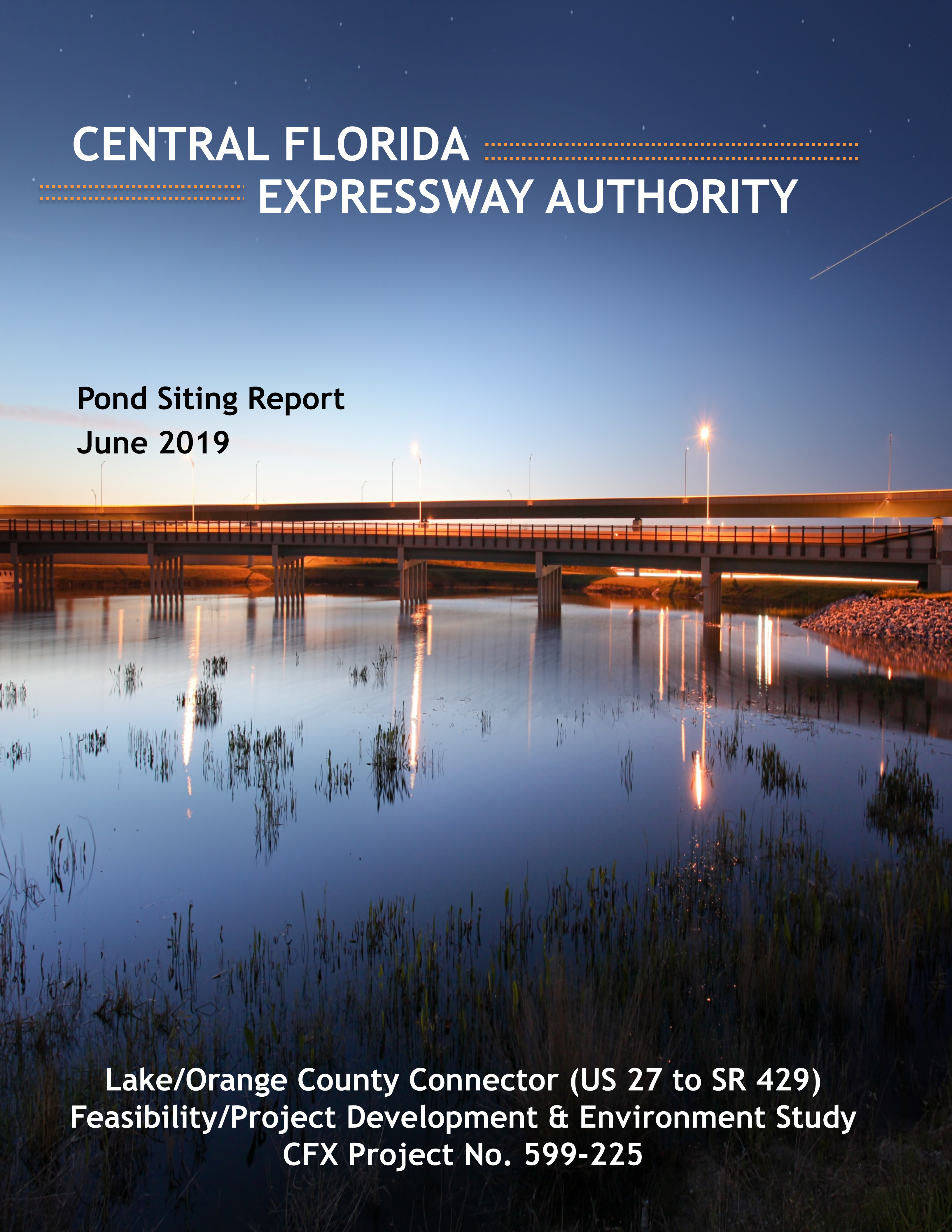

CENTRAL FLORIDA EXPRESSWAY AUTHORITY

Pond Siting Report

June 2019

Lake/Orange County Connector (US 27 to SR 429)
Feasibility/Project Development & Environment Study
CFX Project No. 599-225

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:	**Lake/Orange County Connector PD&E Study**
FINANCIAL PROJECT NUMBER:	**CFX-Project No. 599-225**
LOCATION:	**Lake and Orange Counties**
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 Lake/Orange County Connector project in Lake and Orange Counties.

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: Mark Scott, P.E.

Registration Number: FL # 70948

Signature:

Date:

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PD&E – Project Development and Environment

CFX – Central Florida Expressway Authority

PSR – Pond Siting Report

SJRWMD – St. Johns River Water Management District

SFWMD – South Florida 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

FIGURES

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EXECUTIVE SUMMARY

The Central Florida Expressway Authority (CFX) is presently evaluating the feasibility to provide a Lake/Orange County Connector, a strategic transportation investment aimed at supporting existing and future growth in Lake and Orange counties. The primary objectives of this transportation improvement project are to: expand regional system linkage and connectivity in Lake and Orange counties; enhance mobility between US 27 and SR 429; and accommodate the expected increase in traffic due to population and employment growth within the study area, while being consistent with accepted local and regional plans. As such, the proposed improvements include the construction of a limited-access facility that provides a new east-west connection from US 27 in south Lake County to SR 429 in west Orange County. The limits of this study generally extend from the project's intersection with US 27, just north of Frank Jarrell Road, east to the project's intersection with SR 429, at SR 429's intersection with Schofield Road (SR 429 Exit 13).

The vertical datum utilized for the design calculations and plans, including the FEMA Flood Plain elevations, existing Environmental Resource Permits (ERP's), and Orange and Lake County Lidar data were all based on the North American Vertical Datum of 1988 (NAVD 88). The Pond Site Evaluation Matrices utilized to evaluate the pond alternatives to choose the preferred pond alternative, can be found in **Appendix C. Table-1**, found below, summarizes the preferred pond alternatives, pond offsite right-of-way (ROW) requirements, and pond selection justification for each basin along the project corridor.

Table-1 – Summary of Preferred Pond Sites

Basin Name	Preferred Ponds	Offsite ROW Requirements (acre)	Pond Selection Justification
Basin 1	Ponds 1A1 through 1A4	4.12	Ponds 1A1 through 1A4 require the least amount of offsite ROW acquisition (cost savings).
Basin 2	Pond 2A	9.16	Pond 2A requires the least amount of offsite ROW acquisition (cost savings) and is the most hydraulically connected to the FEMA floodplain.
Basin 3	Ponds 3A1 through 3A3	14.65	Ponds 3A1 through 3A3 require the least amount of offsite ROW acquisition (cost savings).
Basin 4	Ponds 4C1 through 4C3	13.73	Ponds 4C1 through 4C3 is the most hydraulically connected to the FEMA floodplains.
Basin 5	Ponds 5A1 and 5A2	0	Pond alternatives 5A1 & 5A2 are located within the intersection infield and doesn’t require offsite ROW acquisition (cost savings).

1.0 INTRODUCTION

The purpose of the Lake/Orange County Connector Feasibility/Project Development and Environment (PD&E) Study (Lake/Orange County Connector) is to develop a proposed improvement strategy that is technically sound, environmentally sensitive and publicly acceptable. 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 Preliminary Engineering Report. This Pond Siting Report (PSR) has been prepared in support of the PD&E effort.

This report discusses and analyzes the stormwater management plan for the project. The report identifies potential pond locations (both treatment/attenuation and flood compensation ponds) and discusses the right-of-way (ROW) requirements and other design factors associated with the preferred pond sites. A summary for each of the preferred pond site alternatives is in **Table-7** of this report. Preferred and alternate pond site drainage maps are in **Appendix A, Exhibit-1B**.

2.0 PROJECT DESCRIPTION

The CFX is presently evaluating the Lake/Orange County Connector between SR 429 and US 27. The Lake/Orange County Connector project is one of Florida's strategic transportation investments to support future growth, enhance connectivity between Lake and Orange counties, enhance mobility between US 27 and SR 429, and accommodate the expected increase in traffic due to population and employment growth within the study area, while being consistent with accepted local and regional plans. Upon completion of the various typical sections, horizontal alignment combinations, and public involvement effort a preferred alternative was selected.

The limits of this study generally extend from the project's intersection with US 27, just north of Frank Jarrell Road, east to the project's intersection with SR 429, at SR 429's intersection with Schofield Road (SR 429 Exit 13). The proposed five-mile corridor will also have intersections at the proposed road connection to Lake County's proposed CR 455 extension and the proposed road connection to Valencia Parkway. The project spans through two counties and is located within multiple sections, townships, and ranges, including: Orange County - T23S, R27E, Sections S29 thru S32 and Lake County - T23S, R26E, Section S33 thru S36 and T24S, R26E, Sections S1 thru S4, S9, & S10. See **Figure-1** on the following page for a map of the project's location and vicinity.

The proposed design will incorporate a 330-ft ROW along the main corridor of the Lake/Orange County Connector study. The ROW widens at the proposed intersections with US 27, the proposed CR 455 extension connector road, the proposed Valencia Parkway connector road, and SR 429 to include the entrance and exit ramps. The ROW also includes the project's proposed connector roads to Lake County's proposed CR 455 extension and the proposed Valencia Parkway. The stormwater runoff from proposed impervious areas will be treated in proposed stormwater facilities. Both proposed connector roads span from the proposed project's ramps to Schofield Road. The project's recommended stormwater management system includes onsite and offsite ditches along with drainage structures to convey the onsite stormwater runoff into the stormwater facilities and the offsite stormwater runoff to its pre-existing destination.

The typical section shows a proposed 4-lane divided rural roadway with an open drainage system and future widening within the median of up to 10-lanes. The stormwater management system has been sized as if the 82-ft median is paved to accomadate future widening projects. The vertical datum utilized for the design calculations and plans, including the FEMA Flood Plain elevations, existing Environmental Resource Permits (ERP's), and Orange and Lake County Lidar data were all based on the North American Vertical Datum of 1988 (NAVD 88).

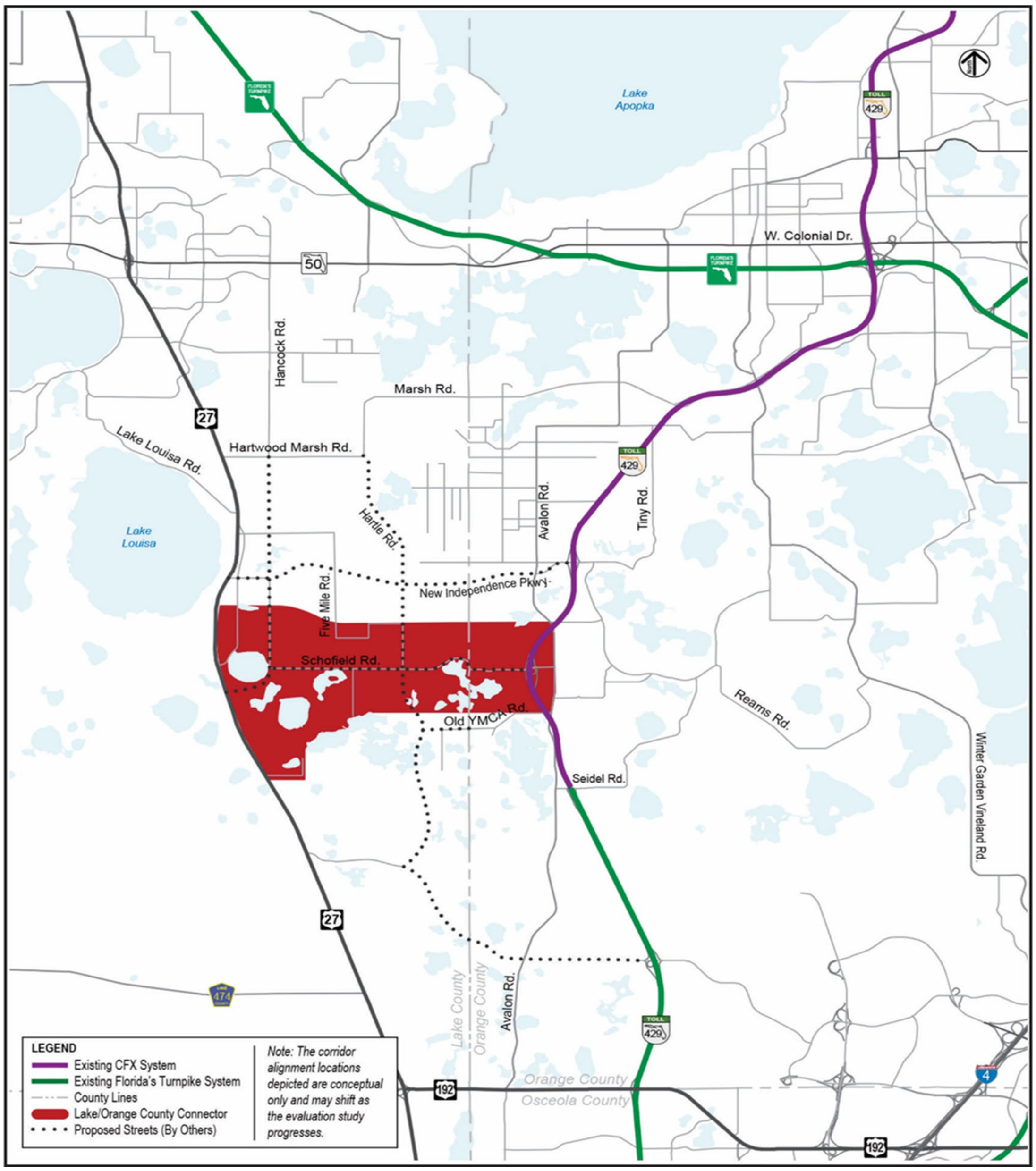


Figure 1 – Project Location

3.0 DATA COLLECTION

The data collected for the Lake/Orange County Connector study drainage design can be found in the following locations:

1. FEMA Flood Map Service Center - https://msc.fema.gov/portal/home
2. USDA – NRCS Web Soil Survey - https://websoilsurvey.nrcs.usda.gov/app/HomePage.htm
3. St. Johns River Water Management District (SJRWMD) - https://www.sjrwmd.com/
4. South Florida Water Management District (SFWMD) - https://www.sfwmd.gov/
5. Orange County Florida - https://www.orangecountyfl.net/
6. Lake County Florida - https://www.lakecountyfl.gov/
7. FDEP Map Direct - https://ca.dep.state.fl.us/mapdirect/
8. NOAA Point Frequency Data Server - https://hdsc.nws.noaa.gov/hdsc/pfds/
9. Florida Department of Transportation (FDOT) Drainage Manuals and Handbooks - https://www.fdot.gov/roadway/Drainage/Manualsandhandbooks.shtm
10. CFX Manuals and Handbooks - https://www.cfxway.com/

4.0 DESIGN CRITERIA

The design of stormwater management facilities for this project is governed by the rules and criteria set forth by the SJRWMD, SFWMD, and FDOT, where applicable. The following criteria was obtained from the 2018 SJRWMD's Permit Information Manual, 2016 Environmental Resource Permit Applicant's Handbooks, and 2019 FDOT Drainage Manual.

4.1 Water Quality and Pond Recovery

- Wet Detention (SJRWMD and SFWMD)
  - Water quality treatment – Greater of 1" over the total basin or 2.5" over the added impervious area.
  - Recovery – One-half the treatment volume within the first 24 to 30 hours after a storm event.
- Dry Retention (on-line) (SJRWMD – Lake County Segment)
  - Treatment – Greater of 0.5" over the total basin area or 1.25" over the added impervious area. Plus an additional 0.5" over the total basin area.
  - Recovery – Treatment volume within 72 hours after a storm event.
- Dry Retention (on-line) (SFWMD – Orange County Segment)
  - Treatment – Greater of 0.5" over the total basin area or 1.25" over the added impervious area.
  - Recovery – Treatment volume within 72 hours after a storm event.

4.2 Water Quantity

- Open Basins (SJRWMD – Lake County Segment)
  - The post-development peak rate of discharge must not exceed the pre-development peak rate of discharge for the 25-year frequency, 24-hour duration storm.

- Open Basins (SFWMD – Orange County Segment)
    - A storm event of a 25-year frequency, 3-day duration shall be used in computing off-site discharge rates.

4.3 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 ROW line. Maintenance berm shall be at least 15-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.

4.4 FEMA Floodplain Compensation

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

5.0 ENVIRONMENTAL LOOK AROUND (ELA)

The regional stakeholders contacted to perform ELA meetings include Lake County, Orange County, FDOT District 5, SJRWMD, and SFWMD. SJWMD has not responded to the requests for an ELA meeting as of the date of this report. The ELA with Lake County was performed on January 10, 2018 at the Lake County Public Works building in Tavares, Florida. The ELA meeting with SFWMD was performed on January 24, 2019 at the SFWMD Orlando Service Center in Orlando, Florida. The ELA meeting with FDOT District 5 was performed on February 26, 2019 at FDOT District 5 Headquarters in Deland, Florida. The ELA meeting with Orange County was performed on April 25, 2019 at the Public Works Building in Orlando, Florida. See **Appendix E** for meeting minutes from each of the ELA meetings. SFWMD was open to an interagency agreement with SJRWMD where SJRWMD would be the sole responsible permitting agency for the project. An interagency agreement will be discussed with SJRWMD when the ELA is performed.

6.0 EXISTING CONDITIONS

6.1 Existing Drainage Conditions

The proposed Lake/Orange County Connector corridor is located within the jurisdiction of the SJRWMD and SFWMD and hydrologically within the Reedy Creek Drainage Basin. The general drainage pattern for the project and the adjacent land is from west to east. Under existing conditions, the project discharges into a series of lakes/ponds, wetlands adjacent to the lakes/ponds, and depressional/low areas. Most of the existing on-site drainage sub-basins are open drainage basins that appear to overtop and combine at or before the 100-year FEMA flood plain storms. Some of the depressional/low area sub-basins are closed basins. None of the existing water/bodies in the project area were found to be outstanding or impaired water bodies.

The Lake/Orange County Connector corridor is divided into five (5) basins for stormwater management. The existing basin limits and their respective outfall locations are listed in **Table-2**. The basin divides were based on the preferred roadway profile's high points and low points. The same basin divide limits were used for the proposed and existing conditions. The existing condition drainage maps are provided in **Appendix A, Exhibit 1A.** A general description of each existing basin is provided in **Section 6.2**.

Table-2 Summary of Existing Condition Basin Limits and Outfall Locations

Basin Name	From Station	To Station	Outfall Location
Basin 1	100+00.00	135+73.05	Basin 1 discharges into depressional/low areas and wetlands located west of and between Lake Adain and Sawgrass Lake.
Basin 2	135+73.05	188+46.66	Basin 2 discharges into depressional/low areas, Sawgrass Lake, Lake Adain, and wetlands located between Lake Adain and Sawgrass Lake.
Basin 3	188+46.66	244+20.95	Basin 3 discharges into depressional/low areas, a series of interconnected natural ponds, Sawgrass Lake, and wetlands located to the northeast of Sawgrass Lake.
Basin 4	244+20.95	315+05.52	Basin 4 discharges into depressional/low areas, a series of natural interconnected ponds, and southeast into Lake Needham and it's adjacent wetlands.
Basin 5	315+05.52	334+66.44	Basin 5 discharges into depressional/low areas and southwest overland into Lake Needham.

6.2 Existing Drainage Basin Characteristics

Basin 1

Basin 1 begins at station 100+00.00 and ends at 135+73.05. This basin begins at the corridor's proposed intersection with US 27 and ends at the approximate center of the wetlands between Lake Adain and Sawgrass Lake. The existing basin consists of unimproved lands (wetlands/waterbodies and upland forests), farmland (pastures/ranges, orchards, and tree farms), and the existing US 27 infrastructure. Basin 1 is made up of mostly open sub-basins (discharging into water bodies and wetlands) and one small closed sub-basin (depressional/low area with approximate popoff elevation of 118') just west of the wetlands located between Lake Adain and Sawgrass Lake. Basin 1 is a part of the Reedy Creek Drainage Basin, which is an open basin.

The section of US 27 impacted by this project had been previously permitted by SJRWMD (ERP No. 90260-2). Existing FDOT Drainage Facilities C and D (with corresponding floodplain compensation areas) from the ERP mentioned above are located within the infields of the corridor's intersection with US 27. Existing FDOT wet Pond C outfalls southeast towards the wetlands west of Square Lake. Existing FDOT wet Pond D outfalls to the northeast towards the wetlands between Lake Adain and Sawgrass Lake. The existing sub-basins within the US 27 intersection's ramps discharge into the wetlands to the southwest of Lake Adain. The sub-basin between the closed depressional/low area sub-basin and the east end of Basin 1 discharge into the wetlands located between Lake Adain and Sawgrass Lake. The existing condition drainage maps are provided in **Appendix A, Exhibit 1A.**

The existing stormwater management system along US 27 is a closed drainage system utilizing drainage structures and wet detention ponds. There are no existing drainage systems identified for the proposed new corridor. Offsite areas draining towards US 27 were addressed by existing cross-drains. The basin falls within FEMA flood zones (Zones A and AE). More flood plain information can be found in **Section 8.0**.

Basin 2

Basin 2 begins at station 135+73.05 and ends at station 188+46.66. The basin begins at the approximate center of the wetlands between Lake Adain and Sawgrass Lake and ends at Cook Road. The existing basin consists of unimproved lands (wetlands/waterbodies and upland forests) and farmland (orchards). Basin 2 is made up of mostly open sub-basins (discharging into water bodies and wetlands) and a few small closed sub-basins (depressional/low area) near the middle of the basin. Basin 2 is a part of the Reedy Creek Drainage Basin, which is an open basin.

The open sub-basin on the west end of basin 2 discharges into the wetland between Lake Adain and Sawgrass Lake. The open sub-basin on the east end of the basin 2 discharges into Sawgrass Lake. The rest of the sub-basins are closed depressional/low areas with popoffs above the 100-year FEMA floodplain elevation of 106.4'. A few small off-site areas drain towards the basin. The existing condition drainage maps are provided in **Appendix A, Exhibit 1A.** No existing ERP's were identified near the basin area. The basin falls within FEMA flood zones (Zones AE). More flood plain information can be found in **Section 8.0**.

Basin 3

Basin 3 begins at station 188+46.66 and ends at station 244+20.95. The basin begins at Cook Road and ends at the proposed extension of CR 455, which includes the west side of the project's proposed CR 455 extension. The existing basin consists of unimproved lands (wetlands/waterbodies and upland forests) and farmland (pastures/ranges and orchards). Basin 3 is made up of mostly open sub-basins (discharging into water bodies and wetlands) and a couple small closed sub-basins (depressional/low area) near the west end of the basin and on the north side of the CR 455 extension road. Basin 3 is a part of the Reedy Creek Drainage Basin, which is an open basin.

Most of the sub-basins drain away from the basin into Sawgrass Lake on the south side and existing depressional/low areas and wetlands on the north side, but a few offsite areas along the northside do drain towards the basin. These areas mainly drain into depressional/low areas and wetlands/water bodies located within the proposed intersection with the CR 455 extension connector road, which ultimately drain into Sawgrass Lake and are a part of the Reedy Creek Drainage Basin. The existing condition drainage maps are provided in **Appendix A, Exhibit 1A.**

No existing ERP's were identified near the basin area. There are no existing drainage systems identified for the proposed new corridor. The basin falls within FEMA flood zones (Zones A and AE). More flood plain information can be found in **Section 8.0.**

Basin 4

Basin 4 begins at station 244+20.95 and ends at station 315+05.52. The basin begins at the proposed connection to the CR 455 extension and ends at the proposed intersection with the connection to the Valencia Parkway, which includes the east side of the project's proposed CR 455 extension. The existing basin consists of unimproved lands (wetlands/waterbodies and upland forests) and farmland (pastures/ranges and orchards). Basin 4 is made up of mostly open sub-basins (discharging into water bodies and wetlands) and a few small closed sub-basins (depressional/low area) near the west end of the basin, on the north side of the CR 455 extension road, and on the east end of the basin. Basin 4 is a part of the Reedy Creek Drainage Basin, which is an open basin.

Most of the open sub-basins discharge into Lake Needham and it's adjacent wetlands. The offsite basins along the north side of the main corridor drain overland through the basin into Lake Needham and its adjacent wetlands. A couple sub-basins on the west side of the basin discharge into a series of natural ponds and the wetlands to the south. The offsite areas east of the proposed CR 455 connection drain overland through basins 4 and 3 into low areas and wetlands/water bodies located within and adjacent to the proposed intersection with CR 455. The existing condition drainage maps are provided in **Appendix A, Exhibit 1A.**

Portions of Basin 4 are located within the jurisdiction of SJRWMD and SFWMD. No existing ERP's were identified near the basin area. There are no existing drainage systems identified for the proposed new corridor. The basin falls within FEMA flood zones (Zones A and AE). More flood plain information can be found in **Section 8.0**.

Basin 5

Basin 5 begins at station 315+05.52 and ends at station 334+66.44. The basin begins at the proposed intersection with the project's Valencia Parkway connector road and ends at the corridor's proposed intersection with SR 429. The existing basin consists of unimproved lands (upland forests), farmland (orchards and tree farms), and the existing SR 429 and Schofield Road infrastructure. Basin 5 is made up of mostly open sub-basins (discharging into water bodies and wetlands) and a small closed sub-basin (depressional/low area) at the north side of the Schofield Road connector road. Basin 5 is a part of the Reedy Creek Drainage Basin, which is an open basin. Basin 5 is an open basin that discharges to the southwest overland into Lake Needham.

The section of SR 429 impacted by this project was previously permitted by FDEP (ERP No. 48-205102-002-EI). Existing CFX Drainage Facilities are located within the basin at the corridor's intersection with SR 429. Offsite areas draining towards SR 429 were addressed by existing cross-drains. An offsite area between Schofield Road and the proposed Schofield Road connector road intersection drains overland towards the west across Basin 5 into a depressional/low area on the west side of the basin. The basin does not fall within FEMA flood zones. The existing condition drainage maps are provided in **Appendix A, Exhibit 1A.**

7.0 PROPOSED CONDITIONS

The proposed design will incorporate a 330-ft ROW along the main corridor or the Lake/Orange County Connector study. The ROW widens at the proposed intersections with US 27, the project's CR 455 extension, the Schofield Road connector road, and SR 429 to include the entrance and exit ramps. The ROW also includes the project's proposed CR 455 extension road and the Schofield Road connector road. The stormwater runoff from proposed impervious areas will be treated in proposed stormwater facilities. Impacts to the 100-year FEMA Floodplain will be compensated in proposed ponds. The typical section shows a proposed 4-lane divided rural roadway with an open drainage system and future widening within the median of up to 10-lanes. The stormwater management system has been sized as if the 82-ft median is paved to include any future widening projects. The proposed typical sections are provided in **Appendix-F**.

The project's recommended stormwater management system includes onsite and offsite ditches along with drainage structures to convey the onsite stormwater runoff into the stormwater facilities and the offsite stormwater runoff to its pre-existing destination. The recommended stormwater management system utilized for each basin was designed to be as consistent as possible with the pre-existing conditions. Water quality treatment and attenuation will be achieved from the construction of new wet detention ponds and new dry retention ponds.

There are a total of five basins within the project limits. All the proposed basins discharge into open basins. The proposed basin limits and their respective outfall locations are listed in **Table-3**. Three alternative pond options were evaluated for each basin. Based on the pond alternative evaluation matrix analysis, preferred pond sites were selected for each basin. The preferred pond sites were selected based on the cost for pond ROW acquisition, wetland and floodplain impacts, and hydraulic characteristics. The final preferred pond sites for each basin are provided in the Pond Alternative Evaluation Matrices (**Appendix C**). More detailed information regarding the preferred pond sites can be found in **Section 9.0.** The proposed condition drainage maps are provided in **Appendix A, Exhibit 1B.**

Table-3 Summary of Proposed Condition Basin Limits and Outfall Locations

Basin Name	From Station	To Station	Preferred Drainage Facility Outfall Locations
Basin 1	100+00.00	135+73.05	Ponds 1A1, 1A2, and 1A3 discharge into the wetlands southwest of Lake Adain. Pond 1A4 discharges into the existing natural pond to the west of Pond 1A4.
Basin 2	135+73.05	188+46.66	Pond 2A discharges into the wetlands between Lake Adain and Sawgrass Lake.
Basin 3	188+46.66	244+20.95	Ponds 3A1 and 3A2 discharge into the wetlands east of Sawgrass Lake. Pond 3A3 discharges east into the series of natural ponds.
Basin 4	244+20.95	315+05.52	Pond 4C1 discharges into the wetlands west of Lake Needham, Pond 4C2 discharges into Pond 3A1, and Pond 4C3 discharges into the wetlands north of Lake Needham.
Basin 5	315+05.52	334+66.44	Ponds 5A1 and 5A2 discharge to the southwest flowing overland into Lake Needham.

7.1 Proposed Drainage Basins

The Lake/Orange County Connector corridor is divided into five (5) basins for stormwater management. The basin divides were based on the preferred roadway profile's high points and low points. The same basin divide limits were used for the proposed and existing conditions. The proposed basin limits and their respective outfall locations are listed in **Table-3**. The proposed condition drainage maps are provided in **Appendix A, Exhibit 1B.**

The recommended stormwater management system includes onsite and offsite ditches along with drainage structures to convey the onsite stormwater runoff into the stormwater facilities and the offsite stormwater runoff to its pre-existing destination. The roadway geometry was designed in order to minimize wetland, floodplain, and existing drainage pond impacts, where possible, while meeting the requirements for the proposed design speed. The proposed mainline design speed is 70 mph. The proposed entrance/exit ramp design speed is 50 mph.

Basin 1

Basin 1 begins at station 100+00.00 and ends at 135+73.05. This basin begins at the corridor's proposed intersection with US 27 and ends at the approximate center of the bridge traversing the wetlands between Lake Adain and Sawgrass Lake, which includes the proposed changes to US 27 associated with the proposed entrance and exit ramps. The basin falls within FEMA flood zones (Zones A and AE). The proposed project only impacts the FEMA Flood Zone A.

The section of US 27 impacted by this project had been previously permitted by SJRWMD (ERP No. 90260-2). Existing FDOT Drainage Facilities C and D (with corresponding floodplain compensation areas) from the ERP mentioned above are located within the infields of the corridor's intersection with US 27. Pond C will not be impacted by the proposed project, but existing Pond D will be greatly impacted and will be replaced by the proposed dry retention Pond 1A4.

The proposed Ponds 1A1, 1A2, and 1A3 are flood plain compensation ponds. Ponds 1A1, 1A2, and the existing lake within the intersection infield are hydraulically connected and discharge to the north of Pond 1A1 into the wetlands southwest of Lake Adain. Pond 1A3 discharges to the northwest into the wetlands southwest of Lake Adain. The proposed dry retention Pond 1A4 was sized for the new corridor's and Existing FDOT Pond D's attenuation and treatment volumes. Pond 1A4 discharges into the existing pond to the west of Pond 1A4, which is hydraulically connected to the wetlands southwest of Lake Adain. More detailed information regarding the preferred pond sites can be found in **Sections 8.0 and 9.0**.

Offsite areas draining towards the US 27 are hydraulically connecting by existing cross-drains to the opposite side of the ROW. The existing cross-drains are to be extended where needed. The offsite areas draining towards the new corridor will be conveyed with offsite ditches into their respective discharge destinations. More information regarding the proposed offsite drainage design can be found in the **Location Hydraulics Report (LHR**) included with the PD&E package.

Basin 2

Basin 2 begins at station 135+73.05 and ends at station 188+46.66. The basin begins at the approximate center of the bridge traversing the wetlands between Lake Adain and Sawgrass Lake and ends at the approximate center of the bridge traversing Cook Road. Basin 2 falls within and impacts FEMA Flood Zones A and AE. The proposed dry retention Pond 2A is sized for the new corridor's attenuation, treatment, and floodplain compensation volumes. Pond 2A discharges into the wetlands between Lake Adain and Sawgrass Lake. More detailed information regarding the preferred pond sites can be found in **Sections 8.0 and 9.0**.

Small offsite areas along the north side of the basin drain toward the new corridor and would have been collected in a depressional/low area within the ROW, therefore the proposed basin and stormwater pond were sized to include the drainage area/volume. An offsite area near the center of the south side of the basin drained across the basin and into a depressional/low area on the north side of the basin will be directed via offsite ditches into a depressional/low area along the north side of the basin. The redirected area is smaller than the area taken in by project's proposed drainage pond that had drained into the destination depressional/low area. More information regarding the proposed offsite drainage design can be found in the **Location Hydraulics Report (LHR**) included with the PD&E package.

Basin 3

Basin 3 begins at station 188+46.66 and ends at station 244+20.95. The basin begins at the approximate center of the bridge traversing Cook Road and ends at the approximate center of the bridge traversing the proposed extension of CR 455, which includes the west side of the project's proposed CR 455 extension. The basin falls within and impacts FEMA flood Zones A and AE.

The proposed wet detention Pond 3A1 is sized for the new corridor's attenuation, treatment, and a portion of the floodplain compensation volumes. Ponds 3A2 and 3A3 are floodplain compensation ponds. Ponds 3A1, 3A2, and the existing natural ponds on the northwest side of the CR 455 interchange are hydraulically connected. Ponds 3A1 and 3A2 discharge into the wetlands east of Sawgrass Lake. Pond 3A3 discharges into the existing ponds on the northwest side of the CR 455 interchange. More detailed information regarding the preferred pond sites can be found in **Sections 8.0 and 9.0**.

Small offsite areas draining toward the north side of the new corridor will be directed into the proposed stormwater pond (Pond 3A1) which will be sized to include these offsite drainage areas/volumes. A large offsite area adjacent to the north side of the main corridor from Station 220+00 to 230+00 will be conveyed with an offsite ditch and drainage structures into the flood compensation area (Pond 3A3). More information regarding the proposed offsite drainage design can be found in the **Location Hydraulics Report (LHR)** included with the PD&E package.

Basin 4

Basin 4 begins at station 244+20.95 and ends at station 315+05.52. The basin begins at the approximate center of the bridge traversing the proposed connection to CR 455 and ends at the end of the bridge traversing the proposed intersection with Schofield Road, which includes the east side of the project's proposed CR 455 connection. Portions of Basin 4 are located within SJRWMD and SFWMD therefore the drainage calculations utilized the most stringent criteria from the water management districts. The basin falls within and impacts FEMA flood Zones A and AE.

The proposed dry retention Pond 4C1 is sized for the new corridor's attenuation and treatment volumes. Ponds 4C2 and 4C3 are flood compensation ponds. Pond 4C1 discharges into the wetlands adjacent to the west side of Lake Needham. Pond 4C2 discharges into Pond 3A1, which is hydraulically connected to the flood plain. Pond 4C3 discharges into the wetlands north of Lake Needham. More information regarding the preferred pond sites can be found in **Sections 8.0 and 9.0**.

A small offsite area at the northeast corner of the CR 455 intersection flows toward the new corridor and would have been collected in a depressional/low area within the ROW, therefore the proposed basin and stormwater pond were sized to include the drainage area/volume. Two offsite areas that drain from east to west across the proposed CR 455 connection will be conveyed by offsite ditches and cross-drains into their respective discharge destinations. Large offsite areas along the north side of the main corridor will be conveyed with an offsite ditch and cross drains into their original discharge destinations. More information regarding the proposed offsite drainage design can be found in the **Location Hydraulics Report (LHR**) included with the PD&E package.

Basin 5

Basin 5 begins at station 315+05.52 and ends at station 334+66.44. The basin begins at the end of the bridge traversing the proposed intersection with the proposed connection to the Valencia Parkway and ends at the corridor's proposed intersection with SR 429, which includes the connector road and the proposed changes to SR 429 associated with the proposed entrance and exit ramps. The basin does not fall within FEMA flood zones.

The section of SR 429 impacted by this project was previously permitted by FDEP (ERP No. 48-205102-002-EI). Existing CFX drainage facilities are located within the basin at the corridor's intersection with SR 429. Two of the existing CFX ponds (Ponds 4A and 4B) appear to be impacted by the project's East bound ramp exiting to North bound SR 429. The existing impacts to the CFX ponds were estimated utilizing the plan view footprint of the lane and data obtained from the existing ERP documents. To minimize impacts the ramps are to be designed with retention walls. Excerpts from the existing ERP documents can be found in **Appendix D**.

The proposed dry retention Ponds 5A1 and 5A2 are sized for the new corridor's attenuation and treatment as well as impacts to the existing CFX ponds' volumes as described below. Ponds 5A1 and 5A2 discharge to the southwest flowing overland into Lake Needham. More detailed information regarding the preferred pond sites can be found in **Section 9.0**.

Offsite areas draining towards SR 429 were addressed by existing cross-drains that were not impacted by the proposed project so will not require extensions. The offsite area draining toward the basin between Schofield Road and the proposed Schofield Road intersection will be conveyed with an offsite ditch and a cross drain into its original discharge destination. More information regarding the proposed offsite drainage design can be found in the **Location Hydraulics Report (LHR**) included with the PD&E package.

7.2 Tailwater Determination

Preliminary tailwater elevations within each of the preferred pond alternatives were determined by taking the maximum value of the pond design high water (DHW) elevations (where established) or the 100-year flood plain elevations. These elevations at each pond location could be used for future preliminary pond designs and routing analyses. This tailwater elevation shall be verified during the design phase. Refer to **Table-4** for preliminary tailwater elevations.

Table-4 Preliminary Tailwater Elevations

Basin	Pond	Max 100-Year FEMA Flood Elevation (ft)	DHW Elevation(1) (ft)	Tailwater Elevation(2) (ft)	Lowest EOP Elevation (ft)	Base Bottom Elevation (ft)	Source
1	1A1	107.50	-	107.50	116.80	115.55	FPID 90260-2, Pond Calc's, & FEMA
	1A2	107.50	-	107.50			
	1A3	107.50	-	107.50			
	1A4	-	110.50	110.50			Pond Calc's & FEMA
2	2A	-	108.40	108.40	124.64	123.39	Pond Calc's & FEMA
3	3A1	-	104.90	104.90	111.61	110.36	Pond Calc's & FEMA
	3A2	106.40	-	106.40			
	3A3	106.40	-	106.40			
4	4C1	-	106.34	106.34	106.80	105.55	Pond Calc's & FEMA
	4C2	106.40	-	106.40			
	4C3	106.00	-	106.00			
5	5A1	-	144.00	144.00	147.33	146.08	Pond Calc's & FEMA
	5A2	-	114.76	114.76	116.16	115.66	

(1) Elevation of the treatment and attenuation volumes for stormwater management (treatment/attenuation) facilities.
(2) Floodplain elevation for floodplain compensation ponds where no DHW established.

7.3 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 and soil types found throughout the proposed corridor are shown in the NRCS USDA Soil Survey Reports located in **Appendix A, Exhibit-3A** through **Exhibit-3G**. In general, the surficial soils consist of fine sands, muck and poorly drained soil. The groundwater ranges from 0’ to greater than 6’ below the existing ground. Refer to **Table-5** below for the soils most prevalent within the project area.

Table-5 USDA NRCS Soil Survey Information

Soil No.	USDA Soil Name	Depth to Water Table (inches)	Hydrologic Soil Group
Lake County Classification			
4	Anclote and Myakka soils	0	A/D
8	Candler Sand, 0 to 5% slopes	>80	A
9	Candler Sand, 5 to 12% slopes	>80	A
20	Immokalee sand	6 to 18	B/D
28	Myakka-Myakka, wet, sands, 0 to 2% slopes	6 to 18	A/D
40	Placid and Myakka sands, depressional	0	A/D
45	Tavares sand, 0 to 5% slopes	42 to 72	A
Orange County Classification			
3	Basinger fine sand, frequently ponded, 0 to 1% slopes	0 to 6	A/D
4	Candler Fine Sand, 0 to 5% slopes	>80	A
5	Candler Fine Sand, 5 to 12% slopes	>80	A

8.0 FLOODPLAIN & ENVIRONMENTAL INFORMATION

The project may impact the 100-year floodplain in three different ways:

1. Longitudinal roadway widening impacts resulting from filling the floodplain areas.
2. Impacts due to proposed pond locations in floodplains.
3. Impacts due to proposed cross-drains in floodplains.

The longitudinal impact due to the recommended Lake/Orange County Connector's alignment cannot be avoided. During the final design phase of the project, every effort should be taken to minimize floodplain and wetland impacts. Floodplain impacts could be compensated for by routing to swales at low profile locations, proposed stormwater ponds, and designated floodplain compensation ponds. Refer to **Appendix A, Exhibit-1** for a map of the preferred alignment and pond alternatives with the wetlands shown.

The FEMA's Flood Insurance Rate Map (FIRM) for Orange and Lake counties show that portions of the project lie within the 100-year floodplain areas Zone AE and Zone A. Most of the project lies within flood Zone X. but large portions of the study lie within the flood zones. FEMA Map Numbers 12069C0675E and 12095C0375F, provide flood information for the project. Floodplain impacts occur throughout the project corridor. Please refer to **Appendix A, Exhibit-2A** for the FEMA flood zone exhibit and **Appendix A, Exhibit-2B** for the FEMA Flood Insurance Rate Maps.

Estimated 100-yr floodplain elevations were determined from the FEMA Map and existing SJRWMD and SFWMD permits. The proposed bridge over the wetlands between Lake Adain and Sawgrass Lake will not impact the floodplain since it spans over the entire floodplain. There will be insignificant impacts due to bridge piers. All 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 impacts due to the roadway fill for the entire proposed project corridor is 182.73 ac-ft. The total available compensation in all the proposed ponds is 190.77 ac-ft. Please refer to **Table-6** for a summary of floodplain impacts and compensation. The dredge and fill volumes are based on limited information available during the PD&E study. A detailed evaluation should be completed during the final design. Based on the preliminary evaluation the proposed project will provide more floodplain compensation than the impact. Therefore, a cup for cup compensation is provided by the project.

Geotechnical exploration is underway to determine the feasibility of removing the proposed bridge traversing the wetlands between Lake Adain and Sawgrass Lake. If the entire bridge is removed from the project the total 106.4' floodplain impacts due to roadway fill will rise from 75.66 ac-ft to 132.86 ac-ft. Therefore, removing the bridge would add 57.20 ac-ft of impacted FEMA 106.4' floodplain. The flood compensation provided in all of the project's ponds for the 106.4' floodplain is 81.88 ac-ft. therefore a net decrease of 50.98 ac-ft will be impacted upon the approximate 1,089-acre floodplain. This would cause an approximate rise in the FEMA 106.4' Floodplain of 0.047' or 0.56". This rise is less than the 0.1' rise permitted by SJRWMD, therefore no more flood compensation would need to be provided if the entire bridge is removed from the project, however the project would not be providing a cup for cup compensation any longer.

Seven (7) floodplain compensation pond sites were identified in Basins 1, 3, and 4 for this project, within the preferred drainage pond alternatives. The preferred floodplain compensation sites include Ponds 1A1, 1A2, 1A3, 3A2, 3A3, 4C2, and 4C3. In addition to the seven (7) floodplain compensation ponds, a couple stormwater ponds located adjacent to floodplains will also provide floodplain compensation. The preferred combined floodplain compensation/drainage ponds sites include Ponds 2A and 3A. At certain segments of the project, for example in Basin 4, the roadway profile is low enough to provide floodplain compensation in the swales; this option should be evaluated during the design phase to minimize offsite flood plain compensation areas.

Table-6 FEMA Floodplain Impact/Compensation Summary Table

Basin ID	Pond ID	Total Basin Floodplain Impact Volume (ac-ft)	Available Compensation Volume in Pond (ac-ft)	Total Compensation Volume in Basin Ponds (ac-ft)
1	1A1	29.51	14.16	32.17
	1A2		7.29	
	1A3		10.71	
	1A4		0	
2	2A	4.51	7.73	7.73
3	3A1	68.45	15.29	70.35
	3A2		11.13	
	3A3		43.93	
4	4C1	80.27	0	80.37
	4C2		3.79	
	4C3		76.58	
5	5A1	0.00	0.00	0.00
	5A2			
	Total (ac-ft):	**182.74**	**190.62**	

9.0 STORMWATER PONDS

Pond location alternatives were determined once the preferred alignment was identified. All the on-site basins were determined to discharge into open basins. The proposed corridor consists of many bridges and is located within multiple FEMA floodplains. This has resulted in the profile being elevated. The elevated profile will accommodate conveyance swales above the proposed cross drain structures without any conflict, before discharging into respective stormwater treatment ponds. Please refer to **Table-7** for a summary of the analysis for the preferred pond alternatives.

9.1 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 highwater 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 (**Appendix C**).

Pond Site Determination and Sizing

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, FDOT, and Lake County are easier to acquire. Pond sites were also proposed in areas where they would have the best hydraulic connectivity with the project corridor and pre-existing conditions.

Each pond size was estimated based on the best available data from each pond site location. Seasonal highwater table (SHWT) elevations at each pond site were estimated based on the soil type from USDA NRCS Soil Surveys for Orange and Lake counties and SHWT elevations identified in existing permits. Please refer to **Table-5** for the soil types, **Appendix B** for the pond sizing calculations, and **Table-7** for the estimated SHWT elevations for each respective pond.

The following method was used to determine each pond's size:

1. The total basin area and impervious areas for the pre- and post- development conditions were determined. The total basin areas for the pre- and post- development conditions are the same.
2. Per CFX's request, the entire 82' median was assumed as an impervious area for sizing the ponds for consideration of future widening.
3. Pre- and post- development runoff volumes were calculated using the SCS runoff calculation method, for 25yr-24hr storm (SJRMWD), 25yr-72hr storm (SFWMD), and for the 100yr-240hr and 100yr-8hr critical duration storms (FDOT) where applicable for each basin.
4. The maximum attenuation volume was calculated by obtaining the maximum difference between the post- and pre- development runoff produced by the storm events mentioned above.
5. For the wet detention ponds, the water quality volumes were calculated by the greater of 1" over the total basin area or 2.5" over the added impervious areas (SJRWMD and SFWMD). For the dry retention ponds, the water quality

volumes were calculated by the greater of 0.5” over the total basin area or 1.25” over the added impervious areas and then adding 0.5” over the total basin area for basins within the SJRWMD and the greater of 0.5” over the total basin area or 1.25” over the added impervious areas for basins within the SFWMD. For basins within both WMD’s the most stringent requirements (SJRWMD) were utilized.

6. Both the calculated attenuation volume and water quality treatment volume were added together to compute the total storage volume required for sizing the pond. It is a conservative approach to add both the treatment and attenuation volumes to size the pond.
7. Side slopes of 1:4 and 1-ft freeboard was used. The 1-ft freeboard is located between the inside edge of the berm and the combined treatment/attenuation stage.
8. 15-foot maintenance berm widths were utilized for estimating the pond areas.
9. SHWT elevations for the ponds were estimated based on the SHWT elevations obtained from the USDA NRCS Soil Survey report and the permits for the existing drainage ponds in the area.
10. Ponds were sized using the volumetric method.
11. A contingency area of 10% was added to the pond volumes.

10.0 RESULTS

The proposed five-mile Lake/Orange County Connector corridor is a new alignment, which consists of a four-lane divided rural roadway. The alignment will impact commercial properties, agricultural properties, and wooded areas. The preferred pond sites have been identified to:

- Minimize impact to residential and commercial properties.
- Minimize wetland and habitat impacts.
- Minimize floodplain impacts.
- Use remnant parcels and intersection infields from the Lake/Orange County Connector corridor. The final design team should maximize the usage of remnant parcels and intersection infields, which might change the pond shapes.

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

1. The SHWT obtained from the USDA Orange and Lake County soil reports and existing ERP permits close to the project area were used to size the ponds. During the final design, actual soil borings should be performed to determine the SHWT.
2. The final pond size calculations were determined by assuming the 82’ median as impervious area.

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 maps, which were obtained from Lake county and Orange county governments’ websites. The profile was determined based on the existing ground elevations obtained from Lidar. The Lidar data does not provide an accurate survey of the existing ground. During the final design, a topographic survey should be performed for the project area to provide more accurate information.

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 Preferred Pond Analysis Summary Table (**Table-7**) for a summary of the selected ponds engineering data and analysis. Refer to the Pond Alternative Evaluation Matrices (**Appendix C**) for a visual demonstration of how the preferred pond alternatives were selected.

11.0 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 Lake/Orange County Connector project. The proposed five-mile Lake/Orange County Connector corridor is a new alignment, which consists of a four-lane divided rural roadway. The project's corridor was divided into five basin areas based on the preferred alignment's high and low points. Three pond system alternatives were designed to meet the treatment, attenuation, and flood compensation requirements for each of the five basins (refer to **Section 9.0** for more information). The pond alternatives were evaluated using pond evaluation matrices (refer to **Section 10.0** and **Appendix C** for more information).

The selected preferred pond alternatives for each basin were:

- Basin 1: Ponds 1A1 through 1A4
- Basin 2: Pond 2A
- Basin 3: Ponds 3A1 though 3A3
- Basin 4: Ponds 4C1 through 4C3
- Basin 5: Ponds 5A1 and 5A2

Refer to the Preferred Pond Analysis Summary Table (**Table-7**) for a summary of the selected preferred pond alternatives.

12.0 REFERENCES

11. FEMA Flood Map Service Center - https://msc.fema.gov/portal/home
12. USDA – NRCS Web Soil Survey - https://websoilsurvey.nrcs.usda.gov/app/HomePage.htm
13. St. Johns River Water Management District (SJRWMD) - https://www.sjrwmd.com/
14. South Florida Water Management District (SFWMD) - https://www.sfwmd.gov/
15. Orange County Florida - https://www.orangecountyfl.net/
16. Lake County Florida - https://www.lakecountyfl.gov/
17. FDEP Map Direct - https://ca.dep.state.fl.us/mapdirect/
18. NOAA Point Frequency Data Server - https://hdsc.nws.noaa.gov/hdsc/pfds/
19. Florida Department of Transportation (FDOT) Drainage Manuals and Handbooks - https://www.fdot.gov/roadway/Drainage/Manualsandhandbooks.shtm
20. CFX Manuals and Handbooks - https://www.cfxway.com/

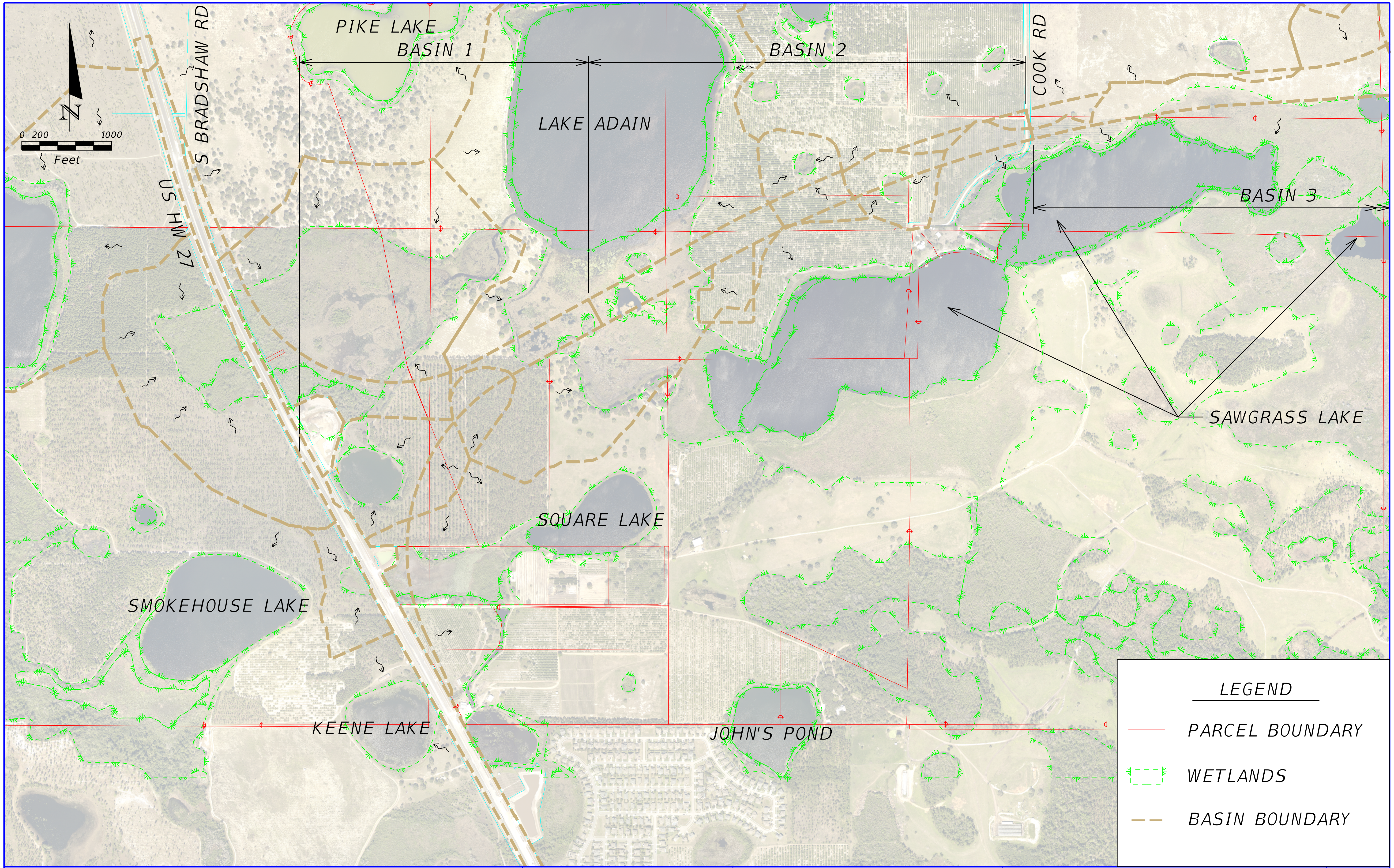
Table-7 Preferred Pond Analysis Summary Table

Basin	Pond Name	Pond Type/ Proposed Function	Predominant Soil Type	Average Existing Ground Elevation (ft)	Estimated SHWT Elevation (ft)	Lowest Edge of Proposed Road (ft)	Required Treatment Volume (ac-ft)	Required Attenuation Volume (ac-ft)	Treatment Volume Provided (ac-ft)	Attenuation Volume Provided (ac-ft)	Pond Bottom/ Control Elevation (ft)	Inside Berm Elevation (ft)	Pond Depth (ft)	Treatment Depth (ft)	Treatment and Attenuation Depth (ft)	Outfall Location
1	1A1	Flood Comp.	Candler Sand & Myakka-Myakka	109	105.5	116.80	N/A	N/A	N/A	N/A	105.50	109.00	3.5	N/A	N/A	Wetlands Southwest of Lake Adain
	1A2	Flood Comp.	Candler Sand & Myakka-Myakka	108	105.5						105.50	108.00	2.5	N/A	N/A	
	1A3	Flood Comp.	Candler Sand, Pomello Sand, & Myakka-Myakka	112.5	104.0						104.00	112.50	8.5	N/A	N/A	Wetlands Southwest of Lake Adain
	1A4	Dry Retention/ Treatment & Attenuation	Candler Sand	117	105.5		12.98	17.48	15.00	72.99	107.50	115.00	7.5	1.31	3.00	Existing Natural Pond West of Pond 1A4
2	2A	Dry Retention/ Treatment, Attenuation, & Flood Comp.	Candler Sand	120	103.0	124.64	4.32	15.09	8.33	72.15	105.00	118.00	13	0.79	3.40	Wetlands between Lake Adain and Sawgrass Lake
3	3A1	Wet Detention/ Treatment, Attenuation, & Flood Comp.	Candler Sand, Arents, & Immokalee Sand	110	103.0	111.61	6.36	3.36	7.88	6.99	103.00	108.00	5	1.22	1.90	Wetlands East of Sawgrass Lake
	3A2	Flood Comp.	Candler Sand, Arents, & Tavares Sand	108			N/A	N/A	N/A	N/A	103.00	108.00	5	N/A	N/A	
	3A3	Flood Comp.	Candler Sand	110							103.00	110.00	7			Unnamed Natural Ponds East of Pond 3A3
4	4C1	Dry Retention/ Treatment	Candler Sand & Tavares Sand	110	102.0	106.80	8.31	-2.97	9.33	9.33	105.00	108.00	3	1.34	1.34	Wetlands West of Lake Needham
	4C2	Flood Comp.	Candler Sand & Tavares Sand	115			N/A	N/A	N/A	N/A	104.00	115.00	11	N/A	N/A	Pond 3A1
	4C3	Flood Comp.	Candler Sand, Ona-Ona, Placid and Myakka Sands, & Tavares Sand	110							102.00	110.00	8			Wetlands North of Lake Needham
5	5A1	Dry Retention/ Treatment & Attenuation	Candler Sand	147	104.0	147.33	3.87	22.84	11.30	27.81	140.00	145.00	5	1.08	4.00	To the southwest flowing overland into Lake Needham
	5A2	Dry Retention/ Treatment & Attenuation		130		116.16					112.00	128.00	16	1.02	2.76	

Appendix A – Exhibits

- Exhibit-1A – Pre Drainage Maps
- Exhibit-1B – Post Drainage Maps
- Exhibit-2A – Floodplain Maps
- Exhibit-2B – FEMA Firm Panels
- Exhibit-3A – USDA Soil Report: Basin 1
- Exhibit-3B – USDA Soil Report: Basin 2
- Exhibit-3C – USDA Soil Report: Pond 2A
- Exhibit-3D – USDA Soil Report: Basin 3
- Exhibit-3E – USDA Soil Report: Basin 4
- Exhibit-3F – USDA Soil Report: Basin 4A3
- Exhibit-3G – USDA Soil Report: Basin 5
- Exhibit-4 – USGS Quadrangle Map
- Exhibit-5A – NOAA Precipitation Frequency Data Estimates
- Exhibit-5B – SJRWMD's SJ 88-3 Max Rainfall Depths

Exhibit-1A Pre Drainage Maps



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PRE DRAINAGE MAPS

EXHIBIT
A-1A-01

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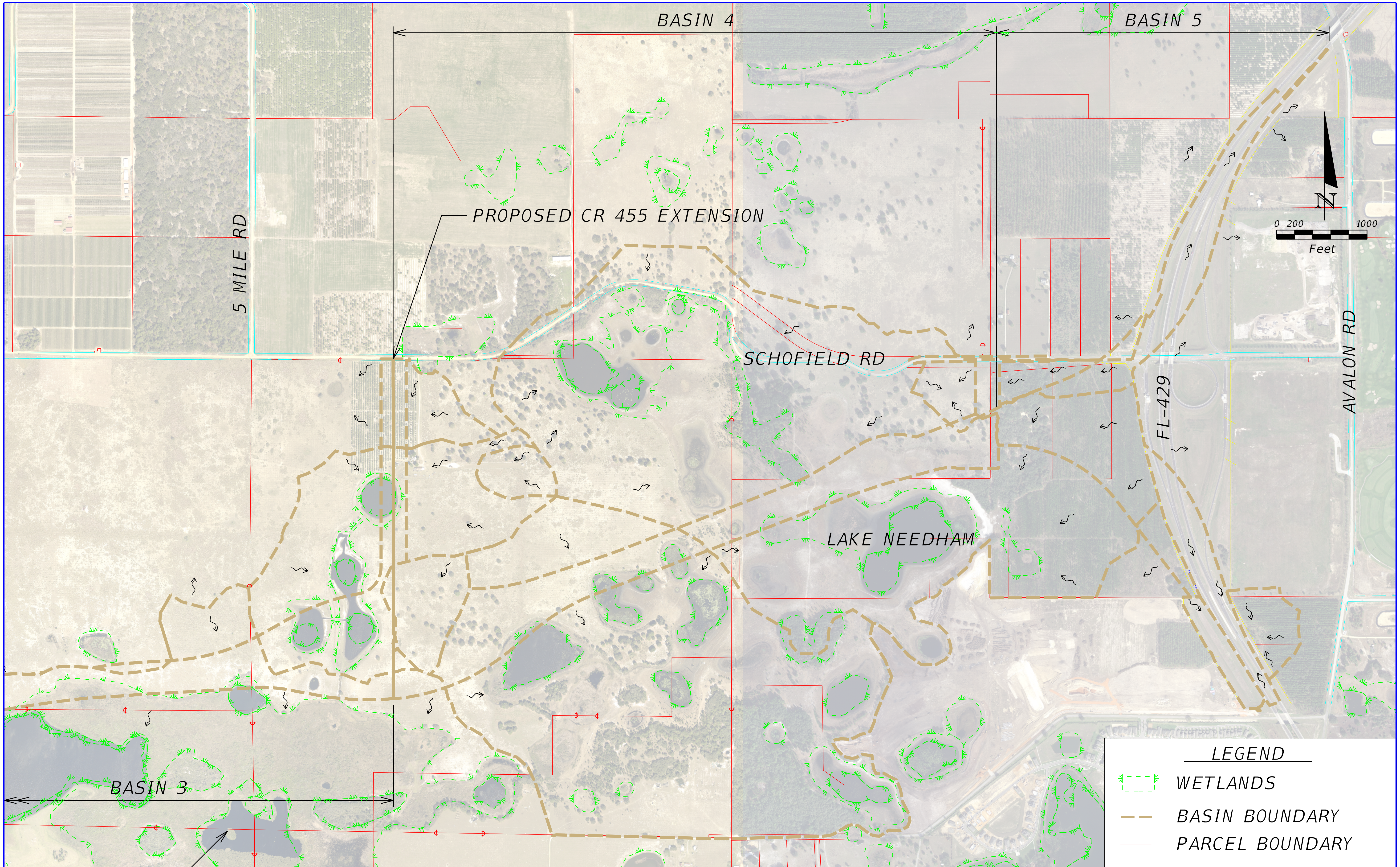

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DATE	DESCRIPTION	DATE	DESCRIPTION

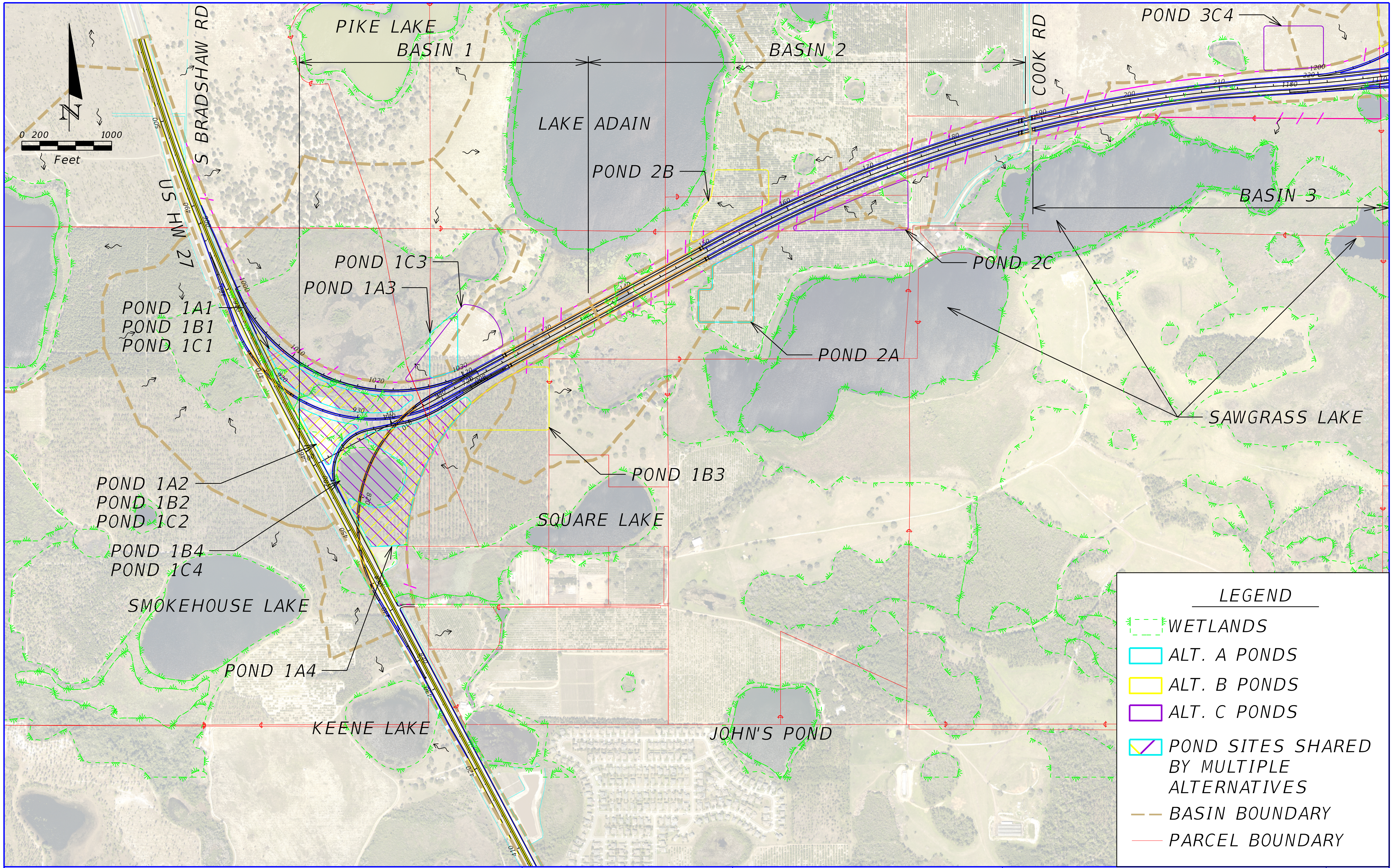
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PRE DRAINAGE MAPS

EXHIBIT
A-1A-02

Exhibit-1B Post Drainage Maps



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DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

POST DRAINAGE MAPS

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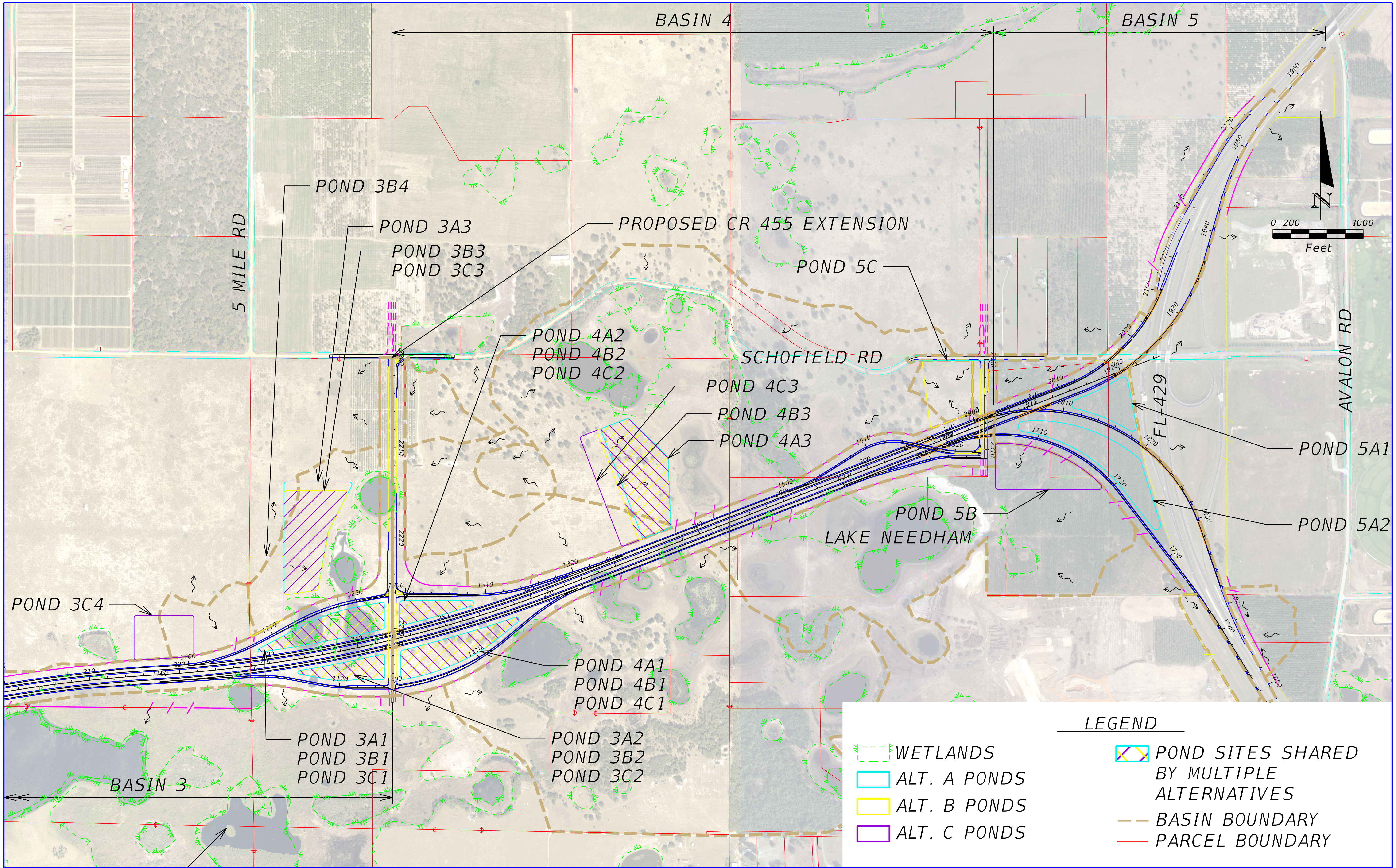
A-1B-01



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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

POST DRAINAGE MAPS

EXHIBIT
A-1B-02

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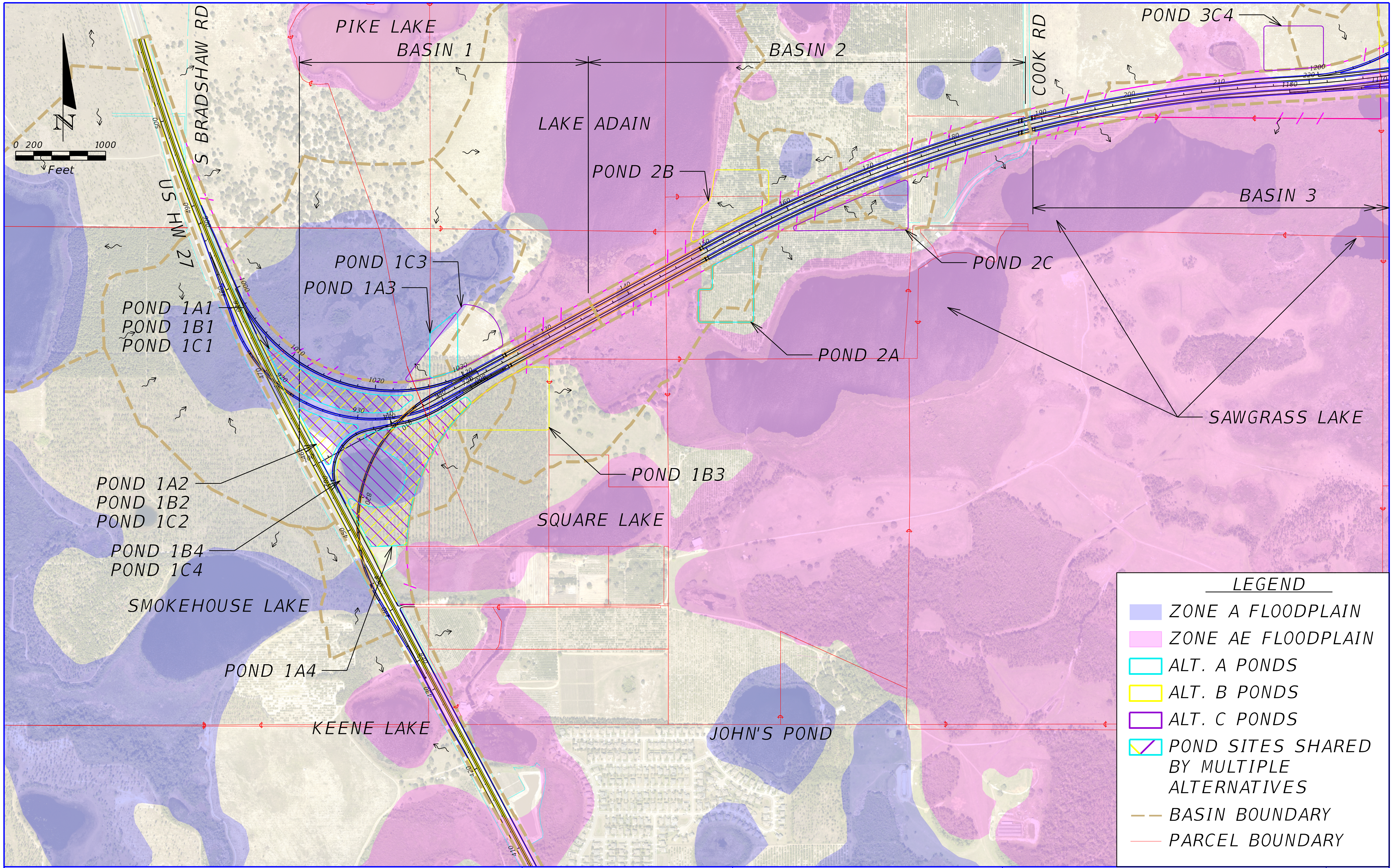
Exhibit-2A Floodplain Maps



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DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

FLOODPLAIN MAPS

EXHIBIT

A-2A-01

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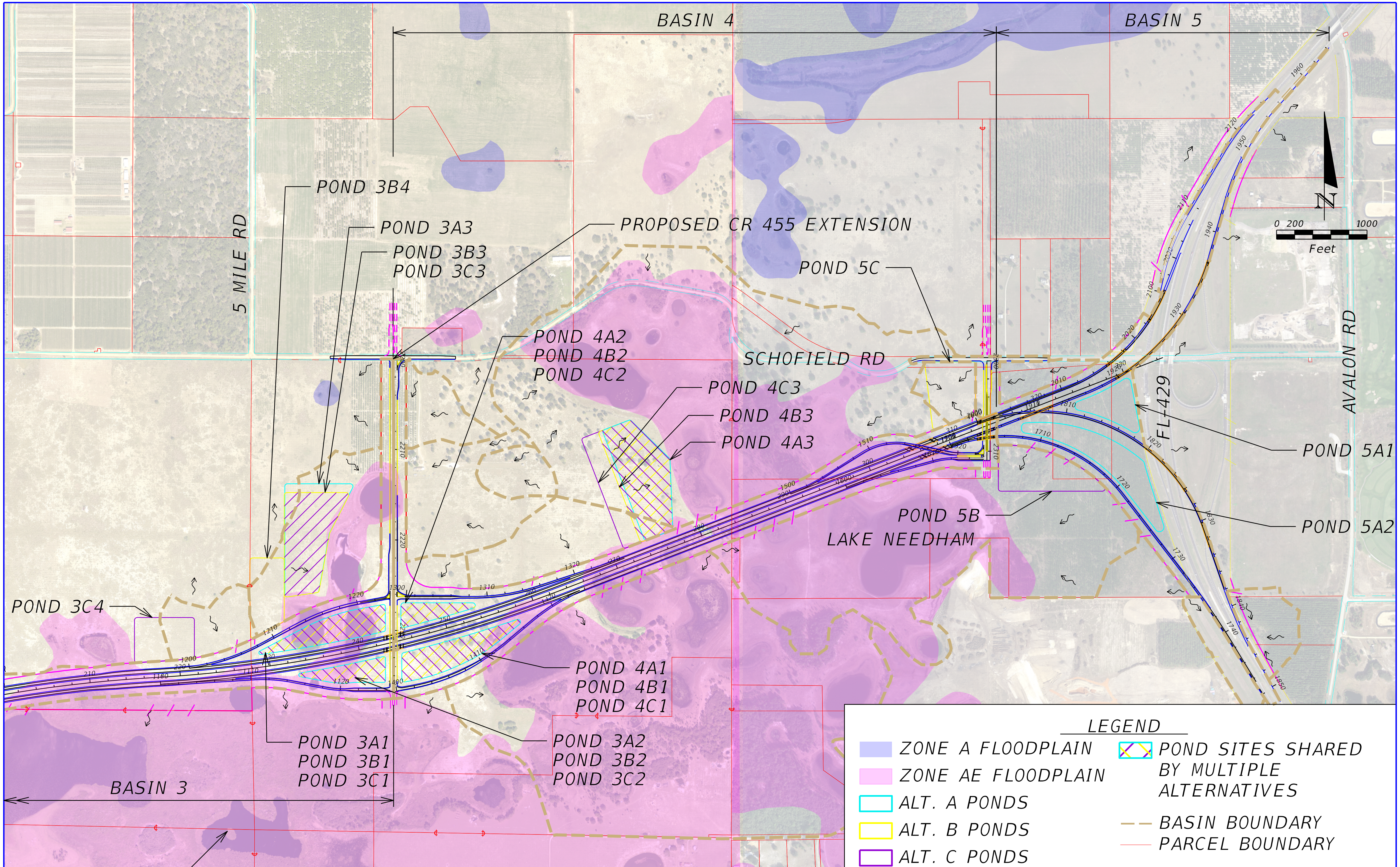

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

FLOODPLAIN MAPS

EXHIBIT
A-2A-02

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Exhibit-2B – FEMA Firm Panels

NOTES TO USERS

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

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

Coastal Base Flood Elevations (BFEs) 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 Transverse Mercator State Plane Florida East FIPS 0901. The **horizontal datum** was NAD83 HARN, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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

Base map information shown on this FIRM was provided in digital format by Lake County and the Florida Geographic Data Library. Orthophotography was collected in 2009 by the Southwest Florida and St. Johns River Water Management District.

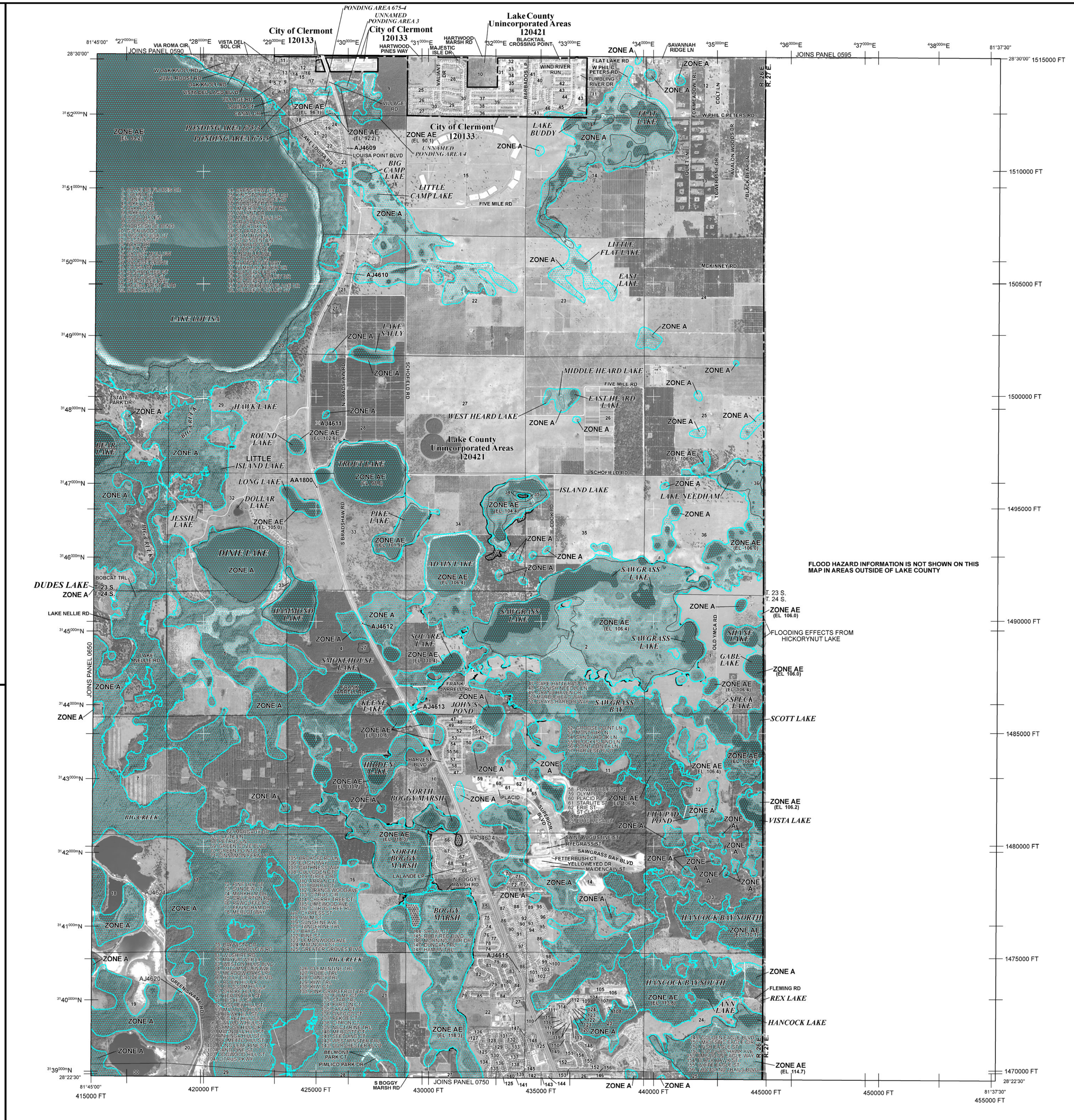
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, 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.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the **FEMA Mapping Information eXchange** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service website at http://www.msc.fema.gov/. Available products may include previously issued Letters of Map Change, a Flood Insurance Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

The **"profile base lines"** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.



LEGEND

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

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, 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 Special Flood Hazard Area formerly protected from the 1% annual chance flood 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 Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities

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

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

* Referenced to the North American Vertical Datum of 1988

(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

$^{42}75^{000m}$E 1000-meter Universal Transverse Mercator grid ticks, zone 17

6000000 FT 5000-foot grid values: Florida State Plane coordinate system, East Zone (FIPSZONE = 0901), 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
July 3, 2002

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

December 18, 2012 - to update corporate limits, change Base Flood Elevations, add Base Flood Elevations, change Special Flood Hazard Areas, change zone designations, update roads and road names, incorporate previously issued Letters of Map Revision, and reflect updated topographic information.

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.

N

MAP SCALE 1" = 2000'

1,000 0 1,000 2,000 3,000 4,000 FEET
600 0 600 1,200 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0675E

FIRM

FLOOD INSURANCE RATE MAP

LAKE COUNTY, FLORIDA

AND INCORPORATED AREAS

PANEL 675 OF 750

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLERMONT, CITY OF	120133	0675	E
LAKE COUNTY	120421	0675	E

APPENDIX A
EXHIBIT 2B
PAGE 01

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
12069C0675E

MAP REVISED
DECEMBER 18, 2012

Federal Emergency Management Agency
~~~

NOTES TO USERS

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

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' 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.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

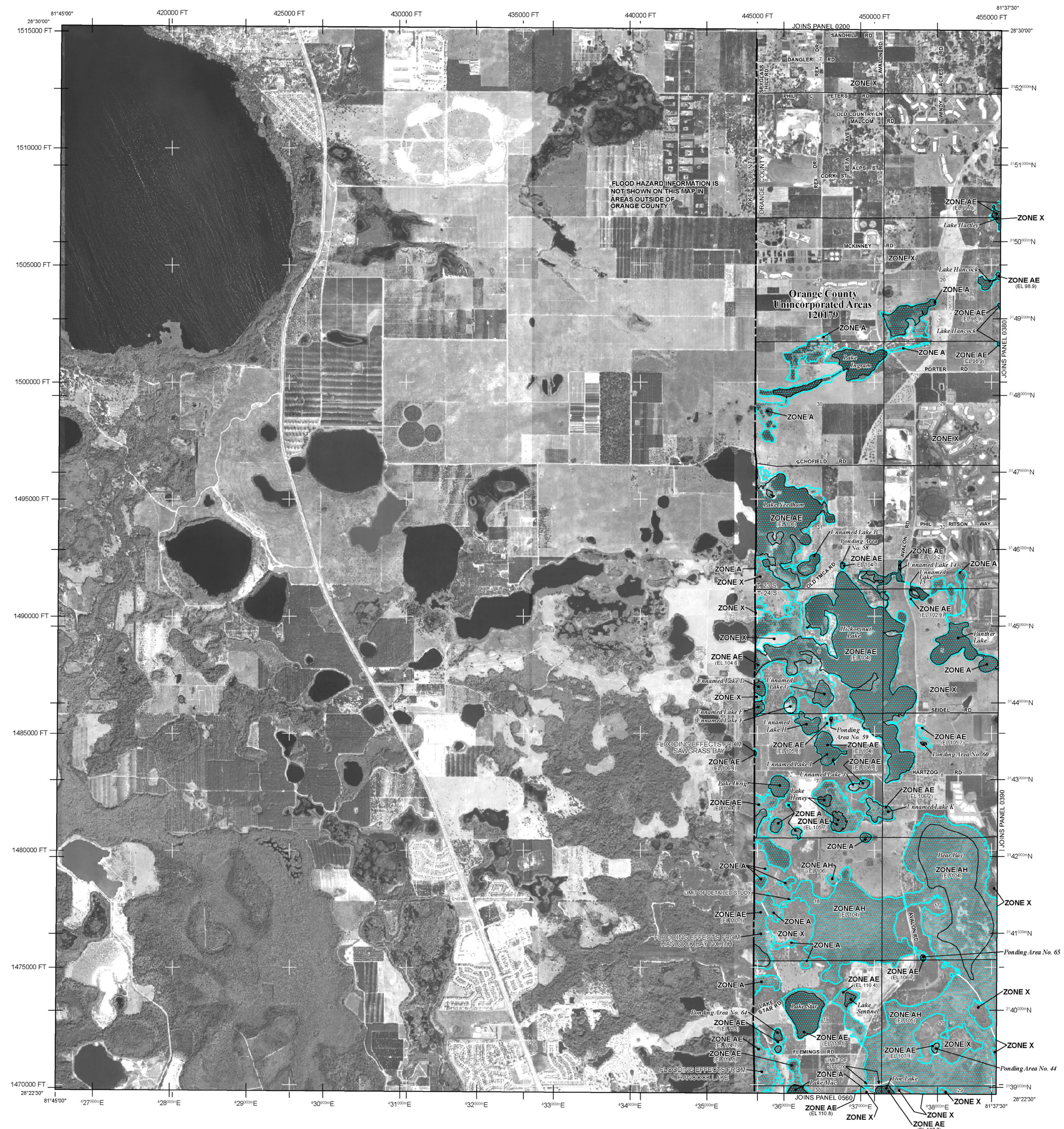
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which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

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

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



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, 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
$^{42}75^{000m}$E	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" = 2000'

1,000 0 1,000 2,000 3,000 4,000 FEET
600 0 600 1,200 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0375F

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

PANEL 375 OF 750
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ORANGE COUNTY	120179	0375	F

APPENDIX A
EXHIBIT 2B
PAGE 02

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
12095C0375F

MAP REVISED
SEPTEMBER 25, 2009
Federal Emergency Management Agency

Exhibit-3A – USDA Soil Report:

Basin 1

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
Lake County Area, Florida

CFX - Lake-Orange Connector - Basin 1

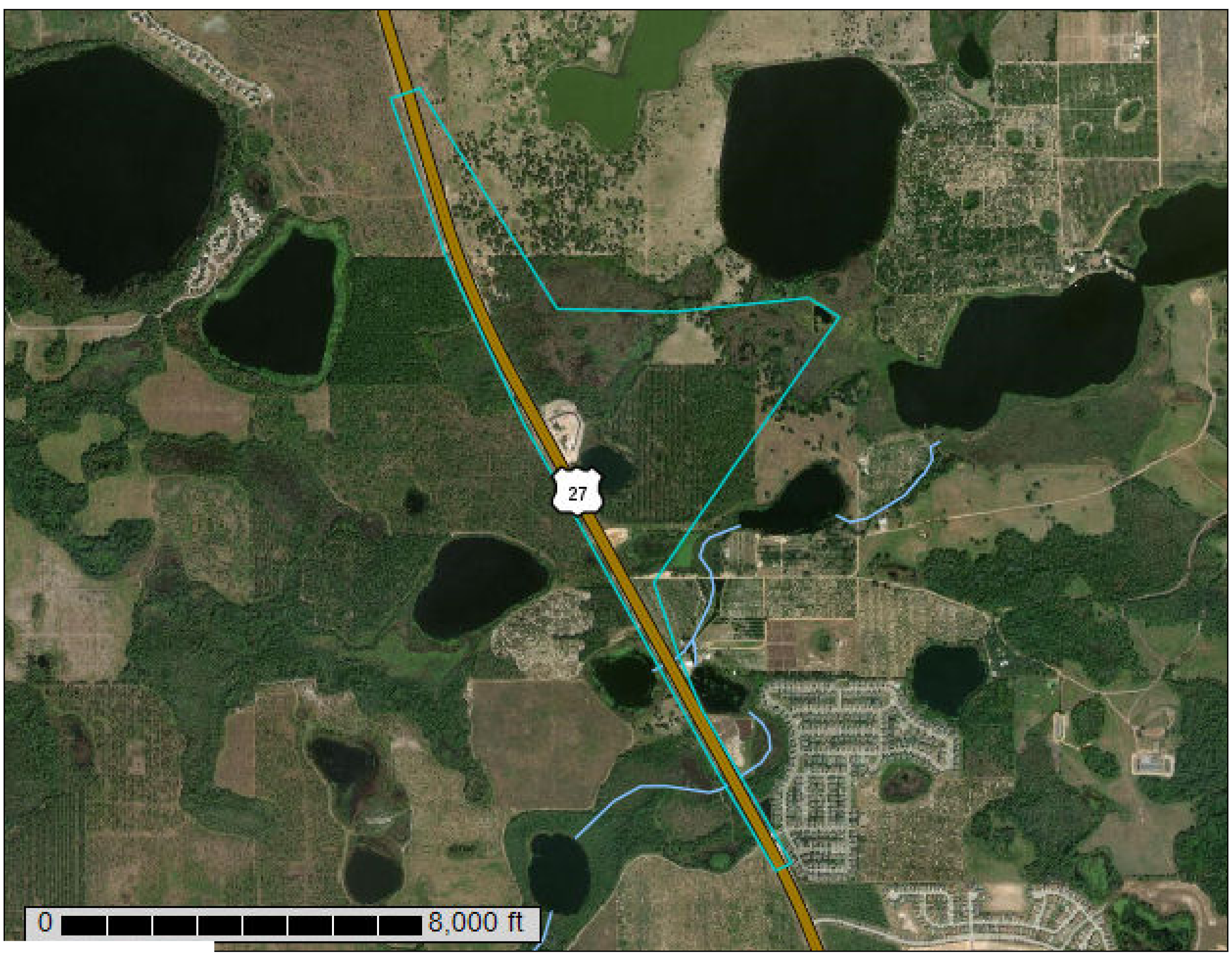


EXHIBIT
3A

April 3, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

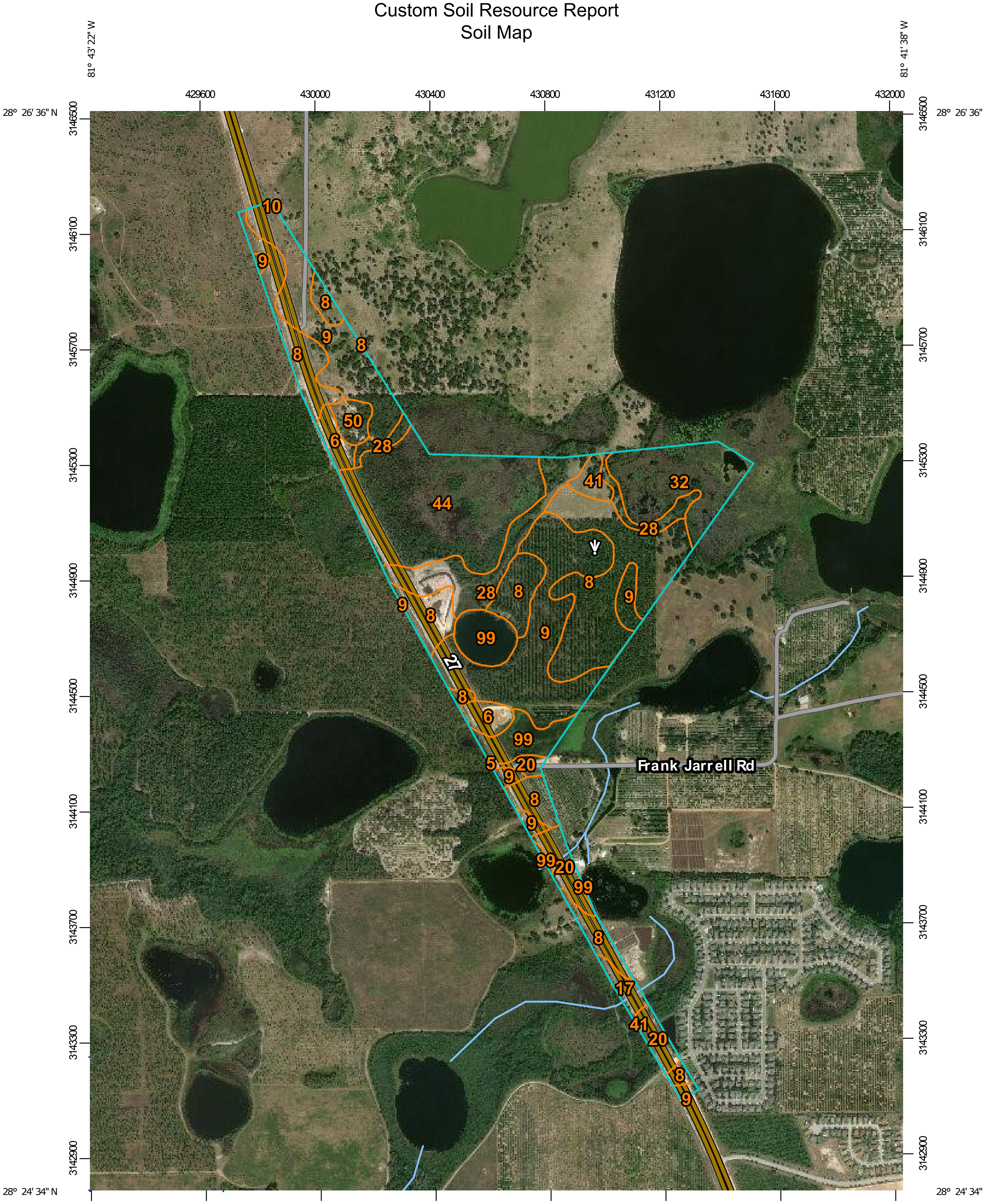
alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:18,300 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 250, 500, 1000, 1500

Feet: 0, 500, 1000, 2000, 3000

N

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:
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: Lake County Area, Florida
Survey Area Data: Version 18, Sep 13, 2018

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

Date(s) aerial images were photographed: Dec 19, 2013—Nov 26, 2017

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5	Apopka sand, 0 to 5 percent slopes	0.0	0.0%
6	Apopka sand, 5 to 12 percent slopes	7.9	2.6%
8	Candler sand, 0 to 5 percent slopes	79.2	25.6%
9	Candler sand, 5 to 12 percent slopes	74.7	24.2%
10	Candler sand, 12 to 40 percent slopes	0.2	0.1%
17	Arents	3.2	1.0%
20	Immokalee sand	11.7	3.8%
28	Myakka-Myakka, wet, sands, 0 to 2 percent slopes	24.9	8.1%
32	Oklawaha muck	25.9	8.4%
41	Pomello sand, 0 to 5 percent slopes	3.6	1.1%
44	Swamp	56.8	18.3%
50	Borrow Pits	4.2	1.3%
99	Water	17.1	5.5%
Totals for Area of Interest		**309.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lake County Area, Florida

5—Apopka sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2w0q6
Elevation: 40 to 150 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 66 to 77 degrees F
Frost-free period: 248 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Apopka and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Apopka

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 55 inches: sand
Bt - 55 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
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: More than 80 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: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL)
Other vegetative classification: Upland Hardwood Hammock (R154XY008FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)

Hydric soil rating: No

Minor Components

Sparr

Percent of map unit: 6 percent
Landform: Rises on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Other vegetative classification: Upland Hardwood Hammock (R154XY008FL)
Hydric soil rating: No

Jumper

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Candler

Percent of map unit: 5 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve, side slope, tread
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R155XY002FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Jonesville

Percent of map unit: 4 percent
Landform: Rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

6—Apopka sand, 5 to 12 percent slopes

Map Unit Setting

National map unit symbol: 1qt5z
Elevation: 40 to 150 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Apopka and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Apopka

Setting

Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 55 inches: sand
Bt - 55 to 80 inches: sandy clay loam

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
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: More than 80 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: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on strongly sloping to steep side slopes of xeric uplands (G154XB113FL)
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Apopka

Percent of map unit: 7 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Kendrick

Percent of map unit: 7 percent

Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Kendrick, thin subsurface

Percent of map unit: 6 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Upland Hardwood Hammock (R154XY008FL)
Hydric soil rating: No

8—Candler sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t3z1
Elevation: 10 to 260 feet
Mean annual precipitation: 47 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 63 inches: sand
E and Bt - 63 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively 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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R155XY002FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Tavares

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, concave
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Millhopper

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

9—Candler sand, 5 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2w0q4
Elevation: 30 to 160 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F

Frost-free period: 290 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: sand
E - 5 to 67 inches: sand
E and Bt - 67 to 80 inches: sand

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on strongly sloping to steep side slopes of xeric uplands (G154XB113FL)
Other vegetative classification: Sand Pine Scrub (R154XY001FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Apopka

Percent of map unit: 6 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Kendrick

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Adamsville

Percent of map unit: 3 percent
Landform: Rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Pompano

Percent of map unit: 1 percent
Landform: Flats on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear, convex
Hydric soil rating: Yes

10—Candler sand, 12 to 40 percent slopes

Map Unit Setting

National map unit symbol: 1nrvg
Elevation: 40 to 150 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Candler

Setting

Landform: Hills on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian or sandy marine deposits

Typical profile

A - 0 to 3 inches: sand
E - 3 to 67 inches: sand
E and Bt - 67 to 80 inches: sand

Properties and qualities

Slope: 12 to 40 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on strongly sloping to steep side slopes of xeric uplands (G154XB113FL)
Other vegetative classification: Sand Pine Scrub (R154XY001FL)
Hydric soil rating: No

Minor Components

Kendrick

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Apopka

Percent of map unit: 5 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

17—Arents

Map Unit Setting

National map unit symbol: 1qt6b
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Arents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arents

Setting

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

Typical profile

C - 0 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 1.98 in/hr)
Depth to water table: About 30 to 60 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 7.8 inches)

20—Immokalee sand

Map Unit Setting

National map unit symbol: 1nrvs
Elevation: 10 to 60 feet

Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Immokalee, non-hydric, and similar soils: 70 percent
Immokalee, hydric, and similar soils: 20 percent
Minor components: 10 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 4 inches: sand
E - 4 to 38 inches: sand
Bh - 38 to 56 inches: sand
BC - 56 to 68 inches: 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 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 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
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 4 inches: sand
E - 4 to 38 inches: sand
Bh - 38 to 56 inches: sand
BC - 56 to 68 inches: 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 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 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

Minor Components

Wabasso, hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

Placid, depressional

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: Slough (R154XY011FL)
Hydric soil rating: Yes

28—Myakka-Myakka, wet, sands, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2twt1
Elevation: 10 to 130 feet
Mean annual precipitation: 43 to 62 inches
Mean annual air temperature: 64 to 75 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Myakka and similar soils: 75 percent
Myakka, wet, and similar soils: 15 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myakka

Setting

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

Typical profile

A - 0 to 6 inches: sand
E - 6 to 20 inches: sand
Bh - 20 to 36 inches: sand
C - 36 to 80 inches: 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 5.95 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 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w

Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

Description of Myakka, Wet

Setting

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

Typical profile

A - 0 to 6 inches: sand
E - 6 to 20 inches: sand
Bh - 20 to 36 inches: sand
C - 36 to 80 inches: 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 5.95 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 5.0 inches)

Interpretive groups

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

Minor Components

Basinger

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear, convex
Across-slope shape: Concave, linear
Ecological site: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: Yes

Eaugallie

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

Placid, depressional

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Ecological site: Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

32—Oklawaha muck

Map Unit Setting

National map unit symbol: 1nrw5
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Oklawaha, Freq. Flooded

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Herbaceous organic material over loamy and clayey marine deposits

Typical profile

Oa - 0 to 9 inches: muck
Oe - 9 to 25 inches: mucky peat
Cg1 - 25 to 31 inches: sandy loam
Cg2 - 31 to 54 inches: sandy clay

Properties and qualities

Slope: 0 to 2 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): Very low to moderately low (0.00 to 0.06 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: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Forage suitability group: Organic soils in depressions and on flood plains (G154XB645FL)
Other vegetative classification: Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

Minor Components

Brighton, depressional

Percent of map unit: 10 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

41—Pomello sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2sm5n
Elevation: 0 to 160 feet
Mean annual precipitation: 46 to 64 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Pomello

Setting

Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Backslope, summit
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 4 inches: sand
E - 4 to 56 inches: sand
Bh - 56 to 62 inches: sand
Bw - 62 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 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): High (1.98 to 5.95 in/hr)
Depth to water table: About 18 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: Very low (about 2.5 inches)

Interpretive groups

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

Minor Components

Immokalee

Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

Tavares

Percent of map unit: 4 percent
Landform: Ridges on marine terraces, flatwoods on marine terraces, hills on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Side slope, interfluve, tread, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R155XY002FL), Sand Pine Scrub (R155XY001FL)
Hydric soil rating: No

St. lucie

Percent of map unit: 3 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, interfluve, riser
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL)
Hydric soil rating: No

Satellite

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, rises on marine terraces, flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R155XY001FL)
Hydric soil rating: No

44—Swamp

Map Unit Setting

National map unit symbol: 1nrwk
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Mineral soil: 50 percent
Organic soil: 50 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mineral Soil

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Interfluve, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 18 inches: fine sand

C - 18 to 80 inches: sand

Properties and qualities

Slope: 0 to 1 percent
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 6 inches
Frequency of flooding: Frequent
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: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Forage suitability group: Forage suitability group not assigned (G154XB999FL)
Other vegetative classification: Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

Description of Organic Soil

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material

Typical profile

Oe - 0 to 80 inches: mucky peat

Properties and qualities

Slope: 0 to 1 percent
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
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: Very high (about 13.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Forage suitability group: Forage suitability group not assigned (G154XB999FL)
Other vegetative classification: Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

50—Borrow Pits

Map Unit Setting

National map unit symbol: 1v082
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Borrow pits: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Borrow Pits

Setting

Landform: Marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Altered marine deposits

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Forage suitability group: Forage suitability group not assigned (G154XB999FL)
Hydric soil rating: Unranked

Minor Components

Aquents

Percent of map unit: 30 percent
Landform: Depressions
Hydric soil rating: Yes

99—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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Exhibit-3B – USDA Soil Report:

Basin 2

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

Lake County Area, Florida

CFX - Lake-Orange Connector - Basin 2

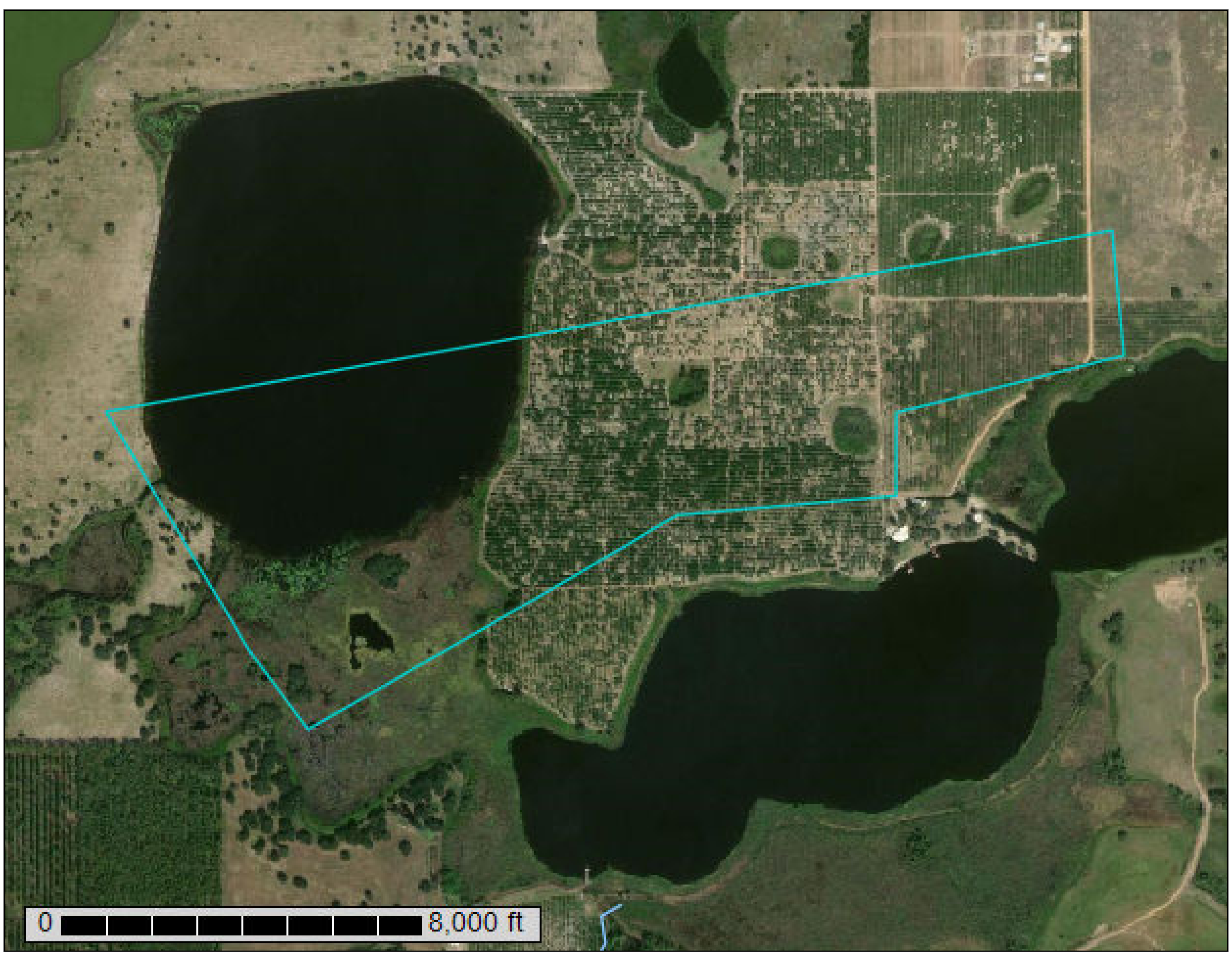

EXHIBIT
3B

April 3, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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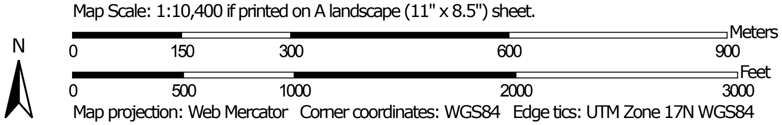
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:10,400 if printed on A landscape (11" x 8.5") sheet.



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.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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: Lake County Area, Florida
Survey Area Data: Version 18, Sep 13, 2018

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

Date(s) aerial images were photographed: Dec 19, 2013—Nov 26, 2017

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Candler sand, 0 to 5 percent slopes	58.4	31.3%
9	Candler sand, 5 to 12 percent slopes	42.3	22.7%
17	Arents	0.9	0.5%
28	Myakka-Myakka, wet, sands, 0 to 2 percent slopes	2.6	1.4%
32	Oklawaha muck	34.9	18.7%
40	Placid and Myakka sands, depressional	2.1	1.1%
99	Water	45.3	24.3%
Totals for Area of Interest		**186.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lake County Area, Florida

8—Candler sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t3z1
Elevation: 10 to 260 feet
Mean annual precipitation: 47 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 63 inches: sand
E and Bt - 63 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively 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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)

Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R155XY002FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Tavares

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, concave
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Millhopper

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

9—Candler sand, 5 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2w0q4
Elevation: 30 to 160 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: sand
E - 5 to 67 inches: sand
E and Bt - 67 to 80 inches: sand

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on strongly sloping to steep side slopes of xeric uplands (G154XB113FL)
Other vegetative classification: Sand Pine Scrub (R154XY001FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Apopka

Percent of map unit: 6 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Kendrick

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Adamsville

Percent of map unit: 3 percent
Landform: Rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Pompano

Percent of map unit: 1 percent
Landform: Flats on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear, convex
Hydric soil rating: Yes

17—Arents

Map Unit Setting

National map unit symbol: 1qt6b
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Arents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arents

Setting

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

Typical profile

C - 0 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 1.98 in/hr)
Depth to water table: About 30 to 60 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 7.8 inches)

28—Myakka-Myakka, wet, sands, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2twt1
Elevation: 10 to 130 feet
Mean annual precipitation: 43 to 62 inches
Mean annual air temperature: 64 to 75 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Myakka and similar soils: 75 percent
Myakka, wet, and similar soils: 15 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myakka

Setting

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

Typical profile

A - 0 to 6 inches: sand
E - 6 to 20 inches: sand
Bh - 20 to 36 inches: sand
C - 36 to 80 inches: 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 5.95 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 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D

Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

Description of Myakka, Wet

Setting

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

Typical profile

A - 0 to 6 inches: sand
E - 6 to 20 inches: sand
Bh - 20 to 36 inches: sand
C - 36 to 80 inches: 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 5.95 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 5.0 inches)

Interpretive groups

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

Minor Components

Basinger

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear, convex
Across-slope shape: Concave, linear
Ecological site: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: Yes

Eaugallie

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

Placid, depressional

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Ecological site: Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

32—Oklawaha muck

Map Unit Setting

National map unit symbol: 1nrw5
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Oklawaha, Freq. Flooded

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Herbaceous organic material over loamy and clayey marine deposits

Typical profile

Oa - 0 to 9 inches: muck
Oe - 9 to 25 inches: mucky peat
Cg1 - 25 to 31 inches: sandy loam
Cg2 - 31 to 54 inches: sandy clay

Properties and qualities

Slope: 0 to 2 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): Very low to moderately low (0.00 to 0.06 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: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Forage suitability group: Organic soils in depressions and on flood plains (G154XB645FL)
Other vegetative classification: Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

Minor Components

Brighton, depressional

Percent of map unit: 10 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

40—Placid and Myakka sands, depressional

Map Unit Setting

National map unit symbol: 1nrwf
Elevation: 10 to 60 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Placid and similar soils: 55 percent
Myakka and similar soils: 35 percent
Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Placid

Setting

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

Typical profile

A - 0 to 18 inches: sand
C - 18 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 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 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G154XB145FL)
Other vegetative classification: Slough (R154XY011FL)
Hydric soil rating: Yes

Description of Myakka

Setting

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

Typical profile

A - 0 to 6 inches: sand
E - 6 to 20 inches: sand
Bh - 20 to 36 inches: sand
C - 36 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained

Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 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: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G154XB145FL)
Other vegetative classification: Slough (R154XY011FL)
Hydric soil rating: Yes

Minor Components

Wabasso, hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

Ellzey, hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

99—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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Exhibit-3C – USDA Soil Report:

Pond 2A

USDA 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

Lake County Area, Florida

CFX - Lake-Orange Connector - Pond 2A

EXHIBIT
3C

April 25, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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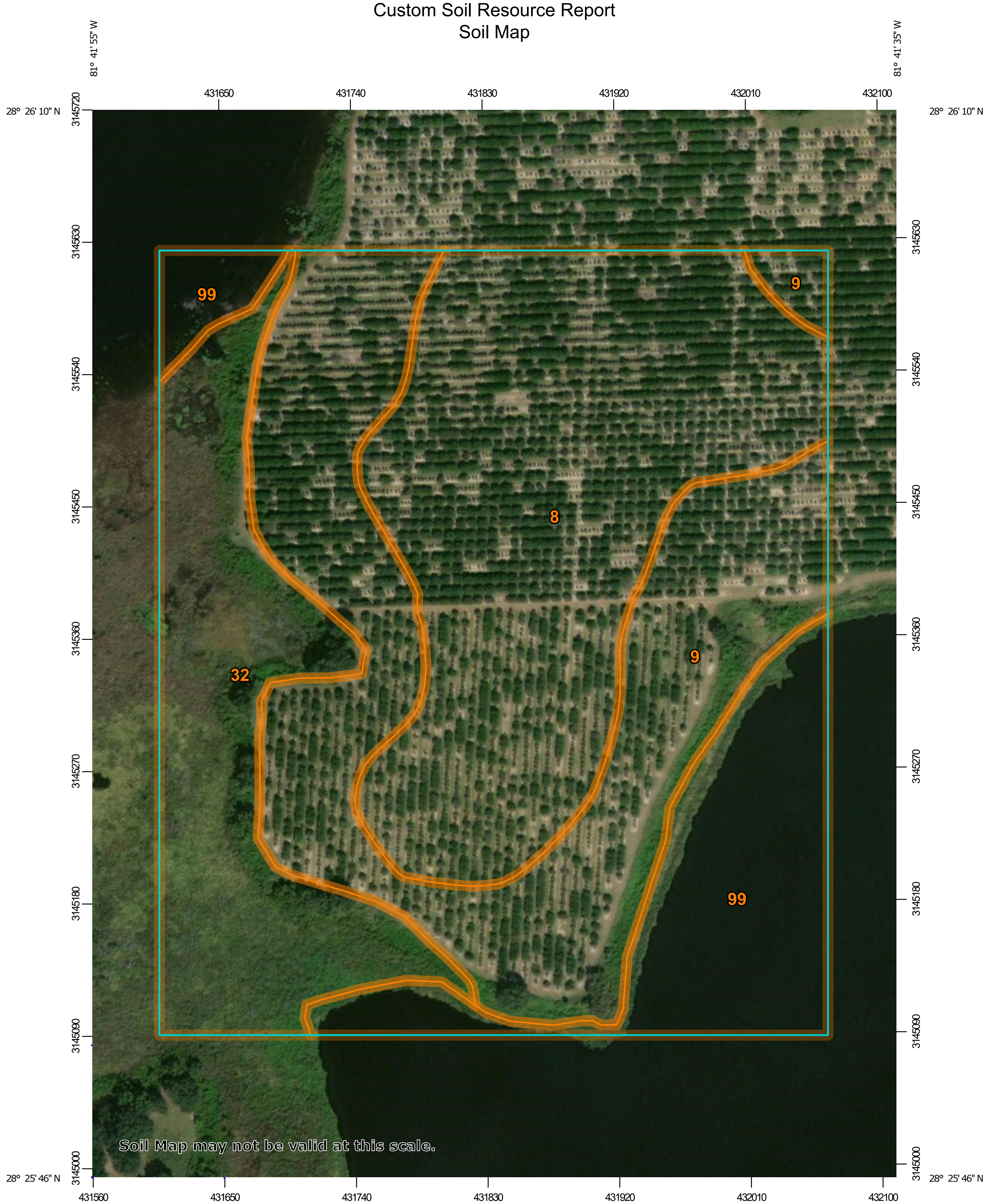
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:3,540 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

N

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.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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: Lake County Area, Florida
Survey Area Data: Version 18, Sep 13, 2018

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

Date(s) aerial images were photographed: Dec 19, 2013—Nov 26, 2017

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Candler sand, 0 to 5 percent slopes	20.9	34.6%
9	Candler sand, 5 to 12 percent slopes	19.0	31.5%
32	Oklawaha muck	11.4	18.8%
99	Water	9.2	15.2%
Totals for Area of Interest		**60.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lake County Area, Florida

8—Candler sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t3z1
Elevation: 10 to 260 feet
Mean annual precipitation: 47 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 63 inches: sand
E and Bt - 63 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively 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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)

Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R155XY002FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Tavares

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, concave
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Millhopper

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

9—Candler sand, 5 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2w0q4
Elevation: 30 to 160 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: sand
E - 5 to 67 inches: sand
E and Bt - 67 to 80 inches: sand

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on strongly sloping to steep side slopes of xeric uplands (G154XB113FL)
Other vegetative classification: Sand Pine Scrub (R154XY001FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Apopka

Percent of map unit: 6 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Kendrick

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Adamsville

Percent of map unit: 3 percent
Landform: Rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Pompano

Percent of map unit: 1 percent
Landform: Flats on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear, convex
Hydric soil rating: Yes

32—Oklawaha muck

Map Unit Setting

National map unit symbol: 1nrw5
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Oklawaha, Freq. Flooded

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Herbaceous organic material over loamy and clayey marine deposits

Typical profile

Oa - 0 to 9 inches: muck
Oe - 9 to 25 inches: mucky peat
Cg1 - 25 to 31 inches: sandy loam
Cg2 - 31 to 54 inches: sandy clay

Properties and qualities

Slope: 0 to 2 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): Very low to moderately low (0.00 to 0.06 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: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Forage suitability group: Organic soils in depressions and on flood plains (G154XB645FL)
Other vegetative classification: Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

Minor Components

Brighton, depressional

Percent of map unit: 10 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

99—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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Exhibit-3D – USDA Soil Report:

Basin 3

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

Lake County Area, Florida

Lake-Orange Connector - Basin 3

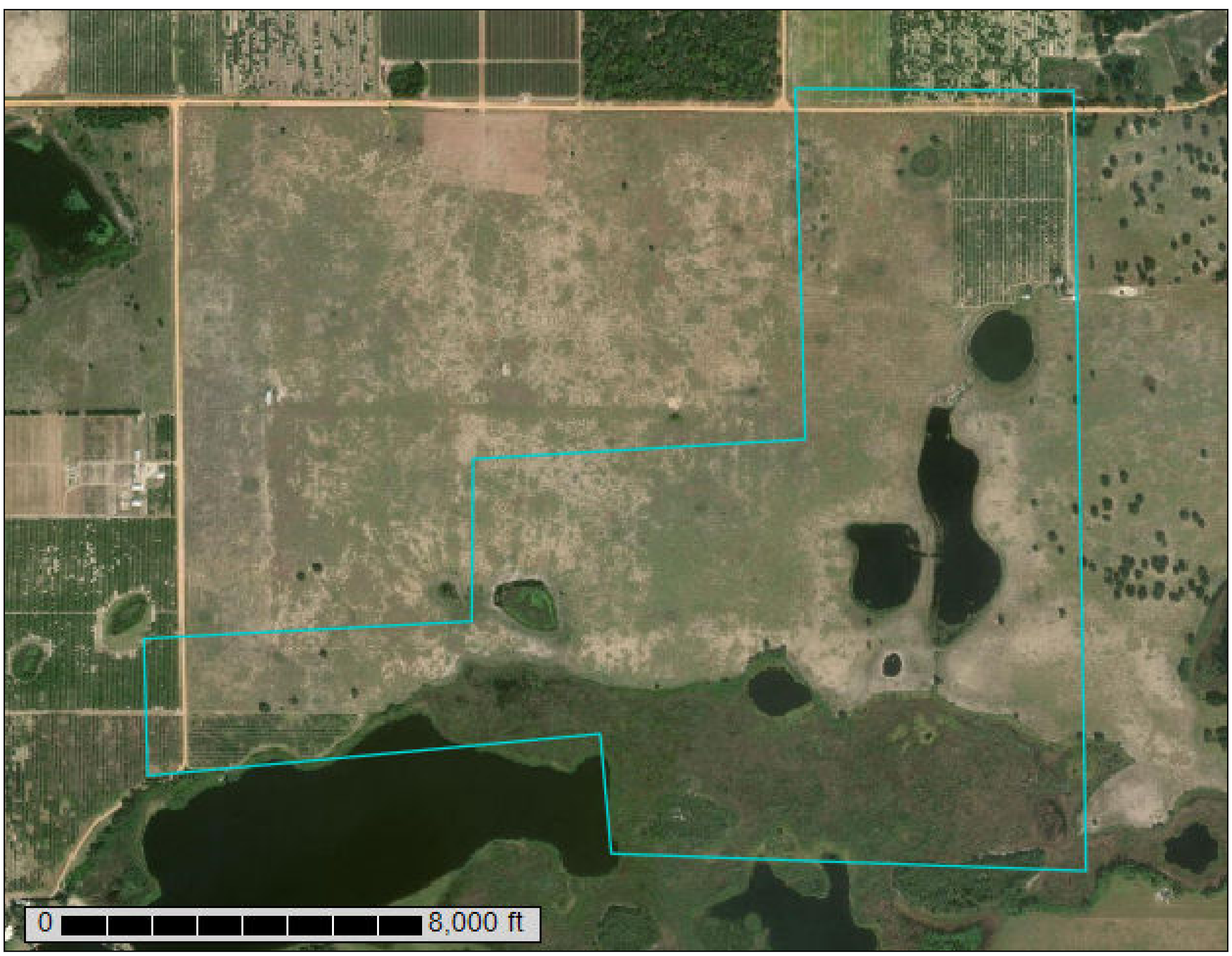

EXHIBIT
3D

April 3, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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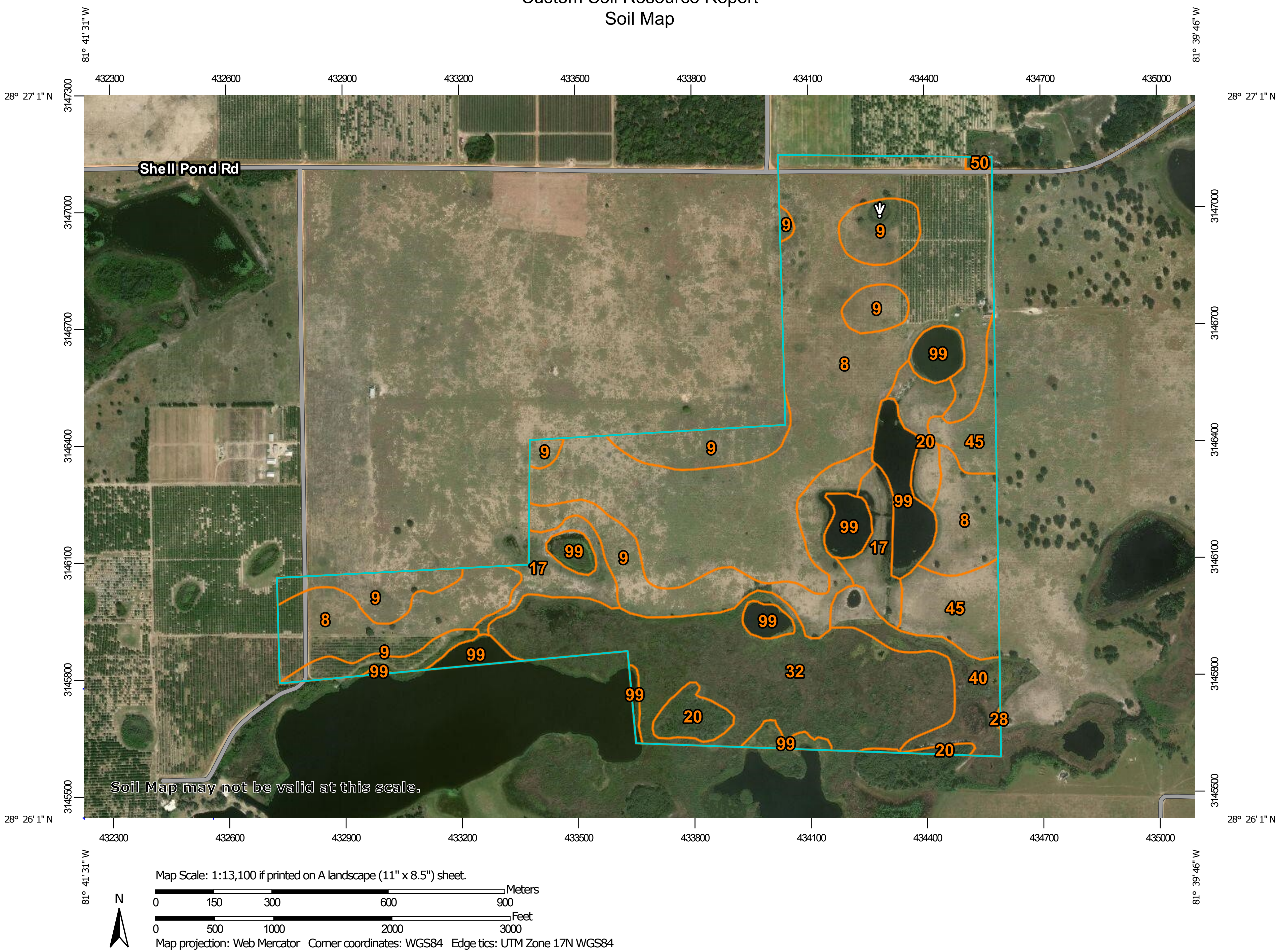
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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: Lake County Area, Florida
Survey Area Data: Version 18, Sep 13, 2018

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

Date(s) aerial images were photographed: Dec 19, 2013—Nov 26, 2017

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Candler sand, 0 to 5 percent slopes	150.7	41.1%
9	Candler sand, 5 to 12 percent slopes	59.7	16.3%
17	Arents	16.4	4.5%
20	Immokalee sand	13.3	3.6%
28	Myakka-Myakka, wet, sands, 0 to 2 percent slopes	0.1	0.0%
32	Oklawaha muck	65.4	17.8%
40	Placid and Myakka sands, depressional	13.9	3.8%
45	Tavares sand, 0 to 5 percent slopes	18.5	5.1%
50	Borrow Pits	0.5	0.1%
99	Water	28.1	7.7%
Totals for Area of Interest		**366.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lake County Area, Florida

8—Candler sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t3z1
Elevation: 10 to 260 feet
Mean annual precipitation: 47 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 63 inches: sand
E and Bt - 63 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively 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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)

Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R155XY002FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Tavares

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, concave
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Millhopper

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

9—Candler sand, 5 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2w0q4
Elevation: 30 to 160 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: sand
E - 5 to 67 inches: sand
E and Bt - 67 to 80 inches: sand

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on strongly sloping to steep side slopes of xeric uplands (G154XB113FL)
Other vegetative classification: Sand Pine Scrub (R154XY001FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Apopka

Percent of map unit: 6 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Kendrick

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Adamsville

Percent of map unit: 3 percent
Landform: Rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Pompano

Percent of map unit: 1 percent
Landform: Flats on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear, convex
Hydric soil rating: Yes

17—Arents

Map Unit Setting

National map unit symbol: 1qt6b
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Arents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arents

Setting

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

Typical profile

C - 0 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 1.98 in/hr)
Depth to water table: About 30 to 60 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 7.8 inches)

20—Immokalee sand

Map Unit Setting

National map unit symbol: 1nrvs
Elevation: 10 to 60 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Immokalee, non-hydric, and similar soils: 70 percent
Immokalee, hydric, and similar soils: 20 percent
Minor components: 10 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 4 inches: sand
E - 4 to 38 inches: sand
Bh - 38 to 56 inches: sand
BC - 56 to 68 inches: 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 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 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D

Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
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 4 inches: sand
E - 4 to 38 inches: sand
Bh - 38 to 56 inches: sand
BC - 56 to 68 inches: 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 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 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

Minor Components

Wabasso, hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

Placid, depressional

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: Slough (R154XY011FL)
Hydric soil rating: Yes

28—Myakka-Myakka, wet, sands, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2twt1
Elevation: 10 to 130 feet
Mean annual precipitation: 43 to 62 inches
Mean annual air temperature: 64 to 75 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Myakka and similar soils: 75 percent
Myakka, wet, and similar soils: 15 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myakka

Setting

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

Typical profile

A - 0 to 6 inches: sand
E - 6 to 20 inches: sand
Bh - 20 to 36 inches: sand
C - 36 to 80 inches: 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 5.95 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 5.0 inches)

Interpretive groups

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

Description of Myakka, Wet

Setting

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

Typical profile

A - 0 to 6 inches: sand
E - 6 to 20 inches: sand
Bh - 20 to 36 inches: sand
C - 36 to 80 inches: 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 5.95 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 5.0 inches)

Interpretive groups

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

Minor Components

Basinger

Percent of map unit: 5 percent

Landform: Drainageways on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear, convex
Across-slope shape: Concave, linear
Ecological site: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: Yes

Eaugallie

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

Placid, depressional

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Ecological site: Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

32—Oklawaha muck

Map Unit Setting

National map unit symbol: 1nrw5
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Oklawaha, Freq. Flooded

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Herbaceous organic material over loamy and clayey marine deposits

Typical profile

Oa - 0 to 9 inches: muck
Oe - 9 to 25 inches: mucky peat
Cg1 - 25 to 31 inches: sandy loam
Cg2 - 31 to 54 inches: sandy clay

Properties and qualities

Slope: 0 to 2 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): Very low to moderately low (0.00 to 0.06 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: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Forage suitability group: Organic soils in depressions and on flood plains (G154XB645FL)
Other vegetative classification: Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

Minor Components

Brighton, depressional

Percent of map unit: 10 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

40—Placid and Myakka sands, depressional

Map Unit Setting

National map unit symbol: 1nrwf
Elevation: 10 to 60 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F

Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Placid and similar soils: 55 percent
Myakka and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Placid

Setting

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

Typical profile

A - 0 to 18 inches: sand
C - 18 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 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 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G154XB145FL)
Other vegetative classification: Slough (R154XY011FL)
Hydric soil rating: Yes

Description of Myakka

Setting

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

Typical profile

A - 0 to 6 inches: sand

E - 6 to 20 inches: sand
Bh - 20 to 36 inches: sand
C - 36 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 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: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G154XB145FL)
Other vegetative classification: Slough (R154XY011FL)
Hydric soil rating: Yes

Minor Components

Wabasso, hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

Ellzey, hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

45—Tavares sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2v173
Elevation: 0 to 180 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Tavares

Setting

Landform: Ridges on marine terraces, knolls on marine terraces, flats on marine terraces
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve, base slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Eolian or sandy marine deposits

Typical profile

A - 0 to 7 inches: sand
C - 7 to 80 inches: 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): High to very high (6.00 to 50.02 in/hr)
Depth to water table: About 42 to 72 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: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A

Forage suitability group: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Apopka

Percent of map unit: 6 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Shoulder, summit, footslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Candler

Percent of map unit: 4 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R155XY002FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Adamsville

Percent of map unit: 3 percent
Landform: Knolls on flatwoods, rises on flatwoods
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, rise, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Upland Hardwood Hammock (R155XY008FL), Upland Hardwood Hammock (R154XY008FL)
Hydric soil rating: No

Zolfo

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

50—Borrow Pits

Map Unit Setting

National map unit symbol: 1v082
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Borrow pits: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Borrow Pits

Setting

Landform: Marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Altered marine deposits

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Forage suitability group: Forage suitability group not assigned (G154XB999FL)
Hydric soil rating: Unranked

Minor Components

Aquents

Percent of map unit: 30 percent
Landform: Depressions
Hydric soil rating: Yes

99—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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Exhibit-3E – USDA Soil Report:

Basin 4

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

Lake County Area, Florida, and Orange County, Florida

Lake-Orange Connector - Basin 4

EXHIBIT
3E

April 3, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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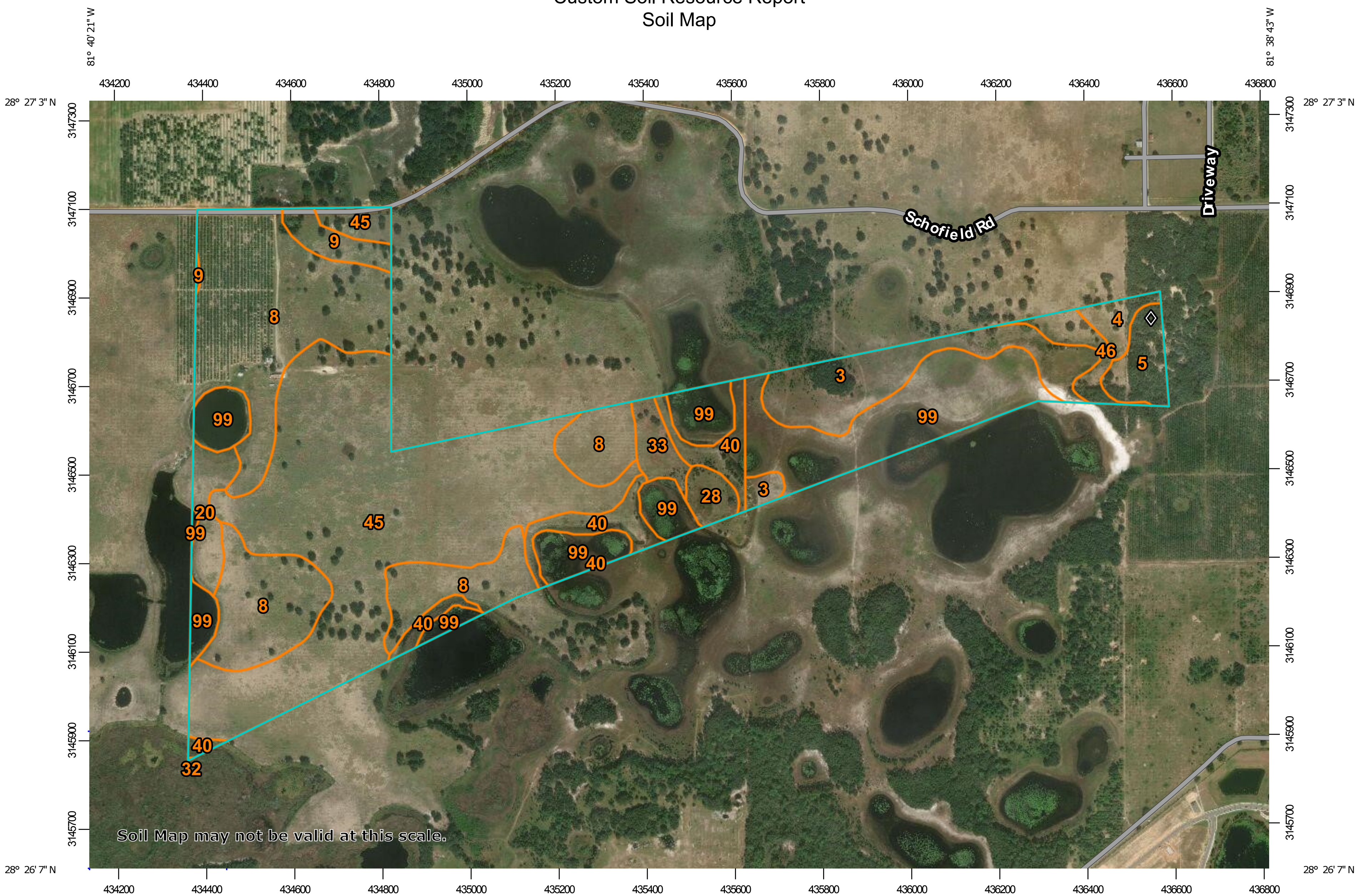
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:12,200 if printed on A landscape (11" x 8.5") sheet.

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.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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: Lake County Area, Florida
Survey Area Data: Version 18, Sep 13, 2018

Soil Survey Area: Orange County, Florida
Survey Area Data: Version 15, Sep 13, 2018

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

MAP LEGEND

MAP INFORMATION

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

Date(s) aerial images were photographed: Dec 19, 2013—Nov 26, 2017

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Candler sand, 0 to 5 percent slopes	67.5	26.2%
9	Candler sand, 5 to 12 percent slopes	4.2	1.6%
20	Immokalee sand	5.5	2.1%
28	Myakka-Myakka, wet, sands, 0 to 2 percent slopes	3.0	1.2%
32	Oklawaha muck	0.0	0.0%
33	Ona-Ona, wet, fine sand, 0 to 2 percent slopes	3.8	1.5%
40	Placid and Myakka sands, depressional	11.5	4.5%
45	Tavares sand, 0 to 5 percent slopes	86.3	33.5%
99	Water	19.5	7.6%
Subtotals for Soil Survey Area		**201.2**	**78.0%**
Totals for Area of Interest		**257.8**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	19.2	7.5%
4	Candler fine sand, 0 to 5 percent slopes	2.9	1.1%
5	Candler fine sand, 5 to 12 percent slopes	5.6	2.2%
46	Tavares fine sand, 0 to 5 percent slopes	4.1	1.6%
99	Water	24.7	9.6%
Subtotals for Soil Survey Area		**56.6**	**22.0%**
Totals for Area of Interest		**257.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lake County Area, Florida

8—Candler sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t3z1
Elevation: 10 to 260 feet
Mean annual precipitation: 47 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 63 inches: sand
E and Bt - 63 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively 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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)

Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R155XY002FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Tavares

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, concave
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Millhopper

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

9—Candler sand, 5 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2w0q4
Elevation: 30 to 160 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: sand
E - 5 to 67 inches: sand
E and Bt - 67 to 80 inches: sand

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on strongly sloping to steep side slopes of xeric uplands (G154XB113FL)
Other vegetative classification: Sand Pine Scrub (R154XY001FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Apopka

Percent of map unit: 6 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Kendrick

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Adamsville

Percent of map unit: 3 percent
Landform: Rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Pompano

Percent of map unit: 1 percent
Landform: Flats on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear, convex
Hydric soil rating: Yes

20—Immokalee sand

Map Unit Setting

National map unit symbol: 1nrvs
Elevation: 10 to 60 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Immokalee, non-hydric, and similar soils: 70 percent
Immokalee, hydric, and similar soils: 20 percent
Minor components: 10 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 4 inches: sand
E - 4 to 38 inches: sand
Bh - 38 to 56 inches: sand
BC - 56 to 68 inches: 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 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 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
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 4 inches: sand
E - 4 to 38 inches: sand
Bh - 38 to 56 inches: sand
BC - 56 to 68 inches: 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 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 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G154XB141FL)
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

Minor Components

Wabasso, hydric

Percent of map unit: 5 percent

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

Placid, depressional

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: Slough (R154XY011FL)
Hydric soil rating: Yes

28—Myakka-Myakka, wet, sands, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2twt1
Elevation: 10 to 130 feet
Mean annual precipitation: 43 to 62 inches
Mean annual air temperature: 64 to 75 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Myakka and similar soils: 75 percent
Myakka, wet, and similar soils: 15 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myakka

Setting

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

Typical profile

A - 0 to 6 inches: sand
E - 6 to 20 inches: sand
Bh - 20 to 36 inches: sand
C - 36 to 80 inches: 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 5.95 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 5.0 inches)

Interpretive groups

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

Description of Myakka, Wet

Setting

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

Typical profile

A - 0 to 6 inches: sand
E - 6 to 20 inches: sand
Bh - 20 to 36 inches: sand
C - 36 to 80 inches: 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 5.95 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 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)

Other vegetative classification: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: Yes

Minor Components

Basinger

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear, convex
Across-slope shape: Concave, linear
Ecological site: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: Yes

Eaugallie

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

Placid, depressional

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Ecological site: Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

32—Oklawaha muck

Map Unit Setting

National map unit symbol: 1nrw5
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Oklawaha, Freq. Flooded

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Herbaceous organic material over loamy and clayey marine deposits

Typical profile

Oa - 0 to 9 inches: muck
Oe - 9 to 25 inches: mucky peat
Cg1 - 25 to 31 inches: sandy loam
Cg2 - 31 to 54 inches: sandy clay

Properties and qualities

Slope: 0 to 2 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): Very low to moderately low (0.00 to 0.06 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: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Forage suitability group: Organic soils in depressions and on flood plains (G154XB645FL)
Other vegetative classification: Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

Minor Components

Brighton, depressional

Percent of map unit: 10 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R154XY010FL)
Hydric soil rating: Yes

33—Ona-Ona, wet, fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w4gx
Elevation: 10 to 130 feet
Mean annual precipitation: 46 to 56 inches
Mean annual air temperature: 66 to 77 degrees F
Frost-free period: 325 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Ona and similar soils: 75 percent
Ona, wet, and similar soils: 12 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ona

Setting

Landform: Flatwoods 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 9 inches: fine sand
Bh - 9 to 16 inches: fine sand
C - 16 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 (0.57 to 1.98 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 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D

Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of Ona, Wet

Setting

Landform: Sloughs 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 9 inches: fine sand
Bh - 9 to 16 inches: fine sand
C - 16 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 (0.57 to 1.98 in/hr)
Depth to water table: About 0 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 4.6 inches)

Interpretive groups

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

Minor Components

Myakka

Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

Basinger, hydric

Percent of map unit: 4 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave

Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL)
Hydric soil rating: Yes

Immokalee

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

40—Placid and Myakka sands, depressional

Map Unit Setting

National map unit symbol: 1nrwf
Elevation: 10 to 60 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Placid and similar soils: 55 percent
Myakka and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Placid

Setting

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

Typical profile

A - 0 to 18 inches: sand
C - 18 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 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 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G154XB145FL)
Other vegetative classification: Slough (R154XY011FL)
Hydric soil rating: Yes

Description of Myakka

Setting

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

Typical profile

A - 0 to 6 inches: sand
E - 6 to 20 inches: sand
Bh - 20 to 36 inches: sand
C - 36 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 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: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G154XB145FL)
Other vegetative classification: Slough (R154XY011FL)
Hydric soil rating: Yes

Minor Components

Wabasso, hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

Ellzey, hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

45—Tavares sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2v173
Elevation: 0 to 180 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Tavares

Setting

Landform: Ridges on marine terraces, knolls on marine terraces, flats on marine terraces
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve, base slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Eolian or sandy marine deposits

Typical profile

A - 0 to 7 inches: sand
C - 7 to 80 inches: 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): High to very high (6.00 to 50.02 in/hr)
Depth to water table: About 42 to 72 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: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Apopka

Percent of map unit: 6 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Shoulder, summit, footslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Candler

Percent of map unit: 4 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R155XY002FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Adamsville

Percent of map unit: 3 percent
Landform: Knolls on flatwoods, rises on flatwoods
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, rise, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Upland Hardwood Hammock (R155XY008FL), Upland Hardwood Hammock (R154XY008FL)

Hydric soil rating: No

Zolfo

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

99—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Orange County, Florida

3—Basinger fine sand, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v16v
Elevation: 0 to 70 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Basinger

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
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: 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 to 6 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 5.7 inches)

Interpretive groups

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

Minor Components

Smyrna

Percent of map unit: 5 percent
Landform: — error in exists on —
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

Samsula

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

Floridana

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

4—Candler fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2shkf
Elevation: 10 to 260 feet
Mean annual precipitation: 47 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, tread

Down-slope shape: Linear, convex
Across-slope shape: Linear, convex, concave
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

Ap - 0 to 5 inches: fine sand
E - 5 to 74 inches: fine sand
E and Bt - 74 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL)
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Tavares

Percent of map unit: 4 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave, convex
Across-slope shape: Concave, linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Adamsville

Percent of map unit: 3 percent
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: No

Millhopper

Percent of map unit: 3 percent
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve

Down-slope shape: Convex
Across-slope shape: Convex, linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

5—Candler fine sand, 5 to 12 percent slopes

Map Unit Setting

National map unit symbol: bv8p
Elevation: 20 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: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 61 inches: fine sand
E and B - 61 to 80 inches: fine sand

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on strongly sloping to steep side slopes of xeric uplands (G155XB113FL)
Hydric soil rating: No

Minor Components

Millhopper

Percent of map unit: 2 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Tavares

Percent of map unit: 2 percent
Landform: Ridges on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Apopka

Percent of map unit: 2 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

46—Tavares fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2w0pz
Elevation: 30 to 160 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Tavares

Setting

Landform: Knolls on marine terraces, ridges on marine terraces

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve, side slope, tread, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Eolian or sandy marine deposits

Typical profile
A - 0 to 5 inches: fine sand
C - 5 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): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 42 to 72 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: Very low (about 2.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Candler
Percent of map unit: 5 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex, concave
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Apopka
Percent of map unit: 4 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Summit, shoulder, footslope
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Narcoossee

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: Upland Hardwood Hammock (R154XY008FL)
Hydric soil rating: No

Zolfo

Percent of map unit: 3 percent
Landform: Rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: North Florida Flatwoods (R154XY004FL)
Hydric soil rating: No

99—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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Exhibit-3F – USDA Soil Report:

Pond 4A3

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

Lake County Area, Florida

CFX - Lake-Orange Connector - Pond 4A3

EXHIBIT 3F

April 25, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

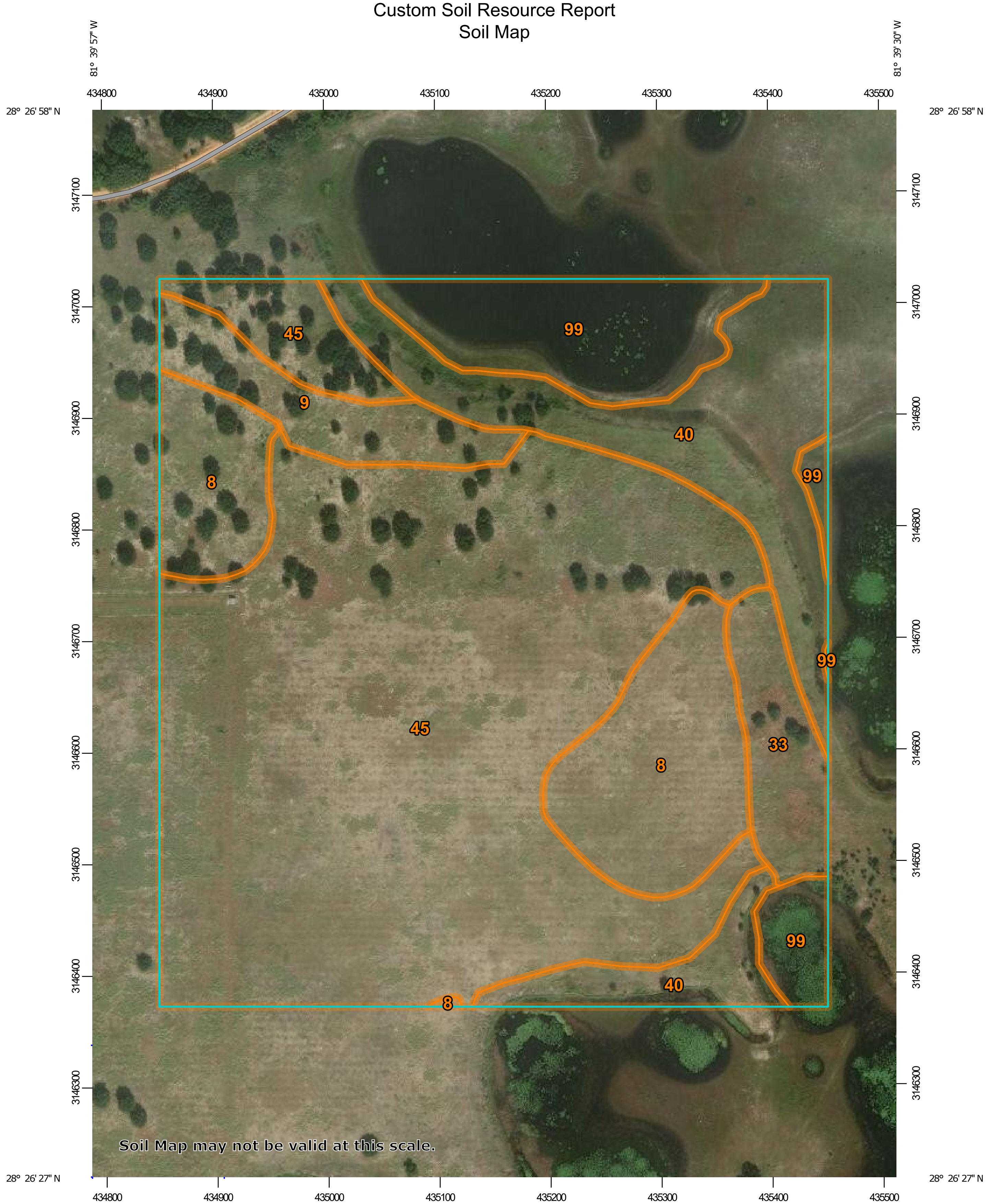
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:4,670 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 200, 400, 800, 1200

N

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.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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: Lake County Area, Florida
Survey Area Data: Version 18, Sep 13, 2018

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

Date(s) aerial images were photographed: Dec 19, 2013—Nov 26, 2017

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Candler sand, 0 to 5 percent slopes	12.1	12.4%
9	Candler sand, 5 to 12 percent slopes	4.4	4.5%
33	Ona-Ona, wet, fine sand, 0 to 2 percent slopes	3.9	4.0%
40	Placid and Myakka sands, depressional	14.4	14.8%
45	Tavares sand, 0 to 5 percent slopes	53.8	55.2%
99	Water	8.9	9.1%
Totals for Area of Interest		**97.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lake County Area, Florida

8—Candler sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t3z1
Elevation: 10 to 260 feet
Mean annual precipitation: 47 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 63 inches: sand
E and Bt - 63 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively 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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)

Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R155XY002FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Tavares

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, concave
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Millhopper

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

9—Candler sand, 5 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2w0q4
Elevation: 30 to 160 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: sand
E - 5 to 67 inches: sand
E and Bt - 67 to 80 inches: sand

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on strongly sloping to steep side slopes of xeric uplands (G154XB113FL)
Other vegetative classification: Sand Pine Scrub (R154XY001FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Apopka

Percent of map unit: 6 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Kendrick

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Adamsville

Percent of map unit: 3 percent
Landform: Rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Pompano

Percent of map unit: 1 percent
Landform: Flats on marine terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear, convex
Hydric soil rating: Yes

33—Ona-Ona, wet, fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w4gx
Elevation: 10 to 130 feet
Mean annual precipitation: 46 to 56 inches
Mean annual air temperature: 66 to 77 degrees F
Frost-free period: 325 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Ona and similar soils: 75 percent
Ona, wet, and similar soils: 12 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ona

Setting

Landform: Flatwoods 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 9 inches: fine sand
Bh - 9 to 16 inches: fine sand
C - 16 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 (0.57 to 1.98 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 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Description of Ona, Wet

Setting

Landform: Sloughs 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 9 inches: fine sand
Bh - 9 to 16 inches: fine sand
C - 16 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 (0.57 to 1.98 in/hr)
Depth to water table: About 0 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 4.6 inches)

Interpretive groups

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

Minor Components

Myakka

Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear

Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

Basinger, hydric
Percent of map unit: 4 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL)
Hydric soil rating: Yes

Immokalee
Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

40—Placid and Myakka sands, depressional

Map Unit Setting
National map unit symbol: 1nrwf
Elevation: 10 to 60 feet
Mean annual precipitation: 46 to 54 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 340 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition
Placid and similar soils: 55 percent
Myakka and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Placid

Setting
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile
A - 0 to 18 inches: sand
C - 18 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 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 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G154XB145FL)
Other vegetative classification: Slough (R154XY011FL)
Hydric soil rating: Yes

Description of Myakka

Setting

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

Typical profile

A - 0 to 6 inches: sand
E - 6 to 20 inches: sand
Bh - 20 to 36 inches: sand
C - 36 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 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: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G154XB145FL)
Other vegetative classification: Slough (R154XY011FL)
Hydric soil rating: Yes

Minor Components

Wabasso, hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

Ellzey, hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: Yes

45—Tavares sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2v173
Elevation: 0 to 180 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 300 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Tavares

Setting

Landform: Ridges on marine terraces, knolls on marine terraces, flats on marine terraces
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve, base slope

Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Eolian or sandy marine deposits

Typical profile

A - 0 to 7 inches: sand
C - 7 to 80 inches: 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): High to very high (6.00 to 50.02 in/hr)
Depth to water table: About 42 to 72 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: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Apopka

Percent of map unit: 6 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Shoulder, summit, footslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Candler

Percent of map unit: 4 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R155XY002FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Adamsville

Percent of map unit: 3 percent

Landform: Knolls on flatwoods, rises on flatwoods
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, rise, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Upland Hardwood Hammock (R155XY008FL), Upland Hardwood Hammock (R154XY008FL)
Hydric soil rating: No

Zolfo

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

99—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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Exhibit-3G – USDA Soil Report:

Basin 5

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

Lake-Orange Connector - Basin 5

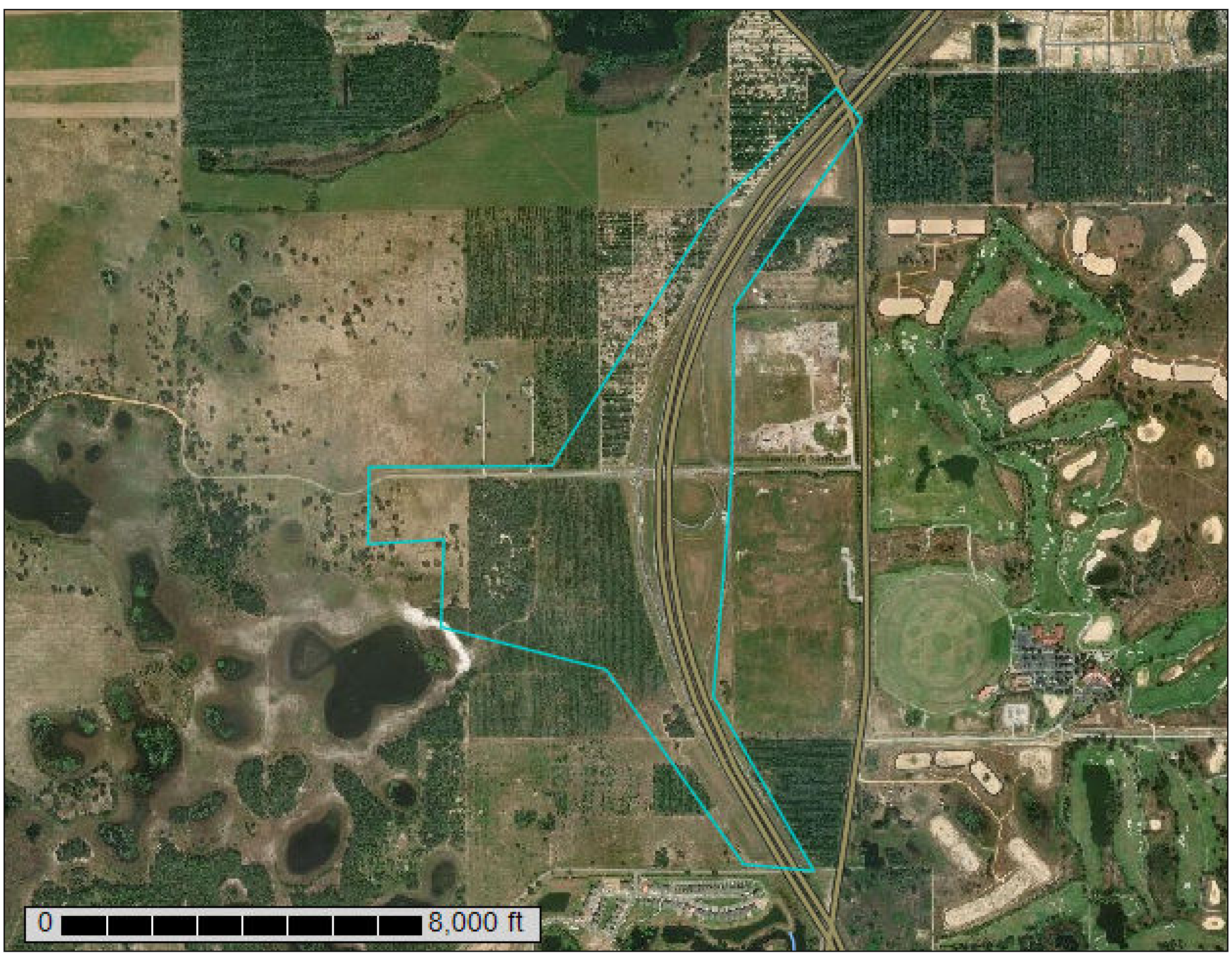

EXHIBIT
3G

April 3, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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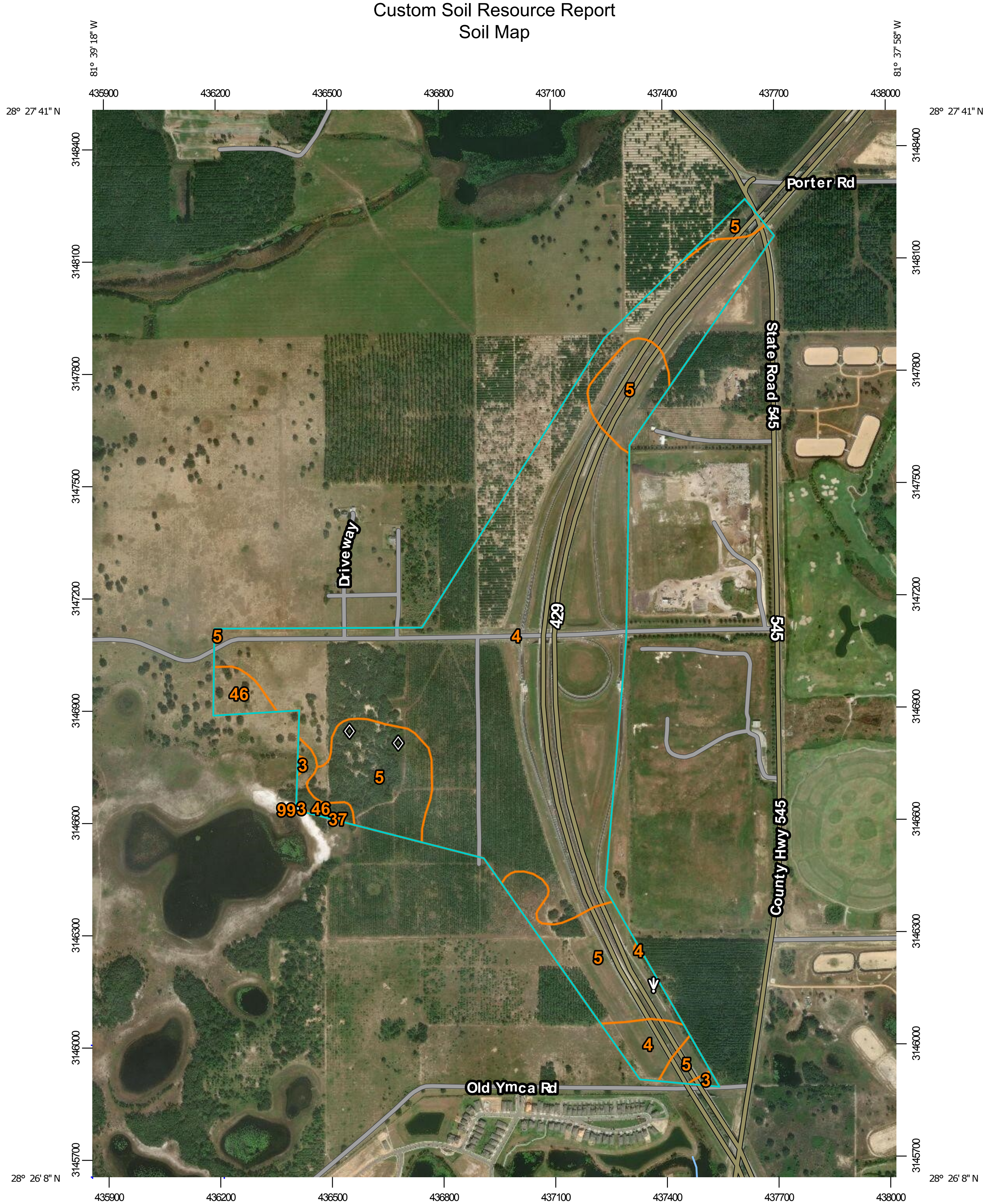
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:13,900 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 200, 400, 800, 1200

Feet: 0, 500, 1000, 2000, 3000

N

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:
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 15, Sep 13, 2018

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

Date(s) aerial images were photographed: Dec 19, 2013—Nov 26, 2017

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	0.7	0.3%
4	Candler fine sand, 0 to 5 percent slopes	195.5	76.3%
5	Candler fine sand, 5 to 12 percent slopes	53.2	20.8%
37	St. Johns fine sand	0.0	0.0%
46	Tavares fine sand, 0 to 5 percent slopes	6.7	2.6%
99	Water	0.0	0.0%
Totals for Area of Interest		**256.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Orange County, Florida

3—Basinger fine sand, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v16v
Elevation: 0 to 70 feet
Mean annual precipitation: 43 to 55 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Basinger

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
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: 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 to 6 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 5.7 inches)

Interpretive groups

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

Minor Components

Smyrna

Percent of map unit: 5 percent
Landform: — error in exists on —
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL)
Hydric soil rating: No

Samsula

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

Floridana

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL)
Hydric soil rating: Yes

4—Candler fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2shkf
Elevation: 10 to 260 feet
Mean annual precipitation: 47 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, tread

Down-slope shape: Linear, convex
Across-slope shape: Linear, convex, concave
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

Ap - 0 to 5 inches: fine sand
E - 5 to 74 inches: fine sand
E and Bt - 74 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL)
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Tavares

Percent of map unit: 4 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave, convex
Across-slope shape: Concave, linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Adamsville

Percent of map unit: 3 percent
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Other vegetative classification: South Florida Flatwoods (R154XY003FL)
Hydric soil rating: No

Millhopper

Percent of map unit: 3 percent
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve

Down-slope shape: Convex
Across-slope shape: Convex, linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

5—Candler fine sand, 5 to 12 percent slopes

Map Unit Setting

National map unit symbol: bv8p
Elevation: 20 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: Farmland of unique importance

Map Unit Composition

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

Description of Candler

Setting

Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 61 inches: fine sand
E and B - 61 to 80 inches: fine sand

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
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: More than 80 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on strongly sloping to steep side slopes of xeric uplands (G155XB113FL)
Hydric soil rating: No

Minor Components

Millhopper

Percent of map unit: 2 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Tavares

Percent of map unit: 2 percent
Landform: Ridges on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Apopka

Percent of map unit: 2 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Linear
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
Forage suitability group: 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
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Minor Components

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
Hydric soil rating: No

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
Hydric soil rating: No

46—Tavares fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2w0pz
Elevation: 30 to 160 feet
Mean annual precipitation: 44 to 56 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Tavares and similar soils: 85 percent

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

Description of Tavares

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve, side slope, tread, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Eolian or sandy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
C - 5 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): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 42 to 72 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: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on rises, knolls, and ridges of mesic uplands (G154XB121FL)
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Candler

Percent of map unit: 5 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex, concave
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Apopka

Percent of map unit: 4 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Summit, shoulder, footslope

Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Narcoossee

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: Upland Hardwood Hammock (R154XY008FL)
Hydric soil rating: No

Zolfo

Percent of map unit: 3 percent
Landform: Rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: North Florida Flatwoods (R154XY004FL)
Hydric soil rating: No

99—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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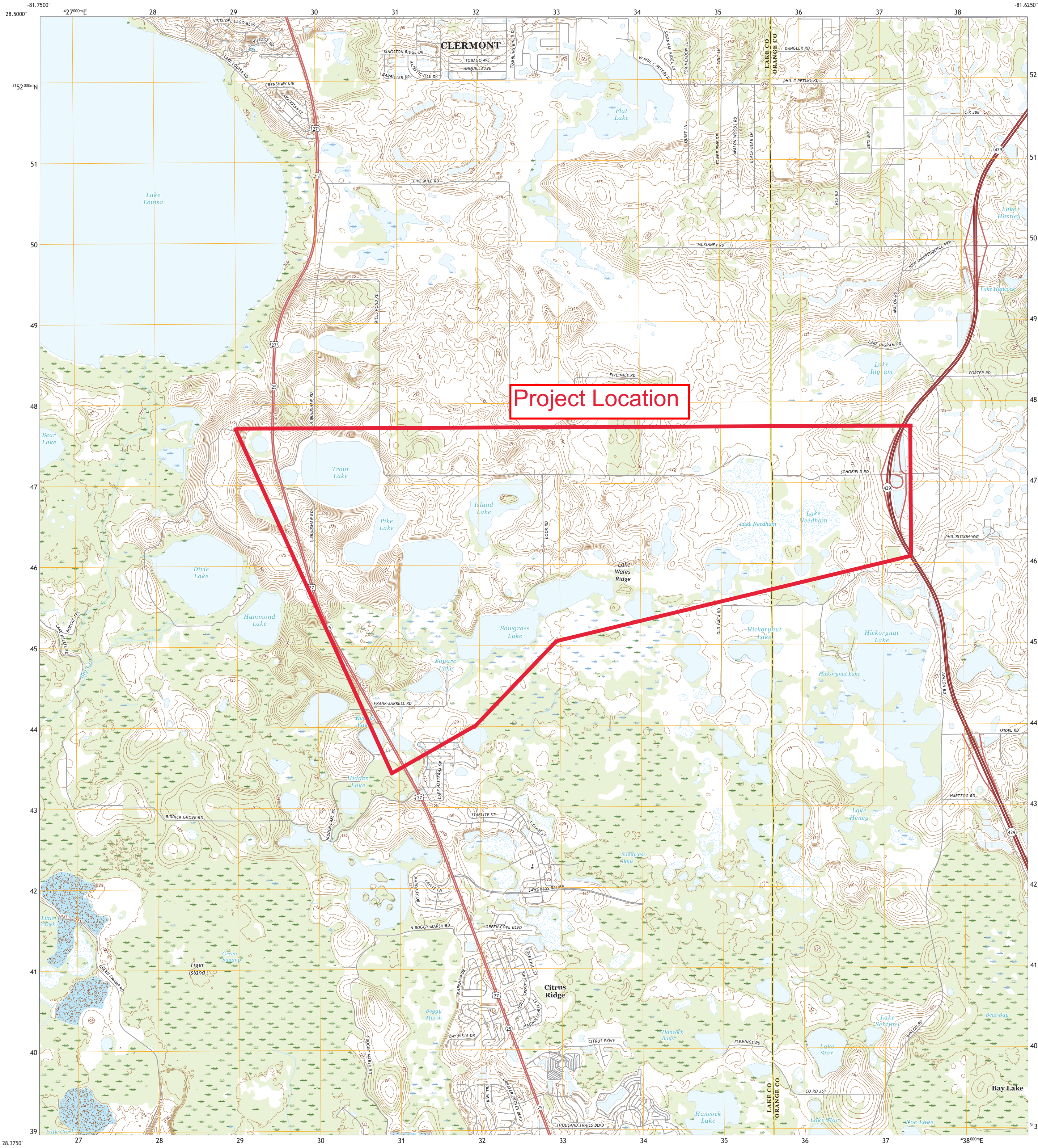
Exhibit-4 USGS Quadrangle Map

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

LAKE LOUISA QUADRANGLE
FLORIDA
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 17R

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery....NAIP, September 2015 - February 2016
Roads....U.S. Census Bureau, 2016
Names....GNIS, 1979 - 2015
Hydrography....National Hydrography Dataset, 2002 - 2017
Contours....National Elevation Dataset, 2009 - 2012
Boundaries....Multiple sources; see metadata file 2014 - 2016
Public Land Survey System....BLM, 2017
Wetlands....FWS National Wetlands Inventory 1984 - 2010

MN
GN
6°7´
109 MILS
0°20´
6 MILS

UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
MM
Grid Zone Designation
17R

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

QUADRANGLE LOCATION

1 Clermont West
2 Clermont East
3 Winter Garden
4 Lake Nellie
5 Windermere
6 Poyner
7 Lake Louisa SW
8 Intercession City

ADJOINING QUADRANGLES

ROAD CLASSIFICATION
Expressway — Local Connector
Secondary Hwy — Local Road
Ramp — 4WD
Interstate Route — US Route — State Route

LAKE LOUISA, FL
2018

APPENDIX A
EXHIBIT 4

Exhibit-5A NOAA Precipitation Frequency Data Estimates

NOAA Atlas 14, Volume 9, Version 2
Location name: Clermont, Florida, USA*
Latitude: 28.4445°, Longitude: -81.6762°
Elevation: 132.19 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

SJRWMD's rainfall amount for the 25yr-96hr storm per SJ 88-3 shows the rainfall amount to be 11.2. 11.2 in will be used to be more conservative.

100-yr, 8-hr = 6.7+(((8.32-6.70)/6)x2) = 7.24

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.488 (0.393-0.594)	0.555 (0.446-0.675)	0.658 (0.528-0.804)	0.740 (0.591-0.909)	0.847 (0.650-1.07)	0.924 (0.696-1.18)	0.997 (0.727-1.31)	1.07 (0.747-1.45)	1.15 (0.777-1.61)	1.21 (0.800-1.74)
10-min	0.715 (0.576-0.870)	0.812 (0.653-0.989)	0.964 (0.773-1.18)	1.08 (0.865-1.33)	1.24 (0.952-1.56)	1.35 (1.02-1.73)	1.46 (1.06-1.92)	1.56 (1.09-2.12)	1.69 (1.14-2.36)	1.77 (1.17-2.54)
15-min	0.872 (0.702-1.06)	0.990 (0.797-1.21)	1.18 (0.943-1.44)	1.32 (1.06-1.62)	1.51 (1.16-1.90)	1.65 (1.24-2.11)	1.78 (1.30-2.34)	1.90 (1.33-2.58)	2.06 (1.39-2.88)	2.16 (1.43-3.10)
30-min	1.39 (1.12-1.69)	1.58 (1.27-1.92)	1.87 (1.50-2.29)	2.10 (1.68-2.58)	2.40 (1.85-3.02)	2.62 (1.97-3.35)	2.82 (2.06-3.71)	3.01 (2.11-4.09)	3.25 (2.19-4.55)	3.41 (2.25-4.89)
60-min	1.82 (1.46-2.21)	2.08 (1.67-2.53)	2.49 (2.00-3.04)	2.81 (2.24-3.45)	3.23 (2.48-4.06)	3.53 (2.66-4.53)	3.82 (2.78-5.03)	4.09 (2.87-5.55)	4.43 (2.99-6.20)	4.66 (3.08-6.69)
2-hr	2.24 (1.82-2.71)	2.58 (2.09-3.12)	3.10 (2.51-3.77)	3.52 (2.83-4.29)	4.06 (3.14-5.07)	4.45 (3.37-5.66)	4.82 (3.54-6.30)	5.17 (3.65-6.97)	5.61 (3.81-7.80)	5.91 (3.93-8.43)
3-hr	2.43 (1.98-2.92)	2.80 (2.28-3.37)	3.39 (2.76-4.10)	3.87 (3.13-4.70)	4.51 (3.51-5.63)	4.98 (3.80-6.33)	5.44 (4.01-7.10)	5.89 (4.17-7.93)	6.46 (4.41-8.98)	6.87 (4.59-9.77)
6-hr	2.78 (2.29-3.32)	3.19 (2.62-3.81)	3.88 (3.18-4.66)	4.47 (3.65-5.40)	5.32 (4.21-6.67)	6.00 (4.64-7.64)	6.70 (5.01-8.77)	7.43 (5.33-10.0)	8.43 (5.82-11.7)	9.21 (6.19-13.0)
12-hr	3.22 (2.67-3.82)	3.63 (3.02-4.32)	4.41 (3.64-5.25)	5.14 (4.22-6.15)	6.27 (5.06-7.93)	7.25 (5.69-9.28)	8.32 (6.30-10.9)	9.50 (6.90-12.9)	11.2 (7.82-15.6)	12.6 (8.52-17.7)
24-hr	3.71 (3.11-4.38)	4.16 (3.48-4.91)	5.06 (4.22-6.00)	5.97 (4.95-7.10)	7.45 (6.10-9.46)	8.78 (6.97-11.2)	10.3 (7.87-13.5)	11.9 (8.77-16.1)	14.4 (10.2-20.0)	16.5 (11.2-23.0)
2-day	4.26 (3.60-4.99)	4.81 (4.06-5.64)	5.91 (4.98-6.96)	7.03 (5.88-8.31)	8.86 (7.32-11.2)	10.5 (8.41-13.4)	12.3 (9.53-16.1)	14.4 (10.7-19.4)	17.5 (12.4-24.1)	20.0 (13.7-27.7)
3-day	4.69 (3.99-5.48)	5.29 (4.49-6.18)	6.49 (5.49-7.61)	7.69 (6.47-9.06)	9.65 (8.01-12.1)	11.4 (9.17-14.5)	13.4 (10.4-17.4)	15.6 (11.6-20.8)	18.8 (13.4-25.8)	21.5 (14.8-29.7)
4-day	5.09 (4.34-5.92)	5.71 (4.87-6.66)	6.95 (5.90-8.12)	8.18 (6.91-9.61)	10.2 (8.48-12.7)	12.0 (9.66-15.1)	14.0 (10.9-18.1)	16.2 (12.1-21.6)	19.5 (14.0-26.7)	22.3 (15.4-30.6)
7-day	6.14 (5.28-7.11)	6.79 (5.83-7.86)	8.05 (6.89-9.35)	9.30 (7.91-10.9)	11.3 (9.45-14.0)	13.1 (10.6-16.4)	15.1 (11.8-19.4)	17.3 (13.0-22.9)	20.6 (14.8-28.0)	23.3 (16.2-31.8)
10-day	7.07 (6.10-8.15)	7.75 (6.68-8.94)	9.05 (7.78-10.5)	10.3 (8.81-12.0)	12.3 (10.3-15.1)	14.1 (11.5-17.5)	16.0 (12.6-20.4)	18.2 (13.6-23.9)	21.3 (15.4-28.9)	23.9 (16.7-32.6)
20-day	9.75 (8.50-11.2)	10.7 (9.28-12.2)	12.3 (10.6-14.1)	13.7 (11.8-15.8)	15.8 (13.2-19.0)	17.5 (14.3-21.4)	19.3 (15.2-24.3)	21.3 (16.0-27.6)	24.0 (17.4-32.1)	26.2 (18.4-35.5)
30-day	12.1 (10.6-13.8)	13.3 (11.7-15.2)	15.3 (13.3-17.5)	16.9 (14.7-19.5)	19.2 (16.1-22.8)	21.0 (17.2-25.4)	22.8 (18.0-28.4)	24.7 (18.6-31.6)	27.2 (19.7-35.9)	29.1 (20.5-39.2)
45-day	15.4 (13.6-17.5)	17.0 (14.9-19.3)	19.5 (17.1-22.2)	21.5 (18.7-24.6)	24.1 (20.2-28.4)	26.1 (21.4-31.2)	27.9 (22.1-34.4)	29.8 (22.5-37.8)	32.0 (23.2-42.0)	33.7 (23.8-45.2)
60-day	18.3 (16.2-20.7)	20.3 (17.9-23.0)	23.3 (20.5-26.5)	25.6 (22.4-29.3)	28.7 (24.1-33.5)	30.8 (25.3-36.7)	32.8 (25.9-40.1)	34.6 (26.2-43.7)	36.8 (26.7-48.0)	38.3 (27.1-51.3)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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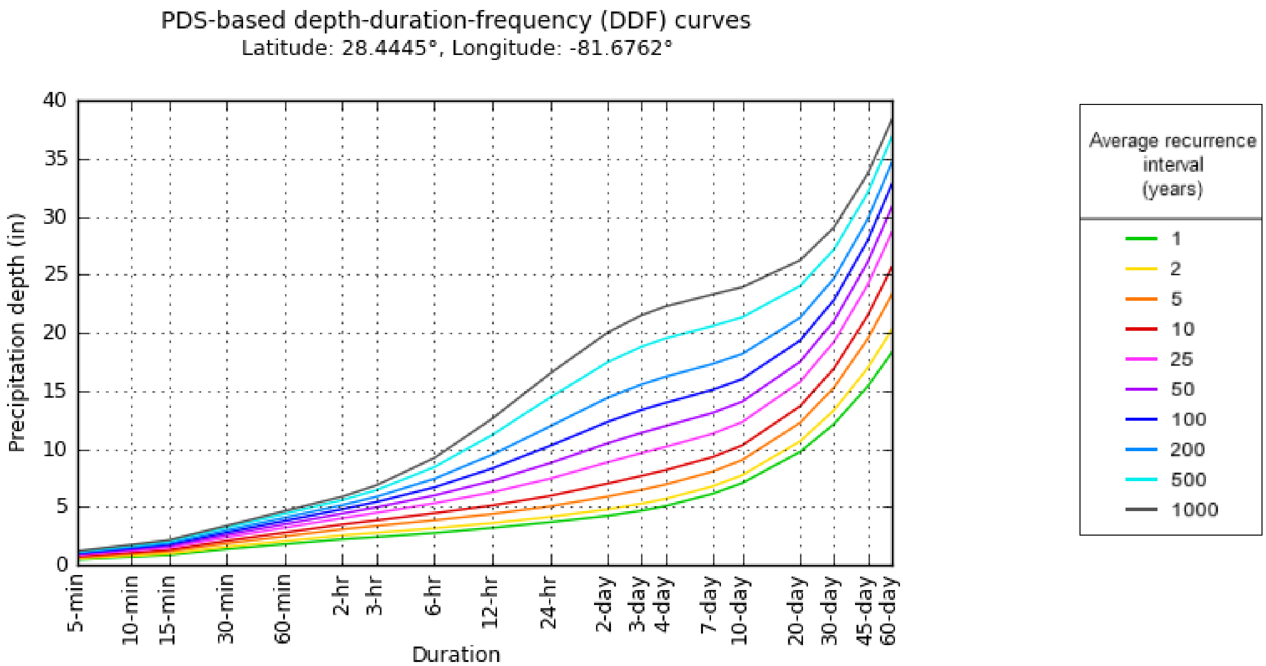
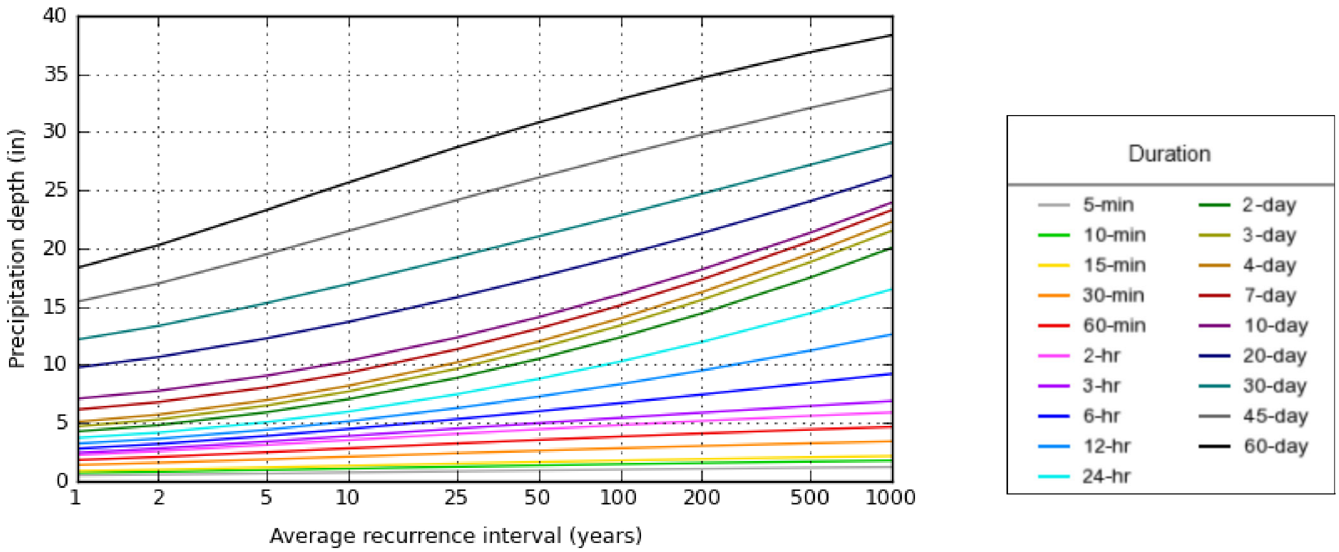
PF graphical

APPENDIX A
EXHIBIT
5





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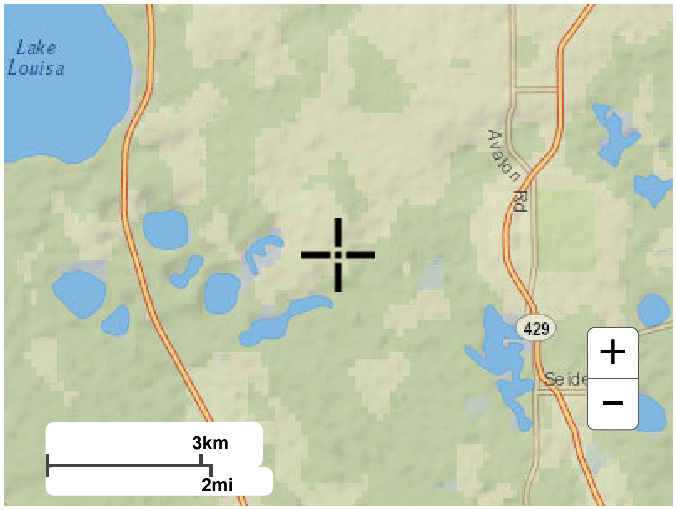
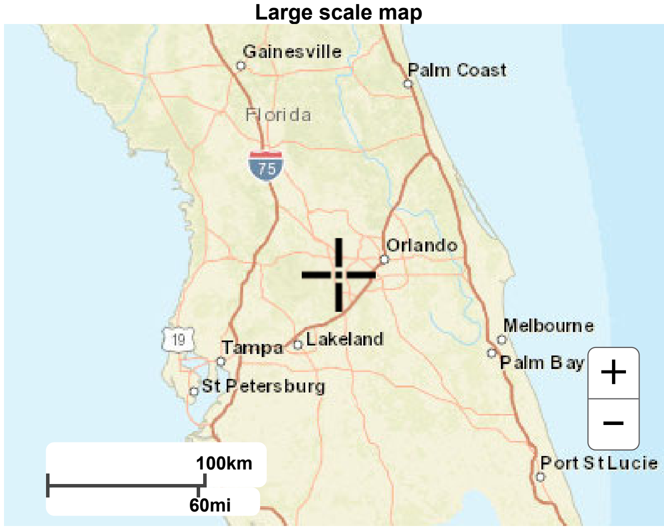
Maps & aerials

Small scale terrain

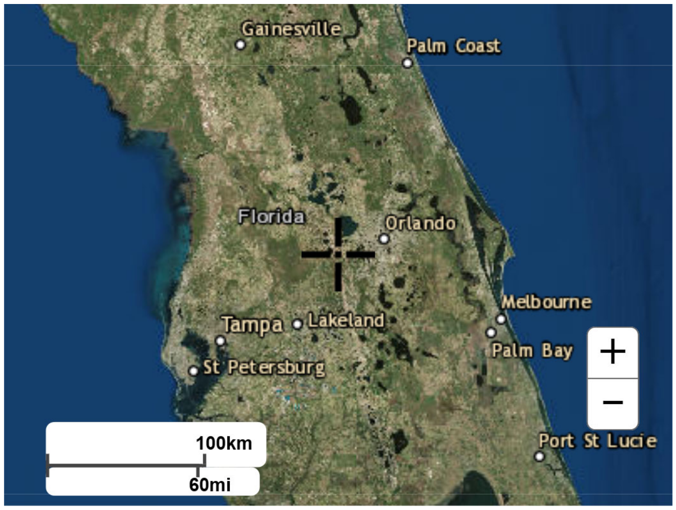


Large scale terrain

Large scale map



Large scale aerial



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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Exhibit-5B SJRWMD’s SJ 88-3 Max Rainfall Depths

Table A-1: Maximum Rainfall Depths for Avon Park, inches (Period of data analyzed = 1931-1983)

Duration Hours	Highest observed	Mean Annual	10 yr	25 yr	100 yr
24	10.15*	4.49	6.9	8.4	10.8
48	10.66*	5.26	7.8	9.3	11.7
96	14.49*	6.26	9.0	10.9	13.9

* Highest during 1914-1983. Log Pearson frequency curve historically adjusted.

Table A-2: Maximum Rainfall Depths for Bartow, inches (Period of data analyzed = 1931-1983)

Duration Hours	Highest Observed	Mean Annual	10 yr	25 yr	100 yr
24	12.91*	4.03	5.9	7.6	10.8
48	14.13*	4.72	7.0	8.8	12.3
96	15.21*	5.71	8.4	10.4	14.1

* Highest during 1913-1983- Log Pearson frequency curve historically adjusted.

Table A-3: Maximum Rainfall Depths for Bithlo, inches (Period of data analyzed = 1948-1983)

Duration Hours	Highest Observed	Mean Annual	10 yr	25 yr	100 yr
24	12.05	4.51	6.8	8.8	12.6
48	12.81	5.29	8.1	10.1	14.1
96	13.54	6.25	9.5	11.8	15.8

Table A-4: Maximum Rainfall Depths for Bushnell, inches (Period of data analyzed = 1937-1983)

Duration Hours	Highest observed	Mean Annual	10 yr	25 yr	100 yr
24	11.68	4.17	6.5	8.2	11.5
48	13.96	4.99	7.6	9.5	13.2
96	14.92	6.04	9.0	11.0	15.0

Table A-5: Maximum Rainfall Depths for Clermont, inches (Period of data analyzed = 1931-1983)

Duration Hours	Highest Observed	Mean Annual	10 yr	25 yr	100 yr
24	14.77*	4.17	6.9	9.0	12.5
48	17.57*	4.86	7.8	10.0	14.0
96	17.75*	5.70	8.8	11.2	15.5

* Highest during 1913-1983- Log Pearson frequency curve historically adjusted.

Table A-6: Maximum Rainfall Depths for Crescent City, inches (Period of data analyzed = 1931-1983)

Duration Hours	Highest Observed	Mean Annual	10 yr	25 yr	100 yr
24	10.34*	4.16	6.2	7.4	9.6
48	11.60*	5.03	7.4	8.7	10.9
96	12.92*	6.03	8.7	10.2	12.4

* Highest during 1911-1983 - Log Pearson Frequncy curve historically adjusted.

Appendix B – Pond Sizing Calculations

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 1A1, 1A2, 1A3, & 1A4
Basin 1

Computed By:	MS
Checked By:	MH
Date:	5/20/2019

Beginning Station	10000.00
End Station	13573.05
Length (ft)	3573.05

Pre-Development

Total Basin Area	
Description	**Area (ac)**
A portion of SR-27, unimproved land (water bodies & woods), pasture/range, and orchards	122.76
TOTAL BASIN AREA	**122.76**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc. at the US 27 Intersection/realignment	26.42
TOTAL IMPERVIOUS AREA	**26.42**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Roadway and Sidewalks	A/D	98	26.42	2,588.88
Grassed Area/Open (Good)	A	39	11.97	466.67
Grassed Area/Open (Good)	D	80	5.20	415.86
Woods/Orchard (Poor)	A	57	27.50	1,567.43
Woods/Orchard (Fair)	A	43	4.23	182.02
Woods (Fair)	A	36	1.52	54.80
Woods (Fair)	D	79	19.15	1,512.80
Woods (Poor)	D	83	3.87	320.88
Pasture/Range (Poor)	A	68	4.97	337.76
Water Bodies	D	100	17.94	1,793.77
		TOTAL	122.76	9,240.87
			COMPOSITE CN	**75.3**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	3.28	5.99	61.24
100 yr, 240 hr	FDOT	16.00	3.28	12.64	129.28
100 yr, 8 hr	FDOT	7.24	3.28	4.39	44.93

Runoff Volume Example Calculations:

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

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

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Soil Storage (in)	S	3.28
Runoff (in)	R	5.99
Runoff (ac-ft)	Vr	61.24

Post Development

Total Basin Area	
Description	**Area (ac)**
Roadway, off-site areas, unimproved lands adjacent to bridges, and ponds	122.76
TOTAL AREA (AC)	**122.76**

Proposed Impervious Area		
Description	**Area[(2)]**	
Proposed Pavement[(1)]	39.14	
Total Impervious Area	**39.14**	**Acre**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.

(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Roadway and Sidewalks	A/D	98	39.14	3,835.50
Grassed Area/Open Area (Good)	A	39	22.04	859.44
Grassed Area/Open Area (Good)	D	80	23.56	1,885.08
Woods/Orchard (Poor)	A	57	3.13	178.32
Woods (Poor)	D	83	2.86	237.16
Water Bodies	D	100	16.05	1,604.85
Proposed Pond Area	A	100	15.98	1,598.29
		TOTAL	122.76	10,198.64
			COMPOSITE CN	**83.1**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	2.04	6.95	71.06
100 yr, 240 hr	FDOT	16.00	2.04	13.79	141.08
100 yr, 8 hr	FDOT	7.24	2.04	5.26	53.85

Runoff Volume Example Calculations:

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

Soil Storage (in)	S	2.04

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	71.06

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION

AREA (AC):	122.76
CN:	75.3

POST DEVELOPED CONDITION

AREA (AC):	122.76
CN:	83.1

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr) PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	61.24	71.06	9.82
FDOT	100 yr, 240 hr	129.28	141.08	11.80
FDOT	100 yr, 8 hr	44.93	53.85	8.92

MAXIMUM ATTENUATION VOLUME (AC-FT)	11.80

WATER QUALITY CALCULATIONS

Water Management District
Pollution Abatement Volume Requirement

Agency:	SJRWMD
Post Development Total Area (ac) =	122.76
Post Development Impervious Area Added (ac) =	12.72

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing an on-line dry retention facility for the treatment and attenuation.

Dry Retention (On-Line System) Criteria - 1.25" over added impervious area or 0.5" over total area, whichever is greater. Plus add 0.5" over the total area. (Based on the SJRWMD treatment volume requirements found in the 2018 Permit Information Manual.)

Dry Retention	**Ac-Ft**	
1) 0.5" of Runoff Over Total Area =	5.11	Governs
2) 1.25" of Runoff Over Added Impervious Area =	1.33	
Governing Condition + 0.5" x Total Area =	10.23	
DRY RETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	**10.23**	

ESTIMATE FLOODPLAIN IMPACTS

With Bridge between Lakes

Floodplain Elevation(3)	Average Existing Ground(4)/ESHWT Elevation(5)	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
107.5	107.0	105.5 (Pond D)	0.5	6.96	3.48
107.5	105.5		2	12.17	24.35
				Total Impact Volume:	**27.83**

Without Bridge between Lakes

Floodplain Elevation(3)	Average Existing Ground(4)/ESHWT Elevation(5)	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
107.5	107.0	105.5 (Pond D)	0.5	6.96	3.48
107.5	105.5		2	12.17	24.35
106.4	103.0		3.4	7.40	25.17
				Total Impact Volume:	**53.00**

(3) The floodplain elevations were drawn from the permitted plans for ERP No. 90260-2 and published FEMA data.

(4) The average existing ground elevations were estimated from the published county lidar data.

(5) The ESHWT was drawn from the control elevations of the ponds constructed under ERP No. 90260-2 and the observed water level of the adjacent wetlands.

ESTIMATE EXISTING DRAINAGE POND IMPACTS

Existing Wet Pond D (Permit 90260-2)

Stage	Description	Area (ac)	Avg. Area (ac)	Incremental Depth (ft)	Incremental Storage (ac-ft)	Total Storage (ac-ft)
105.50	Control Elevation	3.63		0.00	0.00	0.00
106.00		3.71	3.67	0.50	1.84	1.84
107.00		3.74	3.72	1.00	3.72	5.56
107.68	Design High Water Elev	3.85	3.79	0.68	2.58	8.14

Pond Impacted	Floodplain Comp. Impacts (ac-ft)	Treatment Volume (ac-ft)	Attenuation Volume (ac-ft)	Total Impacts (ac-ft)
Pond D w/Flood Comp (Permit 90260-2)	1.68	2.75	5.39	**9.82**

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The depth available for the treatment and attenuation volumes is constrained to the front of berm elevation above the SHWT minus the freeboard minus the Dry Retention Height above SHWT.

2) We will assume the ponds' average SHWT elevations for the purpose of this preliminary pond sizing calculation to be at 6.7' below ground due to the soil types' average SHWT's in the dry pond area is > 80" (6.67') [USGS].

D = Pond Depth from front of Maint. Berm to SHWT =	6.7	ft
F = Freeboard =	1	ft
R = Dry Retention Height Above SHWT =	2	ft
H = D - F - R =	3.7	ft

3) Sum the required treatment, flood compensation, and/or attenuation volumes to attain the Peak Pond Volume.

Required Attenuation Volume =	11.80	ac-ft
Required Treatment Volume =	10.23	ac-ft
Required Flood Compensation Volume =	27.83	ac-ft
Required Existing Pond Flood Plain Impact Compensation Volume =	1.68	ac-ft
Required Existing Pond Treatment Compensation Volume =	2.75	ac-ft
Total Required Existing Pond Compensation Volume =	9.82	ac-ft
Total Flood Compensation Volume =	**29.51**	**ac-ft**
Total Treatment Volume =	**12.98**	**ac-ft**
Total Attenuation and Treatment Volume =	**30.16**	**ac-ft**
Total Peak Volume =	**59.67**	**ac-ft**

4) For purposes of pond area calculations, assume a square pond and only include the attenuation and treatment volumes.

Volume = LWH

where H = height (ft)

L = length of vertical sided pond (ft)

W = width of vertical sided pond (ft)

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

Volume = 30.16 ac-ft

H = 3.7 ft

$30.16 = L^2 \times 3.7$

Solving for L = 595.9 ft

Therefore W = 595.9 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:	3.7	ft
x =	29.6	ft
Length @ top of slope =	626	ft
Width @ top of slope =	626	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	656	ft
Width w/maint. Berm =	656	ft
Total Area =	9.9	acre
Add 10% Contingency	10.9	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN = 10.9 ACRE

Proposed Pond 1A1 Area (Floodplain Comp.):	**7.9 acre**
Proposed Pond 1A2 Area (Floodplain Comp.):	**3.9 acre**
Proposed Pond 1A3 Area (Floodplain Comp.):	**4.1 acre**
Proposed Pond 1A4 Area (Treat., Atten., & Exist. Pond Impacts):	**15.3 acre**
Total Area of Proposed Ponds(6):	**31.2 acre**

Facility Type	Total Area (ac)
Floodplain Compensation	16.0
Dry Retention	15.3

(6) Sized to include floodplain compensation as well as to compensate for hilly terrain. Floodplain compensation is only accounted for up to the 100-year floodplain elevation or the front of berm, whichever is lower.

POND STAGE/STORAGE CALCULATIONS

Proposed Pond 1A4 (Sized to retain the project's treatment, attenuation, and existing pond impacts comp. volumes):

Ave. Existing Ground Elevation =	117	ft
Normal Water Elevation =	105.5	ft (Per the existing Pond D in Permit 90260-2 and observed water elevation of the adjacent existing lake/wetland.)
Lowest Profile Elevation =	118.00	ft
Total Pond Area =	15.26	acre
Depth of Pond =	7.50	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
107.50	Bottom of Pond	9.64		0.00	0.00	0.00
108.00		9.88	9.76	0.50	4.88	4.88
109.00		10.36	10.12	1.00	10.12	15.00
110.00		10.85	10.61	1.00	10.61	25.61
111.00		11.35	11.10	1.00	11.10	36.71
112.00		11.84	11.59	1.00	11.59	48.31
113.00		12.34	12.09	1.00	12.09	60.40
114.00	Free Board Elevation	12.84	12.59	1.00	12.59	72.99
115.00	Front Maint. Berm	13.35	13.10	1.00	13.10	86.09
116.88	Back Maint. Berm	15.26	14.30	1.88	26.82	112.91

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment	12.98	108.81	1.31
Treatment and Attenuation	30.16	110.50	3.00

Proposed Ponds 1A1 (Sized for a portion of the 107.5' flood compensation):

Ave. Existing Ground Elevation =	109	ft
Normal Water Elevation =	105.5	ft (Per the existing Pond D in Permit 90260-2)
Lowest Profile Elevation =	118.00	ft
Total Pond Area =	7.94	acre
Depth of Pond =	3.50	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
105.50	Bottom of Pond	6.74		0.00	0.00	0.00
106.00		6.91	6.83	0.50	3.41	3.41
107.00		7.25	7.08	1.00	7.08	10.49
107.50	Top of Floodplain Comp.	7.42	7.34	0.50	3.67	14.16
108.00		7.60	7.51	0.50	3.76	17.92
109.00	Top of Pond	7.94	7.77	1.00	7.77	25.69

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Total 107.5' Floodplain Compensation Required	29.51	107.50	14.16
Remaining 107.5' Floodplain Comp. Volume Required:			**15.35**

Proposed Flood Comp. Area 1A2 (Sized for a portion of the 107.5' flood compensation):

Ave. Existing Ground Elevation =	108 ft
Normal Water Elevation =	105.5 ft (Per the existing Pond D in Permit 90260-2)
Lowest Profile Elevation =	118.00 ft
Total Pond Area =	3.92 acre
Depth of Pond =	2.50 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
105.50	Bottom of Pond	3.47		0.00	0.00	0.00
106.00		3.56	3.51	0.50	1.76	1.76
107.00		3.73	3.65	1.00	3.65	5.40
107.50	Top of Floodplain Comp.	3.83	3.78	0.50	1.89	7.29
108.00	Top of Pond	3.92	3.87	0.50	1.94	9.23

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Remaining 107.5' Floodplain Compensation Required	15.35	107.50	7.29
Remaining 107.5' Floodplain Comp. Volume Required:			**8.06**

Proposed Flood Comp. Area 1A3 (Sized for a portion of the 107.5' flood compensation):

Ave. Existing Ground Elevation =	112.5 ft
Normal Water Elevation =	104 ft (Per the observed water elevation of the adjacent existing lake/wetland.)
Lowest Profile Elevation =	118.00 ft
Total Pond Area =	4.12 acre
Depth of Pond =	8.50 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
104.00	Bottom of Pond	2.80		0.00	0.00	0.00
104.50		2.87	2.84	0.50	1.42	1.42
105.50		3.02	2.95	1.00	2.95	4.37
106.50		3.17	3.10	1.00	3.10	7.46
107.50	Top of Floodplain Comp.	3.32	3.25	1.00	3.25	10.71
108.50		3.48	3.40	1.00	3.40	14.11
109.50		3.64	3.56	1.00	3.56	17.67
110.50		3.80	3.72	1.00	3.72	21.39
111.50		3.96	3.88	1.00	3.88	25.27
112.50	Top of Pond	4.12	4.04	1.00	4.04	29.31

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Remaining 107.5' Floodplain Compensation Required	8.06	107.50	10.71
Remaining 107.5' Floodplain Comp. Volume Required:			**0.00**

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 1B1, 1B2, 1B3, & 1B4
Basin 1

Computed By:	MS
Checked By:	MH
Date:	5/20/2019

Beginning Station	10000.00
End Station	13573.05
Length (ft)	3573.05

Pre-Development

Total Basin Area	
Description	**Area (ac)**
A portion of SR-27, unimproved land (water bodies & woods), pasture/range, and orchards	135.00
TOTAL BASIN AREA	**135.00**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc. at the US 27 Intersection/realignment	26.42
TOTAL IMPERVIOUS AREA	**26.42**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Roadway and Sidewalks	A/D	98	26.42	2,588.88
Grassed Area/Open (Good)	A	39	11.97	466.67
Grassed Area/Open (Good)	D	80	5.20	415.86
Woods/Orchard (Poor)	A	57	27.50	1,567.43
Woods/Orchard (Fair)	A	43	4.23	182.02
Woods (Fair)	A	36	1.52	54.80
Woods (Fair)	D	79	19.15	1,512.80
Woods (Poor)	D	83	3.87	320.88
Pasture/Range (Poor)	A	68	17.21	1,170.11
Water Bodies	D	100	17.94	1,793.77
		TOTAL	135.00	10,073.21
		COMPOSITE CN		**74.6**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	3.40	5.91	66.43
100 yr, 240 hr	FDOT	16.00	3.40	12.54	141.03
100 yr, 8 hr	FDOT	7.24	3.40	4.32	48.60

Runoff Volume Example Calculations:

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

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

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Soil Storage (in)	S	3.40
Runoff (in)	R	5.91
Runoff (ac-ft)	Vr	66.43

Post Development

Total Basin Area	
Description	**Area (ac)**
Roadway, off-site areas, unimproved lands adjacent to bridges, and ponds	135.00
TOTAL AREA (AC)	**135.00**

Proposed Impervious Area		
Description	**Area(2)**	
Proposed Pavement(1)	39.14	
Total Impervious Area	**39.14**	**Acre**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.

(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Roadway and Sidewalks	A/D	98	39.14	3,835.50
Grassed Area/Open Area (Good)	A	39	7.71	300.55
Grassed Area/Open Area (Good)	D	80	25.46	2,036.62
Woods/Orchard (Poor)	A	57	3.13	178.32
Woods (Poor)	D	83	2.86	237.16
Water Bodies	D	100	9.20	919.76
Proposed Pond Area	A	100	47.51	4,751.04
		TOTAL	135.00	12,258.95
		COMPOSITE CN		**90.8**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	1.01	7.89	88.76
100 yr, 240 hr	FDOT	16.00	1.01	14.85	167.02
100 yr, 8 hr	FDOT	7.24	1.01	6.15	69.22

Runoff Volume Example Calculations:

1) Soil Storage (S)	$S = (1000/CN) - 10$	**Soil Storage (in)**	S	1.01
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	**Runoff (in)**	R	7.89
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	**Runoff (ac-ft)**	Vr	88.76

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION		**POST DEVELOPED CONDITION**	
AREA (AC):	135.00	AREA (AC):	135.00
CN:	74.6	CN:	90.8

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	66.43	88.76	22.33
FDOT	100 yr, 240 hr	141.03	167.02	25.99
FDOT	100 yr, 8 hr	48.60	69.22	20.62

MAXIMUM ATTENUATION VOLUME (AC-FT)	25.99

WATER QUALITY CALCULATIONS

Water Management District
Pollution Abatement Volume Requirement

Agency:	SJRWMD
Post Development Total Area (ac) =	135.00
Post Development Impervious Area Added (ac) =	12.72

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing an on-line dry retention facility for the Project's treatment, attenuation, and flood comp. volumes and an on-line wet detention facility to replace the existing wet detention facility at SR-27 and remaining flood comp. volumes.

Dry Retention (On-Line System) Criteria - 1.25" over added impervious area or 0.5" over total area, whichever is greater. Plus add 0.5" over the total area. (Based on the SJRWMD treatment volume requirements found in the 2018 Permit Information Manual.)

Dry Retention	Ac-Ft	
1) 0.5" of Runoff Over Total Area =	5.62	Governs
2) 1.25" of Runoff Over Added Impervious Area =	1.33	
Governing Condition + 0.5" x Total Area =	11.25	
DRY RETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	**11.25**	

ESTIMATE FLOODPLAIN IMPACTS

With Bridge between Lakes

Floodplain Elevation(3)	Average Existing Ground(4)/ESHWT Elevation(5)	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
107.5	107.0	105.5 (Pond D)	0.5	6.96	3.48
107.5	105.5		2	19.62	39.24
				Total Impact Volume:	**42.72**

Without Bridge between Lakes

Floodplain Elevation(3)	Average Existing Ground(4)/ESHWT Elevation(5)	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
107.5	107.0	105.5 (Pond D)	0.5	6.96	3.48
107.5	105.5		2	19.62	39.24
106.4	105.5		0.9	7.40	6.66
				Total Impact Volume:	**49.38**

(3) The floodplain elevations were drawn from the permitted plans for ERP No. 90260-2 and published FEMA data.

(4) The average existing ground elevations were estimated from the published county lidar data.

(5) The ESHWT was drawn from the control elevations of the ponds constructed under ERP No. 90260-2 and the observed water level of the adjacent wetlands.

ESTIMATE EXISTING DRAINAGE POND IMPACTS

Existing Wet Pond D (Permit 90260-2)

Stage	Description	Area (ac)	Avg. Area (ac)	Incremental Depth (ft)	Incremental Storage (ac-ft)	Total Storage (ac-ft)
105.50	Control Elevation	3.63		0.00	0.00	0.00
106.00		3.71	3.67	0.50	1.84	1.84
107.00		3.74	3.72	1.00	3.72	5.56
107.68	Design High Water Elev	3.85	3.79	0.68	2.58	8.14

Pond Impacted	Floodplain Comp. Impacts (ac-ft)	Treatment Volume (ac-ft)	Attenuation Volume (ac-ft)	Total Impacts (ac-ft)
Pond D w/Flood Comp (Permit 90260-2)	1.68	2.75	5.39	**9.82**

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The depth available for the treatment and attenuation volumes is constrained to the front of berm elevation above the SHWT minus the freeboard minus the Dry Retention Height above SHWT.

2) We will assume the ponds' average SHWT elevations for the purpose of this preliminary pond sizing calculation to be at 6.7' below ground due to the soil types' average SHWT's in the dry pond area is > 80" (6.67') [USGS].

D = Pond Depth from front of Maint. Berm to SHWT =	6.7	ft
F = Freeboard =	1	ft
R = Dry Retention Height Above SHWT =	2	ft
H = D - F - R =	3.7	ft

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

Required Attenuation Volume =	25.99	ac-ft
Required Treatment Volume =	11.25	ac-ft
Required Flood Compensation Volume =	42.72	ac-ft
Required Existing Pond Flood Plain Impact Compensation Volume =	1.68	ac-ft
Required Existing Pond Treatment Compensation Volume =	2.75	ac-ft
Total Required Existing Pond Impact Compensation Volume =	9.82	ac-ft
Total Flood Compensation Volume =	**44.40**	**ac-ft**
Total Treatment Volume =	**14.00**	**ac-ft**
Total Attenuation and Treatment Volume =	**45.38**	**ac-ft**
Total Peak Volume =	**89.77**	**ac-ft**

4) For purposes of pond area calculations, assume a square pond and only include the attenuation and treatment volumes.

Volume = LWH

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

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

Volume = 45.38 ac-ft
H = 3.7 ft

$45.38 = L^2 \times 3.7$

Solving for L = 730.9 ft
Therefore W = 730.9 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:	3.7	ft
x =	29.6	ft
Length @ top of slope =	760	ft
Width @ top of slope =	760	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	790	ft
Width w/maint. Berm =	790	ft
Total Area =	14.3	acre
Add 10% Contingency	15.8	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN = 15.8 ACRE

Proposed Pond 1B1 Area (Exist. Pond Impacts & Floodplain Comp.):	**6.8 acre**
Proposed Pond 1B2 Area (Exist. Pond Impacts & Floodplain Comp.):	**3.1 acre**
Proposed Pond 1B3 Area (Treatment & Attenuation):	**12.2 acre**
Proposed Pond 1B4 Area (Floodplain Comp.):	**25.3 acre**
Total Area of Proposed Ponds(6):	**47.5 acre**

Facility Type	Total Area (ac)
Wet Facility	10.0
Dry Facility	12.2
Flood Comp.	25.3

(6) Sized to include floodplain compensation as well as to compensate for hilly terrain. Floodplain compensation is only accounted for up to the 100-year floodplain elevation or the front of berm, whichever is lower.

POND STAGE/STORAGE CALCULATIONS

Proposed Pond 1B3 (Sized to retain the project's treatment and attenuation):

Ave. Existing Ground Elevation =	115	ft
Normal Water Elevation =	103	ft (Per the adjacent lake/wetland's observed water elevation, Sawgrass Lake)
Lowest Profile Elevation =	118.00	ft
Total Pond Area =	12.24	acre
Depth of Pond =	7.00	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
106.00	Bottom of Pond	9.28		0.00	0.00	0.00
107.00		9.54	9.41	1.00	9.41	9.41
108.00		9.81	9.68	1.00	9.68	19.09
109.00		10.08	9.94	1.00	9.94	29.03
110.00		10.35	10.21	1.00	10.21	39.25
111.00		10.62	10.49	1.00	10.49	49.73
112.00	Free Board Elevation	10.90	10.76	1.00	10.76	60.49
113.00	Front Maint. Berm	11.18	11.04	1.00	11.04	71.53
114.88	Back Maint. Berm	12.24	11.71	1.88	21.95	93.48

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment (Project Only)	11.25	107.21	1.21
Treatment and Attenuation (Project Only)	37.24	109.80	3.80

Proposed Ponds 1B1 & 1B2 (Sized to replace the existing FDOT Pond and a portion of the flood compensation):

Ave. Existing Ground Elevation =	110	ft
Normal Water Elevation =	105.5	ft (Per the existing Pond D in Permit 90260-2)
Lowest Profile Elevation =	118.00	ft
Total Pond Area =	9.97	acre
Depth of Pond =	3.50	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
105.50	Control Elevation	8.14		0.00	0.00	0.00
106.00		8.39	8.26	0.50	4.13	4.13
107.00		8.89	8.64	1.00	8.64	12.77
107.50	Top of Floodplain Comp.	9.14	9.01	0.50	4.51	17.28
108.00	Free Board Elevation	9.39	9.27	0.50	4.63	21.91
109.00	Front Maint. Berm	9.90	9.65	1.00	9.65	31.56
110.88	Back Maint. Berm	11.86	10.88	1.88	20.40	51.96

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment (Existing FDOT Pond Only)	2.75	105.83	0.33
Treatment, Attenuation, & Flood Comp. (Exist. FDOT Pond)	9.82	106.66	1.16

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided[7] (ac-ft)
Total 107.5' Floodplain Compensation Required	44.40	107.50	7.46
Remaining 107.5' Floodplain Comp. Volume Required:			**36.94**

(7) Compensation provided does not include attenuation volumes.

Proposed Pond 1B4 (Sized for a portion of the flood compensation):

Ave. Existing Ground Elevation =	118	ft
Normal Water Elevation =	105.5	ft (Per the existing Pond D in Permit 90260-2 and observed water elevation of the adjacent existing lake/wetland.)
Lowest Profile Elevation =	118.00	ft
Total Pond Area =	25.30	acre
Depth of Pond =	12.50	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
105.50	Bottom of Pond	19.83		0.00	0.00	0.00
106.00		20.04	19.94	0.50	9.97	9.97
107.00		20.47	20.26	1.00	20.26	30.22
107.50	Top of Floodplain Comp.	20.68	20.57	0.50	10.29	40.51
108.00		20.90	20.79	0.50	10.39	50.91
109.00		21.33	21.11	1.00	21.11	72.02
110.00		21.76	21.54	1.00	21.54	93.56
111.00		22.19	21.98	1.00	21.98	115.53
112.00		22.63	22.41	1.00	22.41	137.95
113.00		23.07	22.85	1.00	22.85	160.80
114.00		23.51	23.29	1.00	23.29	184.09
115.00		23.96	23.74	1.00	23.74	207.82
116.00		24.40	24.18	1.00	24.18	232.00
117.00		24.85	24.63	1.00	24.63	256.63
118.00	Top of Pond	25.30	25.08	1.00	25.08	281.71

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Remaining 107.5' Floodplain Compensation Required	36.94	107.50	40.51
Remaining 107.5' Floodplain Comp. Volume Required:			**0.00**

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 1C1, 1C2, 1C3, & 1C4
Basin 1

Computed By:	MS
Checked By:	MH
Date:	5/20/2019

Beginning Station	10000.00
End Station	13573.05
Length (ft)	3573.05

Pre-Development

Total Basin Area	
Description	**Area (ac)**
A portion of SR-27, unimproved land (water bodies & woods), pasture/range, and orchards	133.36
TOTAL BASIN AREA	**133.36**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc. at the US 27 Intersection/realignment	26.42
TOTAL IMPERVIOUS AREA	**26.42**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Roadway and Sidewalks	A/D	98	26.42	2,588.88
Grassed Area/Open (Good)	A	39	11.97	466.67
Grassed Area/Open (Good)	D	80	5.20	415.86
Woods/Orchard (Poor)	A	57	27.50	1,567.43
Woods/Orchard (Fair)	A	43	4.23	182.02
Woods (Fair)	A	36	1.52	54.80
Woods (Fair)	D	79	19.15	1,512.80
Woods (Poor)	D	83	3.87	320.88
Pasture/Range (Poor)	A	68	15.57	1,058.66
Water Bodies	D	100	17.94	1,793.77
		TOTAL	133.36	9,961.77
			COMPOSITE CN	**74.7**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	3.39	5.92	65.74
100 yr, 240 hr	FDOT	16.00	3.39	12.55	139.46
100 yr, 8 hr	FDOT	7.24	3.39	4.33	48.10

Runoff Volume Example Calculations:

1) Soil Storage (S)	$S = (1000/CN) - 10$	**Soil Storage (in)**	S	3.39
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	**Runoff (in)**	R	5.92
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	**Runoff (ac-ft)**	Vr	65.74

Post Development

Total Basin Area	
Description	**Area (ac)**
Roadway, off-site areas, unimproved lands adjacent to bridges, and ponds	133.36
TOTAL AREA (AC)	**133.36**

Proposed Impervious Area		
Description	**Area[(2)]**	
Proposed Pavement[(1)]	39.14	
Total Impervious Area	**39.14**	**Acre**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.

(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Roadway and Sidewalks	A/D	98	39.14	3,835.50
Grassed Area/Open Area (Good)	A	39	7.71	300.55
Grassed Area/Open Area (Good)	D	80	25.46	2,036.62
Woods/Orchard (Poor)	A	57	3.13	178.32
Woods (Poor)	D	83	2.86	237.16
Water Bodies	D	100	9.20	919.76
Proposed Pond Area	A	100	45.87	4,587.14
		TOTAL	133.36	12,095.06
			COMPOSITE CN	**90.7**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	1.03	7.88	87.53
100 yr, 240 hr	FDOT	16.00	1.03	14.83	164.83
100 yr, 8 hr	FDOT	7.24	1.03	6.14	68.23

Runoff Volume Example Calculations:

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

Soil Storage (in)	S	1.03

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

Runoff (in)	R	7.88

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Runoff (ac-ft)	Vr	87.53

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION

AREA (AC):	133.36
CN:	74.7

POST DEVELOPED CONDITION

AREA (AC):	133.36
CN:	90.7

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	65.74	87.53	21.79
FDOT	100 yr, 240 hr	139.46	164.83	25.37
FDOT	100 yr, 8 hr	48.10	68.23	20.13

MAXIMUM ATTENUATION VOLUME (AC-FT)	25.37

WATER QUALITY CALCULATIONS

Water Management District Pollution Abatement Volume Requirement

Agency:	SJRWMD
Post Development Total Area (ac) =	133.36
Post Development Impervious Area Added (ac) =	12.72

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing an on-line dry retention facility for the Project's treatment, attenuation, and flood comp. volumes and an on-line wet detention facility to replace the existing wet detention facility at SR-27 and remaining flood comp. volumes.

Dry Retention (On-Line System) Criteria - 1.25" over added impervious area or 0.5" over total area, whichever is greater. Plus add 0.5" over the total area. (Based on the SJRWMD treatment volume requirements found in the 2018 Permit Information Manual.)

Dry Retention	Ac-Ft	
1) 0.5" of Runoff Over Total Area =	5.56	Governs
2) 1.25" of Runoff Over Added Impervious Area =	1.33	
Governing Condition + 0.5" x Total Area =	11.11	
DRY RETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	**11.11**	

ESTIMATE FLOODPLAIN IMPACTS

With Bridge between Lakes					
Floodplain Elevation[3]	**Average Existing Ground[4]/ESHWT Elevation[5]**	**Exist. Pond Control**	**Depth of Impact (ft)**	**Area of Impact (ac)**	**Impact Volume (ac-ft)**
107.5	107.0	105.5 (Pond D)	0.5	6.96	3.48
107.5	105.5		2	19.62	39.24
				Total Impact Volume:	**42.72**

Without Bridge between Lakes					
Floodplain Elevation[3]	**Average Existing Ground[4]/ESHWT Elevation[5]**	**Exist. Pond Control**	**Depth of Impact (ft)**	**Area of Impact (ac)**	**Impact Volume (ac-ft)**
107.5	107.0	105.5 (Pond D)	0.5	6.96	3.48
107.5	105.5		2	19.62	39.24
106.4	105.5		0.9	7.40	6.66
				Total Impact Volume:	**49.38**

(3) The floodplain elevations were drawn from the permitted plans for ERP No. 90260-2 and published FEMA data.

(4) The average existing ground elevations were estimated from the published county lidar data.

(5) The ESHWT was drawn from the control elevations of the ponds constructed under ERP No. 90260-2 and the observed water level of the adjacent wetlands.

ESTIMATE EXISTING DRAINAGE POND IMPACTS

Existing Wet Pond D (Permit 90260-2)						
Stage	**Description**	**Area (ac)**	**Avg. Area (ac)**	**Incremental Depth (ft)**	**Incremental Storage (ac-ft)**	**Total Storage (ac-ft)**
105.50	Control Elevation	3.63		0.00	0.00	0.00
106.00		3.71	3.67	0.50	1.84	1.84
107.00		3.74	3.72	1.00	3.72	5.56
107.68	Design High Water Elev	3.85	3.79	0.68	2.58	8.14

Pond Impacted	Floodplain Comp. Impacts (ac-ft)	Treatment Volume (ac-ft)	Attenuation Volume (ac-ft)	Total Impacts (ac-ft)
Pond D w/Flood Comp (Permit 90260-2)	1.68	2.75	5.39	**9.82**

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The depth available for the treatment and attenuation volumes is constrained to the front of berm elevation above the SHWT minus the freeboard minus the Dry Retention Height above SHWT.

2) We will assume the ponds' average SHWT elevations for the purpose of this preliminary pond sizing calculation to be at 6.7' below ground due to the soil types' average SHWT's in the dry pond area is > 80" (6.67') [USGS].

D = Pond Depth from front of Maint. Berm to SHWT =	6.7	ft
F = Freeboard =	1	ft
R = Dry Retention Height Above SHWT =	2	ft
H = D - F - R =	3.7	ft

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

Required Attenuation Volume =	25.37	ac-ft
Required Treatment Volume =	11.11	ac-ft
Required Flood Compensation Volume =	42.72	ac-ft
Required Existing Pond Flood Plain Impact Compensation Volume =	1.68	ac-ft
Required Existing Pond Treatment Compensation Volume =	2.75	ac-ft
Total Required Existing Pond Impact Compensation Volume =	9.82	ac-ft
Total Flood Compensation Volume =	**44.40**	**ac-ft**
Total Treatment Volume =	**13.86**	**ac-ft**
Total Attenuation and Treatment Volume =	**44.62**	**ac-ft**
Total Peak Volume =	**89.02**	**ac-ft**

4) For purposes of pond area calculations, assume a square pond and only include the attenuation and treatment volumes.

Volume = LWH

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

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

Volume =	46.30	ac-ft
H =	3.7	ft

$46.30 = L^2 \times 3.7$

Solving for L =	738.3	ft
Therefore W =	738.3	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:	3.7	ft
x =	29.6	ft
Length @ top of slope =	768	ft
Width @ top of slope =	768	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	798	ft
Width w/maint. Berm =	798	ft
Total Area =	14.6	acre
Add 10% Contingency	16.1	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN = 16.1 ACRE

Proposed Pond 1C1 Area (Exist. Pond Impacts & Floodplain Comp.):	**6.8 acre**
Proposed Pond 1C2 Area (Exist. Pond Impacts & Floodplain Comp.):	**3.1 acre**
Proposed Pond 1C3 Area (Treatment & Attenuation):	**10.6 acre**
Proposed Pond 1C4 Area (Floodplain Comp.):	**25.3 acre**
Total Area of Proposed Ponds[6]:	**45.9 acre**

Facility Type	Total Area (ac)
Wet Facility	10.0
Dry Facility	10.6
Flood Comp.	25.3

(6) Sized to include floodplain compensation as well as to compensate for hilly terrain. Floodplain compensation is only accounted for up to the 100-year floodplain elevation or the front of berm, whichever is lower.

POND STAGE/STORAGE CALCULATIONS

Proposed Pond 1C3 (Sized to retain the project's treatment and attenuation):

Ave. Existing Ground Elevation =	115	ft
Normal Water Elevation =	103	ft (Per the adjacent lake/wetland's observed water elevation, Sawgrass Lake)
Lowest Profile Elevation =	118.00	ft
Total Pond Area =	10.60	acre
Depth of Pond =	7.50	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
105.50	Bottom of Pond	7.72	0.00	0.00	0.00	0.00
106.00		7.84	7.78	0.50	3.89	3.89
107.00		8.08	7.96	1.00	7.96	11.85
108.00		8.32	8.20	1.00	8.20	20.05
109.00		8.58	8.45	1.00	8.45	28.50
110.00		8.83	8.71	1.00	8.71	37.21
111.00		9.09	8.96	1.00	8.96	46.17
112.00	Free Board Elevation	9.35	9.22	1.00	9.22	55.39
113.00	Front Maint. Berm	9.61	9.48	1.00	9.48	64.87
114.88	Back Maint. Berm	10.60	10.10	1.88	18.94	83.81

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment (Project Only)	11.11	106.91	1.41
Treatment and Attenuation (Project Only)	36.48	109.94	4.44

Proposed Ponds 1C1 & 1C2 (Sized to replace the existing FDOT Pond and a portion of the flood compensation):

Ave. Existing Ground Elevation =	110	ft
Normal Water Elevation =	105.5	ft (Per the existing Pond D in Permit 90260-2)
Lowest Profile Elevation =	118.00	ft
Total Pond Area =	9.97	acre
Depth of Pond =	3.50	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
105.50	Control Elevation	8.14		0.00	0.00	0.00
106.00		8.39	8.26	0.50	4.13	4.13
107.00		8.89	8.64	1.00	8.64	12.77
107.50	Top of Floodplain Comp.	9.14	9.01	0.50	4.51	17.28
108.00	Free Board Elevation	9.39	9.27	0.50	4.63	21.91
109.00	Front Maint. Berm	9.90	9.65	1.00	9.65	31.56
110.88	Back Maint. Berm	11.86	10.88	1.88	20.40	51.96

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment (Existing FDOT Pond Only)	2.75	105.83	0.33
Treatment, Attenuation, & Flood Comp. (Exist. FDOT Pond)	9.82	106.66	1.16

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided(7) (ac-ft)
Total 107.5' Floodplain Compensation Required	44.40	107.50	7.46
Remaining 107.5' Floodplain Comp. Volume Required:			**36.94**

(7) Compensation provided does not include attenuation volumes.

Proposed Pond 1C4 (Sized for a portion of the flood compensation):

Ave. Existing Ground Elevation =	118	ft
Normal Water Elevation =	105.5	ft (Per the existing Pond D in Permit 90260-2 and observed water elevation of the adjacent existing lake/wetland.)
Lowest Profile Elevation =	118.00	ft
Total Pond Area =	25.30	acre
Depth of Pond =	12.50	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
105.50	Bottom of Pond	19.83		0.00	0.00	0.00
106.00		20.04	19.94	0.50	9.97	9.97
107.00		20.47	20.26	1.00	20.26	30.22
107.50	Top of Floodplain Comp.	20.68	20.57	0.50	10.29	40.51
108.00		20.90	20.79	0.50	10.39	50.91
109.00		21.33	21.11	1.00	21.11	72.02
110.00		21.76	21.54	1.00	21.54	93.56
111.00		22.19	21.98	1.00	21.98	115.53
112.00		22.63	22.41	1.00	22.41	137.95
113.00		23.07	22.85	1.00	22.85	160.80
114.00		23.51	23.29	1.00	23.29	184.09
115.00		23.96	23.74	1.00	23.74	207.82
116.00		24.40	24.18	1.00	24.18	232.00
117.00		24.85	24.63	1.00	24.63	256.63
118.00	Top of Pond	25.30	25.08	1.00	25.08	281.71

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Remaining 107.5' Floodplain Compensation Required	36.94	107.50	40.51
Remaining 107.5' Floodplain Comp. Volume Required:			**0.00**

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 2A
Basin 2

Computed By:	MS
Checked By:	MH
Date	5/20/2019

Beginning Station	13573.05
End Station	18846.66
Length (ft)	5273.61

Pre-Development

Total Basin Area	
Description	**Area (ac)**
Unimproved land (water bodies & woods) and orchards	49.51
TOTAL BASIN AREA	**49.51**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc.	0.00
TOTAL IMPERVIOUS AREA	**0.00**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Woods/Orchard (Poor)	A	57	39.18	2,233.10
Woods/Orchard (Poor) - Offsite	A	57	0.41	23.12
Woods (Poor)	D	83	8.50	705.85
Water Bodies	D	100	1.43	142.57
		TOTAL	49.51	3,104.64
		COMPOSITE CN		**62.7**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	5.95	4.43	18.29
100 yr, 240 hr	FDOT	16.00	5.95	10.57	43.60
100 yr, 8 hr	FDOT	7.24	5.95	3.05	12.59

Runoff Volume Example Calculations:

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

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

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Soil Storage (in)	S	5.95
Runoff (in)	R	4.43
Runoff (ac-ft)	Vr	18.29

Post Development

Total Basin Area	
Description	**Area (ac)**
Roadway, off-site areas, unimproved lands adjacent to bridges, and ponds	49.51
TOTAL AREA (AC)	**49.51**

Proposed Impervious Area		
Description	**Area[2]**	
Proposed Pavement[1]	21.64	
Total Impervious Area	**21.64**	**Acre**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.

(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Roadway	A/D	98	21.64	2,121.02
Grassed/Open Area (Good)	A	60	13.55	813.11
Grassed/Open Area (Good)	D	61	0.44	26.96
Woods/Orchard (Poor) - Offsite	A	57	0.41	23.12
Woods (Poor)	D	83	3.81	316.38
Water Bodies	D	100	0.50	50.35
Proposed Pond Area	A	100	9.16	915.50
		TOTAL	49.51	4,266.44
			COMPOSITE CN	**86.2**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	1.61	7.32	30.22
100 yr, 240 hr	FDOT	16.00	1.61	14.22	58.68
100 yr, 8 hr	FDOT	7.24	1.61	5.62	23.17

Runoff Volume Example Calculations:

1) Soil Storage (S)	$S = (1000/CN) - 10$	**Soil Storage (in)**	S	1.61
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	**Runoff (in)**	R	7.32
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	**Runoff (ac-ft)**	Vr	30.22

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION		**POST DEVELOPED CONDITION**	
AREA (AC):	49.51	AREA (AC):	49.51
CN:	62.7	CN:	86.2

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	18.29	30.22	11.93
FDOT	100 yr, 240 hr	43.60	58.68	15.09
FDOT	100 yr, 8 hr	12.59	23.17	10.58

MAXIMUM ATTENUATION VOLUME (AC-FT)	15.09

WATER QUALITY CALCULATIONS

Water Management District
Pollution Abatement Volume Requirement

Agency:	SJRWMD
Post Development Total Area (ac) =	49.51
Post Development Impervious Area Added (ac) =	21.64

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing a on-line dry retention facility.

Dry Retention (On-Line System) Criteria - 1.25" over added impervious area or 0.5" over total area, whichever is greater. Plus add 0.5" over the total area. (Based on the SJRWMD treatment volume requirements found in the 2018 Permit Information Manual.)

Dry Retention	**Ac-Ft**	
1) 0.5" of Runoff Over Total Area =	2.06	
2) 1.25" of Runoff Over Added Impervious Area =	2.25	Governs
Governing Condition + 0.5" x Total Area =	4.32	
DRY RETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	**4.32**	

ESTIMATE FLOODPLAIN IMPACTS

With Bridge between Lakes

Floodplain Elevation(3)	Average Existing Ground(4)/ESHWT Elevation(5)	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
106.4	101.0	101.0	5.4	0.83	4.51
				Total Impact Volume:	**4.51**

Without Bridge between Lakes

Floodplain Elevation(3)	Average Existing Ground(4)/ESHWT Elevation(5)	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
106.4	103.0	103.0	3.4	9.42	32.03
106.4	101.0	101.0	5.4	0.83	4.51
				Total Impact Volume:	**36.54**

(3) The floodplain elevations were drawn from published FEMA data.

(4) The average existing ground elevations were estimated from the published county lidar data.

(5) The ESHWT was drawn from the observed water level of the adjacent wetlands.

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The depth available for the treatment and attenuation volumes is constrained to the front of berm elevation above the SHWT minus the freeboard minus the Dry Retention Height above SHWT.

2) We will assume the SHWT elevations for the purpose of preliminary pond sizing to be at 6.5' below ground due to the average soil types' in the areas of the pond alternatives SHWT is > 80" (6.67') [USGS].

D = Pond Depth from front of Maint. Berm to SHWT =	6.5	ft
F = Freeboard =	1	ft
R = Dry Retention Height Above SHWT =	2	ft
H = D - F - R =	3.5	ft

3) Sum the required treatment, flood compensation, and/or attenuation volumes to attain the Peak Pond Volume.

Required Attenuation Volume =	15.09	ac-ft
Required Treatment Volume =	4.32	ac-ft
Required Flood Compensation Volume =	4.51	ac-ft
Total Attenuation and Treatment Volume =	**19.40**	**ac-ft**
Total Peak Volume =	**23.91**	**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 (ft)
	W =	width of vertical sided pond (ft)

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

Volume =	19.40	ac-ft
H =	3.5	ft

$19.40 = L^2 \times 3.5$

Solving for L =	491.4	ft
Therefore W =	491.4	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:	3.5	ft
x =	28	ft
Length @ top of slope =	519	ft
Width @ top of slope =	519	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	549	ft
Width w/maint. Berm =	549	ft
Total Area =	6.9	acre
Add 10% Contingency	7.6	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN = 7.6 ACRE

Proposed Pond 2A(6) (Treat., Atten., & Floodplain Comp.): 9.2 acre

(6) Sized to include floodplain compensation as well as to compensate for hilly terrain. Floodplain compensation is only accounted for up to the 100-year floodplain elevation or the front of berm, whichever is lower.

POND STAGE/STORAGE CALCULATIONS

Proposed Pond 2A (Sized to retain the project's treatment, attenuation, and flood comp. volumes):

Ave. Existing Ground Elevation =	120	ft
Normal Water Elevation =	103	ft (Per the adjacent wetland's observed water elevation)
Lowest Profile Elevation =	125.84	ft
Total Pond Area =	9.16	acre
Depth of Pond =	13.00	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
105.00	Bottom of Pond	5.38		0.00	0.00	0.00
106.00		5.58	5.48	1.00	5.48	5.48
106.40	Top of Floodplain Comp.	5.66	5.62	0.40	2.25	7.73
107.00		5.79	5.73	0.60	3.44	11.17
108.00		5.99	5.89	1.00	5.89	17.06
109.00		6.21	6.10	1.00	6.10	23.16
110.00		6.42	6.31	1.00	6.31	29.47
111.00		6.64	6.53	1.00	6.53	36.00
112.00		6.86	6.75	1.00	6.75	42.74
113.00		7.08	6.97	1.00	6.97	49.71
114.00		7.31	7.20	1.00	7.20	56.91
115.00		7.54	7.42	1.00	7.42	64.33
116.00		7.77	7.66	1.00	7.66	71.99
117.00	Free Board Elevation	8.01	7.89	1.00	7.89	79.88
118.00	Front Maint. Berm	8.24	8.13	1.00	8.13	88.01
119.88	Back Maint. Berm	9.16	8.70	1.88	16.31	104.32

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment	4.32	105.79	0.79
Treatment and Attenuation	19.40	108.40	3.40
Treatment, Attenuation, & Flood Comp.	23.91	109.12	4.12

Description	Volume Required (ac-ft)	Floodplain Elevation	Compensation Provided (ac-ft)
Total 106.4' Floodplain Compensation Required	4.51	106.40	7.73
Remaining 106.4' Floodplain Comp. Volume Required:			**0.00**

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 2B
Basin 2

Computed By:	MS
Checked By:	MH
Date	5/20/2019

Beginning Station	13573.05
End Station	18846.66
Length (ft)	5273.61

Pre-Development

Total Basin Area	
Description	**Area (ac)**
Unimproved land (water bodies & woods) and orchards	49.54
TOTAL BASIN AREA	**49.54**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc.	0.00
TOTAL IMPERVIOUS AREA	**0.00**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Woods/Orchard (Poor)	A	57	39.21	2,234.87
Woods/Orchard (Poor) - Offsite	A	57	0.41	23.12
Woods (Poor)	D	83	8.50	705.85
Water Bodies	D	100	1.43	142.57
		TOTAL	49.54	3,106.42
		COMPOSITE CN		**62.7**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	5.95	4.43	18.30
100 yr, 240 hr	FDOT	16.00	5.95	10.57	43.62
100 yr, 8 hr	FDOT	7.24	5.95	3.05	12.60

Runoff Volume Example Calculations:

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

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

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Soil Storage (in)	S	5.95
Runoff (in)	R	4.43
Runoff (ac-ft)	Vr	18.30

Post Development

Total Basin Area	
Description	**Area (ac)**
Roadway, off-site areas, unimproved lands adjacent to bridges, and ponds	49.54
TOTAL AREA (AC)	**49.54**

Proposed Impervious Area		
Description	**Area(2)**	
Proposed Pavement(1)	21.64	
Total Impervious Area	**21.64**	**Acre**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.

(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Roadway	A/D	98	21.64	2,121.02
Grassed/Open Area (Good)	A	60	13.55	813.11
Grassed/Open Area (Good)	D	61	0.44	26.96
Woods/Orchard (Poor) - Offsite	A	57	0.41	23.12
Woods (Poor)	D	83	3.81	316.38
Water Bodies	D	100	0.50	50.35
Proposed Pond Area	A	100	9.19	918.61
		TOTAL	49.54	4,269.55
		COMPOSITE CN		**86.2**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	1.60	7.33	30.24
100 yr, 240 hr	FDOT	16.00	1.60	14.22	58.73
100 yr, 8 hr	FDOT	7.24	1.60	5.62	23.19

Runoff Volume Example Calculations:

1) **Soil Storage (S)** $S = (1000/CN) - 10$

Soil Storage (in)	S	1.60

2) **Runoff (R)** $R = (P-0.2S)^2/(P+0.8S)$

Runoff (in)	R	7.33

3) **Runoff Volume (Vr)** $Vr = R/12 * Area$

Runoff (ac-ft)	Vr	30.24

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION

AREA (AC):	49.54
CN:	62.7

POST DEVELOPED CONDITION

AREA (AC):	49.54
CN:	86.2

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	18.30	30.24	11.94
FDOT	100 yr, 240 hr	43.62	58.73	15.10
FDOT	100 yr, 8 hr	12.60	23.19	10.60

MAXIMUM ATTENUATION VOLUME (AC-FT)	15.10

WATER QUALITY CALCULATIONS

Water Management District
Pollution Abatement Volume Requirement

Agency:	SJRWMD
Post Development Total Area (ac) =	49.54
Post Development Impervious Area Added (ac) =	21.64

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing a on-line dry retention facility.

Dry Retention (On-Line System) Criteria - 1.25" over added impervious area or 0.5" over total area, whichever is greater. Plus add 0.5" over the total area. (Based on the SJRWMD treatment volume requirements found in the 2018 Permit Information Manual.)

Dry Retention	**Ac-Ft**	
1) 0.5" of Runoff Over Total Area =	2.06	
2) 1.25" of Runoff Over Added Impervious Area =	2.25	Governs
Governing Condition + 0.5" x Total Area =	4.32	
DRY RETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	**4.32**	

ESTIMATE FLOODPLAIN IMPACTS

With Bridge between Lakes

Floodplain Elevation[3]	Average Existing Ground[4]/ESHWT Elevation[5]	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
106.4	101.0	101.0	5.4	0.83	4.51
				Total Impact Volume:	**4.51**

Without Bridge between Lakes

Floodplain Elevation[3]	Average Existing Ground[4]/ESHWT Elevation[5]	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
106.4	103.0	103.0	3.4	9.42	32.03
106.4	101.0	101.0	5.4	0.83	4.51
				Total Impact Volume:	**36.54**

(3) The floodplain elevations were drawn from published FEMA data.

(4) The average existing ground elevations were estimated from the published county lidar data.

(5) The ESHWT was drawn from the observed water level of the adjacent wetlands.

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The depth available for the treatment and attenuation volumes is constrained to the front of berm elevation above the SHWT minus the freeboard minus the Dry Retention Height above SHWT.

2) We will assume the SHWT elevations for the purpose of preliminary pond sizing to be at 6.5' below ground due to the average soil types' in the areas of the pond alternatives SHWT is > 80" (6.67') [USGS].

D = Pond Depth from front of Maint. Berm to SHWT =	6.5	ft
F = Freeboard =	1	ft
R = Dry Retention Height Above SHWT =	2	ft
H = D - F - R =	3.5	ft

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

Required Attenuation Volume =	15.10	ac-ft
Required Treatment Volume =	4.32	ac-ft
Required Flood Compensation Volume =	4.51	ac-ft
Total Attenuation and Treatment Volume =	**19.42**	**ac-ft**
Total Peak Volume =	**23.93**	**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 (ft)
	W =	width of vertical sided pond (ft)

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

Volume =	19.42	ac-ft
H =	3.5	ft

$19.42 = L^2 \times 3.5$

Solving for L =	491.6	ft
Therefore W =	491.6	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:	3.5	ft
x =	28	ft
Length @ top of slope =	520	ft
Width @ top of slope =	520	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	550	ft
Width w/maint. Berm =	550	ft
Total Area =	6.9	acre
Add 10% Contingency	7.6	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN =	7.6	ACRE

Proposed Pond 2B(6) (Treat., Atten., & Floodplain Comp.): **9.2 acre**

(6) Sized to include floodplain compensation as well as to compensate for hilly terrain. Floodplain compensation is only accounted for up to the 100-year floodplain elevation or the front of berm, whichever is lower.

POND STAGE/STORAGE CALCULATIONS

Proposed Pond 2B (Sized to retain the project's treatment, attenuation, and flood comp. volumes):

Ave. Existing Ground Elevation =	123	ft
Normal Water Elevation =	101	ft (Per the adjacent wetland's observed water elevation)
Lowest Profile Elevation =	125.84	ft
Total Pond Area =	9.19	acre
Depth of Pond =	15.00	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
105.00	Bottom of Pond	4.89		0.00	0.00	0.00
106.00		5.09	4.99	1.00	4.99	4.99
106.40	Top of Floodplain Comp.	5.17	5.13	0.40	2.05	7.04
107.00		5.29	5.23	0.60	3.14	10.18
108.00		5.50	5.40	1.00	5.40	15.58
109.00		5.71	5.61	1.00	5.61	21.19
110.00		5.93	5.82	1.00	5.82	27.01
111.00		6.15	6.04	1.00	6.04	33.05
112.00		6.37	6.26	1.00	6.26	39.30
113.00		6.59	6.48	1.00	6.48	45.79
114.00		6.82	6.71	1.00	6.71	52.49
115.00		7.05	6.94	1.00	6.94	59.43
116.00		7.29	7.17	1.00	7.17	66.60
117.00		7.52	7.40	1.00	7.40	74.00
118.00		7.76	7.64	1.00	7.64	81.64
119.00	Free Board Elevation	8.01	7.88	1.00	7.88	89.53
120.00	Front Maint. Berm	8.25	8.13	1.00	8.13	97.66
121.88	Back Maint. Berm	9.19	8.72	1.88	16.35	114.00

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment	4.32	105.87	0.87
Treatment and Attenuation	19.42	108.69	3.69
Treatment, Attenuation, & Flood Comp.	23.93	109.49	4.49
Remaining Volume (Total Volume - Volume at Berm Front):			**0.00**

Description	Volume Required (ac-ft)	Floodplain Elevation	Compensation Provided (ac-ft)
Total 106.4' Floodplain Compensation Required	4.51	106.40	7.04
Remaining 106.4' Floodplain Comp. Volume Required:			**0.00**

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 2C
Basin 2

Computed By:	MS
Checked By:	MH
Date:	5/20/2019

Beginning Station	13573.05
End Station	18846.66
Length (ft)	5273.61

Pre-Development

Total Basin Area	
Description	**Area (ac)**
Unimproved land (water bodies & woods) and orchards	54.59
TOTAL BASIN AREA	**54.59**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc.	0.00
TOTAL IMPERVIOUS AREA	**0.00**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Woods/Orchard (Poor)	A	57	39.31	2,240.85
Woods/Orchard (Poor) - Offsite	A	57	5.35	304.95
Woods (Poor)	D	83	8.50	705.85
Water Bodies	D	100	1.43	142.57
		TOTAL	54.59	3,394.22
			COMPOSITE CN	**62.2**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	6.08	4.37	19.87
100 yr, 240 hr	FDOT	16.00	6.08	10.47	47.65
100 yr, 8 hr	FDOT	7.24	6.08	3.00	13.63

Runoff Volume Example Calculations:

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

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

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Soil Storage (in)	S	6.08
Runoff (in)	R	4.37
Runoff (ac-ft)	Vr	19.87

Post Development

Total Basin Area	
Description	**Area (ac)**
Roadway, off-site areas, unimproved lands adjacent to bridges, and ponds	54.59
TOTAL AREA (AC)	**54.59**

Proposed Impervious Area		
Description	**Area[2]**	
Proposed Pavement[1]	21.64	
Total Impervious Area	**21.64**	**Acre**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.

(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Roadway	A/D	98	21.64	2,121.02
Grassed/Open Area (Good)	A	60	13.55	813.11
Grassed/Open Area (Good)	D	61	0.44	26.96
Woods/Orchard (Poor) - Offsite	A	57	5.35	304.95
Woods (Poor)	D	83	3.81	316.38
Water Bodies	D	100	0.50	50.35
Proposed Pond Area	A	100	9.29	929.10
		TOTAL	54.59	4,561.86
			COMPOSITE CN	**83.6**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	1.97	7.01	31.87
100 yr, 240 hr	FDOT	16.00	1.97	13.86	63.05
100 yr, 8 hr	FDOT	7.24	1.97	5.32	24.20

Runoff Volume Example Calculations:

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

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

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Soil Storage (in)	S	1.97
Runoff (in)	R	7.01
Runoff (ac-ft)	Vr	31.87

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION

AREA (AC):	54.59
CN:	62.2

POST DEVELOPED CONDITION

AREA (AC):	54.59
CN:	83.6

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	19.87	31.87	12.00
FDOT	100 yr, 240 hr	47.65	63.05	15.41
FDOT	100 yr, 8 hr	13.63	24.20	10.56

MAXIMUM ATTENUATION VOLUME (AC-FT)	15.41

WATER QUALITY CALCULATIONS

Water Management District
Pollution Abatement Volume Requirement

Agency:	SJRWMD
Post Development Total Area (ac) =	54.59
Post Development Impervious Area Added (ac) =	21.64

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing a on-line dry retention facility.

Dry Retention (On-Line System) Criteria - 1.25" over added impervious area or 0.5" over total area, whichever is greater. Plus add 0.5" over the total area. (Based on the SJRWMD treatment volume requirements found in the 2018 Permit Information Manual.)

Dry Retention	**Ac-Ft**	
1) 0.5" of Runoff Over Total Area =	2.27	Governs
2) 1.25" of Runoff Over Added Impervious Area =	2.25	
Governing Condition + 0.5" x Total Area =	4.55	
DRY RETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	**4.55**	

ESTIMATE FLOODPLAIN IMPACTS

With Bridge between Lakes

Floodplain Elevation(3)	Average Existing Ground(4)/ESHWT Elevation(5)	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
106.4	101.0	101.0	5.4	2.39	12.93
				Total Impact Volume:	**12.93**

Without Bridge between Lakes

Floodplain Elevation(3)	Average Existing Ground(4)/ESHWT Elevation(5)	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
106.4	103.0	103.0	3.4	9.42	32.03
106.4	101.0	101.0	5.4	2.39	12.93
				Total Impact Volume:	**44.96**

(3) The floodplain elevations were drawn from published FEMA data.

(4) The average existing ground elevations were estimated from the published county lidar data.

(5) The ESHWT was drawn from the observed water level of the adjacent wetlands.

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The depth available for the treatment and attenuation volumes is constrained to the front of berm elevation above the SHWT minus the freeboard minus the Dry Retention Height above SHWT.

2) We will assume the SHWT elevations for the purpose of preliminary pond sizing to be at 6.5' below ground due to the average soil types' in the areas of the pond alternatives SHWT is > 80" (6.67') [USGS].

D = Pond Depth from front of Maint. Berm to SHWT =	6.5	ft
F = Freeboard =	1	ft
R = Dry Retention Height Above SHWT =	2	ft
H = D - F - R =	3.5	ft

3) Sum the required treatment, flood compensation, and/or attenuation volumes to attain the Peak Pond Volume. Note that a negative attenuation volume reduces the required floodplain compensation volume.

Required Attenuation Volume =	15.41	ac-ft
Required Treatment Volume =	4.55	ac-ft
Required Flood Compensation Volume =	12.93	ac-ft
Total Attenuation and Treatment Volume =	**19.96**	**ac-ft**
Total Peak Volume =	**32.88**	**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 (ft)
	W =	width of vertical sided pond (ft)

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

Volume =	19.96	ac-ft
H =	3.5	ft

19.96 = L^2 x 3.5

Solving for L =	498.4	ft
Therefore W =	498.4	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:	3.5	ft
x =	28	ft
Length @ top of slope =	526	ft
Width @ top of slope =	526	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	556	ft
Width w/maint. Berm =	556	ft
Total Area =	7.1	acre
Add 10% Contingency	7.8	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN = 7.8 ACRE

Proposed Pond 2C(6) (Treat., Atten., & Floodplain Comp.): **9.3 acre**

(6) Sized to include floodplain compensation as well as to compensate for hilly terrain. Floodplain compensation is only accounted for up to the 100-year floodplain elevation or the front of berm, whichever is lower.

POND STAGE/STORAGE CALCULATIONS

Proposed Pond 2C (Sized to retain the project's treatment, attenuation, and flood comp. volumes):

Ave. Existing Ground Elevation =	116	ft
Normal Water Elevation =	101	ft (Per the adjacent wetland's observed water elevation)
Lowest Profile Elevation =	125.84	ft
Total Pond Area =	9.29	acre
Depth of Pond =	10.00	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
104.00	Bottom of Pond	5.52		0.00	0.00	0.00
105.00		5.77	5.64	1.00	5.64	5.64
106.00		6.02	5.89	1.00	5.89	11.54
106.40	Top of Floodplain Comp.	6.12	6.07	0.40	2.43	13.96
107.00		6.28	6.20	0.60	3.72	17.68
108.00		6.54	6.41	1.00	6.41	24.09
109.00		6.81	6.67	1.00	6.67	30.76
110.00		7.08	6.94	1.00	6.94	37.71
111.00		7.36	7.22	1.00	7.22	44.93
112.00		7.64	7.50	1.00	7.50	52.42
113.00	Free Board Elevation	7.92	7.78	1.00	7.78	60.20
114.00	Front Maint. Berm	8.20	8.06	1.00	8.06	68.26
115.88	Back Maint. Berm	9.29	8.75	1.88	16.40	84.66

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment (Project Only)	4.55	104.74	0.74
Treatment and Attenuation (Project Only)	19.96	107.54	3.54
Treatment, Attenuation, & Flood Comp. (Project Only)	32.88	109.49	5.49
Remaining Volume (Total Volume - Volume at Berm Front):			**0.00**

Description	Volume Required (ac-ft)	Floodplain Elevation	Compensation Provided (ac-ft)
Total 106.4' Floodplain Compensation Required	12.93	106.40	13.96
Remaining 106.4' Floodplain Comp. Volume Required:			**0.00**

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 3A1, 3A2, & 3A3
Basin 3

Computed By:	MS
Checked By:	MH
Date:	5/20/2019

Beginning Station	18846.66
End Station	24420.95
Length (ft)	5574.29

Pre-Development

Total Basin Area	
Description	**Area (ac)**
Unimproved land (water bodies & woods), pasture/range, and orchards	76.38
TOTAL BASIN AREA	**76.38**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc.	0.00
TOTAL IMPERVIOUS AREA	**0.00**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Pasture/Range (Poor)	A	68	41.49	2,821.03
Pasture/Range (Poor)	D	89	14.29	1,272.00
Pasture/Range (Poor) - Offsite	A	68	0.79	53.71
Pasture/Range (Poor) - Offsite	D	89	0.38	33.50
Woods/Orchard (Poor)	A	57	7.16	408.06
Woods (Good)	D	77	0.24	18.59
Water Bodies	D	100	12.03	1,203.40
		TOTAL	76.38	5,810.28
		COMPOSITE CN		**76.1**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	3.15	6.08	38.73
100 yr, 240 hr	FDOT	16.00	3.15	12.76	81.21
100 yr, 8 hr	FDOT	7.24	3.15	4.48	28.51

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	3.15
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.08
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	38.73

Post Development

Total Basin Area	
Description	**Area (ac)**
Roadway, off-site areas, unimproved lands adjacent to bridges, and ponds	76.38
TOTAL AREA (AC)	**76.38**

Proposed Impervious Area		
Description	**Area[2]**	
Proposed Pavement[1]	28.71	
Total Impervious Area	**28.71**	**Acre**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.

(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Roadway	A/D	98	28.71	2,813.38
Grassed/Open Area (Good)	A	39	18.79	732.70
Grassed/Open Area (Good)	D	80	16.27	1,301.49
Pasture/Range (Poor) - Offsite	A	68	0.79	53.71
Pasture/Range (Poor) - Offsite	D	89	0.38	33.50
Proposed Pond Area	D	100	11.45	1,144.84
		TOTAL	76.38	6,079.62
		COMPOSITE CN		**79.6**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	2.56	6.52	41.49
100 yr, 240 hr	FDOT	16.00	2.56	13.29	84.58
100 yr, 8 hr	FDOT	7.24	2.56	4.87	31.01

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

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

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Soil Storage (in)	S	2.56
Runoff (in)	R	6.52
Runoff (ac-ft)	Vr	41.49

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION

AREA (AC):	76.38
CN:	76.1

POST DEVELOPED CONDITION

AREA (AC):	76.38
CN:	79.6

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	38.73	41.49	2.76
FDOT	100 yr, 240 hr	81.21	84.58	3.36
FDOT	100 yr, 8 hr	28.51	31.01	2.49

MAXIMUM ATTENUATION VOLUME (AC-FT)	3.36

WATER QUALITY CALCULATIONS

Water Management District
Pollution Abatement Volume Requirement

Agency:	SJRWMD
Post Development Total Area (ac) =	76.38
Post Development Impervious Area Added (ac) =	28.71

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing a on-line wet detention facility.

Wet Detention (On-Line System) Criteria - 2.50" over added impervious area or 1.0" over total area, whichever is greater. (Based on the SJRWMD's and SFWMD's treatment volume requirements found in the 2018 Permit Information Manual and 2016 ERP Applicant's Handbook Volume II, respectively.) The SFWMD and SJRWMD requirements for wet detention facilities are the same.

Water Quality Volume Required	Ac-Ft	
1) 1" of Runoff Over Total Area =	6.36	Governs
2) 2.5" of Runoff Over Added Impervious Area =	5.98	
POLLUTION ABATEMENT VOLUME REQUIRED =	6.36	

ESTIMATE FLOODPLAIN IMPACTS

Floodplain Elevation(3)	Average Existing Ground(4)/ESHWT Elevation(5)	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
106.4	103.0	103.0	3.4	17.54	59.65
106.4	104.7		1.7	5.18	8.80
				Total Impact Volume:	**68.45**

(3) The floodplain elevations were drawn from published FEMA data.

(4) The average existing ground elevations were estimated from the published county lidar data.

(5) The ESHWT was drawn from the observed water level of the adjacent wetlands.

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The depth available for the treatment and attenuation volumes is constrained to the front of berm elevation above the SHWT minus the freeboard.

2) We will assume the SHWT elevations for the purpose of preliminary pond sizing to be at 5' below ground due to the average soil types' in the areas of the pond alternatives SHWT is 42" (3.5') to 72" (6') [USGS].

D = Pond Depth from front of Maint. Berm to SHWT =	5	ft
F = Freeboard =	1	ft
H = D - F =	4	ft

3) Sum the required treatment, flood compensation, and/or attenuation volumes to attain the Peak Pond Volume.

Required Attenuation Volume =	3.36	ac-ft
Required Treatment Volume =	6.36	ac-ft
Required Flood Compensation Volume =	68.45	ac-ft
Total Attenuation and Treatment Volume =	**9.73**	**ac-ft**
Total Peak Volume =	**78.18**	**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 (ft)
W = width of vertical sided pond (ft)

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

Volume =	9.73	ac-ft
H =	4	ft

$9.73 = L^2 \times 4$

Solving for L =	325.5	ft
Therefore W =	325.5	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:	4	ft
x =	32	ft
Length @ top of slope =	357	ft
Width @ top of slope =	357	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	387	ft
Width w/maint. Berm =	387	ft
Total Area =	3.45	acre
Add 10% Contingency	3.79	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN =	3.8	ACRE

Proposed Pond 3A1 (Treat., Atten., & Floodplain Comp.):	**7.5 acre**
Proposed Pond 3A2 (Floodplain Comp.):	**3.9 acre**
Proposed Pond 3A3 (Floodplain Comp.):	**14.6 acre**
Total Area of Proposed Ponds(6):	**26.1 acre**

Facility Type	Total Area (ac)
Wet Facility	7.5
Floodplain Comp.	18.6

(6) Sized to include floodplain compensation as well as to compensate for hilly terrain. Floodplain compensation is only accounted for up to the 100-year floodplain elevation or the front of berm, whichever is lower.

POND STAGE/STORAGE CALCULATIONS

Proposed Pond 3A1 (Sized to retain the project's treatment, attenuation, and partial flood comp.):

Ave. Existing Ground Elevation =	110 ft
Normal Water Elevation =	103 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation =	112.81 ft
Total Pond Area =	7.51 acre
Depth of Pond =	5.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
103.00	Control Elevation	5.03		0.00	0.00	0.00
104.00		5.29	5.16	1.00	5.16	5.16
105.00		5.57	5.43	1.00	5.43	10.59
106.00		5.84	5.71	1.00	5.71	16.30
106.40	Top of Floodplain Comp.	5.96	5.90	0.40	2.36	18.66
107.00	Freeboard Elevation	6.13	6.04	0.60	3.63	22.28
108.00	Front Maint. Berm	6.41	6.27	1.00	6.27	28.55
109.88	Back Maint. Berm	7.51	6.96	1.88	13.05	41.61

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment	6.36	104.22	1.22
Treatment and Attenuation	9.73	104.90	1.90

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided(7) (ac-ft)
Total 106.4' Floodplain Compensation Required	68.45	106.40	15.29
Remaining 106.4' Floodplain Comp. Volume Required:			**53.16**

(7) Compensation provided does not include attenuation volumes.

Proposed Pond 3A2 (Sized to retain a portion of the project's flood comp. volume):

Ave. Existing Ground Elevation =	108 ft
Normal Water Elevation =	103 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation =	112.81 ft
Total Pond Area =	3.94 acre
Depth of Pond =	5.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
103.00	Bottom of Pond	2.94		0.00	0.00	0.00
104.00		3.14	3.04	1.00	3.04	3.04
105.00		3.33	3.23	1.00	3.23	6.27
106.00		3.53	3.43	1.00	3.43	9.71
106.40	Top of Floodplain Comp.	3.61	3.57	0.40	1.43	11.13
107.00		3.73	3.67	0.60	2.20	13.34
108.00	Top of Pond	3.94	3.84	1.00	3.84	17.17

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Remaining 106.4' Floodplain Compensation Required	53.16	106.40	11.13
Remaining 106.4' Floodplain Comp. Volume Required:			**42.02**

Proposed Flood Comp. Area 3A3 (Sized to retain a portion of the project's flood comp. volume):

Ave. Existing Ground Elevation = 110 ft
Normal Water Elevation = 103 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 112.81 ft
Total Pond Area = 14.65 acre
Depth of Pond = 7.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
103.00	Bottom of Pond	12.38		0.00	0.00	0.00
104.00		12.70	12.54	1.00	12.54	12.54
105.00		13.02	12.86	1.00	12.86	25.39
106.00		13.34	13.18	1.00	13.18	38.57
106.40	Top of Floodplain Comp.	13.47	13.40	0.40	5.36	43.93
107.00		13.66	13.56	0.60	8.14	52.07
108.00		13.99	13.82	1.00	13.82	65.89
109.00		14.32	14.15	1.00	14.15	80.04
110.00	Top of Pond	14.65	14.48	1.00	14.48	94.53

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Remaining 106.4' Floodplain Compensation Required	42.02	106.40	43.93
Remaining 106.4' Floodplain Comp. Volume Required:			**0.00**

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 3B1, 3B2, 3B3, & 3B4
Basin 3

Computed By:	MS
Checked By:	MH
Date:	5/21/2019

Beginning Station	18846.66
End Station	24420.95
Length (ft)	5574.29

Pre-Development

Total Basin Area	
Description	**Area (ac)**
Unimproved land (water bodies & woods), pasture/range, and orchards	83.34
TOTAL BASIN AREA	**83.34**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc.	0.00
TOTAL IMPERVIOUS AREA	**0.00**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Pasture/Range (Poor)	A	68	48.45	3,294.33
Pasture/Range (Poor)	D	89	14.29	1,272.00
Pasture/Range (Poor) - Offsite	A	68	0.79	53.71
Pasture/Range (Poor) - Offsite	D	89	0.38	33.50
Woods/Orchard (Poor)	A	57	7.16	408.06
Woods (Good)	D	77	0.24	18.59
Water Bodies	D	100	12.03	1,203.40
		TOTAL	83.34	6,283.58
		COMPOSITE CN		**75.4**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	3.26	6.00	41.68
100 yr, 240 hr	FDOT	16.00	3.26	12.66	87.90
100 yr, 8 hr	FDOT	7.24	3.26	4.41	30.59

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

Soil Storage (in)	S	3.26

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

Runoff (in)	R	6.00

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Runoff (ac-ft)	Vr	41.68

Post Development

Total Basin Area		
Description		**Area (ac)**
Roadway, off-site areas, unimproved lands adjacent to bridges, and ponds		83.34
	TOTAL AREA (AC)	**83.34**

Proposed Impervious Area		
Description	**Area**[2]	
Proposed Pavement[1]	28.71	
Total Impervious Area	**28.71**	**Acre**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.

(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Roadway	A/D	98	28.71	2,813.38
Grassed/Open Area (Good)	A	39	27.19	1,060.60
Grassed/Open Area (Good)	D	80	19.31	1,544.76
Pasture/Range (Poor) - Offsite	A	68	0.79	53.71
Pasture/Range (Poor) - Offsite	D	89	0.38	33.50
Proposed Pond Area	D	100	6.96	696.03
		TOTAL	83.34	6,201.97
			COMPOSITE CN	**74.4**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	3.44	5.88	40.84
100 yr, 240 hr	FDOT	16.00	3.44	12.51	86.85
100 yr, 8 hr	FDOT	7.24	3.44	4.30	29.85

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	3.44
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	5.88
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	40.84

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION		**POST DEVELOPED CONDITION**	
AREA (AC):	83.34	AREA (AC):	83.34
CN:	75.4	CN:	74.4

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	41.68	40.84	-0.84
FDOT	100 yr, 240 hr	87.90	86.85	-1.05
FDOT	100 yr, 8 hr	30.59	29.85	-0.75

MAXIMUM ATTENUATION VOLUME (AC-FT)	-0.75

WATER QUALITY CALCULATIONS

Water Management District
Pollution Abatement Volume Requirement

Agency:	SJRWMD
Post Development Total Area (ac) =	83.34
Post Development Impervious Area Added (ac) =	28.71

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing an on-line off-site dry retention facility paired with infield flood planes.

Dry Retention (On-Line System) Criteria - 1.25" over added impervious area or 0.5" over total area, whichever is greater. Plus add 0.5" over the total area. (Based on the SJRWMD treatment volume requirements found in the 2018 Permit Information Manual.)

Dry Retention	**Ac-Ft**	
1) 0.5" of Runoff Over Total Area =	3.47	Governs
2) 1.25" of Runoff Over Added Impervious Area =	2.99	
Governing Condition + 0.5" x Total Area =	6.94	
DRY RETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	**6.94**	

ESTIMATE FLOODPLAIN IMPACTS

Floodplain Elevation(3)	Average Existing Ground(4)/ESHWT Elevation(5)	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
106.4	103.0	103.0	3.4	17.54	59.65
106.4	104.7		1.7	5.18	8.80
				Total Impact Volume:	**68.45**

(3) The floodplain elevations were drawn from published FEMA data.

(4) The average existing ground elevations were estimated from the published county lidar data.

(5) The ESHWT was drawn from the observed water level of the adjacent wetlands.

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The depth available for the treatment and attenuation volumes is constrained to the front of berm elevation above the SHWT minus the freeboard minus the Dry Retention Height above SHWT.

2) We will assume the ponds' average SHWT elevations for the purpose of this preliminary pond sizing calculation to be at 6.5' below ground due to the soil types' average SHWT's in the dry pond area (12 ac) is > 80" (6.67') [USGS].

D = Pond Depth from front of Maint. Berm to SHWT =	6.5	ft
F = Freeboard =	1	ft
R = Dry Retention Height Above SHWT =	2	ft
H = D - F - R =	3.5	ft

3) Sum the required treatment, flood compensation, and/or attenuation volumes to attain the Peak Pond Volume. Note that a negative attenuation volume reduces the required floodplain compensation volume.

Required Attenuation Volume =	-0.75	ac-ft
Required Treatment Volume =	6.94	ac-ft
Required Flood Compensation Volume =	68.45	ac-ft
Total Floodplain Impacts =	68.45	ac-ft
Total Attenuation Credits =	-0.75	ac-ft
Total Required Floodplain Compensation =	**67.70**	**ac-ft**
Total Peak Volume =	**74.65**	**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 (ft)
- W = width of vertical sided pond (ft)

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

Volume =	6.94	ac-ft
H =	3.5	ft

$6.94 = L^2 \times 3.5$

Solving for L =	294.0	ft
Therefore W =	294.0	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 =	322	ft
Width @ top of slope =	322	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	352	ft
Width w/maint. Berm =	352	ft
Total Area =	2.8	acre
Add 10% Contingency	3.1	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN =	3.1	ACRE

		Facility Type	Total Area (ac)
Proposed Pond 3B1 (Floodplain Comp. and Attenuation Credit):	**7.5 acre**	Floodplain Comp.	25.1
Proposed Pond 3B2 (Floodplain Comp. and Attenuation Credit):	**3.9 acre**		
Proposed Pond 3B3 (Floodplain Comp. and Attenuation Credit):	**13.7 acre**		
Proposed Pond 3B4 (Treatment):	**7.0 acre**	Dry Facility	7.0
Total Area of Proposed Ponds[(6)]:	**32.1 acre**		

(6) Sized to include floodplain compensation as well as to compensate for hilly terrain. Floodplain compensation is only accounted for up to the 100-year floodplain elevation or the front of berm, whichever is lower.

POND STAGE/STORAGE CALCULATIONS

Proposed Pond 3B4 (Sized to retain the project's treatment):

Ave. Existing Ground Elevation = 120 ft
Normal Water Elevation = 103 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 112.81 ft
Total Pond Area = 6.96 acre
Depth of Pond = 8.50 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
109.50	Bottom of Pond	4.51		0.00	0.00	0.00
110.00		4.60	4.55	0.50	2.28	2.28
111.00	Freeboard Elevation	4.78	4.69	1.00	4.69	6.97
112.00		4.97	4.88	1.00	4.88	11.85
113.00		5.17	5.07	1.00	5.07	16.92
114.00		5.36	5.26	1.00	5.26	22.18
115.00		5.56	5.46	1.00	5.46	27.64
116.00		5.76	5.66	1.00	5.66	33.30
117.00		5.96	5.86	1.00	5.86	39.16
118.00	Front Maint. Berm	6.17	6.07	1.00	6.07	45.23
119.88	Back Maint. Berm	6.96	6.56	1.88	12.31	57.54

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment	6.94	111.00	1.50

Proposed Flood Comp. Area 3B1 (Sized to retain a portion of the project's flood comp. volume and attenuation credit):

Ave. Existing Ground Elevation = 110 ft
Normal Water Elevation = 103 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 112.81 ft
Total Pond Area = 7.51 acre
Depth of Pond = 7.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
103.00	Bottom of Pond	5.50		0.00	0.00	0.00
104.00		5.77	5.64	1.00	5.64	5.64
105.00		6.06	5.92	1.00	5.92	11.55
106.00		6.34	6.20	1.00	6.20	17.75
106.40	Top of Floodplain Comp.	6.46	6.40	0.40	2.56	20.31
107.00		6.63	6.54	0.60	3.93	24.24
108.00		6.92	6.78	1.00	6.78	31.01
109.00		7.21	7.07	1.00	7.07	38.08
110.00	Top of Pond	7.51	7.36	1.00	7.36	45.45

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Total 106.4' Floodplain Compensation Required	67.70	106.40	20.31
Remaining Floodplain Comp. Volume Required:			**47.39**

Proposed Flood Comp. Area 3B2 (Sized to retain a portion of the project's flood comp. volume and attenuation credit):

Ave. Existing Ground Elevation =	108	ft
Normal Water Elevation =	103	ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation =	112.81	ft
Total Pond Area =	3.94	acre
Depth of Pond =	5.00	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
103.00	Bottom of Pond	2.94		0.00	0.00	0.00
104.00		3.14	3.04	1.00	3.04	3.04
105.00		3.33	3.23	1.00	3.23	6.27
106.00		3.53	3.43	1.00	3.43	9.71
106.40	Top of Floodplain Comp.	3.61	3.57	0.40	1.43	11.13
107.00		3.73	3.67	0.60	2.20	13.34
108.00	Top of Pond	7.51	5.62	1.00	5.62	18.96

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Remaining 106.4' Floodplain Compensation Required	47.39	106.40	11.16
Remaining Floodplain Comp. Volume Required:			**36.23**

Proposed Flood Comp. Area 3B3 (Sized to retain a portion of the project's flood comp. volume and attenuation credit):

Ave. Existing Ground Elevation =	110	ft
Normal Water Elevation =	103	ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation =	112.81	ft
Total Pond Area =	13.67	acre
Depth of Pond =	7.00	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
103.00	Bottom of Pond	11.51		0.00	0.00	0.00
104.00		11.81	11.66	1.00	11.66	11.66
105.00		12.11	11.96	1.00	11.96	23.62
106.00		12.42	12.27	1.00	12.27	35.89
106.40	Top of Floodplain Comp.	12.54	12.48	0.40	4.99	40.88
107.00		12.73	12.64	0.60	7.58	48.46
108.00		13.04	12.88	1.00	12.88	61.35
109.00		13.35	13.20	1.00	13.20	74.55
110.00	Top of Pond	13.67	13.51	1.00	13.51	88.06

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Remaining 106.4' Floodplain Compensation Required	36.23	106.40	40.92
Remaining Floodplain Comp. Volume Required:			**0.00**

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 3C1, 3C2, 3C3, & 3C4
Basin 3

Computed By:	MS
Checked By:	MH
Date:	5/21/2019

Beginning Station	18846.66
End Station	24420.95
Length (ft)	5574.29

Pre-Development

Total Basin Area	
Description	**Area (ac)**
Unimproved land (water bodies & woods), pasture/range, and orchards	83.63
TOTAL BASIN AREA	**83.63**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc.	0.00
TOTAL IMPERVIOUS AREA	**0.00**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Pasture/Range (Poor)	A	68	48.74	3,314.37
Pasture/Range (Poor)	D	89	14.29	1,272.00
Pasture/Range (Poor) - Offsite	A	68	0.79	53.71
Pasture/Range (Poor) - Offsite	D	89	0.38	33.50
Woods/Orchard (Poor)	A	57	7.16	408.06
Woods (Good)	D	77	0.24	18.59
Water Bodies	D	100	12.03	1,203.40
		TOTAL	83.63	6,303.63
		COMPOSITE CN		**75.4**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	3.27	6.00	41.80
100 yr, 240 hr	FDOT	16.00	3.27	12.65	88.18
100 yr, 8 hr	FDOT	7.24	3.27	4.40	30.68

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

Soil Storage (in)	S	3.27

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

Runoff (in)	R	6.00

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Runoff (ac-ft)	Vr	41.80

Post Development

Total Basin Area	
Description	**Area (ac)**
Roadway, off-site areas, unimproved lands under bridges, and ponds	83.63
TOTAL AREA (AC)	**83.63**

Proposed Impervious Area		
Description	**Area[2]**	
Proposed Pavement[1]	28.71	
Total Impervious Area	**28.71**	**Acre**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.

(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Roadway	A/D	98	28.71	2,813.38
Grassed/Open Area (Good)	A	39	27.19	1,060.60
Grassed/Open Area (Good)	D	80	19.31	1,544.76
Pasture/Range (Poor) - Offsite	A	68	0.79	53.71
Pasture/Range (Poor) - Offsite	D	89	0.38	33.50
Proposed Pond Area	D	100	7.26	725.51
		TOTAL	83.63	6,231.45
			COMPOSITE CN	**74.5**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	3.42	5.89	41.06
100 yr, 240 hr	FDOT	16.00	3.42	12.52	87.25
100 yr, 8 hr	FDOT	7.24	3.42	4.31	30.02

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

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

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Soil Storage (in)	S	3.42
Runoff (in)	R	5.89
Runoff (ac-ft)	Vr	41.06

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION

AREA (AC):	83.63
CN:	75.4

POST DEVELOPED CONDITION

AREA (AC):	83.63
CN:	74.5

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	41.80	41.06	-0.74
FDOT	100 yr, 240 hr	88.18	87.25	-0.93
FDOT	100 yr, 8 hr	30.68	30.02	-0.66

MAXIMUM ATTENUATION VOLUME (AC-FT)	-0.66

WATER QUALITY CALCULATIONS

Water Management District
Pollution Abatement Volume Requirement

Agency:	SJRWMD
Post Development Total Area (ac) =	83.63
Post Development Impervious Area Added (ac) =	28.71

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing an on-line off-site dry retention facility paired with infield flood planes.

Dry Retention (On-Line System) Criteria - 1.25" over impervious area or 0.5" over total area, whichever is greater. Plus add 0.5" over the total area. (Based on the SJRWMD treatment volume requirements found in the 2018 Permit Information Manual.)

Dry Retention	**Ac-Ft**	
1) 0.5" of Runoff Over Total Area =	3.48	Governs
2) 1.25" of Runoff Over Added Impervious Area =	2.99	
Governing Condition + 0.5" x Total Area =	6.97	
DRY RETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	**6.97**	

ESTIMATE FLOODPLAIN IMPACTS

Floodplain Elevation(3)	**Average Existing Ground(4)/ESHWT Elevation(5)**	**Exist. Pond Control**	**Depth of Impact (ft)**	**Area of Impact (ac)**	**Impact Volume (ac-ft)**
106.4	103.0	103.0	3.4	17.54	59.65
106.4	104.7		1.7	5.18	8.80
				Total Impact Volume:	**68.45**

(3) The floodplain elevations were drawn from published FEMA data.

(4) The average existing ground elevations were estimated from the published county lidar data.

(5) The ESHWT was drawn from the observed water level of the adjacent wetlands.

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The depth available for the treatment and attenuation volumes is constrained to the front of berm elevation above the SHWT minus the freeboard minus the Dry Retention Height above SHWT.

2) We will assume the ponds' average SHWT elevations for the purpose of this preliminary pond sizing calculation to be at 6.5' below ground due to the soil types' average SHWT's in the dry pond area (12 ac) is > 80" (6.67') [USGS].

D = Pond Depth from front of Maint. Berm to SHWT =	6.5	ft
F = Freeboard =	1	ft
R = Dry Retention Height Above SHWT =	2	ft
H = D - F - R =	3.5	ft

3) Sum the required treatment, flood compensation, and/or attenuation volumes to attain the Peak Pond Volume. Note that a negative attenuation volume reduces the required floodplain compensation volume.

Required Attenuation Volume =	-0.66	ac-ft
Required Treatment Volume =	6.97	ac-ft
Required Flood Compensation Volume =	68.45	ac-ft
Total Floodplain Impacts =	68.45	ac-ft
Total Attenuation Credits =	-0.66	ac-ft
Total Required Floodplain Compensation =	**67.79**	**ac-ft**
Total Peak Volume =	**74.76**	**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 (ft)
	W =	width of vertical sided pond (ft)

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

Volume =	6.97	ac-ft
H =	3.5	ft

$$6.97 = L^2 \times 3.5$$

Solving for L =	294.5	ft
Therefore W =	294.5	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:	3.5	ft
x =	28	ft
Length @ top of slope =	323	ft
Width @ top of slope =	323	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	353	ft
Width w/maint. Berm =	353	ft
Total Area =	2.9	acre
Add 10% Contingency	3.1	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN =	3.1	ACRE

		Facility Type	Total Area (ac)
Proposed Pond 3C1 (Floodplain Comp. and Attenuation Credit):	**6.8 acre**	Floodplain Comp.	23.9
Proposed Pond 3C2 (Floodplain Comp. and Attenuation Credit):	**3.4 acre**		
Proposed Pond 3C3 (Floodplain Comp. and Attenuation Credit):	**13.7 acre**		
Proposed Pond 3C4 (Treatment):	**7.3 acre**	Dry Facility	7.3
Total Area of Proposed Ponds[(6)]:	**31.1 acre**		

(6) Sized to include floodplain compensation as well as to compensate for hilly terrain. Floodplain compensation is only accounted for up to the 100-year floodplain elevation or the front of berm, whichever is lower.

POND STAGE/STORAGE CALCULATIONS

Proposed Pond 3C4 (Sized to retain the project's treatment):

Ave. Existing Ground Elevation = 122 ft
Normal Water Elevation = 103 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 112.81 ft
Total Pond Area = 7.26 acre
Depth of Pond = 10.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
110.00	Bottom of Pond	4.68		0.00	0.00	0.00
111.00	Freeboard Elev. 111.50'	4.85	4.76	1.00	4.76	4.76
112.00		5.02	4.93	1.00	4.93	9.69
113.00		5.19	5.11	1.00	5.11	14.80
114.00		5.37	5.28	1.00	5.28	20.08
115.00		5.56	5.46	1.00	5.46	25.55
116.00		5.74	5.65	1.00	5.65	31.20
117.00		5.93	5.83	1.00	5.83	37.03
118.00		6.12	6.02	1.00	6.02	43.05
119.00		6.31	6.21	1.00	6.21	49.27
120.00	Front Maint. Berm	6.50	6.41	1.00	6.41	55.67
121.88	Back Maint. Berm	7.26	6.88	1.88	12.90	68.57

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment	6.97	111.47	1.47

Proposed Flood Comp. Area 3C1 (Sized to retain a portion of the project's flood comp. volume and attenuation credit):

Ave. Existing Ground Elevation = 110 ft
Normal Water Elevation = 103 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 112.81 ft
Total Pond Area = 6.78 acre
Depth of Pond = 7.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
103.00	Bottom of Pond	5.50		0.00	0.00	0.00
104.00		5.77	5.64	1.00	5.64	5.64
105.00		6.06	5.92	1.00	5.92	11.55
106.00		6.34	6.20	1.00	6.20	17.75
106.40	Top of Floodplain Comp.	6.46	6.40	0.40	2.56	20.31
107.00		6.63	6.54	0.60	3.93	24.24
108.00		6.92	6.78	1.00	6.78	31.01
109.00		7.21	7.07	1.00	7.07	38.08
110.00	Top of Pond	6.78	7.00	1.00	7.00	45.08

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Total 106.4' Floodplain Compensation Required	67.79	106.40	20.35
Remaining Floodplain Comp. Volume Required:			**47.44**

Proposed Flood Comp. Area 3C2 (Sized to retain a portion of the project's flood comp. volume and attenuation credit):

Ave. Existing Ground Elevation =	108	ft
Normal Water Elevation =	103	ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation =	112.81	ft
Total Pond Area =	3.43	acre
Depth of Pond =	5.00	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
103.00	Bottom of Pond	2.94		0.00	0.00	0.00
104.00		3.14	3.04	1.00	3.04	3.04
105.00		3.33	3.23	1.00	3.23	6.27
106.00		3.53	3.43	1.00	3.43	9.71
106.40	Top of Floodplain Comp.	3.61	3.57	0.40	1.43	11.13
107.00		3.73	3.67	0.60	2.20	13.34
108.00	Top of Pond	3.43	3.58	1.00	3.58	16.92

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Remaining 106.4' Floodplain Compensation Required	47.44	106.40	11.16
Remaining Floodplain Comp. Volume Required:			**36.28**

Proposed Flood Comp. Area 3C3 (Sized to retain a portion of the project's flood comp. volume and attenuation credit):

Ave. Existing Ground Elevation =	110	ft
Normal Water Elevation =	103	ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation =	112.81	ft
Total Pond Area =	13.67	acre
Depth of Pond =	7.00	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
103.00	Control Elevation	11.51		0.00	0.00	0.00
104.00		11.81	11.66	1.00	11.66	11.66
105.00		12.11	11.96	1.00	11.96	23.62
106.00		12.42	12.27	1.00	12.27	35.89
106.40	Top of Floodplain Comp.	12.54	12.48	0.40	4.99	40.88
107.00		12.73	12.64	0.60	7.58	48.46
108.00		13.04	12.88	1.00	12.88	61.35
109.00		13.35	13.20	1.00	13.20	74.55
110.00		13.67	13.51	1.00	13.51	88.06

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Remaining 106.4' Floodplain Compensation Required	36.28	106.40	40.92
Remaining Floodplain Comp. Volume Required:			**0.00**

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 4A1, 4A2, & 4A3
Basin 4

Computed By:	MS
Checked By:	MH
Date:	5/21/2019

Beginning Station	24420.95
End Station	31505.52
Length (ft)	7084.57

Pre-Development

Total Basin Area	
Description	**Area (ac)**
Unimproved land (water bodies & woods), pasture/range, and orchards	113.45
TOTAL AREA	**113.45**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc.	0.00
TOTAL IMPERVIOUS AREA	**0.00**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Roadway and Sidewalks	D	98	0.00	0.00
Pasture/Range (Poor)	A	68	48.47	3,295.90
Pasture/Range (Poor)	D	89	11.82	1,051.66
Pasture/Range (Poor) - Offsite	A	68	4.92	334.65
Woods/Orchard (Poor)	A	57	4.24	241.40
Woods (Good)	A	30	1.03	31.01
Water Bodies	D	100	42.98	4,297.53
		TOTAL	113.45	9,252.16
		COMPOSITE CN		**81.6**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	2.26	6.76	63.90
25 yr, 72 hr	SFWMD	9.65	2.26	7.38	69.79
100 yr, 240 hr	FDOT	16.00	2.26	13.57	128.32
100 yr, 8 hr	FDOT	7.24	2.26	5.09	48.13

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	6.76
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	63.90

Post-Development

Total Basin Area	
Description	**Area (ac)**
Roadway, off-site areas, and ponds	113.45
TOTAL AREA	**113.45**

Proposed Impervious Area	
Description	**Area[(2)] (ac)**
Proposed Pavement[(1)]	38.56
TOTAL IMPERVIOUS AREA	**38.56**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.
(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	A/D	98	38.56	3,778.41
Grassed/Open Area (Good)	A	39	37.53	1,463.60
Grassed/Open Area (Good)	D	80	18.72	1,497.67
Pasture/Range (Poor) - Offsite	A	68	4.92	334.65
Proposed Pond Area	A/D	100	13.73	1,372.54
		TOTAL	113.45	8,446.88
		COMPOSITE CN		**74.5**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	3.43	5.89	55.64
25 yr, 72 hr	SFWMD	9.65	3.43	6.48	61.29
100 yr, 240 hr	FDOT	16.00	3.43	12.51	118.28
100 yr, 8 hr	FDOT	7.24	3.43	4.30	40.67

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	3.43
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	5.89
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	55.64

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION

AREA (AC):	113.45
CN:	81.6

POST DEVELOPED CONDITION

AREA (AC):	113.45
CN:	74.5

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr) PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	63.90	55.64	-8.26
SFWMD	25 yr, 72 hr	69.79	61.29	-8.50
FDOT	100 yr, 240 hr	128.32	118.28	-10.04
FDOT	100 yr, 8 hr	48.13	40.67	-7.46

MAXIMUM ATTENUATION VOLUME (AC-FT)	-7.46

WATER QUALITY CALCULATIONS

Water Management District
Pollution Abatement Volume Requirement

Agency:	SFWMD &	SJRWMD	(Utilize most stringent regulations)
Post Development Total Area (ac) =		113.45	
Post Development Impervious Area Added (ac) =		38.56	

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing a on-line wet detention facility.

The SFWMD and SJRWMD requirements for wet detention facilities are the same.
Wet Detention (On-Line System) Criteria - 2.50" over added impervious area or 1.0" over total area, whichever is greater. (Based on the SJRWMD's and SFWMD's treatment volume requirements found in the 2018 Permit Information Manual and 2016 ERP Applicant's Handbook Volume II, respectively.)

Water Quality Volume Required:	**Ac-Ft**	
1) 1" of Runoff Over Total Area =	9.45	Governs
2) 2.5" of Runoff Over Added Impervious Area =	8.03	
POLLUTION ABATEMENT VOLUME REQUIRED =	9.45	

ESTIMATE FLOODPLAIN IMPACTS

Floodplain Elevation(3)	Average Existing Ground(4)/ESHWT Elevation(5)	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
106.4	103.0	103.0	3.4	0.57	1.95
106.4	104.7		1.7	0.44	0.75
				Total Impact Volume:	**2.70**

Floodplain Elevation(3)	Average Existing Ground(4)/ESHWT Elevation(5)	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
106.0	102.0	102.0	4.0	4.41	17.64
106.0	104.0		2.0	1.31	2.62
106.0	104.0	104.0	2.0	25.84	51.68
106.0	105.0		1.0	5.63	5.63
				Total Impact Volume:	**77.57**

(3) The floodplain elevations were drawn from published FEMA data.
(4) The average existing ground elevations were estimated from the published county lidar data.
(5) The ESHWT was drawn from the observed water level of the adjacent wetlands.

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The depth available for the treatment and attenuation volumes is constrained to the front of berm elevation above the SHWT minus the freeboard.

2) We will assume the SHWT elevations for the purpose of preliminary pond sizing to be at 5' below ground due to the average soil types' in the areas of the pond alternatives SHWT is 42" (3.5') to 72" (6') [USGS].

D = Pond Depth from top of Maint Berm to SHWT =	5	ft
M = Maintenance Berm (Maint Berm) =	1	ft
H = D - M =	4	ft

3) Sum the required treatment, flood compensation, and/or attenuation volumes to attain the Peak Pond Volume.
Note that a negative attenuation volume reduces the required floodplain compensation volume.

Required Attenuation Volume =	-7.46	ac-ft
Required Treatment Volume =	9.45	ac-ft
Required 106.0' Floodplain Compensation Volume =	77.57	ac-ft
Required 106.4' Floodplain Compensation Volume =	2.70	ac-ft
Total Floodplain Impacts =	80.27	ac-ft
Total Attenuation Credits =	-7.46	ac-ft
Total Required Floodplain Compensation =	**72.80**	**ac-ft**
Total Peak Volume =	**82.26**	**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 (ft)
W = width of vertical sided pond (ft)

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

Volume = 9.45 ac-ft
H = 4 ft

$9.45 = L^2 \times 4$

Solving for L = 320.9 ft
Therefore W = 320.9 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:	4	ft
x =	32	ft
Length @ top of slope =	353	ft
Width @ top of slope =	353	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	383	ft
Width w/maint. Berm =	383	ft
Total Area =	3.37	acre
Add 10% Contingency	3.70	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN = 3.7 ACRE

Proposed Pond 4A1 (Floodplain Comp. and Attenuation Credit):	**7.9 acre**
Proposed Pond 4A2 (Floodplain Comp. and Attenuation Credit):	**3.2 acre**
Proposed Pond 4A3 (Treatment, FP Comp., and Atten. Credit):	**13.7 acre**
Total Area of Proposed Ponds(6):	**24.9 acre**

Facility Type	Total Area (ac)
Flood Plain Comp	11.1
Wet Facility	13.7

(6) Sized to include floodplain compensation as well as to compensate for hilly terrain. Floodplain compensation is only accounted for up to the 100-year floodplain elevation or the front of berm, whichever is lower.

POND STAGE/STORAGE CALCULATIONS

Proposed Flood Comp. Area 4A1 (Sized to retain a portion of the 106.0' flood comp. volume and attenuation credit):

Ave. Existing Ground Elevation = 110 ft
Normal Water Elevation = 102 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 108.00 ft
Total Pond Area = 7.93 acre
Depth of Pond = 8.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
102.00	Bottom of Pond	5.67		0.00	0.00	0.00
103.00		5.94	5.81	1.00	5.81	5.81
104.00		6.22	6.08	1.00	6.08	11.89
105.00		6.50	6.36	1.00	6.36	18.25
106.00	Top of 106.0' FP Comp.	6.78	6.64	1.00	6.64	24.89
107.00		7.07	6.92	1.00	6.92	31.81
108.00		7.35	7.21	1.00	7.21	39.02
109.00		7.64	7.50	1.00	7.50	46.51
110.00	Top of Pond	7.93	7.79	1.00	7.79	54.30

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Total 106.0' Floodplain Compensation Required	70.11	106.00	24.89
Remaining 106.0' Floodplain Comp. Volume Required:			**45.22**

Proposed Flood Comp. Area 4A2 (Sized to retain a portion of the 106.0'/106.4' flood comp. volumes & attenuation credit):

Ave. Existing Ground Elevation = 115 ft
Normal Water Elevation = 102 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 108.00 ft
Total Pond Area = 3.22 acre
Depth of Pond = 13.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
102.00	Bottom of Pond	1.14		0.00	0.00	0.00
103.00		1.27	1.20	1.00	1.20	1.20
104.00		1.41	1.34	1.00	1.34	2.54
105.00		1.55	1.48	1.00	1.48	4.02
106.00	Top of 106.0' FP Comp.	1.70	1.62	1.00	1.62	5.64
106.40	Top of 106.4' FP Comp.	1.76	1.73	0.40	0.69	6.33
107.00		1.85	1.81	0.60	1.08	7.42
108.00		2.01	1.93	1.00	1.93	9.35
109.00		2.18	2.10	1.00	2.10	11.45
110.00		2.35	2.26	1.00	2.26	13.71
111.00		2.52	2.43	1.00	2.43	16.14
112.00		2.69	2.60	1.00	2.60	18.74
113.00		2.86	2.77	1.00	2.77	21.52
114.00		3.04	2.95	1.00	2.95	24.46
115.00	Top of Pond	3.22	3.13	1.00	3.13	27.59

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided[7] (ac-ft)
Total 106.4' Floodplain Compensation Required	2.70	106.40	6.33
Remaining 106.0' Floodplain Compensation Required	45.22	106.00	3.63
Remaining 106.4' Floodplain Comp. Volume Required:			**0.00**
Remaining 106.0' Floodplain Comp. Volume Required:			**41.58**

(7) The 106.0' floodplain comp. provided does not include the portion of the 106.4' floodplain comp. utilized under the 106.0' floodplain elevation

Proposed Pond 4A3 (Sized to retain the treatment and the remainder of the 106.0' flood comp):

Ave. Existing Ground Elevation =	110	ft
Normal Water Elevation =	102	ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation =	108.00	ft
Total Pond Area =	13.73	acre
Depth of Pond =	6.00	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
102.00	Control Elevation	10.85		0.00	0.00	0.00
103.00		11.14	10.99	1.00	10.99	10.99
104.00		11.42	11.28	1.00	11.28	22.27
105.00		11.71	11.57	1.00	11.57	33.84
106.00	Top of 106.0' FP Comp.	12.00	11.86	1.00	11.86	45.70
107.00	Freeboard Elevation	12.30	12.15	1.00	12.15	57.85
108.00	Front Maint. Berm	12.59	12.45	1.00	12.45	70.29
109.88	Back Maint. Berm	13.73	13.16	1.88	24.67	94.97

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment	9.45	102.86	0.86

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Remaining 106.0' Floodplain Compensation Required	41.58	106.00	45.70
Remaining 106.0' Floodplain Comp. Volume Required:			**0.00**

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 4B1, 4B2, & 4B3
Basin 4

Computed By:	MS
Checked By:	MH
Date:	5/21/2019

Beginning Station	24420.95
End Station	31505.52
Length (ft)	7084.57

Pre-Development

Total Basin Area	
Description	**Area (ac)**
Unimproved land (water bodies & woods), pasture/range, and orchards	99.73
TOTAL AREA	**99.73**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc.	0.00
TOTAL IMPERVIOUS AREA	**0.00**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Roadway and Sidewalks	D	98	0.00	0.00
Pasture/Range (Poor)	A	68	48.47	3,295.90
Pasture/Range (Poor)	D	89	11.82	1,051.66
Pasture/Range (Poor) - Offsite	A	68	4.92	334.65
Woods/Orchard (Poor)	A	57	4.24	241.40
Woods (Good)	A	30	1.03	31.01
Water Bodies	D	100	29.25	2,924.99
		TOTAL	99.73	7,879.62
		COMPOSITE CN		**79.0**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	2.66	6.45	53.58
25 yr, 72 hr	SFWMD	9.65	2.66	7.06	58.69
100 yr, 240 hr	FDOT	16.00	2.66	13.20	109.71
100 yr, 8 hr	FDOT	7.24	2.66	4.81	39.94

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

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

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Soil Storage (in)	S	2.66
Runoff (in)	R	6.45
Runoff (ac-ft)	Vr	53.58

Post-Development

Total Basin Area	
Description	**Area (ac)**
Roadway, off-site areas, and ponds	99.73
TOTAL AREA	**99.73**

Proposed Impervious Area	
Description	**Area[2] (ac)**
Proposed Pavement[1]	38.56
TOTAL IMPERVIOUS AREA	**38.56**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.

(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	A/D	98	38.56	3,778.41
Grassed/Open Area (Good)	A	39	29.60	1,154.29
Grassed/Open Area (Good)	D	80	18.72	1,497.67
Pasture/Range (Poor) - Offsite	A	68	4.92	334.65
Proposed Pond Area	A/D	100	7.93	793.11
		TOTAL	99.73	7,558.13
		COMPOSITE CN		**75.8**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	3.19	6.05	50.28
25 yr, 72 hr	SFWMD	9.65	3.19	6.65	55.29
100 yr, 240 hr	FDOT	16.00	3.19	12.72	105.68
100 yr, 8 hr	FDOT	7.24	3.19	4.45	36.97

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	3.19
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.05
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	50.28

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION

AREA (AC):	99.73
CN:	79.0

POST DEVELOPED CONDITION

AREA (AC):	99.73
CN:	75.8

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr) PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SJRWMD	25 yr, 24 hr	53.58	50.28	-3.30
SFWMD	25 yr, 72 hr	58.69	55.29	-3.40
FDOT	100 yr, 240 hr	109.71	105.68	-4.03
FDOT	100 yr, 8 hr	39.94	36.97	-2.97

MAXIMUM ATTENUATION VOLUME (AC-FT)	-2.97

WATER QUALITY CALCULATIONS

Water Management District
Pollution Abatement Volume Requirement

Agency:	SFWMD & SJRWMD	(Utilize most stringent regulations)
Post Development Total Area (ac) =	99.73	
Post Development Impervious Area Added (ac) =	38.56	

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing a on-line wet detention facility.

The SFWMD and SJRWMD requirements for wet detention facilities are the same.
Wet Detention (On-Line System) Criteria - 2.50" over added impervious area or 1.0" over total area, whichever is greater. (Based on the SJRWMD's and SFWMD's treatment volume requirements found in the 2018 Permit Information Manual and 2016 ERP Applicant's Handbook Volume II, respectively.)

Water Quality Volume Required:	**Ac-Ft**	
1) 1" of Runoff Over Total Area =	8.31	Governs
2) 2.5" of Runoff Over Added Impervious Area =	8.03	
POLLUTION ABATEMENT VOLUME REQUIRED =	8.31	

ESTIMATE FLOODPLAIN IMPACTS

Floodplain Elevation[3]	Average Existing Ground[4]/ESHWT Elevation[5]	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
106.4	103.0	103.0	3.4	0.57	1.95
106.4	104.7		1.7	0.44	0.75
				Total Impact Volume:	**2.70**

Floodplain Elevation[3]	Average Existing Ground[4]/ESHWT Elevation[5]	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
106.0	102.0	102.0	4.0	4.41	17.64
106.0	104.0		2.0	1.31	2.62
106.0	104.0	104.0	2.0	25.84	51.68
106.0	105.0		1.0	5.63	5.63
				Total Impact Volume:	**77.57**

(3) The floodplain elevations were drawn from published FEMA data.
(4) The average existing ground elevations were estimated from the published county lidar data.
(5) The ESHWT was drawn from the observed water level of the adjacent wetlands.

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The depth available for the treatment and attenuation volumes is constrained to the front of berm elevation above the SHWT minus the freeboard.

2) We will assume the SHWT elevations for the purpose of preliminary pond sizing to be at 5' below ground due to the average soil types' in the areas of the pond alternatives SHWT is 42" (3.5') to 72" (6') [USGS].

D = Pond Depth from top of Maint Berm to SHWT =	5	ft
M = Maintenance Berm (Maint Berm) =	1	ft
H = D - M =	4	ft

3) Sum the required treatment, flood compensation, and/or attenuation volumes to attain the Peak Pond Volume. Note that a negative attenuation volume reduces the required floodplain compensation volume.

Required Attenuation Volume =	-2.97	ac-ft
Required Treatment Volume =	8.31	ac-ft
Required 106.0' Flood Compensation Volume =	77.57	ac-ft
Required 106.4' Flood Compensation Volume =	2.70	ac-ft
Total Floodplain Impacts =	80.27	ac-ft
Total Attenuation Credits =	-2.97	ac-ft
Total Required Floodplain Compensation =	**77.29**	**ac-ft**
Total Peak Volume =	**85.60**	**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 (ft)
W = width of vertical sided pond (ft)

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

Volume = 8.31 ac-ft
H = 4 ft

$8.31 = L^2 \times 4$

Solving for L = 300.8 ft
Therefore W = 300.8 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:	4	ft
x =	32	ft
Length @ top of slope =	333	ft
Width @ top of slope =	333	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	363	ft
Width w/maint. Berm =	363	ft
Total Area =	3.02	acre
Add 10% Contingency	3.32	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN =	3.3	ACRE

Proposed Pond 4B2 (Treatment, FP Comp., and Atten. Credit):	**7.9 acre**
Proposed Pond 4B1 (Treatment, FP Comp., and Atten. Credit):	**3.2 acre**
Proposed Pond 4A3 (FP Comp. and Atten. Credit):	**15.2 acre**
Total Area of Proposed Ponds(6):	**26.4 acre**

Facility Type	Total Area (ac)
Wet Facility	11.1
FP Comp.	15.2

(6) Sized to include floodplain compensation as well as to compensate for hilly terrain. Floodplain compensation is only accounted for up to the 100-year floodplain elevation or the front of berm, whichever is lower.

POND STAGE/STORAGE CALCULATIONS

Proposed Pond 4B1 (Sized to retain a portion of the treatment, attenuation credit, and 106.0' flood comp.):

Ave. Existing Ground Elevation = 110 ft
Normal Water Elevation = 102 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 108.00 ft
Total Pond Area = 7.93 acre
Depth of Pond = 6.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
102.00	Control Elevation	5.20		0.00	0.00	0.00
103.00		5.47	5.33	1.00	5.33	5.33
104.00		5.74	5.60	1.00	5.60	10.94
105.00		6.01	5.87	1.00	5.87	16.81
106.00	Top of 106.0' FP Comp.	6.29	6.15	1.00	6.15	22.96
107.00	Free Board Elevation	6.57	6.43	1.00	6.43	29.39
108.00	Front Maint. Berm	6.85	6.71	1.00	6.71	36.10
109.88	Back Maint. Berm	7.93	7.39	1.88	13.86	49.96

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment	8.31	103.53	1.53

Description	Volume Required (ac-ft)	Elevation	Compensation Provided(7) (ac-ft)
Total Treatment Volume Required	8.31	103.50	8.13
Total 106.0' Floodplain Compensation Required	74.60	106.00	22.96
Remaining Treatment Volume Required:			**0.18**
Remaining 106.0' Floodplain Comp. Volume Required:			**51.63**

(7) The 106.0' floodplain comp. provided does not include the portion of the 106.4' floodplain comp. utilized under the 106.0' floodplain elevation

Proposed Pond 4B2 (Sized to retain a portion of the treatment, attenuation credit, and 106.0'/106.4' flood comp.):

Ave. Existing Ground Elevation = 115 ft
Normal Water Elevation = 102 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 108.00 ft
Total Pond Area = 3.22 acre
Depth of Pond = 11.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
102.00	Control Elevation	0.93		0.00	0.00	0.00
103.00		1.05	0.99	1.00	0.99	0.99
104.00		1.17	1.11	1.00	1.11	2.10
105.00		1.30	1.24	1.00	1.24	3.34
106.00	Top of 106.0' FP Comp.	1.44	1.37	1.00	1.37	4.71
106.40	Top of 106.4' FP Comp.	1.50	1.47	0.40	0.59	5.30
107.00	Free Board Elevation	1.58	1.54	0.60	0.92	6.22
108.00		1.74	1.66	1.00	1.66	7.88
109.00		1.89	1.81	1.00	1.81	9.69
110.00		2.06	1.97	1.00	1.97	11.67
111.00		2.22	2.14	1.00	2.14	13.81
112.00		2.39	2.30	1.00	2.30	16.11
113.00	Front Maint. Berm	2.56	2.47	1.00	2.47	18.58
114.88	Back Maint. Berm	3.22	2.89	1.88	5.41	24.00

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Remaining Treatment Volume Required	0.18	102.27	0.27

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Total 106.4' Floodplain Compensation Required	2.70	106.40	5.30
Remaining 106.0' Floodplain Compensation Required	51.63	106.00	2.60
Remaining 106.4' Floodplain Comp. Volume Required:			**0.00**
Remaining 106.0' Floodplain Comp. Volume Required:			**49.04**

Proposed Flood Comp. Area 4B3 (Sized to retain a portion of the 106.0' flood comp. volume):

Ave. Existing Ground Elevation = 110 ft
Normal Water Elevation = 102 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 108.00 ft
Total Pond Area = 15.22 acre
Depth of Pond = 8.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
102.00	Bottom of Pond	12.77		0.00	0.00	0.00
103.00		13.07	12.92	1.00	12.92	12.92
104.00		13.37	13.22	1.00	13.22	26.15
105.00		13.68	13.52	1.00	13.52	39.67
106.00	Top of 106.0' FP Comp.	13.98	13.83	1.00	13.83	53.50
107.00		14.29	14.13	1.00	14.13	67.63
108.00		14.60	14.44	1.00	14.44	82.08
109.00		14.91	14.75	1.00	14.75	96.83
110.00	Top of Pond	15.22	15.07	1.00	15.07	111.90

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Remaining 106.0' Floodplain Compensation Required	49.04	106.00	53.50
Remaining 106.0' Floodplain Comp. Volume Required:			**0.00**

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 4C1, 4C2, & 4C3
Basin 4

Computed By:	MS
Checked By:	MH
Date:	5/20/2019

Beginning Station	24420.95
End Station	31505.52
Length (ft)	7084.57

Pre-Development

Total Basin Area	
Description	**Area (ac)**
Unimproved land (water bodies & woods), pasture/range, and orchards	99.73
TOTAL AREA	**99.73**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc.	0.00
TOTAL IMPERVIOUS AREA	**0.00**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Roadway and Sidewalks	D	98	0.00	0.00
Pasture/Range (Poor)	A	68	48.47	3,295.90
Pasture/Range (Poor)	D	89	11.82	1,051.66
Pasture/Range (Poor) - Offsite	A	68	4.92	334.65
Woods/Orchard (Poor)	A	57	4.24	241.40
Woods (Good)	A	30	1.03	31.01
Water Bodies	D	100	29.25	2,924.99
		TOTAL	99.73	7,879.62
		COMPOSITE CN		**79.0**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	2.66	6.45	53.58
25 yr, 72 hr	SFWMD	9.65	2.66	7.06	58.69
100 yr, 240 hr	FDOT	16.00	2.66	13.20	109.71
100 yr, 8 hr	FDOT	7.24	2.66	4.81	39.94

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

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

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Soil Storage (in)	S	2.66
Runoff (in)	R	6.45
Runoff (ac-ft)	Vr	53.58

Post-Development

Total Basin Area	
Description	**Area (ac)**
Roadway, off-site areas, and ponds	99.73
TOTAL AREA	**99.73**

Proposed Impervious Area	
Description	**Area(2) (ac)**
Proposed Pavement(1)	38.56
TOTAL IMPERVIOUS AREA	**38.56**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.

(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
On-site Roadway	A/D	98	38.56	3,778.41
Grassed/Open Area (Good)	A	39	29.60	1,154.29
Grassed/Open Area (Good)	D	80	18.72	1,497.67
Pasture/Range (Poor) - Offsite	A	68	4.92	334.65
Proposed Pond Area	A/D	100	7.93	793.11
		TOTAL	99.73	7,558.13
		COMPOSITE CN		**75.8**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 24 hr	SJRWMD	9.00	3.19	6.05	50.28
25 yr, 72 hr	SFWMD	9.65	3.19	6.65	55.29
100 yr, 240 hr	FDOT	16.00	3.19	12.72	105.68
100 yr, 8 hr	FDOT	7.24	3.19	4.45	36.97

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	3.19
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	6.05
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	50.28

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION		**POST DEVELOPED CONDITION**	
AREA (AC):	99.73	AREA (AC):	99.73
CN:	79.0	CN:	75.8

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	**POST (AC-FT)**	**INCREASE (AC-FT)**
SJRWMD	25 yr, 24 hr	53.58	50.28	-3.30
SFWMD	25 yr, 72 hr	58.69	55.29	-3.40
FDOT	100 yr, 240 hr	109.71	105.68	-4.03
FDOT	100 yr, 8 hr	39.94	36.97	-2.97

MAXIMUM ATTENUATION VOLUME (AC-FT)	-2.97

WATER QUALITY CALCULATIONS

Water Management District
Pollution Abatement Volume Requirement

Agency:	SFWMD &	SJRWMD
Post Development Total Area (ac) =		99.73
Post Development Impervious Area Added (ac) =		38.56

(Utilize most stringent regulations)

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing a on-line dry retention facility.

The SJRWMD requirements for dry retention facilities are more stringent.
Dry Retention (On-Line System) Criteria - 1.25" over impervious area or 0.5" over total area, whichever is greater. Plus add 0.5" over the total area. (Based on the SJRWMD treatment volume requirements found in the 2018 Permit Information Manual.)

Water Quality Volume Required:	Ac-Ft	
1) 0.5" of Runoff Over Total Area =	4.16	Governs
2) 1.25" of Runoff Over Added Impervious Area =	4.02	
Governing Condition + 0.5" x Total Area =	8.31	
DRY RETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	**8.31**	

ESTIMATE FLOODPLAIN IMPACTS

Floodplain Elevation[3]	Average Existing Ground[4]/ESHWT Elevation[5]	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
106.4	103.0	103.0	3.4	0.57	1.95
106.4	104.7		1.7	0.44	0.75
				Total Impact Volume:	**2.70**

Floodplain Elevation[3]	Average Existing Ground[4]/ESHWT Elevation[5]	Exist. Pond Control	Depth of Impact (ft)	Area of Impact (ac)	Impact Volume (ac-ft)
106.0	102.0	102.0	4.0	4.41	17.64
106.0	104.0		2.0	1.31	2.62
106.0	104.0	104.0	2.0	25.84	51.68
106.0	105.0		1.0	5.63	5.63
				Total Impact Volume:	**77.57**

(3) The floodplain elevations were drawn from published FEMA data.
(4) The average existing ground elevations were estimated from the published county lidar data.
(5) The ESHWT was drawn from the observed water level of the adjacent wetlands.

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The depth available for the treatment and attenuation volumes is constrained to the front of berm elevation above the SHWT minus the freeboard minus the Dry Retention Height above SHWT.

2) We will assume the SHWT elevations for the purpose of preliminary pond sizing to be at 5' below ground due to the average soil types' in the areas of the pond alternatives SHWT is 42" (3.5') to 72" (6') [USGS].

D = Pond Depth from front of Maint. Berm to SHWT =	5	ft
F = Freeboard =	1	ft
R = Dry Retention Height Above SHWT =	2	ft
H = D - F - R =	2	ft

3) Sum the required treatment, flood compensation, and/or attenuation volumes to attain the Peak Pond Volume. Note that a negative attenuation volume reduces the required floodplain compensation volume.

Required Attenuation Volume =	-2.97	ac-ft
Required Treatment Volume =	8.31	ac-ft
Required 106.0' Flood Compensation Volume =	77.57	ac-ft
Required 106.4' Flood Compensation Volume =	2.70	ac-ft
Total Floodplain Impacts =	80.27	ac-ft
Total Attenuation Credits =	-2.97	ac-ft
Total Required Floodplain Compensation =	**77.29**	**ac-ft**
Total Peak Volume =	**85.60**	**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 (ft)
W = width of vertical sided pond (ft)

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

Volume =	8.31	ac-ft
H =	2	ft

$8.31 = L^2 \times 2$

Solving for L =	425.4	ft
Therefore W =	425.4	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:	2	ft
x =	16	ft
Length @ top of slope =	441	ft
Width @ top of slope =	441	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	471	ft
Width w/maint. Berm =	471	ft
Total Area =	5.10	acre
Add 10% Contingency	5.61	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN = 5.6 ACRE

Proposed Pond 4C1 (Treatment):	**7.9 acre**
Proposed Pond 4C2 (Floodplain Comp.):	**3.2 acre**
Proposed Pond 4C3 (Floodplain Comp. and Attenuation Credits):	**21.2 acre**
Total Area of Proposed Ponds[6]:	**32.4 acre**

Facility Type	Total Area (ac)
Dry Facility	7.9
Flood Plain Comp.	24.4

(6) Sized to include floodplain compensation as well as to compensate for hilly terrain. Floodplain compensation is only accounted for up to the 100-year floodplain elevation or the front of berm, whichever is lower.

POND STAGE/STORAGE CALCULATIONS

Proposed Pond 4C1 (Sized to retain the project's treatment volume):

Ave. Existing Ground Elevation = 110 ft
Normal Water Elevation = 102 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 108.00 ft
Total Pond Area = 7.93 acre
Depth of Pond = 3.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
105.00	Bottom of Pond	6.01		0.00	0.00	0.00
106.00		6.29	6.15	1.00	6.15	6.15
106.50	Free Board Elevation	6.43	6.36	0.50	3.18	9.33
107.00	Free Board Elevation	6.57	6.50	0.50	3.25	12.58
108.00	Front Maint. Berm	6.85	6.71	1.00	6.71	19.29
109.88	Back Maint. Berm	7.93	7.39	1.88	13.86	33.15

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment	8.31	106.34	1.34

Proposed Flood Comp. Area 4C2 (Sized to retain the project's 106.4' flood comp. volume):

Ave. Existing Ground Elevation = 115 ft
Normal Water Elevation = 102 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 108.00 ft
Total Pond Area = 3.22 acre
Depth of Pond = 11.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
104.00	Bottom of Pond	1.41		0.00	0.00	0.00
105.00		1.55	1.48	1.00	1.48	1.48
106.00		1.70	1.62	1.00	1.62	3.10
106.40	Top of 106.4' FP Comp.	1.76	1.73	0.40	0.69	3.79
107.00		1.85	1.81	0.60	1.08	4.87
108.00		2.01	1.93	1.00	1.93	6.81
109.00		2.18	2.10	1.00	2.10	8.90
110.00		2.35	2.26	1.00	2.26	11.17
111.00		2.52	2.43	1.00	2.43	13.60
112.00		2.69	2.60	1.00	2.60	16.20
113.00		2.86	2.77	1.00	2.77	18.97
114.00		3.04	2.95	1.00	2.95	21.92
115.00	Top of Pond	3.22	3.13	1.00	3.13	25.05

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Total 106.4' Floodplain Compensation Required	2.70	106.40	3.79
		Remaining 106.4' Floodplain Comp. Volume Required:	**0.00**

Proposed Flood Comp. Area 4C3 (Sized to retain the project's 106.0' floodplain comp. volume and attenuation credits):

Ave. Existing Ground Elevation = 110 ft
Normal Water Elevation = 102 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 108.00 ft
Total Pond Area = 21.21 acre
Depth of Pond = 8.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
102.00	Bottom of Pond	18.47		0.00	0.00	0.00
103.00		18.81	18.64	1.00	18.64	18.64
104.00		19.14	18.98	1.00	18.98	37.62
105.00		19.48	19.31	1.00	19.31	56.93
106.00	Top of 106.0' FP Comp.	19.82	19.65	1.00	19.65	76.58
107.00		20.17	20.00	1.00	20.00	96.58
108.00		20.52	20.34	1.00	20.34	116.92
109.00		20.86	20.69	1.00	20.69	137.61
110.00	Top of Pond	21.21	21.04	1.00	21.04	158.65

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Total 106.0' Floodplain Compensation Required	74.60	106.00	76.58
Remaining 106.0' Floodplain Comp. Volume Required:			**0.00**

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 5A1 & 5A2
Basin 5

Computed By:	MS
Checked By:	MH
Date:	5/21/2019

Beginning Station	31505.52
End Station	33466.44
Length (ft)	1960.92

Pre-Development

Total Basin Area	
Description	**Area (ac)**
Portions of SR-429 and Schofield Road, unimproved land (water bodies & woods), pasture/range, and orchards/tree farms	92.80
TOTAL BASIN AREA	**92.80**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc.	16.64
TOTAL IMPERVIOUS AREA	**16.64**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Roadway and Sidewalks	A	98	16.64	1,630.67
Pasture/Range (Poor)	A	68	2.30	156.24
Woods/Orchard (Poor)	A	57	1.04	59.30
Woods/Orchard (Fair)	A	43	35.14	1,511.03
Woods (Good)	A	30	9.12	273.53
Grassed Area	A	39	28.57	1,114.09
		TOTAL	92.80	4,744.86
			COMPOSITE CN	**51.1**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 72 hr	SFWMD	9.65	9.56	3.46	26.77
100 yr, 240 hr	FDOT	16.00	9.56	8.39	64.91
100 yr, 8 hr	FDOT	7.24	9.56	1.91	14.75

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

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

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Soil Storage (in)	S	9.56
Runoff (in)	R	3.46
Runoff (ac-ft)	Vr	26.77

Post Development

Total Basin Area	
Description	**Area (ac)**
Roadway and existing and proposed ponds	92.80
TOTAL AREA	**92.80**

Proposed Impervious Area	
Description	**Area[2] (ac)**
Proposed Pavement[1]	27.52
TOTAL IMPERVIOUS AREA	**27.52**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.

(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Roadway	A	98	27.52	2,697.11
Grassed/Open Area (Good)	A	39	49.26	1,921.17
Proposed Pond Area	A/D	100	16.02	1,601.94
		TOTAL	92.80	6,220.22
		COMPOSITE CN		**67.0**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 72 hr	SFWMD	9.65	4.92	5.53	42.75
100 yr, 240 hr	FDOT	16.00	4.92	11.31	87.47
100 yr, 8 hr	FDOT	7.24	4.92	3.50	27.08

1) Soil Storage (S)	$S = (1000/CN) - 10$	Soil Storage (in)	S	4.92
2) Runoff (R)	$R = (P-0.2S)^2/(P+0.8S)$	Runoff (in)	R	5.53
3) Runoff Volume (Vr)	$Vr = R/12 * Area$	Runoff (ac-ft)	Vr	42.75

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION

AREA (AC):	92.80
CN:	51.1

POST DEVELOPED CONDITION

AREA (AC):	92.80
CN:	67.0

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SFWMD	25 yr, 72 hr	26.77	42.75	15.98
FDOT	100 yr, 240 hr	64.91	87.47	22.56
FDOT	100 yr, 8 hr	14.75	27.08	12.34

MAXIMUM ATTENUATION VOLUME (AC-FT)	22.56

WATER QUALITY CALCULATIONS

Water Management District
Pollution Abatement Volume Requirement

Agency:	SFWMD
Post Development Total Area (ac) =	92.80
Post Development Impervious Area Added (ac) =	10.88

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing a on-line dry retention facility.

Dry Retention (On-Line System) Criteria - 1.25" over added impervious area or 0.5" over total area, whichever is greater. (Based on the SFWMD treatment volume requirements found in the 2016 ERP Applicant's Handbook Volume II.)

Water Quality Volume Required	Ac-Ft	
1) 0.5" of Runoff Over Total Area =	3.87	Governs
2) 1.25" of Runoff Over Added Impervious Area =	1.13	
DRY RETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	**3.87**	

ESTIMATE EXISTING DRAINAGE POND IMPACTS

Description	Area (ac)	Estimated Depth (ft)	Storage (ac-ft)
Existing Pond between the Existing North bound SR 429 Lane and the Existing Schofield Road North bound Entrance Ramp to SR 429	0.04	1.00	0.04
Existing Pond between the Existing Schofield Road North bound Entrance Ramp to SR 429 and East SR 429 ROW	0.24	1.00	0.24
		TOTAL STORAGE IMPACTED (ac-ft):	**0.28**

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The top of the treatment and attenuation volume are constrained to the front of berm elevation above the SHWT minus the freeboard minus the Dry Retention Height above SHWT.

2) We will assume the ponds' average SHWT elevations for the purpose of this preliminary pond sizing calculation to be at 6.5' below ground due to the soil types' average SHWT's in the dry pond area (12 ac) is > 80" (6.67') [USGS].

D = Pond Depth from front of Maint. Berm to SHWT =	6.5	ft
F = Freeboard =	1	ft
R = Dry Retention Height Above SHWT =	2	ft
H = D - F - R =	3.5	ft

3) Sum the required treatment, flood compensation, and/or attenuation volumes to attain the Peak Pond Volume.

Required Attenuation Volume =	22.56	ac-ft
Required Treatment Volume =	3.87	ac-ft
Required Existing Pond Impact Compensation Volume =	0.28	ac-ft
Peak Volume =	**26.71**	**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 (ft)
	W =	width of vertical sided pond (ft)

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

Volume =	26.71	ac-ft
H =	3.5	ft

$$26.71 = L^2 \times 3.5$$

Solving for L =	576.6	ft
Therefore W =	576.6	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:	3.5	ft
x =	28	ft
Length @ top of slope =	605	ft
Width @ top of slope =	605	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	635	ft
Width w/maint. Berm =	635	ft
Total Area =	9.2	acre
Add 10% Contingency =	10.2	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN = 10.2 ACRES

Proposed Pond 5A1:	5.1 acre
Proposed Pond 5A2:	11.0 acre
Total of Ponds:	**16.0 acre**

Facility Type	Total Area
Dry Retention	16.0 acre

POND STAGE/STORAGE CALCULATIONS

Proposed Pond 5A1 (Sized to retain the project's treatment, attenuation, and existing pond impacts):

Ave. Existing Ground Elevation = 147 ft
Normal Water Elevation = 104 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 148.53 ft (From Mainline profile)
Total Pond Area = 5.05 acre
Depth of Pond = 5.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
140.00	Bottom of Dry Pond	3.48		0.00	0.00	0.00
141.00		3.65	3.56	1.00	3.56	3.56
142.00		3.82	3.73	1.00	3.73	7.30
143.00		4.00	3.91	1.00	3.91	11.20
144.00	Free Board Elevation	4.17	4.09	1.00	4.09	15.29
145.00	Front Maint. Berm	4.36	4.26	1.00	4.26	19.55
146.88	Back Maint. Berm	5.05	4.70	1.88	8.82	28.37

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment	3.87	141.08	1.08
Treatment and Attenuation	26.71	146.80	6.80

Description	Volume Required (ac-ft)	Elevation (ft)	Compensation Provided (ac-ft)
Treatment and Attenuation	26.71	144.00	15.29
Remaining Treatment + Attenuation Volume Required:			**11.42**

Proposed Pond 5A2 (Sized to retain the project's treatment, attenuation, and existing pond impacts):

Ave. Existing Ground Elevation = 130 ft
Normal Water Elevation = 104 ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation = 116.73 ft (Schofield Road access road profile)
Total Pond Area = 5.05 acre
Depth of Pond = 16.00 ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
112.00	Bottom of Dry Pond	3.47		0.00	0.00	0.00
113.00		4.06	3.76	1.00	3.76	3.76
114.00		4.38	4.22	1.00	4.22	7.98
115.00	Free Board Elevation	4.70	4.54	1.00	4.54	12.52
116.00		5.04	4.87	1.00	4.87	17.39
117.00		3.82	4.43	1.00	4.43	21.82
118.00		3.82	3.82	1.00	3.82	25.64
119.00		3.82	3.82	1.00	3.82	29.46
120.00		3.82	3.82	1.00	3.82	33.28
121.00		3.82	3.82	1.00	3.82	37.10
122.00		3.82	3.82	1.00	3.82	40.92
123.00		3.82	3.82	1.00	3.82	44.74
124.00		3.82	3.82	1.00	3.82	48.56
125.00		3.82	3.82	1.00	3.82	52.38
126.00		4.00	3.91	1.00	3.91	56.29
127.00		4.17	4.09	1.00	4.09	60.38
128.00	Front Maint. Berm	4.36	4.26	1.00	4.26	64.64
129.88	Back Maint. Berm	5.05	4.70	1.88	8.82	73.46

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment	3.87	113.02	1.02
Remaining Treatment and Attenuation	11.42	114.76	2.76

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 5B
Basin 5

Computed By:	MS
Checked By:	MH
Date:	5/21/2019

Beginning Station	31505.52
End Station	33466.44
Length (ft)	1960.92

Pre-Development

Total Basin Area	
Description	**Area (ac)**
Portions of SR-429 and Schofield Road, unimproved land (water bodies & woods), pasture/range, and orchards/tree farms	102.90
TOTAL BASIN AREA	**102.90**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc.	16.64
TOTAL IMPERVIOUS AREA	**16.64**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Roadway and Sidewalks	A	98	16.64	1,630.67
Pasture/Range (Poor)	A	68	2.30	156.24
Woods/Orchard (Poor)	A	57	1.04	59.30
Woods/Orchard (Fair)	A	43	45.24	1,945.39
Woods (Good)	A	30	9.12	273.53
Grassed Area	A	39	28.57	1,114.09
		TOTAL	102.90	5,179.22
			COMPOSITE CN	**50.3**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 72 hr	SFWMD	9.65	9.87	3.36	28.80
100 yr, 240 hr	FDOT	16.00	9.87	8.23	70.60
100 yr, 8 hr	FDOT	7.24	9.87	1.83	15.71

1) Soil Storage (S) S = (1000/CN) - 10

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

3) Runoff Volume (Vr) Vr = R/12 * Area

Soil Storage (in)	S	9.87
Runoff (in)	R	3.36
Runoff (ac-ft)	Vr	28.80

Post Development

Total Basin Area	
Description	**Area (ac)**
Roadway and existing and proposed ponds	102.90
TOTAL AREA	**102.90**

Proposed Impervious Area	
Description	**Area[2] (ac)**
Proposed Pavement[1]	27.52
TOTAL IMPERVIOUS AREA	**27.52**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.

(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Roadway	A	98	27.52	2,697.11
Grassed/Open Area (Good)	A	39	65.28	2,545.92
Proposed Pond Area	A/D	100	10.10	1,010.15
		TOTAL	102.90	6,253.18
		COMPOSITE CN		**60.8**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 72 hr	SFWMD	9.65	6.46	4.72	40.44
100 yr, 240 hr	FDOT	16.00	6.46	10.22	87.66
100 yr, 8 hr	FDOT	7.24	6.46	2.85	24.46

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

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

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Soil Storage (in)	S	6.46
Runoff (in)	R	4.72
Runoff (ac-ft)	Vr	40.44

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION

AREA (AC):	102.90
CN:	50.3

POST DEVELOPED CONDITION

AREA (AC):	102.90
CN:	60.8

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	POST (AC-FT)	INCREASE (AC-FT)
SFWMD	25 yr, 72 hr	28.80	40.44	11.64
FDOT	100 yr, 240 hr	70.60	87.66	17.05
FDOT	100 yr, 8 hr	15.71	24.46	8.75

MAXIMUM ATTENUATION VOLUME (AC-FT)	17.05

WATER QUALITY CALCULATIONS

Water Management District
Pollution Abatement Volume Requirement

Agency:	SFWMD
Post Development Total Area (ac) =	102.90
Post Development Impervious Area Added (ac) =	10.88

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing a on-line dry retention facility.

Dry Retention (On-Line System) Criteria - 1.25" over added impervious area or 0.5" over total area, whichever is greater. (Based on the SFWMD treatment volume requirements found in the 2016 ERP Applicant's Handbook Volume II.)

Water Quality Volume Required	Ac-Ft	
1) 0.5" of Runoff Over Total Area =	4.29	Governs
2) 1.25" of Runoff Over Added Impervious Area =	1.13	
DRY RETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	**4.29**	

ESTIMATE EXISTING DRAINAGE POND IMPACTS

Description	Area (ac)	Estimated Depth (ft)	Storage (ac-ft)
Existing Pond between the Existing North bound SR 429 Lane and the Existing Schofield Road North bound Entrance Ramp to SR 429	0.04	2.00	0.08
Existing Pond between the Existing Schofield Road North bound Entrance Ramp to SR 429 and East SR 429 ROW	0.24	3.00	0.73
		TOTAL STORAGE IMPACTED (ac-ft):	**0.81**

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The top of the treatment and attenuation volume are constrained to the front of berm elevation above the SHWT minus the freeboard minus the Dry Retention Height above SHWT.

2) We will assume the ponds' average SHWT elevations for the purpose of this preliminary pond sizing calculation to be at 6.5' below ground due to the soil types' average SHWT's in the dry pond area (12 ac) is > 80" (6.67') [USGS].

D = Pond Depth from front of Maint. Berm to SHWT =	6.5	ft
F = Freeboard =	1	ft
R = Dry Retention Height Above SHWT =	2	ft
H = D - F - R =	3.5	ft

3) Sum the required treatment, flood compensation, and/or attenuation volumes to attain the Peak Pond Volume.

Required Attenuation Volume =	17.05	ac-ft
Required Treatment Volume =	4.29	ac-ft
Required Existing Pond Impact Compensation Volume =	0.81	ac-ft
Peak Volume =	**21.34**	**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 (ft)
	W =	width of vertical sided pond (ft)

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

Volume =	21.34	ac-ft
H =	3.5	ft

$$21.34 = L^2 \times 3.5$$

Solving for L =	515.4	ft
Therefore W =	515.4	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:	3.5	ft
x =	28	ft
Length @ top of slope =	543	ft
Width @ top of slope =	543	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	573	ft
Width w/maint. Berm =	573	ft
Total Area =	7.5	acre
Add 10% Contingency =	8.3	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN = 8.3 ACRES

Total of Ponds: **10.1 acre**

Facility Type	Total Area
Dry Retention	10.1 acre

POND STAGE/STORAGE CALCULATIONS

Proposed Pond 5B (Sized to retain the project's treatment, attenuation, and existing pond impacts):

Ave. Existing Ground Elevation =	120	ft
Normal Water Elevation =	104	ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation =	116.73	ft (From Mainline profile)
Total Pond Area =	10.10	acre
Depth of Pond =	6.00	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
112.00	Bottom of Dry Pond	7.53		0.00	0.00	0.00
113.00		7.78	7.66	1.00	7.66	7.66
114.00		8.04	7.91	1.00	7.91	15.56
115.00	Free Board Elevation 115.5	8.30	8.17	1.00	8.17	23.73
116.00		8.56	8.43	1.00	8.43	32.16
117.00		8.82	8.69	1.00	8.69	40.84
118.00	Front Maint. Berm	9.08	8.95	1.00	8.95	49.80
119.88	Back Maint. Berm	10.10	9.59	1.88	17.99	67.78

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment	4.29	112.56	0.56
Treatment and Attenuation	21.34	114.71	2.71

Project: Lake/Orange Connector PD&E
Client: CFX
Pond(s): 5C
Basin 5

Computed By:	MS
Checked By:	MH
Date:	5/21/2019

Beginning Station	31505.52
End Station	33466.44
Length (ft)	1960.92

Pre-Development

Total Basin Area	
Description	**Area (ac)**
Portions of SR-429 and Schofield Road, unimproved land (water bodies & woods), pasture/range, and orchards/tree farms	100.81
TOTAL BASIN AREA	**100.81**

Existing Impervious Area	
Description	**Area (ac)**
Roadway, sidewalk, etc.	16.64
TOTAL IMPERVIOUS AREA	**16.64**

ATTENUATION VOLUME ESTIMATE

Land Use Description	Soil Group	CN	Area (ac)	Product
Roadway and Sidewalks	A	98	16.64	1,630.67
Pasture/Range (Poor)	A	68	10.30	700.51
Woods/Orchard (Poor)	A	57	1.04	59.30
Woods/Orchard (Fair)	A	43	35.14	1,511.03
Woods (Good)	A	30	9.12	273.53
Grassed Area	A	39	28.57	1,114.09
		TOTAL	100.81	5,289.12
		COMPOSITE CN		**52.5**

ESTIMATE OF PRE-DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 72 hr	SFWMD	9.65	9.06	3.64	30.54
100 yr, 240 hr	FDOT	16.00	9.06	8.66	72.74
100 yr, 8 hr	FDOT	7.24	9.06	2.03	17.09

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

Soil Storage (in)	S	9.06
Runoff (in)	R	3.64
Runoff (ac-ft)	Vr	30.54

Post Development

Total Basin Area	
Description	**Area (ac)**
Roadway and existing and proposed ponds	100.81
TOTAL AREA	**100.81**

Proposed Impervious Area	
Description	**Area[2] (ac)**
Proposed Pavement[1]	27.52
TOTAL IMPERVIOUS AREA	**27.52**

(1) This includes the assumption that the median area (82' typical median width) is impervious to account for future widening projects.

(2) The impervious area was found using CAD software and proposed footprint in plan view.

Land Use Description/ Soil Name	Soil Group	CN	Area (ac)	Product
Roadway	A	98	27.52	2,697.11
Grassed/Open Area (Good)	A	39	65.28	2,545.92
Proposed Pond Area	A/D	100	8.00	800.39
		TOTAL	100.81	6,043.43
			COMPOSITE CN	**60.0**

ESTIMATE OF POST DEVELOPMENT RUNOFF VOLUME

Summary Table:

Design Storm	Agency	P (in)	S (in)	R (in)	Vr (ac-ft)
25 yr, 72 hr	SFWMD	9.65	6.68	4.61	38.73
100 yr, 240 hr	FDOT	16.00	6.68	10.07	84.63
100 yr, 8 hr	FDOT	7.24	6.68	2.77	23.27

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

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

3) Runoff Volume (Vr) $Vr = R/12 * Area$

Soil Storage (in)	S	6.68
Runoff (in)	R	4.61
Runoff (ac-ft)	Vr	38.73

SUMMARY OF ATTENUATION ESTIMATES

PRE-DEVELOPED CONDITION

AREA (AC):	100.81
CN:	52.5

POST DEVELOPED CONDITION

AREA (AC):	100.81
CN:	60.0

AGENCY	DESIGN STORM	RUNOFF VOLUME (Vr)		
		PRE (AC-FT)	**POST (AC-FT)**	**INCREASE (AC-FT)**
SFWMD	25 yr, 72 hr	30.54	38.73	8.18
FDOT	100 yr, 240 hr	72.74	84.63	11.89
FDOT	100 yr, 8 hr	17.09	23.27	6.18

MAXIMUM ATTENUATION VOLUME (AC-FT)	11.89

WATER QUALITY CALCULATIONS

Water Management District
Pollution Abatement Volume Requirement

Agency:	SFWMD
Post Development Total Area (ac) =	100.81
Post Development Impervious Area Added (ac) =	10.88

Based on the existing soil types and their depth to SHWT (USGS), Metric is proposing a on-line dry retention facility.

Dry Retention (On-Line System) Criteria - 1.25" over added impervious area or 0.5" over total area, whichever is greater. (Based on the SFWMD treatment volume requirements found in the 2016 ERP Applicant's Handbook Volume II.)

Water Quality Volume Required	**Ac-Ft**	
1) 0.5" of Runoff Over Total Area =	4.20	Governs
2) 1.25" of Runoff Over Added Impervious Area =	1.13	
DRY RETENTION POLLUTION ABATEMENT VOLUME REQUIRED =	**4.20**	

ESTIMATE EXISTING DRAINAGE POND IMPACTS

Description	Area (ac)	Estimated Depth (ft)	Storage (ac-ft)
Existing Pond between the Existing North bound SR 429 Lane and the Existing Schofield Road North bound Entrance Ramp to SR 429	0.04	2.00	0.08
Existing Pond between the Existing Schofield Road North bound Entrance Ramp to SR 429 and East SR 429 ROW	0.24	3.00	0.73
		TOTAL STORAGE IMPACTED (ac-ft):	**0.81**

ESTIMATE POND RIGHT OF WAY REQUIREMENTS

1) The top of the treatment and attenuation volume are constrained to the front of berm elevation above the SHWT minus the freeboard minus the Dry Retention Height above SHWT.

2) We will assume the ponds' average SHWT elevations for the purpose of this preliminary pond sizing calculation to be at 6.5' below ground due to the soil types' average SHWT's in the dry pond area (12 ac) is > 80" (6.67') [USGS].

D = Pond Depth from front of Maint. Berm to SHWT =	6.5	ft
F = Freeboard =	1	ft
R = Dry Retention Height Above SHWT =	2	ft
H = D - F - R =	3.5	ft

3) Sum the required treatment, flood compensation, and/or attenuation volumes to attain the Peak Pond Volume.

Required Attenuation Volume =	11.89	ac-ft
Required Treatment Volume =	4.20	ac-ft
Required Existing Pond Impact Compensation Volume =	0.81	ac-ft
Peak Volume =	**16.09**	**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 (ft)
	W =	width of vertical sided pond (ft)

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

Volume =	16.09	ac-ft
H =	3.5	ft

16.09 = L^2 x 3.5

Solving for L =	447.5	ft
Therefore W =	447.5	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:	3.5	ft
x =	28	ft
Length @ top of slope =	475	ft
Width @ top of slope =	475	ft

6) Add maintenance berms.

Assume 15' maintenance berm (add to each side)

Length w/maint Berm =	505	ft
Width w/maint. Berm =	505	ft
Total Area =	5.9	acre
Add 10% Contingency =	6.5	acre

PRELIMINARY POND AREA REQUIRED FOR BASIN = 6.5 ACRES

Total of Ponds: **8.0 acre**

Facility Type	Total Area
Dry Retention	8.0 acre

POND STAGE/STORAGE CALCULATIONS

Proposed Pond 5C (Sized to retain the project's treatment, attenuation, and existing pond impacts):

Ave. Existing Ground Elevation =	116	ft
Normal Water Elevation =	104	ft (Per the observed water elevation of the adjacent existing waterbodies/wetlands.)
Lowest Profile Elevation =	116.73	ft (From Mainline profile)
Total Pond Area =	8.00	acre
Depth of Pond =	4.00	ft

Stage	Description	Area (ac)	Ave Area (ac)	Localized Depth (ft)	Storage (ac-ft)	Total Storage (ac-ft)
109.00	Bottom of Dry Pond	6.80		0.00	0.00	0.00
110.00		6.80	6.80	1.00	6.80	6.80
111.00		6.90	6.85	1.00	6.85	13.65
112.00	Free Board Elevation	7.00	6.95	1.00	6.95	20.60
113.00	Front Maint. Berm	7.21	7.11	1.00	7.11	27.71
114.88	Back Maint. Berm	8.00	7.61	1.88	14.26	41.97

Description	Volume Required (ac-ft)	Stage	Above Bottom of Pond (ft)
Treatment	4.20	109.62	0.62
Treatment and Attenuation	16.09	111.35	2.35

Appendix C – Pond Evaluation Matrices

Basin 1			
Pond ID	Ponds 1A1 to 1A4	Ponds 1B1 to 1B4	Ponds 1C1 to 1C3
Location	Ponds 1A1, 1A2, & 1A4 are located in infields, Pond 1A3 is located outside of ROW	Ponds 1B1, 1B2, & 1B4 are located in infields, Pond 1B3 is located outside of ROW	Ponds 1C1 to 1C2 are located in infields, Pond 1C3 is located outside of ROW
Total Size of Ponds (acre)	31.2	47.5	45.9
Size of Additional ROW Needed (acre)	4.1	12.2	10.6
No. Parcels Required for Acquisition	1	1	3
ELA Opportunities	Pond 1A4 used for Impacted FDOT Pond & Project	Ponds 1B1 & 1B2 used for Impacted FDOT Pond & Flood Comp	Ponds 1C1 & 1C2 used for Impacted FDOT Pond & Flood Comp
FEMA Floodplain Impacts (ac-ft)	0	21.55	21.55
Listed Species Impact	None	None	None
Contaminated Sites	None	None	None
Archeological & Historical Impacts	None	None	None
Social Impacts	None	None	None
Other Environmental Impacts	None	None	None
Major Utility Conflict Potential (Yes/No)	No	No	No
Construction/Maintenance Concerns	None	None	None
Public Opinion	None	None	None
Aesthetics	Good	Good	Good
Current Land Use Zoning	Agricultural & PUD	Agricultural & PUD	Agricultural & PUD
Future Land Use Zoning	Agricultural & PUD	Agricultural & PUD	Agricultural & PUD
Total Cost*	$5,547,765.60	$8,446,117.50	$8,161,616.70
Associated Risks	None	None	None

Pond Alternative 1A: Ponds 1A1 through 1A4 are the recommended options, since the majority are located within existing CFX ROW and require the least amount of ROW acquisition.

* Total cost estimates do not include the cost of offsite ROW acquisition and will be updated once estimation received from CFX.

Basin 2			
Pond ID	Pond 2A	Pond 2B	Pond 2C
Location	Outside ROW	Outside ROW	Outside ROW
Total Size of Ponds (acre)	9.2	9.2	9.3
Size of Additional ROW Needed (acre)	9.2	9.2	9.3
No. Parcels Required for Acquisition	1	1	2
ELA Opportunities	None	None	None
FEMA Floodplain Impacts (ac-ft)	0	0	8.42
Listed Species Impact	None	None	None
Contaminated Sites	None	None	None
Archeological & Historical Impacts	None	None	None
Social Impacts	None	None	None
Other Environmental Impacts	None	None	None
Major Utility Conflict Potential (Yes/No)	No	No	No
Construction/Maintenance Concerns	None	None	None
Public Opinion	None	None	None
Aesthetics	Good	Good	Good
Current Land Use Zoning	Agricultural	Agricultural	Agricultural
Future Land Use Zoning	Agricultural	Agricultural	Agricultural
Total Cost*	$1,635,879.60	$1,635,879.60	$1,653,660.90
Associated Risks	None	None	None

Pond Alternative 2A: Pond 2A is the recommended option, since it requires the least amount of ROW acquisition and is the most hydraulically connected to the FEMA Floodplain.

* Total cost estimates do not include the cost of offsite ROW acquisition and will be updated once estimation received from CFX.

Basin 3			
Pond ID	Ponds 3A1 to 3A3	Ponds 3B1 to 3B4	Ponds 3C1 to 3C4
Location	Ponds 3A1 & 3A2 are located in infields, Pond 3A3 is located outside of ROW	Ponds 3B1 & 3B2 are located in infields, Ponds 3B3 &3B4 are located outside of ROW	Ponds 3C1 & 3C2 are located in infields, Ponds 3C3 &3C4 are located outside of ROW
Total Size of Ponds (acre)	26.1	32.1	31.1
Size of Additional ROW Needed (acre)	14.6	20.7	17.1
No. Parcels Required for Acquisition	1	1	2
ELA Opportunities	None	None	None
FEMA Floodplain Impacts (ac-ft)	0	0	0
Listed Species Impact	None	None	None
Contaminated Sites	None	None	None
Archeological & Historical Impacts	None	None	None
Social Impacts	None	None	None
Other Environmental Impacts	None	None	None
Major Utility Conflict Potential (Yes/No)	No	No	No
Construction/Maintenance Concerns	None	None	None
Public Opinion	None	None	None
Aesthetics	Good	Good	Good
Current Land Use Zoning	Agricultural	Agricultural	Agricultural
Future Land Use Zoning	Agricultural	Agricultural	Agricultural
Total Cost*	$4,640,919.30	$5,707,797.30	$5,529,984.30
Associated Risks	None	None	None

Pond Alternative 3A: Ponds 3A1 through 3A3 is the recommended option, since it requires the least amount of ROW acquisition and none are located on Cemex property which would most likely be more expensive.

* Total cost estimates do not include the cost of offsite ROW acquisition and will be updated once estimation received from CFX.

Basin 4			
Pond ID	Ponds 4A1 to 4A3	Ponds 4B1 to 4B3	Ponds 4C1 to 4C3
Location	Ponds 4A1 & 4A2 are located in infields, Pond 4A3 is located outside of ROW	Ponds 4B1 & 4B2 are located in infields, Pond 4B3 is located outside of ROW	Ponds 3C1 & 3C2 are located in infields, Pond 4B3 is located outside of ROW
Total Size of Ponds (acre)	24.9	26.4	31.3
Size of Additional ROW Needed (acre)	13.7	15.2	21.2
No. Parcels Required for Acquisition	1	1	1
ELA Opportunities	None	None	None
FEMA Floodplain Impacts (ac-ft)	0	0	0
Listed Species Impact	None	None	None
Contaminated Sites	None	None	None
Archeological & Historical Impacts	None	None	None
Social Impacts	None	None	None
Other Environmental Impacts	None	None	None
Major Utility Conflict Potential (Yes/No)	No	No	No
Construction/Maintenance Concerns	Hydro-connectivity of Flood Plains	Drainage Ponds farther from Low Point in Profile & Hydro-connectivity of Flood Plains	Drainage Ponds farther from Low Point in Profile
Public Opinion	None	None	None
Aesthetics	Good	Good	Good
Current Land Use Zoning	Agricultural	Agricultural	Agricultural
Future Land Use Zoning	Agricultural	Agricultural	Agricultural
Total Cost*	$4,427,543.70	$4,694,263.20	$5,565,546.90
Associated Risks	None	None	None

Pond Alternative 4C: Ponds 4C1 through 4C3 is the recommended option, since it is the most hydraulically connected to the FEMA floodplains
* Total cost estimates do not include the cost of offsite ROW acquisition and will be updated once estimation received from CFX.

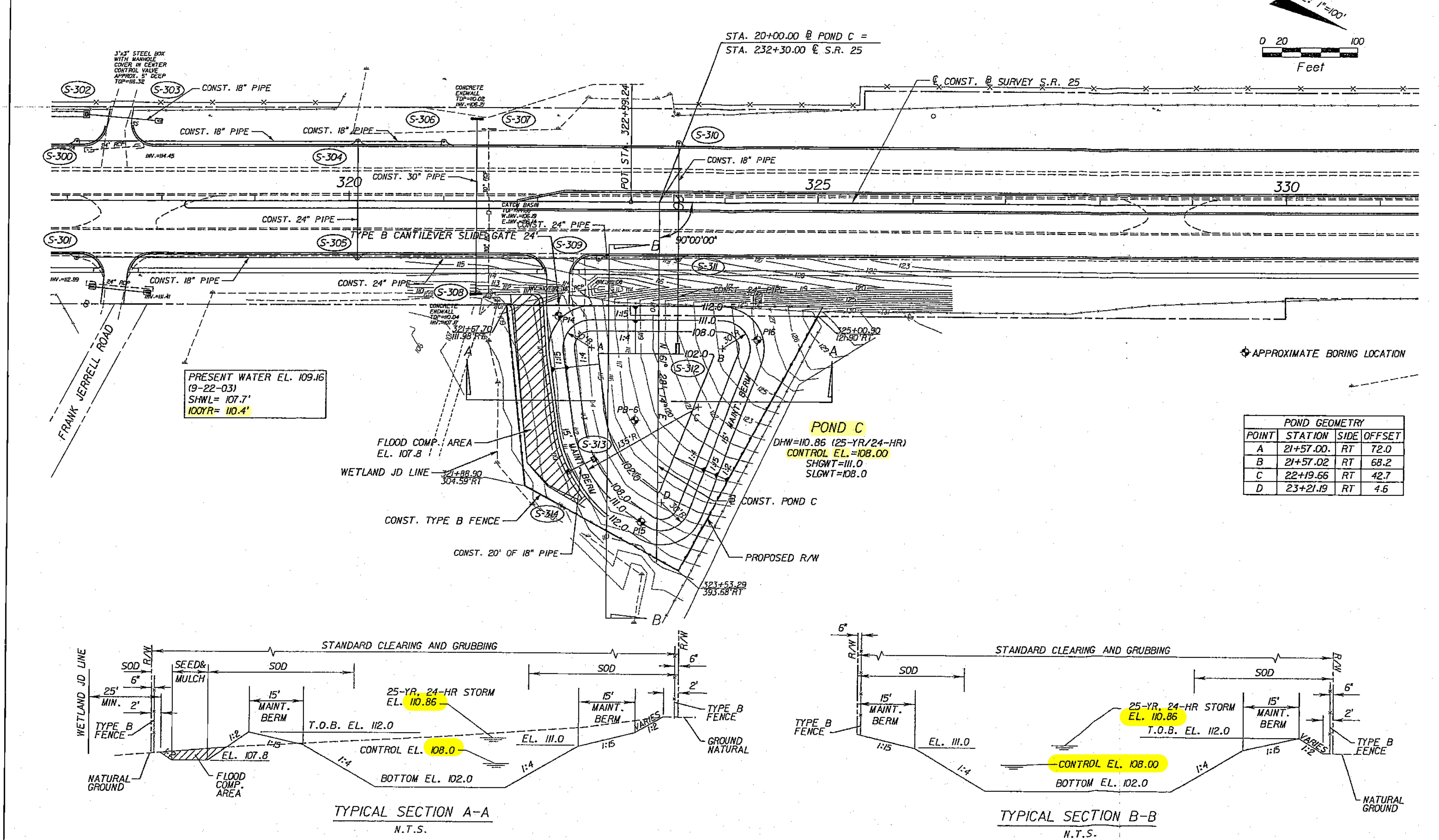
Basin 5			
Pond ID	Ponds 5A1 & 5A2	Pond 5B1	Pond 5C1
Location	All ponds located within infields/ROW.	Located outside of ROW	Located outside of ROW
Total Size of Ponds (acre)	16.0	10.1	8.0
Size of Additional ROW Needed (acre)	0	10.1	8.0
No. Parcels Required for Acquisition	0	2	1
ELA Opportunities	Interagency agreement between SJRWMD & SFWMD (Ponds Sized for either WMD)	Interagency agreement between SJRWMD & SFWMD (Ponds Sized for either WMD)	Interagency agreement between SJRWMD & SFWMD (Ponds Sized for either WMD)
FEMA Floodplain Impacts (ac-ft)	0	0	0
Listed Species Impact	None	None	None
Contaminated Sites	None	None	None
Archeological & Historical Impacts	None	None	None
Social Impacts	None	None	None
Other Environmental Impacts	None	None	None
Major Utility Conflict Potential (Yes/No)	No	No	No
Construction/Maintenance Concerns	None	None	None
Public Opinion	None	None	None
Aesthetics	Excellent	Good	Good
Current Land Use Zoning	Agricultural	Agricultural	Agricultural
Future Land Use Zoning	Village	Village	Village
Total Cost*	$2,845,008.00	$1,795,911.30	$1,422,504.00
Associated Risks	None	None	None

Pond Alternative 5A: Ponds 5A1 and 5A2 is the recommended option, since it requires no additional ROW acquisition.
* Total cost estimates do not include the cost of offsite ROW acquisition and will be updated once estimation received from CFX.

Appendix D – Existing ERP Excerpts

ERP No. 90260-2

ERP No. 90260-2



POND GEOMETRY			
POINT	STATION	SIDE	OFFSET
A	21+57.00	RT	72.0
B	21+57.02	RT	68.2
C	22+19.66	RT	42.7
D	23+21.19	RT	4.6

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD: GLEN T. PARTLOW
P.E. NO: 58725
HDR Employee-owned
HDR Engineering, Inc.
315 E. Robinson Street, Suite 400
Orlando, FL 32801-1949
(407) 420-4200
www.hdrinc.com
FBPR Certificate of Authorization No. 4213

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 25	LAKE	238422-1-52-01

DETENTION AREA C

SHEET NO. 325

6-17

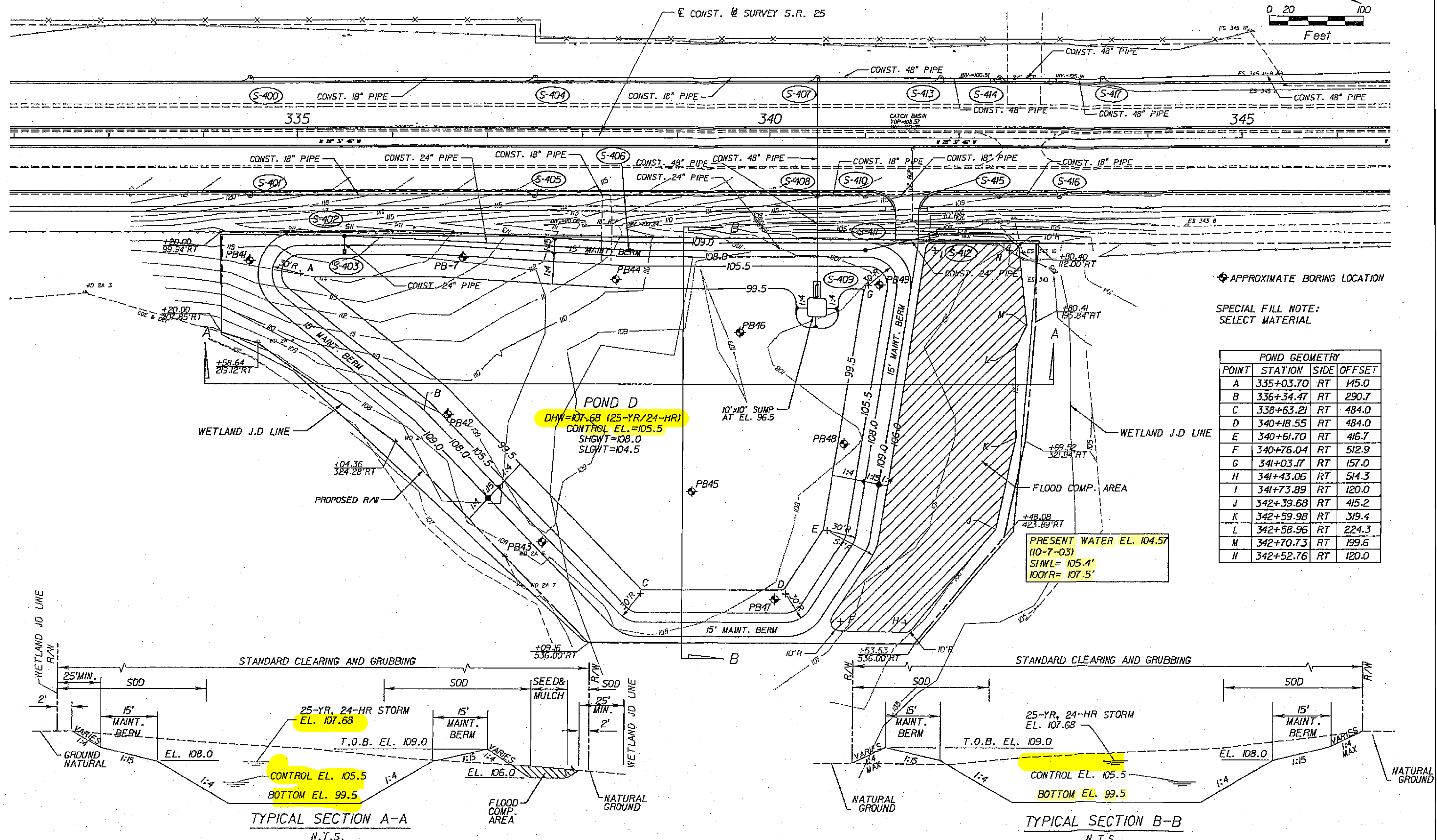
the SCS Type II rainfall distribution. To meet open basin requirements, a control structure was designed with a weir set at the water quality volume elevation and sized such that the post-development flows would not exceed pre-development flows.

The system was modeled using ICPR 3 for Windows. Results from the routed model are provided on the table below. Post-Development flow rates do not exceed pre-development for the design storms evaluated.

The soils encountered at this site are Candler Sands (Type A Soils) and Placid and Myakka Sand (Type D), based on the SCS Soil Survey. There are no known potential contamination sites, or cultural sites previously identified within the proposed pond site. The pond is bound by wetlands on its north and east sides. The pond berm will remain 25 feet from the wetland lines as this is the buffer recommended by the SJRWMD.

Basin D		
	Required	**Provided**
Water Quality Volume (ac-ft)	2.75	2.97
	Pre	**Post**
Peak Flows Q (25yr / 24 hr) (cfs)	46.69	6.20
Peak Stage (25yr / 24 hr) (ft)	N/A	107.68
Peak Flows Q (Mean Annual) (cfs)	6.59	0.82
Peak Stage (Mean Annual) (ft)	N/A	106.39

ERP No. 90260-2



POND GEOMETRY			
POINT	STATION	SIDE	OFFSET
A	335+03.70	RT	145.0
B	336+34.47	RT	290.7
C	338+63.21	RT	484.0
D	340+18.55	RT	484.0
E	340+61.70	RT	416.7
F	340+76.04	RT	512.9
G	341+03.17	RT	157.0
H	341+43.06	RT	514.3
I	341+73.89	RT	120.0
J	342+39.68	RT	415.2
K	342+59.98	RT	319.4
L	342+58.96	RT	224.3
M	342+70.73	RT	199.6
N	342+52.76	RT	120.0

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD: GLEN T. PARTLOW
P.E. NO: 58725
HDR Engineering, Inc.
315 E. Robinson Street, Suite 400
Orlando, FL 32801-1949
(407) 420-4200
www.hdrinc.com
FBPR Certificate of Authorization No. 4213

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 25	LAKE	238422-1-52-01

DETENTION AREA D

SHEET NO. 326

$USER$ 5/23/2005 8:38:40 AM x:\238422152O1\drainage\pdptrd04.dgn

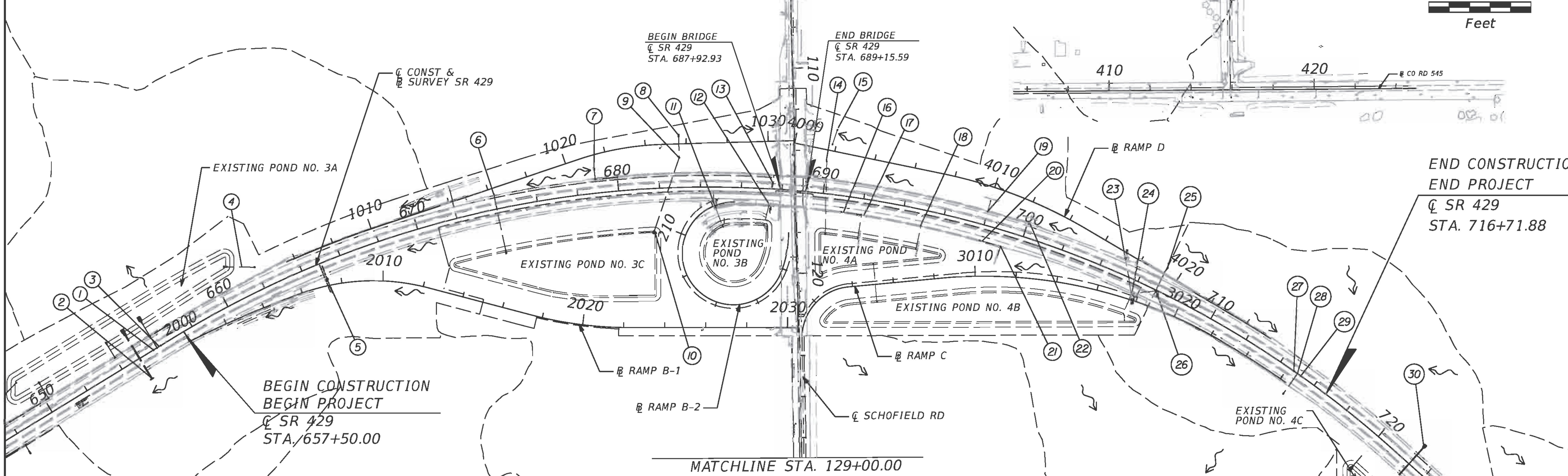
7-19

STR ID	DESCRIPTION
1	DBI TYPE B GRATE EL. 124.39, INV. 120.39
2	STRAIGHT CONCRETE ENDWALL INV. 110.00
3	GUTTER INLET TYPE S, PIPE, U-TYPE CONCRETE ENDWALL GRATE EL. 124.17, INV. 125.55, 18" CAP, INV. 104.50
4	MITERED END SECTION, PIPE, INLET INV. 104.00, 18" RCP, GRATE EL. 129.00, INV. 124.03
5	INFORMATION NOT KNOWN
6	MITERED END SECTION, PIPE, INLET INV. 152.11, 18" PIPE, GRATE 171.57, INV. 162.20
7	INLET, PIPE, INLET GRATE 186.19 INV. 182.86, 18" RCP, GRATE 184.63, INV. 180.83
8	MITERED END SECTION INV. 157.55
9	INLET GRATE 162.58, INV 156.48 (Lt), INV 156.42 (Rt)
10	MITERED END SECTION INV. 151.89
11	GUTTER INLET TYPE S, PIPE, U-TYPE CONCRETE ENDWALL GRATE EL. 187.82, INV. 184.00, 18" CAP, INV. 157.50
12	GUTTER INLET TYPE S, PIPE, U-TYPE CONCRETE ENDWALL GRATE EL. 190.52, INV. 187.44, 18" CAP, INV. 157.50
13	FLUME FLOWLINE @ WALL 193.59, @ MEDIAN 192.55
14	MITERED END SECTION, PIPE, MITERED END SECTION INV. 150.50, 24" RCP, INV. 150.50
15	MITERED END SECTION, PIPE, MITERED END SECTION INV. 157.21, 18" RCP, INV. 157.00
16	GUTTER INLET TYPE S, PIPE, U-TYPE CONCRETE ENDWALL GRATE EL. 190.39, INV. 187.30, 18" CAP, INV. 150.50
17	GUTTER INLET TYPE S, PIPE, U-TYPE CONCRETE ENDWALL GRATE EL. 189.89, INV. 186.81, 18" CAP, INV. 150.50
18	GUTTER INLET TYPE S, PIPE, U-TYPE CONCRETE ENDWALL GRATE EL. 187.23, INV. 184.15, 18" CAP, INV. 150.50
19	GUTTER INLET TYPE S, PIPE, U-TYPE CONCRETE ENDWALL GRATE EL. 186.57, INV. 183.24, 18" CAP, INV. 169.73
20	GUTTER INLET TYPE S, PIPE, U-TYPE CONCRETE ENDWALL GRATE EL. 182.79, INV. 179.71, 18" CAP, INV. 160.48
21	GUTTER INLET TYPE S, PIPE, U-TYPE CONCRETE ENDWALL GRATE EL. 180.77, INV. 177.69, 18" CAP, INV. 164.13
22	GUTTER INLET TYPE S, PIPE, U-TYPE CONCRETE ENDWALL GRATE EL. 182.21, INV. 179.13, 18" CAP, INV. 173.04
23	GUTTER INLET TYPE S, PIPE, DBI TYPE A (J BOTTOM) GRATE EL. 170.22, INV. 165.00, 18" RCP, INV. 156.22
24	DBI TYPE A (J BOTTOM) GRATE EL. 163.57, INV. 153.72 (Rt) (30" RCP), 156.22 (Lt) (18" RCP), 154.22 (Ah) (24" RCP)
25	MITERED END SECTION, PIPE, DBI TYPE B (J BOTTOM) INV. 161.63, 18" RCP, INV. 154.57
26	DBI TYPE B (J BOTTOM) GRATE EL. 160.12, INV. 154.57 (Bk) (24" RCP), 154.57 (Lt) (18" RCP)
27	DBI TYPE B, PIPE, DBI TYPE B GRATE EL. 147.93, INV. 144.97, 18" RCP, INV. 144.16
28	DBI TYPE B GRATE EL. 147.66, INV. 144.16 (Bk) (18" RCP), 144.16 (Ah) (18" RCP), 138.00 (Rt) 24" CAP
29	DBI TYPE B, PIPE, DBI TYPE B GRATE EL. 147.76, INV. 144.80, 18" RCP, INV. 144.16
30	MITERED END SECTION, PIPE, MITERED END SECTION INV. 141.00, 24" CAP, INV. 130.00

ERP 48-205102

NOTE: DO NOT USE THE INFORMATION IN THESE SHEETS FOR CONSTRUCTION PURPOSES. This sheet is in the plans for documentation and to assist construction personnel with drainage concerns.

NOTE: NO CHANGE BETWEEN EXISTING AND PROPOSED DRAINAGE BASINS OR PONDS.



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

TROY W. VARGAS, P.E. LICENSE NO. 57621

WBQ Design & Engineering Inc. 201 N. Magnolia Ave. Suite 200 Orlando Fl. 32801 Phone 407.839.4300 Fax 407.839.1621

CERTIFICATE OF AUTHORIZATION NO. 6796

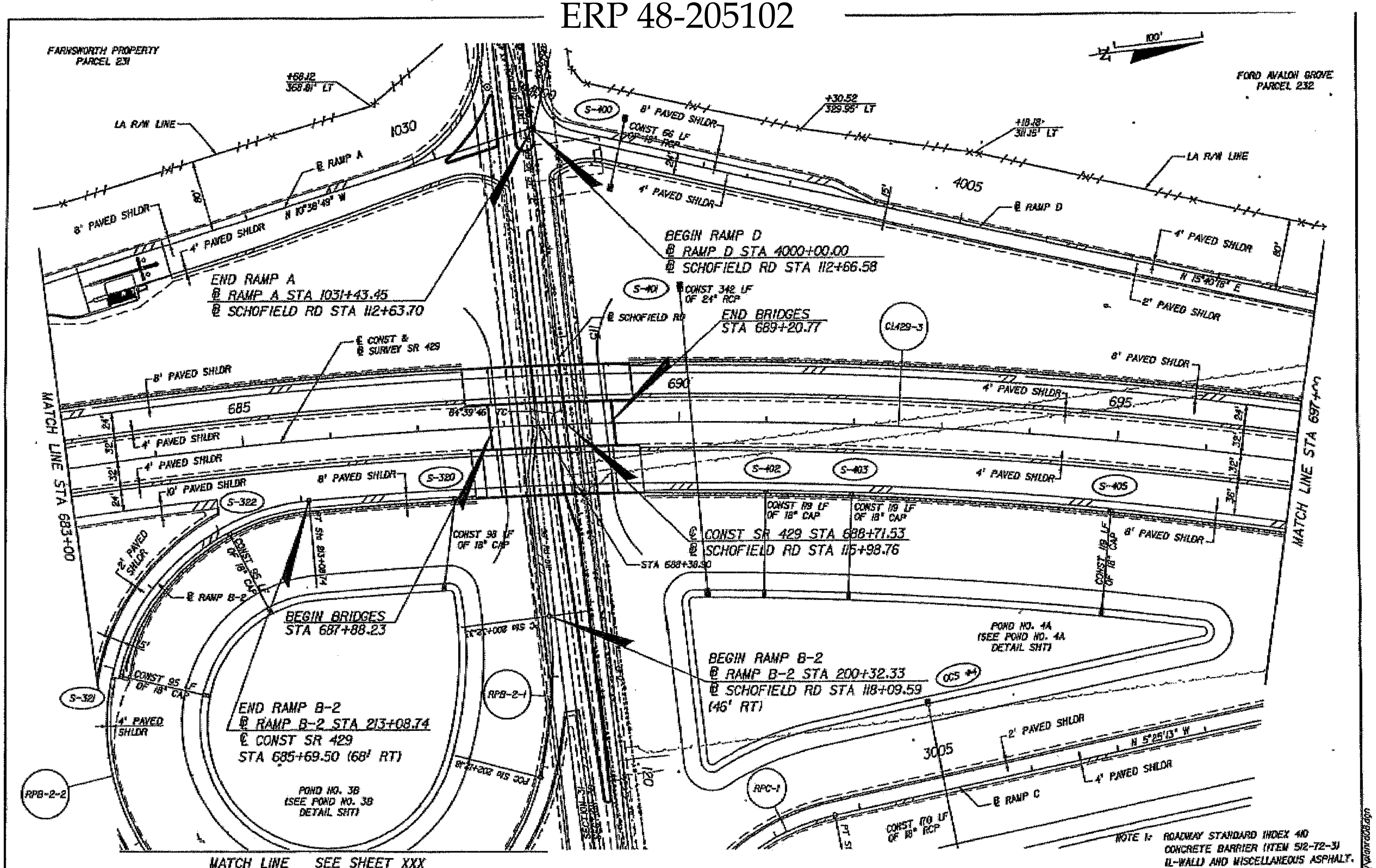
OOCEA PROJ. NO. 429-305

EXPRESSWAY AUTHORITY

EXISTING DRAINAGE MAP

SHEET NO. 3

msuarez 5/14/2012 7:29:23 PM P:\1100CEA.MISC-SCH\429-305\drainage\drmprd01.dgn



REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

PARSONS

CONTRACT No. 653

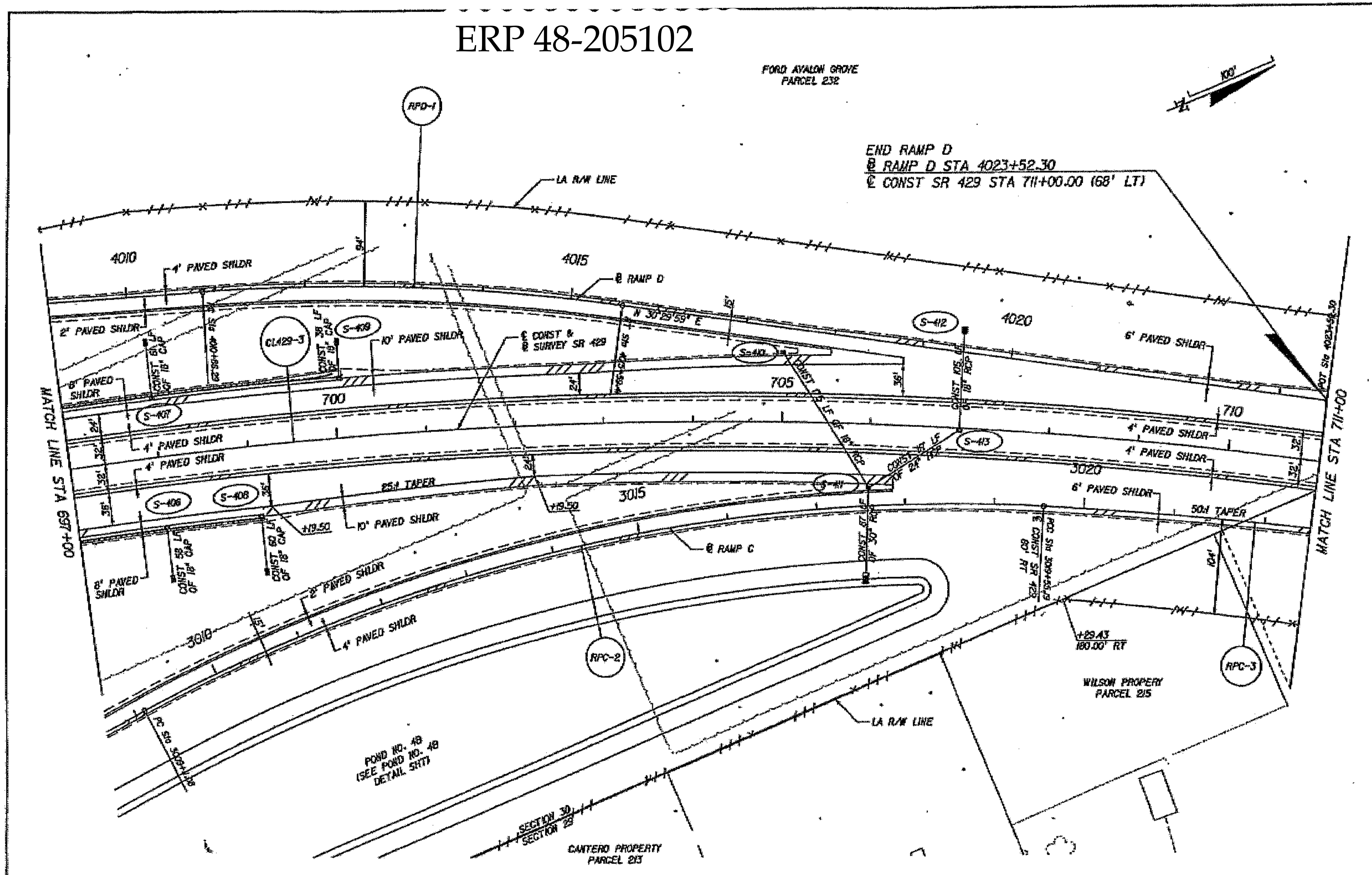
EXPRESSWAY AUTHORITY

SR 429 PLAN
STA 683+00 TO STA 697+00

SHEET NO. 41

Figure 15 of 73

ERP 48-205102



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ROGER D. TREVETT, P.E.
P.E. LICENSE NO. 35093
PARSONS
225 E. ROBINSON ST., SUITE 500 ORLANDO, FL 32801
PHONE: (407) 316-8400 / FAX: (407) 316-8873
CERTIFICATE OF AUTHORIZATION NO. 1838

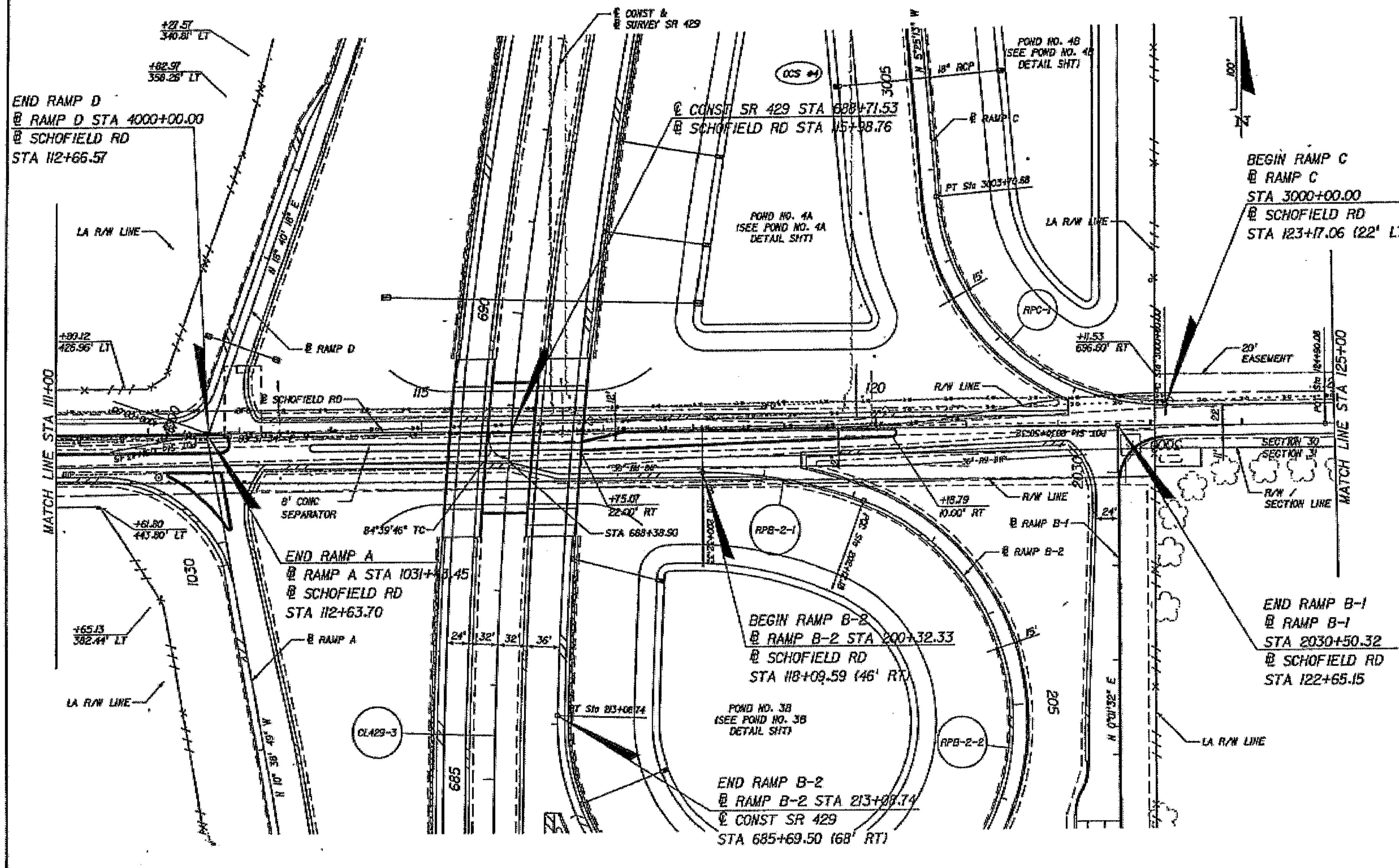
CONTRACT No. 653

EXPRESSWAY AUTHORITY

SR 429 PLAN
STA 697+00 TO STA 711+00

SHEET NO. 42

Figure 16 of 73



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

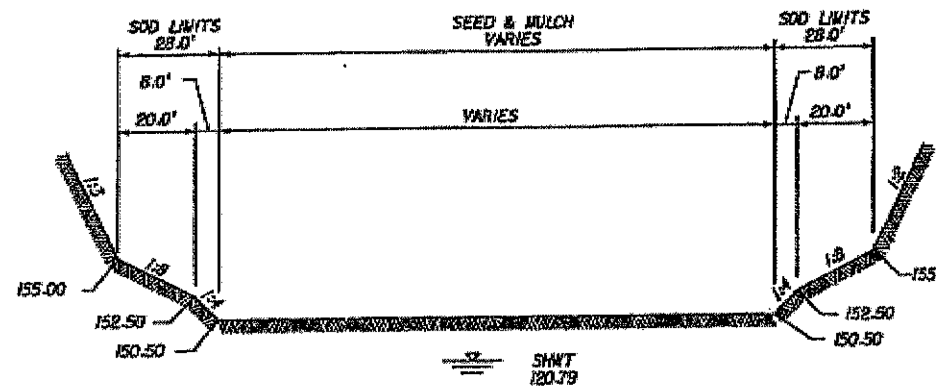
PARSONS
225 E. ROBINSON ST., SUITE 300 ORLANDO, FL 32801

CONTRACT No. 653

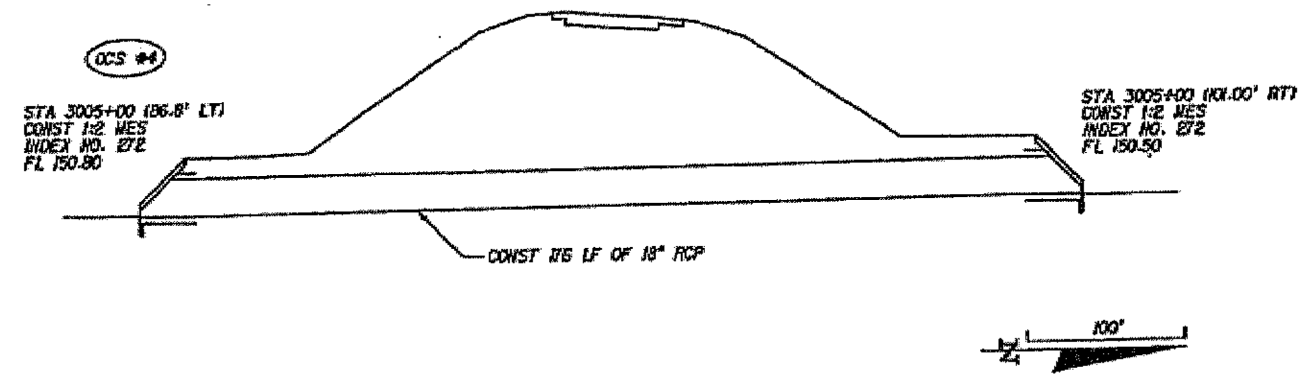
EXPRESSWAY AUTHORITY

SCHOFIELD ROAD PLAN
STA 111+00 TO STA 125+00

SHEET NO. 46



TYPICAL SECTION A-A
(N.T.S.)



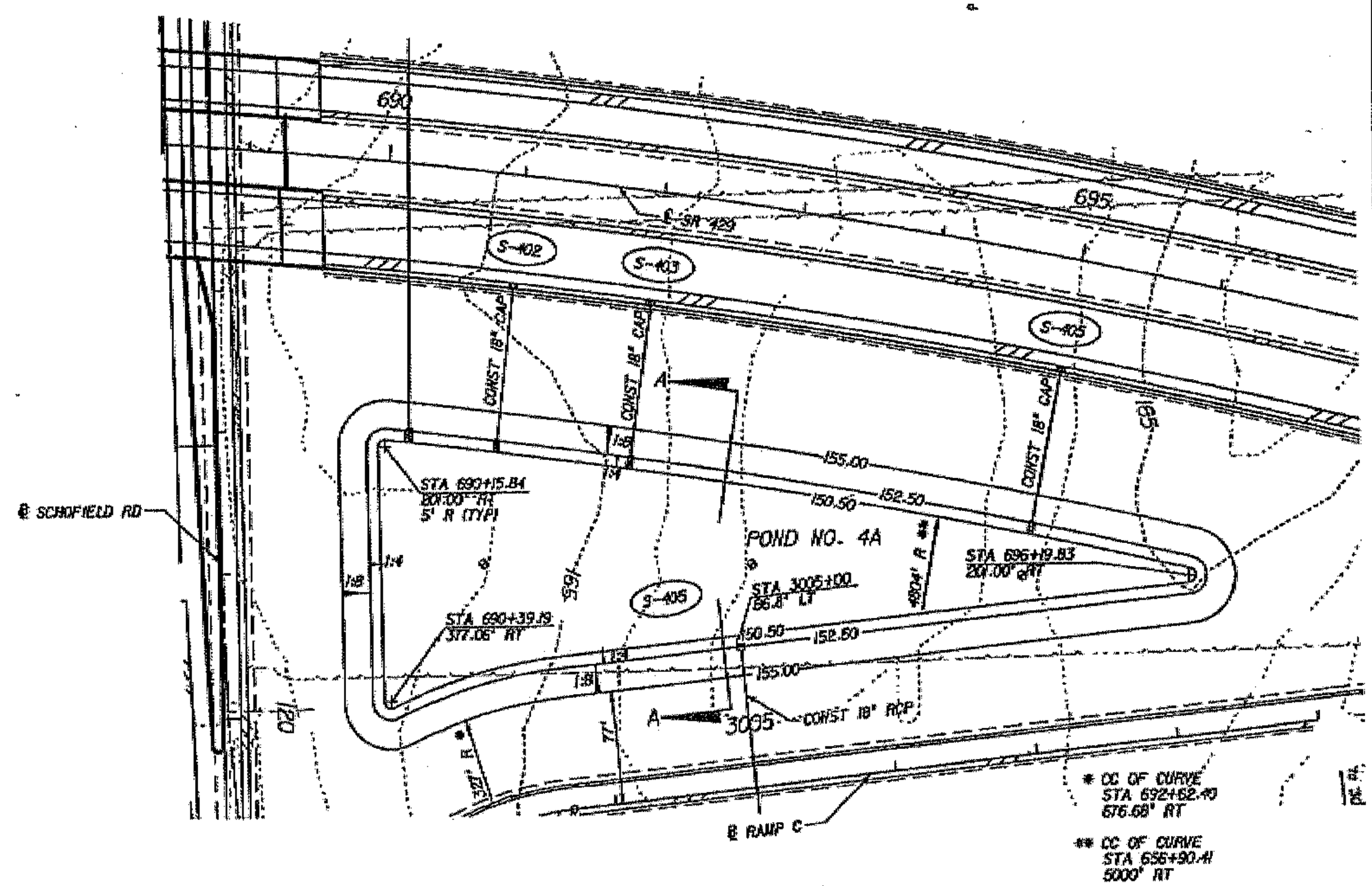
STORM FREQUENCY	PEAK STAGE
10 YR/24 HR (STORMSEWER TAILWATER)	151.29 (STAGE @ PEAK INFLOW)
100 YR/24 HR (ORANGE COUNTY)	153.03

LEGEND

⊕ POND NO. 4A AUGER BORING LOCATIONS

POND CONSTRUCTION NOTES:

1. INITIAL POND BOTTOM ELEVATION TO BE EXCAVATED TO WITHIN 1.0' OF FINAL ELEVATION, FINAL GRADING DEFERRED UNTIL ALL CONTRIBUTING AREAS HAVE BEEN STABILIZED.
2. LIGHT EQUIPMENT SHALL BE USED TO REMOVE ACCUMULATED SEDIMENTS TO ACHIEVE FINAL GRADE WITHOUT COMPACTING POND BOTTOM.
3. AFTER FINAL GRADINGS, POND FLOOR TO BE SCARIFIED WITH ROTARY TILLER OR DISC HARROW TO PROMOTE INFILTRATION AND GROWTH ESTABLISHMENT.



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

PARSONS

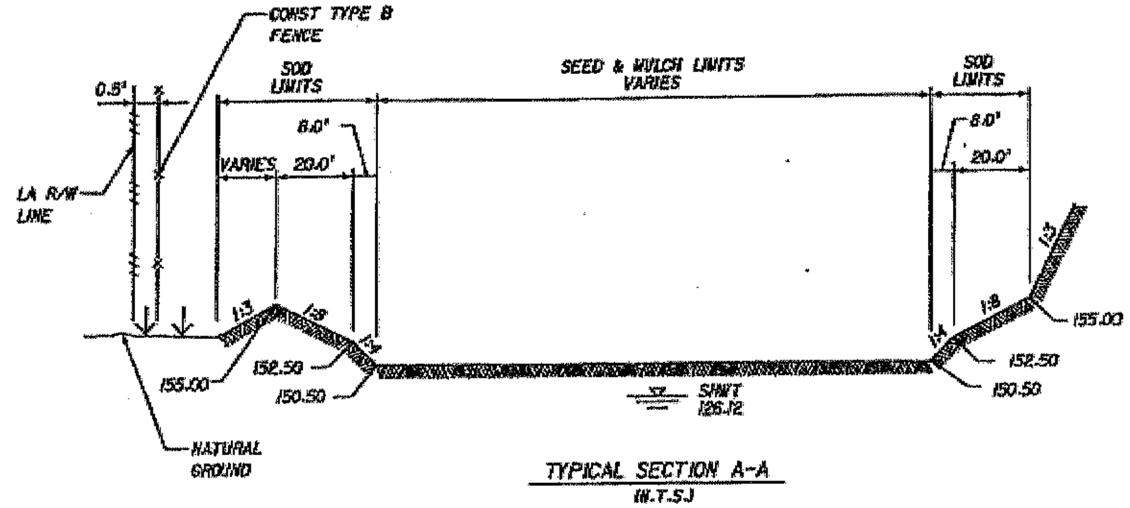
CONTRACT No. 653

EXPRESSWAY AUTHORITY

SR 429 POND DETAILS
POND NO. 4A

SHEET NO. 119

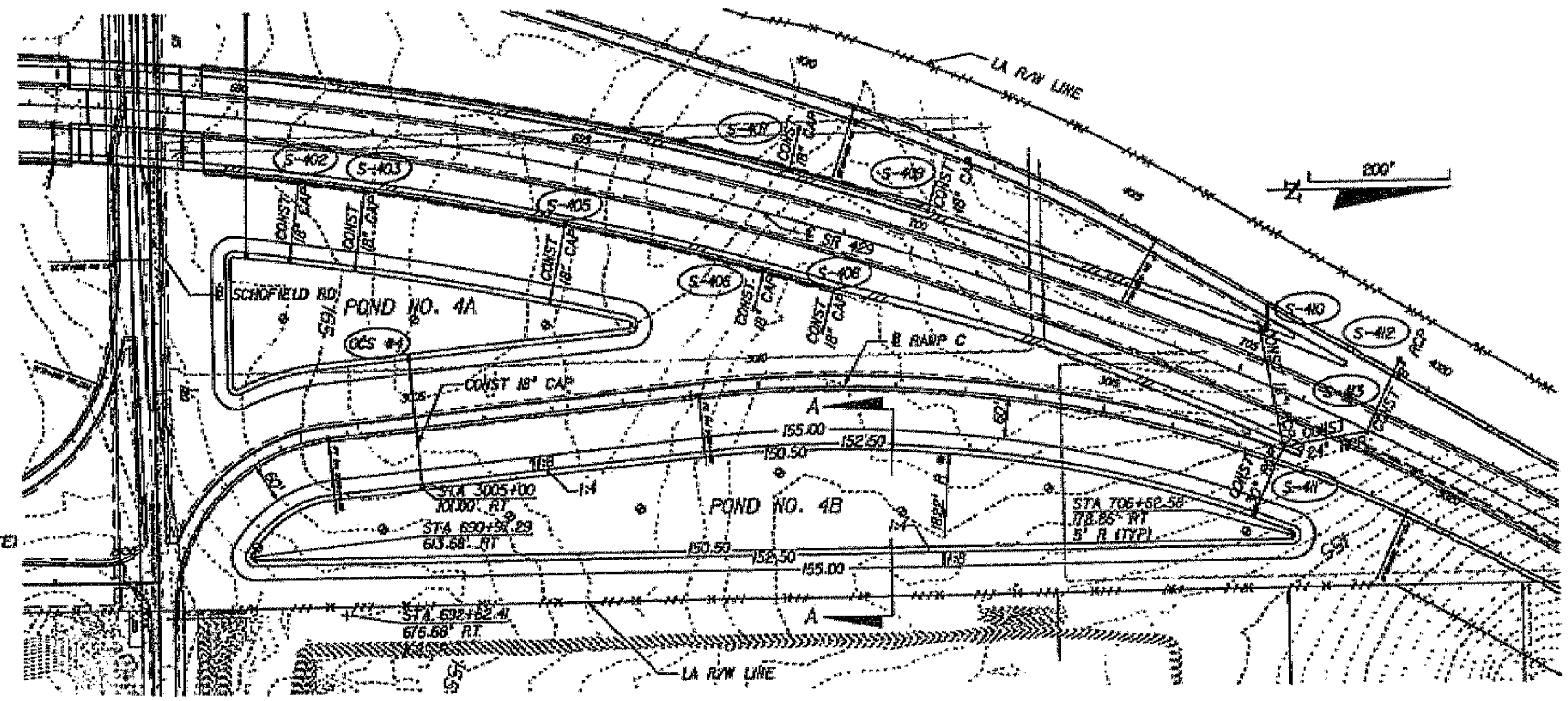
Figure 30 of 73



TYPICAL SECTION A-A
(N.T.S.)

POND CONSTRUCTION NOTES:

1. INITIAL POND BOTTOM ELEVATION TO BE EXCAVATED TO WITHIN 1.0' OF FINAL ELEVATION, FINAL GRADING DEFERRED UNTIL ALL CONTRIBUTING AREAS HAVE BEEN STABILIZED.
2. LIGHT EQUIPMENT SHALL BE USED TO REMOVE ACCUMULATED SEDIMENTS TO ACHIEVE FINAL GRADE WITHOUT COMPACTING POND BOTTOM.
3. AFTER FINAL GRADINGS, POND FLOOR TO BE SCARIFIED WITH ROTARY TILLER OR DISC HARROW TO PROMOTE INFILTRATION AND GROWTH ESTABLISHMENT.



* CC OF CURVE
STA 708+64.14
1989' RT

STORM FREQUENCY	PEAK STAGE
10 YR/24 HR (STORMSEWER TAILWATER)	151.33 (STAGE @ PEAK INFLOW RATE)
100 YR/24 HR (ORANGE COUNTY)	153.03

LEGEND

⊕ POND NO. 4B AUGER BORING LOCATIONS

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ROGER D. TREVETT, P.E.
P.E. LICENSE NO. 39093
PARSONS
225 E. ROBINSON ST., SUITE 300 ORLANDO, FL 32801
CERTIFICATE OF AUTHORIZATION NO. 1151

CONTRACT No. 653

EXPRESSWAY AUTHORITY

SR 429 POND DETAILS
POND NO. 4B

SHEET NO. 120

Appendix E – ELA Meeting Minutes

Feasibility / PD&E Study for the
Lake / Orange County Connector (US 27 to SR 429)
CFX Project No. 599-225

MINUTES: Environmental Look Around (ELA) Meeting

DATE: January 10, 2018 **TIME:** 1:30 P.M.

LOCATION: Lake County Public Works, 350 N. Sinclair Avenue, Tavares FL 32778

ATTENDEES:

George Gadiel, Lake County
Seth Lynch, Lake County
Nicholas Mcray, Lake County
Clayton Lee, Dewberry (by teleconference)
Mark Scott, Metric
Jazlyn Heywood, Metric (by teleconference)
Bill White, Lake County
Jeff Johnson, Lake County
Nicole Gough, Dewberry
Chandra Raman, Metric
Will Sloup, Metric

The purpose of the meeting was to discuss potential regional watershed opportunities. Also, to identify any historic maintenance problems involving drainage or flooding which could affect the viability of the project alternatives and influence the evaluation results. The following items were discussed:

Study Overview

- Exhibits were used to provide an overview of the potential five-mile, new alignment, CFX system expansion project.
- The study is in the alternatives analysis phase; four project alternatives have been developed. Alternatives 1 and 2 are the northern routes while Alternatives 3 and 4 are the southern routes. All alternatives end at a common location at SR 429, whereas there are four potential tie-in locations at US 27.
- New interchanges are proposed at US 27, the future extension of CR 455 (diamond interchange), the future Valencia Parkway (partial interchange) and SR 429 (systems interchange).
- The conceptual designs show US 27 shifted to the east; this is to accommodate the interchange with US 27 while avoiding impacts to Lake Louisa State Park lands.
- The Cook Road overpass accommodates a 120-foot wide typical section; same as at the future CR 455 extension.
- The study team is preparing for a second round of stakeholder and public engagement meetings. The second Environmental Advisory Group (EAG) and Project Advisory Group (PAG) meetings are scheduled for February 12th. The second public informational meeting is scheduled for March 7th.
- Drainage analysis during the alternatives analysis phase entails developing the primary pond(s) per basin. Once a recommended preferred alternative is identified, three alternative pond sites per basin will be identified.
- The study team will also conduct ELA meetings with the appropriate staff at Orange County, SFWMD and SJRWMD.

Flood Zones & Drainage Criteria

- Potential impacts to flood zones A and A/E are the County's primary concern; floodplain impacts should be minimized. The County's floodplain compensation requirements are stricter than SJRWMD criteria, so the County's criteria (cup-for-cup within the affected flood zone) should be used.
- The study team is working to minimize floodplain impacts. If floodplain impacts are unavoidable, cup-for-cup compensation will be provided in floodplain compensation ponds.
- Stormwater management facilities will be designed based on Lake County's Land Development Regulations (LDR) and SJRWMD criteria.
- The proposed project is located in a closed basin. Therefore, pre- and post-discharge requirements will be based on the 25-year, 96-hour storm per SJRWMD criteria.
- County staff questioned whether the study team obtained LiDAR data as there are some low areas along some of the alternatives that will be good pond sites. The team has the most current LiDAR data for Lake County.

Historic Drainage Issues

- Historic drainage issues are very minimal given the rural nature of the area.
- In the Summer of 2018 there was fish kill at Sawgrass Lake; there had been heavy rains in July. Lake County performed nutrient analysis which revealed elevated nutrients at the time of the fish kill and determined there was a verified microcystic bloom in the lake. The County can provide related information from FDEP.
- No water body within the study area has been identified as nutrient impaired.

Stormwater Master Plan

- The County is not aware of any old stormwater master plan that covers the study area.

Regional Pond

- The County is not aware of any future plans for a regional pond.

Joint-Use Pond

- There is no reason the County would not be open to a joint-use pond. However, their preference is not to maintain any such pond. There are current joint-use ponds between FDOT and developers.
- The CR 455 extension PD&E study is not far enough along to define the potential interchange location with the proposed expressway and, therefore, it is not possible at this time to know if there is potential for a joint use pond between both proposed projects.

Stormwater Harvesting

- The County is not currently participating in SJRWMD's stormwater harvesting initiatives since they do not operate a water utility.

Access Management

- The County is concerned with changes to the existing access management along US 27, specifically as it relates to the existing full median opening at the Lake Louisa State Park Entrance and at South Bradshaw Road.
- The County is in the process of vacating South Bradshaw Road.
- The study team continues to coordinate with FDOT as it relates to potential impacts to US 27.

ACTION ITEMS:

1. Lake County (Nicholas) will provide the FDEP information related to the Sawgrass Lake fish kill.

Feasibility / PD&E Study for the
Lake / Orange County Connector (US 27 to SR 429)
CFX Project No. 599-225

South Florida Water Management District Environmental Look Around (ELA)
Meeting Agenda
January 24, 2019

- **PD&E Study Overview**
  - Will describes project. New alignment expansion project.
  - Gone through a corridor analysis. 800' wide on both sides. Evaluated and paired it down to a single corridor with four project alternatives within it. Explains the four project alternatives and interchanges – CR 455 extension, future Valencia Parkway (partial) and SR 429 (System).
  - Legislative agreement, mainline existing is a DEP permit. Improvement or capacity is district and this project falls within that category. DEP doesn't want to take on any new alignment. Come early enough to get the methodology done.
  - Talking to the Districts. Any opportunities or fatal flaws you can think of.
- Recharge is part of the Central Florida Water initiative. Very active areas.
- Good possibility that there could be an interagency agreement. If it came down to it. Half mile and a major interchange.
- Reduce impacts, eliminate impacts to the greatest extent possible
- Pretty standard stuff
- This area is pretty well-drained.
- RIB's
- Closed basins that draw straight down to the aquifer.
- Chris Esterson talk to him about the recharge.

- **Discussion Points**
  - Most of the project is in the jurisdiction of the SJRWMD. Is the SFWMD open to an interagency agreement?
  - Can we merge wetlands into stormwater management facilities?
  - Does the District give water quality credits for any special water quality treatments?
  - Any drainage studies performed by the District in the area? No new. Talk to orange county. They may have.
  - Any potential large permitting that we need to be aware of?
  - Are there any water demands from the District in the area?

- **Open Discussion**

Feasibility / PD&E Study for the
Lake / Orange County Connector (US 27 to SR 429)
CFX Project No. 599-225

MINUTES: Coordination Meeting

DATE: February 26, 2019 **TIME:** 1:30 P.M.

LOCATION: FDOT District Five – Indian River Conference Room

ATTENDEES:

Mario Bizzio, FDOT
Heather Grubert, FDOT
Jean Parlow, FDOT
Jonathan Williamson, Dewberry
Jamison Edwards, Metric
James Crew, Metric
Jim Stroz, FDOT
Karen Snyder, FDOT
Mike Sanders, FDOT
Will Sloup, Metric
Jazlyn Heywood, Metric
Mark Scott, Metric

The purpose of the meeting was to continue coordination efforts as it relates to the proposed Lake/Orange County Connector and US 27. The meeting started with introductions and a study update. The following items were discussed:

Project Alternatives

- The study has a two phased approach: (1) Alternative Corridor Evaluation (ACE), and (2) Alternatives Analysis. The ACE process is complete and a recommended corridor area has been identified.
- Four project alternatives were developed within the recommended corridor area.
- The four project alternatives can be categorized into two northern routes and two southern routes, with four potential tie-in locations on US 27 and one common tie-in location at SR 429.
- Conceptual interchange configurations show a direct connection at US 27, a traditional diamond at the future extension of CR 455, a partial interchange at the future Valencia Parkway, and a new Systems interchange at SR 429.

Schedule

- The project alternatives will be presented for public input at a March 7th public meeting, to be held at the Bridgewater Middle School in Winter Garden. A recommended preferred alternative will then be selected by CFX and refined by the study team.
- The public hearing is anticipated to be held in June of 2019.

Traffic:

- There isn't a significant difference in traffic (2045 Average AADTs) between the alternatives.
- An operational analysis will be performed on the recommended preferred alternative.

Submittals

- Plan sheets for the recommended preferred alternative (specifically along US 27) will be submitted for FDOT review in May 2019. Per notes from the first coordination meeting, the review of a conceptual plan set could take one month due to the number of disciplines involved.

- Metric will arrange a meeting, during the review period, with the assigned reviewers to further explain the project and answer questions.

Access Management
- Access management standards on US 27 will be maintained.
- Olympus – a planned sports, wellness, fitness and entertainment development – is in contact with FDOT regarding access onto US 27. Mike Sanders will provide conceptual access plans that were submitted to the Department in February of 2018. Jean Parlow has had more recent discussions with the Developer.

Drainage
- FDOT is open to joint-use drainage facility opportunities. Ferrell Hickson (District Drainage Design Engineer) and Casey Lyon (District Permit Coordinator) should be contacted regarding potential joint-use opportunities and invited to future coordination meetings.
- Alternative 3 will impact an existing FDOT pond along US 27. There is also a FDOT pond located on the northeast side of Alternative 1, but no impacts are anticipated.

ACTION ITEMS:
- Metric will provide Karen Snyder with the evaluation matrix.
- Michael Sanders will provide the conceptual access plans for the proposed Olympus Development.

Feasibility / PD&E Study for the
Lake / Orange County Connector (US 27 to SR 429)
CFX Project No. 599-225

MINUTES: ELA with Orange County

DATE: April 25, 2019 **TIME:** 1:30 P.M.

LOCATION: Orange County Public Works - Roads & Drainage Conference Room

4200 S. John Young Parkway, Orlando 32839

ATTENDEES:

Brian Sanders, Orange County
Daniel Negron Vega, Orange County
Pedro Medina, Orange County
Brian Nead, Orange County
Jonathan Williamson, Dewberry (phone)
Mark Scott, Metric Engineering (phone)
Michael Holt, Metric Engineering
Will Sloup, Metric Engineering

The purpose of the meeting was to coordinate with Orange County as part of the Environmental Look Around. The meeting started with introductions and a study overview. The following items were discussed:

Meeting Overview

- Mr. Sloup and Mr. Holt gave an overview of the project and explained the intent of the Environmental Look Around (ELA) regarding localized stormwater management collaboration.
- Orange County staff reported that there is one active project in the study area, the widening of Avalon Road. The design has been completed for the segment between Schofield Road and Flamingo Crossing Boulevard but there is no funding for construction.
- Mr. Sanders will send the construction plans of Avalon Road to the team.
- There is a new study for the widening of Avalon Road from Schofield Road to New Independence Parkway, but it is still in the beginning stages.
- All discussed to continue coordination if the Lake / Orange County Connector moves forward to final design for possible partnering for stormwater management between CFX and Orange County.
- Mr. Negron, with the Stormwater Management Division, will provide the team a copy of the Reedy Creek and Cypress Creek Stormwater Master Plans for reference.
- Mr. Sloup discussed the upcoming EAG and PAG meetings. Orange County staff confirmed they will have representatives attending the meetings.
- Mr. Sloup gave a summary of the project schedule and upcoming milestones.

ACTION ITEMS:

- Mr. Sanders will send the construction plans of Avalon Road to the team. (Received 4/29/19)
- Mr. Negron, with the Stormwater Management Division, will provide the team a copy of the Reedy Creek and Cypress Creek Stormwater Master Plans (Received 4/29/19)

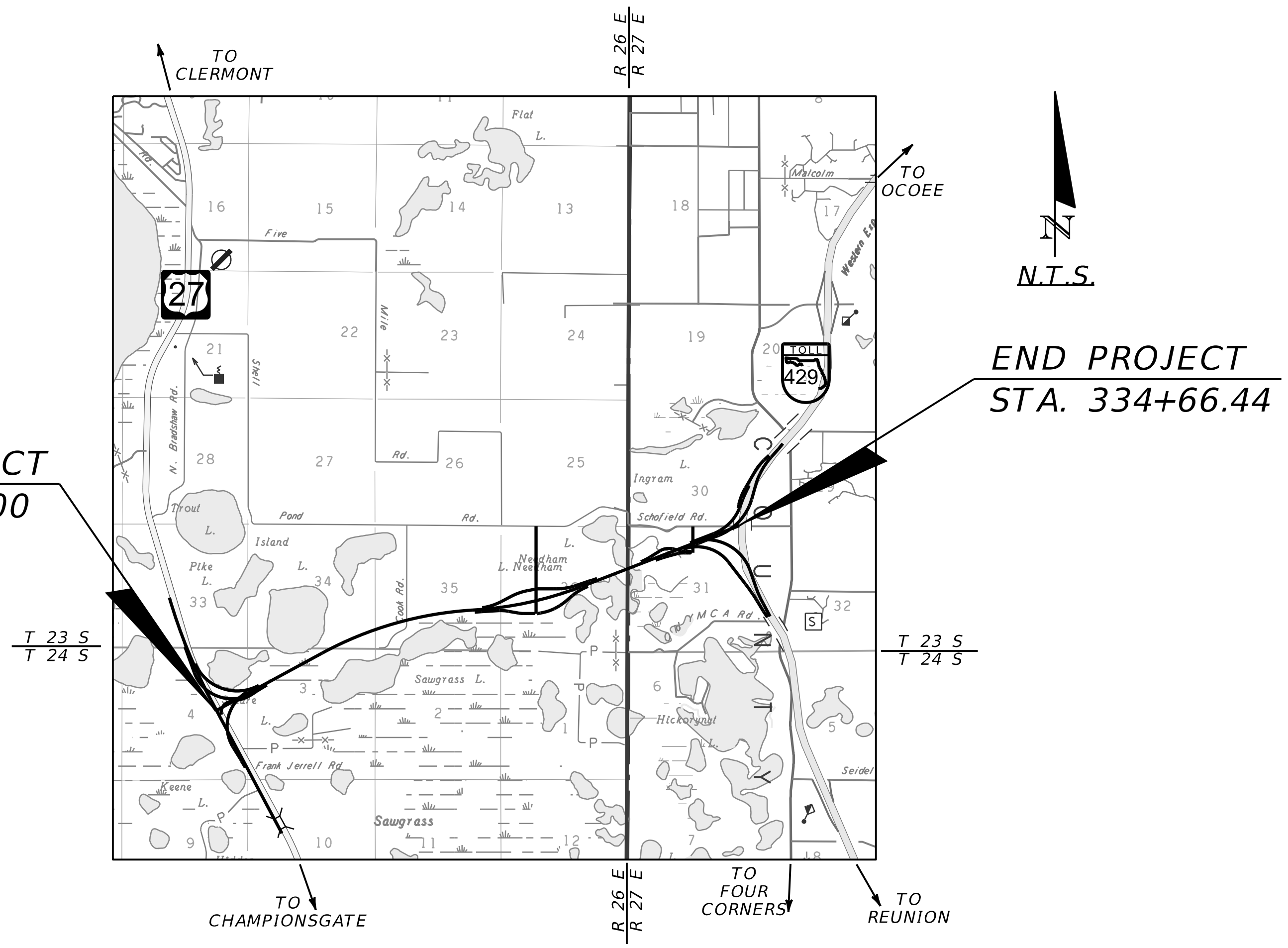
Appendix F – Proposed Typical Section Package

CENTRAL FLORIDA EXPRESSWAY AUTHORITY (CFX)

TYPICAL SECTION PACKAGE

LAKE/ORANGE COUNTY CONNECTOR FEASIBILITY/PD&E STUDY
FROM US 27 TO SR 429
CFX PROJECT NUMBER 599-225

LAKE COUNTY & ORANGE COUNTY



JAMISON R. EDWARDS
LICENSE
No 76095
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

THIS DOCUMENT HAS BEEN DIGITALLY SIGNED AND SEALED BY:

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METRIC ENGINEERING, INC.
525 TECHNOLOGY PARKWAY, SUITE 153
LAKE MARY, FLORIDA 32746
TEL. (407) 644-1898
FAX. (407) 644-2376
CERTIFICATE OF AUTHORIZATION 2294
VENDOR NO. F-59-1685550
JAMISON R. EDWARDS, P.E. NO. 76095

THE ABOVE NAMED PROFESSIONAL ENGINEER SHALL BE RESPONSIBLE FOR THE FOLLOWING SHEETS IN ACCORDANCE WITH RULE 61G15-23.004 F.A.C.

TYPICAL SECTION PACKAGE

SHEET NO.	SHEET DESCRIPTION
1	COVER SHEET
2	TYPICAL SECTION NO. 1
3	TYPICAL SECTION NO. 2
4	TYPICAL SECTION NO. 3
5	TYPICAL SECTION NO. 4
6	TYPICAL SECTION NO. 5
7	TYPICAL SECTION NO. 6
8	TYPICAL SECTION NO. 7
9	TYPICAL SECTION NO. 8
10	TYPICAL SECTION NO. 9
11	TYPICAL SECTION NO. 10
12	TYPICAL SECTION NO. 11
13	TYPICAL SECTION NO. 12
14	TYPICAL SECTION NO. 13
15	TYPICAL SECTION NO. 14
16	TYPICAL SECTION NO. 15
17	TYPICAL SECTION NO. 16
18	TYPICAL SECTION NO. 17
19	TYPICAL SECTION NO. 18
20	TYPICAL SECTION NO. 19

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PROJECT CONTROLS

CONTEXT CLASSIFICATION

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

FUNCTIONAL CLASSIFICATION

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

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

(X) 1 - FREEWAY
( ) 2 - RESTRICTIVE w/Service Roads
( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
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( ) 7 - BOTH MEDIAN TYPES

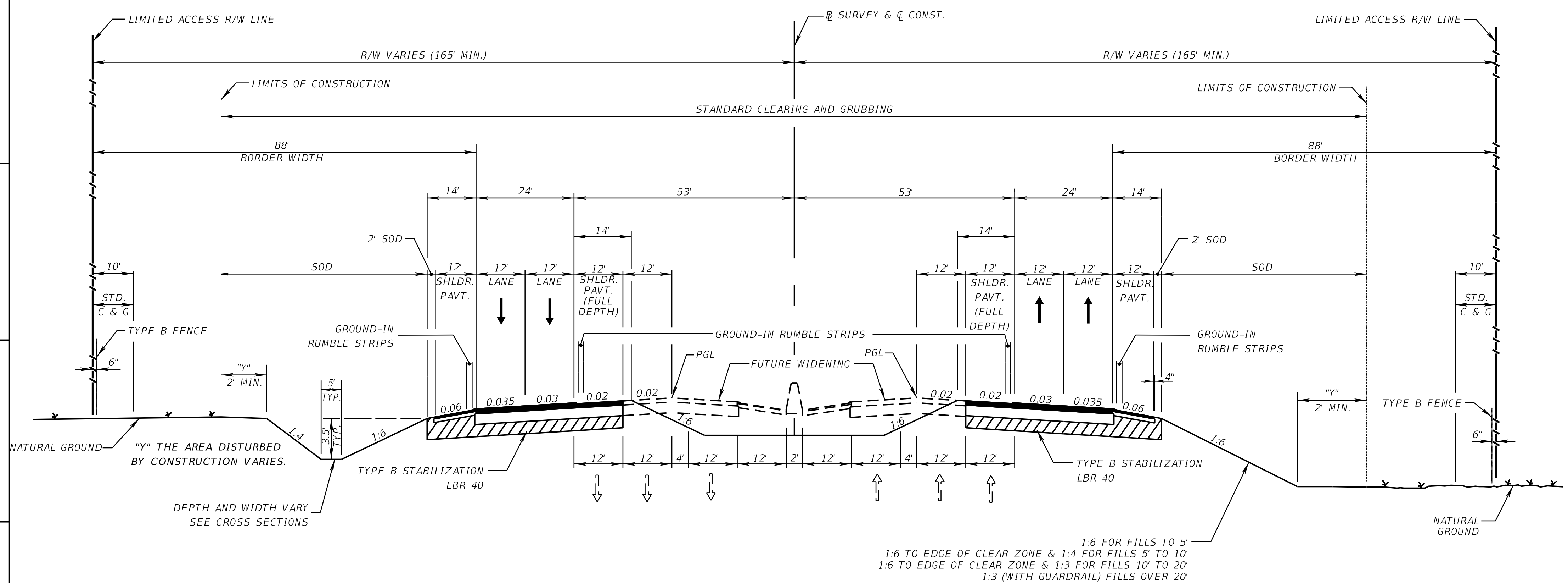
CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

BORDER WIDTH

TYPICAL SECTION No. 1



TYPICAL SECTION
LAKE/ORANGE COUNTY CONNECTOR

STA. 124+06.28 TO STA. 124+70.04
STA. 149+37.04 TO STA. 187+42.31
STA. 188+98.37 TO STA. 242+96.46
STA. 244+86.16 TO STA. 304+82.71
STA. 308+86.36 TO STA. 312+51.19
STA. 314+97.38 TO STA. 317+81.95
STA. 321+08.54 TO STA. 334+66.44

TRAFFIC DATA

CURRENT YEAR = TBD AADT = TBD
ESTIMATED OPENING YEAR = TBD AADT = TBD
ESTIMATED DESIGN YEAR = TBD AADT = TBD
K = TBD% D = TBD % T = TBD % (24 HOUR)
DESIGN SPEED = 70 MPH
POSTED SPEED = 70 MPH

NOT TO SCALE

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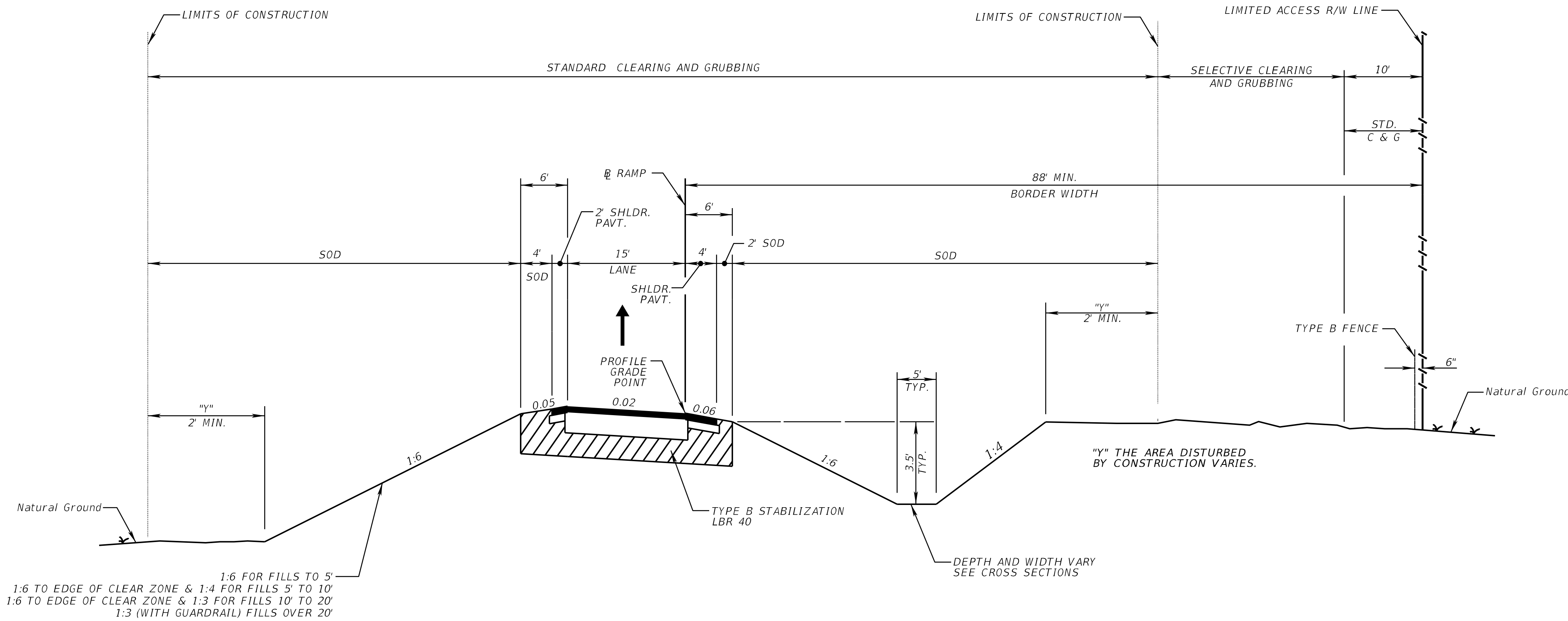
BORDER WIDTH

TYPICAL SECTION No. 2



TYPICAL SECTION
SINGLE LANE RAMP

RAMP 01
RAMP 02
RAMP 03
RAMP 04
RAMP 05
RAMP 06
RAMP 07
RAMP 08
RAMP 09
RAMP 10
RAMP 11
RAMP 12
RAMP 13
RAMP 14
RAMP 15

TRAFFIC DATA

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DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH

NOT TO SCALE

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POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

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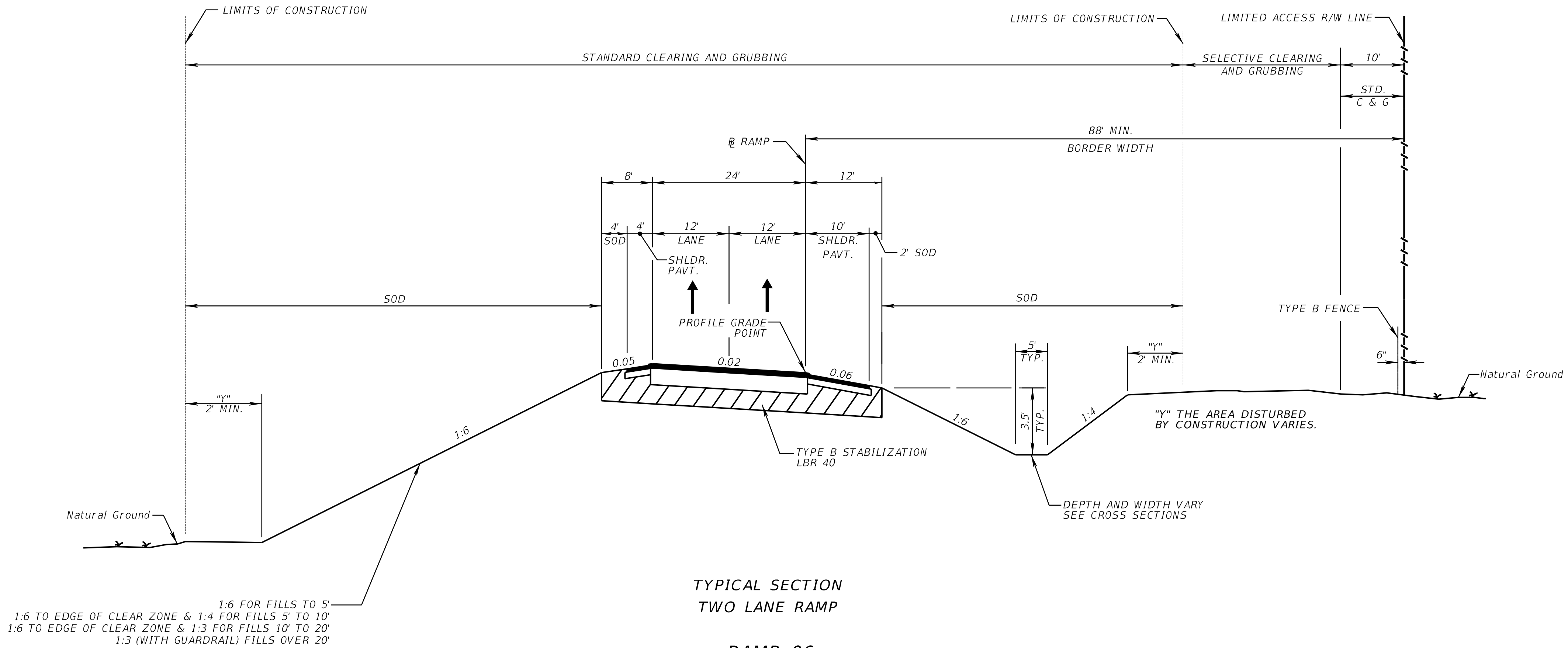

TYPICAL SECTION
TWO LANE RAMP

RAMP 06
RAMP 08
RAMP 09

TRAFFIC DATA

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POSTED SPEED = 45 MPH

NOT TO SCALE

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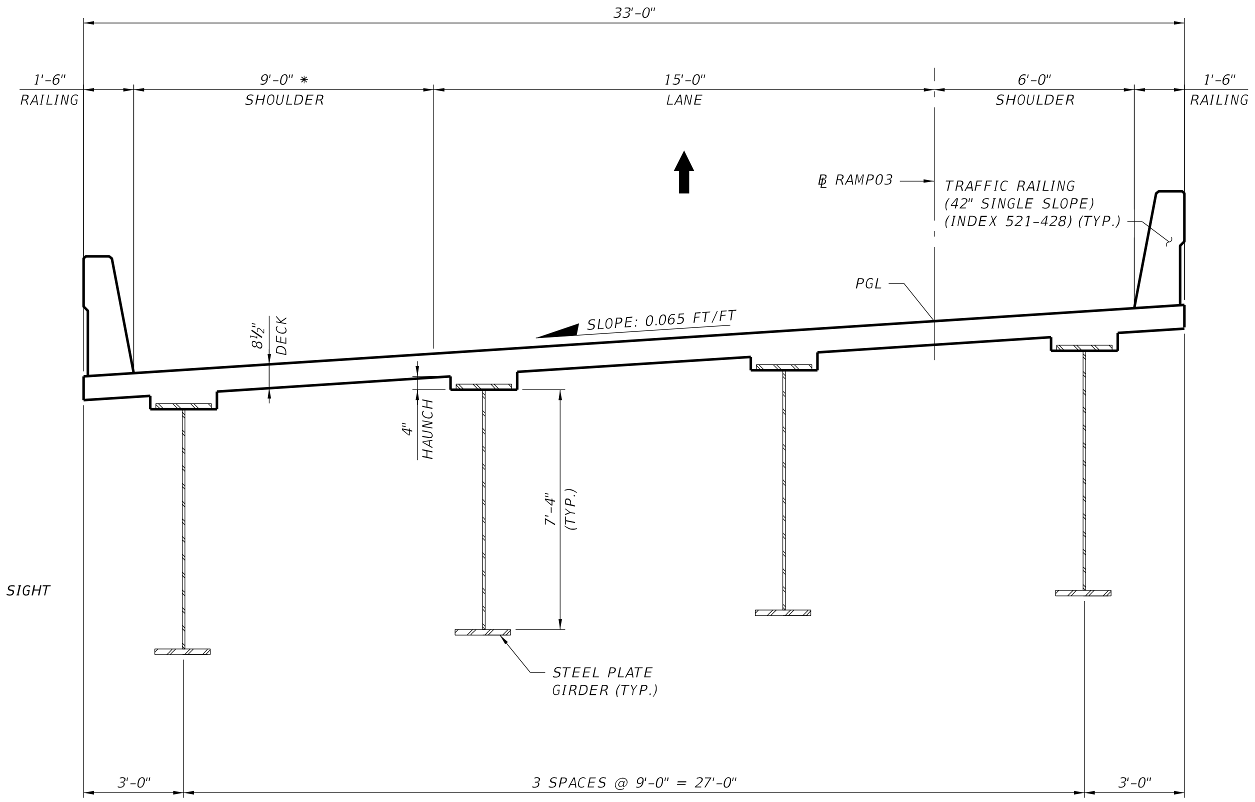

* NOTE: NON-TYPICAL SHOULDER WIDTH BASED ON SIGHT DISTANCE REQUIREMENTS

TYPICAL SECTION
BRIDGE 01
RAMP 3 OVER US 27
STA. 915+50.45 TO STA. 922+01.56

TRAFFIC DATA

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ESTIMATED OPENING YEAR = TBD AADT = TBD
ESTIMATED DESIGN YEAR = TBD AADT = TBD
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HIGHWAY SYSTEM

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ACCESS CLASSIFICATION

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- ( ) RRR (ARTERIALS & COLLECTORS)

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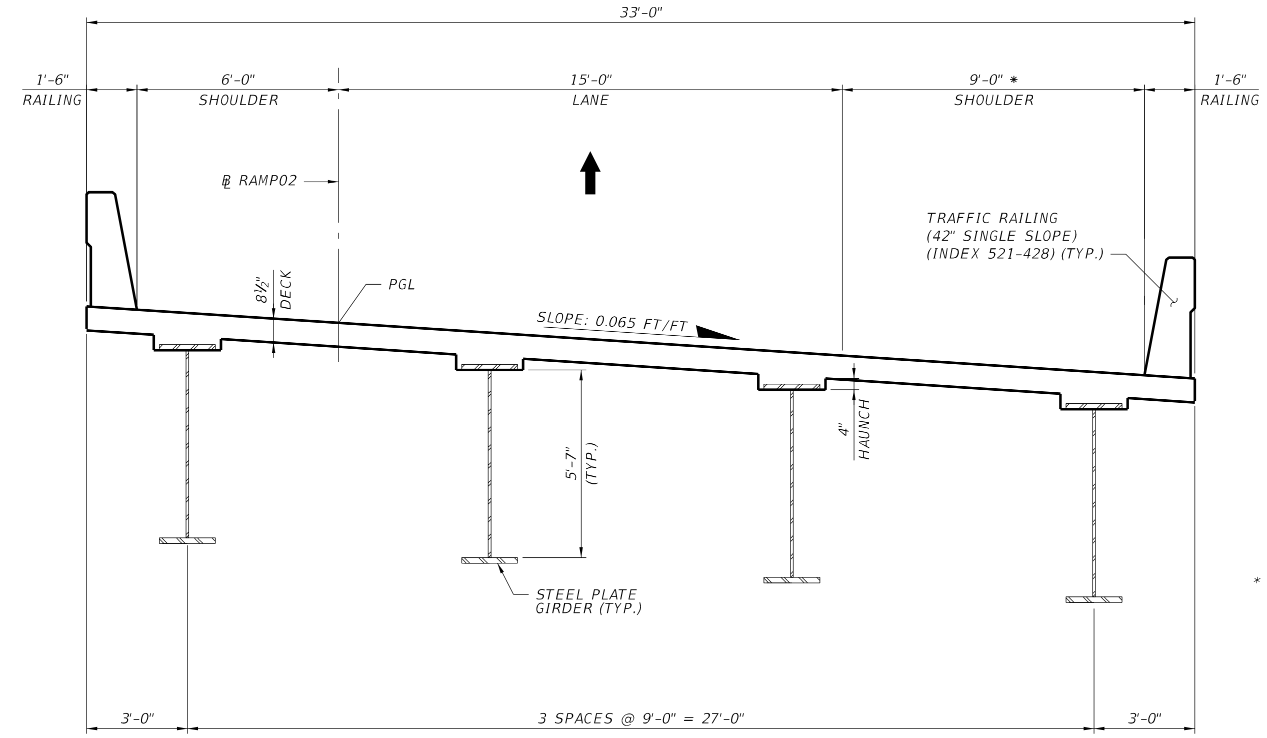
TYPICAL SECTION No. 5



* NOTE: NON-TYPICAL SHOULDER WIDTH BASED ON SIGHT DISTANCE REQUIREMENTS

TYPICAL SECTION
BRIDGE 02
RAMP 2 OVER US 27 AND RAMP 3
STA. 808+16.21 TO STA. 830+20.65

TRAFFIC DATA

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NOT TO SCALE

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PROJECT CONTROLS

CONTEXT CLASSIFICATION

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( ) C2T : RURAL TOWN
( ) C3R : SUBURBAN RES.
(X) N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

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HIGHWAY SYSTEM

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ACCESS CLASSIFICATION

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( ) RESURFACING (LA FACILITIES)
( ) RRR (ARTERIALS & COLLECTORS)

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

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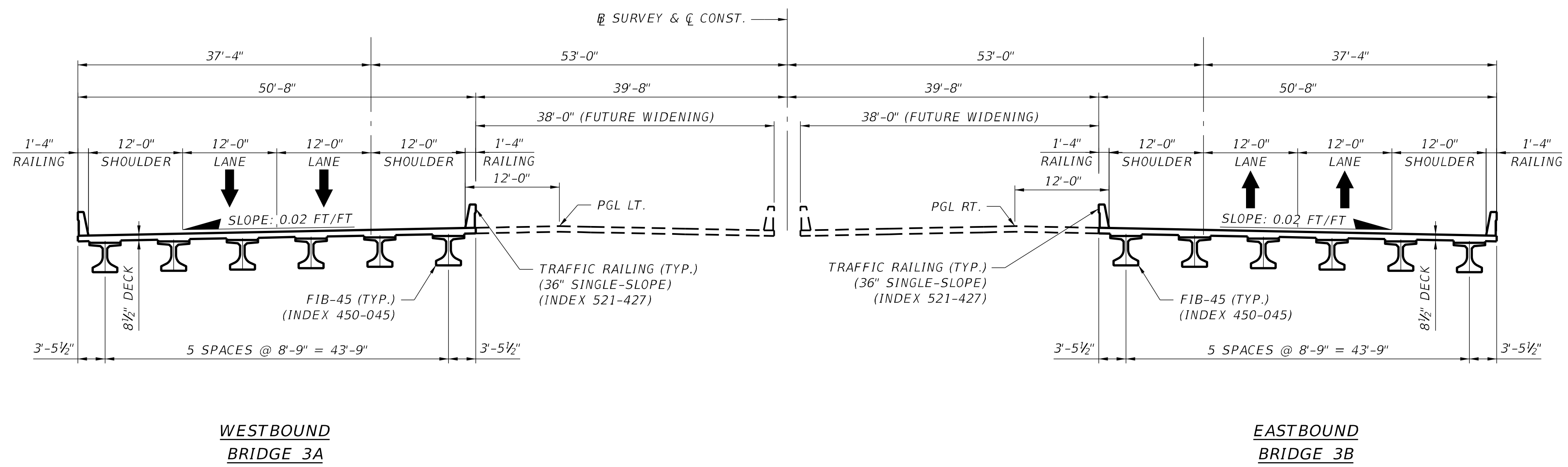
TYPICAL SECTION No. 6



TYPICAL SECTION
BRIDGE 3A AND 3B
MAINLINE OVER EXISTING WETLANDS
STA. 124+70.08 TO STA. 149+37.08

TRAFFIC DATA

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ESTIMATED DESIGN YEAR = TBD AADT = TBD
K = TBD% D = TBD % T = TBD % (24 HOUR)
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POSTED SPEED = 70 MPH

NOT TO SCALE

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PROJECT CONTROLS

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HIGHWAY SYSTEM

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ACCESS CLASSIFICATION

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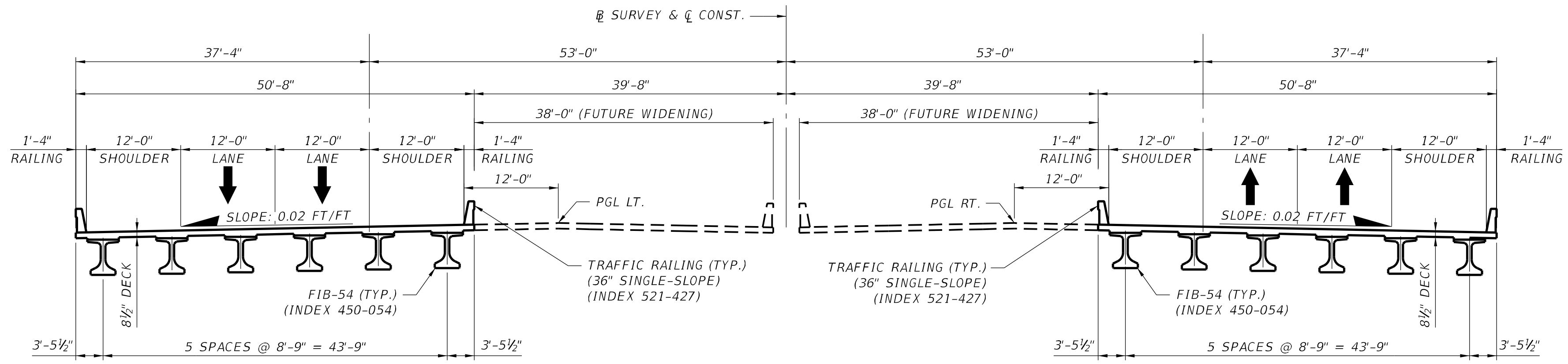
CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

N/A

TYPICAL SECTION No. 7



WESTBOUND
BRIDGE 4A

EASTBOUND
BRIDGE 4B

TYPICAL SECTION
BRIDGE 4A AND 4B
MAINLINE OVER COOK RD.
EB BRIDGE STA. 187+43.97 TO STA. 188+70.33
WB BRIDGE STA. 187+71.40 TO STA. 188+96.81

TRAFFIC DATA

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ESTIMATED OPENING YEAR = TBD AADT = TBD
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NOT TO SCALE

PROJECT CONTROLS

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POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

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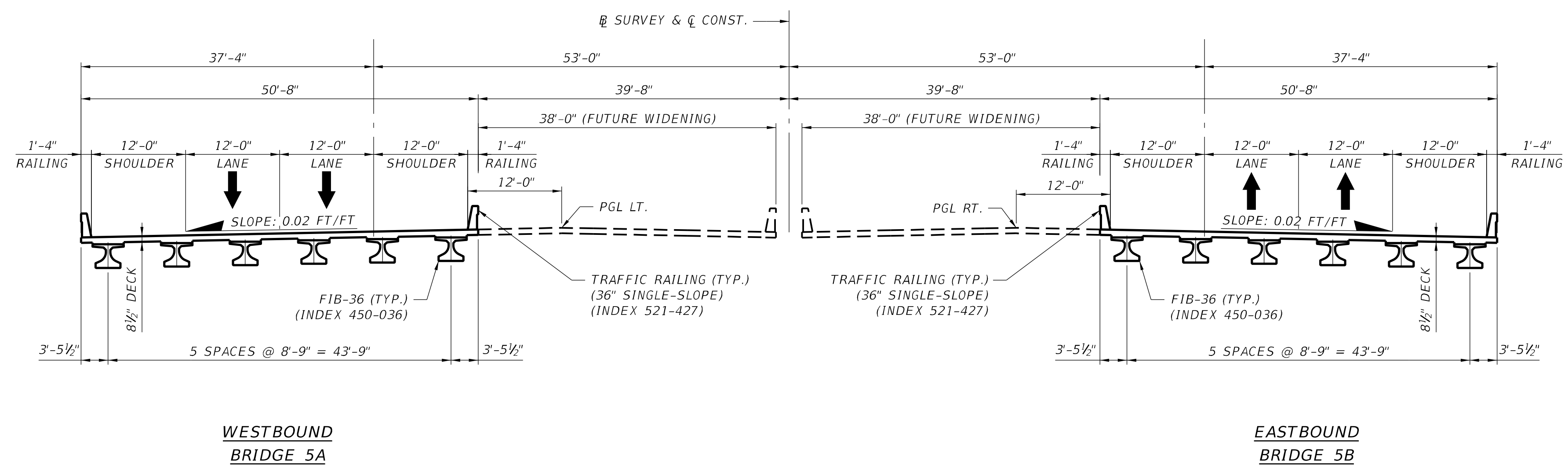
TYPICAL SECTION No. 8



TYPICAL SECTION
BRIDGE 5A AND 5B
MAINLINE OVER CR 455
EB BRIDGE STA. 242+99.26 TO STA. 244+57.07
WB BRIDGE STA. 243+24.18 TO STA. 244+83.18

TRAFFIC DATA

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NOT TO SCALE

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( ) C3R : SUBURBAN RES.
(X) N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

( ) INTERSTATE
(X) FREEWAY/EXPWY.
( ) PRINCIPAL ARTERIAL
( ) MINOR ARTERIAL

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

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

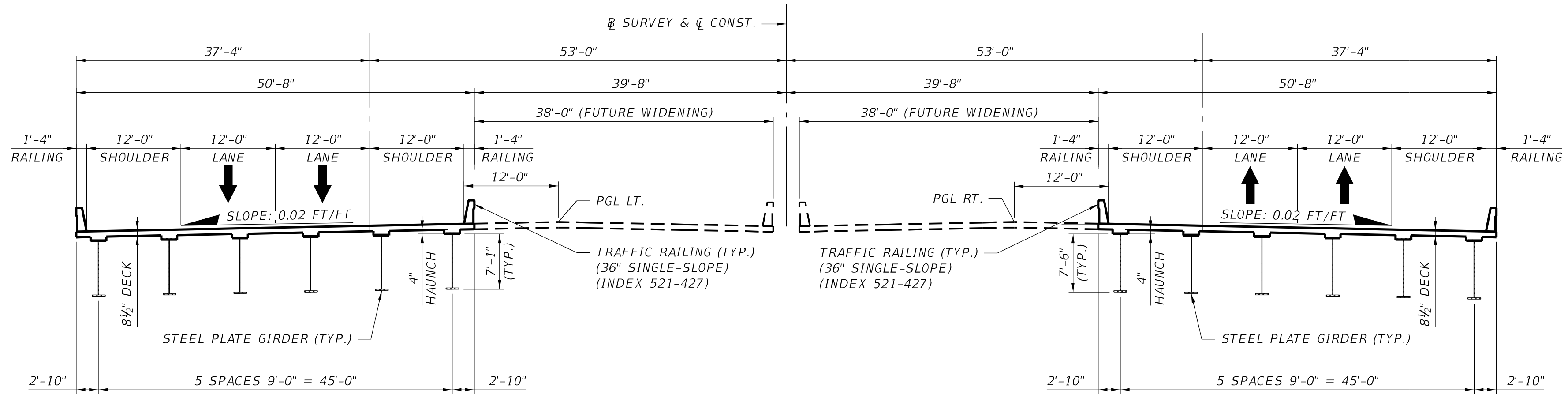
CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

N/A

TYPICAL SECTION No. 9



WESTBOUND
BRIDGE 6A

EASTBOUND
BRIDGE 6B

TYPICAL SECTION
BRIDGE 6A AND 6B
MAINLINE OVER RAMP 9
EB BRIDGE STA. 306+74.88 TO STA. 308+86.36
WB BRIDGE STA. 304+82.71 TO STA. 306+85.08

TRAFFIC DATA

CURRENT YEAR = TBD AADT = TBD
ESTIMATED OPENING YEAR = TBD AADT = TBD
ESTIMATED DESIGN YEAR = TBD AADT = TBD
K = TBD% D = TBD % T = TBD % (24 HOUR)
DESIGN SPEED = 70 MPH
POSTED SPEED = 70 MPH

NOT TO SCALE

PROJECT CONTROLS

CONTEXT CLASSIFICATION

( ) C1 : NATURAL
( ) C2 : RURAL
( ) C2T : RURAL TOWN
( ) C3R : SUBURBAN RES.
(X) N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

( ) INTERSTATE
(X) FREEWAY/EXPWY.
( ) PRINCIPAL ARTERIAL
( ) MINOR ARTERIAL

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

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

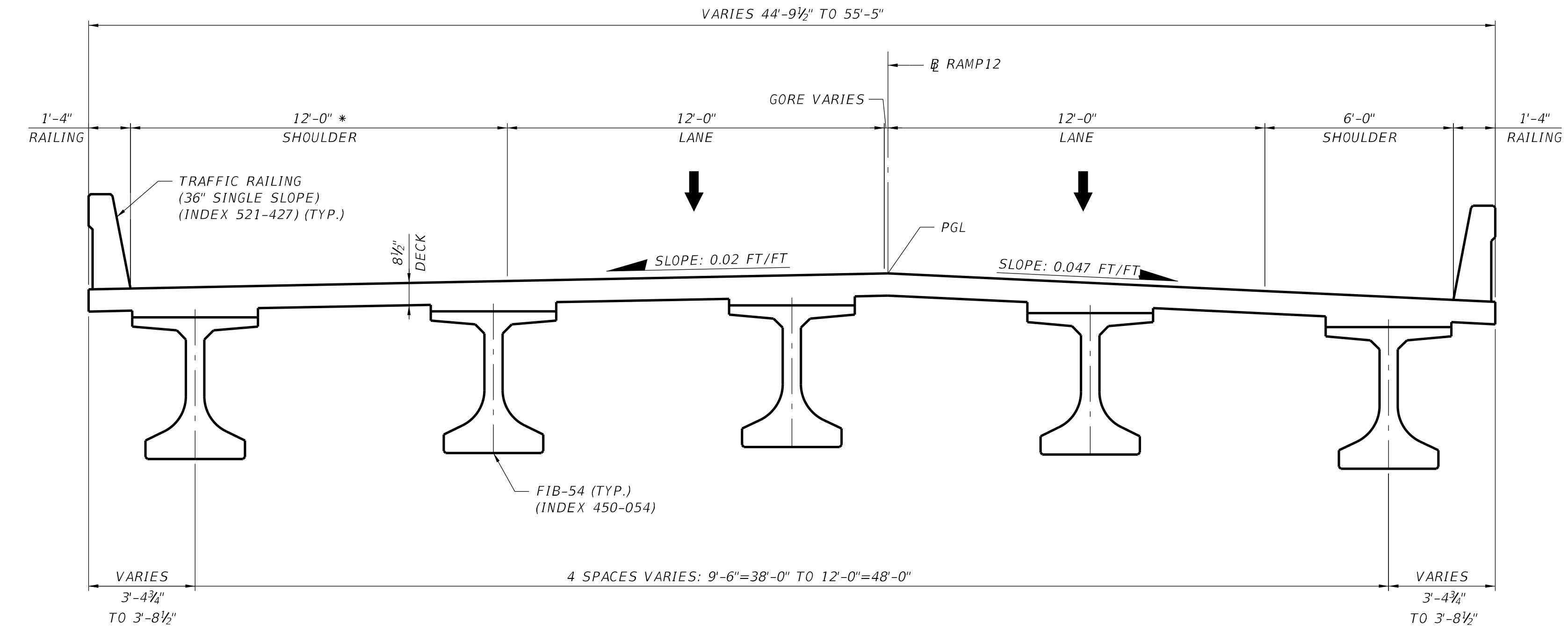
CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

N/A

TYPICAL SECTION No. 10



TYPICAL SECTION
BRIDGE 7A
MAINLINE OVER VALENCIA PARKWAY
STA. 313+22.95 TO STA. 314+84.80

* NOTE: NON-TYPICAL SHOULDER WIDTH BASED ON SIGHT DISTANCE REQUIREMENTS

TRAFFIC DATA

CURRENT YEAR = TBD AADT = TBD
ESTIMATED OPENING YEAR = TBD AADT = TBD
ESTIMATED DESIGN YEAR = TBD AADT = TBD
K = TBD% D = TBD % T = TBD % (24 HOUR)
DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH

NOT TO SCALE

SHEET NO.

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PROJECT CONTROLS

CONTEXT CLASSIFICATION

( ) C1 : NATURAL
( ) C2 : RURAL
( ) C2T : RURAL TOWN
( ) C3R : SUBURBAN RES.
(X) N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

( ) INTERSTATE
(X) FREEWAY/EXPWY.
( ) PRINCIPAL ARTERIAL
( ) MINOR ARTERIAL

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

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

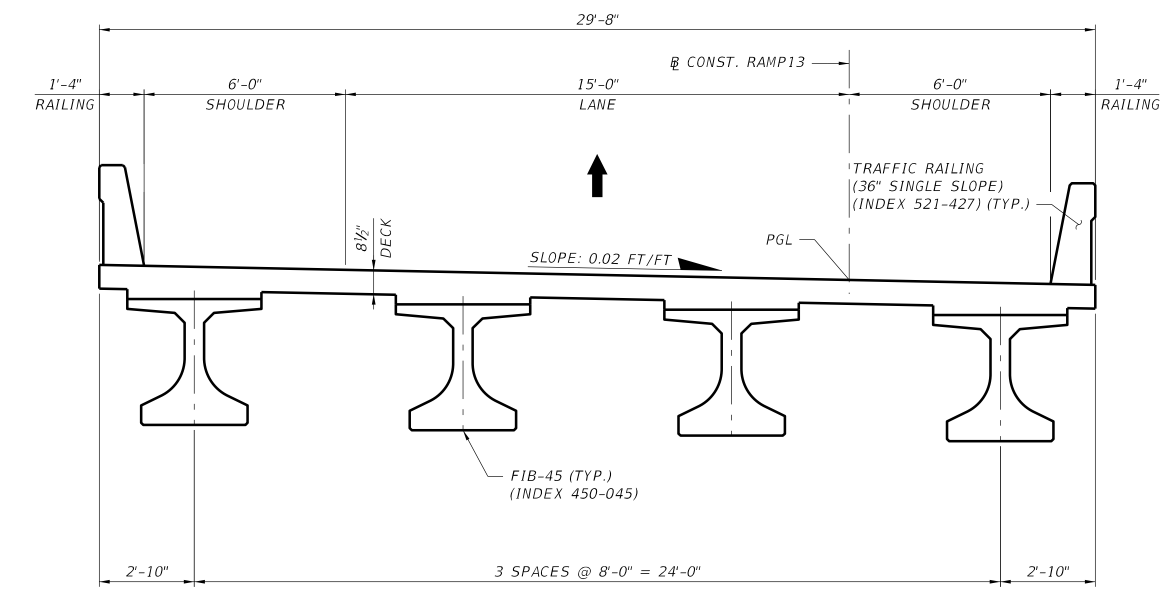
CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

N/A

TYPICAL SECTION No. 11



TYPICAL SECTION
BRIDGE 7B
MAINLINE OVER VALENCIA PARKWAY
STA. 1903+42.02 TO STA. 1905+07.10

TRAFFIC DATA

CURRENT YEAR = TBD AADT = TBD
ESTIMATED OPENING YEAR = TBD AADT = TBD
ESTIMATED DESIGN YEAR = TBD AADT = TBD
K = TBD% D = TBD % T = TBD % (24 HOUR)
DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH

NOT TO SCALE

PROJECT CONTROLS

CONTEXT CLASSIFICATION

( ) C1 : NATURAL
( ) C2 : RURAL
( ) C2T : RURAL TOWN
( ) C3R : SUBURBAN RES.
(X) N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

( ) INTERSTATE
(X) FREEWAY/EXPWY.
( ) PRINCIPAL ARTERIAL
( ) MINOR ARTERIAL

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

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

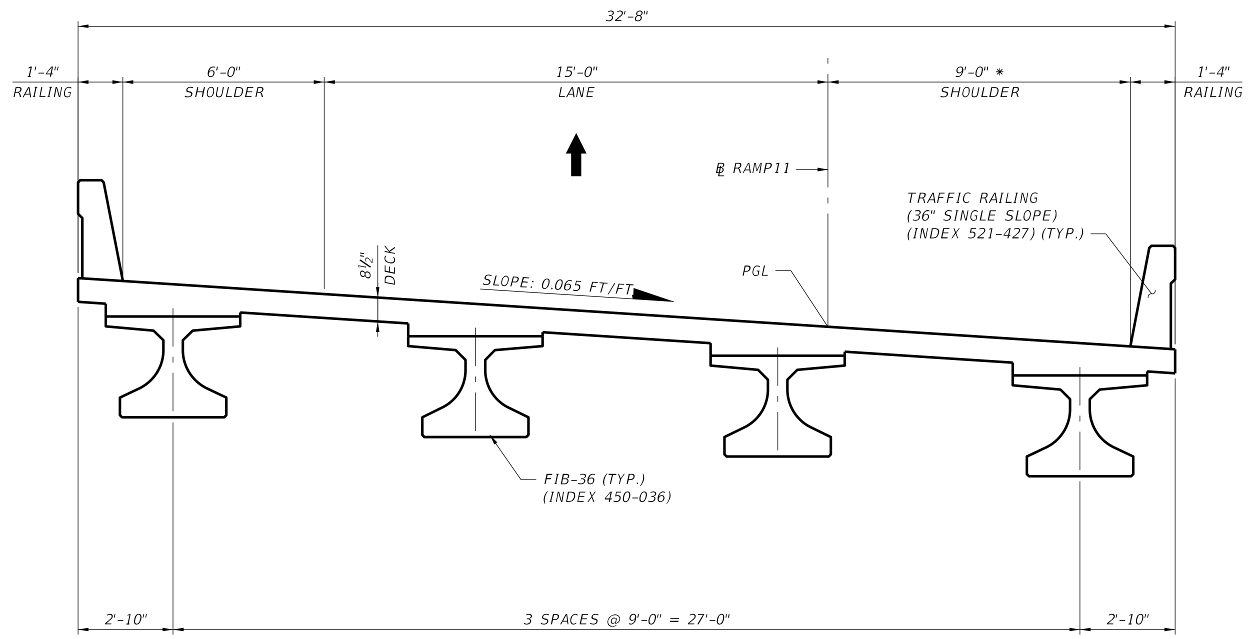
CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

N/A

TYPICAL SECTION No. 12



* NOTE: NON-TYPICAL SHOULDER WIDTH BASED ON SIGHT DISTANCE REQUIREMENTS

TYPICAL SECTION
BRIDGE 7C
MAINLINE OVER VALENCIA PARKWAY
STA. 1703+27.25 TO STA. 1704+82.45

TRAFFIC DATA

CURRENT YEAR = TBD AADT = TBD
ESTIMATED OPENING YEAR = TBD AADT = TBD
ESTIMATED DESIGN YEAR = TBD AADT = TBD
K = TBD% D = TBD % T = TBD % (24 HOUR)
DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH

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PROJECT CONTROLS

CONTEXT CLASSIFICATION

( ) C1 : NATURAL
( ) C2 : RURAL
( ) C2T : RURAL TOWN
( ) C3R : SUBURBAN RES.
(X) N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

( ) INTERSTATE
(X) FREEWAY/EXPWY.
( ) PRINCIPAL ARTERIAL
( ) MINOR ARTERIAL

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

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

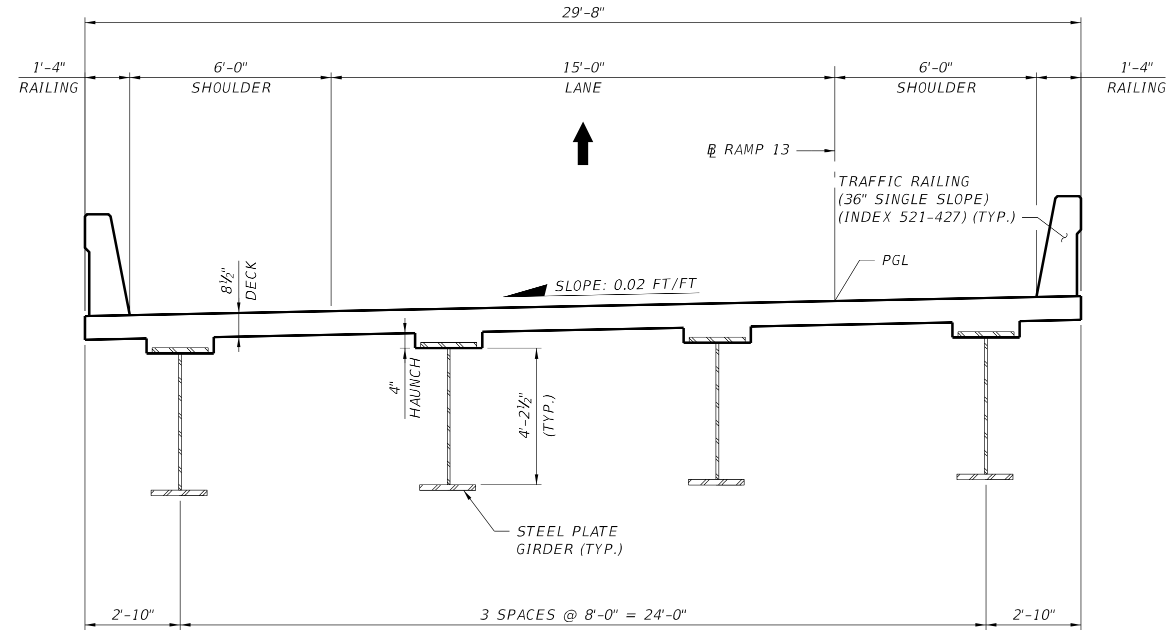
CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

N/A

TYPICAL SECTION No. 13



TYPICAL SECTION
BRIDGE 08
RAMP 13 OVER RAMP 12
STA. 1908+52.29 TO STA. 1911+78.88

TRAFFIC DATA

CURRENT YEAR = TBD AADT = TBD
ESTIMATED OPENING YEAR = TBD AADT = TBD
ESTIMATED DESIGN YEAR = TBD AADT = TBD
K = TBD% D = TBD % T = TBD % (24 HOUR)
DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH

NOT TO SCALE

PROJECT CONTROLS

CONTEXT CLASSIFICATION

( ) C1 : NATURAL
( ) C2 : RURAL
( ) C2T : RURAL TOWN
( ) C3R : SUBURBAN RES.
(X) N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

( ) INTERSTATE
(X) FREEWAY/EXPWY.
( ) PRINCIPAL ARTERIAL
( ) MINOR ARTERIAL

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

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

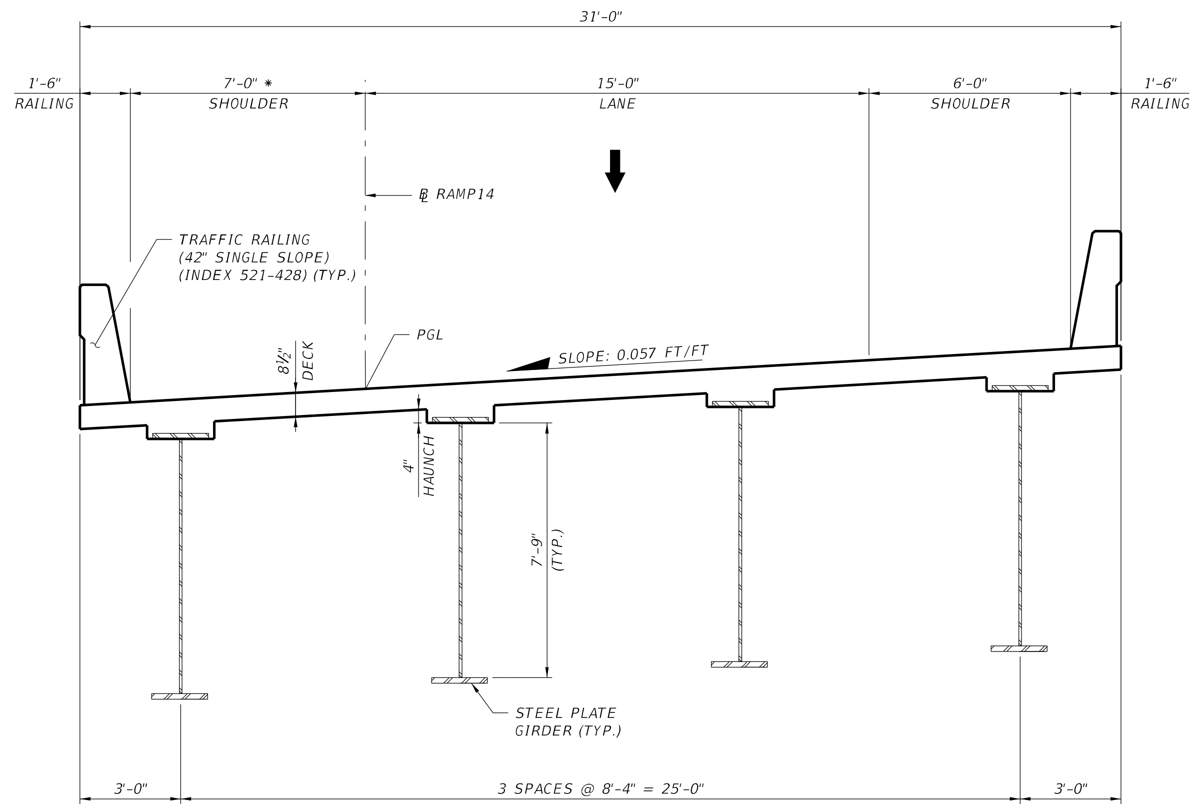
CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

N/A

TYPICAL SECTION No. 14



* NOTE: NON-TYPICAL SHOULDER WIDTH BASED ON SIGHT DISTANCE REQUIREMENTS

TRAFFIC DATA

CURRENT YEAR = TBD AADT = TBD
ESTIMATED OPENING YEAR = TBD AADT = TBD
ESTIMATED DESIGN YEAR = TBD AADT = TBD
K = TBD% D = TBD % T = TBD % (24 HOUR)
DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH

TYPICAL SECTION
BRIDGE 09
RAMP 14 OVER SCHOFIELD RD.
STA. 2015+92.20 STA. 2018+09.96

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PROJECT CONTROLS

CONTEXT CLASSIFICATION

( ) C1 : NATURAL
( ) C2 : RURAL
( ) C2T : RURAL TOWN
( ) C3R : SUBURBAN RES.
(X) N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

( ) INTERSTATE
(X) FREEWAY/EXPWY.
( ) PRINCIPAL ARTERIAL
( ) MINOR ARTERIAL

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

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

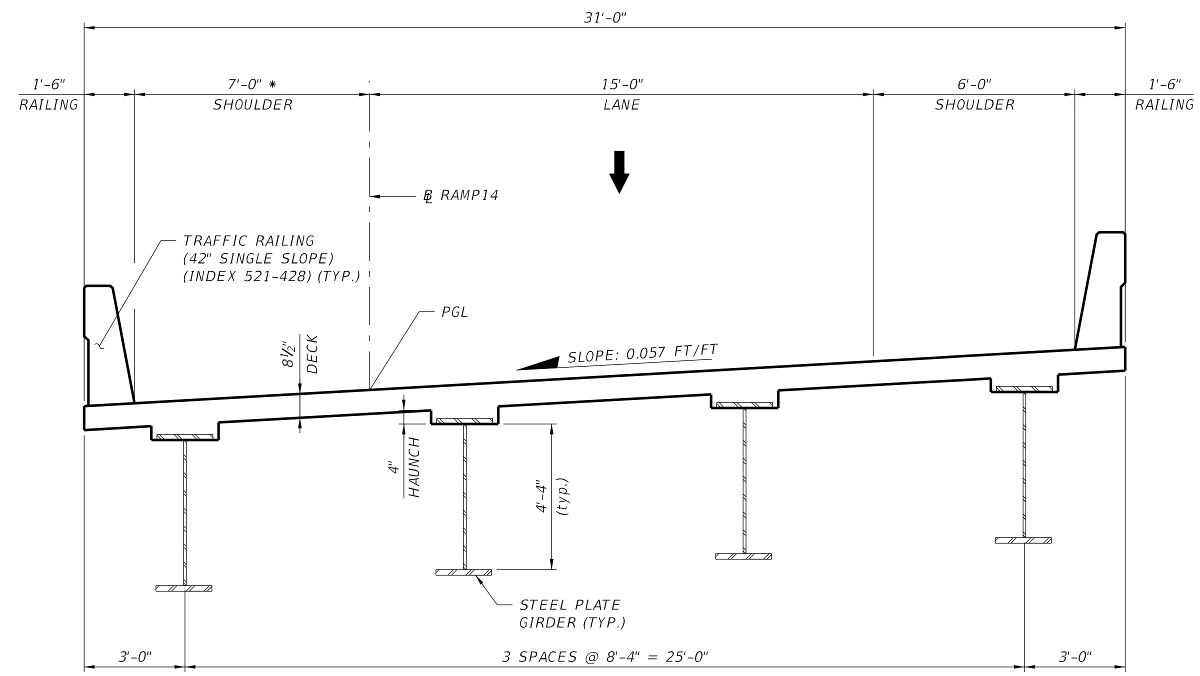
CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

N/A

TYPICAL SECTION No. 15



* NOTE: NON-TYPICAL SHOULDER WIDTH BASED ON SIGHT DISTANCE REQUIREMENTS

TYPICAL SECTION
BRIDGE 10
RAMP 14 OVER RAMP 15
STA. 2022+60.99 TO STA. 2025+93.37

TRAFFIC DATA

CURRENT YEAR = TBD AADT = TBD
ESTIMATED OPENING YEAR = TBD AADT = TBD
ESTIMATED DESIGN YEAR = TBD AADT = TBD
K = TBD% D = TBD % T = TBD % (24 HOUR)
DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH

NOT TO SCALE

PROJECT CONTROLS

CONTEXT CLASSIFICATION

( ) C1 : NATURAL
( ) C2 : RURAL
( ) C2T : RURAL TOWN
( ) C3R : SUBURBAN RES.
(X) N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

( ) INTERSTATE
(X) FREEWAY/EXPWY.
( ) PRINCIPAL ARTERIAL
( ) MINOR ARTERIAL

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

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

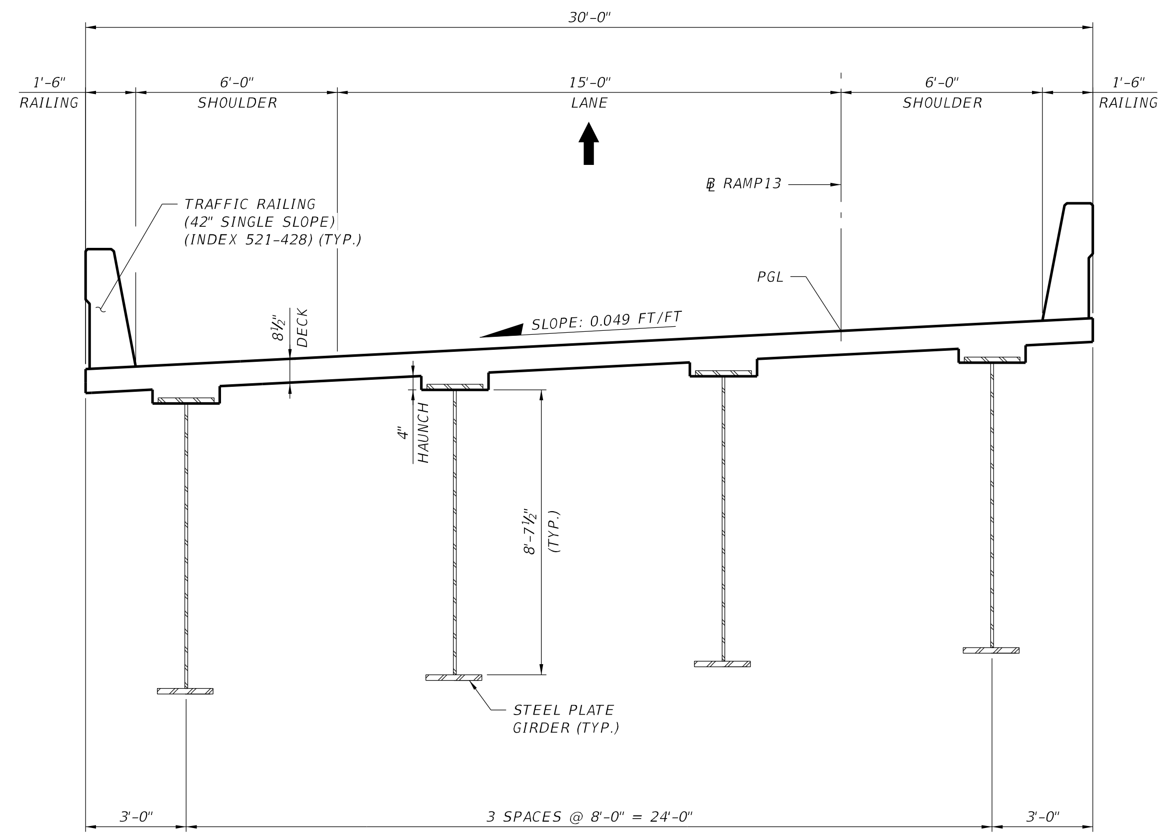
CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

N/A

TYPICAL SECTION No. 16



TYPICAL SECTION
BRIDGE 11
RAMP 13 OVER SR 429
STA. 1920+01.36 TO STA. 1930+07.89

TRAFFIC DATA

CURRENT YEAR = TBD AADT = TBD
ESTIMATED OPENING YEAR = TBD AADT = TBD
ESTIMATED DESIGN YEAR = TBD AADT = TBD
K = TBD% D = TBD % T = TBD % (24 HOUR)
DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH

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PROJECT CONTROLS

CONTEXT CLASSIFICATION

( ) C1 : NATURAL
( ) C2 : RURAL
( ) C2T : RURAL TOWN
( ) C3R : SUBURBAN RES.
(X) N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

( ) INTERSTATE
(X) FREEWAY/EXPWY.
( ) PRINCIPAL ARTERIAL
( ) MINOR ARTERIAL

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

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

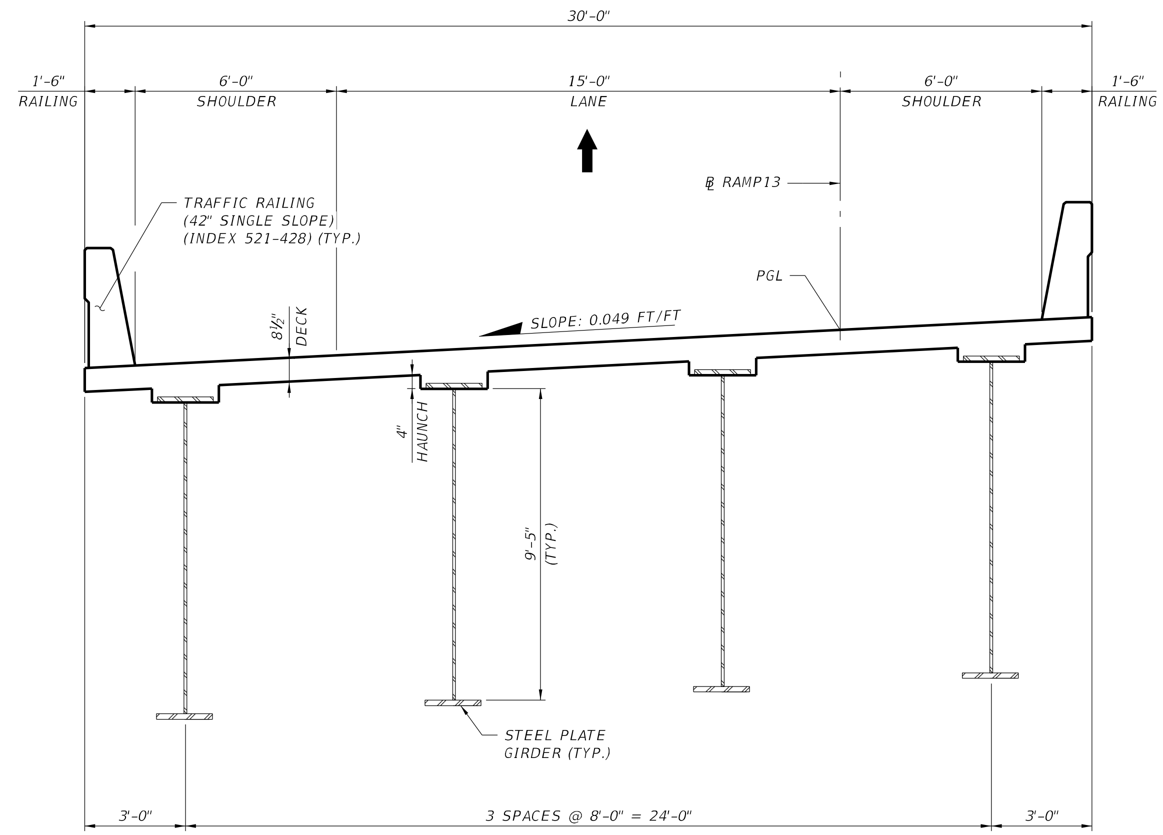
CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

N/A

TYPICAL SECTION No. 17



TYPICAL SECTION
BRIDGE 12
RAMP 13 OVER EXISTING SR 429 NB ON-RAMP
STA. 1933+86.94 TO STA. 1936+48.73

TRAFFIC DATA

CURRENT YEAR = TBD AADT = TBD
ESTIMATED OPENING YEAR = TBD AADT = TBD
ESTIMATED DESIGN YEAR = TBD AADT = TBD
K = TBD% D = TBD % T = TBD % (24 HOUR)
DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH

NOT TO SCALE

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PROJECT CONTROLS

CONTEXT CLASSIFICATION

( ) C1 : NATURAL
( ) C2 : RURAL
( ) C2T : RURAL TOWN
( ) C3R : SUBURBAN RES.
(X) N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

( ) INTERSTATE
(X) FREEWAY/EXPWY.
( ) PRINCIPAL ARTERIAL
( ) MINOR ARTERIAL

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

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

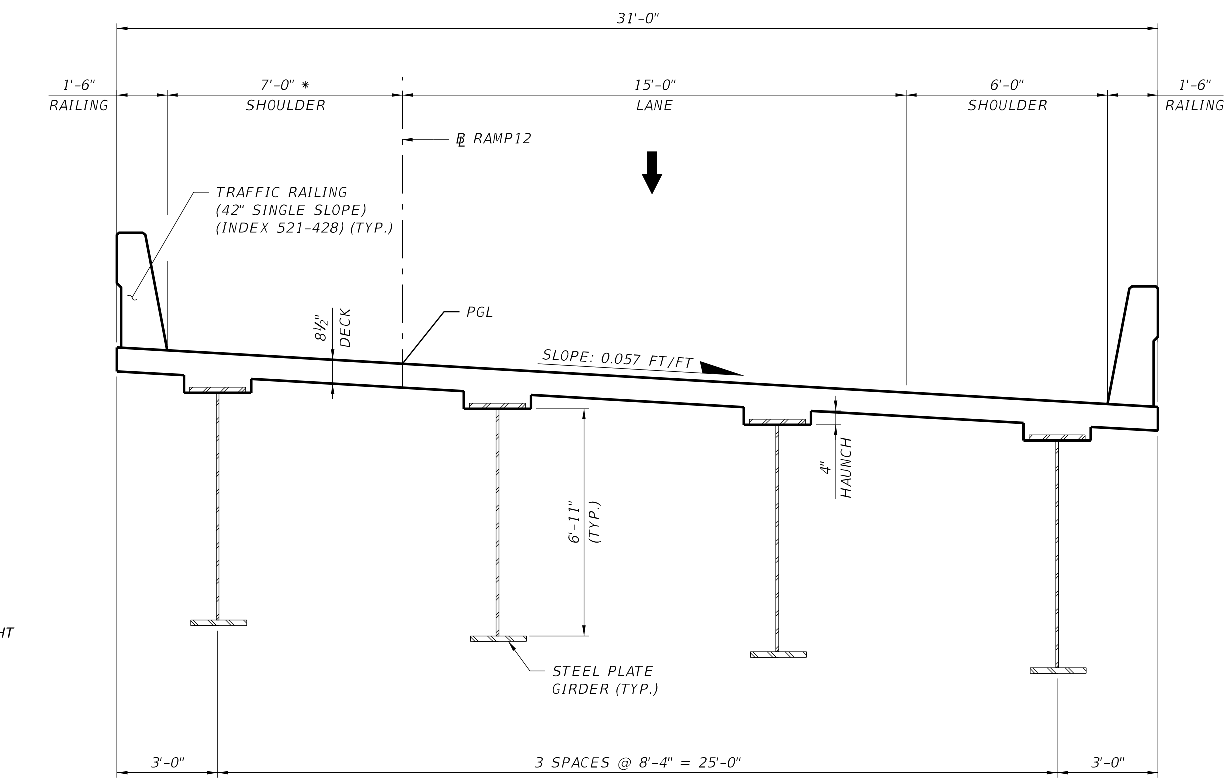
CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

N/A

TYPICAL SECTION No. 18



* NOTE: NON-TYPICAL SHOULDER WIDTH BASED ON SIGHT DISTANCE REQUIREMENTS

TYPICAL SECTION
BRIDGE 13
RAMP 12 OVER SR 429
STA. 1819+81.74 TO STA. 1826+01.97

TRAFFIC DATA

CURRENT YEAR = TBD AADT = TBD
ESTIMATED OPENING YEAR = TBD AADT = TBD
ESTIMATED DESIGN YEAR = TBD AADT = TBD
K = TBD% D = TBD % T = TBD % (24 HOUR)
DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH

NOT TO SCALE

SHEET NO. 19

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PROJECT CONTROLS

CONTEXT CLASSIFICATION

( ) C1 : NATURAL
( ) C2 : RURAL
( ) C2T : RURAL TOWN
( ) C3R : SUBURBAN RES.
(X) N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

( ) INTERSTATE
(X) FREEWAY/EXPWY.
( ) PRINCIPAL ARTERIAL
( ) MINOR ARTERIAL

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

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

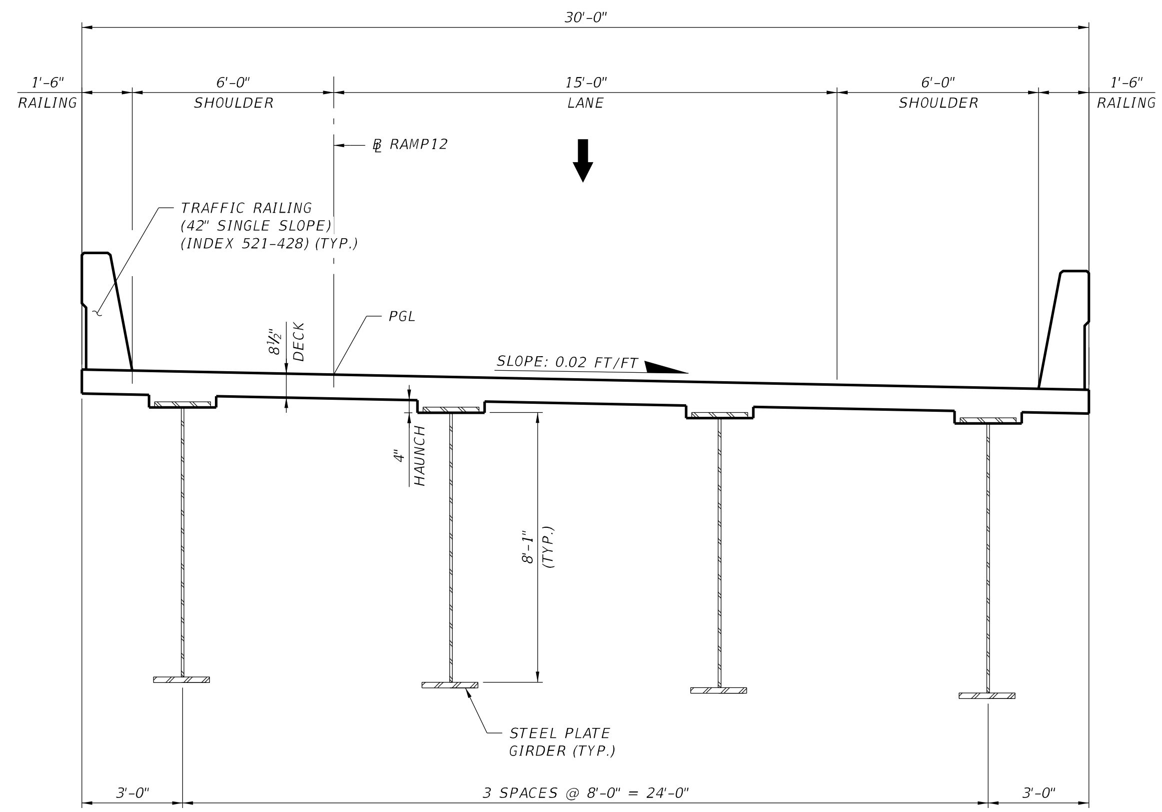
CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

N/A

TYPICAL SECTION No. 19



TYPICAL SECTION
BRIDGE 14
RAMP 12 OVER EXISTING SR 429 NB OFF-RAMP
STA. 1830+51.23 TO STA. 1832+77.86

TRAFFIC DATA

CURRENT YEAR = TBD AADT = TBD
ESTIMATED OPENING YEAR = TBD AADT = TBD
ESTIMATED DESIGN YEAR = TBD AADT = TBD
K = TBD% D = TBD % T = TBD % (24 HOUR)
DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH

NOT TO SCALE

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