

FINAL LOCATION HYDRAULICS MEMORANDUM

Florida Department of Transportation

District 5

South Sumter Trail

From the Withlacoochee State Trail to the Van Fleet Trail / South Lake Trail

Hernando & Sumter County, Florida

Financial Management Number: 435471-1-22-01

Date 09/09/2019

Prepared for:



LOCATIONS HYDRAULICS MEMORANDUM

September 09, 2019

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**FINAL
LOCATION HYDRAULICS MEMORANDUM
PROJECT DEVELOPMENT AND ENVIRONMENT STUDY
SOUTH SUMTER TRAIL – FROM THE WITHLACOOCHEE STATE
TRAIL TO THE VAN FLEET TRAIL/SOUTH LAKE TRAIL
FPID: 435471-1 -22-01**

I. PURPOSE

The purpose of this memorandum is to address base floodplain encroachments resulting from the roadway improvements evaluated in the Project Development and Environment study. In accordance with Executive Order 11988 “Floodplain Management”, USDOT Order 5650.2, “Floodplain Management Protection”, and Federal-Aid Policy Guide 23 CFR 650A, floodplains must be protected. The intent of these regulations is to avoid or minimize highway encroachments within the 100-year (base) floodplains, and to avoid supporting land use development, which is incompatible with floodplain values.

II. BASE FLOODPLAIN

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) for Hernando and Sumter Counties, which are shown in Table 1, indicate portions of the project area are located in the 100-year floodplain (see Figure 1 in Appendix A). Therefore, there will be floodplain involvement within federally defined floodplains. However, there are no regulated floodways.

Map	County	Date
12053C0230D	Hernando	February 2, 2012
12119C0277D	Sumter	September 27, 2013
12119C0278D	Sumter	September 27, 2013
12119C0279D	Sumter	September 27, 2013
12119C0281D	Sumter	September 27, 2013
12119C0282D	Sumter	September 27, 2013
12119C0301D	Sumter	September 27, 2013
12119C0302D	Sumter	September 27, 2013
12119C0306D	Sumter	September 27, 2013
12119C0308D	Sumter	September 27, 2013
12119C0316D	Sumter	September 27, 2013

Most of the floodplains are associated with depression storage and are within Zone A, areas with no base flood elevations determined. The Withlacoochee River floodplain is

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within Zone AE with an average base flood elevation of 51.90 ft, NAVD (Reported as 51.93 ft, NAVD in Hernando County and 51.87 ft, NAVD in Sumter County). According to the Southwest Florida Water Management District (SWFWMD), in addition to the FEMA maps, there are three watershed studies within the project limits that will need to be utilized when assessing floodplains: the Eastern Hernando Watershed Study, the Bushnell Watershed Study, and the Gant Lake Watershed Study.

The anticipated floodplain impacts can be described as having “Minimal Encroachments” as identified in Part 2, Section 13.2.2 of the Florida Department of Transportation Project Development and Environment Manual. The base floodplain impacts will be offset, as required by the SWFWMD permitting process which requires replacement of floodplain storage lost as a result of encroachments. In addition, SWFWMD and FDOT design criteria for conveyance systems (e.g. culverts) allow no significant increase in flood stages.

Most of the preferred alignment is adjacent to roadways. Table 2 lists all known existing cross drains under the roadways. All existing cross drains are anticipated to be extended as part of this project.

Cross Drain	Size
CD-1	36” CMP
CD-2	18” RCP
CD-3	48” CMP
CD-4	48” CMP
CD-5	2-7’X5’ CBC
CD-6	18” RCP
CD-7	30” RCP
CD-8	18” RCP
CD-9	24” CMP
CD-10	18” RCP
CD-11	24” RCP
CD-12	24” RCP
CD-13	UNKNOWN
CD-14	24” RCP
CD-15	18” RCP
CD-16	18” RCP
CD-17	30” RCP
CD-18	2-36” RCP
CD-19	2-36” RCP
CD-20	108”X76” CMP
CD-21	72”X90” CMP
CD-22	72”X70” CMP

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It is expected that these extensions will not result in a significant change in their conveyance capacity and only minimal flood stage increases are predicted. Other than the Withlacoochee River crossing, it is anticipated that the trail will be at grade with no real defined conveyance system through the forested section of the alignment. Some areas may require small cross drains to maintain existing drainage patterns. These areas will be identified in the final design phase when field survey data is obtained.

The preferred alignment will impact depression storage floodplains throughout the corridor which will require replacement of storage lost as a result of the encroachments. The SWFWMD prefers a “cup for cup” mitigation approach if the floodplain encroachment only involves storage impacts and the encroachment and compensation both occur within the same basin. If the floodplain encroachment involves conveyance impacts, such as lengthy cross drain extensions and the bridge crossing, or if the compensation is provided in another basin, then modeling will be required to demonstrate no adverse increases to flood stages.

In many areas of the corridor, it is anticipated that floodplain compensation volume will be accommodated within the ditch adjacent to the trail. Due to the tight right of way existing along the roadways, it is anticipated that compensation will require right of way takes throughout the project limits. Determining the locations needed for compensation was not included as a part of the PD&E phase of the project and will need to formally be determined as the design progresses.

Approximately 800 feet upstream of the preferred Withlacoochee River bridge crossing, are the remnants of the retired Seaboard Coastline Railroad crossing. The bridge is no longer in place, but the embankment that served to support the bridge approaches is still in place and creates a constriction on the floodplain. The proposed bridge length for the preferred trail alignment was set based on the current hydraulic opening created by these embankment fill slopes however, the floodplain impacts resulting from the new bridge have not been considered and analyzed as a part of the PD&E phase of the project. A Bridge Hydraulics Report (BHR) will be required to document the hydraulic impacts of the bridge during the final design phase and the bridge length may need to be refined as a result of the BHR findings. As a minimum, the proposed bridge length should be set to minimize floodplain impacts. The designers should also consider a minimum of two feet (in accordance to Section 260.8.1 of the FDOT Design Manual 2019) between the design flood stage and the low member elevation as vertical clearance for proposed new bridge. Scour due to construction of new bridge should be evaluated utilizing the methodologies in HEC-18 for long term aggradation and degradation and contraction scour. Local scour should be evaluated utilizing the applicable methodologies in accordance with Section 4.9.2.2 of the FDOT Drainage Manual 2019. Rip-rap or other scour prevention measures should be implemented to prevent any abutment scour from occurring.

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An estimate of the potential floodplain impacts has been established based on a visual inspection of lidar contour elevations and the anticipated trail typical sections. The results of the anticipated impacts for each floodplain are included in Appendix B. It should be noted that the calculated impacts in Appendix B are based on an estimate of overall floodplain length in linear feet wherever the proposed trail alignment exists within a floodplain utilizing an average width and approximate depth based on the surrounding topography. There are many unknowns that must be determined before a more accurate estimate can be developed. It is anticipated that this will occur during final design.

III. WATER QUALITY

This project will have no adverse impact to the area's water quality. Stormwater treatment of the additional impervious areas will not be required to be treated as part of the SWFWMD Environmental Resource Permit (ERP).

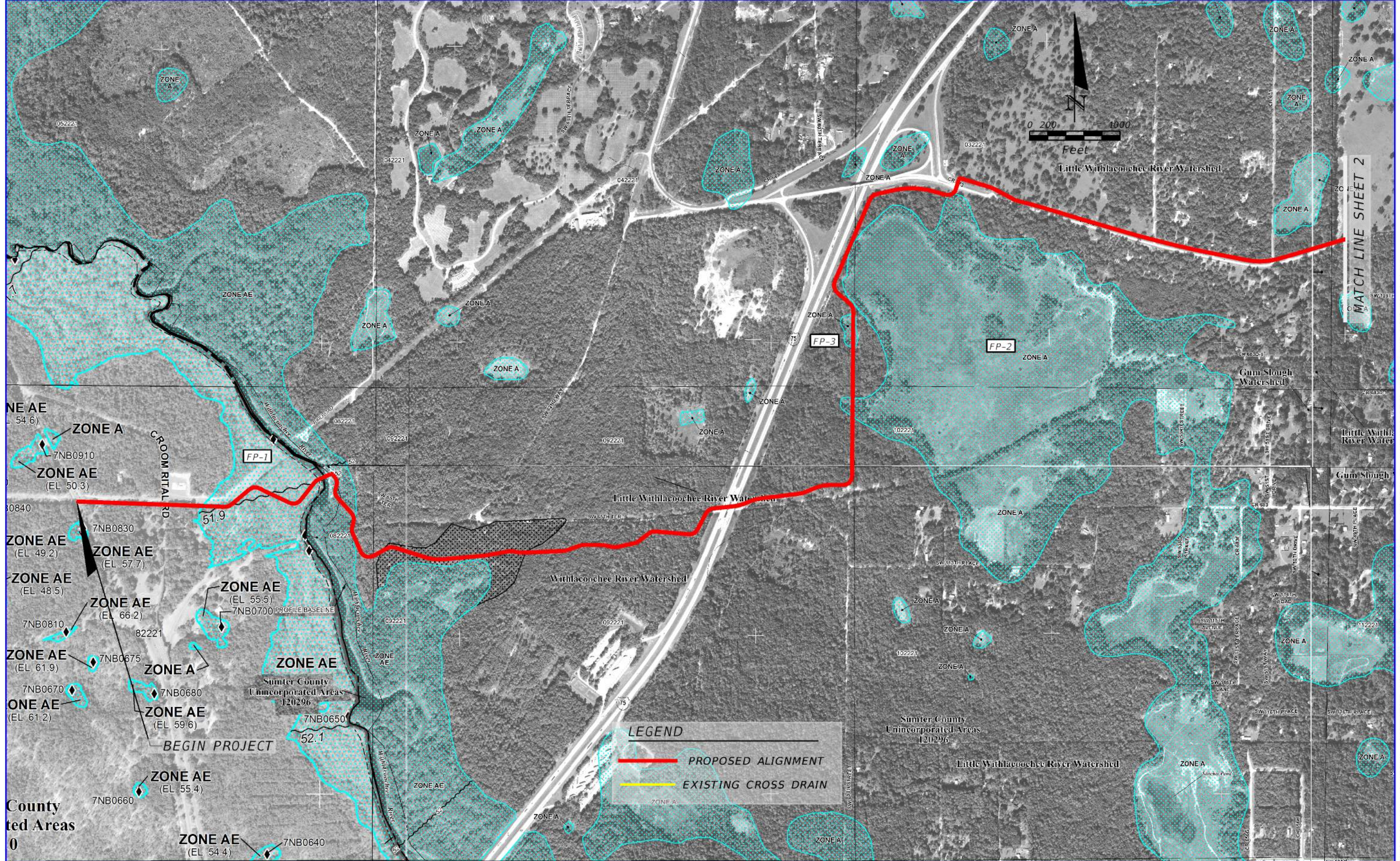
IV. RISK ASSESSMENT

There is no change in flood "Risk" or floodplain impacts associated with this project. The drainage features will be designed in accordance with the FDOT Drainage Manual, topic No. 625-040-002.

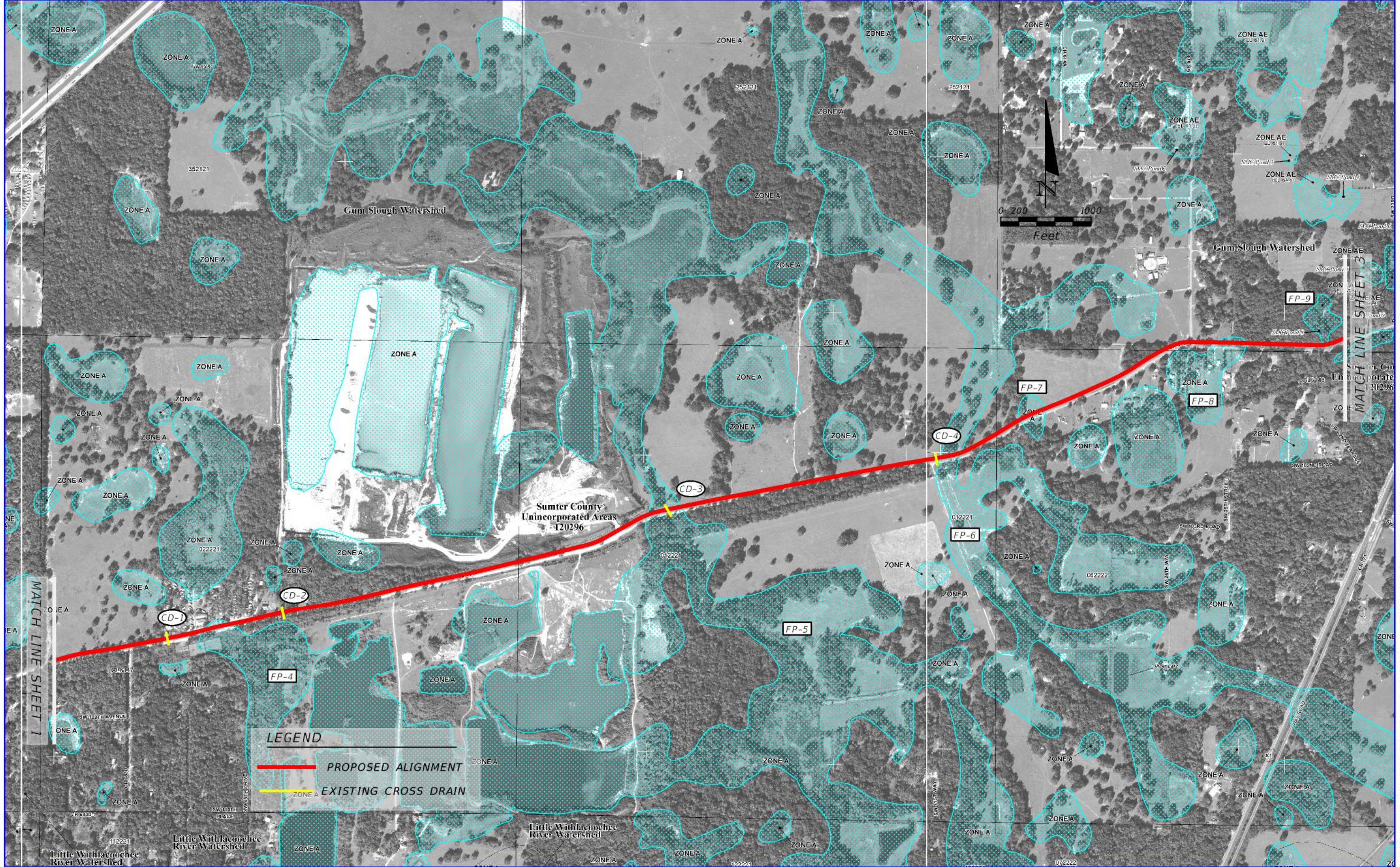
The following floodplain statement is a slightly modified version of Statement Number 3 in the FDOT PD&E Manual, tailored for this project:

The existing drainage structure modifications (such as cross drain extensions) included in this project will result in an insignificant change in their capacity to carry floodwater. These modifications, as well as the construction of a new bridge over the Withlacoochee River, will cause minimal increases in flood heights and flood limits which 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 be no significant change in the potential for interruption or termination of emergency service or emergency evacuation routes as the result of modifications to existing drainage structures or the addition of a new bridge. Therefore, it has been determined that this encroachment is not SSS.

APPENDIX A



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



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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

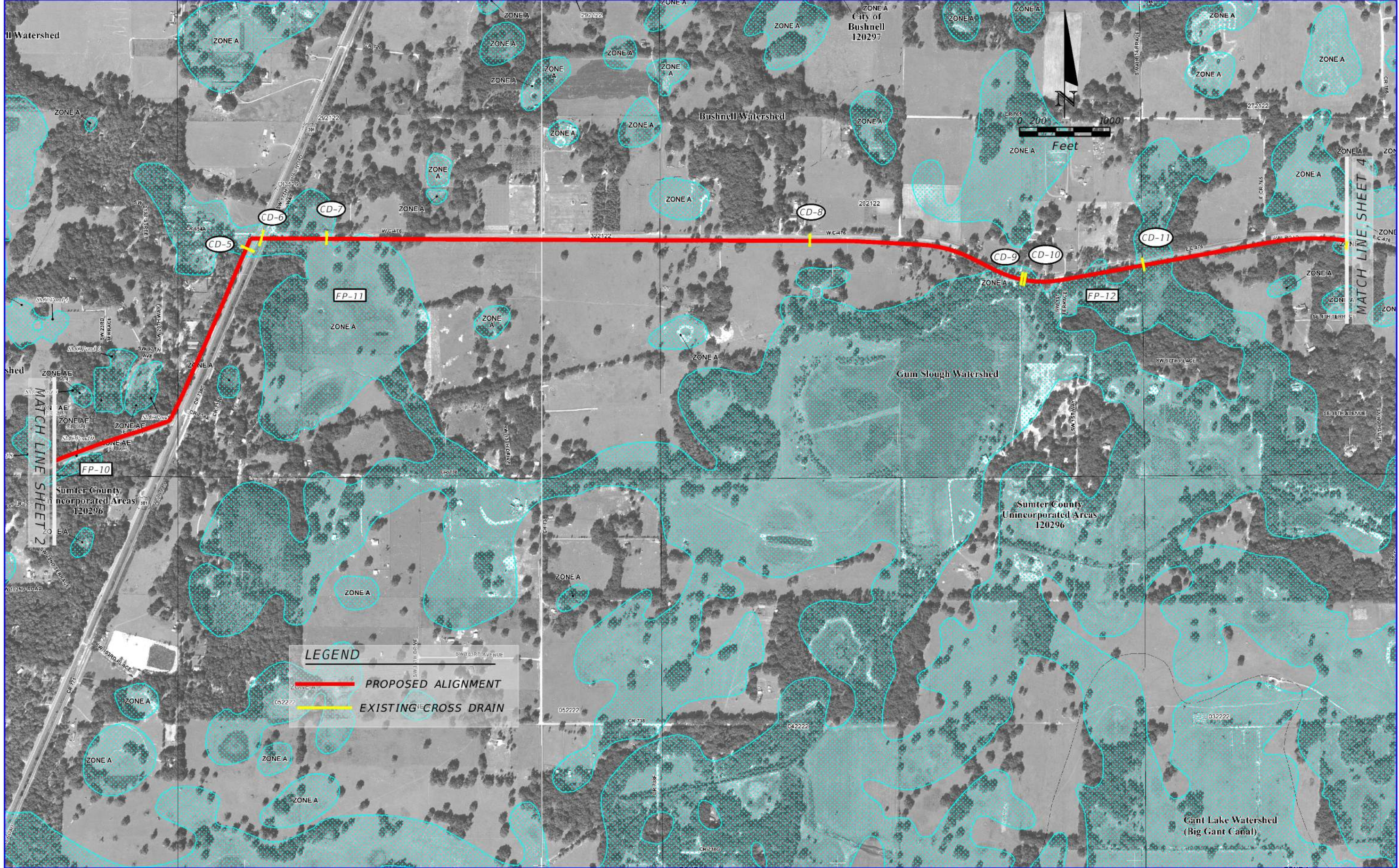
HORIZON ENGINEERING GROUP, INC.
 2603 Maitland Center Pkwy., Suite B
 Maitland, Florida 32751
 Phone: 407-644-7755
 Certificate of Authorization No.: 00009544
 LISA M. H. OLIVERA, P.E. NO. 56056

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SST	SUMTER	435471-1-22-01

FIGURE 1-B

SHEET NO.
2

SUSERS SDATES STIMES SFILES



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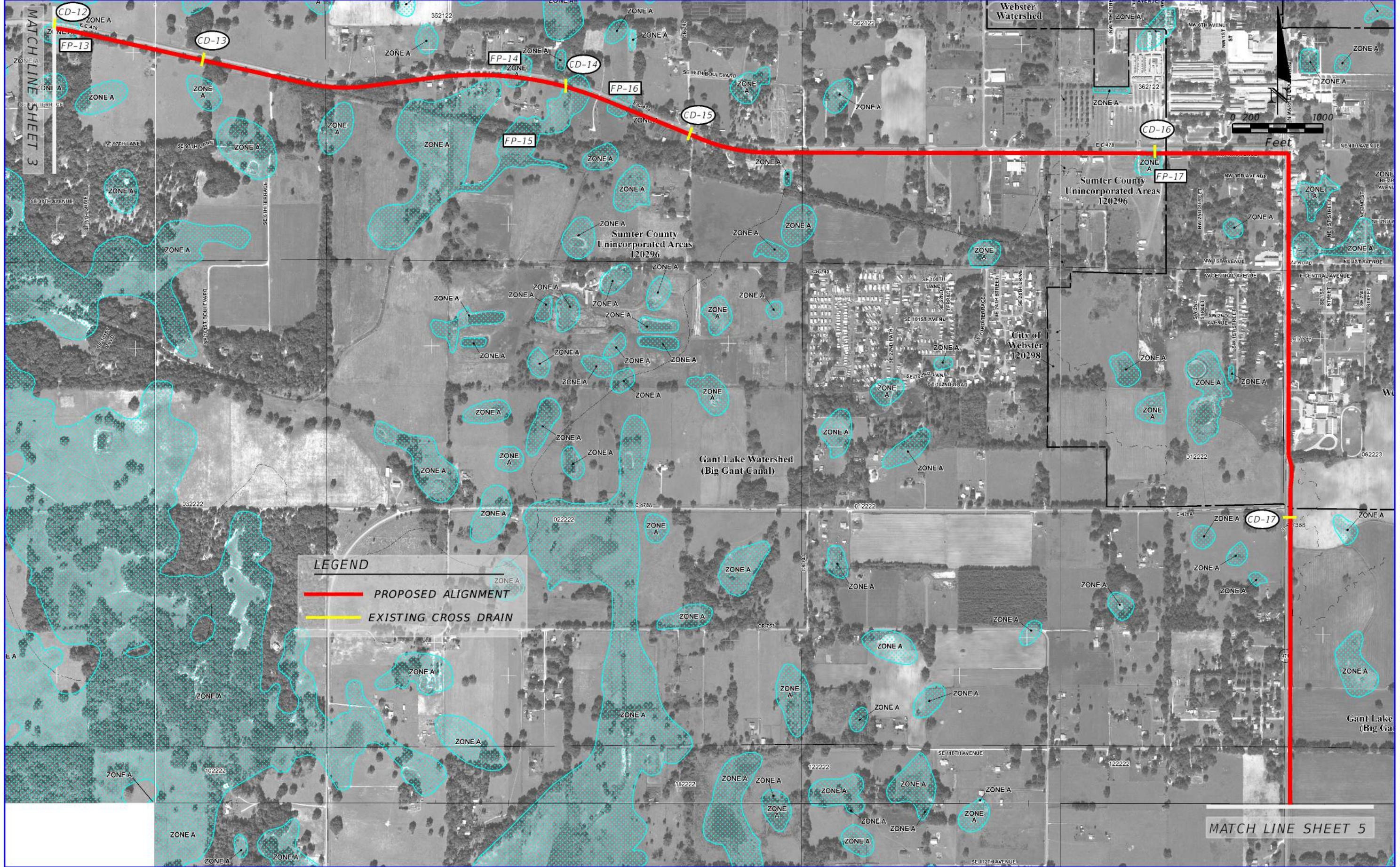
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FIGURE 1-C

SHEET NO.
3



LEGEND
 — PROPOSED ALIGNMENT
 — EXISTING CROSS DRAIN

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

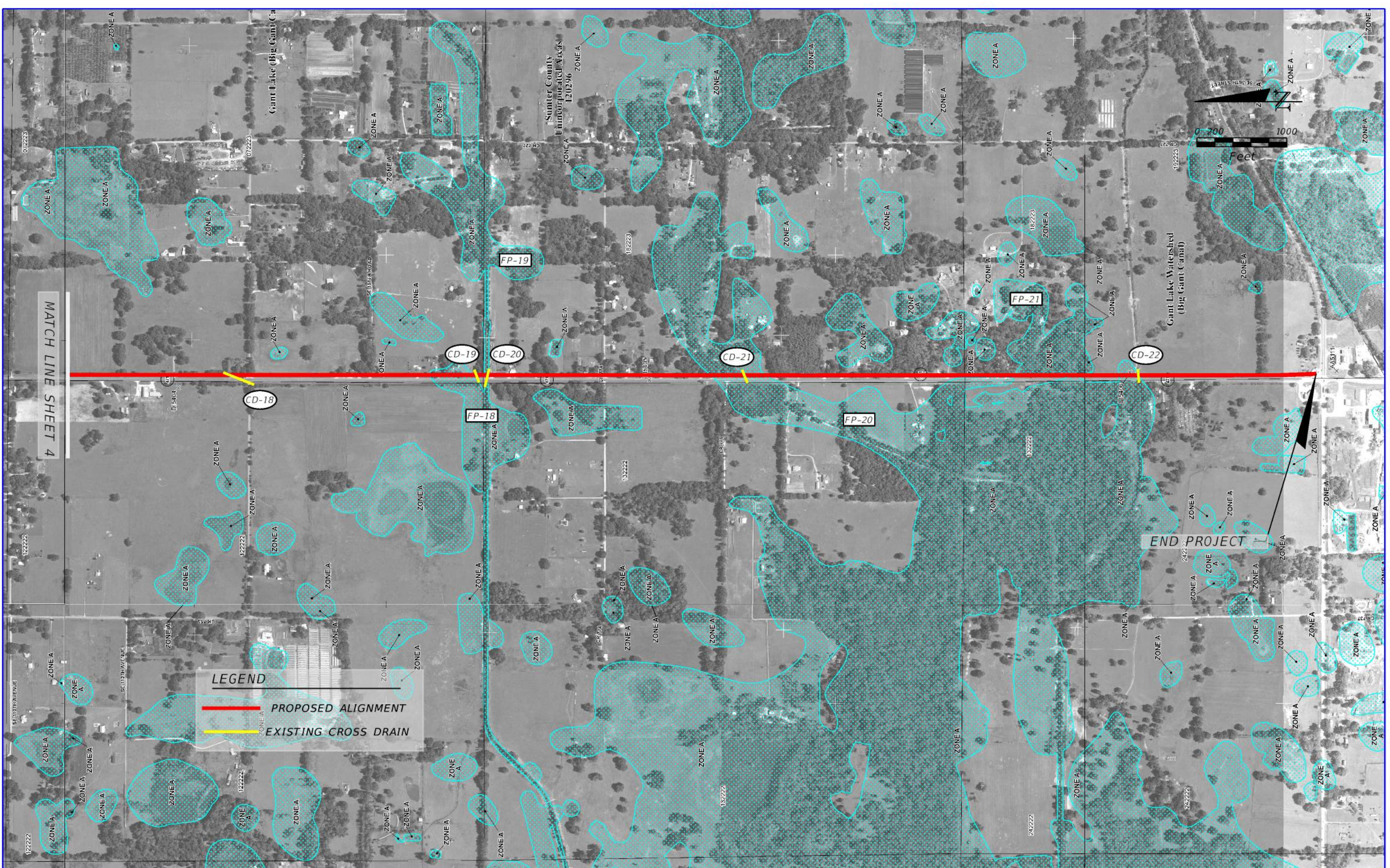
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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
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FIGURE 1-D

SHEET NO.
4

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REVISIONS				HORIZON ENGINEERING GROUP, INC. 2603 Maitland Center Pkwy., Suite B Maitland, Florida 32751 Phone: 407-644-7755 Certificate of Authorization No.: 00009544 LISA M. H. OLIVERA, P.E. NO. 56056	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SHEET NO. 5
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID	
					SST	SUMTER	435471-1-22-01	

FIGURE 1- E

APPENDIX B



PROJECT: South Sumter Trail
 SUBJECT: Floodplain Area Impacts

SHEET: 1 OF 1
 JOB NO.: 435471-1-22-01
 DATE: 9/9/2019
 COMPUTED BY: EDB
 CHECKED BY: LMHO

Floodplain	Zone	Floodplain Elevation* (ft)	Length of Impact (ft)	Width of Impact (ft)	Depth of Impact (ft)	Volume (ac-ft)	Remarks
FP-1	AE	51.9	--	--	--	--	Impacts to this floodplain due to the construction of a new bridge will be based on the final profile and bridge length. Both will be set during final design to limit upstream stage increases. This will be documented in the BHR during final design.
FP-2	A	54.0	420	30	0.5	0.14	
FP-3	A	53.0	378	30	1.5	0.39	
FP-4	A	61.0	337	42	1.0	0.32	
FP-5	A	64.0	411	42	3.0	1.19	
FP-6	A	65.0	237	42	2.5	0.57	
FP-7	A	66.0	295	42	1.0	0.28	
FP-8	A	66.5	352	42	1.0	0.34	
FP-9	A	69.0	50	42	1.0	0.05	
FP-10	A	69.0	160	42	2.0	0.31	
FP-11	A	70.0	950	42	3.5	3.21	
FP-12	A	74.5	1660	42	1.0	1.60	
FP-13	A	78.5	380	42	1.0	0.37	
FP-14	A	80.5	280	42	1.5	0.40	
FP-15	A	80.3	300	42	0.3	0.09	
FP-16	A	81.5	250	42	0.5	0.12	
FP-17	A	86.5	217	42	2.0	0.42	
FP-18	A	85.0	485	42	1.0	0.47	
FP-19	A	86.5	44	42	9.5	0.40	
FP-20	A	85.0	850	42	4.5	3.69	
FP-21	A	84.0	790	42	2.0	1.52	
Total						6.81	

Notes:

* All floodplain elevations for Zone A were determined by 1-foot contours except FP-1 where the elevation was averaged from water surface profiles taken from the Hernando County Flood Insurance Study and the Sumter County Flood Insurance Study.