



SR 400 (I-4) Project Development and Environment (PD&E) Study
FM No.: 201210-2-22-01



Location Hydraulic Report

**Segment 5: State Road 400 (SR 400)/Interstate 4 (I-4)
from West of SR 25/US 27
to West of CR 532 (Polk/Osceola County Line)**

Polk County (16320), Florida

November 2016

HNTB Corporation
610 Crescent Executive Court
Suite 400
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Professional Engineer Certificate

I hereby certify that I am a registered professional engineer in the State of Florida practicing with HNTB Corporation, Inc., a corporation authorized to operate as an engineering business, EB#6500, by the State of Florida, Department of Professional Regulation, Board of Professional Engineers, and that I have reviewed or approved the evaluation, findings, opinions, conclusions, or technical advice hereby reported for SR 400 (I-4) Project Development and Environment Study for the Florida Department of Transportation in Polk County, Florida.

This Location Hydraulic Report (LHR) includes a summary of data collection efforts, floodplain impact estimates, limited cross drain evaluations, and an overall drainage review prepared for the conceptual analyses for the SR 400 (I-4) widening and extension from west of SR 25/US 27 to west of CR 532 (Polk/Osceola County Line) in Polk County.

I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation engineering and planning as applied through professional judgments and experience. This document is for planning purposes only and is not to replace any effort required for final design.

SIGNATURE: _____

NAME: Sanam Rai, P.E.

FIRM: HNTB Corporation

P.E. No.: 69089

DATE: November 2016

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1.0 Introduction

The proposed improvements to I-4 include widening the existing six (6) lane divided urban interstate to a ten (10) lane divided highway in order to improve traffic operations, enhance connectivity and improve mobility by providing travel choices to the motoring public. I-4 is an east-west limited access freeway which links the west and east coasts of Florida, from I-275 in Tampa to I-95 in Daytona Beach. I-4 spans across six (6) counties in Central Florida, traversing through many cities including Lakeland, Celebration, Orlando, Altamonte Springs, Sanford and DeLand. I-4 is a critical component of Florida's Strategic Intermodal System (SIS) which links seaports, rail, airports and other intermodal facilities. This aspect of I-4's significance is evidenced through connectivity provided by major junctions with I-275, I-75, SR 429 (Daniel Webster Western Beltway), SR 417 (Southern Connector/Central Florida Greenway/Seminole Expressway), SR 528 (Martin Andersen Beachline Expressway), SR 91 (Florida's Turnpike), SR 408 (Spessard Lindsay Holland East-West Expressway) in Central Florida and I-95 on the east coast.

I-4 serves as the primary corridor in the movement of people and freight between major population, employment and activity centers in the Central Florida region. When the entire Interstate was fully opened in the early 1960's, it was designed to serve intrastate and interstate travel by providing a critical link between the east and west coasts of Central Florida. Although this role continues to be a crucial transportation function of I-4, the highway also serves large volumes of local and commuter traffic with shorter trip distances. Today, the highway serves as the primary link between hotel/resort complexes and tourist attractions such as Walt Disney World, Universal Studios, Sea World, the International Drive Resort Area and downtown Orlando. Since I-4 is the only north-south limited access facility that is centrally located between the predominant employment centers and the major suburbs to the north, it has become the primary commuting corridor in the Central Florida metropolitan area.

Growth in Central Florida over the past decades has made it difficult for the transportation system to accommodate travel demand. Traffic congestion and crash incidents have resulted in major delays on the Interstate as well as other arterials surrounding the corridor. Increased congestion levels are experienced outside of the typical morning and afternoon rush-hour periods, affecting mobility levels for more hours of the day and impacting other non-commuter/non-weekday travel. The congestion on I-4 is further evidenced by the less than desirable levels of service on the Interstate as well as the crossroads.

Projections of future population and employment in the region indicate that travel demand will continue to increase well into the future. The ability to accommodate the new travel patterns resulting from growth must be provided to sustain the region's economy. Without the improvements, extremely congested conditions are expected to occur for extended periods of time in both the morning and evening peak periods. Due to these congested conditions, user travel times will continue to increase, the movement of goods through the urban area will be slower, and the deliveries of goods within the urban area will be forced to other times throughout the day. The need for improvements to I-4 is illustrated by the important transportation roles I-4 serves to the Central Florida region and the State of Florida. If no improvements are made to the Interstate, a loss in mobility for the area's residents, visitors, and commuters can be expected, resulting in a severe threat to the continued viability of the economy and the quality of life.

This reevaluation involves revising the original design concept showing 6 general use travel lanes (GUL) + 4 Special use lanes (SUL) from west of SR 25/US 27 to west of CR 532 (Polk/Osceola County Line, as recommended in the FONSI for SR 400 (I-4) from West of Memorial Boulevard (SR 546) to the Polk/Osceola County Line (FPN 201210, December 1998), to the current proposed design of six general use and four express lanes. The Express Lanes are

tolled lanes and will extend the full length of the project. The access to/from the tolled lanes will be evaluated as part of this effort to determine if changes are needed from the previously approved concept for access to/from the SUL Lanes.

The original I-4 PD&E Studies involved physical separation between the general use lanes and the SUL lanes on I-4, with demand management in the high occupancy vehicle (HOV) lanes. The original demand management strategy was to control the use of the HOV lanes by requiring a minimum number of occupants per vehicle to maintain an acceptable level of service (Level of Service D). This reevaluation also addresses revising the demand management tool to convert the HOV lanes to tolled express lanes. The express lanes will be separated from the general use travel lanes by two shoulders with a barrier wall between the shoulders. A variable pricing tolling plan is proposed for the express lanes. The tolls will vary by time of day and day of week to maintain acceptable levels of service in the express lanes. The tolls will be collected electronically through existing E-Pass, SunPass and other systems currently in place in the Orlando metropolitan area. The conversion to Express Lanes will maintain the same right of way limits as documented previously and will not change the impacts to the social, natural or physical environment. An update to the Systems Access Modification Report (SAMR) prepared in January, 2013 is being completed in conjunction with this effort.

The primary objective of this Location Hydraulic Report (LHR) is to evaluate the hydraulic conditions along the proposed corridor in the existing and proposed conditions. This evaluation shall be accomplished by assessing and quantifying all floodplain impacts and providing recommendations to offset any impacts. The results of this evaluation will provide FDOT with the information necessary to reach a decision on the type, design, and location of improvements that are required for the widening of SR 400 (I-4).

This report has been prepared in accordance with the requirements set forth in Executive Order 11988, "Floodplain Management", US DOT Order 5650.2, "Floodplain Management and Protection", and Federal-Aid Policy Guide 23 CFR 650A. The intent of these regulations is to avoid or minimize roadway encroachments within the 100-year (base) floodplain, where practicable, and to avoid supporting land use development, which is incompatible with floodplain values. This report provides preliminary information on designated floodplains, cross drains and potential floodplain impacts of the project on these areas.

General information regarding basin delineation, cross drain locations and culvert parameters used in the preparation of this report include the following:

- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Polk County No. 12105C0100F, 12105C0125F and 12105C0225F (Figure 6).
- US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soils Survey for Osceola and Polk County (Figure 2)
- US Geological Survey (USGS) Quadrangle Map (Figure 3)
- Florida Department of Transportation (FDOT) PD&E Manual, Part 2, Chapter 24 (revised January 2008)
- FDOT Drainage Manual (2015)
- 2013 SWFWMD ERP Applicant's Handbook Volume II
- Existing Construction Plans
- Various Existing Permits
- Site Investigation

2.0 Project Description and Purpose

FDOT is proposing to reconstruct and widen I-4 as part of the I-4 Beyond the Ultimate (BtU) concept. This involves the build-out of I-4 to its ultimate condition through Central Florida, including segments in Polk, Osceola, Orange, Seminole and Volusia Counties. The concept design proposes the addition of two (2) new express lanes in each direction, resulting in a total of ten (10) dedicated lanes. The project limits for the segment analyzed in this report are within an approximate 4.5-mile segment of I-4 which extends from west of SR 25/US 27 to west of CR 532 (Polk/Osceola County Line), from Milepost (MP) 27.145 to MP 31.607 in Polk County, and provides for the required stormwater treatment with sixteen (16) potential pond sites along the corridor (See Figure 1: Project Location Map). The proposed improvements to I-4 include widening the existing six (6) lane divided urban interstate to a ten (10) lane divided highway. Generally, the typical section will be consistent throughout this section. All efforts are being made to ensure that the design will be contained within the existing right-of-way with the exception of the pond sites. This alignment serves as the basis for the development of the proposed improvements outlined in the Location Hydraulic Report.

2.1 Proposed Recommended Typical Section

The proposed roadway is intended to be a divided urban interstate. In general, the existing roadway typical section has three 12-foot travel lanes with a 10-foot paved shoulder in each direction separated by a varying median. The proposed improvements to I-4 include widening the existing six lane divided urban interstate to a ten lane divided highway. Generally, the typical section will be consistent throughout Segment 5 and will have three 12-foot general use travel lanes with 12-foot inside and outside shoulders (10-foot paved outside) and two 12-foot express lanes with 10-foot inside and 12-foot outside shoulders in each direction. A 2-foot barrier wall between the adjacent shoulders will separate the express lanes from the general use lanes. The typical section includes a 44-foot gravel transit envelope in the median within a minimum 300 foot right of way (ROW). Stormwater runoff will be collected by inlets and flow through pipes to dry retention and wet detention ponds. The total right-of-way proposed for the recommended section is a minimum of 300 feet.

3.0 Design Criteria

The design of stormwater management facilities and cross drains for this project is governed by the rules and criteria set forth by the South West Florida Water Management District (SWFWMD) and the FDOT. These criteria were drawn from the 2013 SWFWMD ERP Applicant's Handbook Volume II, the 2015 FDOT Drainage Manual, the FDOT Drainage Handbook – Culvert Design (January 2004) and the FHWA Code of Federal Regulation 23 CFR 650A.



Figure 1: Project Location Map

3.1 Culvert Design

- All cross drains, if applicable, shall be designed to have sufficient hydraulic capacity to convey the 50-year (Design Frequency) storm event. All culverts shall be analyzed for the base flood (100-year).
- Backwater shall not significantly change land use values unless flood rights are purchased.
- The headwater for design frequency conditions shall be kept at or below the travel lanes in compliance with the FDOT Drainage Manual.
- The highest tailwater elevation, which can be reasonably expected to occur coincident with the design storm event, shall be used (typically, crown of pipe is used).
- The minimum culvert size is 18" or its equivalent size.
- The design of all cross culverts shall comply with the guidelines set forth in the FDOT Drainage Manual, Chapter 4.

3.2 Floodplains/Floodways

- The proposed project may not cause a net reduction in flood storage within the 10-year floodplain.
- Structures shall cause no more than a one-tenth (0.1) of a foot increase in the 100-year flood elevation 500-feet upstream.
- Proposed construction shall not cause a reduction in flood conveyance capabilities.
- Best Management Practices (BMP's) shall be employed to minimize velocity to avoid undue erosion.
- The design of encroachments shall be consistent with standards established by FEMA.

4.0 Site Conditions

This project lies within the jurisdiction of the South West Florida Water Management District (SWFWMD). Wetlands, wildlife, soils conditions, land use, cross drains, and floodplains describe the site conditions present within the limits of this study. Involvement within wetlands and impact of wildlife are specifically addressed in two separate reports, “Wetlands Evaluation Report” and “Endangered Species Biological Assessment” prepared as part of this PD&E Study.

4.1 Soils

The Soil Survey of Osceola and Polk County, Florida, published by the United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS) has been reviewed for the project vicinity. There are fourteen (14) mapped soil types located in the project area. Table 1 lists these soil types and their hydrologic properties. The Soil Survey Map for the project is illustrated in Figure 2.

Table 1: NRCS Soil Survey Information

Soil Type	Hydrologic Soil Group
Adamsville fine sand (31)	A/D
Eaton mucky fine sand (6)	C/D
Candler sands (3, 4)	A

Soil Type	Hydrologic Soil Group
Basinger mucky fine sands (36)	A/D
Felda fine sand (42)	A/D
Immokalee sand (21)	B/D
Placid and Myakka fine sands (25)	A/D
Pomello fine sand (22)	A
Pomona fine sand (7)	A/D
Samsula muck (13)	A/D
Smyrna and Myakka fine sands (17)	A/D
Tavares fine sands (15)	A
Urban Land (16)	N/A

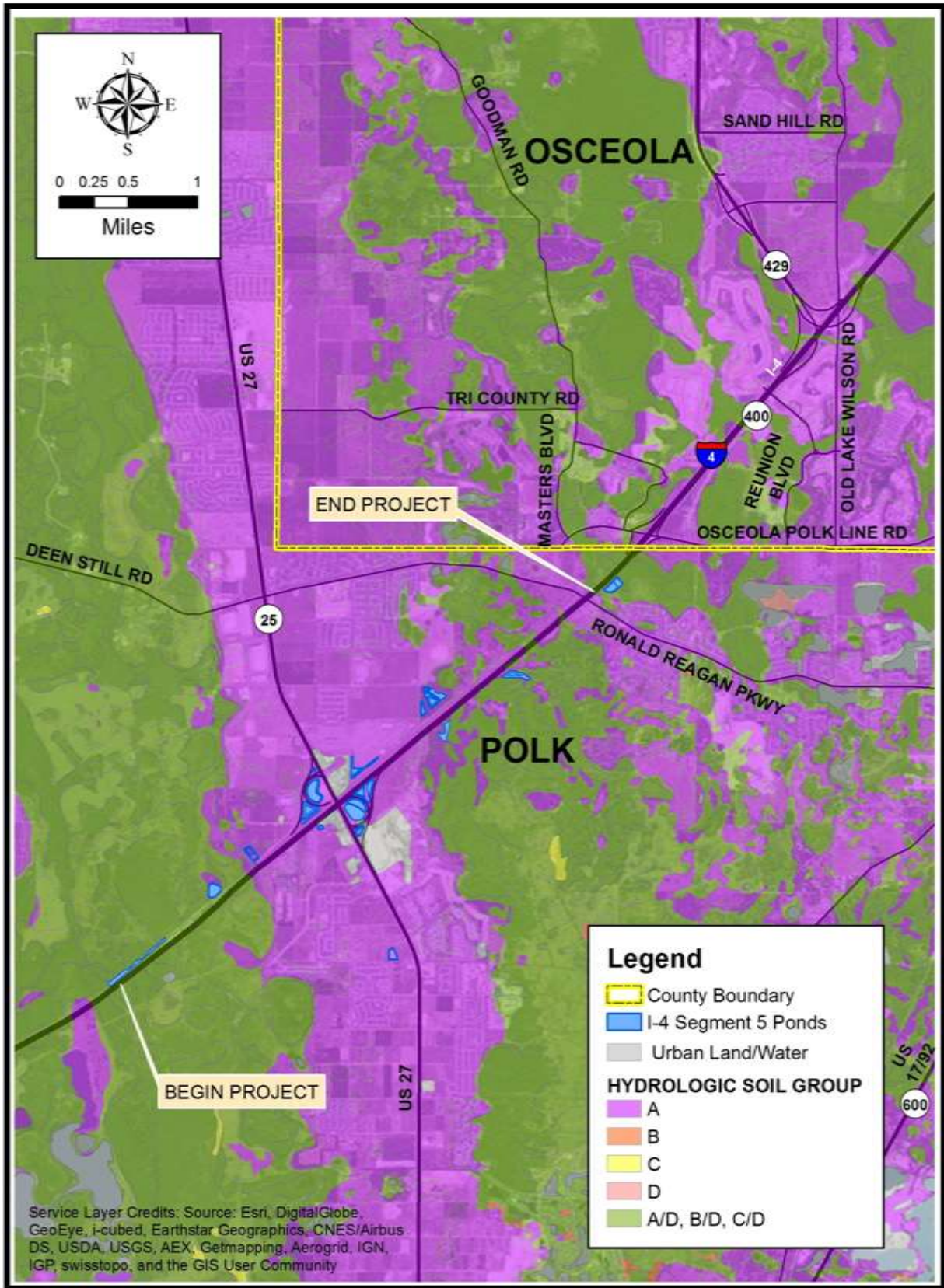


Figure 2: Soil Survey Map

Based on a review of the Polk County Florida United States Geographical Survey (USGS) quadrangle map, the existing ground surface elevations along the project alignment vary approximately from +115 to +200 feet NAVD. A reproduction of the USGS quadrangle map for the project vicinity is shown in Figure 3.

4.2 Land Use

4.2.1 Existing Land Use

Existing land use information within the SR 400 (I-4) PD&E Study is based on the existing land use map and site field reviews. The existing land uses for the project area and the pond alternatives along the I-4, Segment 5 corridor varies with a mixture of uses. The southern portion of the corridor near the I-4 and US 27 interchange is characterized primarily by retail/office use. Other existing land uses along the corridor consist of vacant nonresidential parcels, agricultural use and acreage not zoned for agriculture. Figure 4 illustrates the existing land use within the project area.

4.2.2 Future Land Use

Future land use along the corridor also varies with a mixture of uses. The southern portion of the corridor near the I-4 and US 27 interchange is designated as Regional Activity Center. The remainder of the corridor, to the north of the US 27 interchange is planned for medium density residential use interspersed with preservation areas. At the very north end of the corridor, the area on the west side of I-4 and north Ronald Reagan Parkway (CR 54) is designated for future Employment Center use. The widening of SR 400 (I-4) does not alter the existing or future land uses in the area. Figure 5 illustrates the future land use within the project area.



Figure 3: USGS Quadrangle Map

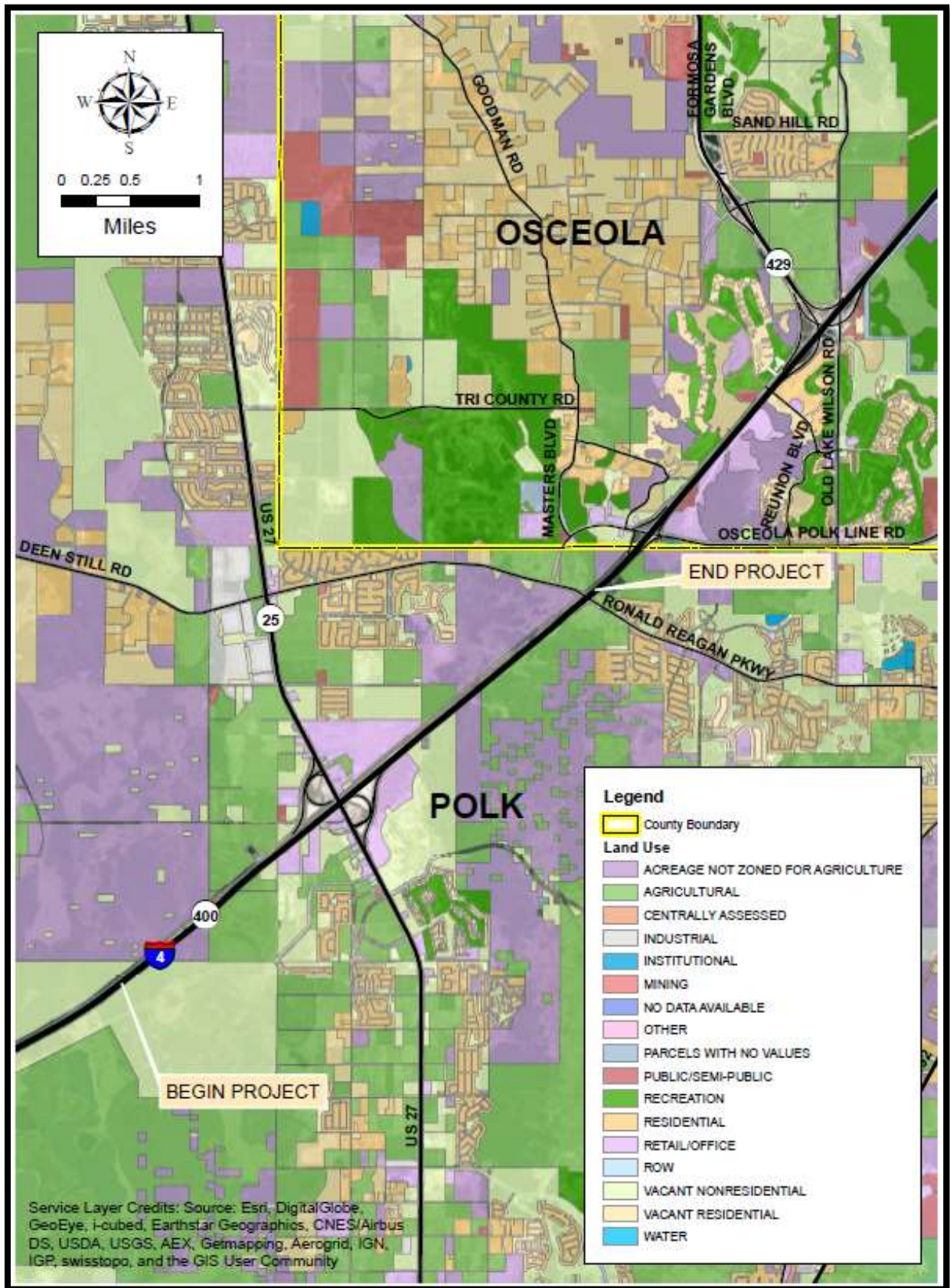


Figure 4: Existing Land Use Map

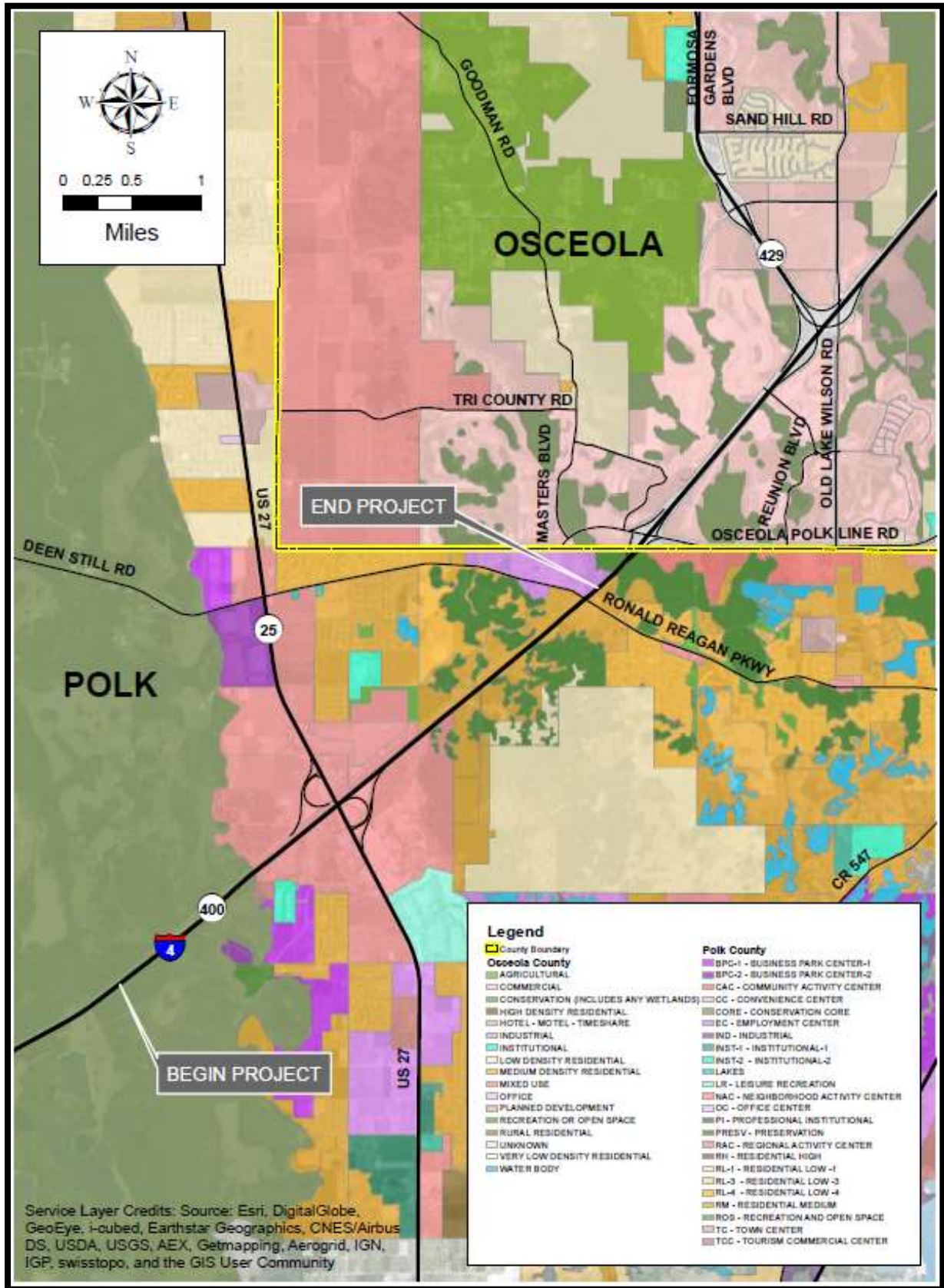


Figure 5: Future Land Use Map

4.3 Cross Drains

4.3.1 Existing Conditions

There are four (4) existing structures which act as cross drains within the study area. Table 2 depicts the existing cross culvert data obtained from the Straight Line Diagram of Road Inventory (Appendix A) pertinent to the project study area, as well as, existing permits and original construction plans. In the case where original construction plans were not found, cross drain invert elevations were obtained from existing permits and the original PD&E study. During the design phase, survey and field verification will be necessary to determine the actual pipe lengths and culvert flow lines.

Table 2: Existing Cross Drains

CD No.	Station	Description from Original Construction Plans						
		Count	Span (in)	Rise (in)	Type	Length (Ft)	Invert Elevation (Ft NAVD)	
							US	DS
CD-1	400+25	2	30	30	RCP	337	126.97	126.20
CD-2	431+19	1	30	30	RCP	212	125.30	125.00
CD-3	537+10	1	30	30	RCP	295	117.66	116.24
CD-4	572+15	2	42	42	RCP	293	113.50	113.20

Abbreviations: RCP – Reinforced Concrete Pipe

The 50 year headwater stage is shown as the critical elevation (roadway elevation) for the purposes of this report. Based on hydraulic calculations, cross drain CD-1 does not have the sufficient hydraulic capacity to convey the 50-year storm event in the existing condition. Please refer to Appendix B for additional information.

4.3.2 Proposed Conditions

Through hydraulic analysis, it was determined that all cross drains need to be upsized. The cross drains will also require a change in slope to function adequately. All cross drains were analyzed using HY8 (Version 7.3) software. Table 3 depicts the results of the hydraulic analysis.

Table 3: Proposed Cross Drains

CD No.	Station	Description from Original Construction Plans						
		Count	Span (in)	Rise (in)	Type	Length (Ft)	Invert Elevation (Ft NAVD)	
							US	DS
CD-1	400+25	3	30	30	RCP	350	126.90	126.20
CD-2	431+19	2	24	24	RCP	328	125.50	125.00
CD-3	537+10	1	36	36	RCP	406	116.94	116.24
CD-4	572+15	2	48	48	RCP	392	113.60	113.20

Abbreviations: RCP – Reinforced Concrete Pipe

4.4 Bridge Structures

4.4.1 Existing Condition

There are two (2) existing bridges located within the project corridor. Table 4 depicts the location and attributes of the existing bridges. Structure conditions and year of construction was provided in the original I-4 PD&E Study.

Table 4: Existing Bridges

Structure No.	Station	Description
B-1	576+80	SR 25/US 27 over I-4
B-2	600+00	CR 54 over I-4

4.4.2 Proposed Condition

In the proposed condition, the existing bridges will be either widened or replaced to accommodate the widening of I-4 to its ultimate condition.

4.5 Floodplain/Floodways

The Federal Emergency Management Agency (FEMA) has developed Flood Insurance Rate Maps (FIRM) for Polk County. According to FEMA Map Numbers 12105C0100F, 12105C0125F and 12105C0225F, portions of the roadway are located within Zone A of the 100-year floodplain. Based on the FEMA floodplain lines, the roadway widening will impact the floodplain on both sides of the roadway. Please refer to the Pond Siting Report (PSR) for additional floodplain compensation information. Table 6 depicts the FEMA Flood Insurance Map.

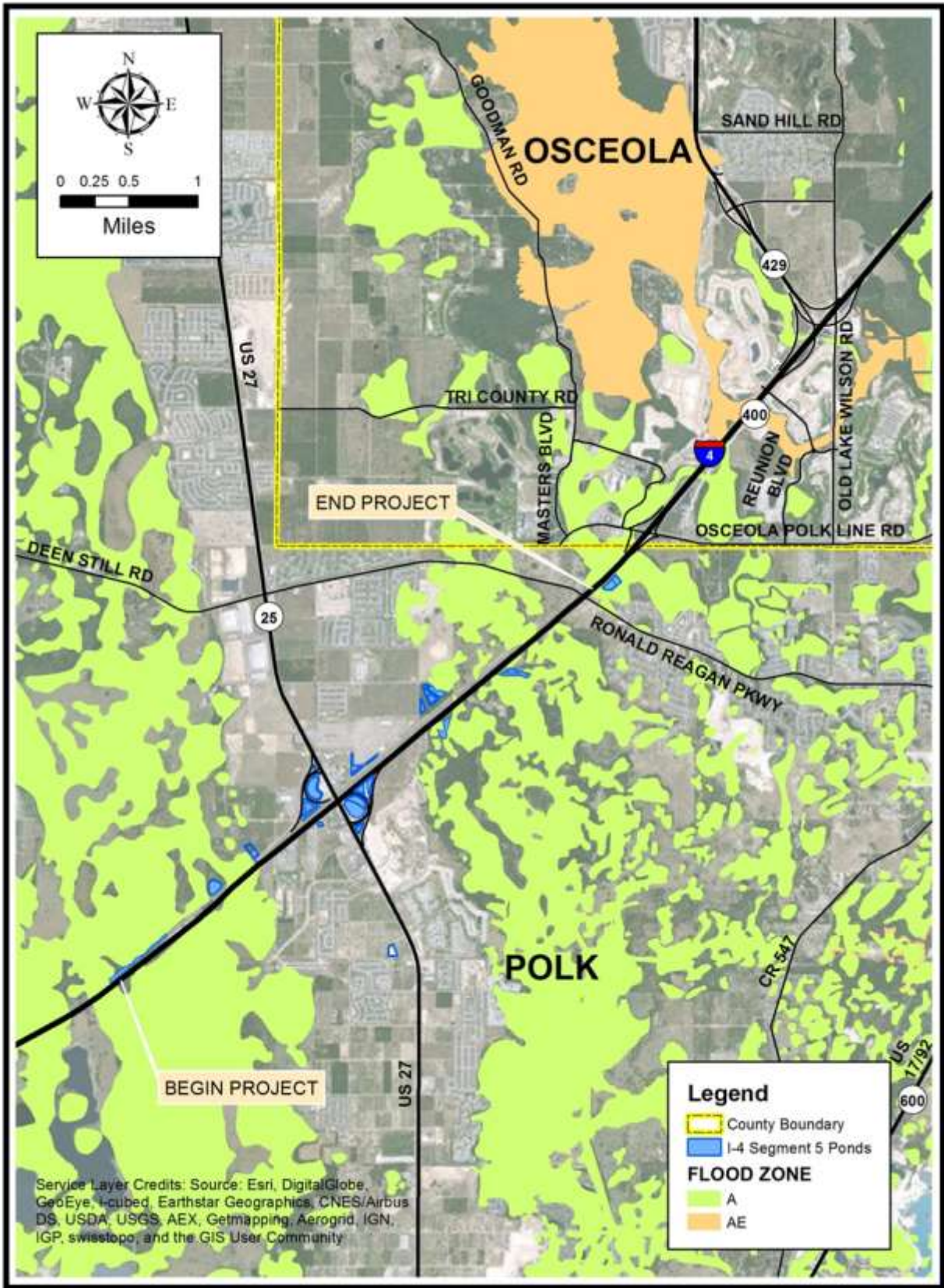


Figure 6: FEMA Flood Insurance Map

5.0 Recommendations and Conclusions

5.1 Cross Drains

There are four (4) cross drains within the study area. The existing cross drains have been evaluated for headwater impacts to see if replacement is necessary. Through hydraulic analysis, it was determined that all cross drains need to be upsized. There are no known historical flooding issues with any cross drains within this segment. Refer to D for correspondence.

5.2 Bridge Structures

There are two (2) existing bridges which will require widening. A scour analysis will not be needed during the design phase because neither bridge is a waterway crossing.

5.3 Floodplains and Floodways

Floodplains are present along the project corridor and adjacent to some proposed ponds within the study limits; however, no floodways are located within the project area. Any impacts associated with the roadway widening will be compensated for in existing pond sites and/or proposed floodplain compensation ponds. Please refer to the Pond Siting Report (PSR) for additional floodplain compensation information.

5.4 Project Classification

In accordance with FDOT's PD&E Manual, Part 2, Chapter 24, Section 24-2.1, Figure 24.1 "Floodplain" Statements, the proposed corridor has been evaluated to determine the impact of the proposed hydraulic modifications. Hydraulic improvements are grouped into six (6) categories based upon the type of the hydraulic improvements and estimated floodplain impact. The proposed project can be best described in two categories:

Category 3: Projects involving modification to existing drainage structures. The proposed project does not involve the replacement of any existing drainage structures or the construction of any new drainage structures. Projects that affect flood heights and flood limits, even minimally, may require further evaluation to support statements that emphasize the insignificance of the modifications (FDOT PD&E Manual, Part 1, Chapter 24). "The modifications to drainage structures included in this project will result in an insignificant change in their capacity to carry floodwater. This change will cause minimal increases in flood heights and flood limits. These minimal increases will not result in any 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 the potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant."

Category 4: Projects on existing alignment involving replacement of existing drainage structures with no record of drainage problems. The proposed project does not involve replacement activities that would reduce the hydraulic performance of existing facilities. Also, there should be no record of drainage problems and no unresolved complaints from residents in the area (FDOT PD&E Manual, Part 1, Chapter 24). "The proposed structure 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 natural and beneficial floodplain values. 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 emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant.”

5.5 Project Summary

The proposed reconstruction and widening of SR 400 (I-4) involves adding two new lanes in each direction and providing stormwater management systems. There are four (4) existing cross drains which will necessitate culvert replacements. This has been determined by hydraulic analysis. There are two (2) bridges within the corridor that will need to be widened to meet the proposed geometry. The proposed alignment impacts the 100-year floodplain, as well as several existing linear treatment swales. Any impacts associated with the roadway widening will be compensated in existing pond sites and/or proposed floodplain compensation ponds. By complying with regulatory criteria, the implementation of this project will not adversely affect the area adjacent to the corridor and meets the expectations of the stakeholders.

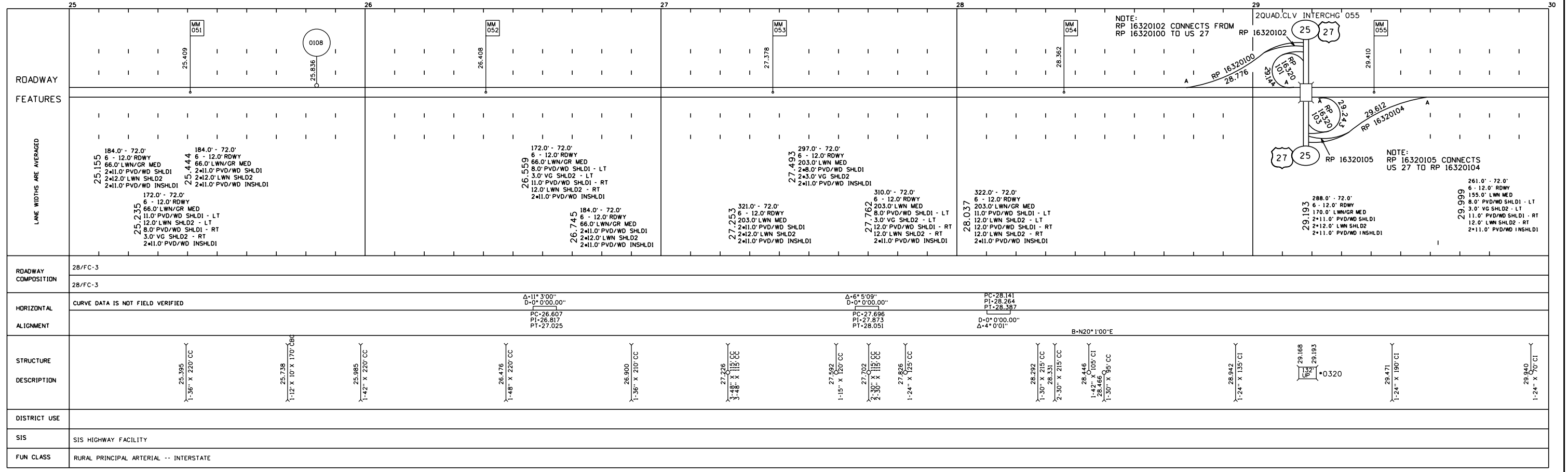
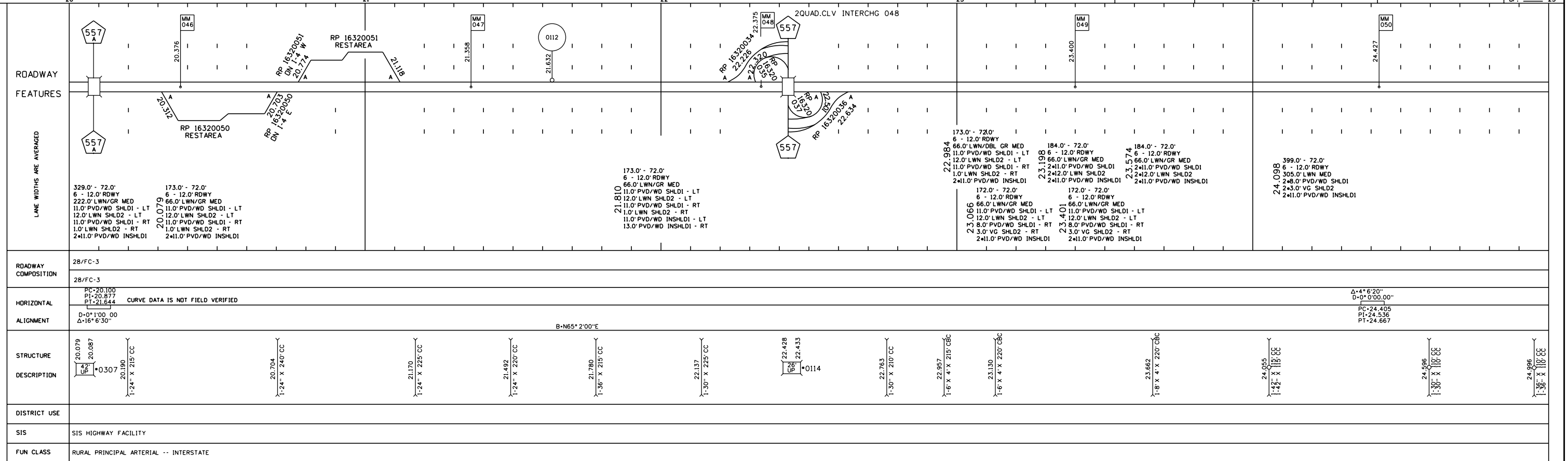
APPENDIX A – STRAIGHT LINE DIAGRAMS

STRAIGHT LINE DIAGRAM OF ROAD INVENTORY

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT ONE MAINTENANCE STATISTICS OFFICE

INT. of US ROUTE NO	STATE ROAD NO.	COUNTY	DISTRICT	ROADWAY ID	SHEET NO.	OF.
I 4	SR 400	POLK	1	16320000	3	4

DATE BY	5 YR INV	SLD REV	BMP	EMP	INTERIM REVISIONS	SLD REV
	05/18/11	06/14/11			INV	
	URS	URS			REV	



DATE BY	5 YR INV	SLD REV	BMP	EMP	INTERIM REVISIONS INV	SLD REV
	05/18/11	06/14/11				
	URS	URS				

STRAIGHT LINE DIAGRAM OF ROAD INVENTORY
 FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT ONE MAINTENANCE STATISTICS OFFICE

INT. or US ROUTE NO	STATE ROAD NO.	COUNTY	DISTRICT	ROADWAY ID	SHEET NO.
I 4	SR 400	POLK	1	16320000	4
					OF 4

ROADWAY FEATURES		
	<p>LANE WIDTHS ARE AVERAGED</p> <p>NET ROADWAY ID LENGTH: 32.022</p>	
ROADWAY COMPOSITION	28/FC-3	
HORIZONTAL ALIGNMENT	CURVE DATA IS NOT FIELD VERIFIED $\Delta=10^{\circ}0'20''$ $D=0^{\circ}0'00.00''$ $PC=31.591$ $PI=31.787$ $PT=31.982$ $B=569^{\circ}7'59''E$	
STRUCTURE DESCRIPTION		
DISTRICT USE		
SIS	SIS HIGHWAY FACILITY	
FUN CLASS	RURAL PRINCIPAL ARTERIAL -- INTERSTATE	

APPENDIX B – CROSS DRAIN CALCULATIONS

HNTB Corporation
 610 Crescent Executive Court, Suite 400
 Lake Mary, FL 32746

DATE

made by:	SR	28-Jan-16
checked by:	BJS	28-Jan-16
HNTB job #:	59219	

PROJECT: I-4 PD&E - Segment 5

CROSS DRAIN NO. _____		CD-1	
		Existing	Proposed
LOCATION	STA.	400+25.00	400+25.00
WIDTH		2.50 FT	2.50 FT
HEIGHT		2.50 FT	2.50 FT
BARRELS		2	3
DIAMETER		2.50 FT	2.50 FT
LENGTH		337.0 FT	350.0 FT
TOTAL CROSS-SECTIONAL AREA		9.82 SF	14.73 SF
MANNING'S ROUGHNESS		0.012	0.012
UPSTREAM INVERT		126.97 FT	126.90 FT
DOWNSTREAM INVERT		126.20 FT	126.20 FT
CRITICAL ELEVATION (ROADWAY SHOULDER EL)		133.00 FT	133.00 FT
TAILWATER (CROWN OF PIPE)		128.70 FT	128.70 FT
DETERMINE FLOWRATES (Q):			
* VELOCITY (25 YR)	6.00 FT/S	Headwater Elevation	Headwater Elevation
Q (25 YR) = V (25 YR) * TOTAL AREA	59 CFS	131.02 FT	129.71 FT
Q (50 YR) = 1.25 * Q (25 YR)	74 CFS	132.35 FT	130.36 FT
Q (100 YR) = 1.40 * Q (25 YR)	82 CFS	FT	130.74 FT

*** Culvert Design Drainage Handbook (2004), Chapter 8, Section 8.1. Culvert Extensions Analysis done with HY-8 Version 7.3 (April 2014)**

CD-1 Existing HY-8 Culvert Analysis Report

Crossing Discharge Data

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

Minimum Flow: 59 cfs

Design Flow: 74 cfs

Maximum Flow: 82 cfs

Table 1 - Summary of Culvert Flows at Crossing: CD1E

Headwater Elevation (ft)	Total Discharge (cfs)	EXIST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
131.02	59.00	59.00	0.00	1
131.20	61.30	61.30	0.00	1
131.39	63.60	63.60	0.00	1
131.59	65.90	65.90	0.00	1
131.80	68.20	68.20	0.00	1
132.01	70.50	70.50	0.00	1
132.23	72.80	72.80	0.00	1
132.35	74.00	74.00	0.00	1
132.69	77.40	77.40	0.00	1
132.93	79.70	79.70	0.00	1
133.00	82.00	80.38	1.06	38
133.00	80.35	80.35	0.00	Overtopping

Table 2 - Culvert Summary Table: EXIST

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)
59.00	59.00	131.02	3.117	4.048	7-M2t	2.500	1.849	2.500	2.500	6.010	0.000
61.30	61.30	131.20	3.227	4.232	7-M2t	2.500	1.884	2.500	2.500	6.244	0.000
63.60	63.60	131.39	3.342	4.424	7-M2t	2.500	1.918	2.500	2.500	6.478	0.000
65.90	65.90	131.59	3.461	4.622	7-M2t	2.500	1.951	2.500	2.500	6.713	0.000
68.20	68.20	131.80	3.584	4.828	7-M2t	2.500	1.983	2.500	2.500	6.947	0.000
70.50	70.50	132.01	3.712	5.040	7-M2t	2.500	2.014	2.500	2.500	7.181	0.000
72.80	72.80	132.23	3.844	5.259	7-M2t	2.500	2.043	2.500	2.500	7.415	0.000
74.00	74.00	132.35	3.915	5.377	7-M2t	2.500	2.058	2.500	2.500	7.538	0.000
77.40	77.40	132.69	4.123	5.720	7-M2t	2.500	2.099	2.500	2.500	7.884	0.000
79.70	79.70	132.93	4.270	5.960	7-M2t	2.500	2.125	2.500	2.500	8.118	0.000
82.00	80.38	133.00	4.315	6.033	7-M2t	2.500	2.132	2.500	2.500	8.187	0.000

 Straight Culvert
 Inlet Elevation (invert): 126.97 ft, Outlet Elevation (invert): 126.20 ft
 Culvert Length: 337.00 ft, Culvert Slope: 0.0023

Site Data - EXIST

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 126.97 ft
 Outlet Station: 337.00 ft
 Outlet Elevation: 126.20 ft
 Number of Barrels: 2

Culvert Data Summary - EXIST

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Concrete
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: CD1E)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
59.00	128.70	2.50
61.30	128.70	2.50
63.60	128.70	2.50
65.90	128.70	2.50
68.20	128.70	2.50
70.50	128.70	2.50
72.80	128.70	2.50
74.00	128.70	2.50
77.40	128.70	2.50
79.70	128.70	2.50
82.00	128.70	2.50

Tailwater Channel Data - CD1E

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 128.70 ft

Roadway Data for Crossing: CD1E

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 2000.00 ft

Crest Elevation: 133.00 ft

Roadway Surface: Paved

Roadway Top Width: 234.00 ft

CD-1 Proposed HY-8 Culvert Analysis Report

Crossing Discharge Data

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

Minimum Flow: 59 cfs

Design Flow: 74 cfs

Maximum Flow: 82 cfs

Table 1 - Summary of Culvert Flows at Crossing: CD1P

Headwater Elevation (ft)	Total Discharge (cfs)	PROP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
129.71	59.00	59.00	0.00	1
129.84	61.30	61.30	0.00	1
129.93	63.60	63.60	0.00	1
130.02	65.90	65.90	0.00	1
130.11	68.20	68.20	0.00	1
130.21	70.50	70.50	0.00	1
130.31	72.80	72.80	0.00	1
130.36	74.00	74.00	0.00	1
130.52	77.40	77.40	0.00	1
130.63	79.70	79.70	0.00	1
130.74	82.00	82.00	0.00	1
133.00	119.08	119.08	0.00	Overtopping

Table 2 - Culvert Summary Table: PROP

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)
59.00	59.00	129.71	2.298	2.813	7-M1t	2.025	1.500	2.500	2.500	4.006	0.000
61.30	61.30	129.84	2.357	2.940	6-FFt	2.134	1.533	2.500	2.500	4.163	0.000
63.60	63.60	129.93	2.416	3.027	6-FFt	2.257	1.562	2.500	2.500	4.319	0.000
65.90	65.90	130.02	2.476	3.117	7-M2t	2.500	1.591	2.500	2.500	4.475	0.000
68.20	68.20	130.11	2.536	3.211	7-M2t	2.500	1.619	2.500	2.500	4.631	0.000
70.50	70.50	130.21	2.597	3.307	7-M2t	2.500	1.647	2.500	2.500	4.787	0.000
72.80	72.80	130.31	2.659	3.407	7-M2t	2.500	1.674	2.500	2.500	4.944	0.000
74.00	74.00	130.36	2.692	3.461	7-M2t	2.500	1.687	2.500	2.500	5.025	0.000
77.40	77.40	130.52	2.787	3.617	7-M2t	2.500	1.726	2.500	2.500	5.256	0.000
79.70	79.70	130.63	2.852	3.726	7-M2t	2.500	1.752	2.500	2.500	5.412	0.000
82.00	82.00	130.74	2.919	3.839	7-M2t	2.500	1.780	2.500	2.500	5.568	0.000

Straight Culvert

Inlet Elevation (invert): 126.90 ft, Outlet Elevation (invert): 126.20 ft

Culvert Length: 350.00 ft, Culvert Slope: 0.0020

Site Data - PROP

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 126.90 ft

Outlet Station: 350.00 ft

Outlet Elevation: 126.20 ft

Number of Barrels: 3

Culvert Data Summary - PROP

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: CD1P)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
59.00	128.70	2.50
61.30	128.70	2.50
63.60	128.70	2.50
65.90	128.70	2.50
68.20	128.70	2.50
70.50	128.70	2.50
72.80	128.70	2.50
74.00	128.70	2.50
77.40	128.70	2.50
79.70	128.70	2.50
82.00	128.70	2.50

Tailwater Channel Data - CD1P

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 128.70 ft

Roadway Data for Crossing: CD1P

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 2000.00 ft

Crest Elevation: 133.00 ft

Roadway Surface: Paved

Roadway Top Width: 286.00 ft

HNTB Corporation
 610 Crescent Executive Court, Suite 400
 Lake Mary, FL 32746

DATE

made by:	SR	27-Aug-15
checked by:	BJS	27-Aug-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - Segment 5

CROSS DRAIN NO. _____		CD-2	
		Existing	Proposed
LOCATION	STA.	431+19.00	431+19.00
WIDTH		2.50 FT	2.00 FT
HEIGHT		2.50 FT	2.00 FT
BARRELS		1	2
DIAMETER		2.50 FT	2.00 FT
LENGTH		212.0 FT	328.0 FT
TOTAL CROSS-SECTIONAL AREA		4.91 SF	6.28 SF
MANNING'S ROUGHNESS		0.012	0.012
UPSTREAM INVERT		125.30 FT	125.50 FT
DOWNSTREAM INVERT		125.00 FT	125.00 FT
CRITICAL ELEVATION (ROADWAY SHOULDER EL)		132.00 FT	132.00 FT
TAILWATER (CROWN OF PIPE)		127.50 FT	127.00 FT
DETERMINE FLOWRATES (Q):			
* VELOCITY (25 YR)	6.00 FT/S	Headwater Elevation	Headwater Elevation
Q (25 YR) = V (25 YR) * TOTAL AREA	29 CFS	129.21 FT	128.64 FT
Q (50 YR) = 1.25 * Q (25 YR)	37 CFS	130.28 FT	129.67 FT
Q (100 YR) = 1.40 * Q (25 YR)	41 CFS	130.92 FT	130.27 FT

*** Culvert Design Drainage Handbook (2004), Chapter 8, Section 8.1. Culvert Extensions Analysis done with HY-8 Version 7.3 (April 2014)**

CD-2 Existing HY-8 Culvert Analysis Report

Crossing Discharge Data

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

Minimum Flow: 29 cfs

Design Flow: 37 cfs

Maximum Flow: 41 cfs

Table 1 - Summary of Culvert Flows at Crossing: CD2E

Headwater Elevation (ft)	Total Discharge (cfs)	EXIST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
129.21	29.00	29.00	0.00	1
129.36	30.20	30.20	0.00	1
129.51	31.40	31.40	0.00	1
129.66	32.60	32.60	0.00	1
129.82	33.80	33.80	0.00	1
129.99	35.00	35.00	0.00	1
130.17	36.20	36.20	0.00	1
130.28	37.00	37.00	0.00	1
130.53	38.60	38.60	0.00	1
130.72	39.80	39.80	0.00	1
130.92	41.00	41.00	0.00	1
132.00	47.03	47.03	0.00	Overtopping

Table 2 - Culvert Summary Table: EXIST

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)
29.00	29.00	129.21	3.071	3.911	4-FFf	2.500	1.834	2.500	2.500	5.908	0.000
30.20	30.20	129.36	3.185	4.055	4-FFf	2.500	1.871	2.500	2.500	6.152	0.000
31.40	31.40	129.51	3.303	4.206	4-FFf	2.500	1.907	2.500	2.500	6.397	0.000
32.60	32.60	129.66	3.425	4.362	4-FFf	2.500	1.941	2.500	2.500	6.641	0.000
33.80	33.80	129.82	3.552	4.524	4-FFf	2.500	1.975	2.500	2.500	6.886	0.000
35.00	35.00	129.99	3.685	4.692	4-FFf	2.500	2.007	2.500	2.500	7.130	0.000
36.20	36.20	130.17	3.822	4.866	4-FFf	2.500	2.038	2.500	2.500	7.375	0.000
37.00	37.00	130.28	3.916	4.985	4-FFf	2.500	2.058	2.500	2.500	7.538	0.000
38.60	38.60	130.53	4.112	5.231	4-FFf	2.500	2.096	2.500	2.500	7.864	0.000
39.80	39.80	130.72	4.265	5.422	4-FFf	2.500	2.123	2.500	2.500	8.108	0.000
41.00	41.00	130.92	4.423	5.620	4-FFf	2.500	2.149	2.500	2.500	8.352	0.000

 Straight Culvert
 Inlet Elevation (invert): 125.30 ft, Outlet Elevation (invert): 125.00 ft
 Culvert Length: 212.00 ft, Culvert Slope: 0.0014

Site Data - EXIST

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 125.30 ft
 Outlet Station: 212.00 ft
 Outlet Elevation: 125.00 ft
 Number of Barrels: 1

Culvert Data Summary - EXIST

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Concrete
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: CD2E)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
29.00	127.50	2.50
30.20	127.50	2.50
31.40	127.50	2.50
32.60	127.50	2.50
33.80	127.50	2.50
35.00	127.50	2.50
36.20	127.50	2.50
37.00	127.50	2.50
38.60	127.50	2.50
39.80	127.50	2.50
41.00	127.50	2.50

Tailwater Channel Data - CD2E

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 127.50 ft

Roadway Data for Crossing: CD2E

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 2000.00 ft

Crest Elevation: 132.00 ft

Roadway Surface: Paved

Roadway Top Width: 162.00 ft

CD-2 Proposed HY-8 Culvert Analysis Report

Crossing Discharge Data

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

Minimum Flow: 29 cfs

Design Flow: 37 cfs

Maximum Flow: 41 cfs

Table 1 - Summary of Culvert Flows at Crossing: CD2P

Headwater Elevation (ft)	Total Discharge (cfs)	PROP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
128.64	29.00	29.00	0.00	1
128.78	30.20	30.20	0.00	1
128.92	31.40	31.40	0.00	1
129.07	32.60	32.60	0.00	1
129.22	33.80	33.80	0.00	1
129.39	35.00	35.00	0.00	1
129.55	36.20	36.20	0.00	1
129.67	37.00	37.00	0.00	1
129.90	38.60	38.60	0.00	1
130.09	39.80	39.80	0.00	1
130.27	41.00	41.00	0.00	1
132.00	50.67	50.67	0.00	Overtopping

Table 2 - Culvert Summary Table: PROP

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)
29.00	29.00	128.64	2.198	3.138	4-FFf	2.000	1.368	2.000	2.000	4.615	0.000
30.20	30.20	128.78	2.269	3.276	4-FFf	2.000	1.396	2.000	2.000	4.806	0.000
31.40	31.40	128.92	2.343	3.420	4-FFf	2.000	1.424	2.000	2.000	4.997	0.000
32.60	32.60	129.07	2.418	3.570	4-FFf	2.000	1.451	2.000	2.000	5.188	0.000
33.80	33.80	129.22	2.496	3.725	4-FFf	2.000	1.480	2.000	2.000	5.379	0.000
35.00	35.00	129.39	2.576	3.886	4-FFf	2.000	1.506	2.000	2.000	5.570	0.000
36.20	36.20	129.55	2.660	4.052	4-FFf	2.000	1.530	2.000	2.000	5.761	0.000
37.00	37.00	129.67	2.717	4.166	4-FFf	2.000	1.547	2.000	2.000	5.889	0.000
38.60	38.60	129.90	2.835	4.402	4-FFf	2.000	1.578	2.000	2.000	6.143	0.000
39.80	39.80	130.09	2.926	4.585	4-FFf	2.000	1.601	2.000	2.000	6.334	0.000
41.00	41.00	130.27	3.021	4.774	4-FFf	2.000	1.623	2.000	2.000	6.525	0.000

 Straight Culvert
 Inlet Elevation (invert): 125.50 ft, Outlet Elevation (invert): 125.00 ft
 Culvert Length: 328.00 ft, Culvert Slope: 0.0015

Site Data - PROP

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 125.50 ft
 Outlet Station: 328.00 ft
 Outlet Elevation: 125.00 ft
 Number of Barrels: 2

Culvert Data Summary - PROP

Barrel Shape: Circular
 Barrel Diameter: 2.00 ft
 Barrel Material: Concrete
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: CD2P)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
29.00	127.00	2.00
30.20	127.00	2.00
31.40	127.00	2.00
32.60	127.00	2.00
33.80	127.00	2.00
35.00	127.00	2.00
36.20	127.00	2.00
37.00	127.00	2.00
38.60	127.00	2.00
39.80	127.00	2.00
41.00	127.00	2.00

Tailwater Channel Data - CD2P

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 127.00 ft

Roadway Data for Crossing: CD2P

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 2000.00 ft

Crest Elevation: 132.00 ft

Roadway Surface: Paved

Roadway Top Width: 285.00 ft

HNTB Corporation
 610 Crescent Executive Court, Suite 400
 Lake Mary, FL 32746

DATE

made by:	SR	27-Aug-15
checked by:	BJS	27-Aug-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - Segment 5

CROSS DRAIN NO. _____		CD-3	
		Existing	Proposed
LOCATION	STA.	537+10.00	537+10.00
WIDTH		2.50 FT	3.00 FT
HEIGHT		2.50 FT	3.00 FT
BARRELS		1	1
DIAMETER		2.50 FT	3.00 FT
LENGTH		295.0 FT	406.0 FT
TOTAL CROSS-SECTIONAL AREA		4.91 SF	7.07 SF
MANNING'S ROUGHNESS		0.012	0.012
UPSTREAM INVERT		117.66 FT	116.94 FT
DOWNSTREAM INVERT		116.24 FT	116.24 FT
CRITICAL ELEVATION (ROADWAY SHOULDER EL)		122.00 FT	122.00 FT
TAILWATER (CROWN OF PIPE)		118.74 FT	119.24 FT
DETERMINE FLOWRATES (Q):			
* VELOCITY (25 YR)	6.00 FT/S	Headwater Elevation	Headwater Elevation
Q (25 YR) = V (25 YR) * TOTAL AREA	29 CFS	120.80 FT	120.28 FT
Q (50 YR) = 1.25 * Q (25 YR)	37 CFS	122.00 FT	120.94 FT
Q (100 YR) = 1.40 * Q (25 YR)	41 CFS	FT	121.32 FT

*** Culvert Design Drainage Handbook (2004), Chapter 8, Section 8.1. Culvert Extensions Analysis done with HY-8 Version 7.3 (April 2014)**

CD-3 Existing HY-8 Culvert Analysis Report

Crossing Discharge Data

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

Minimum Flow: 29 cfs

Design Flow: 37 cfs

Maximum Flow: 41 cfs

Table 1 - Summary of Culvert Flows at Crossing: CD3E

Headwater Elevation (ft)	Total Discharge (cfs)	EXIST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
120.80	29.00	29.00	0.00	1
120.98	30.20	30.20	0.00	1
121.16	31.40	31.40	0.00	1
121.35	32.60	32.60	0.00	1
121.54	33.80	33.80	0.00	1
121.74	35.00	35.00	0.00	1
121.95	36.20	36.20	0.00	1
122.00	37.00	36.46	0.22	55
122.00	38.60	36.49	1.89	5
122.01	39.80	36.49	2.95	3
122.01	41.00	36.50	4.16	3
122.00	36.46	36.46	0.00	Overtopping

Table 2 - Culvert Summary Table: EXIST

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)
29.00	29.00	120.80	3.067	3.142	4-FFf	1.932	1.834	2.500	2.500	5.908	0.000
30.20	30.20	120.98	3.180	3.317	4-FFf	2.006	1.871	2.500	2.500	6.152	0.000
31.40	31.40	121.16	3.298	3.498	4-FFf	2.103	1.907	2.500	2.500	6.397	0.000
32.60	32.60	121.35	3.421	3.686	4-FFf	2.227	1.941	2.500	2.500	6.641	0.000
33.80	33.80	121.54	3.548	3.882	4-FFf	2.500	1.975	2.500	2.500	6.886	0.000
35.00	35.00	121.74	3.680	4.084	4-FFf	2.500	2.007	2.500	2.500	7.130	0.000
36.20	36.20	121.95	3.818	4.294	4-FFf	2.500	2.038	2.500	2.500	7.375	0.000
37.00	36.46	122.00	3.849	4.341	4-FFf	2.500	2.045	2.500	2.500	7.429	0.000
38.60	36.49	122.00	3.851	4.344	4-FFf	2.500	2.045	2.500	2.500	7.433	0.000
39.80	36.49	122.01	3.852	4.346	4-FFf	2.500	2.045	2.500	2.500	7.435	0.000
41.00	36.50	122.01	3.853	4.348	4-FFf	2.500	2.046	2.500	2.500	7.436	0.000

 Straight Culvert
 Inlet Elevation (invert): 117.66 ft, Outlet Elevation (invert): 116.24 ft
 Culvert Length: 295.00 ft, Culvert Slope: 0.0048

Site Data - EXIST

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 117.66 ft
 Outlet Station: 295.00 ft
 Outlet Elevation: 116.24 ft
 Number of Barrels: 1

Culvert Data Summary - EXIST

Barrel Shape: Circular
 Barrel Diameter: 2.50 ft
 Barrel Material: Concrete
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: CD3E)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
29.00	118.74	2.50
30.20	118.74	2.50
31.40	118.74	2.50
32.60	118.74	2.50
33.80	118.74	2.50
35.00	118.74	2.50
36.20	118.74	2.50
37.00	118.74	2.50
38.60	118.74	2.50
39.80	118.74	2.50
41.00	118.74	2.50

Tailwater Channel Data - CD3E

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 118.74 ft

Roadway Data for Crossing: CD3E

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 2000.00 ft

Crest Elevation: 122.00 ft

Roadway Surface: Paved

Roadway Top Width: 248.00 ft

CD-3 Proposed HY-8 Culvert Analysis Report

Crossing Discharge Data

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

Minimum Flow: 29 cfs

Design Flow: 37 cfs

Maximum Flow: 41 cfs

Table 1 - Summary of Culvert Flows at Crossing: CD3P

Headwater Elevation (ft)	Total Discharge (cfs)	PROP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
120.28	29.00	29.00	0.00	1
120.37	30.20	30.20	0.00	1
120.46	31.40	31.40	0.00	1
120.56	32.60	32.60	0.00	1
120.66	33.80	33.80	0.00	1
120.76	35.00	35.00	0.00	1
120.86	36.20	36.20	0.00	1
120.94	37.00	37.00	0.00	1
121.09	38.60	38.60	0.00	1
121.20	39.80	39.80	0.00	1
121.32	41.00	41.00	0.00	1
122.00	47.19	47.19	0.00	Overtopping

Table 2 - Culvert Summary Table: PROP

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)
29.00	29.00	120.28	2.641	3.342	4-FFf	2.377	1.739	3.000	3.000	4.103	0.000
30.20	30.20	120.37	2.710	3.430	4-FFf	2.478	1.775	3.000	3.000	4.272	0.000
31.40	31.40	120.46	2.780	3.522	4-FFf	2.631	1.815	3.000	3.000	4.442	0.000
32.60	32.60	120.56	2.850	3.617	4-FFf	3.000	1.850	3.000	3.000	4.612	0.000
33.80	33.80	120.66	2.921	3.716	4-FFf	3.000	1.885	3.000	3.000	4.782	0.000
35.00	35.00	120.76	2.992	3.818	4-FFf	3.000	1.919	3.000	3.000	4.951	0.000
36.20	36.20	120.86	3.064	3.924	4-FFf	3.000	1.952	3.000	3.000	5.121	0.000
37.00	37.00	120.94	3.113	3.997	4-FFf	3.000	1.974	3.000	3.000	5.234	0.000
38.60	38.60	121.09	3.211	4.147	4-FFf	3.000	2.017	3.000	3.000	5.461	0.000
39.80	39.80	121.20	3.287	4.263	4-FFf	3.000	2.052	3.000	3.000	5.631	0.000
41.00	41.00	121.32	3.364	4.383	4-FFf	3.000	2.083	3.000	3.000	5.800	0.000

Straight Culvert

Inlet Elevation (invert): 116.94 ft, Outlet Elevation (invert): 116.24 ft

Culvert Length: 406.00 ft, Culvert Slope: 0.0017

Site Data - PROP

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 116.94 ft

Outlet Station: 406.00 ft

Outlet Elevation: 116.24 ft

Number of Barrels: 1

Culvert Data Summary - PROP

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: Square Edge with Headwall

Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: CD3P)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
29.00	119.24	3.00
30.20	119.24	3.00
31.40	119.24	3.00
32.60	119.24	3.00
33.80	119.24	3.00
35.00	119.24	3.00
36.20	119.24	3.00
37.00	119.24	3.00
38.60	119.24	3.00
39.80	119.24	3.00
41.00	119.24	3.00

Tailwater Channel Data - CD3P

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 119.24 ft

Roadway Data for Crossing: CD3P

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 2000.00 ft

Crest Elevation: 122.00 ft

Roadway Surface: Paved

Roadway Top Width: 362.00 ft

HNTB Corporation
 610 Crescent Executive Court, Suite 400
 Lake Mary, FL 32746

DATE

made by:	SR	27-Aug-15
checked by:	BJS	27-Aug-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - Segment 5

CROSS DRAIN NO. _____		CD-4	
		Existing	Proposed
LOCATION	STA.	572+15.00	572+15.00
WIDTH		3.50 FT	4.00 FT
HEIGHT		3.50 FT	4.00 FT
BARRELS		2	2
DIAMETER		3.50 FT	4.00 FT
LENGTH		293.0 FT	392.0 FT
TOTAL CROSS-SECTIONAL AREA		19.24 SF	25.13 SF
MANNING'S ROUGHNESS		0.012	0.012
UPSTREAM INVERT		113.50 FT	113.60 FT
DOWNSTREAM INVERT		113.20 FT	113.20 FT
CRITICAL ELEVATION (ROADWAY SHOULDER EL)		122.00 FT	122.00 FT
TAILWATER (CROWN OF PIPE)		116.70 FT	117.20 FT
DETERMINE FLOWRATES (Q):			
* VELOCITY (25 YR)	6.00 FT/S	Headwater Elevation	Headwater Elevation
Q (25 YR) = V (25 YR) * TOTAL AREA	115 CFS	118.34 FT	118.22 FT
Q (50 YR) = 1.25 * Q (25 YR)	144 CFS	119.28 FT	118.80 FT
Q (100 YR) = 1.40 * Q (25 YR)	162 CFS	119.96 FT	119.22 FT

*** Culvert Design Drainage Handbook (2004), Chapter 8, Section 8.1. Culvert Extensions Analysis done with HY-8 Version 7.3 (April 2014)**

CD-4 Existing HY-8 Culvert Analysis Report

Crossing Discharge Data

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

Minimum Flow: 115 cfs

Design Flow: 144 cfs

Maximum Flow: 162 cfs

Table 1 - Summary of Culvert Flows at Crossing: CD4E

Headwater Elevation (ft)	Total Discharge (cfs)	EXIST Discharge (cfs)	Roadway Discharge (cfs)	Iterations
118.34	115.00	115.00	0.00	1
118.48	119.70	119.70	0.00	1
118.62	124.40	124.40	0.00	1
118.77	129.10	129.10	0.00	1
118.92	133.80	133.80	0.00	1
119.08	138.50	138.50	0.00	1
119.25	143.20	143.20	0.00	1
119.28	144.00	144.00	0.00	1
119.59	152.60	152.60	0.00	1
119.77	157.30	157.30	0.00	1
119.96	162.00	162.00	0.00	1
122.00	206.56	206.56	0.00	Overtopping

Table 2 - Culvert Summary Table: EXIST

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)
115.00	115.00	118.34	3.785	4.843	4-FFf	3.500	2.373	3.500	3.500	5.976	0.000
119.70	119.70	118.48	3.904	4.980	4-FFf	3.500	2.421	3.500	3.500	6.221	0.000
124.40	124.40	118.62	4.026	5.122	4-FFf	3.500	2.469	3.500	3.500	6.465	0.000
129.10	129.10	118.77	4.151	5.270	4-FFf	3.500	2.515	3.500	3.500	6.709	0.000
133.80	133.80	118.92	4.280	5.424	4-FFf	3.500	2.561	3.500	3.500	6.953	0.000
138.50	138.50	119.08	4.414	5.583	4-FFf	3.500	2.605	3.500	3.500	7.198	0.000
143.20	143.20	119.25	4.551	5.747	4-FFf	3.500	2.648	3.500	3.500	7.442	0.000
144.00	144.00	119.28	4.575	5.776	4-FFf	3.500	2.655	3.500	3.500	7.484	0.000
152.60	152.60	119.59	4.840	6.093	4-FFf	3.500	2.730	3.500	3.500	7.930	0.000
157.30	157.30	119.77	4.991	6.274	4-FFf	3.500	2.769	3.500	3.500	8.175	0.000
162.00	162.00	119.96	5.148	6.460	4-FFf	3.500	2.807	3.500	3.500	8.419	0.000

 Straight Culvert
 Inlet Elevation (invert): 113.50 ft, Outlet Elevation (invert): 113.20 ft
 Culvert Length: 293.00 ft, Culvert Slope: 0.0010

Site Data - EXIST

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 113.50 ft
 Outlet Station: 293.00 ft
 Outlet Elevation: 113.20 ft
 Number of Barrels: 2

Culvert Data Summary - EXIST

Barrel Shape: Circular
 Barrel Diameter: 3.50 ft
 Barrel Material: Concrete
 Embedment: 0.00 in
 Barrel Manning's n: 0.0120
 Culvert Type: Straight
 Inlet Configuration: Square Edge with Headwall
 Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: CD4E)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
115.00	116.70	3.50
119.70	116.70	3.50
124.40	116.70	3.50
129.10	116.70	3.50
133.80	116.70	3.50
138.50	116.70	3.50
143.20	116.70	3.50
144.00	116.70	3.50
152.60	116.70	3.50
157.30	116.70	3.50
162.00	116.70	3.50

Tailwater Channel Data - CD4E

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 116.70 ft

Roadway Data for Crossing: CD4E

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 2000.00 ft

Crest Elevation: 122.00 ft

Roadway Surface: Paved

Roadway Top Width: 248.00 ft

CD-4 Proposed HY-8 Culvert Analysis Report

Crossing Discharge Data

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

Minimum Flow: 115 cfs

Design Flow: 144 cfs

Maximum Flow: 162 cfs

Table 1 - Summary of Culvert Flows at Crossing: CD4P

Headwater Elevation (ft)	Total Discharge (cfs)	PROP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
118.22	115.00	115.00	0.00	1
118.30	119.70	119.70	0.00	1
118.39	124.40	124.40	0.00	1
118.49	129.10	129.10	0.00	1
118.58	133.80	133.80	0.00	1
118.68	138.50	138.50	0.00	1
118.78	143.20	143.20	0.00	1
118.80	144.00	144.00	0.00	1
119.00	152.60	152.60	0.00	1
119.11	157.30	157.30	0.00	1
119.22	162.00	162.00	0.00	1
122.00	249.48	249.48	0.00	Overtopping

Table 2 - Culvert Summary Table: PROP

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)
115.00	115.00	118.22	3.446	4.620	4-FFf	4.000	2.278	4.000	4.000	4.576	0.000
119.70	119.70	118.30	3.534	4.705	4-FFf	4.000	2.325	4.000	4.000	4.763	0.000
124.40	124.40	118.39	3.623	4.793	4-FFf	4.000	2.375	4.000	4.000	4.950	0.000
129.10	129.10	118.49	3.712	4.885	4-FFf	4.000	2.421	4.000	4.000	5.137	0.000
133.80	133.80	118.58	3.801	4.981	4-FFf	4.000	2.466	4.000	4.000	5.324	0.000
138.50	138.50	118.68	3.890	5.079	4-FFf	4.000	2.510	4.000	4.000	5.511	0.000
143.20	143.20	118.78	3.981	5.181	4-FFf	4.000	2.554	4.000	4.000	5.698	0.000
144.00	144.00	118.80	3.996	5.199	4-FFf	4.000	2.561	4.000	4.000	5.730	0.000
152.60	152.60	119.00	4.165	5.396	4-FFf	4.000	2.642	4.000	4.000	6.072	0.000
157.30	157.30	119.11	4.259	5.508	4-FFf	4.000	2.683	4.000	4.000	6.259	0.000
162.00	162.00	119.22	4.355	5.624	4-FFf	4.000	2.724	4.000	4.000	6.446	0.000

 Straight Culvert
 Inlet Elevation (invert): 113.60 ft, Outlet Elevation (invert): 113.20 ft
 Culvert Length: 392.00 ft, Culvert Slope: 0.0010

Site Data - PROP

Site Data Option: Culvert Invert Data
 Inlet Station: 0.00 ft
 Inlet Elevation: 113.60 ft
 Outlet Station: 392.00 ft
 Outlet Elevation: 113.20 ft
 Number of Barrels: 2

Culvert Data Summary - PROP

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: Square Edge with Headwall
 Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: CD4P)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
115.00	117.20	4.00
119.70	117.20	4.00
124.40	117.20	4.00
129.10	117.20	4.00
133.80	117.20	4.00
138.50	117.20	4.00
143.20	117.20	4.00
144.00	117.20	4.00
152.60	117.20	4.00
157.30	117.20	4.00
162.00	117.20	4.00

Tailwater Channel Data - CD4P

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 117.20 ft

Roadway Data for Crossing: CD4P

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 2000.00 ft

Crest Elevation: 122.00 ft

Roadway Surface: Paved

Roadway Top Width: 276.00 ft

APPENDIX C –
BACK-UP PERMIT DOCUMENTATION

COMPONENTS OF CONTRACT PLANS SET
 ROADWAY PLANS
 SIGNING AND PAVEMENT MARKING PLANS

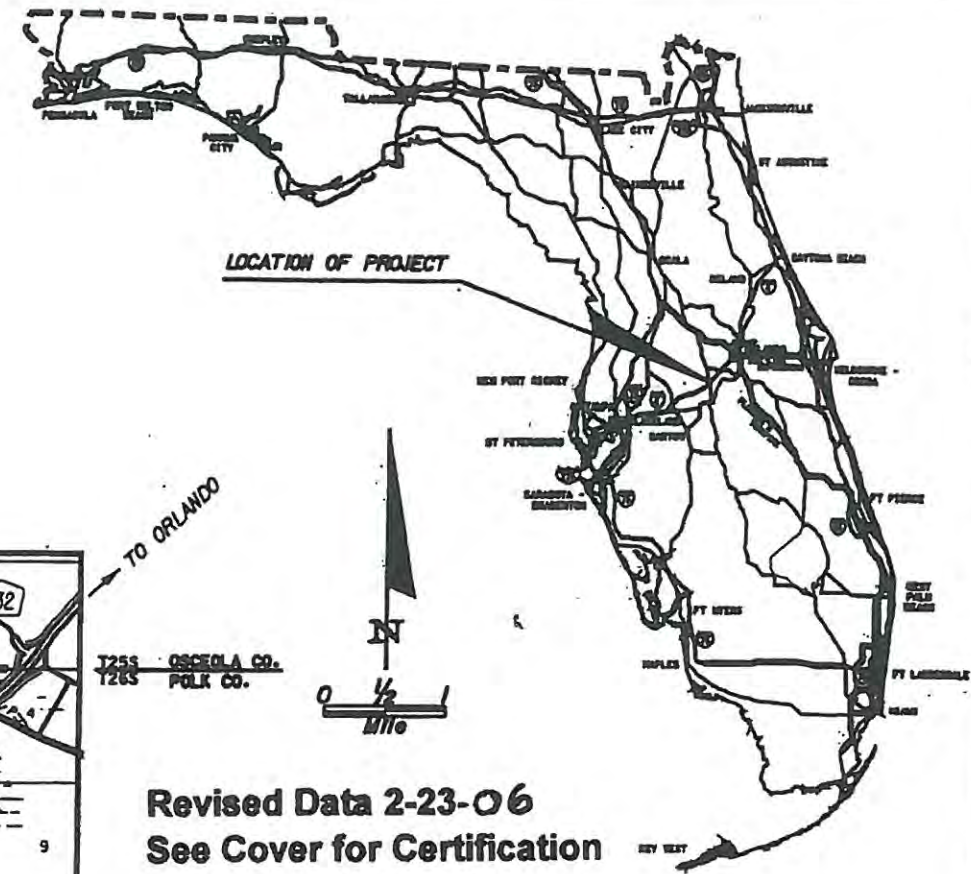
STATE OF FLORIDA
 DEPARTMENT OF TRANSPORTATION
CONTRACT PLANS

FINANCIAL PROJECT ID 201204-1
 (FEDERAL FUNDS)
 POLK COUNTY
 STATE ROAD NO. 400 (1-4)
 SEGMENT 6

CO1 & CO2

INDEX OF ROADWAY PLANS

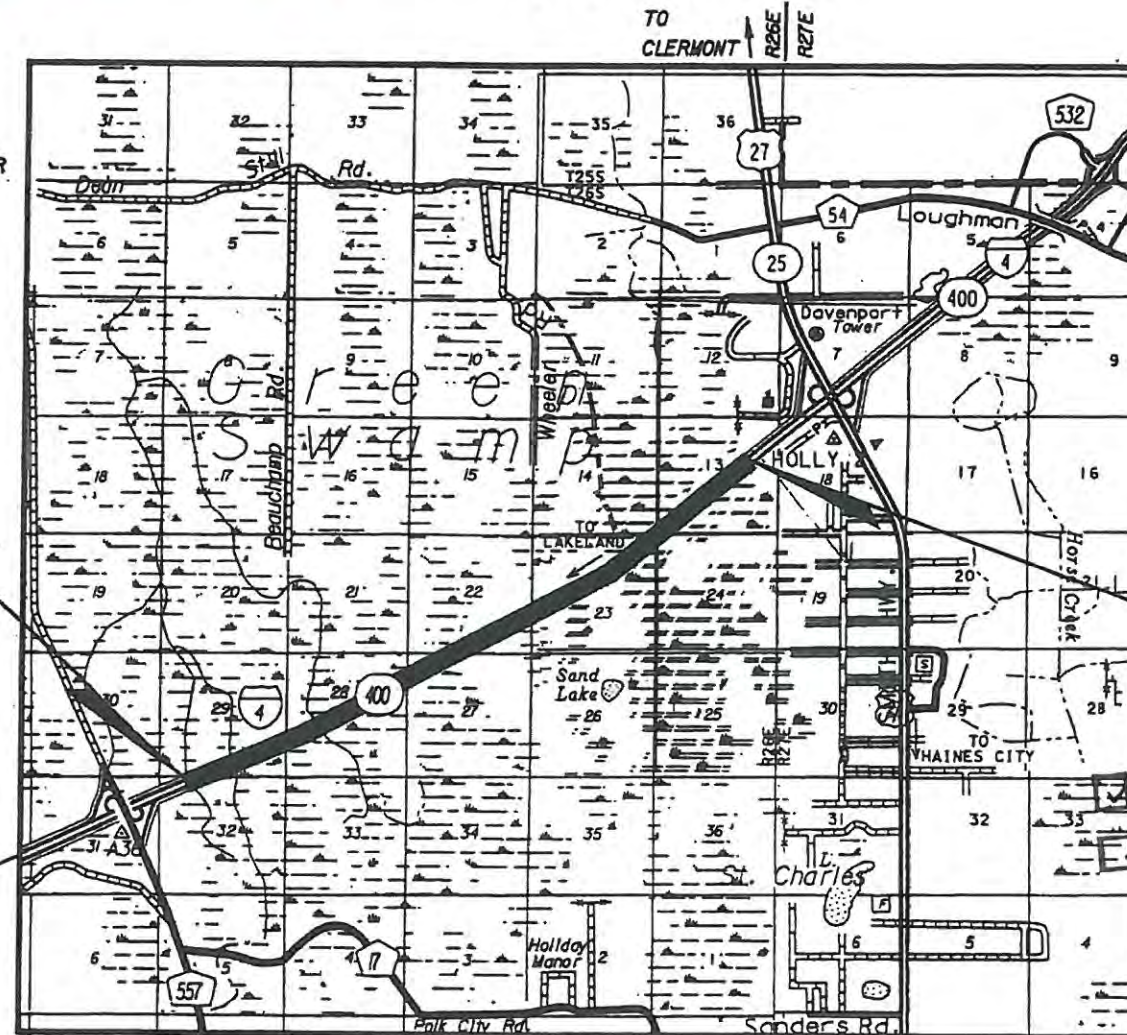
SHEET NO.	SHEET DESCRIPTION
1	KEY SHEET
2-4	TYPICAL SECTIONS
5-7	SURVEY REFERENCE POINTS
7A-7F	BOX CULVERT DATA
8	GENERAL NOTES
9-29	ROADWAY PLAN SHEETS
30-51	ROADWAY PROFILE SHEETS
52	PLAN/PROFILE SHEET - CATTLE CROSSING
53-54	CROSS SECTIONS - CATTLE CROSSING
55	PLAN/PROFILE SHEET - EMERGENCY CROSSOVER
56-85	DRAINAGE STRUCTURES
86	POND CONTROL STRUCTURE DETAILS
87-97	POND DETAIL SHEETS
98	SOIL SURVEY
99-209	CROSS SECTIONS - LEFT SIDE OF @
210-317	CROSS SECTIONS - RIGHT SIDE OF @
318-319	SWPPP
320-340	EROSION CONTROL PLANS
341-345	TRAFFIC CONTROL PLANS



Revised Data 2-23-06
 See Cover for Certification

PLANS PREPARED BY:
JE Jacobs Civil Inc.
 18302 Highwoods Preserve Parkway
 Highwoods Plaza, Suite 200
 Tampa, FL 33647
 Tel. (813) 977-3134
 EBN 6572
 Consultant Contract No. C-7505
 Vendor No. 43-182941

BEGIN SEGMENT 6 PROJECT
 @ SURVEY SR 400 (1-4)
 STA. 1686+34.83 Bk & Ah
 MP 23.050



END SEGMENT 6 PROJECT
 @ SURVEY SR 400 (1-4)
 MP 28.392

EQUATION:
 1968+50.00 Bk=
 1970+06.96 Ah

INSPECTION CONDUCTED BY DISTRICT

INSPECTION NOT CONDUCTED BY DISTRICT

ASBUILT FILE OF RECORD

43011896.032

NOTE: THE SCALE OF THESE PLANS MAY HAVE CHANGED DUE TO REPRODUCTION.

R. Ruckoff
 RICHARD C. RUCKOFF, P.E.

P.E. NO. 47032

2.5.04

WILLIAM J. VECH, JR., P.E.
 Management Director
 P.E. NO. 35650

MAY 18 2006

RECEIVED
 RRD-Bartow

RELEASED FOR CONSTRUCTION

By *J. Allen*
 2-11-04

FISCAL YEAR	SHEET NO.
02	01

GOVERNING STANDARDS AND SPECIFICATIONS:
 FLORIDA DEPARTMENT OF TRANSPORTATION
 DESIGN STANDARDS, DATED JANUARY 2002, AND
 STANDARDS SPECIFICATIONS FOR ROAD AND BRIDGE
 CONSTRUCTION DATED 2000,
 AS AMENDED BY CONTRACT DOCUMENTS.
 AS-BUILT SURVEY

SURVEYOR'S NOTES

- THE PURPOSE OF THIS SURVEY IS TO DEPICT RECORD INFORMATION OBTAINED DURING CONSTRUCTION OF SAID IMPROVEMENTS.
- BENCHMARK DATUM, Horizontal Datum NAD 83/90 Zone 0901 Florida East, POT Stat. 423+22.75 Rod & Cap#2648, Vertical NGVD1929 Datum BM #460 FDOT monument stamped #140 stat. 459+52.53 117.33' left

CERTIFICATION

WE DO HEREBY CERTIFY THAT THE ATTACHED PRINTS INDICATING RECORD INFORMATION FOR THIS PROJECT, IS IN COMPLIANCE WITH THE MINIMUM TECHNICAL REQUIREMENTS FOR FIELD SURVEYING SET FORTH BY THE FLORIDA ADMINISTRATIVE CODE 61G-17.5 UNLESS IT BEARS THE SIGNATURE & ORIGINAL SEAL OF A FLORIDA REGISTERED SURVEYOR AND MAPPER. THIS REPORT IS FOR INFORMATIONAL PURPOSES ONLY.

CERTIFIED THIS 28 DAY OF FEB 2006

Dan A. Burden
 FOR THE FIRM BY: GARY A. BURDEN FIRM NO. 3491
 A/E & INC, LMB 0529
 5800 LAKEHURST DR. SUITE 150-33
 ORLANDO FL 32819
 TELEPHONE # (407) 352-7181

LENGTH OF PROJECT

	LINEAR FEET	MILES
ROADWAY	28215.17	5.34
BRIDGES	0.00	0.000
NET LENGTH OF PROJECT	28215.17	5.34
EXCEPTIONS	0.00	0.000
GROSS LENGTH OF PROJECT	28215.17	5.34

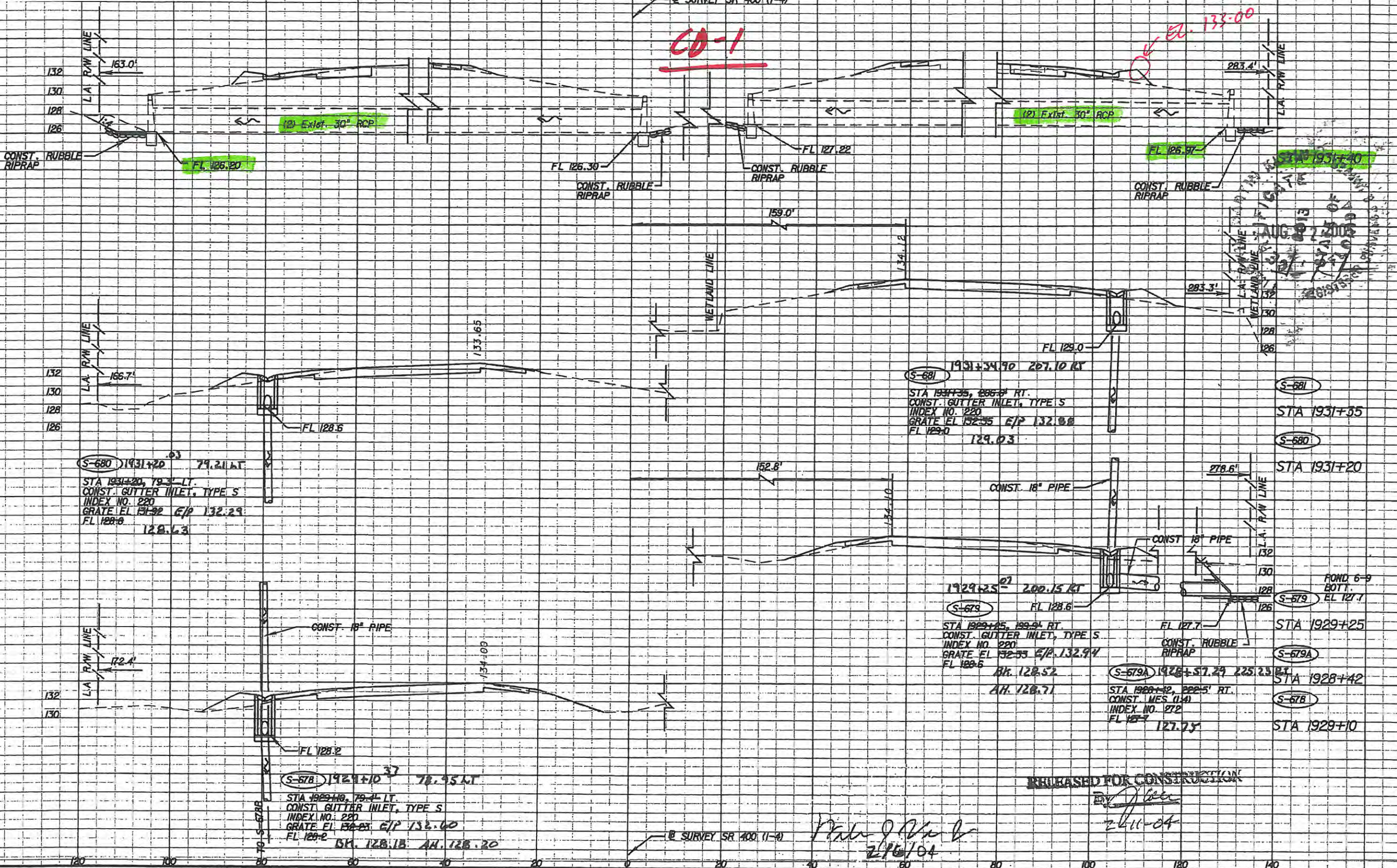
FDOT PROJECT MANAGER: AMY SHAFER, P.E.

KEY SHEET REVISIONS	
DATE	DESCRIPTION

Rev 2-23-04

CO-1

EL. 135.00



STA 1931+40
AUG 27 2006
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

S-680 1931+20 79.21 LT.
STA 1931+20, 79'-3" LT.
CONST. GUTTER INLET, TYPE S
INDEX NO. 220
GRATE EL 131.92 E/P 132.29
FL 128.9

S-681 1931+35 227.10 RT.
STA 1931+35, 226'-8" RT.
CONST. GUTTER INLET, TYPE S
INDEX NO. 220
GRATE EL 132.55 E/P 132.98
FL 129.0

S-679 1929+25 200.15 RT.
STA 1929+25, 199'-9" RT.
CONST. GUTTER INLET, TYPE S
INDEX NO. 220
GRATE EL 132.53 E/P 132.94
FL 128.6

S-679A 1928+42 225.23 RT.
STA 1928+42, 222'-5" RT.
CONST. M.S. (1.4)
INDEX NO. 172
FL 127.7

S-678 1929+10 78.95 LT.
STA 1929+10, 78'-4" LT.
CONST. GUTTER INLET, TYPE S
INDEX NO. 220
GRATE EL 132.05 E/P 132.60
FL 128.2

RELEASED FOR CONSTRUCTION
BY [Signature]
2/11/04

[Signature]
2/16/04

04-FEB-2004 09:32
rail/rail
F:\ES\9700\1002\1002\1025\1025.dwg

DATE		BY		DESCRIPTION	

J Jacobs Civil Inc.
18302 Highroads Preserve Parkway
Highroads Plaza, Suite 200
Tampa, FL 33647
Tel. (813) 917-3434
W. YEON JR., P.E. No. 35650 EBN 6572

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 400	POLK	201204-1

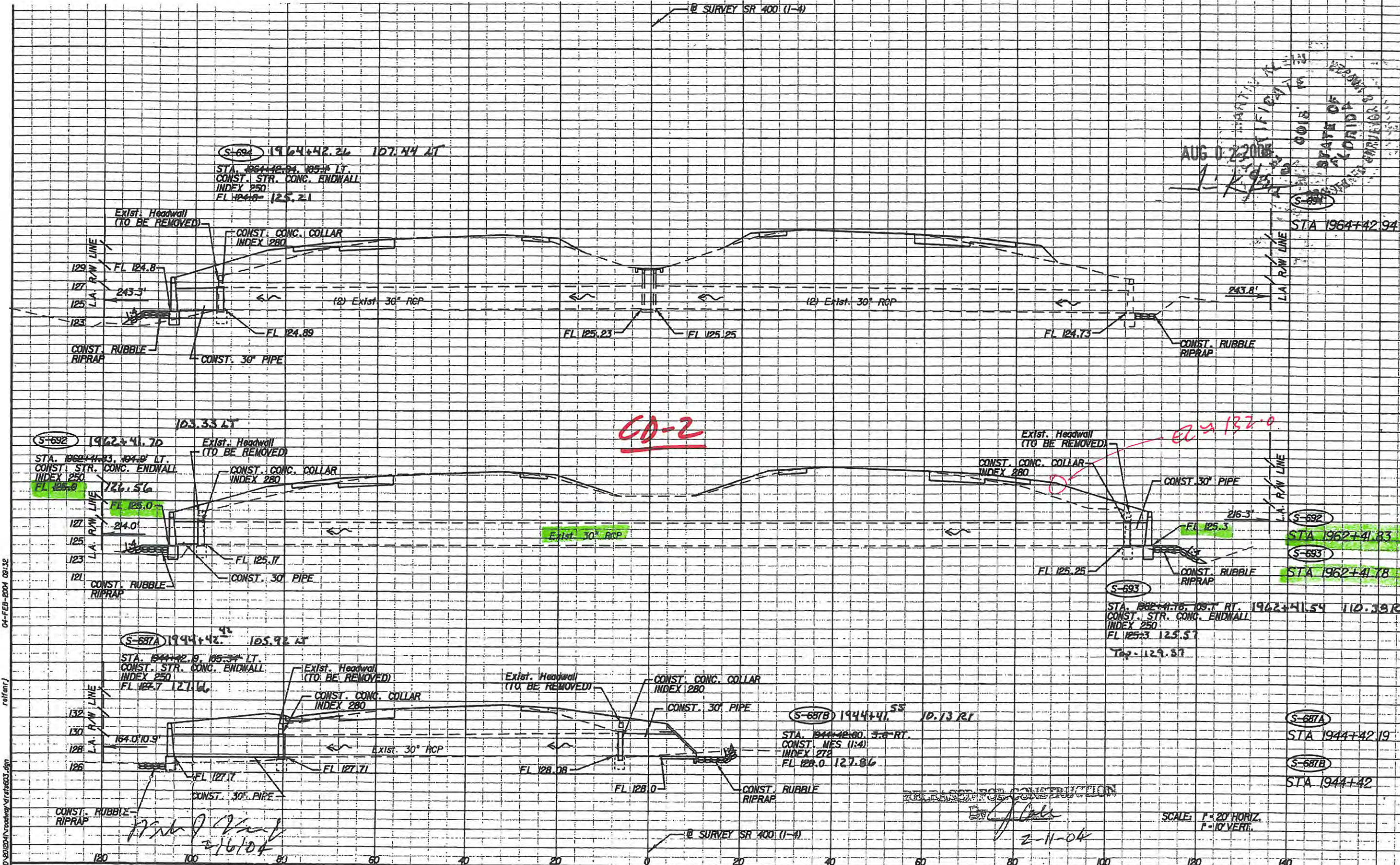
SOUTHWEST FLORIDA WATER
Management District
DRAINAGE STRUCTURES
I-1 SEGMENT 6
MAY 18 2006

SHEET NO.
82

RECEIVED
RRD-Bartow

295

STATE OF FLORIDA
 DEPARTMENT OF TRANSPORTATION
 AUG 0 2 2006
 L. K. / 13



CD-2

04-FEB-2004 09:32
 P:\S\940702\001\01\02\01\working\drainage\drainage.dgn
 ref(en)

RELEASED FOR CONSTRUCTION
 [Signature]
 2-11-04

SCALE: 1" = 20' HORIZ.
 1" = 10' VERT.

DATE		BY		DESCRIPTION	

JE Jacobs Civil Inc.
 18302 Highwoods Preserve Parkway
 Highwoods Plaza, Suite 200
 Tampa, FL 33647
 Tel. (813) 977-3434
 W. VEON JR., P.E. No. 35650 EBN 6572

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 400	POLK	201204-1

Southwest Florida Water Management
DRAINAGE STRUCTURES
 MAY 18 2006
I-1 SEGMENT 6

SHEET NO.
 85

RECEIVED
 RRD-Bartow

Imaged As Is

C-3

298

3
CDX & CDX 4

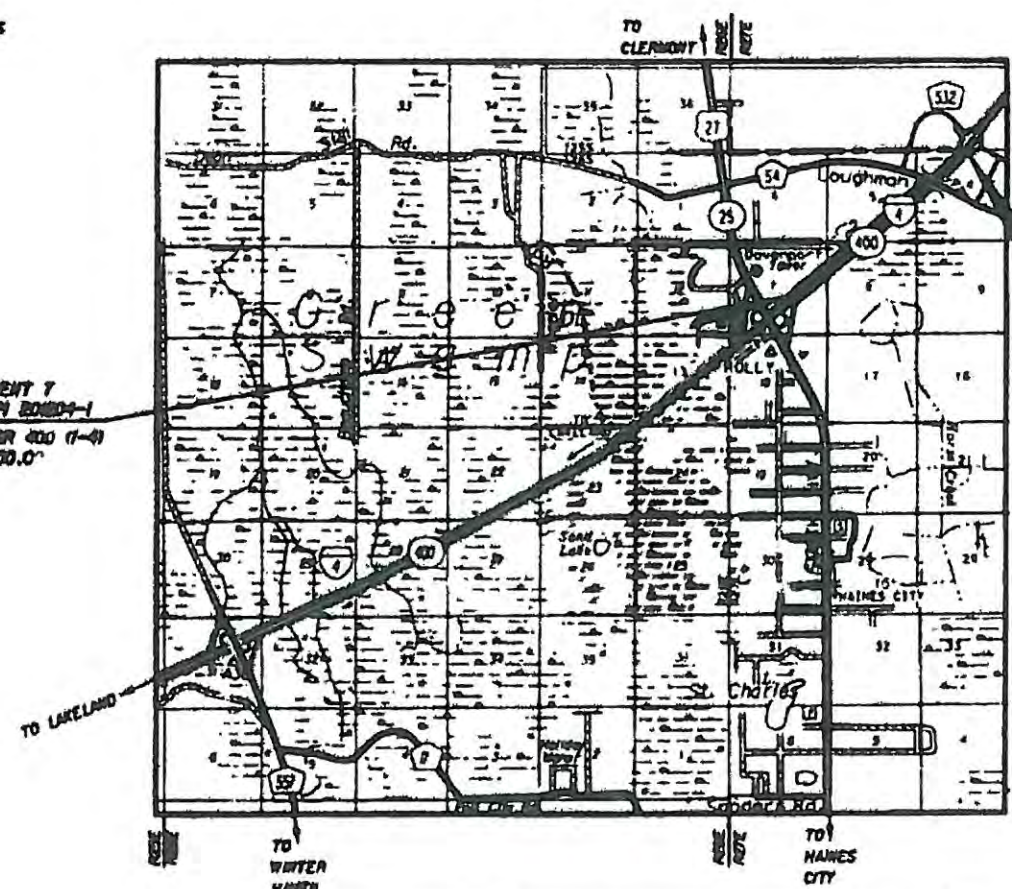
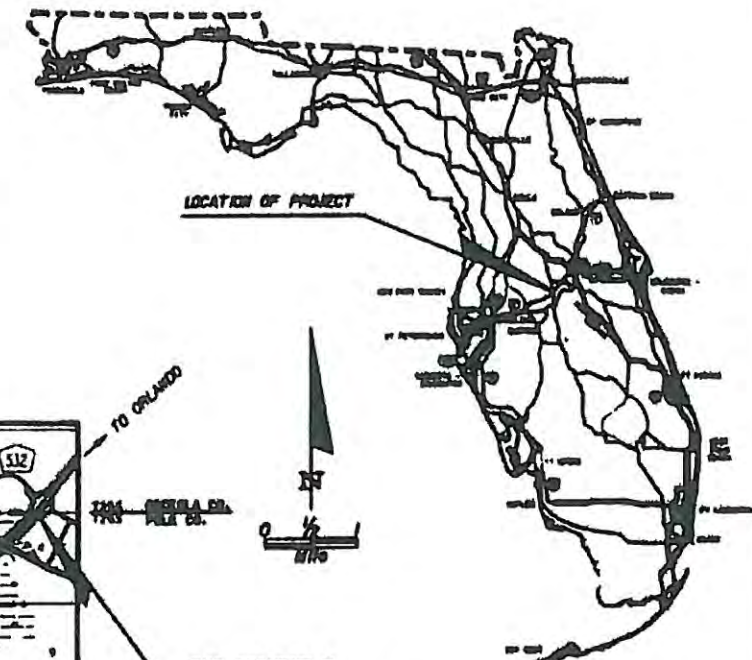
COMPONENTS OF CONTRACT PLANS SET
DRAINAGE PLANS

**STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
CONTRACT PLANS**

FINANCIAL PROJECT ID 201204-1-52-01
POLK COUNTY (16110)
STATE ROAD NO. 400 (1-4)
SEGMENT 7

INDEX OF DRAINAGE PLANS

SHEET NO	SHEET DESCRIPTION
1	KEY SHEET
2-4	TYPICAL SECTIONS
5	GENERAL NOTES
6	PROJECT LAYOUT
7-18	PLAN SHEETS
19-25	PROFILE SHEETS
26-29	DRAINAGE STRUCTURES
30-31	DRAINAGE STRUCTURE DETAILS
32-96	CROSS SECTIONS



BEGIN SEGMENT 7
PROJECT FFI BOUNDARY-1
@ SURVEY SR 400 (1-4)
STA. 805+00.0' @
MP 31.925

END SEGMENT 7
PROJECT FFI BOUNDARY-1
@ SURVEY SR 400 (1-4)
STA. 800+00.0' @
MP 31.901

**ENVIRONMENTAL
RESOURCE PERMIT PLANS**

COVERING STANDARDS AND SPECIFICATIONS:
FLORIDA DEPARTMENT OF TRANSPORTATION,
ROADWAY AND TRAFFIC DESIGN STANDARDS
DATED JANUARY 1992, AND
STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE
CONSTRUCTION DATED 2004,
AS AMENDED BY CONTRACT ADDENDUMS.

ENGINEER OF RECORD:
JE Jacobs Civil Inc.
Professional Professional
1000 N. W. 10th St.
Fort Lauderdale, FL 33304
Tel: 954.344.1000

NOTE: THE SCALE OF THESE PLANS MAY
HAVE CHANGED DUE TO REPRODUCTION

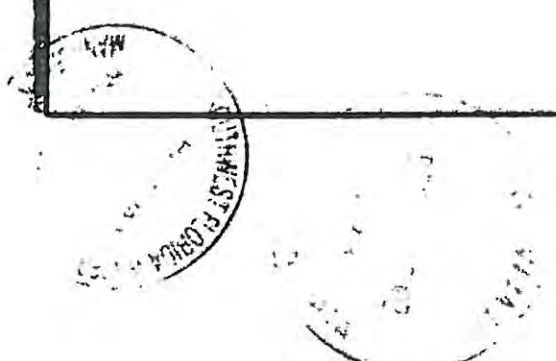
LENGTH OF PROJECT		
	LINEAR FEET	MILES
ROADWAY	10,808.17	2.066
BRIDGES	0.00	0.000
NET LENGTH OF PROJECT	10,808.17	2.066
EXCEPTIONS	0.00	0.000
GROSS LENGTH OF PROJECT	10,808.17	2.066

KEY SHEET REVISIONS	
DATE	DESCRIPTION

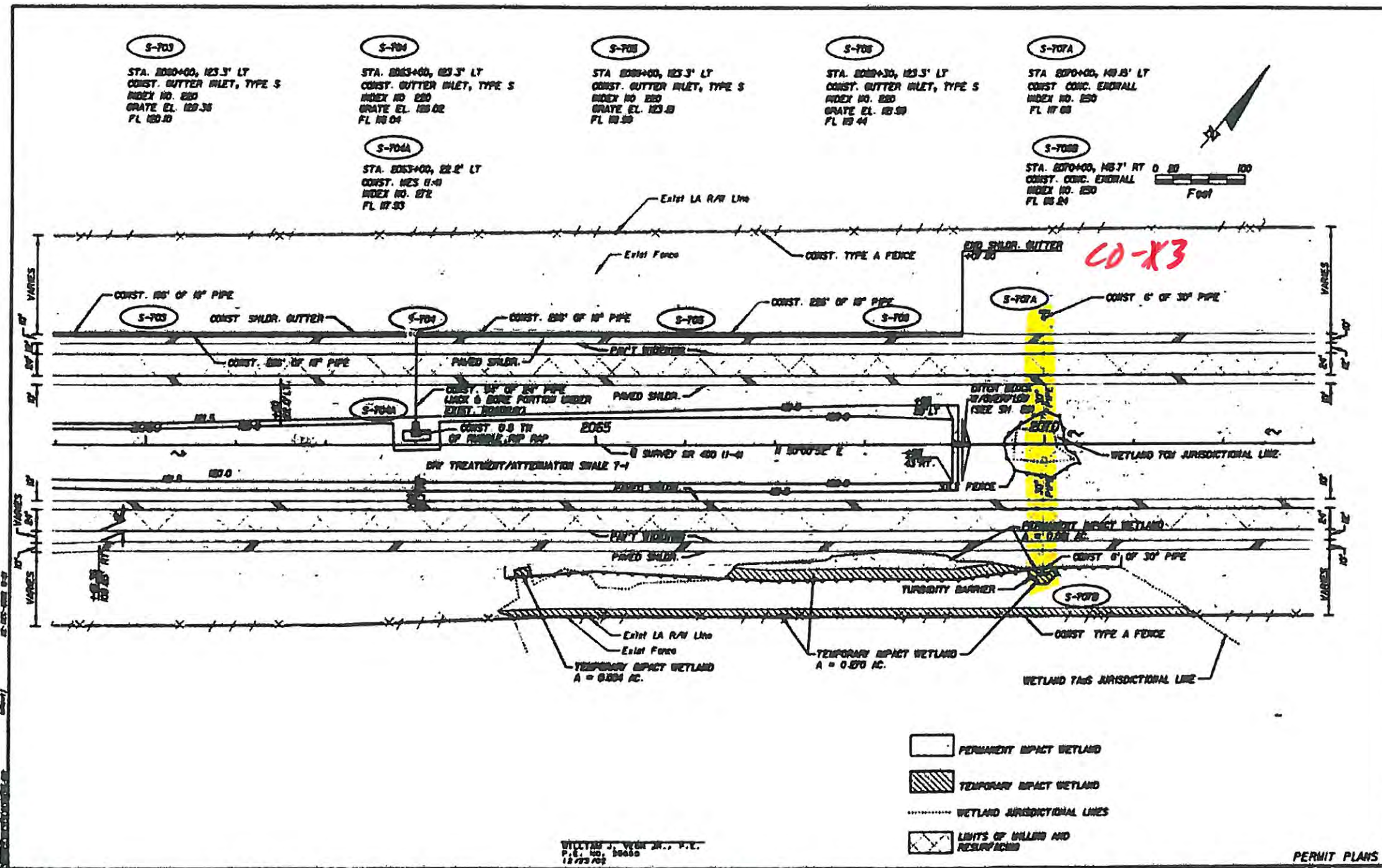
DRAINAGE PLANS
ENGINEER OF RECORD: FRANK J. YOUNG, Jr., P.E.

FISCAL YEAR	SHEET NO.
02	01

FDOT PROJECT MANAGER:



325



S-703

STA. 2060+00, 123.3' LT
CONST. GUTTER INLET, TYPE S
INDEX NO. 220
GRATE EL. 129.38
FL 129.40

S-704

STA. 2063+00, 123.3' LT
CONST. GUTTER INLET, TYPE S
INDEX NO. 220
GRATE EL. 129.02
FL 129.04

S-705

STA. 2066+00, 123.3' LT
CONST. GUTTER INLET, TYPE S
INDEX NO. 220
GRATE EL. 123.40
FL 123.50

S-706

STA. 2069+00, 123.3' LT
CONST. GUTTER INLET, TYPE S
INDEX NO. 220
GRATE EL. 123.50
FL 123.54

S-707A

STA. 2070+00, 140.15' LT
CONST. CONC. ENDWALL
INDEX NO. 220
FL 17.00

S-704A

STA. 2063+00, 22.2' LT
CONST. 12S 11-0
INDEX NO. 272
FL 17.93

S-708

STA. 2070+00, 145.7' RT 0.20
CONST. CONC. ENDWALL
INDEX NO. 220
FL 16.24

CO-X3

WILLIAM J. VEER JR., P.E.
P.E. NO. 26630
12/23/02

JC Jacobs Civil Inc.
1000 Corporate Parkway
Tampa, FL 33604
813.281.1234

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	PROJECT NUMBER
SR 400	POLK	201204-1

PLAN SHEET (3)
STA 2060+00 TO STA 2070+00

PERMIT PLANS

SHEET NO.
8

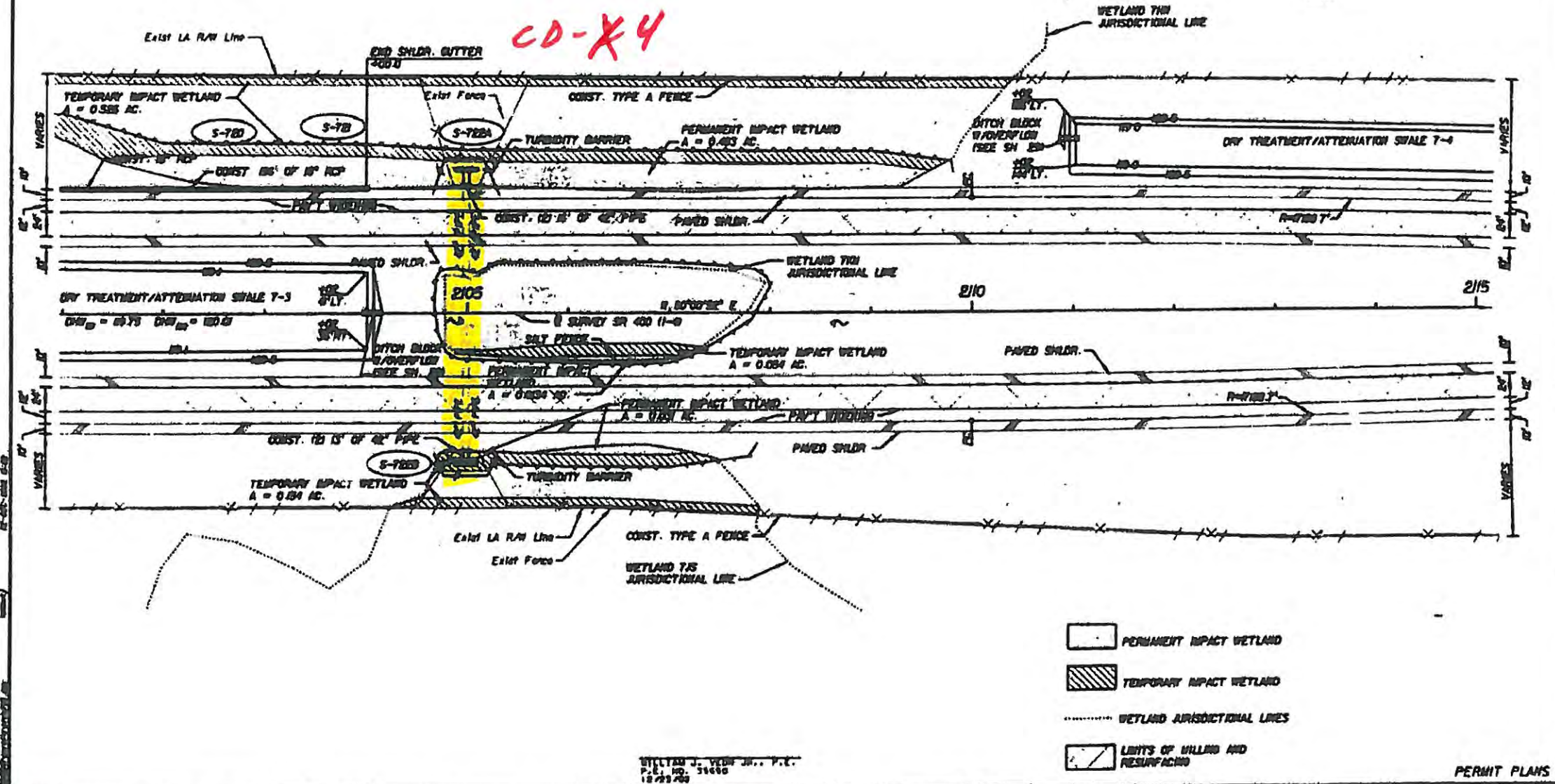
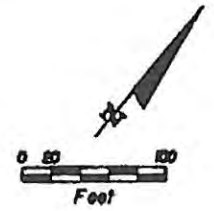
332

S-7B0
 STA. 2102+00, 123.4' LT
 CONST. GUTTER INLET, TYPE S
 INDEX NO. 220
 GRATE EL. 122.12
 FL. 119.00

S-7B1
 STA. 2104+00, 123.4' LT
 CONST. GUTTER INLET, TYPE S
 INDEX NO. 220
 GRATE EL. 121.94
 FL. 119.30

S-7B2A
 STA. 2103+00, 120.0' LT
 CONST. CONC. ENDWALL
 INDEX NO. 220
 FL. 113.50

S-7B2B
 STA. 2103+00, 125.1' LT
 CONST. CONC. ENDWALL
 INDEX NO. 220
 FL. 113.80



- PERMANENT IMPACT WETLAND
- TEMPORARY IMPACT WETLAND
- WETLAND JURISDICTIONAL LINES
- LIMITS OF MILLING AND RESURFACING

STEPHEN J. VEDR... P.E.
 P.E. NO. 31668
 12/23/20

Jacobus Civil Inc.
 2000 Highway 100, Suite 200
 Jacksonville, FL 32204
 904.722.1234

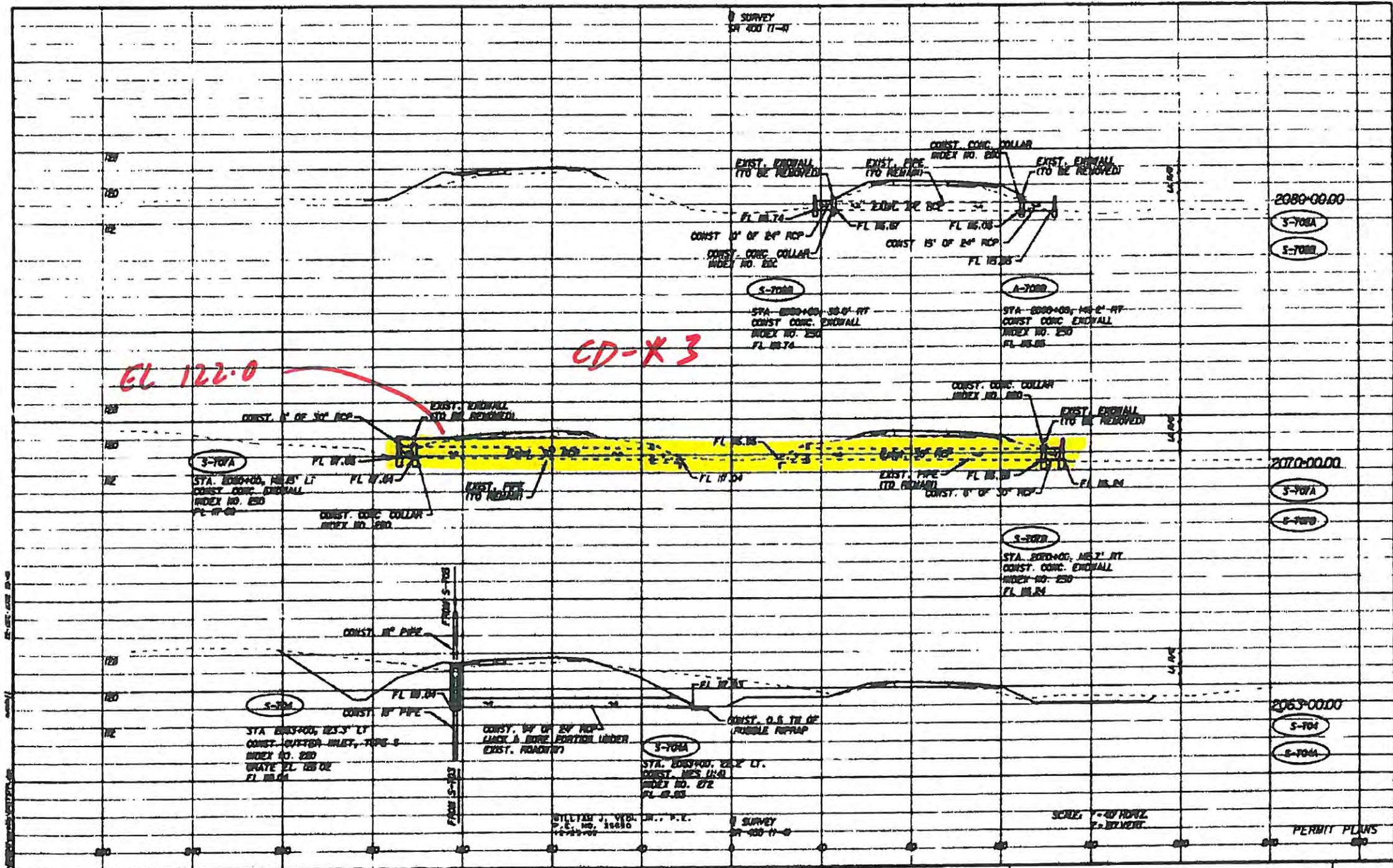
STATE OF FLORIDA		
DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT #
SR 400	POLK	201204-1

PLAN SHEET (5)
STA 2101+00 TO STA 2116+00

PERMIT PLANS	SHEET NO.
	11



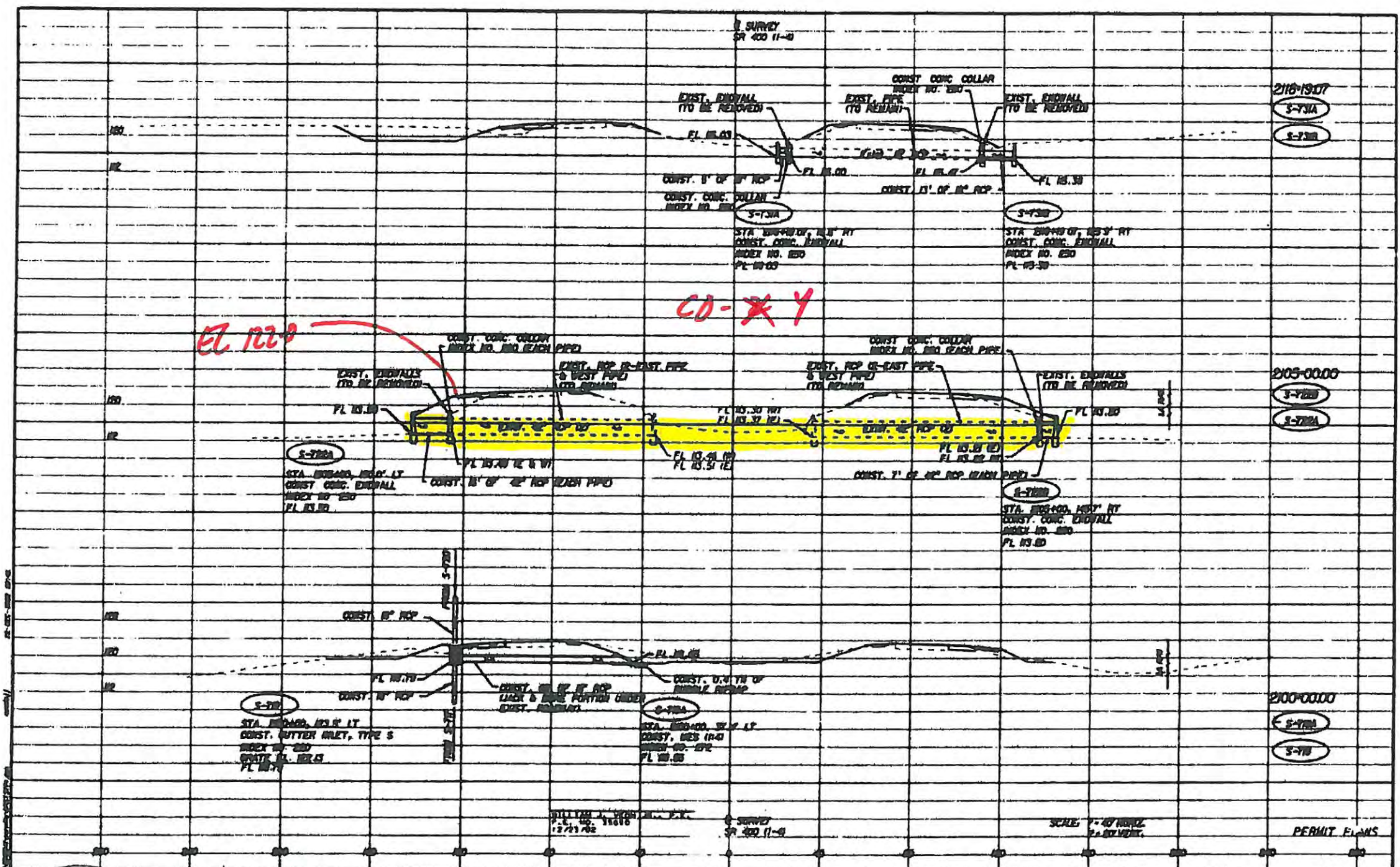
335



REVISIONS		Jacobs Civil Inc. 1222 Highway 90, Suite 200 Ft. Lauderdale, FL 33304 Tel: 954-333-3334 Fax: 954-333-3337	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		DRAINAGE STRUCTURE SHEET (1) I-1 SEGMENT 7	SHEET NO 26
NO.	DESCRIPTION		ROAD NO.	COUNTY		
		SR 400	POLK	201204-1		

STATE OF FLORIDA
 DEPARTMENT OF TRANSPORTATION
 PROJECT NO. 201204-1
 SHEET NO. 26

350



EL. 102.0
 CO-X Y

REVISIONS			
NO.	DATE	BY	DESCRIPTION

JC Jacobs Civil Inc.
 1000 Highway 100, Suite 100
 Tallahassee, FL 32304
 Tel: 904-777-0000
 Fax: 904-777-0001

STATE OF FLORIDA
 DEPARTMENT OF TRANSPORTATION
 ROAD NO. SR 400 COUNTY POLK FISCAL PROJECT ID 201204-1

DRAINAGE STRUCTURE SHEET (8)
 I-1 SEGMENT 7

SHEET NO. 28



352

APPENDIX D – CORRESPONDENCE

From: Jeremy Golloway <jeremy.golloway@tmeenterprises.com>
Sent: Thursday, January 28, 2016 2:26 PM
To: Luz Phillip
Cc: Sanam Rai
Subject: RE: Segment 5 I-4 PD&E Cross drains

Follow Up Flag: Follow up
Flag Status: Flagged

To the best of my knowledge, we have not noticed any issues in the area you referenced. Thanks.

Jeremy Golloway
Regional Manager - Florida
Office – (407) 730-2232
Cell – (407) 625-8812
Fax – (407) 704-7642
Email – Jeremy.golloway@tmeenterprises.com



From: Luz Phillip [<mailto:lphillip@HNTB.com>]
Sent: Thursday, January 28, 2016 10:14 AM
To: jeremy.golloway@tmeenterprises.com
Cc: Sanam Rai <sarai@HNTB.com>
Subject: Segment 5 I-4 PD&E Cross drains

Hello Jeremy,

I am working with Sanam Rai on the I-4 PD&E and I would like to know if you could provide information of any known issues (historical flooding, scour, sedimentation) for any of the cross drains along Segment 5 of the I-4 PD&E project. Segment 5 begins approximately 2 miles west of SR 25/US 27 to just west of CR 532 (Polk/Osceola County Line).

Thank you so much.

Respectfully,

Lucy Phillip, MSCE
Drainage Designer
Tel (407) 547-3062

HNTB COMPANIES
610 Crescent Executive Ct, Lake Mary, FL 32746 | www.hntb.com

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