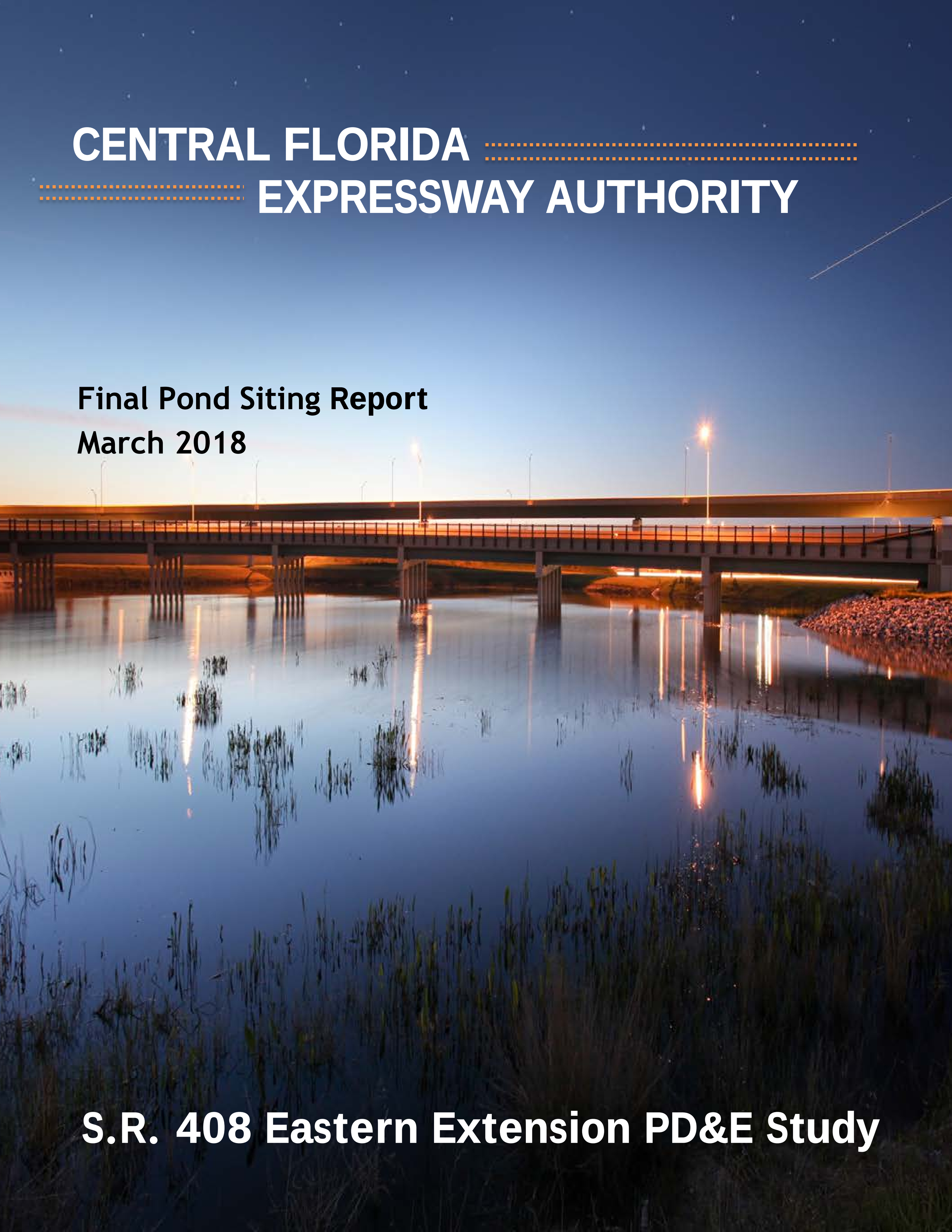
CENTRAL FLORIDA EXPRESSWAY AUTHORITY



Final Pond Siting Report

March 2018

S.R. 408 Eastern Extension PD&E Study

PROFESSIONAL ENGINEER CERTIFICATE

I hereby certify that I am a registered professional engineer in the State of Florida practicing engineering with Metric Engineering, Inc. and I have reviewed or approved the evaluation, findings, opinions and conclusions as reported for:

PROJECT:	**S.R. 408 Eastern Extension PD&E Study**
FINANCIAL PROJECT NUMBER:	**CFX-Project No. 408-254**
LOCATION:	**Orange County**
CLIENT:	**Central Florida Expressway Authority**

This Pond Siting Report (PSR) includes a summary of data collection efforts, calculations, and an overall drainage review prepared for the conceptual analyses of the S.R. 408 Eastern Extension project in Orange 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 judgements and experience. This document is for planning purposes only and is not to replace any effort required for final design.

Florida Registered Engineer:

Name: Chandra S Raman, P.E.

Registration Number: FL # 58740

Signature:

Date:

Table of Contents

TABLES

ACRONYMS

PD&E – Project Development and Environment

CFX – Central Florida Expressway Authority

PSR – Pond Siting Report

SJRWMD – St. Johns River Water Management District

OFW – Outstanding Florida Waters

FDEP – Florida Department of Environmental Protection

FEMA – Federal Emergency Management Agency

FIRM – FEMA Flood Insurance Rate Map

FDOT – Florida Department of Transportation

USDA – United States Department of Agriculture

SHWT – Seasonal High Water Table

HGL – Hydraulic Grade Line

APPENDICES

EXECUTIVE SUMMARY

The purpose of the S.R. 408 Eastern Extension Project Development and Environment (PD&E) study is to develop a proposed improvement strategy that is technically sound, environmentally sensitive and publicly acceptable. As with every PD&E study, emphasis has been placed on the development, evaluation and documentation of detailed engineering and environmental studies including data collection, conceptual design, environmental analyses, project documentation and the preparation of a Pond Siting Report. The project is located in Orange County, Florida.

The Central Florida Expressway Authority (CFX) is presently evaluating the potential to expand S.R. 408 from its current eastern terminus at S.R. 50, locally known as East Colonial Drive, to S.R. 520 in northeast Orange County. This new seven-mile eastern extension of S.R. 408 would constitute the first stage towards providing a west-east high-speed corridor with future connectivity to I-95; enhancing safety, capacity and mobility for the region and CFX customers. After a comprehensive evaluation process, the preferred alternative was selected as being the most effective option within the project study area. Upon completion of the generation of various typical sections, horizontal alignment combinations, and public involvement effort a recommended alternative was selected. Please refer to the typical section in **Appendix-D**.

The proposed S.R. 408 Eastern Extension project is divided into three segments based on the land use characteristics. Segment 1 is more urban in nature and exhibits a higher traffic demand than Segments 2 and 3. Segment 1 is from beginning of the S.R. 50/S.R. 408 interchange to Avalon Park Boulevard. Segments 2 and 3 exhibit more of a rural tendency, beginning east of Avalon Park Boulevard to S.R. 520 at the east end of study area. The purpose of this Pond Siting Report (PSR) is to identify and discuss the stormwater management facilities for each of the 15 drainage basins within the project corridor. Two alternative pond sites were evaluated for each on-site drainage basin. Hydrology and pond sizing calculations are provided in **Appendix-F**.

Existing Drainage Conditions

The proposed S.R. 408 Eastern Extension corridor is located within the jurisdiction of the St. Johns River Water Management District (SJRWMD) and hydrologically within the Big Econ Drainage Basin. The project discharges into the Econlockhatchee (Econ) River, which is a tributary of the St. Johns River. The Econ River drainage basin drains from the south to the north. Since this is a new alignment, the proposed on-site drainage basins are located within various land uses of which are urban, built-up, and wooded/wetland. The drainage conditions for the urban and built-up land uses consists of curb and gutter and open swales that collect the runoff and discharge it to existing retention facilities. Stormwater runoff from the wooded areas drain into existing wetlands or low-lying areas that are connected to the Econ River tributaries.

The proposed S.R. 408 Eastern Extension corridor is a new alignment; therefore, there are no existing cross drains or bridge crossings located along the project corridor. The corridor crosses over the Econ River, Econ River Tributaries, and wetlands. Runoff from the proposed corridor drains to low-lying areas, such as wetlands and creeks that are connected to the Econ River. The Econ River is listed as an Outstanding Florida Waters (OFW) per the Florida Department of Environmental Protection (FDEP). Projects that discharge into OFW require an additional 50% of treatment volume for proposed stormwater management facilities. The river is not listed for nutrient impairment; therefore, pollutant loading analysis is not required. The on-site drainage divides and basin limits are the same for existing and proposed conditions. A drainage map for existing condition was not prepared for this report since the on-site area foot print is the same as the proposed condition. Please refer to **Appendix-E** for the Project Overview Map.

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Orange County shows that a portion of the project lies within the 100-year floodplain areas Zone AE (100 year Base flood elevations are provided) and Zone A (100 year base flood elevations are not provided, areas with 1% change of flooding) . Most of the project lies within flood Zone X (Areas of minimal flood hazard and above the 500-year flood zone). FEMA Map Nos. 12095C0280F, 129095C0285F, 12095C0295F and 12095C0315F, provide flood information for the project. Floodplain impacts occur throughout the project corridor. Refer to the FEMA Flood Insurance Rate Map in **Appendix-B**.

Proposed Drainage Conditions

Per the proposed typical section, roadway runoff will be mainly collected in shoulder gutter inlets and swales before it is piped to the recommended stormwater treatment pond. Water quality treatment and attenuation will be achieved through the construction of new wet detention ponds and expansion of existing ponds. Two alternative pond sites were identified for each basin. Based on the drainage evaluations, shown in the Pond Alternative Evaluation Matrices (**Page 5**), a recommended pond was identified for each basin. All on-site drainage basins are open basins. Two floodplain compensation ponds are proposed exclusively to provide compensation in Basin-11C. Some of the recommended stormwater ponds will provide additional floodplain compensation.

The project was divided into 15 on-site drainage basins. The drainage basins were divided based on high points of the proposed bridge overpass, which maintain flow connectivity to side streets. Scuppers may be used to collect runoff on the proposed bridges when the spread cannot be contained within the shoulder. Shoulder gutter inlets will be used to collect runoff from segments of the bridge with MSE walls and at high fill areas. Bridge drainage shall be evaluated during the design phase. Most of the offsite runoff flows into low lying areas such as wetlands and Econ River tributaries. The offsite runoff will be conveyed through the proposed cross drains. Some of the offsite runoff that drains into the project basin can be collected in by-pass swales at the toe of the embankment and directed to proposed cross drains per historical flow paths. There is enough right-of-way, 300 ft for the entire SR 408 corridor to provide by-pass swales. The other option is to collect offsite runoff in swales or ditch bottom inlets and route it through the stormwater ponds without providing treatment or attenuation.

Summary

The pond sizing analysis estimates right-of-way needs for the recommended pond using volumetric analysis, which accounts for water quality and attenuation. Please note that the pond location recommendations are based on preliminary data calculations, reasonable engineering judgment, environmental analysis and assumptions. This is a preliminary conceptual document; therefore, the pond sizes and locations may change during the final design as more information becomes available. Refer to **Table-1** for the recommended storm water ponds and Table-2 for the recommended floodplain compensation pond.

Refer to the Pond Alternative Evaluation Matrices (**Page 5**), for each on-site drainage basin. The Pond Alternative Evaluation Matrices summarize the on-site basin information, including jurisdictional agency, attenuation and treatment volume required, impacts, and justification for each recommended stormwater pond.

Table-1 Summary of Recommended Water Quality Treatment & Attenuation Ponds

Basin	Recommended Ponds	Pond Selection Justification
1	Pond 1A, 1B and 1C	Ponds 1A, 1B, and 1C are the recommended options, since they are located within existing CFX R/W and do not require R/W acquisition. Converting existing Pond-11 into 3 new ponds contribute to minor surface water impacts.
2	Pond 2B	Pond 2B is the recommended option due to cost savings and willingness of the Orange County School Board to work with this project for land acquisition. Pond 2B has enough storage to provide compensation for the impacted Orange County Pond.
3-4	Pond 3A and Pond 4A	Ponds 3A and 4A are the recommended option, since the ponds are located on vacant lots. The right-of-way acquisition estimates for the vacant lots are more economical and the lots are closer to the onsite basin.
5	Pond 5B	Pond 5B is the recommended option since there are no wetland impacts and it can provide floodplain compensation in addition to treatment and attenuation.
6-8	Pond 6B	Pond 6B was selected as the preferred option, since it could provide floodplain compensation in addition to treatment and attenuation and is located within remnant parcels from the S.R. 408 corridor. The proposed SR 408 alignment will severe the access road (Sherman St and Caudle St) connecting homes south of the alignment. A large Pond 6B will be placed at the location of the homes that will be impacted by the proposed corridor.

Table-1 Summary of Recommended Water Quality Treatment & Attenuation Ponds (Continued)

Basin	Recommended Ponds	Pond Selection Justification
9-10	Pond 9B and Pond 10B	Interconnected Ponds 9B and 10B are the recommended alternate pond sites due to cost savings and minor wetland impacts.
11A	Pond 11A1, Pond 11A2, Pond 11A3, and Pond 11A4	Pond Alternative-2 is the recommended option since all the infield ponds will be within existing CFX R/W, there are no impacts to floodplains or wetlands, and the parcel is more economical. Some of the offsite Pond 11A4 is located on a private property that will be impacted by the S.R. 408 corridor; therefore, the parcel could be purchased together with the roadway R/W acquisition.
11B	Pond 11B1	Pond 11B1 was selected as the recommended pond site due to minor wetland impacts. The property is owned by FDOT; therefore, the property will be easier to acquire.
11C	Pond 11C	Pond 11C is the recommended alternative since it is not located in a wetland, is more economical, and has no impacts to residential properties.
12	Pond 12A	Pond 12A is the recommended option since there are no impacts to residential properties, the parcel is larger, and the parcel is more economical.
13	Pond 13B	Pond 13B is the recommended option, since the pond site is within the remnant parcels and does not have any wetland impacts.
14	Pond 14A	Pond 14A is the recommended option since the pond site is located within remnant parcels, which is more economical.
15	Pond 15A	Pond Alternative-1, Pond 15A is the recommended option. This pond could provide flood relief for the surrounding area and provide water quality treatment for the proposed S.R. 408 corridor. Additionally it could provide compensation volume for the impacted Pond M-1.

Table-2 Summary of Recommended Floodplain Compensation Ponds

Basin	Recommended Ponds	Pond Selection Justification
11C	11C3 & 11C4	Both Ponds 11C3 and 11C4 are the recommended floodplain compensation pond. Need both ponds to compensate impacts caused by the proposed roadway. No floodplain impact caused by the pond berms.

Pond Alternative Evaluation Matrix

Basin 1	
Jurisdiction	SJRWMD
Basin Type and Outfall Location:	Open Basin: Use existing control structure from the modified Pond-11. Positive discharge via control structure into existing wetlands to the east and into un-named Econ River Tributary.
Required Treatment and Attenuation Volume	6.74 ac-ft
Pond Alternative-1: Pond 1A, 1B and 1C are located in the infield areas, where existing Pond-11 is currently located. Due to the proposed roadway geometry converting into an interchange, the existing Pond-11 will be divided and expanded into 3 new ponds.	
Pond ID	Alternative-1: Pond 1A, Pond 1B and Pond 1C
Treatment and Attenuation Volume provided	6.74 ac-ft
Surface Water Impact	3.55 ac
Threatened or Endangered Species Impacts	None
Floodplain	None
Contamination	None
Archeological Impacts	Low
Major Utility Conflict Potential (Y/N)	None
Pond Station	392+00, 400+00, 388+00
Pond Right-of-way	8.14 ac
Right-of-way Acquisition Estimates	None
Location/Parcel Number	Existing CFX Property
Pond Alternative-1: Ponds 1A, 1B and 1C are the recommended options, since they are located within existing CFX R/W and do not require R/W acquisition. Converting existing Pond-11 into 3 new ponds contribute to minor surface water impacts.	

Basin 2		
Jurisdiction	SJRWMD	
Basin Type and Outfall Location:	Open Basin. Positive discharge via control structure into wetlands part of the Econ-River Tributary.	
Required Treatment and Attenuation Volume	7.43 ac-ft	
Pond Alternative-1: Pond 2B, is located on a property owned by Orange County School Board. The site is located on the west side of the Bridgeway Neighborhood. It will be a wet pond and will discharge into wetlands, which are connected to a Econ River Tributary. The pond is located in an upland area and will not impact either wetlands or floodplains.		
Pond Alternative-2: Pond 2C, is located on a private property where Winn-Dixie Supermarket is located. It is right next to S.R. 50 and it is a frontage property. This pond will discharge into wetlands located in the southwest corner of the pond. The value of the property is expected to be very high.		
Pond ID	Pond 2B	Pond 2C
Treatment and Attenuation Volume provided	7.43 ac-ft	7.43 ac-ft
Jurisdictional Wetland Impact	None	None
Threatened or Endangered Species Impacts	None	None
Floodplain	None	None
Contamination	None	None
Archeological Impacts	Low	Low
Major Utility Conflict Potential (Y/N)	None	None
Pond Station	420+00	440+00
Pond Right-of-way	10.23 ac	4.76 ac
Right-of-way Acquisition Estimates	$279,337	$3,132,431
Location/Parcel No	School Board of OC 23-22-31-0000-00-003	Bridgewater Station LLC (Winn-Dixie) 23-22-31-0891-13-000
Pond Alternative-1: Pond 2B is the recommended option due to cost savings and willingness of the Orange County School Board to work with the project for land acquisition. Pond 2B has enough storage to provide compensation for the impacted Orange County Pond.		

<table>
<tr><th colspan="3">Basin 3-4</th></tr>
<tr><td>Jurisdiction</td><td colspan="2">SJRWMD</td></tr>
<tr><td>Basin Type and Outfall Location:</td><td colspan="2">Open Basin. Positive discharge via control structure into wetlands part of the Econ-River Tributary.</td></tr>
<tr><td>Required Treatment and Attenuation Volume</td><td colspan="2">4.87 ac-ft</td></tr>
<tr><td colspan="3">Pond Alternative-1: Pond 3A and Pond 4A, are located on private properties on both sides of Lone Palm Road. The ponds will be interconnected as a single stormwater management facility. The connected ponds will discharge into wetlands that are connected to a Econ River Tributary located on the west side of the pond. The existing ground elevation at the pond site is higher than the 100-year flood elevation; therefore, there will be no floodplain impacts.</td></tr>
<tr><td colspan="3">Pond Alternative-2: Pond 3B, is located on a private property that is away from the project corridor. An extended conveyance pipe system along Lone Palm Road will be required to carry the roadway runoff into the pond, which could be costly. This pond will discharge into wetlands on the west side of the pond. No major floodplain or wetland impacts are anticipated at the pond location. Pond 4B is located within the remnant parcels of the self-storage facility. Depending on the final acquisition of the self-storage facility, Pond 4B and the existing pond could be merged together; this option should be investigated during the final design phase. Pond 4B will discharge into wetlands that are connected to a Econ River Tributary.</td></tr>
<tr><td>Pond ID</td><td>3A and 4A</td><td>3B and 4B</td></tr>
<tr><td>Treatment and Attenuation Volume provided</td><td>4.87 ac-ft</td><td>4.87 ac-ft</td></tr>
<tr><td>Jurisdictional Wetland Impact</td><td>None</td><td>None</td></tr>
<tr><td>Threatened or Endangered Species Impacts</td><td>None</td><td>None</td></tr>
<tr><td>Floodplain</td><td>None</td><td>None</td></tr>
<tr><td>Contamination</td><td>None</td><td>None</td></tr>
<tr><td>Archeological Impacts</td><td>Moderate</td><td>Low</td></tr>
<tr><td>Major Utility Conflict Potential (Y/N)</td><td>None</td><td>None</td></tr>
<tr><td>Pond Station</td><td>450+00, 460+00</td><td>446+00, 464+00</td></tr>
<tr><td>Pond Right-of-way</td><td>4.86 ac</td><td>5.43 ac</td></tr>
<tr><td>Right-of-way Acquisition Estimates</td><td>$133,343</td><td>$1,045,353</td></tr>
<tr><td rowspan="2">Location/Parcel Number</td><td>Pond 3A:
23-22-31-0000-00-22
23-22-31-0000-00-021
23-22-31-0000-00-023</td><td>Pond 3B:
23-22-31-0000-00-079</td></tr>
<tr><td>Pond 4A:
24-22-31-0000-00-010
24-22-31-0000-00-012
24-22-31-0000-00-13
24-22-31-0000-00-005</td><td>Pond 4B:
Amsdell Storage Ventures XXII LLC
24-22-31-0000-00-049</td></tr>
<tr><td colspan="3">Pond Alternative-1: Ponds 3A and 4A are the recommended option, since the ponds are located on vacant lots. The right-of-way acquisition estimates for the vacant lots are more economical and the lots are closer to the onsite basin.</td></tr>
</table>

Basin 5		
Jurisdiction	SJRWMD	
Basin Type and Outfall Location:	Open Basin. Positive discharge via control structure into wetlands part of the Econ-River Tributary.	
Required Treatment and Attenuation Volume	3.52 ac-ft	
Pond Alternative-1: Pond 5A is located at the west side of Avalon Park Blvd and north of the proposed corridor. The pond site is on a private property. The pond is located in FEMA floodplain Zone AE. There will be no floodplain impacts due to the pond berm since the back of the maintenance berm will be at the existing ground elevation. This pond will have minor wetland impacts.		
Pond Alternative-2: Pond 5B is located on the west side of Avalon Park Blvd and south of the proposed corridor. The pond site is on a private property. This pond will be utilized to provide water quality, attenuation, and floodplain compensation. The pond is located within FEMA floodplain Zone A. There will be no floodplain impacts due to the pond berm since the back of the maintenance berm will be at the existing ground elevation.		
Pond ID	5A	5B
Treatment and Attenuation Volume provided	3.52 ac-ft	4.07 ac-ft
Jurisdictional Wetland Impact	0.78 ac	None
Threatened or Endangered Species Impacts	None	None
Floodplain	None	None
Contamination	None	None
Archeological Impacts	Low	Low
Major Utility Conflict Potential (Y/N)	None	None
Pond Station	487+00	487+00
Pond Right-of-way	4.10 ac	4.10 ac
Right-of-way Acquisition Estimates	TBD	TBD
Location/Parcel Number	24-22-31-8971-00-002	24-22-31-8971-00-002
Pond Alternative-2: Pond 5B is the recommended option since there will be no wetland impacts. Although, Pond 5A could be used as floodplain compensation pond if necessary. Both pond sites are located within conservation easements, and mitigation is expected.		

<table>
<tr><th colspan="3">Basin 6-8</th></tr>
<tr><td>Jurisdiction</td><td colspan="2">SJRWMD</td></tr>
<tr><td>Basin Type and Outfall Location:</td><td colspan="2">Open Basin. Positive discharge via control structure into wetlands part of the Econ-River Tributary.</td></tr>
<tr><td>Required Treatment and Attenuation Volume</td><td colspan="2">9.21 ac-ft</td></tr>
<tr><td colspan="3">Pond Alternative-1: Ponds 6A, 7A and 7B are located in Waterford Trails, which is east of Avalon Park Blvd and north of the proposed corridor. All of Pond 6A is located in private property and part of 7A and all of 7B are located in Orange County School Board property. The ponds are not located within FEMA floodplains or wetlands. The pond site mostly consists of remnant parcels from the S.R. 408 project. The site will have minimal impacts to existing homes. The normal water elevation at Pond 6A is lower than the 100-year flood elevation; therefore, this pond could also provide floodplain compensation in addition to treatment and attenuation.</td></tr>
<tr><td colspan="3">Pond Alternative-2: Pond 6B is located in Waterford Trails, which is east of Avalon Park Blvd and south of the proposed corridor. The pond site is on a private property. The pond is not located within FEMA floodplains or wetlands. The pond site mostly consists of remnant parcel from the S.R. 408 project and some new home parcels that will be impacted by eliminating the access road to these properties . The Pond 6B site is located adjacent to a floodplain and the SHWT is lower than the 100-year flood elevation. Therefore, the larger Pond 6B will provide substantial amount of floodplain compensation.</td></tr>
<tr><td>Pond ID</td><td>6A, 7A, 7B</td><td>6B</td></tr>
<tr><td>Treatment and Attenuation Volume provided</td><td>9.21 ac-ft</td><td>9.21 ac-ft</td></tr>
<tr><td>Jurisdictional Wetland Impact</td><td>None</td><td>None</td></tr>
<tr><td>Threatened or Endangered Species Impacts</td><td>None</td><td>None</td></tr>
<tr><td>Floodplain</td><td>None</td><td>None</td></tr>
<tr><td>Contamination</td><td>None</td><td>None</td></tr>
<tr><td>Archeological Impacts</td><td>Low</td><td>Low</td></tr>
<tr><td>Major Utility Conflict Potential (Y/N)</td><td>None</td><td>None</td></tr>
<tr><td>Pond Station</td><td>515+00, 526+00, 527+00</td><td>517+00</td></tr>
<tr><td>Pond Right-of-way</td><td>5.04 ac, 2.63 ac, 4.87 ac</td><td>19.73 ac</td></tr>
<tr><td>Right-of-way Acquisition Estimates</td><td>$562,910, $249,535, $411,427</td><td>$1,155,892</td></tr>
<tr><td rowspan="3">Location/Parcel Number</td><td>Pond 6A:
19-22-32-7976-00-074
19-22-32-7976-00-080
19-22-32-7976-00-097
19-22-32-7976-00-092
19-22-32-7976-00-075
19-22-32-2484-00-050
19-22-32-2484-00-060
19-22-32-2484-00-220</td><td rowspan="3">19-22-32-7976-00-074 19-22-32-7976-00-075
19-22-32-7976-00-072 19-22-32-7976-00-098
19-22-32-7976-00-091 19-22-32-2484-00-100
19-22-32-2484-00-110 19-22-32-2484-00-120
19-22-32-2484-00-130 19-22-32-2484-00-140
19-22-32-2484-00-150 19-22-32-2484-00-160
19-22-32-2484-00-170 19-22-32-2484-00-180
19-22-32-2484-00-190 19-22-32-2484-00-31
19-22-32-2484-00-32 19-22-32-2484-00-33
19-22-32-2484-00-34 19-22-32-2484-00-35
19-22-32-2484-00-36</td></tr>
<tr><td>Pond 7A:
School Board of OC
19-22-32-0000-00-007,
19-22-32-2484-00-250</td></tr>
<tr><td>Pond 7B:
School Board of OC
19-22-32-0000-00-007</td></tr>
<tr><td colspan="3">Pond Alternative-2: Pond 6B was selected as the preferred option, since it could provide additional floodplain compensation in addition to treatment and attenuation, and is located within remnant parcels from the S.R. 408 corridor.</td></tr>
</table>

Basin 9-10		
Jurisdiction	SJRWMD	
Basin Type and Outfall Location:	Open Basin. Positive discharge via control structure into wetlands part of the Econ-River Tributary and through pipes directly into Econ River.	
Required Treatment and Attenuation Volume	5.82 ac-ft	
Pond Alternative-1: Pond 9A is located south of Old Chenney Highway just east of the Econ River. The pond site is located on 3 remnant parcels from the proposed S.R. 408 corridor. The site contains single family homes at the frontage of Old Chenney Highway. The pond is not located within FEMA floodplains or wetlands. The proposed pond site will impact any homes within the parcel. Pond 10A is located on a private property with single family lots that are north of proposed corridor. All of the homes will be impacted within the pond site. No wetland or floodplain impacts are anticipated at this pond site location.		
Pond Alternative-2: Pond 9B and 10B will be interconnected. The ponds are located south of the proposed S.R. 408 corridor. Both ponds are within remnant parcels from the S.R. 408 corridor. The pond sites have private ownership. The ponds will discharge directly into the Econ River. No wetland or floodplain impacts are anticipated at the pond sites. There will be few residential homes impacted by these pond sites.		
Pond ID	9A and 10A	9B and 10B
Treatment and Attenuation Volume provided	5.82 ac-ft	5.93 ac-ft
Jurisdictional Wetland Impact (ac)	0.12	None
Threatened or Endangered Species Impacts	None	None
Floodplain	None	None
Contamination	None	None
Archeological Impacts	Low	Low
Major Utility Conflict Potential (Y/N)	None	None
Pond Station	564+00, 575+00	568+00, 573+00
Pond Right-of-way	5.48 ac	8.38
Right-of-way Acquisition Estimates	$578,690	$379,750
Location/Parcel Number	Pond 9A: 19-22-32-7876-04-020 19-22-32-7876-04-010 19-22-32-7880-02-120	Pond 9B: 19-22-32-7880-02-151 19-22-32-7880-02-161 19-22-32-7880-02-183
	Pond 10A: 19-22-32-7880-02-134 19-22-32-7880-02-135 19-22-32-7880-02-152 19-22-32-7880-02-163 19-22-32-7880-02-172 19-22-32-7880-02-160 19-22-32-7880-02-153 19-22-32-7880-02-133 19-22-32-7880-02-132 19-22-32-7880-02-136	Pond 10B: 19-22-32-7880-02-172 19-22-32-7880-02-181 19-22-32-7880-02-201 19-22-32-7880-02-212 19-22-32-7880-02-203 19-22-32-7880-02-180
Pond Alternative-2: Interconnected Ponds 9B and 10B are the recommended alternate pond sites due to cost savings and no wetland impacts.		

<table>
<tr><th colspan="3">Basin 11A</th></tr>
<tr><td>Jurisdiction</td><td colspan="2">SJRWMD</td></tr>
<tr><td>Basin Type and Outfall Location:</td><td colspan="2">Open Basin. Positive discharge via control structure into wetlands part of the Econ-River Tributary.</td></tr>
<tr><td>Required Treatment and Attenuation Volume</td><td colspan="2">5.27 ac-ft</td></tr>
<tr><td colspan="3">Pond Alternative-1: Basin-11A is the new interchange at the Chuluota Rd Extension. Three infield ponds and an offsite pond 11A4 are interconnected to provide required water quality treatment and attenuation. All infield ponds are located within the CFX R/W and the offsite pond is located on a private property. The Pond 11A4 site is currently a plant nursery. Minor impact to wetland and no impact to floodplain.</td></tr>
<tr><td colspan="3">Pond Alternative-2: A large single pond 11A5 is identified the second alternative. Most of the offsite Pond 11A5 is located on a private property that will be impacted by the S.R. 408 corridor; therefore, the parcel could be purchased together with the roadway R/W acquisition. There are no impacts to wetlands or floodplains.</td></tr>
<tr><td>Pond ID</td><td>Pond 11A1, Pond 11A2,
Pond 11A3, and Pond 11A4</td><td>Pond 11A5</td></tr>
<tr><td>Treatment and Attenuation Volume provided</td><td>5.27 ac-ft</td><td>5.27 ac-ft</td></tr>
<tr><td>Jurisdictional Wetland Impact (ac)</td><td>0.24</td><td>None</td></tr>
<tr><td>Threatened or Endangered Species Impacts</td><td>None</td><td>None</td></tr>
<tr><td>Floodplain</td><td>None</td><td>None</td></tr>
<tr><td>Contamination</td><td>None</td><td>None</td></tr>
<tr><td>Archeological Impacts</td><td>Low</td><td>Low</td></tr>
<tr><td>Major Utility Conflict Potential (Y/N)</td><td>None</td><td>None</td></tr>
<tr><td>Pond Station</td><td>585+00, 590+00,
585+00, 583+00</td><td>587+00</td></tr>
<tr><td>Pond Right-of-way</td><td>5.76 ac</td><td>5.37 ac</td></tr>
<tr><td>Right-of-way Acquisition Estimates</td><td>$41,585</td><td>$45,803</td></tr>
<tr><td>Location/Parcel Number</td><td>Concepts in Greenery
20-22-32-0000-00-014</td><td>20-22-32-0000-00-061
20-22-32-0000-00-059</td></tr>
<tr><td>Remarks</td><td colspan="2">All infield ponds located in the proposed CFX R/W and a single offsite pond located in private property.</td></tr>
<tr><td colspan="3">Pond Alternative-1: Pond Alternative-2 is the recommended option since all of the infield ponds will be within existing CFX R/W, there are will be minor wetland impacts and no floodplain impact. Most of Pond 11A4 is located on a private property that will be impacted by the S.R. 408 corridor; therefore, the parcel could be purchased together with the roadway R/W acquisition. Drainage conveyance to the infield ponds and offsite pond 11A4 will be much easier from the Chuluota Rd extension.</td></tr>
</table>

Basin 11B		
Jurisdiction	SJRWMD	
Basin Type and Outfall Location:	Open Basin. Positive discharge via control structure into wetlands part of the Econ-River Tributary.	
Required Treatment and Attenuation Volume	2.71 ac-ft	
Pond Alternative-1: Pond 11B1 is located across from East River High School. The pond site is currently owned by FDOT. The site is mostly in a wooded area. Floodplain impacts and wetland impacts are not anticipated at the pond site.		
Pond Alternative-2: Pond 11B2 is located within the infield areas behind Walgreens. The Chuluota Road Extension and proposed Pond 11-B1 will impact an existing stormwater pond that provides treatment for Walgreens, Burger King ,and other businesses along the S.R. 50 frontage. This pond could be used as a joint use pond by expanding it.		
Pond ID	Pond 11B1	Pond 11B2
Treatment and Attenuation Volume provided	2.71 ac-ft	2.71 ac-ft
Jurisdictional Wetland Impact (ac)	None	0.64
Threatened or Endangered Species Impacts	None	None
Floodplain	None	None
Contamination	None	None
Archeological Impacts	Low	Low
Major Utility Conflict Potential (Y/N)	None	None
Pond Station	4020+00	4028+00
Pond Right-of-way	3.98 ac	2.3 ac
Right-of-way Acquisition Estimates	TBD	$127,345
Location/Parcel Number	FDOT Property 20-22-32-0000-00-031	20-22-32-4910-00-001 20-22-32-4910-00-002 20-22-32-4910-00-030
Pond Alternative-1: Pond 11B1 was selected as the recommended pond site due to no wetland impacts. The property is owned by FDOT; therefore, the property will be easier to acquire.		

Basin 11C		
Jurisdiction	SJRWMD	
Basin Type and Outfall Location:	Open Basin. Pond 11C2 will discharge into low land areas or floodplain areas of the Econ River. Pond 11C will discharge into Channel E an Econ River tributary.	
Required Treatment and Attenuation Volume	4.36 ac-ft	
Pond Alternative-1: Pond 11C2 is located on private property andare remnant parcels from the S.R. 408 project. This pond is located at the low point of the roadway profile, but is mostly within wetlands. Major wetland impact is anticipated for this alternative. Due the high SHWT elevation this pond could not provide the required treatment and attenuation volume.		
Pond Alternative-2: Pond 11C is located within a remnant parcel from the S.R. 408 project at station 628+00. The pond site is on a privately owned property. The site has no impacts to homes, wetlands, or floodplains. The pond site is located close to a floodplain, but could not provide floodplain compensation since the site's existing ground is higher than the 100-year flood elevation.		
Pond ID	11C2	11C
Treatment and Attenuation Volume provided	3.07 ac-ft	4.36 ac-ft
Jurisdictional Wetland Impact (ac)	N/A	None
Threatened or Endangered Species Impacts	N/A	None
Floodplain	None	None
Contamination	N/A	None
Archeological Impacts	N/A	Moderate
Major Utility Conflict Potential (Y/N)	None	None
Pond Station	610+00	628+00
Pond Right-of-way	7.5 ac	5.7 ac
Right-of-way Acquisition Estimates	$211,686	$119,531
Location/Parcel Number	29-22-32-7882-00-220 29-22-32-7882-00-240 29-22-32-7882-00-230	29-22-32-6721-00-030 29-22-32-6721-00-020 29-22-32-6721-00-010
Pond Alternative-2: Pond 11C is the recommended alternative since it will not have wetland impact, is more economical, and has no impacts to residential properties.		

Basin 11C	
Jurisdiction	SJRWMD
Basin Type and Outfall Location:	Open Basin. Pond 11C2 and 11C3 will discharge into low land areas or floodplain areas of the Econ River. Pond 11C will discharge into Channel E an Econ River tributary.

Floodplain compensation Pond 11C3 is located in a remnant parcel from the SR 408 project. The pond site is mostly located in floodplain and wetland adjacent to Channel E. The existing ground elevation is low at the pond site and the SHWT is between 2 to 3 feet below ground. The maintenance berm will be at the ground elevation, therefore, no floodplain impacts due to the pond itself. Wetland impacts are also anticipated at this pond site.

Pond 11C4 is located within a remnant parcel from the S.R. 408 project at station 635+00. The pond site is on a privately owned property. The site has junk yard operation currently. The site has no impacts to homes, wetlands, or floodplains. The pond site is hydraulically connected to floodplain, the SHWT is lower than the 100-year flood elevation.

Pond ID	11C3	11C4
Provided Floodplain Compensation	21.80 ac-ft	14.93 ac-ft
Jurisdictional Wetland Impact (ac)	N/A	None
Threatened or Endangered Species Impacts	N/A	None
Floodplain	None	None
Contamination	N/A	Moderate
Archeological Impacts	N/A	N/A
Major Utility Conflict Potential (Y/N)	None	None
Pond Station	633+00	635+00
Pond Right-of-way	8.85	5.5 ac
Right-of-way Acquisition Estimates	$119,127	$34,999
Location/Parcel Number	29-22-32-6721-00-030 29-22-32-6721-00-020 29-22-32-6721-00-010 28-22-32-0000-00-015	28-22-32-0000-00-015

Both Ponds 11C3 and 11C4 will be used to provide floodplain compensation for Basin 11C.

Basin 12		
Jurisdiction	SJRWMD	
Basin Type and Outfall Location:	Open Basin. The alternate ponds will discharge into low-lying areas that connected to Econ River tributary (Channel A).	
Required Treatment and Attenuation Volume	4.10 ac-ft	
Pond Alternative-1: Pond 12A is located within remnant parcels from the S.R. 408 corridor. The site is mostly a wooded area and is near a power distribution line. No impact to wetlands or floodplains are anticipated. No impact to residential properties either. The site is located at station 645+00.		
Pond Alternative-2: Pond 12B is located within remnant parcels from the S.R. 408 corridor. The site is mostly a wooded area with several residential homes. No impact to wetlands or floodplains are anticipated. There will be impacts to residential homes at this pond site. The site is located at station 653+00.		
Pond ID	12A	12B
Treatment and Attenuation Volume provided	4.10 ac-ft	4.10 ac-ft
Jurisdictional Wetland Impact (ac)	None	None
Threatened or Endangered Species Impacts	Gopher Tortoise	Gopher Tortoise
Floodplain	None	None
Contamination	None	None
Archeological Impacts	Moderate	Low
Major Utility Conflict Potential (Y/N)	None	None
Pond Station	645+00	653+00
Pond Right-of-way	6.88 ac	5.33 ac
Right-of-way Acquisition Estimates	$65,038	$301,637
Location/Parcel Number	28-22-32-0000-00-003	21-22-32-0734-00-970 21-22-32-0734-00-960 21-22-32-0734-00-990
Pond Alternative-1: Pond 12A is the recommended option since there are no impacts to residential properties, the parcel is larger, and the parcel is more economical.		

Basin 13		
Jurisdiction	SJRWMD	
Basin Type and Outfall Location:	Open Basin. The alternate ponds will discharge into low laying areas that is connected to Econ River tributary (Channel-A).	
Required Treatment and Attenuation Volume	6.51 ac-ft	
Pond Alternative-1: Pond 13A is located on a private property. The site consists of cleared pasture land. No impact to wetlands or floodplains are anticipated. No impact to residential properties either.		
Pond Alternative-2: Pond 13B is located on the south side of the proposed corridor. The pond site is located on a remnant parcel from the S.R. 408 corridor. Minor wetland impacts are anticipated. No floodplains or residential properties will be impacted on this parcel.		
Pond ID	13A	13B
Treatment and Attenuation Volume provided	6.51 ac-ft	6.51 ac-ft
Jurisdictional Wetland Impact (ac)	None	0.16
Threatened or Endangered Species Impacts	None	None
Floodplain	None	None
Contamination	None	None
Archeological Impacts	Low	Low
Major Utility Conflict Potential (Y/N)	None	None
Pond Station	678+00	678+00
Pond Right-of-way	8.01 ac	10.45 ac
Right-of-way Acquisition Estimates	$24,227	$29,786
Location/Parcel Number	22-22-32-0712-00-000 22-22-32-0712-36-001 22-22-32-0712-36-013 22-22-32-0712-36-021	22-22-32-0712-21-010 22-22-32-0712-37-001 22-22-32-0712-14-010 28-22-32-0000-00-008
Pond Alternative-2: Pond 13B is the recommended option, since the pond site will be within remnant parcels and does not have any wetland impacts. Pond 13A would be a complete new purchase and has minor wetland impacts.		

Basin 14		
Jurisdiction	SJRWMD	
Basin Type and Outfall Location:	Open Basin. The alternate ponds will discharge into low laying areas that is connected to Econ River tributary.	
Required Treatment and Attenuation Volume	1.91 ac-ft	
Pond Alternative-1: Pond 14A is located in a private property at station 710+00. It is located on the south side of the project corridor and west of C.R. 13. The pond site is located within remnant parcels from the S.R. 408 project. The pond site has no residential impacts. No wetland or floodplain impacts are anticipated.		
Pond Alternative-2: Pond 14B is located in a private property at station 710+00. It is located on the north side of the project corridor and west of C.R. 13. The pond site will have some residential impacts. No wetland or floodplain impacts are anticipated. This site will not be impacted by the S.R. 408 corridor; therefore, the site would have to be a complete new purchase.		
Pond ID	14A	14B
Treatment and Attenuation Volume provided	2.19 ac-ft	1.91 ac-ft
Jurisdictional Wetland Impact (ac)	None	None
Threatened or Endangered Species Impacts	None	None
Floodplain	None	None
Contamination	None	None
Archeological Impacts	Low	Moderate
Major Utility Conflict Potential (Y/N)	None	None
Pond Station	710+00	710+00
Pond Right-of-way	2.57 ac	2.75 ac
Right-of-way Acquisition Estimates	$58,641	$340,686
Location/Parcel Number	22-22-32-0712-20-150 22-22-32-0712-20-017 22-22-32-0712-20-201 22-22-32-0712-20-013 22-22-32-0712-20-035 22-22-32-0712-20-045 22-22-32-0712-20-043 22-22-32-0712-20-520 22-22-32-0712-20-510 22-22-32-0712-20-054 22-22-32-0712-20-560 22-22-32-0712-20-058 22-22-32-0712-20-750 22-22-32-0712-20-060	22-22-32-0712-18-410 22-22-32-0712-18-370 22-22-32-0712-18-470 22-22-32-0712-18-330 22-22-32-0712-18-430 22-22-32-0712-18-290 22-22-32-0712-18-260 22-22-32-0712-18-230 22-22-32-0712-18-190
Pond Alternative-1: Pond 14A is the recommended option, since the pond site will be within remnant parcels, which is more economical. Pond 14B would have to be a complete new purchase.		

Basin 15		
Jurisdiction	SJRWMD	
Basin Type and Outfall Location:	Open Basin. The alternate Pond 15A will discharge into low laying areas that is connected to Econ River tributary. Pond 15B and Pond M1 will discharge into Channel KE which is a Econ River tributary.	
Required Treatment and Attenuation Volume	6.16 ac-ft	
Pond Alternative-1: Pond 15A is located in a private property at station 725+00. It is located south side of the project corridor in a wooded area. The pond site is in the remnant parcel from the SR 408 project. The pond site has no residential impacts. No wetland or floodplain impacts are anticipated.		
Pond Alternative-2: Pond 15B and Pond M-1 are interconnected ponds. They are located in the bifurcated infield area where the project connects to SR 50. The ponds are located at station 740+00. No additional R/W is required for this pond site. Existing Orange County Pond M-1 will be impacted by the SR 408 project. The impacted Pond M-1 can be compensated in the infield areas. As an alternative option Ponds 15B and M1 could be interconnected and be used as a joint use pond together with Pond M-2 and Pond M-3. Pond M-1 is connected with Pond M-2 and Pond-M3 currently. The infield area will be impacted in the future when the SR 408 extends beyond the current terminus point.		
Pond ID	15A	15B
Treatment and Attenuation Volume provided	6.16 ac-ft	6.16 ac-ft
Surface water Impact	None	2.24 ac
Threatened or Endangered Species Impacts	None	None
Floodplain	None	None
Contamination	None	None
Archeological Impacts	Low	Moderate
Major Utility Conflict Potential (Y/N)	None	None
Pond Station	725+00	740+00
Pond Right-of-way	8.92 ac	4.37 ac
Right-of-way Acquisition Estimates	$115,988	TBD
Location/Parcel Number	27-22-32-0000-00-007 21-22-32-0735-00-001 21-22-32-0735-00-020 21-22-32-0735-00-030 21-22-32-0735-00-010 21-22-32-0735-00-062 21-22-32-0735-00-061 21-22-32-0735-00-063	Orange County BCC 26-22-32-0800-00-450 21-22-32-0735-00-030 21-22-32-0735-00-010 21-22-32-0735-00-092 21-22-32-0735-00-091 21-22-32-0735-00-083 21-22-32-0735-00-082 21-22-32-0735-00-081 21-22-32-0735-00-072 21-22-32-0735-00-071 21-22-32-0735-00-070 21-22-32-0735-00-063 21-22-32-0735-00-061 21-22-32-0735-00-062
Pond Alternative-1: Pond 15A is recommended for Basin 15. Pond 15A could provide treatment, attenuation, floodplain compensation and compensation for possible elimination for Orange County Pond M-1.		

1.0 INTRODUCTION

The vision of this enhanced west-east corridor has been documented in prior concept studies prepared by CFX including the S.R. 408 Eastern Extension Concept Development and Evaluation Study completed in 2008. The limits of this study generally extend from the current terminus of S.R. 408 at S.R. 50 to the vicinity of the S.R. 50/S.R. 520 intersection. The project location and vicinity are shown in **Appendix-A**. The preferred alignment for Segment 1 and Segment 2/3 and the proposed typical sections are provided in **Appendix-D**. The S.R. 408 Eastern Extension is one of Florida's Strategic transportation investments to support future growth and create connections between global trade activities, from the Orlando International Airport, and the University of Central Florida to Cape Canaveral.

This report discusses and analyzes the stormwater management plan for the project. The report identifies potential pond locations and discusses the right-of-way requirements associated with the recommended pond sites. A description for each of the proposed pond sites is in Section 5.2 of this report. Recommended and alternate pond site exhibits are located in **Appendix-E**.

Within the project vicinity, S.R. 50 is functionally classified as a major arterial facility and provides an important connectivity function between the Orlando area to the west and I-95 just south of Titusville to the east. As traffic continues to grow within the study area due to the projected development in the area, it is essential to maintain adequate mobility for the region. A new expressway facility not only improves mobility but significantly reduces the existing exposure to at-grade conflict points associated with traffic signals and local access issues. In summary, the proposed S.R. 408 Eastern Extension Project greatly enhances Central Florida's regional expressway needs and provides the initial phase of the ultimate vision of an expressway connection from Orlando to I-95.

2.0 PROJECT DESCRIPTION

The CFX is presently evaluating the potential expansion of S.R. 408 from its current eastern terminus at S.R. 50 (East Colonial Drive) and Challenger Parkway to S.R. 520 in northeastern Orange County. The recommended seven-mile eastern extension of S.R. 408 would constitute the initial stage of providing a west-east high-speed corridor with future connectivity to I-95, enhancing safety, capacity and mobility for the region and CFX customers. After a comprehensive evaluation process, the preferred alternative was selected as being the most effective option within the project study area. Upon completion of the generation of various typical sections, horizontal alignment combinations, and public involvement effort a recommended alternative was selected. Please refer to the recommended alignment in **Appendix-D**.

The proposed S.R. 408 Eastern Extension project is divided into three segments based on the land use characteristics. Segment 1 is more urban in nature and exhibits a higher traffic demand than Segments 2 and 3. Segment 1 is from beginning of the S.R. 50/S.R.

408 interchange to Avalon Park Boulevard. Segments 2 and 3 exhibit more of a rural tendency, beginning east of Avalon Park Boulevard to S.R. 520 at the east end of the study area.

3.0 DESIGN CRITERIA

The design of stormwater management facilities for this project are governed by the rules and criteria set forth by the St. Johns River Water Management District (SJRWMD) and the FDOT. The following criteria was obtained from the 2013 SJRWMD Applicant's Handbook and 2016 FDOT Drainage Manual.

Water Quality and Pond Recovery

- Wet Detention (SJRWMD)
    1. Water quality treatment – Greater of 1" over the total basin or 2.5" over the impervious area
    2. Recovery – One-half the treatment volume within the first 24 to 30 hours

- Dry Retention (on-line) SJRWMD
    1. Treatment - Greater of 1" over the basin or 1.25" over the impervious area
    2. Recovery - Treatment volume within 72 hours

- Outstanding Florida Water (OFW): Treat an additional fifty percent of the runoff volume

- Econ River Hydrology Basin Criteria (SJRWMD)
    1. Mean annual storm (2.3-year return period) with a total 24-hour rainfall depth of 4.5 inches.
    2. 25-year return period

Water Quantity

- Open basin post-development peak discharges shall be at or below pre-development peak discharge for the 25-year/24-hour storm event.

Pond Design (FDOT Criteria)

- Ponds shall be designed to provide a minimum 20-foot of horizontal clearance between the top edge of the normal pool elevation and the right-of-way line. Maintenance berm shall be at least 20-feet with a slope of 1:8 or flatter.
- Corners of ponds shall be rounded to provide an acceptable turning radius for maintenance equipment (30-foot minimum inside radius).
- At least 1-foot of freeboard is required above the maximum design stage of the pond below the front of the maintenance berm.

4.0 EXISTING CONDITIONS

The proposed S.R. 408 Eastern Extension corridor is located within the jurisdiction of the St. Johns River Water Management District (SJRWMD) and hydrologically within the Big Econ Drainage Basin. The project discharges into the Econ River, which is a tributary of the St. Johns River. The Econ River is an Outstanding Florida Waters. The Econ River drainage basin drains from the south to the north. The on-site drainage basins are all open basins draining to the Econ River. The S.R. 408 Eastern Extension corridor is divided into 15 basins for stormwater management. The basin limits are shown in **Table-3**. The basin divides were based on a conceptual S.R. 408 Eastern Extension profile with high points and low points. The same basin divide limits were used for the proposed condition as well. An existing condition drainage map was not prepared for this report, since the on-site basin limits and right-of-way width are the same for the existing and proposed condition. Offsite drainage patterns remain the same. A general description of each existing basin is provided in **Section 4.4**.

Table-3 Summary of Existing and Proposed Condition Basin Limits

Basin Name	From Station	To Station	Outfall Location
Basin 1	380+15	404+95	Basin 1 discharges to the east of the proposed ramp into the Unnamed Econ River Tributary(1).
Basin 2	404+95	441+95	Basin 2 discharges into low areas of wooded forest that flows into the Unnamed Econ River Tributary(1).
Basin 3-4	441+95	478+50	Basin 3-4 flows to the South into the Unnamed Econ River Tributary(1).
Basin 5	478+50	498+00	Basin 5 discharges into the Unnamed Econ River Tributary(2).
Basin 6-8	498+00	552+23	Basin 6-8 discharges into wetlands that flow into the Unnamed Econ River Tributary(2).
Basin 9-10	552+23	579+95	Basin 9-10 discharge into wetlands that flow west into the Econ River.
Basin 11A	579+95	602+80	Basin 11A discharges into wetlands that flow west into the Econ River.
Basin 11B	4012+98	4037+37	Basin 11B discharges into wetlands that flow west into the Econ River.

Table-3 Summary of Existing and Proposed Condition Basin Limits (continued)

Basin Name	From Station	To Station	Outfall Location
Basin 11C	602+80	629+50	Pond 11C2 discharges into wetland that flow west into the Econ River. Pond 11C, 11C3 and Pond 11C4 discharge into Channel E.
Basin 12	629+50	661+10	Pond 12A discharges into Channel E and Pond-12B discharges into Channel A.
Basin 13	661+10	701+95	Basin 13 discharges into Channel A.
Basin 14	701+95	714+10	Basin 14 discharges into wetlands that flows west into the Econ River.
Basin 15	714+10	746+00	Pond 15A discharges into Channel KE and Pond 15B discharges into Channel M.

4.1 SOIL DATA

The NRCS Soil Survey of Orange County published by United States Department of Agriculture (USDA) has been reviewed for the project. The soil survey map, obtained from the NRCS USDA Soil Survey, for the project is shown in **Appendix-A**. The soil report for this project is also provided in **Appendix-C**. In general, the surficial soils consist of fine sand, mucky fine sand, muck and poorly drained soil. In general, the groundwater is at a depth of 0’ to 3.5’ below the existing ground. **Table-4** outlines the most occurring soils within the offsite pond area.

Table-4 USDA NRCS Soil Survey Information

Soil No.	Orange County USDA Soil Name	Depth to Water Table (inches)	Hydrologic Soil Group
3	Basinger Fine Sand	0	A/D
15	Felda Fine Sand	0 to 6	A/D
20	Immokalee Fine Sand	6 to 12	B/D
34	Pomello Fine Sand	24 to 42	A
37	St. Johns Fine Sand	6 to 12	B/D
42	Sanibel Muck	0	A/D
44	Smyrna-Smyrna, Wet, Fine Sand	6 to 18	A/D
51	Wabasso Fine Sand	6 to 18	B/D
53	Wauberg Fine Sand	0 to 6	D
54	Zolfo Fine Sand	24 to 42	A

4.2 LAND USE

The existing land use along the proposed S.R. 408 Eastern Extension corridor consists mostly of residential developments and undeveloped areas. The residential areas consist of both multi-family and single-family residences. The undeveloped areas are mostly wetlands and upland forests with conservation easements. Please refer to **Appendix-A** for a Land Use Map.

4.3 EXISTING CROSS DRAINS

Considering this is a new alignment, there are not any existing cross drains or bridge structures for review. However, existing cross drains upstream and downstream of the proposed alignment were taken into consideration to maintain functionality and to verify the recommended improvements do not adversely impact the overall drainage function. Refer to **Table-5** for existing S.R. 50 cross drain information. The S.R. 50 Straight Line Diagram is in **Appendix-P** and identifies each S.R. 50 cross drain**.** The culvert size and 50-Year DHW elevations were obtained from the construction plans in **Appendix-Q**, **Appendix-R**, and **Appendix-S**. There is no evidence of scour or sedimentation for any existing cross drain along S.R. 50. Refer to **Appendix-X** for photos of the existing S.R. 50 cross drains.

Table-5 Existing S.R. 50 Cross Drain General Information

Cross Drain ID	Pipe Description	50-Year DHW EL (ft)	Date of Construction
S.R. 50 CD-1	2-8’x6’ CBC	58.57	2012
S.R. 50 CD-2	2-24” RCP	53.53	2012
S.R. 50 CD-3	2-12.95’x8.5’ CBC	50.04	2012
S.R. 50 CD-4	1-30” RCP	54.68	2012
S.R. 50 CD-5	3-10’x6’ CBC	43.70	1960
S.R. 50 CD-6	3-36” RCP	59.10	1960
S.R. 50 CD-7	1-4’x4’ CBC & 1-54” RCP Jointed	59.10	1960
S.R. 50 CD-8	1-30” RCP	66.50	1960
S.R. 50 CD-9	1-8’x7’ CBC	54.80	1960
S.R. 50 CD-10	1-10’x4’ CBC	60.80	1960
S.R. 50 CD-11	1-24” RCP	61.60	1960

4.4 EXISTING DRAINAGE BASIN CHARACTERISTICS

Basin 1 begins at station 380+15 and ends at 404+95, which is just south of the S.R. 408 and S.R. 50 interchange. This basin includes the existing S.R. 408 east and west bound lanes. Stormwater treatment and attenuation for Basin 1 is provided in existing Pond 11. This segment of project was initially permitted in 1987 by CFX with SJRWMD (Permit #4-095-20358-2). Subsequently, this permit was modified to accommodate various design modifications such as the recent S.R. 50 widening project at the S.R. 408 Interchange. Existing Pond 11 outfalls east towards the wetlands into Unnamed Econ River Tributary(1) that ultimately drains into the Econ River.

Basin 2 begins at station 404+95 and ends at station 441+95. The beginning of the basin includes the portion of S.R. 408 at the S.R. 50 interchange. The end of the basin cuts through part of the existing Winn-Dixie Supermarket. The middle part of the basin traverses through wooded areas. This basin also cuts through one of the three existing Orange County ponds (**Appendix-E**) that is located south of the Volkswagen Car Dealership. The existing Orange County ponds are wet retention ponds that were donated to the county by the Waterford Lakes development. Additional information about these ponds are not available at this time. Runoff from this basin generally flows into low areas of the wooded forest to the Unnamed Econ Tributary(1) and ultimately drains into the Econ River.

Basin 3-4 were merged as a single basin to evaluate alternative pond sites.

Basin 3, from station 441+95 to station 456+20, consists of upland forests, which are located within Flood Zone A. This basin contains Unnamed Econ River Tributary(1), which flows north to the Econ River and crosses S.R. 50 via an existing double 12.95’ wide by 8.5’ high box culvert crossing.

Basin 4, from station 456+20 to station 478+50, consists of residential and commercial developments as well as upland forests. The general flow of this basin is to the southeast and ultimately to the Econ River. The residential area includes the Deerwood Manufactured Home Community as well as single family housing. Compass Self Storage is located within the basin. There are SJRWMD permits for both Deerwood Manufactured Home Community and Compass Self Storage, 4-095-20418 and 40C-100527, respectively. The basin generally flows to the south to Unnamed Econ River Tributary(1).

Basin 5 begins at station 478+50 and ends at station 498+00. Basin 5 includes the Deerwood Manufactured Home Community east of Pell Street, upland forests and wetlands to Avalon Park Blvd. As previously stated, the Deerwood Manufactured Home Community is permitted under SJRWMD permit 4-095-20418. The upland forest and wetland areas are permitted under SJRWMD permit 40C-20959 as part of the Colonial Sunflower development. This basin discharges into Unnamed Econ River Tributary(2), which flows north to the Econ River and crosses Avalon Park Boulevard via an existing seven barrel 8’ wide by 5’ high box culvert crossing.

Basin 6-8, begins at station 498+00 and ends at station 552+23, which continues from Avalon Park Boulevard east to middle of Econ River. Basin 6-8 is a mixed land use of upland forests, wetlands, and residential areas. The upland forest and wetland areas are permitted under SJRWMD permit 40C-20959 as part of the Colonial Sunflower development. This basin consists of Unnamed Econ River Tributary(2), which flows north to the Econ River and crosses Faberge Drive via an existing four barrel 34" x 53" ERCP culvert crossing. The upland forest and wetland areas further east of the basin is permitted under SJRWMD permit 40C-20959 as part of the northeastern-most portion of the Colonial Sunflower development. The runoff from this basin flows south to the Econ River and crosses Faberge Drive via an existing four barrel 34" x 53" ERCP culvert crossing. The remaining segment of the basin that crosses a portion of the Econ River is in a floodway (Zone AE). The previous Old Cheney Highway bridge crossing the Econ River serves as the basin boundary. The existing bridge has since been removed.

Basin 9-10 were merged together as a single basin to evaluate alternative pond sites.

Basin 9, from station 552+23 to 569+20, crosses the Econ River and consists of floodplains (Zone AE). The previous Old Cheney Highway bridge crossing the Econ River serves as the basin boundary for these two basins. The existing bridge has since been removed.

Basin 10, from station 569+20 and to station 579+95, includes wooded areas and rural residential land uses from Hamilton Drive to Lockwood Drive. This basin generally drains west to the Econ River.

Basin 11 begins at station 579+95 and ends at station 629+50. This basin is a large basin, therefore, it is further sub-divided into Basins 11A, 11B and 11C. Basin 11B, from station 4012+98 to 4037+37, represents the C.R. 419 Extension and access road to East River High School, while Basins 11A and 11C represent the S.R. 408 Extension and interchange. Basin 11A is from station 579+95 to 602+80 while Basin 11C is from station 602+80 to 629+50.This basin includes rural residential, commercial, upland forests and wetland land uses. It follows the east bank of the Econ River before starting a gradual turn to the east and ending west of Pine Isle Drive. The runoff from this basin generally drains west to the Econ River.

Basin 12 begins at station 629+50, west of Pine Isle Drive and ends at station 661+10 near Cochran Trail. The basin also crosses an auto junk yard and small modular home community. Some of the basin runoff drains into Channel E and the rest of the basin runoff drains to Channel A; both channels drain into the Econ River.

Basin 13 begins at station 661+10 and ends at station 701+95. Picking up at Cochran Trail, Basin 13 continues east to North 5th Street. This basin is predominantly agricultural land use. The runoff from this basin generally flows west in Channel A, which flows into the Econ River.

Basin 14 begins at station 701+95 and ends at station 714+10. Continuing east from

North 5th Street, Basin 14 consists of rural residential areas and ends at County Road 13. The runoff from this basin generally flows west towards the Econ River.

Basin 15 begins at station 714+10 and ends at station 746+00. The basin traverses eastward through some residential areas and finally ties into S.R. 50. The basin mainly consists of wooded areas and some residential areas. The basin also impacts existing Orange County Pond M-1. Runoff from this basin generally drains into collection ditches that are a part of Channel KE and Channel M, which flow into the Econ River. The historical conveyance flow path and existing channels identified in the Bithlo Area Stormwater Management Master Plans at this basin location are depicted in the drainage overview map (**Appendix-E**).

5.0 PROPOSED CONDITIONS

The stormwater runoff from proposed impervious areas will be treated in existing and proposed stormwater facilities. The runoff from the proposed alignment will be collected in roadside swales and closed storm sewer systems, then directed to stormwater ponds for each respective basin. Water quality treatment and attenuation will be achieved from the construction of new wet detention ponds and the expansion of existing ponds. There is a total of 15 basins within the project limits.

The proposed design will incorporate a 300-ft right-of-way from the existing S.R. 408 interchange to the end of the project at S.R. 50. The C.R. 419 extension will maintain a right-of-way of approximately 102 ft from the interchange to S.R. 50.

Two alternative pond sites were evaluated for each basin. Based on the pond alternative evaluation matrix analysis, a preferred pond site was selected. The preferred pond sites were selected based on the cost for pond right-of-way acquisition, wetland and floodplain impacts, and site contamination. The final preferred pond sites for each basin are provided in the Pond Alternative Evaluation Matrices (**Page 5**).

5.1 METHODOLOGY OF POND DETERMINATIONS

Based on the available information, only hydraulically feasible and environmentally permittable pond sites were considered for the final preferred pond locations. Potential pond sites were analyzed and evaluated using the following parameters:

- Hydrologic and hydraulic factors such as existing ground elevations, soil types, estimated seasonal high water table (SHWT) established by a review of the USDA NRCS soils and geotechnical investigations, stormwater conveyance feasibility, allowable hydraulic grade line (HGL), and basin outfalls
- Cultural resource impacts
- Environmental resource impacts, including wetlands and threatened or endangered species
- Floodplain impacts
- Major utility conflict potential

- Hazardous materials and contamination

Please note that the information for environmental impacts, cultural resource impacts, and hazardous materials and contamination impacts are included in the Pond Alternative Evaluation Matrices (**Page 5**).

Pond Site Determination and Sizing

Most of the proposed pond sites are located on remnant parcels from the proposed S.R. 408 alignment. The alternative ponds sites were proposed in areas that have minimal impacts to wetlands, residential areas, and floodplains. Pond sites were also identified based on the ownership of the property; sites that are owned by CFX, Orange County, and the Orange County School Board are easier to acquire. All proposed ponds were designed as wet detention ponds.

Each pond size was estimated based on the best available data from each pond site location. Seasonal high water table (SHWT) elevations at each pond site were estimated based on the soil type from USDA NRCS Soil Survey for Orange County and SHWT from existing permits. Please refer to **Table-4** for soil type and the Pond Analysis Summary Table (**Page 41**) for estimated SHWT elevations for each respective pond.

The following method was used to determine the pond size:

1. Total basin area and impervious areas for pre and post development conditions were determined. Total basin areas for pre and post development conditions are the same.
2. Per CFXs' request, the entire 64' median was assumed as an impervious area for sizing the ponds for consideration of eventual build-out.
3. Pre and post development runoff volume was calculated using the SCS runoff calculation method, for 25yr-24hr storm (SJRMWD) and critical duration storms (FDOT) for 100yr-240hr and 100yr-8hr.
4. Maximum attenuation volume produced by the storm events mentioned above was calculated by the difference between post and pre development runoff.
5. Water quality volume based on SJRWMD criteria of 1" over the total basin or 2.5" over the impervious areas were calculated. An additional 50% treatment volume was added to the largest treatment volume since this project discharges into an OFW.
6. Both calculated attenuation volume and water quality treatment volume were added together to compute the total storage volume required for sizing the pond. This is a conservative approach to add both treatment and attenuation volume to size the pond.
7. Side slopes of 1:4 and 1-ft freeboard was used. The 1-ft freeboard is between the inside edge of the berm and the (treatment + attenuation) stage.
8. Maintenance berm width was kept at 20-ft wide.
9. Based on the SHWT elevation from USDA NRCS Soil Survey report and SHWT from existing project ponds. The ponds were sized using a volumetric method.

5.2 PROPOSED DRAINAGE BASINS AND PONDS

The preferred alternative was ultimately determined to be the most ideal corridor for the extension of S.R. 408. The roadway geometry is limited in order to minimize impacts and meet the requirements for the proposed design speed. The proposed design speed from the beginning of the project to the east side of Avalon Park Blvd is 65 mph and from the east side of Avalon Park Blvd to the end of the project the design speed is 70 mph. Different interchange layouts and considerations were made to provide alternative conceptual designs. Pond locations were determined once the alignment and the most effective interchange layouts were identified. All ponds were designed to be wet detention ponds and all on-site basins are open basins. The proposed corridor consists of many bridges. This has resulted in the profile being elevated. The elevated profile will accommodate the conveyance swales or closed drainage system above the proposed cross drain structure without any conflict, before discharging into respective stormwater treatment ponds.

Basin 1

This basin includes portions of the proposed on and off ramps and the new alignment that turns towards the east. Runoff from the proposed new alignment mainline and ramps will be treated in the same existing Pond-11 by expanding it. Due to the geometry of the proposed interchange, the existing Pond-11 will be expanded and divided into 3 separate infield ponds connected by equalizer pipes. The proposed ponds are named Pond 1A, 1B and 1C. The storage volume for all three ponds is sufficient enough to provide required treatment and attenuation for Basin-1. The existing outfall structure will remain at the same location, where it discharges to the wooded areas to the east. However, the control structure will have to be modified if necessary to accommodate additional runoff from the proposed alignment. The existing SJRWMD Permit #20358-24 for Pond-11 will need to be modified. An alternate pond site is not required since proposed Pond 1A, 1B, and 1C are located within CFX right-of-way. Refer to the Alternative Pond Site Map (**Appendix-E**) for the location of existing Pond-11 and the proposed Ponds 1A, 1B, and 1C. Existing Waterford Lakes Town Center Pond-98 (Permit # 19979-39) might be impacted by this project. Coordination with the Town Center should take place during the final design to mitigate the impact.

Basin 2

The proposed S.R. 408 Eastern Extension alignment will turn towards the east just south of the Volkswagen dealership. This basin will include on and off ramps from existing S.R. 408 to the proposed S.R. 408 Eastern Extension alignment. The new alignment will fill in one of the three wet retention ponds owned by Orange County. According to Orange County, these 3 ponds were donated to the county by Waterford Lakes. Additional information about these existing ponds are not available at this time. The impacted Orange County pond can be compensated in either one of the alternate Ponds 2B or 2C. The other option for compensation is to reshape the other two existing Orange County Ponds; however, reshaping the existing ponds could cause wetland and floodplain impacts. The existing Orange County ponds were not considered as joint use ponds, since they will create floodplain and wetland impacts. However, details about the existing ponds and using them as joint use ponds should be explored during the final design. The proposed alignment also will have minor impact to the existing University Medows Pond-A. This impact is very minor and this can be compensated in the proposed pond. Two alternative pond sites were identified for this basin as Pond 2B and Pond 2C. Runoff for Basin 2 will be collected in roadside swales and shoulder gutter inlets at the bridge approaches before discharging into the alternate ponds 2B or 2C. Pond 2B is located on property owned by the Orange County School Board and Pond 2C is located on a private property that contains a Winn-Dixie Supermarket. Based on the pond alternative evaluation matrix analysis, Pond 2B is the preferred pond site. Pond 2B was selected due to cost savings and willingness of the Orange County School Board to work with the project for land acquisition. Pond 2B also provides a large quantity of floodplain compensation.

Basin 3-4 were merged as a single basin to evaluate the alternative pond sites.

Two alternate pond sites, Pond 3A and 3B, were identified for Basin-3. Pond 3A is located on remnant parcels that will be impacted by the proposed S.R. 408 corridor. Pond 3B is located on a private property away from the project corridor. Drainage for Pond 3B could be conveyed through a stormsewer drainage system along Lone Palm Road south of the Waterford Creek Subdivision. Runoff for Basin 3 will be collected in a closed drainage system utilizing shoulder gutter due to the embankment requirements for the construction of the overpasses for Bridgeway Blvd. and Lone Palm Road. Three 12’ wide x 6’ high box culverts will be necessary to maintain flow of the wetlands from the south to the north in the middle section of the basin. Based on the pond alternative evaluation matrix analysis, Pond 3A is selected as the preferred pond site.

Two alternate pond sites, Ponds 4A and 4B, were identified for Basin-4. Pond 4A is located within vacant remnant parcels and Pond 4B is located on the remnant parcel of the self-storage facility. Based on the pond alternative evaluation matrix, Pond 4A is the preferred site. There is a possibility to merge the existing treatment pond (self-storage facility) with the proposed Pond 4B. Depending on the final acquisition of the self-storage facility, the merging of existing pond and proposed Pond 4B shall be investigated. Coordination with the Self-Storage Facility should take place during final design to re-establish the impacted drainage system. The roadway runoff will be collected in a closed drainage system utilizing shoulder gutter due to the embankment requirements for the construction of the overpasses for Lone Palm Road, Fricke Ave and Pel Street. The close proximity of Pond 4A to Pond 3A provides an opportunity to have single treatment facility for the combined basins. Based on the pond alternative evaluation matrix analysis, interconnecting both Ponds 3A and 4A is the preferred option due to its close proximity and cost. Combination of closed drainage system and conveyance swales will be required to drain the roadway runoff into selected pond sites. Conveyance swales and closed drainage system located at the elevated roadway profile will not be conflicting with cross drains while draining the runoff into the stormwater ponds.

The Deerwood mobile home community internal drainage system will be impacted by the proposed roadway alignment. During the final design, necessary measures should be taken to minimize impact to this community's drainage system and to re-establish the impacted system.

Basin 5

Basin 5 begins at Pel Street and ends at Avalon Park Blvd. Two alternative pond sites, Pond 5A and Pond 5B, were identified for this basin. Both ponds are located within floodplains; compensation for the floodplain impacts could be provided in the ponds itself. The maintenance berms will tie to the existing ground; therefore, there will not be any anticipated floodplain impacts from the construction of these two ponds. The roadway runoff will be collected in a closed drainage system utilizing shoulder gutter due to the embankment requirements for construction of the overpasses for Pel Street and Avalon Park Blvd. Based on the pond alternative evaluation matrix, Pond 5B is the recommended pond location to serve Basin 5 since the pond site will not impact wetlands. Pond 5B will also be able to provide water quality, attenuation, and floodplain compensation. Pond 5A is identified as an alternate pond site.

Basin 6-8

Four pond sites are identified for this basin. A larger Pond 6B located south of the proposed corridor is the recommended site. The larger Pond 6B could provide the required treatment/attenuation volume and floodplain compensation for the entire basin. Pond 6B is located at the low point of the profile. The other alternative ponds are Pond 6A, 7A and 7B. Both Ponds 6A and 7A are located within the remnant parcels from the S.R. 408 corridor. Both ponds will be able to provide treatment, attenuation and some flood plain compensation since Pond 6A is adjacent to a floodplain. The roadway runoff will be collected in a closed drainage system utilizing barrier wall inlets and shoulder gutter inlets due to the embankment requirements for the construction of the overpasses at Avalon Park Blvd., Caudle St., and Colonial Dr. The western portion of the basin is in Flood Zone A and the ponds will be sized to include floodplain compensation. Avalon Park Subdivision Pond-C will be completely impacted by the proposed roadway alignment. The total impact to existing Pond-C is 2.2 ac-t. Compensation for this minor impact will be provided in the selected pond. The Avalon Park Permit #70394-1 will need to be modified for impacting existing Pond-C.

Pond 7B is located on an Orange County School Board property and does not have any significant impacts to wetland or floodplain. The roadway runoff will be collected in a closed drainage system utilizing barrier wall inlets and shoulder gutter inlets due to the embankment requirements for the construction of the overpasses at Colonial Dr. and Old Cheney Highway/Perdido Dr. Avalon Park subdivision Pond-J will not be impacted by the proposed S.R. 408 alignment.

Runoff from the bridge structure will be collected and conveyed to the recommended pond site through a closed drainage system. Bridge scuppers shall be used when the spread cannot be contained within the shoulder. Floodplain impacts and wetland impacts are not anticipated at the bridge location, since the bridge will completely span over the river and floodplain. Only minor impacts are anticipated due to the bridge pier columns. No ponds were identified at the bridge location due to insufficient right-of-way availability and potential impact to wetlands and floodplains. Based on the pond alternative evaluation matrix, the preferred pond site for Basin 6-8 is Pond 6B. Pond 6B is a large pond that could provide required treatment, attenuation, large storage volume for floodplain compensation and compensation for impacted Avalon Park Pond C.

Bridge structures are not proposed at Sherman St and Caudle St. This will eliminate access to the homes located south of the SR 408 corridor. Since there will be no access to these home, it is our recommendation to purchase all the parcels and place stormwater Pond 6B as one alternative. For the second alternative, combination of Ponds 6A, 7A and 7B could be used.

Basin 9-10 were merged together and evaluated as a single basin

Basin 9 crosses the Econ River with a bridge structure. Runoff from the bridge will be collected and conveyed to one of the two alternate Ponds, 9A or 9B. Bridge scuppers shall be used when the spread cannot be contained within the shoulder. Both Ponds 9A and 9B are located within remnant parcels from the S.R. 408 corridor. Both ponds will have floodplain impacts and will be compensated for in the pond itself. Based on the pond alternative evaluation matrix, Pond 9B is the preferred pond site since it will have less impact to residential properties.

Basin 10 is divided between Hamilton Drive and Lockwood Drive. Two alternate pond sites were identified for this basin, Pond 10A and Pond 10B. Both ponds are located in the remnant parcel from the S.R. 408 alignment. Neither ponds have any environmental impacts. Runoff from the proposed S.R. 408 Eastern Extension alignment will be collected by shoulder gutters and will drain into either proposed ponds. Based on the pond alternative evaluation matrix, pond 10B is the preferred pond site since it will have less impact to residential properties.

Interconnecting Pond 9B and Pond 10B provides an opportunity for a single treatment facility. Based on the pond alternative evaluation matrix analysis, Pond 9B and Pond 10B were selected as the preferred option since there is less impact to residential properties, more economical, and the two ponds are in close proximity to be interconnected.

Basin 11A, Basin 11B and Basin 11C

Basin 11 is a large basin. For better evaluation, the overall Basin 11 is divided into Sub-Basins 11A, 11B and 11C. These basins are located between Lockwood Drive to just west of Palm Isle Drive. The basins span over a mile long and will require multiple ponds to meet the treatment and attenuation needs. Basin 11 is predominantly rural residential with some agriculture and wetlands. A portion of the S.R. 408 Eastern Extension alignment crosses a tributary of the Econ River and will require floodplain compensation. The proposed alignment will tie into the C.R. 419 Extension to provide direct access to and from C.R. 419. All the ponds will discharge to the Econ River tributaries.

Basin 11A, includes the S.R. 408 and C.R. 419 interchange areas and a small portion of the C.R. 419 extension. The infield ponds (Pond 11A1, Pond 11A2, and Pond11A3) are located within the proposed CFX R/W for the S.R. 408 corridor. Alternative 1 includes the three infield ponds and one offsite pond (Pond 11A4) that will be interconnected. Pond 11A4 is located on an existing plant nursery and will have some wetland impact. Alternative 2 will consist of an independent Pond 11A5. Pond 11A5 is located south of the interchange on a property that will be impacted by the S.R. 408 corridor. Most of Pond 11A5 is located on a private property that will be impacted by the S.R. 408 corridor; therefore, the parcel could be purchased together with the roadway R/W acquisition. Alternative 1 is selected as the recommended option since this option will use infield ponds that already within the road right-of-way and it will be cost effective.

Basin 11B will consist of the proposed C.R. 419 extension. The basin begins just before the proposed cross drain #7 and ends at S.R. 50. This basin includes the future access road to the East River High School. Two alternate pond sites have been identified for this basin, Pond 11B1 and Pond 11B2. Pond 11B1 is selected as the preferred pond site since the pond site is located within the parcel owned by the FDOT and there are less wetland impacts. Please refer to Pond Alternative Evaluation Matrices on **Page 5**.

Basin 11C is located south of the proposed S.R. 408 and C.R. 419 interchange. Two alternative pond sites were identified for this basin, Pond 11C and Pond 11C2. Pond 11C2 is located at the low point of the basin, however the pond area is mostly in a wetland. Due to high SHWT at this pond site, the pond could not provide sufficient storage volume for treatment and attenuation. Even though Pond 11-C is located closer to the higher point of the profile, it still could provide required treatment and attenuation storage. Since the low point of the roadway profile is still higher than the pond ground elevation, the roadway runoff could be conveyed to Pond 11C through a closed drainage system from the low point of the profile.

Pond 11C was selected as the preferred pond since it is more economical, and has no impacts to residential properties or wetlands. Please refer to Pond Alternative Evaluation Matrices (**Page 5**) for further details. Two additional ponds (Pond 11C3 and Pond 11C4) are proposed in this basin to provide floodplain compensation exclusively. Pond 11C4 site is currently used as an auto part junk yard; therefore, some contamination is expected at the site. Since this site is located within a floodplain and is impacted by the S.R. 408 corridor, it is practical to assume that the rest of the parcel could be used for a floodplain compensation pond. This option is only viable depending on the final sale of the parcel. Pond 11C3 is other floodplain compensation pond identified for this project. Since the roadway alignment in Basin 11C produce large amount of floodplain impact, it is our recommendation to use both Pond 11C4 and 11C3 as floodplain compensation ponds.

Basin 12

Basin 12 begins just west of Palm Isle Drive and ends south of Cochran Trail. This basin consists of rural residential, agricultural, and wetlands. This basin also crosses a tributary of the Econ River at the east end. This location will require floodplain compensation to mitigate the impacts of the mainline S.R. 408. Two alternate pond sites were identified for this basin, Pond 12A and 12B. Both ponds are located within the remnant parcels from the S.R. 408 alignment. Based on the pond alternative evaluation matrix, Pond 12A was selected as the preferred pond location. Pond 12A will not impact residential properties, the parcel is larger, and the parcel is more economical.

Basin 13

Basin 13 begins south of Cochran Trail and ends at South 5th Street. This basin is predominantly agricultural. Runoff will be collected in roadside swales and conveyed to one of the two alternative ponds, Ponds 13A or 13B, identified for this basin. Both pond sites are vacant agricultural properties adjacent to the mainline. Pond 13B is located within remnant portions of property necessary for mainline S.R. 408. Pond 13B will have minor wetland impacts. Based on the pond alternative evaluation matrix, Pond 13B will be the preferred site, since it is located closer the low point of the profile and mainly consist of remnant parcel from S.R. 408.

Basin 14

Basin 14 begins at South 5th Street and ends at C.R. 13. This basin is predominantly rural residential. Two alternate pond sites are identified for this basin, Ponds 14A and 14B. These ponds will be placed within the remnant parcels from the S.R. 408 Eastern Extension corridor. No environmental impacts are identified for these ponds. Based on the pond alternative evaluation matrix, Pond 14A will be the preferred site. Pond 14A will have less impact to residential properties.

Basin 15

This is the last basin of the project. Two alternate ponds were identified for this basin, Pond 15A and Pond 15B. Pond 15B will be interconnected with modified Orange County Pond M-1, Pond M-2 and Pond M-3. The interconnected ponds could be used as a joint use ponds with Orange County. Based on the pond alternative evaluation matrix, Pond 15A is selected as the preferred option for this basin. Preliminary investigation suggests that Orange County Ponds M-2 and M-3 have additional storage capacity. The existing control structures for Ponds M-2 and M-3 will need to be modified to provide additional storage capacity. This basin includes on and off ramps from S.R. 50. The proposed roadway alignment in Basin 15 will impact portion of existing Orange County Pond M-1. Pond M-1 was constructed together with Pond M-2 and Pond M-3 by Orange County to provide flood relief for the adjacent areas and for the Bithlo South Basin. All three ponds are interconnected and discharge into Channel M. Please refer to **Appendix-J** for an excerpt from the Bithlo – Christmas Master Drainage Plan for additional information about Pond M-1. Based on our preliminary investigation, these ponds only provide flood attenuation and not water quality. Pond M-1 is connected to Channel KE which conveys runoff from north of S.R. 50 and drains to Channel M which eventually discharges to Econ River. The proposed roadway will sever the connectivity between Pond M-1 and Channel KE (Bithlo South Basin). Culvert #13 will be placed to reestablish connectivity between Pond M-1 and Channel KE (please refer to Location Hydraulic Report). The bypass ditch from Channel KE to Pond M-1 will be dissected by the westbound and eastbound ramps.

To re-establish the ditch connection 1-48" pipe will be placed. A portion of Pond M-1 will be filled in by the east bound lane. Compensation for filling in Pond M-1 will be provided in alternative Pond 15A by diverting flow from Channel KE and maintaining the historical flood relief in this area. Further investigation and coordination with Orange County is necessary during the final design. Please refer to the drainage maps for locations of the Orange County Ponds M-1, M-2, and M-3.

5.3 TAILWATER DETERMINATION

Preliminary tailwater elevations were determined by taking the average of the existing ground elevations and the 100-year elevations. These preliminary tailwater elevations at each pond location could be used for future pond designs and routing analyses. This tailwater elevation shall be verified based on survey data, and field indications such as stain marks shall be obtained during the design phase. Refer to **Table-6** for preliminary tailwater elevations.

Table-6 Preliminary Tailwater Elevations

Basin	Pond	100-year EL (ft)	DHW EL (ft)	Existing Ground EL (ft)	Tailwater EL (ft)	Source
1	1A	-	60.20	61.0	60.60	SJRWMD Permit #20358
	1B	-	60.20	61.0	60.60	SJRWMD Permit #20358
	1C	-	60.20	61.0	60.60	SJRWMD Permit #20358
2	2B	52.70	-	58.0	55.35	Big Econ Master Plan
	2C	52.70	-	56.0	54.35	Big Econ Master Plan
3-4	3A	52.70	-	55.0	53.85	Big Econ Master Plan
	3B	52.70	-	56.0	54.35	Big Econ Master Plan
	4A	52.70	-	55.0	53.85	Big Econ Master Plan
	4B	-	58.00	58.0	58.00	SJRWMD Permit #100527-1
5	5A	53.70	-	52.0	52.85	Big Econ Master Plan
	5B	53.70	-	53.0	53.35	Big Econ Master Plan
6-8	6A	53.04	-	55.0	54.02	SJRWMD Permit # 70394-1
	6B	53.04	-	56.0	54.52	SJRWMD Permit # 70394-1
	7A	50.00	-	55.0	52.50	SJRWMD Permit #70394
	7B	50.00	-	55.0	52.50	SJRWMD Permit #70394
9-10	9A	52.60	-	49.0	50.80	Big Econ Master Plan
	9B	52.60	-	49.0	50.80	Big Econ Master Plan
	10A	63.56	-	64.0	63.78	SJRWMD Permit #27625-4
	10B	52.60	-	49.0	50.80	Big Econ Master Plan
11A	11A1	63.56	-	63.0	63.28	SJRWMD Permit #27625-4
	11A2	63.56	-	63.0	63.28	SJRWMD Permit #27625-4
	11A3	63.56	-	64.0	63.78	SJRWMD Permit #27625-4
	11A4	63.56	-	65.0	64.28	SJRWMD Permit #27625-4
11B	11B1	63.56	-	60.0	61.78	SJRWMD Permit #27625-4
	11B2	63.56	-	63.0	63.28	SJRWMD Permit #27625-4

Table-6 Preliminary Tailwater Elevations (Continued)

Basin	Pond	100-year EL (ft)	DHW EL (ft)	Existing Ground EL (ft)	Tailwater EL (ft)	Source
11C	11C	45.40	-	51.0	48.20	Bithlo Master Plan
	11C2	45.00	-	39.0	42.00	FEMA
	11C3	45.40	-	37.5	41.45	Bithlo Master Plan
	11C4	45.40	-	43.0	44.20	Bithlo Master Plan
12	12A	45.40	-	47.0	46.20	Bithlo Master Plan
	12B	45.40	-	50.0	47.70	Bithlo Master Plan
13	13A	61.50	-	61.0	61.25	Bithlo Master Plan
	13B	61.50	-	61.0	61.25	Bithlo Master Plan
14	14A	61.50	-	64.0	62.75	Bithlo Master Plan
	14B	61.50	-	66.0	63.75	Bithlo Master Plan
15	15A	57.10	-	61.0	59.05	Bithlo Master Plan
	15B	57.10	-	59.0	58.05	Bithlo Master Plan

5.4 FLOODPLAIN IMPACTS/COMPENSATION

As previously mentioned, the project may impact the 100-year floodplain in three different ways:

1. Longitudinal roadway widening impacts resulting from filling the floodplain areas associated with Econlockhatchee River and its tributaries.
2. Impact due to proposed pond locations in floodplain.
3. Impact due to proposed cross drains in floodplain.

The longitudinal impact due to the recommended S.R. 408 Eastern Extension alignment cannot be avoided. During the final design phase of the project, every effort should be taken to minimize the floodplain impacts. Floodplain impacts could be compensated for by routing to swales at low profile locations, proposed stormwater ponds, and designated floodplain compensation ponds.

The FEMA's Flood Insurance Rate Map (FIRM) for Orange County shows that a portion of the project lies within the 100-year floodplain areas Zone AE and Zone A. Most of the project lies within flood Zone X. FEMA Map No. 12095C0280F, 129095C0285F, 12095C0295F, 12095C0290F and 12095C0315F, provide flood information for the project. Floodplain impacts occur throughout the project corridor and include the Econ River and its tributaries. Please refer to **Appendix-A** for a FEMA flood zone exhibit and **Appendix-B** for a FEMA Flood Insurance Rate Map.

Estimated 100-yr floodplain elevations were determined from the FEMA Map, the Big Econ Stormwater Management Master Plan, existing SJRWMD permits, and the Bithlo Area Stormwater Management Master Plan. The proposed bridge over the Econ River will not impact the floodplain since it spans over the entire river and floodplain. There will be insignificant impacts due to bridge piers. Refer to the Location Hydraulics Report for a Bridge Hydraulics Evaluation. All of the floodplain impacts for this project stem from the proposed roadway fill. There are no floodplain impacts from the proposed floodplain compensation ponds. Pond maintenance berms located within floodplains tie to the existing ground; therefore, no fill will be produced above the existing ground.

Total floodplain impact due to roadway fill for the entire proposed project corridor is 100.28 ac-ft. Available compensation in the proposed stormwater ponds and floodplain compensation ponds are 107.47 ac-ft. Please refer to Table-7 for a summary of floodplain impacts and compensation. The dredge and fill volume are based on limited information available during the PD&E study. A detail evaluation has to be done during the final design. Based on the preliminary evaluation the project will provide more floodplain compensation than the impact. Therefore, a cup for cup compensation is provided by the project.

Two floodplain compensation pond sites were identified for this project in Basin 11C. The pond sites are Pond 11C3 and Pond 11C4. Both Pond 11C3 and Pond 11C4 are selected as the recommended floodplain compensation ponds. Beside this two floodplain compensation ponds, several stormwater ponds located adjacent to floodplains will also provide floodplain compensation. Please refer to **Table-7**. At certain segments of the project, for example at Basin 11C, the roadway profile is low enough to provide floodplain compensation in the swales; this option should be evaluated during the design phase.

Runoff from within the corridor will be collected and conveyed to stormwater management facilities; therefore, reducing the overall impact to the remaining floodplains. The preliminary hydraulic evaluation indicates the flood elevation and limits will not change significantly; therefore, it is assumed that the project will not have a significant impact and the encroachment will be minimal.

SR 408 Eastern Extension-PD&E
CFX

Computed By KS
Checked By CR
Date 3/14/2018

Floodplain Impact/Compensation Summary Table

Basin	Pond ID	Average Existing Ground Elevation (ft)	100-Year Stage (ft)	Fill Depth (ft)	Pond Floodplain Impact Vol (ac-ft)	Roadway Impact Area (ac)	Roadway Floodplain Impact Vol (ac-ft)	Total Impact Vol (ac-ft)	Available Compensation Vol in Pond (ac-ft)	Method of Floodplain Hydraulic Connectivity
1	NO IMPACT TO FLOODPLAIN									
2	Pond 2B	52.3	52.7	0.4	0	10.64	4.26	4.26	17.16	Adjacent to Floodplain
3 & 4	Pond 3A & Pond 4A	48	52.7	4.7	0	3.75	17.63	17.63	1.02	Adjacent to Floodplain
5	Pond 5B	51.2	53.7	2.5	0	7.85	19.63	19.63	13.15	Within Floodplain
6,7 and 8	Pond 6B	50.75	53.04	2.29	0	8.67	19.85	19.85	34.39	Adjacent to Floodplain
9 & 10	NO IMPACT TO FLOODPLAIN									
11-A	NO IMPACT TO FLOODPLAIN									
11-B	NO IMPACT TO FLOODPLAIN									
11-C		42.22	45.4	3.18	0	8.88	28.24	28.24	0.00	Not Connected
	11-C3	37.5	45.4	2	0	0	0.00	0.00	21.80	
	11-C4	43	45.4	3	0	0	0.00	0.00	14.93	
12		43.88	45.5	1.62	0	5.79	9.38	9.38	0.00	Not Connected
13	NO IMPACT TO FLOODPLAIN									
14	NO IMPACT TO FLOODPLAIN									
15	Pond 15-A	59.2	59.5	0.3	0	4.35	1.30	1.30	5.02	Adjacent to Floodplain
							Total:	100.28	107.47	

5.5 PROJECT CLASSIFICATION

The floodplain is in a medium density, semi-urbanized area and the encroachments are classified as “minimal”. Minimal encroachment of a floodplain occurs when there is floodplain involvement, but the impacts on human life, transportation facilities, and natural and beneficial floodplain values are not significant and can be resolved with minimal efforts. Impacts that are resolved using minimal efforts, consist of applying the FDOT drainage design standards and following water management procedures to achieve results that do not increase or significantly change the flood elevation and the floodplain limits.

5.6 FLOODING HISTORY AND MAINTENANCE CONCERN

During a phone interview with the FDOT maintenance staff at the Oviedo Operations Center on 7/8/16, it was indicated that no areas of flooding concern were present along the S.R. 50 corridor. The staff member, Mike Danos, mentioned that there have been no reports of flooding or overtopping within the S.R. 50 corridor. The proposed S.R. 408 alignment is located just south of S.R. 50. Due to the close proximity of proposed S.R. 408 to existing S.R. 50, flooding history of S.R. 50 were used for this project.

6.0 CONCLUSION

This pond siting report has been prepared to provide pond site recommendations as part of the Project Development and Environment study for the proposed S.R. 408 Eastern Extension corridor in Orange County. The proposed seven-mile S.R. 408 Eastern Extension corridor is a new alignment, which consists of a four-lane divided rural roadway. The alignment will impact commercial properties, residential properties, and wooded areas. The final pond size calculations were determined by assuming the 64′ median as impervious area. The recommended pond sites have been identified to:

- Minimize impact to residential and commercial properties.
- Minimize wetland and habitat impacts.
- Minimize floodplain impacts.
- Use remnant parcels from the S.R. 408 corridor. The final design team should maximize the usage of remnant parcels, which might change the pond shapes.

The following assumptions were made to determine the recommended pond sizes and locations:

1. The SHWT obtained from the Orange County soil report was used to size some of the ponds. During the final design, actual soil borings should be performed to determine the SHWT.
2. A preliminary profile was performed to verify that the recommended pond sites will be able to drain the respective on-site drainage basins. The existing ground was created from 1′ contour Lidar, which was obtained from the SJRWMD. The profile was determined based on the existing ground elevations obtained from Lidar. The

Lidar does not provide accurate survey of the existing ground.

A volumetric analysis was used to size the ponds and accounts for both water quality treatment and attenuation. Please note that the pond location recommendations are based on preliminary data calculations, engineering judgment, and assumptions. This is a conceptual document and the pond locations may change during the final design as more detailed information and survey data become available. Refer to the Recommended Pond Analysis Summary Table (**Page 41**) for a summary of engineering data and analysis.

Recommended Pond Analysis Summary

Recommended Pond Analysis Summary Table

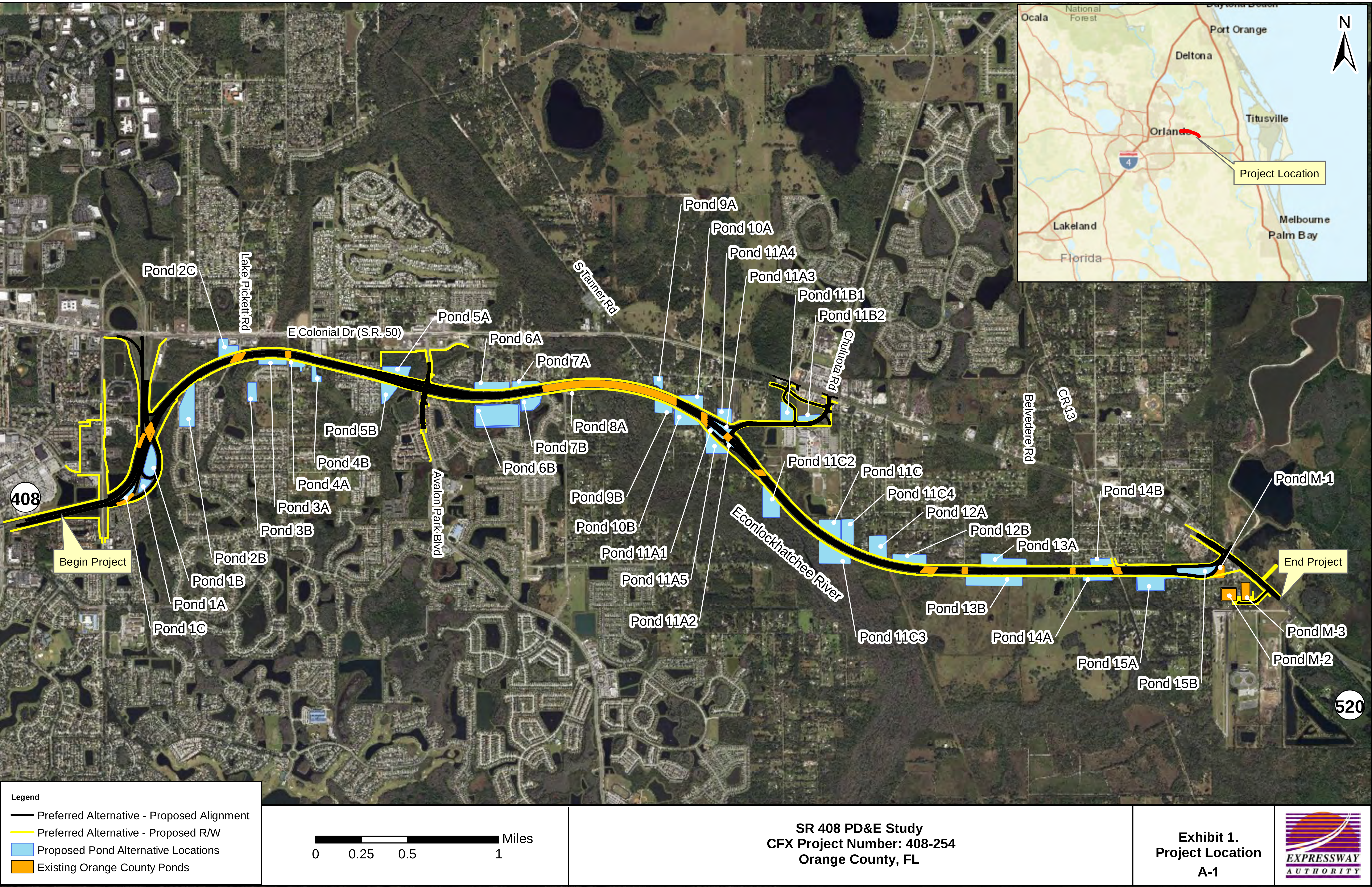
Basin	Pond Name	Predominant Soil Type	Existing Ground Elevation (ft)	Estimated SHWT Elevation (ft)	Lowest edge of Proposed Road (ft)	Required Treatment and Attenuation (ac-ft)	Required Pond Area (ac)	Preliminary Pond Site (ac)	Treatment and Attenuation Depth (ft)	Outfall Location
1	1A	Immokalee fine sand, St. Johns fine sand & Sanibel muck	61.5	58	67.51	6.74	4.1	8.14	1.2	Pond 1A, 1B, & 1C discharge to the east of the proposed ramp into the Unnamed Econ River Tributary(1).
	1B	Immokalee fine sand, St. Johns fine sand & Sanibel muck								
	1C	Immokalee fine sand								
2	2B	Pomello fine sand	58.5	50.5	87.71	7.43	2.4	10.23	0.91	Pond 2B discharges into the Unnamed Econ River Tributary (1).
3 - 4	3A	Smyrna-Smyrna, wet, fine sand	55	50.5	75.71	4.87	2	4.86	1.82	Pond 3A and Pond 4A discharge into the Unnamed Econ River Tributary (1).
	4A	Smyrna-Smyrna, wet, fine sand & Zolfo fine sand								
5	5B	Smyrna-Smyrna, wet, fine sand	53	47.7	79.31	3.52	1.8	4.1	1.5	Pond 5B discharges into the Unnamed Econ River Tributary (2).
6-8	6B	Smyrna-Smyrna, wet, fine sand & Zolfo fine sand	57	50.4	81.71	9.21	3.3	19.73	0.53	Pond 6B discharges into surrounding wetlands that are connected to the Unnamed Econ River Tributary(2).
9 - 10	9B	Immokalee fine sand	49	48	90.41	5.82	4.3	8.38	0.91	Pond 9B & Pond 10B discharge into surrounding wetlands that flow into the Econ River.
	10B	Zolfo fine sand								
11A	11A1	Zolfo fine sand	63	60.5	64.5	5.27	2.6	5.76	1.14	Ponds 11A1, 11A2, 11A3, & 11A4 are interconnected and discharge into wetlands that flow into the Econ River.
	11A2	Zolfo fine sand								
	11A3	Zolfo fine sand								
	11A4	Smyrna-Smyrna, wet, fine sand & Zolfo fine sand								

Recommended Pond Analysis Summary Table (Continued)

Basin	Pond Name	Predominant Soil Type	Existing Ground Elevation (ft)	Estimated SHWT Elevation (ft)	Lowest edge of Proposed Road (ft)	Required Treatment and Attenuation (ac-ft)	Required Pond Area (ac)	Preliminary Pond Site (ac)	Treatment and Attenuation Depth (ft)	Outfall Location
11B	11B1	Smyrna-Smyrna, wet, fine sand	60	59	66.79	2.71	1.9	3.98	0.89	Pond 11B1 discharges into wetlands that flow into the Econ River.
11C	11C	Smyrna-Smyrna, wet, fine sand & Wabasso fine sand	52	50	54.04	4.36	2.8	5.7	1	Pond 11C and Pond 11C4 discharge into Channel E.
	11C3	Felda fine sand	37.5	35	53.39	N/A Floodplain Compensation Pond	N/A Floodplain Compensation Pond	8.85	N/A Floodplain Compensation Pond	
	11C4	St. Johns fine sand & Wabasso fine sand	43	41	52.73	N/A Floodplain Compensation Pond	N/A Floodplain Compensation Pond	5.5	N/A Floodplain Compensation Pond	Pond 11C3 discharges into wetlands that flow into the Econ River.
12	12A	Smyrna-Smyrna, wet, fine sand & Basinger fine sand	48	47	54.02	4.1	3.2	6.88	0.73	Pond 12A discharges into Channel E and Pond 12B discharges into Channel A.
13	13B	Smyrna-Smyrna, wet, fine sand & Pomello fine sand	61	60	78.8	6.51	4	10.45	0.79	Pond 13B discharges into surrounding vacant land that flows into Econ River.
14	14A	Smyrna-Smyrna, wet, fine sand & Pomello fine sand	64	62	85.01	1.91	1.3	2.57	1.5	Pond 14A discharges into wetlands that flow into the Econ River.
15	15A	Smyrna-Smyrna, wet, fine sand	60	53	68.17	6.16	2.6	8.92	1	Pond 15A discharges into wetlands that flow into Channel KE and eventually into Econ River.

Appendix: A

- Exhibit-1 Project Location Map
- Exhibit-2 Soil Survey
- Exhibit-2A Soil Data
- Exhibit-3 USGS Quadrangle Map
- Exhibit-4 Existing Land Use
- Exhibit-5-FEMA Flood Insurance Rate Map

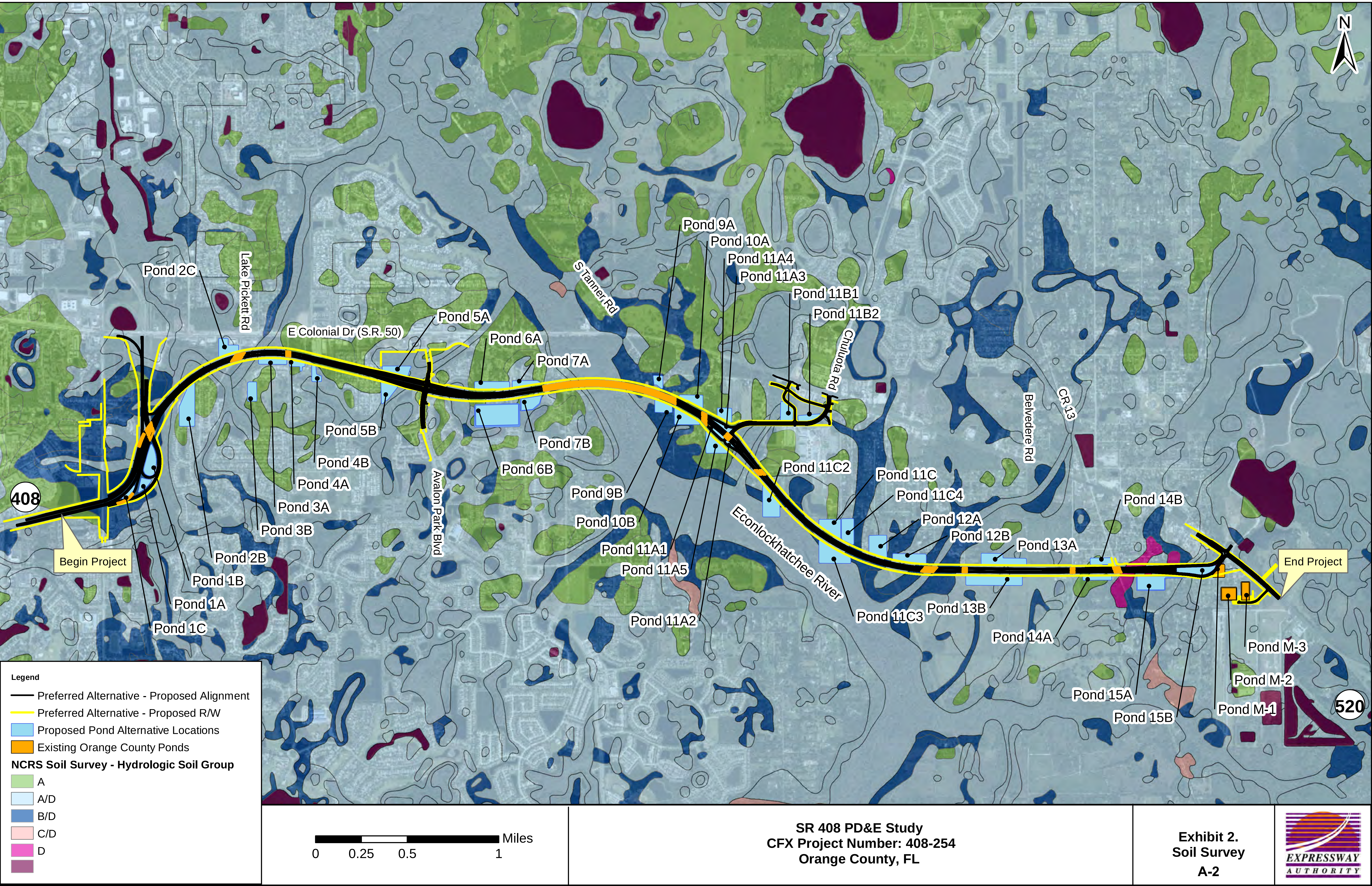


0 0.25 0.5 1 Miles

SR 408 PD&E Study
CFX Project Number: 408-254
Orange County, FL

Exhibit 1.
Project Location
A-1

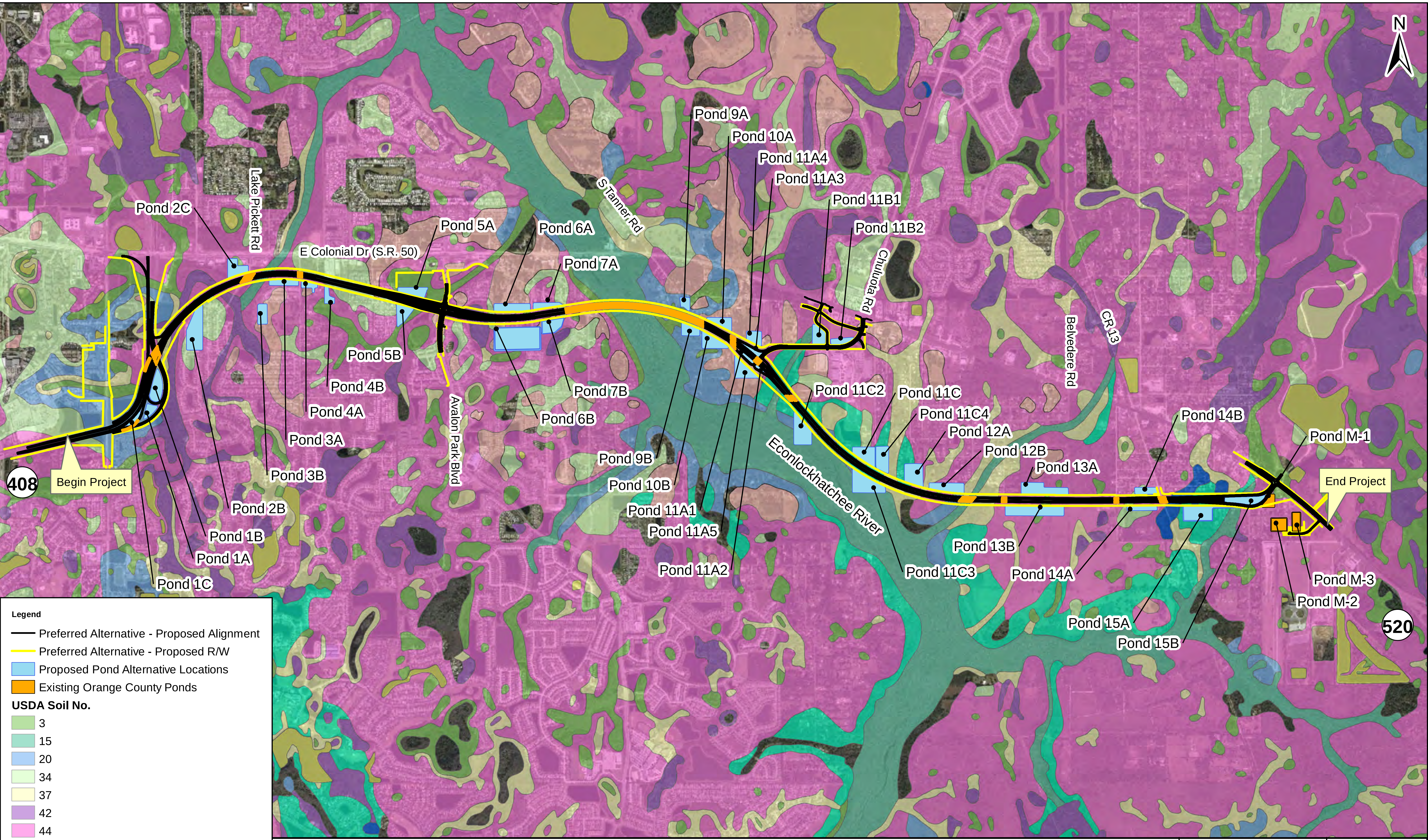
EXPRESSWAY AUTHORITY



SR 408 PD&E Study
CFX Project Number: 408-254
Orange County, FL

Exhibit 2.
Soil Survey
A-2

EXPRESSWAY AUTHORITY

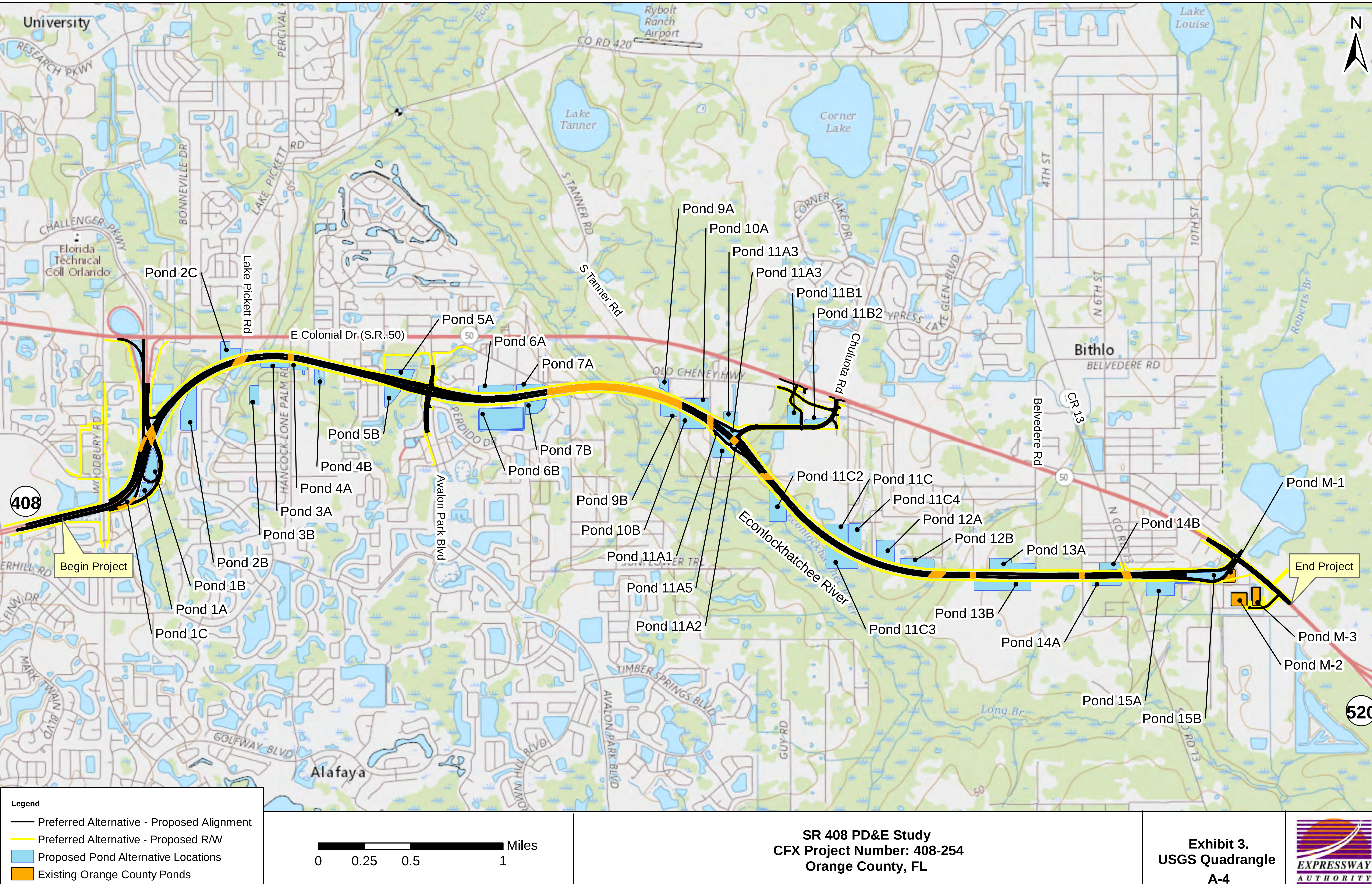


0 0.25 0.5 1 Miles

SR 408 PD&E Study
CFX Project Number: 408-254
Orange County, FL

Exhibit 2A.
Soil Data
A-3

EXPRESSWAY AUTHORITY

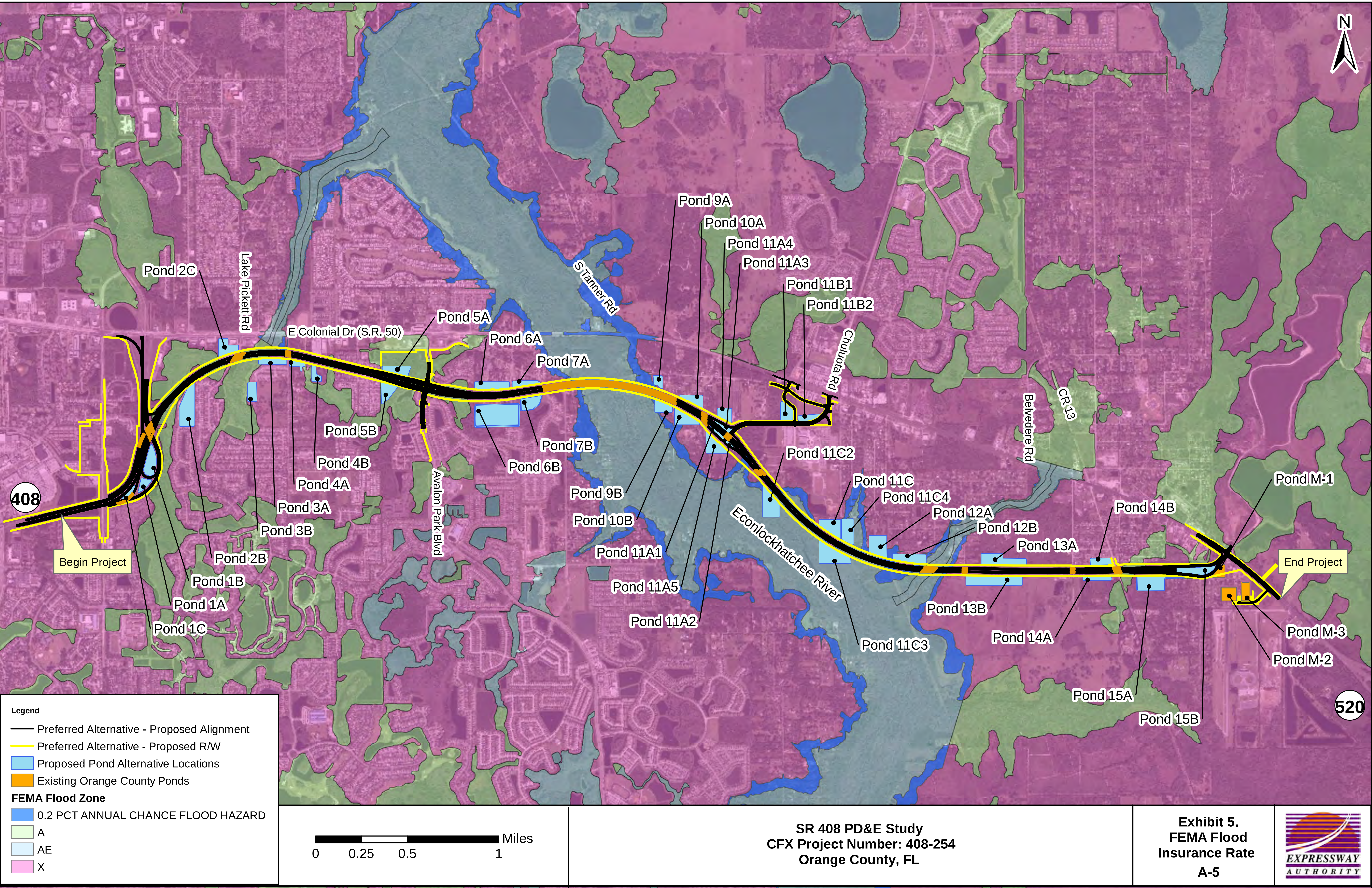


0 0.25 0.5 1 Miles

SR 408 PD&E Study
CFX Project Number: 408-254
Orange County, FL

Exhibit 3.
USGS Quadrangle
A-4

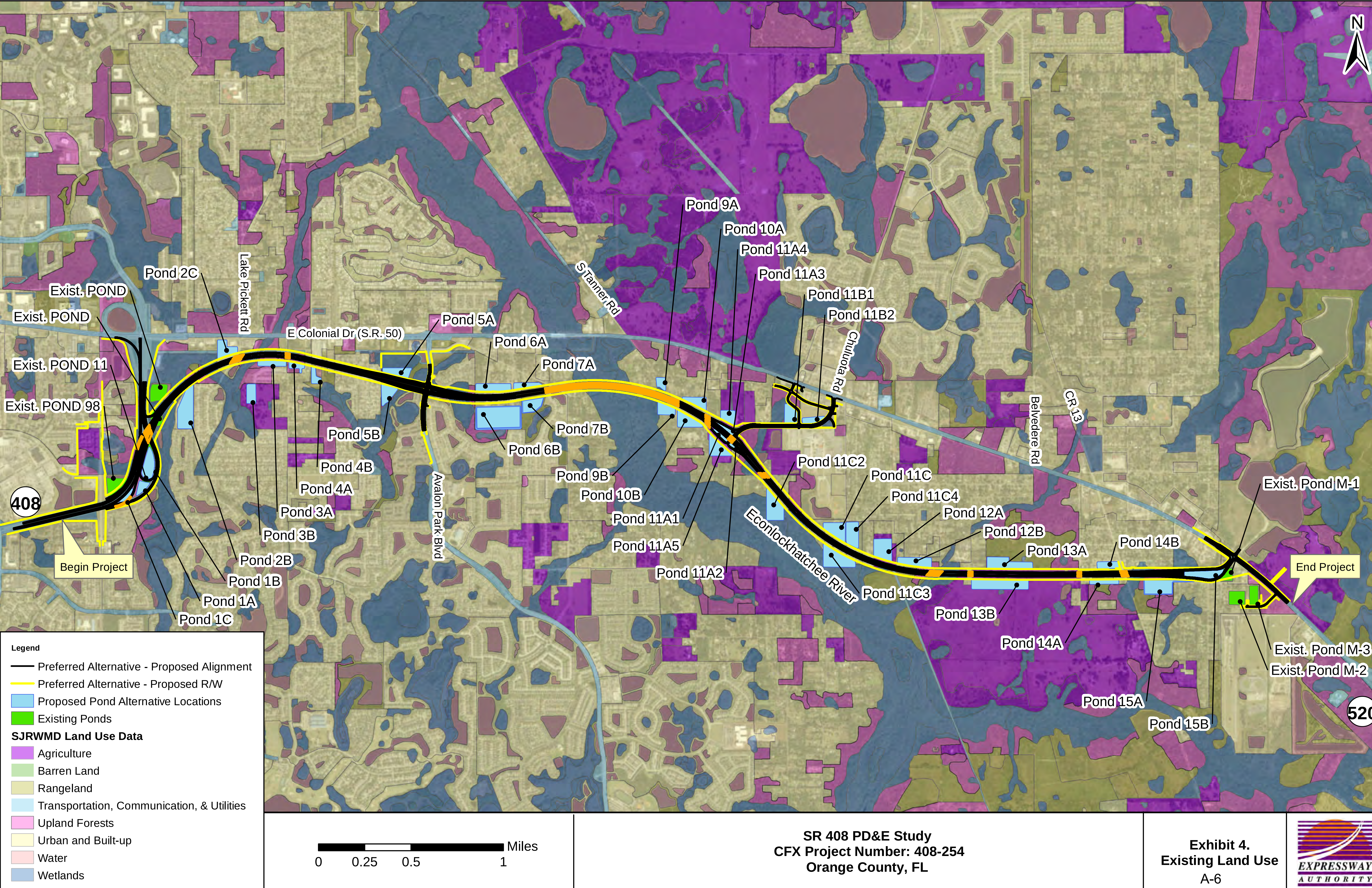
EXPRESSWAY AUTHORITY



SR 408 PD&E Study
CFX Project Number: 408-254
Orange County, FL

Exhibit 5.
FEMA Flood Insurance Rate
A-5

EXPRESSWAY AUTHORITY



SR 408 PD&E Study
CFX Project Number: 408-254
Orange County, FL

Exhibit 4.
Existing Land Use
A-6

EXPRESSWAY AUTHORITY

Appendix: B

FEMA Flood Insurance Rate Map

possible updated or additional flood hazard information.

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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

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

The **projection** used in the preparation of this map was State Plane Florida East FIPS Zone 0901. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

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

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This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

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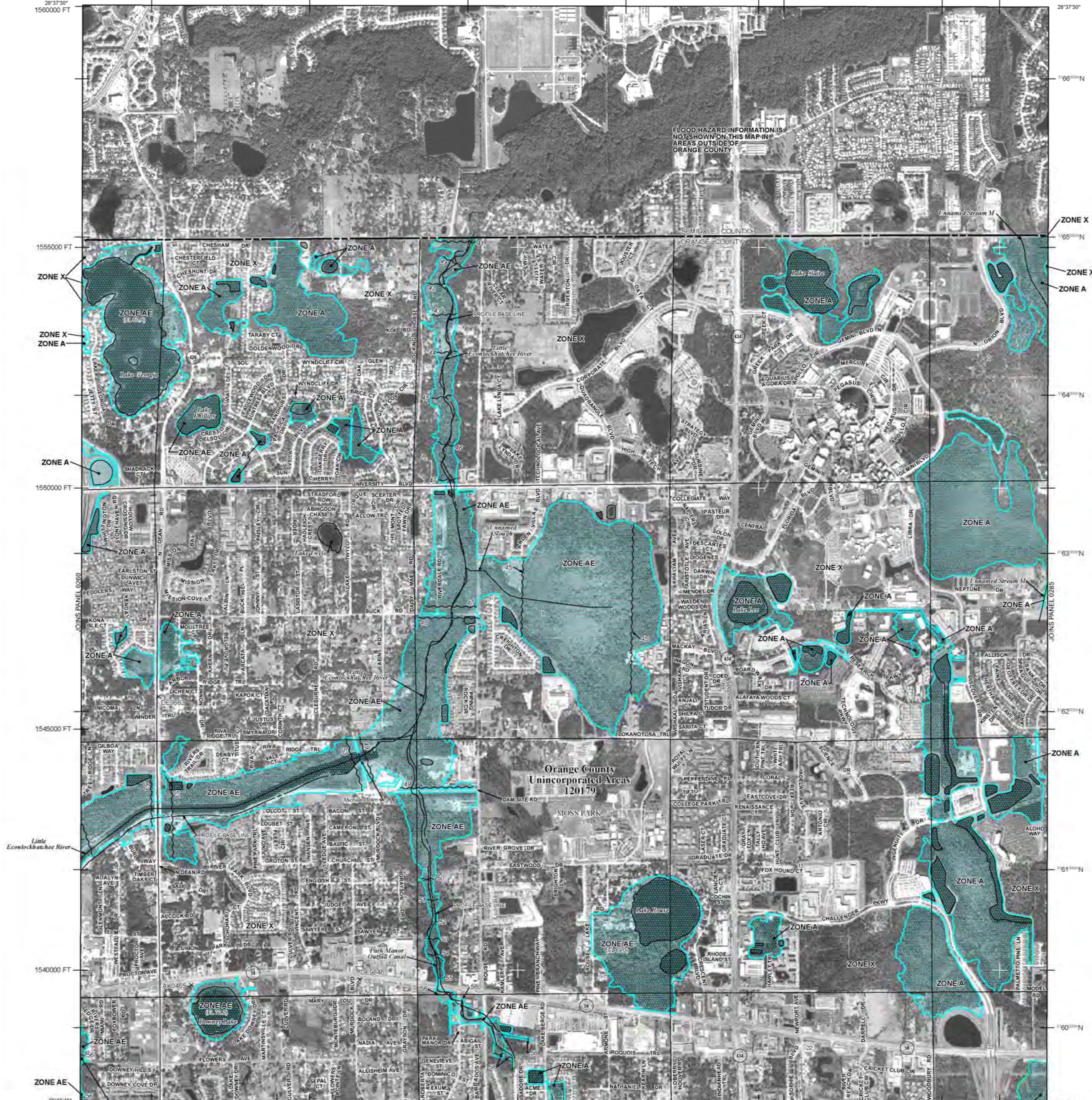
Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a *Flood Insurance Study report*, and/or digital versions of this map. The FEMA Map Service Center may also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

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

NGVD29 to NAVD88 Vertical Datum Conversion Table (feet)

Watershed Name	Minimum Conversion	Maximum Conversion	Average Conversion	Maximum Offset
Big Econlockhatchee River	-1.03	-1.15	-1.09	0.06
Boggy Creek	-0.91	-1.01	-0.96	0.05
Cypress Creek	-0.87	-0.91	-0.89	0.02
Howell Branch	-0.96	-1.05	-0.98	0.07
Lake Apopka	-0.87	-0.97	-0.91	0.06
Lake Hart	-0.97	-1.07	-1.02	0.05
Little Econlockhatchee River	-0.92	-1.07	-1.01	0.09
Little Wekiva River	-0.91	-1.02	-0.95	0.07
Reedy Creek	-0.86	-0.89	-0.88	0.02
Shingle Creek	-0.88	-0.95	-0.91	0.04
St. Johns River	-1.08	-1.33	-1.19	0.14
Wekiva River	-0.88	-1.01	-0.94	0.07



area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

~~~ 513 ~~~ Base Flood Elevation line and value; elevation in feet*

(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

(A)—(A) Cross section line

(23)- - -(23) Transect line

97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

4275000mE 1000-meter Universal Transverse Mercator grid ticks, zone 17

6000000 FT 5000-foot grid values: Florida State Plane coordinate system, East Zone (FIPSZONE = 901), Transverse Mercator projection

DX5510 × Bench mark (see explanation in Notes to Users section of this FIRM panel)

• M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index.

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
DECEMBER 6, 2000

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
SEPTEMBER 25, 2009 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to delete Special Flood Hazard Areas, to update map format, to add roads and road names, to incorporate previously issued Letters of Map Revision, to reflect updated topographic information, and to incorporate previously issued Letters of Map Amendment.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

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

MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET
300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0280F

FIRM
FLOOD INSURANCE RATE MAP
ORANGE COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 280 OF 750

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ORANGE COUNTY	120179	0280	F

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

MAP NUMBER
12095C0280F
~~~

possible updated or additional flood hazard information.

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NGVD29 to NAVD88 Vertical Datum Conversion Table (feet)

Watershed Name	Minimum Conversion	Maximum Conversion	Average Conversion	Maximum Offset
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Boggy Creek	-0.91	-1.01	-0.96	0.05
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Howell Branch	-0.96	-1.05	-0.98	0.07
Lake Apopka	-0.87	-0.97	-0.91	0.06
Lake Hart	-0.97	-1.07	-1.02	0.05
Little Econlockhatchee River	-0.92	-1.07	-1.01	0.09
Little Wekiva River	-0.91	-1.02	-0.95	0.07
Reedy Creek	-0.86	-0.89	-0.88	0.02
Shingle Creek	-0.88	-0.95	-0.91	0.04
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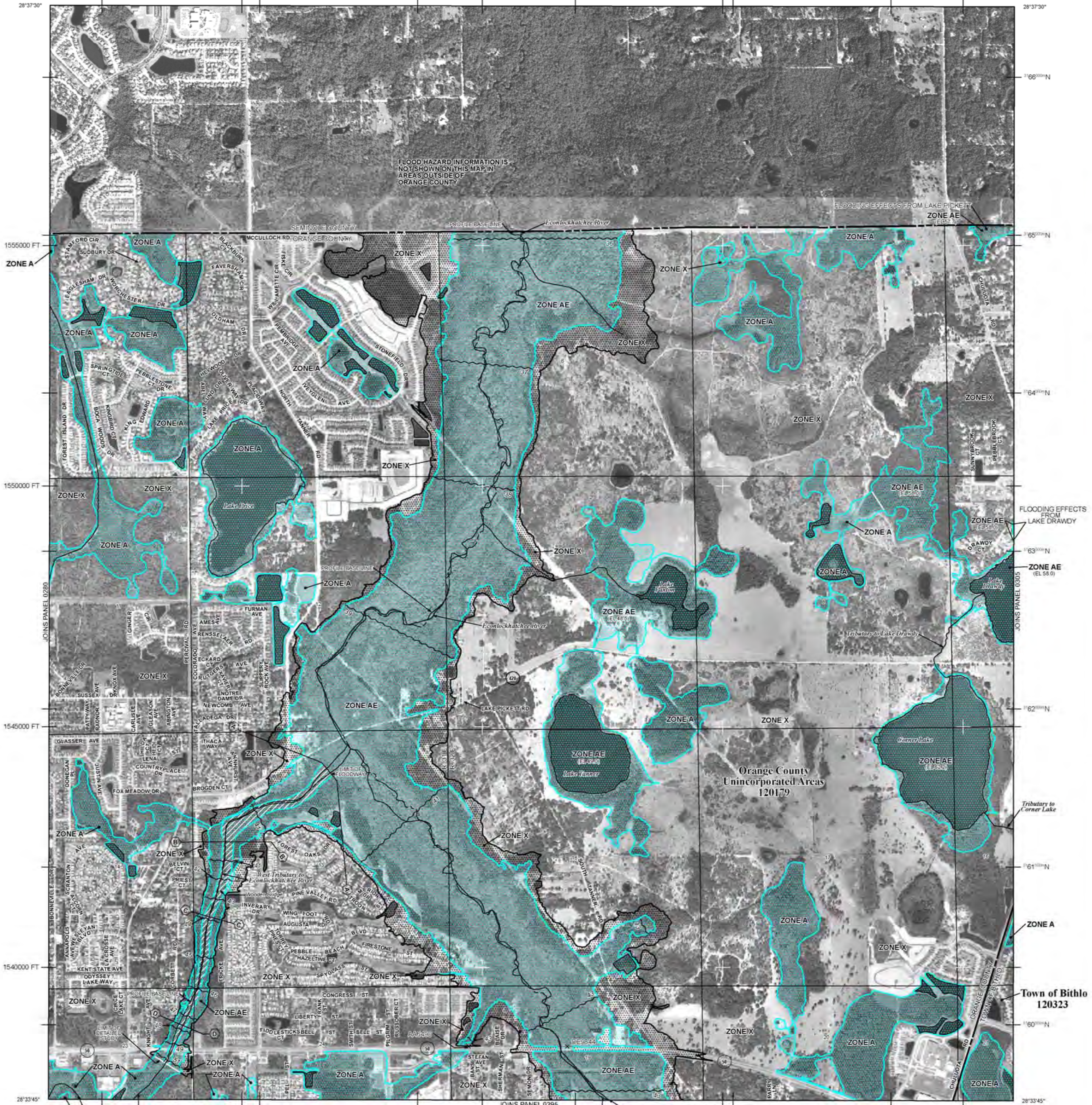

area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
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ZONE AR	Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 Base Flood Elevation line and value; elevation in feet*
(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*
* Referenced to the North American Vertical Datum of 1988 (NAVD 88)
A — A Cross section line
23 - - - 23 Transect line
97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4275000mE 1000-meter Universal Transverse Mercator grid ticks, zone 17
6000000 FT 5000-foot grid values: Florida State Plane coordinate system, East Zone (FIPSZONE = 901), Transverse Mercator projection
DX5510 × Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index.

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
DECEMBER 6, 2000

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
SEPTEMBER 25, 2009 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to delete Special Flood Hazard Areas, to update map format, to add roads and road names, to incorporate previously issued Letters of Map Revision, to reflect updated topographic information, and to incorporate previously issued Letters of Map Amendment.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

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MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET
300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0285F

FIRM
FLOOD INSURANCE RATE MAP
ORANGE COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 285 OF 750

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BITHLO, TOWN OF	120323	0285	F
ORANGE COUNTY	120179	0285	F

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

MAP NUMBER
12095C0285F

possible updated or additional flood hazard information.

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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

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

The **projection** used in the preparation of this map was State Plane Florida East FIPS Zone 0901. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

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

Base map information shown on this FIRM was provided in digital format by Orange County, Florida.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

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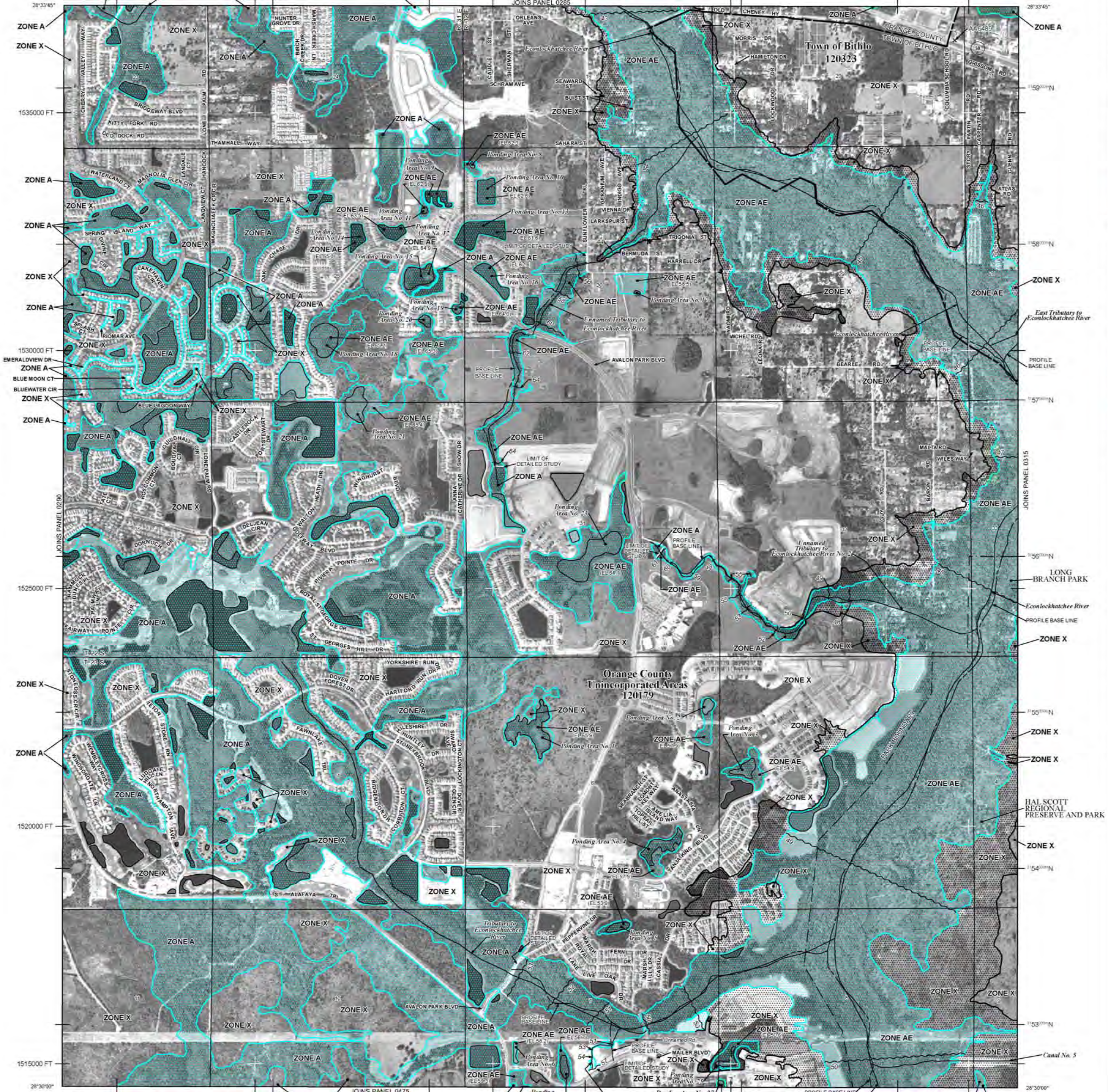

area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
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FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A	Cross section line
23 - - 23	Transect line
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DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORIES
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EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
DECEMBER 6, 2000

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SEPTEMBER 25, 2009 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to delete Special Flood Hazard Areas, to update map format, to add roads and road names, to incorporate previously issued Letters of Map Revision, to reflect updated topographic information, and to incorporate previously issued Letters of Map Amendment.

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500 0 500 1,000 1,500 2,000 FEET
300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0295F

FIRM
FLOOD INSURANCE RATE MAP
ORANGE COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 295 OF 750

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BITHLO, TOWN OF	120323	0295	F
ORANGE COUNTY	120179	0295	F

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MAP NUMBER
12095C0295F

possible updated or additional flood hazard information.

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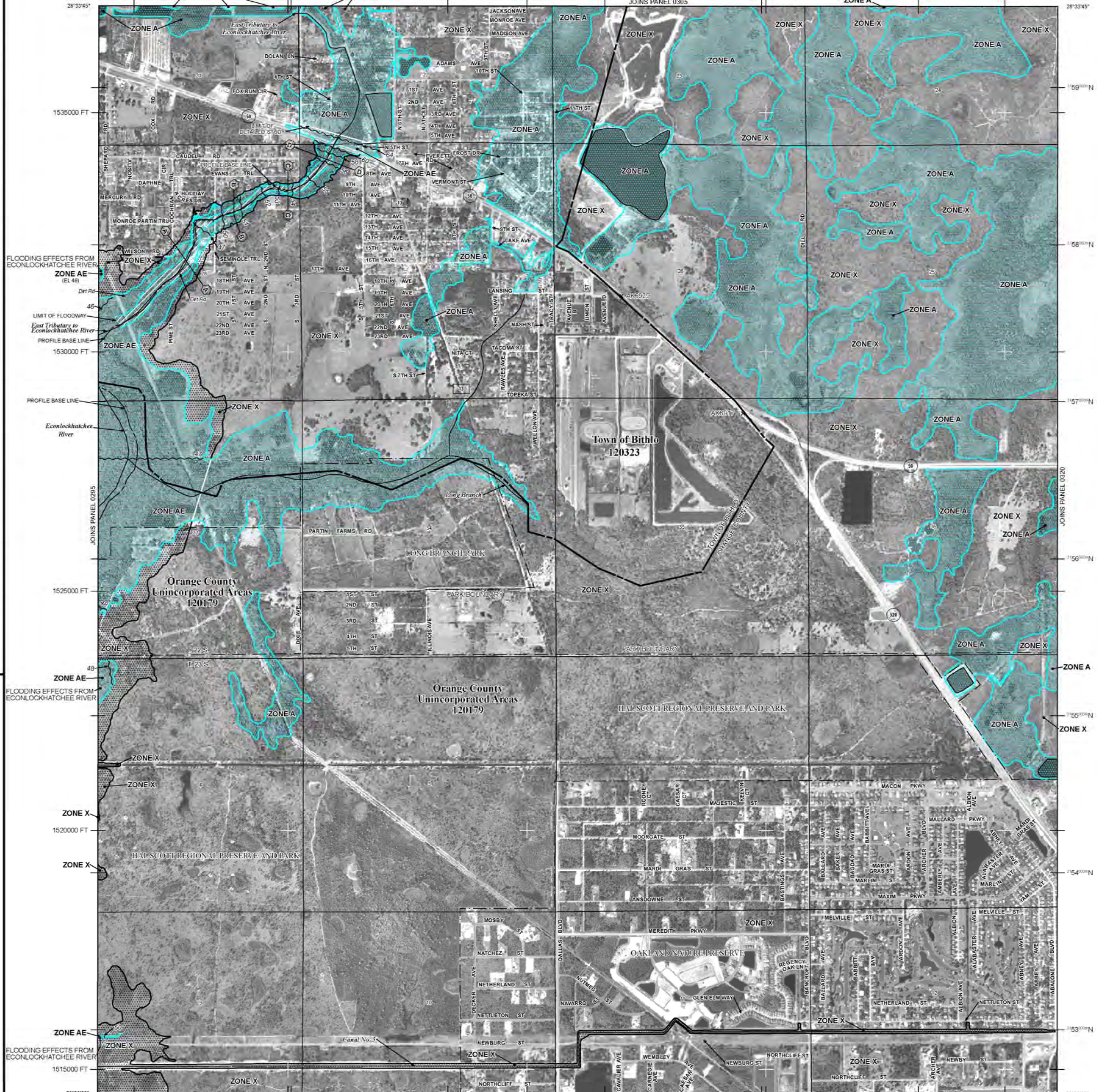

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ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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- 1% annual chance floodplain boundary
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~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

(A)——(A)	Cross section line
(23)- - - -(23)	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
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6000000 FT	5000-foot grid values: Florida State Plane coordinate system, East Zone (FIPSZONE = 901), Transverse Mercator projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORIES
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EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
DECEMBER 6, 2000

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
SEPTEMBER 25, 2009 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to delete Special Flood Hazard Areas, to update map format, to add roads and road names, to incorporate previously issued Letters of Map Revision, to reflect updated topographic information, and to incorporate previously issued Letters of Map Amendment.

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MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET
300 0 300 600 METERS

NFIP

PANEL 0315F

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
ORANGE COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 315 OF 750
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BITHLO, TOWN OF	120323	0315	F
ORANGE COUNTY	120179	0315	F

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

MAP NUMBER
12095C0315F

Appendix: C

USDA NRCS Soil Report

United States Department of Agriculture

NRCS

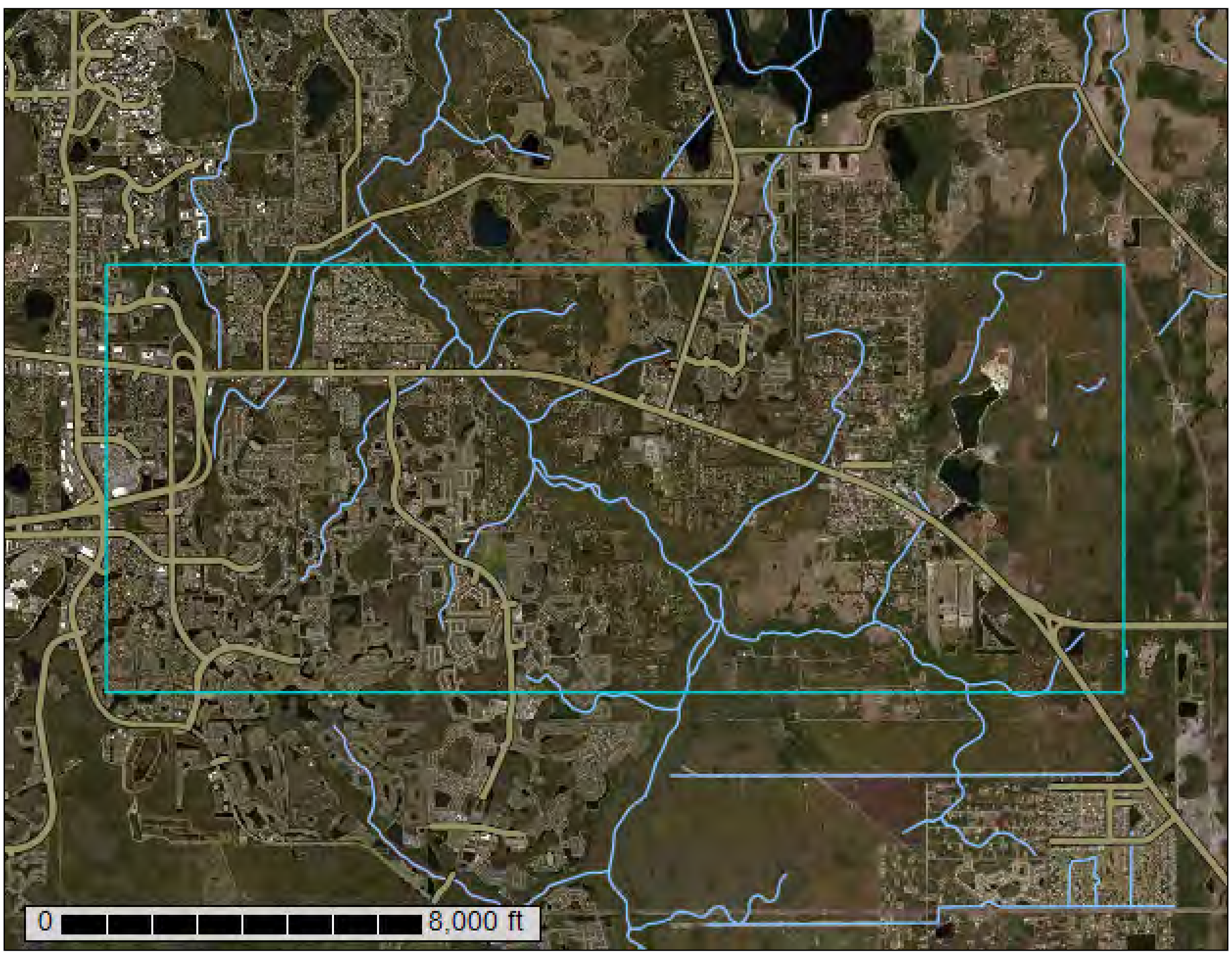
Natural Resources Conservation Service

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

Custom Soil Resource Report for

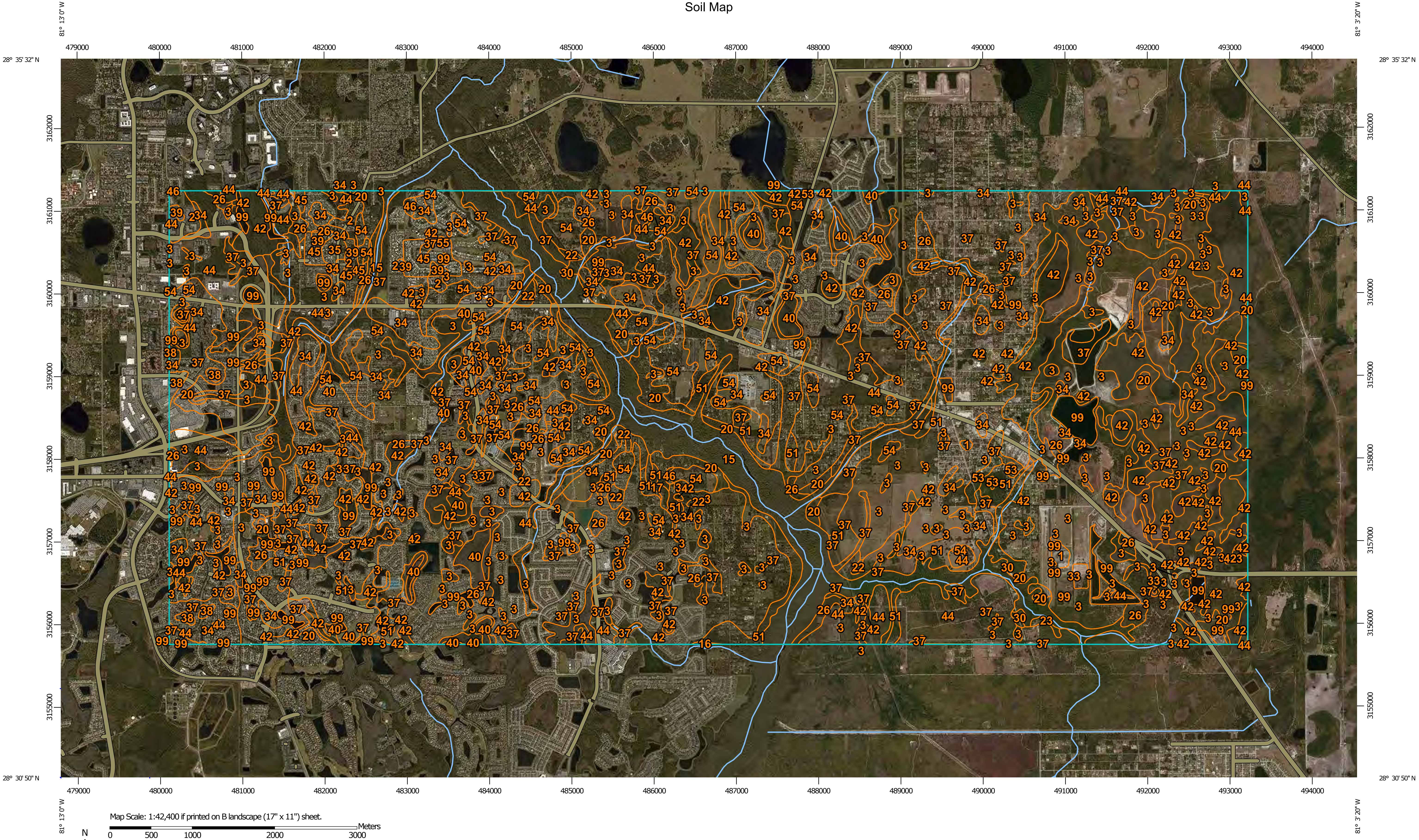
Orange County, Florida

SR 408 Soil Data



May 27, 2016

Custom Soil Resource Report
Soil Map



Map Scale: 1:42,400 if printed on B landscape (17" x 11") sheet.

N

0 500 1000 2000 3000 Meters

0 2000 4000 8000 12000 Feet

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

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

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

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

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: Orange County, Florida
Survey Area Data: Version 12, Nov 19, 2015

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

Date(s) aerial images were photographed: Mar 12, 2011—Feb 20, 2015

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

Orange County, Florida (FL095)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
1	Arents, nearly level	16.4	0.1%
2	Archbold fine sand, 0 to 5 percent slopes	73.1	0.4%
3	Basinger fine sand, depressional, 0 to 1 percent slopes	1,106.2	6.2%
15	Felda fine sand, frequently flooded	1,060.0	5.9%
16	Floridana fine sand, frequently flooded	1.5	0.0%
17	Floridana mucky fine sand, depressional	13.6	0.1%
20	Immokalee fine sand	754.8	4.2%
22	Lochloosa fine sand	57.6	0.3%
23	Malabar fine sand	7.3	0.0%
26	Ona fine sand	193.0	1.1%
27	Ona-Urban land complex	4.8	0.0%
30	Pineda fine sand	28.5	0.2%
33	Pits	13.4	0.1%
34	Pomello fine sand, 0 to 5 percent slopes	986.4	5.5%
35	Pomello-Urban land complex, 0 to 5 percent slopes	19.4	0.1%
37	St. Johns fine sand	920.5	5.2%
38	St. Lucie fine sand, 0 to 5 percent slopes	34.7	0.2%
39	St. Lucie-Urban land complex, 0 to 5 percent slopes	29.9	0.2%
40	Samsula muck	145.3	0.8%
42	Sanibel muck	1,496.8	8.4%
44	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	9,067.4	50.9%
45	Smyrna-Urban land complex	80.9	0.5%
46	Tavares fine sand, 0 to 5 percent slopes	11.6	0.1%
51	Wabasso fine sand, 0 to 2 percent slopes	669.4	3.8%
53	Wauberg fine sand	26.8	0.2%
54	Zolfo fine sand, 0 to 2 percent slopes	717.2	4.0%
55	Zolfo-Urban land complex	11.2	0.1%
99	Water	277.9	1.6%
Totals for Area of Interest		**17,825.4**	**100.0%**

3—Basinger fine sand, depressional, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v16v
Elevation: 0 to 160 feet
Mean annual precipitation: 38 to 62 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Basinger, Depressional

Setting

Landform: Depressions on marine terraces, drainageways on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 14 inches: fine sand
Bh/E - 14 to 36 inches: fine sand
Cg - 36 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)

Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 1 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Smyrna, hydric

Percent of map unit: 5 percent
Landform: — error in exists on —
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Samsula, muck

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Floridana, hydric

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Cypress Woodlands (MCV026CA), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

20—Immokalee fine sand

Map Unit Setting

National map unit symbol: bv7n
Mean annual precipitation: 45 to 53 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Immokalee, non-hydric, and similar soils: 82 percent
Immokalee, hydric, and similar soils: 10 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Immokalee, Non-hydric

Setting

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

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 35 inches: fine sand
Bh - 35 to 67 inches: fine sand
C - 67 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

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

Description of Immokalee, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 35 inches: fine sand

Bh - 35 to 67 inches: fine sand
C - 67 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

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

Minor Components

Pineda

Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Wabasso

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

34—Pomello fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2v16y
Elevation: 0 to 180 feet
Mean annual precipitation: 44 to 52 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 342 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Pomello and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pomello

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve, riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 47 inches: fine sand
Bh - 47 to 58 inches: fine sand
Bw - 58 to 65 inches: fine sand
C - 65 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Other vegetative classification: Sand Pine Scrub (R155XY001FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

Minor Components

Smyrna

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Tavares

Percent of map unit: 1 percent
Landform: Ridges on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Hydric soil rating: No

Bulow

Percent of map unit: 1 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy over loamy soils on knolls and ridges of mesic uplands (G155XB211FL)
Hydric soil rating: No

37—St. Johns fine sand

Map Unit Setting

National map unit symbol: bv87
Elevation: 30 to 150 feet
Mean annual precipitation: 45 to 53 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

St. johns, non-hydric, and similar soils: 60 percent
St. johns, hydric, and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of St. Johns, Non-hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 12 inches: fine sand
E - 12 to 24 inches: fine sand
Bh - 24 to 44 inches: fine sand
C - 44 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: B/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of St. Johns, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 12 inches: fine sand
E - 12 to 24 inches: fine sand
Bh - 24 to 44 inches: fine sand
C - 44 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

Wabasso

Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Immokalee, non-hydric

Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

42—Sanibel muck

Map Unit Setting

National map unit symbol: bv8f
Mean annual precipitation: 45 to 53 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Sanibel, undrained, and similar soils: 65 percent
Sanibel, drained, and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sanibel, Undrained

Setting

Landform: Marshes on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Thin organic material over sandy marine deposits

Typical profile

Oa - 0 to 11 inches: muck
A - 11 to 15 inches: fine sand
C - 15 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Description of Sanibel, Drained

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Thin organic material over sandy marine deposits

Typical profile

Oa - 0 to 11 inches: muck
A - 11 to 15 inches: fine sand
C - 15 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Minor Components

Hontoon, undrained

Percent of map unit: 5 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Samsula

Percent of map unit: 5 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

44—Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2v171
Elevation: 0 to 150 feet
Mean annual precipitation: 38 to 62 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Smyrna, non-hydric, and similar soils: 76 percent
Smyrna, hydric, and similar soils: 20 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Smyrna, Non-hydric

Setting

Landform: Flatwoods on marine terraces, flats on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 17 inches: fine sand
Bh - 17 to 27 inches: loamy fine sand
C - 27 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

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

Description of Smyrna, Hydric

Setting

Landform: Flats on marine terraces, flatwoods on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 17 inches: fine sand
Bh - 17 to 27 inches: loamy fine sand
C - 27 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

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

Minor Components

Basinger, depressional

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Pomona, non-hydric

Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Eaugallie, hydric

Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces, flats on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL), Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Hydric soil rating: Yes

Across-slope shape: Linear
Other vegetative classification: North Florida Flatwoods (R154XY004FL), Sandy soils on rises and knolls of mesic uplands (G155XB131FL)
Hydric soil rating: No

51—Wabasso fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2svzg
Elevation: 0 to 130 feet
Mean annual precipitation: 38 to 62 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Wabasso

Setting

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

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 16 inches: fine sand
Bh - 16 to 28 inches: fine sand
E' - 28 to 32 inches: fine sand
Btg - 32 to 48 inches: fine sandy loam
Cg - 48 to 80 inches: loamy fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 12 to 63 inches to strongly contrasting textural stratification
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Minor Components

Basinger

Percent of map unit: 4 percent
Landform: Drainageways on flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Convex, linear, concave
Across-slope shape: Linear, convex, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Felda

Percent of map unit: 4 percent
Landform: Flatwoods on drainageways on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
Across-slope shape: Concave, linear
Ecological site: Slough (R155XY011FL)
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Riviera

Percent of map unit: 4 percent
Landform: Flatwoods on drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear, convex
Across-slope shape: Concave, linear
Ecological site: Slough (R155XY011FL)
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G156AC241FL)
Hydric soil rating: Yes

Boca

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: South Florida Flatwoods (R155XY003FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

53—Wauberg fine sand

Map Unit Setting

National map unit symbol: bv8t
Mean annual precipitation: 45 to 53 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Wauberg and similar soils: 94 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wauberg

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 8 inches: fine sand
E - 8 to 28 inches: fine sand
B - 28 to 60 inches: sandy clay loam
C - 60 to 80 inches: sandy clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Other vegetative classification: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)

Hydric soil rating: Yes

Minor Components

Wabasso

Percent of map unit: 6 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

54—Zolfo fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w0q1
Elevation: 30 to 160 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 324 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Zolfo and similar soils: 88 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zolfo

Setting

Landform: Rises on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Interfluve, side slope, riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 6 inches: fine sand
E - 6 to 53 inches: fine sand
Bh - 53 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A
Other vegetative classification: North Florida Flatwoods (R154XY004FL), South Florida Flatwoods (R154XY003FL), Sandy soils on rises and knolls of mesic uplands (G154XB131FL)
Hydric soil rating: No

Minor Components

Myakka

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

Tavares

Percent of map unit: 3 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve, tread, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Hydric soil rating: No

Millhopper

Percent of map unit: 3 percent
Landform: Ridges on marine terraces, knolls on marine terraces, flatwoods on marine terraces
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, concave
Across-slope shape: Linear
Other vegetative classification: Upland Hardwood Hammock (R154XY008FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Hydric soil rating: No

Lochloosa

Percent of map unit: 1 percent
Landform: Rises on marine terraces
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex

Across-slope shape: Linear
Other vegetative classification: Sandy over loamy soils on rises and knolls of mesic uplands (G155XB231FL)
Hydric soil rating: No

Malabar

Percent of map unit: 1 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear, convex
Across-slope shape: Concave, linear
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Appendix: D

SR 408 Typical Section

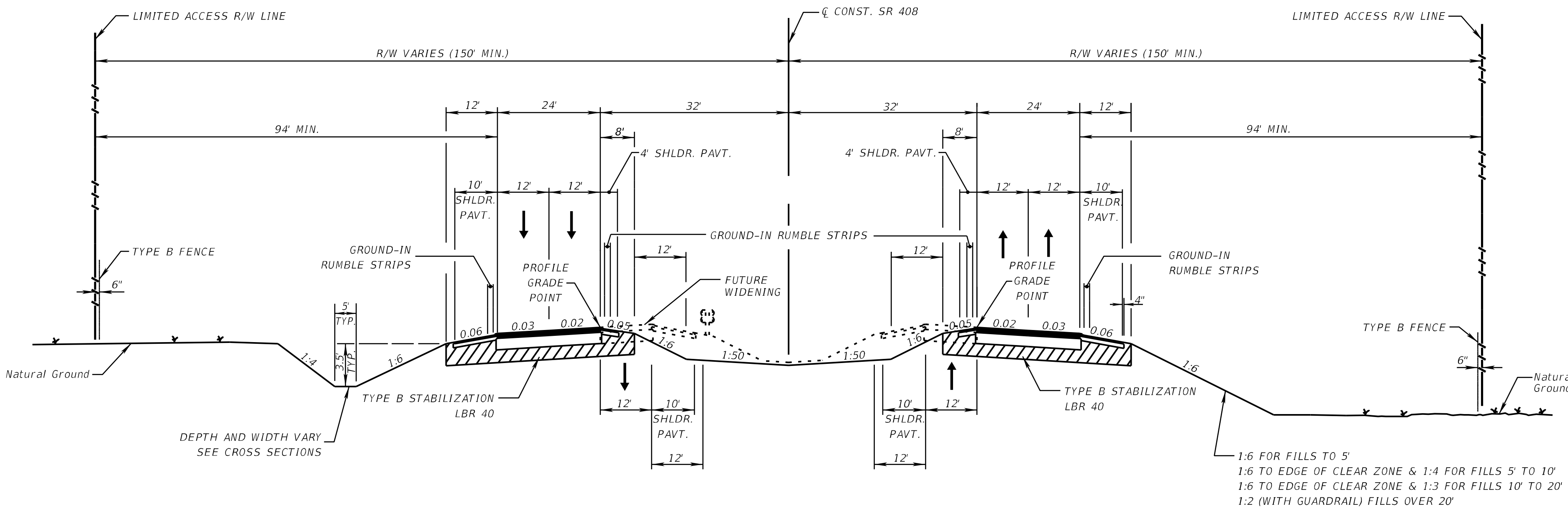
PROJECT IDENTIFICATION

CFX PROJECT NO. 408-254 | FEDERAL AID PROJECT NO. N/A | COUNTY NAME ORANGE

SECTION NO. 75008160 | ROAD DESIGNATION SR 408 | LIMITS/MILEPOST N/A

PROJECT DESCRIPTION SR 408 EASTERN EXTENSION PD&E STUDY (FROM CURRENT EASTERN TERMINUS NEAR WOODBURY ROAD TO SR 50, NEAR SR 520)

PROPOSED ROADWAY TYPICAL SECTION



<u>BEGIN PROJECT TO EAST OF AVALON PARK</u>
DESIGN SPEED = 65 MPH

<u>EAST OF AVALON PARK TO END PROJECT</u>
DESIGN SPEED = 70 MPH

TYPICAL SECTION
SR 408
STA 358+41.08 TO STA 731+27.29

APPROVED BY: C. Brian Fuller, P.E. License No.: 49524	CFX CONCURRENCE	CFX APPROVAL
Engineer Of Record Signature — Date	Jonathan Williamson, AICP, CFX Project Manager — Date	Glenn M. Pressimone, PE, CFX Director of Engineering — Date

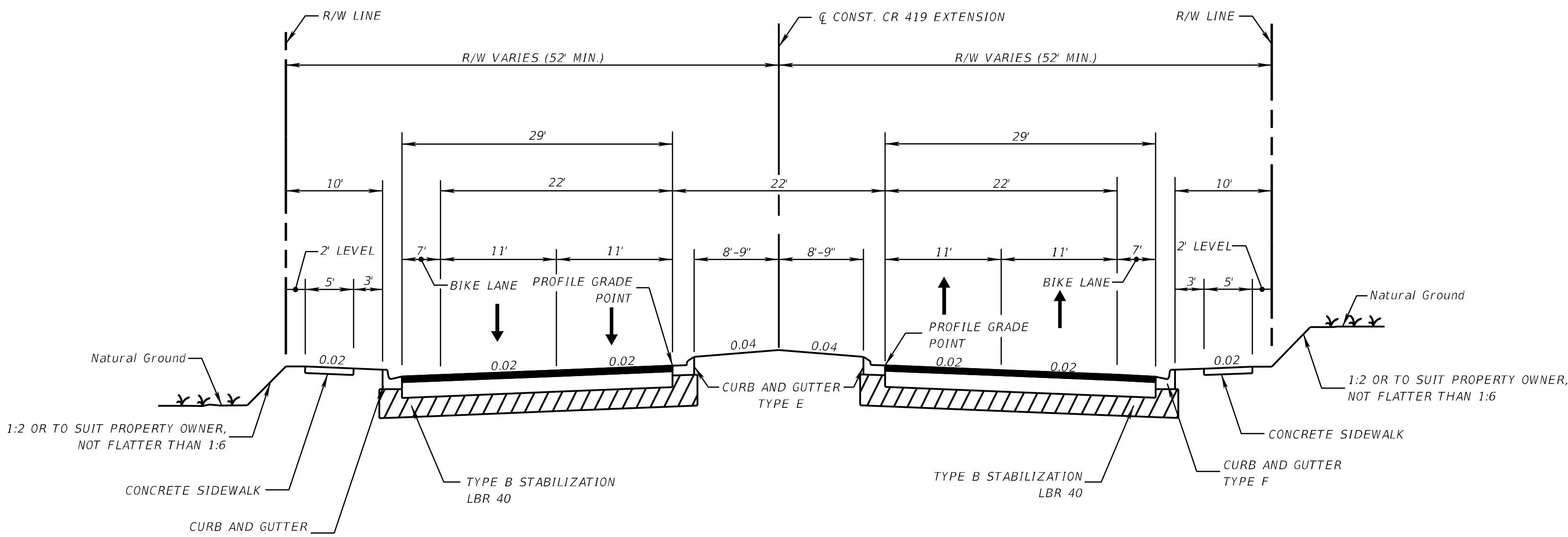
PROJECT IDENTIFICATION

CFX PROJECT NO. 408-254 | FEDERAL AID PROJECT NO. N/A | COUNTY NAME ORANGE

SECTION NO. 75008160 | ROAD DESIGNATION SR 408 | LIMITS/MILEPOST N/A

PROJECT DESCRIPTION SR 408 EASTERN EXTENSION PD&E STUDY (FROM CURRENT EASTERN TERMINUS NEAR WOODBURY ROAD TO SR 50, NEAR SR 520)

PROPOSED ROADWAY TYPICAL SECTION



TYPICAL SECTION
CR 419 EXTENSION (4-LANE)
STA 4001+82.33 TO STA 4037+98.12

DESIGN SPEED = 40 MPH

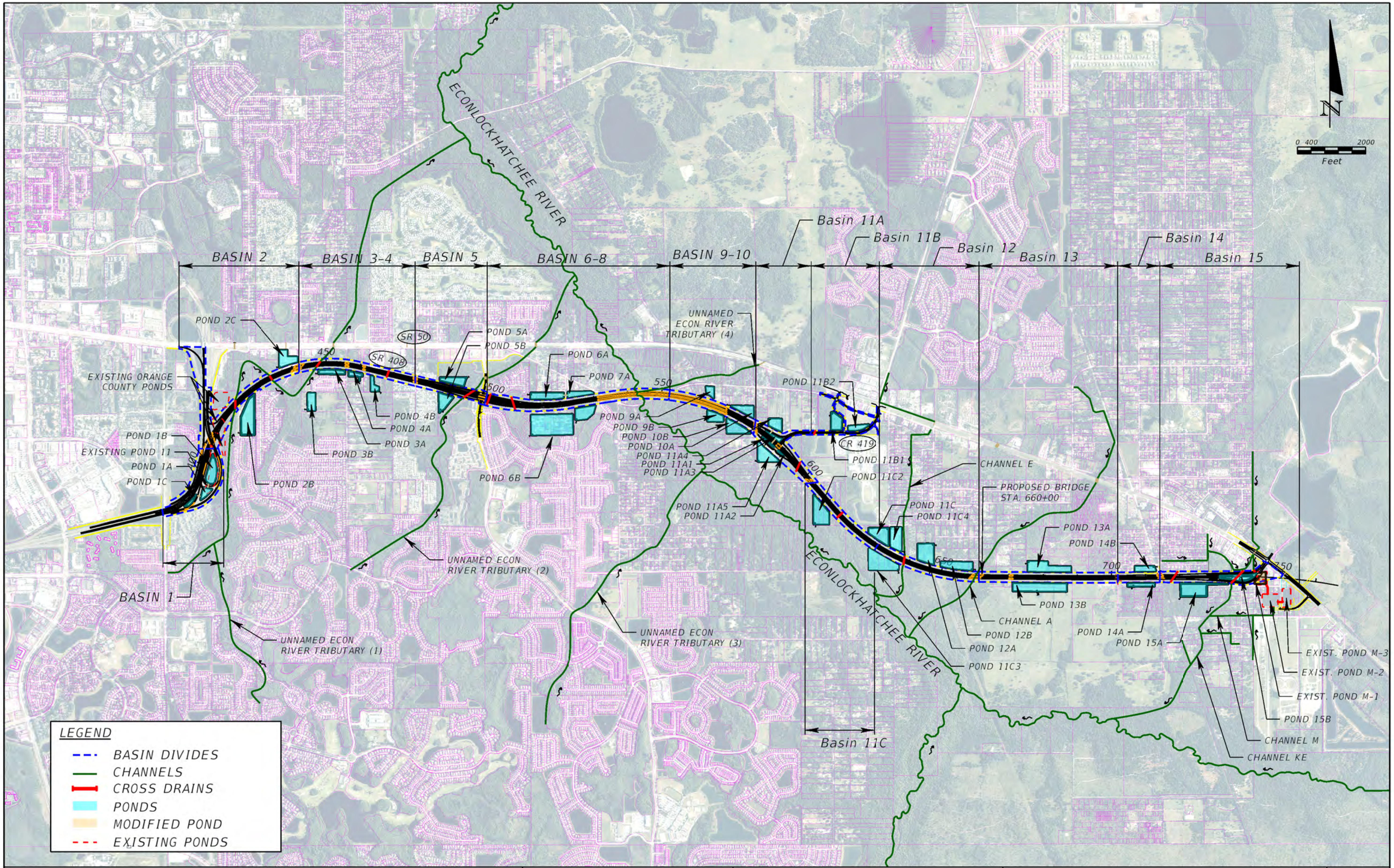
APPROVED BY: C. Brian Fuller, P.E. License No.: 49524	CFX CONCURRENCE	CFX APPROVAL
Engineer Of Record Signature — Date	Jonathan Williamson, AICP CFX Project Manager — Date	Glenn M. Pressimone, PE CFX Director of Engineering — Date

Appendix: E

Proposed Pond Site Maps

- Project Overview Map
- Alternative Pond Site Maps
- Alternative Pond Tax Maps
- Floodplain Maps
- Wetland Maps

Project Overview Map



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

S.R. 408 PD&E STUDY
PROJECT OVERVIEW MAP

SHEET NO.
E-1

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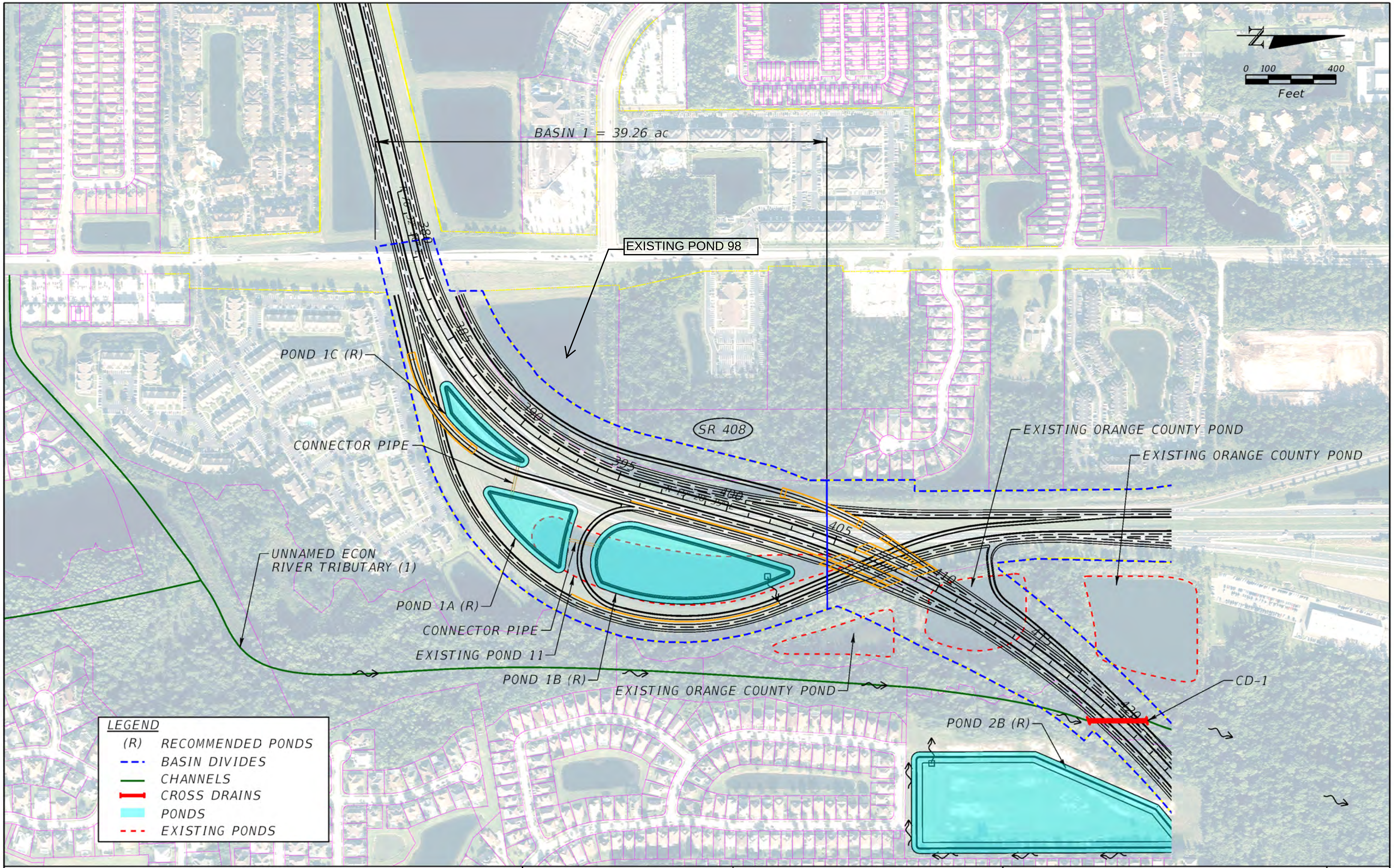
Alternative Pond Site Maps



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND
SITE MAP

SHEET NO.
E-2

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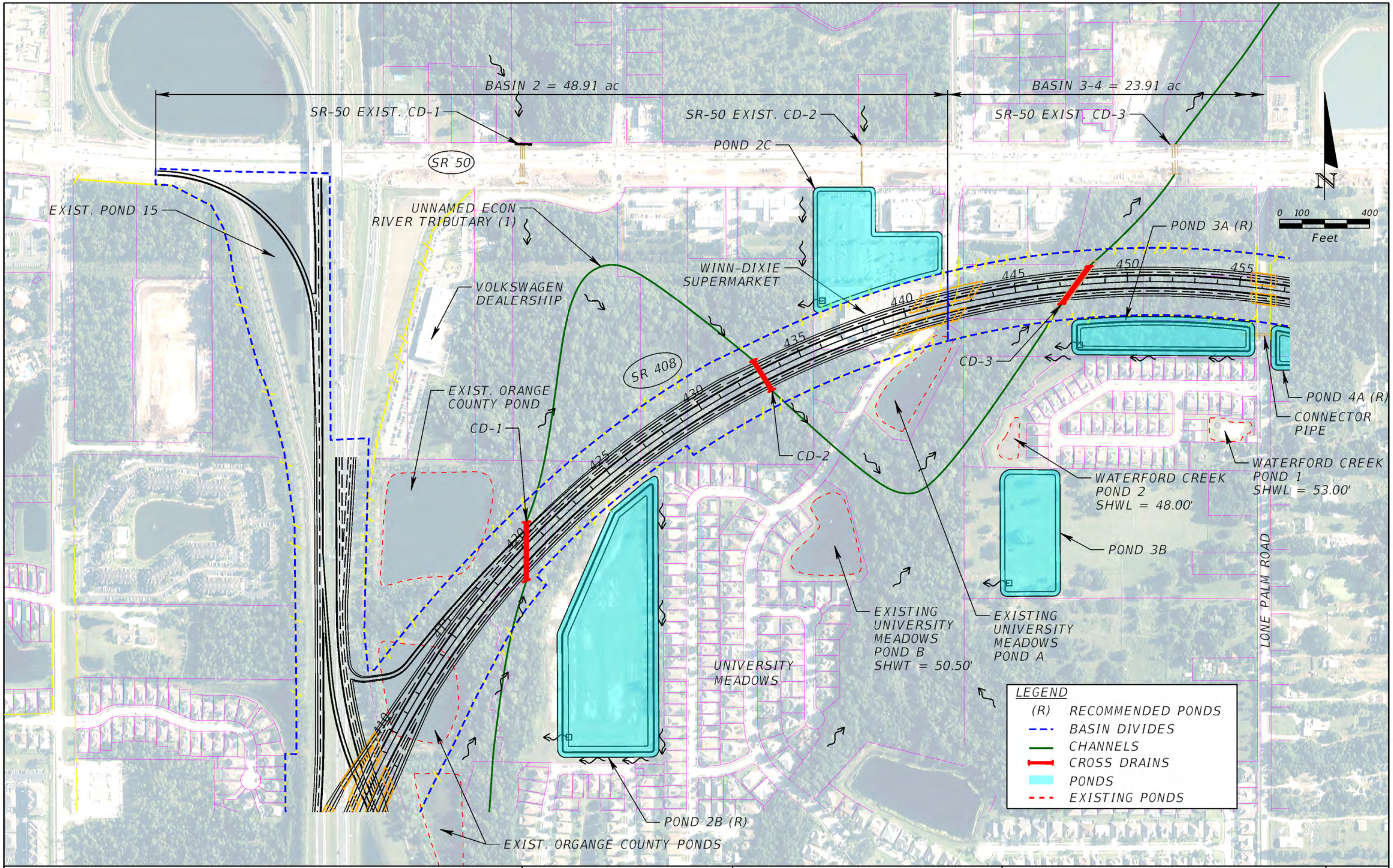

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND
SITE MAP

SHEET NO.
E-3

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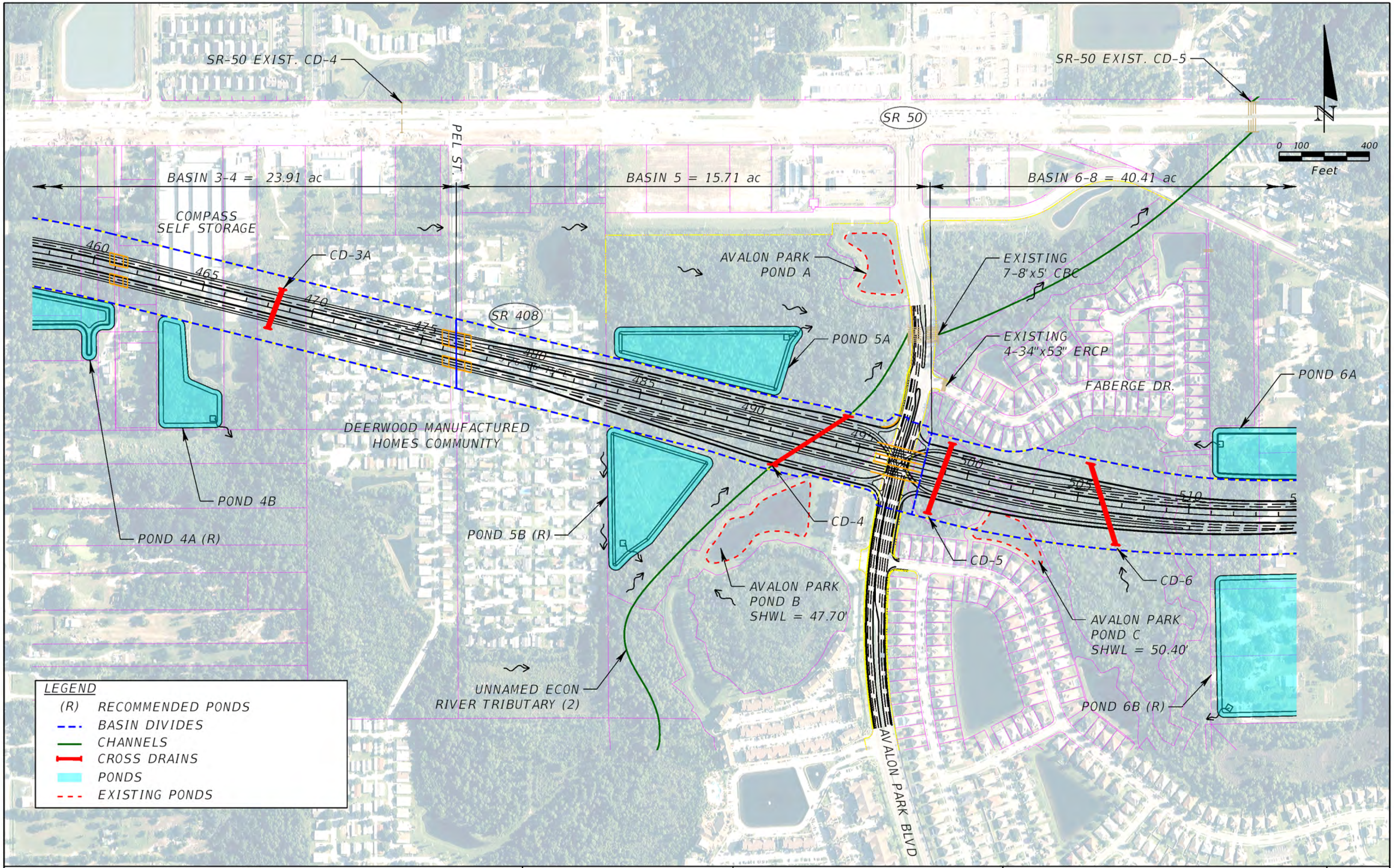

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND
SITE MAP

SHEET NO.
E-4

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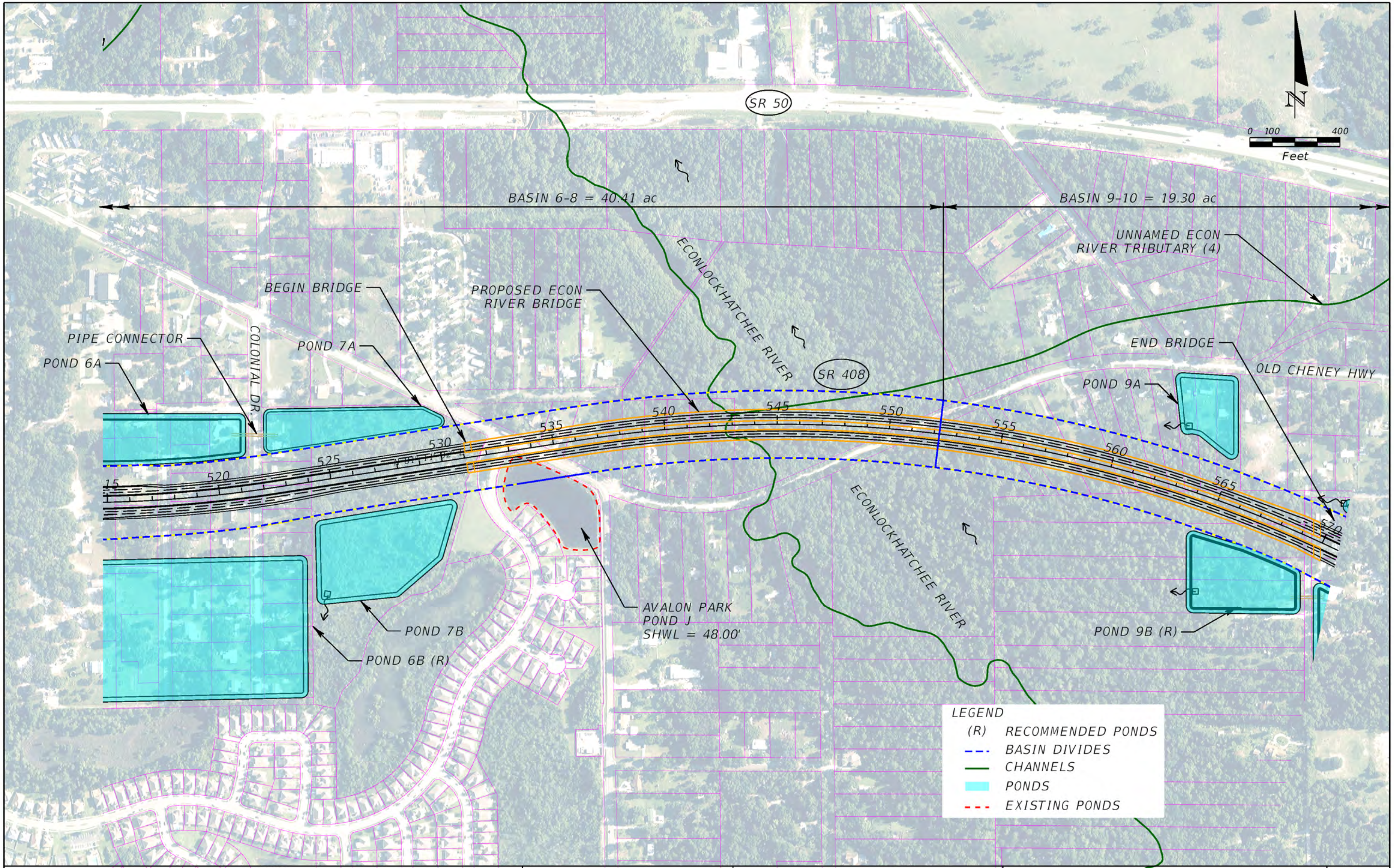

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND SITE MAP

SHEET NO.
E-5

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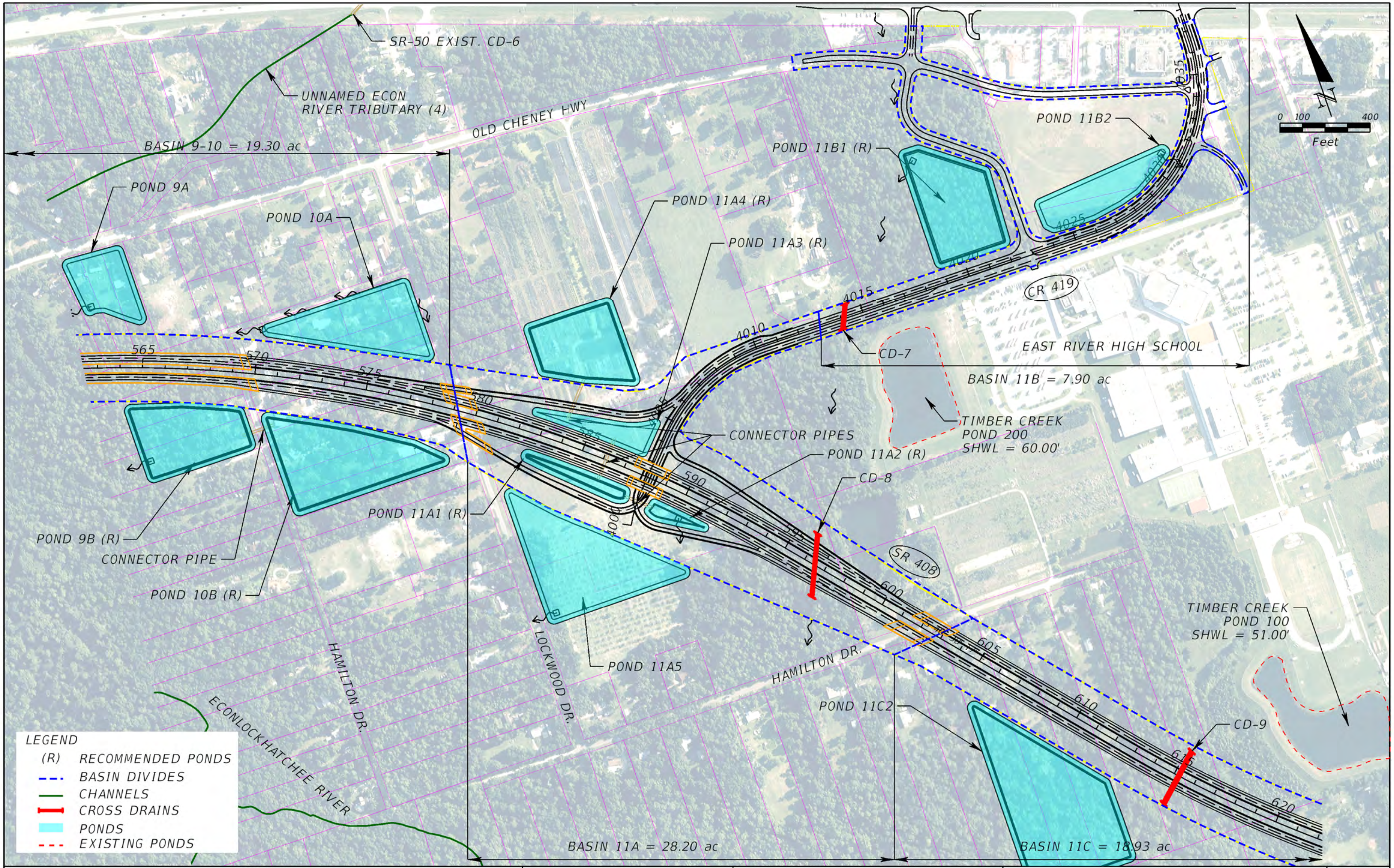
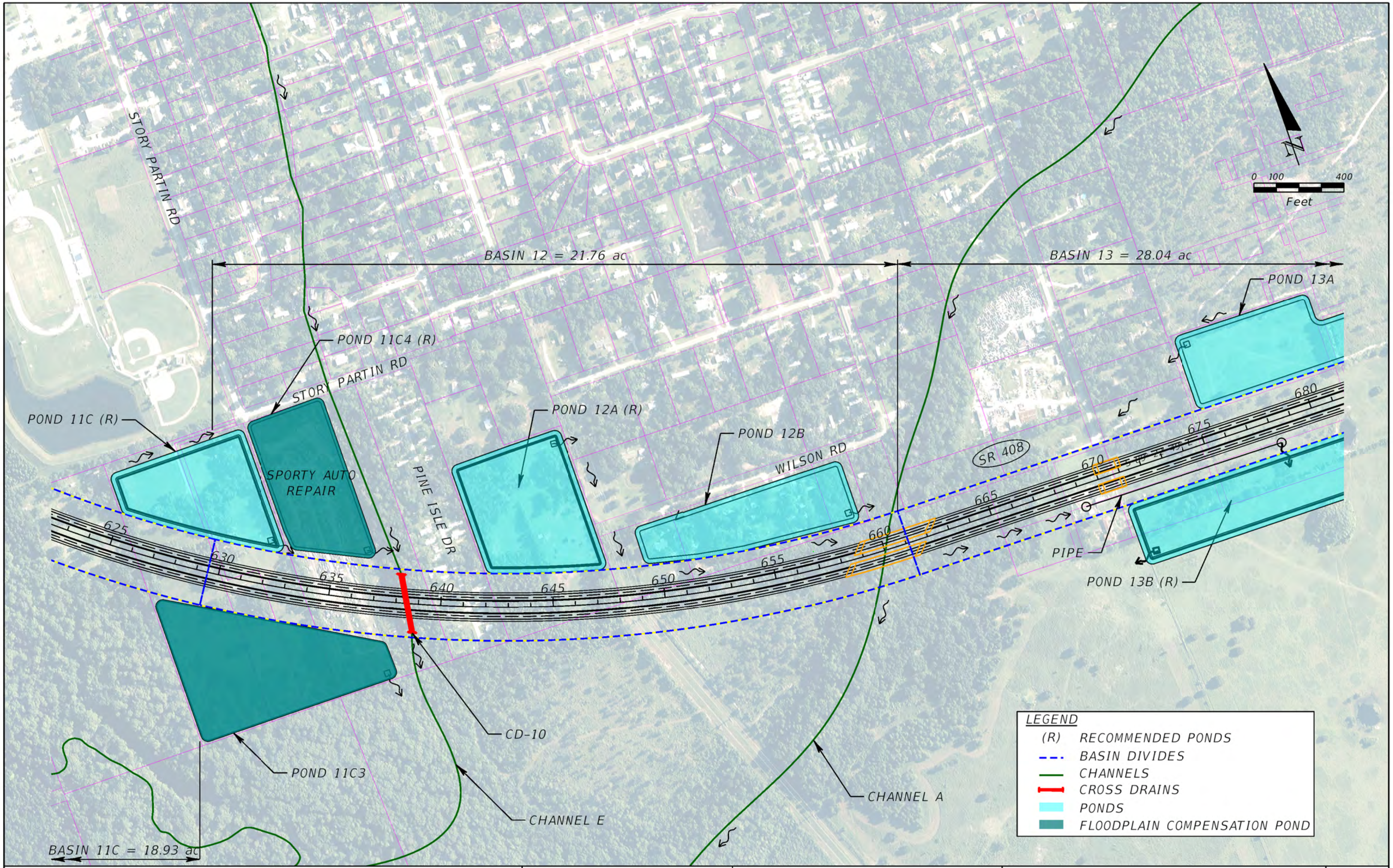


REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND SITE MAP

SHEET NO.
E-6



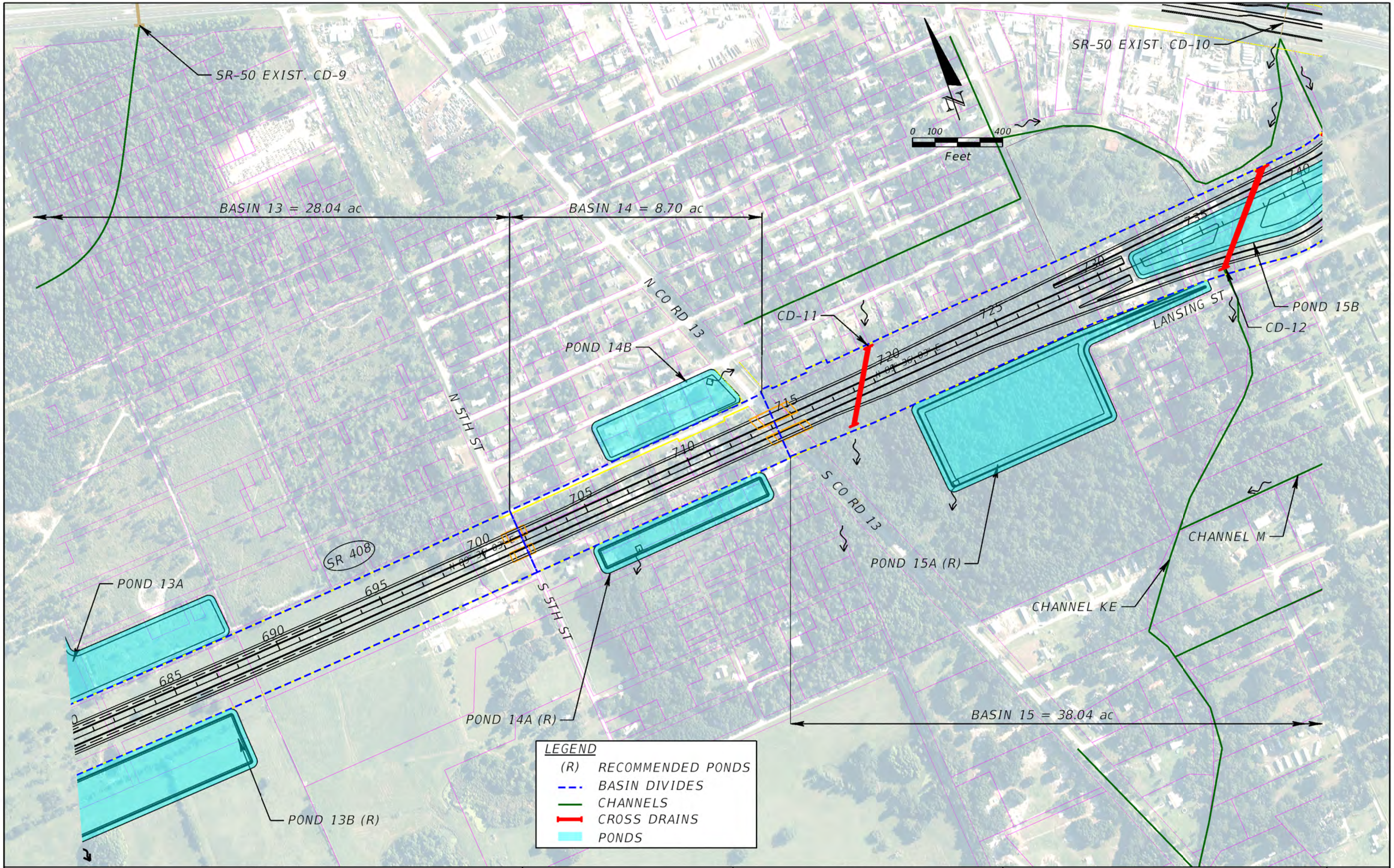
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND SITE MAP

SHEET NO.
E-7



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND SITE MAP

SHEET NO.
E-8

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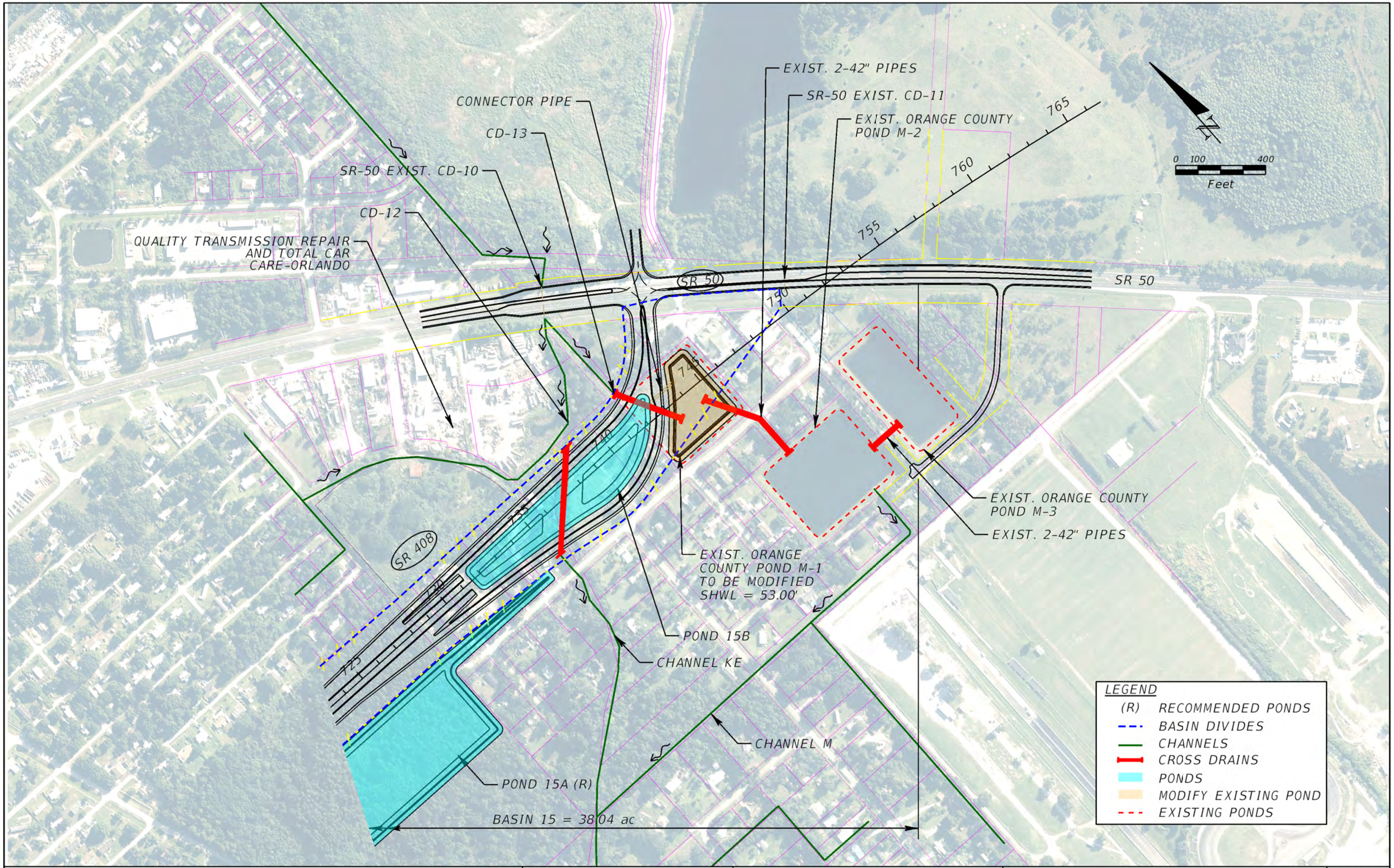


REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

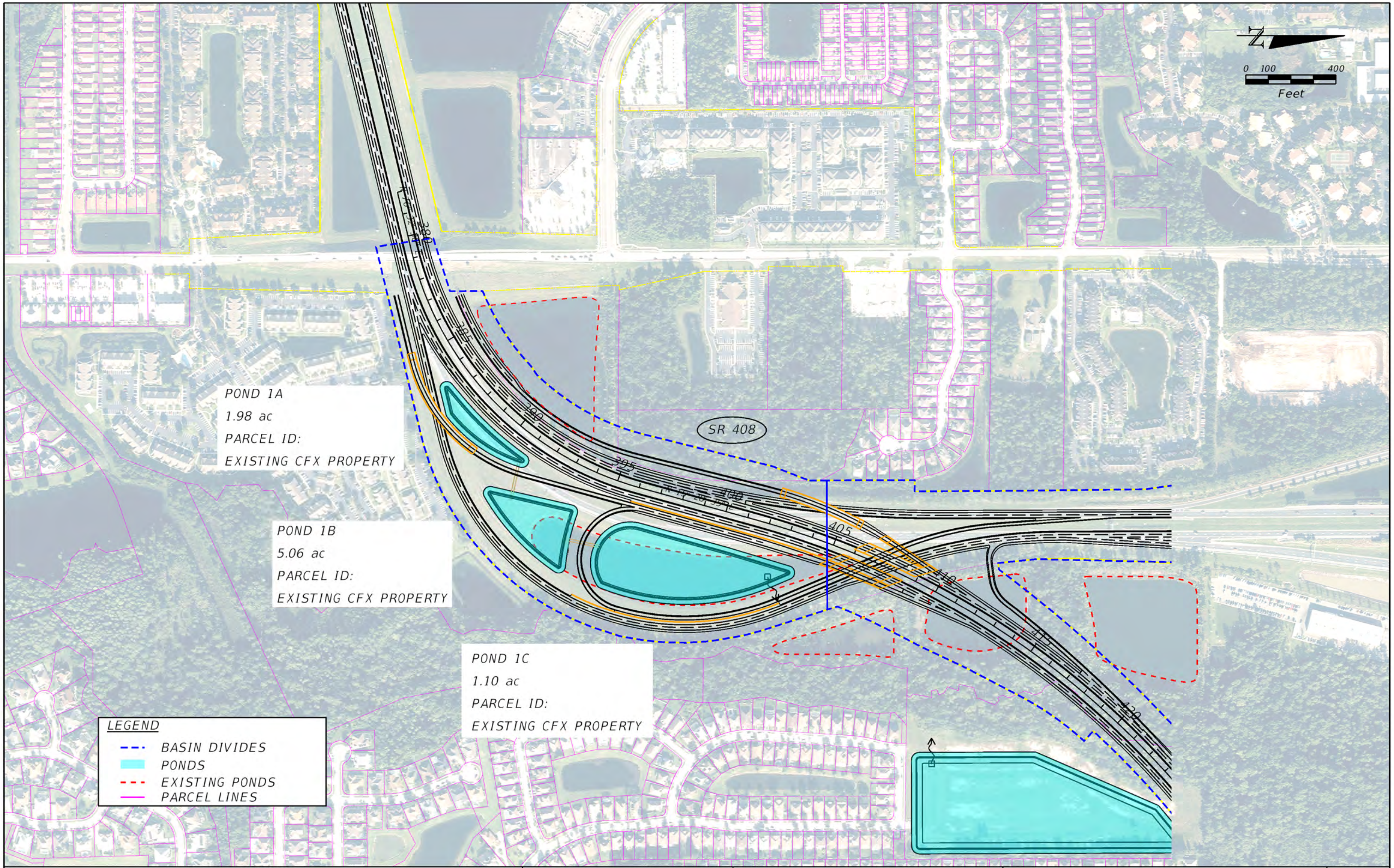
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND SITE MAP

SHEET NO.
E-9

Alternative Pond Tax Maps



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND TAX MAP

SHEET NO. E-10

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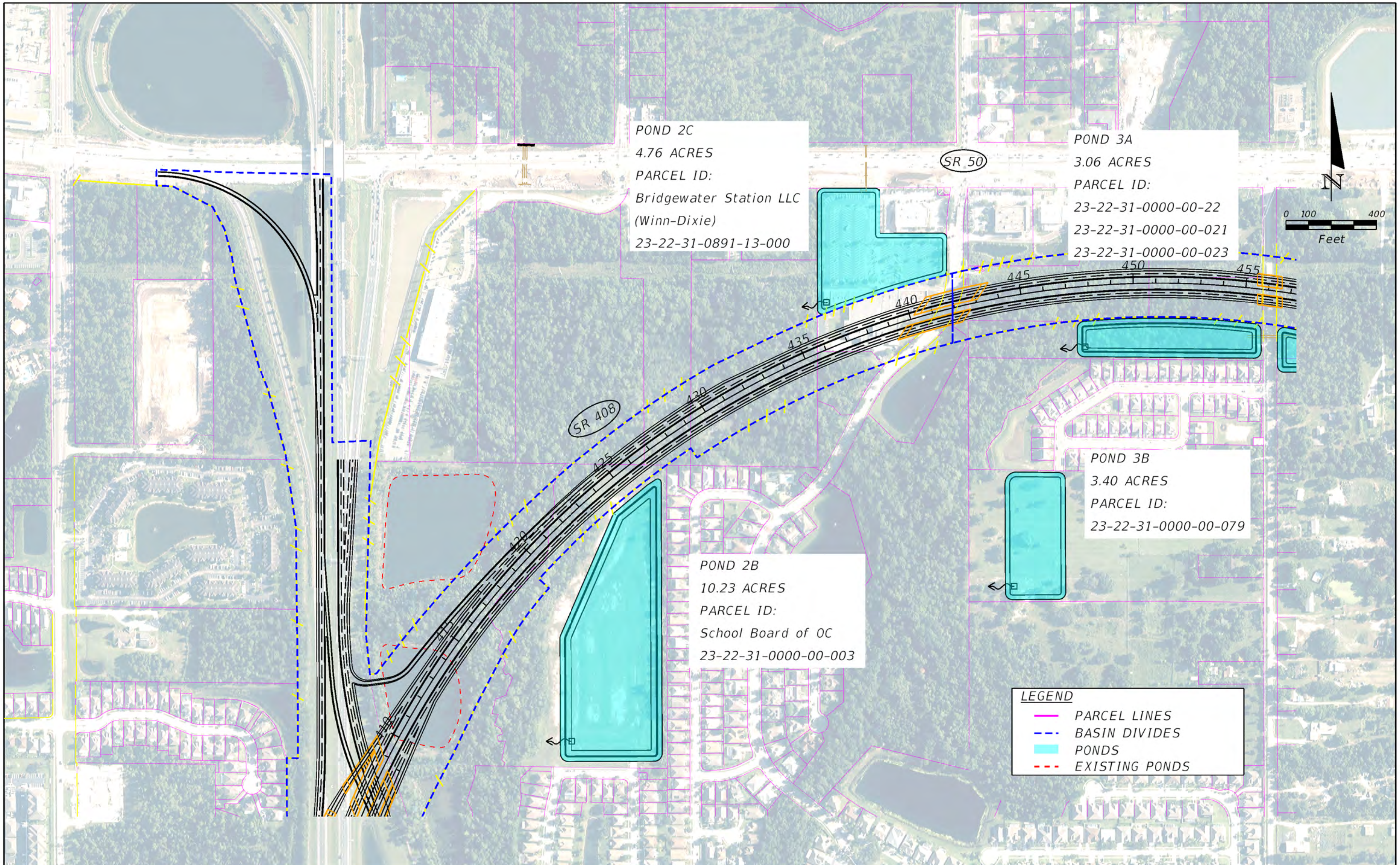


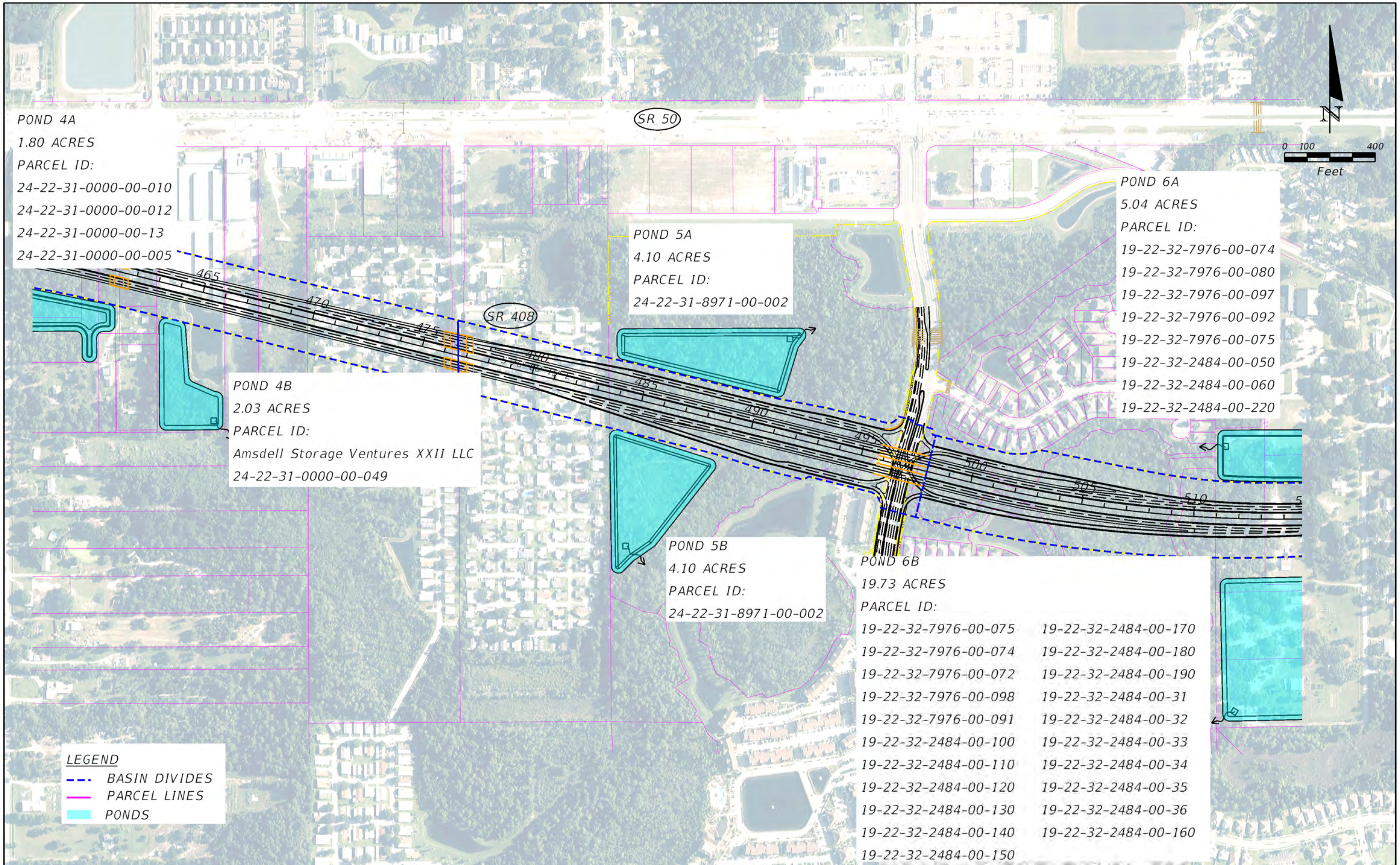
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND
TAX MAP

SHEET NO.
E-11



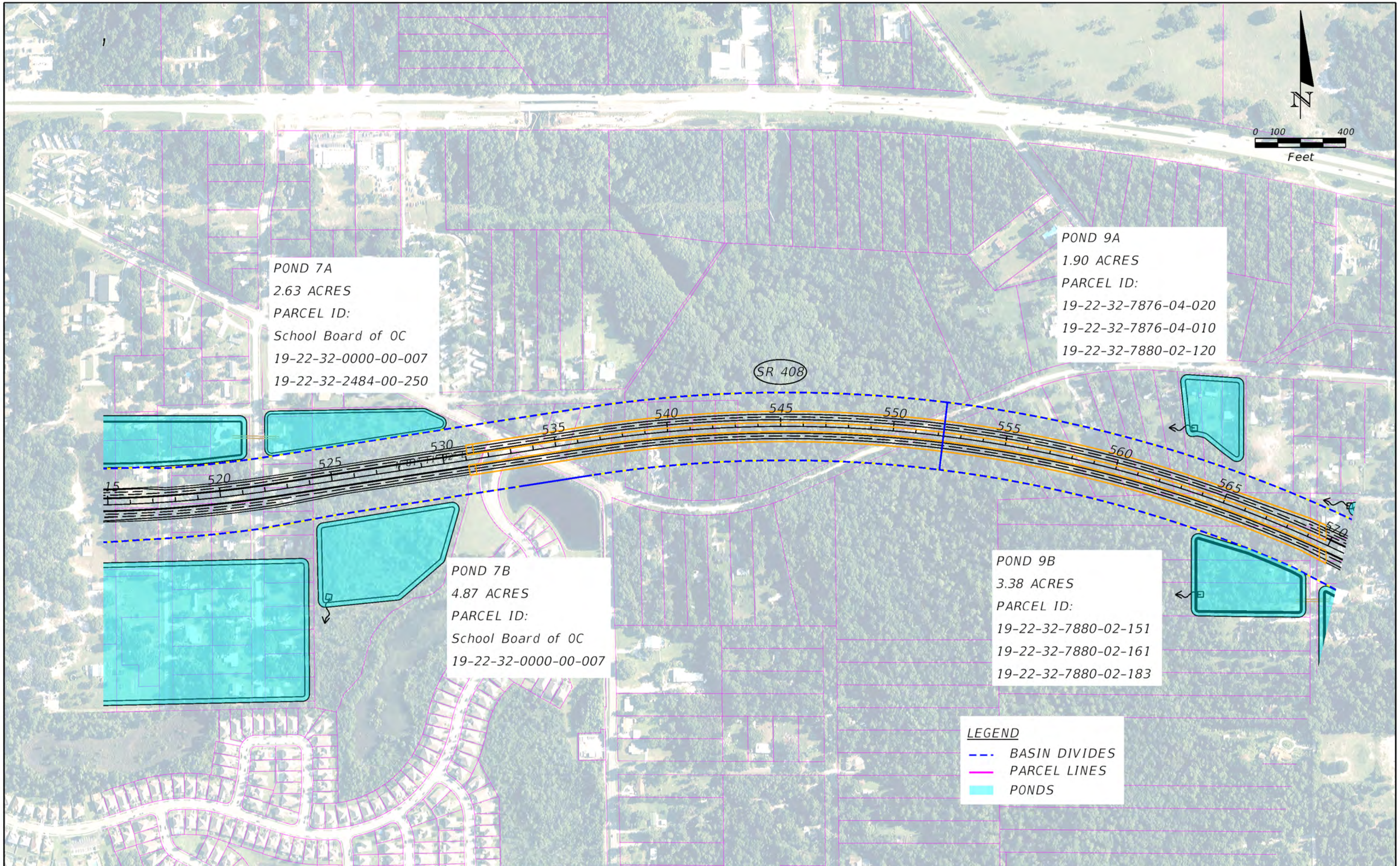
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND TAX MAP

SHEET NO.
E-12



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND TAX MAP

SHEET NO. E-13

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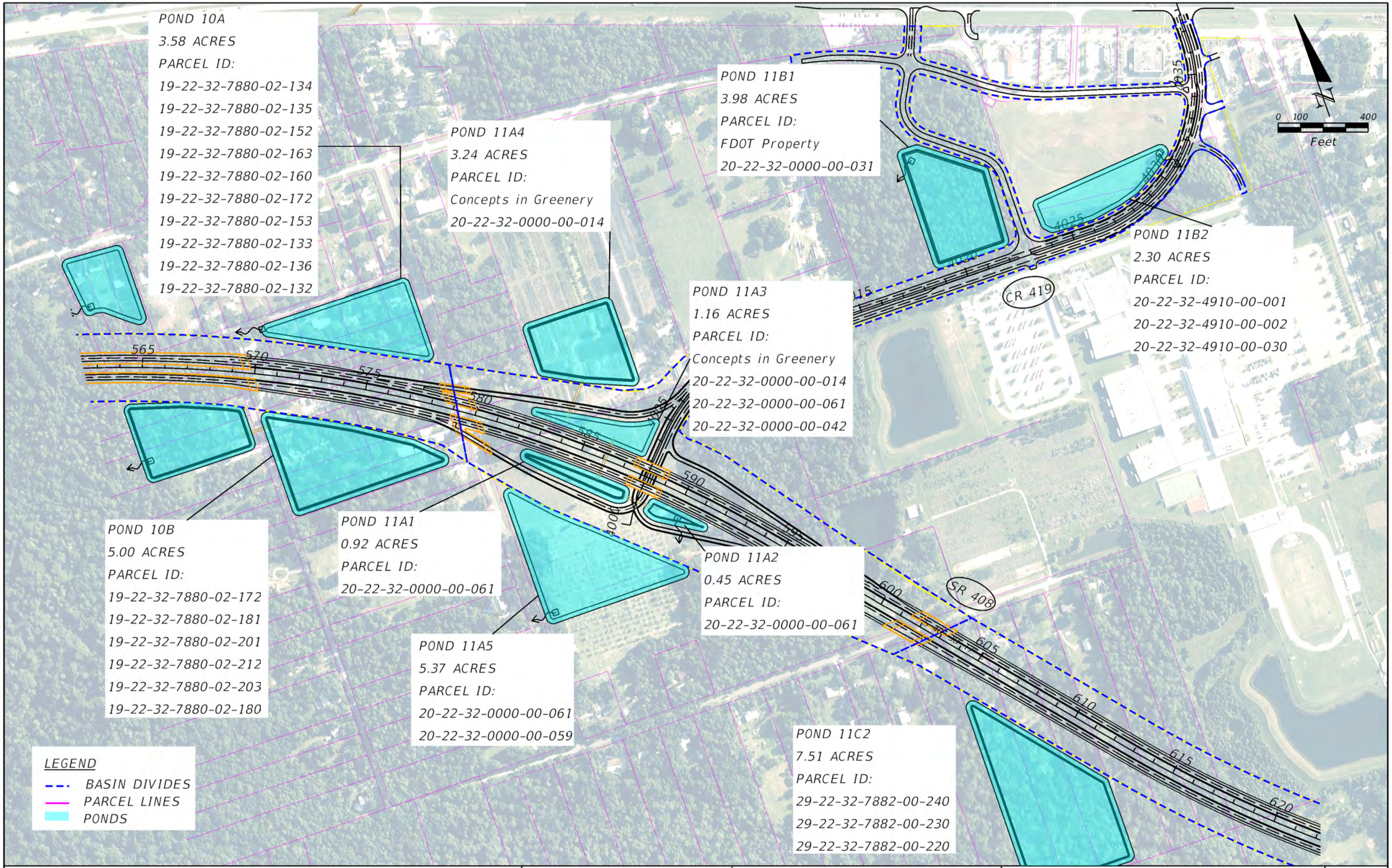

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND
TAX MAP

SHEET NO.
E-14

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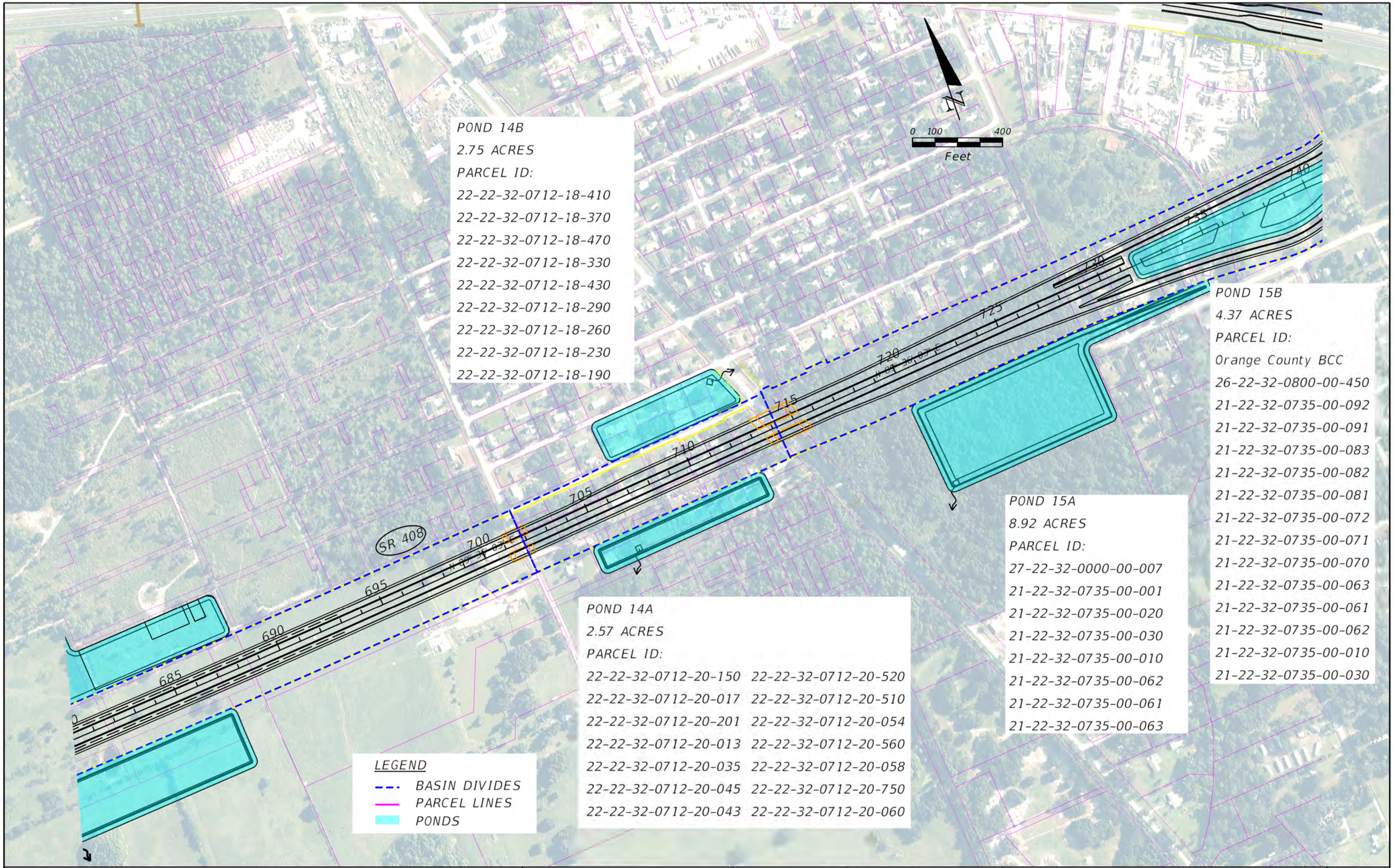
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND TAX MAP

SHEET NO.
E-15



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND
TAX MAP

SHEET NO.
E-16

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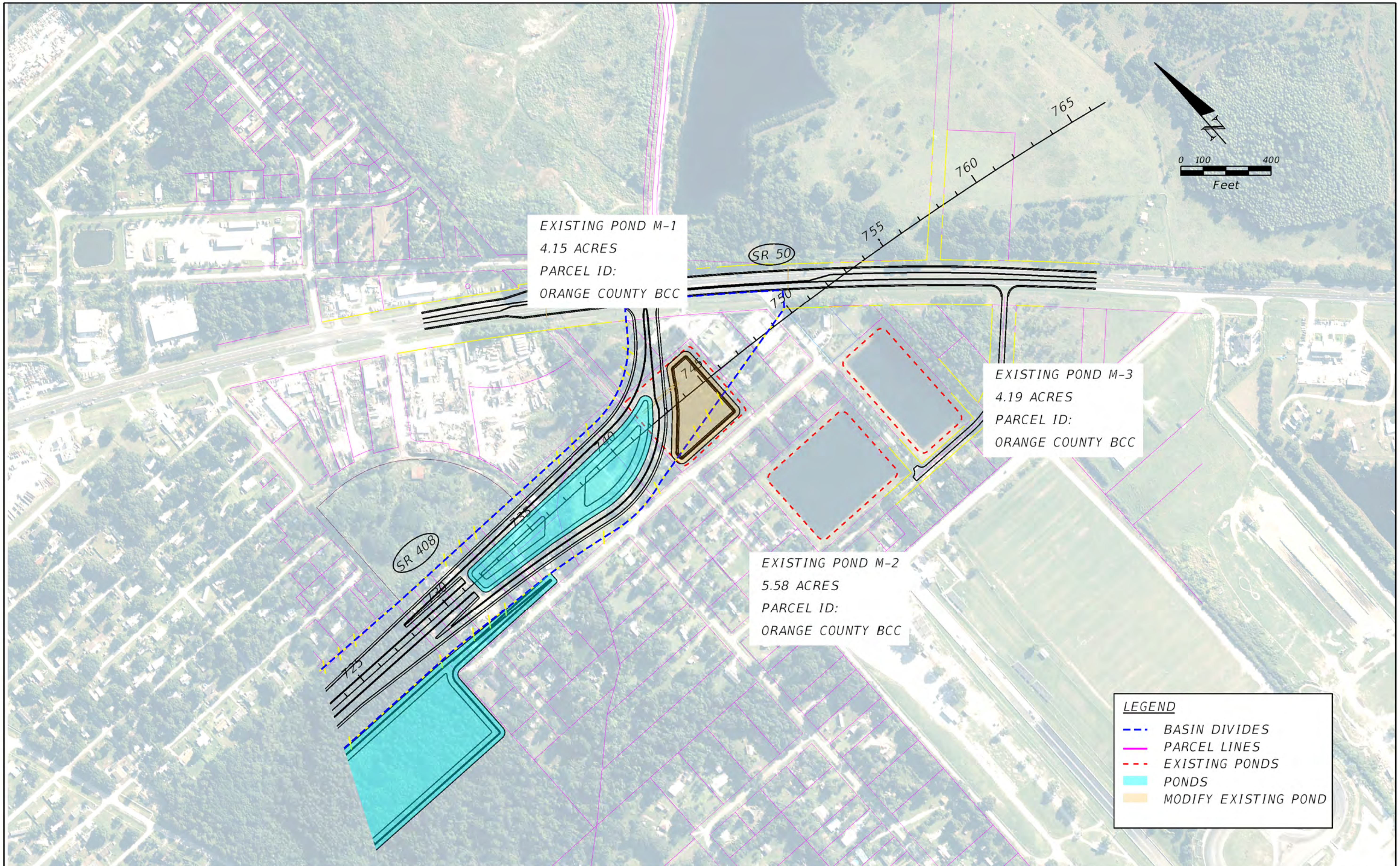


REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

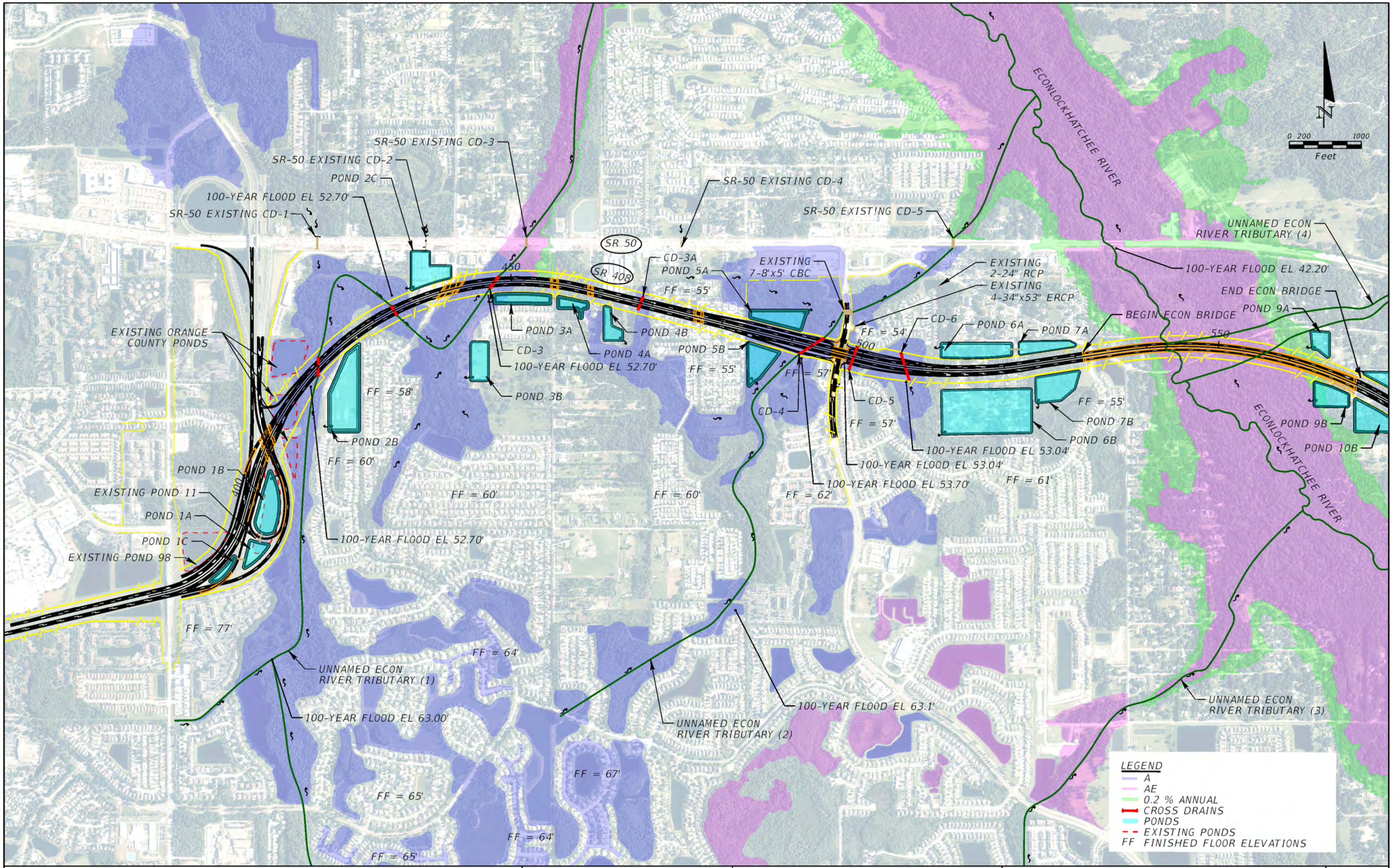
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

ALTERNATIVE POND SITE MAP

SHEET NO.
E-17

Floodplain Maps



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

FLOODPLAIN MAP

SHEET NO. E-18

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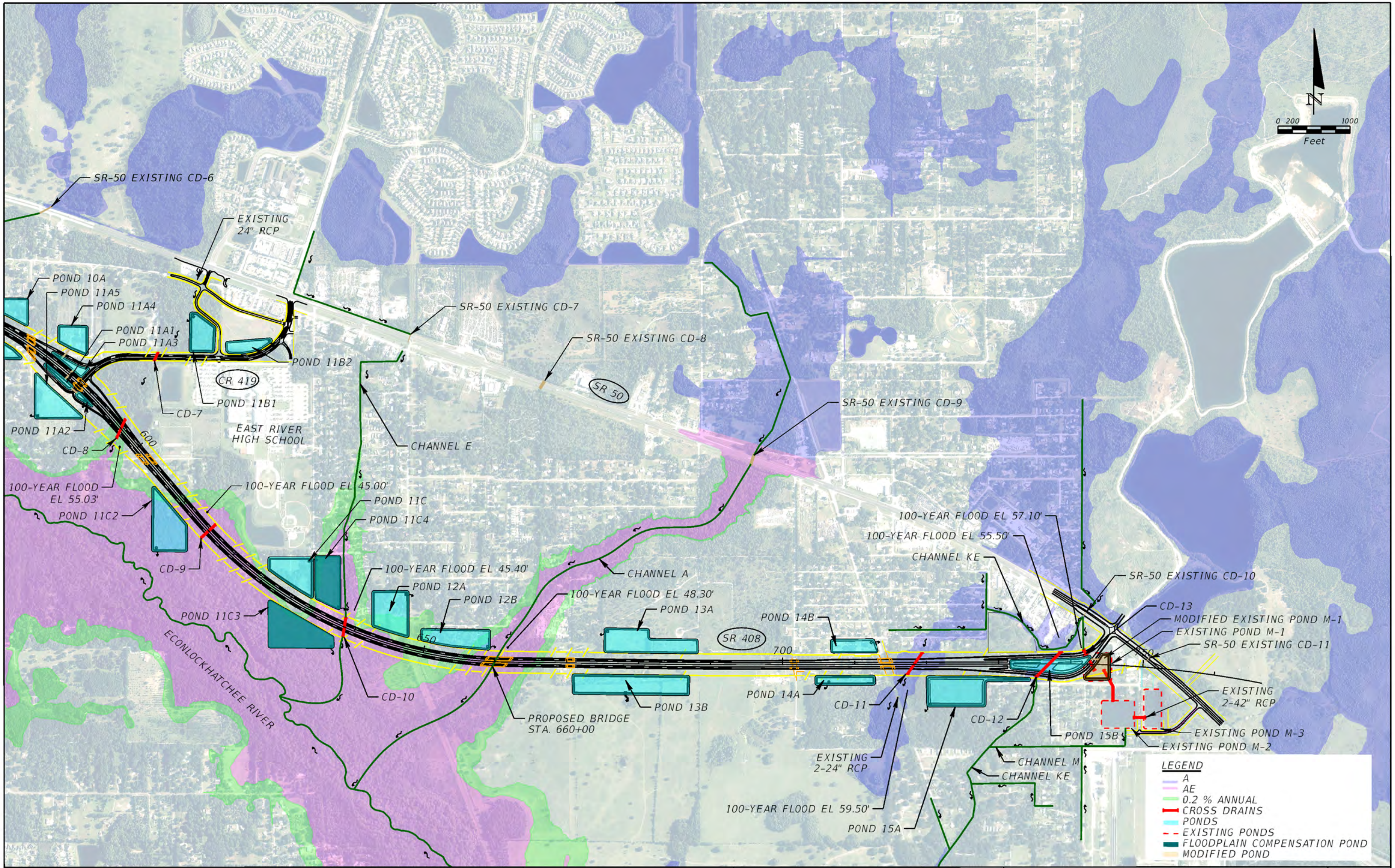

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

FLOODPLAIN MAP

SHEET NO.
E-19

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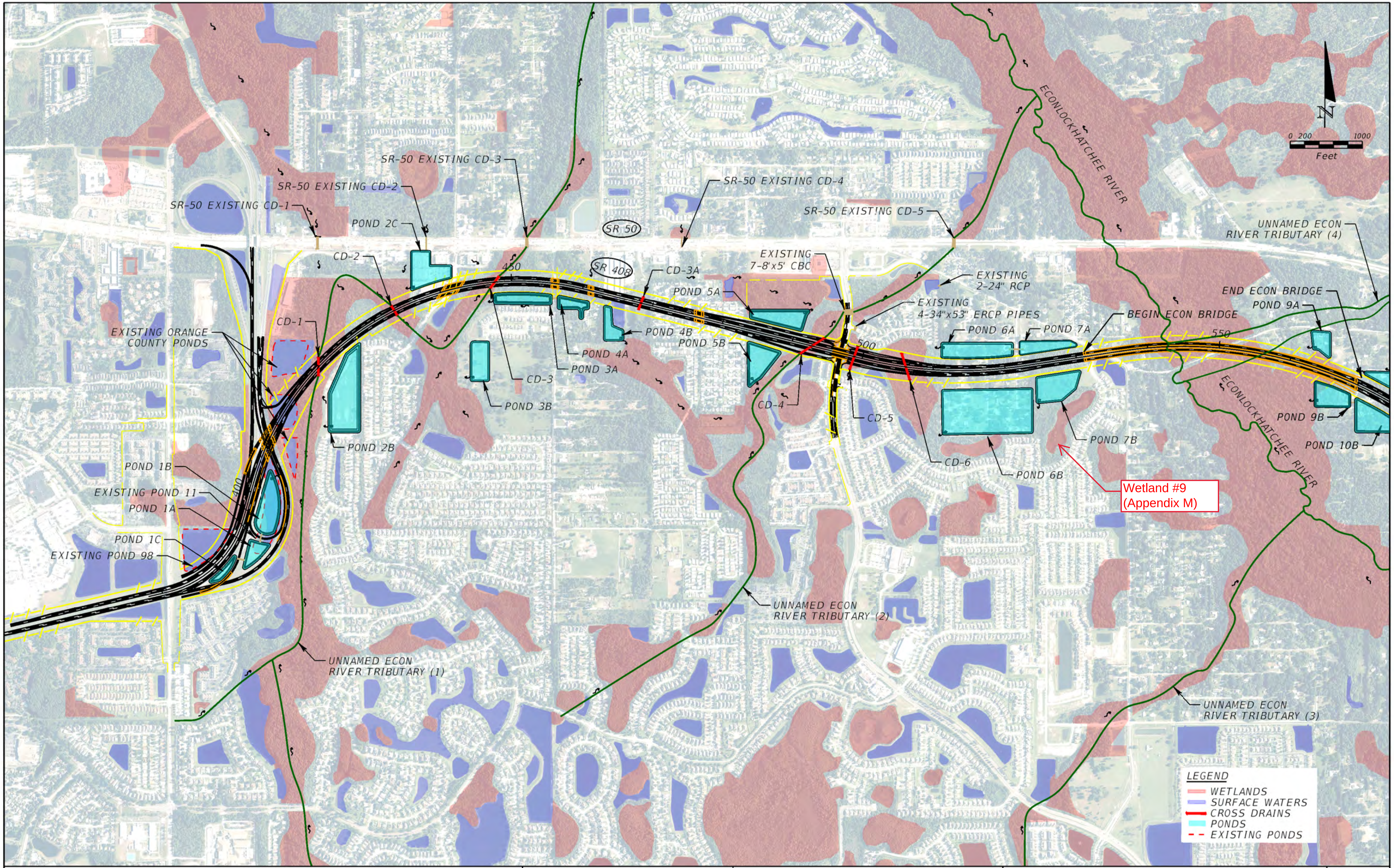
Wetland Maps



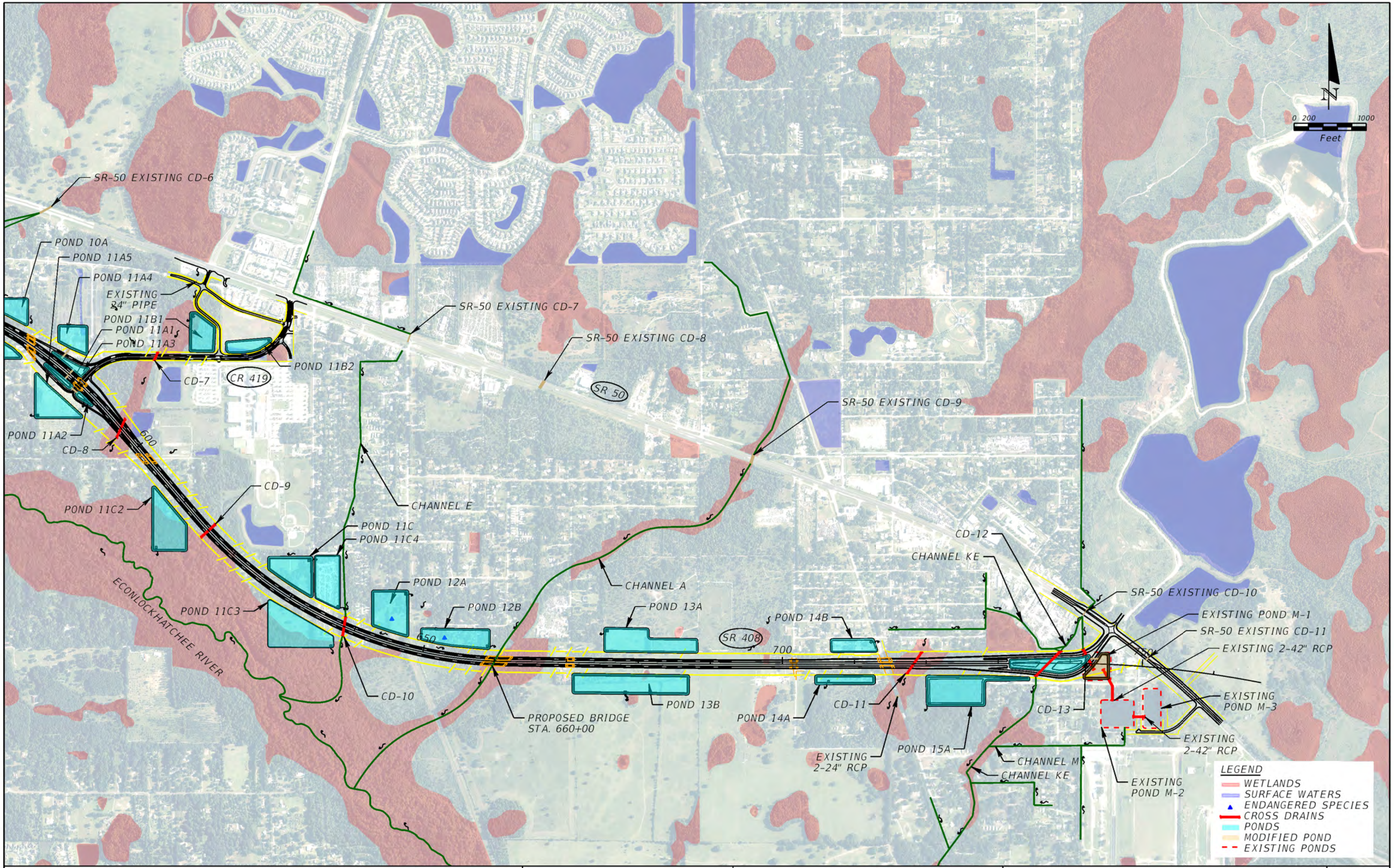
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

WETLAND MAP

SHEET NO.
E-20



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

WETLAND MAP

SHEET NO.
E-21

Appendix: F

Pond Sizing Calculations

SR 408 Eastern Extension-PD&E
CFX
BASIN 1
POND 1A & 1B (EXISTING POND 11)

Computed By KS
Checked By CR
Date 2/26/2017

Beginning Station	38015.00
End Station	40495.00
Length (ft)	2480.00

Total Basin Area				
	R/W Width (ft)			Area (ac)
SR 408 (Ramps, ponds and infield Areas)	n/a	2480		39.26
			TOTAL AREA (AC)	**39.26**

Existing Impervious Area		
Description	Area	
Existing Impervious areas within the basin limits	5.05	
Total Impervious Area	**5.05**	**Acre**

ATTENUATION VOLUME ESTIMATE

Pre-Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Existing SR 50 and SR 408 Roadway				
On-site Roadway and Residential	B/D	98	5.05	494.90
On-site Grassed Area	B/D	80	28.01	2,240.80
Existing Infield Pond	B/D	100	6.20	620.00
		TOTAL	39.26	3,355.70
		COMPOSITE CN		**85.5**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	1.70	6.95	22.73
100 yr, 240 hr	FDOT	18.00	1.70	16.11	52.71
100 yr, 8 hr	FDOT	8.00	1.70	6.27	20.51

1) Soil Storage (S)	S = (1000/CN) - 10	Soil Storage (in)	S	1.70
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.95
3) Runoff Volume (Vr)	Vr = R/12 * Area	Runoff (ac-ft)	Vr	22.73

Proposed Impervious Area			
Description	Width (ft)	Length(ft)	Area
SR 408 Proposed Pavement assumed impervious median on mainline.			11.70
Total Impervious Area			**11.70** **Acre**

Existing Impervious areas on SR 408 already treated in existing FDOT Pond-11.
Existing roadway will be reconstructed therefore, the entire impervious areas in proposed condition needs to be treated.
Existing Pond-11 will be modified to accommodate the proposed project.

Post Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Proposed SR 408 and Existing SR 50				
On-site Roadway	B/D	98	11.70	1,146.60
On-site Grassed Area	B/D	80	19.39	1,551.20
Proposed Pond Area	B/D	100	8.17	817.00
		TOTAL	39.26	3,514.80
		COMPOSITE CN		**89.5**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	1.17	7.44	24.34
100 yr, 240 hr	FDOT	18.00	1.17	16.67	54.53
100 yr, 8 hr	FDOT	8.00	1.17	6.75	22.08

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	1.17
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	7.44
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	24.34

SUMMARY OF ATTENUATION ESTIMATES

PRE DEVELOPED CONDITION		POST DEVELOPED CONDITION	
AREA (AC)	39.26	AREA (AC):	39.26
CN:	85.5	CN:	89.5

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 Yr, 24 hr	22.73	24.34	1.60
FDOT	100 yr, 240 hr	52.71	54.53	1.83
FDOT	100 yr, 8 hr	20.51	22.08	1.57

MAXIMUM ATTENUATION VOLUME (AC-FT)	1.83

WATER QUALITY CALCULATIONS

St. John's River Water Management District Pollution Abatement Volume Requirement

Post Development Total Area (ac) =	39.26
Post Development Impervious Area (ac) =	11.70

The Basin Discharges it Econ River which is an OFW. Additional 50% treatment volume is required
The basin is an Open Basin.

Wet Detention	**Ac-Ft**	
1) 1.5 " of Runoff Over Total Area =	4.91	Governs
2) 3.75" of Runoff Over Impervious Area =	3.66	
WET DETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	3.66	

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

The top of the treatment and attenuation volume are constrained to berm elevation minus the Maintenance Berm.

Per the existing permit, the Normal Water Level in existing Pond-11 is 3.5' below existing ground.
Existing Pond-11 berm = 61.5' and NWL = 58.0'
We will assume the SHWT elevations for the purpose of preliminary pond sizing to be at 3.5' below ground.

Pond Depth from top of Maint Berm to SHWT	3.5	ft
Maintenance Berm (Maint Berm) =	1	ft

H = Depth to pond SHWT - Maintenance Berm = 2.5 ft

3) Use greater of required treatment volume or attenuation volume.

Required Attenuation Volume =	1.83	ac-ft
Required Treatment Volume =	4.91	ac-ft
Peak Volume =	6.74	ac-ft

4) For purposes of pond area calculations, assume a square pond.

Volume = LWH

where H = height (ft)
L = length of vertical sided pond
W = width of vertical sided pond

Since a square pond is being assumed, L = W. Therefore, Volume = L^2H

Volume = 6.74 ac-ft
H = 2.5 ft

$$6.74 = L^2 \times 2.5$$

Solving for L = 342.6 ft
Therefore W = 342.6 ft

5) Increase dimensions to account for side slopes.

Add: x = [(Side Slopes x H) x 2] to each dimension

Side slopes:	4	ft/ft
H:	2.5	ft
x =	20	ft
Length @ top of slope =	363	ft
Width @ top of slope =	363	ft

6) Add maintenance berms.

Assume 20' maintenance berm (add to each side)

Length w/maint Berm =	403	ft
Width w/maint. Berm =	403	ft
Total Area =	3.72	acre
Add 10 % Contingency	4.09	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN-1=	4.1	ACRES

Basin 1 can provide required treatment and attenuation volume in proposed Pond 1A, Pond 1B and Pond 1C, which is by expanding the existing Pond-11.
Pond-11 can be expanded to accommodate the additional runoff from the new roadway alignment.

Existing Pond-11	6.20 acre
Proposed Pond 1A (expanding Pc	1.98 acre
Proposed Pond 1B (expanding Pc	5.06 acre
Proposed Pond 1C (Infield Area)	1.10 acre

Therefore, existing pond and infield areas has additional capacity and room for expansion. No new parcels required for this basin.

Flood plain impact is not anticipated in this basin.

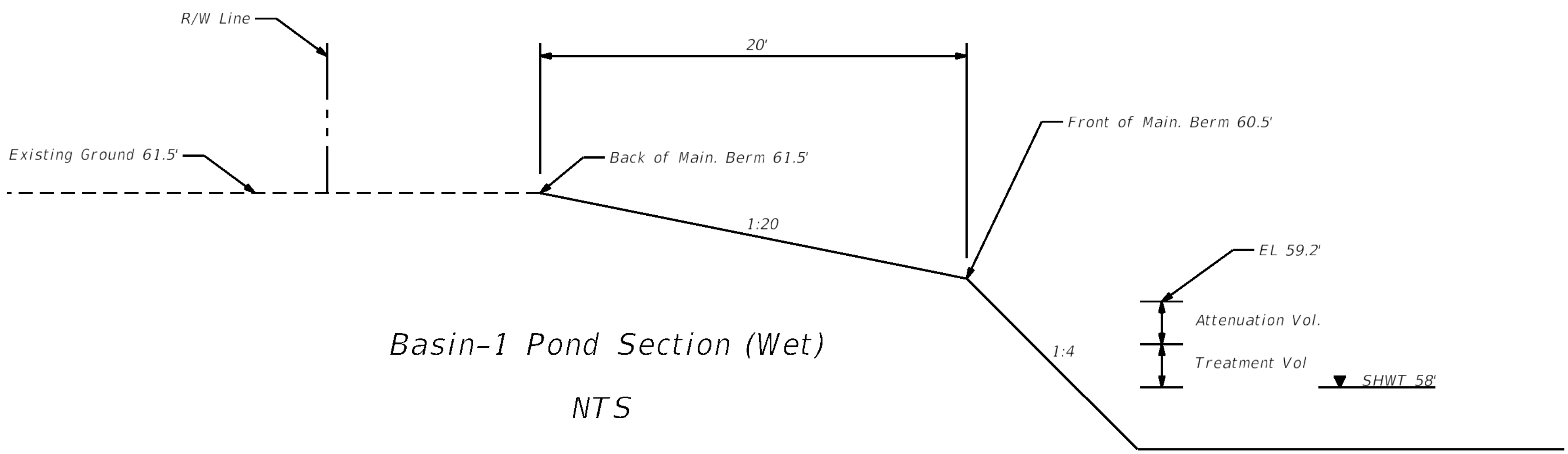
Existing Ground Elevation =	61.5 ft
Normal Water Elevation =	58 ft (Existing Pond-11 NWL = 58' NAVD) Per the existing permit.
Lowest EOP Elevation =	67.51 ft
Total Pond Area=	8.14 acre

Pond Stage/Storage Calculations

Stage	Description	Area (ac)	Ave Area (ac)	Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
58	Normal Water Level	5.26				0.00
59.5		5.80	5.53	1.50	8.30	8.30
60.5	Front Main Berm	6.17	5.99	1.00	5.99	14.28
61.5	Back Main Berm	8.14	7.16	1.00	7.16	21.44

Required Treatment and Attenuation Volume = 6.74 ac-ft

Provided treatment and attenuation volume = 6.74 ac-ft
Provided treatment and attenuation Stage= 59.2 ft



Basin-1 Pond Section (Wet)

NTS

SR 408 Eastern Extension-PD&E
CFX
BASIN 2

Computed By	KS
Checked By	CR
Date	2/26/2017

Beginning Station	40495.00
End Station	44195.00
Length (ft)	3700.00

Total Basin Area	
R/W Width (ft)	Area (ac)
Existing roadway	8.71
Grass and Wooded Area	35.46
Existing infield Pond-15 (SW Quadrant of SR 405/SR 50 Interchange)	1.95
Existing Pond South of VW Dealership	2.79
TOTAL AREA (AC)	**48.91**

Existing Impervious Area		
Description	Area	
Existing Impervious areas within the basin limits	8.71	
Total Impervious Area	**8.71**	**Acre**

ATTENUATION VOLUME ESTIMATE

Pre-Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	A/D	98	8.71	853.58
On-site Grassed Area	A/D	80	35.46	2,836.80
Existing Pond-15	A/D	100	1.95	195.00
Existing Pond South of VW Dealership	A/D	100	2.79	279.00
		TOTAL	48.91	4,164.38
			COMPOSITE CN	**85.1**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	1.74	6.91	28.15
100 yr, 240 hr	FDOT	18.00	1.74	16.06	65.47
100 yr, 8 hr	FDOT	8.00	1.74	6.23	25.39

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (	S	1.74
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.91
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	28.15

Proposed Impervious Area		
Description	Area	
SR 408 Proposed Alignment (Assuming impervious median from Sta 409+00 to 441+95)	18.09	
Total Impervious Area	**18.09**	**Acre**

Post Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Proposed SR 408				
On-site Roadway	A/D	98.00	18.09	1,772.43
On-site Grassed Area	A/D	80	28.87	2,309.92
Existing Pond -15	A/D	100	1.95	195.00
		TOTAL	48.91	4,277.35
			COMPOSITE CN	**87.5**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	1.43	7.19	29.29
100 yr, 240 hr	FDOT	18.00	1.43	16.39	66.79
100 yr, 8 hr	FDOT	8.00	1.43	6.50	26.51

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (	S	1.43
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	7.19
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	29.29

SUMMARY OF ATTENUATION ESTIMATES

PRE DEVELOPED CONDITION		POST DEVELOPED CONDITION	
AREA (AC)	48.91	AREA (AC):	48.91
CN:	85.1	CN:	87.5

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 Yr,24 hr	28.15	29.29	1.14
FDOT	100 yr, 240 hr	65.47	66.79	1.32
FDOT	100 yr, 8 hr	25.39	26.51	1.11

MAXIMUM ATTENUATION VOLUME (AC-FT)	1.32

WATER QUALITY CALCULATIONS

St. John's River Water Management District Pollution Abatement Volume Requirement

Post Development Total Area (ac) =	48.91
Post Development Impervious Area (ac) =	18.09

The Basin Discharges it Econ River which is an OFW. Additional 50% treatment volume is required
The basin is an Open Basin.

Wet Detention	Ac-Ft	
1) 1.5 " of Runoff Over Total Area =	6.11	Governs
2) 3.75" of Runoff Over Impervious Area =	5.65	
WET DETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	6.11	

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

The top of the treatment and attenuation volume are constrained to berm elevation minus the Maint Berm.

Used SHWT elevation from adjacent University Medows development Pond B. The SHWT elevation from permit plans = 50.5'

Pond Depth from top of Maint Berm to SHWT	9	ft
Maint Berm =	1	ft

H = Depth to pond SHWT - Maint Berm = 8 ft

3) Use greater of required treatment volume or attenuation volume.

Required Attenuation Volume =	1.32	ac-ft
Required Treatment Volume =	6.11	ac-ft
Peak Volume =	7.43	ac-ft

4) For purposes of pond area calculations, assume a square pond.

Volume = LWH

where
- H = height (ft)
- L = length of vertical sided pond
- W = width of vertical sided pond

Since a square pond is being assumed, L = W. Therefore, Volume = L^2H

Volume = 7.43 ac-ft
H = 8 ft

$7.43 = L^2 \times 8$

Solving for L = 201.1 ft
Therefore W = 201.1 ft

5) Increase dimensions to account for side slopes.

Add: x = [(Side Slopes x H) x 2] to each dimension

Side slopes:	4	ft/ft
H:	8	ft
x =	64	ft
Length @ top of slope =	265	ft
Width @ top of slope =	265	ft

6) Add maintenance berms.

Assume 20' maintenance berm (add to each side)

Length w/maint berm =	305	ft
Width w/maint. Berm =	305	ft
Total Area =	2.14	acre
Add 10 % Contingency	2.35	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN-2=	2.4	ACRES

Recommended Pond 2B

Existing Ground Elevation =	58.5 ft
Normal Water Elevation =	50.5 ft
Lowest EOP Elevation =	87.71 ft
Pond R/W	10.23 ac

Pond Stage/Storage Calculations

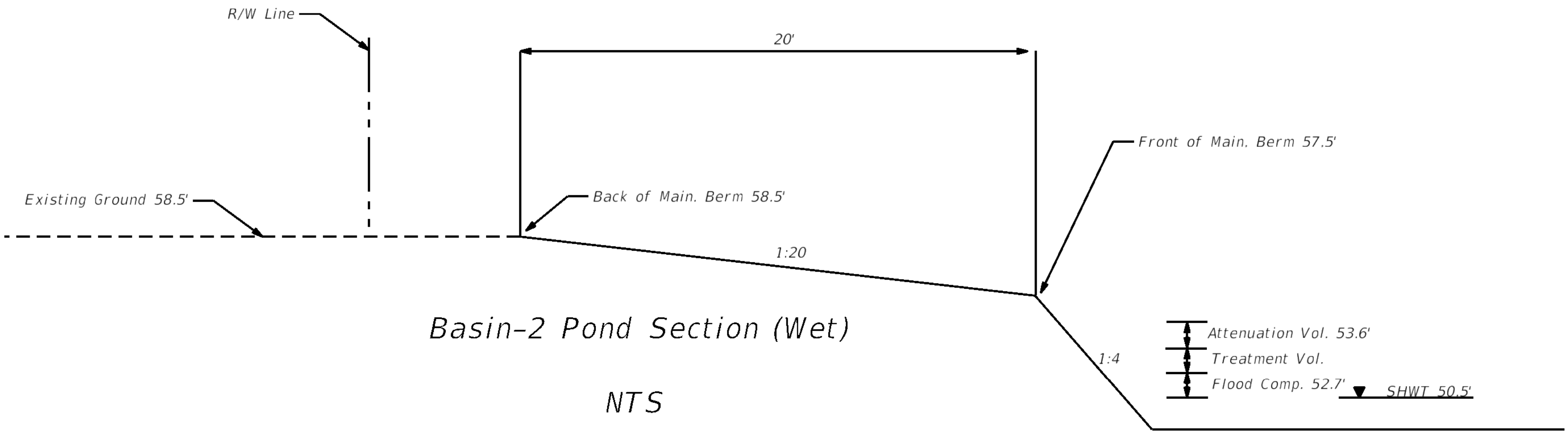
Stage	Description	Area (ac)	Ave Area (ac)	Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
50.5	Normal Water Level	7.02				0.00
56.5		8.58	7.80	6.00	46.80	46.80
57.5	Front Main Berm	8.85	8.72	1.00	8.72	55.52
58.5	Back Main Berm	10.23	9.54	1.00	9.54	65.06

Required Treatment and Attenuation Volume =	7.43 ac-ft
Stage of treatment and attenuation above 52.7'	53.61 ft
Flood plain Compensation between 50.5' to 52.7'	17.16 ac-ft

100-year Flood Elevation= 52.7 ft

The proposed pond will discharge into adjacent flood plain and provide flood connectivity and compensation.

Pond 2B has additional storage volume to provide compensation for the impacted Orange County Pond and minor impact to Unversity Meadows Pond B by the proposed SR 408 Extension.



Basin-2 Pond Section (Wet)

NTS

SR 408 Eastern Extension-PD&E
CFX
BASIN 3-4

Computed By	KS
Checked By	CR
Date	2/26/2017

Beginning Station	44195.00
End Station	47700.00
Length (ft)	3505.00

Total Basin Area

	R/W Width (ft)	Area (ac)
Proposed SR 408 Corridor		23.91
	TOTAL AREA (AC)	**23.91**

Existing Impervious Area

Description	Area	
Existing Impervious areas within the basin limits	0.13	
Residential and commercial areas in Basin-4	4.99	
Total Impervious Area	**5.12**	**Acre**

ATTENUATION VOLUME ESTIMATE

Pre-Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Existing Roadway	A/D	98	5.12	501.76
Woods (Fair)	A/D	79	18.79	1,484.41
		TOTAL	23.91	1,986.17
		COMPOSITE CN		**83.1**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	2.04	6.66	13.26
100 yr, 240 hr	FDOT	18.00	2.04	15.77	31.41
100 yr, 8 hr	FDOT	8.00	2.04	5.99	11.93

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage	S	2.04
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.66
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-f	Vr	13.26

Proposed Impervious Area		
Description	Area	
Proposed SR 408 Corridor (Proposed 4' lanes and assume 64' impervious median = 136')	10.94	
Total Impervious Area	**10.94**	**Acre**

Post Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	A/D	98	10.94	1,072.42
On-site Grassed Area	A/D	80	12.97	1,037.35
		TOTAL	23.91	2,109.78
		COMPOSITE CN		**88.2**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	1.33	7.28	14.51
100 yr, 240 hr	FDOT	18.00	1.33	16.49	32.86
100 yr, 8 hr	FDOT	8.00	1.33	6.60	13.14

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage	S	1.33
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	7.28
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-f	Vr	14.51

SUMMARY OF ATTENUATION ESTIMATES

PRE DEVELOPED CONDITION		POST DEVELOPED CONDITION	
AREA (AC)	23.91	AREA (AC):	23.91
CN:	83.1	CN:	88.2

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	NCREASE (AC-FT)
SJRWMD	25 Yr, 24 hr	13.26	14.51	1.25
FDOT	100 yr, 240 hr	31.41	32.86	1.45
FDOT	100 yr, 8 hr	11.93	13.14	1.22

MAXIMUM ATTENUATION VOLUME (AC-FT)	1.45

WATER QUALITY CALCULATIONS

St. John's River Water Management District
Pollution Abatement Volume Requirement

Water quality and attenuation will be provided in either proposed Ponds 3A , 3B, 4A or 4B.

Post Development Total Area (ac) =	23.91
Post Development Impervious Area (ac) =	10.94

The Basin Discharges it Econ River which is an OFW. Additional 50% treatment volume is required
The basin is an Open Basin.

Wet Detention	**Ac-Ft**	
1) 1.5 " of Runoff Over Total Area =	2.99	
2) 3.75" of Runoff Over Impervious Area =	3.42	Governs
WET DETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	3.42	

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

The top of the treatment and attenuation volume are constrained to berm elevation minus the Maint Berm.

SHWT is from the Waterford Creek development permit # 129575. Took average SHWT from Pond-1 and Pond-2
Pond-1 = 53.0' and Pond-2 = 48.0' The average = 50.5'

Pond Depth from top of Maint Berm to SHWT	6.5	ft
Maint Berm =	1	ft

H = Depth to pond SHWT - Maint Berm = 5.5 ft

3) Use greater of required treatment volume or attenuation volume.

Required Attenuation Volume =	1.45	ac-ft
Required Treatment Volume =	3.42	ac-ft
Peak Volume =	4.87	ac-ft

4) For purposes of pond area calculations, assume a square pond.

Volume = LWH

where
H = height (ft)
L = length of vertical sided pond
W = width of vertical sided pond

Since a square pond is being assumed, L = W. Therefore, Volume = L^2H

Volume = 4.87 ac-ft
H = 5.5 ft

$4.87 = L^2 \times 5.5$

Solving for L = 196.4 ft
Therefore W = 196.4 ft

5) Increase dimensions to account for side slopes.

Add: x = [(Side Slopes x H) x 2] to each dimension

Side slopes:	4	ft/ft
H:	5.5	ft
x =	44	ft
Length @ top of slope =	240	ft
Width @ top of slope =	240	ft

6) Add maintenance berms.

Assume 20' maintenance berm (add to each side)

Length w/maint Berm =	280	ft
Width w/maint. Berm =	280	ft
Total Area =	1.80	acres
Add 10% Contingency	1.99	acres

PRELIMINARY POND AREA REQUIRED FOR BASIN-3 and 4= 2.0 ACRES

Recommended Pond 3A and Pond 4A

Existing Ground Elevation =	55 ft
Normal Water Elevation =	50.5 ft
Lowest EOP Elevation =	75.71 ft
Pond R/W	4.86 ac

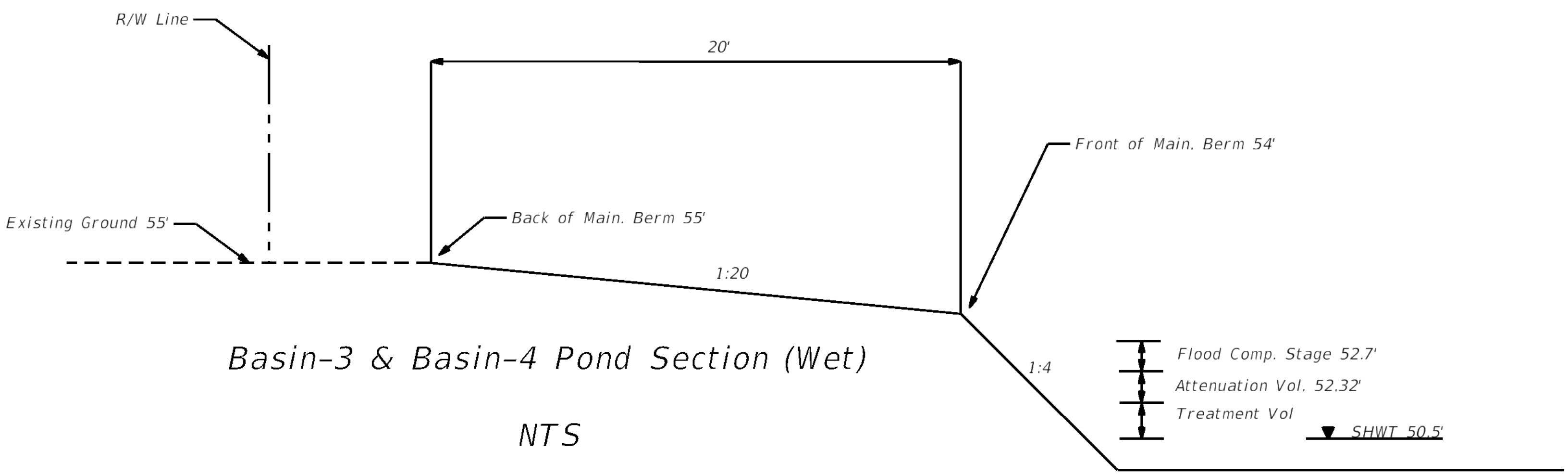
Pond Stage/Storage Calculations

Stage	Description	Area (ac)	Ave Area (ac)	Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
50.5	Normal Water Level	2.20				0.00
53		3.15	2.68	2.50	6.69	6.69
54	Front Main Berm	3.43	3.29	1.00	3.29	9.98
55	Back Main Berm	4.86	4.15	1.00	4.15	14.12

Required Treatment and Attenuation Volume = 4.87 ac-ft

Provided treatment and attenuation volume = 4.87 ac-ft
Provided treatment and attenuation Stage= 52.32 ft
Provide Flood plain Compensation between 52.32' to 52.7' 1.02 ac-ft
100-year Flood Elevation= 52.7 ft

Provided treatment, attenuation and floodplain comp storage = 5.88 ac-ft
Stage at treatment, attenuation and flood compensation = 52.7 ft



Basin-3 & Basin-4 Pond Section (Wet)

NTS

SR 408 Eastern Extension-PD&E
CFX
BASIN 5

Computed By	KS
Checked By	CR
Date	2/26/2017

Beginning Station	47700.00
End Station	49800.00
Length (ft)	2100.00

Total Basin Area

	R/W Width (ft)		Area (ac)
Proposed SR 408 Corridor			15.71
		TOTAL AREA (AC)	**15.71**

Existing Impervious Area

Description	Area	
Residential	3.74	
Total Impervious Area	**3.74**	**Acre**

ATTENUATION VOLUME ESTIMATE

Pre-Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
1/4 Residential Property	A/D	87	3.74	325.38
Woods (Fair)	AD	79	11.97	945.63
		TOTAL	15.71	1,271.01
		COMPOSITE CN		**80.9**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	2.36	6.39	8.37
100 yr, 240 hr	FDOT	18.00	2.36	15.45	20.22
100 yr, 8 hr	FDOT	8.00	2.36	5.73	7.50

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage	S	2.36
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.39
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft	Vr	8.37

Proposed Impervious Area		
Description	Area	
Proposed SR 408 Corridor (Proposed 4' lanes and assume 64' impervious median = 136') + Ramps	7.28	
Total Impervious Area	**7.28**	**Acre**

Post Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	A/D	98	7.28	713.40
On-site Grassed Area	A/D	80	8.43	674.43
		TOTAL	15.71	1,387.83
		COMPOSITE CN		**88.3**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24hr	SJRWMD	8.70	1.32	7.29	9.55
100 yr, 240 hr	FDOT	18.00	1.32	16.51	21.61
100 yr, 8 hr	FDOT	8.00	1.32	6.61	8.65

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage	S	1.32
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	7.29
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft	Vr	9.55

SUMMARY OF ATTENUATION ESTIMATES

PRE DEVELOPED CONDITION		POST DEVELOPED CONDITION	
AREA (AC)	15.71	AREA (AC):	15.71
CN:	80.9	CN:	88.3

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	8.37	9.55	1.18
FDOT	100 yr, 240 hr	20.22	21.61	1.39
FDOT	100 yr, 8 hr	7.50	8.65	1.15

MAXIMUM ATTENUATION VOLUME (AC-FT)	1.39

WATER QUALITY CALCULATIONS

St. John's River Water Management District Pollution Abatement Volume Requirement

Post Development Total Area (ac) =	15.71
Post Development Impervious Area (ac) =	7.28

The Basin Discharges it Econ River which is an OFW. Additional 50% treatment volume is required
The basin is an Open Basin.

Wet Detention	Ac-Ft	
1) 1.5 " of Runoff Over Total Area =	1.96	
2) 3.75" of Runoff Over Impervious Area =	2.27	Governs
WET DETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	2.27	

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

The top of the treatment and attenuation volume are constrained to berm elevation minus the Maint Berm.

Per existing Avalon Park Blvd Permit, the Normal Water elevation in Pond B is 47.7 NAVD
The existing Ground Elevation in this area is around 53 ft.

Pond Depth from top of Maint Berm to SHWT	5.3 ft
Maint Berm =	1 ft

H = Depth to pond SHWT - Maint Berm = 4.3 ft

3) Use greater of required treatment volume or attenuation volume.

Required Attenuation Volume =	1.39 ac-ft
Required Treatment Volume =	2.27 ac-ft
Peak Volume =	3.66 ac-ft

4) For purposes of pond area calculations, assume a square pond.

Volume = LWH

where H = height (ft)
L = length of vertical sided pond
W = width of vertical sided pond

Since a square pond is being assumed, L = W. Therefore, Volume = L^2H

Volume = 3.66 ac-ft
H = 4.3 ft

$3.66 = L^2 \times 4.3$

Solving for L = 192.6 ft
Therefore W = 192.6 ft

5) Increase dimensions to account for side slopes.

Add: x = [(Side Slopes x H) x 2] to each dimension

Side slopes:	4 ft/ft
H:	4.3 ft
x =	34.4 ft
Length @ top of slope =	227 ft
Width @ top of slope =	227 ft

6) Add maintenance berms.

Assume 20' maintenance berm (add to each side)

Length w/maint berm =	267 ft
Width w/maint. Berm =	267 ft
Total Area =	1.64 acres
Add 10% Contingency	1.80 acres

PRELIMINARY POND AREA REQUIRED FOR BASIN-5= 1.8 ACRES

Recommended Pond 5B

Existing Ground Elevation =	53 ft
Normal Water Elevation =	47.7 ft
Lowest EOP Elevation =	79.31 ft
Pond R/W	4.1 ac

Pond Stage/Storage Calculations

Stage	Description	Area (ac)	Ave Area (ac)	Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
47.70	Normal Water Level	2.61				0.00
49.20		2.82	2.72	1.50	4.07	4.07
52.00	Front Main Berm	3.24	3.03	1.80	5.45	9.53
53.00	Back Main Berm	4.10	3.67	1.00	3.67	13.20

Required Treatment and Attenuation Volume = 3.52 ac-ft

Provided treatment and attenuation volume = 4.07 ac-ft
Provided treatment and attenuation Stage= 49.2 ft

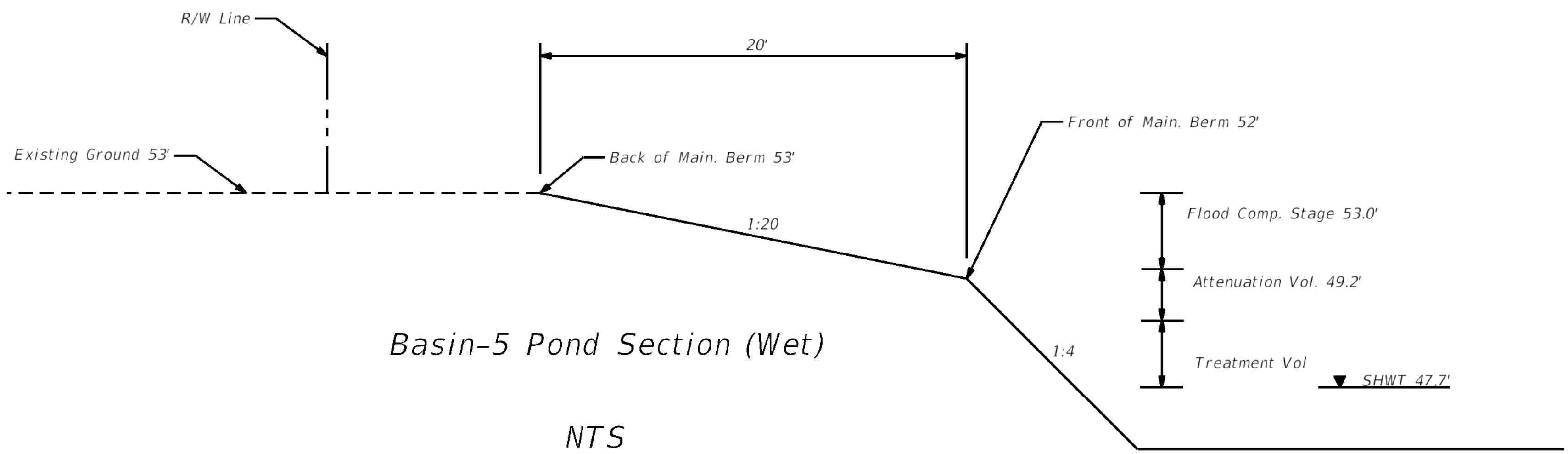
100-year Flood Elevation= 53.7 ft (Big Econ River Master Plan)

Pond 5B is hydraulically connected to 100 year floodplain

Description	Elevation	Area	Dredge Area (ac)	Dredge Height (ft)	Compensation (ac-ft)
Treatment + Attenuation	49.2	2.82	2.82		
Existing Ground Elevation	53	4.1	4.1	3.8	13.15
100-yr Flood Elevation	53.7				

No above ground maintenance berm, therefore no floodplain impact.

Please refer to Floodplain Impact/Compensation Calculation Summary Table.



Basin-5 Pond Section (Wet)

NTS

SR 408 Eastern Extension-PD&E
CFX
BASIN 6-8 (merged as single basin)

Computed By	KS
Checked By	CR
Date	2/26/2017

Beginning Station	49800.00
End Station	55223.00
Length (ft)	5423.00

Total Basin Area				
	R/W Width (ft)	Length (ft)	Area (sq-ft)	Area (ac)
Proposed SR 408 Corridor				40.41
			TOTAL AREA (AC)	**40.41**

Existing Impervious Area				
Description	Width (ft)	Length(ft)	Area	
Residential			3.86	
	Total Impervious Area		**3.86**	**Acre**

ATTENUATION VOLUME ESTIMATE

Pre-Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
1/4 Residential Property	A/D	84	3.86	324.24
Wooded area	A/D	79	36.55	2,887.45
		TOTAL	40.41	3,211.69
			COMPOSITE CN	**79.5**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	2.58	6.22	20.95
100 yr, 240 hr	FDOT	18.00	2.58	15.23	51.30
100 yr, 8 hr	FDOT	8.00	2.58	5.56	18.74

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage	S	2.58
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.22
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft	Vr	20.95

Proposed Impervious Area				
Description	Width (ft)	Length(ft)	Area	
Proposed SR 408 Corridor (Proposed 4' lanes and assume 64' impervious median = 136') + Ramps			17.43	
	Total Impervious Area		**17.43**	**Acre**

Post Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	A/D	98	17.43	1,708.07
On-site Grassed Area	A/D	79	22.98	1,815.48
		TOTAL	40.41	3,523.55
			COMPOSITE CN	**87.2**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	1.47	7.16	24.10
100 yr, 240 hr	FDOT	18.00	1.47	16.35	55.06
100 yr, 8 hr	FDOT	8.00	1.47	6.47	21.80

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage	S	1.47
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	7.16
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft	Vr	24.10

SUMMARY OF ATTENUATION ESTIMATES

PRE DEVELOPED CONDITION		POST DEVELOPED CONDITION	
AREA (AC)	40.41	AREA (AC):	40.41
CN:	79.5	CN:	87.2

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	20.95	24.10	3.15
FDOT	100 yr, 240 hr	51.30	55.06	3.76
FDOT	100 yr, 8 hr	18.74	21.80	3.06

MAXIMUM ATTENUATION VOLUME (AC-FT)	3.76

WATER QUALITY CALCULATIONS

St. John's River Water Management District
Pollution Abatement Volume Requirement

Post Development Total Area (ac) =	40.41
Post Development Impervious Area (ac) =	17.43

The Basin Discharges it Econ River which is an OFW. Additional 50% treatment volume is required
The basin is an Open Basin.

Wet Detention	**Ac-Ft**	
1) 1.5 " of Runoff Over Total Area =	5.05	
2) 3.75" of Runoff Over Impervious Area =	5.45	Govern
WET DETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	5.45	

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

The top of the treatment and attenuation volume are constrained to berm elevation minus the Maint Berm.

Per the Avalon Park Subdivision Permit the SHWT at this location is 50.4' NAVD. (Existing Avalon Pond C)
Existing ground elevation at the Pond Location is = 57 '

Pond Depth from top of Maint Berm to SHWT	6	ft
Maint Berm =	1	ft

H = Depth to pond SHWT - Maint Berm = 5 ft

3) Use greater of required treatment volume or attenuation volume.

Required Attenuation Volume =	3.76	ac-ft
Required Treatment Volume =	5.45	ac-ft
Peak Volume =	9.21	ac-ft

4) For purposes of pond area calculations, assume a square pond.

Volume = LWH

where H = height (ft)
L = length of vertical sided pond
W = width of vertical sided pond

Since a square pond is being assumed, L = W. Therefore, Volume = L^2H

Volume =	9.21	ac-ft
H =	5	ft

$$9.21 = L^2 \times 5$$

Solving for L =	283.3	ft
Therefore W =	283.3	ft

5) Increase dimensions to account for side slopes.

Add: x = [(Side Slopes x H) x 2] to each dimension

Side slopes:	4	ft/ft
H:	5	ft
x =	40	ft
Length @ top of slope =	323	ft
Width @ top of slope =	323	ft

6) Add maintenance berms.

Assume 20' maintenance berm (add to each side)

Length w/maint berm =	363	ft
Width w/maint. Berm =	363	ft
Total Area =	3.03	acre
Add 10% Contingency	3.33	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN-6= 3.3 ACRES

Recommended Pond 6B

Existing Ground Elevation =	57	ft
Normal Water Elevation =	50.4	ft
Lowest EOP Elevation =	81.71	ft
Pond R/W	19.73	ac

Pond Stage/Storage Calculations

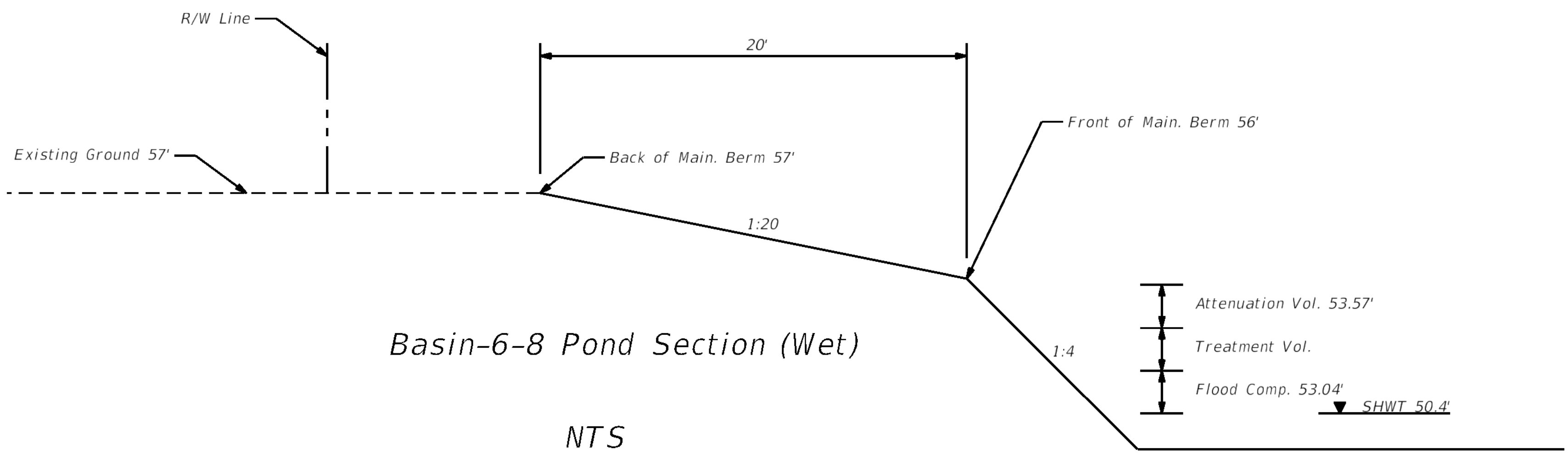
Stage	Description	Area (ac)	Ave Area (ac)	Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
50.4	Normal Water Level	16.11				0.00
52		16.64	16.38	1.00	16.38	16.38
56	Front Main Berm	18.00	17.32	4.00	69.28	85.66
57	Back Main Berm	19.73	18.87	1.00	18.87	104.52

Required Treatment and Attenuation Volume = 9.21 ac-ft

Flood plain compensation provided between(50.4' to 53.04') = 34.39 ac-ft
Provided treatment and attenuation stage above 53.04'= 53.57 ft

100-year Flood Elevation= 53.04 ft (100-year stage at Avalon Subdivision Pond-C)

No above ground maintenance berm, therefore no floodplain impact.
Pond 6B will provide floodplain compensation in addition to providing treatment and attenuation.
Pond 6B will also able to provide compensation for impacted Avalon Park Pond-C.



Basin-6-8 Pond Section (Wet)

NTS

SR 408 Eastern Extension-PD&E
CFX
BASIN 9-10

Computed By	KS
Checked By	CR
Date	2/26/2017

Beginning Station	55223.00
End Station	57995.00
Length (ft)	2772.00

Total Basin Area

	R/W Width (ft)	Area (ac)
Proposed SR 408 Corridor		19.30
	TOTAL AREA (AC)	**19.30**

Existing Impervious Area

Description	Area	
Old Cheney Hwy	0.12	
Residential	2.31	
Total Impervious Area	**2.43**	**Acre**

ATTENUATION VOLUME ESTIMATE

Pre-Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	B/D	98	0.12	12.15
1/4 Residential Property	B/D	87	2.31	200.97
Woods (Fair)	B/D	79	16.87	1,332.41
		TOTAL	19.30	1,545.54
		COMPOSITE CN		**80.1**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	2.49	6.29	10.12
100 yr, 240 hr	FDOT	18.00	2.49	15.32	24.65
100 yr, 8 hr	FDOT	8.00	2.49	5.63	9.06

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	2.49
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.29
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	10.12

Proposed Impervious Area		
Description	Area	
Proposed SR 408 Corridor (Proposed 4' lanes and assume 64' impervious median = 136')	11.12	
Total Impervious Area	**11.12**	**Acre**

Post Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	B/D	98.00	11.12	1,089.33
On-site Grassed Area	B/D	80	8.18	654.75
		TOTAL	19.30	1,744.08
		COMPOSITE CN		**90.4**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	1.07	7.54	12.13
100 yr, 240 hr	FDOT	18.00	1.07	16.78	26.99
100 yr, 8 hr	FDOT	8.00	1.07	6.85	11.02

1) Soil Storage (S) — $S = (1000/CN) - 10$ — Soil Storage (in) S 1.07

2) Runoff (R) — $R = (P-0.2S)^2/(P+0.8S)$ — Runoff (in) R 7.54

3) Runoff Volume (Vr) — $Vr = R/12 * Area$ — Runoff (ac-ft) Vr 12.13

SUMMARY OF ATTENUATION ESTIMATES

PRE DEVELOPED CONDITION		POST DEVELOPED CONDITION	
AREA (AC)	19.30	AREA (AC):	19.30
CN:	80.1	CN:	90.4

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr) PRE (AC-FT)	POST (AC-FT)	NCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	10.12	12.13	2.00
FDOT	100 yr, 240 hr	24.65	26.99	2.34
FDOT	100 yr, 8 hr	9.06	11.02	1.95

MAXIMUM ATTENUATION VOLUME (AC-FT)	2.34

WATER QUALITY CALCULATIONS

St. John's River Water Management District
Pollution Abatement Volume Requirement

Post Development Total Area (ac) =	19.30
Post Development Impervious Area (ac) =	11.12

The Basin Discharges it Econ River which is an OFW. Additional 50% treatment volume is required
The basin is an Open Basin.

Wet Detention	**Ac-Ft**	
1) 1.5 " of Runoff Over Total Area =	2.41	
2) 3.75" of Runoff Over Impervious Area =	3.47	Governs
WET DETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	3.47	

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

The top of the treatment and attenuation volume are constrained to berm elevation minus the Maint Berm.

Per Soil Survey, SHWT at Basin-9 and Basin-10 is between 6" to 24".
We have assumed the SHWT is 1.0' below the existing ground and providing a 2.0' berm above existing ground.

Pond Depth from top of Maint Berm to SHWT	3	ft
Maint Berm =	1	ft

H = Depth to pond SHWT - Maint Berm = 2 ft

3) Use greater of required treatment volume or attenuation volume.

Required Attenuation Volume =	2.34	ac-ft
Required Treatment Volume =	3.47	ac-ft
Peak Volume =	5.82	ac-ft

4) For purposes of pond area calculations, assume a square pond.

Volume = LWH

where	H =	height (ft)
	L =	length of vertical sided pond
	W =	width of vertical sided pond

Since a square pond is being assumed, L = W. Therefore, Volume = L^2H

Volume =	5.82	ac-ft
H =	2	ft

$5.82 = L^2 \times 2$

Solving for L =	355.9	ft
Therefore W =	355.9	ft

5) Increase dimensions to account for side slopes.

Add: x = [(Side Slopes x H) x 2] to each dimension

Side slopes:	4	ft/ft
H:	2	ft
x =	16	ft
Length @ top of slope =	372	ft
Width @ top of slope =	372	ft

6) Add maintenance berms.

Assume 20' maintenance berm (add to each side)

Length w/maint Berm =	412	ft
Width w/maint. Berm =	412	ft
Total Area =	3.90	acres
Add 10% Contingency	4.28	acres

PRELIMINARY POND AREA REQUIRED FOR BASIN-9 and Basin 10= 4.3 ACRES

Recommended Pond 9B and 10B

Existing Ground Elevation =	49 ft
Normal Water Elevation =	48 ft
Lowest EOP Elevation =	90.41 ft
Pond R/W	8.38 ac

Pond Stage/Storage Calculations

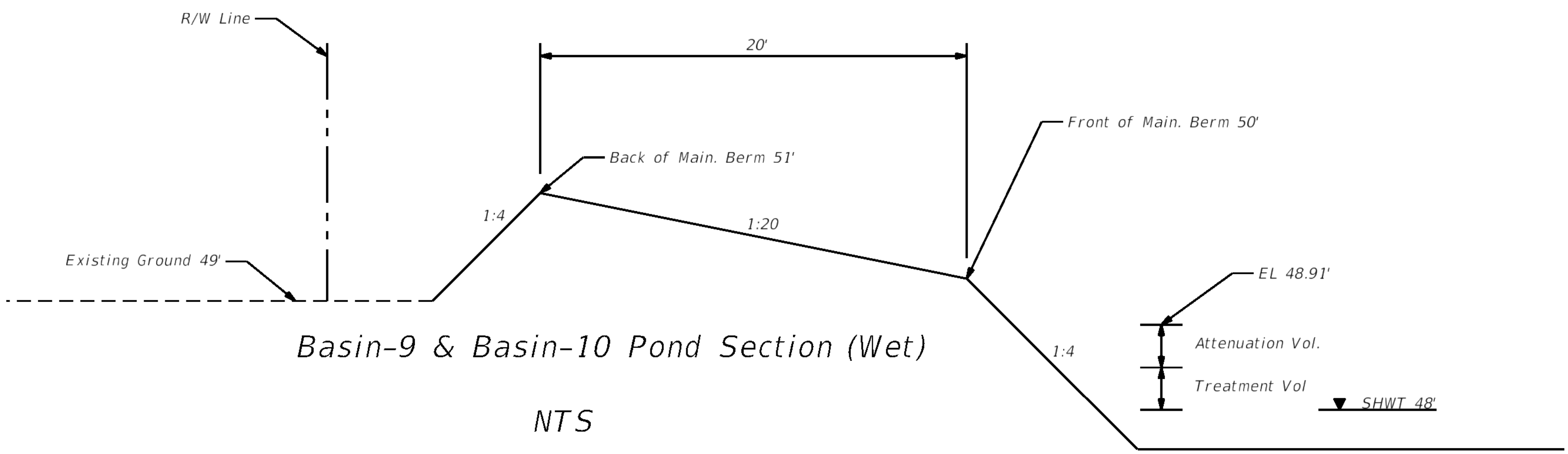
Stage	Description	Area (ac)	Ave Area (ac)	Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
48	Normal Water Level	6.32				0.00
49		6.60	6.46	1.00	6.46	6.46
50	Front Main Berm	6.90	6.75	1.00	6.75	13.21
51	Back Main Berm	8.38	7.64	1.00	7.64	20.85

Required Treatment and Attenuation Volume = 5.82 ac-ft

Provided treatment and attenuation volume = 5.93 ac-ft
Provided treatment and attenuation Stage= 48.91 ft

Pond Site located out side of the 100 year floodplain. FEMA 100-year flood elevation is 43.5' NAVD

The proposed pond will not impact flood plain since the ground elevation is higher than the 100-year stage.



Basin–9 & Basin–10 Pond Section (Wet)

NTS

SR 408 Eastern Extension-PD&E
CFX
BASIN 11A

Computed By	KS
Checked By	CR
Date	2/26/2017

Beginning Station	57995.00
End Station	60200.00
Length (ft)	2205.00

Total Basin Area			
	R/W Width (ft)		Area (ac)
Proposed SR 408 Corridor			28.20
		TOTAL AREA (AC)	**28.20**

Existing Impervious Area			
Description		Area	
Residential		1.20	
On-site Roadway		0.20	
	Total Impervious Area	**1.40**	**Acre**

ATTENUATION VOLUME ESTIMATE

Pre-Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
1/4 Residential Property	B/D	87	1.20	104.40
Woods (Fair)	B/D	80	24.86	1,988.80
On-site Roadway	B/D	98	0.20	19.60
Existing Pond	B/D	100	1.94	194.00
		TOTAL	28.20	2,306.80
		COMPOSITE CN		**81.8**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	2.22	6.50	15.28
100 yr, 240 hr	FDOT	18.00	2.22	15.58	36.61
100 yr, 8 hr	FDOT	8.00	2.22	5.84	13.72

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	2.22
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.50
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	15.28

Proposed Impervious Area		
Description	Area	
Proposed SR 408 Corridor (Proposed 4' lanes and assume 64' impervious median = 136')+ Ramps and Portion of CR 419	10.93	
Total Impervious Area	**10.93**	**Acre**

Post Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	B/D	98	10.93	1,071.32
On-site Grassed Area	B/D	80	17.27	1,381.45
		TOTAL	28.20	2,452.77
			COMPOSITE CN	**87.0**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	1.50	7.13	16.76
100 yr, 240 hr	FDOT	18.00	1.50	16.32	38.35
100 yr, 8 hr	FDOT	8.00	1.50	6.45	15.15

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	1.50
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	7.13
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	16.76

SUMMARY OF ATTENUATION ESTIMATES

PRE DEVELOPED CONDITION		POST DEVELOPED CONDITION	
AREA (AC)	28.20	AREA (AC):	28.20
CN:	81.8	CN:	87.0

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	15.28	16.76	1.47
FDOT	100 yr, 240 hr	36.61	38.35	1.74
FDOT	100 yr, 8 hr	13.72	15.15	1.44

MAXIMUM ATTENUATION VOLUME (AC-FT)	1.74

WATER QUALITY CALCULATIONS

St. John's River Water Management District
Pollution Abatement Volume Requirement

Post Development Total Area (ac) =	28.20
Post Development Impervious Area (ac) =	10.93

The Basin Discharges it Econ River which is an OFW. Additional 50% treatment volume is required
The basin is an Open Basin.

Wet Detention	**Ac-Ft**	
1) 1.5 " of Runoff Over Total Area =	3.53	Governs
2) 3.75" of Runoff Over Impervious Area =	3.42	
WET DETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	3.53	

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

The top of the treatment and attenuation volume are constrained to berm elevation minus the Maint Berm.

Per Soil Survey, SHWT at Basin-11 is between 24" to 42".
We have assumed the SHWT is 3.0' below the existing ground and are providing a 1.5' berm above existing ground.

Pond Depth from top of Maint Berm to SHWT	4.5	ft
Maintenance Berm Depth =	1	ft

H = Depth to pond SHWT - Maintenance Berm = 3.5 ft

3) Use greater of required treatment volume or attenuation volume.

Required Attenuation Volume =	1.74	ac-ft
Required Treatment Volume =	3.53	ac-ft
Peak Volume =	5.27	ac-ft

4) For purposes of pond area calculations, assume a square pond.

Volume = LWH

where H = height (ft)
L = length of vertical sided pond
W = width of vertical sided pond

Since a square pond is being assumed, L = W. Therefore, Volume = L^2H

Volume = 5.27 ac-ft
H = 3.5 ft

$5.27 = L^2 \times 3.5$

Solving for L = 256.1 ft
Therefore W = 256.1 ft

5) Increase dimensions to account for side slopes.

Add: x = [(Side Slopes x H) x 2] to each dimension

Side slopes:	4	ft/ft
H:	3.5	ft
x =	28	ft
Length @ top of slope =	284	ft
Width @ top of slope =	284	ft

6) Add maintenance berms.

Assume 20' maintenance berm (add to each side)

Length w/maint berm =	324	ft
Width w/maint. Berm =	324	ft
Total Area =	2.41	acres
Add 10% Contingency	2.65	acres

PRELIMINARY POND AREA REQUIRED FOR BASIN-11 A= 2.7 ACRES

Recommended Ponds 11A1, 11A2, 11A3 and 11A4. (Infield Ponds and Pond 11A4 will be interconnected)

Existing Ground Elevation =	63 ft
Normal Water Elevation =	60.5 ft
Lowest Point at the Interchange	64.5 ft
Pond R/W	5.76 ac

Pond Stage/Storage Calculations

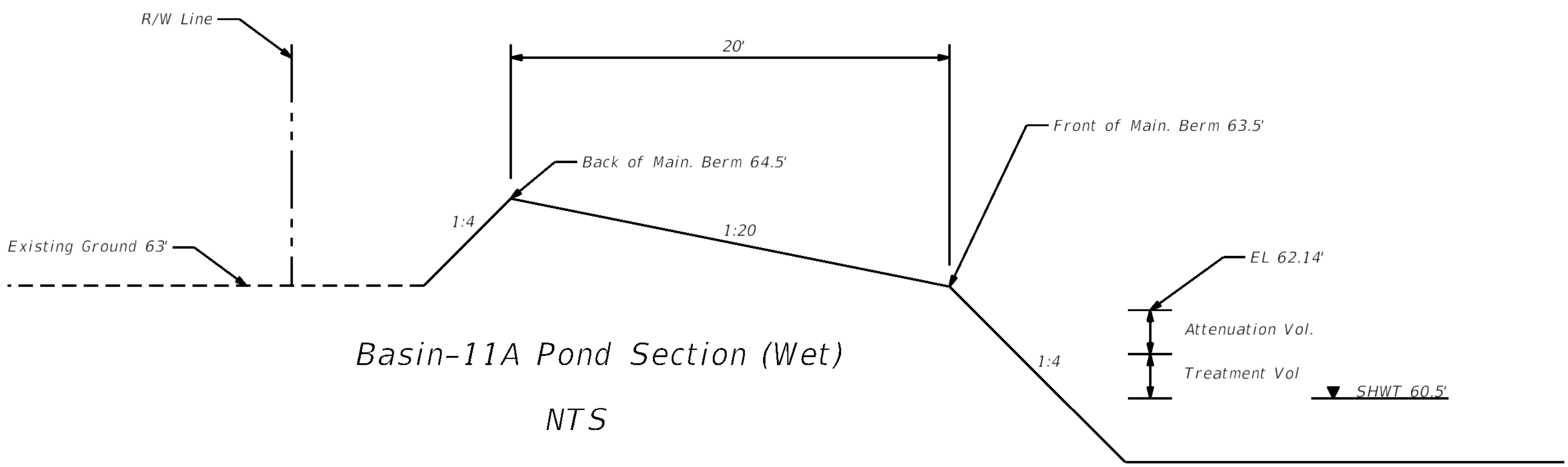
Stage	Description	Area (ac)	Ave Area (ac)	Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
60	Normal Water Level	3				0
62.5		3.43	3.22	2.50	8.04	8.04
63.5	Front Main Berm	3.78	3.61	1.00	3.61	11.64
64.5	Back Main Berm	5.76	4.77	1.00	4.77	16.41

Required Treatment and Attenuation Volume = 5.27 ac-ft

Provided treatment and attenuation volume = 5.27 ac-ft
Provided treatment and attenuation Stage= 61.64 ft

Ponds are located outside of the 100-year flood plain.

The proposed pond will not impact flood plain since the ground elevation is higher than the 100-year stage.



Basin-11A Pond Section (Wet)

NTS

SR 408 Eastern Extension-PD&E
CFX
BASIN 11B

Computed By	KS
Checked By	CR
Date	2/26/2017

Beginning Station	41315.00
End Station	43750.00
Length (ft)	2435.00

Total Basin Area		
	R/W Width (ft)	Area (ac)
Proposed SR-419 Corridor		7.90
	TOTAL AREA (AC)	**7.90**

Existing Impervious Area		
Description	Area	
Residential	0.00	
On-site Roadway	1.06	
Total Impervious Area	**1.06**	**Acre**

ATTENUATION VOLUME ESTIMATE

Pre-Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Woods (Fair)	A/D	79	6.84	540.36
On-site Roadway	A/D	98	1.06	103.88
		TOTAL	7.90	644.24
		COMPOSITE CN		**81.5**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	2.26	6.47	4.26
100 yr, 240 hr	FDOT	18.00	2.26	15.54	10.23
100 yr, 8 hr	FDOT	8.00	2.26	5.81	3.82

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	2.26
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.47
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	4.26

Proposed Impervious Area		
Description	Area	
Curb and Gutter Roadway-not accounted for future Widening.	5.54	
Total Impervious Area	**5.54**	**Acre**

Post Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	A/D	98	5.54	542.92
On-site Grassed Area	A/D	79	2.36	186.44
		TOTAL	7.90	729.36
		COMPOSITE CN		**92.3**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	0.83	7.78	5.12
100 yr, 240 hr	FDOT	18.00	0.83	17.04	11.22
100 yr, 8 hr	FDOT	8.00	0.83	7.08	4.66

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	0.83
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	7.78
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	5.12

SUMMARY OF ATTENUATION ESTIMATES

PRE DEVELOPED CONDITION

AREA (AC)	7.90
CN:	81.5

POST DEVELOPED CONDITION

AREA (AC):	7.90
CN:	92.3

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	4.26	5.12	0.86
FDOT	100 yr, 240 hr	10.23	11.22	0.98
FDOT	100 yr, 8 hr	3.82	4.66	0.84

MAXIMUM ATTENUATION VOLUME (AC-FT)	0.98

WATER QUALITY CALCULATIONS

St. John's River Water Management District
Pollution Abatement Volume Requirement

Post Development Total Area (ac) =	7.90
Post Development Impervious Area (ac) =	5.54

The Basin Discharges it Econ River which is an OFW. Additional 50% treatment volume is required
The basin is an Open Basin.

Wet Detention	**Ac-Ft**	
1) 1.5 " of Runoff Over Total Area =	0.99	
2) 3.75" of Runoff Over Impervious Area =	1.73	Governs
WET DETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	1.73	

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

The top of the treatment and attenuation volume are constrained to berm elevation minus the Maint Berm.

Per Soil Survey, SHWT at Basin-11-A is between 6" to 18".
We have assumed the SHWT is 1.0' below the existing ground and are providing a 2.5' berm above existing ground.

Pond Depth from top of Maint Berm to SHWT	3.5	ft
Maint Berm =	1	ft

H = Depth to pond SHWT - Maint Berm = 2.5 ft

3) Use greater of required treatment volume or attenuation volume.

Required Attenuation Volume =	0.98	ac-ft
Required Treatment Volume =	1.73	ac-ft
Peak Volume =	2.71	ac-ft

4) For purposes of pond area calculations, assume a square pond.

Volume = LWH

where
H = height (ft)
L = length of vertical sided pond
W = width of vertical sided pond

Since a square pond is being assumed, L = W. Therefore, Volume = L^2H

Volume = 2.71 ac-ft
H = 2.5 ft

$2.71 = L^2 \times 2.5$

Solving for L = 217.5 ft
Therefore W = 217.5 ft

5) Increase dimensions to account for side slopes.

Add: x = [(Side Slopes x H) x 2] to each dimension

Side slopes:	4	ft/ft
H:	2.5	ft
x =	20	ft
Length @ top of slope =	237	ft
Width @ top of slope =	237	ft

6) Add maintenance berms.

Assume 20' maintenance berm (add to each side)

Length w/maint berm =	277	ft
Width w/maint. Berm =	277	ft
Total Area =	1.77	acres
Add 10% Contingency	1.94	acres

PRELIMINARY POND AREA REQUIRED FOR BASIN-11A= 1.9 ACRES

Recommended Pond 11B1

Existing Ground Elevation =	60 ft
Normal Water Elevation =	59 ft
Lowest EOP Elevation =	66.79 ft
Pond R/W	3.98 ac

Pond Stage/Storage Calculations

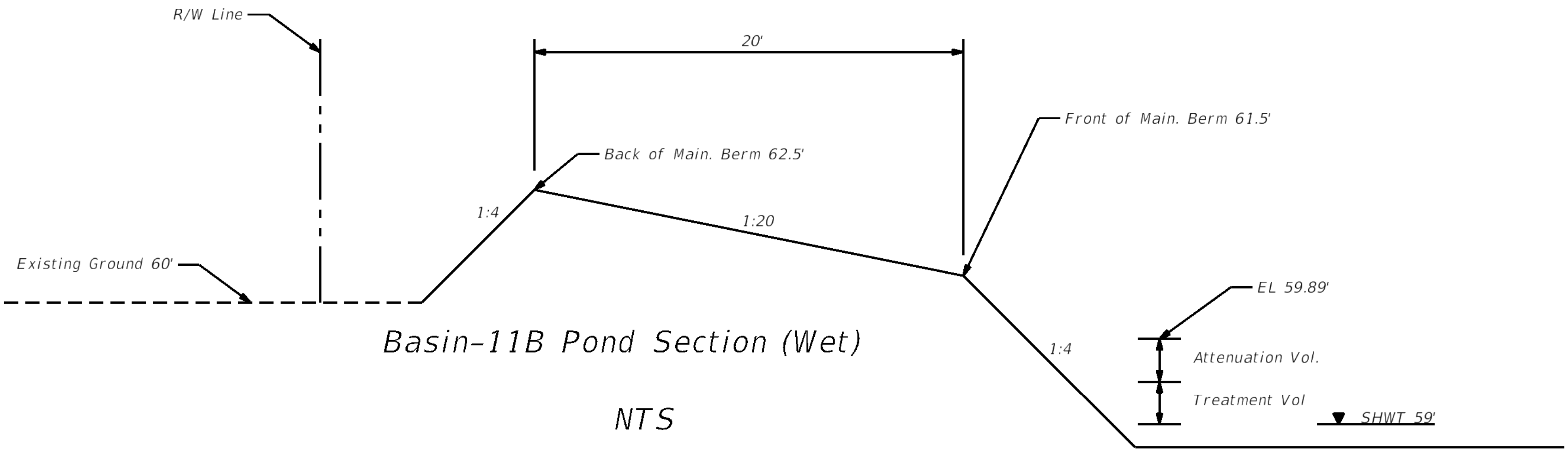
Stage	Description	Area (ac)	Ave Area (ac)	Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
59	Normal Water Level	2.91				0.00
60.5		3.11	3.01	1.50	4.52	4.52
61.5	Front Main Berm	3.25	3.18	1.00	3.18	7.70
62.5	Back Main Berm	3.98	3.62	1.00	3.62	11.31

Required Treatment and Attenuation Volume = 2.71 ac-ft

Provided treatment and attenuation volume = 2.71 ac-ft
Provided treatment and attenuation Stage= 59.89 ft

Pond located outside of the 100-year flood plain.

The proposed pond will not impact flood plain since the ground elevation is higher than the 100-year stage.



Basin-11B Pond Section (Wet)

NTS

SR 408 Eastern Extension-PD&E
CFX
BASIN 11C

Computed By KS
Checked By CR
Date 2/26/2017

Beginning Station	60200.00
End Station	62950.00
Length (ft)	2750.00

Total Basin Area	
R/W Width (ft)	Area (ac)
Proposed SR 408 Corridor	18.93
TOTAL AREA (AC)	**18.93**

Existing Impervious Area		
Description	Area	
Residential	1.52	
On-site Roadway	0.15	
Total Impervious Area	**1.67**	**Acre**

ATTENUATION VOLUME ESTIMATE

Pre-Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
1/4 Residential Property	B/D	87	1.52	132.46
Woods (Fair)	B/D	80	17.26	1,380.60
On-site Roadway	B/D	98	0.15	14.70
		TOTAL	18.93	1,527.76
		COMPOSITE CN		**80.7**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	2.39	6.37	10.05
100 yr, 240 hr	FDOT	18.00	2.39	15.42	24.32
100 yr, 8 hr	FDOT	8.00	2.39	5.71	9.00

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	2.39
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.37
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	10.05

Proposed Impervious Area		
Description	Area	
Proposed SR 408 Corridor (Proposed 4' lanes and assume 64' impervious median = 136')	8.59	
Total Impervious Area	**8.59**	**Acre**

Post Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	B/D	98	8.59	841.41
On-site Grassed Area	B/D	80	10.34	827.53
		TOTAL	18.93	1,668.95
		COMPOSITE CN		**88.2**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	1.34	7.27	11.47
100 yr, 240 hr	FDOT	18.00	1.34	16.48	26.00
100 yr, 8 hr	FDOT	8.00	1.34	6.59	10.39

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	1.34
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	7.27
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	11.47

SUMMARY OF ATTENUATION ESTIMATES

PRE DEVELOPED CONDITION		POST DEVELOPED CONDITION	
AREA (AC)	18.93	AREA (AC):	18.93
CN:	80.7	CN:	88.2

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	10.05	11.47	1.43
FDOT	100 yr, 240 hr	24.32	26.00	1.68
FDOT	100 yr, 8 hr	9.00	10.39	1.39

MAXIMUM ATTENUATION VOLUME (AC-FT)	1.68

WATER QUALITY CALCULATIONS

St. John's River Water Management District Pollution Abatement Volume Requirement

Post Development Total Area (ac) =	18.93
Post Development Impervious Area (ac) =	8.59

The Basin Discharges it Econ River which is an OFW. Additional 50% treatment volume is required
The basin is an Open Basin.

Wet Detention	**Ac-Ft**	
1) 1.5 " of Runoff Over Total Area =	2.37	
2) 3.75" of Runoff Over Impervious Area =	2.68	Governs
WET DETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	2.68	

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

The top of the treatment and attenuation volume are constrained to berm elevation minus the Maint Berm.

Per Soil Survey, SHWT at Basin-11-C is between 24" to 42".
We have assumed the SHWT is 2.0' below the existing ground and are providing a 1.5' berm above existing ground.

Pond Depth from top of Maint Berm to SHWT	3.5	ft
Maintenance Berm Depth =	1	ft

H = Depth to pond SHWT - Maintenance Berm = 2.5 ft

3) Use greater of required treatment volume or attenuation volume.

Required Attenuation Volume =	1.68	ac-ft
Required Treatment Volume =	2.68	ac-ft
Peak Volume =	4.36	ac-ft

4) For purposes of pond area calculations, assume a square pond.

Volume = LWH

where	H =	height (ft)
	L =	length of vertical sided pond
	W =	width of vertical sided pond

Since a square pond is being assumed, L = W. Therefore, Volume = L^2H

Volume =	4.36	ac-ft
H =	2.5	ft

$4.36 = L^2 \times 2.5$

Solving for L =	275.6	ft
Therefore W =	275.6	ft

5) Increase dimensions to account for side slopes.

Add: x = [(Side Slopes x H) x 2] to each dimension

Side slopes:	4	ft/ft
H:	2.5	ft
x =	20	ft
Length @ top of slope =	296	ft
Width @ top of slope =	296	ft

6) Add maintenance berms.

Assume 20' maintenance berm (add to each side)

Length w/maint berm =	336	ft
Width w/maint. Berm =	336	ft
Total Area =	2.59	acres
Add 10% Contingency	2.84	acres

PRELIMINARY POND AREA REQUIRED FOR BASIN-11= 2.8 ACRES

Recommended Pond 11C

Existing Ground Elevation =	52	ft
Normal Water Elevation =	50	ft
Low point in profile	54.04	ft
Pond R/W	5.7	ac

Pond Stage/Storage Calculations

Stage	Description	Area (ac)	Ave Area (ac)	Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
50	Normal Water Level	4.32				0
51		4.50	4.41	1.00	4.41	4.41
52.5	Front Main Berm	4.80	4.65	1.00	4.65	9.06
53.5	Back Main Berm	5.70	5.25	1.00	5.25	14.31

Required Treatment and Attenuation Volume = 4.36 ac-ft

Provided treatment and attenuation volume = 4.36 ac-ft
Provided treatment and attenuation Stage= 51 ft

Ponds are located outside of the 100-year flood plain.

The proposed pond will not impact flood plain since the ground elevation is higher than the 100-year stage.

Pond 11C4 will be used to provide floodplain compensation.

Pond 11C4 is hydraulically connected to 100 year floodplain

Description	Elevation	Area	Dredge Area (ac)	Dredge Height (ft)	Compensation (ac-ft)
Normal Water Elevation	40	4.43	4.43		
Existing Ground Elevation	43	5.52	5.52	3	14.93
100-yr Flood Elevation	45.4				

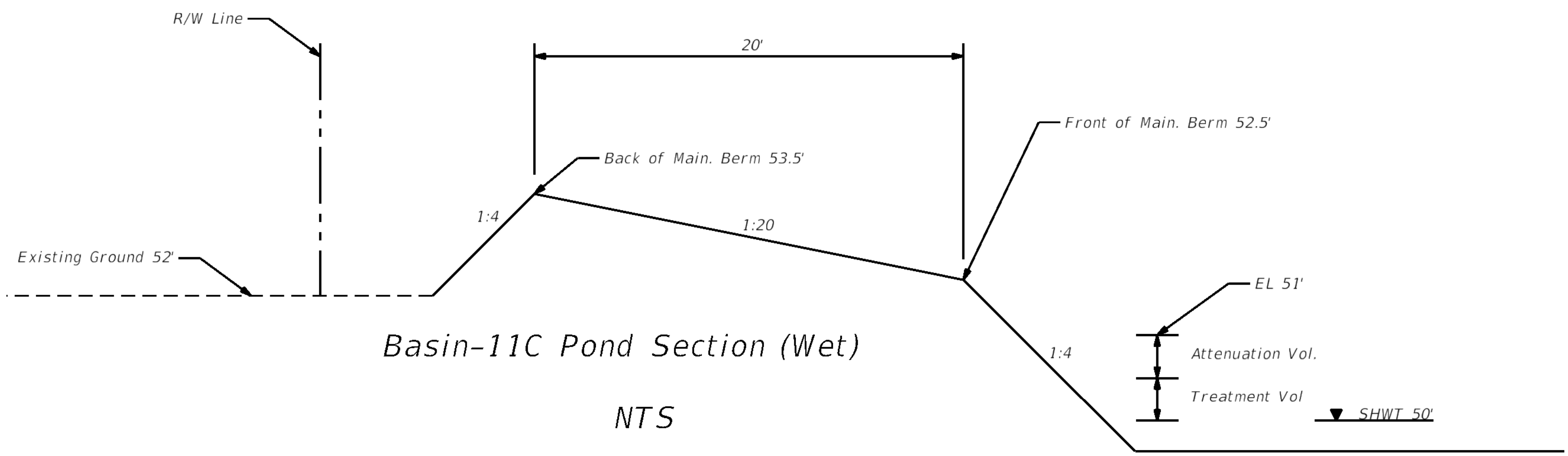
No above ground maintenance berm, therefore no floodplain impact.

Pond 11-C3 will be used to provide floodplain compensation.

Pond 11-C3 is hydraulically connected to 100 year floodplain

Description	Elevation	Area	Dredge Area (ac)	Dredge Height (ft)	Compensation (ac-ft)
Normal Water Elevation	35	8.59	8.59		
Existing Ground Elevation	37.5	8.85	8.85	2.5	21.80
100-yr Flood Elevation	45.4				

No above ground maintenance berm, therefore no floodplain impact.



Basin-11C Pond Section (Wet)

NTS

SR 408 Eastern Extension-PD&E
CFX
BASIN 12

Computed By	KS
Checked By	CR
Date	2/26/2017

Beginning Station	62950.00
End Station	66110.00
Length (ft)	3160.00

Total Basin Area

	R/W Width (ft)	Length (ft)	Area (sq-ft)	Area (ac)
Proposed SR 408 Corridor				**21.76**
			TOTAL AREA (AC)	**21.76**

Existing Impervious Area

Description	Width (ft)	Length(ft)	Area	
Residential			1.05	
Total Impervious Area			**1.05**	**Acre**

ATTENUATION VOLUME ESTIMATE

Pre-Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
1/4 Residential Property	A/D	87	1.05	91.35
Wood (Fair)	A/D	84	20.71	1,739.64
		TOTAL	21.76	1,830.99
		COMPOSITE CN		**84.1**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	1.88	6.79	12.31
100 yr, 240 hr	FDOT	18.00	1.88	15.92	28.87
100 yr, 8 hr	FDOT	8.00	1.88	6.11	11.08

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	1.88
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.79
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	12.31

Proposed Impervious Area				
Description	Width (ft)	Length(ft)	Area	
Proposed SR 408 Corridor (Proposed 4' lanes and assume 64' impervious median = 136')			9.87	
	Total Impervious Area		**9.87**	**Acre**

Post Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	A/D	98.00	9.87	966.86
On-site Grassed Area	A/D	80	11.89	951.53
		TOTAL	21.76	1,918.39
		COMPOSITE CN		**88.2**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	1.34	7.27	13.19
100 yr, 240 hr	FDOT	18.00	1.34	16.48	29.89
100 yr, 8 hr	FDOT	8.00	1.34	6.59	11.94

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	1.34
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	7.27
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	13.19

SUMMARY OF ATTENUATION ESTIMATES

PRE DEVELOPED CONDITION		POST DEVELOPED CONDITION	
AREA (AC)	21.76	AREA (AC):	21.76
CN:	84.1	CN:	88.2

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	12.31	13.19	0.88
FDOT	100 yr, 240 hr	28.87	29.89	1.02
FDOT	100 yr, 8 hr	11.08	11.94	0.86

MAXIMUM ATTENUATION VOLUME (AC-FT)	1.02

WATER QUALITY CALCULATIONS

St. John's River Water Management District Pollution Abatement Volume Requirement

Post Development Total Area (ac) =	21.76
Post Development Impervious Area (ac) =	9.87

The Basin Discharges it Econ River which is an OFW. Additional 50% treatment volume is required
The basin is an Open Basin.

Wet Detention	**Ac-Ft**	
1) 1.5 " of Runoff Over Total Area =	2.72	
2) 3.75" of Runoff Over Impervious Area =	3.08	Governs
WET DETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	3.08	

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

The top of the treatment and attenuation volume are constrained to berm elevation minus the Maint Berm.

Per Soil Survey, SHWT at Basin-12 is between 6" to 18".
We have assumed the SHWT is 1.0' below the existing ground and are providing a 2.0' berm above existing ground.

Pond Depth from top of Maint
Berm to SHWT 3 ft
Maint Berm = 1 ft

H = Depth to pond SHWT - Maint Berm = 2 ft

3) Use greater of required treatment volume or attenuation volume.

Required Attenuation Volume = 1.02 ac-ft
Required Treatment Volume = 3.08 ac-ft

Peak Volume = 4.10 ac-ft

4) For purposes of pond area calculations, assume a square pond.

Volume = LWH

where H = height (ft)
L = length of vertical sided pond
W = width of vertical sided pond

Since a square pond is being assumed, L = W. Therefore, Volume = L^2H

Volume = 4.10 ac-ft
H = 2 ft

$$4.10 = L^2 \times 2$$

Solving for L = 298.8 ft
Therefore W = 298.8 ft

5) Increase dimensions to account for side slopes.

Add: x = [(Side Slopes x H) x 2] to each dimension

Side slopes:	4	ft/ft
H:	2	ft
x =	16	ft
Length @ top of slope =	315	ft
Width @ top of slope =	315	ft

6) Add maintenance berms.

Assume 20' maintenance berm (add to each side)

Length w/maint berm =	355	ft
Width w/maint. Berm =	355	ft
Total Area =	2.89	acres
Add 10% Contingency	3.18	acres

PRELIMINARY POND AREA REQUIRED FOR BASIN-12= 3.2 ACRES

Recommended Pond 12A

Existing Ground Elevation =	48	ft
Normal Water Elevation =	47	ft
Lowest EOP Elevation =	54.02	ft
Pond R/W	6.88	ac

Pond Stage/Storage Calculations

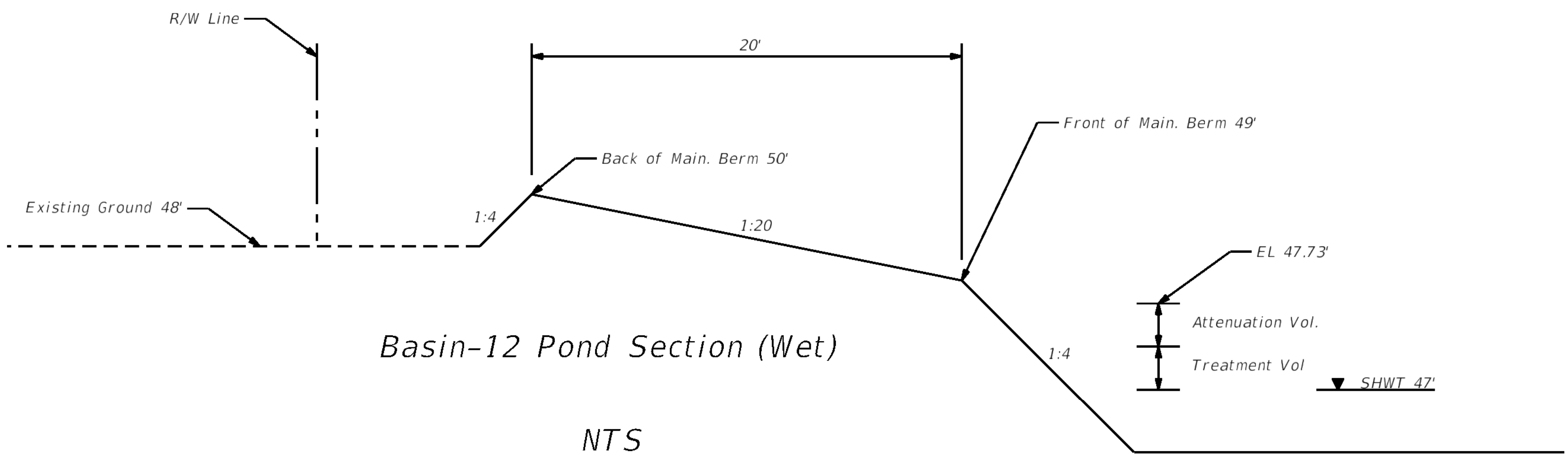
Stage	Description	Area (ac)	Ave Area (ac)	Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
47	Normal Water Level	5.55				0.00
48		5.73	5.64	1.00	5.64	5.64
49	Front Main Berm	5.92	5.83	1.00	5.83	11.47
50	Back Main Berm	6.88	6.40	1.00	6.40	17.87

Required Treatment and Attenuation Volume = 4.10 ac-ft

Provided treatment and attenuation volume = 4.1 ac-ft
Provided treatment and attenuation Stage= 47.73 ft

Pond located outside of the 100-year flood plain.

The proposed pond will not impact flood plain since the ground elevation is higher than the 100-year stage.



Basin-12 Pond Section (Wet)

NTS

SR 408 Eastern Extension-PD&E
CFX
BASIN 13

Computed By	KS
Checked By	CR
Date	2/26/2017

Beginning Station	66110.00
End Station	70195.00
Length (ft)	4085.00

Total Basin Area

	R/W Width (ft)	Area (ac)
Proposed SR 408 Corridor		28.04
	TOTAL AREA (AC)	**28.04**

Existing Impervious Area

Description	Area	
Residential	0.35	
Total Impervious Area	**0.35**	**Acre**

ATTENUATION VOLUME ESTIMATE

Pre-Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
1/4 Residential	A/D	87	0.35	30.45
On-site Grassed Area	A/D	80	27.69	2,215.20
		TOTAL	28.04	2,245.65
		COMPOSITE CN		**80.1**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr/24 hr	SJRWMD	8.70	2.49	6.29	14.71
100 yr, 240 hr	FDOT	18.00	2.49	15.33	35.81
100 yr, 8 hr	FDOT	8.00	2.49	5.64	13.17

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	2.49
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.29
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	14.71

Proposed Impervious Area		
Description	Area	
Proposed SR 408 Corridor (Proposed 4' lanes and assume 64' impervious median = 136')	12.38	
Total Impervious Area	**12.38**	**Acre**

Post Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	A/D	98.00	12.38	1,213.12
On-site Grassed Area	A/D	80	15.66	1,252.90
		TOTAL	28.04	2,466.02
		COMPOSITE CN		**87.9**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	1.37	7.25	16.93
100 yr, 240 hr	FDOT	18.00	1.37	16.45	38.45
100 yr, 8 hr	FDOT	8.00	1.37	6.56	15.33

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	1.37
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	7.25
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	16.93

SUMMARY OF ATTENUATION ESTIMATES

PRE DEVELOPED CONDITION		POST DEVELOPED CONDITION	
AREA (AC)	28.04	AREA (AC):	28.04
CN:	80.1	CN:	87.9

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	14.71	16.93	2.23
FDOT	100 yr, 240 hr	35.81	38.45	2.64
FDOT	100 yr, 8 hr	13.17	15.33	2.17

MAXIMUM ATTENUATION VOLUME (AC-FT)	2.64

WATER QUALITY CALCULATIONS

St. John's River Water Management District Pollution Abatement Volume Requirement

Post Development Total Area (ac) =	28.04
Post Development Impervious Area (ac) =	12.38

The Basin Discharges it Econ River which is an OFW. Additional 50% treatment volume is required
The basin is an Open Basin.

Wet Detention	**Ac-Ft**	
1) 1.5 " of Runoff Over Total Area =	3.51	
2) 3.75" of Runoff Over Impervious Area =	3.87	Governs
WET DETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	3.87	

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

The top of the treatment and attenuation volume are constrained to berm elevation minus the freeboard.

Per Soil Survey, SHWT at Basin-13 is between 0" to 18".
We have assumed the SHWT is 1.0' below the existing ground and are providing a 2.5' berm above existing ground.

Pond Depth from top of Maint Berm to SHWT	3.5	ft
Freeboard =	1	ft

H = Depth to pond SHWT - Freeboard = 2.5 ft

3) Use greater of required treatment volume or attenuation volume.

Required Attenuation Volume =	2.64	ac-ft
Required Treatment Volume =	3.87	ac-ft
Peak Volume =	6.51	ac-ft

4) For purposes of pond area calculations, assume a square pond.

Volume = LWH

where H = height (ft)
L = length of vertical sided pond
W = width of vertical sided pond

Since a square pond is being assumed, L = W. Therefore, Volume = L^2H

Volume = 6.51 ac-ft
H = 2.5 ft

$6.51 = L^2 \times 2.5$

Solving for L = 336.7 ft
Therefore W = 336.7 ft

5) Increase dimensions to account for side slopes.

Add: x = [(Side Slopes x H) x 2] to each dimension

Side slopes:	4	ft/ft
H:	2.5	ft
x =	20	ft
Length @ top of slope =	357	ft
Width @ top of slope =	357	ft

6) Add maintenance berms.

Assume 20' maintenance berm (add to each side)

Length w/maint berm =	397	ft
Width w/maint. Berm =	397	ft
Total Area =	3.61	acres
Add 10% Contingency	3.97	acres

PRELIMINARY POND AREA REQUIRED FOR BASIN-13= 4.0 ACRES

Recommended Pond 13B

Existing Ground Elevation =	61	ft
Normal Water Elevation =	60	ft
Lowest EOP Elevation =	78.8	ft
Pond R/W	10.45	ac

Pond Stage/Storage Calculations

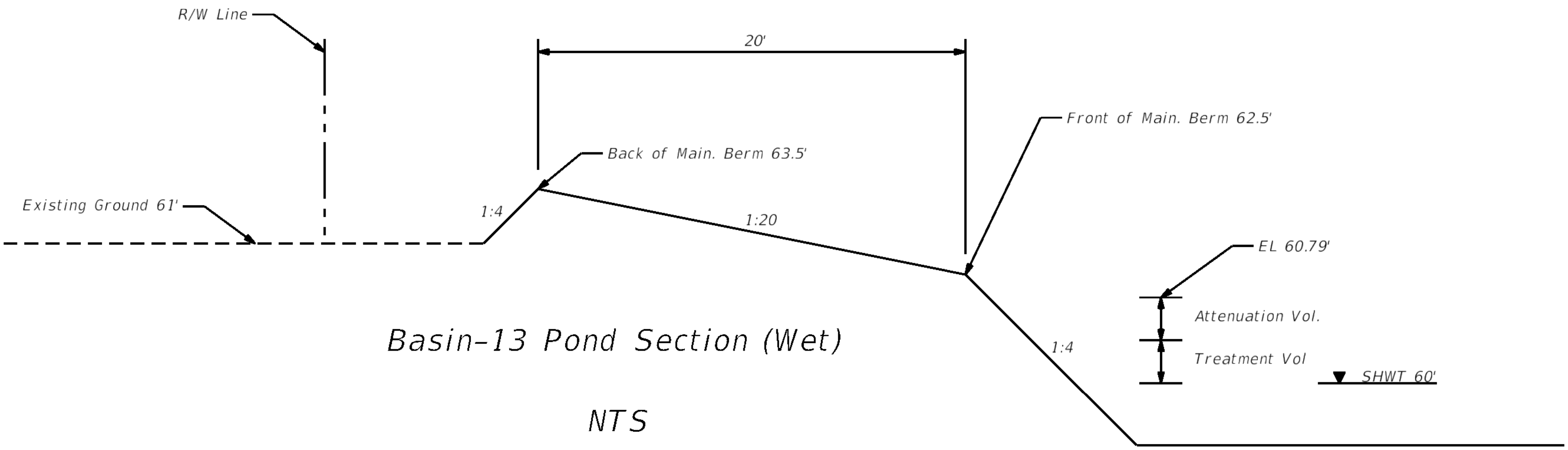
Stage	Description	Area (ac)	Ave Area (ac)	Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
60	Normal Water Level	7.93				0
61.5		8.42	8.175	1.5	12.2625	12.2625
62.5	Front Main Berm	8.75	8.585	1	8.585	20.8475
63.5	Back Main Berm	10.45	9.6	1	9.6	30.4475

Required Treatment and Attenuation Volume = 6.51 ac-ft

Provided treatment and attenuation volume = 6.51 ac-ft
Provided treatment and attenuation Stage= 60.79 ft

Pond located outside of the 100-year flood plain.

The proposed pond will not impact flood plain since the ground elevation is higher than the 100-year stage.



Basin-13 Pond Section (Wet)

NTS

SR 408 Eastern Extension-PD&E
CFX
BASIN 14

Computed By KS
Checked By CR
Date 2/26/2017

Beginning Station	70195.00
End Station	71410.00
Length (ft)	1215.00

Total Basin Area		
	R/W Width (ft)	Area (ac)
Proposed SR 408 Corridor		8.70
	TOTAL AREA (AC)	**8.70**

Existing Impervious Area		
Description	Area	
Residential	1.44	
Total Impervious Area	**1.44**	**Acre**

ATTENUATION VOLUME ESTIMATE

Pre-Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
1/4 Residential Property	A/D	87	1.44	125.28
Woods (Fair)	A/D	79	7.26	573.54
		TOTAL	8.70	698.82
		COMPOSITE CN		**80.3**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	2.45	6.32	4.58
100 yr, 240 hr	FDOT	18.00	2.45	15.36	11.14
100 yr, 8 hr	FDOT	8.00	2.45	5.66	4.11

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	2.45
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.32
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	4.58

Proposed Impervious Area		
Description	Area	
Proposed SR 408 Corridor (Proposed 4' lanes and assume 64' impervious median = 136')	3.68	
Total Impervious Area	**3.68**	**Acre**

Post Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	A/D	98.00	3.68	360.82
On-site Grassed Area	A/D	80	5.02	401.45
		TOTAL	8.70	762.27
		COMPOSITE CN		**87.6**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	1.41	7.21	5.23
100 yr, 240 hr	FDOT	18.00	1.41	16.41	11.90
100 yr, 8 hr	FDOT	8.00	1.41	6.52	4.73

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	1.41
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	7.21
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	5.23

SUMMARY OF ATTENUATION ESTIMATES

PRE DEVELOPED CONDITION		POST DEVELOPED CONDITION	
AREA (AC)	8.70	AREA (AC):	8.70
CN:	80.3	CN:	87.6

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	4.58	5.23	0.64
FDOT	100 yr, 240 hr	11.14	11.90	0.76
FDOT	100 yr, 8 hr	4.11	4.73	0.62

MAXIMUM ATTENUATION VOLUME (AC-FT)	0.76

WATER QUALITY CALCULATIONS

St. John's River Water Management District
Pollution Abatement Volume Requirement

Post Development Total Area (ac) =	8.70
Post Development Impervious Area (ac) =	3.68

The Basin Discharges it Econ River which is an OFW. Additional 50% treatment volume is required
The basin is an Open Basin.

Wet Detention	**Ac-Ft**	
1) 1.5 " of Runoff Over Total Area =	1.09	
2) 3.75" of Runoff Over Impervious Area =	1.15	Governs
WET DETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	1.15	

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

The top of the treatment and attenuation volume are constrained to berm elevation minus the Maint Berm.

Per Soil Survey, SHWT at Basin-14 is between 6" to 42".
We have assumed the SHWT is 2.0' below the existing ground and are providing a 2.0' berm above existing ground.

Pond Depth from top of Maint Berm to SHWT	4	ft
Maint Berm =	1	ft

H = Depth to pond SHWT - Maint Berm = 3 ft

3) Use greater of required treatment volume or attenuation volume.

Required Attenuation Volume =	0.76	ac-ft
Required Treatment Volume =	1.15	ac-ft
Peak Volume =	1.91	ac-ft

4) For purposes of pond area calculations, assume a square pond.

Volume = LWH

where H = height (ft)
L = length of vertical sided pond
W = width of vertical sided pond

Since a square pond is being assumed, L = W. Therefore, Volume = L^2H

Volume = 1.91 ac-ft
H = 3 ft

$1.91 = L^2 \times 3$

Solving for L = 166.5 ft
Therefore W = 166.5 ft

5) Increase dimensions to account for side slopes.

Add: x = [(Side Slopes x H) x 2] to each dimension

Side slopes:	4	ft/ft
H:	3	ft
x =	24	ft
Length @ top of slope =	191	ft
Width @ top of slope =	191	ft

6) Add maintenance berms.

Assume 20' maintenance berm (add to each side)

Length w/maint berm =	231	ft
Width w/maint. Berm =	231	ft
Total Area =	1.22	acres
Add 10% Contingency	1.34	acres

PRELIMINARY POND AREA REQUIRED FOR BASIN-14= 1.3 ACRES

Recommended Pond 14A

Existing Ground Elevation =	64 ft
Normal Water Elevation =	62 ft
Lowest EOP Elevation =	85.01 ft
Pond R/W	2.57 ac

Pond Stage/Storage Calculations

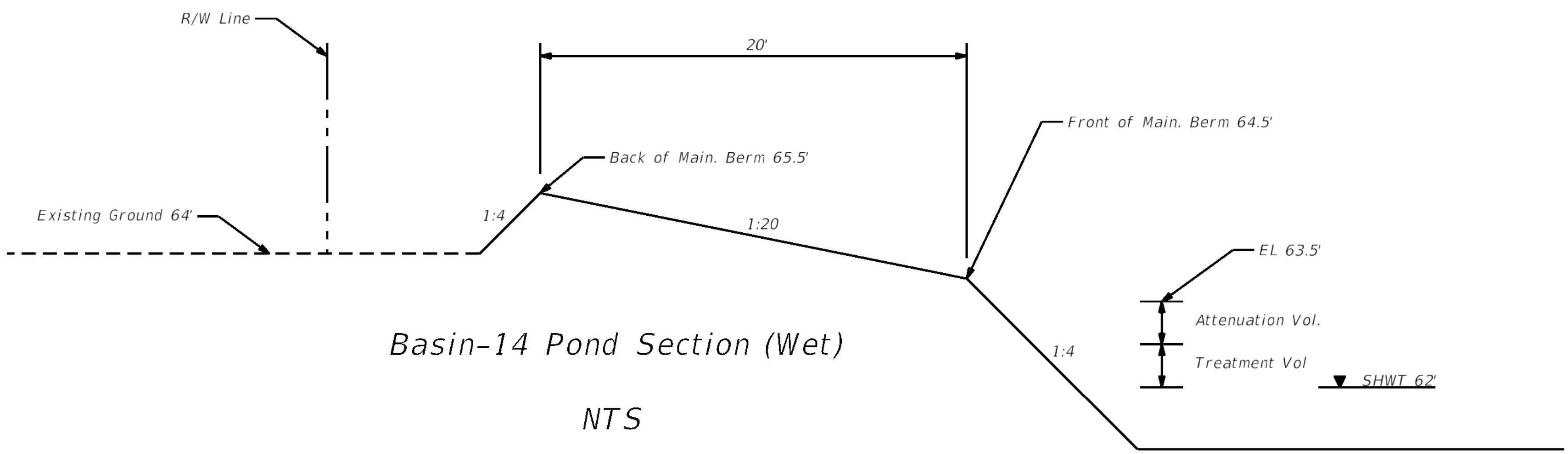
Stage	Description	Area (ac)	Ave Area (ac)	Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
62	Normal Water Level	1.34				0.00
63.5		1.58	1.46	1.50	2.19	2.19
64.5	Front Main Berm	1.74	1.66	1.00	1.66	3.85
65.5	Back Main Berm	2.57	2.16	1.00	2.16	6.01

Required Treatment and Attenuation Volume = 1.91 ac-ft

Provided treatment and attenuation volume = 2.19 ac-ft
Provided treatment and attenuation Stage= 63.5 ft

Pond located outside of the 100-year flood plain.

The proposed pond will not impact flood plain since the ground elevation is higher than the 100-year stage.



Basin-14 Pond Section (Wet)

NTS

SR 408 Eastern Extension-PD&E
CFX
BASIN 15

Computed By	KS
Checked By	CR
Date	2/26/2017

Beginning Station	71410.00
End Station	74600.00
Length (ft)	3190.00

Total Basin Area

	R/W Width (ft)	Area (ac)
Existing Pond M-1		3.11
Grass and Wooded Area		26.18
Grassed Area		4.26
1/2 acre Residential lots		4.49
	TOTAL AREA (AC)	**38.04**

Existing Impervious Area

Description	Area	
Existing Impervious areas within the basin limits	4.49	
Total Impervious Area	**4.49**	**Acre**

ATTENUATION VOLUME ESTIMATE

Pre-Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Existing SR 50				
1/2 acre Residential lots	A/D	84	4.49	377.50
On-site Grassed Area	A/D	80	4.26	340.80
On-site Pond-M1	A/D	100	3.11	311.00
Grass and Wooded Area	A/D	79	26.18	2,067.90
		TOTAL	38.04	3,097.20
		COMPOSITE CN		**81.4**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	2.28	6.46	20.47
100 yr, 240 hr	FDOT	18.00	2.28	15.52	49.21
100 yr, 8 hr	FDOT	8.00	2.28	5.79	18.36

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	2.28
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.46
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	20.47

Proposed Impervious Area		
Description	Area	
Proposed SR 408 Corridor (Proposed 4' lanes and assume 64' impervious median = 136')	10.97	
Total Impervious Area	**10.97**	**Acre**

Post Development

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
<u>Proposed SR 408 and Existing SR 50</u>				
On-site Roadway	A/D	98.00	10.97	1,075.16
On-site Grassed Area	A/D	79	27.07	2,138.45
		TOTAL	38.04	3,213.61
		COMPOSITE CN		**84.5**

Estimate of Runoff Volume

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	8.70	1.84	6.83	21.64
100 yr, 240 hr	FDOT	18.00	1.84	15.97	50.62
100 yr, 8 hr	FDOT	8.00	1.84	6.15	19.50

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	1.84
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.83
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	21.64

SUMMARY OF ATTENUATION ESTIMATES

PRE DEVELOPED CONDITION		POST DEVELOPED CONDITION	
AREA (AC)	38.04	AREA (AC):	38.04
CN:	81.4	CN:	84.5

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	20.47	21.64	1.18
FDOT	100 yr, 240 hr	49.21	50.62	1.41
FDOT	100 yr, 8 hr	18.36	19.50	1.14

MAXIMUM ATTENUATION VOLUME (AC-FT)	1.41

WATER QUALITY CALCULATIONS

St. John's River Water Management District
Pollution Abatement Volume Requirement

Post Development Total Area (ac) =	38.04
Post Development Impervious Area (ac) =	10.97

The Basin Discharges it Econ River which is an OFW. Additional 50% treatment volume is required
The basin is an Open Basin.

Wet Detention	**Ac-Ft**	
1) 1.5 " of Runoff Over Total Area =	4.76	Govern
2) 3.75" of Runoff Over Impervious Area =	3.43	
WET DETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	4.76	

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

The top of the treatment and attenuation volume are constrained to Berm elevation minus the Maint Berm.
Existing Ground Elevation = 60 ft
Per the Bithlo Drainage Master Plan SHWT in Pond M-1 = 53 ft

Pond Depth from top of Maint Berm to SHWT	7	ft
Maint Berm =	1	ft

H = Depth to pond SHWT - Maint Berm = 6 ft

3) Use greater of required treatment volume or attenuation volume.

Required Attenuation Volume =	1.41	ac-ft
Required Treatment Volume =	4.76	ac-ft
Peak Volume =	6.16	ac-ft

4) For purposes of pond area calculations, assume a square pond.

Volume = LWH

where H = height (ft)
L = length of vertical sided pond
W = width of vertical sided pond

Since a square pond is being assumed, L = W. Therefore, Volume = L^2H

Volume =	6.16	ac-ft
H =	6	ft

$$6.16 = L^2 \times 6$$

Solving for L =	211.5	ft
Therefore W =	211.5	ft

5) Increase dimensions to account for side slopes.

Add: x = [(Side Slopes x H) x 2] to each dimension

Side slopes:	4	ft/ft
H:	6	ft
x =	48	ft
Length @ top of slope =	260	ft
Width @ top of slope =	260	ft

6) Add maintenance Berms.

Assume 20' maintenance Berm (add to each side)

Length w/maint Berm =	300	ft
Width w/maint. Berm =	300	ft
Total Area =	2.06	acres
Add 10% Contingency	2.27	acres

PRELIMINARY POND AREA REQUIRED FOR BASIN-15= 2.6 ACRES

Recommended Pond 15A - Will provide compensation for possible elimination of existing Pond M-1

Existing Ground Elevation =	60.00 ft
Normal Water Elevation =	53.00 ft
Lowest EOP Elevation =	68.17 ft
Pond R/W (Infield Pond)	8.92 ac

Pond Stage/Storage Calculations

Stage	Description	Area (ac)	Ave Area (ac)	Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
53.00	Normal Water Level	5.32				0.00
60.00		6.95	6.14	7.00	42.95	42.95
61.00	Front Main Berm	7.27	7.11	1.00	7.11	50.06
62.00	Back Main Berm	8.92	8.10	1.00	8.10	58.15

Required Treatment and Attenuation Volume = 6.16 ac-ft

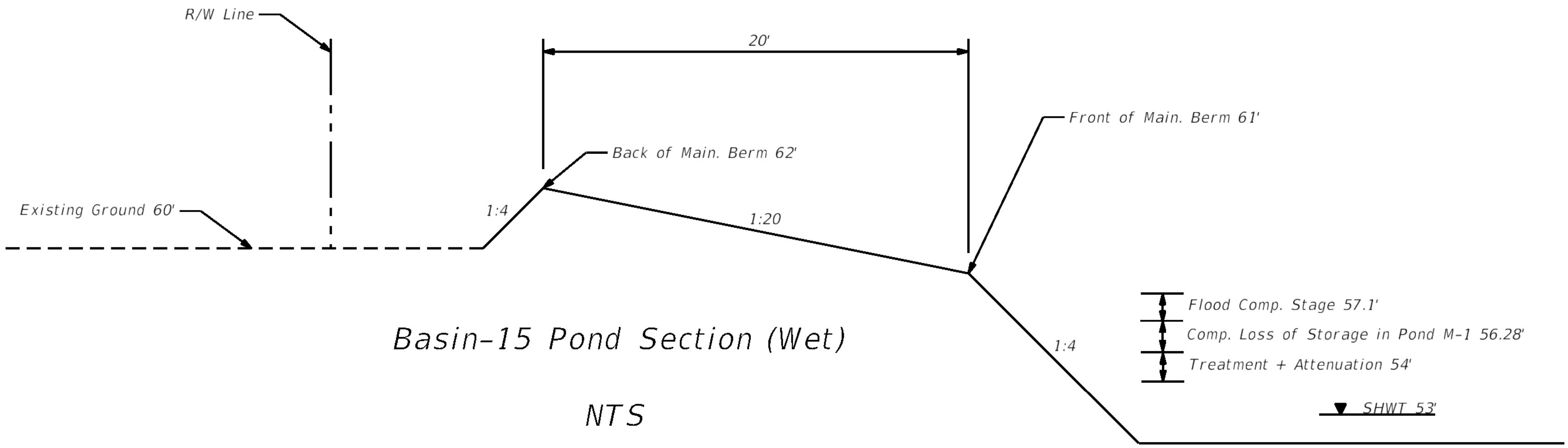
Provided treatment and attenuation volume = 6.16 ac-ft
Provided treatment and attenuation Stage= 54 ft

If Pond M-1 were to be eliminated the total loss in storage volume is 14.01 ac-ft (between stage 54' and 56.28')
Compensating lost storage volume for Pond-M1 in Pond 15A will result in pond stage at = 56.28 ft

100-year Flood Elevation= 57.1 ft at Existing Pond M-1 (Bithlo Stormwater Masterplan)

Flood plain Compensation between 56.28' to 57.1' = 5.02 ac-ft

The 15 A pond has additional storage capacity to compensate for the lost storage in existing Orange County Pond M-1 due to the proposed SR 408 alignment and to provide additional flood plain compensation.

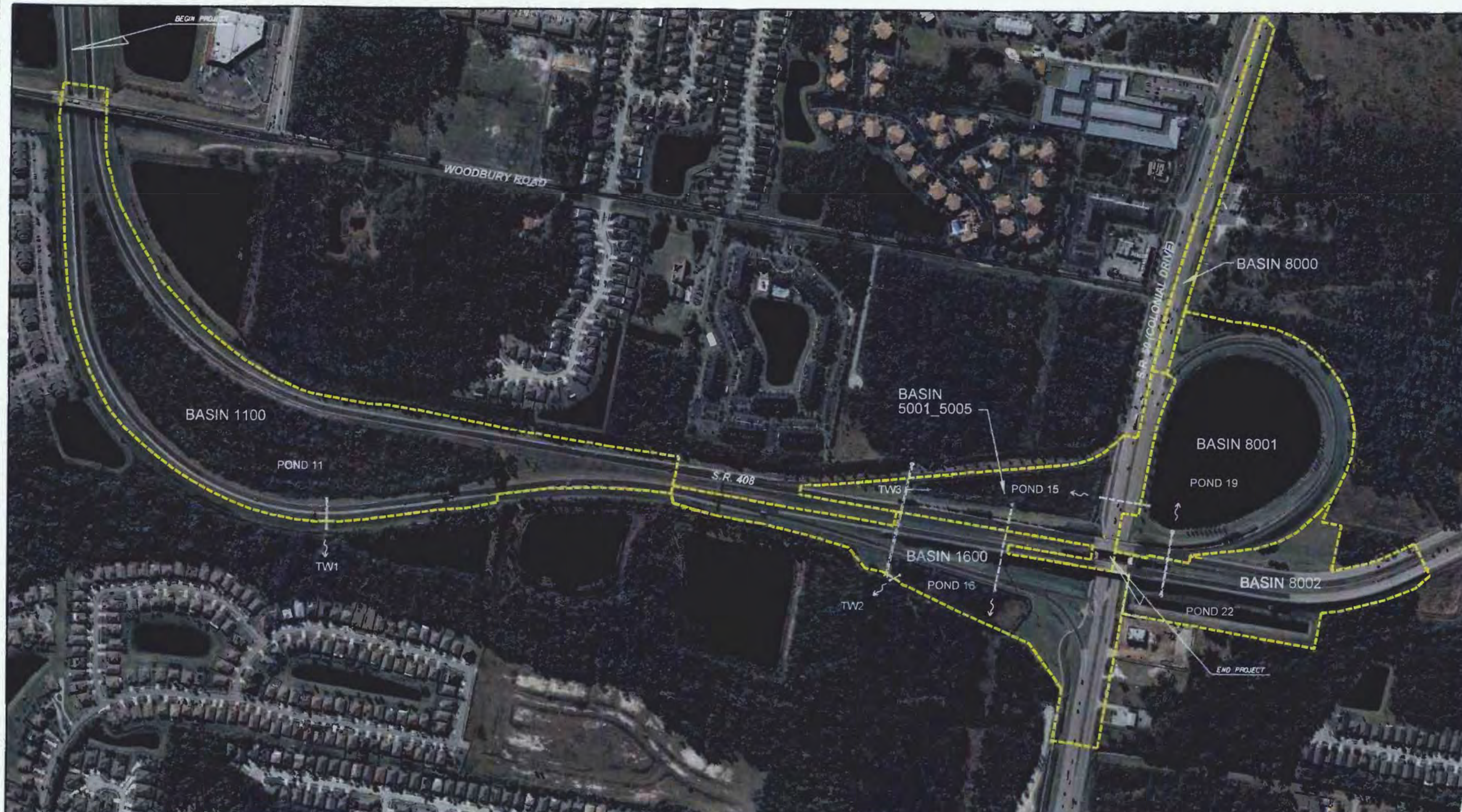


Basin-15 Pond Section (Wet)

NTS

Appendix: G

Excerpt from Existing SR.408 Plans



SCALE: 1"=400'

GTC Engineering Corporation
98 South Semoran Blvd, Orlando, FL 32807
407-380-0402
Certificate of Authorization Number 6758
Claude L. Cassagnol, P.E. P.E. Number 35490

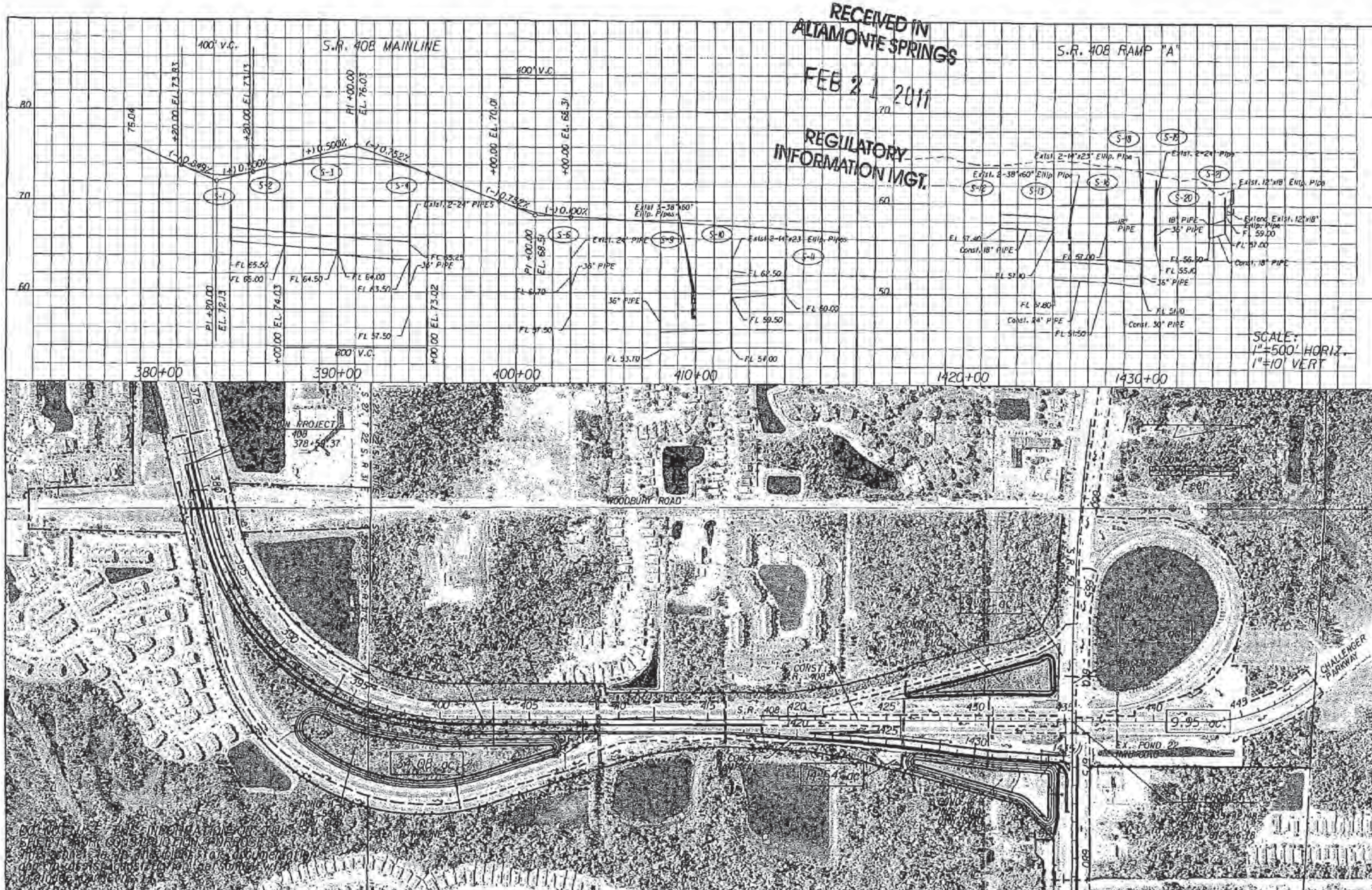
Orange County Florida

PROPOSED DRAINAGE BASIN MAP
S.R. 408

27

BY CMY | DATE 5-27-10 | JOB NUMBER FLD-30 | SHEET 1 of 1

2035R=24



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

GTC Engineering Corporation
90 South Semoran Blvd, Orlando, FL 32807
Phone Number - 407.358.0492
Certificate of Authorization Number 6758
Claude L. Cassagnol, P.E. P.E. Number 35199

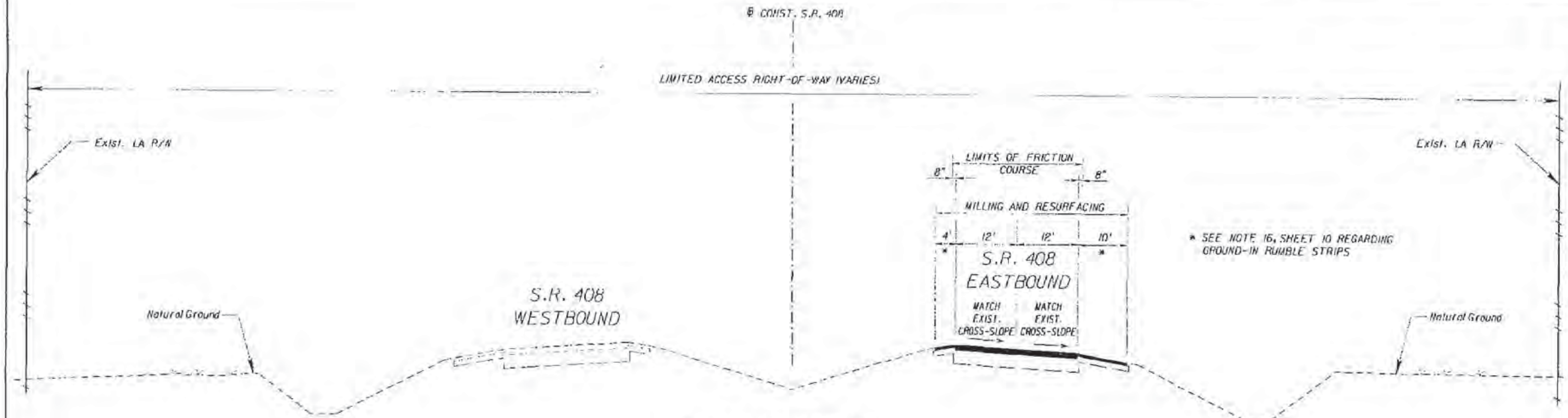
ORLANDO-ORANGE COUNTY EXPRESSWAY AUTHORITY

ROAD NO.	PROJECT NO.
S.R. 408	408-113

EXPRESSWAY AUTHORITY

OVERALL DRAINAGE MAP

SHEET NO. 5



TYPICAL SECTION NO. 1
S.R. 408
STA. 372+80.68 TO STA. 378+59.37
STA. 418+00.00 TO STA. 434+89.21

DESIGN SPEED = 65 MPH
POSTED SPEED = 55 MPH

MAINLINE PAVEMENT DESIGN

MILLING

MILL 3" AVERAGE DEPTH

RESURFACING

SUPERPAVE ASPHALTIC CONCRETE (TRAFFIC LEVEL C)(2 ½")

FRICTION COURSE FC-5 (3/4")(PG 76-22)(BLACK GRANITE)

SHOULDER PAVEMENT DESIGN

MILLING

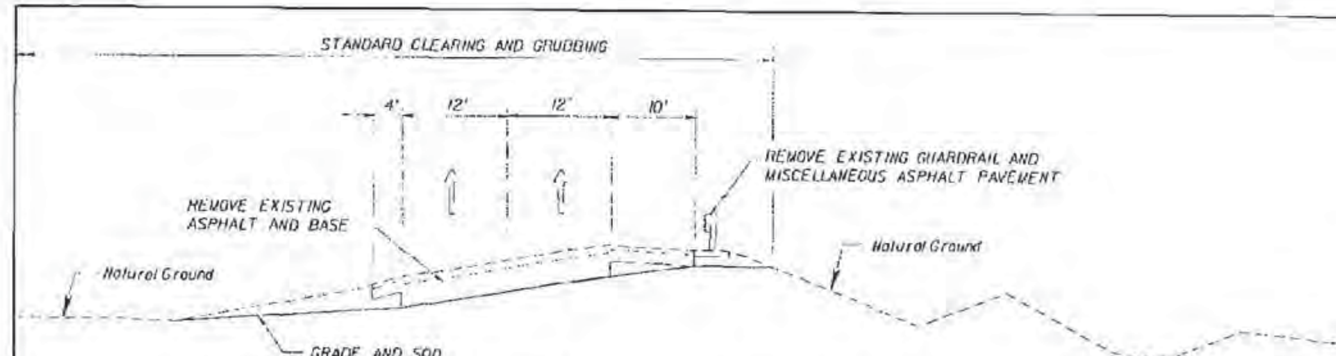
MILL 1½" AVERAGE DEPTH

RESURFACING

SUPERPAVE ASPHALTIC CONCRETE (TRAFFIC LEVEL C)(1 ¾")

TRAFFIC DATA

CURRENT YEAR = 2010 AADT = 33,300
ESTIMATED OPENING YEAR = 2010 AADT = 34,400
ESTIMATED DESIGN YEAR = 2032 AADT = 54,500
K = 9.8% D = 53.5% T = 3.8% (24 HOUR)
DESIGN HOUR T = %
DESIGN SPEED = 65 MPH



TYPICAL SECTION DETAIL
PAVEMENT REMOVAL
S.R. 408 EASTBOUND LANES
STA. 378+59.37 TO STA. 418+00.00

Exist. R/W Limited Access

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Pegasus ENGINEERING
ENGINEER OF RECORD
FURSAN MUNJED, P.E.
LICENSE # 51446
PEGASUS ENGINEERING, LLC
301 WEST STATE ROAD 434, SUITE 309
WINTER SPRINGS, FLORIDA 32708
TEL (407) 992-9160
CERTIFICATE OF AUTHORIZATION NO. 27770

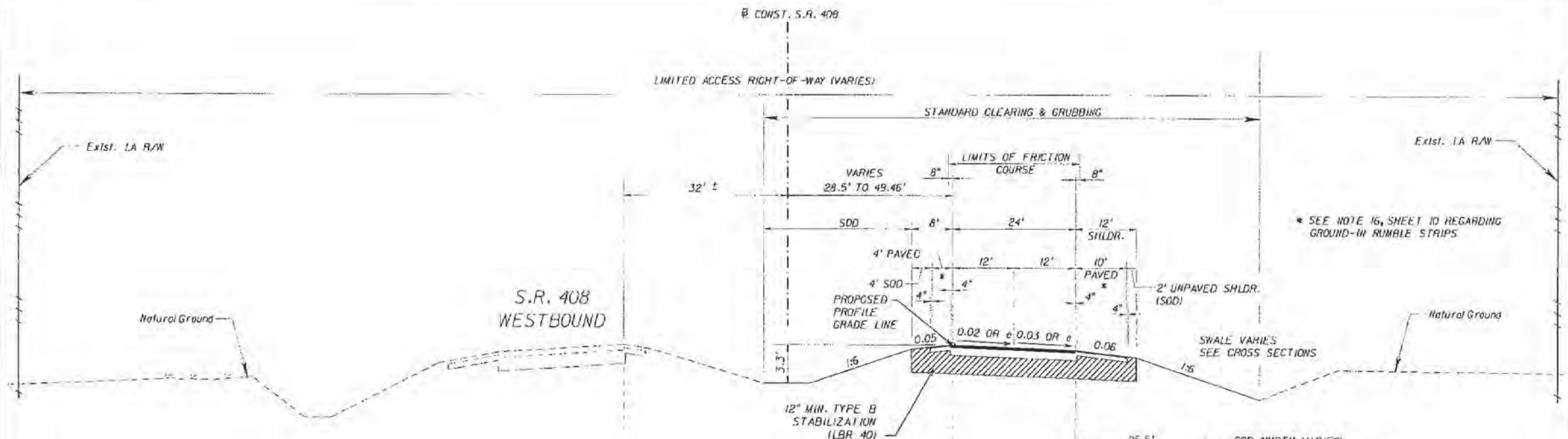
ORLANDO-ORANGE COUNTY EXPRESSWAY AUTHORITY

ROAD NO.	PROJECT NO.
S.R. 408	408-113

EXPRESSWAY AUTHORITY

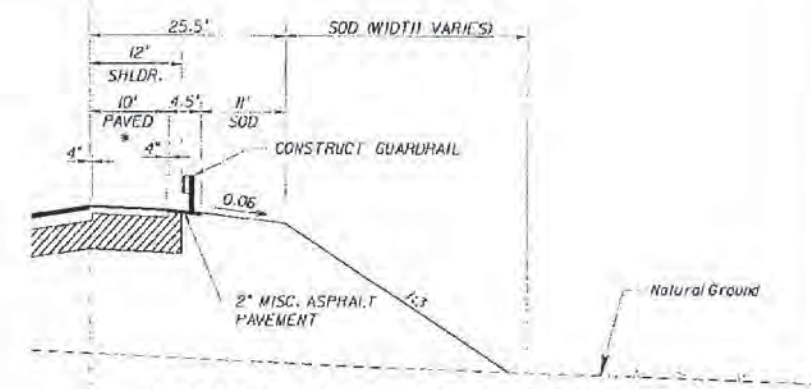
TYPICAL SECTIONS
S.R. 408

SHEET NO. 6



TYPICAL SECTION NO. 2
S.R. 408
STA. 378+59.37 TO STA. 418+00.00

DESIGN SPEED = 65 MPH
POSTED SPEED = 55 MPH



DETAIL FOR SHOULDER SECTIONS
IN SUPERELEVATION W/ GUARDRAIL
STA. 385+33.00 TO STA. 408+08.00

MAINLINE PAVEMENT DESIGN

12" LIMEROCK BASE (LBR 100 (BG 11)

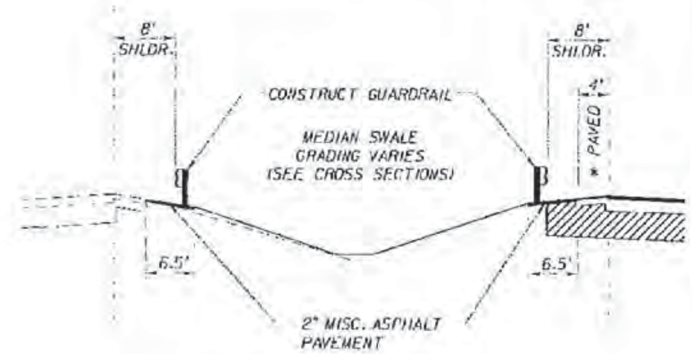
SUPERPAVE ASPHALTIC CONCRETE (TRAFFIC LEVEL C)(4")

FRICTION COURSE FC-5 (3/4")(PG 76-22)(BLACK GRANITE)

SHOULDER PAVEMENT DESIGN

6" LIMEROCK BASE (LBR 100 (BG 4)

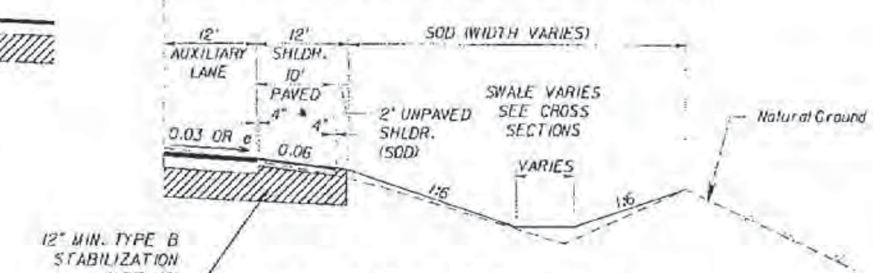
SUPERPAVE ASPHALTIC CONCRETE (TRAFFIC LEVEL C)(1¾")



MEDIAN GUARDRAIL DETAIL
S.R. 408

TRAFFIC DATA

CURRENT YEAR = 2010 AADT = 33,300
ESTIMATED OPENING YEAR = 2010 AADT = 34,400
ESTIMATED DESIGN YEAR = 2032 AADT = 54,900
K = 9.8% D = 53.5% T = 3.8% (24 HOUR)
DESIGN HOUR T = %
DESIGN SPEED = 65 MPH



AUXILIARY LANE DETAIL
STA. 398+00.00 TO STA. 418+00.00

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Pegasus ENGINEER OF RECORD FURQAN MUNEER, P.E. LICENSE # 51445 PEGASUS ENGINEERING, LLC 301 WEST STATE ROAD 434, SUITE 309 WINTER SPRINGS, FLORIDA 32708 TEL (407) 992-9160 CERTIFICATE OF AUTHORIZATION NO. 27770

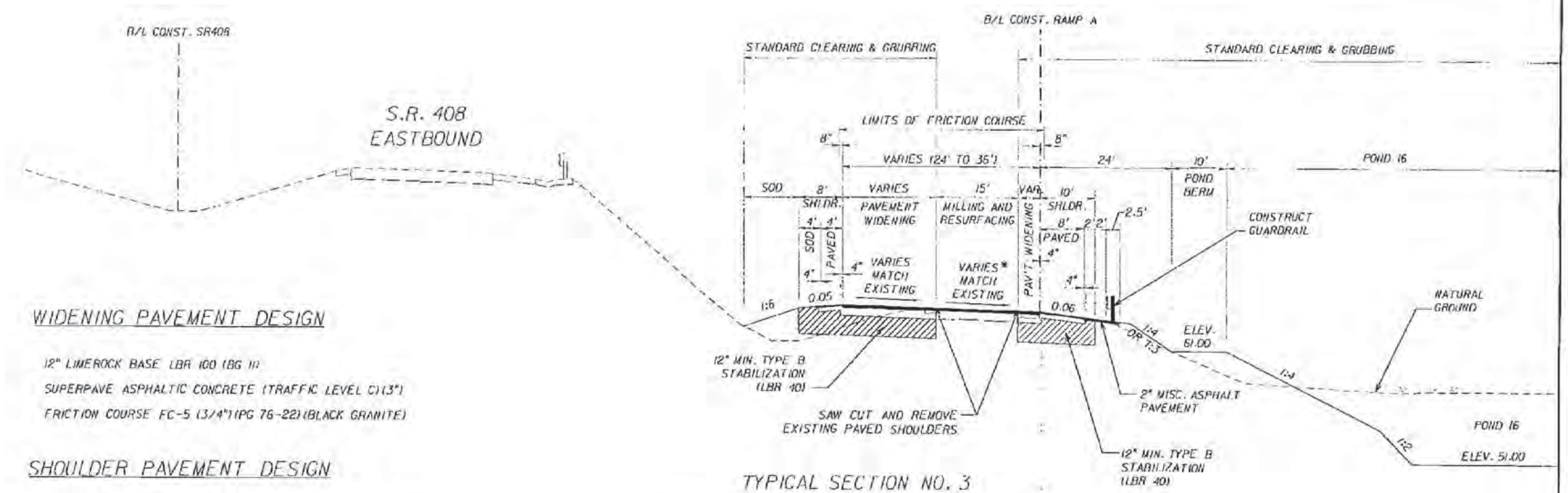
ORLANDO-ORANGE COUNTY EXPRESSWAY AUTHORITY

ROAD NO.	PROJECT NO.
S.R. 408	408-113

EXPRESSWAY AUTHORITY

TYPICAL SECTIONS
S.R. 408

SHEET NO. 7



TYPICAL SECTION NO. 3
RAMP "A"
STA. 1416+00.36 TO STA. 1435+20.00

DESIGN SPEED = 30 MPH

* OVERBUILD EXISTING PAVEMENT TO 0.02 FROM STA. 1432+00 TO STA. 1434+40

WIDENING PAVEMENT DESIGN

12" LIMEROCK BASE LBR 100 (BG 11)

SUPERPAVE ASPHALTIC CONCRETE (TRAFFIC LEVEL C)(3")

FRICTION COURSE FC-5 (3/4")(PG 76-22)(BLACK GRANITE)

SHOULDER PAVEMENT DESIGN

6" LIMEROCK BASE LBR 100 (BG 4)

SUPERPAVE ASPHALTIC CONCRETE (TRAFFIC LEVEL C)(1 ½")

MILLING

MILL 2 ½" AVERAGE DEPTH

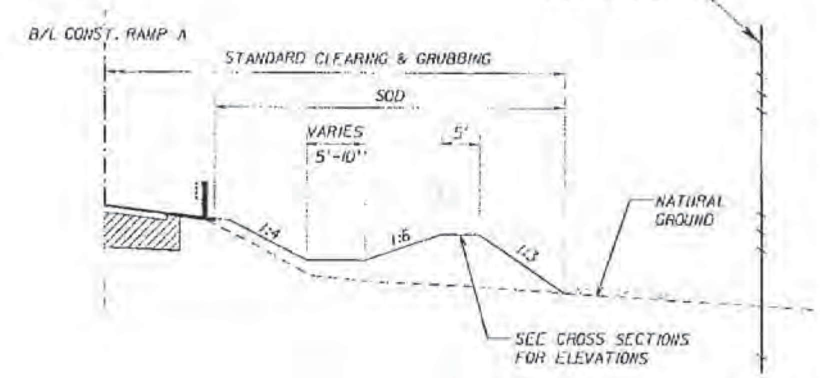
RESURFACING

SUPERPAVE ASPHALTIC CONCRETE (TRAFFIC LEVEL C)(2")

FRICTION COURSE FC-5 (3/4")(PG 76-22)(BLACK GRANITE)

TRAFFIC DATA

CURRENT YEAR = 2010 AADT = 11,200
ESTIMATED OPENING YEAR = 2010 AADT = 11,600
ESTIMATED DESIGN YEAR = 2032 AADT = 18,500
K = 9.8% D = 53.5% T = 3.8% (24 HOUR)
DESIGN HOUR T = %
DESIGN SPEED = 30 MPH



SWALE DETAIL
STA. 1418+00 TO STA. 1426+00

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

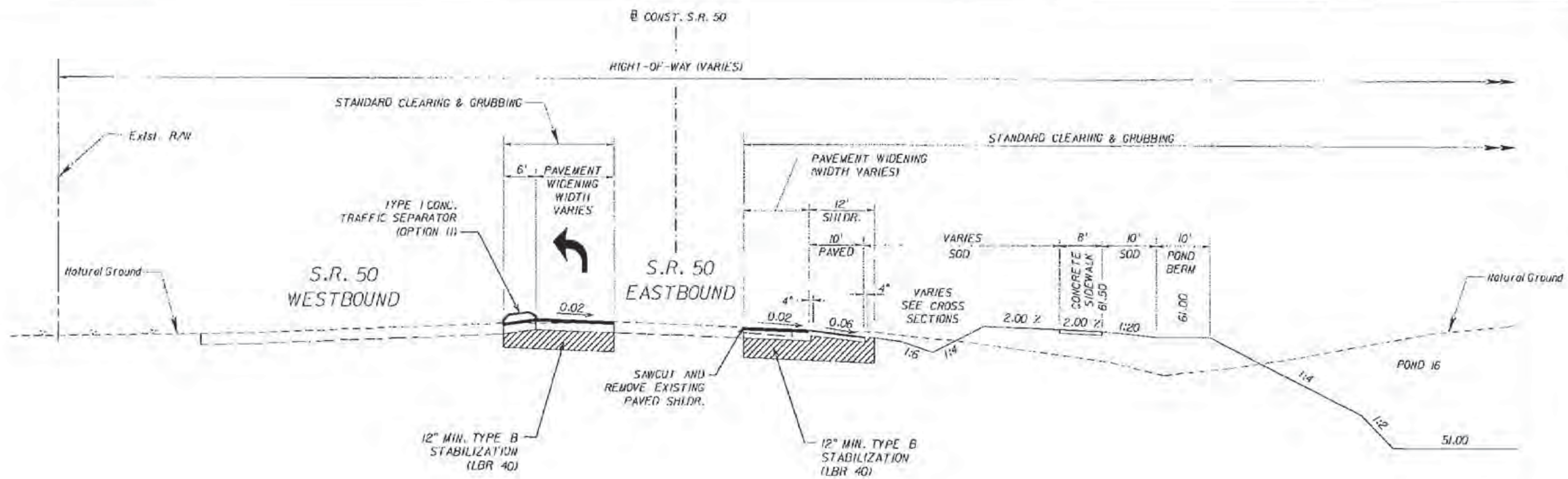
Pegasus Engineering — ENGINEER OF RECORD: FURSAN MUNJED, P.E. LICENSE # 51148 PEGASUS ENGINEERING, LLC 301 WEST STATE ROAD 434, SUITE 309 WINTER SPRINGS, FLORIDA 32708 TEL. (407) 992-9160 CERTIFICATE OF AUTHORIZATION NO. 27170

ORLANDO-ORANGE COUNTY EXPRESSWAY AUTHORITY

ROAD NO.	PROJECT NO.
S.R. 408	408-113

TYPICAL SECTIONS
RAMP "A"

SHEET NO. 8



TYPICAL SECTION NO. 4
S.R. 50
STA. 674+42.08 TO 683+06.37

DESIGN SPEED = 55 MPH
POSTED SPEED = 45 MPH

PAVEMENT WIDENING

BASE GROUP 11 (TYPE B-12.5 ONLY)(7")
SUPERPAVE ASPHALTIC CONCRETE (TRAFFIC LEVEL C)(3")
FRICTION COURSE FC-5 (3/4")(RUBBER)

SHOULDER PAVEMENT DESIGN

BASE GROUP 4 (TYPE B-12.5 ONLY)(4")
SUPERPAVE ASPHALTIC CONCRETE (TRAFFIC LEVEL C)(1")
FRICTION COURSE FC-5 (3/4")(RUBBER)

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Pegasus ENGINEERING — ENGINEER OF RECORD: FURSAN MUNJED, P.E. LICENSE # 51446, PEGASUS ENGINEERING, LLC, 301 WEST STATE ROAD 434, SUITE 309, WINTER SPRINGS, FLORIDA 32708, TEL (407) 992-9160, CERTIFICATE OF AUTHORIZATION NO. 27770

ORLANDO-ORANGE COUNTY EXPRESSWAY AUTHORITY

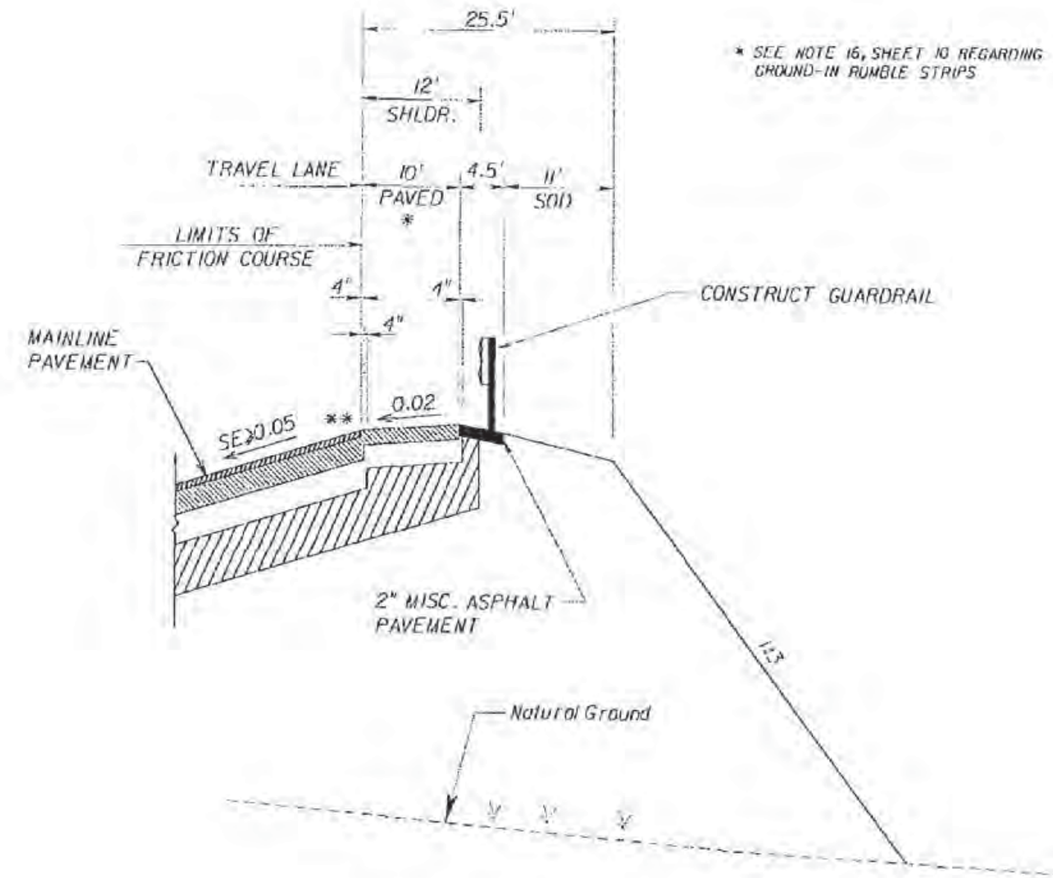
ROAD NO.	PROJECT NO.
S.R. 408	408-113

TYPICAL SECTIONS
S.R. 50

SHEET NO. 9

TYPICAL SECTION NOTES

1. BITUMINOUS PRIME COAT IS TO BE APPLIED TO ALL LIMEROCK BASES ON WHICH PAVEMENT IS TO BE PLACED AT A RATE NOT LESS THAN 0.15 GALLONS PER SQUARE YARD, OR AS DIRECTED BY THE ENGINEER. PAYMENT FOR THE PRIME COAT IS INCIDENTAL TO AND IS INCLUDED IN OTHER ITEMS OF RELATED WORK.
2. TACK COAT IS TO BE APPLIED BETWEEN ALL PAVEMENTS COURSES AT A RATE OF 0.04 GALLONS PER SQUARE YARD, OR AS DIRECTED BY THE ENGINEER. PAYMENT FOR THE TACK COAT IS INCIDENTAL TO AND IS INCLUDED IN OTHER ITEMS OF RELATED WORK.
3. ALL PERMANENT SOD AREAS, EXCEPT POND BOTTOMS, SHALL RECEIVE A 6 INCH FINISH SOIL LAYER, (PER 162-3-101) TO BE PAID FOR UNDER 120-6.
4. NONE OF THE EXISTING LIMEROCK BASE THAT IS REMOVED IS TO BE USED IN THE CONSTRUCTION OF THE NEW LIMEROCK BASE. ALL EXISTING LIMEROCK THAT IS TO BE REMOVED IS TO BE INCORPORATED IN THE STABILIZED PORTION OF THE SUBGRADE.
5. ALL NEWLY-CONSTRUCTED SLOPES TO BE SODDED AS SOON AS PRACTICAL TO MINIMIZE EROSION.
6. ROADSIDE SWALES SHALL BE SODDED TO A MINIMUM OF 2 FOOT DEPTH.
7. AREAS OUTSIDE THE LIMITS OF CONSTRUCTION AND WITHIN THE RIGHT-OF-WAY MAY BE SELECTIVELY CLEARED AND GRUBBED AS DESIGNATED BY THE ENGINEER.
8. ALL DISTURBED AREAS, EXCEPT ROADWAY PAVEMENT AND POND BOTTOMS, WITHIN THE LIMITS OF CONSTRUCTION, SHALL BE GRADES AND SODDED.
9. THE FRICTION COURSE IS TO BE MADE WITH BLACK GRANITE AGGREGATE ONLY (SEE SPECIAL PROVISIONS).
10. COORDINATE MILLING AND RESURFACING CONSTRUCTION OPERATIONS TO PREVENT PONDING OF WATER ON ROADWAY.
11. MILLING OPERATIONS MAY INCLUDE REMOVAL OF LIMEROCK OR SOIL CEMENT BASE, REMOVAL OF BASE SHALL BE INCIDENTAL TO THE CORRESPONDING MILLING EXISTING ASPHALT PAVEMENT PAY ITEM.
12. IN AREAS WHERE BASE COURSE IS EXPOSED, CONTRACTOR SHALL REMOVE ANY LOOSE OR BROKEN ASPHALT, ROLL EXPOSED BASE COURSE WITH MINIMUM 2 PASSES OF A 5 TO 12 TON ROLLER, APPLY PRIME COAT, AND INSTALL NEW ASPHALT (ASPHALT SHALL BE INSTALLED DURING THE SAME OPERATION).
13. THE FRICTION COURSE OVERLAP SHALL BE INSTALLED TO THE DIMENSION PROVIDED IN THE TYPICAL SECTIONS (6") WITH A 0.5 INCH TOLERENCE.
14. ALL FENCE POSTS ARE TO BE SET IN CONCRETE OR BOLTED TO WALL TOPS PER INDEX NO. 802.
15. AT LOCATIONS WHERE FENCE IS INSTALLED OUTSIDE AREAS DESIGNATED FOR CLEARING AND GRUBBING, THE CONTRACTOR SHALL CLEAR THE FENCE LINE SUFFICIENTLY TO ALLOW AN UNOBSTRUCTED INSTALLATION. CLEARING REQUIREMENTS FOR ACCESS AND INSTALLATION EQUIPMENT IS TO BE DETERMINED BY THE CONTRACTOR AND SHALL BE MINIMIZED. IN WETLAND AREAS CLEARING SHALL BE LIMITED TO 5' MAXIMUM.
16. MAINLINE INSIDE AND OUTSIDE SHOULDERS SHALL HAVE GROUND-IN RUMBLE STRIPS AS PER FDOT STANDARD INDEX NO. 518, SHEET 2 OF 2. SHOULDER GROUND-IN RUMBLE STRIPS SHALL BE LONGITUDINAL CUT.
17. AT THE CONTRACTOR'S OPTION, BASE MATERIAL MAY BE USED IN LIEU OF STABILIZED SUBGRADE UNDER PAVED SHOULDERS, AT NO ADDITIONAL COMPENSATION.
18. THE CONTRACTOR SHALL GRADE THE AREA ADJACENT TO THE BASE OF THE WALLS TO ENSURE DRAINAGE FLOWS AWAY FROM THE WALLS.
19. ALL A-8 MATERIAL IS TO BE STOCKPILED AND USED IN THE EMBANKMENT OR FINISH SOIL LAYER IN ACCORDANCE WITH INDEX NOS. 500 & 505.
20. BASED ON THE CONTRACTOR'S TECHNIQUES, A SEPERATE PASS BY THE MILLING MACHINE MAY BE REQUIRED TO MEET DROP-OFF CLEARANCE REQUIREMENTS. ALL ASSOCIATED COSTS SHALL BE INCLUDES IN THE COST FOR CORRESPONDING ASPHALT MILLING PAY ITEM NUMBERS.
21. SHOULDER CROSS SLOPES AT SUPER-ELEVATION LOCATIONS SHALL BE PER OOCEA STANDARDS.
22. SHOULDER ON THE HIGH SIDE SHALL BE SLOPED IN THE SAME DIRECTION AS PAVEMENT WHEN PAVEMENT SLOPE IS GREATER THAN 0.05 FOOT PER FOOT.
23. FOR STABILIZING AT INTERSECTIONS, TURNOUTS AND GRADED CONNECTIONS, SEE STANDARD INDEX 515. SEE TYPICAL SECTIONS FOR DEPTH AND L.B.R.
24. ACTUAL WIDTH OF BASE WIDENING MAY VARY DUE TO ACTUAL EXISTING PAVEMENT WIDTH. CONTRACTOR MAY ELECT TO PLACE UNIFORM WIDTH BASE WIDENING STRIP AT NO ADDITIONAL COST.
25. THE TOP LIFT OF THE ASPHALTIC CONCRETE STRUCTURAL COURSE IS TO INCLUDE THE PG 76-22 BINDER.



MAINLINE SHOULDER
FOR HIGH SIDE OF SUPERELEVATION
SIMILAR FOR CROWNED MEDIAN SHOULDERS
N.T.S.

** PROVIDE A 25' LONG VERTICAL TRANSITION OF THE SHOULDER PAVEMENT STRUCTURAL SECTION FROM 0.75" BELOW THE TOP OF THE HIGH SIDE FRICTION COURSE, TO FLUSH WITH THE TOP OF THE FRICTION COURSE. END THE VERTICAL SHOULDER PAVEMENT TRANSITION WHEN THE HIGH SIDE SHOULDER PAVEMENT CROSS SLOPE EQUALS 0% AND KEEP IT FLUSH WITH THE FRICTION COURSE THROUGH THE FULL SUPER DISTANCE. SEE PLANS FOR LOCATIONS. (NOTE, WHEN SE > 9%, THE SHOULDER CROSS SLOPE = 3%).

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Pegasus Engineering
ENGINEER OF RECORD
FURSAN MUNJED, P.E.
LICENSE # 51446
PEGASUS ENGINEERING, LLC
301 WEST STATE ROAD 434, SUITE 309
WINTER SPRINGS, FLORIDA 32708
TEL. (407) 992-9160
CERTIFICATE OF AUTHORIZATION NO. 27770

ORLANDO-ORANGE COUNTY EXPRESSWAY AUTHORITY

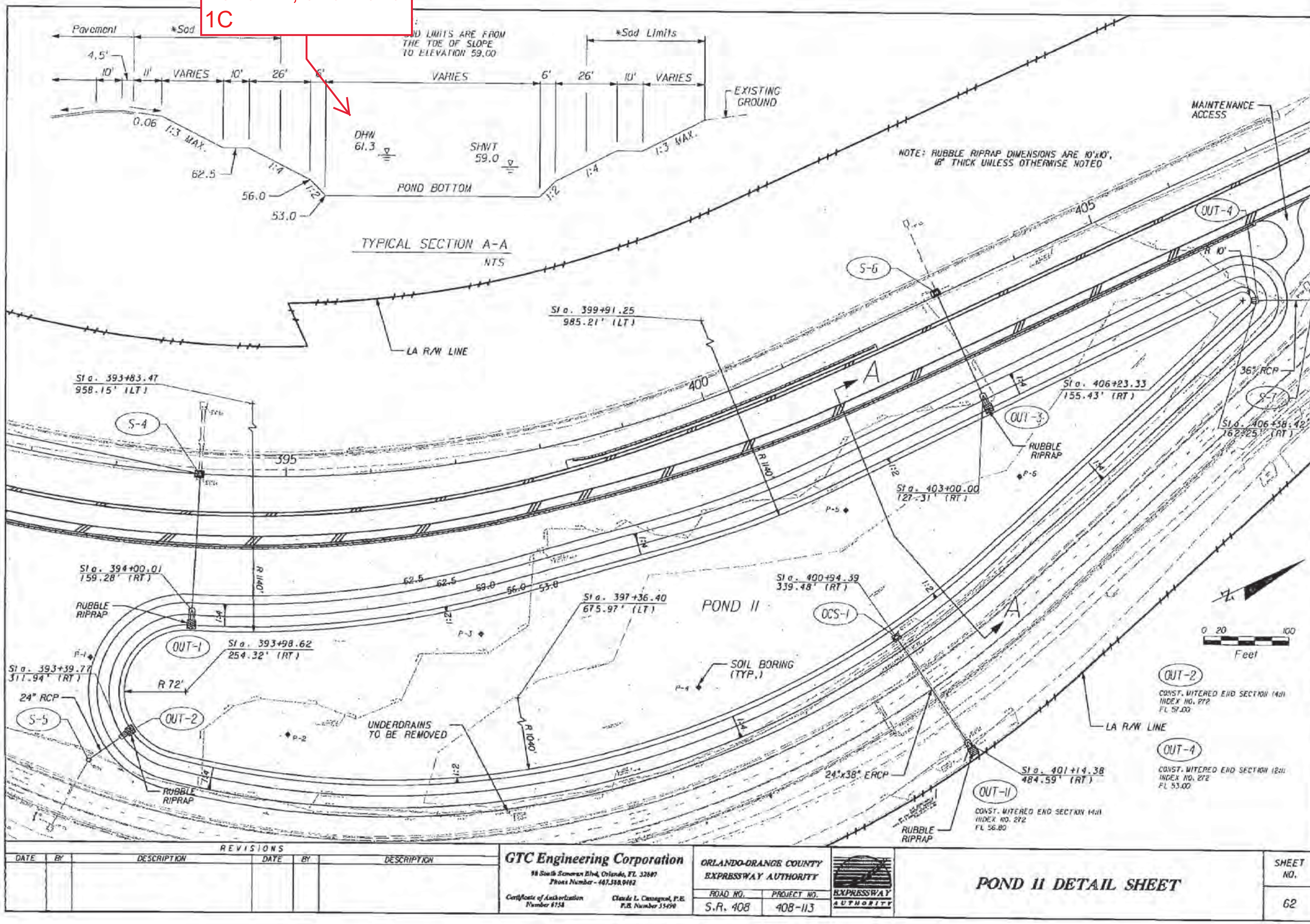
ROAD NO.	PROJECT NO.
S.R. 408	408-113

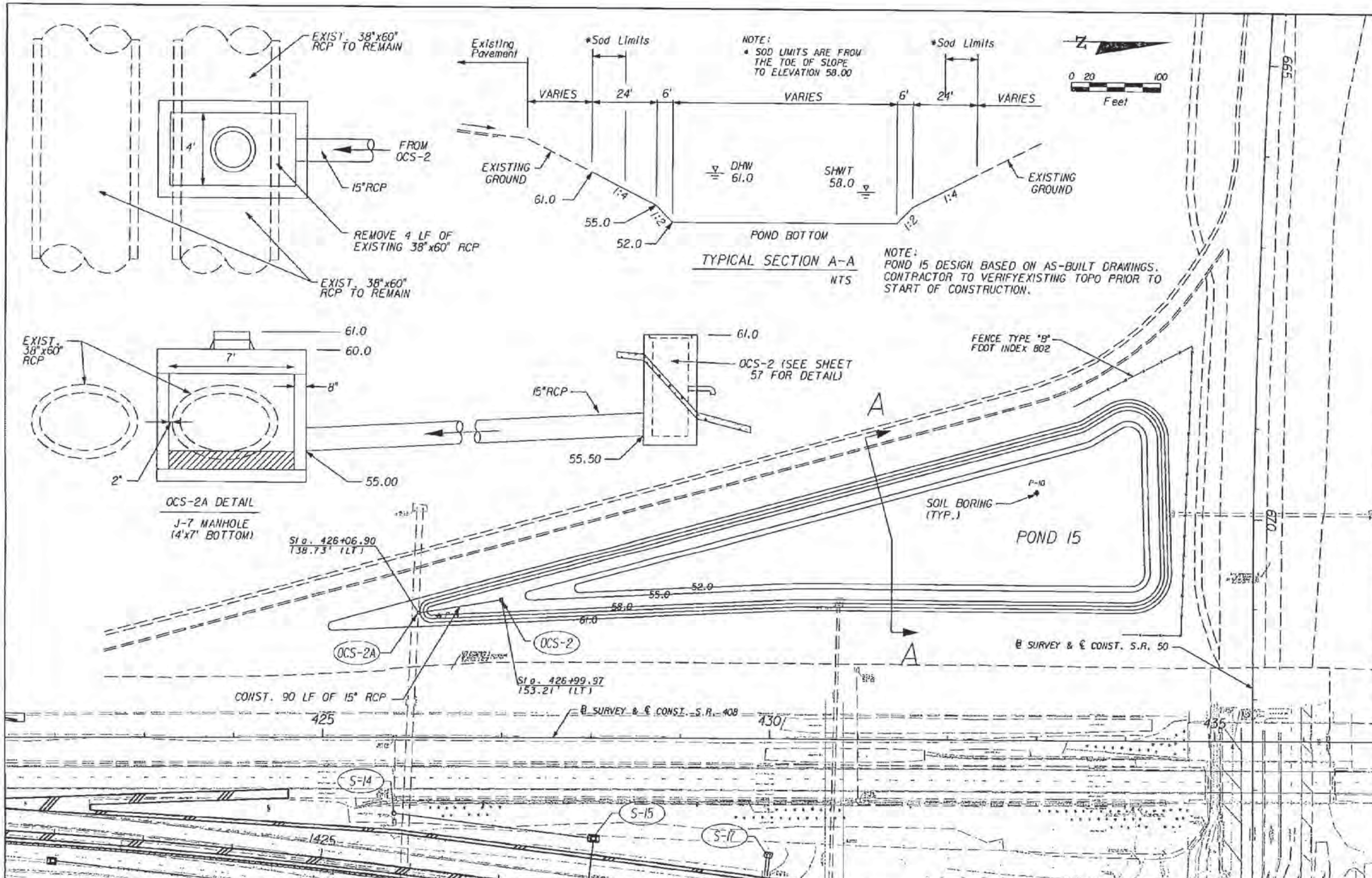
EXPRESSWAY AUTHORITY

TYPICAL SECTION NOTES

SHEET NO. 10

Used for Pond 1A, Pond 1B, and Pond 1C





DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

REVISIONS

GTC Engineering Corporation
50 South Semoran Blvd, Orlando, FL 32807
Phone Number - 407.381.0402
Certificate of Authorization Number 6738
Claude L. Cassagnol, P.E. P.E. Number 35496

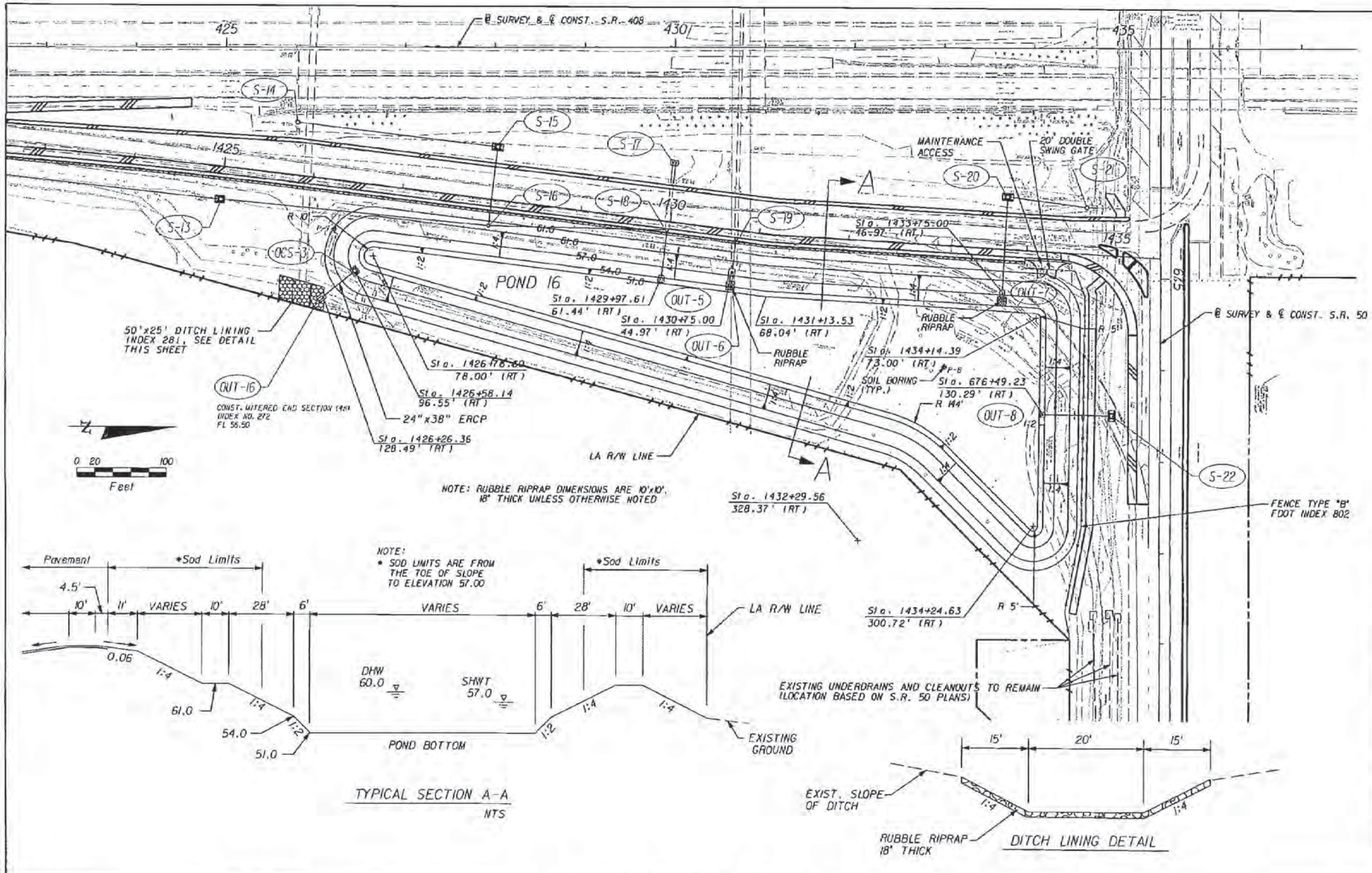
ORLANDO-ORANGE COUNTY EXPRESSWAY AUTHORITY

ROAD NO.	PROJECT NO.
S.R. 408	408-113

EXPRESSWAY AUTHORITY

POND 15 DETAIL SHEET

SHEET NO. 63



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

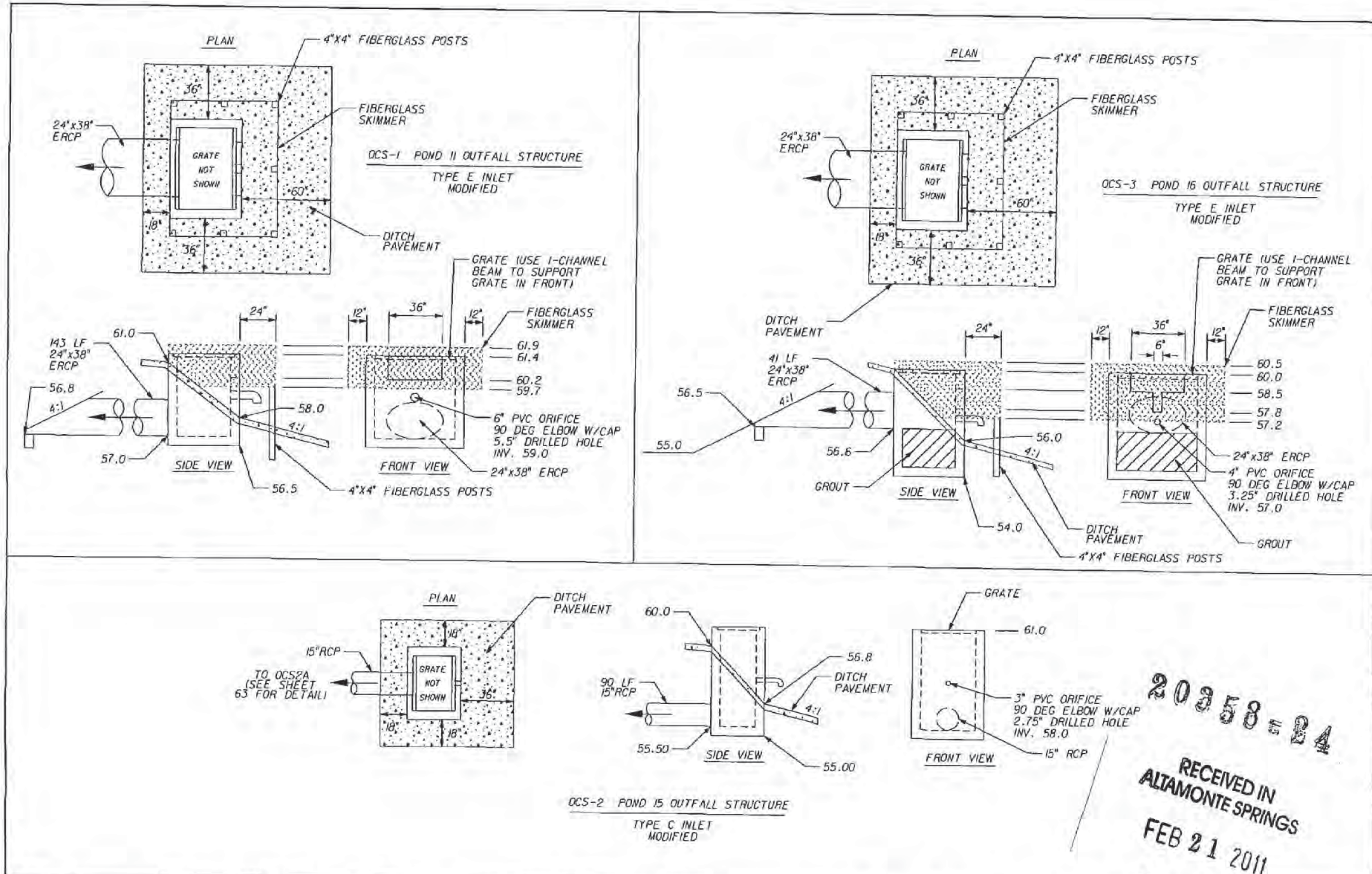
GTC Engineering Corporation

ORLANDO-ORANGE COUNTY EXPRESSWAY AUTHORITY

ROAD NO.	PROJECT NO.
S.R. 408	408-113

POND 16 DETAIL SHEET

SHEET NO. 64



REVISIONS							
DATE	BY	DESCRIPTION		DATE	BY	DESCRIPTION	

GTC Engineering Corporation
Certificate of Authorization Number 6154
Claude L. Cassagnol, P.E. P.E. Number 35490

ORLANDO-ORANGE COUNTY EXPRESSWAY AUTHORITY

ROAD NO.	PROJECT NO.
S.R. 408	408-113

EXPRESSWAY AUTHORITY

OUTFALL STRUCTURE DETAILS
S.R. 408
PONDS 11, 15 AND 16

SHEET NO. 65

Appendix: H

Existing SR.408 Permit Information

GTC Engineering Corporation
98 South Semoran Blvd. - Orlando, FL 32807
Phone 407-380-0402 - Facsimile 407-380-0483

Drainage Design Documentation & Calculations

S.R. 408 at S.R. 50

EXPRESSWAY
AUTHORITY

Prepared for:
Orlando-Orange County Expressway Authority

Prepared by:
GTC Engineering Corporation

February, 2011

Contents

20358-24

RECEIVED
FEB 21 2011
ALTAMONTE

CLAUDE L. CASSAGNOL
LICENSE
NO. 35490
STATE OF FLORIDA
PROFESSIONAL ENGINEER

SECTION 1.0 – GENERAL INFORMATION

1.1 PROJECT LOCATION

The proposed project is located on SR 408 from just west of the bridge with Woodbury Road to the interchange with SR 50, a distance of approximately 1.1 miles. It is located in Sections 23 and 26, Township 22 South, Range 31 East of Orange County, Florida. The proposed project will include the realignment of the eastbound lanes of S.R. 408, the addition of turn lanes at the off ramp to SR 50, and modifications to three existing detention areas. The drainage design accommodates the proposed improvements in all ponds.

Note: This project is based on the NGVD '29 Datum.

1.2 PURPOSE

The purpose of this report is to document the drainage analysis for expanding and/or revising the existing permitted pond sites within the roadway right of way, and to meet the water quantity and water quality needs of the proposed roadway improvements.

1.3 EXISTING DRAINAGE PATTERN

The project is located within the Econlockhatchee River Basin of the St Johns River Water Management District. The existing stormwater management systems outfall to adjacent wetland systems and canals that flow to the Econlockhatchee River.

1.4 TAILWATER

1.4.1 Pond Design

The tailwater used in the pond design is based on stain marks in the existing drainage system.

1.4.2 Storm Sewer Design

The design of the storm sewer system is based on the stage of the 10-year 24-hour storm event at the time of peak inflow.

1.5 FLOODPLAIN IMPACTS AND MITIGATION/FLOODWAY INVOLVEMENT

The portion of SR 408 included in the project area lies outside of the 100-year floodplain as defined by FEMA (see FEMA exhibit, effective date of September 25, 2009 in Appendix A). There is a wetland area directly east of SR 408 which is classified as Zone A (areas within the 100-year floodplain).

1.6 RULES & REGULATIONS

The stormwater management criteria for the mainline and ramps are based on regulations from the St Johns River Water Management District (SJRWMD) and the Florida Department of Transportation (FDOT). In general, the stormwater collection systems for this project will include utilization of roadway swales and storm sewers with ditch bottom inlets, gutter inlets, and curb inlets. The stormwater management facilities consist of wet detention facilities to treat and attenuate the stormwater runoff. Off-site drainage systems are maintained using existing cross drains.

Permits required for this project:

- SJRWMD Environmental Resource Permit
- NPDES Stormwater Permit

1.6.1 Stormwater Pond Design Criteria

The major stormwater attenuation design criteria will require post development discharge rates not to exceed predevelopment discharge rates for the 25-year 24-hour event and the mean annual storm event. For this project, SJRWMD will require water quality treatment based on the type of treatment system proposed, i.e. wet detention (see SJRWMD Basis of Review (BOR)). Pond control elevations for Ponds 15 and 16 were set one-foot below the permitted dry bottom elevation. Pond 11 was set based on existing evidence of high water marks in the drainage system (staining on existing culverts and structures). The proposed Design High Water (DHW) elevation for ponds shall not exceed the low edge of pavement within the basin and shall not exceed base clearance requirements (3' for mainline, 1' for ramps) for a period greater than 24 hours. Ponds not constrained by pavement shall provide one foot of freeboard from the top of berm to the DHW elevation. The ponds are sized based on the SJRWMD 25-year 24-hour (8.60 inch rainfall) runoff volume. The pond layout shall meet applicable SJRWMD criteria as well as FDOT criteria as defined in the FDOT Drainage Manual and the Stormwater Management Facilities Handbook.

<u>Water Quantity Criteria</u> – The water quantity aspects will meet the requirements of the St. Johns River Water Management District (SJRWMD) with appropriate drainage features and stormwater management plan, for a project located within an open drainage basin. The peak allowable post development discharge from the project must be less than or equal to the peak rate at which water leaves the site under existing conditions. The 25-year 24 hour design storm event and mean

annual storm event will be used as required by the SJRWMD (25-year 24-hour rainfall 8.60", mean annual rainfall 4.5"). This criteria is outlined in the Applicants Handbook for Management and Storage of Surface Waters, Rule 40C-4 F.A.C.

Water Quality Criteria – The water quality aspects of the proposed stormwater management system will be designed in accordance with the SJRWMD criteria for a wet detention system. Since the Econlockhatchee River is considered an Outstanding Florida Water (OFW) at this location, the ponds will be designed to retain 3.75" inches of runoff from impervious area or the first 1.5" inch of runoff from the entire basin, whichever is greater. This criteria is outlined in the Applicants Handbook for Regulation of Stormwater Management Systems, Rule 40C-42.

Pond Layout Guidelines – The ponds are designed with side slopes generally at 1:4(V:H). Maintenance berms are flat. A ten foot maintenance berm is provided for Pond 11 to maximize fill requirements. A ten foot maintenance berm is provided for Pond 16 due to pond volume constraints. No maintenance berm is provided for Pond 15 due to pond volume constraints. The existing Pond 15 has no maintenance berm. All ponds have a minimum 1:4 slope from the top of bank to the normal water elevation, which in a meeting with OOCEA was deemed acceptable for maintenance purposes for this project.

Pond Recovery – Stormwater management systems shall be designed so that the outfall structures shall bleed down one-half the treatment volume within 24 to 30 hours following a storm event, but no more than one-half of this volume will be discharged within the first 24 hours. This criteria is outlined in the Applicants Handbook for Regulation of Stormwater Management Systems, Rule 40C-42.

1.7 PREVIOUSLY PERMITTED PROJECT INFORMATION

Some of the information in this report was gathered from projects previously permitted by SJRWMD. The original design of the S.R. 408 project was completed by Prime Engineers (Permit #4-095-20358-2) in 1987 for OOCEA. The as-built plans for the original design were used to determine the inverts, pipe lengths and sizes for the interconnected pond system at the interchange of S.R. 408 and S.R. 50, as well as the stage/area information for the existing ponds. The widening of S.R. 50 at the interchange with S.R. 408 was designed by H.W. Lochner, Inc. for FDOT (Project #239203-4-52-01) and permitted by SJRWMD in 2004 (Permit #4-095-86445-3). For their design, they performed storm routings using revised basin information for the interconnected pond system. Their calculations were used to determine the basin areas, CN, and TC's for the existing condition.

SECTION 2.0 – PREDEVELOPMENT ANALYSIS

The existing typical section consists of a four-lane expressway with open swales and closed storm sewer systems that collect the roadway runoff and discharging into existing permitted ponds. The project alignment is located entirely within Orange County, Florida and within the regulatory boundaries of the SJRWMD.

Predevelopment Basins

Basin 1100

Basin 1100 is located where the eastbound and westbound lanes of SR 408 bifurcate and runs from Station 380+20 to 416+00 of the centerline of SR 408. The basin area drains to the existing Pond 11 located between the eastbound and westbound lanes. This pond is not functioning as intended in the permit, and was originally permitted as a dry bottom pond with underdrains. The pond discharges through a control structure to the wetland east of the eastbound lanes of SR 408.

Basins 5001, 5005

These basins are located on the west side of the center line of SR 408 and drain to the existing Pond 15 located west of the alignment. This pond was permitted as a dry detention facility using underdrains and is not functioning as intended in the permit. The pond discharges through two 24" RCP culverts under SR 408 into Pond 16. Basin 5001 includes the area of SR 50 between Station 664+00 to 671+66 of the centerline of SR 50. Basin 5005 runs from approximately 421+50 to 435+63 of the centerline of SR 408 and includes the pond area, the westbound lanes and a portion of the eastbound lanes of SR 408.

Basins 5000, 5002, 5004

These basins are located on the east side of the center line of SR 408 and drain to the existing Pond 16 located east of the off ramp (to SR 50). This pond is not functioning as intended in the permit, and was originally permitted as a dry bottom pond with underdrains. The pond discharges to the wetland area east of the pond. Basin 5000 runs from approximately 425+76 to 434+60 of the centerline of SR 408 and includes the median area between the eastbound and westbound travel lanes. Basin 5002 runs from approximately Station 1416+00 to 1425+76 of the baseline of Ramp "A" of SR 408 and includes a portion of the eastbound lanes of SR 408, the ramp pavement and roadway swales east of the ramp. Basin 5004 runs from approximately to 1423+70 to 1433+10 of the baseline of Ramp "A" of SR 408 and includes a portion of the eastbound lanes of SR 408, the ramp pavement, grassed swale to the west of the ramp and the Pond 16 area.

Basin 5003

This basin is located on the southeast corner of the SR 408/SR 50 interchange and drains to the existing Pond 17 located south of SR 50. This pond is a dry detention facility which discharges to an existing box culvert east of the pond which outfalls to the wetland south of SR 50. Basin 5003 includes the grassed area north of Pond 16 and west of the turn lanes, the turn lanes onto SR 50 and the east bound lanes of SR 50 from Station 673+11 to Station 681+00 of the centerline of SR 50. This basin was not included in the routing.

Basins 8000, 8001

These basins are located northwest of the interchange at SR 408 and SR 50 and drain to Pond 19, a wet detention facility. This pond discharges through a control structure under SR 50 into Pond 15. Basin 8000 includes the pond area a portion of the westbound lanes of SR 408 and the on-ramp to SR 408 Westbound from westbound SR 50. Basin 8001 includes the westbound lanes of SR 50 from approximately Station 647+30 to 664+00 of SR 50.

Basin 8002

This basin is located at the northeast corner of the SR 408/SR 50 Interchange and runs from Station 435+60 to 449+55 of the centerline of SR 408. This area drains to the existing Pond 22. Pond 22 discharges through a cross drain under SR 408 into Pond 19. Basin 8002 includes the eastbound lanes of SR 408 and the pond area.

Table 1 – Existing Hydrologic Information

Basin	Node	Area (ac.)	Impervious Area (ac.)	CN[1]	Tc (min.)
1100	11	34.08	6.72	93	40
5001*	15	1.85	--	95.9	10
5005*	15	7.96	--	87	36
5000*	16	0.72	--	85.4	10
5002*	16	2.10	--	94.2	10
5004*	16	5.21	--	91	23.3
8000*	19	3.09	--	92.1	45.6
8001*	19	19.04	--	91.5	30
8002*	22	9.95	--	90.2	66.7

* Information from H.W. Lochner Calculations, (SJRWMD Permit #4-095-86445-3), impervious area not available
[1] CN value includes impervious area

SECTION 3.0 – POST DEVELOPMENT ANALYSIS

The proposed improvements will consist of the realignment of the eastbound lanes of SR 408, the widening of the off-ramp to SR 50, and the addition of a turn lane onto SR 50, with runoff collected and directed to stormwater treatment facilities. Three ponds (Ponds 11, 15, and 16) will be converted from dry retention to wet detention facilities. Ponds 11 and 16 will be regraded and discharge structures replaced. Pond 15 will be regraded and a control structure with orifice will be constructed to maintain the established normal water level. Pond 17 will be eliminated and the associated drainage area will be collected in Pond 16. Ponds 19 and 22 will remain in their existing condition. There are no new proposed ponds within this project. Ponds 11, 15 and 16 discharge to an Outstanding Florida Waterbody (OFW).

Post Development Basins

Basin 1100

This basin is located from Station 380+20 to 416+00 of the centerline of SR 408. The eastbound lanes will be realigned further west to follow the existing alignment of the westbound lanes. This basin area will drain to the regraded Pond 11 which will be located east of the realigned eastbound lanes. The control structure for Pond 11 will be replaced. No additional impervious area is proposed for this basin.

Basin 5001_5005

This basin is located at the southwest corner of the SR408/SR 50 interchange and drains to Pond 15 located west of the alignment. Basin 5001_5005 includes the area of SR 50 between Station 664+00 to 671+65 of the centerline of SR 50, the area of SR 408 from approximately 421+46 to 435+63 of the centerline of SR 408, the pond area, the westbound lanes and a portion of the eastbound lanes of SR 408. No additional impervious area is proposed for this basin.

Basin 1600

This basin is located on the east side of the center line of SR 408 and drains to Pond 16 located east of the off ramp to SR 50. Basin 1600 runs from approximately Station 425+75 to 435+63 of the centerline of SR 408 and includes the median area between the eastbound and westbound travel lanes, a portion of the eastbound lanes of SR 408, the ramp pavement and roadway swales east of the ramp, the grassed swale to the west of the ramp, the area of SR 50 from Station 676+75 to 681+00 of the centerline of SR 50, and the Pond 16 area. The ramp area is proposed to be widened along with an addition of a turn lane onto SR 50. Pond 16 will be enlarged to the north and regraded. The existing control structure will be replaced with a drop structure and pipe which will discharge to the existing wetland to the east.

<u>Basins 8000, 8001</u>

These basins are located northwest of the interchange at SR 408 and SR 50 and drain to Pond 19, a wet detention facility. This pond discharges through a control structure under SR 50 into Pond 15. Basin 8000 includes the pond area a portion of the westbound lanes of SR 408 and the on-ramp to SR 408 Westbound from westbound SR 50. Basin 8001 includes the westbound lanes of SR 50 from approximately Station 647+30 to 664+00 of SR 50. No improvements are proposed for these basins.

<u>Basin 8002</u>

This basin is located at the northeast corner of the SR 408/SR 50 Interchange and runs from Station 435+60 to station 449+55 of centerline of SR 408. This area drains to the existing Pond 22. Pond 22 discharges through a cross drain under SR 408 into Pond 19. Basin 8002 includes the eastbound lanes of SR 408 and the pond area. No improvements are proposed for this basin.

Table 2 – Proposed Hydrologic Information

Basin	Node	Area (ac.)	Impervious Area (ac.)	CN[1]	Tc (min.)
1100	11	34.08	6.72	93	23
5001_5005	15	9.81	3.63	91	10
1600	16	14.54	5.17	90	17
8000*	19	3.09	--	92.1	45.6
8001*	19	19.04	--	91.5	30
8002*	22	9.95	--	90.2	66.7

*Information from H.W. Lochner Calculations, (SJRWMD Permit #4-095-86445-3), impervious area not available

[1] CN value includes impervious area

Table 3 – Proposed Hydraulic Information

Pond	25 Year-24 Hour Storm				Mean Annual Storm			
	Peak Stage (ft)		Peak Discharge (cfs)		Peak Stage (ft)		Peak Discharge (cfs)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
Pond 11	63.0	61.3	14.6	12.8	62.3	60.4	1.6	1.6
Pond 15	61.0	61.0	16.4	16.6	59.9	59.8	4.7	3.9
Pond 16	60.1	60.0	23.6	18.8	59.6	58.9	5.3	3.8

Table 4 – Water Quality Volumes

Basin	1.5" of Runoff from Basin (ac-ft)	3.75" of Runoff from Impervious Area (ac-ft)	Water Quality Volume Required (ac-ft)	Water Quality Volume Provided (ac-ft)
Pond 11	4.26	2.10	4.26	4.41
Pond 15	1.23	1.13	1.23	1.25
Pond 16	1.82	1.62	1.82	1.93

Table 5 – Post Development Basin Design Characteristics

Basin	Control Elevation	Pond Bottom Elevation	Top of Berm Elevation	Proposed Peak Stage 25-year 24-hour
Pond 11	59.0	53.0	62.5	61.3
Pond 15	58.0	52.0	62.0	61.0
Pond 16	57.0	51.0	61.0	60.0

SECTION 4.0 – FLOODPLAIN ANALYSIS

There will be no floodplain impacts as a result of the proposed construction.

SECTION 5.0 – CROSS DRAIN ANALYSIS

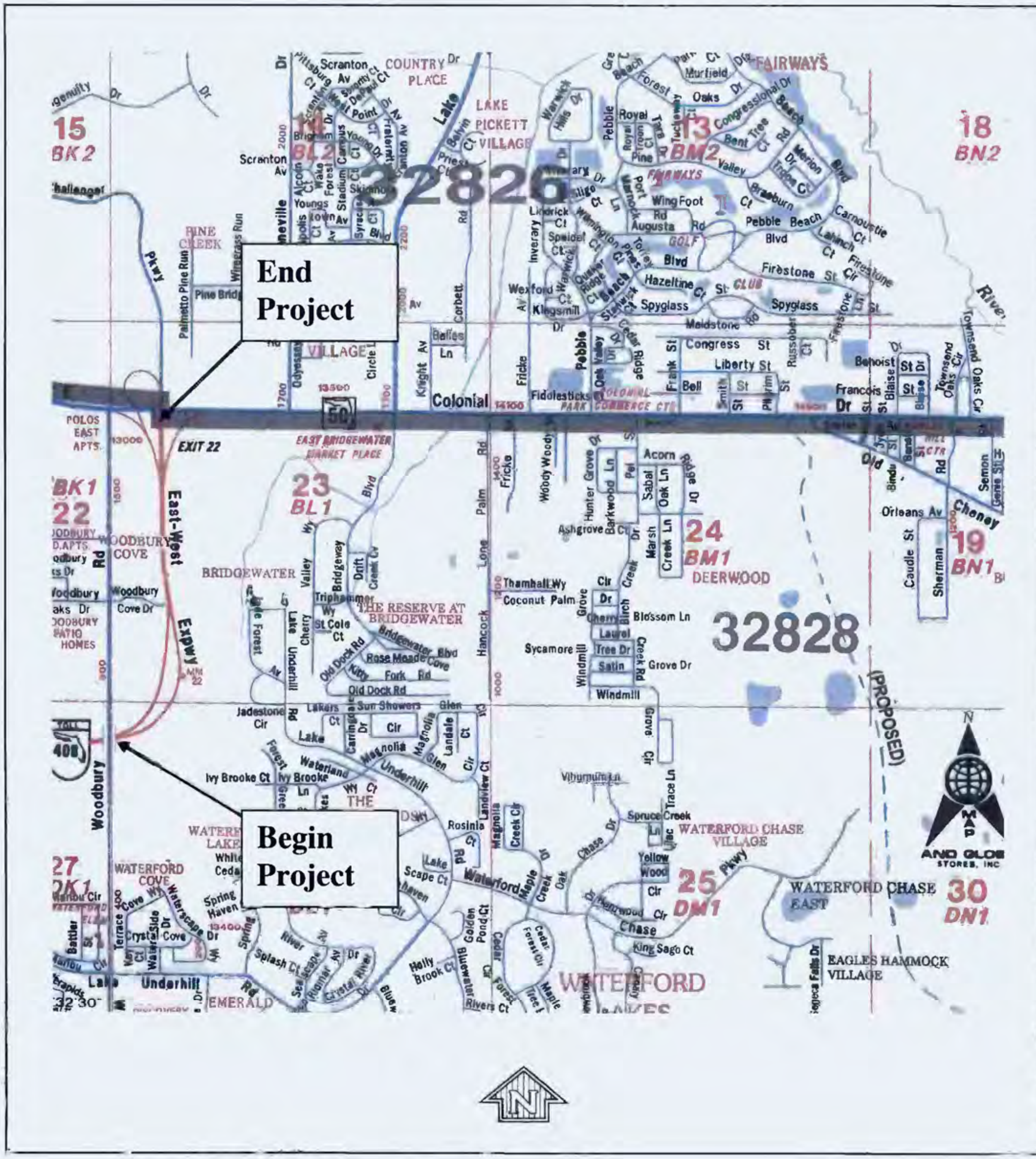
The three existing cross drains within the project will not be affected by the proposed construction. These cross drains are as follows: 3-38"x60" ERCP at Station 408+85, 2-36" RCP at Station 416+00, and 2-38"x60" ERCP at Station 426+00. The locations of these cross drains both horizontally and vertically were taken into account in the design of the proposed storm sewer systems.

SECTION 6.0 – ON-SITE CONVEYANCE ANALYSIS

The on-site conveyance for this project uses roadside and median ditches to collect runoff and convey it to the treatment areas. Ditch bottom inlets located in the median outfall to the roadside ditches. The design of the storm sewer system is based on the tailwater from the receiving pond at the 10 year peak inflow stage. The software program ASAD was used for storm sewer design. ASAD uses the Rational Method to calculate peak flows and Manning's formula to calculate pipe losses in a storm sewer system. Peak flows are calculated using IDF (Intensity Duration Frequency) curves developed by the FDOT for short duration, high intensity storms which represent typical small storms within various zones within the FDOT. This project is located in Zone 7. ASAD does not account for storage within a system and can only use a single tailwater elevation for the starting water surface elevation. See Appendix H for calculations and results.

SECTION 7.0 – REFERENCES

- Florida Department of Transportation (FDOT) Drainage Manual/Handbook (2009)
- FDOT Plans Preparation Manual (2010)
- St. Johns River Water Management District Applicants Handbook for Management and Storage of Surface Waters, Rule 40C-4 F.A.C.
- Orange County Aerials dated 2010
- SCS Soils Data
- FEMA firmettes
- USGS Quadrangle Maps



GTC Engineering Corporation

98 South Semoran Boulevard
Orlando, FL 32807
407-380-0402

S.R. 408 and S.R. 50

Location Map

Orange County, FL

Basin 100

Added Impervious Area - Sta. 514+75 to Sta. 515+90, LT – 0.14 acres

An inlet (S-100) was added at Sta. 514+75 to capture 0.14 acres of impervious area to offset the impervious area added to Basin 1 (0.14 acres).

The additional new impervious area of 0.14 acres, combined with the permitted impervious area of 2.92 acres, totals 3.06 acres and equates to 4.58% of the impervious area within Basin 100. The required treatment volume for Pond 100 increases 4.69% from 0.61 ac-ft (permitted) to 0.64 ac-ft of required volume. The permitted treatment volume provided in Pond 100 is 0.66 ac-ft, which still exceeds the new required amount of 0.64 ac-ft.

No changes to the pond configuration, weir elevation or control elevation are required. The 25yr/24hr maximum discharge increased from 16.23 cfs to 19.01 cfs, but is still less than the allowable discharge of 24.56 cfs.

Basin 200

Added Right Turn Lane – Sta. 539+80 to Sta. 543+50, LT – 0.10 acres
Added Left Turn Lane – Sta. 555+80 to Sta. 559+00 – 0.06 acres
Added Impervious Area - Sta. 558+00 to Sta. 559+00, LT & RT – 0.28 acres

In addition to the right and left turn lanes, the eastern basin boundary for Basin 200 was shifted from Sta. 558+00 to Sta. 559+00 by removing S-301 and S-302 in order to offset the added impervious area in Basin 300 of 0.21 acres.

The additional new impervious area of 0.44 acres, combined with the permitted impervious area of 8.06 acres, totals 8.50 acres and equates to 5.18% of the impervious area within Basin 200. The required treatment volume for Pond 200 increases 5.08% from 1.68 ac-ft (permitted) to 1.77 ac-ft of required volume. The permitted treatment volume provided in Pond 200 is 2.14 ac-ft, which still exceeds the new required amount of 1.77 ac-ft.

No changes to the pond configuration, weir elevation or control elevation are required. However, due to a change at the pond outfall, the control structure was revised from a weir to a drop structure. The 25yr/24hr maximum discharge decreased from 35.14 cfs to 27.68 cfs and is still less than the allowable discharge of 92.97 cfs.

Basin 300

Added Right Turn Lane – Sta. 571+45 to Sta. 579+00 – 0.21 acres
Removed Impervious Area - Sta. 558+00 to Sta 559+00, LT & RT – (0.28 acres)

Basin 300 drains to Pond 1 which was permitted under Permit No. 4-095-27073-2. The western basin boundary for Basin 300 was shifted from Sta. 558+00 to Sta. 559+00 by removing S-301 and S-302 in order to offset the added impervious area in Basin 300 of 0.21 acres. The impervious area originally permitted for Basin 300 has subsequently decreased by 0.07 acres and no modification of Permit No. 4-095-27073-2 is required.

The additional new impervious area is 0.00 acres, which is 0.00% of the impervious area within Basin 300.

Basin 400

Added Impervious Area - Sta. 588+50 to Sta 588+90, LT & RT – 0.09 acres

The western basin boundary for Basin 400 was shifted from Sta. 588+90 to Sta. 588+50 due to a slight profile adjustment.

The additional new impervious area of 0.09 acres, combined with the permitted impervious area of 8.84 acres, totals 8.93 acres and equates to 1.01% of the impervious area within Basin 400. The required treatment volume for Pond 400 increases 1.08% from 1.84 ac-ft (permitted) to 1.86 ac-ft of required volume. The permitted treatment volume provided in Pond 400 is 2.33 ac-ft, which still exceeds the new required amount of 1.86 ac-ft.

No changes to the pond configuration, weir elevation or control elevation are required. The 25yr/24hr maximum discharge increased from 15.07 cfs to 19.03 cfs and is still less than the allowable discharge of 104.44 cfs.

Basin 500A

Added Right Turn Lane – Sta. 626+90 to Sta. 632+80, RT – 0.16 acres
Added Right Turn Lane – Sta. 633+00 to Sta. 636+60, LT – 0.10 acres
Added Left Turn Lane – Sta. 639+80 to Sta. 643+00 – 0.09 acres
Added Left Turn Lane – Sta. 646+80 to Sta. 652+00 – 0.03 acres
Added Left Turn Lane – Sta. 653+50 to Sta. 656+50 – 0.08 acres
Added Right Turn Lane – Sta. 654+00 to Sta. 660+20, RT – 0.17 acres
Added Right Turn Lane – Sta. 661+00 to Sta. 663+50, LT – 0.07 acres
Removed Right Turn Lane – Sta. 661+00 to Sta. 662+50, LT – (0.04 acres)

The additional new impervious area of 0.66 acres, combined with the permitted impervious area of 11.90 acres, totals 12.56 acres and equates to 5.25% of the impervious area within Basin 500. The required treatment volume for Pond 500 increases 5.34% from 2.48 ac-ft (permitted) to 2.62 ac-ft of required volume. The permitted treatment volume provided in Pond 500 is 2.67 ac-ft, which still exceeds the new required amount of 2.62 ac-ft.

No changes to the pond configuration, weir elevation or control elevation are required. The 25yr/24hr maximum discharge increased from 57.67 cfs to 57.70 cfs and is still less than the allowable discharge of 104.17 cfs.

Basin 700

Added Impervious Area – Sta. 681+50 to Sta. 681+90, LT & RT – 0.09 acres
Added Left Turn Lane – Sta. 681+50 to Sta. 681+90 – 0.01 acres
Added Left Turn Lane – Sta. 690+60 to Sta. 694+00 – 0.09 acres
Added Left Turn Lane – Sta. 691+75 to Sta. 693+80 – 0.06 acres
Added Right Turn Lane – Sta. 692+80 to Sta. 700+00, LT – 0.23 acres
Added Left Turn Lane – Sta. 693+80 to Sta. 700+65 – 0.14 acres
Added Right Turn Lane – Sta. 701+00 to Sta. 705+00, RT – 0.11 acres
Removed Left Turn Lane – Sta. 689+00 to Sta. 691+75 – (0.09 acres)

The western basin boundary for Basin 700 was shifted from Sta. 681+90 to Sta. 681+50 due to a slight profile adjustment.
The additional new impervious area of 0.64 acres, combined with the permitted impervious area of 7.83 acres, totals 8.47 acres and equates to 7.56% of the impervious area within Basin 700. The required treatment volume for Pond 700 increases 7.39% from 1.63 ac-ft (permitted) to 1.76 ac-ft of required volume. The permitted treatment volume provided in Pond 700 is 1.69 ac-ft, which is less than the new required amount of 1.76 ac-ft. Therefore, the weir elevation has been increased from 49.10 feet to 49.20 feet. The new treatment volume provided in Pond 700 is 1.88 ac-ft, which exceeds the new required amount of 1.76 ac-ft.

No changes to the pond configuration or control elevation are required. The 25yr/24hr maximum discharge increased from 46.30 cfs to 48.10 cfs (Pond 700 and Pond 800 combined) and is still less than the allowable discharge of 134.81 cfs (Basin 700 and Basin 800 combined).

Basin 800

Added Left Turn Lane – Sta. 716+20 to Sta. 718+00 – 0.05 acres
Added Left Turn Lane – Sta. 728+00 to Sta. 728+50 – 0.02 acres
Added Left Turn Lane – Sta. 731+80 to Sta. 732+80 – 0.02 acres
Removed Left Turn Lane – Sta. 728+00 to Sta. 728+50 – (0.02 acres)

The additional new impervious area of 0.07 acres, combined with the permitted impervious area of 5.73 acres, totals 5.80 acres and equates to 1.21% of the impervious area within Basin 800. The required treatment volume for Pond 800 increases 1.65% from 1.19 ac-ft (permitted) to 1.21 ac-ft of required volume. The permitted treatment volume provided in Pond 800 is 1.25 ac-ft, which exceeds the new required amount of 1.21 ac-ft.

No changes to the pond configuration, weir elevation or control elevation are required. The 25yr/24hr maximum discharge increased from 46.30 cfs to 48.10 cfs (Pond 700 and Pond 800 combined) and is still less than the allowable discharge of 134.81 cfs (Basin 700 and Basin 800 combined).

Project Summary

The combined additional new impervious area for the project is 2.04 acres, an increase of 4.31% over the permitted impervious area. These changes meet the Modification of Permits requirements under Section 40C-4.331 (1) (b) F.A.C. No additional wetlands are impacted by the addition of turn lanes.

Please find enclosed one set of SR 50 Construction Plans and one set of Drainage Design Documentation (Basin Calculations and ICPR Analysis). In addition, the required permit application fee of $270.00 for an Individual ERP Letter Modification is enclosed.

If you have any questions or need any additional information for your review, please contact Ms. Theresa (Tracy) Ellison with H.W. Lochner, Inc. at 727-572-7111, extension 8355.

Sincerely,

Hannah Hernandez
District Permit Coordinator
FDOT District Five
Copies: Patrick Muench, Chris Dabson, Jack Box/HWL, permit file

Appendix: I

Excerpt from Bithlo Area Stormwater Management Master Plan

Executive Summary

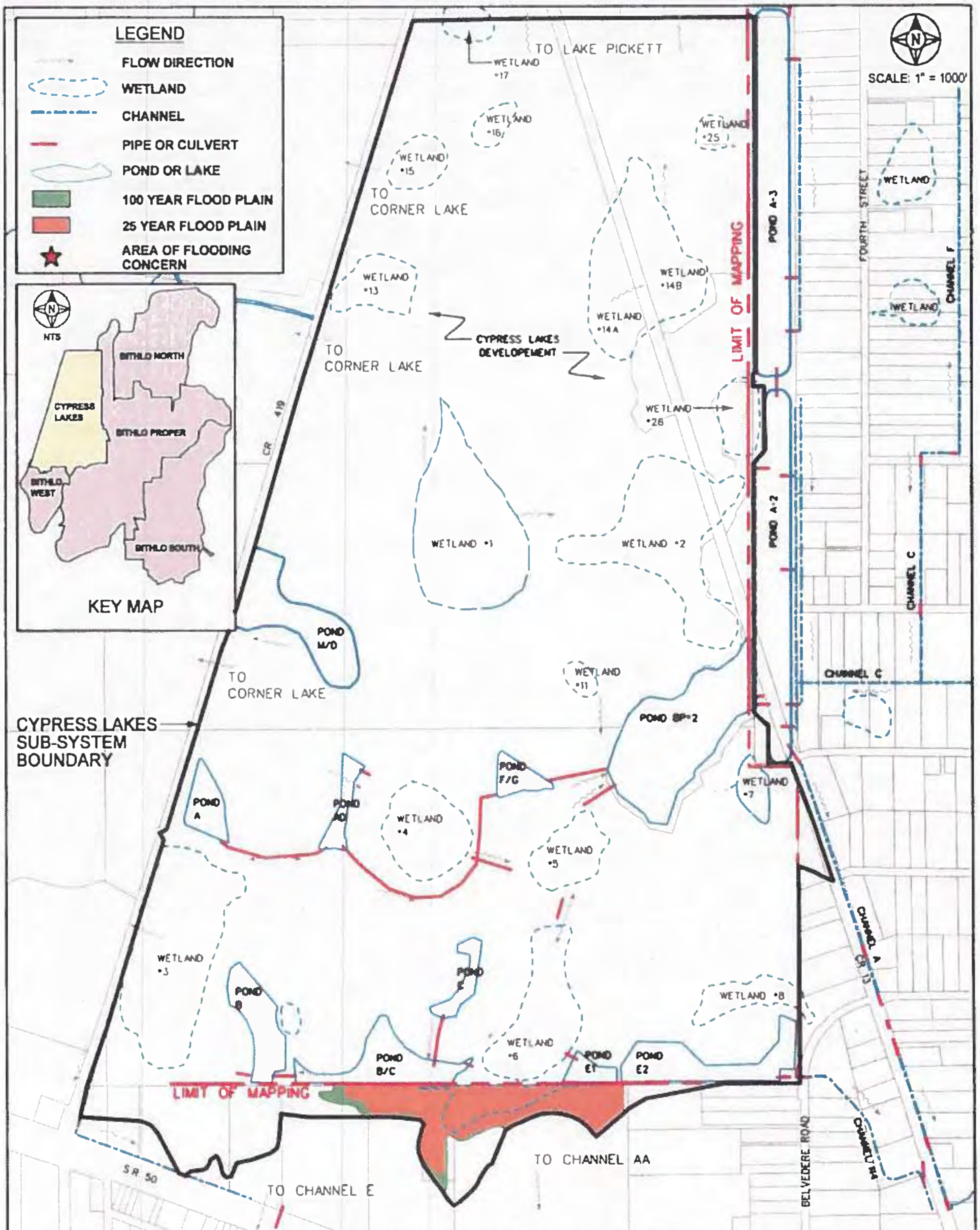
1.0 Purpose of Study

In March 1987, a Stormwater Management Master Plan (Master Plan) was prepared for the Bithlo and Christmas Areas by Ghioto, Singhofen & Associates, Inc (GSA). Since that time, Orange County has implemented numerous elements of the 1987 Master Plan. The purpose of this study is to prepare an update to the 1987 Master Plan. The primary objectives include (1) evaluation of the current conditions with respect to flooding, (2) evaluation of the effectiveness of implementing the remaining elements of the 1987 Master Plan, and (3) development of additional design alternatives, as necessary, to address flooding concerns. As part of this process, the 1987 stormwater model was to be updated from the EXPLC computer model to the Interconnected Channel and Pond Routing (ICPR v2.20) computer model.

2.0 The Study Area

The study area (**Figure ES-1**) consists of approximately 4,540 acres and has been segmented into five separate drainage sub-systems for discussion, analysis and design purposes. These sub-systems are named Bithlo Proper, Bithlo North, Bithlo West, Bithlo South, and Cypress Lakes. The 1987 GSA study included the first three sub-systems. For this update to the Master Plan, the original Bithlo Proper was subdivided to create Bithlo South and Cypress Lakes was added to account for a new development.

Bithlo Proper – Bithlo Proper is the largest of the five sub-systems, consisting of approximately 1,700 acres. It is generally located in the central portion of the overall study area and drains to the south into the Econlockhatchee (Econ) River. Land use in this system north of State Road (S.R.) 50 is primarily low density residential with commercial areas along the highway. South of S.R. 50, land use is primarily rangeland and upland forest with some low-density residential use. Channel A, primary drainage features in this sub-system, originates in the north central portion of the study area and travels south along County Road (C.R.) 13, crosses under Old Cheney Highway and S.R. 50, and subsequently discharges into the Econ River. The Channel B system, including several lateral channels, provides drainage conveyance for the northeast part of the Bithlo Proper system. Channel B connects to Channel A at C.R. 13 about midway between Belvedere Road and S.R. 50. Hydraulic connections exist between Bithlo Proper, Bithlo North, Bithlo South, and Cypress Lakes, however, these sub-systems are presented separately for discussion purposes. The Cypress Lakes sub-system provides the most significant contribution of off-site drainage to Bithlo Proper. The Cypress Lakes sub-system and its discharge locations are discussed below.



BITHLO AREA STORMWATER MANAGEMENT MASTER PLAN

CYPRESS LAKES SUB-SYSTEM CURRENT CONDITIONS FLOOD PLAIN MAP

FIGURE **ES-6**

Project No. 99001

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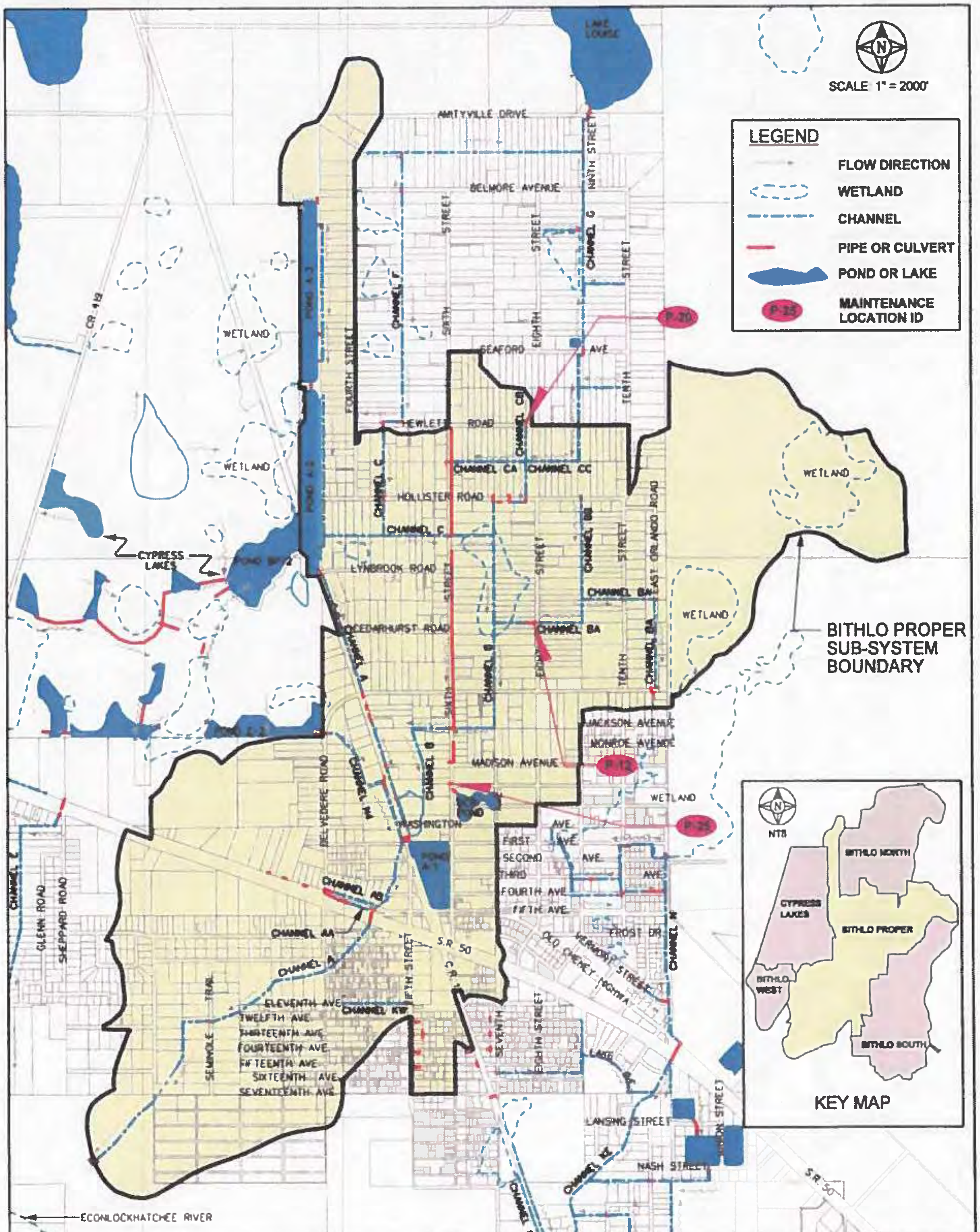

SAI	BITHLO AREA STORMWATER MANAGEMENT MASTER PLAN	BITHLO PROPER RECOMMENDED MAINTENANCE	FIGURE ES-7 Project No. 99001

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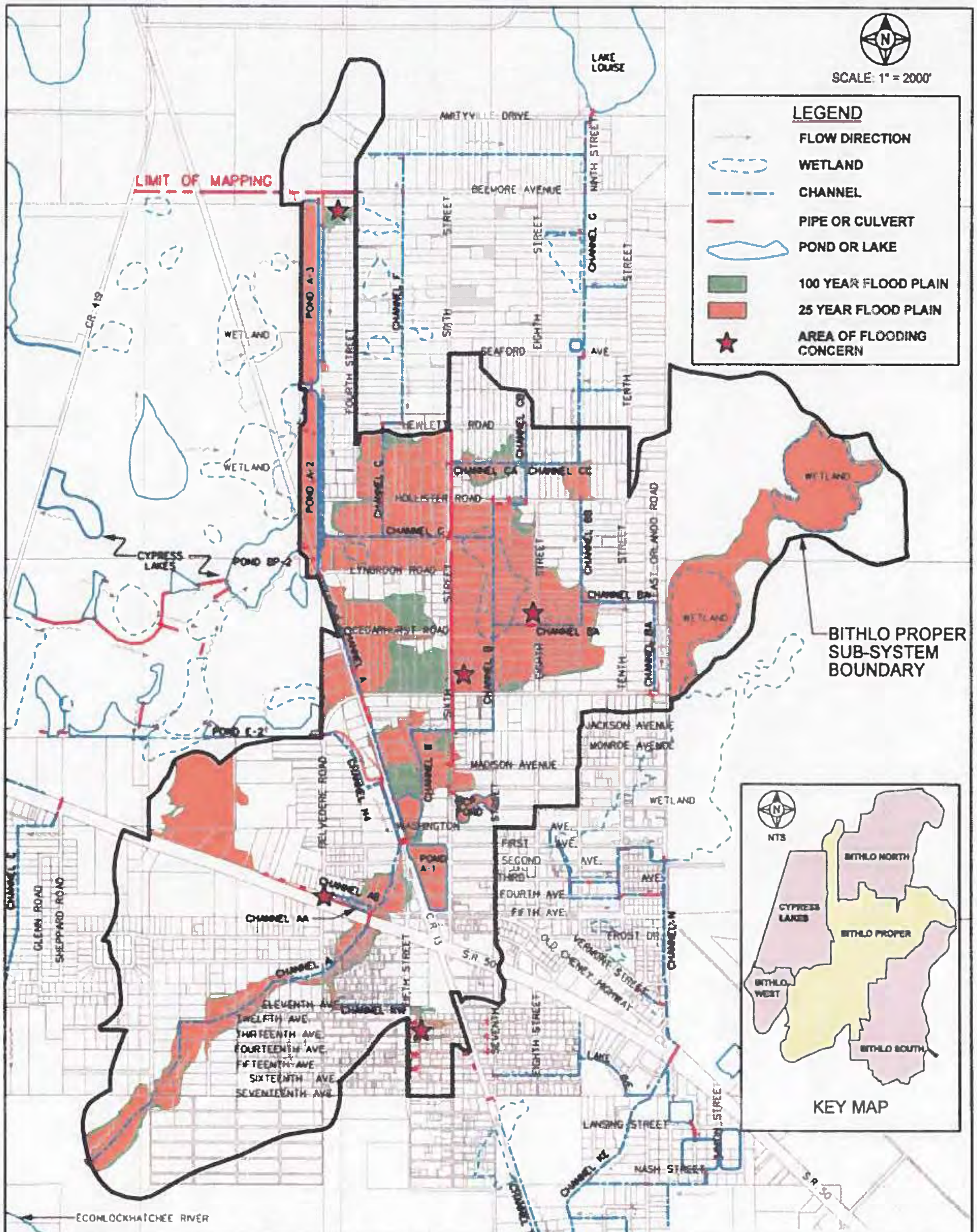


BITHLO AREA STORMWATER MANAGEMENT MASTER PLAN

BITHLO PROPER SUB-SYSTEM CURRENT CONDITIONS FLOOD PLAIN MAP

FIGURE ES-2

Project No. 99001

Section 3 — Bithlo Proper

This section presents a detailed discussion of drainage conditions in the Bithlo Proper Sub-System (**Figure 3.1**). The major drainage features within this sub-system are Channels A, N4, B, C, and KW. For discussion purposes, the information is presented for each major drainage feature separately. The following sections present a description of the drainage feature, the results of the existing conditions analysis, the results of incorporating the remaining elements of the 1987 Master Plan, and an evaluation of alternatives to correct predicted flooding problems. As stated previously, all structures and a number of roadways located within the predicted 100-year flood plain were surveyed in 2001/2002 by LSTS. All references to structure flooding in this report are based on this survey information.

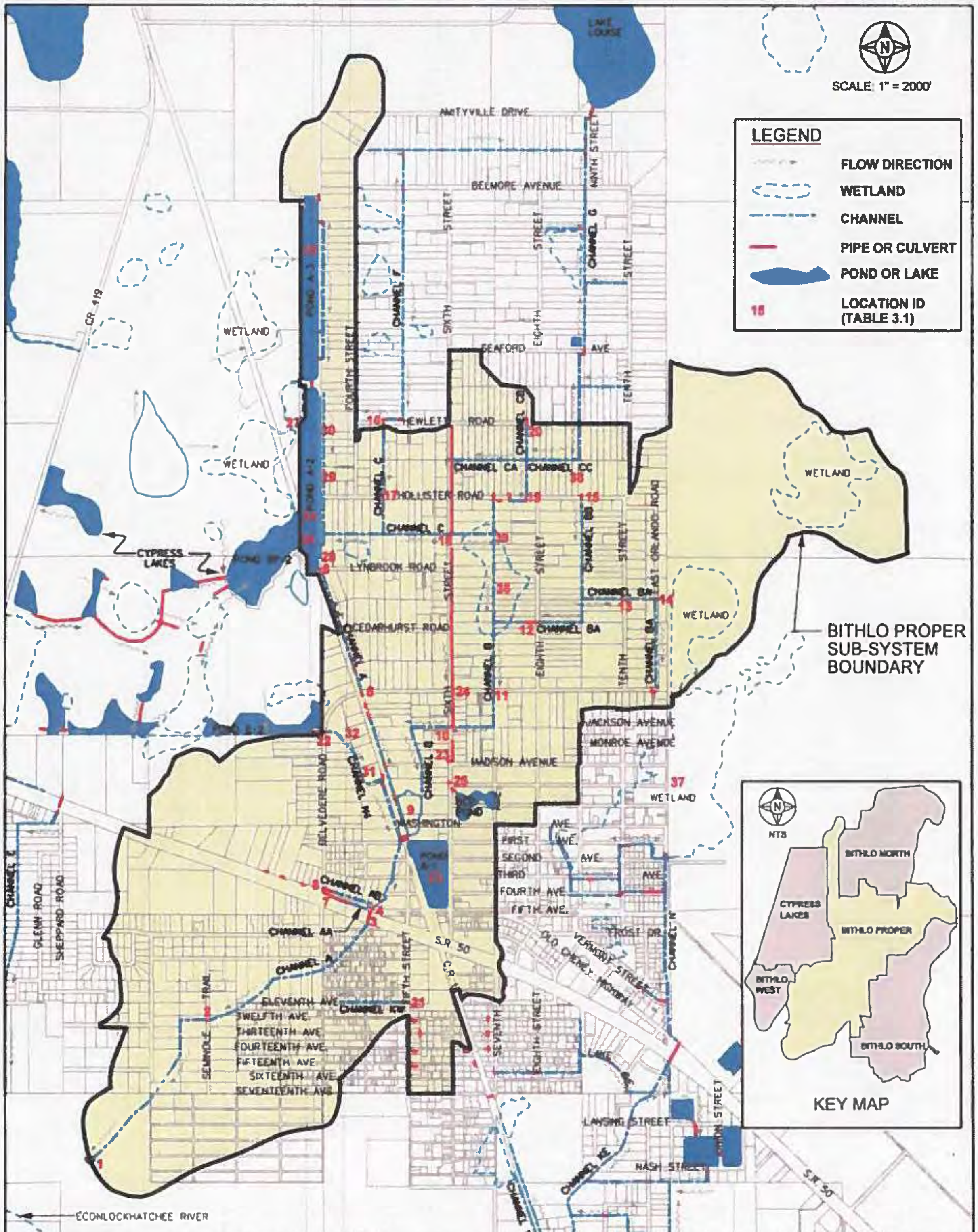
An inventory of drainage structures and conveyances at major crossings and outfalls in the drainage system is presented in **Technical Appendix**. The tabulated information includes geometry, construction materials, location, and Orange County Commissioner district for culverts, weirs, and drop structures. A summary of the structure inventory is presented in **Table 3.1.** This summary table also includes a Location ID for use in referencing the location on the drainage system map, **Figure 3.1**.

3.1 Channel A Drainage System

The Channel A drainage system includes Channels A, AA, AB, and N4. Channel A originates at the north end of the Bithlo Area west of Fourth Street and conveys stormwater south to the east side of C.R. 13, under Belvedere Road, to a wetland area between C.R. 13 and Sixth Street. The wetland then discharges water southwest under C.R. 13 then under Old Cheney Highway and S.R. 50, then through an extended reach of natural channel and ultimately discharges under a utility easement to the Econ River. Channels AA and AB discharge into Channel A from the east along either side of Old Cheney Highway.

The 1987 Master Plan predicted flooding at Old Cheney Highway, at a portion of C.R. 13 south of Belvedere Road including residential yards along the road, Belvedere Road at C.R. 13, and extensive road and lot flooding east of C.R. 13 between Belvedere Road and Lynbrook Road. This flooding in turn created a backwater effect on Channel C resulting in flooding of that area.

Since 1987, all of the previously recommended Channel A improvements appear to have been implemented. These have included installation of Ponds A-1, A-2, and A-3, culvert additions and replacements, and channel modifications along C.R. 13 between Pond A-2 and Pond A-1. In addition, a revised Channel N4 system was implemented to address the relatively large volume of water received from the northwest region of the study area (currently referred to as Cypress Lakes). The originally recommended Channel N4 system diverted water from the northwest toward the south (away from the upper portion of Channel A) to S.R. 50 and into the lower portion of Channel A. The modified version of Channel N4 that was implemented instead diverts water from this area to the east under Belvedere Road and south along the south side of C.R. 13 to a point where it converges with Channel A.



SAI	BITHLO AREA STORMWATER MANAGEMENT MASTER PLAN	BITHLO PROPER SUB-SYSTEM	FIGURE 3.1 Project No. 99001

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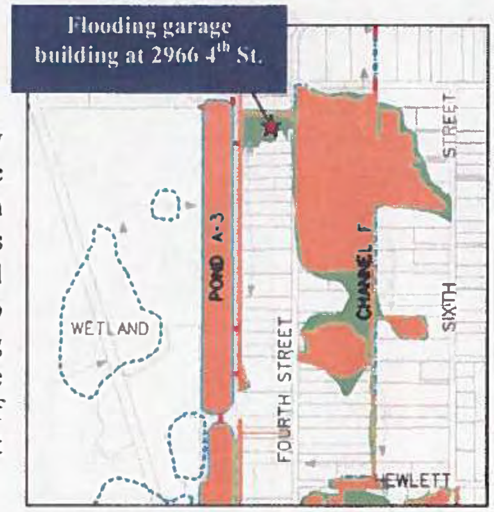
3.1.1 Current Conditions Analysis



The results of the current conditions model indicate that the referenced improvements have adequately eliminated the flooding problems along C.R. 13, the west end of Belvedere Road, and road flooding south of Lynbrook Road. Old Cheney Highway, which was previously predicted to overtop during the 10-year and 25-year storm events, is now predicted to only overtop during the 100-year storm. Only one structure along the Channel A System is predicted to flood during the 100-year storm; a garage building located northeast of Pond A-3. The house located on the same lot does not flood.

It should be noted that the previously implemented improvements along the northern reach of Channel A will not function as predicted in the 1997 Master Plan. This is primarily due to the following two conditions:

(1) Pond A-2 receives additional stormwater drainage from the west. The 1987 design elements were developed based on information from the 1984 aerial photogrammetry indicating that the old C.R. 13 served to hydraulically separate stormwater from the west. However, according to Sam Carr of Consul-Tech Engineering, Inc., sections of old C.R. 13 have since been "cut out" allowing stormwater to flow from the west and into Pond A-2. Mr. Carr also indicated that this represented existing conditions prior to implementation of the Cypress Lakes development.

(2) The area of the constructed Pond A-2 is approximately 2 acres smaller than that specified in 1987. While this contributes to increased stages in the pond, the additional flow from the west has the most significant impact.

While not apparently causing additional flood problems, these conditions result in increased stages in the pond as well as in Channel A along C.R 13 to the south and along Channel C to the east (as compared to the stages predicted in 1987).

Also, based on new information, the Cypress Lakes development is hydraulically connected to a wetland area to the south which subsequently discharges via overland flow to the roadside swale (Channel AA) along the north side of S.R. 50 then to Channel A. The current model indicates that this discharge causes water to overtop Belvedere Road at S.R. 50 for all storm events with the exception of the mean annual event. The flood depth is

Table 3.2 Maximum Stages and Flows at Selected Locations in the Bithlo Proper Sub-System (Current and Project Conditions).

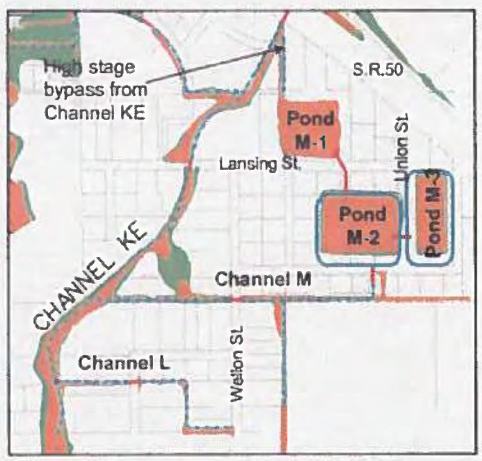
			Mean Annual Storm Event				5-Year Storm Event				10-Year Storm Event				25-Year Storm Event				100-Year Storm Event			
			Current		Project		Current		Project		Current		Project		Current		Project		Current		Project	
LOC ID	Node ID	Location	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)
Channel A																						
1	NA-015	Power Easement, N.	40.2	325	40.2	322	40.5	492	40.5	489	40.7	620	40.7	615	41.5	762	41.5	744	42.8	1027	42.8	1005
2	NA-060	Seminole Trl., W.	48.2	256	48.2	253	48.6	377	48.6	372	48.8	465	48.8	458	49.1	564	49.1	549	49.5	719	49.4	697
2	NA-070	Seminole Trl., E.	48.4	253	48.4	250	49.6	373	49.6	369	50.5	461	50.4	454	50.7	556	50.7	541	50.9	703	50.9	682
3	NA-110	SR 50, N.	57.0	204	57.0	204	58.3	310	58.3	310	59.04	379	59.05	380	59.5	425	59.5	425	60.3	499	60.3	499
4	NA-115	Old Cheney Hwy., N.	57.1	192	57.1	191	58.4	295	58.4	290	59.2	373	59.2	369	60.0	395	60.0	393	61.0	446	61.0	447
-	NA-130	CR 13, W.	60.1	182	60.1	182	60.4	280	60.4	280	60.6	345	60.6	345	60.9	386	60.9	387	61.5	446	61.5	447
33	NA-140	Pond A-1	60.3	10	60.3	10	60.8	15	60.8	15	61.1	22	61.1	22	61.4	27	61.4	27	62.0	34	62.0	34
5	NA-220	Belvedere Rd., N.	65.6	58	65.6	58	66.6	80	66.6	80	66.9	81	66.9	81	67.3	83	67.3	83	68.4	91	68.4	91
6	NA-230	Just S. of Pond A-2	67.1	56	67.1	56	67.9	87	67.9	87	68.2	93	68.2	93	68.4	90	68.4	90	68.8	106	68.8	106
34	NA-240	Pond A-2	67.6	56	67.6	56	68.7	86	68.7	86	69.2	91	69.2	91	69.6	86	69.6	86	69.9	74	69.9	74
35	NA-250	Pond A-3	68.6	11	68.6	11	69.3	29	69.3	29	69.8	34	69.8	34	70.4	38	70.4	38	71.3	42	71.3	42
Channel AA																						
7	NAA-020	Belvedere Rd., W.	63.2	12	60.9	14	64.1	14	61.6	22	64.3	22	62.0	25	64.5	31	63.0	35	64.6	52	64.3	53
Channel AB																						
8	NAB-030	Belvedere Rd., W.	63.5	9	63.3	20	64.5	14	63.3	20	64.6	20	63.8	20	64.6	24	64.4	22	64.7	31	64.6	31
Channel B																						
9	NB-010	Wetland, E. of CR 13	60.3	142	60.3	142	60.8	206	60.8	206	61.1	249	61.1	249	61.3	270	61.3	271	62.0	296	62.0	297
10	NB-040	Sixth St., E.	64.9	76	64.9	76	65.3	79	65.3	79	65.7	82	65.7	82	66.2	91	66.2	91	66.7	98	66.7	98
11	NB-070	Belvedere Rd., N.	66.6	59	66.6	59	67.3	64	67.3	64	68.2	71	68.2	71	68.8	79	68.8	79	69.3	85	69.3	85
-	NB-080	Channel B/BA confluence	67.5	50	67.5	50	68.0	62	68.0	62	68.6	73	68.6	73	69.0	84	69.0	84	69.4	98	69.4	98
Channel BA																						
12	NBA-010	Eighth St., W.	68.3	12	68.3	12	68.8	13	68.8	13	69.0	11	69.0	11	69.1	10	69.1	10	69.4	10	69.4	10
12	NBA-020	Eighth St., E.	68.5	29	68.5	29	69.1	32	69.1	32	69.2	49	69.2	49	69.2	71	69.2	71	69.4	105	69.4	105
13	NBA-040	Tenth St., W.	68.5	16	68.5	16	69.1	23	69.1	23	69.2	24	69.2	24	69.3	25	69.3	25	69.5	26	69.5	26
14	NBA-060	East Orlando Rd., W.	66.2	2	66.2	2	66.3	3	66.3	3	66.4	4	66.4	4	66.4	4	66.4	4	66.5	5	66.5	5

6.3 Channel L/M Drainage System

The Channel L/M drainage system (**Figure 6.1**) includes Channels L and M. Channel L begins at Wellon Avenue and conveys water westward under Rawles Street before discharging into the main leg of Channel KE approximately 1000 feet upstream of C.R. 13. With the exception of limited ponding at Wellon Street, the 1987 GSA study predicted no lot or road flooding associated with this channel. Recommended improvements included cleaning of the channel only.

Channel M originates south of S.R. 50 at an overflow spillway serving as a high water bypass for runoff in the Channel N system. Runoff is conveyed south into Pond M-1 where it is held until elevation 67.5 where it then discharges to Ponds M-2 and M-3 which are equalized by a culvert under Union Street. Stormwater then discharges south under Nash Street, then west under Wellon Street before arriving at its confluence with Channel KE. The 1987 study predicted no flooding concerns in this area. The channel, culvert, and pond improvements constructed in this area are based on recommendations in the 1987 study for a bypass system addressing increased flows from the north (Channel N). As discussed above, the high stage overflow weir was, however, constructed at an elevation that prevents any bypass flow from Channel KE.

6.3.1 Current Conditions Analysis



The results of the current conditions analysis agree with that predicted in the 1987 study. There is no structure or road flooding during any of the five storm events. During the 100-year storm, overland flow may occur across a wooded area where water travels out of bank from Channel KE and into the western reach of Channel M.

Maximum Stages and Flows at selected locations within the Bithlo South Sub-system are presented on **Table 6.2**. An Evaluation of Flood Conditions along the Channel L/M system is presented on **Table 6.5**. Current conditions flood profiles are included for Channel L on **Figure 6.9** and Channel M on **Figure 6.10**. **Sheets 9** and **10** present and the current conditions flood plains (25-year and 100-year) and the flood evaluation results for structures, lots, and roads. A flood plain summary for the Bithlo South Sub-system is presented on **Figure 6.3**.

6.3.2 Evaluation of 1987 Master Plan Remaining Elements

The elements recommended in the 1987 GSA study for Channels L and M have apparently been implemented and are functioning as previously predicted.

6.3.3 Design Alternatives Evaluation – Revisions to the Master Plan

There are currently not flooding concerns in this area.

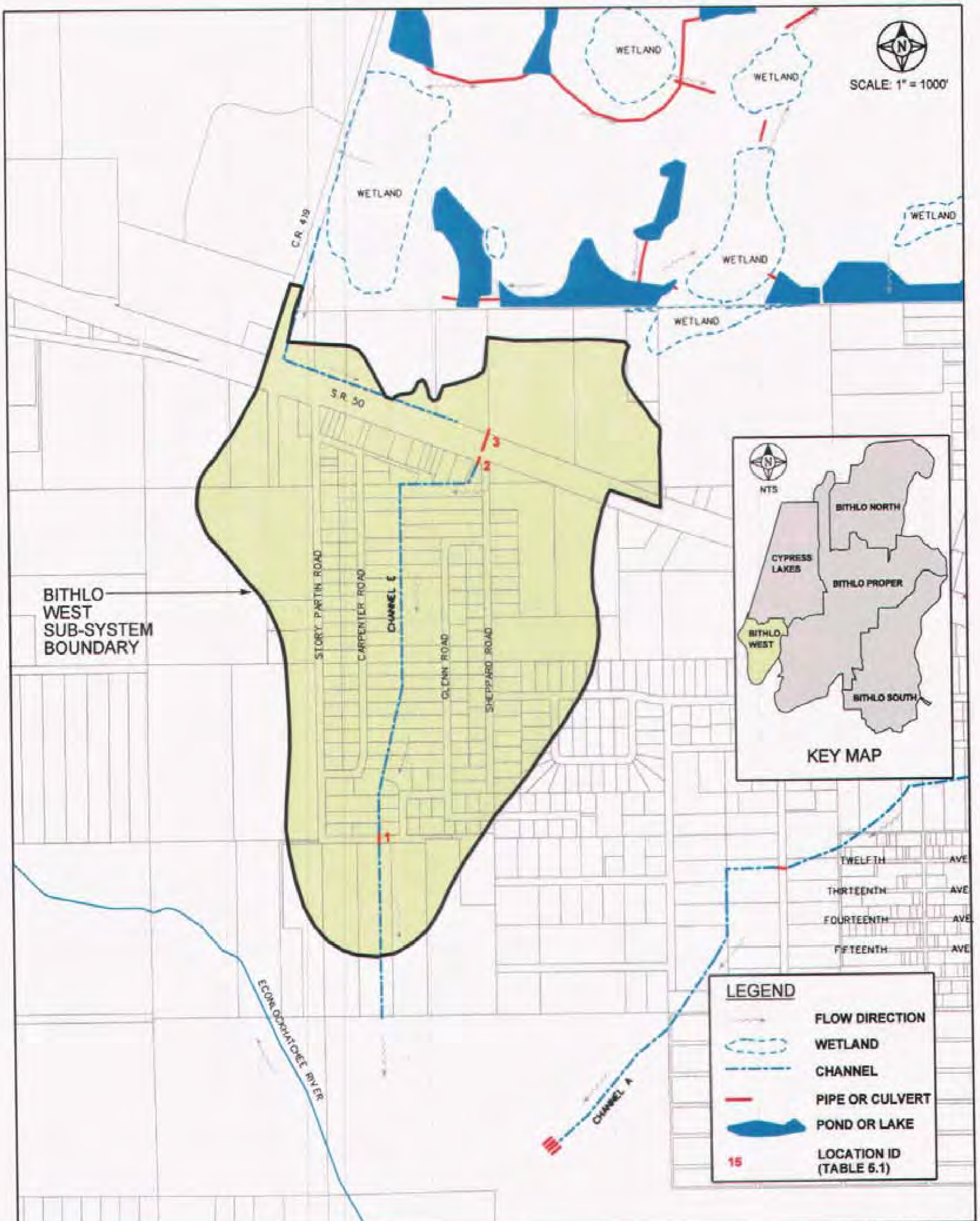
Table 6.2 **Maximum Stages and Flows at Selected Locations in the Bithlo South Sub-System (Current and Project Conditions).**

			Mean Annual Storm Event				5-Year Storm Event				10-Year Storm Event				25-Year Storm Event				100-Year Storm Event			
			Current		Project		Current		Project		Current		Project		Current		Project		Current		Project	
LOC ID	Node ID	Location	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)
Channel K																						
2	NKE-020	C.R. 13, S.	46.4	277	46.4	283	46.8	431	46.8	431	47.0	536	47.0	533	47.1	621	47.1	621	47.34	784	47.35	787
24	NK-110	Wetland, W. of CR13	59.5	28	59.5	32	59.6	46	59.6	54	59.7	59	59.7	71	59.7	71	59.7	84	59.8	97	59.8	110
25	NK-130	Wetland, E. of CR13	60.3	5	60.3	5	60.4	10	60.4	10	60.5	14	60.5	14	60.5	18	60.5	18	60.6	43	60.6	24
Channel KE																						
2	NKE-020	C.R. 13, S.	46.4	277	46.4	283	46.8	431	46.8	431	47.0	536	47.0	533	47.1	621	47.1	621	47.34	784	47.35	787
2	NKE-030	C.R. 13, N.	47.9	244	47.9	247	48.8	375	48.8	366	49.4	465	49.3	449	49.8	537	49.7	523	50.6	668	50.5	659
-	NKE-040	Confluence w/ Chan. L	51.1	236	51.2	239	51.8	361	51.7	353	52.2	447	52.1	432	52.5	516	52.5	502	52.8	642	52.8	633
-	NKE-060	Confluence w/ Chan. M	52.4	213	52.4	215	53.1	327	53.0	317	53.5	404	53.4	386	53.8	467	53.8	449	54.2	575	54.1	565
3	NKE-080	Lansing St., N.	54.4	169	54.4	173	55.3	256	55.2	250	55.8	311	55.7	299	56.1	353	56.0	340	56.6	410	56.6	409
-	NKE-090	Confluence w/ Chan. N	55.10	165	55.15	169	56.0	250	56.0	243	56.5	304	56.4	291	56.9	346	56.8	330	57.3	399	57.3	397
4	NKE-120	Fairfield St., W.	57.6	33	56.7	34	58.7	48	57.3	55	59.5	55	57.7	67	60.4	59	58.2	116	60.7	58	58.8	144
5	NKE-143	14th Ave., N.	58.7	10	58.7	10	59.2	16	59.1	16	59.8	20	59.4	20	60.9	21	59.6	24	61.5	24	60.0	31
6	NKE-165	8th St., W.	59.2	9	58.0	10	59.7	13	58.3	16	60.2	16	58.5	20	60.5	19	58.8	24	60.9	22	59.5	30
7	NKE-220	7th St., E.	61.8	8	60.6	8	61.9	12	60.9	13	62.0	15	61.0	17	62.1	17	61.2	20	62.2	20	61.4	25
7	NKE-225	7th St., W.	63.7	8	-	-	63.8	11	-	-	63.8	14	-	-	63.8	15	-	-	63.9	18	-	-
7	NKE-225Z	7th St., W.	-	-	61.5	8	-	-	61.9	12	-	-	62.1	16	-	-	62.3	19	-	-	62.6	24
-	NKE-235	Between 14th & 15th	65.2	7	62.8	8	65.2	10	63.1	17	65.2	12	63.3	18	65.3	14	63.5	19	65.3	16	63.8	24
8	NKE-245	Between 13th & 14th	65.3	6	63.5	7	65.5	9	63.8	11	65.6	11	64.0	14	65.7	12	64.1	16	65.9	14	64.4	21
9	NKE-255	Between 12th & 13th	65.4	5	64.2	6	65.6	7	64.5	9	65.8	9	64.7	12	66.0	10	64.9	14	66.3	12	65.2	17
10	NKE-265	Between 11th & 12th	65.4	4	64.6	4	65.7	7	64.9	7	66.0	8	65.1	9	66.2	9	65.3	10	66.6	11	65.5	17
Channel L																						
11	NL-020	Rawles St., E.	52.3	13	52.3	13	52.9	21	52.9	21	53.2	30	53.1	29	53.3	33	53.3	33	54.0	42	54.1	42
-	NL-030	Wellon St., W.	55.5	11	55.5	11	55.7	20	55.7	20	55.8	24	55.8	23	55.9	27	55.9	27	56.0	37	56.0	38

Table 6.2 Maximum Stages and Flows at Selected Locations in the Bithlo South Sub-System (Current and Project Conditions).

			Mean Annual Storm Event				5-Year Storm Event				10-Year Storm Event				25-Year Storm Event				100-Year Storm Event			
			Current		Project		Current		Project		Current		Project		Current		Project		Current		Project	
LOC ID	Node ID	Location	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)
Channel M																						
12	NM-030	Wellon St., E.	53.9	26	53.8	23	54.3	43	54.2	38	54.7	58	54.7	59	55.0	71	55.1	76	55.5	95	55.7	107
26	NM-050	Pond M-2	53.9	8	53.6	5	54.4	14	54.3	12	54.8	19	54.8	24	55.0	23	55.2	35	55.5	30	55.9	53
27	NM-060	Pond M-3	53.9	3	53.6	2	54.4	5	54.3	5	54.8	6	54.8	8	55.0	7	55.2	9	55.5	10	55.9	11
28	NM-070	Pond M-1	57.7	10	57.4	0	57.8	15	57.8	13	57.8	19	57.9	26	57.9	22	58.0	35	57.9	28	58.2	51
22	NM-080	Overflow spillway, S.	57.7	0	57.4	0	57.8	0	57.8	6	57.8	0	57.9	15	57.9	0	58.0	24	57.9	0	58.2	36
Channel N																						
14	NN-010	S.R. 50, S.	57.3	126	57.4	131	57.9	192	57.8	186	58.2	232	58.1	217	58.4	266	58.2	243	58.7	319	58.5	284
15	NN-015	S.R. 50, N.	61.1	117	61.1	117	61.8	178	61.8	178	62.3	214	62.3	214	62.6	246	62.6	246	63.1	294	63.1	294
15	NN-020	Old Cheney Hwy., N.	61.1	93	61.1	93	61.9	143	61.9	143	62.3	171	62.3	171	62.6	195	62.6	195	63.2	236	63.2	236
17	NN-050	Struct from wetland, N.	61.5	20	61.5	20	62.3	38	62.3	38	62.7	52	62.7	52	63.1	63	63.1	63	63.6	84	63.6	84
18	NN-110	Third Ave., N.	62.0	1	62.0	1	62.9	1	62.9	1	63.4	1	63.4	1	63.9	1	63.9	1	64.5	1	64.5	1
19	NN-150	Third Ave., N.	62.0	10	62.0	10	63.3	15	63.3	15	64.0	21	64.0	21	64.4	25	64.4	25	65.0	33	65.0	33
Channel NA																						
20	NNA-030	Intersect 4th & 10th, W.	61.9	19	61.9	19	63.2	24	63.2	24	63.8	34	63.8	34	64.1	38	64.1	38	64.5	49	64.5	49
-	NNA-070	4th St., N.	61.6	21	61.6	21	62.5	25	62.5	25	63.0	27	63.0	27	63.3	27	63.3	27	63.8	28	63.8	28

Notes:
1. Flow represents the peak outflow at the referenced node.
2. Results are from the Bithlo Current Conditions model <EXIST> and the Bithlo Project Conditions model <B-PROJ1>.
3. The simulated storms are all 24-hr duration storms.
4. The LOC ID numbers associated with each location are included for the purpose of cross referencing to the system map (refer to Figure 6.1)



BITHLO AREA STORMWATER MANAGEMENT MASTER PLAN

BITHLO WEST SUB-SYSTEM

FIGURE 5.1

Project No. 99001

Table 5.2 Maximum Stages and Flows at Selected Locations in the Bithlo West Sub-System (Current and Project Conditions).

			Mean Annual Storm Event				5-Year Storm Event				10-Year Storm Event				25-Year Storm Event				100-Year Storm Event			
			Current		Project		Current		Project		Current		Project		Current		Project		Current		Project	
LOC ID	Node ID	Location	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)
Channel E																						
3	NE-080	S.R. 50, N.	62.1	35	62.1	35	62.8	52	62.8	52	63.3	65	63.3	65	63.8	78	63.8	78	65.0	106	65.0	106
2	NE-070	Old Cheney Hwy., N.	59.9	38	59.9	38	60.2	57	60.2	57	60.4	72	60.4	72	60.6	86	60.6	86	61.4	132	61.4	131
-	NE-050	Southern turn in chan.	52.9	68	52.9	68	53.3	104	53.3	104	53.6	155	53.6	156	53.8	165	53.8	165	54.2	295	54.2	295
1	NE-030	Story Partin Rd., N.	44.7	121	44.7	121	45.5	189	45.5	189	46.0	242	46.0	242	46.5	291	46.5	291	47.4	364	47.4	364
1	NE-020	Story Partin Rd., S.	44.6	134	44.6	134	45.3	208	45.3	208	45.7	265	45.7	265	46.0	312	46.0	312	46.5	398	46.5	398

Appendix: J

Excerpt from BJM Associates, Inc.

Bithlo – Christmas Master Drainage Plan

4-095-0302 AGM3

1720

Bound Reports
1720

BJM ASSOCIATES, INC.™

SYSTEM KE

BITHLO – CHRISTMAS

MASTER DRAINAGE PLAN

BITHLO DRAINAGE IMPROVEMENTS

Section 26, Township 22 South, Range 32 East

Orange County, Florida.

APPLICATION No. 4-095-0302AGM3

MODIFICATION OF PERMIT No. 4-095-0302GM2E

Response #2 to

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

Prepared for

ORANGE COUNTY

STORMWATER MANAGEMENT DEPARTMENT

4200 S. JOHN YOUNG PARKWAY

ORLANDO, FLORIDA 32839-9205

AUGUST 1996

8-30-96

Engineers • Land Planners • Surveyors
506 Wymore Road • Winter Park, FL 32789 • (407) 645-5566

BJM ASSOCIATES, INC.

Engineers Land Planners Surveyors

August 30, 1996

Ms. Stephanie R. Smith, P.E.
Department of Resource Management
St. John's River Water Management District
618 E. South Street
Orlando, Fl 32801

RE: System KE of Bithlo Christmas Master Drainage Plan
Application No. 4-095-0302AGM3

Dear Ms. Smith,

We are submitting five (5) copies of the requested for additional information in response to your comments dated May 2, 1996 as follows:

1. Based on the response to question 2 in the first RAI, the total pond area at elevation 52.8 should be 9.9 acres. A rough measurement of the two ponds indicates that the area is about 6.5 acres. In our meeting on April 16, it was discussed that the design and sizing of the ponds was based on a volume rather than an area requirement. However, to meet the volume requirement, the pond stage had to be increased and this increase may have some adverse impacts to the up- and downstream conditions. Please provide either additional pond area to meet the master plan requirements or provide calculations to show that the volume provided is equivalent to the volume required (based on the master calculations) and that the increase in the pond stage will not have an adverse impact to the permitted master drainage system for the Bithlo area. [40C-4:301(1)(a)4,6; (2)(a)4,6; amended 6/7/93 F.A.C.]

   RESPONSE: Attached calculations show the increase in the pond stage of pond M-2 will not have an adverse impact to the permitted master drainage system for the Bithlo area.

2. Since the addition of Pond M-2 East is a new proposal and was not part of the master plan, it seems that the connecting pipes and inlets between the two ponds are part of this proposal. If so, please indicate with shading. [40C-4.301(1)(a)4,6; (2)(a)4,6; amended 6/7/93 F.A.C.]

   RESPONSE: The connecting pipes and inlets between two ponds have been indicated with shading (see proposed pond M-2 East plan).

aps.eng.bithlo.app.smith.ltr

3. Staff has reviewed your response to comment 4 and 5 of the RAI dated March 1, 1996. Although no mitigation was needed for the loss of wetland functions associated with the Nash/Union Street roadside ditches, they were identified, accounted for, and evaluated in both permits 4-095-0302GM2 and 12-095-0051GM. Please use a similar approach to account for the RHPZ (wetland and upland component) within the; east side of the Union Street, west side of Avenue D, and north side Nash Street roadside ditches and any proposed encroachments. Please Complete Table One of Section E of the ERP permit application form. [40C-4.301(1)(a)4,6; (2)(a)4,6; amended 6/7/93 F.A.C. and subparagraph Chapter 40C-41(5)(d)(1),(4) and (5), F.A.C.]

RESPONSE: In accordance with a meeting on August 20, 1996 between Bernard J. Martin, P.E. of BJM Associates, Inc. and Elizabeth R . Johnson of S.J.R.W.M.D., the ditches at Union Street, Avenue D, Nash Street were determined to be non-jurisdictional.

If you need further information, please call me at (407) 645-5566.

Sincerely,

Bernard J. Martin, P.E.

cc: Michael J. Drozeck, P.E.
Orange County Stormwater Management Department

aps.eng.bithlo.app.smith.ltr

DRAINAGE CALCULATIONS

DRAINAGE CALCULATIONS POND M-1 & POND M-2 BITHLO

The original design of the Bithlo Master Storm drainage system envisioned the use of existing pond M-1 (4510) and the excavation of a proposed new pond M-2 (4420).

BJM Associates reconfigured the geometry of proposed pond M-2 to avoid damages to existing homes which had been constructed in the interim time period between the study date and the current time.

Although the reconfigured pond provides comparable storage volumes, St. Johns Water Management District wished BJM to evaluate the backwater conditions the reconfigured pond would have on the existing pond M-1.

PROCEDURE

BJM Associates retrieved the original data, input and output files for the relative ponds and the associated reaches.

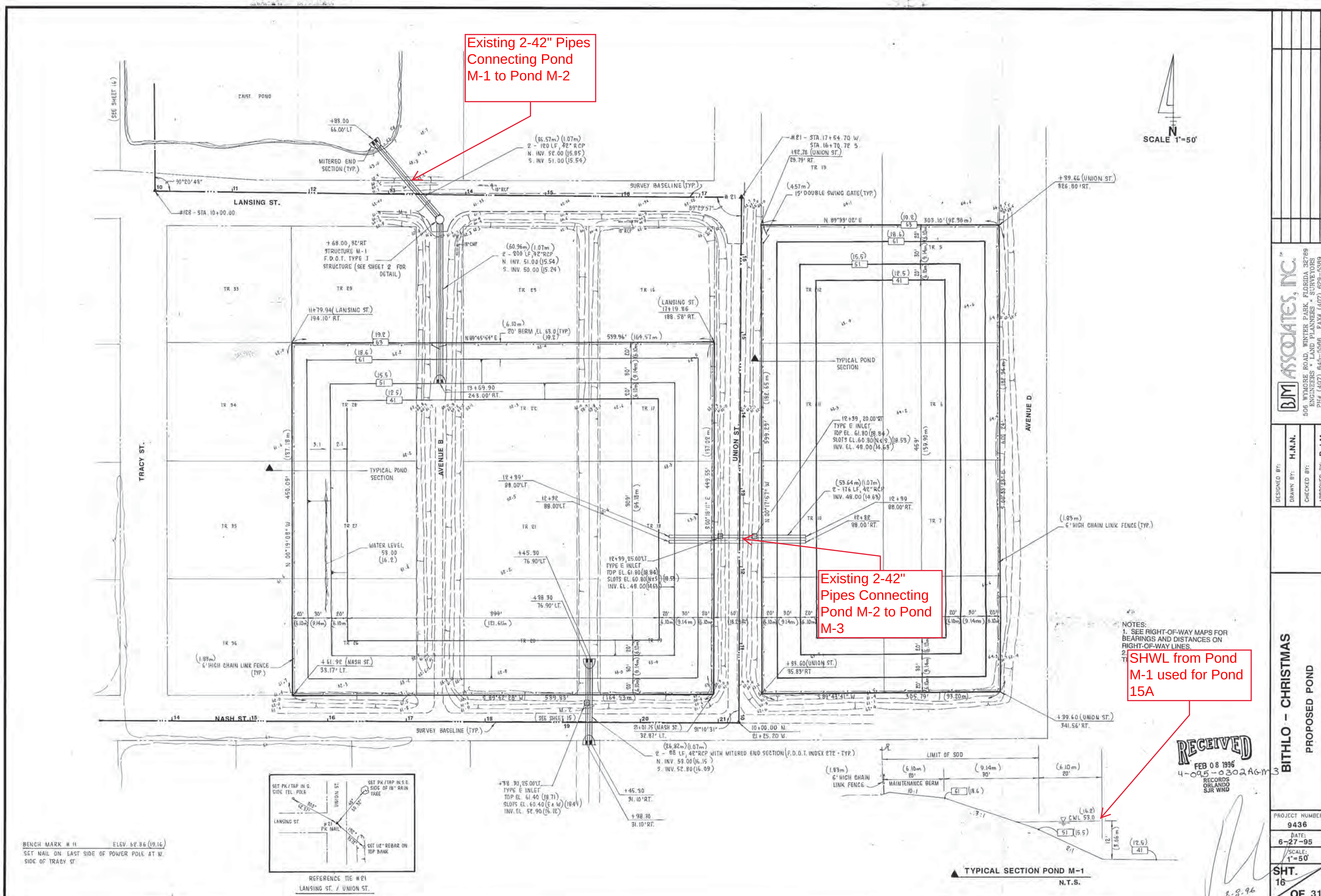
Attached herein are the original input and output files for the relative ponds and reaches.

BJM then routed the 25 year 24 hours storm event through the designed system to compare with the previous study output.

SUMMARY

There is no discernable difference between the anticipated headwaters in the original design and the proposed design.

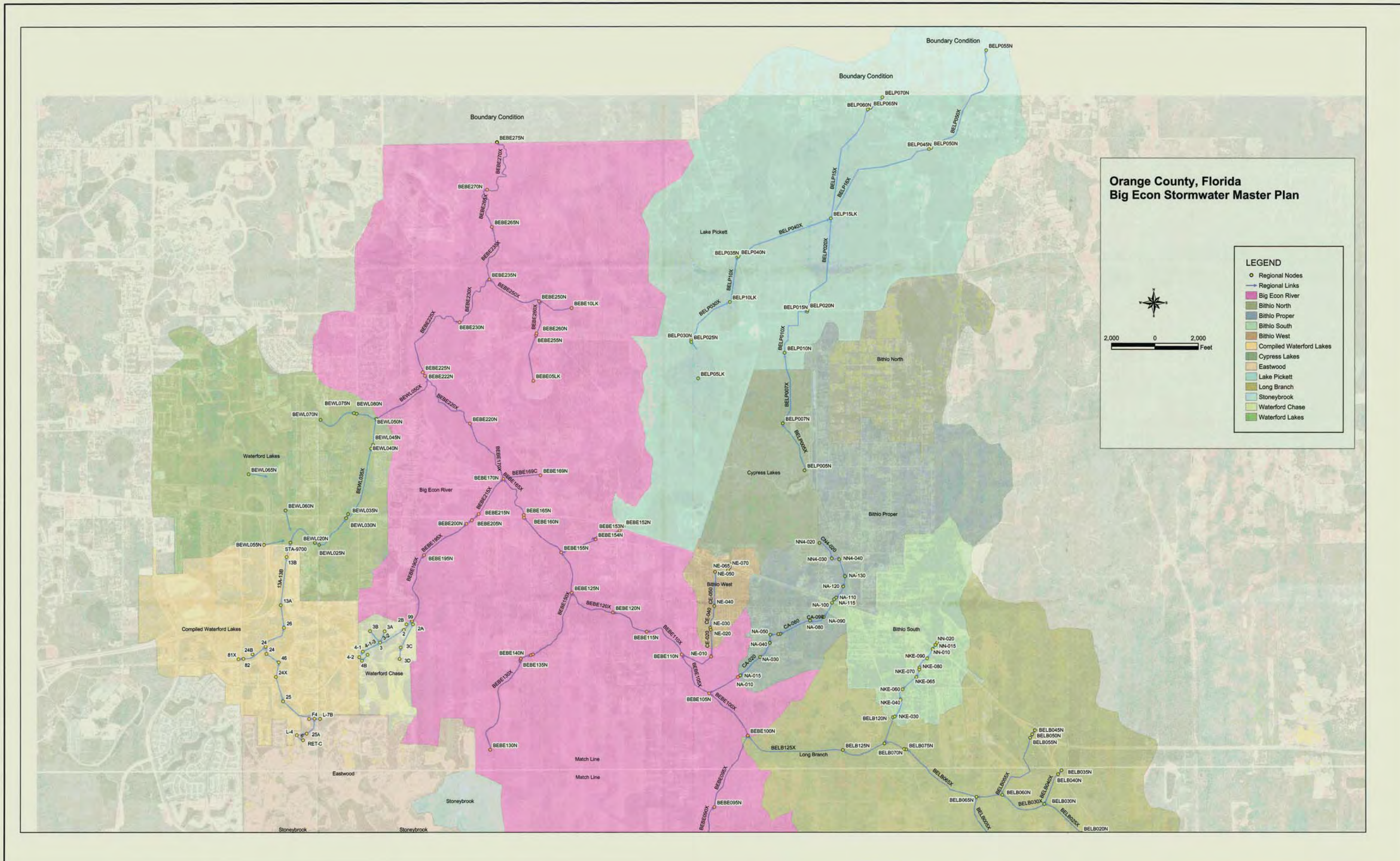
	ORIGINAL DESIGN	PROPOSED
POND M-1 ELEV	60.5	59.61
POND M-2 ELEV	57.8	57.98
POND M-2 DISCHARGE	130 CFS	111.18 CFS


Existing 2-42" Pipes Connecting Pond M-1 to Pond M-2
Existing 2-42" Pipes Connecting Pond M-2 to Pond M-3
SHWL from Pond M-1 used for Pond 15A
SCALE 1"=50'
N
LANSING ST.
NASH ST.
TRACY ST.
AVENUE B
UNION ST.
AVENUE D
SURVEY BASELINE (TYP.)
EXIST. POND
(SEE SHEET 16)
MITERED END SECTION (TYP.)
(36.57m) (1.07m) 2 - 120 LF, 42" RCP N. INV. 52.00 (15.85) S. INV. 51.00 (15.54)
+68.00, 32' RT STRUCTURE M-1 F.D.O.T. TYPE J STRUCTURE (SEE SHEET 2 FOR DETAIL)
(60.96m) (1.07m) 2 - 200 LF, 42" RCP N. INV. 51.00 (15.54) S. INV. 50.00 (15.24)
(6.10m) 20' BERM, EL 63.0 (TYP) (19.2)
TYPICAL POND SECTION
WATER LEVEL 53.00 (16.2)
12+39, 25.00'LT TYPE E INLET TOP EL. 61.80 (18.84) SLOTS EL. 60.80 (N&S) (18.53) INV. EL. 48.00 (14.63)
12+39, 20.00'RT TYPE E INLET TOP EL. 61.80 (18.84) SLOTS EL. 60.80 (N&S) (18.53) INV. EL. 48.00 (14.63)
(53.64m) (1.07m) 2 - 176 LF, 42" RCP INV. 49.00 (14.63)
(26.82m) (1.07m) 2 - 88 LF, 42" RCP WITH MITERED END SECTION (F.D.O.T. INDEX 272 - TYP.) N. INV. 53.00 (16.15) S. INV. 52.80 (16.09)
+38.30, 25.00'LT TYPE E INLET TOP EL. 61.40 (18.71) SLOTS EL. 60.40 (E & W) (18.41) INV. EL. 52.90 (16.12)
(1.83m) 6' HIGH CHAIN LINK FENCE (TYP.)
(4.57m) 15' DOUBLE SWING GATE (TYP.)
BENCH MARK # 11 ELEV. 62.86 (19.16) SET NAIL ON EAST SIDE OF POWER POLE AT W. SIDE OF TRACY ST.
REFERENCE TIE #21 LANSING ST. / UNION ST.
NOTES:
1. SEE RIGHT-OF-WAY MAPS FOR BEARINGS AND DISTANCES ON RIGHT-OF-WAY LINES.
LIMIT OF SOD
MAINTENANCE BERM
CWL 53.0
TYPICAL SECTION POND M-1
N.T.S.
RECEIVED FEB 08 1996
4-095-0302AG-M3
RECORDS ORLANDO SJR WMD
BITHLO - CHRISTMAS
PROPOSED POND
BJM ASSOCIATES, INC.
506 WYMORE ROAD, WINTER PARK, FLORIDA 32789
ENGINEERS * LAND PLANNERS * SURVEYORS
PH# (407) 645-5566 FAX# (407) 629-5399
DESIGNED BY:
DRAWN BY: H.N.N.
CHECKED BY:
APPROVED BY: B.J.M.
PROJECT NUMBER 9436
DATE: 6-27-95
SCALE: 1"=50'
SHT. 16 OF 31
8-8-96

J-7

Appendix: K

Excerpt from Big Econ River Basin
Stormwater Management Master Plan



D:\Projects\6059\34037\arcmaps_figures\Appendix_F_1of3.mxd

Appendix F - 1 of 3

06/26/03

moultonda

CDM

GIS Source: Orange County, USGS, SJRWMD & CDM

Table 5-1
Big Econ Stormwater Management Master Plan
Orange County, Florida
Existing Conditions Results

Model ID	U/S Node	D/S Node	Critical Elevation[1]	Location	Mean Annual				10 Year - 24 Hour				25 Year - 24 Hour				100 Year - 24 Hour				Comments
					U/S Stage[3]	D/S Stage[3]	Flooding	Flow[2]	U/S Stage[3]	D/S Stage[3]	Flooding	Flow[2]	U/S Stage[3]	D/S Stage[3]	Flooding	Flow[2]	U/S Stage[3]	D/S Stage[3]	Flooding	Flow[2]	
BEBE010C	BEBE010N	BEBE015N	65.8	Wewahootee Road	62.4	61.8	-	89	63.9	62.3	-	170	64.5	62.4	-	197	65.2	62.5	-	224	
BEBE011C	BEBE010N	BEBE015N	65.8	Wewahootee Road	62.4	61.8	-	172	63.9	62.3	-	347	64.5	62.4	-	416	65.2	62.5	-	498	
BEBE010W	BEBE010N	BEBE015N	65.8	Wewahootee Road - Overflow	62.4	61.8	-	0	63.9	62.3	-	0	64.5	62.4	-	0	65.2	62.5	-	0	
BEBE015X	BEBE015N	BEBE020N	57.6		61.8	55.2	-	393	62.3	56.8	-	732	62.4	57.3	-	863	62.5	58.1	0.5	1011	
BEBE020X	BEBE020N	BEBE025N	62.1	Beeline Bridge Equivalent	55.2	55.2	-	998	56.8	56.8	-	1967	57.3	57.3	-	2338	58.1	58.1	-	3067	
BEBE020W	BEBE020N	BEBE025N	62.15	Beeline - Overflow	55.2	55.2	-	0	56.8	56.8	-	0	57.3	57.3	-	0	58.1	58.1	-	0	
BEBE025X	BEBE025N	BEBE030N	56.6		55.2	53.8	-	992	56.8	55.8	-	1931	57.3	56.4	-	2291	58.1	57.2	0.5	3023	
BEBE030X	BEBE030N	BEBE035N	57.4		53.8	53.6	-	971	55.8	55.7	-	1861	56.4	56.3	-	2186	57.2	57.0	-	2961	
BEBE035X	BEBE035N	BEBE040N	50.2		53.6	52.5	2.3	2300	55.7	54.8	4.6	4418	56.3	55.4	5.2	5169	57.0	56.1	5.9	6007	Hal Scott - flooding not a problem
BEBE040X	BEBE040N	BEBE045N	49.8		52.5	52.1	2.3	2371	54.8	54.2	4.4	4758	55.4	54.8	5.0	5638	56.1	55.5	5.7	6735	Hal Scott - flooding not a problem
BEBE045X	BEBE045N	BEBE050N	48.3		52.1	45.5	-	2519	54.2	48.1	-	5187	54.8	48.8	0.5	6181	55.5	49.8	1.5	7516	Hal Scott - flooding not a problem
BEBE050X	BEBE050N	BEBE055N	47		45.5	44.7	-	2529	48.1	47.4	0.4	5310	48.8	48.1	1.1	6360	49.8	49.2	2.2	7843	Hal Scott - flooding not a problem
BEBE055X	BEBE055N	BEBE060N	43.1		44.7	44.6	1.5	2813	47.4	47.2	4.1	5700	48.1	47.9	4.8	6883	49.2	49.0	5.9	8642	Hal Scott - flooding not a problem
BEBE05X	BEBE05LK	BEBE255N	49.2		47.6	46.3	-	18	48.4	47.5	-	48	48.7	47.8	-	60	49.2	48.5	-	83	Hal Scott - flooding not a problem
BEBE060X	BEBE060N	BEBE065N	37.4		44.6	44.6	7.2	2967	47.2	47.2	9.8	6150	47.9	47.9	10.5	7360	49.0	49.0	11.6	9211	Hal Scott - flooding not a problem
BEBE065C	BEBE065N	BEBE070N	44.7	Powerline Bridge Equivalent	44.6	44.5	-	178	47.2	47.2	2.5	186	47.9	47.9	3.2	188	49.0	49.0	4.3	159	Hal Scott - flooding not a problem
BEBE065W	BEBE065N	BEBE070N	44.7	Powerline Overflow	44.6	44.5	-	0	47.2	47.2	2.5	419	47.9	47.9	3.2	492	49.0	49.0	4.3	542	Hal Scott - flooding not a problem
BEBE065X	BEBE065N	BEBE070N	44.7		44.6	44.5	-	2779	47.2	47.2	2.5	5606	47.9	47.9	3.2	6766	49.0	49.0	4.3	8661	Hal Scott - flooding not a problem
BEBE070X	BEBE070N	BEBE075N	44.8		44.5	44.4	-	2900	47.2	47.0	2.2	6086	47.9	47.8	3.0	7302	49.0	48.8	4.0	9145	Hal Scott - flooding not a problem
BEBE075X	BEBE075N	BEBE080N	43.4		44.4	44.1	0.7	3025	47.0	46.6	3.2	6435	47.8	47.3	3.9	7783	48.8	48.4	5.0	9697	Floodplain of Big Econ
BEBE080X	BEBE080N	BEBE085N	42.9		44.1	43.9	1.0	2957	46.6	46.4	3.5	6390	47.3	47.1	4.2	7736	48.4	48.2	5.3	9579	Floodplain of Big Econ
BEBE085X	BEBE085N	BEBE090N	42.8		43.9	43.6	0.8	2904	46.4	46.1	3.3	6358	47.1	46.8	4.0	7719	48.2	47.9	5.1	9566	Floodplain of Big Econ
BEBE090X	BEBE090N	BEBE095N	40.6		43.6	43.3	2.7	2862	46.1	45.6	5.0	6437	46.8	46.3	5.7	7852	47.9	47.4	6.8	9855	Floodplain of Big Econ
BEBE095X	BEBE095N	BEBE100N	40.7		43.3	41.1	0.4	2824	45.6	43.7	3.0	6355	46.3	44.6	3.9	7724	47.4	46.1	5.3	9761	Floodplain of Big Econ
BEBE100X	BEBE100N	BEBE105N	38.4		41.1	40.5	2.1	2852	43.7	43.1	4.7	6497	44.6	43.9	5.5	7943	46.1	45.5	7.1	10316	Floodplain of Big Econ
BEBE105X	BEBE105N	BEBE110N	39.3		40.5	39.6	0.3	2879	43.1	42.2	2.9	6567	43.9	43.2	3.9	8029	45.5	44.9	5.6	10462	Floodplain of Big Econ
BEBE10X	BEBE10LK	BEBE250N	41.7		45.3	39.7	-	35	46.3	40.5	-	93	46.6	40.8	-	118	47.1	41.6	-	173	
BEBE110X	BEBE110N	BEBE115N	37.8		39.6	39.1	1.3	2866	42.2	41.7	3.9	6510	43.2	42.8	5.0	7969	44.9	44.6	6.8	10388	Floodplain of Big Econ
BEBE115X	BEBE115N	BEBE120N	38		39.1	37.9	-	2855	41.7	41.1	3.1	6453	42.8	42.2	4.2	7909	44.6	44.2	6.2	10322	Floodplain of Big Econ
BEBE120X	BEBE120N	BEBE125N	37.9		37.9	37.7	-	2832	41.1	40.9	3.0	6379	42.2	42.0	4.1	7840	44.2	44.0	6.1	10295	Floodplain of Big Econ
BEBE125X	BEBE125N	BEBE155N	35.1		37.7	36.6	1.5	2812	40.9	40.3	5.2	6312	42.0	41.5	6.4	7792	44.0	43.6	8.5	10364	Floodplain of Big Econ
BEBE130X	BEBE130N	BEBE135N	61.8		72.4	51.9	-	117	72.7	53.8	-	233	72.8	54.2	-	277	72.9	55.2	-	360	
BEBE135C	BEBE135N	BEBE145N	53.4	Sunflower Trail Extension	51.9	51.5	-	109	53.8	53.0	0.4	207	54.2	53.8	0.8	209	55.2	55.2	1.8	208	Problem Area 12 - Sunflower Trail
BEBE135W	BEBE135N	BEBE145N	53.4	Sunflower Trail - Overflow	51.9	51.5	-	0	53.8	53.0	0.4	59	54.2	53.8	0.8	154	55.2	55.2	1.8	301	Problem Area 12 - Sunflower Trail
BEBE145C	BEBE145N	BEBE150N	55.8	Sunflower Trail	51.5	50.5	-	140	53.0	51.2	-	284	53.8	51.3	-	343	55.2	51.5	-	420	
BEBE145W	BEBE145N	BEBE150N	55.8	Sunflower Trail - Overflow	51.5	50.5	-	0	53.0	51.2	-	0	53.8	51.3	-	0	55.2	51.5	-	0	
BEBE150X	BEBE150N	BEBE125N	37.9		50.5	37.7	-	139	51.2	40.9	3.0	283	51.3	42.0	4.1	342	51.5	44.0	6.1	420	Floodplain of Big Econ
BEBE152C	BEBE152N	BEBE153N	62	State Road 50	59.6	57.4	-	84	60.6	58.3	-	200	61.1	58.4	-	200	61.9	58.6	-	201	
BEBE152W	BEBE152N	BEBE153N	62	State Road 50 - Overflow	59.6	57.4	-	0	60.6	58.3	-	0	61.1	58.4	-	0	61.9	58.6	-	200	
BEBE153X	BEBE153N	BEBE154N	52		57.4	50.8	-	128	58.3	53.6	1.6	171	58.4	53.7	1.7	180	58.6	53.7	1.7	200	Floodplain of Big Econ Tributary
BEBE154C	BEBE154N	BEBE155N	54	Old Cheney Highway	50.8	36.6	-	84	53.6	40.3	-	152	53.7	41.5	-	153	53.7	43.6	-	154	
BEBE154W	BEBE154N	BEBE155N	54	Old Cheney - Overflow	50.8	36.6	-	0	53.6	40.3	-	19	53.7	41.5	-	27	53.7	43.6	-	45	
BEBE155X	BEBE155N	BEBE160N	32.7		36.6	36.5	3.8	2780	40.3	40.1	7.4	6250	41.5	41.3	8.6	7742	43.6	43.3	10.6	10366	Floodplain of Big Econ
BEBE160X	BEBE160N	BEBE165N	44.7	SR 50 Bridge Equivalent	36.5	36.4	-	2763	40.1	40.1	-	6220	41.3	41.3	-	7716	43.3	43.3	-	10360	
BEBE160W	BEBE160N	BEBE165N	44.6	SR 50 Bridge - Overflow	36.5	36.4	-	0	40.1	40.1	-	0	41.3	41.3	-	0	43.3	43.3	-	0	
BEBE165X	BEBE165N	BEBE170N	36.5		36.4	35.7	-	2752	40.1	39.6	3.1	6194	41.3	40.8	4.3	7693	43.3	42.9	6.4	10356	Floodplain of Big Econ
BEBE169C	BEBE169N	BEBE170N	41.3	South Tanner Road	35.7	35.7	-	167	40.3	39.6	-	291	41.6	40.8	0.3	266	42.9	42.9	1.6	171	Overtopping due largely to tailwater in BE
BEBE169W	BEBE169N	BEBE170N	41.3	South Tanner - Overflow	35.7	35.7	-	0	40.3	39.6	-	0	41.6	40.8	0.3	49	42.9	42.9	1.6	299	Overtopping due largely to tailwater in BE
BEBE170X	BEBE170N	BEBE220N	31.7		35.7	35.4	3.7	2711	39.6	39.3	7.6	6121	40.8	40.5	8.8	7620	42.9	42.7	11.0	10338	Floodplain of Big Econ
4A-4B	4A	4B	65.4	Waterford Chase Parkway - d/s of pond 4A	64.9	64.9	-	4	65.5	65.3	0.1	9	65.7	65.4	0.3	12	66.1	65.5	0.7	17	Problem Area 10 - Maple Creek Drive
4B-4-2	4B	4-2	66.5	Control structure out of pond 4-B	64.9	63.6	-	0	65.3	64.3	-	11	65.4	64.7	-	16	65.5	65.4	-	24	
4-1-4-2	4-1	4-2	66.5	Waterford Chase Parkway - d/s wetland 4-2	63.6	63.6	-	0	64.3	64.3	-	0	64.6	64.7	-	0	65.2	65.4	-	0	
4-1-3	4-1	3	66	Drop structure - Maple Creek Drive	63.6	63.6	-	2	64.3	64.1	-	8	64.6	64.3	-	10	65.2	64.6	-	12	
3-2	3	2	66.5	Oak Chase Drive	63.6	63.6	-	20	64.1	64.0	-	42	64.3	64.2	-	61	64.6	64.4	-	96	
2-99	2	BEBE190N	66	Waterford Chase outfall	63.6	59.4	-	10	64.0	59.9	-	16	64.2	60.1	-	17	64.4	60.4	-	19	
2-99A	2	BEBE190N	66	Waterford Chase outfall	63.6	59.4	-	2	64.0	59.9	-	27	64.2	60.1	-	38	64.4	60.4	-	48	
2-99B	2	BEBE190N	66	Waterford Chase outfall	63.6	59.4	-	0	64.0	59.9	-	0	64.2	60.1	-	7	64.4	60.4	-	30	
BEBE190X	BEBE190N	BEBE195N	52.5		59.4	54.6	2.1	108	59.9	54.7	2.2	252	60.1	54.8	2.3	311	60.4	54.8	2.3	419	Floodplain of Big Econ Tributary
BEBE195X	BEBE195N	BEBE200N	47.8		54.6	46.5	-	169	54.7	47.8	0.0	301	54.8	48.3	0.5	370	54.8	49.3	1.5	496	Floodplain of Big Econ Tributary
BEBE200C	BEBE200N	BEBE205N	49.5	Old Cheney Highway Bridge Equivalent	46.5	44.7	-	258	47.8	45.2	-	513	48.3	45.7	-	621	49.3	47.5	-	817	
BEBE200W	BEBE200N	BEBE205N	49.5	Old Cheney - Overflow	46.5	44.7	-	0	47.8	45.2	-	0	48.3	45.7	-	0	49.3	47.5	-	0	
BEBE210C	BEBE205N	BEBE215N	49.9	SR 50	44.7	44.6	-	353	45.2	45.0	-	512	45.7	45.4	-	621	47.5	47.1	-	807	
BEBE210W	BEBE205N	BEBE215N	49.9	SR 50 - Overflow	44.7	44.6	-	0	45.2	45.0	-	0	45.7	45.4	-	0	47.5	47.1	-	0	
BEBE215X	BEBE215N	BEBE170N	36.5		44.6	35.7	-	403	45.0	39.6	3.1	512	45.4	40.8	4.3	621	47.1	42.9	6.4	805	Floodplain of Big Econ Tributary
BEBE220X	BEBE220N	BEBE222N	34.6		35.4	34.8	0.2	2676	39.3	38.9	4.3	6051	40.5	40.1	5.5	7568	42.7	42.3	7.7	10318	Floodplain of Big Econ
BEBE222X	BEBE222N	BEBE225N	44.7	Lake Pickett Bridge Equivalent	34.8	34.8	-	2724	38.9	38.9	-	6137	40.1	40.1	-	7792	42.3	42.3	-	10408	
BEBE222W	BEBE222N	BEBE225N	41.4	Lake Pickett - Overflow	34.8	34.8	-	0	38.9	38.9	-	0	40.1	40.1	-	0	42.3	42.3	0.9	194	Floodplain of Big Econ
BEBE225X	BEBE225N	BEBE230N	38.3		34.8	32.5	-	2723	38.9	35.9	-	6135	40.1	37.6	-	7700	42.3	40.5	2.2	10601	Floodplain of Big Econ
BEBE230X	BEBE230N	BEBE235N	41.7		32.5	32.2	-	2719	35.9	35.6	-	6129	37.6	37.3	-	7696	40.5	40.3	-	10600	

Notes:
1) Critical Elevation refers to road overtopping elevation for culverts and top of bank for open channels.
2) Flow taken from Link Maximum Conditions Report (cfs)
3) Stages taken from Node Maximum Conditions Report (ft NGVD)

Table 5-1
Big Econ Stormwater Management Master Plan
Orange County, Florida
Existing Conditions Results

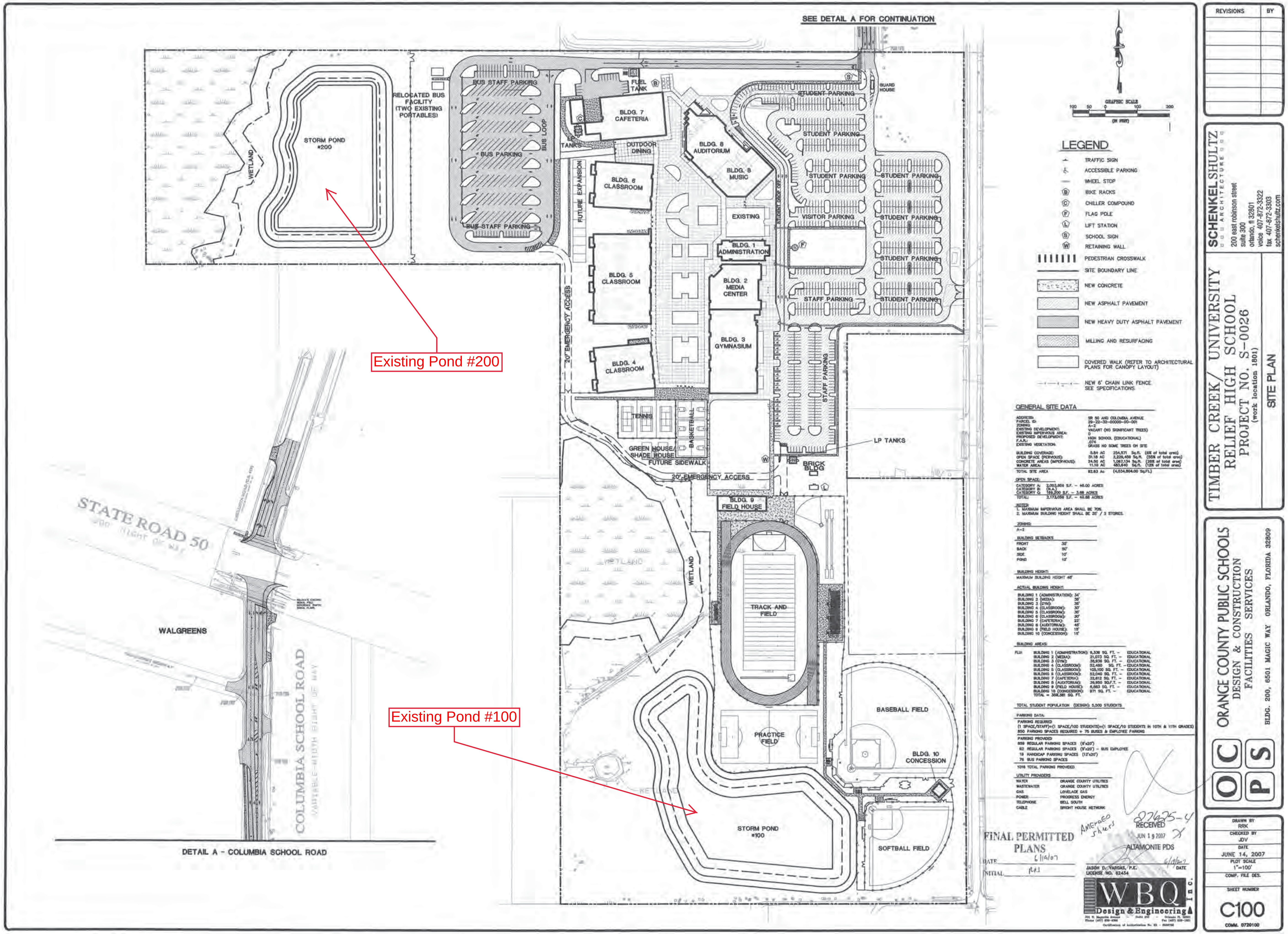
Model ID	U/S Node	D/S Node	Critical Elevation[1]	Location	Mean Annual				10 Year - 24 Hour				25 Year - 24 Hour				100 Year - 24 Hour				Comments
					U/S Stage[3]	D/S Stage[3]	Flooding	Flow[2]	U/S Stage[3]	D/S Stage[3]	Flooding	Flow[2]	U/S Stage[3]	D/S Stage[3]	Flooding	Flow[2]	U/S Stage[3]	D/S Stage[3]	Flooding	Flow[2]	
CH-4B	CH-4A	CH-4B	51		47.7	47.0	-	816	49.0	48.2	-	1769	49.9	49.3	-	2117	50.0	49.1	-	2778	From Avalon Park FEMA floodplain study
CH-4C	CH-4B	CH-5	49		47.0	46.0	-	815	48.2	47.1	-	1768	49.3	48.8	-	2116	49.1	48.8	-	2779	From Avalon Park FEMA floodplain study
CH-5	CH-5	CH-6	50		46.0	44.4	-	820	47.1	47.0	-	1775	48.8	47.8	-	2114	48.8	48.8	-	2791	From Avalon Park FEMA floodplain study
CH-6	CH-6	CH-7	50		44.4	44.4	-	816	47.0	47.0	-	1736	47.8	47.8	-	2047	48.8	48.8	-	2671	From Avalon Park FEMA floodplain study
CH-7	CH-7	BEBE075N	44.8		44.4	44.4	-	784	47.0	47.0	2.2	1617	47.8	47.8	3.0	1886	48.8	48.8	4.0	2429	From Avalon Park FEMA floodplain study
CONS5-W	BESB050N	C1	78	Weir flow to Alafaya Trail Culverts	76.2	74.7	-	82	76.4	75.4	-	196	76.5	75.7	-	243	76.6	76.1	-	326	
BETC005X	BETC005N	BETC020N	55.4		55.6	53.9	-	498	56.2	55.9	0.5	989	56.7	56.5	1.1	1161	57.1	57.1	1.7	1866	Floodplain of Turkey Creek
BETC010X	BETC010N	BETC015N	62.6		73.0	64.8	2.2	1828	73.6	65.6	3.0	2762	73.8	65.9	3.3	3132	74.1	66.4	3.8	3864	Floodplain of Turkey Creek
BETC015X	BETC015N	BETC020N	48.8		64.8	53.9	5.1	802	65.6	55.9	7.1	1546	65.9	56.5	7.7	1816	66.4	57.1	8.3	2339	Floodplain of Turkey Creek
BETC020X	BETC020N	BEBE035N	57.4		53.9	53.6	-	1047	55.9	55.7	-	2018	56.5	56.3	-	2335	57.1	57.0	-	2505	
BEWF005X	BEWF005N	BEWF010N	65.1		65.5	65.4	0.3	448	66.7	66.6	1.5	771	67.0	66.8	1.7	912	67.4	67.2	2.1	1160	Floodplain of Wedgefield Canal
BEWF010P	BEWF010N	BEWF015N	65.3	Culvert Riser in Wedgefield Canal	65.4	61.0	0.1	408	66.6	63.5	1.3	431	66.8	63.7	1.5	433	67.2	64.1	1.9	435	Floodplain of Wedgefield Canal
BEWF010W	BEWF010N	BEWF015N	65.3		65.4	61.0	0.1	13	66.6	63.5	1.3	461	66.8	63.7	1.5	603	67.2	64.1	1.9	851	Floodplain of Wedgefield Canal
BEWF015X	BEWF015N	BEWF020N	61.1		61.0	61.0	-	667	63.5	63.5	2.4	771	63.7	63.7	2.6	912	64.1	64.1	3.0	1160	Floodplain of Wedgefield Canal
BEWF020P	BEWF020N	BEWF025N	62.3	Culvert Riser in Wedgefield Canal	61.0	57.4	-	401	63.5	59.0	1.2	482	63.7	59.2	1.4	488	64.1	59.6	1.8	494	Floodplain of Wedgefield Canal
BEWF020W	BEWF020N	BEWF025N	62.3		61.0	57.4	-	0	63.5	59.0	1.2	397	63.7	59.2	1.4	539	64.1	59.6	1.8	784	Floodplain of Wedgefield Canal
BEWF025X	BEWF025N	BEWF030N	57.8		57.4	57.4	-	379	59.0	59.0	1.2	764	59.2	59.2	1.4	909	59.6	59.6	1.8	1155	Floodplain of Wedgefield Canal
BEWF030P	BEWF030N	BEWF035N	57.5	Culvert Riser in Wedgefield Canal	57.4	54.6	-	348	59.0	57.9	1.5	413	59.2	58.1	1.7	421	59.6	58.6	2.1	430	Floodplain of Wedgefield Canal
BEWF030W	BEWF030N	BEWF035N	57.5		57.4	54.6	-	0	59.0	57.9	1.5	571	59.2	58.1	1.7	720	59.6	58.6	2.1	974	Floodplain of Wedgefield Canal
BEWF035X	BEWF035N	BEWF040N	54.8		54.6	54.6	-	348	57.9	57.9	3.1	761	58.1	58.1	3.3	906	58.6	58.6	3.8	1153	Floodplain of Wedgefield Canal
BEWF040P	BEWF040N	BEWF045N	56.8	Culvert Riser in Wedgefield Canal	54.6	52.1	-	330	57.9	54.2	1.1	465	58.1	54.8	1.3	482	58.6	55.5	1.8	501	Floodplain of Wedgefield Canal
BEWF040W	BEWF040N	BEWF045N	56.8		54.6	52.1	-	0	57.9	54.2	1.1	324	58.1	54.8	1.3	477	58.6	55.5	1.8	747	Floodplain of Wedgefield Canal
BEWF045X	BEWF045N	BEBE045N	54.6		52.1	52.1	-	322	54.2	54.2	-	717	54.8	54.8	0.2	858	55.5	55.5	0.9	1098	Floodplain of Wedgefield Canal
BEWF050X	BEWF050N	BEWF055N	55		65.3	51.9	-	414	66.7	52.7	-	809	67.1	52.8	-	1010	67.5	52.7	-	1501	
BEWF055X	BEWF055N	BEBE050N	48.3		51.9	45.5	-	668	52.7	48.1	-	1387	52.8	48.8	0.5	1624	52.7	49.8	1.5	2022	Floodplain of Wedgefield Canal
BEWF060X	BEWF060N	BEWF065N	63.7		60.9	60.3	-	379	63.4	63.1	-	510	64.2	64.0	0.3	546	65.5	65.3	1.6	651	Floodplain of Wedgefield Canal
BEWF065P	BEWF065N	BEWF070N	64.9	Culvert Riser in Wedgefield Canal	60.3	58.0	-	379	63.1	59.7	-	505	64.0	60.3	-	536	65.3	61.1	0.4	569	Floodplain of Wedgefield Canal
BEWF065W	BEWF065N	BEWF070N	64.9		60.3	58.0	-	0	63.1	59.7	-	0	64.0	60.3	-	0	65.3	61.1	0.4	78	Floodplain of Wedgefield Canal
BEWF070X	BEWF070N	BEWF075N	60.3		58.0	58.0	-	727	59.7	59.7	-	711	60.3	60.3	-	729	61.1	61.1	0.8	713	Floodplain of Wedgefield Canal
BEWF075P	BEWF075N	BEWF080N	60.7	Culvert Riser in Wedgefield Canal	58.0	56.2	-	378	59.7	56.5	-	502	60.3	56.6	-	533	61.1	56.9	0.4	570	Floodplain of Wedgefield Canal
BEWF075W	BEWF075N	BEWF080N	60.7		58.0	56.2	-	0	59.7	56.5	-	0	60.3	56.6	-	0	61.1	56.9	0.4	74	Floodplain of Wedgefield Canal
BEWF080X	BEWF080N	BEWF085N	56		56.2	56.1	0.1	378	56.5	56.4	0.4	502	56.6	56.5	0.5	532	56.9	56.7	0.7	643	Floodplain of Wedgefield Canal
BEWF085P	BEWF085N	BEWF090N	55.4	Culvert Riser in Wedgefield Canal	56.1	49.2	0.7	210	56.4	50.7	1.0	215	56.5	51.8	1.1	216	56.7	53.5	1.3	216	Floodplain of Wedgefield Canal
BEWF085W	BEWF085N	BEWF090N	55.4		56.1	49.2	0.7	168	56.4	50.7	1.0	286	56.5	51.8	1.1	332	56.7	53.5	1.3	480	Floodplain of Wedgefield Canal
BEWF090X	BEWF090N	BEWF095N	52.6		49.2	48.6	-	378	50.7	50.3	-	500	51.8	51.5	-	530	53.5	53.4	0.8	643	Floodplain of Wedgefield Canal
BEWF095P	BEWF095N	BEWF100N	53	Culvert Riser in Wedgefield Canal	48.6	44.6	-	378	50.3	47.2	-	497	51.5	47.9	-	528	53.4	49.0	0.4	591	Floodplain of Wedgefield Canal
BEWF095W	BEWF095N	BEWF100N	53		48.6	44.6	-	0	50.3	47.2	-	0	51.5	47.9	-	0	53.4	49.0	0.4	60	Floodplain of Wedgefield Canal
BEWF100X	BEWF100N	BEBE060N	43.1		44.6	44.6	1.5	378	47.2	47.2	4.1	497	47.9	47.9	4.8	528	49.0	49.0	5.9	642	Floodplain of Wedgefield Canal
BEWF105X	BEWF105N	BEWF110N	69.3		63.3	61.7	-	53	64.1	62.2	-	155	64.4	62.3	-	167	65.0	62.4	-	194	
BEWF110P	BEWF110N	BEWF115N	64.6	Culvert Riser in Wedgefield Canal	61.7	58.4	-	53	62.2	59.1	-	155	62.3	59.2	-	167	62.4	59.3	-	194	
BEWF110W	BEWF110N	BEWF115N	64.6		61.7	58.4	-	0	62.2	59.1	-	0	62.3	59.2	-	0	62.4	59.3	-	0	
BEWF115X	BEWF115N	BEWF120N	61.5		58.4	58.4	-	53	59.1	58.9	-	155	59.2	58.9	-	167	59.3	59.0	-	194	
BEWF120P	BEWF120N	BEWF125N	60.5	Culvert Riser in Wedgefield Canal	58.4	53.8	-	53	58.9	54.4	-	155	58.9	54.4	-	167	59.0	54.6	-	194	
BEWF120W	BEWF120N	BEWF125N	60.5		58.4	53.8	-	0	58.9	54.4	-	0	58.9	54.4	-	0	59.0	54.6	-	0	
BEWF125X	BEWF125N	BEWF130N	56.4		53.8	53.8	-	221	54.4	54.3	-	246	54.4	54.4	-	249	54.6	54.5	-	250	
BEWF130P	BEWF130N	BEWF135N	54.9	Culvert Riser in Wedgefield Canal	53.8	50.0	-	53	54.3	50.6	-	155	54.4	50.7	-	167	54.5	52.4	-	194	
BEWF130W	BEWF130N	BEWF135N	54.9		53.8	50.0	-	0	54.3	50.6	-	0	54.4	50.7	-	0	54.5	52.4	-	0	
BEWF135X	BEWF135N	BEWF140N	57		50.0	50.0	-	53	50.6	50.6	-	405	50.7	50.7	-	426	52.4	52.4	-	421	
BEWF140P	BEWF140N	BEWF145N	53.7	Culvert Riser in Wedgefield Canal	50.0	46.5	-	52	50.6	48.3	-	155	50.7	48.8	-	166	52.4	50.2	-	194	
BEWF140W	BEWF140N	BEWF145N	53.7		50.0	46.5	-	0	50.6	48.3	-	0	50.7	48.8	-	0	52.4	50.2	-	0	
BEWF145X	BEWF145N	BEWF150N	53.3		46.5	46.4	-	52	48.3	48.3	-	808	48.8	48.8	-	808	50.2	50.2	-	799	
BEWF150P	BEWF150N	BEWF155N	50.2	Culvert Riser in Wedgefield Canal	46.4	43.8	-	52	48.3	46.9	-	153	48.8	47.1	-	165	50.2	48.0	-	191	
BEWF150W	BEWF150N	BEWF155N	50.2		46.4	43.8	-	0	48.3	46.9	-	0	48.8	47.1	-	0	50.2	48.0	-	0	
BEWF155X	BEWF155N	BEWF160N	49		43.8	43.8	-	52	46.9	46.9	-	153	47.1	47.1	-	164	48.0	47.9	-	191	
BEWF160P	BEWF160N	BEWF165N	46.6	Culvert Riser in Wedgefield Canal	43.8	43.6	-	52	46.9	46.1	0.3	149	47.1	46.8	0.5	149	47.9	47.9	1.3	129	Floodplain of Wedgefield Canal
BEWF160W	BEWF160N	BEWF165N	46.6		43.8	43.6	-	0	46.9	46.1	0.3	37	47.1	46.8	0.5	92	47.9	47.9	1.3	172	Floodplain of Wedgefield Canal
BEWF165X	BEWF165N	BEBE090N	48.9		43.6	43.6	-	52	46.1	46.1	-	153	46.8	46.8	-	164	47.9	47.9	-	190	Floodplain of Wedgefield Canal
CULV-2	81X	82	74	Woodbury Road	69.9	69.3	-	170	71.2	69.9	-	350	71.6	70.1	-	416	72.6	70.6	-	526	
CHANL-5	82	24	65		69.3	62.8	-	171	69.9	63.6	-	352	70.1	63.8	-	416	70.6	63.9	-	526	
CHANL-6	24	26	65		62.8	59.7	-	200	63.6	61.2	-	414	63.8	61.6	-	467	63.9	62.3	-	545	
CULV-10	26	13A	60		59.7	55.4	-	268	61.2	55.7	1.2	560	61.6	55.9	1.6	656	62.3	56.2	2.3	795	Floodplain of Big Econ Tributary
13A-13B	13A	13B	55		55.4	53.7	0.4	63	55.7	55.0	0.7	72	55.9	55.3	0.9	74	56.2	55.8	1.2	76	Floodplain of Big Econ Tributary
B13A-13B	13A	13B	55		55.4	53.7	0.5	240	55.7	55.0	0.5	570	55.9	55.3	0.5	675	56.2	55.8	0.5	834	Floodplain of Big Econ Tributary
CHN-12-O	13B	STA-9700	57		53.7	52.0	-	342	55.0	53.2	-	873	55.3	53.3	-	1007	55.8	53.7	-	1312	
BEWL015X	STA-9700	BEWL020N	49		52.0	50.1	1.1	339	53.2	50.4	1.4	873	53.3	51.1	2.1	1013	53.7	52.1	3.1	1322	Floodplain of Big Econ Tributary
BEWL020C	BEWL020N	BEWL025N	57.8	Bridgeway Blvd - Bridge Equivalent	50.1	50.1	-	531	50.4	50.3	-	1136	51.1	51.0	-	1325	52.1	52.0	-	1690	
BEWL020W	BEWL020N	BEWL025N	57.8	Bridgeway Blvd Overflow	50.1	50.1	-	0	50.4	50.3	-	0	51.1	51.0	-	0	52.1	52.0	-	0	
BEWL025X	BEWL025N	BEWL030N	47.8		50.1	46.4	-	531	50.3	49.5	1.7	1136	51.0	50.2	2.4	1324	52.0	51.3	3.5	1695	Floodplain of Big Econ Tributary
BEWL030C	BEWL030N	BEWL035N	54.4	SR 50	46.4	44.4	-	612	49.5	45.0	-	1354	50.2	45.1	-	1549	51.3	45.4	-	2000	

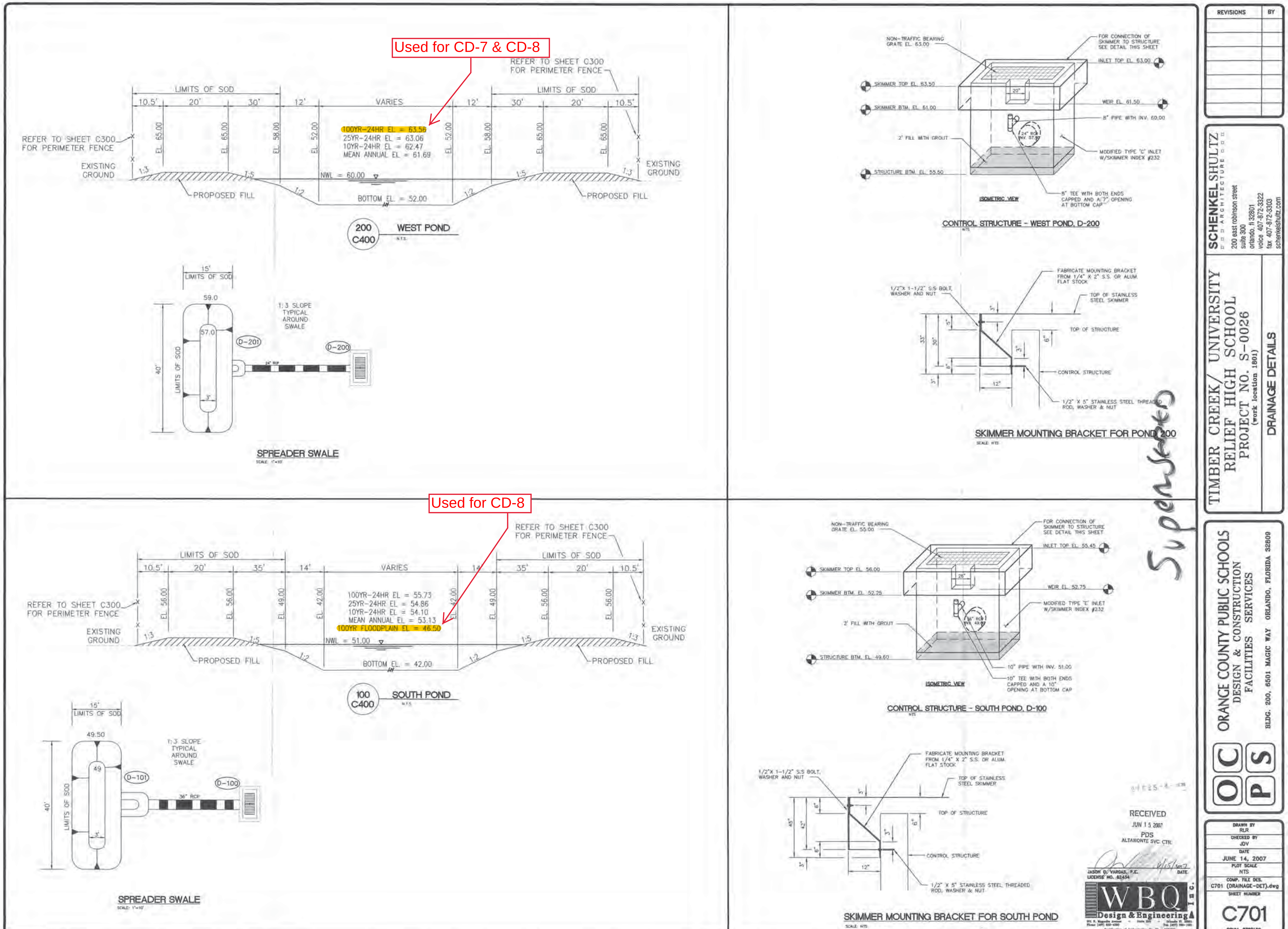
Notes:
1) Critical Elevation refers to road overtopping elevation for culverts and top of bank for open channels.
2) Flow taken from Link Maximum Conditions Report (cfs)
3) Stages taken from Node Maximum Conditions Report (ft NGVD)

Appendix: L

Excerpt from Orange County Public Schools

Timber Creek High School Construction Plans

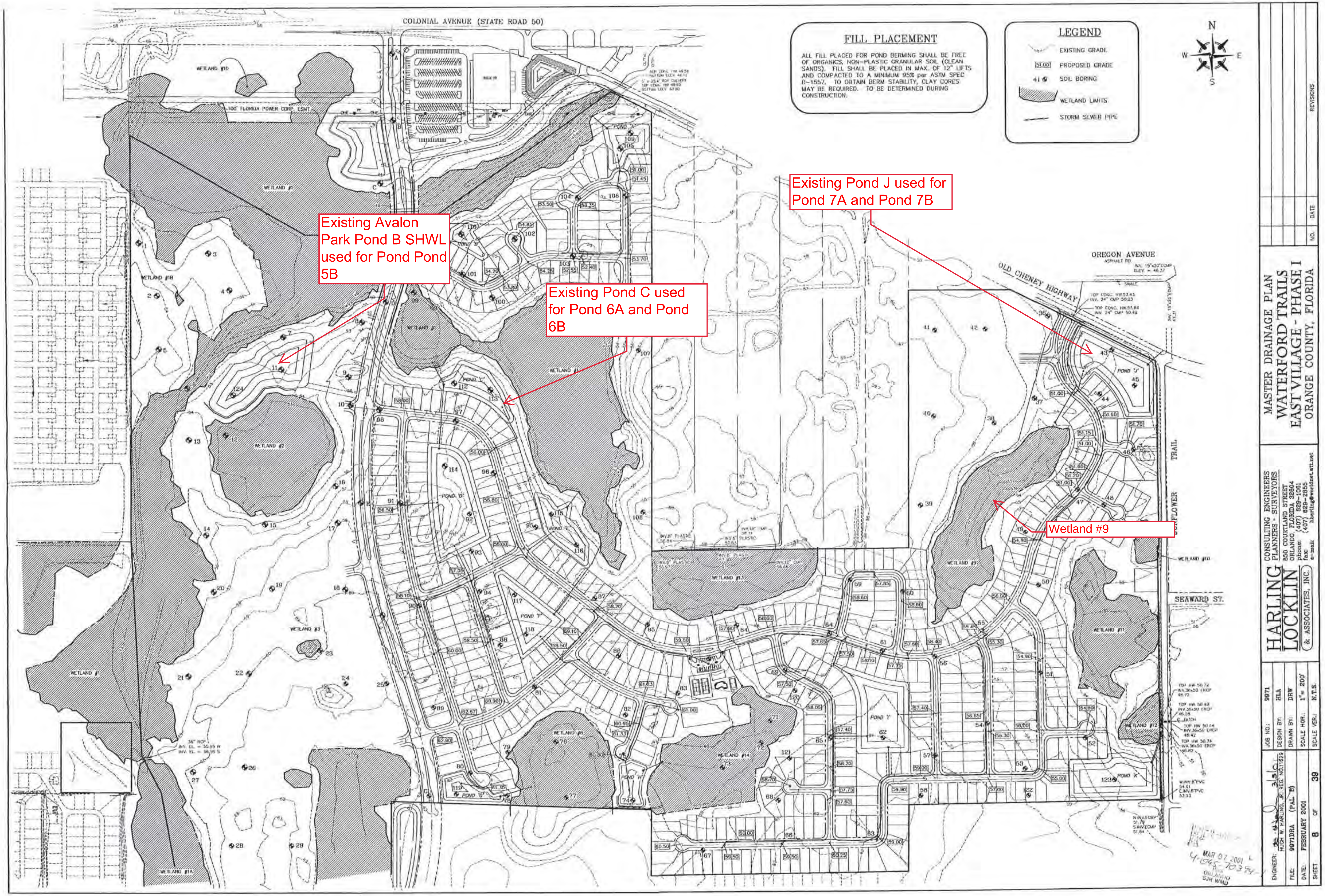

SEE DETAIL A FOR CONTINUATION
STORM POND #200
WETLAND
RELOCATED BUS FACILITY (TWO EXISTING PORTABLES)
BUS STAFF PARKING
BUS PARKING
BUS LOOP
FUEL TANK
BLDG. 7 CAFETERIA
OUTDOOR DINING
BLDG. 8 AUDITORIUM
BLDG. 8 MUSIC
BLDG. 6 CLASSROOM
BLDG. 5 CLASSROOM
BLDG. 4 CLASSROOM
BLDG. 1 ADMINISTRATION
BLDG. 2 MEDIA CENTER
BLDG. 3 GYMNASIUM
EXISTING
FUTURE EXPANSION
20' EMERGENCY ACCESS
STUDENT PARKING
VISITOR PARKING
STAFF PARKING
GUARD HOUSE
TENNIS
BASKETBALL
GREEN HOUSE/ SHADE HOUSE
FUTURE SIDEWALK
LP TANKS
BRICK BLDG
BLDG. 9 FIELD HOUSE
TRACK AND FIELD
PRACTICE FIELD
BASEBALL FIELD
BLDG. 10 CONCESSION
SOFTBALL FIELD
STORM POND #100
WETLAND
STATE ROAD 50
200' RIGHT OF WAY
WALGREENS
COLUMBIA SCHOOL ROAD
DETAIL A - COLUMBIA SCHOOL ROAD
Existing Pond #200
Existing Pond #100
GRAPHIC SCALE
LEGEND
TRAFFIC SIGN
ACCESSIBLE PARKING
WHEEL STOP
BIKE RACKS
CHILLER COMPOUND
FLAG POLE
LIFT STATION
SCHOOL SIGN
RETAINING WALL
PEDESTRIAN CROSSWALK
SITE BOUNDARY LINE
NEW CONCRETE
NEW ASPHALT PAVEMENT
NEW HEAVY DUTY ASPHALT PAVEMENT
MILLING AND RESURFACING
COVERED WALK (REFER TO ARCHITECTURAL PLANS FOR CANOPY LAYOUT)
NEW 6' CHAIN LINK FENCE SEE SPECIFICATIONS
GENERAL SITE DATA
FINAL PERMITTED PLANS
RECEIVED
JUN 1 9 2007
ALTAMONTE PDS
JASON D. VARGAS, P.E. LICENSE NO. 62434
WBQ Design & Engineering Inc.
REVISIONS
BY
SCHENKELSHULTZ
200 east robinson street
suite 300
orlando, fl 32801
voice 407-872-3322
fax 407-872-3303
schenkelshultz.com
TIMBER CREEK/ UNIVERSITY RELIEF HIGH SCHOOL
PROJECT NO. S-0026
(work location 1801)
SITE PLAN
ORANGE COUNTY PUBLIC SCHOOLS
DESIGN & CONSTRUCTION
FACILITIES SERVICES
BLDG. 200, 6501 MAGIC WAY ORLANDO, FLORIDA 32809
OCPS
DRAWN BY
RRK
CHECKED BY
JDV
DATE
JUNE 14, 2007
PLOT SCALE
1"=100'
COMP. FILE DES.
SHEET NUMBER
C100

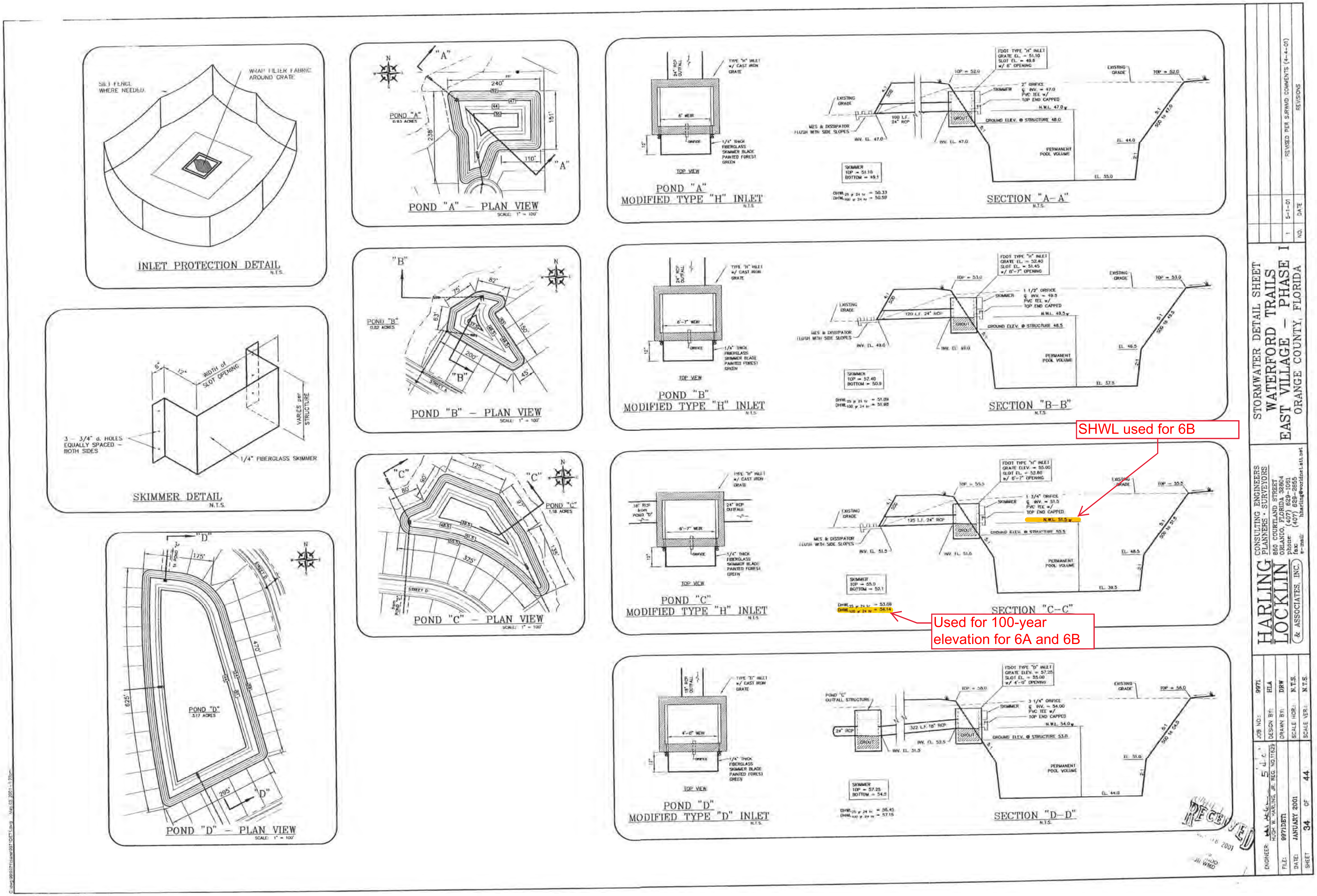


Used for CD-7 & CD-8
REFER TO SHEET C300 FOR PERIMETER FENCE
LIMITS OF SOD
10.5' 20' 30' 12' VARIES 12' 30' 20' 10.5'
EL. 65.00 EL. 65.00 EL. 58.00 EL. 52.00 EL. 52.00 EL. 58.00 EL. 65.00 EL. 65.00
100YR-24HR EL = 63.56
25YR-24HR EL = 63.06
10YR-24HR EL = 62.47
MEAN ANNUAL EL = 61.69
EXISTING GROUND
NWL = 60.00
BOTTOM EL = 52.00
PROPOSED FILL
200 C400 WEST POND
15' LIMITS OF SOD
59.0
57.0
1:3 SLOPE TYPICAL AROUND SWALE
D-201
D-200
40'
LIMITS OF SOD
24" RCP
SPREADER SWALE
NON-TRAFFIC BEARING GRATE EL. 63.00
FOR CONNECTION OF SKIMMER TO STRUCTURE SEE DETAIL THIS SHEET
INLET TOP EL. 63.00
SKIMMER TOP EL. 63.50
SKIMMER BTM. EL. 61.00
WEIR EL. 61.50
8" PIPE WITH INV. 60.00
2' FILL WITH GROUT
MODIFIED TYPE "C" INLET W/SKIMMER INDEX #232
STRUCTURE BTM. EL. 55.50
8" TEE WITH BOTH ENDS CAPPED AND A 7" OPENING AT BOTTOM CAP
ISOMETRIC VIEW
CONTROL STRUCTURE - WEST POND, D-200
FABRICATE MOUNTING BRACKET FROM 1/4" X 2" S.S. OR ALUM. FLAT STOCK
1/2"X 1-1/2" S.S BOLT, WASHER AND NUT
TOP OF STAINLESS STEEL SKIMMER
TOP OF STRUCTURE
CONTROL STRUCTURE
1/2" X 5" STAINLESS STEEL THREADED ROD, WASHER & NUT
SKIMMER MOUNTING BRACKET FOR POND 200
Superseded
Used for CD-8
REFER TO SHEET C300 FOR PERIMETER FENCE
LIMITS OF SOD
10.5' 20' 35' 14' VARIES 14' 35' 20' 10.5'
EL. 56.00 EL. 56.00 EL. 49.00 EL. 42.00 EL. 42.00 EL. 49.00 EL. 56.00 EL. 56.00
100YR-24HR EL = 55.73
25YR-24HR EL = 54.86
10YR-24HR EL = 54.10
MEAN ANNUAL EL = 53.13
100YR FLOODPLAIN EL = 46.50
EXISTING GROUND
NWL = 51.00
BOTTOM EL = 42.00
PROPOSED FILL
100 C400 SOUTH POND
15' LIMITS OF SOD
49.50
49
1:3 SLOPE TYPICAL AROUND SWALE
D-101
D-100
36" RCP
40'
LIMITS OF SOD
SPREADER SWALE
NON-TRAFFIC BEARING GRATE EL. 55.00
FOR CONNECTION OF SKIMMER TO STRUCTURE SEE DETAIL THIS SHEET
INLET TOP EL. 55.45
SKIMMER TOP EL. 56.00
SKIMMER BTM. EL. 52.25
WEIR EL. 52.75
MODIFIED TYPE "E" INLET W/SKIMMER INDEX #232
2' FILL WITH GROUT
STRUCTURE BTM. EL. 49.60
10" PIPE WITH INV. 51.00
10" TEE WITH BOTH ENDS CAPPED AND A 10" OPENING AT BOTTOM CAP
ISOMETRIC VIEW
CONTROL STRUCTURE - SOUTH POND, D-100
FABRICATE MOUNTING BRACKET FROM 1/4" X 2" S.S. OR ALUM. FLAT STOCK
1/2"X 1-1/2" S.S BOLT, WASHER AND NUT
TOP OF STAINLESS STEEL SKIMMER
TOP OF STRUCTURE
CONTROL STRUCTURE
1/2" X 5" STAINLESS STEEL THREADED ROD, WASHER & NUT
SKIMMER MOUNTING BRACKET FOR SOUTH POND
RECEIVED
JUN 15 2007
PDS
ALTAMONTE SVC. CTR.
WBQ Design & Engineering Inc.
REVISIONS BY
SCHENKELSHULTZ ARCHITECTURE
200 east robinson street
suite 300
orlando, fl 32801
voice 407-872-3322
fax 407-872-3303
schenkelshultz.com
TIMBER CREEK/ UNIVERSITY RELIEF HIGH SCHOOL
PROJECT NO. S-0026
(work location 1801)
DRAINAGE DETAILS
ORANGE COUNTY PUBLIC SCHOOLS
DESIGN & CONSTRUCTION FACILITIES SERVICES
BLDG. 200, 6501 MAGIC WAY ORLANDO, FLORIDA 32809
OCPS
DRAWN BY RLR
CHECKED BY JDV
DATE JUNE 14, 2007
PLOT SCALE NTS
COMP. FILE DES. C701 (DRAINAGE-DET).dwg
SHEET NUMBER
C701

Appendix: M

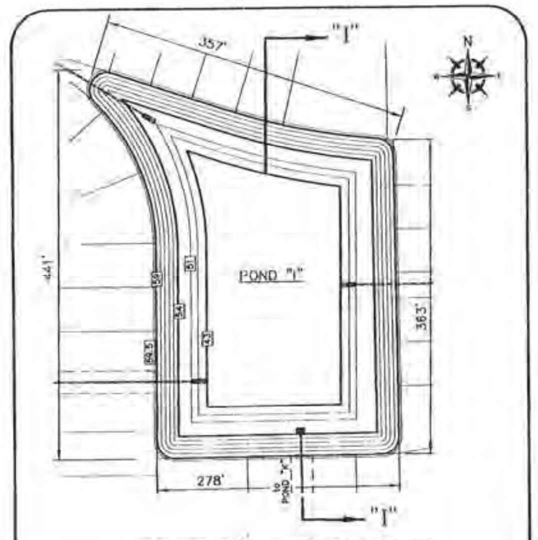
Excerpt from Harling Locklin & Associates, Inc.
Waterford Trails Plans and Avalon Park Boulevard Plans


COLONIAL AVENUE (STATE ROAD 50)
FILL PLACEMENT
ALL FILL PLACED FOR POND BERMING SHALL BE FREE OF ORGANICS, NON-PLASTIC GRANULAR SOIL (CLEAN SANDS). FILL SHALL BE PLACED IN MAX. OF 12" LIFTS AND COMPACTED TO A MINIMUM 95% per ASTM SPEC D-1557. TO OBTAIN BERM STABILITY, CLAY CORES MAY BE REQUIRED. TO BE DETERMINED DURING CONSTRUCTION.
LEGEND
EXISTING GRADE
51.00
PROPOSED GRADE
41
SOIL BORING
WETLAND LIMITS
STORM SEWER PIPE
N
W
E
S
Existing Avalon Park Pond B SHWL used for Pond Pond 5B
Existing Pond C used for Pond 6A and Pond 6B
Existing Pond J used for Pond 7A and Pond 7B
Wetland #9
OREGON AVENUE
OLD CHENEY HIGHWAY
SEAWARD ST.
TRAIL
WETLAND #1
WETLAND #2
WETLAND #3
WETLAND #9
WETLAND #10
WETLAND #11
WETLAND #12
WETLAND #13
WETLAND #14
WETLAND #1A
WETLAND #1B
100' FLORIDA POWER CORP. ESMT.
MASTER DRAINAGE PLAN
WATERFORD TRAILS
EAST VILLAGE - PHASE I
ORANGE COUNTY, FLORIDA
HARLING LOCKLIN & ASSOCIATES, INC.
CONSULTING ENGINEERS
PLANNERS - SURVEYORS
850 COURTLAND STREET
ORLANDO, FLORIDA 32804
phone: (407) 629-1061
fax: (407) 629-2855
e-mail: hharling@worldnet.att.net
ENGINEER: HUGH W. HARLING, JR. REG. NO.11529
FILE: 9971DRA (PAL B)
DATE: FEBRUARY 2001
SHEET 8 OF 39
JOB NO.: 9971
DESIGN BY: HLA
DRAWN BY: DRW
SCALE HOR.: 1" = 200'
SCALE VER.: N.T.S.
NO.
DATE
REVISIONS
MAR 07 2001

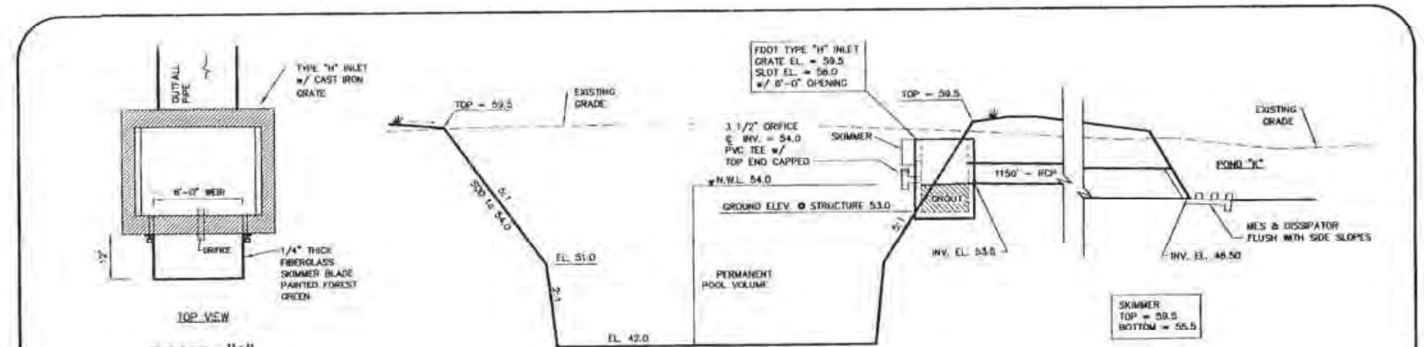


INLET PROTECTION DETAIL
N.T.S.
SILT FENCE WHERE NEEDED
WRAP FILTER FABRIC AROUND GRATE
POND "A" – PLAN VIEW
SCALE: 1" = 100'
POND "A" 0.93 ACRES
POND "A" MODIFIED TYPE "H" INLET
N.T.S.
SECTION "A–A"
N.T.S.
SKIMMER DETAIL
N.T.S.
3 – 3/4" d. HOLES EQUALLY SPACED – BOTH SIDES
1/4" FIBERGLASS SKIMMER
WIDTH of SLOT OPENING
VARIES per STRUCTURE
POND "B" – PLAN VIEW
SCALE: 1" = 100'
POND "B" 0.82 ACRES
POND "B" MODIFIED TYPE "H" INLET
N.T.S.
SECTION "B–B"
N.T.S.
POND "C" – PLAN VIEW
SCALE: 1" = 100'
POND "C" 1.18 ACRES
POND "C" MODIFIED TYPE "H" INLET
N.T.S.
SECTION "C–C"
SHWL used for 6B
Used for 100-year elevation for 6A and 6B
POND "D" – PLAN VIEW
SCALE: 1" = 100'
POND "D" 3.17 ACRES
POND "D" MODIFIED TYPE "D" INLET
N.T.S.
SECTION "D–D"
N.T.S.
STORMWATER DETAIL SHEET
WATERFORD TRAILS
EAST VILLAGE – PHASE I
ORANGE COUNTY, FLORIDA
HARLING LOCKLIN & ASSOCIATES, INC.
CONSULTING ENGINEERS • PLANNERS • SURVEYORS
850 COURTLAND STREET
ORLANDO, FLORIDA 32804
phone: (407) 629-1061
fax: (407) 629-2855
REVISED PER SJRWMD COMMENTS (4-4-01)
REVISIONS
JOB NO: 9971
DESIGN BY: HLA
DRAWN BY: DRW
SCALE HOR.: N.T.S.
SCALE VER.: N.T.S.
FILE: 9971DET
DATE: JANUARY 2001
SHEET 34 OF 44
RECEIVED

M-2

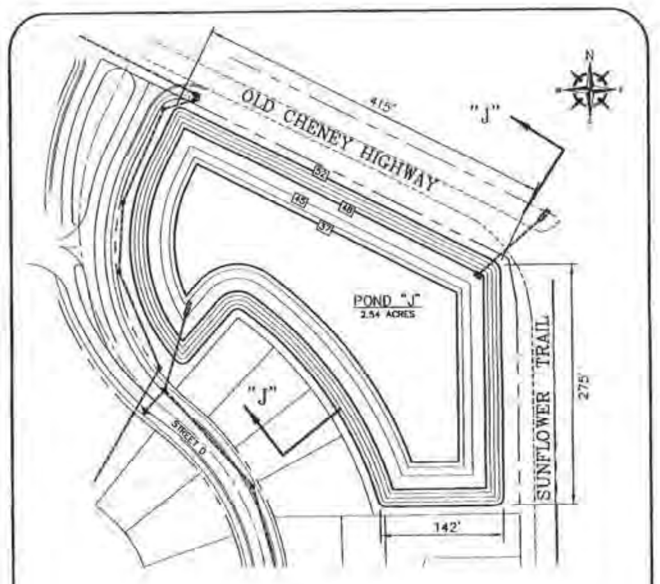


POND "I" - PLAN VIEW
SCALE: 1" = 100'

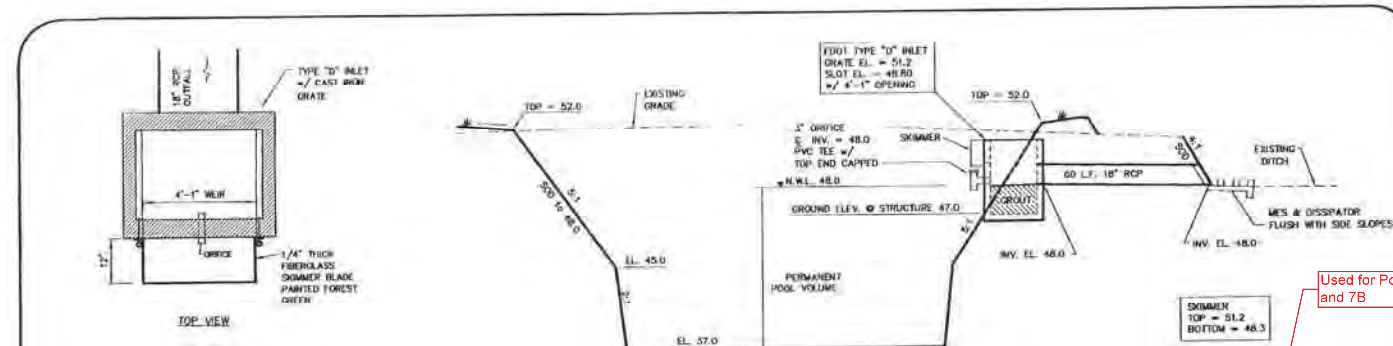


POND "I" MODIFIED TYPE "H" INLET
N.T.S.

SECTION "I-I"
N.T.S.



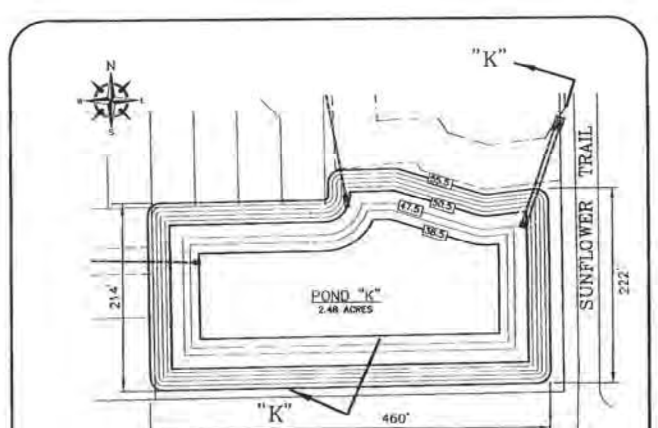
POND "J" - PLAN VIEW
SCALE: 1" = 100'



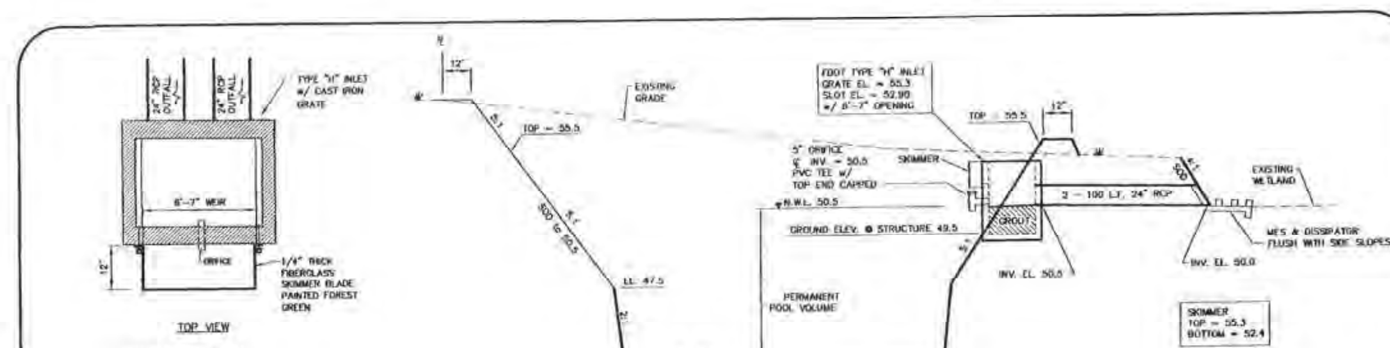
POND "J" MODIFIED TYPE "D" INLET
N.T.S.

SECTION "J-J"
N.T.S.

Used for Pond 7A and 7B

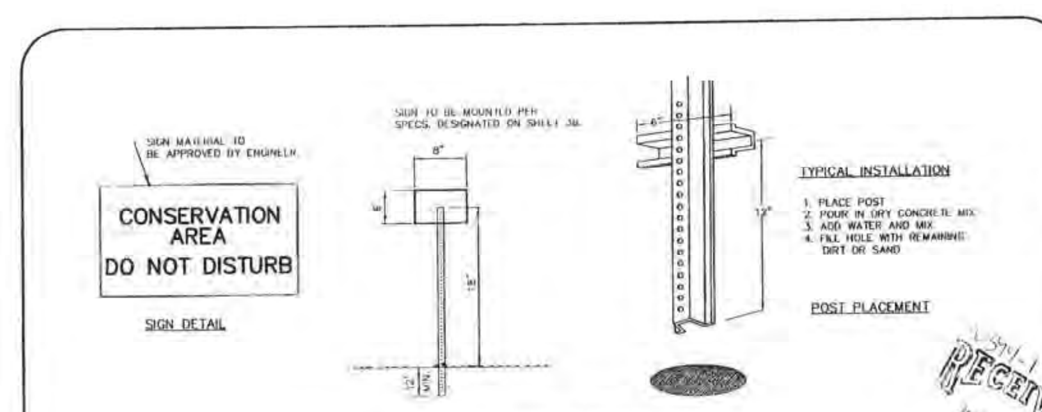


POND "K" - PLAN VIEW
SCALE: 1" = 100'



POND "K" MODIFIED TYPE "H" INLET
N.T.S.

SECTION "K-K"
N.T.S.



CONSERVATION AREA SIGN DETAIL
NTS

RECEIVED

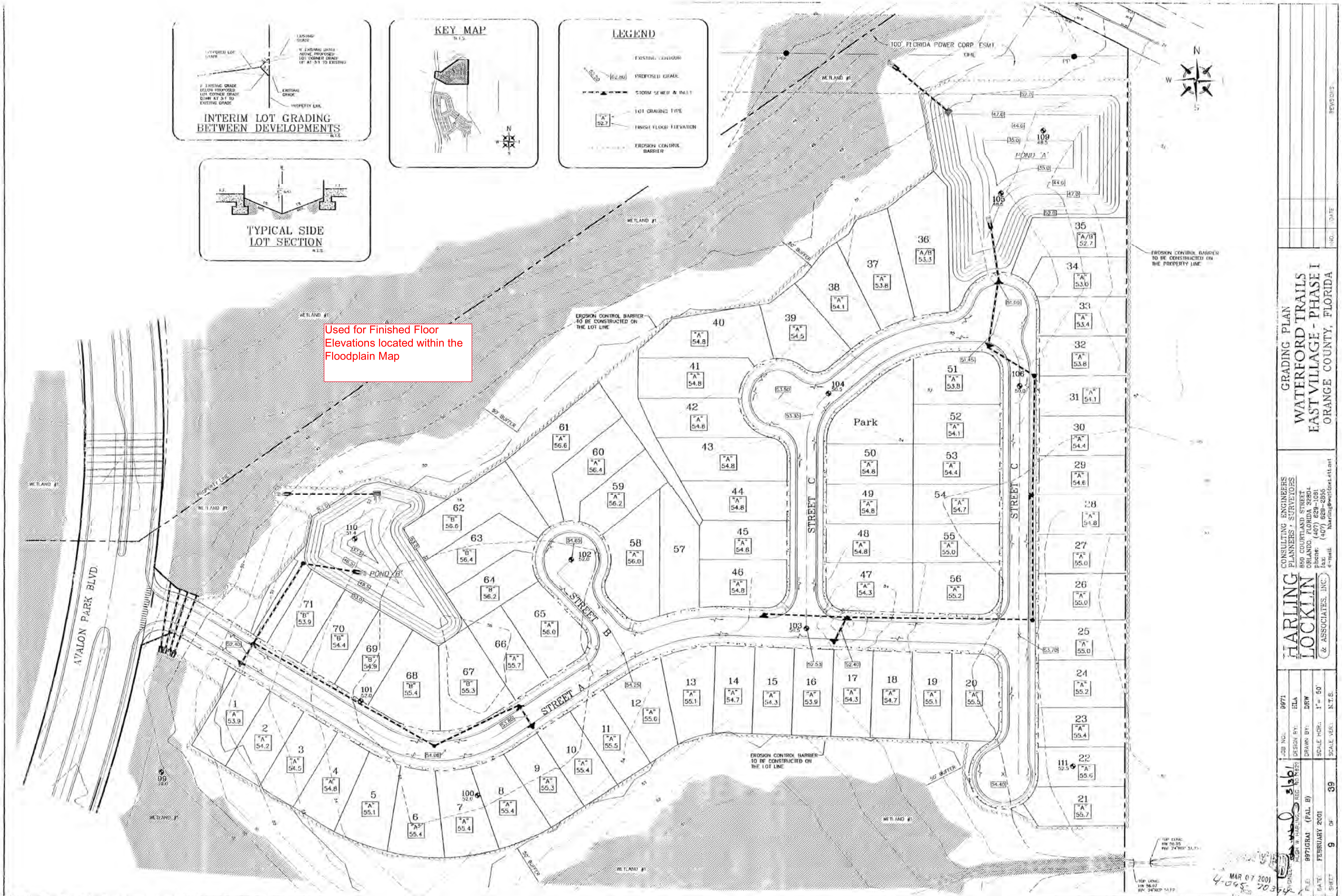
NO.	DATE	REVISIONS
1	4-26-01	REVISED PER SJRWMD COMMENTS (4-4-01)

STORMWATER DETAIL SHEET
WATERFORD TRAILS
EAST VILLAGE - PHASE 1
ORANGE COUNTY, FLORIDA

HARLING LOCKLIN & ASSOCIATES, INC.
CONSULTING ENGINEERS
PLANNERS · SURVEYORS
850 COURTLAND STREET
ORLANDO, FLORIDA 32804
phone: (407) 629-1061
fax: (407) 629-2855

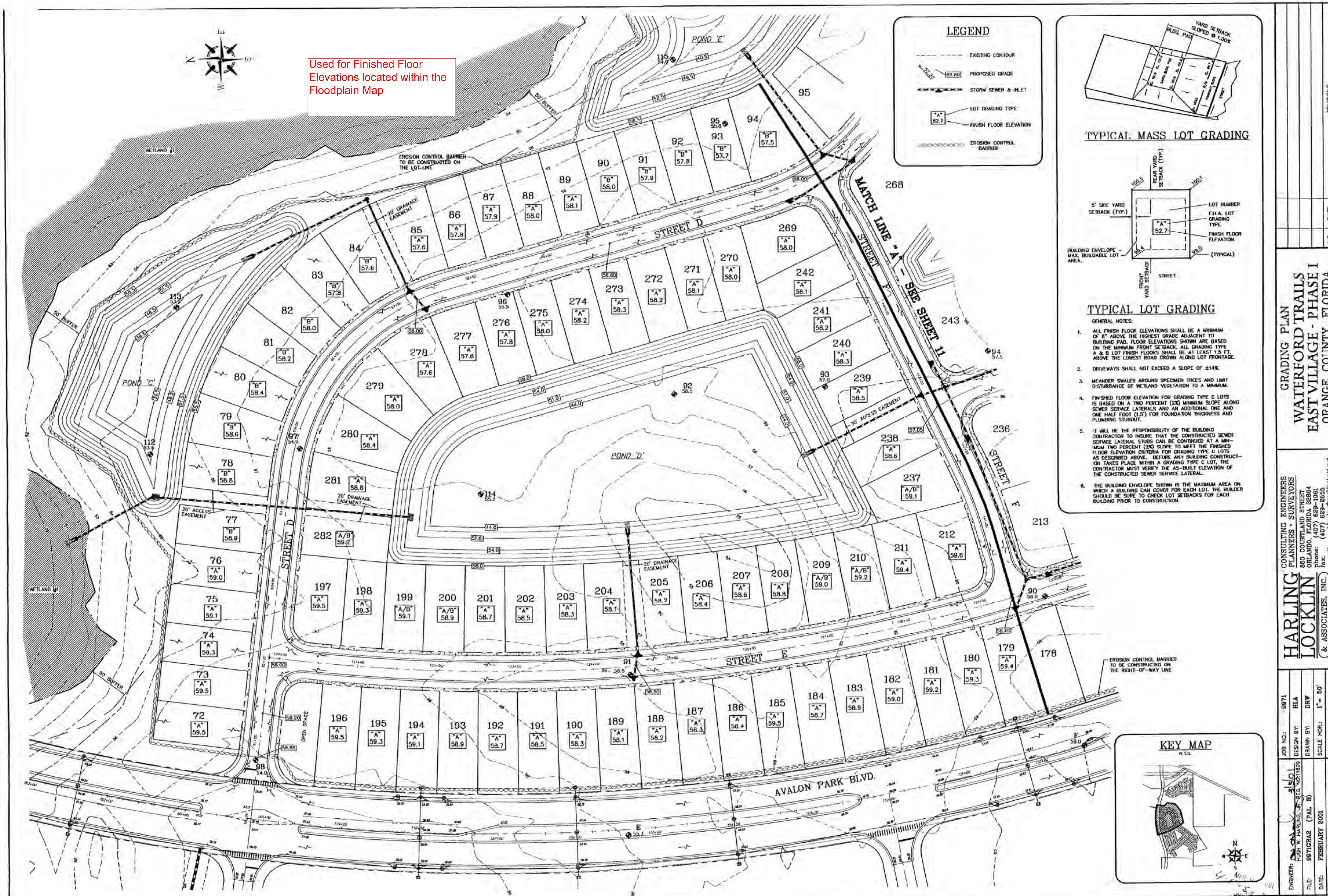
JOB NO.:	9971
DESIGN BY:	HLA
DRAWN BY:	DRW
SCALE HOR.:	N.T.S.
SCALE VER.:	N.T.S.
ENGINEER:	HUGH W. HARLING, JR. REG. NO.11629
FILE:	9971DET3
DATE:	JANUARY 2001
SHEET	38 OF 44

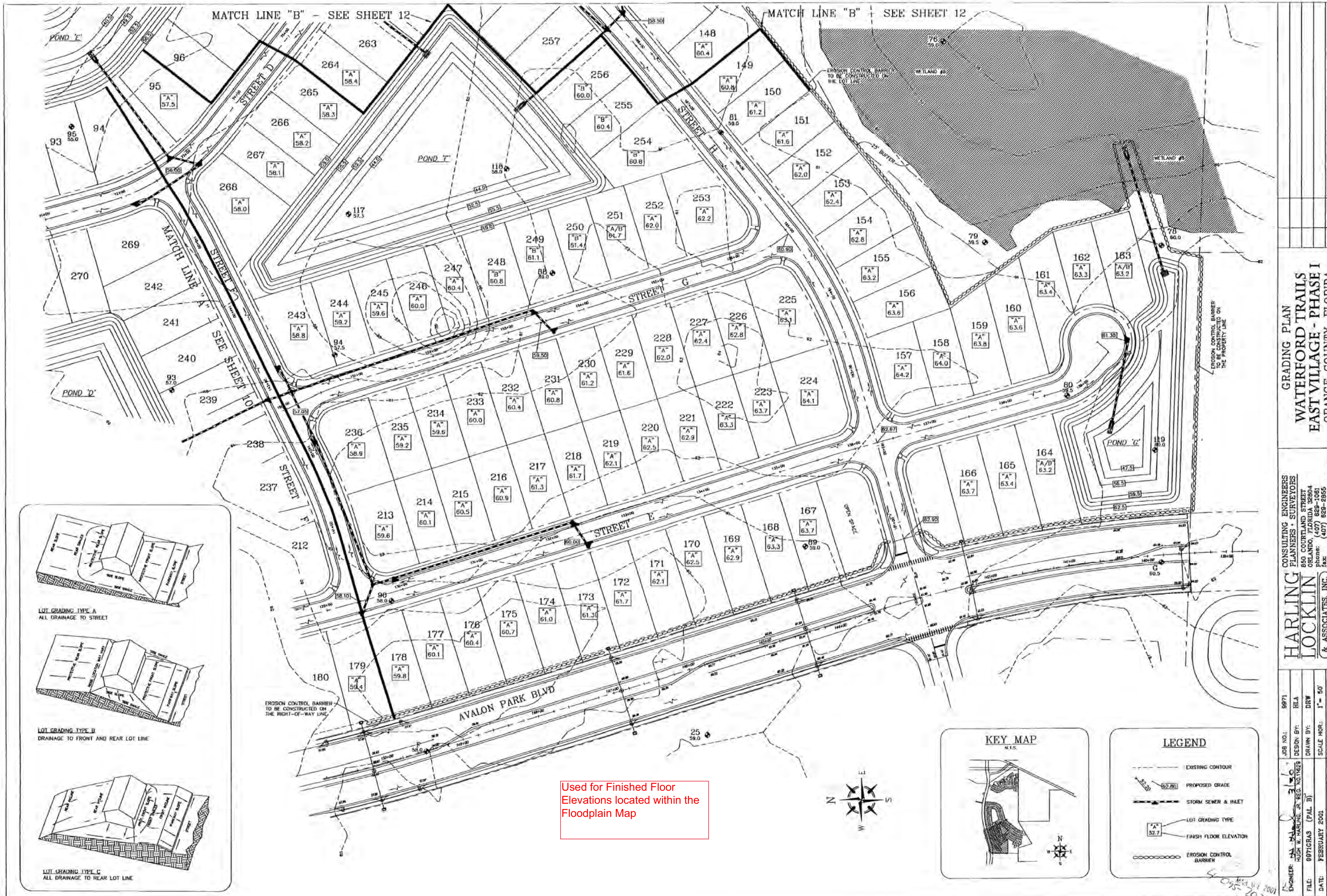
Used for Finished Floor Elevations located within the Floodplain Map



M-4

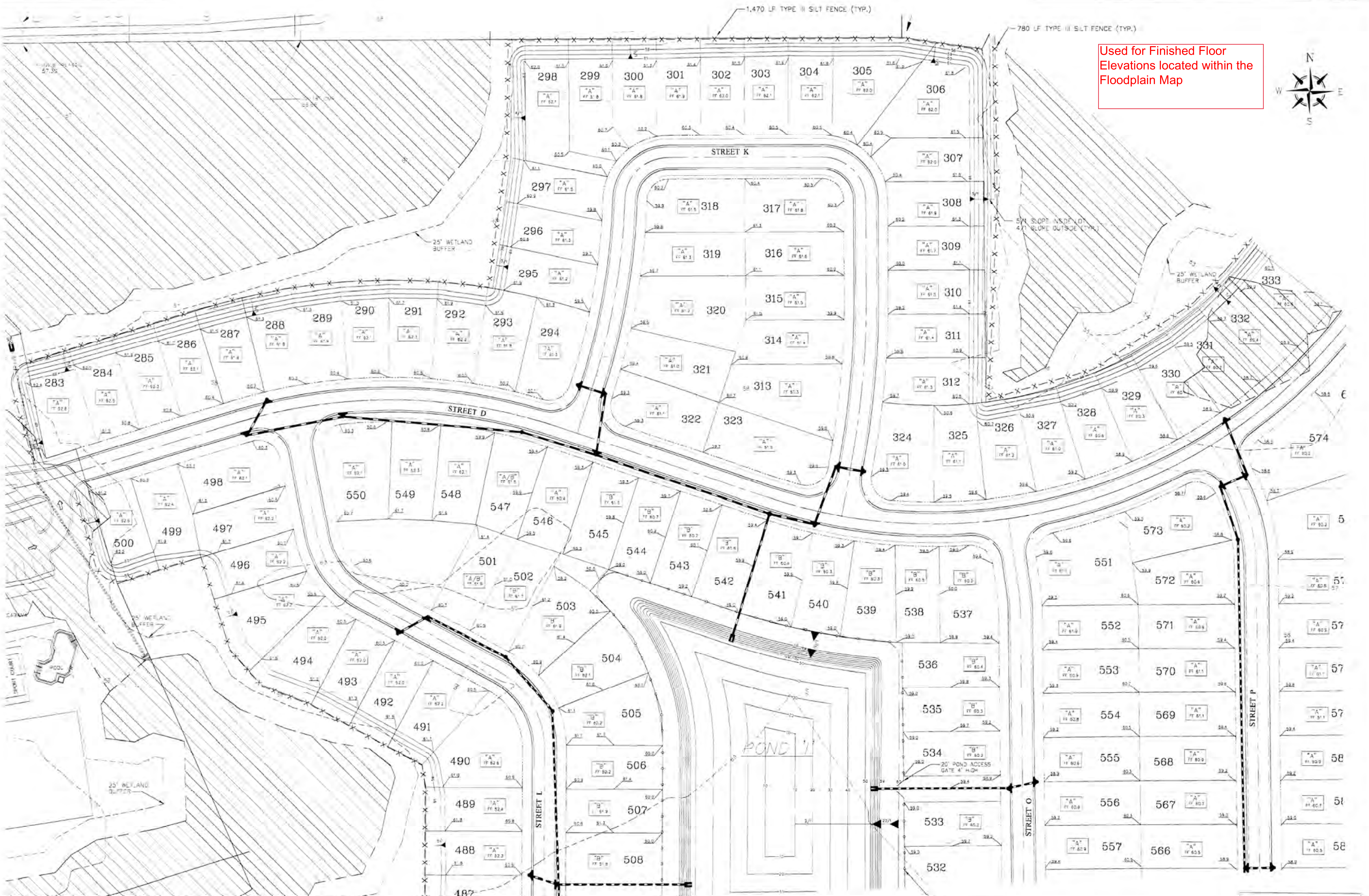
Used for Finished Floor Elevations located within the Floodplain Map





Used for Finished Floor Elevations located within the Floodplain Map

M-6



SILT FENCE NOTES:

1. ALL SILT FENCING TO BE INSTALLED IMMEDIATELY AFTER LAND CLEARING OPERATION AND PRIOR TO RETENTION POND EXCAVATION.
2. CONTRACTOR TO DEVELOP POND DE-WATERING PLANS SUFFICIENT TO MEET STATE WATER QUALITY STANDARDS AT ALL DISCHARGE POINTS FROM SITE. DE-WATERING PLANS TO BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO ANY DE-WATERING ACTIVITIES.

NOTE:
ALL LOTS DESIGNED FOR A MINIMUM 1% SIDE LOT SWALE GRADE

RECEIVED
OCT 2 5 ...
PDS

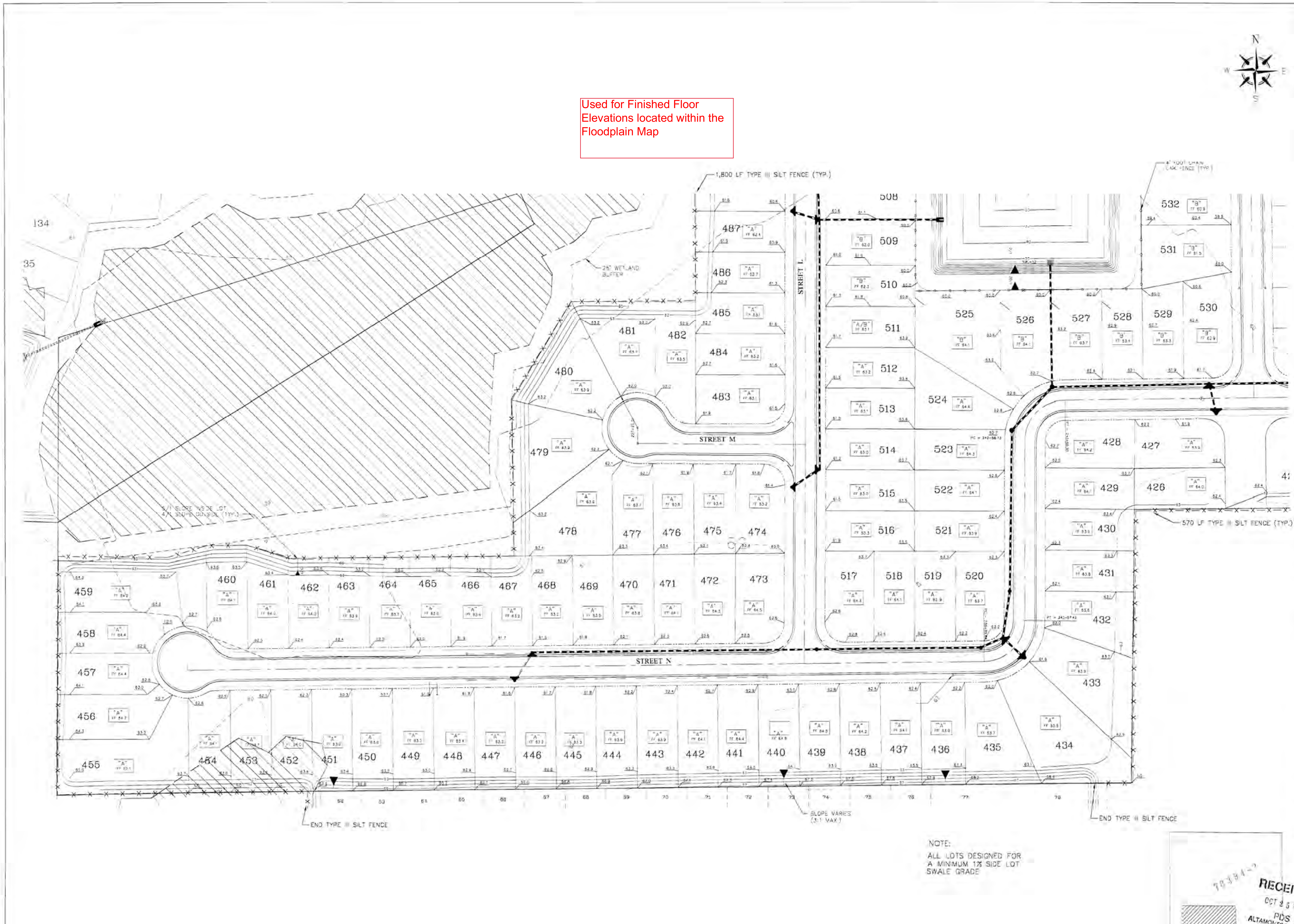
HARLING LOCKLIN (& ASSOCIATES, INC.)
Consulting Engineers-Planners-Surveyors
850 Courtland Street Orlando, Florida 32804
Phone: 407-629-1061
Fax: 407-629-2835
E-mail: hharling@worldnet.att.net

Lot Grading Plan
Waterford Trails - Phase II
Orange County, Florida

Drawn by: AJR
Designed by: WF
Filename: 9971BaseP2
xrefs:
Engineer: Hugh W. Harling, Jr. P.E. No.11629
Job Number: 9971
Scale: 1"=50'
Date: August 06, 2002

Sheet 9 of 34

Used for Finished Floor Elevations located within the Floodplain Map



HARLING LOCKLIN & ASSOCIATES, INC.

Consulting Engineers · Planners · Surveyors
850 Courtland Street Orlando, Florida 32804
Phone: 407-629-1061
Fax: 407-629-2855
E-mail: hharling@worldnet.att.net

Lot Grading Plan

Waterford Trails - Phase II

Orange County, Florida

Drawn by: AJR
Designed by: WF
Filename: 9971BaseP2
xref's:

Engineer: Hugh W. Harling, Jr. P.E. No.11629
Job Number: 9971
Scale: 1"=50'
Date: August 06, 2002

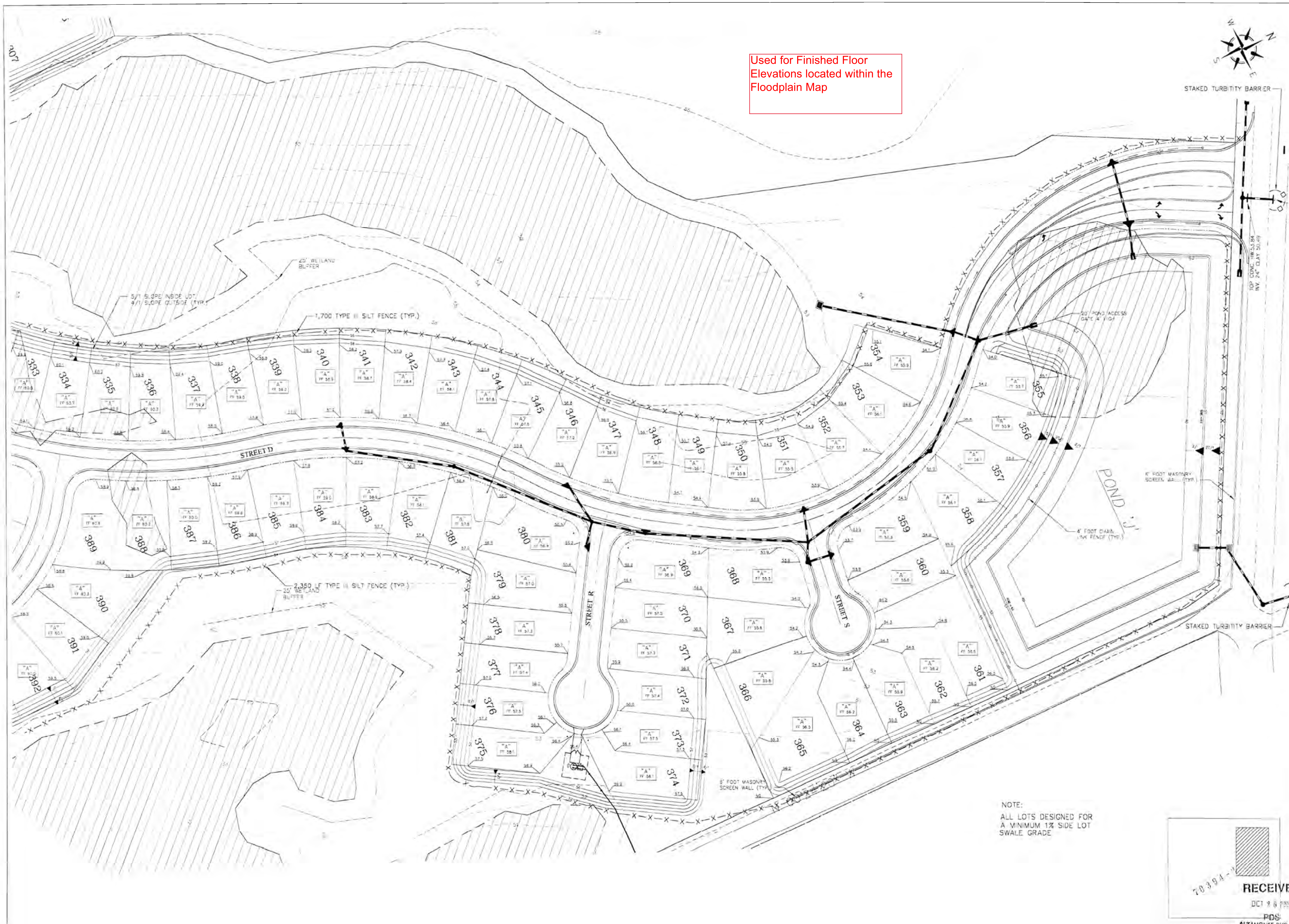
10/25/02

RECEIVED
OCT 25 2002
PDS
ALTAMONTE SVC. CTR

Sheet 10 of 34

M-8

Used for Finished Floor Elevations located within the Floodplain Map



No.	Date	Revisions	Rev by

HARLING LOCKLIN
(& ASSOCIATES, INC.)
Consulting Engineers-Planners-Surveyors
850 Courtland Street Orlando, Florida 32804
Phone: 407-629-1061
Fax: 407-629-2855
E-mail: hharling@worldnet.att.net

Lot Grading Plan

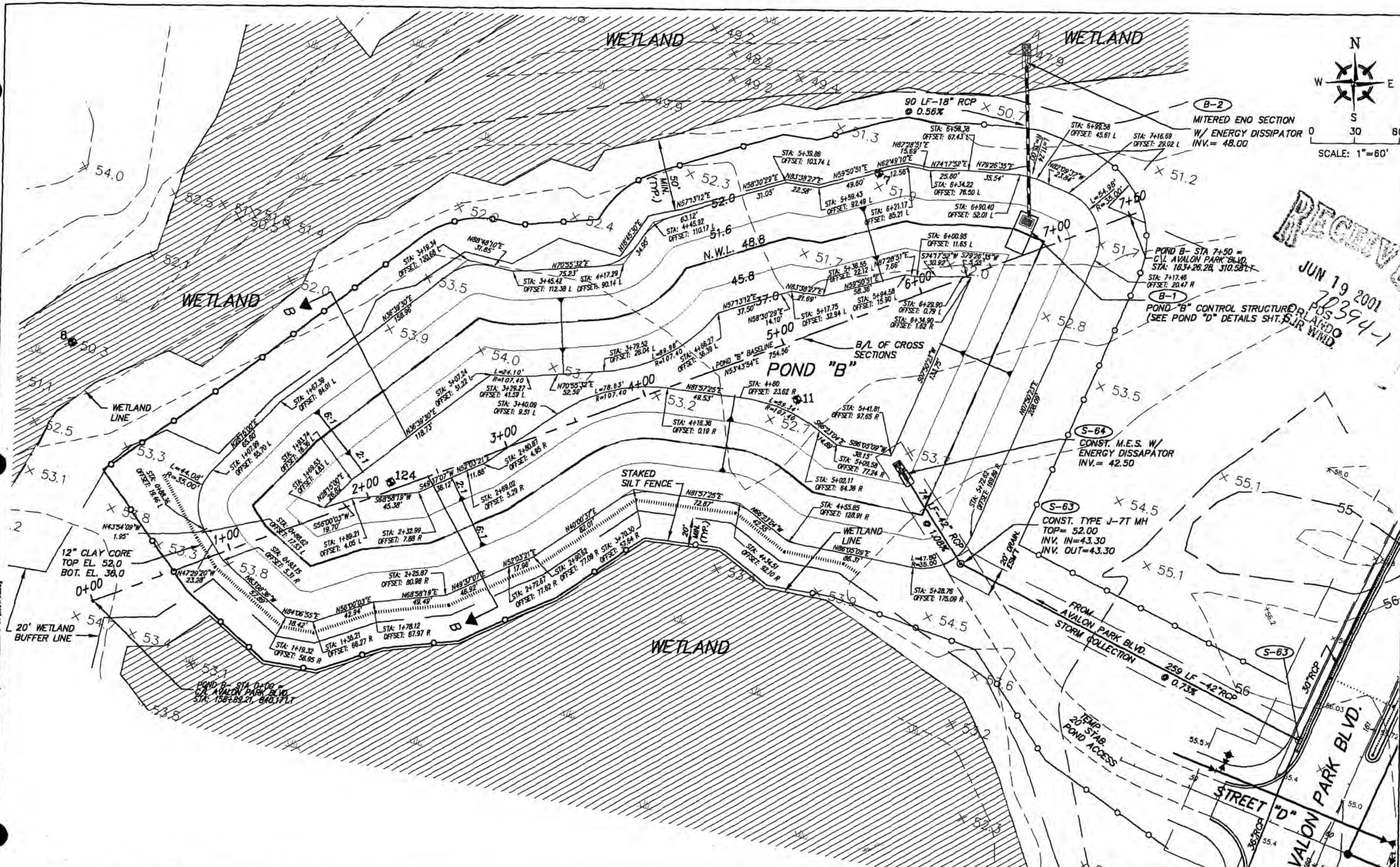
Waterford Trails - Phase II

Orange County, Florida

Drawn by: AJR
Designed by: WF
Filename: 9971Base02
xref's:

Engineer: Hugh W. Harling, Jr. P.E. No.11629
Job Number: 9971
Scale: 1"=50'
Date: August 06, 2002

Sheet: 11 of 34



DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Plotted: Jun 07, 2001 - 10:46am

	NAME	DATE
DESIGNED BY	ADD	2/01
CHECKED BY	PC	2/01
SUPERVISED BY:	HLH	

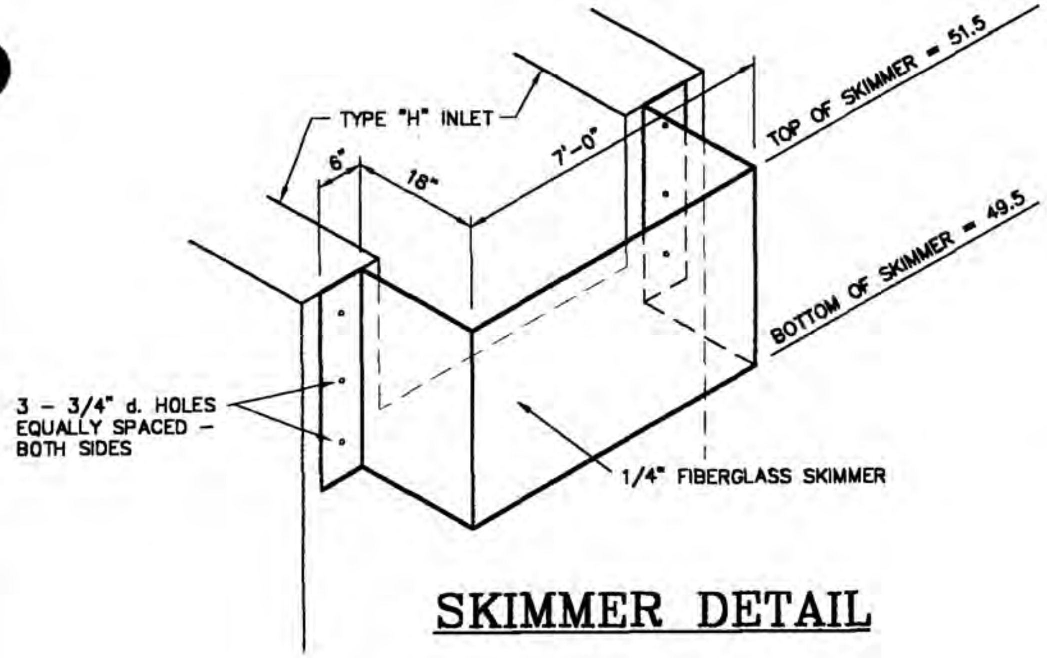
HARLING LOCKLIN & ASSOCIATES, INC. CONSULTING ENGINEERS PLANNERS · SURVEYORS 850 COURTLAND STREET ORLANDO, FLORIDA 32804 PHONE (407) 629-1061

ORANGE COUNTY, FLORIDA
AVALON PARK BOULEVARD
POND "B" PLAN

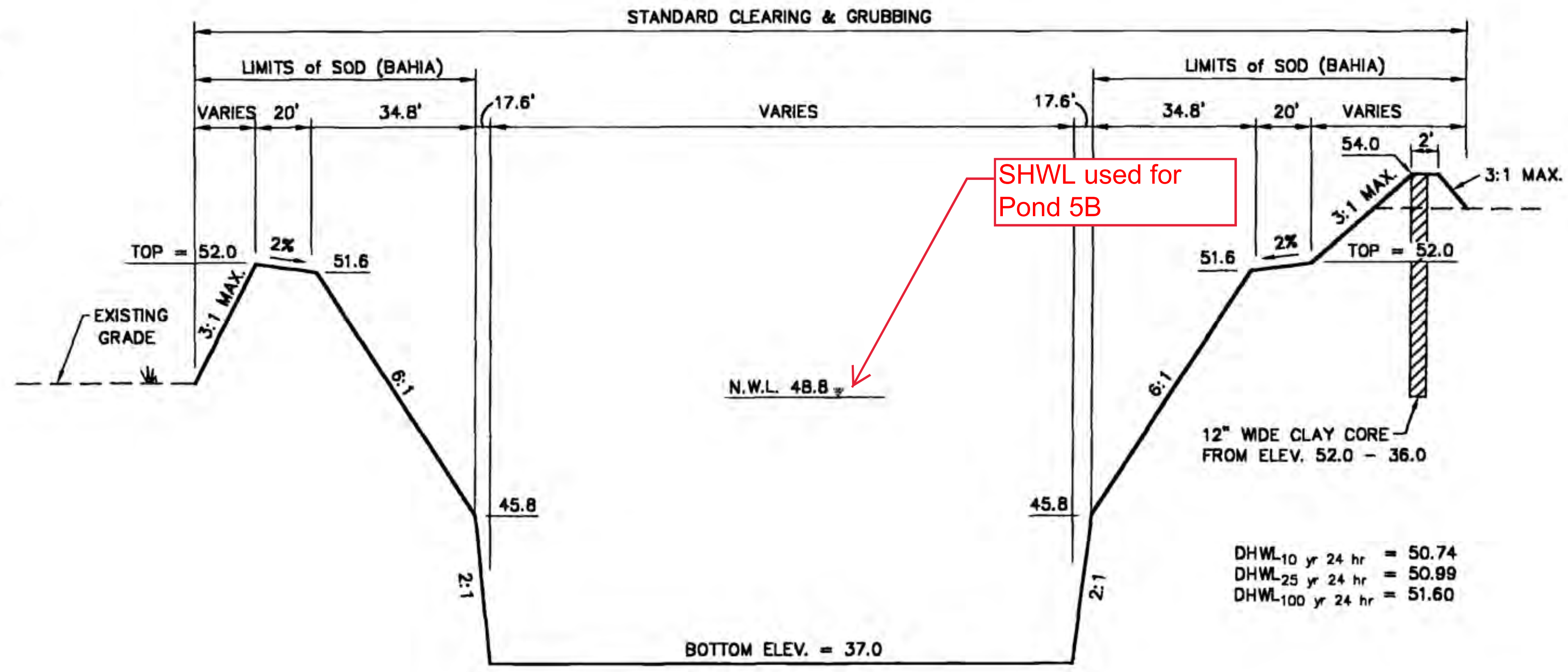
SHEET 39 OF 133

90% SUBMITTAL 5-29-01

M-10

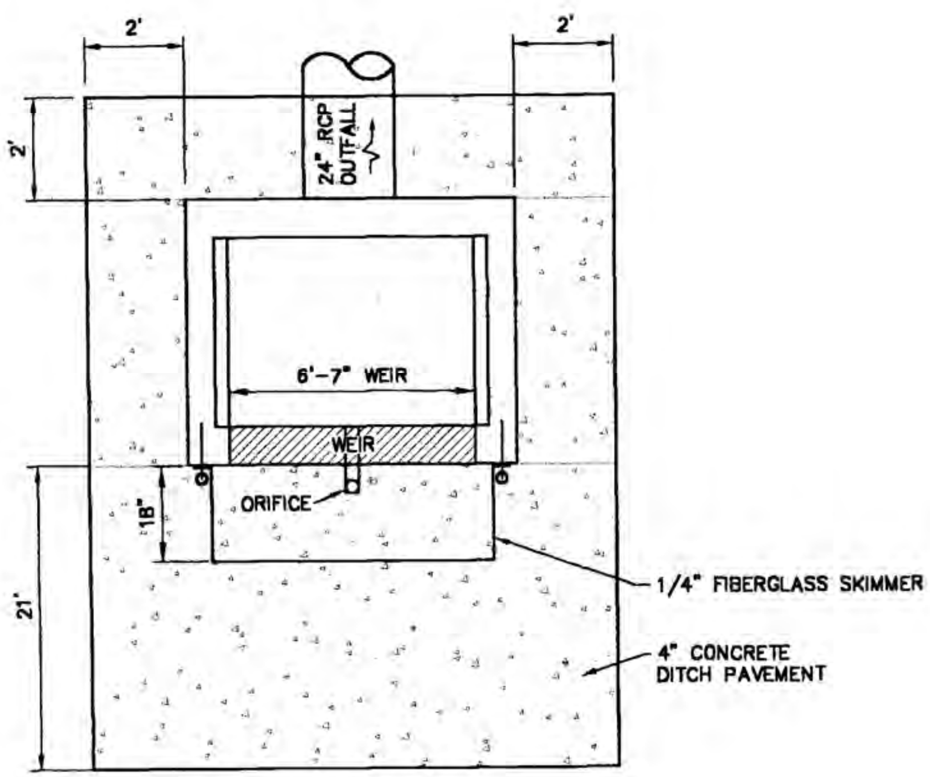


SKIMMER DETAIL

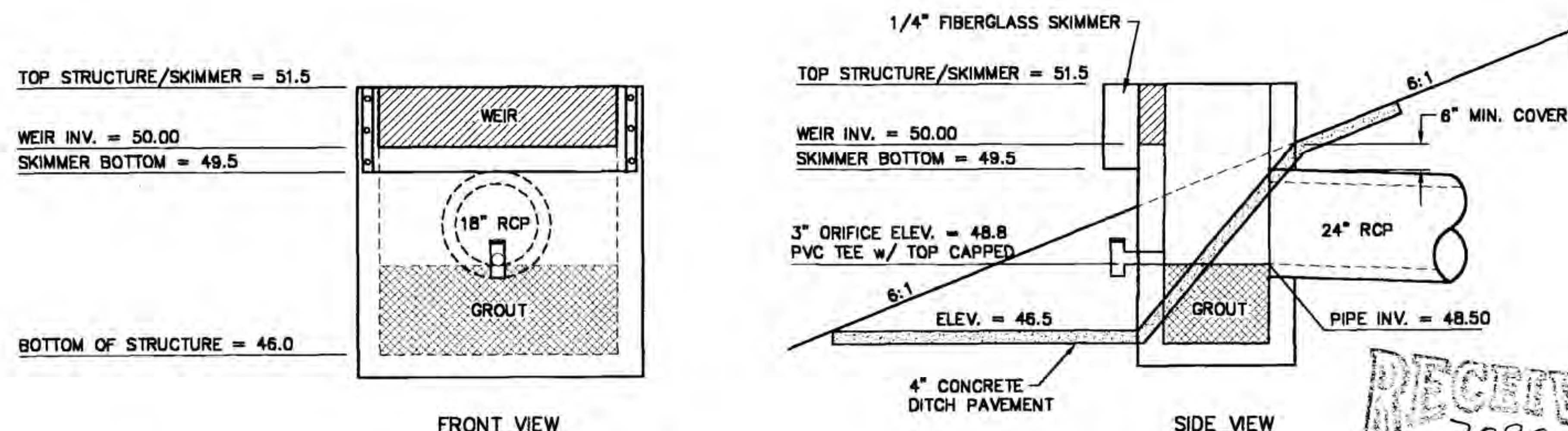


TYPICAL POND SECTION

SECTION "B-B"



TOP VIEW



MODIFIED TYPE "H" INLET OUTFALL STRUCTURE

POND "B" (B-1)

RECEIVED
70394-1
JUN 19 2001
PDS ORLANDO SJR WMD

Plotted: May 23, 2001 - 7:46pm

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	ADD	2/01	DESIGNED BY		
CHECKED BY	PC	2/01	CHECKED BY		
SUPERVISED BY:	HLH				

HARLING LOCKLIN & ASSOCIATES, INC. — CONSULTING ENGINEERS, PLANNERS · SURVEYORS, 850 COURTLAND STREET, ORLANDO, FLORIDA 32804, PHONE: (407) 629-1061

ORANGE COUNTY, FLORIDA
AVALON PARK BOULEVARD
POND "B" DETAILS

SHEET 40 OF 121

60% SUBMITTAL 4-06-01

No.	Date	Revisions	Rev. by:

HARLING LOCKLIN
& ASSOCIATES, INC.

Consulting Engineers• Planners• Surveyors
850 Courtland Street Orlando, Florida 32804
Phone: 407-629-1061
Fax: 407-629-2855
E-mail: hharling@worldnet.att.net

Lot Grading Plan

Waterford Trails - Phase II

Orange County, Florida

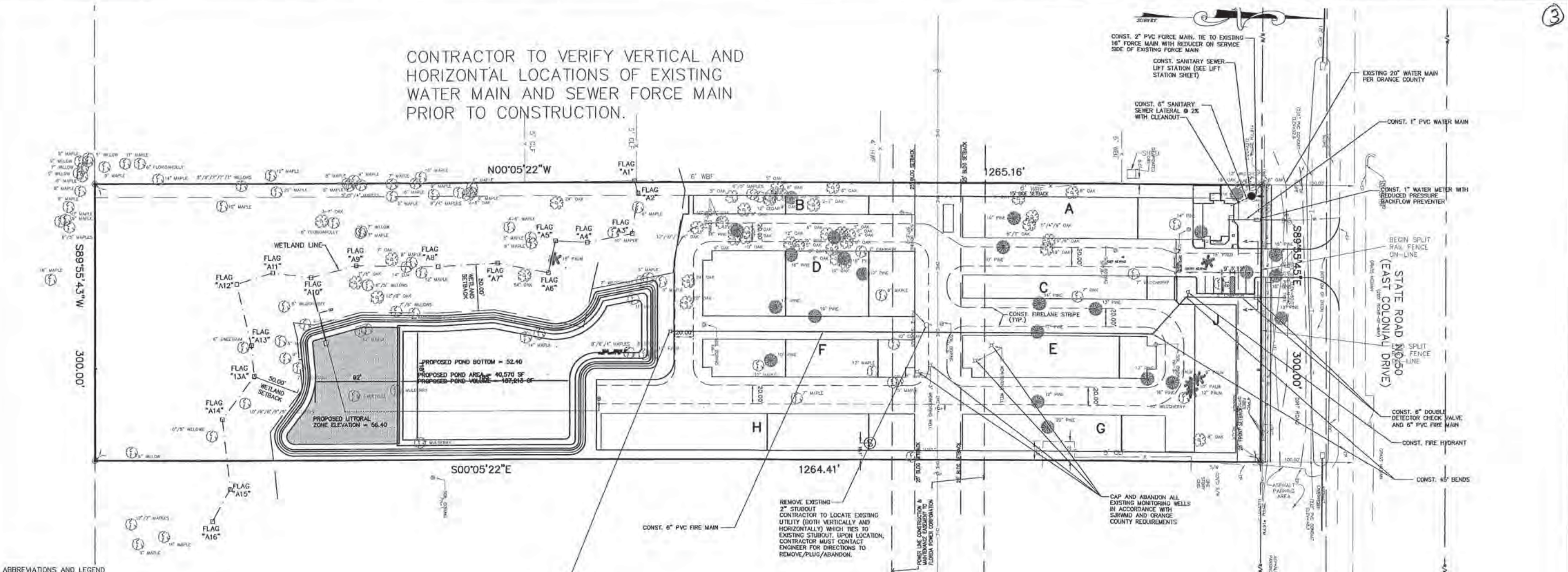
Drawn by: AJR
Designed by: WF
Filename: 9971BaseP2
xref's:

Engineer: Hugh W. Harling, Jr. P.E. No.11629
Job Number: 9971
Scale: 1"=50'
Date: August 06, 2002

Sheet 11 of 34

Appendix: N

Excerpt from Kisinger Campo & Associates Corp.
The Fairways – Self Storage



ABBREVIATIONS AND LEGEND

I.R.	IRON ROD
I.P.	IRON PIPE
℄	CENTERLINE
SEC.	SECTION
RCP	REINFORCED CONCRETE PIPE
CMP	CORRUGATED METAL PIPE
O.R.	OFFICIAL RECORDS (BOOK)
P.B.	PLAT BOOK
PG.	PAGE
	FENCE, AS NOTED
	SIGN
	WATER VALVE
	WATER METER
	UNDERGROUND WATER LINE
	DRAIN PIPE, SIZE NOTED
	GUY ANCHOR
	POWER POLE
	OVERHEAD POWER LINES
	UNDERGROUND TELEPHONE LINES
Ⓢ	SANITARY MANHOLE
E/P	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY (LINE)
LS	LAND SURVEYOR
LB	CERTIFICATE OF AUTHORIZATION
CCR	CERTIFIED CORNER RECORD
WBF	WOOD BOARD FENCE
CLF	CHAIN LINK FENCE
D.B.	DEED BOOK
REC	RECOVERED
	PROPOSED LIFT STATION
	PROPOSED CLEANOUT
	PROPOSED WATER LINE
	PROPOSED SEWER LINE
	PROPOSED FIRE HYDRANT
	PROPOSED REDUCER

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

SURVEYOR'S NOTES:

1. THE BEARINGS SHOWN HEREON ARE ASSUMED, BASED ON THE NORTH LINE OF THE NORTHWEST 1/4 OF SECTION 24, TOWNSHIP 22 SOUTH, RANGE 31 EAST, BEING N88°21'23"E.

2. SUB-SURFACE INSTALLATIONS OR IMPROVEMENTS SUCH AS UNDERGROUND UTILITIES AND FOUNDATIONS HAVE NOT BEEN LOCATED, UNLESS OTHERWISE SHOWN.

3. DATE OF FIELD SURVEY: MAY 18, 2005

4. THIS PROPERTY IS SUBJECT TO THE FOLLOWING EASEMENTS, ENCUMBERANCES, EXCEPTIONS, RESERVATIONS, RESTRICTIONS, COVENANTS, CONDITIONS, ASSIGNMENTS, ASSESSMENTS, OR AGREEMENTS AS LISTED IN SCHEDULE B, SECTION 2 OF THE FIRST AMERICAN TITLE INSURANCE COMPANY'S COMMITMENT NO. 2037-701759, DATED DECEMBER 17, 2004 AT 8:00 AM, PROVIDED TO THIS SURVEYOR BY THE CLIENT:

(A) EASEMENT TO FLORIDA POWER CORPORATION (DEED BOOK 984, PAGE 364, PUBLIC RECORDS, ORANGE COUNTY, FLORIDA) – POWER LINE IS SHOWN HEREON, HOWEVER, THE EASEMENT IS "BLANKET" IN NATURE AND ONLY LIMITS THE PROPERTY OWNER FROM BUILDING WITHIN 25 FEET OF SAID POWER LINE.

FLOOD NOTE:
BASED UPON MY REVIEW OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAPS FOR ORANGE COUNTY, FLORIDA, PANEL Nos. 285 AND 295 OF 700, COMMUNITY PANEL Nos. 12095C0285E AND 12095C0295E (RESPECTIVELY), BOTH WITH AN EFFECTIVE DATE OF DECEMBER 6, 2000, THE PROPERTY SHOWN HEREON LIES PARTIALLY WITHIN ZONE X (AREAS DETERMINED TO BE OUTSIDE 500-YEAR FLOOD PLAIN), AND ZONE A (AREAS WITHIN 100-YEAR FLOOD, NO BASE FLOOD ELEVATIONS DETERMINED).

LEGAL DESCRIPTION (From Title Commitment):

The West 300 feet of the East 1/2 of the Southwest 1/4 of the Northwest 1/4, lying south of highway in Section 24, Township 22 South, Range 31 East, Orange County, Florida.

100827 1

OWNER/APPLICANT:
NOAH'S G.P.
30435 N. HIGHWAY 281
BULVERDE, TEXAS 78163

RECEIVED
AUG 02 2005
PDS
ALTAMONTE BVD. CTR.

KISINGER CAMPO & ASSOCIATES CORP.
2203 NORTH LOIS AVENUE, SUITE 1200
TAMPA, FL 33607
(813) 871-5331
BOARD OF PROFESSIONAL ENGINEERS
CERTIFICATE OF AUTHORIZATION No.00002317

NO.	DATE	REVISIONS

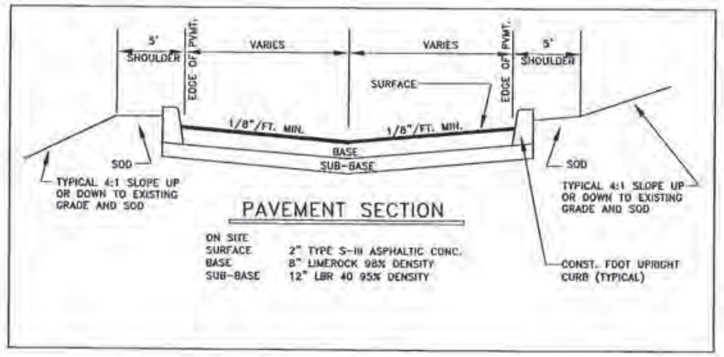
THE FAIRWAYS - SELF STORAGE
WATER & SEWER PLAN

DESIGNED BY: ACM
DRAWN BY:
CHECKED BY:
DATE: 7/29/05
SCALE: 1"=50'
FILE NO. 2200504

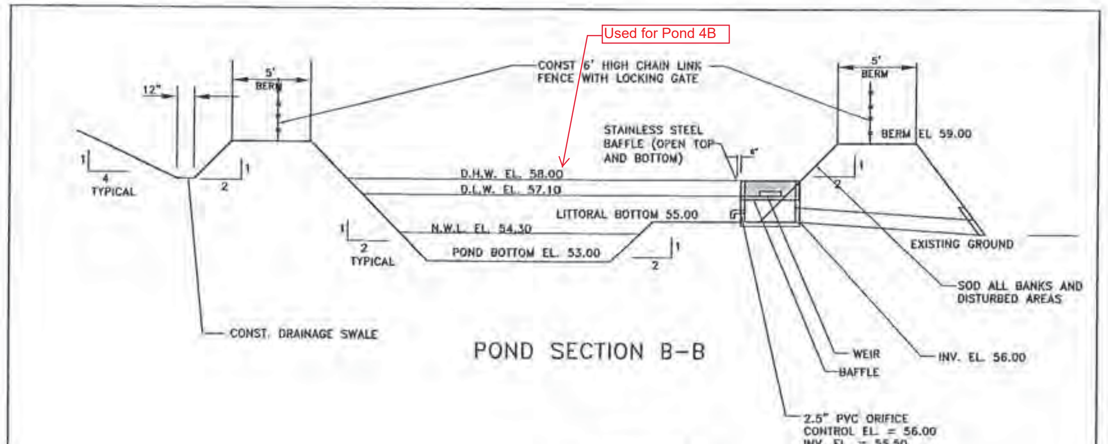
AARON CHRISTOPHER MEARES, P.E.
FLA. REGISTERED ENGINEER NO. 62955

SHEET C2 OF C6

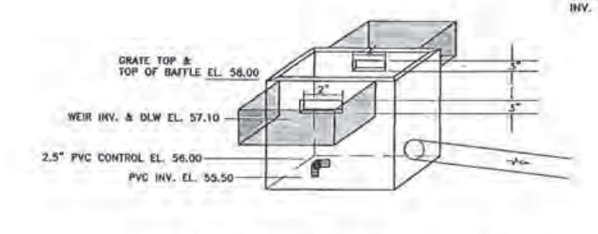
N-1



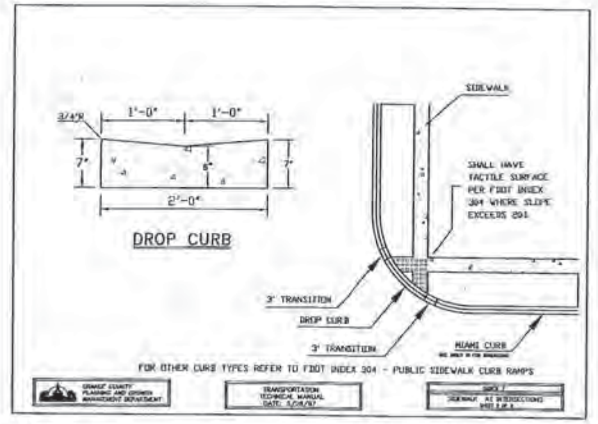
PAVEMENT SECTION



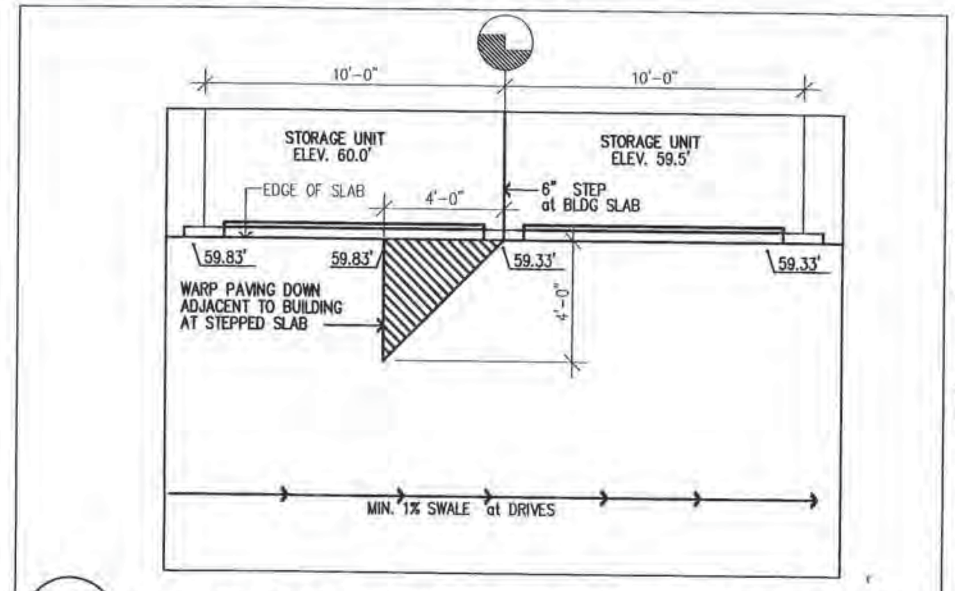
POND SECTION B-B



POND CONTROL STRUCTURE



DROP CURB



1 PAVING TRANSITION at BLDG STEP
1/4"=1'-0"

GENERAL NOTES

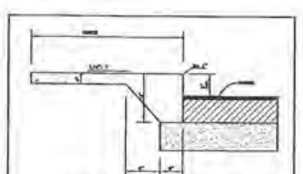
1. The dimensions and locations of the proposed buildings shown hereon are approximate only. Do not utilize said measurements for building layout. Refer to the Architectural drawings for exact building dimensions.
2. Land surveys, soils reports and legal descriptions were provided by others. The Engineer does not certify to the accuracy or completeness of same. The user of these plans shall verify the accuracy of all said information prior to any construction.
3. Prior to construction the Contractor and owner shall determine the locations of all drinking wells, septic tanks, waterways and other facilities to insure that all minimum setbacks between drainage facilities and all other utilities as required by law are met. All existing potable wells within minimum setback areas between any other utility shall be capped or plugged by a licensed water well contractor in accordance with Rules 400-3 and 17-21.10(4). Florida Ad. Code. DO NOT UTILIZE THESE PLANS FOR CONSTRUCTION PRIOR TO THIS INVESTIGATION.
4. Prior to any construction the Contractor shall verify all aboveground and subsurface site conditions, facilities and utilities. The Contractor shall abide by Fl. Statute 93.240 (Sections 566.101 through 566.111 THE UNDERGROUND FACILITY DAMAGE PREVENTION AND SAFETY ACT (call 1-800-432-4770). The Contractor is responsible for the replacement to as-new condition of any existing facility and utility damaged by him whether or not shown hereon.
5. Prior to construction the Contractor shall obtain permits for all on-site and off-site work required by appropriate agencies.
6. Deviations from this drawing are not permitted without the written consent of Orange County and the Engineer. The Contractor shall notify the Engineer of any discrepancies in the drawings prior to proceeding.
7. No construction is permitted in any Conservation Area or setback.
8. All required fill shall meet the Architect's specifications.
9. The Contractor shall furnish and install all materials and labor required for the construction, testing, inspection and completion of the project.
10. The Contractor shall replace all survey stakes destroyed.
11. It is the intent of this design to conform to all applicable ADA codes and regulations, but the Engineer does not warrant or guarantee same to the user of these plans. The user of these plans shall become familiar with said ADA provisions and add same to this plan as necessary to conform to said codes.

ROAD AND DRAINAGE NOTES

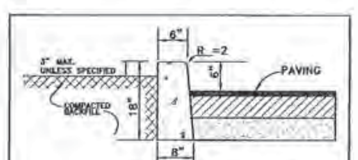
1. All workmanship and materials shall conform to Fla. D.O.T. STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2004 edition and all Orange County Technical Manuals.
2. This drawing shows drainage and grading design to within 5 feet of the building(s) only and specifically excludes designs for structures, retaining walls, waterproofing and ventilation. The Contractor shall coordinate with others to insure that support designs have been completed by other design professionals and that no conflicts exist with any other construction, particularly grading within 5 feet of the buildings.
3. Ponds shall be excavated prior to any other construction, with stormwater runoff directed to them. Over-excavation and burying any debris beneath the pond is prohibited. If dewatering is required the Contractor shall construct settling/percolation ponds on site. Following all other construction, the ponds shall be fine graded and sodded per the plan.
4. EROSION / SEDIMENTATION CONTROL: The Contractor shall supply all erosion / sedimentation barriers (hay bales, silt screens and so forth) to prevent siltation and excess quantities of earth from being transported either by natural drainage or vehicular traffic onto any adjacent properties, streets, storm sewers, waterways, conservation areas and so forth. The Contractor shall clean and restore any areas affected by erosion / sedimentation. Erosion control measures are to be in place at the start of construction and to remain in place until construction is completed. The Contractor is to inspect barriers for damage and maintain as needed.
5. The Contractor shall furnish the Engineer a complete as-built survey performed by a Registered Land Surveyor of all drainage and grading construction within 30 days of construction completion.
6. OPERATION & MAINTENANCE OF THE STORMWATER MANAGEMENT SYSTEM:
   (a) Regularly clean all pipes, weirs and inlets.
   (b) Maintain all design elevations and dimensions in the pond.
   (c) Repair all areas affected by erosion immediately.
   (d) Dry Pond: Mow, clean and power rake the pond bottom regularly.
   (e) Wet Pond: Removal of native vegetation, including cattails is prohibited. Removal includes dredging, the application of herbicides, introduction of grass carp and cutting. Maintenance of the ponds shall include keeping structures free of any obstructions. The maintenance entity should address any questions regarding authorized activities within the wet detention pond to SJRWMD.
7. The Contractor shall remove all existing asphalt, trees being designated as being removed and other debris and dispose of same off site at an approved dumping facility.
8. The Contractor shall stripe the parking lot and install concrete curb stops as indicated hereon.
9. All inlets and grate tops shall be designed and furnished as H-20 load bearing. Grate tops must be traversible by bicycles and pedestrians.
10. The Contractor shall obtain on site piping permits from the Orange County Building Dept. prior to any construction.

Traffic Control Plan:

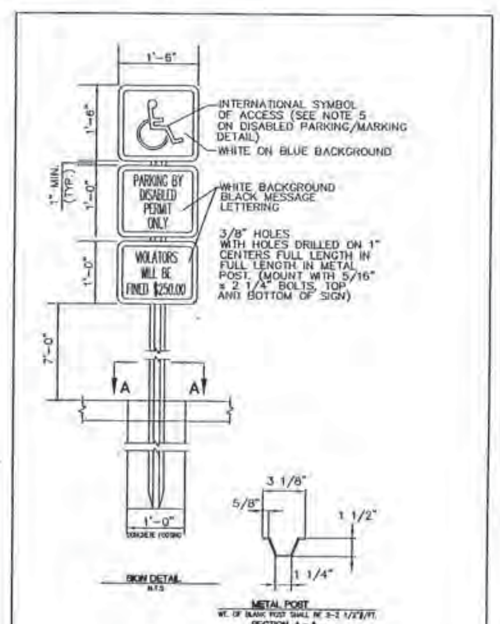
1. The Permittee shall conduct his operations such that there will be a minimum of interference with or interruption of traffic upon and along the roadway. This applies to both the initial installation and the continuing maintenance and operation of facilities except in emergencies There shall be no interference with or interruption of traffic upon and along the roadway until a maintenance of traffic plan approved by the county.
2. During the installation of the facilities authorized by the Use Permit, the Permittee shall at all times maintain flaggers, signs, lights, flares, barricades, and other safety devices as required by the applicable standards or as the County may reasonably deem necessary to properly protect traffic upon the roadway, and to warn and safeguard the public, work crews or County employees against injury or damage.
3. For work within County Right-of-way, submit a maintenance of traffic plan to Orange County Traffic Department.



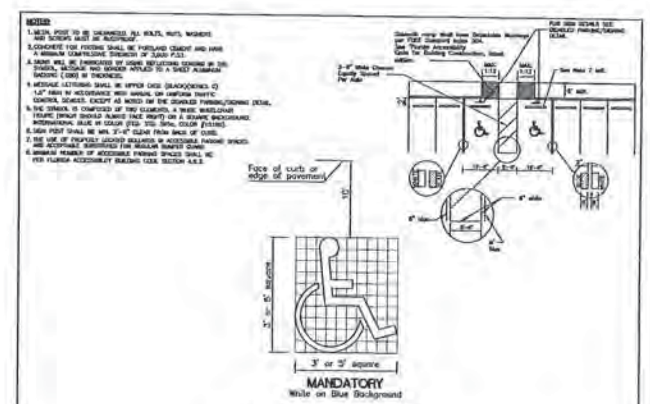
TYPICAL CROSS SECTION OF WALK @ PAVING/PARKING



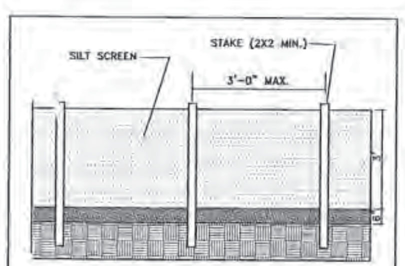
F.D.O.T. TYPE D VERTICAL CURB
(SEE F.D.O.T. INDEX FOR SPECIFIC DETAILS)



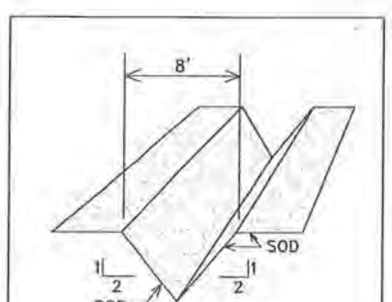
DISABLED PARKING / SIGNING
TYPICAL DETAILS



DISABLED PARKING / MARKING
TYPICAL DETAILS



SILT SCREEN DETAIL



SWALE SECTION

100527 1

RECEIVED
AUG 0 3 2005
PDS
ALTAMONTE SVC. CTR.

Kisinger Campo & Associates Corp.
KISINGER CAMPO & ASSOCIATES CORP.
2203 NORTH LOIS AVENUE, SUITE 1200
TAMPA, FL 33607
(813) 871-5331
BOARD OF PROFESSIONAL ENGINEERS
CERTIFICATE OF AUTHORIZATION No.00002317

NO.	DATE	REVISIONS

THE FAIRWAYS - SELF STORAGE
PAVING & DRAINAGE DETAILS

DESIGNED BY:	ACM	DATE:	08/09/05
DRAWN BY:	SBT	SCALE:	N.T.S.
CHECKED BY:	RST	FILE NO.	2200418

AARON CHRISTOPHER MEARES, P.E.
FLA. REGISTERED ENGINEER NO. 62955

SHEET C3 OF C6

(4)

N-2

Appendix: O

Correspondence

FDOT Drainage Coordination Meeting Minutes
SR408 Extension PD&E (SR408 to SR520 along SR50)
Project No. 408-254
Contract No. 001064

Wednesday, November 18, 2015
1:30 pm to 3:00pm

Attendees: Todd Alexander (FDOT)
Annette Brennan (FDOT)
Gene Howerton (Arcadis)
Walter Nemecek (Arcadis)
Matt Gibbs (CES)
Chris Wence (CES)
Eric Arp (CES)
Ferrell Hickson (FDOT)
Will Sloup (Metric)
Gabriela Garcia (Metric)
Chandra Raman (Metric)
Lance Decuir (Atkins)

- Mr. Sloup introduced the team and explained the project history, background, current scope and status.
- The FDOT team (CES) explained that for the first project segment from Avalon Park to Chuluota Road, most of the drainage is being handled by the eastern project segment (from Chuluota Road to SR 520). FDOT owns a parcel at Corner School Drive which currently has a Park and Ride facility on the northern edge. A portion of that land will be used to construct a new pond for attenuation. The remnants of the land will be deeded over to the School Board who plans on developing the land for a new bus loops facility. This segment discharges to existing cross drains and to the Econlockhatchee River. Permit application is anticipated for April 2016.
- The FDOT project segment from Avalon Park to Chuluota Road has Phase II due January 15, 2016 and final due in August 2016. Survey is completed but required modification due to on-going construction.
- The eastern project segment (Arcadis) will be modifying existing county ponds A1, M1, M2 and M2 East which will be transferred to the FDOT for maintenance. The existing ditches in this segment have severe contamination and are not proposed to be modified. The proposed typical section will consist of curb and gutter with curb flume to drain the roadway runoff into the swales. The swale will drain into Econ River without treatment. Instead of treating SR 50, this segment will modify pond A1 and treat the runoff from the Bithlo community. That pond currently serves as overflow and is not treating the runoff. The county and SJRWMD have approved this method as that community has major contamination issues.
- Phase II for the eastern project segment is due in February 2016. Survey is underway.

- The FDOT team described the following features in the project area:
    - There are many pristine wetlands and the area residents are very protective of them.
    - There are large elevation differences throughout the area
    - There should be available capacity in the existing ponds for treatment. For additional attenuation the existing ponds can likely be modified.
    - There is an existing ICPR model for the area that is owned by the County. The Model was done by Streamline Technologies Inc.
    - The owner of the exiting borrow pits on the northwest of the SR 520 intersection has stated he is willing to sell some borrow pits to the FDOT for use for drainage.
- Econ River is critical for OFW, RFPZ and contaminations.
- Mr. Tim McKinney from United Global Outreach (Florida Hospital Affiliate) is a Bithlo resident that is very involved. The FDOT team recommended that CFX team reach out to him. Mr. Sloup explained that he has been invited to our PAG.
- Frank O'Dea traveled to Tallahassee to discuss funding for the SR 50 widening. The results of the meeting is not known. Both of these projects are top priorities for the district.

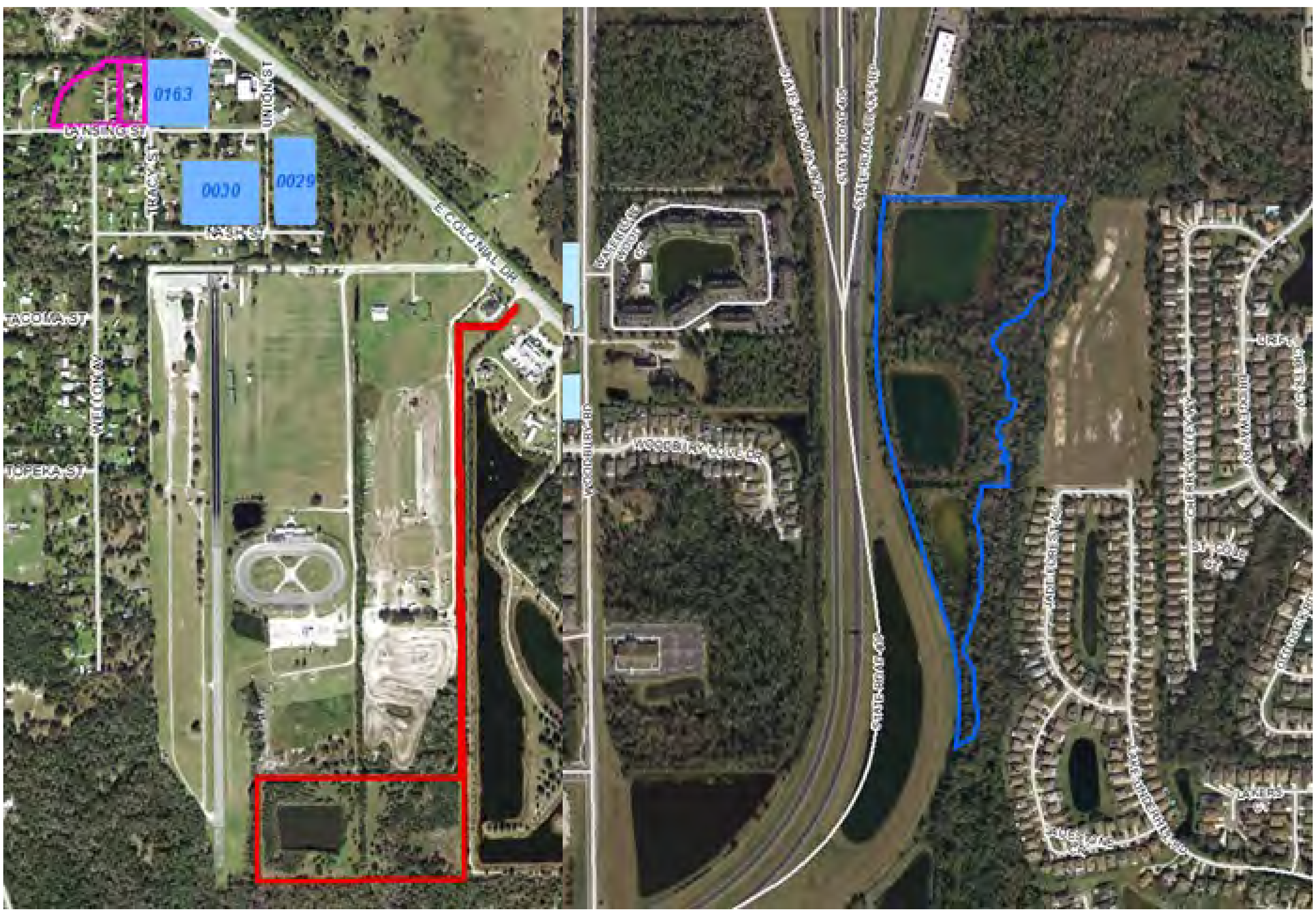

State Road 50
From Chuluota Road to SR 520
FDOT
Corner Lake Middle School
Corner School Dr
Publix Shopping Plaza
Chuluota Rd
SR 50
East River Falcons Way
Story Partin Rd
East River High School
CD1
Shepard Rd
Cox Rd
CD2
Belvedere Rd
3rd St
CD3
POND A1
5th St
North 6th St
North CR 13
North 7th St
North 7th St
Berkeley St
Claradon St
9th St
Exeter St
Old Cheney Hwy
Pair Field St
Gloucester St
CD4
CD5
Bithlo Health Center
POND M1
POND M2
POND M2 EAST
Orlando Speed World Dragway
SR 50

Scott Gamit

From: Grace.ChuaCorn@ocfl.net
Sent: Monday, April 4, 2016 4:14 PM
To: Chandra Raman; William Sloup
Cc: Mike.Drozeck@ocfl.net
Subject: OC Response to Bithlo SWMMP data request - SR 408 Ext PD&E

Please find Bithlo Area Stormwater Management Master Plan Final Reports in the provided link below:
ftp://ftp.orangecountyfl.net/divisions/Public_Works/pub/Stormwater%20Mgmt%20Div/Data%20Request/Metric/

Regarding your County easement inquiries, I found the following details below:
Red outline - Environmentally Sensitive Land / Green Place Project
Pink outline - Vacant Lands / Bithlo Ranches Foreclosure
Blue outline – Retention Ponds / Waterford Lakes Property donated in 2006, this is only easement that I'm sure controlled under Public Works Dept.



Regards,

Grace L. Chua Corn, EI, CFM, GISP
Stormwater Management Division
Orange County Public Works
4200 South John Young Parkway

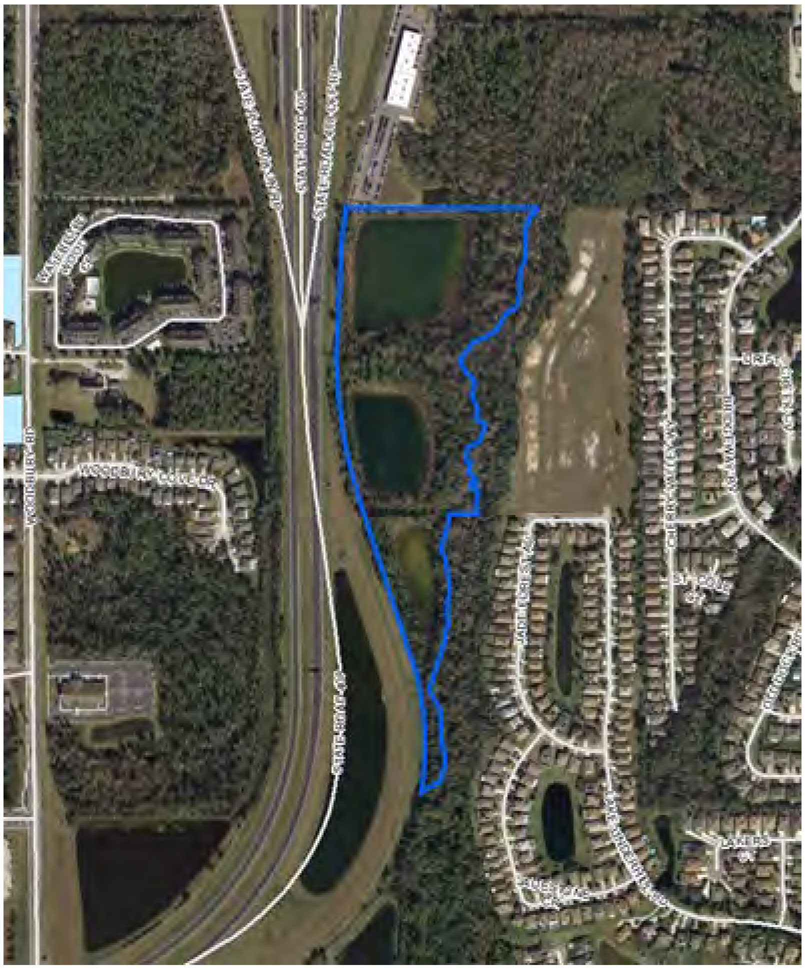
Orlando, Florida 32839
407.836.7965
Grace.ChuaCorn@ocfl.net

PLEASE NOTE: Florida has a very broad public records law (F. S. 119). All e-mails to and from County Officials are kept as a public record. Your e-mail communications, including your e-mail address may be disclosed to the public and media at any time.

Scott Gamit

From:	Grace.ChuaCorn@ocfl.net
Sent:	Wednesday, June 1, 2016 12:28 PM
To:	Chandra Raman
Cc:	Mike.Drozeck@ocfl.net; Jeff.Charles@ocfl.net
Subject:	RE: OC Response to Bithlo SWMMP data request - SR 408 Ext PD&E

For more information regarding the parcel below, please contact Engineering Division.



Point of contact:

Raymond Williams
Chief Engineer
Engineering Division
Orange Co Public Works
Raymond.Williams@ocfl.net
(407) 836-7900

Regards,

Grace L. Chua Corn, EI, CFM, GISP

Stormwater Management Division
Orange County Public Works
407.836.7965
Grace.ChuaCorn@ocfl.net

From: Chandra Raman [mailto:chandra.raman@metriceng.com]
Sent: Friday, April 08, 2016 10:12 AM
To: Chua Corn, Grace L
Subject: RE: OC Response to Bithlo SWMMP data request - SR 408 Ext PD&E

Grace,

Thank you for your prompt response. Need further clarification, is that mean the red and pink outline parcels are not owned by County? What are the blue outline ponds are being used for now.

Thank You

CHANDRA RAMAN, P.E.
Senior Drainage Engineer
11760 Marco Beach Dr,
Jacksonville, Florida 32224
Office: (904)-260-1567
Cell: (561)-713-8977
Fax: (904)-260-1613
chandra.raman@metriceng.com
www.metriceng.com

From: Grace.ChuaCorn@ocfl.net [mailto:Grace.ChuaCorn@ocfl.net]
Sent: Monday, April 04, 2016 4:14 PM
To: Chandra Raman <chandra.raman@metriceng.com>; William Sloup <william.sloup@metriceng.com>
Cc: Mike.Drozeck@ocfl.net
Subject: OC Response to Bithlo SWMMP data request - SR 408 Ext PD&E

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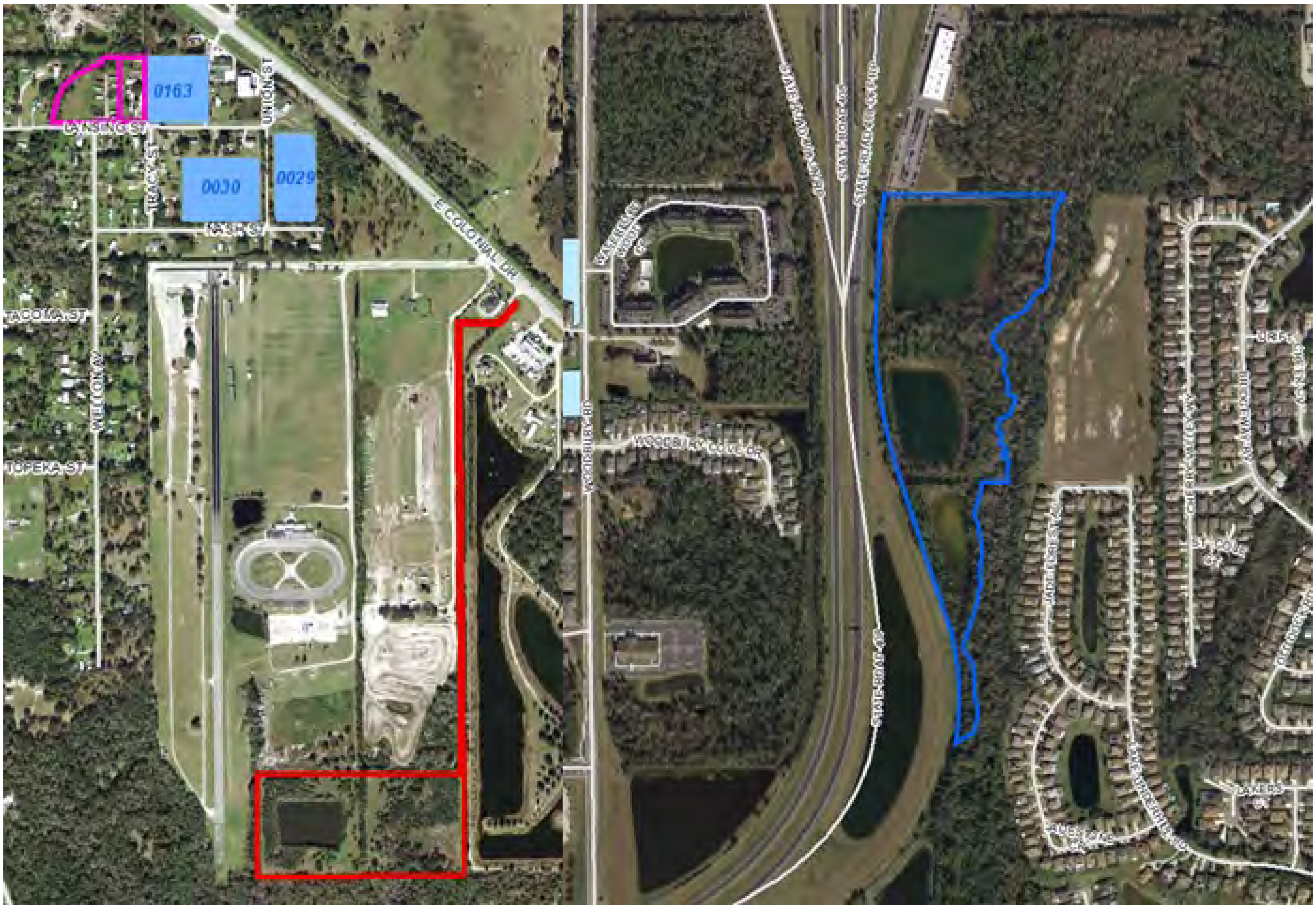
Regarding your County easement inquiries, I found the following details below:
Red outline - Environmentally Sensitive Land / Green Place Project
Pink outline - Vacant Lands / Bithlo Ranches Foreclosure
Blue outline – Retention Ponds / Waterford Lakes Property donated in 2006, this is only easement that I'm sure controlled under Public Works Dept.



Regards,

Grace L. Chua Corn, EI, CFM, GISP
Stormwater Management Division
Orange County Public Works
4200 South John Young Parkway
Orlando, Florida 32839
407.836.7965
Grace.ChuaCorn@ocfl.net

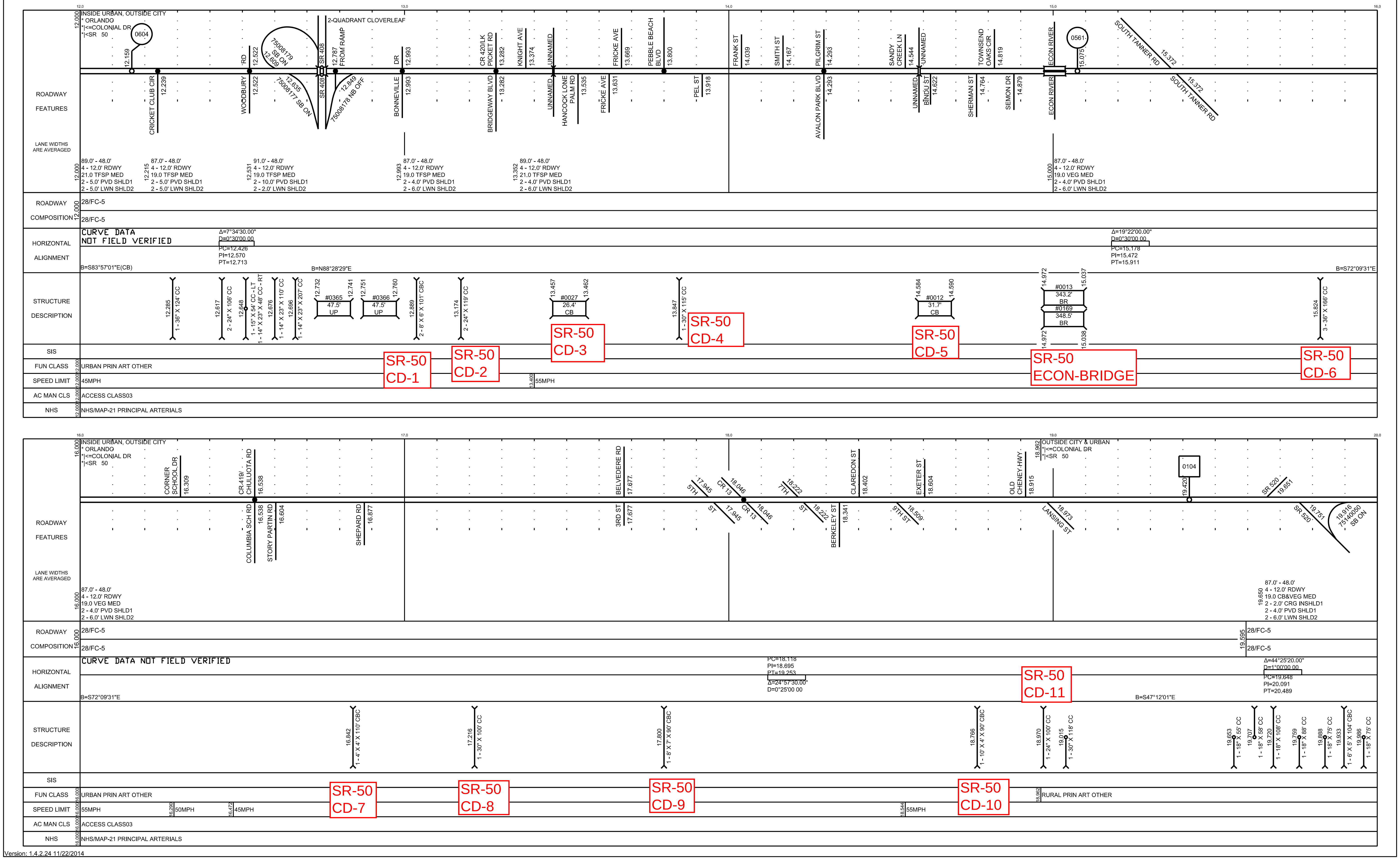
PLEASE NOTE: Florida has a very broad public records law (F. S. 119).
All e-mails to and from County Officials are kept as a public record.

Your e-mail communications, including your e-mail address may be disclosed to the public and media at any time.

Appendix: P

SR.50 Straight Line Diagram

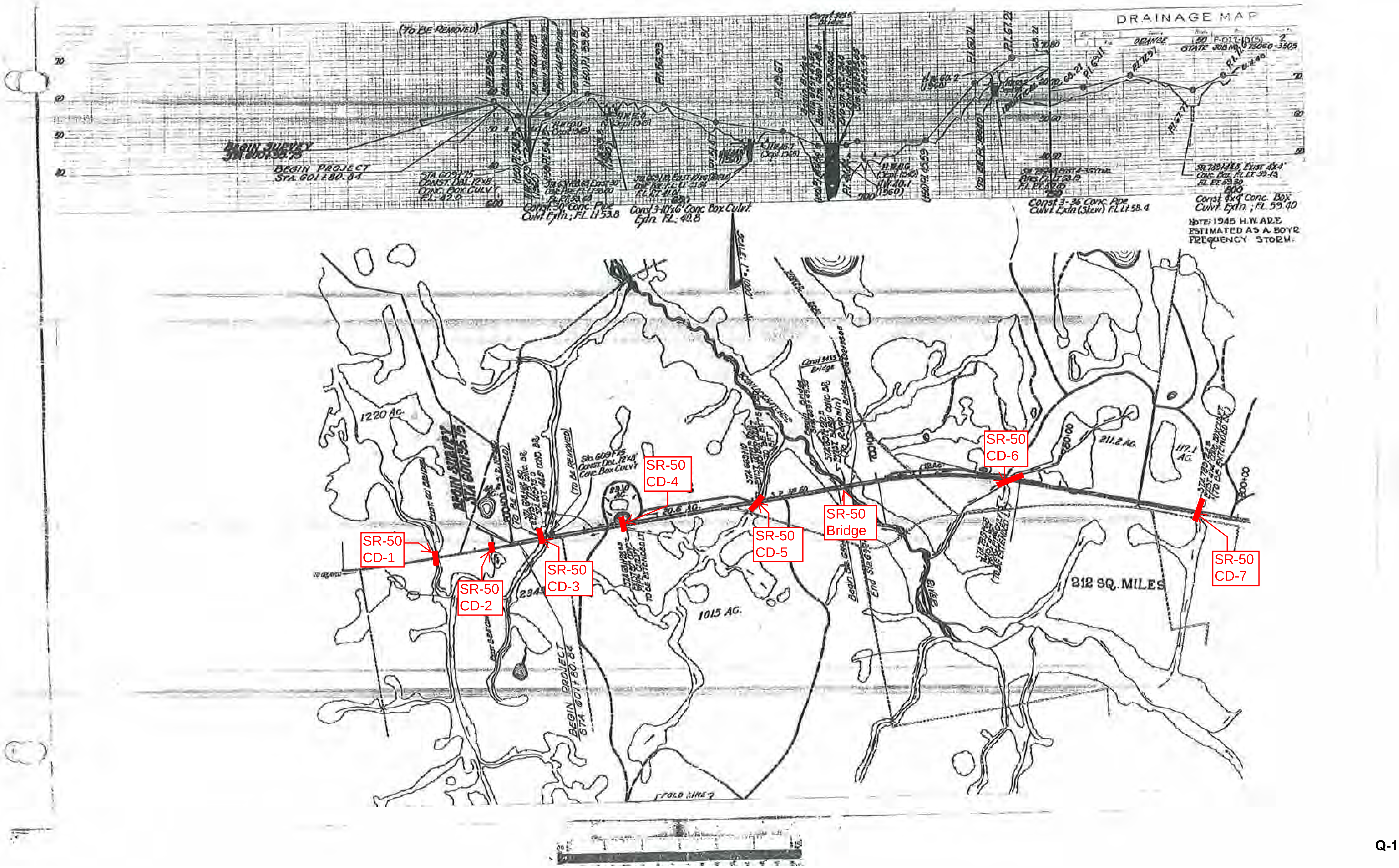
	5 YR INV	SLD REV	BMP	EMP	INV	SLD REV	FLORIDA DEPARTMENT OF TRANSPORTATION	SECTION STATUS	INT. or US ROUTE NO.	STATE ROAD NO.	COUNTY	DISTRICT	ROADWAY ID	SHEET NO:
DATE	07/23/2014	08/18/2014	000.000	029.005		12/23/2014 MR	STRAIGHT LINE DIAGRAM OF ROAD INVENTORY	02	US 92/US 17	SR 50/SR 600	ORANGE	05	75060000	3 OF 4
BY	Kim Auerbach	Michael Register												

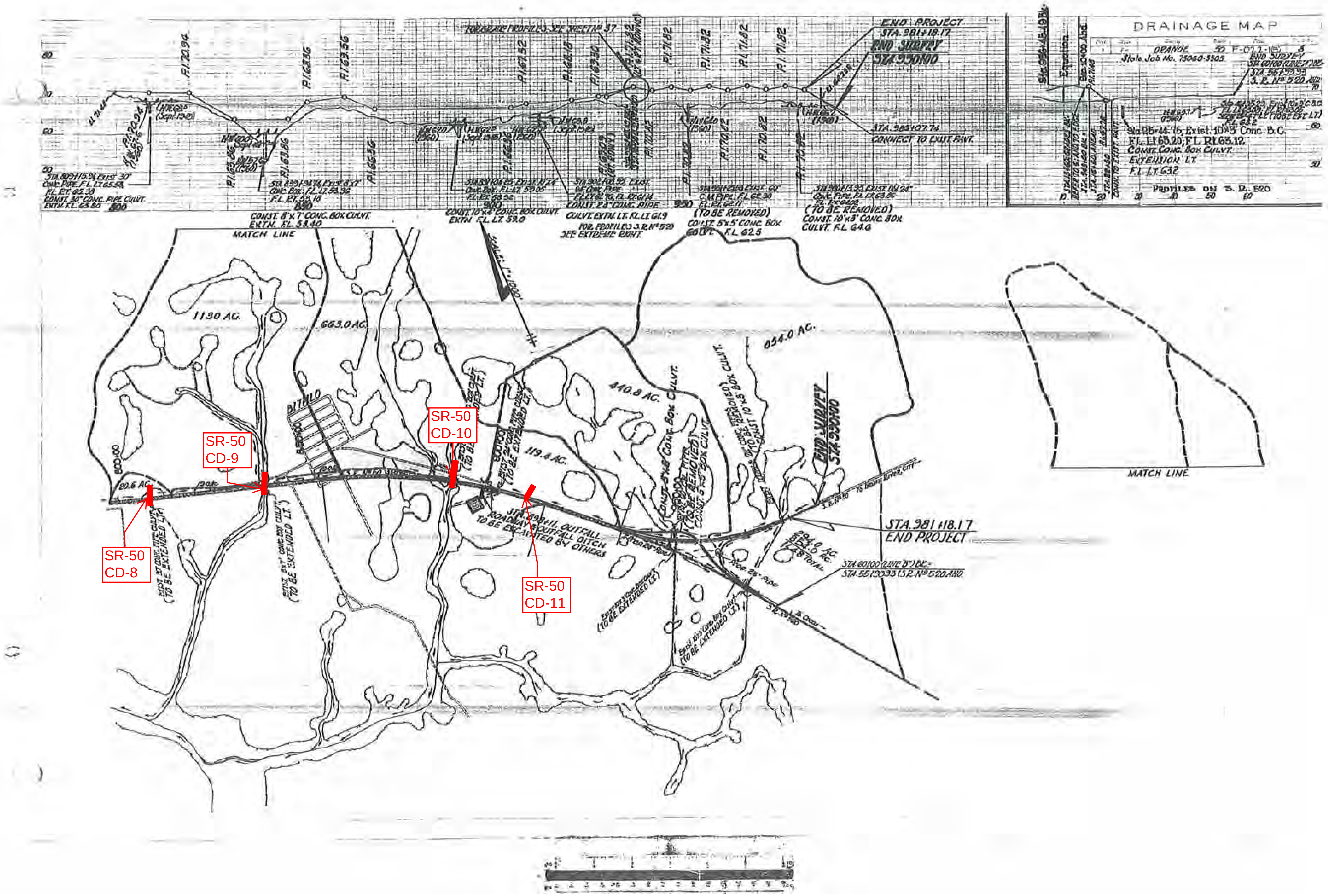


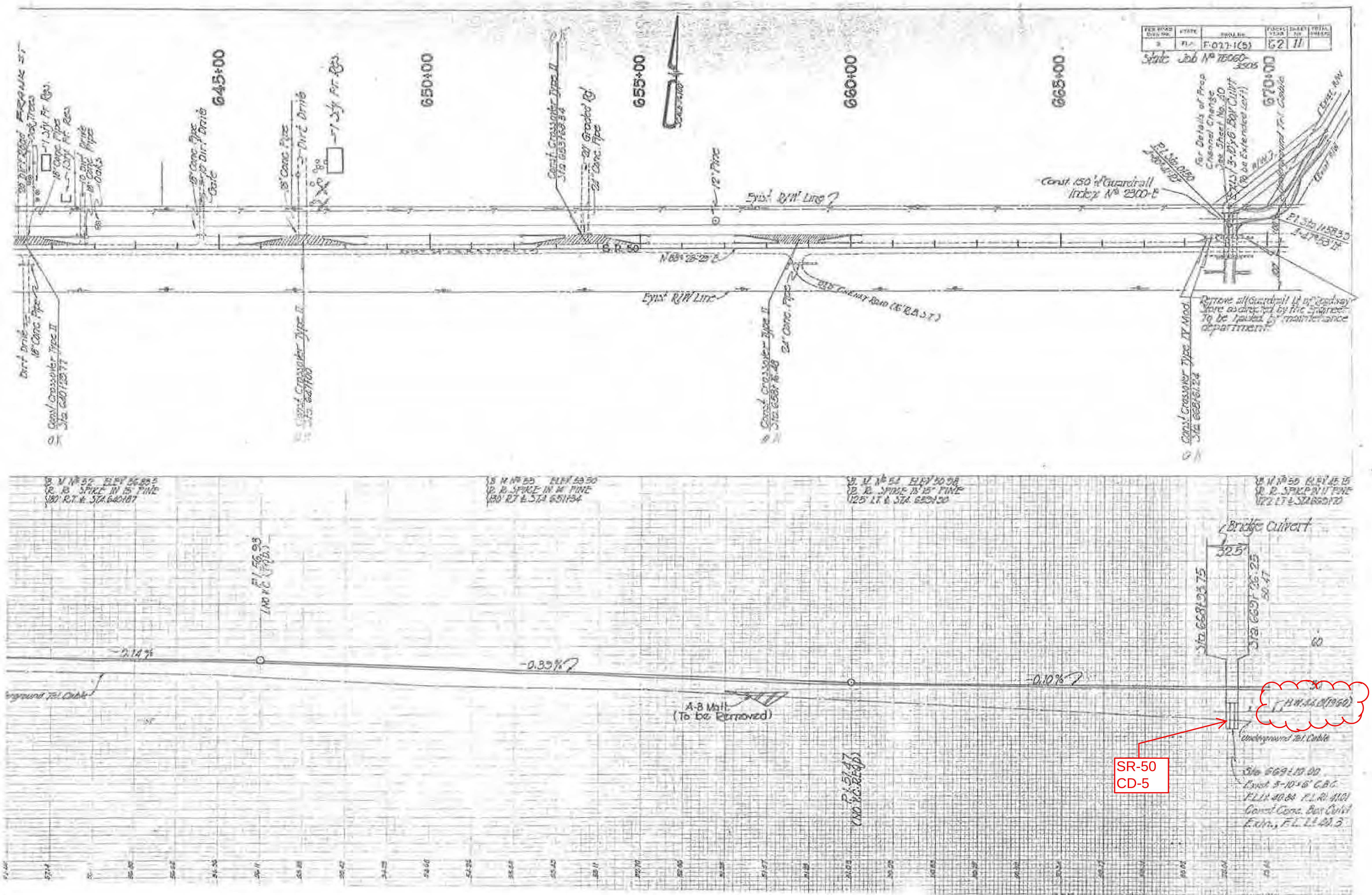
Version: 1.4.2.24 11/22/2014

Appendix: Q

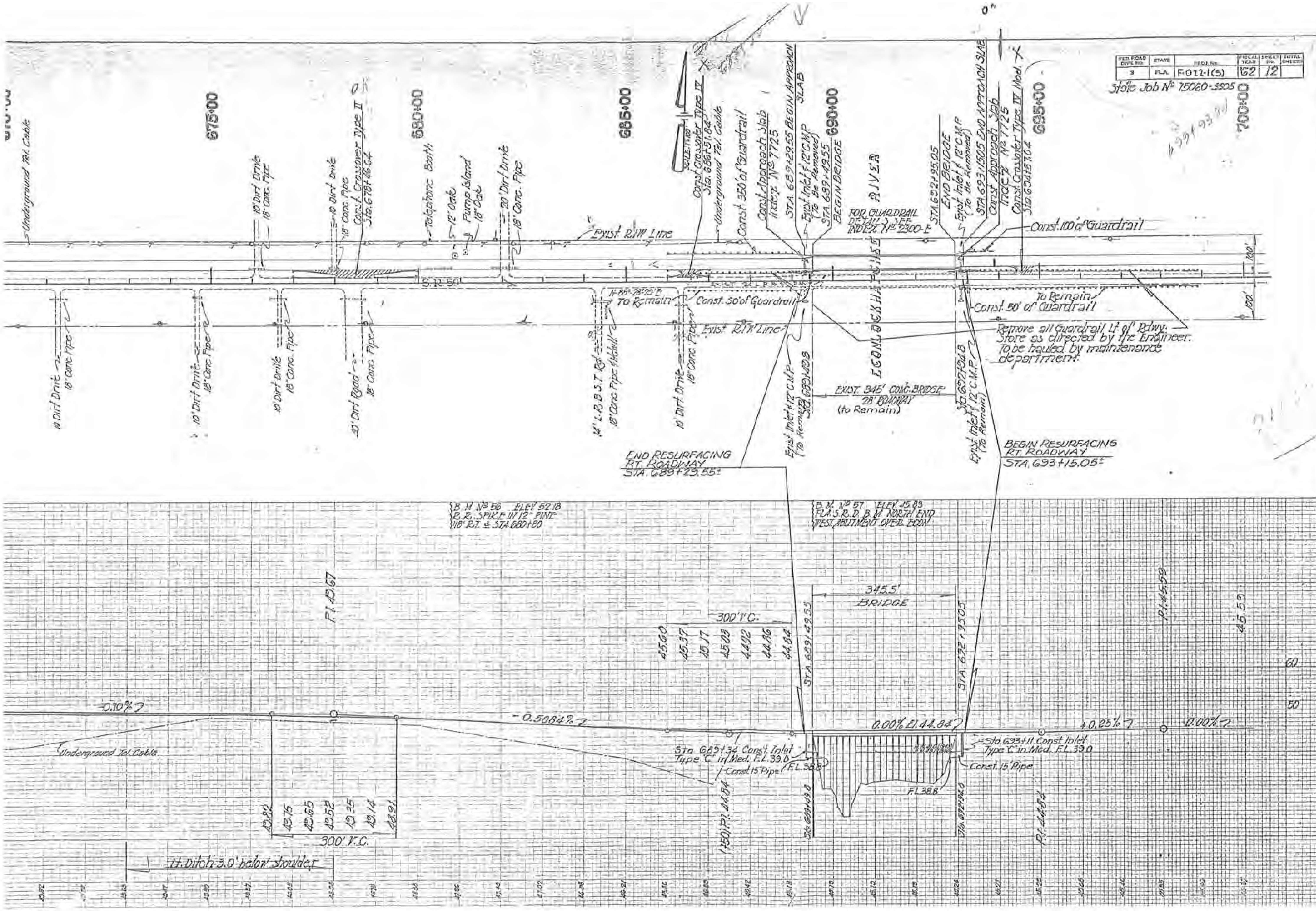
Excerpt from SR 50 Original Construction Plans


DRAINAGE MAP
BEGIN SURVEY
BEGIN PROJECT
1220 Ac.
1015 AC.
211.2 AC.
212 SQ. MILES
Const. 3-10'x6' Conc. Box Culvt. Extn. FL. 40.8
Const. 4'x4' Conc. Box Culvt. Extn.; FL. 59.40
NOTE: 1945 H.W. ARE ESTIMATED AS A 50 YR FREQUENCY STORM.
FOLD LINE
SR-50 CD-1
SR-50 CD-2
SR-50 CD-3
SR-50 CD-4
SR-50 CD-5
SR-50 Bridge
SR-50 CD-6
SR-50 CD-7

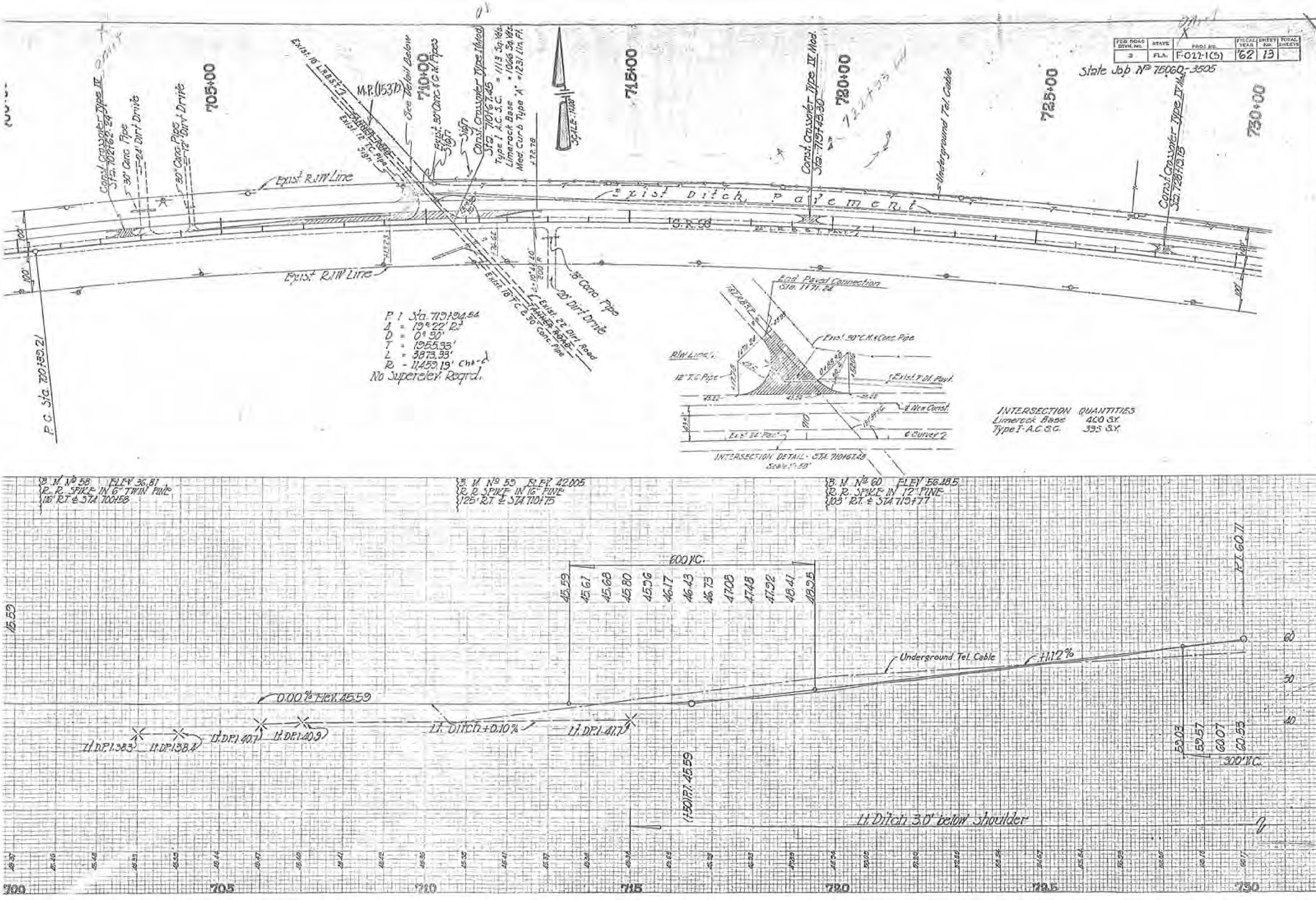

DRAINAGE MAP
ORANGE
State Job No. 75060-3505
END PROJECT
STA. 981+18.17
END SURVEY
STA. 990+00
CONNECT TO EXIST. PAVT.
MATCH LINE
1130 AC.
663.0 AC.
440.8 AC.
119.4 AC.
20.6 AC.
854.0 AC.
BITHLO
SR-50
CD-8
SR-50
CD-9
SR-50
CD-10
SR-50
CD-11
STA. 981+18.17
END PROJECT
PROFILES ON S. R. 520


F-027-1(5)
62
11
State Job No 75060-3505
645+00
650+00
655+00
660+00
665+00
670+00
Exist. R/W Line
Const. 150' of Guardrail Index No 2300-E
For Details of Prop. Channel Change See Sheet No. 20
Remove all Guardrail Lt of Roadway Store as directed by the Engineer To be hauled by maintenance department
Const. Crossover Type II
Const. Crossover Type IV Mod.
12" Pipe
24" Conc. Pipe
18" Conc. Pipe
Bridge Culvert
32.5'
Sta 668+33.75
-0.14%
-0.33%
-0.10%
A-8 Malt (To be Removed)
Underground Tel. Cable
Sta 669+10.00
Exist. 3-10'x6' C.B.C.
Const. Conc. Box Culvt Extn.
SR-50
CD-5

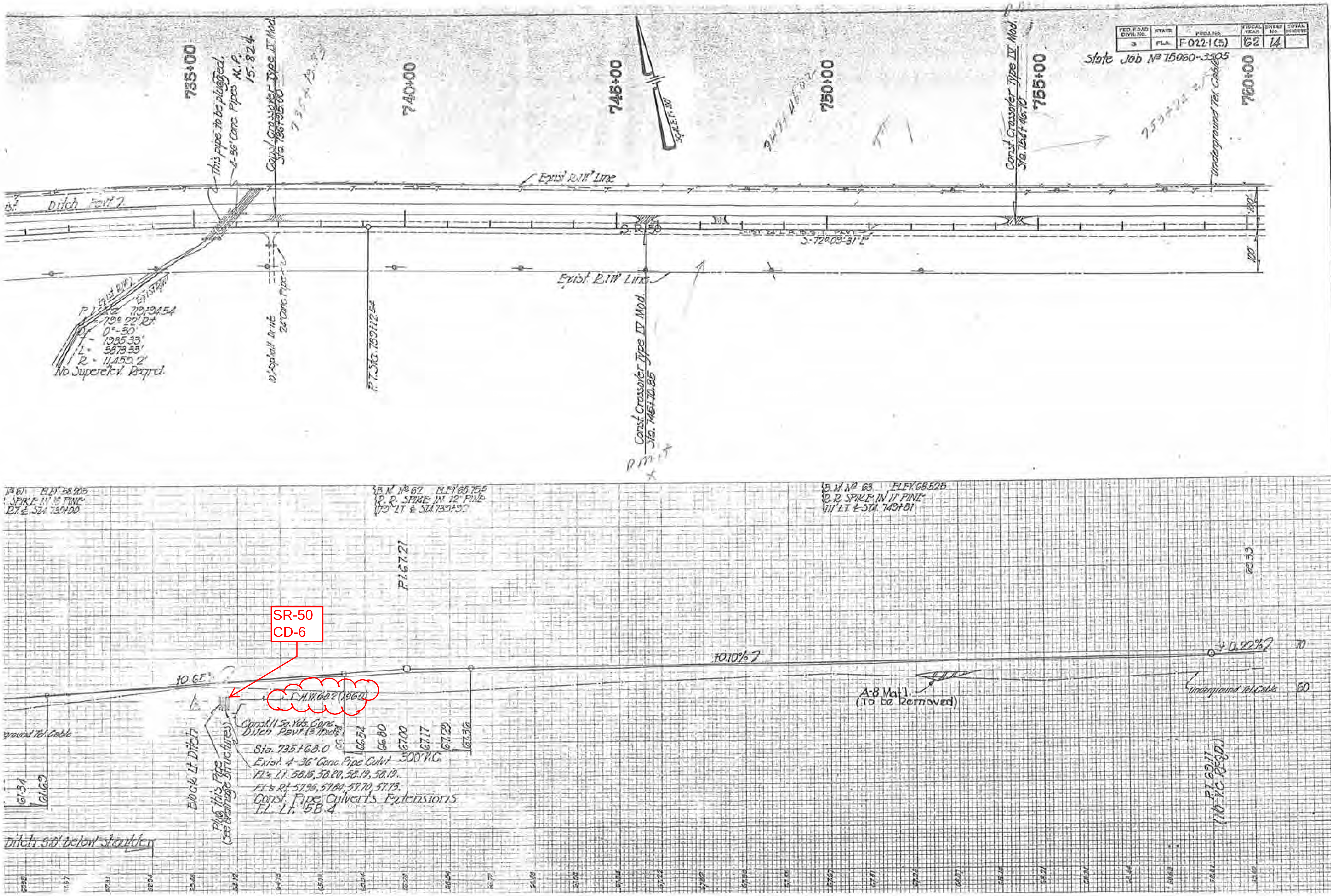
Q-3


FED. ROAD DIVN. No. 3
STATE FLA.
PROJ. No. F-022-1(5)
FISCAL YEAR 62
SHEET No. 12
State Job No. 75060-3505
675+00
680+00
685+00
690+00
695+00
700+00
Underground Tel. Cable
10' Dirt Drive 18" Conc. Pipe
10' Dirt Drive 18" Conc. Pipe
Const. Crossover Type II Sta. 678+46.64
Telephone Booth
12" Oak
Pump Island
18" Oak
20' Dirt Drive 18" Conc. Pipe
Exist. R/W Line
S.R. 50
To Remain
Const. Crossover Type II Sta. 686+51.84
Underground Tel. Cable
Const. 350' of Guardrail
Const. Approach Slab Index No. 7725
STA. 689+29.55 BEGIN APPROACH SLAB
Exist. Inlet & 12" C.M.P. (To Be Removed)
STA. 689+49.55 BEGIN BRIDGE
FOR GUARDRAIL DETAILS SEE INDEX No. 2300-E
ECONLOCKHATCHEE RIVER
STA. 692+95.05 END BRIDGE
Exist. Inlet & 12" C.M.P. (To Be Removed)
STA. 693+15.05 END APPROACH SLAB
Const. Approach Slab Index No. 7725
Const. Crossover Type IV Mod. Sta. 694+17.04
Const. 100' of Guardrail
Const. 50' of Guardrail
Const. 50' of Guardrail
To Remain
Remove all Guardrail Lt. of Rdwy. Store as directed by the Engineer. To be hauled by maintenance department.
10' Dirt Drive 18" Conc. Pipe
10' Dirt Drive 18" Conc. Pipe
10' Dirt Drive 18" Conc. Pipe
20' Dirt Road 18" Conc. Pipe
14' L.R.B.S.T. Rd. 18" Conc. Pipe Rt. & Lt.
10' Dirt Drive 18" Conc. Pipe
Exist. Inlet & 12" C.M.P. (To Remain) Sta. 689+10.8
EXIST. 345' CONC. BRIDGE 28' ROADWAY (to Remain)
Exist. Inlet & 12" C.M.P. (To Remain) Sta. 693+24.8
END RESURFACING RT. ROADWAY STA. 689+29.55±
BEGIN RESURFACING RT. ROADWAY STA. 693+15.05±
B.M. No. 56 ELEV. 52.18 R.R. SPIKE IN 12" PINE 118' RT. ℄ STA. 680+80
B.M. No. 57 ELEV. 45.83 FLA. S.R.D. B.M. NORTH END WEST ABUTMENT OVER ECON
P.I. 49.67
300' V.C.
45.60
45.37
45.17
45.03
44.92
44.86
44.84
345.5' BRIDGE
STA. 689+49.55
STA. 692+95.05
P.I. 45.59
45.59
60
50
-0.10%
-0.50847%
0.00% El. 44.84
+0.25%
0.00%
Underground Tel. Cable
Sta. 689+34 Const. Inlet Type 'C' in Med. F.L. 39.0
Const. 15" Pipe
F.L. 38.8
Sta. 693+11 Const. Inlet Type 'C' in Med. F.L. 39.0
Const. 15" Pipe
F.L. 38.8
Sta. 689+49.8
Sta. 692+94.0
49.82
49.75
49.65
49.52
49.35
49.14
48.91
300' V.C.
(150) P.I. 44.84
P.I. 44.84
Lt. Ditch 3.0' below shoulder

Q-4

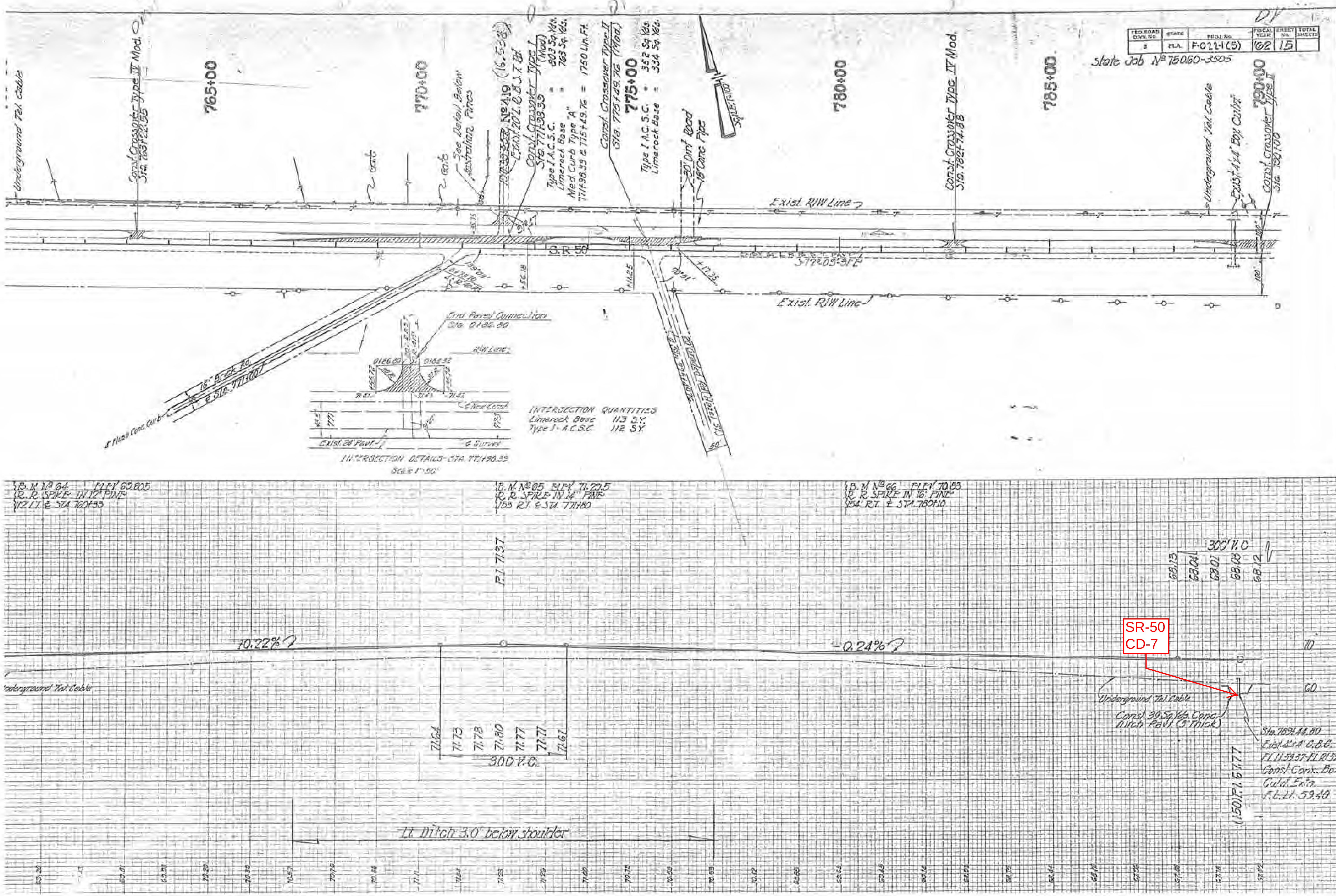


FED. ROAD DIVN. NO. 3 | STATE FLA. | PROJ. NO. F-022-1(5) | FISCAL YEAR '62 | SHEET NO. 13 | TOTAL SHEETS
State Job No 75060-3505
705+00
710+00
715+00
720+00
725+00
730+00
Const. Crossover Type III Sta. 702+62.24
30" Conc. Pipe
24' Dirt Drive
30" Conc. Pipe + 12' Dirt Drive
Exist. R/W Line
Exist. 16" L.R.B.S.T.
Exist. 12" T.C. Pipe
M.P. (153)
See Detail Below
Exist. 30" Conc. & C.M. Pipes
Sign
Const. Crossover Type I (Mod) Sta. 710+67.45
Type 1 A.C.S.C. = 1113 Sq. Yds.
Limerock Base = 1066 Sq. Yds.
Med. Curb Type "A" = 1231 Lin. Ft.
Scale 1"=100'
Exist. Ditch Pavement
S.R. 50
Const. Crossover Type III Mod. Sta. 719+49.30
Underground Tel. Cable
Const. Crossover Type IV Mod. Sta. 728+13.15
Exist. R/W Line
18" Conc. Pipe
20' Dirt Drive
Exist. 18" T.C. & 30" Conc. Pipe
Exist. 22' Dirt Road
P.C. Sta. 700+39.21
P I Sta. 713+94.54
Δ = 19° 22' Rt
D = 0° 30'
T = 1955.33'
L = 3873.33'
R = 11,459.19' Chord
No Superelev. Reqrd.
End Paved Connection Sta. 11+71.22
Exist. 30" C.M. & Conc. Pipe
R/W Lines
12" T.C. Pipe
Exist. 2' Dt. Pavt.
¢ New Const.
¢ Curve 2
INTERSECTION DETAIL - STA. 710+67.45
Scale 1"=50'
INTERSECTION QUANTITIES
Limerock Base 400 S.Y.
Type I - A.C.S.C. 395 S.Y.
B. M. No 58 ELEV. 36.81
R. R. SPIKE IN 6" TWIN PINE
116' RT. ¢ STA. 700+58
B. M. No 59 ELEV. 42.005
R. R. SPIKE IN 16" PINE
125' RT. ¢ STA. 710+75
B. M. No 60 ELEV. 56.485
R. R. SPIKE IN 12" PINE
105' RT. ¢ STA. 719+77
600' V.C.
45.59 45.61 45.68 45.80 45.96 46.17 46.43 46.73 47.08 47.48 47.92 48.41 48.95
45.59
0.00% Elev. 45.59
Lt. Ditch +0.10%
Lt. D.P.1 38.3
Lt. D.P. 38.4
Lt. D.P. 40.7
Lt. D.P. 40.9
Lt. D.P. 41.7
(+50) P.T. 45.59
Underground Tel. Cable
+1.12%
P.T. 60.11
59.03 59.57 60.07 60.53
300' V.C.
60
50
40
Lt. Ditch 3.0' below Shoulder
700
705
710
715
720
725
730



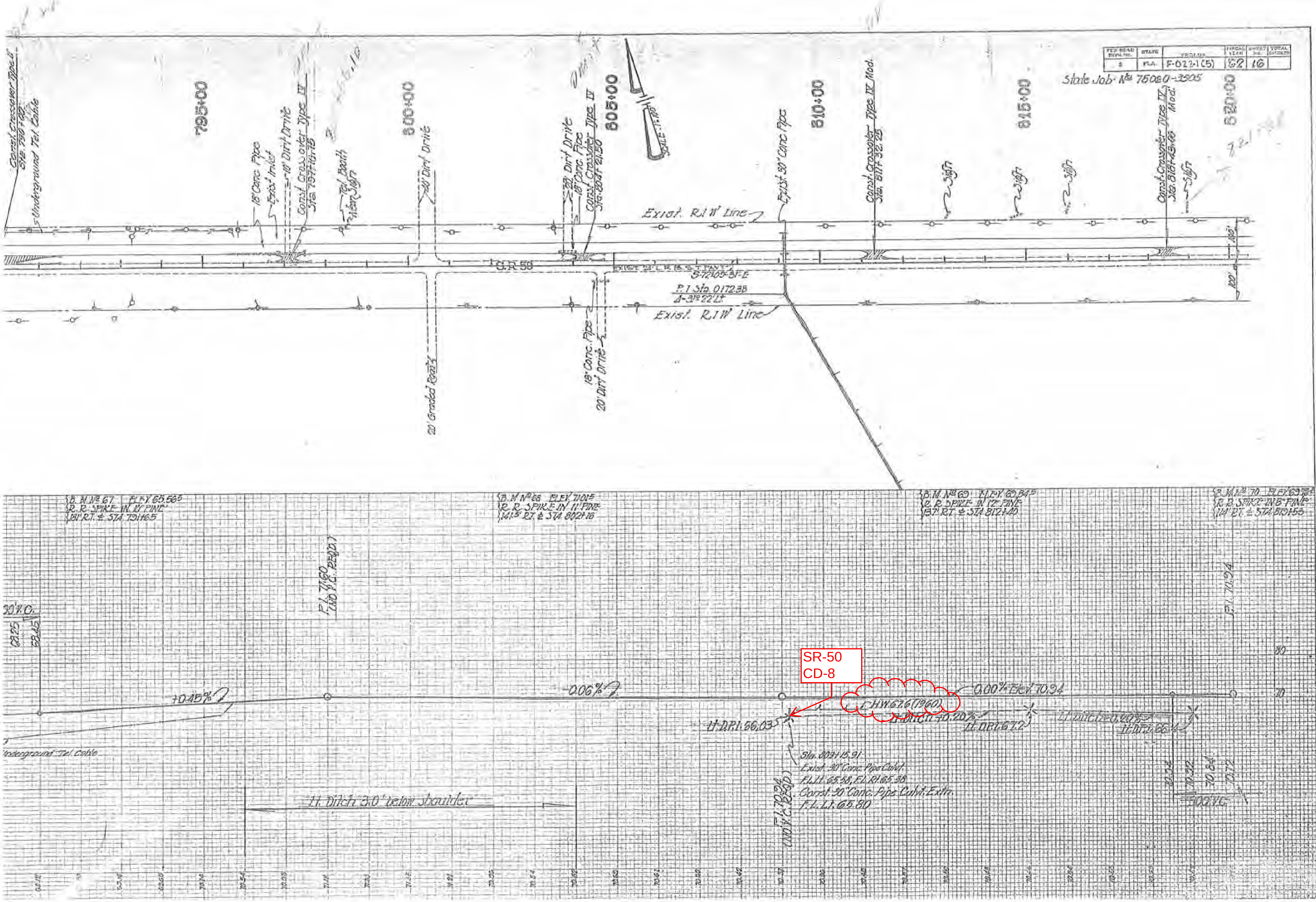
FED. ROAD DIVN. NO. 3
STATE FLA.
PROJ. NO. F-022-1(5)
FISCAL YEAR 62
SHEET NO. 14
State Job № 75060-3505
735+00
740+00
745+00
750+00
755+00
760+00
This pipe to be plugged, 4-36" Conc. Pipes M.P. 15.824
Const. Crossover Type IV Mod. Sta. 736+95.00
Const. Crossover Type IV Mod. Sta. 754+46.70
Const. Crossover Type IV Mod. Sta. 745+70.85
Exist. R/W Line
Ditch Pavt.
S.R. 50
S-72°09'-31"E
Underground Tel. Cable
P.T. Sta. 739+12.54
24" Conc. Pipe
No Superelev. Reqrd.
B.M. № 62 ELEV. 65.755 R.R. SPIKE IN 12" PINE
B.M. № 63 ELEV. 68.525 R.R. SPIKE IN 11" PINE 111' LT. ℄ STA. 743+81
P.I. 67.21
+0.10%
+0.22%
SR-50
CD-6
C.H.W. 60.2 (1960)
Const. 11 Sq. Yds. Conc. Ditch Pavt. (3" Thick)
Sta. 735+68.0
Exist. 4-36" Conc. Pipe Culvt.
Const. Pipe Culverts Extensions
EL. Lt. 58.4
300' V.C.
66.54
66.80
67.00
67.17
67.29
67.36
Block Lt. Ditch
Plug this Pipe (See Drainage Structures)
A-8 Mat'l. (To be Removed)
P.I. 69.11 (No V.C. Reqd.)
69.33
Ditch 5.0' below shoulder
70
60

Q-6



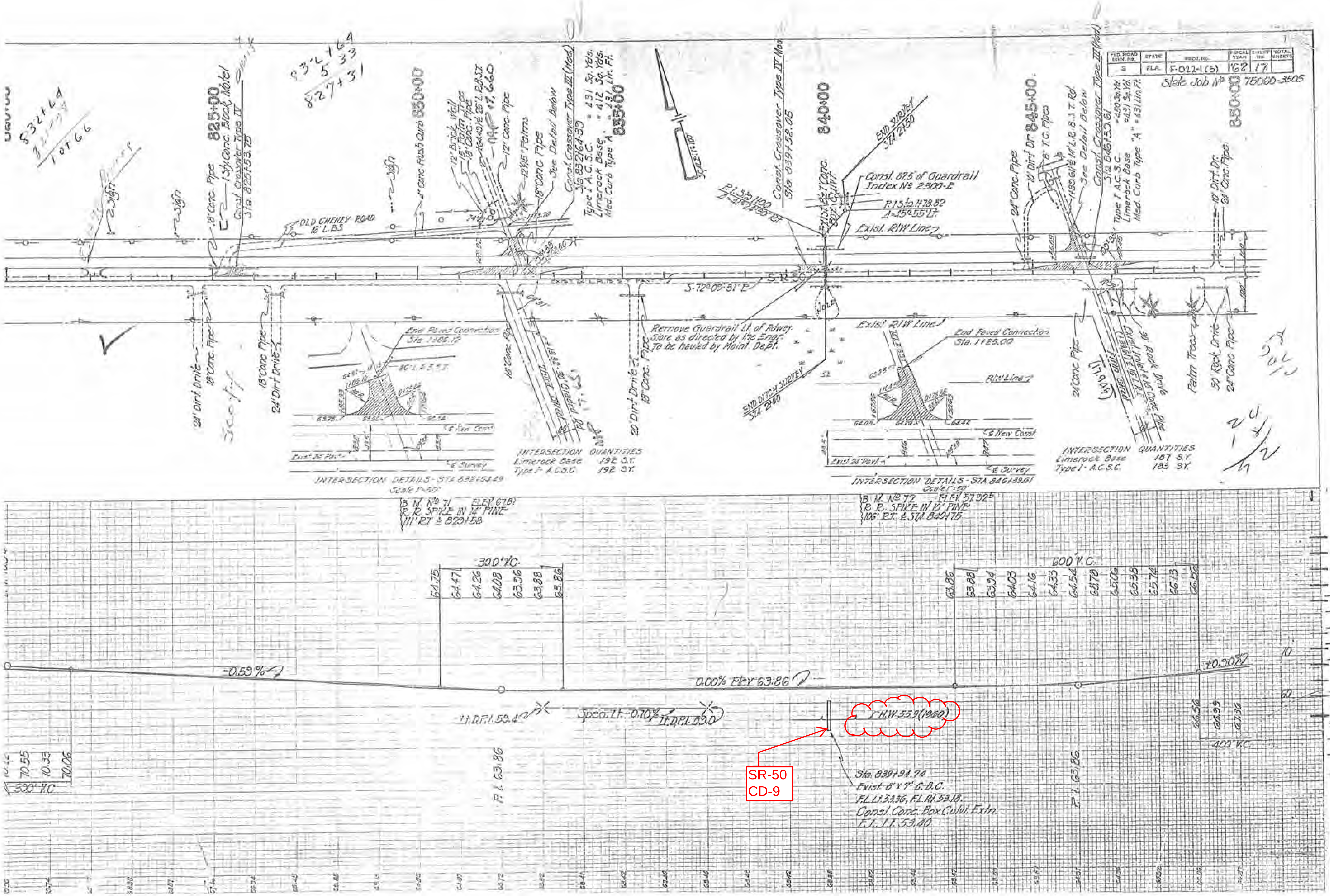
FED. ROAD DIV. NO. 3 STATE FLA. PROJ. NO. F-022-1(5) FISCAL YEAR '62 SHEET NO. 15
State Job Nº 75060-3505
765+00
770+00
775+00
780+00
785+00
790+00
Underground Tel. Cable
Const. Crossover Type III Mod. Sta. 763+29.55
Gate
See Detail Below
Australian Pines
Const. Crossover Type I Sta. 771+38.35
Type I A.C.S.C. = 603 Sq. Yds.
Limerock Base = 763 Sq. Yds.
Med. Curb Type "A" 771+98.39 & 775+49.76 = 1750 Lin. Ft.
Const. Crossover Type II (Mod.) Sta. 775+49.76
Type I A.C.S.C. = 352 Sq. Yds.
Limerock Base = 334 Sq. Yds.
30' Dirt Road
18" Conc. Pipe
Scale 1"=100'
Const. Crossover Type IV Mod. Sta. 782+74.38
Exist. 4x4 Box Culvt.
Const. Crossover Type II Sta. 790+00
Exist. R/W Line
S.R. 50
S 72°05'-31" E
16' Brick Rd.
Flush Conc. Curb
End Paved Connection Sta. 0+86.80
R/W Line
INTERSECTION QUANTITIES
Limerock Base 113 S.Y.
Type I - A.C.S.C. 112 S.Y.
Exist. 24' Pavt.
℄ Survey
INTERSECTION DETAILS - STA. 771+98.39
Scale 1"=50'
B. M. Nº 64 ELEV. 60.805 R. R. SPIKE IN 12" PINE 112' LT. ℄ STA. 760+33
B. M. Nº 65 ELEV. 71.295 R. R. SPIKE IN 14" PINE 153' RT. ℄ STA. 771+80
B. M. Nº 66 ELEV. 70.83 R. R. SPIKE IN 16" PINE 54' RT. ℄ STA. 780+10
P.I. 71.97
+0.72%
-0.24%
300' V.C.
71.64 71.73 71.78 71.80 71.77 71.71 71.61
68.13 68.04 68.01 68.03 68.12
Underground Tel. Cable
Const. 39 Sq. Yds. Conc. Ditch Pavt. (5" Thick)
Sta. 789+44.80
Exist. 4'x4' C.B.C.
Const. Conc. Box Culvt. Extn.
F.L. Lt. 59.40
Lt. Ditch 3.0' below shoulder
70
60
SR-50
CD-7

Q-7

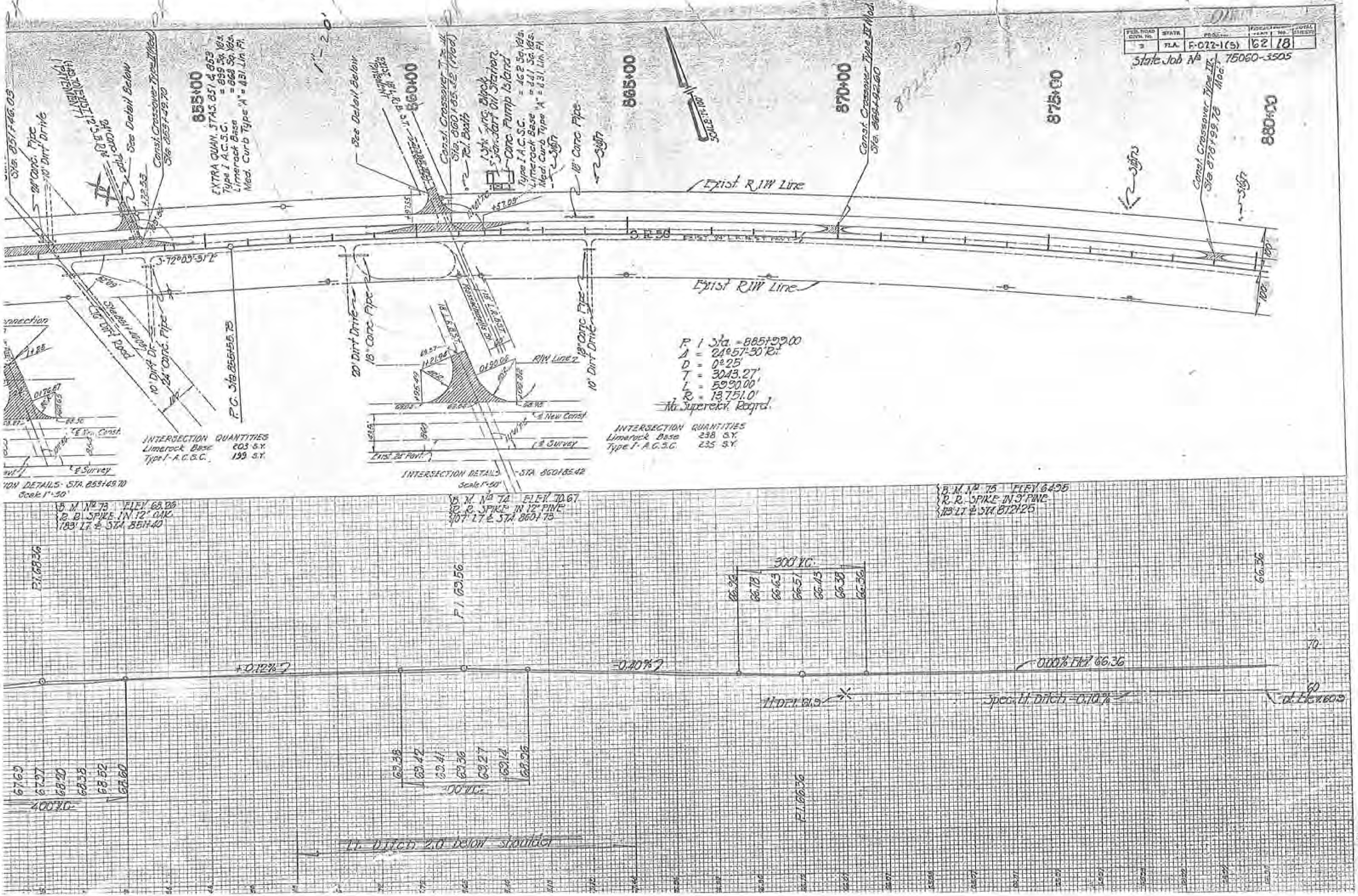


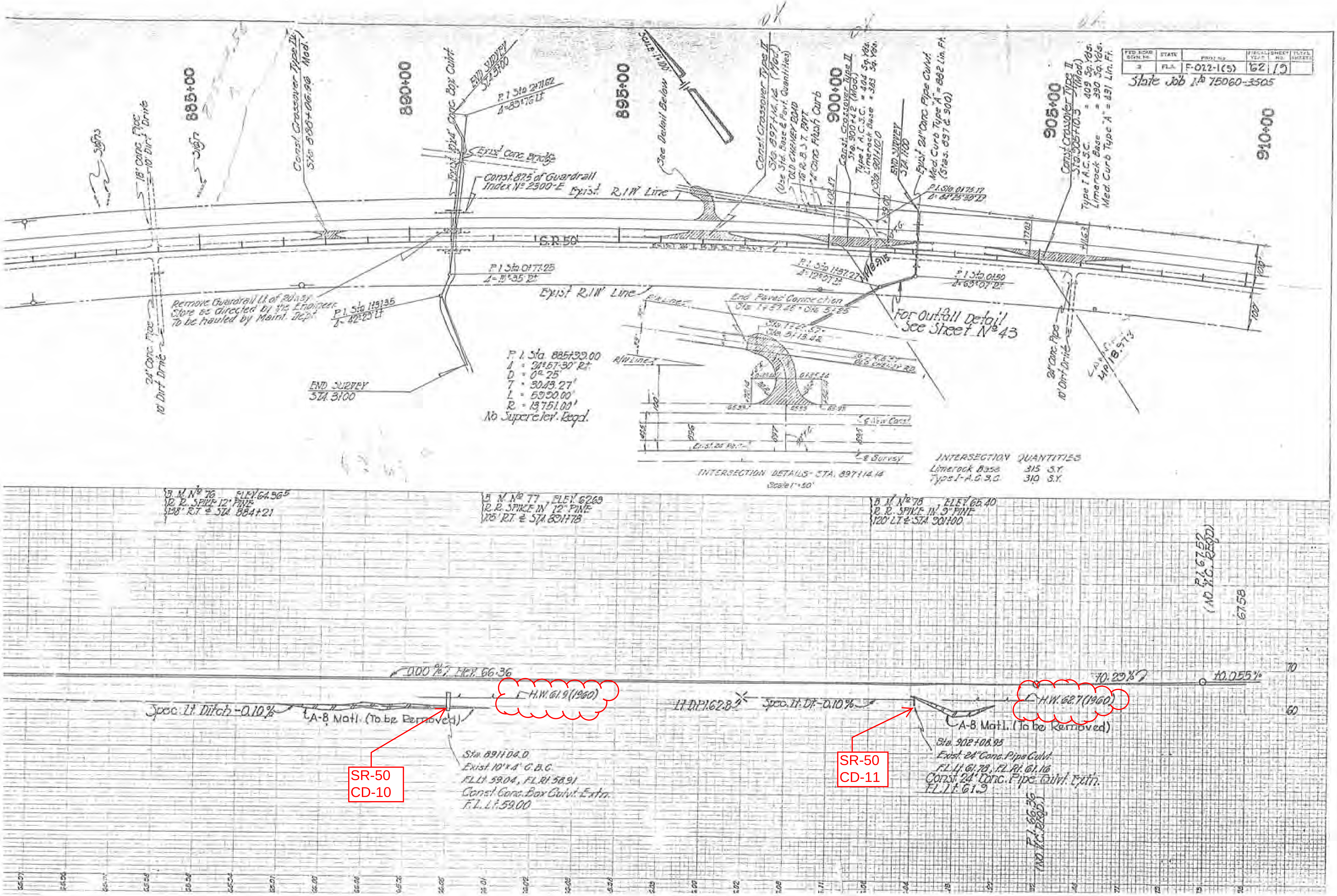
F-023-1(5)
62
16
State Job No 75080-3505
795+00
800+00
805+00
810+00
815+00
820+00
Const. Crossover Type II Sta. 790+192
Underground Tel. Cable
18" Conc. Pipe
Exist. Inlet
10' Dirt Drive
Const. Crossover Type IV Sta. 797+61.75
Tel. Booth
Near Sign
20' Dirt Drive
Dirt Drive
18" Conc. Pipe
Const. Crossover Type IV Sta. 804+61.50
Exist. 30" Conc. Pipe
Const. Crossover Type IV Mod. Sta. 811+32.75
Sign
Const. Crossover Type IV Mod. Sta. 818+23.66
Exist. R/W Line
S.R. 50
P.I. Sta. 0172.38
Exist. R/W Line
20' Graded Road
18" Conc. Pipe
20' Dirt Drive
B.M. No 67 ELEV. 65.565
R.R. SPIKE IN 11" PINE
B.M. No 68 ELEV. 71.015
R.R. SPIKE IN 11" PINE
B.M. No 69 ELEV. 65.845
R.R. SPIKE IN 12" PINE
B.M. No 70 ELEV. 69.76
R.R. SPIKE IN 8" PINE
P.I. 71.60
+0.45%
-0.06%
0.00% Elev. 70.34
P.I. 70.94
SR-50
CD-8
HW 67.6 (1960)
Lt. Ditch
Lt. D.P.I. 66.03
Lt. D.P.I. 67.72
Lt. Ditch
Underground Tel. Cable
Lt. Ditch 3.0' below Shoulder
Sta. 809+15.91
Exist. 30" Conc. Pipe Culvt.
F.L. Lt. 65.58, F.L. Rt. 65.38
Const. 30" Conc. Pipe Culvt. Extn.
F.L. Lt. 65.80
80
70

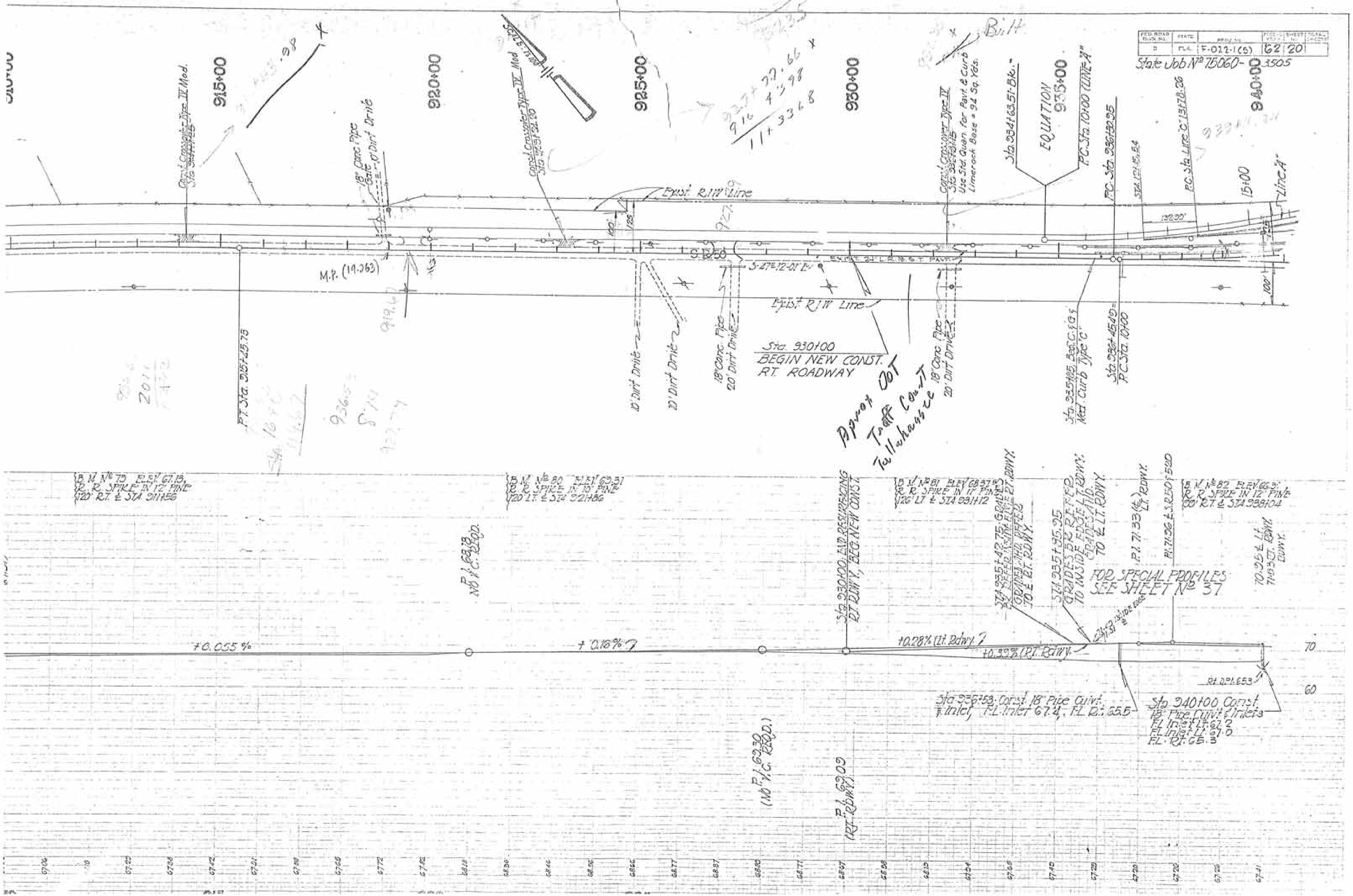
Q-8


FED. ROAD DIV. NO. | STATE | PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS
3 | FLA. | F-022-1(5) | '62 | 17
State Job No 75060-3505
825+00
830+00
835+00
840+00
845+00
850+00
OLD CHENEY ROAD 16' L.B.S.
S.R. 50
S-72°09'31"E
18" Conc. Pipe
13' Conc. Block Motel
Const. Crossover Type IV Sta. 825+53.75
1" Conc. Flush Curb
12' Brick Wall
15" Conc. Pipe
12" Conc. Pipe
See Detail Below
Const. Crossover Type III (Mod.) Sta. 832+64.39
Type I A.C.S.C. = 431 Sq. Yds.
Limerock Base = 412 Sq. Yds.
Med. Curb Type "A" = 131 Lin. Ft.
Const. Crossover Type IV Mod. Sta. 839+52.05
Const. 87.5' of Guardrail Index No 2300-E
Exist. R/W Line
END SURVEY STA. 21+50
Remove Guardrail Lt. of Rdwy. Store as directed by the Engr. To be hauled by Maint. Dept.
END DITCH SURVEY STA. 21+00
End Paved Connection Sta. 1+06.12
End Paved Connection Sta. 1+25.00
R/W Line
24" Conc. Pipe
10' Dirt Dr.
See Detail Below
Const. Crossover Type III (Mod.) Sta. 846+33.61
Type I A.C.S.C. = 450 Sq. Yd.
Limerock Base = 431 Sq. Yd.
Med. Curb Type "A" = 131 Lin. Ft.
10' Dirt Dr.
24" Conc. Pipe
21' Dirt Drive
18" Conc. Pipe
24' Dirt Drive
20' Dirt Drive
18" Conc. Pipe
24" Conc. Pipe
50' Rock Drive
Palm Trees
€ New Const.
€ Survey
Exist. 24' Pavt.
INTERSECTION DETAILS - STA. 832+64.39 Scale 1"=50'
INTERSECTION QUANTITIES
Limerock Base 192 S.Y.
Type I - A.C.S.C. 192 S.Y.
INTERSECTION DETAILS - STA. 846+39.61 Scale 1"=50'
INTERSECTION QUANTITIES
Limerock Base 187 S.Y.
Type I - A.C.S.C. 183 S.Y.
B. M. No 71 ELEV. 67.81 R. R. SPIKE IN 14" PINE 111' RT. € 829+58
B. M. No 72 ELEV. 57.925 R. R. SPIKE IN 10" PINE 106' RT. € STA. 840+75
300' V.C.
64.75
64.47
64.26
64.08
63.96
63.88
63.86
600' V.C.
63.86
63.88
63.94
64.03
64.16
64.33
64.54
64.78
65.06
65.38
65.74
66.13
66.56
-0.59%
0.00% ELEV. 63.86
+0.50%
Lt. D.P.I. 53.4
Spec. Lt. -0.10%
Lt. D.P.I. 53.0
H.W. 53.9 (1960)
P.I. 63.86
P.I. 63.86
70.55
70.33
70.06
300' V.C.
66.56
66.99
67.36
400' V.C.
70
60
SR-50
CD-9
Sta. 839+94.74
Exist. 8' x 7' C.B.C.
F.L. Lt. 53.56, F.L. Rt. 53.18.
Const. Conc. Box Culvt. Extn.
F.L. Lt. 53.00

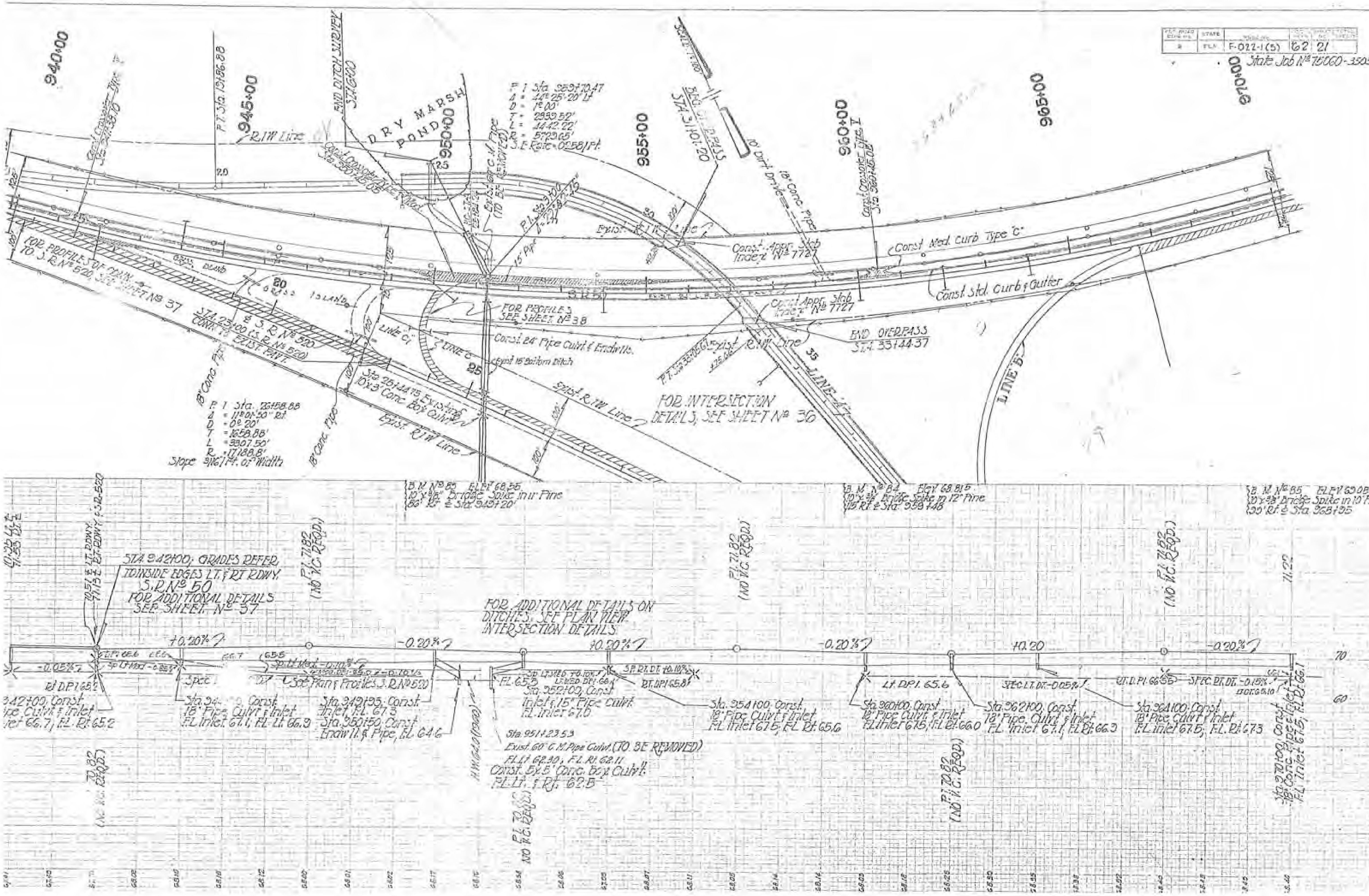
Q-9


FLA.
F-072-1(5)
62
18
State Job No. 75060-3505
855+00
860+00
865+00
870+00
875+00
880+00
See Detail Below
Const. Crossover-Type II Mod.
Sta. 855+49.70
EXTRA QUAN. STAS. 851 & 853
Type I A.C.S.C. = 899 Sq. Yds.
Limerock Base = 868 Sq. Yds.
Med. Curb Type "A" = 431 Lin. Ft.
Const. Crossover Type II (Mod.)
Sta. 860+85.42
Rt. Both
Conc. Pump Island
Type I A.C.S.C. = 462 Sq. Yds.
Limerock Base = 441 Sq. Yds.
Med. Curb Type "A" = 431 Lin. Ft.
18" Conc. Pipe
Const. Crossover Type III Mod.
Sta. 869+92.60
Const. Crossover Type III Mod.
Sta. 878+99.78
Exist. R/W Line
24" Conc. Pipe
Dirt Road
10' Dirt Dr.
24" Conc. Pipe
P.C. Sta. 855+55.73
20' Dirt Drive
18" Conc. Pipe
18" Conc. Pipe
10' Dirt Drive
R/W Line
New Const.
Survey
Exist. 24' Pavt.
P.I. Sta. = 885+33.00
Δ = 24°57'30" Rt.
D = 0°25'
T = 3043.27'
L = 5990.00'
R = 13,751.0'
No Superelev. Reqrd.
INTERSECTION QUANTITIES
Limerock Base 203 S.Y.
Type I - A.C.S.C. 199 S.Y.
INTERSECTION QUANTITIES
Limerock Base 238 S.Y.
Type I - A.C.S.C. 235 S.Y.
INTERSECTION DETAILS - STA. 855+49.70
Scale 1"=50'
INTERSECTION DETAILS - STA. 860+85.42
Scale 1"=50'
B.M. No 73 ELEV. 68.36
R. R. SPIKE IN 12" OAK
183' Lt. ℄ STA. 851+40
B.M. No 74 ELEV. 70.67
R. R. SPIKE IN 12" PINE
107' Lt. ℄ STA. 860+73
B.M. No 75 ELEV. 64.95
R. R. SPIKE IN 9" PINE
113' Lt. ℄ STA. 872+25
P.I. 68.36
P.I. 69.56
300' V.C.
P.I. 66.36
66.36
+0.12%
-0.40%
0.00% Elev. 66.36
Lt. Ditch 61.5
Spec. Lt. Ditch -0.10%
Lt. Ditch 2.0' below shoulder
400' V.C.
300' V.C.
67.69
67.97
68.20
68.38
68.52
68.60
69.38
69.42
69.41
69.36
69.27
69.14
68.96
66.78
66.63
66.51
66.43
66.38
66.36


State Job No 75060-3505
F-022-1(5)
885+00
890+00
895+00
900+00
905+00
910+00
S.R. 50
Exist. R/W Line
Const. 875' of Guardrail Index No 2300-E
Exist. Conc. Bridge
END SURVEY STA. 3100
P.I. Sta. 885+33.00
No Superelev. Regd.
For Outfall Detail See Sheet No 43
INTERSECTION DETAILS - STA. 897+14.14
INTERSECTION QUANTITIES
Limerock Base 315 S.Y.
Type I-A.C.S.C. 310 S.Y.
B.M. No 76 ELEV. 64.36
B.M. No 77 ELEV. 62.63
B.M. No 78 ELEV. 65.40
H.W. 61.9 (1960)
H.W. 62.7 (1960)
A-8 Matl. (To be Removed)
Spec. Lt. Ditch -0.10%
Sta. 891+04.0
Exist. 10'x4' C.B.C.
Const. Conc. Box Culvt. Extn.
Sta. 902+08.95
Exist. 24" Conc. Pipe Culvt.
Const. 24" Conc. Pipe Culvt. Extn.
SR-50
CD-10
SR-50
CD-11



FED. ROAD DIV. NO. 3 | STATE FLA. | PROJ. NO. F-022-1(5) | 62 | 20
State Job No 75060-3505
915+00
920+00
925+00
930+00
EQUATION 935+00
940+00
Exist. R/W Line
M.P. (19.263)
P.T. Sta. 915+25.75
18" Conc. Pipe 20' Dirt Drive
10' Dirt Drive
10' Dirt Drive
Sta. 930+00 BEGIN NEW CONST. RT. ROADWAY
Sta. 934+63.51 Bk.
P.C. Sta. 10+00 (LINE "A")
P.C. Sta. 936+39.95
15+00
Line "A"
Approx DOT Traff Count Tallahassee
B.M. No 79 ELEV. 67.13, R.R. SPIKE IN 12" PINE 120' RT. ℄ STA. 911+56
B.M. No 80 ELEV. 69.31 R.R. SPIKE IN 10" PINE 120' LT. ℄ STA. 921+86
B.M. No 81 ELEV. 68.37 R.R. SPIKE IN 11" PINE 126' LT. ℄ STA. 931+12
B.M. No 82 ELEV. 66.9 R.R. SPIKE IN 12" PINE 130' RT. ℄ STA. 938+04
P.I. 68.18 No V.C. REQD.
Sta. 930+00 END RESURFACING RT. RDWY., BEG. NEW CONST.
FOR SPECIAL PROFILES SEE SHEET No 37
+0.055 %
+0.16 %
+0.28% (Lt. Rdwy.)
+0.39% (Rt. Rdwy.)
70
60
Sta. 936+53: Const. 18" Pipe Culvt. & Inlet, F.L. Inlet 67.4, F.L. Rt. 65.5
Sta. 940+00 Const. 18" Pipe Culvt. & Inlets F.L. Inlet Lt. 67.2 F.L. Inlet Lt. 67.0 F.L. Rt. 65.3
P.I. 69.30 (No V.C. REQD.)
P.I. 69.09 (RT. RDWY.)


F-022-1(5) 62 21
State Job Nº 78060-3505
940+00
945+00
950+00
955+00
960+00
965+00
970+00
DRY MARSH POND
END DITCH SURVEY
R/W Line
P.I. Sta. 959+70.47
Δ = 44°25'20" Lt.
D = 1°00'
T = 2833.52'
L = 4442.22'
R = 5729.65'
S.E. Rate = 0.0258/Ft.
Const. Med. Curb Type "C"
Const. Std. Curb & Gutter
Const. Appr. Slab Index Nº 7727
END OVERPASS
STA. 33+44.37
FOR PROFILES SEE SHEET Nº 38
Const. 24" Pipe Culvt. & Endwlls.
FOR INTERSECTION DETAILS, SEE SHEET Nº 36
FOR PROFILES OF CONN. TO S.R. Nº 520, SEE SHEET Nº 37
GRASS ISLAND
STA. 25+00 (S.R. Nº 520) CONN. TO EXIST. PAVT.
LINE "C"
LINE "B"
Exist. R/W Line
18" Conc. Pipe
P.I. Sta. 25+58.88
Δ = 11°01'50" Rt.
D = 0°20'
T = 1658.88'
L = 3307.50'
R = 17,188.8'
Slope 3/16"/Ft. of Width
Sta. 28+14.75 Existing 10'x3' Conc. Box Culvt.
B.M. Nº 83 ELEV. 68.55 10"x3/8" Bridge Spike in Lt. Pine 80' Rt. ℄ Sta. 949+20
B.M. Nº 84 Elev. 68.815 10"x3/8" Bridge Spike in 12" Pine 115' Rt. ℄ Sta. 959+48
B.M. Nº 85 ELEV. 69.085 10"x3/8" Bridge Spike in 10" Pine 130' Rt. ℄ Sta. 968+95
STA. 942+00; GRADES REFER TO INSIDE EDGES LT. & RT. RDWY. S.R. Nº 50
FOR ADDITIONAL DETAILS SEE SHEET Nº 37
FOR ADDITIONAL DETAILS ON DITCHES, SEE PLAN VIEW INTERSECTION DETAILS.
P.I. 71.82 (NO V.C. REQD.)
P.I. 70.82 (NO V.C. REQD.)
+0.20%
-0.20%
Sta. 951+23.53 Exist. 60" C.M. Pipe Culvt. (TO BE REMOVED) F.L. Lt. 62.30, F.L. Rt. 62.11
Const. 8'x5' Conc. Box Culvt. F.L. Lt. & Rt. 62.5
Sta. 952+00; Const. Inlet & 15" Pipe Culvt. F.L. Inlet 67.0
Sta. 954+00; Const. 18" Pipe Culvt. & Inlet F.L. Inlet 67.5, F.L. Rt. 65.6
Sta. 960+00; Const. 18" Pipe Culvt. & Inlet F.L. Inlet 67.5, F.L. Lt. 66.0
Sta. 962+00; Const. 18" Pipe Culvt. & Inlet F.L. Inlet 67.1, F.L. Rt. 66.3
Sta. 964+00; Const. 18" Pipe Culvt. & Inlet F.L. Inlet 67.5, F.L. Rt. 67.3
Sta. 949+95; Const. Inlet, F.L. 67.3
Sta. 950+50; Const. Endwll. & Pipe, F.L. 64.6
Sta. 970+00; Const. 18" Conc. Pipe & Inlet F.L. Inlet 67.6, F.L. Rt. 66.1
See Plan & Profiles S.R. Nº 520
70
60

Q-13

Appendix: R

Excerpt from Lochner

SR-50 Widening Construction Plans

COMPONENTS OF CONTRACT PLANS SET

ROADWAY PLANS
SIGNING AND PAVEMENT MARKING PLANS
SIGNALIZATION PLANS
ITS PLANS

A DETAILED INDEX APPEARS ON THE KEY SHEET OF EACH COMPONENT

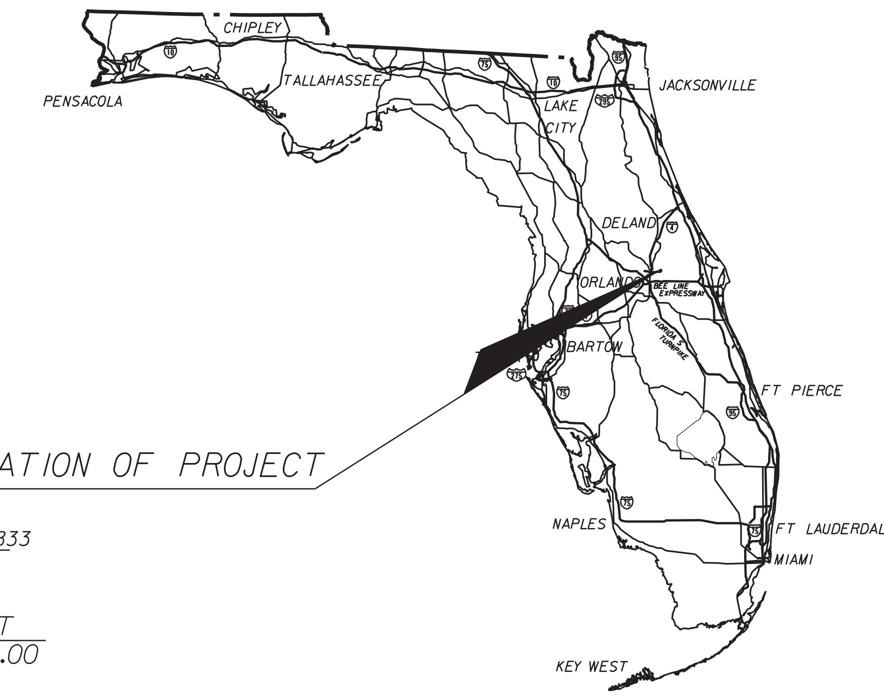
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

CONTRACT PLANS

FINANCIAL PROJECT ID 239203-4-52-01

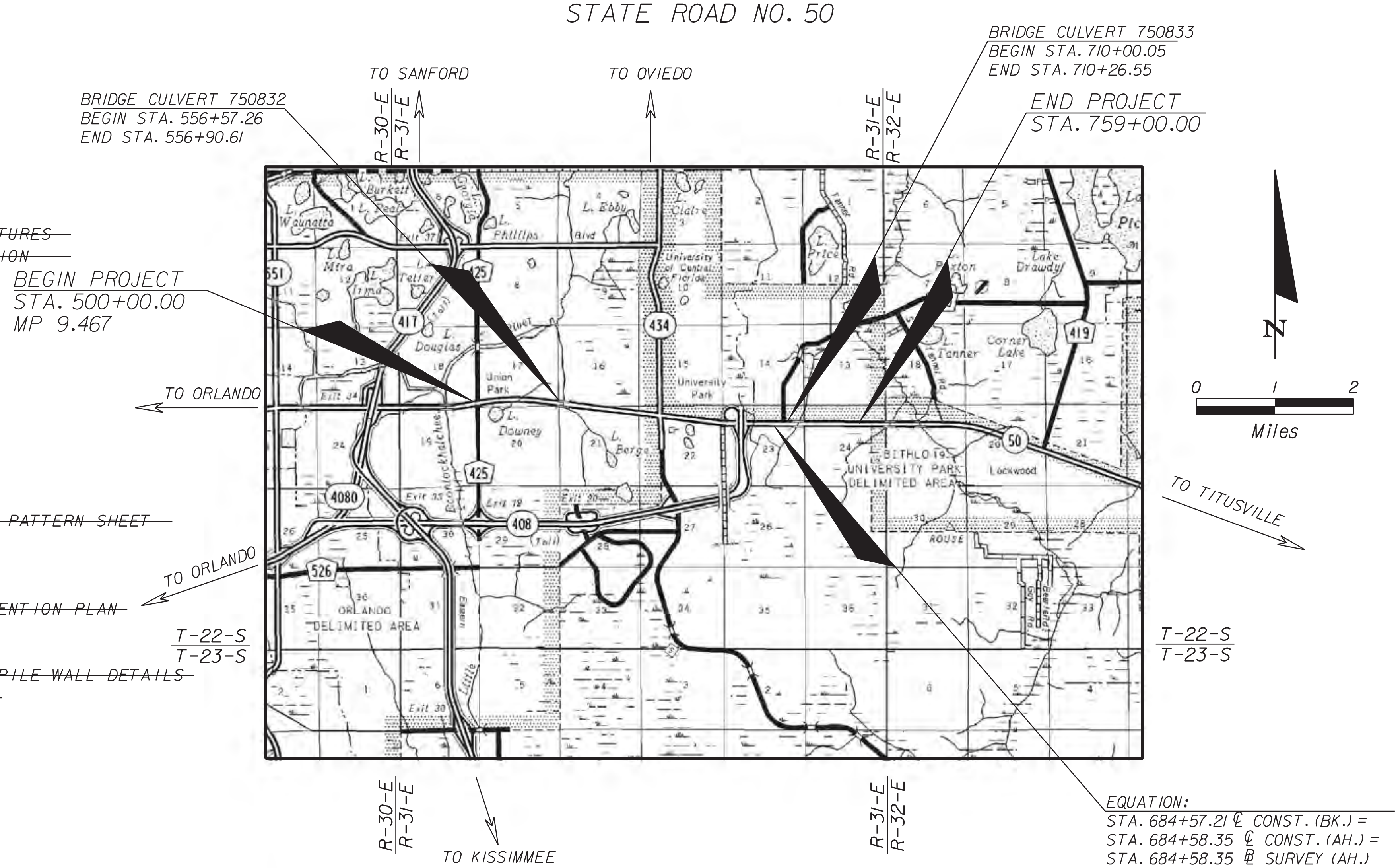
ORANGE COUNTY (75060)

STATE ROAD NO. 50



LOCATION OF PROJECT

SHEET NO.	SHEET DESCRIPTION
1	KEY SHEET
~~2~~	~~NOTES TO REVIEWER~~
~~3-7~~	~~SUMMARY OF PAY ITEMS~~
11 - 12	DRAINAGE MAP
~~15 - 33~~	~~TYPICAL SECTIONS~~
~~34 - 48~~	~~SUMMARY OF QUANTITIES~~
~~49 - 52~~	~~BRIDGE CULVERT DETAILS~~
~~53 - 63~~	~~REPORT OF BORINGS~~
~~64 - 78~~	~~SUMMARY OF DRAINAGE STRUCTURES~~
~~79~~	~~OPTIONAL MATERIAL TABULATION~~
~~80~~	~~GENERAL NOTES~~
~~81 - 82~~	~~PROJECT LAYOUT~~
~~83 - 85~~	~~REFERENCE TIES~~
120 - 125	ROADWAY PLAN-PROFILES
~~126 - 150~~	~~SIDE STREET PROFILES~~
~~151 - 154~~	~~RAMP TERMINAL DETAILS~~
~~155 - 158~~	~~INTERSECTION DETAILS~~
~~159 - 330~~	~~DRAINAGE STRUCTURES~~
337	POND DETAILS
338 - 340	DRAINAGE DETAILS
~~341~~	~~SPECIAL DETAILS~~
~~343~~	~~INTERCHANGE CROSS SECTION PATTERN SHEET~~
~~344~~	~~ROADWAY SOIL SURVEY~~
602 - 605	CROSS SECTIONS
~~629 - 630~~	~~DRIVEWAY SECTIONS~~
~~631 - 664~~	~~STORMWATER POLLUTION PREVENTION PLAN~~
~~665 - 772~~	~~TRAFFIC CONTROL PLANS~~
~~773 - 818~~	~~UTILITY ADJUSTMENTS~~
~~819 - 828~~	~~CRITICAL TEMPORARY SHEET PILE WALL DETAILS~~
~~829 - 830~~	~~CONCRETE ENDWALL DETAILS~~



ROADWAY SHOP DRAWINGS TO BE SUBMITTED TO:

JOHN N. BOX P.E. NO. 41832
H.W. LOCHNER INC.
13577 FEATHER SOUND DR., SUITE 600
CLEARWATER, FLORIDA 33762

PLANS PREPARED BY:

LOCHNER

H. W. LOCHNER, INC.
CONSULTING ENGINEERS AND PLANNERS
13577 FEATHER SOUND DR., SUITE 600
CLEARWATER, FLORIDA 33762
VENDOR NO. 36-2338811
CONTRACT NO. C-7461
C.A. 894

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

PLANS UPDATE
PERMIT SUBMITTAL
SEPTEMBER 2012

PROJECT LENGTH IS BASED ON ℄ CONSTRUCTION

LENGTH OF PROJECT		
	LINEAR FEET	MILES
ROADWAY	25,898.86	4.905
BRIDGES	NA	NA
NET LENGTH OF PROJECT	25,898.86	4.905
EXCEPTIONS	NA	NA
GROSS LENGTH OF PROJECT	25,898.86	4.905

FDOT PROJECT MANAGER: CHRISTOPHER L. DABSON, P.E.

GOVERNING STANDARDS AND SPECIFICATIONS:
FLORIDA DEPARTMENT OF TRANSPORTATION, DESIGN STANDARDS DATED 2010, AND SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION DATED 2010, AS AMENDED BY CONTRACT DOCUMENTS.

APPLICABLE DESIGN STANDARDS MODIFICATIONS: 7-1-2013

FOR DESIGN STANDARDS MODIFICATIONS CLICK ON "DESIGN STANDARDS" AT THE FOLLOWING WEB SITE: http://www.dot.state.fl.us/rddesign/

REVISIONS

KEY SHEET REVISIONS		
DATE	BY	DESCRIPTION

ROADWAY PLANS
ENGINEER OF RECORD (E.O.R.): JOHN N. BOX, P.E.

P.E. NO.: 41832

FISCAL YEAR	SHEET NO.
14	1

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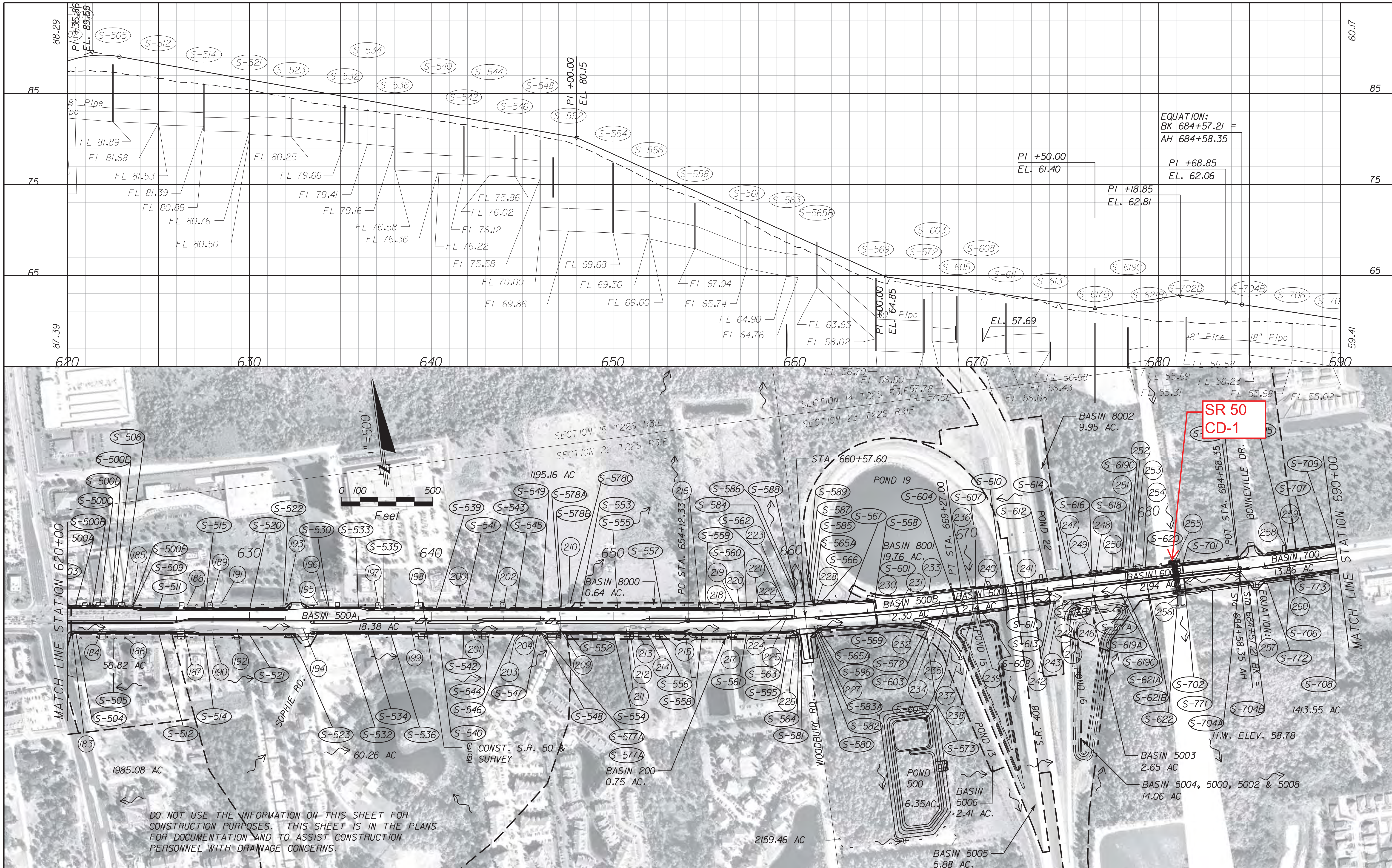
R-1

$DATE$ $TIME$ $FILE$



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

LOCHNER C.A. 894
H. W. LOCHNER, INC.
CONSULTING ENGINEERS AND PLANNERS
13577 FEATHER SOUND DRIVE, SUITE 600
CLEARWATER, FLORIDA 33762
THERESA D. ELLISON, P.E. NO. 53918

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

DRAINAGE MAP

SHEET NO.
10

R-2

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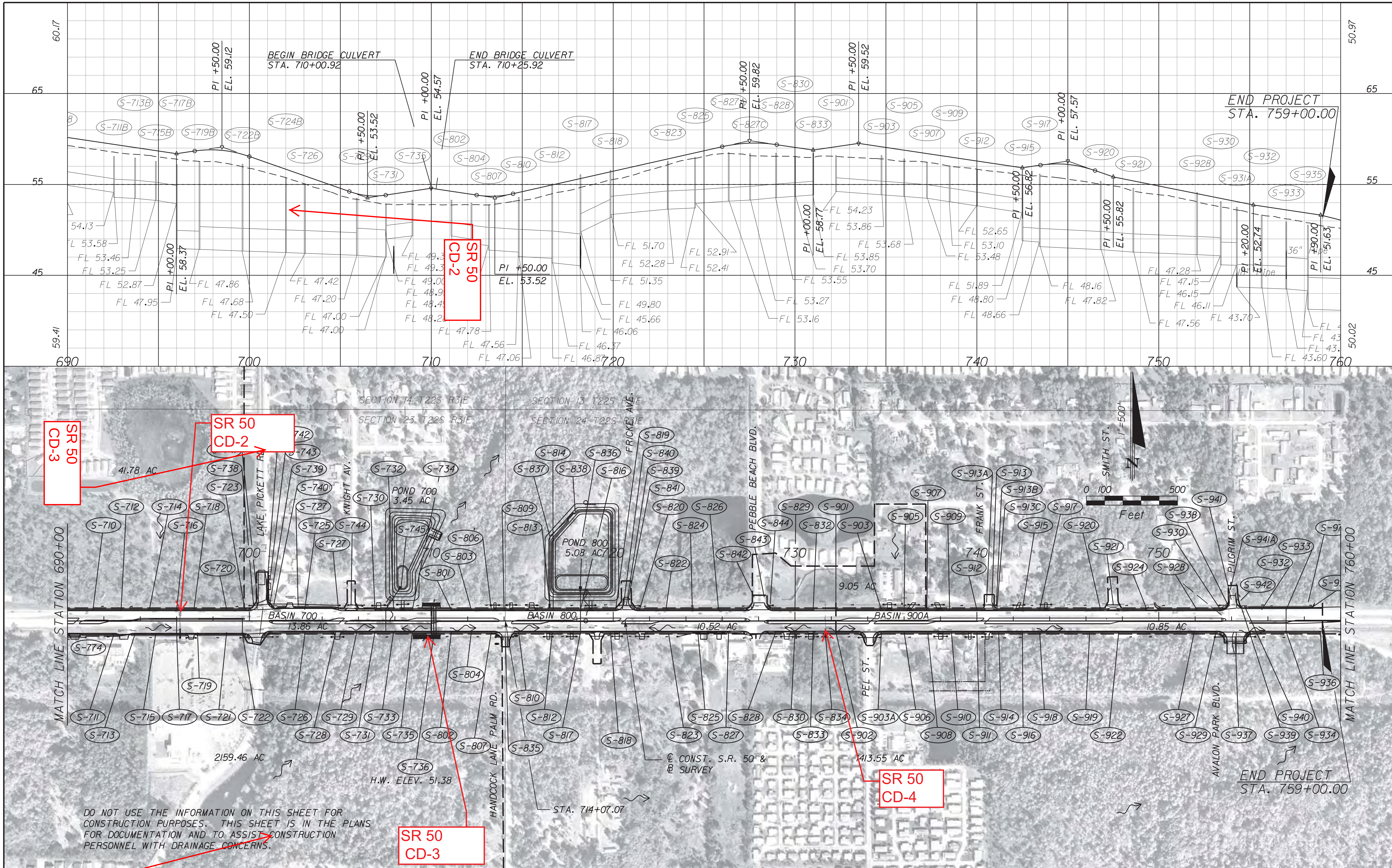

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

REVISIONS

SR 50
CD-4

LOCHNER C.A. 894
H. W. LOCHNER, INC.
CONSULTING ENGINEERS AND PLANNERS
13577 FEATHER SOUND DRIVE, SUITE 600
CLEARWATER, FLORIDA 33762
MICHAEL D. FINCH, P.E. NO. 40118

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

DRAINAGE MAP

SHEET NO. 11

R-3

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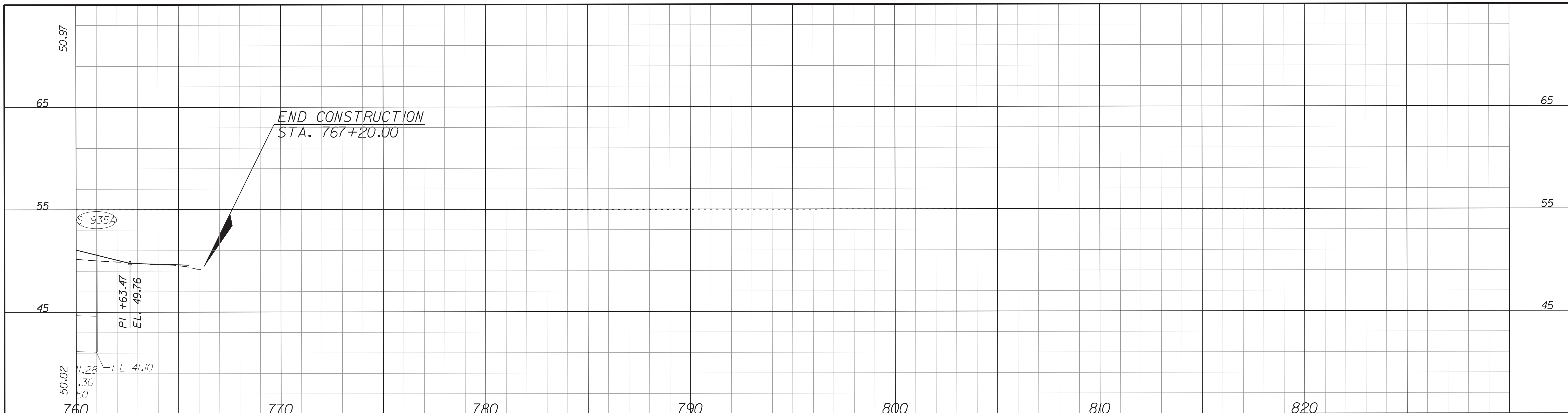


REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

LOCHNER C.A. 894
H. W. LOCHNER, INC.
CONSULTING ENGINEERS AND PLANNERS
13577 FEATHER SOUND DRIVE, SUITE. 600
CLEARWATER, FLORIDA 33762
MICHAEL D. FINCH, P.E. NO. 40118

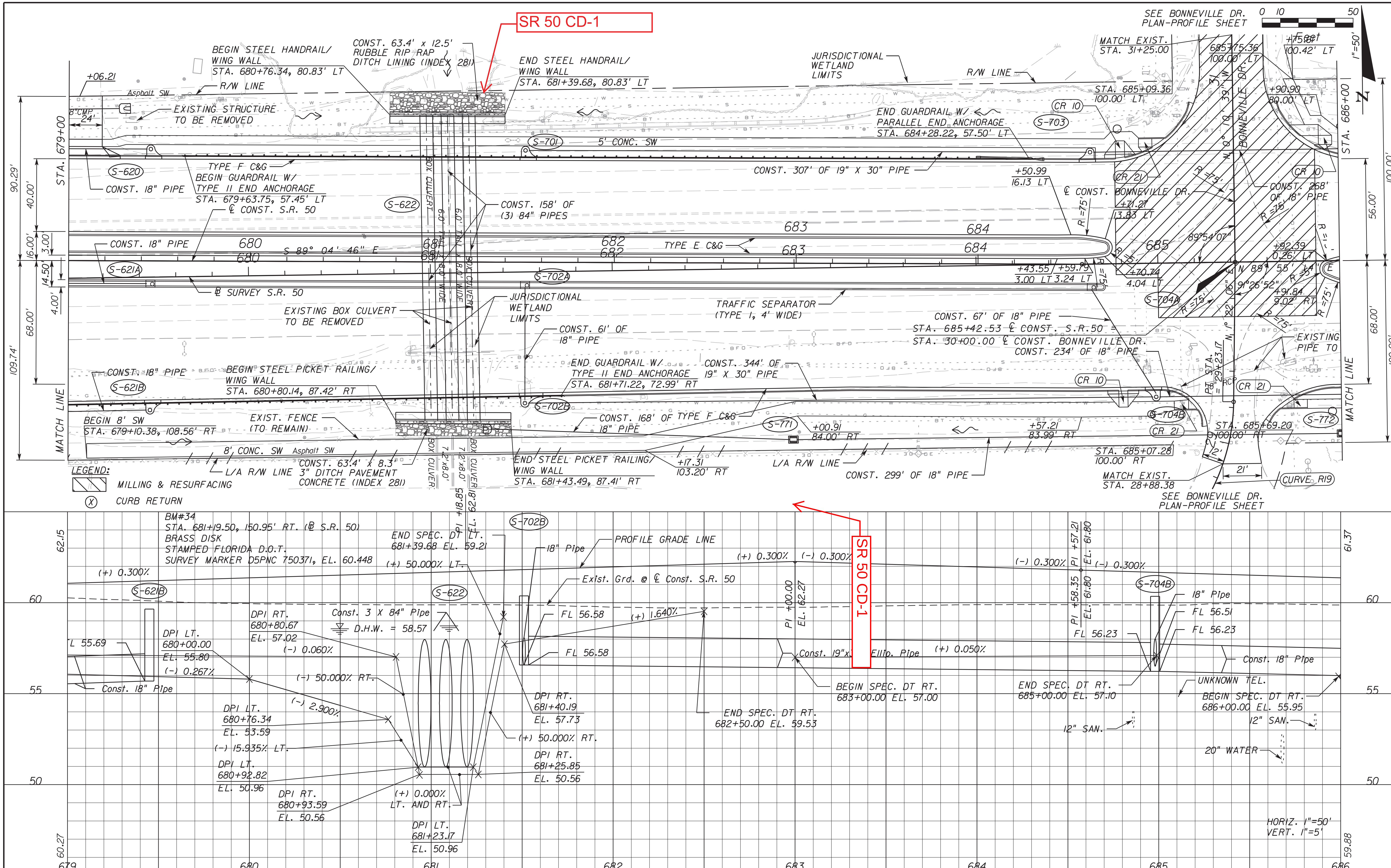
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

DRAINAGE MAP

SHEET NO. 12

R-4



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

LOCHNER
13577 FEATHER SOUND DR. SUITE 600
CLEARWATER, FLORIDA 33762
FBPR CERTIFICATE OF AUTH. # 894
JOHN N. BOX, P.E. # 41832

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

PLAN-PROFILE (28)
STA. 679+00 TO STA. 686+00

SHEET NO. 113

R-5

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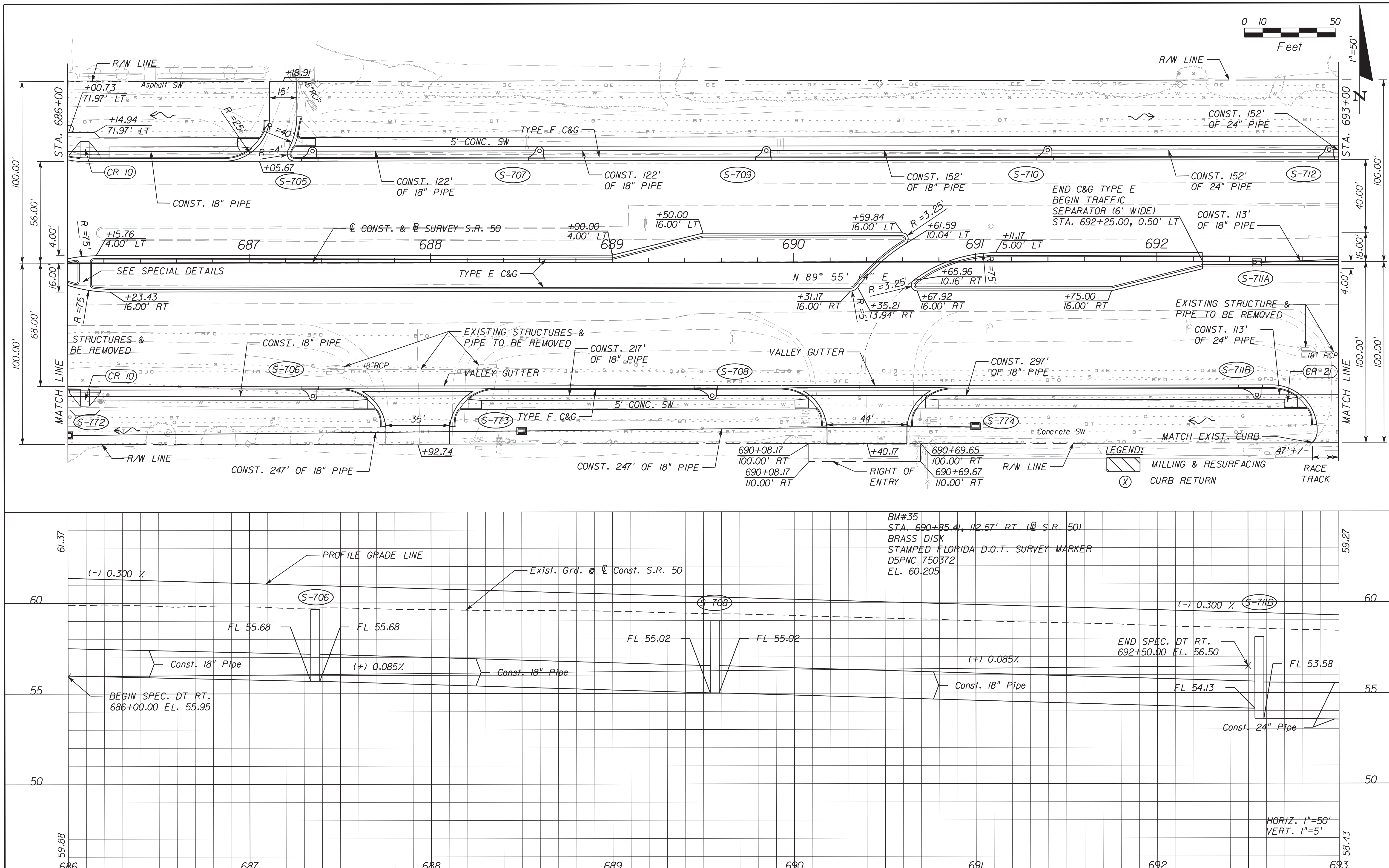

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

LOCHNER
13577 FEATHER SOUND DR. SUITE 600
CLEARWATER, FLORIDA 33762
FBPR CERTIFICATE OF AUTH. # 894
JOHN N. BOX, P.E. # 41832

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

PLAN-PROFILE (29)
STA. 686+00 TO STA. 693+00

SHEET NO.
114

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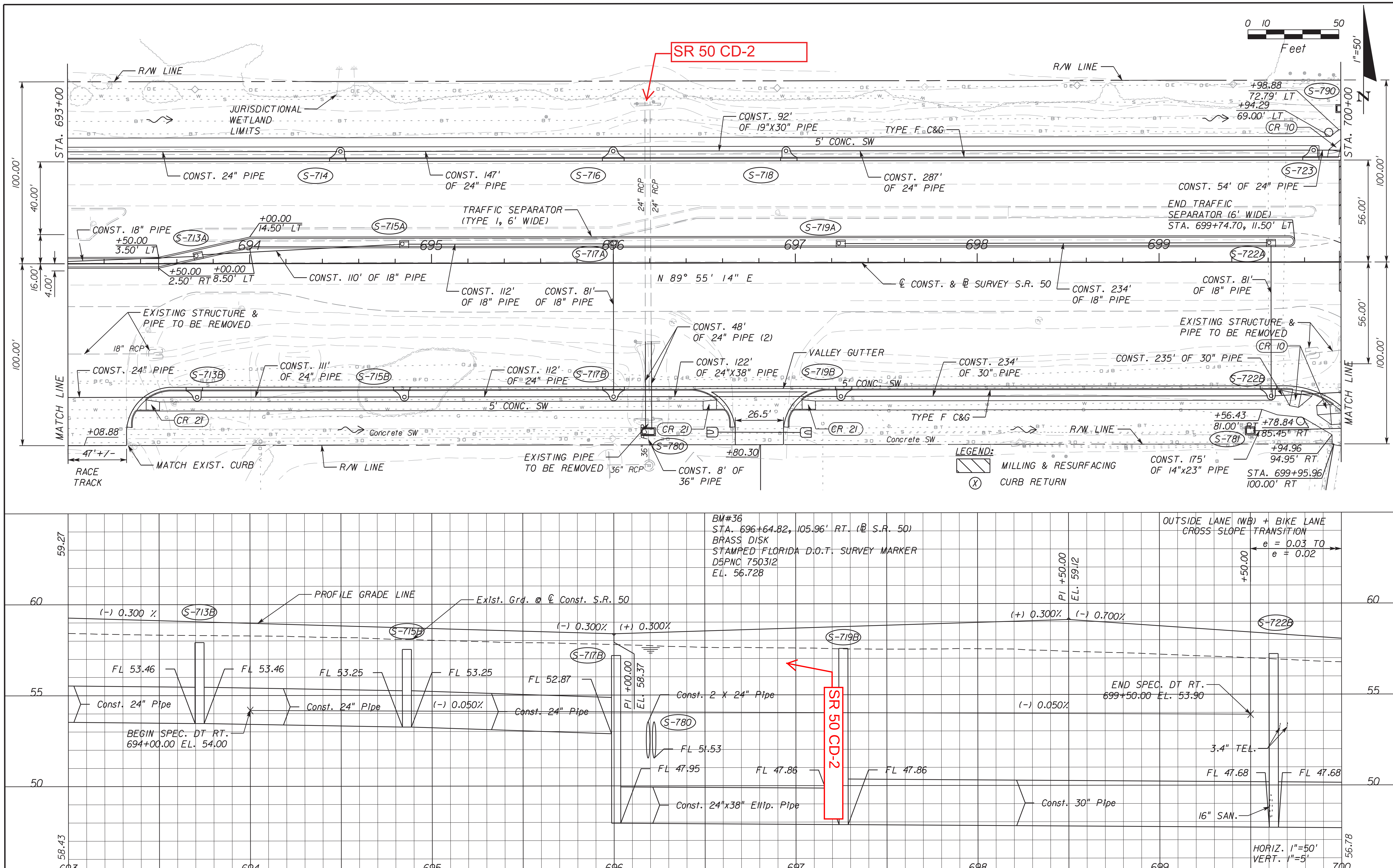
R-6



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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

LOCHNER
13577 FEATHER SOUND DR. SUITE 600
CLEARWATER, FLORIDA 33762
FBPR CERTIFICATE OF AUTH. # 894
JOHN N. BOX, P.E. # 41832

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

PLAN-PROFILE (30)
STA. 693+00 TO STA. 700+00

SHEET NO. 115

R-7

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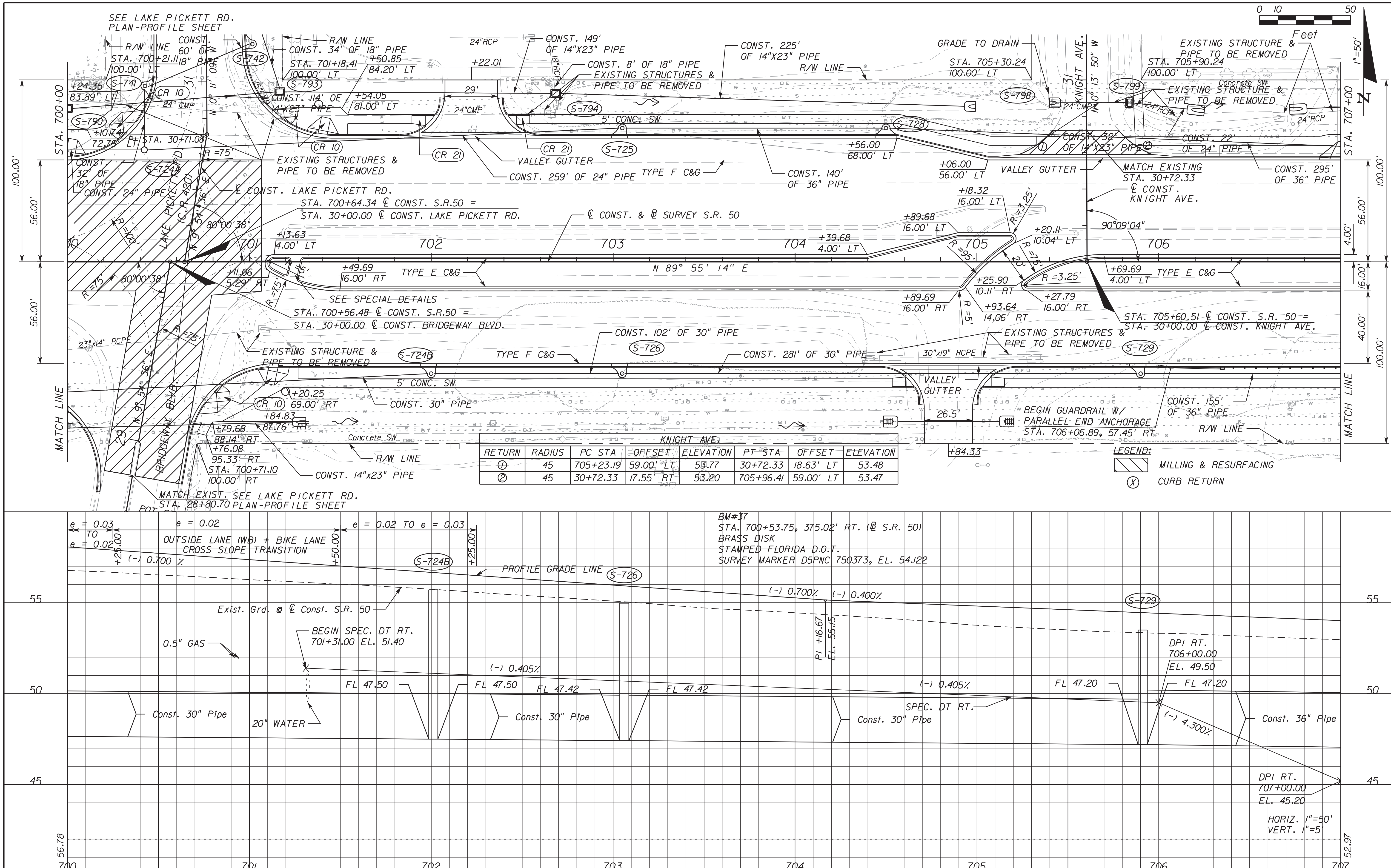

KNIGHT AVE.							
RETURN	RADIUS	PC STA	OFFSET	ELEVATION	PT STA	OFFSET	ELEVATION
1	45	705+23.19	59.00' LT	53.77	30+72.33	18.63' LT	53.48
2	45	30+72.33	17.55' RT	53.20	705+96.41	59.00' LT	53.47

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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

LOCHNER
13577 FEATHER SOUND DR. SUITE 600
CLEARWATER, FLORIDA 33762
FBPR CERTIFICATE OF AUTH. # 894
JOHN N. BOX, P.E. # 41832

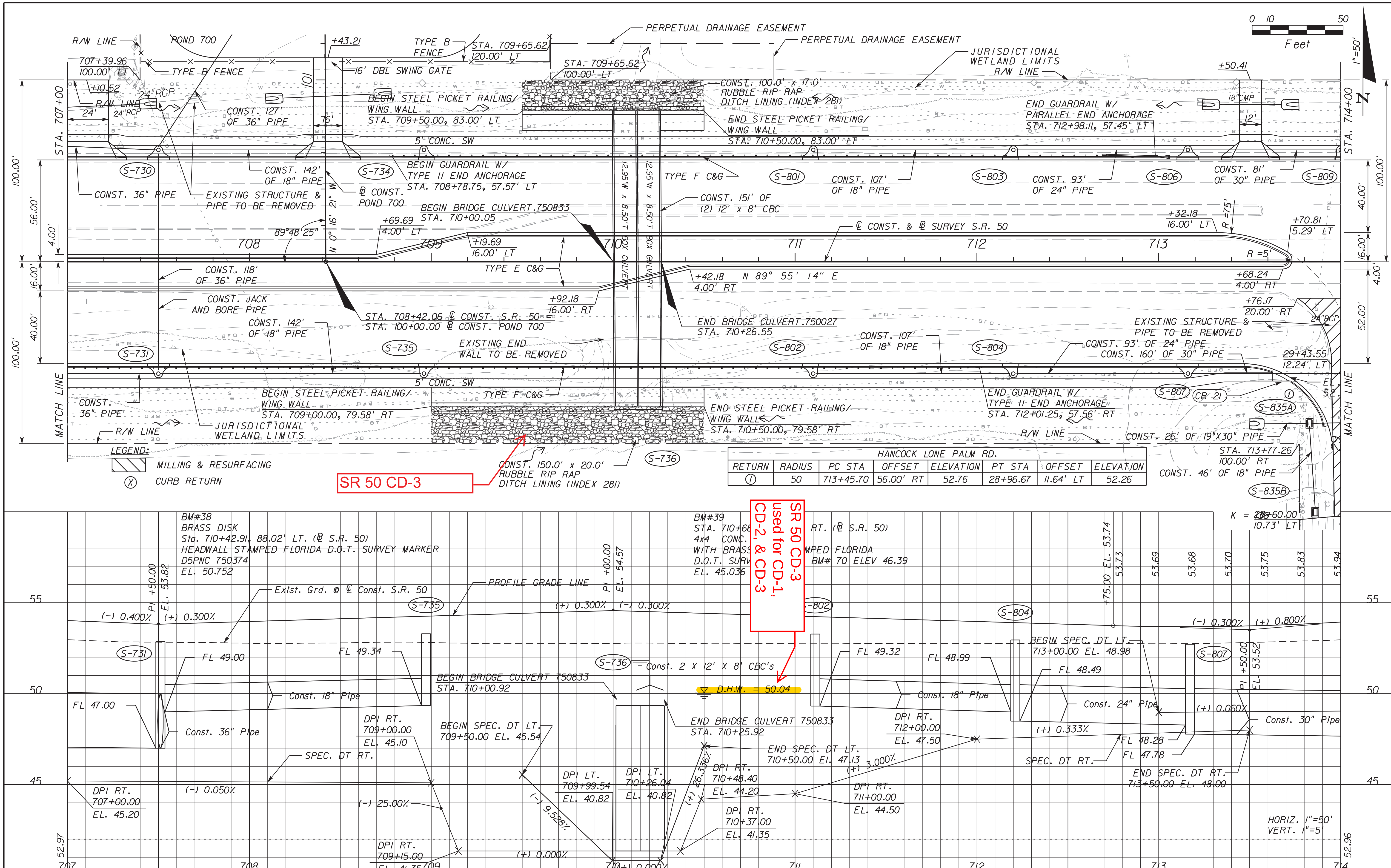
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

PLAN-PROFILE (31)
STA. 700+00 TO STA. 707+00

SHEET NO. 116

R-8



HANCOCK LONE PALM RD.							
RETURN	RADIUS	PC STA	OFFSET	ELEVATION	PT STA	OFFSET	ELEVATION
1	50	713+45.70	56.00' RT	52.76	28+96.67	11.64' LT	52.26

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

LOCHNER
13577 FEATHER SOUND DR. SUITE 600
CLEARWATER, FLORIDA 33762
FBPR CERTIFICATE OF AUTH. # 894
JOHN N. BOX, P.E. # 41832

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

PLAN-PROFILE (32)
STA. 707+00 TO STA. 714+00

SHEET NO. 117

R-9

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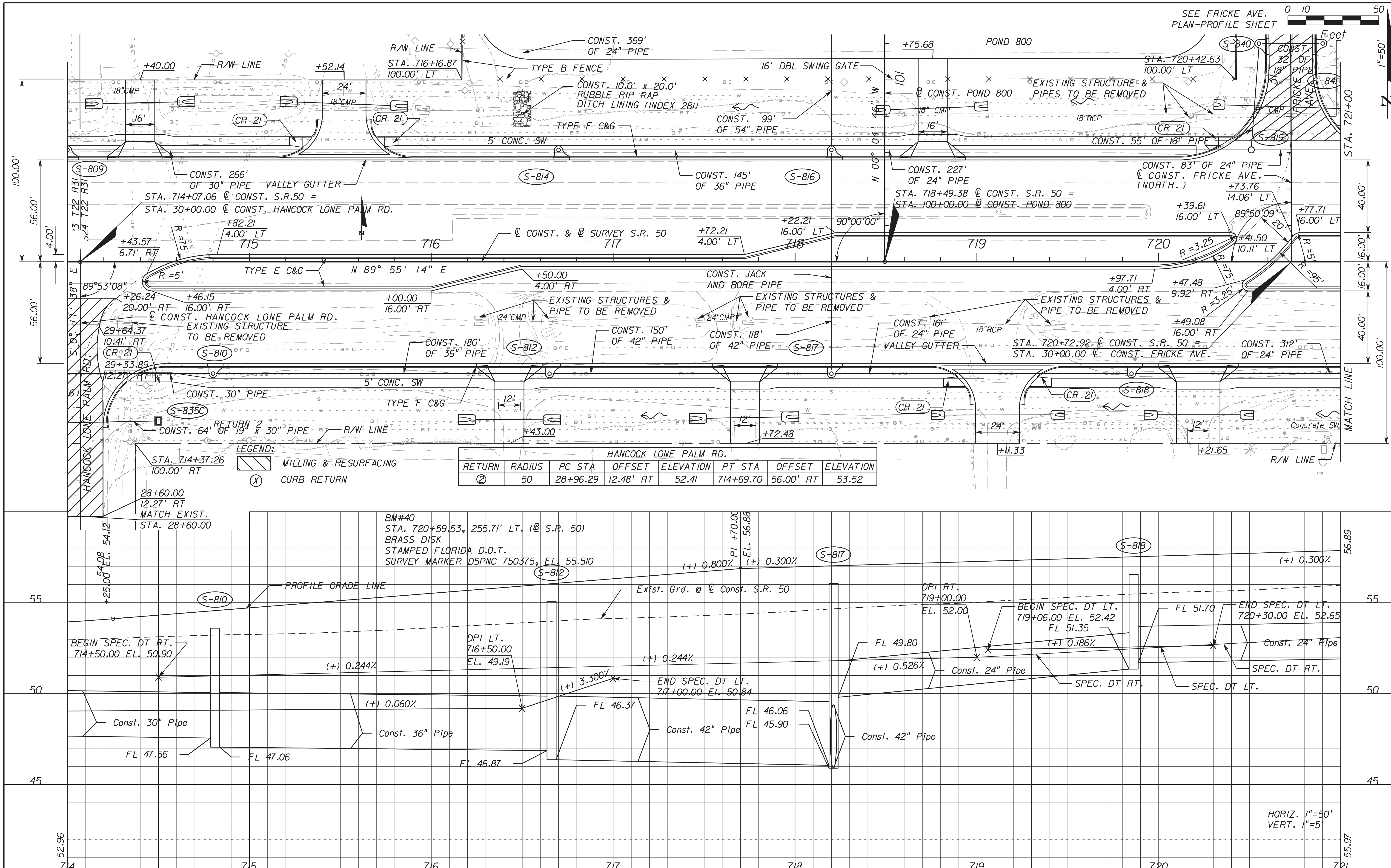

HANCOCK LONE PALM RD.							
RETURN	RADIUS	PC STA	OFFSET	ELEVATION	PT STA	OFFSET	ELEVATION
2	50	28+96.29	12.48' RT	52.41	714+69.70	56.00' RT	53.52

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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

LOCHNER
13577 FEATHER SOUND DR. SUITE 600
CLEARWATER, FLORIDA 33762
FBPR CERTIFICATE OF AUTH. # 894
JOHN N. BOX, P.E. # 41832

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

PLAN-PROFILE (33)
STA. 714+00 TO STA. 721+00

SHEET NO. 118

R-10

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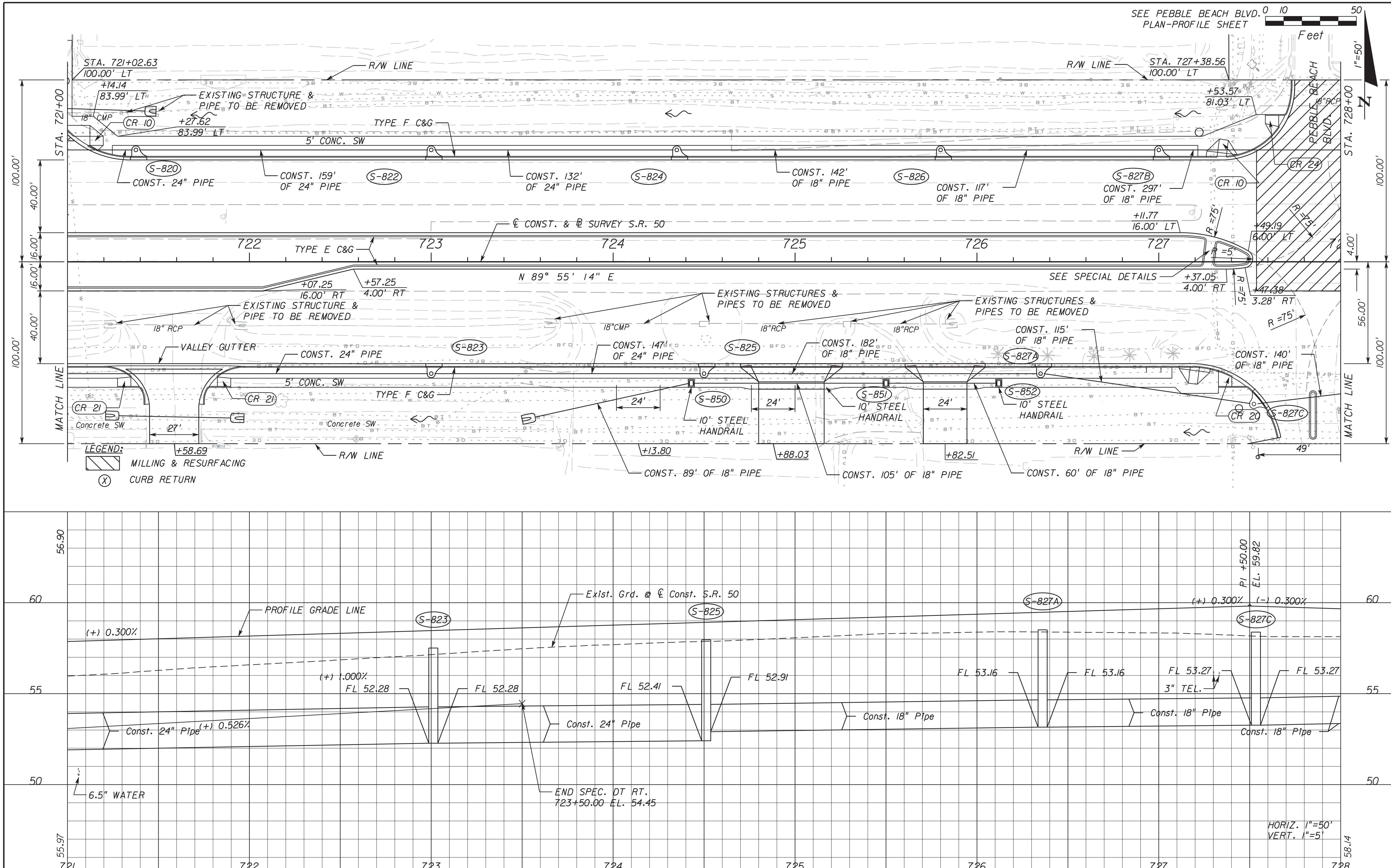

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

LOCHNER
13577 FEATHER SOUND DR. SUITE 600
CLEARWATER, FLORIDA 33762
FBPR CERTIFICATE OF AUTH. # 894
JOHN N. BOX, P.E. # 41832

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

PLAN-PROFILE (34)
STA. 721+00 TO STA. 728+00

SHEET NO.
119

R-11

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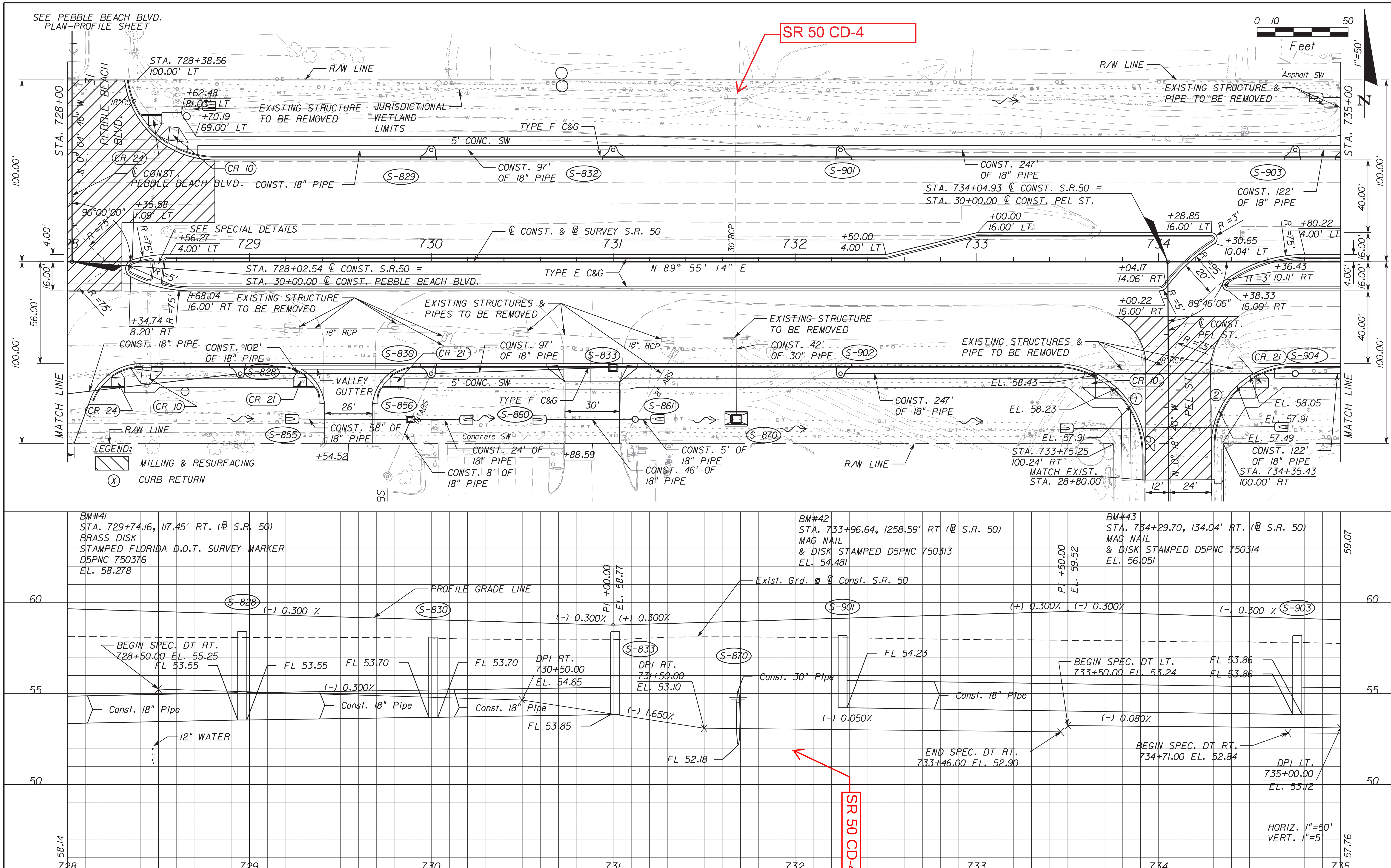

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

LOCHNER
13577 FEATHER SOUND DR. SUITE 600
CLEARWATER, FLORIDA 33762
FBPR CERTIFICATE OF AUTH. # 894
JOHN N. BOX, P.E. # 41832

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

PLAN-PROFILE (35)
STA. 728+00 TO STA. 735+00

SHEET NO.
120

R-12

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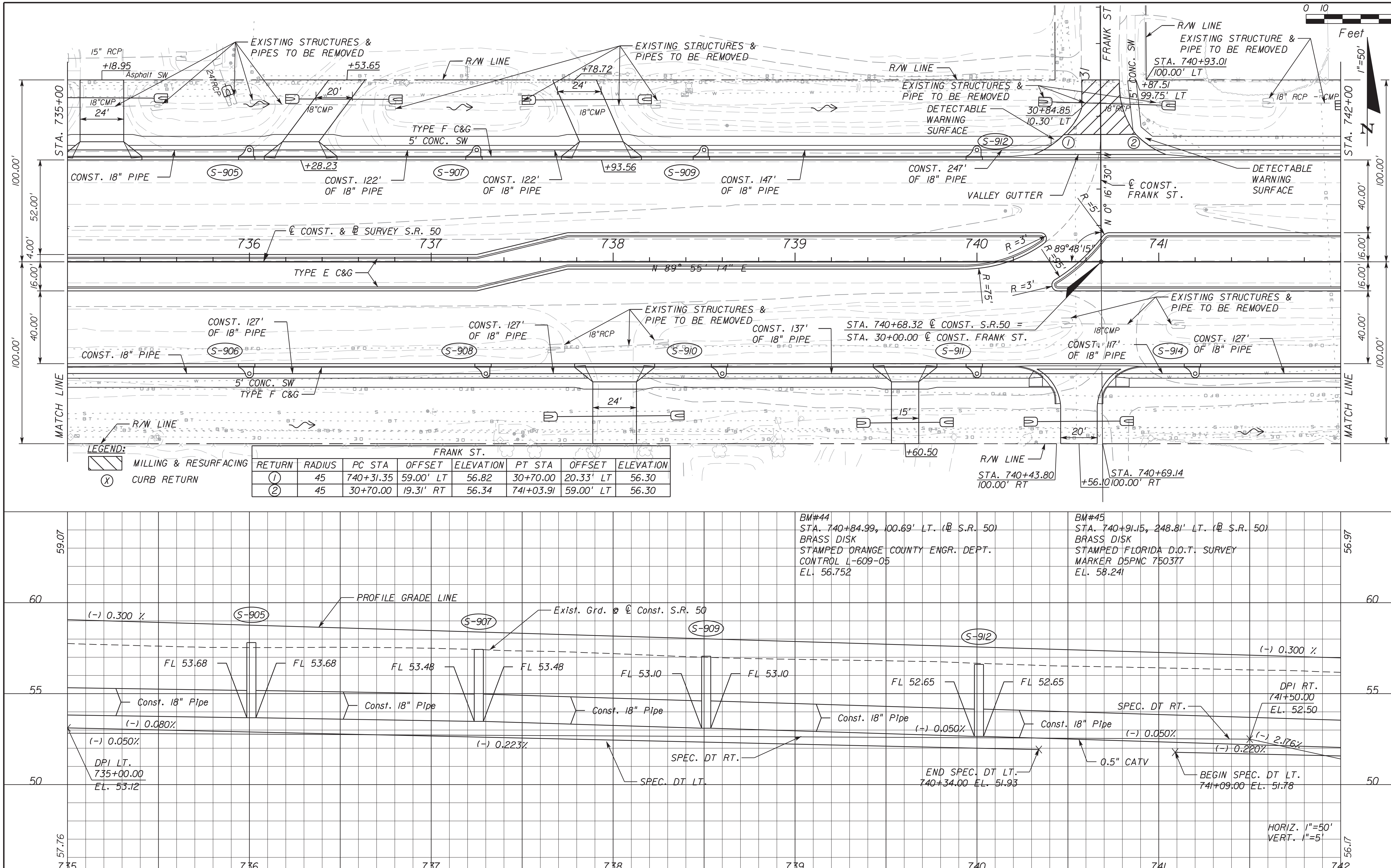

FRANK ST.							
RETURN	RADIUS	PC STA	OFFSET	ELEVATION	PT STA	OFFSET	ELEVATION
1	45	740+31.35	59.00' LT	56.82	30+70.00	20.33' LT	56.30
2	45	30+70.00	19.31' RT	56.34	741+03.91	59.00' LT	56.30

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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

LOCHNER
13577 FEATHER SOUND DR. SUITE 600
CLEARWATER, FLORIDA 33762
FBPR CERTIFICATE OF AUTH. # 894
JOHN N. BOX, P.E. # 41832

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

PLAN-PROFILE (36)
STA. 735+00 TO STA. 742+00

SHEET NO.
121

R-13

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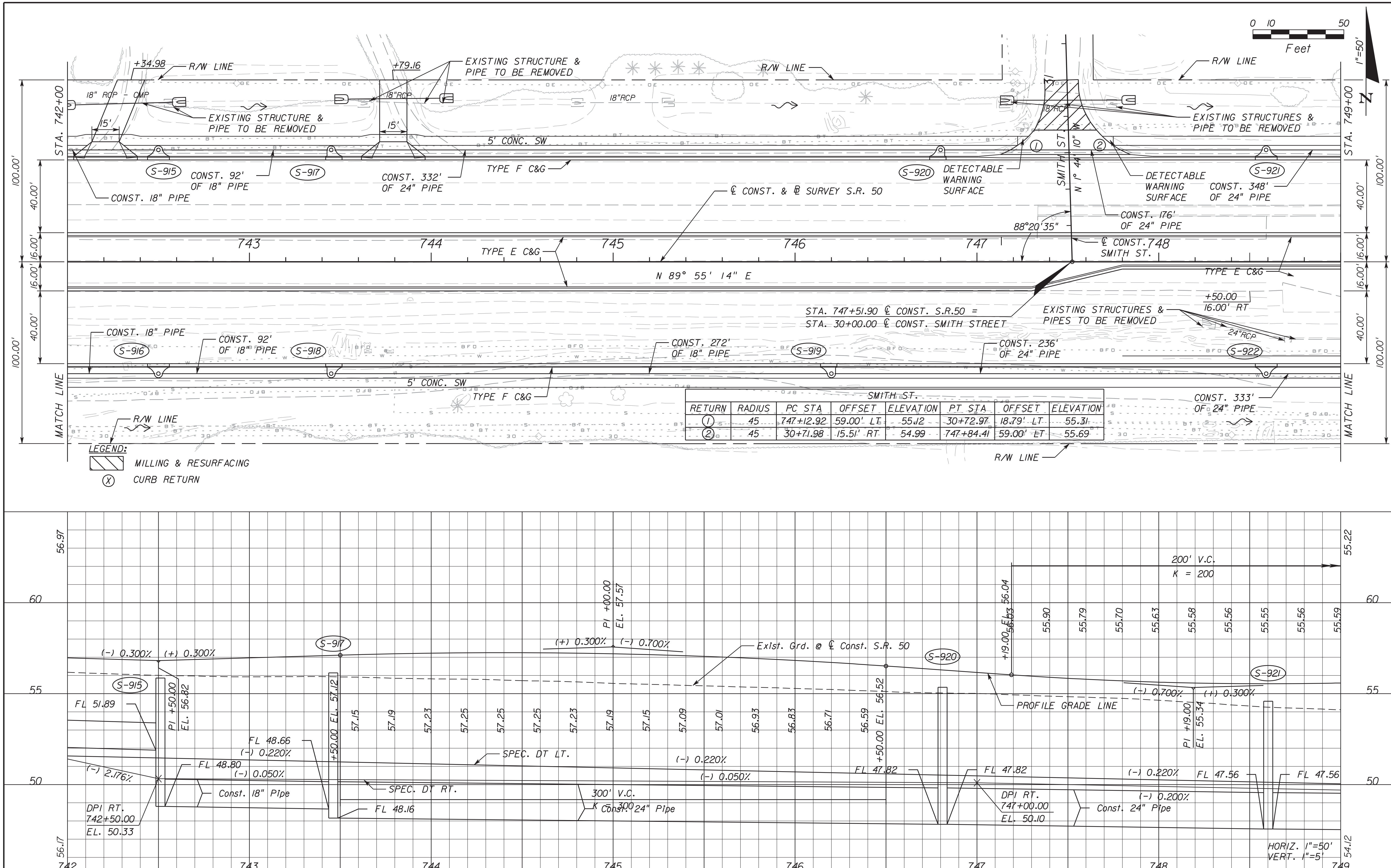

SMITH ST.							
RETURN	RADIUS	PC STA	OFFSET	ELEVATION	PT STA	OFFSET	ELEVATION
1	45	747+12.92	59.00' LT	55.12	30+72.97	18.79' LT	55.31
2	45	30+71.98	15.51' RT	54.99	747+84.41	59.00' LT	55.69

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REVISIONS					
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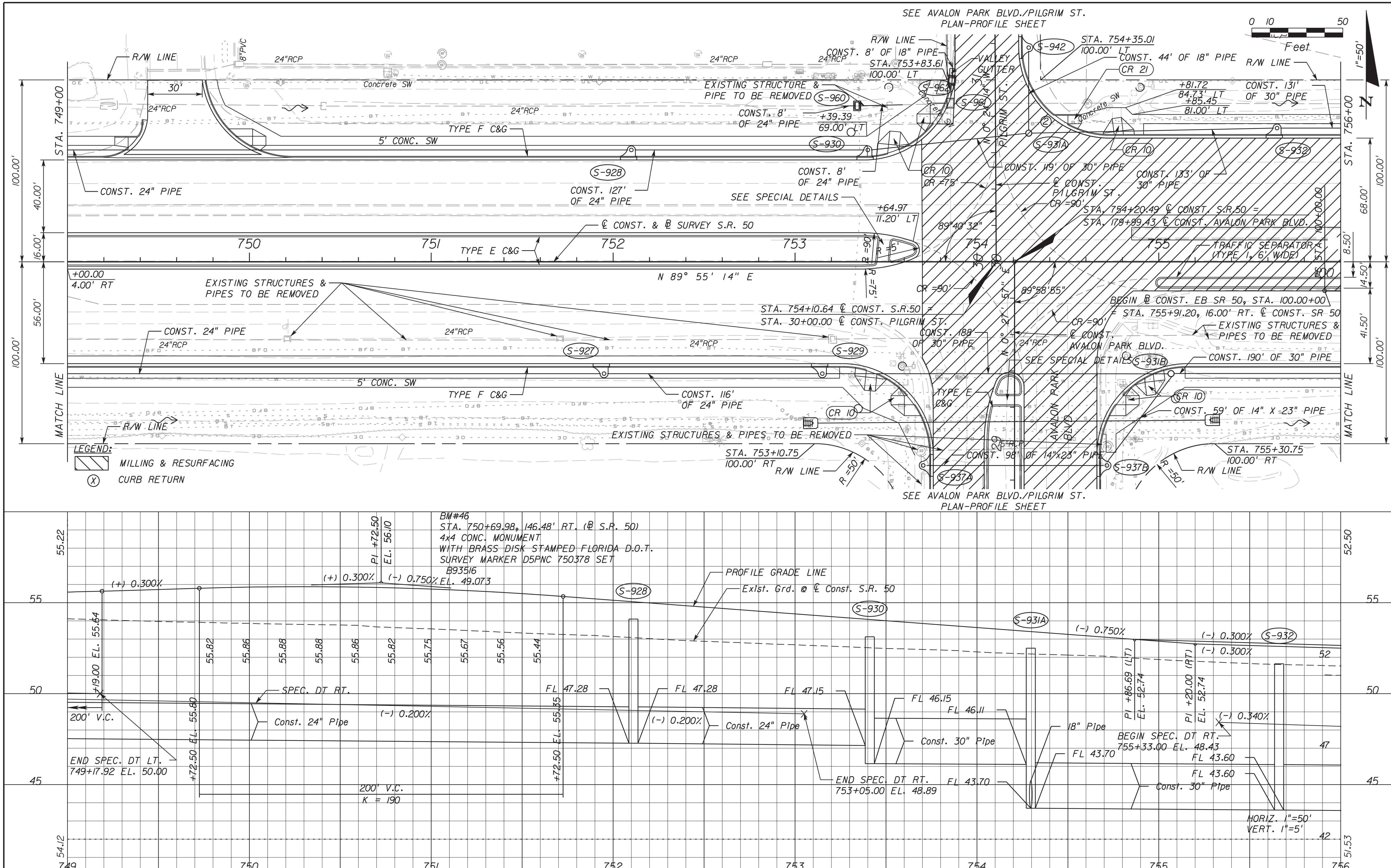
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

PLAN-PROFILE (37)
STA. 742+00 TO STA. 749+00

SHEET NO.
122

R-14



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REVISIONS					
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CLEARWATER, FLORIDA 33762
FBPR CERTIFICATE OF AUTH. # 894
JOHN N. BOX, P.E. # 41832

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

PLAN-PROFILE (38)
STA. 749+00 TO STA. 756+00

SHEET NO. 123

R-15

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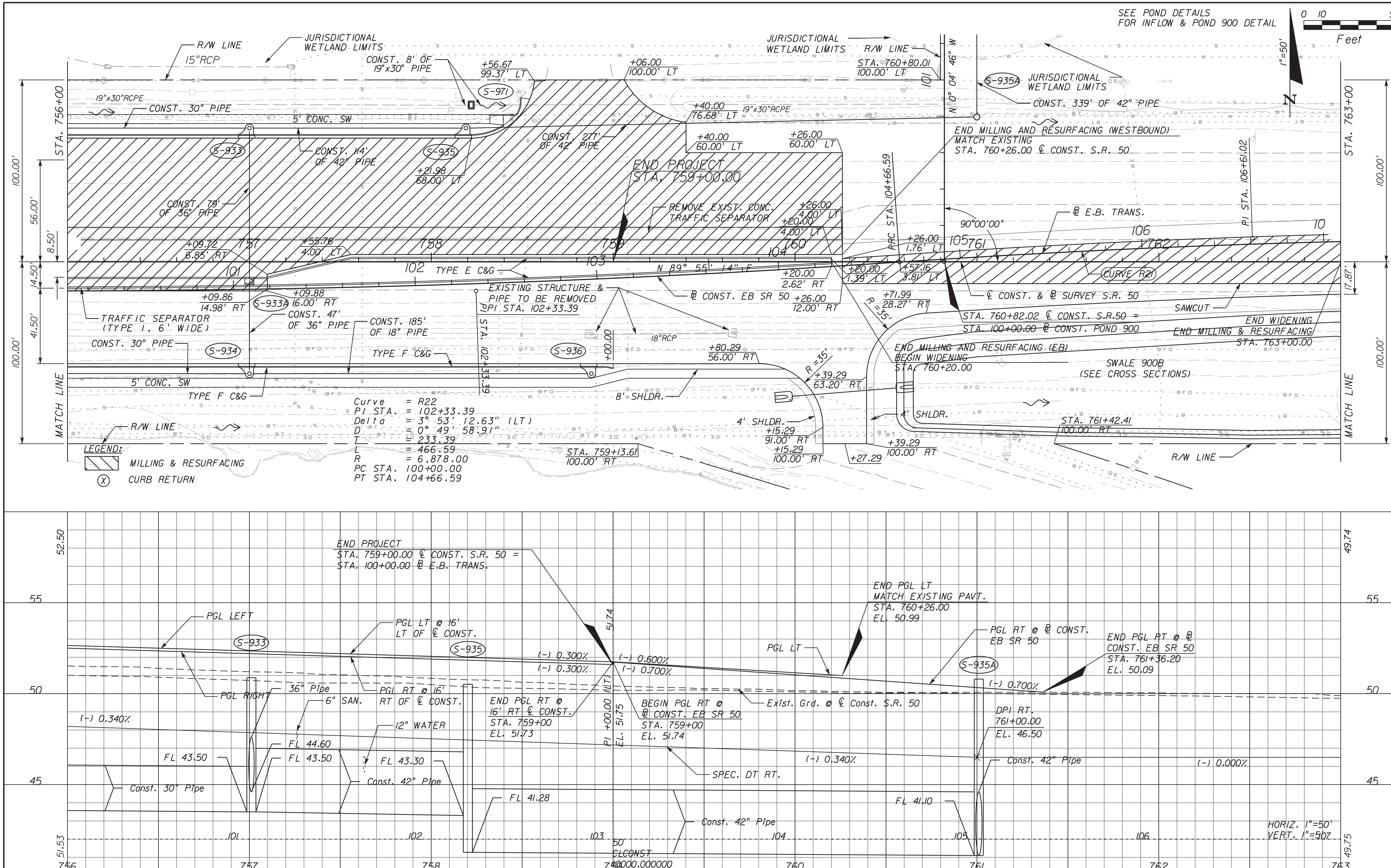

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FBPR CERTIFICATE OF AUTH. # 894
JOHN N. BOX, P.E. # 41832

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

PLAN-PROFILE (39)
STA. 756+00 TO STA. 763+00

SHEET NO. 124

R-16

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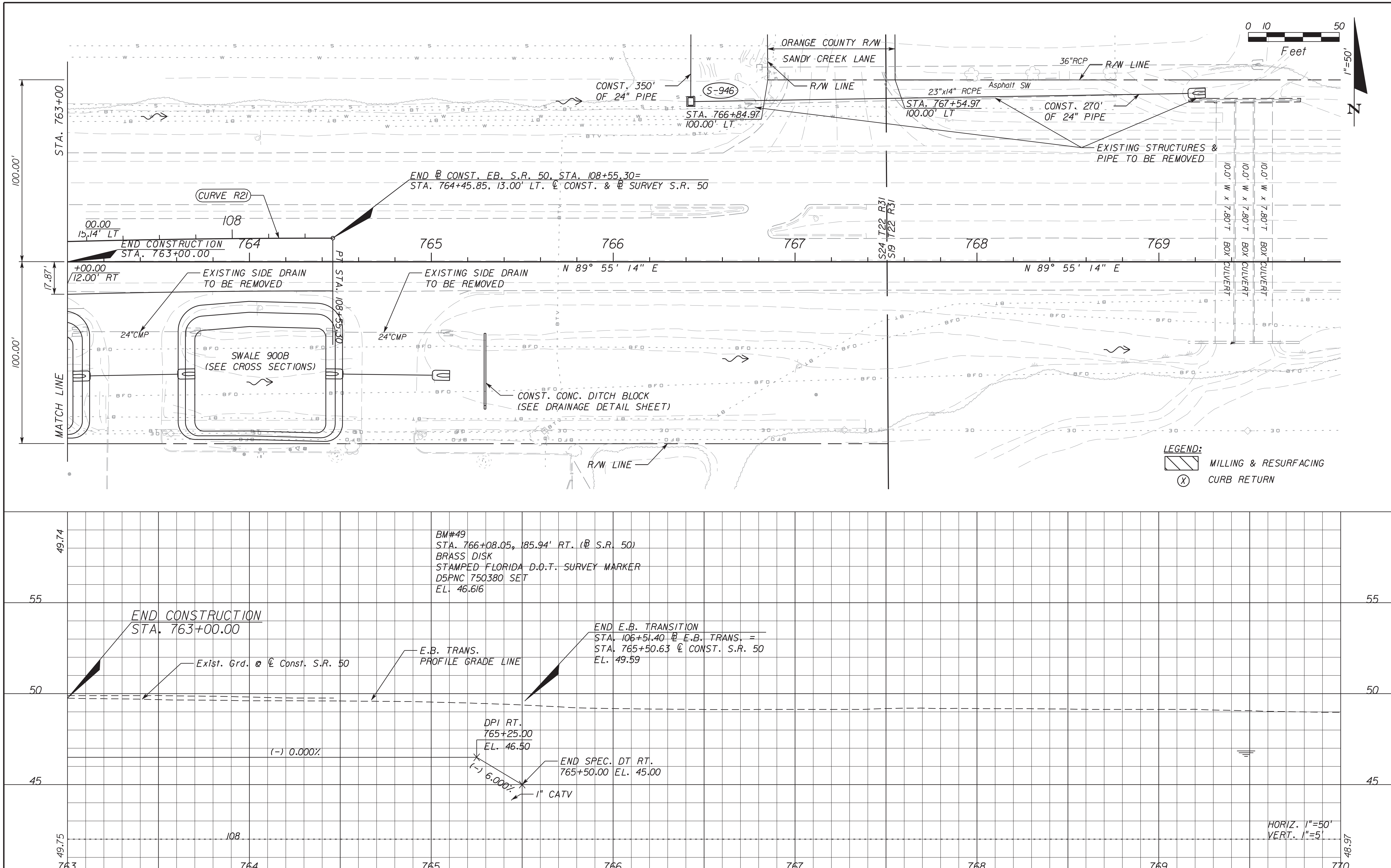

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

LOCHNER
13577 FEATHER SOUND DR. SUITE 600
CLEARWATER, FLORIDA 33762
FBPR CERTIFICATE OF AUTH. # 894
JOHN N. BOX, P.E. # 41832

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 50	ORANGE	239203-4-52-01

PLAN-PROFILE (40)
STA. 763+00 TO STA. 770+00

SHEET NO. 125

R-17

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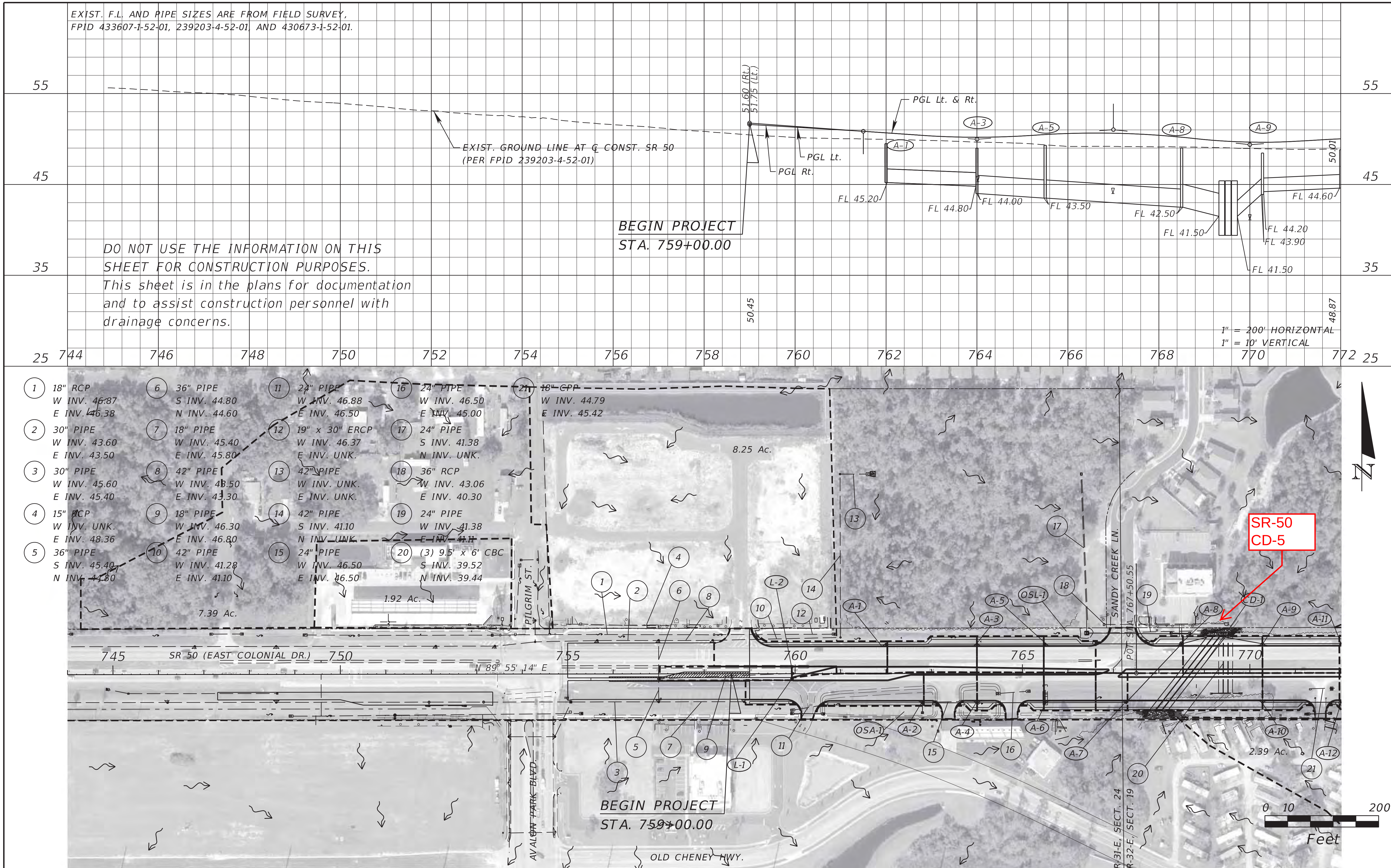
Appendix: S

Excerpt from Comprehensive Engineering Services, Inc.

SR-50 Widening Construction Plans



1	18" RCP, W INV. 46.87, E INV. 46.38
2	30" PIPE, W INV. 43.60, E INV. 43.50
3	30" PIPE, W INV. 45.60, E INV. 45.40
4	15" RCP, W INV. UNK., E INV. 48.36
5	36" PIPE, S INV. 45.40, N INV. 44.80
6	36" PIPE, S INV. 44.80, N INV. 44.60
7	18" PIPE, W INV. 45.40, E INV. 45.80
8	42" PIPE, W INV. 43.50, E INV. 43.30
9	18" PIPE, W INV. 46.30, E INV. 46.80
10	42" PIPE, W INV. 41.28, E INV. 41.10
11	24" PIPE, W INV. 46.88, E INV. 46.50
12	19" x 30" ERCP, W INV. 46.37, E INV. UNK.
13	42" PIPE, W INV. UNK., E INV. UNK.
14	42" PIPE, S INV. 41.10, N INV. UNK.
15	24" PIPE, W INV. 46.50, E INV. 46.50
16	24" PIPE, W INV. 46.50, E INV. 45.00
17	24" PIPE, S INV. 41.38, N INV. UNK.
18	36" RCP, W INV. 43.06, E INV. 40.30
19	24" PIPE, W INV. 41.38, E INV. 41.11
20	(3) 9.5' x 6' CBC, S INV. 39.52, N INV. 39.44
21	18" CPP, W INV. 44.79, E INV. 45.42

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

DRAINAGE MAP

SHEET NO. 5

S-1

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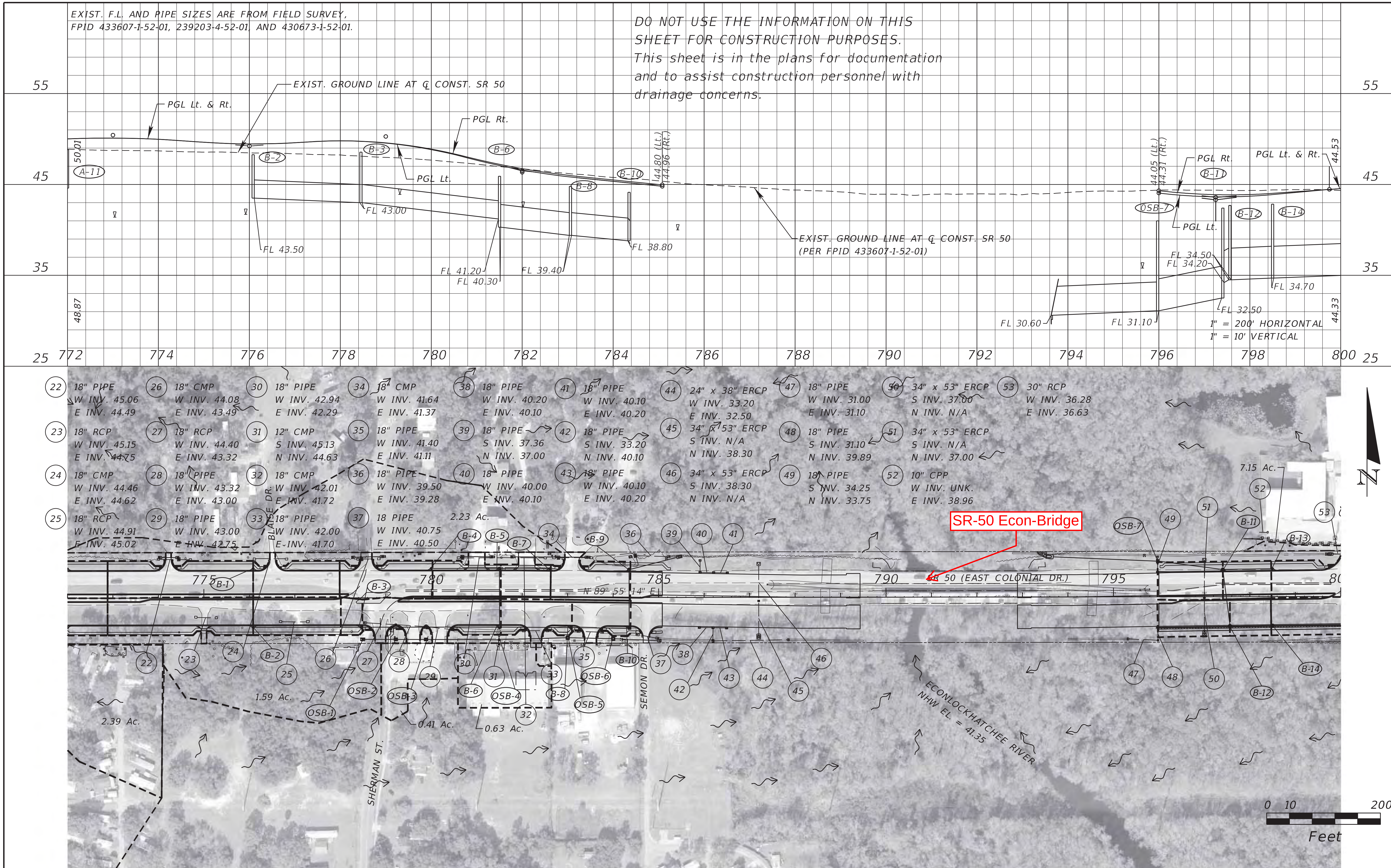

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

DRAINAGE MAP

SHEET NO.
6

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EXIST. F.L. AND PIPE SIZES ARE FROM FIELD SURVEY,
FPID 433607-1-52-01, 239203-4-52-01, AND 430673-1-52-01.

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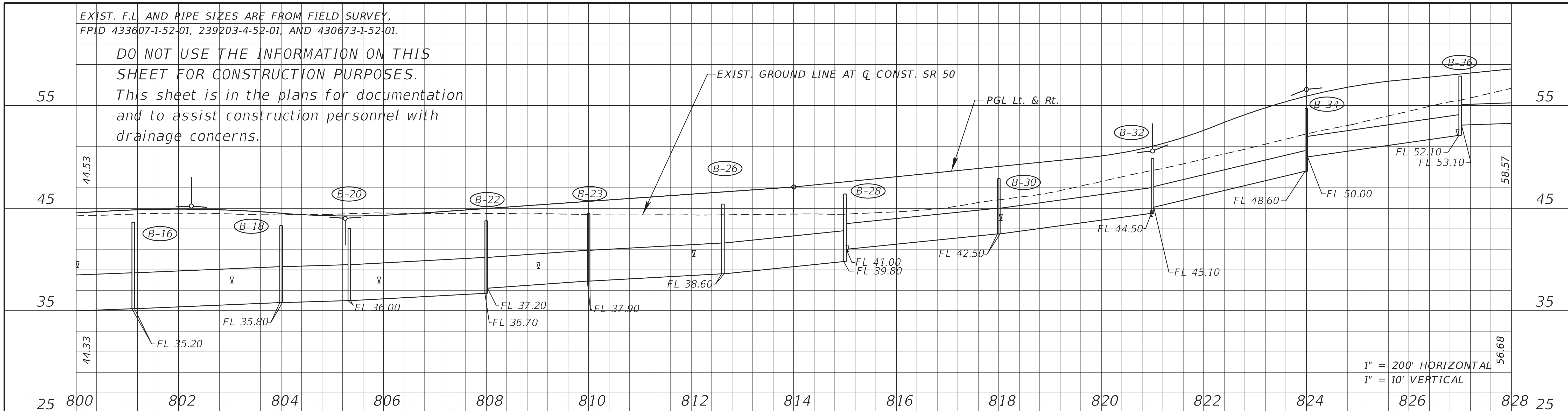
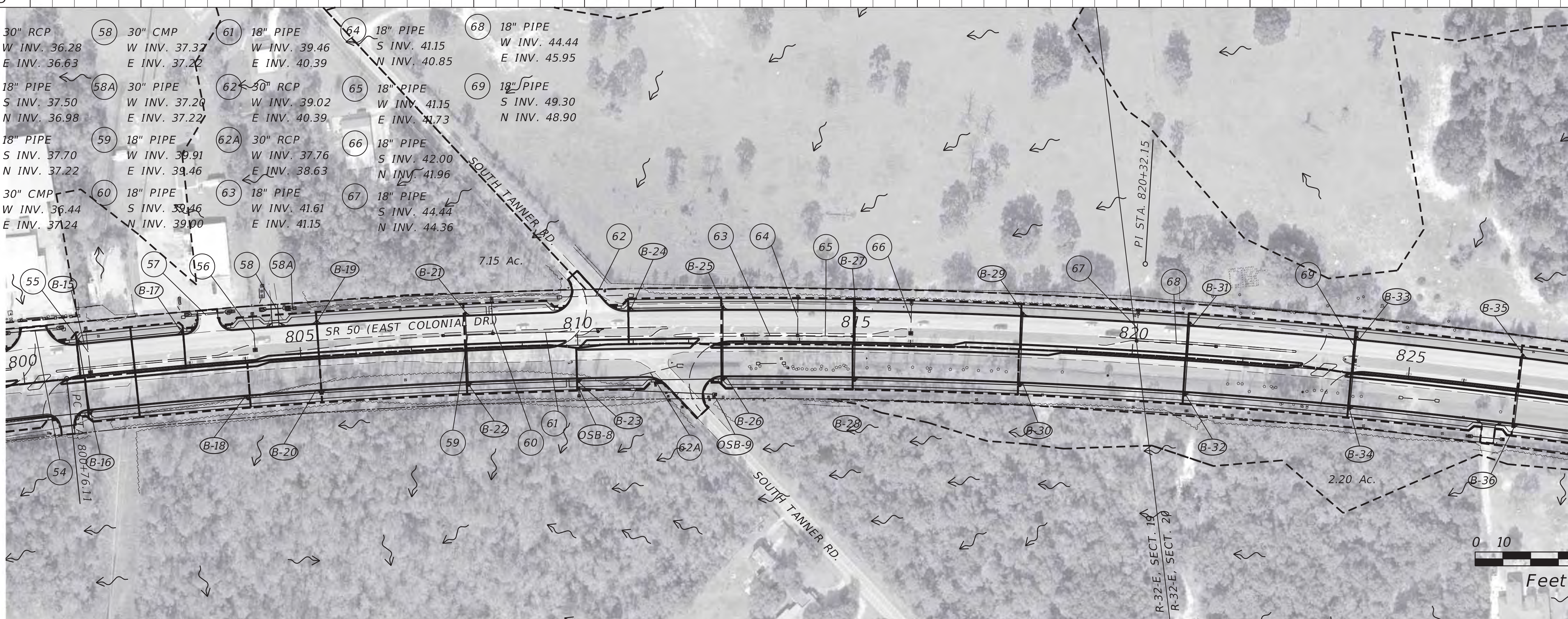


54	30" RCP	W INV. 36.28 / E INV. 36.63
55	18" PIPE	S INV. 37.50 / N INV. 36.98
56	18" PIPE	S INV. 37.70 / N INV. 37.22
57	30" CMP	W INV. 36.44 / E INV. 37.24
58	30" CMP	W INV. 37.32 / E INV. 37.22
58A	30" PIPE	W INV. 37.20 / E INV. 37.22
59	18" PIPE	W INV. 39.91 / E INV. 39.46
60	18" PIPE	S INV. 39.46 / N INV. 39.00
61	18" PIPE	W INV. 39.46 / E INV. 40.39
62	30" RCP	W INV. 39.02 / E INV. 40.39
62A	30" RCP	W INV. 37.76 / E INV. 38.63
63	18" PIPE	W INV. 41.61 / E INV. 41.15
64	18" PIPE	S INV. 41.15 / N INV. 40.85
65	18" PIPE	W INV. 41.15 / E INV. 41.73
66	18" PIPE	S INV. 42.00 / N INV. 41.96
67	18" PIPE	S INV. 44.44 / N INV. 44.36
68	18" PIPE	W INV. 44.44 / E INV. 45.95
69	18" PIPE	S INV. 49.30 / N INV. 48.90



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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

DRAINAGE MAP

SHEET NO. 7

S-3

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EXIST. F.L. AND PIPE SIZES ARE FROM FIELD SURVEY,
FPID 433607-1-52-01, 239203-4-52-01, AND 430673-1-52-01.

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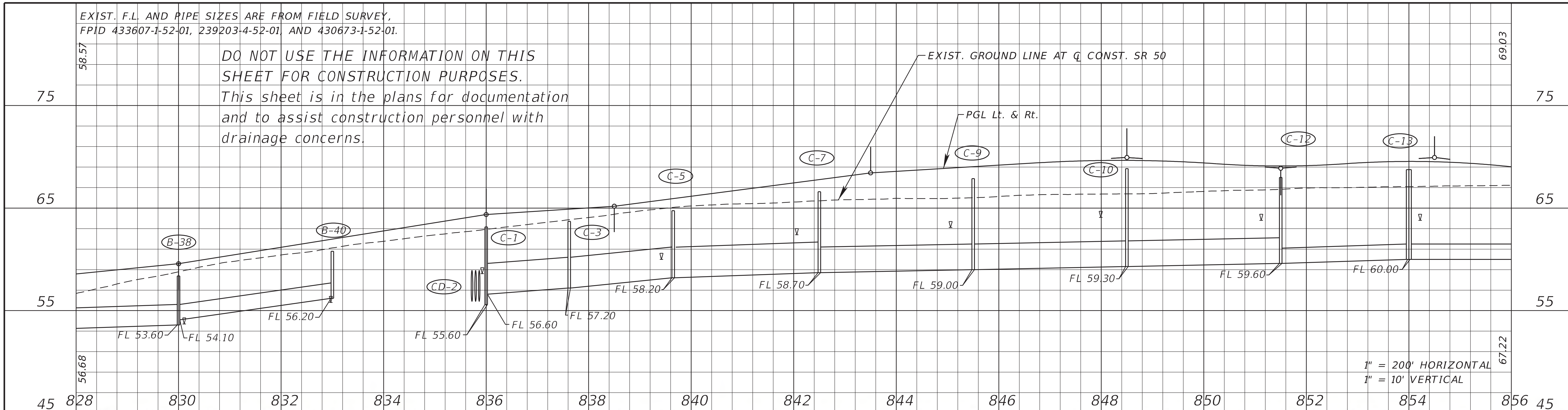

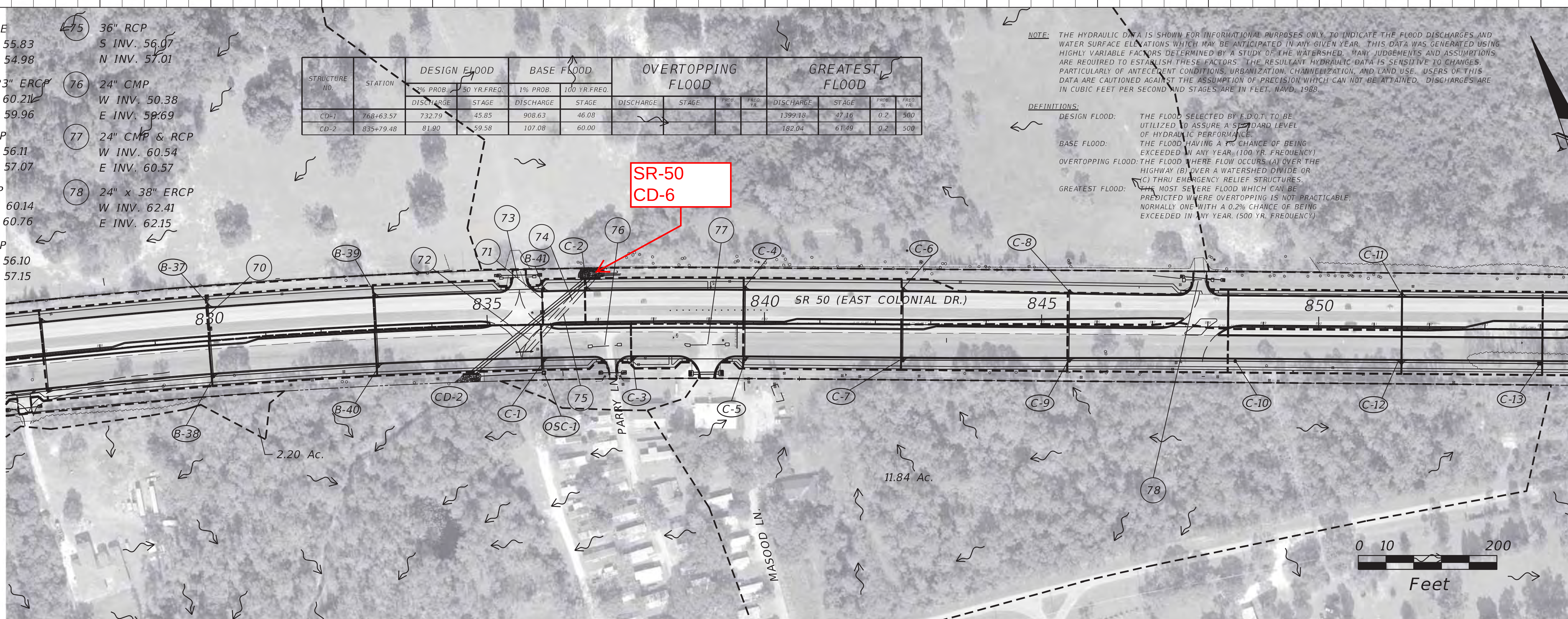

70 18" PIPE
S INV. 55.83
N INV. 54.98

71 14" x 23" ERCP
S INV. 60.21
N INV. 59.96

72 36" RCP
S INV. 56.11
N INV. 57.07

73 18" RCP
W INV. 60.14
E INV. 60.76

74 36" RCP
S INV. 56.10
N INV. 57.15

75 36" RCP
S INV. 56.07
N INV. 57.01

76 24" CMP
W INV. 50.38
E INV. 59.69

77 24" CMP & RCP
W INV. 60.54
E INV. 60.57

78 24" x 38" ERCP
W INV. 62.41
E INV. 62.15

STRUCTURE NO.	STATION	DESIGN FLOOD		BASE FLOOD		OVERTOPPING FLOOD				GREATEST FLOOD			
		2% PROB.	50 YR.FREQ.	1% PROB.	100 YR.FREQ.								
		DISCHARGE	STAGE	DISCHARGE	STAGE	DISCHARGE	STAGE	PROB. %	FREQ. YR.	DISCHARGE	STAGE	PROB. %	FREQ. YR.
CD-1	768+63.57	732.79	45.85	908.63	46.08					1399.18	47.16	0.2	500
CD-2	835+79.48	81.90	59.58	107.08	60.00					182.04	61.49	0.2	500

NOTE: THE HYDRAULIC DATA IS SHOWN FOR INFORMATIONAL PURPOSES ONLY, TO INDICATE THE FLOOD DISCHARGES AND WATER SURFACE ELEVATIONS WHICH MAY BE ANTICIPATED IN ANY GIVEN YEAR. THIS DATA WAS GENERATED USING HIGHLY VARIABLE FACTORS DETERMINED BY A STUDY OF THE WATERSHED. MANY JUDGEMENTS AND ASSUMPTIONS ARE REQUIRED TO ESTABLISH THESE FACTORS. THE RESULTANT HYDRAULIC DATA IS SENSITIVE TO CHANGES, PARTICULARLY OF ANTECEDENT CONDITIONS, URBANIZATION, CHANNELIZATION, AND LAND USE. USERS OF THIS DATA ARE CAUTIONED AGAINST THE ASSUMPTION OF PRECISION WHICH CAN NOT BE ATTAINED. DISCHARGES ARE IN CUBIC FEET PER SECOND AND STAGES ARE IN FEET, NAVD, 1988.

DEFINITIONS:

DESIGN FLOOD: THE FLOOD SELECTED BY F.D.O.T. TO BE UTILIZED TO ASSURE A STANDARD LEVEL OF HYDRAULIC PERFORMANCE.

BASE FLOOD: THE FLOOD HAVING A 1% CHANCE OF BEING EXCEEDED IN ANY YEAR. (100 YR. FREQUENCY)

OVERTOPPING FLOOD: THE FLOOD WHERE FLOW OCCURS (A) OVER THE HIGHWAY (B) OVER A WATERSHED DIVIDE OR (C) THRU EMERGENCY RELIEF STRUCTURES.

GREATEST FLOOD: THE MOST SEVERE FLOOD WHICH CAN BE PREDICTED WHERE OVERTOPPING IS NOT PRACTICABLE, NORMALLY ONE WITH A 0.2% CHANCE OF BEING EXCEEDED IN ANY YEAR. (500 YR. FREQUENCY)

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STATE OF FLORIDA
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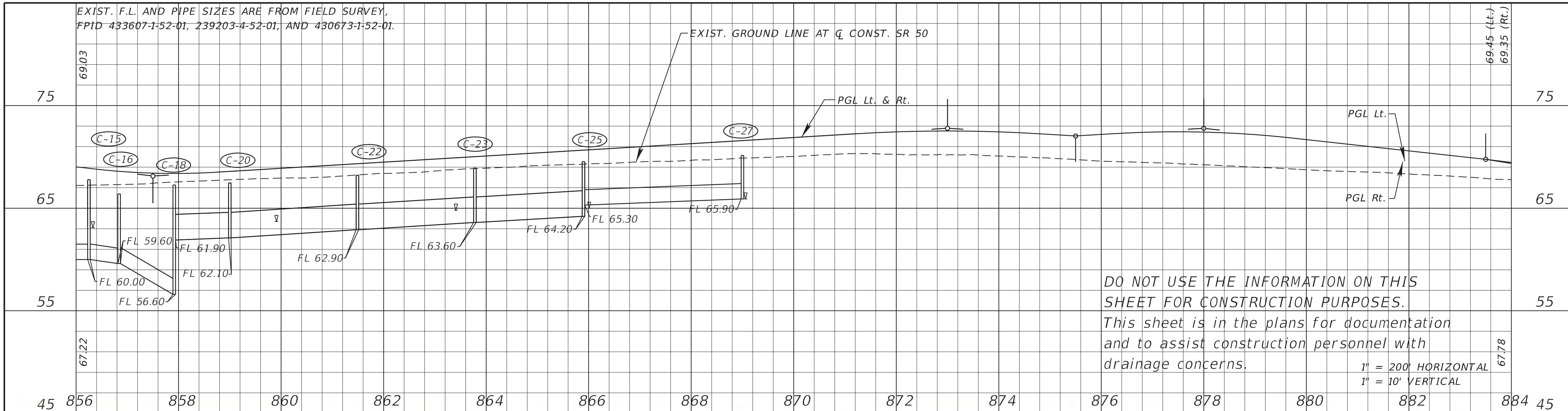
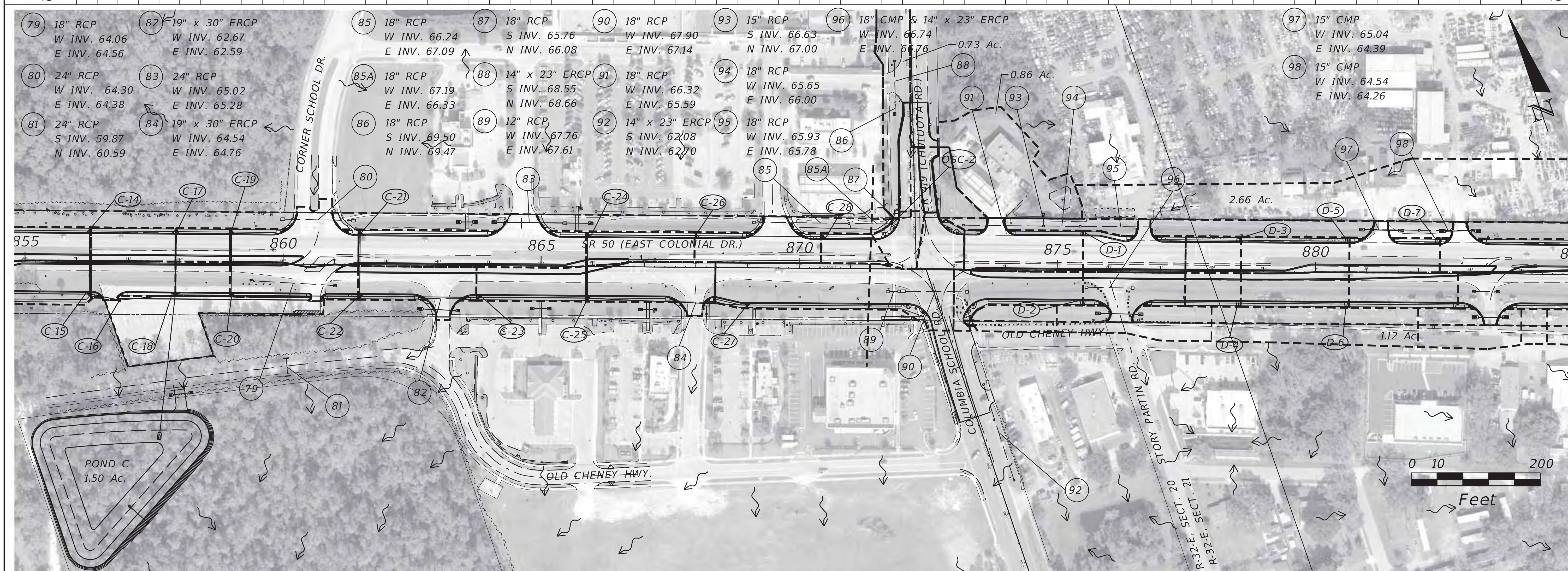
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

DRAINAGE MAP

SHEET NO. 8





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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

DRAINAGE MAP

SHEET NO.
9

S-5

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EXIST. F.L. AND PIPE SIZES ARE FROM FIELD SURVEY, FPID 433607-1-52-01, 239203-4-52-01, AND 430673-1-52-01.

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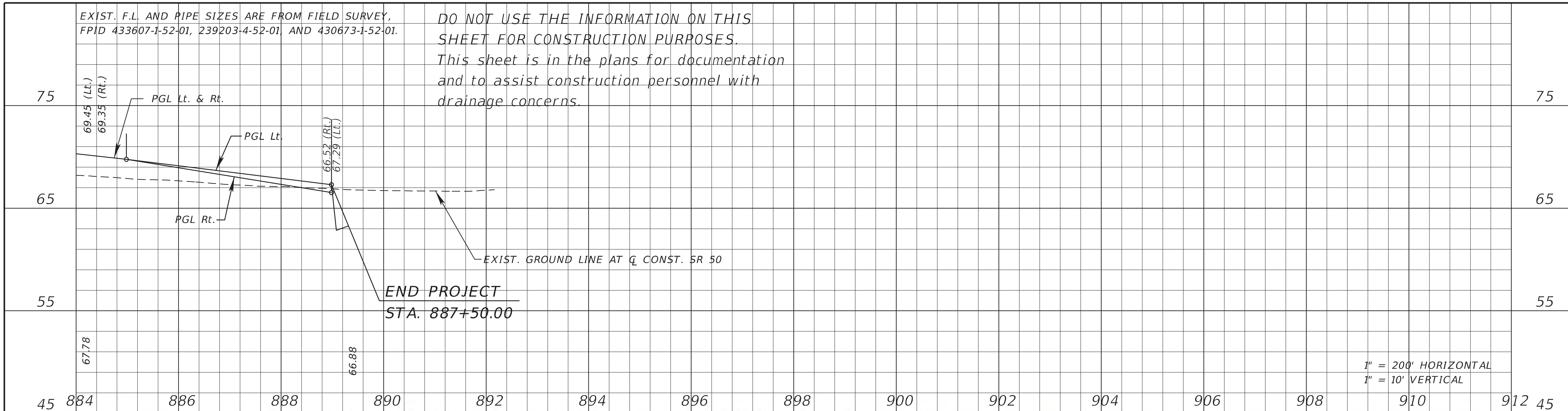

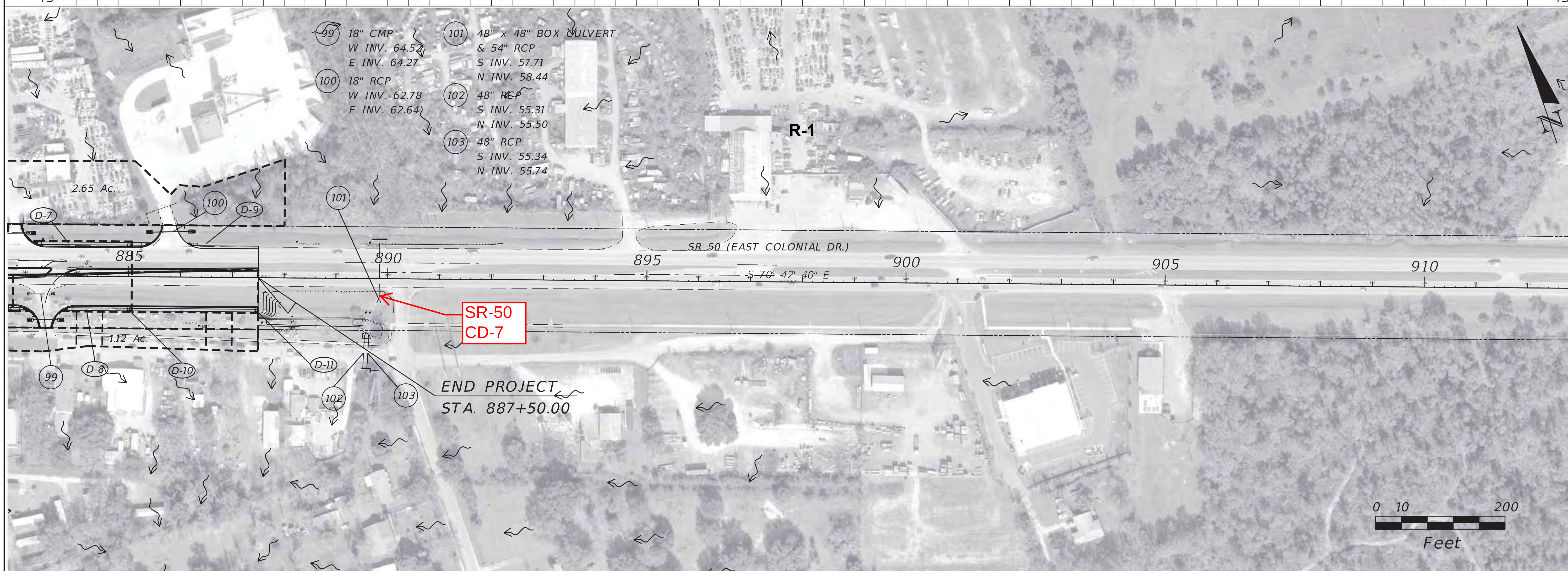

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

DRAINAGE MAP

SHEET NO. 10

S-6

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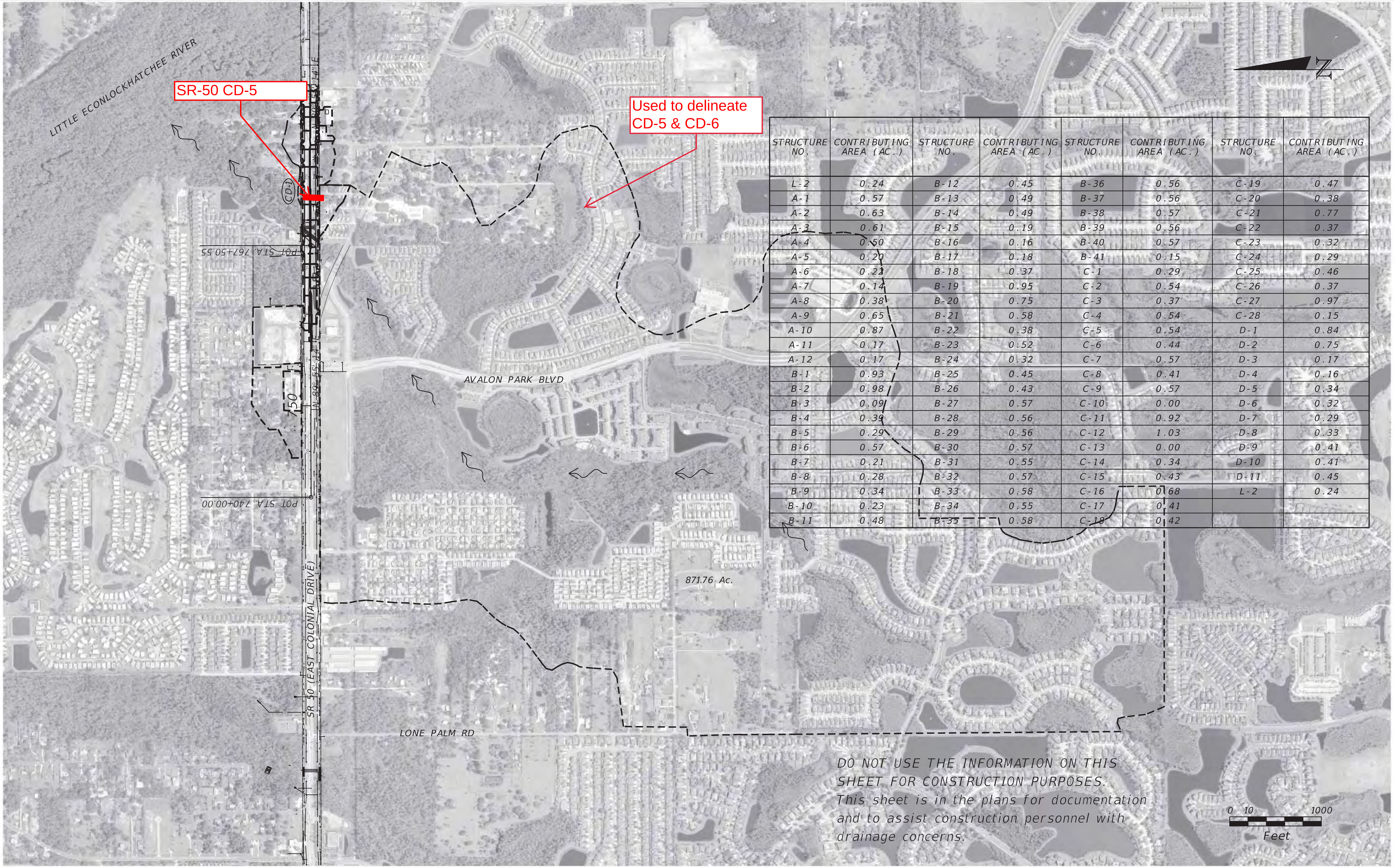
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

DRAINAGE MAP

SHEET NO. 11

S-7



STRUCTURE NO.	CONTRIBUTING AREA (AC.)	STRUCTURE NO.	CONTRIBUTING AREA (AC.)	STRUCTURE NO.	CONTRIBUTING AREA (AC.)	STRUCTURE NO.	CONTRIBUTING AREA (AC.)
L-2	0.24	B-12	0.45	B-36	0.56	C-19	0.47
A-1	0.57	B-13	0.49	B-37	0.56	C-20	0.38
A-2	0.63	B-14	0.49	B-38	0.57	C-21	0.77
A-3	0.61	B-15	0.19	B-39	0.56	C-22	0.37
A-4	0.50	B-16	0.16	B-40	0.57	C-23	0.32
A-5	0.20	B-17	0.18	B-41	0.15	C-24	0.29
A-6	0.22	B-18	0.37	C-1	0.29	C-25	0.46
A-7	0.14	B-19	0.95	C-2	0.54	C-26	0.37
A-8	0.38	B-20	0.75	C-3	0.37	C-27	0.97
A-9	0.65	B-21	0.58	C-4	0.54	C-28	0.15
A-10	0.87	B-22	0.38	C-5	0.54	D-1	0.84
A-11	0.17	B-23	0.52	C-6	0.44	D-2	0.75
A-12	0.17	B-24	0.32	C-7	0.57	D-3	0.17
B-1	0.93	B-25	0.45	C-8	0.41	D-4	0.16
B-2	0.98	B-26	0.43	C-9	0.57	D-5	0.34
B-3	0.09	B-27	0.57	C-10	0.00	D-6	0.32
B-4	0.39	B-28	0.56	C-11	0.92	D-7	0.29
B-5	0.29	B-29	0.56	C-12	1.03	D-8	0.33
B-6	0.57	B-30	0.57	C-13	0.00	D-9	0.41
B-7	0.21	B-31	0.55	C-14	0.34	D-10	0.41
B-8	0.28	B-32	0.57	C-15	0.43	D-11	0.45
B-9	0.34	B-33	0.58	C-16	0.68	L-2	0.24
B-10	0.23	B-34	0.55	C-17	0.41		
B-11	0.48	B-35	0.58	C-18	0.42		

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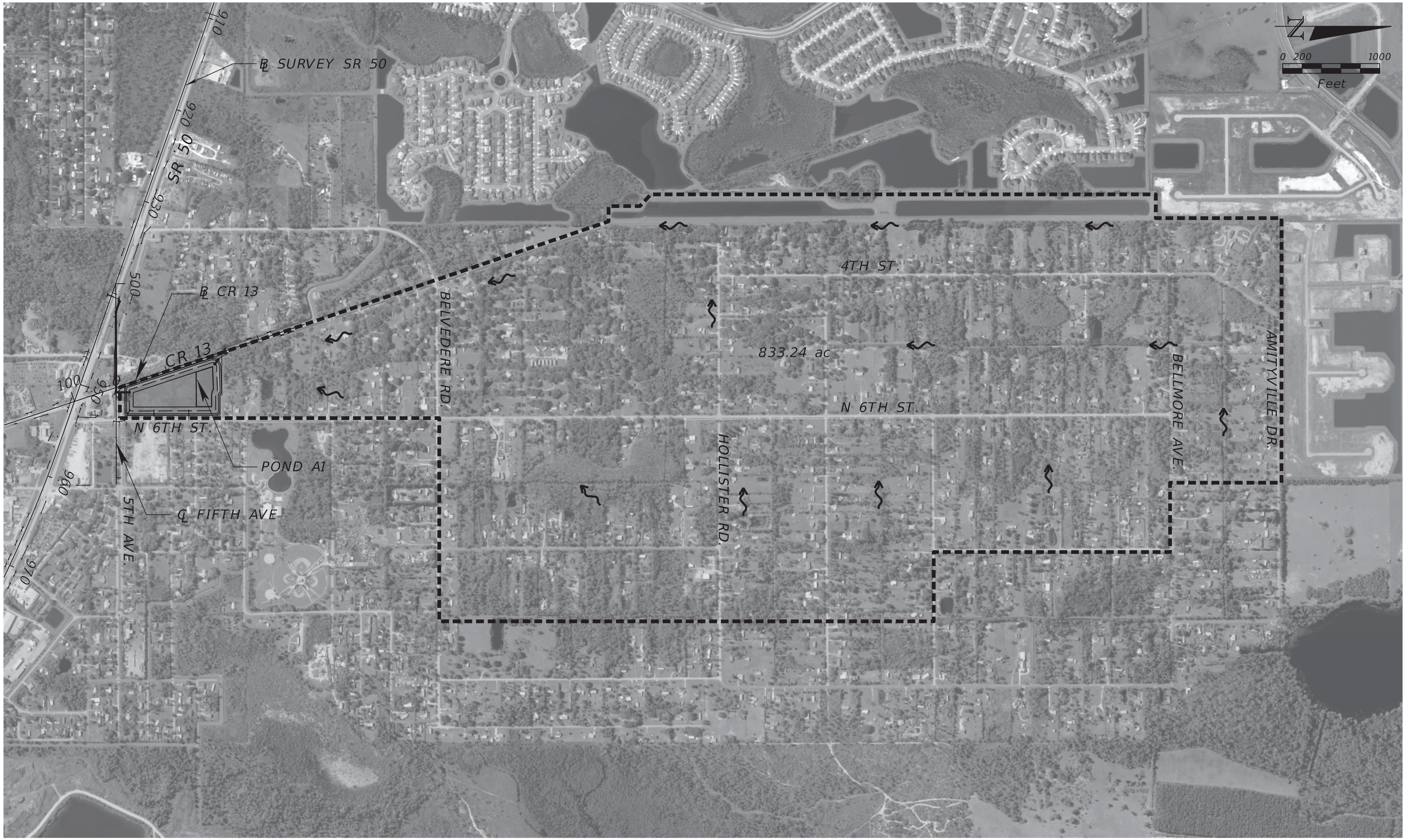
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

DRAINAGE MAP

SHEET NO.
12

S-8



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1650 Prudential Drive, Suite 400
Jacksonville, Florida 32207
T: 904 721 2991 | F: 904 861 2450
Certificate of Authorization No. 7917
Walter J. Nemecek, III, PE | No. 58122

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

DRAINAGE MAP

SHEET NO.
13

S-9

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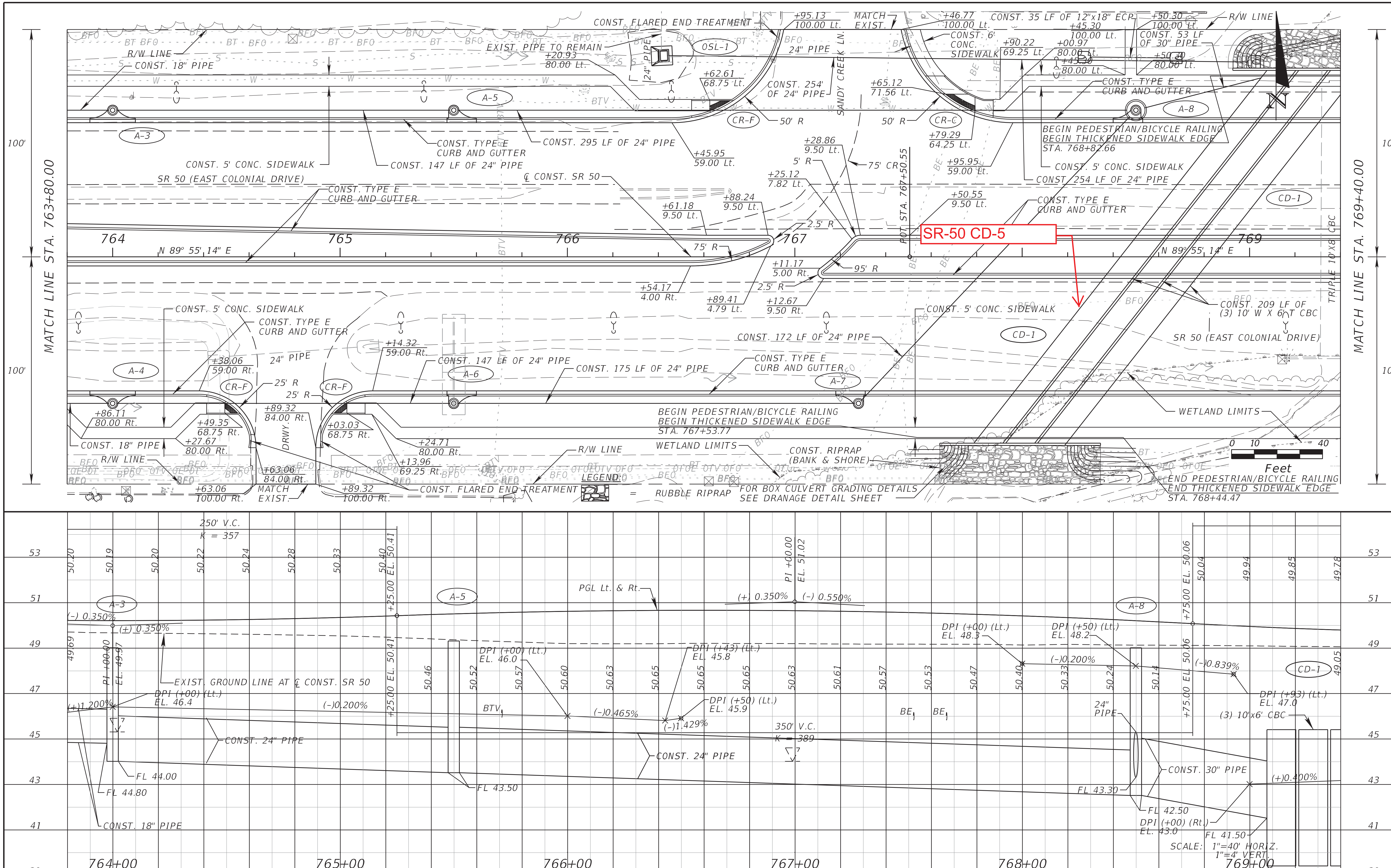

REVISIONS

DATE	DESCRIPTION	DATE	DESCRIPTION

PRELIMINARY
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1/11/2016 12:14:51 PM

Comprehensive Engineering Services, Inc.
201 S Orange Ave, Suite 1300
Orlando, FL 32801-3442
Certificate of Authorization : 7862
Matthew Robert Gibbs, P.E., License No. 64741

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

ROADWAY PLAN-PROFILE

SHEET NO. 36

S-10

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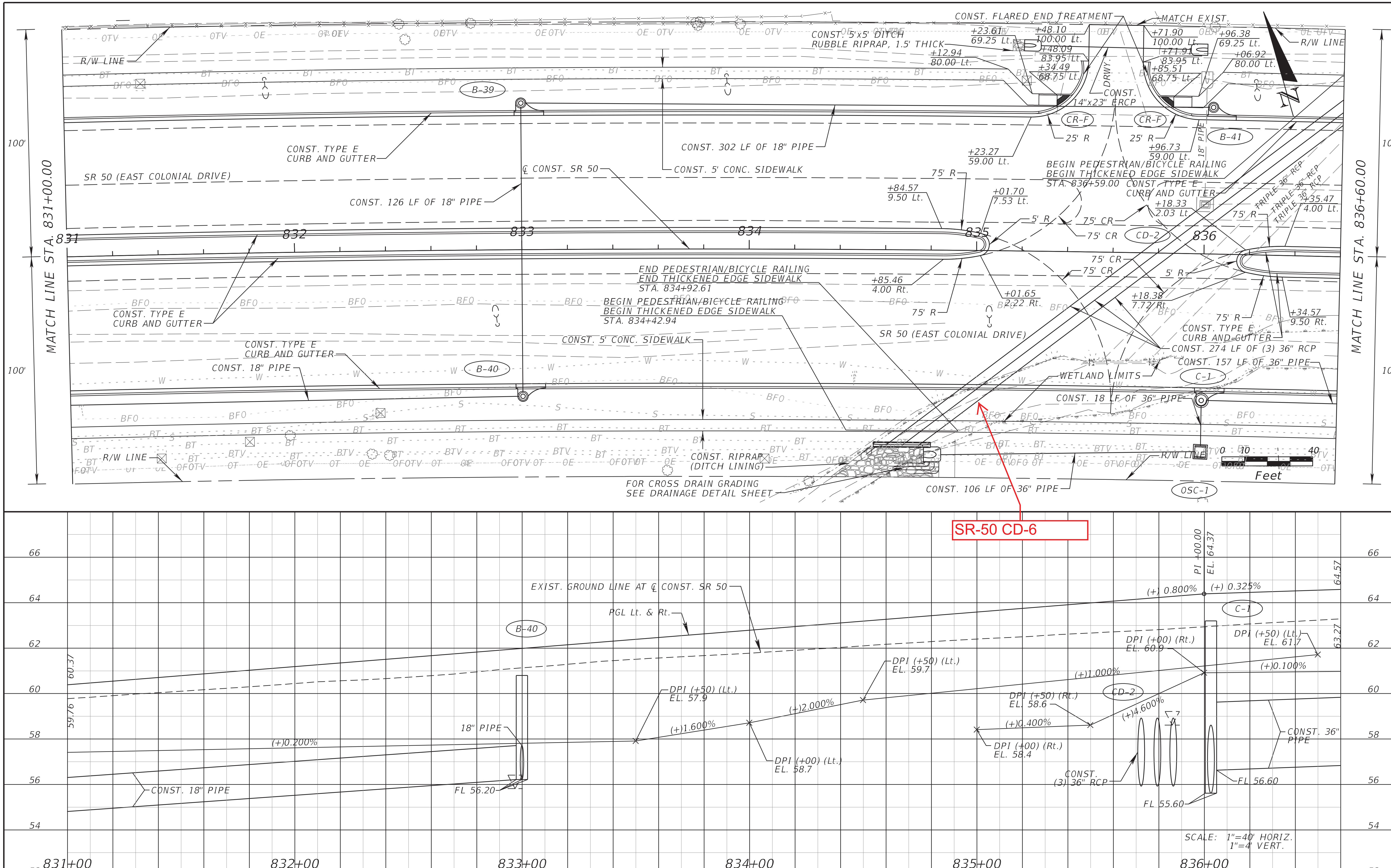

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REVISIONS			
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1/11/2016 12:15:34 PM

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Orlando, FL 32801-3442
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Matthew Robert Gibbs, P.E., License No. 64741

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

ROADWAY PLAN-PROFILE

SHEET NO.
48

S-11

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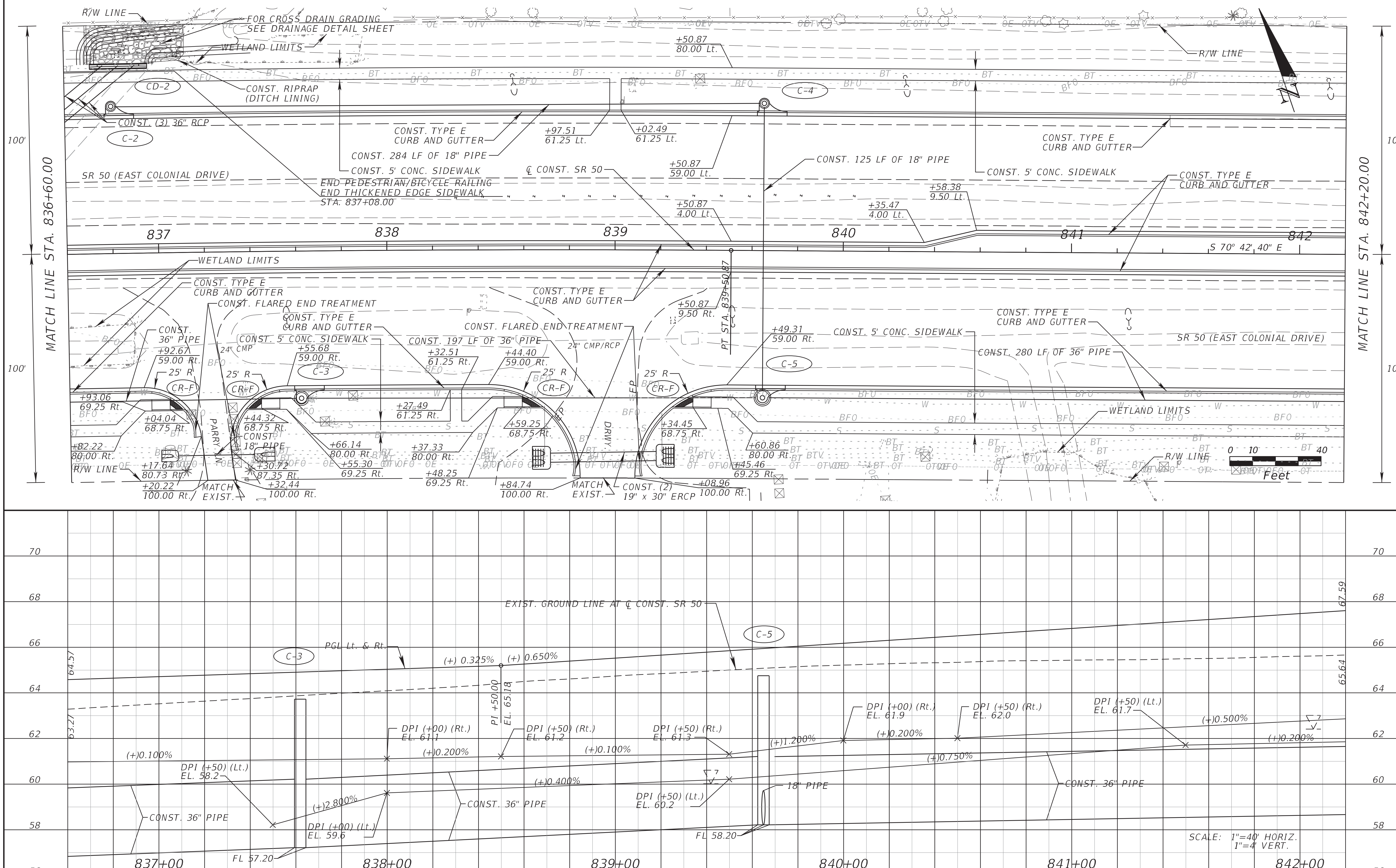

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REVISIONS			
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Comprehensive Engineering Services, Inc.
201 S Orange Ave, Suite 1300
Orlando, FL 32801-3442
Certificate of Authorization : 7862
Matthew Robert Gibbs, P.E., License No. 64741

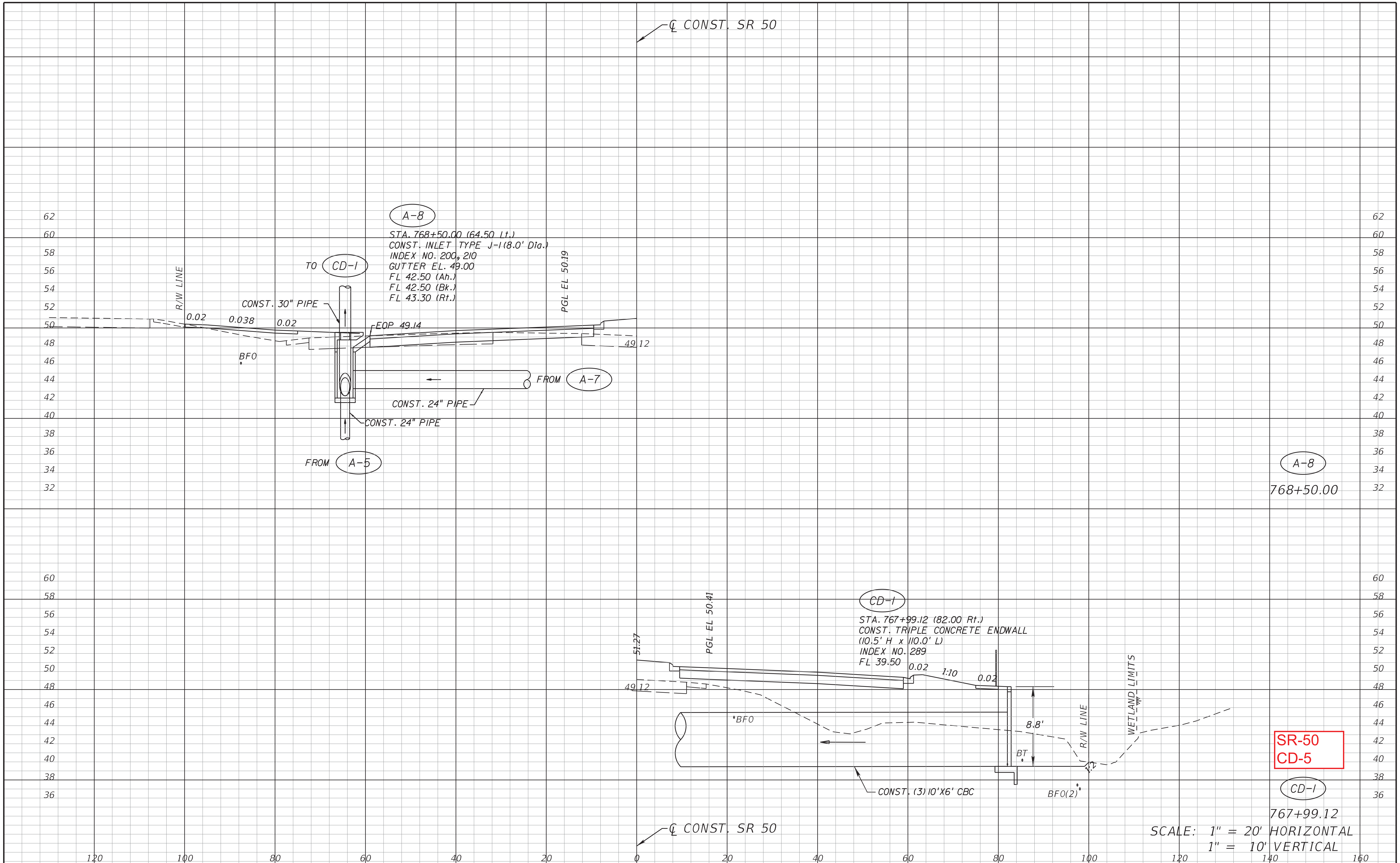
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

ROADWAY PLAN-PROFILE

SHEET NO. 49

S-12



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

PRELIMINARY
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1/11/2016 12:17:42 PM

Comprehensive Engineering Services, Inc.
201 S Orange Ave, Suite 1300
Orlando, FL 32801-3442
Certificate of Authorization No: 7862
Eric Arp, P.E., License No. 53971

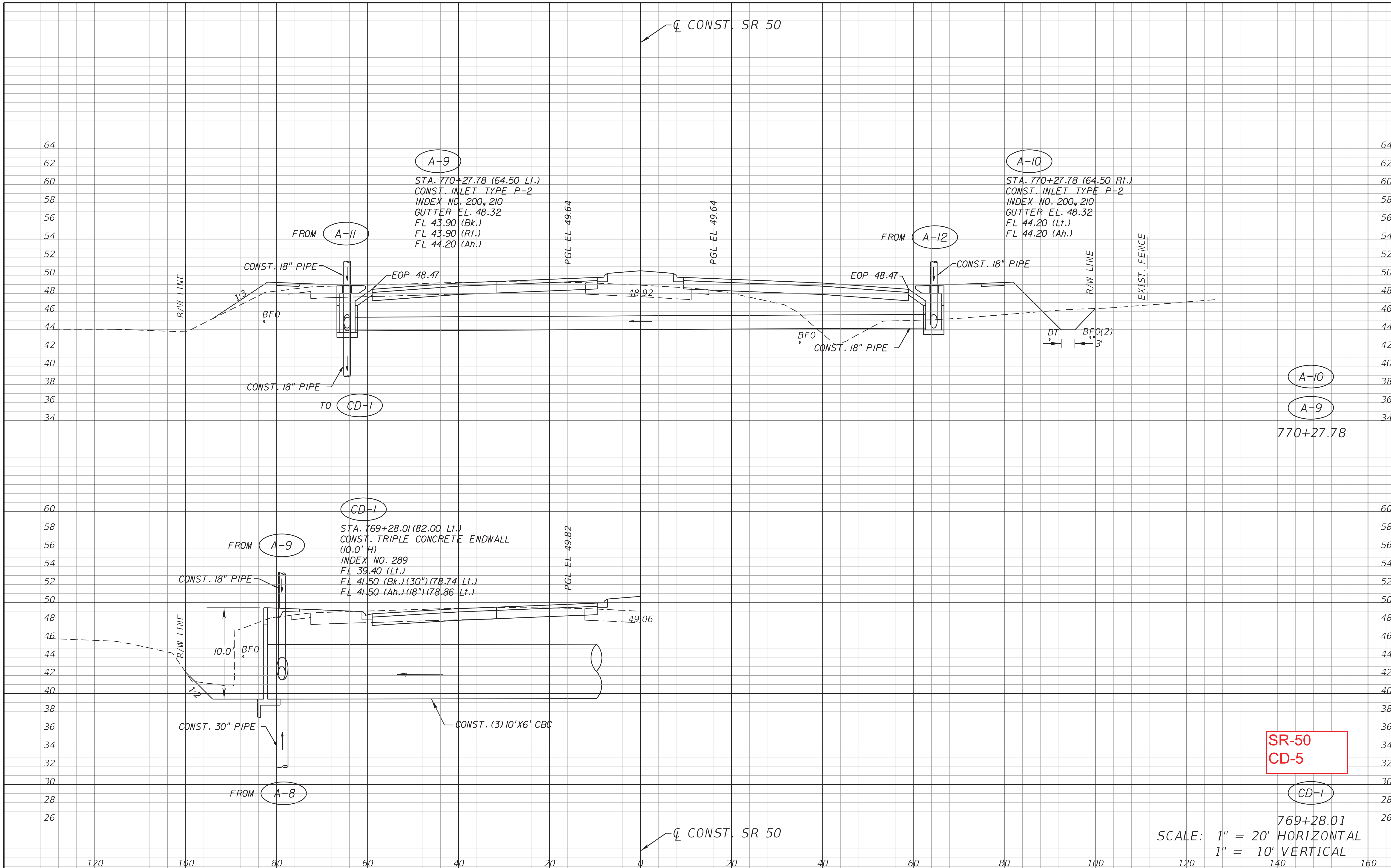
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

DRAINAGE STRUCTURES

SHEET NO. 87

S-13



REVISIONS			
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Comprehensive Engineering Services, Inc.
201 S Orange Ave, Suite 1300
Orlando, FL 32801-3442
Certificate of Authorization No: 7862
Eric Arp, P.E., License No. 53971

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

DRAINAGE STRUCTURES

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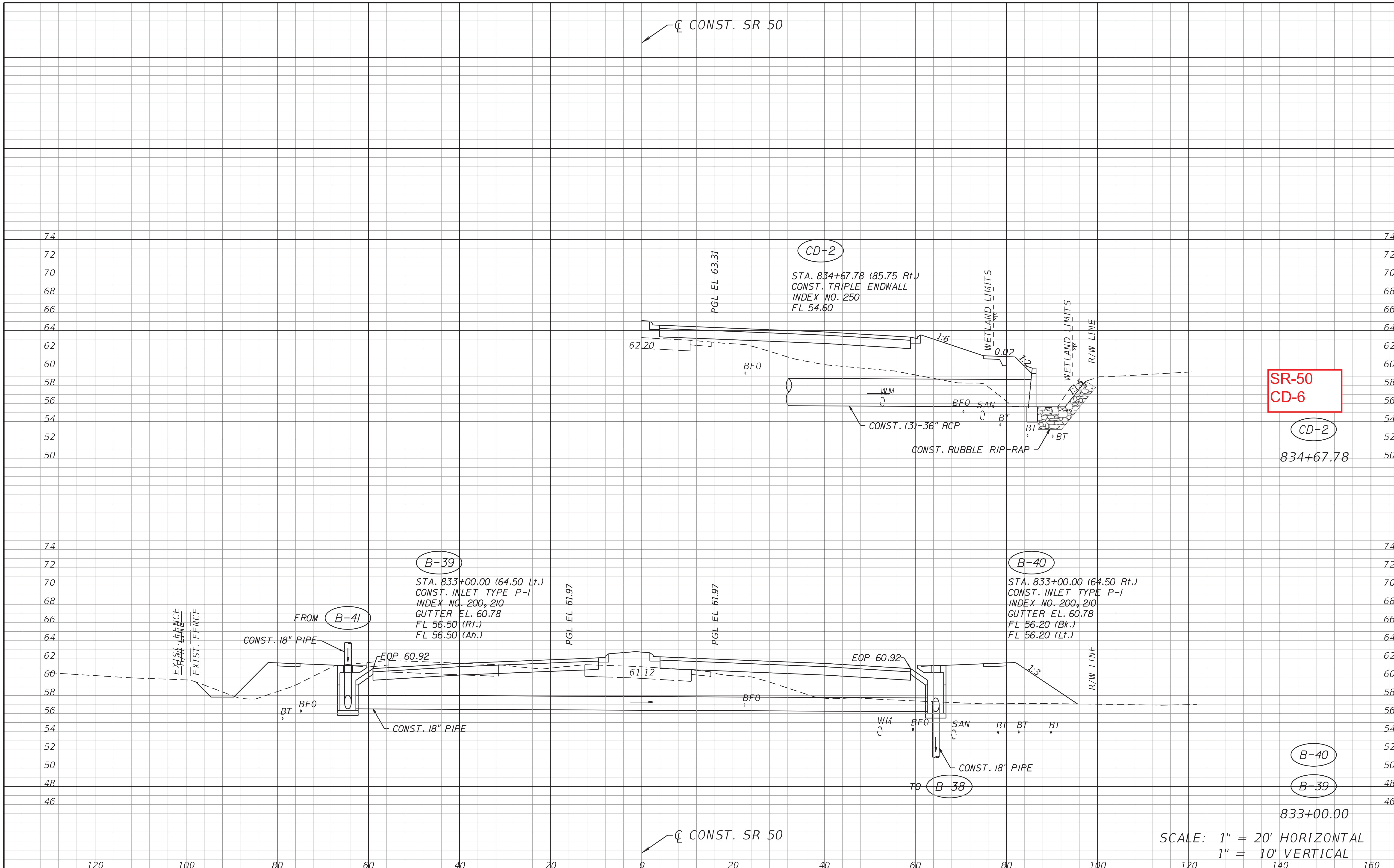

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION
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Comprehensive Engineering Services, Inc.
201 S Orange Ave, Suite 1300
Orlando, FL 32801-3442
Certificate of Authorization No: 7862
Eric Arp, P.E., License No. 53971

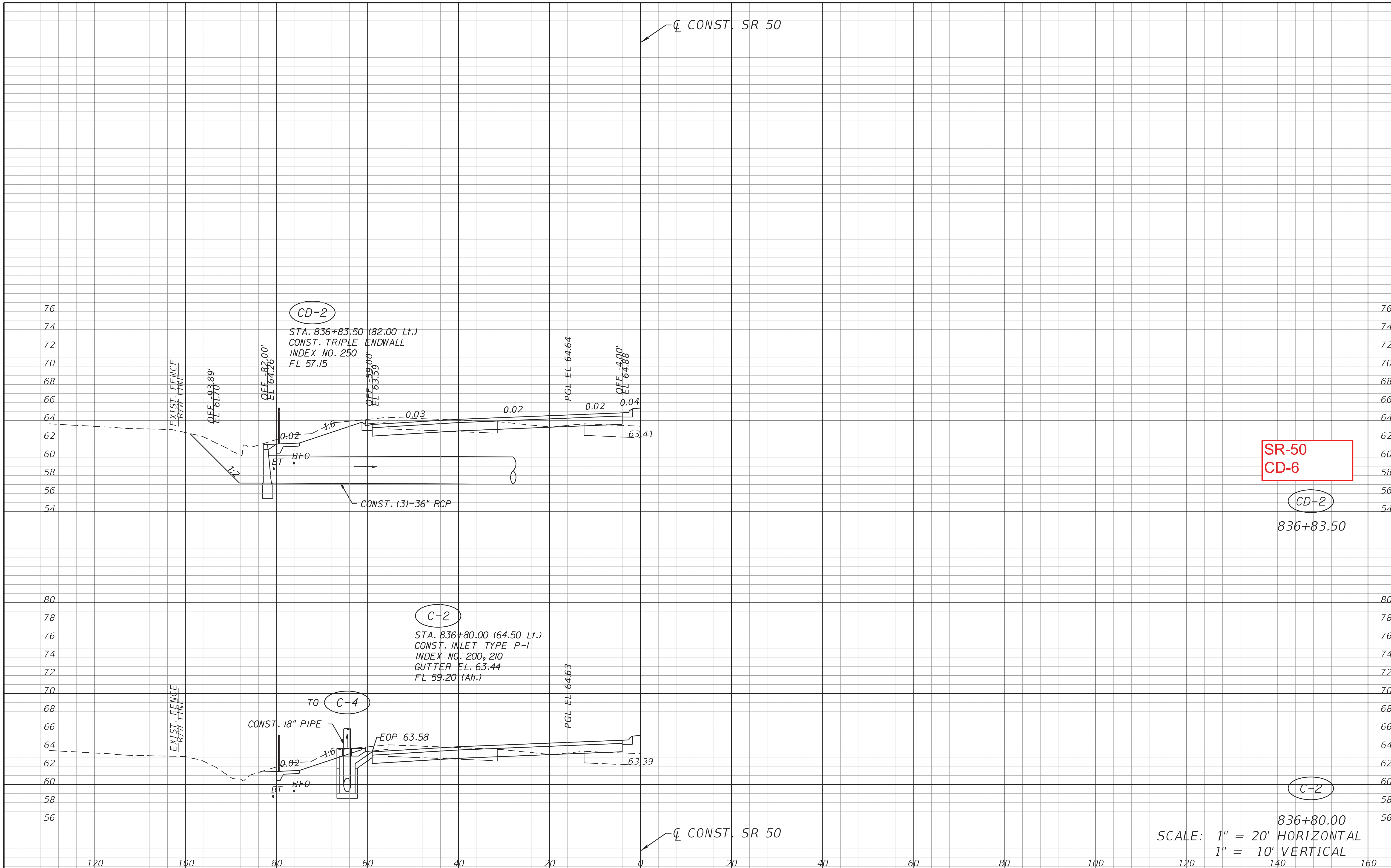
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

DRAINAGE STRUCTURES

SHEET NO.
106

S-15



NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION
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201 S Orange Ave, Suite 1300
Orlando, FL 32801-3442
Certificate of Authorization No: 7862
Eric Arp, P.E., License No. 53971

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 50	ORANGE	239203-7-52-01

DRAINAGE STRUCTURES

SHEET NO. 108

S-16

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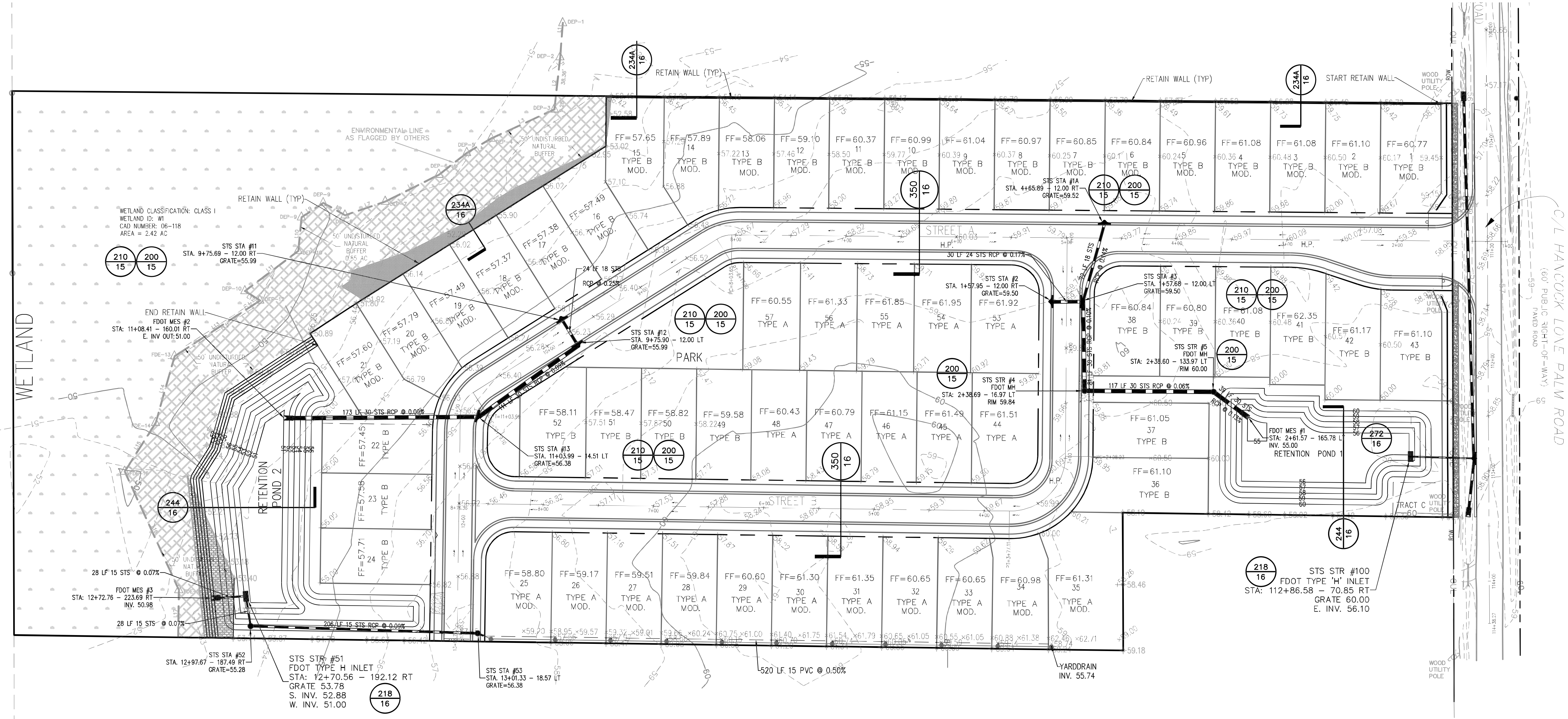
Appendix: T

Excerpt from CAD Engineering and Design, Inc

Waterford Creek



STORMWATER MANAGEMENT SYSTEM

1. THE ENTITY THAT WILL OWN, OPERATE, AND MAINTAIN THE STORM SEWER SHOWN ON THESE PLANS IS MATTAMY–JACKSONVILLE PARTNERSHIP. THE CONTRACTOR SHALL BE EXPECTED TO MEET ALL THE REQUIREMENTS OF THE PERMITS OBTAINED.

2. THE CONTRACTOR SHALL PERFORM HIS OWN INVESTIGATIONS AND CALCULATIONS AS NECESSARY TO ASSURE HIMSELF OF EARTHWORK QUANTITIES. THERE IS NO IMPLICATION THAT EARTHWORK BALANCES AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY IMPORT FILL NEEDED, OR FOR REMOVAL AND DISPOSAL OF EXCESS MATERIALS.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE NECESSARY TESTING TO ASSURE THAT THE PROPER COMPACTION HAS BEEN ACHIEVED ON THE SUBGRADE, BASE, AND ALL OTHER PERTINENT AREAS THAT HAVE BEEN COMPLETED. THE CONTRACTOR SHALL BEAR ALL COSTS ASSOCIATED WITH TESTING AND SHALL PROVIDE THE OWNER AND THE ENGINEER WITH COPIES OF THE CERTIFICATION OF COMPACTION FROM THE TESTING COMPANY.

4. PRIOR TO BID PREPARATION, THE CONTRACTOR MUST BECOME FAMILIAR WITH THE OVERALL SITE CONDITIONS AND PERFORM ADDITIONAL INVESTIGATIONS AS DETERMINED NECESSARY TO UNDERSTAND THE LIMIT AND DEPTH OF EXPECTED ORGANIC SILT PEAT AREAS, ADEQUACY OF EXISTING MATERIALS AS FILL, DEWATERING REQUIREMENTS, CLEAN FILL REQUIRED FROM OFF–SITE AND MATERIALS TO BE DISPOSED OF OFF–SITE, ALL OF WHICH WILL AFFECT HIS PRICING. ANY DELAY, INCONVENIENCE, OR EXPENSE CAUSED TO THE CONTRACTOR DUE TO INADEQUATE INVESTIGATION OF EXISTING CONDITIONS SHALL BE INCIDENTAL TO THE CONTRACT, AND NO EXTRA COMPENSATION WILL BE ALLOWED. THE MATERIALS ANTICIPATED TO BE ENCOUNTERED DURING CONSTRUCTION MAY REQUIRE DRYING PRIOR TO USE AS BACKFILL, AND THE CONTRACTOR MAY HAVE TO IMPORT MATERIALS, AT NO EXTRA COST, FROM OFF–SITE TO MEET THE REQUIREMENTS FOR COMPACTION AND PROPER FILL.

5. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE EXISTING SITE CONDITIONS OF SOIL PRIOR TO N.T.P. TO DETERMINE IF ANY OFF–SITE MATERIALS WILL NEED TO BE IMPORTED TO ACHIEVE THE GRADES SPECIFIED ON THE PLANS.

6. THE CONTRACTOR SHALL NOTIFY THE OWNER AND ENGINEER WHEN ALL WORK IS LAID OUT (SURVEY STAKED), SO THAT A DETERMINATION MAY BE MADE OF SPECIFIC TREES TO BE REMOVED. A TREE REMOVAL PERMIT IS REQUIRED TO BE OBTAINED BY THE CONTRACTOR.

7. ALL FILL MATERIALS SHALL BE FREE OF MUCK, STUMPS, ROOTS, BRUSH, VEGETATIVE MATTER, RUBBISH, OR OTHER UNSUITABLE MATTER.

8. ALL MATERIALS EXCAVATED SHALL REMAIN THE PROPERTY OF THE OWNER AND SHALL BE STOCKPILED AT ON–SITE LOCATIONS AS SPECIFIED BY THE OWNER. MATERIALS SHALL BE STOCKPILED SEPARATELY AS TO USEABLE (NONORGANIC) FILL STOCKPILES AND ORGANIC (MUCK) STOCKPILES IF MUCK IS ENCOUNTERED. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL UNSUITABLE FILL MATERIALS FROM THE SITE.

9. FILL MATERIALS PLACED UNDER ROADWAYS SHALL BE COMPACTED TO AT LEAST 98% MAXIMUM DENSITY AS SPECIFIED IN AASHTO T–180. ALL OTHER AREAS ARE TO BE COMPACTED TO AT LEAST 95% MAXIMUM DENSITY AS SPECIFIED IN AASHTO T–180. FILL MATERIALS SHALL BE PLACED AND COMPACTED IN A MAXIMUM OF 12" LIFTS. REFER TO SOILS REPORT FOR ADDITIONAL INFORMATION. THE CONTRACTOR SHALL PROVIDE THE ENGINEER AND THE OWNER WITH ALL (PASSING AND FAILING) TESTING RESULTS. RESULTS SHALL BE PROVIDED ON A TIMELY AND REGULAR BASIS PRIOR TO CONTRACTOR'S PAY REQUEST SUBMITTAL.

10. GRADING SHOWN ON THESE PLANS IS PROVIDED TO THE CONTRACTOR TO EXPRESS THE GENERAL GRADING INTENT OF THE PROJECT. THE CONTRACTOR SHALL GRADE THE ENTIRE SITE TO PROVIDE POSITIVE DRAINAGE IN ALL AREAS. SMOOTH TRANSITIONS SHALL BE PROVIDED BETWEEN CONTOURS OR SPOT ELEVATIONS AS SHOWN ON THE PLANS TO ACCOMPLISH THE GRADING INTENT. ALL SLOPES SHALL BE STABILIZED IMMEDIATELY AFTER FINAL GRADING HAS BEEN COMPLETED. CONTRACTOR SHALL NOTIFY OWNER AND ENGINEER A MINIMUM OF FORTY–EIGHT(48) HOURS PRIOR TO DEMOBILIZATION OF GRADING EQUIPMENT TO DETERMINE THAT THE GRADING INTENT HAS BEEN ACHIEVED.

11. REINFORCED CONCRETE PIPE (RCP) SHALL BE CLASS III WITH RUBBER GASKET JOINTS. RCP SHALL CONFORM TO FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (LATEST EDITION) SECTION 941. RUBBER GASKETS SHALL CONFORM TO SECTION 942.

12. ALL OTHER RELATED ITEMS REQUIRED FOR THE CONSTRUCTION OF THE STORM SEWER (OUTFALL PROTECTION, POLLUTION CONTROL, ETC.) ARE TO BE IN ACCORDANCE WITH DETAILS SHOWN ON THE CONSTRUCTION PLANS, FDOT ROADWAY AND TRAFFIC DESIGN STANDARDS, AND FDOT STANDARD SPECIFICATIONS FOR ROADWAY AND BRIDGE CONSTRUCTION (LATEST EDITION).

13. ALL PIPE CALL OUTS ARE MEASURED CENTERLINE TO CENTERLINE FOR MANHOLES AND INLETS.

14. ALL ON–SITE AREAS DISTURBED BY THE CONSTRUCTION SHALL BE STABILIZED WITH A SEED AND MULCH MIXTURE UNLESS OTHERWISE NOTED.

15. ALL OFF–SITE AREAS DISTURBED BY CONSTRUCTION SHALL BE SODDED WITH BAHIA.

16. FINISHED FLOOR ELEVATIONS ARE 6" ABOVE SOD AT SLAB ON ALL SIDES.

17. MINIMUM GRADE OF SODDED AREA TO BE 1%.

18. COORDINATE WITH LANDSCAPE CONTRACTOR TO ASSURE POND(S) ARE SODDED TO PREVENT SCOURING.

19. F.D.O.T. INDEX NO. 102 AND 103 SHALL BE USED FOR EROSION AND SEDIMENT CONTROL.

20. BOUNDARY AND TOPOGRAPHIC DATA IS BASED ON SURVEY PREPARED BY W.C. ELLIOTT SURVEYING DATED JUNE 29, 2011.

21. FOR SOILS DATA, REFER TO REPORT PREPARED BY NODARSE & ASSOCIATES, INC. DATED JUNE 29, 2011.

22. SITE GRADING, PAVING, AND DRAINAGE MATERIALS AND CONSTRUCTION SHALL CONFORM TO ORANGE COUNTY AND SJRWMD DEVELOPMENT STANDARDS AND SPECIFICATIONS.

23. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR(S) TO INSURE THAT ALL REQUIRED PERMITS ARE OBTAINED AND ARE IN HAND PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.

24. THE STORMWATER POND SIDE SLOPES SHALL BE CONSTRUCTED DURING THE EARLY STAGES OF CONSTRUCTION; SIDE SLOPES SHALL BE SODDED AND THE BOTTOM SEEDED. THESE AREAS SHOULD HAVE VEGETATION ADDED AS SOON AS FEASIBLE.

PAVING & DRAINAGE NOTES:

25. SIDEWALKS ARE TO BE CONSTRUCTED THE LENGTH OF FRONTAGE FOR TRACTS A & B AND ALONG HANCOCK LONE PALM ROAD AS PART OF THE INFRASTRUCTURE.

26. THE MINIMUM GRADE FOR THE SUBDIVISION STREETS WITH MIAMI CURB SHALL BE TWENTY–FOUR HUNDREDTHS (.24%) PERCENT.

27. WHERE BERMS ARE PROPOSED, THE DESIGN SHALL BE CERTIFIED BY THE GEOTECHNICAL ENGINEER.

28. ALL ENVIRONMENTAL SWALES WILL BE OWNED AND MAINTAINED BY THE INDIVIDUAL LOT OWNER AND WILL BE CONSTRUCTED WITH THE INFRASTRUCTURE.

29. AN EROSION CONTROL PLAN IS BEING SUBMITTED AND WILL BE APPROVED BY THE COUNTY ENGINEER.

30. THE SIDEWALK AND APRON IN FRONT OF THE DETENTION PONDS & LIFTSTATION ARE 6" THICK AS SHOWN ON PLANS.

SCALE IN FEET
1" = 100'

T-1

Dec 18,2011 – 1:42pm
X:\CAD PROJECTS\105 Mattamy Homes\105001 Waterford Creek\Eng\Final\105001 C03 PGD.dwg

CAD Engineering Design, Inc.
Andrew E. Wright, P.E.
FL. Reg. # 59554
Date
FL. Cert. of Auth. #29191

REV.	DATE	BY	COMMENTS
1			

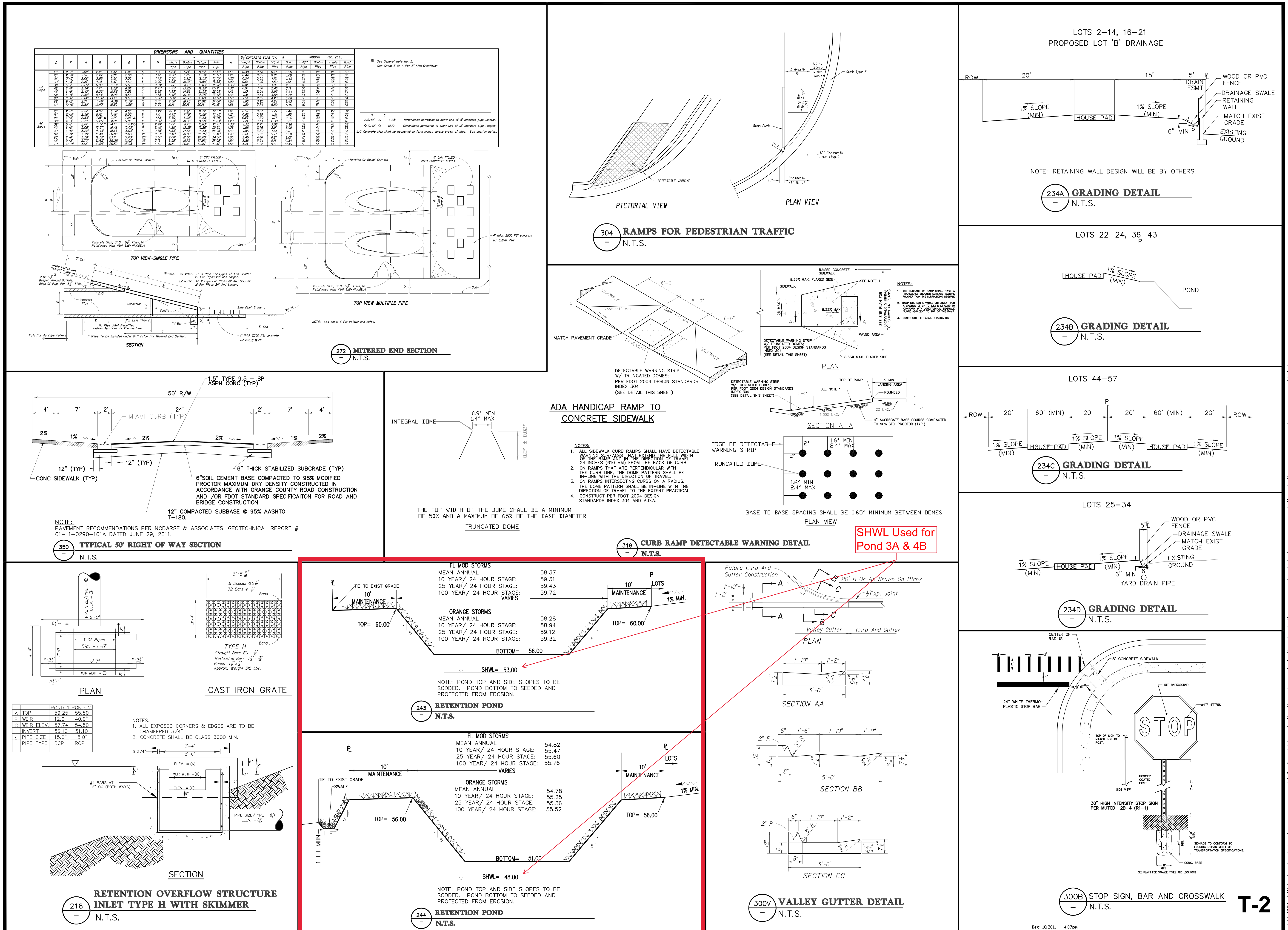
PREPARED FOR: MATTAMY HOMES
400 PARK AVENUE SOUTH, SUITE 220
WINTER PARK, FLORIDA 32789
PHONE (407) 599-9994
FAX (407) 599-9998

PAVING GRADING AND DRAINAGE DETAILS

WATERFORD CREEK
1548, 1566 HANCOCK LONE PALM RD
ORLANDO, ORANGE COUNTY, FLORIDA 32828

CAD ENGINEERING DESIGN, INC.
1656 Stefan Cole Lane
Apopka, Florida 32703
Phone: (407) 495-6719
Fax: (407) 814-0158

PROJECT #: 105-001
DRAWN: JDD
APPROVED: AEW
DATE: DECEMBER 5, 2011
SHEET NAME: C03
SHEET: 6



CAD Engineering Design, Inc.
Andrew E. Wright, P.E.
FL. Reg. # 59554
Date
FL. Cert. of Auth. #29191

REV.	DATE	BY	COMMENTS
1			

PREPARED FOR:
MATTAMY HOMES
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WINTER PARK, FLORIDA 32789
PHONE: (407) 599-9994
FAX: (407) 599-9998

PAVING GRADING AND DRAINAGE DETAILS

WATERFORD CREEK
1548, 1566 HANCOCK LONE PALM RD
ORLANDO, ORANGE COUNTY, FLORIDA 32828

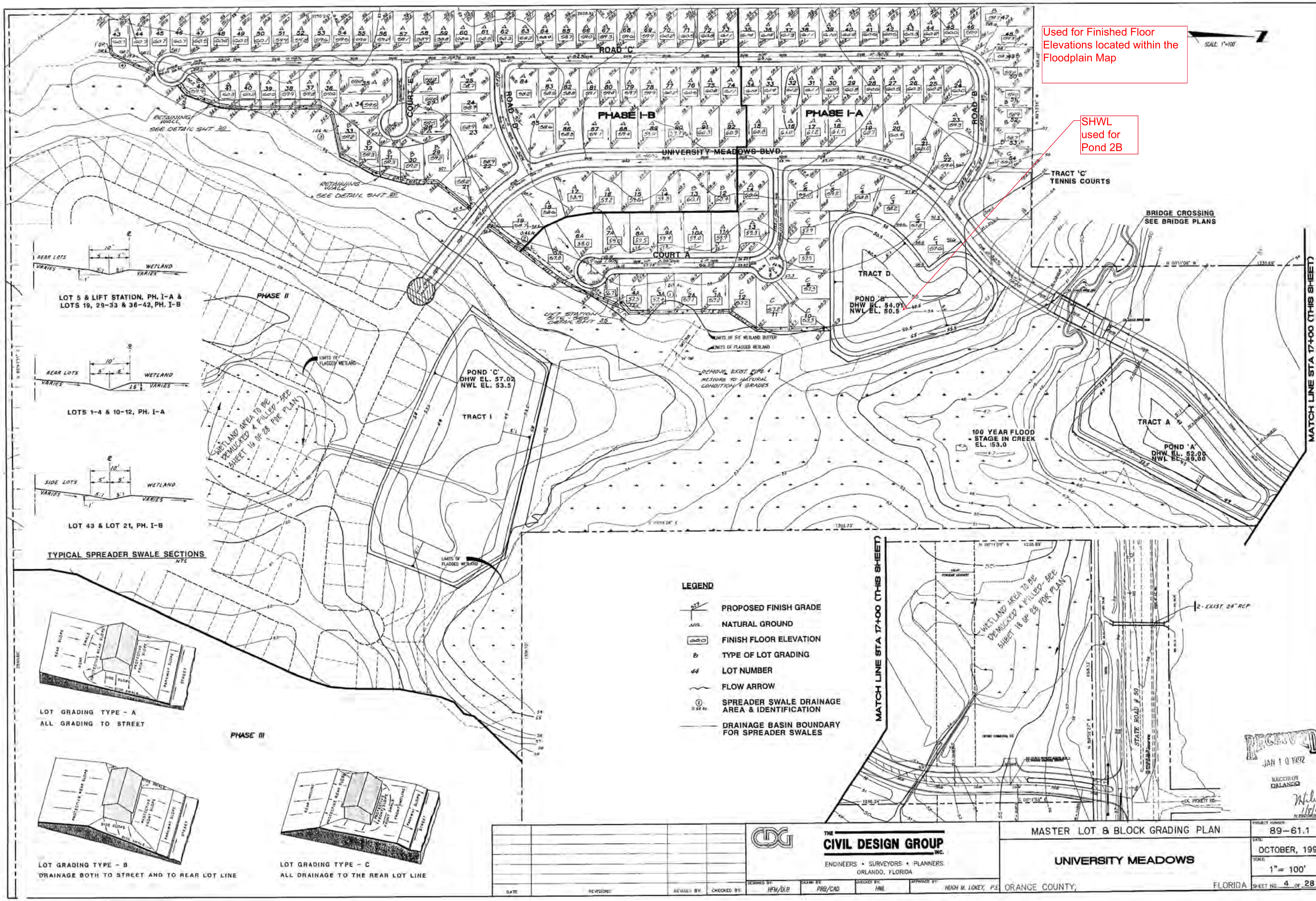
CAD ENGINEERING DESIGN, INC.
1656 Stefan Cole Lane
Apopka, Florida 32703
Phone: (407) 495-6719
Fax: (407) 814-0158

PROJECT: #105-001
DRAWN: JDD
APPROVED: AEW
DATE: DECEMBER 5, 2011
SHEET NAME: C13
SHEET: 16

Appendix: U

Excerpt from The Civil Design Group

University Meadows & Bridgewater Plans



Used for Finished Floor Elevations located within the Floodplain Map
SHWL used for Pond 2B
SCALE: 1"=100'
ROAD 'C'
ROAD 'B'
ROAD 'D'
COURT 'B'
COURT 'A'
PHASE I-B
PHASE I-A
PHASE II
PHASE III
UNIVERSITY MEADOWS BLVD.
RETAINING WALL SEE DETAIL SHT. 20
RETAINING WALL SEE DETAIL SHT. 20
TRACT 'C' TENNIS COURTS
BRIDGE CROSSING SEE BRIDGE PLANS
TRACT D
POND 'B' DHW EL. 54.0 NWL EL. 50.5
POND 'C' DHW EL. 57.0 NWL EL. 53.5
TRACT I
TRACT A
POND 'A' DHW EL. 52.00 NWL EL. 49.00
100 YEAR FLOOD STAGE IN CREEK EL. 153.0
LIMITS OF 50' WETLAND BUFFER
LIMITS OF FLAGGED WETLAND
REMOVE EXIST. PIPE & RESTORE TO NATURAL CONDITION & GRADES
WETLAND AREA TO BE DEMUCKED & FILLED - SEE SHEET 14 OF 28 FOR PLAN
WETLAND AREA TO BE DEMUCKED & FILLED - SEE SHEET 18 OF 28 FOR PLAN
LIFT STATION STA. SEE DETAIL SHT. 85
MATCH LINE STA 17+00 (THIS SHEET)
MATCH LINE STA 17+00 (THIS SHEET)
2 - EXIST. 24" RCP
STATE ROAD # 50
REAR LOTS
WETLAND
VARIES
LOT 5 & LIFT STATION, PH. I-A & LOTS 19, 29-33 & 36-42, PH. I-B
LOTS 1-4 & 10-12, PH. I-A
SIDE LOTS
LOT 43 & LOT 21, PH. I-B
TYPICAL SPREADER SWALE SECTIONS
NTS
LOT GRADING TYPE - A
ALL GRADING TO STREET
LOT GRADING TYPE - B
DRAINAGE BOTH TO STREET AND TO REAR LOT LINE
LOT GRADING TYPE - C
ALL DRAINAGE TO THE REAR LOT LINE
LEGEND
PROPOSED FINISH GRADE
NATURAL GROUND
FINISH FLOOR ELEVATION
TYPE OF LOT GRADING
LOT NUMBER
FLOW ARROW
SPREADER SWALE DRAINAGE AREA & IDENTIFICATION
DRAINAGE BASIN BOUNDARY FOR SPREADER SWALES
RECEIVED
JAN 10 1992
RECORDS ORLANDO
THE CIVIL DESIGN GROUP INC.
ENGINEERS • SURVEYORS • PLANNERS
ORLANDO, FLORIDA
MASTER LOT & BLOCK GRADING PLAN
UNIVERSITY MEADOWS
ORANGE COUNTY, FLORIDA
PROJECT NUMBER 89-61.1
DATE OCTOBER, 1991
SCALE 1"= 100'
SHEET NO. 4 OF 28
DATE
REVISIONS
REVISED BY
CHECKED BY
DESIGNED BY HFM/DLB
DRAWN BY PRB/CAD
CHECKED BY HML
APPROVED BY HUGH M. LOKEY, P.E.

U-1

NOTE:
ALL LOTS TO BE GRADED AS SHOWN ON THIS LOT GRADING PLAN. FINISHED LOT GRADE FOR BUILDING PADS SHALL BE 6" BELOW THE FINISHED FLOOR ELEVATIONS SHOWN ON THE PLANS BELOW.

Used for Finished Floor Elevations located within the Floodplain Map

LEGEND:

- 62.4 / FINISHED GRADE ELEVATION
- 64.3 FINISHED FLOOR ELEVATION
- EXIST. GROUND SURFACE CONTOURS
- • 62.4 GROUND SHOTS FROM ACTUAL FEILD SURVEY

DATE	REVISIONS	REVISED BY	CHECKED BY

THE CIVIL DESIGN GROUP INC
ENGINEERS • SURVEYORS • PLANNERS
ORLANDO, FLORIDA

DESIGNED BY:	DRAWN BY:	CHECKED BY:	APPROVED BY:
WCF	RTS	WCF	WILLIAM C. FOGLE P.E.

MASTER GRADING PLAN

BRIDGEWATER PHASE III

ORANGE COUNTY FLORIDA

4-095 2001884
RECEIVED
NOV 07 2001
FDS
ALTAMONTE SVC. CTR.

PROJECT NUMBER:	215700
DATE:	OCTOBER, 2001
SCALE:	1" = 60'
SHEET NO.	4 of 20

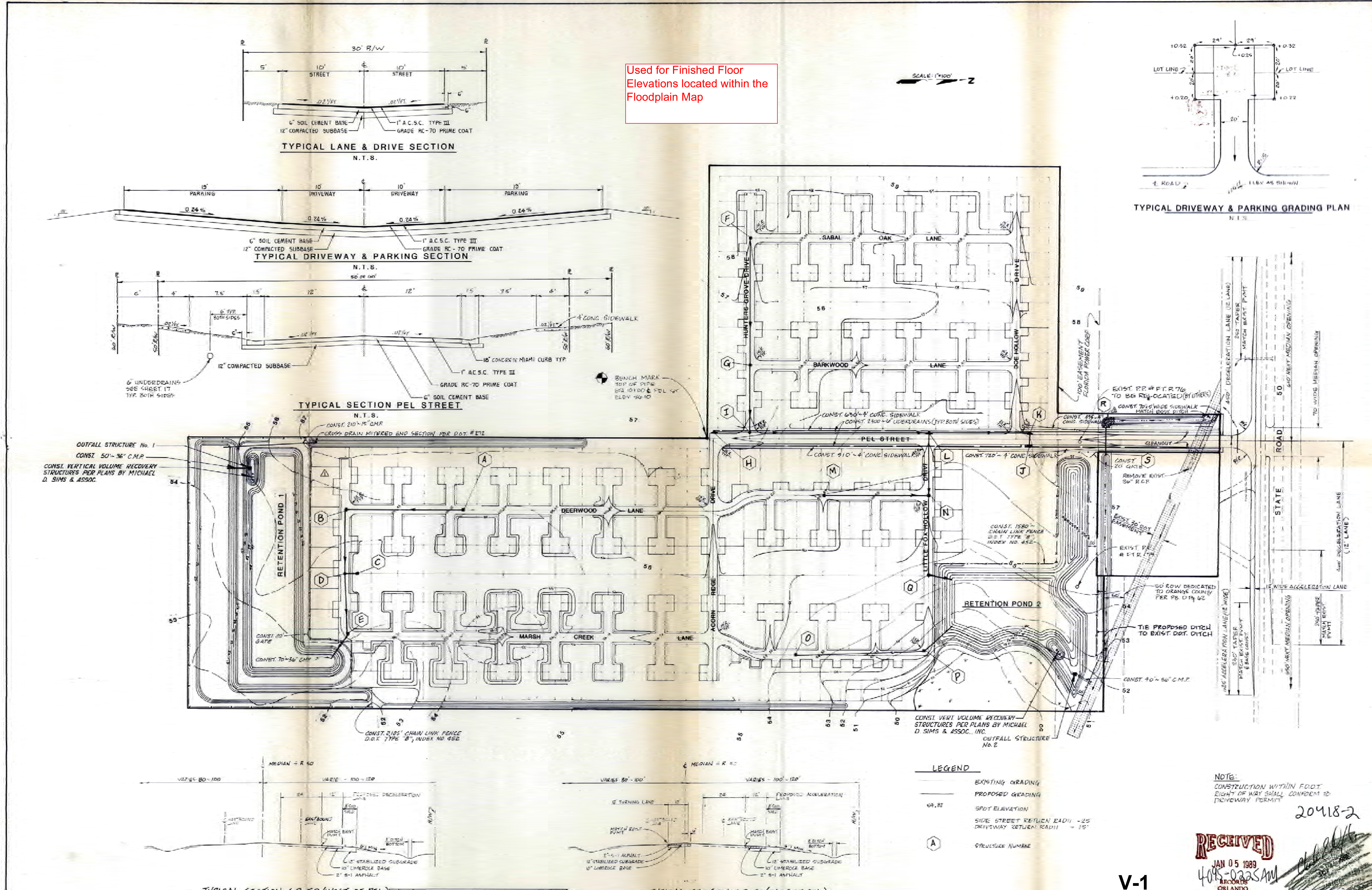
U-2

Appendix: V

Excerpt from Glace and Radcliffe, Inc.

Deerwood Plans

Used for Finished Floor Elevations located within the Floodplain Map



NO	BY	REVISIONS	DATE
5	JAL	REMOVED UNDERDRAIN ADDED VVRS' PER MICHAEL SIMS	11/88
4	J.J.A.	ADDED FENCE & UNDERDRAIN RET. POND #1	8/87
3	B.M.M.	ADDED RIP-RAP AT CULVERT	7/87
2	J.J.A.	RELOCATED DRAINAGE DITCH	7/87
1	B.M.M.	SOUTH END - LOT LAYOUT	5/87

DESIGNED	G.R.I.	DATE	2-87
DRAWN	B.M.M.	DATE	2-87
CHECKED	C.E.G.	DATE	2-87
APPROVED	R.B.K.	DATE	2-87

GLACE & RADCLIFFE, INC.
CONSULTING ENGINEERS
ST. PETERSBURG & WINTER PARK, FLORIDA

DEERWOOD
MOBILE HOME PARK

SITE PLAN
PAVING . GRADING & DRAINAGE

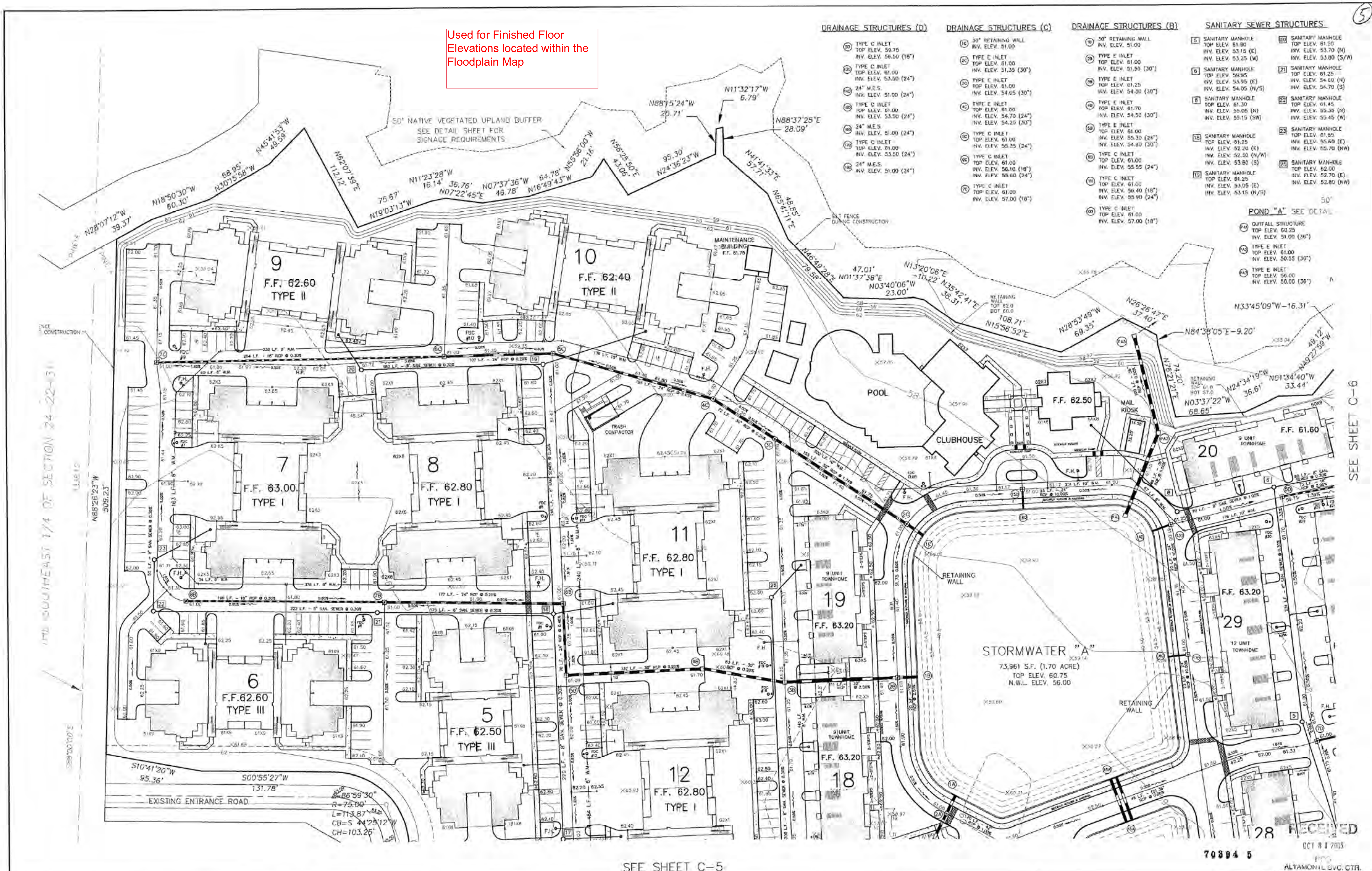
SCALE 1"=100'
JOB NO 86538
SHEET NO. 4 OF 21

Appendix: W

Excerpt from George Garrett, P.E.

Avalon II Plans

Used for Finished Floor Elevations located within the Floodplain Map



NO.	DATE	REVISION	APP'D.	BY
0				

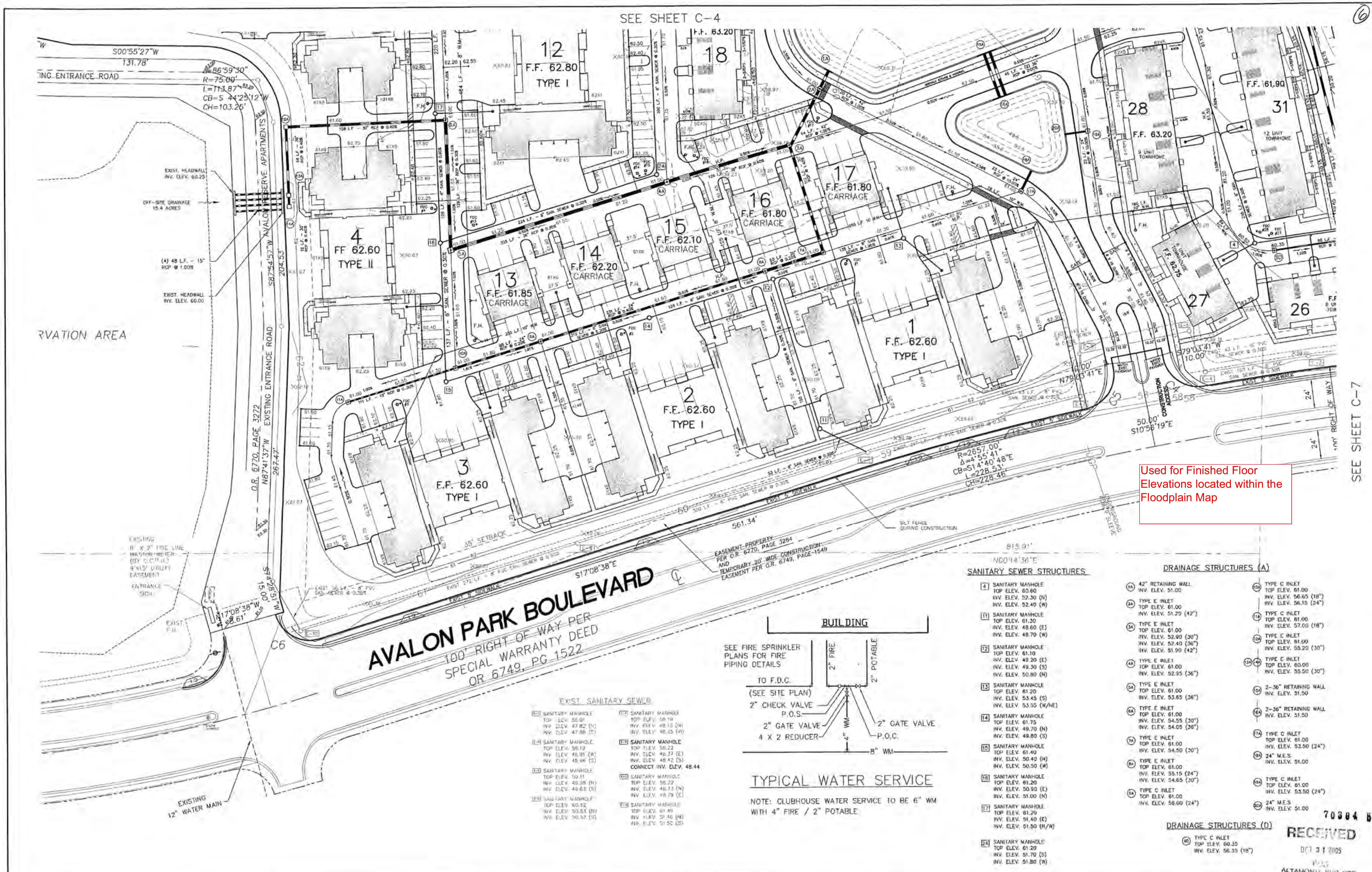
GEORGE GARRETT, P.E.
P.O. BOX 531085
ORLANDO, FLORIDA 32853
407-256-5852 FAX: 321-636-1035

AVALON II
ORANGE COUNTY, FLORIDA

SITE PLAN

SCALE: 1" = 40'
JOB NO. 24-017
FILE: SITEPLAN
DRAWN BY: GG
DATE: 8-05
SHT. C-4

W-1



NO.	DATE	REVISION	APP'D. BY
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GEORGE GARRETT, P.E.
P.O. BOX 531085
ORLANDO, FLORIDA 32853
407-256-5852 FAX: 321-636-1035

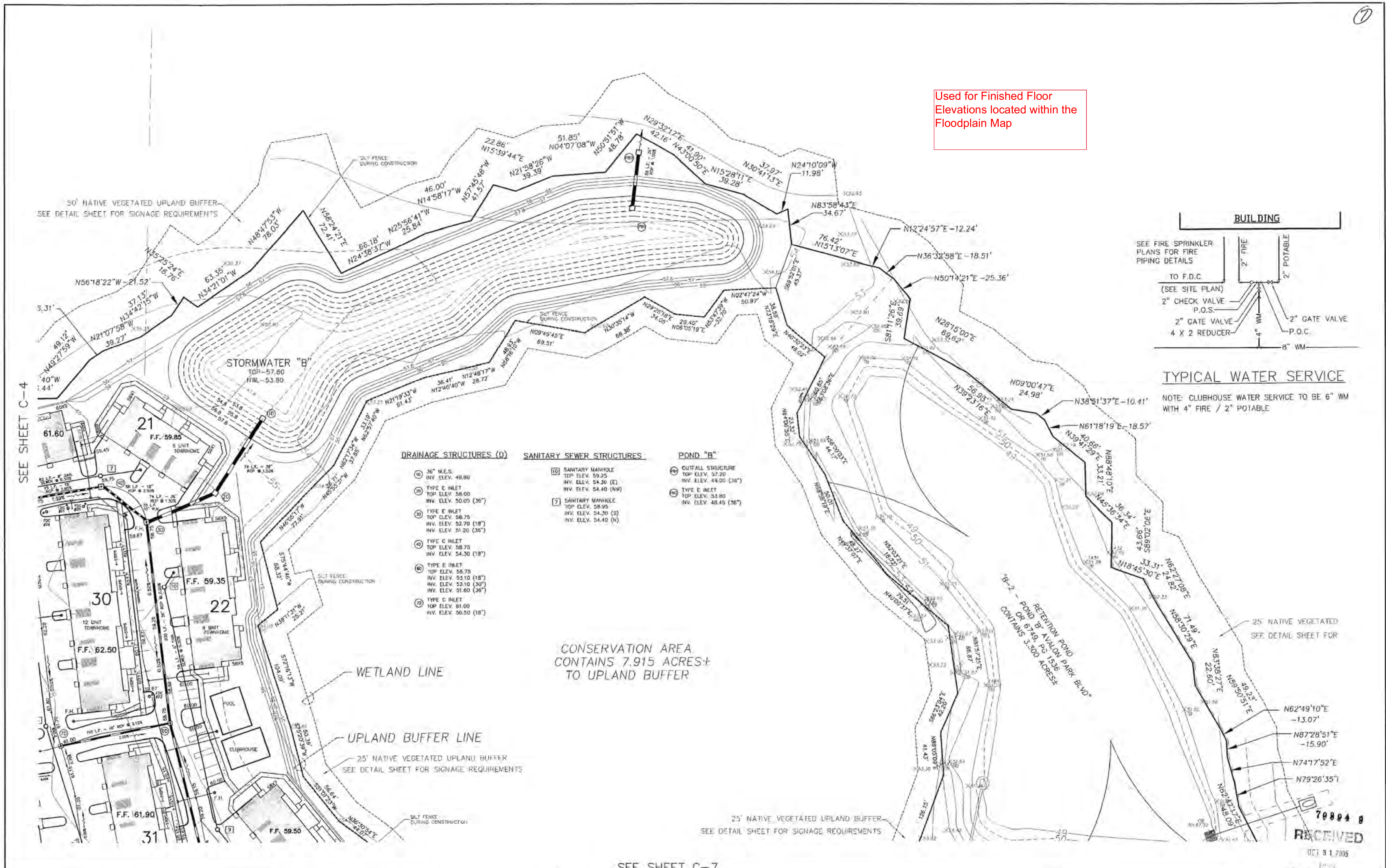
AVALON II
ORANGE COUNTY, FLORIDA

SITE PLAN

SCALE: 1" = 40'
JOB NO. 24-017
FILE: SITEPLAN
DRAWN BY: GG
DATE: 8-05
SHT. C-5

W-2

Used for Finished Floor Elevations located within the Floodplain Map



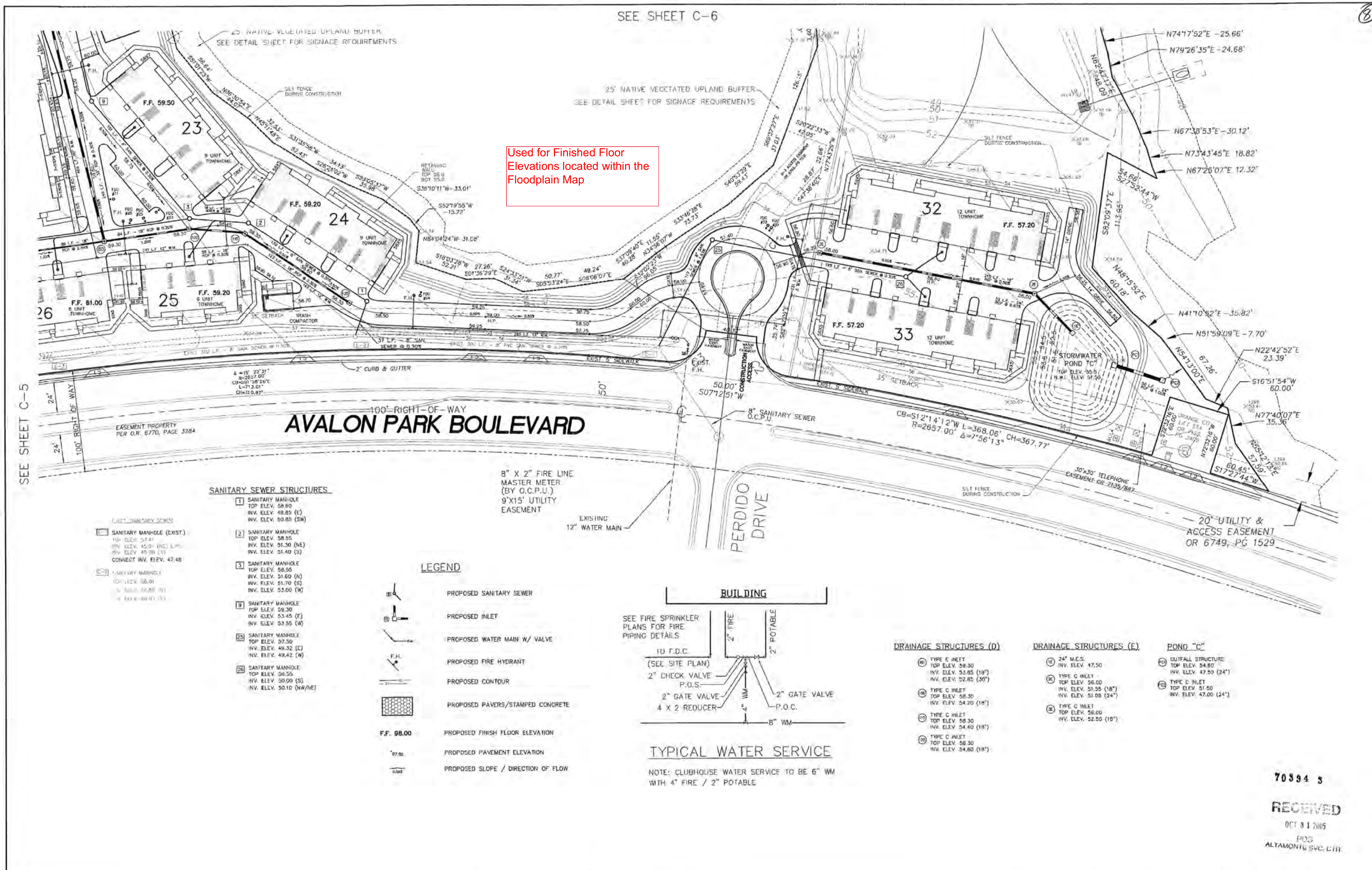
NO.	DATE	REVISION	APP'D. BY
0			

GEORGE GARRETT, P.E.
P.O. BOX 531085
ORLANDO, FLORIDA 32853
407-256-5852 FAX: 321-636-1035

AVALON II
ORANGE COUNTY, FLORIDA

SITE PLAN

SCALE: 1" = 40'
JOB NO. 24-017
FILE: SITEPLAN
DRAWN BY: GG
DATE: 8-05
SHT. C-6



NO.	DATE	REVISION	APP'D. BY
0			

GEORGE GARRETT, P.E.
P.O. BOX 531085
ORLANDO, FLORIDA 32853
407-256-5852 FAX: 321-636-1035

AVALON II
ORANGE COUNTY, FLORIDA

SITE PLAN

SCALE: 1" = 40'
JOB NO. 24-017
FILE: SITEPLAN
DRAWN BY: GG
DATE: 8-05
SHT. C-7

Appendix: X

SR-50 Field Visit Photos (May 2016)

SR 50- CD1 (2-8' x 6’ CBC)

(Looking North Side of the Culvert)

SR 50- CD2 (2-24” RCP)

(North side of the Culvert)

SR 50-CD3 (2-12.95’ x 8.5’ CBC)

(South Side of the Culvert)

SR 50-CD4 (1-30” RCP)

(South Side of the Culvert)

SR 50-CD5(3-10’x6’ CBC)

(South Side of the Culvert)

SR 50-CD6 (3-36” RCP)

(South side of the Culvert)

SR 50-CD7 (1-4’ x 4’ CBC & 1-54" RCP Jointed)

(South Side of the Culvert)

SR 50- CD8 (1-30” RCP)

(South side of the culvert)

SR 50- CD9 (1-8’x7’ CBC)

(South Side of the Culvert)

SR 50-CD10 (1-10’x4’ CBC)

(South Side of the Culvert)

SR 50-CD11 (1-24” RCP)

(South Side of the Culvert)

Appendix: Y

Waterford Lakes Town Center

BASIN ALAF100 23.0 Ac.
BASIN 100 A 56.3 Ac.
CONNECTOR ROAD
DEDICATED PUBLIC R.O.W.
FUTURE POND 10A
BASIN 200 27.48 Ac.
ALAFAYA TRAIL
POND 20A
POND 20B
TAIL WATER 20 X
BASIN 100 85.52 Ac.
EAST WEST EXPRESSWAY
POND 10
BASIN 101 23.8 Ac.
BASIN 102 10.20 Ac.
BASIN 980 A 6 Ac.
WOODBURY ROAD
BASIN 980 8.6 Ac.
POND 98
TAIL WATER 13 B
Existing Pond 98
N
S
E
W
200 0 100 200 400
This plan may have been reduced in size. Verify before scaling dimensions
IVEY, HARRIS & WALLS, INC.
Simon Property Group
115 W. Washington Street
Indianapolis, IN 46204
WATERFORD LAKES
ORANGE COUNTY, FLORIDA
BASIN AND NODE MAP
DATE
DESCRIPTION
APP.
10/16/98 SJRWMD COMMENTS
SCALE: AS-NOTED
DATE: 10/29/98
DESIGN: RL
DRAWN: DET
CHECKED: JSD
CADD: 1046C217
JOB NO. 01046.00
SHEET C-217
RECEIVED
DEC 02 1998
F:\PROJ\01046.00\Civil\SHEETS\COUNTY\1046C217 11-2-98 11:26:46 am EST

FUTURE - CONNECTOR ROAD
LIMITS OF SJRWMD PERMIT
LIMITS OF PHASE 1 CONSTRUCTION
FUTURE DEVELOPMENT
WOODBURY ROAD
STORM MANHOLE w/ TYPE "J" BOTTOM RIM: 71.0 I.E.: 60.00
STORM MANHOLE w/ TYPE "P" BOTTOM RIM: 71.0 I.E.: 64.63
302 LF ~ 42" RCP AT 1.49%
269 LF ~ 15" RCP AT 0.37%
300 LF ~ 48" RCP AT 0.9%
TO BE INSTALLED DURING RECONSTRUCTION OF WOODBURY ROAD
STORM MANHOLE w/ TYPE "J" BOTTOM RIM: 71.0 I.E.: 58.69
268 LF ~ 15" RCP AT 0.37%
259 LF ~ 48" RCP AT 0.9%
STORM MANHOLE w/ TYPE "P" BOTTOM RIM: 71.5 I.E.: 65.63
STORM MANHOLE w/ TYPE "J" BOTTOM RIM: 71.5 I.E.: 61.06
106 LF ~ 15" RCP AT 0.35%
110 LF ~ 48" RCP AT 0.9%
I.E.: 66.0
I.E.: 62.0
390 LF ~ 15" RCP
STORM MANHOLE w/ TYPE "P" BOTTOM RIM: 67.0 I.E.: 63.10
144 LF ~ 15" RCP AT 0.37%
MITERED END SECTION I.E.: 55.5
MITERED END SECTION I.E.: 56.0
STORM MANHOLE w/ TYPE "P" BOTTOM RIM: 67.0 I.E.: 63.63
POND #10 NWL = 69.00 10YR/24HR = 72.21 25YR/24HR = 72.68 100YR/24HR = 73.59
POND #98 (EXISTING) NWL = 61.00 10YR/24HR = 64.04 25YR/24HR = 64.22 100YR/24HR = 64.36
LEGEND
CURB INLET
INLET
STORM MANHOLE
HEAD WALL
MITERED END SECTION
PROPOSED GRADE
PROPOSED CONTOUR
STORM SEWER
ESTIMATED PREDEVELOPMENT SEASONAL HIGH GROUNDWATER CONTOUR
KEYMAP
C-201
C-202
C-203
C-204
C-205
C-206
C-207
C-208
C-209
C-210
C-211
C-212
C-213
C-214
N
S
E
W
RECEIVED OCT 19 1998
This plan may have been reduced in size. Verify before scaling dimensions.
IVEY, HARRIS & WALLS, INC.
Simon Property Group 115 W. Washington Street Indianapolis, IN 46204
WATERFORD LAKES ORANGE COUNTY, FLORIDA
GRADING AND DRAINAGE PLAN
SJRWMD COMMENTS
SCALE: AS-NOTED
DATE: 09/01/98
DESIGN: RL
CHECKED: JSD
CADD: 1046C212
JOB NO. 01046.00
SHEET C-212