

DRAINAGE DESIGN CONCEPT REPORT

SR 60 Grade Separation at CSX Railroad PROJECT DEVELOPMENT AND ENVIRONMENT STUDY Polk County, Florida

Financial Project ID: 436559-1-22-01

Prepared for:



**FLORIDA DEPARTMENT OF TRANSPORTATION
DISTRICT ONE
801 North Broadway Avenue
Bartow, Florida 33831
Tampa, Florida 33612-6403**

January 2015

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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
EXECUTIVE SUMMARY	1
SECTION 1.0 INTRODUCTION.....	3
1.1. PURPOSE	3
1.2. PROJECT DESCRIPTION.....	3
SECTION 2.0 GENERAL PROJECT INFORMATION	6
2.1 PROJECT EXISTING AND PROPOSED TYPICAL SECTIONS.....	6
2.1.1. Existing Typical Sections	6
2.1.2. Proposed Typical Sections.....	6
2.2. RUNOFF CURVE NUMBERS.....	6
2.3. RAINFALL INTENSITY DATA	6
2.4. SEASONAL HIGH GROUNDWATER TABLE ELEVATIONS.....	7
SECTION 3.0 EXISTING CONDITIONS	12
3.1. GEOTECHNICAL INFORMATION	12
3.2. FLOODPLAINS	12
3.3. FLOODWAYS	12
3.4. CROSS DRAINS AND BRIDGES	16
3.5. SWFWMD BOR 5.8 REQUIREMENT	16
3.6. IMPAIRED WATERBODY RULE.....	16
3.7. PROJECT OUTFALL WBIDS.....	16
3.8. WILDLIFE AND WETLAND ASSESSMENT	17
3.8.1. Wildlife Assessment	17
3.8.2. Wetland Assessment	17
3.9. EXISTING STORMWATER MANAGEMENT.....	17
SECTION 4.0 BASIN 1	18
4.1. OVERVIEW	18
4.2. TREATMENT METHOD.....	18
4.3. WATER QUALITY	18
4.4. WATER QUANTITY	18
4.5. POND SITING.....	18
4.6. OUTFALL	18
4.7. ALTERNATIVES	19
4.8. FLOODPLAIN COMPENSATION	19
SECTION 5.0 BASIN 3	20
5.1. OVERVIEW	20
5.2. TREATMENT METHOD.....	20
5.3. WATER QUALITY	20
5.4. WATER QUANTITY	20

5.5.	POND SITING	20
5.6.	OUTFALL	20
5.7.	ALTERNATIVES	20
5.8.	FLOODPLAIN COMPENSATION	21

LIST OF FIGURES

Figure 1-1	Project Location	5
Figure 2-1	Existing Roadway Typical Section	8
Figure 2-2	Proposed Roadway Typical Section	9
Figure 2-3	Proposed SR 60 Bridge Typical Section.....	10
Figure 2-4	Proposed Frontage Road Bridge Typical Section.....	11
Figure 3-1	Project Soils Map.....	13
Figure 3-2	FEMA FIRM Panel.....	14

LIST OF TABLES

Table 3-1	PCDC Cross Sections	15
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APPENDICIES

Appendix A	Vertical Datum Conversion.....	A-1
Appendix B	Rainfall Intensity	B-1
Appendix C	Geotechnical Data	C-1
Appendix D	Wildlife and Wetland Report	D-1
Appendix E	Basin Pre/Post Figures	E-1
Appendix F	Pond Sizing Calculations	F-1

EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) proposes to construct a new overpass to carry State Road (SR) 60 over the CSX railroad approximately 11 miles east of Bartow and 4 miles west of Lake Wales in Polk County, Florida. The purpose of this Drainage Design Concept Report is to determine the feasibility of using two existing FDOT parcels as stormwater management facility (SMF) sites. This study found that the two existing FDOT parcels located east and west of the CSX railroad should be sufficient to provide the water management and floodplain compensation necessary for the project.

All elevations are presented in the North American Vertical Datum of 1988 (NAVD 88).

The project is approximately 1.08 miles in length. The construction of the overpass will be striped as a four lane typical mimicking the present conditions; however the SMF will be evaluated for an ultimate six lane configuration.

The project has been delineated into two basins, Basin 1 and Basin 3. Basin 1 is from the beginning of the project to the high point over the CSX railroad. Basin 3 is from the high point over the CSX railroad to the end of the project to the east. Basin 1 will discharge to SMF 1, which is a remnant borrow pit west of the Peace Creek Drainage Canal (PCDC). Basin 3 will discharge to SMF 3, which is also a remnant borrow pit east of the CSX rail road. Both basins discharge to the PCDC.

In the existing condition Basin 1 is divided into two basins, Basin 1 and Basin 2. Basin 2 is a sub-basin of Basin 1, which drains from the east end of the PCDC Bridge to the high point of the CSX railroad. The horizontal and vertical alignment allows the runoff to be combined into one basin, which discharges over the new proposed PCDC Bridge to SMF 1.

The Florida Department of Environmental Protection (FDEP) has classified the PCDC as an impaired waterbody (IWB) (WBID 1539). The impairments in the PCDC are for Biochemical Oxygen Demand (BOD), Historic Chlorophyll-A, and Dissolved Oxygen. The SMFs within this project will be required to demonstrate a net improvement to mitigate for the environmental impairments. Both basins are considered open basins and neither is considered an Outstanding Florida Waters (OFW).

Due to the soils present and the seasonal high groundwater table (SHGWT) both SMFs will be proposed as wet detention.

Portions of the project fall within Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) zone AE in FIRM panel 120 261 0545 G, effective November 19, 2003. The 100 year floodplain elevation is 112.081 ft. The amount of floodplain within the project is minimal and will be compensated for in the reconstruction of the outfall ditch. The construction of this project will not affect the 100 year flood stage; therefore have no adverse effect on the

floodplain. The Southwest Florida Water Management District (SWFWMD) PCDC Interconnected Pond Routing (ICPR) watershed model will be modified in the design phase to ensure there will be no adverse effects to the floodplain.

Section 1.0

INTRODUCTION

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study to evaluate costs and impacts of constructing a new overpass to carry State Road (SR) 60 over the CSX railroad (milepost 25.544, crossing #625419N) approximately 11 miles east of Bartow and 4 miles west of Lake Wales in Polk County, Florida. The project location map (**Figure 1-1**) illustrates the location and limits of the Study.

1.1. PURPOSE

The purpose of the project is to replace the SR 60 at-grade railroad crossing with a grade separation. The need for the project is not based on the need for additional capacity. It is based on improving safety; to provide a grade separation of the railroad crossing to separate vehicle traffic from the train traffic. The project will also reduce travel delays by removing the need to stop traffic for trains. The purpose of the PD&E Study is to provide documented environmental and engineering analyses to assist the FDOT in reaching a decision on the location and conceptual design of the new railroad overpass and associated improvements in order to accommodate future traffic demand in a safe and efficient manner. This PD&E study satisfies the FDOT requirements and follows the process outlined in the FDOT *Project Development and Environment Manual, Part 1 Chapter 10: Non-Federal Projects*. The design year for the analysis is 2035.

The purpose of this Drainage Design Concept Report is to determine the feasibility of using the two existing FDOT parcels as the stormwater management facility (SMF) sites. Both parcels were evaluated to verify that they are suitable for the following characteristics:

- Hydraulics
- Hydrology
- Potential hazardous material contamination
- Potential wetland impacts and mitigation
- Potential impacts to threatened and endangered species

1.2. PROJECT DESCRIPTION


The PD&E Study limits are SR 60 from 3200 feet west of CSX railroad crossing #625419N to 2500 feet east of CSX railroad crossing #625419N, a distance of 5700 feet (1.08 mile). The project is located within Section 01, Township 30 South, Range 26 East, and Section 6, Township 30 South, Range 27 East, within the Eloise United States Geological Survey (USGS) 7.5-minute (1:24,000) quad map and the USGS “Fort Pierce” 1 x 2 degree (1:250,000) topographic map.

SR 60 is an existing four-lane divided rural arterial which is part of the National Highway System and the Strategic Intermodal System (SIS). SR 60 is designated as an evacuation route by the Florida State Emergency Response Team. SR 60 is classified by FDOT as a rural principal arterial – other. Existing land uses in the study area include industrial, agricultural, infrastructure, and

residential. The Access Classification is Access Class 3. There are no connecting roads within the project area, but access to SR 60 from adjacent properties is provided by driveway connections. In addition to the proposed bridges over the CSX railroad, new bridges will be provided over the Peace Creek drainage canal (PCDC), west of the railroad. While the purpose and need for this project is not to add capacity, an ultimate six-lane facility will be evaluated in order to accommodate future widening along SR 60.

Figure 1-1: Project Location



	<p>SR 60 Grade Separation over CSX Railroad Polk County, Florida</p> <p>Financial Project ID: 436559-1-22-01</p>	
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Section 2.0

GENERAL PROJECT INFORMATION

2.1 PROJECT EXISTING AND PROPOSED TYPICAL SECTIONS

2.1.1. Existing Typical Sections

SR 60 is a four-lane divided rural roadway within the study area as shown in **Figure 2-1**. Two 12-ft lanes, an 8-ft inside shoulder and a 10-ft outside shoulder (5 ft paved) is provided in each direction, separated by a 40-ft depressed, grassed median. Exclusive right turn lanes are provided at the median openings serving C&J, Peterson Industries and International Paper. No sidewalks are present. Bicyclists are accommodated on the 5-ft paved outside shoulders. The existing westbound roadway is crowned in the center, whereas the eastbound roadway slopes to the outside.

2.1.2. Proposed Typical Sections

The proposed typical section is a four-lane divided rural roadway with a 23.5-ft median, which includes two 10-ft paved shoulders and a barrier wall, as shown in **Figure 2-2**. Three 12-ft travel lanes with 10-ft flush outside paved shoulders are provided in each direction. Bicyclists will be accommodated by the outside 10-ft paved shoulder in each direction. The travel lanes are on embankment with mechanically stabilized earth (MSE) walls approaching the bridges over the railroad. The proposed design speed for this typical section is 70 mph. A frontage road is required on the south side, west of the railroad tracks, which will utilize the existing eastbound roadway pavement. A driveway is provided on the north side to provide access to adjacent parcels. ROW acquisition will be required to accommodate the driveways. This typical section requires 232-ft of ROW, with ROW being acquired on both sides of SR 60, as shown in the concept plans.

There are six new bridges proposed to carry SR 60 over the Peace Creek, the driveway, and the railroad. **Figure 2-3** shows the proposed bridge typical section.

Figure 2-4 depicts how the existing eastbound SR 60 bridge will be modified to remove the outer portion of the deck to replace the barrier walls so the bridge can continue in use to carry the frontage road over the Peace Creek.

2.2. RUNOFF CURVE NUMBERS

Runoff curve numbers (CN) have been determined using the guidelines set forth in the Natural Resources Conversation Service (NRCS) TR-55 along with the FDOT Hydrology Handbook. The hydrologic soil group (HSG) discussed in Section 3.1 and land use were used in the determination of CN values.

2.3. RAINFALL INTENSITY DATA

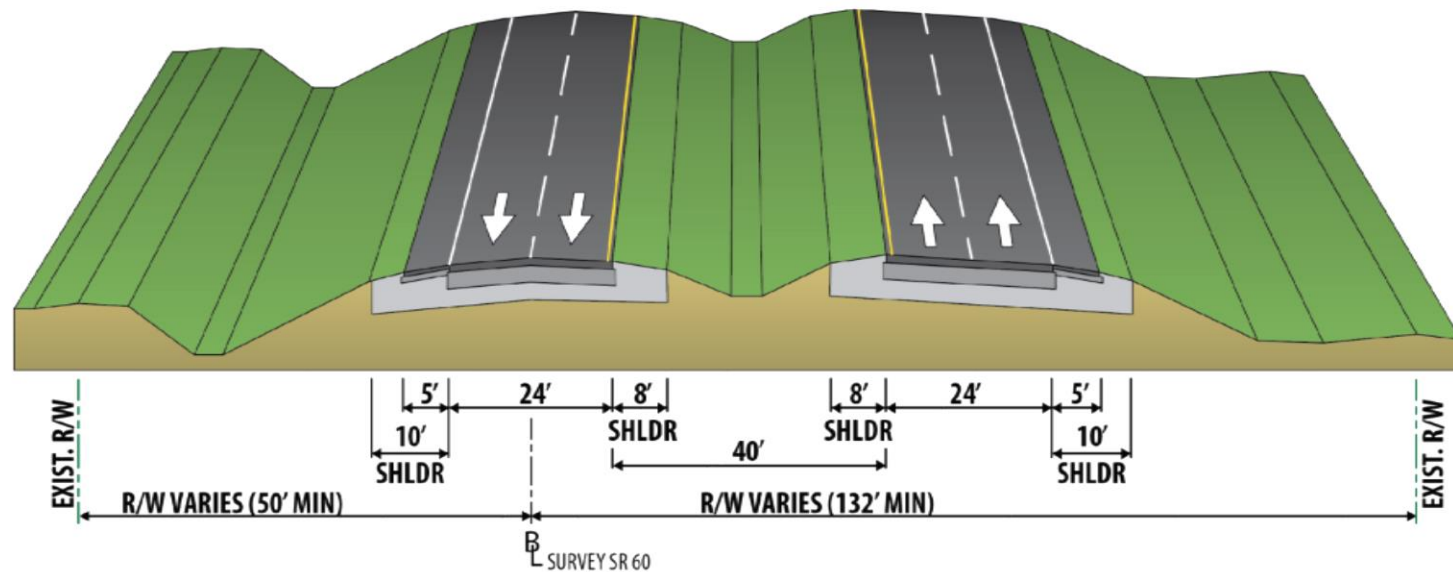
The rainfall intensity data was taken from the National Oceanic and Atmospheric Administration

(NOAA) Precipitation Frequency Data Server. Latitude and longitude information was submitted and NOAA provided graphs and tabular data as seen in **Appendix B**. This data was cross referenced, and found to be consistent with the Florida IDF Curves provided by the FDOT.

2.4. SEASONAL HIGH GROUNDWATER TABLE ELEVATIONS

The seasonal high groundwater table (SHGWT) is based on the NRCS Polk County Soil Survey, Light Detection and Ranging (LiDAR), wetland information, and field work. Geotechnical borings and formal wetland delineation will be performed in the design phase.

Figure 2-1: Existing Roadway Typical Section



**SR 60 Grade Separation over CSX Railroad
Polk County, Florida**

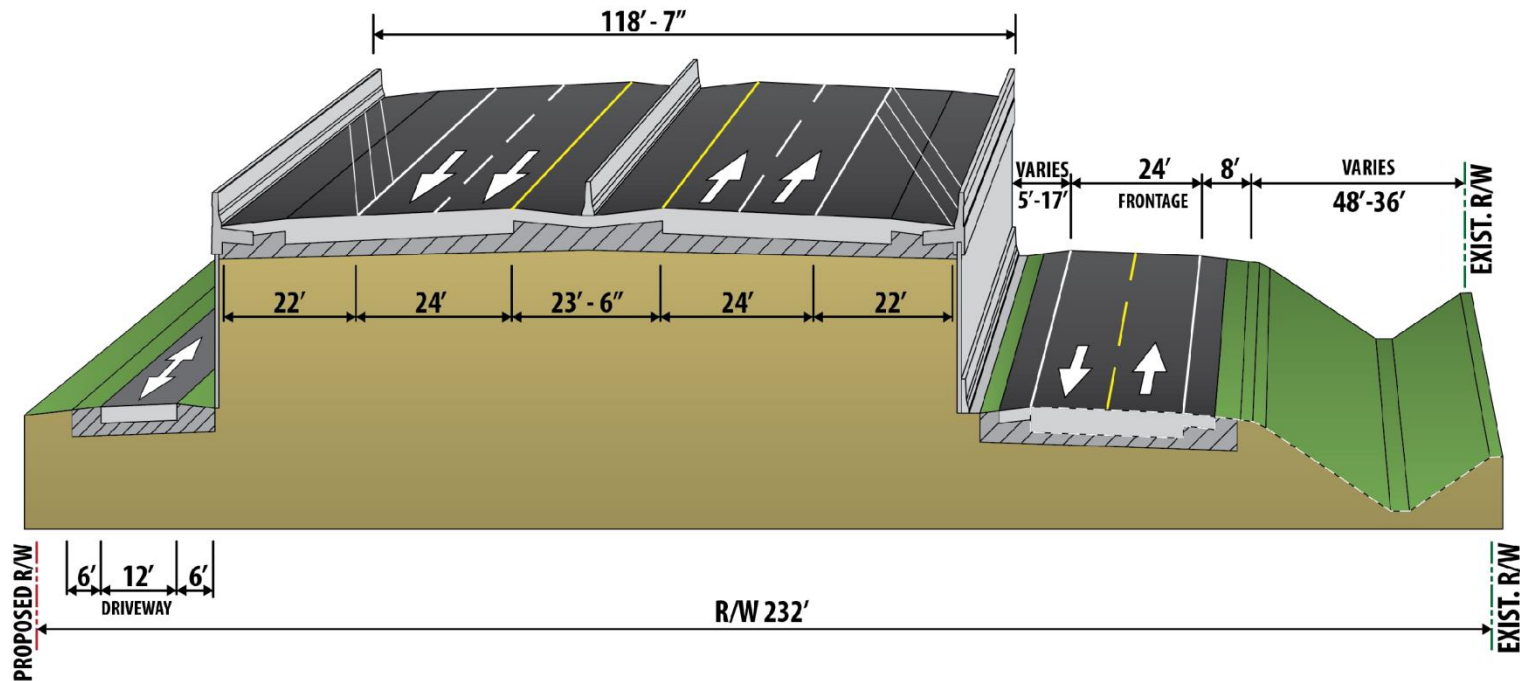
Financial Project ID's: 436559-1-22-01



Existing Typical Section



Figure 2-2: Proposed Roadway Typical Section



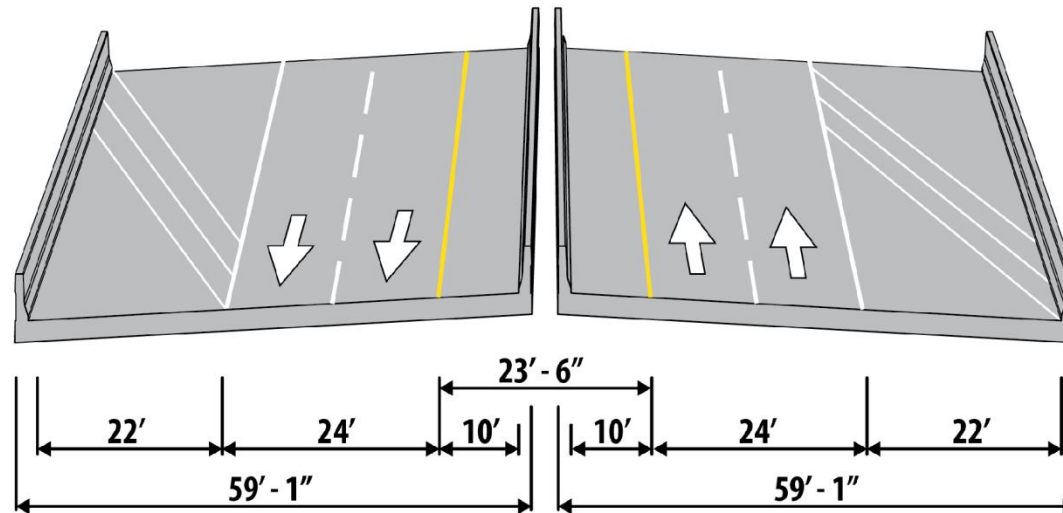
**SR 60 Grade Separation over CSX Railroad
Polk County, Florida**

Financial Project ID: 436559-1-22-01

Proposed Typical Section A-A



Figure 2-3: Proposed SR 60 Bridge Typical Section





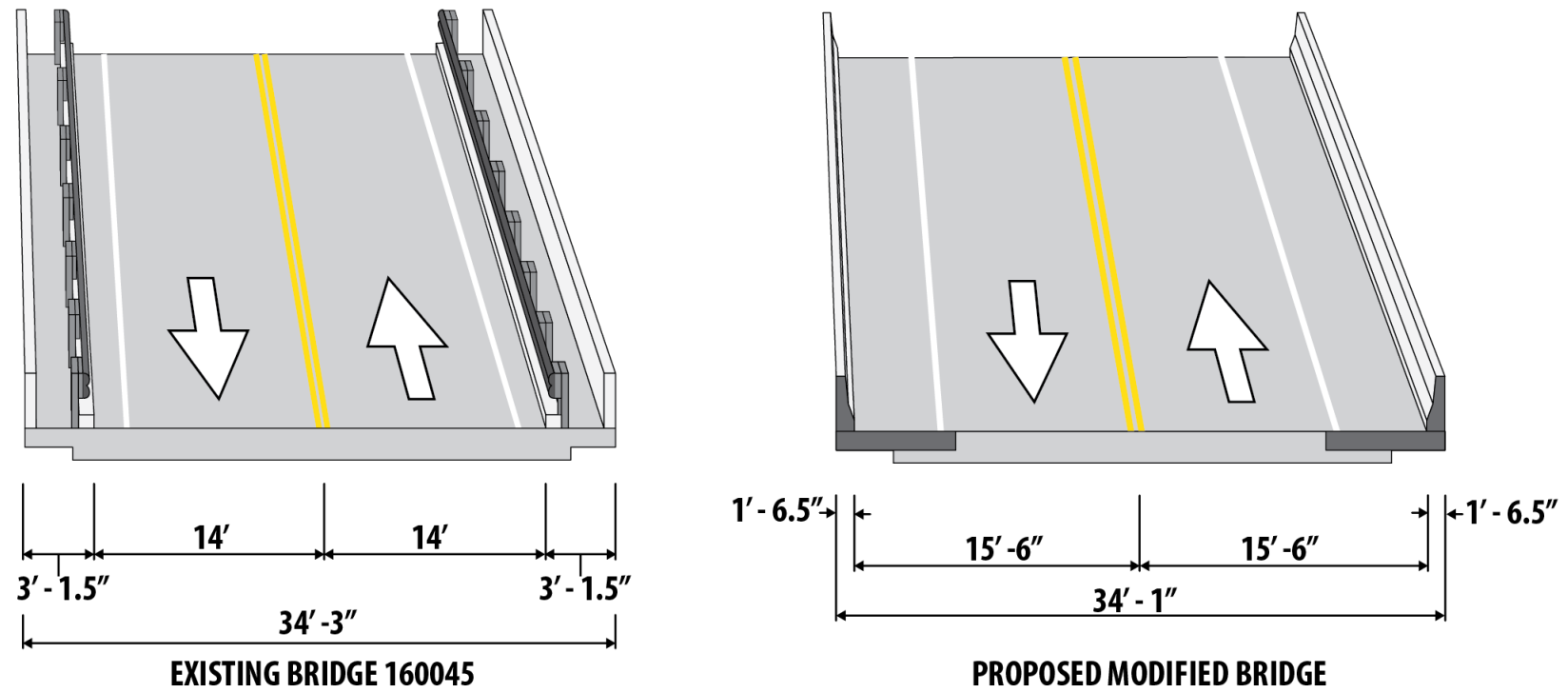
 <p>DISTRICT ONE</p>	<p>SR 60 Grade Separation over CSX Railroad Polk County, Florida</p> <p>Financial Project ID: 436559-1-22-01</p> <p>Proposed Bridge Typical Section</p>	
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Figure 2-4: Proposed Frontage Road Bridge Typical Section



	<p>SR 60 Grade Separation over CSX Railroad Polk County, Florida</p> <p>Financial Project ID: 436559-1-22-01</p> <p>Proposed Bridge Typical Section</p>	
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Section 3.0

EXISTING CONDITIONS

3.1. GEOTECHNICAL INFORMATION

The majority of soils within the project area fall within hydrologic soil group A/D, as seen in **Figure 3-1**. There are some areas that contain hydrologic soil group D. Soil types were obtained from the NRCS - Polk County Soil Survey, Version 10. This survey was released September 22nd, 2014. Most of the area is Pomona fine sand. There also is Estero Kaliga muck in the vicinity. Soil types can be seen in **Appendix C**.

3.2. FLOODPLAINS

The project impacts the Peace Creek Drainage Canal floodplain and falls within the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) community panel 120261 0545 G. This FIRM panel became effective November 19, 2003. No changes to the FIRM have been made since 2003 according to the local FEMA office. The FIRM panel can be seen in **Figure 3-2**. The roadway falls within Zone X, areas within the 500-year floodplain. The roadside ditches and the FDOT parcels for the proposed SMF fall in Zone AE, areas within the 100-year floodplain with a base flood elevation of 113 NGVD 29, or 112.081 NAVD 88.

The Southwest Florida Water Management District (SWFWMD) is also conducting a study of this watershed with an Interconnected Pond Routing (ICPR) model of the PCDC. The PCDC ICPR watershed model is currently being reviewed by FEMA and may be adopted into the updated Flood Insurance Study (FIS) and FIRM, but a schedule has not been set. The model is based off the 100-year 5 day event where the existing FIRM is based off the 100-year 24-hour event. This model will need to be modified during the design phase for the PCDC Bridge configuration to demonstrate a no change condition for the 100-year and lesser events for the SWFWMD.

The amount of floodplain within the project is minimal and will be compensated for in the reconstruction of the outfall ditches. The construction of this project will not affect the 100 year flood stage; therefore has no adverse effect on the floodplain. A complete update to the PCDC watershed model will be completed in the design phase to ensure that there is not a rise to the 100-year flood stage.

3.3. FLOODWAYS

PCDC is classified as a FEMA floodway in the Flood Insurance Study (FIS) for Polk County effective September 28, 2012 (FEMA FIS Polk County, Florida, Table 7, Page 62 and 63) shown in **Table 3-1**. The elevation at cross section U, just upstream of the PCDC Bridge, is 112.6. FEMA no-rise certification and a bridge hydraulics report (BHR) will be conducted in the design phase.

Figure 3-1: Project Soils Map

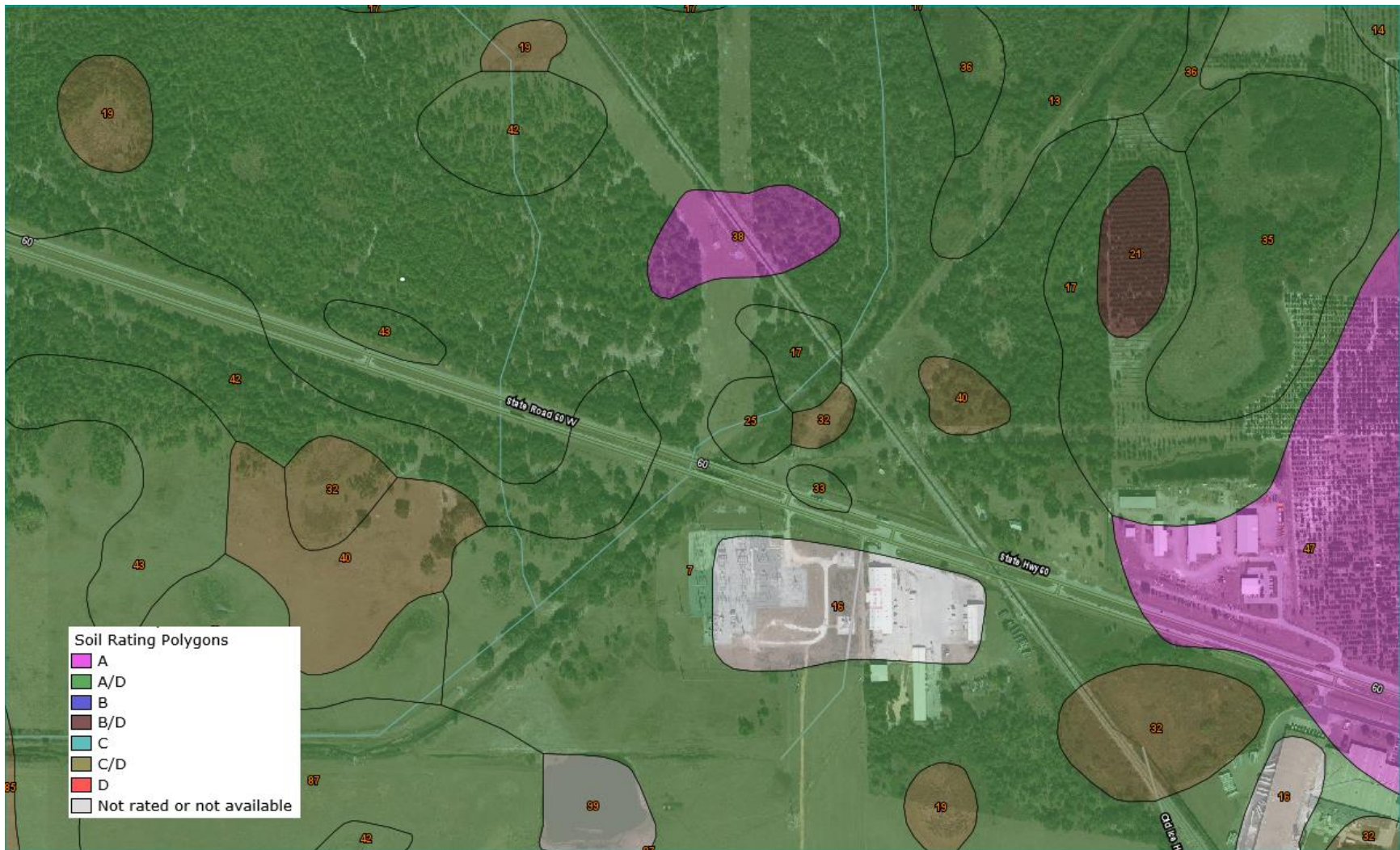


Figure 3-2: FEMA FIRM Panel

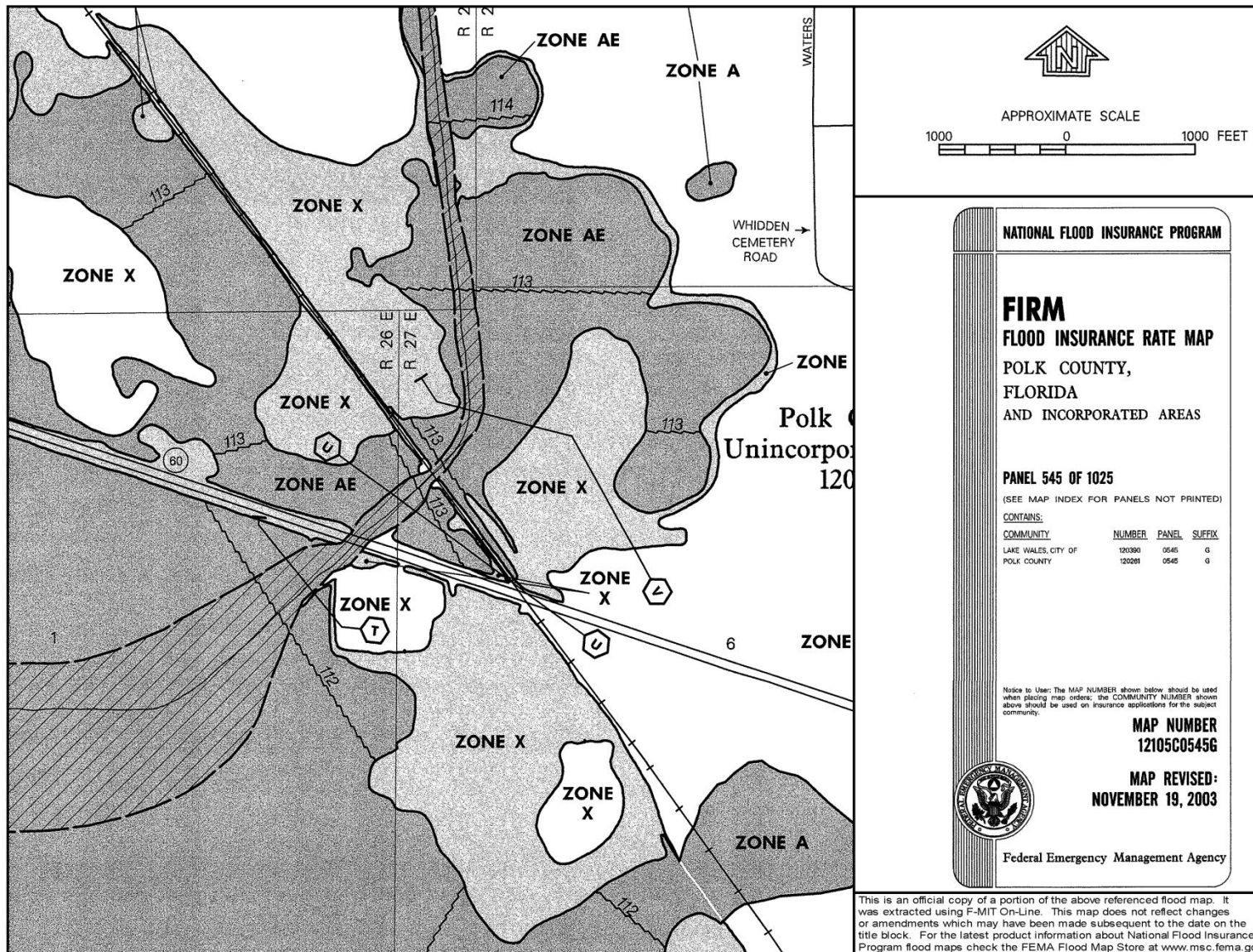


Table 3-1: PCDC Cross Sections

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NGVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Peace Creek Drainage Canal								
A	0	1,846	9,490	0.6	99.8	99.8	100.8	1.0
B	2,080	1,157	6,263	1.1	99.9	99.9	100.9	1.0
C	3,759	847	4,379	1.5	100.1	100.1	101.1	1.0
D	5,883	686	3,163	2.0	100.5	100.5	101.5	1.0
E	8,801	626	2,723	2.6	102.0	102.0	102.8	0.8
F	10,554	118	934	4.1	103.1	103.1	103.9	0.8
G	10,783	150	833	4.3	103.4	103.4	104.3	0.9
H	11,283	690	5,099	1.7	104.0	104.0	104.8	0.8
I	14,743	345	2,206	3.1	104.6	104.6	105.5	0.9
J	25,972	2,482	14,605	0.5	105.9	105.9	106.8	0.9
K	31,396	400	806	5.4	107.0	107.0	107.9	0.9
L	32,316	460	2,898	2.4	107.8	107.8	108.7	0.9
M	35,231	200	1,373	3.6	108.8	108.8	109.6	0.8
N	35,541	240	1,138	3.5	109.2	109.2	109.8	0.6
O	38,566	310	1,701	3.3	110.3	110.3	111.1	0.8
P	41,881	153	1,170	3.0	111.3	111.3	112.3	1.0
Q	42,150	200	1,581	3.3	111.6	111.6	112.5	0.9
R	49,569	1,700	10,670	0.4	112.2	112.2	113.2	1.0
S	52,639	1,211	9,864	0.4	112.2	112.2	113.2	1.0
T	60,229	350	1,565	1.4	112.3	112.3	113.3	1.0
U	61,247	245	1,129	1.7	112.6	112.6	113.5	0.9
V	62,020	155	506	3.1	113.1	113.1	113.8	0.7
W	67,243	61	438	3.2	115.2	115.2	115.8	0.6
X	73,844	65	492	2.6	116.9	116.9	117.4	0.5
Y	77,324	120	572	2.1	118.2	118.2	118.5	0.3
Z	83,724	615	1,101	1.8	119.5	119.5	120.1	0.6

3.4. CROSS DRAINS AND BRIDGES

There is a 30-inch existing cross drain east of the CSX railroad crossing. Today stormwater within the eastbound lanes east of the CSX railroad crossing flows to a roadside ditch with a profile that brings the stormwater west to this cross drain. In the proposed condition a portion of the basin that utilizes the cross drain will be removed and routed through the SMF. A full cross drain analysis will be conducted during the design phase.

There are two existing bridges within the project limits over the PCDC. The westbound bridge is considered functionally obsolete and will be removed during construction. The eastbound bridge is still within its design life and will be repurposed for the frontage road with the northern alignment shift.

A new bridge will be constructed to carry the mainline traffic over the PCDC. Requirements discussed within section 3.3 will apply. The CSX railroad Bridge is not a hydraulic structure and will not convey water from the PCDC up to the 500-year event.

3.5. SWFWMD BOR 5.8 REQUIREMENT

This proposed project falls under the SWFWMD BOR section 5.8 Alterations to Existing Public Roadway Projects. BOR 5.8.b states: “When alterations involve extreme hardship, in order to provide direct treatment of new project area, the District will consider proposals to satisfy the overall public interest that shall include equivalent treatment of alternate existing pavement areas to achieve the required pollution abatement. For example, existing untreated contributing areas not otherwise required to be included for treatment may be included for treatment by the system in lieu of direct treatment of new project area when the pollution abatement is equivalent and benefits the same receiving waters.” The analysis that was completed with this drainage concept report used this SWFWMD criterion. For this project, existing untreated contributing pavement area from SR 60 will be used for equivalent treatment of some areas that cannot be drained to the proposed pond because of low edge of pavement constraints.

3.6. IMPAIRED WATERBODY RULE

The Florida Department of Environmental Protection (FDEP) has classified the PCDC water body ID (WBID) 1539 as an impaired waterbody (IWB). The impairments in the PCDC are for Biochemical Oxygen Demand (BOD), Historic Chlorophyll-A, and Dissolved Oxygen. The SMFs within this project will have to demonstrate a net improvement to mitigate for the environmental impairments. Since both SMFs outfall to the PCDC a regional net improvement would also be valid. Nutrient pollutant loading calculations were not performed for this analysis but will be analyzed during the design phase.

3.7. PROJECT OUTFALL WBIDS

All stormwater runoff will outfall to PCDC, Water Body Identification (WBID) 1539. PCDC is not an Outstanding Florida Water (OFW).

3.8. WILDLIFE AND WETLAND ASSESSMENT

Environmental scientists have been able to provide preliminary information in relation to wildlife and wetlands within the project area and parcels for the proposed SMFs. The Florida Natural Areas Index (FNAI), United States Fish and Wildlife Service (USFWS) databases along with field reconnaissance were utilized in the preliminary findings. Based on the preliminary results, it is not likely that any state or federally protected species will be affected by the proposed project. Further species-specific surveys and formal wetland delineation will be conducted during the design phase.

3.8.1. Wildlife Assessment

Data sources contain documented occurrence of the bald eagle within or immediately adjacent to the project limits. The wood stork and sandhill crane are likely to be found within the same area. There are several other species that have a potential to occur that are state and/or federally protected.

The wood stork, Florida sandhill crane, and the bald eagle were all physically observed onsite. No protected plant species were observed during the field visits.

Further information on the species and their protected status are included within the General Wildlife and Wetland Assessment Memo (**Appendix D**).

3.8.2. Wetland Assessment

About 16 acres of the project area is classified as wetlands and surface waters. 23 individual wetlands and surface waters were identified, all falling within three habitat types.

More information regarding the wetlands and mitigation are included in the General Wildlife and Wetland Assessment Memo.

3.9. EXISTING STORMWATER MANAGEMENT

Currently stormwater on SR 60 within the project limits either sheet flows or is ditched to the PCDC without receiving any formal treatment.

Section 4.0

BASIN 1

4.1. OVERVIEW

Basin 1 extends from the beginning of the project to the high point over the CSX railroad and drains to the PCDC. The proposed profile grade of the bridge in conjunction with a 10-ft shoulder will allow for water to be contained within the shoulder. The first inlet will be placed west of the PCDC Bridge.

4.2. TREATMENT METHOD

Due to the high SHGWT and the wetlands that are adjacent to the proposed pond site, the preferred treatment for Basin 1 is wet detention.

4.3. WATER QUALITY

Basin 1 will treat one inch of the project's directly connected impervious area (DCIA). Portions of the frontage roads that are not hydraulically feasible to collect will discharge directly to the PCDC. An existing pavement area of SR 60 west of the project limits equal to the new impervious being let go from the frontage road will be collected with shoulder gutter and shoulder gutter inlets and drained to SMF 1.

4.4. WATER QUANTITY

Basin 1 will attenuate stormwater in the post condition for match the pre condition for the 25-yr 24-hr event to meet SWFWMD requirements. .

4.5. POND SITING

SMF 1 shall fall within FDOT parcel 263001000000011080 which was purchased as a borrow pit for the original SR 60 construction.

A 50-foot perpetual easement within parcel 263001000000011010 will be acquired to route stormwater into the facility along with providing maintenance access.

4.6. OUTFALL

There is an existing ditch that runs down the south side of the parcel to the PCDC. Survey data will be taken to determine if any modifications to the ditch will be needed in the design phase.

4.7. ALTERNATIVES

Due to the nature of the PD&E process there are many assumptions and factors that will change in the design phase. For this drainage design concept report the most easterly inlet in Basin 1 is west of the PCDC, which allows most of the new roadway pavement to be drained directly to SMF 1.

There are several roadway factors such as super elevation transition and profile changes that could require an inlet be placed east of the PCDC in order to collect all of the new impervious pavement area for treatment and attenuation. Placing an inlet east of the PCDC Bridge would require stormwater to be piped across the PCDC and treated within SMF 1, or to treat additional alternate existing SR 60 pavement that would not otherwise receive treatment. However, due to the relatively high pond control elevation compared to the existing low edge of pavement (LEOP) this may require raising the existing roadway profile grade of SR 60.

The SHGWT and pond control elevation (CE) were determined using the best available LiDAR survey data, field reviews, and engineering judgment. The CE for SMF 1 was primarily set close to the adjacent and conjoined wetlands estimated SHGWT. The field reviews showed that the high water marks on pine trees near the wetlands were approximately 6-inches above the water level. During the Design Phase, the wetland water marks will be surveyed to determine a more accurate wetland SHGWT. Due to the lack of wetland survey and the location of several wetlands near and encompassing part of the SMF 1 site, the CE was not dropped 6-inches below the estimated wetland SHGWT. If the required treatment and attenuation volumes cannot be met at SMF 1 there are at least two possible alternatives.

Alternative 1 would include the use of a pond liner to lower the pond control elevation and increase the available depth for treatment and attenuation. The control elevation can be dropped by draining the treatment volume by pipe to the PCDC. Due to the associated cost of a pond liner, alternative pond sizes would be evaluated to balance the cost of the pond liner construction with the cost of excavation and embankment above the liner. The tail water from the PCDC and the hydraulic losses in the pipe would determine the control elevation, and the ditch would still carry high flows from the pond.

Alternative 2 would be to raise the existing LEOP that drains to the SMF to increase the available treatment and attenuation depth in the pond. This reconstruction of more of the existing roadway greatly increases the amount of earthwork, base, and asphalt for the project.

4.8. FLOODPLAIN COMPENSATION

Basin 1 includes just over 0.1 acres of floodplain that will be affected with the proposed improvements. This volume (cup for cup) will be able to be made up with the regrading of the outfall ditch. The SWFWMD PCDC ICPR model will be updated in the design phase to verify that the 100-year floodplain elevation remains unchanged.

Section 5.0

BASIN 3

5.1. OVERVIEW

Basin 3 extends eastward from the high point over the CSX railroad. The proposed grade of the bridge in conjunction with a 10-ft shoulder will allow for water to be contained within the shoulder. Water will be collected at the touchdown of the grade separation.

5.2. TREATMENT METHOD

Due to the high SHGWT and adjacent wetland the preferred treatment for Basin 3 is wet detention.

5.3. WATER QUALITY

Basin 3 will treat one inch of the project's new DCIA to meet SWFWMD presumptive criteria, and pollutant loading will be evaluated during the design phase to ensure that there is net improvement to the PCDC, which is an IWB.

5.4. WATER QUANTITY

Basin 3 will attenuate stormwater in the post condition to match the pre condition for the 25-yr 24-hr event to meet SWFWMD requirements.

5.5. POND SITING

SMF 3 falls within FDOT parcel 273006000000032010, which was purchased as a barrow pit for the original SR 60 construction.

A 40-foot perpetual easement within parcel 273006000000012080 will be acquired to route stormwater into the facility along with providing access for maintenance equipment.

5.6. OUTFALL

There is an existing ditch that runs from the SR 60 cross drain (east of the CSX railroad) north towards PCDC. Historic 1952 aerials show the ditch discharging to the PCDC, however recent aerials, LiDAR, and field reconnaissance shows that the ditch has been partial filled north of a power easement. This ditch would be redesigned and regraded within a 40-foot drainage easement.

5.7. ALTERNATIVES

Due to the nature of the of the PD&E process there are many assumptions and factors that will

change during the design phase.

SHGWT and pond control elevation were both determined using the best available data and engineering judgment. If the required treatment and attenuation volumes cannot be met at SMF 3 there are at least two possible alternatives.

Alternative 1 would include the use of a pond liner.

Alternative 2 would be to raise the LEOP outside of the existing project limits to allow greater treatment and attenuation depth and accommodate the hydraulic losses from the roadway to the pond. This alternative could greatly increase the amount of additional earthwork and reconstruction.

5.8. FLOODPLAIN COMPENSATION

Basin 3 includes just less 0.1 acres of floodplain that will be affected with the proposed improvements. This volume (cup for cup) will be able to be made up with the regrading of the outfall ditch. The SWFWMD PCDC ICPR model may be updated during the design phase to verify that the 100-year floodplain elevation remains unchanged.

APPENDIX A

VERTICAL DATUM CONVERSION

Questions concerning the VERTCON process may be mailed to [NGS](#)

Latitude: 27.904

Longitude: 081.661

NGVD 29 height: 113.00 FT

Datum shift (NAVD 88 minus NGVD 29): -0.919 feet

Converted to NAVD 88 height: 112.081 feet

APPENDIX B

RAINFALL INTENSITY



NOAA Atlas 14, Volume 9, Version 2
Location name: Lake Wales, Florida, US*
Latitude: 27.9047°, Longitude: -81.6612°
Elevation: 113 ft*
 * source: Google Maps



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffrey Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

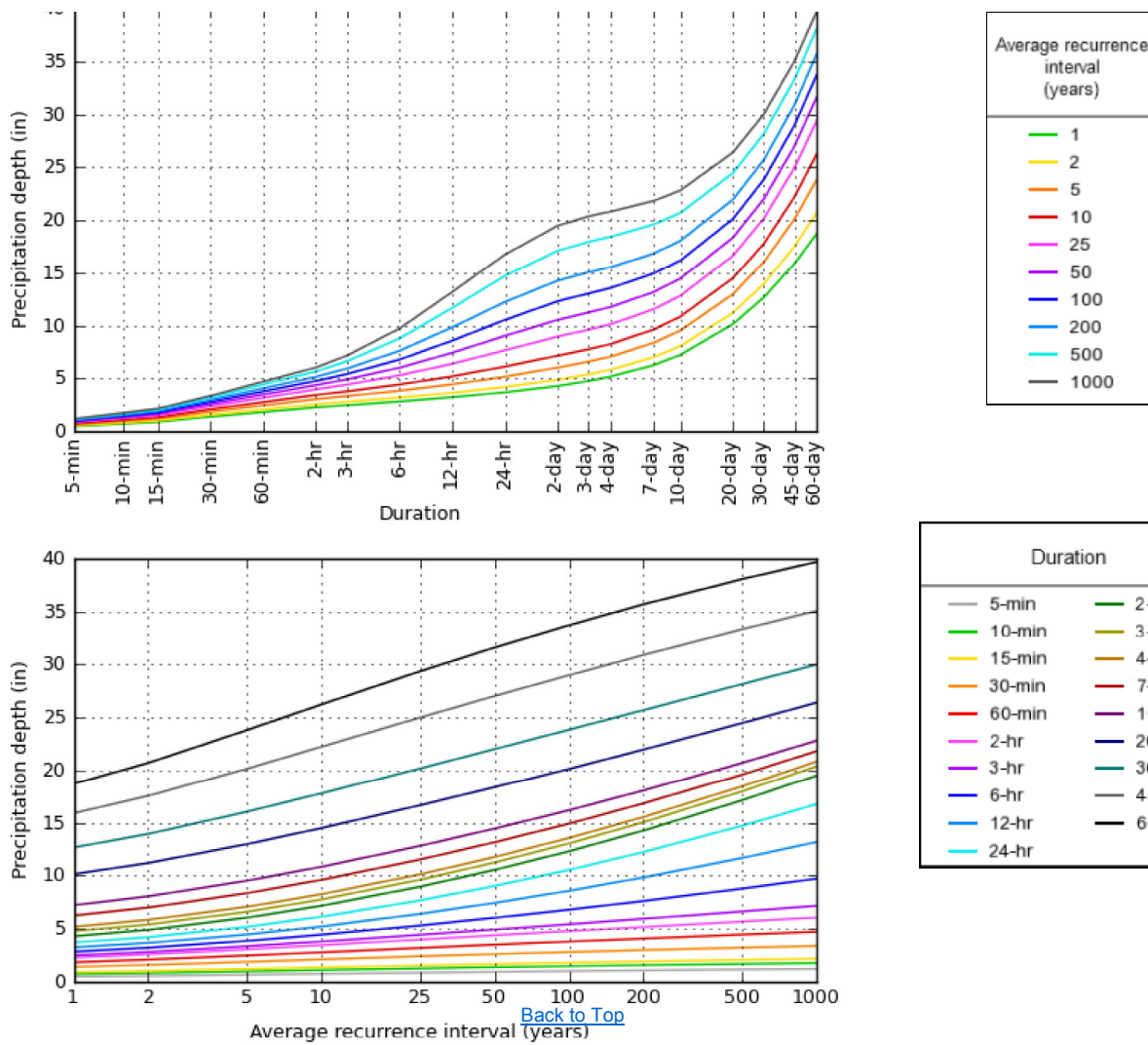
PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.511 (0.414–0.621)	0.577 (0.467–0.702)	0.680 (0.549–0.830)	0.760 (0.611–0.934)	0.865 (0.668–1.09)	0.941 (0.712–1.21)	1.01 (0.740–1.35)	1.08 (0.757–1.49)	1.16 (0.784–1.66)	1.22 (0.804–1.79)
10-min	0.748 (0.607–0.909)	0.844 (0.684–1.03)	0.995 (0.804–1.22)	1.11 (0.894–1.37)	1.27 (0.978–1.60)	1.38 (1.04–1.78)	1.48 (1.08–1.97)	1.58 (1.11–2.18)	1.70 (1.15–2.43)	1.78 (1.18–2.62)
15-min	0.912 (0.740–1.11)	1.03 (0.834–1.25)	1.21 (0.980–1.48)	1.36 (1.09–1.67)	1.55 (1.19–1.95)	1.68 (1.27–2.17)	1.81 (1.32–2.41)	1.93 (1.35–2.66)	2.07 (1.40–2.97)	2.17 (1.44–3.20)
30-min	1.41 (1.15–1.72)	1.60 (1.30–1.95)	1.89 (1.52–2.31)	2.11 (1.70–2.60)	2.41 (1.86–3.04)	2.62 (1.98–3.38)	2.81 (2.06–3.75)	3.00 (2.11–4.14)	3.23 (2.18–4.61)	3.38 (2.23–4.97)
60-min	1.85 (1.50–2.25)	2.09 (1.70–2.55)	2.48 (2.00–3.03)	2.79 (2.24–3.42)	3.20 (2.47–4.05)	3.50 (2.65–4.53)	3.80 (2.78–5.07)	4.08 (2.87–5.65)	4.45 (3.01–6.38)	4.71 (3.12–6.94)
2-hr	2.29 (1.87–2.76)	2.59 (2.12–3.12)	3.07 (2.50–3.72)	3.46 (2.80–4.21)	3.99 (3.12–5.03)	4.39 (3.35–5.64)	4.78 (3.53–6.35)	5.17 (3.66–7.12)	5.67 (3.87–8.10)	6.05 (4.02–8.84)
3-hr	2.49 (2.05–2.99)	2.82 (2.32–3.39)	3.35 (2.75–4.04)	3.80 (3.10–4.61)	4.43 (3.49–5.59)	4.92 (3.79–6.33)	5.42 (4.03–7.20)	5.94 (4.23–8.17)	6.63 (4.54–9.46)	7.16 (4.78–10.4)
6-hr	2.85 (2.37–3.39)	3.22 (2.67–3.83)	3.86 (3.19–4.62)	4.44 (3.65–5.34)	5.31 (4.25–6.72)	6.03 (4.70–7.77)	6.79 (5.11–9.04)	7.62 (5.50–10.5)	8.78 (6.09–12.5)	9.72 (6.53–14.1)
12-hr	3.25 (2.73–3.84)	3.67 (3.07–4.34)	4.46 (3.72–5.29)	5.21 (4.33–6.22)	6.40 (5.21–8.14)	7.44 (5.88–9.59)	8.58 (6.53–11.4)	9.84 (7.17–13.5)	11.7 (8.16–16.6)	13.2 (8.91–18.9)
24-hr	3.71 (3.14–4.35)	4.21 (3.56–4.94)	5.18 (4.36–6.09)	6.13 (5.14–7.26)	7.67 (6.32–9.73)	9.03 (7.21–11.6)	10.5 (8.10–14.0)	12.2 (9.00–16.8)	14.7 (10.4–20.8)	16.8 (11.4–23.9)
2-day	4.30 (3.67–4.99)	4.89 (4.18–5.69)	6.04 (5.14–7.05)	7.16 (6.06–8.41)	8.96 (7.44–11.3)	10.5 (8.48–13.4)	12.3 (9.53–16.2)	14.3 (10.6–19.4)	17.1 (12.2–24.1)	19.5 (13.4–27.6)
3-day	4.77 (4.10–5.52)	5.40 (4.63–6.25)	6.60 (5.64–7.66)	7.76 (6.60–9.07)	9.61 (8.02–12.0)	11.2 (9.09–14.2)	13.0 (10.1–17.1)	15.0 (11.2–20.4)	18.0 (12.8–25.2)	20.4 (14.0–28.8)
4-day	5.19 (4.48–5.98)	5.84 (5.03–6.73)	7.07 (6.07–8.18)	8.25 (7.05–9.61)	10.1 (8.46–12.6)	11.8 (9.53–14.8)	13.6 (10.6–17.6)	15.5 (11.6–21.0)	18.4 (13.2–25.7)	20.8 (14.4–29.3)
7-day	6.25 (5.44–7.15)	7.00 (6.08–8.01)	8.35 (7.23–9.60)	9.60 (8.26–11.1)	11.5 (9.65–14.1)	13.1 (10.7–16.4)	14.9 (11.7–19.2)	16.8 (12.6–22.5)	19.6 (14.0–27.1)	21.8 (15.1–30.6)
10-day	7.23 (6.32–8.23)	8.06 (7.03–9.18)	9.52 (8.28–10.9)	10.8 (9.37–12.5)	12.8 (10.7–15.5)	14.4 (11.8–17.8)	16.2 (12.7–20.7)	18.0 (13.5–23.9)	20.7 (14.9–28.4)	22.8 (15.9–31.9)
20-day	10.1 (8.95–11.4)	11.2 (9.87–12.7)	13.0 (11.4–14.7)	14.5 (12.6–16.5)	16.6 (14.0–19.8)	18.4 (15.1–22.3)	20.1 (15.9–25.3)	22.0 (16.6–28.7)	24.5 (17.7–33.2)	26.4 (18.5–36.6)
30-day	12.7 (11.2–14.2)	13.9 (12.4–15.7)	16.0 (14.2–18.1)	17.8 (15.6–20.2)	20.2 (17.0–23.8)	22.0 (18.1–26.5)	23.8 (18.9–29.7)	25.7 (19.4–33.3)	28.1 (20.4–37.9)	30.0 (21.1–41.4)
45-day	15.9 (14.2–17.8)	17.5 (15.6–19.6)	20.1 (17.9–22.6)	22.2 (19.6–25.1)	25.0 (21.2–29.2)	27.0 (22.3–32.3)	29.0 (23.1–35.9)	30.9 (23.4–39.7)	33.3 (24.2–44.6)	35.0 (24.7–48.2)
60-day	18.7 (16.8–20.8)	20.7 (18.5–23.1)	23.8 (21.2–26.6)	26.2 (23.3–29.5)	29.3 (24.9–34.1)	31.6 (26.2–37.5)	33.7 (26.9–41.4)	35.6 (27.1–45.6)	38.0 (27.7–50.6)	39.6 (28.1–54.4)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

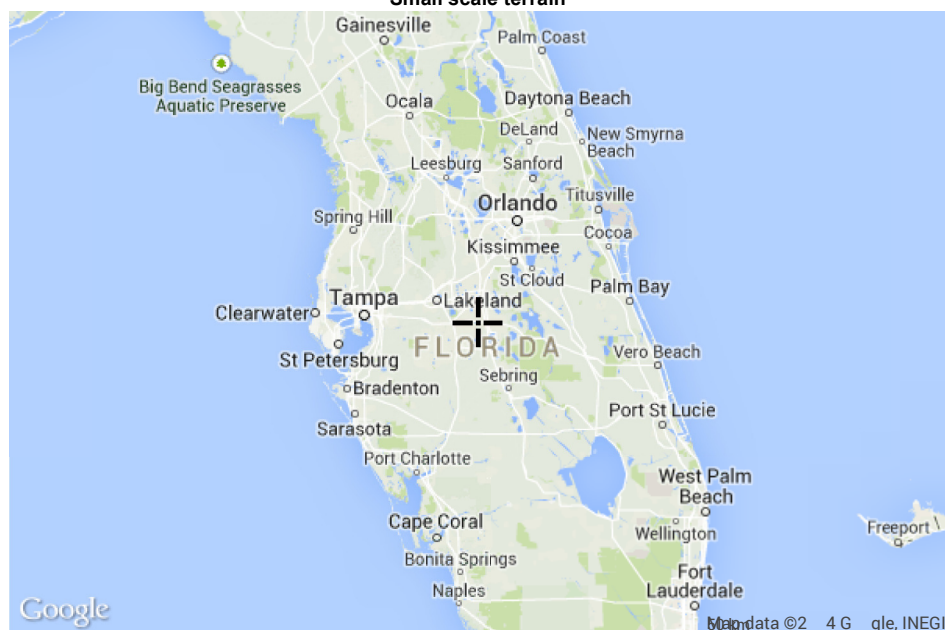
PF graphical

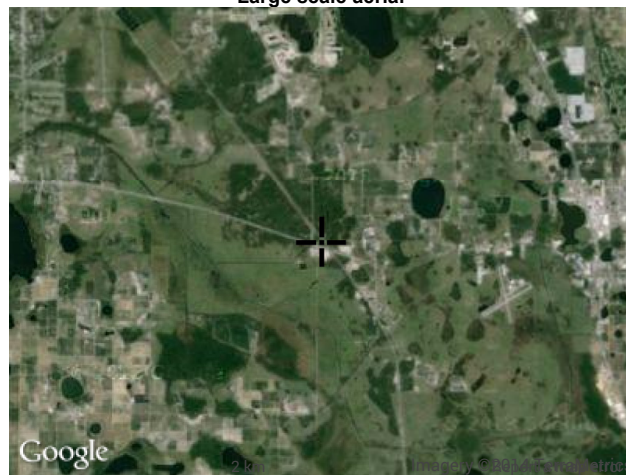


NOAA Atlas 14, Volume 9, Version 2

Maps & aerials

Created (GMT): Thu Dec 11 20:17:38 2014

Small scale terrain

Large scale terrain**Large scale map****Large scale aerial**[Back to Top](#)

[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[Office of Hydrologic Development](#)
1325 East West Highway
Silver Spring, MD 20910

SR 60 Grade Separation at CSX Railroad PD&E Study
B-4 Drainage Design Concept Report

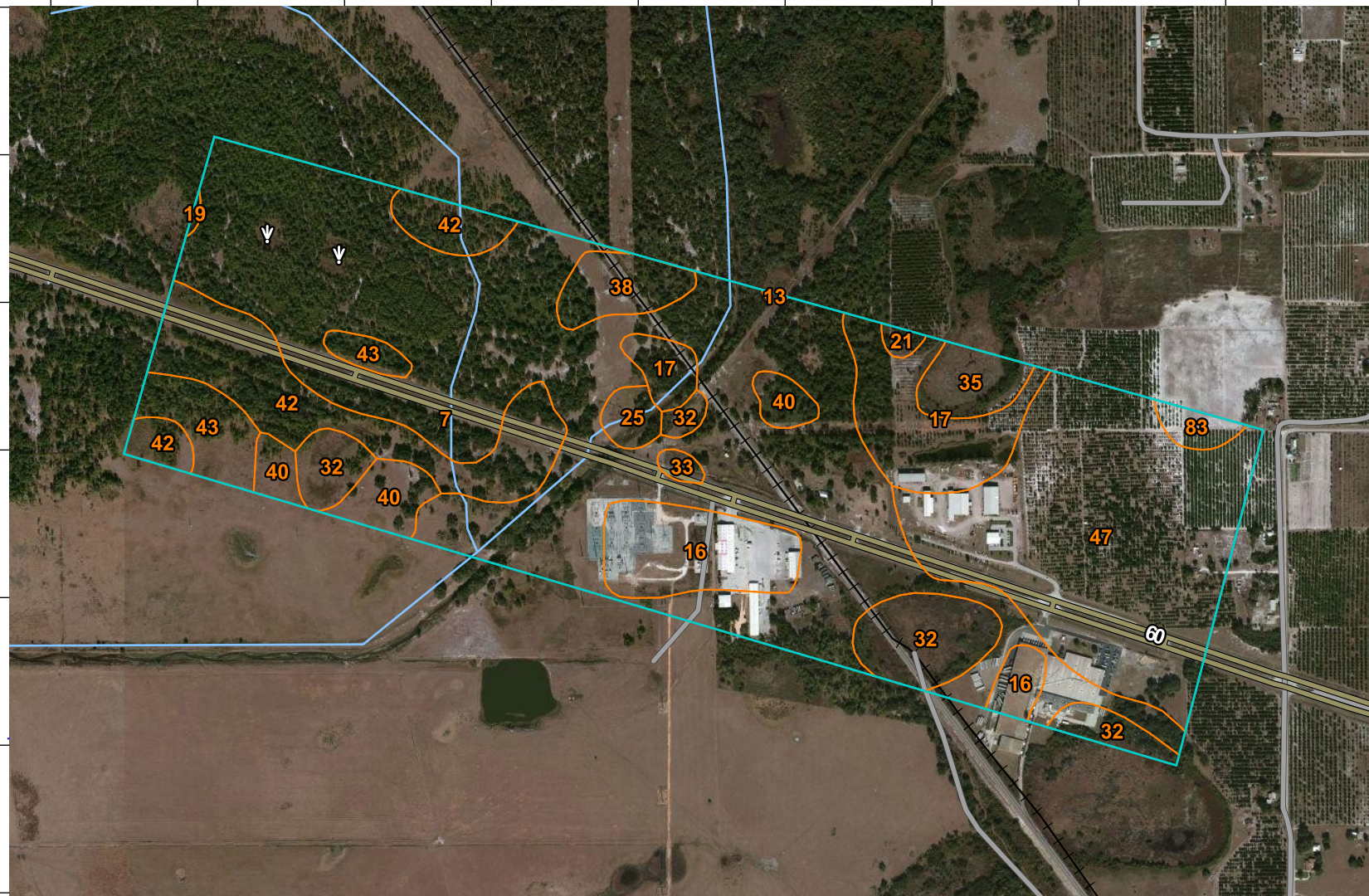
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)

APPENDIX C

GEOTECHNICAL DATA

Soil Map—Polk County, Florida



Map Scale: 1:12,800 if printed on A landscape (11" x 8.5") sheet.



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



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

12/23/2014
Page 1 of 3

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Polk County, Florida
Survey Area Data: Version 10, Sep 22, 2014

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

Date(s) aerial images were photographed: Dec 8, 2010—Mar 8, 2011

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

Map Unit Legend

Polk County, Florida (FL105)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
7	Pomona fine sand	169.6	44.5%
13	Samsula muck	0.2	0.0%
16	Urban land	19.3	5.1%
17	Smyrna and Myakka fine sands	21.4	5.6%
19	Floridana mucky fine sand, depressional	0.3	0.1%
21	Immokalee sand	1.0	0.3%
25	Placid and Myakka fine sands, depressional	3.0	0.8%
32	Kaliga muck	20.8	5.5%
33	Holopaw fine sand, depressional	1.2	0.3%
35	Hontoon muck	6.4	1.7%
38	Electra fine sand	7.4	1.9%
40	Wauchula fine sand	10.7	2.8%
42	Felda fine sand	34.7	9.1%
43	Oldsmar fine sand	10.7	2.8%
47	Zolfo fine sand	71.8	18.8%
83	Archbold sand, 0 to 5 percent slopes	2.7	0.7%
Totals for Area of Interest		381.1	100.0%

APPENDIX D
WILDLIFE AND WETLAND REPORT

Technical Memorandum

Date: December 12, 2014

From: David Loy, Sr. Environmental Scientist

To: Doug Zang, Environmental Project Manager - FDOT District One

RE: **General Wildlife and Wetland Assessment Memo**
SR 60 Grade Separation over CSX Railroad PD&E
FPID: 436559-1-22-01
Polk County, Florida

Introduction and Purpose

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study to evaluate costs and impacts of constructing a new overpass to carry State Road (SR) 60 over the CSX Railroad (milepost 25.544, crossing #625419N) approximately 11 miles east of Bartow and 4 miles west of Lake Wales in Polk County, Florida.

The PD&E Study limits are SR 60 from 3200 feet west of CSX Railroad crossing #625419N to 2500 feet east of CSX Railroad crossing #625419N, a distance of 5700 feet (1.08 mile). The project is located within Section 01, Township 30 South, Range 26 East, and Section 6, Township 30 South, Range 27 East, within the Eloise United States Geological Survey (USGS) 7.5-minute (1:24,000) quad map and the USGS "Fort Pierce" 1 x 2 degree (1:250,000) topographic map. Please refer to **Attachment A** for the project location map, which illustrates the location and limits of the Study.

The purpose of the project is to replace the SR 60 at-grade railroad crossing with a grade separation. The need for the project is not based on the need for additional capacity. It is based on improving safety; to provide a grade separation of the railroad crossing to separate vehicle traffic from the train traffic. The project will also reduce travel delays by removing the need to stop traffic for trains. The purpose of the PD&E Study is to provide documented environmental and engineering analyses to assist the FDOT in reaching a decision on the location and conceptual design of the new railroad overpass and associated improvements in order to accommodate future traffic demand in a safe and efficient manner. This PD&E study satisfies the FDOT requirements and follows the process outlined in the FDOT *Project Development and Environment Manual, Part 1 Chapter 10: Non-Federal Projects*.

This PD&E study documents the need for the improvements and presents the procedures utilized to develop and evaluate the overpass concept. Information relating to the engineering, environmental, and social characteristics essential for development of the railroad overpass concept was collected. Design criteria were established and a preliminary alternative was developed. The evaluation of the overpass concept was based on a variety of parameters utilizing a matrix format. This process identifies the Recommended Alternative that minimizes the socio-cultural, economic, natural, and physical impacts while providing the necessary future transportation improvements. The study also solicits input from the community and users of the facility. The design year for the analysis is 2035.

The purpose of the review was to perform a general wildlife assessment to determine the potential for state and federally protected species within and immediately adjacent to the proposed project corridor and to document potential impacts to jurisdictional wetlands and other surface waters (OSWs). A survey corridor extending 500 feet from the existing edge of pavement was utilized in order to include all right-of-way (ROW) needed for the project. Portions of two parcels that may potentially be used for stormwater pond sites exceeded the 500 foot survey corridor; however, field surveys were extended to cover these areas.

Desktop Review

A combination of desktop analysis using available online GIS data and field reconnaissance were utilized in the assessment of the referenced project corridor. Both the Florida Natural Areas Index (FNAI) and United States Fish and Wildlife Service (USFWS) online databases maintain occurrence lists for listed species that have been documented, or are expected to occur, within the project limits and areas immediately adjacent to the project. Both these lists were reviewed to determine which protected species may have potential involvement with the proposed project. A list of protected species that have been historically documented and/or have the potential to occur within the matrix units are included in **Attachment B** FNAI Report.

According to desktop review of the available online FNAI biodiversity matrix database and the full FNAI report, the bald eagle (*Haliaeetus leucocephalus*) has documented occurrence within or immediately adjacent to the study area and the wood stork (*Mycteria americana*) and sandhill crane (*Grus canadensis pratensis*), are “likely” to occur within or adjacent to the study area.

In addition to the above referenced species, the following state and/or federally protected species are listed by FNAI as having the “potential” to occur within or near the study corridor based on predicted ranges and the presence of potential suitable habitat:

gopher tortoise (*Gopherus polyphemus*) – ST (candidate for federal listing)
eastern indigo snake (*Drymarchon corais couperi*) – ST, FT
red-cockaded woodpecker (*Picoides borealis*) – SE, FE
blue-tailed mole skink (*Eumeces egregius lividus*) – ST, FT
Florida black bear (*Ursus americanus floridana*) – ST
bald eagle (*Haliaeetus leucocephalus*)

Additionally, an estimate of jurisdictional wetlands occurring within and immediately adjacent to the project corridor were initially provided through the use of SWFWMD Florida Land Use Cover and Forms Classification System (FLUCFCS) data. A field verification of existing habitats was also utilized in the verification of SWFWMD data and the classification of jurisdictional wetland types on site. According to the SWFWMD FLUCFCS data, the assessment area contains nine (9) land use types: FLUCFCS 434 – hardwood conifer mixed, FLUCFCS 510 – streams and waterways, FLUCFCS 641 – freshwater marsh, FLUCFCS 643 – wet prairies, FLUCFCS 810 – transportation, FLUCFCS 830 – utilities, FLUCFCS 110 – low density residential, FLUCFCS 150 – industrial, FLUCFCS 220 – tree crops. Please refer to **Attachment C** for FLUCFCS map.

GIS layers were also utilized as a resource in the preparation of field maps for this report and were acquired from various data sources. The most recent data was utilized from each source, which ranged from 2009 to 2013. These sources included:

Southwest Florida Water Management District (SWFWMD)

Florida Department of Environmental Protection (FDEP)
Florida Fish and Wildlife Conservation Commission (FWC)
United States Fish and Wildlife Service (USFWS)

Survey Methodology and Results

Protected Species

General field assessments were conducted throughout the project corridor on 11/5/14 and 12/15/14 to determine the suitability for listed species occurrence within and immediately adjacent to the project corridor. The field assessment was conducted in accordance with Part 2 Chapter 27 of the PD&E manual and was performed via the use of pedestrian surveys in areas identified as potentially containing suitable habitat for protected species, as well as through vehicular based transects that provided coverage over the entire corridor. Species-specific surveys based on agency-specific methodology were not conducted. Please refer to **Attachment D** for field map markup.

The PD&E evaluation corridor occurs within the USFWS consultation areas for several federally protected wildlife species including: crested caracara (*Caracara cheriway*), sand skink (*Neoseps reynoldsi*), blue-tailed mole skink (*Eumeces egregius lividus*) Florida scrub jay (*Aphelocoma coerulescens*), grasshopper sparrow (*Ammodramus savannarum*) and the everglade snail kite (*Rostrhamus sociabilis plumbeus*). The study area also occurs within the core foraging area (CFA) of several documented wood stork nesting colonies, which consist of: 612316 (Lake John), 616037 (Lake Rosalie), 616114, 616117, 616321, and NE Mulberry.

Several state and federally protected species were physically observed onsite during the field reviews. These species consisted of: the wood stork (*Mycteria americana*), Florida sandhill crane (*Grus canadensis pratensis*), and bald eagle (*Haliaeetus leucocephalus*).

Federally Protected Species

The following nine federally protected species were considered as having potential involvement with the project based on existing data:

Eastern Indigo Snake

The Eastern indigo snake is listed as threatened by both the USFWS and FWC. The Eastern indigo snake utilizes a wide range of habitats including upland sandhill to swamp edges. Eastern indigo snakes are known for utilizing gopher tortoise burrows and are a known commensal (cohabitant) to this species. No critical habitat for the eastern indigo snake has been designated by the USFWS. No Eastern indigo snakes were observed during field investigations; however, suitable habitat for the eastern indigo snake is present throughout the project corridor. Typically adverse effects to this species are avoided through FDOT's commitments to utilize USFWS' *Standard Protection Measures for the Eastern Indigo Snake* during construction (see **Attachment E: Standard Protection Measures for the Eastern Indigo Snake**).

Bald Eagle

The bald eagle is no longer protected under the federal ESA nor the Florida Endangered and Threatened Species Act (ETSA). However, the USFWS still exerts jurisdiction over the eagle through the Bald and Golden Eagle Protection Act (BGEPA; 16, U.S.C. 668-668-d, as amended) and the Migratory Bird Treaty Act (MBTA; 16 U.S.C. 703-712). The USFWS has generally delegated all responsibilities regarding the

bald eagle to the FWC in Florida. The FWC has incorporated the provisions of the MBTA under 68A-13.002 (Florida Administrative Code (F.A.C.)) The FWC implemented a state-wide eagle management plan that defines protection requirements for active nest sites. Generally, activities up to 660 feet from an active eagle nest require following FWC guidelines in order to avoid disturbing the eagles. Any activity outside of this distance is not regulated and requires no coordination with the FWC. If an active nest occurs within 660 feet of the proposed project, development of project-specific guidelines may be necessary to avoid disturbing nesting bald eagles. If eagle nests are documented within 660 feet of the project during construction, further coordination will occur with the FWC and/or USFWS as appropriate.

No active nests were observed during the field survey; however, an eagle was observed during the field review. The closest documented nest (PO 238) occurs approximately 1,600 feet south of the proposed study area and the proposed project occurs outside the protection zone for all known nests; therefore, no coordination with FWC is anticipated at this time. Please see **Attachment F: Wildlife Resource Maps** for documented bald eagle nests.

Wood Stork

The wood stork is protected as endangered by USFWS and FWC. This species is typically found in freshwater marshes, swamps, lagoons, ponds, flooded fields, depressions in marshes and brackish wetlands. The critical foraging areas for this species include areas of very shallow water, generally six to ten inches in depth, where there is an abundance of small fishes and other aquatic life. Wood storks were observed adjacent to the proposed project site and due to the presence of suitable foraging habitat, wood storks are anticipated within the project footprint. The proposed project is located within the Core Foraging Area (CFA) of six wood stork colonies located in Polk County, Florida. Please see **Attachment F: Wildlife Resource Maps for Wood Stork Colonies and Core Foraging Area (CFA) Map**. Mitigation sufficient to offset wetland/wood stork foraging habitat impacts will be provided through the purchase of wetland mitigation bank credits, the FDOT Mitigation Program as per Ch. 373.4137, F.S. or as otherwise agreed to with the applicable agencies. Therefore, no impacts to this species are anticipated as part of the proposed project.

Audubon's Crested Caracara

The crested caracara is listed as threatened by both the USFWS and FWC. This particular species can occur in dry or wet prairies with scattered cabbage palms; however, the crested caracara primarily uses improved or semi-improved pastures. The caracara also commonly nests in cabbage palms surrounded by habitats with low ground cover and low density of tall or shrubby vegetation. No critical habitat for the crested caracara has been designated by the USFWS. Suitable habitat does not exist within the project corridor and no individuals were observed during field investigations. According to the most updated online data, the closest documented occurrence was approximately 16 miles from the proposed project limits. Therefore, it is anticipated that the proposed project will have no effect on this species.

Everglade Snail Kite

Although not observed on the site, the proposed project does occur within the USFWS consultation area for this species and was therefore included in this evaluation. The snail kite is protected as endangered by USFWS and FWC. This species is typically found around large, open freshwater marshes and lakes with shallow open waters. Snail kites often roost and nest colonially within Carolina willows, pond apples or other small trees. The snail kite's principal prey is apple snails that inhabit areas vegetated by spikerush, maidencane and sawgrass. No designated critical habitat for the Everglade snail kite is located within the proposed project corridor (USFWS 1999a).

The proposed project corridor consists primarily of smaller freshwater marshes and scrub shrub wetlands with dense vegetation with minimal open water components. Additionally, no suitable prey (apple snail) were observed during the field review. The proposed project site occurs within the USFWS consultation area for this species; however, due to the presence of only marginal suitable habitat and the lack of suitable prey, impacts to this species are not anticipated.

Blue-Tailed Mole Skink and Sand Skink

The sand skink and the blue-tailed mole skink are listed as threatened by both the USFWS and the Florida Fish and Wildlife Conservation Commission (FWC). These two species occur in xeric uplands with loose, sandy soils and are known to occur on the sandy ridges of Florida, ranging from Putnam County to Highlands County. The blue-tailed mole skink appear to be restricted to the Lake Wales Ridge in Highlands, Polk, and Osceola Counties, whereas sand skink populations occur on the Lake Wales, Winter Haven, and Mt. Dora Ridges in Highlands, Lake, Marion, Orange, Osceola, Polk, and Putnam Counties. Both species are typically found in areas free of abundant plant roots, with open canopies, scattered shrubby vegetation and patches of bare sand. No critical habitat for the blue-tailed mole skink or sand skink has been designated by the USFWS.

As stated in the February 2012 Conservation Consultation Guide (CCG) published by the USFWS, surveys may be required based on three basic criteria: the project occurs within the USFWS consultation area located along the Central Florida Ridge, is at an elevation of 82 feet or higher, and has suitable soils (as defined in United States Department of Agriculture (USDA) / Natural Resource Conservation Service (NRCS)), regardless of adjacent land uses or vegetative cover. Appropriate soil types include: Apopka, Arredondo, Archbold, Astatula, Candler, Daytona, Duette, Florahome, Gainesville, Hague, Kendrick, Lake, Millhopper, Orsino, Paola, Pomello, Satellite, St. Lucie, Tavares, and Zuber. Based on existing NRCS soils data, the proposed project does not occur within mapped skink soils; therefore, no consultation with USFWS will be required for this species.

Florida Scrub Jay

The Florida scrub jay is listed as threatened by both the USFWS and FWC. This species is typically found in scattered, often small and isolated patches of sand pine scrub, xeric (dry) oak scrub, scrubby flatwoods, and scrubby coastal stands in peninsular Florida. Scrub jays typically avoid wetlands and heavily forested areas, including canopied sand pine sands. Optimal scrub jay habitat is dominated by shrubby scrub live oaks, myrtle oaks, or scrub oaks from three to ten feet tall, covering 50% to 90% of the area; bare ground or sparse vegetation (less than 6 inches) tall covering 10% to 50% of the area; and scattered trees with no more than 20% canopy cover. Due to dense canopy exhibited within large portions of the project corridor, proximity to commercial and residential development, and the lack of prescribed fire and scrub oak habitat, only marginal suitable habitat exists within the proposed project corridor. According to FWC online data, incidental observations of the species were recorded approximately 3,000 feet southeast of the project corridor in 1998. No individuals were observed during the field assessments and due to the age of the data and the lack of suitable habitat within or immediately adjacent to the project corridor, impacts to this species are not anticipated.

Florida Grasshopper Sparrow

The Florida grasshopper sparrow is listed as endangered by both the USFWS and FWC. This species typically occurs in dry prairies that are open and low in stature. The preferred habitat consists of treeless, relatively poorly-drained grassland that are typically dominated by saw palmetto and dwarf oaks,

bluestem grasses, St. John's wort and wiregrasses. Florida grasshopper sparrows generally occupy an open landscape, and tend to avoid forested edges and preferentially use the centers of open patches. The proposed project largely occurs along forested fringes adjacent to the Peace Creek drainage canal. No individuals were observed during field investigations and the closest documented occurrence was approximately seventeen miles east of the proposed project limits. Therefore, no impacts to this species are anticipated.

State Protected Species

In addition to the federally protected species listed above, several state protected species have the potential to occur within or adjacent to the proposed project corridor based on availability of suitable habitat.

Gopher Tortoise

The gopher tortoise is listed as threatened by FWC and is currently considered a candidate species for listing by USFWS and subsequent protection under the ESA. The gopher tortoise occurs in sandhill (pine-turkey oak associations), sand pine scrub, xeric hammock, pine flatwoods, dry prairie, coastal grasslands and dunes and mixed hardwood pine communities. Disturbed habitats such as roadsides, fencerows, clearings and old fields often support populations of gopher tortoises. No gopher tortoises were observed during the field survey; however, two potentially occupied burrows were observed within 25 feet of the southwestern corner of the eastern most proposed FDOT pond site, immediately east of the CSX railroad. Additionally, mixed hardwood pine communities, clearings, roadsides with suitable soils, and old fields are common along the corridor and within some of the SMF alternatives. Under state law (68A-27.003, F.A.C.), permitting is required for any activities that will result in the take, harassment, molestation, damage, or destruction of gopher tortoises and their burrows. Any construction activities that occur within 25 feet of a potentially occupied gopher tortoise burrow will require coordination with FWC and relocation of these tortoises to a FWC approved recipient site. A gopher tortoise survey is recommended prior to construction of the proposed project in order to avoid potential impacts to this species.

Sandhill Crane

The Florida sandhill crane (*Grus canadensis pratensis*) is a large wading bird that is found in both dry and wetland prairie habitats, with maidencane communities containing low-form emergent vegetation being their preferred habitat. The sandhill crane is listed as threatened by FWC but currently remains unlisted by the USFWS. Several sandhill cranes were observed foraging within the proposed project corridor during the field survey. If construction activities are conducted while avoiding impacts to this species or any active nests, then no coordination with FWC will be required. It is recommended that species-specific surveys for the sandhill crane be performed prior to commencing work on the proposed project. If work is proposed during nesting season (late winter to early spring), surveys to confirm presence/absence and location of sandhill crane nests should also be performed. If nests are located within the project study area, it is recommended that FDOT coordinate with FWC to provide appropriate habitat mitigation or conservation measures.

Also, due to the presence of suitable foraging habitat within and immediately adjacent to the project corridor, other state-protected wading birds and species of special concern (SSC) have the potential to occur within the project footprint. These species include; the limpkin (*Aramus guarauna*), little blue heron (*Egretta caerulea*), snowy egret (*Egretta thula*), tricolored heron (*Egretta tricolor*), and white ibis (*Eudocimus albus*). If construction of the project can be conducted while avoiding impacts to these species or any active nests, then no coordination with FWC will be required.

Southeastern American Kestrel

The southeastern American kestrel is a small raptor that is currently listed as threatened with FWC. Kestrels prefer open habitats, such as pine savannas, longleaf pine-turkey oak sandhills, pine flatwoods, farmlands, and can even utilize suburban golf courses and residential areas. Components that make these landscapes suitable include open terrain with enough cover to support small terrestrial prey animals, vegetation low and sparse enough to ensure adequate prey availability, elevated hunting perches, and an adequate supply of nesting sites. According to FNAI data this species is not included as having potential involvement with the proposed project; however, areas of mixed hardwood conifer, pine flatwoods and adjacent pasture areas exist within and immediately adjacent to the proposed project corridor. Additionally, incidental observations of this species were recorded approximately 2 miles east of the project corridor by FWC in 2010. Although this species was not observed during field assessments, they are commonly found within Polk County and species specific surveys will be provided in support of permit documents prior to the commencement of construction activities.

Protected Plant Species

A list of the protected plant species that occur in Polk County is included in **Appendix B – FNAI report**. None of these protected plant species were observed within the project area during the field surveys. A large majority of the protected plant species that occur within Polk County are found within upland scrub habitat and no scrub habitat exists within or immediately adjacent to the project corridor. If any protected plant species are observed during the continued design or construction of the project, coordination with the Florida Department of Agriculture and Consumer Services (FDACS) and/or the USFWS will be initiated. Based on this information and the scope of the work of this project, this project is not anticipated to have an effect on protected plant species.

Wetlands/ OSWs

Wetland involvement within the proposed project corridor was evaluated by field-based reviews of wetlands within the vicinity of the right-of-way (including several SMF sites). Wetland delineations were approximate in nature and were conducted in accordance with the State wetland jurisdictional methodology, as described in Chapter 62-340, FAC, and the U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual (Environmental Laboratories 1987), which entailed the use of a “three parameter” approach: presence of hydrophytic vegetation, hydric soils, and hydrology. Additionally, the assessment of several offsite SMF was conducted utilizing aerial imagery, and pertinent available data sources including soils data from the USDA NRCS (formerly known as the Soil Conservation Service), 2009 FLUCFCS data from the SWFWMD, and the USFWS National Wetlands Inventory (NWI).

Based on collected field data and desktop reviews, 3 habitat types and 23 individual wetlands and surface waters were identified in the project study area. These features include natural wetlands, natural surface waters, and man-made wetland features designated as other surface waters (OSW). Wetlands and surface waters comprise approximately 16 acres of the project study area. Please refer to **Attachment G** for observed Wetland and OSW habitat within the proposed project corridor. General descriptions of each wetland habitat type are provided below. **Table 1** provides the approximate acreage of each wetland habitat type within the project study area. These acreages are approximate in nature and represent the wetlands/OSWs occurring within the entire assessment area which extends 500 feet from existing edge of pavement. The acreages of wetlands/OSWs occurring within actual construction zones will likely be less.

Table 1: Wetland and Surface Water Communities within Study Area

SITE	FLUCFCS CODE	FLUCFCS Description	USFWS Code	Acreage in Study Area or SMF
OSW 1	510	Streams and Waterways	PEM	0.31
OSW 2	510	Streams and Waterways	PEM	1.97
OSW 3	510	Streams and Waterways	PEM	0.15
OSW 4	510	Streams and Waterways	PEM	0.14
OSW 5	510	Streams and Waterways	PEM	0.02
OSW 6	510	Streams and Waterways	PEM	0.24
OSW 7	510	Streams and Waterways	PEM	0.46
OSW 8	510	Streams and Waterways	PEM	0.20
OSW 9	510	Streams and Waterways	PEM	0.10
OSW 10	510	Streams and Waterways	PEM	0.05
OSW 11	510	Streams and Waterways	PEM	0.26
OSW 12	510	Streams and Waterways	PEM	0.04
OSW 13	510	Streams and Waterways	PEM	0.07
OSW 14	510	Streams and Waterways	PEM	0.36
OSW 15	510	Streams and Waterways	PEM	0.05
OSW 16	510	Streams and Waterways	PEM	0.14
OSW 17	510	Streams and Waterways	PEM	0.05
WL 1	641	Freshwater marsh	PEM	0.71
WL 2	641	Freshwater marsh	PSS	6.08
WL 3	641	Freshwater marsh	PEM	1.54
WL 4	641	Freshwater marsh	PEM	0.34
WL 5	641	Freshwater marsh	PEM	2.05
WL 6	641	Freshwater Marsh	PEM	0.38
			TOTAL	15.71

Freshwater Marsh (FLUCFCS 641)

This category includes vegetated, non-forested freshwater wetlands such as marshes and seasonally flooded basins and meadows that are usually located in low-lying areas or depressions. Six of the twenty-three wetlands and surface waters identified in the project study area are classified as freshwater marshes. These wetlands are located throughout the project study area. Typical plant species observed in these wetlands included soft rush (*Juncus effusus*), St. John's Wort (*Hypericum sp.*), maidencane (*Panicum hemitomon*), dog fennel (*Eupatorium capillifolium*), bushy broom grass (*Andropogon glomeratus*), fire flag (*Thalia geniculata*), cattails (*Typha sp.*), primrose willow (*Ludwigia peruviana*), and pickerelweed (*Pontedaria cordata*). These freshwater marshes comprise approximately 11.1 acres of the wetlands within the project study area.

Streams and Waterways (FLUCFCS 510)

This category represents a combination of excavated ditches/swales/canals including the Peace Creek drainage canal. Seventeen of the twenty wetlands and surface waters identified in the project study area are classified as freshwater streams and waterways. The ditches/swales that make up the excavated waterbodies associated with this category may be considered wetlands by state and federal permitting agencies if they were dredged through wetlands or areas mapped as hydric soils and may be considered USACE jurisdictional since they have hydrologic connection with Waters of the US. The ditches/swales typically contain a mixture of herbaceous and woody plant species including cattail, Carolina willow (*Salix caroliniana*), primrose willow, danglepod (*Sesbania herbacea*), pickerelweed, fire flag, torpedo grass (*Panicum repens*), and Brazilian pepper (*Schinus terebinthifolius*). Freshwater streams and waterways comprise approximately 4.6 acres of the wetlands within the project study area.

UMAM / Mitigation

Formal wetland delineation and functional analyses have not been conducted to date. For this assessment a preliminary UMAM assessment was performed for each representative wetland type based on FLUCFCS categories identified within the project study area and observations made during the field evaluation. For the wetland types evaluated within the project study area, the preliminary UMAM scores ranged from 0.40 for freshwater marshes (FLUCFCS 641) existing within pasture areas actively utilized by cattle, to 0.50 for freshwater marshes existing at the eastern terminus of the corridor immediately adjacent to commercial development, and 0.30 for roadside drainage swales and ditches.

Table 2: Estimated Functional Loss from Wetland Impacts

SITE	FLUCFCS CODE	UMAM Delta	Impact Ac.	Functional Loss
OSW 1	510	0.30	0.31	0.09
OSW 2	510	0.60	1.97	1.18
OSW 3	510	0.30	0.15	0.05
OSW 4	510	0.30	0.14	0.04
OSW 5	510	0.30	0.02	0.01
OSW 6	510	0.30	0.24	0.07
OSW 7	510	0.30	0.46	0.14
OSW 8	510	0.30	0.20	0.06
OSW 9	510	0.30	0.10	0.03
OSW 10	510	0.30	0.05	0.02
OSW 11	510	0.30	0.26	0.08
OSW 12	510	0.30	0.04	0.01
OSW 13	510	0.30	0.07	0.02
OSW 14	510	0.30	0.36	0.11
OSW 15	510	0.30	0.05	0.02
OSW 16	510	0.30	0.14	0.04
OSW 17	510	0.30	0.05	0.02

WL 1	641	0.40	0.71	0.28
WL 2	641	0.50	6.08	3.04
WL 3	641	0.50	1.54	0.77
WL 4	641	0.50	0.34	0.17
WL 5	641	0.50	2.05	1.03
WL 6	641	0.50	0.38	0.19
	TOTAL		15.71	7.47

These preliminary UMAM scores and values are estimates and subject to review and change during the permitting process. Typically, mitigation is not anticipated for impacts to OSW's; however, mitigation may be required due to the loss of suitable foraging habitat (SFH) for the wood stork. Mitigation sufficient to offset wetland/wood stork foraging habitat impacts will be provided through the purchase of wetland mitigation bank credits, the FDOT Mitigation Program as per Ch. 373.4137, F.S. or as otherwise agreed to with the applicable agencies. The proposed project occurs within the mitigation service areas (MSA) for both the Boran Ranch and the Peace River mitigation banks.

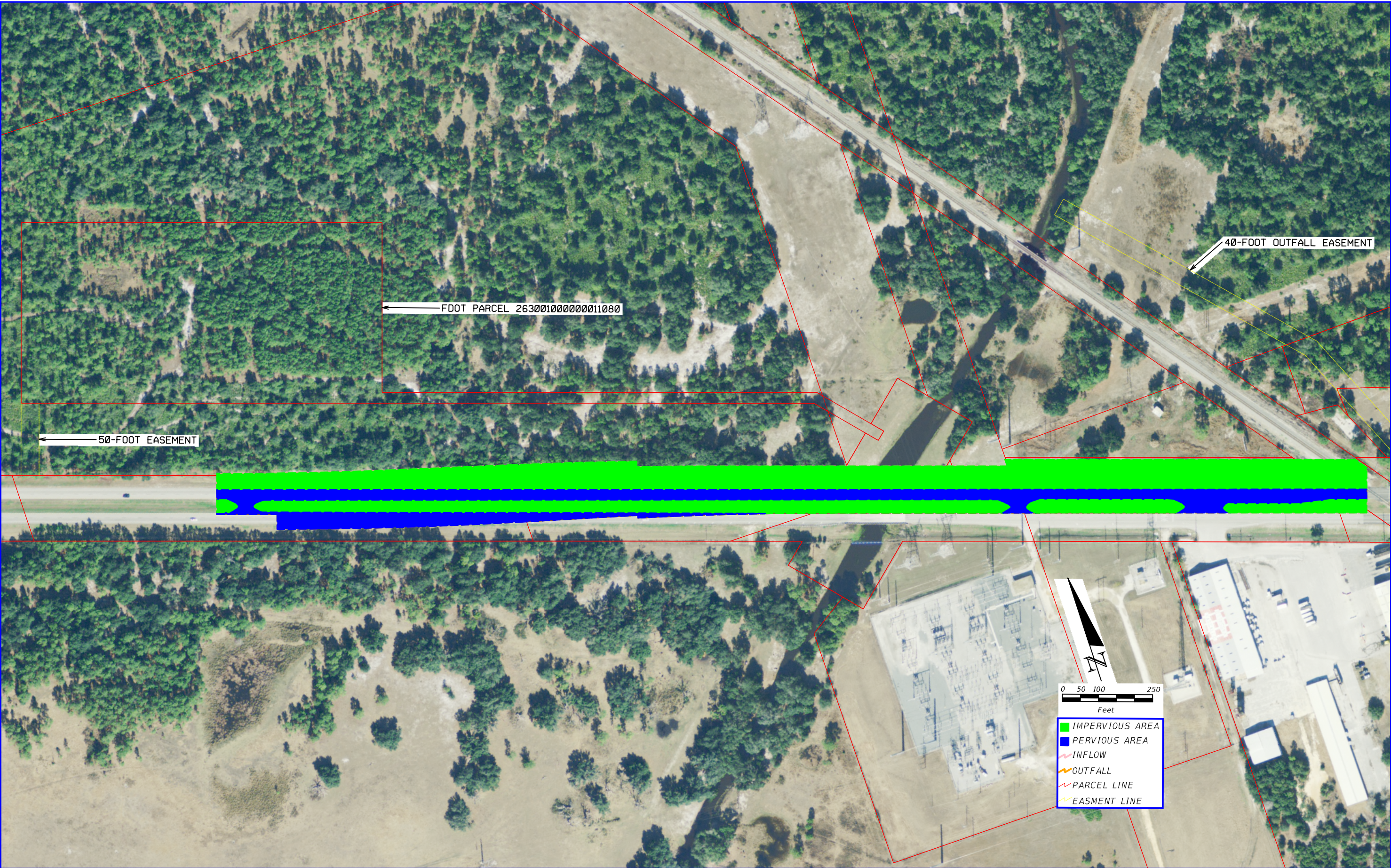
Conclusion

Based on the results of this field review, it is not likely that any state or federally protected species will be affected by the proposed project assuming recommendations listed in the species description section above are followed and necessary coordination with USFWS is completed. Please note that field conditions are subject to change and these observations have limited spatial and temporal validity and may not be valid at the time of project construction. As mentioned in previous text sections, field review/survey efforts are recommended to verify the presence/absence of listed species and wetlands within and immediately adjacent to the project limits prior to the construction commencement.

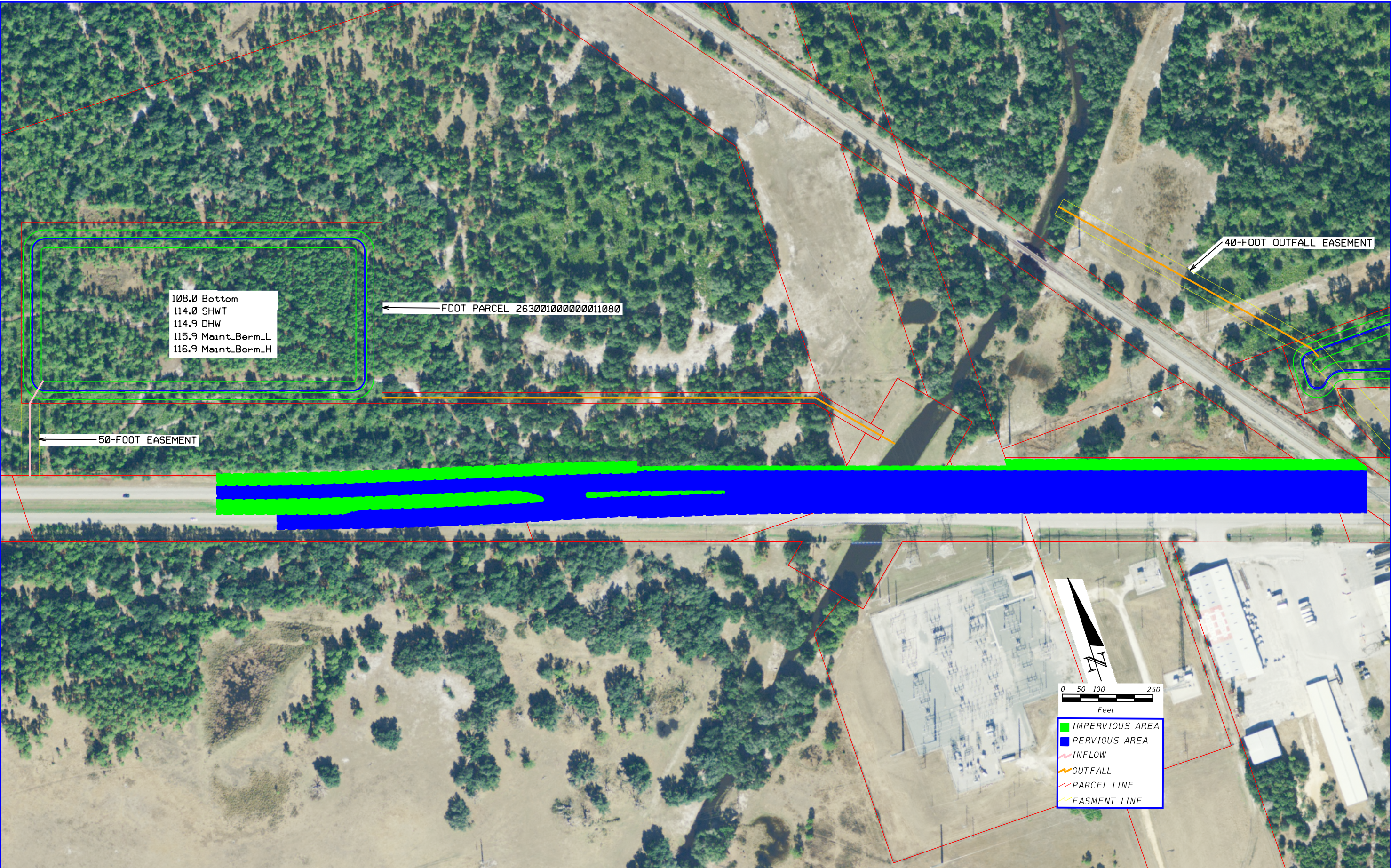
If you have any questions, or if you would like any additional information, please contact me at (941) 378-0272, or email me at david.loy@atkinsglobal.com.

APPENDIX E

BASIN PRE/POST FIGURES



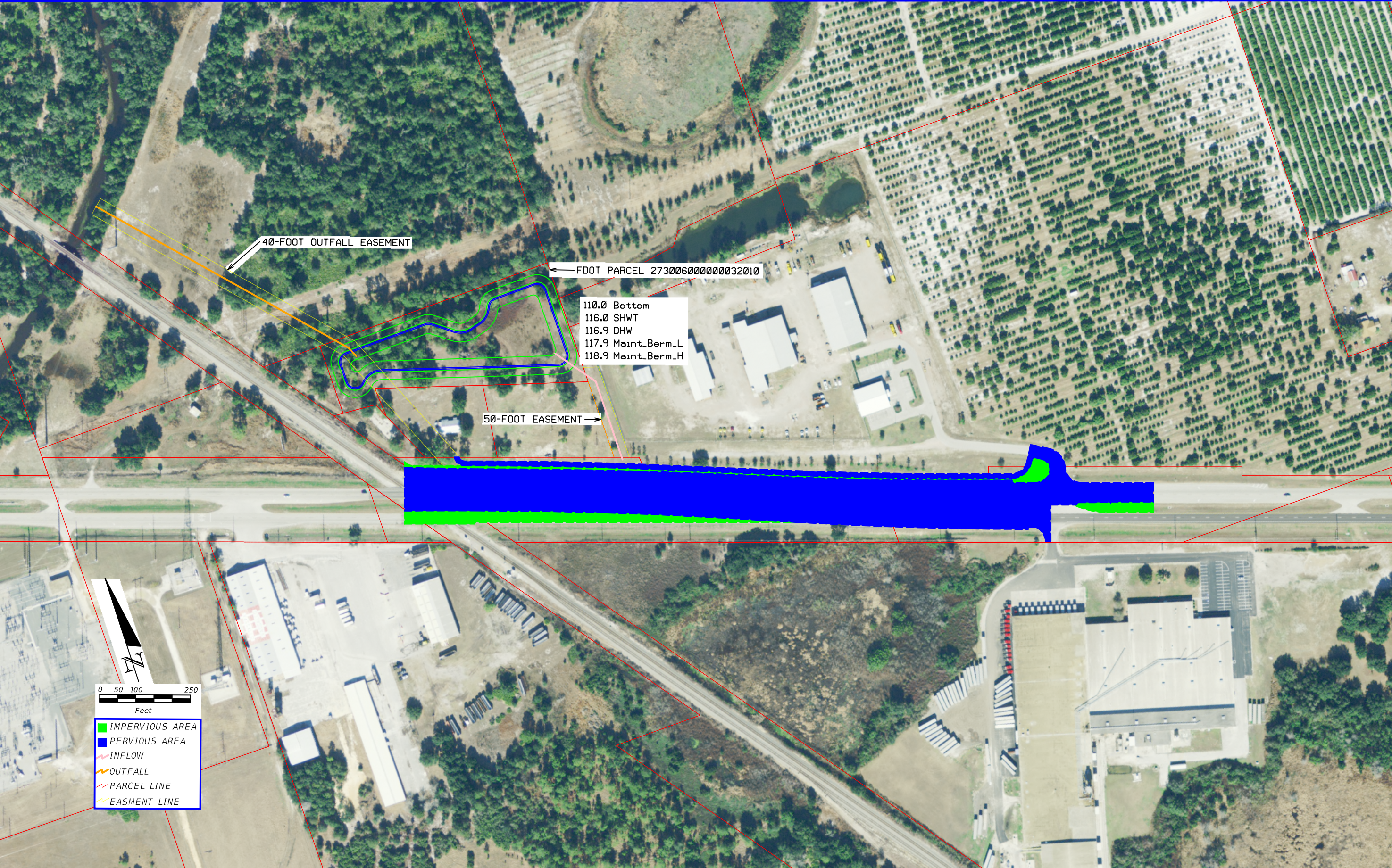
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DATE	DESCRIPTION	DATE	DESCRIPTION				
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				SR 60	POLK	436559-1-22-01	



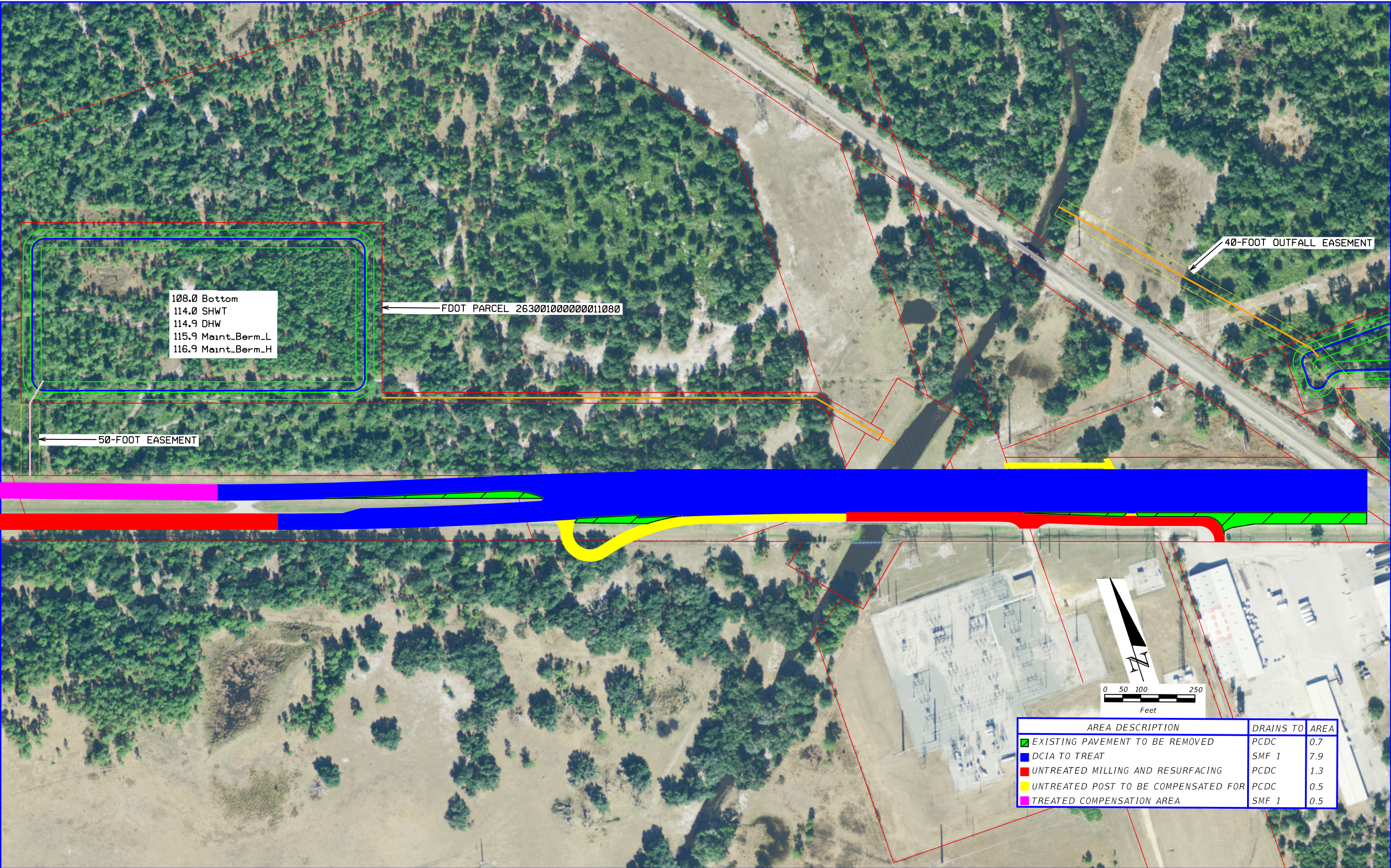
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DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		E-3
					SR 60	POLK	436559-1-22-01		



REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			BASIN 3 PRE-DEVELOPMENT	SHEET NO. E-4
DATE	DESCRIPTION	DATE	DESCRIPTION					
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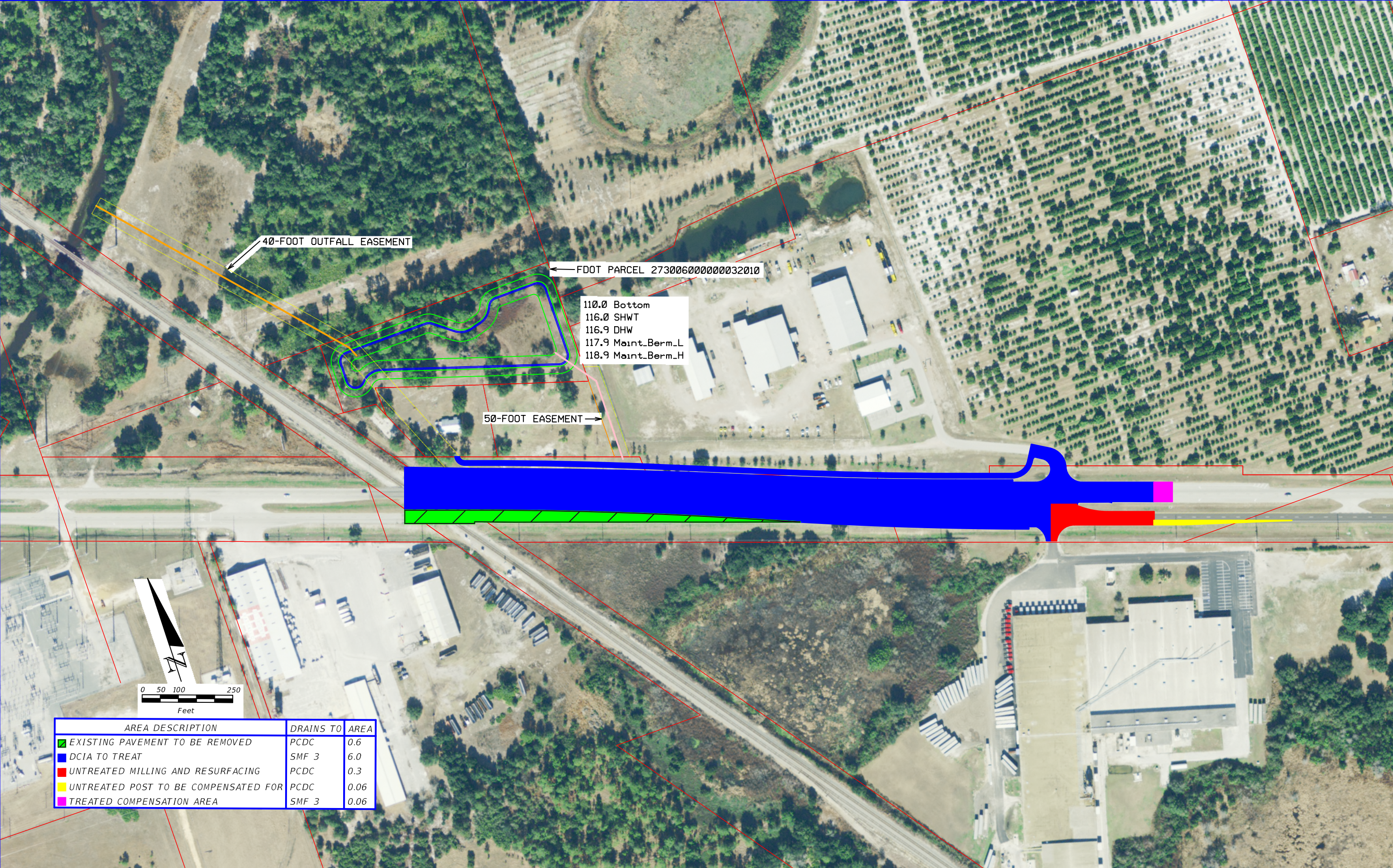


REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			BASIN 3 POST-DEVELOPMENT	SHEET NO. E-5
DATE	DESCRIPTION	DATE	DESCRIPTION					
				ROAD NO. SR 60	COUNTY POLK	FINANCIAL PROJECT ID 436559-1-22-01		



AREA DESCRIPTION	DRAINS TO	AREA
EXISTING PAVEMENT TO BE REMOVED	PCDC	0.7
DCIA TO TREAT	SMF 1	7.9
UNTREATED MILLING AND RESURFACING	PCDC	1.3
UNTREATED POST TO BE COMPENSATED FOR	PCDC	0.5
TREATED COMPENSATION AREA	SMF 1	0.5

REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			BASIN 1 TREATMENT AREAS	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION					
								E-6



AREA DESCRIPTION	DRAINS TO	AREA
EXISTING PAVEMENT TO BE REMOVED	PCDC	0.6
DCIA TO TREAT	SMF 3	6.0
UNTREATED MILLING AND RESURFACING	PCDC	0.3
UNTREATED POST TO BE COMPENSATED FOR	PCDC	0.06
TREATED COMPENSATION AREA	SMF 3	0.06

REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			BASIN 3 TREATMENT AREAS	SHEET NO. E-7
DATE	DESCRIPTION	DATE	DESCRIPTION					
				ROAD NO. SR 60	COUNTY POLK	FINANCIAL PROJECT ID 436559-1-22-01		

APPENDIX F

POND SIZING CALCUATIONS

Name	Date
GTL	12/16/2014
TAP	12/16/2014

Basin 1

Knowns	
Open Basin	
LEOP =	115.8 Ft
Distance SMF -> LEOP =	1100.0 Ft
Head Loss =	00.9 Ft
Approximate SHWT =	114.0 Ft
Control Elevation =	114.0 Ft

Attenuation Areas¹ and CNS

	Area			
	Area		CN	
	Pre	Post	Pre	Post
Pond	3.1 Ac	3.1 Ac	87	100
Impervious	3.1 Ac	7.9 Ac	98	98
Pervious	7.4 Ac	2.6 Ac	85	85
<div> <div>Pre-Development = 88.419 @ 13.6 Ac</div> <div>Pre-Development = 95.971 @ 13.6 Ac</div> </div>				

Rainfall and Attenuation

Storm Event	25Yr-24Hr	
Precipitation =	7.67 In	
	Pre	Post
S	1.31	0.42
Q	6.29 In	7.19 In
Volume	7.13 Ac-Ft	8.15 Ac-Ft
Attenuation Volume =	1.02 Ac-Ft	

Treatment Volume

Total Area ² to Treat =	8.4 Ac
Required Treatment	1.00 In
Required Treatment Volume =	0.70 Ac-Ft

Summary Pond Requirements

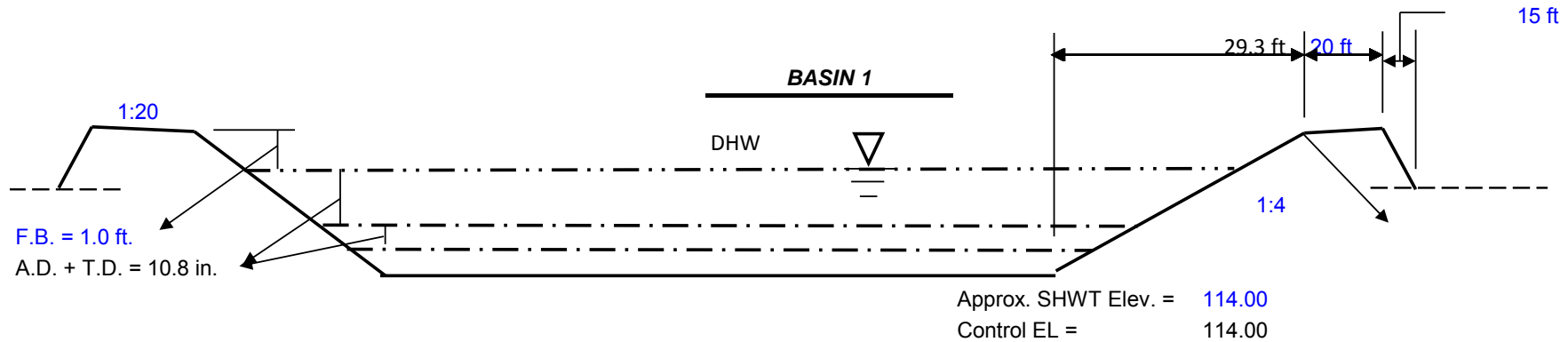
Attenuation Volume =	1.02 Ac-Ft
Treatment Volume =	0.70 Ac-Ft
Total Volume =	1.72 Ac-Ft

Footnotes

¹ See Basin Pre-Post Figures

² See Basin Treatment Areas Figure

POND SIZE ESTIMATE



Approx. low edge of pavement elevation (LEOP)= Approx. low edge of pavement elevation (LEOP)=

Approx. hydraulic clearance from LEOP = 1.00 ft

Available depth for T.D. + A.D. = 10.80 in

DHW EL = 114.9
 Low Edge of Maintnace Berm = 115.9
 Heigh Edge of Maitnace Berm (TOB) = 116.9
 Bottom = 108.00

Square length at bottom of T.D.	284.9 ft
Square length at top of A.D.	292.1 ft
Treatment & Attenuation Volume provided	1.72 ac-ft
Square length at top of freeboard (F.B.)	300.1 ft
Outside pond dimensions (including maint. berm & tie-down)	370.1 ft

<i>Treatment Volume Required</i>
0.70 ac-ft
<i>Attenuation Volume Required</i>
1.02 ac-ft

Minimum Total Area Required:

3.1 ac

Name Date
 Computations By: GTL 12/16/2014
 Checked By: TAP 12/17/2014

Basin 3

Knowns	
Open Basin	
LEOP =	118.7 Ft
Distance SMF -> LEOP =	2300.0 Ft
Head Loss =	01.8 Ft
Approximate SHWT =	116.0 Ft
Control Elevation =	116.0 Ft

Attenuation Areas ¹ and CNs				
	Area		CN	
	Pre	Post	Pre	Post
Pond	2.3 Ac	2.3 Ac	87	100
Impervious	3.3 Ac	6.1 Ac	98	98
Pervious	3.7 Ac	0.9 Ac	85	85
Pre-Development = 90.108 @ 9.3 Ac				
Pre-Development = 97.237 @ 9.3 Ac				

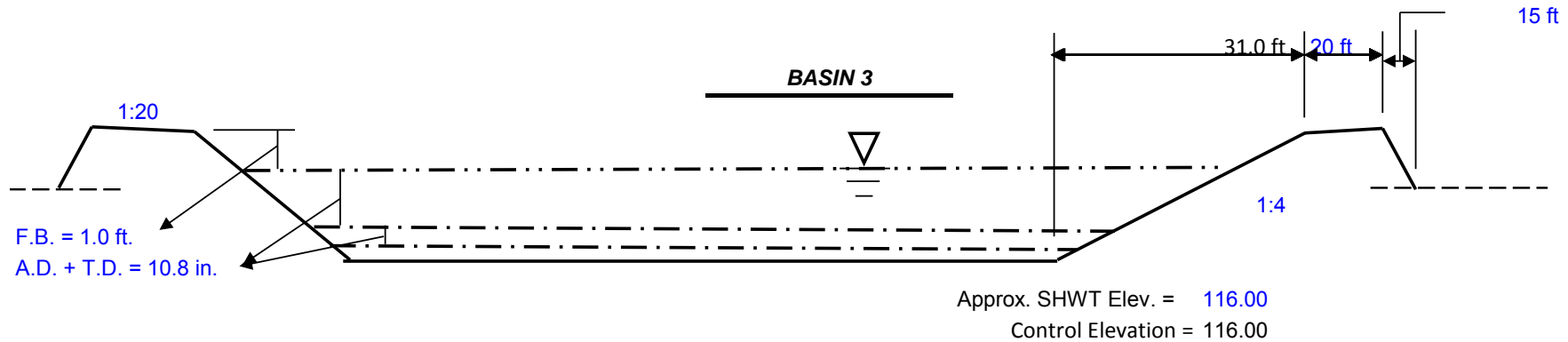
Rainfall and Attenuation				
Storm Event 25Yr-24Hr				
Precipitation = 7.67 In				
	Pre	Post		
S	1.1	0.28		
Q	6.49 In	7.34 In		
Volume	5.03 Ac-Ft	5.69 Ac-Ft		
Attenuation Volume = 0.66 Ac-Ft				

Treatment Volume	
Total Area ² to Treat =	6.1 Ac
Height to Treat =	1.00 In
Treatment Volume =	0.51 Ac-Ft

Summary	
Attenuation Volume =	0.66 Ac-Ft
Treatment Volume =	0.51 Ac-Ft
Total Volume =	1.17 Ac-Ft

Footnotes	
¹ See Basin Pre-Post Figures	
² See Basin Treatment Areas Figure	

POND SIZE ESTIMATE



Approx. low edge of pavement elevation (LEOP) = 118.70

Approx. hydraulic clearance from LEOP = 1.00 ft

Available depth for T.D. + A.D. = 10.80 in

DHW EL = 116.9

Low Edge of Maintenance Berm = 117.9

High Edge of Maintenance Berm (TOB) = 118.9

Bottom = 110.00

Square dimension at bottom of T.D.	234.4 ft
Square dimension at top of A.D.	241.6 ft
Treatment & Attenuation Volume provided	1.17 ac-ft
Square dimension at top of freeboard (F.B.)	249.6 ft
Outside pond dimensions (including maint. berm & tie-down)	319.6 ft

<i>Treatment Volume Required</i>
0.51 ac-ft
<i>Attenuation Volume Required</i>
0.66 ac-ft

Minimum Total Area Required:

2.3 ac