FINAL
POND SITING REPORT

Florida Department of Transportation
District One

SR 31 PD&E Study
From SR 80 (Palm Beach Boulevard) to SR 78 (Bayshore Road)

Lee County, Florida

Financial Management Number: 441942-1-22-01
ETDM Number: 14359

MAY 2023

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 14, 2016 and executed by FHWA and FDOT.

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Executive Summary

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study to evaluate improvement alternatives for State Road (SR) 31 from Palm Beach Boulevard (SR 80) to Bayshore Road (SR 78) in Lee County, Florida. The improvements consist of widening the existing two-lane roadway to a six-lane urban facility and a new bridge, for a project length of approximately 1.47 miles and intersection improvements with SR 80. The project site is located within Sections 12, 13, 24 and 25 of Township 43S, Range 25E, and Sections 7, 18, 19, and 30 of Township 43S, Range 26E. **Figure 1**, the **Project Location Map**, is provided in **Appendix 1**.

SR 31 is currently classified by FDOT as an urban minor arterial along the project length and proposes an urban curb and gutter typical section having six 11-foot travel lanes, two 12-foot wide shared-use paths, a raised median, and a closed storm sewer collection and conveyance system.

The project is located within the Tidal Caloosahatchee sub-basin of the Caloosahatchee River Watershed as defined by the South Florida Water Management District (SFWMD). The tidal portion of the Caloosahatchee River extends upstream (33.2 miles) from the Gulf of Mexico to the Franklin Lock. The Caloosahatchee River traverses the project limits and serves as the primary outfall for the project area. This segment of SR 31 is located within Waterbody ID (WBID) 3240C – Caloosahatchee Estuary (Tidal Segment 3 – per the current 303(d) list) and is listed as impaired for Nutrients and Dissolved Oxygen. A Total Maximum Daily Load (TMDL) has been adopted for this WBID and a water quality nutrient loading analysis has been performed for Environmental Resource Permit (ERP) purposes.

There are four existing cross drains and one existing bridge (movable) within the project limits. The cross drains provide conveyance of offsite and onsite runoff through the roadway corridor with eventual discharge into the Caloosahatchee River. In the proposed conditions, the cross drains have been designed to accommodate offsite flows and maintain current drainage patterns. The cross drain details and analysis can be found in the Location Hydraulics Report (LHR) for this project.

Roadway runoff sheet flows to the adjacent natural wetlands and undeveloped properties which then outfall to the Caloosahatchee River without providing formal water quality treatment or attenuation. The roadway project corridor is divided into two roadway basins: Basin 1 south of the river (between SR 80 and the profile high point over the Caloosahatchee River), and Basin 2 north of the river (between the profile high point over the Caloosahatchee River and SR 78). Although the project corridor is comprised of two roadway drainage basins only Basin 1 was evaluated for pond siting with this report. The Basin 2 (from the proposed bridge high point to north of the Caloosahatchee River to the End Project at SR 78) stormwater management facility (SMF, named Pond 2) recommended alternative has been determined under the adjacent SR 31 Project (FPID 428917-1-22-01 & 442027-2-54-01) to the north.

An ERP permitting coordination meeting was held with the SFWMD in September 13, 2019 (see **Appendix 10**), and it was determined that floodplain impact **compensation is not be required for the project**. The floodplain associated with the tidal Caloosahatchee River is considered a surge floodplain and will not be affected by fill encroachments. Estimated floodplain fill impacts have been quantified for the recommended alternative roadway alignment and recommended SMF, these are included in the SR 31 Location Hydraulic Report for this project.

The proposed stormwater management system will consist of an off-site SMF designed to treat and attenuate the stormwater runoff from the improved project corridor. The analysis estimates pond right-of-way needs using a volumetric analysis approach that accounts for water quality treatment (presumptive and net improvement) and water quantity for peak discharge attenuation where required. Potential SMF alternatives were identified along the project limits and were designed as a combination dry retention / wet detention system to meet ERP permit requirements. For SMF discharges directly to the Caloosahatchee River (tidally influenced), peak discharge attenuation is not required, otherwise post development peak discharge attenuation is based on the 25-year/72-hour design storm event. FDOT Critical Duration analysis is not required per FDOT District One, see FDOT email correspondence in **Appendix 10**. Five SMF site alternatives (SMFs 1-A, 1-B, 1-C, 1-E, & 1-F) were evaluated for Basin 1 with SMF 1-E being the recommended pond site alternative based on the parameters identified in the SMF Site Evaluation Matrix (see **Appendix 3** and **Table 1**) and on the Pond Alternatives Map in **Appendix 1**.

One major design constraint on this project is the existing FGT gas transmission line. DRMP was directed to avoid crossing or impacting this line as much as possible and the location of this line (in the vicinity of the river) is a major constraint impacting the ability to locate an efficient and economically suited stormwater pond site.

Please note SMF recommendations are based on sizes and locations determined from preliminary data calculations, best available data, reasonable engineering judgement, and assumptions. SMF sizes and configurations may change during final design as specific site information (seasonal high ground water table (SHGWT), actual topographic elevation data, wetland hydrologic information, and final roadway geometry) is obtained. Please refer to **Table 1** for a summary of the Basin1 SMF alternatives estimated right-of-way area needs.

Table 1 – Stormwater Management Facility Alternatives Summary

SMF Name	SMF Right-of-Way Area (Ac) (Including Access & Outfall Easements)	Recommended SMF Site
1-A	11.86	
1-B	10.96	
1-C	10.75	
1-E	13.48	✓
1-F	15.78	

The calculations and analysis for this report are based on the 1988 North American Vertical Datum (NAVD 88). The Conversion equation from NAVD 88 to NGVD 29 is -1.17 feet, for example

11.17 feet (NGVD 29 elevation) -1.17 feet = 10.00 feet (NAVD 88 elevation)

1.0 Introduction

The FDOT is conducting a PD&E Study to evaluate roadway improvement alternatives for SR 31 from SR 80 to SR 78 in Lee County, Florida. These improvements consist of widening the existing two-lane roadway to a six-lane urban facility and a new bridge, for a project length of approximately 1.47 miles along with intersection improvements with SR 80. **Figure 1,** the **Project Location Map** is provided in **Appendix 1**.

SR 31 is currently classified by FDOT as an urban minor arterial along the project length and proposes an urban curb and gutter typical section having six 11-foot travel lanes, two 12-foot wide shared-use paths, a raised median, and a closed storm sewer collection and conveyance system. **Figure 8**, The **Proposed Typical Section**, is provided in **Appendix 1**.

The purpose of this Pond Siting Report (PSR) is to discuss, analyze, and identify the stormwater management system to serve the proposed roadway improvements based on environmental, hydrology and hydraulics, and economic factors. The stormwater management system will provide water quality treatment (presumptive and net improvement) and runoff attenuation (if necessary) with a combination of dry retention and wet detention. The proposed stormwater management system (drainage infrastructure and SMF) will comply with FDOT Drainage Manual and FDOT Design Manual and the regulatory criteria outlined in the SFWMD Environmental Resource Permit (ERP) Manual. The pond siting analysis for the alternative pond sites is found in Section 6 of this report. The exhibits for this report are located in **Appendix 1,** the **Drainage Design Criteria Table is in Appendix 2**, the **SMF Engineering Summary Table** and **SMF Site Evaluation Matrix** are included in **Appendix 3, and the SMF Design Calculations** are included in **Appendix 4**. Other supporting information and data are included in the remaining appendices.

The calculations and analysis for this report are based on the 1988 North American Vertical Datum (NAVD 88). The Conversion equation from NAVD 88 to NGVD 29 is -1.17 feet, for example

11.17 feet (NGVD 29 elevation) -1.17 feet = 10.00 feet (NAVD 88 elevation)

2.0 Project Description

FDOT proposes widening SR 31, from an existing two-lane rural roadway to a six-lane urban facility, from SR 80 (Palm Beach Blvd) to north of SR 78 (Bayshore Rd) in Lee County, Florida. The project extends for approximately 1.47 miles north. The limits of this project are shown on the **Project Location Map** as shown in **Figure 1, Appendix 1.**

The purpose of this report is to determine the Pond (SMF) size right-of-way area needed to provide the appropriate water quality treatment, water quantity attenuation, and maintenance berms and easements for the proposed roadway improvements.

3.0 Design Criteria

The design of the stormwater management facilities (SMFs) for this project are based on the jurisdictional rules of the South Florida Water Management District (SFWMD) and FDOT roadway design criteria. Water treatment and attenuation requirements will comply with guidelines as defined in Chapter 62-330 of the Florida Administration Code (F.A.C.) and the SFWMD ERP manual. **Appendix 2** contains the compiled **Drainage Design Criteria Table** used on this project, based on SFWMD and FDOT criterion.

A treatment train system comprised of dry retention and wet detention SMFs will provide the necessary water quality treatment and water quantity attenuation for the runoff associated with the proposed roadway improvements. The SMFs have been designed and sized for the SR 31 six-lane roadway configuration shown in the proposed roadway typical section (**Figure 8**) in **Appendix 1**. The following points summarize the SMF water quality, quantity, and SMF geometric requirements used for the project.

- **Water Quality** – for wet detention, the required water quality volume requires one inch (1”) over entire developed area or 2.5” over the new impervious area, whichever value is greater. For dry retention the required water quality volume is 50% of the wet detention criteria. For the wet detention, the outfall control structure shall be designed to drawdown a maximum of one-half inch (0.5”) of the detention volume in 24 hours. The project is also within Waterbody ID (WBID) 3240C – Caloosahatchee Estuary (Tidal Segment 3 – per the current 303(d) list) and is listed as impaired for Nutrients and Dissolved Oxygen. Therefore, a pre versus post pollutant loading analysis is required as part of the ERP permitting process. The pre versus post pollutant loading analysis will need to 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.
- **Water Quantity** – The SFWMD requires that the post development peak discharge shall be at or below pre-development peak discharge for the 25-year/72-hour storm event. In accordance with the SFWMD coordination meeting on September 2019, pre vs. post discharge rate attenuation will not be required for those basins which discharge directly to the Caloosahatchee River. FDOT will not require critical duration analysis (Rule 14-86) for the Basin 1 SMF preferred site for this project.
- **Detention Pond Facilities Configuration** – The pond will include a 15 foot wide maintenance berm, 1:4 (Vertical:Horizontal) for interior pond side slopes and berm tie-in slopes to existing ground, and 1-foot freeboard from the Design High Water (DHW) stage to the inside maintenance berm elevation. The elevation of the littoral shelf shall be no greater than 3 feet deep below the control elevation and the littoral area shall be the lesser of 20 percent of the wet detention area or 2.5 percent of the total of the detention area (including side slopes) plus the basin contributing area.

4.0 Data Collection

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

- FDOT Drainage Manual, January 2022
- FDOT Drainage Design Guide, January 2022
- FDOT PD&E Manual, Chapter 13 Floodplains, July 2020
- SR 31 Plans
  - Final Plans for Roadway Resurfacing, FPID 195662-1-52-01, M.P. 0.017 to M.P. 4.684, 1999
  - Final Plans of Bridge Rehabilitation, Project No. 12090-3509, M.P. 0.970 to M.P. 1.117, 1994
- FDOT Straight Line Diagrams (SLD's) of Road Inventory for SR 31 and SR 80
- Federal Emergency Management Agency (FEMA), Preliminary Map Panels
  - Nos. 12071 C0282G and 12071 C0284G, Lee County, Florida dated June 28, 2019
- U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)
  - Online Web Soil Survey - Lee County, Florida
- Lee County LiDAR 1-foot contours from, 2018
- Lee County Property Appraiser's Website (parcel lines), 2019
- National Wetland Inventory (NWI) from U.S. Fish and Wildlife Service (USFWS), 2019 (GIS data)
- SFWMD Environmental Resource Permit Information Manual Volume IV, 2012
- SFWMD Online ERP Permitting Website (Permit Documentation)
- United States Geological Survey (USGS) Quadrangle Maps
- Field Reconnaissance (May 2019 and March 2022)
- Interviews with FDOT Maintenance Staff
- Sweetwater Landing Access Driveway Plan (October 2005) by DBS Consulting
- Cultural Resource Assessment Survey (CRAS) by Janus Research, June 2022
- Environmental Evaluation Report by DRMP, Inc., May 2022
- Geotechnical Memorandum by Tierra, Inc. (Not Available at this time)
- Contamination Screening Evaluation Report (Not Available at this time)

5.0 Existing Conditions

5.1 Hydrology and Topography

The project is located within the Tidal Caloosahatchee sub-basin of the Caloosahatchee River Watershed as defined by the South Florida Water Management District (SFWMD). The tidal portion of the Caloosahatchee River extends upstream (33.2 miles) from the Gulf of Mexico, through the project limits, and up to the Franklin Lock. The Caloosahatchee River traverses through the project limits and serves as the primary outfall for the entire corridor. This segment of SR 31 is located within Waterbody ID (WBID) 3240C – Caloosahatchee Estuary (Tidal Segment 3 – per the current 303(d) list) and is listed as impaired for Nutrients and Dissolved Oxygen. A Total Maximum Daily Load (TMDL) has been adopted for this WBID.

The topography of the project area is relatively flat with elevations ranging from a high of 20 feet to a low of 0 feet (NAVD 88 datum). Roadway runoff sheet flows to natural wetland systems and undeveloped adjacent properties without formal water quality treatment or attenuation and the runoff from the existing bridge discharges directly to the Caloosahatchee River through scuppers. The roadway project corridor is divided into two roadway basins: Basin 1 south of the river (between SR 80 and the Caloosahatchee River), and Basin 2 north of the river (between the Caloosahatchee River and SR 78). **Table 2** summarizes the limits of these basins.

Table 2 – Summary of Existing Drainage Basins

Basin Number	**From Station** CL Const SR 31	**To Station** CL Const SR 31	**Total Basin Area (Acres)**	**Outfall Location**
1 SR 31 SR 80	50+00 394+34	103+48 440+00	24.40 20.75	Adjacent wetlands and conveyance features with eventual outfall to the Caloosahatchee River
2 Included in the Adjacent North PD&E Project	103+48	126+22.61	N/A	Caloosahatchee River

The general drainage for offsite drainage is consistent with the conveyance direction of the existing four cross drains within the limits of the project, see the **Drainage Basin Map** (**Figure 2**) provided in **Appendix 1**. Flow from SR 80 drains north through CD-04 (double 36” RCP), meandering through a wetland to CD-01 (double 36” RCP) which drains to the west under SR 31. From the downstream end of CD-01 runoff can flow in one of three directions depending on flow stages and the natural conveyance capacity of three identified features. Flow arrows on the Drainage Basin Map (see **Figure 2** in **Appendix 1**) depict flow directions and the location of these three drainage conveyance features. A field review was performed (March 2022) and confirmed these features.

- Feature one is poorly defined shallow swale/ditch that drains to north to CD-02 (double 36” RCP). Flow through CD-02 drains east then south and eventually outfalls to a tidally influenced man-made channel.
- Feature two is a series of man-made channelized segments with interconnecting pipes that flows south and west and eventually outfalls to the Caloosahatchee River, via the FP&L property.
- Feature three is a poorly defined swale/ditch the flows due west and eventually outfalls to the Caloosahatchee River, traversing several private properties.

5.2 Soils Data & Geotechnical Investigations

The Soil Survey of Lee County, Florida, published by the USDA NRCS has been reviewed for the project limits and the roadway corridor Soil Survey Map is provided as **Figure 4** in **Appendix 1**. According to the Soil Survey, there are eight (8) different soil types located within the project limits with the majority of these classified as Hydrologic Soil Group (HSG) Type B/D soils. These types of soils are poorly to very poorly drained soils with high groundwater tables. **Table 3 – USDA NRCS Soil Survey Information** summarizes the encountered soil types and indicates variable groundwater table depths ranging from above to 1.5' below existing ground.

A geotechnical evaluation study was performed by Tierra Inc. along the proposed roadway improvement alignment and within the SMF alternative sites. The field data results and estimated SMF geotechnical design parameters are not available currently. This report will be updated to include the geotechnical data and the **Geotechnical Memorandum** is included in **Appendix 9.**

Table 3 – USDA NRCS Soil Survey Information

Soil No.	Lee County USDA Soil Name	Seasonal High Ground Water		HSG	Soil Classification		
		Depth (feet)	Duration (months)		Depth (inches)	Unified	AASHTO
6	Hallandale Fine Sand	0.25 - 1.5	Jun - Nov	B/D	0 - 2 2 - 7 7 - 12	SP, SP-SM SP, SP-SM SP, SP-SM	A-3 A-3 A-3
7	Matlacha Gravelly Fine Sand - Urban Land Complex	1.5 - 3.5	Jun - Nov	B	0 - 35 35 - 40 40 - 80	SP, SP-SM SP, SP-SM SP, SP-SM	A-3 A-3 A-3
11	Myakka Fine Sand	0.50 - 1.5	Jun - Nov	B/D	0 - 20 20 - 36 36 - 80	SP, SP-SM SM, SP-SM SP, SP-SM	A-3 A-3, A-2-4 A-3
35	Wabasso Sand	0.50 - 1.5	Jun - Oct	B/D	0 - 24 24 - 28 28 - 62 62 - 80	SP, SP-SM SP-SM, SM SC, SM-SC SP-SM, SM	A-3 A-3, A-2-4 A-2-4, A-2-6 A-3, A-2-4
36	Immokalee Sand - Urban Land Complex	0.50 - 1.5	Jun - Nov	B/D	0 - 9 9 - 36 36 - 55 55-80	SP, SP-SM SP, SP-SM SP-SM, SM SP, SP-SM	A-3 A-3 A-3, A-2-4 A-3
42	Wabasso Sand, Limestone Substratum	0.50 - 1.5	Jun - Oct	C/D	0 - 25 25 - 35 35 - 45 45 - 55	SP-SM, SM SP SP-SM, SM SM, SM-SC, SC	A-3, A-2-4 A-2-4 A-3, A-2-4 A-2-4, A-2-6, A-6, A-4
45	Copeland Fine Sandy Loam	0.0 - 1.5	Jul - Apr	D	0 - 8 8 - 20 20 - 28	SP-SM, SM SM-SC, SC SM, SM-SC	A-3, A-2-4 A-2-4, A-2-6 A-2-4
144	Calossa Fine Sand	1.5 - 3.5	Jul - Oct	A	0 - 10 10 - 27 27 - 80	SP, SP-SM SP, SP-SM CH, SC,CL,MH	A-3 A-3 A-6, A-7

5.3 Cross Drains

The cross drain details and analysis for the four cross drains located along the project corridor can be found in the Location Hydraulics Report (LHR) for this project. The size and geometry of all cross drains and bridges have been verified from each FDOT straight line diagram (SLD), SR 31 plans, as well as during field reconnaissance. Please refer to **Table 4** for a summary of existing cross drains and bridges. Please refer to **Appendix 5** for the existing cross drain data, field photos taken at each cross drain, and SLDs.

Table 4 – Summary of Existing Cross Drains and Bridges

Structure Number	FDOT Milepost	Description
CD-01	0.221	Double 36" RCP
CD-02	0.682	Double 36" RCP
#120064	0.970 - 1.118	777.9' Bridge over Caloosahatchee River (Wilson Pigott Bridge)
CD-03	1.425	Single 24" RCP
CD-04	8.401 (Along SR 80)	Double 36” RCP

5.4 Existing Permits

There are several roadway improvement projects with SFWMD issued ERP permits along and adjacent to the SR 31 project limits, these are summarized in **Table 5** along with excerpts from each ERP Permit provided in **Appendix 11**. The SR 31 at SR 80 intersection improvements will add turn lanes and new operational movements and will require a modification to the current SR 80 ERP permit.

Table 5 – Summary of Existing SFWMD ERP Permits

SFWMD Application Number	SFWMD ERP Permit Number	Permit Project Name	Date issued	Project Description	Stormwater System Description
08197-B	88-00012-S	SR 80 Widening From I-75 to SR 31	22-Feb-1988	SR 80 roadway widening (from I-75 to SR 31) from an existing 2-lane road to a proposed 6-lane road along with the construction of a surface water management system to serve the 67.9 acres (2.73 miles) highway [project.	The stormwater management system consists of roadside retention swales and 1 wet detention pond (1.4 acres in size) to provide water quality treatment and peak discharge attenuation. The swales were designed of the 3-year-1-hour storm event.
X000008151 (on E-Permit Portal)	84-00026-S	SR 80 Widening From SR 31 to Buckingham Road	9-Mar-1984	SR 80 roadway safety improvements (from SR 31 to Buckingham Road) from an existing 2-lane road to a proposed 4-lane road along with the construction of a surface water management and the extension of two double 36" cross drains. X000008151_Application-Permit location map).	The stormwater management system consists of roadside retention swales to provide water quality treatment and peak discharge attenuation. The swales were designed of the 3-year-1-hour storm event.
12026-A	87-00022-S	SR 80 Roadway Improvements from Buckingham Rd to Hickey Creek	27-Mar-1987	SR 80 roadway Improvements (from Buckingham Road to West of Hickey Creek) from an existing 2-lane road to a proposed 4-lane road along with the construction of a surface water management system to serve the highway [project.	The stormwater management system consists of roadside retention swales to provide water quality treatment and peak discharge attenuation. The swales were designed of the 3-year-1-hour storm event.
171207-1	36-103420-P	SR 80 Widening: Shoreland Dr to Buckingham Rd Shared Used Path	13-Feb-2018	Improvements on SR 80 including construction of 10-ft shared use path along north side of roadway from Shoreland Dr to Buckingham Rd.	The previously permitted swale ditch blocks were relocated and new ditch blocks were added to meet water quality requirements.
180730-8	36-03133-P	SR 80/SR 31 Right Turn Lane	21-Nov-2018	Added a right turn lane along SR 31 and SR 80 to provide access to the commercial development located in the NW quadrant of the intersection (originally permitted under App. 180531-1, ERP No. 36-06523-P). The permitted onsite commercial development SWM system provides the WQ treatment and attenuation for the right turn lane additions.	Stormwater treatment and attenuation are provided in the SWM system located within the Commercial development.
960916-14	36-03133-P	SR 31	1-Oct-1996	Resurfacing, widening, and paving 5 miles of SR 31 from SR 80 to Charlotte County Line in Lee County, Florida. Also includes the extension of 6 existing culverts.	No stormwater management system was permitted, the roadside ditches provide water quality treatment.
081217-1	36-03133-P	SR 31	1-Mar-2010	Widening of SR 31 from SR 78 to the Charlotte County Line from 2-lanes to 6 lanes. Construction of a joint use stromwater management system between FDOT District 1 and Babcock Ranch Holdings, LLC. Numerous ERP permit modifications have take place since approval of the first ERP permit No. 08-0004-S-05.	The stormwater management system is designed as a cascading wet detention system, divided into eight basins with ultimate outfall from Basin 100 into the Owl Creek tributary system.

5.5 Floodplain/Floodways

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), panel numbers 12071 C0282G and 12071 C0284G for Lee County, Florida dated June 28, 2019 were reviewed for floodplains and floodways within the SR 31 project limits. According to Lee County, these preliminary FIRM maps will be effective in November of 2022. Based on FDOT direction, the floodplain analysis and SR 31 roadway profile should consider the Preliminary Maps instead of the older (2008) maps that will be archived, meeting minutes are provided in **Appendix 10**.

The majority of the SR 31 project corridor is designated Zone AE with the 100-yr flood stage at elevation 10 NAVD 88 while the shorelines adjacent to the Caloosahatchee River are Zone AE elevation 11 NAVD 88. The proposed SR 31 alignment and profile along with SMF berms will encroach the FEMA designated 100-year floodplain. However, this floodplain is considered a **tidal surge floodplain** and therefore impacts will not require compensation. The floodplain encroachment areas due to the roadway and SMF improvements are documented in the SR 31 Draft Location Hydraulic Report. Please see the preliminary **FEMA FIRM Maps** in **Appendix 1**, **Figures 6A and 6B**.

5.6 Environmental Characteristics

5.6.1 Land Use Data

The project corridor is a mixture of residential and agricultural land uses interspersed with native wetland and upland habitat. The primary utility along the corridor is the Florida Gas Transmission (FGT) owned 26” gas main located within a 50-foot easement, see the **Pond Alternatives Map** (**Figure 3**) in **Appendix 1.** There a 26” gas main along the east side of the project from south of Sweetwater Landing Marina to the end of the project (at SR 78) that parallels the project along the east side of SR 31. The gas main and easement proceed west just south of the Sweetwater Landing Marina to well outside the roadway limits of the project. The widening of SR 31 from SR 80 to north of SR 78 does not significantly 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 **Figure 5** for **Land Use Map** in **Appendix 1**.

5.6.2 Cultural Features

A Cultural Resource Assessment Survey (CRAS) for this PD&E study conducted by Janus Research to evaluate the project corridor and the SMF site alternatives for community services, cultural features, neighborhood gathering places, historic sites, and the potential for archaeologically significant sites. All these resources represent commonly occurring types of architecture for the locale, and available data did not indicate any significant historical associations. Additionally, the archaeological survey confirmed the low archaeological site potential of the archaeological area of potential effect (APE). No archaeological sites or occurrences were identified within the SR 31 project APE during the current survey and no further archaeological work is recommended. For more details regarding these features, the CRAS is provided in **Appendix 7**.

The Resource Group 8LL02586 (Caloosahatchee River Canal) is recommended eligible to National Register of Historic Places (NRHP) listing, with that portion of the canal located within the APE contributing to the resource group. The proposed widening of SR 31 and replacement of the existing SR 31 bridge (Wilson Pigott Bridge, FDOT No. 120064) over the Caloosahatchee River will have no adverse effect on this resource. The canal has been bridged since the 1960s, and the proposed replacement bridge will not impede the flow of the canal and no further work is recommended. All the other historic resources documented for the current survey, whether previously or newly recorded, are considered ineligible for listing in the National Register either individually or as part of a district.

5.6.3 Natural and Biological Features

The SR 31 roadway corridor is adjacent to and abuts wetland systems and isolated wetlands along the project limits. It is anticipated that the proposed SR 31 roadway widening will result in wetland impacts both along the corridor and potentially within the limits of the recommended SMF alternative. Several species could potentially occur within or along the project corridor based on the literature and database review as noted in the **Environmental Evaluation Report** (by DRMP, included in **Appendix 6**).

DRMP biologists conducted a wetland delineation on April 11th and 12th, 2022 for the SMF alternatives and easements (see Figure 3 in Appendix 1). The wetlands were delineated in accordance with federal and state guidelines (U.S. Army Corps of Engineers (USACE) Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (2010) and FAC Rule 62-340, respectively). The wetlands identified in the report represent the approximate wetland extents within and adjacent to the pond site alternatives. However, these limits have not been reviewed or approved by the permitting regulatory agencies. As part of the permitting effort for the project, the wetland limits will need to be reviewed and approved by the regulatory agencies and prior to construction of the project. SMF alternative recommendations will be based on avoidance of wetland impacts whenever possible.

A list of species considered to potentially occur within the project SMF alternative pond site areas is included in the Environmental Evaluation Report (BY DRMP), although none were observed during the SMF site review. The **Environmental Evaluation Report** identified that all five pond sites have potential wetlands and/or surface water impacts.

6.0 Proposed Conditions

The limits of Basin 1 are from SR 80 to the high point of the proposed bridge over the Caloosahatchee River as summarized in Table 6. The stormwater management design approach for this project addresses stormwater quality treatment and attenuation for the proposed Basin 1 roadway improvements, comprised of the following components.

- SR 31 roadway (for the 2-lane to 6-lane widening improvements)
- SR 31 at SR 80 Quadrant intersection improvements (this design option is considered the most extensive improvement condition of the intersection improvement alternatives)
- SR 80 roadway improvements (potential loss of permitted linear swale stormwater management)

The Drainage Basin Map in Appendix 1 shows the limits of Basin 1 and what roadway portions will be directed to the dry retention or wet detention water quality treatment. There are proposed SR 31 at SR 80 operational intersection improvement alternatives that are being considered, and the recommended option will need to be accommodated in the preferred SMF facility. For the SMF pond siting effort, the quadrant intersection alternative was used as the most conservative approach for sizing each site. The total area to be routed through the recommended SMF alternative (dry retention and wet detention) will treat and attenuate (if necessary) a total of 45.15 acres as detailed in the **SMF Engineering Analysis Summary Table** provided in **Appendix 3** and as summarized in **Table 6**.

Table 6 – Summary of Proposed Drainage Basins

Basin Number	**From Station** CL Const SR 31	**To Station** CL Const SR 31	**Total Basin Area (Acres)**	**Outfall Location**
1 SR 31 SR 80	50+00 394+34	108+59 440+00	24.40 20.75	Direct outfall to the Caloosahatchee River
2 Included in the Adjacent North PD&E Project	108+59	127+45.38	N/A	Caloosahatchee River

The primary design challenge for the SMF sizing on this project is the water quality component. The proposed increase in roadway pavement and right-of-way area results in increased nutrient laden runoff from the project site. Impaired waterbody criterion specifies “net improvement” nutrient (Nitrogen – N and Phosphorus – P) loading reductions prior to discharge and this cannot be achieved solely using a wet detention treatment system. To meet the “net improvement” criteria a design approach using a “treatment train” system of dry retention in series with wet detention is required. The water quality treatment calculations, provided in **Appendix 4**, demonstrate compliance with both the SFWMD presumptive criteria and net nutrient loading improvement criteria.

A second design challenge is associated with SMF site topography, the existing SR 80 roadway profile, and the proposed SR 31 roadway profile. For the SMF alternatives, the existing average grade is approximately elevation 1.6-4.0 ft, with only minor variations while the existing SR 80 profile elevation is approximately elevation 7.0. Based on the discussions with the Department, the proposed SR 31 profile will be designed with the low edge of pavement elevation at or above the preliminary FEMA FIRM 100-year flood elevation of 10.0. The preliminary FEMA maps are provided in **Appendix 1**, see **Figures 6A and 6B**. The SR 31 to SR 80 profile tie-in will transition from elevation 10 along SR 31 to the existing SR 80 profile elevation of 7.0.

The elevation difference between the SR 80 profile (elevation 7.0 +/-) and a dry retention bottom elevation of 3.5-4.0 does not provide the necessary physical clearances for a closed storm pipe system to covey runoff to the facility without being significantly sumped below the SMF bottom nor is there enough physical clearance between the tailwater (in dry area with a weir) to the SR 80 roadway to design an economically feasible storm sewer collection system. Therefore, the SR 80 runoff will be directed to a wet detention facility for treatment and attenuation. The SR 80 runoff, from the eastbound lanes, will drain to dry swale facilities that will discharge into pipe for conveyance to the wet detention portion of each SMF site. This approach reduces the amount of directly connected impervious area (DCIA) from SR 80, providing enhanced water quality treatment in advance of the wet detention SMF. The majority of the SR 31 roadway runoff will be collected in a closed storm system and conveyed to the dry retention portion of the SMF Site. The dry pond would include an additional 1.5 ft of clean fill to be added to the pond bottom to prolong the service life of the pond. Each of the **Basin/Pond Drainage Maps** provided in **Appendix 4** shows the bleed down of these dry retention areas within each part of the SMF Site as well as the SR 80 Non-DCIA limits.

6.1 Floodplain Impacts and Compensation

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), panel numbers 12071 C0282G and 12071 C0284G for Lee County, Florida dated June 28, 2019 were reviewed for floodplains and floodways within the SR 31 project limits. The majority of the SR 31 project corridor is designated Zone AE with the 100-yr flood stage at elevation 10 NAVD 88 while the shorelines adjacent to the Caloosahatchee River are Zone AE elevation 11 NAVD 88.

The proposed SR 31 alignment and profile along with SMF berms will encroach into the FEMA designated 100-year floodplain. A coordination meeting was held with SFWMD in September 2019 and confirmed the floodplain within the project limits is a **tidal surge floodplain** and therefore the **SR 31 and SMF site encroachment impacts not require compensation**, the **SFWMD meeting minutes** are provided in **Appendix 10**. The floodplain encroachment areas due to the roadway and SMF improvements are documented in the SR 31 Location Hydraulic Report. Please see the **FEMA FIRM Maps** in **Appendix 1**, **Figures 6A** and **6B**.

6.2 Proposed SMF Site Alternatives Evaluation Methodology

The SMF siting analysis for this project considered a number of elements such as water quality treatment, peak discharge attenuation (where not directly out-falling to the tidal Caloosahatchee River), Land right-of-way needs, soil type(s), wetland and surface water impacts, threatened and endangered species, floodplain impacts, existing and future land uses, potential for archaeological impacts, conveyance hydraulics, outfall tailwater conditions, inflow outflow and access easement needs, SMF geotechnical design parameters, potential for utility impacts, The pond siting analysis assumes that all ponds will be designed using the wet detention pond design criteria. The pond stage area calculations also include a note regarding the calculated head loss. The following parameters were considered in the selection of potential pond sites:

- **Pond Design Hydrologic and Hydraulic Factors**
  - Existing ground elevation (topography)
  - Soil types and estimated seasonal high groundwater water (SHGWT) elevation
  - Distance to the low edge of pavement (closed pipe conveyance)
  - Allowable hydraulic grade line (HGL)
  - Discharge outfall tailwater conditions
  - Floodplain impacts
- **Land Use Consideration**
  - Environmental wetland impacts
  - Threatened or endangered species impacts
  - Hazardous materials & contamination potential
  - Community, cultural resources, and archaeological potential impacts
  - Major utility conflict potential
- **Estimated right-of-way needs**
  - SMF area
  - Inflow and outflow access easement areas

The Land Use Consideration information (environmental wetland impacts, community, cultural resources, and archaeological potential, hazardous materials & contamination potential, and geotechnical) are included in **Appendices 6 through 9.** Summary results for each of these are incorporated into the **SMF Site Evaluation Matrix** in **Appendix 4**.

6.3 SMF Alternatives

A total of five SMF alternatives were considered for Basin 1. Please refer to **Drainage Basin and Pond Alternatives Maps** provided in **Appendix 1** for the SMF locations and associated roadway drainage basin areas. The limits of the proposed basins begin and end at or near the same locations as in the existing condition. The proposed condition assumes collecting the bridge runoff in Basins 1 and 2, whereas in the existing condition the bridge has scuppers and discharges directly to the Caloosahatchee River. The pond alternatives have been conservatively sized to accommodate the attenuation volume needs though some could be directly connected to a tidally influenced waterbody. **Table 6 – Summary of Proposed Drainage Basins** provides a summary of the proposed basin limits and their outfall locations.

6.3.1 SMF 1-A

Location: SMF alternative 1-A provides the necessary treatment and attenuation for the proposed Basin 1 roadway improvements. The SMF 1-A site is an existing borrow pit situated within two property parcels and located north of SR 80 (approximate station 67+00 RIGHT, CL SR 31) and sits back (approximately 410 feet) from the SR 31 right-of-way preserving the SR 31 frontage for future development. Additionally, at this time, the site is under design development as a residential subdivision (31-Oaks Subdivision) and could potentially increase right-of-way acquisition costs. The location of SMF 1-A (Wet and Dry) is displayed on the **Pond Alternative Map** in **Appendix 1**. **This site is not the preferred alternative.**

Hydrology and Hydraulics: This site is centrally located within the basin and requires inflow and outflow closed conveyance access easements from the SR 31 corridor. The southern 50-ft' wide easement would be the inflow from SR 31 and SR 80 and drain into the dry pond and wet pond, running a length of approximately 500-ft. The outflow would be the northern 50-ft easement, discharging from the wet pond a length of approximately 500-ft, where it meets back with the SR 31 right-of-way. The site is located a good distance away from the tidal Caloosahatchee River discharge point and therefore requires a long run (2950 LF +/-) of closed storm drain outfall system from SMF 1-A (Wet). This site meets the hydraulic needs for Basin 1 and provides adequate hydraulic clearance between the low edge of pavement on SR 31 (SMF 1-A Dry) and for SR 80 (SMF 1-A Wet). The tailwater for the outfall from SMF 1-A (Wet) is the tidal Caloosahatchee River. The sizing calculations for this Dry-Wet SMF combination can be found in **Appendix 4**.

Land Use Features: The site is primarily a borrow area (water body) but includes some perimeter land areas comprised of mixed wetland hardwoods. The **Environmental Evaluation Report** in **Appendix 6** addresses wetland habitat as well as threatened and endangered species although no species were observed during the site review. This SMF site will impact approximately 0.29 acres of wetlands, has habitat to support various species, has a medium ranking for hazardous materials & contamination potential, a low ranking for community, cultural resources, and archaeological potential effect, and utility impact potential is low. The land use items are discussed in detail in their respective reports provided **Appendices 6-9**.

Topo and Soils: The existing ground approximately elevation 4.0 based on Lee County 2-ft LiDAR contour data. The pond site is situated within HSG Type B/D soils (Myakka & Immokalee fine sands) and HSG Type D soils (Copeland Sandy loam). Elevation 3.7 was used as the estimated SHGWT elevation for the SMF 1-A sizing analysis based on the Preliminary Roadway Soil Survey Report (by Tierra) that can be found in **Appendix 9**. A significant construction cost, specific to this SMF site, requires filling about 6 acres of the borrow site with Type A (highly permeable) clean sand to provide the needed dry retention portion of SMF 1-A.

Right-of-way: The estimated SMF 1-A right-of-way area is 11.86 acres and includes the inflow and outflow access easements as shown on the **SMF 1-A Alternative Map in Appendix 4**.

6.3.2 SMF 1-B

Location: SMF alternative 1-B provides the necessary treatment and attenuation for the proposed Basin 1 roadway improvements. The SMF 1-B site is situated within two property parcels, located north of SR 80 (approximate station Sta. 68+75 RIGHT, CL SR 31) and abutting the proposed SR 31 frontage. Additionally, at this time, the site is under design development as a residential subdivision (31-Oaks Subdivision) and could potentially increase right-of-way acquisition costs. The location of SMF 1-B (Wet and Dry) is displayed on the **Pond Alternative Map** in **Appendix 1**. **This site is not the preferred alternative.**

Hydrology and Hydraulics: This site is centrally located within the basin and does not require any inflow or outflow conveyance access easements coming off the SR 31 corridor. The site is located a good distance away from a tidal Caloosahatchee River discharge point and therefore requires a long run (2040 LF +/-) of closed storm drain outfall system from SMF 1-B Wet. This site meets the hydraulic needs for Basin 1, providing adequate hydraulic clearance between the low edge of pavement on SR 31 (SMF 1-B Dry) and for SR 80 (SMF 1-B Wet). The tailwater for the outfall from SMF 1-B Wet is the tidal Caloosahatchee River. The sizing calculations for this Dry-Wet SMF combination can be found in Appendix 4.

Land Use Features: The site is comprised of low density residential with hardwoods, mixed wetland hardwoods, and borrow area (water body). The **Environmental Evaluation Report** in **Appendix 6** addresses wetland habitat as well as threatened and endangered species although no species were observed during the site review. This SMF site will impact approximately 1.06 acres of wetlands, has habitat to support various species, has a medium ranking for hazardous materials & contamination potential, a low ranking for community, cultural resources, and archaeological potential effect, and utility impact potential is low. The land use items are discussed in detail in their respective reports provided **Appendices 6-9**.

Topo and Soils: The existing ground elevation is at approximately 4.00 ft NAVD based on Lee County 2-ft LiDAR contour data. The pond site is situated within HSG B/D soil (Brynwood fine sand) and HSG D soil (Copeland fine loamy sand). Elevation 2.9 was used as the estimated SHGWT elevation for the SMF 1-B sizing analysis based on the Preliminary Roadway Soil Survey Report (by Tierra) that can be found in **Appendix 9**. Part of this site is a borrow area and could be used for the wet detention portion of SMF 1-B, but some filling within the borrow area would be required to construct the pond maintenance berm and slope tie ins.

Right-of-way: The estimated SMF 1-B right-of-way area is 10.96 acres as shown on the **SMF 1-B Alternative Map in Appendix 4**. This site would require a long run of closed storm drain pipe for the outfall system at a tidal discharge point, but this can be accommodated with the proposed SR 31 roadway right-of-way. As previously noted, this SMF site is within the 31-Oaks Subdivision residential development plans and could have higher acquisition cost due to potential land use change.

6.3.3 SMF 1-C

Location: SMF alternative 1-C provides the necessary treatment and attenuation for the proposed Basin 1 roadway improvements. The SMF 1-C site is situated within two property parcels, located north of SR 80 (approximate station Sta. 61+50 RIGHT, CL SR 31) and sits back (approximately 540 feet) from the SR 31 right-of-way preserving the SR 31 frontage for future development. Additionally, at this time, the site is under design development as a residential subdivision (31-Oaks) and could potentially increase right-of-way acquisition costs. The location of SMF 1-C (Wet and Dry) is displayed on the **Pond Alternative Map** in **Appendix 1**. **This site is not the preferred alternative.**

Hydrology and Hydraulics: This site is centrally located within the basin and requires inflow and outflow closed conveyance access easements from the SR 31 corridor The southern 50-ft' wide easement would be the inflow from SR 31 and SR 80 and drain into the dry pond and wet pond, running a length of approximately 600-ft. The outflow would be the northern 50-ft easement, discharging from the wet pond a length of approximately 600-ft, where it meets back with the SR 31 right-of-way. The site is located a good distance away from the tidal Caloosahatchee River discharge point and therefore requires a long run (4050 LF +/-) of closed storm drain outfall system from the northern SMF 1-C easement. This site meets the hydraulic needs for Basin 1 and provides adequate hydraulic clearance between the low edge of pavement on SR 31 (SMF 1-C Dry) and for SR 80 (SMF 1-C Wet). The tailwater for the outfall from SMF 1-C (Wet) is the tidal Caloosahatchee River. The sizing calculations for this Dry-Wet SMF combination can be found in **Appendix 4**.

Land Use Features: It is bordered by the borrow area (waterbody) to the north and mixed wetland hardwoods habitat to the west. The majority of the pond site alternative is currently an active cattle pasture and there are small, isolated wetlands located in the northwest quadrant of this site The **Environmental Evaluation Report** in **Appendix 6** addresses wetland habitat as well as threatened and endangered species although no species were observed during the site review. This SMF site will impact approximately 0.67 acres of wetlands, has habitat to support various species, has a medium ranking for hazardous materials & contamination potential, a low ranking for community, cultural resources, and archaeological potential effect, and utility impact potential is low. The land use items are discussed in detail in their respective reports provided **Appendices 6-9**.

Topo and Soils: The existing ground elevation ranges from 4 to 6 feet across the site based on Lee County 2-ft LiDAR contour data. The pond site is situated primarily within HSG B/D soils (Immokalee sand-Urban land complex) and HSG A/D soil (Myakka fine sand). Elevation 3.7 ft was used as the estimated SHGWT elevation for the SMF 1-C sizing analysis based on the Preliminary Roadway Soil Survey Report (by Tierra) that can be found in **Appendix 9**. Part of this site is a borrow area and could be used for the wet detention portion of SMF 1-C, but some filling within the borrow area would be required to construct the pond maintenance berm and slope tie ins.

Right-of-way: The estimated SMF 1-C right-of-way area is 10.75 acres and includes the inflow and outflow access easements as shown on the **SMF 1-C Alternative Map** in **Appendix 4**.

6.3.4 SMF 1-E

Location: SMF alternative 1-E provides the necessary treatment and attenuation for the proposed Basin 1 roadway improvements. The SMF 1-E site is situated within two property parcels, located north of SR 80 (approximate station Sta. 64+13 LEFT, CL SR 31) and sits back (approximately 920 feet) from the SR 31 right-of-way preserving the SR 31 frontage for future development. The location of SMF 1-E (Wet and Dry) is displayed on the **Pond Alternative Map** in **Appendix 1**. **This is the preferred alternative site.**

Hydrology and Hydraulics: This site is centrally located within the basin and requires inflow and outflow closed conveyance access easements from the SR 31 corridor. The inflow easement is 50 ft wide and approximately a quarter mile long and discharges to the dry and wet ponds from SR 31 and SR 80. The site is located closer to the tidal Caloosahatchee River discharge point with an outfall to the river. This pond site will outfall through a spreader swale from SMF 1-E (Wet) then convey in a poorly defined natural channel to the west side of the FGT gas transmission easement. West of the FGT easement, SMF 1-E will require an DBI inlet and approximately 900 LF +/- of closed storm drain outfall system to the Caloosahatchee River. This site meets the hydraulic needs for Basin 1 and provides adequate hydraulic clearance between the low edge of pavement on SR 31 (SMF 1-E Dry) and for SR 80 (SMF 1-E Wet). The tailwater for the outfall from SMF 1-E (Wet) is the poorly defined natural channel. The sizing calculations for this Dry-Wet SMF combination can be found in **Appendix 4**.

Land Use Features: The SMF site includes some perimeter land areas comprised of mixed wetland hardwoods. The **Environmental Evaluation Report** in **Appendix 6** addresses wetland habitat as well as threatened and endangered species although no species were observed during the site review. This SMF site will impact approximately 2.52 acres of wetlands, has habitat to support various species, has a medium ranking for hazardous materials & contamination potential, a low ranking for community, cultural resources, and archaeological potential effect, and utility impact potential is medium. The land use items are discussed in detail in their respective reports provided is **Appendices 6-9**.

Topo and Soils: The existing ground elevation is at approximately 1.60 ft NAVD based on the Preliminary Roadway Soil Survey Report (by Tierra) that can be found in **Appendix 9**. The pond site is situated within HSG A & A/D soils (Caloosa fine sand) with an estimated SHGWT at existing ground. This pond site also has a small amount (2.4%) of Wulfert muck. Elevation 1.6 was used as the estimated SHGWT elevation for the SMF 1-E sizing analysis. Soils from this site could be used for fill, as some soil removing and filling within the muck area would be required to construct the pond maintenance berm and slope tie ins.

Right-of-way: The estimated SMF 1-E right-of-way area is 13.48 acres and includes the inflow and outflow access easements as shown on the **SMF 1-E Alternative Map** in **Appendix 4**. Crossing through the FGT easement will require approval and coordination is currently ongoing. Correspondence of this can be found in **Appendix 10**.

6.3.5 SMF 1-F

Location: SMF alternative 1-F provides the necessary treatment and attenuation for the proposed Basin 1 roadway improvements. The SMF 1-F site is situated within two property parcels, located north of SR 80 (approximate station Sta. 69+00 LEFT, CL SR 31) and sits back (approximately 920 feet) from the SR 31 right-of-way preserving the SR 31 frontage for future development. The location of SMF 1-F (Wet and Dry) is displayed on the **Pond Alternative Map** in **Appendix 1**. **This site is not the preferred alternative site.**

Hydrology and Hydraulics: This site is centrally located within the basin and requires inflow and outflow closed conveyance access easements from the SR 31 corridor. The inflow easement is 50 ft wide and approximately a third of a mile long and discharges to the dry and wet ponds from SR 31 and SR 80. The site is located closer to the tidal Caloosahatchee River discharge point with an outfall to the river. This pond site will outfall through a spreader swale from SMF 1-F (Wet) then convey in a poorly defined natural channel to the west side of the FGT gas transmission easement. West of the FGT easement, SMF 1-F will require an DBI inlet and approximately 900 LF +/- of closed storm drain outfall system to the Caloosahatchee River. This site meets the hydraulic needs for Basin 1 and provides adequate hydraulic clearance between the low edge of pavement on SR 31 (SMF 1- F Dry) and for SR 80 (SMF 1-F Wet). The tailwater for the outfall from SMF 1-F (Wet) is the poorly defined natural channel. The sizing calculations for this Dry-Wet SMF combination can be found in **Appendix 4**.

Land Use Features: The site includes some perimeter land areas comprised of mixed wetland hardwoods. The **Environmental Evaluation Report** in **Appendix 6** addresses wetland habitat as well as threatened and endangered species although no species were observed during the site review. This SMF site will impact approximately 11.87 acres of wetlands, has habitat to support various species, has a medium ranking for hazardous materials & contamination potential, a low ranking for community, cultural resources, and archaeological potential effect, and utility impact potential is medium. The land use items are discussed in detail in their respective reports provided **Appendices 6-9**.

Topo and Soils: The existing ground elevation is at approximately 1.60 ft NAVD based on the Preliminary Roadway Soil Survey Report (by Tierra) that can be found in **Appendix 9**. The pond site is situated within HSG A & A/D soils (Caloosa fine sand). This pond site also has a large amount (33.9%) of Wulfert muck. Elevation 1.6 ft was used as the estimated SHGWT elevation for the SMF 1-F sizing analysis. Soils from this site could be used for fill, as some removing and filling within the muck area would be required to construct the pond maintenance berm and slope tie ins.

Right-of-way: The estimated SMF 1-F right-of-way area is 15.78 acres and includes the inflow and outflow access easements as shown on the **SMF 1-F Alternative Map** in **Appendix 4**. Crossing through the FGT easement will require approval and coordination is currently ongoing. Correspondence of this can be found in **Appendix 10**.

7.0 Conclusions

Five SMF alternatives were evaluated through the site analysis and sizing process. There are alternatives on each side of SR 31 that have distinct advantages and disadvantages. The alternative sites on the west side of SR 31 (SMFs 1-E and 1-F) have adequate size and are on open land without future development plans. Alternative sites on the west side of SR 31 (SMFs 1-E and 1-F) have adequate size and outfall to the Tidal Caloosahatchee River via closed storm drain system.

APPENDIX 1 - Exhibits

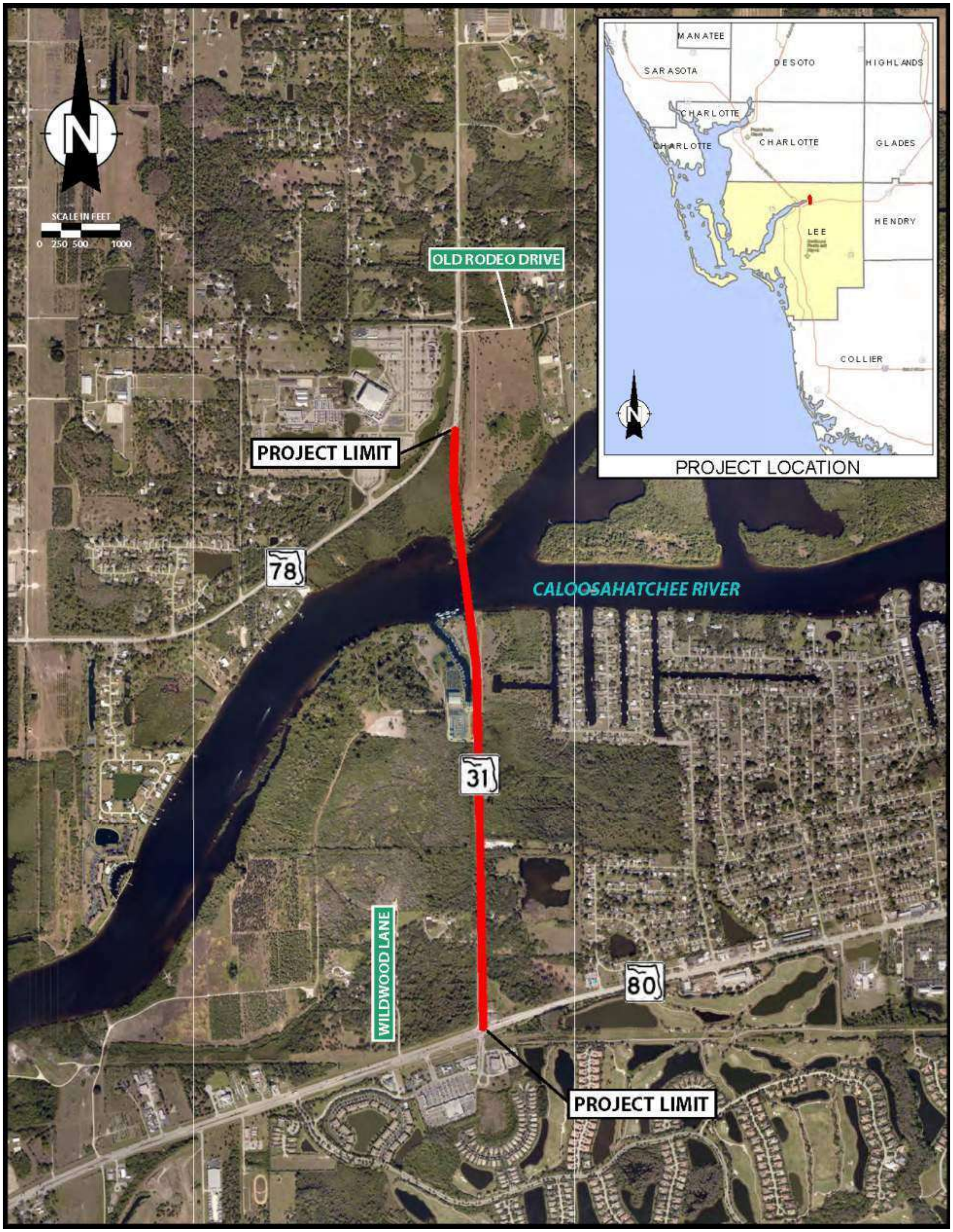


Figure 1 – Project Location Map

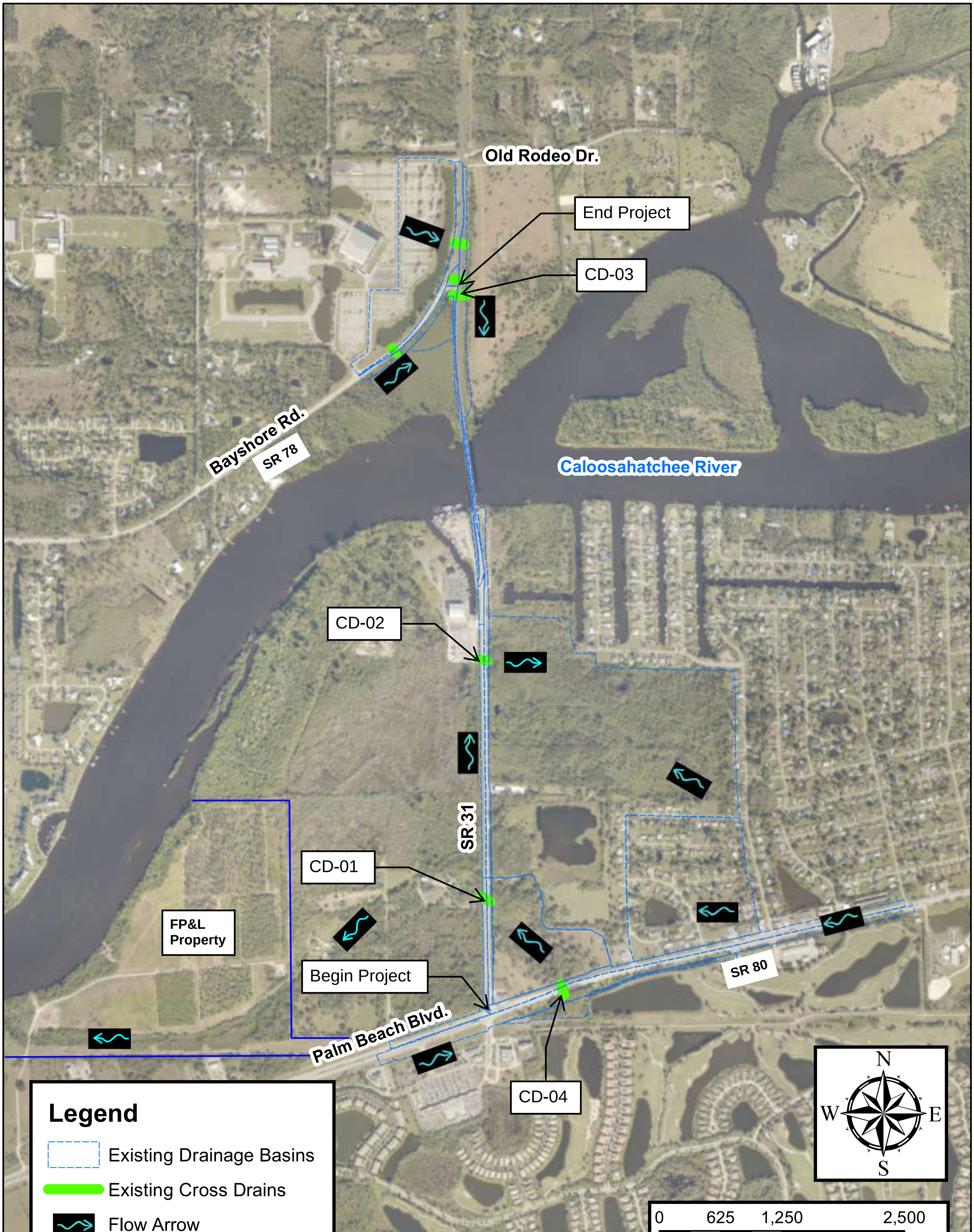
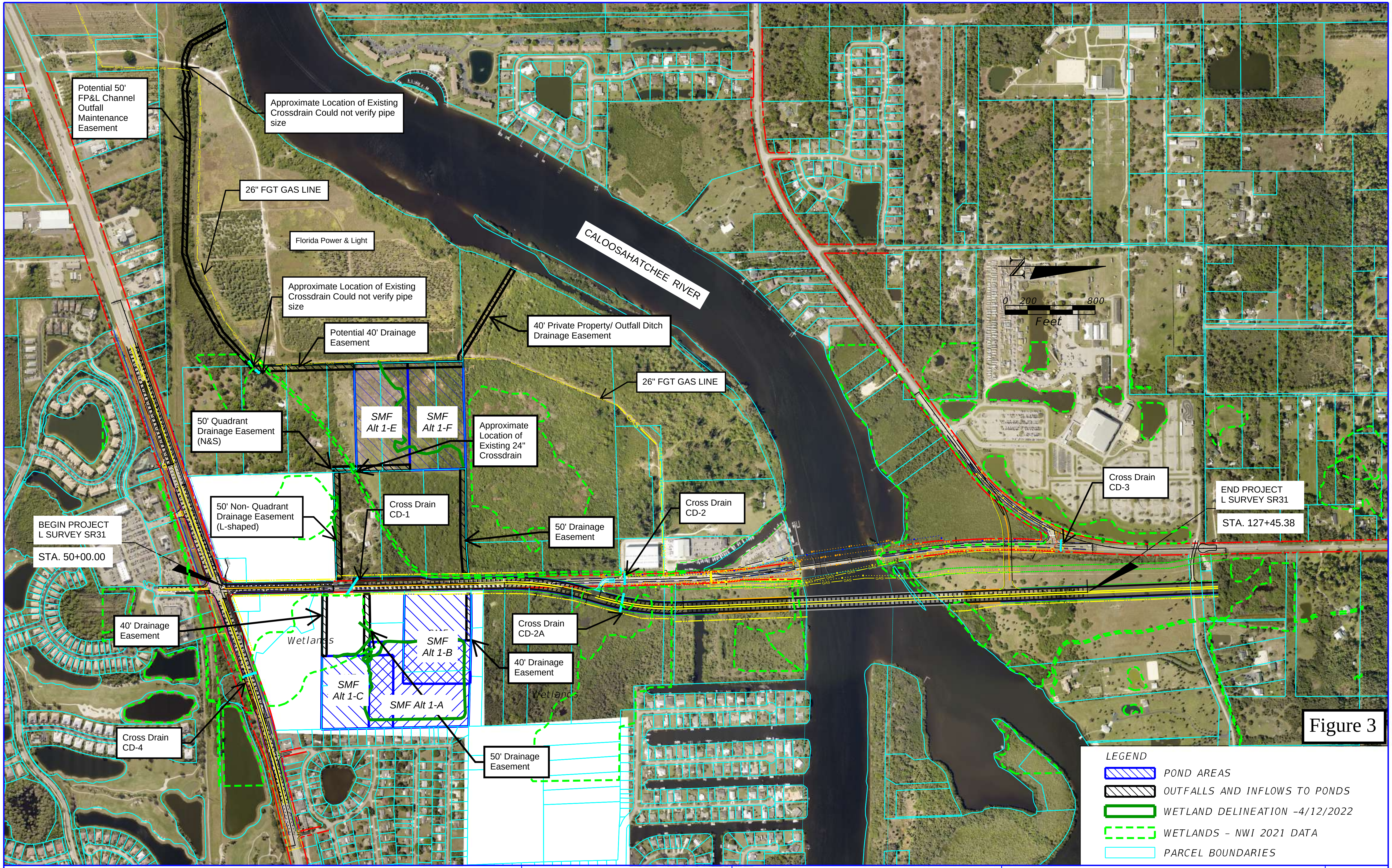


Figure 2 - Drainage Basin Map



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

DRMP
ENGINEERS • SURVEYORS • PLANNERS • SCIENTISTS
DRMP, INC.
941 LAKE BALDWIN LANE, ORLANDO, FLORIDA 32814
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CERTIFICATE OF AUTHORIZATION NO. 2648

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
31	LEE	441942-1-22-01

DRAINAGE MAP

SHEET NO.

JSheets 8/22/2022 1:24:38 PM Default

Custom Soil Resource Report
Soil Map

Figure 4 - Soil Survey Map

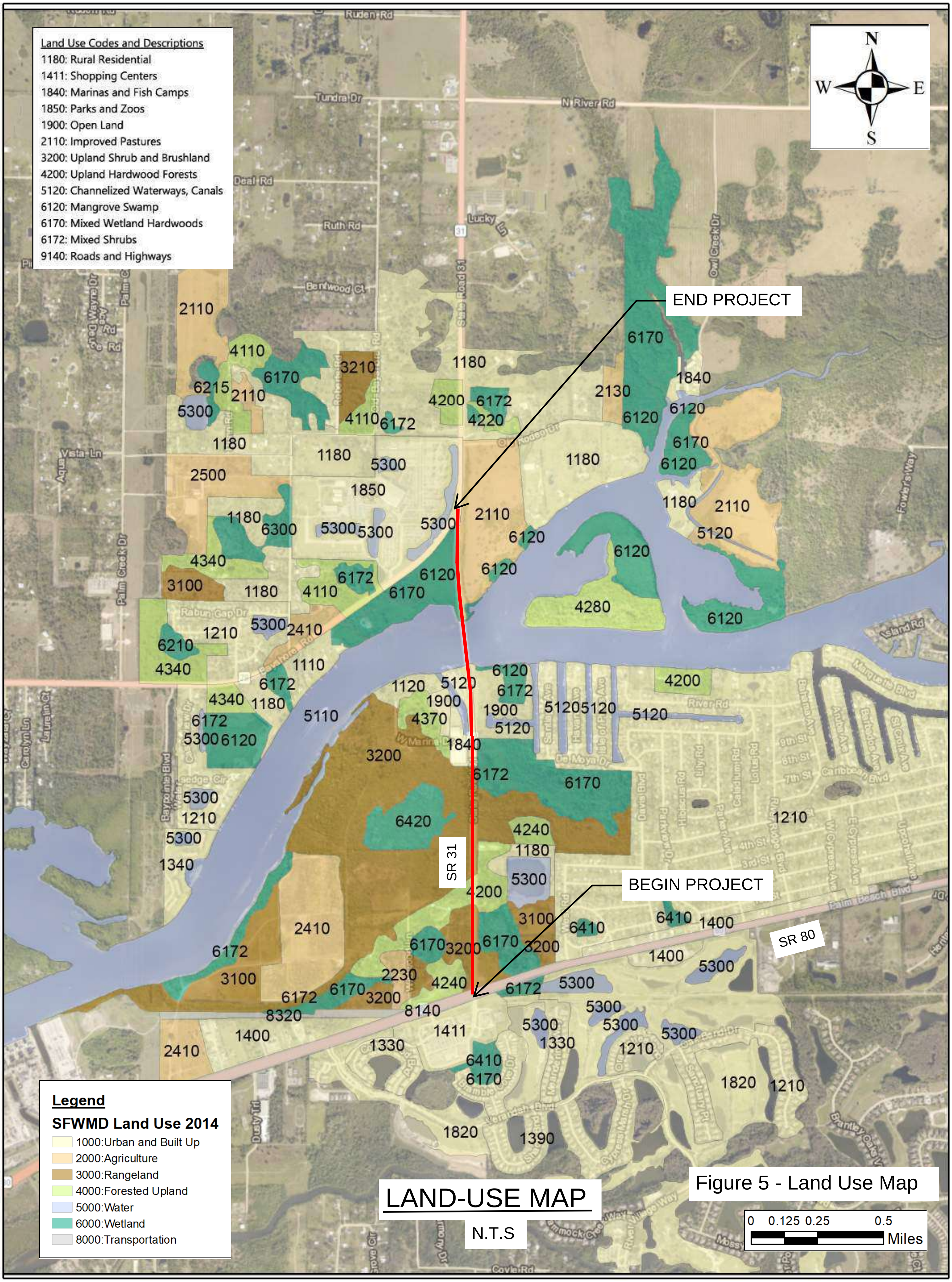
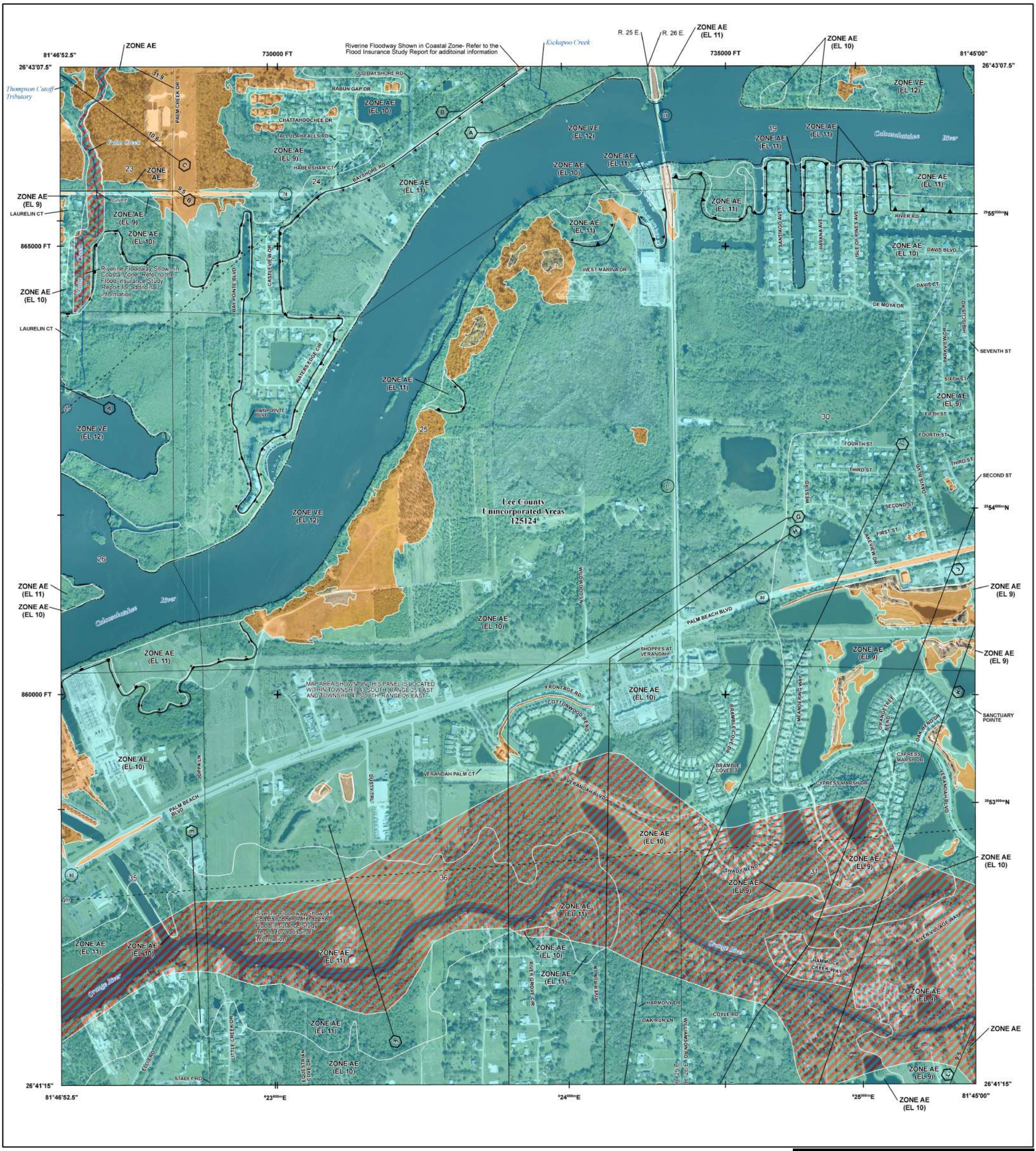


Figure 5 - Land Use Map



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) Zone A, V, A99
	With BFE or Depth Zone AE, AO, AH, VE, AR
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee See Notes. Zone X
	Area with Flood Risk due to Levee Zone D
OTHER AREAS	NO SCREEN Area of Minimal Flood Hazard Zone X
	Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
	E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
OTHER FEATURES	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided by Lee County, dated 2008 and 2018; the Florida Department of Transportation, dated 2017 and 2018; the U.S. Department of Agriculture, dated 2018; and the U.S. Department of Transportation, dated 2017.

LIMIT OF MODERATE WAVE ACTION: Zone AE has been divided by a Limit of Moderate Wave Action (LiMWA). The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between Zone VE and the LiMWA (or between the shoreline and the LiMWA for areas where Zone VE is not identified) will be similar to, but less severe than, those in the Zone VE.

Limit of Moderate Wave Action (LiMWA)

SCALE

N

Map Projection:
State Plane Transverse Mercator, Florida West Zone 0902; North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 250 500 750 1,000 2,000 feet

meters 0 125 250 500

PANEL LOCATOR

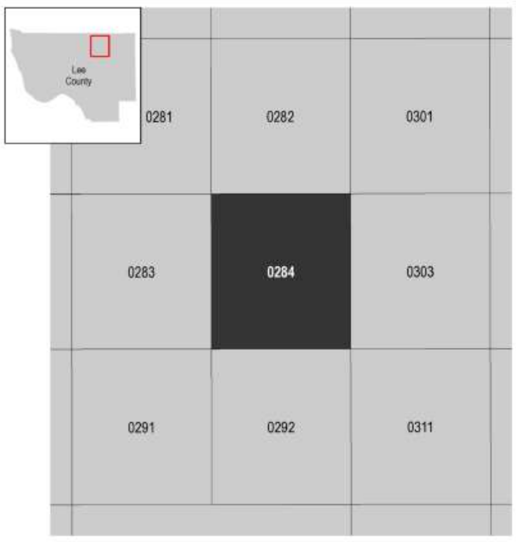


Figure 6A - FEMA Map

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

LEE COUNTY, FLORIDA
and Incorporated Areas

PANEL 284 OF 685

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LEE COUNTY	125124	0284	G

VERSION NUMBER
2.4.3.5

MAP NUMBER
12071C0284G

MAP REVISED
NOVEMBER 17, 2022

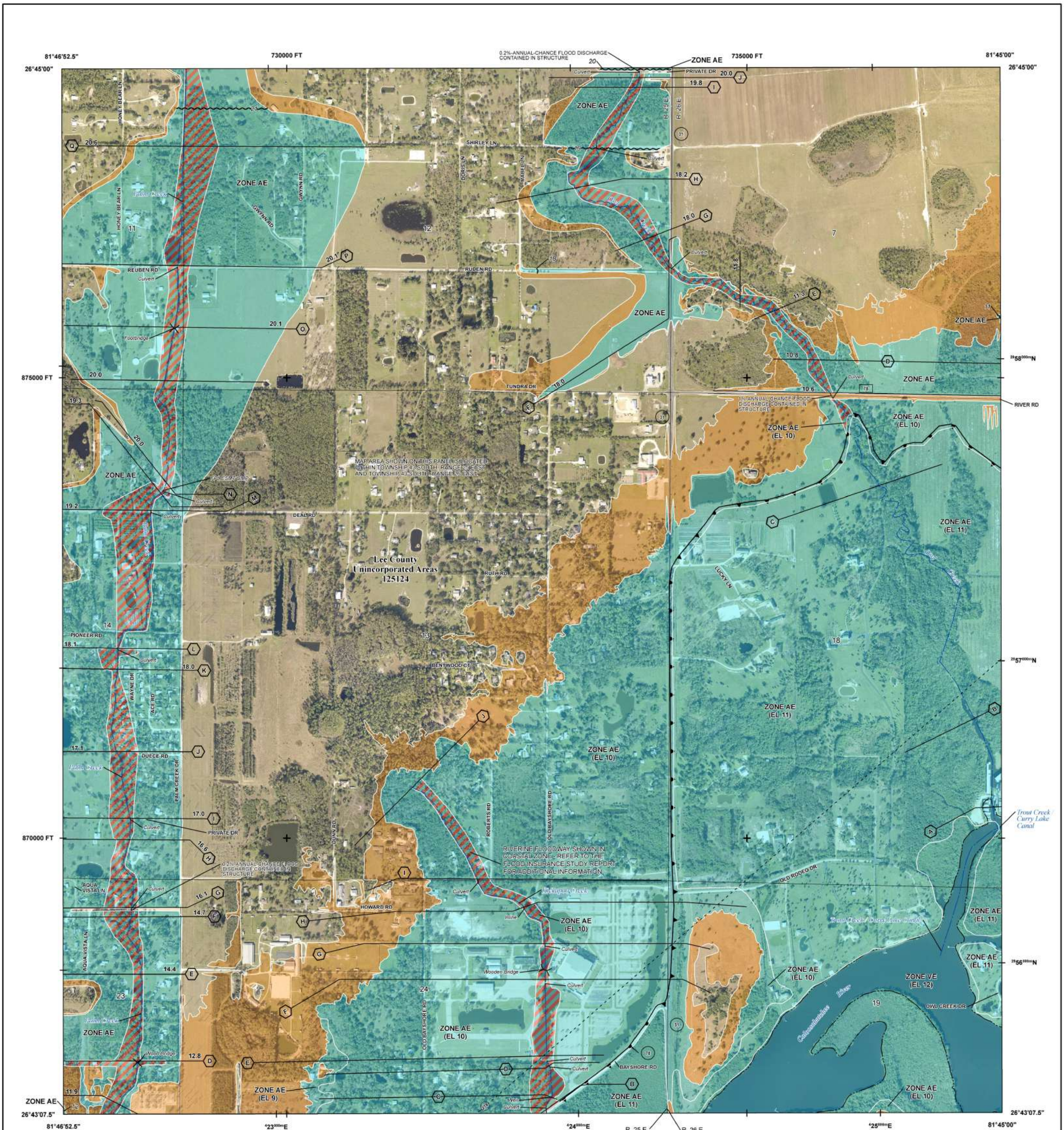


Figure 6B - FEMA Map

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- E 18.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

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For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided by Lee County, dated 2008 and 2018; the Florida Department of Transportation, dated 2017 and 2018; the U.S. Department of Agriculture, dated 2018; and the U.S. Department of Transportation, dated 2017.

LIMIT OF MODERATE WAVE ACTION: Zone AE has been divided by a Limit of Moderate Wave Action (LiMWA). The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between Zone VE and the LiMWA (or between the shoreline and the LiMWA for areas where Zone VE is not identified) will be similar to, but less severe than, those in the Zone VE.

Limit of Moderate Wave Action (LiMWA)

SCALE

Map Projection:
State Plane Transverse Mercator, Florida West Zone 0902; North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

N

1 inch = 500 feet 1:6,000

0 250 500 750 1,000 2,000 feet

0 125 250 500 meters

PANEL LOCATOR

FEMA
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

LEE COUNTY, FLORIDA
and Incorporated Areas

PANEL **282** OF **685**

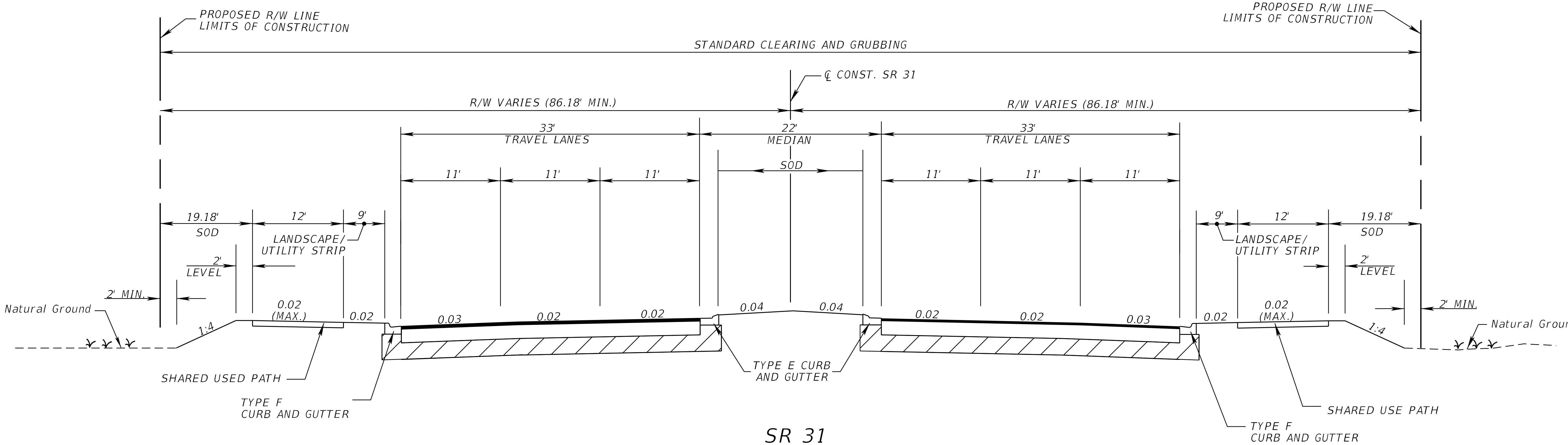
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LEE COUNTY	125124	0282	G

VERSION NUMBER
2.4.3.5

MAP NUMBER
12071C0282G

MAP REVISED
NOVEMBER 17, 2022



SR 31
FROM SR 80 TO SR 78

MP 0.000 TO MP 0.970
MP 1.117 TO MP 1.407

TRAFFIC DATA

CURRENT YEAR = 2019 AADT = 13000
ESTIMATED OPENING YEAR = 2025 AADT = 26500
ESTIMATED DESIGN YEAR = 2045 AADT = 56800
K = 9% D = 54% T = 10.6% (24 HOUR)
DESIGN HOUR T = 5.3%
DESIGN SPEED = 45 MPH
POSTED SPEED = 45 MPH
TARGET SPEED = 45 MPH

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

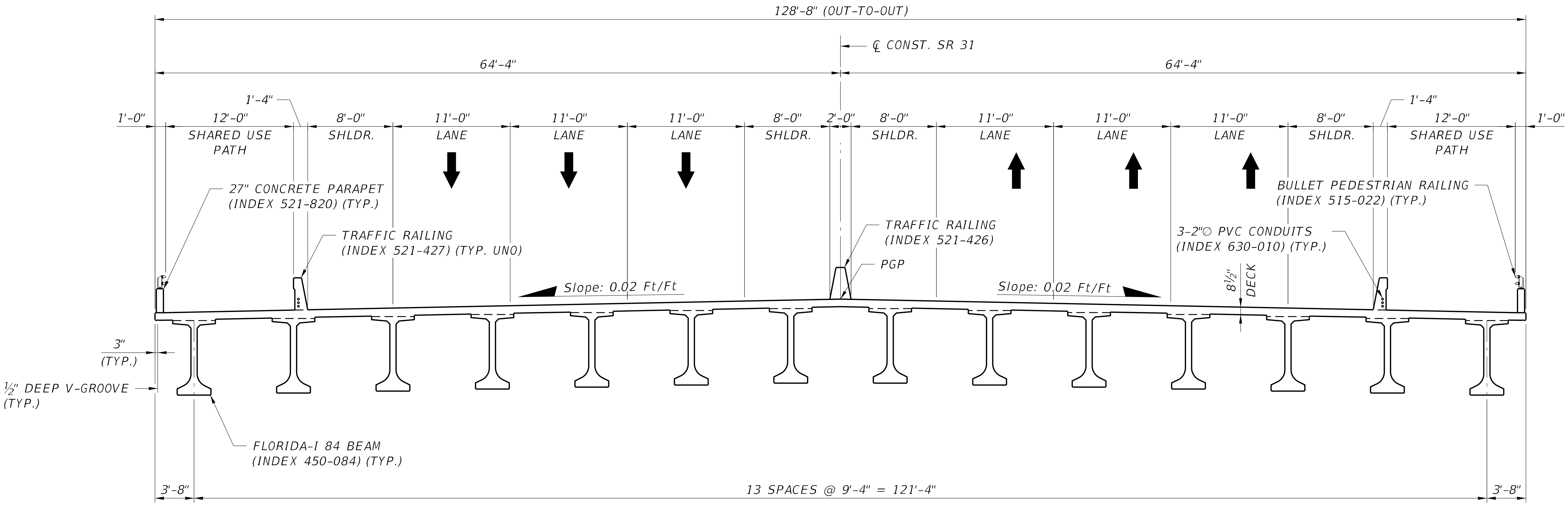
ENGINEER OF RECORD
BARRY TODD WHITE, P.E.
LICENSE NUMBER: P.E. 89071
DRMP, INC.
941 LAKE BALDWIN LANE
ORLANDO, FL 32814

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

TYPICAL SECTIONS

SHEET NO.
2



SECTION THROUGH BRIDGE

HIGH LEVEL FIXED BRIDGE

LEGEND

➡ DIRECTION OF TRAVEL

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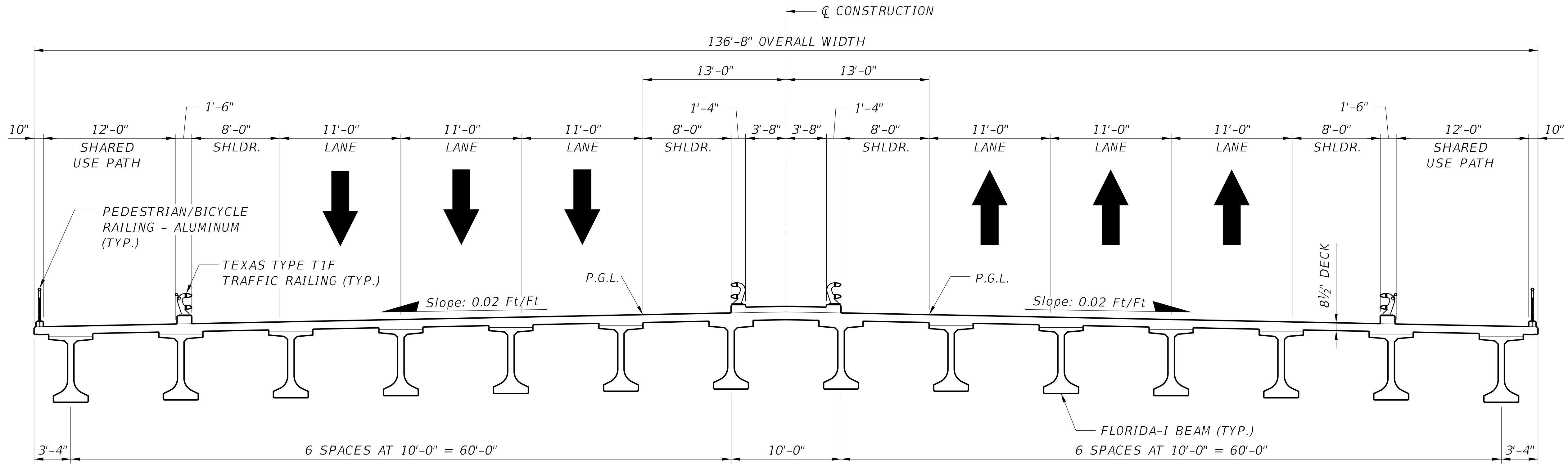
REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	BARRY TODD WHITE, P.E. LICENSE NUMBER: P.E. 89071 DRMP, INC. 941 LAKE BALDWIN LANE ORLANDO, FL 32814	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	TYPICAL SECTIONS HIGH-LEVEL FIXED BRIDGE	
					SR 31	LEE	441942-1-22-01		3

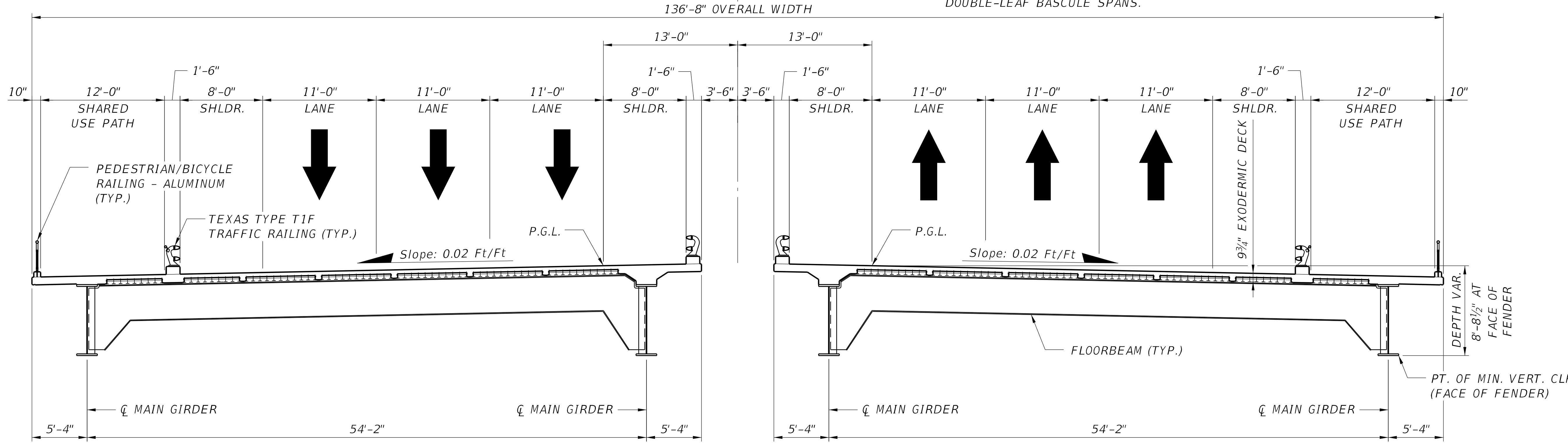
FAC NOTE



APPROACH SPAN SECTION
MOVABLE BRIDGE

TYPICAL SECTION NOTES:

1. TEXAS TYPE T1F TRAFFIC RAILING (OR SIMILAR MASH TL-3 LIGHTWEIGHT OPEN RAILING) AND PEDSTRIAN/BICYCLE RAILING - ALUMINUM REQUIRED FOR BASCULE BRIDGE TO LIMIT WEIGHT AND AVOID OBSTRUCTED OPERATOR VISIBILITY.
2. CLOSED MEDIAN ON APPROACH SPANS REQUIRED FOR BASCULE BRIDGE TO ACCOMMODATE MOVABLE BRIDGE GATE HOUSINGS AND SIGNAL MAST ARMS IN THE MEDIAN.
3. OPEN MEDIAN ON BASCULE SPAN REQUIRED TO PERMIT INDEPENDENT OPERATION OF TWIN DOUBLE-LEAF BASCULE SPANS.



BASCULE SPAN SECTION

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
BARRY TODD WHITE, P.E.
LICENSE NUMBER: P.E. 89071
DRMP, INC.
941 LAKE BALDWIN LANE
ORLANDO, FL 32814

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

TYPICAL SECTIONS MOVABLE BRIDGE OPTION

SHEET NO. 4

FAC NOTE

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ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SR 31 LINE AND GRADE	SHEET NO.
BARRY TODD WHITE P.E. LICENSE NUMBER: 89071 DRMP, INC. 941 LAKE BALDWIN LANE ORLANDO, FL 32814	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
	SR 31	LEE COUNTY	441942-1-22-01		5

FAC NOTE

ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				SHEET NO.
BARRY TODD WHITE LICENSE NUMBER 89071 DRMP, INC. 941 LAKE BALDWIN LANE ORLANDO, FL 32814	ROAD NO. SR 31	COUNTY LEE COUNTY	FINANCIAL PROJECT ID 441942-1-22-01	SR 31 LINE AND GRADE	6

FAC NOTE

ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SR 31 LINE AND GRADE	SHEET NO.
BARRY TODD WHITE LICENSE NUMBER 89071 DRMP, INC. 941 LAKE BALDWIN LANE ORLANDO, FL 32814	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
	SR 31	LEE COUNTY	441942-1-22-01		7

FAC NOTE

NOTES:
1. No bike lanes or keyholes provide in this concept
2. 8’ Sidewalk
   - West side of SR 31
   - North Side of SR 80
3. 12’ Shared Use Path
   - East side of SR 31
   - South side of SR 80
4. SR 80 Median Width
   - 22’ Median Width From Sta 495+00 to 495+96
   - 78’ Median Width from Sta 508+08 to Sta 510+78
   - 22’ Median Width From Sta 518+89 to Sta 532+10
5. SR 31 Median Width
   - 22’ Median Width From Sta 182+12 to Sta 197+31
   - 110' Median Width From Sta 208+96 to Sta 212+61
6. Westbound Travel Lanes
   - Third thru lane develop at Sta 523+57 and drops into right-turn lane to SR 31
   - Only two westbound thru lanes in the intersection
   - Third westbound thru lane develops as free-flow southbound right-turn lane

PROFESSIONAL TYPE	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SR 31 LINE AND GRADE GRADE SEPARATED ALTERNATIVE	SHEET NO.
BARRY TODD WHITE LICENSE NUMBER 89071 DRMP, INC. 941 LAKE BALDWIN LANE ORLANDO, FL 32814	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
	SR 31	LEE COUNTY	441942-1-22-01		Plan 3A

FAC NOTE

APPENDIX 2

Drainage Criteria Matrix

SR 31 - DRAINAGE CRITERIA MATRIX

Design Parameter		SFWMD Criteria	FDOT Criteria	Drainage Criteria to be Used
Storm Sewer	Design Frequency and Analysis for Pipe Hydraulics	N/A	Rational Method required. General design = 3-year/24-hour (P=6.0 in) Composite C-value - Impervious=0.95, Pervious=0.20	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 (Standard Plans 2019- 2020)	FDOT
	Maximum Inlet Interception Rates	N/A	FDOT Drainage Design Guide (2020)	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
	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 (3-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)

SR 31 - DRAINAGE CRITERIA MATRIX

Design Parameter		SFWMD 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 peak stage in the pond during the storm drain design event. District 1 prefers that the starting elevation for the pond routing be the weir elevation; however, there are occasional difficult situations where the bleed-down elevation allowed by the local water management district may be allowed. 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
	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 12" as specified in the FDOT Drainage Design Guide (2020). 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. Culvert Service Life Estimator (CSLE) program will be used for selection of appropriate materials.	FDOT
	Pipe Size	N/A	Trunk line and lateral, min. = 18". Does not apply to discharge systems from Stormwater Mgmt. Facilities	FDOT

SR 31 - DRAINAGE CRITERIA MATRIX

Design Parameter		SFWMD 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 Design Guide (2020) Chapter 4	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.	SFWMD - SCS unit-hydrograph method Uh256
	Design Frequency	Stormwater Management Facilities - 25 year-72 hour storm event.	Roadside Ditches-10-yr.; Outfall Ditches and Canals-25-yr.; Off-site crossdrains-50-yr (High use or essential).	SFWMD
	Time of Concentration (T_C)	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 (SFWMD and FDOT accepted)
	Design Storm Duration	72-hour storm duration for stormwater mgmt facilities	24-hour storm duration for closed drainage systems and roadside ditches.	SFWMD
	Rainfall Distributions	SFWMD Distribution table from SFWMD Technical Memorandum, Basis of Review For Environmental Resource Permit Applications Within the South Florida Water Management District, or NRCS	FDOT Rainfall Distributions	SFWMD

SR 31 - DRAINAGE CRITERIA MATRIX

Design Parameter		SFWMD Criteria	FDOT Criteria	Drainage Criteria to be Used
Hydrologic and Hydraulic Calculations for all Other Drainage Features	Water Quality/Treatment (Wet Detention/Dry Retention)	Required treatment volume = 1" over entire developed area or 2.5" over the net new impervious area, whichever is greater (Wet Detention Systems). Pre - Post Pollutant Loading Calculations for Impaired Water Body if required.	Specified by the Regulatory Agency (SFWMD)	SFWMD
	Water Quantity/Attenuation	**Open Basins:** Post-development peak discharges shall be at or below pre-development peak discharges for the 25-year/72-hour storm events.	N/A	SFWMD
	Off-site Flows	N/A	When possible, offsite discharges should be separated from the FDOT facilities unless commingling runoff proves to not have hydraulic implications.	FDOT
Retention and Detention Facilities	Pond Configuration - Wet Ponds (for additional info, see Open Drainage Facilities)	Shallow, littoral areas are desirable for water quality enhancement (Please see Littoral Zone for more information). It is recommended that 25 to 50 percent of the wet retention/detention area be deeper than 12 feet. Pond Area should be greater than 0.5 acre minimum. 100 feet minimum for linear areas in excess of 200 feet length. Irregular shaped areas may have narrower reaches but shall average at least 100 feet.	Pond Depth specified by Regulatory Agency (SFWMD).	SFWMD
	Littoral Zone (Wet Detention)	Shall be sloped 1:4 or flatter. The littoral area shall be shallower than 6 feet as measured from below the control elevation. The minimum shallow, littoral area shall be the lesser of 20 percent of the wet retention/detention area or 2.5 percent of the total of the retention/detention area (including side slopes) plus the basin contributing area.	Specified by the Regulatory Agency (SFWMD)	SFWMD
	Water Quality/Quantity Volume Recovery Rate (Wet Detention/Dry Retention)	The outfall control structure shall be designed to drawdown one half inch of the detention volume in 24 hours.	Specified by the Regulatory Agency (SFWMD)	SFWMD

SR 31 - DRAINAGE CRITERIA MATRIX

Design Parameter		SFWMD Criteria	FDOT Criteria	Drainage Criteria to be Used
Retention and Detention Facilities	Orifice/Bleeder Devices (Wet Detention)	Drawdown devices shall incorporate dimensions no smaller than 6 square inches of cross-section area that is 2 inches wide or less than 20º for "V" notches shall include a device to eliminate clogging.	Specified by the Regulatory Agency (SFWMD)	SFWMD
	Skimmer	Systems which receive stormwater from areas with greater than 50% impervious area (excluding water bodies) or which are a potential source of oil and grease, must include a baffle, skimmer, grease trap or other mechanism suitable for preventing oil and grease from leaving the stormwater system in concentrations that would cause a violation of water quality standards.	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 to the Control Elevation (NWL)	FDOT
Floodplain	Compensation	"Cup for cup" method; design storm is 100 yr-72hr for floodplain compensation and flood protection of finished floors.	Specified by the Regulatory Agency (SFWMD)	FDOT and SFWMD
Open Drainage Facilities (Ponds, Ditches, Canals)	Minimum Requirement for Maintenance Berms around Perimeter of Ponds	N/A	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.	FDOT
	Maximum Side Slopes for Ditches/Canals	For permanently wet ponds or ditches, side slopes can be no steeper than 1:4 (average pond side slope) out to a depth of 2-feet below the control elevation.	Based on FDOT Clear Zone Criteria	FDOT
	Maximum Side Slopes for Ponds		Use a 1:4 side slope for ease with maintenance. Side slopes steeper than 1:3 require special equipment for mowing.	SFWMD

SR 31 - DRAINAGE CRITERIA MATRIX

Design Parameter		SFWMD 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	5' bottom width desirable, but less width may be allowed on ditches.	FDOT
	Tailwater Conditions for Ponds	For regulated systems the design and maintained stage elevations are available either from the respective local jurisdiction or the District. For non-regulated systems, water stages are computed from the best available data and must be submitted to the District for review and concurrence.	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.	SFWMD 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 Design Guide 2020, Chapter 3)	FDOT
	Minimum Freeboard	N/A	1 ft. above DHW elevation. Less freeboard is acceptable when a permanent containment, such as concrete, is provided, or a more stringent tolerance is specified.	FDOT
	Retention Swales	Top width to depth ratio of the cross section equal to or greater than 6:1 or side slopes equal to or greater than 3:1 (horizontal to vertical).	Retention Swale drainage only permitted in soil conditions where percolation and required drawdown can be achieved.	SFWMD and FDOT

Criteria Sources:

1. EnvironmentalResource Permit InformationManual Volume IV (2014
2. EnvironmentalResource Applicants HandbookVolume Volume I, June 201
3. EnvironmentalResource Applicants HandbookVolume Volume II, June 201
4. FDOT - Drainage Manual (01/2020
5. FDOT - Drainage Design Guide (01/2020

APPENDIX 3

SMF Engineering Summary Table

SMF Evaluation Matrix

Preliminary Cost Estimates

SR 31 PD&E Study - From State Road 78 (Bayshore Road) to County Road 78 (North River Road) and from County Road 78 (North River Road) to Cook Brown Road

POND SITES EVALUATION

SMF ENGINEERING SUMMARY TABLE

Pond Selections	Basin for Stormwater Treatment Pond/ Floodplain Impact Area for FPC	Location		Existing Ground Elevation (ft)	Soil Names & Hydrologic Groups		Impaired Water Body	Wet Detention / Dry Retention	Open / Closed Conveyance System	Estimated SHWT Elevation (ft)	Lowest Edge of Existing Roadway (ft)	Distance From Lowest Edge of Proposed Roadway (ft)	Estimated Allowable DHW (ft)	Estimated Allowable Treatment & Attenuation Depth (ft)	Outfall Location	Roadway Drainage Area (ac)	Required Treatment & Attenuation Volume (ac-ft)	Provided Treatment & Attenuation Volume (ac- ft)
		Station	Parcel Number		HSG	Soil Name	YES/NO											
Pond 1-A	Basin 1	23+00 to 32+00 (Right)	10300448 & 10300449	4.00	B/D & D	BRYNWOOD FINE SAND, MYAKKA FINE SAND, IMMOKALEE SAND, COPELAND SANDY LOAM	YES	Dry Retention	Closed	3.50	7.00	1000	7.00	2.80	Caloosahatchee River	23.48	6.82	10.26
Pond 1-A	Basin 1	23+00 to 32+00 (Right)	10300448 & 10300449	4.00	B/D & D	BRYNWOOD FINE SAND, MYAKKA FINE SAND, IMMOKALEE SAND, COPELAND SANDY LOAM	YES	Wet Detention	Open/Closed	3.50	7.00	1000	7.00	2.45	Caloosahatchee River	20.26	6.99	9.54
Pond 1-B	Basin 1	26+00 to 32+00 (Right)	10300448	4.00	B/D	BRYNWOOD FINE SAND, MYAKKA FINE SAND, COPELAND SANDY LOAM	YES	Dry Retention	Closed	3.50	7.00	1000	7.00	3.46	Caloosahatchee River	21.01	5.84	7.67
Pond 1-B	Basin 1	26+00 to 32+00 (Right)	10300448	4.00	B/D	BRYNWOOD FINE SAND, MYAKKA FINE SAND, COPELAND SANDY LOAM	YES	Wet Detention	Open/Closed	3.50	7.00	1000	7.00	3.50	Caloosahatchee River	16.98	5.36	8.87
Pond 1-C	Basin 1	18+50 to 23+00 (Right)	10300447 & 10300449	4.50	B/D & D	MYAKKA FINE SAND, IMMOKALEE SAND, COPELAND SANDY LOAM	YES	Dry Retention	Closed	3.50	7.00	2500	7.00	3.96	Caloosahatchee River	20.32	5.66	6.53
Pond 1-C	Basin 1	18+50 to 23+00 (Right)	10300447 & 10300449	4.50	B/D & D	MYAKKA FINE SAND, IMMOKALEE SAND, COPELAND SANDY LOAM	YES	Wet Detention	Open/Closed	3.50	7.00	2500	7.00	3.50	Caloosahatchee River	15.42	4.62	5.21
Pond 1-E	Basin 1	22+00 to 26+50 (Left)	10239222 & 10239223	4.00	A/D & A	WULFERT MUCK, CALOOSA FINE SAND	YES	Dry Retention	Closed	2.50	7.00	2500	7.00	3.54	Wetland System to Caloosahatchee River	22.07	6.43	10.00
Pond 1-E	Basin 1	22+00 to 26+50 (Left)	10239222 & 10239223	4.00	A/D & A	WULFERT MUCK, CALOOSA FINE SAND	YES	Wet Detention	Open/Closed	2.50	7.00	2500	7.00	2.75	Wetland System to Caloosahatchee River	17.06	5.37	5.73
Pond 1-F	Basin 1	26+50 to 32+50 (Left)	10239223 & 10239224	4.00	A/D & A	WULFERT MUCK, CALOOSA FINE SAND	YES	Dry Retention	Closed	3.00	7.00	2000	7.00	3.20	Wetland System to Caloosahatchee River	22.42	6.53	10.61
Pond 1-F	Basin 1	26+50 to 32+50 (Left)	10239223 & 10239224	4.00	A/D & A	WULFERT MUCK, CALOOSA FINE SAND	YES	Wet Detention	Open/Closed	3.00	7.00	2000	7.00	2.92	Wetland System to Caloosahatchee River	16.79	4.70	6.39

Notes:

1. Attenuation is not required for Basin 1 because the outfall is Tidal (ditch is directly connected to the Caloosahatchee River).

SMF Alternatives Evaluation Matrix

SMF Alternative	Right of Way			Land Use							Estimated Costs ($)	SMF Alternatives Ranking (1 - 5)
	SMF Site (Acres)	SMF Inflow & Outfall Easements (Acres)	Easement Comments	Archaeological / Historical Impact Potential	Soils / Geotechnical	Estimated Wetland Impacts SMF Site* (Acres)	Estimated Wetland Impacts Drainage Easements* (Acres)	Protected Species Present	Major Utility Conflict Potential (Y/N)	Hazardous Materials & Contamination Potential		
Pond 1-A	10.84	1.02	2950 LF of closed storm system SMFoff SR 31 R/W easement required Outfall tidal Caloosahatchee River	Low / None	Fill Borrow Pit with A3 material	0.02	0.27	No	No	Medium	$12,233,019	4
Pond 1-B	10.96	0.00	2040 LF of closed storm system; SMF Abuts SR 31 R/W easement **not** required; Outfall to tidal Caloosahatchee River	Low / None	Excavate and replace existing soil with A3 material for dry retention	1.06	0.00	No	No	Medium	$6,517,544	5
Pond 1-C	9.50	1.25	4050 LF of closed storm system; SMF off SR 31 R/W easement required; Outfall to tidal Caloosahatchee River	Low / None	Excavate and replace existing soil with A3 material for dry retention	0.03	0.64	No	No	Medium	$5,293,502	3
Pond 1-E	10.48	3.00	910 LF of closed storm system; Outfall through spreader swale across FGT gas easement; tidal Caloosahatchee River	Low / None	HSG Type A & A/D Soils	2.19	0.33	No	Yes	Low	$4,597,313	1
Pond 1-F	10.89	4.89	910 LF of closed storm system; Outfall through spreader swale across FGT gas easement; tidal Caloosahatchee River	Low / None	Potental Muck removal; Excavate and replace with A-3 material	9.03	2.84	No	Yes	Low	$7,214,782	2

Note: There is a 50-foot Florida Gas Transmission (FGT) easement with an existing 26" gas main along the west side of the project.

* The estimation of the wetlands/OSW impacts at each pond site is an approximation based on the primary pond locations. These calculations are subject to change until the jurisdictional wetland determination has been approved by the permitting agencies.

ENGINEER'S OPINION OF COST
SR 31 PD&E STUDY
FROM SR 80 (PALM BEACH BOULEVARD) TO SR 78 (BAYSHORE ROAD)
FINANCIAL MANAGEMENT NUMBER: 441942-1-22-01
Date: 11/3/2022

SMF 1A
Prepared By: John Huryn, E.I.
Checked By: Scott Garth, P.E.

FDOT PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
120 6	EMBANKMENT	CY	230,000	$ 32.15	$ 7,394,500.00
425 1 581	INLETS, DT BOT, TYPE H, <10'*	EA	2	$ 8,501.11	$ 17,002.22
425 2 61	MANHOLES, P-8, <10'	EA	1	$ 4,339.74	$ 4,339.74
425 2 91	MANHOLES, J-8, <10'	EA	8	$ 6,047.67	$ 48,381.36
430 175 142	PIPE CULVERT, OPT MATERIAL, ROUND, 42"S/CD*	LF	50	$ 300.19	$ 15,009.50
430 175 148	PIPE CULVERT, OPT MATERIAL, ROUND, 48"S/CD	LF	3,500	$ 413.00	$ 1,445,500.00
430 982 138	MITERED END SECTION, OPTIONAL ROUND, 36" CD*	EA	1	$ 5,635.05	$ 5,635.05
430 982 141	MITERED END SECTION, OPTIONAL ROUND, 48" CD*	EA	3	$ 9,188.12	$ 27,564.36
N/A	WETLAND MITIGATION COST	LS	1	$ 36,250.00	36,250.00
N/A	EASEMENTS	LS	1	$ 1,200,000.00	$ 1,200,000.00
				SUBTOTAL	$ 10,194,182.23
				INITIAL CONTINGENCY (20%)	$ 2,038,836.45
				GRAND TOTAL	$ **12,233,018.68**

Notes:

1. All unit costs based on FDOT Historical Unit Costs Area 10.
2. * Symbolizes that the Unit Cost is Based on FDOT Statewide 12 month Unit Costs.

ENGINEER'S OPINION OF COST
SR 31 PD&E STUDY
FROM SR 80 (PALM BEACH BOULEVARD) TO SR 78 (BAYSHORE ROAD)
FINANCIAL MANAGEMENT NUMBER: 441942-1-22-01
Date: 11/3/2022

SMF 1B
Prepared By: John Huryn, E.I.
Checked By: Scott Garth, P.E.

FDOT PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
120 6	EMBANKMENT	CY	109,000	$ 32.15	$ 3,504,350.00
425 1 581	INLETS, DT BOT, TYPE H, <10'*	EA	2	$ 8,501.11	$ 17,002.22
425 2 61	MANHOLES, P-8, <10'	EA	1	$ 4,339.74	$ 4,339.74
425 2 91	MANHOLES, J-8, <10'	EA	6	$ 6,047.67	$ 36,286.02
430 175 142	PIPE CULVERT, OPT MATERIAL, ROUND, 42"S/CD*	LF	50	$ 300.19	$ 15,009.50
430 175 148	PIPE CULVERT, OPT MATERIAL, ROUND, 48"S/CD	LF	2,200	$ 413.00	$ 908,600.00
430 982 138	MITERED END SECTION, OPTIONAL ROUND, 36" CD*	EA	1	$ 5,635.05	$ 5,635.05
430 982 141	MITERED END SECTION, OPTIONAL ROUND, 48" CD*	EA	3	$ 9,188.12	$ 27,564.36
N/A	WETLAND MITIGATION COST	LS	1	$ 132,500.00	132,500.00
N/A	EASEMENTS	LS	1	$ 780,000.00	780,000.00
				SUBTOTAL	$ 5,431,286.89
				INITIAL CONTINGENCY (20%)	$ 1,086,257.38
				GRAND TOTAL	$ **6,517,544.27**

Notes:
1. All unit costs based on FDOT Historical Unit Costs Area 10.
2. * Symbolizes that the Unit Cost is Based on FDOT Statewide 12 month Unit Costs.

ENGINEER'S OPINION OF COST
SR 31 PD&E STUDY
FROM SR 80 (PALM BEACH BOULEVARD) TO SR 78 (BAYSHORE ROAD)
FINANCIAL MANAGEMENT NUMBER: 441942-1-22-01
Date: 11/3/2022

SMF 1C
Prepared By: John Huryn, E.I.
Checked By: Scott Garth, P.E.

FDOT PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
120 6	EMBANKMENT	CY	51,200	$ 32.15	$ 1,646,080.00
425 1 581	INLETS, DT BOT, TYPE H, <10'*	EA	2	$ 8,501.11	$ 17,002.22
425 2 61	MANHOLES, P-8, <10'	EA	2	$ 4,339.74	$ 8,679.48
425 2 91	MANHOLES, J-8, <10'	EA	8	$ 6,047.67	$ 48,381.36
430 175 142	PIPE CULVERT, OPT MATERIAL, ROUND, 42"S/CD*	LF	50	$ 300.19	$ 15,009.50
430 175 148	PIPE CULVERT, OPT MATERIAL, ROUND, 48"S/CD	LF	4,550	$ 413.00	$ 1,879,150.00
430 982 138	MITERED END SECTION, OPTIONAL ROUND, 36" CD*	EA	1	$ 5,635.05	$ 5,635.05
430 982 141	MITERED END SECTION, OPTIONAL ROUND, 48" CD*	EA	3	$ 9,188.12	$ 27,564.36
N/A	WETLAND MITIGATION COST	LS	1	$ 83,750.00	83,750.00
N/A	EASEMENTS	AC	1	$ 680,000.00	$ 680,000.00
				SUBTOTAL	$ 4,411,251.97
				INITIAL CONTINGENCY (20%)	$ 882,250.39
				GRAND TOTAL	$ **5,293,502.36**

Notes:
1. All unit costs based on FDOT Historical Unit Costs Area 10.
2. * Symbolizes that the Unit Cost is Based on FDOT Statewide 12 month Unit Costs.

ENGINEER'S OPINION OF COST
SR 31 PD&E STUDY
FROM SR 80 (PALM BEACH BOULEVARD) TO SR 78 (BAYSHORE ROAD)
FINANCIAL MANAGEMENT NUMBER: 441942-1-22-01
Date: 11/4/2022

SMF 1E
Prepared By: John Huryn, E.I.
Checked By: Scott Garth, P.E.

FDOT PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
120 1	REGULAR EXCAVATION	CY	21500	$ 12.85	$ 276,275.00
120 6	EMBANKMENT	CY	20,000	$ 32.15	$ 643,000.00
425 1 581	INLETS, DT BOT, TYPE H, <10'*	EA	2	$ 8,501.11	$ 17,002.22
425 2 61	MANHOLES, P-8, <10'	EA	3	$ 4,339.74	$ 13,019.22
425 2 91	MANHOLES, J-8, <10'	EA	7	$ 6,047.67	$ 42,333.69
430 175 136	PIPE CULVERT, OPT MATERIAL, ROUND, 36"S/CD*	LF	1,500	$ 228.19	$ 342,285.00
430 175 142	PIPE CULVERT, OPT MATERIAL, ROUND, 42"S/CD*	LF	50	$ 300.19	$ 15,009.50
430 175 148	PIPE CULVERT, OPT MATERIAL, ROUND, 48"S/CD	LF	2,500	$ 413.00	$ 1,032,500.00
430 982 138	MITERED END SECTION, OPTIONAL ROUND, 36" CD*	EA	1	$ 5,635.05	$ 5,635.05
430 982 141	MITERED END SECTION, OPTIONAL ROUND, 48" CD*	EA	2	$ 9,188.12	$ 18,376.24
524 1 1	CONCRETE DITCH PAVT, NON REINFORCED, 3"	SY	100	$ 69.33	$ 6,933.00
N/A	WETLAND MITIGATION COST	LS	1	$ 315,000.00	315,000.00
N/A	EASEMENTS	AC	1	$ 1,380,000.00	$ 1,380,000.00
				SUBTOTAL	$ 3,831,093.92
				INITIAL CONTINGENCY (20%)	$ 766,218.78
				GRAND TOTAL	$ **4,597,312.70**

Notes:

1. All unit costs based on FDOT Historical Unit Costs Area 10.
2. * Symbolizes that the Unit Cost is Based on FDOT Statewide 12 month Unit Costs.

ENGINEER'S OPINION OF COST
SR 31 PD&E STUDY
FROM SR 80 (PALM BEACH BOULEVARD) TO SR 78 (BAYSHORE ROAD)
FINANCIAL MANAGEMENT NUMBER: 441942-1-22-01
Date: 11/4/2022

SMF 1E
Prepared By: John Huryn, E.I.
Checked By: Scott Garth, P.E.

FDOT PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
120 1	REGULAR EXCAVATION	CY	22,000	$ 12.85	282,700.00
120 6	EMBANKMENT	CY	20,000	$ 32.15	$ 643,000.00
425 1 581	INLETS, DT BOT, TYPE H, <10'*	EA	2	$ 8,501.11	$ 17,002.22
425 2 61	MANHOLES, P-8, <10'	EA	3	$ 4,339.74	$ 13,019.22
425 2 91	MANHOLES, J-8, <10'	EA	10	$ 6,047.67	$ 60,476.70
430 175 136	PIPE CULVERT, OPT MATERIAL, ROUND, 36"S/CD*	LF	1,000	$ 228.19	$ 228,190.00
430 175 142	PIPE CULVERT, OPT MATERIAL, ROUND, 42"S/CD*	LF	50	$ 300.19	$ 15,009.50
430 175 148	PIPE CULVERT, OPT MATERIAL, ROUND, 48"S/CD	LF	4,000	$ 413.00	$ 1,652,000.00
430 982 138	MITERED END SECTION, OPTIONAL ROUND, 36" CD*	EA	1	$ 5,635.05	$ 5,635.05
430 982 141	MITERED END SECTION, OPTIONAL ROUND, 48" CD*	EA	2	$ 9,188.12	$ 18,376.24
524 1 1	CONCRETE DITCH PAVT, NON REINFORCED, 3"	SY	100	$ 69.33	$ 6,933.00
N/A	WETLAND MITIGATION COST	LS	1	$ 1,972,676.00	1,972,676.00
N/A	EASEMENTS	AC	1	$ 1,380,000.00	$ 1,380,000.00
				SUBTOTAL	$ 6,012,317.93
				INITIAL CONTINGENCY (20%)	$ 1,202,463.59
				GRAND TOTAL	$ **7,214,781.52**

Notes:

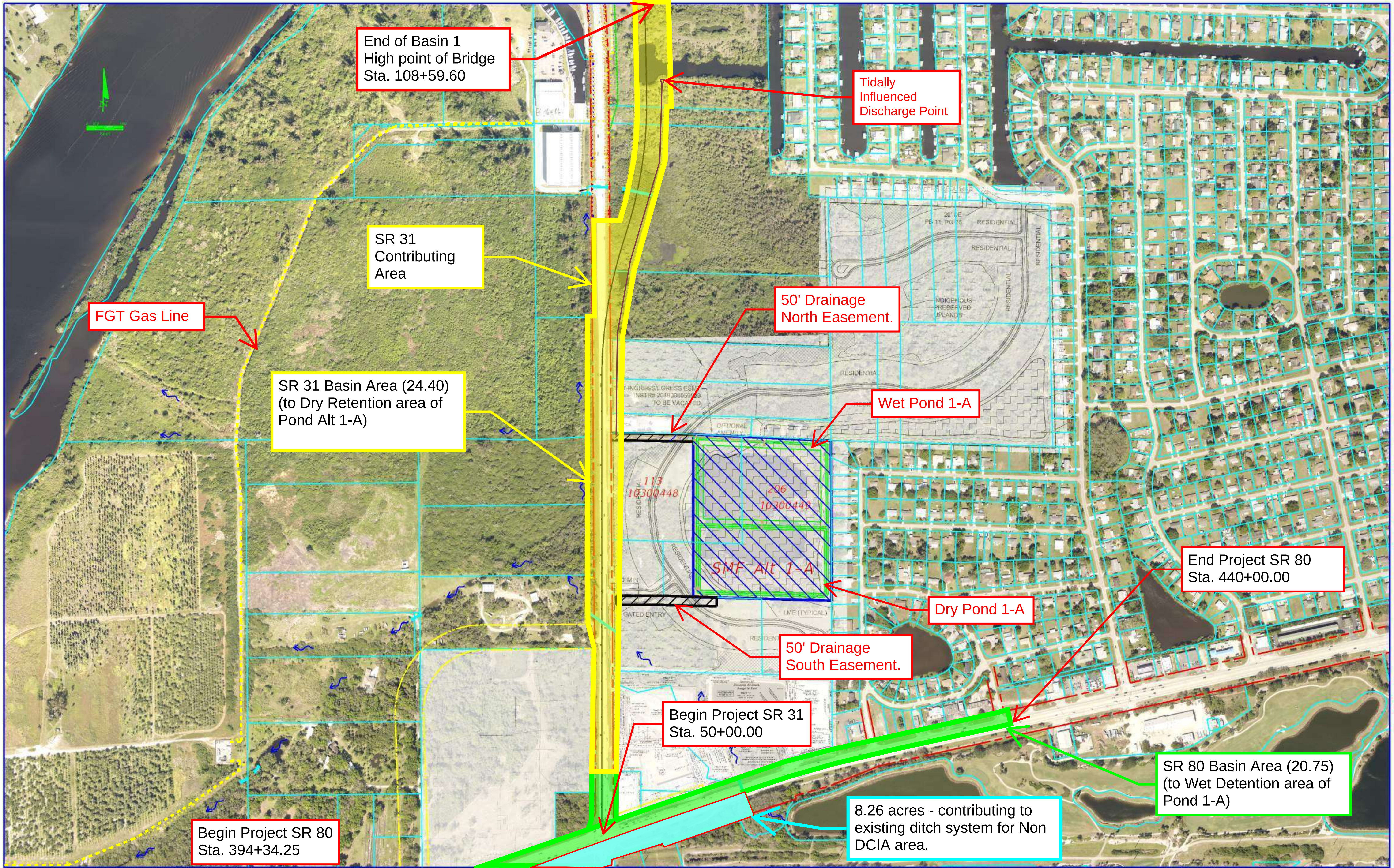
1. All unit costs based on FDOT Historical Unit Costs Area 10.
2. * Symbolizes that the Unit Cost is Based on FDOT Statewide 12 month Unit Costs.

APPENDIX 4

Pond Design Calculations

POND 1-A

Pond Design & Nutrient Loading Calculations



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

FDOT

DRMP, Inc.
941 Lake Baldwin Ln.
Orlando, FL 32814
www.drmp.com
Phone: 407-896-0594
Fax: 407-896-4836

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

SMF 1-A ALTERNATIVE MAP

SHEET NO.

BASIN 1 / POND 1-A

Dry Retention Pond Calculations

Resource Documentation

BASIN 1 / POND 1-A DRY POND, SR 31 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PRE DEVELOPMENT CONDITION

BASIN LIMITS: STA. 50+00.00 to STA 103+48.74, CL

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH						IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
					TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)			
SR 31 Mainline	50+00.00		103+48.74	116.33	32	12	0	0.0	0	0	5.40	8.89	14.28
Additional ROW	50+00.00		103+48.74	82	0	0	0	0.0	0	0	0.00	10.12	10.12
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
SUBTOTAL:											***5.40***	***19.01***	***24.40***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
RDWY SUBTOTAL:											***5.40***	***19.01***	***24.40***
BASIN POND											***0.00***	*7.24*	*7.24*
TOTAL:					`						**5.40**	**26.25**	**31.64**

Note: Project areas have been verified by CADD shape files

BASIN 1 / POND 1-A DRY POND, SR 31 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

POST DEVELOPMENT CONDITION

BASIN LIMITS: STA. 50+00.00 to STA 108+59.60, CL CONST.

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
SR 31 Mainline	50+00.00		108+59.60	150	80.6	0	4	4.0	0	24	15.203	4.985	20.188
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
Quadrant Alternative	+.00		12+22.50	150	80.6	0	4	4.0	0	0	2.485	1.727	4.213
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.000	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
SUBTOTAL:											***17.69***	***6.71***	***24.40***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
* Total area indicates actual area, Stationing indicates impervious area													
RDWY SUBTOTAL:											***17.69***	***6.71***	***24.40***
BASIN POND											***5.79***	***1.45***	***7.24***
TOTAL:											**23.48**	**8.16**	**31.64**

Note: Project areas have been verified by CADD shape files

PRE DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **POND 1-A - Dry Pond, SR 31 Area**

CONDITION: **PRE-DEVELOPMENT**

Soil Name and Hydrologic group	**Cover Description** (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	**CN** Tab. 2-2	**CN** Fig. 2-3	**CN** Fig. 2-4	**Area** acres	**Product of CN x Area**
11 - Brywood fine sand, wet (A/D) 36 - Immokalee sand-Urban land complex (A/D) 45 - Copeland fine sandy loam (B/D) 99 - Water	POND SITE PERVIOUS, Woods (Fair condition)	100			7.24	724.00
11 - Brywood fine sand, wet (A/D) 36 - Immokalee sand-Urban land complex (A/D) 45 - Copeland fine sandy loam (B/D)	POND SITE IMPERVIOUS	100			0.00	0.00
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST ROADWAY SURFACE	98			5.40	528.75
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST AREA TO BECOME ROW, Woods (Fair condition)	77			19.01	1463.42
	Totals =				31.64	2716.17

CN = **85.8**

Use **86**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	1.63	
Runoff Depth (Q)	9.26	in.
Runoff Volume	24.42	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POST DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **POND 1-A - Dry Pond, SR 31 Area**

CONDITION: **POST-DEVELOPMENT**

Soil Name and Hydrologic group	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN			Area acres	Product of CN x Area
		Tab. 2-2	Fig. 2-3	Fig. 2-4		
11 - Brywood fine sand, wet (A/D) 36 - Immokalee sand-Urban land complex (A/D) 45 - Copeland fine sandy loam (B/D)	POND SITE PERVIOUS Propose Pond Surface at ESHGWT	77			1.45	111.50
11 - Brywood fine sand, wet (A/D) 36 - Immokalee sand-Urban land complex (A/D) 45 - Copeland fine sandy loam (B/D)	POND SITE IMPERVIOUS At Control Elevation	100			5.79	579.20
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW PERVIOUS Good condition	80			6.71	536.99
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW IMPERVIOUS Proposed Pavement	98			17.69	1733.49
		Totals =			31.64	2961.17

CN = **93.6**

Use **94**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	0.64	
Runoff Depth (Q)	10.27	in.
Runoff Volume	27.08	ac-ft
ATTENUATION VOLUME	**2.66**	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POLLUTION ABATEMENT VOLUME

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

POND: **1-A - Dry Pond - SR 31**

BASIN LIMITS: STA. 50+00.00 to STA 108+59.60, CL CONST.

TOTAL BASIN AREA: 31.64 AC.

IMPERVIOUS COVERAGE: 23.48 AC.

1st inch of runoff - 50% less for Dry Retention	**1.32**	ac-ft
Site area for water quality pervious/impervious calculations only	24.40	ac of site area for water quality pervious/impervious
Impervious area for water quality pervious/impervious calculations only	23.48	ac of site area for water quality pervious/impervious
Percentage of imperviousness for water quality	96.23%	impervious
2.5 inches times the runoff from the impervious area - 50% less for Dry Retention	**2.45**	ac-ft

2.45 ac-ft Volume controls

POND STAGE / STORAGE CALCULATIONS - DRY POND

BASIN 1 / POND 1-A:

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PARCEL: 10300448, 10300449

DESCRIPTION: ALTERNATIVE 1-A

POND BOTTOM EL.	5.50
BOTTOM LENGTH	690.00 FT
BOTTOM WIDTH	350.00 FT
TOP LENGTH	710.00 FT
TOP WIDTH	370.00 FT
FRONT SLOPE (?:1)	4.00
BACK SLOPE (?:1)	4.00
INC. OF STAGE TREAT.	0.06
INC. OF STAGE ATTN.	0.12

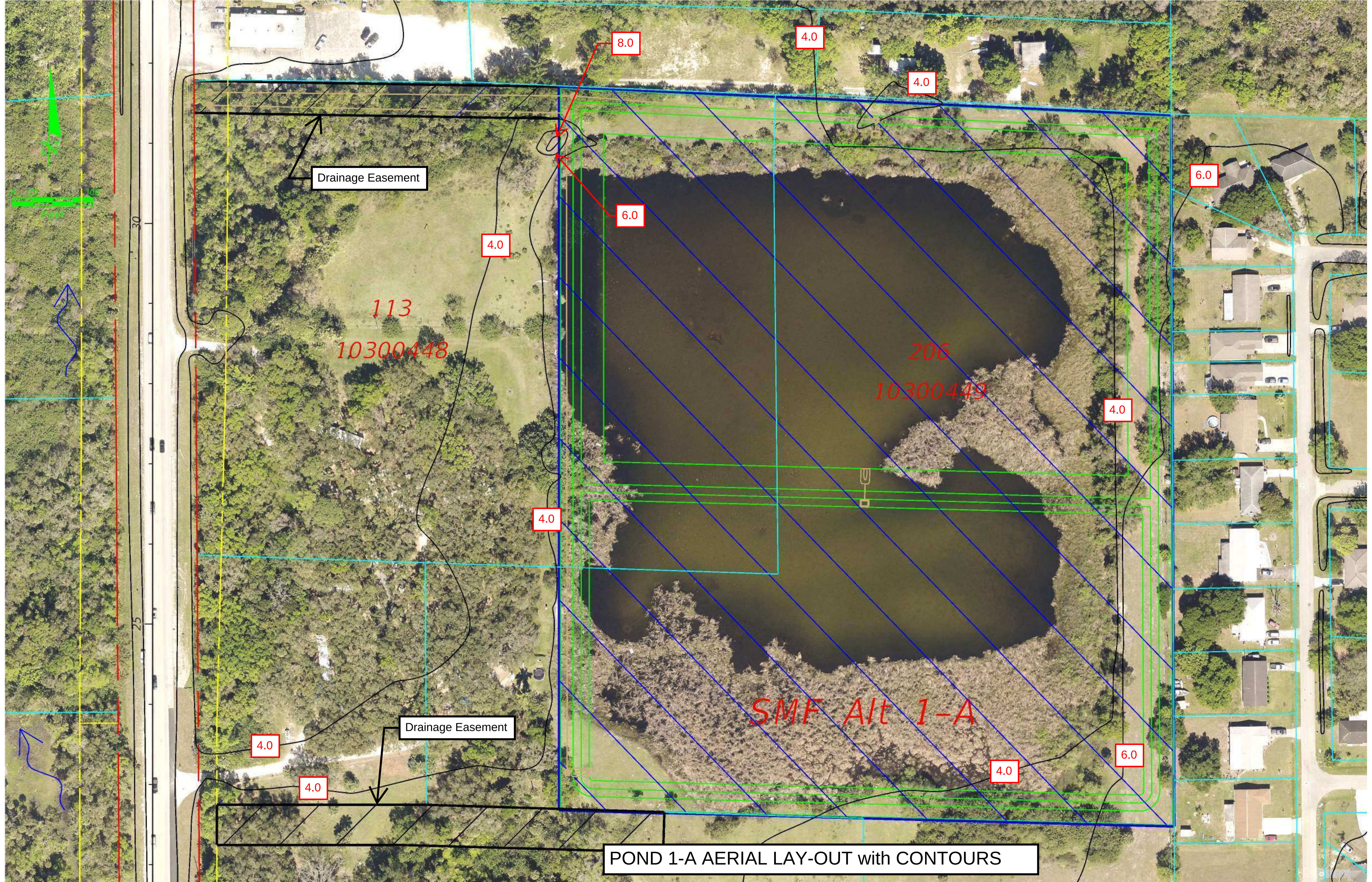
STAGE (ELEV.)	AREA (SQ-FT)	VOLUME (CU-FT)	(AC-FT)	
5.50	**241500**	0		Control Elevation
5.56	242315	14514	0.33	
5.62	243131	29078	0.67	
5.68	243946	43690	1.00	
5.74	244762	58351	1.34	
5.80	245577	73062	1.68	
5.86	246392	87821	2.02	
5.92	247208	102629	2.36	
5.98	248023	117486	**2.70**	WQ Treatment Volume Elevation
6.10	249654	147346	3.38	
6.22	251285	177402	4.07	
6.34	252915	207654	4.77	
6.46	254546	238102	**5.47**	Peak Attenuation Volume
6.58	256177	268746	6.17	
6.70	257808	299585	6.88	
6.82	259438	330619	7.59	
6.94	261069	361850	8.31	
7.06	**262700**	393276	9.03	Inside Top of Bank

Treatment Volume Required = **2.45** ac-ft
Attenuation Volume Required = **2.66** ac-ft

Treatment Volume Provided = **2.70** ac-ft
Attenuation Volume Provided = **2.77** ac-ft

Pond Area = 7.24 Acres
Pond dimensions times 1.20 to account for maintenance berms, access and tieing back into existing ground.

Head Losses represented by conservative 0.0005 ft/ft. Distance from low point along SR 31 to dry pond is approximately 1/10 mile. Proposed low point along SR 31 is approximatley 10'; 6.46'+(490'*0.0005ft/ft) = 6.71' 6.71' < 10.00'



POND 1-A AERIAL LAY-OUT with CONTOURS

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2/]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.
2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2c Runoff curve numbers for other agricultural lands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4]	48	65	73
Woods—grass combination (orchard or tree farm). [5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.
3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4 Actual curve number is less than 30; use CN = 30 for runoff computations.
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Lee County, Florida

SMF Alt 1-A

April 19, 2022

Soil Map

Map Scale: 1:1,890 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6	Brynwood fine sand, wet, 0 to 2 percent slopes	0.1	0.6%
11	Myakka fine sand, 0 to 2 percent slopes	1.7	10.5%
36	Immokalee sand-Urban land complex, 0 to 2 percent slopes	1.8	10.7%
45	Copeland fine sandy loam, frequently ponded, 0 to 1 percent slopes	1.9	11.4%
99	Water	11.0	66.8%
Totals for Area of Interest		**16.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

Minor Components

Cypress lake

Percent of map unit: 6 percent
Landform: Flats on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear, convex
Across-slope shape: Linear, concave
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Rock outcrop, misc

Percent of map unit: 5 percent
Hydric soil rating: No

Parkwood variant, mod. deep

Percent of map unit: 2 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Wetland Hardwood Hammock (R155XY012FL), Loamy and clayey soils on flats of hydric or mesic lowlands (G155XB341FL)
Hydric soil rating: No

Wabasso

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

11—Myakka fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2s3lg
Elevation: 0 to 130 feet
Mean annual precipitation: 42 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Myakka and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myakka

Setting

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

Typical profile

A - 0 to 6 inches: fine sand
E - 6 to 20 inches: fine sand
Bh - 20 to 36 inches: fine sand
C - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Minor Components

Basinger

Percent of map unit: 5 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Wabasso

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex, linear

Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Cassia

Percent of map unit: 3 percent
Landform: Rises on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Immokalee

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Riser, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Satellite

Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces, rises on marine terraces
Landform position (three-dimensional): Tread, talf, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

36—Immokalee sand-Urban land complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2x9c1
Elevation: 0 to 150 feet
Mean annual precipitation: 42 to 68 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 355 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Immokalee and similar soils: 43 percent
Urban land: 35 percent
Minor components: 22 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Immokalee

Setting

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

Typical profile

A - 0 to 9 inches: sand
E - 9 to 36 inches: sand
Bh - 36 to 55 inches: sand
C - 55 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of Urban Land

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Riser, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: No parent material

Interpretive groups

Land capability classification (irrigated): None specified
Forage suitability group: Forage suitability group not assigned (G155XB999FL)
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Unranked

Minor Components

Basinger

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

Oldsmar

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Pomello

Percent of map unit: 4 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope, riser
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Brynwood

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Satellite

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Felda

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces

Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Immokalee

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Riser, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Jenada

Percent of map unit: 1 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

45—Copeland fine sandy loam, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2x9dj
Elevation: 0 to 150 feet
Mean annual precipitation: 45 to 63 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Copeland

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

Parent material: Sandy and loamy marine deposits over limestone

Typical profile

A1 - 0 to 8 inches: fine sandy loam
A2 - 8 to 20 inches: fine sandy loam
Btkg - 20 to 28 inches: sandy clay loam
2R - 28 to 38 inches: bedrock

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: D
Forage suitability group: Loamy and clayey soils on stream terraces, flood plains, or in depressions (G155XB345FL)
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Loamy and clayey soils on stream terraces, flood plains, or in depressions (G155XB345FL)
Hydric soil rating: Yes

Minor Components

Felda

Percent of map unit: 4 percent
Landform: Flats on marine terraces, depressions on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Anclote

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

Folio	Owner Name	Site Address	Last Trans. Date	Last Trans. Amt	Just Value	Taxable Value
	JAMSCAG INVESTMENT LLC	ACCESS UNDETERMINED, FORT MYERS	5-2014	$ 450,000	$ 314,505	$ 140,413

BASIN 1 / POND 1-A

Wet Detention Pond Calculations

BASIN 1 / POND 1-A WET POND - SR 80 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PRE DEVELOPMENT CONDITION

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00 , CL

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH						IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
					TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)			
SR 80 Mainline	394+34.25		440+00.00	175	67	10	0	4.0	0	0	8.47	9.91	18.38
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
Additional ROW	12+22.50		22+63.38	100	83	0	0	0.0	0	0	1.99	0.39	2.38
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
SUBTOTAL:											***10.45***	***10.30***	***20.75***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
RDWY SUBTOTAL:											***10.45***	***10.30***	***20.75***
BASIN POND											***0.00***	***8.84***	***8.84***
TOTAL:					`						**10.45**	**19.14**	**29.59**

Note: Project areas have been verified by CADD shape files

BASIN 1 / POND 1-A WET POND - SR 80 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

POST DEVELOPMENT CONDITION

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00, CL CONST.

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH						IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
					TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)			
SR 80 Mainline	394+34.25		440+00.00	175	80	10	0	4.0	0	0	9.88	8.50	18.38
	+.00		+.00	0	0	0	0	0.0	0	0	0.000	0.00	0.000
Quadrant Alternative	12+22.50		22+63.38	100	75	0	4	4.0	0	0	1.987	0.391	2.378
	+.00		+.00	0	0	0	0	0.0	0	0	0.000	0.00	0.000
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.000	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
SUBTOTAL:											***11.86***	***8.89***	***20.75***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
* Total area indicates actual area, Stationing indicates impervious area													
RDWY SUBTOTAL:											***11.86***	***8.89***	***20.75***
BASIN POND											*7.07*	*1.77*	*8.84*
TOTAL:											**18.93**	**10.66**	**29.59**

Note: Project areas have been verified by CADD shape files

PRE DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-A Wet Pond, SR 80 Area**

CONDITION: **PRE-DEVELOPMENT**

Soil Name and Hydrologic group	**Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)**	**CN**			**Area acres**	**Product of CN x Area**
		Tab. 2-2	**Fig. 2-3**	**Fig. 2-4**		
11 - Brywood fine sand, wet (A/D) 36 - Immokalee sand-Urban land complex (A/D) 45 - Copeland fine sandy loam (B/D) 99 - Water	POND SITE PERVIOUS, Woods (Fair condition)	100			8.84	884.00
11 - Brywood fine sand, wet (A/D) 36 - Immokalee sand-Urban land complex (A/D) 45 - Copeland fine sandy loam (B/D)	POND SITE IMPERVIOUS	100			0.00	0.00
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST ROADWAY SURFACE	98			10.45	1024.58
7 - Matlacha gravelly fine sand (B) 35 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST AREA TO BECOME ROW, Woods (Fair condition)	77			10.30	793.09
	Totals =				29.59	2701.68

CN = **91.3**

Use **91**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	0.99	
Runoff Depth (Q)	9.90	in.
Runoff Volume	24.41	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POST DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-A Wet Pond, SR 80 Area**

CONDITION: **POST-DEVELOPMENT**

Soil Name and Hydrologic group	**Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)**	**CN**			**Area acres**	**Product of CN x Area**
		Tab. 2-2	**Fig. 2-3**	**Fig. 2-4**		
11 - Brywood fine sand, wet (A/D) 36 - Immokalee sand-Urban land complex (A/D) 45 - Copeland fine sandy loam (B/D)	POND SITE PERVIOUS Propose Pond Surface at ESHGWT	80			1.77	141.44
11 - Brywood fine sand, wet (A/D) 36 - Immokalee sand-Urban land complex (A/D) 45 - Copeland fine sandy loam (B/D)	POND SITE IMPERVIOUS At Control Elevation	100			7.07	707.20
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW PERVIOUS Good condition	80			8.89	711.38
7 - Matlacha gravelly fine sand (B) 35 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW IMPERVIOUS Proposed Pavement	98			11.86	1162.53
		Totals =			29.59	2722.55

CN = **92.0**

Use **92**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	0.87	
Runoff Depth (Q)	10.02	in.
Runoff Volume	24.71	ac-ft
ATTENUATION VOLUME	**0.31**	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POLLUTION ABATEMENT VOLUME

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

BASIN 1 / POND 1-A: Wet Pond, SR 80 Area

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00, CL CONST.

TOTAL BASIN AREA: 29.59 AC.

IMPERVIOUS COVERAGE: 18.93 AC.

1st inch of runoff	**2.47**	ac-ft
Site area for water quality pervious/impervious calculations only	20.75	ac of site area for water quality pervious/impervious
Impervious area for water quality pervious/impervious calculations only	18.93	ac of site area for water quality pervious/impervious
Percentage of imperviousness for water quality	91.23%	impervious
2.5 inches times the runoff from the impervious area	**3.94**	ac-ft

3.94 ac-ft Volume controls

POND STAGE / STORAGE CALCULATIONS-WET

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

BASIN 1 / POND 1-A Wet Pond, SR 80 Area

PARCEL: **10300448 & 10300449**

DESCRIPTION: ALTERNATIVE 1-A

Control Elevation	3.70	= Seasonal High Water Elevation
BOTTOM LENGTH	654.00 FT	
BOTTOM WIDTH	396.00 FT	
TOP LENGTH	710.00 FT	
TOP WIDTH	452.00 FT	
FRONT SLOPE (?:1)	4.00	
BACK SLOPE (?:1)	4.00	
INC. OF STAGE TREAT.	0.08	
INC. OF STAGE ATTN.	0.02	

STAGE (ELEV.)	AREA (SQ-FT)	VOLUME (CU-FT)	VOLUME (AC-FT)	
3.70	**258984**	0		Control Elevation
3.78	265027	20960	0.48	
3.86	271069	42404	0.97	
3.94	277112	64331	1.48	
4.02	283154	86742	1.99	
4.10	289197	109636	2.52	
4.18	295239	133014	3.05	
4.26	301282	156874	3.60	
4.34	307324	181219	**4.16**	WQ Treatment Volume Elevation
4.36	308835	187380	4.30	
4.38	310346	193572	4.44	
4.40	311856	199794	4.59	
4.42	313367	206046	**4.73**	Peak Attenuation Volume
4.44	314877	212329	4.87	
4.46	316388	218641	5.02	
4.48	317899	224984	5.16	
4.50	319409	231357	5.31	
4.52	**320920**	237761	5.46	Top of Bank

Treatment Volume Required =	**3.94**	ac-ft
Attenuation Volume Required =	**0.31**	ac-ft
Treatment Volume Provided =	**4.16**	ac-ft
Attenuation Volume Provided =	**0.57**	ac-ft

Pond Area = 8.84 Acres

Pond dimensions times 1.20 to account for maintenance berms, access and tieing back into existing ground.

Head Losses represented by conservative 0.0005 ft/ft. Distance from low point along SR 80 to wet pond is approximately 1/2 mile. Low point along SR 80 is approximatley 5.70'; 4.42'+(2120'*0.0005ft/ft) = 5.48 5.48' < 5.7'

POND STAGE / STORAGE CALCULATIONS-WET POND PERMANENT POOL COMPUTATION

POND: **1-A Wet Pond, SR 80 Area**

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PARCEL: **10300448 & 10300449**

DESCRIPTION: ALTERNATIVE 1-A

SHGWT Elevation 3.70
LITTORAL ZONE -2.30

INC. OF STAGE TREAT. 0.43
INC. OF STAGE ATTN. 0.43

STAGE (ELEV.)	AREA (SQ-FT)	AREA (AC)	VOLUME (CU-FT)	VOLUME (AC-FT)	
-2.30	**246528**	**5.660**	0	0.00	
-1.88	247410	5.680	104962	2.41	
-1.45	248293	5.700	210299	4.83	
-1.03	249175	5.720	316011	7.25	
-0.60	250057	5.741	422097	9.69	
-0.18	250940	5.761	528559	12.13	
0.25	251822	5.781	635396	14.59	
0.68	252704	5.801	742608	17.05	
1.10	253586	5.822	850194	**19.52**	
1.53	254486	5.842	960268	22.04	
1.97	255385	5.863	1070732	24.58	
2.40	256285	5.883	1181585	27.13	
2.83	257185	5.904	1292829	29.68	
3.27	258084	5.925	1404461	32.24	
3.70	258984	5.945	1516484	**34.81**	Control Elevation
3.70	**258984**	**5.945**	1516536	**34.81**	Inside Top of Bank

NUTRIENT LOADING CALCULATIONS

Complete Report (not including cost) Ver 4.3.5

Project: SR 31 Pond - Alt. A
Date: 6/15/2022 11:06:08 AM

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	Pond Alt 1-A - Dry	Pond Alt 1-A - Wet
Rainfall Zone	Florida Zone 4	Florida Zone 4
Annual Mean Rainfall	51.50	51.50

Pre-Condition Landuse Information

Landuse	User Defined Values	User Defined Values
Area (acres)	31.64	29.59
Rational Coefficient (0-1)	0.20	0.30
Non DCIA Curve Number	86.00	91.00
DCIA Percent (0-100)	0.00	0.00
Nitrogen EMC (mg/l)	1.250	1.660
Phosphorus EMC (mg/l)	0.180	0.230
Runoff Volume (ac-ft/yr)	26.995	37.919
Groundwater N (kg/yr)	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000
Nitrogen Loading (kg/yr)	41.606	77.613
Phosphorus Loading (kg/yr)	5.991	10.754

Post-Condition Landuse Information

Landuse	Highway: TN=1.520 TP=0.200	Highway: TN=1.520 TP=0.200
Area (acres)	31.64	29.59
Rational Coefficient (0-1)	0.82	0.58
Non DCIA Curve Number	80.00	80.00
DCIA Percent (0-100)	100.00	65.40
Wet Pond Area (ac)	0.00	8.84
Nitrogen EMC (mg/l)	1.520	1.520
Phosphorus EMC (mg/l)	0.200	0.200
Runoff Volume (ac-ft/yr)	111.754	51.900
Groundwater N (kg/yr)	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000

Nitrogen Loading (kg/yr)	209.444	97.268
Phosphorus Loading (kg/yr)	27.558	12.798

Catchment Number: 1 Name: Pond Alt 1-A - Dry

Project: SR 31 Pond - Alt. A
Date: 6/15/2022

Retention Design

Retention Depth (in)	1.600
Retention Volume (ac-ft)	4.219

Watershed Characteristics

Catchment Area (acres)	31.64
Contributing Area (acres)	31.640
Non-DCIA Curve Number	80.00
DCIA Percent	100.00
Rainfall Zone	Florida Zone 4
Rainfall (in)	51.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	80
Required TP Treatment Efficiency (%)	78
Provided TP Treatment Efficiency (%)	80

Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	168.016
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	22.107
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)

Load		Treatment		Surface Discharge
N: 209.44 kg/yr	→	N: 80 %	→	N: 41.43 kg/yr
P: 27.56 kg/yr		P: 80 %		P: 5.45 kg/yr

↓

Mass Reduction
N: 168.02 kg/yr
P: 22.11 kg/yr

Load Diagram for Retention (As Used In Routing)

Upstream Nodes	Load		Treatment		Mass Discharged
None	N: 209.44 kg/yr	→	N: 80.2 %	→	N: 41.43 kg/yr
	P: 27.56 kg/yr		P: 80.2 %		P: 5.45 kg/yr
	Q: 111.75 ac-ft				Q: 22.10 ac-ft

↓

Mass Removed
N: 168.02 kg/yr
P: 22.11 kg/yr

Catchment Number: 2 Name: Pond Alt 1-A - Wet

Project: SR 31 Pond - Alt. A
Date: 6/15/2022

Wet Detention with Littoral Shelf Design

Permanent Pool Volume (ac-ft)	34.810
Permanent Pool Volume (ac-ft) for 31 days residence	4.408
Annual Residence Time (days)	245
Littoral Zone Efficiency Credit	10
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	29.59
Contributing Area (acres)	20.750
Non-DCIA Curve Number	80.00
DCIA Percent	65.40
Rainfall Zone	Florida Zone 4
Rainfall (in)	51.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	20
Provided TN Treatment Efficiency (%)	47
Required TP Treatment Efficiency (%)	16
Provided TP Treatment Efficiency (%)	78

Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	0.000
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

Load Diagram for Wet Detention with Littoral Shelf (stand-alone)

Load		Treatment		Surface Discharge
N: 25.47 kg/yr	→	N: 47 %	→	N: 13.38 kg/yr
P: 3.35 kg/yr		P: 78 %		P: 0.75 kg/yr
		↓		Mass Reduction
				N: 12.09 kg/yr
				P: 2.60 kg/yr

Load Diagram for Wet Detention (As Used In Routing)

Upstream Nodes	Load		Treatment		Mass Discharged
Node: 1	N: 138.70 kg/yr P: 18.25 kg/yr Q: 74.00 ac-ft	→	N: 47.5 % P: 77.5 %	→	N: 72.84 kg/yr P: 4.11 kg/yr Q: 74.00 ac-ft

↓

Mass Removed
N: 65.85 kg/yr
P: 14.14 kg/yr

Summary Treatment Report Version: 4.3.5

Project: SR 31 Pond - Alt. A

Date:6/15/2022

Analysis Type: Net Improvement
BMP Types:
Catchment 1 - (Pond Alt 1-A - Dry) Retention
Catchment 2 - (Pond Alt 1-A - Wet) Wet Detention with Littoral Shelf
Based on % removal values to the nearest percent

Routing Summary
Catchment 1 Routed to Catchment 2
Catchment 2 Routed to Outlet

Total nitrogen target removal met? **Yes**
Total phosphorus target removal met? **Yes**

Summary Report

Nitrogen

Surface Water Discharge

Total N pre load	119.22 kg/yr
Total N post load	306.71 kg/yr

Target N load reduction	61 %	
Target N discharge load	119.22 kg/yr	
Percent N load reduction	76 %	
Provided N discharge load	72.84 kg/yr	160.62 lb/yr
Provided N load removed	233.87 kg/yr	515.68 lb/yr

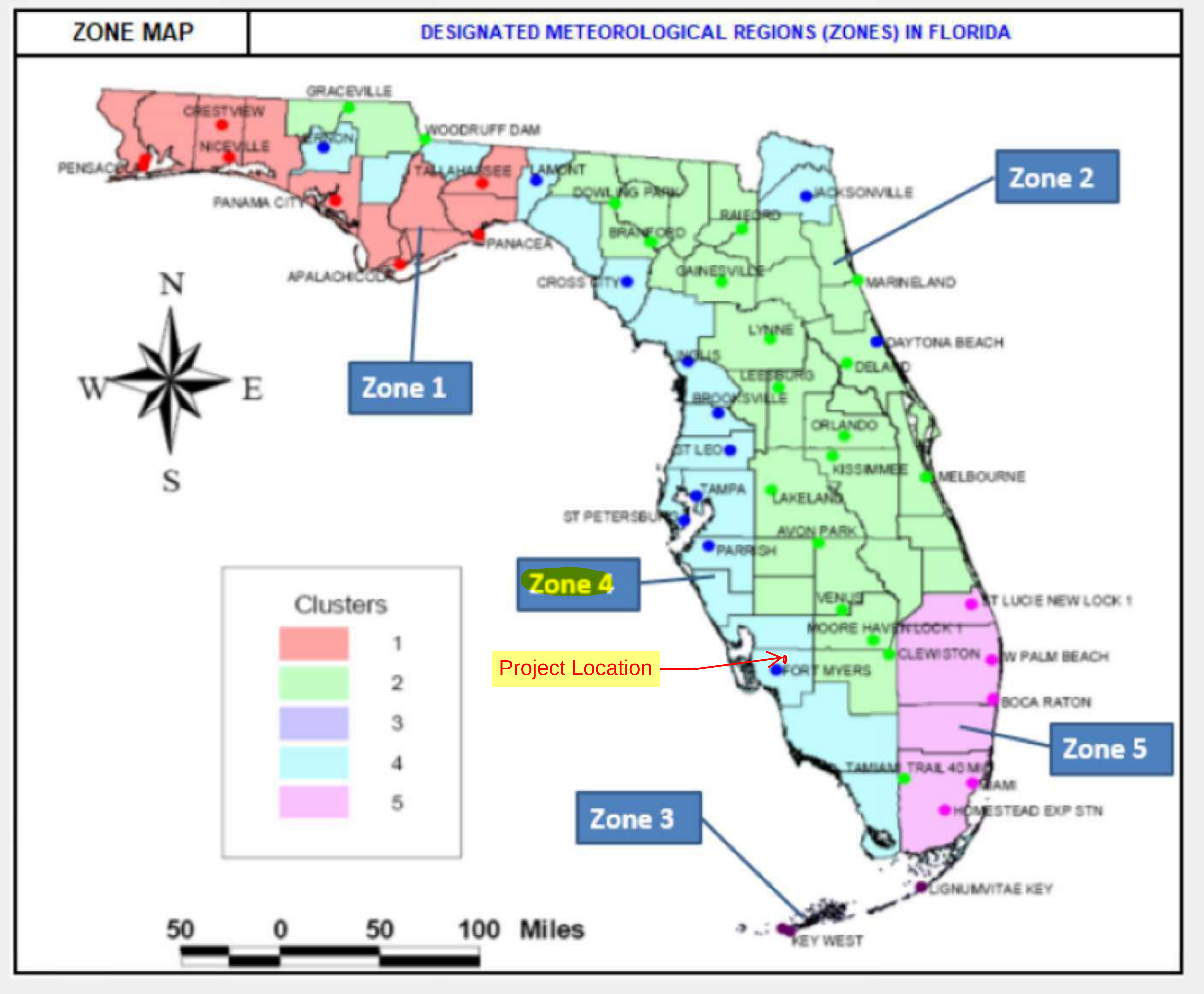
Phosphorus

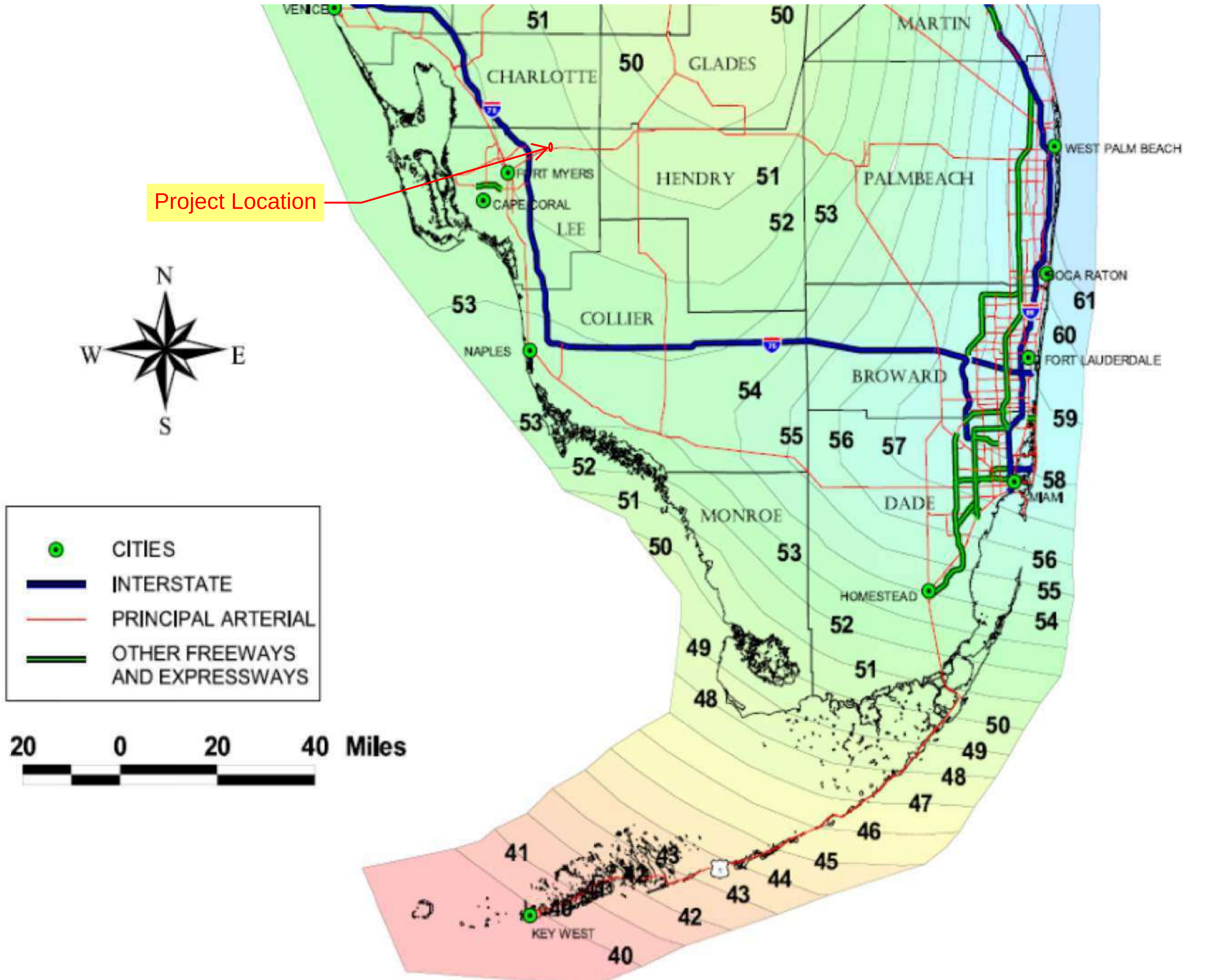
Surface Water Discharge

Total P pre load	16.745 kg/yr	
Total P post load	40.357 kg/yr	
Target P load reduction	59 %	
Target P discharge load	16.745 kg/yr	
Percent P load reduction	90 %	
Provided P discharge load	4.106 kg/yr	9.05 lb/yr
Provided P load removed	36.251 kg/yr	79.933 lb/yr

NUTRIENT LOADING CALCULATIONS

Resource Documentation


ZONE MAP
DESIGNATED METEOROLOGICAL REGIONS (ZONES) IN FLORIDA
Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Project Location
N
S
E
W
Clusters
1
2
3
4
5
GRACEVILLE
CRESTVIEW
WOODRUFF DAM
NICEVILLE
PENSACOLA
TALLAHASSEE
LAMONT
PANAMA CITY
DOWLING PARK
JACKSONVILLE
RAIFORD
BRANFORD
PANACEA
APALACHICOLA
GAINESVILLE
CROSS CITY
MARINELAND
LYNNE
DAYTONA BEACH
INGLIS
DELAND
LEESBURG
BROOKSVILLE
ORLANDO
ST LEO
KISSIMMEE
MELBOURNE
TAMPA
LAKELAND
ST PETERSBURG
AVON PARK
PARRISH
VENUS
ST LUCIE NEW LOCK 1
MOORE HAVEN LOCK 1
CLEWISTON
W PALM BEACH
FORT MYERS
BOCA RATON
TAMIAMI TRAIL 40 MI
MIAMI
HOMESTEAD EXP STN
LIGNUMVITAE KEY
KEY WEST
50
0
50
100
Miles



MEAN ANNUAL RAINFALL MAP

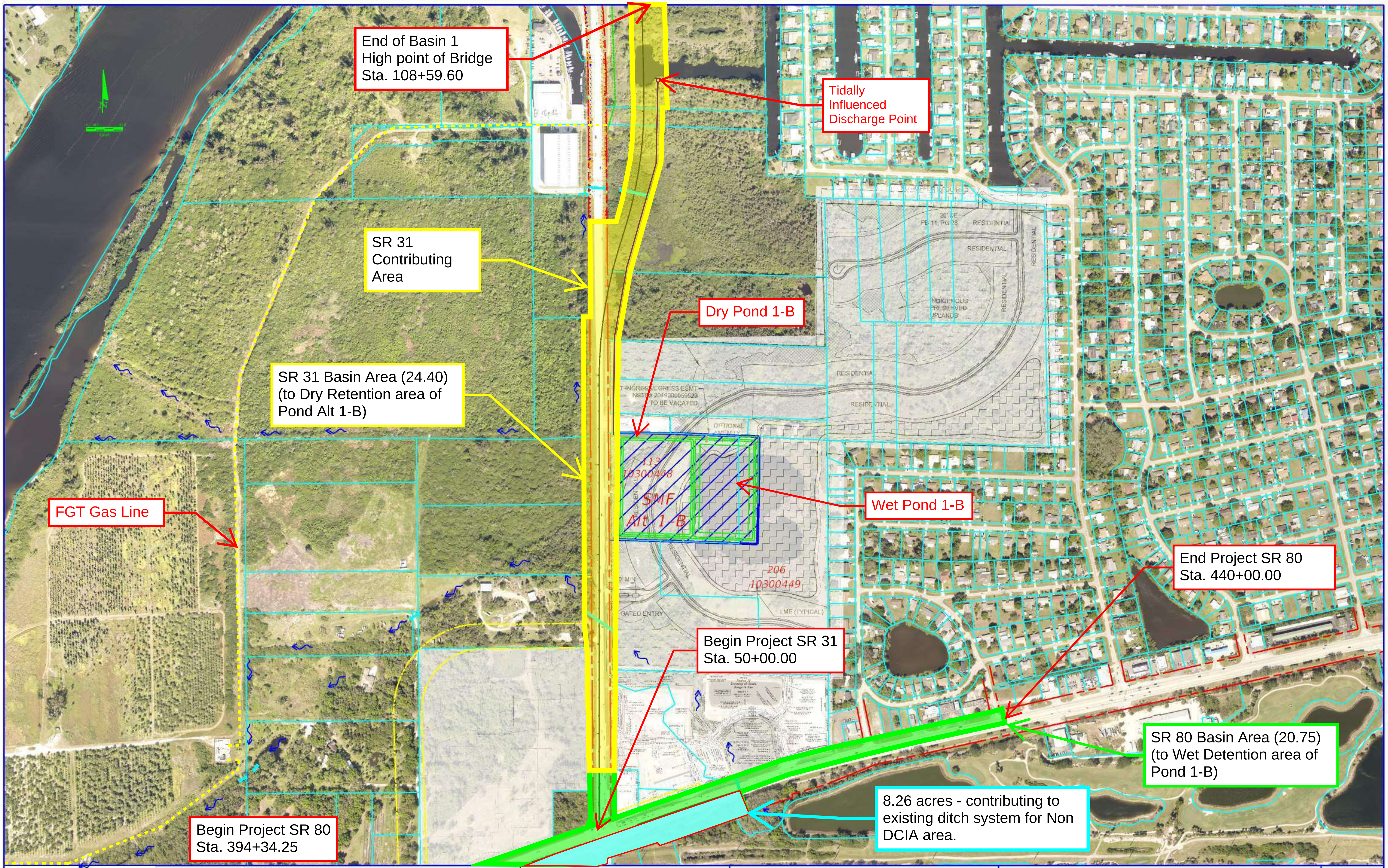
SR 31 Pond Siting Report

Customized Nutrient Loading Calculations - Pre-Developed Conditions

Pond Alternative	Basin 1 - Land Use Areas (Ac)					Nitrogen (mg/l)					Phosphorus (mg/l)					Composite Nutrient Values	
	Roadway	Pond Area	Undeveloped	Water	Total Area (Ac)	Highway	Agricultural Pasture	Ruderal / Upland	Undeveloped Wet Flatwoods	Undeveloped Wet Prairie	Highway	Agricultural Pasture	Ruderal / Upland	Undeveloped Wet Flatwoods	Undeveloped Wet Prairie	Nitrogen (mg/l)	Phosphorous (mg/l)
1-A Wet	19.36	8.84	1.40	7.00	29.59	1.52	3.51		1.21		0.20	0.69		0.02		1.66	0.23
1-A Dry	13.23	7.24	11.17	4.00	31.64	1.52	3.51		1.21		0.20	0.69		0.02		1.25	0.18
1-B Wet	19.36	4.89	1.40	2.80	25.64	1.52			1.21		0.20			0.02		1.47	0.18
1-B Dry	13.23	6.07	11.17	0.00	30.47	1.52			1.21		0.20			0.02		1.35	0.10
1-C Wet	19.36	4.35	1.40	0.00	25.10	1.52	3.51		1.21		0.20	0.69		0.02		1.85	0.27
1-C Dry	13.23	5.20	11.17	0.00	29.60	1.52	3.51		1.21		0.20	0.69		0.02		1.75	0.22
1-E Wet	19.36	4.85	1.40	0.00	25.60	1.52		1.69	1.21		0.20		0.16	0.02		1.54	0.18
1-E Dry	13.23	5.48	11.17	0.00	29.88	1.52		1.69	1.21		0.20		0.16	0.02		1.44	0.13
1-F Wet	19.36	4.51	1.40	0.00	25.26	1.52			1.21		0.20			0.02		1.45	0.16
1-F Dry	13.23	5.92	11.17	0.00	30.32	1.52			1.21		0.20			0.02		1.35	0.10

POND 1-B

Pond Design & Nutrient Loading Calculations



REVISIONS

DATE	DESCRIPTION	DATE	DESCRIPTION

FDOT

DRMP, Inc.
941 Lake Baldwin Ln.
Orlando, FL 32814
www.drmp.com
Phone: 407-896-0594
Fax: 407-896-4836

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

SMF 1-B ALTERNATIVE MAP

SHEET NO.

BASIN 1 / POND 1-B

Dry Retention Pond Calculations

Resource Documentation

BASIN 1 / POND 1-B - DRY POND, SR 31 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PRE DEVELOPMENT CONDITION

BASIN LIMITS: STA. 50+00.00 to STA 103+48.74 , CL

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH						IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
					TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)			
SR 31 Mainline	50+00.00		103+48.74	116.33	32	12	0	0.0	0	0	5.395	8.889	14.284
Additional ROW	50+00.00		103+48.74	82	0	0	0	0.0	0	0	0.00	10.12	10.12
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
SUBTOTAL:											***5.395***	***19.005***	***24.401***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
RDWY SUBTOTAL:											***5.40***	***19.01***	***24.40***
BASIN POND											***0.00***	***6.07***	***6.07***
TOTAL:					`						**5.40**	**25.08**	**30.47**

Note: Project areas have been verified by CADD shape files

BASIN 1 / POND 1-B - DRY POND, SR 31 AREA BREAKDOWN

.

POST DEVELOPMENT CONDITION

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

BASIN LIMITS: STA. 50+00.00 to STA 108+59.60, CL CONST.

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
SR 31 Mainline	50+00.00		108+59.60	150	80.6	0	4	4.0	0	24	15.207	4.981	20.188
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
Quadrant Alternative	+.00		12+22.50	150	80.56	0	4	4.0	0	0	2.485	1.727	4.213
	+.00		+.00	0	12.00	0	0	0.0	0	0	0.000	0.00	0.000
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.000	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
SUBTOTAL:											***17.69***	***6.71***	***24.40***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
	* Total area indicates actual area, Stationing indicates impervious area												
RDWY SUBTOTAL:											***17.69***	***6.71***	***24.40***
BASIN POND											***4.86***	***1.21***	***6.07***
TOTAL:											**22.55**	**7.92**	**30.47**

Note: Project areas have been verified by CADD shape files

PRE DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-B - Dry Pond, SR 31 Area**

CONDITION: **PRE-DEVELOPMENT**

Soil Name and Hydrologic group	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN			Area acres	Product of CN x Area
		Tab. 2-2	Fig. 2-3	Fig. 2-4		
6 - Brynwood fine sand (B/D) 45 - Copeland fine sandy loam (D)	POND SITE PERVIOUS, Woods (Fair condition)	79			6.07	479.53
6 - Brynwood fine sand (B/D) 45 - Copeland fine sandy loam (D)	POND SITE IMPERVIOUS	98			0.00	0.00
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST ROADWAY SURFACE	98			5.40	528.75
7 - Matlacha gravelly fine sand (B) 35 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST AREA TO BECOME ROW, Woods (Fair condition)	79			19.01	1501.43
	Totals =				30.47	2509.71

CN = **82.4**

Use **82**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	2.20	
Runoff Depth (Q)	8.74	in.
Runoff Volume	22.20	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POST DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-B - Dry Pond, SR 31 Area**

CONDITION: **POST-DEVELOPMENT**

Soil Name and Hydrologic group	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN			Area acres	Product of CN x Area
		Tab. 2-2	Fig. 2-3	Fig. 2-4		
6 - Brynwood fine sand (B/D) 45 - Copeland fine sandy loam (D)	POND SITE PERVIOUS Berms and Slopes	80			1.21	96.80
6 - Brynwood fine sand (B/D) 45 - Copeland fine sandy loam (D)	POND SITE IMPERVIOUS At Control Elevation	100			4.86	485.60
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW PERVIOUS Good condition	80			6.71	536.66
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW IMPERVIOUS Proposed Pavement	98			17.69	1733.88
		Totals =			30.47	2852.95

CN =	93.6	
Use	**94**	
25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	0.64	
Runoff Depth (Q)	10.27	in.
Runoff Volume	26.07	ac-ft
ATTENUATION VOLUME	**3.87**	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POLLUTION ABATEMENT VOLUME

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

BASIN 1 / POND 1-B - Dry Pond, SR 31 Area

BASIN LIMITS: STA. 50+00.00 to STA 108+59.60, CL CONST.

TOTAL BASIN AREA: 30.47 AC.

IMPERVIOUS COVERAGE: 22.55 AC.

1st inch of runoff - 50% less for Dry Retention	**1.27**	ac-ft
Site area for water quality pervious/impervious calculations only	24.40	ac of site area for water quality pervious/impervious
Impervious area for water quality pervious/impervious calculations only	22.55	ac of site area for water quality pervious/impervious
Percentage of imperviousness for water quality	92.41%	impervious
2.5 inches times the runoff from the impervious area - 50% less for Dry Retention	**2.35**	ac-ft

2.35 ac-ft Volume controls

POND STAGE / STORAGE CALCULATIONS-DRY POND

BASIN 1 / POND 1-B - Dry Pond, SR 31 Area

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PARCEL: 10300448 & 10300449

DESCRIPTION: ALTERNATIVE 1-B

Control Elevation	5.50
BOTTOM LENGTH	521.00 FT
BOTTOM WIDTH	380.00 FT
TOP LENGTH	544.00 FT
TOP WIDTH	405.00 FT
FRONT SLOPE (?:1)	4.00
BACK SLOPE (?:1)	4.00
INC. OF STAGE TREAT.	0.07
INC. OF STAGE ATTN.	0.21

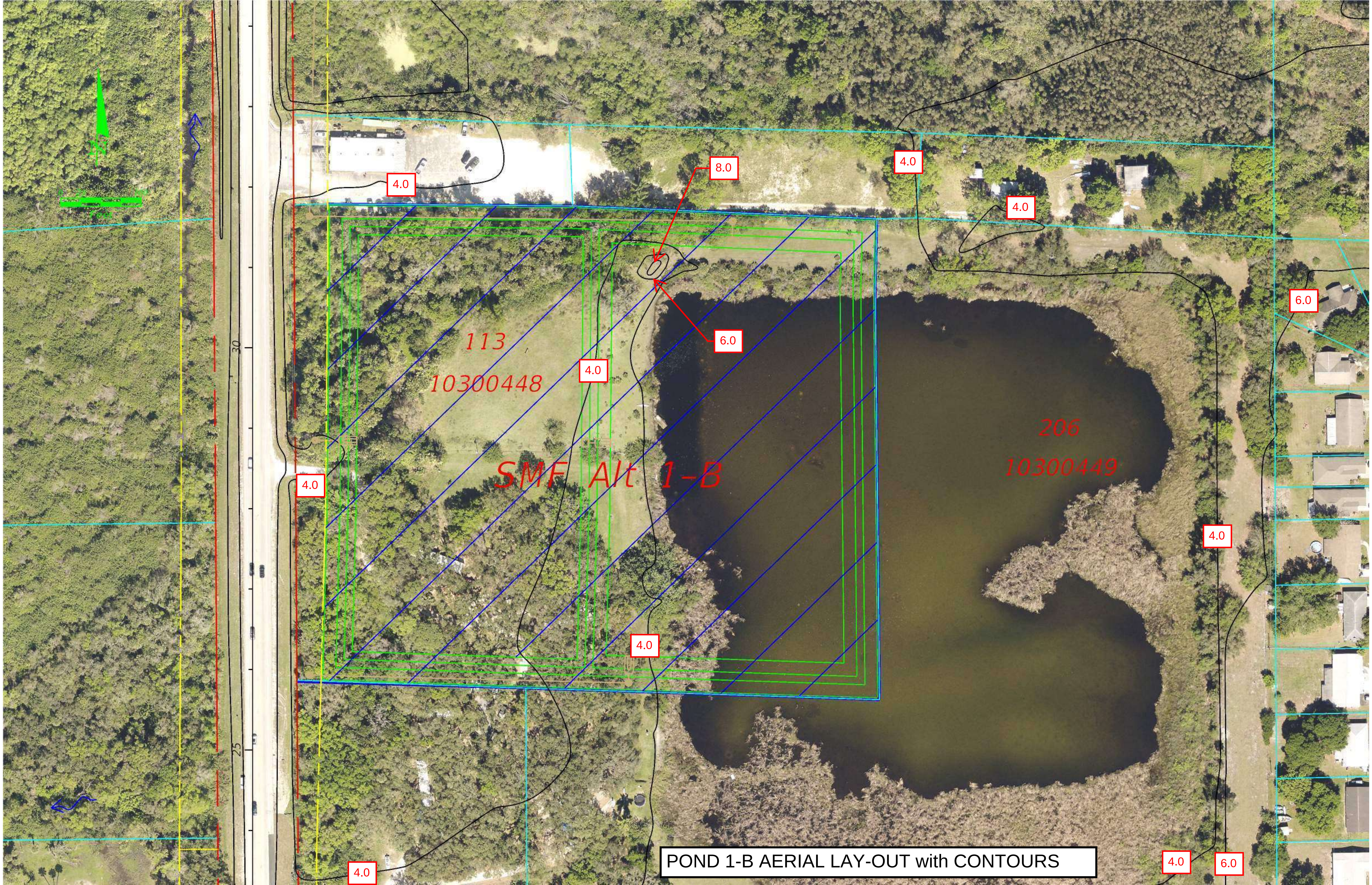
STAGE (ELEV.)	AREA (SQ-FT)	VOLUME (CU-FT)	VOLUME (AC-FT)	
5.50	**197980**	0		Control Elevation
5.57	198618	13881	0.32	
5.64	199257	27807	0.64	
5.71	199895	41777	0.96	
5.78	200533	55792	1.28	
5.85	201171	69852	1.60	
5.92	201810	83956	1.93	
5.99	202448	98105	2.25	
6.06	203086	112299	**2.58**	WQ Treatment Volume Elevation
6.27	205001	155148	3.56	
6.48	206916	198399	4.55	
6.69	208831	242052	5.56	
6.90	210746	286108	**6.57**	Peak Attenuation Volume
7.11	212661	330566	7.59	
7.32	214575	375425	8.62	
7.53	216490	420687	9.66	
7.74	218405	466351	10.71	
7.95	**220320**	512418	11.76	Top of Bank

Treatment Volume Required =	**2.35**	ac-ft
Attenuation Volume Required =	**3.87**	ac-ft
Treatment Volume Provided =	**2.58**	ac-ft
Attenuation Volume Provided =	**3.99**	ac-ft

Pond Area = 6.07 Acres

Pond dimensions times 1.20 to account for maintenance berms, access and tieing back into existing ground.

Head Losses represented by conservative 0.0005 ft/ft. Distance from low point along SR 31 to dry pond is approximatley 1/4 mile. Proposed low point along SR 31 is approximatley 10'; 6.90+(1250'*0.0005ft/ft) = 7.53' 7.53'<10'



POND 1-B AERIAL LAY-OUT with CONTOURS

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.
2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2c Runoff curve numbers for other agricultural lands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4]	48	65	73
Woods—grass combination (orchard or tree farm). [5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.
3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4 Actual curve number is less than 30; use CN = 30 for runoff computations.
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

United States Department of Agriculture

NRCS

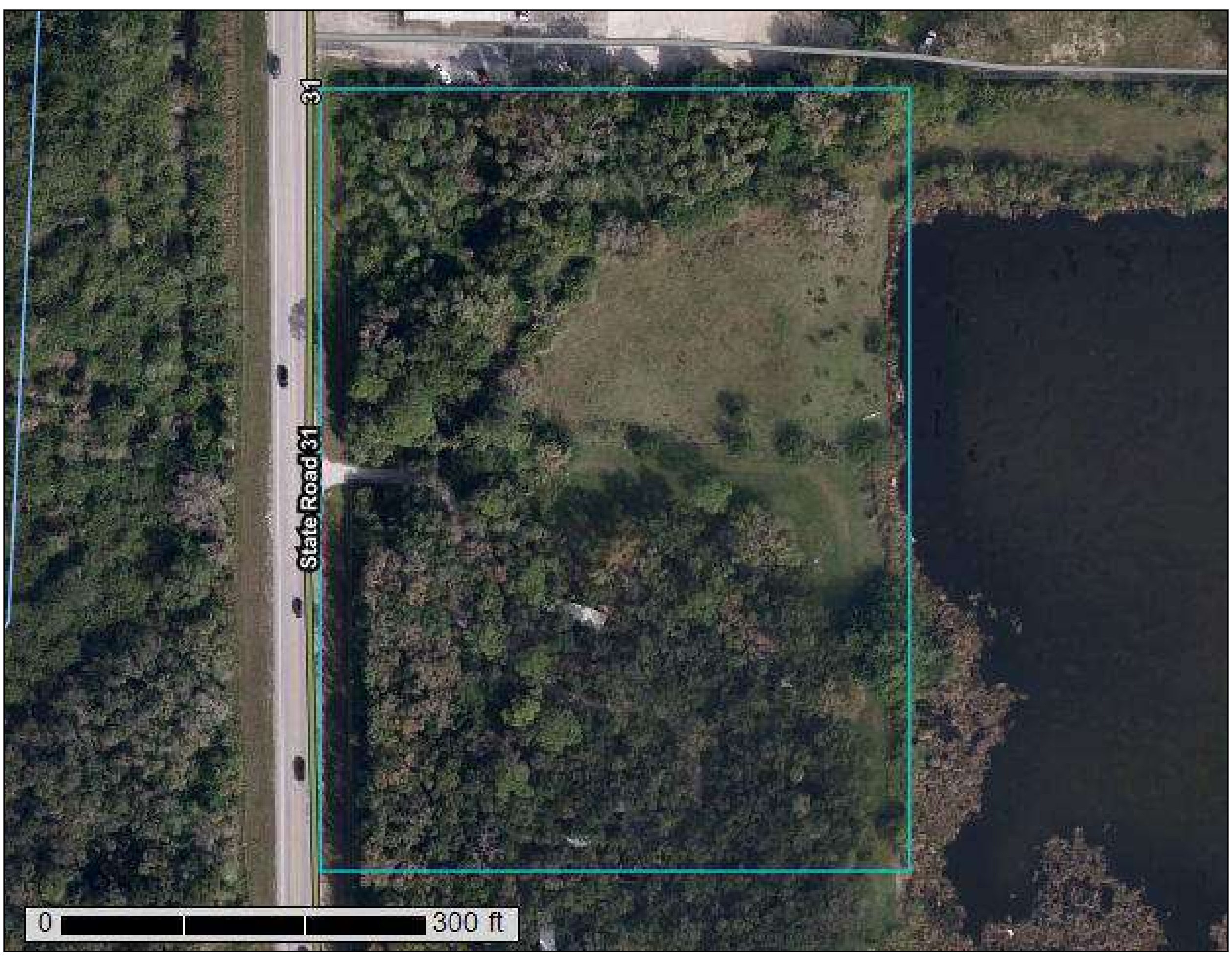
Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Lee County, Florida

SMF Alt 1-B



April 19, 2022

Soil Map

Map Scale: 1:1,150 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

N

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6	Brynwood fine sand, wet, 0 to 2 percent slopes	2.6	36.2%
11	Myakka fine sand, 0 to 2 percent slopes	0.1	1.0%
45	Copeland fine sandy loam, frequently ponded, 0 to 1 percent slopes	4.5	62.8%
Totals for Area of Interest		**7.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

Lee County, Florida

6—Brynwood fine sand, wet, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2zlfc
Elevation: 0 to 70 feet
Mean annual precipitation: 46 to 56 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 360 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Brynwood and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brynwood

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy marine deposits over limestone

Typical profile

A - 0 to 2 inches: fine sand
Eg - 2 to 7 inches: fine sand
Bw - 7 to 12 inches: fine sand
2R - 12 to 22 inches: bedrock

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 2 to 20 inches to lithic bedrock
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 5.95 in/hr)
Depth to water table: About 3 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Cassia

Percent of map unit: 3 percent
Landform: Rises on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Immokalee

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Riser, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Satellite

Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces, rises on marine terraces
Landform position (three-dimensional): Tread, talf, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

45—Copeland fine sandy loam, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2x9dj
Elevation: 0 to 150 feet
Mean annual precipitation: 45 to 63 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Copeland

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy and loamy marine deposits over limestone

Typical profile

A1 - 0 to 8 inches: fine sandy loam
A2 - 8 to 20 inches: fine sandy loam
Btkg - 20 to 28 inches: sandy clay loam
2R - 28 to 38 inches: bedrock

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: D
Forage suitability group: Loamy and clayey soils on stream terraces, flood plains, or in depressions (G155XB345FL)
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Loamy and clayey soils on stream terraces, flood plains, or in depressions (G155XB345FL)
Hydric soil rating: Yes

Minor Components

Felda

Percent of map unit: 4 percent
Landform: Flats on marine terraces, depressions on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Anclote

Percent of map unit: 3 percent

RAP	Folio	Owner Name	Site Address	Last Trans. Date	Last Trans. Amt	Just Value	Taxable
	10300448	JAMSCAG INVESTMENT LLC	16450 STATE ROAD 31, FORT MYERS	5-2014	$ 450,000	$ 218,130	$ 1

BASIN 1 / POND 1-B

Wet Detention Pond Calculations

BASIN 1 / POND 1-B WET POND - SR 80 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PRE DEVELOPMENT CONDITION

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00 , CL

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH						IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
					TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)			
SR 80 Mainline	394+34.25		440+00.00	175.33	67	10	0	4.0	0	0	8.47	9.91	18.38
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
Additional ROW	12+22.50		22+63.38	100	83	0	0	0.0	0	0	1.99	0.39	2.38
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
SUBTOTAL:											***10.45***	***10.30***	***20.75***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
RDWY SUBTOTAL:											***10.45***	***10.30***	***20.75***
BASIN POND											***0.00***	***4.89***	***4.89***
TOTAL:					`						**10.45**	**15.19**	**25.64**

Note: Project areas have been verified by CADD shape files

BASIN 1 / POND 1-B WET POND - SR 80 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

POST DEVELOPMENT CONDITION

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00, CL CONST.

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
SR 80 Mainline	394+34.25		440+00.00	175	80.2	10	0	4.0	0	0	9.88	8.50	18.38
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
Quadrant Alternative	12+22.50		22+63.38	100	75.15	0	4	4.0	0	0	1.987	0.391	2.378
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.000	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
SUBTOTAL:											***11.86***	***8.89***	***20.75***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
	* Total area indicates actual area, Stationing indicates impervious area												
RDWY SUBTOTAL:											***11.86***	***8.89***	***20.75***
BASIN POND											***3.91***	***0.98***	***4.89***
TOTAL:											**15.77**	**9.87**	**25.64**

Note: Project areas have been verified by CADD shape files

PRE DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-B - Wet Pond - SR 80 Area**

CONDITION: **PRE-DEVELOPMENT**

Soil Name and Hydrologic group	**Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)**	**CN**			**Area acres**	**Product of CN x Area**
		Tab. 2-2	**Fig. 2-3**	**Fig. 2-4**		
6 - Brynwood fine sand (B/D) 45 - Copeland fine sandy loam (D)	POND SITE PERVIOUS, Woods (Fair condition)	79			4.89	386.31
6 - Brynwood fine sand (B/D) 45 - Copeland fine sandy loam (D)	POND SITE IMPERVIOUS	98			0.00	0.00
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST ROADWAY SURFACE	98			10.45	1024.58
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST AREA TO BECOME ROW, Woods (Fair condition)	79			10.30	813.69
		Totals =			25.64	2224.59

CN = **86.7**

Use **87**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	1.49	
Runoff Depth (Q)	9.39	in.
Runoff Volume	20.07	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POST DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-B - Wet Pond - SR 80 Area**

CONDITION: **POST-DEVELOPMENT**

Soil Name and Hydrologic group	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN			Area acres	Product of CN x Area
		Tab. 2-2	Fig. 2-3	Fig. 2-4		
6 - Brynwood fine sand (B/D) 45 - Copeland fine sandy loam (D)	POND SITE PERVIOUS Berms and Slopes	80			0.98	78.24
6 - Brynwood fine sand (B/D) 45 - Copeland fine sandy loam (D)	POND SITE IMPERVIOUS At Control Elevation	100			3.91	391.20
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW PERVIOUS Good condition	80			8.89	711.38
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW IMPERVIOUS Proposed Pavement	98			11.86	1162.53
		Totals =			25.64	2343.35

CN = **91.4**

Use **91**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	0.99	
Runoff Depth (Q)	9.90	in.
Runoff Volume	21.15	ac-ft
ATTENUATION VOLUME	**1.08**	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POLLUTION ABATEMENT VOLUME

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

BASIN 1 / POND 1-B - Wet Pond, SR 80 Area

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00 , CL CONST.

TOTAL BASIN AREA: 25.64 AC.

IMPERVIOUS COVERAGE: 15.77 AC.

1st inch of runoff	**2.14**	ac-ft
Site area for water quality pervious/impervious calculations only	20.75	ac of site area for water quality pervious/impervious
Impervious area for water quality pervious/impervious calculations only	15.77	ac of site area for water quality pervious/impervious
Percentage of imperviousness for water quality	76.00%	impervious
2.5 inches times the runoff from the impervious area	**3.29**	ac-ft

3.29 ac-ft Volume controls

POND STAGE / STORAGE CALCULATIONS-WET

BASIN 1 / POND 1-B - Wet Pond, SR 80 Area

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PARCEL: 10300448 & 10300449

DESCRIPTION: ALTERNATIVE 1-B

Control Elevation	2.90	= Seasonal High Water elevation
BOTTOM LENGTH	515.00 FT	
BOTTOM WIDTH	299.00 FT	
TOP LENGTH	543.00 FT	
TOP WIDTH	327.00 FT	
FRONT SLOPE (?:1)	4.00	
BACK SLOPE (?:1)	4.00	
INC. OF STAGE TREAT.	0.12	
INC. OF STAGE ATTN.	0.07	

STAGE (ELEV.)	AREA (SQ-FT)	VOLUME (CU-FT)	VOLUME (AC-FT)	
2.90	153985	0		Control Elevation
3.02	155764	18585	0.43	
3.14	157544	37383	0.86	
3.26	159323	56395	1.29	
3.38	161102	75621	1.74	
3.50	162882	95060	2.18	
3.62	164661	114713	2.63	
3.74	166440	134579	3.09	
3.86	168220	154658	**3.55**	WQ Treatment Volume Elevation
3.93	169258	166470	3.82	
4.00	170295	178354	4.09	
4.07	171333	190311	4.37	
4.14	172371	202341	**4.65**	Peak Attenuation Volume
4.21	173409	214443	4.92	
4.28	174447	226618	5.20	
4.35	175485	238866	5.48	
4.42	176523	251186	5.77	
4.49	177561	263579	6.05	Top of Bank

Treatment Volume Required = **3.29** ac-ft
Attenuation Volume Required = **1.08** ac-ft

Treatment Volume Provided = **3.55** ac-ft
Attenuation Volume Provided = **1.09** ac-ft

Pond Area = 4.89 Acres
Pond dimensions times 1.20 to account for maintenance berms, access and tieing back into existing ground.

Head Losses represented by conservative 0.0005 ft/ft. Distance from low point along SR 80 to wet pond is approximately 1/4 mile. Low point along SR 80 is approximatley 5.70'; 4.14'+(1500'*0.0005ft/ft) = 4.89' 4.89' < 5.7'

POND STAGE / STORAGE CALCULATIONS - PERMANENT POOL COMPUTATION

BASIN 1 / POND 1-B - Wet Pond, SR 80 Area

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PARCEL: **10300448 & 10300449**

DESCRIPTION: ALTERNATIVE 1-B

SHGWT Elevation 2.90
LITTORAL ZONE -0.60

INC. OF STAGE TREAT. 0.25
INC. OF STAGE ATTN. 0.25

STAGE (ELEV.)	AREA (SQ-FT)	AREA (AC)	VOLUME (CU-FT)	VOLUME (AC-FT)	
-0.60	**139376**	**3.200**	0	0.00	
-0.35	140420	3.224	34974	0.80	
-0.10	141463	3.248	70210	1.61	
0.15	142507	3.271	105706	2.43	
0.40	143550	3.295	141463	3.25	
0.65	144594	3.319	177481	4.07	
0.90	145637	3.343	213760	4.91	
1.15	146681	3.367	250299	5.75	
1.40	147724	3.391	287100	**6.59**	
1.65	148768	3.415	324161	7.44	
1.90	149811	3.439	361484	8.30	
2.15	150855	3.463	399067	9.16	
2.40	151898	3.487	436911	10.03	
2.65	152942	3.511	475016	10.90	
2.90	153985	3.535	513382	**11.79**	Control Elevation
2.90	**153985**	**3.535**	513382	**11.79**	Inside Top of Bank

NUTRIENT LOADING CALCULATIONS

Complete Report (not including cost) Ver 4.3.5

Project: SR 31 Pond - Alt. B
Date: 6/16/2022 7:01:27 PM

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	Pond Alt 1-B - Dry	Pond Alt 1-B - Wet
Rainfall Zone	Florida Zone 4	Florida Zone 4
Annual Mean Rainfall	51.50	51.50

Pre-Condition Landuse Information

Landuse	User Defined Values	User Defined Values
Area (acres)	30.47	25.64
Rational Coefficient (0-1)	0.15	0.25
Non DCIA Curve Number	82.00	89.00
DCIA Percent (0-100)	0.00	0.00
Nitrogen EMC (mg/l)	1.350	1.470
Phosphorus EMC (mg/l)	0.100	0.180
Runoff Volume (ac-ft/yr)	19.720	27.422
Groundwater N (kg/yr)	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000
Nitrogen Loading (kg/yr)	32.824	49.702
Phosphorus Loading (kg/yr)	2.431	6.086

Post-Condition Landuse Information

Landuse	Highway: TN=1.520 TP=0.200	Highway: TN=1.520 TP=0.200
Area (acres)	30.47	25.64
Rational Coefficient (0-1)	0.82	0.58
Non DCIA Curve Number	80.00	80.00
DCIA Percent (0-100)	100.00	65.40
Wet Pond Area (ac)	0.00	4.74
Nitrogen EMC (mg/l)	1.520	1.520
Phosphorus EMC (mg/l)	0.200	0.200
Runoff Volume (ac-ft/yr)	107.621	52.275
Groundwater N (kg/yr)	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000

Nitrogen Loading (kg/yr)	201.700	97.971
Phosphorus Loading (kg/yr)	26.539	12.891

Catchment Number: 1 Name: Pond Alt 1-B - Dry

Project: SR 31 Pond - Alt. B
Date: 6/16/2022

Retention Design

Retention Depth (in)	1.370
Retention Volume (ac-ft)	3.479

Watershed Characteristics

Catchment Area (acres)	30.47
Contributing Area (acres)	30.470
Non-DCIA Curve Number	80.00
DCIA Percent	100.00
Rainfall Zone	Florida Zone 4
Rainfall (in)	51.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	84
Provided TN Treatment Efficiency (%)	76
Required TP Treatment Efficiency (%)	91
Provided TP Treatment Efficiency (%)	76

Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	152.461
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	20.061
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)

Load		Treatment		Surface Discharge
N: 201.70 kg/yr	→	N: 76 %	→	N: 49.24 kg/yr
P: 26.54 kg/yr		P: 76 %		P: 6.48 kg/yr

↓

Mass Reduction
N: 152.46 kg/yr
P: 20.06 kg/yr

Load Diagram for Retention (As Used In Routing)

Upstream Nodes	Load		Treatment		Mass Discharged
None	N: 201.70 kg/yr	→	N: 75.6 %	→	N: 49.24 kg/yr
	P: 26.54 kg/yr		P: 75.6 %		P: 6.48 kg/yr
	Q: 107.62 ac-ft				Q: 26.27 ac-ft

↓

Mass Removed
N: 152.46 kg/yr
P: 20.06 kg/yr

Catchment Number: 2 Name: Pond Alt 1-B - Wet

Project: SR 31 Pond - Alt. B
Date: 6/16/2022

Wet Detention with Littoral Shelf Design

Permanent Pool Volume (ac-ft)	11.640
Permanent Pool Volume (ac-ft) for 31 days residence	4.440
Annual Residence Time (days)	81
Littoral Zone Efficiency Credit	10
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres) 25.64
Contributing Area (acres) 20.900
Non-DCIA Curve Number 80.00
DCIA Percent 65.40
Rainfall Zone Florida Zone 4
Rainfall (in) 51.50

Surface Water Discharge

Required TN Treatment Efficiency (%) 49
Provided TN Treatment Efficiency (%) 44
Required TP Treatment Efficiency (%) 53
Provided TP Treatment Efficiency (%) 69

Media Mix Information

Type of Media Mix Not Specified
Media N Reduction (%)
Media P Reduction (%)

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr) 0.000
TN Mass Load (kg/yr) 0.000
TN Concentration (mg/L) 0.000
TP Mass Load (kg/yr) 0.000
TP Concentration (mg/L) 0.000

Load Diagram for Wet Detention with Littoral Shelf (stand-alone)

Load N: 25.66 kg/yr P: 3.38 kg/yr	→	Treatment N: 44 % P: 69 %	→	Surface Discharge N: 14.38 kg/yr P: 1.06 kg/yr
		↓		Mass Reduction N: 11.28 kg/yr P: 2.32 kg/yr

Load Diagram for Wet Detention (As Used In Routing)

Upstream Nodes	Load		Treatment		Mass Discharged
Upstream Nodes Node: 1	Load N: 147.21 kg/yr P: 19.37 kg/yr Q: 78.55 ac-ft	→	Treatment N: 44.0 % P: 68.6 %	→	Mass Discharged N: 82.49 kg/yr P: 6.08 kg/yr Q: 78.55 ac-ft

↓

Mass Removed
N: 64.72 kg/yr
P: 13.29 kg/yr

Summary Treatment Report Version: 4.3.5

Project: SR 31 Pond - Alt. B

Date:6/16/2022

Analysis Type: Net Improvement

BMP Types:

Catchment 1 - (Pond Alt 1-B - Dry) Retention

Catchment 2 - (Pond Alt 1-B - Wet) Wet Detention with Littoral Shelf

Based on % removal values to the nearest percent

Routing Summary
Catchment 1 Routed to Catchment 2
Catchment 2 Routed to Outlet

Total nitrogen target removal met? **Yes**
Total phosphorus target removal met? **Yes**

Summary Report

Nitrogen

Surface Water Discharge

Total N pre load	82.53 kg/yr
Total N post load	299.67 kg/yr

Target N load reduction	72 %	
Target N discharge load	82.53 kg/yr	
Percent N load reduction	72 %	
Provided N discharge load	82.49 kg/yr	181.89 lb/yr
Provided N load removed	217.18 kg/yr	478.89 lb/yr

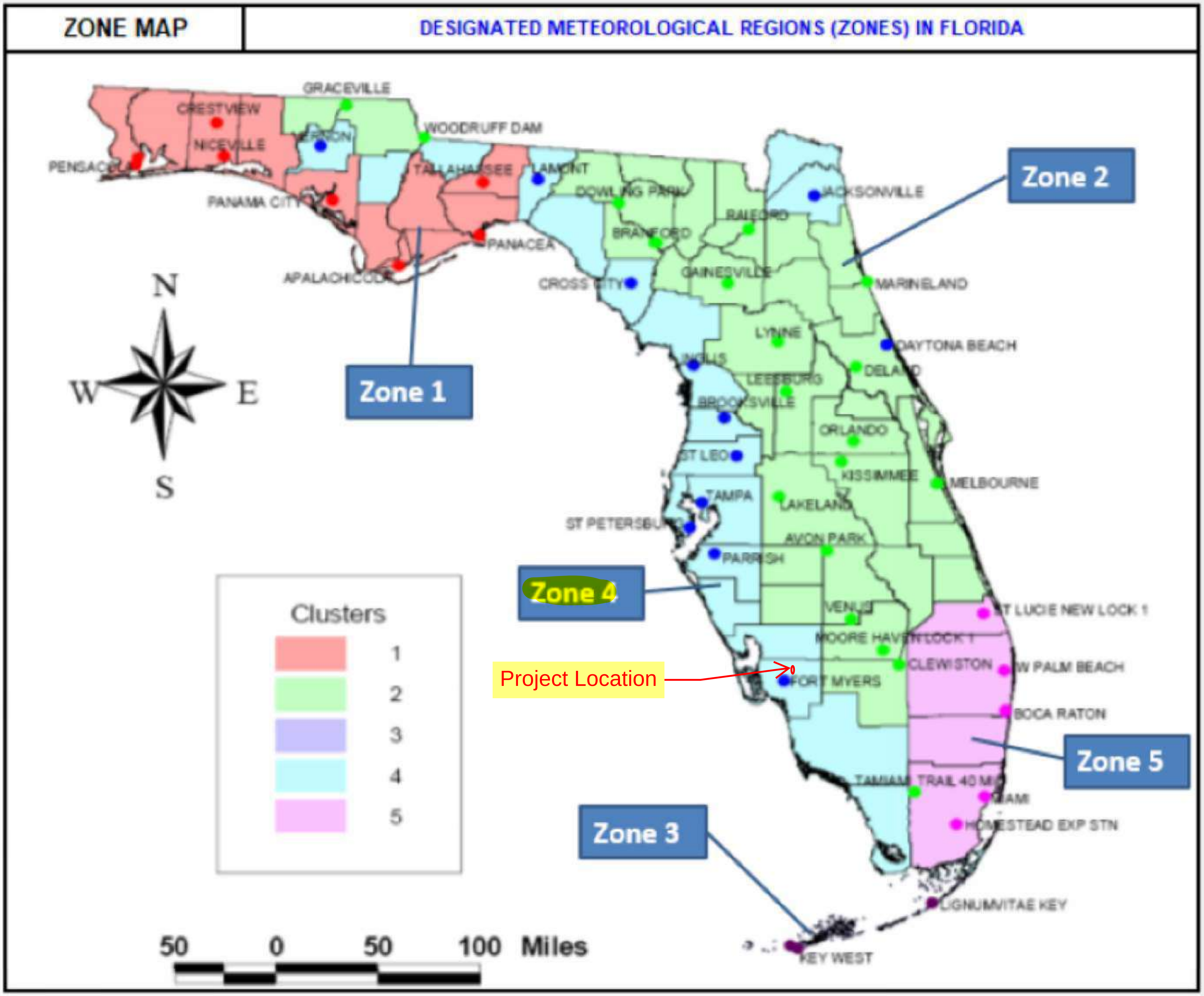
Phosphorus

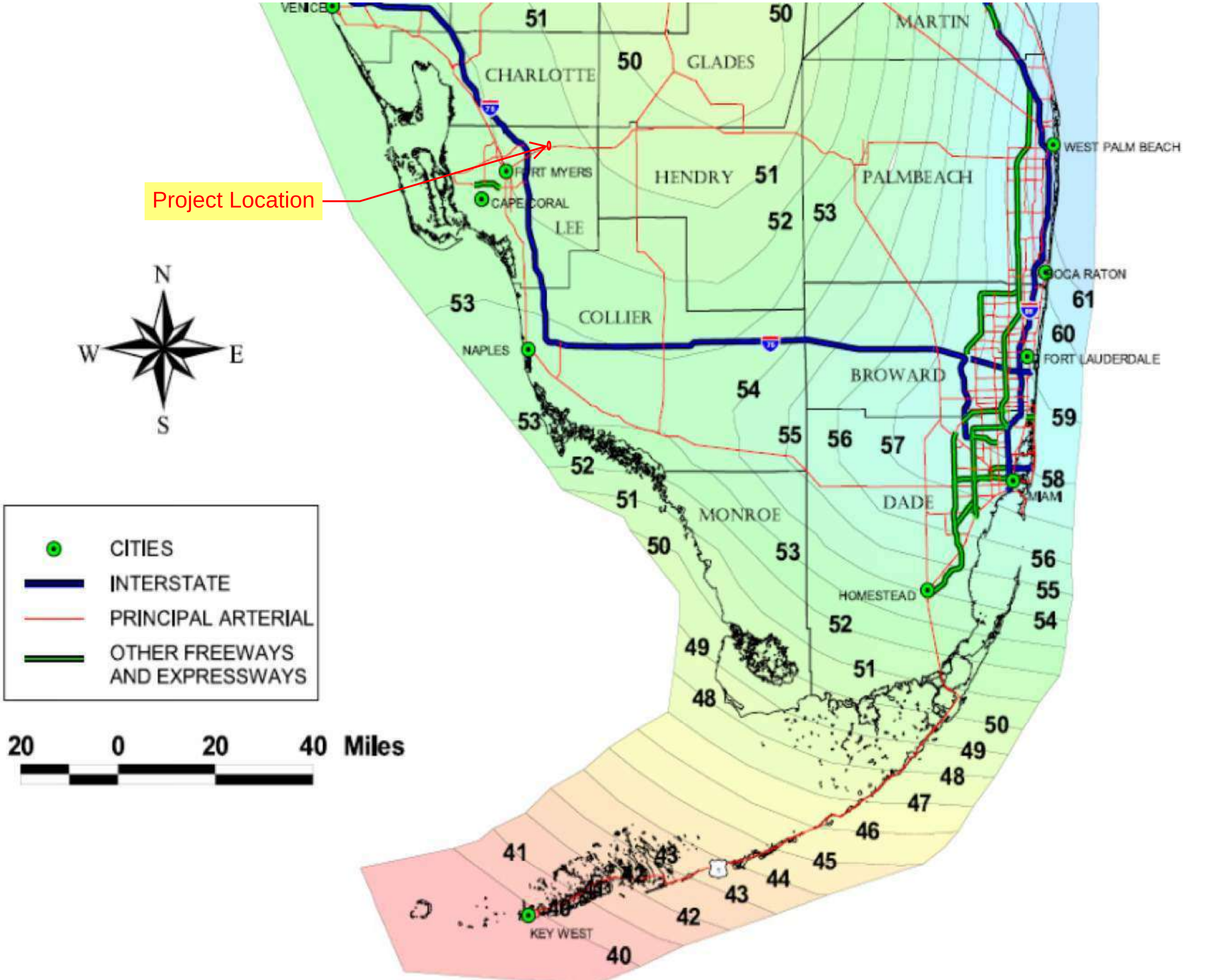
Surface Water Discharge

Total P pre load	8.517 kg/yr	
Total P post load	39.43 kg/yr	
Target P load reduction	78 %	
Target P discharge load	8.517 kg/yr	
Percent P load reduction	85 %	
Provided P discharge load	6.081 kg/yr	13.41 lb/yr
Provided P load removed	33.349 kg/yr	73.535 lb/yr

NUTRIENT LOADING CALCULATIONS

Resource Documentation


ZONE MAP
DESIGNATED METEOROLOGICAL REGIONS (ZONES) IN FLORIDA
GRACEVILLE
CRESTVIEW
WOODRUFF DAM
NICEVILLE
PENSACOLA
TALLAHASSEE
LAMONT
PANAMA CITY
DOWLING PARK
JACKSONVILLE
RALFORD
BRANFORD
PANACEA
APALACHICOLA
CROSS CITY
GAINESVILLE
MARINELAND
LYNNE
DAYTONA BEACH
INGLIS
DELAND
LEESBURG
BROOKSVILLE
ORLANDO
ST LEO
KISSIMMEE
MELBOURNE
TAMPA
LAKELAND
ST PETERSBURG
AVON PARK
PARRISH
VENUS
ST LUCIE NEW LOCK 1
MOORE HAVEN LOCK 1
CLEWISTON
W PALM BEACH
FORT MYERS
BOCA RATON
TAMIAMI TRAIL 40 MI
MIAMI
HOMESTEAD EXP STN
LIGNUMVITAE KEY
KEY WEST
Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Project Location
N
S
E
W
Clusters
1
2
3
4
5
50 0 50 100 Miles



MEAN ANNUAL RAINFALL MAP

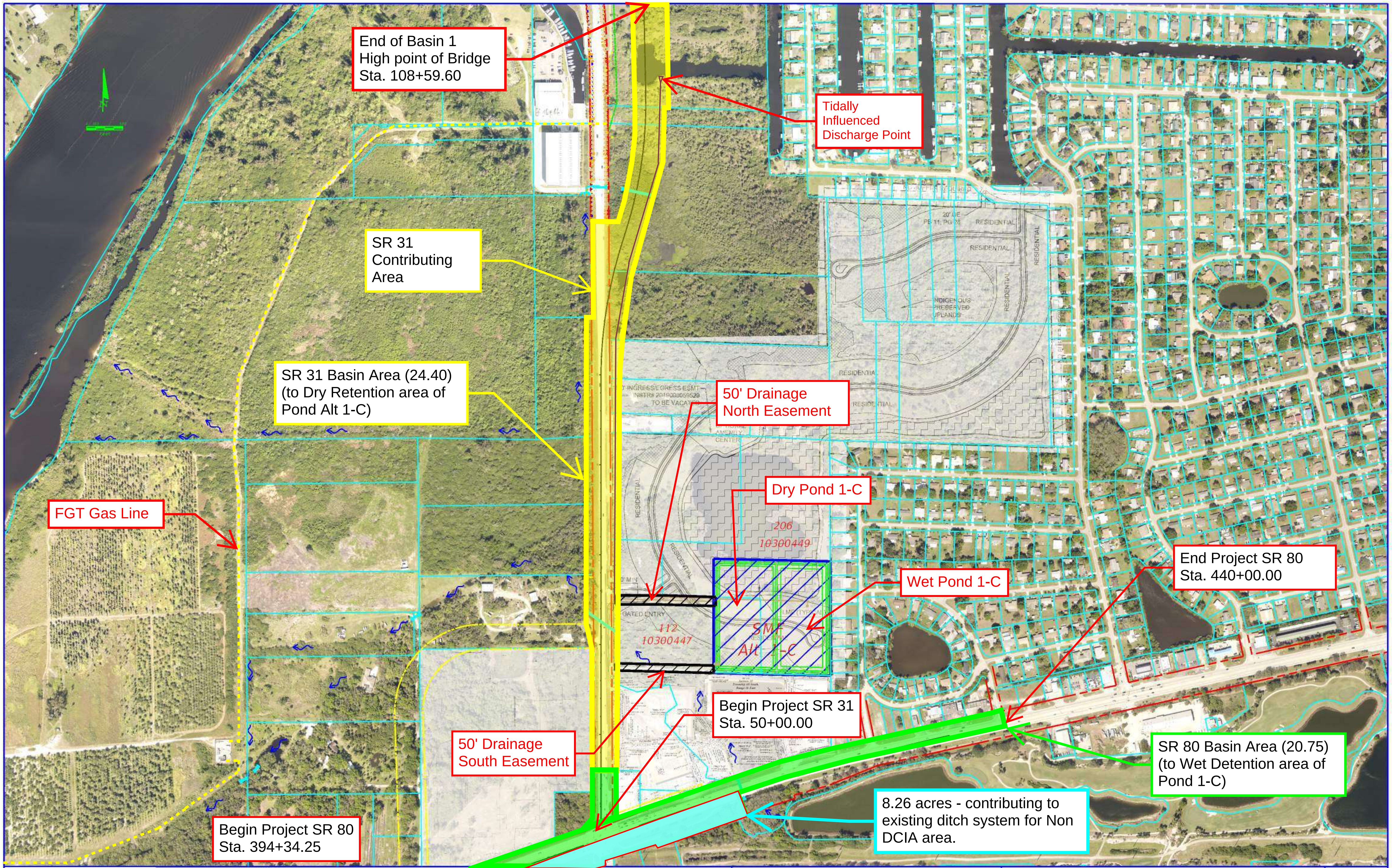
SR 31 Pond Siting Report

Customized Nutrient Loading Calculations - Pre-Developed Conditions

Pond Alternative	Basin 1 - Land Use Areas (Ac)					Nitrogen (mg/l)					Phosphorus (mg/l)					Composite Nutrient Values	
	Roadway	Pond Area	Undeveloped	Water	Total Area (Ac)	Highway	Agricultural Pasture	Ruderal / Upland	Undeveloped Wet Flatwoods	Undeveloped Wet Prairie	Highway	Agricultural Pasture	Ruderal / Upland	Undeveloped Wet Flatwoods	Undeveloped Wet Prairie	Nitrogen (mg/l)	Phosphorous (mg/l)
1-A Wet	19.36	8.84	1.40	7.00	29.59	1.52	3.51		1.21		0.20	0.69		0.02		1.66	0.23
1-A Dry	13.23	7.24	11.17	4.00	31.64	1.52	3.51		1.21		0.20	0.69		0.02		1.25	0.18
1-B Wet	19.36	4.89	1.40	2.80	25.64	1.52			1.21		0.20			0.02		1.47	0.18
1-B Dry	13.23	6.07	11.17	0.00	30.47	1.52			1.21		0.20			0.02		1.35	0.10
1-C Wet	19.36	4.35	1.40	0.00	25.10	1.52	3.51		1.21		0.20	0.69		0.02		1.85	0.27
1-C Dry	13.23	5.20	11.17	0.00	29.60	1.52	3.51		1.21		0.20	0.69		0.02		1.75	0.22
1-E Wet	19.36	4.85	1.40	0.00	25.60	1.52		1.69	1.21		0.20		0.16	0.02		1.54	0.18
1-E Dry	13.23	5.48	11.17	0.00	29.88	1.52		1.69	1.21		0.20		0.16	0.02		1.44	0.13
1-F Wet	19.36	4.51	1.40	0.00	25.26	1.52			1.21		0.20			0.02		1.45	0.16
1-F Dry	13.23	5.92	11.17	0.00	30.32	1.52			1.21		0.20			0.02		1.35	0.10

POND 1-C

Pond Design & Nutrient Loading Calculations



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

FDOT

DRMP, Inc.
941 Lake Baldwin Ln.
Orlando, FL 32814
www.drmp.com
Phone: 407-896-0594
Fax: 407-896-4836

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

SMF 1-C ALTERNATIVE MAP

SHEET NO.

JSheets 6/16/2022 10:53:31 AM Default

BASIN 1 / POND 1-C

Dry Retention Pond Calculations

Resource Documentation

BASIN 1 / POND 1-C DRY POND - SR 31 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PRE DEVELOPMENT CONDITION

BASIN LIMITS: STA. 50+00.00 to STA 103+48.74, CL

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH						IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
					TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)			
SR 31 Mainline	50+00.00		103+48.74	116.33	32	12	0	0.0	0	0	5.395	8.889	14.284
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
Additional ROW	50+00.00		103+48.74	82	0	0	0	0.0	0	0	0.00	10.12	10.12
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
SUBTOTAL:											***5.40***	***19.01***	***24.40***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
RDWY SUBTOTAL:											***5.40***	***19.01***	***24.40***
BASIN POND											***0.00***	***5.20***	***5.20***
TOTAL:					`						**5.40**	**24.21**	**29.60**

Note: Project areas have been verified by CADD shape files

BASIN 1 / POND 1-C DRY POND - SR 31 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

POST DEVELOPMENT CONDITION

BASIN LIMITS: STA. 50+00.00 to STA 108+59.60, CL CONST.

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
SR 31 Mainline	50+00.00		108+59.60	150	80.6	0	4	4.0	0	24	15.203	4.985	20.188
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
Quadrant Alternative	+.00		12+22.50	150	80.56	0	4	4.0	0	0	2.485	1.727	4.213
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.000	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
SUBTOTAL:											***17.69***	***6.71***	***24.40***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
* Total area indicates actual area, Stationing indicates impervious area													
RDWY SUBTOTAL:											***17.69***	***6.71***	***24.40***
BASIN POND											***4.16***	***1.04***	***5.20***
TOTAL:											**21.85**	**7.75**	**29.60**

Note: Project areas have been verified by CADD shape files

PRE DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-C Dry Pond - SR 31 Area**

CONDITION: **PRE-DEVELOPMENT**

Soil Name and Hydrologic group	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN			Area acres	Product of CN x Area
		Tab. 2-2	Fig. 2-3	Fig. 2-4		
11 - Myakka fine sand (A/D) 36 - Immokalee sand-Urban land (B/D)	POND SITE PERVIOUS, Woods (Fair condition)	79			5.20	410.80
11 - Myakka fine sand (A/D) 36 - Immokalee sand-Urban land (B/D)	POND SITE IMPERVIOUS	98			0.00	0.00
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST ROADWAY SURFACE	98			5.40	528.75
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST AREA TO BECOME ROW, Woods (Fair condition)	79			19.01	1501.43
	Totals =				29.60	2440.98

CN = **82.5**

Use **82**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	2.20	
Runoff Depth (Q)	8.74	in.
Runoff Volume	21.57	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POST DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-C Dry Pond - SR 31 Area**

CONDITION: **POST-DEVELOPMENT**

Soil Name and Hydrologic group	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN			Area acres	Product of CN x Area
		Tab. 2-2	Fig. 2-3	Fig. 2-4		
11 - Myakka fine sand (A/D) 36 - Immokalee sand-Urban land (B/D)	POND SITE PERVIOUS Propose Pond Surface at ESHGWT	80			1.04	83.20
11 - Myakka fine sand (A/D) 36 - Immokalee sand-Urban land (B/D)	POND SITE IMPERVIOUS At Control Elevation	100			4.16	416.00
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW PERVIOUS Good condition	80			6.71	536.99
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW IMPERVIOUS Proposed Pavement	98			17.69	1733.49
		Totals =			29.60	2769.67

CN = 93.6
Use **94**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	0.64	
Runoff Depth (Q)	10.27	in.
Runoff Volume	25.33	ac-ft
ATTENUATION VOLUME	**3.76**	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POLLUTION ABATEMENT VOLUME

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

BASIN 1 / POND 1-C - Dry Pond SR 31 Area

BASIN LIMITS: STA. 50+00.00 to STA 108+59.60 , CL CONST.

TOTAL BASIN AREA: 29.60 AC.

IMPERVIOUS COVERAGE: 21.85 AC.

1st inch of runoff - 50% less for Dry Retention	**0.12**	ac-ft
Site area for water quality pervious/impervious calculations only	24.40	ac of site area for water quality pervious/imperious
Impervious area for water quality pervious/impervious calculations only	21.85	ac of site area for water quality pervious/imperious
Percentage of imperviousness for water quality	89.54%	impervious
2.5 inches times the runoff from the impervious area - 50% less for Dry Retention	**2.28**	ac-ft

2.28 ac-ft Volume controls

POND STAGE / STORAGE CALCULATIONS

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

POND: **1-C Dry Pond - SR 31 Area**

PARCEL: **10300447 & 10300449**

DESCRIPTION: ALTERNATIVE 1-C

POND BOTTOM EL.	6.00
BOTTOM LENGTH	562.00 FT
BOTTOM WIDTH	298.00 FT
TOP LENGTH	586.00 FT
TOP WIDTH	322.00 FT
FRONT SLOPE (?:1)	4.00
BACK SLOPE (?:1)	4.00
INC. OF STAGE TREAT.	0.08
INC. OF STAGE ATTN.	0.24

STAGE (ELEV.)	AREA (SQ-FT)	VOLUME (CU-FT)	VOLUME (AC-FT)	
6.00	**167476**	0		Control Elevation
6.08	168139	13425	0.31	
6.16	168802	26902	0.62	
6.24	169465	40433	0.93	
6.32	170128	54017	1.24	
6.40	170791	67653	1.55	
6.48	171454	81343	1.87	
6.56	172117	95086	2.18	
6.64	172780	108882	**2.50**	WQ Treatment Volume Elevation
6.88	174769	150588	3.46	
7.12	176758	192771	4.43	
7.36	178747	235432	5.40	
7.60	180736	278570	**6.40**	Peak Attenuation Volume
7.84	182725	322185	7.40	
8.08	184714	366278	8.41	
8.32	186703	410848	9.43	
8.56	**188692**	455895	10.47	Top of Bank

Treatment Volume Required =	**2.28**	ac-ft
Attenuation Volume Required =	**3.76**	ac-ft
Treatment Volume Provided =	**2.50**	ac-ft
Attenuation Volume Provided =	**3.90**	ac-ft

Pond Area = 5.20 Acres

Pond dimensions times 1.20 to account for maintenance berms, access and tieing back into existing ground.

Head Losses represented by conservative 0.0005 ft/ft. Distance from low point along SR 31 to dry pond is approximatley 1/10 mile. Proposed low point along SR 31 is approximatley 10'; 7.60+(565'*0.0005ft/ft) = 7.88' 7.88'<10'

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area [2/]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.
2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2c Runoff curve numbers for other agricultural lands [1]

Cover description: Cover type	Hydrologic condition	Curve numbers for hydrologic soil group: A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4]	48	65	73
Woods—grass combination (orchard or tree farm). [5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.
3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4 Actual curve number is less than 30; use CN = 30 for runoff computations.
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Lee County, Florida

SMF Alt 1-C

April 19, 2022

Soil Map


81° 45' 30" W
81° 45' 22" W
26° 42' 19" N
26° 42' 14" N
424550
424570
424590
424610
424630
424650
424670
424690
424710
424730
424750
424770
2954010
2953990
2953970
2953950
2953930
2953910
2953890
2953870
36
11
45
Soil Map may not be valid at this scale.
Map Scale: 1:1,100 if printed on A landscape (11" x 8.5") sheet.
Meters
0
15
30
60
90
Feet
0
50
100
200
300
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
11	Myakka fine sand, 0 to 2 percent slopes	3.6	57.0%
36	Immokalee sand-Urban land complex, 0 to 2 percent slopes	2.7	41.8%
45	Copeland fine sandy loam, frequently ponded, 0 to 1 percent slopes	0.1	1.3%
Totals for Area of Interest		**6.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate

Lee County, Florida

11—Myakka fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2s3lg
Elevation: 0 to 130 feet
Mean annual precipitation: 42 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Myakka and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myakka

Setting

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

Typical profile

A - 0 to 6 inches: fine sand
E - 6 to 20 inches: fine sand
Bh - 20 to 36 inches: fine sand
C - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

36—Immokalee sand-Urban land complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2x9c1
Elevation: 0 to 150 feet
Mean annual precipitation: 42 to 68 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 355 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Immokalee and similar soils: 43 percent
Urban land: 35 percent
Minor components: 22 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Immokalee

Setting

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

Typical profile

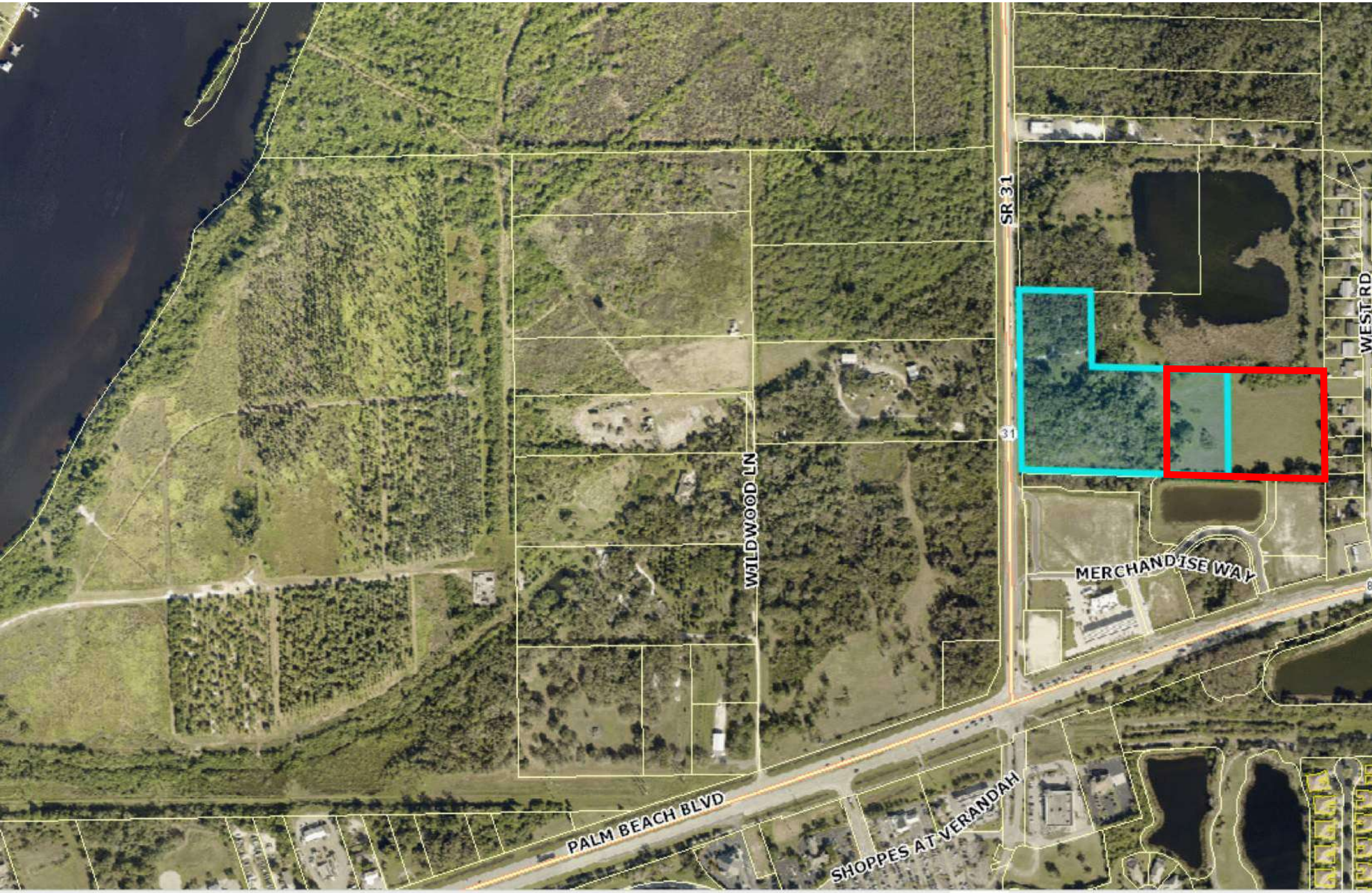
A - 0 to 9 inches: sand
E - 9 to 36 inches: sand
Bh - 36 to 55 inches: sand
C - 55 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

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



Folio	Owner Name	Site Address	Last Trans. Date	Last Trans. Amt	Just Value	Taxable Value
10300447	JAMSCAG INVESTMENT LLC	16400 STATE ROAD 31, FORT MYERS	5-2014	$ 450,000	$ 164,063	$ 45,951

BASIN 1 / POND 1-C

Wet Detention Pond Calculations

BASIN 1 / POND 1-C WET POND - SR 80 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PRE DEVELOPMENT CONDITION

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00, CL

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
SR 80 Mainline	394+34.25		440+00.00	175.33	80	10	0	4.0	0	0	9.876	8.502	18.377
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
Additional ROW	12+22.50		22+63.38	99.5	83	0	0	0.0	0	0	1.99	0.39	2.38
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
SUBTOTAL:											***11.86***	***8.89***	***20.75***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
RDWY SUBTOTAL:											***11.86***	***8.89***	***20.75***
BASIN POND											***0.00***	***4.35***	***4.35***
TOTAL:											**11.86**	**13.24**	**25.10**

Note: Project areas have been verified by CADD shape files

BASIN 1 / POND 1-C WET POND - SR 80 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

<u>POST DEVELOPMENT CONDITION</u>

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00, CL CONST.

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH						IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
					TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)			
SR 80 Mainline	394+34.25		440+00.00	175	80.2	10	0	4.0	0	0	9.88	8.50	18.38
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
Quadrant Alternative	12+22.50		22+63.38	100	75.15	0	4	4.0	0	0	1.99	0.39	2.38
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.000	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
SUBTOTAL:											***11.86***	***8.89***	***20.75***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
* Total area indicates actual area, Stationing indicates impervious area													
RDWY SUBTOTAL:											***11.86***	***8.89***	***20.75***
BASIN POND											***3.48***	***0.87***	***4.35***
TOTAL:											**15.34**	**9.76**	**25.10**

Note: Project areas have been verified by CADD shape files

PRE DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-C Wet Pond - SR 80 Area**

CONDITION: **PRE-DEVELOPMENT**

Soil Name and Hydrologic group	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN			Area acres	Product of CN x Area
		Tab. 2-2	Fig. 2-3	Fig. 2-4		
11 - Myakka fine sand (A/D) 36 - Immokalee sand-Urban land (B/D)	POND SITE PERVIOUS, Woods (Fair condition)	79			4.35	343.65
11 - Myakka fine sand (A/D) 36 - Immokalee sand-Urban land (B/D)	POND SITE IMPERVIOUS	98			0.00	0.00
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST ROADWAY SURFACE	98			11.86	1162.53
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST AREA TO BECOME ROW, Woods (Fair condition)	79			8.89	702.49
		Totals =			25.10	2208.67

CN = **88.0**

Use **88**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	1.36	
Runoff Depth (Q)	9.52	in.
Runoff Volume	19.91	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POST DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-C Wet Pond - SR 80 Area**

CONDITION: **POST-DEVELOPMENT**

Soil Name and Hydrologic group	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
11 - Myakka fine sand (A/D) 36 - Immokalee sand-Urban land (B/D)	POND SITE PERVIOUS Berm and Slopes	80			0.87	69.60
11 - Myakka fine sand (A/D) 36 - Immokalee sand-Urban land (B/D)	POND SITE IMPERVIOUS At Control Elevation	100			3.48	348.00
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW PERVIOUS Good condition	80			8.89	711.38
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW IMPERVIOUS Proposed Pavement	98			11.86	1162.53
		Totals =			25.10	2291.51

CN = **91.3**

Use **91**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	0.99	
Runoff Depth (Q)	9.90	in.
Runoff Volume	20.70	ac-ft
ATTENUATION VOLUME	**0.79**	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POLLUTION ABATEMENT VOLUME

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

BASIN 1 / POND 1-C - Wet Pond, SR 80 Area

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00, CL CONST.

TOTAL BASIN AREA: 25.10 AC.

IMPERVIOUS COVERAGE: 15.34 AC.

1st inch of runoff	**2.09**	ac-ft
Site area for water quality pervious/impervious calculations only	20.75	ac of site area for water quality pervious/impervious
Impervious area for water quality pervious/impervious calculations only	15.34	ac of site area for water quality pervious/impervious
Percentage of imperviousness for water quality	73.92%	impervious
2.5 inches times the runoff from the impervious area	**3.20**	ac-ft

3.20 ac-ft Volume controls

POND STAGE / STORAGE CALCULATIONS-WET

BASIN 1 / POND 1-C - Wet Pond, SR 80 Area

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PARCEL: 10300447 & 10300449

DESCRIPTION: ALTERNATIVE 1-C

Control Elevation	3.70	=	Seasonal High Water Elevation
BOTTOM LENGTH	557.00 FT		
BOTTOM WIDTH	242.00 FT		
TOP LENGTH	585.00 FT		
TOP WIDTH	270.00 FT		
FRONT SLOPE (?:1)	4.00		
BACK SLOPE (?:1)	4.00		
INC. OF STAGE TREAT.	0.13		
INC. OF STAGE ATTN.	0.06		

STAGE (ELEV.)	AREA (SQ-FT)	VOLUME (CU-FT)	VOLUME (AC-FT)	
3.70	**134794**	0		Control Elevation
3.83	136808	17383	0.40	
3.96	138821	35023	0.80	
4.08	140835	52921	1.21	
4.21	142848	71076	1.63	
4.34	144862	89490	2.05	
4.47	146875	108161	2.48	
4.60	148889	127090	2.92	
4.72	150903	146277	**3.36**	WQ Treatment Volume Elevation
4.78	151783	154752	3.55	
4.84	152664	163276	3.75	
4.89	153545	171850	3.95	
4.95	154426	180473	**4.14**	Peak Attenuation Volume
5.00	155307	189146	4.34	
5.06	156188	197868	4.54	
5.12	157069	206639	4.74	
5.17	**157950**	215460	4.95	Top of Bank

Treatment Volume Required =	**3.20**	ac-ft
Attenuation Volume Required =	**0.79**	ac-ft
Treatment Volume Provided =	**3.36**	ac-ft
Attenuation Volume Provided =	**0.79**	ac-ft

Pond Area = 4.35 Acres

Pond dimensions times 1.20 to account for maintenance berms, access and tieing back into existing ground.

Head Losses represented by conservative 0.0005 ft/ft. Distance from low point along SR 50 to wet pond is approximately 1/4 mile. Low point along SR 80 is approximatley 5.70'; 4.95'+(1500'*0.0005ft/ft) = 5.7'

POND STAGE / STORAGE CALCULATIONS-WET POND PERMANENT POOL COMPUATATION

BASIN 1 / POND 1-C - Wet Pond, SR 80 Area

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PARCEL: **10300447 & 10300449**

DESCRIPTION: ALTERNATIVE 1-C

SHGWT Elevation 3.70
LITTORAL ZONE -2.30

INC. OF STAGE TREAT. 0.45
INC. OF STAGE ATTN. 0.40

STAGE (ELEV.)	AREA (SQ-FT)	AREA (AC)	VOLUME (CU-FT)	VOLUME (AC-FT)	
-2.30	**64372**	**1.478**	0	0.00	
-1.85	69654	1.599	30156	0.69	
-1.40	74935	1.720	62688	1.44	
-0.95	80217	1.842	97598	2.24	
-0.50	85499	1.963	134884	3.10	
-0.05	90780	2.084	174546	4.01	
0.40	96062	2.205	216586	4.97	
0.85	101344	2.327	261002	5.99	
1.30	106625	2.448	307795	**7.07**	
1.70	111320	2.556	351384	8.07	
2.10	116015	2.663	396851	9.11	
2.50	120710	2.771	444196	10.20	
2.90	125404	2.879	493419	11.33	
3.30	130099	2.987	544519	12.50	
3.70	134794	3.094	597498	**13.72**	Control Elevation
3.70	**134794**	**3.094**	597498	**13.72**	Inside Top of Bank

NUTRIENT LOADING CALCULATIONS

Complete Report (not including cost) Ver 4.3.5

Project: SR 31 Pond - Alt. C
Date: 6/20/2022 7:32:01 AM

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	Pond Alt 1-C - Dry	Pond Alt 1-C - Wet
Rainfall Zone	Florida Zone 4	Florida Zone 4
Annual Mean Rainfall	51.50	51.50

Pre-Condition Landuse Information

Landuse	User Defined Values	User Defined Values
Area (acres)	29.60	25.10
Rational Coefficient (0-1)	0.15	0.23
Non DCIA Curve Number	82.00	88.00
DCIA Percent (0-100)	0.00	0.00
Nitrogen EMC (mg/l)	1.750	1.850
Phosphorus EMC (mg/l)	0.220	0.270
Runoff Volume (ac-ft/yr)	19.157	25.034
Groundwater N (kg/yr)	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000
Nitrogen Loading (kg/yr)	41.335	57.105
Phosphorus Loading (kg/yr)	5.196	8.334

Post-Condition Landuse Information

Landuse	Highway: TN=1.520 TP=0.200	Highway: TN=1.520 TP=0.200
Area (acres)	29.60	25.10
Rational Coefficient (0-1)	0.82	0.58
Non DCIA Curve Number	80.00	80.00
DCIA Percent (0-100)	100.00	65.40
Wet Pond Area (ac)	0.00	4.35
Nitrogen EMC (mg/l)	1.520	1.520
Phosphorus EMC (mg/l)	0.200	0.200
Runoff Volume (ac-ft/yr)	104.548	51.900
Groundwater N (kg/yr)	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000

Nitrogen Loading (kg/yr)	195.940	97.268
Phosphorus Loading (kg/yr)	25.782	12.798

Catchment Number: 1 Name: Pond Alt 1-C - Dry

Project: SR 31 Pond - Alt. C
Date: 6/20/2022

Retention Design

Retention Depth (in)	1.190
Retention Volume (ac-ft)	2.935

Watershed Characteristics

Catchment Area (acres)	29.60
Contributing Area (acres)	29.600
Non-DCIA Curve Number	80.00
DCIA Percent	100.00
Rainfall Zone	Florida Zone 4
Rainfall (in)	51.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	79
Provided TN Treatment Efficiency (%)	71
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	71

Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	139.408
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	18.343
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)

Load		Treatment		Surface Discharge
N: 195.94 kg/yr	→	N: 71 %	→	N: 56.53 kg/yr
P: 25.78 kg/yr		P: 71 %		P: 7.44 kg/yr
		↓		Mass Reduction N: 139.41 kg/yr P: 18.34 kg/yr

Load Diagram for Retention (As Used In Routing)

Upstream Nodes	Load		Treatment		Mass Discharged
None	N: 195.94 kg/yr P: 25.78 kg/yr Q: 104.55 ac-ft	→	N: 71.1 % P: 71.1 %	→	N: 56.53 kg/yr P: 7.44 kg/yr Q: 30.16 ac-ft
			↓		
			Mass Removed N: 139.41 kg/yr P: 18.34 kg/yr		

Catchment Number: 2 Name: Pond Alt 1-C - Wet

Project: SR 31 Pond - Alt. C
Date: 6/20/2022

Wet Detention with Littoral Shelf Design

Permanent Pool Volume (ac-ft)	13.070
Permanent Pool Volume (ac-ft) for 31 days residence	4.408
Annual Residence Time (days)	92
Littoral Zone Efficiency Credit	10
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	25.10
Contributing Area (acres)	20.750
Non-DCIA Curve Number	80.00
DCIA Percent	65.40
Rainfall Zone	Florida Zone 4
Rainfall (in)	51.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	41
Provided TN Treatment Efficiency (%)	44
Required TP Treatment Efficiency (%)	35
Provided TP Treatment Efficiency (%)	69

Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	0.000
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

Load Diagram for Wet Detention with Littoral Shelf (stand-alone)

Load
N: 25.47 kg/yr →
P: 3.35 kg/yr

Treatment
N: 44 % →
P: 69 %

Surface Discharge
N: 14.20 kg/yr
P: 1.05 kg/yr

↓

Mass Reduction
N: 11.27 kg/yr
P: 2.30 kg/yr

Load Diagram for Wet Detention (As Used In Routing)

Upstream Nodes	Load		Treatment		Mass Discharged
	Load				Mass Discharged
Upstream Nodes	N: 153.80 kg/yr		Treatment		N: 85.73 kg/yr
Node: 1	P: 20.24 kg/yr	→	N: 44.3 %	→	P: 6.33 kg/yr
	Q: 82.06 ac-ft		P: 68.7 %		Q: 82.06 ac-ft

↓

Mass Removed
N: 68.08 kg/yr
P: 13.91 kg/yr

Summary Treatment Report Version: 4.3.5

Project: SR 31 Pond - Alt. C

Analysis Type: Net Improvement
BMP Types:
Catchment 1 - (Pond Alt 1-C - Dry) Retention
Catchment 2 - (Pond Alt 1-C - Wet) Wet Detention with Littoral Shelf
Based on % removal values to the nearest percent

Date:6/20/2022

Routing Summary
Catchment 1 Routed to Catchment 2
Catchment 2 Routed to Outlet

Total nitrogen target removal met? **Yes**
Total phosphorus target removal met? **Yes**

Summary Report

Nitrogen

Surface Water Discharge

Total N pre load	98.44 kg/yr
Total N post load	293.21 kg/yr

Target N load reduction	66 %	
Target N discharge load	98.44 kg/yr	
Percent N load reduction	71 %	
Provided N discharge load	85.73 kg/yr	189.02 lb/yr
Provided N load removed	207.48 kg/yr	457.5 lb/yr

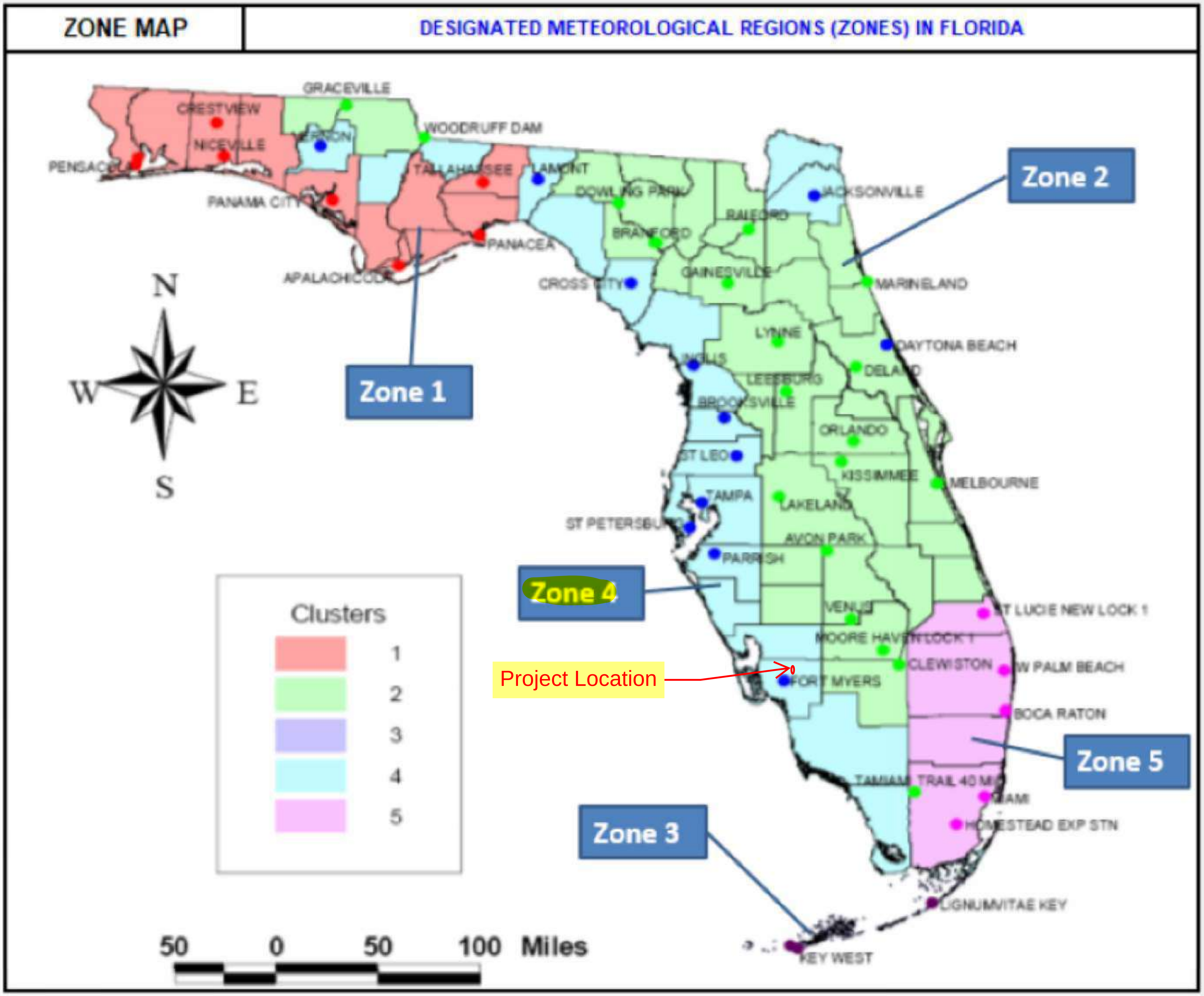
Phosphorus

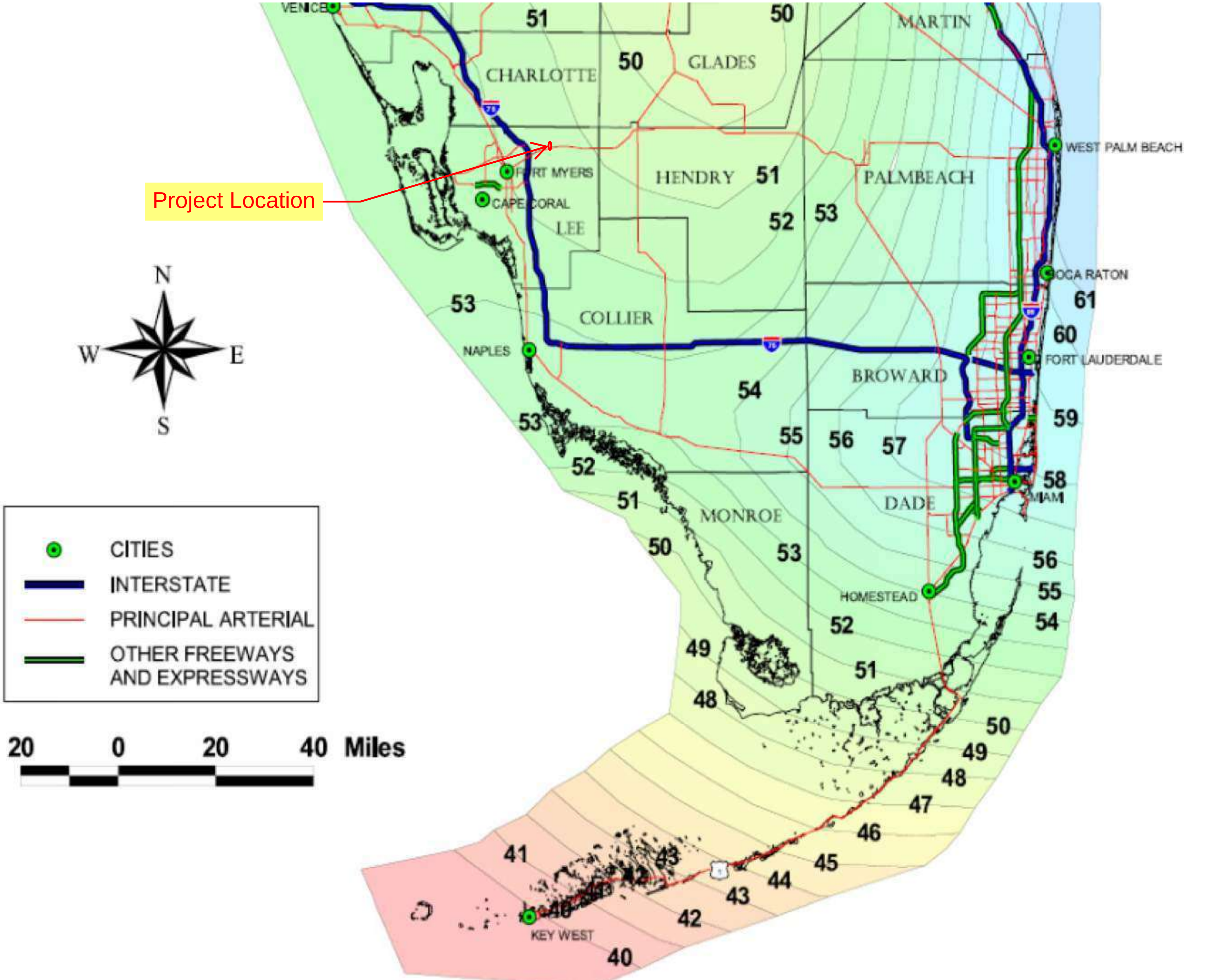
Surface Water Discharge

Total P pre load	13.531 kg/yr	
Total P post load	38.58 kg/yr	
Target P load reduction	65 %	
Target P discharge load	13.531 kg/yr	
Percent P load reduction	84 %	
Provided P discharge load	6.328 kg/yr	13.95 lb/yr
Provided P load removed	32.252 kg/yr	71.117 lb/yr

NUTRIENT LOADING CALCULATIONS

Resource Documentation


ZONE MAP
DESIGNATED METEOROLOGICAL REGIONS (ZONES) IN FLORIDA
Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Project Location
Clusters
1
2
3
4
5
N
S
E
W
50 0 50 100 Miles
GRACEVILLE
CRESTVIEW
WOODRUFF DAM
NICEVILLE
PENSACOLA
TALLAHASSEE
LAMONT
PANAMA CITY
DOWLING PARK
JACKSONVILLE
RAIFORD
BRANFORD
PANACEA
APALACHICOLA
GAINESVILLE
CROSS CITY
MARINELAND
LYNNE
DAYTONA BEACH
INGLIS
DELAND
LEESBURG
BROOKSVILLE
ORLANDO
ST LEO
KISSIMMEE
MELBOURNE
TAMPA
LAKELAND
ST PETERSBURG
AVON PARK
PARRISH
VENUS
ST LUCIE NEW LOCK 1
MOORE HAVEN LOCK 1
CLEWISTON
W PALM BEACH
FORT MYERS
BOCA RATON
TAMIAMI TRAIL 40 MI
MIAMI
HOMESTEAD EXP STN
LIGNUMVITAE KEY
KEY WEST



MEAN ANNUAL RAINFALL MAP

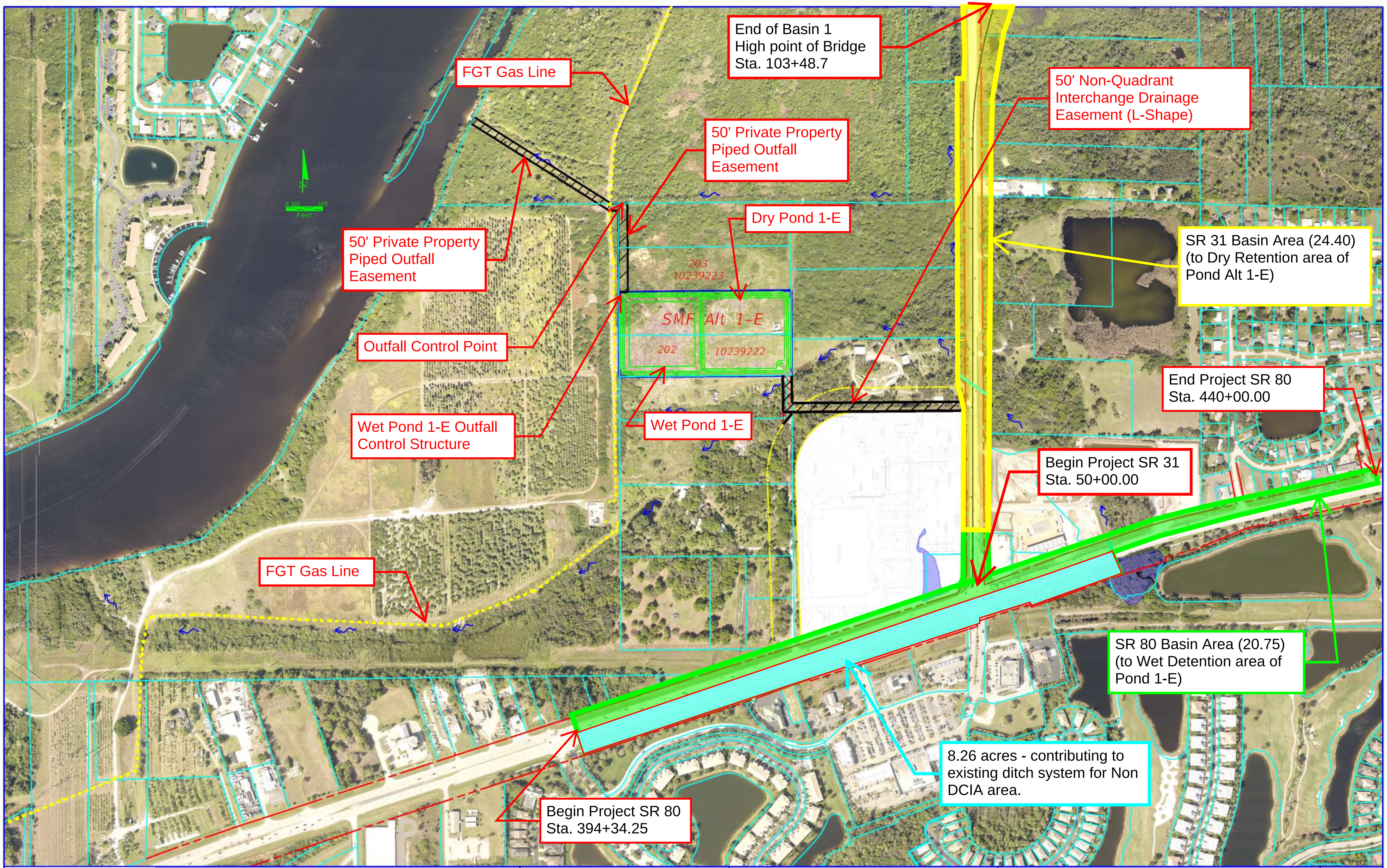
SR 31 Pond Siting Report

Customized Nutrient Loading Calculations - Pre-Developed Conditions

Pond Alternative	Basin 1 - Land Use Areas (Ac)					Nitrogen (mg/l)					Phosphorus (mg/l)					Composite Nutrient Values	
	Roadway	Pond Area	Undeveloped	Water	Total Area (Ac)	Highway	Agricultural Pasture	Ruderal / Upland	Undeveloped Wet Flatwoods	Undeveloped Wet Prairie	Highway	Agricultural Pasture	Ruderal / Upland	Undeveloped Wet Flatwoods	Undeveloped Wet Prairie	Nitrogen (mg/l)	Phosphorous (mg/l)
1-A Wet	19.36	8.84	1.40	7.00	29.59	1.52	3.51		1.21		0.20	0.69		0.02		1.66	0.23
1-A Dry	13.23	7.24	11.17	4.00	31.64	1.52	3.51		1.21		0.20	0.69		0.02		1.25	0.18
1-B Wet	19.36	4.89	1.40	2.80	25.64	1.52			1.21		0.20			0.02		1.47	0.18
1-B Dry	13.23	6.07	11.17	0.00	30.47	1.52			1.21		0.20			0.02		1.35	0.10
1-C Wet	19.36	4.35	1.40	0.00	25.10	1.52	3.51		1.21		0.20	0.69		0.02		1.85	0.27
1-C Dry	13.23	5.20	11.17	0.00	29.60	1.52	3.51		1.21		0.20	0.69		0.02		1.75	0.22
1-E Wet	19.36	4.85	1.40	0.00	25.60	1.52		1.69	1.21		0.20		0.16	0.02		1.54	0.18
1-E Dry	13.23	5.48	11.17	0.00	29.88	1.52		1.69	1.21		0.20		0.16	0.02		1.44	0.13
1-F Wet	19.36	4.51	1.40	0.00	25.26	1.52			1.21		0.20			0.02		1.45	0.16
1-F Dry	13.23	5.92	11.17	0.00	30.32	1.52			1.21		0.20			0.02		1.35	0.10

POND 1-E

Pond Design & Nutrient Loading Calculations



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

FDOT

DRMP, Inc.
941 Lake Baldwin Ln.
Orlando, FL 32814
www.drmp.com
Phone: 407-896-0594
Fax: 407-896-4836

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

SMF 1-E ALTERNATIVE MAP

SHEET NO.

JSheets 6/6/2022 3:40:55 PM Default

BASIN 1 / POND 1-E

Dry Retention Pond Calculations

Resource Documentation

BASIN 1 / POND 1-E DRY POND AREA BREAKDOWN

	DATE
MADE BY: JH	03-Nov-22
CHCK BY: MJ	04-Nov-22

<u>PRE DEVELOPMENT CONDITION</u>

BASIN LIMITS: STA. 50+00.00 to STA 103+48.74 , CL

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
SR 31 Mainliner	50+00.00		103+48.74	116.33	32	12	0	0.0	0	0	5.395	8.889	14.284
Additional ROW	50+00.00		103+48.74	82	0	0	0	0.0	0	0	0.00	10.12	10.12
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
SUBTOTAL:											***5.40***	***19.01***	***24.40***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
RDWY SUBTOTAL:											***5.40***	***19.01***	***24.40***
BASIN POND											***0.00***	***5.48***	***5.48***
TOTAL:					`						**5.40**	**24.49**	**29.88**

Note: Project areas have been verified by CADD shape files

BASIN 1 / POND 1-E DRY POND AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

POST DEVELOPMENT CONDITION

BASIN LIMITS: STA. 50+00.00 to STA 108+59.60, CL CONST.

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
SR 31 Mainliner	50+00.00		108+59.60	150	80.6	0	4	4.0	0	24	15.203	4.985	20.188
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
Quadrant Alternative	+.00		12+22.50	150	80.56	0	4	4.0	0	0	2.485	1.727	4.213
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.000	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
SUBTOTAL:											***17.69***	***6.71***	***24.40***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
* Total area indicates actual area, Stationing indicates impervious area													
RDWY SUBTOTAL:											***17.69***	***6.71***	***24.40***
BASIN POND											***4.38***	***1.10***	***5.48***
TOTAL:											**22.07**	**7.81**	**29.88**

Note: Project areas have been verified by CADD shape files

PRE DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-E**

CONDITION: **PRE-DEVELOPMENT**

Soil Name and Hydrologic group	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN			Area acres	Product of CN x Area
		Tab. 2-2	Fig. 2-3	Fig. 2-4		
144 - Caloosa fine sand (A)	POND SITE PERVIOUS, Pasture / Woods (Fair condition)	79			5.48	432.92
144 - Caloosa fine sand (A)	POND SITE IMPERVIOUS	98			0.00	0.00
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST ROADWAY SURFACE	98			5.40	528.75
7 - Matlacha gravelly fine sand (B) 35 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST AREA TO BECOME ROW, Woods (Good condition)	77			19.01	1463.42
		Totals =			29.88	2425.09

CN = **81.2**

Use **81**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	2.35	
Runoff Depth (Q)	8.61	in.
Runoff Volume	21.45	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POST DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-E**

CONDITION: **POST-DEVELOPMENT**

Soil Name and Hydrologic group	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN			Area acres	Product of CN x Area
		Tab. 2-2	Fig. 2-3	Fig. 2-4		
144 - Caloosa fine sand (A)	POND SITE PERVIOUS Berms and Slopes above NWL	80			1.10	87.68
144 - Caloosa fine sand (A)	POND SITE IMPERVIOUS At Control Elevation	100			4.38	438.40
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW PERVIOUS Good condition	80			6.71	536.99
7 - Matlacha gravelly fine sand (B) 35 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW IMPERVIOUS Proposed Pavement	98			17.69	1733.49
		Totals =			29.88	2796.55

CN = **93.6**

Use **94**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	0.64	
Runoff Depth (Q)	10.27	in.
Runoff Volume	25.57	ac-ft
ATTENUATION VOLUME	**4.13**	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POLLUTION ABATEMENT VOLUME

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

BASIN 1 / POND 1-E Dry Pond, SR 31 Area

BASIN LIMITS: STA. 50+00.00 to STA 108+59.60, CL CONST.

TOTAL BASIN AREA: 29.88 AC.

IMPERVIOUS COVERAGE: 22.07 AC.

1st inch of runoff - 50% less for Dry retention	**1.25**	ac-ft
Site area for water quality pervious/impervious calculations only	24.40	ac of site area for water quality pervious/imperious
Impervious area for water quality pervious/impervious calculations only	22.07	ac of site area for water quality pervious/imperious
Percentage of imperviousness for water quality	90.46%	impervious
2.5 inches times the runoff from the impervious area - 50% less for Dry retention	**2.30**	ac-ft

2.30 ac-ft Volume controls

POND STAGE / STORAGE CALCULATIONS-DRY POND

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

BASIN 1 / POND 1-E

PARCEL: **10239222 & 1039223**

DESCRIPTION: ALTERNATIVE 1-E

POND BOTTOM EL.	3.10
BOTTOM LENGTH	450.00 FT
BOTTOM WIDTH	396.00 FT
TOP LENGTH	474.00 FT
TOP WIDTH	420.00 FT
FRONT SLOPE (?:1)	4.00
BACK SLOPE (?:1)	4.00
INC. OF STAGE TREAT.	0.09
INC. OF STAGE ATTN.	0.25

STAGE (ELEV.)	AREA (SQ-FT)	VOLUME (CU-FT)	VOLUME (AC-FT)	
3.10	**178200**	0		Control Elevation
3.19	178833	16066	0.37	
3.28	179465	32190	0.74	
3.37	180098	48370	1.11	
3.46	180731	64608	1.48	
3.55	181364	80902	1.86	
3.64	181996	97253	2.23	
3.73	182629	113661	2.61	
3.82	183262	130126	**2.99**	WQ Treatment Volume Elevation
4.07	185019	176161	4.04	
4.32	186777	222636	5.11	
4.57	188535	269550	6.19	
4.82	190292	316903	**7.28**	Peak Attenuation Volume
5.07	192050	364696	8.37	
5.32	193807	412928	9.48	
5.57	195565	461600	10.60	
5.82	197322	510710	11.72	
6.07	**199080**	560261	12.86	Inside Top of Bank

Treatment Volume Required =	**2.30**	ac-ft	50% less for Dry retention
Attenuation Volume Required =	**4.13**	ac-ft	
Treatment Volume Provided =	**2.99**	ac-ft	
Attenuation Volume Provided =	**4.29**	ac-ft	

Pond Area = 5.48 Acres

Pond dimensions times 1.20 to account for maintenance berms, access and tieing back into existing ground.

Head Losses represented by conservative 0.0005 ft/ft. Distance from low point along SR 31 to dry pond is approximately 1/4 mile. Proposed low point along SR 31 is approximatley 10'; 4.82'+(1320'*0.0005ft/ft) = 4.88' 4.88' < 10.00'

Aerial and Contour Map
SMF Alternative 1-E

6/11/2022, 3:47:49 PM

Parcel Labels
Government Land Labels
Mobile Home Parks
Condo Building
Parcel Hooks
Parcel Lines
Street Number
Easements
Contour Lines
Hydrology
Section Lines
Labels
Lines
Coastal Range Monuments
Coastline

1:2,257

0 0.01 0.03 0.06 mi

0 0.03 0.05 0.1 km

University of South Florida, County of Lee, FL, FDEP, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA |

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2/]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.
2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.
3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4 Actual curve number is less than 30; use CN = 30 for runoff computations.
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

United States Department of Agriculture

NRCS

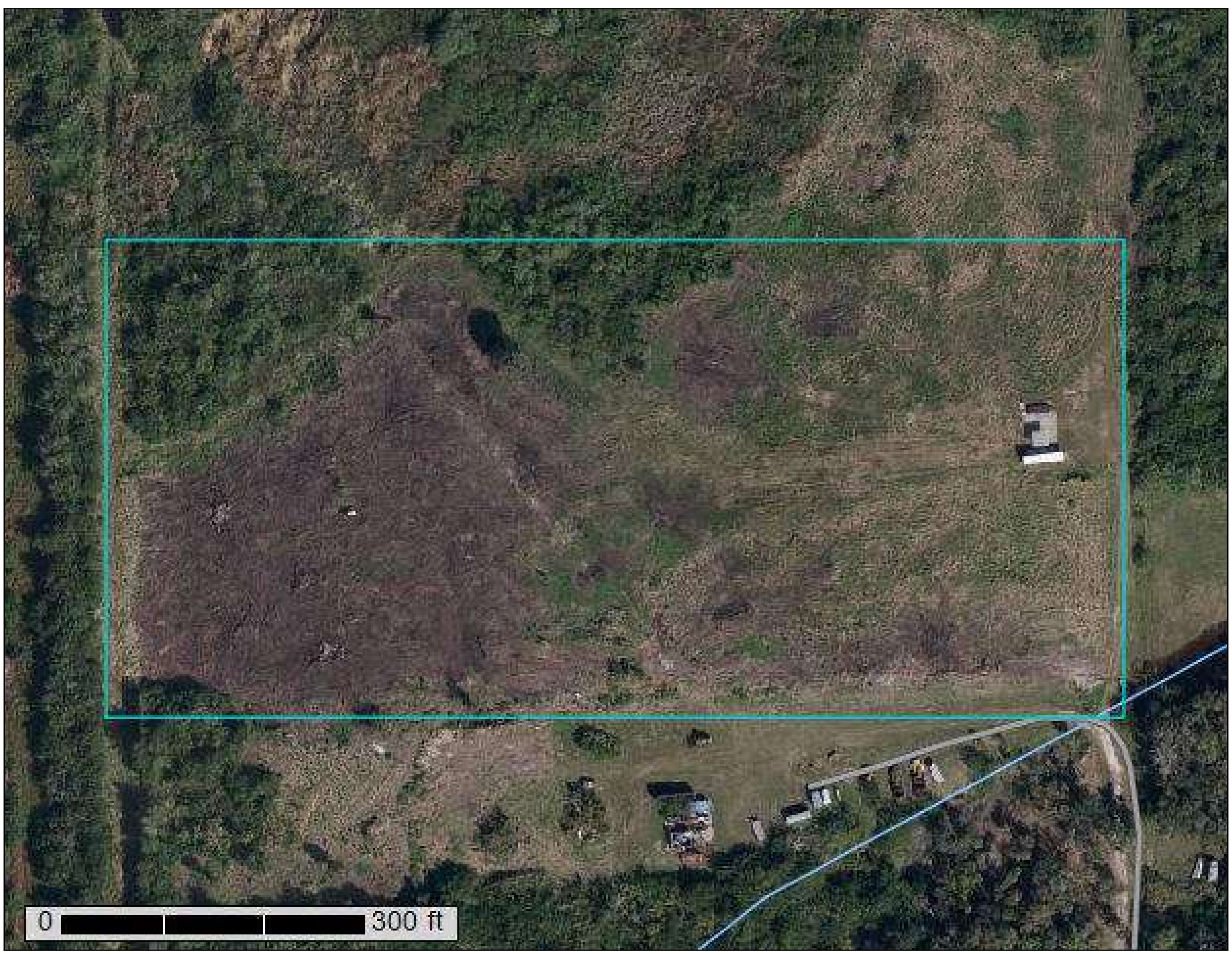
Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

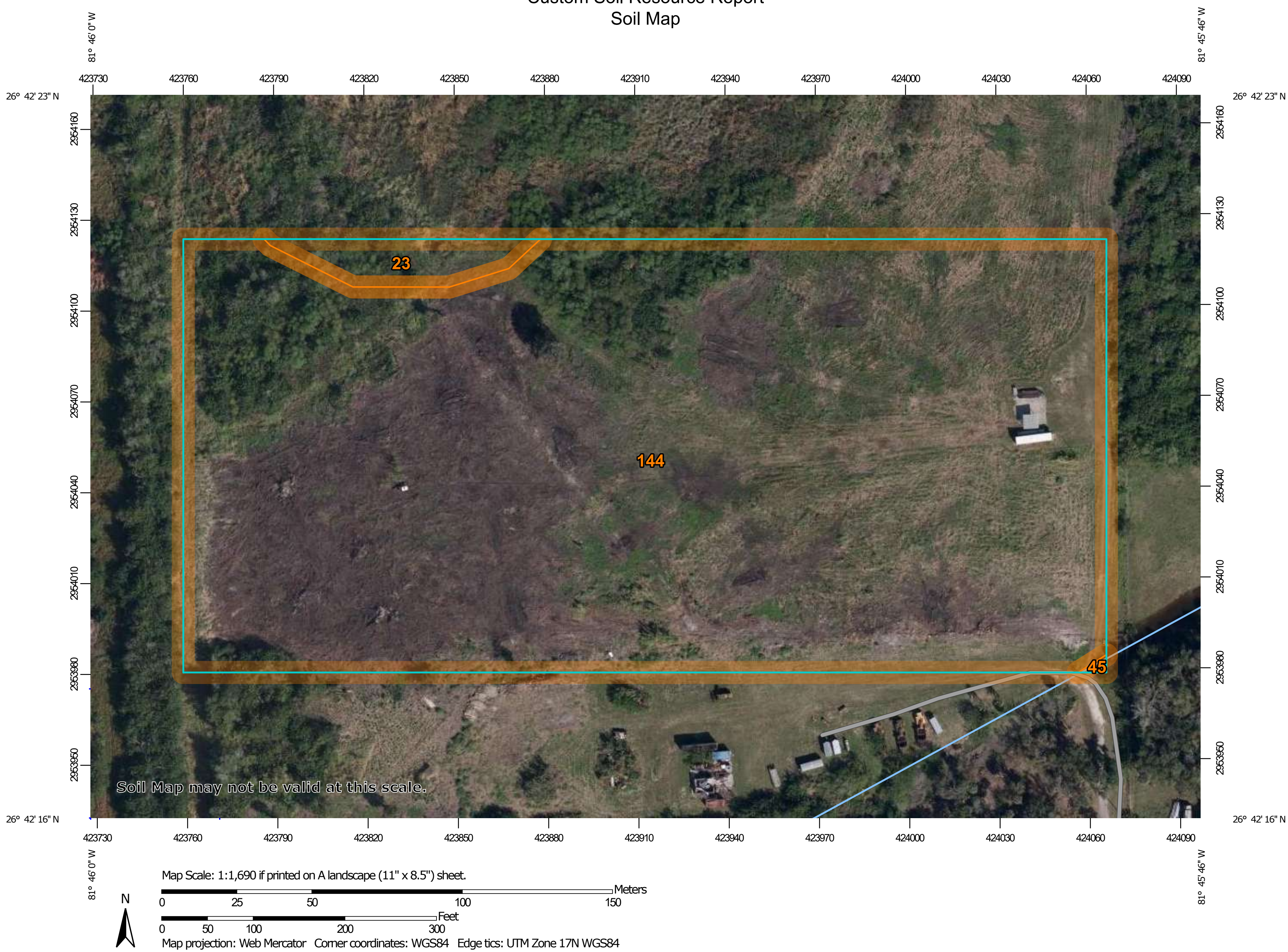
Lee County, Florida

SMF Alt. 1-E



April 19, 2022

Soil Map



Map Scale: 1:1,690 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

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

MAP LEGEND

Area of Interest (AOI)
Area of Interest (AOI)

Soils
Soil Map Unit Polygons
Soil Map Unit Lines
Soil Map Unit Points

Special Point Features
Blowout
Borrow Pit
Clay Spot
Closed Depression
Gravel Pit
Gravelly Spot
Landfill
Lava Flow
Marsh or swamp
Mine or Quarry
Miscellaneous Water
Perennial Water
Rock Outcrop
Saline Spot
Sandy Spot
Severely Eroded Spot
Sinkhole
Slide or Slip
Sodic Spot
Spoil Area
Stony Spot
Very Stony Spot
Wet Spot
Other
Special Line Features

Water Features
Streams and Canals

Transportation
Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background
Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lee County, Florida
Survey Area Data: Version 19, Aug 25, 2021

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

Date(s) aerial images were photographed: Feb 1, 2020—Mar 20, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
23	Wulfert muck, tidal, 0 to 1 percent slopes	0.3	2.4%
45	Copeland fine sandy loam, frequently ponded, 0 to 1 percent slopes	0.0	0.1%
144	Caloosa fine sand, 0 to 2 percent slopes	10.6	97.5%
Totals for Area of Interest		**10.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

144—Caloosa fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2x9d8
Elevation: 0 to 30 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 360 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Caloosa and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caloosa

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Sandy and clayey dredge spoils

Typical profile

A - 0 to 10 inches: fine sand
C1 - 10 to 27 inches: fine sand
C2 - 27 to 80 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 13 to 47 inches to strongly contrasting textural stratification
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 14 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Forage suitability group: Forage suitability group not assigned (G155XB999FL)

	Folio	Owner Name	Site Address	Last Trans. Date	Last Trans. Amt	Just Value	Taxable Value
	10239222	OCCHIPINTI JOSEPH & JOANN L	WILDWOOD LN, FORT MYERS	4-2021	$ 179,500	$ 42,525	$ 42,52

BASIN / POND 1-E

Wet Detention Pond Calculations

BASIN 1 / POND 1-E Wet Pond - SR 80 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PRE DEVELOPMENT CONDITION

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00 , CL

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH						IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
					TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)			
SR 80 Mainliner	394+34.25		440+00.00	175.33	67	10	0	4.0	0	0	8.468	9.909	18.377
Additional ROW	12+22.50		22+63.38	100	83	0	0	0.0	0	0	1.99	0.39	2.38
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
SUBTOTAL:											***10.45***	***10.30***	***20.75***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
RDWY SUBTOTAL:											***10.45***	***10.30***	***20.75***
BASIN POND											***0.00***	***4.85***	***4.85***
TOTAL:					`						**10.45**	**15.15**	**25.60**

Note: Project areas have been verified by CADD shape files

BASIN 1 / POND 1-E Wet Pond - SR 80 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

POST DEVELOPMENT CONDITION

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00 , CL CONST.

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH						IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
					TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)			
SR 80 Mainline	394+34.25		440+00.00	175	80.2	10	0	4.0	0	0	9.876	8.502	18.377
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
Quadrant Alternative	12+22.50		22+63.38	100	75.15	0	4	4.0	0	0	1.987	0.391	2.378
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.000	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
SUBTOTAL:											***11.86***	***8.89***	***20.75***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
* Total area indicates actual area, Stationing indicates impervious area													
RDWY SUBTOTAL:											***11.86***	***8.89***	***20.75***
BASIN POND											***3.88***	***0.97***	***4.85***
TOTAL:											**15.74**	**9.86**	**25.60**

Note: Project areas have been verified by CADD shape files

PRE DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-E Wet Pond, SR 80 Area**

CONDITION: **PRE-DEVELOPMENT**

Soil Name and Hydrologic group	**Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)**	**CN**			**Area acres**	**Product of CN x Area**
		Tab. 2-2	**Fig. 2-3**	**Fig. 2-4**		
144 - Caloosa fine sand (A)	POND SITE PERVIOUS, Woods, (Fair condition)	79			4.85	383.15
144 - Caloosa fine sand (A)	POND SITE IMPERVIOUS	98			0.00	0.00
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST ROADWAY SURFACE	98			10.45	1024.58
7 - Matlacha gravelly fine sand (B) 35 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST AREA TO BECOME ROW, Woods (Good condition)	77			10.30	793.09
		Totals =			25.60	2200.83

CN = **86.0**

Use **86**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	1.63	
Runoff Depth (Q)	9.26	in.
Runoff Volume	19.76	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POST DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-E Wet Pond, SR 80 Area**

CONDITION: **POST-DEVELOPMENT**

Soil Name and Hydrologic group	**Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)**	**CN**			**Area acres**	**Product of CN x Area**
		Tab. 2-2	**Fig. 2-3**	**Fig. 2-4**		
144 - Caloosa fine sand (A)	POND SITE PERVIOUS Berms and Slopes above Pond Bottom	80			0.97	77.60
144 - Caloosa fine sand (A)	POND SITE IMPERVIOUS At Control Elevation	100			3.88	388.00
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW PERVIOUS Good condition	80			8.89	711.38
7 - Matlacha gravelly fine sand (B) 35 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW IMPERVIOUS Proposed Pavement	98			11.86	1162.53
		Totals =			25.60	2339.51

CN =	**91.4**	
Use	**91**	
25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	0.99	
Runoff Depth (Q)	9.90	in.
Runoff Volume	21.12	ac-ft
ATTENUATION VOLUME	**1.35**	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POLLUTION ABATEMENT VOLUME

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

BASIN 1 / POND 1-E: Wet Pond

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00, CL CONST.

TOTAL BASIN AREA: 25.60 AC.

IMPERVIOUS COVERAGE: 15.74 AC.

1st inch of runoff	**2.13**	ac-ft
Site area for water quality pervious/impervious calculations only	20.75	ac of site area for water quality pervious/imperious
Impervious area for water quality pervious/impervious calculations only	15.74	ac of site area for water quality pervious/imperious
Percentage of imperviousness for water quality	75.85%	impervious
2.5 inches times the runoff from the impervious area	**3.28**	ac-ft

3.28 ac-ft Volume controls

POND STAGE / STORAGE CALCULATIONS-WET

BASIN 1 / POND 1-E Wet Pond

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PARCEL: **10239222 & 1039223**

DESCRIPTION: ALTERNATIVE 1-E

Control Elevation	1.60	=	Seasonal High Water elevation
BOTTOM LENGTH	364.40 FT		
BOTTOM WIDTH	362.50 FT		
TOP LENGTH	420.40 FT		
TOP WIDTH	418.50 FT		
FRONT SLOPE (?:1)	4.00		
BACK SLOPE (?:1)	4.00		
INC. OF STAGE TREAT.	0.13		
INC. OF STAGE ATTN.	0.10		

STAGE (ELEV.)	AREA (SQ-FT)	VOLUME (CU-FT)	(AC-FT)	
1.60	**132095**	0		Control Elevation
1.73	134758	17345	0.40	
1.86	137422	35037	0.80	
1.99	140085	53075	1.22	
2.12	142748	71459	1.64	
2.25	145412	90190	2.07	
2.38	148075	109266	2.51	
2.51	150738	128689	2.95	
2.64	153402	148458	**3.41**	WQ Treatment Volume Elevation
2.74	155450	163901	3.76	
2.84	157499	179548	4.12	
2.94	159548	195401	4.49	
3.04	161596	211458	**4.85**	Peak Attenuation Volume
3.14	163645	227720	5.23	
3.24	165694	244187	5.61	
3.34	167743	260859	5.99	
3.44	169791	277735	6.38	
3.54	171840	294817	6.77	
3.64	173889	312103	7.16	
3.74	**175937**	329595	7.57	Inside Top of Bank

Treatment Volume Required = **3.28** ac-ft
Attenuation Volume Required = **1.35** ac-ft

Treatment Volume Provided = **3.41** ac-ft
Attenuation Volume Provided = **1.45** ac-ft

Pond Area = 4.85 Acres
Pond dimensions times 1.20 to account for maintenance berms, access and tieing back into existing ground.

Head Losses represented by conservative 0.0005 ft/ft. Distance from low point along SR 80 to wet pond is approximately 1/2 mile. Low point along SR 80 is approximatley 5.70'; 3.04'+(2730'*0.0005ft/ft) = 4.41 4.41' < 5.7'

POND STAGE / STORAGE CALCULATIONS-WET POND PERMANENT POOL COMPUTATION

			DATE
BASIN: 1-E Wet Pond, SR 80 Area	MADE BY:	JH	03-Nov-22
	CHCK BY:	MJ	04-Nov-22

PARCEL: 10239222 & 1039223

DESCRIPTION: ALTERNATIVE 1-E

SHGWT Elevation 1.60
LITTORAL ZONE -4.40

INC. OF STAGE TREAT. 0.45
INC. OF STAGE ATTN. 0.40

STAGE (ELEV.)	AREA (SQ-FT)	AREA (AC)	VOLUME (CU-FT)	VOLUME (AC-FT)	
-4.40	**117957**	**2.708**	0	0.00	
-3.95	119017	2.732	53319	1.22	
-3.50	120078	2.757	107116	2.46	
-3.05	121138	2.781	161389	3.70	
-2.60	122198	2.805	216140	4.96	
-2.15	123259	2.830	271368	6.23	
-1.70	124319	2.854	327073	7.51	
-1.25	125379	2.878	383255	8.80	
-0.80	126440	2.903	439914	**10.10**	
-0.40	127382	2.924	490679	11.26	
0.00	128325	2.946	541820	12.44	
0.40	129267	2.968	593339	13.62	
0.80	130210	2.989	645234	14.81	
1.20	131152	3.011	697507	16.01	
1.60	132095	3.032	750156	**17.22**	Control Elevation
1.60	**132095**	**3.032**	750156	**17.22**	Inside Top of Bank

NUTRIENT LOADING CALCULATIONS

Complete Report (not including cost) Ver 4.3.5

Project: SR 31 Pond - Alt. E
Date: 6/15/2022 10:31:14 AM

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	Pond Alt 1-E - Dry	Pond Alt 1-E - Wet
Rainfall Zone	Florida Zone 4	Florida Zone 4
Annual Mean Rainfall	51.50	51.50

Pre-Condition Landuse Information

Landuse	User Defined Values	User Defined Values
Area (acres)	29.88	25.60
Rational Coefficient (0-1)	0.14	0.22
Non DCIA Curve Number	81.00	87.00
DCIA Percent (0-100)	0.00	0.00
Nitrogen EMC (mg/l)	1.460	1.540
Phosphorus EMC (mg/l)	0.130	0.180
Runoff Volume (ac-ft/yr)	18.004	23.687
Groundwater N (kg/yr)	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000
Nitrogen Loading (kg/yr)	32.411	44.978
Phosphorus Loading (kg/yr)	2.886	5.257

Post-Condition Landuse Information

Landuse	Highway: TN=1.520 TP=0.200	Highway: TN=1.520 TP=0.200
Area (acres)	29.88	25.60
Rational Coefficient (0-1)	0.82	0.58
Non DCIA Curve Number	80.00	80.00
DCIA Percent (0-100)	100.00	65.40
Wet Pond Area (ac)	0.00	4.85
Nitrogen EMC (mg/l)	1.520	1.520
Phosphorus EMC (mg/l)	0.200	0.200
Runoff Volume (ac-ft/yr)	105.537	51.900
Groundwater N (kg/yr)	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000

Nitrogen Loading (kg/yr)	197.794	97.268
Phosphorus Loading (kg/yr)	26.026	12.798

Catchment Number: 1 Name: Pond Alt 1-E - Dry

Project: SR 31 Pond - Alt. E
Date: 6/15/2022

Retention Design

Retention Depth (in)	1.420
Retention Volume (ac-ft)	3.536

Watershed Characteristics

Catchment Area (acres)	29.88
Contributing Area (acres)	29.880
Non-DCIA Curve Number	80.00
DCIA Percent	100.00
Rainfall Zone	Florida Zone 4
Rainfall (in)	51.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	84
Provided TN Treatment Efficiency (%)	77
Required TP Treatment Efficiency (%)	89
Provided TP Treatment Efficiency (%)	77

Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	151.724
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	19.964
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)

Load
N: 197.79 kg/yr
P: 26.03 kg/yr

→

Treatment
N: 77 %
P: 77 %

→

Surface Discharge
N: 46.07 kg/yr
P: 6.06 kg/yr

↓

Mass Reduction
N: 151.72 kg/yr
P: 19.96 kg/yr

Load Diagram for Retention (As Used In Routing)

Upstream Nodes
None

Load
N: 197.79 kg/yr
P: 26.03 kg/yr
Q: 105.54 ac-ft

→

Treatment
N: 76.7 %
P: 76.7 %

→

Mass Discharged
N: 46.07 kg/yr
P: 6.06 kg/yr
Q: 24.58 ac-ft

↓

Mass Removed
N: 151.72 kg/yr
P: 19.96 kg/yr

Catchment Number: 2 Name: Pond Alt 1-E - Wet

Project: SR 31 Pond - Alt. E
Date: 6/15/2022

Wet Detention with Littoral Shelf Design

Permanent Pool Volume (ac-ft)	17.220
Permanent Pool Volume (ac-ft) for 31 days residence	4.408
Annual Residence Time (days)	121
Littoral Zone Efficiency Credit	10
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	25.60
Contributing Area (acres)	20.750
Non-DCIA Curve Number	80.00
DCIA Percent	65.40
Rainfall Zone	Florida Zone 4
Rainfall (in)	51.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	54
Provided TN Treatment Efficiency (%)	46
Required TP Treatment Efficiency (%)	59
Provided TP Treatment Efficiency (%)	72

Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	0.000
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

Load Diagram for Wet Detention with Littoral Shelf (stand-alone)

Load
N: 25.47 kg/yr →
P: 3.35 kg/yr

Treatment
N: 46 % →
P: 72 %

Surface Discharge
N: 13.85 kg/yr
P: 0.95 kg/yr

↓

Mass Reduction
N: 11.62 kg/yr
P: 2.40 kg/yr

Load Diagram for Wet Detention (As Used In Routing)

Upstream Nodes	Load		Treatment		Mass Discharged
Node: 1	N: 143.34 kg/yr P: 18.86 kg/yr Q: 76.48 ac-ft	→	N: 45.6 % P: 71.7 %	→	N: 77.93 kg/yr P: 5.33 kg/yr Q: 76.48 ac-ft

↓

Mass Removed
N: 65.40 kg/yr
P: 13.53 kg/yr

Summary Treatment Report Version: 4.3.5

Project: SR 31 Pond - Alt. E

Analysis Type: Net Improvement

BMP Types:

Catchment 1 - (Pond Alt 1-E - Dry) Retention

Catchment 2 - (Pond Alt 1-E - Wet) Wet Detention with Littoral Shelf

Based on % removal values to the nearest percent

Date:6/15/2022

Routing Summary
Catchment 1 Routed to Catchment 2
Catchment 2 Routed to Outlet

Total nitrogen target removal met? **Yes**
Total phosphorus target removal met? **Yes**

Summary Report

Nitrogen

Surface Water Discharge

Total N pre load	77.39 kg/yr
Total N post load	295.06 kg/yr

Target N load reduction	74 %	
Target N discharge load	77.39 kg/yr	
Percent N load reduction	74 %	
Provided N discharge load	77.93 kg/yr	171.84 lb/yr
Provided N load removed	217.13 kg/yr	478.77 lb/yr

Phosphorus

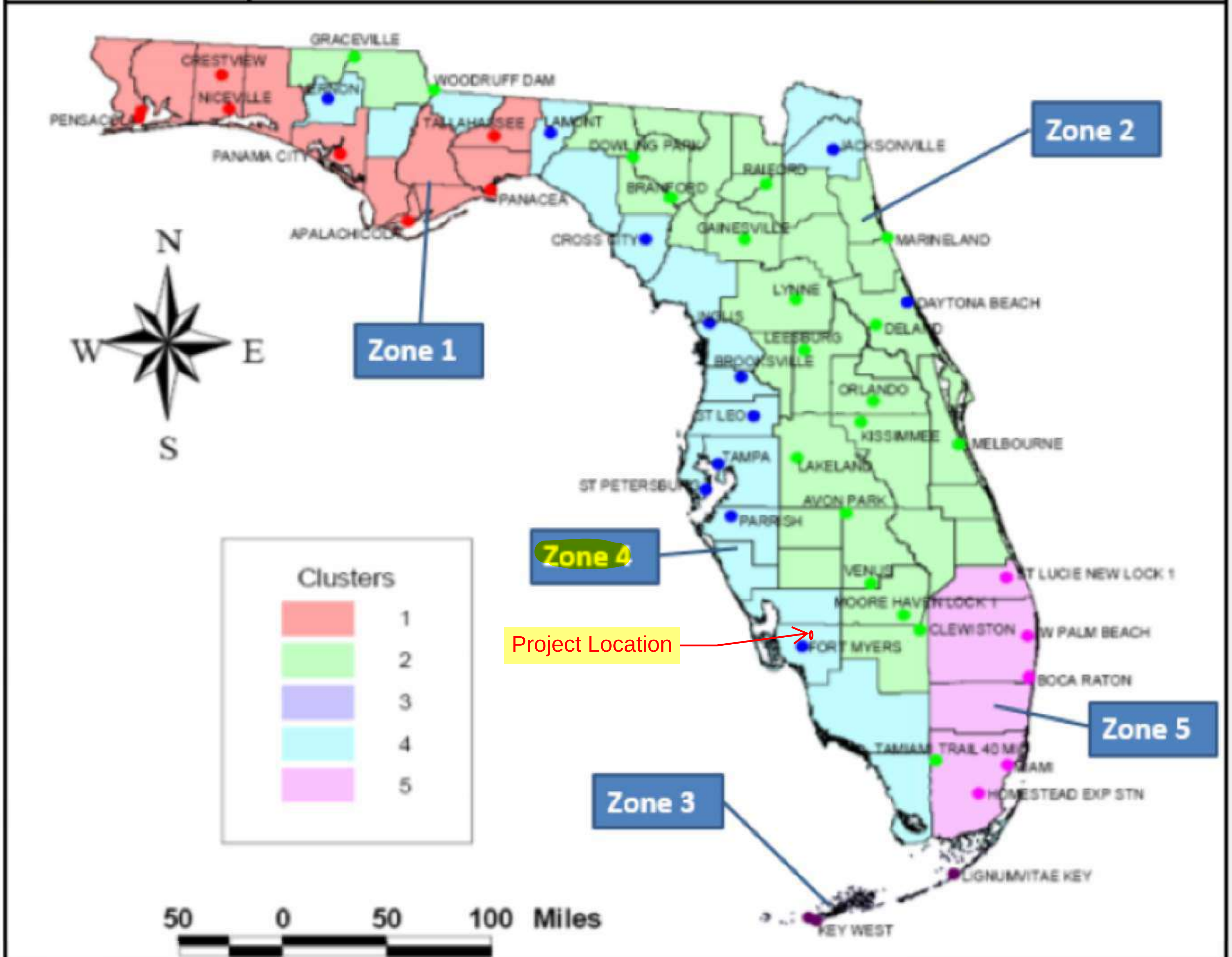
Surface Water Discharge

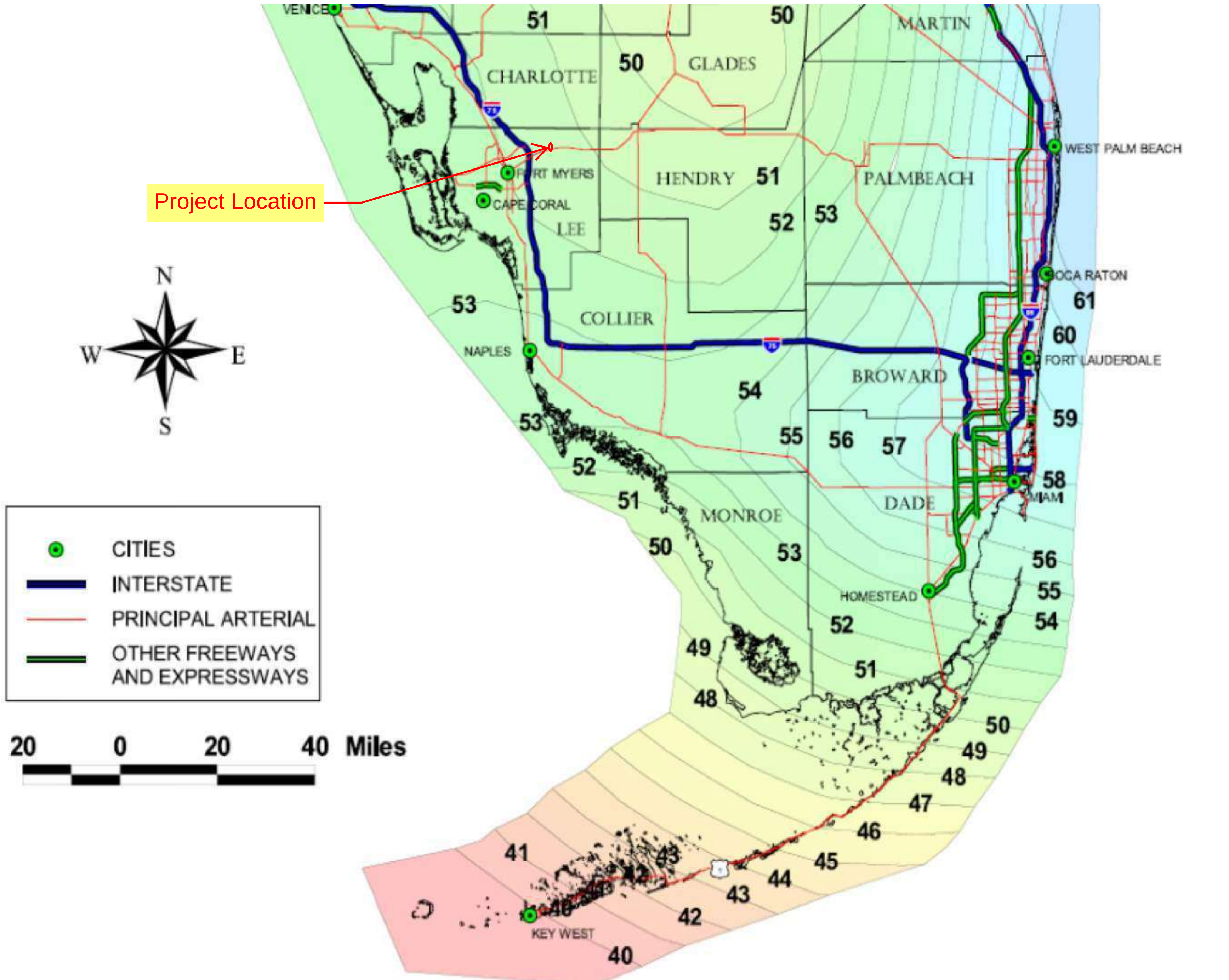
Total P pre load	8.143 kg/yr	
Total P post load	38.824 kg/yr	
Target P load reduction	79 %	
Target P discharge load	8.143 kg/yr	
Percent P load reduction	86 %	
Provided P discharge load	5.328 kg/yr	11.75 lb/yr
Provided P load removed	33.496 kg/yr	73.858 lb/yr

NUTRIENT LOADING CALCULATIONS

Resource Documentation

ZONE MAP	DESIGNATED METEOROLOGICAL REGIONS (ZONES) IN FLORIDA





MEAN ANNUAL RAINFALL MAP

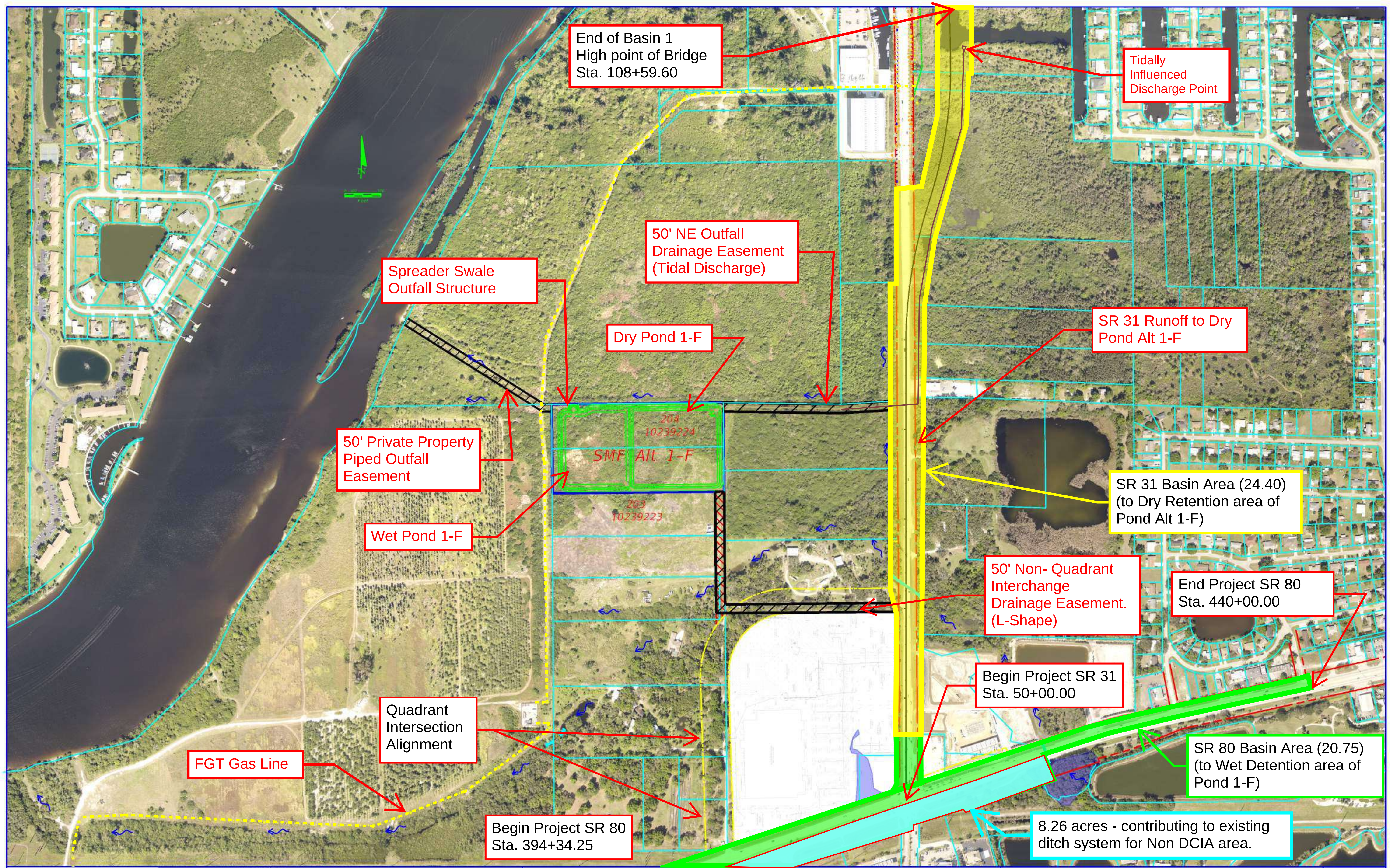
SR 31 Pond Siting Report

Customized Nutrient Loading Calculations - Pre-Developed Conditions

Pond Alternative	Basin 1 - Land Use Areas (Ac)					Nitrogen (mg/l)					Phosphorus (mg/l)					Composite Nutrient Values	
	Roadway	Pond Area	Undeveloped	Water	Total Area (Ac)	Highway	Agricultural Pasture	Ruderal / Upland	Undeveloped Wet Flatwoods	Undeveloped Wet Prairie	Highway	Agricultural Pasture	Ruderal / Upland	Undeveloped Wet Flatwoods	Undeveloped Wet Prairie	Nitrogen (mg/l)	Phosphorous (mg/l)
1-A Wet	19.36	8.84	1.40	7.00	29.59	1.52	3.51		1.21		0.20	0.69		0.02		1.66	0.23
1-A Dry	13.23	7.24	11.17	4.00	31.64	1.52	3.51		1.21		0.20	0.69		0.02		1.25	0.18
1-B Wet	19.36	4.89	1.40	2.80	25.64	1.52			1.21		0.20			0.02		1.47	0.18
1-B Dry	13.23	6.07	11.17	0.00	30.47	1.52			1.21		0.20			0.02		1.35	0.10
1-C Wet	19.36	4.35	1.40	0.00	25.10	1.52	3.51		1.21		0.20	0.69		0.02		1.85	0.27
1-C Dry	13.23	5.20	11.17	0.00	29.60	1.52	3.51		1.21		0.20	0.69		0.02		1.75	0.22
1-E Wet	19.36	4.85	1.40	0.00	25.60	1.52		1.69	1.21		0.20		0.16	0.02		1.54	0.18
1-E Dry	13.23	5.48	11.17	0.00	29.88	1.52		1.69	1.21		0.20		0.16	0.02		1.44	0.13
1-F Wet	19.36	4.51	1.40	0.00	25.26	1.52			1.21		0.20			0.02		1.45	0.16
1-F Dry	13.23	5.92	11.17	0.00	30.32	1.52			1.21		0.20			0.02		1.35	0.10

POND 1-F

Pond Design & Nutrient Loading Calculations



REVISIONS

DATE	DESCRIPTION	DATE	DESCRIPTION

FDOT

DRMP, Inc.
941 Lake Baldwin Ln.
Orlando, FL 32814
www.drmp.com
Phone: 407-896-0594
Fax: 407-896-4836

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

SMF 1-F ALTERNATIVE MAP

SHEET NO.

JSheets 6/2/2022 2:42:17 PM Default

BASIN 1 / POND 1-F

Dry Retention Pond Calculations

Resource Documentation

BASIN 1 / POND 1-F DRY POND, SR 31 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PRE DEVELOPMENT CONDITION

BASIN LIMITS: STA. 50+00.00 to STA 103+48.74 , CL

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH						IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
					TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)			
SR 31 Mainliner	50+00.00		103+48.74	116.33	32	12	0	0.0	0	0	5.395	8.889	14.284
Additional ROW	50+00.00		103+48.74	82	0	0	0	0.0	0	0	0.00	10.12	10.12
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
SUBTOTAL:											***5.40***	***19.01***	***24.401***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
RDWY SUBTOTAL:											***5.40***	***19.01***	***24.40***
BASIN POND											***0.00***	***5.92***	***5.92***
TOTAL:					`						**5.40**	**24.93**	**30.32**

Note: Project areas have been verified by CADD shape files

BASIN / POND 1-F DRY POND, SR 31 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

POST DEVELOPMENT CONDITION

BASIN LIMITS: STA. 50+00.00 to STA 108+59.60 , CL CONST.

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SHARED USE-PATH (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
SR 31 Mainliner	50+00.00		108+59.60	150	80.6	0	4	4.0	0	24	15.203	4.985	20.188
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
Quadrant Alternative	+.00		12+22.50	150	80.6	0	4	4.0	0	0	2.485	1.727	4.213
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.000	0.00	0.000
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.000	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
SUBTOTAL:											***17.69***	***6.71***	***24.40***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
	* Total area indicates actual area, Stationing indicates impervious area												
RDWY SUBTOTAL:											***17.69***	***6.71***	***24.40***
BASIN POND											***4.74***	***1.18***	***5.92***
TOTAL:											**22.42**	**7.90**	**30.32**

Note: Project areas have been verified by CADD shape files

PRE DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-F Dry Pond, SR 31 Area**

CONDITION: **PRE-DEVELOPMENT**

Soil Name and Hydrologic group	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN			Area acres	Product of CN x Area
		Tab. 2-2	Fig. 2-3	Fig. 2-4		
23 - Wulfert muck (A/D) 144 - Caloosa fine sand (A)	POND SITE PERVIOUS, Woods (Fair condition)	77			5.92	455.84
23 - Wulfert muck (A/D) 144 - Caloosa fine sand (A)	POND SITE IMPERVIOUS	98			0.00	0.00
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST ROADWAY SURFACE	98			5.40	528.75
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST AREA TO BECOME ROW, Woods (Fair condition)	77			19.01	1463.42
		Totals =			30.32	2448.01

CN = **80.7**

Use **81**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	2.35	
Runoff Depth (Q)	8.61	in.
Runoff Volume	21.76	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POST DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-F - Dry Pond, SR 31 Area**

CONDITION: **POST-DEVELOPMENT**

Soil Name and Hydrologic group	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN			Area acres	Product of CN x Area
		Tab. 2-2	Fig. 2-3	Fig. 2-4		
23 - Wulfert muck (A/D) 144 - Caloosa fine sand (A)	POND SITE PERVIOUS Berms and Slopes	80			1.18	94.72
23 - Wulfert muck (A/D) 144 - Caloosa fine sand (A)	POND SITE IMPERVIOUS At Control Elevation	100			4.74	473.60
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW PERVIOUS Good condition	80			6.71	536.99
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW IMPERVIOUS Proposed Pavement	98			17.69	1733.49
		Totals =			30.32	2838.79

CN = **93.6**

Use **94**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	0.64	
Runoff Depth (Q)	10.27	in.
Runoff Volume	25.95	ac-ft
ATTENUATION VOLUME	**4.19**	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POLLUTION ABATEMENT VOLUME

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

BASIN 1 / POND 1-F - Dry Pond, SR 31 Area

BASIN LIMITS: STA. 50+00.00 to STA 108+59.60 , CL CONST.

TOTAL BASIN AREA: 30.32 AC.

IMPERVIOUS COVERAGE: 22.42 AC.

1st inch of runoff - 50% less for Dry retention	**1.26**	ac-ft
Site area for water quality pervious/impervious calculations only	24.40	ac of site area for water quality pervious/imperious
Impervious area for water quality pervious/impervious calculations only	22.42	ac of site area for water quality pervious/imperious
Percentage of imperviousness for water quality	91.90%	impervious
2.5 inches times the runoff from the impervious area - 50% less for Dry retention	**2.34**	ac-ft

2.34 ac-ft Volume controls

POND STAGE / STORAGE CALCULATIONS-DRY POND

BASIN 1 / POND 1-F - Dry Pond, SR 31 Area

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PARCEL: **10239223 & 1039224**

DESCRIPTION: ALTERNATIVE 1-F - Dry Pond

Control Elevation	3.10
BOTTOM LENGTH	468.00 FT
BOTTOM WIDTH	413.00 FT
TOP LENGTH	492.00 FT
TOP WIDTH	437.00 FT
FRONT SLOPE (?:1)	4.00
BACK SLOPE (?:1)	4.00
INC. OF STAGE TREAT.	0.07
INC. OF STAGE ATTN.	0.23

STAGE (ELEV.)	AREA (SQ-FT)	VOLUME (CU-FT)	(AC-FT)	
3.10	**193284**	0		Control Elevation
3.17	193918	13552	0.31	
3.24	194551	27148	0.62	
3.31	195185	40789	0.94	
3.38	195818	54474	1.25	
3.45	196452	68204	1.57	
3.52	197085	81977	1.88	
3.59	197719	95796	2.20	
3.66	198352	109658	**2.52**	WQ Treatment Volume Elevation
3.89	200434	155518	3.57	50% less for Dry retention
4.12	202515	201857	4.63	
4.35	204597	248675	5.71	
4.58	206678	295972	**6.79**	Peak Attenuation Volume
4.81	208760	343747	7.89	
5.04	210841	392001	9.00	
5.27	212923	440734	10.12	
5.50	**215004**	489946	11.25	Top of Bank

Treatment Volume Required = **2.34** ac-ft 50% less for Dry retention
Attenuation Volume Required = **4.19** ac-ft

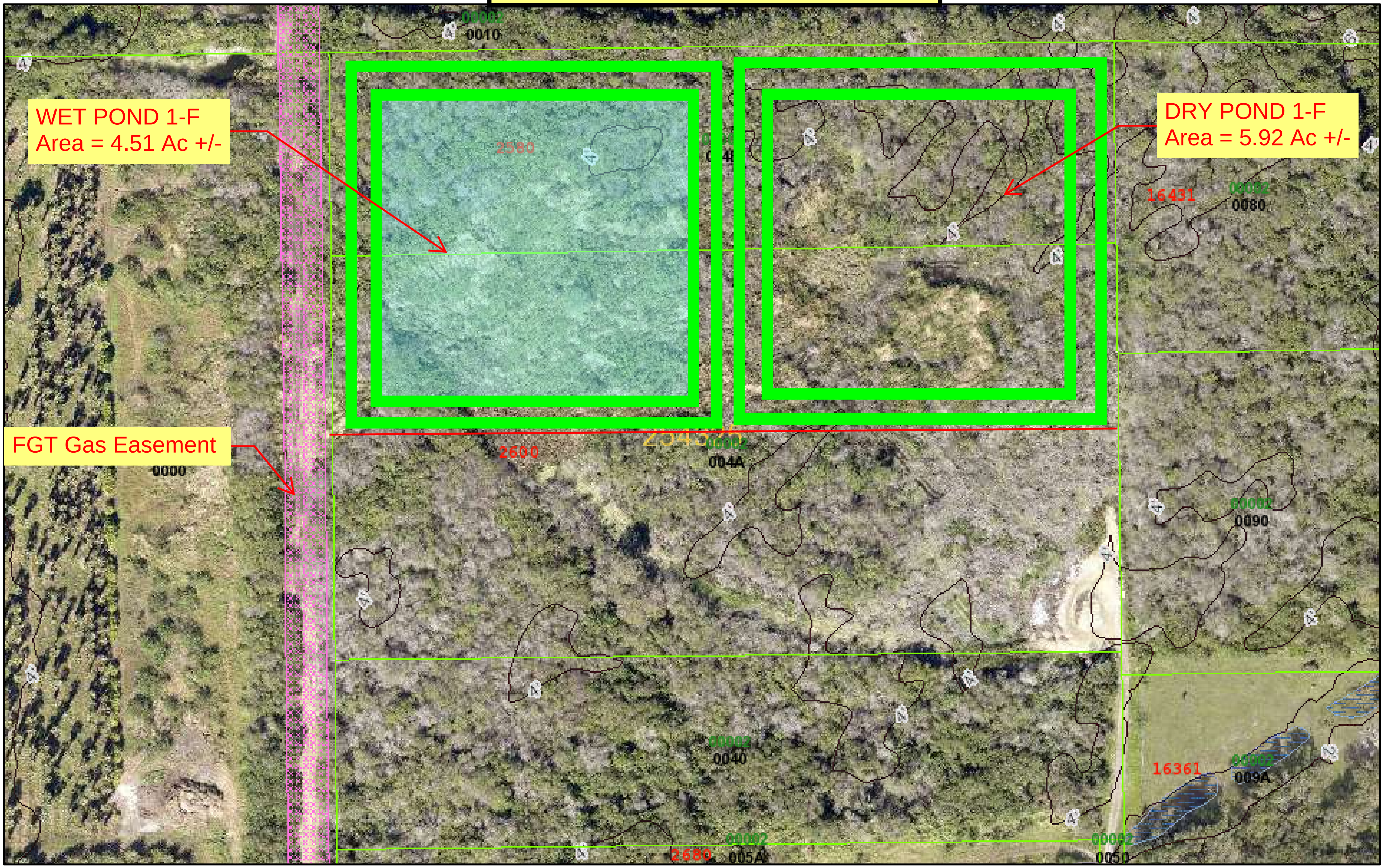
Treatment Volume Provided = **2.52** ac-ft
Attenuation Volume Provided = **4.28** ac-ft

Pond Area = 5.92 Acres
Pond dimensions times 1.20 to account for maintenance berms, access and tieing back into existing ground.

Head Losses represented by conservative 0.0005 ft/ft. Distance from low point along SR 31 to dry pond is approximately 1/3 mile. Proposed low point along SR 31 is approximatley 10'; 4.58'+(1700'*0.0005ft/ft) = 5.43' 5.43' < 10.00'

Aerial and Contour Map

SMF Alternative 1-F



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Parcel Labels
Government Land Labels
Mobile Home Parks
Condo Building
Parcel Hooks
Parcel Lines
Street Number
Easements
Contour Lines
Hydrology
Section Lines
Labels
Lines
Coastal Range Monuments
Coastline

1:2,257

0 0.01 0.03 0.06 mi

0 0.03 0.05 0.1 km

University of South Florida, County of Lee, FL, FDEP, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA |

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
~~Paved; curbs and storm sewers (excluding right-of-way)~~		~~98~~	~~98~~	~~98~~	~~98~~
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.
2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2c Runoff curve numbers for other agricultural lands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4]	48	65	73
Woods—grass combination (orchard or tree farm). [5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.
3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4 Actual curve number is less than 30; use CN = 30 for runoff computations.
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Lee County, Florida

April 19, 2022

Soil Map

Map Scale: 1:1,740 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

N

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
23	Wulfert muck, tidal, 0 to 1 percent slopes	5.2	39.9%
144	Caloosa fine sand, 0 to 2 percent slopes	7.8	60.1%
Totals for Area of Interest		**13.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

Lee County, Florida

23—Wulfert muck, tidal, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2x9d2
Elevation: 0 to 10 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 360 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Wulfert, Tidal

Setting

Landform: Tidal marshes on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Herbaceous organic material over sandy marine deposits

Typical profile

Oan1 - 0 to 12 inches: muck
Oan2 - 12 to 36 inches: muck
Cn - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Very frequent
Frequency of ponding: None
Maximum salinity: Slightly saline to strongly saline (4.0 to 24.0 mmhos/cm)
Sodium adsorption ratio, maximum: 50.0
Available water supply, 0 to 60 inches: Very high (about 15.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Forage suitability group: Forage suitability group not assigned (G155XB999FL)
Other vegetative classification: Salt Marsh (R155XY009FL), Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Yes

Minor Components

Kesson, tidal

Percent of map unit: 10 percent
Landform: Tidal marshes on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: Salt Marsh (R155XY009FL), Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: Yes

144—Caloosa fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2x9d8
Elevation: 0 to 30 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 360 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Caloosa and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caloosa

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Sandy and clayey dredge spoils

Typical profile

A - 0 to 10 inches: fine sand
C1 - 10 to 27 inches: fine sand
C2 - 27 to 80 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 13 to 47 inches to strongly contrasting textural stratification
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 42 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 14 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Forage suitability group: Forage suitability group not assigned (G155XB999FL)
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

Minor Components

Matlacha

Percent of map unit: 8 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

St. augustine

Percent of map unit: 7 percent
Landform: Marine terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Convex
Other vegetative classification: Forage suitability group not assigned (G155XB999FL)
Hydric soil rating: No

	Folio	Owner Name	Site Address	Last Trans. Date	Last Trans. Amt	Just Value	Taxable Value
	10239224	BARBATO MARC & MEAGHAN	2580 WILDWOOD LN, FORT MYERS	12-2021	$ 142,000	$ 42,363	$ 42,363

BASIN 1 / POND 1-F

Wet Detention Pond Calculations

BASIN 1 / POND 1-F Wet Pond - SR 80 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PRE DEVELOPMENT CONDITION

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00 , CL

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH						IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
					TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SIDE-WALK (Ft.)			
SR 31 Mainliner	394+34.25		440+00.00	175.33	67	10	0	4.0	0	0	8.47	9.91	18.38
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
Additional ROW	12+22.50		22+63.38	99.5	0	0	0	0.0	0	0	0.00	2.38	2.38
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0		0	0	0.00	0.00	0.00
SUBTOTAL:											***8.47***	***12.29***	***20.75***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
RDWY SUBTOTAL:											***8.47***	***12.29***	***20.75***
BASIN POND											***0.00***	***4.51***	***4.51***
TOTAL:					`						**8.47**	**16.80**	**25.26**

Note: Project areas have been verified by CADD shape files

BASIN 1 / POND 1-F Wet Pond - SR 80 AREA BREAKDOWN

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

POST DEVELOPMENT CONDITION

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00, CL CONST.

LOCATION	STATION	To	STATION	R/W WIDTH (Ft.)	IMPERVIOUS WIDTH TRAVEL LANES (Ft.)	SHLDR (Ft.)	TYPE 'F' C&G (Ft.)	TYPE 'E' C&G (Ft.)	TRAFFIC SEP.	SHARED USE-PATH (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)
SR 80	394+34.25		440+00.00	175	80.2	10	0	4.0	0	0	9.876	8.502	18.377
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.00	0.00	0.00
Quadrant Alternative	12+22.50		22+63.38	100	75.15	0	4	4.0	0	0	1.987	0.391	2.378
	+.00		+.00	0	12.00	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0.00	0	0	0.0	0	0	0.00	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.000	0.00	0.00
	+.00		+.00	0	0	0	0	0.0	0	0	0.00	0.00	0.00
SUBTOTAL:											***11.86***	***8.89***	***20.75***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERSECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
INTERECTING STREET	+.00		+.00		0						0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
											0.00	0.00	0.00
SUBTOTAL:											***0.00***	***0.00***	***0.00***
* Total area indicates actual area, Stationing indicates impervious area													
RDWY SUBTOTAL:											***11.86***	***8.89***	***20.75***
BASIN POND											***3.61***	***0.90***	***4.51***
TOTAL:											**15.47**	**9.79**	**25.26**

Note: Project areas have been verified by CADD shape files

PRE DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-F Wet Pond, SR 80 Area**

CONDITION: **PRE-DEVELOPMENT**

Soil Name and Hydrologic group	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN			Area acres	Product of CN x Area
		Tab. 2-2	Fig. 2-3	Fig. 2-4		
23 - Wulfert muck (A/D) 144 - Caloosa fine sand (A)	POND SITE PERVIOUS, Woods (Fair condition)	77			4.51	347.27
23 - Wulfert muck (A/D) 144 - Caloosa fine sand (A)	POND SITE IMPERVIOUS	98			0.00	0.00
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST ROADWAY SURFACE	98			8.47	829.87
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	EXIST AREA TO BECOME ROW, Woods (Fair condition)	77			12.29	946.08
		Totals =			25.26	2123.22

CN = **84.0**

Use **84**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	1.90	
Runoff Depth (Q)	9.00	in.
Runoff Volume	18.96	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POST DEVELOPMENT RUNOFF CURVE NUMBER CALCULATION

		DATE:
MADE BY:	JH	03-Nov-22
CHKED BY:	MJ	04-Nov-22

PROJECT: **SR 31 PD&E**

LOCATION: **BASIN 1 / POND 1-F Wet Pond, SR 80 Area**

CONDITION: **POST-DEVELOPMENT**

Soil Name and Hydrologic group	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN			Area acres	Product of CN x Area
		Tab. 2-2	Fig. 2-3	Fig. 2-4		
23 - Wulfert muck (A/D) 144 - Caloosa fine sand (A)	POND SITE PERVIOUS Berms and Slopes	80			0.90	72.16
23 - Wulfert muck (A/D) 144 - Caloosa fine sand (A)	POND SITE IMPERVIOUS At Control Elevation	100			3.61	360.80
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW PERVIOUS Good condition	80			8.89	711.38
7 - Matlacha gravelly fine sand (B) 42 - Wabasso sand (C/D) 45 - Copeland fine sandy loam (D)	ROADWAY ROW IMPERVIOUS Proposed Pavement	98			11.86	1162.53
		Totals =			25.26	2306.87

CN = **91.3**

Use **91**

25 year - 3 day rainfall (P)	11.0	in.
Potential Abstraction (S)	0.99	
Runoff Depth (Q)	9.90	in.
Runoff Volume	20.84	ac-ft
ATTENUATION VOLUME	**1.88**	ac-ft

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service, U.S. department of Agriculture, June 1986.

ERP permit Applicant's Handbook Volume II, Part III, 3.3 Design Storm & Page A-18

POLLUTION ABATEMENT VOLUME

BASIN 1 / POND 1-F - Wet Pond, SR 80 Area

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

BASIN LIMITS: STA. 394+34.25 to STA 440+00.00, CL CONST.

TOTAL BASIN AREA: 25.26 AC.

IMPERVIOUS COVERAGE: 15.47 AC.

1st inch of runoff	**2.11**	ac-ft
Site area for water quality pervious/impervious calculations only	20.75	ac of site area for water quality pervious/imperious
Impervious area for water quality pervious/impervious calculations only	15.47	ac of site area for water quality pervious/imperious
Percentage of imperviousness for water quality	74.54%	impervious
2.5 inches times the runoff from the impervious area	**3.22**	ac-ft

3.22 ac-ft Volume controls

POND STAGE / STORAGE CALCULATIONS-WET

BASIN 1 / POND 1-F - Wet Pond, SR 80 Area

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PARCEL: **10239223 & 1039224**

DESCRIPTION: ALTERNATIVE 1-F - Wet Pond

Control Elevation	1.60	= Seasonal High Water elevation
BOTTOM LENGTH	405.00 FT	
BOTTOM WIDTH	335.00 FT	
TOP LENGTH	441.00 FT	
TOP WIDTH	371.00 FT	
FRONT SLOPE (?:1)	4.00	
BACK SLOPE (?:1)	4.00	
INC. OF STAGE TREAT.	0.13	
INC. OF STAGE ATTN.	0.14	

STAGE (ELEV.)	AREA (SQ-FT)	VOLUME (CU-FT)	VOLUME (AC-FT)	
1.60	**135675**	0		Control Elevation
1.73	137254	17740	0.41	
1.86	138833	35686	0.82	
1.99	140412	53837	1.24	
2.12	141991	72193	1.66	
2.25	143570	90755	2.08	
2.38	145149	109521	2.51	
2.51	146728	128493	2.95	
2.64	148307	147671	**3.39**	WQ Treatment Volume Elevation
2.78	150007	168553	3.87	
2.92	151708	189673	4.35	
3.06	153408	211031	4.84	
3.20	155109	232627	**5.34**	Peak Attenuation Volume
3.34	156809	254461	5.84	
3.48	158510	276534	6.35	
3.62	160210	298844	6.86	
3.76	161911	321392	7.38	
3.90	**163611**	344179	7.90	Top of Bank

Treatment Volume Required = **3.22** ac-ft
Attenuation Volume Required = **1.88** ac-ft

Treatment Volume Provided = **3.39** ac-ft
Attenuation Volume Provided = **1.95** ac-ft

Pond Area = 4.51 Acres
Pond dimensions times 1.20 to account for maintenance berms, access and tieing back into existing ground.

Head Losses represented by conservative 0.0005 ft/ft. Distance from low point along SR 80 to wet pond is approximately 2/3 mile. Low point along SR 80 is approximatley 5.70'; 3.20'+(3250'*0.0005ft/ft) = 4.83 4.83' < 5.7'

POND STAGE / STORAGE CALCULATIONS-WET POND PERMANENT POOL COMPUTATION

BASIN 1 / POND 1-F - Wet Pond, SR 80 Area

		DATE
MADE BY:	JH	03-Nov-22
CHCK BY:	MJ	04-Nov-22

PARCEL: **10239223 & 1039224**

DESCRIPTION: ALTERNATIVE 1-F - Wet Pond

SHGWT Elevation 1.60
LITTORAL ZONE -4.40

INC. OF STAGE TREAT. 0.45
INC. OF STAGE ATTN. 0.40

STAGE (ELEV.)	AREA (SQ-FT)	AREA (AC)	VOLUME (CU-FT)	VOLUME (AC-FT)	
-4.40	**118491**	**2.720**	0	0.00	
-3.95	119780	2.750	53611	1.23	
-3.50	121069	2.779	107802	2.47	
-3.05	122357	2.809	162573	3.73	
-2.60	123646	2.839	217923	5.00	
-2.15	124935	2.868	273854	6.29	
-1.70	126224	2.898	330365	7.58	
-1.25	127513	2.927	387456	8.89	
-0.80	128801	2.957	445126	**10.22**	
-0.40	129947	2.983	496876	11.41	
0.00	131093	3.009	549084	12.61	
0.40	132238	3.036	601750	13.81	
0.80	133384	3.062	654874	15.03	
1.20	134529	3.088	708457	16.26	
1.60	135675	3.115	762498	**17.50**	Control Elevation
1.60	**135675**	**3.115**	762498	**17.50**	Inside Top of Bank

NUTRIENT LOADING CALCULATIONS

Complete Report (not including cost) Ver 4.3.5

Project: SR 31 Pond - Alt. F
Date: 6/15/2022 1:49:55 PM

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	Pond Alt 1-F - Dry	Pond Alt 1-F - Wet
Rainfall Zone	Florida Zone 4	Florida Zone 4
Annual Mean Rainfall	51.50	51.50

Pre-Condition Landuse Information

Landuse	User Defined Values	User Defined Values
Area (acres)	30.32	25.26
Rational Coefficient (0-1)	0.14	0.22
Non DCIA Curve Number	81.00	87.00
DCIA Percent (0-100)	0.00	0.00
Nitrogen EMC (mg/l)	1.350	1.460
Phosphorus EMC (mg/l)	0.100	0.160
Runoff Volume (ac-ft/yr)	18.269	23.373
Groundwater N (kg/yr)	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000
Nitrogen Loading (kg/yr)	30.410	42.075
Phosphorus Loading (kg/yr)	2.253	4.611

Post-Condition Landuse Information

Landuse	Highway: TN=1.520 TP=0.200	Highway: TN=1.520 TP=0.200
Area (acres)	30.32	25.26
Rational Coefficient (0-1)	0.82	0.58
Non DCIA Curve Number	80.00	80.00
DCIA Percent (0-100)	100.00	65.40
Wet Pond Area (ac)	0.00	4.51
Nitrogen EMC (mg/l)	1.520	1.520
Phosphorus EMC (mg/l)	0.200	0.200
Runoff Volume (ac-ft/yr)	107.092	51.900
Groundwater N (kg/yr)	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000

Nitrogen Loading (kg/yr)	200.707	97.268
Phosphorus Loading (kg/yr)	26.409	12.798

Catchment Number: 1 Name: Pond Alt 1-F - Dry

Project: SR 31 Pond - Alt. F
Date: 6/15/2022

Retention Design

Retention Depth (in)	1.793
Retention Volume (ac-ft)	4.530

Watershed Characteristics

Catchment Area (acres)	30.32
Contributing Area (acres)	30.320
Non-DCIA Curve Number	80.00
DCIA Percent	100.00
Rainfall Zone	Florida Zone 4
Rainfall (in)	51.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	85
Provided TN Treatment Efficiency (%)	83
Required TP Treatment Efficiency (%)	91
Provided TP Treatment Efficiency (%)	83

Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	167.324
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	22.016
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)

Load		Treatment		Surface Discharge
N: 200.71 kg/yr	→	N: 83 %	→	N: 33.38 kg/yr
P: 26.41 kg/yr		P: 83 %		P: 4.39 kg/yr

↓

Mass Reduction
N: 167.32 kg/yr
P: 22.02 kg/yr

Load Diagram for Retention (As Used In Routing)

Upstream Nodes	Load		Treatment		Mass Discharged
None	N: 200.71 kg/yr	→	N: 83.4 %	→	N: 33.38 kg/yr
	P: 26.41 kg/yr		P: 83.4 %		P: 4.39 kg/yr
	Q: 107.09 ac-ft				Q: 17.81 ac-ft

↓

Mass Removed
N: 167.32 kg/yr
P: 22.02 kg/yr

Catchment Number: 2 Name: Pond Alt 1-F - Wet

Project: SR 31 Pond - Alt. F
Date: 6/15/2022

Wet Detention with Littoral Shelf Design

Permanent Pool Volume (ac-ft)	17.500
Permanent Pool Volume (ac-ft) for 31 days residence	4.408
Annual Residence Time (days)	123
Littoral Zone Efficiency Credit	10
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	25.26
Contributing Area (acres)	20.750
Non-DCIA Curve Number	80.00
DCIA Percent	65.40
Rainfall Zone	Florida Zone 4
Rainfall (in)	51.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	57
Provided TN Treatment Efficiency (%)	46
Required TP Treatment Efficiency (%)	64
Provided TP Treatment Efficiency (%)	73

Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	0.000
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

Load Diagram for Wet Detention with Littoral Shelf (stand-alone)

Load N: 25.47 kg/yr P: 3.35 kg/yr	→	Treatment N: 46 % P: 73 %	→	Surface Discharge N: 13.75 kg/yr P: 0.89 kg/yr
		↓		Mass Reduction N: 11.72 kg/yr P: 2.46 kg/yr

Load Diagram for Wet Detention (As Used In Routing)

Upstream Nodes	Load		Treatment		Mass Discharged
Node: 1	N: 130.65 kg/yr	→	N: 46.0 %	→	N: 70.52 kg/yr
	P: 17.19 kg/yr		P: 73.3 %		P: 4.58 kg/yr
	Q: 69.71 ac-ft				Q: 69.71 ac-ft

↓

Mass Removed
N: 60.13 kg/yr
P: 12.61 kg/yr

Summary Treatment Report Version: 4.3.5

Project: SR 31 Pond - Alt. F

Date:6/15/2022

Analysis Type: Net Improvement
BMP Types:
Catchment 1 - (Pond Alt 1-F - Dry) Retention
Catchment 2 - (Pond Alt 1-F - Wet) Wet Detention with Littoral Shelf
Based on % removal values to the nearest percent

Routing Summary
Catchment 1 Routed to Catchment 2
Catchment 2 Routed to Outlet

Total nitrogen target removal met? **Yes**
Total phosphorus target removal met? **Yes**

Summary Report

Nitrogen

Surface Water Discharge

Total N pre load	72.49 kg/yr
Total N post load	297.97 kg/yr

Target N load reduction	76 %	
Target N discharge load	72.49 kg/yr	
Percent N load reduction	76 %	
Provided N discharge load	70.52 kg/yr	155.51 lb/yr
Provided N load removed	227.45 kg/yr	501.53 lb/yr

Phosphorus

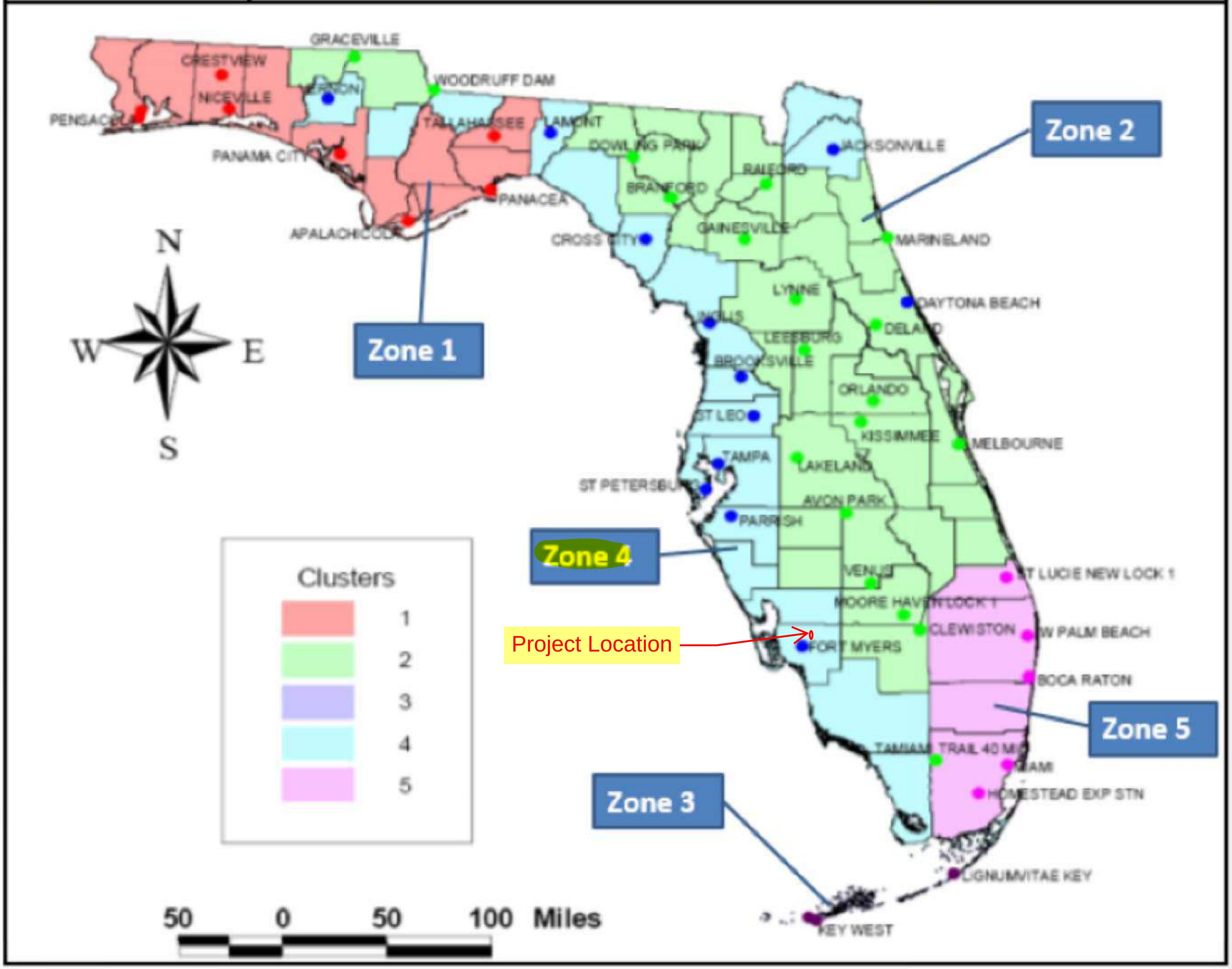
Surface Water Discharge

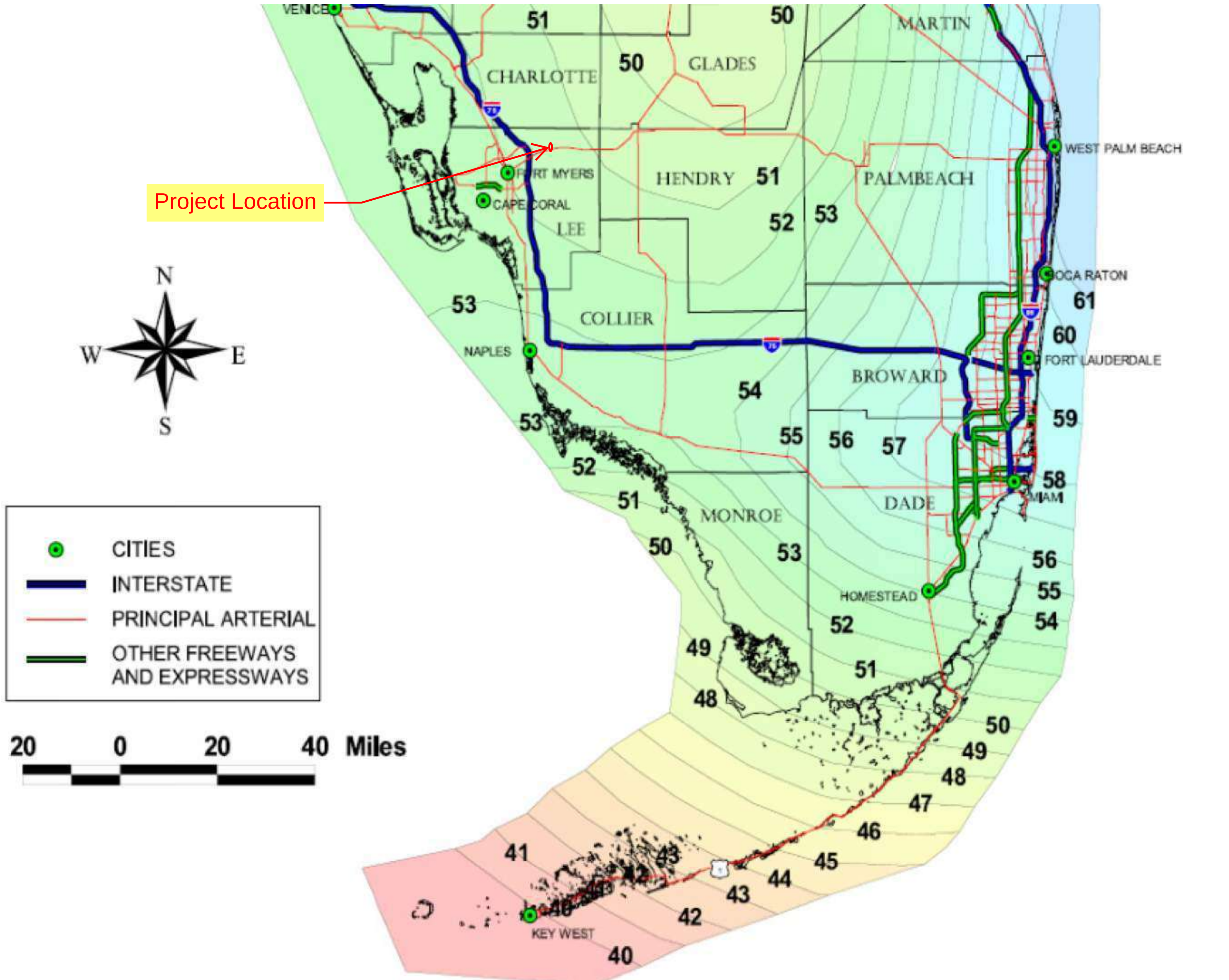
Total P pre load	6.864 kg/yr	
Total P post load	39.207 kg/yr	
Target P load reduction	82 %	
Target P discharge load	6.864 kg/yr	
Percent P load reduction	88 %	
Provided P discharge load	4.583 kg/yr	10.11 lb/yr
Provided P load removed	34.624 kg/yr	76.346 lb/yr

NUTRIENT LOADING CALCULATIONS

Resource Documentation

ZONE MAP	DESIGNATED METEOROLOGICAL REGIONS (ZONES) IN FLORIDA





MEAN ANNUAL RAINFALL MAP

SR 31 Pond Siting Report

Customized Nutrient Loading Calculations - Pre-Developed Conditions

Pond Alternative	Basin 1 - Land Use Areas (Ac)					Nitrogen (mg/l)					Phosphorus (mg/l)					Composite Nutrient Values	
	Roadway	Pond Area	Undeveloped	Water	Total Area (Ac)	Highway	Agricultural Pasture	Ruderal / Upland	Undeveloped Wet Flatwoods	Undeveloped Wet Prairie	Highway	Agricultural Pasture	Ruderal / Upland	Undeveloped Wet Flatwoods	Undeveloped Wet Prairie	Nitrogen (mg/l)	Phosphorous (mg/l)
1-A Wet	19.36	8.84	1.40	7.00	29.59	1.52	3.51		1.21		0.20	0.69		0.02		1.66	0.23
1-A Dry	13.23	7.24	11.17	4.00	31.64	1.52	3.51		1.21		0.20	0.69		0.02		1.25	0.18
1-B Wet	19.36	4.89	1.40	2.80	25.64	1.52			1.21		0.20			0.02		1.47	0.18
1-B Dry	13.23	6.07	11.17	0.00	30.47	1.52			1.21		0.20			0.02		1.35	0.10
1-C Wet	19.36	4.35	1.40	0.00	25.10	1.52	3.51		1.21		0.20	0.69		0.02		1.85	0.27
1-C Dry	13.23	5.20	11.17	0.00	29.60	1.52	3.51		1.21		0.20	0.69		0.02		1.75	0.22
1-E Wet	19.36	4.85	1.40	0.00	25.60	1.52		1.69	1.21		0.20		0.16	0.02		1.54	0.18
1-E Dry	13.23	5.48	11.17	0.00	29.88	1.52		1.69	1.21		0.20		0.16	0.02		1.44	0.13
1-F Wet	19.36	4.51	1.40	0.00	25.26	1.52			1.21		0.20			0.02		1.45	0.16
1-F Dry	13.23	5.92	11.17	0.00	30.32	1.52			1.21		0.20			0.02		1.35	0.10

APPENDIX 5

Cross Drain Summary Table

Cross Drain Field Photos

Table 5 - Summary of Proposed Cross Drains

Structure Number	Crossdrains								Roadway	
	Size	Type	Number of Barrels	Length (ft)	Inverts (Elevations)		Tailwater (ft)	Cross Sectional Area (sf)	Roadway Overtopping Elevation (ft)	Crest-Length (ft)
					Upstream (ft)	Downstream (ft)				
CD-1	48"	RCP	2	178	0.3	0.1	3.6	25.13	10	1850
CD-2	36"	RCP	2	111	-0.4	-0.5	2.5	19.24	10	2435
CD-2A	48"	RCP	2	164	-0.3	-0.4	2.5	25.13	10	2435
CD-3	18"	RCP	1	96	0.00	-0.2	1.3	1.77	10	510
CD-4	36"	RCP	2	117	1.54	1.43	4.4	14.14	7	1330

All elevations are NAVD 88.

Recently Extended Cross Drain CD-01 – East Side of SR 31, Looking South, Upstream Side

Recently Extended Cross Drain CD-01 - East Side of SR 31, Looking North, Upstream Side

Existing Endwall, Existing Cross Drain CD-01 – West Side of SR 31, Looking North, Downstream Side

Existing Endwall, Existing Cross Drain CD-01 - West Side of SR 31, Looking South, Downstream Side

Existing Cross Drain CD-02 – East side of SR 31, looking North, Upstream Side

Existing Cross Drain CD-02 – West side of SR 31, Looking West, Downstream Side

Existing DBI on Cross Drain CD-03 – West side of SR 31, Looking South, Upstream Side

Existing Cross Drain CD-03 – east side of SR 31, Looking North, Downstream Side


Existing Cross Drain CD-04 - North side of SR 80, Looking South


Existing Cross Drain CD-04 – South side of SR 80, Looking East at CD-04 Headwall

APPENDIX 6

Environmental Evaluation Report

SR 31 FROM SR 80 TO SR 78
FPID# 441942-1

POND SITE ALTERNATIVE ENVIRONMENTAL EVALUATION

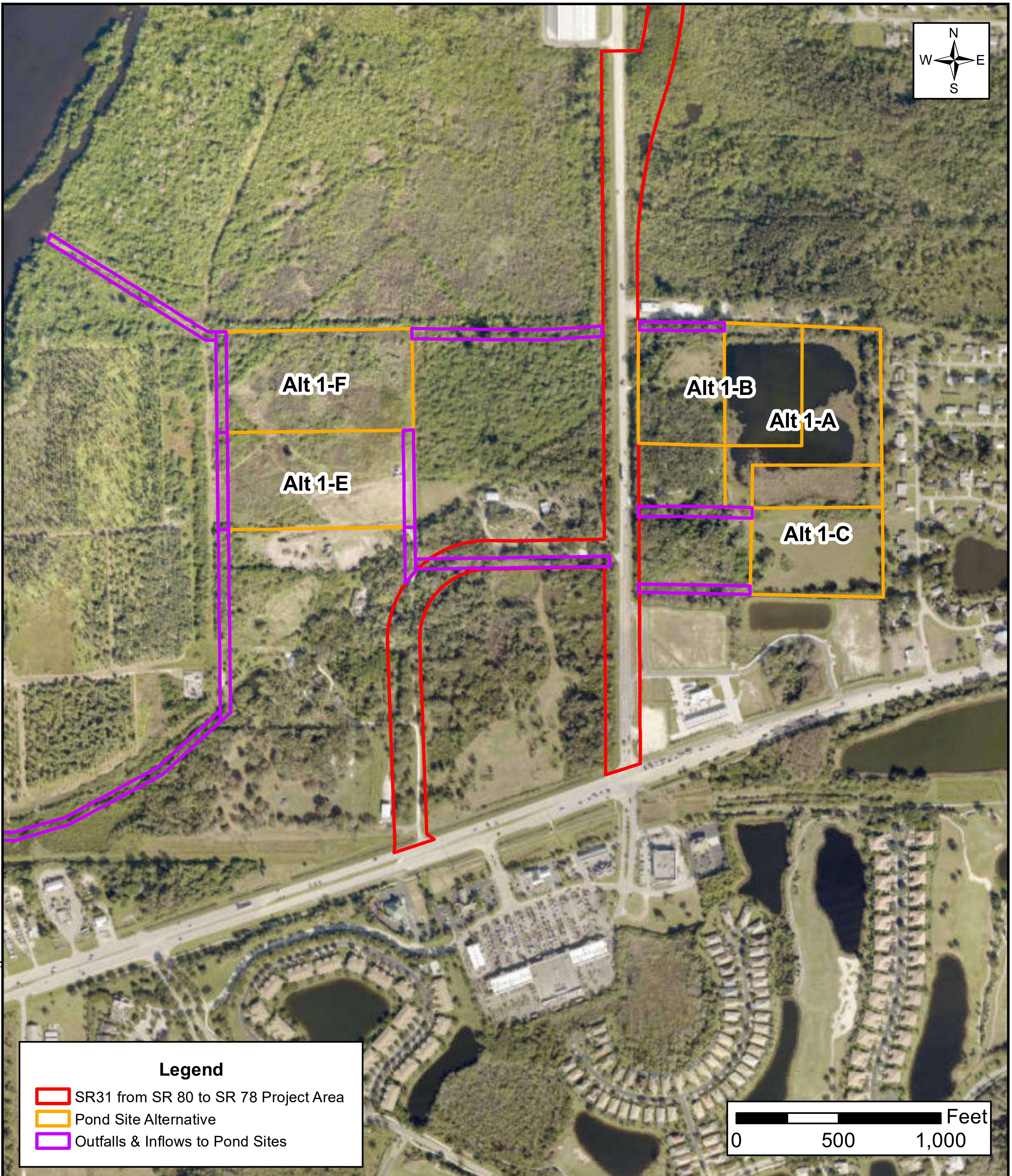
This document provides an environmental evaluation of the pond site alternatives considered in association with the widening of approximately 1.50 miles of State Road (SR) 31 from SR 80 (Palm Beach Boulevard) to SR 78 (Bayshore Road) and the replacement of Wilson Pigott Bridge over the Caloosahatchee River in northeastern Lee County, Florida. Multiple stormwater pond locations were considered for this project in an effort to select locations that would result in impacts that are minimized to the greatest extent possible, as permitting regulations require. The results of the environmental evaluation are based on a combination of aerial interpretation, desktop review of on-site natural resources, and field evaluations conducted on April 11-12, 2022.

Methodology

Prior to conducting the site assessment, a review of the available Geographic Information Systems (GIS) data and literature was conducted to identify any protected species or wetlands that have been documented within and adjacent to the project area. The GIS and literature that was reviewed is listed below:

- United States Department of Agriculture (USDA) Soil Survey for Lee County (2022);
- Natural Resources Conservation Service (NRCS) soils GIS data for Lee County (2018);
- United States Geological Survey (USGS) Quadrangle Map;
- Environmental Science Research Institute's (ESRI) Online World Imagery (2022);
- South Florida Water Management District (SFWMD) land use data (2019);
- United States Fish and Wildlife Service (USFWS) GIS databases;
- Florida Fish and Wildlife Conservation (FWC) GIS databases;
- FWC Florida's Endangered Species and Threatened Species Lists (2018); and
- Florida Natural Areas Inventory database of listed species for Lee County (April 2022, date accessed).

DRMP biologists conducted a wetland delineation on April 11-12, 2022 within the project area. The wetlands were delineated in accordance with federal and state guidelines (U.S. Army Corps of Engineers (USACE) Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (2010) and FAC Rule 62-340, respectively. The wetlands identified in the images below represent the determined wetland extents within and adjacent to the pond site alternatives. However, these limits have not been reviewed or approved by the permitting regulatory agencies. The wetland limits will be reviewed and approved by the regulatory agencies during the permitting phase and prior to construction of the project.



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DATE: June 2022

DRAWN BY: BH

PROJECT NUMBER: 18-0080.000

State Road 31 from
State Road 80 to State Road 78

FPID: 441942-1-22-01

Lee County, FL

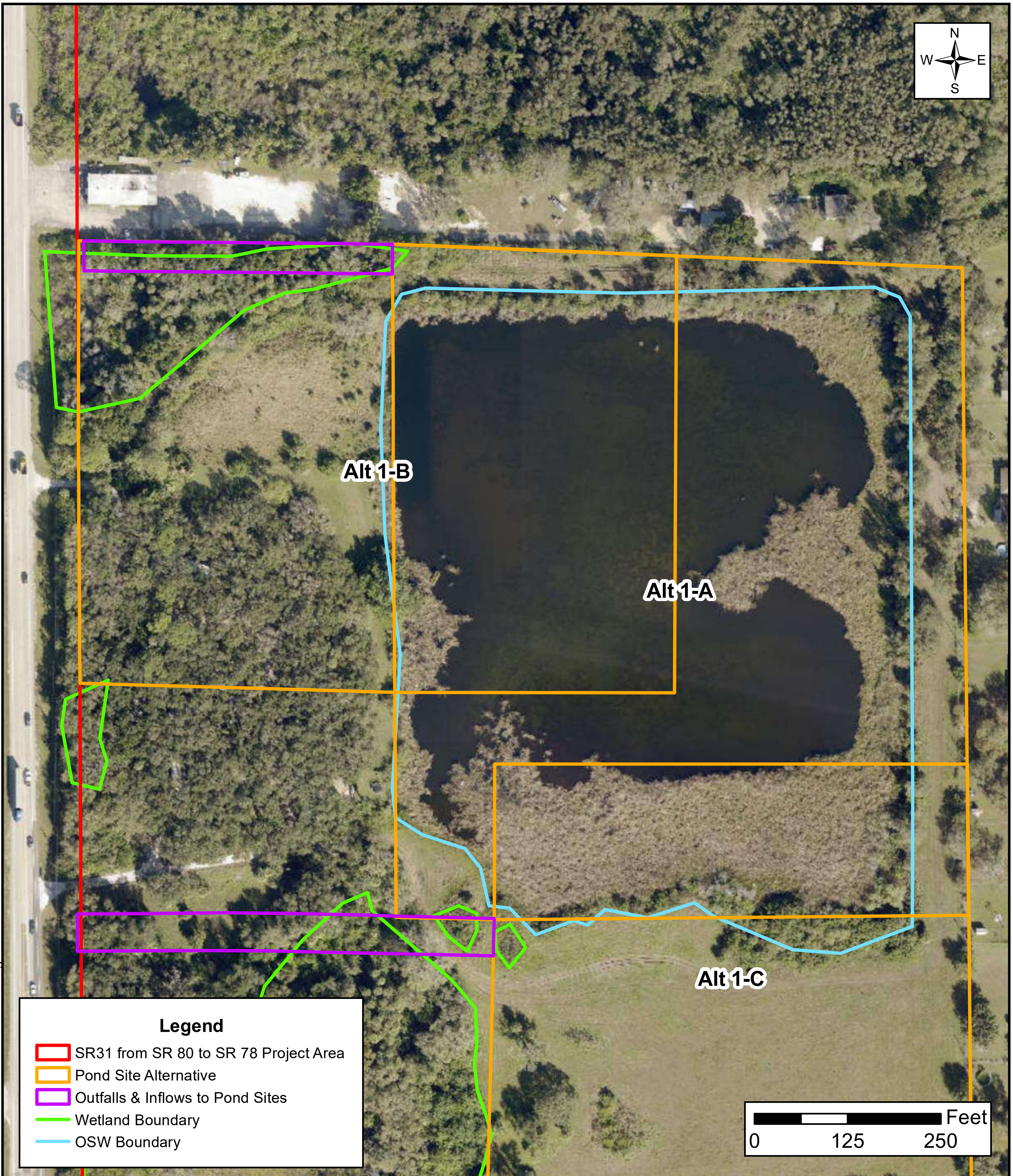
Pond Site Alternatives

DATA SOURCE: Aerial Map - ESRI 2022

Figure
1

Pond Site Alt 1-A

Pond Site Alternative 1-A is an existing stormwater detention pond that is located east of the proposed SR 31 widening. This alternative is bordered by a residential neighborhood to the east, rural residential mobile homes to the west, and Pond Site Alternative Alt 1-C to the south which consists predominantly of active cattle pasture. There is a vegetated berm located along the eastern edge of the alternative. The berm area is dominated by bahiagrass (*Paspalum notatum*), saw palmetto (*Serenoa repens*), cabbage palm (*Sabal palmetto*), and live oak (*Quercus virginiana*). The pond consisted of edges dominated by cattail (*Typha latifolia*), Carolina willow (*Salix caroliniana*), Brazilian pepper (*Schnius terebinthifolia*), cabbage palm (*Sabal palmetto*), wax myrtle (*Myrica cerifera*), Peruvian primrose-willow (*Ludwigia peruviana*); open water; and drainage structures. The stormwater detention pond exhibited little to no littoral zone and the potential for listed species utilization for this pond site alternative is low to moderate. There was no evidence of protected species observed within Pond Site Alternative 1-A during the field assessment. There will be approximately 0.02 acres of primary wetland impacts, 0.05 secondary impacts, and 13.04 acres of OSW impacts associated with the construction of Pond Site Alternative 1-A. There will be approximately 0.27 acres of primary wetland impacts and 0.23 acres of secondary wetland impacts associated with the drainage easement for the pond site alternative.



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Lee County, FL

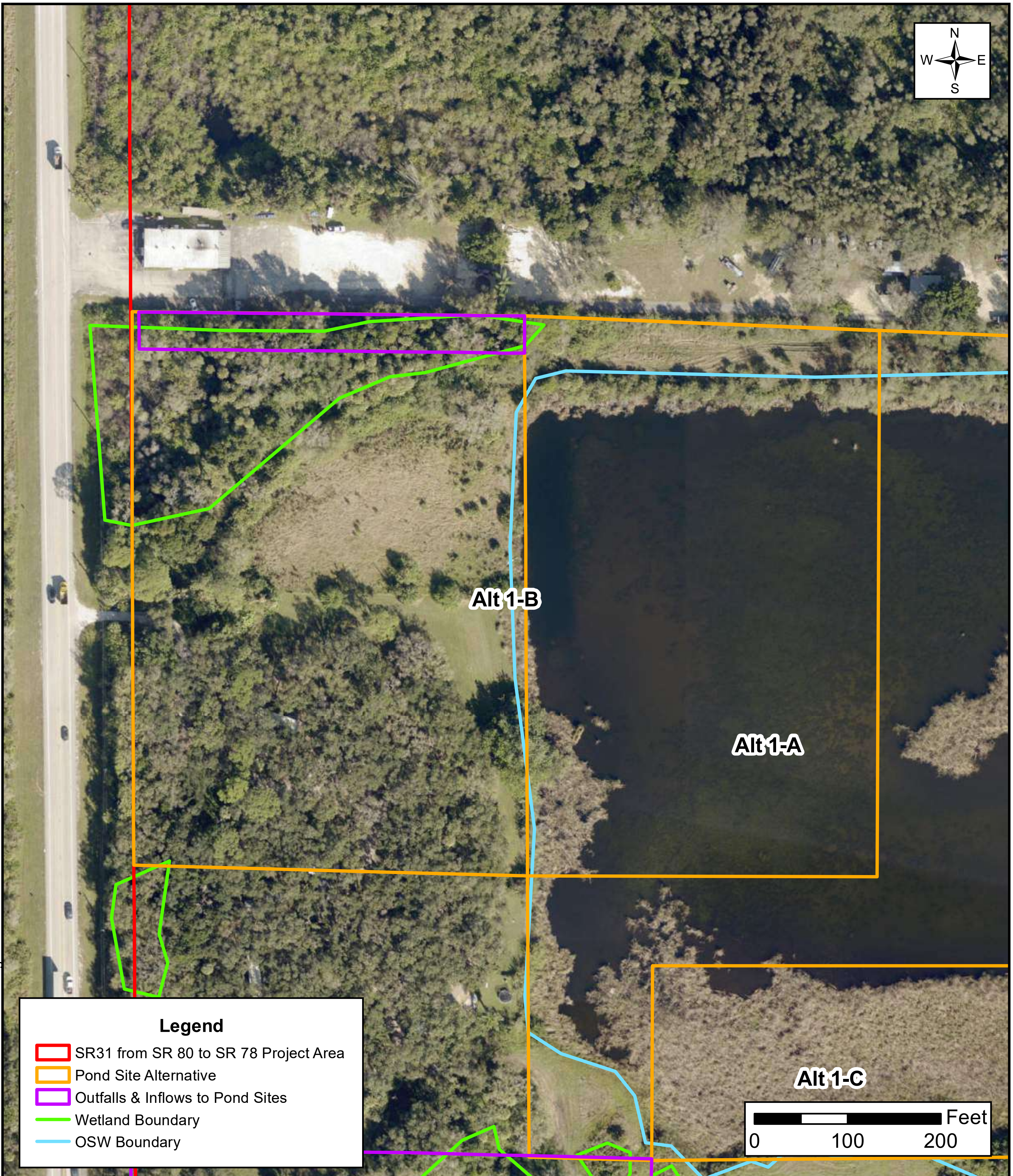
Pond Site Alternatives

DATA SOURCE:
Aerial Map - ESRI 2022

Figure
1-A

Pond Site Alt 1-B

Pond Site Alternative 1-B is located east of SR 31, adjacent to the SR 31 right-of-way. It is bordered by the Pond Site Alternative 1-A to the east and rural residential homes to the south. The majority of the pond site alternative is currently low density rural residential homes and is dominated by live oak, crowngrass (*Paspalum L*), broomsedge (*Andropogon virginicus*), caeser weed (*Urena lobata*), and dogfennel (*Eupatorium capillifolium*). In the northern portion of the pond site alternative is a mixed wetland hardwood community. The mixed wetland hardwood community is made up of cabbage palm, Brazilian pepper, Carolina willow, wax myrtle, cinnamon fern (*Osmunda cinnamomea*), and arrowhead (*Sagittaria latifolia*). There will be approximately 1.06 acres of primary wetland impacts, 0.19 acres of secondary impacts, and 4.78 acres of OSW impacts associated with the construction of Pond Site Alternative 1-B. There was no evidence of protected species observed within Pond Site Alternative 1-B during the field assessment.



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Lee County, FL

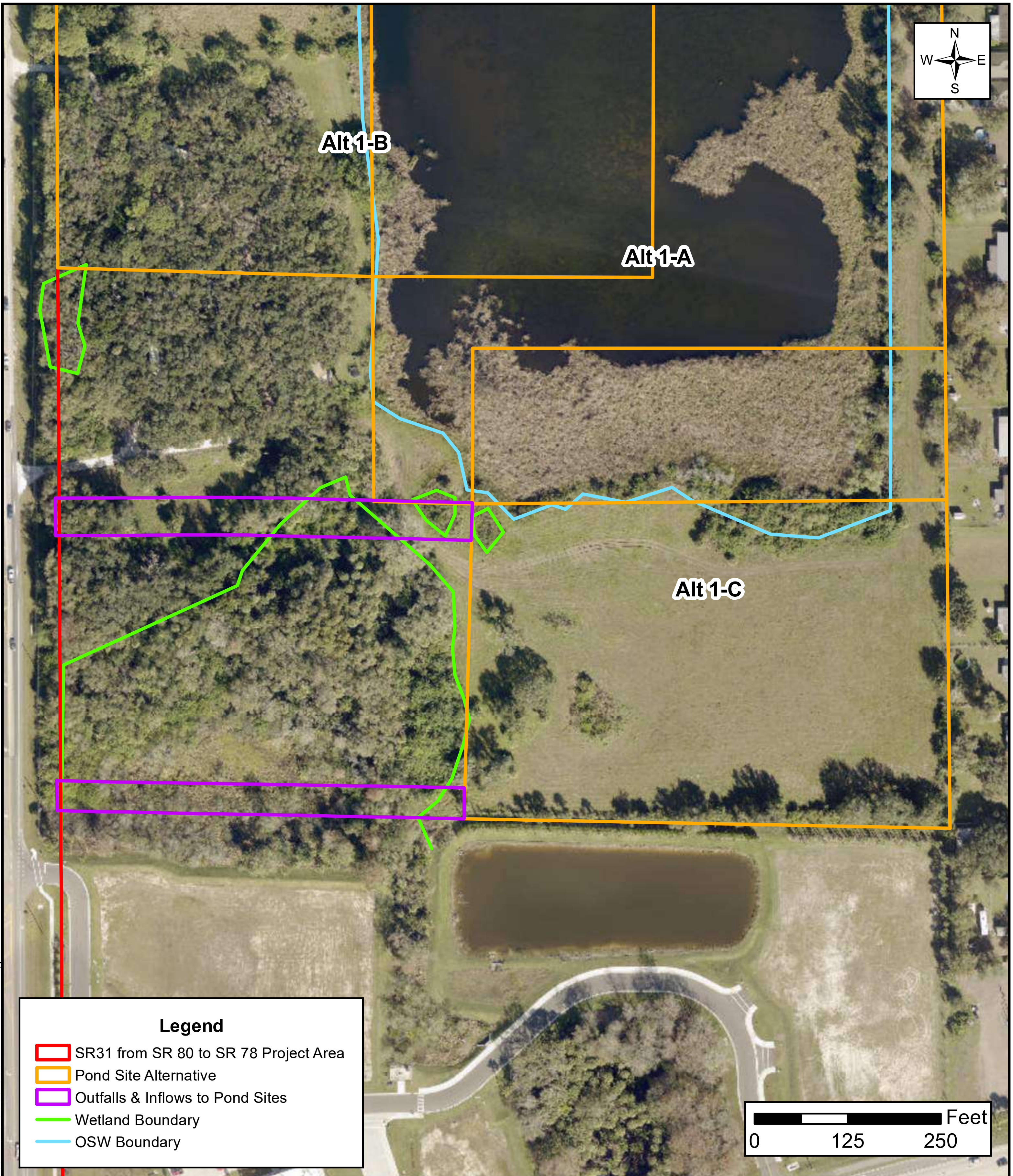
Pond Site Alternatives

DATA SOURCE:
Aerial Map - ESRI 2022

Figure 1-B

Pond Site Alt 1-C

Pond Site Alternative 1-C is located east of the proposed SR 31 widening. It is bordered by the Pond Site Alternative 1-A to the north and mixed wetland hardwoods habitat to the west. The majority of the pond site alternative is currently an active cattle pasture and is dominated by bahiagrass, dogfennel, and dense-spike blackroot (*Pterocaulon pycnostachyum*). There are several disturbed brush piles located within the active cattle pasture. These areas are made up of Brazilian pepper, Christmas bush (*Senna bicapsularis*), grapevine (*Vitis vinifera*), beach vitex (*Vitex rotundifolia*), and dogfennel. Located to the west of the pond site alternative is a mixed wetland hardwood community made up of cabbage palm, Brazilian pepper, Carolina willow, wax myrtle, cinnamon fern, and arrowhead. There are small isolated wetlands located in the northwest quadrant of the pond site alternative. These areas are absent of any canopy species and are largely composed of Carolina willow, Brazilian pepper, and cattail. There will be approximately 0.03 acres of primary wetland impacts, 0.03 acres of secondary wetland impacts, and 2.81 acres of OSW impacts associated with the construction of pond site alternative 1-C. There will be approximately 0.64 acres of primary wetland impacts and 0.70 acres of secondary wetland impacts associated with the drainage easement for the pond site alternative. There was no evidence of protected species observed within pond site alternative 1-C during the field assessment.



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Lee County, FL

Pond Site Alternatives

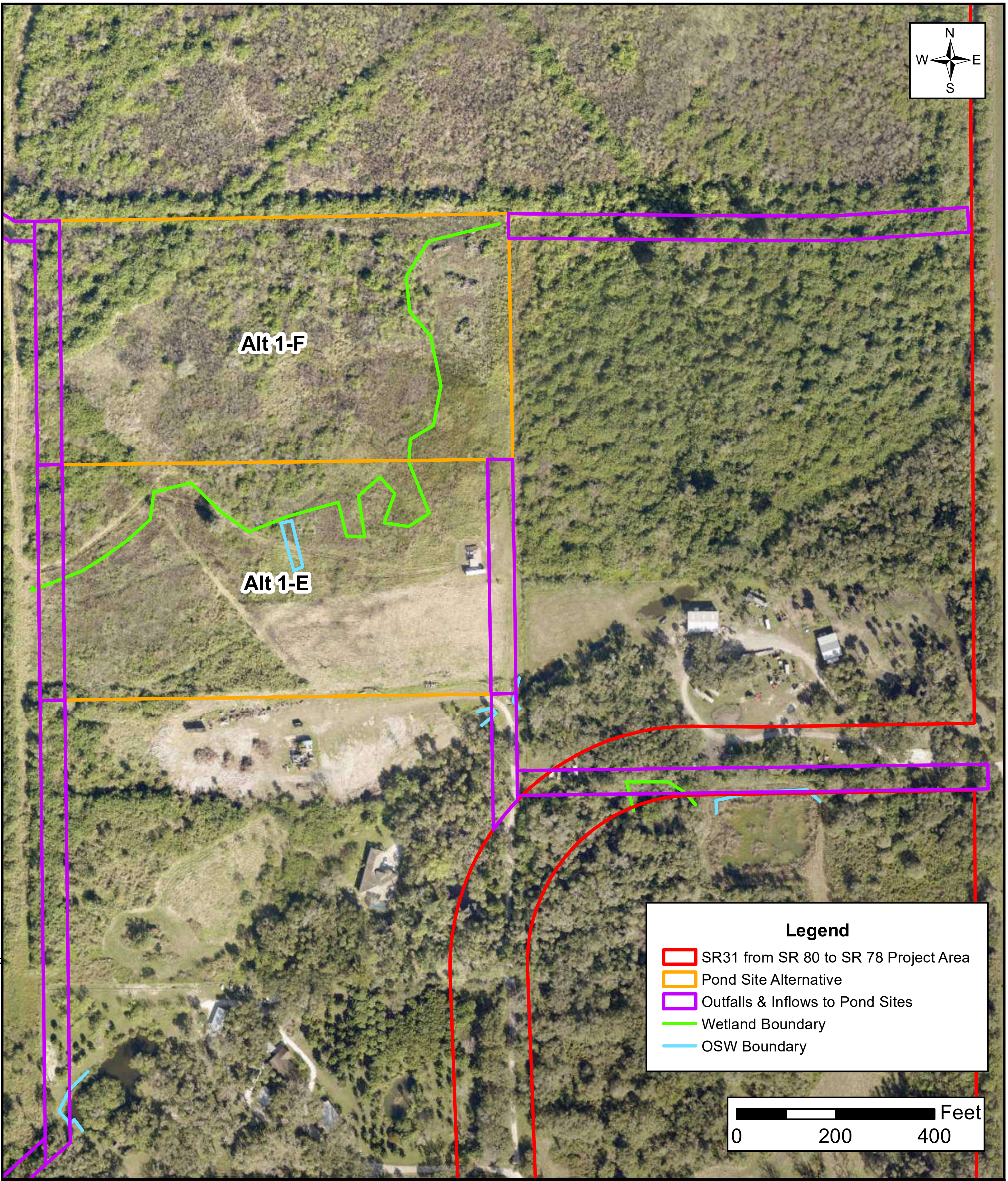
DATA SOURCE: Aerial Map - ESRI 2022

Figure

1-C

Pond Site Alt 1-E

Pond Sites Alternative 1-E is located west of the existing SR 31. It is bordered by a tree farm to the west and rural residential homes to the south and Pond Site Alternative 1-F to the north. It currently consists of two different habitat types: mixed hardwood coniferous swamp and disturbed land. A majority of the pond site alternative area is heavily disturbed (tree clearing and farming activities) and is currently composed of species found commonly within the herbaceous dry prairie community type: Johnsongrass (*Sorghum halepense*), caeser weed, ragweed (*Ambrosia artemisiifolia*), devil's beggartick (*Bidens frondosa*). The mixed hardwood coniferous swamps community is located along the north portion of the pond site alternative. It is composed of Carolina willow, Peruvian primrose-willow, Brazilian pepper, swamp dock (*Rumex verticillatus*), and bulrush (*Scirpus spp*.). There will be approximately 2.19 acres of primary wetland impacts, 0.59 acre of secondary impacts, and 0.05 acres of OSW impacts associated with the construction of Pond Site Alternative 1-E. There will be approximately 0.33 acres of primary wetland impacts, 0.39 acres of secondary impacts, and 0.02 acres of OSW impacts associated with the drainage easement for the pond site alternative. There was no evidence of protected species observed within Pond Site Alternative 1-E during the field assessment.



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Lee County, FL

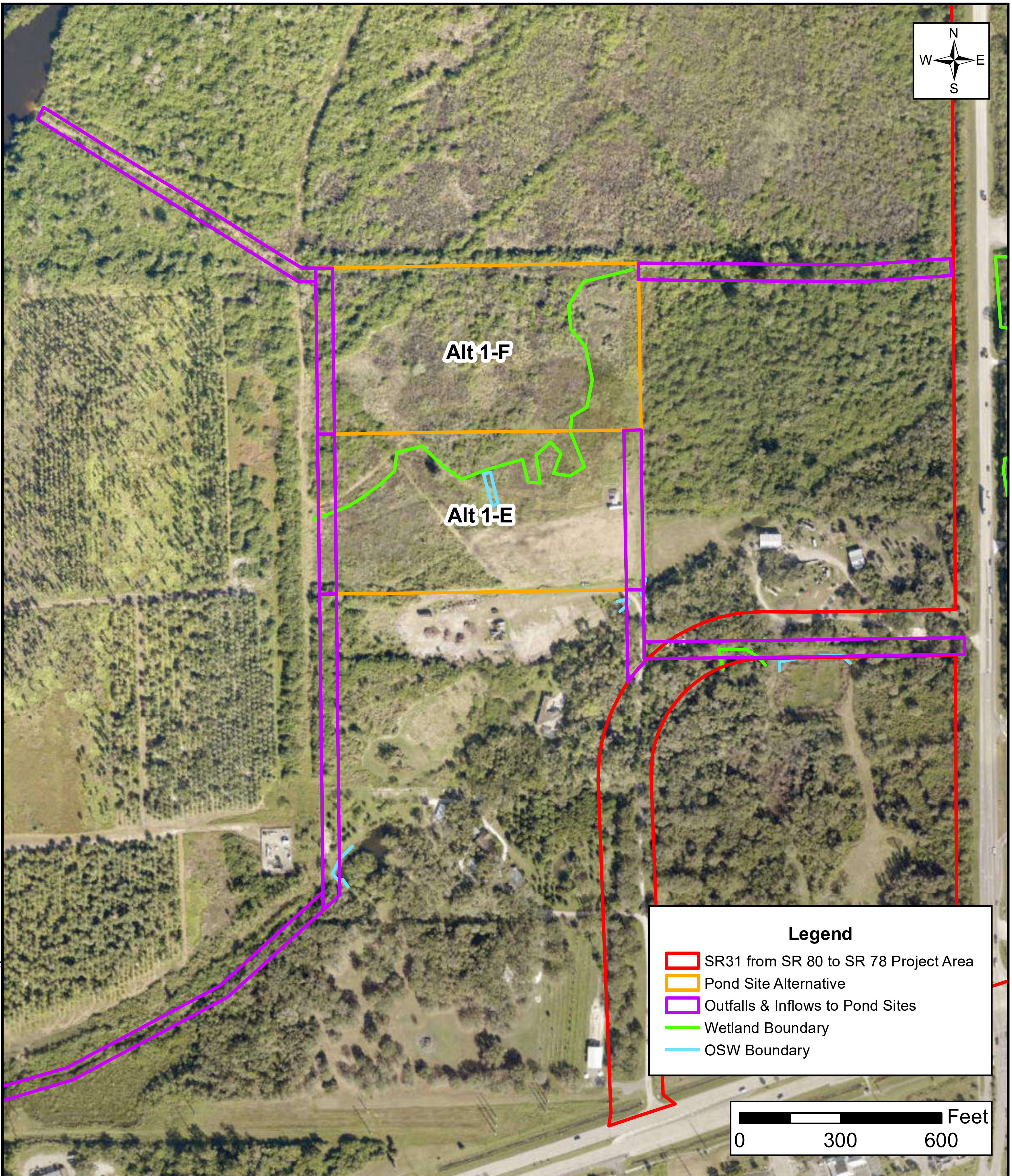
Pond Site Alternatives

DATA SOURCE: Aerial Map - ESRI 2022

Figure 1-E

Pond Site Alt 1-F

Pond Sites Alternative 1-F is located west of the existing SR 31. It is bordered by a tree farm to the west and Pond Site Alternative 1-E to the south. The majority of the pond site alternative area is a mixed coniferous swamps community and is currently composed of Carolina willow, Peruvian primrose-willow, Brazilian pepper, and bulrush (*Scirpus spp*.). There will be approximately 9.03 acres of primary wetland impacts and 1.27 acres of secondary wetland impacts associated with the construction of Pond Site Alternative 1-F. There will be approximately 2.84 acres of primary wetland impacts, 3.33 acres of secondary wetland impacts, and 0.02 acres of OSW impacts associated with the drainage easement for the pond site alternative. There was no evidence of protected species observed within Pond Site Alternative 1-F during the field assessment.



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Lee County, FL

Pond Site Alternatives

DATA SOURCE: Aerial Map - ESRI 2022

Figure 1-F

Summary

The pond site alternatives selected for the widening of SR 31 were evaluated for presence of wetlands and protected wildlife species. DRMP biologists conducted a wetland delineation in accordance with federal and state guidelines (U.S. Army Corps of Engineers (USACE) Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (2010) and FAC Rule 62-340, respectively. A summary of the findings has been provided below in Table 1.

Table 1 - SR 31 (SR 80 to SR 78) Pond Site Alternatives – Wetland & OSW Impacts

Pond Site	Primary Wetland Impacts Pond Sites*	Secondary Wetland Impacts Pond Sites*	Primary Wetland Impacts Drainage Easements*	Secondary Wetland Impacts Drainage Easements*	OSW Impacts
1-A	0.02	0.05	0.27	0.23	13.04
1-B	1.06	0.19	0.00	0.00	4.78
1-C	0.03	0.03	0.64	0.70	2.81
1-E	2.19	0.59	0.33	0.39	0.07
1-F	9.03	1.27	2.84	3.33	0.02

* The estimation of the wetland/OSW impacts at each pond site is an approximation based on the preliminary pond locations. These calculations are subject to change until the jurisdictional wetland determination has been approved by the permitting agencies.

In addition, DRMP biologists conducted a general wildlife survey to address the occurrence, or potential occurrence, of wildlife and plant species listed as threatened, endangered, or candidate, according to methodology outlined by the USFWS, FWC, and/or FNAI. Wildlife species identification was accomplished through visual observations and aural indicators. There was no evidence of protected species observed within the pond site alternatives during the general wildlife survey. A summary of protected species with potential to utilize habitat within the pond site alternatives is provided below in Table 2.

Table 2. Protected Species with Potential to Utilize Habitat within the Pond Site Alternatives

Species	Listing Status		Habitat Preference	Likelihood of Occurrence
	USFWS	FWC/FDACS		
Reptiles and Amphibians				
American alligator (*Alligator mississippiensis*)	T (S/A)	T (S/A)	Most permanent bodies of freshwater	Moderate
Eastern indigo snake (*Drymarchon couperi*)	T	T	Upland and wetland habitat, gopher tortoise burrows	Moderate
Gopher tortoise (*Gopherus polyphemus*)	C	T	Xeric uplands, pine flatwoods, pastures, and open, ruderal habitats	Low
Mammals				
Big Cypress Fox Squirrel (*Sciurus niger avicennia*)	None	T	Variety of forested habitats with open to moderately dense understory and shrub	Low
Florida black bear (*Ursus americanus floridanus*)	None	68A-4.009, FAC*	Various forested communities, forested wetlands for diurnal cover	Moderate
Florida bonneted bat (*Eumops floridanus*)	E	E	Palms and hollow trees	Moderate

Florida panther (*Puma concolor coryi*)	E	E	Extensive forested communities and large wetlands	Low
Bird				
Bald eagle (*Haliaeetus leucocephalus*)	BGEPA & MBTA	68A-16.002 FAC**	Close to bays, rivers, lakes, or other bodies of water	Moderate
Crested Caracara (*Caracara cheriway*)	T	T	Open country, dry prairie, pasture lands	Moderate
Florida Sandhill Crane (*Antigone canadensis pratensis*)	None	T	Wet prairies, marshy lakes, and shallow flooded areas	Moderate
Florida Scrub-Jay (*Aphelocoma coerulescens*)	T	T	Low-growing oak scrub habitat in well-drained sandy soils	Low
Florida Burrowing Owl (*Athene cunicularia floridana*)	None	T	High, sparsely vegetated, sandy ground such as dry prairies and sandhills	Low
Little Blue Heron (*Egretta caerulea*)	None	T	Shallow, freshwater habitats like lakes, marshes, swamps, and streams	Moderate
Red-cockaded woodpecker (*Picoides borealis*)	E	E	Sandhill and pine flatwoods with large pine trees suitable for nesting	Low
Tricolored Heron (*Egretta tricolor*)	None	T	Wetlands, mangrove swamps, tidal creeks, ditches, edges of ponds & lakes	Moderate
Wood stork (*Mycteria americana*)	T	T	Wetlands, streams, lakes, swamps, manmade impoundments and ditches	Moderate
Plants				
Beautiful pawpaw (*Deeringothamnus pulchellus*)	E	E	Open slash pines, longleaf pine flatwoods with wiregrass	Low

Table 6.3 Definitions:
USFWS = United States Fish and Wildlife Service
FWC = Florida Fish and Wildlife Conservation Commission
FDACS = Florida Department of Agriculture and Consumer Services
E = Endangered, T = Threatened, C = Candidate, T(S/A) =Threatened due to Similarity of Appearance
* Removed from Florida's Endangered and Threatened Species List in 2012, but still protected under the FAC
** Removed from Florida's Endangered and Threatened Species List in 2008, but is still protected under the Bald and Golden Eagle Protection Act (BGEPA), Migratory Bird Treaty Act (MBTA), and FAC
Documented = Observed within or adjacent to the project area during wildlife surveys.

The project area is located along the existing SR 31 corridor near the Caloosahatchee River. There are portions of the pond site alternatives which fall within state-assumed waters or federally retained waters. Project related impacts to wetlands and OSWs will be jurisdictional to the USACE or FDEP, depending on which pond site alternative is selected. The following provides a list of permits that may be required for the SR 31 widening project, including the above-mentioned pond site alternatives.

<u>Project results in wetland or OSW impacts:</u>
- Environmental Resource Permit – SFWMD
- Section 404 Dredge and Fill Permit – USACE/FDEP

<u>Project results in more than five acres of land clearing:</u>
- National Pollutant Discharge Elimination System Permit – FDEP

APPENDIX 7

Cultural Resource Assessment Report (Excerpts)

MAIN OFFICE
1107 N Ward Street
Tampa, FL 33607

Tel: 813.636.8200
Fax: 813.636.8212
janus@janus-research.com

Memorandum

To: James P. Sheets, DRMP, Inc.
Cc: Michael Leo, DRMP, Inc.
From: Adam M. Schieffer and Kathleen S. Hoffman, Janus Research
Date: June 3, 2022
Re: Updated Summary of Cultural Resources Existing Conditions for the SR 31 PD&E Study from SR 80 to SR 78, Lee County, Florida (441942-1) Incorporating Additional Drainage and Limits from the April 4, 2022 Pond Alternatives Map

INTRODUCTION

As requested, the current memorandum serves to provide an update to the previous *Summary of Cultural Resources Existing Conditions for the SR 31 PD&E Study from SR 80 to SR 78, Lee County, Florida (441942-1)* provided in March 2022 to aid in the preparation of the related Pond Siting Report (PSR). The goal of this effort is to provide cultural resources information to assist in the avoidance of resources listed in, determined eligible for, or considered eligible for listing in the *National Register of Historic Places* (National Register) according to the criteria set forth in 36 CFR Section 60.4. This updated memorandum is not intended to meet the requirements of *Section 106 of the National Historic Preservation Act (NHPA) of 1966* (Public Law 89-665, as amended), as implemented by 36 CFR 800 -- Protection of Historic Properties (incorporating amendments effective August 5, 2004), the revised Chapter 267, *Florida Statutes (F.S.),* or Chapter 1A-46 *(Archaeological and Historical Report Standards and Guidelines), Florida Administrative Code (F.A.C.)*.

STUDY AREA

The study area for archaeological resources consisted of the footprints of the 'Existing Survey Limits', 'Additional Survey – Required Services', and 'Additional Survey – Optional Services' areas depicted on the Survey Scope Exhibit provided by DRMP, Inc. (Attachment A), as well as the additional drainage features and limits illustrated on the recently provided Pond Alternatives Map from April 4, 2022 (Attachment B). The study area for historic resources also included these footprints from both exhibits. In addition, the study area for historic resources also included those parcels or resources located adjacent to these footprints, as well as a 500-foot buffer from the general area where the bridge is proposed.

METHODS

Background research conducted to determine the existing conditions within the study area included of a search of the Florida Master Site File (FMSF) geographic information systems (GIS) data[1], FMSF site file forms and survey manuscripts, and other pertinent GIS data

[1] *The FMSF data is not a comprehensive inventory of all cultural resources. It is an inventory of resources for which information has been provided, and describes their condition at the time of their recording. As a result, previous determinations of National Register significance may not reflect existing conditions. The FMSF can be used as guide, but should not be used to determine the official position of the FDHR or the SHPO regarding the significance of a resource. Please also note that, due to ongoing COVID-19 safety protocols, the FMSF data may not be as current as usual, despite the ongoing quarterly updates.*

available from the Florida Geographic Data Library (FGDL), including but not limited to Lee County Property Appraiser records, Florida Department of Transportation (FDOT) bridge records, and National Bridge Inventory (NBI) records.

SUMMARY

Previous Level of Cultural Resources Survey

- While numerous surveys intersect or partially contain the study area, the majority of the study area has not been recently surveyed for historic resources.
- The only previous archaeological survey work likely to be accepted as comprehensive by the FDHR/SHPO is a 2012 survey of SR 31, the *Cultural Resource Assessment Survey of State Road 31 from State Road 80 (Palm Beach Boulevard) to North of County Road 78 (North River Road) Lee County, Florida* (SEARCH 2012; FMSF Manuscript No. 20161). This survey covers portions of the archaeological study area along SR 31, SR 80, and Bayshore Road. However, numerous areas, especially those extending outside of the existing road right of way (ROW) have not yet been surveyed for archaeological resources.
    - A previous technical memorandum related to various pond sites, some of which partially overlap with the current study area, was appended to the 2012 CRAS, but does not appear to have been coordinated with the FDHR/SHPO.

Previously Recorded Archaeological Sites

- <u>0 known significant archaeological sites</u> located within or adjacent to the study area.
- <u>0 known archaeological sites with confirmed or reported human remains</u> within or adjacent to the study area.
- <u>0 previously recorded archaeological sites</u> within or adjacent to the study area.

Previously Recorded and Potential Historic Resources

- <u>1 known significant historic resource</u> within the study area.
    - Caloosahatchee River Canal (8LL2586): This resource was previously determined to be National Register–eligible by the SHPO in 2012. Portions of within the study area have been considered contributing to the larger resource group in 2012 as it ‘retained its integrity and conveyed its period of significance’ as a result of FMSF Manuscript No. 20161. In 2012, the SHPO concurred that the previously proposed replacement of the bridge over the canal would not have an adverse effect on the canal since it had been bridged since the 1960s, and the previously proposed bridge would not impede the flow of the canal.
- <u>3 additional previously recorded historic resources</u> within the study area
    - Wilson Pigott Bridge (8LL2615): This bridge was previously determined to be National Register–ineligible by the SHPO in 2012 as a result of FMSF Manuscript No. 20161.
    - Seaboard Airline Railroad Grade (8LL1898): The majority of this resource within the study area was determined National Register–ineligible by the SHPO in 2012 as a result of FMSF Manuscript No. 20161. Unevaluated portions of this resource are expected to extend outside of the 2012 survey area into the current study area.

  - SR 31 (8LL2845): This historic road segment has not yet been recorded within the study area, but portions were previously recorded outside of the study area to the north as part of the 2020 *Cultural Resource Assessment Survey for SR 31 State Environmental Impact Report (SEIR) from CR 78 to North of Cook Brown Road, Lee/Charlotte Counties, Florida (428917-2-21-01)* (ACI 2020; FMSF Manuscript No. 27302). The segment to the north was determined Nation Register–ineligible by the SHPO due to alterations and a lack of historic associations.
- <u>15 Potential Unrecorded Historic Resources</u>
  - There are 15 parcels with historic build dates of 1974 or earlier interested by the study area (listed below). The number of extant historic buildings within the eventual historic resources area of potential effect (APE) established for the project will need to be determined by field survey efforts associated with the cultural resources assessment survey.
    - 12226 Palm Beach Boulevard (c. 1971)
    - 12350 Palm Beach Boulevard (c. 1956)
    - 16400 SR 31 (c. 1969)
    - 16550–16552 SR 31 (c. 1973)
    - 18031/18041 SR 31 (c. 1971)
    - 2621 West Road (c. 1973)
    - 2701 West Road (c. 1972)
    - 2719 West Road (c. 1974)
    - 2725 West Road (c. 1972)
    - 2819 West Road (c. 1962)
    - 11650–11700 West Marina Drive (c. 1972)
    - 11941–11945 West Marina Drive (c. 1970)
    - 2193 Santiago Avenue (c. 1973)
    - 2194 Santiago Avenue (c. 1972)
    - 2194 Havana Avenue (c. 1971)
  - While 2193 Havana Avenue was included on the list of potential historic resources in the initial existing conditions document, updated parcel data and the review of modern aerial imagery indicate the c. 1969 building is no longer extant at this location.
  - While the Southwest Florida and Lee County Fair is a historic event that has been ongoing since before the mid-1920s, it was not held at the current civic center location at 11831 Bayshore Road until 1979 (Southwest Florida and Lee County Fair 2022).

The locations of the historic linear resources and historic bridge within the study area, as well as the locations of the 15 parcels with historic build dates intersected by the study area, are illustrated on an aerial photograph in Attachment C.

CONCLUSIONS

The expansion of the archaeological and historic resources study areas to incorporate additional drainage features and project limits depicted on the April 4, 2022 Pond Alternatives Map resulted in the inclusion of one additional potential historic resource, 18031/18041 SR 31 (c. 1971), within the updated study area. This parcel is located adjacent to the west side of the project corridor at its northern terminus. 14 of the 15 parcels with historic build dates previously identified during the March 2022 review are still intersected by the historic resources study area. As noted previously, the parcel at 2193 Havana Avenue is no longer noted as having a historic build date, and no longer contains an extant building.

There are still no known recorded archaeological sites located within or adjacent to the study area. In addition no changes to the counts or National Register eligibility statuses for the four previously recorded historic resources were identified as a result of the updated search of the expanded historic resources study area.

REFERENCES CITED

Archaeological Consultants, Inc. (ACI)
2020 *Cultural Resource Assessment Survey for SR 31 State Environmental Impact Report (SEIR) from CR 78 to North of Cook Brown Road, Lee/Charlotte Counties, Florida (428917-2-21-01)*. Manuscript on file, Florida Division of Historical Resources, Tallahassee, Florida.

Southeastern Archaeological Consultants, Inc. (SEARCH)
2012 *Cultural Resource Assessment Survey of State Road 31 from State Road 80 (Palm Beach Boulevard) to North of County Road 78 (North River Road) Lee County, Florida. Manuscript on file, Florida Division of Historical Resources, Tallahassee, Florida.*

Southwest Florida and Lee County Fair
2022 History of the Southwest Florida & Lee County Fair. Electronic document, https://swflcfair.com/history, accessed March 15, 2022.

Attachment A:

Existing Survey Limits, Areas of Additional Survey – Required Services, and Areas of Additional Survey – Optional Services as Depicted on Survey Scope Exhibit

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

DRMP
ENGINEERS • SURVEYORS • PLANNERS • SCIENTISTS
DRMP, INC.
941 LAKE BALDWIN LANE, ORLANDO, FLORIDA 32814
PHONE: (407) 896-0594 FAX: (407) 896-4836
CERTIFICATE OF AUTHORIZATION NO. 2648

SR 31 FROM SR 80 (PALM BEACH BLVD) TO SR 78 (BAYSHORE RD)

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
31	LEE	441942-1-22-01

AERIAL OVERVIEW

SHEET NO.

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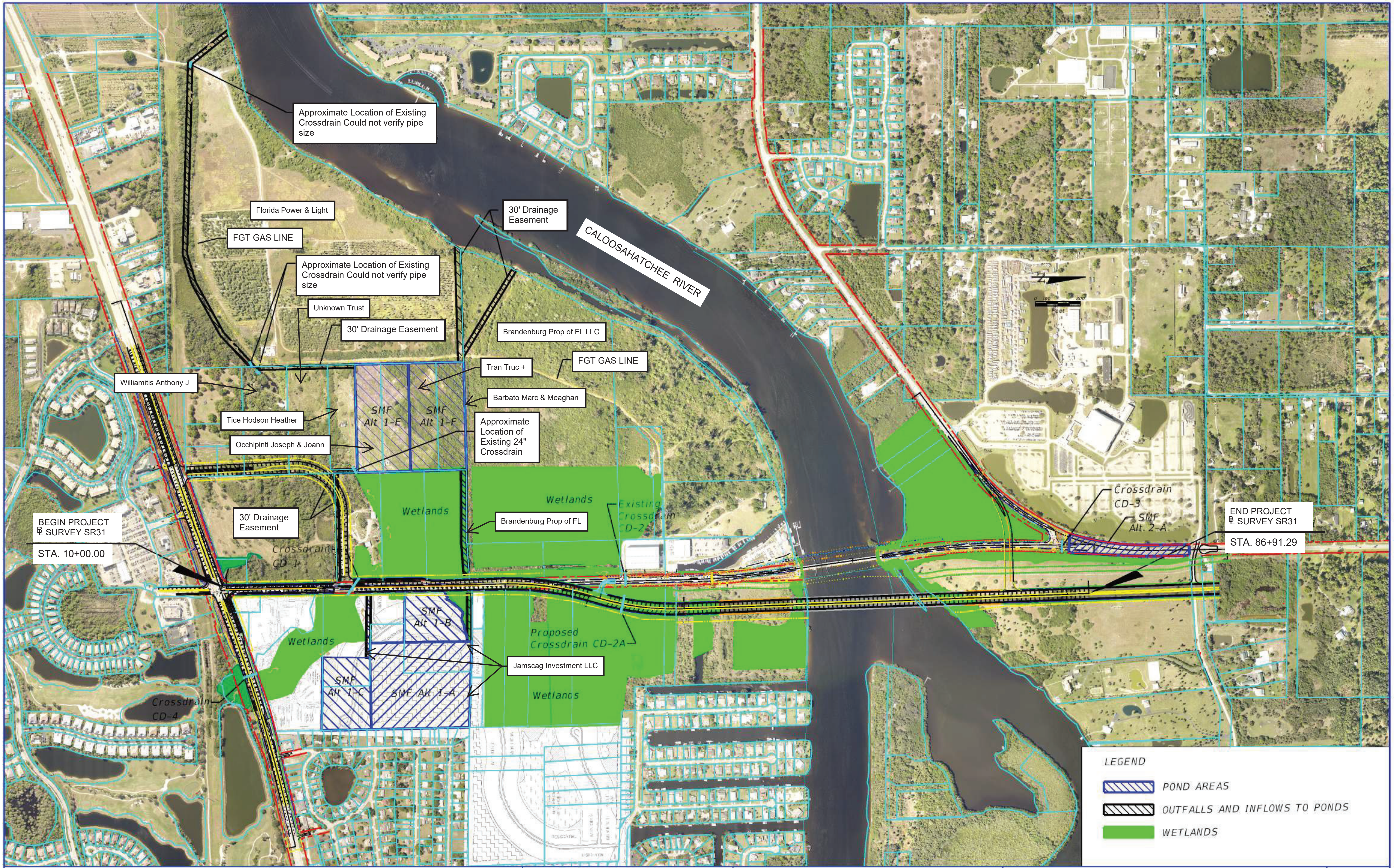
Attachment B:

Pond Alternatives Map from April 4, 2022



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

FDOT

DRMP, Inc.
941 Lake Baldwin Ln.
Orlando, FL 32814
www.drmp.com
Phone: 407-896-0594
Fax: 407-896-4836

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
31	LEE	441942-1-22-01

POND ALTERNATIVES MAP

SHEET NO.

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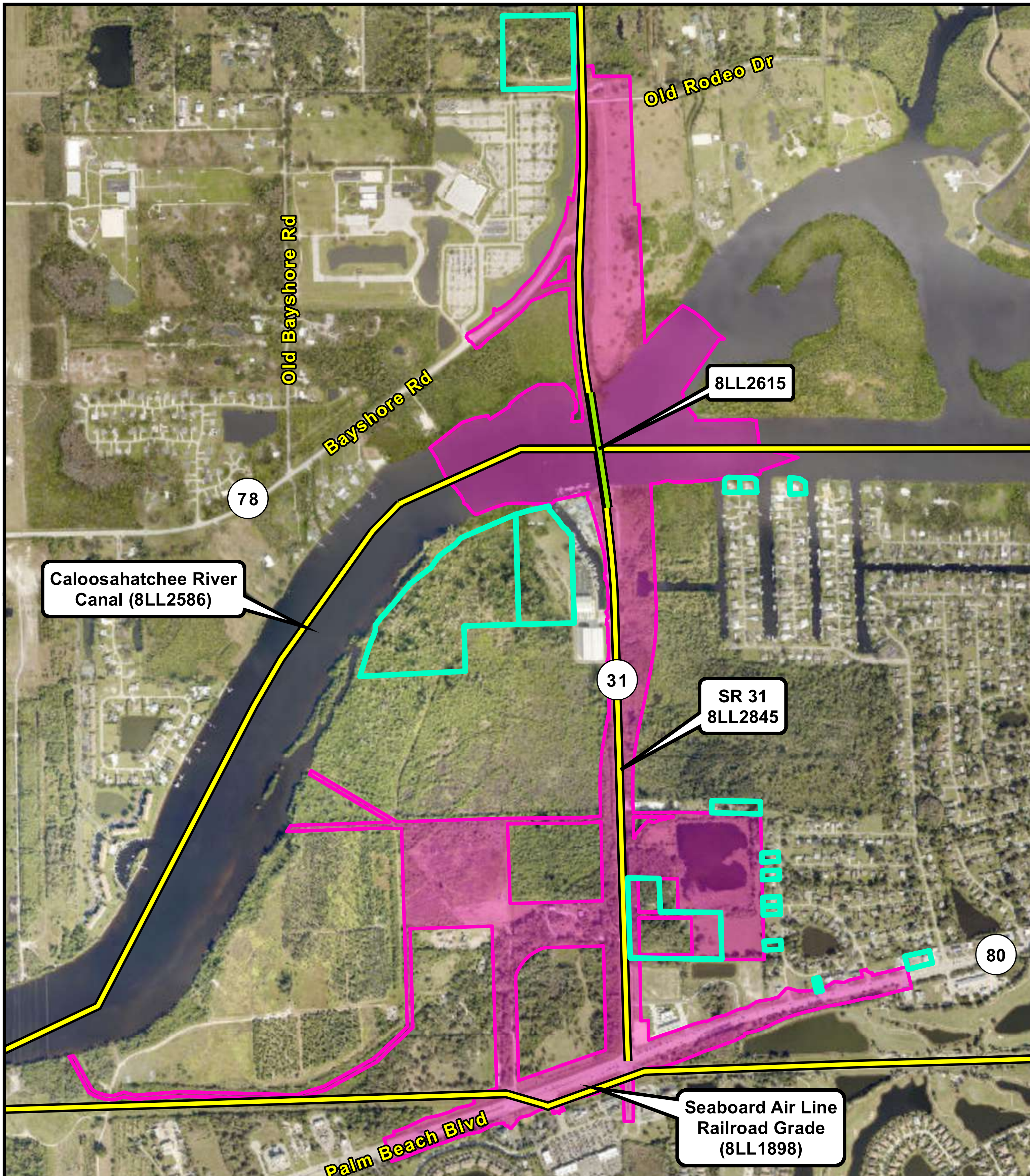
Attachment C:

Locations of Previously Recorded Historic Resources Within the Study Area and Parcels With Buildings With Historic Build Dates Intersected by the Study Area Illustrated on an Aerial Photograph



Locations of Previously Recorded Historic Resources Within the Study Area and Parcels With Buildings With Historic Build Dates Intersected by the Study Area

Combined Footprint from Survey Scope Exhibit and April 2022 Pond Alternatives Map

Parcel With Historic Build Date

Historic Bridge

Historic Linear Resource

APPENDIX 8

Contamination Screening Evaluation Report (Excerpts)

Report to be added at a Later Date.

APPENDIX 9

Geotechnical Memorandum

October 25, 2022

DRMP, Inc.
941 Lake Baldwin Lane
Orlando, FL 32814

Attn: Mark Prochak, P.E.

RE: Preliminary Roadway Soil Survey Report
SR 31 from SR 80 (Palm Beach Blvd) to SR 78 (Bayshore Rd)
Lee County, Florida
FPN: 441942-1-22-01
Tierra Project No. 6511-18-173

Mr. Prochak:

Tierra, Inc. (Tierra) has performed preliminary geotechnical services along the proposed roadway alignments and within pond alternatives for the above referenced project. The results of our field exploration program, the data obtained and the Seasonal High Ground Water Table (SHGWT) estimates are presented in this letter report.

As part of our study, Tierra reviewed soils information obtained from the Soil Survey of Lee County, Florida published by the United States Department of Agriculture (USDA) National Resources Conservation Services (NRCS) and topographic information obtained from the "Fort Myers, Florida" and "Olga, Florida" Quadrangle Maps published by the United States Geological Survey (USGS). Reproductions of the **USDA Soil Survey & USGS Quadrangle Maps** for the project vicinity are included in **Appendix A** of this report. A **Summary of USDA Soil Survey** information is also included in **Appendix A**.

A total of forty-five (45) hand auger borings were completed at selected locations along the project alignments and within pond alternatives to estimate the SHGWT and to evaluate near-surface soil conditions. Generally, these borings were located at intervals of approximately 300 feet on the left and right sides of the existing roadways and proposed new alignments. The boring depths ranged from approximately 1 to 8 feet below existing grades. Each boring location was staked in the field by Tierra prior to coordinating utility clearances and performing the test borings. The locations and elevations of the borings were established by the project surveyor and provided to Tierra for use in this report. The boring locations are presented on the **Boring Location Plan** in **Appendix B** of this report.

In general, the encountered subsurface conditions consisted predominantly of sandy soils with varying degrees of silt and shell (A-3/A-2-4) with interbedded layers of clayey soils (A-4/A-2-6/A-6/A-7-6/A-7-6) within the boring depths explored.

Organic soil (A-8) was encountered within some of the borings. The organic content ranged from 5 to 48 percent based on laboratory testing performed on samples obtained from within the borings. This material should be removed and utilized in accordance with the FDOT Standard Plans and Specifications.

In addition, buried construction debris mixed with sand was encountered within some borings performed in pond alternatives. The buried debris consisted of asphalt, brick and rock pieces. This material is considered deleterious for roadway embankment utilization. Its presence and removal requirements, if any, within the pond shall be evaluated during final design. If excavated, this material should be removed and disposed of offsite and not used within the project limits.

Some of the borings performed were terminated at depths of less than 5 feet due to borehole collapse from groundwater intrusion. Additionally, some of the borings were terminated at depths less than 5 feet due to the presence of hard material consisting of buried construction debris and/or shallow limestone/caprock. Notes warning the Contractor of the presence of near-surface limestone and debris materials will be provided to DRMP for inclusion in the plans as the project progresses.

The results of the borings performed are presented on the **Soil Profiles** sheets and **Pond Soil Survey** sheets in **Appendix B**.

The SHGWT level at the majority of the boring locations was estimated based on a review of the soil samples including natural soil indicators such as stain lines, mottles, depth to the root layer, measured groundwater levels in the borings, information provided in the USDA Soil Survey published by the NRCS, available well monitoring data from the Lee County Division of Natural Resources and the surrounding topography. At some of the boring locations, the SHGWT could not be determined due to a lack of natural indicators most likely due to disturbed soil in the area. In addition, the SHGWT level is estimated to be above existing grades in some locations. We recommend the project biologist be consulted to assist with determining SHGWT levels at these locations. The estimated SHGWT levels at the boring locations along the proposed roadway alignments and within the pond alternatives are provided in the **Summary of Seasonal High Groundwater Table Estimates** tables in **Appendix C**.

The SHGWT levels reported in the attached tables are estimated historic levels. Man-made influences, such as existing water management ditches, swales, and drainage ponds, all of which exist along the project corridor, will affect groundwater levels but are not considered when determining the historical SHGWT. Where appropriate, biological indicators should be used in conjunction with the historic SHGWT levels when setting pavement grades. Once profile and grade lines become available, Tierra requests the opportunity to review the base elevations in relation to the SHGWT estimates.

Representative soil samples collected from the borings performed along the project alignment 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 testing, Atterberg Limits and natural moisture content determination. In addition, environmental corrosion tests were performed on selected soil samples to evaluate the corrosive nature of the subsurface soils encountered along the project alignment.

The following list summarizes the laboratory tests performed by Tierra and the respective test methods utilized:

- 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).

- Natural Moisture Content - The moisture content tests were conducted in general accordance with the AASHTO test designation T-265 (ASTM test designation D-2216).

- Organic Content - Tests were performed in general accordance with AASHTO T-267.

- Environmental Corrosion - Environmental corrosion tests were conducted in general accordance with the FDOT test designations FM 5-550, FM 5-551, FM 5-552 and FM 5-553.

A summary of the laboratory test results for each soil stratum encountered along the project alignment is presented on the **Roadway Soil Survey** sheet in **Appendix B**. This sheet includes ranges of laboratory test results for different stratum soil samples collected from borings performed along the project alignment. Detailed summaries of the laboratory test results performed for soil and environmental classification are presented in **Appendix D**.

Tierra collected bulk soil samples along the project alignment and transported them to the State Materials Laboratory in Gainesville, Florida for the Resilient Modulus testing. The M_R results and the recommended design M_R value are provided in **Appendix E** of this report.

Tierra appreciates the opportunity to be of service to DRMP on this project. If you have any questions or comments regarding this letter, please contact our office at your earliest convenience.

Sincerely,

TIERRA, INC.

Alban Hung, E.I.
Geotechnical Engineering Intern

Thomas E. Musgrave Jr., P.E.
Geotechnical Engineer
Florida License No. 81669

Lawrence P. Moore, P.E.
Principal Geotechnical Engineer
Florida License No. 47673

Appendix A
USDA Soil Survey & USGS Quadrangle Maps
Summary of USDA Soil Survey

Appendix B
Roadway Soil Survey
Boring Location Plan Sheets
Soil Profiles Sheets
Pond Soil Survey Sheets

Appendix C
Summary of Seasonal High Groundwater Table Estimates for Roadway
Summary of Seasonal High Groundwater Table Estimates for Pond Alternatives

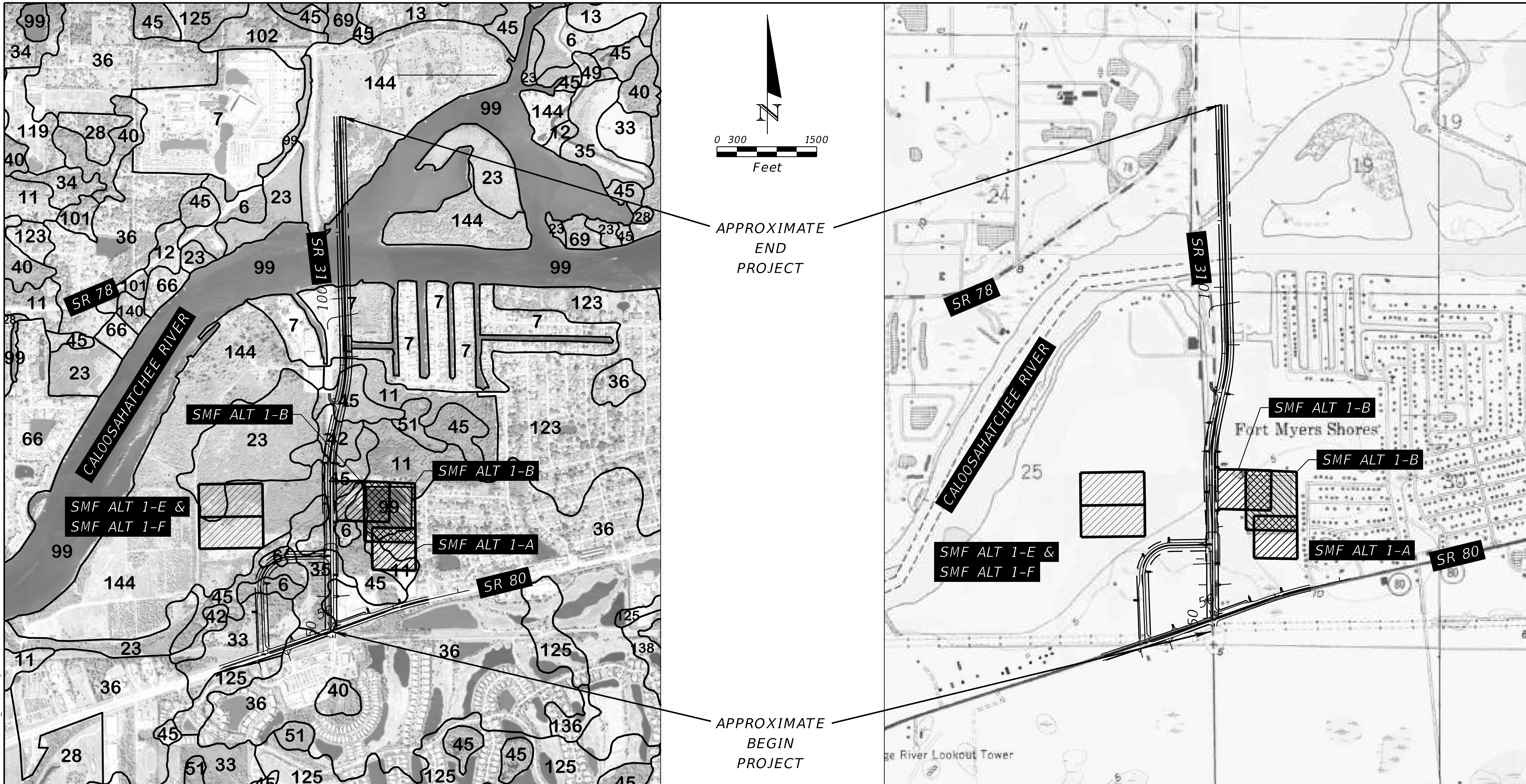
Appendix D
Summary of Laboratory Test Results for Soil Classification
Summary of Laboratory Test Results for Environmental Classification

Appendix E
Embankment Resilient Modulus Pavement Design Report

APPENDIX A

USDA Soil Survey & USGS Quadrangle Maps

Summary of USDA Soil Survey



REFERENCE: USDA SOIL SURVEY OF LEE COUNTY, FLORIDA

REFERENCE: USGS QUADRANGLE MAPS OF "FORT MYERS, FLORIDA" & "OLGA, FLORIDA"

TOWNSHIP:	43S	43S
RANGE:	25E	26E
SECTION:	24, 25, 36	19, 30, 31

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J:\6511\2018 Files\6511-18-173 SR 31 PD&E\ORD\6511-18-173\Geotechnical\USDA_USGS01.dgn

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
THOMAS E. MUSGRAVE, JR., P.E.
LICENSE NUMBER: 81669
TIERRA, INC.
7351 TEMPLE TERRACE HIGHWAY
TAMPA, FLORIDA 33637

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

USDA SOIL SURVEY & USGS QUADRANGLE MAPS

SHEET NO.

Summary of USDA Soil Survey
SR 31 Project Development and Environment (PD&E) Studies
From SR 80 (Palm Beach Blvd) to SR 78 (Bayshore Blvd)
Lee County, Florida
FPN: 441942-1-22-01
Tierra Project No.: 6511-18-173

USDA Map Symbol and Soil Name	Depth (in)	Soil Classification		Permeability (in/hr)			pH	Seasonal High Water Table	
		USCS	AASHTO					Depth (feet)	Months
(6) Hallandale	0-2	SP-SM, SM	A-2-4	6.0	-	20.0	5.1-6.5	0.3-1.5	June-Oct
	2-7	SM, SP-SM	A-3, A-2-4	6.0	-	20.0	5.6-7.8		
	7-12	SM, SP-SM	A-2-4	0.6	-	6.0	5.6-7.8		
	>12-22	Limestone		2.0	-	20.0	---		
(7) Matlacha-Urban land	0-35	SP-SM, SM	A-3, A-2-4	2.0	-	6.0	5.6-8.4	1.5 - 3.5	June-Nov
	35-40	SM, SP-SM	A-3, A-2-4	6.0	-	20.0	5.6-7.3		
	40-80	SM, SP-SM	A-3, A-2-4	6.0	-	20.0	5.6-7.3		
	Information not provided for Urban Land								
(11) Myakka	0-6	SP-SM, SM	A-3, A-2-4	6.0	-	20.0	3.5-6.5	0.5 - 1.5	June-Nov
	6-20	SP-SM, SM	A-3, A-2-4	6.0	-	20.0	3.5-6.5		
	20-36	SP-SM, SM	A-2-4, A-3	0.6	-	6.0	3.5-6.5		
	36-80	SP-SM, SM	A-3, A-2-4	6.0	-	20.0	3.5-6.5		
(33) Oldsmar	0-6	SP-SM, SM	A-3, A-2-4	6.0	-	20.0	3.5-7.3	0.5 - 1.5	June-Nov
	6-38	SM, SP-SM	A-2-4, A-3	6.0	-	20.0	3.5-7.3		
	38-50	SP-SM, SM	A-2-4, A-3	0.2	-	6.0	3.5-7.3		
	50-80	SC, CL, SC-SM	A-4, A-7-6, A-6	0.1	-	0.2	5.1-7.8		
(35) Wabasso	0-6	SP-SM, SM	A-3, A-2-4	6.0	-	20.0	5.1-6.5	0.5 - 1.5	June-Nov
	6-25	SP-SM, SP	A-3, A-2-4	6.0	-	20.0	5.1-6.5		
	25-30	SP-SM, SM	A-3, A-2-4	6.0	-	20.0	5.0-5.5		
	30-58	CL, SC	A-6, A-7-6	0.1	-	0.2	6.1-7.3		
	58-80	SM, SC	A-2-4, A-2-6	0.6	-	6.0	6.1-7.3		
(36) Immokalee-Urban land	0-9	SP-SM	A-2-4, A-3	6.0	-	20.0	3.5-6.0	0.5 - 1.5	June-Nov
	9-36	SP, SP-SM	A-2-4, A-3	6.0	-	20.0	3.5-6.0		
	36-55	SP-SM, SM	A-3, A-2-4	0.6	-	2.0	3.5-6.0		
	55-80	SM, SP-SM	A-2-4, A-3	6.0	-	20.0	3.5-6.0		
	Information not provided for Urban Land								
(42) Wabasso, limestone substratum	0-6	SP-SM, SP, SM	A-2-4, A-3	6.0	-	20.0	4.5-6.5	0.5 - 1.5	June-Nov
	6-25	SM, SP-SM, SP	A-2-4, A-3	6.0	-	20.0	4.5-6.5		
	25-35	SP, SM, SP-SM	A-2-4, A-3	0.6	-	20.0	4.5-6.5		
	35-45	CL, SC, SC-SM	A-2-4, A-6	0.1	-	0.2	6.1-8.4		
	>45-55	Limestone		2.0	-	20.0	---		
(45) Copeland	0-8	SC, CL, SM	A-2-4, A-6	0.6	-	6.0	6.1-7.3	+2.0-0.0	Jan-Feb, Jun-Dec
	8-20	SC, CL, SM	A-6, A-2-4	0.6	-	6.0	6.1-7.8		
	20-28	SC, CL, CH	A-7-6, A-4	0.1	-	0.2	7.4-8.4		
	>28-38	Limestone		2.0	-	20.0	---		
(125) Oldsmar sand-Urban land	0-6	SP-SM, SM	A-3, A-2-4	6.0	-	20.0	3.5-7.3	0.5 - 1.5	Jun-Nov
	6-38	SP-SM, SM	A-2-4, A-3	6.0	-	20.0	3.5-7.3		
	38-50	SP-SM, SM	A-2-4, A-3	0.2	-	6.0	3.5-7.3		
	50-80	CL, SC-SM	A-4, A-7-6, A-6	0.1	-	0.2	5.1-7.8		
	Information not provided for Urban Land								
(144) Caloosa	0-10	SP-SM, SM	A-3, A-2-4	6.0	-	20.0	6.1-8.4	1.5-3.5	June-Nov
	10-27	SP-SM, SM	A-2-4, A-3	6.0	-	20.0	6.1-8.4		
	27-80	CH	A-7-6	0.0	-	0.1	6.1-8.4		

(1) AASHTO and USCS do not provide classification for Limestone.

APPENDIX B

Roadway Soil Survey

Boring Location Plan Sheets

Soil Profiles Sheets

Pond Soil Survey Sheets

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

DATE OF SURVEY: JANUARY 2019 TO OCTOBER 2022
SURVEY MADE BY: TIERRA, INC.
SUBMITTED BY: THOMAS E. MUSGRAVE, P.E.

DISTRICT: 1
ROAD NO.: SR 31
COUNTY: LEE

FINANCIAL PROJECT ID : 441942-1-22-01
PROJECT NAME: SR 31 PROJECT DEVELOPMENT ENVIRONMENT (PD&E) STUDIES FROM SR 80 (PALM BEACH BLVD.) TO SR 78 (BAYSHORE RD.)

CROSS SECTION SOIL SURVEY FOR THE DESIGN OF ROADS

SURVEY BEGINS STA. : 51+23 SURVEY ENDS STA. : 127+00 REFERENCE: ℄ SR 31

	ORGANIC CONTENT		MOISTURE CONTENT		SIEVE ANALYSIS RESULTS PERCENT PASS (%)						ATTERBERG LIMITS (%)					CORROSION TEST RESULTS				
STRATUM NO.	NO. OF TESTS	% ORGANIC	NO. OF TESTS	MOISTURE CONTENT	NO. OF TESTS	10 MESH	40 MESH	60 MESH	100 MESH	200 MESH	NO. OF TESTS	LIQUID LIMIT	PLASTIC INDEX	AASHTO GROUP	DESCRIPTION	NO. OF TESTS	RESISTIVITY ohm-cm	CHLORIDE ppm	SULFATES ppm	pH
1	2	2-3	3	15-33	17	100	91	63	37	2-10	1	NP	NP	A-3	PALE GRAY TO GRAY TO LIGHT BROWN TO ORANGE-BROWN SAND TO SAND WITH SILT, OCCASIONALLY WITH SHELL	9	2,200-14,000	15-135	<5-81	7.4-83
2	4	1-3	7	16-32	15	100	95	77	53	13-28	3	NP	NP	A-2-4	GRAY TO LIGHT BROWN TO BROWN SILTY SAND	1	7,800	30	<5	8.2
3	--	--	4	24-31	4	--	--	--	--	21-55	4	26-41	11-22	A-2-6/A-6/ A-7-6	LIGHT BROWN TO BROWN TO ORANGE-BROWN CLAYEY SAND TO CLAYEY-SILTY SAND	--	--	--	--	--
4	--	--	1	59	1	--	--	--	--	94	1	76	38	A-7-5/A-7-6	GRAY TO DARK GRAY CLAY	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	WEATHERED LIMESTONE/CAPROCK	--	--	--	--	--
6	9	5-48	9	39-310	6	--	--	--	--	11-82	2	NP-49	NP-28	A-8	DARK BROWN ORGANIC SAND TO ORGANIC SILTY SAND TO MUCK	--	--	--	--	--
7	--	--	--	--	--	--	--	--	--	--	--	--	-	--	GRAY TO BROWN SAND WITH CONSTRUCTION DEBRIS INCLUDING ASPHALT, BRICK AND ROCK PIECES	--	--	--	--	--

NOTES:

1. THE MATERIAL FROM STRATUM 1 (A-3) APPEARS SATISFACTORY FOR USE IN THE EMBANKMENT WHEN UTILIZED IN ACCORDANCE WITH STANDARD PLANS, INDEX 120-001.
2. THE MATERIAL FROM STRATUM 2 (A-2-4) APPEARS SATISFACTORY FOR USE IN THE EMBANKMENT WHEN UTILIZED IN ACCORDANCE WITH STANDARD PLANS, INDEX 120-001. 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.
3. THE MATERIAL FROM STRATUM 3 (A-2-6/A-6/A-7-6) IS PLASTIC MATERIAL AND SHALL BE REMOVED IN ACCORDANCE WITH STANDARD PLANS, INDEX 120-002 AND UTILIZED IN ACCORDANCE WITH STANDARD PLANS, INDEX 120-001.
4. THE MATERIAL FROM STRATUM 4 (A-7-5/A-7-6) IS HIGH PLASTIC MATERIAL AND SHALL BE REMOVED IN ACCORDANCE WITH STANDARD PLANS INDEX 120-002 AND UTILIZED IN ACCORDANCE WITH STANDARD PLANS, INDEX 120-001.
5. THE MATERIAL FROM STRATUM 6 (A-8) IS MUCK MATERIAL AND SHALL BE REMOVED IN ACCORDANCE WITH STANDARD PLANS, INDEX 120-002 AND UTILIZED IN ACCORDANCE WITH STANDARD PLANS, INDEX 120-001.

EMBANKMENT AND SUBGRADE MATERIAL

STRATA BOUNDARIES ARE APPROXIMATE. MAKE FINAL CHECK AFTER GRADING.

▼ - WATER TABLE ENCOUNTERED
▽ - ESTIMATED SEASONAL HIGH GROUNDWATER TABLE
▽+ - ESTIMATED SEASONAL HIGH GROUNDWATER TABLE ABOVE GRADE
GNA - GROUNDWATER NOT APPARENT
GNE - GROUNDWATER NOT ENCOUNTERED
NP - NON-PLASTIC
"--" INDICATES AN UNMEASURED PARAMETER.
A - WITH LIMESTONE FRAGMENTS
B - WITH SHELL FRAGMENTS

6. THE MATERIAL FROM STRATUM 5 IS A NATURAL LIMESTONE FORMATION AND WAS ENCOUNTERED WITHIN THE BORINGS. THIS MATERIAL IS ROCK AND IS LOCATED IN SHALLOW DEPTHS. EXCAVATIONS INTO AND/OR THROUGH LIMESTONE/CAPROCK WILL BE DIFFICULT AND WILL REQUIRE NON CONVENTIONAL CONSTRUCTION TECHNIQUES AND SPECIALIZED EQUIPMENT. LIMESTONE/CAPROCK IS POROUS AND WILL BE DIFFICULT TO DEWATER.
7. THE MATERIAL FROM STRATUM 7 IS DEBRIS MATERIAL CONSISTING OF SAND WITH ASPHALT, BRICK AND ROCK PIECES AND WAS ENCOUNTERED WITHIN POND ALTERNATIVES. IF EXCAVATED, THIS MATERIAL SHALL BE REMOVED AND DISPOSED OF OFFSITE AND NOT USED WITHIN THE PROJECT LIMITS.

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

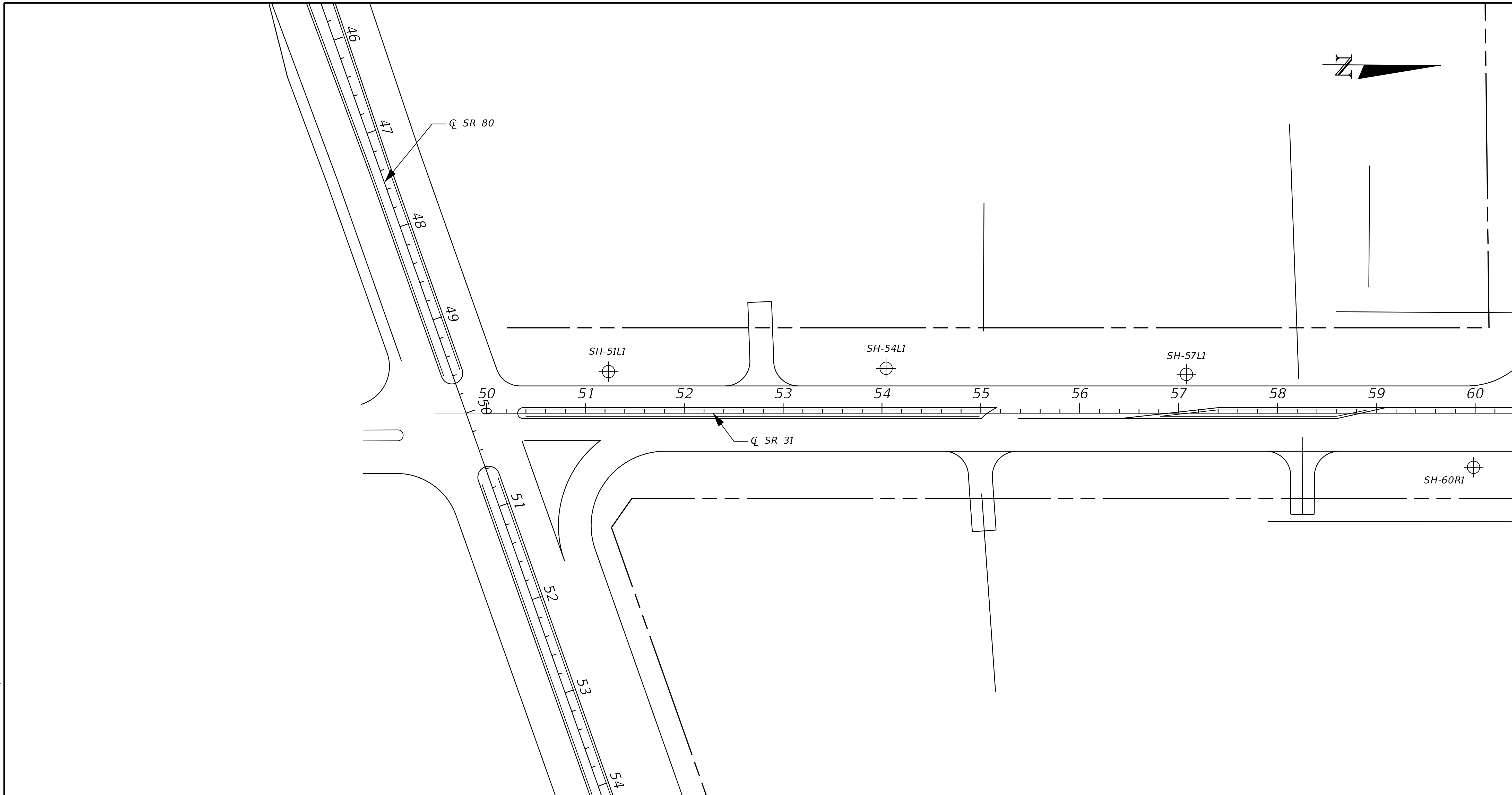
ENGINEER OF RECORD
THOMAS E. MUSGRAVE, JR., P.E.
LICENSE NUMBER: 81669
TIERRA, INC.
7351 TEMPLE TERRACE HIGHWAY
TAMPA, FLORIDA 33637

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

ROADWAY SOIL SURVEY

SHEET NO.



LEGEND

⌖ APPROXIMATE AUGER BORING LOCATION

0 20 100
Feet

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
THOMAS E. MUSGRAVE, JR., P.E.
LICENSE NUMBER: 81669
TIERRA, INC.
7351 TEMPLE TERRACE HIGHWAY
TAMPA, FLORIDA 33637

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

BORING LOCATION PLAN (1)

SHEET NO.

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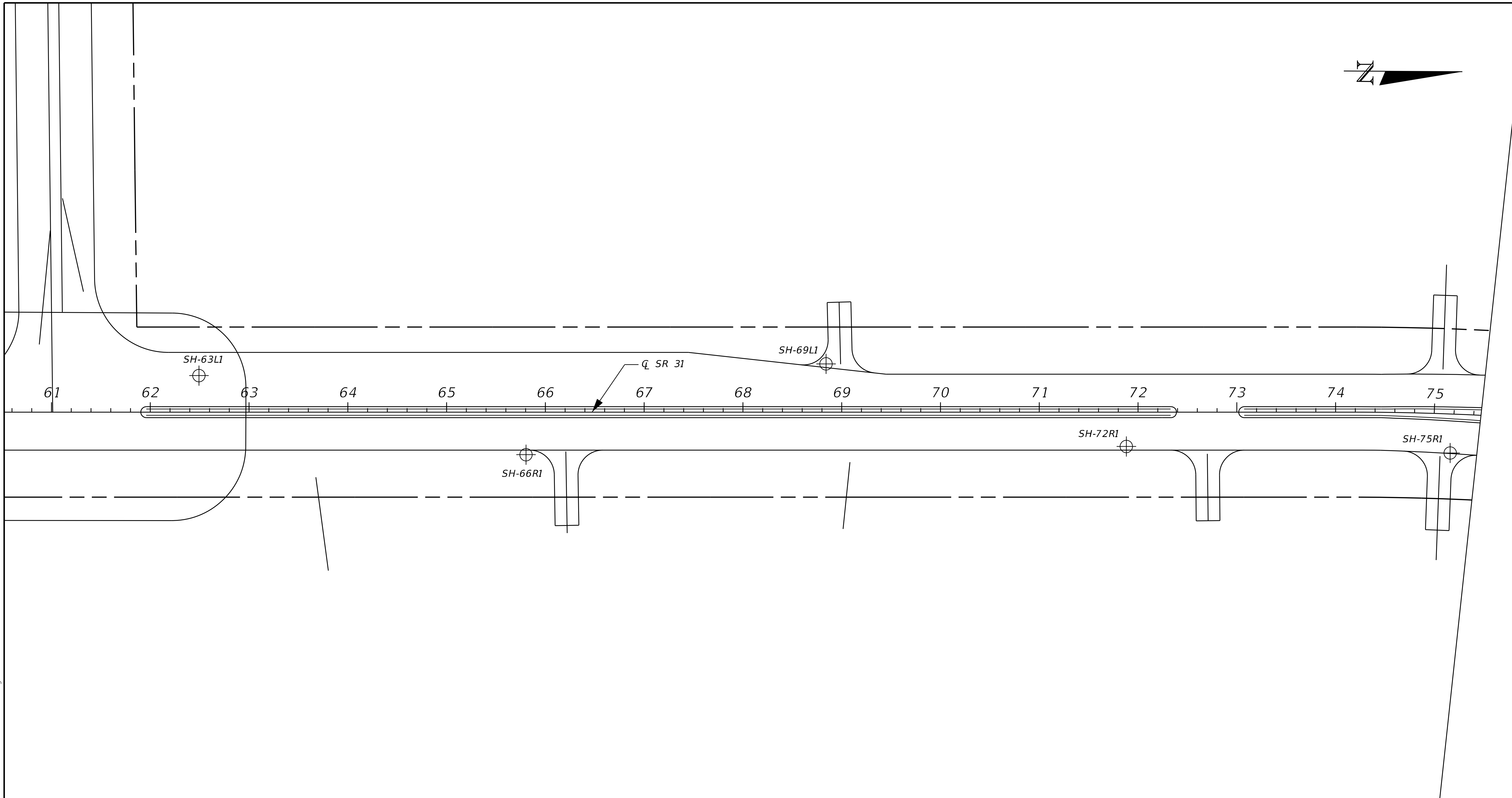
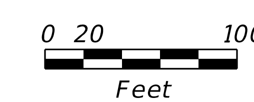


LEGEND

⌖ APPROXIMATE AUGER BORING LOCATION



REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			BORING LOCATION PLAN (2)	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	THOMAS E. MUSGRAVE, JR., P.E. LICENSE NUMBER: 81669 TIERRA, INC. 7351 TEMPLE TERRACE HIGHWAY TAMPA, FLORIDA 33637	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
					SR 31	LEE	441942-1-22-01		

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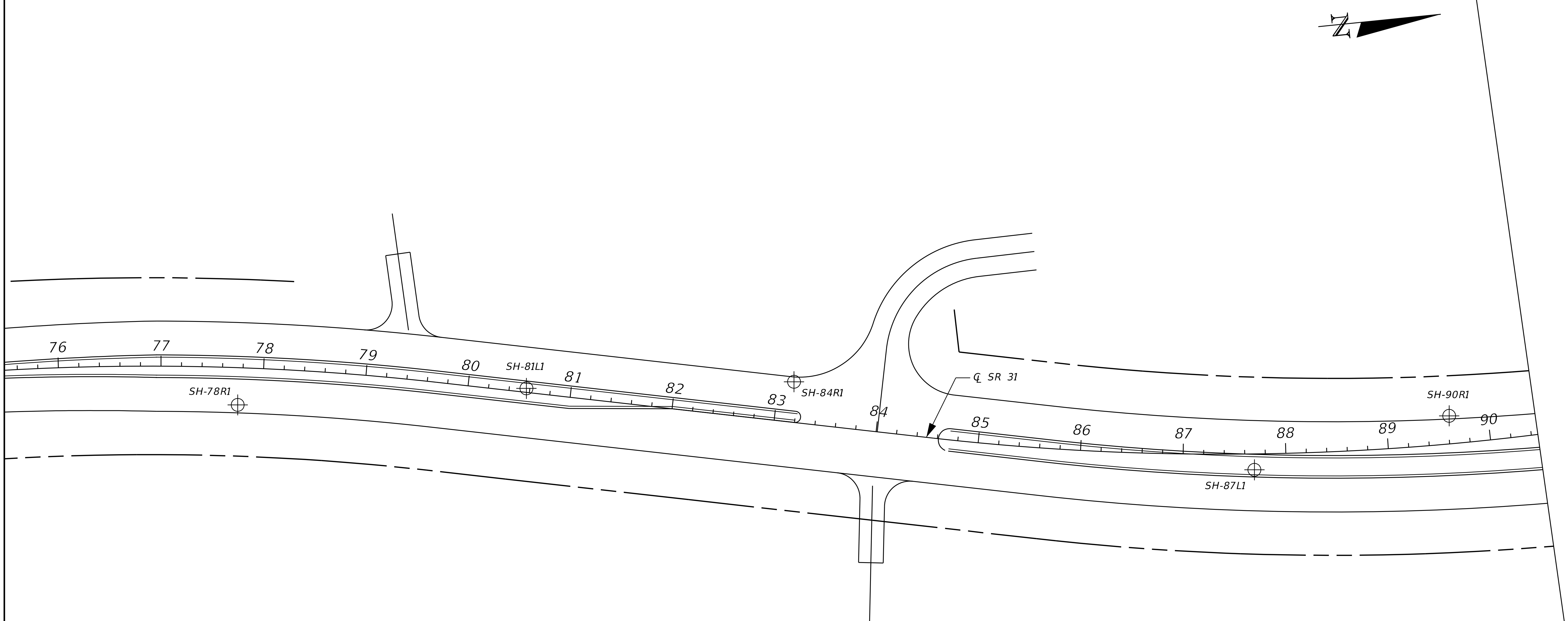

LEGEND

⌖ APPROXIMATE AUGER BORING LOCATION

0 20 100
Feet

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
THOMAS E. MUSGRAVE, JR., P.E.
LICENSE NUMBER: 81669
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7351 TEMPLE TERRACE HIGHWAY
TAMPA, FLORIDA 33637

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

BORING LOCATION PLAN (3)

SHEET NO.

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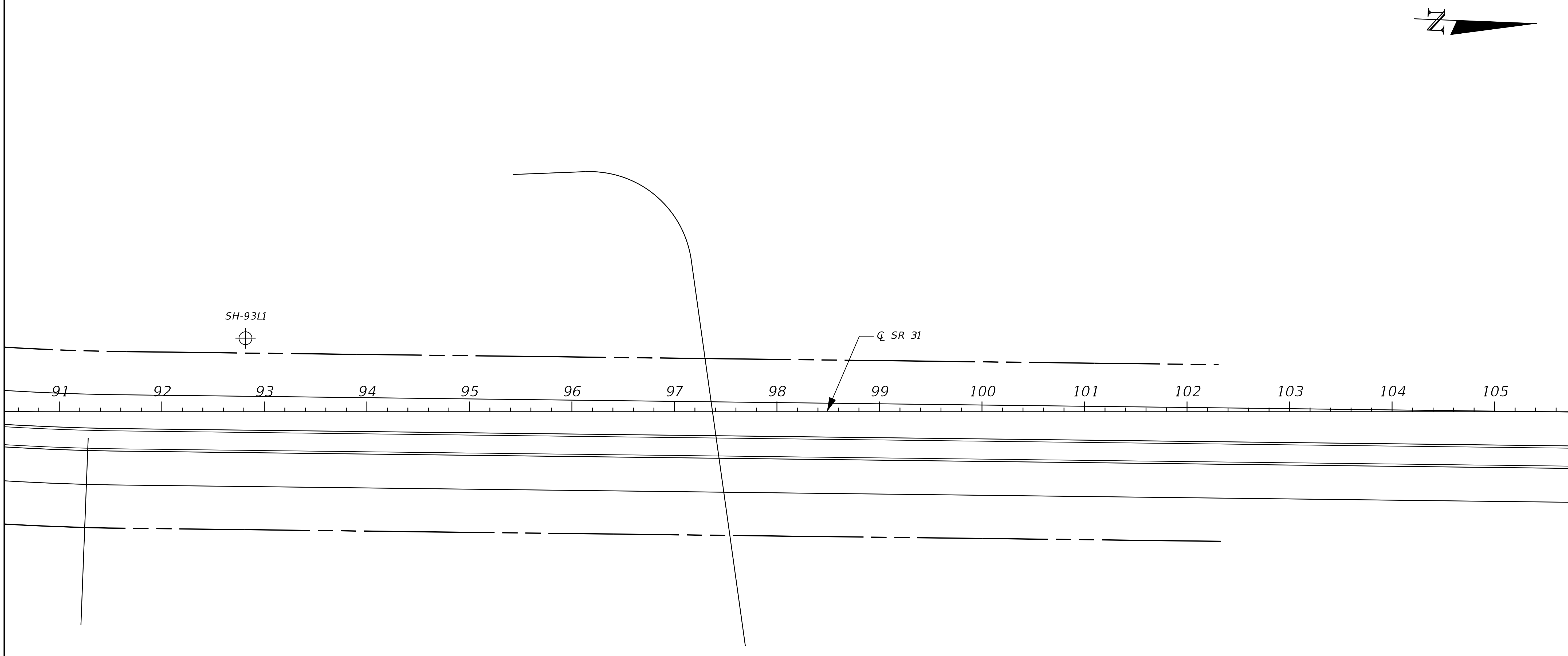

LEGEND

⌖ APPROXIMATE AUGER BORING LOCATION

0 20 100
Feet

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	THOMAS E. MUSGRAVE, JR., P.E. LICENSE NUMBER: 81669 TIERRA, INC. 7351 TEMPLE TERRACE HIGHWAY TAMPA, FLORIDA 33637	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	BORING LOCATION PLAN (4)	
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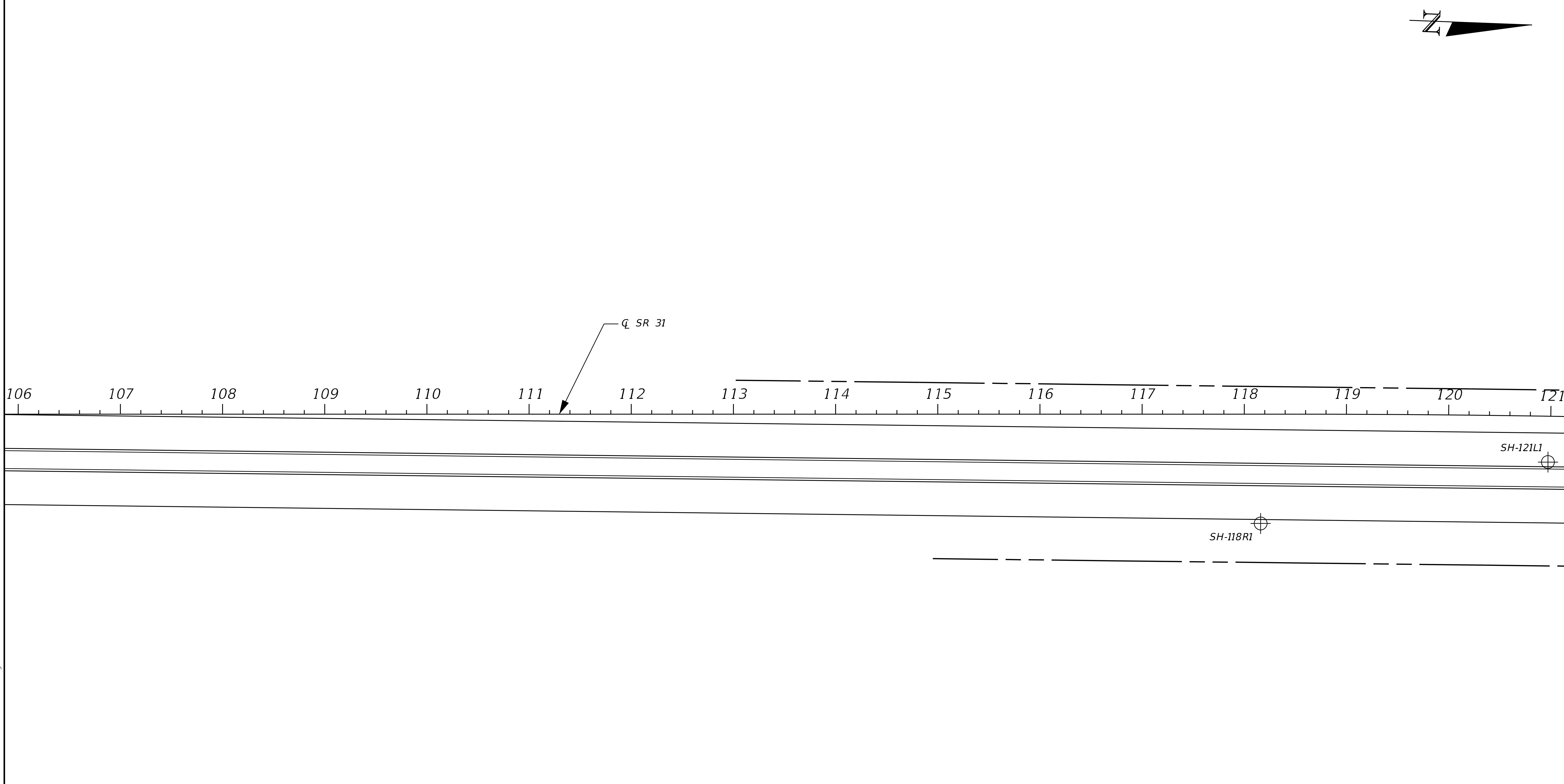

LEGEND

APPROXIMATE AUGER BORING LOCATION

0 20 100
Feet

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	THOMAS E. MUSGRAVE, JR., P.E. LICENSE NUMBER: 81669 TIERRA, INC. 7351 TEMPLE TERRACE HIGHWAY TAMPA, FLORIDA 33637	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	BORING LOCATION PLAN (5)	
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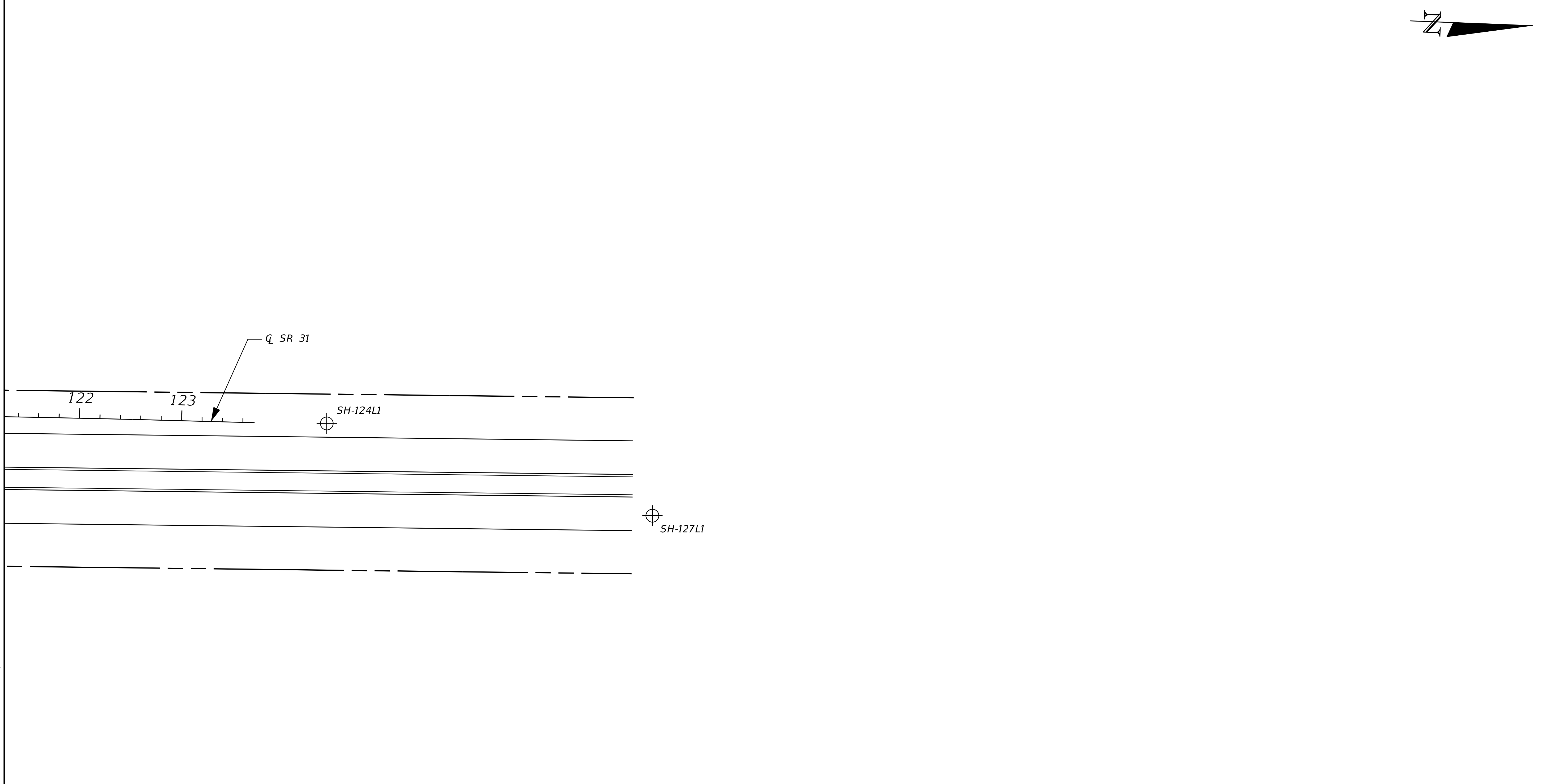

LEGEND

APPROXIMATE AUGER BORING LOCATION

0 20 100
Feet

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	THOMAS E. MUSGRAVE, JR., P.E. LICENSE NUMBER: 81669 TIERRA, INC. 7351 TEMPLE TERRACE HIGHWAY TAMPA, FLORIDA 33637	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	BORING LOCATION PLAN (6)	
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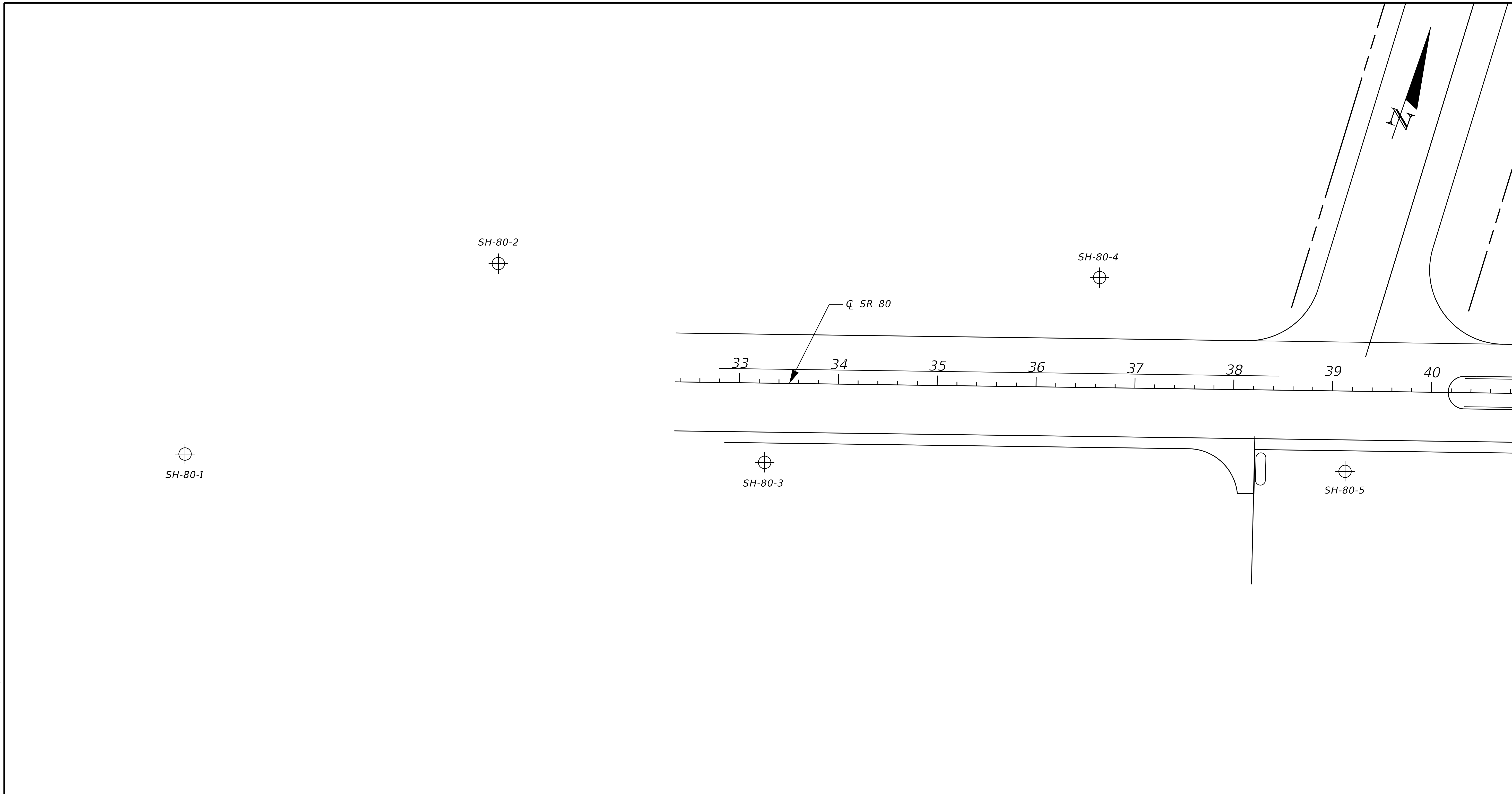

LEGEND

⌖ APPROXIMATE AUGER BORING LOCATION

0 20 100
Feet

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	THOMAS E. MUSGRAVE, JR., P.E. LICENSE NUMBER: 81669 TIERRA, INC. 7351 TEMPLE TERRACE HIGHWAY TAMPA, FLORIDA 33637	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	BORING LOCATION PLAN (7)	
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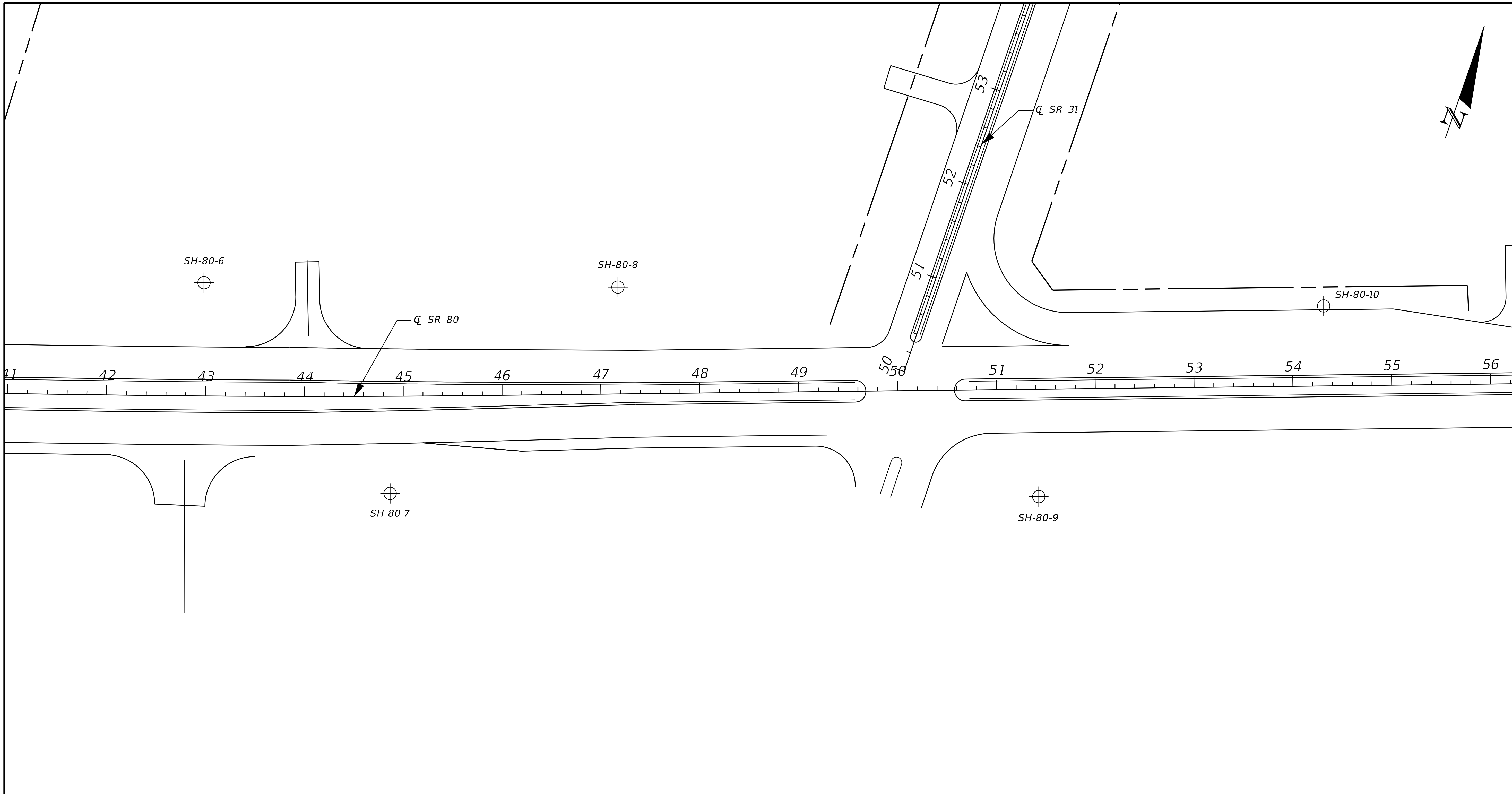

LEGEND

⌖ APPROXIMATE AUGER BORING LOCATION

0 20 100
Feet

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			BORING LOCATION PLAN (8)	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	THOMAS E. MUSGRAVE, JR., P.E. LICENSE NUMBER: 81669 TIERRA, INC. 7351 TEMPLE TERRACE HIGHWAY TAMPA, FLORIDA 33637	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
					SR 31	LEE	441942-1-22-01		

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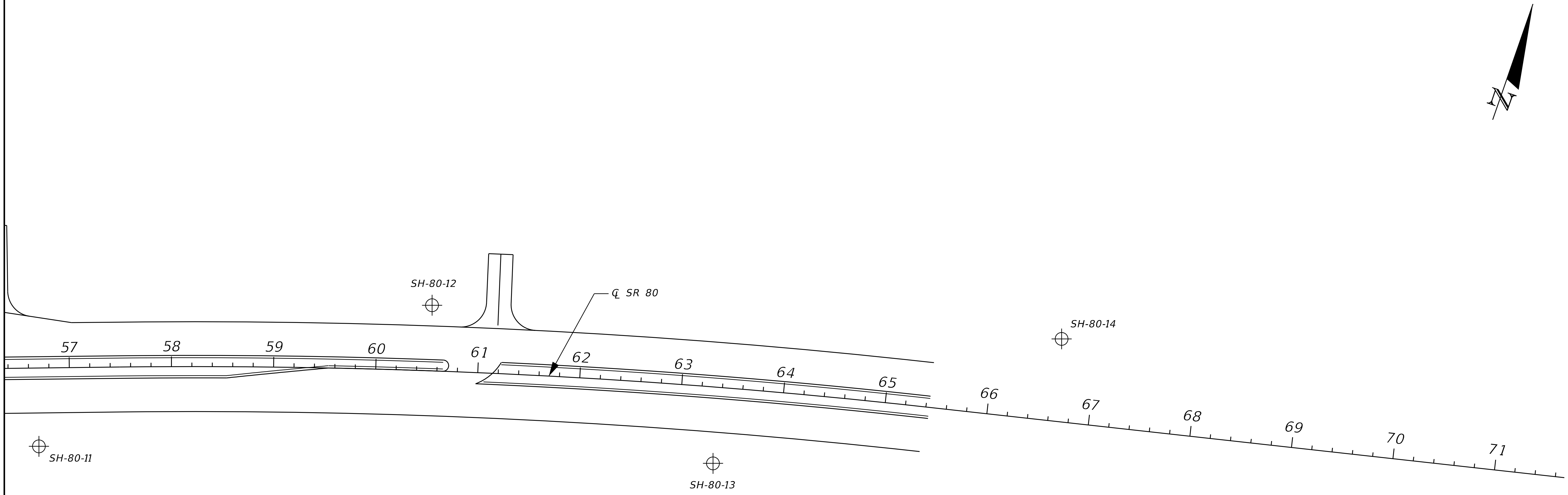

LEGEND

⌖ APPROXIMATE AUGER BORING LOCATION

0 20 100
Feet

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	THOMAS E. MUSGRAVE, JR., P.E. LICENSE NUMBER: 81669 TIERRA, INC. 7351 TEMPLE TERRACE HIGHWAY TAMPA, FLORIDA 33637	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	BORING LOCATION PLAN (9)	
					SR 31	LEE	441942-1-22-01		

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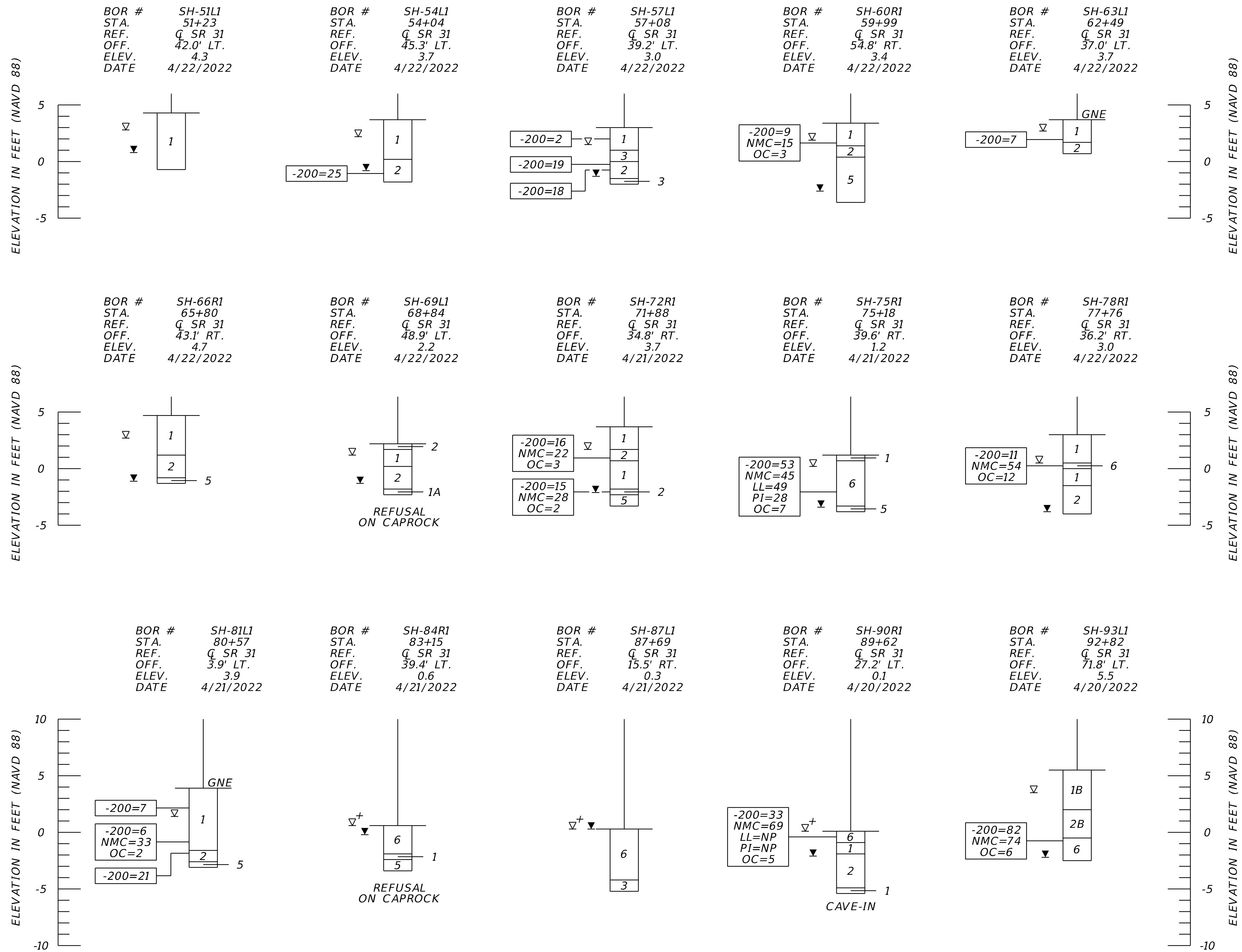


LEGEND

1. PALE GRAY TO GRAY TO LIGHT BROWN TO ORANGE-BROWN TO DARK BROWN SAND TO SAND WITH SILT, OCCASIONALLY WITH SHELL (A-3)
2. GRAY TO LIGHT BROWN TO BROWN SILTY SAND (A-2-4)
3. LIGHT BROWN TO BROWN TO ORANGE-BROWN CLAYEY SAND TO CLAYEY-SILTY SAND (A-2-6/A-6/A-7-6)
4. GRAY TO DARK GRAY CLAY (A-7-5/A-7-6)
5. WEATHERED LIMESTONE/CAPROCK
6. DARK BROWN ORGANIC SAND TO ORGANIC SILTY SAND TO MUCK (A-8)
7. GRAY TO BROWN SAND WITH CONSTRUCTION DEBRIS INCLUDING ASPHALT, BRICK AND ROCK PIECES

A - WITH LIMESTONE FRAGMENTS

B - WITH SHELL FRAGMENTS

A-3	AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW AND LABORATORY TESTING ON SELECTED SAMPLES FOR CONFIRMATION OF VISUAL REVIEW.
-200	PERCENT PASSING #200 SIEVE
NMC	NATURAL MOISTURE CONTENT (%)
LL	LIQUID LIMIT (%)
PI	PLASTICITY INDEX (%)
OC	ORGANIC CONTENT (%)
NP	NON-PLASTIC
NAVD 88	NORTH AMERICAN VERTICAL DATUM OF 1988
▽+	ESTIMATED SEASONAL HIGH GROUNDWATER TABLE ABOVE GRADE
▽	ESTIMATED SEASONAL HIGH GROUNDWATER TABLE
▼	GROUNDWATER LEVEL ENCOUNTERED DURING FIELD EXPLORATIONS
GNE	GROUNDWATER NOT ENCOUNTERED
REFUSAL	HAND AUGER TERMINATED DUE TO REFUSAL CONDITIONS ON DEBRIS AND/OR CAPROCK
CAVE-IN	HAND AUGER TERMINATED DUE TO BOREHOLE COLLAPSE FROM GROUNDWATER INTRUSION
EASTING	EASTING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83.
NORTHING	NORTHING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83.
℄ SR 31	CENTERLINE CONSTRUCTION OF SR 31
℄ SR 80	CENTERLINE CONSTRUCTION OF SR 80

NOTES:
1. THE LOCATIONS AND ELEVATIONS OF THE BORINGS WERE PROVIDED BY THE PROJECT SURVEYOR. PROJECT DESIGN FILES WERE USED TO CONVERT THE PROVIDED LOCATIONS TO STATION AND OFFSET.
2. BORINGS DENOTED WITH AN ASTERISK (*) ARE LOCATED OUTSIDE OF THE LIMITS INCLUDED IN CURRENT DESIGN FILES.

SR 31

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

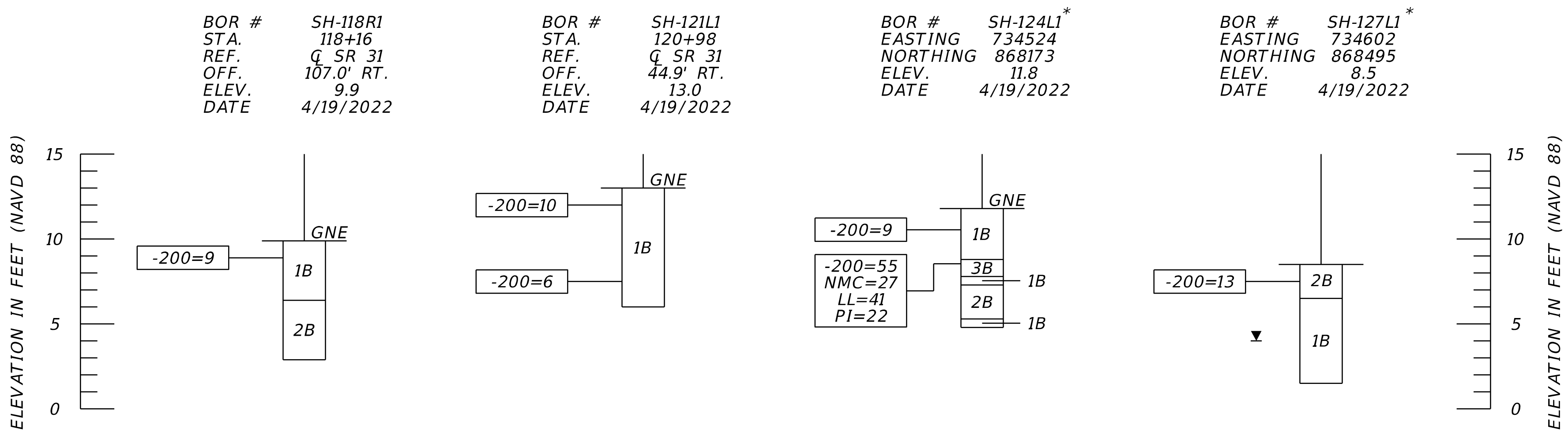
ENGINEER OF RECORD
THOMAS E. MUSGRAVE, JR., P.E.
LICENSE NUMBER: 81669
TIERRA, INC.
7351 TEMPLE TERRACE HIGHWAY
TAMPA, FLORIDA 33637

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

SOIL PROFILES (1)

SHEET NO.



LEGEND

1. PALE GRAY TO GRAY TO LIGHT BROWN TO ORANGE-BROWN TO DARK BROWN SAND TO SAND WITH SILT, OCCASIONALLY WITH SHELL (A-3)
2. GRAY TO LIGHT BROWN TO BROWN SILTY SAND (A-2-4)
3. LIGHT BROWN TO BROWN TO ORANGE-BROWN CLAYEY SAND TO CLAYEY-SILTY SAND (A-2-6/A-6/A-7-6)
4. GRAY TO DARK GRAY CLAY (A-7-5/A-7-6)
5. WEATHERED LIMESTONE/CAPROCK
6. DARK BROWN ORGANIC SAND TO ORGANIC SILTY SAND TO MUCK (A-8)
7. GRAY TO BROWN SAND WITH CONSTRUCTION DEBRIS INCLUDING ASPHALT, BRICK AND ROCK PIECES

A - WITH LIMESTONE FRAGMENTS

B - WITH SHELL FRAGMENTS

A-3	AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW AND LABORATORY TESTING ON SELECTED SAMPLES FOR CONFIRMATION OF VISUAL REVIEW.
-200	PERCENT PASSING #200 SIEVE
NMC	NATURAL MOISTURE CONTENT (%)
LL	LIQUID LIMIT (%)
PI	PLASTICITY INDEX (%)
OC	ORGANIC CONTENT (%)
NP	NON-PLASTIC
NAVD 88	NORTH AMERICAN VERTICAL DATUM OF 1988
▽+	ESTIMATED SEASONAL HIGH GROUNDWATER TABLE ABOVE GRADE
▽	ESTIMATED SEASONAL HIGH GROUNDWATER TABLE
▼	GROUNDWATER LEVEL ENCOUNTERED DURING FIELD EXPLORATIONS
GNE	GROUNDWATER NOT ENCOUNTERED
REFUSAL	HAND AUGER TERMINATED DUE TO REFUSAL CONDITIONS ON DEBRIS AND/OR CAPROCK
CAVE-IN	HAND AUGER TERMINATED DUE TO BOREHOLE COLLAPSE FROM GROUNDWATER INTRUSION
EASTING	EASTING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83.
NORTHING	NORTHING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83.
℄ SR 31	CENTERLINE CONSTRUCTION OF SR 31
℄ SR 80	CENTERLINE CONSTRUCTION OF SR 80

NOTES:
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2. BORINGS DENOTED WITH AN ASTERISK (*) ARE LOCATED OUTSIDE OF THE LIMITS INCLUDED IN CURRENT DESIGN FILES.

SR 31

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD

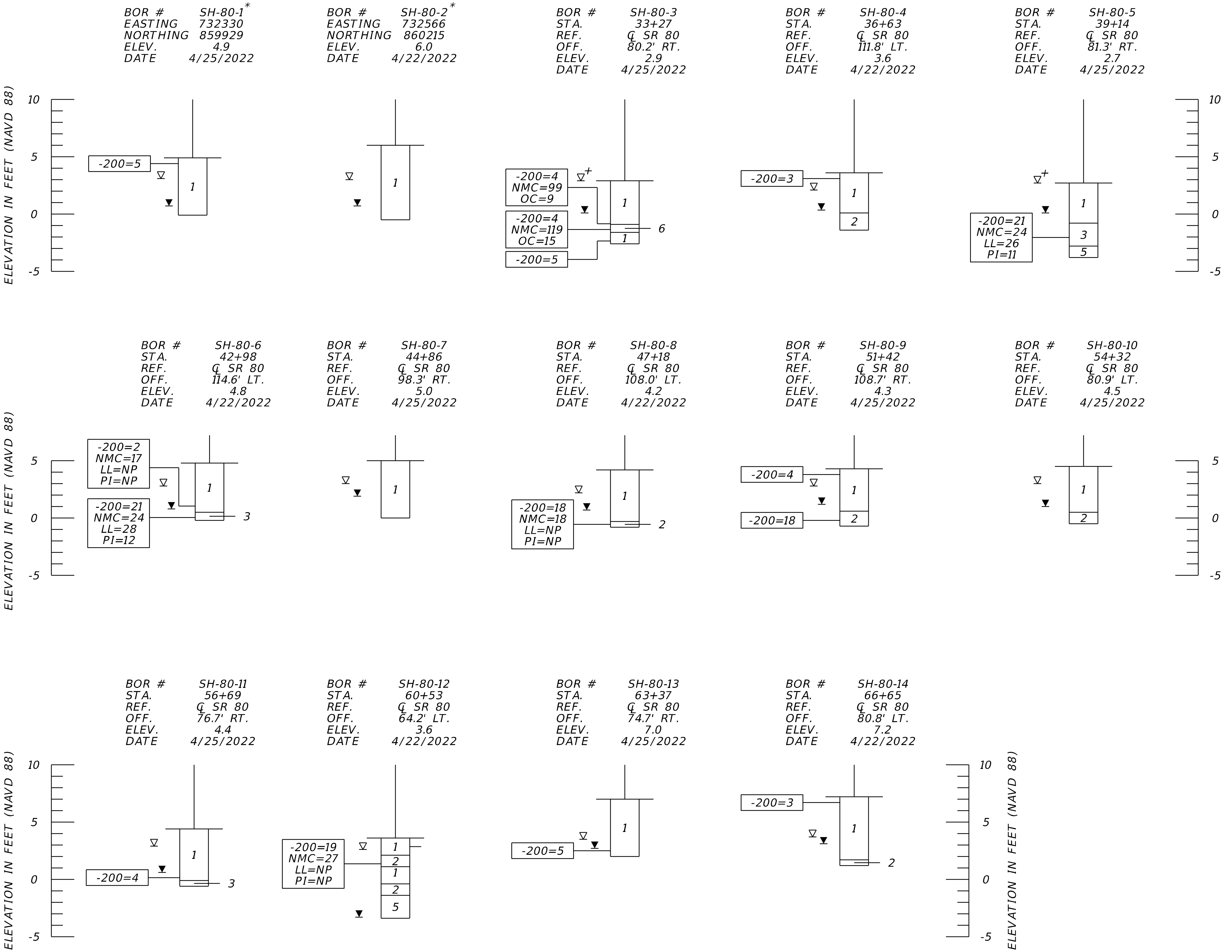
THOMAS E. MUSGRAVE, JR., P.E.
LICENSE NUMBER: 81669
TIERRA, INC.
7351 TEMPLE TERRACE HIGHWAY
TAMPA, FLORIDA 33637

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

SOIL PROFILES (2)

SHEET NO.



LEGEND

1.	PALE GRAY TO GRAY TO LIGHT BROWN TO ORANGE-BROWN TO DARK BROWN SAND TO SAND WITH SILT, OCCASIONALLY WITH SHELL (A-3)
2.	GRAY TO LIGHT BROWN TO BROWN SILTY SAND (A-2-4)
3.	LIGHT BROWN TO BROWN TO ORANGE-BROWN CLAYEY SAND TO CLAYEY-SILTY SAND (A-2-6/A-6/A-7-6)
4.	GRAY TO DARK GRAY CLAY (A-7-5/A-7-6)
5.	WEATHERED LIMESTONE/CAPROCK
6.	DARK BROWN ORGANIC SAND TO ORGANIC SILTY SAND TO MUCK (A-8)
7.	GRAY TO BROWN SAND WITH CONSTRUCTION DEBRIS INCLUDING ASPHALT, BRICK AND ROCK PIECES
	A - WITH LIMESTONE FRAGMENTS
	B - WITH SHELL FRAGMENTS
A-3	AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW AND LABORATORY TESTING ON SELECTED SAMPLES FOR CONFIRMATION OF VISUAL REVIEW.
-200	PERCENT PASSING #200 SIEVE
NMC	NATURAL MOISTURE CONTENT (%)
LL	LIQUID LIMIT (%)
PI	PLASTICITY INDEX (%)
OC	ORGANIC CONTENT (%)
NP	NON-PLASTIC
NAVD 88	NORTH AMERICAN VERTICAL DATUM OF 1988
▽+	ESTIMATED SEASONAL HIGH GROUNDWATER TABLE ABOVE GRADE
▽	ESTIMATED SEASONAL HIGH GROUNDWATER TABLE
▼	GROUNDWATER LEVEL ENCOUNTERED DURING FIELD EXPLORATIONS
GNE	GROUNDWATER NOT ENCOUNTERED
REFUSAL	HAND AUGER TERMINATED DUE TO REFUSAL CONDITIONS ON DEBRIS AND/OR CAPROCK
CAVE-IN	HAND AUGER TERMINATED DUE TO BOREHOLE COLLAPSE FROM GROUNDWATER INTRUSION
EASTING	EASTING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83.
NORTHING	NORTHING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83.
℄ SR 31	CENTERLINE CONSTRUCTION OF SR 31
℄ SR 80	CENTERLINE CONSTRUCTION OF SR 80

NOTES:
1. THE LOCATIONS AND ELEVATIONS OF THE BORINGS WERE PROVIDED BY THE PROJECT SURVEYOR. PROJECT DESIGN FILES WERE USED TO CONVERT THE PROVIDED LOCATIONS TO STATION AND OFFSET.
2. BORINGS DENOTED WITH AN ASTERISK (*) ARE LOCATED OUTSIDE OF THE LIMITS INCLUDED IN CURRENT DESIGN FILES.

SR 80

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
THOMAS E. MUSGRAVE, JR., P.E.
LICENSE NUMBER: 81669
TIERRA, INC.
7351 TEMPLE TERRACE HIGHWAY
TAMPA, FLORIDA 33637

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

SOIL PROFILES (3)

SHEET NO.

BORING LOCATION PLAN

0 100 400
Feet

LEGEND

1. PALE GRAY TO GRAY TO LIGHT BROWN TO ORANGE-BROWN TO DARK BROWN SAND TO SAND WITH SILT, OCCASIONALLY WITH SHELL (A-3)
2. GRAY TO LIGHT BROWN TO BROWN SILTY SAND (A-2-4)
3. LIGHT BROWN TO BROWN TO ORANGE-BROWN CLAYEY SAND TO CLAYEY-SILTY SAND (A-2-6/A-6/A-7-6)
4. GRAY TO DARK GRAY CLAY (A-7-5/A-7-6)
5. WEATHERED LIMESTONE/CAPROCK
6. DARK BROWN ORGANIC SAND TO ORGANIC SILTY SAND TO MUCK (A-8)
7. GRAY TO BROWN SAND WITH CONSTRUCTION DEBRIS INCLUDING ASPHALT, BRICK AND ROCK PIECES

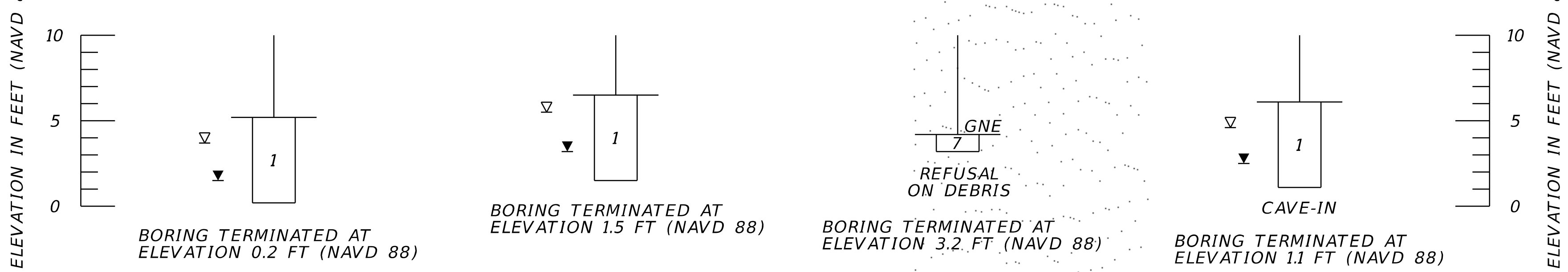
A - WITH LIMESTONE FRAGMENTS

B - WITH SHELL FRAGMENTS

A-3	AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW AND LABORATORY TESTING ON SELECTED SAMPLES FOR CONFIRMATION OF VISUAL REVIEW.
-200	PERCENT PASSING #200 SIEVE
NMC	NATURAL MOISTURE CONTENT (%)
LL	LIQUID LIMIT (%)
PI	PLASTICITY INDEX (%)
OC	ORGANIC CONTENT (%)
NP	NON-PLASTIC
NAVD 88	NORTH AMERICAN VERTICAL DATUM OF 1988
⊕	APPROXIMATE AUGER BORING LOCATION
▽+	ESTIMATED SEASONAL HIGH GROUNDWATER TABLE ABOVE GRADE
▽	ESTIMATED SEASONAL HIGH GROUNDWATER TABLE
▼	GROUNDWATER LEVEL ENCOUNTERED DURING FIELD EXPLORATIONS
GNE	GROUNDWATER NOT ENCOUNTERED
REFUSAL	HAND AUGER TERMINATES DUE TO REFUSAL CONDITIONS ON DEBRIS AND/OR CAPROCK
CAVE-IN	HAND AUGER TERMINATED DUE TO BOREHOLE COLLAPSE FROM GROUNDWATER INTRUSION
EASTING	EASTING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83.
NORTHING	NORTHING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83.

NOTE: THE LOCATIONS AND ELEVATIONS OF THE BORINGS WERE PROVIDED BY THE PROJECT SURVEYOR. PROJECT DESIGN FILES WERE USED TO CONVERT THE PROVIDED LOCATIONS TO STATION AND OFFSET.

BOR #	PBA-8	PBA-9	PBA-10	PBA-11
EASTING	735199	735618	735332	735498
NORTHING	861770	861773	862047	861933
ELEV.	5.2	6.5	4.2	6.1
DATE	8/3/2022	8/3/2022	8/3/2022	8/4/2022



BORING TERMINATED AT ELEVATION 0.2 FT (NAVD 88)

BORING TERMINATED AT ELEVATION 1.5 FT (NAVD 88)

BORING TERMINATED AT ELEVATION 3.2 FT (NAVD 88)

BORING TERMINATED AT ELEVATION 1.1 FT (NAVD 88)

SMF ALT 1-C

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
THOMAS E. MUSGRAVE, JR., P.E.
LICENSE NUMBER: 81669
TIERRA, INC.
7351 TEMPLE TERRACE HIGHWAY
TAMPA, FLORIDA 33637

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

POND SOIL SURVEY (1)

SHEET NO.

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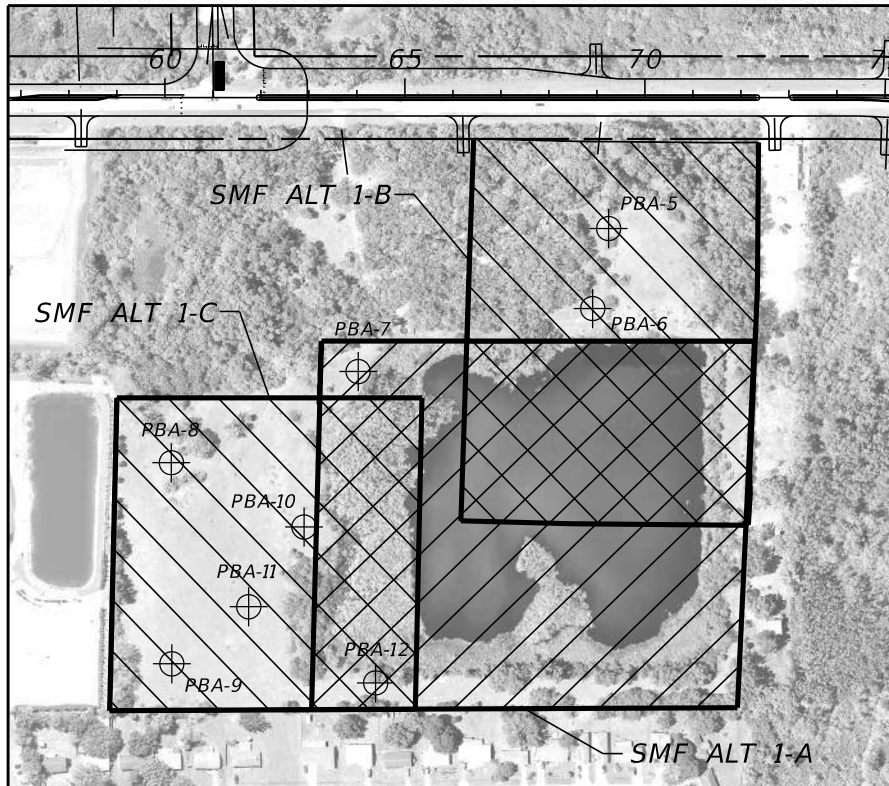
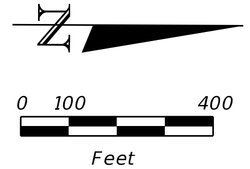
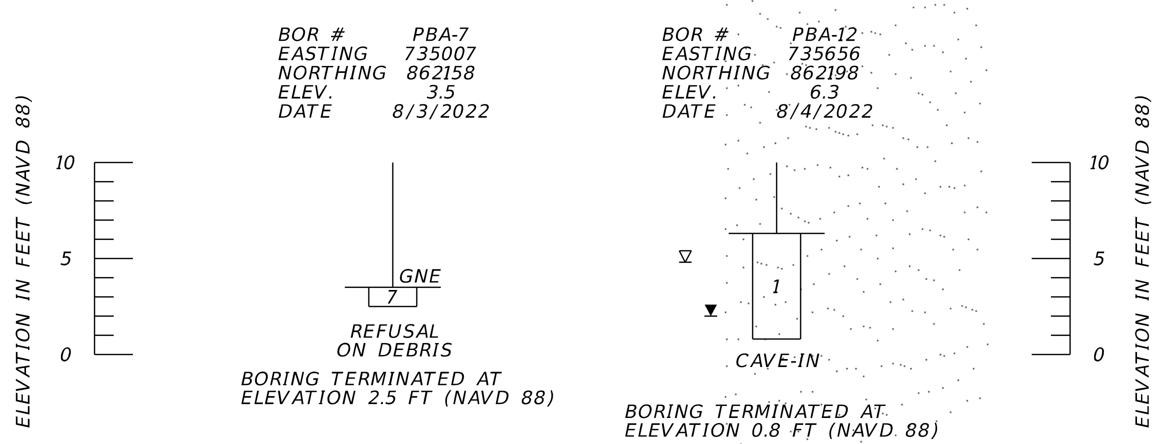


BORING LOCATION PLAN





LEGEND

1. PALE GRAY TO GRAY TO LIGHT BROWN TO ORANGE-BROWN TO DARK BROWN SAND TO SAND WITH SILT, OCCASIONALLY WITH SHELL (A-3)
2. GRAY TO LIGHT BROWN TO BROWN SILTY SAND (A-2-4)
3. LIGHT BROWN TO BROWN TO ORANGE-BROWN CLAYEY SAND TO CLAYEY-SILTY SAND (A-2-6/A-6/A-7-6)
4. GRAY TO DARK GRAY CLAY (A-7-5/A-7-6)
5. WEATHERED LIMESTONE/CAPROCK
6. DARK BROWN ORGANIC SAND TO ORGANIC SILTY SAND TO MUCK (A-8)
7. GRAY TO BROWN SAND WITH CONSTRUCTION DEBRIS INCLUDING ASPHALT, BRICK AND ROCK PIECES

A - WITH LIMESTONE FRAGMENTS

B - WITH SHELL FRAGMENTS

A-3 AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW AND LABORATORY TESTING ON SELECTED SAMPLES FOR CONFIRMATION OF VISUAL REVIEW.

-200 PERCENT PASSING #200 SIEVE
NMC NATURAL MOISTURE CONTENT (%)
LL LIQUID LIMIT (%)
PI PLASTICITY INDEX (%)
OC ORGANIC CONTENT (%)
NP NON-PLASTIC

NAVD 88 NORTH AMERICAN VERTICAL DATUM OF 1988

⊕ APPROXIMATE AUGER BORING LOCATION

▽+ ESTIMATED SEASONAL HIGH GROUNDWATER TABLE ABOVE GRADE

▽ ESTIMATED SEASONAL HIGH GROUNDWATER TABLE

▼ GROUNDWATER LEVEL ENCOUNTERED DURING FIELD EXPLORATIONS

GNE GROUNDWATER NOT ENCOUNTERED

REFUSAL HAND AUGER TERMINATES DUE TO REFUSAL CONDITIONS ON DEBRIS AND/OR CAPROCK

CAVE-IN HAND AUGER TERMINATED DUE TO BOREHOLE COLLAPSE FROM GROUNDWATER INTRUSION

EASTING EASTING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83.

NORTHING NORTHING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83.

NOTE: THE LOCATIONS AND ELEVATIONS OF THE BORINGS WERE PROVIDED BY THE PROJECT SURVEYOR. PROJECT DESIGN FILES WERE USED TO CONVERT THE PROVIDED LOCATIONS TO STATION AND OFFSET.

SMF ALT 1-A

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
THOMAS E. MUSGRAVE, JR., P.E.
LICENSE NUMBER: 81669
TIERRA, INC.
7351 TEMPLE TERRACE HIGHWAY
TAMPA, FLORIDA 33637

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

POND SOIL SURVEY (2)

SHEET NO.

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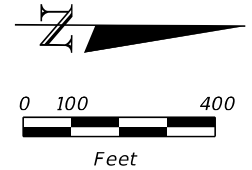
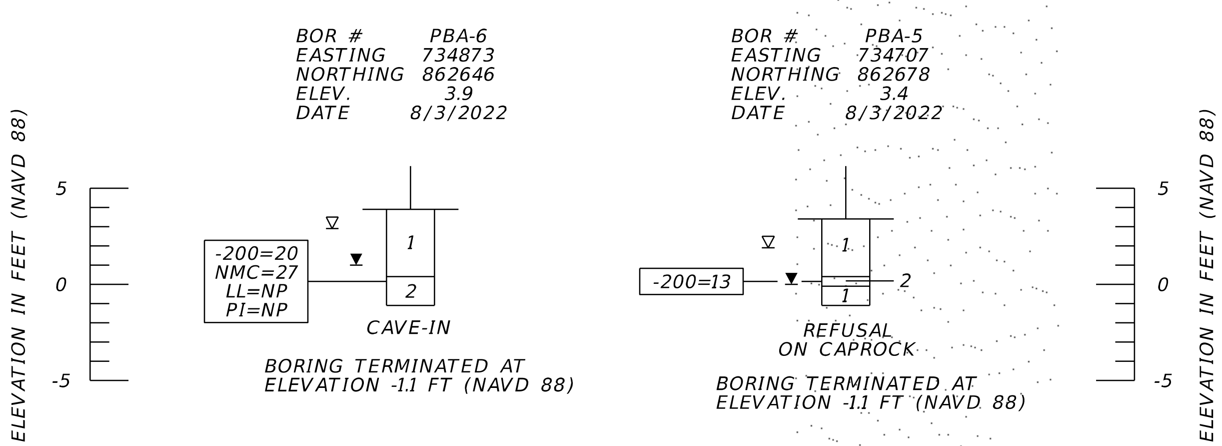
BORING LOCATION PLAN



LEGEND

1.	PALE GRAY TO GRAY TO LIGHT BROWN TO ORANGE-BROWN TO DARK BROWN SAND TO SAND WITH SILT, OCCASIONALLY WITH SHELL (A-3)
2.	GRAY TO LIGHT BROWN TO BROWN SILTY SAND (A-2-4)
3.	LIGHT BROWN TO BROWN TO ORANGE-BROWN CLAYEY SAND TO CLAYEY-SILTY SAND (A-2-6/A-6/A-7-6)
4.	GRAY TO DARK GRAY CLAY (A-7-5/A-7-6)
5.	WEATHERED LIMESTONE/CAPROCK
6.	DARK BROWN ORGANIC SAND TO ORGANIC SILTY SAND TO MUCK (A-8)
7.	GRAY TO BROWN SAND WITH CONSTRUCTION DEBRIS INCLUDING ASPHALT, BRICK AND ROCK PIECES
	A - WITH LIMESTONE FRAGMENTS
	B - WITH SHELL FRAGMENTS
A-3	AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW AND LABORATORY TESTING ON SELECTED SAMPLES FOR CONFIRMATION OF VISUAL REVIEW.
-200	PERCENT PASSING #200 SIEVE
NMC	NATURAL MOISTURE CONTENT (%)
LL	LIQUID LIMIT (%)
PI	PLASTICITY INDEX (%)
OC	ORGANIC CONTENT (%)
NP	NON-PLASTIC
NAVD 88	NORTH AMERICAN VERTICAL DATUM OF 1988
⊕	APPROXIMATE AUGER BORING LOCATION
∇+	ESTIMATED SEASONAL HIGH GROUNDWATER TABLE ABOVE GRADE
∇	ESTIMATED SEASONAL HIGH GROUNDWATER TABLE
▼	GROUNDWATER LEVEL ENCOUNTERED DURING FIELD EXPLORATIONS
GNE	GROUNDWATER NOT ENCOUNTERED
REFUSAL	HAND AUGER TERMINATES DUE TO REFUSAL CONDITIONS ON DEBRIS AND/OR CAPROCK
CAVE-IN	HAND AUGER TERMINATED DUE TO BOREHOLE COLLAPSE FROM GROUNDWATER INTRUSION
EASTING	EASTING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83.
NORTHING	NORTHING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83.

NOTE: THE LOCATIONS AND ELEVATIONS OF THE BORINGS WERE PROVIDED BY THE PROJECT SURVEYOR. PROJECT DESIGN FILES WERE USED TO CONVERT THE PROVIDED LOCATIONS TO STATION AND OFFSET.



SMF ALT 1-B

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
THOMAS E. MUSGRAVE, JR., P.E.
LICENSE NUMBER: 81669
TIERRA, INC.
7351 TEMPLE TERRACE HIGHWAY
TAMPA, FLORIDA 33637

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

POND SOIL SURVEY (3)

SHEET NO.

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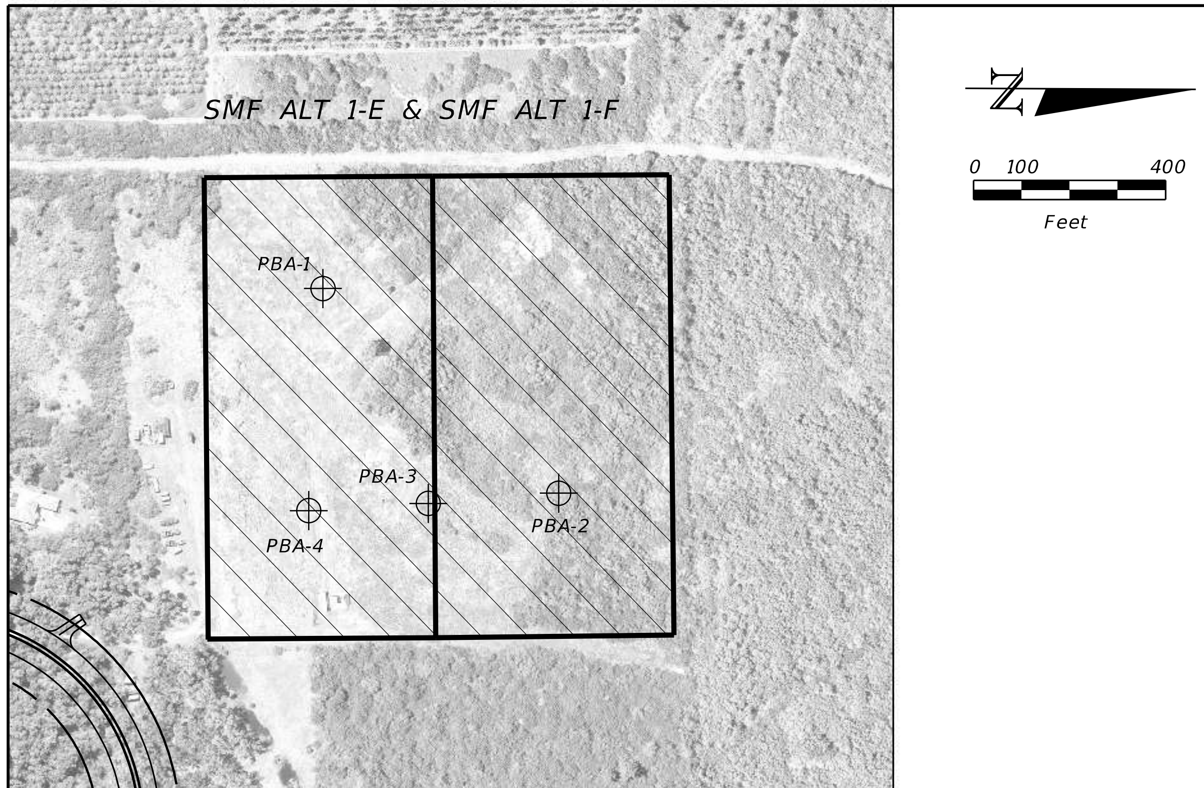
BORING LOCATION PLAN



LEGEND

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2. GRAY TO LIGHT BROWN TO BROWN SILTY SAND (A-2-4)
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A - WITH LIMESTONE FRAGMENTS

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-200 PERCENT PASSING #200 SIEVE
NMC NATURAL MOISTURE CONTENT (%)
LL LIQUID LIMIT (%)
PI PLASTICITY INDEX (%)
OC ORGANIC CONTENT (%)
NP NON-PLASTIC

NAVD 88 NORTH AMERICAN VERTICAL DATUM OF 1988

⊕ APPROXIMATE AUGER BORING LOCATION

∇+ ESTIMATED SEASONAL HIGH GROUNDWATER TABLE ABOVE GRADE

∇ ESTIMATED SEASONAL HIGH GROUNDWATER TABLE

▼ GROUNDWATER LEVEL ENCOUNTERED DURING FIELD EXPLORATIONS

GNE GROUNDWATER NOT ENCOUNTERED

REFUSAL HAND AUGER TERMINATES DUE TO REFUSAL CONDITIONS ON DEBRIS AND/OR CAPROCK

CAVE-IN HAND AUGER TERMINATED DUE TO BOREHOLE COLLAPSE FROM GROUNDWATER INTRUSION

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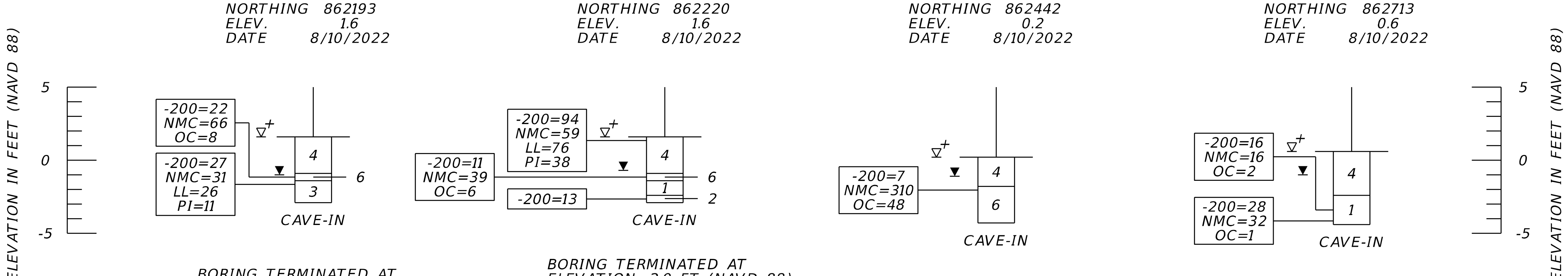
NOTE: THE LOCATIONS AND ELEVATIONS OF THE BORINGS WERE PROVIDED BY THE PROJECT SURVEYOR. PROJECT DESIGN FILES WERE USED TO CONVERT THE PROVIDED LOCATIONS TO STATION AND OFFSET.

BOR #	PBA-4	PBA-1	PBA-3	PBA-2
EASTING	733157	732694	733141	733118
NORTHING	862193	862220	862442	862713
ELEV.	1.6	1.6	0.2	0.6
DATE	8/10/2022	8/10/2022	8/10/2022	8/10/2022



BORING TERMINATED AT ELEVATION -2.9 FT (NAVD 88)

BORING TERMINATED AT ELEVATION -2.9 FT (NAVD 88)

BORING TERMINATED AT ELEVATION -4.3 FT (NAVD 88)

BORING TERMINATED AT ELEVATION -4.4 FT (NAVD 88)

SMF ALT 1-E & SMF ALT 1-F

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
THOMAS E. MUSGRAVE, JR., P.E.
LICENSE NUMBER: 81669
TIERRA, INC.
7351 TEMPLE TERRACE HIGHWAY
TAMPA, FLORIDA 33637

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

POND SOIL SURVEY (4)

SHEET NO.

APPENDIX C

Summary of Seasonal High Groundwater Table Estimates for Roadways
Summary of Seasonal High Groundwater Table Estimates for Pond Alternatives

SUMMARY OF SEASONAL HIGH GROUNDWATER TABLE ESTIMATES
PROJECT DEVELOPMENT AND ENVIRONMENTAL (PD&E) STUDIES
SR 31 FROM SR 80 (PALM BEACH BLVD.) TO SR 78 (BAYSHORE RD.)
LEE COUNTY, FLORIDA
FINANCIAL PROJECT ID: 441942-1-22-01
TIERRA PROJECT NO.: 6511-18-173

Boring Name	Boring Location(1)				Boring Depth(2) (feet)	Ground Elevation(1) (feet, NAVD 88)	Measured Groundwater Table			USDA Soil Survey		Estimated SHGWT(5)	
	Easting (feet)	Northing (feet)	Station	Offset			Date Recorded	Depth(3) (feet)	Elevation (feet, NAVD88)	Map Symbol	Estimated SHGWT(4) Depth (feet)	Depth (feet)	Elevation (feet, NAVD88)
SR 31													
SH-51L1	734402	860876	51+23	42' LT.	5.0	4.3	4/22/2022	3.4	0.9	35	0.5-1.5	1.5	2.8
SH-54L1	734397	861156	54+04	45' LT.	5.5	3.7	4/22/2022	4.5	-0.8	36	0.5-1.5	1.5	2.2
SH-57L1	734401	861460	57+08	39' LT.	5.0	3.0	4/22/2022	4.3	-1.3	35/36	0.5-1.5/0.5-1.5	1.5	1.5
SH-60R1	734493	861751	59+99	55' RT.	7.0	3.4	4/22/2022	6.0	-2.6	35	0.5-1.5	1.5	1.9
SH-63L1	734400	862001	62+49	37' LT	3.0	3.7	4/22/2022	GNE	<0.7	45	+2.0-0.0	1.0	2.7
SH-66R1	734479	862333	65+80	43' RT.	6.0	4.7	4/22/2022	5.8	-1.1	45	+2.0-0.0	1.5	3.2
SH-69L1	734385	862636	68+84	49' LT.	4.5	2.2	4/22/2022	3.5	-1.3	35/45	0.5-1.5/+2.0-0.0	1.0	1.2
SH-72R1	734467	862941	71+88	35' RT.	7.0	3.7	4/21/2022	5.8	-2.1	45	+2.0-0.0	2.0	1.7
SH-75R1	734472	863269	75+18	40' RT.	5.0	1.2	4/21/2022	3.8	-2.6	42/45	0.5-1.5/+2.0-0.0	0.5	0.7
SH-78R1	734490	863522	77+76	36' RT	7.0	3.0	4/22/2022	6.8	-3.8	42	0.5-1.5	2.0	1.0
SH-81L1	734502	863804	80+57	4' LT.	7.0	3.9	4/21/2022	GNE	<-3.1	42	0.5-1.5	2.5	1.4
SH-84R1	734522	864064	83+15	39' LT.	4.0	0.6	4/21/2022	0.8	-0.2	45	+2.0-0.0	ABG(6)	ABG(6)
SH-87L1	734653	864501	87+69	16' RT.	5.5	0.3	4/21/2022	ABG	>0.3	45	+2.0-0.0	ABG(6)	ABG(6)
SH-90R1	734620	864695	89+62	27' LT.	5.5	0.1	4/20/2022	2.2	-2.1	11	0.5-1.5	ABG(6)	ABG(6)
SH-93L1	734566	865012	92+82	72' LT.	8.0	5.5	4/20/2022	7.6	-2.1	7	1.5-3.5	2.0	3.5
SH-118R	734646	867551	118+16	107' RT.	7.0	9.9	4/19/2022	GNE	<2.9	144	1.5-3.5	ND	ND
SH-121L1	734575	867830	120+98	45' RT.	7.0	13.0	4/19/2022	GNE	<6.0	144	1.5-3.5	ND	ND
SH-124L1	734524	868173	---	---	7.0	11.8	4/19/2022	GNE	<4.8	144	1.5-3.5	ND	ND
SH-127L1	734602	868495	---	---	7.0	8.5	4/19/2022	4.5	4.0	144	1.5-3.5	ND	ND

(1) The boring locations and ground elevations were provided by the project surveyor. The easting and northing coordinates presented above are referenced to the FL State Plane West coordinate system. Station and offset are referenced to the centerline of construction and were determined by using project design files.

(2) Depth of boring below existing grades. Shallow borings due to auger refusal or cave-in.

(3) Depth below grade at time of boring.

(4) Seasonal high groundwater table depth based on the Lee County, Florida USDA Soil Survey information.

(5) Seasonal high groundwater table depth estimated based on soil stratigraphy, measured groundwater levels from the borings, the Lee County, Florida USDA Soil Survey information, Lee County well monitoring data and High Water Table Maps, and past experience with similar soil conditions in the project area.

(6) Tierra recommends the project biologist be consulted to assist with determining seasonal high groundwater table levels using biological indicators and/or available wetland information at these locations.

ABG: At or Above Existing Grade

GNE: Groundwater Not Encountered

ND: Not Determined due to a lack of natural geotechnical indicators - Disturbance with fill

SUMMARY OF SEASONAL HIGH GROUNDWATER TABLE ESTIMATES
PROJECT DEVELOPMENT AND ENVIRONMENTAL (PD&E) STUDIES
SR 31 FROM SR 80 (PALM BEACH BLVD.) TO SR 78 (BAYSHORE RD.)
LEE COUNTY, FLORIDA
FINANCIAL PROJECT ID: 441942-1-22-01
TIERRA PROJECT NO.: 6511-18-173

Boring Name	Boring Location[1]				Boring Depth[2] (feet)	Ground Elevation[1] (feet, NAVD 88)	Measured Groundwater Table			USDA Soil Survey		Estimated SHGWT[5]	
	Easting (feet)	Northing (feet)	Station	Offset			Date Recorded	Depth[3] (feet)	Elevation (feet, NAVD88)	Map Symbol	Estimated SHGWT[4] Depth (feet)	Depth (feet)	Elevation (feet, NAVD88)
SR 80													
SH-80-1	732330	859929	---	---	5.0	4.9	4/25/2022	4.2	0.7	33/36	0.5-1.5/0.5-1.5	1.5	3.4
SH-80-2	732566	860215	---	---	6.5	6.0	4/22/2022	5.3	0.7	33	0.5-1.5	3.0	3.0
SH-80-3	732887	860113	33+27	80' RT.	6.0	2.9	4/25/2022	2.8	0.1	125	0.5-1.5	ABG[6]	ABG[6]
SH-80-4	733145	860401	36+63	112' LT.	5.0	3.6	4/22/2022	3.3	0.3	33	0.5-1.5	1.0	2.6
SH-80-5	733444	860297	39+14	81' RT.	6.5	2.7	4/25/2022	2.6	0.1	33/125	0.5-1.5/0.5-1.5	ABG[6]	ABG[6]
SH-80-6	733746	860605	42+98	115' LT.	5.0	4.8	4/22/2022	4.0	0.8	33/36	0.5-1.5/0.5-1.5	2.0	2.8
SH-80-7	733994	860465	44+86	98' RT.	5.0	5.0	4/25/2022	3.1	1.9	36	0.5-1.5	1.5	3.5
SH-80-8	734143	860738	47+18	108' LT.	5.0	4.2	4/22/2022	3.5	0.7	35/36	0.5-1.5/0.5-1.5	2.0	2.2
SH-80-9	734614	860677	51+42	109' RT.	5.0	4.3	4/25/2022	3.1	1.2	36	0.5-1.5	1.5	2.8
SH-80-10	734823	860954	54+32	81' LT.	5.0	4.5	4/25/2022	3.4	1.1	36	0.5-1.5	1.5	3.0
SH-80-11	735100	860887	56+69	77' RT.	5.0	4.4	4/25/2022	3.8	0.6	36	0.5-1.5	1.5	2.9
SH-80-12	735418	861144	60+53	64' LT.	7.0	3.6	4/22/2022	6.9	-3.3	36/45	0.5-1.5/+2.0-0.0	1.5	2.1
SH-80-13	735729	861088	63+37	75' RT.	5.0	7.0	4/25/2022	4.3	2.7	36	0.5-1.5	3.0	4.0
SH-80-14	736011	861315	66+65	81' LT.	6.0	7.2	4/22/2022	4.1	3.1	36	0.5-1.5	3.0	4.2

(1) The boring locations and ground elevations were provided by the project surveyor. The easting and northing coordinates presented above are referenced to the FL State Plane West coordinate system. Station and offset are referenced to the centerline of construction and were determined by using project design files.

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SUMMARY OF SEASONAL HIGH GROUNDWATER TABLE ESTIMATES
PROJECT DEVELOPMENT AND ENVIRONMENTAL (PD&E) STUDIES
SR 31 FROM SR 80 (Palm Beach Blvd.) TO SR 78 (Bayshore Rd.)
LEE COUNTY, FLORIDA
FINANCIAL PROJECT ID: 441942-1-22-01
TIERRA PROJECT NO.: 6511-18-173

Boring Name	Pond Name	Boring Location[1]				Boring Depth[2] (feet)	Ground Elevation[1] (feet, NAVD 88)	Measured Groundwater Table			USDA Soil Survey		Estimated SHGWT[5]	
		Easting (feet)	Northing (feet)	Station	Offset			Date Recorded	Depth[3] (feet)	Elevation (feet, NAVD88)	Map Symbol	Estimated SHGWT[4] Depth (feet)	Depth (feet)	Elevation (feet, NAVD88)
Pond Alternates														
PBA-7	SMF ALT 1-A	735007	862158	64+03	571' RT.	1.0[7]	3.5	8/3/2022	GNE	<2.5	11	0.5-1.5	ND	---
PBA-12	SMF ALT 1-A	735656	862198	64+39	1220' RT.	5.5	6.3	8/4/2022	4.3	2.0	36	0.5-1.5	1.5	4.8
PBA-5	SMF ALT 1-B	734707	862678	69+24	273' RT.	4.5	3.4	8/3/2022	3.4	0.0	6	0.3-1.5	1.5	1.9
PBA-6	SMF ALT 1-B	734873	862646	69+91	440' RT.	5.0	3.9	8/3/2022	2.9	1.0	45	+2.0-0.0	1.0	2.9
PBA-8	SMF ALT 1-C	735199	861770	60+14	761' RT.	5.0	5.2	8/3/2022	4.1	1.1	11	0.5-1.5	1.5	3.7
PBA-9	SMF ALT 1-C	735618	861773	60+14	1180' RT.	5.0	6.5	8/3/2022	3.3	3.2	11	0.5-1.5	2.0	4.5
PBA-10	SMF ALT 1-C	735332	862047	62+90	895' RT.	1.0[7]	4.2	8/3/2022	GNE	<3.2	36	0.0-1.5	ND	---
PBA-11	SMF ALT 1-C	735498	861933	61+75	1061' RT.	5.0	6.1	8/4/2022	3.4	2.7	36	0.0-1.5	1.5	4.6
PBA-1	SMF ALT 1-E	732694	862220	64+77	1742' LT.	4.5	1.6	8/10/2022	2.3	-0.7	144	1.5-3.5	ABG[6]	ABG[6]
PBA-4	SMF ALT 1-E	733157	862193	64+47	1279' LT.	4.5	1.6	8/10/2022	2.6	-1.0	144	1.5-3.5	ABG[6]	ABG[6]
PBA-3	SMF ALT 1-E/F	733141	862442	66+96	1294' LT.	4.5	0.2	8/10/2022	1.3	-1.1	144	1.5-3.5	ABG[6]	ABG[6]
PBA-2	SMF ALT 1-F	733118	862713	69+68	1316' LT.	5.0	0.6	8/10/2022	1.6	-1.0	144	1.5-3.5	ABG[6]	ABG[6]

(1) The boring locations and ground elevations were provided by the project surveyor. The easting and northing coordinates presented above are referenced to the FL State Plane West coordinate system. Station and offset are referenced to the centerline of construction and were determined by using project design files.
(2) Depth of boring below existing grades. Shallow borings due to auger refusal or cave-in.
(3) Depth below grade at time of boring.
(4) Seasonal high groundwater table depth based on the Lee County, Florida USDA Soil Survey information.
(5) Seasonal high groundwater table depth estimated based on soil stratigraphy, measured groundwater levels from the borings, the Lee County, Florida USDA Soil Survey information, Lee County well monitoring data and High Water Table Maps, and past experience with similar soil conditions in the project area.
(6) Tierra recommends the project biologist be consulted to assist with determining seasonal high groundwater table levels using biological indicators and/or available wetland information at these locations.
(7) Boring terminated due to hand auger refusal on buried rocks and/or debris.
ABG: At or Above Existing Grade
GNE: Groundwater Not Encountered
ND: Not Determined due to a lack of natural geotechnical indicators - Disturbance with fill

APPENDIX D

Summary of Laboratory Test Results for Soil Classification

Summary of Laboratory Test Results for Environmental Classification

Summary of Laboratory Test Results for Soil Classification
SR 31 Project Development and Environment (PD&E) Studies
From SR 80 (Palm Beach Blvd) to SR 78 (Bayshore Blvd)
Lee County, Florida
FPN: 441942-1-22-01
Tierra Project No.: 6511-18-173

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-57L1	0.5 - 1.5	1	A-3	---	---	---	---	2	---	---	---	---	---
SH-60R1	1.5 - 2.0	1	A-3	---	---	---	---	9	---	---	---	3	15
SH-63L1	1.5 - 2.0	1	A-3	---	---	---	---	7	---	---	---	---	---
SH-81R1	1.5 - 2.0	1	A-3	100	91	63	37	7	---	---	---	---	---
SH-81R1	4.5 - 5.0	1	A-3	---	---	---	---	6	---	---	---	2	33
SH-118R1	0.0 - 2.0	1	A-3	---	---	---	---	9	---	---	---	---	---
SH-121L1	0.0 - 2.0	1	A-3	---	---	---	---	10	---	---	---	---	---
SH-121L1	5.0 - 6.0	1	A-3	---	---	---	---	6	---	---	---	---	---
SH-124L1	0.0 - 2.5	1	A-3	---	---	---	---	9	---	---	---	---	---
SH-80-1	0.0 - 1.0	1	A-3	---	---	---	---	5	---	---	---	---	---
SH-80-3	5.0 - 5.5	1	A-3	---	---	---	---	5	---	---	---	---	---
SH-80-4	0.0 - 1.0	1	A-3	---	---	---	---	3	---	---	---	---	---
SH-80-6	3.5 - 4.3	1	A-3	---	---	---	---	2	NP	NP	NP	---	17
SH-80-9	0.0 - 1.0	1	A-3	---	---	---	---	4	---	---	---	---	---
SH-80-11	4.0 - 4.5	1	A-3	---	---	---	---	4	---	---	---	---	---
SH-80-13	4.0 - 5.0	1	A-3	---	---	---	---	5	---	---	---	---	---
SH-80-14	0.0 - 1.0	1	A-3	---	---	---	---	3	---	---	---	---	---
SH-54L1	4.5 - 5.0	2	A-2-4	---	---	---	---	25	---	---	---	---	---
SH-57L1	3.0 - 3.5	2	A-2-4	---	---	---	---	19	---	---	---	---	---
SH-57L1	3.5 - 4.0	2	A-2-4	---	---	---	---	18	---	---	---	---	---
SH-72R1	2.5 - 3.0	2	A-2-4	---	---	---	---	16	---	---	---	3	22
SH-72R1	5.5 - 6.0	2	A-2-4	---	---	---	---	15	---	---	---	2	28
SH-81R1	5.5 - 6.0	2	A-2-4	100	95	77	53	21	---	---	---	---	---
SH-127L1	0.0 - 2.0	2	A-2-4	---	---	---	---	13	---	---	---	---	---
SH-80-8	4.5 - 5.0	2	A-2-4	---	---	---	---	18	NP	NP	NP	---	18
SH-80-9	4.0 - 5.0	2	A-2-4	---	---	---	---	18	---	---	---	---	---
SH-80-12	2.0 - 2.5	2	A-2-4	---	---	---	---	19	NP	NP	NP	---	27
PBA-1	4.0 - 4.5	2	A-2-4	---	---	---	---	13	---	---	---	---	---
PBA-2	3.5 - 4.5	2	A-2-4	---	---	---	---	16	---	---	---	2	16
PBA-2	4.5 - 5.0	2	A-2-4	---	---	---	---	28	---	---	---	1	32
PBA-5	3.0 - 3.5	2	A-2-4	---	---	---	---	13	---	---	---	---	---
PBA-6	3.5 - 4.0	2	A-2-4	---	---	---	---	20	NP	NP	NP	---	27
SH-124L1	3.0 - 3.5	3	A-7-6	---	---	---	---	55	41	19	22	---	27
SH-80-5	4.5 - 5.0	3	A-2-6	---	---	---	---	21	26	15	11	---	24
SH-80-6	4.3 - 5.0	3	A-2-6	---	---	---	---	21	28	16	12	---	24
PBA-4	3.0 - 3.5	3	A-2-6	---	---	---	---	27	26	15	11	---	31
PBA-1	0.0 - 0.5	4	A-7-5	---	---	---	---	94	76	38	38	---	59
SH-75R1	3.0 - 3.5	6	A-8	---	---	---	---	53	49	21	28	7	45
SH-78R1	2.5 - 3.0	6	A-8	---	---	---	---	11	---	---	---	12	54
SH-80-3	3.5 - 4.0	6	A-8	---	---	---	---	---	---	---	---	9	99
SH-80-3	4.0 - 4.5	6	A-8	---	---	---	---	---	---	---	---	15	119
SH-90R1	0.0 - 1.0	6	A-8	---	---	---	---	33	NP	NP	NP	5	69
SH-93L1	6.0 - 6.5	6	A-8	---	---	---	---	82	---	---	---	6	74
PBA-1	2.5 - 3.0	6	A-8	---	---	---	---	11	---	---	---	6	39
PBA-3	2.0 - 2.5	6	A-8	---	---	---	---	---	---	---	---	48	310
PBA-4	2.5 - 3.0	6	A-8	---	---	---	---	22	---	---	---	8	66

Summary of Laboratory Test Results for Environmental Classification
SR 31 Project Development and Environment (PD&E) Studies
From SR 80 (Palm Beach Blvd) to SR 78 (Bayshore Blvd)
Lee County, Florida
FPN: 441942-1-22-01
Tierra Project No.: 6511-18-173

Boring Number	Depth (feet)	Stratum Number	pH (FM 5-550)	Resistivity (ohm-cm) (FM 5-551)	Chlorides (ppm) (FM 5-552)	Sulfates (ppm) (FM 5-553)	Environmental Classification[1]	
							Steel	**Concrete**
SH-57L1	0.5 - 1.5	1	7.6	2,900	30	<5	Moderately Aggressive	Moderately Aggressive
SH-78R1	1.0 - 2.0	1	7.6	3,500	15	<5	Moderately Aggressive	Slightly Aggressive
SH-118R1	0.0 - 2.0	1	7.9	5,600	15	<5	Slightly Aggressive	Slightly Aggressive
SH-121L1	0.0 - 2.0	1	8.1	8,400	15	<5	Slightly Aggressive	Slightly Aggressive
SH-124L1	0.0 - 2.5	1	8.3	14,000	30	15	Slightly Aggressive	Slightly Aggressive
SH-80-1	0.0 - 1.0	1	7.6	2,200	135	81	Moderately Aggressive	Moderately Aggressive
SH-80-4	0.0 - 1.0	1	7.4	12,000	15	<5	Slightly Aggressive	Slightly Aggressive
SH-80-9	0.0 - 1.0	1	7.5	6,600	40	18	Slightly Aggressive	Slightly Aggressive
SH-80-14	0.0 - 1.0	1	7.7	14,000	30	<5	Slightly Aggressive	Slightly Aggressive
SH-127L1	0.0 - 2.0	2	8.2	7,800	15	<5	Slightly Aggressive	Slightly Aggressive

(1) As per FDOT Structures Design Guidelines

APPENDIX E

Embankment Resilient Modulus Pavement Design Report

Florida Department of Transportation
RON DESANTIS
GOVERNOR
605 Suwannee Street
Tallahassee, FL 32399-0450
JARED W. PERDUE, P.E.
SECRETARY

MEMORANDUM

DATE: July 19, 2022

TO: Kisan Patel, District Geotechnical Materials Engineer

FROM: David Horhota, State Geotechnical Materials Engineer

SUBJECT: Embankment Resilient Modulus Pavement Design
District 1, Lee County
FPN 441942-1: SR-31 from SR-80 (Palm Beach Blvd) to SR-78 (Bayshore Rd)

Five (5), 2-bag samples were received by the State Materials Office (SMO) for determination of an embankment (roadbed) resilient modulus for pavement design. After visual observation of the five samples, it was determined that the material from each 2-bag sample looked visually similar and the material from each of the bags were combined to form one sample from each location. After combining materials from the bags, samples from each location were obtained for classification tests (Atterberg limits, particle size analysis, and organic content), Proctor density, and resilient modulus. The classification test results are reported in Tables 1 and 2. Information provided for this project by Tierra, Inc. did not include sample depth.

Table 1. Summary of Initial Soil Gradation Results

Sample ID	Passing 3/4" (%)	Passing 1/2" (%)	Passing 3/8" (%)	Passing No. 4 (%)	Passing No. 10 (%)	Passing No. 40 (%)	Passing No. 60 (%)	Passing No. 100 (%)	Passing No. 200 (%)
SH-127L	100.0	95.4	92.3	79.1	51.7	32.9	22.3	15.7	8.8
SH-118L	100.0	99.2	98.2	90.2	66.6	48.3	28.5	16.1	5.2
SH-93L	100.0	100.0	99.8	98.6	94.7	79.6	52.0	31.7	9.7
SH-72L	100.0	100.0	100.0	99.9	99.3	94.3	77.5	54.9	6.4
SH-51L	100.0	99.4	99.4	99.4	99.0	91.3	64.4	39.7	4.9

Table 2. Summary of Soil Classification and Organic Content Results

Sample ID	Location	Soil Class.	Organic Content (%)	LL/PI
SH-127L	424440, 2955963	A-1-b	2.3	N.P.
SH-118L	424449, 2955676	A-1-b	1.6	N.P.
SH-93L	424418, 2954902	A-3	0.7	N.P.
SH-72L	424383, 2954272	A-3	1.1	N.P.
SH-51L	424631, 2953642	A-3	0.8	N.P.

In addition to the classification testing, the following test program was conducted:

(1) Standard Proctor, AASHTO T 99
(2) Resilient Modulus (M_R), AASHTO T 307.

A summary of laboratory test results is included in Table 3. The resilient modulus values listed in this table were obtained using the relationship developed from each individual test (resilient modulus versus bulk stress - with bulk stress, **Θ,** defined as $\boldsymbol{\Theta = \sigma_1 + \sigma_2 + \sigma_3}$), and using a bulk stress of 11 psi, which is the recommendation from Dr. Ping's research work in modeling the embankment in-situ stresses for Florida pavement conditions. Two results are listed for each location because two samples were prepared for each location and they represent the individual test result from each sample tested. The resilient modulus samples were compacted to within 1 pound per cubic foot (pcf) of the maximum density and 0.5 percent of the optimum moisture content as determined by AASHTO T99.

Table 3. Summary of T-99 and M_R Test Results

Sample ID	Passing No. 200, %	Standard Proctor Density, pcf	Optimum Moisture Content, %	Resilient Modulus @ Θ=11psi (psi)
SH-127L	9	121.8	11.4	12,268
				12,142
SH-118L	5	114.5	11.8	10,119
				10,494
SH-93L	10	114.2	12.0	11,390
				10,978
SH-72L	6	107.5	12.5	10,884
				11,399
SH-51L	5	107.1	14.1	10,403
				11,248

To obtain a design embankment resilient modulus, a 90 percent method was used as outlined in both the Flexible Pavement Design Manual and Soils and Foundations Handbook. The resilient modulus values were ranked in ascending order and the percentage of values which were greater than or equal to the individual value were determined. The results of this analysis are recorded in Table 4 and the corresponding graph of these results is included as Figure 1.

Table 4. Ranked M_R Test Results for 90 Percent Method

Rank	Sample ID	% ≥	M_R (psi)
1	SH-118L (1)	100	10,119
2	SH-51L (1)	90	10,403
3	SH-118L (2)	80	10,494
4	SH-72L (1)	70	10,884
5	SH-93L (2)	60	10,978
6	SH-51L (2)	50	11,248
7	SH-93L (1)	40	11,390
8	SH-72L (2)	30	11,399
9	SH-127L (2)	20	12,142
10	SH-127L (1)	10	12,268

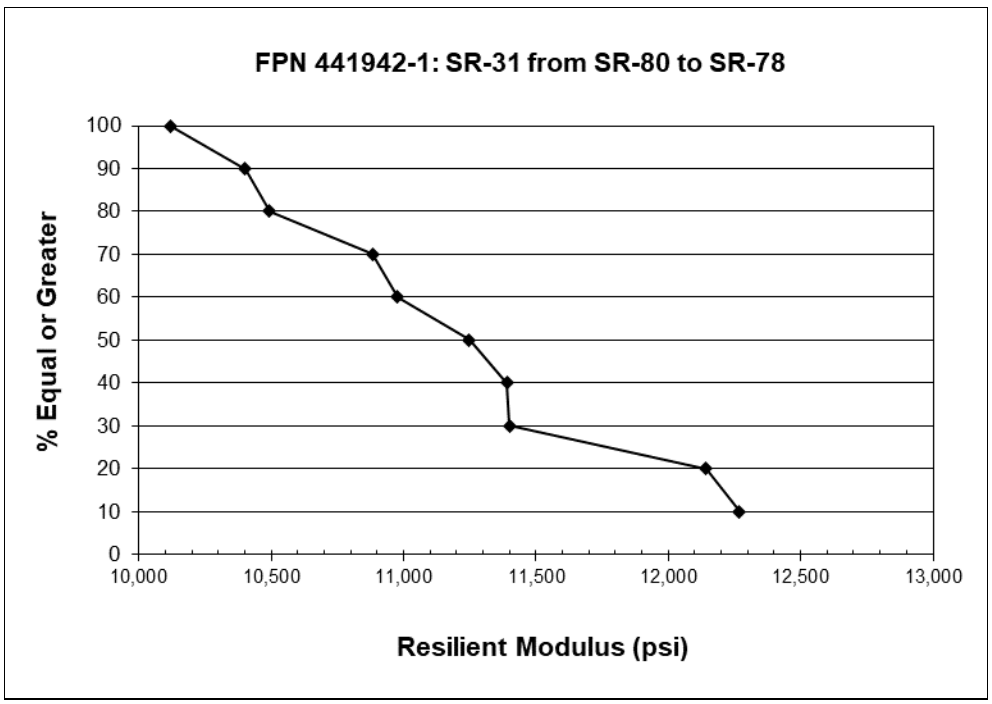

Figure 1. Ranked M_R Test Results for 90% Method

Based on the results shown in Table 4 and Figure 1, the resilient modulus corresponding to a 90th percentile is **10,400 psi**, which would represent the design embankment M_R value.

John Huryn

From:	Tom Musgrave <tmusgrave@tierraeng.com>
Sent:	Thursday, October 27, 2022 2:12 PM
To:	Mike Jaroch
Cc:	Larry Moore; Mark Prochak; Scott Garth; John Huryn; Todd White; Alban Hung
Subject:	RE: RE: 441942 - SR 31 from SR 80 to SR 78 - Draft Geotech and Bridge Hydraulic Report Status
Attachments:	RE: FPN_441942-1 SR 31: Alternate Pond Site - Remaining Boring Coordinates
Categories:	Filed by Newforma

Good afternoon Mike.

- The vertical ground elevations were provided to Tierra by the project surveyor (Kenneth Glass – CivilSurv). The survey elevations were given to us to the fourth decimal place and we rounded to the nearest one decimal. The attached email includes the spreadsheet with the provided pond boring elevations. Were the ponds surveyed for ground elevations?

- We have reviewed the contour lines from the Lee County site. The SHGWT estimates provided in our report are based on the surveyed boring location elevations. We cannot verify the accuracy of the contour lines from the website.

- For a single SHGWT value we would recommend the following:

  For SMF 1-A and 1-C which are adjacent to one another please use an elevation ≥ 3.7 ft.

  For SMF 1-B please use an elevation ≥ 2.9 ft.

- The SHGWT levels were estimated to be at or above grade within the SMF 1-E/F pond areas. We recommend the project biologist be consulted to assist with the SHGWT levels in these pond alternatives. Please send us the wetland elevations from your biologist for our file.

Please do not hesitate to contact us with any questions. Thank you.

Tom Musgrave, P.E.
Geotechnical Engineer
TIERRA, INC.
7351 Temple Terrace Highway | Tampa, Florida 33637
T 813.989.1354 | **F** 813.989.1355 | **C** 813.385.7922
www.tierraeng.com | tmusgrave@tierraeng.com
geotechnical environmental materials engineering

From: Mike Jaroch >
Sent: Thursday, October 27, 2022 9:49 AM
To: Tom Musgrave <tmusgrave@tierraeng.com>; Larry Moore <lmoore@tierraeng.com>
Cc: Mark Prochak <Mprochak@drmp.com>; Todd White <bwhite@drmp.com>; Scott Garth <SGarth@drmp.com>; John

Huryn <JHuryn@drmp.com>
Subject: RE: RE: 441942 - SR 31 from SR 80 to SR 78 - Draft Geotech and Bridge Hydraulic Report Status
Importance: High

Tom and Larry,

John Huryn and I were looking at the SHGWT Summary Table in the Geotech Report you provide for the pond sites and have a couple of questions. See attached.

- What is the accuracy of the vertical grade elevation you show for existing ground at your boring locations?
- We took contour data from the Lee County Website (not sure of the accuracy) but it differs quite significantly from the elevations you are showing in the summary table for Pond Alternatives 1E, 1F, and to some degree 1C. see attached graphics or those pond sites showing the contours we got from Lee County (Link to GIS map: https://leegis.leegov.com/LeeSpInS/, you will need to turn on the contours under the Infrastructure layer)
    - We are trying to resolve the discrepancies between the two data's, any help with this on your end would be appreciated.
- Can you give us a single estimated SHGWT elevation per pond site?
    - We will be using a bleeder orifice with positive outfall, so the pond (final alternative) will eventually equalize to a single elevation through the pond footprint after construction.

We are going to QC tomorrow with our PSR Report and submittal to FDOT next week, so there is some urgency to our questions/request. Call me if you would like to discuss this in more detail.

Thanks!
Mike

Mike Jaroch, PE
Chief Engineer
Main: 813.318.2343 | Direct: 813.321.5789
mjaroch@drmp.com

941 Lake Baldwin Lane, Orlando, FL 32814

From: Tom Musgrave <tmusgrave@tierraeng.com>
Sent: Tuesday, September 20, 2022 2:59 PM
To: Leo Rodriguez <LRodriguez@drmp.com>; lmoore@tierraeng.com; Scott Garth <SGarth@drmp.com>; Mike Jaroch <mjaroch@drmp.com>; mgosselin@intera.com
Cc: Esteban Gonzalez <esgonzalez@drmp.com>; Logan Yarbrough <lyarbrough@drmp.com>; Mark Prochak

APPENDIX 10 - Correspondence

SFWMD Pre Application Meeting Minutes

SR 31 Kickoff Meeting with FDOT-1

SR 31 Pond Siting Evaluation Meeting with FDOT-1

FGT Correspondence

DRMP, INC.

PRINCIPALS
Lawrence L. Smith, Jr.
Wayne D. Chalifoux
Donaldson K. Barton, Jr.
Glenn J. Lusink
Jon S. Meadows
Mark D. Prochak
Mark E. Puckett

941 Lake Baldwin Lane, Orlando, Florida 32814
Phone: 407.896.0594 | Fax: 407.896.4836

SFWMD Pre Application Meeting Minutes

SR 31 PD&E Study
From SR 80 (Palm Beach Boulevard) To SR 78 (Bay Shore Road)
441942-1-22-01

September 13, 2019 at 10:30 AM
SFWMD Ft. Myers

A Pre- Application meeting was held on 09/13/19 at 10:30 AM in the 2nd floor Conference Room at the SFWMD Ft Myers Office. The purpose of the meeting was to confirm the drainage approach to support the proposed widening and bridge replacement. Below is a list of attendees and a summary of the meeting.

Attendees:

- Brian Rose- SFWMD
- Melissa Roberts- SFWMD
- Laura Layman- SFWMD
- Brent Setchell- FDOT
- Nicole Monies- FDOT
- Ken Kniel -DRMP
- Jim Sheets- DRMP
- Scott Garth- DRMP

1. DRMP provided an agenda, sign in sheet and aerial showing two proposed alignments (see attached). Proposed is a 2 to 6 lane widening and bridge replacement over the Caloosahatchee River. The 2 alignments are a western alignment around the west side of the marina and an existing alignment. There are constraints on the existing alignment including FGT and the marina. SFWMD noted the western alignment appears to have more environmental impacts.

2. DRMP suggested no floodplain compensation or attenuation due to the tidal nature of the area and that the ponds be sized for treatment only. DRMP presented the FEMA FIRM which shows elevation 7 to the Franklin Lock. SFWMD asked that DRMP will need to confirm the tidal vs. freshwater floodplain limits. SFWMD suggested looking deeper into the December 2018 Flood Insurance Study (FIS) for supporting documentation.

3. The location of the proposed pond sites will determine if any attenuation is required. The key for attenuation is showing no downstream adverse impacts to private properties. SFWMD referenced the SFWMD allowable discharge rates document and determined the discharge rate limitation is east of the Franklin Lock and therefore does not apply to this project.

4. For the pond siting, there are numerous pond site opportunities with each alignment. DRMP suggested the Lee Civic Center as a potential joint use pond. SFWMD stated that the Lee Civic Center (LCC) may not be able to support additional water coming into their system. LCC has minimal vertical storage. DRMP also suggested compensating treatment will be included as a stormwater management

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1.833.811.3767
www.DRMP.com

alternative. FDOT asked if there are any known regional opportunities. SFWMD suggested we check with Billy Jacoby of Lee County. SFWMD mentioned that Babcock Ranch recently purchased the property NE of the existing bridge. SFWMD has also received some new wetland delineation permits near the marina that may be of use.

5. The SR 80 intersection will be improved and will likely displace the existing linear treatment ponds along SR 80. It may be possible to pipe the intersection to a new pond to the north along SR 31.

6. The TMDL on the Caloosahatchee River will require pollutant loading calculations with focus on Nitrogen as the primary impairment.

7. The project is not located within an OFW. The OFW is located approximately 20 miles west of the project limits. Therefore, SFWMD agreed and additional 50% treatment would not be required.

8. Wetland impacts are anticipated for each alignment. SFWMD agreed that Little Pine Island Mitigation Bank could be used to offset wetland impacts.

9. The existing bridge is likely to be demolished.

10. SFWMD was receptive to the Contractor providing a temporary sediment and erosion control plan.

11. A mixing zone for water quality may be requested with the Individual permit application.

12. SFWMD suggested coordination with USACE and Coast Guard be a priority.

13. The anticipated permit will be an Individual with a fee of $7500.

Action Items:

1. DRMP to contact Lee County for potential regional opportunities.
2. DRMP to review and confirm tidal vs. freshwater limits
3. DRMP to prepare a Pond Siting Report and conceptual drainage plan based on the attached criteria.

Cc: Attendees (agenda, sign-in sheet and aerial)
Xavier Pagan

DRMP, INC.

PRINCIPALS
Lawrence L. Smith, Jr.
Wayne D. Chalifoux
Donaldson K. Barton, Jr.
Glenn J. Lusink
Jon S. Meadows
Mark D. Prochak
Mark E. Puckett

941 Lake Baldwin Lane, Orlando, Florida 32814
Phone: 407.896.0594 | Fax: 407.896.4836

DRMP Job #: 18-0080.000

PRE APPLICATION MEETING NO. 2

SR 31 PD&E STUDY
FROM SR 80 (PALM BEACH BOULEVARD) TO SR 78 (BAY SHORE ROAD)
441942-1-22-01

August 28, 2019 at 10 AM
SFWMD Ft. Myers Service Center

A SFWMD Pre Application Meeting was held for a previous study on September 28, 2011 (minutes attached).

I. Existing Conditions

a. Floodplain
b. Wetlands
c. Existing Permits (SR 31; SR 80)
d. Adjacent Projects (SR 78 and SR 31 to the north)
e. Previous Reports
f. WBIDS/Impairments
g. 2 Cross Drains

II. Proposed Improvements

a. Widening 2 to 6 lanes on SR 31; SR 80 intersection improvements

b. 2 Potential Alignment Alternatives

   i. Alt 1- existing alignment
      - FGL and Marina constraints
   ii. Alt 2- western realignment
      - Env impacts
      - Floodway involvement (Kickapoo Creek)

c. Ponds
   i. Impairments
   ii. Water quality
   iii. Water quantity

d. Regional Opportunities
   i. Lee Civic Center
   ii. Caloosahatchee River BMAP
   iii. Coordination with Lee County (Cathy Olson)
   iv. Adjacent projects coordination for pond near Lee Civic Center

e. Bridge Replacement

III. Environmental
a. Wetlands
b. Species
c. Mitigation options

IV. Erosion Control
a. Plans
b. SWPPP

V. Anticipated permit and fee

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SR 31 PD&E STUDY
SFWMD Pre Application Meeting

FROM SR 80 (PALM BEACH BOULEVARD) TO SR 78 (BAY SHORE ROAD)
441942-1-22-01 SIGN-IN SHEET
SEPTEMBER 13, 2019 AT 10:30 A.M.

	Name	Affiliation	Email Address	Signature
1	Scott Garth	DRMP	sgarth@drmp.com	
2	James Sheets	DRMP	Jsheets@drmp.com	
3	Ken Kniel	DRMP	KKniel@drmp.com	
4	Laura Layman	SFWMD	llayman@sfwmd.gov	[illegible]
5	Melissa Roberts	SFWMD	mroberts@sfwmd.gov	[illegible]
6	Brian Rose	SFWMD	brose@sfwmd.gov	[illegible]
7	Nick Ruiz	AIM Engineering	nruiz@aimengr.com	[illegible]
8	Dawn Ratican	AIM	dratican@aimengr.com	[illegible]
9	Nicole Monies	FDOT	nicole.monies@dot.state.fl.us	[illegible]
10	Brent Setchell	FDOT	brent.setchell@dot.state.fl.us	[illegible]
11				
12				

DRMP, INC.

PRINCIPALS
Wayne D. Chalifoux
Donaldson K. Barton, Jr.
Glenn J. Lusink
Jon S. Meadows
Mark D. Prochak
Mark E. Puckett
Lawrence L. Smith, Jr.

2882 Remington Green Circle, Tallahassee, Florida 32308
Phone: 850.562.9600 | Fax: 850.575.5544

DRMP Job #: 18-0080.000

SR 31 PD&E STUDY
FROM SR 80 (PALM BEACH BOULEVARD) TO SR 78 (BAY SHORE ROAD)
441942-1-22-01
KICKOFF MEETING

February 14, 2019 at 9:30 a.m.
FDOT District 1 Headquarters (DEMO Room 231)

Attendees:

Patrick Bateman, FDOT D1 PM	Steve Wallace, DRMP
Marlon Bizerra, FDOT	Colette Moss, DRMP
William Hartmann, FDOT	Scott Garth, DRMP
Gwen Pipkin, FDOT	Carolyn Malphurs, DRMP
Jonathon Bennett, FDOT	Ravi Narayanan, AECOM
Lauren Peters, FDOT	Marty Peate, AECOM
Kevin Ingle, FDOT	Alicia Gonzalez, MRG (on phone)
Xavier Pagan, DRMP PM	Mary Gainor, MRG
Michael Leo, DRMP	

Discussions from the meeting are shown below. These notes are not intended to be verbatim, but a general synopsis of the topics covered during the meeting.

- Due to limited availability of FDOT staff, Marlon requested that DRMP start the meeting by conducting a walkthrough of the project.

- DRMP provided a PowerPoint presentation walkthrough of the project covering each discipline. Below summarizes the discussion during the walkthrough.

  - The project will be posted on the FLRoads.com webpage.
  - The meeting with systems planning will be happening soon. Part of traffic analysis may already be covered.
  - C3C Complete Street Context was already submitted and approved.
  - Kevin requested the design to include 3D modeling, for which DRMP was not scoped.
  - 60% Bridge rehab plans were reviewed by DRMP. Construction cost estimated at $3.2M in 2020.
  - No floodplain compensation areas due to tidal influence of Caloosahatchee River
  - Pond sites will be investigated to provide excess volume to account for 2-lane to 4-lane expansion on the adjacent SR 78 project.
  - DRMP to review PGA proposal for pond site ideas
  - Seasonally dependent surveys will include all necessary wildlife species, but not for species where surveys will expire.
  - Bat acoustic surveys are now required based on direction received from USFWS and OEM.
  - DRMP will confirm SHPO and USFWS approvals are on schedule before public hearing

- Marlon anticipates heavy oversight from FDOT (monthly progress meetings with task leads) and challenged the team to impress as he anticipates funding will become available to advance this project to design without advertising.

- Marlon reminded the team that this is a highly visible project and that Central Office is watching. He also stated opposition to the subject project is forming.

- Marlon and Gwen supported eliminating undesirable alternatives early. Marlon brought up the benefits of the 3D visualization at public meetings (used Cortez as an example) which may need to be added to this project.

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- Action Items

    - 3-Month look ahead… data collection
    - Ravi to set up meeting to discuss methodology to collect traffic data
    - Patrick to set up monthly recurring meetings starting with 4/17 at 10:00 AM (Xavier to forward to Team)
    - Xavier to bring updated schedule to every progress meeting
    - FDOT to provide comments on DRMP's QC Plan and approve PIP
    - DRMP will draft a property owner access letter for Patrick to sign and for the team to use to conduct field work.
    - DRMP will look into options for addressing request for 3D design and bat acoustics.

DRMP Job #: 18-008.000

SR 31 PD&E STUDY
FROM SR 80 (PALM BEACH) TO SR 78 (BAY SHORE ROAD)
441942-1-22-01
DRAINAGE POND SITING MEETING MINUTES
May 16, 2022 at 1:00 PM
MS Teams Meeting

Attendees

Patrick Bateman, PE - FDOT	
Brent Setchell, PE - FDOT	
Richard Oujevolk, PE - FDOT	
Melody Matter, PE – McCormick Taylor	
James Sheets, DRMP Drainage	
Scott Garth, PE - DRMP Drainage	
Mike Jaroch, PE - DRMP Drainage	

Opening:

Mr. Jaroch started the meeting by briefly going over the agenda outline (attached) and discussed the intent of the meeting. This is the second pond siting meeting to discuss water quality requirements including nutrient loading reductions, pond alternatives and outfalls, ERP permitting, and the final Pond Siting Evaluation Matrix at Mr. Setchell's direction.

Project Overview:

Mr. Jaroch discussed the project limits and basin boundaries. The project goes from SR 80 (Palm Beach Boulevard) to SR 78 (Bayshore Road), just north of the Caloosahatchee River. Mr. Jaroch also mentioned that the only basin being evaluated as part of this project was the basin from SR 80 to the high point of the bridge over the Caloosahatchee River. The basin from the high point of the bridge over the Caloosahatchee River north to SR 78 would be completed as part of the adjacent project to the north as directed by the Department in an earlier meeting. The pond siting approach requires dry treatment in conjunction with wet detention to meet water quality treatment and nutrient loading reduction requirements. DRMP has identified 5 pond site alternatives that are being evaluated for the project and each is comprised of a treatment train system with dry and wet parts to each pond site. Based on previous meetings with the Department, the proposed SR 31 roadway profile will be designed to be above the "preliminary" FEMA Maps (showing a 100-year flood elevation of 10.0 NAVD 88). The elevation difference between the proposed SR 31 roadway profile and the existing natural ground (topography) provides the opportunity to incorporate dry retention into each pond site alternative. For the pond tailwater conditions, sea level rise (SLR) will be based on a resiliency study being done by Intera.

Mr. Setchell inquired as to the status of the existing SR 31 roadway right of way (R/W) area (near the bridge and adjacent to the marina) as a dry retention facility. It was pointed out that

DRMP was directed to stay away from the FPL gas easement and that a future access road (that would go under the bridge and to the east) to a new development is intended there.

Mr. Setchell stated that each pond site alternative should include the necessary outfall easement needs to provide a hydraulic connection to the Caloosahatchee River for each of the pond alternatives located to the west of SR 31 (Alt 1-E and Alt 1-F).

Mr. Oujevolk noted that the entire length of each outfall easement (hydraulically connecting the pond discharge to the Caloosahatchee River) needs to be evaluated to account for ALL impacts for the NEPA process.

Pond Site Alternative Discussion:

Mr. Jaroch discussed each of the 5 pond site alternatives and outfall options. The three pond alternatives on the east side of SR 31 will be designed to have a closed pipe outfall system that connects directly to the Caloosahatchee River (within FDOT R/W). These ponds alternatives are considered "joint use" opportunities with the 31-Oaks Development.

- SMF 1A; See graphic (located almost entirely within the existing borrow area)
  - Outfall will be piped all the way to the Caloosahatchee River within FDOT R/W to a man-made dredged channel
- SMF 1B; See graphic (located adjacent to the proposed SR 31R/W)
  - Outfall will be piped all the way to the Caloosahatchee River within FDOT R/W to a man-made dredged channel
- SMF 1C; See graphic (southern most alternative, located off the proposed SR 31R/W)
  - Pipe all the way to the Caloosahatchee River within FDOT R/W to man-made dredged channel

Mr. Setchell indicated that each of the east alternatives should be evaluated a take without considering "joint use." The "joint use" opportunity would be entertained by FDOT if the developer pursues this with the Department. He also indicated we should notify the Department's R/W group and let them know about the "planned 31-Oaks Development

- SMF 1E; See graphic (located west and off of the SR 31 R/W)
  - Ultimate outfall is the Caloosahatchee River
  - Discharge south via pipe or open conveyance to man-made conveyance channel
  - Two easement options:
    - I. Pipe all the way to the Caloosahatchee River in the same alignment with the man-made (dredged) channel within FP&L property
      1. Piped outfall would be very long
      2. Less long-term maintenance
    - II. Use existing man-made (dredged) channel within FP&L property that goes all the way to the Caloosahatchee River
      1. Regular/on-going long-term maintenance of channel

- SMF 1F; See graphic (located west and off of the SR 31 R/W)
  - Ultimate outfall is the Caloosahatchee River
  - Discharge north via spreader swale then drains west to the Caloosahatchee River via poorly defined natural conveyance channel
  - Easement:
    - ii. The north spreader swale would discharge into a poorly defined natural conveyance channel that drains west and ultimately outfalls into the Caloosahatchee River
    - iii. Would not propose a piped connection between Alternative 1-F and the Caloosahatchee River because it would require crossing the FGT gas main located just west of this pond site alternative
      1. This alternative would require regular/on-going long-term maintenance of natural conveyance channel

Permitting Discussion:

Mr. Garth discussed the anticipated permitting for the project, these include a SFWMD ERP Permit, FDEP Construction Activities, USACE Waters of the State.

Mr. Setchell mentioned that a Coast Guard permit would also be required

Work with Mike Leo on the permitting SA

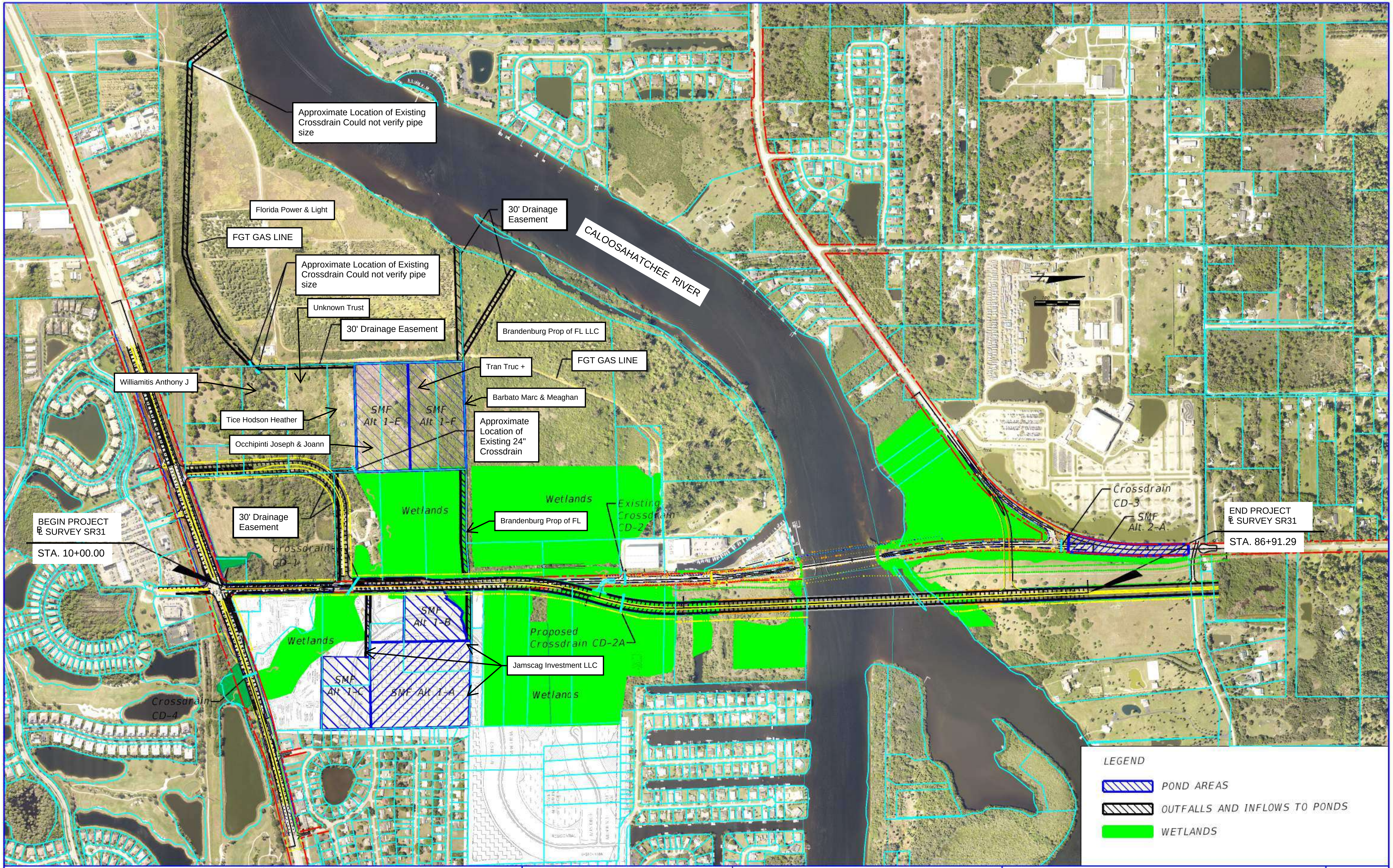
Pond Site Alternative Evaluation Matrix:

The draft Evaluation Matrix was presented and covered

a. Soils/wetlands/surface waters
b. Parcel Type (Other Impacts Gas Main)
c. R/W (cost)
d. R/W (size)
e. Socio economic
f. Historic
g. Hazardous Materials and Contamination
h. T&E Species
i. Floodplains

Action Items:

- Work towards completion of the Pond Siting Report (anticipated submittal – early June) – **DRMP**
- SA for ERP Permitting effort - **DRMP**
- Notify FDOT-1 R/W about 31-Oaks Development for potential effect to R/W costs for Pond Alternatives 1-A, 1-B, & 1-C – **Scott Garth, Mike Leo, Richard Oujevolk**



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POND ALTERNATIVES MAP

SHEET NO.

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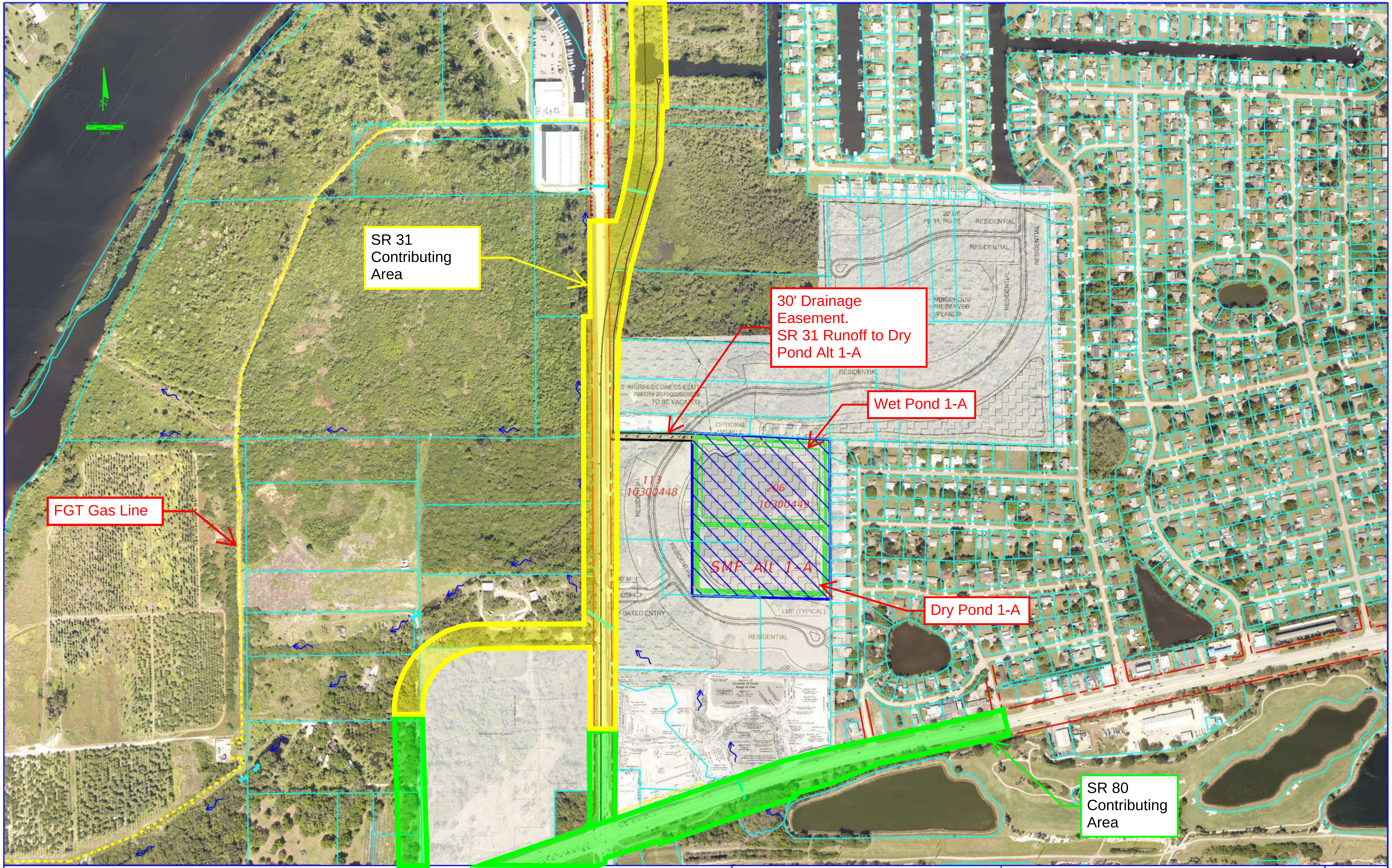

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POND 1-A POND DETAILS

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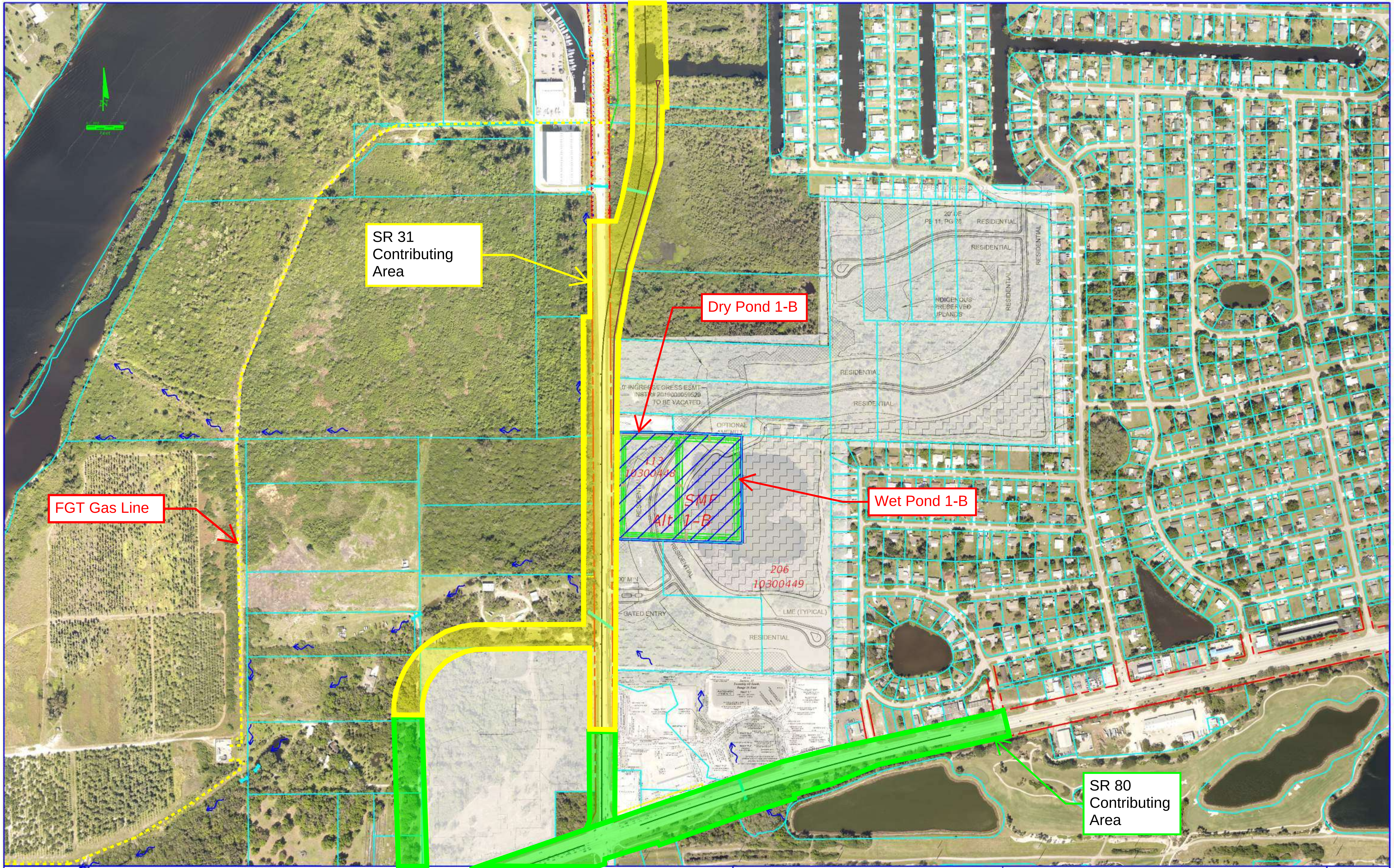

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POND 1-B POND DETAILS

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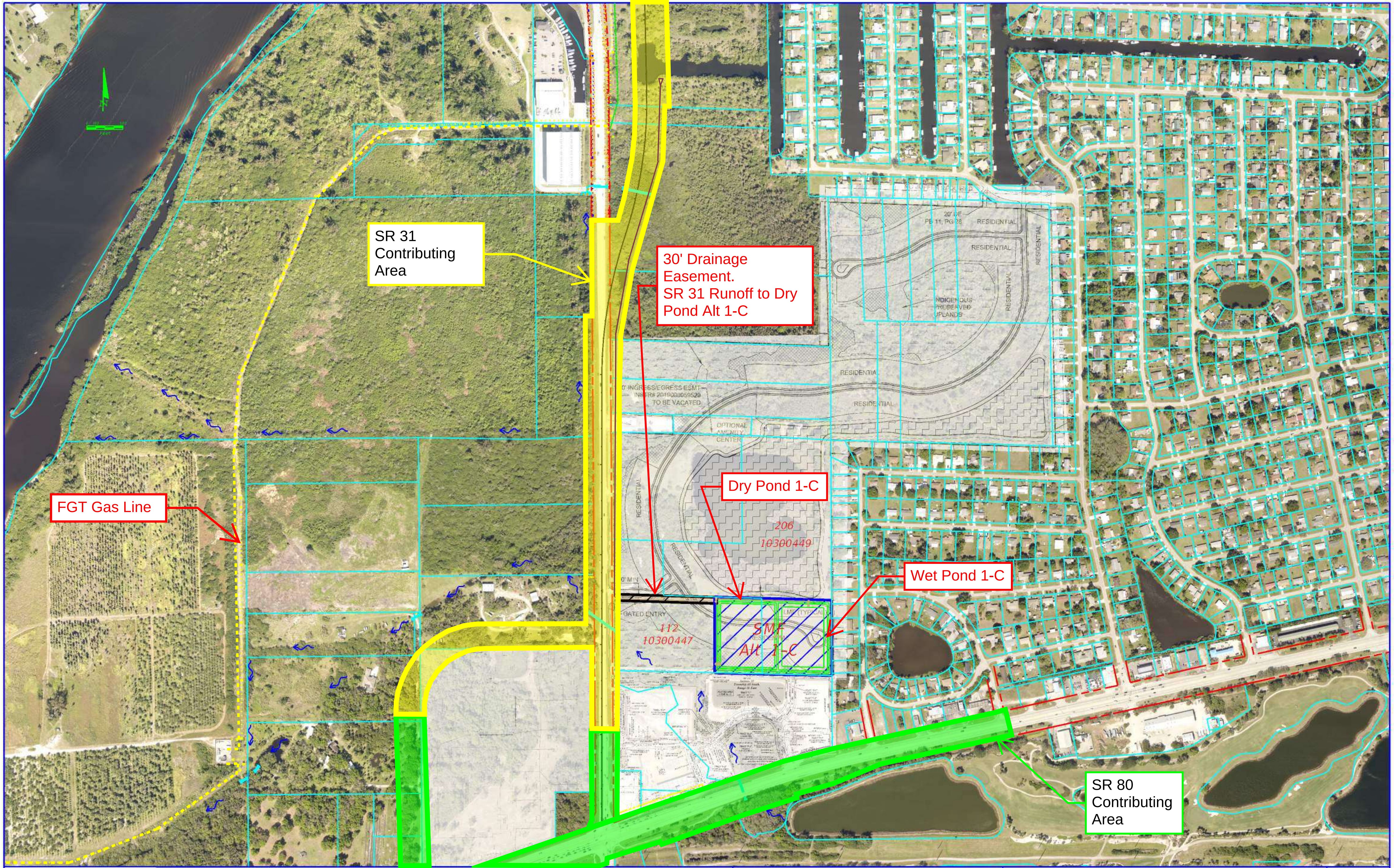

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POND 1-C POND DETAILS

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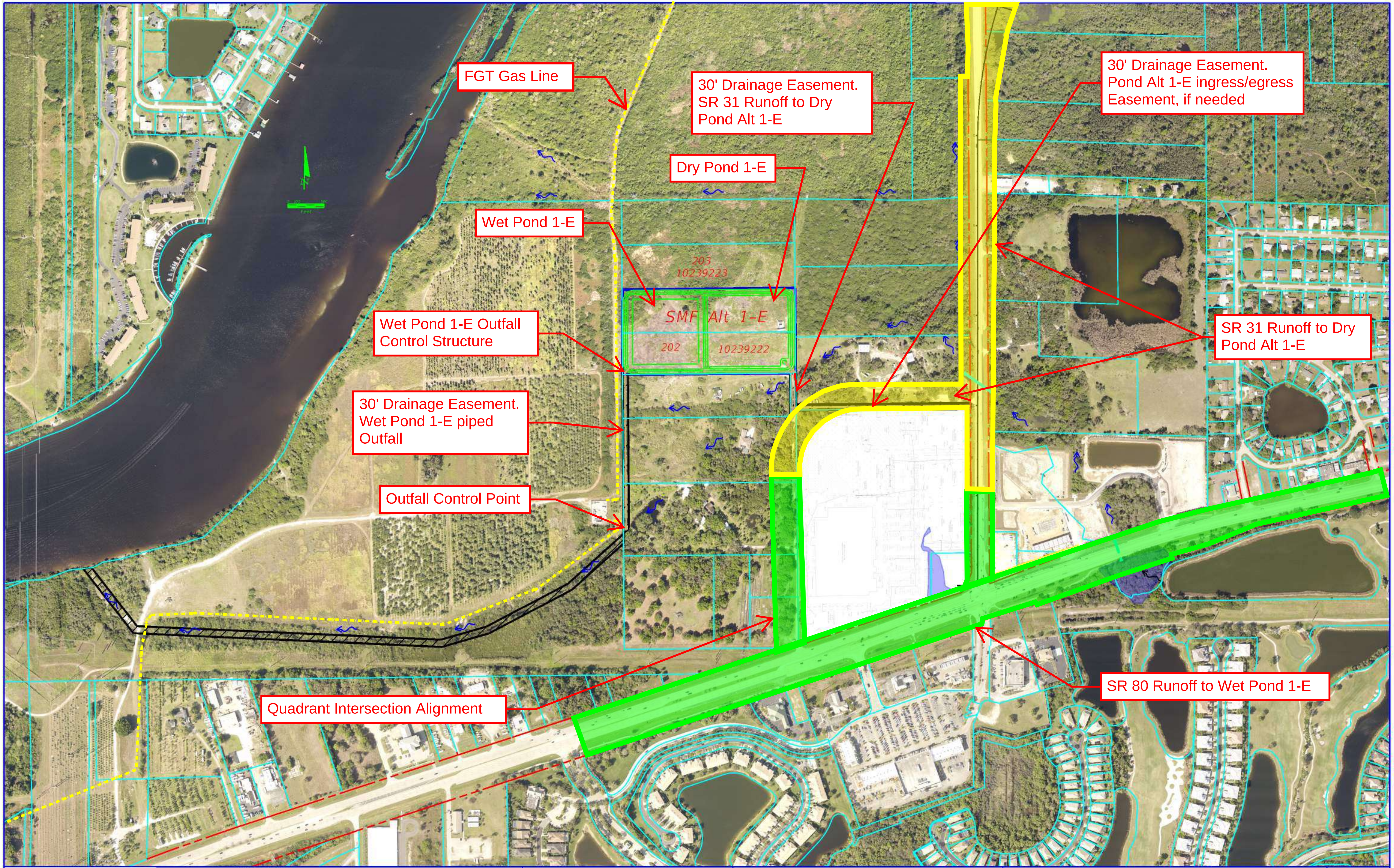

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POND 1-E POND DETAILS

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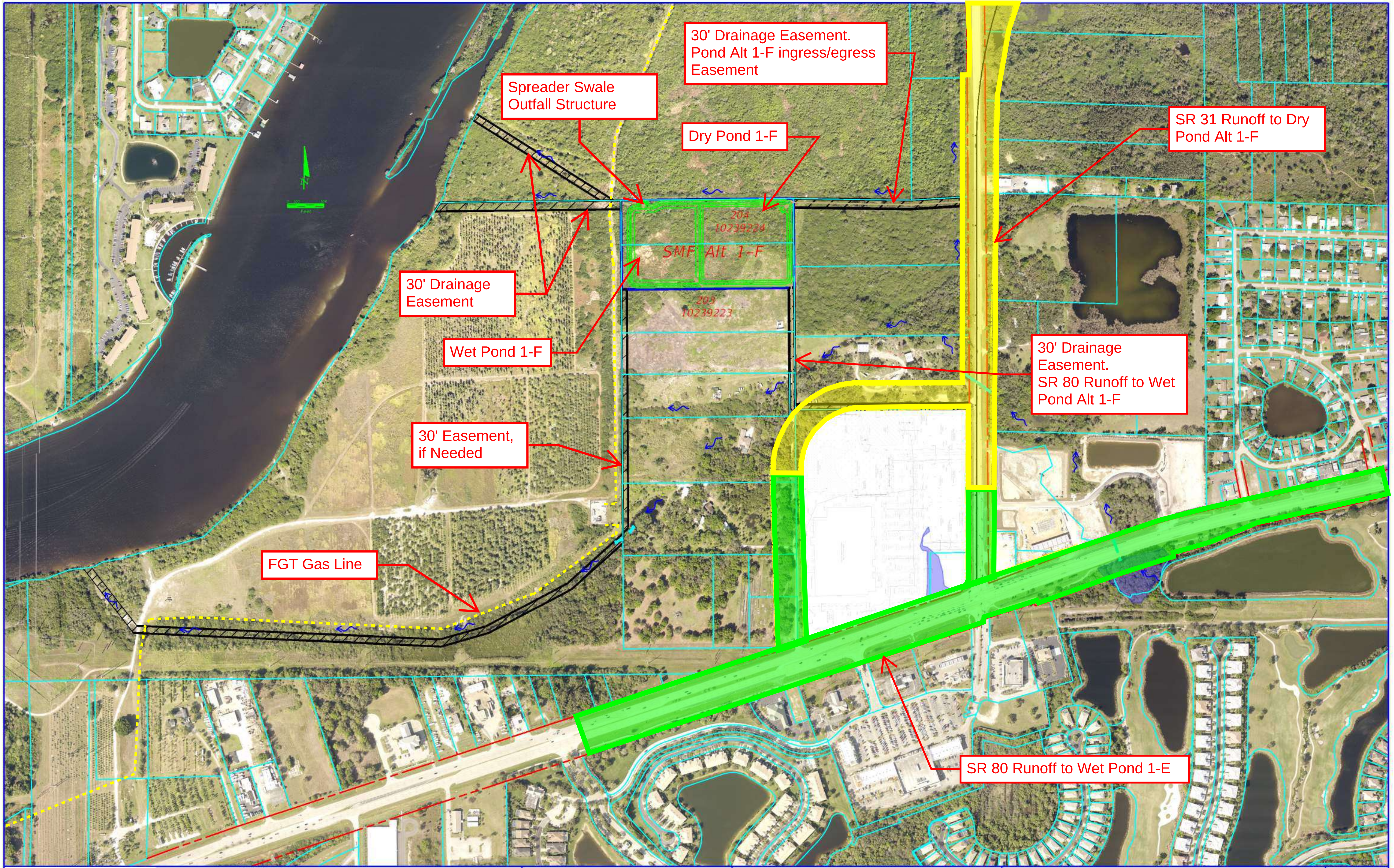

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POND 1-F POND DETAILS

SHEET NO.

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Looking South at natural Drainage swale outfall in Gas Line trail

Looking North at natural Drainage swale outfall in Gas line trail

Looking South at natural Drainage swale in Gas line trail

Looking West at Upstream end of Existing 24” cross drain

Looking West at Downstream side of 24” cross drain

Looking West Downstream side of cross drain, looking Downstream of Creek

Looking East at Concrete cased Gas Line at location of gas Line crossing Creek

Looking East at Gas Line crossing the creek

Looking West at Gas Line Sub-Station

Looking South along natural Drainage swale East side of Gas Line Sub-Station

Looking North along natural drainage swale at the east side of Gas Line Sub-Station

Looking West at Drainage Outfall creek

FPID 441942-1-22-01 SR 31 (PD&E) from SR 80 to SR 78
Pond Siting Meeting
Monday May 16th, 2022 at 1:00pm

Agenda Outline:

Purpose: Meeting to discuss Water Quality Requirements, Pond Outfalls, ERP Permitting and the Final Pond Siting Evaluation Matrix.

1. Project overview
   a. Project limits
   b. Project Alignment
      i. Quadrant Intersection (Not finalized yet)
      ii. SR 78 intersection (see graphic)
      iii. Address improvements along SR 80 where the existing permitted linear swales will be impacted
   c. Typical section
      i. 6-lane Suburban Typical with a multi-use trail on both side of the road
   d. Profile will be based on the Preliminary 100-year floodplain (Elevation 10.0 NAVD 88) FEMA Maps
      i. The new profile provides HGL clearance to work with (so we can use dry retention, only for SR 31, not SR 80)
      ii. New High-Level Bridge

2. Pond Siting
   a. 5 SMF alternatives being evaluated (goal is to avoid FGT gas main)
      i. 3 (on east side) would be joint use with 31 Oaks Development
      ii. 2 (on west side) Offsite Ponds off of the SR 31 right of way
   b. Water quality must meet "net improvement" and presumptive criteria
      i. Dry retention in line with wet detention (series or treatment train system)
   c. Water Quantity Attenuation is pre-versus post for the 25/72 storm event
      i. Not required if we directly discharge to the Caloosahatchee River
   d. Sea Level Rise
      i. Resiliency study being done by Intera, will incorporate findings (tailwater conditions for pond outfalls)

3. Pond Outfalls (A few options to consider)
   a. SMF 1A (joint use)
      i. Pipe all the way to the Caloosahatchee within FDOT R/W to man-made dredged channel
   b. SMF 1B (joint use)
      i. Pipe all the way to the Caloosahatchee within FDOT R/W to man-made dredged channel
   c. SMF 1C (joint use)
      i. Pipe all the way to the Caloosahatchee within FDOT R/W to man-made dredged channel
   d. SMF 1E

        i. Discharge south via pipe or open conveyance to man-made conveyance channel
        ii. Discharge to the north via pipe or open conveyance with spreader swale discharge
            1. To the natural conveyance channel to the west through FP&L property (similar to SMF 1-F)
        iii. Pipe all the way to the Caloosahatchee within FDOT R/W to man-made dredged channel
            1. Second pipe system and a very long outfall pipe run
    e. SMF 1F
        i. Discharge to the north via spreader swale discharge
            1. To the natural conveyance channel to the west through FP&L property (similar to SMF 1-E)
        ii. Discharge south via pipe or open conveyance to man-made conveyance channel (similar to SMF 1-E)
        iii. Pipe all the way to the Caloosahatchee within FDOT R/W to man-made dredged channel
            1. Second pipe system and a very long outfall pipe run

4. ERP Permitting

a. SA for ERP permit application submittal
b. Set up SFWMD Pre-app (when FDOT-1 gives the go-ahead) to discuss project scope and address permitting items
    i. Water Quality
    ii. Attenuation
    iii. Floodplain Impacts/Compensation
    iv. Wetlands and Surface Waters
    v. FDEP or USACE involvement for waters of the State

5. SMF Evaluation Matrix

a. Soils/wetlands/surface waters
b. Parcel Type (Other Impacts Gas Main)
c. R/W (cost)
d. R/W (size)
e. Socio economic
f. Historic
g. Hazardous Materials and Contamination
h. T&E Species
i. Floodplains

John Huryn

From:	Mark Prochak
Sent:	Tuesday, October 25, 2022 1:32 PM
To:	joseph.e.sanchez@energytransfer.com
Cc:	Brent Postma; Scott Garth; Mike Jaroch
Subject:	RE: 441942 - SR 31 and SR 80 Utility Coordination

Good afternoon Joe, I am following up on this email. Wanted to make sure you received and see if FGT needs anything else at this time.

Mark Prochak, PE
Principal
Main: 407.896.0594 | Direct: 407.362.1460
mprochak@drmp.com

DRMP
941 Lake Baldwin Lane, Orlando, FL 32814

From: Mark Prochak
Sent: Thursday, October 13, 2022 2:43 PM
To: joseph.e.sanchez@energytransfer.com
Cc: Brent Postma <bpostma@elementeg.com>; Scott Garth <SGarth@drmp.com>; Mike Jaroch <mjaroch@drmp.com>
Subject: RE: 441942 - SR 31 and SR 80 Utility Coordination

Good afternoon Joe, it was nice catching up with you earlier this week via the phone.

Attached is a graphic that shows what I was trying to explain. For our SR 31 PDE project we identified pond 1E wet and dry ponds as our preferred alternative. We are proposing a shallow swale conveyance outfall that would cross over the existing FGT line. We would use a paved swale to eliminate erosion. We have not completed any VVH information on the existing line. We coordinated with the project to the north being completed by Kimley Horn and estimated the top of pipe being +/- 3’ deep.

We would appreciate FGT’s review and comments on this approach. While this is a PDE our scope of services includes preparing 100% R/W maps. The maps require us to tie down our outfalls.

Thanks in advance for the review and comments, if possible we would appreciate some feedback no later than 10/20/22.

Mark Prochak, PE
Principal
Main: 407.896.0594 | Direct: 407.362.1460
mprochak@drmp.com

DRMP
941 Lake Baldwin Lane, Orlando, FL 32814

From: Mark Prochak
Sent: Thursday, September 22, 2022 1:52 PM
To: joseph.e.sanchez@energytransfer.com
Cc: Brent Postma <bpostma@elementeg.com>; Scott Garth <SGarth@drmp.com>
Subject: 441942 - SR 31 and SR 80 Utility Coordination

Good afternoon Joe,

I am the Project Manager for the above referenced PDE project for FDOT. Previously DRMP's utility coordination subconsultant(Brent Postma) contacted FGT in 2019. Information received from FGT is attached.

The PDE project is advancing at this time and we would like to complete more recent coordination with FGT. What is the most convenient want to coordinate?

I can give you a call?

Send more info?

Other?

I look forward to hearing from you.

Mark Prochak, PE
Principal
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mprochak@drmp.com
DRMP
941 Lake Baldwin Lane, Orlando, FL 32814

From: Molina, Luis <LMolina@leegov.com>
Sent: Friday, August 14, 2020 8:41 AM
To: Scott Garth <SGarth@drmp.com>
Cc: Olson, Cathy <COlson@leegov.com>
Subject: RE: SR 31 PD&E study

Scott,

I don't know of any pond opportunities in the vicinity of your project. For future reference, below the locations (yellow dashed lines) identified in our flood mitigation masterplan. Most of the projects involves a combination of improved conveyance and ponds for storage.

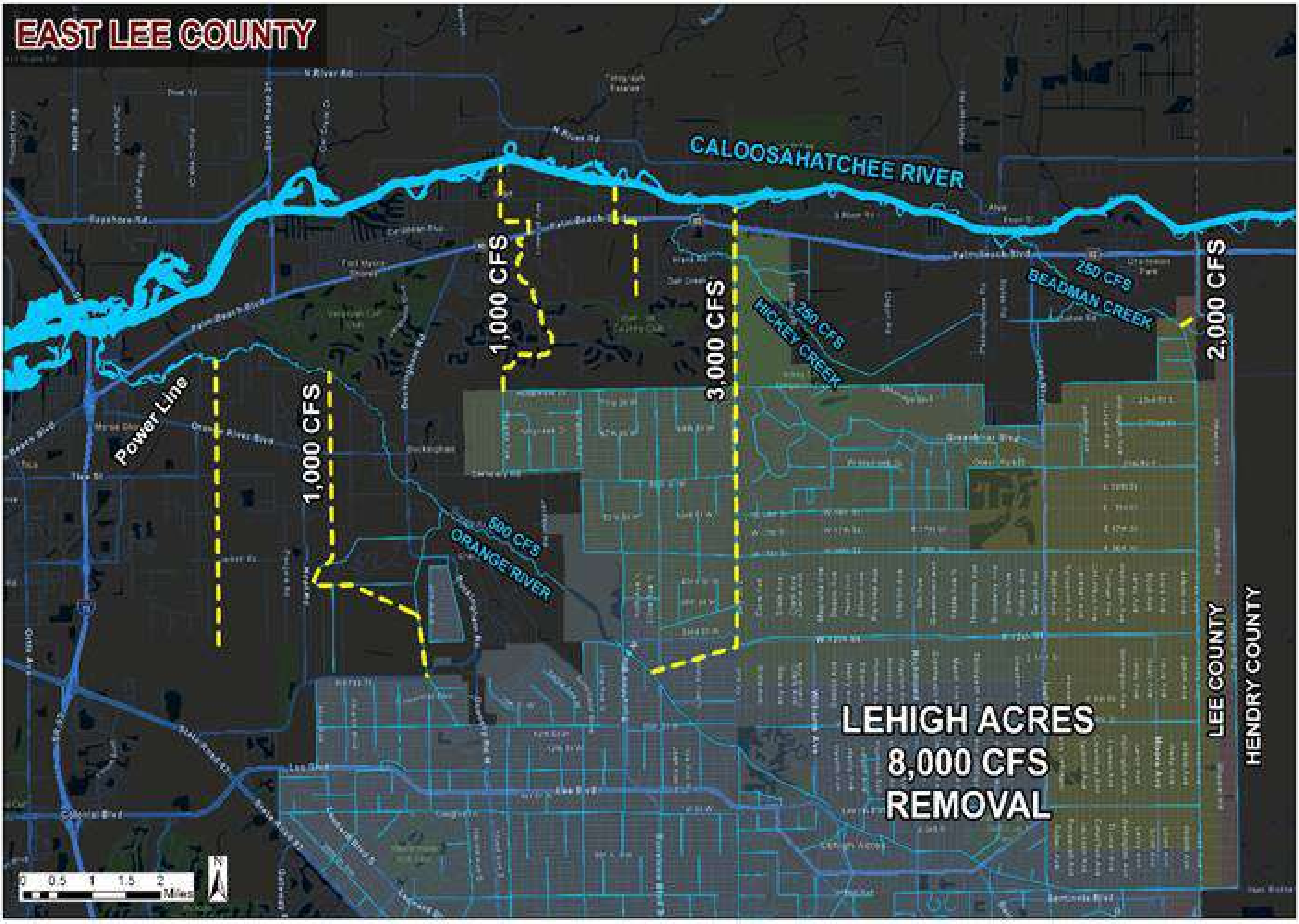


Figure 1: East Lee County Removal

Regards,

Luis Molina, P.G., P.E.
Engineering Manager I
Division of Natural Resources
P: 239-533-8132
C: 239-822-7823
F: 239-485-8408

email: molinalr@leegov.com
Website: https://www.leegov.com/naturalresources

From: Scott Garth <SGarth@drmp.com>
Sent: Thursday, August 13, 2020 1:09 PM
To: Molina, Luis <LMolina@leegov.com>
Cc: Olson, Cathy <COlson@leegov.com>
Subject: [EXTERNAL] SR 31 PD&E study

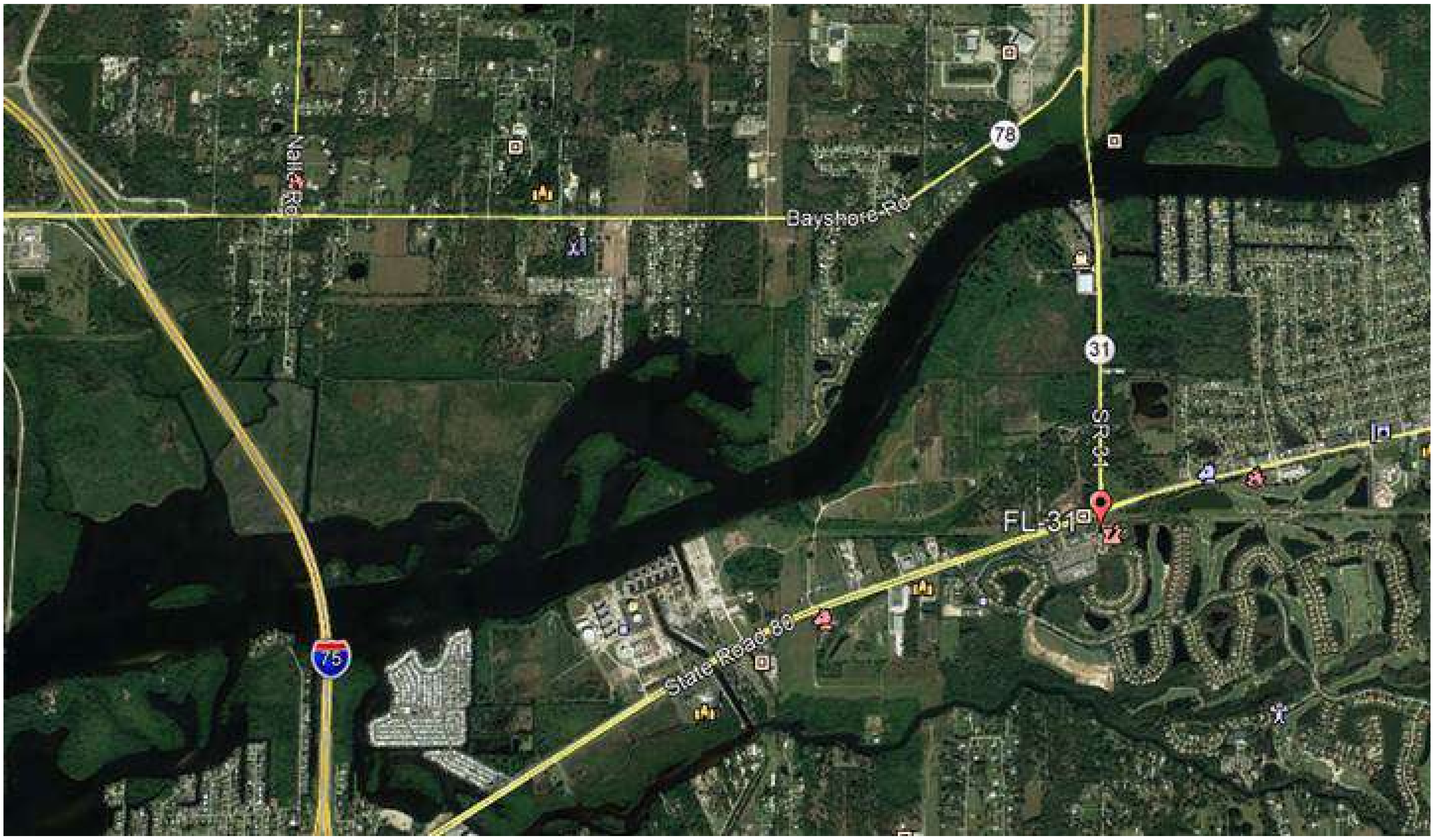
Hi Luis,

I'm working on a PD&E study for the FDOT d1 for the widening of SR 31 from SR 80 to SR 78.

Part of what we are tasked to do for the pond siting effort is to explore any regional or joint use opportunities with the local municipalities.

Do you know of any regional pond opportunities near the corridor?

Thank you for any input.



Scott Garth, PE, LEED AP
Vice President/Office Leader
Main: 813.265.9800 | Direct: 813.321.5781 | Cell: 813.784.8105
sgarth@drmp.com

DRMP, Inc.
15310 Amberly Drive, Suite 200, Tampa, FL 33647

APPENDIX 11 – Existing Permits

ERP Permit No. 36-03133 - SR 31 Shoulder Widening

ERP Permit No. 88-00012 - SR 80/SR 31 Turn Lanes

SFWMD Permit 36-03133

SR 31 Shoulder Widening

South Florida Water Management District

36-03133-P SR 31
960916-14 10/1/96

BEG. PERMIT NUMBER 36-03133-P

APPLICATION NO.

960916-14

P

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
ENVIRONMENTAL RESOURCE
NOTICED GENERAL PERMIT NO. 36-03133-P

Form #0941
08/95

DATE ISSUED: October 1, 1996

PERMITTEE: FLORIDA DEPARTMENT OF TRANSPORTATION
801 N BROADWAY
P.O. BOX 1249
BARTOW, FL 33831-1249

PROJECT DESCRIPTION: THE RESURFACING, WIDENING AND PAVING OF 5 MILES OF SR 31 FROM SR 80 TO THE CHARLOTTE COUNTY LINE, INCLUDING THE EXTENSION OF 6 EXISTING CULVERTS.

PROJECT LOCATION: LEE COUNTY, SECTION 25,24,13,12,1 TWP 43S RGE 25E
SECTION 30,19,18,7,6 TWP 43S RGE 26E

This is to notify you of the District's agency action concerning Notice of Intent for Permit Application No. 960916-14, dated September 16, 1996. This action is taken pursuant to Rule 40E-1.603 and Chapters 40E-40and 40E-400, Florida Administrative Code (F.A.C.).

Based on the information provided, District rules have been adhered to and an Environmental Resource General Permit is in effect for this project subject to:

1. Not receiving a filed request for a Chapter 120, Florida Statutes, administrative hearing,
2. the attached General Conditions,
3. the attached 4 Exhibit(s), and
4. and the attached 5 Specific Conditions in section 4?? ???.447.

Should you object to these Conditions, please refer to the attached "Notice of Rights" which addresses the procedures to be followed if you desire a public hearing or other review of the proposed agency action. Please contact this office if you have any questions concerning this matter. If we do not hear from you in accordance with the "Notice of Rights," we will assume that you concur with the District's action.

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a "Notice of Rights" has been mailed to the Permittee (and the persons listed in the attached distribution list) no later than 5:00 p.m. on the 1st day of October, 1996, in accordance with Section 120.60(3), Florida Statutes.

BY: Karen M Johnson

Karen M. Johnson
Sr Supv Environmental Analyst
Ft Myers Service Center

Certified Mail No. P 482 208 133

Enclosures

482 208 133

US Postal Serv

Receipt f

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PS Form **3800**, April 1995

FLA DEPT OF TRANSPORTATION
801 N BROADWAY
P O BOX 1249
BARTOW, FLA.   33831-1249

on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "*Return Receipt Requested*" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

4a. Article Number

P 4[illegible] 208 133

4b. Service Type

☐ Registered ☐ Certified

☐ Express Mail ☐ Insured

☐ Return Receipt for Merchandise ☐ COD

7. Date of Delivery

10/2/96

8. Addressee's Address (*Only if requested and fee is paid*)

RIDA DEPT OF TRANSPORTATION
N BROADWAY
BOX 1249
TOW, FLA. 33831-1249

Thank you for using Return Receipt Service.

Is your RET...

6. Signature (Addressee or Agent)

X [signature]

PS Form **3811**, December 1994 Domestic Return Receipt

UNITED STATES POSTAL SERVICE

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Print your name, address, and ZIP Code in this box •

SOUTH FLORIDA
WATER MANAGEMENT DISTRICT

Fort Myers Service Center
2301 McGregor Blvd.
Fort Myers, FL 33901

FORT MYERS
OCT 10 1996
RECEIVED

FORM 0537
10/87

South Florida Water Management District
GENERAL PERMIT
NOTICE OF RIGHTS

This Notice of Rights is intended to inform the recipient of the administrative and judicial review which may be available as mandated by section 120.60(3), Florida Statutes. Be advised that although this notice is intended to be comprehensive, the review procedures set forth herein have been the subject of judicial construction and interpretation which may affect the administrative of judicial review available. Recipients are therefore advised to become familiar with Chapters 120 and 373, Florida Statutes, and the judicial interpretation of the provisions of these chapters.

1. If a substantially affected person objects to the staff's recommendation, that person has the right to request an administrative hearing on the proposed agency action. The substantially affected person may request either a formal or an informal hearing, as set forth below. Failure to comply with the prescribed time periods shall constitute a waiver of the right to a hearing.

2. If a substantially affected person believes a genuine issue of material fact is in dispute, that person may request a formal hearing pursuant to section 120.57(1), Florida Statutes, by filing a petition not later than:
   a. IF NOTICE OF THE APPLICATION WAS PUBLISHED BY THE APPLICANT, within fourteen (14) days after mailing of the proposed agency action or
   b. IF NOTICE OF THE APPLICATION WAS NOT PUBLISHED, within fourteen days after receipt of actual notice.

   The request for a section 120.57(1), F.S., formal hearing must comply with the requirements of Rule 40E-1.521, Florida Administrative Code, a copy of which is attached. Petitions are deemed filed upon receipt by the District. Failure to substantially comply with the provisions of Rule 40E-1.521, Florida Administrative Code, shall constitute a waiver of the right to a 120.57(1) hearing. If a petition for administrative hearing is not timely filed, the staff's proposed agency will automatically mature into final agency action.

3. If a substantially affected person believes that no issues of material fact are in dispute, that person may request an informal hearing pursuant to section 120.57(2), F.S., by filing a petition for hearing not later than:
   a. IF NOTICE OF THE APPLICATION WAS PUBLISHED BY THE APPLICANT, within fourteen (14) days after mailing of the proposed agency action or
   b. IF NOTICE OF THE APPLICATION WAS NOT PUBLISHED, within fourteen days after receipt of actual notice.

   A request for informal hearing shall be considered as a waiver of the right to request a formal section 120.57(1), F.S., hearing. A request for a section 120.57(1), F.S., formal hearing not in substantial compliance with the provisions of rule 40E-1.521, F.A.C., may be considered by the District as a request for informal hearing. If a petition for administrative hearing is not timely filed, the staff's proposed agency action will automatically mature into final agency action.

4. Pursuant to section 373.114, Florida Statutes, a party to the proceeding below may seek review of a Final Order rendered on the permit application before the Land and Water Adjudicatory Commission, as provided therein. Review under this section is initiated by filing a request for review with the Land and Water Adjudicatory Commission and serving a copy on the Department of Environmental Regulation and any person named in the Order within 20 days after rendering of the District's Order. However, when the order to be reviewed has statewide or regional significance, as determined by the Land and Water Adjudicatory Commission within 60 days after receipt of a request for review, the commission may accept a request for review from any affected person within 30 days after the rendering of the order. Review under section 373.114, Florida Statutes, is limited solely to a determination of consistency with the provisions and purposes of Chapter 373, Florida Statutes. This review is appellate in nature and limited to the record below.

5. A party who is adversely affected by final agency action on the permit application is entitled to judicial review in the District Court of Appeal pursuant to section 120.68, Florida Statutes, as provided therein. Review under section 120.68, Florida Statutes in the District Court of Appeal is initiated by filing a petition in the appropriate District Court of Appeal in accordance with Florida rule of appellate Procedure 9.110. The Notice of Appeal must be filed within 30 days of the final agency action.

6. Section 373.617(2), Florida Statutes, provides:

   Any person substantially affected by a final action of any agency with respect to a permit may seek review within 90 days of the rendering of such decision and request monetary damages and other relief in the circuit court in the judicial circuit in which the affected property is located; however, circuit court review shall be confined solely to determining whether final agency action is an unreasonable exercise of the state's police power constituting a taking without just compensation. Review of final agency action for the purpose of determining whether the action is in accordance with existing statutes or rules and based on component substantial evidence shall proceed in accordance with Chapter 120.

7. Please be advised that exhaustion of administrative remedies is generally a prerequisite to appeal to the District Court of Appeal or the seeking of Circuit Court review of final agency action by the District on the permit application. There are, however, exceptions to the exhaustion requirement. The applicant is advised to consult the case law as to the requirements of exhaustion exceptions.

Initiation of Formal Proceedings

(1) Initiation of formal proceedings shall be made by petition to the District. The term petition as used herein includes any application or other document which expresses a requ... formal proceedings. Each petition should be printed, typewritten or otherwise duplicated in legible form on white paper or sta... legal size. Unless printed, the impression shall be on one side of the paper only an... lines shall be double-spaced and indented.

(2) All petitions filed under these rules shall contain:

(a) The name and address of the District and the District's file or identification number, if known;

(b) The name and address of the petitioner or petitioners;

(c) An explanation of how each petitioner's substantial interests will be affected by the District's determination;

(d) A statement of when and how petitioner received notice of the District's decision or intent to render a decision;

(e) A statement of all disputed issues of material fact. If there are none, the petitioner must so indicate;

(f) A concise statement of the ultimate facts which petitioner believes entitle petitioner to the relief sought as well as the rules and statutes which support petitioner's claim for relief;

(g) A demand for the relief to which the petitioner deems himself entitled; and

(h) Other information which the petitioner contends is material.

(3) Upon receipt of a petition for formal proceedings, the Office of Counsel shall review the petition for compliance with subsection (2). The Board shall accept those petitions in substantial compliance therewith, which have been timely filed, which establish that the petitioner is a substantially affected party, and which state a dispute which is within the jurisdiction of the District to resolve. If accepted, the Board shall designate the presiding officer of the administrative hearing. The District shall promptly give written notice to all parties of the action taken on the petition, and shall state with particularity its reasons therefor.

(4) If a petition is filed that does not substantially comply with the requirement of subsection (2) of this section, the District shall issue an order dismissing the petition with leave to file an amended petition complying with the requirements of this rule within the time period designated in the order. If an amended petition complying with this rule is not filed with the District Clerk within the designated time period, the petitioner's right to a processing under Section 120.57, Florida Statutes, is waived.

(5) If a valid petition is filed, with the consent of all parties and upon a showing of good cause, Board action on the petition pursuant to Section 120.57(1)(b) shall be waived. "Good cause" shall mean a set of circumstances unforeseen and outside of the control of the person requesting the waiver.

(6) When a valid petition for administrative hearing has been filed, the Board action shall defer consideration of the matter pending the completion of the administrative hearing and the submittal of a recommended order, and any exceptions to that order.

(7) If the Board designates a Hearing Officer assigned by the Division of Administrative Hearings as the presiding officer, the District Clerk shall forward the petition and all relevant materials filed with the District to the Division of Administrative Hearings, and shall notify all parties of its action.

Specific Authority 120.53, 373.044, 373.113 F.S. Law Implemented 120.53(1), 120.57, 373.113 F.S. Histor... ...w 9-3-81, formerly 16K-109.(1), 16K-1.112(1) --(3), 16K-1.12, Amended 5-11-93.

GENERAL CONDITIONS

1. THE TERMS, CONDITIONS, REQUIREMENTS, LIMITATIONS, AND RESTRICTIONS SET FORTH IN THIS SECTION ARE GENERAL PERMIT CONDITIONS SHALL BE APPLICABLE TO, AND ARE BINDING UPON THE PERMITTEE FOR ALL NO NOTICE AND NOTICED GENERAL PERMITS IN THIS CHAPTER. THESE CONDITIONS ARE ENFORCEABLE UNDER PART IV OF CHAPTER 373, F.S.

2. THE GENERAL PERMIT IS VALID ONLY FOR THE SPECIFIC ACTIVITY INDICATED. ANY DEVIATION FROM THE SPECIFIED ACTIVITY AND THE CONDITIONS FOR UNDERTAKING THAT ACTIVITY SHALL CONSTITUTE A VIOLATION OF THE PERMIT. A VIOLATION OF THE PERMIT IS A SUSPENSION OR REVOCATION OF THE PERMITTEE'S RIGHT TO CONDUCT SUCH ACTIVITY UNDER THE GENERAL PERMIT. THE DISTRICT MAY BEGIN LEGAL PROCEEDINGS SEEKING PENALTIES OR OTHER REMEDIES AS PROVIDED BY LAW FOR ANY VIOLATION OF THESE CONDITIONS.

3. THIS GENERAL PERMIT DOES NOT ELIMINATE THE NECESSITY TO OBTAIN ANY REQUIRED FEDERAL, STATE, LOCAL AND SPECIAL DISTRICT AUTHORIZATIONS PRIOR TO THE START OF ANY CONSTRUCTION, ALTERATION, OPERATION, MAINTENANCE, REMOVAL OR ABANDONMENT AUTHORIZED BY THIS PERMIT. THIS GENERAL 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 GENERAL PERMIT AND THIS CHAPTER.

4. THIS GENERAL PERMIT DOES NOT RELIEVE THE PERMITTEE FROM LIABILITY AND PENALTIES WHEN THE PERMITTED ACTIVITY CAUSES HARM OR INJURY TO: HUMAN HEALTH OR WELFARE; ANIMAL, PLANT OR AQUATIC LIFE; OR PROPERTY. IT DOES NOT ALLOW THE PERMITTEE TO CAUSE POLLUTION IN CONTRAVENTION OF FLORIDA STATUTES AND DISTRICT RULES.

5. THE PERMITTEE IS HEREBY ADVISED THAT SECTION 253.77, F.S., STATES THAT A PERSON MAY NOT COMMENCE ANY EXCAVATION, CONSTRUCTION, OR OTHER ACTIVITY INVOLVING THE USE OF SOVEREIGN OR OTHER LANDS OF THE STATE, THE TITLE TO WHICH IS VESTED IN THE BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND WITHOUT OBTAINING THE REQUIRED LEASE, LICENSE, EASEMENT, OR OTHER FORM OF CONSENT AUTHORIZING THE PROPOSED USE. THEREFORE,THE PERMITTEE IS RESPONSIBLE FOR OBTAINING ANY NECESSARY AUTHORIZATIONS FROM THE BOARD OF TRUSTEES PRIOR TO COMMENCING ACTIVITY ON SOVEREIGNTY LANDS OR OTHER STATEOWNED LANDS.

6. THE GENERAL PERMIT MAY BE MODIFIED, SUSPENDED OR REVOKED IN ACCORDANCE WITH CHAPTER 120, AND SECTION 373.429, F.S.

7. THIS PERMIT SHALL NOT BE TRANSFERRED TO A THIRD PARTY EXCEPT PURSUANT TO SECTION 40E-4.351, F.A.C. THE PERMITTEE TRANSFERRING THE GENERAL PERMIT SHALL REMAIN LIABLE FOR ANY CORRECTIVE ACTIONS THAT MAY BE REQUIRED AS A RESULT OF ANY PERMIT VIOLATIONS PRIOR TO SALE, CONVEYANCE, OR OTHER TRANSFER OF OWNERSHIP OR CONTROL OF THE PERMITTED SYSTEM OR THE REAL PROPERTY AT WHICH THE PERMITTED SYSTEM IS LOCATED.

8. UPON REASONABLE NOTICE TO THE PERMITTEE, DISTRICT STAFF WITH PROPER IDENTIFICATION SHALL HAVE PERMISSION TO ENTER, INSPECT, SAMPLE AND TEST THE PERMITTED SYSTEM TO INSURE CONFORMITY WITH THE PLANS AND SPECIFICATIONS APPROVED BY THE PERMIT.

9. THE PERMITTEE SHALL MAINTAIN ANY PERMITTED SYSTEM IN ACCORDANCE WITH THE PLANS SUBMITTED TO THE DISTRICT.

10. A PERMITTEE'S RIGHT TO CONDUCT A SPECIFIC NOTICED ACTIVITY UNDER THIS NOTICED GENERAL PERMIT IS AUTHORIZED FOR A DURATION OF FIVE YEARS.

GENERAL CONDITIONS

11. CONSTRUCTION, ALTERATION, OPERATION, MAINTENANCE, REMOVAL AND ABANDONMENT APPROVED BY THIS GENERAL PERMIT SHALL BE CONDUCTED IN A MANNER WHICH DOES NOT CAUSE VIOLATIONS OF STATE WATER QUALITY STANDARDS, INCLUDING ANY ANTIDEGRADATION PROVISIONS OF SECTION 62-4.242(1)(A) AND (B), 62-4.242(2) AND (3), AND 62-302.300, F.A.C., AND ANY SPECIAL STANDARDS FOR OUTSTANDING FLORIDA WATERS AND OUTSTANDING NATIONAL RESOURCE WATERS. THE PERMITTEE SHALL IMPLEMENT BEST MANAGEMENT PRACTICES FOR EROSION, TURBIDITY, AND OTHER POLLUTION CONTROL TO PREVENT VIOLATION OF STATE WATER QUALITY STANDARDS. TEMPORARY EROSION CONTROL MEASURES SUCH AS SODDING, MULCHING, AND SEEDING SHALL BE IMPLEMENTED AND SHALL BE MAINTAINED ON ALL ERODIBLE GROUND AREAS PRIOR TO AND DURING CONSTRUCTION. PERMANENT EROSION CONTROL MEASURES SUCH AS SODDING AND PLANTING OF WETLAND SPECIES SHALL BE COMPLETED WITHIN SEVEN DAYS OF ANY CONSTRUCTION ACTIVITY. TURBIDITY BARRIERS SHALL BE INSTALLED AND MAINTAINED AT ALL LOCATIONS WHERE THE POSSIBILITY OF TRANSFERRING SUSPENDED SOLIDS INTO WETLANDS OR OTHER SURFACE WATERS EXISTS DUE TO THE PERMITTED ACTIVITY. TURBIDITY BARRIERS SHALL REMAIN IN PLACE AND SHALL BE MAINTAINED IN A FUNCTIONAL CONDITION 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.

12. THE PERMITTEE SHALL HOLD AND SAVE THE DISTRICT HARMLESS FROM ANY AND ALL DAMAGES, CLAIMS, OR LIABILITIES WHICH MAY ARISE BY REASON OF THE CONSTRUCTION, ALTERATION, OPERATION, MAINTENANCE, REMOVAL, ABANDONMENT OR USE OF ANY SYSTEM AUTHORIZED BY THE GENERAL PERMIT.

13. THE PERMITTEE SHALL IMMEDIATELY NOTIFY THE DISTRICT IN WRITING OF ANY PREVIOUSLY SUBMITTED INFORMATION THAT IS LATER DISCOVERED TO BE INACCURATE.

SPECIFIC CONDITIONS

40E-400.447 General Permit to the Florida Department of Transportation, Counties and Municipalities for Minor Activities Within Existing FDOT Rights-of-Way or Easements.

1. THE PERMITTEE SHALL USE EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES IN STRICT COMPLIANCE TO WITH THE GUIDELINES AND SPECIFICATIONS DESCRIBED IN CHAPTER 6 OF THE FLORIDA LAND DEVELOPMENT MANUAL: A GUIDE TO SOUND LAND AND WATER MANAGEMENT (FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION 1988), INCORPORATED BY REFERENCE IN RULE 40E-4.091, F.A.C., TO PREVENT VIOLATION OF STATE WATER QUALITY STANDARDS.

2. IMMEDIATELY FOLLOWING COMPLETION OF SLOPE CONSTRUCTION, THE FILL AREAS AND ANY DISTURBED BANKS OF WETLANDS OR OTHER SURFACE WATERS SHALL BE STABILIZED WITH VEGETATION OR RIPRAP TO PREVENT EROSION. TEMPORARY EROSION CONTROLS FOR ALL EXPOSED SOILS WITHIN WETLANDS AND OTHER SURFACE WATERS SHALL BE COMPLETED WITHIN SEVEN CALENDAR DAYS OF THE MOST RECENT CONSTRUCTION ACTIVITY. PREVENTION OF EROSION OF EXPOSED EARTH INTO WETLANDS AND OTHER SURFACE WATERS IS A CONSTRUCTION PRIORITY AND COMPLETED SLOPES SHALL NOT REMAIN UNSTABILIZED WHILE OTHER CONSTRUCTION CONTINUES.

3. IN ADDITION TO COMPLYING WITH THE NOTICE PROVISIONS OF SECTION 40E- 400.211, F.A.C., AT LEAST 90 DAYS PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE PERMITTEE SHALL PROVIDE WRITTEN NOTIFICATION TO THE APPROPRIATE DISTRICT SERVICE CENTER OF THE DATE THE PERMITTED CONSTRUCTION ACTIVITIES ARE PLANNED TO BEGIN AND WITHIN 90 DAYS FOLLOWING COMPLETION OF CONSTRUCTION THE PERMITTEE SHALL PROVIDE WRITTEN NOTIFICATION TO THE APPROPRIATE DISTRICT SERVICE CENTER OF THE DATE CONSTRUCTION ACTIVITIES ARE COMPLETED.

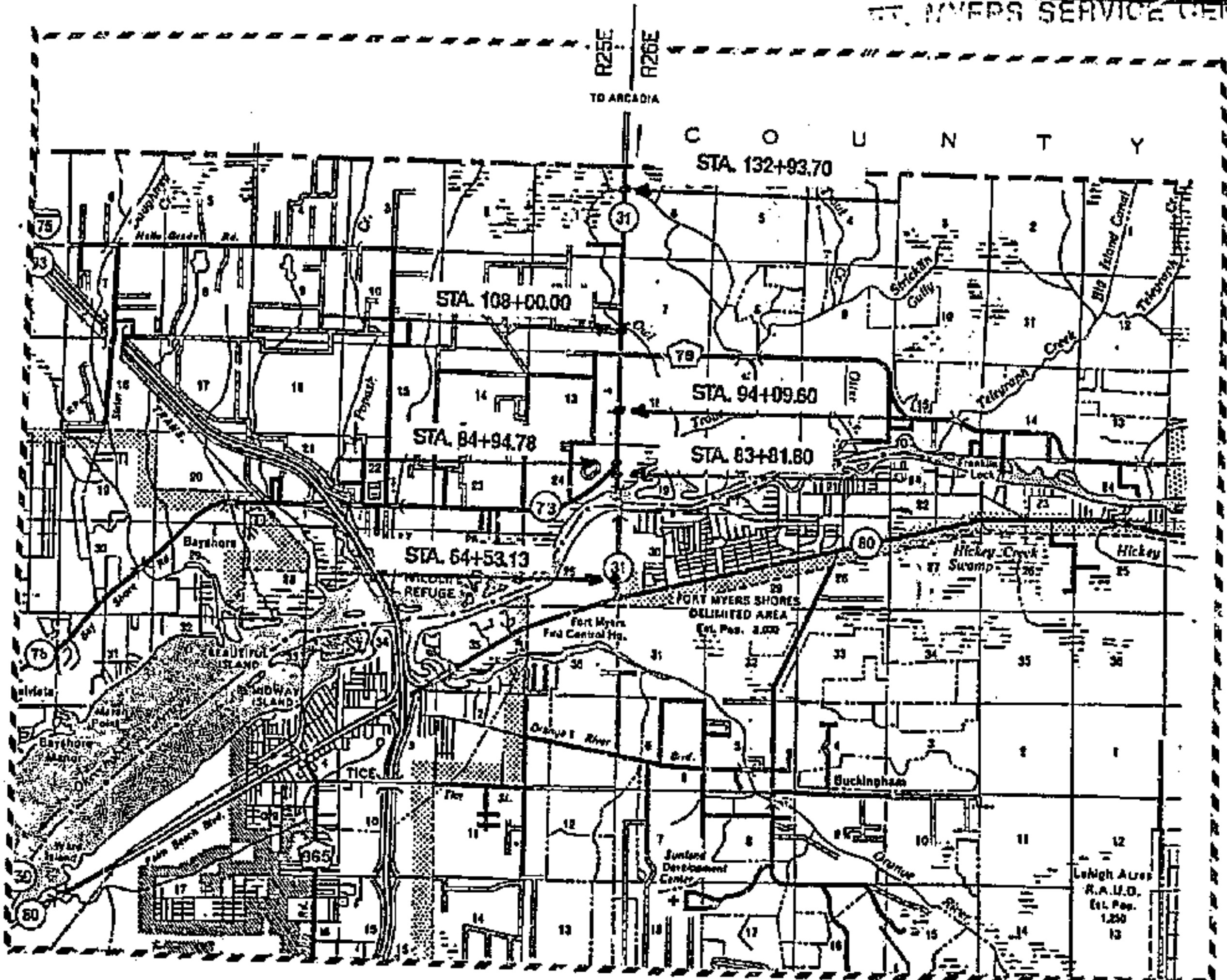
4. THE PERMITTEE SHALL LIMIT STREAM CHANNEL RELOCATION TO STREAMS WHICH HAVE AN AVERAGE ANNUAL DISCHARGE OF 10 CUBIC FEET PER SECOND OR LESS. THE LENGTH OF RELOCATED CHANNELS OR THOSE SIGNIFICANTLY ALTERED SHALL BE LIMITED TO 200 FEET PER STREAM. A STREAM CHANNEL SHALL BE ALTERED ONLY WHEN SUCH A MEASURE WILL REDUCE THE LONG TERM ADVERSE WATER QUALITY IMPACTS AND WILL MAINTAIN OR RESTORE THE STREAM'S NATURAL HYDRAULIC CAPABILITY.

5. THIS GENERAL PERMIT SHALL NOT APPLY TO DITCH CONSTRUCTION IN CLASS I OR CLASS II SURFACE WATERS, OUTSTANDING NATIONAL RESOURCE WATERS OR WATERS DESIGNATED AS OUTSTANDING FLORIDA WATERS.

APPLICAT .UMBER

960916-14

FT. MYERS SERVICE CENTER



Sta. 64+53.13	Sta. 83+81.60	Sta. 84+94.78	Sta. 94+09.60	Sta. 108+00.00	Sta. 132+93.70
T43S	T43S	T43S	T43S	T43S	T43S
R25 & 26E	R25 & 26E	R25 & 26E	R25 & 26E	R25 & 25E	R25 & 26
Sec. 25 & 30	Sec. 24 & 19	Sec. 24 & 19	Sec. 13 & 18	Sec. 12 & 7	Sec. 1 & 6

ORIGINAL SUBMITTAL
SEP 16 1996
FORT MYERS SERVICE CENTER

James R. Wilt Jr
9/11/96

1"=2 Miles

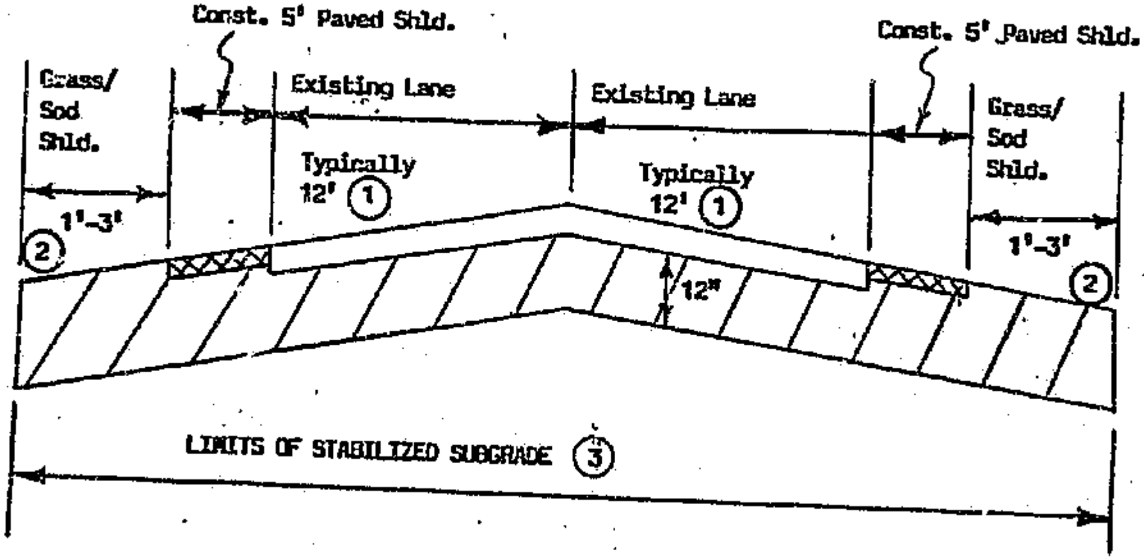
EXHIBIT 1

State Project 12090-3501
Applicant: Fla. Dept. of Trans.
Sheet 1 of 15
September 1996

FT. MYERS SERVICE CENTER
960612-5
APPLICAT. NUMBER

EXHIBIT 2

ADDL/REVISED SUBMITTAL
SEP 16 1996
FORT MYERS SERVICE CENTER



-NOTES-

(1) Substandard lane widths may require additional widening to meet present safety standards.

(2) Grassed/sodded shoulder width varies 1'-3' depending on width of existing R/W or sensitivity of area.

(3) Subgrade is stabilized (mixed and compacted) from outside shoulder to outside shoulder during construction of the original roadway.

DESIGN CRITERIA

These type projects are in no way associated with multi-laning of the existing transportation facility. These types of projects are designed to meet present safety standards and maintain the structural integrity of the roadway. Any future multi-laning activities would require additional lengthening or replacement of existing drainage structures and permitting of the new facility.

TYPICAL WIDENING & RESURFACING SECTION

SHEET 1 OF 3

N.T.S.

960617-5

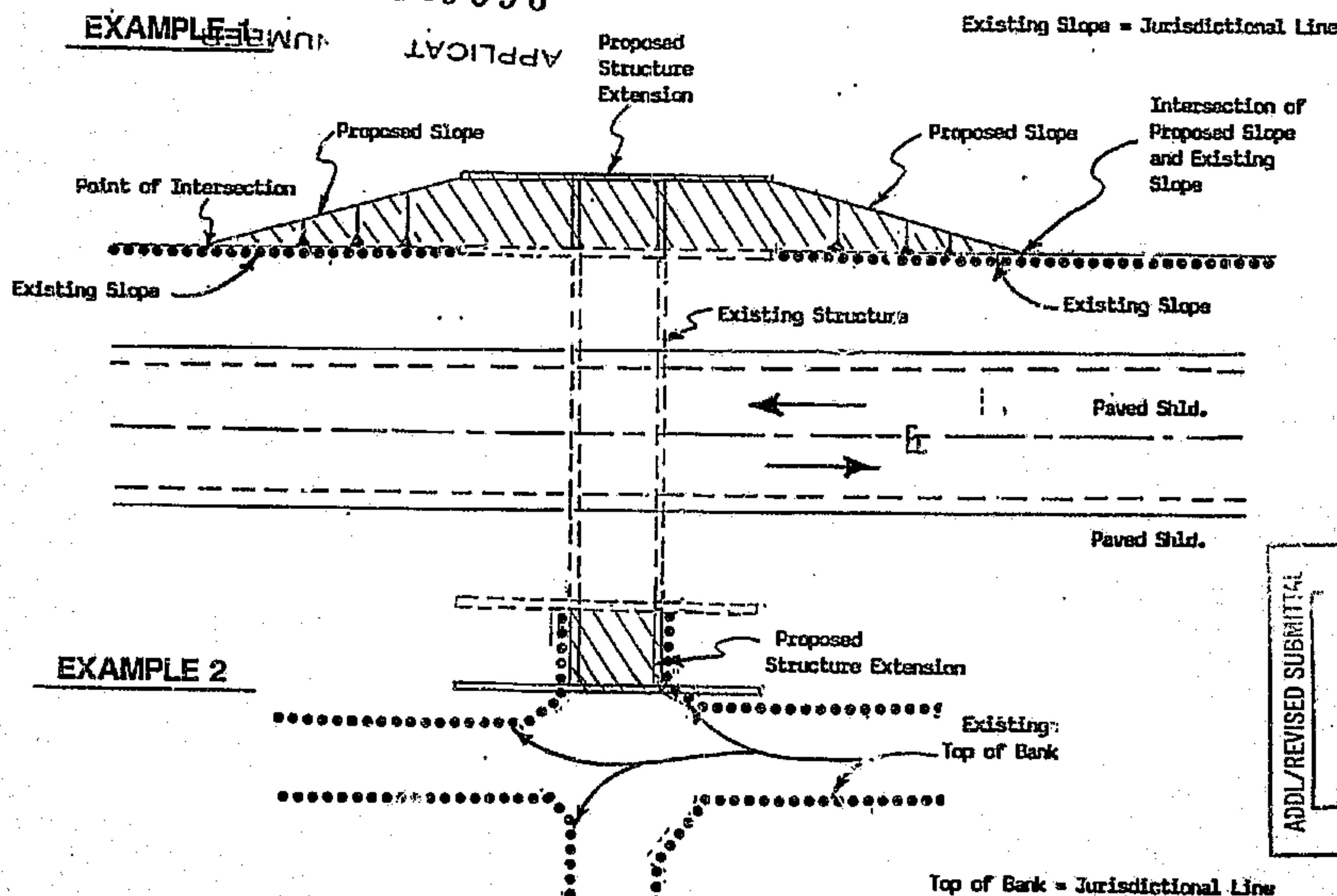


EXHIBIT 3

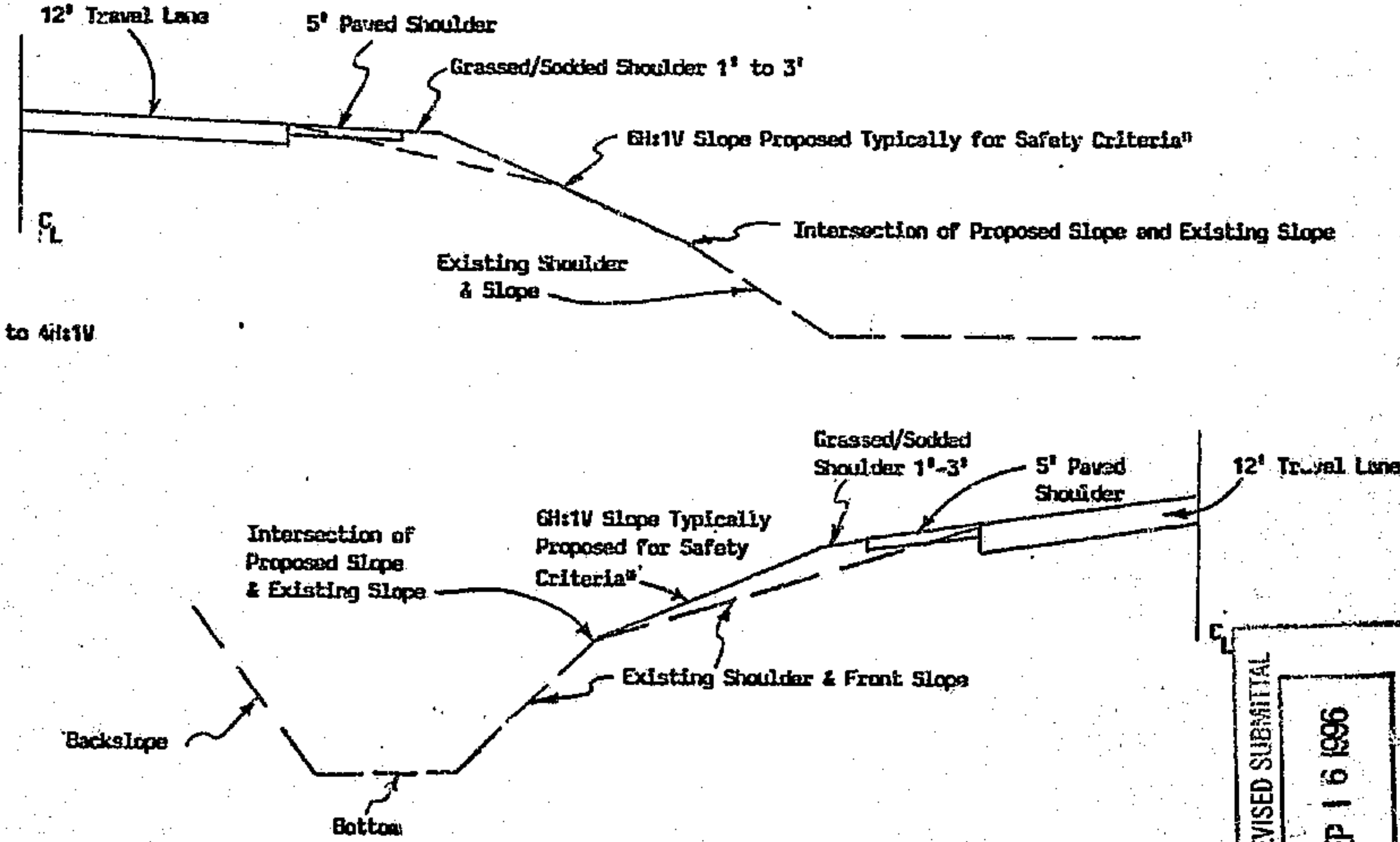
TYPICAL FILLING ON WIDENING RESURFACING PROJECT

SHEET 2 OF 3

N.T.S.

APPLICATION NUMBER 960617-5

EXHIBIT 4



*May be Reduced to 4H:1V if Justified

ADDL/REVISED SUBMITTAL
SEP 16 1996
FORT MYERS SERVICE CENTER

TYPICAL FILLING ON ROADWAY SLOPES

SHEET 3 OF 3

N.T.S.

FLORIDA
LAWTON CHILES
GOVERNOR

DEPARTMENT OF TRANSPORTATION

BEN G. WATTS
SECRETARY

P. O. Box 1249
Bartow, FL 33831-1249
September 12, 1996

RECEIVED
SEP 16 1996
FORT MYERS

9609l6-14

Certified Mail Z 726 907 034

Mr. Chip Merriam, Director
South Florida Water Management District
First Union Center
2301 McGregor Blvd.
Fort Myers, FL 33901

RE: State Project 12090-3501
W.P.I. No. 1114632
F.A.P. No. XU-345-1(5)
SR 31 from Palm Beach Blvd. (SR 80)
To Charlotte County Line
Lee County
Noticed General Permit Application

Dear Mr. Merriam:

The Florida Department of Transportation proposes to resurface approximately 5 miles of SR 31 from Palm Beach Blvd. (SR 80) to Charlotte County Line in Lee County. Six existing drainage structures will be extended in conjunction with the resurfacing project.

The following information is enclosed to assist you in processing a Noticed General Permit.

(1) Four copies of the signed Environmental Resource Permit Application

(2) Four copies of permit sketches (One set signed and sealed)

(3) In accordance with the present agreement with the District and the Department of Transportation, we will be paying the processing fee with a Purchase Order Partial Delivery Notice. We will begin processing the payment upon notification of the amount due.

RECYCLED PAPER

Mr. Chip Merriam
Page 2
September 12, 1996

960916-14

I am submitting one copy of the Environmental Resource Permit directly to the Corps of Engineers Field Office in Fort Myers.

Your cooperation in referencing the State Project Number on all correspondence will be appreciated.

If you have questions or require additional information, please contact me at (941)519-2380.

Sincerely,

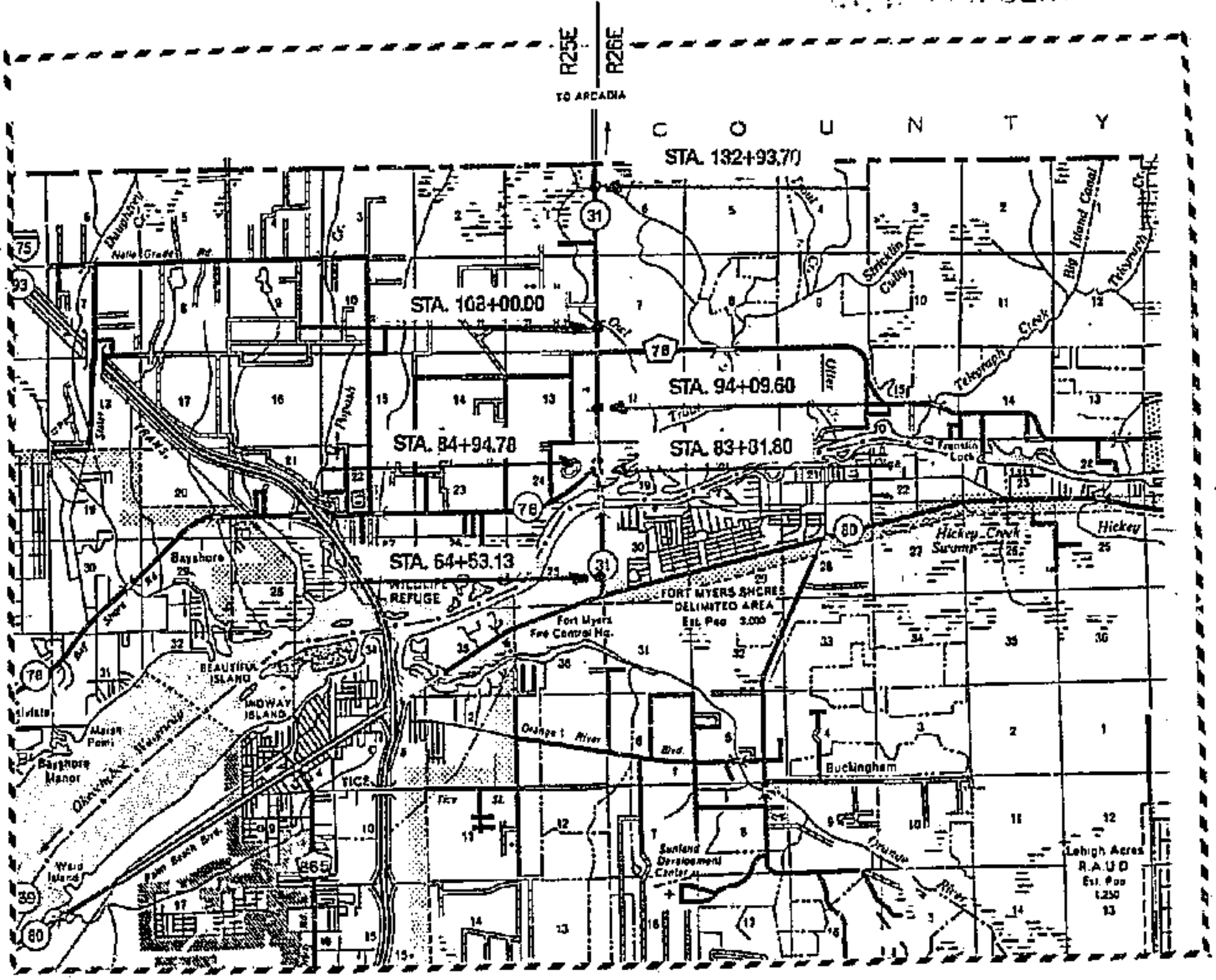
James R. Wilt, Jr., P.E.
District Permit Engineer

JRW/bjm
cc: Mr. G. E. Carrigan
Enclosures

APPLICAT UMBER

960916-14

FT. MYERS SERVICE CENTER



Sta. 64+53.13	Sta. 83+81.80	Sta. 84+94.78	Sta. 94+09.60	Sta. 108+00.00	Sta. 132+93.70
T43S	T43S	T43S	T43S	T43S	T43S
R25 & 26E	R25 & 26E	R25 & 26E	R25 & 26E	R25 & 26E	R25 & 26
Sec. 25 & 30	Sec. 24 & 19	Sec. 24 & 19	Sec. 13 & 18	Sec. 12 & 7	Sec. 1 & 6

ORIGINAL SUBMITTAL
SEP 16 1996
FORT MYERS SERVICE CENTER

1"=2 Miles

James R. Will Jr.
9/11/96

State Project 12090-3501
Applicant: Fla. Dept. of Trans.
Sheet 1 of 15
September 1996

APPLICAT UMBER

960916-14

FT. MYERS SERVICE CENTER

GENERAL NOTES

1. The Florida Department of Transportation proposes to resurface approximately 5 miles of SR 31 from Palm Beach Blvd. (SR 80) to Charlotte County Line in Lee County. Six existing drainage structures will be extended in conjunction with the resurfacing project.

2. Strict adherence to Section 104 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction used in conjunction with this application provide reasonable assurance that water quality will not be violated.

3. Types of equipment involved in the construction will include: gradeall, dump trucks, bulldozer, pumps and front end loader. The equipment will be trucked or self propelled to the site.

4. Turbidity curtains, silt fences, sand bags, hay bales or some combination of these items will be used as directed by the project engineer to maintain State Water Quality Standards.

5. Excavated material that is suitable will be used in construction of the shoulders. Unsuitable material will be disposed of and contained in upland sites provided by the contractor.

6. Traffic will be maintained on SR 31 during construction.

7. Fill material shall be of satisfactory material that is clean and compactible into a suitable and enduring roadway.

8. During the construction or extension of multiple opening structures, the contractor, as directed by the Project Engineer, shall be required to phase construct drainage structures in order to maintain adequate water flow.

9. All elevations shown in this permit application are referenced to U.S.G.S. National Vertical Datum of 1929.

10. The following volumes of earthwork are required for the project. (The following volumes represent fill or excavation within waters of the State.)

ORIGINAL SUBMITTAL

SEP 16 1996

FORT MYERS SERVICE CENTER

<u>Sta. 64+53.13</u>

Juris. Fill = $32.05m^3$ (.0128 A./.0052 ha)

Juris. Exc. = $9.84m^3$ (.01 A./.0038 ha)

<u>Sta. 83+81.80</u>

Juris. Fill = $11.28m^3$ (.0052 A./.0018 ha)

Juris. Exc. = $1.96m^3$ (.0016 A./.0006 ha)

<u>Sta. 84+94.78</u>

Juris. Fill = $16.09m^3$ (.0061 A./.0026 ha)

Juris. Exc. = $3.6m^3$ (.0017 A./.0008 ha)

<u>Sta. 94+09.60</u>

Juris. Fill : $59.86m^3$ (.0178 A./.0068 ha)

Juris. Exc.: $11.61m^3$ (.0138 A./.0058 ha)

STATEMENT OF CERTIFICATION FOR DNR SUBMERGED LANDS

Pursuant to Section 339.135, F.S., the Florida Department of Community Affairs has determined that this project is not inconsistent with the local comprehensive plan for the affected area.

James R. Wilt Jr.
9/11/96

State Project 12090-3501
Applicant: Fla. Dept. of Trans.
Sheet 2 of 15
September 1996

GENERAL NOTES (Cont.)

Sta. 108+00.00

Juris. Fill = 94.36m^3 (.018 A./.0088 ha)

Juris. Exc. = 6m^3 (.002 A./.0012 ha)

Sta. 132+93.70

Juris. Fill = 26.12m^3 (.011 A./.0042 ha)

Juris. Exc. = 3.8m^3 (.0038 A./.0015 ha)

TOTALS: JURIS. FILL = 36.81m^3 (.0329 A./.0137 ha)

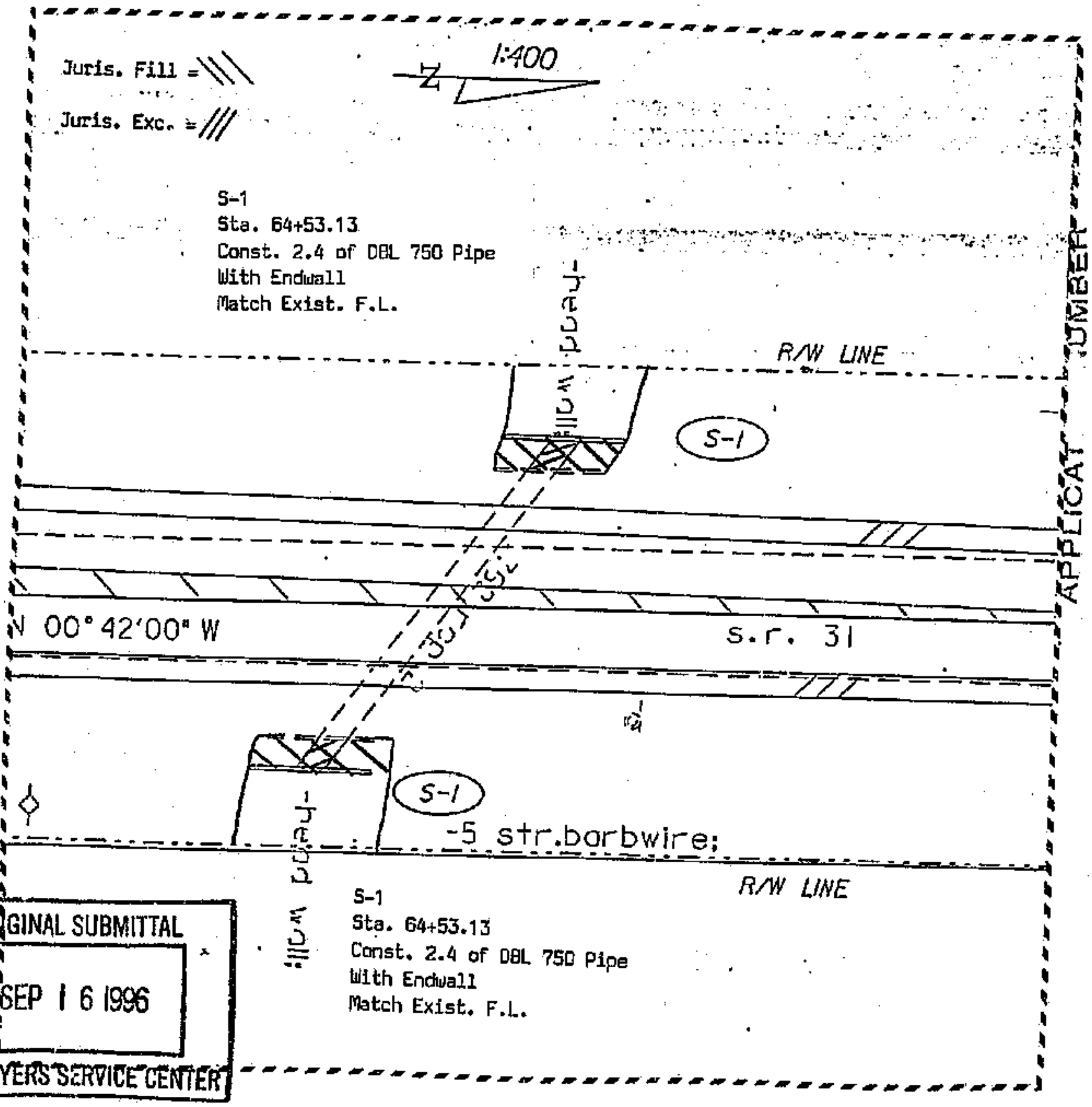
JURIS. EXC. = 239.76m^3 (.0709 A./.0294 ha)

APPLICAT. NUMBER
960916-14
MYERS SERVICE CENTER

ORIGINAL SUBMITTAL
SEP 16 1996
FORT MYERS SERVICE CENTER

James R. Wolf Jr.
9/11/96

State Project 12090-3501
Applicant: Fla. Dept. of Trans.
Sheet 3 of 15
September 1996



Plan View
Sta. 64+53.13

James R. Welt
9/11/96

State Project 12090-3501
Applicant: Fla. Dept. of Trans.

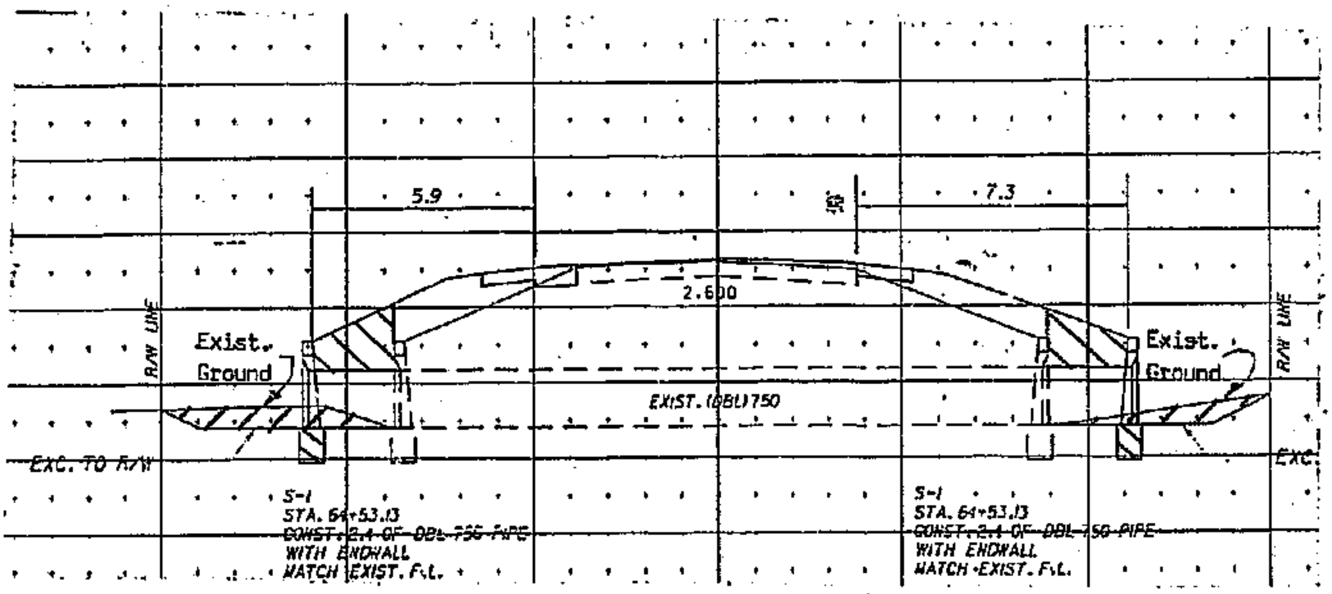
Sheet 4 of 15

September 1996

Scale: 1:200 Horiz.
1:100 Vert.

Juris. Fill =

Juris. Exc. =



APPLICAT. NUMBER
960916-14
MYERS SERVICE CENTER

Cross Section View
Sta. 64+53.13

ORIGINAL SUBMITTAL
SEP 16 1996
FORT MYERS SERVICE CENTER

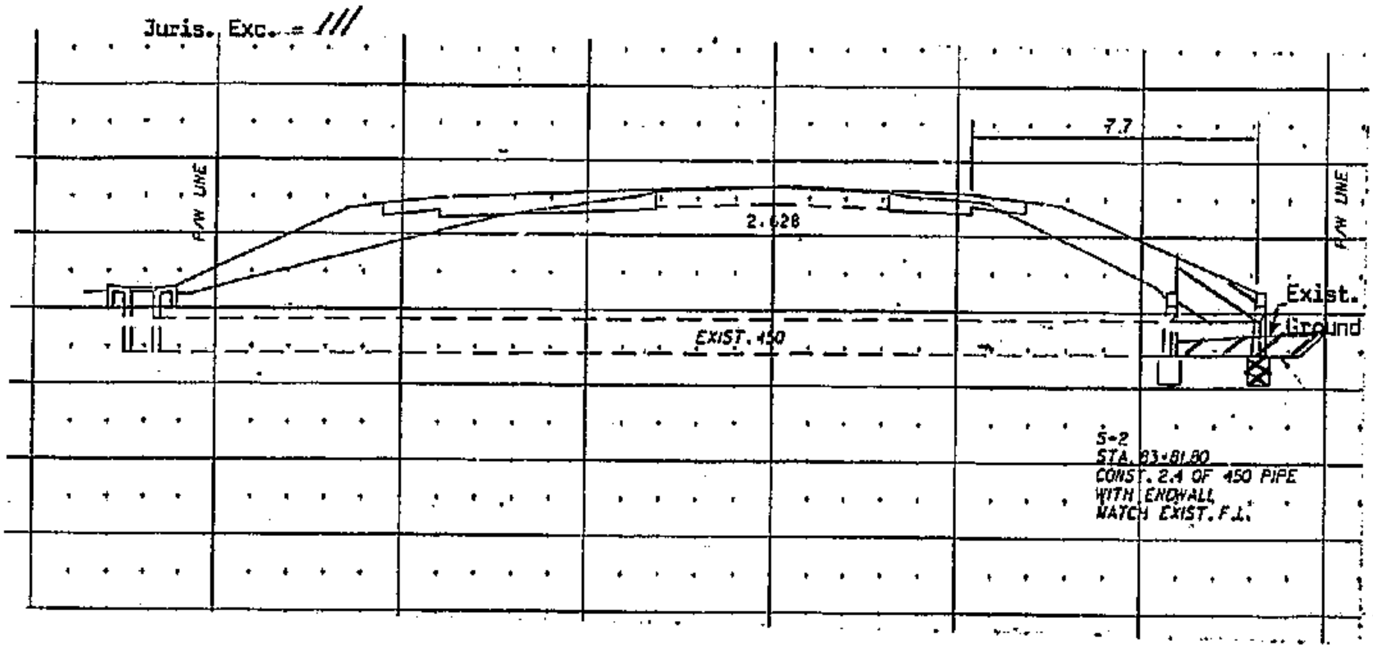
9/11/96

State Project 12090-3501
Applicant: Fla. Dept. of Trans.
Sheet 5 of 15
September 1996

Scale: 1:200 Horiz.
1:100 Vert.

Juris. Fill = \\\

Juris. Exc. = ///



Cross Section View
Sta. 83+81.80

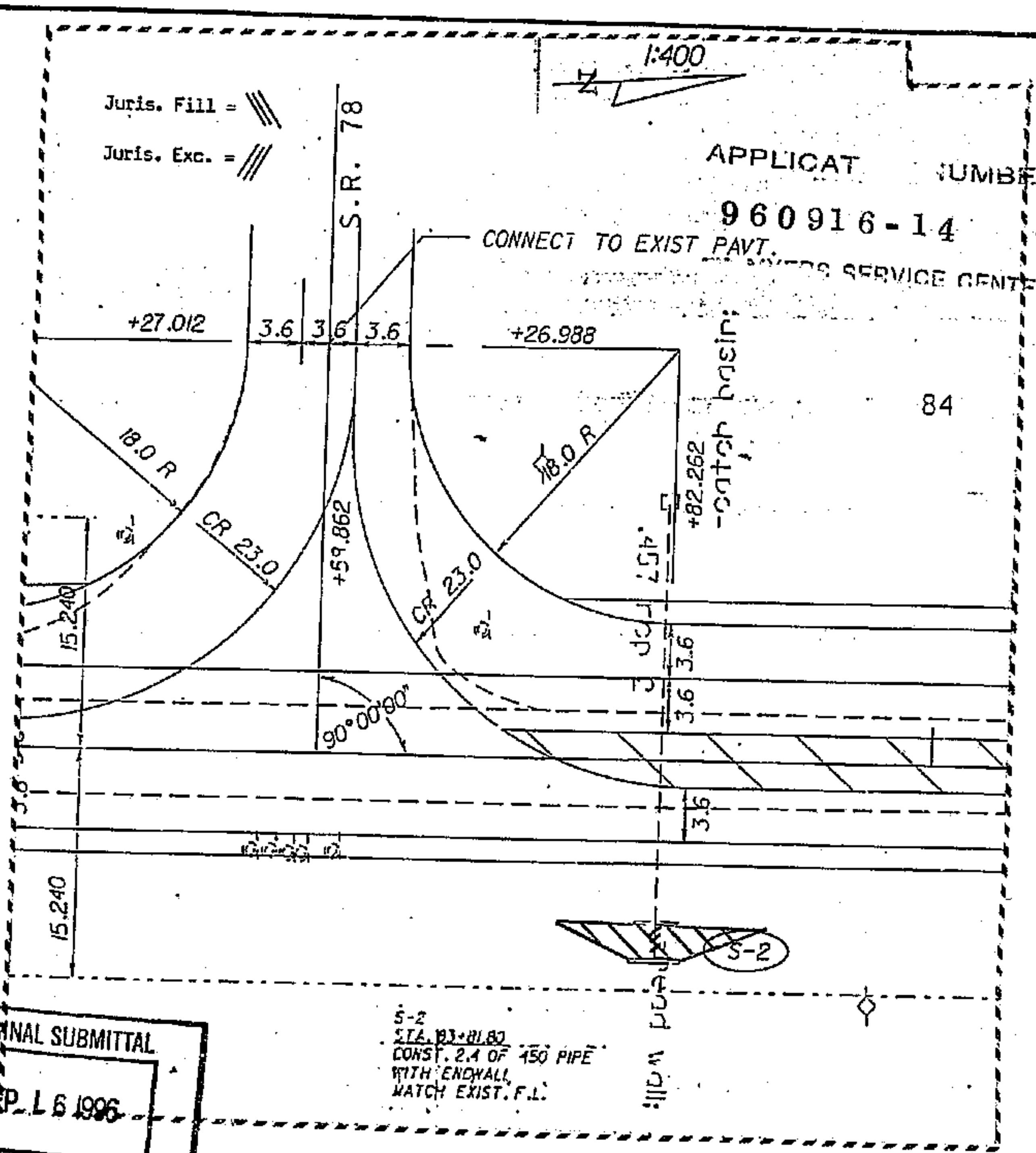
APPLICAT UMBER
960916-14
MYERS SERVICE CENTER

ORIGINAL SUBMITTAL
SEP 16 1996
FORT MYERS SERVICE CENTER

James R. Wolf Jr.
9/11/96

State Project 12090-3501
Applicant: Fla. Dept. of Trans.
Sheet 7 of 15
September 1996

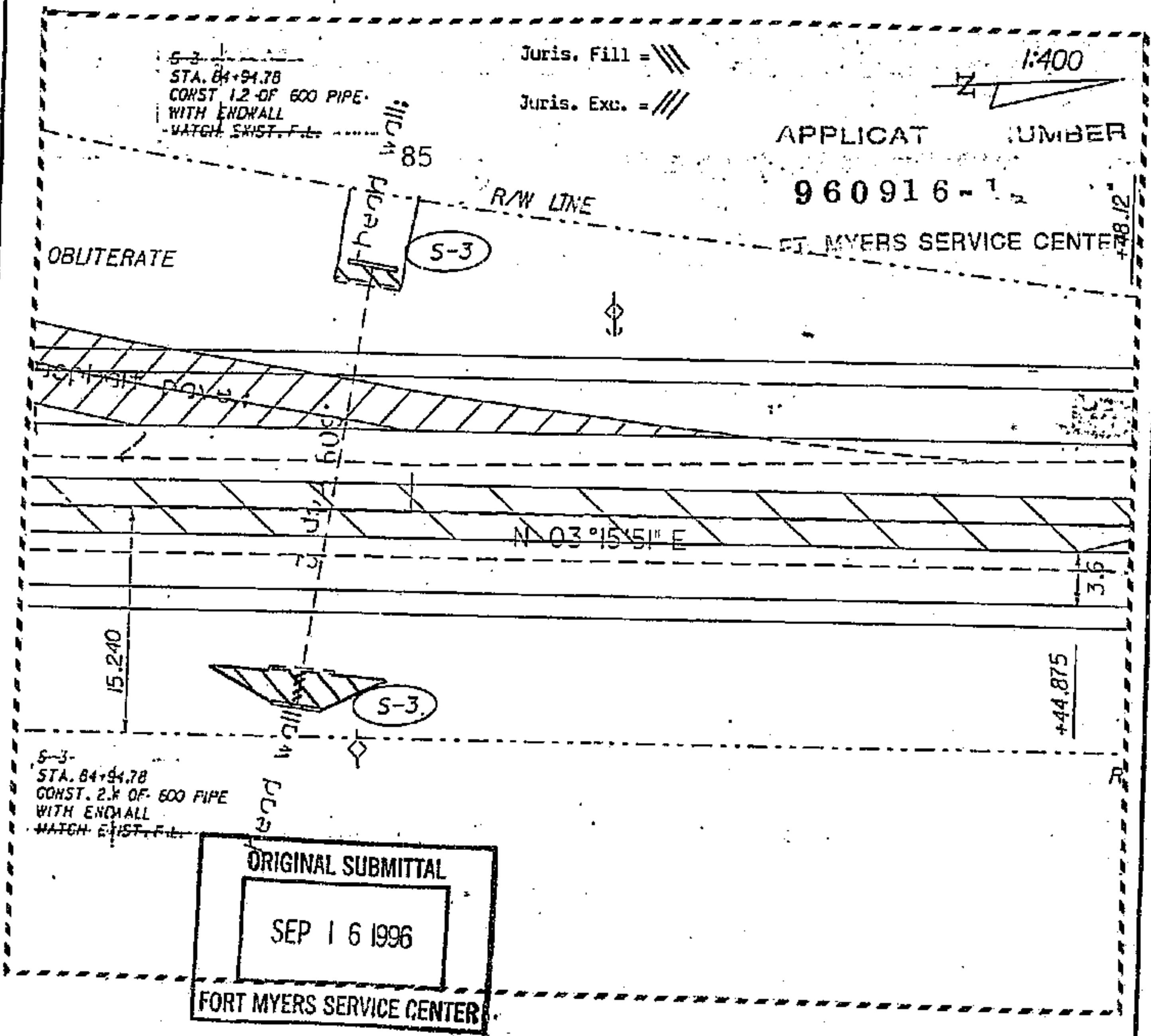
APPLICAT   UMBER
960916-14
MYERS SERVICE CENTER



Plan View
Sta. 83+81.80

James R. Wolf
9/11/96

State Project 12090-3501
Applicant: Fla. Dept. of Trans.
Sheet 6 of 15
September 1996



Plan View
Sta. 84+94.78

James R. Wolf Jr.
9/11/96

State Project 12090-3501
Applicant: Fla. Dept. of Trans.
Sheet 8 of 15
September 1996

Scale: 1:200 Horiz.
1:100 Vert.

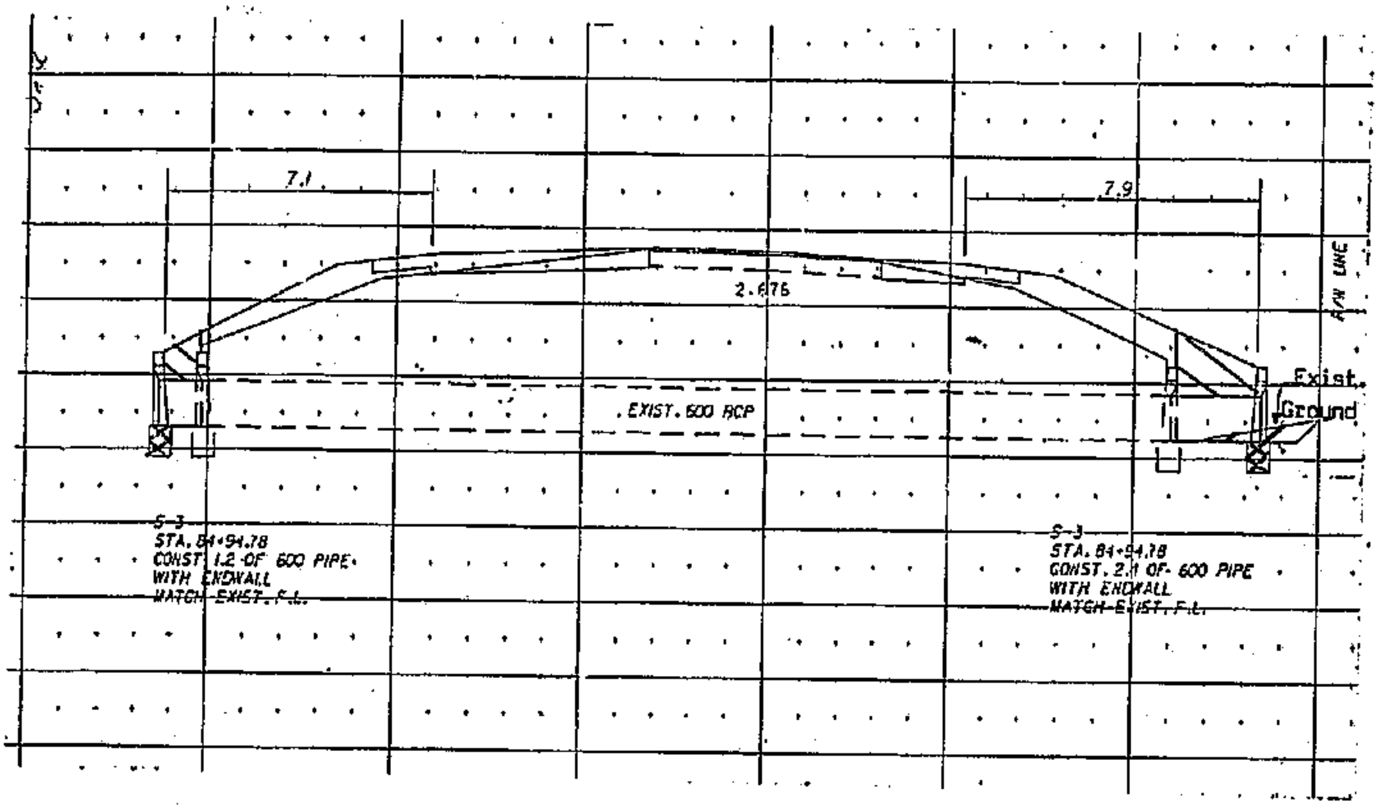
Juris. Fill =

Juris. Exc. =

APPLICAT .UMBER

960916-14

... MYERS SERVICE CENTER

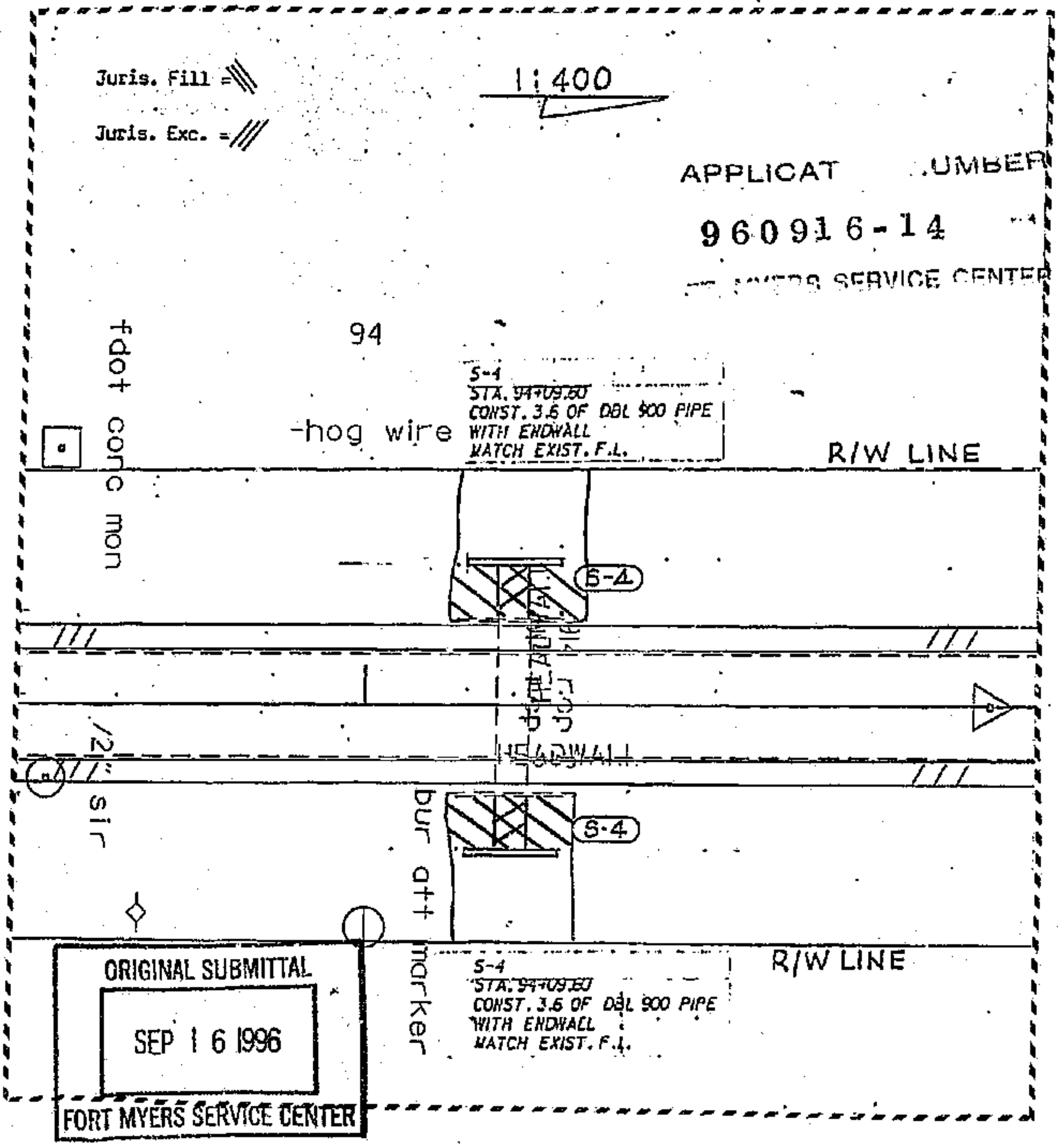


Cross Section View
Sta. 84+94.78

ORIGINAL SUBMITTAL
SEP 16 1996
FORT MYERS SERVICE CENTER

James R. Wilf Jr.
9/11/96

State Project 12090-3501
Applicant: Fla. Dept. of Trans.
Sheet 9 of 15
September 1996



Plan View
Sta. 94+09.60

James L. Wolf Jr.
9/11/96

State Project 12090-3501
Applicant: Fla. Dept. of Trans.
Sheet 10 of 15
September 1996

Scale: 1:200 Horiz.
1:100 Vert.

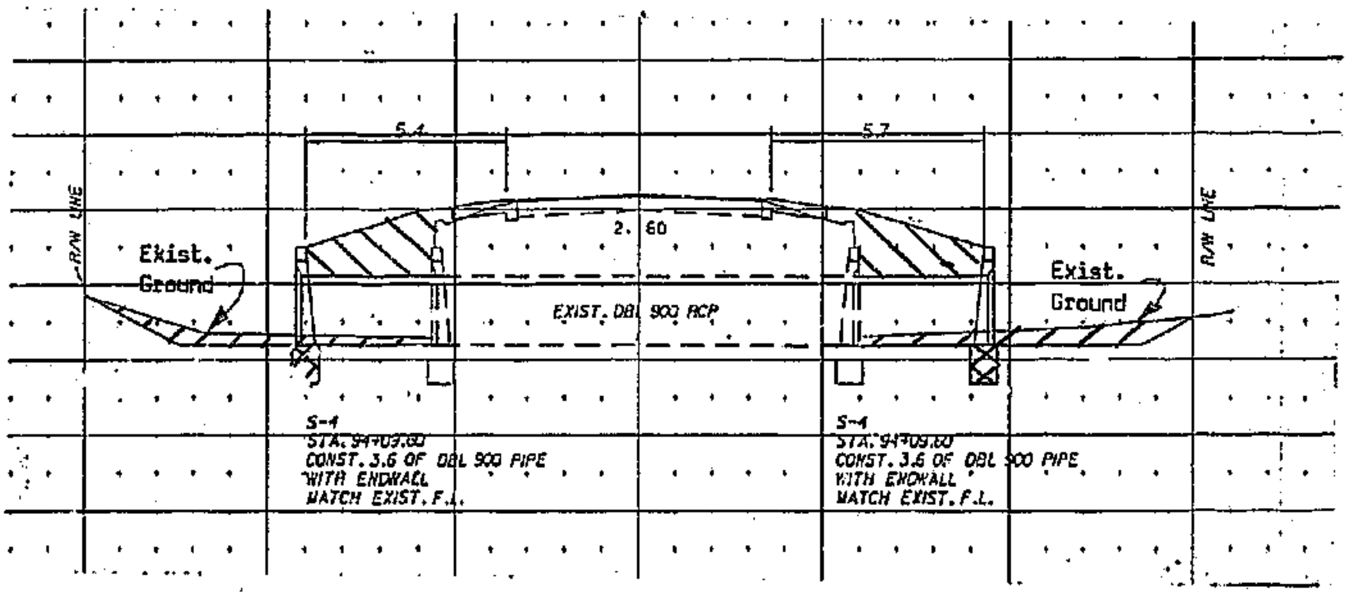
Juris. Fill = \\\

Juris. Exc. = ///

APPLICAT[illegible] [illegible]UMBER

960916-14

[illegible] [illegible]YERS SERVICE CENTER



Cross Section View
Sta. 94+09.60

ORIGINAL SUBMITTAL
SEP 16 1996
FORT MYERS SERVICE CENTER

James R Wilt Jr
9/11/96

State Project 12090-3501
Applicant: Fla. Dept. of Trans.
Sheet 11 of 15
September 1996

Juris. Fill = \\\

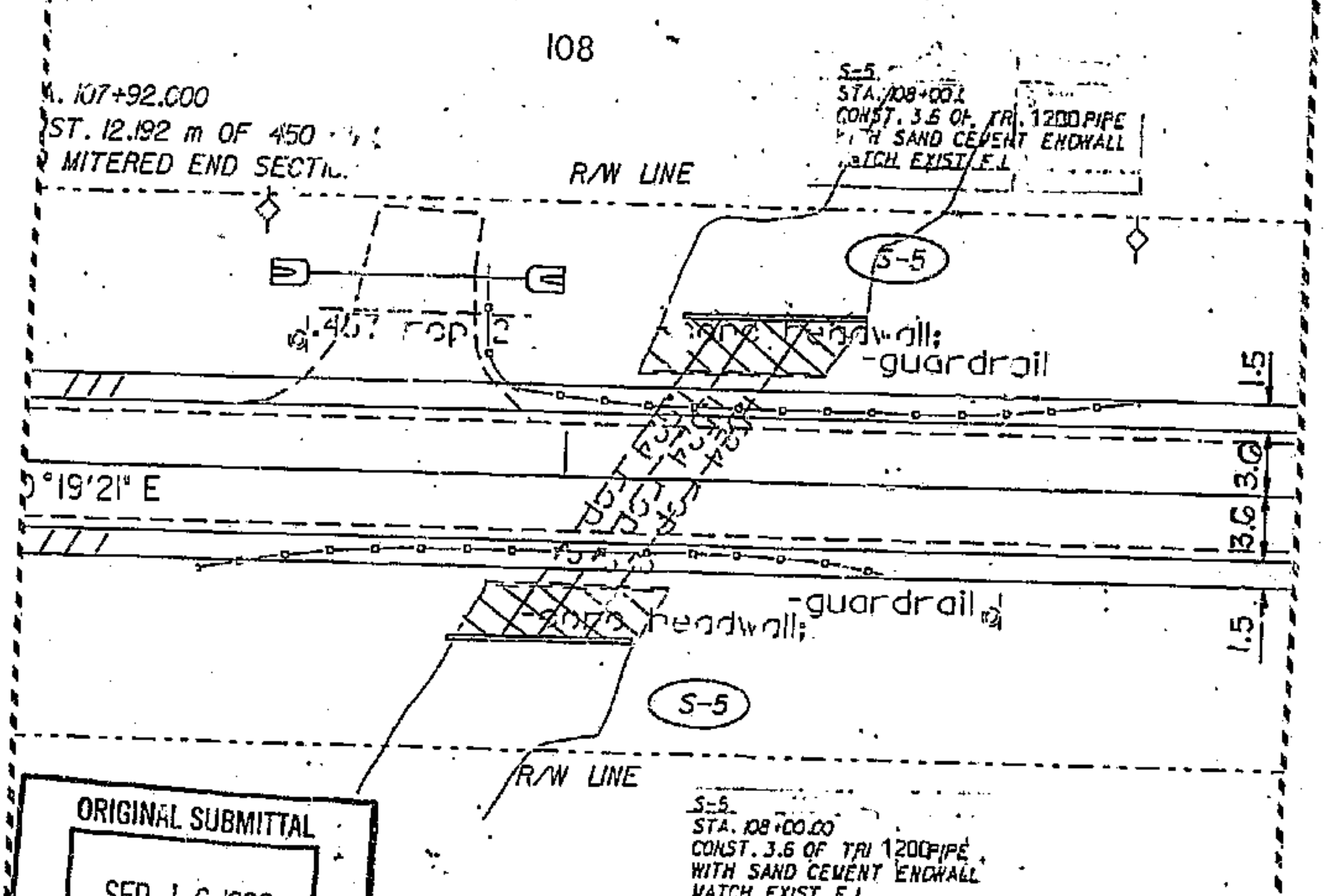
Juris. Exc. = ///

1:400

APPLICAT ... A

960916-14

...T MYERS SERVICE CENTER



ORIGINAL SUBMITTAL

SEP 16 1996

FORT MYERS SERVICE CENTER

Plan View

Sta. 108+00.00

James R. Wolf Jr.
9/11/96

State Project 12090-3501

Applicant: Fla. Dept. of Trans.

Sheet 12 of 15

September 1996

Scale: 1:200 Horiz.
1:100 Vert.

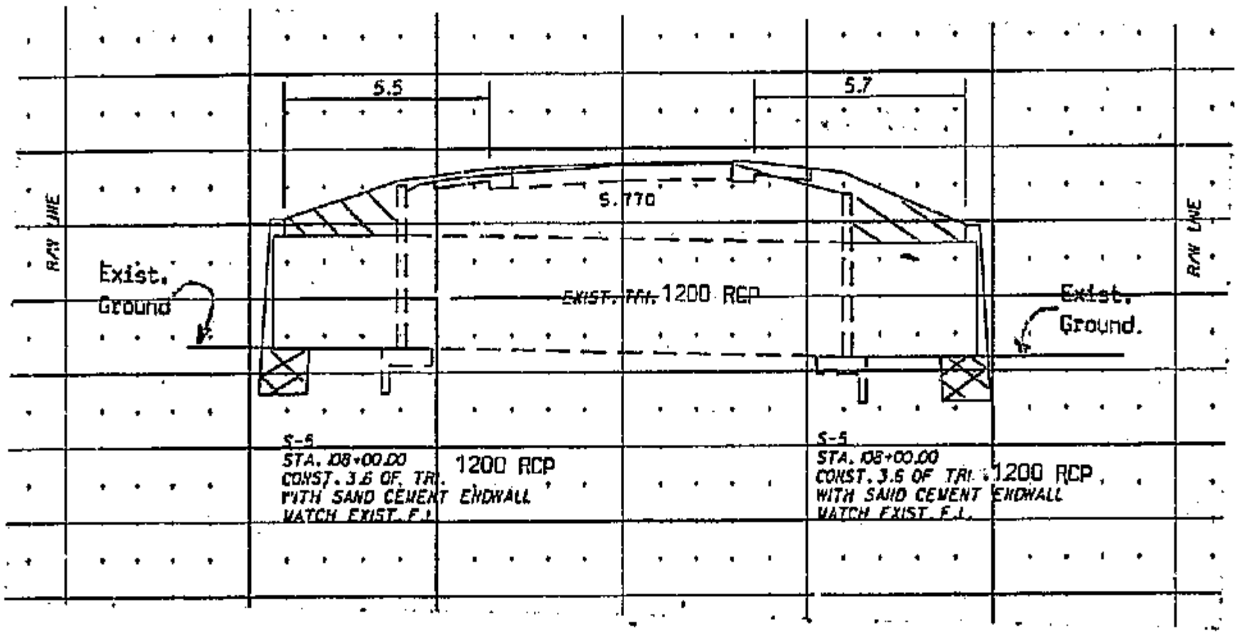
Juris. Fill = \\\

Juris. Exc. = ///

APPLICAT UMBER

960916-14

FT MYERS SERVICE CENTER



Cross Section View
Sta. 108+00.00

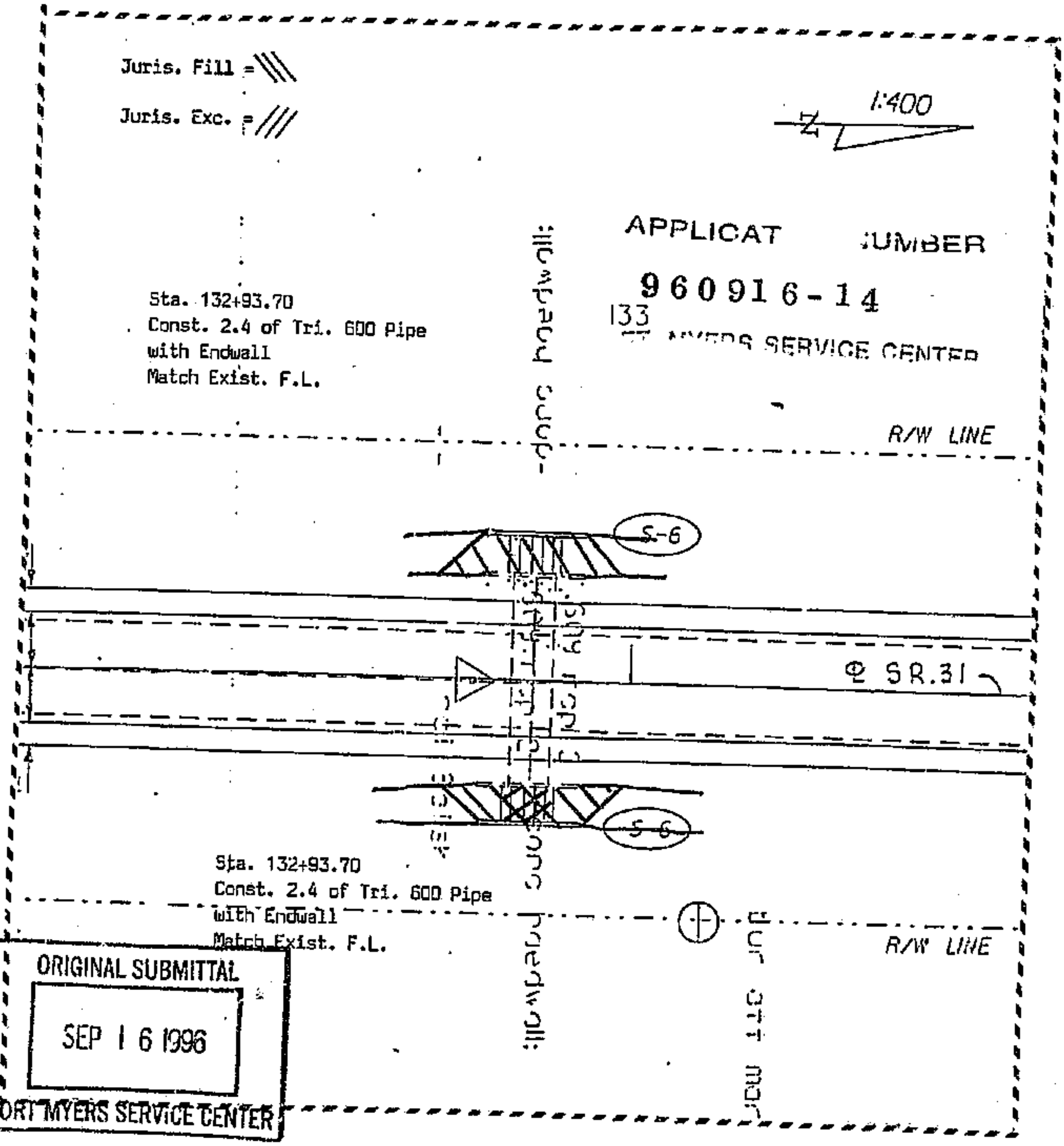
ORIGINAL SUBMITTAL

SEP 16 1996

FORT MYERS SERVICE CENTER

James L Welt Jr.
9/11/96

State Project 12090-3501
Applicant: Fla. Dept. of Trans.
Sheet 13 of 15
September 1996



APPLICAT UMBER
960916-14
133
FT MYERS SERVICE CENTER

Plan View
Sta. 132+93.70

Jason R. Welt Jr
9/11/94

State Project 12090-3501
Applicant: Fla. Dept. of Trans.
Sheet 14 of 15
September 1996

Scale: 1:200 Horiz.
1:100 Vert.

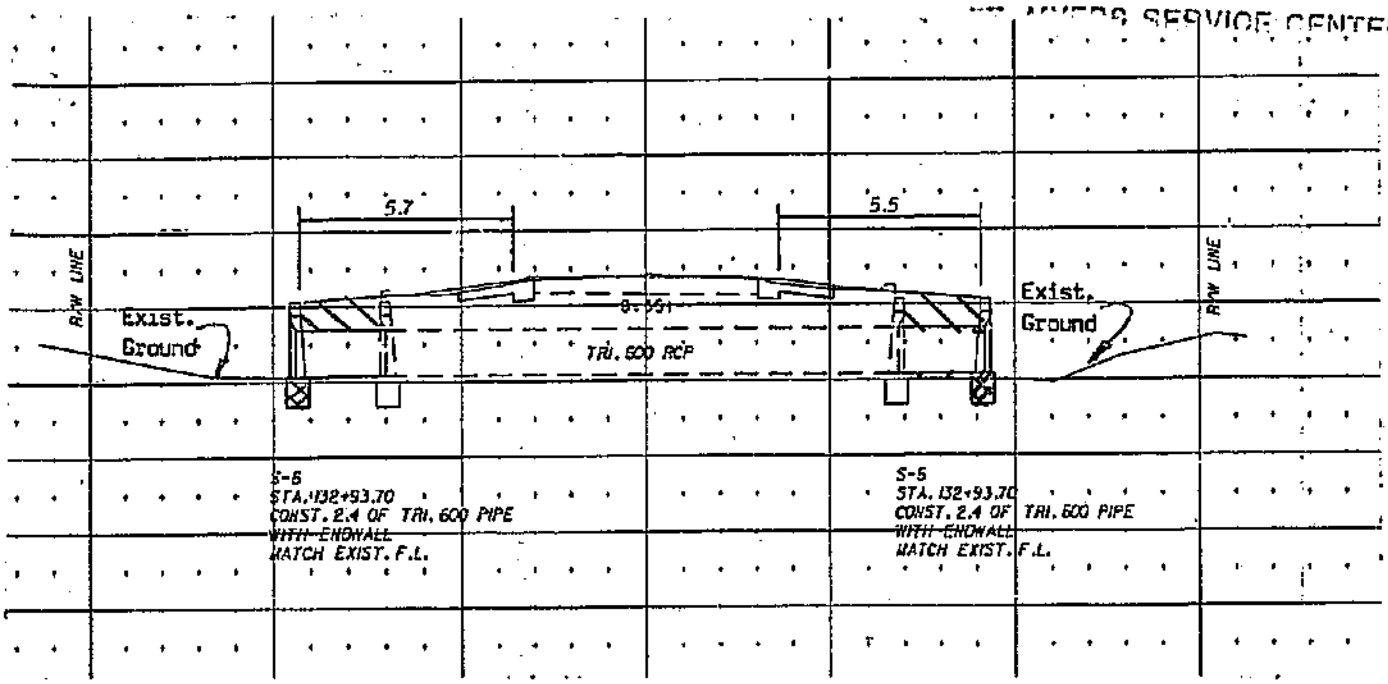
Juris. Fill = \\\

Juris. Exc. = ///

APPLICAT .UMBER

960916-14

FT. MYERS SERVICE CENTER



Cross Section View
Sta. 132+93.70

James R. Wilt Jr.
9/11/96

State Project 12090-3501
Applicant: Fla. Dept. of Trans.
Sheet 15 of 15
September 1996

South Florida Water Management District

Fort Myers Service Center • 2301 McGregor Boulevard • Fort Myers, FL 33901
(941) 338-2929 • Fax (941) 338-2936 • 1-800-248-1201 • Suncom 748-2929

CON 24-01
REGULATION DEPARTMENT

September 17, 1996

US Army Corps of Engineers
Joe Bachelor
Tampa Regulatory Field Office
CESAJ-CO-RW-T
P. O. Box 19247
Tampa, FL 33606-9247

Dear Sir:

SUBJECT: **APPLICATION NO: 960916-14**
PROJECT: State Road 31
COUNTY: Lee

This District is currently processing the attached application. Rule 40E-1.603(5)(a), Florida Administrative Code, requires that within 72 hours of receipt, a copy of the application shall be forwarded to the appropriate office of the US Army Corps of Engineers.

If you have any further questions, please contact Karen Johnson at 941/338-2929.

KMJ/
Attachments

District Headquarters • 3301 Gun Club Road, P.O. Box 24680, West Palm Beach, FL 33416-4680 • (407) 686-8800, FL WATS 1-800-432-2045

Form 0971

960916-14

SPN 12090-3501

ORIGINAL SUBMITTAL
SEP 1 6 1996
FORT MYERS SERVICE CENTER

FOR AGENCY USE ONLY

ACOE Application # ______
Date Application Received ______
Proposed Project Lat. ___° ___' ___"
Proposed Project Long. ___° ___' ___"

DEP/WMD Application # ______
Date Application Received ______
Fee Received $ ______
Fee Receipt # ______

APPLICATION NUMBER 960916-14

FORT MYERS SERVICE CENTER

SECTION A

Are any of the activities described in this application proposed to occur in, on, or over wetlands or other surface waters? ☒ yes ☐ no
Is this application being filed by or on behalf of a government entity or drainage district? ☒ yes ☐ no

A. Type of Environmental Resource Permit Requested (check at least one)

☒ Noticed General - include information requested in Section B.
☐ Standard General (Single Family Dwelling)-Include information requested in Sections C and D.
☐ Standard General (all other projects) - include information requested in Sections C and E.
☐ Individual (Single Family Dwelling) - include information requested in Sections C and D.
☐ Individual (all other projects) - include information requested in Sections C and E.
☐ Conceptual - include information requested in Sections C and E.
☐ Mitigation Bank Permit (construction) - include information requested in Section C and F. (If the proposed mitigation bank involves the construction of a surface water management system requiring another permit defined above, check the appropriate box and submit the information requested by the applicable section.)
☐ Mitigation Bank (conceptual) - include information requested in Section C and F.

B. Type of activity for which you are applying (check at least one)

☐ Construction or operation of a new system including dredging or filling in, on or over wetlands and other surface waters.
☒ Alteration or operation of an existing system which was not previously permitted by a WMD or DEP.
☐ Modification of a system previously permitted by a WMD or DEP. Provide previous permit numbers. ______

☐ Alteration of a system ☐ Extension of permit duration ☐ Abandonment of a system
☐ Construction of additional phases of a system ☐ Removal of a system

C. Are you requesting authorization to use State Owned Lands. ☐ yes ☐ no
(If yes include the information requested in Section G.)

D. For activities in, on or over wetlands or other surface waters, check type of federal dredge and fill permit requested:
☐ Individual ☐ Programmatic General
☐ General ☒ Nationwide ☐ Not Applicable

E. Are you claiming to qualify for an exemption ☐ yes ☒ no
If yes provide rule number if known. ______

Form 0971

SPN 12090-3501

OWNER(S) OF LAND	ENTITY TO RECEIVE PERMIT (IF OTHER THAN OWNER)
NAME Florida Department of Transportation	NAME
ADDRESS 801 N. Broadway, P. O. Box 1249	ADDRESS
CITY, STATE, ZIP Bartow, FL 33831-1249	CITY, STATE, ZIP
COMPANY AND TITLE Florida Department of Transportation	COMPANY AND TITLE
TELEPHONE (941) 519-2380 FAX (941) 534-7039	TELEPHONE ( ) FAX ( )
AGENT AUTHORIZED TO SECURE PERMIT (IF AN AGENT IS USED)	CONSULTANT (IF DIFFERENT FROM AGENT)
NAME James R. Wilt, Jr., P.E.	NAME
COMPANY AND TITLE Florida Department of Transportation	COMPANY AND TITLE
ADDRESS P. O. Box 1249	ADDRESS
CITY, STATE, ZIP Bartow, FL 33831-1249	CITY, STATE, ZIP
TELEPHONE (941) 519-2380 FAX (941) 534-7039	TELEPHONE ( ) FAX ( )

Name of project, including phase if applicable SR 31

Is this application for part of a multi-phase project? ☐ yes ☒ no

Total applicant-owned area contiguous to the project ______ ac

Total project area for which a permit is sought ______ ac

Impervious area for which a permit is sought ______ ac

What is the total area (metric equivalent for federally funded projects) of work in, on, or over wetlands or other surface waters?

.1038 acres ______ square feet .0431 hectares ______ square meters

Number of new boat slips proposed. ______

Project location (use additional sheets, if needed)

County(ies) Lee

Section(s) 25,24,13,12,1 Township 43S Range 25E

Section(s) 30,19,18,7,6 Township 43S Range 26E

Land Grant name, if applicable ______

Tax Parcel Identification Number ______

Street address, road, or other location ______

City, Zip Code if applicable ______

ORIGINAL SUBMITTAL

SEP 16 1996

FT. MYERS SERVICE CENTER

APPLICATION NUMBER

960916-14

FT. MYERS SERVICE CENTER

SPN 12090-3501

Describe in general terms the proposed project, system, or activity.

The Florida Department of Transportation proposes to resurface approximately 5 miles of SR 31 from Palm Beach Blvd. (SR 80) to Charlotte County Line in Lee County. Six existing drainage structures will be extended in conjunction with the resurfacing project.

APPLICAT. NUMBER
960916-14
FT. MYERS SERVICE CENTER

If there have been any pre-application meetings, including at the project site, with regulatory staff, please list the date(s), location(s), and names of key staff and project representatives.

Please identify by number any MSSW/Wetland resource/ERP/ACOE Permits pending, issued or denied for projects at the location, and any related enforcement actions.

Agency	Date	No.\Type of Application	Action Taken

Note:The following information is required only for projects proposed to occur in,on or over wetlands that need a federal dredge and fill permit and/or authorization to use state owned submerged lands and is not necessary when applying solely for an Environmental Resource Permit. Please provide the names, addresses and zip codes of property owners whose property directly adjoins the project (excluding applicant). Please attach a plan view showing the owner's names and adjoining property lines. Attach additional sheets if necessary.

1.

2.

ORIGINAL SUBMITTAL
SEP 16 1996
FORT MYERS SERVICE CENTER

3.

4.

1 mile = 5,280 feet
1,760 yard

5 miles = 26400
x 40ft wide
1056000
= 24.24 acres

Form 0971

APPLICAT[illegible] .UMBER
SPN 12090-3501
960916-14
[illegible] MYERS SERVICE CENTER

By signing this application form, I am applying, or I am applying on behalf of the applicant, for the permit and any proprietary authorizations identified above, according to the supporting data and other incidental information filed with this application. I am familiar with the information contained in this application and represent that such information is true, complete and accurate. I understand this is an application and not a permit, and that work prior to approval is a violation. I understand that this application and any permit issued or proprietary authorization issued pursuant thereto, does not relieve me of any obligation for obtaining any other required federal, state, water management district or local permit prior to commencement of construction. I agree, or I agree on behalf of my corporation, to operate and maintain the permitted system unless the permitting agency authorizes transfer of the permit to a responsible operation entity. I understand that knowingly making any false statement or representation in this application is a violation of Section 373.430, F.S. and 18 U.S.C. Section 1001.

James R. Wilt, Jr., P.E.

Typed/Printed Name of Applicant (If no Agent is used) or Agent (If one is so authorized below)

Signature of Applicant/Agent

District Permit Engineer 9/11/96 Date

(Corporate Title if applicable)

AN AGENT MAY SIGN ABOVE ONLY IF THE APPLICANT COMPLETES THE FOLLOWING:

I hereby designate and authorize the agent listed above to act on my behalf, or on behalf of my corporation, as the agent in the processing of this application for the permit and/or proprietary authorization indicated above; and to furnish, on request, supplemental information in support of the application. In addition, I authorize the above-listed agent to bind me, or my corporation, to perform any requirement which may be necessary to procure the permit or authorization indicated above. I understand that knowingly making any false statement or representation in this application is a violation of Section 373.430, F.S. and 18 U.S.C. Section 1001.

Typed/Printed Name of Applicant — Signature of Applicant — Date

(Corporate Title if applicable)

Please note: The applicant's original signature (not a copy) is required above.

ORIGINAL SUBMITTAL
SEP 16 1996
FT. MYERS SERVICE CENTER

PERSON AUTHORIZING ACCESS TO THE PROPERTY MUST COMPLETE THE FOLLOWING:

I either own the property described in this application or I have legal authority to allow access to the property, and I consent, after receiving prior notification, to any site visit on the property by agents or personnel from the Department of Environmental Protection, the Water Management District and the U.S. Army Corps of Engineers necessary for the review and inspection of the proposed project specified in this application. I authorize these agents or personnel to enter the property as many times as may be necessary to make such review and inspection. Further, I agree to provide entry to the project site for such agents or personnel to monitor permitted work if a permit is granted.

James R. Wilt, Jr., P.E.

Typed/Printed Name — Signature — Date

District Permit Engineer 9/11/96

(Corporate Title if applicable)

SFWMD Permit 88-00012

SR 80/SR 31 Turn Lanes

PROJECT DATUM
NAVD
DATUM CONVERSION
NAVD + 1.19 = NGVD

GORDON CENTER
TURN LANE IMPROVEMENTS

CONSTRUCTION PLANS

PART OF SECTION 30, TOWNSHIP 43 SOUTH, RANGE 26 EAST
LEE COUNTY, FLORIDA

PROJECT INFORMATION

ZONING	CPD (S.R. 80 / S.R. 31 CPD, RESOLUTION Z-15-022)
ERP	PERMIT #36-06523-P

CONSULTANTS

ENGINEER	LANDSCAPE ARCHITECT	SURVEY
DELISI FITZGERALD, INC. 1605 HENDRY ST. FORT MYERS, FL 33901 (239) 418-0691	DAVID M. JONES AND ASSOCIATES, INC. 2221 McGREGOR BLVD. FORT MYERS, FL 33901 (239) 337-5525	METRON SURVEYING & MAPPING, LLC 10970 S. CLEVELAND AVE., SUITE 605 FORT MYERS, FL 33907 (239) 275-8575

UTILITY PROVIDERS

WATER & SEWER	ELECTRIC	TELEPHONE
LEE COUNTY UTILITIES 1500 MONROE ST. FORT MYERS, FL 33901 (239) 533-8181	FLORIDA POWER AND LIGHT 2425 THOMPSON ST. FORT MYERS, FL 33901 (239) 332-9154	CENTURYLINK 2820 CARGO ST. FORT MYERS, FL 33902 (239) 336-2008
CABLE	**GAS**	**FIRE DISTRICT**
COMCAST CABLE 12641 CORPORATE LAKES DR. FORT MYERS, FL 33913 (239) 432-1805	TECO GAS 5901 ENTERPRISE PKWY. FORT MYERS, FL 33905 (239) 690-5513	FORT MYERS SHORES FIRE DISTRICT 12345 PALM BEACH BLVD. FORT MYERS, FL 33905 (239) 694-2833

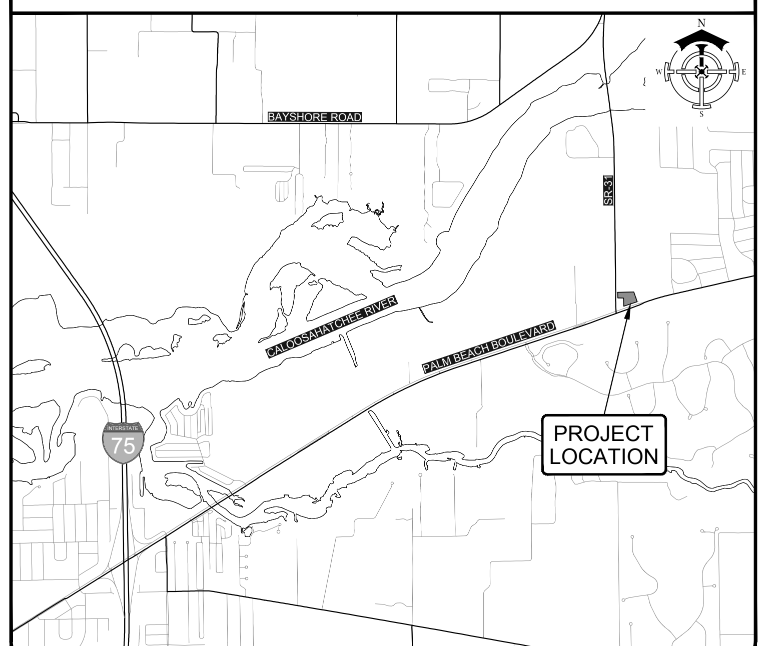
FDOT REQUIREMENT

AT LEAST 72 HOURS IN ADVANCE OF BEGINNING CONSTRUCTION OF THE PROJECT, THE CONTRACTOR SHALL CONTACT THE LOCAL MAINTENANCE FDOT ENGINEER'S OFFICE TO SECURE GENERAL USE PERMITS AND/OR OTHER PERMITS AS REQUIRED FOR WORKING WITHIN THE DEPARTMENT'S RIGHT-OF-WAY.

THESE PLANS HAVE BEEN PREPARED IN ACCORDANCE WITH AND ARE GOVERNED BY THE SATE OF FLORIDA DEPARTMENT OF TRANSPORTATION, STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (DATED 2018) AND DESIGN STANDARDS BOOKLET (DATED 2017/2018).

FOR DESIGN STANDARDS REVISIONS, CLICK ON "DESIGN STANDARDS" AT THE FOLLOWING WEB SITE: http://www.fdot.gov/roadway/.

VICINITY MAP



FDOT INFORMATION

ROAD INFO	STATE ROAD 80, ROADWAY ID 12020000, MILEPOST 8.249 - 8.357 STATE ROAD 31, ROADWAY ID 12620000, MILEPOST
PERMIT NO.	2015-A-192-0006 (ACCESS)
PERMIT NO.	2015-D-192-0005 (DRAINAGE)
FDOT PROJECT NO.	429823-1-52-01 (SR-80 SHARED USE PATH PROJECT)

SHEET INDEX

CONSTRUCTION INFORMATION

Always call 811 two full business days before you dig
Sunshine811.com
CALL BEFORE YOU DIG: 811

DELISI FITZGERALD, INC.
Planning – Engineering – Project Management
1605 Hendry Street
Fort Myers, FL 33901
(239) 418-0691
(239) 418-0692 fax
Florida Certificate
of Authorization
Engineering LB #26978

ENGINEER OF RECORD:
JOHN T. WOJDAK, P.E. (FOR THE FIRM)
FLORIDA P.E. NO. 58217

NOT VALID WITHOUT SEAL, SIGNATURE AND DATE

OWNER / DEVELOPER:
RACETRAC PETROLEUM, INC.
200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER
TURN LANE IMPROVEMENTS

PLAN REVISIONS

#	DATE	DESCRIPTION

COVER SHEET, VICINITY MAP AND INDEX

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

Status:
FOR CONSTRUCTION,
SUBJECT TO ALL PERMIT APPROVALS

Sheet Number: 1

K:\21307 - RACETRAC @ PALM BEACH BOULEVARD\FDOT\PLAN SET\21307-01-COVER.DWG
3/27/2018 8:56 AM

K:\21307 - RACETRAC @ PALM BEACH BOULEVARD\FDOT\PLAN SET\21307-02-AERIAL.DWG
3/27/2018 8:56 AM

DeLISI FITZGERALD, INC.
Planning – Engineering – Project Management

1605 Hendry Street
Fort Myers, FL 33901
(239) 418-0691
(239) 418-0692 fax

Florida Certificate
of Authorization
Engineering LB #26978

ENGINEER OF RECORD:
JOHN T. WOJDAK, P.E. (FOR THE FIRM)
FLORIDA P.E. NO. 58217

NOT VALID WITHOUT SEAL, SIGNATURE AND DATE

OWNER / DEVELOPER:
RACETRAC PETROLEUM, INC.
200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

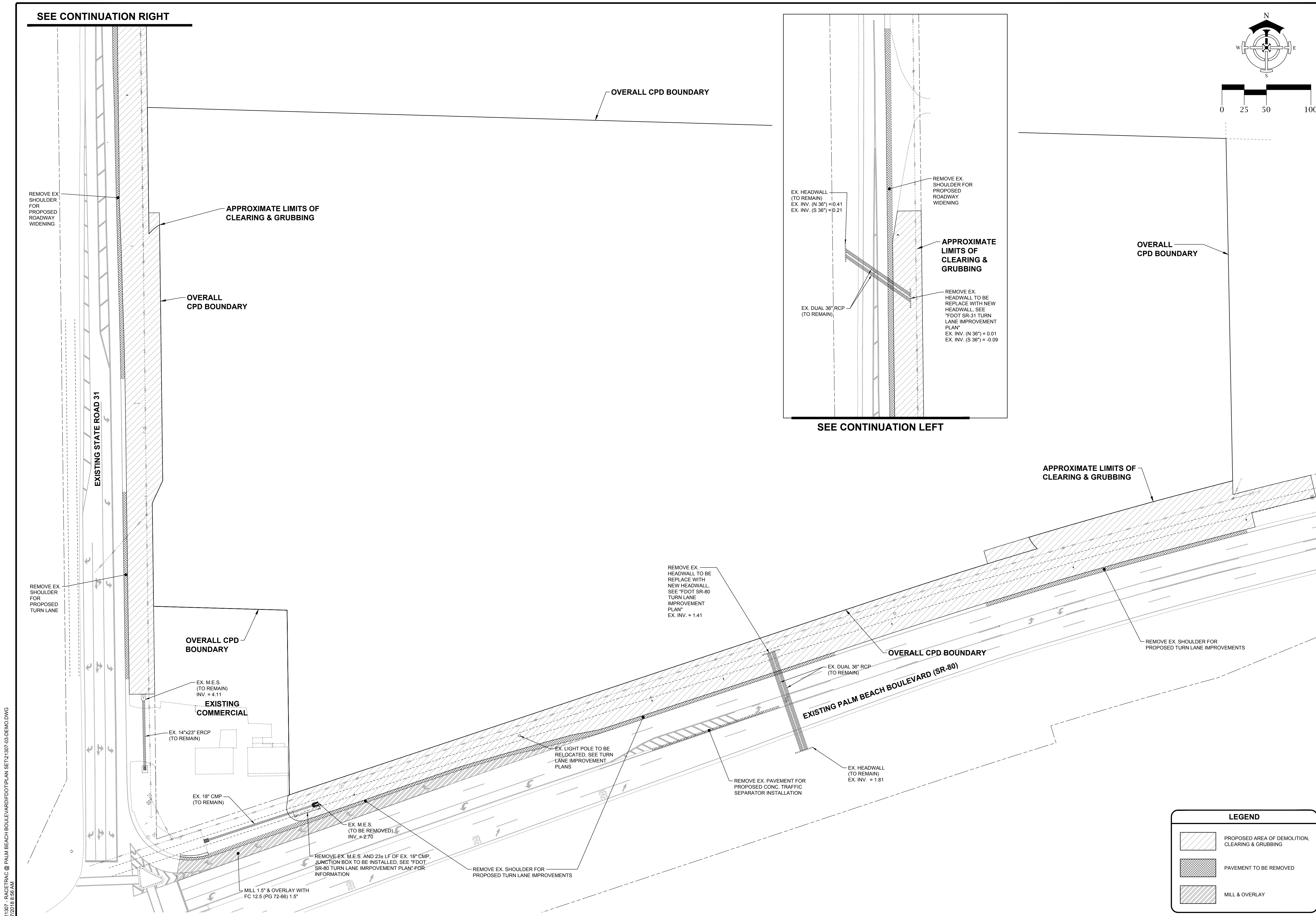
#	DATE	DESCRIPTION

AERIAL PHOTOGRAPH & EXISTING CONDITIONS PLAN

Project Manager:	JTW		
Drawn By:	CAS		
Checked By:	JTW		
Project Number:	21307		
Part of Section(s):	30		
Township:	43 S	Range:	26 E
County, State:	LEE COUNTY, FL		

Status:
FOR CONSTRUCTION,
SUBJECT TO ALL PERMIT APPROVALS

Sheet Number: 2



DELISI FITZGERALD, INC.
Planning – Engineering – Project Management

1605 Hendry Street
Fort Myers, FL 33901
(239) 418-0691
(239) 418-0692 fax

Florida Certificate of Authorization Engineering LB #26978

ENGINEER OF RECORD:
JOHN T. WOJDAK, P.E. (FOR THE FIRM)
FLORIDA P.E. NO. 58217

NOT VALID WITHOUT SEAL, SIGNATURE AND DATE

OWNER / DEVELOPER:
RACETRAC PETROLEUM, INC.
200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

#	DATE	DESCRIPTION

DEMOLITION PLAN

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

Status:
FOR CONSTRUCTION,
SUBJECT TO ALL PERMIT APPROVALS

Sheet Number: 3

GENERAL DEVELOPMENT NOTES:

1. ALL CONTRACTORS AND SUB-CONTRACTORS SHALL MAINTAIN THEIR WORK AND THE SITE RELATIVE TO THEIR WORK IN ACCORDANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN AND ALL REQUIREMENTS OF THE PROJECT N.P.D.E.S. PERMIT.
2. THE CONTRACTOR SHALL BE RESPONSIBLE TO DEWATER IN COMPLIANCE WITH ALL LOCAL, STATE AND FEDERAL PERMITTING REQUIREMENTS.
3. THE CONTRACTOR SHALL RETAIN ON THE WORK SITE AT ALL TIMES COPIES OF ALL PERMITS NECESSARY FOR ANY CONSTRUCTION.
4. THE CONTRACTOR SHALL NOTIFY THE OWNER AND CONTACT ALL UTILITY COMPANIES FOR LOCATIONS OF EXISTING UTILITIES IN THE AREA 72 HOURS (MINIMUM) PRIOR TO COMMENCING CONSTRUCTION.
5. THE LOCATION OF EXISTING UTILITIES, SIDEWALKS, PAVEMENT, VEGETATION AND MISCELLANEOUS IMPROVEMENTS ARE APPROXIMATE. THE EXACT FIELD LOCATIONS SHALL BE VERIFIED BY THE CONTRACTOR IN THE FIELD PRIOR TO COMMENCING ANY CONSTRUCTION.
6. THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS THE BENCHMARK DATUM FOR THIS PROJECT.
7. ANY PUBLIC LAND CORNER WITHIN LIMITS OF CONSTRUCTION IS TO BE PROTECTED. ANY LAND CORNER MONUMENT IN DANGER OF BEING DESTROYED MUST BE PROPERLY REFERENCED BY THE CONTRACTOR.
8. EXISTING IMPROVEMENTS SHALL BE RESTORED TO A CONDITION EQUIVALENT TO THAT WHICH EXISTED PRIOR TO COMMENCING CONSTRUCTION, AT NO ADDITIONAL COST TO THE OWNER.
9. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS PRIOR TO COMMENCEMENT OF CONSTRUCTION. ANY DEVIATION IN PLAN INFORMATION SHALL BE REPORTED TO THE ENGINEER AND OWNER'S REPRESENTATIVE IMMEDIATELY.
10. CONTRACTOR IS REQUIRED TO OBTAIN FROM THE ENGINEER WRITTEN APPROVAL FOR ANY DEVIATIONS FROM THE PLANS AND/OR SPECIFICATIONS.
11. UNDERGROUND CONTRACTOR SHALL MINIMIZE THE WORK AREA AND WIDTH OF ALL TRENCHES TO AVOID DISTURBANCES OF NATURAL VEGETATION. SPOIL FROM TRENCHES SHALL BE PLACED ONLY ON PREVIOUSLY CLEARED AREAS OR AS DIRECTED BY THE OWNER. CONTRACTOR SHALL NO REMOVE OR DISTURB ANY TREES AND/OR SHRUBS WITHOUT PRIOR APPROVAL OF THE OWNER.

IMPERVIOUS AREA SUMMARY

ROAD	NET IMPERVIOUS INCREASE
SR-80	0.55 AC.
SR-31	0.23 AC.
TOTAL	0.78 AC.

GENERAL DRAINAGE NOTES:

1. THE LENGTH OF ALL STORM DRAIN PIPES SHOWN ARE APPROXIMATE AND ARE MEASURED FROM THE INSIDE FACE OF STRUCTURE TO THE INSIDE FACE OF THE NEXT STRUCTURE.
2. EXISTING OFF-SITE DRAINAGE PATTERNS SHALL BE MAINTAINED DURING THE COURSE OF CONSTRUCTION.
3. THE LOCATION OF THE DRAINAGE STRUCTURES SHOWN ON THE PLANS MAY BE FIELD ADJUSTED TO PRESERVE ANY EXISTING VEGETATION, AS APPROVED BY THE ENGINEER.
4. DURING CONSTRUCTION, ALL INLET OPENINGS SHALL BE COVERED WITH FILTER FABRIC (MIRAFI 140N, OR APPROVED EQUAL) TO PREVENT DEBRIS FROM FALLING INTO THE INLET.
5. THE CONTRACTOR SHALL ADJUST ALL PROPOSED ELEVATIONS TO MEET THE EXISTING GRADES AS NEEDED.
6. ALL STORM DRAINAGE PIPE SHALL BE REINFORCED CONCRETE PIPE (RCP), UNLESS OTHERWISE NOTED.
7. PROPOSED GRADES IN OPEN SPACE AREAS ARE TOP OF SOD.
8. THE DATUM CONVERSION IS NAVD PLUS 1.19' EQUALS NGVD.
9. THERE ARE NO KNOWN IMPACTS TO SURFACE GROUND WATER RESULTING FROM THE PROJECT.
10. ALL ELEVATIONS PROVIDED ARE BASED IN NAVD DATUM.
11. OPERATION AND OWNERSHIP OF THE SURFACE WATER MANAGEMENT SYSTEM SHALL BE THE RESPONSIBILITY OF FDOT.

EROSION CONTROL NOTES:

1. PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITY APPROPRIATE EROSION CONTROL DEVICES SHALL BE INSTALLED TO CONTROL AND REDUCE SOIL EROSION AND SEDIMENT TRANSPORT TO OFF SITE AREAS. THE CONTRACTOR SHALL MAINTAIN THESE DEVICES THROUGHOUT THE DURATION OF CONSTRUCTION. ALL DEVICES SHALL REMAIN IN PLACE UNTIL PERMANENT EROSION CONTROL IS ESTABLISHED.
2. AREAS LOCATED ADJACENT TO UNDEVELOPED AREAS SHALL BE STABILIZED WITH SOD IMMEDIATELY UPON REACHING FINAL GRADE.
3. THE CONTRACTOR SHALL SUPPLEMENT THIS PLAN AS MAY BE REQUIRED TO CONTROL AND REDUCE SOIL EROSION BASED ON THE CONTRACTORS MEANS, METHODS AND TECHNIQUE OF CONSTRUCTION. THE CONTRACTOR SHALL ALSO FILE A NPDES NOTICE OF INTENT WITH THE EPA AND LEE COUNTY DEVELOPMENT SERVICE DIVISION AT LEAST 48 HOURS PRIOR TO THE START OF CONSTRUCTION.
4. DURING CONSTRUCTION, ALL INLET OPENINGS SHALL BE COVERED WITH FILTER FABRIC (MIRAFI 140N, OR APPROVED EQUAL) TO PREVENT DEBRIS FROM FALLING INTO THE INLET. FILTER FABRIC TO BE REMOVED FROM ALL INLETS IMMEDIATELY UPON PROPER STABILIZATION OF CONSTRUCTED IMPROVEMENTS.

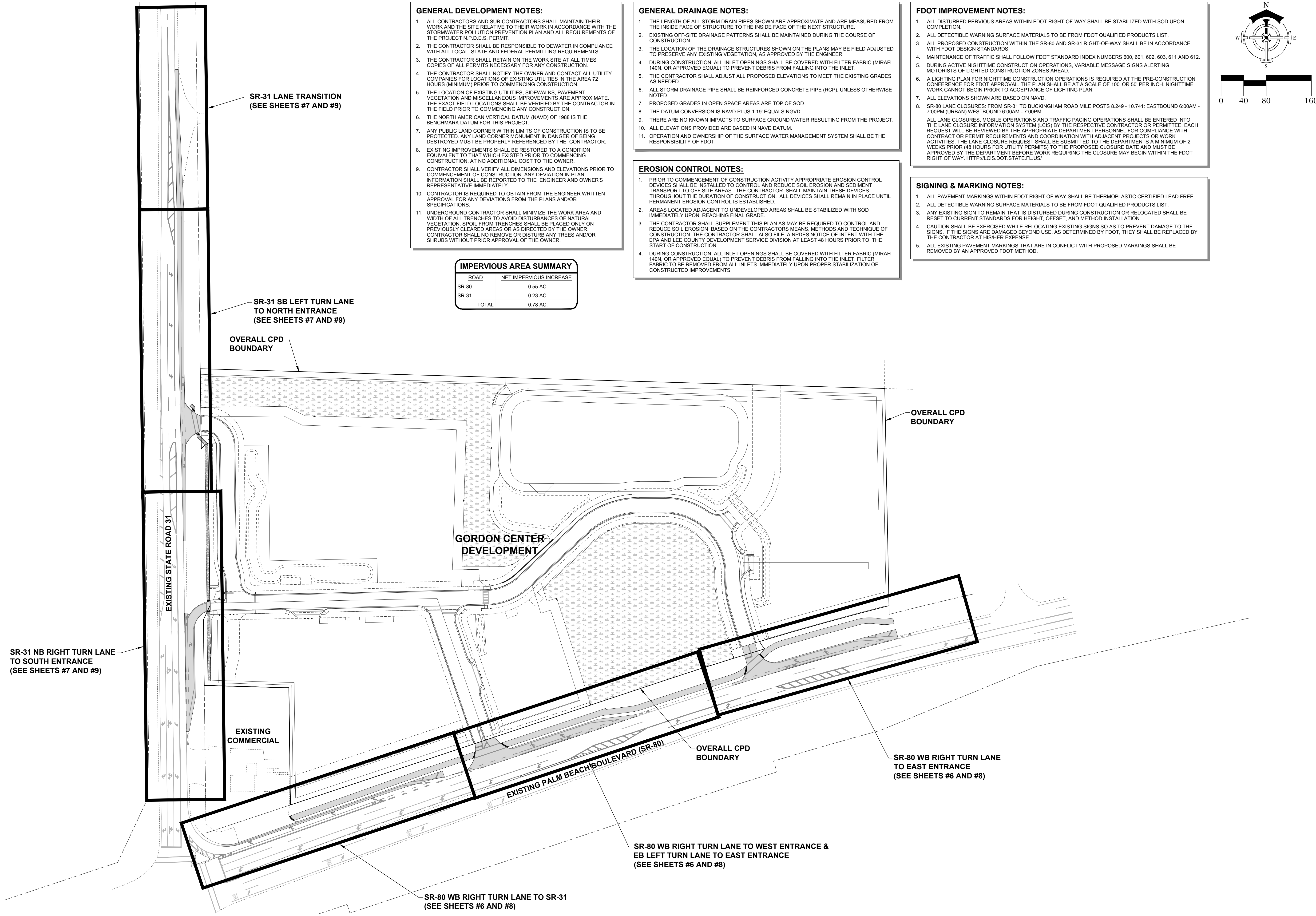
FDOT IMPROVEMENT NOTES:

1. ALL DISTURBED PERVIOUS AREAS WITHIN FDOT RIGHT-OF-WAY SHALL BE STABILIZED WITH SOD UPON COMPLETION.
2. ALL DETECTIBLE WARNING SURFACE MATERIALS TO BE FROM FDOT QUALIFIED PRODUCTS LIST.
3. ALL PROPOSED CONSTRUCTION WITHIN THE SR-80 AND SR-31 RIGHT-OF-WAY SHALL BE IN ACCORDANCE WITH FDOT DESIGN STANDARDS.
4. MAINTENANCE OF TRAFFIC SHALL FOLLOW FDOT STANDARD INDEX NUMBERS 600, 601, 602, 603, 611 AND 612.
5. DURING ACTIVE NIGHTTIME CONSTRUCTION OPERATIONS, VARIABLE MESSAGE SIGNS ALERTING MOTORISTS OF LIGHTED CONSTRUCTION ZONES AHEAD.
6. A LIGHTING PLAN FOR NIGHTTIME CONSTRUCTION OPERATIONS IS REQUIRED AT THE PRE-CONSTRUCTION CONFERENCE FOR FDOT APPROVAL. THE PLAN SHALL BE AT A SCALE OF 100' OR 50' PER INCH. NIGHTTIME WORK CANNOT BEGIN PRIOR TO ACCEPTANCE OF LIGHTING PLAN.
7. ALL ELEVATIONS SHOWN ARE BASED ON NAVD.
8. SR-80 LANE CLOSURES: FROM SR-31 TO BUCKINGHAM ROAD MILE POSTS 8.249 - 10.741: EASTBOUND 6:00AM - 7:00PM (URBAN) WESTBOUND 6:00AM - 7:00PM.

   ALL LANE CLOSURES, MOBILE OPERATIONS AND TRAFFIC PACING OPERATIONS SHALL BE ENTERED INTO THE LANE CLOSURE INFORMATION SYSTEM (LCIS) BY THE RESPECTIVE CONTRACTOR OR PERMITTEE. EACH REQUEST WILL BE REVIEWED BY THE APPROPRIATE DEPARTMENT PERSONNEL FOR COMPLIANCE WITH CONTRACT OR PERMIT REQUIREMENTS AND COORDINATION WITH ADJACENT PROJECTS OR WORK ACTIVITIES. THE LANE CLOSURE REQUEST SHALL BE SUBMITTED TO THE DEPARTMENTS A MINIMUM OF 2 WEEKS PRIOR (48 HOURS FOR UTILITY PERMITS) TO THE PROPOSED CLOSURE DATE AND MUST BE APPROVED BY THE DEPARTMENT BEFORE WORK REQUIRING THE CLOSURE MAY BEGIN WITHIN THE FDOT RIGHT OF WAY. HTTP://LCIS.DOT.STATE.FL.US/

SIGNING & MARKING NOTES:

1. ALL PAVEMENT MARKINGS WITHIN FDOT RIGHT OF WAY SHALL BE THERMOPLASTIC CERTIFIED LEAD FREE.
2. ALL DETECTIBLE WARNING SURFACE MATERIALS TO BE FROM FDOT QUALIFIED PRODUCTS LIST.
3. ANY EXISTING SIGN TO REMAIN THAT IS DISTURBED DURING CONSTRUCTION OR RELOCATED SHALL BE RESET TO CURRENT STANDARDS FOR HEIGHT, OFFSET, AND METHOD INSTALLATION.
4. CAUTION SHALL BE EXERCISED WHILE RELOCATING EXISTING SIGNS SO AS TO PREVENT DAMAGE TO THE SIGNS. IF THE SIGNS ARE DAMAGED BEYOND USE, AS DETERMINED BY FDOT, THEY SHALL BE REPLACED BY THE CONTRACTOR AT HIS/HER EXPENSE.
5. ALL EXISTING PAVEMENT MARKINGS THAT ARE IN CONFLICT WITH PROPOSED MARKINGS SHALL BE REMOVED BY AN APPROVED FDOT METHOD.



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ENGINEER OF RECORD:
JOHN T. WOJDAK, P.E. (FOR THE FIRM)
FLORIDA P.E. NO. 58217

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OWNER / DEVELOPER:
RACETRAC PETROLEUM, INC.
200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

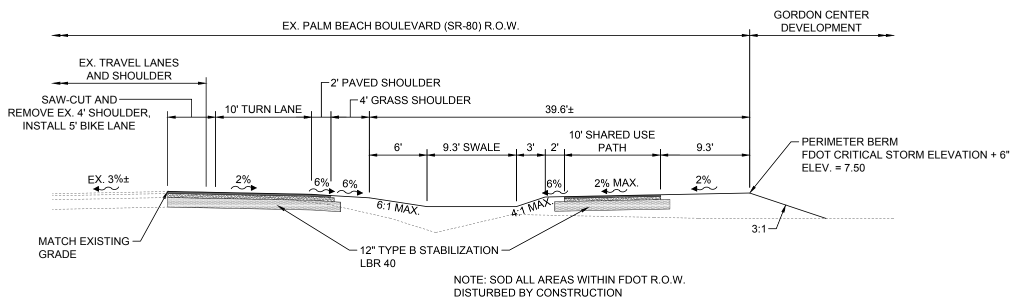
DATE	DESCRIPTION

OVERALL SITE PLAN

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

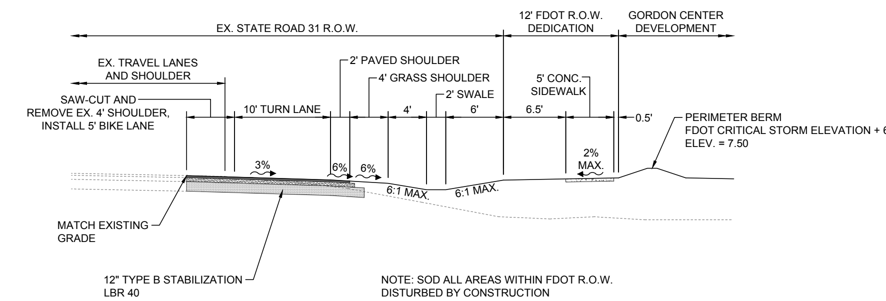
Status:
FOR CONSTRUCTION,
SUBJECT TO ALL PERMIT APPROVALS

Sheet Number: 4



SR-80 WB RIGHT TURN LANE SECTION (EAST ENTRANCE)

NTS



SR-31 NB RIGHT TURN LANE SECTION

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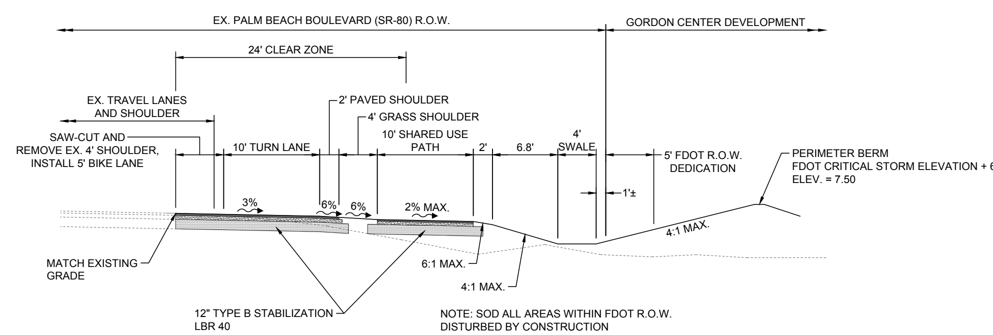
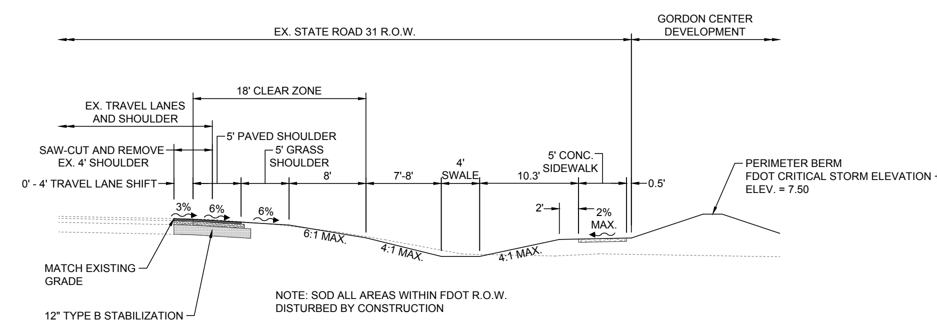


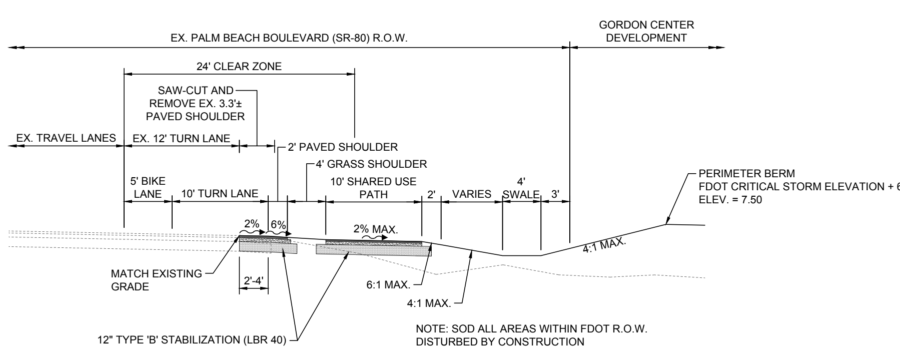
SR-80 WB RIGHT TURN LANE SECTION (WEST ENTRANCE)

NTS



SR-31 NB TRAVEL LANE SHIFT BETWEEN NORTHERN AND SOUTHERN ENTRANCES SECTION

NTS



SR-80 EXISTING WB RIGHT TURN LANE IMPROVEMENT SECTION

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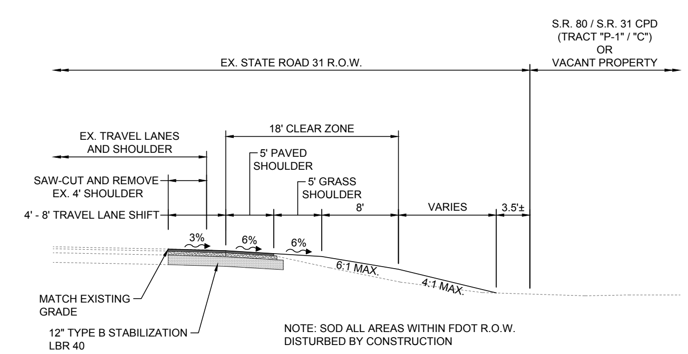

SR-31 NB TRAVEL LANE SHIFT NORTH OF NORTHERN ENTRANCE SECTION

NTS

SR-80 PAVEMENT DESIGN:

OPTIONAL BASE GROUP 9 (6" TYPE B-12.5 ASPHALT BASE) WITH SP 12.5 (PG 76-22), TRAFFIC LEVEL D, 2.5" AND FC 12.5 (PG 76-22) 1.5"

SHOULDER PAVEMENT
OPTIONAL BASE GROUP 1 (4" TYPE B-12.5 ASPHALT BASE) WITH SP 12.5 (PG 76-22), TRAFFIC LEVEL D, 2.5" AND FC 12.5 (PG 76-22) 1.5"

SHARED USE PATH PAVEMENT
OPTIONAL BASE GROUP 1 WITH 1" TYPE SP STRUCTURAL COURSE (TRAFFIC B)

FOR ADDITIONAL DETAILS SEE FDOT INDEX NOS.: 104, 300, 301, 304, 310, 505, 510, 514, 526

SR-31 PAVEMENT DESIGN:

OPTIONAL BASE GROUP 9 (6" TYPE B-12.5 ASPHALT BASE) WITH SP 12.5 (PG 76-22), TRAFFIC LEVEL D, 2.5" AND FC 12.5 (PG 76-22) 1.5"

SHOULDER PAVEMENT
OPTIONAL BASE GROUP 1 (4" TYPE B-12.5 ASPHALT BASE) WITH SP 12.5 (PG 76-22), TRAFFIC LEVEL D, 2.5" AND FC 12.5 (PG 76-22) 1.5"

FOR ADDITIONAL DETAILS SEE FDOT INDEX NOS.: 104, 300, 301, 304, 310, 505, 510, 514, 526

PROJECT DATUM
NAVD
DATUM CONVERSION
NAVD + 1.19 = NGVD

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ENGINEER OF RECORD:
JOHN T. WOJDAK, P.E. (FOR THE FIRM)
FLORIDA P.E. NO. 58217

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OWNER / DEVELOPER:
RACETRAC PETROLEUM, INC.
200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

#	DATE	DESCRIPTION

FDOT TURN LANE IMPROVEMENTS TYPICAL SECTIONS

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

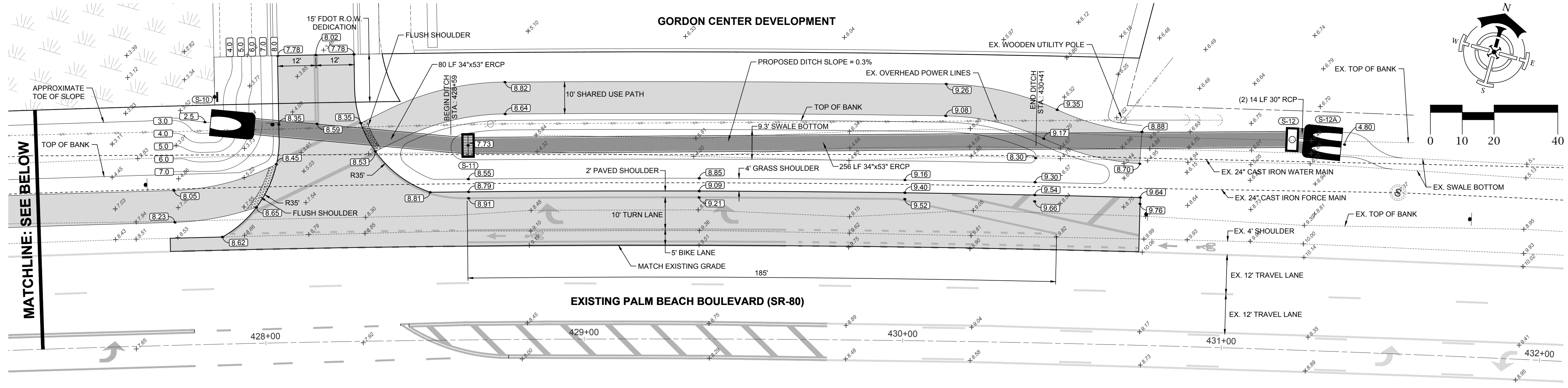
Status:
FOR CONSTRUCTION, SUBJECT TO ALL PERMIT APPROVALS

Sheet Number: 5

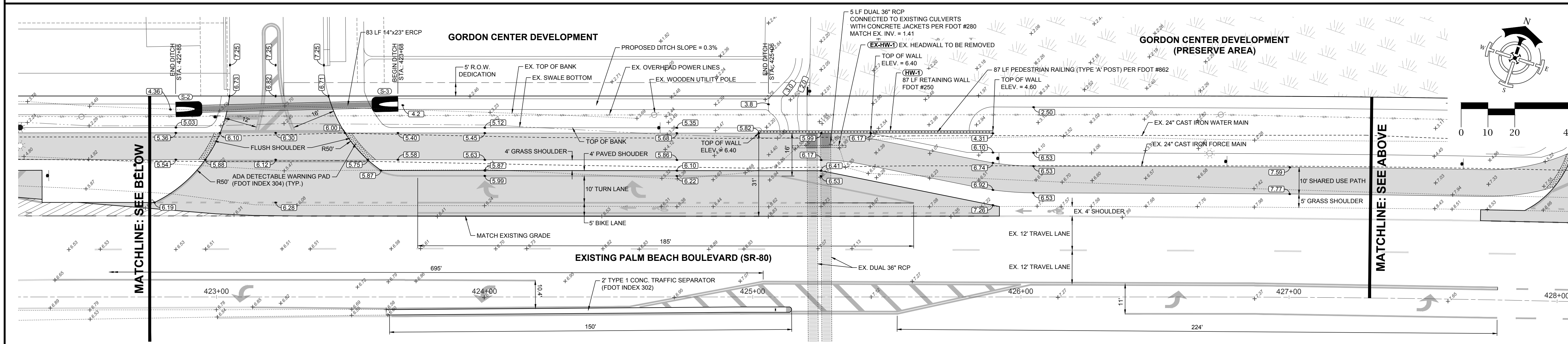
DRAINAGE STRUCTURE TABLE

S-1 TEMPORARY TYPE 'C' INLET - FDOT #201, 232 (STEEL GRATE) GRATE ELEV. = **5.71** INV. W (18") = **2.70** INV. NE (18") = **2.71**	**S-12** MANHOLE TYPE J-7 (8' WIDTH) FDOT #200, 201 RIM ELEV. = **7.50** INV. E (30") = 3.10 INV. E (30") = 3.10 INV. W (34"x53") = **2.64**
S-1A TEMPORARY TYPE 'C' INLET - FDOT #201, 232 GRATE ELEV. = **4.53** INV. SW (18") = **2.03**	**S-12A** DUAL 30" MES - FDOT #273 INV. (30") = **4.80**
S-2 14"x23" MES - FDOT #273 INV. (14"x23") = **3.93**	**HW-1** HEADWALL - FDOT #250 INV. = **1.41**
S-3 14"x23" MES - FDOT #273 INV. (14"x23") = **3.80**	**EX-S-1** EX. GRATE INLET EX. GRATE ELEV. = **5.35** EX. INV. E (18") = **2.90**
S-10 34"x53" MES - FDOT #273 INV. (34"x53") = **2.47**	**EX-HW-1** EX. HEADWALL - TO BE REMOVED EX. INV. = **1.41**
S-11 TYPE 'H' INLET - FDOT #232 GRATE ELEV. = **7.73** INV. E (34"x53") = **2.51** INV. W (34"x53") = **2.51**	

NOTE:
STRUCTURES EX-S-1, S-1, S-1A AND EXISTING DRIVEWAY TO BE REMOVED CONCURRENTLY WITH DEVELOPMENT AT 12002 PALM BEACH BLVD. DITCH SHALL BE CONSTRUCTED TO MATCH ADJACENT DITCH SECTION. THIS WORK SHALL BE RESPONSIBILITY OF THE PERMITEE OF PERMIT 05-D-192-0030.



SR-80 WB RIGHT TURN LANE (EAST ENTRANCE)



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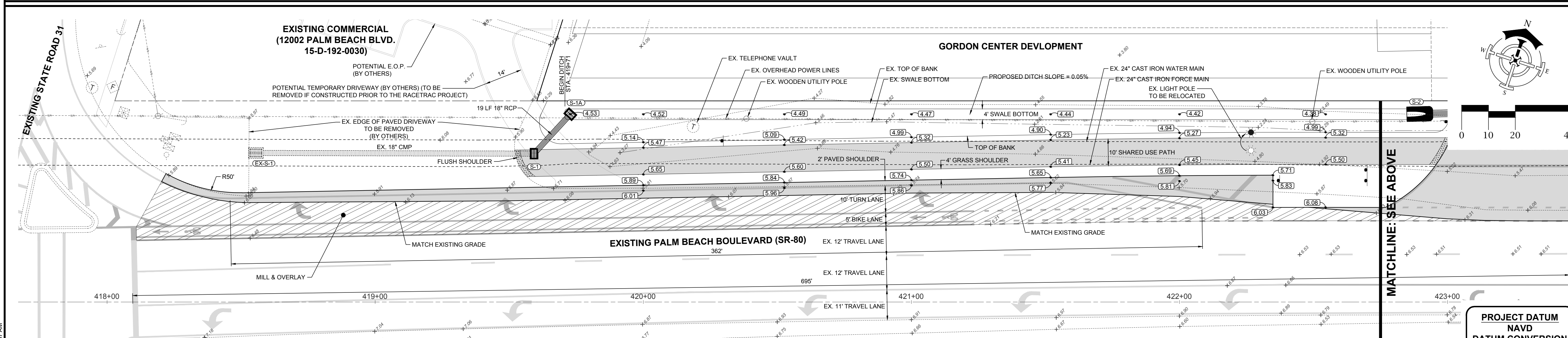

PROJECT DATUM
NAVD
DATUM CONVERSION
NAVD + 1.19 = NGVD

SR-80 EXISTING WB RIGHT TURN LANE

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ENGINEER OF RECORD:
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OWNER / DEVELOPER:
RACETRAC PETROLEUM, INC.
200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

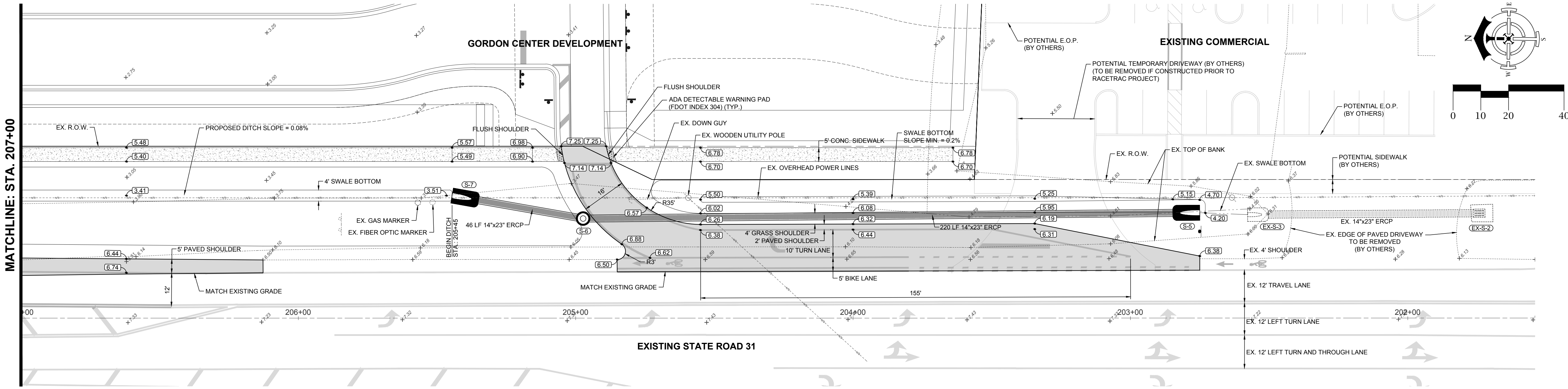
#	DATE	DESCRIPTION

FDOT SR-80 TURN LANE IMPROVEMENT PLAN

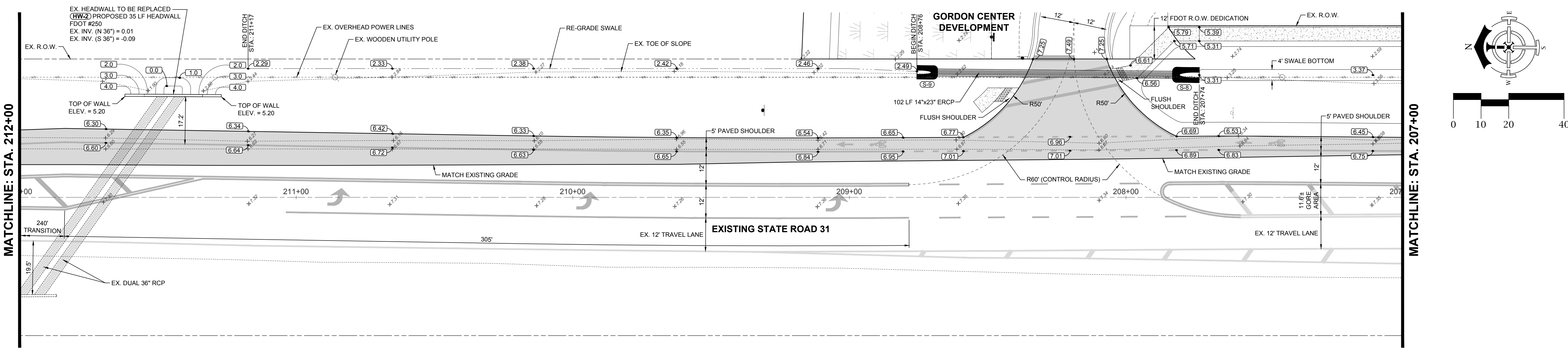
Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

Status:
FOR CONSTRUCTION,
SUBJECT TO ALL PERMIT APPROVALS

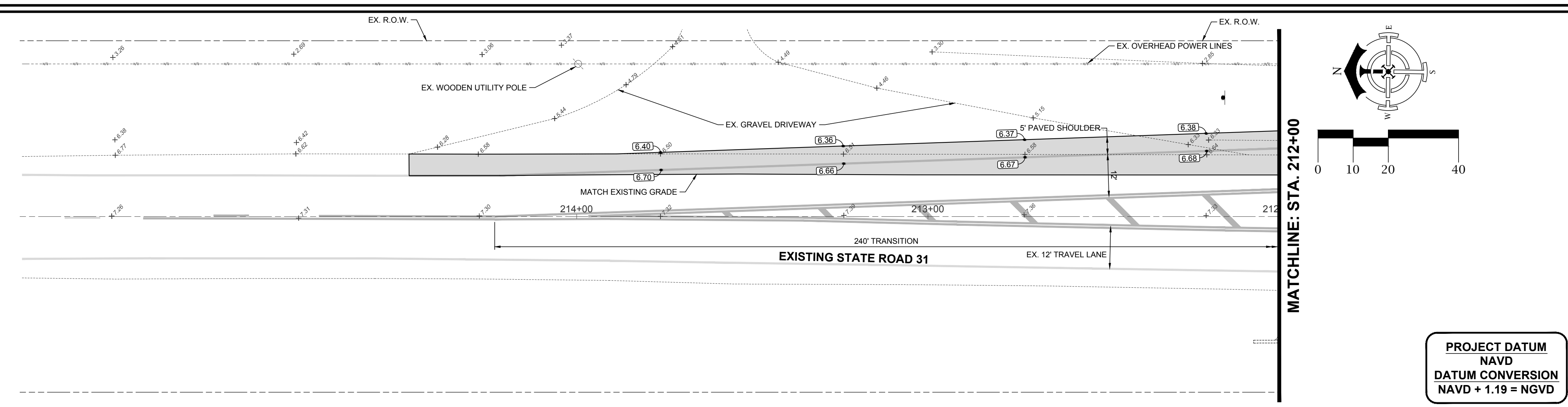
Sheet Number: 6



SR-31 NB RIGHT TURN LANE - SOUTH ENTRANCE



SR-31 SB LEFT TURN LANE - NORTH ENTRANCE



SR-31 LANE TRANSITION

DRAINAGE STRUCTURE TABLE

S-5	14"x23" MES - FDOT #273 INV. (14"x23") = **3.70**
S-6	MANHOLE TYPE P-7 - FDOT #200, 201 RIM ELEV. = **8.76** INV. S (14"x23") = **3.37** INV. N (14"x23") = **3.37**
S-7	14"x23" MES - FDOT #273 INV. (14"x23") = **3.30**
S-8	14"x23" MES - FDOT #273 INV. (14"x23") = **3.31**
S-9	14"x23" MES - FDOT #273 INV. (14"x23") = **2.49**
HW-2	HEADWALL - FDOT #250 INV. (N 36") = **0.01** INV. (S 36") = **-0.09**
EX-S-2	EX. GRATE INLET EX. GRATE ELEV. = **6.06** EX. INV. N (14"x23") = **4.11**
EX-S-3	EX. 14"x23" MES EX. INV. (14"x23") = **4.11**

PROJECT DATUM
NAVD
DATUM CONVERSION
NAVD + 1.19 = NGVD

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OWNER / DEVELOPER:
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(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

#	DATE	DESCRIPTION

FDOT SR-31 TURN LANE IMPROVEMENTS PLAN

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

Status:
FOR CONSTRUCTION,
SUBJECT TO ALL PERMIT APPROVALS

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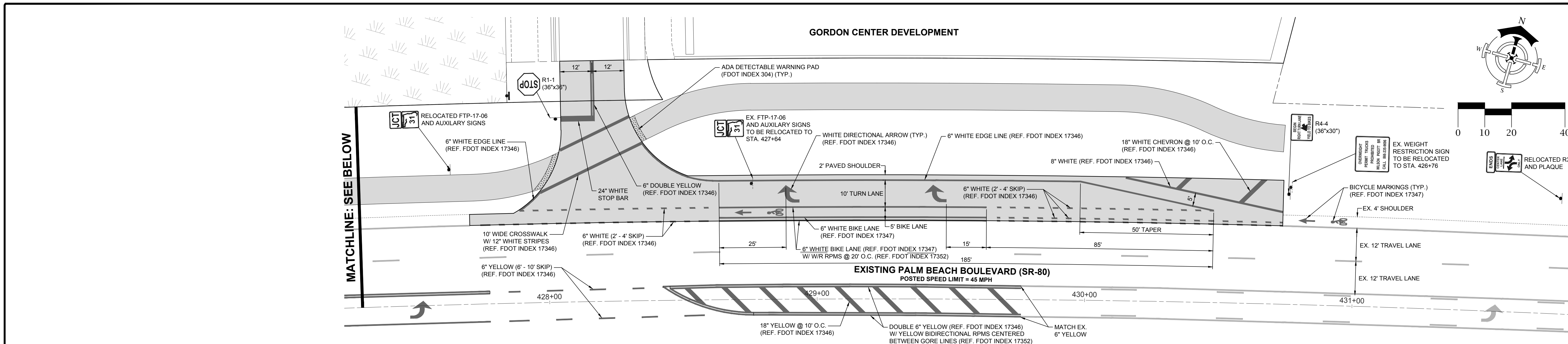
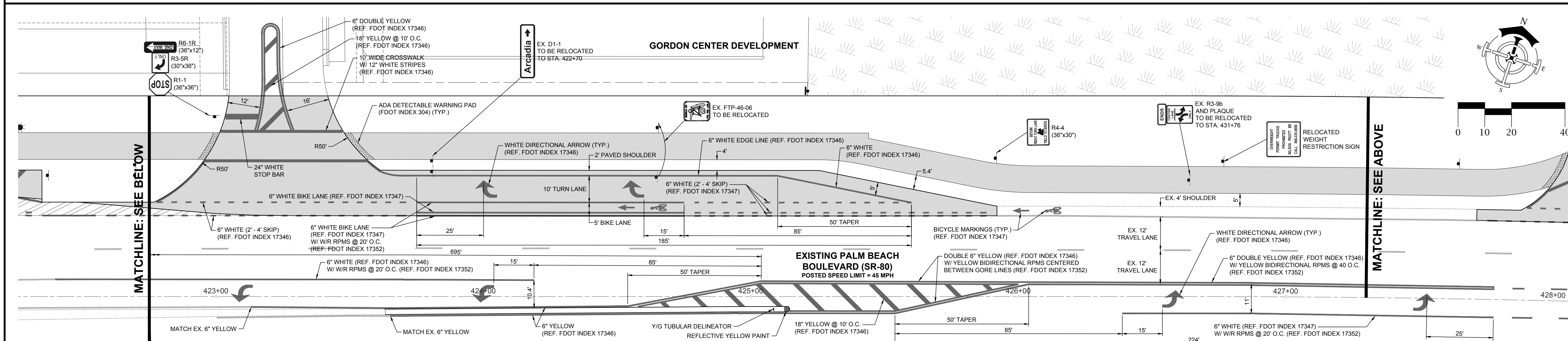
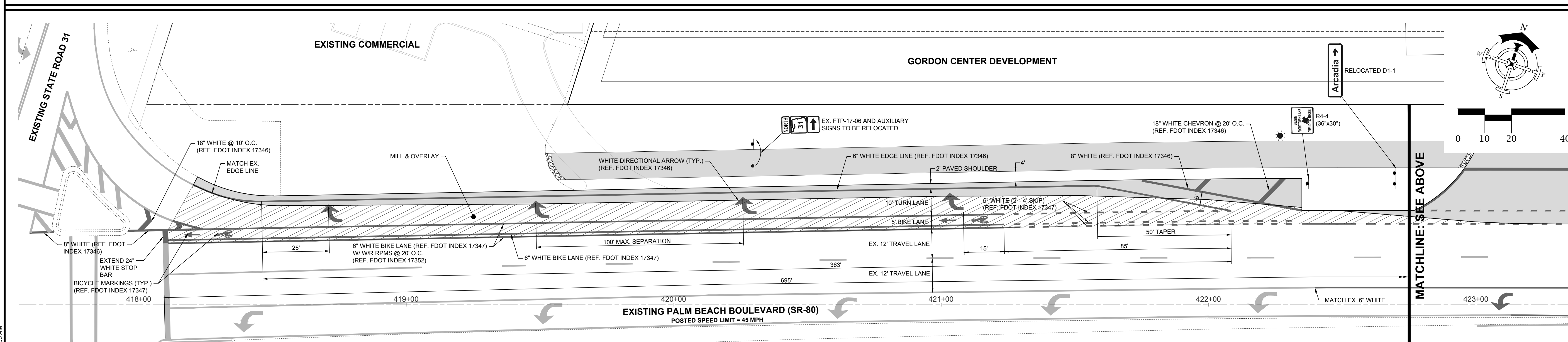


SR-80 WB RIGHT TURN LANE (EAST ENTRANCE)



SR-80 WB RIGHT TURN LANE (WEST ENTRANCE)



SR-80 EXISTING WB RIGHT TURN LANE

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FLORIDA P.E. NO. 58217

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OWNER / DEVELOPER:
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ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

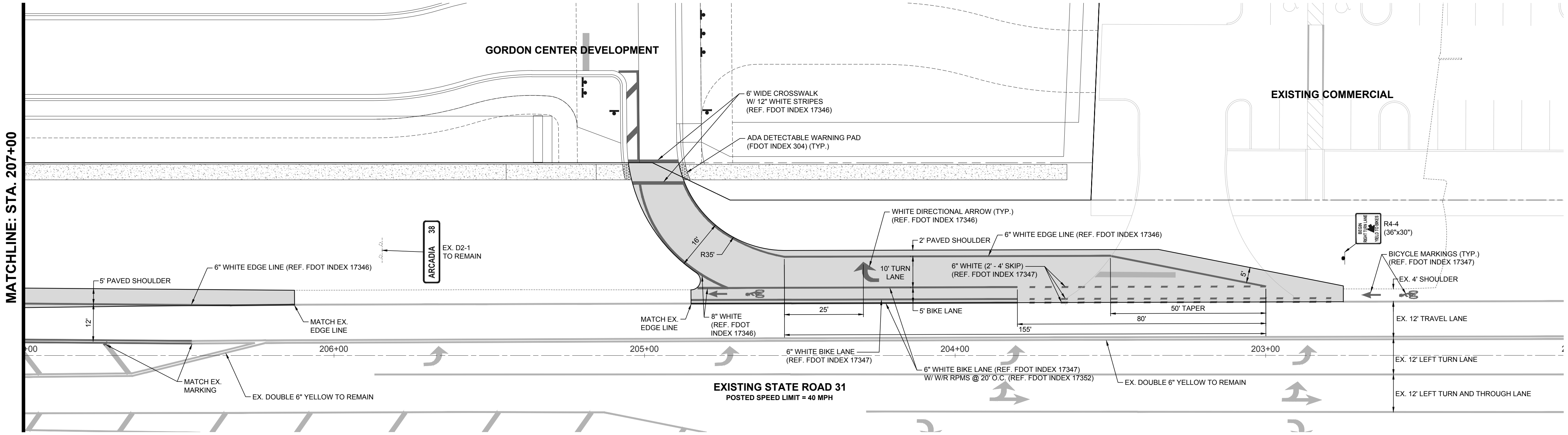
#	DATE	DESCRIPTION

FDOT SR-80 TURN LANE SIGNING & MARKING PLAN

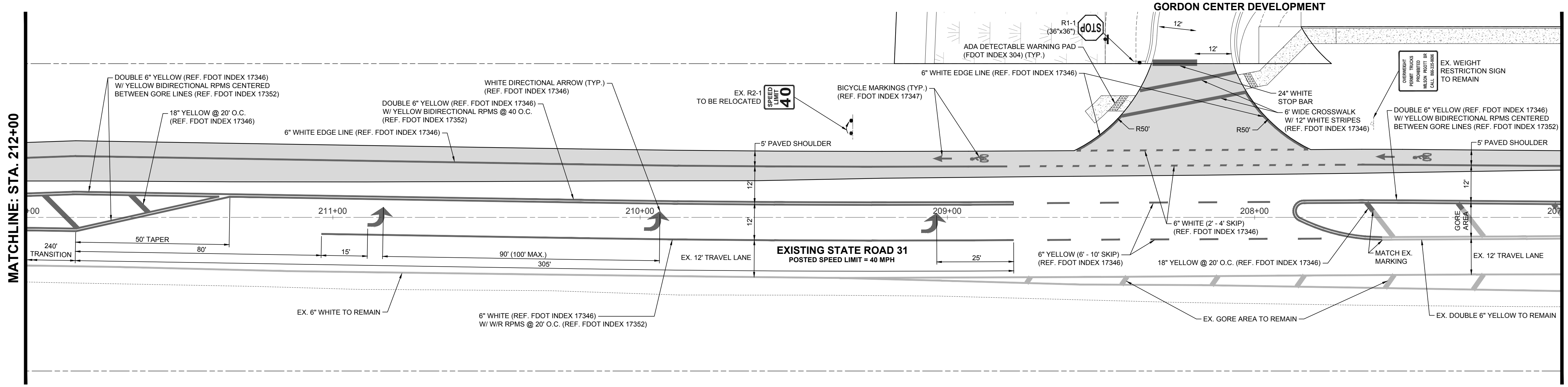
Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

Status:
FOR CONSTRUCTION, SUBJECT TO ALL PERMIT APPROVALS

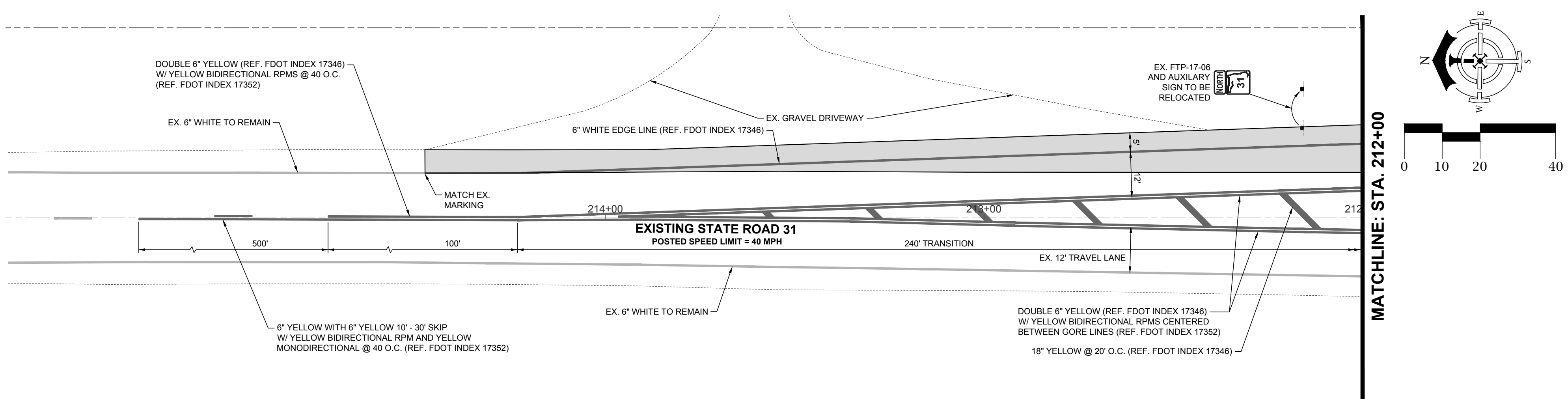
Sheet Number: 8



SR-31 NB RIGHT TURN LANE - SOUTH ENTRANCE



SR-31 SB LEFT TURN LANE - NORTH ENTRANCE



SR-31 LANE TRANSITION

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3/27/2018 8:58 AM

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200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

#	DATE	DESCRIPTION

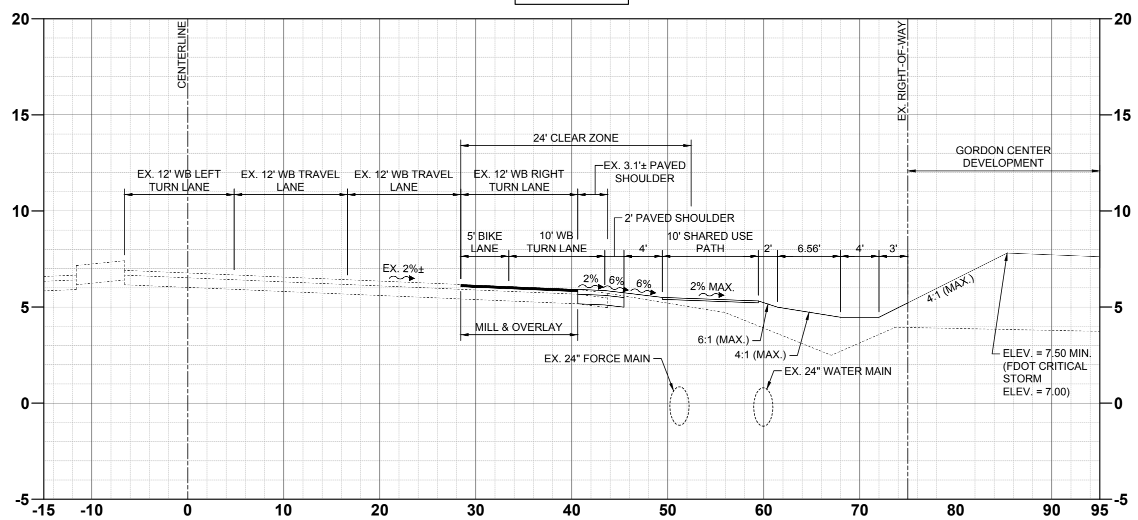
FDOT SR-31 TURN LANE SIGNING & MARKING PLAN

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

Status:
FOR CONSTRUCTION,
SUBJECT TO ALL PERMIT APPROVALS

Sheet Number: 9

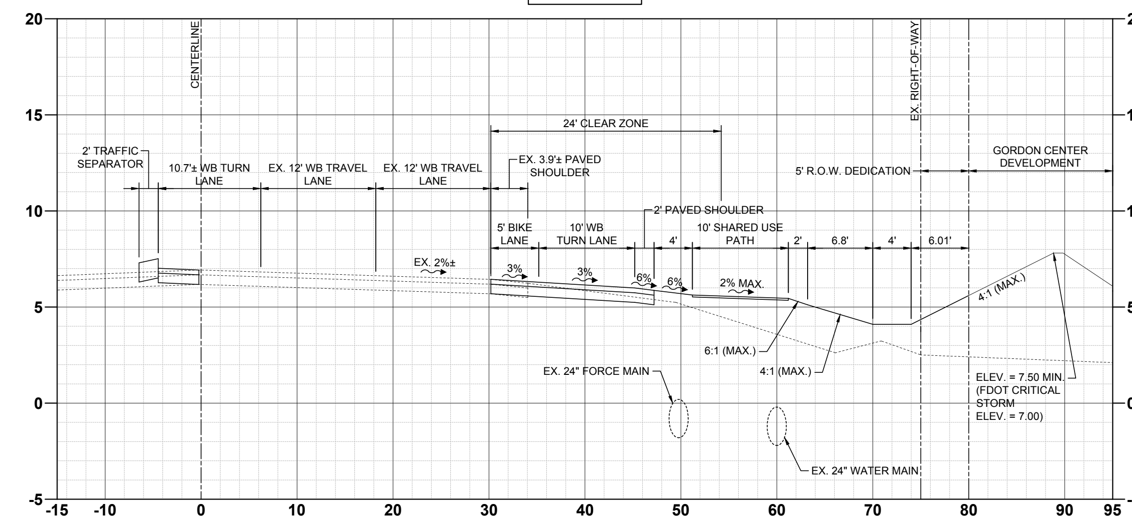
421+00.00



FDOT SR-80 CROSS SECTION @ STATION 421+00.00

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

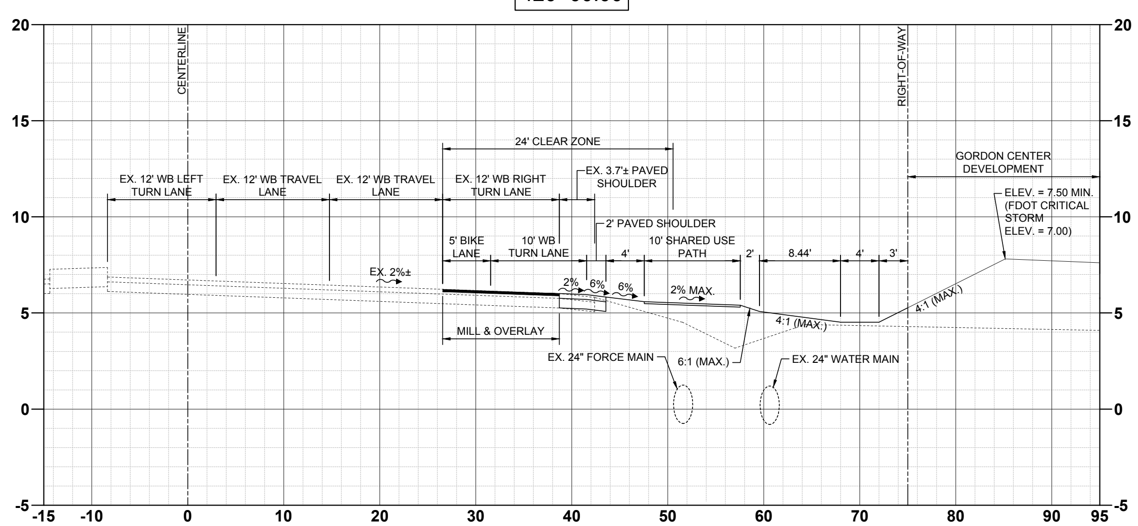
424+00.00



FDOT SR-80 CROSS SECTION @ STATION 424+00.00

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

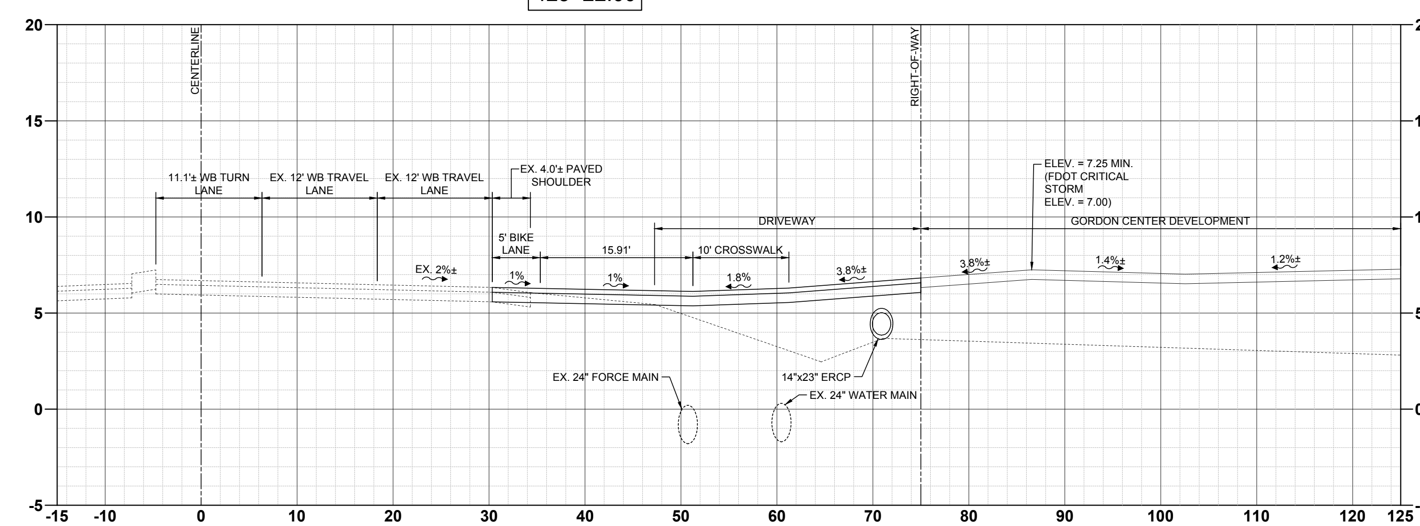
420+00.00



FDOT SR-80 CROSS SECTION @ STATION 420+00.00

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

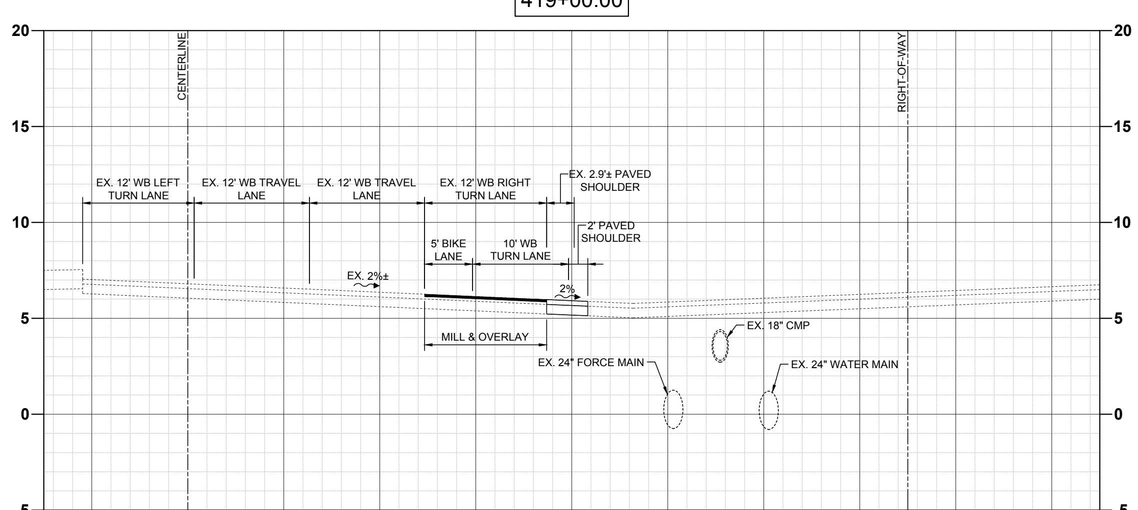
423+22.00



FDOT SR-80 CROSS SECTION @ STATION 423+22.00 (℄ WEST ENTRANCE)

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

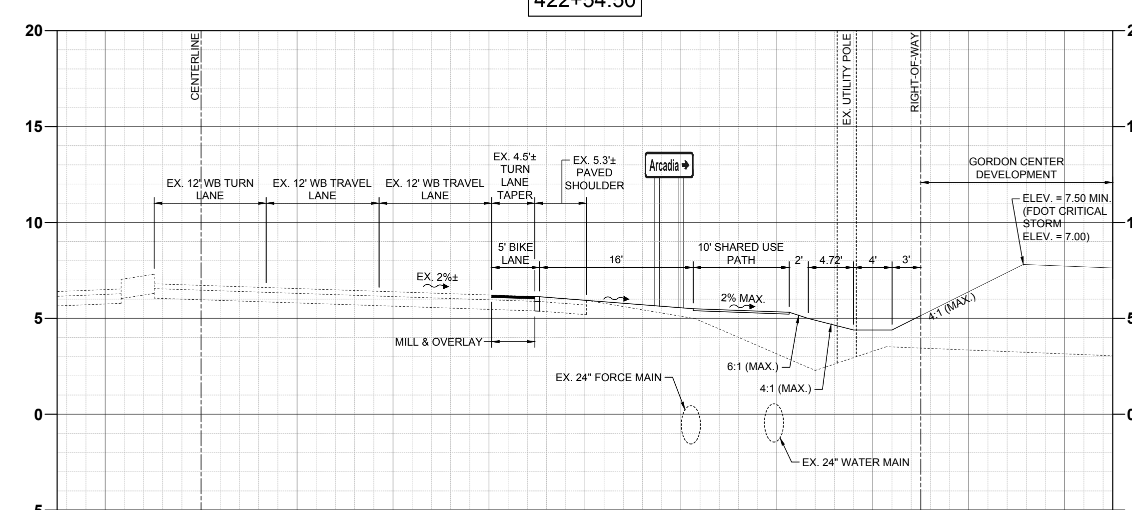
419+00.00



FDOT SR-80 CROSS SECTION @ STATION 419+00.00

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

422+54.50



FDOT SR-80 CROSS SECTION @ STATION 422+54.50

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

DeLISI FITZGERALD, INC.
Planning – Engineering – Project Management
1605 Hendry Street
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(239) 418-0692 fax
Florida Certificate of Authorization Engineering LB #26978

ENGINEER OF RECORD:
JOHN T. WOJDAK, P.E. (FOR THE FIRM)
FLORIDA P.E. NO. 58217

NOT VALID WITHOUT SEAL, SIGNATURE AND DATE

OWNER / DEVELOPER:
RACETRAC PETROLEUM, INC.
200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

#	DATE	DESCRIPTION

FDOT SR-80 TURN LANE IMPROVEMENTS SECTIONS

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

Status:
FOR CONSTRUCTION, SUBJECT TO ALL PERMIT APPROVALS

Sheet Number: 10

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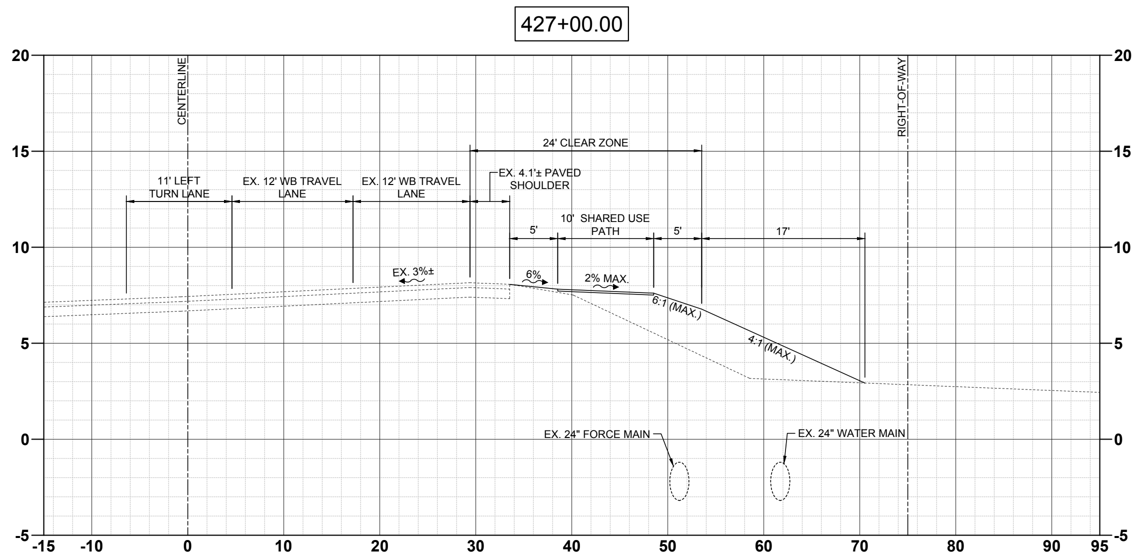
3/27/2018 8:58 AM



FDOT SR-80 CROSS SECTION @ STATION 427+00.00
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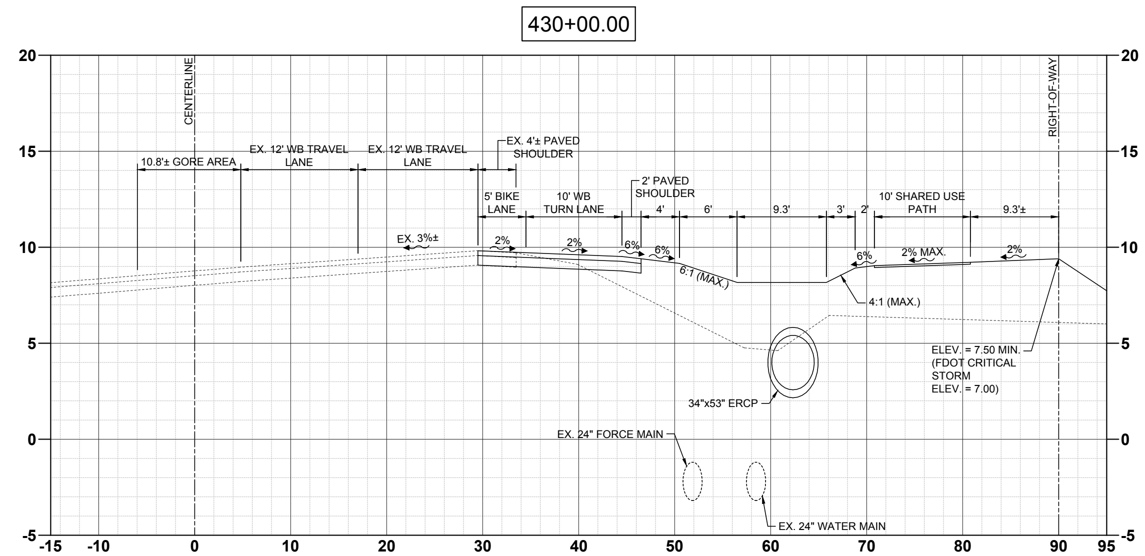
VERTICAL SCALE: 1"=5'



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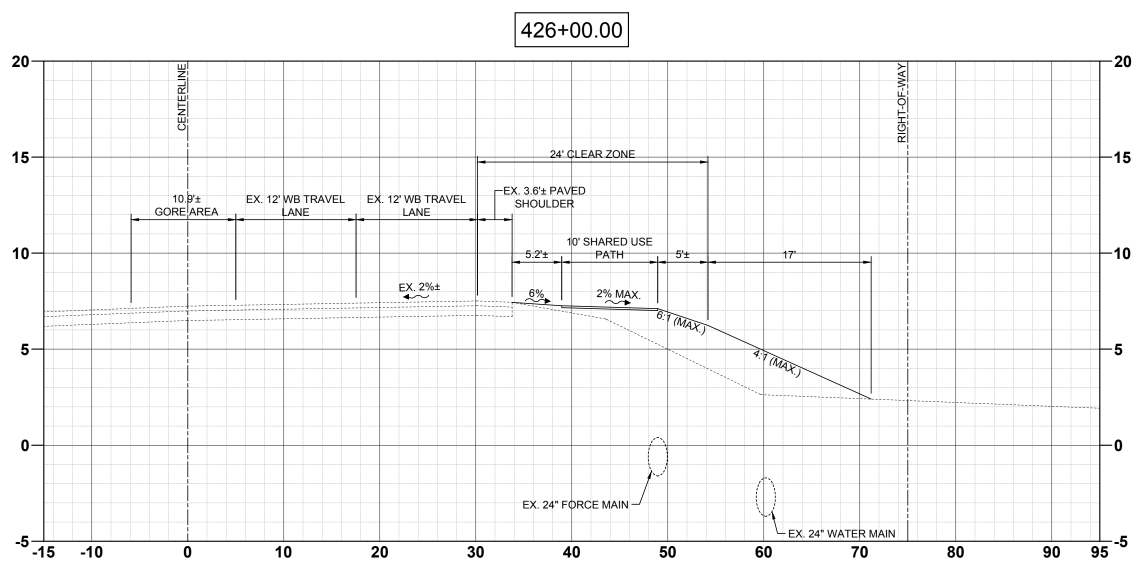
VERTICAL SCALE: 1"=5'



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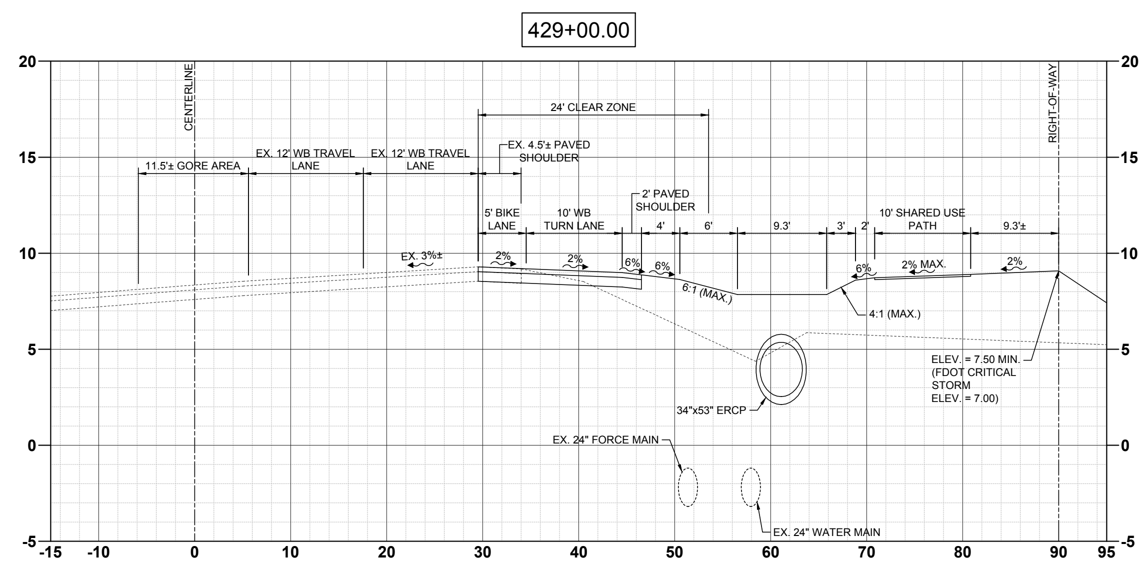
VERTICAL SCALE: 1"=5'



FDOT SR-80 CROSS SECTION @ STATION 429+00.00
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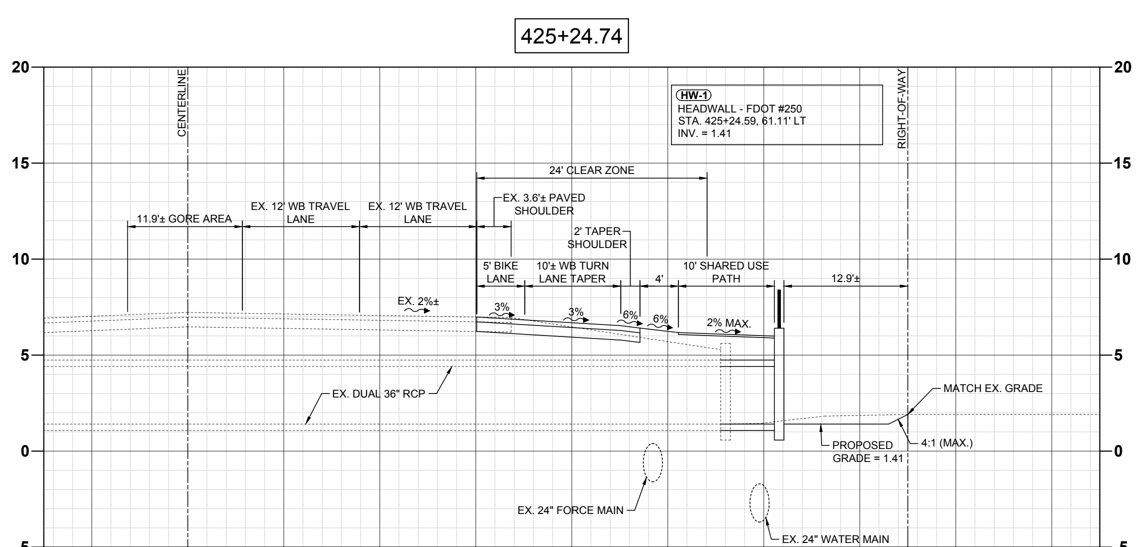
VERTICAL SCALE: 1"=5'



FDOT SR-80 CROSS SECTION @ STATION 425+24.74
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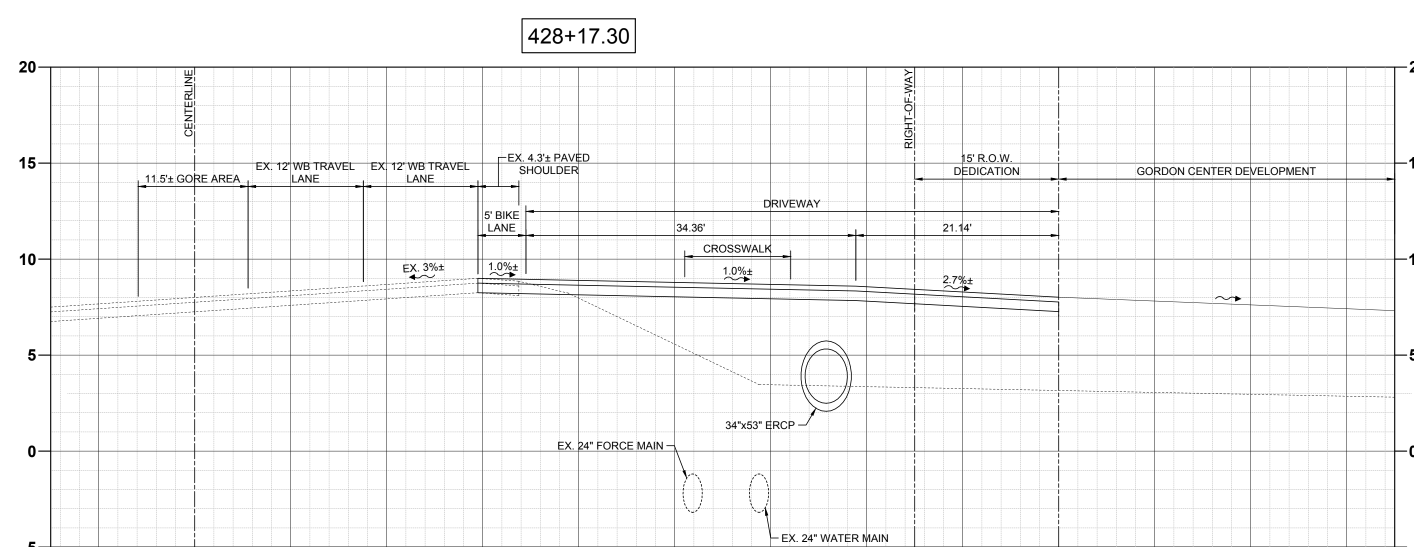
VERTICAL SCALE: 1"=5'



FDOT SR-80 CROSS SECTION @ STATION 428+17.30 (℄ EAST ENTRANCE)
HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

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3/27/2018 9:25 AM

DELISI FITZGERALD, INC.
Planning – Engineering – Project Management
1605 Hendry Street
Fort Myers, FL 33901
(239) 418-0691
(239) 418-0692 fax
Florida Certificate of Authorization Engineering LB #26978

ENGINEER OF RECORD:
JOHN T. WOJDAK, P.E. (FOR THE FIRM)
FLORIDA P.E. NO. 58217

NOT VALID WITHOUT SEAL, SIGNATURE AND DATE

OWNER / DEVELOPER:
RACETRAC PETROLEUM, INC.
200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

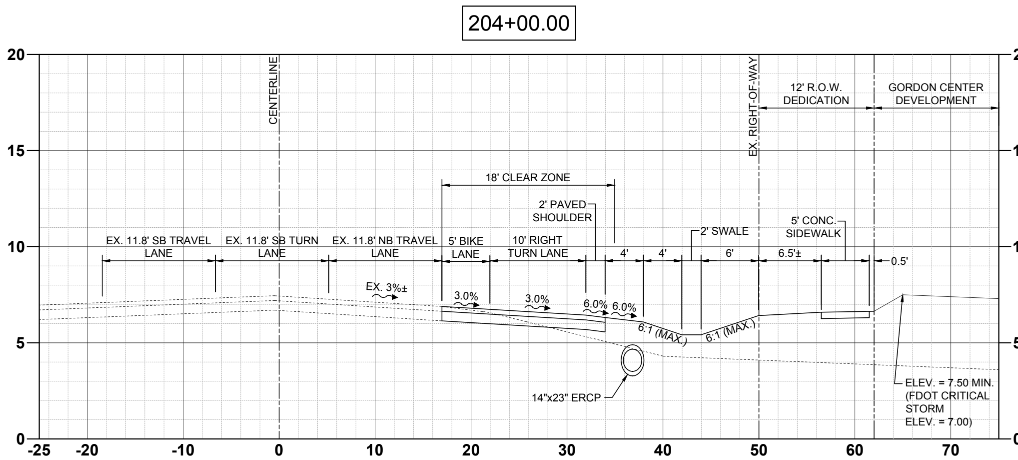
#	DATE	DESCRIPTION

FDOT SR-80 TURN LANE IMPROVEMENTS SECTIONS

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

Status:
FOR CONSTRUCTION,
SUBJECT TO ALL PERMIT APPROVALS

Sheet Number: 11



FDOT SR-31 CROSS SECTION @ STATION 204+00.00
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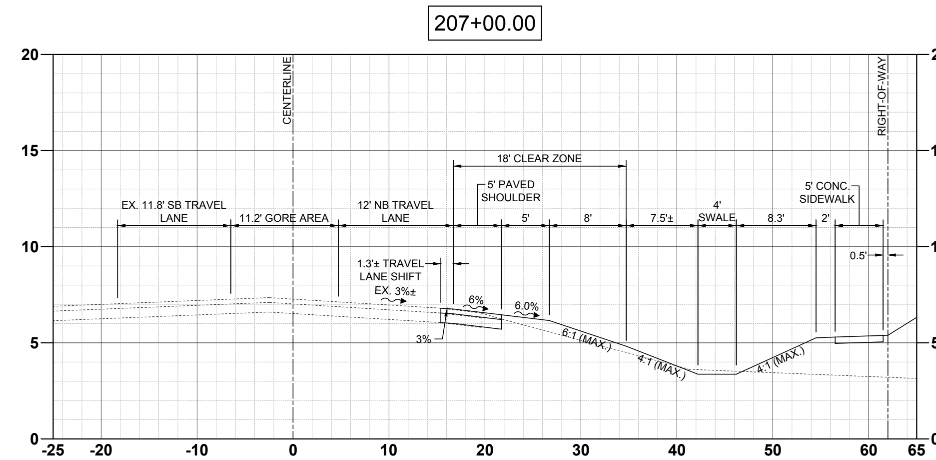
VERTICAL SCALE: 1"=5'



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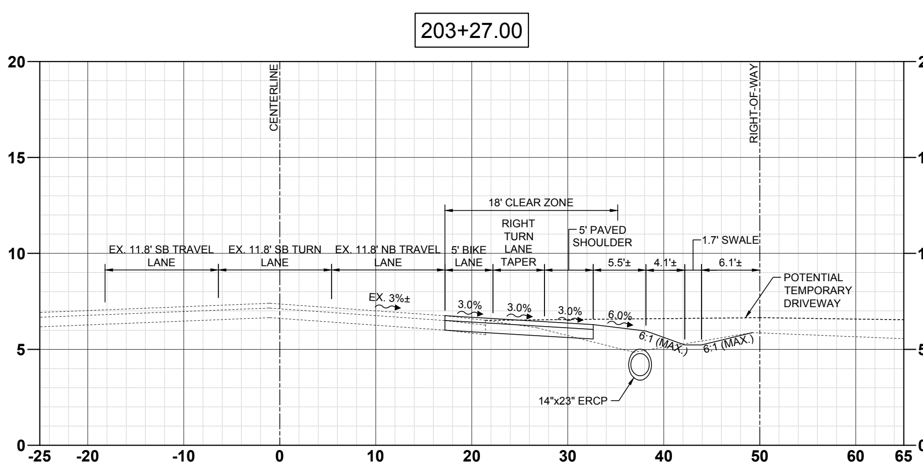
VERTICAL SCALE: 1"=5'



FDOT SR-31 CROSS SECTION @ STATION 203+27.00
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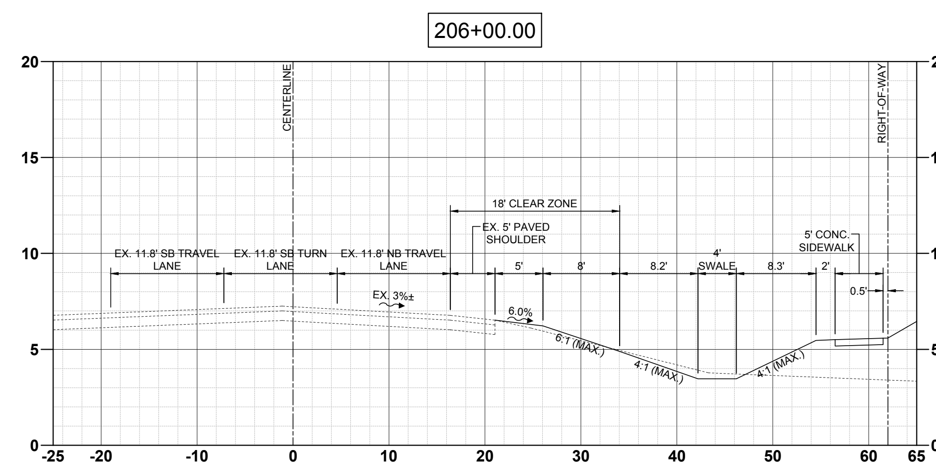
VERTICAL SCALE: 1"=5'



FDOT SR-31 CROSS SECTION @ STATION 206+00.00
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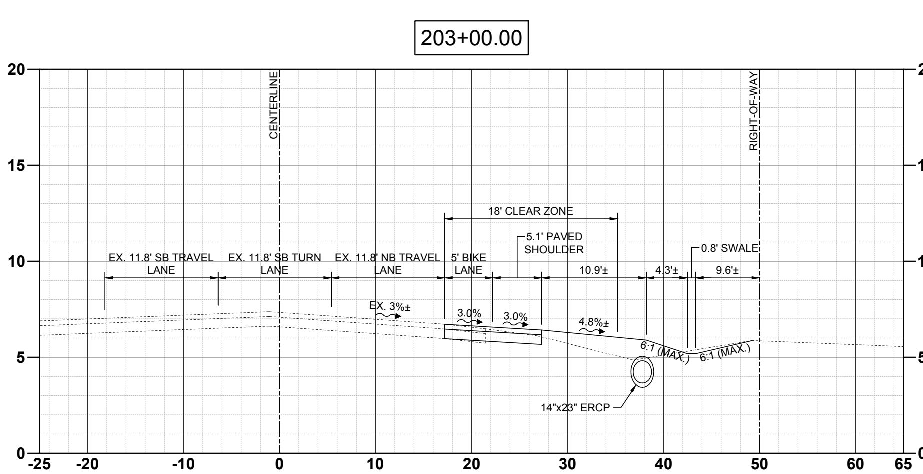
VERTICAL SCALE: 1"=5'



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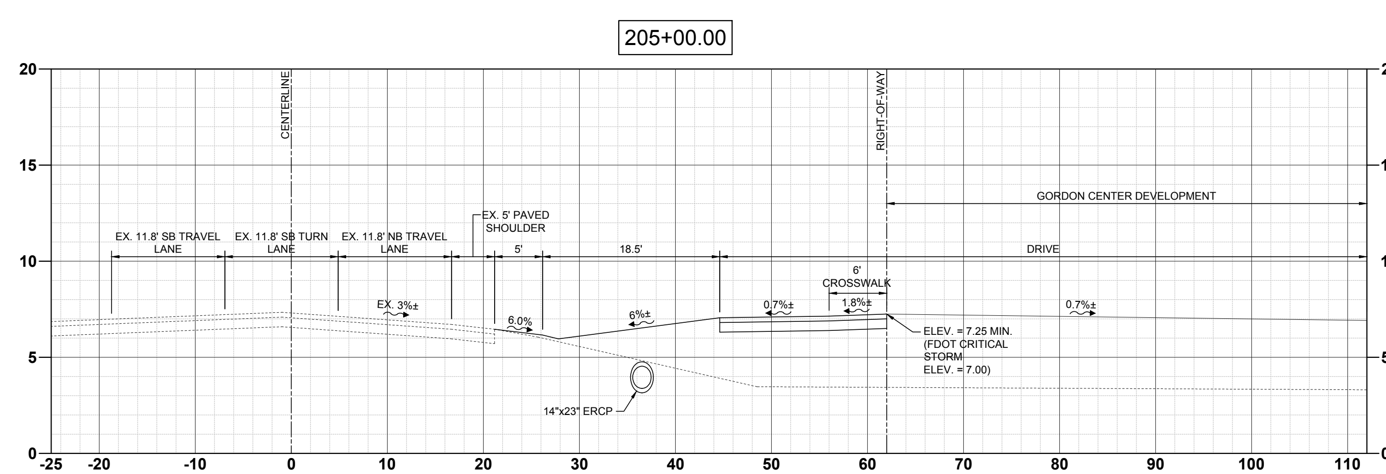
VERTICAL SCALE: 1"=5'



FDOT SR-31 CROSS SECTION @ STATION 205+00.00 (℄ SOUTH ENTRANCE)
HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

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ENGINEER OF RECORD:
JOHN T. WOJDAK, P.E. (FOR THE FIRM)
FLORIDA P.E. NO. 58217

NOT VALID WITHOUT SEAL, SIGNATURE AND DATE

OWNER / DEVELOPER:
RACETRAC PETROLEUM, INC.
200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

#	DATE	DESCRIPTION

FDOT SR-31 TURN LANE IMPROVEMENTS SECTIONS

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

Status:
FOR CONSTRUCTION, SUBJECT TO ALL PERMIT APPROVALS

Sheet Number: 12

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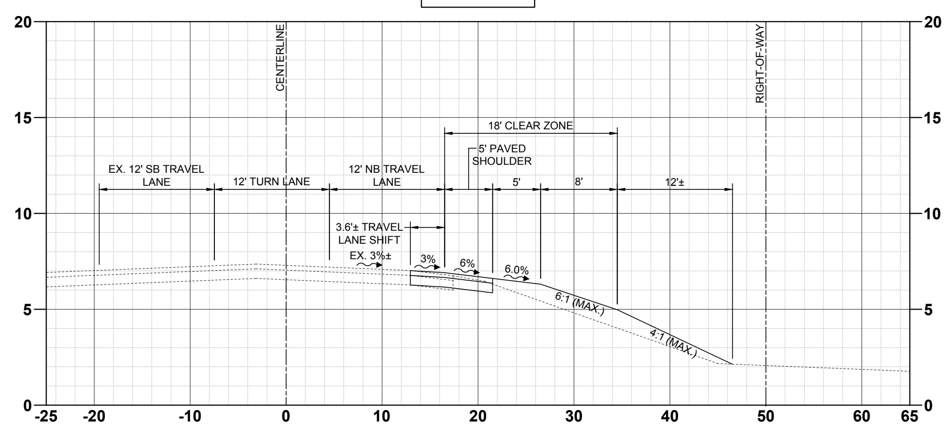
3/27/2018 8:59 AM

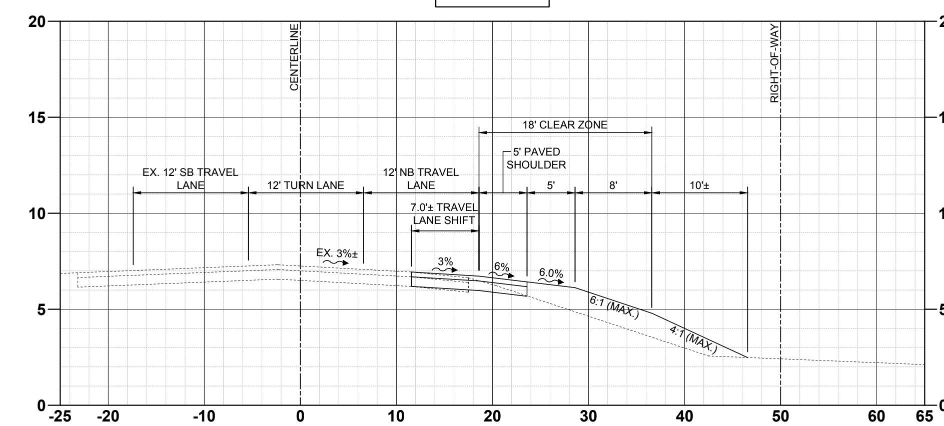
209+00.00



FDOT SR-31 CROSS SECTION @ STATION 209+00.00

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

211+00.00



FDOT SR-31 CROSS SECTION @ STATION 211+00.00

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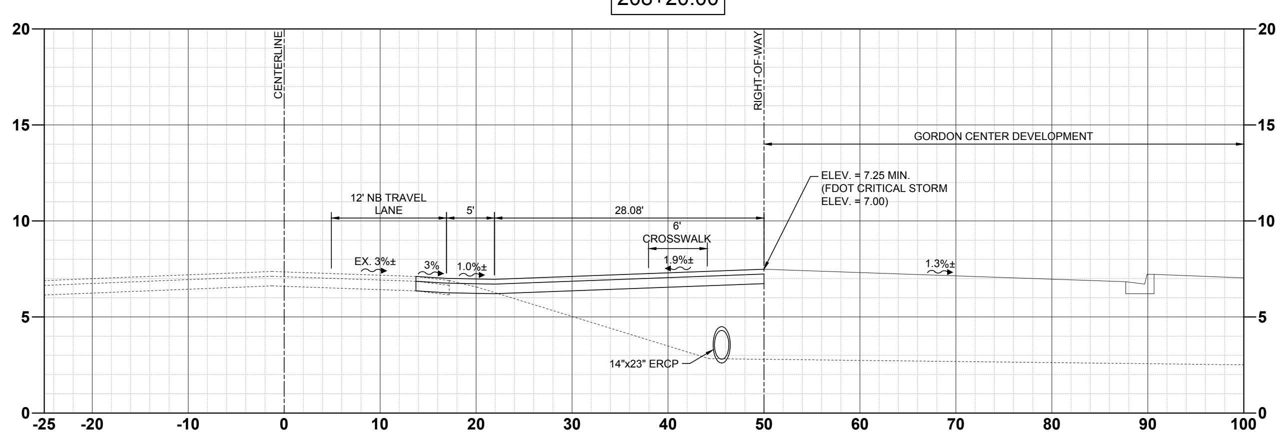
VERTICAL SCALE: 1"=5'

208+20.00



FDOT SR-31 CROSS SECTION @ STATION 208+20.00 (℄ NORTH ENTRANCE)

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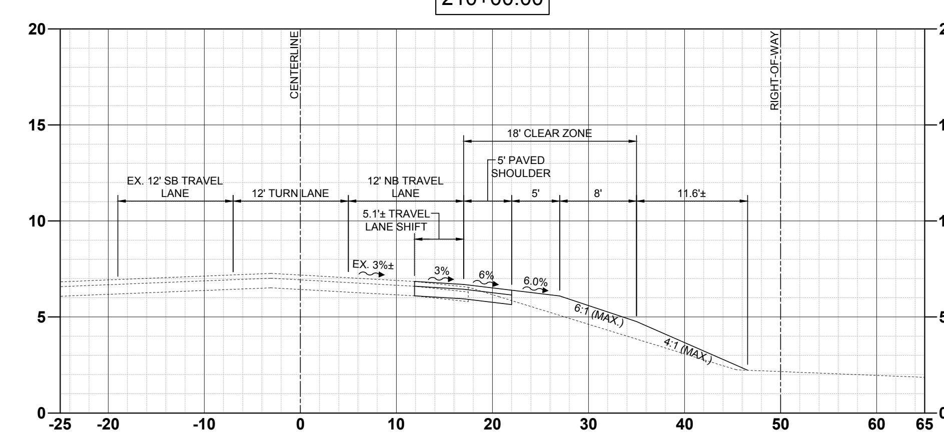
VERTICAL SCALE: 1"=5'

210+00.00



FDOT SR-31 CROSS SECTION @ STATION 210+00.00

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

DELISI FITZGERALD, INC.
Planning – Engineering – Project Management
1605 Hendry Street
Fort Myers, FL 33901
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Florida Certificate of Authorization Engineering LB #26978

ENGINEER OF RECORD:
JOHN T. WOJDAK, P.E. (FOR THE FIRM)
FLORIDA P.E. NO. 58217

NOT VALID WITHOUT SEAL, SIGNATURE AND DATE

OWNER / DEVELOPER:
RACETRAC PETROLEUM, INC.
200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

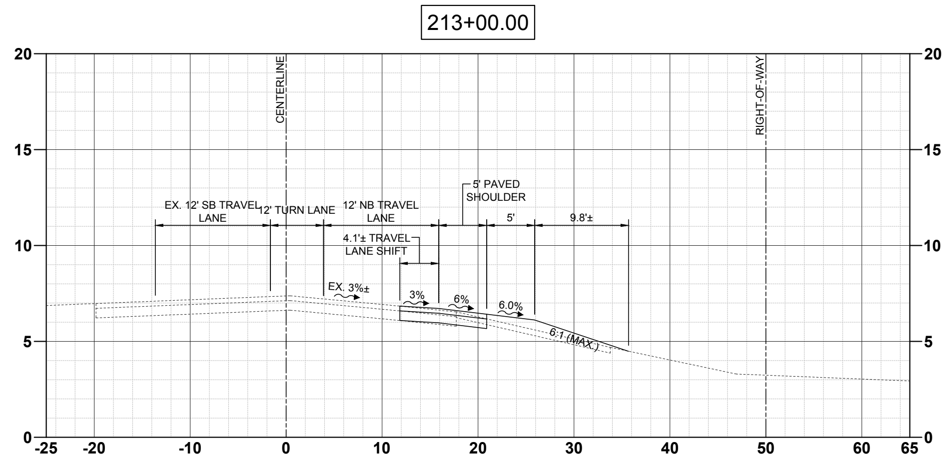
#	DATE	DESCRIPTION

FDOT SR-31 TURN LANE IMPROVEMENTS SECTIONS

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

Status:
FOR CONSTRUCTION,
SUBJECT TO ALL PERMIT APPROVALS

Sheet Number: 13



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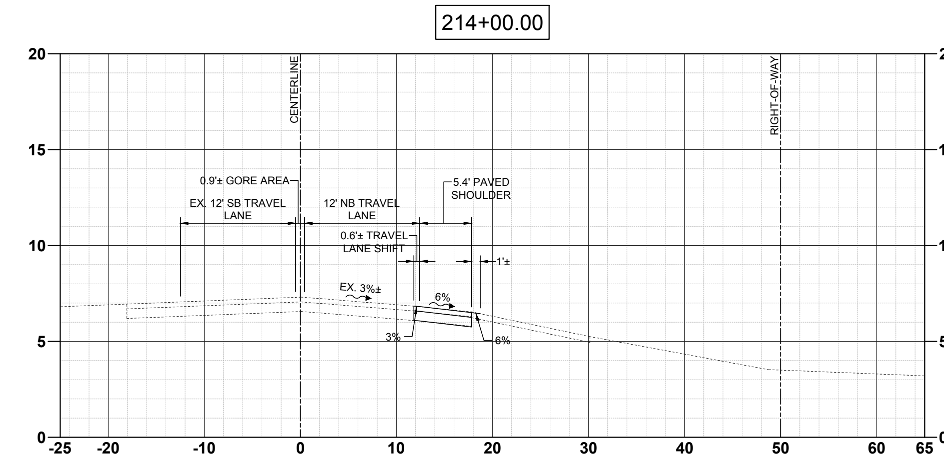
VERTICAL SCALE: 1"=5'



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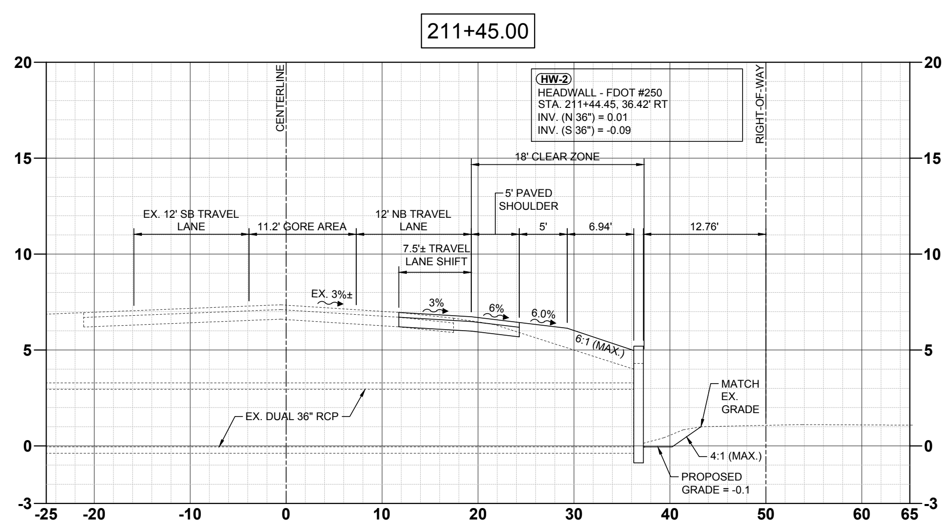

FDOT SR-31 CROSS SECTION @ STATION 211+45.00

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

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3/27/2018 8:59 AM

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Fort Myers, FL 33901
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FLORIDA P.E. NO. 58217

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200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

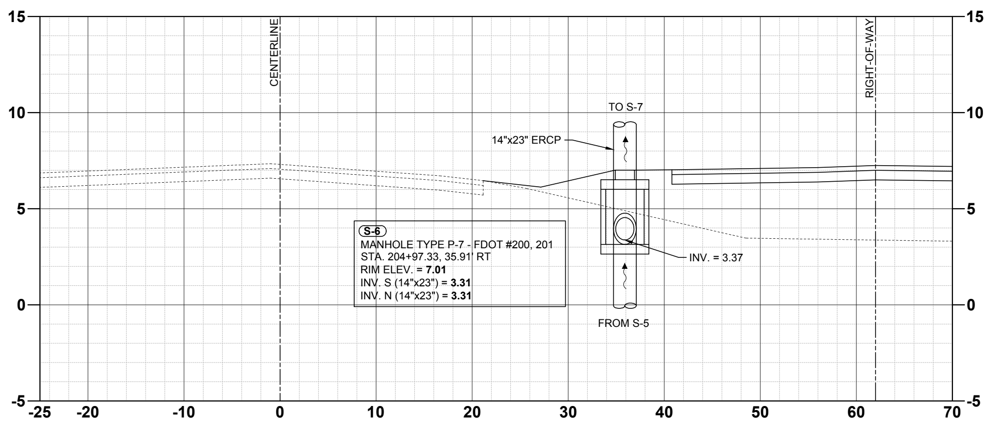
#	DATE	DESCRIPTION

FDOT SR-31 TURN LANE IMPROVEMENTS SECTIONS

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

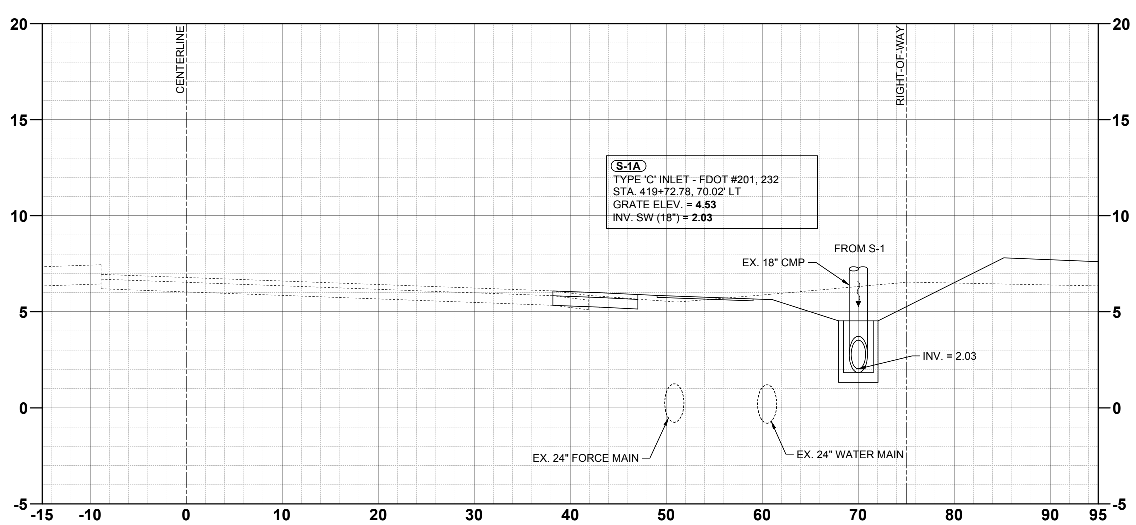
Status:
FOR CONSTRUCTION,
SUBJECT TO ALL PERMIT APPROVALS

Sheet Number: 14



FDOT SR-31 CROSS SECTION @ STRUCTURE S-6

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'



FDOT SR-80 CROSS SECTION @ STRUCTURE S-1A

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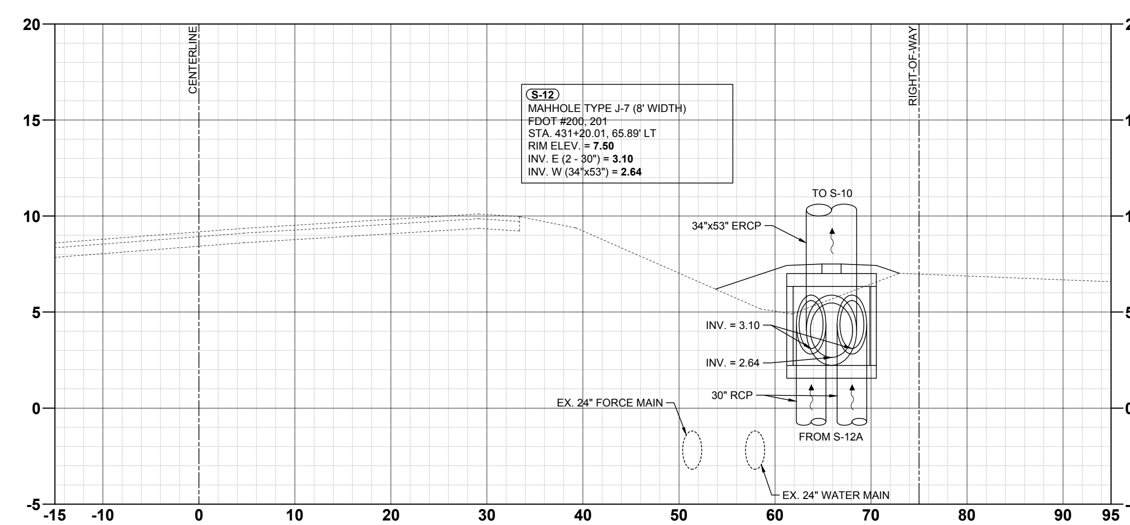
VERTICAL SCALE: 1"=5'



FDOT SR-80 CROSS SECTION @ STRUCTURE S-12

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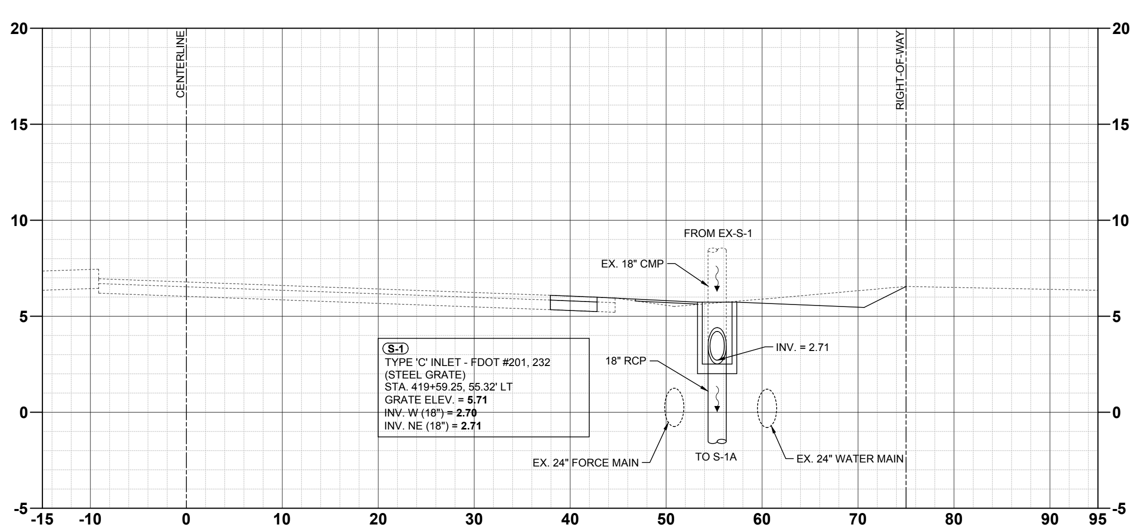
VERTICAL SCALE: 1"=5'



FDOT SR-80 CROSS SECTION @ STRUCTURE S-1

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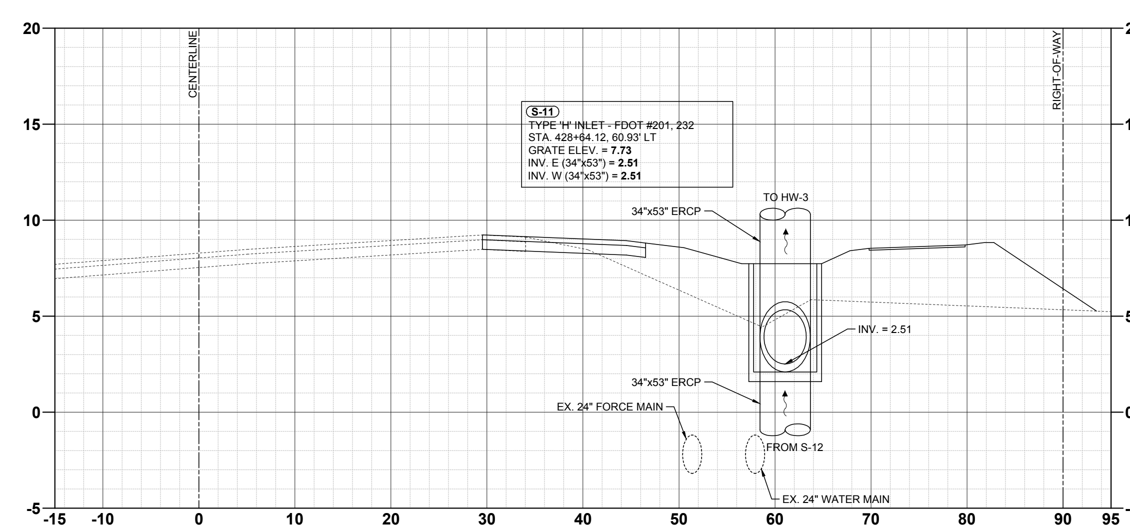
VERTICAL SCALE: 1"=5'



FDOT SR-80 CROSS SECTION @ STRUCTURE S-11

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

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ENGINEER OF RECORD:
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ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

#	DATE	DESCRIPTION

DRAINAGE STRUCTURE SECTIONS

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

Status:
FOR CONSTRUCTION,
SUBJECT TO ALL PERMIT APPROVALS

Sheet Number: 15

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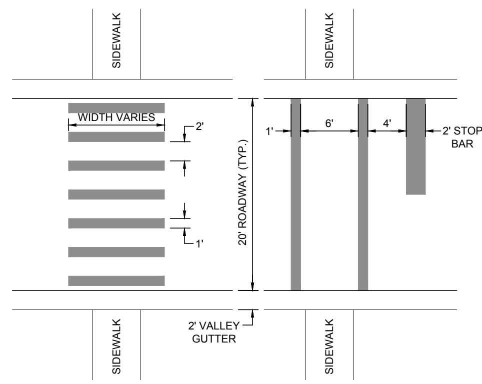
3/27/2018 9:00 AM



HIGH VISIBILITY

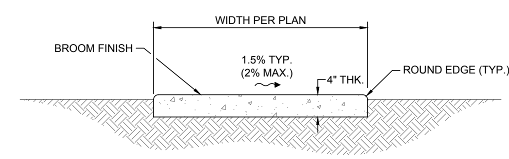
STANDARD
W/ STOP BAR

NOTES:

1. SEE PLANS FOR TYPE OF CROSSWALK STRIPING AND LOCATION.
2. DETAILS REFERENCED F.D.O.T. INDEX NO. 17346 & M.U.T.C.D. SECTION 3B.17
3. CROSSWALKS SHALL HAVE A MAXIMUM RUNNING SLOPE OF 1:20 (5%) AND A MAXIMUM CROSS SLOPE OF 1:50 (2%) PER ADA STANDARDS FOR ACCESSIBLE DESIGN SECTION 4.3.

TYPICAL PEDESTRIAN CROSSWALKS

NTS



NOTES:

1. SIDEWALK SHALL BE CONSTRUCTED IN CONFORMANCE WITH FDOT STANDARD INDEX 310 AND STANDARD SPECIFICATION 522 AND CORRESPONDING STANDARDS.
2. COMPACT FILL AREAS TO MINIMUM 95% OF AASHTO T99 DENSITY.
3. SIDEWALK SHALL HAVE CONTRACTION JOINTS SPACED EQUALLY TO THE SIDEWALK WIDTH AND HAVE EXPANSION JOINTS EVERY 120' MAXIMUM.
4. CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 3000 PSI IN 28 DAYS.
5. SIDEWALKS SHALL HAVE A MAXIMUM RUNNING SLOPE OF 1:20 (5%) AND A MAXIMUM CROSS SLOPE OF 1:50 (2%) PER ADA STANDARDS FOR ACCESSIBLE DESIGN SECTION 4.3.
6. CURB RAMPS SHALL BE CONSTRUCTED IN CONFORMANCE WITH ADA STANDARDS FOR ACCESSIBLE DESIGN SECTION 4.7 AND FDOT STANDARD INDEX 304.

TYPICAL CONCRETE SIDEWALK DETAIL

NTS

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200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER
TURN LANE IMPROVEMENTS

PLAN REVISIONS

#	DATE	DESCRIPTION

PAVING DETAILS

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

Status:
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Sheet Number: 16

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3/27/2018 9:00 AM

NOTE:
REFERENCE FDOT DESIGN STANDARDS 2017/2018, INDEX NO. 600, TRAFFIC CONTROL THROUGH WORK ZONES FOR ADDITIONAL INFORMATION.

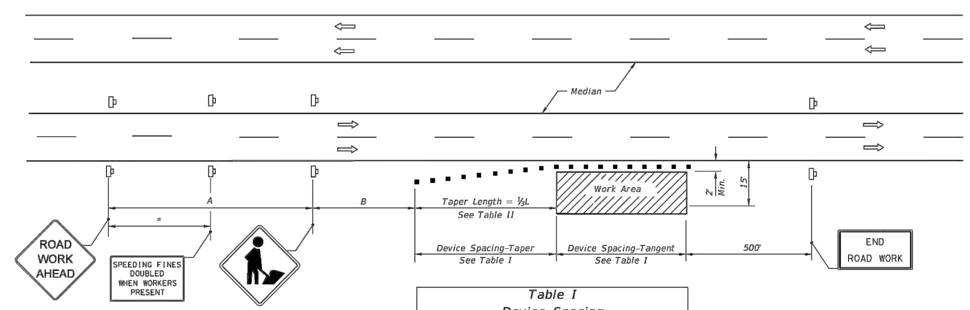


Table I
Device Spacing

Speed (mph)	Max. Distance Between Devices (ft.)			
	Cones or Tubular Markers		Type I or Type II Barricades or Vertical Panels or Drums	
	Taper	Tangent	Taper	Tangent
25	25	50	25	50
30 to 45	25	50	30	50
50 to 70	25	50	50	100

Table II
Taper Length - Shoulder

Speed (mph)	⅓L (ft.)			Notes
	8' Shldr.	10' Shldr.	12' Shldr.	
25	28	35	42	$L=\frac{WS^2}{60}$
30	40	50	60	
35	55	68	82	
40	72	90	107	
45	120	150	180	L=WS
50	133	167	200	
55	147	183	220	
60	160	200	240	
65	173	217	260	
70	187	233	280	

8' minimum shoulder width.

⅓L = Length of shoulder taper in feet

W = Width of total shoulder in feet (combined paved and unpaved width)

S = Posted speed limit (mph)

DISTANCE BETWEEN SIGNS

Speed	Spacing (ft.)	
	A	B
40 mph or less	200	200
45 mph	350	350
50 mph or greater	500	500

* 250' beyond the ROAD WORK AHEAD sign or midway between signs whichever is less.

SYMBOLS

Work Area

Channelizing Device (See Index No. 600)

Work Zone Sign

Lane Identification + Direction of Traffic

GENERAL NOTES

1. When a high volume of work vehicles are entering and leaving the Work Area at speeds slower than 10 MPH below the posted speed, place an MOT-5-06 sign in the ROAD WORK AHEAD sign location and shift the ROAD WORK AHEAD sign upstream 500 ft.
2. This TCZ plan also applies to work performed in the median more than 2' but less than 15' from the edge of travelway.
3. When work is being performed on a multilane undivided roadway the signs normally mounted in the median (as shown) shall be omitted.
4. WORKERS signs to be removed or fully covered when no work is being performed.
5. SHOULDER WORK sign may be used as an alternate to the WORKER symbol sign.
6. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed in accordance with other applicable TCZ Indexes.
7. For general TCZ requirements and additional information, refer to Index No. 600.

DURATION NOTES

1. Signs and channelizing devices may be omitted if all of the following conditions are met:
   a. Work operations are 60 minutes or less.
   b. Vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA CLOSER THAN 15' BUT NOT CLOSER THAN 2' TO THE EDGE OF TRAVEL WAY.

LAST REVISION	DESCRIPTION:			INDEX NO.	SHEET NO.
01/01/16		FDOT FY 2017-18 DESIGN STANDARDS	MULTILANE, WORK ON SHOULDER	612	1 of 1

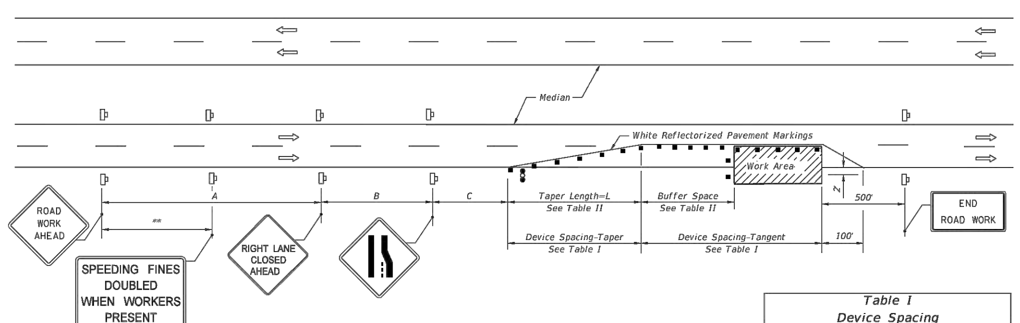


Table II
Buffer Space and Taper Length

Speed (mph)	Buffer Space	Taper Length (12' Lateral Transition)	
	Dist. (ft.)	L (ft.)	Notes (Merge)
25	155	125	$L=\frac{WS^2}{60}$
30	200	180	
35	250	245	
40	305	320	
45	360	540	L = WS
50	425	600	
55	495	660	
60	570	720	
65	645	780	
70	730	840	

When Buffer Space cannot be attained due to geometric constraints, the greatest attainable length shall be used, but not less than 200 ft.

For lateral transitions other than 12', use formula for L shown in notes column. Where:

L = Length of taper in feet
W = Width of lateral transition in feet
S = Posted speed limit (mph)

Table I
Device Spacing

Speed (mph)	Max. Distance Between Devices (ft.)			
	Cones or Tubular Markers		Type I or Type II Barricades or Vertical Panels or Drums	
	Taper	Tangent	Taper	Tangent
25	25	50	25	50
30 to 45	25	50	30	50
50 to 70	25	50	50	100

DISTANCE BETWEEN SIGNS

Speed	Spacing (ft.)		
	A	B	C
40 mph or less	200	200	200
45 mph	350	350	350
50 mph	500	500	500
*55 mph or greater	2640	1640	1000

* The ROAD WORK 1 MILE sign may be used as an alternate to the ROAD WORK AHEAD sign and the RIGHT LANE CLOSED ½ MILE sign may be used as an alternate to the RIGHT LANE CLOSED AHEAD sign.

** 500' beyond the ROAD WORK AHEAD sign or midway between signs whichever is less.

SYMBOLS

Work Area

Channelizing Device (See Index No. 600)

Work Zone Sign

Advance Warning Arrow Board

GENERAL NOTES

1. Work operations shall be confined to one traffic lane, leaving the adjacent lane open to traffic.
2. On undivided highways the median signs as shown are to be omitted.
3. When work is performed in the median lane on divided highways, the channelizing device plan is inverted and left lane closed and lane ends signs substituted for the right lane closed and lane end signs.

   The same applies to undivided highways with the following exceptions:
   a. Work shall be confined within one median lane.
   b. Additional barricades, cones, or drums shall be placed along the centerline abutting the work area and across the trailing end of the work area.

   When work on undivided highways occurs across the centerline so as to encroach on both median lanes, the inverted plan is applied to the approach of both roadways.
4. Signs and traffic control devices are to be modified in accordance with INTERMITTENT WORK STOPPAGE details (sheet 2 of 2) when no work is being performed and the highway is open to traffic.
5. The two channelizing devices directly in front of the work area may be omitted provided vehicles in the work area have high-intensity rotating, flashing, oscillating, or strobe lights operating.
6. When paved shoulders having a width of 8 ft. or more are closed, channelizing devices shall be used to close the shoulder in advance of the merging taper to direct vehicular traffic to remain within the travel way. See Index No. 612 for shoulder taper formulas.
7. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed in accordance with other applicable TCZ Indexes.
8. This TCZ plan does not apply when work is being performed in the middle lane(s) of a six or more lane highway. See Index No. 614.
9. For general TCZ requirements and additional information, refer to Index No. 600.

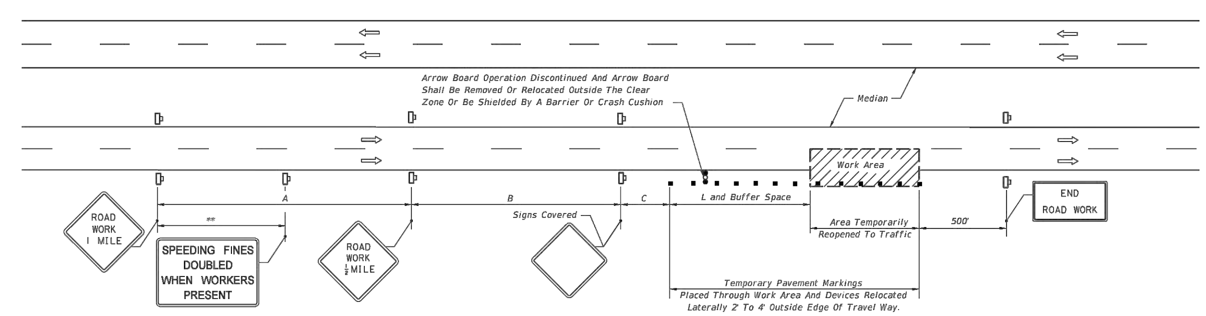
DURATION NOTES

1. Temporary white edgeline may be omitted for work operations less than 3 consecutive calandar days.
2. For work operations up to approximately 15 minutes, signs, channelizing devices, arrow board, and buffer space may be omitted if all of the following conditions are met:
   a. Speed limit is 45 mph or less.
   b. No sight obstructions to vehicles approaching the work area for a distance equal to the buffer space and the taper length combined.
   c. Volume and complexity of the roadway has been considered.
   d. The closed lane is occupied by a class 5 or larger, medium duty truck(s) with a minimum gross weight vehicle rating (GWVR) of 16,001 lb with high-intensity, rotating, flashing, oscillating, or strobe lights mounted above the cab height and operating.
3. For work operations up to 60 minutes, arrow board and buffer space may be omitted if conditions a, b, and c in DURATION NOTE 2 are met, and vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.

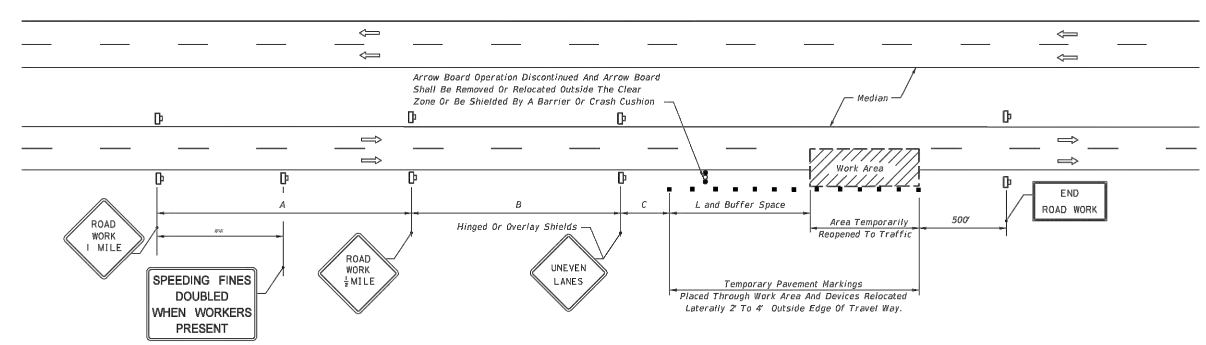
CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE LANE ADJACENT TO EITHER SHOULDER AND THE AREA 2' OUTSIDE THE EDGE OF TRAVEL WAY.

LAST REVISION	DESCRIPTION:			INDEX NO.	SHEET NO.
01/01/16		FDOT FY 2017-18 DESIGN STANDARDS	MULTILANE, WORK WITHIN TRAVEL WAY MEDIAN OR OUTSIDE LANE	613	1 of 2



EVEN PAVEMENT



UNEVEN PAVEMENT

INTERMITTENT WORK STOPPAGE - LANE REOPENED TO TRAFFIC

LAST REVISION	DESCRIPTION:			INDEX NO.	SHEET NO.
07/01/15		FDOT FY 2017-18 DESIGN STANDARDS	MULTILANE, WORK WITHIN TRAVEL WAY MEDIAN OR OUTSIDE LANE	613	2 of 2

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Florida Certificate of Authorization Engineering LB #26978

ENGINEER OF RECORD:
JOHN T. WOJDAK, P.E. (FOR THE FIRM)
FLORIDA P.E. NO. 58217

NOT VALID WITHOUT SEAL, SIGNATURE AND DATE

OWNER / DEVELOPER:
RACETRAC PETROLEUM, INC.
200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER TURN LANE IMPROVEMENTS

PLAN REVISIONS

#	DATE	DESCRIPTION

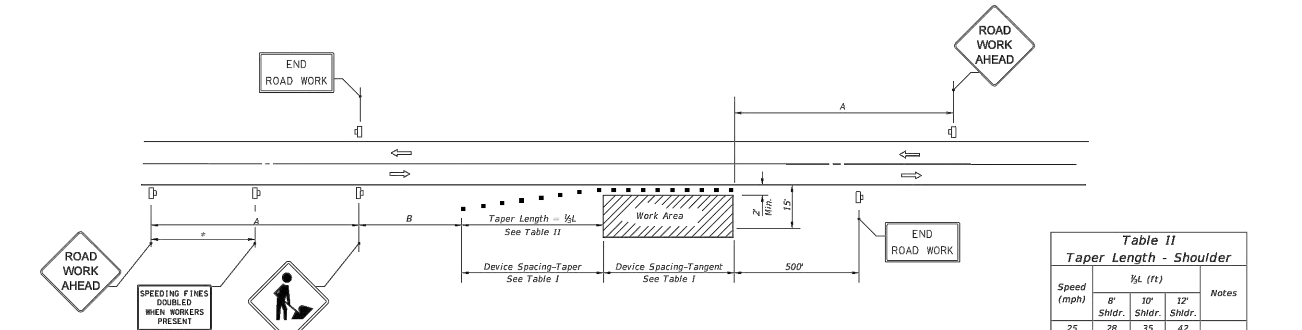
SR-80 FDOT MAINTENANCE OF TRAFFIC DETAILS

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

Status:
FOR CONSTRUCTION,
SUBJECT TO ALL PERMIT APPROVALS

Sheet Number: 17

NOTE:
REFERENCE FDOT DESIGN STANDARDS 2017/2018, INDEX NO. 600, TRAFFIC CONTROL THROUGH WORK ZONES FOR ADDITIONAL INFORMATION.



DISTANCE BETWEEN SIGNS		
Speed	Spacing (ft.)	
	A	B
40 mph or less	200	200
45 mph	350	350
50 mph or greater	500	500

*Midway between signs.

Table I
Device Spacing

Speed (mph)	Max. Distance Between Devices (ft.)			
	Cones or Tubular Markers		Type I or Type II Barricades or Vertical Panels or Drums	
	Taper	Tangent	Taper	Tangent
25	25	50	25	50
30 to 45	25	50	30	50
50 to 70	25	50	50	100

Table II
Taper Length - Shoulder

Speed (mph)	⅓L (ft)			Notes
	8' Shldr.	10' Shldr.	12' Shldr.	
25	28	35	42	$L=\frac{WS^2}{60}$
30	40	50	60	
35	55	68	82	
40	72	90	107	
45	120	150	180	L=WS
50	133	167	200	
55	147	183	220	
60	160	200	240	
65	173	217	260	
70	187	233	280	

8' minimum shoulder width

⅓L = Length of shoulder taper in feet

W = Width of total shoulder in feet (combined paved and unpaved width)

S = Posted speed limit (mph)

SYMBOLS

- Work Area
- Channelizing Device (See Index No. 600)
- Work Zone Sign
- Lane Identification + Direction of Traffic

GENERAL NOTES

1. When four or more work vehicles enter the through traffic lanes in a one hour period or less (excluding establishing and terminating the work area), the advanced FLAGGER sign shall be substituted for the WORKERS sign. For location of flaggers and FLAGGER signs, see Index No. 603.
2. SHOULDER WORK sign may be used as an alternate to the WORKER symbol sign only on the side where the shoulder work is being performed.
3. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed in accordance with other applicable TCZ Indexes.
4. For general TCZ requirements and additional information, refer to Index No. 600.

DURATION NOTES

1. Signs and channelizing devices may be omitted if all of the following conditions are met:
   a. Work operations are 60 minutes or less.
   b. Vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.

CONDITIONS

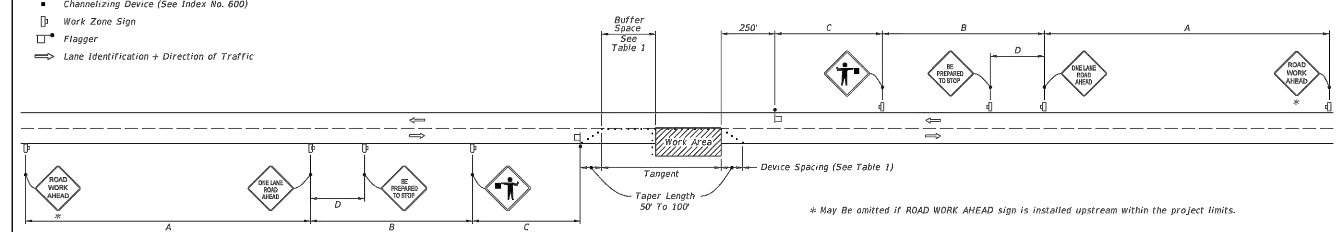
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA CLOSER THAN 15' BUT NOT CLOSER THAN 2' TO THE EDGE OF TRAVEL WAY.

10/12/2016 1:06:55 PM

LAST REVISION	REVISION	DESCRIPTION:	FDOT	FY 2017-18 DESIGN STANDARDS	TWO-LANE, TWO-WAY, WORK ON SHOULDER	INDEX NO.	SHEET NO.
07/01/15						602	1 of 1

SYMBOLS:

- Work Area
- Channelizing Device (See Index No. 600)
- Work Zone Sign
- Flagger
- Lane Identification + Direction of Traffic



WITHOUT TEMPORARY RAISED RUMBLE STRIPS

GENERAL NOTES:

1. Special Conditions may be required in accordance with these notes and the following sheets:
   A. Railroad Crossings:
      a. If an active railroad crossing is located closer to the Work Area than the queue length plus 300 feet, extend the Buffer Space as shown on Sheet 3.
      b. If the queuing of vehicles across an active railroad crossing cannot be avoided, provide a uniformed traffic control officer or flagger at the highway-rail grade crossing to prevent vehicles from stopping within the highway-rail grade crossing, even if automatic train warning devices are in place.
   B. If the Work Area encroaches on the Centerline, use the Layout for Temporary Lane Shift to Shoulder on Sheet 3 only if the Existing Paved Shoulder width is sufficient to provide for an 11' lane between the Work Area and the Edge of Existing Paved Shoulder. Reduce the posted speed when appropriate.
2. Temporary Raised Rumble Strips:
   A. Use when both of the following conditions are met concurrently:
      a. Existing Posted Speed is 55 mph or greater;
      b. Work duration is greater than 60 minutes.
   B. Use a consistent Strip color throughout the work zone.
   C. Place each Rumble Strip Set transversely across the lane at locations shown.
   D. Use Option 1 or Option 2 as shown on Sheet 2. Use only one option throughout work zone.
3. Additional one-way control may be provided by the following means:
   A. Flag-carrying vehicle;
   B. Official vehicle;
   C. Pilot vehicles;
   D. Traffic signals.

   When flaggers are the sole means of one-way control, the flaggers must be in sight of each other or in direct communication at all times.
4. When a side road intersects the highway within the TTC zone, place additional TTC devices in accordance with other applicable TCZ Indexes.
5. The two channelizing devices directly in front of the work area may be omitted provided vehicles in the work area have high-intensity rotating, flashing, oscillating, or strobe lights operating.
6. When Buffer Space cannot be attained due to geometric constraints, use the greatest attainable length, not less than 200 ft, for posted speeds greater than 25 mph.
7. ROAD WORK AHEAD and the BE PREPARED TO STOP signs may be omitted if all of the following conditions are met:
   A. Work operations are 60 minutes or less.
   B. Speed limit is 45 mph or less.
   C. There are no sight obstructions to vehicles approaching the work area for a distance equal to the Buffer Space shown in Table 1.
   D. Vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.
   E. Volume and complexity of the roadway has been considered.
   F. If a railroad crossing is present, vehicles will not queue across rail tracks.
   G. AFADs are not in use.
8. See Index 600 for general TCZ requirements and additional information.
9. Automated Flagger Assistance Devices (AFADs) may be used in accordance with Specifications Section 102, 990 and the APL vendor drawings.

TABLE 1

Posted Speed	DEVICE SPACING				Distance Between Signs				Buffer Space
	Maximum Spacing of Cones or Tubular Markers		Maximum Spacing of Type I or Type II Barricades/Panels/Drums						
	On a Taper	On a Tangent	On a Taper	On a Tangent	A	B	C	D	
25	20'	50'	20'	50'	200'	200'	200'	100'	155'
30	20'	50'	20'	50'	200'	200'	200'	100'	200'
35	20'	50'	20'	50'	200'	200'	200'	100'	250'
40	20'	50'	20'	50'	200'	200'	200'	100'	305'
45	20'	50'	20'	50'	350'	350'	350'	175'	360'
50	20'	50'	20'	100'	500'	500'	500'	250'	425'
55	20'	50'	20'	100'	2640'	1500'	1000'	500'	495'
60	20'	50'	20'	100'	2640'	1500'	1000'	500'	570'
65	20'	50'	20'	100'	2640'	1500'	1000'	500'	645'
70	20'	50'	20'	100'	2640'	1500'	1000'	500'	730'

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA BETWEEN THE CENTERLINE AND A LINE 2' OUTSIDE THE EDGE OF TRAVEL WAY.

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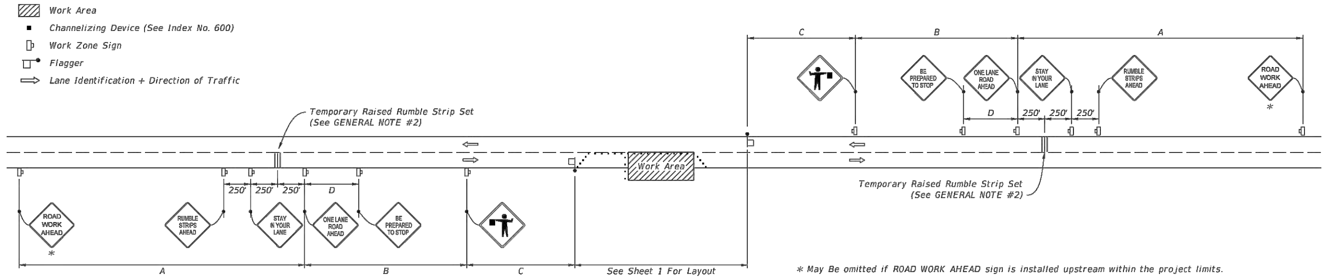
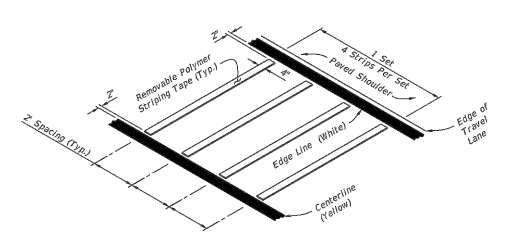
LAST REVISION	REVISION	DESCRIPTION:	FDOT	FY 2017-18 DESIGN STANDARDS	TWO-LANE, TWO-WAY, WORK WITHIN THE TRAVEL WAY	INDEX NO.	SHEET NO.
01/01/16						603	1 of 3

SYMBOLS:

- Work Area
- Channelizing Device (See Index No. 600)
- Work Zone Sign
- Flagger
- Lane Identification + Direction of Traffic

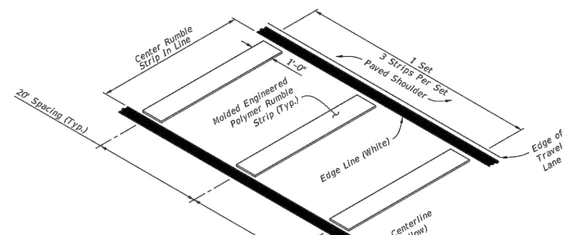


WITH TEMPORARY RAISED RUMBLE STRIPS
(When Required See GENERAL NOTE #2)



REMOVABLE POLYMER STRIPING TAPE

RUMBLE STRIP SET
OPTION - 1



MOLDED ENGINEERED POLYMER SET

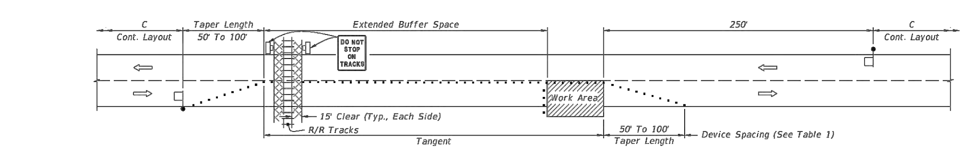
RUMBLE STRIP SET
OPTION - 2

TEMPORARY RAISED RUMBLE STRIPS

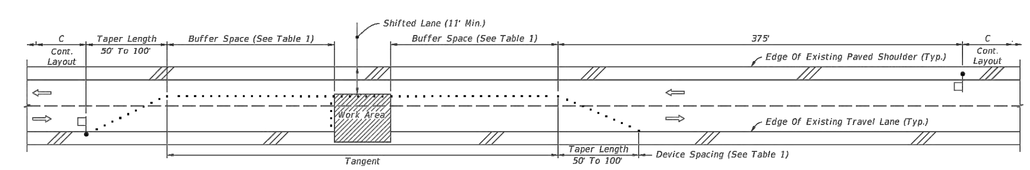
LAST REVISION	REVISION	DESCRIPTION:	FDOT	FY 2018-19 DESIGN STANDARDS	TWO-LANE, TWO-WAY, WORK WITHIN THE TRAVEL WAY	INDEX NO.	SHEET NO.
02/04/16						603	2 of 3

SYMBOLS:

- Work Area
- Channelizing Device (See Index No. 600)
- Work Zone Sign
- Flagger
- Lane Identification + Direction of Traffic



TEMPORARY RAILROAD CROSSING BUFFER SPACE EXTENSION



TEMPORARY LANE SHIFT TO SHOULDER WHEN WORK AREA ENCROACHES ON THE CENTERLINE

SPECIAL CONDITIONS

Cross Rerefence:
1. See General Note #1, Sheet 1 for more information.

SPECIAL CONDITIONS

LAST REVISION	REVISION	DESCRIPTION:	FDOT	FY 2017-18 DESIGN STANDARDS	TWO-LANE, TWO-WAY, WORK WITHIN THE TRAVEL WAY	INDEX NO.	SHEET NO.
01/01/16						603	3 of 3

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Florida Certificate of Authorization Engineering LB #26978

ENGINEER OF RECORD:
JOHN T. WOJDAK, P.E. (FOR THE FIRM)
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NOT VALID WITHOUT SEAL, SIGNATURE AND DATE

OWNER / DEVELOPER:
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200 GALLERIA PARKWAY SE, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

PROJECT:
GORDON CENTER
TURN LANE IMPROVEMENTS

PLAN REVISIONS		
#	DATE	DESCRIPTION

SR-31 FDOT
MAINTENANCE OF TRAFFIC DETAILS

Project Manager:	JTW
Drawn By:	CAS
Checked By:	JTW
Project Number:	21307
Part of Section(s):	30
Township: 43 S	Range: 26 E
County, State:	LEE COUNTY, FL

Status:
FOR CONSTRUCTION,
SUBJECT TO ALL PERMIT APPROVALS

Sheet Number: 18