

# FINAL

# LOCATION HYDRAULICS REPORT

Florida Department of Transportation  
District One

SR 31 Project Development and Environment (PD&E) Study  
From SR 80 (Palm Beach Blvd) to SR 78 (Bayshore Road)

Lee County, Florida

Financial Management Number: 441942-1-22-01

ETDM Number 14359

June 2022

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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## Table of Contents

Section	Page
<b>Executive Summary .....</b>	<b>4</b>
<b>1.0 Introduction.....</b>	<b>6</b>
<b>2.0 Project Description .....</b>	<b>7</b>
<b>3.0 Data Collection .....</b>	<b>7</b>
<b>4.0 Existing Drainage Conditions.....</b>	<b>8</b>
4.1 Topography & Hydrologic Features .....	8
4.2 Existing Bridge Data .....	8
4.2.1 Previous Studies.....	10
4.2.2 Long Term Aggradation and Degradation.....	10
4.3 Soils Data & Geotechnical Investigations.....	11
4.4 Environmental Characteristics .....	12
4.4.1 Land Use Data .....	12
4.5 Floodplains/Floodways .....	12
4.5.1 Preliminary FEMA Map Comparison.....	13
4.6 Flooding History and Maintenance Concerns.....	14
<b>5.0 Proposed Conditions .....</b>	<b>14</b>
5.1 Proposed Typical Section Improvements .....	16
5.2 Longitudinal & Transverse Floodplain Impacts.....	16
5.3 Project Classification.....	17
5.4 Risk Evaluation .....	17
5.5 PD&E Manual Requirements with Minimal Encroachment.....	18
<b>6.0 Conclusions.....</b>	<b>20</b>

## **TABLES**

Table 1 – Summary of Existing Cross Drains and Bridges

Table 2 – Existing Bridge Data (Caloosahatchee River)

Table 3 – Bridge Inspection Report Results Bridge (Caloosahatchee River)

Table 4 – USDA NRCS Soil Survey Information

Table 5 – Summary of Proposed Cross Drains

Table 6 – Cross Drain Comparison Summary Table

## **APPENDICES**

Appendix 1 - Exhibits

Appendix 2 – Cross Drain Field Photos

Appendix 3 – Cross Drain Analysis (HY-8)

Appendix 4 – FEMA Floodplain Maps

Appendix 5 - Correspondence

Appendix 6 – Existing Permits

## 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 31 (SR 31) from SR 80 (Palm Beach Blvd) to SR 78 (Bayshore Rd) in Lee County, Florida. The improvements consist of widening the existing two-lane rural roadway to a 6-lane urban curb and gutter section from State Road 80 (SR 80) to SR 78, for a project length of approximately 1.5 miles. The study includes the bridge replacement over the Caloosahatchee River and intersection improvements at SR 80.

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). SR 31 is classified as an urban minor arterial from SR 80 to north of SR 78. The proposed typical section comprises of six (6) 11-foot lanes, two (2) 12-foot wide shared use paths, a raised median, and curb and gutter with storm sewer system. [See Figure 8 in Appendix 1.](#)

The purpose of this Location Hydraulic Report is to address base floodplain encroachments resulting from the roadway improvements evaluated in the PD&E Study. In accordance with Executive Order 11988 “Floodplain Management”, USDOT Order 5650.2. “Floodplain Management Protection”, and Federal-Aid Policy Guide 23 CFR 650A, floodplains must be protected. The intent of these regulations is to avoid or minimize highway encroachments within the 100-year (base) floodplains.

A SFWMD Preapplication Meeting was held on September 13, 2019. There are 4 existing cross drains within the study limits (See Figure ES-1 next page). Two cross drains along SR 31 will be upsized due to the widening. One new cross drain (CD-2A) will be required to maintain conveyance under the new Eastern Alignment (see table below).

**Table ES-1 Cross Drain Data**

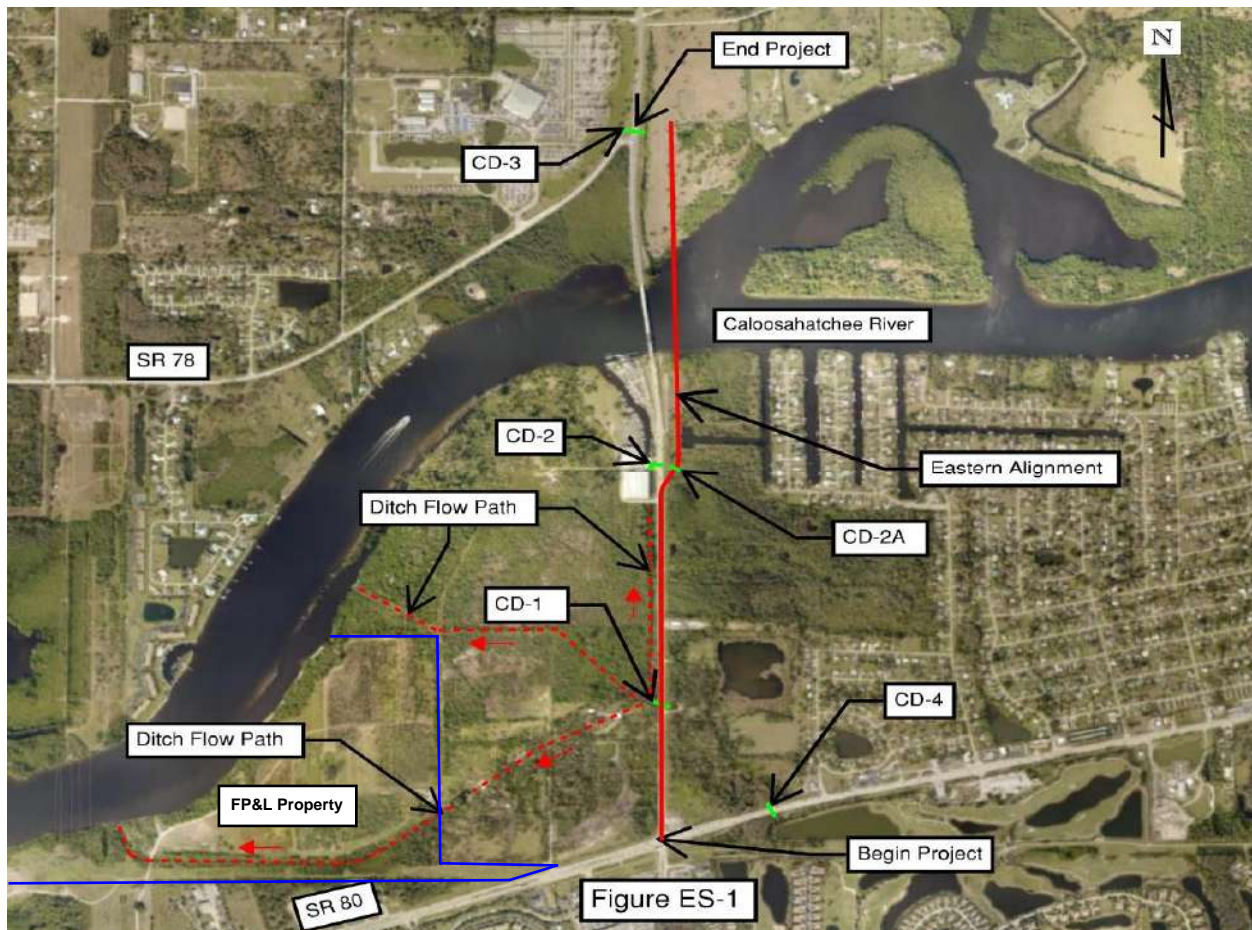
Cross Drain	Pipe Size		Pipe Length		Design Changes
	Existing	Proposed	Existing	Proposed	
CD-1	2-36"	2-48"	90'	178'	Replace & Upsize
CD-2	2-36"	2-36"	111'	111'	No Modifications
CD-2A	N/A	2-48"	N/A	164'	New CD
CD-3	18"	18"	96'	96'	No Modifications
CD-4 (SR 80)	2-36"	2-36"	117'	TBD	TBD

The existing base flood (2008) is elevation 7' NAVD which is the approximate roadway crown elevation of SR 31 and SR 80. No floodplain compensation is proposed due to the tidal nature of the floodplain within the study limits. It should be noted that Lee County has developed Preliminary FEMA maps (dated June

28, 2019) with a base flood elevation of 10/11 which is approximately 3 feet higher than the current floodplain. The new maps are anticipated to be effective in the fall of 2022. In the drainage coordination meeting with FDOT District One drainage department dated December 06, 2021, the decision was made to use the “preliminary” maps and the elevation 10.0 100-year floodplain elevations. A study is being conducted by Intera in connection with this project concerning “Sea Level Rise”. Sea Level Rise will be taken into account and further analysis regarding resiliency will be included when the study is completed, see meeting minutes from 12/06/2021, FDOT District One Drainage meeting. It is determined that the floodplain encroachment is classified as “minimal”. Minimal encroachments on a floodplain occur when there is a floodplain involvement, but the impacts on human life, transportation facilities, and natural and beneficial floodplain values are not significant and can be resolved with minimal efforts. Because the project is located downstream of the Franklin Lock, the portion of the Caloosahatchee Watershed that contributes to this project is tidally influenced. Since this contributing area is tidally influenced floodplain compensation is not a part of this project. Please refer to [Section 5.5](#) for further discussion.

In conclusion, the following statement summarized the results of our findings:

***“The proposed cross drains will perform hydraulically in a manner equal to or greater than the existing condition, and backwater surface elevations are not expected to increase. Thus, there will be no significant change in flood risk, and there will not be a significant change in the potential for interruption or termination of emergency service or in emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant.”***



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## 1.0 Introduction

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study to evaluate the costs and impacts of constructing roadway capacity improvements to State Road 31 (SR 31) from SR 80 (Palm Beach Blvd) to SR 78 (Bayshore Rd) in Lee County, Florida. These improvements consist of widening the existing two-lane roadway to a six-lane roadway from State Road 80 (SR 80) to SR 78, for a project length of approximately 1.5 miles. The study includes the bridge replacement over the Caloosahatchee River along with SR 80 intersection improvements.

SR 31 is currently classified by FDOT as an urban minor arterial from SR 80 to north of SR 78. The proposed typical section comprises of six (6) 11-foot lanes, two (2) 12-foot wide shared-use paths, a raised median, and curb and gutter with storm sewer system. The [Project Location Map](#) is shown in [Figure 1, Appendix 1](#) exhibits.

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 project site is within Section 12, 13, 24 and 25 of Township 43 South, Range 25 East, Sections 7, 18, 19, and 30 Township 43 South, Range 26 East. The existing drainage pattern south of the Wilson Pigott Bridge is typically from east to west around the area of the intersection of SR 80 and SR 31, stormwater runoff sheet flows to the west then is collected in roadside swales flowing into the existing double 36" RCP (CD-1) cross drain or adjacent wetlands. A portion of the roadway runoff sheet flows directly to adjacent wetland systems. The stormwater runoff in the area on the west side of SR 31 from the intersection of SR 80 and SR 31 sheet flows either to the north or to the west to the river through the FP&L property. Flowing to the north, runoff is collected in roadside swales along the roadway embankment and flows to the Sweetwater Landing Marina. A double 36" RCP (CD-2) conveys the runoff from the west side of SR 31 to the east side of SR 31. The existing double 36" cross drain has a 90-degree turn located at the driveway to the marina. From CD-2 the stormwater run-off flows north to the Caloosahatchee River. [See Figure 2, Drainage Map for existing flow patterns](#). The existing drainage pattern north of the bridge is that the west side sheet flows to the east towards SR 31. Then the stormwater is collected in road side ditches that flows to the south to the Caloosahatchee River. The stormwater runoff from the east sheet flows to the west toward SR 31 and then is collected in road side ditches and flows to the south to the Caloosahatchee River.

Please refer to [Figure 2](#) for the [Drainage Basin Map](#). A reproduction of the [United States Geological Survey \(USGS\) Quadrangle Maps](#) for the project vicinity is shown in [Figure 3](#).

The purpose of this Location Hydraulic Report is to address base floodplain encroachments resulting from the roadway improvements evaluated in the PD&E Study. In accordance with Executive Order 11988 "Floodplain Management", USDOT Order 5650.2. "Floodplain Management Protection", and Federal-Aid Policy Guide 23 CFR 650A, floodplains must be protected. The intent of these regulations is to avoid or minimize highway encroachments within the 100-year (base) floodplains and to avoid supporting land use development incompatible with floodplain values. All exhibits for this report are included in [Appendix 1](#). For the ease of review, [Cross Drain Analysis](#) and [FEMA Floodplain Maps](#) are included in [Appendices 3](#) and [4](#), respectively. Other supporting information and data is included in the remaining appendices. Please note that the vertical datum used for this project is NAVD 88, unless otherwise specified.

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## 2.0 Project Description

FDOT proposes a roadway widening for SR 31 from SR 80 (Palm Beach Blvd) to north of SR 78 (Bayshore Rd) in Lee County, Florida. The project extends for approximately 1.5 miles traversing four (4) cross drains and one (1) bridge will have to be replaced as a result of the roadway widening. The limits of this project are shown on the [Project Location Map](#) as shown in [Figure 1, Appendix 1](#) exhibits.

The existing typical section for SR 31 within the project limits is a two-lane rural roadway within a right-of-way that is 100 feet in width. It includes two twelve-foot lanes with five-foot paved shoulders along both sides of the road. Stormwater runoff is collected in roadside swales or sheet flows to adjacent wetlands. The posted speed limit along SR 31 through the project limits is 40 miles per hour (MPH) from SR 80 to north of SR 78. The existing roadway and bridge typical sections are provided as shown in [Figures 7 and 9, Appendix 1](#).

## 3.0 Data Collection

The PD&E 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, January 2019
- SR 31 Plans – Final Plans for Roadway Resurfacing, FPID 195662-1-52-01, M.P. 0.017 to M.P. 4.684, 1999
- SR 31 Plans – Final Plans of Bridge Rehabilitation, Project No. 12090-3509, M.P. 0.970 to M.P. 1.117, 1994
- SFWMD Environmental Resource Permit Information Manual Volume IV, 2012
- Federal Emergency Management Agency (FEMA), Panel Nos. 12071C0282F and 12071C0284F Lee County, Florida dated August 28, 2008, Preliminary Panels Nos. 12071C0284G and 12071C0282G, Florida dated 6/28/2019.
- U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey of Lee County, Florida 1984
- USDA NRCS Soil Survey Geographic (SSURGO) Database from SFWMD, 2010
- United States Geological Survey (USGS) Quadrangle Maps
- 1-foot contours from Lee County LiDAR, 2018
- Lee County Property Appraiser's Website (GIS parcel lines), 2019
- FDOT Straight Line Diagrams (SLD's) of Road Inventory for SR 31 and SR 78
- Field Reconnaissance (May 2019); field rain photos (May 2020)
- National Wetland Inventory (NWI) from U.S. Fish and Wildlife Service (USFWS), 2008 (GIS data)
- Interviews with FDOT Maintenance Staff
- SFWMD Environmental Resource Permits: 36-03133-P, 88-00012-S, 36-00036-S, and 36-00588-S

- Wetland Evaluation Report by DRMP, Inc., June 2020

## 4.0 Existing Drainage Conditions

### 4.1 Topography & Hydrologic Features

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. Please refer to [USGS Quadrangle Map](#) and [Figure 3 in Appendix 1](#). There are four (4) existing cross drains and one (1) existing bridge within the project limits allowing for conveyance of offsite and onsite runoff to the Caloosahatchee River. The size and geometry of all cross drains and bridges have been verified from the FDOT SLD's, 1-foot LiDAR contours, SR 31 plans, as well as during field reconnaissance. Please refer to [Table 1](#) for a summary of existing cross drains and bridges. Please refer to [Appendix 2](#) for field photos.

**Table 1 – Summary of Existing Cross Drains and Bridge**

Structure Number	FDOT Milepost	Description
CD-1	0.221	Double 36" RCP
CD-2	0.682	Double 36" RCP
#120064	0.970 - 1.118	777.9' Bridge over Caloosahatchee River (Wilson Pigott Bridge)
CD-3	1.425	Single 18" RCP
CD-4	SR 80 MP - 8.401	Double 36" RCP

### 4.2 Existing Bridge Data

The Wilson Pigott Bridge (Bridge No. 120064) is located on SR 31 approximately 1.0 mile north of SR 80, and crosses over the Caloosahatchee River. The bridge over the Caloosahatchee River had rehabilitations in 1996 and 2008. The Florida Department of Transportation proposes to reconstruct this bridge. Refer to [Figure 8-2, Appendix 1](#) for a typical section of the existing bridge. Information gathered from the Bridge Inspection Report was used to provide some of the parameters as summarized in [Table 2](#).



**Table 2 – Existing Bridge Data (Caloosahatchee River)**

	Bridge No. 120064
Year Constructed	1960
Structure Name	Wilson Pigott Draw Bridge
Section Number	12 090 000
Mile Post (MP) Marker	0.97
Facility Carried	SR 31
Approximate Location	1 mile north of SR 80
Owner/Maintenance Agency	FDOT
Crossing Waterway/Canal ID	Caloosahatchee River
Bridge Length	777.9 feet
Number of Traffic Lanes	2
Number of Spans	14 Total (1 Main Span at 105 feet, 13 Approach Spans)
Structure Type Pile Type	Steel, Movable-Bascule
Bridge Width	22.9 feet
Navigable Vertical Clearance	37 feet
Navigable Horizontal Clearance	26 feet
Channel Depth	89.6 feet
Deck Skew	0.0 degree
Deck Type	Concrete with concrete rails
Deck Drainage	Scuppers

### 4.2.1 Previous Studies

A Bridge Inspection Report (BIR) for the Wilson Pigott Draw Bridge (Bridge No. 120064) was prepared by Marlin Engineering, Inc. on October 29, 2021 for the FDOT. The BIR includes a scour elevation profile from inspections performed in 1998, 2019, and 2021. The 2021 BIR mentioned that the existing channel is in good condition, channel banks are protected or well vegetated, river control devices and embankment protection are not required or are in good condition. The concrete pier walls, bridge railing, columns, and abutments show little or no deterioration. There may be discoloration, efflorescence, and/or superficial cracking, but without effect on strength or serviceability, also minor cracks, spalls and scaling may be present but there is no exposed reinforcing or surface evidence of rebar corrosion. The 2021 BIR recommended removing dirt and debris accumulation on concrete abutment caps, removing vegetation growing from a concrete cap, removing vegetation from the abutment slope protection, and repairing undermined and displaced sand-cement riprap bags at toe of south slope protection. It is also recommended repairing the spall with exposed steel in the right sidewalk on the concrete deck and repairing the lower wales of the fender system. The 2021 BIR overall Performance Rating is “Fair” with a Sufficiency Rating of 52.0 and Health Index of 95.52 and channel rating is 7 (Minor Damage). Please refer to [Table 3](#) for a summary of the performance of the bridge.

**Table 3 – Bridge Inspection Report Results Bridge (Caloosahatchee River)**

Bridge Number	Existing Waterway	Channel Rating (2021 BIR)	Sufficiency Rating (2021 BIR)
120064	Caloosahatchee River	7 - Minor Damage	52.0

### 4.2.2 Long Term Aggradation and Degradation

The long-term aggradation (channel accumulation of sediment) and degradation (channel lowering due to erosion) scour has been analyzed using the existing data in the 2011 Bridge Inspection Report. Based on the BIR channel survey (1998, 2009, and 2011) the left side of the canal showed long term aggradation of 2.9 feet and 2.1 feet at Bents #5 and #6, respectively, and the right side of the canal showed degradation of 0.7 feet at Bent #8. The BIR dated 2011 also mentioned that the existing abutment slope protection has moderate to major deterioration and cracking, major deterioration of joints, and minor settlement may be present. Due to these reasons, the existing channel has experienced some long-term aggradation and degradation scouring. A Bridge Development Report (BDR) and a Bridge Hydraulics Report (BHR) will be provided to evaluate various bridge replacement alternatives.

### 4.3 Soils Data & Geotechnical Investigations

The Soil Survey of Lee County, Florida, published by the USDA NRCS (dated 1984) has been reviewed for the project vicinity. USDA SSURGO was also obtained from SFWMD to create a soils map in the project area using GIS ArcMap. SSURGO data was compared to Soil Survey by USDA NRCS and found no deviation. The soil survey map for the project vicinity is illustrated in **Figure 4 of Appendix 1**.

The soils encountered along the project limits are mostly Hydrological Soil Group (HSG) B/D soils. These types of soils are very poorly drained or poorly drained soils with high water tables. According to the Soil Survey, there are eight (8) different soil types located along the project limits. **Table 4 – USDA NRCS Soil Survey Information** summarizes and lists the soil types and relevant information. The ground water is at a depth of 0.5’ – 1.5’ below the existing ground throughout the majority of the project. According to the soil survey, there are some areas along or adjacent to SR 31 where the estimated seasonal high-water table is above the ground surface during certain months of the year.

**Table 4 – 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	SP, SP-SM	A-3
					2 - 7	SP, SP-SM	A-3
					7 - 12	SP, SP-SM	A-3
7	Matlacha Gravelly Fine Sand - Urban Land Complex	1.5 - 3.5	Jun - Nov	B	0 - 35	SP, SP-SM	A-3
					35 - 40	SP, SP-SM	A-3
					40 - 80	SP, SP-SM	A-3
11	Myakka Fine Sand	0.50 - 1.5	Jun - Nov	B/D	0 - 20	SP, SP-SM	A-3
					20 - 36	SM, SP-SM	A-3, A-2-4
					36 - 80	SP, SP-SM	A-3
35	Wabasso Sand	0.50 - 1.5	Jun - Oct	B/D	0 - 24	SP, SP-SM	A-3
					24 - 28	SP-SM, SM	A-3, A-2-4
					28 - 62	SC, SM-SC	A-2-4, A-2-6
					62 - 80	SP-SM, SM	A-3, A-2-4
36	Immokalee Sand - Urban Land Complex	0.50 - 1.5	Jun - Nov	B/D	0 - 9	SP, SP-SM	A-3
					9 - 36	SP, SP-SM	A-3
					36 - 55	SP-SM, SM	A-3, A-2-4
					55-80	SP, SP-SM	A-3
42	Wabasso Sand, Limestone Substratum	0.50 - 1.5	Jun - Oct	C/D	0 - 25	SP-SM, SM	A-3, A-2-4
					25 - 35	SP	A-2-4
					35 - 45	SP-SM, SM	A-3, A-2-4
					45 - 55	SM, SM-SC, SC	A-2-4, A-2-6, A-6, A-4
45	Copeland Fine Sandy Loam	0.0 - 1.5	Jul - Apr	D	0 - 8	SP-SM, SM	A-3, A-2-4
					8 - 20	SM-SC, SC	A-2-4, A-2-6
					20 - 28	SM, SM-SC	A-2-4
144	Calossa Fine Sand	1.5 - 3.5	Jul - Oct	A	0 - 10	SP, SP-SM	A-3
					10 - 27	SP, SP-SM	A-3
					27 - 80	CH, SC, CL, MH	A-6, A-7

## 4.4 Environmental Characteristics

### 4.4.1 Land Use Data

The project begins at SR 80 (Palm Beach Blvd) and continues to SR 78 (Bayshore Road). The project corridor is a mixture of residential and agricultural land uses interspersed with native wetland and upland habitat. The Caloosahatchee River bisects the project corridor at the north end of this project and generally delineates the agricultural portions of the project corridor to the north from the more residential and native wetland areas to the south.

The widening of SR 31 from SR 80 to SR 78 does not alter the existing or future land uses in the area. Future land uses adjacent to the project limits will include urban community, suburban, public facilities, and rural lands. Please see [Figure 5](#) for [Land Use Maps](#) in [Appendix 1](#).

## 4.5 Floodplains/Floodways

The Federal Emergency Management Agency (FEMA) has developed Flood Insurance Rate Maps (FIRM) for the study area. The relevant FIRM panel numbers are 12071C0282F and 12071C0284F, for Lee County, Florida dated August 28, 2008. The majority of the project is designated Zone AE with the 100-yr flood stage at elevation 7 ft NAVD. Please see the FEMA Flood Insurance Rate Maps in [Figure 6](#), [Appendix 1](#) and in [Appendix 4](#).

Per the coordination meeting with SFWMD in September 2019, floodplain compensation (FPC) sites will not be required for the project because the floodplain is in the Tidal Caloosahatchee River Basin and the Franklin Lock further east is considered the tidal limits. Existing SFWMD permits were researched within the project vicinity and no floodplain compensation has been required for adjacent development. See the SFWMD Meeting Minutes in [Appendix 6](#).

The area of the Caloosahatchee River that is located within the limits of this project is downstream of the Franklin Lock (S-79) which is located to the east of this project. The Franklin Lock separates the freshwater portion of the Caloosahatchee Canal on the east, from the 33.2-mile-long, saline tidal estuarine portion of the Caloosahatchee River on the west.

Below is an excerpt from *FDEP Final TMDL Report, South District, Caloosahatchee Basin, Nutrient TMDL for the Caloosahatchee Estuary (WBIDs 3210A, 3210B, and 3240C), September 2009*.

*The 75-mile-long Caloosahatchee River originates as the C-43 Canal at the southwest corner of Lake Okeechobee at Structure S-77. and then flows predominately east to west, eventually*

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*discharging into the Gulf of Mexico at San Carlos Bay. Water flow is controlled by the USACOE, crossing over 3 control structures: The Moore Haven Lock (flow from Lake Okeechobee over S-77 into the C-43/Caloosahatchee River), the Ortona Lock (s-78), and the Franklin Lock (s-79). The distance along C-43 from Moore Haven to the Ortona Lock is approximately 15.5 miles, and the distance from the Ortona Lock to the Franklin Lock is approximately 27.9 miles. **The Franklin Lock separates the freshwater portion of the Caloosahatchee Canal on the east, from the 33.2-mile-long, saline tidal estuarine portion of the Caloosahatchee River on the west.***

#### 4.5.1 Preliminary FEMA Maps Comparison

FEMA is currently updating the National Flood Insurance Program Flood zone maps for Lee County. Preliminary FEMA floodplain maps 12071C0282G and 12071C0284G have been revised for Zone AE. These maps are dated 6/28/2019 but are stamped preliminary and have not been adopted by Lee County representatives as of the time of this report. Per coordination with Lee County, the maps are anticipated to become effective in the fall of 2022. SR 31 and the buildup of the surrounding area has been constructed to the existing base flood elevation 7.0.

The Preliminary FEMA Flood Maps are proposing a floodplain elevation of 10.0 based on the most current model. Using the Preliminary floodplain elevation of 10.0 could require the need for the proposed roadway to be constructed higher since SR 31 is a hurricane evacuation route. SR 80 is also a hurricane evacuation route and is also at elevation 7. As of the time that this report is being completed, Lee County has not approved the Preliminary FEMA Flood Maps with the floodplain elevation of 10.0. In meetings with FDOT District One engineers the discussion was made to use the preliminary FEMA Flood Maps as by the time this project is ready for design and construction the FEMA Flood Maps will approved and use for design.

The flood elevations in this area are controlled by storm surges, and as such the grade of the roadway will not have a significant effect on flood stages.

The design of coastal projects should include sea level rise analysis to address the vulnerability of flooding over the design life of the facility. From FDOT Drainage Design Manual in table 3.2 "Sea level Rise Data" states that the average MSL increase at Station ID Fort Myers is 0.122 in/yr. The MHW elevation per FDEP for the Wilson Pigott Bridge is 0.21 (NAVD). This verification will be resolved in the design of this project. Intera is developing a "white paper" for FDOT district One on sea level rise (SLR) and resiliency which will be used in design to address sea level rise and resiliency.

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## 4.6 Flooding History and Maintenance Concerns

*In correspondence with FDOT maintenance staff on 5/06/2020, FDOT indicated that SR 31 from SR 80 to SR 78 has not experienced overtopping and drainage problems within the project limits. The maintenance staff mentioned that the drainage concerns are located north of the project limits. [Please refer to Appendix 6.](#)*

## 5.0 Proposed Conditions

The existing drainage patterns will be maintained in the future condition. The stormwater runoff from the project limits will be collected in a closed drainage system and conveyed to proposed Stormwater Management Facilities. The ponds will discharge at or near the same cross drains or conveyance ditches that carry the roadway runoff in the existing condition. The water quality treatment and water quantity attenuation will be achieved through the construction of offsite wet detention ponds, which will require the acquisition of additional right-of-way.

Water quality treatment will be provided as required by the rules set forth by the South Florida Water Management District (SFWMD). A Pond Siting Report (PSR) will be developed as part of this study.

In the preferred alignment, the proposed Eastern Alignment, will only affect CD-1 with the additional width of the proposed roadway typical section because the roadway alignment does not deviate from the existing alignment until north of CD-1. The updates to cross drain CD-1 is extending the existing length of 78' to a proposed length of 178' to cross the proposed typical section, nearly doubling the pipe length causes the HY-8 model to rise to overtopping for the 100-year event. The HY-8 modeling shows that with the increased pipe size, the water surface elevation is maintained to pre-condition. In addition, the potential of the proposed roadway to be over-topped from larger storm events is reduced to the point of being able to provide a 1-foot free board from the roadway over-topping for the 500-year event. This provides a level of safety for any future development along this section of the SR 31 corridor. Overtopping is not just over the roadway but can be over/between drainage basins. The final design will be required to size the cross drains to show no adverse impacts. For the proposed plan view, profiles and project alignment, [please refer to Figures 11, 12, and 13 in Appendix 1.](#)

**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	14.14	10	2435
CD-2A	48"	RCP	2	164	-0.3	-0.4	3.6	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.

**Table 6 - Headwater Comparison Summary Table**

Cross Drain	Pipe Size		Pipe Length		50 yr Storm Event Elevation		100 yr Storm Event Elevation		500 yr Storm Event Elevation or Overtopping Elevation		Roadway Crest Elevation
	Existing	Proposed	Existing (ft)	Proposed (ft)	Existing (ft)	Proposed (ft)	Existing (ft)	Proposed (ft)	Existing (ft)	Proposed (ft)	
CD-1	2-36"	2-48"	90	178	4.88	4.08	5.52	4.32	7.04	5.65	10.00
CD-2	2-36"	2-36"	111	111	3.87	N/A	4.56	N/A	7.02	N/A	10.00
CD-2A	N/A	2-48"	N/A	164	N/A	3.15	N/A	3.45	N/A	4.99	10.00
CD-3	18"	18"	96	96	3.25	N/A	4.22	N/A	7.02	N/A	10.00

CD-2 - Because of the Roadway Alignment shift, CD-02 is modeled as 2 separate cross drains, CD-02 and CD-02A.

CD-3 - Due to eastern alignment shift, existing CD-03 does not need to be extended.

CD-2 and CD-3 use existing condition model elevations.

Datum = NAVD 88

The preferred Eastern alignment has a different effect on cross drain CD-2. The eastern alignment deviates from the existing alignment and flares out to the east of the existing alignment creating an open space between the existing roadway, that will be used for the marina entrance, and the proposed roadway alignment. The proposed updates to CD-2 using the eastern alignment will allow the existing cross drain to remain in its present lay-out with an increase of one pipe size but will use an additional cross drain on the proposed roadway alignment to support the existing cross drain. This additional cross drain is named CD-2A. The proposed cross drain (CD-2A) will use a pipe size larger due to its length than the existing CD-2 pipe size to reduce the water surface elevation in this area. With the Eastern alignment being the preferred alignment, the existing CD-3 will not be modified from its existing layout as the existing drainage will function with the existing ditch grading. At this time with the preliminary project layout, CD-4 has not been analyzed since the SR 80 intersection analysis has not been finalized. With any additional roadway width because of the final SR 80 intersection layout CD-4 will be extended to accommodate any SR 80 improvements.

## 5.1 Proposed Typical Section Improvements

The urban roadway typical section includes a six-lane divided roadway with a raised median, six (6) 11-foot travel lanes in each direction, two (2) 12-foot shared use paths, with curb and gutter for an urban typical section. The urban typical section will use curb inlets to collect the stormwater run-off and pipe it to the proposed ponds. The proposed right-of-way varies throughout the project as the proposed alignment transitions from the existing roadway to the proposed right-of-way. The minimum typical right-of-way width for the project is 155'.

The proposed lengths of cross drains are assumed to be extended from their current length to the proposed lengths as detailed in plans. **Please refer to Figure 8 in Appendix 1 for proposed typical sections.**

## 5.2 Longitudinal & Transverse Floodplain Impacts

This project will impact the 100-year floodplain in three (3) different ways;

1. Impacts from filling the floodplain areas associated with the proposed roadway widening, isolated wetlands, wetland systems, and depressional areas.
2. Transverse impacts resulting from the extension and replacement of the existing cross drain culverts.
3. Transverse impacts resulting from widening of the bridge.



The impacts cannot be avoided since the floodplains associated with the water bodies extend both north and south of the proposed alignment. The floodplain impact area was quantified based on the FEMA 100-year base flood elevation and the existing ground elevation (from 1-foot LiDAR contours) for the entire project length. To be conservative, it was assumed that any filling from the proposed roadway outside of the existing roadway was quantified as floodplain impacts.

The culvert extensions for two (2) cross drains were analyzed for existing and proposed conditions performances. Because of the roadway alignment deviating to the east. The analysis at CD-02 is modeled as a separate cross drain. Please refer to Appendix 3 for cross drains analyses and HY-8 inputs and results. During the final design phase of the project, every necessary action should be taken to minimize upstream impacts. To minimize upstream impacts, FDOT design criteria for conveyance system (e.g. culvert) allow no significant increase in flood stages at the upstream end of the structures.

It should be noted that these proposed cross drains were sized and analyzed based on best engineering judgments, assumptions, and limited available data. During the design phase, each cross drain should be analyzed for existing and proposed conditions with more defined data and designed to ensure no conflicts with the proposed roadway and no significant increase in headwater elevations. Also, a more detailed inspection of the cross drains will be necessary to verify their structural integrity and assess the need for complete reconstruction.

Impacts resulting from the widening and construction of the bridge at the Caloosahatchee River are considered minimal. As a minimum, the designer should maintain the horizontal and vertical openings at the bridges similar to the existing condition. A Bridge Hydraulic Report (BHR), under a separate cover, will be prepared to document the hydraulic impacts of the widening.

### 5.3 Project Classification

The floodplain is in a low density, non-urbanized area, and the encroachments area is classified as "minimal". Minimal encroachments on a floodplain occur when there is a floodplain involvement, but the impacts on human life, transportation facilities, and natural and beneficial floodplain values are not significant and can be resolved with minimal efforts. Normally, these minimal efforts to address the impacts will consist of applying the Department's drainage design standards and following the Water Management District's procedures to achieve results that will not increase or significantly change the flood elevations and/or limits.

### 5.4 Risk Evaluation

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There is no change in flood “Risk” associated with this project. The encroachments will not have a significant potential for interruption or termination of transportation facilities needed for emergency vehicles or used as an evacuation route. In addition, no significant adverse impacts on natural and beneficial floodplain values are anticipated and no significant impacts to highway users are expected. Per the coordination meeting with SFWMD in September 2019, floodplain compensation (FPC) sites will not be required for the project because the floodplain is in the Tidal Caloosahatchee River Basin.

## 5.5 PD&E Manual Requirements with Minimal Encroachment

Chapter 13 Floodplains of the FDOT’s 2019 PD&E Manual, Part 2, defines four categories of encroachments as they pertain to base floodplain involvement; significant, minimal, none and no involvement, and also lists the report criteria corresponding to these encroachment categories. The FDOT has different requirements based on the category of the encroachment. The proposed SR 31 widening project was determined to have minimal encroachments and as a result, the requirements for this category are listed as follows:

1. General description of the project including location, length, existing and proposed typical sections, drainage basins, and cross drains.

*This project involves improvements to SR 31 from SR 80 (Palm Beach Blvd) to SR 78 (Bayshore Rd) and is located in Lee County, Florida, sections 12, 13, 24 and 25 of Township 43 South, Range 25 East and sections 7, 18, 19, and 30 of Township 43 South, Range 26 East. Please see Appendix 1 for location map, drainage basin, and existing and proposed typical sections.*

2. Determination of Whether the proposed action is in the base floodplain.

*The project is located within preliminary FEMA maps (Zone AE) elevation 10/11. The project is located within the Tidal Caloosahatchee sub-basin of the Caloosahatchee River Watershed. While the project is located in the 100-yr. flood zone AE, with floodplain encroachments, tidally influenced floodplains do not require compensation. See the SFWMD meeting minutes in Appendix 6.*

3. The history of flooding of the existing facilities and/or measures to minimize any impacts due to the proposed project improvements.

*According to the FDOT District 1 maintenance staff, SR 31 (from SR 80 to SR 78) has not experienced flooding problems within the limits of this project. All the cross drains and bridges/bridge culverts within the project study limits were found to be in good condition based on field reconnaissance (See Appendix 2 – Cross Drain Pictures and Checklists).*

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*A full stormwater management system will be designed to minimize impacts to adjacent offsite areas, both upstream and downstream.*

4. Determination of whether the encroachment is longitudinal or transverse, and if it is a longitudinal encroachment an evaluation and discussion of practicable avoidance alternatives.

*Impacts will be minimized by utilizing the maximum allowable roadway embankment slope. The existing roadway bisects the floodplain. There are no economically feasible avoidance alternatives.*

5. The practicability of avoidance alternatives and/or measures to minimize impacts.

*This project will minimize the floodplain impacts resulting from the roadway fill by using the maximum allowable roadway embankment slope within the floodplain area to minimize the floodplain impacts.*

6. Impact of the proposed improvements on emergency services and evacuation.

*The proposed cross drains will perform hydraulically in a manner equal to or greater than the existing condition, and backwater surface elevations are not expected to increase. As a result, there will be no significant change in flood risk, and there will not be a significant change in the potential for interruption or termination of emergency service or in emergency evacuation routes.*

7. Impacts of the proposed improvement on the base flood, likelihood of flood risk, overtopping, location of overtopping, backwater, etc.

*The proposed cross drains will perform hydraulically in a manner equal to or greater than the existing condition, and backwater surface elevations are not expected to increase. As a result, there will be no significant change in flood risk or overtopping.*

8. Determination of the impacts of the proposed improvements on regulatory floodways, if any, and documentation of coordination with FEMA and local agencies to determine the project's consistency with the regulatory floodway.

*There are no floodway impacts with this project.*

9. The impacts on natural and beneficial floodplain values, and measures to restore and preserve these values (this information may also be addressed as part of the wetland impact evaluation and recommendations).

*See the Natural Resources Evaluation (NRE) Report for the SR 31 PD&E Study.*

10. Consistency of the proposed improvements with the local floodplain development plan or the land use elements in the Comprehensive Plan, and the potential impacts of encouraging development within the 100 year base floodplain.

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*The project will remain consistent with local floodplain development plans. The project will not support base floodplain development that is incompatible with existing floodplain management programs.*

11. Measures to minimize flood-plain impacts associated with the project, and measures to restore and preserve the natural and beneficial flood-plain values impacted by the project.

*This project will minimize the floodplain impacts resulting from the roadway fill by using the maximum allowable roadway embankment slope within the floodplain area to minimize the floodplain impacts.*

12. A map showing project, location and impacted floodplains. Provide copies of all applicable FIRM maps should be included within the final LHR report appendix.

*See Figure 6, 6A, and 6B in Appendix 1.*

13. Results of any project risk assessments performed.

*The proposed bridge and cross drains will perform hydraulically in a manner equal to or greater than the existing condition, and backwater surface elevations are not expected to increase. As a result, there will be no significant change in flood risk.*

## 6.0 Conclusions

The modifications to drainage structures included in the project will result in an insignificant change in their capacity to carry floodwater. This change will cause no increase in flood heights and flood limits. The proposed structures will perform hydraulically in a manner equal to or greater than the existing structure and backwater surface elevations are not expected to increase. As a result, there will be no significant adverse impacts on the natural and beneficial floodplain values or any significant change in flood risks or damage. There will not be a significant change in potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant.

## **APPENDIX 1**

### **Exhibits**

**Figure 1 – Project Location Map**

**Figure 2 – Drainage Basin Map**

**Figure 3 – USGS Map**

**Figure 4 – Soil Survey Map**

**Figure 5 – Land Use Map**

**Figure 6 – FEMA Map**

**Figure 6A & 6B – Preliminary FEMA Map**

**Figure 7 – Existing Roadway Typical Section**

**Figure 8 – Proposed Roadway Typical Section**

**Figure 9 – Existing Bridge Typical Section**

**Figure 10 – Proposed Bridge Typical Section**

**Figure 11 – Proposed Eastern Alignment Profile**

**Figure 12 – Proposed Eastern Alignment Map**

**Figure 13 – Proposed Eastern Alignment Map (Full Map)**

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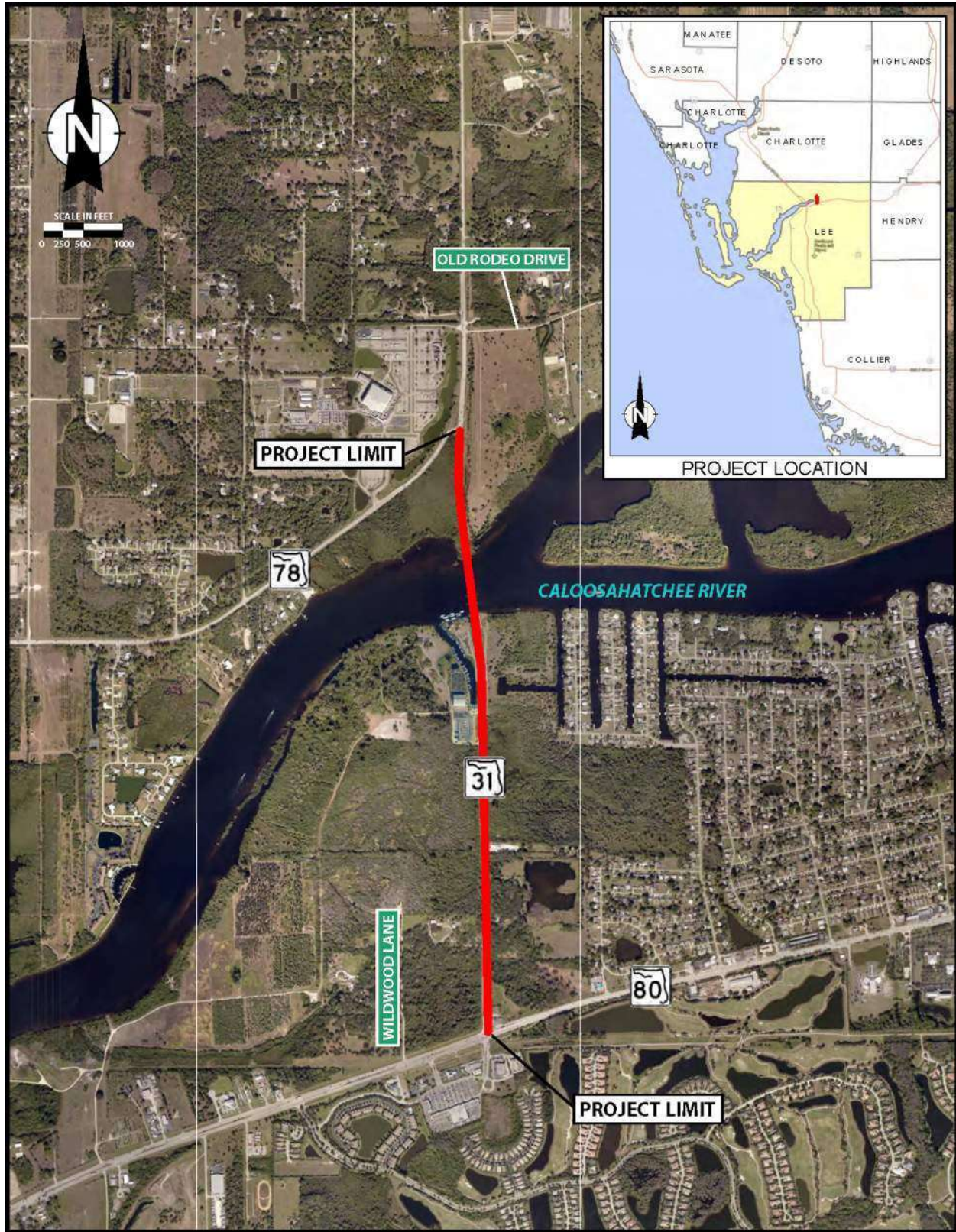
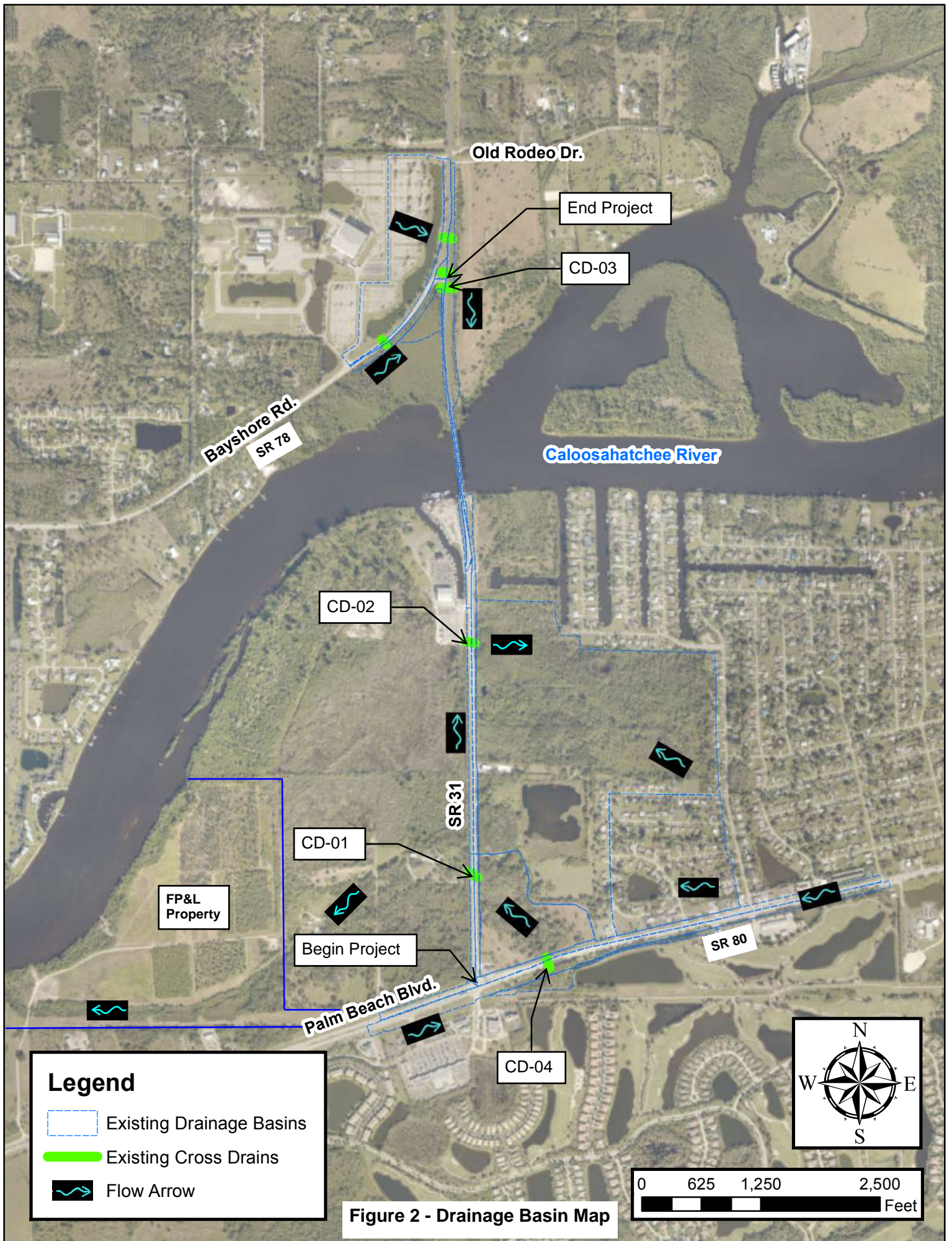


Figure 1 – Project Location Map



Old Rodeo Dr.

End Project

CD-03

Bayshore Rd.  
SR 78

Caloosahatchee River

CD-02

SR 31

CD-01

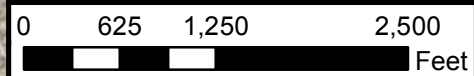
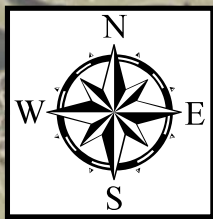
FP&L  
Property

Begin Project

Palm Beach Blvd.

SR 80

CD-04



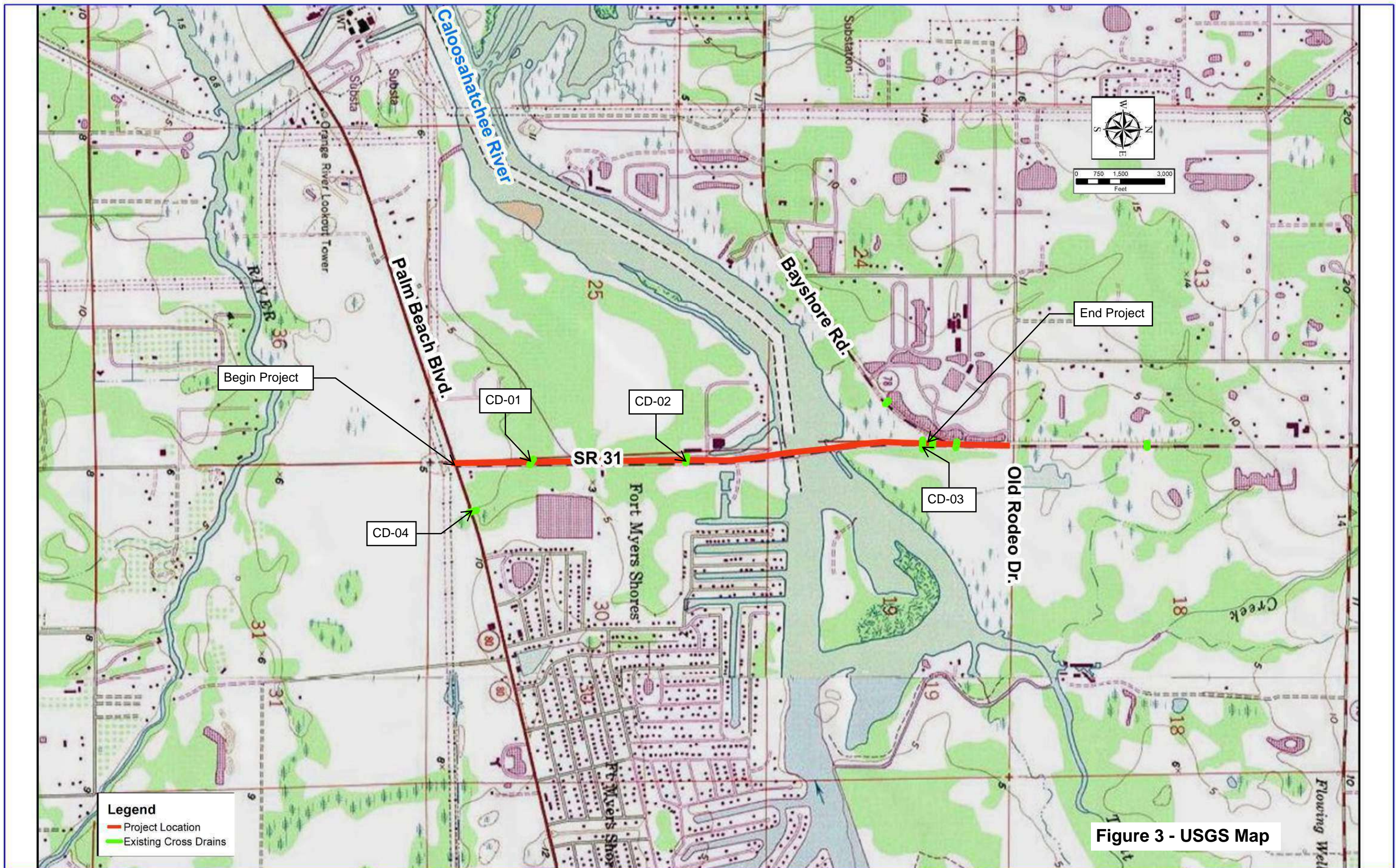


Figure 3 - USGS Map

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

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

USGS MAP

SHEET NO.



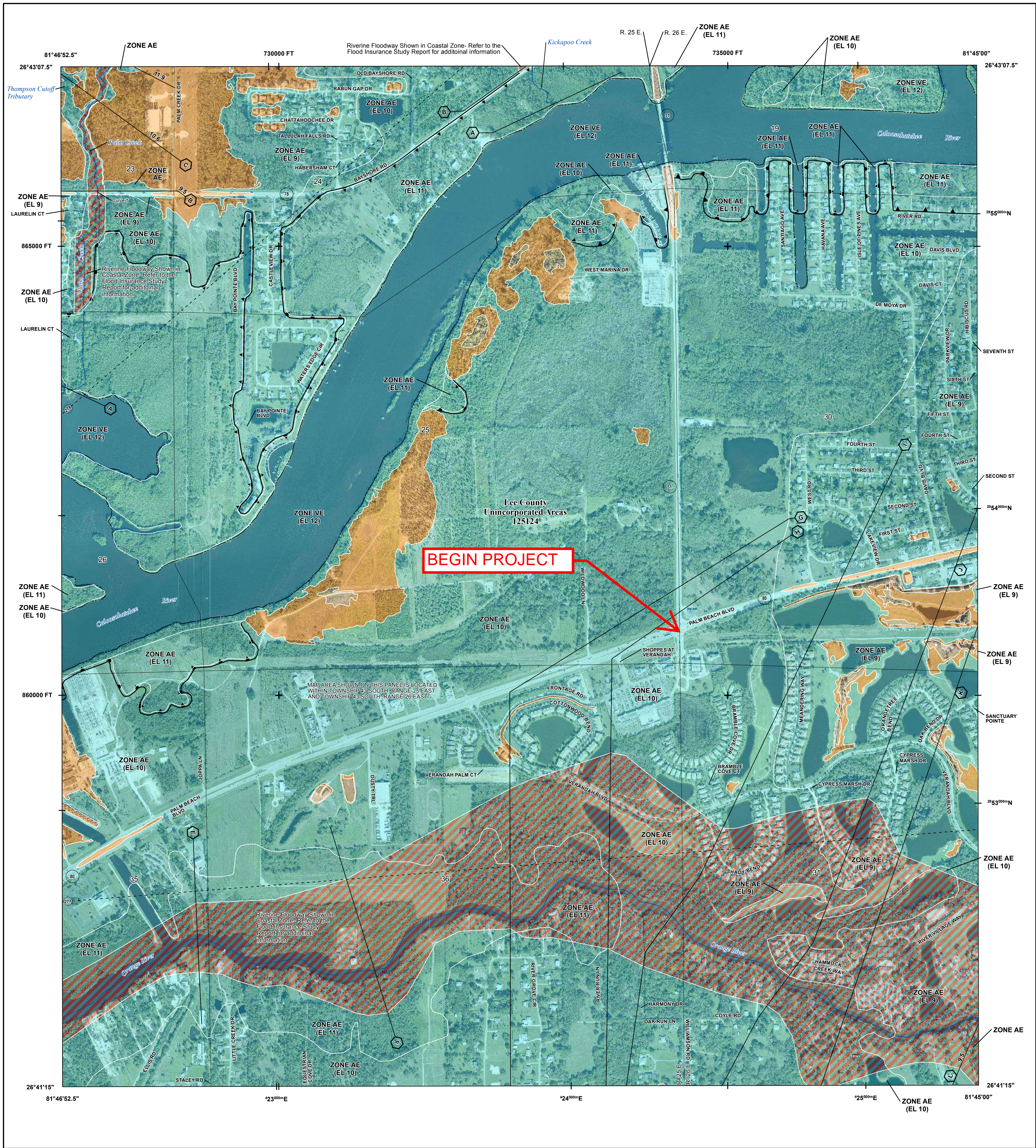
Custom Soil Resource Report  
Soil Map



Figure 4 - Soil Survey 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](https://MSC.FEMA.GOV)**
- Without Base Flood Elevation (BFE) Zone A, V, A99
  - With BFE or Depth Zone AE, AO, AH, VE, AR
  - Regulatory Floodway
  - 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
  - NO SCREEN Area of Minimal Flood Hazard Zone X
  - Area of Undetermined Flood Hazard Zone D
  - Channel, Culvert, or Storm Sewer
  - Levee, Dike, or Floodwall
  - Cross Sections with 1% Annual Chance Water Surface Elevation
  - Coastal Transect
  - Coastal Transect Baseline
  - Profile Baseline
  - Hydrographic Feature
  - Base Flood Elevation Line (BFE)
  - 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.

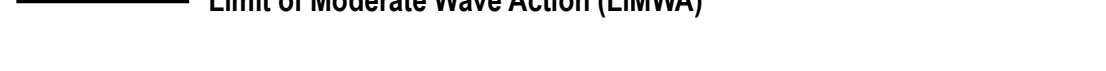
Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

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

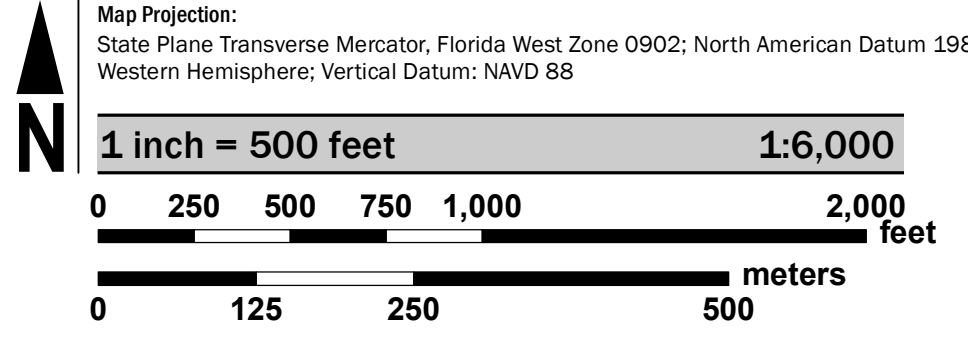
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

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.

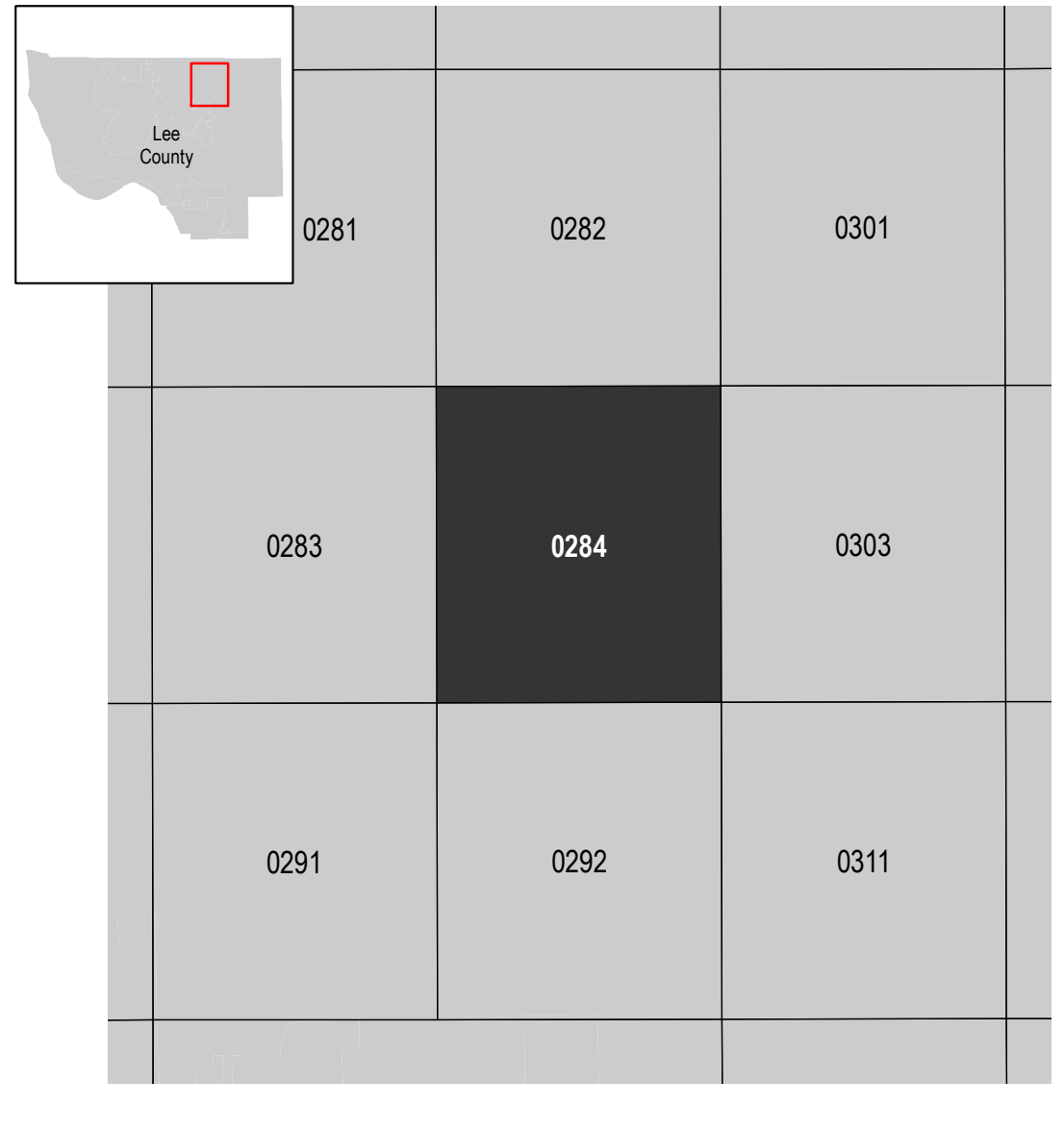
LIMIT OF MODERATE WAVE ACTION: Zone AE has been divided by a Limit of Moderate Wave Action (LiMWA). The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between Zone VE and the LiMWA (or between the shoreline and the LiMWA for areas where Zone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



**SCALE**



**PANEL LOCATOR**



**Figure 6A - Preliminary FEMA Map**

**FEMA**  
 National Flood Insurance Program

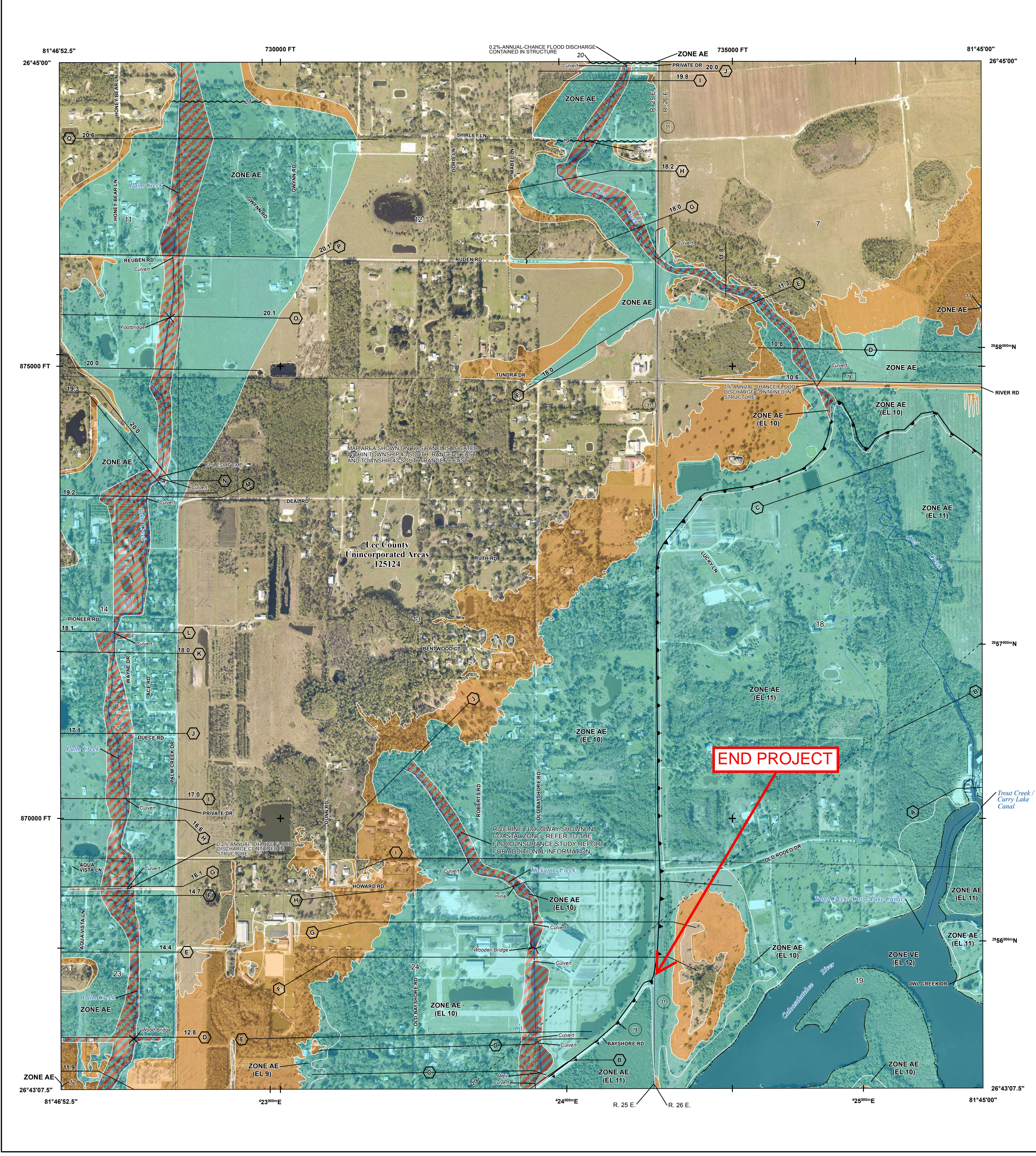
**NATIONAL FLOOD INSURANCE PROGRAM**  
 FLOOD INSURANCE RATE MAP  
 LEE COUNTY, FLORIDA  
 and Incorporated Areas  
 PANEL 284 OF 685

Community Contains:  
 LEE COUNTY

NUMBER PANEL SUFFIX  
 125124 0284 G

**PRELIMINARY**  
**6/28/2019**

VERSION NUMBER  
 2.4.3.5  
 MAP NUMBER  
 12071C0284G  
 MAP REVISED



**Figure 6B - Preliminary 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](https://MSC.FEMA.GOV)**

	Without Base Flood Elevation (BFE) Zone A, V, A99
	With BFE or Depth Zone AE, AO, AH, VE, AR
	Regulatory Floodway
	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
	NO SCREEN Area of Minimal Flood Hazard Zone X
	Area of Undetermined Flood Hazard Zone D
	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
	Cross Sections with 1% Annual Chance Water Surface Elevation
	Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

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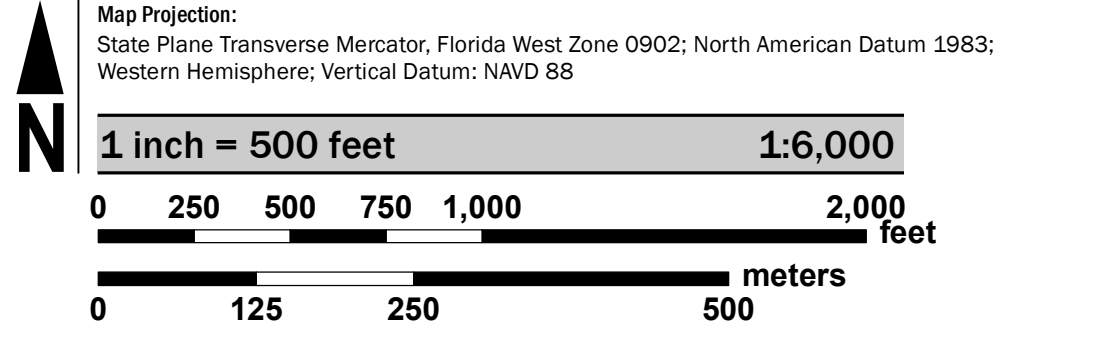
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Base map information shown on this FIRM was provided by Lee County, dated 2008 and 2018; the Florida Department of Transportation, dated 2017 and 2018; the U.S. Department of Agriculture, dated 2018; and the U.S. Department of Transportation, dated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



**PANEL LOCATOR**

Lee County

		0120		
0115		0119	0138	0139
0277	0281	<b>0282</b>	0301	0302
0279	0283	0284	0303	0304
0287	0291	0292	0311	0312

**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 LEE COUNTY      NUMBER PANEL SUFFIX 125124 0282 G

**PRELIMINARY**  
**6/28/2019**

VERSION NUMBER 2.4.3.5  
 MAP NUMBER 12071C0282G  
 MAP REVISED

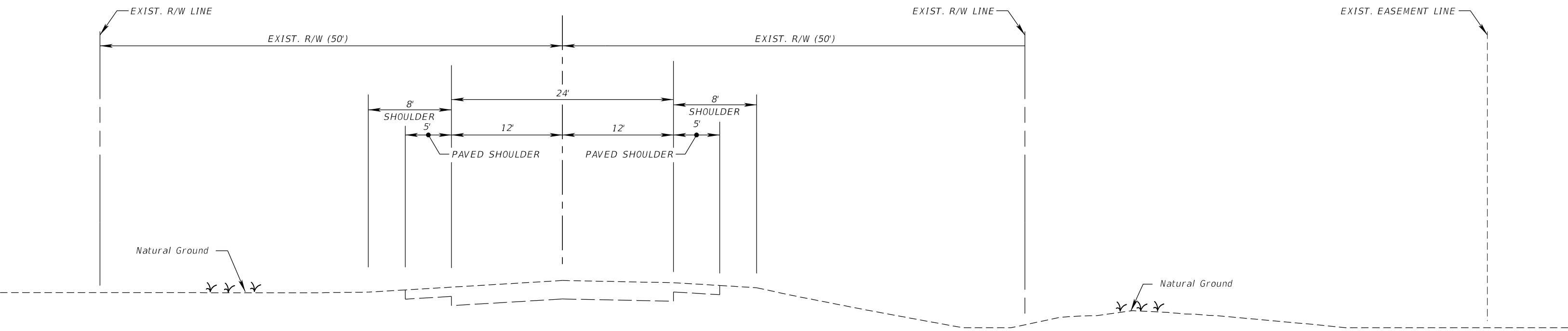


Figure 7 - Existing Roadway Typical Section

**PROJECT CONTROLS**

**CONTEXT CLASSIFICATION**

- ( ) C1 : NATURAL (X) C3C : SUBURBAN COMM.
- ( ) C2 : RURAL ( ) C4 : URBAN GENERAL
- ( ) C2T : RURAL TOWN ( ) C5 : URBAN CENTER
- ( ) C3R : SUBURBAN RES. ( ) C6 : URBAN CORE
- ( ) N/A : L.A. FACILITY

**FUNCTIONAL CLASSIFICATION**

- ( ) INTERSTATE ( ) MAJOR COLLECTOR
- ( ) FREEWAY/EXPWY. ( ) MINOR COLLECTOR
- (X) PRINCIPAL ARTERIAL ( ) LOCAL
- ( ) MINOR ARTERIAL

**HIGHWAY SYSTEM**

- ( ) NATIONAL HIGHWAY SYSTEM
- (X) STRATEGIC INTERMODAL SYSTEM
- (X) STATE HIGHWAY SYSTEM
- ( ) OFF-STATE HIGHWAY SYSTEM

**ACCESS CLASSIFICATION**

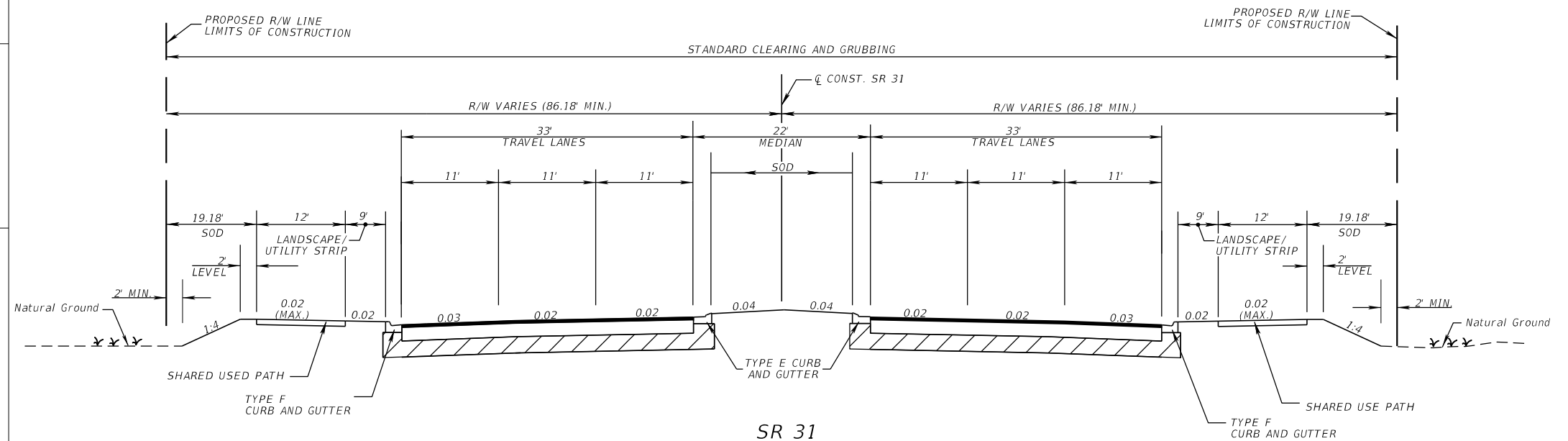
- ( ) 1 - FREEWAY
- ( ) 2 - RESTRICTIVE w/Service Roads
- ( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- (X) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- ( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
- ( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- ( ) 7 - BOTH MEDIAN TYPES

**CRITERIA**

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- ( ) RESURFACING (LA FACILITIES)
- ( ) RRR (ARTERIALS & COLLECTORS)

**POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:**

**TYPICAL SECTION No. 01**



SR 31  
FROM SR 80 TO SR 78

MP 0.000 TO MP 0.970  
MP 1.117 TO MP 1.407

**TRAFFIC DATA**

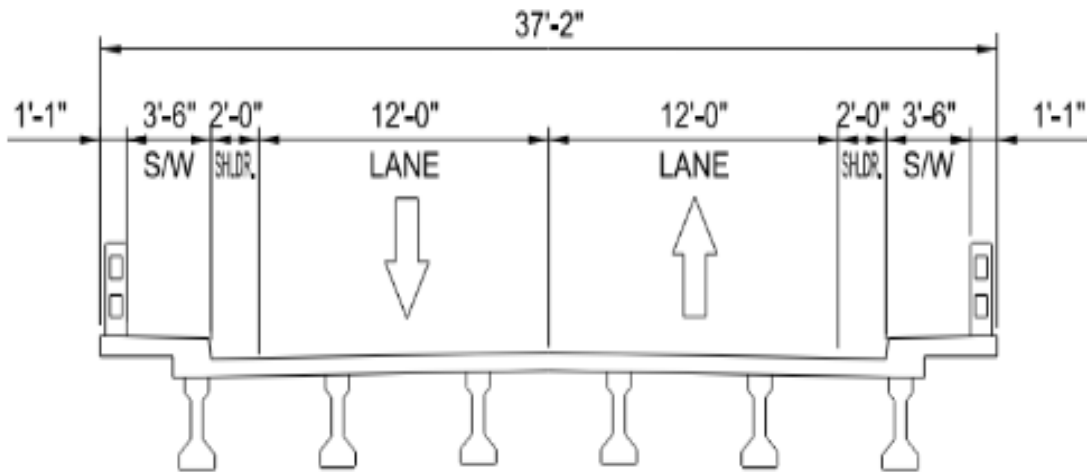
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 ESTIMATED OPENING YEAR = 2025 AADT = 26500  
 ESTIMATED DESIGN YEAR = 2045 AADT = 56800  
 K = 9% D = 54% T = 10.6% (24 HOUR)  
 DESIGN HOUR T = 5.3%  
 DESIGN SPEED = 45 MPH  
 POSTED SPEED = 45 MPH  
 TARGET SPEED = 45 MPH

Figure 8 - Proposed Roadway Typical Section

NOT TO SCALE

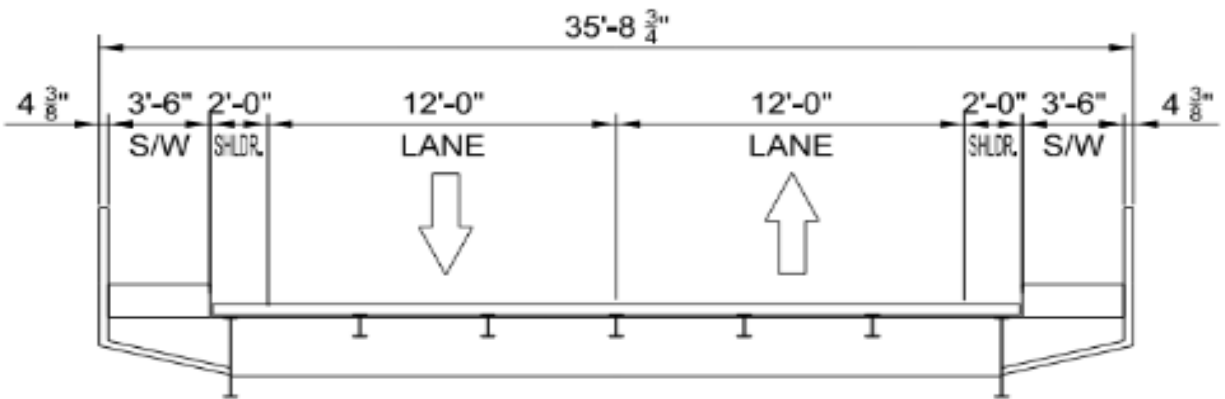
FINANCIAL PROJECT ID	SHEET NO.
441942-1-22-01	2

# EXISTING BRIDGE TYPICAL SECTIONS



Existing Approach Span Typical Section (60-ft Spans)

(NTS)



Existing Movable Span Typical Section

(NTS)



**PROJECT CONTROLS**

**CONTEXT CLASSIFICATION**

- ( ) C1 : NATURAL                      (X) C3C : SUBURBAN COMM.
- ( ) C2 : RURAL                        ( ) C4 : URBAN GENERAL
- ( ) C2T : RURAL TOWN                ( ) C5 : URBAN CENTER
- ( ) C3R : SUBURBAN RES.            ( ) C6 : URBAN CORE
- ( ) N/A : L.A. FACILITY

**FUNCTIONAL CLASSIFICATION**

- ( ) INTERSTATE                        ( ) MAJOR COLLECTOR
- ( ) FREEWAY/EXPWY.                ( ) MINOR COLLECTOR
- (X) PRINCIPAL ARTERIAL            ( ) LOCAL
- ( ) MINOR ARTERIAL

**HIGHWAY SYSTEM**

- ( ) NATIONAL HIGHWAY SYSTEM
- (X) STRATEGIC INTERMODAL SYSTEM
- (X) STATE HIGHWAY SYSTEM
- ( ) OFF-STATE HIGHWAY SYSTEM

**ACCESS CLASSIFICATION**

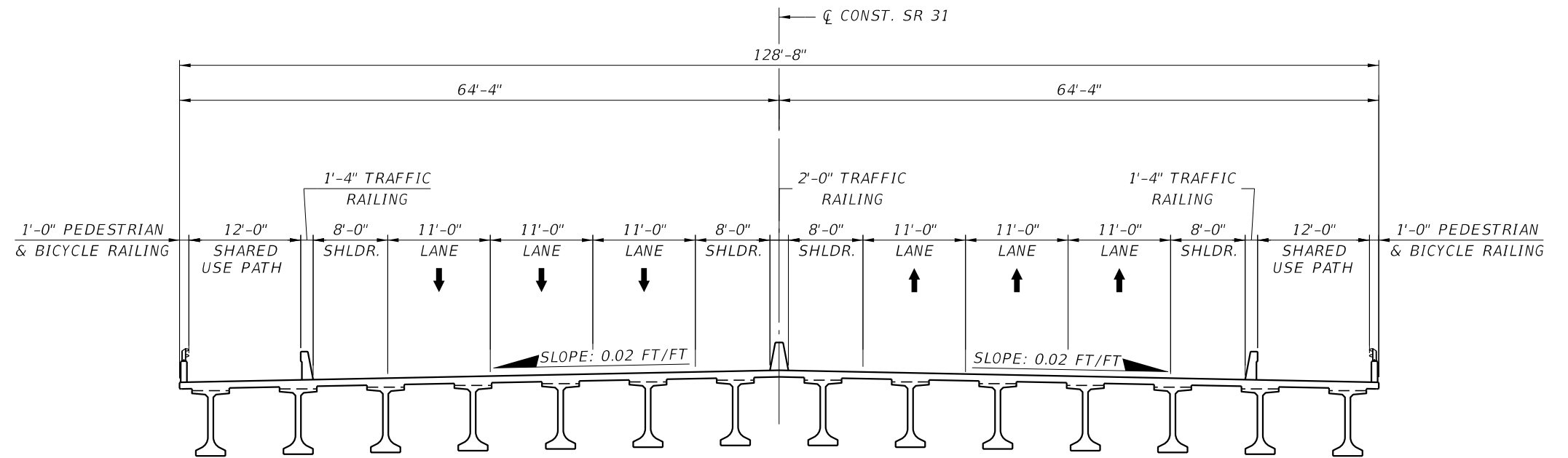
- ( ) 1 - FREEWAY
- ( ) 2 - RESTRICTIVE w/Service Roads
- ( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- (X) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- ( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
- ( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- ( ) 7 - BOTH MEDIAN TYPES

**CRITERIA**

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- ( ) RESURFACING (LA FACILITIES)
- ( ) RRR (ARTERIALS & COLLECTORS)

**POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:**

**TYPICAL SECTION No. 02  
(BRIDGE ALTERNATIVE 1)**



**HIGH-LEVEL FIXED BRIDGE  
AT CALOOSAHATCHEE RIVER  
MP 0.970 TO MP 1.117**

**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

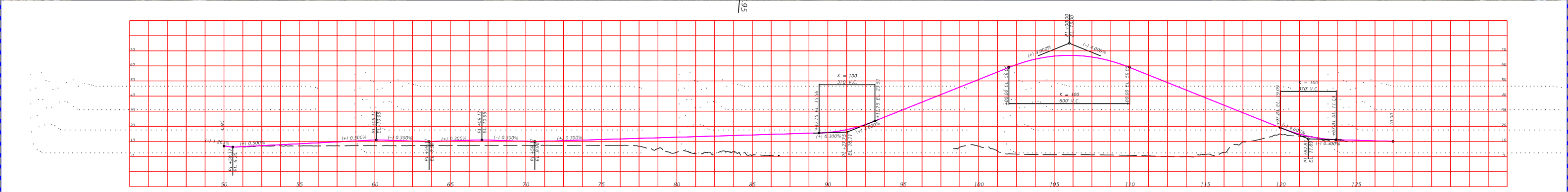
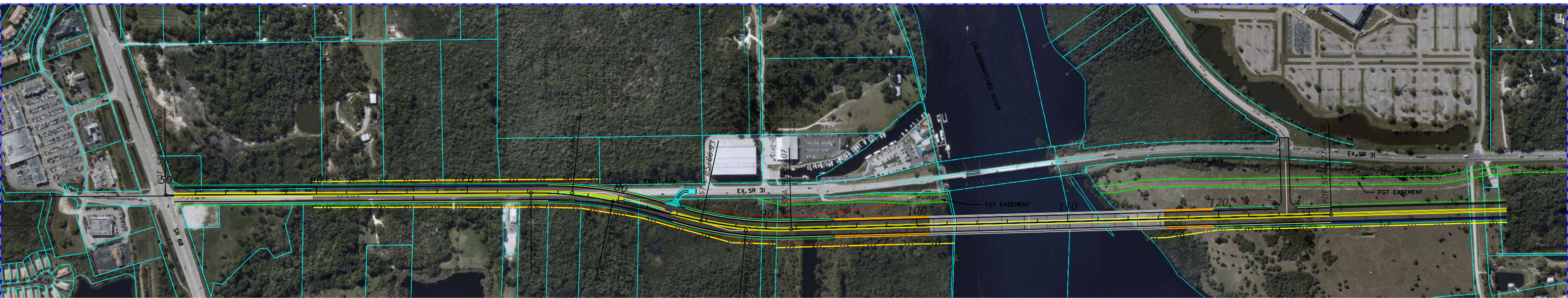
Figure 10 - Proposed Bridge Typical Section

**Proposed Bridge Typical Section**

N.T.S.

FINANCIAL PROJECT ID	SHEET NO.
441942-1-22-01	3

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.



DATE	DESCRIPTION	REVISIONS	DATE	DESCRIPTION

**DRMP**  
DRMP INC.  
 941 LAKE BALDWIN LANE, ORLANDO, FLORIDA 32814  
 PHONE: (407) 296-0554 FAX: (407) 296-6226  
 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

**PRELIMINARY CONCEPTUAL  
 PLAN/PROFILE**

SHEET NO.

Figure 11 - Preliminary Plan & Profile

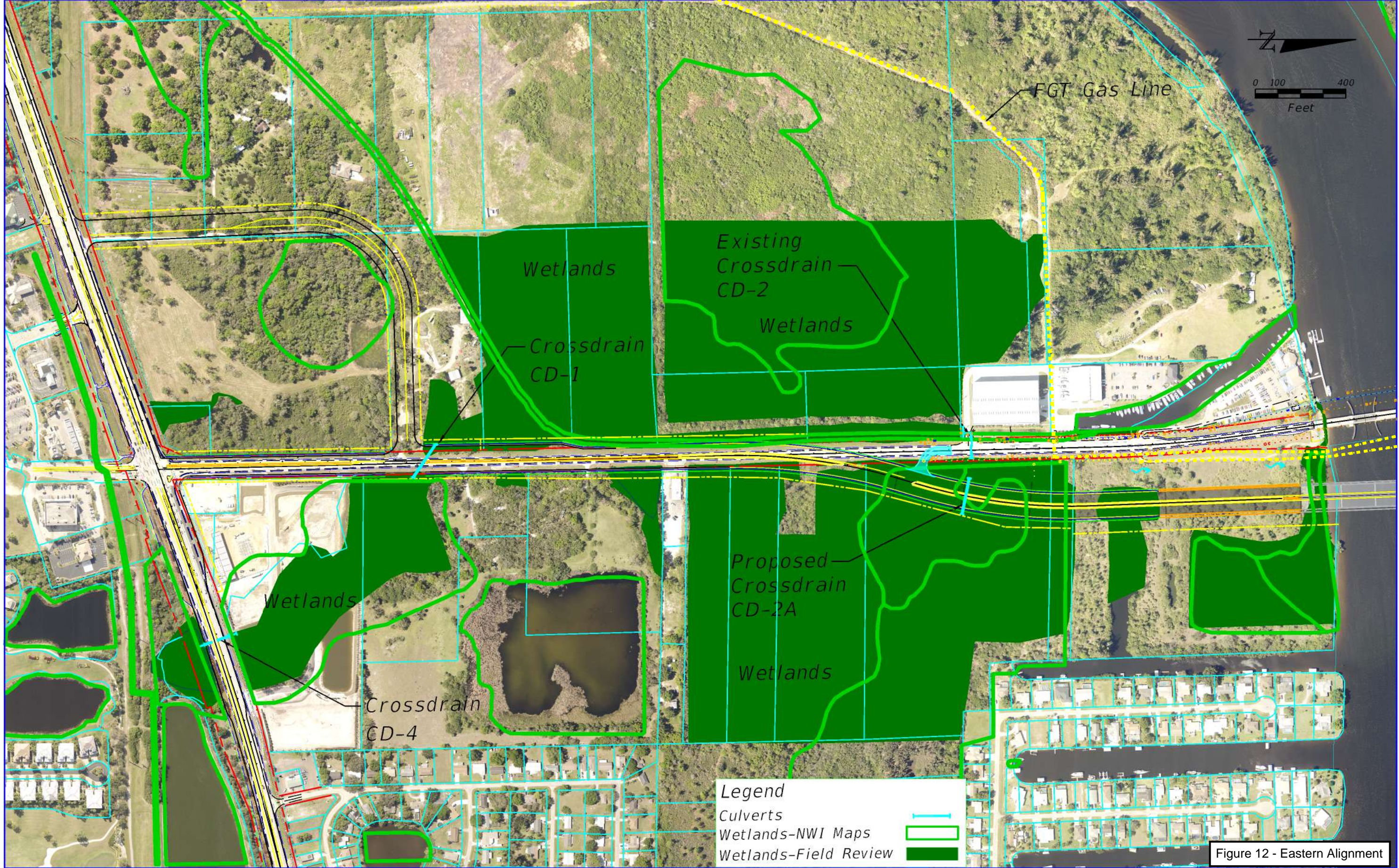


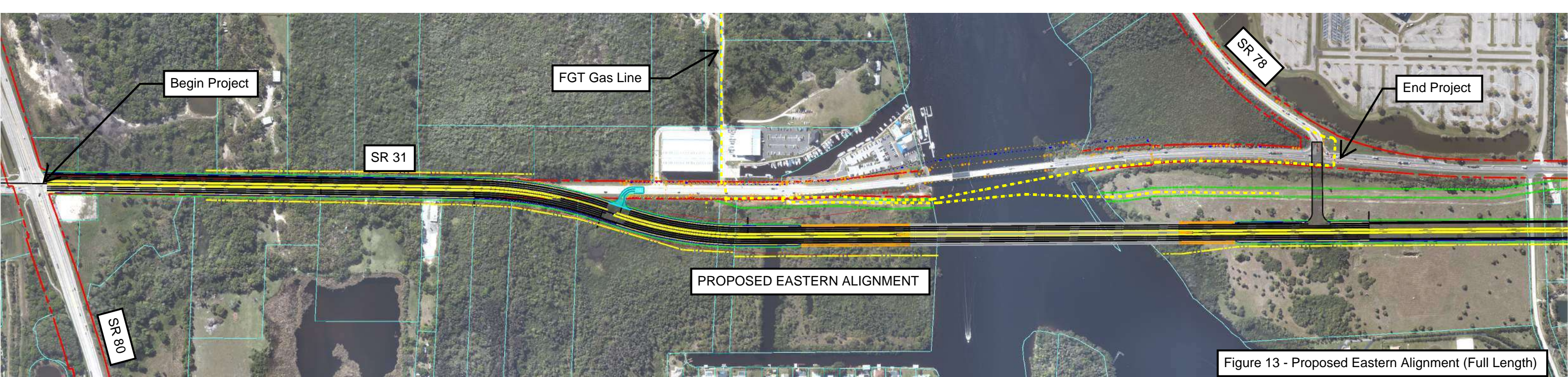
Figure 12 - Eastern Alignment

REVISIONS	
DATE	DESCRIPTION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 31	LEE	441942-1-22-01

<b>EASTERN ALIGNMENT 1</b>
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SHEET NO.
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PROPOSED EASTERN ALIGNMENT

Figure 13 - Proposed Eastern Alignment (Full Length)

**APPENDIX 2**  
**Crossdrain Field Photos**

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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 3**  
**Crossdrain Analysis**

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## Estimated Discharges with No Known Historical Problems

as per FDOT drainage design Guide dated January 2020

25 yr.  $Q = AV$

A = Existing Culvert Area

2 - 36" Area = 14.14 ft<sup>2</sup>

18" Area = 1.77 ft<sup>2</sup>

V = 6.0 feet per second

25 yr. Q      2 - 36" = (14.14 x 6) = 84.84 cfs

18" = (1.77 x 6) = 10.60 cfs

100 yr. Q = 1.4 x (25 yr Q)

100 yr. Q      2 - 36" = 1.4 x (84.84 cfs) = 118.78 cfs

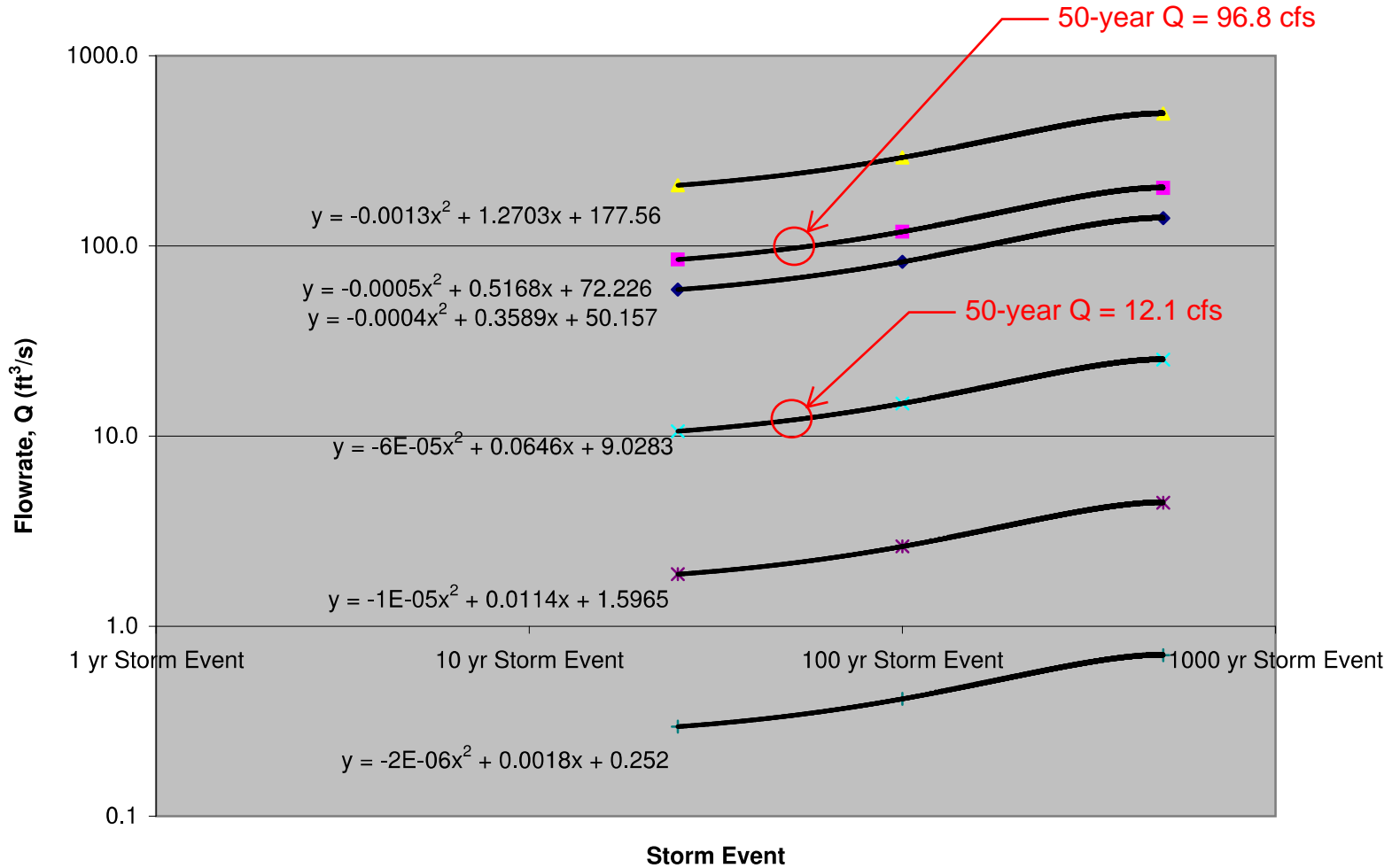
18" = 1.4 x (10.60 cfs) = 14.84 cfs

500 yr. Q = 1.7 x (100 yr Q)

500 yr. Q      2 - 36" = 1.7 x (118.78 cfs) = 201.93 cfs

18" = 1.7 x (14.84 cfs) = 25.23 cfs

## Determination of $Q_{50}$



<ul style="list-style-type: none"> <li>◆ 2-30" PIPES</li> <li>✱ 1-30" PIPE</li> <li>— Poly. (2-48" PIPES, 1-42" PIPE)</li> </ul>	<ul style="list-style-type: none"> <li>■ 2-36" PIPES</li> <li>+ 1-24" PIPE</li> <li>— Poly. (1-36" PIPE)</li> <li>— Poly. (1-24" PIPE)</li> </ul>	<ul style="list-style-type: none"> <li>▲ 2-48" PIPES, 1-42" PIPE</li> <li>— Poly. (2-30" PIPES)</li> <li>— Poly. (1-30" PIPE)</li> </ul>	<ul style="list-style-type: none"> <li>× 1-18" PIPE</li> <li>— Poly. (2-36" PIPES)</li> <li>— Poly. (1-24" PIPE)</li> </ul>
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Note: Graph of flows is from FDOT IDF Regression Equations in the 2022 FDOT Drainage Design Guide.

**CROSSDRAIN FLOW RATES**

Structure Number	Roadway Stationing	Crossdrain							Roadway		Flow (cfs)			
		Size	Type	Number of Barrels	Inverts		*Tailwater Elevations	Surface Area (sf)	Crown Elevation	Crest Length	Q25	Q50	Q100	Q500
					Upstream	Downstream					25yr Storm	50yr Storm	100 yr Storm	500 yr Storm
CD-1	Sta. 211+70.87	48"	RCP	2	0.3	0.1	3.6	25.13	10	1850	84.8	96.8	118.8	201.9
CD-2	Sta. 236+00.00	36"	RCP	2	-0.4	-0.5	2.5	14.14	10	2435	84.8	96.8	118.8	201.9
CD-2A	Sta. 45+41.69 Eastern Alignment	48"	RCP	2	-0.3	-0.4	3.6	25.13	10	2435	84.8	96.8	118.8	201.9
CD-3	Sta. 275+00.00	18"	RCP	1	0.00	-0.2	1.3	1.77	10	510	10.6	12.1	14.8	25.2
CD-4	Sta. 425+25.77 SR 80 Alignment	36"	RCP	2	1.54	1.43	4.4	14.14	7	1330	84.8	96.8	118.8	201.9

CD-02A exists in Proposed Conditions only and will use flow rates from CD-02.

All elevations are taken from NAVD 88 Datum.

\* Tailwater elevations used are the crown elevations of the cross drain at the outlet.

## Design Frequency Water Surface Elevations

Cross Drain	Pipe Size		Pipe Length		50 yr Storm Event Elevation		100 yr Storm Event Elevation		500 yr Storm Event Elevation or Overtopping Elevation		Proposed Roadway Crest Elevation (NAVD 88)
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	
CD-1	2-36"	2-48"	90'	178'	4.88	4.08	5.52	4.32	7.04	5.65	10.00
CD-2	2-36"	2-36"	111'	111'	3.87	N/A	4.56	N/A	7.02	N/A	10.00
CD-2A	N/A	2-48"	N/A	164'	N/A	3.15	N/A	3.45	N/A	4.99	10.00
CD-3	18"	18"	96'	96'	3.25	N/A	4.22	N/A	7.02	N/A	10.00

CD-2 - Because of the Roadway Alignment shift, CD-02 is modeled as 2 separate cross drains, CD-02 and CD-02A.

CD-3 - Due to eastern alignment shift, existing CD-03 does not need to be extended.

Datum = NAVD 88

**HY8 Analysis**  
**Existing CD-1**



# HY-8 Culvert Analysis Report

## Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 96.8 cfs

Design Flow: 118.8 cfs

Maximum Flow: 201.9 cfs

441942-1-22-01 SR -31 PD&E Study  
Existing CD-1

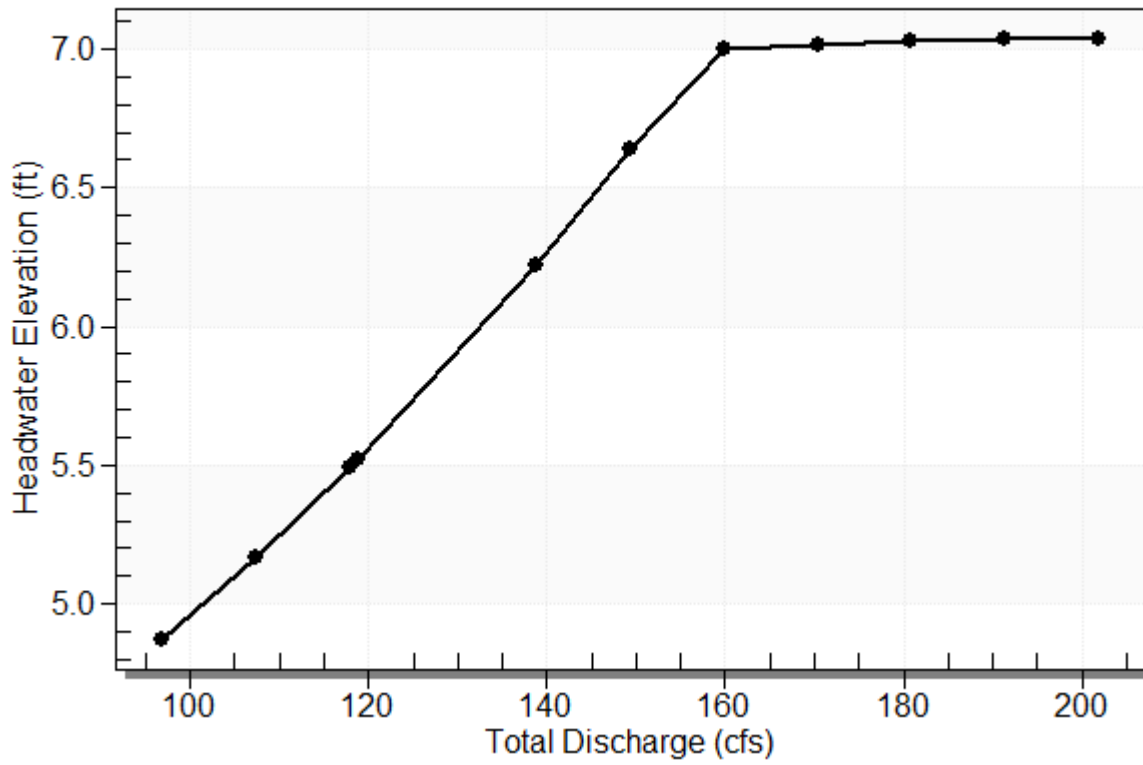
**Table 1 - Summary of Culvert Flows at Crossing: CD-01 Ex**

Headwater Elevation (ft)	Total Discharge (cfs)	CD-01 Ex Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4.88	96.80	96.80	0.00	1
5.17	107.31	107.31	0.00	1
5.49	117.82	117.82	0.00	1
5.52	118.80	118.80	0.00	1
6.22	138.84	138.84	0.00	1
6.64	149.35	149.35	0.00	1
7.00	159.86	158.09	0.23	76
7.02	170.37	158.43	10.55	5
7.03	180.88	158.65	21.27	4
7.03	191.39	158.81	31.04	3
7.04	201.90	158.97	41.64	3
7.00	158.06	158.06	0.00	Overtopping

# Rating Curve Plot for Crossing: CD-01 Ex

## Total Rating Curve

Crossing: CD-01 Ex

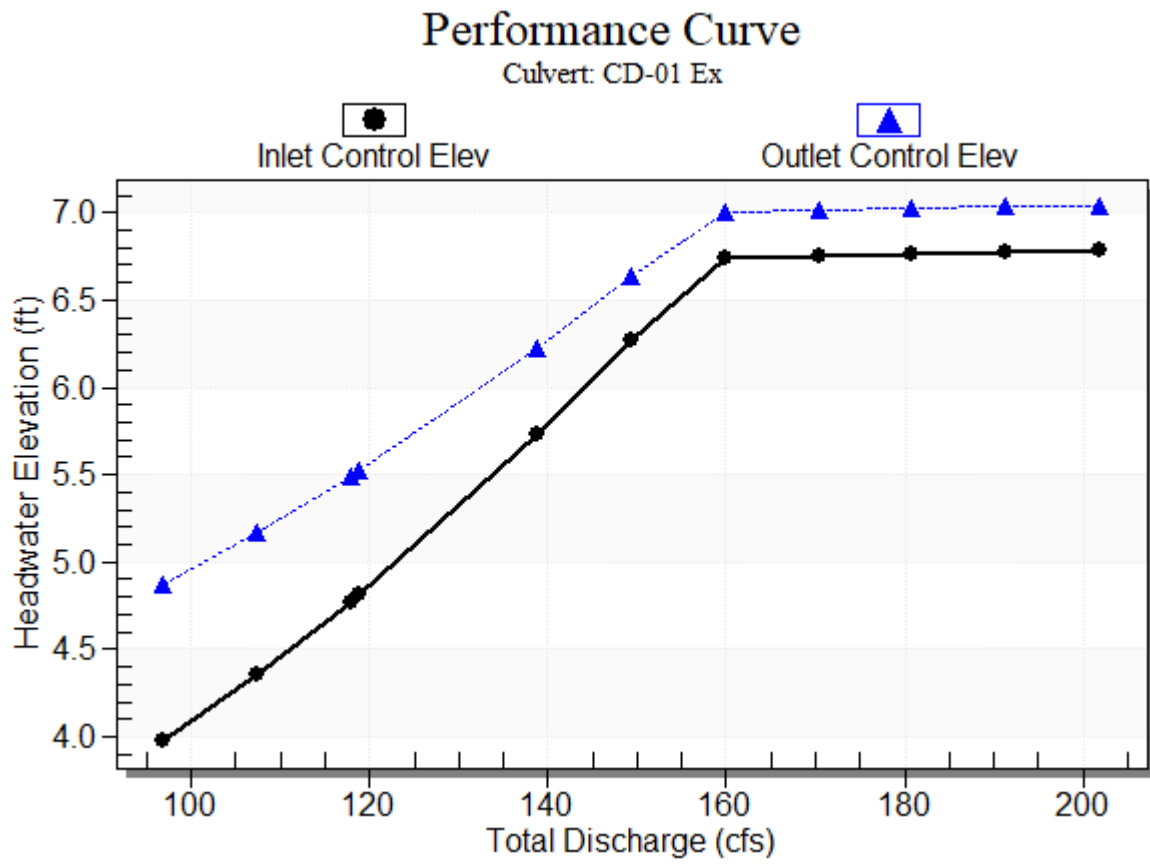


**Table 2 - Culvert Summary Table: CD-01 Ex**

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
96.80	96.80	4.88	3.675	4.575	4-FFf	3.000	2.262	3.000	3.500	6.847	0.000
107.31	107.31	5.17	4.054	4.867	4-FFf	3.000	2.377	3.000	3.500	7.591	0.000
117.82	117.82	5.49	4.473	5.189	4-FFf	3.000	2.480	3.000	3.500	8.334	0.000
118.80	118.80	5.52	4.515	5.221	4-FFf	3.000	2.489	3.000	3.500	8.403	0.000
138.84	138.84	6.22	5.432	5.923	4-FFf	3.000	2.650	3.000	3.500	9.821	0.000
149.35	149.35	6.64	5.967	6.335	4-FFf	3.000	2.715	3.000	3.500	10.564	0.000
159.86	158.09	7.00	6.437	6.701	4-FFf	3.000	2.761	3.000	3.500	11.183	0.000
170.37	158.43	7.02	6.455	6.716	4-FFf	3.000	2.762	3.000	3.500	11.207	0.000
180.88	158.65	7.03	6.467	6.725	4-FFf	3.000	2.763	3.000	3.500	11.222	0.000
191.39	158.81	7.03	6.476	6.732	4-FFf	3.000	2.764	3.000	3.500	11.234	0.000
201.90	158.97	7.04	6.485	6.739	4-FFf	3.000	2.765	3.000	3.500	11.245	0.000

\*\*\*\*\*  
Straight Culvert  
Inlet Elevation (invert): 0.30 ft, Outlet Elevation (invert): 0.10 ft  
Culvert Length: 90.00 ft, Culvert Slope: 0.0022  
\*\*\*\*\*

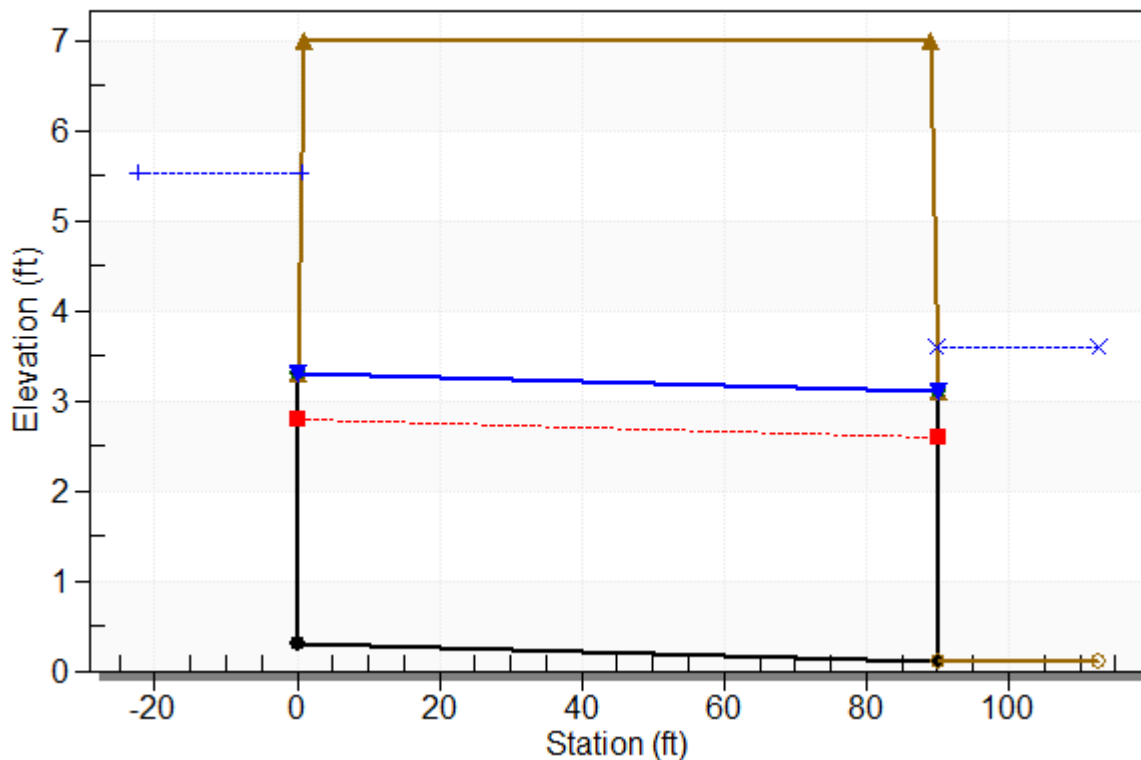
### Culvert Performance Curve Plot: CD-01 Ex



## Water Surface Profile Plot for Culvert: CD-01 Ex

Crossing - CD-01 Ex, Design Discharge - 118.8 cfs

Culvert - CD-01 Ex, Culvert Discharge - 118.8 cfs



### Site Data - CD-01 Ex

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 0.30 ft

Outlet Station: 90.00 ft

Outlet Elevation: 0.10 ft

Number of Barrels: 2

### Culvert Data Summary - CD-01 Ex

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: None

**Table 3 - Downstream Channel Rating Curve (Crossing: CD-01 Ex)**

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
96.80	3.60	3.50
107.31	3.60	3.50
117.82	3.60	3.50
118.80	3.60	3.50
138.84	3.60	3.50
149.35	3.60	3.50
159.86	3.60	3.50
170.37	3.60	3.50
180.88	3.60	3.50
191.39	3.60	3.50
201.90	3.60	3.50



**Tailwater Channel Data - CD-01 Ex**

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 3.60 ft

**Roadway Data for Crossing: CD-01 Ex**

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 1850.00 ft

Crest Elevation: 7.00 ft

Roadway Surface: Paved

Roadway Top Width: 88.00 ft

**HY8 Analysis**  
**Proposed CD-1**

# HY-8 Culvert Analysis Report

## Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 96.8 cfs

Design Flow: 118.8 cfs

Maximum Flow: 201.9 cfs

441942-1-22-01 SR -31 PD&E Study  
Proposed CD-01

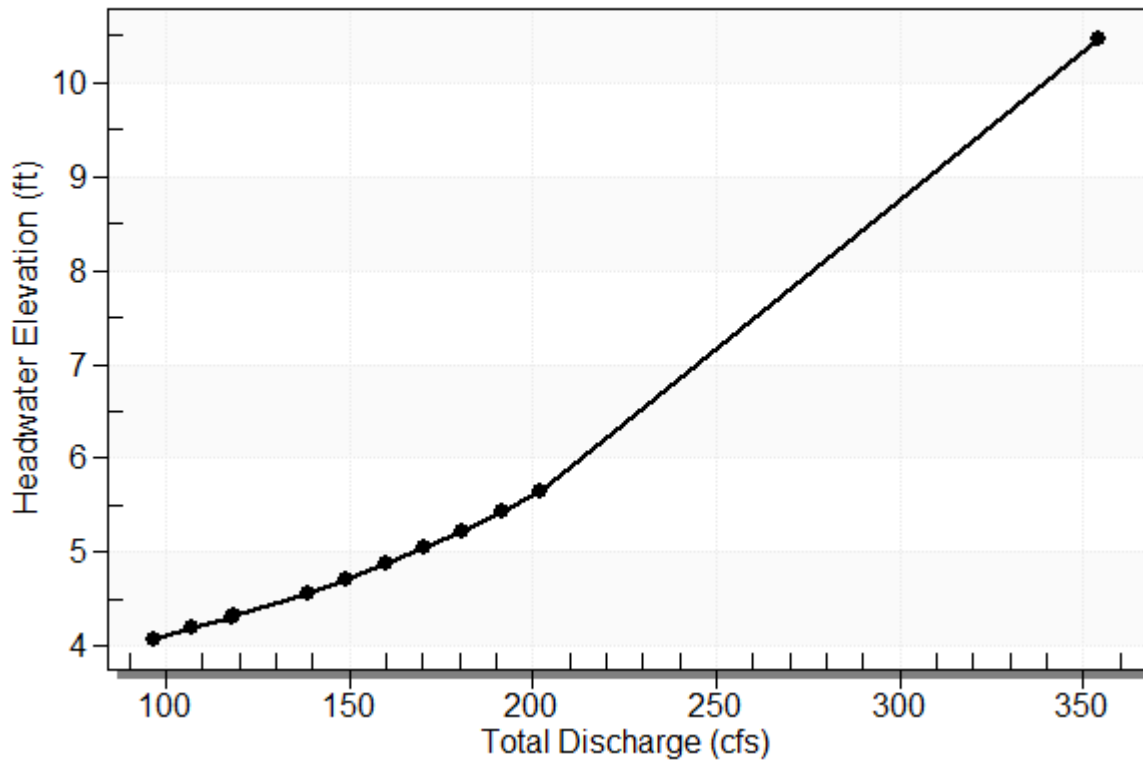
**Table 1 - Summary of Culvert Flows at Crossing: CD-01 Pro**

Headwater Elevation (ft)	Total Discharge (cfs)	CD-01 Pro Discharge (cfs)	Roadway Discharge (cfs)	Iterations
4.08	96.80	96.80	0.00	1
4.20	107.31	107.31	0.00	1
4.30	117.82	117.82	0.00	1
4.32	118.80	118.80	0.00	1
4.57	138.84	138.84	0.00	1
4.72	149.35	149.35	0.00	1
4.87	159.86	159.86	0.00	1
5.04	170.37	170.37	0.00	1
5.23	180.88	180.88	0.00	1
5.43	191.39	191.39	0.00	1
5.65	201.90	201.90	0.00	1
10.00	354.05	354.05	0.00	Overtopping

Rating Curve Plot for Crossing: CD-01 Pro

### Total Rating Curve

Crossing: CD-01 Pro



**Table 2 - Culvert Summary Table: CD-01 Pro**

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
96.80	96.80	4.08	3.017	3.780	3-M1t	2.963	2.083	3.500	3.500	4.151	0.000
107.31	107.31	4.20	3.202	3.896	3-M2t	4.000	2.199	3.500	3.500	4.602	0.000
117.82	117.82	4.30	3.382	4.004	3-M2t	4.000	2.306	3.500	3.500	5.052	0.000
118.80	118.80	4.32	3.398	4.016	3-M2t	4.000	2.316	3.500	3.500	5.094	0.000
138.84	138.84	4.57	3.741	4.269	3-M2t	4.000	2.514	3.500	3.500	5.954	0.000
149.35	149.35	4.72	3.926	4.415	3-M2t	4.000	2.609	3.500	3.500	6.405	0.000
159.86	159.86	4.87	4.116	4.573	3-M2t	4.000	2.705	3.500	3.500	6.855	0.000
170.37	170.37	5.04	4.315	4.742	3-M2t	4.000	2.794	3.500	3.500	7.306	0.000
180.88	180.88	5.23	4.524	4.925	3-M2t	4.000	2.880	3.500	3.500	7.757	0.000
191.39	191.39	5.43	4.743	5.131	7-M2t	4.000	2.962	3.500	3.500	8.207	0.000
201.90	201.90	5.65	4.974	5.351	7-M2t	4.000	3.040	3.500	3.500	8.658	0.000

\*\*\*\*\*

Straight Culvert

Inlet Elevation (invert): 0.30 ft, Outlet Elevation (invert): 0.10 ft

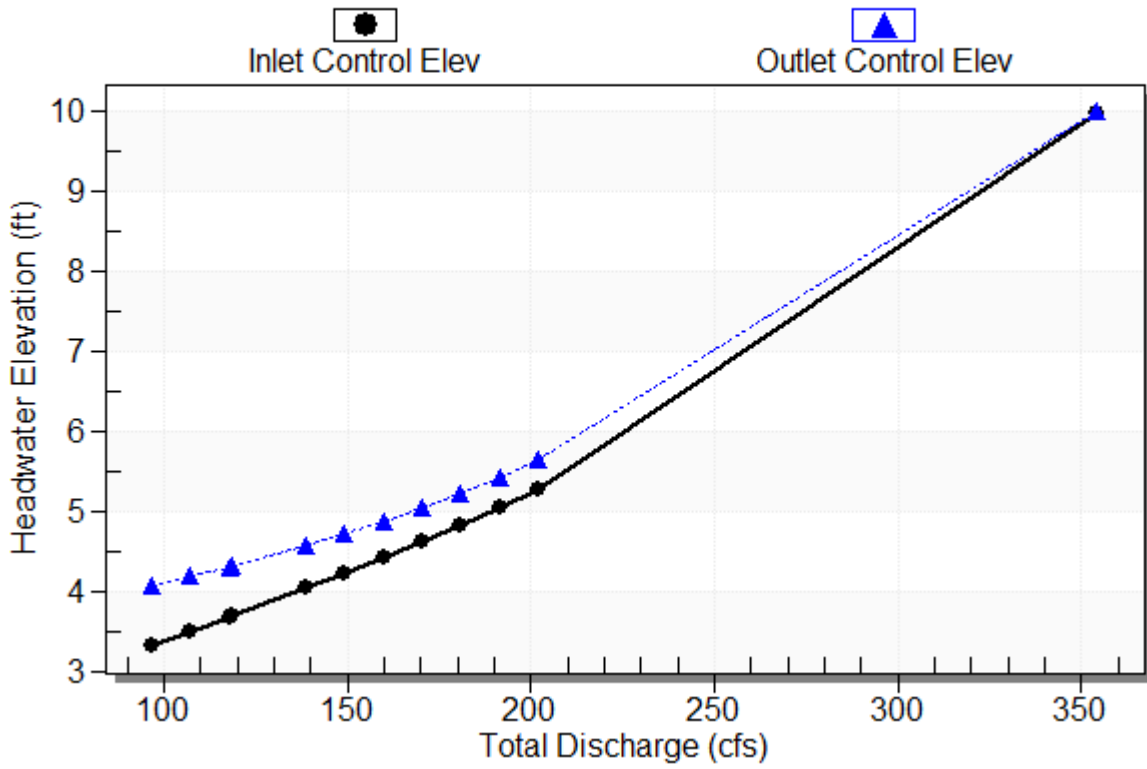
Culvert Length: 178.00 ft, Culvert Slope: 0.0011

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# Culvert Performance Curve Plot: CD-01 Pro

## Performance Curve

Culvert: CD-01 Pro

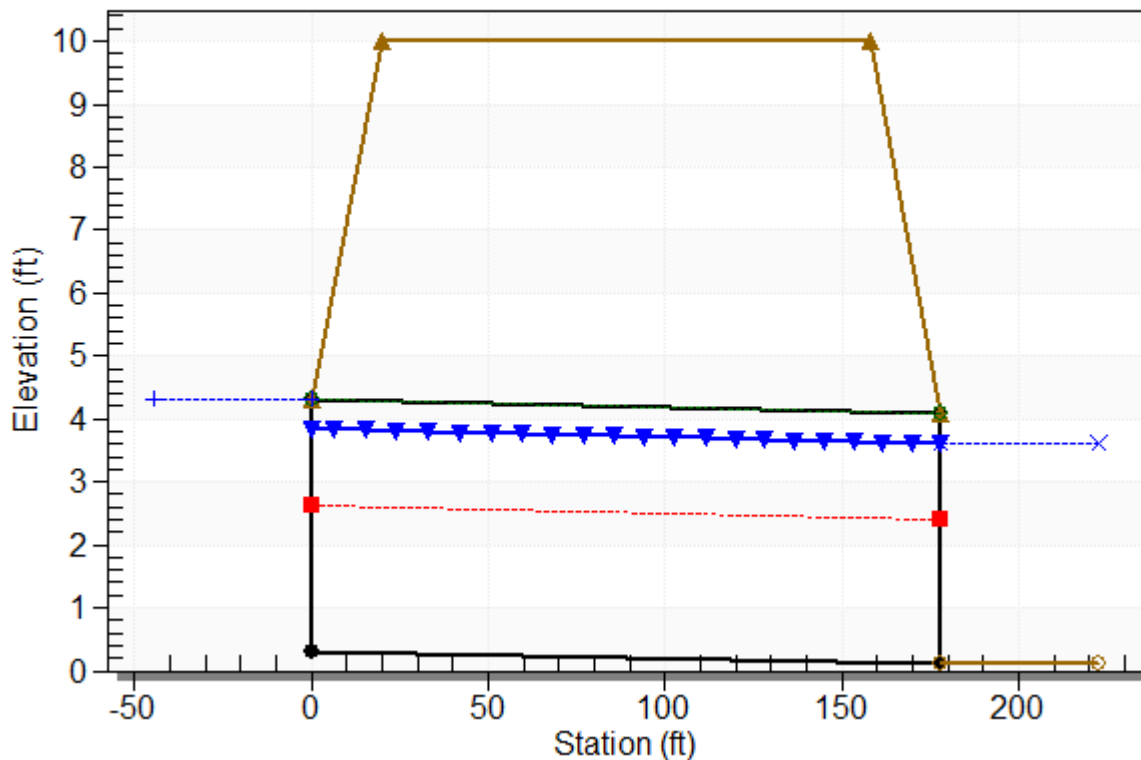




## Water Surface Profile Plot for Culvert: CD-01 Pro

Crossing - CD-01 Pro, Design Discharge - 118.8 cfs

Culvert - CD-01 Pro, Culvert Discharge - 118.8 cfs



### Site Data - CD-01 Pro

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 0.30 ft

Outlet Station: 178.00 ft

Outlet Elevation: 0.10 ft

Number of Barrels: 2

### Culvert Data Summary - CD-01 Pro

Barrel Shape: Circular

Barrel Diameter: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: None

**Table 3 - Downstream Channel Rating Curve (Crossing: CD-01 Pro)**

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
96.80	3.60	3.50
107.31	3.60	3.50
117.82	3.60	3.50
118.80	3.60	3.50
138.84	3.60	3.50
149.35	3.60	3.50
159.86	3.60	3.50
170.37	3.60	3.50
180.88	3.60	3.50
191.39	3.60	3.50
201.90	3.60	3.50

**Tailwater Channel Data - CD-01 Pro**

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 3.60 ft

**Roadway Data for Crossing: CD-01 Pro**

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 1850.00 ft

Crest Elevation: 10.00 ft

Roadway Surface: Paved

Roadway Top Width: 138.00 ft

**HY8 Analysis**  
**Existing CD-2**

# HY-8 Culvert Analysis Report

## Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 96.8 cfs

Design Flow: 118.8 cfs

Maximum Flow: 201.9 cfs

441942-1-22-01 SR -31 PD&E Study  
Existing CD-2

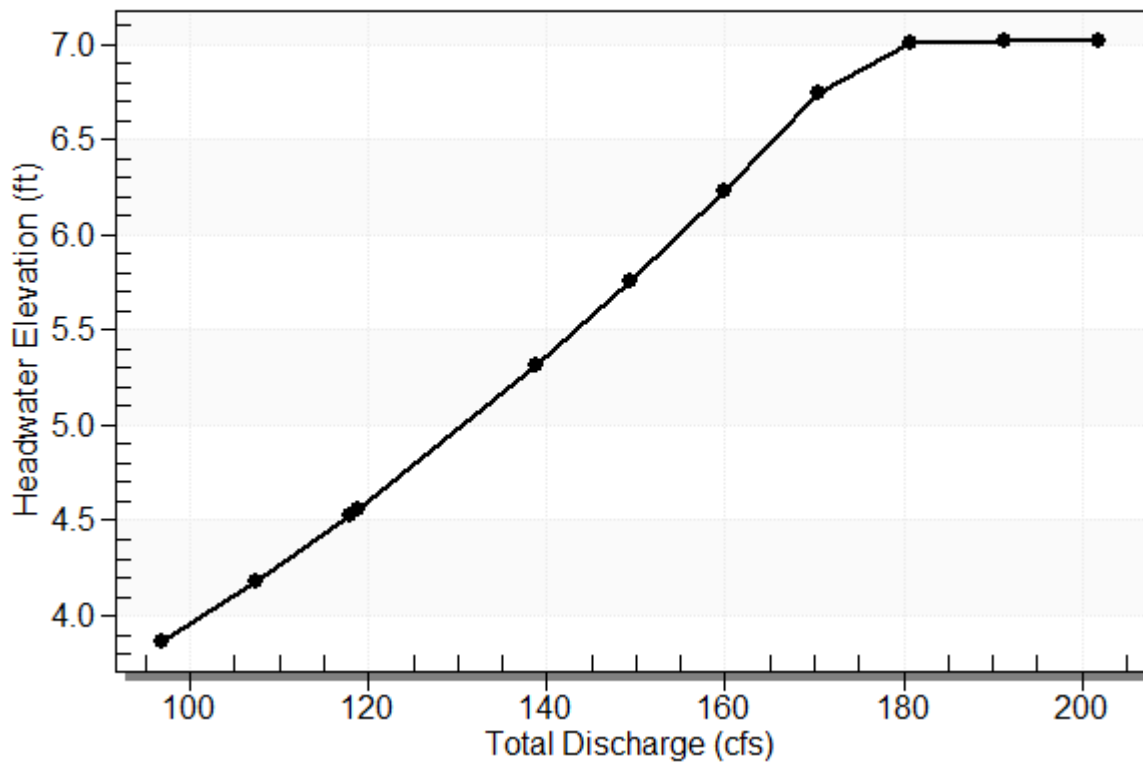
**Table 1 - Summary of Culvert Flows at Crossing: CD-02 Ex**

Headwater Elevation (ft)	Total Discharge (cfs)	CD-02 Ex Discharge (cfs)	Roadway Discharge (cfs)	Iterations
3.87	96.80	96.80	0.00	1
4.18	107.31	107.31	0.00	1
4.53	117.82	117.82	0.00	1
4.56	118.80	118.80	0.00	1
5.32	138.84	138.84	0.00	1
5.76	149.35	149.35	0.00	1
6.23	159.86	159.86	0.00	1
6.74	170.37	170.37	0.00	1
7.01	180.88	175.05	4.15	40
7.02	191.39	175.21	14.55	4
7.02	201.90	175.33	25.78	4
7.00	174.93	174.93	0.00	Overtopping

# Rating Curve Plot for Crossing: CD-02 Ex

## Total Rating Curve

Crossing: CD-02 Ex



**Table 2 - Culvert Summary Table: CD-02 Ex**

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
96.80	96.80	3.87	3.677	4.269	4-FFf	3.000	2.262	3.000	3.000	6.847	0.000
107.31	107.31	4.18	4.056	4.582	4-FFf	3.000	2.377	3.000	3.000	7.591	0.000
117.82	117.82	4.53	4.475	4.928	4-FFf	3.000	2.480	3.000	3.000	8.334	0.000
118.80	118.80	4.56	4.517	4.962	4-FFf	3.000	2.489	3.000	3.000	8.403	0.000
138.84	138.84	5.32	5.434	5.716	4-FFf	3.000	2.650	3.000	3.000	9.821	0.000
149.35	149.35	5.76	5.969	6.158	4-FFf	3.000	2.715	3.000	3.000	10.564	0.000
159.86	159.86	6.23	6.536	6.633	4-FFf	3.000	2.769	3.000	3.000	11.308	0.000
170.37	170.37	6.74	7.133	7.140	4-FFf	3.000	2.811	3.000	3.000	12.051	0.000
180.88	175.05	7.01	7.407	7.376	4-FFf	3.000	2.833	3.000	3.000	12.382	0.000
191.39	175.21	7.02	7.416	7.384	4-FFf	3.000	2.834	3.000	3.000	12.393	0.000
201.90	175.33	7.02	7.424	7.391	4-FFf	3.000	2.835	3.000	3.000	12.402	0.000



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Straight Culvert

Inlet Elevation (invert): -0.40 ft, Outlet Elevation (invert): -0.50 ft

Culvert Length: 111.00 ft, Culvert Slope: 0.0009

\*\*\*\*\*

**Culvert Performance Curve Plot: CD-02 Ex**

## **Water Surface Profile Plot for Culvert: CD-02 Ex**

### **Site Data - CD-02 Ex**

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: -0.40 ft

Outlet Station: 111.00 ft

Outlet Elevation: -0.50 ft

Number of Barrels: 2

### **Culvert Data Summary - CD-02 Ex**

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: None

**Table 3 - Downstream Channel Rating Curve (Crossing: CD-02 Ex)**

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
96.80	2.50	3.00
107.31	2.50	3.00
117.82	2.50	3.00
118.80	2.50	3.00
138.84	2.50	3.00
149.35	2.50	3.00
159.86	2.50	3.00
170.37	2.50	3.00
180.88	2.50	3.00
191.39	2.50	3.00
201.90	2.50	3.00

**Tailwater Channel Data - CD-02 Ex**

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 2.50 ft

**Roadway Data for Crossing: CD-02 Ex**

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 2435.00 ft

Crest Elevation: 7.00 ft

Roadway Surface: Paved

Roadway Top Width: 111.00 ft

**HY8 Analysis**  
**Proposed CD-2A**

# HY-8 Culvert Analysis Report

## Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 96.8 cfs

Design Flow: 118.8 cfs

Maximum Flow: 201.9 cfs

441942-1-22-01 SR -31 PD&E Study  
Proposed CD-2A

**Table 1 - Summary of Culvert Flows at Crossing: CD-2A Pro**

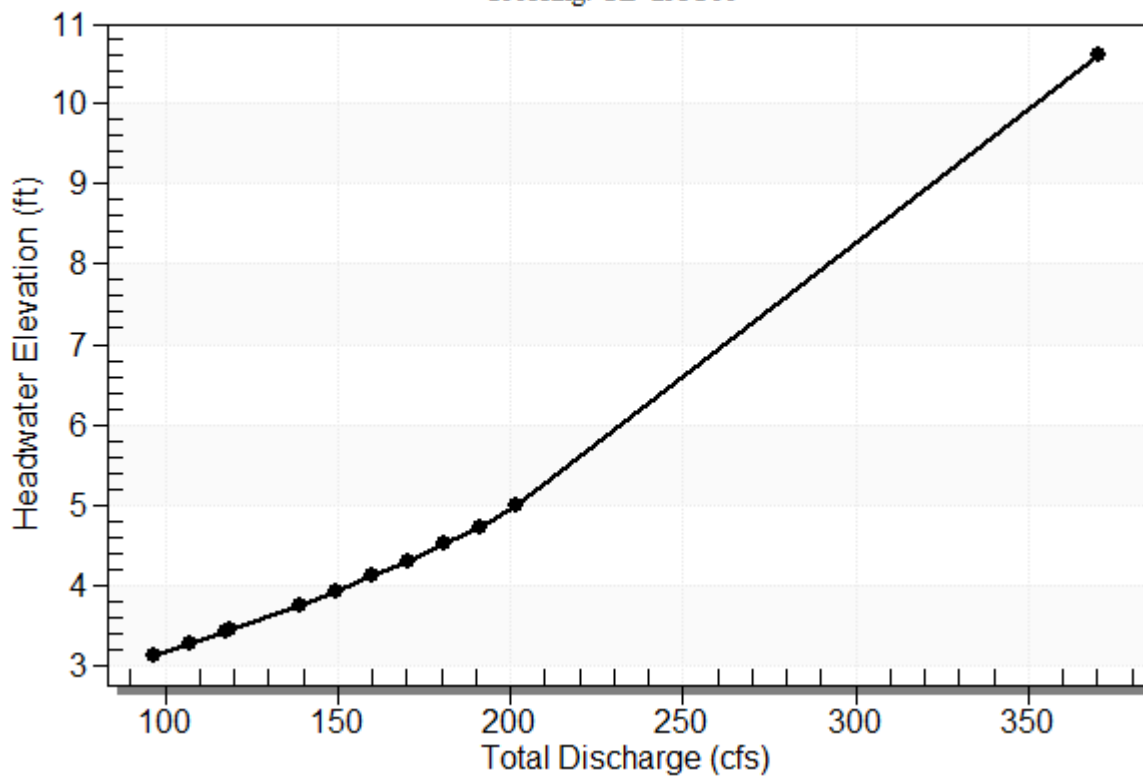
Headwater Elevation (ft)	Total Discharge (cfs)	CD-2A Pro Discharge (cfs)	Roadway Discharge (cfs)	Iterations
3.15	96.80	96.80	0.00	1
3.29	107.31	107.31	0.00	1
3.44	117.82	117.82	0.00	1
3.45	118.80	118.80	0.00	1
3.76	138.84	138.84	0.00	1
3.94	149.35	149.35	0.00	1
4.12	159.86	159.86	0.00	1
4.31	170.37	170.37	0.00	1
4.52	180.88	180.88	0.00	1
4.74	191.39	191.39	0.00	1
4.99	201.90	201.90	0.00	1
10.00	370.26	370.26	0.00	Overtopping



# Rating Curve Plot for Crossing: CD-2A Pro

## Total Rating Curve

Crossing: CD-2A Pro



**Table 2 - Culvert Summary Table: CD-2A Pro**

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
96.80	96.80	3.15	3.018	3.448	3-M2t	4.000	2.083	2.900	2.900	4.960	0.000
107.31	107.31	3.29	3.203	3.587	3-M2t	4.000	2.199	2.900	2.900	5.499	0.000
117.82	117.82	3.44	3.383	3.735	3-M2t	4.000	2.306	2.900	2.900	6.037	0.000
118.80	118.80	3.45	3.399	3.750	3-M2t	4.000	2.316	2.900	2.900	6.088	0.000
138.84	138.84	3.76	3.742	4.060	3-M2t	4.000	2.514	2.900	2.900	7.114	0.000
149.35	149.35	3.94	3.927	4.235	3-M2t	4.000	2.609	2.900	2.900	7.653	0.000
159.86	159.86	4.12	4.117	4.419	3-M2t	4.000	2.705	2.900	2.900	8.191	0.000
170.37	170.37	4.31	4.316	4.612	3-M2t	4.000	2.794	2.900	2.900	8.730	0.000
180.88	180.88	4.52	4.525	4.817	3-M2t	4.000	2.880	2.900	2.900	9.269	0.000
191.39	191.39	4.74	4.744	5.038	7-M2c	4.000	2.962	2.962	2.900	9.593	0.000
201.90	201.90	4.99	4.975	5.292	7-M2c	4.000	3.040	3.040	2.900	9.851	0.000

\*\*\*\*\*

Straight Culvert

Inlet Elevation (invert): -0.30 ft, Outlet Elevation (invert): -0.40 ft

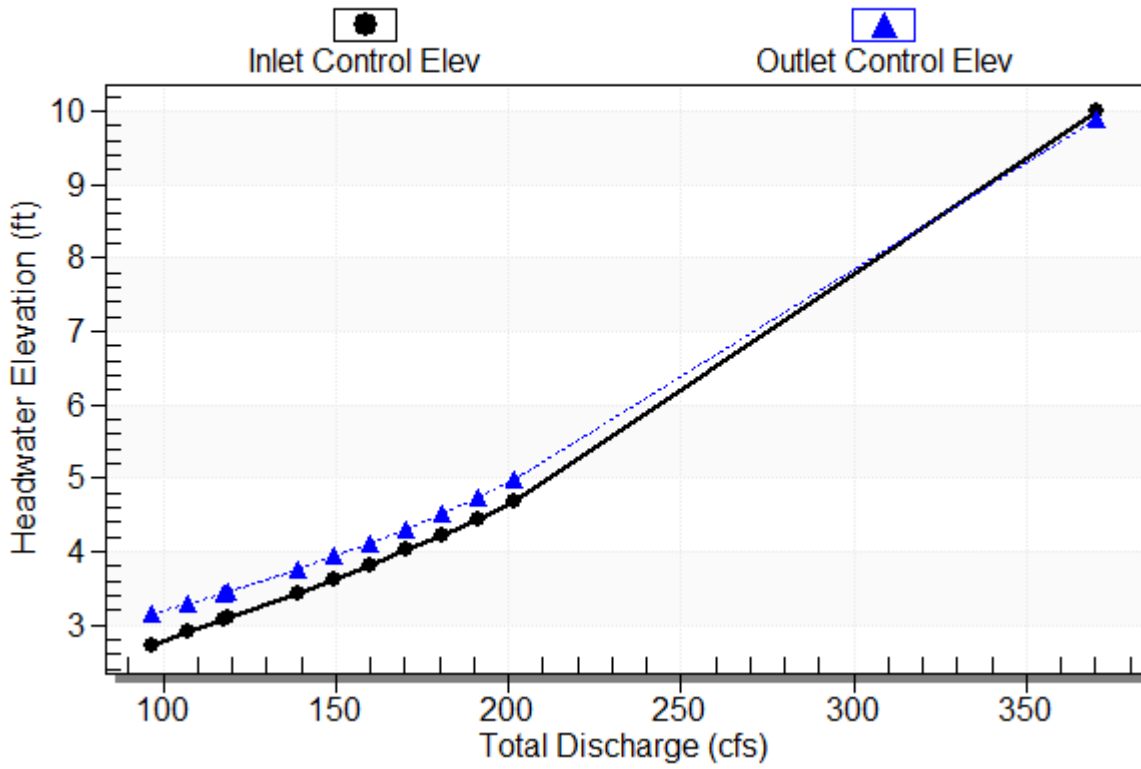
Culvert Length: 164.00 ft, Culvert Slope: 0.0006

\*\*\*\*\*

# Culvert Performance Curve Plot: CD-2A Pro

## Performance Curve

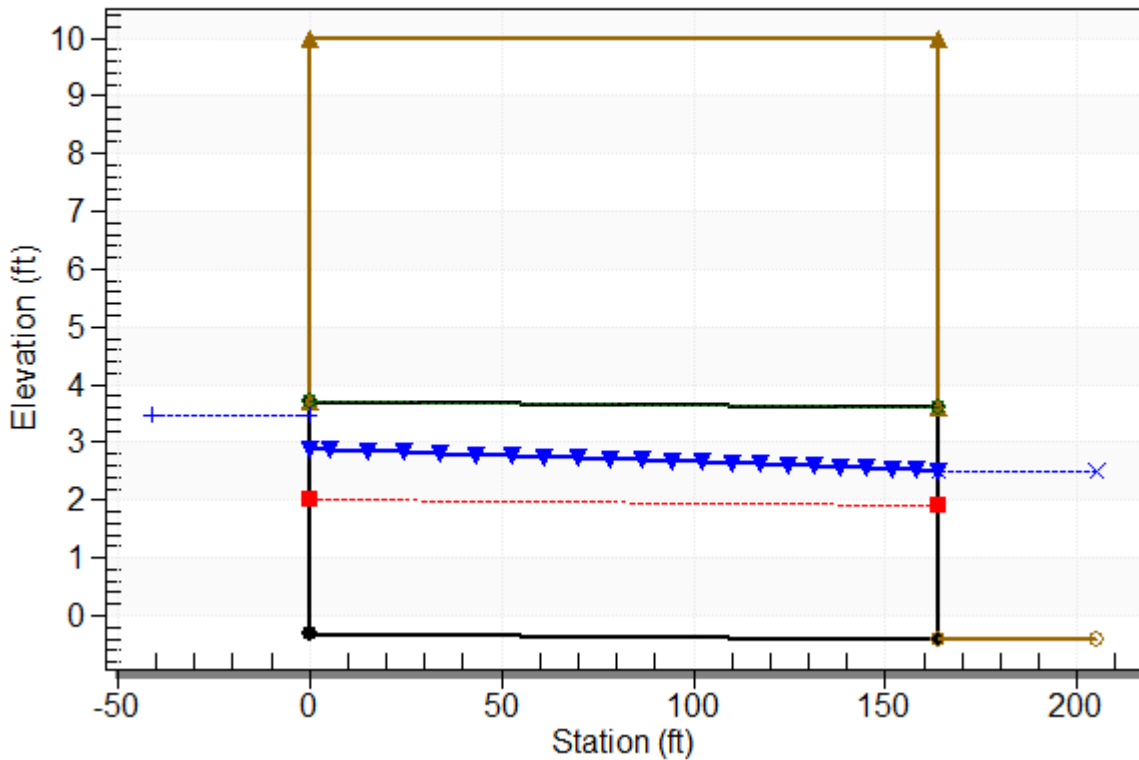
Culvert: CD-2A Pro



## Water Surface Profile Plot for Culvert: CD-2A Pro

Crossing - CD-2A Pro, Design Discharge - 118.8 cfs

Culvert - CD-2A Pro, Culvert Discharge - 118.8 cfs



### Site Data - CD-2A Pro

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: -0.30 ft

Outlet Station: 164.00 ft

Outlet Elevation: -0.40 ft

Number of Barrels: 2

### Culvert Data Summary - CD-2A Pro

Barrel Shape: Circular

Barrel Diameter: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: None

**Table 3 - Downstream Channel Rating Curve (Crossing: CD-2A Pro)**

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
96.80	2.50	2.90
107.31	2.50	2.90
117.82	2.50	2.90
118.80	2.50	2.90
138.84	2.50	2.90
149.35	2.50	2.90
159.86	2.50	2.90
170.37	2.50	2.90
180.88	2.50	2.90
191.39	2.50	2.90
201.90	2.50	2.90

**Tailwater Channel Data - CD-2A Pro**

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 2.50 ft

**Roadway Data for Crossing: CD-2A Pro**

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 2435.00 ft

Crest Elevation: 10.00 ft

Roadway Surface: Paved

Roadway Top Width: 164.00 ft

**HY8 Analysis**

**Existing CD-3**



# HY-8 Culvert Analysis Report

## Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 12.1 cfs

Design Flow: 14.8 cfs

Maximum Flow: 25.2 cfs

441942-1-22-01 SR -31 PD&E Study  
Existing CD-3

**Table 1 - Summary of Culvert Flows at Crossing: CD-03**

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
3.25	12.10	12.10	0.00	1
3.70	13.41	13.41	0.00	1
4.19	14.72	14.72	0.00	1
4.22	14.80	14.80	0.00	1
5.31	17.34	17.34	0.00	1
5.94	18.65	18.65	0.00	1
6.61	19.96	19.96	0.00	1
7.00	21.27	20.68	0.40	64
7.01	22.58	20.69	1.67	4
7.02	23.89	20.70	3.08	4
7.02	25.20	20.71	4.32	3
7.00	20.67	20.67	0.00	Overtopping

**Rating Curve Plot for Crossing: CD-03**

**Table 2 - Culvert Summary Table: Culvert 1**

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
12.10	12.10	3.25	2.669	3.253	4-FFf	1.500	1.318	1.500	1.500	6.847	0.000
13.41	13.41	3.70	3.046	3.699	4-FFf	1.500	1.365	1.500	1.500	7.589	0.000
14.72	14.72	4.19	3.455	4.190	4-FFf	1.500	1.397	1.500	1.500	8.330	0.000
14.80	14.80	4.22	3.481	4.222	4-FFf	1.500	1.402	1.500	1.500	8.375	0.000
17.34	17.34	5.31	4.353	5.311	4-FFf	1.500	1.365	1.500	1.500	9.812	0.000
18.65	18.65	5.94	4.894	5.939	4-FFf	1.500	1.459	1.500	1.500	10.554	0.000
19.96	19.96	6.61	5.496	6.614	4-FFf	1.500	1.500	1.500	1.500	11.295	0.000
21.27	20.68	7.00	5.844	7.004	4-FFf	1.500	1.500	1.500	1.500	11.702	0.000
22.58	20.69	7.01	5.850	7.011	4-FFf	1.500	1.500	1.500	1.500	11.709	0.000
23.89	20.70	7.02	5.855	7.016	4-FFf	1.500	1.500	1.500	1.500	11.715	0.000
25.20	20.71	7.02	5.859	7.020	4-FFf	1.500	1.500	1.500	1.500	11.719	0.000

\*\*\*\*\*

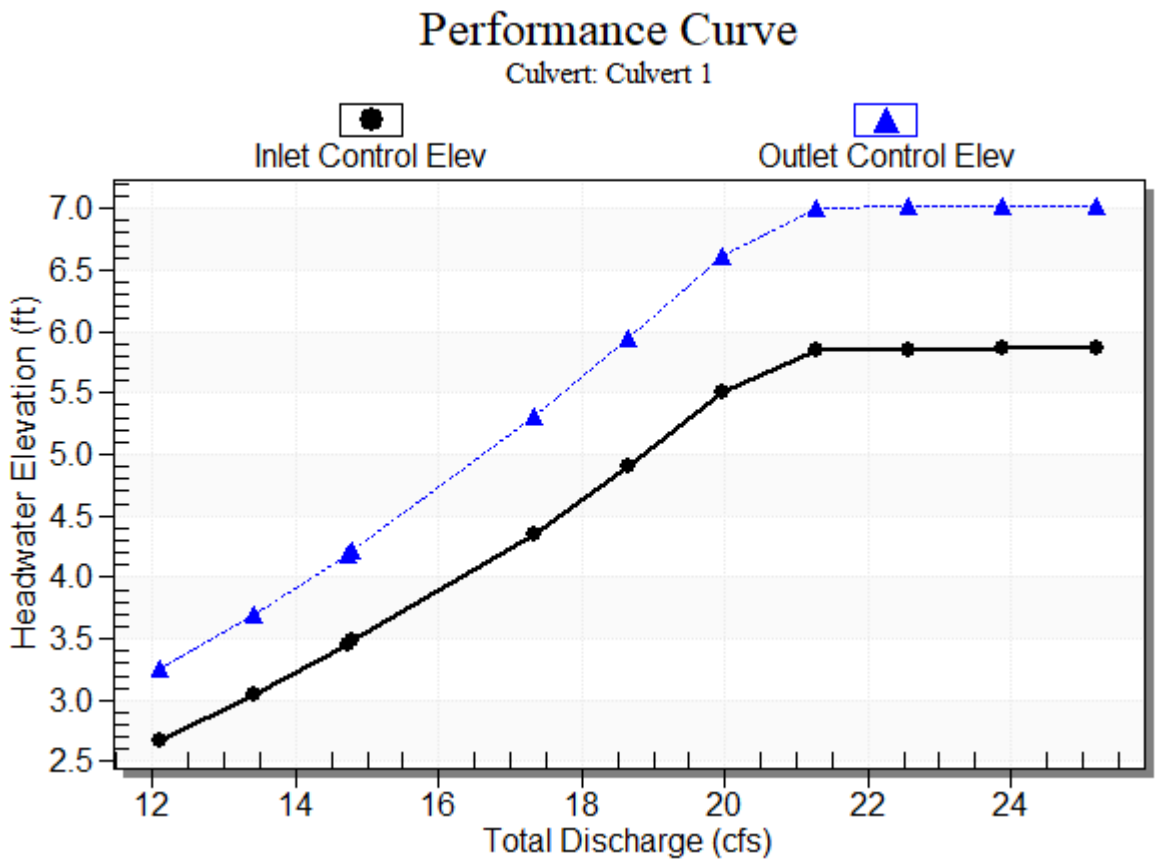
Straight Culvert

Inlet Elevation (invert): 0.00 ft, Outlet Elevation (invert): -0.20 ft

Culvert Length: 96.00 ft, Culvert Slope: 0.0021

\*\*\*\*\*

### Culvert Performance Curve Plot: Culvert 1



## **Water Surface Profile Plot for Culvert: Culvert 1**

### **Site Data - Culvert 1**

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 0.00 ft

Outlet Station: 96.00 ft

Outlet Elevation: -0.20 ft

Number of Barrels: 1

### **Culvert Data Summary - Culvert 1**

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: None

**Table 3 - Downstream Channel Rating Curve (Crossing: CD-03)**

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
12.10	1.30	1.50
13.41	1.30	1.50
14.72	1.30	1.50
14.80	1.30	1.50
17.34	1.30	1.50
18.65	1.30	1.50
19.96	1.30	1.50
21.27	1.30	1.50
22.58	1.30	1.50
23.89	1.30	1.50
25.20	1.30	1.50



**Tailwater Channel Data - CD-03**

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 1.30 ft

**Roadway Data for Crossing: CD-03**

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 510.00 ft

Crest Elevation: 7.00 ft

Roadway Surface: Paved

Roadway Top Width: 96.00 ft

**APPENDIX 4**  
**FEMA Floodplain Maps**

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**NOTES TO USERS**

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **Floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

**Coastal Base Flood Elevations** shown on this map apply only landward of 0.7 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Florida State Plane west zone (FIPSZONE 902). The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services  
NOAA, NGS12  
National Geodetic Survey  
SSMC-3, #6202  
1315 East-West Highway  
Silver Spring, Maryland 20910-3282  
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

**Base map** information shown on this FIRM was provided in digital format by the Lee County GIS Department. The road centerline information was constructed based on orthophotography produced at a scale of 1"=100' from aerial imagery flown in 1998 and updated using orthophotography dated 2002 and 2005. The surface water features were also constructed based on orthophotography produced at a scale of 1"=100' from aerial imagery flown in 1998.

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Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.



**LEGEND**

**SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD**

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, AV, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decommissioned. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE AR9** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

**FLOODWAY AREAS IN ZONE AE**

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

**OTHER FLOOD AREAS**

- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

**OTHER AREAS**

- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.

**COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**

**OTHERWISE PROTECTED AREAS (OPAs)**

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- - - Floodway boundary
- - - Zone D boundary
- ..... CBRS and OPA boundary
- ..... Boundary dividing Special Flood Hazard Area zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513' Base Flood Elevation line and value; elevation in feet\*
- 987' Base Flood Elevation value where uniform within zone; elevation in feet\*

\* Referenced to the North American Vertical Datum of 1988

- ⊙ Cross section line
- ⊙ Transsect line
- 87°07'45", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 17°78'00"N 1000-meter Universal Transverse Mercator grid values, zone 17
- 600000 FT 5000-foot grid ticks: Florida State Plane coordinate system; West zone (FIPSZONE 9002), Transverse Mercator projection
- DX5510 x Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 River Mile

**MAP REPOSITORY**  
Refer to listing of Map Repositories on Map Index.

**EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP**  
August 28, 2008

**EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL**

For community map revision history prior to countywide mapping, refer to the Community Map History table located in 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.

**MAP SCALE 1" = 500'**

250 500 1000 FEET  
150 0 150 300 METERS

**NATIONAL FLOOD INSURANCE PROGRAM**

**PANEL 0284F**

**FIRM**  
**FLOOD INSURANCE RATE MAP**

**LEE COUNTY, FLORIDA AND INCORPORATED AREAS**

**PANEL 284 OF 685**  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS	COMMUNITY	NUMBER	PANEL	SUFFIX
LEE COUNTY	125124	0284	F	

Notice to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance applications for the subject community.

**MAP NUMBER 12071C0284F**

**EFFECTIVE DATE AUGUST 28, 2008**

Federal Emergency Management Agency

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NGS Information Services  
NOAA, NGS12  
National Geodetic Survey  
SSMC-3, #6202  
1315 East-West Highway  
Silver Spring, Maryland 20910-3282  
(301) 713-3242

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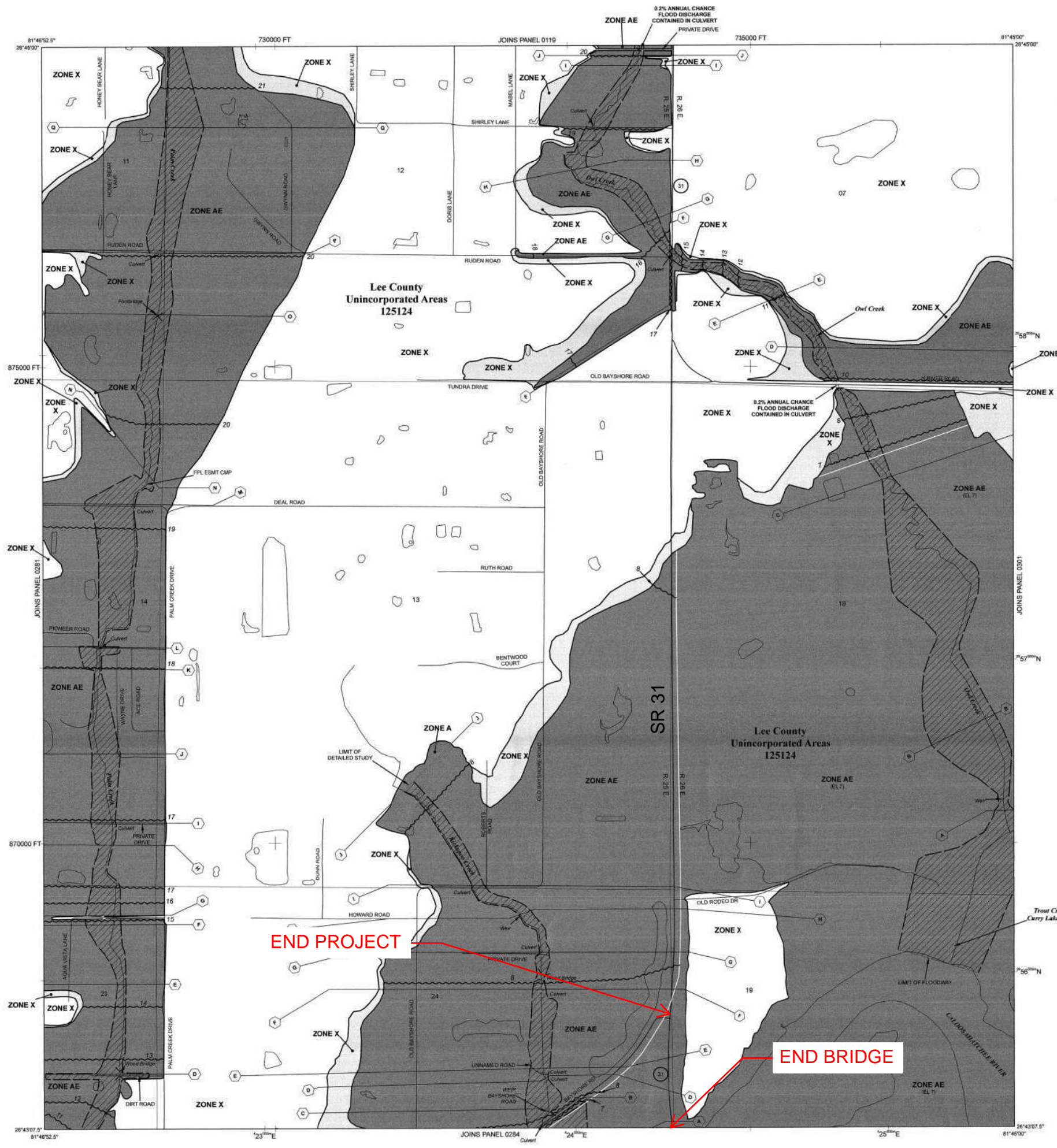
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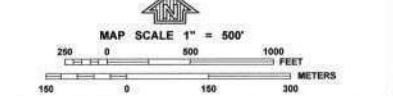
Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-338-2627) or visit the FEMA website at <http://www.fema.gov>.



**LEGEND**

- SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD**
    - ZONE A** No Base Flood Elevations determined.
    - ZONE AE** Base Flood Elevations determined.
    - ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
    - ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
    - ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decommissioned. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
    - ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
    - ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
    - ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
  - FLOODWAY AREAS IN ZONE AE**
    - The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.
  - OTHER FLOOD AREAS**
    - ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
  - OTHER AREAS**
    - ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
    - ZONE D** Areas in which flood hazards are undetermined, but possible.
  - COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**
  - OTHERWISE PROTECTED AREAS (OPAs)**
  - CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.
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  - Floodway boundary**
  - Zone D boundary**
  - CBRS and OPA boundary**
  - Boundary dividing Special Flood Hazard Area zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.**
  - Base Flood Elevation line and value; elevation in feet\***
  - Base Flood Elevation value where uniform within zone; elevation in feet\***
- \* Referenced to the North American Vertical Datum of 1988
- Cross section line
  - Traversed line
  - 87°07'45", 32°22'30"
  - Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
  - 1000-meter Universal Transverse Mercator grid values, zone 17
  - 5000-foot grid ticks: Florida State Plane coordinate system, West zone (FIPSZONE 902), Transverse Mercator projection
  - Bench mark (see explanation in Notes to Users section of this FIRM panel)
  - DX5510**
  - M1.5** River Mile
- MAP REPOSITORY**  
Refer to listing of Map Repositories on Map Index
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP**  
August 28, 2008
- EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL**
- For community map revision history prior to countywide mapping, refer to the Community Map History table located in 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.



**NATIONAL FLOOD INSURANCE PROGRAM**

**PANEL 0282F**

**FIRM**

**FLOOD INSURANCE RATE MAP**

**LEE COUNTY, FLORIDA AND INCORPORATED AREAS**

**PANEL 282 OF 685**

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

**CONTAINS:**

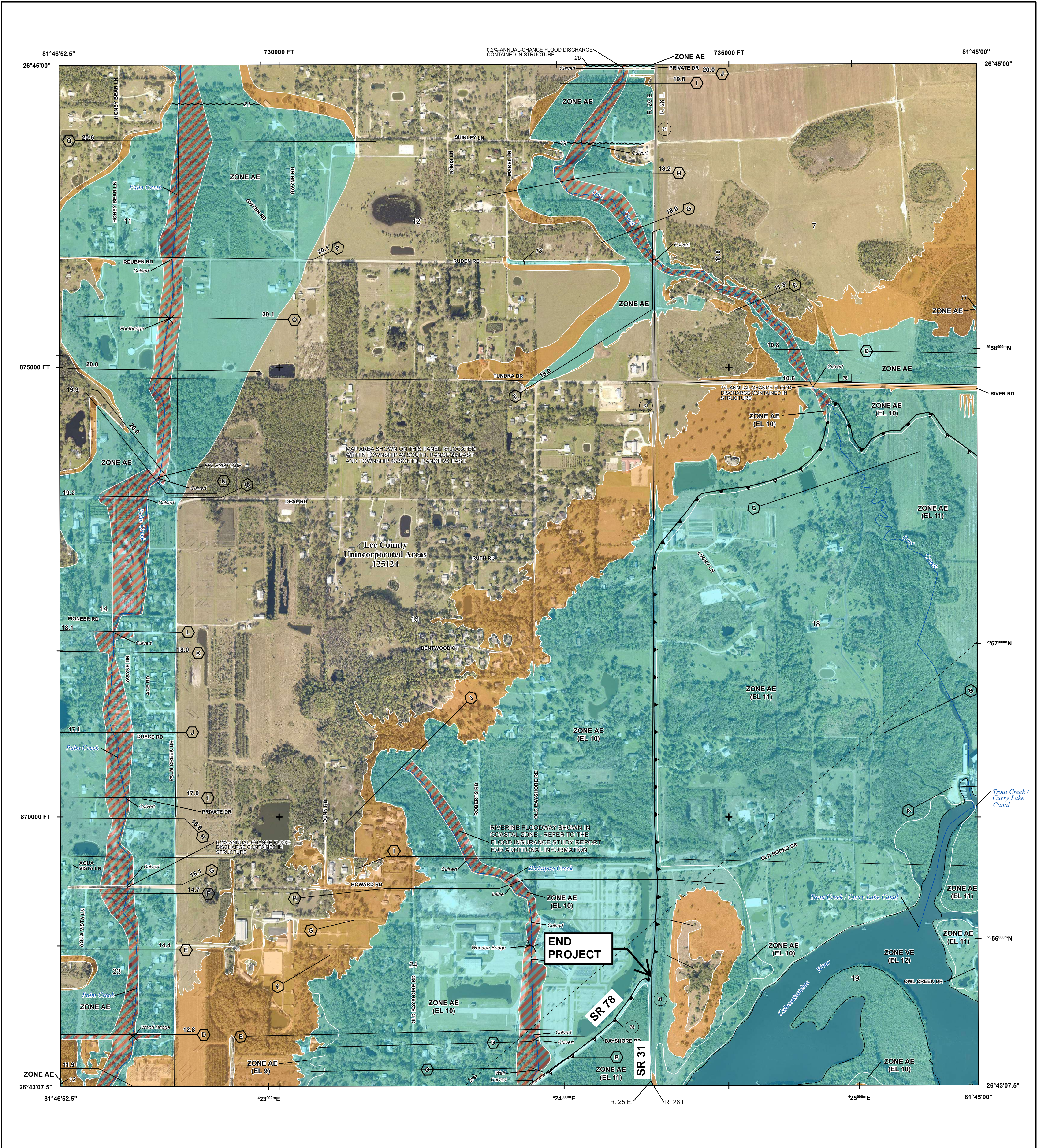
COMMUNITY	NUMBER	PANEL	SUFFIX
LEE COUNTY	125124	0282	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

**MAP NUMBER**  
12071C0282F

**EFFECTIVE DATE**  
AUGUST 28, 2008

**Federal Emergency Management Agency**



**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](https://MSC.FEMA.GOV)**

	Without Base Flood Elevation (BFE) Zone A, V, A99
	With BFE or Depth Zone AE, AO, AH, VE, AR
	Regulatory Floodway
	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
	NO SCREEN Area of Minimal Flood Hazard Zone X
	Area of Undetermined Flood Hazard Zone D
	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
	Cross Sections with 1% Annual Chance Water Surface Elevation
	Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	Base Flood Elevation Line (BFE)
	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.

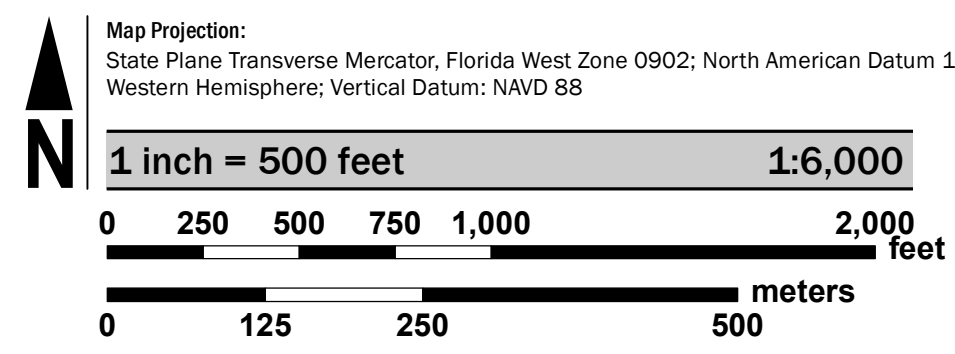
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

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**



**PANEL LOCATOR**



**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

**PRELIMINARY  
 6/28/2019**

VERSION NUMBER  
 2.4.3.5  
 MAP NUMBER  
 12071C0282G  
 MAP REVISED



## **APPENDIX 5**

### **Correspondence**

---

**PRINCIPALS**

Lawrence L. Smith, Jr.  
Wayne D. Chalifoux  
Donaldson K. Barton, Jr.  
Glenn J. Lusink  
Jon S. Meadows  
Mark D. Prochak  
Mark E. Puckett

**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 2<sup>nd</sup> 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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Charlotte, North Carolina  
Chipley, Florida  
Fort Myers, Florida  
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Melbourne, Florida  
 Mooresville, North Carolina  
Orlando, Florida  
Panama City, Florida  
Pensacola, Florida  
Stockbridge, Georgia  
Tallahassee, Florida  
Tampa, Florida





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

**PRINCIPALS**  
Lawrence L. Smith, Jr.  
Wayne D. Chalifoux  
Donaldson K. Barton, Jr.  
Glenn J. Lusink  
Jon S. Meadows  
Mark D. Prochak  
Mark E. Puckett

**DRMP Job #: 18-0080.000**

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**PRE APPLICATION MEETING No. 2**

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**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

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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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Boca Raton, Florida  
Cary, North Carolina  
Charlotte, North Carolina  
ChIPLEY, Florida  
Fort Myers, Florida  
Gainesville, Florida  
Jacksonville, Florida  
Lakeland, Florida  
Melbourne, Florida  
Mooresville, North Carolina  
Orlando, Florida  
Panama City, Florida  
Pensacola, Florida  
Stockbridge, Georgia  
Tallahassee, Florida  
Tampa, Florida

**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 Gerth	DRMP	sgerth@drmp.com	
2	James Sheets	DRMP	jsheds@drmp.com	
3	Ken Knied	DRMP	kknied@drmp.com	
4	Laura Hayman	SFWMD	lhayman@sfwmd.gov	Laura Hayman
5	Melissa Roberts	SFWMD	mroberts@sfwmd.gov	Melissa Roberts
6	Brian Rose	SFWMD	brose@sfwmd.gov	Brian Rose
7	Nick Ruiz	AIM Engineering	nruiz@aimengr.com	Nick Ruiz
8	Dawn Ratican	AIM	dratican@aimengr.com	Dawn Ratican
9	Nicole Monies	FDOT	nicole.monies@dot.state.fl.us	Nicole Monies
10	Brent Setchell	FDOT	brent.setchell@dot.state.fl.us	Brent Setchell
11				
12				

## James P. Sheets

---

**From:** Jacoby, Billie <BJacoby@leegov.com>  
**Sent:** Tuesday, November 12, 2019 1:09 PM  
**To:** James P. Sheets  
**Cc:** McNulty, Shawn; Pigott, Chelsea  
**Subject:** RE: 441942-1-22-1 SR 31 PD&E Study, verifying information in the FEMA FIRM and FIS as being current  
**Attachments:** FIRM comparison - SR 31 PD and E Study.pdf

Good afternoon James,

Please see my comments below.

1. Verify that the information on the FEMA Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRM) is current,
  - \*This study area falls within current effective FIRM panels [282F](#) (effective August 28, 2008 but revised 2/28/13 by LOMR 12-04-2790P) and [284F](#) effective August 28, 2008 (no LOMRs). The Flood Insurance Study currently in effect is dated [December 7, 2018](#).
2. Document any proposed significant changes to the flood elevations, and
  - \*There will be changes. The existing FEMA Base Flood Elevation is typically around 7 feet NAVD in this area. New prelim maps show the new elevation requirement will be 10' NAVD88 with also some increase in flood zone designations. In 2013, FEMA launched the coastal risk map study in Southwest Florida for Lee, Charlotte, Collier, Desoto, Hendry and Sarasota counties. As a result, new preliminary FIRM maps were recently released. Many riverine areas have been impacted by this coastal study. We have a [webpage](#) dedicated to this coastal study and the resulting maps. We don't yet have an effective date for these new prelim flood maps as everything depends on the appeal process. I have provided an image snippet of the general difference between the current maps vs. prelim maps for this area (see attached FIRM comparison). FIRM panels 282F and 284F have been revised as indicated by the new map suffix G label. Panels [282G](#) & [284G](#) are 'preliminary' at this stage. There is a new preliminary FIS as well. (15 volumes which can be accessed through FEMA's Map Service Center)
3. Determine if there is any other important stormwater or floodplain information that should be included in our study.
  - Link to the [South Lee County Flood Mitigation Plan](#) led by our Natural Resources Division. Please contact Luis Molina for further information. Luis Molina, P.G., P.E.. Surface Water Manager, Division of Natural Resources, P: 239-533-8132 [LMolina@leegov.com](mailto:LMolina@leegov.com)

Should you have any questions or need to discuss further, please don't hesitate to contact me.

Best regards,

Billie Jacoby, CFM  
CRS Coordinator/Regulatory Review Supervisor  
239-533-8948  
Department of Community Development for Unincorporated Lee County

---

**From:** James P. Sheets [mailto:JSheets@drmp.com]  
**Sent:** Friday, November 08, 2019 9:56 AM

**To:** Jacoby, Billie; Mayfield, Lee  
**Cc:** McNulty, Shawn; Pigott, Chelsea  
**Subject:** [EXTERNAL] RE: 441942-1-22-1 SR 31 PD&E Study, verifying information in the FEMA FIRM and FIS as being current

Good Morning Billie,

Thank you for responding to my request. For question 3, I am just inquiring about any other resent information on floodplain studies or stormwater designs or information that would pertain to this area that would need to be added into this study. Thank you for looking in to this.

**James P. Sheets, EI**  
**Drainage Designer**

Main: 813.265.9800 | Direct: 813.321.5783  
JSheets@drmp.com

**DRMP, Inc.**

15310 Amberly Drive, Suite 200, Tampa, FL 33647

---

**From:** Jacoby, Billie <BJacoby@leegov.com>  
**Sent:** Friday, November 8, 2019 9:40 AM  
**To:** Mayfield, Lee <LMayfield@leegov.com>; James P. Sheets <JSheets@drmp.com>  
**Cc:** McNulty, Shawn <SMcNulty@leegov.com>; Pigott, Chelsea <CPigott@leegov.com>  
**Subject:** RE: 441942-1-22-1 SR 31 PD&E Study, verifying information in the FEMA FIRM and FIS as being current

Hello,

Shawn McNulty is our Building Official/Floodplain Administrator. I have copied him on this message.

We can assist with items one and two, however, I am not sure about number 3. James, may you please provide more context to question 3?

Thanks,

Billie Jacoby, CFM  
CRS Coordinator/Regulatory Review Supervisor  
239-533-8948  
Department of Community Development for Unincorporated Lee County

---

**From:** Mayfield, Lee  
**Sent:** Thursday, November 07, 2019 3:58 PM  
**To:** James P. Sheets; Jacoby, Billie  
**Subject:** RE: 441942-1-22-1 SR 31 PD&E Study, verifying information in the FEMA FIRM and FIS as being current

Afternoon James,

Billie, can you assist here?

Lee Mayfield  
Director, Lee County Public Safety – Emergency Management  
239-533-0620

239-476-2480 (Mobile)  
[LMayfield@leegov.com](mailto:LMayfield@leegov.com)

---

**From:** James P. Sheets <[JSheets@drmp.com](mailto:JSheets@drmp.com)>  
**Sent:** Thursday, November 7, 2019 2:30 PM  
**To:** Mayfield, Lee <[LMayfield@leegov.com](mailto:LMayfield@leegov.com)>  
**Subject:** [EXTERNAL] 441942-1-22-1 SR 31 PD&E Study, verifying information in the FEMA FIRM and FIS as being current

Good Afternoon Lee,

I am working on a Project Development and Environmental (PD&E) study for SR 31 from SR 80 (Palm Beach Blvd) to SR 78 (Bayshore Rd) on behalf of the Florida Department of Transportation and I am looking for information on Floodplain issues. I am working on the stormwater analysis and part of our work involves contacting the floodplain administrators for impacted communities to:

1. Verify that the information on the FEMA Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRM) is current,
2. Document any proposed significant changes to the flood elevations, and
3. Determine if there is any other important stormwater or floodplain information that should be included in our study.

I don't know if you are the Floodplain Administrator for Lee County or not? If not, could you please direct me to the appropriate staff member?

Thank you,



**James P. Sheets, EI**  
**Drainage Designer**

Main: 813.265.9800 | Direct: 813.321.5783

[JSheets@drmp.com](mailto:JSheets@drmp.com)

**DRMP, Inc.**

15310 Amberly Drive, Suite 200, Tampa, FL 33647



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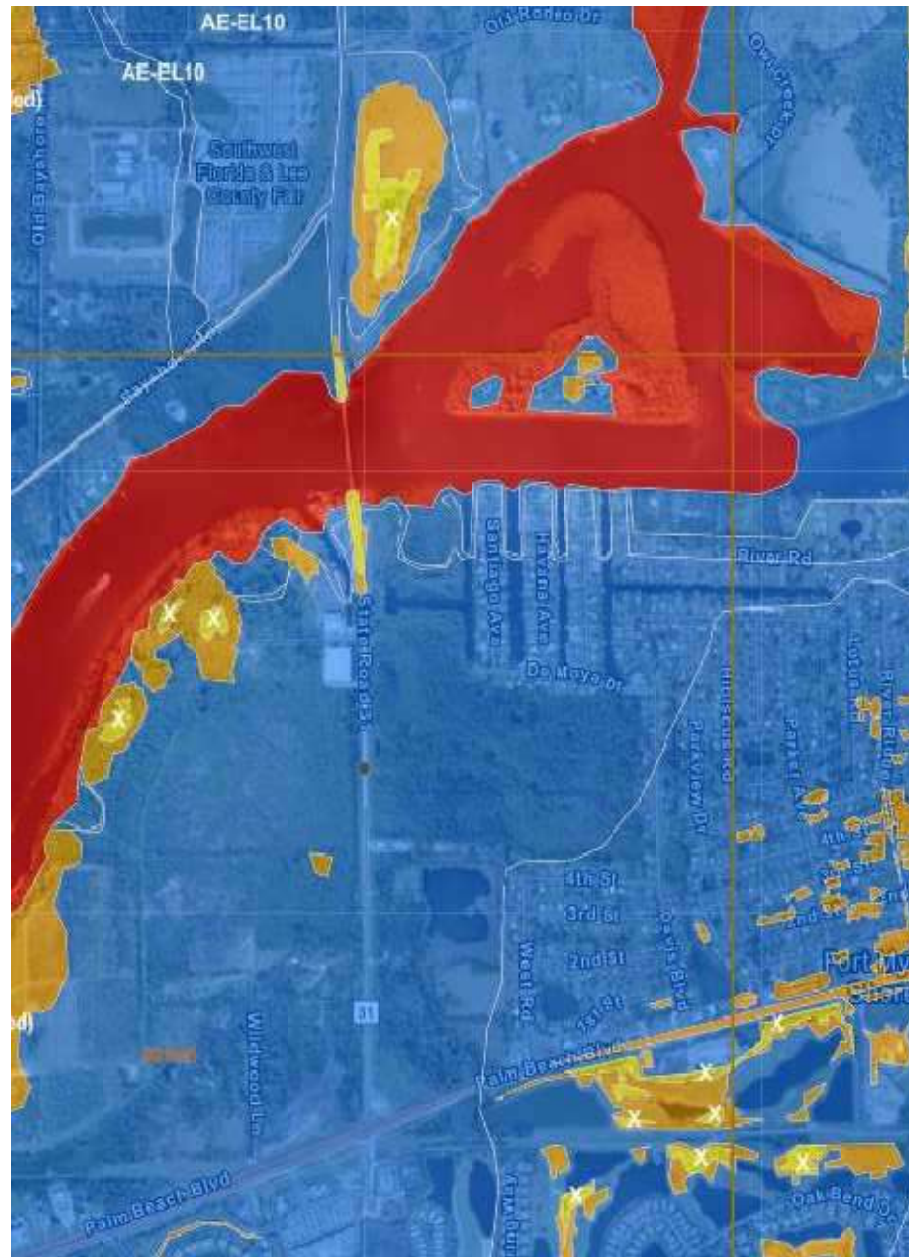
Please note: Florida has a very broad public records law. Most written communications to or from County Employees and officials regarding County business are public records available to the public and media upon request. Your email communication may be subject to public disclosure.

Under Florida law, email addresses are public records. If you do not want your email address released in response to a public records request, do not send electronic mail to this entity. Instead, contact this office by phone or in writing.

Currently effective FIRM



Preliminary FIRM



## James P. Sheets

---

**From:** Scott Garth  
**Sent:** Thursday, May 7, 2020 7:39 AM  
**To:** James P. Sheets  
**Subject:** FW: SR 31 from SR 80 to SR 78  
**Attachments:** SR31 Drainage Issues.jpg

Please save email to file and add to LHR/PER. thanks!

**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

---

**From:** Carrillo, Rolando <Rolando.Carrillo@dot.state.fl.us>  
**Sent:** Wednesday, May 6, 2020 2:34 PM  
**To:** Scott Garth <SGarth@drmp.com>  
**Subject:** RE: SR 31 from SR 80 to SR 78

Hi Scott

I can tell you that most of the issues are between Lee/Charlotte County line and Ruden Rd. on SR31, in the attached green line is the Lee/Charlotte Co. line

The residents in the area are convinced that the pipes in the area are too small to handle the water coming from Charlotte Co., most that have been measured are 24" pipes.

Thank you  
Rolando Carrillo  
Maintenance Program Manager-Field Operations  
2981 NE Pine Island Road  
Cape Coral, FL 33909  
PHONE: 239-985-7885  
FAX: 239-656-7737  
[Rolando.carrillo@dot.state.fl.us](mailto:Rolando.carrillo@dot.state.fl.us)

---

**From:** Scott Garth <[SGarth@drmp.com](mailto:SGarth@drmp.com)>  
**Sent:** Wednesday, May 06, 2020 8:52 AM  
**To:** Carrillo, Rolando <[Rolando.Carrillo@dot.state.fl.us](mailto:Rolando.Carrillo@dot.state.fl.us)>  
**Subject:** SR 31 from SR 80 to SR 78

**EXTERNAL SENDER:** Use caution with links and attachments.

Rolando,



Do you know who in FDOT maintenance I could talk with about any flooding or drainage issues along SR 31?

Sincerely,



**Scott Garth, PE, LEED AP**

**Vice President/Office Leader**

Main: 813.265.9800 | Direct: 813.321.5781 | Cell: 813.784.8105

[SGarth@drmp.com](mailto:SGarth@drmp.com)

**DRMP, Inc.**

15310 Amberly Drive, Suite 200, Tampa, FL 33647

REFLECTING ON 40 YEARS

40 years

READ MORE

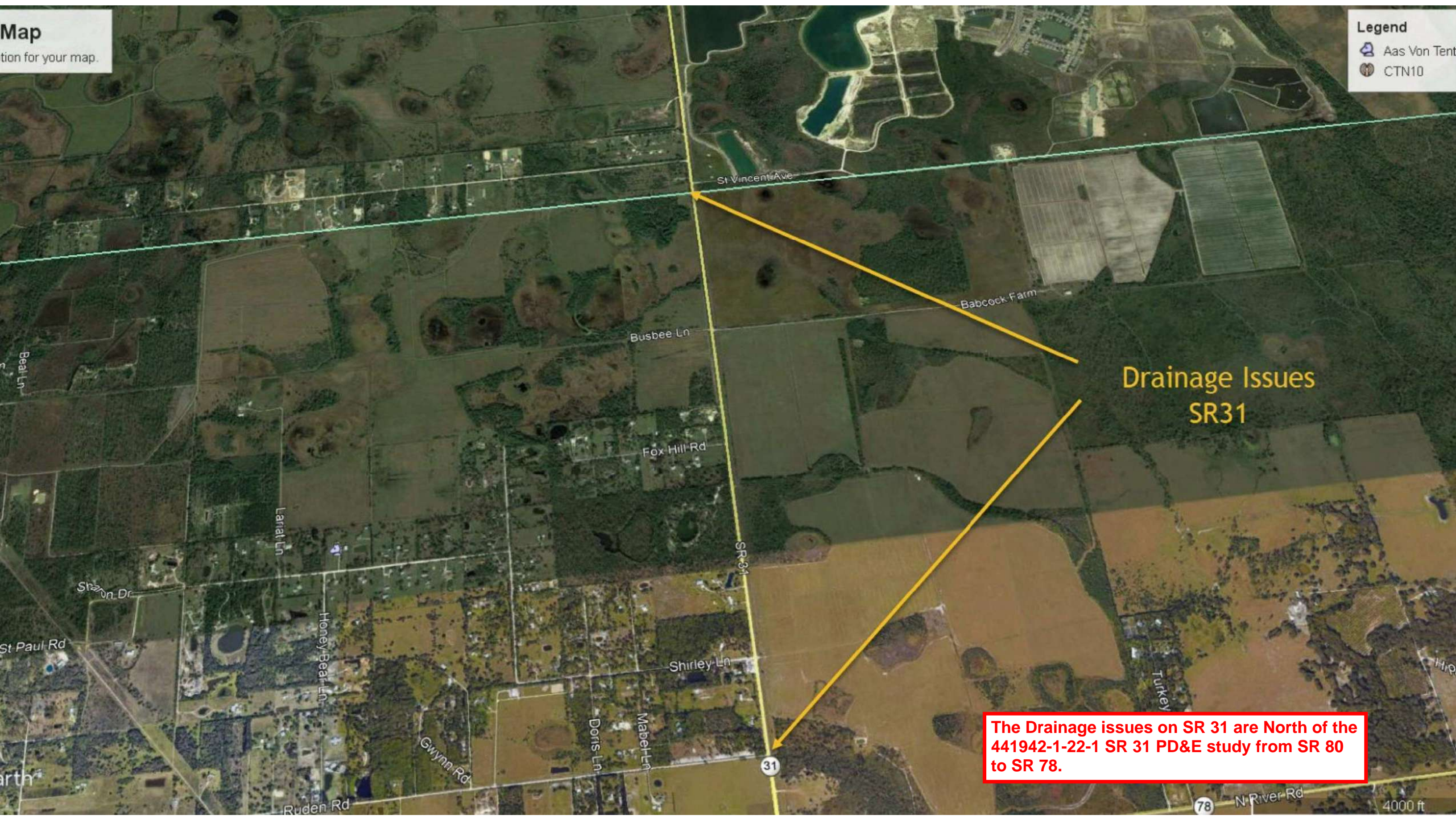
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Twitter YouTube

Map  
ation for your map.

**Legend**

- Aas Von Tent
- CTN10



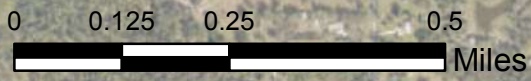
Drainage Issues  
SR31

The Drainage issues on SR 31 are North of the 441942-1-22-1 SR 31 PD&E study from SR 80 to SR 78.

4000 ft

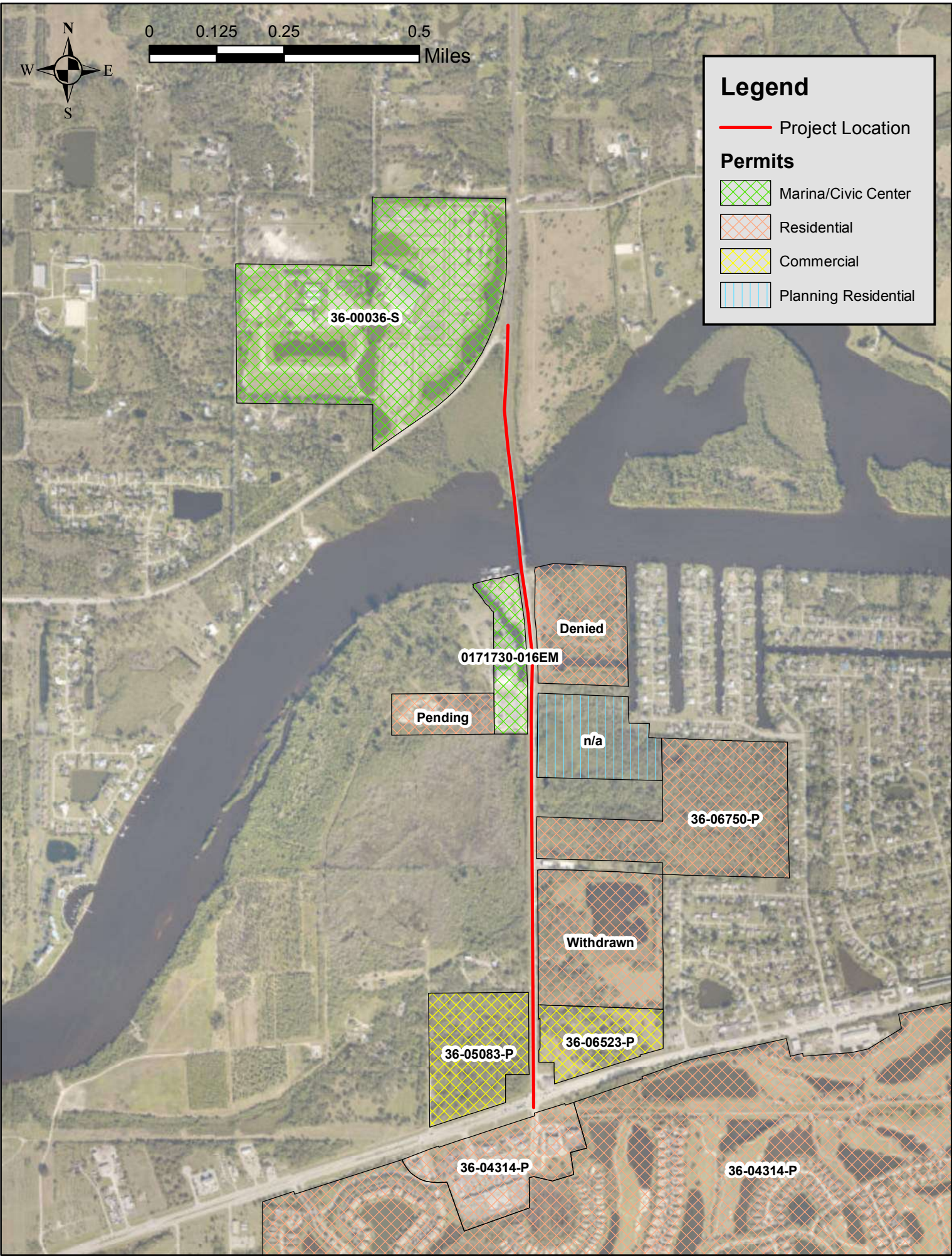
## **APPENDIX 6**

### **Existing Permits**



### Legend

- Project Location
- Permits**
  - Marina/Civic Center
  - Residential
  - Commercial
  - Planning Residential



**441942-1-22-01 SR 31 from SR 80 (Palm Beach Blvd) to SR 78 (Bayshore Rd)**

**Permit Research Table**

Permit Name	Permit Number	Permit Type & Permit Status	Project Info/ Date issued	Contents of Permit Package	Permitted Requirements	Floodplain Compensation Status
SR 80	Application # 171207-1, old permit # 88-00012-S	SFWMD ERP, Approved	FPN 429823-1-52-01, 10' shared use path along the north side of SR 80.	Original permitted design (permit 88-00012-S) included a series of linear treatment swales. Permit is to modify existing linear treatment swales to treat the existing permitted volumes plus the additional impervious areas from driveways and turn-lanes.	No wetland impacts are anticipated. 3.60 acres of additional impervious area. Project does not discharge to an OFW. The western portion of the project is located within the 100-yr floodplain. Project will not have a significant impact on the 100-yr floodplain.	Floodplain Compensation not addressed
Race Track Petroleum	Application # 190603-1, SFWMD permit # 36-06523-P	SFWMD ERP, Approved	Race Trac gas station/convenience store	Project area = 2.68 acres, Drainage Basin = Tidal Caloosahatchee. Proposed project is to construct a 5,411 SF convenience store with 16 fueling stations. The proposed SWM system increases the size of the previously permitted dry detention area to compensate for the increase in impervious area.	Project area originally permitted under App. No. 060331-15 and modified under app. No. 171213-17 for construction of commercial/retail, no construction has taken place. App. 060331-15 authorized a total 3.19 acres of direct wetland impacts and 1.13 acres of secondary wetland impacts. To offset the loss of these wetlands, a total of 2.5 acres of wetlands and 0.26 acres of uplands were to be enhanced and preserved within the overall project area. A total of 2.65 freshwater forested and 0.95 freshwater herbaceous mitigation credits were purchd at Little Pine Island Mitigation Bank. There are no additional wetland or other surface water impacts associated with this 2.68 acre project.	Floodplain Compensation not addressed
State Road 80 CPD	SFWMD permit # 36-05083-P, App. #'s 040116-22, 150120-14, 180518-4	SFWMD ERP, Approved	SR 80 CPD	Project area = 24.69 acres, Drainage area = Tidal Caloosahatchee. Total Acres Wetland Onsite = 5.52 Areas, Total Acres Wetland Preserved Onsite = 2.35 Acres, Total Acres Impacted Onsite = 3.17 Areas, Total Acres Presv/Milt Compensation Onsite = 2.35, Offsite Mitigation Credits-Mit. Bank = 1.73 - Little Pine Island Mitigation Bank.	This application is a request for construction and operation authorization for a surface water management system serving a c24.69 acre commercial project known as State Road 80 CPD, with discharge into waters of the Caloosahatchee River via an existing off site conveyance ditch.	Floodplain Compensation not addressed
Johns Livestock Well	SFWMD permit # 36-08821-W, Application # 170606-3	Water use	Livestock Water Supply	Use classification is: Livestock Water Supply. Source classification is: Ground water from: sandstone Aquifer. Withdrawal facilities: Groundwater - Proposed: 1 - 4" x 100' x 20 GPM Well cased to 80 feet.	Water use permit. Total annual allocation is 0.04 million gallons (MG). (110 GPD). The purpose of this application is to obtain a water use permit for Livestock drinking water supply for 12 beef cattle. Withdrawals are from the Sandstone aquifer via one proposed withdrawal facility.	Floodplain Compensation not addressed
Bam 31 - Overflow Trailer Lot	SFWMD permit # , App. # 180604-614	Application # 180604-614 Withdrawn.		A portion of the site will be utilized for boat/boat trailer storage associated with the existing marina located to the east of the property. Project total area = 9.18 acres with 2.81 acres of wetlands, no wetland impacts are proposed. Project has 0.66 acre upland buffer area around 2.81 acre wetland. Project has 4 dry retention areas, 2 future storage areas, one indoor and one open storage areas, both areas will be paved. Site includes office/retail space and paved parking. Tract I is open storage/paved, Tract II is Indoor storage/paved, and Tract III is office/paved	An individual permit. Withdraw application # 180604-614.	Floodplain Compensation not addressed

441942-1-22-01 SR 31 from SR 80 (Palm Beach Blvd) to SR 78 (Bayshore Rd)

Permit Research Table

Sweetwater Landing Marina	36-0171730-001, 36-0171730-003, and 36-0171730.006	FDEP, Approved	M-31 Marina LLC	Permit 36-0171730.006 is for Dry Storage Facility, Sweetwater Landing Marina, included 2 proposed building for dry storage, filling in a portion of man-made canal, and parking area with a small treatment pond. Permit 36-0171730-003 is for Marina 31 Restaurant Parcel - The construction of a stormwater management system, realignment of an existing seawall, and creation of a littoral shelf to accommodate the entrance road expansion. Permit 36-0171730-001 is for repair and replace existing dock decking and piling. Replace seawall sections within 12" of existing location and maintenance dredge basin to -5' MLW.	Permit is to construct a stormwater management system to serve 2.72 acre site and realign 197 linear feet of seawall waterward of the existing location and backfill 0.5 acre of privately owned submerged lands within a man-made boat basin. an approximate 120 sq. ft. littoral shelf faced with a rip-rap revetment will also be created. Smooth Cordgrass ( <i>Spartina Alterniflora</i> ) shall be planted on two-foot centers throughout the littoral shelf. Receiving Water Body: Man-made boat basin connected to the Caloosahatchee River (Class III Waters).	Floodplain Compensation not addressed
Caloosa Landing	SFWMD App. # 051114-13 & 060111-1	SFWMD ERP, Denied. Permit was Denied because the applicant did not respond to SFWMD	Caloosa Landing LLC	SFWMD permit application # 051114-13 has Dewatering permit application, for the dewatering activities at the project site associated with excavation of one lake and utility installation.	This application is a request for an Environmental Resource Permit to authorize construction and operation of a surface water management system to serve a 23.63 acre residential development known as Caloosa Landing.	Floodplain Compensation not addressed
Kickapoo Creek at Lee Civic Center	SFWMD ERP 36-00036-S, Application 090624-7	ERP/Surface water management permit	Kickapoo Creek Improvements	Conveyance system only. The components of the permitted surface water management consist of inlets, pipes or other form of conveyance system. Confirmation of ditches, canals, and/or swales with cross-sections, pipe diameters, inverts, and lengths is provided.	The subject surface water management system has been designed, constructed and completed.	Floodplain Compensation not addressed
Verandah	SFWMD ERP 36-04314-P, App. # 001027-4	SFWMD ERP, Approved	Verandah Community Association, Last Date for Agency Action: Oct. 10, 2002. Conceptual phase of this permit expires on Oct. 10, 2004. the construction phase shall expire on Oct. 10, 2007.	A 1455.4 acre mixed residential and commercial development with golf courses, Construction and operation of a surface water management system to serve 618.8 acres of the development. The system discharges to the Orange River.	Drainage Basin: Tidal Caloosahatchee, Receiving Body: Orange River	Floodplain Compensation not addressed
Verandah-Commercial Parcels	SFWMD ERP 36-04314-P, App. # 060815-8	SFWMD ERP, Approved	Verandah - Commercial Parcels Key Swale Improvements, ERP Permit (General Permit Modification)	Modification of an Environmental Resource Permit authorizing construction and operation of a surface water management system serving 23.8 acres of a commercial project, Verandah Commercial Parcels Key Swales Improvements with discharge into the Orange River via an existing surface water management system.	Drainage Basin: Tidal Caloosahatchee, Sub-Basin: Orange River, Class: Class III Receiving Body: Orange River via an existing SWM system.	Floodplain Compensation not addressed