

# FINAL POND SITING REPORT UPDATE SR 429 Wekiva Parkway Section 7A (from east of River Oaks Circle to east of Orange Blvd.)

FPID No: 240200-2-52-01



July 2014

# FINAL POND SITING REPORT



## Wekiva 7A PSR Update

SR 429 from 0.04 Miles East of River Oaks Circle to 0.1 Miles East of Orange Blvd.

Seminole County, Florida

FPID No. 240200-2-52-01

July 2014



## PROFESSIONAL ENGINEER CERTIFICATE

I hereby certify that I am a registered professional engineer in the State of Florida practicing with URS Corporation, a corporation, authorized to operate as an engineering business, Certificate of Authorization No. 000002, by the State of Florida, Department of Business and Professional Regulation, Board of Professional Engineers, and that I have reviewed or approved the evaluation, findings, opinions, conclusions, or technical advice hereby reported for:

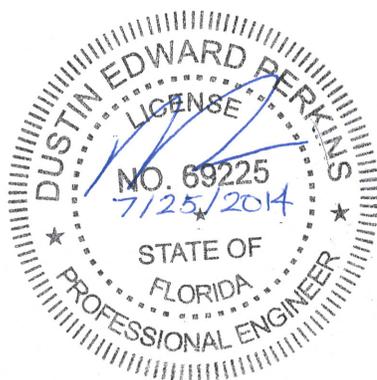
**Project:** Wekiva Parkway Section 7A

**FPN:** 240200-2-52-01

**Location:** Seminole County, Florida.

**Client:** FDOT – District Five

This **FINAL** Pond Siting Report includes a summary of data collection efforts and conceptual drainage analyses prepared for conceptual analyses for the Wekiva Parkway Section 7A PD&E Study, SR 429 from 0.04 Miles East of River Oaks Circle to 0.1 Miles East of Orange Blvd. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of civil engineering as applied through design standards and criteria set forth by the federal, state, and local regulatory agencies as well as professional judgment and experience.



**Name:** Dustin E. Perkins, P.E.

**Signature:** 

**P.E. Number:** 69225

**Date:** 07/25/14

**Address:** URS Corporation  
315 E. Robinson Street  
Suite 245  
Orlando, FL 32801

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## EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT), District Five, is conducting an update to the Wekiva Parkway Project Development and Environment (PD&E) Study Pond Siting Report completed in July 2010 by CH2MHILL regarding the Wekiva 7A section of the report. The Wekiva 7A project limits are State Road 429 from 0.04 Miles East of River Oaks Circle to 0.1 Miles East of Orange Blvd, a distance of approximately 3.5 miles. The proposed improvements consist of constructing State Road 429, a four lane limited access expressway with an ultimate six lane section and two urban two lane frontage roads, eastbound and westbound. The proposed improvements will also include a sidewalk along the westbound frontage road and a multi-use trail and ten foot sidewalk along the eastbound frontage road. The multi-use trail is proposed from the beginning of the project at 0.04 Miles East of River Oaks Circle to Longwood Markham road. Drainage improvements for this project will be designed to accommodate the ultimate roadway condition.

The purpose of and need for the Wekiva Parkway were originally documented in the October, 1989 state-level Environmental Impact Statement (EIS) prepared by FDOT for the Northwest Beltway Study, Part B. In November 2002, FDOT again documented the purpose of and need for the northwest portion of the Western Beltway (State Road 429) in a presentation to the Wekiva Basin Area Task Force. The PD&E Study completed in 2010 summarized the project needs in detail and recommended a proposed interim four lane limited access expressway (State Road 429), with an ultimate six lane section, and two urban, two lane frontage roads for the 7A portion of the Wekiva Parkway.

The purpose of this Pond Siting Report update is to document the stormwater management plan for the project. The update will also address stormwater management criteria changes that have occurred since the 2010 PD&E Study, provide additional geotechnical data for alternative pond locations, and discuss the published documentation on the hydraulic connections of Lake Sylvan, Yankee Lake, and the Wekiva River that define the open basin nature of the project. This report identifies alternate pond locations, discusses right-of-way requirements, and documents estimated pond construction costs associated with the alternative pond sites. In addition, this report provides a recommendation for the preferred pond locations.

### Existing Drainage Conditions

The project is located within Seminole County and is within the jurisdiction of the St. Johns River Water Management District (SJRWMD). The project boundaries are generally located within the Middle St. Johns River Basin and more specifically located within the Wekiva River Basin and the Lake Monroe Basin. The project is entirely contained within the Wekiva River Protection Area (WRPA), and the Wekiva Study Area (also known as the Wekiva Recharge Protection Zone).

The Wekiva 7A project corridor is generally divided into three (3) hydrologic basins; Wekiva River (WR), Yankee Lake (YL), and Lake Sylvan (LS). General basin boundaries were initially identified utilizing boundaries presented by the Florida Department of Environmental Protection (FDEP) and the SJRWMD. The hydrologic basin limits were confirmed or adjusted utilizing the Seminole County one (1) foot contour lidar data. All of the hydrologic basins identified are considered open basins, which is a change from the original Pond Siting Report that used closed basin



criteria for the Yankee Lake and Lake Sylvan basins. The Wekiva River is considered an Outstanding Florida Water and has recently established Total Maximum Daily Loads (TMDL's) for total nitrogen (TN) and total phosphorus (TP) that were not considered in the original Pond Siting Report. Lake Sylvan is the only basin with recorded historical flooding in the surrounding areas.

Generally throughout the project corridor along State Road 46, as permitted by SJRWMD, retention swales and offsite conveyance ditches are presently managing the stormwater and utilizing existing cross drains to discharge into the major outfall locations. The eastern portion of the Wekiva Parkway 7A project, where the proposed State Road 429 alignment diverges south away from the existing State Road 46 roadway corridor, generally drains towards Lake Sylvan through wooded areas and wetlands delineated as offsite areas in the Sylvan Lake PUD Phase II SJRWMD Permit. This portion of the project drains through the residential development prior to the outfall into Lake Sylvan.

Existing land use is predominantly residential with few vacant commercial sites, dedicated areas, and agriculture sites on the south side of the proposed roadway alignment. The existing land use on the north side of the proposed roadway alignment is a mixture of managed environmental lands, public land, residential mobile home, residential multifamily, vacant commercial, vacant institutional, agriculture, residential single family, public other, and education. Refer to **Appendix 1, Figure 3** for the **Existing Land Use Map**.

There are seven (7) existing cross drains that convey stormwater runoff under State Road 46 and serve as outfall locations for the roadway collection system. Generally, the cross drains convey stormwater runoff in a south to north direction under State Road 46 with only one (1) of the culverts, CD-6, conveying runoff in a north to south direction. Three (3) of the cross drains (CD-3, CD-4, and CD-6) serve as outfalls for the project corridor and offsite drainage areas ultimately discharging through lateral ditches into Yankee Lake and Lake Sylvan. **Table 1** shows a **Summary of Existing Cross Drains** and **Appendix 1, Figure 7, Sub-Basin Maps** shows the existing cross drain locations.

The Federal Emergency Management Agency (FEMA) has developed Flood Insurance Rate Maps (FIRM) for Seminole County. Refer to **Appendix 11** for the **FEMA FIRMs**. There are no FEMA regulated floodways within the limits of the Wekiva 7A project. 100-year floodplain boundaries are located within the project corridor, with the majority located near Yankee Lake and Lake Sylvan. These areas are designated as Zone A floodplains (floodplain boundaries in which no base floodplain elevations have been established).

**Table 1 – Summary of Existing Cross Drains**

<b>Cross Drain</b>	<b>Approximate Location (CL Const. SR 429)</b>	<b>Description</b>	<b>Outfall</b>
CD-1	960+00	(1) – 24" RCP	Roadside Ditch
CD-2	1014+00	(1) – 18" RCP	Roadside Ditch
CD-3	1020+00	(2) – 42" RCP	Yankee Lake
CD-4	1027+50	(1) – 9' X 2' CBC	Yankee Lake
CD-5	1035+50	(1) – 18" RCP	Roadside Ditch
CD-6	1055+25	(1) – 36" RCP	Lake Sylvan
CD-7	1067+50	(2) – 24" RCP	Roadside Ditch

Proposed Drainage Conditions

The existing drainage boundaries and local drainage basins will generally be maintained in the proposed conditions. The stormwater runoff from the proposed State Road 429 and frontage roads will be collected by a closed drainage conveyance system, which will discharge into the proposed dry retention stormwater management facilities: WR1, WR2, YL1, YL2, LS, and CC. Please refer to **Appendix 1, Figure 6, Pond Siting Layout** for the preferred and alternative pond locations. Offsite area(s) which cannot be drained into the ponds will be collected in an offsite system and conveyed to the existing outfall location.

The project will not have adverse impacts to the area's water quality or quantity. The design of the stormwater management facilities for the project is governed by the rules set forth by the SJRWMD and FDOT. Water quality treatment and water quantity attenuation requirements will comply with the guidelines as defined in Chapter 40D-4 of the Florida Administration Code (F.A.C.) and the SJRWMD Environmental Resource Permit (ERP) manual. Critical duration analysis should be performed to comply with FDOT Rule Chapter 14-86 F.A.C.

1. The general requirements for treatment volume in a dry retention system are the following:

Offline Dry Retention:

one half inch (0.5") of runoff from the drainage area

or

one and a quarter inches (1.25") of runoff from the impervious area, whichever is greater.

Online Dry Retention

an additional one half inch (0.5") of runoff from the drainage area over that volume specified for off-line treatment.

2. Special requirements contained within this project corridor are as follows:

Outstanding Florida Waters (OFW) – Wekiva Outfall Only

an additional fifty percent (50%) of treatment volume over that specified above

Wekiva Recharge Protection Zone – Entire Project Corridor

proposed system must provide for retention storage of three inches of runoff from all impervious areas proposed to be constructed on soils defined as Type "A" Soils as defined by the Natural Resources Conservation Service (NRCS) Soil Survey

Total Maximum Daily Loads – Wekiva Outfall Only

proposed improvements shall demonstrate a net improvement for TN and TP



The SCS method has been used to determine the required pond size for each basin. House Bill 599, passed in 2012, alleviates the responsibility from FDOT to treat and attenuate offsite stormwater runoff comingled with onsite stormwater runoff, therefore offsite areas were not considered in the basin areas used for the preliminary pond sizing. Ponds were sized to attenuate the most stringent requirement for attenuation defined by the outfall location. Wekiva River and Yankee Lake use the 25 year 24 hour storm event defined by SJRWMD, and the Lake Sylvan outfall uses the 100 year 72 hour storm event defined by FDOT (Chapter 14-86 F.A.C.). It should be noted that for contingency purposes, conservative estimates were used to determine the feasibility of the pond locations and approximate sizes based on preliminary data and engineering judgment. Design level geotechnical data used to determine permeability rates was not available at the time of the report development; therefore a conservative separation of two feet above the highest estimated seasonal high water table was used to establish the pond bottoms.

Existing stormwater outfall locations throughout the corridor have been identified and shall be maintained in the proposed condition. Potential stormwater outfall locations for each pond alternative were considered and recommendations on the preferred alternative are provided in the report.

Based on information available during the pond siting analysis, only hydraulically feasible pond sites which could achieve the design criteria requirements were considered. It should be noted that swales were initially considered as a viable alternative to the proposed pond locations, but were eliminated from the alternatives due to the aesthetic requirements of the corridor determined during the early stages of the report development. Pond sites are analyzed and evaluated for the following parameters:

- Hydrologic and hydraulic factors such as existing ground elevation, soil types, estimated Seasonal High Water Table (SHWT) established by a review of the USDA NRCS soils and geotechnical investigations, stormwater conveyance feasibility, allowable hydraulic grade line (HGL), and basin outfalls
- Environmental resource impacts including wetlands and threatened or endangered species
- Floodplain impacts (Yankee Lake & Lake Sylvan)
- Major utility conflict potential (Florida Gas Transmission, etc.)
- Impacts to cultural resources
- Hazardous materials and contamination

### Summary

Alternative pond sites have been identified along the project corridor. The evaluation provides estimates for right-of-way needs implementing a volumetric analysis that accounts for the water quantity and quality requirements set forth by FDOT, SJRWMD, and FDEP. Please refer to **Table 3** for the **Alternatives Evaluation Matrix** which includes a right-of-way cost estimate. The estimate is a budget tool used by the FDOT to estimate total acquisition costs for the properties associated with each stormwater management facility and to budget the appropriate funds for acquisition. Please be aware right-of-way cost estimates are not real estate appraisals and do not reflect market value. The FDOT uses appraisals that comply with the Uniform Standards of Professional Appraisal Practice (USPAP) for acquisition purposes.

The preliminary calculations used to support the pond recommendations are included in **Appendix 3, Pond Design Calculations**. Additional considerations for the pond alternatives are shown in **Table 3, Alternatives Evaluation Matrix**. The graphical representation of the pond alternatives, and the roadway alignment is provided in **Appendix 1, Figure 6, Pond Siting Layout**. Please note that the recommendations are based preliminary data and calculations, reasonable engineering judgment, and assumptions. The pond sizes and locations are subject to change during final design when detailed data becomes available for the permeability rates of the soils, estimated seasonal high water elevations, and final roadway profiles. Please refer to **Table 2 for the Summary of Stormwater Management Facility Recommendations**.

**Table 2 – Summary of Stormwater Management Facility Recommendations**

<b>Basin Name</b>	<b>Preferred Pond</b>	<b>Approximate Location (CL Const. SR 429)</b>	<b>Outfall/Hydrologic Basin</b>
WR1	WR1	935+00, LT	Wekiva River
WR2	WR2	955+00, LT	Wekiva River
YL1	YL1	1010+00, RT	Yankee Lake
YL2	YL2	1035+00, LT	Yankee Lake
LS	LS	1063+00, LT	Lake Sylvan
Yankee Lake	FPC	1000+00, LT	Yankee Lake
CC	CC	1090+00, RT	Lake Sylvan

The preferred pond locations were selected based on the existing topography of the corridor, soil types, and proximity to the potential outfall locations. Environmental impacts from the proposed pond locations were considered and included in the pond site evaluation matrix, yet due to the strict criteria for recharge and pollutant loading, the environmental impacts were often out-weighted by the stormwater requirements for the project. Properties which were acquired during early right-of-way acquisition by FDOT were evaluated as potential pond sites. Ponds WR1, WR2, LS, and FPC are proposed on FDOT owned property. Ponds YL1 and YL2 are proposed on properties bordering the depressed area between Yankee Lake and Lake Sylvan which contain poor soils and muck unsuitable for a dry pond. Pond locations proposed on higher ground further away from the depressed area would require frontage road profiles to be elevated several feet above those proposed in the line and grade along the Yankee Lake area. Pond CC is proposed just north of the existing outfall location for South Orange Avenue in an area hydraulically suitable for the proposed South Orange Avenue improvements.

**Wekiva 7A Pond Siting Report Update – Seminole County, Florida**  
**SR 429 from 0.04 Miles East of River Oaks Circle to 0.1 Miles East of Orange Blvd.**  
**FPID No: 240200-2-52-01**

**July 2014**

**Table 3– Alternatives Evaluation Matrix**

Pond Site Alternative	Pond Size Required including easements & access (acres)	Total Parcel Required (acres)	FEMA Flood Zone	Wetland Impacts (acres)	Arch. / Historical Impact Potential	Environmental Impact Risk	Threatened or Endangered Species Impacts	Hazardous Materials & Contamination Potential	Social Impact	Major Utility Conflict Potential (Y/N)	Existing Land Use	Future Land Use	Total Pond Costs	Rankings
WR1	8.12	21-19-29-300-001A-0000 (0.9725 acres), 21-19-29-300-0010-0000 (1.656) , 36-18-29-300-0010-0000 (4.116 acres)	X	3.52	Moderate	High	Low	None	Low	Y*	Vacant Residential/Managed Environmental Land	Rural/5, Rural/3	\$798,926.39	1
WR2	7.72	22-19-29-300-0060-0000 (7.081 acres)	X	0.00	Moderate to high	Low	Moderate	None	Low	Y*	Public Other	Rural/5	\$1,801,513.60	1
YL1	6.45	26-19-29-300-0080-0000 (5.75 acres)	X	0.00	High	Low	Moderate	None	Low	N	Vacant residential	Rural/5	\$2,688,304.10	1
YL1 (ALT 1)	16.20	22-19-29-300-002B-0000 (1.175 acres), 22-19-29-300-0020-0000 (4.782 acres), 23-19-29-300-0030-0000 (3.403 acres), 23-19-29-300-003B-0000 (2.237 acres)	A, X	0.01	High	Moderate	Moderate	None	Low	Y*	Vacant residential/Public Other/Public/Residential Single Family	Rural/5, Public/Quasi-Public	\$2,284,641.41	2
YL1 (ALT 2)	12.38	22-19-29-300-002A-0000 (12.17 acres)	X	0.00	Moderate to high	Low	Moderate	None	Low	Y*	Education	Rural/5	\$2,561,137.72	3
YL1 (ALT 2B)	7.04	22-19-29-300-002B-0000 (1.443 acres), 23-19-09-300-0030-0000 (3.701 acres)	A, X	0.00	High	Moderate	Moderate	None	Low	Y*	Public Other/Vacant Residential	Rural/5	\$966,939.21	3
YL2	7.09	26-19-29-501-0000-0010 (6.60 acres), 26-19-29-501-0000-0130 (0.157 acres)	A, X	0.00	Moderate	Low	Low	None	Low to moderate	Y**	Residential Single Family	Low Density Residential	\$2,495,626.47	1
YL2 (ALT 1)	6.77	26-19-29-501-0000-0010 (3.091 acres), 26-19-29-501-0000-0130 (0.072 acres), 26-19-29-300-0050-0000 (1.546 acres), 26-19-29-300-005B-0000 (1.645 acres)	X	0.00	Low to moderate	Low	Low	None	Low to moderate	Y*	Residential Single Family/Commercial	Low Density Residential, Rural/5	\$4,054,086.78	2
YL2 (ALT 2)	4.35	26-19-29-300-0040-0000 (3.90 acres)	X	0.00	Low	Low	Low	None	Low	Y*	Agriculture	Rural/5	\$6,432,085.28	3
YL2 (ALT 2B)	3.70	26-19-29-501-0000-0010 (3.091 acres)	X	0.00	Low to moderate	Low	Low	None	Low to moderate	Y*	Residential Single Family	Low Density Residential	\$1,972,172.21	3



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SR 429 from 0.04 Miles East of River Oaks Circle to 0.1 Miles East of Orange Blvd.**

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**Table 3 Cont. – Alternatives Evaluation Matrix**

Pond Site Alternative	Pond Size Required including easements & access (acres)	Total Parcel Required (acres)	FEMA Flood Zone	Wetland Impacts (acres)	Arch. / Historical Impact Potential	Environmental Impact Risk	Threatened or Endangered Species Impacts	Hazardous Materials & Contamination Potential	Social Impact	Major Utility Conflict Potential (Y/N)	Existing Land Use	Future Land Use	Total Pond Costs	Rankings
LS	13.03	25-19-29-300-28A-0000 (9.974 acres), 26-19-29-300-0030-0000 (3.051 acres)	X	0.00	Moderate to high	Low	High	None	Low	Y*	Vacant Residential	Rural/5	\$5,702,790.92	1
LS (ALT 1)	4.11	25-19-25-300-0250-0000, 25-19-29-300-0260-0000 (3.003 acres)	X	0.00	Low	Low	Low	None	Low to moderate	N	Residential Single Family	Rural/5	\$3,440,910.55	2
LS (ALT 2)	2.03	25-19-29-501-0400-0010 (1.121 acres), 25-19-29-501-0400-0040 (0.132 acres), 25-19-29-501-0400-0050 (0.120 acres), 25-19-29-300-0160-0000 (0.046 acres), 25-19-29-300-0170-0000 (0.335 acres), 25-19-29-300-017A-0000 (0.171 acres), 25-19-29-300-0250-0000 (0.104 acres)	X	0.00	Low	Low	Low	None	Low to moderate	Y*	Vacant Residential/Residential Single Family	Rural/5, Low Density Residential	\$1,904,165.18	3
FPC	5.14	22-19-29-300-002B-0000 (1.443 acres), 23-19-09-300-0030-0000 (3.701 acres)	A, X	0.00	High	Moderate	Moderate	None	Low	N	Public Other/Vacant Residential	Rural/5	\$966,939.21	1
FPC (ALT 1)	3.31	23-19-29-300-003A-0000 (2.511 acres), 26-19-29-502-0000-0130 (0.796 acres)	A	0.00	Undetermined	Moderate	Moderate	None	Low to moderate	N	Residential Single Family/Public Other	Rural/5	\$1,274,119.81	2
FPC (ALT 2)	3.30	26-19-29-502-0000-0130 (0.832 acres), 26-19-29-502-0000-0120 (1.057 acres), 26-19-29-502-0000-0110 (0.849 acres), 26-19-29-502-0000-0090 (0.558 acres)	A	1.12	Undetermined	Moderate to high	Moderate	None	Low to moderate	N	Vacant Residential/Residential Single Family	Rural/5	\$1,904,165.18	3
FPC (ALT 3)	3.30	26-19-29-502-0000-0090 (0.172 acres), 26-19-29-502-0000-0080 (0.030 acres), 26-19-29-502-0000-0070 (0.094 acres), 26-19-29-502-0000-0060 (0.202 acres), 26-19-29-502-0000-0050 (0.361 acres), 26-19-29-502-0000-0040 (0.576 acres), 26-19-29-502-0000-0030 (0.758 acres), 26-19-29-502-0000-0010 (1.102 acres)	A, X	0.13	Undetermined	Moderate to high	Moderate	None	Low to moderate	N	Vacant Residential/Residential Single Family	Rural/5	\$3,083,632.93	4



**Table 3 Cont. – Alternatives Evaluation Matrix**

Pond Site Alternative	Pond Size Required including easements & access (acres)	Total Parcel Required (acres)	FEMA Flood Zone	Wetland Impacts (acres)	Arch. / Historical Impact Potential	Environmental Impact Risk	Threatened or Endangered Species Impacts	Hazardous Materials & Contamination Potential	Social Impact	Major Utility Conflict Potential (Y/N)	Existing Land Use	Future Land Use	Total Pond Costs	Rankings
CC	2.10	25-19-29-300-0160-0000	X	0.00	Low	Low	Low	None	Low to moderate	N	Vacant Residential	Suburban Estates	\$849,824.19	1
CC (ALT 1)	1.33	25-19-29-300-016A-0000	X	0.00	Undetermined	Low	Low	None	Low to moderate	N	Residential Single Family	Suburban Estates	\$287,286.53	2
CC (ALT 2)	1.72	25-19-29-300-0120-0000	X	0.00	Undetermined	Low	Low	None	Low	N	Vacant Residential	Planned Development	\$1,042,291.76	3

Note: The cost evaluation for the stormwater management facility alternatives in this report includes stormwater management facility construction costs, costs associated with wetland impacts, and parcel acquisition costs. The stormwater management facility construction costs includes cost of drainage pipes associated with the outfall, clearing and grubbing, earthwork excavation and grading, berm construction, fencing, access accommodations, and sodding. The associated parcel acquisition costs for each alternative evaluated includes the estimated cost of land and any impacted improvements, administrative costs, and legal fees.

\* Pond accounts for 50' FGT Easement on North side of WB Frontage Road. Inflow & Outfall pipes will cross FGT Easement.

\*\* Pond accounts for 50' FGT Easement on North side of WB Frontage Road. Inflow & Outfall pipes will cross FGT Easement. NW corner of pond contains potential outfall to Yankee Lake that will cross the FPL Easement.

Note: The stormwater management facility construction costs include cost of installed drainage structures, drainage pipes and outfalls, clearing and grubbing, earthwork excavation and grading, berm construction, erosion protection, fencing, access accommodations, and sodding. The associated parcel acquisition costs for each alternative evaluated include the estimated cost of land and any impacted improvements, administrative costs, and legal fees.

## SECTION 1: INTRODUCTION

The Florida Department of Transportation (FDOT), District Five, is conducting an update to the Wekiva Parkway Project Development and Environment (PD&E) Study Pond Siting Report completed in July 2010 by CH2MHILL regarding the Wekiva 7A section of the report. The Wekiva 7A project limits are State Road 429 from 0.04 Miles East of River Oaks Circle to 0.1 Miles East of Orange Blvd, a distance of approximately 3.5 miles. The proposed improvements consist of constructing State Road 429, a four lane limited access expressway with an ultimate six lane section and two urban two lane frontage roads, eastbound and westbound. The proposed improvements will also include a sidewalk along the westbound frontage road and a multi-use trail and ten foot sidewalk along the eastbound frontage road. The multi-use trail is proposed from the beginning of the project at 0.04 Miles East of River Oaks Circle to Longwood Markham road. Drainage improvements for this project will be designed to accommodate the ultimate roadway condition.

The purpose of and need for the Wekiva Parkway were originally documented in the October, 1989 state-level EIS prepared by FDOT for the Northwest Beltway Study, Part B. In November 2002, FDOT again documented the purpose of and need for the northwest portion of the Western Beltway (State Road 429) in a presentation to the Wekiva Basin Area Task Force. The PD&E Study completed in 2010 summarized the project needs in detail and recommended a proposed interim four lane limited access expressway (State Road 429), with an ultimate six lane section, and two urban two lane frontage roads for the 7A portion of the Wekiva Parkway.

This Wekiva 7A project is now funded for design and the Pond Siting Report update process is being used by the FDOT to re-evaluate pond locations that were identified during the 2010 PD&E Study as well as evaluate alternate locations that were not identified. The process will also be used to determine and document if any change has occurred in the social, economic or environmental setting around the project since the approval of the original PD&E study, and to assure compliance with all current applicable federal and state laws. The project is located within Sections 21, 22, 23, 24, 25, 26, 27, and 28, of Township 19 South, Range 29 East; Section 30, of Township 19 South, Range 30 East. Project **Location Map/USGS Quadrangle Map** is shown in **Appendix 1, Figure 1**.

The purpose of this Pond Siting Report update is to discuss the stormwater management plan for the project. The update will also address stormwater management criteria changes that have occurred since the 2010 PD&E Study, provide additional geotechnical data for alternative pond locations, and discuss the published documentation on the hydraulic connections of Lake Sylvan, Yankee Lake, and the Wekiva River that define the open basin nature of the project. This report identifies alternate pond locations, discusses right-of-way requirements, and documents estimated pond construction costs associated with the alternative pond sites. In addition, this report provides a recommendation for the preferred pond locations.

The pond siting analysis documentation for the conceptual pond sites is found in **Section 6, Proposed Stormwater Management Facilities** and **Appendix 3, Pond Design Calculations** of this report. All figures for this report are included in **Appendix 1**. Other supporting documentation and information is provided in the remaining appendices. The datum used for the calculations is NAVD unless otherwise specified.

**SECTION 2: EXISTING DRAINAGE CONDITIONS**

The project is located within Seminole County and is within the jurisdiction of the St. Johns River Water Management District (SJRWMD). The project boundaries are generally located within the Middle St. Johns River Basin and more specifically located within the Wekiva River Basin and the Lake Monroe St Johns River Basin. The project is entirely within the Wekiva River Protection Area (WRPA) and the Wekiva Study Area (also known as the Wekiva Recharge Protection Zone).

The project is contained within the boundaries of the following Water Body Identification numbers defined by FDEP:

Wekiva River Planning Unit:

- 2956A Wekiva River (Adopted TMDL and EPA Approved- Pollutants: TN and TP)
- 2970A Lake Markham Outlet
- 2961A Lake Sylvan Outlet

Lake Monroe Planning Unit:

- 2893C St. Johns River above Wekiva River (Adopted TMDL and EPA Approved- Pollutants: TN and TP)

Although the project limits are contained within the Wekiva River Basin/Planning Unit and the Lake Monroe Basin/Planning Unit., a thorough review of existing site conditions, available topographic data, and existing SJRWMD permit documentation reveals the entire project generally drains towards the Wekiva River Basin through three (3) major outfall locations listed below:

Major Project Outfalls:

- Lake Sylvan
- Yankee Lake
- Wekiva River (Outstanding Florida Water – OFW)

Generally throughout the project corridor along State Road 46, retention swales and offsite conveyance ditches are presently managing the stormwater and utilizing existing cross drains to discharge into the major outfall locations. The existing facilities were permitted under SJRWMD Permit Application No. 4-117-0382AG by the FDOT in 1994.

The eastern portion of the Wekiva Parkway 7A project, where the proposed State Road 429 alignment diverges south away from the existing State Road 46 roadway corridor, generally drains towards Lake Sylvan through wooded areas and wetlands delineated as offsite areas in the Sylvan Lake PUD Phase II SJRWMD Permit Application No. 4-117-0399AC. This portion of the project drains through the residential development prior to the outfall into Lake Sylvan.

The majority of the project area is contained within the boundaries of the System Inventory and Engineering Analysis for the Lake Sylvan Sub-basin performed by CDM for Seminole County in 2008. The report is part of a (3) three phase program to address the existing and predicted flooding problems within the basin and incorporate water quality

retrofit considerations. The report provides characteristics of the watershed and documents hydrologic and hydraulic modeling of the watershed which includes Lake Sylvan and Yankee Lake. The existing cross drains under SR 46 are incorporated into the model and document the hydraulic connection, Culvert Model ID 107030C, between Lake Sylvan and Yankee Lake for the mean annual event. The outfall from Yankee Lake into the Wekiva River is also incorporated in the model, Culvert Model ID 0102020C2, documenting discharge during the mean annual event which will serve to support defining the entire Wekiva 7A project as an open basin. The System Inventory and Engineering Analysis report also identifies areas of historic flooding, which include residential homes and local streets, around Lake Sylvan. Florida Administrative Code Chapter 14-86 and the FDOT Drainage Manual require open basins that discharge to an outfall with recorded historic flooding to perform critical duration analysis for stormwater management facilities discharging to that outfall. Based on the documentation provided in the System Inventory and Engineering Analysis report, FDOT stormwater management systems discharging to Lake Sylvan will require a critical duration analysis.

## **2.1 TOPOGRAPHY & HYDROLOGIC FEATURES**

There are seven (7) existing cross drains, shown in **Appendix 1, Figure 7, Sub-Basin Maps**, which convey stormwater runoff under State Road 46 and serve as outfall locations for the roadway collection system. Generally, the cross drains convey stormwater runoff in a south to north direction under State Road 46 with only one (1) of the culverts, CD-6, conveying runoff in a north to south direction. Three (3) of the cross drains (CD-3, CD-4, and CD-6) serve as outfalls for the project corridor and offsite drainage areas ultimately discharging through lateral ditches into Yankee Lake and Lake Sylvan.

There are four (4) existing outfalls serving State Road 46 in the Wekiva 7A project limits. The outfalls are as follows: Wekiva River via roadside spreader swales; Yankee Lake via two (2) separate lateral ditches on the downstream end of CD-3 and CD-4; and Lake Sylvan via a lateral ditch on the downstream end of CD-6.

The Seminole County Systems Inventory Report documents CD-4 (0107030C) as the outfall for Lake Sylvan providing the historical connection to Yankee Lake. The report also provides alternatives and recommendations to Seminole County for potential rehabilitation of the hydraulic connection from Lake Sylvan to CD-4 in effort to control lake levels as part of the overall Lake Level Management Plan. Replacement or extension of CD-4 will be coordinated with Seminole County Engineering during design.

CD-6 was identified in the Seminole County Systems Inventory and Engineering Analysis as problem area No. 7. CD-6 (0117010C) has an acceptable level of service in the existing condition, but in future conditions as outlined in the report, is expected to overtop the roadway by 0.1' for the 100-year/24-hour design storm event. **Table 4** shows a **Summary of Existing Cross Drains**.

**Table 4 – Summary of Existing Cross Drains**

Cross Drain	Approximate Location (CL Const. SR 429)	Description	Outfall
CD-1	960+00	(1) – 24" RCP	Roadside Ditch
CD-2	1014+00	(1) – 18" RCP	Roadside Ditch
CD-3	1020+00	(2) – 42" RCP	Yankee Lake
CD-4	1027+50	(1) – 9' X 2' CBC	Yankee Lake
CD-5	1035+50	(1) – 18" RCP	Roadside Ditch
CD-6	1055+25	(1) – 36" RCP	Lake Sylvan
CD-7	1067+50	(2) – 24" RCP	Roadside Ditch

**2.2 SOILS DATA & GEOTECHNICAL INVESTIGATIONS**

The United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey of Seminole County, Florida has been reviewed for the project corridor. The soil survey map for the project vicinity is illustrated in **Figure 2 – USDA NRCS Soils Map**, in **Appendix 1**.

Eleven (11) types of soils were encountered along the project corridor. The soil types vary and range from Hydrological Soil Group (HSG) A to HSG C/D. Type A soils are very well drained soils with low water tables and Type C/D soils have a slow infiltration rate when thoroughly wet and the potential to have a clay pan or clay layer near the surface. **Table 5 – USDA Soil Survey Information** summarizes and lists the soil types including relevant information.

**Table 5 – USDA Soil Survey Information**

Soil No.	Seminole County USDA Soil Name	Depth to Water Table	HSG	Soil Classification		
		Depth* (centimeters)		Depth (inches)	Unified	AASHTO
2	Adamsville-Sparr fine sands	84	A	0-4	SP-SM	A-2-4, A-3
				4-80	SP, SP-SM	A-2-4, A-3
4	Astatula fine sands, 0 to 5 percent slopes	>200	A	0-4	SP, SP-SM	A-3
				4-80	SP, SP-SM	A-3
6	Astatula-Apopka fine sands, 0 to 5 percent slopes	>200	A	0-4	SP, SP-SM	A-3
				4-80	SP, SP-SM	A-3
7	Astatula-Apopka fine sands, 5 to 8 percent	>200	A	0-3	SP, SP-SM	A-3
				3-80	SP, SP-SM	A-3



**Wekiva 7A Pond Siting Report Update - Seminole County, Florida**  
**SR 429 from 0.04 Miles East of River Oaks Circle to 0.1 Miles East of Orange Blvd.**  
**FPID No: 240200-2-52-01**

**July 2014**

10	Basinger, Samsula, and Hontoon soils, depressional	0	A/D	0-6	SP, SP-SM	A-2-4, A-3
				6-18	SP, SP-SM	A-2-4, A-3
				18-35	SP, SP-SM	A-2-4, A-3
				35-80	SP, SP-SM	A-2-4, A-3
13	EauGallie and Immokalee fine sands	31	A/D	0-6	SP, SP-SM	A-3
				6-18	SP, SP-SM	A-3
				18-30	SM, SP-SM	A-2-4, A-3
				30-45	SP, SP-SM	A-2-4, A-3
				45-64	SC, SC-SM, SM	A-2-4, A-2-6
17	Brighton, Samsula, and Sanibel mucks	0	A/D	0-8	PT	A-8
				8-80	PT	A-8
20	Myakka and EauGallie fine sands	31	A/D	0-5	SP, SP-SM	A-3
				5-28	SP, SP-SM	A-3
				28-45	SM, SP-SM	A-2-4, A-3
				45-80	SP, SP-SM	A-3
24	Paola-St. Lucie sands, 0 to 5 percent slopes	>200	A	0-3	SP	A-3
27	Pomello fine sand, 0 to 5 percent slopes	84	A	0-2	SP, SP-SM	A-3
				2-31	SP, SP-SM	A-3
				31-40	SM, SP-SM	A-2-4, A-3
				40-80	SP, SP-SM	A-3
28	Pompano fine sand, occasionally flooded	15	A/D	0-80	SP, SP-SM	A-2-4, A-3
31	Tavares-Millhopper fine sands, 0 to 5 percent slopes	145	A/D	0-6	SP, SP-SM	A-3
				6-80	SP, SP-SM	A-3
35	Wabasso fine sand	31	C/D	0-6	SP, SP-SM	A-3
				6-18	SP, SP-SM	A-3
				18-25	SM, SP-SM	A-2-4, A-3
				25-27	SP, SP-SM	A-3
				27-70	SC, SC-SM	A-2-4, A-2-6
				70-80	SM, SP-SM	A-2-4, A-3
99	Water	>200				



## 2.3 ENVIRONMENTAL CHARACTERISTICS

### 2.3.1 Land Use Data

Existing land use is predominantly residential with few vacant commercial sites, dedicated areas, and agriculture sites on the south side of the proposed roadway alignment. The existing land use on the north side of the proposed alignment is a mixture of managed environmental lands, public land, residential mobile home, residential multifamily, vacant commercial, vacant institutional, agriculture, residential single family, public other, and education. The future land uses in the project area will not be altered. Please see **Figure 3 & 4, Existing and Future Land Use Map**, in **Appendix 1**.

### 2.3.2 Cultural Features

Cultural features preserve and enhance the cultural nature of a community and include parks, schools, churches and other religious institutions. Also included are historic sites, archaeologically significant sites and neighborhood gathering places. Community services include facilities that provide necessary services such as fire stations, police stations, public and private schools, hospitals, cemeteries, public buildings, and civic facilities. The following is a list of sites in or near the project area:

- Sylvan Lake Cemetery
- Rock Church of Central Florida & Academy
- Seminole State Forest
- Florida Trail
- Wekiva River Aquatic Preserve
- Academy of Learning
- Lakeside United Methodist Church
- Paola Wesleyan Church
- Crossings Community Church
- St. Andrews Chapel
- Holy Cross Lutheran Day Care and Academy
- Wilson Elementary School
- Primrose School of Lake Mary Heathrow
- La Petite Academy
- Ladybird Academy
- Reformation Bible College

Additional information regarding Cultural features can be found in **Appendix 4 – Cultural Resource Assessment Report**.

**2.3.3 Wetlands**

The identification of wetlands was conducted during the updated 2010 PD&E Study and is provided in the Wetland Evaluation Report, prepared by CH2M HILL in June 2010, in compliance with Presidential Executive Order 11990, and the Federal Highway Administration’s (FHWA) Technical Advisory T6640.8A, Title 23, Code of Federal Regulations (CFR), Part 777, and in accordance with guidelines presented in Part Two, Chapter 18 of the Florida Department of Transportation’s (FDOT’s) Project Development and Environment (PD&E) Manual. The study area was defined as roughly an 800-foot wide corridor, centered on the alternative alignments and immediate vicinity, in addition to potential stormwater pond locations. For the purposes of this report, the National Wetlands Inventory (NWI) mapping for Seminole County was used to locate and quantify estimated impacts associated with the alternative pond locations. Preliminary wetland mitigation costs at the potential impact sites for the pond alternatives shall be quantified using the Senate Bill costs, Florida Statutes Section 373.4137. It is anticipated that during final design and permitting of the project the Uniform Mitigation Assessment Method (UMAM), per Chapter 62-345 Florida Administrative Code, shall be used to classify, describe, and quantify the impact areas and associated mitigation costs.

**2.4 EXISTING DRAINAGE BASINS**

The Wekiva 7A project corridor is generally divided into three (3) hydrologic basins; Wekiva River (WR), Yankee Lake (YL), and Lake Sylvan (LS). General basin boundaries were initially identified utilizing boundaries presented by the FDEP and the SJRWMD. The hydrologic basin limits were confirmed or adjusted utilizing the Seminole County one (1) foot contour lidar data. Further adjustments to hydrologic basin boundaries shall be performed during design to reflect the actual existing boundaries using surveyed topographic features as they become available. Please refer to **Table 6** for the **Summary of Existing and Proposed Drainage Basins**.

**Table 6 – Summary of Existing and Proposed Drainage Basins**

<b>Basin Name</b>	<b>Begin (CL Const. SR 429)</b>	<b>End (CL Const. SR 429)</b>	<b>Outfall</b>
WR1	920+00	944+00	Wekiva River
WR2	944+00	973+50	Wekiva River
YL1	973+50	1022+00	Yankee Lake
YL2	1022+00	1059+00	Yankee Lake
LS	1059+00	1108+38	Lake Sylvan
CC	1088+00	1105+00	Lake Sylvan

**2.4.1 Basin WR**

The Wekiva River (WR) Basin encompasses the western portion of the Wekiva 7A project from the Begin Project limits to approximately Yankee Lake Road and is entirely contained within the Wekiva River Recharge Protection Zone. The Wekiva River is defined as an Outstanding Florida Water by the FDEP within Florida Administrative Code



62-302.700. The FDEP has adopted TMDLs for the Wekiva River specifically regarding Phosphorus and Nitrogen and is outlined in the TMDL Report for Nutrient TMDLs for the Wekiva River (WBIDs 2956, 2956A, and 2956C) and Rock Springs Run (WBID 2967) dated April 18<sup>th</sup>, 2008. The basin is defined by the SJRWMD as an “open basin”. The SJRWMD outlines special standards for the Wekiva River Hydrologic Basin in the SJRWMD Environmental Resource Permit Applicant’s Handbook, Volume II, dated October 1<sup>st</sup>, 2013 for Floodplain Storage (Section 13.3.2) and erosion, sediment control and water quality (Section 13.3.3). The SJRWMD also outlines special standards within the Applicant’s Handbook for the Wekiva Recharge Protection Basin (Section 13.0).

The stormwater runoff from the existing State Road 46 right-of-way corridor in the WR Basin is captured within an open collection system consisting of roadside treatment swales and conveyance ditches. The system generally collects onsite runoff from State Road 46 in treatment swales where attenuation and treatment is provided then discharges into the conveyance ditches where the onsite and offsite runoff are conveyed towards the Wekiva River. A series of spreader swales along the western limits of the WR Basin prohibit concentrated discharge into the Wekiva River and promote a shallow concentrated flow into the wetlands along the eastern bank of the Wekiva River.

SJRWMD Permit Application No. 4-117-0382AG, dated March 25<sup>th</sup>, 1994, documents the proposed paving of 3.26 miles of four (4) feet wide shoulders on both sides of State Road 46 which is now the existing condition of the roadway. The existing conditions of the permit shall be utilized as documentation to support the pre-condition “allowable” discharge rates. As discussed with the FDEP and SJRWMD on October 1<sup>st</sup>, 2013 the pre-condition water quality shall consider the existing swales permitted under 4-117-0382AG, yet the pre-condition discharge rates would reference those historic “pre-condition” rates identified in the permit.

#### **2.4.2 Basin YL**

The Yankee Lake (YL) Basin encompasses the central portion of the Wekiva 7A project from approximately Yankee Lake Road as the western boundary to Glade Road as the eastern boundary and is entirely contained within the Wekiva River Recharge Protection Zone. Yankee Lake is not considered an Outstanding Florida Water by the FDEP. TMDLs have not been established for Yankee Lake and no verified impairment has been determined by the FDEP. The basin is considered by the SJRWMD as an “open basin” by definition of discharge occurring during the mean annual, 10 year/24 hour, and 25 year/24 hour rainfall events. The Seminole County Systems Inventory Report documents the open channel (including a portion of pipe culvert within the Yankee Lake Water Reclamation Facility) from Yankee Lake to Wekiva River discharging during all events that define an open basin (Open Channel Model ID 1003020X, 0102010X, 010203X, and Culvert Model ID 0102020C1, 0102020C2). Historical flooding of Yankee Lake was not documented in the Seminole County Systems Inventory Report.

The stormwater runoff from the existing State Road 46 right-of-way corridor in the YL Basin is captured within an open collection system consisting of roadside treatment swales and conveyance ditches. The system generally collects onsite runoff from State Road 46 in treatment swales where attenuation and treatment is provided then discharges into the conveyance ditches where the onsite and offsite runoff are conveyed towards CD-3 and CD-4 which outfall into lateral ditches towards Yankee Lake.

SJRWMD Permit Application No. 4-117-0382AG, dated March 25<sup>th</sup>, 1994, documents the proposed paving of 3.26 miles of four (4) feet wide shoulders on both sides of State Road 46 which is now the existing condition of the roadway. The existing conditions of the permit shall be utilized as documentation to support the pre-condition “allowable” discharge rates. As discussed with the FDEP and SJRWMD on October 1<sup>st</sup>, 2013 the pre-condition water quality shall consider the existing swales permitted under 4-117-0382AG, yet the pre-condition discharge rates would reference those historic “pre-condition” rates identified in the permit.

### 2.4.3 Basin LS

The Lake Sylvan (LS) Basin encompasses the eastern portion of the Wekiva 7A project from approximately Glade Road as the western boundary to the End Project limits and is entirely contained within the Wekiva River Recharge Protection Zone. Lake Sylvan is not considered an Outstanding Florida Water by the FDEP. TMDLs have not been established for Lake Sylvan, yet the FDEP has determined a verified impairment of the lake for Mercury found in fish tissue. The basin is considered by the SJRWMD as an “open basin” by definition of discharge occurring during the mean annual, 10 year/24 hour, and 25 year/24 hour rainfall events. The Seminole County Systems Inventory Report documents the open channel (including the cross drain under State Road 46, CD-4) from Lake Sylvan to Yankee Lake discharging during all events that define an open basin (Open Channel Model ID 0107003X, 0107005X, 0107020X, 0107021X and Culvert Model ID 0107004W, 0107010C, 0107030C). Historical flooding of residential properties and areas surrounding Lake Sylvan is documented in the Seminole County Systems Inventory Report.

The stormwater runoff from the existing State Road 46 right-of-way corridor in the LS Basin is captured within an open collection system consisting of roadside treatment swales and conveyance ditches. The system generally collects onsite runoff from State Road 46 in treatment swales where attenuation and treatment is provided then discharges into the conveyance ditches where the onsite and offsite runoff are conveyed towards CD-6 which outfalls into a wetland along the northern bank of Lake Sylvan.

SJRWMD Permit Application No. 4-117-0382AG, dated March 25<sup>th</sup>, 1994, documents the proposed paving of 3.26 miles of four (4) feet wide shoulders on both sides of State Road 46 which is now the existing condition of the roadway. The existing conditions of the permit shall be utilized as documentation to support the pre-condition “allowable” discharge rates. As discussed with the FDEP and SJRWMD on October 1<sup>st</sup>, 2013 the pre-condition water quality shall consider the existing swales permitted under 4-117-0382AG, yet the pre-condition discharge rates would reference those historic “pre-condition” rates identified in the permit.

The footprint of the proposed State Road 429, south of the divergence with existing State Road 46, is coincidental with the basin boundary for Lake Sylvan documented in Seminole County Systems Inventory Report (approximately Wayside Drive). The SJRWMD Permit Application No. 4-117-0399AC, Sylvan Lake PUD Phase 2, indicates offsite drainage areas in the vicinity of the proposed State Road 429 footprint to discharge through Sylvan Lake PUD Phase 2 into wetlands along the east bank of Lake Sylvan via a storm drain system. Pre-condition discharge rates will be determined for the footprint of the proposed State Road 429 which currently discharges through Sylvan Lake PUD Phase 2 and accounted for in the “allowable” discharge rate to Lake Sylvan from the LS Basin.

#### 2.4.4 Basin CC

The Capri Cove (CC) Basin encompasses the footprint of the proposed South Orange Avenue re-alignment from the intersection of Wayside Drive and Orange Blvd to the western end of the proposed re-alignment and is entirely contained within the Wekiva River Recharge Protection Zone and Lake Sylvan Basin as defined by the Seminole County System Inventory and Engineering Analysis for the Lake Sylvan Sub-basin. Lake Sylvan is not considered an Outstanding Florida Water by the FDEP. TMDLs have not been established for Lake Sylvan, yet the FDEP has determined a verified impairment of the lake for Mercury found in fish tissue. The basin is considered by the SJRWMD as an “open basin” by definition of discharge occurring during the mean annual, 10 year/24 hour, and 25 year/24 hour rainfall events. The Seminole County Systems Inventory Report documents the open channel (including the cross drain under State Road 46, CD-4) from Lake Sylvan to Yankee Lake discharging during all events that define an open basin (Open Channel Model ID 0107003X, 0107005X, 0107020X, 0107021X and Culvert Model ID 0107004W, 0107010C, 0107030C). Historical flooding of residential properties and areas surrounding Lake Sylvan is documented in the Seminole County Systems Inventory Report.

The stormwater runoff from the existing South Orange Avenue corridor in the CC Basin historically drained through the Sylvan Lakes Development into Lake Sylvan. Based on available permit data for the Sylvan Lake Subdivision the CC basin appears to drain through Phase 1 and Phase 2 of the Sylvan Lakes PUD. The eastern portion of the existing South Orange Ave, consisting of the paved east west portion of roadway, is collected into roadside ditches with no apparent outfall most likely constructed by Seminole County as part of the paving project for this portion of South Orange Ave. During rainfall larger events the ditches would overtop and sheet flow through the Sylvan lakes development. The western portion of the existing South Orange Ave, consisting of the unpaved portion roadway has no apparent collection system and appears to sheet flow west across residential lots into a wetland which ultimately drains into Lake Sylvan. The western portion of the existing South Orange Ave, consisting of the paved north south portion of the roadway is collected into roadside ditches with no apparent outfall most likely constructed by Seminole County as part of the paving project for this portion of South Orange Ave. During larger rainfall events the ditches would overtop and sheet flow west across residential lots into a wetland which ultimately drains into Lake Sylvan.

The historic “unpaved” conditions of the Basin CC footprint shall be utilized to determine the pre-condition “allowable” discharge rates since the existing paved condition contains swales providing attenuation for the roadway. The historic contours and SJRWMD permits are used to document the historic flow patterns of the basin. As discussed with the FDEP and SJRWMD on October 1<sup>st</sup>, 2013 the pre-condition water quality shall consider the existing swales, yet the pre-condition discharge rates would reference those historic “pre-condition” rates.

#### 2.5 FLOODPLAINS/FLOODWAYS

The Federal Emergency Management Agency (FEMA) has developed Flood Insurance Rate Maps (FIRM) for Seminole County. There are no FEMA regulated floodways within the limits of the Wekiva 7A project. 100-year floodplain boundaries are located within the project corridor, with the majority located near Yankee Lake and Lake Sylvan. These areas are designated as Zone A floodplains (floodplain boundaries in which no base floodplain elevations have been established). The Seminole County Systems Inventory and Engineering Analysis for the Lake Sylvan Sub-basin generated a hydraulic stormwater model of Lake Sylvan, Yankee Lake, and the Yankee Lake

outfall which documented stages of the lakes for design and flood events. The stages presented in the Seminole County report shall be used for the determination of the Zone A floodplain elevation in Yankee Lake and Lake Sylvan. Based on results documented in the report, the stages for the 100 year / 24 hour storm were found to be 37.2 feet NAVD for Yankee Lake and 42.2 feet NAVD for Lake Sylvan. The other floodplain designation within the project area is flood Zone X, which is outside of the 100 year floodplain boundary. See **FEMA Flood Insurance Rate Maps in Appendix 11**.

Floodplain impacts resulting from the construction of the proposed roadway will be compensated for with the “cup for cup” methodology.

### **SECTION 3: DESIGN CRITERIA**

The design of the stormwater management facilities for the project is governed by the rules set forth by the SJRWMD and FDOT. Water quality treatment and water quantity attenuation requirements will comply with the guidelines as defined in Chapter 40D-4 of the Florida Administration Code (F.A.C.) and the SJRWMD Environmental Resource Permit (ERP) manual, Volume I and II. Critical duration analysis should be performed to comply with FDOT Rule Chapter 14-86 F.A.C. Refer to **Appendix 2** for the **Drainage Design Criteria** documenting the requirements for this project.

Dry retention ponds will provide the requirements for water quality and quantity for the proposed Wekiva 7A project. Refer to the summary below for the water quality, water quantity, and retention pond configuration criteria used for the project.

- Off-line dry retention will provide a water quality volume of the first one half inch (0.5”) of runoff from the drainage area or one and a quarter inches (1.25”) of runoff from the impervious area, whichever is greater.
- On-line dry retention will provide a water quality volume of an additional one half inch (0.5”) of runoff from the drainage area over that volume specified for off-line treatment.
- Water quantity: For open basins, SJRWMD requires that the post-development peak discharges shall be at or below pre-development peak discharges for the 25-year/24-hour storm event.
- FDOT Critical Duration: For open basins subject to historic flooding, FDOT critical duration analysis for 2-year/1-hour through 100-year/3-day storm events shall be analyzed to ensure that the post-development peak discharge rate does not exceed the pre-development peak discharge rate.
- Retention pond design configuration: The proposed pond will include a twenty foot (20’) maintenance berm (15’ minimum) with maximum slope 1:8, maximum 1:4 pond side slopes, maximum 1:2 tie up/down slopes to existing ground elevation and a minimum one foot (1’) freeboard from the inside maintenance berm to the Design High Water (DHW) elevation. Please refer to FDOT District 5’s checklist for more information about pond configurations.
- Drawdown of treatment volume in no more than 72 hours.
- In order not to reduce recharge in the Wekiva River Recharge Protection Basin, the applicant must demonstrate that the proposed system provides for retention storage of three inches (3”) of runoff from all impervious areas proposed to be constructed on soils defined as Type “A” Soils as defined by the Natural

Resources Conservation Service (NRCS) Soil Survey. Areas with Type "A" Soils shall be considered "Most Effective Recharge Areas".

- Proposed improvements within the Wekiva River Basin must show a net improvement for Total Phosphorus (TP) and Total Nitrogen (TN).
- A Water Quality Protection Zone shall extend one half mile from the Wekiva River, Little Wekiva River north of State Road 436, Black Water Creek, Rock Springs Run, Seminole Creek, and Sulphur Run. The applicant must give reasonable assurance in the erosion and sediment control plan that during construction or alteration of the system (including re-vegetation and stabilization), erosion will be minimized and sediment will be retained on-site. The plan must be in conformance with the erosion and sediment control principles set forth in section 13.8.2, SJRWMD Permit Information Manual, and must contain the information set forth in section 13.8.3, SJRWMD Permit Information Manual. Detailed plans depicting the erosion and sediment control measures shall be required when permit applications are submitted.

The stormwater runoff from the proposed improvements will be collected by inlets and conveyed to the proposed dry retention ponds. The SCS method has been used to determine the required pond size for the basin. It should be noted that for contingency purposes, conservative estimates were used to determine the feasibility of the pond location and approximate size based on preliminary data and engineering judgment. Final pond configurations may change during design when sufficient design level data becomes available.

#### **SECTION 4: DATA COLLECTION**

The design team collected and reviewed data from the following sources:

- FDOT Drainage Manual Standards, January 2014
- SJRWMD Environmental Resource Permit Applicant's Handbook, Volumes I and II, October 2013
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panels 12117C0035F, 12117C0045F, and 12117C0065F
- Soil Conservation Service (NRCS) maps, Seminole County, FL
- United States Geological Survey (USGS) maps
- FDOT Drainage Handbook: "Stormwater Management Facility", January 2004
- Existing SJRWMD Permits (4-117-0382AG and 4-117-0399AC)
- URS Field Reconnaissance, 2013/2014
- CH2M Hill Wetland Evaluation Report, June 2010
- GEC Level 2 Contamination Impact Assessment Reports, 2014
- SEARCH Cultural Resources Desktop Analysis, 2014
- CH2M Hill Pond Siting Report for the Wekiva Parkway (SR 429)/SR 46 Realignment PD&E Study, July 2010
- CH2M Hill Location Hydraulic Report for the Wekiva Parkway (SR 429)/SR 46 Realignment PD&E Study, September 2010
- The Balmoral Group Technical Memorandums, July 2012
- CDM Smith System Inventory and Engineering Analysis for the Lake Sylvan Subbasin, September 2008

- SJRWMD Minimum Levels Reevaluation: Sylvan Lake, 2010

#### **SECTION 5: PROPOSED DRAINAGE CONDITIONS**

The existing drainage boundaries and local drainage basins will generally be maintained in the proposed conditions. The stormwater runoff from the proposed State Road 429 and frontage roads will be collected by a closed drainage conveyance system, which will discharge into the proposed stormwater management facilities: WR1, WR2, YL1, YL2, and LS.

The stormwater runoff from the Begin Project limits (approximately Wekiva River) to approximately Yankee Lake Road will be collected by the proposed inlets along State Road 429 and the frontage roads. Stormwater treatment and attenuation will be achieved within the proposed ponds WR1 and WR2. The specific western limits of this basin have been coordinated with Section 6 and determined to be station 920+00 on State Road 429, station 3007+75 on the westbound frontage road, and station 159+67 on the eastbound frontage road. A portion of the westbound frontage road, west of station 3007+75 to River Oaks Circle has been determined to be hydraulically infeasible to drain to WR1; therefore this portion of the westbound frontage road will be drained into Section 6 for treatment and attenuation. The specific eastern limits of this basin are approximately station 973+50 on State Road 429, station 3048+00 on the westbound frontage road, and station 2034+00 on the eastbound frontage road. This basin has one (1) major outfall, Wekiva River. Offsite runoff within this basin, where hydraulically feasible, will drain into the proposed ponds. Offsite areas which cannot be drained into the ponds will be collected in an offsite system designed to outfall into a spreader swale prior to discharge into the ultimate outfall, Wekiva River.

The stormwater runoff from approximately Yankee Lake Road to approximately Lake Markham Road will be collected by the proposed inlets along State Road 429 and the frontage roads. Stormwater treatment and attenuation will be achieved within the proposed pond YL1. The specific western limits of this basin are approximately station 973+50 on State Road 429, station 3048+00 on the westbound frontage road, and station 2034+00 on the eastbound frontage road. The specific eastern limits of this basin are approximately station 1022+00 on State Road 429, station 3097+00 on the westbound frontage road, and station 2082+00 on the eastbound frontage road. Offsite runoff within this basin, where hydraulically feasible, will drain into the proposed pond. This basin has one (1) major outfall, Yankee Lake. Offsite areas which cannot be drained into the pond shall be collected in an offsite system designed to outfall into the reconstructed lateral ditch prior to discharge into the ultimate outfall, Yankee Lake.

The stormwater runoff from approximately Lake Markham Road to approximately Glad View Drive will be collected by the proposed inlets along State Road 429 and the frontage roads. Stormwater treatment and attenuation will be achieved within the proposed pond YL2. The specific western limits of this basin are approximately station 1022+00 on State Road 429, station 3097+00 on the westbound frontage road, and station 2082+00 on the eastbound frontage road. The specific eastern limits of this basin are approximately station 1060+00 on State Road 429, station 3135+00 on the westbound frontage road, and station 2120+00 on the eastbound frontage road. This basin has two (2) major outfalls, Yankee Lake and Lake Sylvan. Generally, the offsite areas are drained northward through CD-4 into Yankee Lake and southward through CD-6 into Lake Sylvan. Offsite runoff within this basin shall be designed to bypass the proposed pond. Offsite areas will be collected in an offsite system designed to outfall into the

reconstructed cross drains and lateral ditches prior to discharge into the ultimate outfalls, Lake Sylvan and Yankee Lake.

The stormwater runoff from approximately Glade View Drive to approximately the End Project limits will be collected by the proposed inlets along State Road 429 and the frontage roads. Stormwater treatment and attenuation will be achieved within the proposed pond LS. The specific western limits of this basin are approximately station 1060+00 on State Road 429, station 3135+00 on the westbound frontage road, and station 2120+00 on the eastbound frontage road. The specific eastern limits of this basin are approximately station 1108+38 on State Road 429, station 3178+00 on the westbound frontage road, and station 2164+00 on the eastbound frontage road. This basin has one (1) major outfall, Lake Sylvan. Offsite runoff within this basin shall be designed to bypass the proposed pond where cost effective. Offsite areas will be collected in an offsite system designed to outfall into the reconstructed cross drain and lateral ditch prior to discharge into the ultimate outfall, Lake Sylvan.

The stormwater runoff from Wekiva 7A along State Road 429 east of station 1108+38 shall be drained into Section 8 of the proposed Wekiva Parkway to be treated and attenuated in a stormwater management facility. Review of available preliminary design data for Section 8 of the Wekiva Parkway indicates stormwater runoff from approximately station 1107+50 on State Road 429 has been accounted for in the design of the stormwater management facility.

The stormwater runoff from the proposed Orange Avenue footprint will be collected by the proposed inlets along Orange Avenue. Stormwater treatment and attenuation will be achieved within the proposed pond CC. The specific western limit of the basin will be located along the back of sidewalk on the proposed north south portion of Orange Avenue. The specific eastern limit of the basin will be coincidental with the intersection of the existing Wayside Drive and Orange Boulevard. This basin has one (1) major outfall, Lake Sylvan. Offsite runoff within this basin shall be designed to bypass the proposed pond where cost effective. Offsite areas will be collected in an offsite system designed maintain existing drainage patterns of the area.

## **SECTION 6: PROPOSED STORMWATER MANAGEMENT FACILITIES**

### **6.1 OVERVIEW**

#### **6.1.1 Stormwater Management Facilities**

Within the project limits there are three (3) major hydrologic drainage basins defined by outfall. The project has been subdivided into six (6) sub-basins, each with a designated proposed stormwater management facility. Ponds have been located and sized using conservative estimates to determine site hydraulic feasibility based on preliminary data and engineering judgment. The ponds were sized on the assumption that the offsite runoff would be drained through separate bypass systems. Please refer to **Figure 6** in **Appendix 1** for a graphic display of the pond locations.

Four (4) of the proposed sub-basins contain offsite properties FDOT acquired during early Right-of-Way acquisitions. Basins which contain an existing FDOT property identified as a suitable location for a pond did not consider alternative sites. For the purposes of this report, these properties were evaluated based on suitability for the proposed drainage basin.

Basin WR, which includes sub-basins WR1 and WR2, contains two (2) existing FDOT offsite properties determined feasible for pond locations. Sub-basin WR1, the western most sub-basin, has been identified to require additional property, not owned by FDOT, to accommodate stormwater runoff from Section 6. Pond WR2 was determined suitable for the proposed sub-basin WR2. Preliminary evaluation of the acquired property for Pond WR2 considered not only the stormwater requirements of the project, but also the embankment requirements of the proposed roadway. Due to the topography of basin WR and stormwater regulations for the Wekiva River Basin, two (2) ponds were required to accommodate stormwater treatment and attenuation from the proposed roadway.

Basin YL, which includes sub-basins YL1 and YL2, contains one (1) existing FDOT offsite property determined inadequate for a treatment and attenuation pond location. Sub-basin YL1, the western most sub-basin, considers three (3) pond location alternatives with one (1) of the alternatives (YL1 Alt 2) inadequate to function as a stand-alone pond for the sub-basin requiring a second smaller pond (YL1 Alt 2B) proposed on the offsite FDOT owned property. Sub-basin YL2 considers three (3) alternatives with two (2) of the alternatives (YL2 and YL2 Alt 1) impacting the same property (whole or partial) and the other alternative inadequate to function as a stand-alone pond for the sub-basin requiring a second smaller pond (YL2 Alt 2B) proposed in the same location as the western portion of the YL2 Alt 1 pond. Due to the topography of basin YL and recharge requirements for the Wekiva River Recharge Protection Zone, two (2) ponds were required to accommodate stormwater treatment and attenuation from the proposed roadway.

Basin LS contains one (1) existing FDOT offsite property which has been determined feasible for a pond location and suitable for the LS basin. The FDOT property was acquired during the development of this report, therefore two (2) other alternatives were also considered prior to the acquisition. The other alternatives considered (LS Alt 1 and LS Alt 2) were determined inadequate to function as a stand-alone pond for the basin and no further evaluation for feasible alternatives was performed. Preliminary evaluation of the acquired property and pond configuration considered not only the stormwater requirements of the project, but also embankment requirements for the proposed roadway.

Basin CC, does not contain any property owned by FDOT, therefore three (3) alternative locations for the proposed ponds were selected based on available open space along the proposed Orange Avenue alignment. Pond CC, CC Alt 1, and CC Alt 2 have been determined to be adequately sized to accommodate stormwater treatment and attenuation from the proposed roadway.

## **6.2 METHODOLOGY OF POND DETERMINATION**

Based on the available information, only hydraulically feasible and environmentally permissible pond sites were considered for the recommended alternative. Environmental impacts from the proposed pond locations were considered and included in the pond site evaluation matrix, yet due to the strict criteria for recharge and pollutant loading, the environmental impacts were often out-weighted by the stormwater requirements for the project. It should be noted that swales were initially considered as a viable alternative to the proposed pond locations, but were eliminated from the alternatives due to the aesthetic requirements of the corridor determined during the early stages of the report development. Pond sites are analyzed and evaluated for the following parameters:

- Hydrologic and hydraulic factors such as existing ground elevation, soil types, estimated Seasonal High Water Table (SHWT) established by a review of the USDA NRCS soils and geotechnical investigations, stormwater conveyance feasibility, allowable hydraulic grade line (HGL), and basin outfalls
- Environmental resource impacts including wetlands and threatened or endangered species
- Floodplain impacts (Yankee Lake & Lake Syvlan)
- Major utility conflict potential (Florida Gas Transmission, etc.)
- Impacts to cultural resources
- Hazardous materials and contamination

Please note that the information for estimated SHWT, environmental impacts, cultural resource impacts, and hazardous materials and contamination impacts are included in **Appendices 4 through 8**.

### **6.3 STORMWATER PONDS**

#### **6.3.1 Sub-Basin WR1**

Alternatives for the pond site were not considered for pond WR1 since the pond site is currently owned by FDOT and was acquired during early right-of-way acquisitions. The type of facility selected for pond WR 1 was determined based on the ability to achieve the Total Nitrogen (TN) and Total Phosphorus (TP) TMDL net improvement requirements for the Wekiva River as documented in the design criteria. Based on the type of facility selected which could achieve the TMDL requirements, hydraulically feasible sub-basin limits were determined. Due to the topography of the existing terrain, specifically at River Oaks Circle, the WR1 western sub-basin limit on the westbound frontage road was terminated at approximately Wekiva Park Drive (station 3007+75). The remainder of the westbound frontage road from Wekiva Park Drive to River Oaks Circle will be collected for treatment and attenuation within the Section 6 limits of the Wekiva Parkway project. The western limit of the sub-basin on the eastbound frontage road is approximately station 159+67, and on State Road 429 approximately station 920+00 (which includes a significant portion of the Wekiva River bridge in Section 6). The eastern limit of sub-basin on the westbound frontage road was terminated at approximately station 3019+00, along the eastbound frontage road at approximately station 2005+00, and along State Road 429 at approximately 944+00.

The SCS method has been used to determine the required pond size for the basin. It should be noted that for contingency purposes, conservative estimates were used to determine the feasibility of a pond at this location and approximate size based on preliminary data and engineering judgment. Design level geotechnical data used to determine permeability rates was not available at the time of the report development; therefore a conservative separation of two feet above the highest estimated seasonal high water table was used to establish a pond bottom. Generally, the water table profile follows the existing ground at this pond site, which drastically falls moving towards the river. Final pond configurations shall be determined during design when sufficient design level data is available.

### 6.3.1.1 Pond WR1

Pond WR1 is a proposed dry retention system that will provide stormwater treatment and attenuation for sub-basin WR1. The pond is located north of State Road 429 at approximately station 935+00. The pond site is proposed within parcels: 21-19-29-300-0010-0000, 21-19-29-300-001A-0000, 36-18-29-300-0010-0000. Preliminary geotechnical data for the pond site indicates a rather shallow estimated seasonal high groundwater table with depths of three (3) to five (5) feet below existing ground and predominantly type A/D soils. The depths to the estimated seasonal high groundwater table would be more conducive to that of a wet detention pond, yet due to the nitrogen removal inefficiencies of a wet detention facility, this type of facility was deemed inadequate. The topography of the site is a mildly sloping terrain with elevation differences across the site of up to four (4) feet. Pond WR1 is sized as a shallow dry retention facility in an effort to meet the pollutant loading requirements of the Wekiva River.

Since no alternatives were considered at this site, preliminary development of the pond configuration and grading was evaluated. The conservative approach on the estimated seasonal high and pond bottom elevation required an above ground impoundment on the northwest portion of the pond berm along Wekiva Park Drive. The pond bottom is set to the elevation of existing Wekiva Park Drive at State Road 46 with an outside berm elevation approximately four and half (4.5) feet above the pond bottom. Wekiva Park Drive is anticipated to be reconstructed with a higher profile in this area due the proposed profile of the westbound frontage road. To determine preliminary construction limits, slopes tie-downs along the northwest berm were set at a 1:6 (V:H) slope. The northern, eastern, and southern berms of the pond will be approximately at grade.

Potential outfalls for the pond were considered and identified as either of the following:

- Closed outfall system to a spreader swale in Section 6 with ultimate outfall into Wekiva River
- Broad crested concrete weir into Lower Wekiva Preserve State Park

The preferred outfall alternative is the closed outfall system into a spreader swale contained in Section 6. The preferred alternative was selected based on the patterns of the existing roadway stormwater management system. The preferred alternative would mimic the stormwater runoff patterns of the existing condition.

The non-preferred alternative would utilize the State Park as an outfall and secondary dry pond in order to avoid a spreader swale adjacent to the Wekiva River. This alternative would require additional geotechnical investigation including infiltration rates to evaluate the potential for a positive recovery of the State Park, coordination with FDEP and SJRWMD, and additional survey within the State Park to determine the available storage in the area.

### 6.3.2 Sub-Basin WR2

Alternatives for the pond site were not considered for pond WR2 since the pond site is currently owned by FDOT and was acquired during early right-of-way acquisitions. The type of facility selected for pond WR 2 was determined based on the ability to achieve the Total Nitrogen (TN) and Total Phosphorus (TP) TMDL net improvement requirements for the Wekiva River as documented in the design criteria. Based on the type of facility selected which could achieve the TMDL requirements, hydraulically feasible sub-basin limits were determined. Due to the topography of the existing terrain, specifically along the frontage roads, the western WR2 sub-basin limit was

terminated at approximately station 3019+00 on the westbound frontage road, approximately station 2005+00 along the eastbound frontage road, and approximately 944+00 along State Road 429. The eastern limit of the sub-basin is approximately station 3048+00 on the westbound frontage road, approximately station 2034+00 on the eastbound frontage road, and station 973+50 on State Road 429.

The SCS method has been used to determine the required pond size for the basin. It should be noted that for contingency purposes, conservative estimates were used to determine the feasibility a pond at this location and approximate size based on preliminary data and engineering judgment. Design level geotechnical data used to determine permeability rates was not available at the time of the report development; therefore a conservative separation of two feet above the highest estimated seasonal high water table was used to establish a pond bottom. Final pond configurations shall be determined during design when sufficient available design level data is available.

### **6.3.2.1 Pond WR2**

Pond WR2 is a proposed dry retention system that will provide stormwater treatment and attenuation for sub-basin WR2. The pond is located north of State Road 429 at approximately station 955+00. The pond site is proposed on an FDOT owned property: parcel 22-19-29-300-0060-0000. Preliminary geotechnical data for the pond site indicates a rather deep estimated seasonal high groundwater table with depths of thirteen (13) to twenty nine (29) feet below existing ground and predominantly type A soils. The topography of the site is a rolling terrain with elevation differences across the site of up to eleven (11) feet. Pond WR2 is sized as a dry retention facility maximized within the existing parcel to facilitate stormwater storage, recovery, embankment, and pollutant loading requirements for the project.

Since no alternatives were considered at this site, preliminary development of the pond configuration and grading was evaluated. The pond bottom is set to an elevation of approximately ten and a half (10.5) feet lower than the lowest surrounding existing ground elevation. The outside berm elevation is set to an elevation approximately six (6) feet higher than the lowest surrounding existing ground. Slopes used to determine preliminary construction limits were set at a 1:6 (V:H) slope. The perimeter of the pond will contain positive upward slopes to existing ground on the eastern pond berm and negative downward slopes on the northern and western pond berms.

Potential outfalls for the pond were considered and identified as either of the following:

- Closed outfall system to a spreader swale in Section 6 with an ultimate into Wekiva River
- Broad crested concrete weir into Lower Wekiva Preserve State Park

The preferred outfall alternative is the closed outfall system into a spreader swale contained in Section 6. The preferred alternative was selected based on the patterns of the existing roadway stormwater management system. The preferred alternative would mimic the stormwater runoff patterns of the existing condition.

The non-preferred alternative would utilize the State Park as an outfall and secondary dry pond in order to avoid a direct discharge into the Wekiva River. This alternative would require additional geotechnical investigation including infiltration rates to evaluate the potential for a positive recovery of the State Park, coordination with FDEP and SJRWMD, and additional survey within the State Park to determine the available storage in the area.

### 6.3.3 Sub-Basin YL1

Sub-basin YL1 has three (3) pond alternatives which have been considered: YL1, YL1 Alt 1, and YL1 Alt 2. The preferred alternative is pond YL1. Due to the topography of the existing terrain, specifically along the frontage roads, the western YL1 sub-basin limit was terminated at approximately station 3048+00 on the westbound frontage road, approximately station 2034+00 on the eastbound frontage road, and approximately station 973+50 on State Road 429. The eastern limit of the sub-basin is approximately station 3097+00 on the westbound frontage road, approximately station 2082+00 on the eastbound frontage road, and approximately station 1022+00 on State Road 429.

The SCS method has been used to determine the required pond size for the basin. It should be noted that for contingency purposes, conservative estimates were used to determine the feasibility of the pond location and approximate size based on preliminary data and engineering judgment. Design level geotechnical data used to determine permeability rates was not available at the time of the report development; therefore a conservative separation of two feet above the highest estimated seasonal high water table was used to establish a pond bottom. Final pond configurations shall be determined during design when sufficient design level data is available.

#### 6.3.3.1 Pond YL1

Pond YL1 is preferred due to the location of the property relative to the outfall, relatively flat terrain, low water table, type A soils, and proximity to the low point of the existing terrain. Pond YL1 is a proposed dry retention system that will provide stormwater treatment and attenuation for sub-basin YL1. The pond is located south of State Road 429 at approximately station 1010+00. The pond site is proposed on a single property: parcel 26-19-29-300-0080-0000. Preliminary geotechnical data for the pond site indicates a rather deep estimated seasonal high groundwater table with depths of nine (9) to thirteen (13) feet below existing ground and predominantly type A soils with the southern portion of the pond containing type A/D soils. The topography of the site is a mildly sloping terrain with elevation differences across the site of up to four (4) feet. Pond YL1 is sized as a dry retention facility maximized within the existing parcel to facilitate stormwater storage, recovery, and embankment requirements for the project. The outfall for Pond YL1 shall include a closed or open system within the proposed FDOT right-of-way along the south side of the eastbound frontage road to cross drain CD-3, which will maintain current drainage patterns with ultimate discharge into Yankee Lake.

#### 6.3.3.2 Pond YL1 Alt 1

Pond YL1 Alt 1 is a proposed dry retention system that will provide stormwater treatment and attenuation for sub-basin YL1. The pond is located north of State Road 429 at approximately station 1005+00. The pond site is proposed to span across four (4) properties. Two (2) of the properties are owned by FDOT: parcel 22-19-29-300-002B-0000 and parcel 23-19-29-300-0030-0000. The other two (2) properties are as follows: parcel 22-19-29-300-0020-0000 and parcel 23-19-29-300-003B-0000. Parcel 22-19-29-300-0020-0000 is owned by Seminole County and used as a spray field for the Yankee Lake Water Reclamation facility operations. Preliminary geotechnical data for the pond site indicates a rather shallow estimated seasonal high groundwater table with depths of two (2) to six (6) feet below existing ground and predominantly type A soils on the western portion of the pond with type C/D soils on

the eastern portion. The topography of the site is a steep sloping terrain with elevation differences across the site of up to ten (10) feet. The pond bottom is set to an elevation 3.87 feet above the average water elevation of Yankee Lake and 0.18 feet below the 100 year flood elevation of Yankee Lake (reference: Seminole County Lake Sylvan Systems Inventory Report). The outside berm elevation is set to an elevation approximately eight (8) feet higher than the lowest surrounding existing ground. Slopes used to determine preliminary construction limits were set at a 1:6 (V:H) slope. The perimeter of the pond will contain positive upward slopes to existing ground on the western pond berm and negative downward slopes on the northern and eastern pond berms. The outfall for Pond YL1 Alt 1 shall include a broad crested weir within the northern berm of the pond which will discharge directly into Yankee Lake.

### **6.3.3.3 Pond YL1 Alt 2**

Pond YL1 Alt 2 is a proposed dry retention system that will provide stormwater treatment and attenuation for a portion sub-basin YL1. This pond cannot function as the stand-alone pond for this sub-basin due to the hydraulic constraints between the groundwater and the roadway profiles; therefore this pond alternative also requires the construction of YL1 Alt 2B, which is a portion of the YL1 Alt 1 pond. Pond YL1 Alt 2 is located north of State Road 429 at approximately station 985+00. Pond YL1 Alt 2 is proposed on a property currently owned by the Seminole County School Board: parcel 22-19-29-300-002A-0000 and Pond YL1 Alt 2B is proposed on the two (2) properties already owned by FDOT: parcel 22-19-29-300-002B-0000 and parcel 23-19-29-300-0030-0000. Preliminary geotechnical data for the YL1 Alt 2 pond site indicates a rather shallow estimated seasonal high groundwater table with depths of two (2) to six (6) feet below existing ground and predominantly type A soils. The topography of the YL1 Alt 2 site is a mildly sloping terrain with elevation differences across the site of up to six (6) feet. Preliminary geotechnical data for the YL1 Alt 2B pond site indicates a rather shallow estimated seasonal high groundwater table with depths of two (2) to six (6) feet below existing ground and predominantly type A soils on the western portion of the pond with type C/D soils on the eastern portion. The topography of the YL1 Alt 2B site is a steep sloping terrain with elevation differences across the site of up to ten (10) feet. Due to the hydraulic constraints at the YL1 Alt 2 location, pond YL1 Alt 2B was required to accommodate the proposed basin.

### **6.3.4 Sub-Basin YL2**

Sub-basin YL2 has three (3) pond alternatives which have been considered: YL2, YL2 Alt 1, and YL2 Alt 2. The preferred alternative is pond YL2. Due to the topography of the existing terrain, specifically along the frontage roads, the western YL1 sub-basin limit was terminated at approximately station 3097+00 on the westbound frontage road, approximately station 2082+00 on the eastbound frontage road, and approximately station 1022+00 on State Road 429. The eastern limit of the sub-basin is approximately station 3134+00 on the westbound frontage road, approximately station 2119+00 on the eastbound frontage road, and approximately station 1059+00 on State Road 429.

The SCS method has been used to determine the required pond size for the basin. It should be noted that for contingency purposes, conservative estimates were used to determine the feasibility of the pond location and approximate size based on preliminary data and engineering judgment. Design level geotechnical data used to determine permeability rates was not available at the time of the report development; therefore a conservative

separation of two feet above the highest estimated seasonal high water table was used to establish a pond bottom. Final pond configurations shall be determined during design when sufficient design level data is available.

#### **6.3.4.1 Pond YL2**

Pond YL2 is preferred due to the location of the property relative to the outfall, low water table, type A soils, and proximity to the low point of the existing terrain. Pond YL2 is a proposed dry retention system that will provide stormwater treatment and attenuation for sub-basin YL2. The pond is located north of State Road 429 at approximately station 1035+00. The pond site is proposed on two (2) properties: parcel 26-19-29-501-0000-0010 and parcel 26-19-29-501-0000-0130. Preliminary geotechnical data for the pond site indicates a rather deep estimated seasonal high groundwater table with depths of five (5) to eleven (11) feet below existing ground and predominantly type A soils. The topography of the site is a rolling terrain with elevation differences across the site of up to fourteen (14) feet. Pond YL2 is sized as a dry retention facility maximized within the existing parcel to facilitate stormwater storage, recovery, and embankment requirements for the project. Potential outfalls for Pond YL2 considered were: a closed outfall system within the proposed FDOT right-of-way to CD-4 which will discharge directly into Yankee Lake or a broad crested weir with direct discharge into Yankee Lake. Both outfalls are viable options and should be considered during design.

#### **6.3.4.2 Pond YL2 Alt 1**

Pond YL2 Alt 1 is a proposed dry retention system that will provide stormwater treatment and attenuation for sub-basin YL2. The pond, bisected by a thirty (30) foot right-of-way for Forest Lane, is located north of State Road 429 at approximately station 1035+00 and 1041+00. The pond site is proposed on two (2) properties: parcel 26-19-29-501-0000-0010 and parcel 26-19-29-300-0050-0000. Preliminary geotechnical data for the pond site indicates a rather deep estimated seasonal high groundwater table with depths of five (5) to eleven (11) feet below existing ground and predominantly type A soils. The topography of the site is a rolling terrain with elevation differences across the site of up to fourteen (14) feet. Pond YL2 Alt 1 is sized as a dry retention facility with a partial take on parcel 26-19-29-501-0000-0010 avoiding the existing residential home and maintaining the access along Forest Lane. The outfall for Pond YL2 Alt 1 shall include a closed drainage system within the proposed FDOT right-of-way to CD-4 which will discharge directly into Yankee Lake.

#### **6.3.4.3 Pond YL2 Alt 2**

Pond YL2 Alt 2 is a proposed dry retention system that will provide stormwater treatment and attenuation for a portion of sub-basin YL2. This pond cannot function as the stand-alone pond for this sub-basin due to the hydraulic constraints between the groundwater and the roadway profiles; therefore this pond alternative also requires the construction of YL2 Alt 2B, which is a portion of the YL2 Alt 1 pond. The YL2 Alt 2 pond is located north of State Road 429 at approximately station 1054+00. The YL2 Alt 2 pond site is proposed on one (1) property: parcel 26-19-29-300-0040-0010 and the YL2 Alt 2B site is proposed on one (1) property: 26-19-29-501-0000-0010. Preliminary geotechnical data for the YL2 Alt 2 pond site indicates the estimated seasonal high groundwater table with depths of six (6) to eleven (11) feet below existing ground and predominantly type A soils. The topography of the YL2 Alt 2 site is a relatively flat with an elevation difference across the site of two (2) feet. The outfall for Pond YL2 Alt 2 shall

include a closed drainage system within the proposed FDOT right-of-way to CD-6 which will discharge directly into Lake Sylvan. Preliminary geotechnical data for the YL2 Alt 2B pond site indicates a rather deep estimated seasonal high groundwater table with depths of five (5) to eleven (11) feet below existing ground and predominantly type A soils. The topography of the YL2 Alt 2B site is a rolling terrain with elevation differences across the site of up to fourteen (14) feet. Pond YL2 Alt 2B is a partial take on parcel 26-19-29-501-0000-0010 avoiding the existing residential home and maintaining the access along Forest Lane. The outfall for Pond YL2 Alt 2B shall include a closed drainage system within the proposed FDOT right-of-way to CD-4 which will discharge directly into Yankee Lake. Due to the constraints associated with the hydraulics at the YL2 Alt 2 location, pond YL2 Alt 2B was required to accommodate the proposed basin.

### **6.3.5 Basin LS**

Basin LS has three (3) pond alternatives which were considered: LS, LS Alt 1, and LS Alt 2. The preferred alternative is pond LS, which is contained on two (2) parcels acquired by FDOT during the development of this report. Due to the topography of the existing terrain, specifically along the frontage roads, the western LS basin limit was terminated at approximately station 3134+00 on the westbound frontage road, approximately station 2119+00 on the eastbound frontage road, and approximately station 1059+00 on State Road 429. The eastern limit of the basin is approximately station 3178+00 on the westbound frontage road, approximately station 2164+00 on the eastbound frontage road, and approximately station 1108+38 on State Road 429.

The SCS method has been used to determine the required pond size for the basin. It should be noted that for contingency purposes, conservative estimates were used to determine the feasibility of a pond at this location and approximate size based on preliminary data and engineering judgment. Design level geotechnical data used to determine permeability rates was not available at the time of the report development; therefore a conservative separation of two feet above the highest estimated seasonal high water table was used to establish a pond bottom. Final pond configurations shall be determined during design when sufficient design level data is available.

#### **6.3.5.1 Pond LS**

Pond LS is a proposed dry retention system that will provide stormwater treatment and attenuation for basin LS. The pond is located north of State Road 429 at approximately station 1063+00. The pond site is proposed on two (2) FDOT owned properties: parcel 26-19-29-300-0030-0000 and parcel 25-19-29-300-028A-0000. Preliminary geotechnical data for the pond site indicates a rather deep estimated seasonal high groundwater table with depths of ten (10) to eighteen (18) feet below existing ground and predominantly type A soils. The topography of the site is a rolling terrain with elevation differences across the site of up to ten (10) feet. Pond LS is sized as a dry retention facility maximized within the existing parcels to facilitate stormwater storage, recovery, and embankment requirements for the project. The outfall for Pond LS shall include a closed drainage system within the proposed FDOT right-of-way to CD-6 which will discharge directly into Lake Sylvan.

#### **6.3.5.2 Pond LS Alt 1**

Pond LS Alt 1 is a proposed dry retention system that will provide stormwater treatment and attenuation for a portion of basin LS. This pond cannot function as the stand-alone pond for this basin due to the hydraulic constraints

between the groundwater and the roadway profiles. The pond is located south of State Road 429 at approximately station 1084+00. The pond site is proposed on two (2) properties: parcel 25-19-29-300-0250-0000 and parcel 25-19-29-300-0260-0000. Preliminary geotechnical data for the pond site indicates a rather deep estimated seasonal high groundwater table with depths of eight (8) to fifteen (15) feet below existing ground and predominantly type A soils. The topography of the site is a gently sloping terrain with elevation differences across the site of up to six (6) feet. Pond LS Alt 1 is sized as a dry retention facility maximized within the existing parcels to facilitate stormwater storage, recovery, and embankment requirements for the project. The outfall for Pond LS Alt 1 shall include an open drainage system within the proposed FDOT right-of-way to CD-6 which will discharge directly into Lake Sylvan. The open drainage system will serve as the outfall for LS Alt 1 and an offsite conveyance system. Due the constraints associated with the hydraulics at this location and the early acquisition of the LS pond site, further evaluation of the pond was not performed.

### **6.3.5.2 Pond LS Alt 2**

Pond LS Alt 2 is a proposed dry retention system that will provide stormwater treatment and attenuation for a portion of basin LS. This pond cannot function as the stand-alone pond for this basin due to the hydraulic constraints between the groundwater and the roadway profiles. The pond is located within the infields of State Road 429 and the frontage roads (State Road 46) and north of State Road 429 at approximately station 1089+00. The pond sites are proposed on six (6) properties: parcel 25-19-29-300-0170-0000, parcel 25-19-29-300-0160-0000, parcel 25-19-29-300-017A-0000, parcel 25-19-29-501-0400-0050, parcel 25-19-29-501-0400-0040, and parcel 25-19-29-501-0400-0010. Preliminary geotechnical data for the pond site indicates a rather deep estimated seasonal high groundwater table with depths of eight (8) to fifteen (15) feet below existing ground and predominantly type A soils. The topography of the site is a gently sloping terrain with elevation differences across the site of up to five (5) feet. Pond LS Alt 2 is sized as a dry retention facility maximized within the existing parcels to facilitate stormwater storage, recovery, and embankment requirements for the project. The outfall for Pond LS Alt 2 shall include an open drainage system within the proposed FDOT right-of-way to CD-6 which will discharge directly into Lake Sylvan. The open drainage system will serve as the outfall for LS Alt 2 and an offsite conveyance system. Due the constraints associated with the hydraulics at this location and the early acquisition of the LS pond site, further evaluation of the pond was not performed.

### **6.3.6 Yankee Lake Floodplain**

The Wekiva Parkway traverses the Yankee Lake Federal Emergency Management Agency (FEMA) 100 year floodplain in section 7A. FEMA has developed Flood Insurance Rate Maps (FIRM) for Seminole County. FIRM map number 12117C0035F, dated September 28, 2007 indicates a floodplain around Yankee Lake designated as Zone A. Floodplains with a Zone A designation characterize flood boundaries in which no base floodplain elevation has been established. Refer to **Appendix 11** for the **FEMA FIRMs**.

A preliminary evaluation of the impacts to the floodplain was determined using a flood elevation referenced from the Seminole County Systems Inventory and Engineering Analysis for the Lake Sylvan Sub-basin. The report generated a hydraulic stormwater model of Lake Sylvan, Yankee Lake, and the Yankee Lake outfall which documented stages of the lakes for flood events. Based on results documented in the report, the stage for the 100 year / 24 hour storm

was found to be 37.2 feet NAVD for Yankee Lake. The preliminary evaluation of the proposed improvements traversing the floodplain indicates approximately 3 ac-ft of impacts to the Yankee Lake floodplain. Refer to **Appendix 3, Pond Sizing Calculations** for supporting documentation on impacts and compensation.

Compensation for the floodplain impacts was determined using a “cup for cup” methodology. Areas identified for viable compensation sites were estimated to provide a one (1) foot depth of flood storage across the site. Due to the topography surrounding Yankee Lake and varying depths to the estimated seasonal high groundwater table, the estimate for flood storage was considered conservative.

Four (4) alternatives were considered for the Yankee Lake floodplain compensation area: FPC, FPC Alt 1, FPC Alt 2, and FPC Alt 3. The recommended alternative is FPC, which is located on two (2) FDOT owned properties. In an effort to minimize the sites required to achieve the compensation, all of the alternatives would consider an expansion of the lake by excavating portions of the existing bank.

#### **6.3.6.1 FPC**

FPC is located on the north side of State Road 429 at approximately station 1005+00. The site is proposed on two (2) FDOT owned properties: parcel 22-19-29-300-002B-0000 and parcel 23-19-29-300-0030-0000. It should be noted that FPC would preclude the use of YL2 Alt 1, a non-preferred treatment and attenuation pond alternative for sub-basin YL2. Preliminary geotechnical data for the site indicates a rather shallow estimated seasonal high groundwater table with depths of two (2) to six (6) feet below existing ground and predominantly type A soils on the western portion of the site with type C/D soils on the eastern portion. The topography of the site is a steep sloping terrain with elevation differences across the site of up to ten (10) feet. FPC provides 5.14 ac-ft of compensation.

#### **6.3.6.2 FPC Alt 1**

FPC Alt 1 is located on the north side of State Road 429 at approximately station 1016+00. The site is proposed on a single property: parcel 26-19-29-502-0000-0130. Preliminary geotechnical data from the FPC site was referenced and indicates a rather shallow estimated seasonal high groundwater table with depths of two (2) to six (6) feet below existing ground and type C/D soils. The topography of the site is a mildly sloping terrain with elevation differences across the site of up to four (4) feet. FPC Alt 1 provides 3.31 ac-ft of compensation.

#### **6.3.6.3 FPC Alt 2**

FPC Alt 2 is located on the north side of State Road 429 at approximately station 1021+00. The site is proposed on four (4) properties: parcel 26-19-29-502-0000-0090, parcel 26-19-29-502-0000-0110, parcel 26-19-29-502-0000-0130, and parcel 23-19-29-300-003A-0000. Preliminary geotechnical data from the FPC site was referenced and indicates a rather shallow estimated seasonal high groundwater table with depths of two (2) to six (6) feet below existing ground and type C/D soils. The topography of the site is a gently sloping terrain with elevation differences across the site of up to two (2) feet. FPC Alt 2 provides 3.29 ac-ft of compensation.

### 6.3.6.4 FPC Alt 3

FPC Alt 3 is located on the north side of State Road 429 at approximately station 1028+00. The site is proposed on eight (8) properties: parcel 26-19-29-502-0000-0030, parcel 26-19-29-502-0000-0040, parcel 26-19-29-502-0000-0050, parcel 23-19-29-502-0000-0060, parcel 23-19-29-502-0000-0070, parcel 23-19-29-502-0000-0080, parcel 23-19-29-502-0000-0090, and parcel 23-19-29-502-0000-0010. Preliminary geotechnical data from the YL2 site was referenced and indicates an estimated seasonal high groundwater table with depths of five (5) to eleven (11) feet below existing ground and type A/D soils. The topography of the site is a rolling terrain with elevation differences across the site of up to twelve (12) feet. FPC Alt 3 provides 3.29 ac-ft of compensation.

### 6.3.7 Lake Sylvan Floodplain

The Wekiva Parkway traverses the Lake Sylvan Federal Emergency Management Agency (FEMA) 100 year floodplain in section 7A. FEMA has developed Flood Insurance Rate Maps (FIRM) for Seminole County. FIRM map number 12117C0035F, dated September 28, 2007 indicates a floodplain around Lake Sylvan designated as Zone A. Floodplains with a Zone A designation characterize flood boundaries in which no base floodplain elevation has been established. Refer to **Appendix 11** for the **FEMA FIRMs**.

A preliminary evaluation of the impacts to the floodplain was determined using a flood elevation referenced from the Seminole County Systems Inventory and Engineering Analysis for the Lake Sylvan Sub-basin. The report generated a hydraulic stormwater model of Lake Sylvan, Yankee Lake, and the Yankee Lake outfall which documented stages of the lakes for flood events. Based on results documented in the report, the stage for the 100 year / 24 hour storm was found to be 42.2 feet NAVD for Lake Sylvan. The preliminary evaluation of the proposed improvements traversing the floodplain indicates no impact to the Lake Sylvan floodplain.

### 6.3.8 Basin CC

Basin CC has three (3) pond alternatives which were considered: CC, CC Alt 1, and CC Alt 2. The preferred alternative is pond CC, which is contained on one (1) parcel which will also be impacted from the proposed roadway alignment. Due to the topography of the existing terrain, the western CC basin limit was terminated behind the sidewalk on the west side of the north south portion of the proposed Orange Ave. The eastern limit of the basin is terminated at the existing intersection of Wayside Drive and Orange Boulevard.

The SCS method has been used to determine the required pond size for the basin. It should be noted that for contingency purposes, conservative estimates were used to determine the feasibility of a pond at this location and approximate size based on preliminary data and engineering judgment. Design level geotechnical data used to determine permeability rates was not available at the time of the report development; therefore a conservative separation of two feet above the highest estimated seasonal high water table was used to establish a pond bottom. Final pond configurations shall be determined during design when sufficient design level data is available.

#### **6.3.8.1 Pond CC**

Pond CC is a proposed dry retention system that will provide stormwater treatment and attenuation for basin CC. The pond is located south of State Road 429 at approximately station 1090+00. The pond site is proposed on one (1) offsite property: parcel 25-19-29-300-0160-0000. Preliminary geotechnical data for the pond site indicates a rather deep estimated seasonal high groundwater table with depths of eight (8) to twelve (12) feet below existing ground and predominantly type A soils. The topography of the site is a rolling terrain on the southern portion of the property with elevation differences across the site of up to five (5) feet and a flat terrain on the northern portion of the property. Pond CC is sized as a dry retention facility maximized within the available open space of the existing parcel to facilitate stormwater storage, recovery, and embankment requirements for the project. The use of the proposed pond CC site will facilitate the most cost effective profile for the proposed roadway alignment of Orange Avenue. The outfall for Pond CC shall include a closed drainage system within the proposed FDOT right-of-way to the existing outfall which will discharge through existing wetlands within the Sylvan Lakes subdivision directly into Lake Sylvan.

#### **6.3.8.2 Pond CC Alt 1**

Pond CC Alt 1 is a proposed dry retention system that will provide stormwater treatment and attenuation for basin CC. The pond is located south of State Road 429 at approximately station 1095+00. The pond site is proposed on one (1) offsite property: parcel 25-19-29-300-0170-0000. Preliminary geotechnical data for the SR 429 alignment in the vicinity of pond CC Alt 1 indicate an estimated seasonal high groundwater depth of approximately eight (8) feet below existing ground. The topography of the site is a flat terrain with elevations differences across the site of one (1) foot. Pond CC Alt 1 is sized as a dry retention facility maximized within the available open space of the existing parcel to facilitate stormwater storage, recovery, and embankment requirements for the project. Based on evaluation of the data available, use of the pond CC Alt 1 site would require elevating portions of the proposed Orange Avenue alignment to facilitate a closed drainage system and dry pond. The outfall for Pond CC Alt 1 shall include a closed drainage system within the proposed FDOT right-of-way to the existing outfall which will discharge through existing wetlands within the Sylvan Lakes subdivision directly into Lake Sylvan.

#### **6.3.8.3 Pond CC Alt 2**

Pond CC Alt 2 is a proposed dry retention system that will provide stormwater treatment and attenuation for basin CC. The pond is located south of State Road 429 at approximately station 1102+00. The pond site is proposed on one (1) offsite property: parcel 25-19-29-300-0120-0000. Preliminary geotechnical data for the SR 429 alignment in the vicinity of pond CC Alt 2 indicate an estimated seasonal high groundwater depth of approximately four (4) feet below existing ground. The topography of the site is a flat terrain with elevations differences across the site of one (1) foot. Pond CC Alt 2 is sized as a dry retention facility maximized within the available open space of the existing parcel to facilitate stormwater storage, recovery, and embankment requirements for the project. Based on evaluation of the data available, use of the pond CC Alt 2 site would require elevating portions of the proposed Orange Avenue alignment to facilitate a closed drainage system and dry pond. The outfall for Pond CC Alt 2 shall include a closed drainage system within the proposed FDOT right-of-way to the existing outfall which will discharge through existing wetlands within the Sylvan Lakes subdivision directly into Lake Sylvan.

**SECTION 7: CONCLUSION**

Alternative pond sites have been identified along the project corridor. The evaluation provides estimates for right-of-way needs implementing a volumetric analysis that accounts for the water quantity and quality requirements set forth by FDOT, SJRWMD, and FDEP for the project area. The right-of-way cost estimate provided in this report is a budget tool used by the FDOT to estimate total acquisition costs for the properties associated with each stormwater management facility and to budget the appropriate funds for acquisition. Please be aware right-of-way cost estimates are not real estate appraisals and do not reflect market value. The FDOT uses appraisals that comply with the Uniform Standards of Professional Appraisal Practice (USPAP) for acquisition purposes.

The preliminary calculations used to support the recommendations are included in **Appendix 3**. The graphical representation of the pond alternatives and the roadway alignment is provided in **Appendix 1, Figure 6, Pond Siting Layout**. Please note that the recommendations are based preliminary data and calculations, reasonable engineering judgment, and assumptions. The pond sizes and locations are subject to change during final design when detailed data becomes available for the permeability rates of the soils, estimated seasonal high water elevations, and final roadway profiles. Please refer to **Table 7 for the Summary of Stormwater Management Facility Recommendations**.

**Table 7 – Summary of Stormwater Management Facility Recommendations**

Basin Name	Preferred Pond	Approximate Location (CL Const. SR 429)	Pond Bottom Elevation	Inside Berm Elevation	Design High Water Elevation	Minimum Gutter Elevation	Outfall
WR1	WR1	935+00, LT	34.00	38.00	35.32	39.42	Wekiva River
WR2	WR2	955+00, LT	41.50	55.00	44.07	47.00	Wekiva River
YL1	YL1	1010+00, RT	41.00	45.50	43.60	46.29	Yankee Lake
YL2	YL2	1035+00, LT	40.00	45.00	42.25	46.78	Yankee Lake
LS	LS	1063+00, LT	45.00	50.50	45.89	49.36	Lake Sylvan
CC	CC	1090+00, RT	59.00	63.00	60.41	63.80	Lake Sylvan