 Bottom Clip(in): 0.000
Type: Horizontal Top Clip(in): 0.000
Flow: Both Weir Disc Coef: 3.200
Geometry: Rectangular Orifice Disc Coef: 0.600
Span(in): 37.00 Invert(ft): 140.150
Rise(in): 24.00 Control Elev(ft): 140.150

TABLE

==== Weirs =====

Name: Firehouse-Weir From Node: Firehouse-Pond
Group: BASE To Node: Ex DBI C-1
Flow: Both Count: 1
Type: Vertical: Mavis Geometry: Rectangular

Span(in): 48.00
Rise(in): 12.00
Invert(ft): 141.800
Control Elevation(ft): 141.800

TABLE

Bottom Clip(in): 0.000
Top Clip(in): 0.000
Weir Discharge Coef: 3.100
Orifice Discharge Coef: 0.610

Name: Post OF B-2 From Node: Swale B-2
Group: BASE To Node: Post TW B-C-D

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Flow: Both Count: 1
Type: Vertical: Mavis Geometry: Trapezoidal

Bottom Width(ft): 4.00
Left Side Slope(h/v): 4.00
Right Side Slope(h/v): 4.00
Invert(ft): 138.450
Control Elevation(ft): 138.450
Struct Opening Dim(ft): 1.15

TABLE

Bottom Clip(ft): 0.000
Top Clip(ft): 0.000
Weir Discharge Coef: 3.200
Orifice Discharge Coef: 0.600

Name: Post OF E From Node: Swale E
Group: BASE To Node: Post OS-2
Flow: Both Count: 1
Type: Vertical: Mavis Geometry: Trapezoidal

Bottom Width(ft): 5.00
Left Side Slope(h/v): 6.00
Right Side Slope(h/v): 6.00
Invert(ft): 139.800
Control Elevation(ft): 139.800
Struct Opening Dim(ft): 9999.00

TABLE

Bottom Clip(ft): 0.000
Top Clip(ft): 0.000
Weir Discharge Coef: 3.200
Orifice Discharge Coef: 0.600

Name: Post OF OS-2 From Node: Post OS-2
Group: BASE To Node: Post TW-E
Flow: Both Count: 1
Type: Vertical: Mavis Geometry: Trapezoidal

Bottom Width(ft): 60.00
Left Side Slope(h/v): 30.00
Right Side Slope(h/v): 30.00
Invert(ft): 139.500
Control Elevation(ft): 139.500
Struct Opening Dim(ft): 9999.00

TABLE

Bottom Clip(ft): 0.000
Top Clip(ft): 0.000
Weir Discharge Coef: 3.200
Orifice Discharge Coef: 0.600

=====
Rating Curves
=====

Name: Filter From Node: SE-Basin Count: 1
Group: BASE To Node: Post B-4 Flow: Both

TABLE	ELEV ON(ft)	ELEV OFF(ft)
#1: Filter	138.600	138.500
#2:	0.000	0.000
#3:	0.000	0.000
#4:	0.000	0.000

Permitted Park 33

=====
Percolation Links
=====

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Surface Area Option: Vary based on Stage/Area Table
Vertical Flow Termination: Horizontal Flow Algorithm
Aquifer Base Elev(ft): 125.000 Perimeter 1(ft): 1060.000
Water Table Elev(ft): 134.000 Perimeter 2(ft): 1420.000
*****0.000 Perimeter 3(ft): 2640.000
Horiz Conductivity(ft/day): 11.500 Distance 1 to 2(ft): 50.000
Vert Conductivity(ft/day): 23.000 Distance 2 to 3(ft): 300.000
Effective Porosity(dec): 0.200 Num Cells 1 to 2: 10
Suction Head(in): 4.170 Num Cells 2 to 3: 40
Layer Thickness(ft): 5.000

Name: PER D-1 From Node: Swale D-1 Flow: Both
Group: BASE To Node: GWT D Count: 1

Surface Area Option: Vary based on Stage/Area Table
Vertical Flow Termination: Horizontal Flow Algorithm
Aquifer Base Elev(ft): 121.800 Perimeter 1(ft): 1020.000
Water Table Elev(ft): 136.800 Perimeter 2(ft): 1365.000
*****0.000 Perimeter 3(ft): 2840.000
Horiz Conductivity(ft/day): 12.800 Distance 1 to 2(ft): 50.000
Vert Conductivity(ft/day): 25.500 Distance 2 to 3(ft): 300.000
Effective Porosity(dec): 0.200 Num Cells 1 to 2: 10
Suction Head(in): 4.170 Num Cells 2 to 3: 40
Layer Thickness(ft): 1.200

Name: PER D-3 From Node: Pond D-3 Flow: Both
Group: BASE To Node: GWT D Count: 1

Surface Area Option: Vary based on Stage/Area Table
Vertical Flow Termination: Horizontal Flow Algorithm
Aquifer Base Elev(ft): 120.500 Perimeter 1(ft): 940.000
Water Table Elev(ft): 135.500 Perimeter 2(ft): 1265.000
*****0.000 Perimeter 3(ft): 2390.000
Horiz Conductivity(ft/day): 14.200 Distance 1 to 2(ft): 50.000
Vert Conductivity(ft/day): 28.300 Distance 2 to 3(ft): 300.000
Effective Porosity(dec): 0.200 Num Cells 1 to 2: 10
Suction Head(in): 4.170 Num Cells 2 to 3: 40
Layer Thickness(ft): 1.400

Name: PER E From Node: Swale E Flow: Both
Group: BASE To Node: GWT E Count: 1

Surface Area Option: Vary based on Stage/Area Table
Vertical Flow Termination: Horizontal Flow Algorithm
Aquifer Base Elev(ft): 120.300 Perimeter 1(ft): 1935.000
Water Table Elev(ft): 135.300 Perimeter 2(ft): 2310.000
*****0.000 Perimeter 3(ft): 4300.000
Horiz Conductivity(ft/day): 17.000 Distance 1 to 2(ft): 50.000
Vert Conductivity(ft/day): 34.000 Distance 2 to 3(ft): 300.000
Effective Porosity(dec): 0.200 Num Cells 1 to 2: 10
Suction Head(in): 4.170 Num Cells 2 to 3: 40
Layer Thickness(ft): 3.700

Name: PER OS-2 From Node: Post OS-2 Flow: Both
Group: BASE To Node: GWT E Count: 1

Surface Area Option: Vary based on Stage/Area Table
Vertical Flow Termination: Horizontal Flow Algorithm

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Aquifer Base Elev(ft): 120.300	Perimeter 1(ft): 325.000
Water Table Elev(ft): 135.300	Perimeter 2(ft): 760.000
*****0.000	Perimeter 3(ft): 1520.000
Horiz Conductivity(ft/day): 17.000	Distance 1 to 2(ft): 50.000
Vert Conductivity(ft/day): 34.000	Distance 2 to 3(ft): 300.000
Effective Porosity(dec): 0.200	Num Cells 1 to 2: 10
Suction Head(in): 4.170	Num Cells 2 to 3: 40
Layer Thickness(ft): 3.700	

=====
Hydrology Simulations
=====

Name: 10-1
Filename: O:\Drainage\13-03-Calculations\ICPR\Post\10-1.R32

Override Defaults: Yes
Storm Duration(hrs): 1.00
Rainfall File: Fdot-1
Rainfall Amount(in): 3.25

Time(hrs)	Print Inc(min)
1.000	5.00

Name: 10-2
Filename: O:\Drainage\13-03-Calculations\ICPR\Post\10-2.R32

Override Defaults: Yes
Storm Duration(hrs): 2.00
Rainfall File: Fdot-2
Rainfall Amount(in): 4.00

Time(hrs)	Print Inc(min)
2.000	5.00

Name: 10-24
Filename: O:\Drainage\13-03-Calculations\ICPR\Post\10-24.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Fdot-24
Rainfall Amount(in): 7.40

Time(hrs)	Print Inc(min)
24.000	5.00

Name: 10-4
Filename: O:\Drainage\13-03-Calculations\ICPR\Post\10-4.R32

Override Defaults: Yes
Storm Duration(hrs): 4.00
Rainfall File: Fdot-4
Rainfall Amount(in): 4.45

Time(hrs)	Print Inc(min)
4.000	5.00

Name: 10-72
Filename: O:\Drainage\13-03-Calculations\ICPR\Post\10-72.R32

Override Defaults: Yes
Storm Duration(hrs): 72.00
Rainfall File: Fdot-72
Rainfall Amount(in): 9.20

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SWFWMD Permit No. 7112
(East West Road)

***East West Road
(FAP No.: ARRA 145 B,
FPN: 426645-1-52-01)***

Lakeland, Florida

Prepared for **Florida Department of Transportation**

Submitted to **Southwest Florida Water Management District
Bartow Service Office
170 Century Boulevard
Bartow, FL 33830**

Prepared by **Jacobs Engineering Group, Inc.
18302 Highwoods Preserve Parkway
Suite 200
Tampa, Florida 33647**

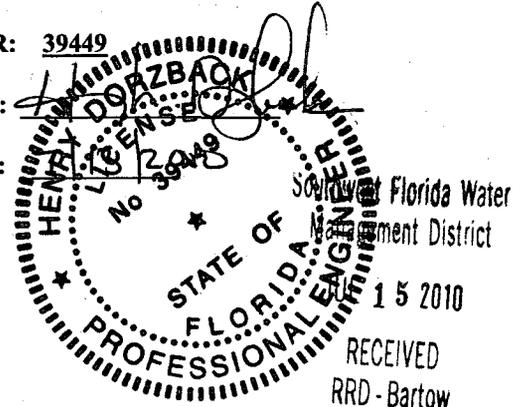
**VHB-MS No. 62092.09
JULY, 2010**

NAME: Henry L. Dorzback, P.E.

FLORIDA REGISTRATION NUMBER: 39449

SIGNATURE: 

DATE: 7/15/2010



Basin Number 100A

Description: Basin number 100A consists of the north half of the East West Road right-of-way beginning at approximately station 2+20, which is at the intersection of SR 33 and the East West Road, and ends at station 6+00, located 380 ft east of SR 33. Basin number 100A also includes the east side of SR 33 from station 418+80 to station 438+29.

Roadway Segment (East West Road): station 2+20 to station 6+00

Length: 380 feet

Average Width of Basin = 68 feet

Basin Area = $380(68)/43560 = 0.593$ acres

Roadway Segment (SR 33): station 418+80 to station 438+29

Length: 1949 feet

Right-of-Way Width = 120 feet

Basin Area = $1949(120)/43560 = 5.369$ acres

Total Basin Area = $0.593 + 5.369 = 5.962$ acres

Treatment Volume (dry detention)

Required Treatment Volume = $(0.5/12)(5.962) = 0.248$ ac-ft

Attenuation Volume

Storm Frequency: 100 year

Hydrologic Soil Group: "C"

Storm Duration: 24 hour

Rainfall Amount: 11 inches

Potential Abstraction (S) = $(1000/CN) - 10$

Runoff Depth (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Pre-Development Weighted Curve Number (pavement and grass)

Description	Width (ft)	Land Use	CN	Product
Pavement	18	Pavement	98	1764
Grass	170	R/W	80	13600
Total	188			15364

Weighted CN = $\text{Product}/\text{Total Width} = 15364/188 = 82$

$S_{pre} = (1000/82) - 10 = 2.195$ inches

$Q_{pre} = \frac{\{11 - 0.2(2.195)\}^2}{\{11 + 0.8(2.195)\}} = 8.744$ inches

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Basin Number 100A

Post-Development Weighted Curve Number (*pavement and grass*)

SR 33 avg. pavement width = 27 ft
East West Road pavement width = 41

Description	Width (ft)	Land Use	CN	Product
Pavement	68	Pavement	98	6664
Grass	120	R/W	80	9600
Total	188			16264

Weighted CN = Product/Total Width = 16264/188 = 86

$S_{post} = (1000/86) - 10 = 1.628$ inches

$Q_{post} = \frac{\{11 - 0.2(1.628)\}^2}{\{11 + 0.8(1.628)\}} = 9.262$ inches

Runoff Depth = 9.262" - 8744" = 0.518"
Attenuation Volume = (Runoff Depth) x (Basin Area)
Attenuation Volume = (0.518/12)(5.962) = 0.257 ac-ft

Total Required Pond Volume = 0.248 + 0.257 = 0.505 ac-ft

Treatment Swale Dimensions

SHWT = 133 ft (NAVD)
Bottom Elev. = 134.00 (NAVD)

Water Depth = 1.0 ft; Avg. Width = 28 ft.; Side Slope 1:8

Dimensions
Required Area = vol/depth = 0.505/1 = 0.505 ac.
Length = Area/width = 0.505(43560)/28 = 786 ft.
Use L=920' at d=0.0'

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Basin Number 100A

Stage-Storage Data

Elevation/Stage (ft)	Surface Area (Ac)	Storage Volume (Ac-ft)
134.0	0.422	0.000
134.5	0.596	0.254
135.0	0.774	0.598
136.0	1.136	0.955

Determine weir elevation based on required treatment volume of 0.248 ac-ft.

$$\text{Weir El.} = 134.0 + 0.248/0.598 = 134.4 \text{ ft. } \textit{Set Weir at 134.8}$$

25-year/24-hour Results

Qpre = 29.9 cfs

Qpost = 28.8 cfs

Max Stage = 135.4 ft

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East West Road - Basin 1A
 Basin Max Report

Simulation	Basin	Group	Time Max hrs	Flow Max cfs	Volume in	Volume ft3
100Y024H	B-1A_POST	BASE	12.02	24.381	8.7	106993.1
SWFWMD_025Y024H	B-1A_POST	BASE	12.02	18.162	6.3	78106.5
100Y024H	B-1A_POST2	BASE	12.02	18.334	8.7	80457.1
SWFWMD_025Y024H	B-1A_POST2	BASE	12.02	13.658	6.3	58734.8
100Y024H	B-1A_PRE	BASE	12.02	41.138	8.2	176411.8
SWFWMD_025Y024H	B-1A_PRE	BASE	12.02	30.129	5.9	126647.7

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East West Road - Basin 1A
Node Max Report

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
N-1A_POST	BASE	100Y024H	12.00	134.700	136.000	0.0024	0	12.00	24.893	0.00	0.000
N-1A_POST	BASESWFWMD	025Y024H	12.00	134.700	136.000	0.0024	0	12.00	16.376	0.00	0.000
N-1A_PRE	BASE	100Y024H	12.00	134.700	136.000	0.0024	0	12.00	40.965	0.00	0.000
N-1A_PRE	BASESWFWMD	025Y024H	12.00	134.700	136.000	0.0024	0	12.00	29.902	0.00	0.000
N-POND_1A	BASE	100Y024H	12.32	135.637	136.000	0.0050	43759	12.00	24.317	12.32	9.690
N-POND_1A	BASESWFWMD	025Y024H	12.38	135.383	136.000	0.0050	39762	12.00	18.062	12.38	5.824

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East West Road - Basin 1A
Link Max Report

Name	Group	Simulation	Max Time Flow hrs	Max Flow cfs	Max Delta Q cfs	Max Time US Stage hrs	Max US Stage ft	Max Time DS Stage hrs	Max DS Stage ft
P-100_101	BASE	100Y024H	12.32	9.690	-0.069	12.32	135.637	12.00	134.700
P-100_101	BASESWFMD	025Y024H	12.38	5.824	0.050	12.38	135.383	12.00	134.700

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Basins

Name: B-1A_POST Node: N-POND_1A Status: Onsite
Group: BASE Type: SCS Unit Hydrograph CN

Unit Hydrograph: UH484 Peaking Factor: 484.0
Rainfall File: Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 10.00
Area(ac): 3.403 Time Shift(hrs): 0.00
Curve Number: 86.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

SR 33 from station 418+80 to station 429+00

Name: B-1A_POST2 Node: N-1A_POST Status: Onsite
Group: BASE Type: SCS Unit Hydrograph CN

Unit Hydrograph: UH484 Peaking Factor: 484.0
Rainfall File: Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 10.00
Area(ac): 2.559 Time Shift(hrs): 0.00
Curve Number: 86.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

SR 33 from station 429+00 to station 438+29

Name: B-1A_PRE Node: N-1A_PRE Status: Onsite
Group: BASE Type: SCS Unit Hydrograph CN

Unit Hydrograph: UH484 Peaking Factor: 484.0
Rainfall File: Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 10.00
Area(ac): 5.962 Time Shift(hrs): 0.00
Curve Number: 82.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Nodes

Name: N-1A_POST Base Flow(cfs): 0.000 Init Stage(ft): 133.000
Group: BASE Warn Stage(ft): 136.000
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	133.000
12.00	134.700
300.00	134.700

Name: N-1A_PRE Base Flow(cfs): 0.000 Init Stage(ft): 133.000
Group: BASE Warn Stage(ft): 136.000
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	133.000
12.00	134.700
300.00	134.700

Name: N-POND_1A Base Flow(cfs): 0.000 Init Stage(ft): 134.000
Group: BASE Warn Stage(ft): 136.000
Type: Stage/Area

Stage(ft)	Area(ac)
134.000	0.4220
134.500	0.5960
135.000	0.7740
136.000	1.1360

Drop Structures

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Name: P-100_101 From Node: N-POND_1A Length(ft): 55.00
Group: BASE To Node: N-1A_POST Count: 1

UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Circular	Circular	Solution Algorithm: Automatic
Span(in): 24.00	24.00	Flow: Both
Rise(in): 24.00	24.00	Entrance Loss Coef: 0.000
Invert(ft): 131.000	130.800	Exit Loss Coef: 1.000
Manning's N: 0.012000	0.012000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

*** Weir 1 of 2 for Drop Structure P-100_101 ***

Count: 1	Bottom Clip(in): 0.000	TABLE
Type: Vertical: Mavis	Top Clip(in): 0.000	
Flow: Both	Weir Disc Coef: 3.200	
Geometry: Rectangular	Orifice Disc Coef: 0.600	
Span(in): 49.00	Invert(ft): 134.800	
Rise(in): 10.00	Control Elev(ft): 134.800	

*** Weir 2 of 2 for Drop Structure P-100_101 ***

Count: 1	Bottom Clip(in): 0.000	TABLE
Type: Horizontal	Top Clip(in): 0.000	
Flow: Both	Weir Disc Coef: 3.200	
Geometry: Rectangular	Orifice Disc Coef: 0.600	
Span(in): 37.00	Invert(ft): 135.700	
Rise(in): 49.00	Control Elev(ft): 135.700	

==== Hydrology Simulations =====

Name: 010Y024H
Filename: C:\ICPR-FDOT\Project1\010Y024H.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: FDOT-24
Rainfall Amount(in): 7.25

Time(hrs)	Print Inc(min)
-----	-----
30.000	5.00

Name: 025Y024H
Filename: C:\ICPR-FDOT\Project1\025Y024H.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: FDOT-24
Rainfall Amount(in): 8.60

Time(hrs)	Print Inc(min)
-----	-----
30.000	5.00

Name: 100Y024H
Filename: C:\ICPR-FDOT\Project1\100Y024H.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: FLMOD
Rainfall Amount(in): 10.40

Time(hrs)	Print Inc(min)
-----	-----
30.000	5.00

Name: SWFWMD_025Y024H
Filename: C:\ICPR-FDOT\Project1\SWFWMD_025Y024H.R32

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RRD - Bartow

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: FLMOD
Rainfall Amount(in): 8.00

Time(hrs)	Print Inc(min)
30.000	5.00

==== Routing Simulations =====

Name: 010Y024H Hydrology Sim: 010Y024H
Filename: C:\ICPR-FDOT\Project1\010Y024H.I32

Execute: No Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 30.00
Min Calc Time(sec): 0.2500 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

010 yr / 024 hr

Time(hrs)	Print Inc(min)
999.000	5.000

Group	Run
BASE	Yes

Name: 025Y024H Hydrology Sim: 025Y024H
Filename: C:\ICPR-FDOT\Project1\025Y024H.I32

Execute: No Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 30.00
Min Calc Time(sec): 0.2500 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

025 yr / 024 hr

Time(hrs)	Print Inc(min)
999.000	5.000

Group	Run
BASE	Yes

Name: 100Y024H Hydrology Sim: 100Y024H
Filename: C:\ICPR-FDOT\Project1\100Y024H.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 30.00
Min Calc Time(sec): 0.2500 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

100 yr / 024 hr

Time(hrs)	Print Inc(min)
999.000	5.000

Group	Run
BASE	Yes

Name: SWFWMD_025Y024H Hydrology Sim: SWFWMD_025Y024H
Filename: C:\ICPR-FDOT\Project1\SWFWMD_025Y024H.I32

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Execute: Yes
Alternative: No

Restart: No

Patch: No

Max Delta Z(ft): 1.00
Time Step Optimizer: 10.000
Start Time(hrs): 0.000
Min Calc Time(sec): 0.2500
Boundary Stages:

Delta Z Factor: 0.00500
End Time(hrs): 30.00
Max Calc Time(sec): 60.0000
Boundary Flows:

SWFWMD 025 yr / 024 hr

Time (hrs)	Print Inc (min)
999.000	5.000
Group	Run
BASE	Yes

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Basin Number 100B

Description: Basin number 100B consists of the south half of the East West Road right-of-way beginning at approximately station 2+20, which is at the intersection of SR 33 and the East West Road, and ends at station 6+00, located 380 ft east of SR 33. Basin number 100B also includes the east side of SR 33 from station 407+21 to station 418+80.

Roadway Segment (East West Road): station 2+20 to station 6+00

Length: 380 feet

Average Width of Basin = 80 feet

Basin Area = $380(80)/43560 = 0.698$ acres

Roadway Segment (SR 33): station 407+21 to station 418+80

Length: 1159 feet

Right-of-Way Width = 120 feet

Basin Area = $1159(120)/43560 = 3.193$ acres

Total Basin Area = $0.698 + 3.196 = 3.891$

Treatment Volume (dry detention)

Required Treatment Volume = $(0.5/12)(3.891) = 0.162$ ac-ft

Attenuation Volume

Storm Frequency: 100 year

Hydrologic Soil Group: "C"

Storm Duration: 24 hour

Rainfall Amount: 11 inches

Potential Abstraction (S) = $(1000/CN) - 10$

Runoff Depth (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Pre-Development Weighted Curve Number (pavement and grass)

Description	Width (ft)	Land Use	CN	Product
Pavement	23	Pavement	98	2254
Grass	177	R/W	80	14160
Total	200			16414

Weighted CN = $Product/Total\ Width = 16414/200 = 82.0$

$S_{pre} = (1000/82.0) - 10 = 2.195$ inches

$Q_{pre} = \frac{\{11 - 0.2(2.195)\}^2}{\{11 + 0.8(2.195)\}} = 8.744$ inches

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Basin Number 100B

Post-Development Weighted Curve Number (*pavement and grass*)

Description	Width (ft)	Land Use	CN	Product
Pavement	68	Pavement	98	6664
Grass	132	R/W	80	10560
Total	200			17224

$$\text{Weighted CN} = \text{Product/Total Width} = 17224/200 = 86$$

$$S_{\text{post}} = (1000/86.0) - 10 = 1.628 \text{ inches}$$

$$Q_{\text{post}} = \frac{\{11 - 0.2(1.628)\}^2}{\{11 + 0.8(1.628)\}} = 9.262 \text{ inches}$$

$$\text{Runoff Depth} = 9.262" - 8744" = 0.518"$$

$$\text{Attenuation Volume} = (\text{Runoff Depth}) \times (\text{Basin Area})$$

$$\text{Attenuation Volume} = (0.518/12)(3.891) = 0.172 \text{ ac-ft}$$

$$\text{Total Required Pond Volume} = 0.162 + 0.172 = 0.334 \text{ ac-ft}$$

Treatment Swale Dimensions

$$\text{SHWT} = 133 \text{ ft (NAVD)}$$

$$\text{Bottom Elev.} = 134.00 \text{ (NAVD)}$$

$$\text{Water Depth} = 1.0 \text{ ft; Width} = 36 \text{ ft.; Side Slope } 1:8$$

Dimensions

$$\text{Required Length} = \text{vol/depth} = 0.334/1 = 0.334 \text{ ac.}$$

$$\text{Length} = \text{Area/Width} = 0.334(43560)/36 = 404 \text{ ft.}$$

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Basin Number 100B

Stage-Storage Data

Elevation/Stage (ft)	Surface Area (Ac)	Storage Volume (Ac-ft)
134.0	0.386	0.00
134.5	0.499	0.221
135.0	0.614	0.500
136.0	0.735	0.674

Determine weir elevation based on required treatment volume of 0.162 ac-ft.

$$\text{Weir El.} = 134.0 + 0.162/0.50 = 134.3 \text{ ft.} \quad \text{Set Weir at 134.7}$$

25-year/24-hour Results

Qpre = 19.5 cfs

Qpost = 14.1 cfs

Max Stage = 135.3 ft

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East West Road - Basin 1B
Basin Max Report

Simulation	Basin	Group	Time Max hrs	Flow Max cfs	Volume in	Volume ft3
100Y024H	B-1B_POST	BASE	12.02	27.877	8.7	122336.3
SWFWMD_025Y024H	B-1B_POST	BASE	12.02	20.767	6.3	89307.2
100Y024H	B-1B_PRE	BASE	12.02	26.848	8.2	115132.2
SWFWMD_025Y024H	B-1B_PRE	BASE	12.02	19.663	5.9	82654.5

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East West Road - Basin 1B
Node Max Report

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Max Stage ft	Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
N-1B_POST	BASE	100Y024H	12.00	134.700	136.000	0.0024	0	12.15	17.824	0.00	0.000
N-1B_POST	BASESWFWMD	025Y024H	12.00	134.700	136.000	0.0024	0	12.14	14.070	0.00	0.000
N-1B_PRE	BASE	100Y024H	12.00	134.700	136.000	0.0024	0	12.00	26.698	0.00	0.000
N-1B_PRE	BASESWFWMD	025Y024H	12.00	134.700	136.000	0.0024	0	12.00	19.512	0.00	0.000
N-POND_1B	BASE	100Y024H	12.15	135.490	136.000	0.0050	29329	12.00	27.768	12.15	17.824
N-POND_1B	BASESWFWMD	025Y024H	12.14	135.277	136.000	-0.0050	28204	12.00	20.654	12.14	14.070

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East West Road - Basin 1B
Link Max Report

Name	Group	Simulation	Max Time Flow hrs	Max Flow cfs	Max Delta Q cfs	Max Time US Stage hrs	Max US Stage ft	Max Time DS Stage hrs	Max DS Stage ft
P-107_108	BASE	100Y024H	12.15	17.824	0.156	12.15	135.490	12.00	134.700
P-107_108	BASESWFMD	025Y024H	12.14	14.070	0.134	12.14	135.277	12.00	134.700

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RRD - Barrow

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall
Downstream FHWA Inlet Edge Description:
Horizontal Ellipse Concrete: Square edge with headwall

*** Weir 1 of 1 for Drop Structure P-107_108 ***

TABLE

Count: 1	Bottom Clip(in): 0.000
Type: Horizontal	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 37.00	Invert(ft): 134.700
Rise(in): 49.00	Control Elev(ft): 134.700

==== Hydrology Simulations =====

Name: 010Y024H
Filename: C:\ICPR-FDOT\Project1\010Y024H.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: FDOT-24
Rainfall Amount(in): 7.25

Time(hrs)	Print Inc(min)
30.000	5.00

Name: 025Y024H
Filename: C:\ICPR-FDOT\Project1\025Y024H.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: FDOT-24
Rainfall Amount(in): 8.60

Time(hrs)	Print Inc(min)
30.000	5.00

Name: 100Y024H
Filename: C:\ICPR-FDOT\Project1\100Y024H.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: FLMOD
Rainfall Amount(in): 10.40

Time(hrs)	Print Inc(min)
30.000	5.00

Name: SWFWMD_025Y024H
Filename: C:\ICPR-FDOT\Project1\SWFWMD_025Y024H.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: FLMOD
Rainfall Amount(in): 8.00

Time(hrs)	Print Inc(min)
30.000	5.00

==== Routing Simulations =====

Name: 010Y024H Hydrology Sim: 010Y024H
Filename: C:\ICPR-FDOT\Project1\010Y024H.I32

Execute: No Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 30.00

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East West Road - Basin 1B
Input Report

Min Calc Time(sec): 0.2500
Boundary Stages:

Max Calc Time(sec): 60.0000
Boundary Flows:

010 yr / 024 hr

Time(hrs) Print Inc(min)

999.000 5.000

Group Run

BASE Yes

Name: 025Y024H Hydrology Sim: 025Y024H
Filename: C:\ICPR-FDOT\Project1\025Y024H.I32

Execute: No Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 30.00
Min Calc Time(sec): 0.2500 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

025 yr / 024 hr

Time(hrs) Print Inc(min)

999.000 5.000

Group Run

BASE Yes

Name: 100Y024H Hydrology Sim: 100Y024H
Filename: C:\ICPR-FDOT\Project1\100Y024H.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 30.00
Min Calc Time(sec): 0.2500 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

100 yr / 024 hr

Time(hrs) Print Inc(min)

999.000 5.000

Group Run

BASE Yes

Name: SWFWMD_025Y024H Hydrology Sim: SWFWMD_025Y024H
Filename: C:\ICPR-FDOT\Project1\SWFWMD_025Y024H.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 30.00
Min Calc Time(sec): 0.2500 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

SWFWMD 025 yr / 024 hr

Time(hrs) Print Inc(min)

999.000 5.000

Group Run

BASE Yes

Southwest Florida Water
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SWFWMD Permit No. 21375
(Firstpark at Bridgewater)



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Southwest Florida Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
SUNCOM 628-4150 TDD only 1-800-231-6103 (FL only)
World Wide Web: <http://www.swfwmd.state.fl.us>

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)
SUNCOM 578-2070

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)
SUNCOM 572-6200

Venice Service Office
115 Corporation Way
Venice, Florida 34292-3524
(941) 486-1212 or
1-800-320-3503 (FL only)
SUNCOM 526-6900

Lecanto Service Office
3600 West Sovereign Path
Suite 226
Lecanto, Florida 34461-8070
(352) 527-8131
SUNCOM 667-3271

January 26, 2001

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General Counsel

Mr. M.C. Davis
View Properties, Ltd.
151 Regions Way, Suite 2C
Destin, FL 32541

Board of Trustees of the Internal Improvement
Trust Fund of the State of Florida
c/o Florida Fish and Wildlife Conservation
3829 Tenoroc Road
Lakeland, FL 33805

**Subject: Notice of Proposed Agency Action - Approval
Proposed Permit No. 49021375.000**

Dear Permittee:

This letter constitutes notice of proposed agency action by the Southwest Florida Water Management District on the above-referenced proposed permit. Please read thoroughly the enclosed copy of the proposed permit.

A recommendation of approval of the proposed permit will be presented to the District Governing Board for consideration at its next meeting beginning at 1:00 p.m. on February 27, 2001, at the District Headquarters, 2379 Broad Street, Brooksville, FL 34604-6899.

You or any person whose substantial interests are affected by the District's action regarding a permit may request an administrative hearing in accordance with Sections 120.569 and 120.57, Florida Statutes (F.S.), and Chapter 28-106, Florida Administrative Code (F.A.C.), of the Uniform Rules of Procedure. A request for hearing must (1) explain how the substantial interests of each person requesting the hearing will be affected by the District's action, or proposed action; (2) state all material facts disputed by the person requesting the hearing or state that there are no disputed facts; and (3) otherwise comply with Chapter 28-106, F.A.C. Copies of Sections 28-106.201 and 28-106.301, F.A.C., are enclosed for your reference. A request for hearing must be filed with (received by) the Agency Clerk of the District at the District's Brooksville address within 21 days of receipt of this notice. Receipt is deemed to be the fifth day after the date on which this notice is deposited in the United States mail. Failure to file a request for hearing within this time period shall constitute a waiver of any right you or such person may have to request a hearing under Sections 120.569 and 120.57, F.S. Mediation pursuant to Section 120.573, F.S. to settle an administrative dispute regarding the District's action in this matter is not available prior to the filing of a request for hearing.

If you do not wish to request an administrative hearing but wish to address the Governing Board informally concerning the proposed decision, you may appear before the Governing Board at the time and place stated above. Such an appearance shall not provide a basis for appealing the decision of the Governing Board pursuant to Chapter 120, F.S.

Enclosed is a 'Noticing Packet' that provides information regarding District Rule, 40D-1.1010, F.A.C. which addresses the notification of persons having substantial interests that may be affected by the District's action in this matter. The packet contains guidelines on how to provide notice of the District's action, and a notice that you may use.

If you have any questions concerning this matter, please contact the Bartow Regulation Department or the Agency Clerk at extension 4338.

Sincerely,
Adeline Wood
Adeline Wood, Supervisor
Records and Data Department

AW:tg
Enclosures: Proposed Permit with Conditions, Sections 28-106.201, 28-106.301, Noticing Packet

cc: James A. Carnicelli, P.E., and USACOE

INDPAAMSW
R. 07/30/99

Protecting Your
Water Resources

DRAFT

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
ENVIRONMENTAL RESOURCE
CONCEPTUAL
PERMIT NO. 49021375.000

EXPIRATION DATE: February 27, 2003

PERMIT ISSUE DATE: February 27, 2001

This permit issued under the provisions of Chapter 373, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.), Rule 40D-4, authorizes the Permittee to use the information outlined herein and shown by the application, approved drawing(s), plans, and other documents, attached hereto and kept on file at the Southwest Florida Water Management District (District).

PROJECT NAME: Bridgewater Master Surface Water Management System

GRANTED TO: View Properties, Ltd.
151 Regions Way - Suite 2C
Destin, FL 32541

Board of Trustees of the Internal Improvement
Trust Fund of the State of Florida
c/o Florida Fish and Wildlife Conservation Commission
3829 Tenoroc Road
Lakeland, FL 33805

ABSTRACT: This permit authorization is for the conceptual approval of a surface water management system serving a 1,128.40 acre multi-land use development including industrial, commercial, and residential uses, as named above and as shown on the approved drawings. The project site is located south of Interstate 4, west of State Road 33 (Combee Road) and north of Old Combee Road in the City of Lakeland, Polk County. Information regarding the surface water management systems, 100-year floodplain and wetlands is contained within the tables and comments below.

OP. & MAINT. ENTITY: Bridgewater Master Association, Inc.
151 Regions Way, Suite 2-C
Destin, FL 32541

PROPERTY LOCATION: Polk County

SEC/TWP/RGE: 15,16,20,21,22 and 28/27S/24E

**TOTAL ACRES OWNED
OR UNDER CONTROL:** 1,128.40

PROJECT SIZE: 1,128.40 Acres

LAND USE: Commercial

DATE APPLICATION FILED: September 15, 2000

AMENDED DATE: December 5, 2000

I. Water Quantity/Quality

POND NO.	AREA ACRES AT TOP OF BANK	TREATMENT TYPE
100	6.30	Retention
200	3.60	N/A
300	7.20	Wet Detention
400	9.60	Wet Detention
500	0.10	N/A
600	0.10	N/A
700	0.10	N/A
900	14.50	Wet Detention
1000	50.90	Wet Detention
1100	47.70	Wet Detention
1200	16.70	N/A
1300	3.20	N/A
1400	13.80	N/A
1500	56.60	Wet Detention
1600	2.52	N/A
1700	2.07	N/A
1800	60.00	Wet detention
TOTAL	294.04	

II. 100-Year Floodplain

Encroachment (Acre-Feet of fill)	Compensation (Acre-Feet of excavation)	Compensation Type*	Encroachment Result**(feet)
0.00	0.00	NE [X]	Depth [N/A]

*Codes [X] for the type or method of compensation provided are as follows:

NE = No Encroachment

N/A = Not Applicable

**Depth of change in flood stage (level) over existing receiving water stage resulting from floodplain encroachment caused by a project that claims MI type of compensation.

III. Environmental Considerations

Wetland Information:				
WETLAND NO.	TOTAL AC.	NOT IMPACTED AC.	TEMPORARILY DISTURBED AC.	PERMANENTLY DESTROYED AC.
1	0.23	0.23	0.00	0.00
2	0.58	0.58	0.00	0.00
3	0.07	0.07	0.00	0.00
4	0.35	0.35	0.00	0.00
5	0.11	0.11	0.00	0.00
6	0.07	0.07	0.00	0.00
7	2.97	2.97	0.00	0.00
8	1.97	1.97	0.00	0.00
9	0.21	0.21	0.00	0.00
10	2.07	2.07	0.00	0.00
11	1.85	1.85	0.00	0.00
12	0.19	0.19	0.00	0.00
13	0.15	0.15	0.00	0.00
14	0.06	0.06	0.00	0.00
15	3.46	3.46	0.00	0.00
16	0.16	0.16	0.00	0.00
17	23.88	23.88	0.00	0.00
18	0.10	0.10	0.00	0.00
19	9.72	9.72	0.00	0.00
20	0.02	0.02	0.00	0.00
21	0.02	0.02	0.00	0.00
22	0.09	0.09	0.00	0.00
23	0.04	0.04	0.00	0.00
24	0.23	0.23	0.00	0.00
25	0.47	0.47	0.00	0.00
26	0.20	0.20	0.00	0.00
27	0.05	0.05	0.00	0.00
28	0.12	0.12	0.00	0.00
29	0.02	0.02	0.00	0.00
30	0.07	0.07	0.00	0.00
31	0.17	0.17	0.00	0.00
32	0.04	0.04	0.00	0.00
33	0.08	0.08	0.00	0.00
34	0.27	0.27	0.00	0.00
35	0.04	0.04	0.00	0.00
36	0.03	0.03	0.00	0.00
37	0.16	0.16	0.00	0.00
38	0.68	0.68	0.00	0.00
39	0.07	0.07	0.00	0.00
40	0.23	0.23	0.00	0.00

Wetland Information: (Continued)				
WETLAND NO.	TOTAL AC.	NOT IMPACTED AC.	TEMPORARILY DISTURBED AC.	PERMANENTLY DESTROYED AC.
41	0.49	0.49	0.00	0.00
42	0.32	0.32	0.00	0.00
43	0.66	0.66	0.00	0.00
100	5.10	5.10	0.00	0.00
200	2.40	2.40	0.00	0.00
800	4.90	4.90	0.00	0.00
900	12.60	12.60	0.00	0.00
1000	50.90	50.90	0.00	0.00
1100	43.20	43.20	0.00	0.00
1200	15.50	15.50	0.00	0.00
1300	2.50	2.50	0.00	0.00
1400	12.00	12.00	0.00	0.00
1500	39.00	39.00	0.00	0.00
1800	46.30	46.30	0.00	0.00
1900	4.10	4.10	0.00	0.00
TOTAL	291.27	291.27	0.00	0.00

Comments: The project area includes 52.77 acres of non-forested wetlands and 238.50 acres of excavated surface waters. Permanent impacts are proposed to 13.77 acres of non-forested wetlands (Wetland No. 2, 7, 8,10, 11, 15, 17, and 38), 0.13 acre of surface waters (Wetland No. 1500), and 1.49 acres of isolated, non-forested wetlands less than 0.50 acre in size (Wetland Nos. 9, 12, 13, 14, 16, 21, 22, 23, 24, 26, 27, 28, and 36). No mitigation is required for impacts to Wetland Nos. 9, 12, 13, 14, 16, 21, 22, 23, 24, 26, 27, 28, and 36 because they are isolated, less than 0.50 acre in size and are not used by threatened or endangered species. Impacts to the wetlands will be detailed in the construction permits for this project.

Mitigation Information:					
AREA NO.	CREATED/ RESTORED AC.	UPLAND PRESERVED AC.	ENHANCED WETLAND AC.	WETLANDS PRESERVED AC.	MISC. MITI AC.
1	6.00	0.00	0.00	0.00	0.00
2	2.15	0.00	0.00	0.00	0.00
3	7.24	0.00	0.00	0.00	0.00
TOTAL	15.39	0.00	0.00	0.00	0.00
NET CHANGE	1.49		OTHER MITIGATION TOTAL		0.00

Comments: Mitigation for impacts to 13.77 acres of non-forested wetlands and 0.13 acre of a man-made surface water body will be provided by construction of three areas of wetland creation (area 1, 2, and 3) totaling 15.39 acres contiguous to on site existing water bodies. No mitigation is required for impacts to Wetland Nos. 9, 12, 13, 14, 16, 21, 22, 23, 24, 26, 27, 28, and 36 because they are isolated, less than 0.50 acre in size and are not used by threatened or endangered species. The areas of wetlands created for mitigation will be detailed in the construction permits for this project.

Watershed names: Peace River and Withlacoochee River

A regulatory conservation easement is not required.

A proprietary conservation easement is not required.

SPECIFIC CONDITIONS

1. If the ownership of the project area covered by the subject permit is divided, with someone other than the Permittee becoming the owner of part of the project area, this permit shall terminate, pursuant to Section 40D-1.6105, F.A.C. In such situations, each land owner shall obtain a permit (which may be a modification of this permit) for the land owned by that person. This condition shall not apply to the division and sale of lots or units in industrial/commercial/residential subdivisions or condominiums.
2. The discharges from this system shall meet state water quality standards as set forth in Chapter 62-302 and Section 62-4.242, F.A.C., for class waters equivalent to the receiving waters.
3. The District reserves the right, upon prior notice to the Permittee, to conduct on-site research to assess the pollutant removal efficiency of the surface water management system. The Permittee may be required to cooperate in this regard by allowing on-site access by District representatives, by allowing the installation and operation of testing and monitoring equipment, and by allowing other assistance measures as needed on site.
4. Pursuant to Chapter 40D-4.321(1)(a), unless revoked or otherwise modified, the duration of this Conceptual Permit shall be two years from the date of issuance, unless within that period of time an application for a construction permit is filed for any portion of the project. If the application for a construction permit is approved and construction is commenced according to Rule 40D-4.321, F.A.C., then the Conceptual Permit is valid so long as the conceptually permitted phases are under construction consistent with a phased development master plan for a surface water management system that has been permitted by the District. If construction of the permitted phases is discontinued or is inconsistent with the phased development master plan, then the Conceptual Permit shall expire.
5. For all of the drainage basins and stormwater management (SWM) areas identified on the approved plans, with the exception of drainage basins/SWM areas 300 and 400, the pre-treatment of stormwater runoff prior to discharge into wetlands/other surface waters shall be in accordance with Section 5.2.a., paragraph 3.,(c), Basis of Review. This provision for pre-treatment is proposed via the use of dry grassed, catchments that detain the first one-fourth (1/4) inch of runoff with an overall depth of no more than four (4) inches.
6. Refer to **GENERAL CONDITION** No. 15 herein.

GENERAL CONDITIONS

1. The general conditions attached hereto as Exhibit "A" are hereby incorporated into this permit by reference and the Permittee shall comply with them.

Authorized Signature

DISCUSSION PAPER
ENVIRONMENTAL RESOURCE APPLICATION NO. 49021375.000
Bridgewater Master Surface Water Management System

SUMMARY

- Project type:

1,128.40 acre conceptual project with multi-land use development including industrial, commercial and residential uses.

- Location:

South of Interstate 4, west of State Road 33 (Combee Road) and north of Old Combee Road in the City of Lakeland, Polk County.

- Surface Water Management System:

Engineering

a. Treatment and attenuation of stormwater runoff to be accomplished via sixteen detention ponds and one retention pond.

b. 100-year floodplain - no encroachment proposed.

Environmental

The project area includes 52.77 acres of non-forested wetlands and 238.50 acres of excavated surface waters.

Permanent impacts are proposed to 13.77 acres of non-forested wetlands, 0.13 acre of surface waters, and 1.49 acres of isolated, non-forested wetlands less than 0.50 acre in size.

Three areas of wetland creation totaling 15.39 acres contiguous to existing water bodies are offered as mitigation during the construction phase of this project.

- Meets Rule Requirements. Staff recommends approval.



An Equal Opportunity Employer

Southwest Florida Water Management District



Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)
SUNCOM 578-2070

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)
SUNCOM 572-6200

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
SUNCOM 628-4150 TDD only 1-800-231-6103 (FL only)
World Wide Web: <http://www.swfwmd.state.fl.us>

Venice Service Office
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SUNCOM 526-6900

Lecanto Service Office
3600 West Sovereign Path
Suite 226
Lecanto, Florida 34461-8070
(352) 527-8131
SUNCOM 667-3271

49021375.000

February 14, 2001

MR. M. C. DAVIS
VIEW PROPERTIES, LTD.
151 REGIONS WAY - SUITE 2C
DESTIN, FL 32541

Subject: Notice of **REVISED** Date of Governing Board Meeting

This letter constitutes notice that the Southwest Florida Water Management District's Proposed Agency Action mailed to you on **January 26, 2001**, will be presented for consideration to the District Governing Board beginning at **1:00 p.m. on February 26, 2001**.

**The Public Hearing date has been changed from
February 27, 2001 to February 26, 2001.**

If you have any questions concerning this matter, please contact the Regulation Department or the Records and Data Department, Administrative Review & Records Section, at Extension 4338.

Sincerely,

Adeline Wood

Adeline Wood, Supervisor
Records and Data Department

AW:tg

Ronald C. Johnson
Chair, Polk

Monroe "Al" Coogler
Vice Chair, Citrus

Sally Thompson
Secretary, Hillsborough

Ronnie E. Duncan
Treasurer, Pinellas

Edward W. Chance
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Thomas G. Dabney, II
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Pamela L. Fentress
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Watson L. Haynes, II
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Janet D. Kovach
Hillsborough

Heidi B. McCree
Hillsborough

John K. Renke, III
Pasco

E. D. "Sonny" Vergara
Executive Director

Gene A. Heath
Assistant Executive Director

William S. Bilenky
General Counsel

49 021375.000



An Equal Opportunity Employer

Southwest Florida Water Management District



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February 14, 2001

JAMES A. CARNICELLI, P.E.
RIDGE PROFESSIONAL GROUP, INC.
306 PILAKLAKAHA AVENUE, SUITE 2
AUBURNDALE, FL 33823

- Ronald C. Johnson**
Chair, Polk
- Monroe "Al" Coogler**
Vice Chair, Citrus
- Sally Thompson**
Secretary, Hillsborough
- Ronnie E. Duncan**
Treasurer, Pinellas
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Sincerely,

Adeline Wood, Supervisor
Records and Data Department

AW:tg

- E. D. "Sonny" Vergara**
Executive Director
- Gene A. Heath**
Assistant Executive Director
- William S. Bifenky**
General Counsel

49021375.000



An Equal Opportunity Employer

Southwest Florida Water Management District

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February 14, 2001

BOARD OF TRUSTEES OF THE INTERNAL
IMPROVEMENT
TRUST FUND OF THE STATE OF FLORIDA
C/O FLORIDA FISH AND WILDLIFE CONSERVATION
COMMISSION
3829 TENOROC ROAD
LAKELAND, FL 33805

Subject: Notice of **REVISED** Date of Governing Board Meeting

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Adeline Wood

Adeline Wood, Supervisor
Records and Data Department

AW:tg

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February 26, 2001

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Mr. M. C. Davis
View Properties, Ltd.
151 Regions Way - Suite 2C
Destin, FL 32541

Board of Trustees of the Internal Improvement
Trust Fund of the State of Florida
c/o Florida Fish and Wildlife Conservation Commission
3829 Tenoroc Road
Lakeland, FL 33805

Subject: **Final Agency Action Transmittal Letter**
ERP Conceptual
Permit No: 49021375.000
Project Name: Bridgewater Master Surface Water Management System
County: Polk
Sec/Twp/Rge: 15,16,20,21,22 and 28/27S/24E

Dear Gentlemen:

The Conceptual Permit referenced above was **approved** by the District Governing Board subject to all terms and conditions set forth in the permit.

The enclosed approved conceptual plans are part of the permit, and construction must be in accordance with these plans.

If you have questions concerning the permit, please contact Jan R. Burke, P.E., at the Bartow Service Office. For assistance with environmental concerns, please contact Jeffrey B. Whealton.

Sincerely,

Adeline Wood, Supervisor
Records and Data Department

AW:JRB:kmh
Enclosures: Approved Permit w/Conditions Attached
Conceptual Plans
cc/enc: File of Record 49021375.000
cc/Permit: USACOE
James A. Carnicelli, P.E., Ridge Professional Group, Inc.

- E. D. "Sonny" Vergara**
Executive Director
- Gene A. Heath**
Assistant Executive Director
- William S. Bilenky**
General Counsel

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
ENVIRONMENTAL RESOURCE
CONCEPTUAL
PERMIT NO. 49021375.000

EXPIRATION DATE: February 26, 2003

PERMIT ISSUE DATE: February 26, 2001

This permit issued under the provisions of Chapter 373, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.), Rule 40D-4, authorizes the Permittee to use the information outlined herein and shown by the application, approved drawing(s), plans, and other documents, attached hereto and kept on file at the Southwest Florida Water Management District (District).

PROJECT NAME: Bridgewater Master Surface Water Management System

GRANTED TO: View Properties, Ltd.
151 Regions Way - Suite 2C
Destin, FL 32541

Board of Trustees of the Internal Improvement
Trust Fund of the State of Florida
c/o Florida Fish and Wildlife Conservation Commission
3829 Tenoroc Road
Lakeland, FL 33805

ABSTRACT: This permit authorization is for the conceptual approval of a surface water management system serving a 1,128.40 acre multi-land use development including industrial, commercial, and residential uses, as named above and as shown on the approved drawings. The project site is located south of Interstate 4, west of State Road 33 (Combee Road) and north of Old Combee Road in the City of Lakeland, Polk County. Information regarding the surface water management systems, 100-year floodplain and wetlands is contained within the tables and comments below.

OP. & MAINT. ENTITY: Bridgewater Master Association, Inc.
151 Regions Way, Suite 2-C
Destin, FL 32541

PROPERTY LOCATION: Polk County

SEC/TWP/RGE: 15,16,20,21,22 and 28/27S/24E

**TOTAL ACRES OWNED
OR UNDER CONTROL:** 1,128.40

PROJECT SIZE: 1,128.40 Acres

LAND USE: Commercial

DATE APPLICATION FILED: September 15, 2000

AMENDED DATE: December 5, 2000

I. Water Quantity/Quality

POND NO.	AREA ACRES AT TOP OF BANK	TREATMENT TYPE
100	6.30	Retention
200	3.60	N/A
300	7.20	Wet Detention
400	9.60	Wet Detention
500	0.10	N/A
600	0.10	N/A
700	0.10	N/A
900	14.50	Wet Detention
1000	50.90	Wet Detention
1100	47.70	Wet Detention
1200	16.70	N/A
1300	3.20	N/A
1400	13.80	N/A
1500	56.60	Wet Detention
1600	2.52	N/A
1700	2.07	N/A
1800	60.00	Wet detention
TOTAL	294.04	

II. 100-Year Floodplain

Encroachment (Acre-Feet of fill)	Compensation (Acre-Feet of excavation)	Compensation Type*	Encroachment Result**(feet)
0.00	0.00	NE [X]	Depth [N/A]

*Codes [X] for the type or method of compensation provided are as follows:

NE = No Encroachment

N/A = Not Applicable

**Depth of change in flood stage (level) over existing receiving water stage resulting from floodplain encroachment caused by a project that claims MI type of compensation.

III. Environmental Considerations

Wetland Information:				
WETLAND NO.	TOTAL AC.	NOT IMPACTED AC.	TEMPORARILY DISTURBED AC.	PERMANENTLY DESTROYED AC.
1	0.23	0.23	0.00	0.00
2	0.58	0.58	0.00	0.00
3	0.07	0.07	0.00	0.00
4	0.35	0.35	0.00	0.00
5	0.11	0.11	0.00	0.00
6	0.07	0.07	0.00	0.00
7	2.97	2.97	0.00	0.00
8	1.97	1.97	0.00	0.00
9	0.21	0.21	0.00	0.00
10	2.07	2.07	0.00	0.00
11	1.85	1.85	0.00	0.00
12	0.19	0.19	0.00	0.00
13	0.15	0.15	0.00	0.00
14	0.06	0.06	0.00	0.00
15	3.46	3.46	0.00	0.00
16	0.16	0.16	0.00	0.00
17	23.88	23.88	0.00	0.00
18	0.10	0.10	0.00	0.00
19	9.72	9.72	0.00	0.00
20	0.02	0.02	0.00	0.00
21	0.02	0.02	0.00	0.00
22	0.09	0.09	0.00	0.00
23	0.04	0.04	0.00	0.00
24	0.23	0.23	0.00	0.00
25	0.47	0.47	0.00	0.00
26	0.20	0.20	0.00	0.00
27	0.05	0.05	0.00	0.00
28	0.12	0.12	0.00	0.00
29	0.02	0.02	0.00	0.00
30	0.07	0.07	0.00	0.00
31	0.17	0.17	0.00	0.00
32	0.04	0.04	0.00	0.00
33	0.08	0.08	0.00	0.00
34	0.27	0.27	0.00	0.00
35	0.04	0.04	0.00	0.00
36	0.03	0.03	0.00	0.00
37	0.16	0.16	0.00	0.00
38	0.68	0.68	0.00	0.00
39	0.07	0.07	0.00	0.00
40	0.23	0.23	0.00	0.00

Wetland Information: (Continued)				
WETLAND NO.	TOTAL AC.	NOT IMPACTED AC.	TEMPORARILY DISTURBED AC.	PERMANENTLY DESTROYED AC.
41	0.49	0.49	0.00	0.00
42	0.32	0.32	0.00	0.00
43	0.66	0.66	0.00	0.00
100	5.10	5.10	0.00	0.00
200	2.40	2.40	0.00	0.00
800	4.90	4.90	0.00	0.00
900	12.60	12.60	0.00	0.00
1000	50.90	50.90	0.00	0.00
1100	43.20	43.20	0.00	0.00
1200	15.50	15.50	0.00	0.00
1300	2.50	2.50	0.00	0.00
1400	12.00	12.00	0.00	0.00
1500	39.00	39.00	0.00	0.00
1800	46.30	46.30	0.00	0.00
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Mitigation Information:					
AREA NO.	CREATED/ RESTORED AC.	UPLAND PRESERVED AC.	ENHANCED WETLAND AC.	WETLANDS PRESERVED AC.	MISC. MITI AC.
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2	2.15	0.00	0.00	0.00	0.00
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TOTAL	15.39	0.00	0.00	0.00	0.00
NET CHANGE	1.49	OTHER MITIGATION TOTAL			0.00

Comments: Mitigation for impacts to 13.77 acres of non-forested wetlands and 0.13 acre of a man-made surface water body will be provided by construction of three areas of wetland creation (area 1, 2, and 3) totaling 15.39 acres contiguous to on site existing water bodies. No mitigation is required for impacts to Wetland Nos. 9, 12, 13, 14, 16, 21, 22, 23, 24, 26, 27, 28, and 36 because they are isolated, less than 0.50 acre in size and are not used by threatened or endangered species. The areas of wetlands created for mitigation will be detailed in the construction permits for this project.

CERTIFICATE OF MAILING

I hereby certify that a copy of the PAA on Application No. 49021375.000 was mailed by United States Mail to the below listed parties this 26th day of January 2001.

PAA Expiration Date: February 21, 2001

FAA Expiration Date: _____

Applicant: Mr. M.C. Davis
View Properties, Ltd.
151 Regions Way, Suite 2C
Destin, FL 32541

Board of Trustees of the Internal Improvement
Trust Fund of the State of Florida
c/o Florida Fish and Wildlife Conservation Commission
3829 Tenoroc Road
Lakeland, FL 33805

Applicant's
Contact/Consultant: James A. Carnicelli, P.E.
Ridge Professional Group, Inc.
306 Pilaklakaha Avenue, Suite 2
Auburndale, FL 33823

PAA/FAA Request(s): USACOE
Tampa Regulatory Field Office
Post Office Box 19247
Tampa, FL 33686-9247

WRP Required Noticing: N/A

N/A ERP - Eminent Domain Property Owners (EPOs) **mailed regular U. S. mail**

N/A WRP - Adjacent Waterfront Property Owners (AWPOs) **if requested**

N/A WUP - Adjacent Property Owners (APOs) **mailed regular U. S. mail**

N/A Surface water and/or well tag(s) have been sent to department.

Documents sent:
Regular U.S. mail - PAA/FAA letter, draft/original Permit,
Rules 28-106.201 and 28-16.301, F.A.C., and
Noticing Packet

Theresa Harda

Records and Data Specialist
Records and Data Department

R&D MSSW/ERP/WRP/WOD
PAA PERMIT CHECKLIST

PERMITS ARE CHECKED BY THE R&D SUPERVISOR PRIOR TO PAA MAILOUT AND PRIOR TO THE MAILING OF THE APPROVED PERMIT.

Proofer: check permit against project data sheet and application file of record for:

Item Proofed	✓ QR	✓ PR	Item Proofed	✓ QR	✓ PR
ERP/MSSW/WRP/WOD	✓		Total Acres Owned	✓	✓
Addresses: Permittee/Owner	✓		Project Size	✓	✓
Applicant	✓		Section/Township/Range	✓	✓
Engineer/Consultant	✓		Fee Received / Due / Refund	✓	
Owner's Agent	✓		Operation and Maintenance Entity	✓	
Name & No. of Interested parties - Copy to Permit Packet	✓		PAA Information Only: Advertisement		
Complete Information: Construction (Conceptual) (Check Permit Header Paragraph)	✓	✓	Abstract	✓	✓
Permit No./Revision No.	✓	✓	Discussion Paper	✓	✓
Application Received Date	✓		FAA Transmittal Letter and Labels	✓	
Amended Date	✓		Conditions - Verify Permit #s referenced and attachments included		(6)
Complete/Incomplete Date	✓		Wetland Report	✓	✓
Default Date	✓		Statement of Completion (N/A for Conceptual)	N/A	
Issued Date	✓	✓	DRAWINGS: Included & correct stamp applied for Construction or Conceptual	✓	
Expiration Date	✓	✓	Verify Quad Plotting - Send corrected copy to File of Record	✓	
County	✓	✓	Prof. Certification	✓	
Project Name	✓	✓	Certificate of Mailing	✓	
Land Use	✓	✓			

- R&D Supervisor has checked the items listed above for PAA Mailing on 1-23-01 (Date). Supervisors Initials mnf
- R&D Supervisor has checked Permit for issue and expiration date on _____ (Date) and approved for issue. Supervisors Initials _____

FAA DRAWINGS

BOARD DATE: Feb 27, 2001

PAA-

PERMIT NO: 49 021375.000

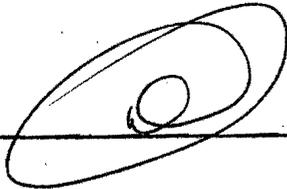
CONCEPTUAL: ✓

CONSTRUCTION: _____

QUANTITY: 1

STAFF INITIALS: tg

FAA-

DATE MAILED & STAFF INITIALS: 2/28/01 1 

**PROFESSIONAL CERTIFICATION
FOR THE ENGINEERING EVALUATION REPORT**

MSSW/ERP Permit Number: 49021375.000
Date Application Received: September 15, 2000
Permittee's Name: View Properties, Ltd.
Address: 151 Regency Way - Suite 2C
Destin, FL 32541

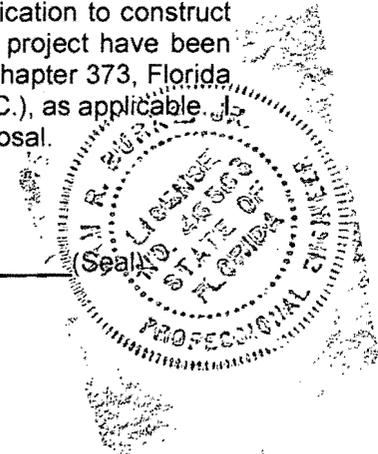
Board of Trustees of the Internal Improvement
Trust Fund of the State of Florida
c/o Florida Fish and Wildlife Conservation Commission
3829 Tenoroc Road
Lakeland, FL 33805

Project Name: Bridgewater Master Surface Water Management System
Project Description: Commercial
Project Size: 1,128.40 Acres
Activity: Conceptual
Section(s)/Township/Range: 15,16,20,21,22 and 28/27S/24E

I HEREBY CERTIFY that the engineering features described in the referenced application to construct and/or operate a surface water management system associated with the indicated project have been evaluated regarding provision of reasonable assurance of compliance with Part IV, Chapter 373, Florida Statutes, and Chapters 40D-4, 40D-40 or 40D-400, Florida Administrative Code (F.A.C.), as applicable. I have not evaluated and do not make any certifications as to other aspects of the proposal.

 01/12/01

Jan R. Burke, P.E.
FL P.E. #46563
Bartow Regulation Department
Southwest Florida Water Management District
170 Century Blvd.
Bartow, FL 33830



*When required by Section 61G15-26.001(1), F.A.C., a professional engineer's seal, signature and date (i.e., "Professional Certification") means that the work indicated has been conducted under the responsible supervision, direction or control of a person licensed by the State to practice engineering, who by authority of their license is required to have some specialized knowledge of engineering. Professional Certification is not a guaranty or warranty of fitness or suitability, either explicit or implied.

PERMIT NO.

49021375.000

PERMIT NAME:

Bridgewater Master Surface Water Management System

BASIN NO. - POND NO.		O or C	100	C	200	0	300	0	TOTALS
POND DATA	POND BOTTOM ELEVATION		<125.0		<125.0		128.5		/
	SEASONAL HIGH WATER ELEVATION		135.0		135.0		134.5		
	CONTROL DEVICE ELEVATION		135.0		N/A		134.5		
	DESIGN LOW WATER ELEVATION		135.0		135.0		134.8		
	WEIR INVERT ELEVATION	ENCROACHMENT	137.25		136.0		134.97		
	DESIGN HIGH WATER ELEVATION		136.62		136.75		136.49		
	TOP OF BANK ELEVATION		138.0		137.0		138.0		
	AREA AT TOP OF BANK (Ac.)		6.30		3.60		7.20		
	VOLUME AT DHW (Ac.-Ft.)		9.23		5.25		13.2		
	VOLUME AT TOB (Ac.-Ft.)		16.5		6.0		16.5		
QUANTITY	25YR/24HR DISCHARGE RATES	WEIR WIDTH (FT)	"D" INLET		2 @ 30' slots		10 INCH		
		PRE-DEVELOPED (CFS)	—		SADDLE		GATOR CREEK 4.00		
		POST-DEVELOPED (CFS)	—		CREEK		—		
	100YR/24HR RETENTION VOLUMES	PROVIDED (Ac.-Ft.)	16.5		—		—		
REQUIRED (Ac.-Ft.)		9.23		—		—			
QUALITY	TREATMENT AREA	OFW? Y OR N	20.6	N	21.1	N	25.1	N	
	TREATMENT VOL. REQUIRED (Ac.-Ft.)		6.86		SADDLE		2.84		
	TREATMENT VOL. PROVIDED (Ac.-Ft.)		16.5		CREEK		2.87		
	METHOD OF TREATMENT		RETENTION		N/A		WET DETENTION		
	CONTROL DEVICE TYPE		NATURAL INFILTRATION		SADDLE		ORIFICES		
	CONTROL DEVICE DIMENSIONS				CREEK		4.5" Ø		
	RECOVERY TIME (Hrs.)						< 72 HRS		
100-YEAR FLOODPLAIN	ENCROACHMENT (Ac.-Ft.)		—		—		—		
	COMPENSATION (Ac.-Ft.)		—		—		—		
	COMPENSATION TYPE		—		—		—		
	ENCROACHMENT RESULT (feet)		—		—		—		

COMMENTS:

JLB
 WAT William A. Hartmann 1/17/01 25YR-24HR
 POND 100 CLOSED BASIN RETAINS 100YR, 24HR w/ NO DISCHARGES PRE POST
 PONDS 300 & 400 DISCHARGE TO GATOR CREEK BASIN 103.70 97.08
 TREATMENT FOR ALL OTHER SUB-BASINS (SADDLE CREEK) 129.22 25.67 (NORTH)
 IS PROVIDED IN PONDS 900, 1000, 1100, 1500 + 1800 48.24 44.74 (SOUTH)
 DRAINAGE AREA 843.6
 TREATMENT VOLUMES (REQUIRED) 70.3 ACRES-FT
 TREATMENT VOLUMES PROVIDED 71.18 ACRES-FT

PERMIT NO. 49021375.000

PERMIT NAME: BRIDGEWATER MASTER SURFACE WATER MANAGEMENT SYSTEM

TOTALS

BASIN NO. - POND NO.		O or C	400	500	600	TOTALS	
POND DATA	POND BOTTOM ELEVATION		128.5	132/131.5	132/131.5	/	
	SEASONAL HIGH WATER ELEVATION		134.5	133.5	133.5		
	CONTROL DEVICE ELEVATION		134.5	133.5	133.5		
	DESIGN LOW WATER ELEVATION		134.95	133.74	133.74		
	WEIR INVERT ELEVATION		135.19	132.5	131.5		
	DESIGN HIGH WATER ELEVATION		136.77	135.47	135.46		
	TOP OF BANK ELEVATION		138.0	136.0	136.0		
	AREA AT TOP OF BANK (Ac.)		9.60	0.10	0.10		→
	VOLUME AT DHW (Ac.-Ft.)		19.64	-	-		/
	VOLUME AT TOB (Ac.-Ft.)		21.62	-	-		
QUANTITY	25YR/24HR DISCHARGE RATES	WEIR WIDTH (FT)	160 INCHES	5' BOTTOM WIDTH OF SILL	20' BOTTOM WEIR CROWN	/	
		PRE-DEVELOPED (CFS)	GATOR	SADDLE			
		POST-DEVELOPED (CFS)	CREEK	CREEK			
	100YR/24HR RETENTION VOLUMES	PROVIDED (Ac.-Ft.)	-	-	-		
REQUIRED (Ac.-Ft.)		-	-	-			
QUALITY	TREATMENT AREA	OFW? Y OR N	65.6 N	29.4 N	56.8 N	/	
	TREATMENT VOL. REQUIRED (Ac.-Ft.)		5.47	SADDLE			
	TREATMENT VOL. PROVIDED (Ac.-Ft.)		5.49	CREEK			
	METHOD OF TREATMENT		WET DETENTION	N/A	N/A		
	CONTROL DEVICE TYPE		ORIFICE	-	-		
	CONTROL DEVICE DIMENSIONS		5.67" φ	-	-		
	RECOVERY TIME (Hrs.)		760 HRS	-	-		
100-YEAR FLOODPLAIN	ENCROACHMENT (Ac.-Ft.)		→	→	→	→	
	COMPENSATION (Ac.-Ft.)		→	→	→	→	
	COMPENSATION TYPE		→	→	→	→	
	ENCROACHMENT RESULT (feet)		→	→	→	→	

COMMENTS: TRB
WAF William A. Hartman 1/17/01

PERMIT NO. 49021375.000

PERMIT NAME: BUILDSEWER MASTER SURFACE WATER MANAGEMENT SYSTEM

BASIN NO. - POND NO.		O or C	700	0	900	0	1000	0	TOTALS
P O N D D A T A	POND BOTTOM ELEVATION		131.5/131.0		4123.5		4123.5		
	SEASONAL HIGH WATER ELEVATION		133.5		133.5		133.5		
	CONTROL DEVICE ELEVATION		133.5		133.5		133.5		
	DESIGN LOW WATER ELEVATION		133.74		133.74		133.74		
	WEIR INVERT ELEVATION		131.0		^{EQUATED} 128.5		^{EQUATED} 128.0		
	DESIGN HIGH WATER ELEVATION		135.46		135.27		135.27		
	TOP OF BANK ELEVATION		136.0		136.0		136.0		
	AREA AT TOP OF BANK (Ac.)		0.10		14.50		50.90		
	VOLUME AT DHW (Ac.-Ft.)		-		2398		85.78		
	VOLUME AT TOB (Ac.-Ft.)		-		33.88		120.20		
Q U A N T I T Y	25YR/24HR DISCHARGE RATES	WEIR WIDTH (FT)	25' ^{BOTTOM} WEIR		36" ϕ		36" ϕ		
		PRE-DEVELOPED (CFS)	← SADDLE		→				
	100YR/24HR RETENTION VOLUMES	POST-DEVELOPED (CFS)	← CREEK		→				
		PROVIDED (Ac.-Ft.)	-		-		-		
	REQUIRED (Ac.-Ft.)	-		-		-			
Q U A L I T Y	TREATMENT AREA	OFW? Y OR N	700	N	69.4	N	115.5	N	
	TREATMENT VOL. REQUIRED (Ac.-Ft.)		← SADDLE		→				
	TREATMENT VOL. PROVIDED (Ac.-Ft.)		← CREEK		→				
	METHOD OF TREATMENT		N/A		WET RETENTION		WET RETENTION		
	CONTROL DEVICE TYPE		-		-		-		
	CONTROL DEVICE DIMENSIONS		-		-		-		
	RECOVERY TIME (Hrs.)		-		-		-		
100-YEAR FLOODPLAIN	ENCROACHMENT (Ac.-Ft.)		→		→		→		
	COMPENSATION (Ac.-Ft.)		→		→		→		
	COMPENSATION TYPE		→		→		→		
	ENCROACHMENT RESULT (feet)		→		→		→		

COMMENTS: JTB
WAL William A. Hartmann (1/17/01)

SWFWMD ENGINEERING WORKSHEET

PERMIT NO. 49021375.000

PERMIT NAME: BRIDGE WATER SURFACE WATER MANAGEMENT SYSTEM

BASIN NO. - POND NO.		O or C	1100	0	1200	0	1300	0	TOTALS
P O N D D A T A	POND BOTTOM ELEVATION		<u>4123.5</u>		<u>4124.5</u>		<u>4124.5</u>		
	SEASONAL HIGH WATER ELEVATION		<u>133.5</u>		<u>134.5</u>		<u>134.5</u>		
	CONTROL DEVICE ELEVATION		<u>133.5</u>		<u>134.5</u>		<u>134.5</u>		
	DESIGN LOW WATER ELEVATION		<u>133.7</u>		<u>134.5</u>		<u>134.5</u>		
	WEIR INVERT ELEVATION		133.5		<u>131.0</u>		<u>130.5</u>		
	DESIGN HIGH WATER ELEVATION		<u>135.27</u>		<u>135.68</u>		<u>135.64</u>		
	TOP OF BANK ELEVATION		<u>136.0</u>		<u>136.0</u>		<u>137.0</u>		
	AREA AT TOP OF BANK (Ac.)		<u>47.70</u>		<u>16.70</u>		<u>3.20</u>		
	VOLUME AT DHW (Ac.-Ft.)		<u>80.45</u>		<u>19.12</u>		<u>3.25</u>		
	VOLUME AT TOB (Ac.-Ft.)		<u>113.63</u>		<u>24.30</u>		<u>7.32</u>		
Q U A N T I T Y	25YR/24HR DISCHARGE RATES	WEIR WIDTH (FT)	<u>20' 30"</u>		<u>24" φ</u>		<u>24" φ</u>		
		PRE-DEVELOPED (CFS)	<u>← SADDLE</u>		<u>→</u>		<u>→</u>		
		POST-DEVELOPED (CFS)	<u>← CREEK</u>		<u>→</u>		<u>→</u>		
	100YR/24HR RETENTION VOLUMES	PROVIDED (Ac.-Ft.)	<u>-</u>		<u>-</u>		<u>-</u>		
REQUIRED (Ac.-Ft.)		<u>-</u>		<u>-</u>		<u>-</u>			
Q U A L I T Y	TREATMENT AREA	OFW? Y OR N	<u>107.3</u>	<u>N</u>	<u>38.8</u>	<u>N</u>	<u>12.8</u>	<u>N</u>	
	TREATMENT VOL. REQUIRED (Ac.-Ft.)		<u>← SADDLE</u>		<u>→</u>		<u>→</u>		
	TREATMENT VOL. PROVIDED (Ac.-Ft.)		<u>← CREEK</u>		<u>→</u>		<u>→</u>		
	METHOD OF TREATMENT		<u>100% TREATMENT</u>		<u>N/A</u>		<u>N/A</u>		
	CONTROL DEVICE TYPE		<u>-</u>		<u>-</u>		<u>-</u>		
	CONTROL DEVICE DIMENSIONS		<u>-</u>		<u>-</u>		<u>-</u>		
	RECOVERY TIME (Hrs.)		<u>-</u>		<u>-</u>		<u>-</u>		
100-YEAR FLOODPLAIN	ENCROACHMENT (Ac.-Ft.)		<u>0</u>		<u>0</u>		<u>0</u>	<u>→</u>	
	COMPENSATION (Ac.-Ft.)		<u>0</u>		<u>0</u>		<u>0</u>	<u>→</u>	
	COMPENSATION TYPE		<u>0</u>		<u>0</u>		<u>0</u>	<u>→</u>	
	ENCROACHMENT RESULT (feet)		<u>0</u>		<u>0</u>		<u>0</u>	<u>→</u>	

COMMENTS:

JTB
WAY William A. Hartmann 1/17/01

SWFWMD ENGINEERING WORKSHEET

PERMIT NO.

49021375.000

PERMIT NAME:

BRIDGEWATER MASTER SURFACE WATER MANAGEMENT SYSTEM

BASIN NO. - POND NO.		O or C	1400	1500	1600	TOTALS
POND DATA	POND BOTTOM ELEVATION		4124.5	4123.5	4123.5	
	SEASONAL HIGH WATER ELEVATION		134.5	133.5	133.5	
	CONTROL DEVICE ELEVATION		134.5	134.0/133.5	133.5	
	DESIGN LOW WATER ELEVATION		134.5	133.74	133.74	
	WEIR INVERT ELEVATION		134.5	134.0/133.5	133.3	
	DESIGN HIGH WATER ELEVATION		135.57	135.45	135.41	
	TOP OF BANK ELEVATION		137.0	136.0	136.0	
	AREA AT TOP OF BANK (Ac.)		13.80	56.60	2.52	
	VOLUME AT DHW (Ac.-Ft.)		13.80	108.7	1.80	
	VOLUME AT TOB (Ac.-Ft.)		32.30	135.1	2.16	
QUANTITY	25YR/24HR DISCHARGE RATES	WEIR WIDTH (FT)	2020'	360 INCHES / 600 FEET	TWO, 10' x 3' CULVERTS	
		PRE-DEVELOPED (CFS)	← SADDLE →			
	POST-DEVELOPED (CFS)	← CREEK →				
	100YR/24HR RETENTION VOLUMES	PROVIDED (Ac.-Ft.)	-	-	-	
REQUIRED (Ac.-Ft.)		-	-	-		
QUALITY	TREATMENT AREA	OFW? Y OR N	27.90 N	152.4 N	21.5 N	
	TREATMENT VOL. REQUIRED (Ac.-Ft.)		← SADDLE →			
	TREATMENT VOL. PROVIDED (Ac.-Ft.)		← CREEK →			
	METHOD OF TREATMENT		N/A	WET DETENTION	N/A	
	CONTROL DEVICE TYPE		-	ORIFICES	-	
	CONTROL DEVICE DIMENSIONS		-	(5)-6" φ	-	
	RECOVERY TIME (Hrs.)		-	760 HRS	-	
100-YEAR FLOODPLAIN	ENCROACHMENT (Ac.-Ft.)		→			→
	COMPENSATION (Ac.-Ft.)		→			→
	COMPENSATION TYPE		→			→
	ENCROACHMENT RESULT (feet)		→			→

COMMENTS:

JMB
NATH William A. Hartmann 1/17/01

SWFWMD ENGINEERING WORKSHEET

PERMIT NO.

49021375.000

PERMIT NAME:

BROOKWATER MASTER SURFACE WATER MANAGEMENT SYSTEM

BASIN NO. - POND NO.		O or C	1700	0	1800	0	TOTALS	
P O N D D A T A	POND BOTTOM ELEVATION		423.5		423.5			
	SEASONAL HIGH WATER ELEVATION		133.5		133.5			
	CONTROL DEVICE ELEVATION		133.5		133.5			
	DESIGN LOW WATER ELEVATION		133.74		133.74			
	WEIR INVERT ELEVATION		133.2		134.0			
	DESIGN HIGH WATER ELEVATION		135.40		135.40			
	TOP OF BANK ELEVATION		136.0		136.0			
	AREA AT TOP OF BANK (Ac.)		2.07		60.00			294.94
	VOLUME AT DHW (Ac.-Ft.)		1.80		108.68			
	VOLUME AT TOB (Ac.-Ft.)		2.02		143.0			
Q U A N T I T Y	WEIR WIDTH (FT)		20' ^{BOTTOM} _{NEED TO BE SHARPER}		2 @ 27" EACH		(N) (S)	
	25YR/24HR DISCHARGE RATES	PRE-DEVELOPED (CFS)	→ SADDLE		12.22	25.67		
		POST-DEVELOPED (CFS)	→ CREEK		48.24	44.74		
	100YR/24HR RETENTION VOLUMES	PROVIDED (Ac.-Ft.)	-		-			
REQUIRED (Ac.-Ft.)		-		-		TOTAL TO SADDLE CREEK		
Q U A L I T Y	TREATMENT AREA	OFW? Y OR N	20.30	N	155.2	N	843.6	N
	TREATMENT VOL. REQUIRED (Ac.-Ft.)		SADDLE		70.3			
	TREATMENT VOL. PROVIDED (Ac.-Ft.)		CREEK		71.18			
	METHOD OF TREATMENT		N/A		WEIR RETENTION			
	CONTROL DEVICE TYPE		-		-			
	CONTROL DEVICE DIMENSIONS		-		-			
	RECOVERY TIME (Hrs.)		-		-			
100-YEAR FLOODPLAIN	ENCROACHMENT (Ac.-Ft.)		→		0.00			
	COMPENSATION (Ac.-Ft.)		→		0.00			
	COMPENSATION TYPE		→		NE			
	ENCROACHMENT RESULT (feet)		→		N/A			

COMMENTS:

JNB
WAT William A. Hartman 1/17/01

DRAINAGE SUMMARY

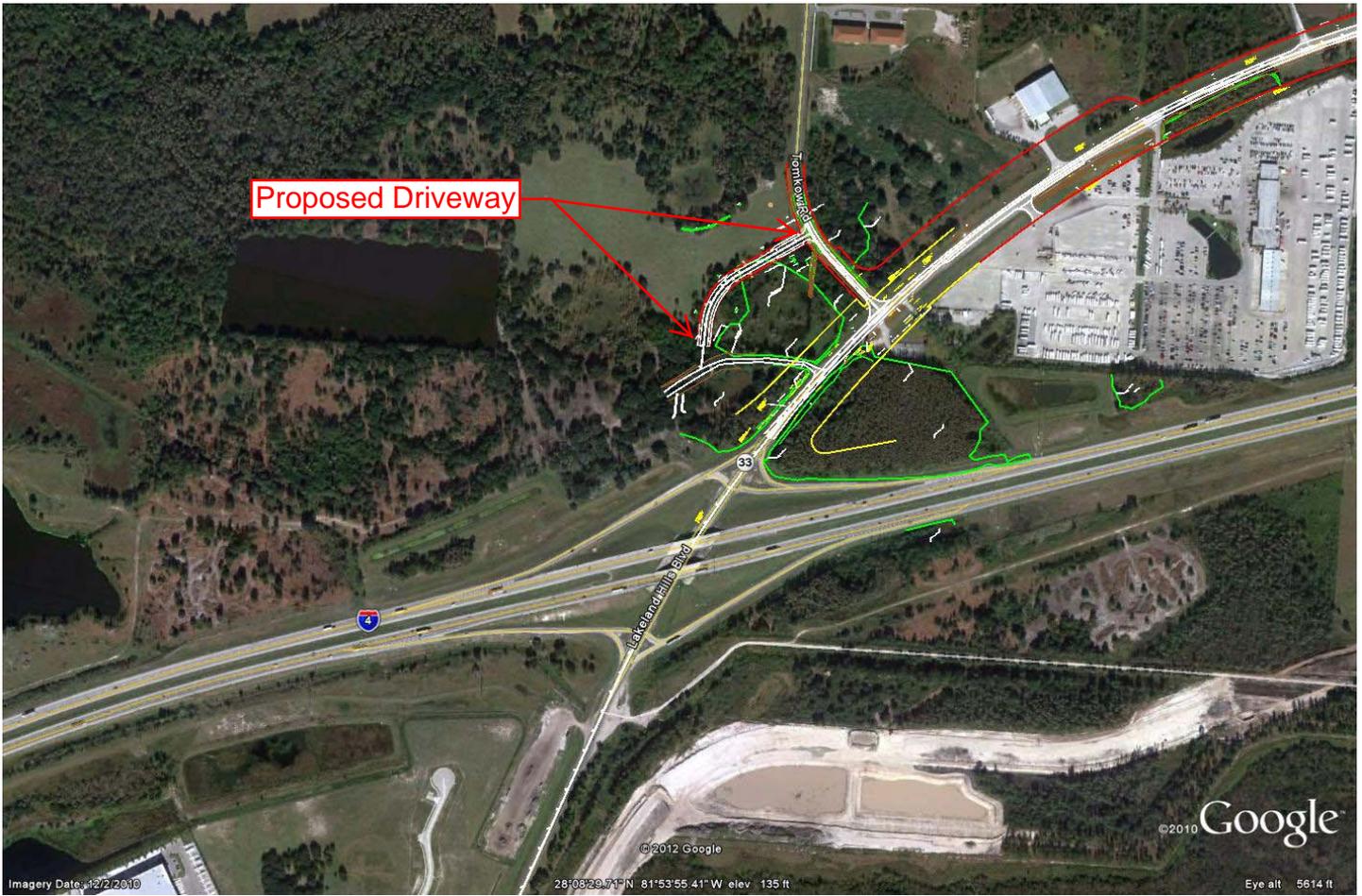
The Florida Department of Transportation (FDOT) proposes to construct a 780-foot long driveway from Tomkow Road as part of a cost to cure from a right-of-way taking in Polk County. The proposed driveway will consist of two 12-foot travel lanes, 6-foot unpaved outside shoulders and roadside treatment swales within an existing 60 foot right-of-way. The project is located within Section 10 of Township 27 South, Range 24 East.

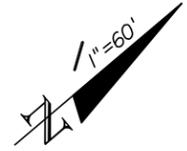
Stormwater runoff will be directed to the proposed roadside swales for treatment and attenuation. This project is located within the Orange Hammock Drainage Basin, Water Basin ID (WBID) 1449, which has no impairments according to the Florida Department of Environmental Protection (FDEP). Four ditch blocks will be added near the proposed cross drain to provide the required treatment and attenuation prior to discharge to the existing adjacent wetland. The design of the stormwater management facilities will comply with the criteria set forth by the Southwest Florida Water Management District (SWFWMD) and FDOT for open basins. SWFWMD requires dry retention ponds to treat the first half inch of runoff over the entire project area. SWFWMD also requires the project to attenuate the difference in the pre and post development attenuation volumes for a 25-year, 24-hour storm event. The proposed cross drains were sized utilizing culvert sizing calculations to ensure existing conveyances are maintained. Soils information was procured through the USDA website and is included in this report. Double Ring Infiltration Tests were also performed to establish the site specific permeability of the soils. The seasonal high water elevation (SHWE) and tailwater utilized in the ICPR model were based on existing topographic survey and soils information. Fill from the proposed driveway will not have any significant impacts on the floodplain within the area.

Approximately 0.19 acres of direct and 0.11 acres of secondary wetland impacts will occur for the proposed driveway. The right-of-way for the proposed driveway was previously acquired, which precludes FDOT from relocating the driveway to avoid the impacts. The proposed wetland impacts are to the fringe of herbaceous wetlands previously impacted by grazing. The wetland impacts are proposed to be offset by the purchase of mitigation credits from Green Swamp mitigation bank, which has a service area that covers the project area. No cumulative impacts are anticipated due to the low quality and quantity of the wetlands being impacted.

SWFWMD Permit No. 40908
(Tomkow Road Driveway)

Aerial Location Map

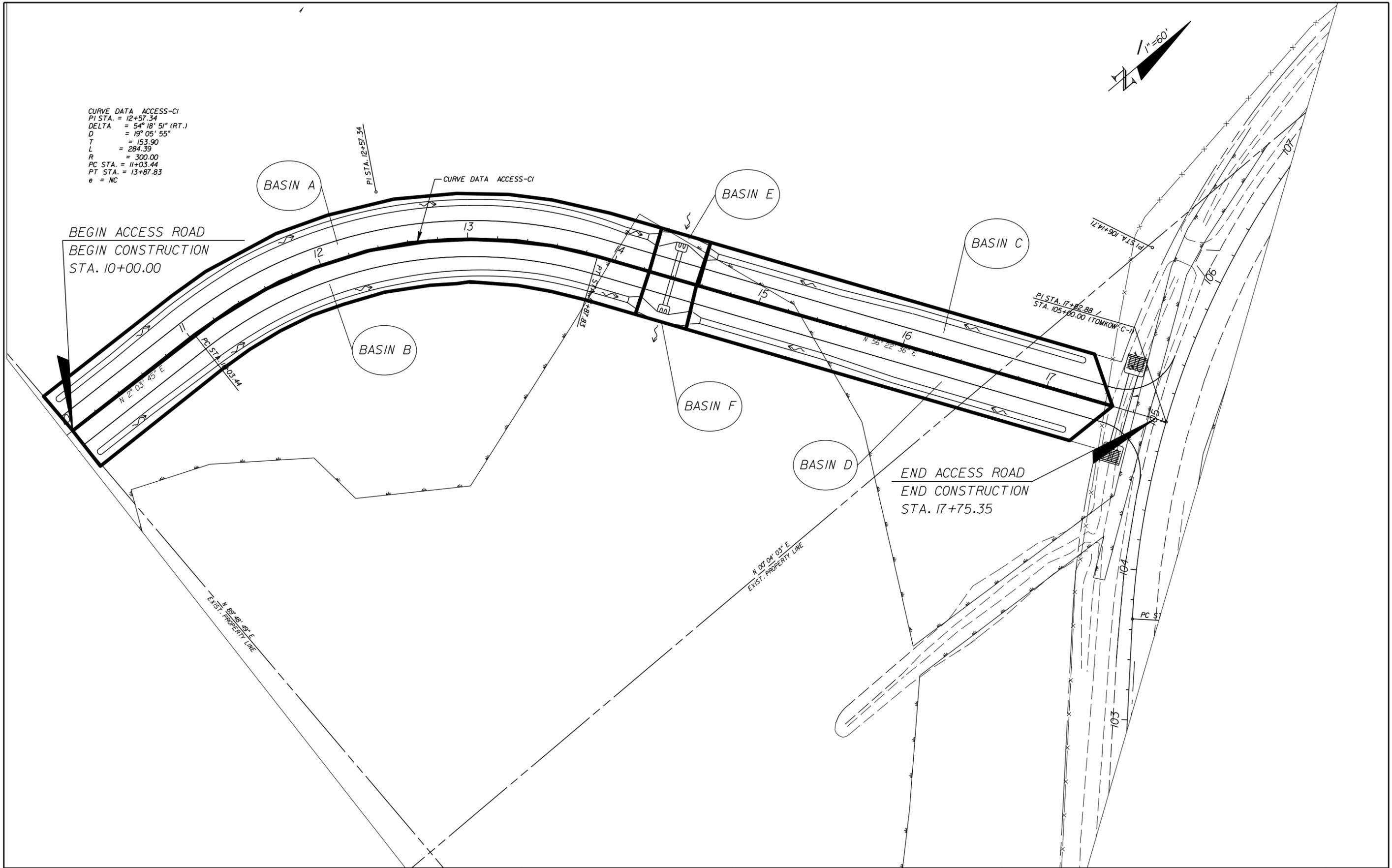




CURVE DATA ACCESS-CI
 PI STA. = 12+57.34
 DELTA = 54° 18' 51" (RT.)
 D = 19° 05' 55"
 T = 153.90
 L = 284.39
 R = 300.00
 PC STA. = 11+03.44
 PT STA. = 13+87.83
 e = NC

BEGIN ACCESS ROAD
 BEGIN CONSTRUCTION
 STA. 10+00.00

END ACCESS ROAD
 END CONSTRUCTION
 STA. 17+75.35



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
 BRENT J. SETCHELL, P.E.
 P.E. LICENSE NUMBER 63134
 FLORIDA DEPARTMENT OF TRANSPORTATION
 801 N. BROADWAY AVENUE
 BARTOW, FL 33830-3809

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	POLK	

**POST DEVELOPMENT
 DRAINAGE MAP**

SHEET NO.
 1

NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C.