SR 400 (I-4) Project Development and Environment (PD&E) Study

FM No.: 432100-1-22-01

Pond Siting Report

Segment 3: State Road 400 (SR 400)/Interstate 4 (I-4) from One Mile East of SR 434 to East of SR 15-600/US 17-92

Seminole County (77160), Florida

November 2016

HNTB Corporation
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Professional Engineer Certificate

I hereby certify that I am a registered professional engineer in the State of Florida practicing with HNTB Corporation, Inc., a corporation authorized to operate as an engineering business, EB#6500, by the State of Florida, Department of Professional Regulation, Board of Professional Engineers, and that I have reviewed or approved the evaluation, findings, opinions, conclusions, or technical advice hereby reported for SR 400 (I-4) Project Development and Environment Study for the Florida Department of Transportation in Seminole County, Florida.

This Pond Siting Report (PSR) includes a summary of data collection efforts, calculations, and an overall drainage review prepared for the conceptual analyses for the SR 400 (I-4) widening and extension from one mile east of SR 434 to east of SR 15-600/US 17-92 in Seminole County.

I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation engineering and planning as applied through professional judgments and experience. This document is for planning purposes only and is not to replace any effort required for final design.

SIGNATURE: _____

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DATE: **November 2016**

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Executive Summary

The Florida Department of Transportation (FDOT) is conducting an update/reevaluation of the Project Development and Environment (PD&E) studies for the extension of proposed express lanes for State Road 400 (SR 400)/Interstate 4 (I-4). The project limits extend from one mile east SR 434 (Milepost 4.050) to east of SR 15/600-US 17/92 (Milepost 14.135) in Seminole County, Florida. The project is located within Sections 29, 31 and 32 of Township 19 South, Range 30 East; Sections 6 and 7 of Township 20 South, Range 30 East; and Sections 12, 13, 24, 25, 26, and 35 of Township 20 South, Range 29 East and is approximately ten (10) miles long. The project datum is NAVD 88.

The purpose of this preliminary engineering report is to document design changes in support of the PD&E update for the I-4 BtU Segment 3 portion of the FEIS for I-4 from SR 528 (Beachline Expressway) to SR 472 (FPN 242486-1, 242592-1 and 242703-1, August 2002, Record of Decision pending). This update includes environmental and engineering analysis of the original design concept, which showed six general use lanes (GULs) and two high occupancy vehicles (HOV) lanes (6+2), to the current proposed design, which includes six GULs and four express lanes (EL) operating under a variable price toll plan (6+4). Other changes being reanalyzed include stormwater management, access plan and interchange configurations. The proposed right-of way width is 300 feet minimum.

The project has been divided into twenty-two (22) drainage basins, which require twenty-seven (27) pond sites and one (1) swale for the treatment and attenuation of project runoff. Thirty (30) potential pond sites and one (1) swale were evaluated. It is the intent of this report to suggest and evaluate, in detail, potential pond sites for this purpose in order to ultimately determine the most advantageous location for each pond. The following tables list the recommended pond alternatives.

Table 1 - Summary of Recommended Pond Sites

Basin Designation	Recommended Alternative
*HH	*Pond HH
*II	*Pond II
300	Pond 300
301	Pond 301
302	Pond 302
303	Pond 303-A2 & 303-B2
304	Pond 304
305	Pond 305 & 305A
306	Pond 306
307	Pond 307
308	Pond 308
309	Ponds 309
310	Pond 310
311	Pond 311
312	Ponds 312
313	Ponds 313 & 313A
313A	Swale 313A
314	Pond 314
315	Pond 315
316	Pond 316
317	Ponds 317A, 317B & 317C
318	Ponds 318A & 318B

*Existing basins and corresponding pond sites; SJRWMD Permit No. 4-117-22434-3.

Table 2 - Summary of Recommended FPC Pond Sites

Basin Designation	Recommended Alternative
FPC 300	FPC 300-A

Table 3 - Summary of Existing Pond Names and Associated Projects*

Basin Name	Pond Alternative Name	Section 2 FEIS PD&E Stormwater Facilities	Existing Stormwater Facilities	Reason For New Alternative
HH	HH	HH-3	Pond HH (SR 400(I-4), FPID No. 242592-3-32-01)	-
II	II	HH-2	Pond II (SR 400(I-4), FPID No. 242592-3-32-01)	-
300	Pond 300	Pond II-1-A	Pond E (I-4 Widening from SR 434 to Lake Mary Blvd, FPID No. 77160-3601)	Modified and enlarged alternative due to proposed alignment.
301	Pond 301	Pond JJ-1	Pond F (I-4 Widening from SR 434 to Lake Mary Blvd, FPID No. 77160-3601)	Enlarged alternative.

Basin Name	Pond Alternative Name	Section 2 FEIS PD&E Stormwater Facilities	Existing Stormwater Facilities	Reason For New Alternative
302	Pond 302	Pond KK-2	Pond G (I-4 Widening from SR 434 to Lake Mary Blvd, FPID No. 77160-3601)	Enlarged alternative.
303	Pond 303-A1	Pond LL-2	Pond I (I-4 Widening from SR 434 to Lake Mary Blvd, FPID No. 77160-3601)	Enlarged alternative due to proposed alignment.
303	Pond 303-A2	Pond LL-2	Pond I (I-4 Widening from SR 434 to Lake Mary Blvd, FPID No. 77160-3601)	Regraded pond.
303	Pond 303-B2	Pond LL-1	–	–
304	Pond 304	Pond MM-2	Pond J (I-4 Widening from SR 434 to Lake Mary Blvd, FPID No. 77160-3601)	Regraded pond.
305	Pond 305	Shown as Designed By Others	Pond 1-SE (I-4 Widening from West of Lake Mary Blvd to West of SR 15, FPID No. 242598-1-52-01)	Modified pond due to proposed alignment.
305	Pond 305A	–	–	To accommodate proposed ramp alignment.
306	Pond 306	Shown as Designed By Others	Pond 1-NW (I-4 Widening from West of Lake Mary Blvd to West of SR 15, FPID No. 242598-1-52-01)	Modified pond due to proposed alignment.
307	Pond 307	Shown as Designed By Others	Pond 2 (I-4 Widening from West of Lake Mary Blvd to West of SR 15, FPID No. 242598-1-52-01)	–
308	Pond 308	Shown as Designed By Others	Pond 3 (I-4 Widening from West of Lake Mary Blvd to West of SR 15, FPID No. 242598-1-52-01)	Modified and enlarged alternative due to proposed alignment.
309	Ponds 309	Shown as Designed By Others	Ponds A and A1 (I-4/CR 46A Interchange, FPID No. 77160-3436)	–
310	Pond 310	Shown as Designed By Others	Pond B (I-4/CR 46A Interchange, FPID No. 77160-3436)	–
311	Pond 311	Shown as Designed By Others	Pond C (I-4/CR 46A Interchange, FPID No. 77160-3436)	–
312	Pond 312	Shown as Designed By Others	Pond 13 (I-4/SR 46 Ramp Improvements Project, FPID No. 407573-1-52-01)	–
313	Ponds 313 & 313A	–	Ponds 1 and 1A (I-4/SR 46 Ramp Improvements Project, FPID No. 407573-1-52-01)	Modified existing ponds.
313A	Swale 313A	–	–	New alternative
314	Pond 314	Shown as Designed By Others	Pond 4-I (I-4 Widening from West of Lake Mary Blvd to West of SR 15/600, FPID No. 242598-1-52-01)	–
315	Pond 315	Shown as Designed By Others	Pond 4-II (I-4 Widening from West of Lake Mary Blvd to West of SR	–

Basin Name	Pond Alternative Name	Section 2 FEIS PD&E Stormwater Facilities	Existing Stormwater Facilities	Reason For New Alternative
			15/600, FPID No. 242598-1-52-01)	
316	Pond 316	Shown as Designed By Others	Pond 5 (I-4 Widening from West of Lake Mary Blvd to West of SR 15/600, FPID No. 242598-1-52-01)	–
317	Ponds 317A & 317C	Pond QQ-3 & Pond QQ-5	Ponds QQ-3 & Pond QQ-5 (I-4 St. Johns River Bridge Replacement and Six-Laning, FPID No. 242702-1-52-01)	Expanded existing Pond QQ-3 and reduced existing Pond QQ-5 due to proposed alignment.
317	Pond 317B	–	Pond I (I-4 Exit Ramp B1 Construction and Realignment of CR 15, FPID No. 242702-2-32-01)	–
318	Pond 318A	–	Pond 4 (County road 15 SR 46 to Orange Boulevard, Seminole County P.S. 537)	Modified pond due to proposed alignment.
318	Pond 318B	–	–	To accommodate proposed alignment.
FPC 300	FPC 300-A	Pond CP-1	–	–
FPC 300	FPC 300-B	–	–	New alternative.

*Existing ponds were renamed for naming consistency with the proposed basins – Table 3 depicts these changes.

1.0 Introduction

The proposed improvements to I-4 include widening the existing six-lane divided urban interstate to a 10- or 12-lane divided highway in order to improve traffic operations, enhance connectivity and improve mobility by providing travel choices to the motoring public. I-4 is an east-west limited access freeway which links the west and east coasts of Florida, from I-275 in Tampa to I-95 in Daytona Beach. I-4 spans across six counties in Central Florida, traversing many cities including Lakeland, Orlando, Altamonte Springs, Sanford and DeLand. I-4 is a critical component of Florida's Strategic Intermodal System (SIS) which links seaports, rail, airports and other intermodal facilities. This aspect of I-4's significance is evidenced through connectivity provided by major junctions with I-275 and I-75 in the Tampa Bay area, SR 429 (Daniel Webster Western Beltway), SR 417 (Southern Connector/Central Florida Greeneway/Seminole Expressway), SR 528 (Martin Andersen Beachline Expressway), SR 91 (Florida's Turnpike), SR 408 (Spessard Lindsay Holland East-West Expressway) in Central Florida and I-95 on the east coast.

I-4 serves as the primary corridor in the movement of people and freight between major population, employment and activity centers in the Central Florida region. When the entire Interstate was fully opened in the early 1960's, it was designed to serve intrastate and interstate travel by providing a critical link between the east and west coasts of Central Florida. Although this role continues to be a crucial transportation function of I-4, the highway also serves large volumes of local and commuter traffic with shorter trip distances. Today, the highway serves as the primary link between hotel/resort complexes and tourist attractions such as Walt Disney World, Universal Studios, Sea World, the International Drive Resort Area and downtown Orlando. Since I-4 is the only north-south limited access facility that is centrally located between the predominant employment centers and the major suburbs to the north, it has become the primary commuting corridor in the Central Florida metropolitan area.

Growth in Central Florida over the past decades has made it difficult for the transportation system to accommodate travel demand. Additionally, traffic congestion and crash incidents have resulted in major delays on the Interstate as well as other arterials surrounding the corridor. Increased congestion levels are experienced outside of the typical morning and afternoon rush-hour periods, affecting mobility levels for more hours of the day and impacting other non-commuter/non-weekday travel. The congestion on I-4 is further evidenced by the less than desirable levels of service on the Interstate as well as the crossroads.

Projections of future population and employment in the region indicate that travel demand will continue to increase well into the future. The ability to accommodate the new travel patterns resulting from growth must be provided to sustain the region's economy. Without the improvements, extremely congested conditions are expected to occur for extended periods of time in both the morning and evening peak periods. Due to these congested conditions, user travel times will continue to increase, the movement of goods through the urban area will be slower, and the deliveries of goods within the urban area will be forced to other times throughout the day. The need for improvements to I-4 is illustrated by the important transportation roles I-4 serves to the Central Florida region and the State of Florida. If no improvements are made to the Interstate, a loss in mobility for the area's residents, visitors and commuters can be expected, resulting in a severe threat to the continued viability of the economy and the quality of life.

This PD&E update involves revising the original design concept showing 6 GULs + 2 HOV lanes, as recommended in the FEIS for I-4 from SR 528 to SR 472 (FPN No. 242486, 242592 & 242703, August 2002, Record of Decision Pending), to the current proposed design of 6 GUL + 4 EL. The express lanes are tolled lanes and will extend the full length of the project. The access to/from the tolled lanes will be evaluated as part of this effort to determine if changes are needed from the previously approved concept for access to/from the HOV Lanes. The original I-4 PD&E Studies involved physical separation between the general use lanes and the HOV lanes on I-4, with demand management in the HOV lanes. The original demand management strategy was to control the use of the lanes by requiring a minimum number of occupants per vehicle to maintain an acceptable level of service (Level of Service D).

This update also addresses revising the demand management tool to convert the HOV lanes to tolled express lanes. The express lanes will be separated from the general use travel lanes by two shoulders with a barrier wall between the shoulders. A variable pricing tolling plan is proposed for the express lanes. The tolls will vary by time of day and day of week to maintain acceptable levels of service in the express lanes. The tolls will be collected electronically through existing E-Pass, SunPass and other systems currently in place in the Central Florida area. The conversion to express lanes will maintain the same right of way limits as documented previously and will not change the impacts to the social, natural or physical environment. An update to the Systems Access Modification Report (SAMR) prepared in January 2013 is being completed in conjunction with this effort.

2.0 Project Description

FDOT is proposing to reconstruct and widen I-4 as part of the I-4 BtU concept. This involves the build-out of I-4 to its ultimate condition through Central Florida, including segments in Polk, Osceola, Orange, Seminole and Volusia Counties. The project limits for the segment analyzed in this report are within an approximate 10-mile segment of I-4 which extends from east of SR 434 (Milepost 4.050) to east of US 17-92 (Milepost 14.135) in Seminole County, Florida. It is the intent of this report to suggest and evaluate, in detail, potential pond sites for this purpose in order to ultimately determine the most advantageous location for each pond.

The concept design proposes the addition of two new express lanes in each direction, resulting in a total of ten dedicated lanes for the majority of the I-4 Segment 3 corridor [6 general use lanes (GUL) + 4 express lanes (EL)]. The section of I-4 from the begin project limits to just south of Lake Mary Boulevard will have three GUL and one auxiliary lane in each direction, resulting in a 12-lane section (6 GUL + 2 Aux + 4 EL) through this portion of the corridor. Although, the interstate is a designated east-west corridor, the alignment follows a southwest to northeast orientation through the limits of Segment 3. The study area in this section from east of SR 434 to east of US 17-92 includes the interchanges at Lake Mary Boulevard, CR 46A, SR 417 (Seminole Expressway)/SR 429 (future Wekiva Parkway), SR 46 and US 17-92.

The project is located within Sections 29, 31 and 32 of Township 19 South, Range 30 East; Sections 6 and 7 of Township 20 South, Range 30 East; and Sections 12, 13, 24, 25, 26, and35 of Township 20 South, Range 29 East. The project limits are within an approximate ten (10) mile segment of I-4 which extends from 1 mile east of SR 434 (Milepost 4.050) to east of SR 15/600-US 17/92 (Milepost 14.135) in Seminole County, Florida and provides for the required stormwater treatment with a minimum of twenty-seven (27) recommended pond sites and one (1) treatment swale along the corridor as shown in Figure 1. The project datum is NAVD 88. A reproduction of the USGS quadrangle map for the project vicinity is shown in Figure 2.

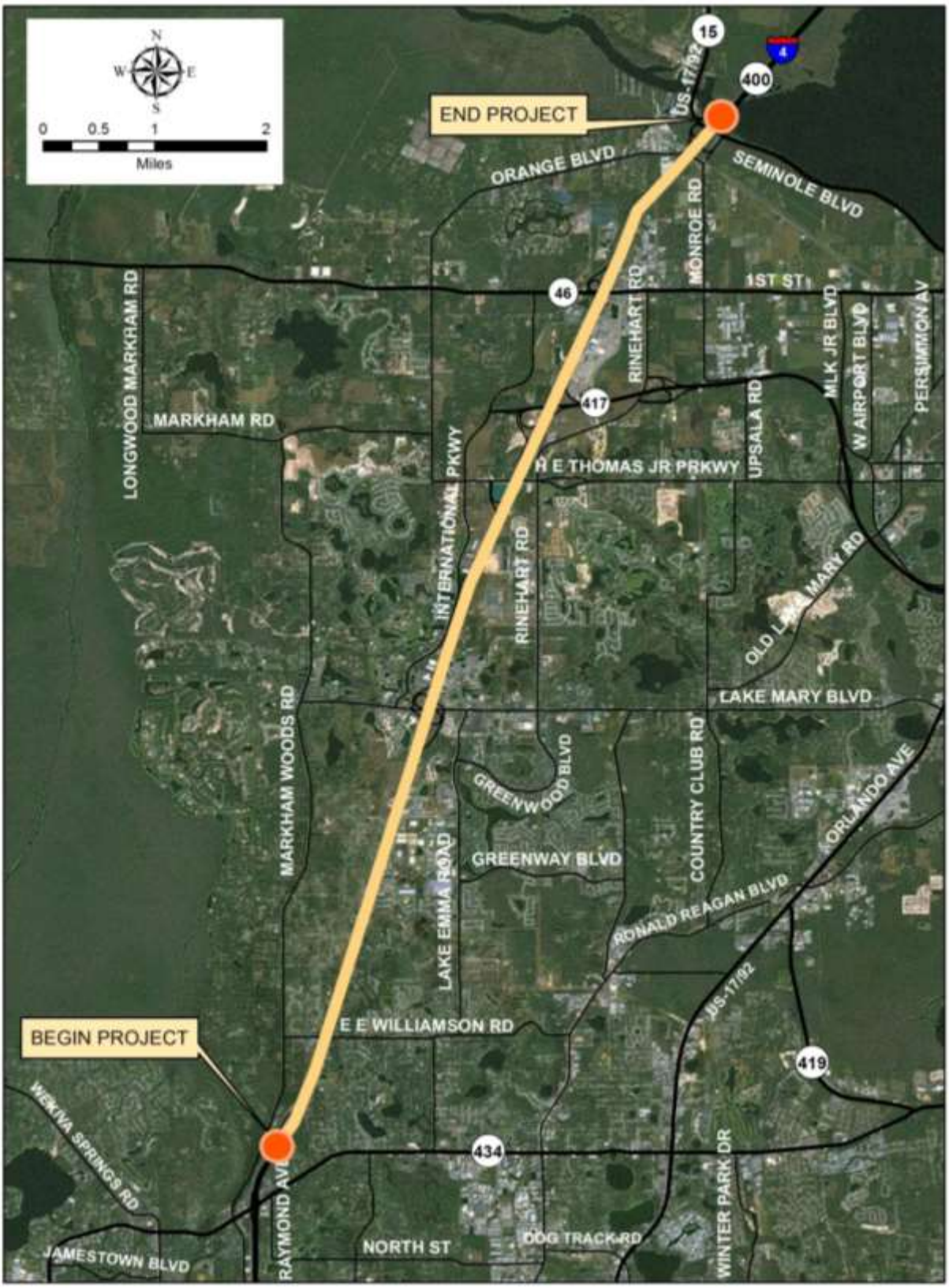


Figure 1 – Project Location Map

Figure 2 – USGS Quadrangle Map

3.0 Design Criteria

The design of stormwater management facilities for this project is governed by the rules and criteria set forth by the St. Johns River Water Management District (SJRWMD) and the FDOT. These criteria were drawn from the 2010 SJRWMD Applicant's Handbook: Management and Storage of Surface Waters (MSSW) and Applicant's Handbook: Regulation of Stormwater Management Systems (RSMS), March 2010 FDEP Stormwater Quality Applicant's Handbook (SQAH) and the 2014 FDOT Drainage Manual.

Water Quality and Pond Recovery

- Wet detention
  - Treatment – Greater of 1" over the basin or 2.5" over impervious area (RSMS, Section 14.2)
  - Recovery – One-half the treatment volume within 24 to 30 hours (RSMS, Section 14.3)
- Dry retention (on-line)
  - Treatment – Greater of 1" over the basin or 1.25" over impervious area +0.5" over total area (RSMS, Section 11.2)
  - Recovery – Treatment volume within 72 hours (RSMS, Section 11.3)
- Wekiva Recharge Area: Greater of 1" over the basin or 3" over impervious area (MSSW, Section 11.3.1)
- Wekiva River Hydrologic Basin - Outstanding Florida Water (OFW): Treat an additional fifty percent of the runoff volume (RSMS, Sections 14.13 and 11.2)
- Nutrient Load Reduction – The required level of TP load reduction is whichever is the least: 85% or post = pre (SQAH, Section 3.1)

Water Quantity

- Open Basin – Limits the post-development peak discharge rate to the pre-development peak discharge rate for the 25-year / 24-hour storm event and the mean annual storm events. (RSMS, Section 9.8.2)
- Closed Basin (with an outfall) – Limits the post-development discharge volume to the pre-development discharge volume for the 25-year / 96-hour storm event. (MSSW, Section 10.4.2) The pond must also be sized to limit the post-development peak discharge volume to the pre-development discharge volume for the 100-year / 10-day storm event. (FDOT, Section 5.3.1.3)
- Closed Basin (without an outfall) – The pond must be sized to hold the entire runoff from the post-development condition for the 100-year / 10-day storm event. (FDOT, Section 5.3.1.3)

Pond Design (FDOT, Section 5.3.4.2)

- Ponds shall be designed to provide a minimum 20-foot of horizontal clearance between the top edge of the normal pool elevation and the right-of-way line. Maintenance berm shall be at least 15-feet with a slope of 1:8 or flatter.
- Corners of ponds shall be rounded to provide an acceptable turning radius for maintenance equipment (30-foot minimum inside radius).
- At least 1-foot of freeboard is required above the maximum design stage of the pond below the front of the maintenance berm.

4.0 Existing Drainage Conditions

4.1 Land Uses

The existing land uses for the project area and the pond alternatives are residential, retail/office, industrial, institutional, public/semi-public, vacant nonresidential and vacant residential. Future land uses include commercial, industrial, high density residential, institutional, low density residential, medium density residential, mixed use, office and planned development. The widening of SR 400 (I-4) does not alter the existing or future land uses in the area. The existing land uses are shown in Figure 3 and the future land uses are shown in Figure 4.

4.2 Soil Conditions

The Soil Survey of Seminole County, Florida (1990), published by the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) has been reviewed for the project vicinity. There are nineteen (19) mapped soil types located in the project area. Table 4 lists these soil types and their hydraulic properties. The soil survey map for the project is illustrated in Figure 5.

Table 4 - NRCS Soil Survey Information

Soil Type	Hydrologic Soil Group
Adamsville-Sparr fine sands (2)	A
Arents (3)	A/D
Astatula-Apopka fine sands (6,7,8)	A
Basinger & Delray fine sands (9)	A/D
Basinger, Samsula & Hontoon (10)	A/D
Basinger & Smyrna fine sands (11)	A/D
EauGallie & Immokalee fine sands (13)	A/D
Felda & Manatee mucky fine sands (15)	A/D
Myakka & EauGallie fine sands (20)	A/D
Nittaw Mucky fine sand (21)	C/D
Nittaw, Okeelanta & Basinger (23)	C/D
Pineda fine sand (25)	C/D
Pomello fine sand (28)	A
St. Johns & Eaugallie fine sand (29)	B/D
Tavares-Millhopper fine sands (31)	A
Udorthents (26)	A
Urban Land (34)	N/A

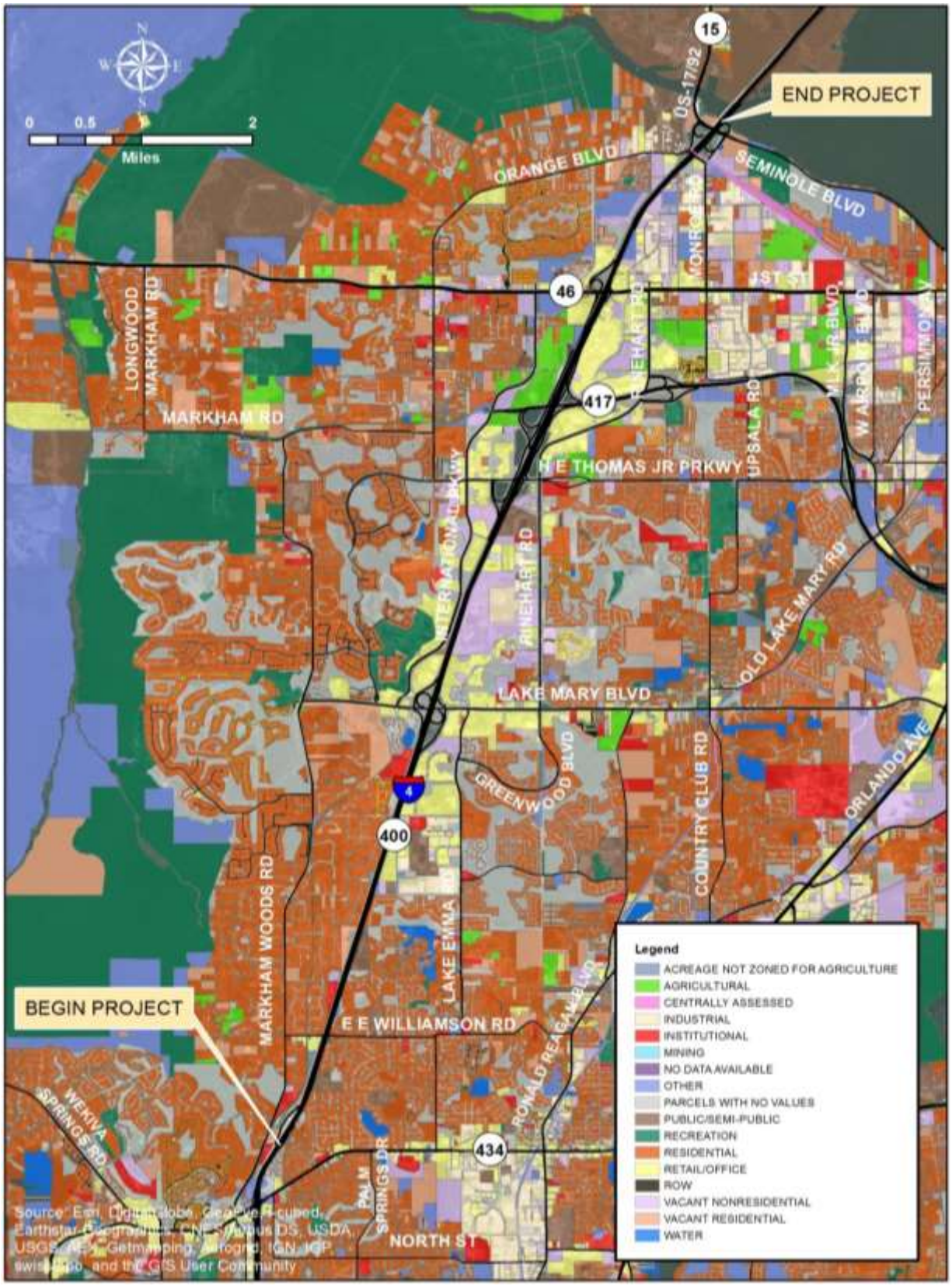


Figure 3 – Existing Land Use Map

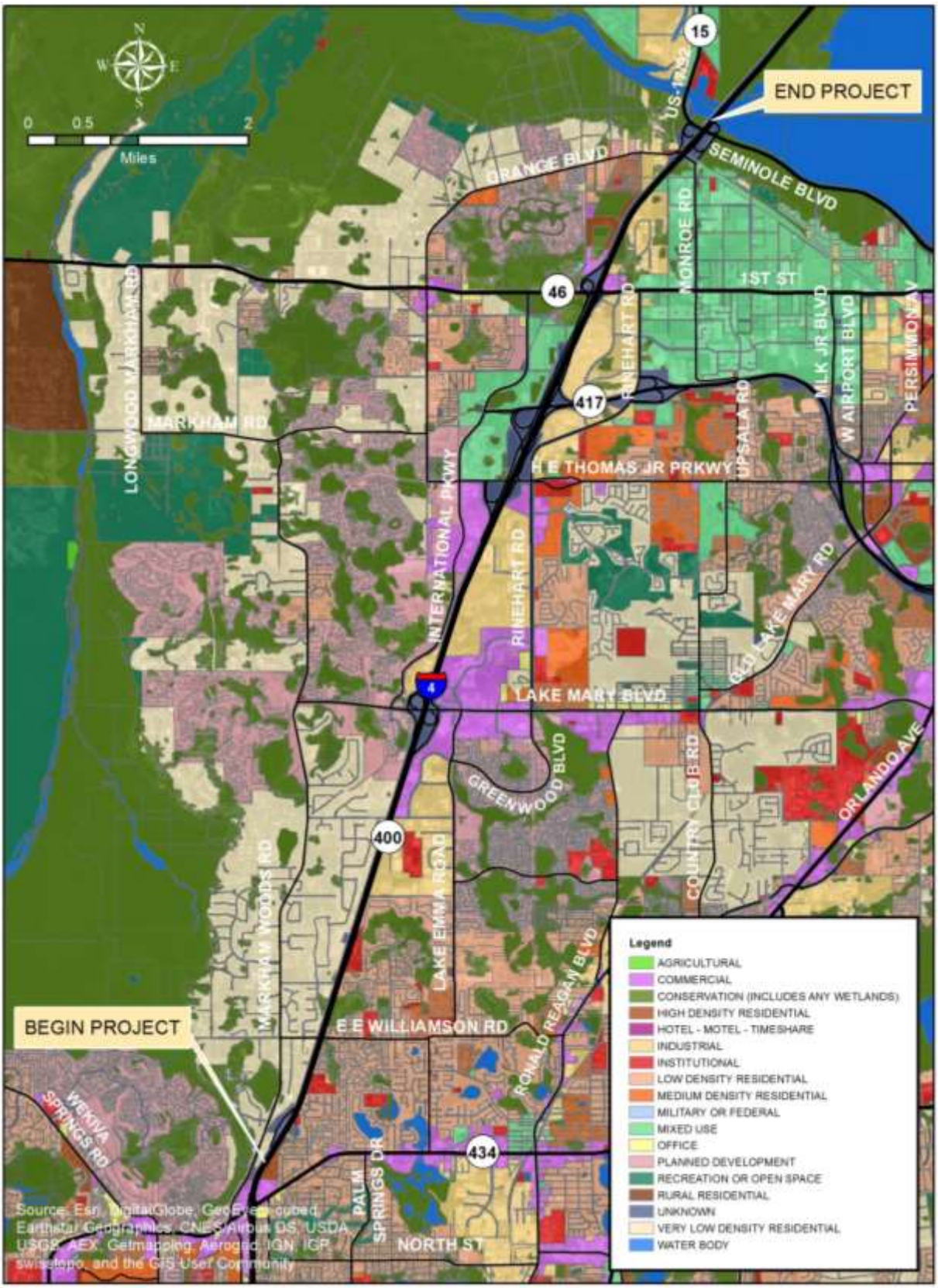


Figure 4 – Future Land Use Map

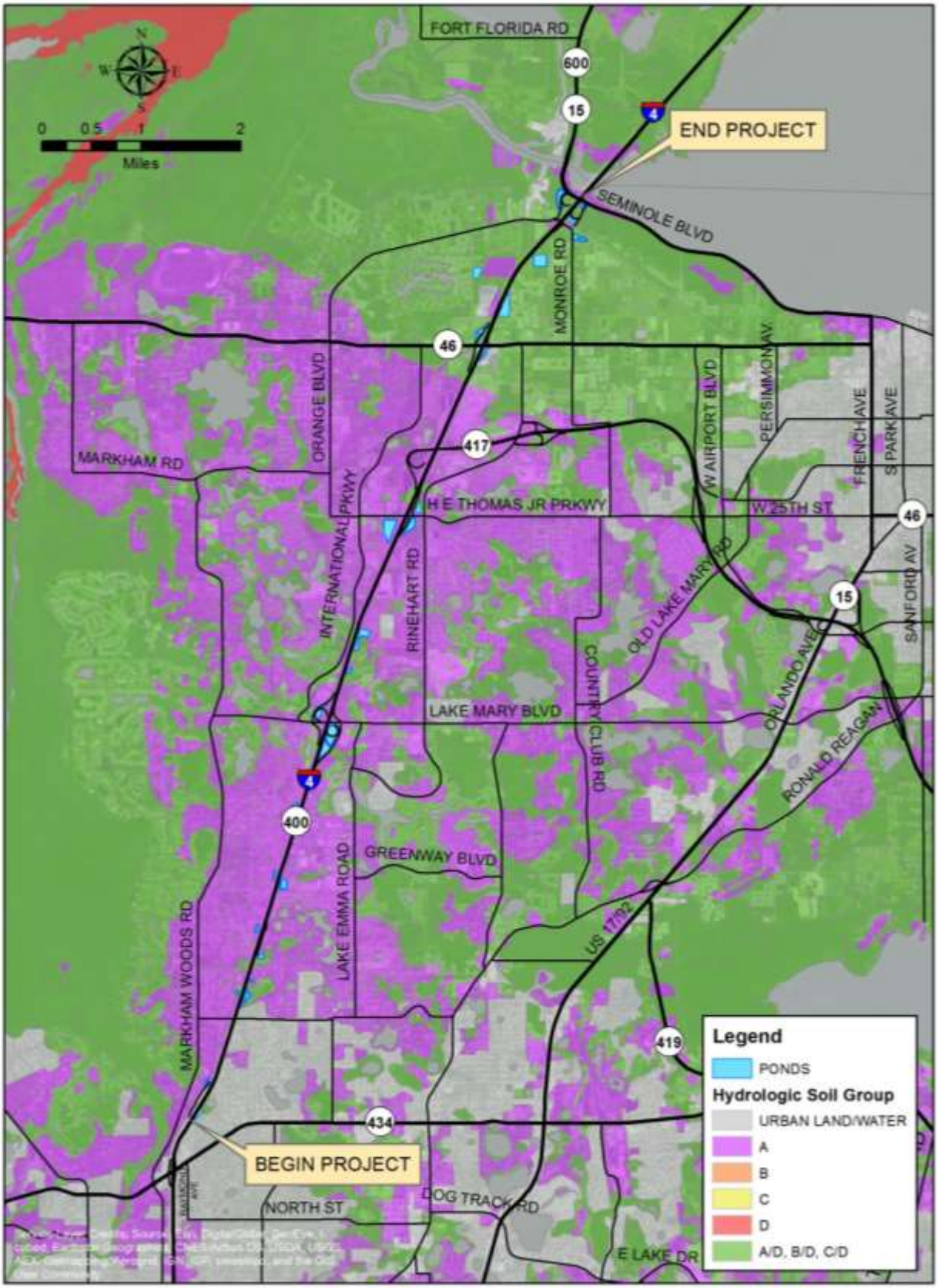


Figure 5 – Soil Survey Map

4.3 Existing Roadway Drainage Systems

The project corridor is located in the St. Johns River Water Management District. The project is separated into twenty-two (22) sub-basins. The basins consist of the pond site and the full right-of-way. Basins HH to 306 are located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The remaining three (3) basins outfall to Lake Monroe, which is a nutrient impaired body of water. A majority of the basins are closed.

4.3.1 Basin HH

Basin HH begins south of the westbound rest area (Richie Green Rest Area) in Longwood at Station 2040+00 and continues north to Station 2061+00. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. A previous SR 400 (I-4) widening project (FPID No. 242592-3-32-01) designed and permitted (Permit No. 4-117-22434-3) in 2009 by Jacobs Engineering proposed widening the existing 6 lanes to a 12 lane roadway. The typical section consisted of 3 general use lanes, 2 special use lanes and 1 auxiliary lane in each direction. The stormwater runoff from the roadway is collected by a series of ditches and inlets that flow to an existing pond: Pond HH. The existing pond is located adjacent to the east side of I-4 at Station 2050+00. The pond soils are classified in Hydrologic Soil Group A/D. The existing pond was designed as a dry retention pond and modified and re-graded to provide treatment and attenuation for the additional runoff generated by the proposed improvements. The pond discharge point was still maintained to the Little Wekiva River, an Outstanding Florida Water (OFW).

4.3.2 Basin II

Basin II begins at the south end of the westbound rest area (Richie Green Rest Area) in Longwood at Station 2050+00, which includes only the westbound general use lanes and continues north to Station 2061+00, at which point includes all travel lanes both east and westbound north to Station 2080+00. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. A previous SR 400 (I-4) widening project (FPID No. 242592-3-32-01) designed and permitted (Permit No. 4-117-22434-3) in 2009 by Jacobs Engineering proposed widening the existing 6 lanes to a 12 lane roadway. The typical section consisted of 3 general use lanes, 2 special use lanes and 1 auxiliary lane in each direction. The stormwater runoff from the roadway is collected by a series of ditches and inlets that flow to an existing pond (Pond II). Pond II consists of three (3) ponds interconnected with equalizer pipes. The existing ponds are located adjacent to the west side of I-4 at Station 2065+00. The pond soils are classified in Hydrologic Soil Group A. The existing ponds were designed as dry retention ponds and modified and re-graded to provide treatment and attenuation for the additional runoff generated by the proposed improvements. The pond discharge point was still maintained to the Little Wekiva River, an Outstanding Florida Water (OFW).

4.3.3 Basin 300

Basin 300 begins north of the westbound rest area in Longwood at Station 2080+00 and continues north to the high point at Station 2128+00. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway that flows towards the right-of-way is collected by roadside swales and discharges east into Grace Lake. The stormwater runoff from

the lanes that flow into the median are collected by a series of ditches and inlets and conveyed to the existing pond (Pond E in Permit No. 22434-1). The existing plans were designed in 1929 NGVD. The existing pond is located within the floodplain of Grace Lake adjacent to the east side of I-4 from Station 2115+00 to 2120+00. The pond soils are classified in Hydrologic Soil Groups A and A/D. The existing pond was designed as a wet detention pond. The seasonal high of the pond was based on the normal water elevation of Grace Lake. The pond was designed such that the runoff enters the south side of the pond and discharges north to Grace Lake. Grace Lake is a land-locked lake.

4.3.4 Basin 301

Basin 301 begins at the high point at Station 2128+00 and continues north to a highpoint at Station 2141+00 at the eastbound rest area. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway that flows towards the right-of-way is collected by roadside swales and discharges into a depressional area located west of the roadway. The stormwater runoff from the lanes that flow into the median are collected by a series of ditches and inlets that flow to the existing pond (Pond F in Permit No. 22434-1). The existing plans were designed in 1929 NGVD. A small section in the gore area at the eastbound rest area also flows into the existing pond. The existing pond is located within the southwest corner of the eastbound rest area from Station 2138+00 to 2140+78. The pond soils are classified in Hydrologic Soil Groups A and A/D. The existing pond was designed as a dry retention pond. The pond was designed such that the runoff enters the north side of the pond and discharges west to the cross drain that flows underneath I-4 to the depressional area. The depressional area receives additional runoff from the residential area to the west. The depressional area at Station 2133+75 is land-locked.

4.3.5 Basin 302

Basin 302 begins at the high point at Station 2141+00 at the eastbound rest area and continues north to a high point north of the eastbound rest area at Station 2162+00. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway that flows towards the right-of-way and the median are collected by a series of ditches and inlets that flow to the existing pond (Pond G in Permit No. 22434-1). The existing plans were designed in 1929 NGVD. A portion of the eastbound rest area also flows into the existing pond. The existing pond is located west of I-4, across from the eastbound rest area from Station 2151+65 to 2155+00. The pond soils are classified in Hydrologic Soil Group A. The existing pond was designed as a dry retention pond. The pond discharges south to a depressional area adjacent to the pond. The depressional area also receives runoff from a large offsite area west of the pond. The depressional area at Station 2150+00 is land-locked.

4.3.6 Basin 303

Basin 303 begins at the high point north of the eastbound rest area at Station 2162+00 and continues north to the high point at Station 2189+00. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway that flows towards the right-of-way and the median are collected by a series of ditches and inlets that flow to the existing pond (Pond I in Permit No. 22434-1). The existing plans were designed in 1929 NGVD. The existing pond is located east of I-4 from Station 2176+00 to 2180+80. The pond soils are classified in Hydrologic Soil Group

A. The existing pond was designed as a dry retention pond. The pond discharges south to an outfall ditch within an FDOT drainage easement that flows to Lake Myrtle. Lake Myrtle is land-locked.

4.3.7 Basin 304

Basin 304 begins at the high point at Station 2189+00 and continues north to Station 2221+00. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway is collected by a roadside ditches and cross drains that flow to the existing pond (Pond J in Permit No. 22434-1). The existing plans were designed in 1929 NGVD. In the current condition, a portion of the eastbound roadway flows to the Lake Mary Boulevard system. The existing pond is located north of Long Pond Road and west of I-4 from Station 2217+50 to 2224+00. The pond soils are classified in Hydrologic Soil Group A. The existing pond was designed as a dry retention pond. The pond is located in a drainage easement and the FDOT has a joint-use agreement with the property owner. The pond discharges north to a depressional area adjacent to the pond. The depressional area also receives runoff from a large offsite area west of the pond. The depressional area at Station 2224+00 is land-locked.

4.3.8 Basin 305

Basin 305 begins at Station 2221+00 and continues north to the high point at Station 2284+00. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway of I-4, Lake Mary Blvd. and the Lake Mary Blvd. ramp is collected by roadside ditches and cross drains that flow to the existing pond (Pond 1-SE in Permit No. 22124-2). The existing plans were designed in 1929 NGVD. The existing pond is located in the southeast quadrant of the I-4/Lake Mary Blvd. Interchange from Station 2248+30 to 2262+40. The pond soils are classified in Hydrologic Soil Groups A and A/D. The existing pond was designed as a dry retention pond and discharges to the Heathrow Development storm water management system, which is an open basin.

4.3.9 Basin 306

Basin 306 begins at Station 2272+52 and continues north to Station 2284+00. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. Basin 306 includes runoff from the off-ramp at Lake Mary Blvd. and the infield portion of the ramp. The stormwater runoff from the roadway is collected by roadside ditches and cross drains that flow to the existing pond (Pond 1-NW in Permit No. 22124-2). This section is located within the Wekiva Recharge Protection Basin. The existing plans were designed in 1929 NGVD. The existing pond is located in the upper northwest quadrant of the I-4/Lake Mary Blvd. Interchange from Station 2274+00 to 2279+50. The pond soils are classified in Hydrologic Soil Group A. The existing pond was designed as a dry retention pond. The pond discharges to the Heathrow Development storm water management system, which is an open basin.

The existing Basin 1-W located in the northwest quadrant of the I-4/Lake Mary Blvd. Interchange along Lake Mary Blvd. Runoff from part of Lake Mary Boulevard and a portion of the internal ramp on the northwest quadrant is included in Basin 1-W. The stormwater runoff from the roadway is collected by storm sewer systems that flow to the existing pond (Pond 1-W in Permit No. 22124-2).

4.3.10 Basin 307

Basin 307 begins at the high point at Station 2284+00 and continues north to Station 2305+00. The stormwater runoff from the roadway is collected by a roadside ditches and cross drains that flow to the existing pond (Pond 2 in Permit No. 22124-2). The existing plans were designed in 1929 NGVD. The existing pond is located north of Lake Mary Blvd. Interchange and east of I-4 from Station 2296+00 to 2300+00. The pond soils are classified in Hydrologic Soil Group A/D. The existing pond was designed as a dry retention pond and is located in a drainage easement so that the property owners can relocate the pond in the future if needed. The pond discharges west through the Primera development property. Basin 307 is located in the Lake Emma basin which is land-locked.

4.3.11 Basin 308

Basin 308 begins at Station 2305+00 and continues north to the high point at Station 2365+00. The stormwater runoff from the roadway is collected by a roadside ditches and cross drains that flow to the existing pond (Pond 3 in Permit No. 22124-2). The existing plans were designed in 1929 NGVD. The existing pond is located east of I-4 from Station 2309+00 to 2319+00. The pond soils are classified in Hydrologic Soil Group A and A/D. The existing pond was designed as a dry retention pond. The pond is located in a drainage easement so that the property owners can relocate the pond in the future if needed. The pond discharges west through the International Parkway storm sewer system. Basin 308 is located within the Lake Emma basin which is land-locked.

4.3.12 Basin 309

Basin 309 begins at Station 2365+00 and continues north to CR 46A at Station 2386+00. The stormwater runoff from the westbound roadway is collected in existing roadside swales and conveyed through a 24-inch RCP culvert that flows to the existing ponds (Ponds A and A1 in Permit No. 22514-1). The existing plans were designed in 1929 NGVD. The existing ponds are located in the southwest quadrant of the I-4 and CR 46A Interchange from Station 2367+50 to 2383+50. Pond 309 was designed as a wet detention pond and Pond 309A was designed as extra dry storage for Pond 309. Pond 309 is directly connected to the storage area (Pond 309A) by a 24-inch RCP at elevation 69’ NGVD. The storage area is capable of storing 3.48 acre-feet of stormwater. The existing pond has a broad crested weir that can overflow into the adjacent basin that goes to Pond 310. The pond soils are classified in Hydrologic Soil Group A. Basin 309 is considered a land-locked basin.

4.3.13 Basin 310

Basin 310 begins at Station 2365+00 and continues north to CR 46A at Station 2385+00. The stormwater runoff from the eastbound roadway is collected in existing roadside swales and inlets that flow to the existing pond (Pond B in Permit No. 22514-1). The existing plans were designed in 1929 NGVD. The existing pond is located in the southeast quadrant of the I-4 and CR 46A Interchange from Station 2376+00 to 2386+00 and was designed as a wet detention pond. Pond 310 is connected to a storage area west of the pond by a 24-inch RCP at elevation 61’ NGVD. The storage area is capable of storing 3.80 acre-feet of stormwater. The existing pond has a broad crested weir that can overflow into the adjacent basin that goes to Pond 311. The pond soils are classified in Hydrologic Soil Groups A and A/D. The pond is located within a land-locked basin.

4.3.14 Basin 311

Basin 311 begins at Station 2385+00 and continues north to Station 2410+00. The stormwater runoff from the eastbound roadway, CR 46A east of I-4 and Rinehart Road is collected by existing roadside swales and inlets that flow to the existing pond (Pond C in Permit No. 22514-1). The stormwater runoff from the westbound roadway flows to the existing pond for SR 417. The existing plans were designed in 1929 NGVD. The existing pond is located in the northeast quadrant of the I-4 and CR 46A Interchange from Station 2389+00 to 2398+00 and was designed as a wet detention pond. The existing pond has a broad crested weir and an outfall control structure that can overflow into the mitigation site/wetlands, north of the pond site. The pond soils are classified in Hydrologic Soil Groups A and A/D. The pond is located within a land-locked basin.

Loch Lehman and the FDOT Borrow pit are existing floodplain compensation ponds located just north of CR 46A within the FDOT right of way. Loch Lehman is located west of I-4 from Station 2392+00 to 2410+00 and the Borrow Pit is located east of I-4 from Station 2397+00 to 2412+00. The overall basin is landlocked and does not have a positive outfall.

4.3.15 Basin 312

The information provided in this basin was extracted from the I-4/SR 46 Ramp Improvements project (FPID No. 407573-1-52-01). Existing Basin 13 (Basin 312) was renamed for the purpose of naming consistency. Basin 312 begins at the bridge over SR 417 and continues north along the I-4 corridor to Station 2455+00. This pond was designed for the current I-4 Ultimate design and has recently been constructed.

4.3.16 Basin 313

Basin 313 begins at SR 46 and continues north for approximately 2,600 feet. This section was originally designed as Design-Bid-Build and permitted (Permit No. 22514-3) to construct ramp improvements at the I-4/SR 46 Interchange (FPID No. 407573-1-52-01). The FDOT later approved this project as a Design-Build Project. The construction was recently completed. The basin consists of the pond sites, the ramp from westbound I-4 to SR 46, an exit ramp from westbound SR 46 to westbound I-4, and the existing realignment of the eastbound SR 46 to westbound I-4. Modifications made to Pond 1 (Permit No. 22514-10) and Pond 1A was added within this basin to accommodate additional impervious area within the project limits. Pond 1A is interconnected with Pond 1. Pond 1 discharges to an existing perimeter ditch west of Ramp D. The existing perimeter ditch ultimately discharges to Lockhart-Smith Canal, which is an open basin due to its direct connection to the St. Johns River. This area was designed for the current I-4 Ultimate design.

4.3.17 Basin 313A

Basin 313A begins at Station 2467+50 and continues north to SR 46. The limits include the eastbound ramp to SR 46 and a small portion of SR 46 from eastbound of I-4. Basin 313A (existing basin SR46E in Permit 22514-11) drains to the Lockhart-Smith Canal with no treatment through a closed storm sewer system on the south side of the road and an open ditch on the north side.

4.3.18 Basin 314

Basin 314 begins at Station 2455+00 and continues north to Station 2519+00. The limits from Station 2484+75 to 2519+00 include only the eastbound roadway of I-4. The existing plans were designed in 1929 NGVD. The stormwater runoff from the roadway is collected by a perimeter ditch that discharges to the existing pond (Pond 4-I in Permit No. 22124-2). Pond 4-I is located adjacent to I-4 eastbound and provides treatment and attenuation for the roadway and for Parcel 105 (Comfort Inn). Pond 4-I was designed as a wet detention pond and discharges directly into the Lockhart-Smith Canal, which is an open basin due to its direct connection to the St. Johns River. The pond soils are classified in Hydrologic Soil Group A/D and C/D.

4.3.19 Basin 315

Basin 315 begins at Station 2484+75 and continues north along the westbound of I-4 to Station 2519+00. The stormwater runoff is collected by inlets and discharges to an existing pond (Pond 4-II in Permit No. 22124-2). The existing plans were designed in 1929 NGVD. Pond 4-II was designed as a wet detention pond and discharges directly into the Lockhart-Smith Canal, which is an open basin due to its direct connection to the St. Johns River. Pond 4-II is located approximately 0.28 miles west of the I-4 corridor. The pond soils are classified in Hydrologic Soil Group A/D.

4.3.20 Basin 316

Basin 316 begins at Station 2519+00 and continues north to a high point at Orange Avenue at Station 2565+00. The stormwater is collected by a series of ditches and inlets that flow to the existing pond (Pond 5, Permit No. 22124-2). Historically, the west portion of the basin drains north under Orange Boulevard, while the east portion flows north by roadside ditches to a point where it merges with Elder Ditch and ultimately discharging to Lake Monroe. The existing plans were designed in 1929 NGVD. Pond 5 was designed as a wet detention pond and ultimately discharges to Lake Monroe, which is a nutrient impaired water body. Pond 5 is located adjacent to I-4 eastbound from Station 2536+00 to Station 2545+00. The pond soils are classified in Hydrologic Soil Group A/D.

4.3.21 Basin 317

Basin 317 begins at Station 2565+00 and continues north to the high point on the bridge at US 17/92 at the St. Johns River at Station 2583+00. The stormwater is collected by a series of ditches and inlets that flow to the existing ponds (Pond QQ-3 & Pond QQ-5 in Permit No. 64105-3 and Pond 1 in Permit No. 64105-1). The existing plans were designed in 1929 NGVD. The existing ponds were designed as wet detention ponds. Pond QQ-3 and Pond QQ-5 are interconnected. Pond 1 was later built with the improvements of Orange Boulevard (CR 15) and the construction of Ramp B1. Pond 1 is connected with Pond QQ-5. Pond QQ-3 discharges into a roadside swale by County Road 15 (CR 15) and Pond QQ-5 discharges to the east and along CR 15 to Lake Monroe. Pond 1 discharges to the wetlands located west of the pond. The basin is within the Elder Creek basin, which is a part of the Lake Monroe Watershed. The pond soils are classified in Hydrologic Soil Groups A/D, B/D and C/D.

4.3.22 Basin 318

Basin 318 begins 0.25 miles south of School Street at Station 60+85 and continues north to Orange Boulevard at Station 82+02. Refer to the existing permit in Appendix E for stationing and existing basin limits. Historically, the stormwater was collected by a series of drainage ditch systems that flow to the Elder Creek Basin. During the County Road 15 (CR 15) Improvements project, the roadway was widened from a two-lane rural section to an urban section that provides two 12-foot travel lanes, a center bidirectional 12-foot lane and a 4-foot bike lane in each direction. The existing plans were designed in 1929 NGVD. The storm sewer system was modified to consist of curb inlets that collect runoff from the roadway and is conveyed to the existing pond (Pond 4 in Permit No. 90901-1). Due to hydraulic constraints, five hundred feet of runoff along CR 15 discharges directly to Elder Creek via a 24-inch pipe. Compensation for other untreated areas is provided in the pond. (Refer to existing permit, Appendix E for untreated areas). Pond 4 was designed as a wet detention pond and discharges to Elder Creek, which is part of the Lake Monroe Watershed. The pond soils are classified in Hydrologic Soil Group B/D.

4.4 Floodplains/Floodways

The Federal Emergency Management Agency (FEMA) has developed Flood Insurance Rate Maps (FIRM) for Seminole and Volusia County. According to FEMA Map Numbers 12117C0055F, 12117C0065F, 12117C0135F, and 12117C0155F, portions of the roadway and the existing pond within Basin 300 are located in the 100-year floodplain of Grace Lake. The roadway widening will impact the floodplain on both sides of the roadway. There are minimal impacts to the 100-year floodplain near SR 46. There are no regulatory floodways within the project corridor. The FEMA Flood Insurance Rate Maps for the project is shown in Figure 6.

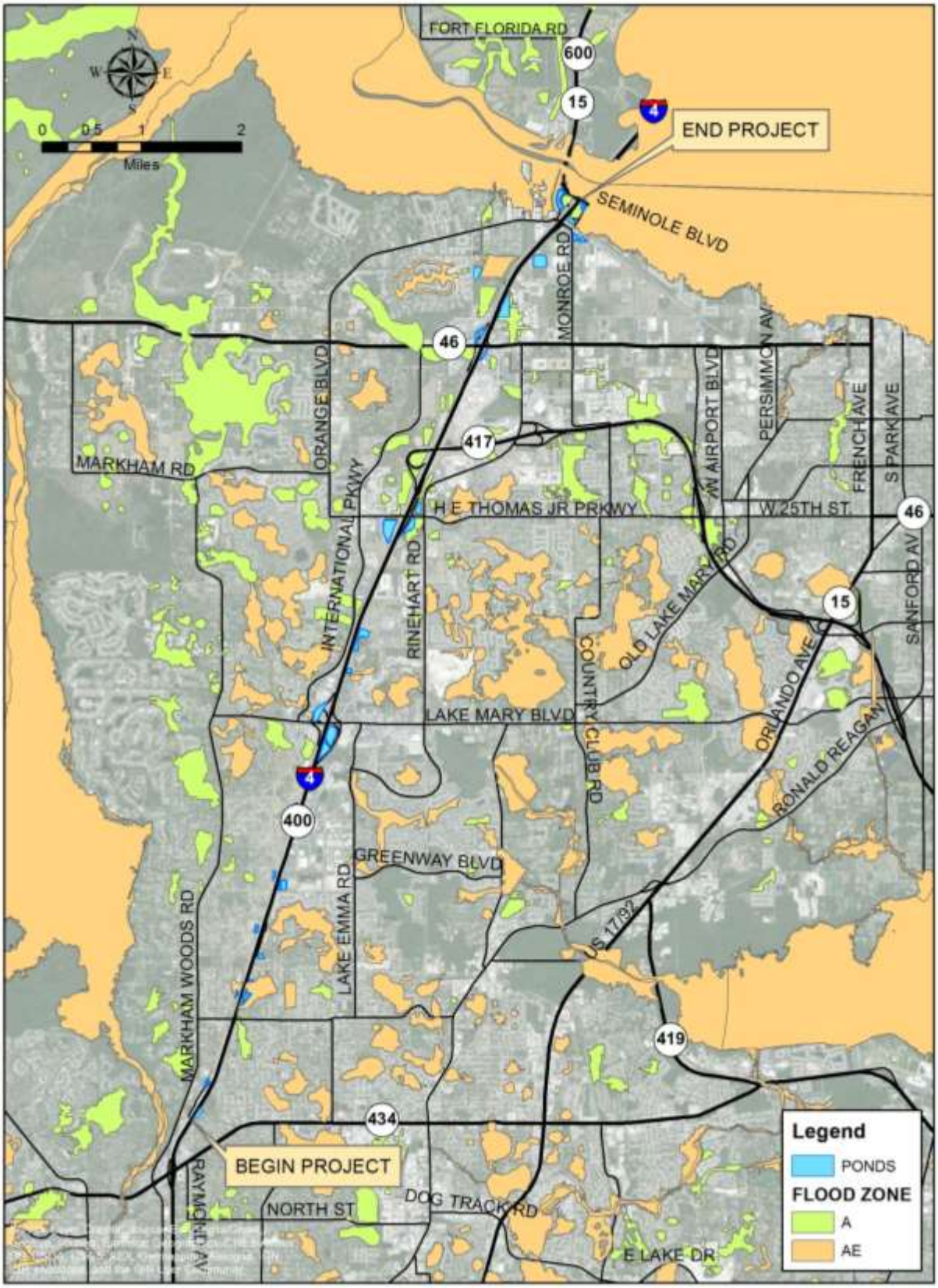


Figure 6 – FEMA Flood Insurance Map

5.0 Proposed Drainage Conditions/Stormwater Ponds

5.1 Overview

This project will make significant improvements to the water quality along the roadway corridor. The stormwater runoff from both the new and existing impervious areas will be treated in existing and proposed stormwater facilities. The stormwater runoff will be collected by storm sewer systems and roadside ditches. The water quality treatment and attenuation will be achieved through the expansion and construction of offsite ponds, some of which will require acquisition of additional right-of-way.

The stormwater will be routed to existing and proposed stormwater ponds. There are a total of twenty-two (22) basins within the project limits. In areas with poor soils and high water table, only wet detention ponds were considered. Ponds were sized based on the assumption that most of the offsite runoff would be drained through separate systems. For a majority of the ponds, the location of where the proposed basins begin and end is the same as the existing condition. The location of the outfall in the proposed condition is the same as the existing. Three (3) basins outfall to a nutrient impaired water body.

The Wekiva Parkway (SR 429) and the I-4/Wekiva Parkway (SR 429) interchange project is currently in the design phase. The existing ponds for I-4 and SR 417 will be redesigned and resized as part of the Wekiva Parkway (SR 429) project by others and will include the current I-4 recommended design.

5.2 Methodology of Pond Determinators

Based on the available information, only the hydraulically feasible and environmentally permittable alternative pond sites are considered. Alternative pond sites are analyzed and evaluated for the following parameters:

- Hydrologic and hydraulic factors such as existing ground elevation, soil types, seasonal high water table (SHWT), stormwater conveyance feasibility, allowable hydraulic grade line (HGL), and basin outfalls.
- Cultural resource impacts
- Environmental resource impacts, including wetlands and threatened or endangered species
- Potential for hazardous materials and contamination
- Floodplain impacts
- Potential for impacts to major utilities
- Estimated right-of-way acquisition cost
- Property owner input (On properties where the property owner requested a meeting).
- Conservation Lands

5.3 Pond Alternatives

5.3.1 Basin HH

Basin HH begins south of the westbound rest area (Richie Green Rest Area) in Longwood at Station 2040+00 and continues north to Station 2061+00. The basin consists of the pond site, the full right-of-way and three (3) offsite areas: Springwood Village subdivision, Lake Acorn subdivision, and Oak Lake subdivision, all located east of I-4. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway will be collected by storm sewer systems that discharge to the existing pond. There is only one alternative for this basin, since the existing pond was designed to provide treatment and attenuation for the additional runoff generated by the proposed improvements. Pond HH is located within the FDOT's existing right-of-way; therefore, no additional right-of-way is required for this pond.

5.3.1.1 Pond HH

Pond HH is an existing pond located adjacent to the east side of I-4 at Station 2050+00. The pond soils are classified in Hydrologic Soil Group A/D. The existing pond was designed as a dry retention pond and modified and re-graded to provide treatment and attenuation for the additional runoff generated by the proposed improvements. The pond will continue to discharge to the Little Wekiva River, an Outstanding Florida Water (OFW).

In the permitted (existing) condition, Basin HH accounts for **9.33** acres of onsite impervious roadway area and an onsite total basin area of **16.92** acres (along I-4) which takes into account the ultimate roadway typical section. The overall basin also includes three (3) offsite areas: Springwood Village subdivision, Lake Acorn subdivision, and Oak Lake subdivision, all located east of I-4. Another area contributing to the overall basin is the Richie Green rest area located next to the westbound travel lanes. The overall basin area is **180.53** acres.

In the proposed condition, Basin HH accounts for **9.30** acres of onsite impervious roadway area and an onsite total basin area of **15.40** acres (along I-4). The offsite areas and the Richie Green rest area are unchanged and will still contribute to the overall basin. The overall basin area is **179.01** acres. **Pond HH is the recommended alternative for this basin.**

5.3.2 Basin II

Basin II begins at the south end of the westbound rest area (Richie Green Rest Area) in Longwood at Station 2050+00, which includes only the westbound general use lanes and continues north to Station 2061+00, at which point includes all travel lanes both east and westbound north to Station 2080+00. The basin consists of the pond site, the full right-of-way and two (2) offsite areas: a wooded area east of I-4 named Sanlando Springs and another wooded area west of the roadway named B 208. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway will be collected by storm sewer systems that discharge to the existing pond. There is only one alternative for this basin, since the existing pond(s) were designed to provide treatment and attenuation for the additional runoff generated by the proposed improvements. Pond II is located within the FDOT's existing right-of-way; therefore, no additional right-of-way is required for this pond.

5.3.2.1 Pond II

Pond II consists of three (3) ponds interconnected with equalizer pipes. The existing ponds are located adjacent to the west side of I-4 at Station 2065+00. The pond soils are classified in Hydrologic Soil Group A. The existing ponds were designed as dry retention ponds to provide

treatment and attenuation for the additional runoff generated by the proposed improvements. The pond will continue to discharge to the Little Wekiva River, an Outstanding Florida Water (OFW).

In the permitted (existing) condition, Basin II accounts for **12.34** acres of onsite impervious roadway area and an onsite total basin area of **27.09** acres (along I-4) which takes into account the ultimate roadway typical section. The overall basin also includes two (2) offsite areas: a wooded area east of I-4 named Sanlando Springs and another wooded area west of the roadway named B 208. Another area contributing to the overall basin is the Richie Green rest area located next to the westbound travel lanes. The overall basin area is **62.97** acres.

In the proposed condition, Basin II accounts for **11.98** acres of onsite impervious roadway area and an onsite total basin area of **19.97** acres (along I-4). The offsite areas and the Richie Green rest area are unchanged and will still contribute to the overall basin. The overall basin area is **55.85** acres. Two active gopher tortoise burrows were observed within this pond site. No relocation of the burrows will be necessary since there are no proposed modifications being made to this pond. For additional information on gopher tortoise impacts, refer to the Endangered Species Biological Assessment (ESBA) provided by Stantec. **Pond II is the recommended alternative for this basin.**

5.3.3 Basin 300

Basin 300 begins north of the westbound rest area in Longwood at Station 2080+00 and continues north to the high point at Station 2128+00. The basin consists of the pond site and the full right-of-way. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway will be collected by storm sewer systems that discharge to the pond. There is only one alternative for this basin, since the existing pond will be expanded for the proposed improvements.

5.3.3.1 Pond 300

Pond 300 is an existing pond (Pond E in Permit No. 22434-1) that will need to be expanded to 4.50 acres. The pond was built under the I-4 Widening from SR 434 to Lake Mary Blvd. project (FPID No. 77160-3601). The existing plans were designed in 1929 NGVD. This pond alternative (Pond II-1-A in Section 2 FEIS) was enlarged and modified due to the proposed alignment. Due to the proximity of the existing pond to the roadway, a large portion of the existing pond will be filled in by the roadway widening. The proposed pond will impact two (2) parcels. Refer to Table 5 for total right-of-way takes. The pond is located within the floodplain of Grace Lake, adjacent to the east side of I-4 from Station 2111+50 to 2121+00. Although the pond berm causes an impact to the floodplain, the area of cut between the existing ground and the design high water will result in the pond providing compensation for the floodplain impacts. The pond soils are classified in Hydrologic Soil Groups A and A/D. The pond will be designed as a wet detention pond. The pond will continue to discharge to Grace Lake; which is land-locked. Since the pond is located in a closed basin, additional treatment volume for OFW criteria is not required. **Pond 300 is the recommended alternative for this basin.**

5.3.4 Basin 301

Basin 301 begins at the high point at Station 2128+00 and continues north to a highpoint at Station 2141+00 at the eastbound rest area. The basin consists of the pond site and the full right-of-way. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway will be collected by storm sewer systems that discharge to the pond. A small section in the gore area at the eastbound rest area will continue to flow into the pond.

There is only one alternative for this basin, since the existing pond will be expanded for the proposed improvements.

5.3.4.1 Pond 301

Pond 301 is an existing pond (Pond F in Permit No. 22434-1) that will need to be expanded in order to accommodate the proposed roadway widening. The pond was built under the I-4 Widening from SR 434 to Lake Mary Blvd. project (FPID No. 77160-3601). This pond alternative was evaluated under Section 2 FEIS as Pond JJ-1. The existing plans were designed in 1929 NGVD. The existing pond will be expanded to 2.03 acres and the maintenance berm will be regraded and reduced to 15-foot. The pond is located within the southeast corner of the eastbound rest area from Station 2138+00 to 2141+00. Additional right-of-way will not be required for the pond expansion. The pond soils are classified in Hydrologic Soil Groups A and A/D. The pond will be designed as a dry retention pond. The pond will continue to discharge west to the cross drain that flows underneath I-4 to the depressional area. The depressional area also receives runoff from the residential area to the west. The depressional area at Station 2133+75 is land-locked. Since the pond is located in a closed basin, additional treatment volume for OFW criteria is not required. Several gopher tortoise burrows were observed on this pond site. The burrows will be relocated prior to site manipulation in the vicinity of the burrow. The pond construction cost located on Table 7, take this cost into account. For additional information on gopher tortoise impacts, refer to the ESBA provided by Stantec. **Pond 301 is the recommended alternative for this basin.**

5.3.5 Basin 302

Basin 302 begins at the high point at Station 2141+00 at the eastbound rest area and continues north to a high point north of the eastbound rest area at Station 2162+00. The basin consists of the pond site and the full right-of-way. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway will be collected by roadside ditches and storm sewer systems that discharge to the pond. There is only one alternative for this basin, since the existing pond will be expanded for the proposed improvements.

5.3.5.1 Pond 302

Pond 302 is an existing pond (Pond G in Permit No. 22434-1) that will need to be expanded in order to accommodate the roadway widening. The pond was built under the I-4 Widening from SR 434 to Lake Mary Blvd. project (FPID No. 77160-3601). This alternative was evaluated under Section 2 FEIS as Pond KK-2. The existing plans were designed in 1929 NGVD. A portion of the eastbound rest area will also continue to flow into the pond. The existing pond will be expanded only to the south in order to avoid impacting the offsite ditches along the north and west sides of the pond site. The existing pond will be expanded to 2.02 acres and the maintenance berm will be regraded and reduced to 15-foot. Additional right-of-way will not be required for the pond expansion. The pond is located west of I-4, across from the eastbound rest area from Station 2150+80 to 2155+00. The pond soils are classified in Hydrologic Soil Group A. The pond will be designed as a dry retention pond. The pond will continue to discharge south to a depressional area adjacent to the pond. The depressional area also receives runoff from a large offsite area west of the pond. The depressional area at Station 2150+00 is land-locked. Since the pond is located in a closed basin, additional treatment volume for OFW criteria is not required. Gopher tortoise burrows were observed on this pond site. The burrows will be relocated prior to site manipulation in the vicinity of the burrow. The pond construction cost located on Table 7, take this cost into account. For additional information on gopher tortoise impacts, refer to the ESBA provided by Stantec. **Pond 302 is the recommended alternative for this basin.**

5.3.6 Basin 303

Basin 303 begins at the high point north of the eastbound rest area at Station 2162+00 and continues north to the high point at Station 2189+00. The basin consists of the pond site and the full right-of-way. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway will be collected by roadside ditches and storm sewer systems that discharge to the pond. There are two alternatives for this basin. Ponds 303-A2 & 303-B2 are the least costly alternative and is the recommended alternative for this basin.

5.3.6.1 Pond 303-A1

The first alternative is Pond 303-A1. Pond 303-A1 is an existing pond (Pond I in Permit No. 22434-1) that will need to be expanded in order to accommodate the roadway widening. The pond was built under the I-4 Widening from SR 434 to Lake Mary Blvd. project (FPID No. 77160-3601). This pond alternative was evaluated under Section 2 FEIS as Pond LL-2. The existing plans were designed in 1929 NGVD. The existing pond would be expanded to 5.42 acres and the maintenance berm will be regraded and reduced to 15-foot. The proposed pond will impact one parcel. Refer to Table 5 for total right-of-way takes. The pond is located east of I-4 from Station 2176+00 to 2182+00. The pond soils are classified in Hydrologic Soil Group A. The pond will be designed as a dry retention pond. The pond discharges south to an outfall ditch within an FDOT drainage easement that flows to Lake Myrtle. Lake Myrtle is land-locked. Since the pond is located in a closed basin, additional treatment volume for OFW criteria is not required. Gopher tortoise burrows were observed on this pond site. The burrows will be relocated prior to site manipulation in the vicinity of the burrow. The pond construction cost located on Table 7 takes this cost into account. For additional information on gopher tortoise impacts, refer to the ESBA provided by Stantec.

5.3.6.2 Ponds 303-A2 and 303-B2

The second alternative consists of two ponds, Ponds 303-A2 and 303-B2. Pond 303-A2 is an existing pond (Pond I in Permit No. 22434-1) where the maintenance berm will be regraded and reduced to 15-foot. The pond was built under the I-4 Widening from SR 434 to Lake Mary Blvd. project (FPID No. 77160-3601). This pond alternative was evaluated under Section 2 FEIS as Pond LL-2. The existing plans were designed in 1929 NGVD. The pond is located east of I-4 from Station 2176+00 to 2181+00. Pond 303-A2 will collect the runoff from the eastbound side of the roadway. Pond 303-B2 is a proposed pond on the west side of the roadway from Station 2180+50 to 2186+00. This pond alternative was evaluated under Section 2 FEIS as Pond LL-1. The pond will collect the runoff form the westbound side of the roadway. Pond 303-B2 will impact one (1) parcel, which has a billboard sign on it. Refer to Table 5 for total right-of-way takes. The pond soils are classified in Hydrologic Soil Group A. The ponds will be designed as dry retention ponds. The ponds will continue to discharge south to an outfall ditch within an FDOT drainage easement that flows to Lake Myrtle. Lake Myrtle is land-locked. Since the ponds are located in a closed basin, additional treatment volume for OFW criteria is not required. Several gopher tortoise burrows were observed on the pond sites. The burrows will be relocated prior to site manipulation in the vicinity of the burrow. The pond construction cost located on Table 7, take this cost into account. For additional information on gopher tortoise impacts, refer to the ESBA provided by Stantec. **Ponds 303-A2 & 303-B2 are the recommended alternative for this basin.**

5.3.7 Basin 304

Basin 304 begins at the high point at Station 2189+00 and continues north to Station 2221+00. The basin consists of the pond site and the full right-of-way. This section is located within the Wekiva Recharge

Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway will be collected by roadside ditches and storm sewer systems that discharge to the pond. There is only one alternative for this basin, since the existing pond will be expanded for the proposed improvements.

5.3.7.1 Pond 304

Pond 304 is an existing pond that needs to be regraded in order to accommodate the roadway widening (Pond J in Permit No. 22434-1). The pond was built under the I-4 Widening from SR 434 to Lake Mary Blvd. project (FPID No. 77160-3601). This pond alternative was evaluated under Section 2 FEIS as Pond MM-2. The existing plans were designed in 1929 NGVD. The outfall control structure may need to be altered in the proposed condition. The pond is located north of Long Pond Road and west of I-4 from Station 2217+50 to 2224+00. The pond soils are classified in Hydrologic Soil Group A. The pond is designed as a dry retention pond, and is located in a drainage easement; the FDOT has a joint-use agreement with the property owner. The pond discharges north to a depressional area adjacent to the pond, which also receives runoff from a large offsite area west of the pond. The depressional area at Station 2224+00 is land-locked. Since the pond is located in a closed basin, additional treatment volume for OFW criteria is not required. Several gopher tortoise burrows were observed on this pond site. The burrows will be relocated prior to site manipulation in the vicinity of the burrow. The pond construction cost located on Table 7, take this cost into account. For additional information on gopher tortoise impacts, refer to the ESBA provided by Stantec. **Pond 304 is the recommended alternative for this basin.**

5.3.8 Basin 305

Basin 305 begins at Station 2221+00 and continues northeast to the high point at Station 2284+00. The basin limits have been modified from the original basin limits to accommodate for the proposed improvements to Lake Mary Boulevard and the I-4 corridor. The basin consists of the pond site and the full right-of-way along the I-4 corridor from Station 2221+00 to Lake Mary Boulevard and from Station 2269+00 to 2284+00, only the eastbound portion is included within this basin. The limits along Lake Mary are from Station 56+33 to 90+60, of which only the south section is included from Station 56+33 to I-4. Approximately 520 feet of the proposed Lake Emma ramp to I-4 will be included within this basin as well. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway will be collected by roadside ditches and storm sewer systems that discharge to the pond. There is only one alternative for this basin, since the existing pond will be modified for the proposed improvements.

5.3.8.1 Pond 305 & Pond 305A

Pond 305 is an existing pond (Pond 1-SE in Permit No. 22124-2) that will need to reconfigured and split into two ponds (Pond 305 & Pond 305A) to accommodate for the proposed improvements of I-4 and Lake Mary Boulevard. The pond was designed and permitted for the Heathrow Southeast Area Master Drainage Plan and I-4 Intersection Drainage (CPH Project No. P0077.00) and was later modified under the I-4 Widening Lake Mary Boulevard to US 17-92 project (FPID No. 242598-1-52-01). Existing plans were designed in 1929 NGVD. This pond was shown as designed by others in the Section 2 FEIS. The ponds are located in the southeast quadrant of the I-4/Lake Mary Blvd. Interchange from Station 2248+60 to 2267+00 and will be interconnected. The improvements to Lake Emma will impact an existing pond (Pond SW (Pond 110) in Permit No. 22307-1), which will be compensated for within Ponds 305 and 305A. The ponds will also account for an additional 1.58 acres of impervious area, which is from the impervious area of the remaining portion of the proposed Lake Emma ramp to I-4 that cannot be conveyed to the ponds (See existing pond compensation calculations located within Appendix B for more detail). The ponds will also

compensate for 0.07 ac-ft of impacts to two existing exfiltration trenches along Lake Emma. The outfall control structure may need to be altered in the proposed condition. The pond soils are classified in Hydrologic Soil Group A and A/D. The pond is designed as a dry retention pond and will continue to discharge to the Heathrow Development storm water management system, which is an open basin. Since the pond is located in an open basin, additional treatment volume for OFW criteria is required. **Ponds 305 & 305A are the recommended alternative for this basin.**

5.3.9 Basin 306

Basin 306 begins at Station 2269+00 and continues northeast to Station 2284+00. The basin limits have been modified from the original basin limits to accommodate for the proposed improvements to Lake Mary Boulevard and the I-4 corridor. The basin consists of the pond site, the north of Lake Mary Boulevard to the I-4 bridge, the I-4 westbound ramp to Lake Mary Boulevard and the westbound portion of I-4. This section is located within the Wekiva Recharge Protection Basin and the Wekiva River Hydrologic Basin. The stormwater runoff from the roadway will be collected by storm sewer systems that flow to the pond. There is only one alternative for this basin, since the existing pond will be modified for the proposed improvements.

5.3.9.1 Pond 306

Pond 306 is an existing pond (Pond 1-NW in Permit No. 22124-2) that will need to be shifted west of the I-4 ramp to Lake Mary Boulevard, outside of the infield area. The pond will need to be expanded and does not impact the floodplain located to the west of it. The pond was designed and permitted under the Heathrow Southeast Area Master Drainage Plan and I-4 Intersection Drainage project (CPH Project No. P0077.00) and later modified under the I-4 Widening Lake Mary Boulevard to US 17-92 project (FPID No. 242598-1-52-01). The existing plans were designed in 1929 NGVD. This pond was shown as designed by others in the Section 2 FEIS. Pond 306 is located in the upper northwest quadrant of the I-4/Lake Mary Blvd. Interchange from Station 2268+00 to 2279+00. The pond soils are classified in Hydrologic Soil Groups A. The pond is designed as a dry retention pond and will continue to discharge to the Heathrow Development storm water management system, which is an open basin. Since the pond is located in an open basin, additional treatment volume for OFW criteria is required. **Pond 306 is the recommended alternative for this basin.**

5.3.10 Basin 307

Basin 307 begins at the high point at Station 2284+00 and continues north to Station 2305+00. The basin consists of the pond site and the full right-of-way. The stormwater runoff from the roadway will be collected by storm sewer systems that discharge to the pond. There is only one alternative for this basin.

5.3.10.1 Pond 307

Pond 307 is an existing pond (Pond 2 in Permit No. 22124-2) that does not need to be expanded or regraded. The pond was built under the I-4 Widening from West of Lake Mary Blvd. to West of SR 15 project (FPID No. 242598-1-52-01). The existing plans were designed in 1929 NGVD. The outfall control structure may need to be altered in the proposed condition. This pond was shown as designed by others in the Section 2 FEIS. The pond is located north of the I-4/Lake Mary Blvd. Interchange and lies adjacent to I-4 eastbound from Station 2296+00 to 2300+00. The pond soils are classified in Hydrologic Soil Group A/D. The pond is designed as a dry retention pond and is located in a drainage easement so that the property owners can relocate the pond in the future if needed. The pond will continue to discharge west through the Primera development property,

and is located in the Lake Emma basin which is land-locked. **Pond 307 is the recommended alternative for this basin.**

5.3.11 Basin 308

Basin 308 begins at Station 2305+00 and continues north to Station 2365+00. The basin limits for the proposed condition was extended to the north by 1,250 ft. Since there is not enough room for expansion near the ponds (Ponds 309, 309A and 310) to the north, the additional pavement added for the ultimate condition was sent to Pond 308. The basin consists of the pond site and the full right-of-way. The stormwater runoff from the roadway will be collected by storm sewer systems that discharge to the pond. There is only one alternative for this basin.

5.3.11.1 Pond 308

Pond 308 is an existing pond (Pond 3 in Permit No. 22124-2) that will be expanded to the north and east of the pond and the maintenance berm will be regraded and reduced to 15-foot. The pond was sized to store the additional area from the north that was not previously draining to it. The pond was built under the I-4 Widening from West of Lake Mary Blvd to West of SR 15 project (FPID No. 242598-1-52-01). The existing plans were designed in 1929 NGVD. This pond was shown as designed by others in the Section 2 FEIS. The pond is located east of I-4 from Station 2309+00 to 2321+76. The proposed pond will impact one (1) parcel. Refer to Table 5 for total right-of-way takes. The pond soils are classified in Hydrologic Soil Group A and A/D and is designed as a dry retention pond. The pond is located in a drainage easement so that the property owners can relocate the pond in the future if needed. The pond will continue to discharge west through the International Parkway storm sewer system, and is located in the Heathrow development property which is land-locked. Two active gopher tortoise burrows were observed on this pond site. The burrows will be relocated prior to site manipulation in the vicinity of the burrow. The pond construction cost located on Table 7, take this cost into account. For additional information on gopher tortoise impacts, refer to the ESBA provided by Stantec. **Pond 308 is the recommended alternative for this basin.**

5.3.12 Basin 309

Basin 309 begins at Station 2365+00 and continues north to CR 46A at Station 2386+00. The basin limits for the proposed condition was reduced by 1,250 ft. Since there isn't an undeveloped area near the existing ponds to use for expansion, the basin divide was shifted to allow the excess runoff to flow south to Pond 308. The basin consists of the pond sites, a portion of CR 46A (from International Pkwy to I-4) and the full right-of-way along the westbound I-4 corridor. The stormwater runoff from the roadway will be collected by roadside ditches and storm sewer systems that discharge to the ponds. There is only one alternative for this basin, since the existing pond will be modified for the proposed improvements.

5.3.12.1 Pond 309

Pond 309 is an existing pond (Pond A in Permit No. 22514-1) that will be reconfigured and combined with the existing pond (Pond A1 in Permit 22514-1) to accommodate the proposed roadway alignment. The maintenance berm will be regraded and reduced to 15-foot. The pond was designed and permitted for the I-4 and CR 46A Interchange project (FPID No. 77160-3436). The existing plans were designed in 1929 NGVD. Pond 309 was shown as designed by others in the Section 2 FEIS. Pond 309 is located in the southwest quadrant of the I-4/CR 46A Interchange from Station 2369+50 to 2383+00 and is designed as a wet detention pond that holds the entire proposed volume for the 100yr/10dy storm event. The pond will continue to have a broad crested

weir that can overflow to Basin 310. The pond soils are classified in Hydrologic Soil Group A. Basin 309 is located within a land-locked basin and does not have a positive outfall. **Pond 309 is the recommended alternative for this basin.**

5.3.13 Basin 310

Basin 310 begins at Station 2365+50 and continues northeast to CR 46A at Station 2384+00. The basin limits for the proposed condition was reduced by 1,250 ft. Since there isn't an undeveloped area near the existing ponds to use for expansion, the basin divide was shifted to allow the excess runoff to flow south to Pond 308. The basin consists of the pond site and the full right-of-way along the eastbound I-4 corridor. The stormwater runoff will continue to be collected by storm sewer systems that flow to the pond. There is only one alternative for this basin, since the existing pond will be modified for the proposed improvements.

5.3.13.1 Pond 310

Pond 310 is an existing pond (Pond B in Permit No. 22514-1) that will have the maintenance berm regraded and reduced to 15-foot. The pond was designed and permitted for the I-4 and CR 46A Interchange project (FPID No. 77160-3436). The existing plans were designed in 1929 NGVD. The pond was shown as designed by others in the Section 2 FEIS. The pond soils are classified in Hydrologic Soil Group A and A/D. Pond 310 is located in the southeast quadrant of the I-4/CR 46A Interchange from Station 2376+00 to 2386+00 and will be designed by others. Please refer to the appendix for pond calculations. Basin 310 is considered land-locked and does not have a positive outfall. **Pond 310 is the recommended alternative for this basin.**

5.3.14 Basin 311

Basin 311 begins at Station 2384+00 and continues northeast to Station 2410+00. The basin has been modified from the original limits to accommodate for the proposed improvements. The basin consists of the pond site, the eastbound general use lanes, the eastbound express lane ramp, CR 46A improvements east of I-4 and Rinehart Road. The stormwater runoff from the eastbound roadway will continue to be collected by storm sewer systems that flow to the pond. There is only one alternative for this basin, since the existing pond will accommodate for the proposed improvements.

5.3.14.1 Pond 311

Pond 311 is an existing pond (Pond C in Permit No. 22514-1) that will need to be regraded and reduced to allow adequate horizontal clearance for Rinehart Road. The pond was designed and permitted for the I-4 and CR 46A Interchange project (FPID No. 77-160-3436). The existing plans were designed in 1929 NGVD. This pond was shown as designed by others in the Section 2 FEIS. The pond is located in the northeast quadrant of the I-4/CR 46A Interchange from Station 2389+00 to 2398+00 and is designed as a wet retention pond. The pond will continue to have a broad crested weir that can overflow to the existing wetlands to the north. An outfall control structure may need to be added in the proposed condition. The pond soils are classified in Hydrologic Soil Group A and A/D. Basin 311 is considered to be land-locked. **Pond 311 is the recommended alternative for this basin.**

Loch Lehman and the FDOT Borrow pit will be impacted by the proposed recommended roadway alternative. The ponds will have to be regraded and expanded within the FDOT right of way. The modified Loch Lehman is located west of I-4 from Station 2392+00 to 2410+00 and the modified Borrow Pit is located east of I-4 from Station 2397+00 to 2412+00.

Additionally, the Colonial Town Park Pond (permitted Pond 10) on the west side of I-4 will also be impacted by the proposed roadway improvements. In the existing condition, the Colonial Town Park Pond is a closed basin which provides storage volume for the 100 year/24 hour storm event. Additional volume is being provided in Loch Lehman to offset the impacts in the existing pond.

5.3.15 Basin 312

Basin 312 begins at Wekiva Parkway (SR 429) and continues north along the I-4 corridor to Station 2486+00 westbound and Station 2457+00 eastbound. The basin consists of the pond site (Pond 13 in Permit No. 22514-10), a portion of the eastbound collector distributor road and the full right-of-way. Stormwater runoff generated by Basin 312 is being collected by storm sewer collection systems and discharges to the existing storm sewer system that conveys the runoff ultimately to the Lockhart-Smith Canal. There is only one alternative for this basin.

5.3.15.1 Pond 312

Pond 312 was modified under the I-4/SR 46 Improvements Project (FPID No. 407573-1-52-01) and was originally designed under the I-4 Interchange at SR 46 Project (FPID No. 407573-1-32-01). This pond was shown as designed by others in the Section 2 FEIS. Although Pond 312 was recently constructed and designed to accommodate the current I-4 Ultimate roadway expansion, the proposed improvements to I-4 and the Wekiva Parkway project will impact this pond; therefore, modifications to this pond will be made by others during the design of the Wekiva Parkway (SR 429) project. The pond is located adjacent to the westbound collector distributor road from Station 2443+00 to Station 2457+00. The pond was designed as a wet detention pond and ultimately discharges to the Lockhart-Smith Canal. The pond soils are classified in Hydrologic Soil Group A. Basin 312 is an open basin. **Pond 312 is the recommended alternative for this basin.**

5.3.16 Basin 313

Basin 313 begins at SR 46 and continues north to approximately 2,600 feet north of SR 46. The basin consists of Pond 313 and Pond 313A (Pond 1 and Pond 1A in Permit No. 22514-10). The basin consists of the pond sites, the ramp from westbound I-4 to SR 46, an exit ramp from westbound SR 46 to westbound I-4, and the existing realignment of the eastbound SR 46 to westbound I-4. This interchange was recently reconstructed. There is only one alternative for this basin.

5.3.16.1 Ponds 313 & 313A

Pond 313 (Pond 1 in Permit No. 22514-3, 10, 11) is an existing pond. The pond was designed and permitted as a Design-Bid-Build project under the project I-4/SR 46 Ramp Improvements and later modified under the Design-Build project under I-4/SR 46 Ramp Improvements FPID No. 407573-1-52-01). Pond 313 is located in the triangular infield area bounded by Ramps D and D1 and westbound I-4 from Station 2489+00 to Station 2496+00 and was designed as a wet detention pond. Pond 313A was designed as a wet detention pond and is located within Ramp D, directly south of existing Pond 313 from Station 2485+00 to Station 2489+00. A 36-inch RCP connects the ponds causing them to function as one pond. The pond discharges to a perimeter ditch west of Ramp D and ultimately discharges to the Lockhart-Smith Canal. The pond soils are classified in Hydrologic Soil Group A/D. Basin 313 is an open basin. **Ponds 313 & 313A are the recommended alternative for this basin.**

5.3.17 Basin 313A

Basin 313A begins at Station 2467+50 and continues north to Station 2485+66 at the SR 46/I-4 interchange. The basin consists of a treatment swale, the eastbound ramp to SR 46, the ramp to Towne Road, N. Oregon Avenue and a small portion of SR 46 from eastbound of I-4. There is only one alternative for this basin.

5.3.17.1 Swale 313A

Swale 313A is a proposed treatment alternative that will accommodate the proposed alignment. Swale 313A is located within the proposed right-of-way adjacent to the eastbound ramp from Station 2477+00 to 2485+00. The swale soils are classified in Hydrologic Soil Group D and is designed as a dry retention swale. Swale 313A ultimately discharges to the Lockhart-Smith Canal, which is an open basin. **Swale 313A is the recommended alternative for this basin.**

5.3.18 Basin 314

Basin 314 begins north of Wekiva Parkway from Station 2455+00 and continues north to Station 2519+00. The basin consists of the pond site and the full right-of-way from Station 2455+00 to Station 2484+75 and includes the eastbound roadway of I-4 from Station 2484+75 to Station 2519+00. Stormwater runoff from the roadway is collected by a perimeter ditch that discharges to the existing pond (Pond 4-I in Permit No. 22124-2). There is only one alternative for this basin, since the existing pond is adequate for the proposed improvements.

5.3.18.1 Pond 314

Pond 314 is an existing pond (Pond 4-I in Permit No. 22124-2) that was built under the I-4 Widening from West of Lake Mary Boulevard to West of SR 15/600 (US 17/92) project, FPID No. 242598-1-52-01. The pond does not need to be expanded or regraded. The pond discharges to a perimeter ditch west of Ramp D and ultimately discharges to the Lockhart-Smith Canal. This pond was shown as designed by others in the Section 2 FEIS. The pond is located east of I-4 from Station 2503+00 to Station 2516+00. The pond was designed as a wet detention pond and ultimately discharges to the Lockhart-Smith Canal. The pond soils are classified in Hydrologic Soil Group A/D. Basin 314 is an open basin. **Pond 314 is the recommended alternative for this basin.**

5.3.19 Basin 315

Basin 315 begins at SR 46 from Station 2484+75 and continues north to Station 2519+00. The basin consists of the pond site and the westbound roadway of I-4. Stormwater runoff from the roadway is collected by roadside swales that discharge to the existing pond (Pond 4-II in Permit No. 22124-2). There is only one alternative for this basin, since the existing pond is adequate for the proposed improvements.

5.3.19.1 Pond 315

Pond 315 is an existing pond (Pond 4-II in Permit No. 22124-2) that that was built under the I-4 Widening from West of Lake Mary Boulevard to West of SR 15/600 (US 17/92) project, FPID No. 242598-1-52-01. The pond does not need to be expanded or regraded. Pond 315 is located approximately 0.28 miles west of the I-4 corridor and discharges directly into the Lockhart-Smith Canal. This pond was shown as designed by others in the Section 2 FEIS. The pond was designed as a wet detention pond. The pond soils are classified in Hydrologic Soil Group A/D and C/D. Basin 315 is an open basin. **Pond 315 is the recommended alternative for this basin.**

5.3.20 Basin 316

Basin 316 begins at the high point at Station 2519+00 and continues north to a high point at Orange Avenue at Station 2565+00. The basin consists of the pond site and the full right-of-way. The stormwater runoff from the roadway will be collected by roadside ditches and storm sewer systems that discharge to the existing pond (Pond 5 in Permit No. 22124-2). There is only one alternative for this basin, since the existing pond is adequate for the proposed improvements.

5.3.20.1 Pond 316

Pond 316 is an existing pond (Pond 5 in Permit No. 22124-2) that does not need to be expanded or regraded. Pond 316 was designed as a wet detention pond that ultimately discharges to Lake Monroe. Pond 316 is located adjacent to I-4 eastbound from Station 2536+00 to Station 2545+00. The existing plans were designed in 1929 NGVD. This pond was shown as designed by others in the Section 2 FEIS. The pond soils are classified in Hydrologic Soil Group A/D. The pond was built under the I-4 Widening from West of Lake Mary Blvd to West of SR15/600 project (FPID No. 242598-1-52-01). Basin 316 is an open basin. **Pond 316 is the recommended alternative for this basin.**

5.3.21 Basin 317

Basin 317 begins at Station 2565+00 and continues north to the high point at the US 17/92 bridge at Station 2583+00. The stormwater runoff from the roadway will be collected by a series of ditches and inlets that flow to the existing ponds (Pond QQ-3 in Permit No. 64105-1 and Pond 1 in Permit No. 64105-7). The basin consists of three (3) pond sites, the I-4 right-of-way, US 17/92 and Monroe Road from west of I-4 to 140 feet north of the Volusia County/Seminole County Line. There is only one alternative for this basin, since modifying the existing ponds are adequate for the proposed improvements.

5.3.21.1 Ponds 317A, 317B & 317C

Pond 317A is an existing pond (Pond QQ-3 in Permit No. 64105-1) that will require reconfiguring and expanding to accommodate the proposed alignments. Pond 317A is designed as a wet detention pond that ultimately discharges to Lake Monroe. Pond 317A is located from Station 2568+00 to 2578+00. One (1) parcel will be taken as a result of the proposed roadway alignment. The parcel will also be utilized by Pond 317A for treatment and attenuation. Refer to Table 5 for total right-of-way takes. Pond 317B is an existing pond (Pond 1 in Permit No. 64105-7) that does not require expanding or regrading. Pond 317B was designed as a wet detention pond that ultimately discharges to Lake Monroe. Pond 317B is located in the southeast quadrant of I-4 and US 17/92 from Station 2575+00 to 2579+00. Pond 317C is an existing pond (Pond QQ-5 in Permit No. 64105-1) and will be reduced in size as a result of the proposed alignment. Pond 317C is designed as a wet detention pond that discharges south to adjacent wetlands, then ultimately to Lake Monroe. Pond 317C is located from Station 2568+00 to 2569+00. The pond was shown as designed by others in the Section 2 FEIS. Ponds QQ-3 and QQ-5 were built under the I-4 St. Johns River Bridge Replacement and Six-Laning Project (FPID No. 242702-1-52-01). Pond 1 was built under the State Road 400 (I-4) Exist Ramp B1 Construction and Realignment of County Road 15 project (FPID No. 242702-2-32-01). The existing plans were designed in 1929 NGVD. Ponds 317A soils are classified in Hydrologic Soil Group A/D, B/D and C/D. Pond 317B soils are classified in Hydrologic Soil Group A/D and Pond 317C soils are classified in Hydrologic Soil Group B/D. Basin 317 is an open basin. **Ponds 317A, 317B & 317C are the recommended alternative for this basin.**

5.3.22 Basin 318

Basin 318 begins 0.25 miles south of School Street and continues north along Monroe Road to the I-4 bridge. The basin limits are modified from the existing limits to accommodate for the proposed roadway alignment. The stormwater runoff from the roadway will be collected by storm sewer systems and conveyed to the existing pond (Pond 4 in Permit No. 90901-1). The basin consists of two (2) pond sites, Monroe Road, School Street from east of Monroe Road and Orange Boulevard from east of I-4. There is only one alternative for this basin.

5.3.22.1 Ponds 318A & 318B

Pond 318A is an existing pond (Pond 4 in Permit No. 90901-1) located adjacent to School Street and 380 feet east of Monroe Road. Pond 318A will be reduced as a result of the proposed alignment. Pond 318A is designed as a wet detention pond that ultimately discharges to Lake Monroe. This pond was not a pond alternative in the Section 2 FEIS. Pond 318B is a new proposed pond alternative located within the infield ramp of Monroe Road and Orange Boulevard. Four (4) parcels will be taken to accommodate the proposed roadway alignment. Pond 318B will also utilize the parcels for treatment and attenuation. Refer to Table 5 for total right-of-way takes. Pond 318A was built under the County Road 15/SR 46 to Orange Boulevard project, (P.S. 537) in Seminole County. The existing plans were designed in 1929 NGVD. Ponds 318A and 318B soils are classified in Hydrologic Soil Group B/D. Basin 318 is an open basin. **Ponds 318A and 318B are the recommended alternative for this basin.**

5.4 Floodplains/Floodways

5.4.1 Basin 300

The Federal Emergency Management Agency (FEMA) has developed Flood Insurance Rate Maps (FIRM) for Seminole and Volusia Counties. According to FEMA Map No. 12117C0135F, portions of the roadway and the proposed pond (Pond E in Permit No. 22434-1) within Basin 300 are located in the 100-year floodplain. Based on the FEMA floodplain lines, the roadway widening will impact the floodplain on both sides of the roadway. The widening of the westbound lanes will impact the floodplain from Station 2116+00 to 2124+00 and are located in Zone AE of the floodplain with an elevation of 66.00 ft NAVD. The widening of the eastbound lanes will impact the floodplain from Station 2106+50 to 2124+50 and are located in Zone AE of the floodplain with an elevation of 66.00 ft NAVD. The pond berm for Pond 300 will also impact the floodplain and is located in Zone AE of the floodplain with an elevation of 66.00 ft NAVD. Although the pond berm causes an impact to the floodplain, the area of cut between the existing ground and the design high water will result in the pond providing compensation for the floodplain impacts. The roadway impacts the floodplain for a total of 6.43 ac-ft. There are two (2) feasible alternatives for the floodplain compensation pond in this basin. After consideration from the public involvement meeting and meetings with property owners, it was determined that FPC Pond 300-A has the least amount of impacts.

5.4.1.1 FPC 300-A

The first alternative is FPC 300-A. FPC 300-A would impact one (1) parcel for a total right-of-way take of 1.15 ac from the 3.35 ac parcel. The right-of-way take would not impact the existing house or the billboard on this parcel. FPC 300-A is located east of I-4 from Station 2125+00 to 2126+50. The pond soils are classified in Hydrologic Soil Group A. The floodplain compensation pond is hydraulically connected to the floodplain. FPC 300-A is a modified alternative from Section 2 FEIS under the name Pond CP-1. **FPC 300-A is the recommended alternative for this basin.**

5.4.1.2 FPC 300-B

The second alternative is FPC 300-B. FPC 300-B would impact one (1) parcel for a total right-of-way take of 1.70 ac from the 11.02 ac parcel. There is a 20 foot buffer between the top of pond and the property line on the east and west sides, which allows some of the trees to remain. The right-of-way take would not impact the existing soccer fields north of the pond or the billboard on this parcel. FPC 300-B is located west of I-4 from Station 2114+00 to 2118+50. The pond soils are classified in Hydrologic Soil Group A/D. The floodplain compensation pond is hydraulically connected to the floodplain by an existing crossdrain located at Station 2120+87.

5.4.1.3 FPC 300-C

The third alternative is FPC 300-C. FPC 300-C is an option that was recommended by the Value Engineering Study due to the impacts to an existing billboard within the FPC 300-A parcel. The potential pond site is located within the floodplain of Lake Grace, just east of Pond 300. After receiving additional topographic survey for the site, it was determined that it is not a feasible option. The existing ground elevation for the majority of the potential site is lower than the floodplain elevation of 66.00 ft. NAVD. After this alternative was eliminated, FPC 300-A was reconfigured around the existing billboard as not to impact it.

6.0 Conclusion

The Pond Alternative Matrices (Tables 5-7) show a summary of the engineering data and analysis, as well as, the impact and cost analysis. 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 include cost of installed drainage structures, drainage pipes and outfalls, clearing & 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. The recommended pond sites are shown in Tables 1 and 2.

Table 5 – Pond Engineering Data & Analysis

Pond	Location	Soil Names & Hydrologic Groups	Estimated SHWT El. (ft)	Lowest Edge of Roadway (ft)	Outfall Location	Roadway Drainage Area (ac)	Method of Treatment	Required Treatment & Attenuation Volume (ac-ft)	Provided Treatment & Attenuation Volume (ac-ft)	Required Add. Pond Area Including Access (ac)	Total Parcel Available (ac)
HH	Station 2050+00 FDOT Property	Basinger, Samsula, & Hontoon (A/D) & Urban Land (A/D)	50.00	56.00	Little Wekiva River	9.30	Dry Retention	N/A	N/A	N/A	N/A
II	Station 2065+00 FDOT Property	Astatula-Apopka (A)	60.00	56.00	Little Wekiva River	11.98	Dry Retention	N/A	N/A	N/A	N/A
300	Station 2112+00 FDOT Property & Parcel No. 25-20-29-503-0A00-0000	Astatula (A) & Myakka & EauGallie (A/D)	59.96	65.00	Grace Lake	32.83	Wet Detention	12.53	12.53	3.46	4.07
	Parcel No. 25-20-29-510-000-0070									0.58	9.46
301	Station 2138+00 FDOT Property (Rest Area)	Basinger, Samsula & Hontoon (A/D), Astatula-Apopka (A) & Myakka and Eaugallie (A/D)	47.96	55.00	Depressional Area at Sta. 2133+75	9.34	Dry Retention	3.57	4.85	N/A	N/A
302	Station 2153+00 FDOT Property	Astatula (A)	41.46	55.00	Depressional Area at Sta. 2150+00	19.05	Dry Retention	8.46	9.20	N/A	N/A
303-A1	Station 2176+00 FDOT Property & Parcel No. 24-20-29-512-0000-0020	Astatula (A)	45.06	66.00	Lake Myrtle	19.04	Dry Retention	13.22	21.06	4.39	4.56
303-A2	Station 2176+00 FDOT Property	Astatula (A)	45.06	66.00	Lake Myrtle	10.66	Dry Retention	6.40	6.79	N/A	N/A
303-B2	Station 2180+50 Parcel No. 24-20-29-300-0090-0000	Astatula (A)	55.00	66.00	Lake Myrtle	8.37	Dry Retention	4.72	4.90	2.71	2.71
304	Station 2217+00 FDOT Property	Astatula (A)	45.00	68.00	Depressional Area at Sta. 2224+00	23.63	Dry Retention	15.90	16.48	N/A	N/A
305 & 305A	Station 2248+60 FDOT Property	Astatula (A) Myakka & EauGallie (A/D)	38.96	48.66	Heathrow Development	79.30	Dry Retention	48.09	53.08	N/A	N/A
306	Station 2268+00 FDOT Property	Astatula (A)	38.33	57.68	Heathrow Development	18.38	Dry Retention	6.90	13.02	N/A	N/A
307	Station 2296+00 Drainage Easement	Basinger, Samsula & Hontoon (A/D)	39.36	60.00	Primera Development Property	15.36	Dry Retention	6.80	6.80	N/A	N/A
308	Station 2309+00 Drainage Easement & Parcel No. 07-20-30-5MK-0000-0020	Astatula (A) Basinger, Samsula & Hontoon (A/D)	47.16	60.00	International Pkwy Storm Sewer System	43.01	Dry Retention	24.81	32.32	7.71	155.33
309	2369+50 FDOT Property	Tavares-Millhopper & Astatula (A)	66.96	70.65	None	24.72	Wet Retention	53.09	56.66	N/A	N/A

Pond	Location	Soil Names & Hydrologic Groups	Estimated SHWT El. (ft)	Lowest Edge of Roadway (ft)	Outfall Location	Roadway Drainage Area (ac)	Method of Treatment	Required Treatment & Attenuation Volume (ac-ft)	Provided Treatment & Attenuation Volume (ac-ft)	Required Add. Pond Area Including Access (ac)	Total Parcel Available (ac)
310	2376+00 FDOT Property	Tavares-Millhopper (A) & EauGallie & Immokalee (A/D)	61.46	71.95	None	By Others	Wet Retention	By Others	By Others	N/A	N/A
311	2389+00 FDOT Property	Tavares-Millhopper (A) & Basinger & Smyrna (A/D)	56.96	65.00	Wetlands at Sta. 2400+00	41.27	Wet Retention	14.38	20.75	N/A	N/A
313 & 313A	2486+00 & 2489+00 FDOT Property	Myakka & EauGallie (A/D)	27.50	30.00	Lockhart-Smith Canal	13.51	Wet Detention	2.27	9.47	N/A	N/A
Swale 313A	2477+00 FDOT Property	Myakka & EauGallie (A/D) & Urban (A/D)	28.00	32.00	Lockhart-Smith Canal	6.85	Dry Swales	0.86	1.21	N/A	N/A
314	2503+00 FDOT Property	Myakka &EauGallie (A/D)	20.76	25.00	Lockhart-Smith Canal	59.64	Wet Detention	13.21	18.90	N/A	N/A
315	2520+00 (0.28 miles west) FDOT Property	Myakka &EauGallie (A/D)	18.66	25.00	Lockhart-Smith Canal	13.10	Wet Detention	3.62	15.18	N/A	N/A
316	2536+00 FDOT Property	Myakka &EauGallie (A/D) & Pineda (C/D)	12.06	23.57	Lake Monroe	38.74	Wet Detention	9.59	12.89	N/A	N/A
317A	2574+00 FDOT Property &	Felda and Manatee (B/D), Nittaw, Okeelanta & Basinger (A/D) & Pineda (C/D)	4.50	10.50	Lake Monroe	66.60	Wet Detention	8.80	8.80	N/A	N/A
	Parcel No. 16-19-30-300-002A-0000									3.53	8.87
317B	2578+00 FDOT Property	Arents, Basinger, Samsula & Hontoon & Nittaw (A/D)								N/A	N/A
317C	2568+00 FDOT Property	Felda & Manatee (B/D)									
318A	Seminole County	Felda & Manatee (B/D)	6.46	9.21	Lake Monroe	13.25	Wet Detention	3.41	3.41	N/A	N/A
	Parcel No. 16-19-30-5AC-0000-025A									0.01	0.44
	Parcel No. 16-19-30-5AC-0000-0250									0.01	0.40
	Parcel No. 16-19-30-5AC-0000-0240									2.03	2.87
318B	Parcel No. 16-19-30-5AC-0000-025C									1.60	2.83
	Parcel No. 16-19-30-5AC-0000-025B									0.40	0.58
	Parcel No. 16-19-30-5AC-0000-025A									0.24	0.44
	Parcel No. 16-19-30-5AC-0000-0250									0.02	0.40

Table 6 – Floodplain Compensation Pond Engineering Data & Analysis

FPC Pond	Location	Soil Names & Hydrologic Groups	Estimated SHWT El. (ft)	100 YR Floodplain Elevation (ft)	Required Compensation (ac-ft)	Storage Provided (ac-ft)	Required Add. Pond Area Including Access (ac)	Total Parcel Available (ac)
300-A	Station 2125+00 Parcel No. 25-20-29-300-0050-0000	Myakka & Eau Gallie (A/D)	55.00	66.00	3.61	3.79	1.14	3.37
300-B	Station 2117+00 Parcel No. 26-20-29-300-0010-0000	Myakka & Eau Gallie (A/D)	57.00	66.00	3.61	3.95	1.70	11.02

Table 7 – Pond and Floodplain Compensation Pond Impact & Cost Analysis

Pond	Existing Land Use	**Threatened or Endangered Species Impacts	***Hazardous Materials & Contamination Potential	Major Utility Conflict Potential (Y/N)	Floodplain Impacts (ac-ft)	Wetland & Surface Water Impacts (ac)		Total Pond Cost	Rankings
HH	No Data Available	Moderate	Low	N	0.00	0.00		$0.00*	1
II	No Data Available	High	Low	N	0.00	0.00		$10,022	1
300	Residential	Moderate	Medium	N	6.43	0.00	1.33	$3,007,104	1
301	Public / Semi-Public	High	Low	N	0.00	0.00		$147,267	1
302	Vacant Residential	High	Low	N	0.00	0.00		$125,014	1
303-A1	Other	High	Low	N	0.00	0.00		$3,716,650	2
303-A2	Vacant Nonresidential	High	Low	N	0.00	0.00		$24,048	1
303-B2	Acreage Not Zoned for Agriculture	High	Low	N	0.00	0.00		$3,321,411	
304	Parcels with no Values	High	Low	N	0.00	0.00		$83,427	1
305 & 305A	Parcels with no Values	High	Low	N	0.00	0.00		$487,591	1
306	Parcels with no Values	Moderate	Low	N	0.00	0.00		$438,650	1
307	No Data Available	Moderate	High	N	0.00	0.00		$0.00*	1
308	No Data Available	High	High	N	0.00	0.00		$4,077,912	1
309	No Data Available	High	Low	N	0.00	0.00		$447,713	1

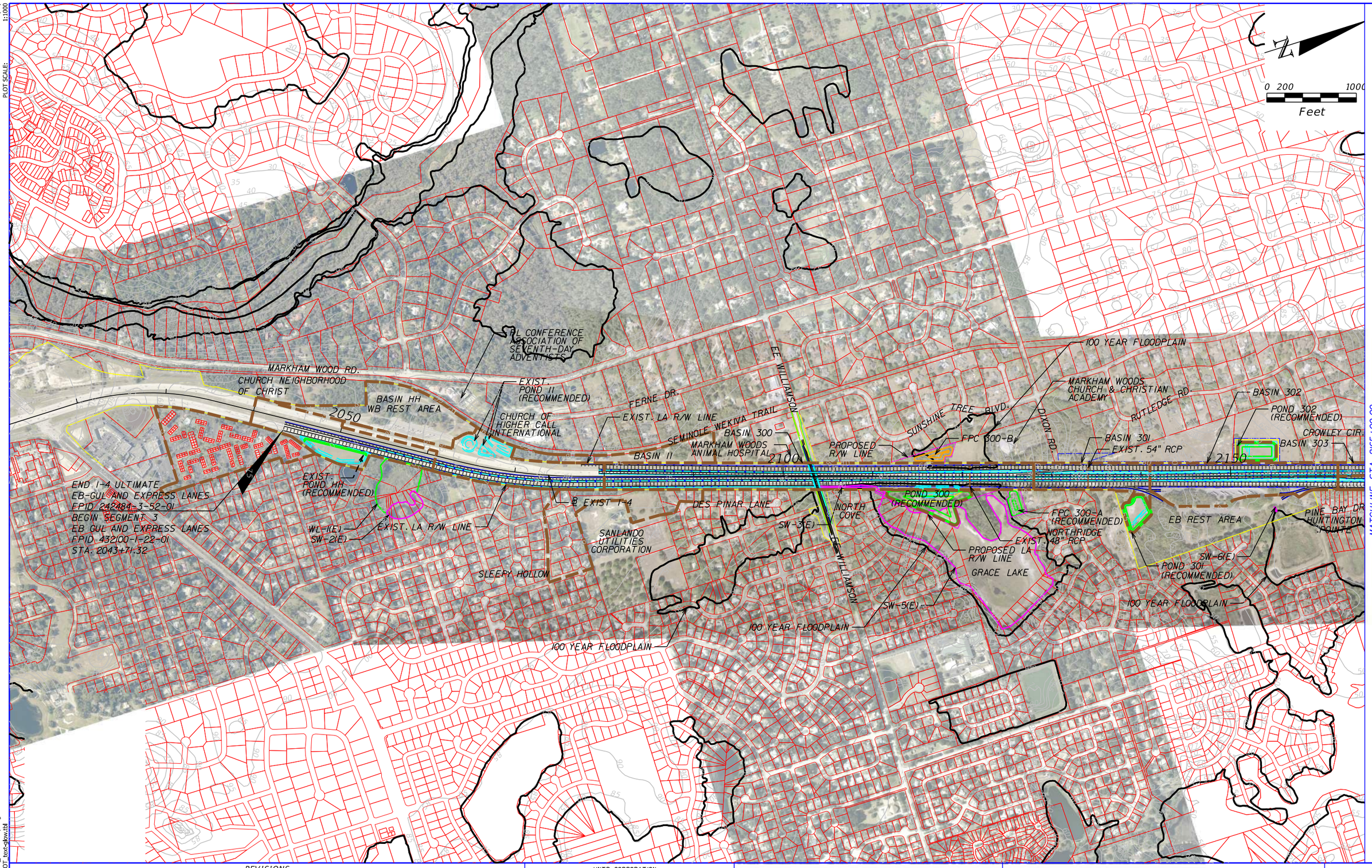
Pond	Existing Land Use	**Threatened or Endangered Species Impacts	***Hazardous Materials & Contamination Potential	Major Utility Conflict Potential (Y/N)	Floodplain Impacts (ac-ft)	Wetland & Surface Water Impacts (ac)	Total Pond Cost	Rankings
310	No Data Available	High	Low	N	0.00	0.00	$384,903	1
311	No Data Available	High	Low	N	0.00	0.00	$100,239	1
312	No Data Available	High	Low	N	0.00	0.00	$0.00*	1
313 & 313A	No Data Available	High	Low	N	0.00	0.00	$0.00*	1
Swale 313A	No Data Available	Low	Medium	N	0.00	0.00	$94,893	1
314	No Data Available	High	Low	N	0.00	0.00	$0.00*	1
315	No Data Available	High	Low	N	0.00	0.00	$0.00*	1
316	No Data Available	High	Low	N	0.00	0.00	$0.00*	1
317A	No Data Available & Vacant Residential	High	Low	Y	0.00	4.46 | 0.00	$1,698,766	1
317B	No Data Available	High	Low	Y	0.00	0.00	$0.00*	1
317C	No Data Available	Moderate	Low	Y	0.00	0.00	$9,174	1
318A	Vacant Government	High	Low	N	0.00	0.00	$888,574	1
318B	Vacant Commercial, Vacant Government & Residential	Low	Low	N	0.00	0.00	$1,173,120	1
FPC 300-A	Residential	Moderate	Medium	N	0.00	0.00	$493,519	1
FPC 300-B	Institutional	Moderate	Medium	N	0.00	0.00	$638,151	2

*Since there are no proposed changes to this pond, the total pond cost is $0.
**Refer to the Endangered Species Biological Assessment (ESBA) for more detailed information.
***Refer to the Contamination Screening Evaluation Report (CSER) for more detailed information.

APPENDIX A –

DRAINAGE MAPS

MODEL:
SHEET SIZE: drmprd320 16.5x10.6 (in.)
PLOT SCALE: 1:1000



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
OVERALL DRAINAGE MAP
SEGMENT 3

SHEET NO. A-1

PRINT DRIVER:
PEN TABLE: Color_FDOTPDF.pltcfg
FDOT_text-qlow.tbl

MODEL: drmprd321
SHEET SIZE: 16.5x10.6 (in.)
PLOT SCALE: 1:1000

MATCHLINE STA. 2165+00.00

MATCHLINE STA. 2315+00.00

0 200 1000
Feet

100 YEAR FLOODPLAIN
POND 303-B2 (RECOMMENDED)
PROPOSED LA R/W LINE
CROWLEY CIR.
LONG POND DR.
WALDENS POND COVE
BASIN 303
℄ EXIST I-4
2200
BASIN 304
POND 304 (RECOMMENDED)
DUNBROOKE LOOP
INTERNATIONAL PKWY.
LAKE MARY SENIOR LIVING
EXIST. LA R/W LINE
BASIN 305
ITT TECHNICAL INSTITUTE
2250
NOTTINGHILL CONDOMINIUM
LAKE MARY PROFESSIONAL CAMPUS
LAKE MARY BLVD.
50
WESCAR
POND 306 (RECOMMENDED)
BASIN 306
COVERGY'S
SEMINOLE COUNTY WASTEWATER TREATMENT
INTERNATIONAL PKWY.
BASIN 307
2300
SEMINOLE WEKIVA TRAIL

PINE BAY DR.
HUNTINGTON POINTE
POND 303-A2 (RECOMMENDED)
SUN TECH COMMERCE PARK
POND 303-A1
FL POWER CORP
PROPOSED LA R/W LINE
100 YEAR FLOODPLAIN
FOX 35 WOFL
SKYLINE DR.
GOOD LIFE BROADCASTING
ATRIUM CORPORATE CENTER
EXIST. LA R/W LINE
DUKE ENERGY
LAKE MARY DORMITORY
SAND POND RD.
SCHOLASTIC
CANDLEWOOD SUITES
GREENWOOD BLVD.
FOUR NORTHPOINT CENTER
FILUTOWSKI INSTITUTE
LA QUINTA
HOMESTEAD HOTEL
EXTENDED STAY AMERICA
POND 305 (RECOMMENDED)
POND 305A (RECOMMENDED)
WL-1A(E)
HILTON GARDEN INN
CRESCENT AT PRIMERA ONE
HNTB CORP.
CRESCENT AT PRIMERA TWO
EXIST. EASEMENT
HOMEWOOD SUITES
MACARONI GRILL
POND 307 (RECOMMENDED)
PROPOSED PEDESTRIAN BRIDGE
100 YEAR FLOODPLAIN
BASIN 308
POND 308 (RECOMMENDED)
EXIST. EASEMENT
WL-2(E)
100 YEAR FLOODPLAIN

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
OVERALL DRAINAGE MAP
SEGMENT 3

SHEET NO. A-2

PRINT DRIVER: Color_FDOTPDF.pltcfg
PEN TABLE: FDOT_text-qlow.tbl

MODEL: drmprd322
SHEET SIZE: 16.5x10.6 (in.)
PLOT SCALE: 1:1000

N

0 200 1000
Feet

MATCHLINE STA. 2315+00.00

SEMINOLE WEKIVA TRAIL
INTERNATIONAL PKWY.
100 YEAR FLOODPLAIN
BASIN 308
EXIST. LA R/W LINE
2350
CROSS SEMINOLE TRAIL
BASIN 309
POND 309 (RECOMMENDED)
CR 426A
50
100 YEAR FLOODPLAIN
SW-4(W)
100 YEAR FLOODPLAIN
LOCH LEHMAN
2400
100 YEAR FLOODPLAIN
BASIN 314
POND 312
SW-10(W)
2450
RINEHART RD.
100 YEAR FLOODPLAIN
SR 417
TOWNE CENTER BLVD.
WP BALL BLVD.
UNITED ARTISTS SEMINOLE TOWNE CENTER 10 MOVIE THEATER
SEMINOLE TOWNE CENTER MALL
MATCHLINE STA. 2465+40.00
HONDA
SANFORD INFINITI
FDOT BORROW PIT
POND 311 (RECOMMENDED)
BASIN 311
ABC FINE WINE & SPIRITS
100 YEAR FLOODPLAIN
CENENNIAL BANK
UNITED STATES POST OFFICE
BASIN 310
100 YEAR FLOODPLAIN
POND 310 BY OTHERS (RECOMMENDED)
POST OFFICE
660 CENTURY POINT
ABB
CROSS SEMINOLE TRAIL
EXIST. LA R/W LINE
℄ EXIST I-4
EXIST. EASEMENT
21ST CENTURY INSURANCE
PROPOSED EASEMENT
POND 308 (RECOMMENDED)
WL-2(E)

Color_FDOTPDF.pltcfg
FDOT_text-qbkw.tbl

PRINT DRIVER:
PEN TABLE:

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
OVERALL DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-3

MODEL: drmprd323
SHEET SIZE: 16.5x10.6 (in.)
PLOT SCALE: 1:1000

0 200 1000
Feet

POND 315 (RECOMMENDED)
100 YEAR FLOODPLAIN
SW-17A(W)
SW-17B(W)
SW-18(W)
DUNBAR AVE
SW-19(W)
BASIN 316
SW-22(W) LA MESA RV
SW-2(W)
2550
WL-3(W)
WL-4(W)
POND 317A (RECOMMENDED)
100 YEAR FLOODPLAIN
PART OF ORLANDO
ORANGE BLVD
SEMINOLE COUNTY PORT AUTHORITY
ST. JOHNS RIVER
VOLUSIA COUNTY SEMINOLE COUNTY
WL-5(W)
2600
WL-1(W)
100 YEAR FLOODPLAIN
WL-2(W)
SW-10A(W)
SW-10B(W)
SW-11(W)
SW-12(W)
BASIN 313
SW-15(W)
AUDI NORTH ORLANDO AND AUTO MALL
BASIN 315
SW-16(W)
2500
SR 46
POND 313 (RECOMMENDED)
POND 314 (RECOMMENDED)
SW-17(E) FIVE-R
SW-18(E)
POND 316 (RECOMMENDED)
SW-19(E)
SW-20(E)
SW-21(E) SOUTHERN PRIDE BUSINESS CENTER
SW-22(E)
SW-22A(E)
FLORIDA ROCK INDUSTRIES
BASIN 318
PROPOSED R/W LINE
POND 318B (RECOMMENDED)
SW-22(W)
MONROE RDC
SW-22B(E)
SW-27(E)
POND 317C (RECOMMENDED)
WL-4(E)
ST. JOHNS RIVER
END SEGMENT 3
STA. 2583+00.00
WL-5(E)
SW-24(E)
POND 317B (RECOMMENDED)
WL-3(E)
WL-6(E)
US #192
100
HARLEY-DAVIDSON
HICKMAN CIR.
HIGH REACH 2
RUG KING
HICKMAN DR.
PLUMMER
SW-16(E)
BASIN 314
COMFORT INN
CRACKER BARREL
WL-2A(E)
OUTBACK STEAKHOUSE
MCDONALDS
SUPER 8 MOTEL
CHEVRON GAS STATION
POND 313A (RECOMMENDED)
SWALE 313A (RECOMMENDED)
100 YEAR FLOODPLAIN
BASIN 313A
ST. JOHNS PKWY
MATCHLINE STA. 2465+40.00
POND 318A (RECOMMENDED)
100 YEAR FLOODPLAIN

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

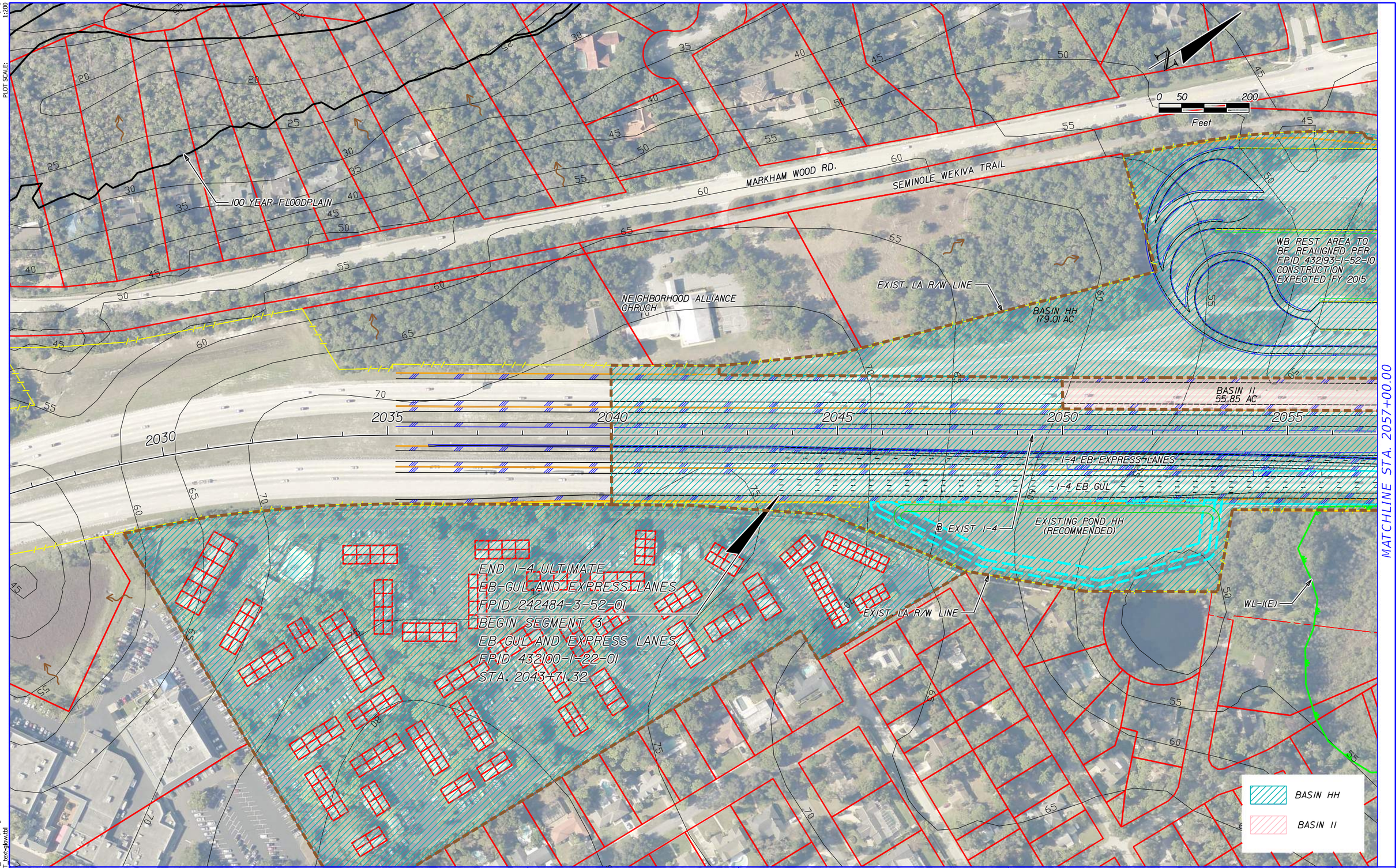
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
OVERALL DRAINAGE MAP
SEGMENT 3

SHEET NO. A-4

Color_FDOTPDF.pltcfg
FDOT_text-glow.tbl
PRINT DRIVER:
PEN TABLE:

MODEL: drmprd01A
SHEET SIZE: 16.5x10.6 (in.)
PLOT SCALE: 1:200



MATCHLINE STA. 2057+00.00

Color_FDOTPDF.ptcfg
FDOT_text-glow.tbl
PRINT DRIVER:
PEN TABLE:

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

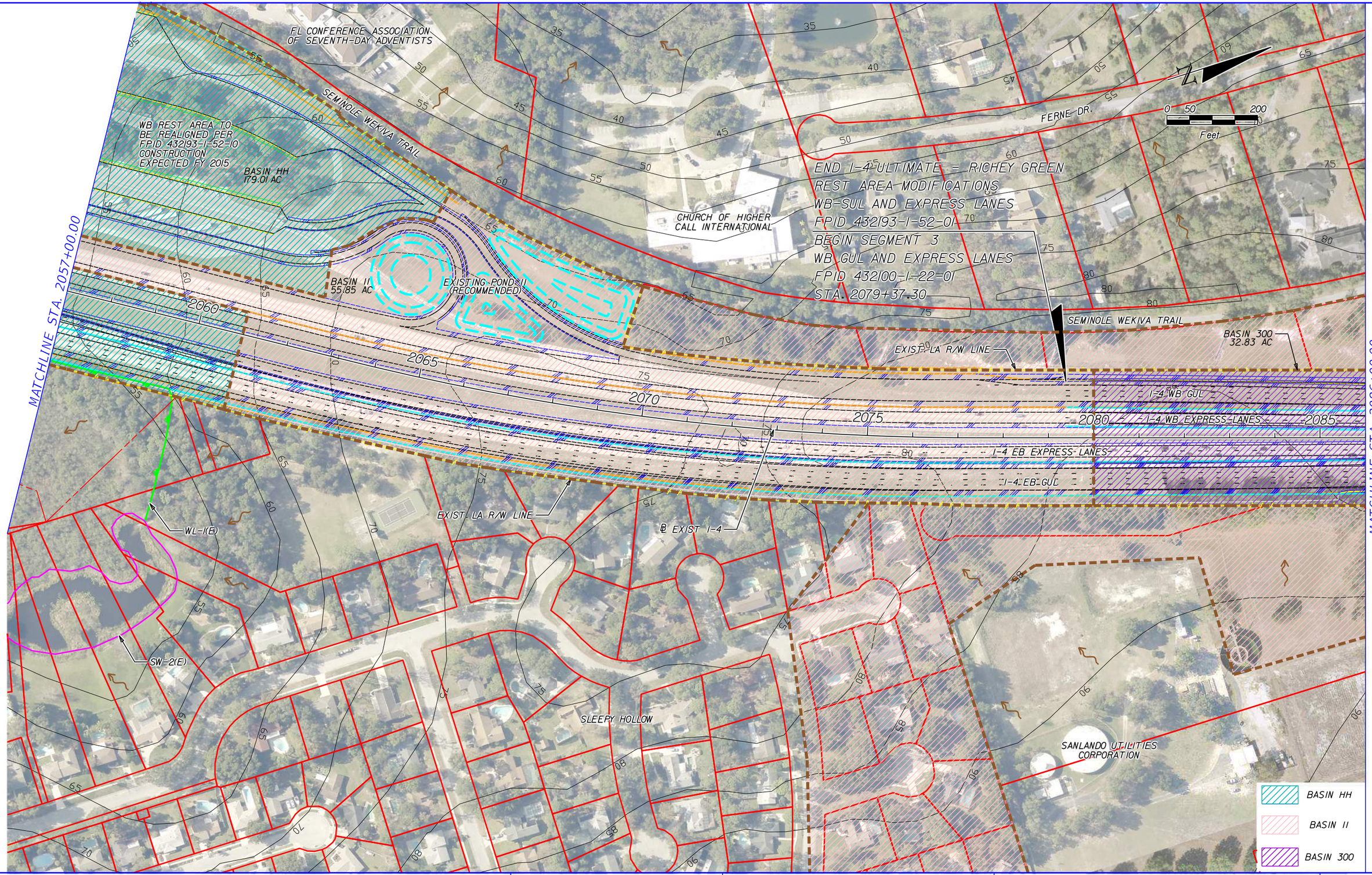
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY DRAINAGE MAP SEGMENT 3

SHEET NO. A-5

MODEL:
SHEET SIZE: drmprd01B
PLOT SCALE: 16.5x10.6 (in.) 1:200



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY DRAINAGE MAP SEGMENT 3

SHEET NO. A-6

PRINT DRIVER: Color_FDOTPDF.pltcfg
PEN TABLE: FDOT_text-gkw.tbl

drmprd01
16.5x10.6 (in.)
1:200.005
MODEL:
SHEET SIZE:
PLOT SCALE:

MATCHLINE STA. 2086+00.00

MATCHLINE STA. 2116+00.00

0 50 200
Feet

SEMINOLE WEKIVA TRAIL

EE WILLIAMSON

SUNSHINE TREE BLVD.

100 YEAR FLOODPLAIN

PARCEL ID: 26-20-29-300-0010-0000
AREA TAKEN: 74,021 SF

PROPOSED R/W LINE

FPC 300-B
(ALTERNATIVE)
0.83 AC

BASIN 11
55.85 AC

EXIST. LA R/W LINE

MARKHAM WOODS
ANIMAL HOSPITAL

BASIN 300
32.83 AC

I-4 WB GUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB GUL

℄ EXIST I-4

DES PINAR LANE

TOULA AVE

HICKORY TREE AVE

HICKORY TREE RD

PENELOPE DR

EXIST. LA R/W LINE

100 YEAR FLOODPLAIN

SW-3(E)

POND 300
(RECOMMENDED)
4.50 AC

EXISTING R/W

SW-5(E)

PARCEL ID: 25-20-29-503-0A00-0000
AREA TAKEN: 150,683 SF

PROPOSED LA R/W LINE

NORTH COVE

NORTH RIDGE CT

GRACE LAKE CIR

NORTH COVE BLVD

BASIN II

BASIN 300

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO. A-7

Color_FDOTPDF.pltcfg
FDOT_text-qlow.tbl
PRINT DRIVER:
PEN TABLE:

drmprd02
16.5x10.6 (in.)
1:200

MODEL:
SHEET SIZE:
PLOT SCALE:

STA. 2116+00.00

MATCHLINE STA.

STA. 2146+00.00

MATCHLINE STA.

SUNSHINE TREE BLVD.

DIXON RD.

RUTLEDGE RD.

0 50 200
Feet

100 YEAR FLOODPLAIN

PROPOSED R/W LINE

PARCEL ID: 26-20-29-300-0010-0000
AREA TAKEN: 74,021 SF

MARKHAM WOODS
CHURCH & CHRISTIAN ACADEMY

FPC 300-B
(ALTERNATIVE)
0.83 AC

EXIST. LA R/W LINE

EXIST. 48" RCP

BASIN 300
32.83 AC

I-4 WB GUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB GUL

B EXIST I-4

BASIN 301
9.34 AC

100 FT. ACCESS EASEMENT

15 FT. NON-EXCLUSIVE ACCESS EASEMENT

EXIST. 54" RCP

I-4 EB GUL TO REST AREA

BASIN 302
19.05 AC
EB REST AREA

POND 300
(RECOMMENDED)
4.50 AC

PARCEL ID: 25-20-29-503-0A00-0000
AREA TAKEN: 150,683 SF

PROPOSED LA R/W LINE

FPC 300-A
(RECOMMENDED)
0.69 AC

EXIST. LA R/W LINE

PROPOSED LA R/W LINE

NORTHRIDGE DR.

PROPOSED LA R/W LINE

PARCEL ID: 25-20-29-300-0050-0000
AREA TAKEN: 49,585 SF

PARCEL ID: 25-20-29-510-0000-0070
AREA TAKEN: 25,298 SF

NORTHRIDGE

POND 301
(RECOMMENDED)
2.03 AC

SW-5(E)

100 YEAR FLOODPLAIN

100 YEAR FLOODPLAIN

GRACE LAKE

SW-5(E)

NOTE:
THE EXISTING DRAINAGE STRUCTURES ARE FOR GRAPHIC PURPOSES ONLY. FIELD SURVEY IS REQUIRED TO DETERMINE THE ACTUAL STATIONING.

BASIN 300
BASIN 301
BASIN 302

Color_FDOTPDF.pltcfg
FDOT_text-glow.tbl

PRINT DRIVER:
PEN TABLE:

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-8

drmprd03
16.5x10.6 (in.)
1:200

MODEL:
SHEET SIZE:
PLOT SCALE:

MATCHLINE STA. 2146+00.00

MATCHLINE STA. 2176+00.00

15 FT. NON-EXCLUSIVE ACCESS EASEMENT

EXIST. LA R/W LINE

POND 302
(RECOMMENDED)
2.02 AC

CROWLEY CIR.

BASIN 303
19.04 AC

I-4 WB GUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB GUL

EXIST I-4
REST AREA TO
I-4 EB GUL

BASIN 302
19.05 AC

EB REST AREA

BEGIN SHOULDER CONCRETE BARRIER
WALL, F SHAPED, WITH 10' NOISE WALL
STA. 2157+63.05

SW-6(E)

100 YEAR FLOODPLAIN

EXIST. LA R/W LINE

PINE BAY DR

END SHOULDER CONCRETE BARRIER
WALL, F SHAPED, WITH 10' NOISE WALL
STA. 2175+05.40

HUNTINGTON POINTE

PERPETUAL EASEMENT

0 50 200
Feet

BASIN 302

BASIN 303

Color_FDOTPDF.pltcfg
FDOT_text-cgtxw.tbl

PRINT DRIVER:
PEN TABLE:

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-9

lphillip 11/3/2016 11:57:25 AM \\LKMw00\pmwork3\Jobs\59219 - I4 SAMR\TECHPROD\432100122201\Segment 3\drainage\drmprd301.dgn

MODEL: drmprd04
SHEET SIZE: 16.5x10.6 (in.)
PLOT SCALE: 1:200

MATCHLINE STA. 2176+00.00

MATCHLINE STA. 2206+00.00

CROWLEY CIR.

LONG POND DR.

WALDENS POND COVE

SKYLINE DR.

PARCEL ID: 24-20-29-300-0090-0000
AREA TAKEN: 118,119 SF

PROPOSED LA R/W LINE

POND 303-B2
(RECOMMENDED)
1.48 AC

EXIST LA R/W LINE

BASIN 303
19.04 AC

℄ EXIST I-4

I-4 WB GUL

BASIN 304
23.63 AC

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB GUL

POND 303-A2
(RECOMMENDED)
1.80 AC

POND 303-A1
(ALTERNATIVE)
5.42 AC

SUN TECH COMMERCE PARK

PARCEL ID: 24-20-29-512-0000-0020
AREA TAKEN: 191,299 SF

FL POWER CORP

FOX 35 WOFL

GOOD LIFE BROADCASTING

ATRIUM CORPORATE CENTER

0 50 200
Feet

BASIN 303

BASIN 304

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO. A-10

PRINT DRIVER: Color_FDOTPDF.pltcfg
PEN TABLE: FDOT_text-glow.tbl

lphillip 11/3/2016 11:57:31 AM \\LKMw00\pmwork3\Jobs\59219 - I4 SAMR\TECHPROD\432100122001\Segment 3\drainage\drmprd301.dgn

drmprd05
16.5x10.6 (in.)
1:200

MODEL:
SHEET SIZE:
PLOT SCALE:

MATCHLINE STA. 2206+00.00

MATCHLINE STA. 2236+00.00

CHARDONNAY CT.

DUNBROOKE LOOP

LAKE MARY SENIOR LIVING

INTERNATIONAL PKWY.

BENTONSHIRE PL.

WALDENS POND COVE

25 FT. MAINTENANCE ROAD EASEMENT

POND 304
(RECOMMENDED)
3.21 AC

BASIN 304
23.63 AC

EXIST. LA R/W LINE

BASIN 305
79.30 AC

I-4 WB GUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB GUL

℄ EXIST I-4

SKYLINE DR.

CANDLEWOOD SUITES

SCHOLASTIC

FILUTOWSKI INSTITUTE

FOUR NORTHPOINT CENTER

THE A.G. MAURO COMPANY

SANDPOND RD

DUKE ENERGY

SEMINOLE COUNTY SERVICES

GREENWOOD BLVD

LAKE MARY DORMITORY

SAND POND

0 50 200
Feet

BASIN 304

BASIN 305

Color_FDOTPDF.pltcfg
FDOT_text-glow.tbl

PRINT DRIVER:
PEN TABLE:

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-11

lphillip 11/3/2016 11:57:44 AM \\LKMw00\pmwork3\Jobs\59219 - I4 SAMR\TECHPROD\43210012201\Segment 3\drainage\drmprd301.dgn

drmprd06
16.5x10.6 (in.)
1:200

MODEL:
SHEET SIZE:
PLOT SCALE:

MATCHLINE STA. 2236+00.00

MATCHLINE STA. 2266+00.00

LAKE MARY SENIOR LIVING

INTERNATIONAL PKWY.

NOTTING HILL CONDOMINIUM

LAKE MARY PROFESSIONAL CAMPUS

0 50 200
Feet

ITT TECHNICAL INSTITUTE

EXIST. LA R/W LINE

100 YEAR FLOODPLAIN

INTERNATIONAL PKWY.

LAKE MARY WB TO I-4 WB GUL

I-4 WB GUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB GUL

2240 2245 2250 2255 2260 2265

BASIN 305
79.30 AC

I-4 EB GUL TO LAKE MARY BLVD

℄ EXIST I-4

POND 305
(RECOMMENDED)
6.96 AC

I-4 EB GUL TO LAKE MARY BLVD

FOUR NORTHPOINT CENTER

LA QUINTA

HOMESTEAD HOTEL

EXTENDED STAY AMERICA

LAKE EMMA TO I-4 WB GUL

EXISTING POND

POND 305A
(RECOMMENDED)
10.49 AC

EXIST. LA R/W LINE

GREENWOOD BLVD.

PROPOSED LA R/W LINE

WL-1A(E)

I-4 EB GUL TO LAKE EMMA

(LAKE MARY BLVD ALTERNATE 4 SHOWN)

BASIN 305

Color_FDOTPDF.pltcfg
FDOT_text-qlow.tbl

PRINT DRIVER:
PEN TABLE:

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-12

MATCHLINE STA. 2266+00.00

MATCHLINE STA. 2296+00.00

WESCAR

EXIST. LA R/W LINE

100-YEAR FLOODPLAIN

POND 306
(RECOMMENDED)
7.92 AC

BASIN 306
18.38 AC

I-4 WB GUL TO LAKE MARY BLVD

EXISTING POND
TO BE REMOVED

CONVERGYS

NETCRACKER
TECHNOLOGY
SOLUTIONS

NETCRACKER
TECHNOLOGY
SOLUTIONS

NETCRACKER
TECHNOLOGY
SOLUTIONS

INTERNATIONAL PKWY.

0 50 200
Feet

SEMINOLE
COUNTY
WASTEWATER
TREATMENT

BASIN 307
15.36 AC

I-4 WB GUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB GUL

EXIST. I-4

LAKE EMMA TO I-4 EB GUL

BASIN 305
79.30 AC

POND 305A
(RECOMMENDED)
10.49 AC

LAKE MARY BLVD

LAKE MARY TO I-4 EB GUL

HOMEWOOD
SUITES

HILTON
GARDEN
INN

EXIST. LA R/W LINE

CRESCENT AT
PRIMERA ONE

HNTB CORPORATION

CRESCENT AT
PRIMERA TWO

100 YEAR FLOODPLAIN

REMAX LAKE

(LAKE MARY BL

BASIN 305

BASIN 306

BASIN 307

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-13

drmprd08
16.5x10.6 (in.)
1:200

MODEL:
SHEET SIZE:
PLOT SCALE:

MATCHLINE STA. 2296+00.00

MATCHLINE STA. 2326+00.00

AAA

100 YEAR FLOODPLAIN

0 50 200
Feet

PARCEL ID: 07-20-30-300-005D-0000
AREA TAKEN: 8,185 SF

PARCEL ID: 06-20-30-300-0320-0000
AREA TAKEN: 5,732 SF

PARCEL ID: 06-20-30-300-0140-0000
AREA TAKEN: 25,938 SF

SEMINOLE COUNTY WASTEWATER TREATMENT

INTERNATIONAL PKWY.

SEMINOLE WEKIVA TRAIL

80

81

82

EXIST. LA R/W LINE

BASIN 307
15.36 AC

BASIN 308
43.01 AC

I-4 WB GUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB GUL

2300

2305

2310

2315

2320

2325

℄ EXIST I-4

EXIST. LA R/W LINE

POND 307
(RECOMMENDED)
1.82 AC

EXIST. EASEMENT

POND 308
(RECOMMENDED)
8.67 AC

79

EXIST. EASEMENT

WL-2(E)

PROPOSED EASEMENT

100 YEAR FLOODPLAIN

REMAX LAKE

PARCEL ID: 07-20-30-5MK-0000-0020
AREA TAKEN: 28,813 SF

PARCEL ID: 07-20-30-5MK-0000-0020
AREA TAKEN: 335,708 SF

BASIN 307

BASIN 308

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-14

Color_FDOTPDF.pltctg
FDOT_text-xglow.tbl

PRINT DRIVER:
PEN TABLE:

lphillip 11/3/2016 11:58:52 AM \\LKMw00\pmwork3\Jobs\59219 - I4 SAMR\TECHPROD\432100122O1\Segment 3\drainage\drmprd301.dgn

drmprd09
16.5x10.6 (in.)
1:200

MODEL:
SHEET SIZE:
PLOT SCALE:

MATCHLINE STA. 2326+00.00

MATCHLINE STA. 2356+00.00

INTERNATIONAL PKWY.

SEMINOLE WEKIVA TRAIL

CROSS SEMINOLE TRAIL

100 YEAR FLOODPLAIN

0 50 200
Feet

PARCEL ID: 06-20-30-300-0140-0000
AREA TAKEN: 25,938 SF

PARCEL ID: 06-20-30-300-016D-0000
AREA TAKEN: 8,761 SF

BASIN 308
43.01 AC

PARCEL ID: 06-20-30-300-002D-0000
AREA TAKEN: 4,461 SF

PARCEL ID: 06-20-30-300-002B-0000
AREA TAKEN: 3,946 SF

PARCEL ID: 06-20-30-300-002G-0000
AREA TAKEN: 25 SF

PARCEL ID: 06-20-30-300-002E-0000
AREA TAKEN: 387 SF

PARCEL ID: 06-20-30-300-002F-0000
AREA TAKEN: 31 SF

EXIST. LA R/W LINE

EXIST. LA R/W LINE

EXIST. LA R/W LINE

83 84 87 88 41 9L 90

80 I-4 WB CUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB CUL

2330 2335 2340 2345 2350 2355

℄ EXIST I-4

PARCEL ID: 07-20-30-5MK-0000-0020
AREA TAKEN: 28,813 SF

PARCEL ID: 06-20-30-509-0000-0010
AREA TAKEN: 7,350 SF

PARCEL ID: 06-20-30-508-0000-01A0
AREA TAKEN: 1,487 SF

79 85 86 89

RINEHART RIDGE IV
660 CENTURY POINT

21ST CENTURY INSURANCE

ABB

BASIN 308

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-15

Color_FDOTPDF.pltcfg
FDOT_text-glow.tbl

PRINT DRIVER:
PEN TABLE:

lphillip 11/3/2016 11:59:10 AM \\LKMw00\pmwork3\Jobs\59219 - I4 SAMR\TECHPROD\432100122O1\Segment 3\drainage\drmprd301.dgn

drmprd10
16.5x10.6 (in.)
1:200

MODEL:
SHEET SIZE:
PLOT SCALE:

MATCHLINE STA. 2356+00.00

MATCHLINE STA. 2386+00.00

0 50 200
Feet

92B

92A

41

89

93

94B

94A

186

187

PARCEL ID: 31-19-30-509-0000-0140
AREA TAKEN: 2,747 SF

PARCEL ID: 31-19-30-509-0000-0120
AREA TAKEN: 658 SF

EXIST. LA R/W LINE

100 YEAR FLOODPLAIN

CR 46A GUL RAMP TO I-4 WB GUL

SR 417 GUL RAMP TO I-4 WB GUL

EXIST. LA R/W LINE

PARCEL ID: 06-20-30-300-002G-0000
AREA TAKEN: 25 SF

AIRSPACE AGREEMENT

PARCEL ID: 06-20-30-300-002X-0000
AREA TAKEN: 1,325 SF

BASIN 308
43.01 AC

POND 309
(RECOMMENDED)
13.46 AC

100 YEAR FLOODPLAIN

PARCEL ID: 31-19-30-509-0C00-0000
AREA TAKEN: 117,324 SF

BASIN 309
24.72 AC

SW-4(W)

I-4 WB GUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB GUL

I-4 EB GUL RAMP TO CR 46A GUL

BASIN 310
14.77 AC

BASIN 311
41.27 AC

EXISTING BRIDGE
TO REMAIN

CROSS SEMINOLE TRAIL

E EXIST I-4

POST OFFICE

EXIST. LA R/W LINE

POND 310 (RECOMMENDED)
BY OTHERS

UNITED STATES POST OFFICE

100 YEAR FLOODPLAIN

CENTENNIAL
BANK

(CR 46A ALTERNATE 3 SHOWN)

BASIN 308
BASIN 309
BASIN 310
BASIN 311

Color_FDOTPDF.pltcfg
FDOT_text-glow.tbl

PRINT DRIVER:
PEN TABLE:

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-16

MODEL: drmprd11
SHEET SIZE: 16.5x10.6 (in.)
PLOT SCALE: 1:200

MATCHLINE STA. 2386+00.00

MATCHLINE STA. 2416+00.00

PARCEL ID: 31-19-30-509-0000-0000
AREA TAKEN: 117,324 SF

PARCEL ID: 31-19-30-509-0000-0120
AREA TAKEN: 5,698 SF

100 YEAR FLOODPLAIN

EXIST. LA R/W LINE

LOCH LEHMAN

SR 429 RAMP TO I-4 WB GUL

100 YEAR FLOODPLAIN

SR 417 GUL RAMP TO I-4 WB GUL

100 YEAR FLOODPLAIN

I-4 WB GUL RAMP TO SR 417 SB

100 YEAR FLOODPLAIN

0 50 200
Feet

I-4 WB GUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

2390 2395 2400 2405 2410 2415

I-4 EB GUL

BASIN 311
41.27 AC

I-4 EB GUL RAMP TO SR 417 GUL

CR 46A RAMP TO I-4 EB GUL

I-4 EB EXPRESS LANES RAMP TO SR 417 GUL

100 YEAR FLOODPLAIN

POND 311
(RECOMMENDED)
5.47 AC

POND 310
(RECOMMENDED)
BY OTHERS

CR 46A

EXIST. LA R/W LINE

RINEHART RD.

℄ EXIST I-4

100 YEAR FLOODPLAIN

FDOT BORROW PIT

100 YEAR FLOODPLAIN

HONDA

SANFORD INFINITI

DON MEALEY IMPORTS

ABC FINE WINE & SPIRITS

BASIN 310
14.77 AC

100 YEAR FLOODPLAIN

(CR 46A

BASIN 310

BASIN 311

Color_FDOTPDF.pltcfg
FDOT_text-qbw.tbl

PRINT DRIVER:
PEN TABLE:

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-17

lphillip 11/3/2016 11:59:27 AM \\LKMw00\pmwork3\Jobs\59219 - I4 SAMR\TECHPROD\43210012201\Segment 3\drainage\drmprd301.dgn

drmprd12
16.5x10.6 (in.)
1:200

MODEL:
SHEET SIZE:
PLOT SCALE:

MATCHLINE STA. 2416+00.00

MATCHLINE STA. 2446+00.00

SR 417 NB RAMP TO I-4 WB GUL

100 YEAR FLOODPLAIN
I-4 WB GUL RAMP TO SR 417 SB

I-4 WB GUL RAMP TO SR 417 SB

WEKIVA PARKWAY

I-4 GUL RAMP TO SR 429 SB

100 YEAR FLOODPLAIN

182

WILSON RD

0 50 200
Feet

100 YEAR FLOODPLAIN

179

BASIN 312

181

I-4 EXPRESS LANES RAMP TO SR 429 SB

EXIST. LA R/W LINE

EXIST. R/W LINE

POND 312

I-4 WB GUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB GUL

2420 2425 2430 2435 2440 2445

EXIST I-4

I-4 EB GUL RAMP TO SR 417 SB

SR 417

SR 429 NB RAMP TO I-4 EB

SR 417 NB RAMP TO I-4 EB

I-4 EB GUL RAMP TO SR 429 SB

EXIST. LA R/W LINE

SEMINOLE TOWNE CENTER

132W

UNITED ARTISTS
SEMINOLE TOWNE CENTER
IO MOVIE THEATER

TOWNE CENTER C/R.

EXIST. R/W LINE

SOUTH MALL ENTRANCE

134W

Color_FDOTPDF.pltcfg
FDOT_text-glow.tbl

PRINT DRIVER:
PEN TABLE:

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-18

MODEL: drmprd13
SHEET SIZE: 16.5x10.6 (in.)
PLOT SCALE: 1:200

MATCHLINE STA. 2446+00.00

MATCHLINE STA. 2476+00.00

100 YEAR FLOODPLAIN

180

EXISTING POND

BASIN 314
59.64 AC

9

EXIST. LA R/W LINE

POND 312

FORD

100 YEAR FLOODPLAIN

SW-10(W)

EXIST. PERP. EASEMENT

I-4 WB GUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB GUL

2450 2455 2460 2465 2470 2475

BASIN 312

TOWNE CENTER CIR.

℄ EXIST I-4

177

178

176

SR 417 RAMP
TO I-4 EB

I-4 GUL RAMP
TO SR 46

EXIST. LA R/W LINE

BASIN 313A
6.85 AC

PROPOSED LA R/W LINE

TOWNE CENTER PLAZA

MILLER'S ALE HOUSE
RESTAURANT

SEMINOLE TOWNE CENTER

N. MALL ENTRANCE RD.

STEAK'N SHAKE

SEMINOLE TOWNE CENTER MALL

BASIN 313A

BASIN 314

Color_FDOTPDF.pltcfg
FDOT_text-gkw.tbl

PRINT DRIVER:
PEN TABLE:

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-19

lphillip 11/3/2016 11:59:52 AM \\LKMw00\pmwork3\Jobs\59219 - I4 SAMR\TECHPROD\43210012201\Segment 3\drainage\drmprd301.dgn

MODEL: drmprd14
SHEET SIZE: 16.5x10.6 (in.)
PLOT SCALE: 1:200

MATCHLINE STA. 2476+00.00

MATCHLINE STA. 2506+00.00

SW-11(W)
SW-15(W)
EXIST. LA R/W LINE
AUDI NORTH ORLANDO AND AUTO MALL
0 50 200 Feet
100 YEAR FLOODPLAIN
SW-10A(W)
WL-2(W)
BASIN 313 13.51 AC
SW-12(W)
SR 46 GUL RAMP TO I-4 WB GUL
SR 46 EB RAMP TO I-4 WB GUL
SW-10B(W)
EXIST. LA R/W LINE
EXIST. PERP. EASEMENT
POND 313A (RECOMMENDED) 1.44 AC
POND 313 (RECOMMENDED) 3.11 AC
BASIN 315 13.10 AC
AUDI NORTH ORLANDO
100 YEAR FLOODPLAIN
I-4 WB GUL RAMP TO SR 46
SW-16(W)
I-4 WB GUL
I-4 WB EXPRESS LANES
I-4 EB EXPRESS LANES
I-4 EB GUL
℄ EXIST I-4
EXIST. LA R/W LINE
PROPOSED LA R/W LINE
SWALE 313A (RECOMMENDED)
1.63 AC
I-4 GUL RAMP TO TOWNE ROAD
I-4 GUL RAMP TO SR 46
BASIN 313A 6.85 AC
TOWNE CENTER PLAZA
SPRINGHILL SUITES
IHOP RESTAURANT
SR 46 RAMP TO I-4 EB GUL
ROYAL INN & SUITES
PARCEL ID: 29-19-30-300-0060-0000 AREA TAKEN: 1,319 SF
WL-2A(E)
CRACKER BARREL
COMFORT INN
PARCEL ID: 29-19-30-300-007C-0000 AREA TAKEN: 921 SF
POND 314 (RECOMMENDED) 9.77 AC
PARCEL ID: 29-19-30-300-007G-0000 AREA TAKEN: 1,720 SF
PARCEL ID: 29-19-30-300-007E-0000 AREA TAKEN: 2,392 SF
BASIN 314 59.64 AC
PARCEL ID: 29-19-30-300-007F-0000 AREA TAKEN: 377 SF
PARCEL ID: 29-19-30-300-005C-0000 AREA TAKEN: 277 SF
SUNOCO GAS STATION
OUTBACK STEAKHOUSE
EXIST. LA R/W LINE
S. OREGON AVE.
TOWNE RD.
HICKMAN DR.
MCDONALDS
7-11 GAS STATION
MOBIL GAS STATION
MATRESS GIANT
100 YEAR FLOODPLAIN (SR 46 ALTERNATE I SHOWN)
SW-16(E)

BASIN 313
BASIN 313A
BASIN 314
BASIN 315

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY DRAINAGE MAP SEGMENT 3

SHEET NO. A-20

PRINT DRIVER: Color_FDOTPDF.pltcfg
PEN TABLE: FDOT_text-qlow.tbl

drmprd15
16.5x10.6 (in.)
1:200

MODEL:
SHEET SIZE:
PLOT SCALE:

MATCHLINE STA. 2506+00.00

MATCHLINE STA. 2536+00.00

SW-17A(W)

100 YEAR FLOODPLAIN

100 YEAR FLOODPLAIN

0 50 200
Feet

50 FT. EASEMENT
TO POND 315

SW-17B(W)

EXIST. LA R/W LINE

SW-15(W)

BASIN 315
13.10 AC

SW-18(W)

BASIN 316
38.74 AC

SW-19(W)

I-4 WB GUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB GUL

2510 2515 2520 2525 2530 2535

25 30 20

BASIN 314
59.64 AC

@ EXIST I-4

SW-17(E)

SW-18(E)

EXIST. LA R/W LINE

104 105 106 107

100 YEAR FLOODPLAIN

POND 314
(RECOMMENDED)
9.77 AC

SW-16(E)

HARLEY-DAVIDSON

100 YEAR FLOODPLAIN

FIVE-R

PLUMMER

HICKMAN CIR.

HIGH REACH 2

FASTERER CORP

GO ELECTRONICS

HICKMAN DR.

GUARDIAN EQUIPMENT

EWING

BASIN 314

BASIN 315

BASIN 316

Cdot_FDOTPDF.pltcfg
FDOT_text-sjkw.tbl

PRINT DRIVER:
PEN TABLE:

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-21

drmprd16
16.5x10.6 (in.)
1:200

MODEL:
SHEET SIZE:
PLOT SCALE:

MATCHLINE STA. 2536+00.00

MATCHLINE STA. 2566+00.00

100 YEAR FLOODPLAIN

ORANGE BLVD.

PORT OF SANFORD

(US 17/92 ALTERNATE I SHOWN)

0 50 200
Feet

SEMINOLE COUNTY PORT AUTHORITY

LA MESA RV

DUNBAR AVE.

CHESTNUT ST.

110 FT. DUKE ENERGY EASEMENT

110 FT. FPL EASEMENT

EXIST. LA R/W LINE

SW-19(W)

PARCEL ID: 16-19-30-5AB-0A00-0010
AREA TAKEN: 5,525 SF

BASIN 317
66.60 AC

US 17/92 GUL RAMP TO I-4 WB GUL

BASIN 316
38.74 AC

SW-21(W)

I-4 WB GUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB GUL

SW-22(W)

SW-21(E)

SW-18(E)

EXIST. LA R/W LINE

SW-19(E)

EXIST I-4

I-4 EB GUL RAMP TO US 17/92

ORANGE BLVD.

SCHOOL ST.

ELDER RD.

SOUTHERN PRIDE BUSINESS CENTER

SW-20(E)

POND 316
(RECOMMENDED)
10.48 AC

BASIN 318
13.25 AC

PARCEL ID: 21-19-30-502-0400-0000
AREA TAKEN: 107 SF

SW-22(E)

FLORIDA ROCK INDUSTRIES

PARCEL ID: 16-19-30-5AC-0000-013B
AREA TAKEN: 5,924 SF

BASIN 316

BASIN 318

Color_FDOTPDF.pltcfg
FDOT_text-glow.tbl

PRINT DRIVER:
PEN TABLE:

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-22

drmprd17
16.5x10.6 (in.)
1:200

MODEL:
SHEET SIZE:
PLOT SCALE:

MATCHLINE STA. 2566+00.00

PARCEL ID: 16-19-30-300-002A-0000
AREA TAKEN: 153,639 SF

100 YEAR FLOODPLAIN

WL-3(W)

EXIST. LA R/W LINE

WL-4(W)

POND 317A
(RECOMMENDED)
8.08 AC

PARCEL ID: 16-19-30-300-002A-0000
AREA TAKEN: 232,651 SF

100 YEAR FLOODPLAIN

BASIN 317
66.60 AC
I-4 WB GUL RAMP TO
US 17/92 GUL

I-4 WB GUL

I-4 WB EXPRESS LANES

I-4 EB EXPRESS LANES

I-4 EB GUL

SW-23(W)

℄ EXIST I-4

MONROE RD GUL RAMP TO
I-4 EB GUL

SW-24(E)

EXIST R/W LINE

POND 317C
(RECOMMENDED)
1.64 AC

100 YEAR FLOODPLAIN

WL-3(E)

100 YEAR FLOODPLAIN

MULTIUSE TRAIL

SW-22A(E)

BASIN 318
13.25 AC

MONROE RD

SW-22B(E)

SW-27(E)

WL-4(E)

MULTIUSE TRAIL

PARCEL ID: 16-19-30-300-0020-0000
AREA TAKEN: 1,085 SF

EXIST. LA R/W LINE

END SEGMENT 3
STA. 2583+00.00

EXISTING BRIDGES
TO REMAIN

WL-5(E)

MULTIUSE TRAIL

WL-6(E)

POND 317B
(RECOMMENDED)
2.27 AC

US 17/92

ST. JOHNS RIVER

VOLUSIA COUNTY
SEMINOLE COUNTY

0 50 200
Feet

BASIN 317

BASIN 318

(US 17/92 ALTERNATE 8 SHOWN)

MATCHLINE STA. 2596+00.00

Color_FDOTPDF.ptc\g
FDOT_text-glow.tbl

PRINT DRIVER:
PEN TABLE:

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HNTB CORPORATION
610 CRESCENT EXECUTIVE CT
SUITE 400
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: SANAM RAI, P.E.
FL. REGISTRATION NO. 69089

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
400	SEMINOLE VOLUSIA	432100-1-22-01

I-4 PD&E STUDY
DRAINAGE MAP
SEGMENT 3

SHEET NO.
A-23

APPENDIX B –

BASIN CALCULATIONS

I-4 PD and E

Segment 3

27 February 2014

INPUT	OUTPUT
State Plane, NAD83	State Plane, NAD83
0901 - Florida East, U.S. Feet	0901 - Florida East, U.S. Feet
Vertical - NGVD29 (Vertcon94), U.S. Feet	Vertical - NAVD88, U.S. Feet

1 1/1

Northing/Y:	1636572.384	**Northing/Y:**	1636572.384
Easting/X:	553830.778	**Easting/X:**	553830.778
Elevation/Z:	0	**Elevation/Z:**	-1.040
Convergence:	-0 09 14.96879	**Convergence:**	-0 09 14.96879
Scale Factor:	0.999953179	**Scale Factor:**	0.999953179
Combined Factor:	0.999957542	**Combined Factor:**	0.999957591

Grid Shift (U.S. ft.): X/Easting = 0.0, Y/Northing = 0.0

Remark:

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	SR	16-Aug-16
checked by:	BJS	16-Aug-16
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: HH
POND NAME: HH (Pond HH in Permit No. 4-117-22434-3)

STATION LIMITS: From: 2040+00
To: 2061+00

Roadway Length: 2100 ft
R/W Width: VARIES (See Note 1)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	12	144 ft
Wall	2 ft	3	6 ft
Shoulder	12 ft	4	48 ft
Shoulder	6 ft	2	12 ft
Shoulder	10 ft	2	20 ft
	Total Impervious Width:		230 ft

Additional Impervious:
(ramps, turn lanes, etc.)

Impervious Roadway Area:	9.55 ac
Pervious Roadway Area:	2.37 ac
Total Roadway Area:	11.92 ac

Pond Area:

Pervious Pond Area:	3.08 ac	(Existing Pond HH)
Water Surface Area:	0.00 ac	
Total Pond Area:	3.08 ac	

Total Area:

Impervious Area:	9.55 ac
Pervious Area:	5.45 ac
Water Surface Area:	0.00 ac
Total Area:	15.00 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	9.55 ac	935.9
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	5.45 ac	267.1
		Total:	15.00 ac	1203.0

CN = Total CN * Area / Total Area = **80.2**

BASIN HH (PERMITTED BASIN HH)	PRE DEVELOPMENT AREA (AC)	POST DEVELOPMENT AREA (AC)
	ONSITE AREAS	
BASIN HH IMPERVIOUS	9.33	9.55
BASIN HH PERVIOUS	4.11	2.37
POND HH	3.38	3.08
POND HH CONTRIBUTING AREA	0.1	0.1
RICHEY GREEN REST AREA	0	0
TOTAL	**16.92**	**15.1**
	OFFSITE AREAS	
SPRINGWOOD VILLAGE	18.92	18.92
LAKE ACORN SUBDIVISION	47.13	47.13
OAK LAKE SUBDIVISION	97.56	97.56
TOTAL	**163.61**	**163.61**
GRAND TOTAL	**180.53**	**178.71**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	SR	16-Aug-16
checked by:	BJS	16-Aug-16
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: II
POND NAME: II (Pond II in Permit No. 4-117-22434-3)

STATION LIMITS: From: 2061+00
To: 2080+00

Roadway Length: 1900 ft
R/W Width: VARIES (See Note 1)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	10	120 ft
Wall	2 ft	3	6 ft
Shoulder	12 ft	4	48 ft
Shoulder	6 ft	2	12 ft
Shoulder	10 ft	2	20 ft
	Total Impervious Width:		206 ft

Additional Impervious:
(ramps, turn lanes, etc.)

Impervious Roadway Area:	11.98 ac
Pervious Roadway Area:	1.78 ac
Total Roadway Area:	13.76 ac

Pond Area:

Pervious Pond Area:	4.21 ac	(Existing Pond II)
Water Surface Area:	0.00 ac	
Total Pond Area:	4.21 ac	

Total Area:

Impervious Area:	11.98 ac
Pervious Area:	5.99 ac
Water Surface Area:	0.00 ac
Total Area:	17.97 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	11.98 ac	1174.0
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	5.99 ac	293.5
		Total:	17.97 ac	1467.6

CN = Total CN * Area / Total Area = **81.7**

BASIN II (PERMITTED BASIN II)	PRE DEVELOPMENT AREA (AC)	POST DEVELOPMENT AREA (AC)
	ONSITE AREAS	
BASIN II IMPERVIOUS	12.34	11.98
BASIN II PERVIOUS	8.54	1.78
POND II	4.21	4.21
POND II CONTRIBUTING AREA	2	2
TOTAL	**27.09**	**19.97**
	OFFSITE AREAS	
RICHEY GREEN REST AREA	14.65	14.65
SANLANDO SPRINGS	14.39	14.39
B 208	6.84	6.84
TOTAL	**35.88**	**35.88**
GRAND TOTAL	**62.97**	**55.85**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	18-Mar-15
checked by:	BJS	18-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 300
POND NAME: 300 (Pond E in Permit No. 22434-1)

STATION LIMITS: From: 2080+00 To: 2128+00
Roadway Length: 4800 ft
R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	4	48 ft
Guardrail	5 ft	0	0 ft
Shoulder	10 ft	4	40 ft
	Total Impervious Width:		88 ft

Additional Impervious: 0.00 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 9.70 ac
Pervious Roadway Area: 23.13 ac
Total Roadway Area: 32.83 ac

Pond Area:

Pervious Pond Area: 4.50 ac
Water Surface Area: 0.00 ac
Total Pond Area: 4.50 ac

Total Area:

Impervious Area: 9.70 ac
Pervious Area: 27.63 ac
Water Surface Area: 0.00 ac
Total Area: 37.33 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	9.70 ac	950.3
Water Area	---	100	0.00 ac	0.0
Woods (Fair cover)	A	36	1.98 ac	71.3
Woods (Fair cover)	A/D	79	3.56 ac	281.2
Open Land (Grass cover 50% - 75%)	A	49	7.64 ac	374.4
Open Land (Grass cover 50% - 75%)	A/D	84	14.45 ac	1214.1
		Total:	37.33 ac	2891.2

CN = Total CN * Area / Total Area = **77.5**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 2.91 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **15.41 in**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	18-Mar-15
checked by:	BJS	18-Mar-15
HNTB job #:	59219	

PROJECT: **I-4 PD&E - SEGMENT 3**

BASIN NAME: 300
POND NAME: 300 (Pond E in Permit No. 22434-1)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	12	144 ft
Wall	2 ft	3	6 ft
Shoulder	12 ft	4	48 ft
Shoulder	6 ft	2	12 ft
Shoulder	10 ft	2	20 ft
	Total Impervious Width:		230 ft

Additional Impervious: 0.16 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 25.50 ac
Pervious Roadway Area: 7.33 ac
Total Roadway Area: 32.83 ac

Pond Area:

Pervious Pond Area: 1.80 ac
Water Surface Area: 2.70 ac
Total Pond Area: 4.50 ac

Total Area:

Impervious Area: 25.50 ac
Pervious Area: 9.13 ac
Water Surface Area: 2.70 ac
Total Area: 37.33 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	25.50 ac	2499.4
Water Area	---	100	2.70 ac	270.0
Open Land (Grass cover 50% - 75%)	A	49	3.45 ac	169.1
Woods (Fair cover)	A/D	79	2.05 ac	162.0
Open Land (Grass cover 50% - 75%)	A/D	84	3.63 ac	304.6
		Total:	37.33 ac	3405.0

CN = Total CN * Area / Total Area = **91.2**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 0.96 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **17.39 in**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	18-Mar-15
checked by:	BJS	18-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 300
POND NAME: 300 (Pond E in Permit No. 22434-1)

POND SIZING : WET DETENTION POND (CLOSED BASIN) - SJRWMD (W/ OUTFALL)

Required Treatment Volume:

3" over Impervious Area = 6.38 ac-ft (Recharge criteria)
1" over Total Area = 3.11 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 6.38 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 15.41 in
Q_{post} = 17.39 in
ΔQ = 1.98 in

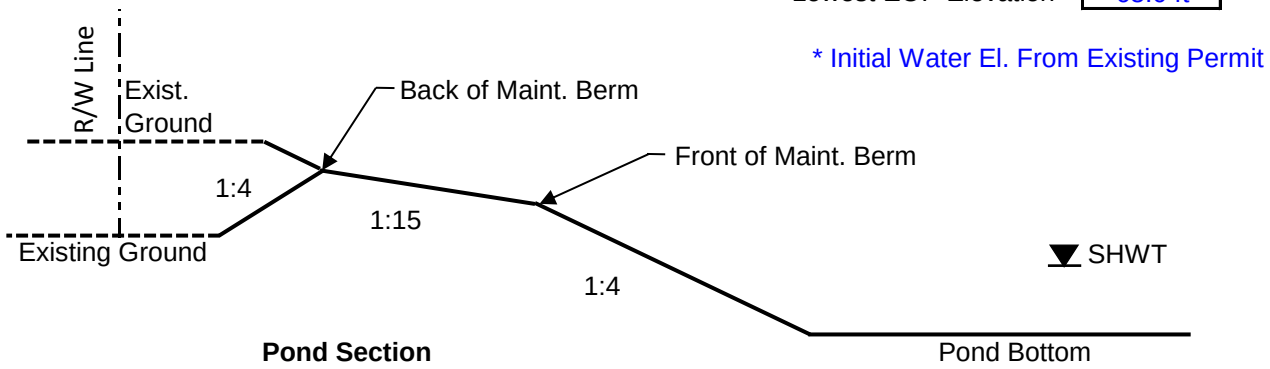
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 6.16 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:15
Pond Tie-In Width = 14.0 ft @ 1:4

Existing Ground Elevation = 65.0 ft
Initial Water Elevation* = 59.96 ft
Lowest EOP Elevation = 65.0 ft

* Initial Water El. From Existing Permit



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
66.00	Back of Maintenance Berm	4.50 ac			20.24 ac-ft
65.00	Front of Maintenance Berm	3.71 ac			16.14 ac-ft
64.00	---	3.51 ac			12.53 ac-ft
62.00	---	3.10 ac			5.92 ac-ft
59.96	Initial Water Elevation	2.70 ac			0.00 ac-ft
52.00	Pond Bottom	1.33 ac			

Required Treatment Volume: 6.38 ac-ft
Required Treat. Vol. + Atten.: 12.53 ac-ft

Top El. Of Treatment Volume: 62.16
Top El. Of Treat. Vol. + Atten.: 64.00

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		date:
made by:	LDP	18-Mar-15
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HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 301
POND NAME: 301 (Pond F in Permit No. 22434-1)

STATION LIMITS: From: 2128+00 To: 2141+00
Roadway Length: 1300 ft
R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	4	48 ft
Shoulder	10 ft	4	40 ft
Guardrail	5 ft	0	0 ft
	Total Impervious Width:		88 ft

Additional Impervious: 0.58 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 3.21 ac
Pervious Roadway Area: 6.13 ac
Total Roadway Area: 9.34 ac

Pond Area:

Pervious Pond Area: 2.03 ac
Water Surface Area: 0.00 ac
Total Pond Area: 2.03 ac

Total Area:

Impervious Area: 3.21 ac
Pervious Area: 8.16 ac
Water Surface Area: 0.00 ac
Total Area: 11.37 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	3.21 ac	314.2
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	3.06 ac	149.9
Open Land (Grass cover 50% - 75%)	A/D	84	5.10 ac	428.7
		Total:	11.37 ac	892.9

CN = Total CN * Area / Total Area = **78.5**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 2.73 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **15.58 in**

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610 Crescent Executive Court, Suite 400
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		date:
made by:	LDP	18-Mar-15
checked by:	BJS	18-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 301
POND NAME: 301 (Pond F in Permit No. 22434-1)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	12	144 ft
Wall	2 ft	3	6 ft
Shoulder	12 ft	4	48 ft
Shoulder	6 ft	2	12 ft
Shoulder	10 ft	2	20 ft
	Total Impervious Width:		230 ft

Additional Impervious: 0.41 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 7.27 ac
Pervious Roadway Area: 2.07 ac
Total Roadway Area: 9.34 ac

Pond Area:

Pervious Pond Area: 0.68 ac
Water Surface Area: 1.35 ac (At the Treatment Volume Stage)
Total Pond Area: 2.03 ac

Total Area:

Impervious Area: 7.27 ac
Pervious Area: 2.75 ac
Water Surface Area: 1.35 ac
Total Area: 11.37 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	7.27 ac	712.9
Water Area	---	100	1.35 ac	135.0
Open Land (Grass cover 50% - 75%)	A	49	1.10 ac	53.9
Open Land (Grass cover 50% - 75%)	A/D	84	1.65 ac	138.3
		Total:	11.37 ac	1040.0

CN = Total CN * Area / Total Area = **91.5**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN}$ - 10 = 0.93 in Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **17.43 in**

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Lake Mary, FL 32746

		date:
made by:	LDP	18-Mar-15
checked by:	BJS	18-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 301
POND NAME: 301 (Pond F in Permit No. 22434-1)

POND SIZING : DRY RETENTION POND (CLOSED BASIN) - SJRWMD (W/ OUTFALL)

Required Treatment Volume:

3" over Impervious Area = 1.82 ac-ft (Recharge criteria)
1" over Total Area = 0.95 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 1.82 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 15.58 in
Q_{post} = 17.43 in
ΔQ = 1.85 in

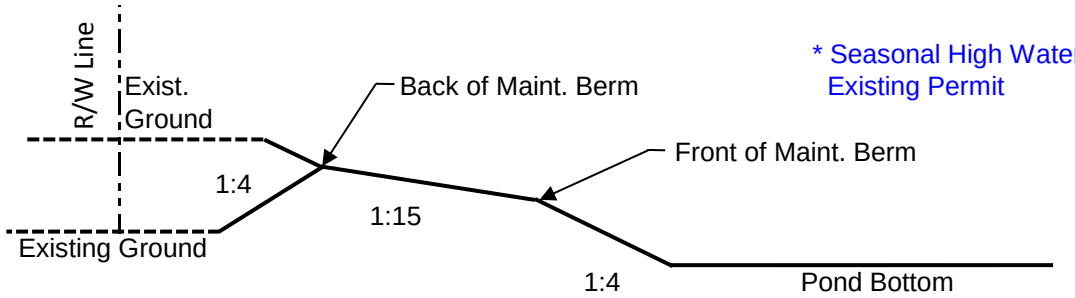
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 1.75 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:15
Pond Tie-In Width = 26.0 ft @ 1:4

Existing Ground Elevation = 60.0 ft
Seasonal High Water Elevation* = 47.96 ft
Lowest EOP Elevation = 55.0 ft

* Seasonal High Water El. From Existing Permit



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
56.00	Back of Maintenance Berm	2.03 ac			8.29 ac-ft
55.00	Front of Maintenance Berm	1.64 ac			6.45 ac-ft
54.00	---	1.55 ac			4.85 ac-ft
53.00	---	1.45 ac			3.35 ac-ft
50.50	Pond Bottom	1.23 ac			0.00 ac-ft

Required Treatment Volume: 1.82 ac-ft
Required Treat. Vol. + Atten.: 3.57 ac-ft
Top El. Of Treatment Volume: 51.86
Top El. Of Treat. Vol. + Atten.: 53.14

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		date:
made by:	LDP	27-Aug-14
checked by:	BJS	27-Aug-14
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT3

BASIN NAME: 302
POND NAME: 302 (Pond G in Permit No. 22434-1)

STATION LIMITS: From: 2141+00 To: 2162+00
Roadway Length: 2100 ft
R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	4	48 ft
Shoulder	10 ft	4	40 ft
Guardrail	5 ft	0	0 ft
	Total Impervious Width:		88 ft

Additional Impervious: 2.66 ac
(ramps, turn lanes, rest area)

Impervious Roadway Area: 6.90 ac
Pervious Roadway Area: 12.15 ac
Total Roadway Area: 19.05 ac

Pond Area:

Pervious Pond Area: 2.02 ac
Water Surface Area: 0.00 ac
Total Pond Area: 2.02 ac

Total Area:

Impervious Area: 6.90 ac
Pervious Area: 14.17 ac
Water Surface Area: 0.00 ac
Total Area: 21.07 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	6.90 ac	676.4
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	14.17 ac	694.2
		Total:	21.07 ac	1370.6

CN = Total CN * Area / Total Area = **65.1**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 5.37 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **13.32 in**

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Lake Mary, FL 32746

		date:
made by:	LDP	27-Aug-14
checked by:	BJS	27-Aug-14
HNTB job #:	59219	

PROJECT: **I-4 PD&E - SEGMENT3**

BASIN NAME: 302
POND NAME: 302 (Pond G in Permit No. 22434-1)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	12	144 ft
Wall	2 ft	3	6 ft
Shoulder	12 ft	4	48 ft
Shoulder	6 ft	2	12 ft
Shoulder	10 ft	2	20 ft
	Total Impervious Width:		230 ft

Additional Impervious: 2.32 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 13.41 ac
Pervious Roadway Area: 5.64 ac
Total Roadway Area: 19.05 ac

Pond Area:

Pervious Pond Area: 0.92 ac
Water Surface Area: 1.10 ac (At the Treatment Volume Stage)
Total Pond Area: 2.02 ac

Total Area:

Impervious Area: 13.41 ac
Pervious Area: 6.56 ac
Water Surface Area: 1.10 ac
Total Area: 21.07 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	13.41 ac	1314.0
Water Area	---	100	1.10 ac	110.0
Open Land (Grass cover 50% - 75%)	A	49	6.56 ac	321.5
		Total:	21.07 ac	1745.5

CN = Total CN * Area / Total Area = **82.8**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 2.07 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **16.23 in**

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		date:
made by:	LDP	27-Aug-14
checked by:	BJS	27-Aug-14
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT3

BASIN NAME: 302
POND NAME: 302 (Pond G in Permit No. 22434-1)

POND SIZING : DRY RETENTION POND (CLOSED BASIN) - SJRWMD (W/ OUTFALL)

Required Treatment Volume:

3" over Impervious Area = 3.35 ac-ft (Recharge criteria)
1" over Total Area = 1.76 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 3.35 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 13.32 in
Q_{post} = 16.23 in
ΔQ = 2.91 in

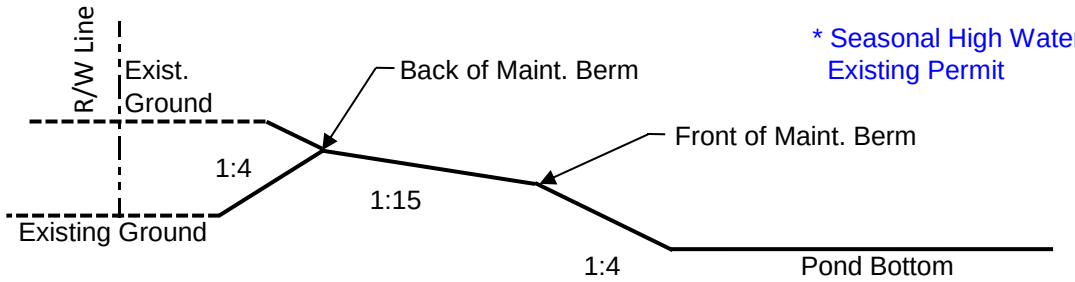
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 5.11 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:15
Pond Tie-In Width = 42.0 ft @ 1:4

Existing Ground Elevation = 65.0 ft
Seasonal High Water Elevation* = 41.46 ft
Lowest EOP Elevation = 55.0 ft

* Seasonal High Water El. From Existing Permit



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
57.00	Back of Maintenance Berm	2.02 ac			12.59 ac-ft
56.00	Front of Maintenance Berm	1.62 ac			10.77 ac-ft
55.00	---	1.52 ac			9.20 ac-ft
50.00	---	1.05 ac			2.78 ac-ft
47.00	Pond Bottom	0.80 ac			0.00 ac-ft

Required Treatment Volume: 3.35 ac-ft
Required Treat. Vol. + Atten.: 8.46 ac-ft
Top El. Of Treatment Volume: 50.62
Top El. Of Treat. Vol. + Atten.: 54.42

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	19-Mar-15
checked by:	BJS	19-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 303
POND NAME: 303-A1 (Pond I in Permit No. 22434-1)

STATION LIMITS: From: 2162+00 To: 2189+00
Roadway Length: 2700 ft
R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	4	48 ft
Guardrail	5 ft	1	5 ft
Shoulder	10 ft	4	40 ft
	Total Impervious Width:		93 ft

Additional Impervious: 0.00 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 5.76 ac
Pervious Roadway Area: 13.28 ac
Total Roadway Area: 19.04 ac

Pond Area:

Pervious Pond Area: 5.42 ac
Water Surface Area: 0.00 ac
Total Pond Area: 5.42 ac

Total Area:

Impervious Area: 5.76 ac
Pervious Area: 18.70 ac
Water Surface Area: 0.00 ac
Total Area: 24.46 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	5.76 ac	564.9
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	18.70 ac	916.1
		Total:	24.46 ac	1481.0

CN = Total CN * Area / Total Area = **60.5**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 6.52 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **12.47 in**

HNTB Corporation
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		date:
made by:	LDP	19-Mar-15
checked by:	BJS	19-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 303
POND NAME: 303-A1 (Pond I in Permit No. 22434-1)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	12	144 ft
Wall	2 ft	3	6 ft
Shoulder	12 ft	4	48 ft
Shoulder	6 ft	2	12 ft
Shoulder	10 ft	2	20 ft
	Total Impervious Width:		230 ft

Additional Impervious: 1.38 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 15.64 ac
Pervious Roadway Area: 3.40 ac
Total Roadway Area: 19.04 ac

Pond Area:

Pervious Pond Area: 1.45 ac
Water Surface Area: 3.97 ac (At the Treatment Volume Stage)
Total Pond Area: 5.42 ac

Total Area:

Impervious Area: 15.64 ac
Pervious Area: 4.85 ac
Water Surface Area: 3.97 ac
Total Area: 24.46 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	15.64 ac	1532.3
Water Area	---	100	3.97 ac	397.0
Open Land (Grass cover 50% - 75%)	A	49	4.85 ac	237.8
		Total:	24.46 ac	2167.2

CN = Total CN * Area / Total Area = **88.6**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.29 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **17.04 in**

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610 Crescent Executive Court, Suite 400
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		date:
made by:	LDP	19-Mar-15
checked by:	BJS	19-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 303
POND NAME: 303-A1 (Pond I in Permit No. 22434-1)

POND SIZING : DRY RETENTION POND (CLOSED BASIN) - SJRWMD (W/ OUTFALL)

Required Treatment Volume:

3" over Impervious Area = 3.91 ac-ft (Recharge Criteria)
1" over Total Area = 2.04 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 3.91 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 12.47 in
Q_{post} = 17.04 in
ΔQ = 4.57 in

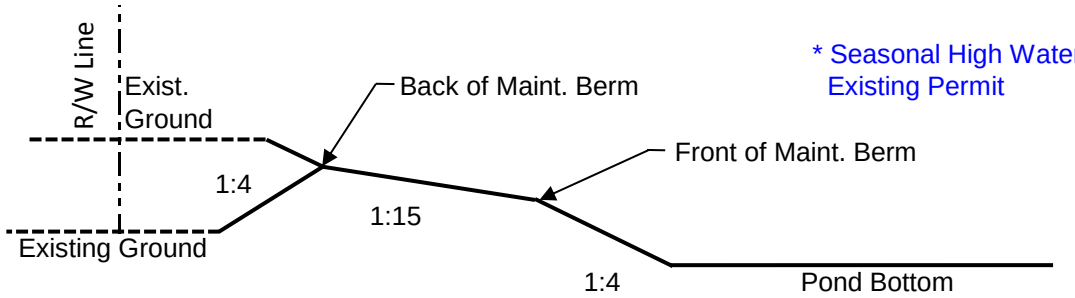
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 9.31 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:15
Pond Tie-In Width = 14.0 ft @ 1:4

Existing Ground Elevation = 63.0 ft
Seasonal High Water Elevation* = 45.06 ft
Lowest EOP Elevation = 66.0 ft

* Seasonal High Water El. From Existing Permit



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
62.00	Back of Maintenance Berm	5.42 ac			30.86 ac-ft
61.00	Front of Maintenance Berm	4.78 ac			25.76 ac-ft
60.00	---	4.61 ac			21.06 ac-ft
57.00	---	4.13 ac			7.95 ac-ft
55.00	Pond Bottom	3.82 ac			0.00 ac-ft

Required Treatment Volume: 3.91 ac-ft
Required Treat. Vol. + Atten.: 13.22 ac-ft
Top El. Of Treatment Volume: 55.98
Top El. Of Treat. Vol. + Atten.: 58.21

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		date:
made by:	LDP	19-Mar-15
checked by:	BJS	19-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 303 (Eastbound Only)
POND NAME: 303-A2 (Pond I in Permit No. 22434-1)

STATION LIMITS: From: 2162+00 To: 2189+00
Roadway Length: 2700 ft
R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	2	24 ft
Gaurdrail	5 ft	1	5 ft
Shoulder	10 ft	2	20 ft
		Total Impervious Width:	49 ft

Additional Impervious: 0.00 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 3.04 ac
Pervious Roadway Area: 7.62 ac
Total Roadway Area: 10.66 ac

Pond Area:

Pervious Pond Area: 1.80 ac
Water Surface Area: 0.00 ac
Total Pond Area: 1.80 ac

Total Area:

Impervious Area: 3.04 ac
Pervious Area: 9.43 ac
Water Surface Area: 0.00 ac
Total Area: 12.46 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	3.04 ac	297.6
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	9.43 ac	461.9
		Total:	12.46 ac	759.5

CN = Total CN * Area / Total Area = **60.9**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 6.41 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **12.55 in**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	19-Mar-15
checked by:	BJS	19-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 303 (Eastbound Only)
POND NAME: 303-A2 (Pond I in Permit No. 22434-1)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	7	84 ft
Wall	2 ft	1	2 ft
Shoulder	12 ft	2	24 ft
Shoulder	6 ft	1	6 ft
Shoulder	10 ft	1	10 ft
	Total Impervious Width:		126 ft

Additional Impervious: 0.70 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 8.51 ac
Pervious Roadway Area: 2.15 ac
Total Roadway Area: 10.66 ac

Pond Area:

Pervious Pond Area: 0.97 ac
Water Surface Area: 0.83 ac (At the Treatment Volume Stage)
Total Pond Area: 1.80 ac

Total Area:

Impervious Area: 8.51 ac
Pervious Area: 3.12 ac
Water Surface Area: 0.83 ac
Total Area: 12.46 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	8.51 ac	834.0
Water Area	---	100	0.83 ac	83.0
Open Land (Grass cover 50% - 75%)	A	49	3.12 ac	153.0
		Total:	12.46 ac	1070.0

CN = Total CN * Area / Total Area = **85.9**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.65 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **16.66 in**

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610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	19-Mar-15
checked by:	BJS	19-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 303 (Eastbound Only)
POND NAME: 303-A2 (Pond I in Permit No. 22434-1)

POND SIZING : DRY RETENTION POND (CLOSED BASIN) - SJRWMD (W/ OUTFALL)

Required Treatment Volume:

3" over Impervious Area = 2.13 ac-ft (Recharge Criteria)
1" over Total Area = 1.04 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 2.13 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 12.55 in
Q_{post} = 16.66 in
ΔQ = 4.11 in

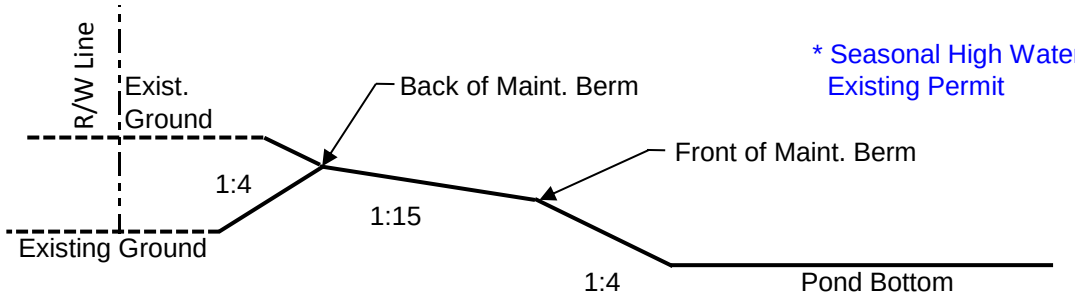
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 4.27 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:15
Pond Tie-In Width = 10.0 ft @ 1:4

Existing Ground Elevation = 63.0 ft
Seasonal High Water Elevation* = 45.06 ft
Lowest EOP Elevation = 66.0 ft

* Seasonal High Water El. From Existing Permit



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
63.00	Back of Maintenance Berm	1.80 ac			9.71 ac-ft
62.00	Front of Maintenance Berm	1.38 ac			8.12 ac-ft
61.00	---	1.28 ac			6.79 ac-ft
56.50	---	0.83 ac			2.06 ac-ft
53.50	Pond Bottom	0.55 ac			0.00 ac-ft

Required Treatment Volume: 2.13 ac-ft
Required Treat. Vol. + Atten.: 6.40 ac-ft
Top El. Of Treatment Volume: 56.60
Top El. Of Treat. Vol. + Atten.: 60.63

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Lake Mary, FL 32746

		date:
made by:	LDP	19-Mar-15
checked by:	BJS	19-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 303 (Westbound Only)
POND NAME: 303-B2

STATION LIMITS: From: 2162+00 To: 2189+00
Roadway Length: 2700 ft
R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	2	24 ft
Gaurdrail	5 ft	0	0 ft
Shoulder	10 ft	2	20 ft
		Total Impervious Width:	44 ft

Additional Impervious: 0.00 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 2.73 ac
Pervious Roadway Area: 5.64 ac
Total Roadway Area: 8.37 ac

Pond Area:

Pervious Pond Area: 1.46 ac
Water Surface Area: 0.00 ac
Total Pond Area: 1.46 ac

Total Area:

Impervious Area: 2.73 ac
Pervious Area: 7.10 ac
Water Surface Area: 0.00 ac
Total Area: 9.83 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	2.73 ac	267.3
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	7.10 ac	348.0
		Total:	9.83 ac	615.3

CN = Total CN * Area / Total Area = **62.6**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 5.98 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **12.86 in**

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		date:
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PROJECT: **I-4 PD&E - SEGMENT 3**

BASIN NAME: 303 (Westbound Only)
POND NAME: 303-B2

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	5	60 ft
Wall	2 ft	1.5	3 ft
Shoulder	12 ft	2	24 ft
Shoulder	6 ft	1	6 ft
Shoulder	10 ft	1	10 ft
	Total Impervious Width:		103 ft

Additional Impervious: 0.32 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 6.70 ac
Pervious Roadway Area: 1.67 ac
Total Roadway Area: 8.37 ac

Pond Area:

Pervious Pond Area: 0.90 ac
Water Surface Area: 0.56 ac (At the Treatment Volume Stage)
Total Pond Area: 1.46 ac

Total Area:

Impervious Area: 6.70 ac
Pervious Area: 2.57 ac
Water Surface Area: 0.56 ac
Total Area: 9.83 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	6.70 ac	657.0
Water Area	---	100	0.56 ac	56.0
Open Land (Grass cover 50% - 75%)	A	49	2.57 ac	125.7
		Total:	9.83 ac	838.7

CN = Total CN * Area / Total Area = **85.3**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.72 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **16.58 in**

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		date:
made by:	LDP	19-Mar-15
checked by:	BJS	19-Mar-15
HNTB job #:	59219	

PROJECT: **I-4 PD&E - SEGMENT 3**

BASIN NAME: 303 (Westbound Only)
POND NAME: 303-B2

POND SIZING : DRY RETENTION POND (CLOSED BASIN) - SJRWMD (W/ OUTFALL)

Required Treatment Volume:

3" over Impervious Area = 1.68 ac-ft (Recharge Criteria)
1" over Total Area = 0.82 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 1.68 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 12.86 in
Q_{post} = 16.58 in
ΔQ = 3.72 in

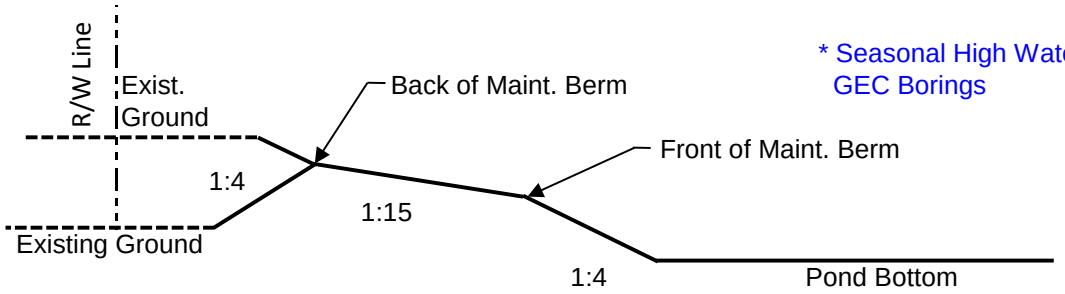
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 3.05 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:15
Pond Tie-In Width = 38.0 ft @ 1:4

Existing Ground Elevation = 74.0 ft
Seasonal High Water Elevation* = 55.0 ft
Lowest EOP Elevation = 66.0 ft

* Seasonal High Water El. From GEC Borings



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
67.00	Back of Maintenance Berm	1.46 ac			7.19 ac-ft
66.00	Front of Maintenance Berm	1.07 ac			5.92 ac-ft
65.00	---	0.98 ac			4.90 ac-ft
62.00	---	0.69 ac			2.40 ac-ft
57.00	Pond Bottom	0.27 ac			0.00 ac-ft

Required Treatment Volume:	1.68 ac-ft	Required Treat. Vol. + Atten.:	4.72 ac-ft
Top El. Of Treatment Volume:	60.49	Top El. Of Treat. Vol. + Atten.:	64.79

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		date:
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PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 304
POND NAME: 304 (Pond J in Permit No. 22434-1)

STATION LIMITS: From: 2189+00 To: 2221+00
Roadway Length: 3200 ft
R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	4	48 ft
Inside Shoulder	8 ft	2	16 ft
Outside Shoulder	10 ft	2	20 ft
	Total Impervious Width:		84 ft

Additional Impervious: (ramps, turn lanes, etc.) 0.00 ac

Impervious Roadway Area: 5.24 ac*
Pervious Roadway Area: 18.39 ac
Total Roadway Area: 23.63 ac

* Existing Impervious Area from permit.

Pond Area:

Pervious Pond Area: 3.21 ac
Water Surface Area: 0.00 ac
Total Pond Area: 3.21 ac

Total Area:

Impervious Area: 5.24 ac
Pervious Area: 21.60 ac
Water Surface Area: 0.00 ac
Total Area: 26.84 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	5.24 ac	513.5
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	21.60 ac	1058.4
		Total:	26.84 ac	1571.9

CN = Total CN * Area / Total Area = **58.6**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 7.07 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **12.08 in**

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		date:
made by:	LDP	20-Mar-15
checked by:	BJS	20-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 304
POND NAME: 304 (Pond J in Permit No. 22434-1)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	12	144 ft
Wall	2 ft	4	8 ft
Shoulder	12 ft	4	48 ft
Shoulder	6 ft	2	12 ft
Shoulder	10 ft	2	20 ft
	Total Impervious Width:		232 ft

Additional Impervious: 2.52 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 19.56 ac
Pervious Roadway Area: 4.07 ac
Total Roadway Area: 23.63 ac

Pond Area:

Pervious Pond Area: 1.31 ac
Water Surface Area: 1.90 ac (At the Treatment Volume Stage)
Total Pond Area: 3.21 ac

Total Area:

Impervious Area: 19.56 ac
Pervious Area: 5.38 ac
Water Surface Area: 1.90 ac
Total Area: 26.84 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	19.56 ac	1917.2
Water Area	---	100	1.90 ac	190.0
Open Land (Grass cover 50% - 75%)	A	49	5.38 ac	263.5
		Total:	26.84 ac	2370.7

CN = Total CN * Area / Total Area = **88.3**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.32 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **17.00 in**

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		date:
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PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 304
POND NAME: 304 (Pond J in Permit No. 22434-1)

POND SIZING : DRY RETENTION POND (CLOSED BASIN) - SJRWMD (W/ OUTFALL)

Required Treatment Volume:

3" over Impervious Area = 4.89 ac-ft (Recharge Criteria)
1" over Total Area = 2.24 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 4.89 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 12.08 in
Q_{post} = 17.00 in
ΔQ = 4.92 in

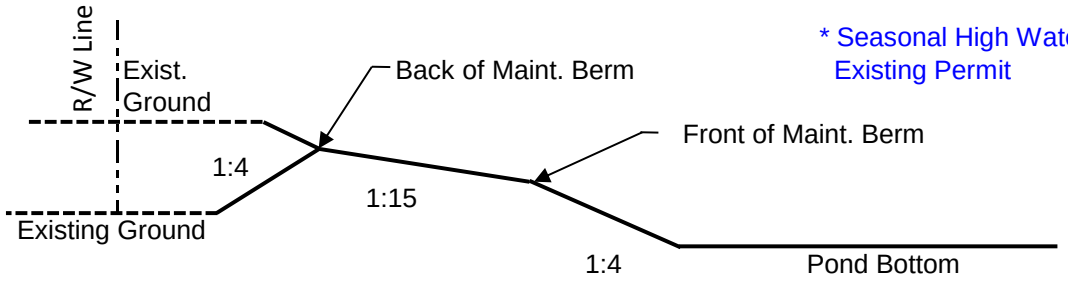
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 11.01 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:15
Pond Tie-In Width = 42.0 ft @ 1:4

Existing Ground Elevation = 72.0 ft
Seasonal High Water Elevation* = 45.0 ft
Lowest EOP Elevation = 68.0 ft

* Seasonal High Water El. From Existing Permit



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
64.00	Back of Maintenance Berm	3.21 ac			22.06 ac-ft
63.00	Front of Maintenance Berm	2.69 ac			19.11 ac-ft
62.00	---	2.56 ac			16.48 ac-ft
58.00	---	2.05 ac			7.26 ac-ft
54.00	Pond Bottom	1.58 ac			0.00 ac-ft

Required Treatment Volume: 4.89 ac-ft
Required Treat. Vol. + Atten.: 15.90 ac-ft

Top El. Of Treatment Volume: 56.69
Top El. Of Treat. Vol. + Atten.: 61.78

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		date:
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PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 305
POND NAME: 305 (Pond 1-SE in Permit No. 22124-2)

STATION LIMITS: From: 2221+00 To: 2284+00

Roadway Length: 6300 ft
R/W Width: VARIES

EXISTING CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	4	48 ft
Inside Shoulder	8 ft	2	16 ft
Outside Shoulder	10 ft	2	20 ft
		Total Impervious Width:	84 ft

Additional Impervious: (ramps, turn lanes, etc.) 3.25 ac

Impervious Roadway Area: 15.40 ac
Pervious Roadway Area: 63.90 ac
Total Roadway Area: 79.30 ac

Pond Area:

Pervious Pond Area: 17.45 ac
Water Surface Area: 0.00 ac
Total Pond Area: 17.45 ac

Total Area:

Impervious Area: 15.40 ac
Pervious Area: 81.35 ac
Water Surface Area: 0.00 ac
Total Area: 96.75 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	15.40 ac	1509.1
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	66.84 ac	3275.1
Open Land (Grass cover 50% - 75%)	A/D	84	14.51 ac	1219.1
		Total:	96.75 ac	6003.2

CN = Total CN * Area / Total Area = **62.0**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 6.12 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **3.95 in**

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		date:
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checked by:	BJS	30-Nov-15
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PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 305
POND NAME: 305 (Pond 1-SE in Permit No. 22124-2)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	10	120 ft
Wall	2 ft	4	8 ft
Shoulder	6 ft	2	12 ft
Shoulder	10 ft	2	20 ft
Shoulder	12 ft	4	48 ft
	Total Impervious Width:		208 ft

Compensation for Lake Emma Road: 1.58 ac

Additional Impervious: 20.28 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 51.94 ac
Pervious Roadway Area: 27.36 ac
Total Roadway Area: 79.30 ac

Pond Area:

Pervious Pond Area: 3.31 ac
Water Surface Area: 14.14 ac (At the Treatment Volume Stage)
Total Pond Area: 17.45 ac

Total Area:

Impervious Area: 51.94 ac
Pervious Area: 30.67 ac
Water Surface Area: 14.14 ac
Total Area: 96.75 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	51.94 ac	5090.4
Water Area	---	100	14.14 ac	1414.0
Open Land (Grass cover 50% - 75%)	A	49	18.09 ac	886.4
Open Land (Grass cover 50% - 75%)	A/D	84	12.58 ac	1056.5
		Total:	96.75 ac	8447.3

CN = Total CN * Area / Total Area = **87.3**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.45 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **6.97 in**

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		date:
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PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 305
POND NAME: 305 (Pond 1-SE in Permit No. 22124-2)

POND SIZING : DRY RETENTION POND (OPEN BASIN) - SJRWMD

Required Treatment Volume:

3" over Impervious Area =	12.99 ac-ft	(Recharge Criteria)
1" over Total Area =	8.06 ac-ft	
Largest Treatment Volume =	12.99 ac-ft	

Additional 50% for OFW:

1.5" over Impervious Area =	6.49 ac-ft
0.5" over Total Area =	4.03 ac-ft
Largest Treatment Volume =	6.49 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = **19.48 ac-ft**

Required Compensation Treatment Volume: **4.18 ac-ft** (Impact to exist. Pond 110, SJRWMD Permit App. No. 22307-1)

Required Compensation Treatment Volume: **0.07 ac-ft** (Impact to exist. Exfiltration Trench # B3 & # B4, SJRWMD Permit App. No. 29351-5)

Total Treatment Volume = **23.73 ac-ft**

Required Attenuation Volume:

Total Runoff:

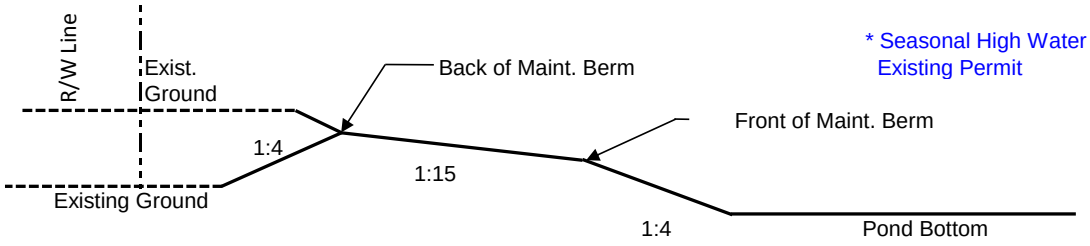
Q_{pre} =	3.95 in
Q_{post} =	6.97 in
ΔQ =	3.02 in

Attenuation V_{req} = ΔQ/12 x Total Area = **24.36 ac-ft**

Maintenance Area Width =	15.0 ft	@ 1:15
Pond Tie-In Width =	19.6 ft	@ 1:4

Existing Ground Elevation =	49.06 ft
Seasonal High Water Elevation* =	38.96 ft
Lowest EOP Elevation =	48.66 ft

* Seasonal High Water El. From Existing Permit



Pond Section

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610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
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checked by:	BJS	30-Nov-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 305
POND NAME: 305 (Pond 1-SE in Permit No. 22124-2)

POND 305

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
46.66	Back of Maintenance Berm	6.96 ac			32.64 ac-ft
45.66	Front of Maintenance Berm	6.09 ac			26.12 ac-ft
44.66	---	5.86 ac			20.14 ac-ft
42.00	---	5.26 ac			5.35 ac-ft
40.96	Pond Bottom	5.03 ac			0.00 ac-ft

POND 305A

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
46.66	Back of Maintenance Berm	10.49 ac			52.43 ac-ft
45.66	Front of Maintenance Berm	9.57 ac			42.40 ac-ft
44.66	---	9.34 ac			32.94 ac-ft
42.00	---	8.71 ac			8.93 ac-ft
40.96	Pond Bottom	8.47 ac			0.00 ac-ft

POND 305 + POND 305A

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
46.66	Back of Maintenance Berm	17.45 ac			85.07 ac-ft
45.66	Front of Maintenance Berm	15.66 ac			68.51 ac-ft
44.66	---	15.20 ac			53.08 ac-ft
42.00	---	13.97 ac			14.28 ac-ft
40.96	Pond Bottom	13.50 ac			0.00 ac-ft

Required Treatment Volume:	19.48 ac-ft	Required Treat. Vol. + Atten.:	48.08 ac-ft
Top El. Of Treatment Volume:	42.38	Top El. Of Treat. Vol. + Atten.:	44.32

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PROJECT: **I-4 PD&E - SEGMENT 3**

BASIN NAME: 306
POND NAME: 306 (Pond 1-NW in Permit No. 22124-2)

STATION LIMITS: From: 2269+00 To: 2284+00
Roadway Length: 1500 ft
R/W Width: VARIES

EXISTING CONDITION

Roadway Area: WB GUL Ramp, northwest quadrant of Lake Mary and westbound side of I-4

Description	Width	Quantity	Total Width
Travel Lane	12 ft	2	24 ft
Inside Shoulder	8 ft	1	8 ft
Outside Shoulder	10 ft	1	10 ft
	Total Impervious Width:		42 ft

Additional Impervious: 5.43 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 6.88 ac
Pervious Roadway Area: 11.50 ac
Total Roadway Area: 18.38 ac

Pond Area:

Pervious Pond Area: 7.92 ac
Water Surface Area: 0.00 ac
Total Pond Area: 7.92 ac

Total Area:

Impervious Area: 6.88 ac
Pervious Area: 19.42 ac
Water Surface Area: 0.00 ac
Total Area: 26.30 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	6.88 ac	673.9
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	17.91 ac	877.8
Open Land (Grass cover 50% - 75%)	A/D	84	1.51 ac	126.8
		Total:	26.30 ac	1678.5

CN = Total CN * Area / Total Area = **63.8**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 5.67 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **4.16 in**

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		date:
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PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 306
POND NAME: 306 (Pond 1-NW in Permit No. 22124-2)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	5	60 ft
Wall	2 ft	2	4 ft
Shoulder	6 ft	1	6 ft
Shoulder	10 ft	1	10 ft
Shoulder	12 ft	2	24 ft
	Total Impervious Width:		104 ft

Additional Impervious: 4.02 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 7.60 ac
Pervious Roadway Area: 10.78 ac
Total Roadway Area: 18.38 ac

Pond Area:

Pervious Pond Area: 1.53 ac
Water Surface Area: 6.39 ac (At the Treatment Volume Stage)
Total Pond Area: 7.92 ac

Total Area:

Impervious Area: 7.60 ac
Pervious Area: 12.31 ac
Water Surface Area: 6.39 ac
Total Area: 26.30 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	7.60 ac	744.9
Water Area	---	100	6.39 ac	639.0
Open Land (Grass cover 50% - 75%)	A	49	10.75 ac	526.7
Open Land (Grass cover 50% - 75%)	A/D	84	1.56 ac	131.0
		Total:	26.30 ac	2041.7

CN = Total CN * Area / Total Area = **77.6**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 2.88 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **5.81 in**

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		date:
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PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 306
POND NAME: 306 (Pond 1-NW in Permit No. 22124-2)

POND SIZING : DRY RETENTION POND (OPEN BASIN) - SJRWMD

Required Treatment Volume:

3" over Impervious Area = 1.90 ac-ft (Recharge Criteria)
1" over Total Area = 2.19 ac-ft

Additional 50% for OFW:

1.5" over Impervious Area = 0.95 ac-ft
0.5" over Total Area = 1.10 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 3.29 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 4.16 in
Q_{post} = 5.81 in
ΔQ = 1.65 in

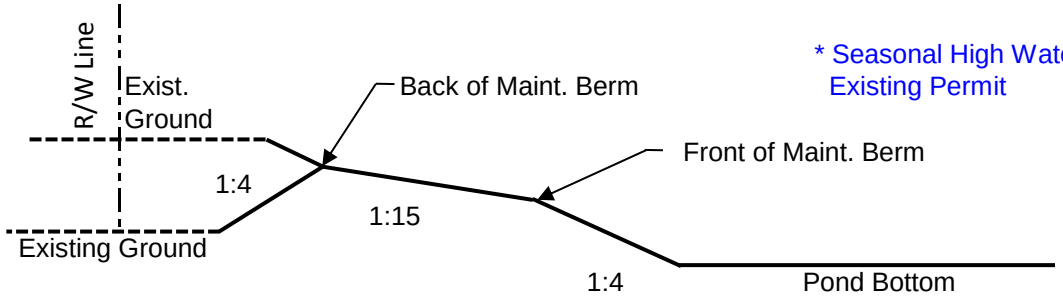
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 3.61 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:15
Pond Tie-In Width = 10.0 ft @ 1:4

Existing Ground Elevation = 60.00 ft
Seasonal High Water Elevation* = 38.33 ft
Lowest EOP Elevation = 57.68 ft

* Seasonal High Water El. From Existing Permit



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
60.00	Back of Maintenance Berm	7.92 ac			27.35 ac-ft
59.00	Front of Maintenance Berm	6.99 ac			19.89 ac-ft
58.00	---	6.75 ac			13.02 ac-ft
57.00	---	6.51 ac			6.39 ac-ft
56.00	Pond Bottom	6.27 ac			0.00 ac-ft

Required Treatment Volume: 3.29 ac-ft
Required Treat. Vol. + Atten.: 6.90 ac-ft
Top El. Of Treatment Volume: 56.51
Top El. Of Treat. Vol. + Atten.: 57.08

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		date:
made by:	LDP	26-Mar-15
checked by:	BJS	26-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 307
POND NAME: 307 (Pond 2 in Permit No. 22124-2)

STATION LIMITS: From: 2284+00 To: 2305+00
Roadway Length: 2100 ft
R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	4	48 ft
Inside Shoulder	10 ft	2	20 ft
Outside Shoulder	8 ft	2	16 ft
		Total Impervious Width:	84 ft

Additional Impervious: 0.40 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 4.45 ac
Pervious Roadway Area: 10.91 ac
Total Roadway Area: 15.36 ac

Pond Area:

Pervious Pond Area: 1.82 ac
Water Surface Area: 0.00 ac
Total Pond Area: 1.82 ac

Total Area:

Impervious Area: 4.45 ac
Pervious Area: 12.73 ac
Water Surface Area: 0.00 ac
Total Area: 17.18 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	4.45 ac	436.1
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	10.18 ac	498.8
Open Land (Grass cover 50% - 75%)	A/D	84	2.55 ac	214.2
		Total:	17.18 ac	1149.1

CN = Total CN * Area / Total Area = **66.9**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 4.95 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **13.65 in**

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		date:
made by:	LDP	26-Mar-15
checked by:	BJS	26-Mar-15
HNTB job #:	59219	

PROJECT: **I-4 PD&E - SEGMENT 3**

BASIN NAME: 307
POND NAME: 307 (Pond 2 in Permit No. 22124-2)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	12	144 ft
Wall	2 ft	4	8 ft
Shoulder	12 ft	4	48 ft
Shoulder	6 ft	2	12 ft
Shoulder	10 ft	2	20 ft
Total Impervious Width:			232 ft

Additional Impervious: 1.21 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 12.39 ac
Pervious Roadway Area: 2.97 ac
Total Roadway Area: 15.36 ac

Pond Area:

Pervious Pond Area: 0.86 ac
Water Surface Area: 0.96 ac (At the Treatment Volume Stage)
Total Pond Area: 1.82 ac

Total Area:

Impervious Area: 12.39 ac
Pervious Area: 3.82 ac
Water Surface Area: 0.96 ac
Total Area: 17.18 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	12.39 ac	1214.7
Water Area	---	100	0.96 ac	96.4
Open Land (Grass cover 50% - 75%)	A	49	1.84 ac	90.2
Open Land (Grass cover 50% - 75%)	A/D	84	1.98 ac	166.3
		Total:	17.18 ac	1567.6

CN = Total CN * Area / Total Area = **91.2**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 0.96 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **17.40 in**

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		date:
made by:	LDP	26-Mar-15
checked by:	BJS	26-Mar-15
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PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 307
POND NAME: 307 (Pond 2 in Permit No. 22124-2)

POND SIZING : DRY RETENTION POND (CLOSED BASIN) - SJRWMD (W/ OUTFALL)

Required Treatment Volume:

1.25" over Impervious Area + 0.5" over Total Area= 1.29 ac-ft
1" over Total Area = 1.43 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 1.43 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 13.65 in
Q_{post} = 17.40 in
ΔQ = 3.75 in

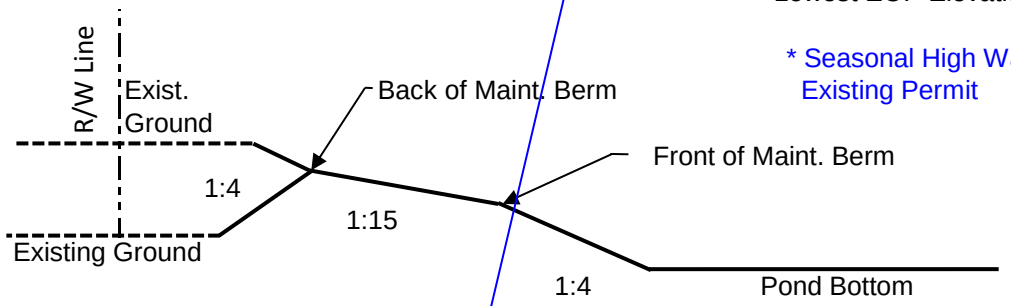
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 5.36 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:15
Pond Tie-In Width = 22.6 ft @ 1:4

Existing Ground Elevation = 60.0 ft
Seasonal High Water Elevation* = 39.36 ft
Lowest EOP Elevation = 60.0 ft

* Seasonal High Water El. From Existing Permit



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
56.86	Back of Maintenance Berm	1.82 ac			10.85 ac-ft
55.36	Front of Maintenance Berm	1.47 ac			8.38 ac-ft
54.00	---	1.25 ac			6.53 ac-ft
50.50	---	1.05 ac			2.51 ac-ft
47.86	Pond Bottom	0.85 ac			0.00 ac-ft

Required Treatment Volume: 1.43 ac-ft
Required Treat. Vol. + Atten.: 6.80 ac-ft

Top El. Of Treatment Volume: 49.37
Top El. Of Treat. Vol. + Atten.: 54.23

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		date:
made by:	LDP	26-Mar-15
checked by:	BJS	26-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 308
POND NAME: 308 (Pond 3 from Permit No. 22124-2)

STATION LIMITS: From: 2305+00 To: 2365+00
Roadway Length: 6000 ft
R/W Width: 300 ft

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	4	48 ft
Inside Shoulder	10 ft	2	20 ft
Outside Shoulder	8 ft	2	16 ft
	Total Impervious Width:		84 ft

Additional Impervious: 0.00 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 11.57 ac
Pervious Roadway Area: 31.44 ac
Total Roadway Area: 43.01 ac

Pond Area:

Pervious Pond Area: 8.67 ac
Water Surface Area: 0.00 ac
Total Pond Area: 8.67 ac

Total Area:

Impervious Area: 11.57 ac
Pervious Area: 40.11 ac
Water Surface Area: 0.00 ac
Total Area: 51.68 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	11.57 ac	1133.9
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	35.24 ac	1726.7
Open Land (Grass cover 50% - 75%)	A/D	84	4.87 ac	409.1
		Total:	51.68 ac	3269.7

CN = Total CN * Area / Total Area = **63.3**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 5.81 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **12.99 in**

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		date:
made by:	LDP	26-Mar-15
checked by:	BJS	26-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 308
POND NAME: 308 (Pond 3 from Permit No. 22124-2)

PROPOSED CONDITION

STATION LIMITS: From: 2305+00 To: 2365+00 Roadway Length: 6000 ft R/W Width: 300 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	14	168 ft
Wall	2 ft	7	14 ft
Shoulder	12 ft	3	36 ft
Shoulder	6 ft	2	12 ft
Shoulder	10 ft	3	30 ft
	Total Impervious Width:		260 ft

Additional Impervious: 2.66 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 38.47 ac
Pervious Roadway Area: 4.54 ac
Total Roadway Area: 43.01 ac

Pond Area:

Pervious Pond Area: 2.40 ac
Water Surface Area: 6.27 ac (At the Treatment Volume Stage)
Total Pond Area: 8.67 ac

Total Area:

Impervious Area: 38.47 ac
Pervious Area: 6.93 ac
Water Surface Area: 6.27 ac
Total Area: 51.68 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	38.47 ac	3770.3
Water Area	---	100	6.27 ac	627.4
Open Land (Grass cover 50% - 75%)	A	49	3.54 ac	173.6
Open Land (Grass cover 50% - 75%)	A/D	84	3.39 ac	284.8
		Total:	51.68 ac	4856.1

CN = Total CN * Area / Total Area = **94.0**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 0.64 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **17.75 in**

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		date:
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checked by:	BJS	26-Mar-15
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PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 308
POND NAME: 308 (Pond 3 from Permit No. 22124-2)

POND SIZING : DRY RETENTION POND (CLOSED BASIN) - SJRWMD (W/ OUTFALL)

Required Treatment Volume:

1.25" over Impervious Area + 0.5" over Total Area= 4.01 ac-ft
1" over Total Area = 4.31 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 4.31 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 12.99 in
Q_{post} = 17.75 in
ΔQ = 4.76 in

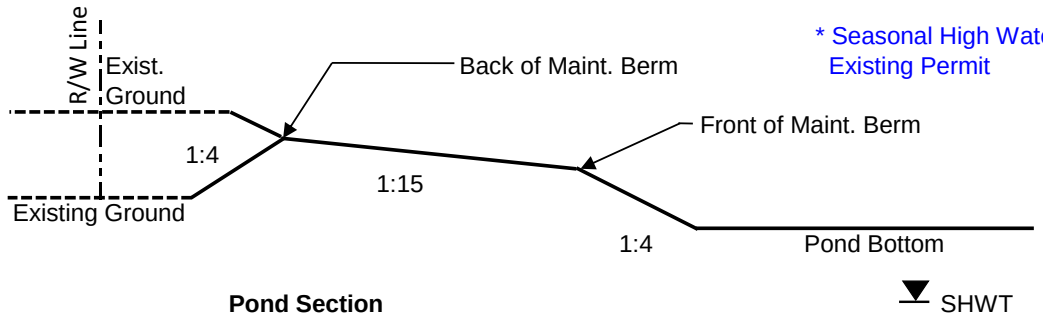
Attenuation V_{req} = $\Delta Q/12$ x Total Area= 20.51 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:15
Pond Tie-In Width = 18.0 ft @ 1:4

Existing Ground Elevation = 55.0 ft
Seasonal High Water Elevation* = 47.16 ft
Lowest EOP Elevation = 60.0 ft

* Seasonal High Water El. From Existing Permit



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
57.00	Back of Maintenance Berm	8.67 ac			47.66 ac-ft
56.00	Front of Maintenance Berm	7.44 ac			39.60 ac-ft
55.00	---	7.12 ac			32.32 ac-ft
52.00	---	6.64 ac			11.68 ac-ft
50.16	Pond Bottom	6.06 ac			0.00 ac-ft

Required Treatment Volume:	4.31 ac-ft	Required Treat. Vol. + Atten.:	24.81 ac-ft
Top El. Of Treatment Volume:	50.84	Top El. Of Treat. Vol. + Atten.:	53.91

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		date:
made by:	SR	11-Dec-15
checked by:	BJS	11-Dec-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 309
POND NAME: 309 (Pond A in Permit No. 22514-1)

STATION LIMITS: From: 2365+00 LT
To: 2386+00 LT

Roadway Length: 2100 ft
R/W Width: VARIES

PROPOSED CONDITION

Roadway Area: (I-4 Westbound and CR 46A West of I-4)

Description	Width	Quantity	Total Width
Travel Lane	12 ft	5	60 ft
Wall	2 ft	3.5	7 ft
Shoulder	6 ft	1	6 ft
Shoulder	10 ft	1	10 ft
Shoulder	12 ft	2	24 ft
	Total Impervious Width:		107 ft

Additional Impervious: 12.23 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 17.39 ac
Pervious Roadway Area: 7.33 ac
Total Roadway Area: 24.72 ac

Pond Area:

Pervious Pond Area: 2.84 ac
Water Surface Area: 10.62 ac
Total Pond Area: 13.46 ac

Total Area:

Impervious Area: 17.39 ac
Pervious Area: 10.17 ac
Water Surface Area: 10.62 ac
Total Area: 38.18 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	17.39 ac	1704.1
Water Area	---	100	10.62 ac	1062.0
Open Land (Grass cover 50% - 75%)	A	49	9.59 ac	470.0
Open Land (Grass cover 50% - 75%)	A/D	84	0.58 ac	48.7
		Total:	38.18 ac	3284.8

CN = Total CN * Area / Total Area = **86.0**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.62 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **16.69 in**

POND SIZING : WET RETENTION POND (CLOSED BASIN) - SJRWMD (NO OUTFALL)

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		date:
made by:	SR	11-Dec-15
checked by:	BJS	11-Dec-15
HNTB job #:	59219	

PROJECT: **I-4 PD&E - SEGMENT 3**

BASIN NAME: 309
POND NAME: 309 (Pond A in Permit No. 22514-1)

Required Treatment Volume:

2.5" over Impervious Area = 3.62 ac-ft
1" over Total Area = 3.18 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 3.62 ac-ft

Required Attenuation Volume:

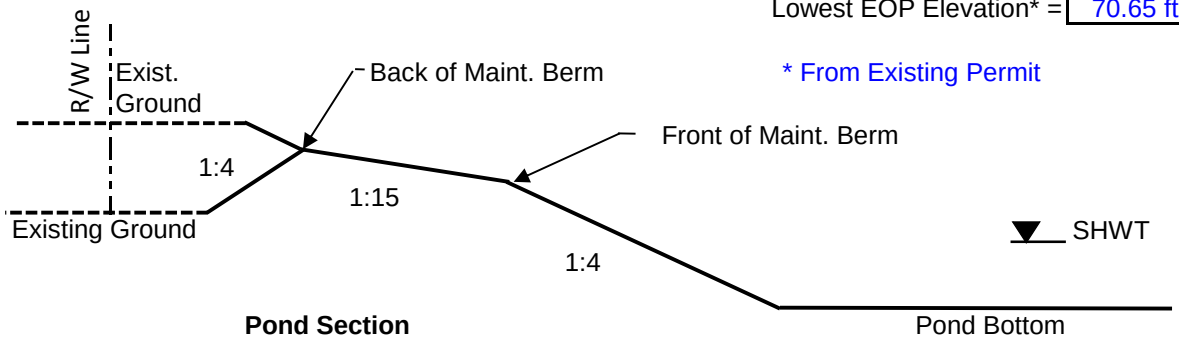
Total Runoff: Q_{post} = 16.69 in

Attenuation V_{req} = ΔQ/12 x Total Area = 53.09 ac-ft

Maintenance Area Width = 15.0 ft @ 1:15
Pond Tie-In Width = 19.2 ft @ 1:4

Existing Ground Elevation = 69.16 ft
Initial Water Elevation* = 66.96 ft
Lowest EOP Elevation* = 70.65 ft

* From Existing Permit



Pond Section

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		date:
made by:	SR	11-Dec-15
checked by:	BJS	11-Dec-15
HNTB job #:	59219	

PROJECT: **I-4 PD&E - SEGMENT 3**

BASIN NAME: 309
POND NAME: 309 (Pond A in Permit No. 22514-1)

POND 309

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
73.96	Back of Maintenance Berm	13.46 ac			81.76 ac-ft
72.96	Front of Maintenance Berm	12.34 ac			68.86 ac-ft
71.96	---	12.05 ac			56.66 ac-ft
67.96	---	10.90 ac			10.76 ac-ft
66.96	Initial Water Elevation	10.62 ac			0.00 ac-ft
58.96	Pond Bottom	8.48 ac			

Required Treatment Volume: 3.62 ac-ft
Required Attenuation Volume: 53.09 ac-ft

Top El. Of Treatment Volume: 68.30
Top El. Of Attenuation Volume: 71.67

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		date:
made by:	LDP	24-Mar-15
checked by:	BJS	24-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 311
POND NAME: 311 (Pond C in Permit No. 22514-1)

STATION LIMITS: From: 2384+00 RT
To: 2410+00 RT

Roadway Length: 2600 ft
R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area: (I-4 Eastbound, CR 46A East of I-4 and Rinehart)

Description	Width	Quantity	Total Width
Travel Lane	12 ft	2	24 ft
Guardrail	5 ft	0	0 ft
Shoulder	10 ft	2	20 ft
		Total Impervious Width:	44 ft

Additional Impervious: 2.13 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 4.76 ac
Pervious Roadway Area: 36.51 ac
Total Roadway Area: 41.27 ac

Pond Area:

Pervious Pond Area: 5.47 ac
Water Surface Area: 0.00 ac
Total Pond Area: 5.47 ac

Total Area:

Impervious Area: 4.76 ac
Pervious Area: 41.98 ac
Water Surface Area: 0.00 ac
Total Area: 46.74 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	4.76 ac	466.1
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	24.35 ac	1193.2
Open Land (Grass cover 50% - 75%)	A/D	84	17.63 ac	1481.2
		Total:	46.74 ac	3140.5

CN = Total CN * Area / Total Area = **67.2**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 4.88 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **13.70 in**

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		date:
made by:	LDP	24-Mar-15
checked by:	BJS	24-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 311
POND NAME: 311 (Pond C in Permit No. 22514-1)

PROPOSED CONDITION

Roadway Area: (I-4 Eastbound, CR 46A East of I-4 and Rinehart)

Description	Width	Quantity	Total Width
Travel Lane	12 ft	4	48 ft
Wall	2 ft	2	4 ft
Inside Shoulder	12 ft	1	12 ft
Outside Shoulder	12 ft	1	12 ft
	Total Impervious Width:		76 ft

Additional Impervious: 19.01 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 23.55 ac
Pervious Roadway Area: 17.72 ac
Total Roadway Area: 41.27 ac

Pond Area:

Pervious Pond Area: 2.15 ac
Water Surface Area: 3.32 ac
Total Pond Area: 5.47 ac

Total Area:

Impervious Area: 23.55 ac
Pervious Area: 19.87 ac
Water Surface Area: 3.32 ac
Total Area: 46.74 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	23.55 ac	2307.5
Water Area	---	100	3.32 ac	332.0
Open Land (Grass cover 50% - 75%)	A	49	11.94 ac	585.2
Open Land (Grass cover 50% - 75%)	A/D	84	7.93 ac	666.1
		Total:	46.74 ac	3890.9

CN = Total CN * Area / Total Area = **83.2**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 2.01 in

Precipitation (P) = 18.5 in (for 100yr/10dy storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **16.29 in**

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		date:
made by:	LDP	24-Mar-15
checked by:	BJS	24-Mar-15
HNTB job #:	59219	

PROJECT: **I-4 PD&E - SEGMENT 3**

BASIN NAME: 311
POND NAME: 311 (Pond C in Permit No. 22514-1)

POND SIZING : WET DETENTION POND (CLOSED BASIN) - SJRWMD (W/ OUTFALL)

Required Treatment Volume:

2.5" over Impervious Area = 4.91 ac-ft
1" over Total Area = 3.90 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 4.91 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 13.70 in
Q_{post} = 16.29 in
ΔQ = 2.58 in

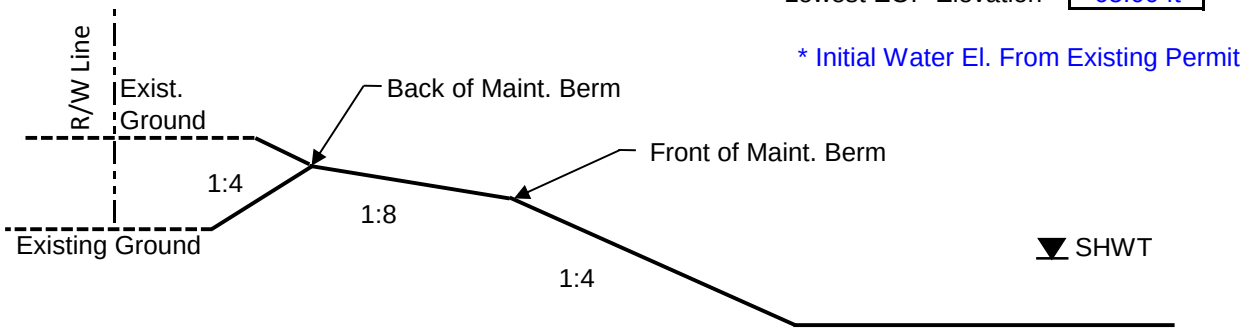
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 10.06 ac-ft

---

Maintenance Area Width = 20.0 ft @ 1:8
Pond Tie-In Width = 13.8 ft @ 1:4

Existing Ground Elevation = 65.00 ft
Initial Water Elevation* = 56.96 ft
Lowest EOP Elevation = 65.00 ft

* Initial Water El. From Existing Permit



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
65.96	Back of Maintenance Berm	5.47 ac			37.62 ac-ft
63.46	Front of Maintenance Berm	4.50 ac			25.16 ac-ft
62.46	---	4.32 ac			20.75 ac-ft
59.96	---	3.77 ac			10.64 ac-ft
56.96	Initial Water Elevation	3.32 ac			0.00 ac-ft
48.96	Pond Bottom	2.65 ac			

Required Treatment Volume:	4.91 ac-ft	Required Treat. Vol. + Atten.:	14.96 ac-ft
Top El. Of Treatment Volume:	58.34	Top El. Of Treat. Vol. + Atten.:	61.03

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		date:
made by:	SR	16-Aug-16
checked by:	BJS	16-Aug-16
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 313A
POND NAME: Swale 313A

STATION LIMITS: From: 2467+50 To: 2485+66 Roadway Length: 1816 ft R/W Width: 300 ft

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	0	0 ft
Inside Shoulder	10 ft	0	0 ft
Outside Shoulder	8 ft	0	0 ft
	Total Impervious Width:		0 ft

Additional Impervious: 2.12 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 2.12 ac
Pervious Roadway Area: 3.10 ac
Total Roadway Area: 6.85 ac

Pond Area:

Pervious Pond Area: 1.63 ac
Water Surface Area: 0.00 ac
Total Pond Area: 1.63 ac

Total Area:

Impervious Area: 2.12 ac
Pervious Area: 4.73 ac
Water Surface Area: 0.00 ac
Total Area: 6.85 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	2.12 ac	207.8
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	D	84	4.87 ac	409.1
		Total:	6.99 ac	616.8

CN = Total CN * Area / Total Area = **88.2**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.33 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **7.09 in**

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		date:
made by:	SR	16-Aug-16
checked by:	BJS	16-Aug-16
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 313A
POND NAME: Swale 313A

PROPOSED CONDITION

STATION LIMITS: From: 2305+00 To: 2365+00 Roadway Length: 6000 ft R/W Width: 300 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	0	0 ft
Wall	2 ft	0	0 ft
Shoulder	12 ft	0	0 ft
Shoulder	6 ft	0	0 ft
Shoulder	10 ft	0	0 ft
	Total Impervious Width:		0 ft

Additional Impervious: 2.74 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 2.74 ac
Pervious Roadway Area: 2.48 ac
Total Roadway Area: 6.85 ac

Pond Area:

Pervious Pond Area: 0.42 ac
Water Surface Area: 1.21 ac
Total Pond Area: 1.63 ac

Total Area:

Impervious Area: 2.74 ac
Pervious Area: 2.90 ac
Water Surface Area: 1.21 ac
Total Area: 6.85 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	2.74 ac	268.5
Water Area	---	100	1.21 ac	121.0
Open Land (Grass cover 50% - 75%)	D	84	2.90 ac	243.6
		Total:	6.85 ac	633.1

CN = Total CN * Area / Total Area = **92.4**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 0.82 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **7.59 in**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	SR	16-Aug-16
checked by:	BJS	16-Aug-16
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 313A
POND NAME: Swale 313A

POND SIZING : DRY RETENTION POND (CLOSED BASIN) - SJRWMD (W/ OUTFALL)

Required Treatment Volume:

1.25" over Impervious Area + 0.5" over Total Area= 0.29 ac-ft
1" over Total Area = 0.57 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 0.57 ac-ft

Required Attenuation Volume:

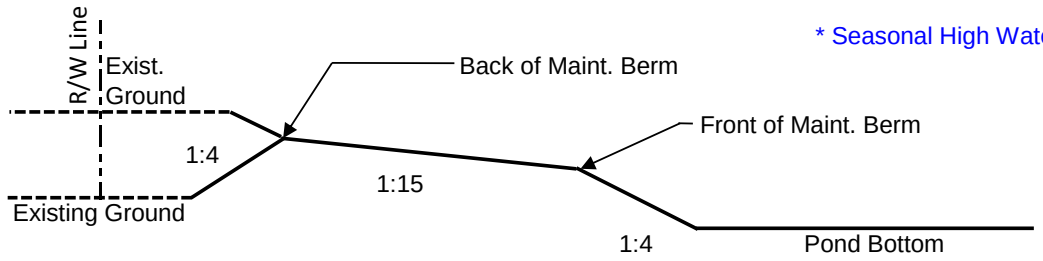
Total Runoff:
Q_{pre} = 7.09 in
Q_{post} = 7.59 in
ΔQ = 0.50 in

Attenuation V_{req} = $\Delta Q/12$ x Total Area= 0.29 ac-ft

Maintenance Area Width = 15.0 ft @ 1:15
Pond Tie-In Width = 10.0 ft @ 1:4

Existing Ground Elevation = 32.0 ft
Seasonal High Water Elevation* = 28.00 ft
Lowest EOP Elevation = 32.0 ft

* Seasonal High Water El. From GEC



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
32.00	Back of Maintenance Berm	1.63 ac			4.13 ac-ft
31.00	Front of Maintenance Berm	1.46 ac			2.59 ac-ft
30.00	---	1.29 ac			1.21 ac-ft
29.50	---	1.21 ac			0.59 ac-ft
29.00	Pond Bottom	1.13 ac			0.00 ac-ft

Required Treatment Volume:	0.57 ac-ft	Required Treat. Vol. + Atten.:	0.86 ac-ft
Top El. Of Treatment Volume:	29.49	Top El. Of Treat. Vol. + Atten.:	29.72

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	19-Dec-15
checked by:	BJS	19-Dec-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 313
POND NAME: 313 (Ponds 1 and 1A in Permit No. 22124-11)

STATION LIMITS: From: 55+70 SR 46 & Roadway Length: 1280 ft
To: 68+50 RAMP R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	4	48 ft
Curb & Gutter	2 ft	2	4 ft
Outside Shoulder	5 ft	1	5 ft
	Total Impervious Width:		57 ft

Additional Impervious: (ramps, turn lanes, etc.) 0.00 ac

Impervious Roadway Area: 3.92 ac
Pervious Roadway Area: 9.59 ac
Total Roadway Area: 13.51 ac

Pond Area:

Pervious Pond Area: 4.55 ac
Water Surface Area: 0.00 ac
Total Pond Area: 4.55 ac

Total Area:

Impervious Area: 3.92 ac
Pervious Area: 14.14 ac
Water Surface Area: 0.00 ac
Total Area: 18.06 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	3.92 ac	383.7
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A/D	84	14.14 ac	1188.1
		Total:	18.06 ac	1571.9

CN = Total CN * Area / Total Area = **87.0**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.49 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **6.94 in**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	19-Dec-15
checked by:	BJS	19-Dec-15
HNTB job #:	59219	

PROJECT: **I-4 PD&E - SEGMENT 3**

BASIN NAME: 313
POND NAME: 313 (Ponds 1 and 1A in Permit No. 22124-11)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	6	72 ft
Wall	2 ft	0	0 ft
Shoulder	4 ft	2	8 ft
Shoulder	12 ft	0	0 ft
	Total Impervious Width:		80 ft

Additional Impervious: (ramps, turn lanes, etc.)	0.65 ac
Impervious Roadway Area:	6.15 ac
Pervious Roadway Area:	7.36 ac
Total Roadway Area:	13.51 ac

Pond Area:

Pervious Pond Area:	1.71 ac
Water Surface Area:	2.84 ac
Total Pond Area:	4.55 ac

Total Area:

Impervious Area:	6.15 ac
Pervious Area:	9.07 ac
Water Surface Area:	2.84 ac
Total Area:	18.06 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	6.15 ac	602.3
Water Area	---	100	2.84 ac	284.0
Open Land (Grass cover 50% - 75%)	A/D	84	9.07 ac	762.2
		Total:	18.06 ac	1648.5

CN = Total CN * Area / Total Area = **91.3**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 0.96 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **7.45 in**

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610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	19-Dec-15
checked by:	BJS	19-Dec-15
HNTB job #:	59219	

PROJECT: **I-4 PD&E - SEGMENT 3**

BASIN NAME: 313
POND NAME: 313 (Ponds 1 and 1A in Permit No. 22124-11)

POND SIZING : WET DETENTION POND (OPEN BASIN) - SJRWMD

Required Treatment Volume:

2.5" over Impervious Area = 1.28 ac-ft
1" over Total Area = 1.51 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 1.51 ac-ft

Required Attenuation Volume:

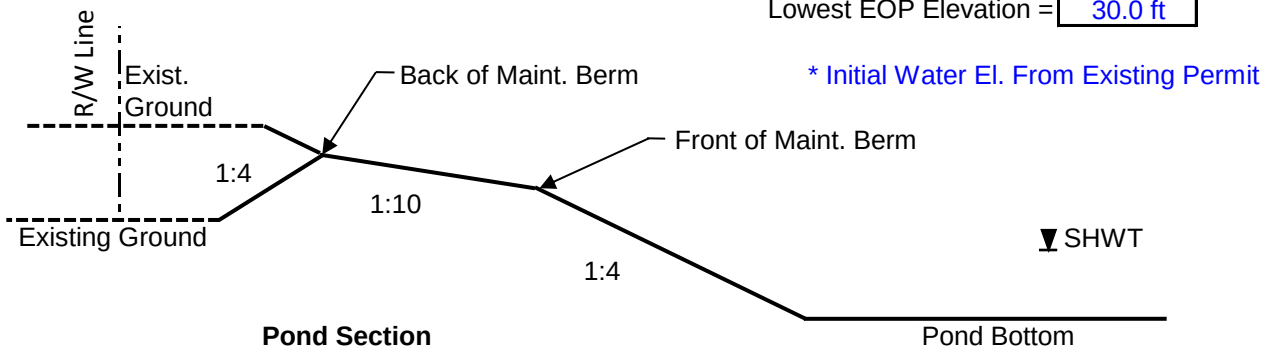
Total Runoff:
Q_{pre} = 6.94 in
Q_{post} = 7.45 in
ΔQ = 0.51 in

Attenuation V_{req} = $\Delta Q/12$ x Total Area = 0.77 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:10
Pond Tie-In Width = 18.0 ft @ 1:4

Existing Ground Elevation = 31.0 ft
Initial Water Elevation* = 27.50 ft
Lowest EOP Elevation = 30.0 ft



Pond Section

* Initial Water El. From Existing Permit

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610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	19-Dec-15
checked by:	BJS	19-Dec-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 313
POND NAME: 313 (Ponds 1 and 1A in Permit No. 22124-11)

POND 313

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
33.00	Back of Maintenance Berm	3.11 ac			13.55 ac-ft
31.50	Front of Maintenance Berm	2.60 ac			9.27 ac-ft
30.50	---	2.46 ac			6.74 ac-ft
29.00	---	2.24 ac			3.21 ac-ft
27.50	Initial Water Elevation	2.04 ac			0.00 ac-ft
17.50	Pond Bottom	1.01 ac			

POND 313A

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
33.00	Back of Maintenance Berm	1.44 ac			5.72 ac-ft
31.50	Front of Maintenance Berm	1.11 ac			3.81 ac-ft
30.50	---	1.03 ac			2.74 ac-ft
29.00	---	0.91 ac			1.28 ac-ft
27.50	Initial Water Elevation	0.80 ac			0.00 ac-ft
17.50	Pond Bottom	0.19 ac			

POND 313 + POND 313A

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
33.00	Back of Maintenance Berm	4.55 ac			19.27 ac-ft
31.50	Front of Maintenance Berm	3.71 ac			13.07 ac-ft
30.50	---	3.49 ac			9.47 ac-ft
29.00	---	3.15 ac			4.49 ac-ft
27.50	Initial Water Elevation	2.84 ac			0.00 ac-ft
17.50	Pond Bottom	1.20 ac			

Required Treatment Volume:	1.51 ac-ft	Required Treat. Vol. + Atten.:	2.27 ac-ft
Top El. Of Treatment Volume:	28.10	Top El. Of Treat. Vol. + Atten.:	28.33

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	26-Mar-15
checked by:	BJS	26-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 314
POND NAME: 314 (Pond 4-I in Permit No. 22124-2)

STATION LIMITS:
From: 2455+00 LT & RT — Roadway Length: 2975 ft
To: 2484+75 LT & RT — R/W Width: VARIES

From: 2484+75 RT — Roadway Length: 3425 ft
To: 2519+00 RT — R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	4	48 ft
Inside Shoulder	8 ft	2	16 ft
Outside Shoulder	10 ft	2	20 ft
		Total Impervious Width:	84 ft

Additional Impervious: 0.00 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 9.04 ac
Pervious Roadway Area: 50.60 ac
Total Roadway Area: 59.64 ac

Pond Area:

Pervious Pond Area: 9.77 ac
Water Surface Area: 0.00 ac
Total Pond Area: 9.77 ac

Total Area:

Impervious Area: 9.04 ac
Pervious Area: 60.37 ac
Water Surface Area: 0.00 ac
Total Area: 69.41 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	9.04 ac	885.8
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A/D	84	60.37 ac	5071.1
		Total:	69.41 ac	5957.0

CN = Total CN * Area / Total Area = **85.8**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.65 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **6.80 in**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	26-Mar-15
checked by:	BJS	26-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 314
POND NAME: 314 (Pond 4-I in Permit No. 22124-2)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	12	144 ft
Wall	2 ft	3	6 ft
Shoulder	6 ft	2	12 ft
Shoulder	10 ft	2	20 ft
Shoulder	12 ft	4	48 ft
	Total Impervious Width:		230 ft

Additional Impervious: 13.13 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 37.88 ac
Pervious Roadway Area: 21.76 ac
Total Roadway Area: 59.64 ac

Pond Area:

Pervious Pond Area: 1.87 ac
Water Surface Area: 7.90 ac
Total Pond Area: 9.77 ac

Total Area:

Impervious Area: 37.88 ac
Pervious Area: 23.63 ac
Water Surface Area: 7.90 ac
Total Area: 69.41 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	37.88 ac	3712.3
Water Area	---	100	7.90 ac	790.0
Open Land (Grass cover 50% - 75%)	A/D	84	23.63 ac	1984.9
		Total:	69.41 ac	6487.2

CN = Total CN * Area / Total Area = **93.5**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 0.70 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **7.71 in**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	26-Mar-15
checked by:	BJS	26-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 314
POND NAME: 314 (Pond 4-I in Permit No. 22124-2)

POND SIZING : WET DETENTION POND (OPEN BASIN) - SJRWMD

Required Treatment Volume:

2.5" over Impervious Area = 7.89 ac-ft
1" over Total Area = 5.78 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 7.89 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 6.80 in
Q_{post} = 7.71 in
ΔQ = 0.92 in

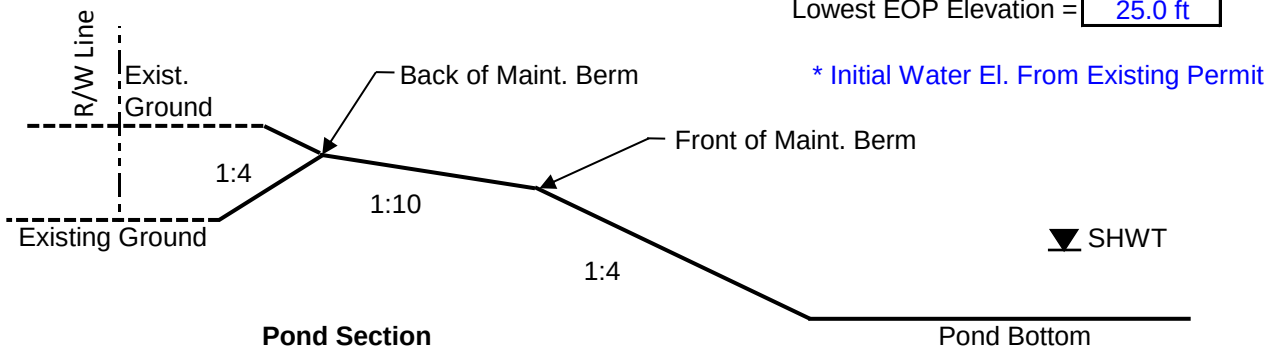
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 5.32 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:10
Pond Tie-In Width = 12.2 ft @ 1:4

Existing Ground Elevation = 25.0 ft
Initial Water Elevation* = 20.76 ft
Lowest EOP Elevation = 25.0 ft

* Initial Water El. From Existing Permit



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
25.56	Back of Maintenance Berm	9.77 ac			41.39 ac-ft
24.06	Front of Maintenance Berm	8.72 ac			27.52 ac-ft
23.06	---	8.53 ac			18.90 ac-ft
21.96	---	8.23 ac			9.68 ac-ft
20.76	Initial Water Elevation	7.90 ac			0.00 ac-ft
14.86	Pond Bottom	6.25 ac			

Required Treatment Volume: 7.89 ac-ft
Required Treat. Vol. + Atten.: 13.21 ac-ft
Top El. Of Treatment Volume: 21.75
Top El. Of Treat. Vol. + Atten.: 22.38

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	26-Mar-15
checked by:	BJS	26-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 315
POND NAME: 315 (Pond 4-II in Permit No. 22124-2)

STATION LIMITS: From: 2484+75 LT
To: 2519+00 LT
Roadway Length: 3425 ft
R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	2	24 ft
Inside Shoulder	8 ft	1	8 ft
Outside Shoulder	10 ft	1	10 ft
		Total Impervious Width:	42 ft

Additional Impervious: 0.00 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 3.30 ac
Pervious Roadway Area: 9.80 ac
Total Roadway Area: 13.10 ac

Pond Area:

Pervious Pond Area: 4.55 ac
Water Surface Area: 0.00 ac
Total Pond Area: 4.55 ac

Total Area:

Impervious Area: 3.30 ac
Pervious Area: 14.35 ac
Water Surface Area: 0.00 ac
Total Area: 17.65 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	3.30 ac	323.6
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A/D	84	14.35 ac	1205.2
		Total:	17.65 ac	1528.8

CN = Total CN * Area / Total Area = **86.6**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.54 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **6.89 in**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	26-Mar-15
checked by:	BJS	26-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 315
POND NAME: 315 (Pond 4-II in Permit No. 22124-2)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	6	72 ft
Wall	2 ft	1.5	3 ft
Shoulder	6 ft	1	6 ft
Shoulder	10 ft	1	10 ft
Shoulder	12 ft	2	24 ft
	Total Impervious Width:		115 ft

Additional Impervious: 1.23 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 10.27 ac
Pervious Roadway Area: 2.83 ac
Total Roadway Area: 13.10 ac

Pond Area:

Pervious Pond Area: 1.42 ac
Water Surface Area: 3.13 ac
Total Pond Area: 4.55 ac

Total Area:

Impervious Area: 10.27 ac
Pervious Area: 4.25 ac
Water Surface Area: 3.13 ac
Total Area: 17.65 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	10.27 ac	1006.7
Water Area	---	100	3.13 ac	313.0
Open Land (Grass cover 50% - 75%)	A/D	84	4.25 ac	356.8
		Total:	17.65 ac	1676.5

CN = Total CN * Area / Total Area = **95.0**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 0.53 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **7.90 in**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	26-Mar-15
checked by:	BJS	26-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 315
POND NAME: 315 (Pond 4-II in Permit No. 22124-2)

POND SIZING : WET DETENTION POND (OPEN BASIN) - SJRWMD

Required Treatment Volume:

2.5" over Impervious Area = 2.14 ac-ft
1" over Total Area = 1.47 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 2.14 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 6.89 in
Q_{post} = 7.90 in
ΔQ = 1.01 in

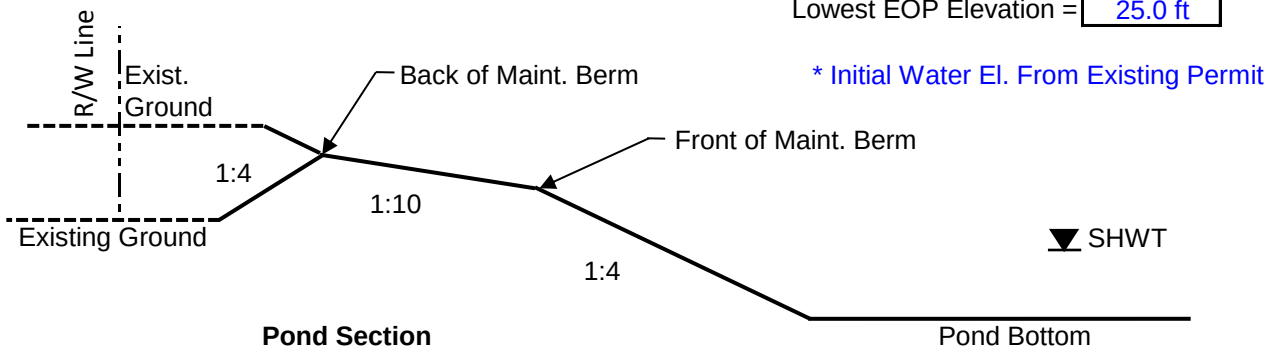
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 1.48 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:10
Pond Tie-In Width = 12.2 ft @ 1:4

Existing Ground Elevation = 25.0 ft
Initial Water Elevation* = 18.66 ft
Lowest EOP Elevation = 25.0 ft

* Initial Water El. From Existing Permit



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
25.56	Back of Maintenance Berm	4.55 ac			25.42 ac-ft
24.06	Front of Maintenance Berm	3.95 ac			19.05 ac-ft
23.06	---	3.78 ac			15.18 ac-ft
20.96	---	3.46 ac			7.58 ac-ft
18.66	Initial Water Elevation	3.13 ac			0.00 ac-ft
8.76	Pond Bottom	1.82 ac			

Required Treatment Volume: 2.14 ac-ft
Required Treat. Vol. + Atten.: 3.62 ac-ft

Top El. Of Treatment Volume: 19.31
Top El. Of Treat. Vol. + Atten.: 19.87

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	11-Dec-15
checked by:	BJS	11-Dec-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 316
POND NAME: 316 (Pond 5 in Permit No. 22124-2)

STATION LIMITS: From: 2519+00 To: 2565+00
Roadway Length: 4600 ft
R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	4	48 ft
Inside Shoulder	8 ft	2	16 ft
Outside Shoulder	10 ft	2	20 ft
	Total Impervious Width:		84 ft

Additional Impervious: 5.07 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 13.94 ac
Pervious Roadway Area: 24.80 ac
Total Roadway Area: 38.74 ac

Pond Area:

Pervious Pond Area: 10.48 ac
Water Surface Area: 0.00 ac
Total Pond Area: 10.48 ac

Total Area:

Impervious Area: 13.94 ac
Pervious Area: 35.28 ac
Water Surface Area: 0.00 ac
Total Area: 49.22 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	13.94 ac	1366.2
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	6.70 ac	328.5
Open Land (Grass cover 50% - 75%)	A/D, C/D	84	28.58 ac	2400.4
		Total:	49.22 ac	4095.0

CN = Total CN * Area / Total Area = **83.2**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN}$ - 10 = 2.02 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **6.48 in**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	11-Dec-15
checked by:	BJS	11-Dec-15
HNTB job #:	59219	

PROJECT: **I-4 PD&E - SEGMENT 3**

BASIN NAME: 316
POND NAME: 316 (Pond 5 in Permit No. 22124-2)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	12	144 ft
Wall	2 ft	3	6 ft
Shoulder	6 ft	2	12 ft
Shoulder	10 ft	2	20 ft
Shoulder	12 ft	4	48 ft
	Total Impervious Width:		230 ft

Additional Impervious: 1.90 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 26.19 ac
Pervious Roadway Area: 12.55 ac
Total Roadway Area: 38.74 ac

Pond Area:

Pervious Pond Area: 1.89 ac
Water Surface Area: 8.59 ac
Total Pond Area: 10.48 ac

Total Area:

Impervious Area: 26.19 ac
Pervious Area: 14.44 ac
Water Surface Area: 8.59 ac
Total Area: 49.22 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	26.19 ac	2566.5
Water Area	---	100	8.59 ac	859.0
Open Land (Grass cover 50% - 75%)	A	49	3.75 ac	184.0
Open Land (Grass cover 50% - 75%)	A/D	84	10.69 ac	897.7
		Total:	49.22 ac	4507.1

CN = Total CN * Area / Total Area = **91.6**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 0.92 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **7.49 in**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	11-Dec-15
checked by:	BJS	11-Dec-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 316
POND NAME: 316 (Pond 5 in Permit No. 22124-2)

POND SIZING : WET DETENTION POND (OPEN BASIN) - SJRWMD

Required Treatment Volume:

2.5" over Impervious Area = 5.46 ac-ft
1" over Total Area = 4.10 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 5.46 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 6.48 in
Q_{post} = 7.49 in
ΔQ = 1.01 in

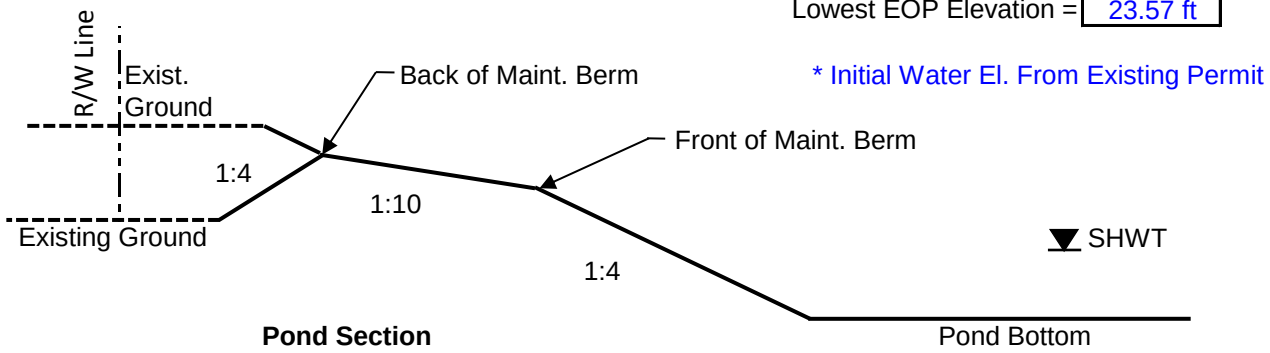
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 4.13 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:10
Pond Tie-In Width = 27.9 ft @ 1:4

Existing Ground Elevation = 21.93 ft
Control Elevation 12.06 ft
Lowest EOP Elevation = 23.57 ft

* Initial Water El. From Existing Permit



Pond Section

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
17.46	Back of Maintenance Berm	10.48 ac			36.10 ac-ft
16.06	Front of Maintenance Berm	9.48 ac			22.13 ac-ft
12.06	Initial Water Elevation	8.59 ac			0.00 ac-ft
6.06	Pond Bottom	7.30 ac			

Required Treatment Volume: 5.46 ac-ft
Required Treat. Vol. + Atten.: 9.59 ac-ft
Top El. Of Treatment Volume: 13.05
Top El. Of Treat. Vol. + Atten.: 13.79

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	18-Mar-15
checked by:	BJS	18-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 317
POND NAME: 317 (Pond QQ-3 and QQ-5 in Permit No. 4-127-64105-1) (Pond 1 in Permit No. 64105-7)

STATION LIMITS: From: 2565+00 To: 2583+00
Roadway Length: 1800 ft
R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	4	48 ft
Inside Shoulder	8 ft	2	16 ft
Outside Shoulder	10 ft	2	20 ft
		Total Impervious Width:	84 ft

Additional Impervious: (ramps, turn lanes, etc.) 18.00 ac

Impervious Roadway Area: 21.47 ac
Pervious Roadway Area: 45.13 ac
Total Roadway Area: 66.60 ac

Pond Area:

Pervious Pond Area: 11.99 ac
Water Surface Area: 0.00 ac
Total Pond Area: 11.99 ac

Total Area:

Impervious Area: 21.47 ac
Pervious Area: 57.12 ac
Water Surface Area: 0.00 ac
Total Area: 78.59 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	21.47 ac	2104.2
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	12.35 ac	605.2
Open Land (Grass cover 50% - 75%)	A/D, B/D, C/D	84	44.77 ac	3760.6
		Total:	78.59 ac	6469.9

CN = Total CN * Area / Total Area = **82.3**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 2.15 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **6.37 in**

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610 Crescent Executive Court, Suite 400
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		date:
made by:	LDP	18-Mar-15
checked by:	BJS	18-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 317
POND NAME: 317 (Pond QQ-3 and QQ-5 in Permit No. 4-127-64105-1) (Pond 1 in Permit No. 64105-7)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	10	120 ft
Wall	2 ft	6	12 ft
Shoulder	6 ft	2	12 ft
Shoulder	10 ft	2	20 ft
Shoulder	12 ft	4	48 ft
	Total Impervious Width:		212 ft

Additional Impervious: 13.42 ac
(ramps, turn lanes, etc.)

Impervious Roadway Area: 22.18 ac
Pervious Roadway Area: 44.42 ac
Total Roadway Area: 66.60 ac

Pond Area:

Pervious Pond Area: 4.65 ac
Water Surface Area: 7.34 ac
Total Pond Area: 11.99 ac

Total Area:

Impervious Area: 22.18 ac
Pervious Area: 49.07 ac
Water Surface Area: 7.34 ac
Total Area: 78.59 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	22.18 ac	2173.7
Water Area	---	100	7.34 ac	734.0
Open Land (Grass cover 50% - 75%)	A	49	9.56 ac	468.4
Open Land (Grass cover 50% - 75%)	A/D, B/D, C/D	84	39.51 ac	3318.8
		Total:	78.59 ac	6694.9

CN = Total CN * Area / Total Area = **85.2**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.74 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **6.72 in**

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610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	18-Mar-15
checked by:	BJS	18-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 317
POND NAME: 317 (Pond QQ-3 and QQ-5 in Permit No. 4-127-64105-1) (Pond 1 in Permit No. 64105-7)

POND SIZING : WET DETENTION POND (OPEN BASIN) - SJRWMD

Required Treatment Volume:

2.5" over Impervious Area = 4.62 ac-ft
1" over Total Area = 6.55 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 6.55 ac-ft

Required Attenuation Volume:

Total Runoff:
Q_{pre} = 6.37 in
Q_{post} = 6.72 in
ΔQ = 0.34 in

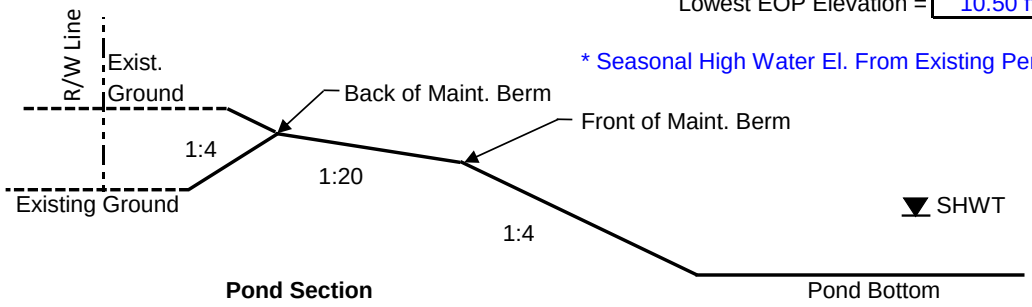
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 2.26 ac-ft

---

Maintenance Area Width = 20.0 ft @ 1:20
Pond Tie-In Width = 12.0 ft @ 1:4

Existing Ground Elevation = 10.00 ft
Estimated Seasonal High = 4.50 ft
Lowest EOP Elevation = 10.50 ft

* Seasonal High Water El. From Existing Permit



Pond Section

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	18-Mar-15
checked by:	BJS	18-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 317
POND NAME: 317 (Pond QQ-3 and QQ-5 in Permit No. 4-127-64105-1) (Pond 1 in Permit No. 64105-7)

POND 317A

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
9.50	Back of Maintenance Berm	8.08 ac			32.27 ac-ft
8.50	Front of Maintenance Berm	6.73 ac			24.86 ac-ft
4.50	Initial Water Elevation	5.70 ac			0.00 ac-ft
-3.75	Pond Bottom	3.70 ac			

POND 317B

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
9.50	Back of Maintenance Berm	2.27 ac			6.91 ac-ft
8.50	Front of Maintenance Berm	1.63 ac			4.96 ac-ft
4.50	Initial Water Elevation	0.85 ac			0.00 ac-ft
-3.75	Pond Bottom	0.16 ac			

POND 317C

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
9.50	Back of Maintenance Berm	1.64 ac			5.28 ac-ft
8.50	Front of Maintenance Berm	1.15 ac			3.88 ac-ft
4.50	Initial Water Elevation	0.79 ac			0.00 ac-ft
-3.75	Pond Bottom	0.19 ac			

POND 317A + POND 317B

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
9.50	Back of Maintenance Berm	11.99 ac			44.45 ac-ft
8.50	Front of Maintenance Berm	9.51 ac			33.70 ac-ft
4.50	Initial Water Elevation	7.34 ac			0.00 ac-ft
-3.75	Pond Bottom	4.05 ac			

Required Treatment Volume:	6.55 ac-ft	Required Treat. Vol. + Atten.:	8.80 ac-ft
Top El. Of Treatment Volume:	5.28	Top El. Of Treat. Vol. + Atten.:	5.55

HNTB Corporation
610 Crescent Executive Court, Suite 400
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		date:
made by:	LDP	16-Mar-15
checked by:	BJS	16-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 318
POND NAME: 318 (Pond 4 in Permit No. 40-117-90901-1,2)

STATION LIMITS: From:* 060+85 To:* 082+02
Roadway Length: 2117 ft
R/W Width: VARIES

EXISTING CONDITION

Note: Existing condition reflects the previous condition before the current pond was built.

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	2	24 ft
Bike Lane	4 ft	0	0 ft
Curb & Gutter	2 ft	2	4 ft
		Total Impervious Width:	28 ft

Additional Impervious: (ramps, turn lanes, etc.)	4.05 ac
Additional off site Impervious:	6.95 ac
Additional off site Pervious:	0.39 ac
Impervious Roadway Area:	12.36 ac
Pervious Roadway Area:	0.89 ac
Total Roadway Area:	13.25 ac

Pond Area:

Pervious Pond Area:	3.63 ac
Water Surface Area:	0.00 ac
Total Pond Area:	3.63 ac

Total Area:

Impervious Area:	12.36 ac
Pervious Area:	4.52 ac
Water Surface Area:	0.00 ac
Total Area:	16.88 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	12.36 ac	1211.4
Water Area	---	100	0.00 ac	0.0
Open Land (Grass cover 50% - 75%)	A	49	1.73 ac	84.8
Open Land (Grass cover 50% - 75%)	A/D, C/D	84	2.79 ac	234.3
		Total:	16.88 ac	1530.4

CN = Total CN * Area / Total Area = **90.7**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.03 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **7.38 in**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	16-Mar-15
checked by:	BJS	16-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 318
POND NAME: 318 (Pond 4 in Permit No. 40-117-90901-1,2)

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12 ft	4	48 ft
Wall	2 ft	2	4 ft
Turn Lane	12 ft	1	12 ft
Shoulder	8 ft	2	16 ft
Bike Lane	6 ft	2	12 ft
	Total Impervious Width:		92 ft

Additional Impervious: (ramps, turn lanes, etc.)	2.30 ac
Additional off site Impervious:	5.83 ac
Additional off site Pervious:	0.26 ac
Impervious Roadway Area:	12.60 ac
Pervious Roadway Area:	0.65 ac
Total Roadway Area:	13.25 ac

Pond Area:

Pervious Pond Area:	1.64 ac
Water Surface Area:	1.99 ac
Total Pond Area:	3.63 ac

Total Area:

Impervious Area:	12.60 ac
Pervious Area:	2.29 ac
Water Surface Area:	1.99 ac
Total Area:	16.88 ac

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious Area	---	98	12.60 ac	1234.9
Water Area	---	100	1.99 ac	199.0
Open Land (Grass cover 50% - 75%)	A	49	0.50 ac	24.5
Open Land (Grass cover 50% - 75%)	A/D, C/D	84	1.79 ac	150.3
		Total:	16.88 ac	1608.7

CN = Total CN * Area / Total Area = **95.3**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 0.49 in

Precipitation (P) = 8.5 in (for 25yr/24hr storm event)

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **7.94 in**

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	16-Mar-15
checked by:	BJS	16-Mar-15
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

BASIN NAME: 318
POND NAME: 318 (Pond 4 in Permit No. 40-117-90901-1,2)

POND SIZING : WET DETENTION POND (OPEN BASIN) - SJRWMD

Required Treatment Volume:

2.5" over Impervious Area = 2.63 ac-ft
1" over Total Area = 1.41 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = 2.63 ac-ft

Required Attenuation Volume:

Total Runoff: Q_{pre} = 7.38 in
Q_{post} = 7.94 in
ΔQ = 0.56 in

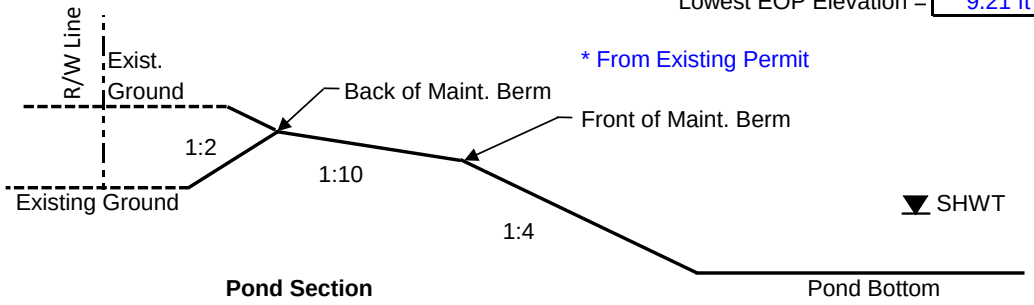
Attenuation V_{req} = $\Delta Q/12$ x Total Area = 0.78 ac-ft

---

Maintenance Area Width = 15.0 ft @ 1:10
Pond Tie-In Width = 11.9 ft @ 1:2

Existing Ground Elevation = 10.00 ft
Control Elevation * = 6.46 ft
Lowest EOP Elevation = 9.21 ft

* From Existing Permit



Pond Section

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	LDP	16-Mar-15
checked by:	BJS	16-Mar-15
HNTB job #:	59219	

PROJECT: **I-4 PD&E - SEGMENT 3**

BASIN NAME: 318
POND NAME: 318 (Pond 4 in Permit No. 40-117-90901-1,2)

POND 318A

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
10.96	Back of Maintenance Berm	2.04 ac			6.89 ac-ft
9.46	Front of Maintenance Berm	1.63 ac			4.14 ac-ft
6.46	Initial Water Elevation	1.13 ac			0.00 ac-ft
4.46	------	0.89 ac			

POND 318B

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
10.96	Back of Maintenance Berm	1.59 ac			5.32 ac-ft
9.46	Front of Maintenance Berm	1.26 ac			3.18 ac-ft
6.46	Initial Water Elevation	0.86 ac			0.00 ac-ft
4.46	------	0.67 ac			

POND 318A + POND 318B

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
10.96	Back of Maintenance Berm	3.63 ac			12.21 ac-ft
9.46	Front of Maintenance Berm	2.89 ac			7.32 ac-ft
6.46	Initial Water Elevation	1.99 ac			0.00 ac-ft
4.46	------	1.56 ac			

Required Treatment Volume: 2.63 ac-ft
Required Treat. Vol. + Atten.: 3.41 ac-ft
Top El. Of Treatment Volume: 7.54
Top El. Of Treat. Vol. + Atten.: 7.86

Freeboard = 1.60 ac

APPENDIX C –

FLOODPLAIN CALCULATIONS

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

		date:
made by:	SR	16-Aug-16
checked by:	BJS	16-Aug-16
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

POND NAME: FPC 300-A

FLOODPLAIN COMPENSATION CALCULATIONS

WESTBOUND ROADWAY:

Station Limits: 2116+00 to 2124+00

Roadway Length: 800 ft

Roadway Width: 20 ft

100 YR Floodplain Elevation:	66.0 ft
Ave. Existing Ground Elevation:	62.0 ft
Elevation Difference:	4.0 ft

Required Compensation = Roadway Length * Roadway Width * Elevation Difference: 1.47 ac-ft

---

EASTBOUND ROADWAY:

Station Limits: 2106+50 to 2124+50

Roadway Length: 1800 ft

Roadway Width: 30 ft

100 YR Floodplain Elevation:	66.0 ft
Ave. Existing Ground Elevation:	62.0 ft
Elevation Difference:	4.0 ft

Required Compensation = Roadway Length * Roadway Width * Elevation Difference: 4.96 ac-ft

---

Total Roadway Required Compensation: 6.43 ac-ft

HNTB Corporation
610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

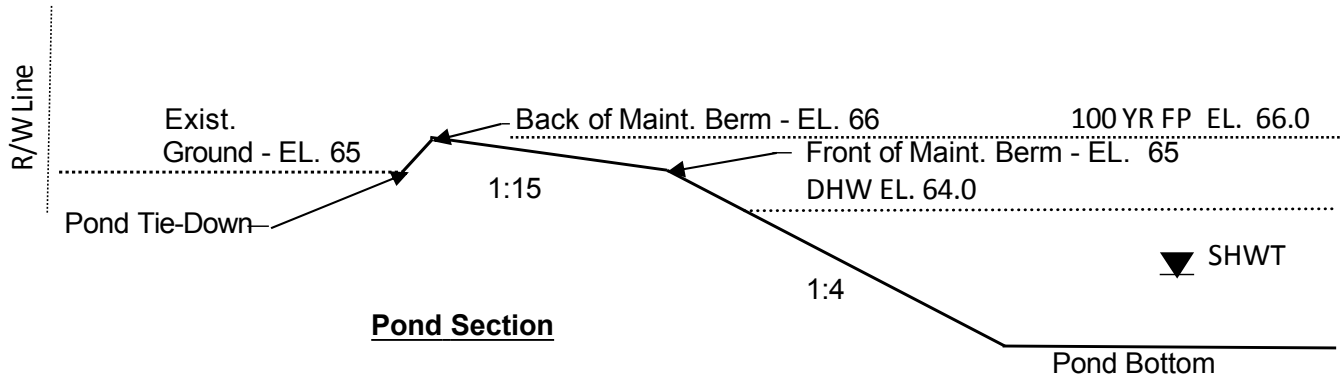
		date:
made by:	SR	16-Aug-16
checked by:	BJS	16-Aug-16
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

POND NAME: FPC 300-A

FLOODPLAIN COMPENSATION CALCULATIONS

EXISTING/PROPOSED TREATMENT POND:



Pond Section

Area Between Pond Tie Down and Front of Berm: 0.79 ac

Back of Berm Elevation: 66.0 ft
Existing Ground EL./Front of Berm EL.: 65.0 ft
Elevation Difference: 1.0 ft

Amount of Fill = Area * Elevation Difference: 0.79 ac-ft

Ave. Area Between Front of Berm and DHW from Pond: 3.61 ac

Existing Ground EL./Front of Berm EL.: 65.0 ft
DHW Elevation: 64.0 ft
Elevation Difference: 1.0 ft

Amount of Cut = Ave. Area * Elevation Difference: 3.61 ac-ft

Provided Pond Compensation = Amount of Cut - Amount of Fill: 2.82 ac-ft

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		date:
made by:	SR	16-Aug-16
checked by:	BJS	16-Aug-16
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

POND NAME: FPC 300-A

FLOODPLAIN COMPENSATION CALCULATIONS

REQUIRED COMPENSATION

Required Roadway Compensation:	6.43 ac-ft
Provided Pond Compensation:	-2.82 ac-ft
Total Required Compensation:	3.61 ac-ft

PROPOSED FLOODPLAIN POND:

FPC 300-A

100 YR Floodplain Elevation: 66.0 ft
Avg. Existing Ground Elevation: 75.0 ft

Seasonal High Water Elevation: 55.0 ft

* Seasonal High Water El. From GEC Borings

Elevation	Area	Storage
66.00	0.69 ac	3.79 ac-ft
66.00	0.62 ac	3.79 ac-ft
65.00	0.56 ac	3.20 ac-ft
55.00	0.08 ac	0.00 ac-ft

Total Storage Provided by FPC Ponds: **3.79 ac-ft**

Total Compensation Needed: **3.61 ac-ft**

Additional Storage Provided: **0.18 ac-ft**

HNTB Corporation
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Lake Mary, FL 32746

		date:
made by:	SR	16-Aug-16
checked by:	BJS	16-Aug-16
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

POND NAME: FPC 300-B

FLOODPLAIN COMPENSATION CALCULATIONS

WESTBOUND ROADWAY:

Station Limits: 2116+00 to 2124+00

Roadway Length: 800 ft

Roadway Width: 20 ft

100 YR Floodplain Elevation:	66.0 ft
Ave. Existing Ground Elevation:	62.0 ft
Elevation Difference:	4.0 ft

Required Compensation = Roadway Length * Roadway Width * Elevation Difference: 1.47 ac-ft

---

EASTBOUND ROADWAY:

Station Limits: 2106+50 to 2124+50

Roadway Length: 1800 ft

Roadway Width: 30 ft

100 YR Floodplain Elevation:	66.0 ft
Ave. Existing Ground Elevation:	62.0 ft
Elevation Difference:	4.0 ft

Required Compensation = Roadway Length * Roadway Width * Elevation Difference: 4.96 ac-ft

---

Total Roadway Required Compensation: 6.43 ac-ft

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610 Crescent Executive Court, Suite 400
Lake Mary, FL 32746

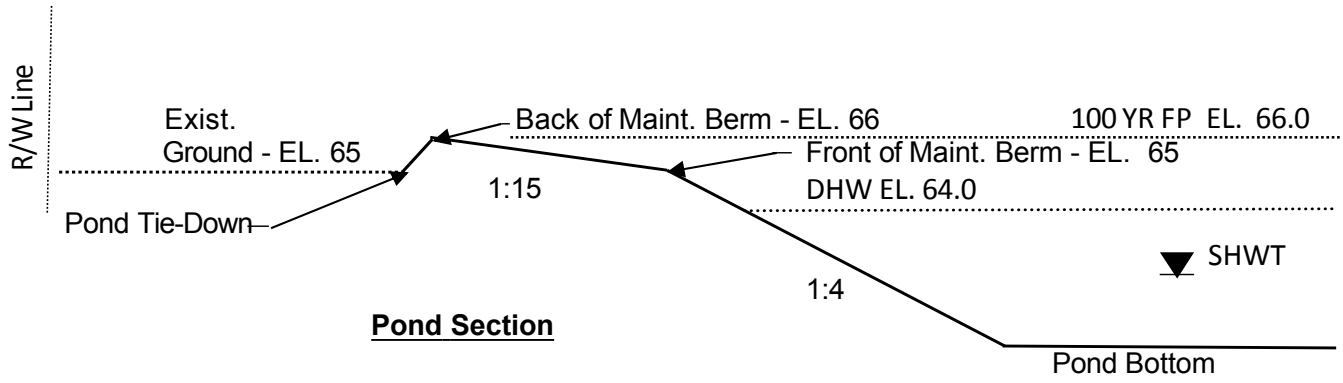
		date:
made by:	SR	16-Aug-16
checked by:	BJS	16-Aug-16
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 3

POND NAME: FPC 300-B

FLOODPLAIN COMPENSATION CALCULATIONS

EXISTING/PROPOSED TREATMENT POND:



Pond Section

Area Between Pond Tie Down and Front of Berm: 0.79 ac

Back of Berm Elevation: 66.0 ft
Existing Ground EL./Front of Berm EL.: 65.0 ft
Elevation Difference: 1.0 ft

Amount of Fill = Area * Elevation Difference: 0.79 ac-ft

Ave. Area Between Front of Berm and DHW from Pond: 3.61 ac

Existing Ground EL./Front of Berm EL.: 65.0 ft
DHW Elevation: 64.0 ft
Elevation Difference: 1.0 ft

Amount of Cut = Ave. Area * Elevation Difference: 3.61 ac-ft

Provided Pond Compensation = Amount of Cut - Amount of Fill: 2.82 ac-ft

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		date:
made by:	SR	16-Aug-16
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HNTB job #:	59219	

PROJECT: **I-4 PD&E - SEGMENT 3**

POND NAME: FPC 300-B

FLOODPLAIN COMPENSATION CALCULATIONS

REQUIRED COMPENSATION

Required Roadway Compensation:	6.43 ac-ft
Provided Pond Compensation:	-2.82 ac-ft
Total Required Compensation:	3.61 ac-ft

PROPOSED FLOODPLAIN POND:

FPC 300-B

100 YR Floodplain Elevation: 66.0 ft
Avg. Existing Ground Elevation: 67.0 ft

Seasonal High Water Elevation: 57.0 ft

* Seasonal High Water El. From GEC Borings

Elevation	Area	Storage
66.00	0.83 ac	3.95 ac-ft
65.00	0.74 ac	3.16 ac-ft
65.00	0.66 ac	3.16 ac-ft
57.00	0.13 ac	0.00 ac-ft

Total Storage Provided by FPC Ponds: **3.95 ac-ft**

Total Compensation Needed: **3.61 ac-ft**

Additional Storage Provided: **0.34 ac-ft**

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		date:
made by:	SR	16-Aug-16
checked by:	BJS	16-Aug-16
HNTB job #:	59219	

PROJECT: I-4 PD&E - SEGMENT 1

Required Treatment Volume:

Existing Loch Lehman & FDOT Borrow Pit (Floodplain Compensation Pond)

Existing FDOT Borrow Pit Volume

(SJRWMD Permit App. No. 22514-1)

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
65.00		6.89 ac			39.87 ac-ft
61.80	100 YR Flood Elevation	5.83 ac			19.51 ac-ft
60.00		5.24 ac			9.55 ac-ft
58.00	Normal Water Elevation	4.31 ac			0.00 ac-ft

*Elevations in NGVD 29.

Proposed FDOT Borrow Pit Volume

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
65.00		7.09 ac			42.56 ac-ft
61.80	100 YR Flood Elevation	6.16 ac			21.36 ac-ft
60.00		5.65 ac			10.73 ac-ft
58.00	Normal Water Elevation	5.08 ac			0.00 ac-ft

*Elevations in NGVD 29.

Additional Floodplain Compensation Volume= 1.85 ac-ft

Existing Loch Lehman Volume

(SJRWMD Permit App. No. 22514-1)

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
70.00		19.71 ac			156.49 ac-ft
65.00		12.96 ac			74.82 ac-ft
61.80	100 YR Flood Elevation	10.85 ac			36.72 ac-ft
60.00		9.66 ac			18.26 ac-ft
58.00	Normal Water Elevation	8.60 ac			0.00 ac-ft

*Elevations in NGVD 29.

Proposed Loch Lehman Volume

Elevation	Description	Area	Dimensions		Storage
			Length	Width	
70.00		16.95 ac			177.01 ac-ft
65.00		15.10 ac			96.88 ac-ft
61.80	100 YR Flood Elevation	13.94 ac			50.42 ac-ft
60.00		13.30 ac			25.90 ac-ft
58.00	Normal Water Elevation	12.60 ac			0.00 ac-ft

*Elevations in NGVD 29.

Additional Floodplain Compensation Volume= 13.70 ac-ft

Total Additoinal Floodplain Compensation Volume= 15.54 ac-ft

APPENDIX D –

CORRESPONDENCE

HNTB Corporation
The HNTB Companies
Engineers Architects Planners

610 Crescent Executive Court
Suite 400
Lake Mary, FL 32746

Telephone (407) 805-0355
Facsimile (407) 805-0227
www.hntb.com

Meeting Date/Time: April 23, 2013 / 2:00 PM

HNTB Project No. 59219

Meeting Name: I-4 SAMR SJRWMD Pre-Application Meeting

Location: SJRWMD, Maitland Office

Purpose: SJRWMD Pre-App for I-4 Ultimate

Attending: Barry Switzer, HNTB
Heather Johnstone, HNTB
Ken Lewis, SJRWMD

The purpose of this meeting was to discuss the I-4 PD&E project and the drainage approach to the project. The following items were discussed:

- Project Overview:
  - 5 Sections and 5 Reports – 5)US 27 to Polk County Line, 1)Polk County Line to SR 528, 2)SR 528 to Kirkman Interchange, 3)SR 434 to SR46, and 4)SR 46 to SR 472
  - Sections 1, 2, and 5 are located in SFWMD
  - Sections 3 and 4 are located in SJRWMD
  - Design to be completed by end of 2014

- Project Team:
  - HNTB – Roadway, Structures, Drainage and Permitting
  - Greenhorne & O'Mara – Contamination, Air, Noise and Wildlife
  - 3 E Consultants – Wetlands
  - Southeastern Archaeology Research – Cultural Resources
  - GEC – Geotechnical

- Areas of Interest:
  - Padgett Creek has had many complaints from the residents in the area. The residents believe I-4's construction restricted the ability of DeBary Bayou to be flushed by Lake Monroe. The ACOE study showed that there is no relationship between the I-4 causeway construction and the deterioration of the DeBary Bayou. HNTB asked if SJRWMD had any information related to the complaints. Ken stated that he did not, but he was aware of the complaints by the residents. Ken said that any improvements we made in this area, such as additional culverts under I-4, should make the residents happy.
  - We discussed the past flooding issues at the Saxon Boulevard Interchange. Ken stated that he has not seen any flooding since the interchange had been rebuilt.

- Commuter Rail was discussed. Barry explained that in other areas of the state, the rail was considered to be pervious. Ken agreed that would be appropriate for this project.
- HNTB asked if there were any known areas of flooding along the corridor. Ken stated that he wasn't aware of any.
- HNTB asked if the new Statewide Rule would have an impact on this project. Ken stated that for this project, there would not be a big impact. The smaller projects are more likely to be impacted by the new rule. The purpose of the new rule is for all water management districts to have the same rules with the same costs. Each individual water management district will still have different criteria for special basins, such as the Lake Apopka area. Phosphorus loading calculations will still be required in areas that are considered impaired. Nitrogen loading calculations are not required at this time. Phosphorus loading calculations can be completed through either the Lake Apopka method or the method outlined in the Stormwater Quality Handbook.

- Water Quality Criteria:
  - The water quality criteria have remained the same for wet detention ponds: 1" over the basin or 2.5" over impervious area and 8.6" of rainfall for the 25 yr/24 hr event.
  - Ken suggested that we check the DEP website for the verified list of impaired water.

Should any revisions, additions or clarifications of these notes be required, please advise Heather Johnstone at hjohnstone@hntb.com .

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Meeting Date/Time: November 13, 2013

HNTB Project No. 59219

Meeting Name: I-4 SAMR SJRWMD Pre-Application Meeting

Location: SJRWMD, Maitland Office

Purpose: SJRWMD Pre-App for I-4 Ultimate PD&E

Attending: Luis Diaz, HNTB
Melinda Fischl, HNTB
Ken Lewis, SJRWMD
Lee Kissick, SJRWMD
Maurice Pearson, 3E
Gunda Griffin, 3E

The purpose of this meeting was to discuss the I-4 PD&E project and the drainage approach to the project. The following items were discussed:

- Project Overview:
  - 5 Sections and 5 Reports – 5)US 27 to Polk County Line, 1)Polk County Line to SR 528, 2)SR 528 to Kirkman Interchange, 3)SR 434 to SR46, and 4)SR 46 to SR 472
  - Sections 1, 2, and 5 are located in SFWMD
  - Sections 3 and 4 are located in SJRWMD
  - Design to be completed by end of 2014

- Project Team:
  - HNTB – Roadway, Structures, Drainage and Permitting
  - 3 E Consultants – Wetlands

- Areas of Interest:
  - Segment 3 – There was very little by way of wetlands
  - Segment 4 – Pond 411– the borrow pit is a very nice location because it has a connection to St. Johns
    - Would rather use somewhere than borrow lake (prior to this, the use of swales was suggested and they were talked out of it).
  - Padgett Creek – Melinda discussed the "Flushing Approach" and will send Lee and Ken the ACOE Study and the Power Point the FDOT wants to use as an approach. Lee was in agreement with this idea.
  - Ken pointed out overtreatment using OFW quantities is good or using compensating treatment of currently non-treated as long as it is within the same receiving water.

- Lee likes long, linear ponds and/or swales. He says the wetlands along the road within the right-of-way are very poor quality and he would give FDOT a break on using those (check the existing permit for the area between 17/92 and Padgett Creek).
    - There are 3 mitigation banks within this area and FDOT has a preference to use the banks.
    - Ken will send a mitigation map showing the basins.

- Engineering:
    - Recent list of impaired water bodies.
    - Stay within the easement of SSL and Tribe
    - The use of SSL for barge equipment is something to consider.
    - Luis stated that we are not doing anything in the water, just above it (in the area of the bridge over St. Johns/Lake Monroe).
    - Individual Permit:
        - The project area may slightly change, making it a major permit modification for fees impacted but not the way it is permitted.
        - CH 62-330
        - SWERP (Volume 1)
        - District Rules (Volume 2)

- Environmental Considerations:
    - 3E Consultants (3E) presented a general overview of how wetlands and surface waters were delineated throughout the corridor. Within the existing right-of-way (ROW) and potential pond locations, the limits of jurisdictional systems were identified using handheld Global Positioning System (GPS) devices. In locations outside of the existing ROW, GPS devices were used in combination with on the ground aerial interpretation.

    - The group discussed a proposed pond location just north of Padgett Creek on the west side of the existing ROW within a portion of a borrow pit. Lee indicated that he felt the quality of the borrow pit was good and that design considerations should look to avoid converting the pit into a stormwater pond. Lee discussed that he permitted I-4 improvements through this section of roadway near Padgett Creek and the borrow pit. During that permit review, FDOT avoided impacts to the borrow pit by doing a long linear stormwater system near the edge of the road. Lee suggested that consideration for such a treatment system should be considered again as a part of our planning. In this area of large wetland systems, Lee's preference is for a stormwater treatment facility that is a linear system through areas of disturbed wetland communities.

    - Melinda mentioned that the FDOT's approach to the possible addition of culverts under I-4 at Lake Monroe and Padgett Creek could create flushing of the creek. Lee indicated that mitigation value may be given for the improvements created by the culvert addition.

    - Maurice indicated that mitigation options are being explored including mitigation banking.

- Lee mentioned that the project should not have Riparian Habitat Protection Zone (RHPZ) involvement.

- Lee indicated that the project traverses three (3) hydrologic basins.

  The project will likely require an Individual permit under the major modification.

Should any revisions, additions or clarifications of these notes be required, please advise Melinda Fischl at mfischl@hntb.com .

PHONE MEETING NOTES

Date: 8/29/2014

HNTB Project No. 59219 – I-4 PD&E

Meeting Name: I-4 PD&E – Pond 300

Location: Phone Meeting

Purpose: To discuss proposed ponds and project timeline

Attending: HNTB – Sanam Rai, Property Owner – Patrick Burton (John L. Di Masi Law Firm)

Mr. Burton was interested about the project, its potential impacts to the North Cove Homeowners Association property and the anticipated timeline of the project. He mentioned that he represents the North Cove HOA.

Mr. Rai explained the PD&E study concept and its preliminary phase. It was explained that the pond sites are alternatives and are subject to change based on many factors.

Mr. Burton mentioned that existing pond (Pond 300) is being expanded within the HOA property but did not impact any of the residential lots. He also stated that he would coordinate with the HOA and find out if they had any issues with the pond being expanded within their property.

Mr. Rai mentioned that the property owners can visit the following website to find out the necessary project information and any updates: www.i4express.com

END OF MINUTES

PHONE MEETING NOTES

Date: 8/18/2014

HNTB Project No. 59219 – I-4 PD&E

Meeting Name: I-4 PD&E – Pond 308, 309

Location: Phone Meeting

Purpose: To discuss proposed ponds and project timeline

Attending: HNTB – Sanam Rai, Property Owner – Jennifer Sharabba

Ms. Sharabba was interested about the project, its potential impacts to her property and the anticipated timeline of the project.

Ms. Sharabba mentioned that existing Pond 308 (old Pond 309) is being expanded by approximately 5.0 acres.

Mr. Rai explained the PD&E study concept and its preliminary phase. It was explained that the pond sites are alternatives and are subject to change based on many factors.

Mr. Rai mentioned that the property owners can visit the following website to find out the necessary project information and any updates: www.i4express.com

END OF MINUTES

PHONE MEETING NOTES

Date: 6/19/2015

HNTB Project No. 59219 – I-4 PD&E

Meeting Name: I-4 PD&E – Pond 318B

Location: Phone Meeting

Purpose: Responding to the pond letter

Attending: HNTB – Luz Phillip, Property Owner – Mack Cotton (Property Owner)

Mr. Cotton wanted to notify HNTB that he is giving his permission to access his property. He sent HNTB a certified letter stating this as well. Mr. Cotton would like to schedule a meeting to discuss the process and time line of the project.

Mrs. Phillip explained to him that we would contact him next week to schedule a meeting. Mr. Cotton's phone number is 407-415-5093. He stated he does not have access to email.

END OF MINUTES

PHONE MEETING NOTES

Date: 9/12/2014

HNTB Project No. 59219 – I-4 PD&E

Meeting Name: I-4 PD&E – FPC Pond 300B

Location: Phone Meeting

Purpose: To discuss proposed ponds and project timeline

Attending: HNTB – Sanam Rai, Property Owner – Judy Woodward

Ms. Woodward was interested about the project, its potential impacts to her property and the anticipated timeline of the project.

Mr. Rai explained the PD&E study concept and its preliminary phase. It was explained that the pond site is an alternative and is subject to change based on many factors.

Ms. Woodward mentioned that she has lived in her house for 28 years and would like to have a tree buffer from the noise and traffic along I-4. She also stated that she had attended the public meeting held in March / April of this year.

She mentioned that if FPC Pond 300B was the preferred alternative, she would prefer a 20 ft. tree buffer between her property and I-4.

Mr. Rai mentioned that the property owner can visit the following website to find out the necessary project information and any updates: www.i4express.com

END OF MINUTES

RECORD OF TELEPHONE CALL

Job #	59219	**Date**	8/7/2013
Call From	Dave Jackson	**Of**	Church Wekiva Assembly of God
Call To	Heather Johnstone	**Of**	HNTB
Parcel ID	26-20-29-300-0051-0000		

Subject Discussed

Dave Jackson is the pastor at the Church Wekiva Assembly of God. Dave wanted to know more information about the project and what would be involved. I explained that the project is just in the study phase and the design project is at least 2 years out. During the design phase, pond sites would be re-evaluated and at that time right-of-way acquisition would begin. I further explained that the pond (FPC 300-B) is one of two alternatives for that area and that the pond is a dry floodplain pond not a traditional wet pond. Dave asked whether the billboard on the property would be impacted. I stated that we did not show impacting the billboard or the soccer field, we are only impacting the area where the trees are located. Dave said that he understood and thanked me for the information.

Action to be Taken

None.

RECORD OF TELEPHONE CALL

Job #	59219	**Date**	8/19/2013
Call From	Rick Speech	**Of**	Beech Outdoor Co.
Call To	Heather Johnstone	**Of**	HNTB
Parcel ID	24-20-29-300-0090-0000		

Subject Discussed

Rick Speech wanted to know more information about the project and what would be involved. I explained that the project is just in the study phase and the design project is at least 2 years out. During the design phase, pond sites would be re-evaluated and at that time right-of-way acquisition would begin. I further explained that Pond 303-B2 is one of two alternatives for that area. Rick asked whether the high area adjacent to his property would be lowered. I stated that the design team would determine that when they set the profile. Rick requested that we keep him up to date with any new information that we may have. I told him about the I-4 website and recommended that he look at it for more information and to stay up to speed on the project.

Action to be Taken

None.

RECORD OF TELEPHONE CALL

Job #	59219	**Date**	8/14/2013
Call From	Heather Johnstone	**Of**	HNTB
Call To	Sharon Wilson	**Of**	On Behalf of Bernice Loris
Parcel ID	25-20-29-300-0050-0000		

Subject Discussed

Sharon Wilson called on behalf of Bernice Loris, who is the owner. Sharon stated that Bernice is 91 years old and that she had been contacted in the past during the original PD&E. She asked whether FDOT was planning on taking the entire property that included the house. I explained that the figure only showed taking the back part of the property where the trees are located. I further explained that the pond (FPC 300-A) is one of two alternatives for that area and that the pond is a dry floodplain pond not a traditional wet pond. Additionally, the project is just in the study phase and the design project is at least 2 years out. During the design phase, pond sites would be re-evaluated and at that time right-of-way acquisition would begin. Sharon said that she understood and thanked me for the information.

Action to be Taken

None.

MEETING NOTES

Date: 9/23/2015

HNTB Project No. 59219 – I-4 PD&E

Meeting Name: I-4 PD&E – Pond 303-B2

Location: HNTB Office - 610 Crescent Executive Court, Suite 400, Lake Mary, Florida 32746, 11:00 AM

Purpose: To discuss proposed ponds

Attending: HNTB – Sanam Rai, Robert Denney, Property Owner – Lloyd Tweed

Mr. Rai gave a brief overview of the project limits and explained the PD&E study concept and its preliminary phase.

Mr. Tweed was interested about the project, its potential impacts to his property and the anticipated timeline of the project.

Mr. Rai mentioned that the pond alternative impacting his property is not the recommended alternative.

Mr. Tweed stated that his property is a lot higher compared to the roadway and is not an appropriate site for a pond. Mr. Rai explained to Mr. Tweed that the pond is not on his property and that the impacts are due to the pond tie-in and not the pond itself.

Mr. Rai and Mr. Denney mentioned that there was a possibility of modifying the pond berm to avoid impacting his property. Mr. Rai stated that he would contact Mr. Tweed in the near future to provide further information on the modified pond site.

END OF MINUTES

HNTB Corporation
Engineers Architects

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MEETING ATTENDANCE

Project: I-4 PD&E

Location: 610 Crescent Executive Court, Suite 400, Lake Mary, Florida 32746

Subject: Lloyd Tweed / Pond 303-B2 Coordination for I-4 PD&E

Date: 9/23/2015 11:00 AM

Attendee	Representing	Telephone	E-mail
SANAM RAI	HNTB	(407)547-3025	SARAI@HNTB.com
Robert Denney	HNTB	407-805-0355	rdenney@hntb.com
LLOYD T TWEED		407-805-0722	

APPENDIX E –

EXISTING PERMITS

Permit No. 22434-3

I-4 Ultimate
(Central Parkway to E.E. Williamson)

INDIVIDUAL ENVIRONMENTAL RESOURCE PERMIT TECHNICAL STAFF REPORT

24-Sep-2010

APPLICATION #: 4-117-22434-3

Applicant: Florida Department of Transportation - District 5
719 S Woodland Blvd
Deland, FL 32720 USA
(386) 943-5000

Owner: Florida Department of Transportation - District 5
719 S Woodland Blvd
Deland, FL 32720 USA
(386) 943-5000

Agent: Florida Department of Transportation - District 5
Hannah Hernandez
719 S Woodland Blvd
DeLand, FL 32720 USA
(386) 943-5601

Consultant: Jacobs Engineering
Murray Santoro
1000 Legion Place Ste 1400
Orlando, FL 32801 USA
(407) 514-1400

Project Name: I-4 Ultimate (Central Parkway to E. E. Williamson), FPID 242592-3

Acres Owned: 123.5

Project Acreage: 123.5

County: Seminole

STR:

Section(s):	Township(s):	Range(s):
35	20S	29E
2,11	21S	29E

Receiving Water Body:

Name	Class
Little Wekiwa River	III Fresh, OFW, IW

Authority:	40C-4.041(2)(b)5, 40C-4.041(2)(b)2
Existing Land Use:	Commercial and Services(1400), Stream and Lake Swamps (Bottomland)(6150), Undeveloped Land within urban areas(1910), Govermental(1750), Roads and Highways(8140)
Mitigation Drainage Basin:	Wekiva River Nested
Special Regulatory Basin:	Wekiva River , Wekiva Recharge Basin
Final O&M Entity:	Florida Department of Transportation - District 5
ERP Conservation Easements/Restrictions:	N/A
Interested Parties:	No
Objectors:	No

Authorization Statement:

Construction of a surface water management system with stormwater treatment by retention for SR-400 (I-4) from North of Central Parkway to North of SR 434. FPID: 242592-3, a 123.5 - acre project to be constructed as per plans received by the District on September 30, 2009 and as amended by Sheets LD-1, LD-2, and LD-3 received by the District on July 6, 2010.

Recommendation: Approval

Reviewers: Ralph Miller; Richard Lee

Staff Comments

Project Location and Brief Description:

The project is located on Interstate 4 (aka SR 400) between Central Parkway and EE Williamson Boulevard in Seminole County. FDOT proposes to widen the existing roadway section from six lanes to twelve lanes between Central Parkway and EE Williamson Boulevard (approximately 2.5 miles), and reconstruct the I-4 and SR 434 interchange, which is 1.25 miles north of Central Parkway.

Permitting History:

On January 10, 1995, Permit Number 4-117-22434-1 was issued for the construction of a surface water management system that consists of the widening of the existing Interstate 4 (SR 400) from four to six lanes over a 3.98 mile interval. This was within the most Effective Recharge Area and Water Quality Protection Zone, but not within the Riparian Habitat Protection Zone of the Wekiva River Hydrologic Basin.

On July 8, 1998, Permit Number 4-117-22434-2 was issued for the modification to the surface water management system which consisted of enlarging the existing truck bays for the east bound and west bound I-4 rest areas at Lake Mary. The surface water management system includes one dry retention pond (westbound) and one dry retention pond (east bound).

This is a modification to Permit Number 4-117-22434-1. The modifications includes the widening of the 2.5 mile section of I-4 between Central Parkway and EE Williamson Boulevard from six lanes to twelve lanes, and the reconstruction of the SR 434 and I-4 interchange.

Engineering

Description of Surface Water Management System:

I-4 was constructed in the late 1950s and early 1960s prior to any stormwater regulations. Through the years, various stormwater management systems have been permitted and constructed in association with more recent road improvements in order to intercept and treat the runoff prior to discharging to the respective receiving water bodies. The proposed project is comprised of four major drainage basins and six stormwater management systems (Ponds EE, FF, FF-1, GG, HH, and II). The drainage basins are designated, Basin EE, Interchange, Basins HH, and Basin II.

In pre development, drainage is as follows: (a) runoff from the roadway in Basin EE drains into an existing FDOT pond that outfalls to an existing landlocked lake, (b) runoff from the Interchange Basin discharges into a storm sewer system that conveys stormwater runoff under I-4 to the existing Jacobson's Pond which outfalls into Pond A, which is located on the west bound side of I-4, which in turn ultimately discharges to the Little Wekiva River; (c) the existing runoff from Basin HH and Basin II flows into existing ditches that convey stormwater to an existing 36 inch cross drain, which eventually discharges to the Little Wekiva River.

In post development, the drainage will be as follows: (a) Basin EE will flow to Pond EE, which discharges through a control structure to the existing land locked lake, (b) stormwater runoff from the SR 434 and I-4 interchange (Interchange Basin) will be conveyed to Ponds FF, FF-1, Revised Pond I, and Pond GG prior to discharging west to the Little Wekiva River, (c) basins HH and II will discharge to Ponds HH and II, which will be modified in post development by splitting Pond II into three interconnected stormwater ponds; (d) stormwater discharge from Ponds HH and II basins will remain the same as predevelopment (to the Little Wekiva River).

Water Quality:

The applicant has submitted plans and calculations demonstrating that the proposed surface water management system will provide treatment and recovery of the treatment volume required by Chapter 40C-42, F.A.C., for systems that discharge to an Outstanding Florida Water (OFW).

Flood Protection:

The applicant has submitted plans and calculations demonstrating that the proposed surface water management system will provide for attenuation of the peak rate of discharge of stormwater runoff from the mean annual/24-hour and 25-year/24-hour storm events. Basin EE discharges to a landlocked system. Therefore, the applicant has submitted plans and calculations demonstrating that the proposed surface water management system will provide storage and recovery of the difference between the pre-development and the post-development runoff volume from the 25-year/96-hour storm event, pursuant to Chapter 40C-4, F.A.C. and Section 10.4 of the Applicant's Handbook: Management and Storage of Surface Waters.

The applicant has provided reasonable assurance that this project, as proposed, is consistent with the design criteria and objectives of the District set forth in Chapters 40C-4, 40C-41, and 40C-42, F.A.C. and that the proposed project meets all applicable conditions for permit issuance pursuant to Sections 40C-4.301 and 40C-40.302, F.A.C.

Special Basin Criteria:

Recharge Standard - the project is located within the Wekiva River Recharge Protection Basin. However, the soils are comprised of Urban Land Complex, Type D soils and no retention requirements are applicable.

Storage Standard - the project area is not located within the 100 year floodplain. Therefore, there is no net reduction in the flood storage within the 100 year flood plain of a stream or other water course which has a drainage area of more than one square mile and which has a direct hydrologic connection to the Little Wekiva River.

Standards for Erosion and Sediment Control and Water Quality - the project lies within the Water Quality Protection Zone. The applicant has submitted erosion control plans demonstrating that erosion / sediment control devices will be installed for the protection of, and minimization of sediment transport and erosion to, the Little Wekiva River.

Standard for Limiting Drawdown - the proposed project is not within the Water Quantity Protection Zone.

Riparian Habitat Protection Zone - the project is not located within the Riparian Habitat Protection Zone.

Local Government Notification for the Wekiva River Protection Area - the project is not located within the Wekiva River Protection Area, as defined in Section 369.303(9), F.S.

Environmental

Site Description:
The proposed project involves the ultimate widening of Interstate 4 from Central Parkway to EE Williamson and improvement to the Interstate 4 and State Road 434 interchange. The majority of the proposed regulated activities are located within the existing improved right-of-way of I-4. Several pond sites and the proposed improvements to the I-4 / SR 434 interchange involve construction outside of the existing right-of-way.

All portions of the proposed project limits are located within existing urban landscape that include existing roadway, commercial buildings, and residential development. A portion of the intersection improvement are located within 550 feet of the Little Wekiva River, and therefore fall within the Riparian Habitat Protection Zone of this river. The majority of the RHPZ consists of existing commercial development with limited landscape and open space.

Those portions of the project site located west of Markham Woods Road consist of undeveloped single-family residential lots that back onto the Little Wekiva River. The upland portions have been historically cleared and have been utilized as staging areas during recent construction activities in the area. These uplands are dominated by ruderal grasses and forbs with scattered canopy species present. The wetlands consist of riverine, mixed hardwood wetlands with a significant edge effect along the eastern edge. In general, the uplands on these lots are of moderate to moderately low quality and the wetlands are of moderate to moderately high quality, with the primary deleterious factor being their location relative to the adjacent urban development and roadways.

Impacts: *Subsection 12.2.2, ERP A.H., states that an applicant must provide reasonable assurances that a regulated activity will not impact the values of wetland and other surface water functions so as to cause adverse impacts to: (a) the abundance and diversity of fish, wildlife and listed species; and (b) the habitat of fish, wildlife and listed species.*

The vast majority of the proposed project is located in uplands. Wetland impacts are limited to those required to construct and operate an outfall structure north of State Road 434 and west of Markham Woods Road. Construction of the outfall structure involves the dredging/filling of 0.013 acres of wetlands and the clearing of an additional 0.036 acres of wetlands. As summarized above, these riverine, mixed hardwood wetlands are of moderate to moderately high quality and provide habitat for a variety of ubiquitous wildlife species adapted to living in close proximity to human development. The proposed dredging, filling, and clearing will adversely affect the value of the functions provided by these wetlands and will adversely affect the abundance and diversity of fish, wildlife, and their habitat.

The value of the functions of the wetlands to be adversely affected was analyzed utilizing the Uniform Mitigation Assessment Method described in chapter 62-345, F.A.C. A summary of the analysis can be found in the attached exhibit.

The Department proposes to mitigate the proposed impacts as summarized in the Mitigation Section, below.

Secondary impacts: *Subsection 12.2.7, ERP A.H., contains a four part criterion which addresses additional impacts that may be caused by a project: (a) impacts to wetland functions that may result from the intended use of a project; (b) impacts to the upland nesting habitat of listed species that are aquatic or wetland dependent; (c) impacts to significant historical and archaeological resources that are closely linked and causally related to any proposed dredging or filing of wetlands or other surface waters; and (d) wetland impacts that may be caused by future phases of the project or activities that are closely linked and causally related to the project.*

As summarized in the Impact Section, above, the vast majority of the proposed regulated activities are located in uplands. These uplands generally are sufficiently distant from off-site wetlands and other surface waters that the proposed activities will not cause unacceptable, adverse secondary impacts to their functions. However, as also noted above, the proposed activities include construction of an outfall structure in wetlands abutting the Little Wekiva River. The construction and maintenance of this outfall structure will adversely affect the adjacent forested wetlands by allowing additional edge effect within the wetlands adjacent to the outfall. An assessment of the existing edge effect indicates that approximately 0.049 acres of adjacent wetlands will experience a measurable change in species composition and characteristics. To provide reasonable assurance that the proposed system meets the requirements of section 12.2.7(a), A.H., the Department proposes to mitigate the proposed secondary impacts to these wetlands as summarized in the Mitigation Section, below.

The proposed project does not contain upland habitats that provide significant nesting, denning, or breeding habitat for wetland-dependent "listed" species, therefore, the applicant has demonstrated that the project will not cause unacceptable adverse secondary impacts, as described by Section 12.2.7(b), A.H.

On October 30, 2009, the District received correspondence from the Florida Department of State, Division of Historic Resources indicating that the project area was previously surveyed, reviewed by that office, and determined to have no significant effects on significant historical or archaeological resources. Therefore, no adverse, unacceptable impacts to archaeological or historical resources are anticipated to result from this proposed project, pursuant to Section 12.2.7(c), A.H. Proposed Condition 18 for this permit will ensure that should cultural resources or artifacts be discovered, the District will be notified.

As the proposed project consists of the ultimate anticipated build out for Interstate 4, no future phases are planned. Therefore, the project is not anticipated to cause adverse secondary impacts to wetlands, pursuant to Section 12.2.7(d), A.H.

Elimination/Reduction of Impacts: *Pursuant to subsection 12.2.1, ERP A.H., the applicant must consider practicable design modifications, which would reduce or eliminate adverse impacts to wetlands and other surface waters. A proposed modification which is not technically capable of being done, is not economically viable, or which adversely affects public safety through endangerment of lives or property is not considered "practicable".*

As summarized above, the vast majority of activities proposed in this application are located within uplands. Those wetland impacts required to construct the proposed outfall have been minimized to the greatest extent practicable to maintain a technically feasible stormwater design.

Mitigation:
The Department proposes to utilize the provisions of section 373.4137, F.S., to mitigate the proposed direct and secondary wetland impacts. Section 373.4137, provides that mitigation to offset the adverse effects of FDOT transportation projects be inventoried and funded by the FDOT and be carried out by the water management districts, including the use of mitigation banks established pursuant to this part. The mitigation for this project has been included on FDOT's inventory and is included in the 2011 escrow.

Cumulative Impacts: *Subsection 12.2.8, ERP A.H., requires applicants to provide reasonable assurances that their projects will not cause unacceptable cumulative impacts upon wetlands and other surface waters within the same drainage basin as the project for which a permit is sought. This analysis considers past, present, and likely future similar impacts and assumes that reasonably expected future applications with like impacts will be sought, thus necessitating equitable distribution of acceptable impacts among future applications. Mitigation, which offsets a projects adverse impacts within the same basin as the project for which a permit is sought is presumed to not cause unacceptable cumulative impacts.*

The District proposes to mitigate all impacts within the same basin as the impacts. In accordance with paragraph 373.414(8)(b), F.S., the regulated activity meets the cumulative impact requirements of subsections 373.414(8)(a), F.S., 40C-4.301(3), F.A.C., and 12.2.8, ERP A.H.

I-4 Ultimate (Central Parkway to E. E. Williamson), FPID 242592-3

	Acres
Total Surface Water	**0.941**

Total Wetlands	0.941
Total OSW	0.000
Impacts that Require Mitigation	**0.128**
Dredged or Filled	0.013
Clearing	0.036
Secondary Impacts	0.049
Adverse Alteration to Upland RHPZ	0.030
Mitigation	**1.199**
On-Site	**1.172**
Restoration of RHPZ Uplands	0.370
Enhancement of RHPZ Uplands	0.802
Off-Site	
S.B. 1986 Funds (0.10,SJ41)	

Special Basin Criteria

The proposed regulated activities are located within the Wekiva River Special Basin and within the Riparian Habitat Protection Zone (RHPZ) of the Little Wekiva River, as defined in paragraph 40C-41.063(3)(e), F.A.C. The proposed project limits contains 4.814 acres of RHPZ uplands, the vast majority of which consists of urban and commercial land uses. The portions of the project west of Markham Woods Road consists of undeveloped single-family residential lot that have been used for staging and other related activities during recent construction activities in the area. In general, the RHPZ uplands within the project limits are providing moderate to low quality habitat for Aquatic and wetland dependent list species.

The Department proposes to convert 0.030 acres of currently vegetated RHPZ uplands to paved surfaces, to remove existing pavement from 0.397 acres of currently paved RHPZ uplands, and to vegetatively enhance a total of 1.172 acres of uplands within the RHPZ. The Department also proposes to construct an outfall (as summarized in the Wetland Impact Section, above), which involves activities within 0.049 acres of wetlands within the RHPZ.

In accordance with the provisions of subparagraph 40C-41.063(3)(e)2, F.A.C., the paving of 0.030 acres of currently vegetated upland RHPZ and the activities proposed in 0.049 acres of wetland RHPZ are presumed to adversely affect the abundance, food sources, and habitat of aquatic and wetlands dependent species provided by the Zone. In accordance with the provisions of subparagraph 40C-41.063(3)(e)3, F.A.C., the restoration and enhancement of 1.199 acres of uplands within the RHPZ will promote a more endemic state, where the land in the Zone has been

changed by man.

Staff is recommending conditions be included on the permit to allow for irrigation of the proposed upland plantings to facilitate and verify successful establishment. Staff also recommends a permit condition be included on the permit in lieu of requiring the Department to record a conservation easement over this area. Due to the size, nature, and location of this upland RHPZ enhancement area, staff does not believe the cost of recording a conservation easement over this area would justify the benefit.

The Department has provided reasonable assurance that the proposed activities within the RHPZ, when taken as a whole, will not adversely affect the abundance, food sources, or habitat (including its use to satisfy nesting, breeding, and resting needs) of aquatic or wetland dependent species provided by the Riparian Habitat Protection Zone.

Summary:
The applicant has provided reasonable assurance that the proposed activities meet the conditions for issuance of permits specified in sections 40C-4.301 and 40C-4.302, F.A.C., and that the proposed system is consistent with the applicable review criteria specified in chapters 40C-4, 40C-41, and 40C-42, F.A.C.

Conditions

1. All activities shall be implemented as set forth in the plans, specifications and performance criteria as approved by this permit. Any deviation from the permitted activity and the conditions for undertaking that activity shall constitute a violation of this permit.

2. This permit or a copy thereof, complete with all conditions, attachments, exhibits, and modifications, shall be kept at the work site of the permitted activity. The complete permit shall be available for review at the work site upon request by District staff. The permittee shall require the contractor to review the complete permit prior to commencement of the activity authorized by this permit.

3. Activities approved by this permit shall be conducted in a manner which do not cause violations of state water quality standards.

4. Prior to and during construction, the permittee shall implement and maintain all erosion and sediment control measures (best management practices) required to retain sediment on-site and to prevent violations of state water quality standards. All practices must be in accordance with the guidelines and specifications in chapter 6 of the Florida Land

Development Manual: A Guide to Sound Land and Water Management (Florida Department of Environmental Regulation 1988), which are incorporated by reference, unless a project specific erosion and sediment control plan is approved as part of the permit, in which case the practices must be in accordance with the plan. If site specific conditions require additional measures during any phase of construction or operation to prevent erosion or control sediment, beyond those specified in the erosion and sediment control plan, the permittee shall implement additional best management practices as necessary, in accordance with the specifications in chapter 6 of the Florida Land Development Manual: A Guide to Sound Land and Water Management (Florida Department of Environmental Regulation 1988). The permittee shall correct any erosion or shoaling that causes adverse impacts to the water resources.

5. Stabilization measures shall be initiated for erosion and sediment control on disturbed areas as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 7 days after the construction activity in that portion of the site has temporarily or permanently ceased.

6. At least 48 hours prior to commencement of activity authorized by this permit, the permittee shall submit to the District a Construction Commencement Notice Form No. 40C-4.900(3) indicating the actual start date and the expected completion date.

7. When the duration of construction will exceed one year, the permittee shall submit construction status reports to the District on an annual basis utilizing an Annual Status Report Form No. 40C-4.900(4). These forms shall be submitted during June of each year.

8. For those systems which will be operated or maintained by an entity which will require an easement or deed restriction in order to provide that entity with the authority necessary to operate or maintain the system, such easement or deed restriction, together with any other final operation or maintenance documents as are required by subsections 7.1.1 through 7.1.4 of the Applicant's Handbook: Management and Storage of Surface Waters, must be submitted to the District for approval. Documents meeting the requirements set forth in these subsections of the Applicant's Handbook will be approved. Deed restrictions, easements and other operation and maintenance documents which require recordation either with the Secretary of State or the Clerk of the Circuit Court must be so recorded prior to lot or unit sales within the project served by the system, or upon completion of construction of the system, whichever occurs first. For those systems which are proposed to be maintained by county or municipal entities, final operation and maintenance documents must be received by the District when maintenance and operation of the system is accepted by the local governmental entity. Failure to submit the appropriate final documents referenced in this paragraph will result in the permittee remaining liable for carrying out maintenance and operation of the permitted system.

9. Each phase or independent portion of the permitted system must be completed in accordance with the permitted plans and permit conditions prior to the initiation of the permitted use of site infrastructure located within the area served by the portion or phase of the system. Each phase or independent portion of the system must be completed in accordance with the permitted plans and permit conditions prior to transfer of responsibility for operation and maintenance of that phase or portion of the system to local government or other responsible entity.

10. Within 30 days after completion of construction of the permitted system, or independent portion of the system, the permittee shall submit a written statement of completion and certification by a registered professional engineer or other appropriate individual as authorized by law, utilizing As Built Certification Form 40C-1.181(13) or 40C-1.181(14) supplied with this permit. When the completed system differs substantially from the permitted plans, any substantial deviations shall be noted and explained and two copies of as-built drawings submitted to the District. Submittal of the completed form shall serve to notify the District that the system is ready for inspection. The statement of completion and certification shall be based on on-site observation of construction (conducted by the registered professional engineer, or other appropriate individual as authorized by law, or under his or her direct supervision) or review of as-built drawings for the purpose of determining if the work was completed in compliance with approved plans and specifications. As-built drawings shall be the permitted drawings revised to reflect any changes made during construction. Both the original and any revised specifications must be clearly shown. The plans must be clearly labeled as "as-built" or "record" drawing. All surveyed dimensions and elevations shall be certified by a registered surveyor. The following information, at a minimum, shall be verified on the as-built drawings: 1. Dimensions and elevations of all discharge structures including all weirs, slots, gates, pumps, pipes, and oil and grease skimmers; 2. Locations, dimensions, and elevations of all filter, exfiltration, or underdrain systems including cleanouts, pipes, connections to control structures, and points of discharge to the receiving waters; 3. Dimensions, elevations, contours, or cross-sections of all treatment storage areas sufficient to determine state-storage relationships of the storage area and the permanent pool depth and volume below the control elevation for normally wet systems, when appropriate; 4. Dimensions, elevations, contours, final grades, or cross-sections of the system to determine flow directions and conveyance of runoff to the treatment system; 5. Dimensions, elevations, contours, final grades, or cross-sections of all conveyance systems utilized to convey off-site runoff around the system; 6. Existing water elevation(s) and the date determined; and Elevation and location of benchmark(s) for the survey.

11. The operation phase of this permit shall not become effective until the permittee has submitted the appropriate As-Built Certification Form, the District determines the system to

be in compliance with the permitted plans, and the entity approved by the District in accordance with subsections 7.1.1 through 7.1.4 of the Applicant's Handbook: Management and Storage of Surface Waters, accepts responsibility for operation and maintenance of the system. The permit may not be transferred to such an approved operation and maintenance entity until the operation phase of the permit becomes effective. Following inspection and approval of the permitted system by the District, the permittee shall request transfer of the permit to the responsible approved operation and maintenance entity, if different from the permittee. Until the permit is transferred pursuant to section 7.1 of the Applicant's Handbook: Management and Storage of Surface Waters, the permittee shall be liable for compliance with the terms of the permit.

12. Should any other regulatory agency require changes to the permitted system, the permittee shall provide written notification to the District of the changes prior implementation so that a determination can be made whether a permit modification is required.

13. This permit does not eliminate the necessity to obtain any required federal, state, local and special district authorizations prior to the start of any activity approved by this permit. This permit does not convey to the permittee or create in the permittee any property right, or any interest in real property, nor does it authorize any entrance upon or activities on property which is not owned or controlled by the permittee, or convey any rights or privileges other than those specified in the permit and chapter 40C-4 or chapter 40C-40, F.A.C.

14. The permittee shall hold and save the District harmless from any and all damages, claims, or liabilities which may arise by reason of the activities authorized by the permit or any use of the permitted system.

15. Any delineation of the extent of a wetland or other surface water submitted as part of the permit application, including plans or other supporting documentation, shall not be considered specifically approved unless a specific condition of this permit or a formal determination under rule 40C-1.1006, F.A.C., provides otherwise.

16. The permittee shall notify the District in writing within 30 days of any sale, conveyance, or other transfer of ownership or control of the permitted system or the real property at which the permitted system is located. All transfers of ownership or transfers of a permit are subject to the requirements of rule 40C-1.612, F.A.C. The permittee transferring the permit shall remain liable for any corrective actions that may be required as a result of any permit violations prior to such sale, conveyance or other transfer.

17. Upon reasonable notice to the permittee, District authorized staff with proper identification shall have permission to enter, inspect, sample and test the system to insure conformity with the plans and specifications approved by the permit.

18. If historical or archaeological artifacts are discovered at any time on the project site, the permittee shall immediately notify the District.

19. The permittee shall immediately notify the District in writing of any previously submitted information that is later discovered to be inaccurate.

20. This permit for construction will expire five years from the date of issuance.

21. All wetland areas or water bodies that are outside the specific limits of construction authorized by this permit must be protected from erosion, siltation, scouring or excess turbidity, and dewatering.

22. Prior to construction, the permittee must clearly designate the limits of construction on-site. The permittee must advise the contractor that any work outside the limits of construction, including clearing, may be a violation of this permit.

23. The operation and maintenance entity shall inspect the stormwater or surface water management system once within two years after the completion of construction and every two years thereafter to determine if the system is functioning as designed and permitted. The operation and maintenance entity must maintain a record of each required inspection, including the date of the inspection, the name, address, and telephone number of the inspector, and whether the system was functioning as designed and permitted, and make such record available for inspection upon request by the District during normal business hours. If at any time the system is not functioning as designed and permitted, then within 14 days the entity shall submit an Exceptions Report to the District, on form number 40C-42.900(6), Exceptions Report for Stormwater Management Systems Out of Compliance.

24. The proposed surface water management system must be constructed in accordance with the plans received by the District on September 30, 2009, as amended by Sheets LD-1, LD-2, and LD-3 of the plans received by the District on July 6, 2010.

25. The construction activities entails the construction of several types of retaining wall systems (Mechanically Stabilized Earth Walls, Concrete Cantilever retaining Walls, and Sheet Pile Wall systems) at varying depths, and different pond locations. The Florida Department of Transportation (FDOT) has acknowledged that the proposed wall systems will meet all structural, soil stability, maintenance, construction, and design requirements, with a design life of 75 years. FDOT is required to submit all final wall designs and stability analysis to the District for written approval prior to the commencement of construction.

26. The mitigation provided for the purposes of section 373.4137, F.S. shall be for at least 0.01

acres of impact.

27. The upland RHPZ enhancement planting area, denoted on Sheet LD-3 of the permitted plans, must be planted prior to any of the following events (whichever occurs first): issuance of the first certificate of occupancy; use of the infrastructure for its intended use; or transfer of responsibility for operation and maintenance of the system to a local government or other responsible entity.

28. Artificial irrigation of the 1.17-acre upland RHPZ enhancement area (LD-3) may be conducted as needed to establish the planted upland species. All artificial irrigation must cease within two (2) years of initial planting. If additional irrigation is required for establishment of the planted upland species, the permittee may notify the District in writing of the circumstances and for good cause shown, irrigation may be allowed for additional periods commensurate with the good cause shown. This condition does not alleviate the permittee from obtaining any and all state and/or local permits required to install and/or use an irrigation system.

29. Successful enhancement of the 1.17-acre upland RHPZ enhancement area (LD-3) will have occurred when:
    A. At least eighty percent (80%) of the planted individuals in each stratum have survived throughout the monitoring period and are showing signs of normal growth, based upon standard growth parameters such as height and base diameter, or canopy circumference; and,
    B. At least eighty percent (80%) cover by appropriate upland herbaceous species has been obtained; and,
    C. The above criteria have been achieved by the end of a 5-year period following *cessation* of supplemental irrigation.

30. If successful enhancement has not occurred as stated above, the Permittee must apply to the District for a permit modification no later than thirty (30) days following the termination of the monitoring period. The application must include a narrative describing the type and causes of failure and contain a complete set of plans for the redesign and/or replacement planting of the upland RHPZ enhancement area (LD-3) so that the success criteria will be achieved. Within thirty (30) days of District approval and issuance of the permit modification, the Permittee must implement the redesign and/or replacement planting. Following completion of such work, success criteria as stated above or as modified by subsequent permit must again be achieved. In addition, the monitoring required by these conditions must be conducted.

31. In the event that fifty percent (50%) or greater mortality of planted upland species in any stratum within the upland RHPZ enhancement area (LD-3) occurs, the Permittee must undertake a remediation program approved by District staff.

32. Any activities within or use of the 1.17-acres of upland RHPZ enhancement area (LD-3) that are inconsistent with providing food sources or habitat (including its use to satisfy nesting, breeding and resting needs) for aquatic and wetland dependent species are prohibited. Without limiting the generality of the foregoing, except for those activities specifically authorized in this permit, the following activities and uses are expressly prohibited:
    A. Construction or placing buildings, roads, signs, billboards or other advertising, utilities or other structures on or above the ground.
    B. Dumping or placing soil or other substance or material as landfill or dumping or placing of trash, waste or unsightly or offensive materials.
    C. Trimming, removing or destroying trees, shrubs, or other vegetation.
    D. Excavating, dredging or removing loam, peat, gravel, soil, rock or other material substances in such a manner as to affect the surface.
    E. Applying herbicides, pesticides, or fertilizers to
    F. Surface use, except for purposes that permit the land area to remain predominantly in its enhanced natural condition.
    G. Activities detrimental to erosion control, soil conservation, or aquatic and wetland dependent wildlife habitat preservation.
    H. Acts or uses detrimental to such preservation of land areas.

    This condition shall remain in effect for the full extent of the operation phase of this permit.

33. The permittee must provide notice to District staff at least 30 days prior to the first pre-construction meeting held with the construction contractors.

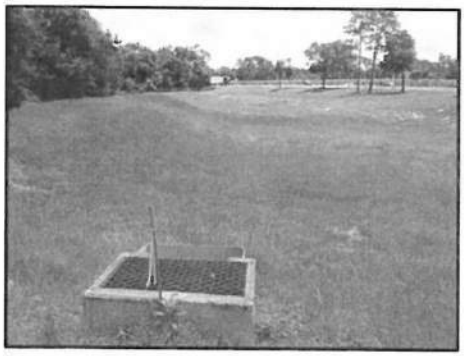
DRAINAGE REPORT

SR 400(I-4)/SR-434 Interchange Widening

Seminole County

Prepared for:

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION



FDOT – District 5
DeLand, Florida

Prepared by:

JACOBS™

Orlando, Florida

AUGUST 2009

PROFESSIONAL ENGINEER CERTIFICATE

I hereby certify that I am a registered professional engineer in the State of Florida practicing with **Jacobs Engineering Group, Inc.**, a corporation authorized to operate as an engineering business. I have reviewed and taken no exceptions to the evaluation, findings, opinions and conclusions as reported for the following project.

PROJECT:	**SR 400/SR 434 Interchange Improvements – Drainage Report**
FINANCIAL PROJECT NUMBER:	**242593-3-32-01**
F.A. PROJECT NUMBER:	**N/A**
LOCATION:	**Seminole County, Florida**
CLIENT:	**Florida Department of Transportation – District 5, DeLand, Florida**

The Drainage Report includes a summary of data collection efforts and design analysis for the pond sites, and other possible primary drainage system for the SR 400/SR 434 Interchange Widening project. I acknowledge that the procedures and references used to develop the results contained in this report are consistent with 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.

SIGNATURE:_____

NAME: ***Murray Santoro, P. E.***

P.E. NUMBER: **66065**

DATE: _____

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1.0 EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) District Five is proposing the widening of State Road 400 (I-4) from North of Central Parkway to 1.6 miles North of State Road 434 (SR 434) in Seminole County, Florida. This Drainage Report documents the drainage calculations for the proposed improvements along I-4 and SR 434 related to the construction limits, a distance of approximately 2.53 miles. The proposed roadway improvement consists of widening SR 400 (I-4) from six to 12 lanes

The stormwater management facilities (SMF) will provide water quality treatment and attenuate the runoff volume, limiting the discharge to permitted pre-developed runoff rates. Offsite stormwater runoff (flowing to the proposed pond locations) will be diverted, as much as possible, around the proposed pond sites. The project is located within the St. John's River Water Management District's (SJRWMD) Lower St. Johns River Basin.

Existing drainage patterns and basin boundaries were determined based upon the Existing Drainage Maps, the Existing Construction Plans, Field investigations, United States Geological Survey (USGS) Topographic Maps and Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) information. The report identifies the project areas within specific basins of the Little Wekiva River.

Two sub-basins have already been permitted for the project corridor. The portion of the project north of SR 434, from SR 434 to the project termini, is located within open drainage basins to the Little Wekiva River. The existing collection and conveyance of stormwater runoff within these basins is via roadside ditches and some storm drain pipes. Existing culverts direct the water collected in the roadside ditches toward the basin outfalls eventually reaching the Little Wekiva River for areas in open basins. Currently, stormwater treatment ponds exist to treat stormwater runoff for portions of I-4 along the project corridor.

Basin EE begins at station 671+00 and ends at station 700+00. Currently, runoff from the road sheet flows into existing ditches that convey the stormwater runoff to be discharged into an existing FDOT pond. The existing pond then outfalls into a nearby lake; however Basin EE has been determined to be located within a landlocked basin.

The I-4 Interchange Basins discharge to existing roadway swales where the runoff is conveyed into DBI's and a storm sewer system that goes beneath SR 434 and discharges into the existing Jacobson's Pond. The Jacobson's Pond then outfalls beneath I-4 into Pond A (future Pond GG) located on the westbound side of I-4. Pond A ultimately discharges into the Wekiva River. The basin for I-4 consists of ramps and mainline roadway which discharge to existing ditches that collect the runoff into a storm sewer system that is part of the SR 434 secondary system and ultimately discharges to the Wekiva River.

Basin HH begins at station 748+00 and ends at station 771+50. Basin II begins at station 771+50 and ends at station 815+00. Currently, runoff from the road sheet flows into existing

ditches that convey the stormwater runoff to be discharged into existing FDOT ponds. The existing ponds eventually convey stormwater via an existing 36" cross-drain eventually reaching the Little Wekiva River. Basin divides were generated using several sources; Geographic Information System (GIS) contour maps, existing topography, quadrangle maps, and existing permit information. Basin divides were generated using several sources; GIS contour maps, existing topography, quadrangle maps, and existing permit information.

The proposed drainage system has been divided into three drainage sub-basins (Basins 'EE'; 'FF', 'FF-1', & 'GG'; and 'HH' & 'II') for analysis purposes. The SMF will provide water quality treatment and attenuate the runoff volume, limiting the discharge to pre-developed runoff rates. Offsite stormwater runoff anticipated will be addressed with the proposed improvements.

Basin EE will begin at station 660+00 and end at station 700+60. The proposed Pond EE will discharge through a control structure to the nearby lake where it discharged in the pre-development condition. The interchange basins in the post-development condition consists of the same areas as in the pre-development condition with minor adjustments. Basin FF begins at Station 700+60 and ends at Station 723+84, and also collects runoff from Ramp B. Basin FF-1 begins at Station 723+84 and ends at Station 733+00, it also collects the runoff from Ramps D and D1. Basin GG begins at Station 733+00 and ends at Station 748+04. Basin GG will maintain the existing outfall location as in the pre-development condition with a minor pipe size change. The existing basins generated by the SR 434 widening project have remained the same. Pond 1, which was a pond designed for SR 434, had to be modified due to the proposed configuration for the I-4 ramps. In order to maintain the same volume, Pond 1 had to be adjusted; however all the elevations were kept the same, as well as the outfall structure.

Post-development Ponds 'HH' and 'II' were modified from the pre-development condition. Pond 'II' had to be divided into three ponds interconnected with equalizer pipes since a ramp connecting the roadway to the Rest area is proposed. The three Ponds 'II' are considered as one pond since they have the same pond elevation and side slopes, and equalizer pipes are proposed in the bottom of the ponds. Both Ponds 'HH' and 'II' are designed to be dry bottom ponds with recovery of the treatment volume accomplished through natural percolation in the pond bottoms.

For further information regarding the basins, the areas, treatment volumes, and other data, please refer to Appendix B, sections 1, 2, and 3.

	DESIGN STORMS								TREATMENT VOLUME RECOVERY		
	MEAN ANNUAL		10YR-24HR		25YR-24HR		96Hr		Required	Required	SJRWMD
Pond/Node ID	Pre cfs	Post cfs	Pre cfs	Post cfs	Pre cfs	Post cfs	Pre cfs	Post cfs	Treatment Volume Recovery Time ac-ft	Treatment Volume Recovery Time hrs	Recovery Time hrs
EE	3.0	0			105.5	22.79	158.67	54.69	4.00	12	72
FF**	22.52	7.32	47.89	40.28	57.62	51.36			4.95	70	72
FF-1**									2.14	12	72
GG**									2.26	24	72
HH***	10.54	10.37	63.53	57.70	67.70	59.79			5.36	36*	36
II***									5.26	28	72

* Recovery time includes a factor of safety of 2 due to underdrains.

** Discharge rates correspond to Node "AN2" in ICPR routing output.

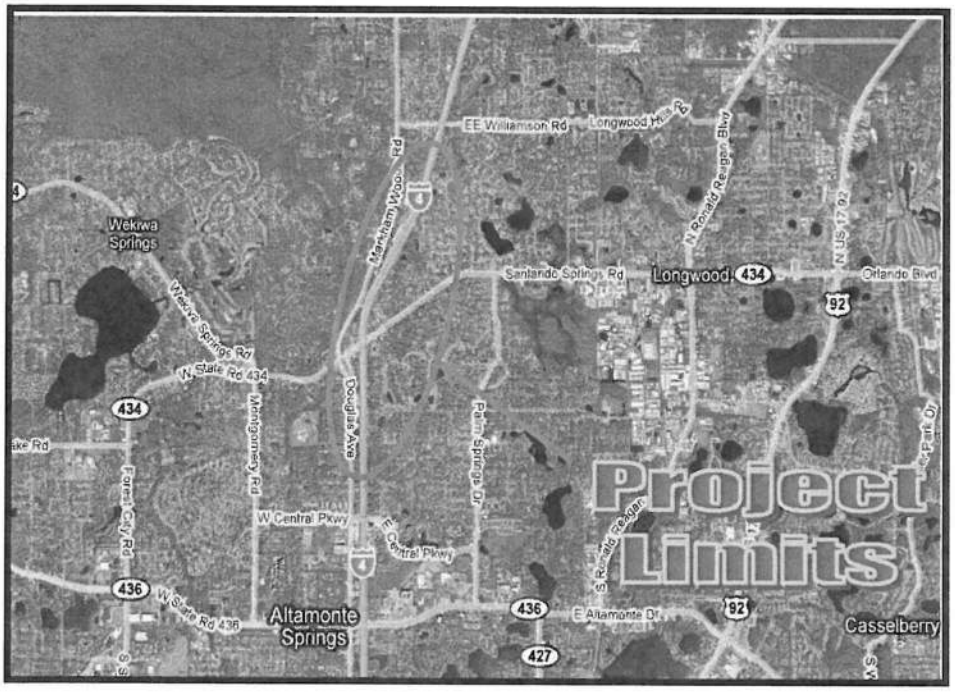
*** Discharge rates correspond to Node "Little Wekiva River" in ICPR routing output.

2.0 BACKGROUND

2.1 Project Overview

The Florida Department of Transportation (FDOT) District Five is proposing the widening of State Road 400 (I-4) from North of Central Parkway to North of SR 434 in Seminole County, Florida (**Figure 1** - Location Map). This Drainage Report documents the drainage calculations for the proposed improvements along I-4 and SR 434 related to the construction limits, a distance of approximately 2.53 miles.

Figure 1 - Location Map



This report evaluates the project site based on the NAVD 1988 datum; however some of the information collected uses the NGVD 1929 datum. The conversion equation between the NAVD 88 and NGVD 29 datum is as follows:

(NAVD 88) – (NGVD 29) = -1.014 ft

2.2 Proposed Improvements

The proposed roadway improvement consists of widening SR 400 (I-4) from six to 12 lanes. The improvements to SR 400 will accommodate expected future traffic capacity increases and improve the level of service.

The proposed I-4 typical section will consist of three *General Use Lanes (GUL)*, two *Special Use Lanes (SUL)* and one auxiliary lane in each direction for the limits of the project. The Special Use Lanes are separated from the General Use Lanes via a barrier-wall. It includes providing I-4 with shoulders, barrier wall separators, a median ditch or barrier wall, and stormdrain systems. Furthermore, in the vicinity of super-elevated pavement sections, the median ditch typical sections are considered individually to accommodate runoff without adversely impacting travel or public safety. The proposed typical sections are shown in **Figures 2 and 3**.

Figure 2 - Typical Section 1

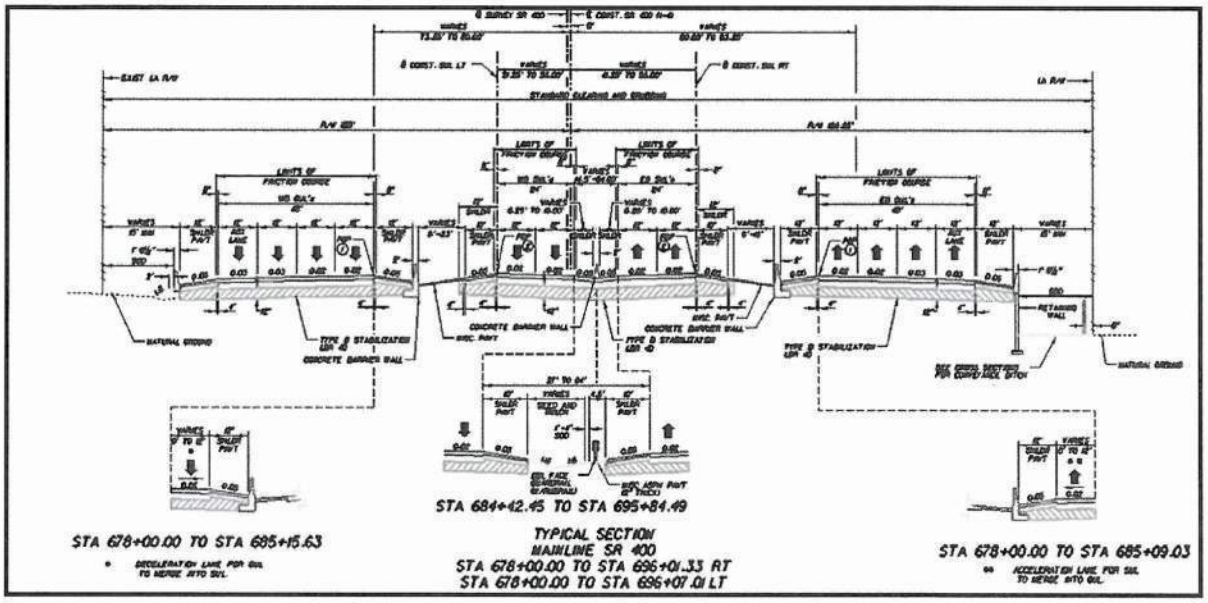
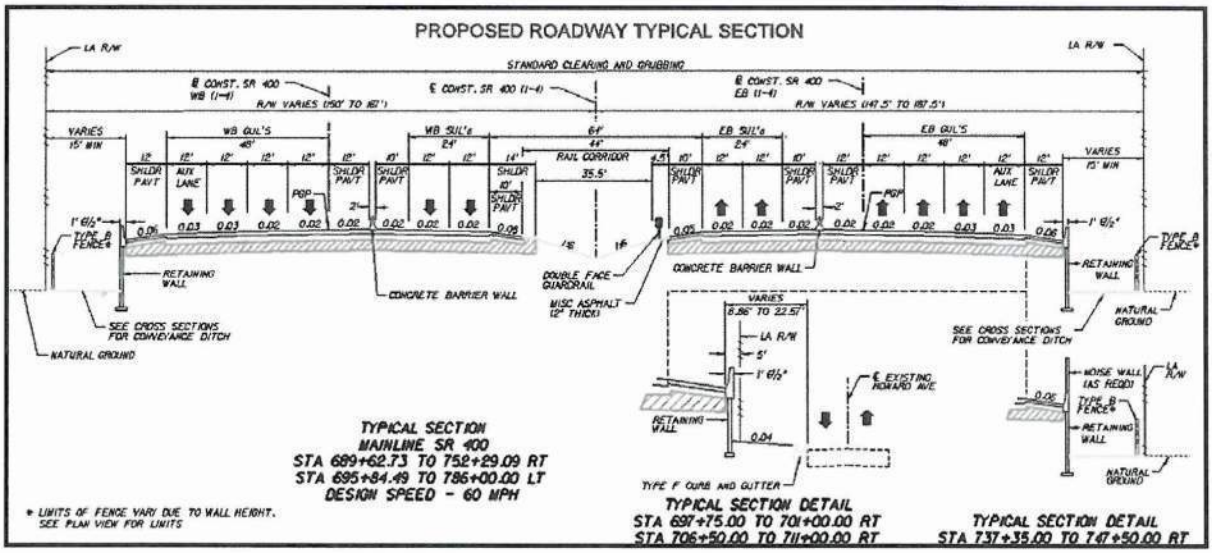


Figure 3 - Typical Section 2



With the proposed improvements to the SR 400 corridor comes an increase in stormwater runoff and pollutant loading. Due to this increase, stormwater management facilities (SMF) for the treatment and attenuation of the additional stormwater runoff have been provided. Please note that throughout this report, the terms ***Pond Site*** and ***SMF*** are used interchangeably.

The proposed drainage system will consist of median ditch bottom inlets, barrier wall inlets, ditch bottom inlets, manholes, and an underground pipe network that is designed to collect and convey roadway stormwater runoff away from the roadway and into a SMF. The SMF will provide water quality treatment and attenuate the runoff volume, limiting the discharge to permitted pre-developed runoff rates. Discharge from the SMF's will be to historic outfall locations.

Offsite stormwater runoff (flowing to the proposed pond locations) will be diverted, as much as possible, around the proposed pond sites. Any stormwater runoff that cannot be diverted will be captured within the pond. Offsite areas currently discharging into the existing right-of-way will be diverted to the existing cross drains to historic flow paths.

3.0 GENERAL INFORMATION

3.1 Project Location

The project corridor is located in Seminole County, Florida, in Section 35 of Township 20 South and Range 29 East; and in Sections 2, and 11 of Township 21 South, Range 29 East **(Figure 4** - USGS Quadrangle Map*)*. State Road 400 is an Interstate Highway and *Primary Emergency Evacuation Route (EAST/WEST)* from I-95 to I-75 and is also a major west-east route through Central Florida from Daytona to Tampa. It provides a main link through most of the cities in Central Florida. The corridor is a major transportation route for the region and the state utilized by local residents, commuters, and interstate public and commercial traffic. The project is located within the St. John's River Water Management District's (SJRWMD) Lower St. Johns River Basin.

3.2 Purpose

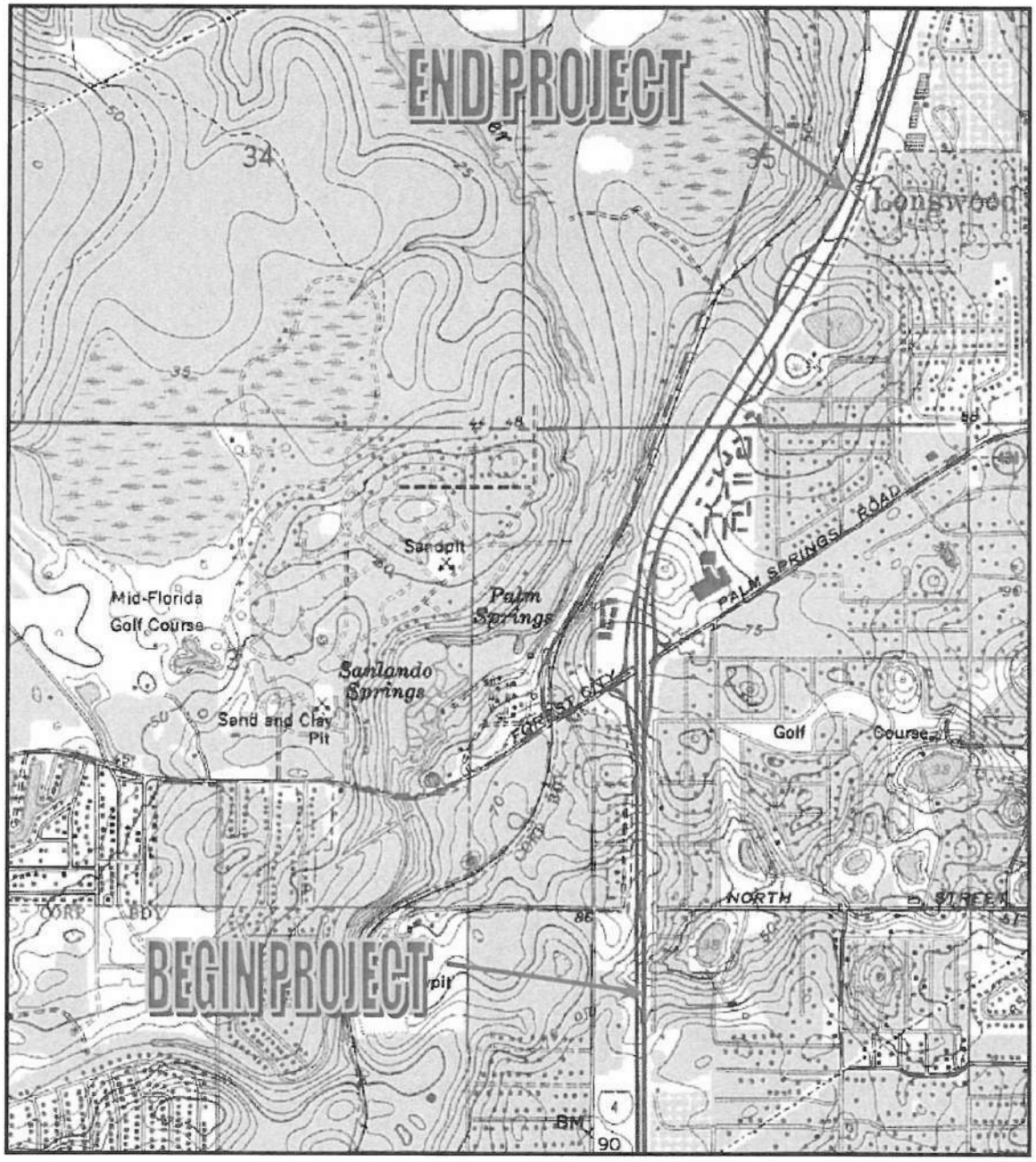
The purpose of this SR 400 Drainage Report is to document the existing/permitted and proposed drainage improvements for the roadway widening adding the various lanes to I-4. Proposed limits of this report for the improvements include the project limits and portions of SR 434 within the interchange area. The project limits for the widening of SR 400 are from Station 687+00+/- to Station 811+70.54+/-, a distance of approximately 2.53 miles.

The total proposed improvement consists of widening of SR 400 (I-4) from six to twelve lanes from north of Central Parkway to north of SR 434 in Seminole County. The existing roadway typical section is a six-lane divided rural highway. It includes three, 12-foot travel lanes in each direction separated by a minimum 64-foot grass median. There is one (1) interchange located within the total project corridor. The interchange is at SR 434 and I-4.

3.3 Existing Topography and Drainage Patterns

The topography of the project area varies from very flat in areas to having significant relief, with ground elevations ranging from 50 ft. (near existing ponds and ditches) to 75+/- ft. (near the higher roadway elevations). Existing drainage patterns and basin boundaries were determined based upon the Existing Drainage Maps, the Existing Construction Plans, Field investigations, USGS Topographic Maps and FEMA FIRM information. The overall drainage areas contributing to SR 400 (I-4) and SR 434 are outlined in the Existing Drainage Maps in the appendix section of this report.

Figure 4 - USGS Quadrangle Map



3.4 Watersheds

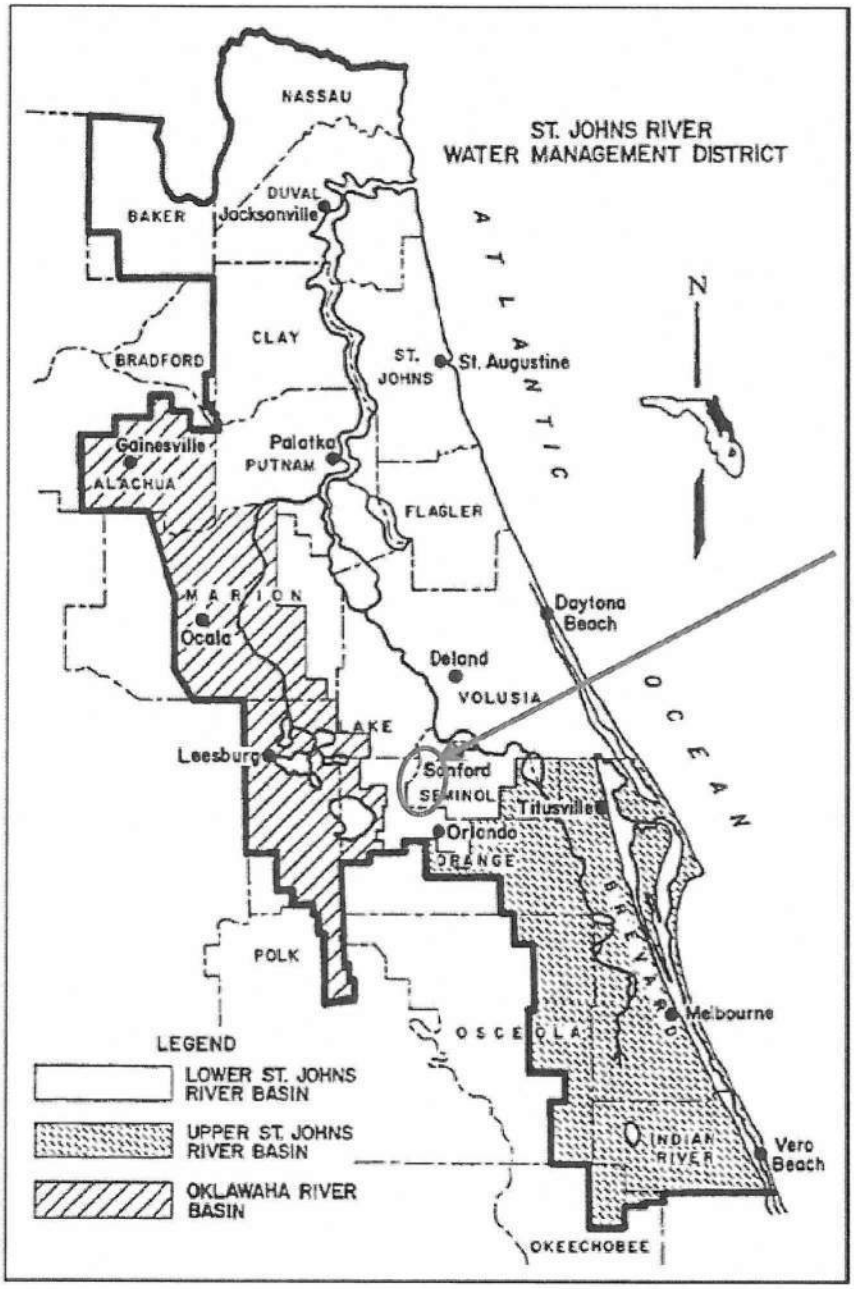
The project is contained within the Lower St. Johns River Basin (LSJRB), which extends from the Little Wekiva River in Orange, Seminole, Lake, and Volusia counties northward into Putnam, St. Johns, and Duval counties eventually reaching the Atlantic Ocean in Jacksonville, Florida **(Figure 5** - SJRWMD Basin Map**).**

The project resides within the Wekiva River Nested watershed (**Figure 6 - Watersheds**), which outfalls into the St. Johns River. Seminole County has a Watershed Management Plan prepared for the Little Wekiva River, dated November 2005. The report identifies the project areas within specific basins of the Little Wekiva River. The first portion of the I-4 project from the beginning of the project to south of SR 434, is within a closed drainage basin. The remainder of the project lies- within open basins flowing toward the Little Wekiva River. The Little Wekiva River is an Outstanding Florida Water (OFW) and certain water quality and quantity requirements are enforced for permitting by SJRWMD.

3.5 Sub-Basins

Two sub-basins have already been permitted for the project corridor. Portions of the project limits from the project beginning to SR 434, reside within a land-locked area of the watershed. The portion of the project north of SR 434, from SR 434 to the project termini, is located within open drainage basins to the Little Wekiva River. The existing collection and conveyance of stormwater runoff within these basins is via roadside ditches and some storm drain pipes. Existing culverts direct the water collected in the roadside ditches towards the outfall eventually reaching the Little Wekiva River **(Figure 7 - Wekiva River Hydrologic Basin & Recharge Protection Basin)** for areas in open basins. Currently, stormwater treatment ponds exist to treat stormwater runoff for portions of I-4 along the project corridor.

Figure 5 - SJRWMD Basin Map



PROJECT VICINITY

Figure 6 - Watersheds

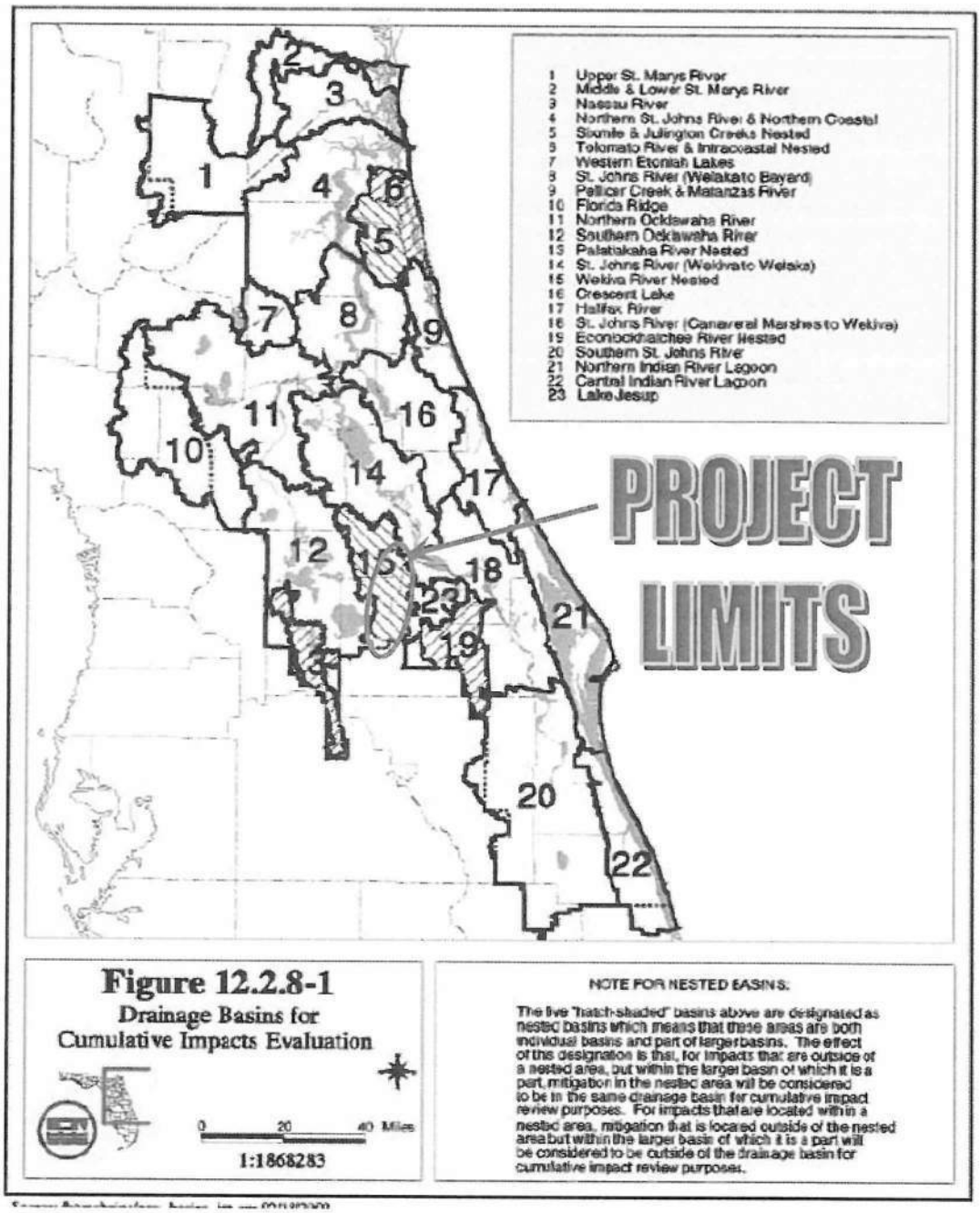
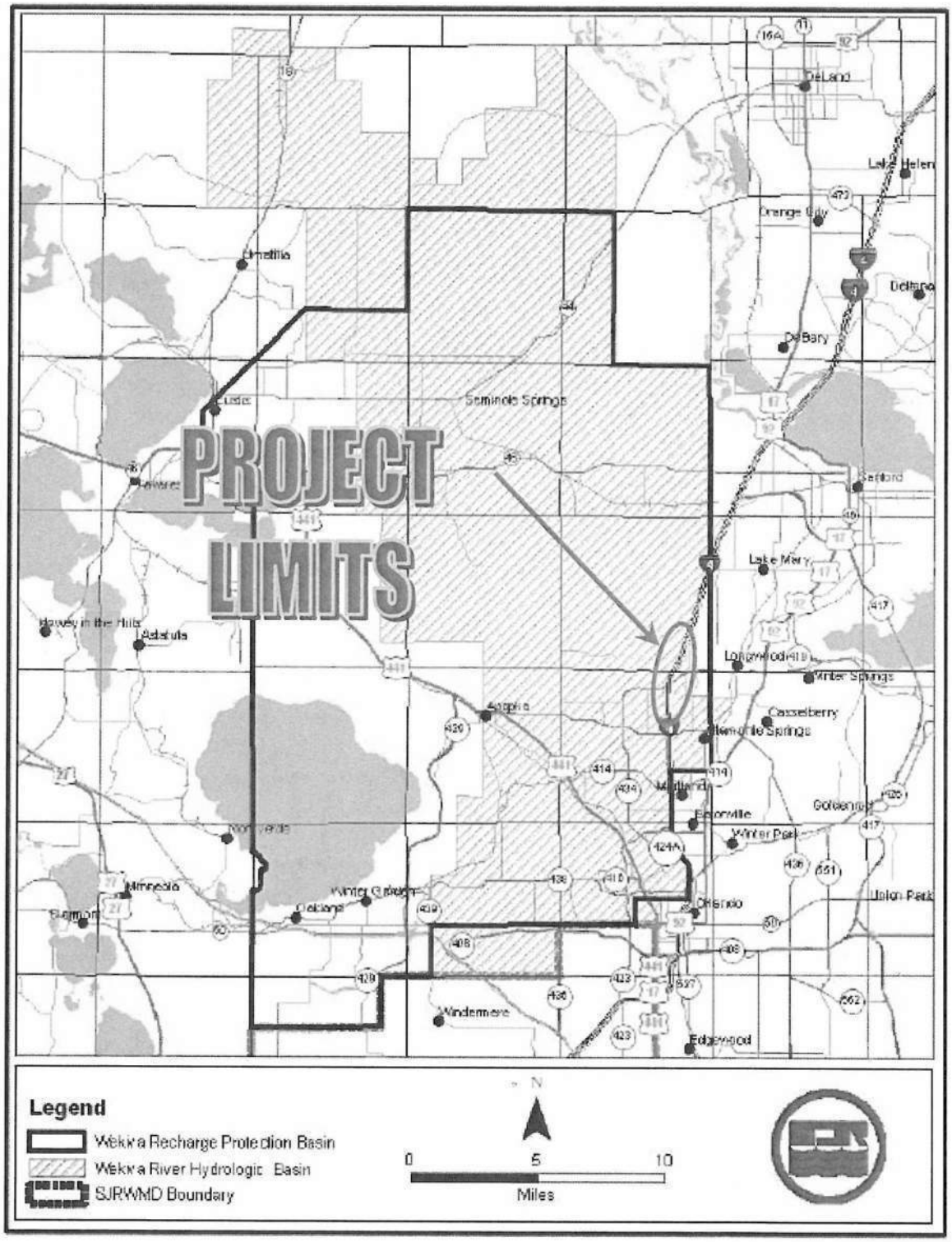


Figure 7 - Wekiva River Hydrologic Basin & Recharge Protection Basin



3.6 Existing Cross Drains and Bridge Culverts

There is one (1) existing cross drain within the project corridor. There are a few storm drains that appear to serve as cross drains in the existing condition. These are included below, however neither the cross drain, or the storm drains will remain in the Post condition. A brief description of the culverts is found below.

- Storm Drain No. 4 is a 30-inch RCP at Station 690+43+/- connecting into an existing FDOT pond on the east side of I-4. To be removed.
- Cross Drain No. 9 is a 24-inch RCP at Station 697+87 drains to a roadside ditch directing runoff into the existing FDOT pond at Station 690+00. To be removed.
- Storm Drain No. 13 is a 24-inch RCP at Station 711+25.69 is cross drain connected with other ditch bottom inlets and structures prior to discharging into the Jacobson's pond located north of SR 434 adjacent to I-4. To be removed.
- Storm Drain No. 55 is an 18" RCP to 36"RCP that is connected into an existing FDOT pond for I-4. To be removed.
- Storm Drain No. 85 is a 36" RCP at Station 764+00 draining the offsite areas from the east side of I-4 through various structures toward the west eventually reaching the Wekiva River. To be removed.
- Storm Drain No. 102 is a 30" RCP at Station 780+00 connecting into an existing FDOT pond on the east side of I-4. To be removed.

3.7 Tailwater

Tailwater information used in the design of the stormwater management facilities was based upon existing permits and studies within the project corridor. A time vs. stage relationship is established for the tailwater conditions at the outfalls within the project limits. Basin EE is within a land-locked basin and therefore, no tailwater was used to model the existing and proposed conditions for Basin EE. Instead, a Stage-Area relationship was established for the existing and proposed lake outfall in the analysis of Basin EE. The outfalls for Basins FF, FF-1, GG, HH, and II are all interconnected to existing outfall pipes which discharge toward the Little Wekiva River. Peak tailwater elevations for the Wekiva River are so low that no direct influence in the various design storm events being modeled.

3.8 Permits

Below is a list of the permits and documentation obtained for the design of the proposed drainage system:

- SJRWMD ERP Number 4-117-0398-AG for SR 400 (I-4) SR 434 to Lake Mary Blvd.
- SJRWMD ERP Number 40-117-105058-1 for SR 434 (Montgomery Road to I-4)
- SJRWMD ERP Number 4-0995-62355-1 (I-4 HOV Lanes)
- SJRWMD ERP Number 4-117-115654-1 for SR 434 (I-4 to Rangeline Road)
- SJRWMD ERP Number 40-117-65518-1 (Victoria Manor Subdivision)
- SJRWMD ERP Number 40-117-64542-1 (Arthur St., Baker St., etc.)
- SJRWMD ERP Number 40-117-58249-1 (Markham Woods Road Widening)

3.9 Floodplain Impacts and Mitigation

The Federal Emergency Management Agency (FEMA) has developed Flood Insurance Rate Map (FIRM) for this area of Seminole County. The relevant FIRM Community Panel Numbers for the project corridor are 12117C0135F and 12117C0145F (**Figure 8**: FEMA Flood Insurance Rate Map), dated September 28, 2007. The only section within the 100-year floodplain area is located near an existing FDOT Pond off of Oliver Avenue.

3.10 Soils Data & Geotechnical Investigations

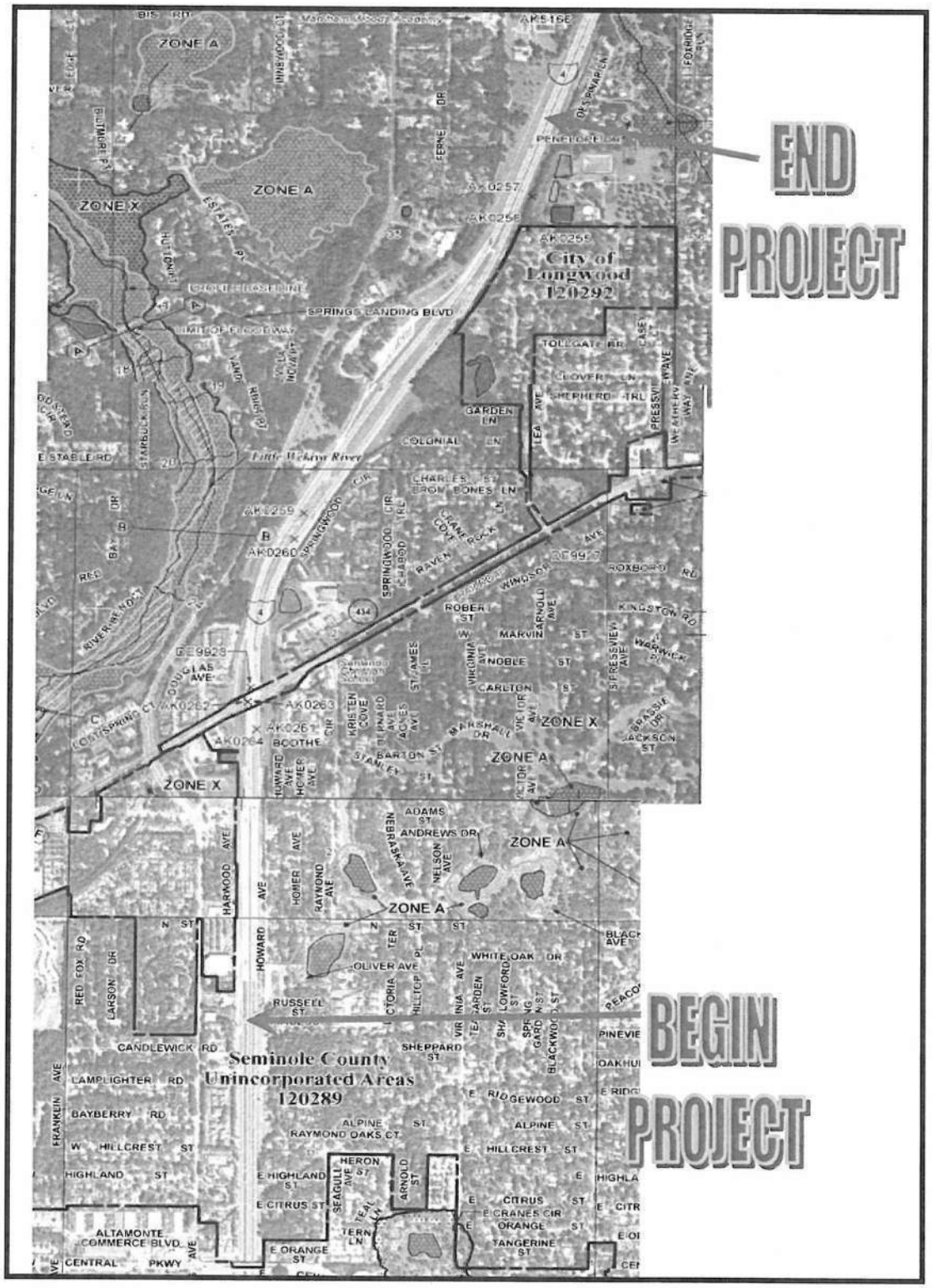
The National Conservation Resource Service Soil Survey of Seminole County, Florida, published by the United States Department of Agriculture (USDA) Soil Conservation Survey has been reviewed for the project vicinity. The Curve Number values used for the proposed improvements are 98 for impervious areas and 100 for water surfaces. The curve numbers for pervious areas vary considering the land uses and underlying soil types. The offsite areas were investigated to determine the appropriate soils, hydrologic soil group, soils permeability, and depth to the seasonal groundwater. Weighted Curve number determinations were established using the TR-55 Handbook (June 1986) and appropriate tables for curve numbers/land uses within the project area and offsite areas. The seasonal high ground water elevations were determined from the soils report for the project limits and attached separately.

Table 1 – USDA SCS Soil Survey Information

SOIL SURVEY INFORMATION						
Seminole County USDA Soil Series	Seasonal High Groundwater Table		Hydrologic Soil Group	Soil Classification		
	Depth (feet)	Duration (months)		Depth (inches)	Unified	AASHTO
Adamsville-Sparr Fine Sand) (2)	2 – 3.5 1.5-3.5	Jun – Nov	C	0 - 4 4 – 41 41 – 43 43 – 72 72 – 80	SP-SM SP-SM SM-SC SM-SC SM-SC	A-3 A-2-4 A-2, A-4, A-6
Astatula-Apopka Fine Sands, (0-5% Slopes) (6)	> 6.0	- - -	A	0 - 4 4 – 80 0 – 64 64-80	SP-SM SP-SM SP-SM, SM-SC A-2-6	A-3 A-3 A-3, A-2-4
Astatula-Apopka Fine Sands, (5-8% Slopes) (7)	> 6.0	- - -	A	0 - 3 3 – 80 0 – 65 65-80	SP-SM SP-SM SP-SM, SM-SC	A-3 A-3 A-3, A-2-4 A-2-6
Astatula-Apopka Fine Sands, (8-12% Slopes) (8)	> 6.0	- - -	A	0 - 3 3 – 80 0 – 65 65-80	SP-SM SP-SM SP-SM, SM-SC	A-3 A-3 A-3, A-2-4 A-2-6
Basinger-Hontoon Soils, depressional (10)	+2.0 – 0.0	Jan – Feb Jan – Dec	B/D, D	0 – 6 6 – 80 0 – 80	SP-SM, SP-SM PT	A-3, A-2-4 A-3, A-2-4 A-8
Tavares-Millhopper Fine Sands (0-5& Slopes) (31)	3.5-6.0	Jul – Dec	A	0 – 6 6 – 80 0 – 45 45 – 80	SP-SM SP-SM, SP-SM SM-SC	A-3 A-3 A-3, A-2-4 A-3. A-2-4
Urban Land (34)	- - -	- - -	D	- - -	- - -	- - -

+ Indicates water table above the surface of the soil.

Figure 8: FEMA Flood Insurance Rate Map



3.11 Rules and Regulations/Regulatory Agency Criteria

The designs of the stormwater management facilities for this project are governed by the rules and criteria set forth by the FDOT and the SJRWMD.

Criteria for the project are as outlined in the following sources:

- State of Florida Department of Transportation Handbooks
    - Drainage Manual – January 2008
    - Stormwater Management Facility Handbook – January 2004
    - Culvert Design Handbook – January 2005
    - Storm Drains Handbook – January 2008
- State of Florida Department of Transportation Plans Preparation Manual.
    - Volumes I and II
- St. Johns River Water Management District
    - Manual from SJRWMD Applicant's Handbook: Management & Storage of Surface Waters (MSSW), November 2008
    - Applicant's Handbook: Stormwater Management Systems, December 2006

The design of stormwater management facilities for the project is governed by the rules and criteria set forth by the FDOT and the SJRWMD. The project is located within the Wekiva River Drainage basin, which includes special basin criteria developed by the SJRWMD that requires addition treatment volume requirements for an Outstanding Florida Waterway (OFW), and also additional recharge criteria for projects with "Type A soils" located within the basins aquifer recharge area.

Criteria for the project are as follows:

3.11.2 St. Johns River Water Management District

3.11.2.1 Treatment Volume Requirements—Dry Retention Systems

a) Off-line retention of the first ½ inch of runoff or 1.25 inches of runoff from the impervious area, whichever is greater.

b) On-line retention of an additional ½ inch of runoff from the drainage area over the volume specified for Dry Retention Systems, (a) above.

c) On-line retention of an additional 50% of the treatment volume specified in (b) for all basins discharging to the Little Wekiva River, an OFW.

d) Retention storage of 3 inches of runoff from the impervious area for projects with "Type A soils" located within the Wekiva Recharge Protection Basin.

3.11.2.2Attenuation

a) Limited to the Mean Annual "pre versus post" discharge rate (positive outfall).

b) Limited to the 25-year/24-hour "pre versus post" discharge rate (positive outfall).

3.11.3 FDOT Design Criteria - Stormwater Management Facility Criteria

A. Stormwater management facilities shall be designed in accordance with all applicable criteria, rules and standards of the FDOT and the governing water management district. (*DM, Sec. 5.2*). In general, stormwater management facilities should be designed to provide the necessary quantity, rate and quality control based on the presumption that for the existing discharge all necessary quantity, rate and quality control of stormwater from upper property has occurred prior to reaching the right of way. Consistent with this presumption, the most economically feasible of the following shall be provided: (*DM, Sec. 5.3.1.1*).

1. Separation of offsite discharges from the Department's stormwater management facilities (*DM, Sec. 5.3.1.1*).
2. When separation of offsite discharges is not feasible, consideration shall be given to joint use, and/or, regional treatment facilities in cooperation with local, regional and/or private organizations. (*DM, 5.3.1.1*).
3. If wet detention facilities are used, the design of a 21-day residence time (permanent pool) is preferred, in lieu of the 14-day residence time with littoral shelf.
4. Facilities designed to be dry or those using underdrains or exfiltration shall require the appropriate geotechnical analysis. This analysis shall be certified by the project Geotechnical Engineer.

B. Additional Stormwater Management Facility standards design features or policies for detention and retention pond design are as follows:

1. Minimum Depth—Wet detention facilities shall have a minimum water depth of 6 feet in order to minimize the growth of cattails or other undesirable vegetation that increase maintenance costs. The 6 feet should be measured between the pond bottom and the control or normal water elevation.
2. Maintenance Berms—Ponds shall be designed to provide a minimum 20 feet. Horizontal clearance between the top edge of the normal pool elevation and the right-of-way line. At least 15 feet adjacent to the pond shall be level or have a maximum slope of 1:8. The berm area shall be sodded. (*DM, Sec. 5.3.4.2.1*).
3. Corners—Facility corners shall be rounded to provide an appropriate turning radius for maintenance equipment. (*DM, Sec. 5.3.4.2.2*).
4. Freeboard—Except where a permanent containment feature is provided (i.e. concrete), one foot of freeboard is required above the maximum design stage

whenever elevation is higher than one foot below the finished ground to compensate for grading irregularities. (*DM, Sec. 5.3.4.2.3*).

The maximum design stage is defined as the peak stage for the design storm event(s), as required by the water management district having permitting jurisdiction.

1. Fencing—Ponds having side slopes steeper than 1:4 shall be provided a protective barrier (e.g. wall, fence, etc.) to prevent unauthorized entry. Refer to *Appendix D (Part 2 - Protective treatment) [DM Vol. I]* for other considerations. *Appendix D* is a guideline and not a standard. Gates for maintenance equipment access shall be placed at appropriate locations. (*DM, Sec. 5.3.4.2.4*). Some ponds may not be fenced at the owner's discretion.

2. Access and Easements—When pond areas are not accessible directly from the proposed roadway right-of-way, an access easement shall be provided. (*DM, Sec. 5.3.4.2.5*).

Stormwater management facilities should be accessible from the proposed roadway, whenever possible. Plans should be checked to ensure accessibility over ditches or other obstructions.

1. Skimmers/Baffles—All basin outlet structures shall be designed to skim floating debris, oil and grease. Skimmers/baffles shall be fiberglass, rather than aluminum to minimize theft.
2. Sod—All side slopes shall be sodded. The side slopes of wet ponds shall be sodded to the normal water or control level. The side slopes of dry facilities shall be sodded down to the toe of slope at the facility bottom. The dry facility bottom shall be seeded and mulched, or left bare.
3. Clearance to Roadway—Horizontal clearance from the edge of travel lane to the 24-hour standing water surface (depth greater than 3 feet) of a stormwater management facility or canal shall be 60 feet. The subject water feature must parallel the roadway for a distance greater than or equal to 1000 feet. The facility shall comply with Canal Hazard Standards, if applicable. (PPM, Sec. 4.2.1).

The following table summarizes the required water quality and water quantity criteria established by the Florida Department of Transportation (FDOT), and the St. Johns River Water Management District (SJRWMD) that will be used in the final design and permitting of the interstate reconstruction.

Table 2 – Water Quality & Quantity Criteria Summary Table

CRITERIA	FDOT	SJRWMD
Water Quality **(Treatment)**	Requirement— Meet or exceed the applicable regulatory agency criteria.	Dry Retention Systems: Provide for one of the following: a) Off-line retention of the first ½ inch of runoff or 1.25 inches of runoff from the impervious area, whichever is greater. b) On-line retention of an additional ½ of runoff from the drainage area over the volume specified for Dry Retention Systems (a) above.
OFW		c) On-line retention of an additional 50% of the treatment volume specified in (b) for all basins discharging to the Little Wekiva River, an OFW.
Recharge Criteria		d) Retention storage of 3 inches of runoff from the impervious area since the interchange is located within the Wekiva Recharge Protection Basin.
Water Quantity **(Attenuation for Open Basins)**	Peak post-development discharge rates shall not exceed pre-development rates for all critical duration storms with return frequency of up to and including the 100-year/10-day storm event.	Peak post-development discharge rates shall not exceed pre-development rates for the 25-year/24-hour, 10-year/24-hour, and mean annual design frequency storms.

4.0 PRE-DEVELOPMENT ANALYSIS

The existing SR 400 roadway alignment divides the project into three sub-basins, two of which ultimately discharge eventually into the Little Wekiva River. The sub-basins are Basins 'EE', 'FF' & 'GG', and 'HH' & 'II'. The table below lists the basin station limits and their respective outfalls.

Table 3 – Summary of Existing Drainage Basins Limits

Basin Name	From Station	To Station	Outfall Location
'EE'	Before 678+00	700+00	Existing FDOT Pond to Existing Lake
'Interchange Basins'	700+00	748+00	Little Wekiva River
'HH' & 'II'	748+00	800+50	Little Wekiva River

Below is a brief narrative of the existing drainage basins and their respective outfalls.

4.1 Basin EE

Basin EE begins at station 671+00 and ends at station 700+00. The pre-development basin differs slightly from the post development basin. Currently, runoff from the road sheet flows into existing ditches that convey the stormwater runoff into an existing FDOT pond prior to being discharged. The existing pond outfalls into a nearby lake; however Basin EE has been determined to be located within a land-locked basin. Basin divides were generated using several sources; GIS contour maps, existing topography, quadrangle maps, and existing permit information. There are several offsite areas which are draining towards the road. On the west side, there are numerous commercial sites that discharge into the existing FDOT right-of-way via MES or concrete spillways. The runoff coming towards I-4 from the west side is conveyed under I-4 through a 30" cross drain, and into the existing FDOT Pond. On the east side of the road there are several contributing residential areas. There are two subdivisions that contain dry retention ponds which discharge into the existing lake, similar to the FDOT pond. The two subdivisions are Victoria Manor and Victoria Park. Victoria Manor was permitted in 2000 (SJRWMD permit no. 40-117-65518-1), and Victoria Park was permitted in 1984 by the Department of Environmental Protection. Based on the existing SJRWMD permits' obtained as well as a watershed study in the vicinity of the project, the appropriate information was used in generating a representative computer model for the pre-development model in ICPR. Offsite areas were included in the computer model for the existing condition. However, infiltration was not modeled as part of the flood routing model. The results from the routing for the pre-development conditions indicate that flooding has occurred due to the high stages of the lake to which most of the offsite and onsite areas ultimately discharge into the existing lake. Please refer to **Appendix B-1**.

4.2 Interchange Basins

The Interchange Basins begin at station 700+00 and end at station 748+00. The pre-development basin differs slightly from the post development basin. Currently, runoff from the road sheet flows into existing ditches that convey the stormwater runoff to be discharged into various FDOT ponds adjacent to the I-4 corridor. The Little Wekiva River nearby is the existing outfall for all the basins. Basin divides were generated using several sources; GIS contour maps, existing topography, quadrangle maps, and existing permit information. There are several offsite areas which are draining towards I-4 and through to the Little Wekiva River. On the east side, there are numerous commercial sites and roadway areas from SR 434 that discharge into the existing FDOT right-of-way eventually reaching the existing Jacobson's pond. The runoff coming towards I-4 is conveyed under SR 434 through a storm drain system. There are several contributing residential areas included in the SR 434 drainage basins. Based on the existing SJRWMD permits' obtained as well as other data in the vicinity of the project, the appropriate information was used in generating the pre-development model in ICPR. The SR 434 design for Seminole County was considered as the existing condition for the design effort for this project.

The pre-development ICPR model was generated using the permitted information provided by Bowyer Singleton and Associates (BSA) for the SR 434 widening project, the existing Pond Siting Report (PSR) prepared by URS and several permits obtained in the vicinity of the project. The I-4 Ramp basins discharge to existing roadway swales where the runoff is conveyed into DBI's and a storm sewer system that goes beneath SR 434 and discharges into the existing Jacobson's Pond. The Jacobson's Pond then outfalls beneath I-4 into Pond A (future Pond GG) located on the westbound side of I-4. Pond A ultimately discharges into the Wekiva River. Basin I-4 consists of ramps and mainline roadway which discharge to existing ditches that collect the runoff into a storm sewer system that is part of the SR 434 secondary system and ultimately discharges to the Wekiva River.

It is important to point out that the pre-development model used for the pre vs. post analysis is actually SR 434's post-development model for the analysis of I-4 widening project. The results from the routing for the pre-development conditions indicate the ultimately discharge to the Little Wekiva River. Please refer to **Appendix B-2**.

4.3 Basins HH & II

Basin HH begins at station 748+00 and ends at station 771+50. The pre-development basin differs slightly from the post development basin. Currently, runoff from the road sheet flows into existing ditches that convey the stormwater runoff to be discharged into an existing FDOT pond. The existing ponds eventually convey stormwater to the Little Wekiva River by an existing 36" cross-drain. This piped system continues west approximately 800 ft to the back side of the westbound Rest Area. At that point, runoff from the Rest Area also enters the piped system. After reaching the east side of Markham Woods Road, the system turns north and continues approximately 800 feet before discharging into the Little Wekiva River.

Basin HH divides were generated using several sources; GIS contour maps, existing topography, quadrangle maps, and existing permit information. On the east side of the road there are several contributing residential areas. There are three subdivisions that contribute to this drainage basin. One subdivision named Springwood Village discharged directly into the FDOT pond, Springwood Village. The other two subdivisions, Lake Acorn and Oak Lake, contain wet detention ponds which discharge into the same lake as the FDOT pond. The pre-development model was generated in ICPR using the available information. Please refer to **Appendix B-3**.

Basin II begins at station 771+50 and ends at station 815+00. The pre-development basin differs slightly from the post development basin. Currently, runoff from the road sheet flows into existing ditches that convey the stormwater runoff to be discharged into an existing FDOT pond. The outfall for Basin II is the same one described on Basin HH. Basin divides were generated using several sources; GIS contour maps, existing topography, quadrangle maps, and existing permit information. On the east side of the road there are several contributing residential areas. There are two offsite areas that contribute to this drainage basin. One wooded area east of I-4, named Sanlando Springs and another named 'B 208' is a wooded area west of the I-4 and bounded by the former A.C.L. Railroad, now a Seminole County bike trail. The pre-development model was generated in ICPR using the available information.

5.0 POST-DEVELOPMENT ANALYSIS

The proposed roadway improvement consists of widening SR 400 by adding eastbound and westbound travel lanes and shoulders. The proposed improvements to SR 400 will accommodate the expected future traffic capacity increases and therefore, raise the level of service. The proposed roadway typical section (**Figures 2 & 3** - Proposed Typical Sections) are comprised of six-lanes in each direction in a divided rural roadway.

The proposed drainage system will consist of ditch bottom and barrier wall inlets along with an underground pipe network designed to collect and convey roadway stormwater runoff away from the roadway and into a SMF. The SMF will provide water quality treatment and attenuate the runoff volume, limiting the discharge to pre-developed runoff rates. Discharge from the SMF's will be to historic outfall locations.

Offsite stormwater runoff anticipated will be addressed with the proposed improvements. The existing drainage outfall and local offsite drainage basins will be maintained unchanged in the post-developed condition. The project is within the jurisdiction of the SJRWMD.

The proposed stormwater management systems will be designed to minimize right-of-way requirements while achieving a level of treatment and attenuation that will be favorably reviewed by the appropriate agencies. The proposed drainage system has been divided into three drainage sub-basins (Basins 'EE'; 'FF', 'FF-1', & 'GG'; and 'HH' & 'II') for analysis purposes. Refer to the Drainage calculations in ***Appendix B*** for basin calculations, and Inter-Connected Pond Routing (ICPR) model input and output.

Table 4 - Summary of Proposed Drainage Basins Limits

Basin Name	From Station	To Station	Outfall Location
'EE'	Before 678+00	700+60	Existing FDOT Pond to Existing Lake
'FF', 'FF-1', & 'GG'	700+60	748+00	Little Wekiva River
'HH' & 'II'	748+00	815+00	Little Wekiva River

5.1 Basin EE

Basin EE will be collected into a storm sewer system and conveyed to the existing FDOT pond (Pond EE) which will be regraded to be able to treat and attenuate the additional runoff generated by the new pavement. Basin EE will begin at station 660+00 and end at station 700+60. The secondary system in the section of I-4 prior to our begin project is being designed by Parson's; however the runoff will be conveyed to the existing FDOT Pond EE. The offsite areas remain the same as in the pre-development condition, with minor adjustments to the drainage patterns, emphasizing that no adverse impact occurs. The proposed Pond EE will discharge through a control structure to the nearby lake where it discharged in the pre-development condition. As stated previously Basin EE is

considered to be a land-locked basin. This basin is located on the Wekiva Recharge Protection Basin and therefore, as stated in Chapter 40C-41 of the Florida Administrative Code, additional criteria is required. The criteria requires that the system within the Wekiva Recharge Protection Basin retain three inches of runoff from new impervious areas proposed to be constructed on type A soils, and percolate into the soil within 72 hours.

The post-development model was generated in ICPR using the same parameters for the pre-development in regards to the offsite. The time of concentration for the offsite system to the west was changed per the enclosure of the ditch due to the lack of right-of-way. Initial and maximum stages in the lake were obtained from several permits and a study performed by Devo Engineering for North Street and Raymond Avenue. The bottom elevation of the existing Pond EE will have to be adjusted to be able to recover the treatment volume in 72 hours.

5.2 Interchange Basin

The interchange Basin in the post-development condition consists of the same areas as in the pre-development condition with minor adjustments. Basin FF begins at Station 700+60 and ends at Station 723+84, and also collects runoff from Ramp B. Basin FF-1 begins at Station 723+84 and ends at Station 733+00, it also collects the runoff from Ramps D and D1. Basin GG begins at Station 733+00 and ends at Station 748+04.

Basin FF will collect the runoff into a storm sewer system, as well as roadways ditches in the median, that will discharge into Pond FF. As depicted in the ICPR model, pond FF has a control structure that connects to an existing 36" pipe prior to discharging into the existing Jacobson's Pond similar to the pre-development condition. The existing Jacobson's Pond then discharges under I-4 into Pond GG (Pond A in pre-development model), and ultimately into the Wekiva River via an existing outfall under Markham Woods Road.

Basin FF-1 collects the runoff into a storm sewer system that discharges into Pond FF-1. Pond FF-1 then outfalls to the Wekiva River through an outfall pipe to an existing parcel that was acquired by Seminole County for stormwater/drainage purposes. A new outfall pipe is designed and modeled in ICPR.

Basin GG will collect the runoff into a storm sewer system that will discharge into the existing Pond A (Pond GG in our plans) which will be regraded to be able to treat and attenuate the additional runoff generated by the new pavement. Basin GG will maintain the existing outfall location as in the pre-development condition with a minor pipe size change.

The existing basins generated by the SR 434 widening project have remained the same. Pond 1, which was a pond designed for SR 434, had to be modified due to the proposed configuration for the I-4 ramps. In order to maintain the same volume, Pond 1 had to be modified and remodeled; however all the elevations were kept the same, as well as the outfall structure.

5.3 Basins HH & II

Stormwater from Basin 'HH' will be collected into a storm sewer system and conveyed to the existing FDOT pond (Pond 'HH') which will be regraded to be able to treat and attenuate the additional runoff generated by the new pavement. Basin 'HH' will begin at station 784+00 and end at station 771+50. The offsite areas remain the same as in the pre-development condition, with minor adjustments to the drainage patterns, emphasizing that no adverse impact occurs.

Stormwater from Basin 'II' will be collected into a storm sewer system and conveyed to the existing FDOT pond (Pond 'II') which will be regraded to be able to treat and attenuate the additional runoff generated by the new pavement. Basin II will begin at station 771+50 and end at station 815+00. The offsite areas remain the same as in the pre-development condition, with minor adjustments to the drainage patterns, emphasizing that no adverse impact occurs.

Post-development Ponds 'HH' and 'II' were modified from the pre-development condition. Pond 'II' had to be divided into three ponds interconnected with equalizer pipes since a ramp connecting the roadway to the Rest area is proposed. The three ponds 'II' are considered as one pond since they have the same pond elevation and side slopes, and equalizer pipes are proposed in the bottom of the ponds. Both Ponds 'HH' and 'II' are designed to be dry bottom ponds with recovery of the pollution abatement volume accomplished through natural percolation in the pond bottoms.

6.0 FLOODPLAIN ANALYSIS

The latest FEMA FIRM Maps were reviewed (12117C0135F and 12117C0145F, dated September 28, 2007), which confirms the project corridor currently is not within the floodplain. Any Zone A determined adjacent to the project area is a part of the floodplain and if impacted will be compensated accordingly. The only area within the Zone A designation is associated with the existing Pond EE-1. Therefore, the 100-year/24-hour design storm for Basin EE will be modeled also.

7.0 ON-SITE CONVEYANCE ANALYSIS

The proposed drainage includes the use of ditch bottom and barrier wall inlets collecting stormwater runoff and storm drain pipe conveying the stormwater runoff to designated stormwater management facilities.

Tailwater elevations for the flood routing model are estimated using the existing permitted data, survey, and the proposed engineering models for the proposed ponds. Refer to the Drainage Calculations in ***Appendix C and D*** for storm sewer calculations and ditch calculations.

Tailwater elevations utilized for the storm drain systems are based on the stage at the peak inflow of the respective stormwater management pond, with a starting pond elevation equal to the overflow weir and the drawdown, disregarding the drawdown orifice. Great care has been used to establish design high water (DHW) levels for the storm drain systems to not adversely impact SR 400 travel lanes.

Ditch calculations are computed using the Manning's Equation and the appropriate input from the proposed roadway improvements. The areas of super elevation transition, bridge end treatment, sag inlets, etc. has been reviewed and considered in the ditch calculations also.

Sag analysis of the storm drain systems was performed to determine the 50-year storm drain hydraulic grade line. The sag inlets on the mainline were reviewed for compliance with the FDOT design documents. The 50-year tailwater elevation in the proposed ponds is established using the flood routing computer models for the proposed post-development condition.

8.0 OFF-SITE CONVEYANCE ANALYSIS

Proposed offsite drainage systems are included in the project plans. The offsite areas were reviewed and considered as in the pre-development condition to the post-development condition. The systems designed included offsite runoff as part of the drainage designs throughout the project limits. Outside ditches were designed to collect and convey offsite runoff downstream without any detrimental effects to adjoining property owners.

9.0 CONCLUSIONS

Proposed drainage systems for the project as modeled indicate that this project meets the SJRWMD and FDOT drainage criteria and permitting requirements as much as possible. The drainage areas were reviewed and compared in the pre-development condition to the post-development condition. The systems designed included offsite runoff as part of the design.

Pond EE is located in a land-locked basin. The proposed Pond EE is a dry bottom pond and discharges runoff to the existing lake across Oliver Avenue. The design meets the SJRWMD criteria for the design storm, However, for the FDOT Critical Duration storm events, the longer and larger design storm events exceed the existing high water levels for the existing lake across Oliver Avenue. The pond is established to hold back as much stormwater runoff as practical to reduce any adverse incidents to adjoining property owners. The pond recovery is also exceeded in that 100% recovery does not occur within 72 hours. However, more than the treatment volume does recover within 72 hours. Pond EE will require over excavation of the pond bottom and to be backfilled with A-3 Select fill material.

Pond FF, Pond FF-1, and Pond GG are all discharging to the Little Wekiva River and make up the Interchange Basin. All the ponds are dry bottom ponds. Pond FF is connected toward the existing Jacobson's pond which is all draining to the west side of I-4 toward Pond GG. Pond GG is connected to the existing outfall under Markham Woods Road as permitted for SR 434. The only revision is the outfall pipe and structure for Pond GG connecting the existing system. Pond FF-1 is a new pond within the propose loop ramp. The pond has more volume than needed for the project but with the excess volume the pond does not recover fully within 72 hours. The treatment volume is recovered well before 72 hours. Ponds FF-1 and GG will require over excavation of the pond bottom and to be backfilled with A-3 Select fill material.

Ponds HH and II are existing ponds expanded to accommodate additional volumes generated from the proposed improvements. Both ponds are dry bottom ponds. Pond HH does not fully recover within 72 hours. Pond II is divided into 3 ponds with a large pond very similar to the existing pond and two smaller ponds. The smaller ponds and the large pond are interconnected with an equalizer pipe so as having Pond II acting as one pond. Both ponds are interconnected to an existing outfall behinds the existing rest area. The existing outfall eventually reaches the Little Wekiva River. Pond HH will require over excavation of the pond bottom and to be backfilled with A-3 Select fill material.

The overall drainage design incorporates the SJRWMD and FDOT design elements as much as possible meeting discharge rates and treatment requirements for the Wekiva River Basin. The design data and resulting analysis is contained in Appendix B.

10.0 REFERENCES

The following is a list of documents referenced during, and as part of, the design process in establishing design criteria and parameters and designing the proposed drainage features in compliance with local, state and federal regulations.

- U.S. Department of Agriculture, Soil Conservation Service. (1986). Urban Hydrology for Small Watersheds, Technical Release No. 55. Second Edition. USDA-SCS, Washington, D.C.

- U.S. Department of Agriculture, Soil Conservation Service. Florida Rainfall Intensity for 10-year/24-hour, 25-year/24-hour, 100-year/24-hour and 25-year/96-hour storm events.

- St. Johns River Water Management District. Environmental Resource Permit Information Manual Volume IV, dated 2006

- State of Florida Department of Transportation – Drainage Handbooks

JACOBS

Made by: MPR/HDT Ch'd by:
Date: August 6 2009 Time: 11:26 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **HH**
NODE NAME: **Pond HH**

PRE - DEVELOPED CONDITION

AREA	BASIN DESCRIPTION	BASIN FLOWS TO...
15.80 ac.	Ex Basin HH	Ex Pond HH
3.41 ac.	Ex Pond HH	Ex Pond HH
18.92 ac.	Ex Springwood Village	Ex Pond HH
47.13 ac.	Ex Lake Acorn	Ex Lake Acorn
97.56 ac.	Ex Oak Lake	Ex Oak Lake
182.82 ac.	TOTAL BASIN AREAS	

Ex Basin HH

BASIN NAME: **Ex Basin HH**

NODE NAME:	Ex Pond HH	LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREAimpervious	6.69 ac.	Impervious areas (Streets & roads)	100.00%	---	42.36%
AREApervious	9.11 ac.	Open Space (Grass cover 50% to 75%)		A	57.64%
TOTAL AREA =	15.80 ac.				100.00%
Weighted CN =	64.00		Tc = 22.20 minutes.		
RUNOFF VOLUME =	5.62 ac.-ft.	25YR-24HR DESIGN STORM EVENT			

Ex Pond HH

BASIN NAME: **Ex Pond HH**

NODE NAME:	Ex Pond HH	LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
Area impervious	0.10 ac.	Impervious areas (Streets & roads)	100.00%	---	2.93%
AREApervious	3.31 ac.	Open Space (Grass cover > 75%)		A	97.07%
TOTAL AREA =	3.41 ac.				100.00%
Weighted CN =	40.70		Tc = 10.00 minutes.		
RUNOFF VOLUME =	0.45 ac.-ft.	25YR-24HR DESIGN STORM EVENT			

Ex Springwood Village

BASIN NAME: **Ex Springwood**

NODE NAME:	Ex Pond HH	LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREAimpervious	10.55 ac.	Impervious areas (Streets & roads)	100.00%	---	55.76%
AREApervious	8.37 ac.	Open Space (Grass cover > 75%)		A	44.24%
TOTAL AREA =	18.92 ac.				100.00%
Weighted CN =	71.90		Tc = 22.20 minutes.		
RUNOFF VOLUME =	8.22 ac.-ft.	25YR-24HR DESIGN STORM EVENT			

Ex Lake Acorn

BASIN NAME: **Ex Lake Acorn**

NODE NAME:	Ex Lake Acorn	LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREApervious	46.39 ac.	Residential Areas (1/8 ac. or less, 65% Imp.)	65.00%	A	98.43%
AREAwater surf.	0.74 ac.	Lake Water Surface		---	1.57%
TOTAL AREA =	47.13 ac.				100.00%
Weighted CN =	77.40		Tc = 53.70 minutes.		
RUNOFF VOLUME =	23.08 ac.-ft.	25YR-24HR DESIGN STORM EVENT			

Ex Oak Lake

BASIN NAME: **Ex Oak Lake**

NODE NAME:	Ex Oak Lake	LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREApervious	93.30 ac.	Residential Areas (1/8 ac. or less, 65% Imp.)	65.00%	A	95.63%
AREAwater surf.	4.26 ac.	Lake Water Surface		---	4.37%
TOTAL AREA =	97.56 ac.				100.00%
Weighted CN =	78.00		Tc = 65.20 minutes.		
RUNOFF VOLUME =	6.94 ac.-ft.	25YR-24HR DESIGN STORM EVENT			

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Date: August 6 2009 Time: 11:36 AM
Project Number: 242592-3-52-01

PROJECT: I-4 & SR 434 Improvements
BASIN NAME: II
NODE NAME: Pond II

PRE - DEVELOPED CONDITION

AREA	BASIN DESCRIPTION	BASIN FLOWS TO...
19.36 ac.	Ex Basin II	Ex Pond II
4.06 ac.	Ex Pond II	Ex Pond II
14.39 ac.	Ex Sanlando	Ex Pond II
7.77 ac.	Ex B208	Ex Pond II
15.35 ac.	Ex Rest Area	DBI Outfall
60.93 ac.	TOTAL BASIN AREAS	

Ex Basin II

BASIN NAME: Ex Basin II
NODE NAME: Ex Pond II

		LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREAimpervious	7.83 ac.	Impervious areas (Streets & roads)	100.00%	- - -	40.44%
AREApervious	11.53 ac.	Open Space (Grass cover > 75%)		A	59.56%
TOTAL AREA =	19.36 ac.				100.00%
Weighted CN =	62.90		Tc = 61.20	minutes.	
RUNOFF VOLUME =	6.67 ac.-ft.	25YR-24HR	DESIGN STORM EVENT		

Ex Pond II

BASIN NAME: Ex Pond II
NODE NAME: Ex Pond II

		LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREAimpervious	0.67 ac.	Impervious areas (Streets & roads)	100.00%	- - -	16.53%
AREApervious	3.39 ac.	Open Space (Grass cover > 75%)		A	83.47%
TOTAL AREA =	4.06 ac.				100.00%
Weighted CN =	48.80		Tc = 10.00	minutes.	
RUNOFF VOLUME =	0.84 ac.-ft.	25YR-24HR	DESIGN STORM EVENT		

Ex Sanlando

BASIN NAME: Ex Sanlando
NODE NAME: Ex Pond II

		LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREApervious	14.39 ac.	Residential Areas (1/4 ac., 38% Impervious)		A	100.00%
TOTAL AREA =	14.39 ac.				100.00%
Weighted CN =	43.00		Tc = 50.70	minutes.	
RUNOFF VOLUME =	2.21 ac.-ft.	25YR-24HR	DESIGN STORM EVENT		

Ex B208

BASIN NAME: Ex B208
NODE NAME: Ex Pond II

		LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREApervious	7.77 ac.	Open Space (Grass cover 50% to 75%)		A	100.00%
TOTAL AREA =	7.77 ac.				100.00%
Weighted CN =	39.00		Tc = 42.40	minutes.	
RUNOFF VOLUME =	0.92 ac.-ft.	25YR-24HR	DESIGN STORM EVENT		

Ex Rest Area

BASIN NAME: Ex Rest Area
NODE NAME: DBI Outfall

		LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREAimpervious	5.00 ac.	Impervious areas (Streets & roads)	100.00%	- - -	32.57%
AREApervious	10.35 ac.	Open Space (Grass cover > 75%)		A	67.43%
TOTAL AREA =	15.35 ac.				100.00%
Weighted CN =	58.20		Tc = 44.90	minutes.	
RUNOFF VOLUME =	4.58 ac.-ft.	25YR-24HR	DESIGN STORM EVENT		

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:26 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **HH**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

per Permit No. 4-117-0398A6

BASIN DESCRIPTION: **Ex Basin HH**
BASIN NAME: **Ex Basin HH**
NODE NAME: **Ex Pond HH**
BASIN SIZE: **15.80** acres
TYPE of EVALUATION: **PRE -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Impervious areas (Streets & roads)	100.00%	- - -	- - -	98.00	42.36%	41.51
Open Space (Grass cover 50% to 75%)		6, 7, 8, 31	A	39.00	57.64%	22.48
					100.00%	63.99

(PRODUCT SUM) 63.99

WEIGHTED CN = ---------- = ---------- = 63.99
(AREA or 100%) 100.00%

USE CN = 64.00

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 5.63 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 4.27 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$Vr = R * AREA/12 = 5.62$ acre-feet

TIME of CONCENTRATION CALCULATION

per Permit No. 4-117-0398A6

USE TOTAL TIME of CONCENTRATION = 22.20

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Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:26 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **HH**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Ex Pond HH**
BASIN NAME: **Ex Pond HH**
NODE NAME: **Ex Pond HH**
BASIN SIZE: **3.41** acres
TYPE of EVALUATION: **PRE -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Impervious areas (Streets & roads)	98.00%	- - -	- - -	98.00	2.93%	2.87
Open Space (Grass cover > 75%)	75.00%	6, 7, 8, 31	A	39.00	97.07%	37.86
					100.00%	40.73

WEIGHTED CN = (PRODUCT SUM) / (AREA or 100%) = 40.73 / 100.00 = 40.73

USE CN = 40.70

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 14.57 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 1.60 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$$Vr = R * AREA/12 = 0.45 \text{ acre-feet}$$

TIME of CONCENTRATION CALCULATION

per Permit No. 4-117-0398A6

USE TOTAL TIME of CONCENTRATION = 10.00

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:26 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **HH**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Ex Springwood**
BASIN NAME: **Ex Springwood**
NODE NAME: **Ex Pond HH**
BASIN SIZE: **18.92** acres
TYPE of EVALUATION: **PRE -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Impervious areas (Streets & roads)	100.00%	- - -	- - -	98.00	55.76%	54.65
Open Space (Grass cover > 75%)		6, 7, 8, 31	A	39.00	44.24%	17.25
					100.00%	71.90

(PRODUCT SUM) 71.90

WEIGHTED CN = (PRODUCT SUM) / (AREA or 100%) = 71.90 / 100.00% = 71.90 **USE CN = 71.90**

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 3.91 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 5.21 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$$Vr = R * AREA/12 = 8.22 \text{ acre-feet}$$

TIME of CONCENTRATION CALCULATION

OVERLAND FLOW(SHEET FLOW):

$$To = \frac{0.93 * (L^{0.6}) * (n^{0.6})}{(i^{0.4}) * (S^{0.3})} = To(hr.'s)$$

OVERLAND TERRAIN: **PAVEMENT**

"n"	LAND USE
0.015	PAVEMENT
0.05	BARE SOIL
0.20	POOR GRASS
0.40	AVE. GRASS or LAWNS
0.60	DENSE GRASS or WOODLANDS
0.80	THICK FOREST

SHALLOW CONCENTRATED FLOW

$$Tsh = \frac{Lsh}{60 \times V} = Tsh(minutes) \text{ where:}$$

VELOCITY = Vunpaved, Vpaved, Vpipe and/or Vditch
Vunpaved = 16.1345 x (S)^0.5; where S = Slope in ft/ft. Vpipe = 2.5 fps (Established)
Vpaved = 20.3282 x (S)^0.5; where S = Slope in ft/ft. Vditch = 0.5 fps (Established)

FLOW TYPE	LENGTH	MANNING'S 'n'	SLOPE	RAINFALL (iterative)	INTENSITY(in) (calculated)	VELOCITY	TIME (min)
OVERLAND	**270 ft.**	**0.015**	**0.50%**	**7.4 in./hr.**	**7.40 in./hr.**	**----**	**4.74**
PAVED	**638 ft.**		**1.90%**			**2.80**	**3.79**
UNPAVED	**277 ft.**		**2.90%**			**2.75**	**1.68**
UNPAVED	**1,800 ft.**		**2.40%**			**2.50**	**12.00**
					TOTAL TIME of CONCENTRATION =		**22.22**

USE TOTAL TIME of CONCENTRATION = 22.20

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:26 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **HH**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Ex Lake Acorn**
BASIN NAME: **Ex Lake Acorn**
NODE NAME: **Ex Lake Acorn**
BASIN SIZE: **47.13** acres
TYPE of EVALUATION: **PRE -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Residential Areas (1/8 ac. or less, 65% Imp.)	65.00%	6, 7, 8, 31	A	77.00	98.43%	75.79
Lake Water Surface		- - -	- - -	100.00	1.57%	1.57
					100.00%	77.36

(PRODUCT SUM) 77.36

WEIGHTED CN = (PRODUCT SUM) / (AREA or 100%) = 77.36 / 100.00% = 77.36

USE CN = 77.40

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 2.92 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 5.88 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$$Vr = R * AREA/12 = 23.08 \text{ acre-feet}$$

TIME of CONCENTRATION CALCULATION

OVERLAND FLOW(SHEET FLOW):

$$To = \frac{0.93 * (L^{0.6}) * (n^{0.6})}{(i^{0.4}) * (S^{0.3})} = To(hr.'s)$$

OVERLAND TERRAIN: **AVE. GRASS**

"n"	LAND USE
0.015	PAVEMENT
0.05	BARE SOIL
0.20	POOR GRASS
0.40	AVE. GRASS or LAWNS
0.60	DENSE GRASS or WOODLANDS
0.80	THICK FOREST

SHALLOW CONCENTRATED FLOW

$$Tsh = \frac{Lsh}{60 \times V} = Tsh(minutes)$$ where:

VELOCITY = Vunpaved, Vpaved, Vpipe and/or Vditch

Vunpaved = 16.1345 x (S)^0.5; where S = Slope in ft/ft. Vpipe = 2.5 fps (Established)
Vpaved = 20.3282 x (S)^0.5; where S = Slope in ft/ft. Vditch = 0.5 fps (Established)

FLOW TYPE	LENGTH	MANNING'S 'n'	SLOPE	RAINFALL (iterative)	INTENSITY(in) (calculated)	VELOCITY	TIME (min)
OVERLAND	263 ft.	0.400	0.500%	3.94 in./hr.	3.94 in./hr.		43.03
PAVED	303 ft.		1.30%			2.32 fps	2.18
UNPAVED	272 ft.	0.400	1.300%			1.84 fps	2.46
PAVED	372 ft.		2.10%			2.95 fps	2.10
UNPAVED	628 ft.		3.00%			2.79 fps	3.75
PIPE FLOW	25 ft.					2.50 fps	0.17
						TOTAL TIME of CONCENTRATION =	53.69
						USE TOTAL TIME of CONCENTRATION =	53.70

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:26 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **HH**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Ex Oak Lake**
BASIN NAME: **Ex Oak Lake**
NODE NAME: **Ex Oak Lake**
BASIN SIZE: **97.56** acres
TYPE of EVALUATION: **PRE -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Residential Areas (1/8 ac. or less, 65% Imp.)	65.00%	6, 7, 8, 31	A	77.00	95.63%	73.64
Lake Water Surface		- - -	- - -	100.00	4.37%	4.37
					100.00%	78.00

WEIGHTED CN = (PRODUCT SUM) / (AREA or 100%) = 78.00 / 100.00% = 78.00 **USE CN = 78.00**

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 2.82 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 5.95 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$$Vr = R * AREA/12 = 48.36 \text{ acre-feet}$$

TIME of CONCENTRATION CALCULATION

OVERLAND FLOW(SHEET FLOW):

$$To = \frac{0.93 * (L^{0.6}) * (n^{0.6})}{(i^{0.4}) * (S^{0.3})} = To(hr.'s)$$

OVERLAND TERRAIN: **AVE. GRASS**

"n"	LAND USE
0.015	PAVEMENT
0.05	BARE SOIL
0.20	POOR GRASS
0.40	AVE. GRASS or LAWNS
0.60	DENSE GRASS or WOODLANDS
0.80	THICK FOREST

SHALLOW CONCENTRATED FLOW

$$Tsh = \frac{Lsh}{60 \times V} = Tsh(minutes)$$ where:

VELOCITY = Vunpaved, Vpaved, Vpipe and/or Vditch
Vunpaved = 16.1345 x (S)^0.5; where S = Slope in ft/ft. Vpipe = 2.5 fps (Established)
Vpaved = 20.3282 x (S)^0.5; where S = Slope in ft/ft. Vditch = 0.5 fps (Established)

FLOW TYPE	LENGTH	MANNING'S 'n'	SLOPE	RAINFALL (iterative)	INTENSITY(in) (calculated)	VELOCITY	TIME (min)
OVERLAND	**300 ft.**	**0.400**	**0.50%**	**3.72 in./hr.**	**3.72 in./hr.**	**----**	**47.65**
UNPAVED	**303 ft.**		**1.00%**			**1.61 fps**	**3.14**
PAVED	**308 ft.**		**1.00%**			**2.03 fps**	**2.53**
PIPE FLOW	**1,784 ft.**					**2.50 fps**	**11.89**
					TOTAL TIME of CONCENTRATION =		**65.21**
					USE TOTAL TIME of CONCENTRATION =		**65.20**

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:41 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **II**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

per Permit No. 4-117-0398A6

BASIN DESCRIPTION: **Ex Basin II**
BASIN NAME: **Ex Basin II**
NODE NAME: **Ex Pond II**
BASIN SIZE: **19.36** acres
TYPE of EVALUATION: **PRE -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Impervious areas (Streets & roads)	100.00%	- - -	- - -	98.00	40.44%	39.63
Open Space (Grass cover > 75%)		6, 7, 8, 31	A	39.00	59.56%	23.23
					100.00%	62.86

WEIGHTED CN = (PRODUCT SUM) 62.86 / (AREA or 100%) 100.00% = 62.86

USE CN = 62.90

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 5.90 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 4.13 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$$Vr = R * AREA/12 = 6.67 \text{ acre-feet}$$

TIME of CONCENTRATION CALCULATION

per Permit No. 4-117-0398A6

USE TOTAL TIME of CONCENTRATION = 61.20

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:41 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **II**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

per Permit No. 4-117-0398A6

BASIN DESCRIPTION: **Ex Pond II**
BASIN NAME: **Ex Pond II**
NODE NAME: **Ex Pond II**
BASIN SIZE: **4.06** acres
TYPE of EVALUATION: **PRE -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Impervious areas (Streets & roads)	100.00%	- - -	- - -	98.00	16.53%	16.20
Open Space (Grass cover > 75%)		6, 7, 8, 31	A	39.00	83.47%	32.55
					100.00%	48.75

(PRODUCT SUM) 48.75

WEIGHTED CN = ---------- = ---------- = 48.75 **USE CN = 48.80**
(AREA or 100%) 100.00%

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 10.49 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 2.49 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$$Vr = R * AREA/12 = 0.84 \text{ acre-feet}$$

TIME of CONCENTRATION CALCULATION

per Permit No. 4-117-0398A6

USE TOTAL TIME of CONCENTRATION = 10.00

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:41 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **II**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Ex Sanlando**
BASIN NAME: **Ex Sanlando**
NODE NAME: **Ex Sanlando**
BASIN SIZE: **14.39** acres
TYPE of EVALUATION: **PRE -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Residential Areas (1/4 ac., 38% Impervious)		6, 7, 8, 31	A	43.00	100.00%	43.00
					100.00%	43.00

(PRODUCT SUM) 43.00

WEIGHTED CN = (PRODUCT SUM) / (AREA or 100%) = 43.00 / 100.00% = 43.00

USE CN = 43.00

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 13.26 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 1.84 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$$Vr = R * AREA/12 = 2.21 \text{ acre-feet}$$

TIME of CONCENTRATION CALCULATION

OVERLAND FLOW(SHEET FLOW):

$$To = \frac{0.93 * (L^{0.6}) * (n^{0.6})}{(i^{0.4}) * (S^{0.3})} = To(hr.'s)$$

OVERLAND TERRAIN: **AVE. GRASS**

"n"	LAND USE
0.015	PAVEMENT
0.05	BARE SOIL
0.20	POOR GRASS
0.40	AVE. GRASS or LAWNS
0.60	DENSE GRASS or WOODLANDS
0.80	THICK FOREST

SHALLOW CONCENTRATED FLOW

$$Tsh = \frac{Lsh}{60 \times V} = Tsh(minutes)$$ where:

VELOCITY = Vunpaved, Vpaved, Vpipe and/or Vditch
Vunpaved = 16.1345 x (S)^0.5; where S = Slope in ft/ft. Vpipe = 2.5 fps (Established)
Vpaved = 20.3282 x (S)^0.5; where S = Slope in ft/ft. Vditch = 0.5 fps (Established)

FLOW TYPE	LENGTH	MANNING'S 'n'	SLOPE	RAINFALL (iterative)	INTENSITY(in) (calculated)	VELOCITY	TIME (min)
OVERLAND	**117 ft.**	**0.400**	**1.00%**	**5.9 in./hr.**	**5.93 in./hr.**	**----**	**18.24**
PAVED	**726 ft.**		**0.30%**			**1.11**	**10.90**
UNPAVED	**344 ft.**		**1.00%**			**1.61**	**3.56**
PIPE FLOW	**461 ft.**					**2.50**	**3.07**
DITCH FLOW	**355 ft.**		**0.30%**			**0.50**	**11.83**
PIPE FLOW	**470 ft.**					**2.50**	**3.13**
					TOTAL TIME of CONCENTRATION =		**50.75**

USE TOTAL TIME of CONCENTRATION = 50.70

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:41 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **II**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

per Permit No. 4-117-0398A6

BASIN DESCRIPTION: **Ex B208**
BASIN NAME: **Ex B208**
NODE NAME: **Ex Pond II**
BASIN SIZE: **7.77** acres
TYPE of EVALUATION: **PRE -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Open Space (Grass cover > 75%)		6, 7, 8, 31	A	39.00	100.00%	39.00
					100.00%	39.00

USE CN = 39.00

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 15.64 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 1.42 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$Vr = R * AREA/12 = 0.92$ acre-feet

TIME of CONCENTRATION CALCULATION

per Permit No. 4-117-0398A6

USE TOTAL TIME of CONCENTRATION = 42.40

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:41 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **II**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Ex Rest Area**
BASIN NAME: **Ex Rest Area**
NODE NAME: **DBI Outfall**
BASIN SIZE: **15.35** acres
TYPE of EVALUATION: **PRE -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Impervious areas (Streets & roads)	100.00%	- - -	- - -	98.00	32.57%	31.92
Open Space (Grass cover 50% to 75%)		6, 7, 8, 31	A	39.00	67.43%	26.30
					100.00%	58.21

(PRODUCT SUM) 58.21
WEIGHTED CN = ---------- = ---------- = 58.21 **USE CN = 58.20**
(AREA or 100%) 100.00%

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 7.18 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 3.58 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$$Vr = R * AREA/12 = 4.58 \text{ acre-feet}$$

TIME of CONCENTRATION CALCULATION

OVERLAND FLOW(SHEET FLOW):

$$To = \frac{0.93 * (L^{0.6}) * (n^{0.6})}{(i^{0.4}) * (S^{0.3})} = To(hr.'s)$$

OVERLAND TERRAIN: **AVE. GRASS**

"n"	LAND USE
0.015	PAVEMENT
0.05	BARE SOIL
0.20	POOR GRASS
0.40	AVE. GRASS or LAWNS
0.60	DENSE GRASS or WOODLANDS
0.80	THICK FOREST

SHALLOW CONCENTRATED FLOW

$$Tsh = \frac{Lsh}{60 \times V} = Tsh(minutes)$$ where:

VELOCITY = Vunpaved, Vpaved, Vpipe and/or Vditch
Vunpaved = 16.1345 x (S)^0.5; where S = Slope in ft/ft. Vpipe = 2.5 fps (Established)
Vpaved = 20.3282 x (S)^0.5; where S = Slope in ft/ft. Vditch = 0.5 fps (Established)

FLOW TYPE	LENGTH	MANNING'S 'n'	SLOPE	RAINFALL (iterative)	INTENSITY(in) (calculated)	VELOCITY	TIME (min)
OVERLAND	**163 ft.**	**0.400**	**0.30%**	**4.30 in./hr.**	**4.31 in./hr.**	**----**	**36.35**
PIPE FLOW	**1,289 ft.**					**2.50**	**8.59**
					TOTAL TIME of CONCENTRATION =		**44.94**

USE TOTAL TIME of CONCENTRATION = 44.90

JACOBS

Made by: MPR/HDT **Checked by:** _____
DATE: August 6 2009 **TIME:** 11:33 AM
Project Number: **242592-3-52-01**

PROJECT: **I-4 & SR 434 Improvements**

EXISTING POND/LAKE STORAGE DATA

BASIN NAME: **Ex Pond HH**
NODE NAME: **Ex Pond HH**

Stage (ft.)	AREA (ac.)
50	1.32
52	1.82
54.5	2.00
55	2.10
56	2.30

BASIN NAME: **Ex Pond II**
NODE NAME: **Ex Pond II**

Stage (ft.)	AREA (ac.)
59	0.50
61	0.75
64	1.09
66.5	1.32
68	1.85

BASIN NAME: **Ex Lake Acorn**
NODE NAME: **Ex Lake Acorn**

Stage (ft.)	AREA (ac.)
48	0.50
49	0.60
50	0.67
51	0.74
52	1.00
53	1.30
54	1.70
55	2.00

BASIN NAME: **Ex Oak Lake**
NODE NAME: **Ex Oak Lake**

Stage (ft.)	AREA (ac.)
47	3
48	4.00
49	4.26
50	5.00
51	5.50
52	6.20
53	7.00
54	7.50
55	8.00

JACOBS

Made by: MPR/HDT Ch'd by:
Date: August 6 2009 Time: 11:26 AM
Project Number: 242592-3-52-01

PROJECT: I-4 & SR 434 Improvements
BASIN NAME: HH
NODE NAME: Pond HH

POST - DEVELOPED CONDITION

AREA	BASIN BREAKDOWN	BASIN FLOWS TO...
13.45 ac.	Basin HH	Pond HH
3.41 ac.	Pond HH	Pond HH
18.92 ac.	Springwood Village	Pond HH
47.13 ac.	Lake Acorn	Lake Acorn
97.56 ac.	Oak Lake	Oak Lake
180.47 ac.	TOTAL BASIN AREAS	

Basin HH

BASIN NAME: HH
NODE NAME: Pond HH

		LAND USE	% Impervious	SOILS TYPE	Percent of Area
AREAimpervious	9.33 ac.	Impervious areas (Streets & roads)	100.00%	---	69.41%
AREApervious	4.11 ac.	Open Space (Grass cover > 75%)		A	30.59%
TOTAL AREA =	13.45 ac.				100.00%
Weighted CN =	80.00		Tc = 10.00 minutes.		
RUNOFF VOLUME =	6.94 ac.-ft.	25YR-24HR DESIGN STORM EVENT			

Pond HH

BASIN NAME: Pond HH
NODE NAME: Pond HH

		LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
Area impervious	0.10 ac.	Impervious areas (Streets & roads)	100.00%	---	2.93%
AREApervious	3.38 ac.	Open Space (Grass cover > 75%)		A	99.00%
TOTAL AREA =	3.41 ac.				101.93%
Weighted CN =	40.70		Tc = 10.00 minutes.		
RUNOFF VOLUME =	0.45 ac.-ft.	25YR-24HR DESIGN STORM EVENT			

Springwood Village

BASIN NAME: Springwood
NODE NAME: Pond HH

		LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREAimpervious	10.55 ac.	Impervious areas (Streets & roads)	100.00%	---	55.76%
AREApervious	8.37 ac.	Open Space (Grass cover > 75%)		A	44.24%
TOTAL AREA =	18.92 ac.				100.00%
Weighted CN =	71.90		Tc = 22.20 minutes.		
RUNOFF VOLUME =	8.22 ac.-ft.	25YR-24HR DESIGN STORM EVENT			

Lake Acorn

BASIN NAME: Lake Acorn
NODE NAME: Lake Acorn

		LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREApervious	46.39 ac.	Residential Areas (1/8 ac. or less, 65% Imp.)	65.00%	A	98.43%
AREAwater surf.	0.74 ac.	Lake Water Surface		---	1.57%
TOTAL AREA =	47.13 ac.				100.00%
Weighted CN =	77.40		Tc = 53.70 minutes.		
RUNOFF VOLUME =	23.08 ac.-ft.	25YR-24HR DESIGN STORM EVENT			

Oak Lake

BASIN NAME: Oak Lake
NODE NAME: Oak Lake

		LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREApervious	93.30 ac.	Residential Areas (1/8 ac. or less, 65% Imp.)	65.00%	A	95.63%
AREAwater surf.	4.26 ac.	Lake Water Surface		---	4.37%
TOTAL AREA =	97.56 ac.				100.00%
Weighted CN =	78.00		Tc = 65.20 minutes.		
RUNOFF VOLUME =	6.94 ac.-ft.	25YR-24HR DESIGN STORM EVENT			

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:26 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **HH**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Basin HH**
BASIN NAME: **Basin HH**
NODE NAME: **Pond HH**
BASIN SIZE: **13.45** acres
TYPE of EVALUATION: **POST -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Impervious areas (Streets & roads)	100.00%	- - -	- - -	98.00	69.41%	68.02
Open Space (Grass cover > 75%)		6, 7, 8, 31	A	39.00	30.59%	11.93
					100.00%	79.95

(PRODUCT SUM) 79.95

WEIGHTED CN = ---------- = ---------- = 79.95 **USE CN = 80.00**
(AREA or 100%) 100.00%

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 2.50 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 6.19 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$Vr = R * AREA/12 =$ 6.94 acre-feet

TIME of CONCENTRATION CALCULATION

OVERLAND FLOW(SHEET FLOW):

$$To = \frac{0.93 * (L^{0.6}) * (n^{0.6})}{(i^{0.4}) * (S^{0.3})} = To(hr.'s)$$

OVERLAND TERRAIN: **PAVEMENT**

"n"	LAND USE
0.015	PAVEMENT
0.05	BARE SOIL
0.20	POOR GRASS
0.40	AVE. GRASS or LAWNS
0.60	DENSE GRASS or WOODLANDS
0.80	THICK FOREST

SHALLOW CONCENTRATED FLOW

$$Tsh = \frac{Lsh}{60 \times V} = Tsh(minutes)$$ where:

VELOCITY = Vunpaved, Vpaved, Vpipe and/or Vditch
Vunpaved = 16.1345 x (S)^0.5; where S = Slope in ft/ft. Vpipe = 2.5 fps (Established)
Vpaved = 20.3282 x (S)^0.5; where S = Slope in ft/ft. Vditch = 0.5 fps (Established)

FLOW TYPE	LENGTH	MANNING'S 'n'	SLOPE	RAINFALL (iterative)	INTENSITY(in) (calculated)	VELOCITY	TIME (min)
OVERLAND	56 ft.	0.015	2.00%	7.40 in./hr.	7.40 in./hr.	----	1.22
PAVED	121 ft.		2.40%			3.15 fps	0.64
PIPE FLOW	1,000 ft.					2.50 fps	6.67
					TOTAL TIME of CONCENTRATION =		8.52

USE TOTAL TIME of CONCENTRATION = 10.00

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:26 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **HH**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Pond HH**
BASIN NAME: **Pond HH**
NODE NAME: **Pond HH**
BASIN SIZE: **3.41** acres
TYPE of EVALUATION: **POST - DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Impervious areas (Streets & roads)	100.00%	- - -	- - -	98.00	2.93%	2.87
Open Space (Grass cover > 75%)		6, 7, 8, 31	A	39.00	99.00%	38.61
					101.93%	41.48

(PRODUCT SUM) 41.48

WEIGHTED CN = (PRODUCT SUM) / (AREA or 100%) = 41.48 / 101.93% = 40.70 **USE CN = 40.70**

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 14.57 \text{ inches}$$

Determine Runoff: R

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 1.60 \text{ inches}$$

Determine Runoff Volume; Vr

$$Vr = R * AREA/12 = 0.45 \text{ acre-feet}$$

TIME of CONCENTRATION CALCULATION

USE TOTAL TIME of CONCENTRATION = 10.00

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:26 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **HH**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Oak Lake**
BASIN NAME: **Oak Lake**
NODE NAME: **Oak Lake**
BASIN SIZE: **97.56** acres
TYPE of EVALUATION: **POST-** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Residential Areas (1/8 ac. or less, 65% Imp.)	65.00%	6, 7, 8, 31	A	77.00	95.63%	73.64
Lake Water Surface		- - -	- - -	100.00	4.37%	4.37
					100.00%	78.00

(PRODUCT SUM) 78.00

WEIGHTED CN = ---------- = ---------- = 78.00 **USE CN = 78.00**
(AREA or 100%) 100.00%

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 2.82 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 5.95 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$Vr = R * AREA/12 =$ 48.36 acre-feet

TIME of CONCENTRATION CALCULATION

OVERLAND FLOW(SHEET FLOW):

$$To = \frac{0.93 * (L^{0.6}) * (n^{0.6})}{(i^{0.4}) * (S^{0.3})} = To(hr.'s)$$

OVERLAND TERRAIN: **AVE. GRASS**

"n"	LAND USE
0.015	PAVEMENT
0.05	BARE SOIL
0.20	POOR GRASS
0.40	AVE. GRASS or LAWNS
0.60	DENSE GRASS or WOODLANDS
0.80	THICK FOREST

SHALLOW CONCENTRATED FLOW

$$Tsh = \frac{Lsh}{60 \times V} = Tsh(minutes)$$ where:

VELOCITY = Vunpaved, Vpaved, Vpipe and/or Vditch
Vunpaved = 16.1345 x (S)^0.5; where S = Slope in ft/ft. Vpipe = 2.5 fps (Established)
Vpaved = 20.3282 x (S)^0.5; where S = Slope in ft/ft. Vditch = 0.5 fps (Established)

FLOW TYPE	LENGTH	MANNING'S 'n'	SLOPE	RAINFALL (iterative)	INTENSITY(in) (calculated)	VELOCITY	TIME (min)
OVERLAND	**300 ft.**	**0.400**	**0.50%**	**3.72 in./hr.**	**3.72 in./hr.**	**----**	**47.65**
UNPAVED	**303 ft.**		**1.00%**			**1.61 fps**	**3.14**
PAVED	**308 ft.**		**1.00%**			**2.03 fps**	**2.53**
PIPE FLOW	**1,784 ft.**					**2.50 fps**	**11.89**
						TOTAL TIME of CONCENTRATION =	65.21
						USE TOTAL TIME of CONCENTRATION =	65.20

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:26 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **HH**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Lake Acorn**
BASIN NAME: **Lake Acorn**
NODE NAME: **Lake Acorn**
BASIN SIZE: **47.13** acres
TYPE of EVALUATION: **POST** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Residential Areas (1/8 ac. or less, 65% Imp.)	65.00%	6, 7, 8, 31	A	77.00	98.43%	75.79
Lake Water Surface		- - -	- - -	100.00	1.57%	1.57
					100.00%	77.36

(PRODUCT SUM) 77.36
WEIGHTED CN = ---------- = ---------- = 77.36 **USE CN = 77.40**
(AREA or 100%) 100.00%

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 2.92 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 5.88 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$$Vr = R * AREA/12 = 23.08 \text{ acre-feet}$$

TIME of CONCENTRATION CALCULATION

OVERLAND FLOW(SHEET FLOW):

$$To = \frac{0.93 * (L^{0.6}) * (n^{0.6})}{(i^{0.4}) * (S^{0.3})} = To(hr.'s)$$

OVERLAND TERRAIN: **AVE. GRASS**

"n"	LAND USE
0.015	PAVEMENT
0.05	BARE SOIL
0.20	POOR GRASS
0.40	AVE. GRASS or LAWNS
0.60	DENSE GRASS or WOODLANDS
0.80	THICK FOREST

SHALLOW CONCENTRATED FLOW

$$Tsh = \frac{Lsh}{60 \times V} = Tsh(minutes)$$ where:

VELOCITY = Vunpaved, Vpaved, Vpipe and/or Vditch
Vunpaved = 16.1345 x (S)^0.5; where S = Slope in ft/ft. Vpipe = 2.5 fps (Established)
Vpaved = 20.3282 x (S)^0.5; where S = Slope in ft/ft. Vditch = 0.5 fps (Established)

FLOW TYPE	LENGTH	MANNING'S 'n'	SLOPE	RAINFALL (iterative)	INTENSITY(in) (calculated)	VELOCITY	TIME (min)
OVERLAND	263 ft.	0.400	0.50%	3.94 in./hr.	3.94 in./hr.	----	43.03
PAVED	303 ft.		1.30%			2.32 fps	2.18
UNPAVED	272 ft.	0.400	1.30%			1.84 fps	2.46
PAVED	372 ft.		2.10%			2.95 fps	2.10
UNPAVED	628 ft.	0.400	3.00%			2.79 fps	3.75
PIPE FLOW	25 ft.					2.50 fps	0.17
						TOTAL TIME of CONCENTRATION =	53.69

USE TOTAL TIME of CONCENTRATION = 53.70

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:26 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **HH**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Springwood Village**
BASIN NAME: **Springwood**
NODE NAME: **Pond HH**
BASIN SIZE: **18.92** acres
TYPE of EVALUATION: **POST -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Impervious areas (Streets & roads)	100.00%	- - -	- - -	98.00	55.76%	54.65
Open Space (Grass cover > 75%)		6, 7, 8, 31	A	39.00	44.24%	17.25
					100.00%	71.90

(PRODUCT SUM) 71.90

WEIGHTED CN = ---------- = ---------- = 71.90 **USE CN = 71.90**
(AREA or 100%) 100.00%

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 3.91 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 5.21 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$Vr = R * AREA/12 =$ 8.22 acre-feet

TIME of CONCENTRATION CALCULATION

OVERLAND FLOW(SHEET FLOW):

$$To = \frac{0.93 * (L^{0.6}) * (n^{0.6})}{(i^{0.4}) * (S^{0.3})} = To(hr.'s)$$

OVERLAND TERRAIN: **PAVEMENT**

"n"	LAND USE
0.015	PAVEMENT
0.05	BARE SOIL
0.20	POOR GRASS
0.40	AVE. GRASS or LAWNS
0.60	DENSE GRASS or WOODLANDS
0.80	THICK FOREST

SHALLOW CONCENTRATED FLOW

$$Tsh = \frac{Lsh}{60 \times V} = Tsh(minutes)$$ where:

VELOCITY = Vunpaved, Vpaved, Vpipe and/or Vditch

Vunpaved = 16.1345 x (S)^0.5; where S = Slope in ft/ft. Vpipe = 2.5 fps (Established)
Vpaved = 20.3282 x (S)^0.5; where S = Slope in ft/ft. Vditch = 0.5 fps (Established)

FLOW TYPE	LENGTH	MANNING'S 'n'	SLOPE	RAINFALL (iterative)	INTENSITY(in) (calculated)	VELOCITY	TIME (min)
OVERLAND	**270 ft.**	**0.015**	**0.50%**	**7.4 in./hr.**	**7.40 in./hr.**	**----**	**4.74**
PAVED	**638 ft.**		**1.90%**			**2.80**	**3.79**
UNPAVED	**277 ft.**		**2.90%**			**2.75**	**1.68**
UNPAVED	**1,800 ft.**		**2.40%**			**2.50**	**12.00**
					TOTAL TIME of CONCENTRATION =		**22.22**

USE TOTAL TIME of CONCENTRATION = 22.20

JACOBS

Made by: MPR/HDT Ch'd by:
Date: August 6 2009 Time: 11:36 AM
Project Number: 242592-3-52-01

PROJECT: I-4 & SR 434 Improvements
BASIN NAME: II
NODE NAME: Pond II

POST - DEVELOPED CONDITION

AREA	BASIN BREAKDOWN	BASIN FLOWS TO...
20.88 ac.	Basin II	Pond II
6.22 ac.	Pond II	Pond II
14.39 ac.	Sanlando	Pond II
6.84 ac.	B208	Pond II
14.65 ac.	Rest Area	DBI Outfall
62.97 ac.	TOTAL BASIN AREAS	

Basin II

BASIN NAME: Basin II
NODE NAME: Pond II

		LAND USE	% Impervious	SOILS TYPE	Percent of Area
AREAimpervious	12.34 ac.	Impervious areas (Streets & roads)	100.00%	- - -	59.10%
AREApervious	8.54 ac.	Open Space (Grass cover > 75%)		A	40.90%
TOTAL AREA =	20.88 ac.				100.00%
Weighted CN =	73.90		Tc = 29.80	minutes.	
RUNOFF VOLUME =	9.49 ac.-ft.	25YR-24HR	DESIGN STORM EVENT		

Pond II

BASIN NAME: Pond II
NODE NAME: Pond II

		LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREAimpervious	2.00 ac.	Impervious areas (Streets & roads)	100.00%	- - -	32.23%
AREApervious	4.21 ac.	Open Space (Grass cover > 75%)		A	67.77%
TOTAL AREA =	6.22 ac.				100.00%
Weighted CN =	58.00		Tc = 10.00	minutes.	
RUNOFF VOLUME =	1.84 ac.-ft.	25YR-24HR	DESIGN STORM EVENT		

Sanlando

BASIN NAME: Sanlando
NODE NAME: Sanlando

		LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREApervious	14.39 ac.	Residential Areas (1/4 ac., 38% Impervious)		A	100.00%
TOTAL AREA =	14.39 ac.				100.00%
Weighted CN =	43.00		Tc = 50.75	minutes.	
RUNOFF VOLUME =	2.21 ac.-ft.	25YR-24HR	DESIGN STORM EVENT		

B208

BASIN NAME: B208
NODE NAME: Pond II

		LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREApervious	6.84 ac.	Open Space (Grass cover 50% to 75%)		A	100.00%
TOTAL AREA =	6.84 ac.				100.00%
Weighted CN =	39.00		Tc = 42.40	minutes.	
RUNOFF VOLUME =	0.92 ac.-ft.	25YR-24HR	DESIGN STORM EVENT		

Rest Area

BASIN NAME: Rest Area
NODE NAME: DBI Outfall

		LAND USE DESCRIPTION	% Impervious	SOILS TYPE	Percent of Area
AREAimpervious	5.83 ac.	Impervious areas (Streets & roads)	100.00%	- - -	32.57%
AREApervious	8.82 ac.	Open Space (Grass cover > 75%)		A	67.43%
TOTAL AREA =	14.65 ac.				100.00%
Weighted CN =	58.20		Tc = 44.90	minutes.	
RUNOFF VOLUME =	4.58 ac.-ft.	25YR-24HR	DESIGN STORM EVENT		

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:41 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **II**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Basin II**
BASIN NAME: **Basin II**
NODE NAME: **Pond II**
BASIN SIZE: **20.88** acres
TYPE of EVALUATION: **POST -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Impervious areas (Streets & roads)	100.00%	- - -	- - -	98.00	59.10%	57.92
Open Space (Grass cover > 75%)		6, 7, 8, 31	A	39.00	40.90%	15.95
					100.00%	73.87

(PRODUCT SUM) 73.87

WEIGHTED CN = (PRODUCT SUM) / (AREA or 100%) = 73.87 / 100.00% = 73.87 **USE CN = 73.90**

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 3.53 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 5.45 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$$Vr = R * AREA/12 = 9.49 \text{ acre-feet}$$

TIME of CONCENTRATION CALCULATION

OVERLAND FLOW(SHEET FLOW):

$$To = \frac{0.93 * (L^{0.6}) * (n^{0.6})}{(i^{0.4}) * (S^{0.3})} = To(hr.'s)$$

OVERLAND TERRAIN: **PAVEMENT**

"n"	LAND USE
0.015	PAVEMENT
0.05	BARE SOIL
0.20	POOR GRASS
0.40	AVE. GRASS or LAWNS
0.60	DENSE GRASS or WOODLANDS
0.80	THICK FOREST

SHALLOW CONCENTRATED FLOW

$$Tsh = \frac{Lsh}{60 \times V} = Tsh(minutes)$$ where:

VELOCITY = Vunpaved, Vpaved, Vpipe and/or Vditch
Vunpaved = 16.1345 x (S)^0.5; where S = Slope in ft/ft. Vpipe = 2.5 fps (Established)
Vpaved = 20.3282 x (S)^0.5; where S = Slope in ft/ft. Vditch = 0.5 fps (Established)

FLOW TYPE	LENGTH	MANNING'S 'n'	SLOPE	RAINFALL (iterative)	INTENSITY(in) (calculated)	VELOCITY	TIME (min)
OVERLAND	**87 ft.**	**0.015**	**0.05%**	**7.40 in./hr.**	**7.40 in./hr.**	**----**	**4.79**
UNPAVED	**126 ft.**		**0.03%**			**0.28 fps**	**7.50**
PIPE FLOW	**2,625 ft.**					**2.50 fps**	**17.50**
						TOTAL TIME of CONCENTRATION =	**29.79**

USE TOTAL TIME of CONCENTRATION = 29.80

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:41 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **II**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Pond II**
BASIN NAME: **Pond II**
NODE NAME: **Pond II**
BASIN SIZE: **6.22** acres
TYPE of EVALUATION: **POST - DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Impervious areas (Streets & roads)	100.00%	- - -	- - -	98.00	32.23%	31.58
Open Space (Grass cover > 75%)		6, 7, 8, 31	A	39.00	67.77%	26.43
					100.00%	58.01

(PRODUCT SUM) 58.01

WEIGHTED CN = (PRODUCT SUM) / (AREA or 100%) = 58.01 / 100.00% = 58.01

USE CN = 58.00

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 7.24 \text{ inches}$$

Determine Runoff: R

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 3.55 \text{ inches}$$

Determine Runoff Volume; Vr

$$Vr = R * AREA/12 = 1.84 \text{ acre-feet}$$

TIME of CONCENTRATION CALCULATION

TOTAL TIME of CONCENTRATION = 10.00

USE TOTAL TIME of CONCENTRATION = 10.00

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:41 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **II**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Sanlando**
BASIN NAME: **Sanlando**
NODE NAME: **Sanlando**
BASIN SIZE: **14.39** acres
TYPE of EVALUATION: **POST -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Residential Areas (1/4 ac., 38% Impervious)		6, 7, 8, 31	A	43.00	100.00%	43.00
					100.00%	43.00

(PRODUCT SUM) 43.00

WEIGHTED CN = ---------- = ---------- = 43.00 **USE CN = 43.00**
(AREA or 100%) 100.00%

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 13.26 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 1.84 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$$Vr = R * AREA/12 = 2.21 \text{ acre-feet}$$

TIME of CONCENTRATION CALCULATION

OVERLAND FLOW(SHEET FLOW):

$$To = \frac{0.93 * (L^{0.6}) * (n^{0.6})}{(i^{0.4}) * (S^{0.3})} = To(hr.'s)$$

OVERLAND TERRAIN: **AVE. GRASS**

"n"	LAND USE
0.015	PAVEMENT
0.05	BARE SOIL
0.20	POOR GRASS
0.40	AVE. GRASS or LAWNS
0.60	DENSE GRASS or WOODLANDS
0.80	THICK FOREST

SHALLOW CONCENTRATED FLOW

$$Tsh = \frac{Lsh}{60 \times V} = Tsh(minutes)$$ where:

VELOCITY = Vunpaved, Vpaved, Vpipe and/or Vditch
Vunpaved = 16.1345 x (S)^0.5; where S = Slope in ft/ft. Vpipe = 2.5 fps (Established)
Vpaved = 20.3282 x (S)^0.5; where S = Slope in ft/ft. Vditch = 0.5 fps (Established)

FLOW TYPE	LENGTH	MANNING'S 'n'	SLOPE	RAINFALL (iterative)	INTENSITY(in) (calculated)	VELOCITY	TIME (min)
OVERLAND	**117 ft.**	**0.400**	**1.00%**	**5.9 in./hr.**	**5.93 in./hr.**	**----**	**18.24**
PAVED	**726 ft.**		**0.30%**			**1.11 fps**	**10.90**
UNPAVED	**344 ft.**		**1.00%**			**1.61 fps**	**3.56**
PIPE FLOW	**461 ft.**					**2.50 fps**	**3.07**
DITCH FLOW	**355 ft.**		**0.30%**			**0.50 fps**	**11.83**
PIPE FLOW	**470 ft.**					**2.50 fps**	**3.13**
						TOTAL TIME of CONCENTRATION =	**50.75**

USE TOTAL TIME of CONCENTRATION = 50.75

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:41 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **II**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **B208**
BASIN NAME: **B208**
NODE NAME: **Pond II**
BASIN SIZE: **6.84** acres
TYPE of EVALUATION: **POST -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Open Space (Grass cover 50% to 75%)		6, 7, 8, 31	A	39.00	100.00%	39.00

USE CN = 39.00

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 15.64 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 1.42 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$$Vr = R * AREA/12 = 0.92 \text{ acre-feet}$$

TIME of CONCENTRATION CALCULATION

per Permit No. 4-117-0398A6

USE TOTAL TIME of CONCENTRATION = 42.40

JACOBS

Made by: MPR/HDT Ch'd by:
DATE: August 6, 2009 TIME: 11:41 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**
BASIN NAME: **II**

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

BASIN DESCRIPTION: **Rest Area**
BASIN NAME: **Rest Area**
NODE NAME: **DBI Outfall**
BASIN SIZE: **15.35** acres
TYPE of EVALUATION: **POST -** **DEVELOPMENT**
(PRE- or POST-)
RAINFALL DEPTH: **8.60** inches,(**25YR-24HR** EVENT).

Determine Basin Runoff Curve Number: CN

Land Use Description	PERCENT of IMPERVIOUS	Soil Name	Soil Group	CN	Percent of AREA	PRODUCT
Impervious areas (Streets & roads)	100.00%	- - -	- - -	98.00	32.57%	31.92
Open Space (Grass cover 50% to 75%)		6, 7, 8, 31	A	39.00	67.43%	26.30
Residential Areas (1/4 ac., 38% Impervious)		6, 7, 8, 31	A	43.00	0.00%	0.00
					100.00%	58.21

(PRODUCT SUM) 58.21

WEIGHTED CN = ---------- = ---------- = 58.21 **USE CN = 58.20**
(AREA or 100%) 100.00%

ESTIMATED RUNOFF VOLUME:

Determine Soil Storage: S

$$S = \frac{1000}{CN} - 10 = 7.18 \text{ inches}$$

Determine Runoff: R
25YR-24HR

$$R = \frac{(P - 0.2 \times S)^2}{(P + 0.8 \times S)} = 3.58 \text{ inches}$$

Determine Runoff Volume; Vr
25YR-24HR

$Vr = R * AREA/12 =$ 4.58 acre-feet

TIME of CONCENTRATION CALCULATION

OVERLAND FLOW(SHEET FLOW):

$$To = \frac{0.93 * (L^{0.6}) * (n^{0.6})}{(i^{0.4}) * (S^{0.3})} = To(hr.'s)$$

OVERLAND TERRAIN: **AVE. GRASS**

"n"	LAND USE
0.015	PAVEMENT
0.05	BARE SOIL
0.20	POOR GRASS
0.40	AVE. GRASS or LAWNS
0.60	DENSE GRASS or WOODLANDS
0.80	THICK FOREST

SHALLOW CONCENTRATED FLOW

$$Tsh = \frac{Lsh}{60 \times V} = Tsh(minutes)$$ where:

VELOCITY = Vunpaved, Vpaved, Vpipe and/or Vditch
Vunpaved = 16.1345 x (S)^0.5; where S = Slope in ft/ft. Vpipe = 2.5 fps (Established)
Vpaved = 20.3282 x (S)^0.5; where S = Slope in ft/ft. Vditch = 0.5 fps (Established)

FLOW TYPE	LENGTH	MANNING'S 'n'	SLOPE	RAINFALL (iterative)	INTENSITY(in) (calculated)	VELOCITY	TIME (min)
OVERLAND	**163 ft.**	**0.400**	**0.30%**	**4.30 in./hr.**	**4.31 in./hr.**	**----**	**36.35**
PIPE FLOW	**1,289 ft.**					**2.50 fps**	**8.59**
					TOTAL TIME of CONCENTRATION =		**44.94**

USE TOTAL TIME of CONCENTRATION = 44.90

JACOBS

Made by: MPR/HDT | Checked by:
DATE: August 6 2009 | TIME: 11:33 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**

POND DESIGN CALCULATIONS

BASIN NAME: **HH**
NODE NAME: **Pond HH**

WATER QUALITY CALCULATIONS

AREA CALCULATIONS:

Basin Designation	AREA TOTAL	AREA imperv.	AREA perv.	AREA ws
HH	13.45 ac.	9.33 ac.	4.11 ac.	0.00 ac.
Pond HH	3.41 ac.	0.10 ac.	3.38 ac.	0.00 ac.
Springwood	18.92 ac.	10.55 ac.	8.37 ac.	0.00 ac.
TOTALS =	35.78 ac.	19.98 ac.	15.86 ac.	0.00 ac.
	% Impervious =	55.85%	% Pond R/W Area =	9.54%

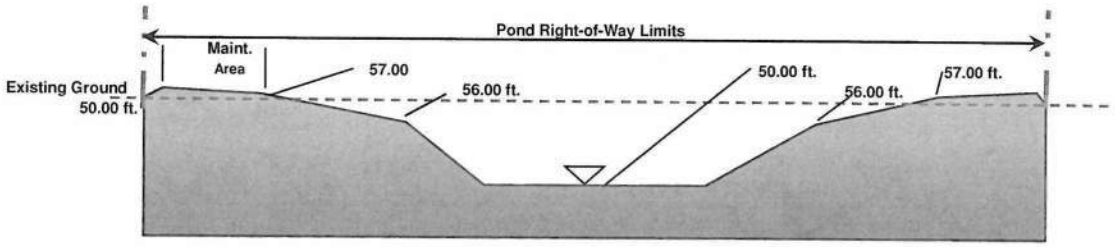
DRY-RETENTION OFFLINE TREATMENT VOLUME: 1.25" x AREA impervious or 0.5" x AREAtotal

1.25 inch Volume =	2.08 ac.-ft.		AREA imperv.	19.98 ac.	
0.5 inch VOLUME =	1.49 ac.-ft.	3.57 ac-ft	Existing Imp. Areas	17.24 ac.	in "A" type Soils
3.00 inch VOLUME =	0.69 ac.-ft.		Additional Imp. Areas	2.74 ac.	

USE Vtreatment = 3.57 ac.-ft.
USE Vtreatment + 50% = 5.36
USE A DRY-BOTTOM DETENTION **POND FOR** Pond HH

POND DESIGN

USE A DRY-BOTTOM DETENTION **POND FOR** Pond HH **Zone:** 7



POND SECTION

STAGE-STORAGE CALCULATIONS

	STAGE (ft. NGVD)	AREA (ac.)	AVERAGE AREA (ac.)	INCRE DEPTH (ft.)	INCRE STORAGE (ac.-ft.)	TOTAL STORAGE (ac.-ft.)
NWL	50.00	1.84	--	0.00	--	0.00
	52.00	2.00	1.92	2.00	3.84	3.84
	54.00	2.16	2.08	2.00	4.16	8.00
BANK	56.00	2.32	2.24	2.00	4.48	12.48
TOP	57.00	2.64	2.48	1.00	2.48	14.96

REQUIRED TREATMENT VOLUME = 5.36 ac.-ft.
REQUIRED TREATMENT STAGE = 52.73 ft.
PROVIDED TREATMENT STAGE = 52.75 ft.
PROVIDED TREATMENT VOLUME = 5.40 ac.-ft.

JACOBS

Made by: MPR/HDT | Checked by:
DATE: August 6 2009 | TIME: 11:41 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**

POND DESIGN CALCULATIONS

BASIN NAME: **Basin II**
NODE NAME: **Pond II**

WATER QUALITY CALCULATIONS

AREA CALCULATIONS:

Basin Designation	AREA TOTAL	AREA imperv.	AREA perv.	AREA ws
Basin II	20.88 ac.	12.34 ac.	8.54 ac.	0.00 ac.
Pond II	6.22 ac.	2.00 ac.	4.21 ac.	0.00 ac.
Sanlando	14.39 ac.	0.00 ac.	14.39 ac.	0.00 ac.
B208	6.84 ac.	0.00 ac.	6.84 ac.	0.00 ac.
TOTALS =	48.32 ac.	14.34 ac.	33.98 ac.	0.00 ac.
	% Impervious =	29.68%	% Pond R/W Area =	12.86%

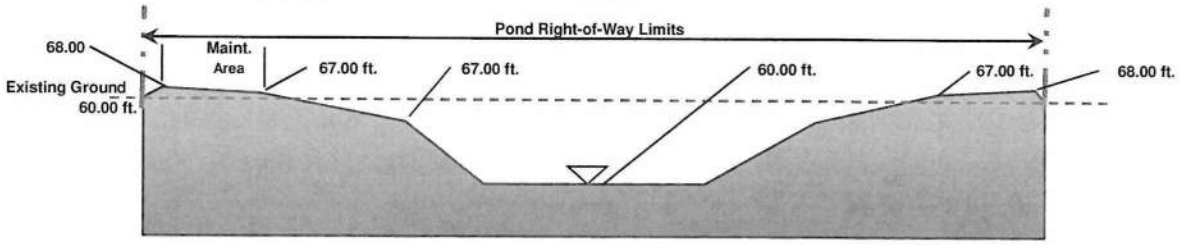
DRY-RETENTION OFFLINE TREATMENT VOLUME: 1.25" x AREA impervious or 0.5" x AREAtotal

1.25 inch Volume =	1.49 ac.-ft.	AREA imperv.	14.34 ac.	
0.5 inch VOLUME =	2.01 ac.-ft.	Existing Imp. Areas	7.83 ac.	in "A" type Soils
3.00 inch VOLUME =	1.63 ac.-ft.	Additional Imp. Areas	6.52 ac.	

USE Vtreatment = 3.51 ac.-ft.
USE Vtreatment + 50% = 5.26
USE A DRY-BOTTOM RETENTION POND FOR Pond II

POND DESIGN

USE A DRY-BOTTOM RETENTION POND FOR Pond II Zone: 7



POND SECTION

STAGE-STORAGE CALCULATIONS

	STAGE (ft. NGVD)	AREA (ac.)	AVERAGE AREA (ac.)	INCRE DEPTH (ft.)	INCRE STORAGE (ac.-ft.)	TOTAL STORAGE (ac.-ft.)
NWL	60.00	0.79	--	0.00	--	0.00
	62.00	1.09	0.94	2.00	1.88	1.88
	64.00	1.43	1.26	2.00	2.52	4.40
	66.00	1.79	1.61	2.00	3.22	7.62
BANK	67.00	1.98	1.89	1.00	1.89	9.51
TOP	68.00	3.06	2.52	1.00	2.52	12.03

weir

REQUIRED TREATMENT VOLUME = 5.26 ac.-ft.
REQUIRED TREATMENT STAGE = 64.54 ft.
PROVIDED TREATMENT STAGE = 64.55 ft.
PROVIDED TREATMENT VOLUME = 5.29 ac.-ft.

JACOBS

Made by: MPR/HDT Checked by: _____

DATE: August 6 2009 TIME: 11:36 AM

Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**

SKIMMER BLADE DESIGN

BASIN NAME: **HH**

NODE NAME: **Pond HH**

The skimmer blade will be attached to the perimeter of the outfall with the bottom of the blade located 6" below the control elevation, and the top of the blade located 6" above the design high water elevation or the top of the box for **25YR-24HR** storm.

CONTROL ELEVATION =	50.00 ft.
DESIGN HIGH WATER =	55.61 ft.
GRATE TOP ELEVATION =	55.90 ft.
BOTTOM OF SKIMMER =	52.25 ft.
TOP OF SKIMMER =	56.10 ft.
POND BOTTOM ELEVATION =	50.00 ft.

DESIGN WEIR ELEVATION = 52.75 ft.

Assuming flow under the blade acts as flow through an orifice:

$Q = CA(2gH)^{0.5}$

Where: Q = Flow rate, cfs
C = Orifice coefficient (0.6)
A = Area between skimmer and control box, sq ft: L * D(horizontal)
g = 32.2 ft/sec^2
H = Allowable head difference, ft
L = Length of skimmer, ft
D = Skimmer opening, inches

Using the following data:

Q = 12.22 cfs
D = 18.00 inches
H = 0.10 ft.

Outfall Box Type Data: DBI Type 'D'

1st Wall Thickness	8.00 in.	FL Elev. =	47.27 ft.
2nd Wall Thickness	8.00 in.	Pipe Crown =	51.69 ft.
1st Side Length :	3.08 ft.		
2nd Side Length :	4.08 ft.		
Outfall Pipe Size:	18.00 in.		

Number of Pipe(s): 1

Checking Actual skimmer blade length:
(use around 3-sides of the box)

Lactual = (L1+2*Th1/12+2*D/12)+
2*(L2+2*Th2/12+D/12)

Lactual = 21.25 ft.

Leffective = (L1+2*Th1/12+2*D/12)+
2*(L2+2*Th2/12)

Leff = 18.25 ft.

If we use three sides only with an H = 0.10 feet, we have a D actual:

Q = 12.22 cfs
Leff = 18.25 ft
H = 0.10 ft

$$Dactual = \frac{Q/(C*Leff)}{(2*G*H)^{0.5}}$$

Dactual = 0.44 ft. or in 5.28 inches.

Checking the actual Head:

Q = 12.22 cfs
D = 18.00 in.
Leff = 18.25 ft.

$$Hactual = \frac{(Q/(C*L*D/12))^2}{2*G}$$

Hactual = 0.009 ft.

Length	Width	Area
18.25 ft.	1.50 ft.	27.375 SF

Three side come a little short in an area comparison but the head is so small that 3 sides are enough for the design.

Conclusion:

Use an DBI Type 'D' Inlet with the Skimmer Blade around the THREE(3) side(s) of the box a 18.00 inches separation from the wall with an Actual Length of 21.25 feet. An DBI Type 'D' Inlet will be required for the 18.00 in. outfall pipe(s).

JACOBS

Made by: MPR/HDT Checked by:
DATE: August 6 2009 TIME: 11:48 AM
Project Number: 242592-3-52-01

PROJECT: **I-4 & SR 434 Improvements**

SKIMMER BLADE DESIGN

BASIN NAME: **II**
NODE NAME: **Pond II**

The skimmer blade will be attached to the perimeter of the outfall with the bottom of the blade located 6" below the control elevation, and the top of the blade located 6" above the design high water elevation or the top of the box for **100YR-10DAY** storm.

CONTROL ELEVATION = 64.60 ft.
DESIGN HIGH WATER = 66.71 ft.
GRATE TOP ELEVATION = 66.90 ft.
BOTTOM OF SKIMMER = 64.10 ft.
TOP OF SKIMMER = 67.20 ft.
POND BOTTOM ELEVATION = 60.00 ft.

DESIGN WEIR ELEVATION = **64.60 ft.**

Assuming flow under the blade acts as flow through an orifice:

$Q = CA(2gH)^{0.5}$

Where: Q = Flow rate, cfs
C = Orifice coefficient (0.6)
A = Area between skimmer and control box, sq ft: L * D(horizontal)
g = 32.2 ft/sec^2
H = Allowable head difference, ft
L = Length of skimmer, ft
D = Skimmer opening, inches

Using the following data:

Q = 22.81 cfs
D = 16.00 inches
H = 0.10 ft.

Outfall Box Type Data: DBI Type D

1st Wall Thickness 8.00 in. FL Elev. = 60.50 ft.
2nd Wall Thickness 8.00 in. Pipe Crown = 64.92 ft.
1st Side Length : 3.08 ft.
2nd Side Length : 2.00 ft.
Outfall Pipe Size: 24.00 in.
Number of Pipe(s): 1

Checking Actual skimmer blade length:
(use around 3-sides of the box)

Lactual = (L1+2*Th1/12+2*D/12)+ 2*(L2+2*Th2/12+D/12)
Lactual = 16.42 ft.

Leffective = (L1+2*Th1/12+2*D/12)+ 2*(L2+2*Th2/12)
Leff = 13.75 ft.

If we use three sides only with an H = 0.10 feet, we have a D actual:

Q = 22.81 cfs
Leff = 13.75 ft
H = 0.10 ft

$$Dactual = \frac{Q/(C*Leff)}{(2*G*H)^{0.5}}$$

Dactual = 1.09 ft. or in 13.07 inches.

Checking the actual Head:

Q = 22.81 cfs
D = 16.00 in.
Leff = 13.75 ft.

$$Hactual = \frac{(Q/(C*L*D/12))^2}{2*G}$$

Hactual = 0.067 ft.

Length	Width	Area
13.75 ft.	1.33 ft.	18.333 SF
16.42 ft.	1.33 ft.	21.889 SF

Conclusion:

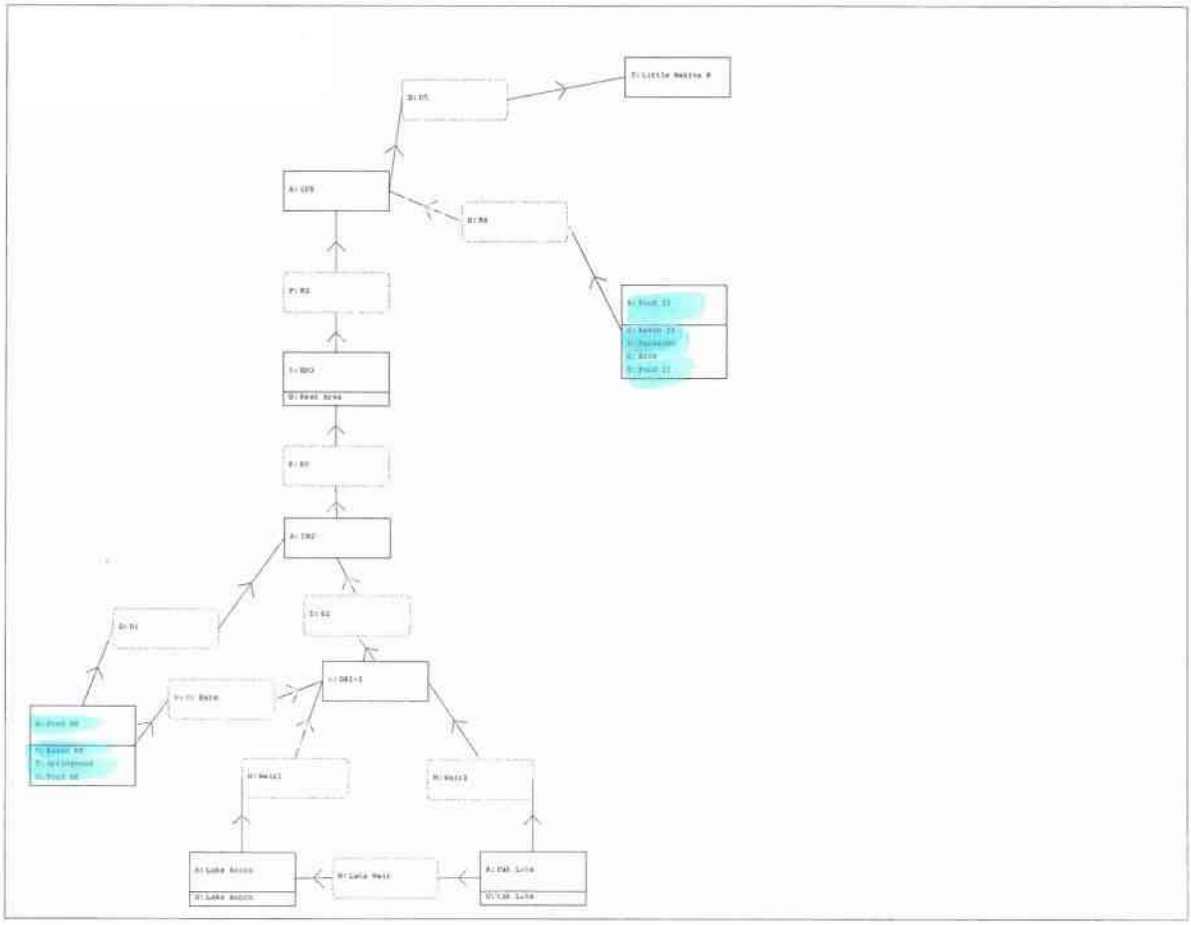
Use an DBI Type D Inlet with the Skimmer Blade around the THREE(3) side(s) of the box a 16.00 inches separation from the wall with an Actual Length of 16.42 feet. An DBI Type D Inlet will be required for the 24.00 in. outfall pipe(s).

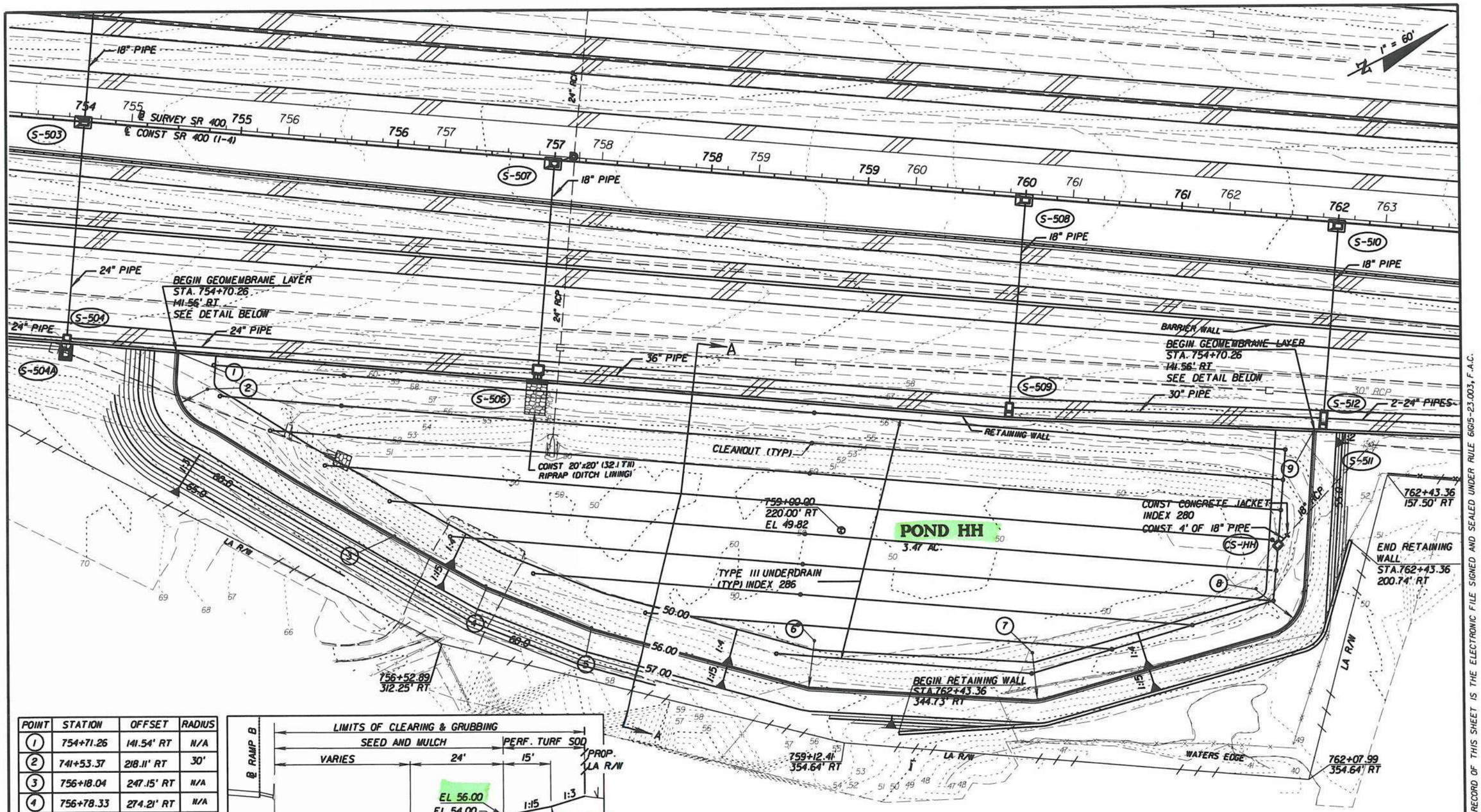
I4 FROM CENTRAL PARKWAY TO NORTH OF SR 434
PROPOSED POND 'HH' & 'II'
2009-08-06

Nodes
A Stage/Area
V Stage/Volume
T Time/Stage
M Manhole

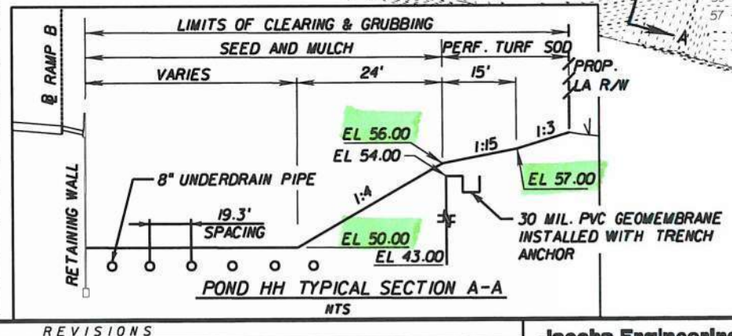
Basins
O Overland Flow
U SCS Unit CN
S SBUH CN
Y SCS Unit GA
Z SBUH GA

Links
P Pipe
W Weir
C Channel
D Drop Structure
B Bridge
R Rating Curve
H Breach
E Percolation
F Filter
X Exfil Trench





POINT	STATION	OFFSET	RADIUS
1	754+71.26	141.54' RT	N/A
2	741+53.37	218.11' RT	30'
3	756+18.04	247.15' RT	N/A
4	756+78.33	274.21' RT	N/A
5	757+46.94	295.14' RT	N/A
6	760+32.48	317.52' RT	30'
7	760+26.80	288.07' RT	30'
8	761+65.74	236.22' RT	30'
9	761+94.00	133.79' RT	N/A



POND HH TYPICAL SECTION A-A
NTS

DESIGN STORM	DHW
25YR/24HR	55.37
10YR/24HR	54.47
MEAN ANNUAL	52.89

POND HH

NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C.

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Jacobs Engineering Group Inc.
1000 Legion Place, Suite 1400
Orlando, Florida 32801
(407) 514-1400
CERTIFICATE OF AUTHORIZATION NO. 2822
ENGINEER OF RECORD:
MURRAY B. SANTORO, P.E. NO. 66065

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 400	SEMINOLE	242592-3-32-01

POND DETAIL SHEET

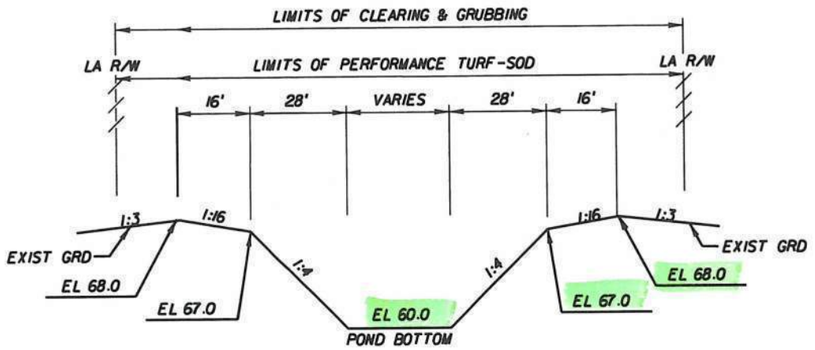
SHEET NO.

SantoroMB 8/7/2009 9:21:39 AM P:\CADD\242592320\drainage\PDPLRD06.dgn

ROUND POND II			
POINT	STATION	OFFSET	RADIUS
21	769+73.49	240.00' LT	69.04'

MIDDLE POND II			
POINT	STATION	OFFSET	RADIUS
13	773+53.16	476.65' LT	612'
14	771+19.65	313.01' LT	20'
15	771+22.57	184.00' LT	20'
16	772+61.73	222.07' LT	20'
17	771+60.43	242.27' LT	30'
18	771+57.66	210.00' LT	30'
19	772+04.71	210.00' LT	30'
20	769+73.49	240.00' LT	139'

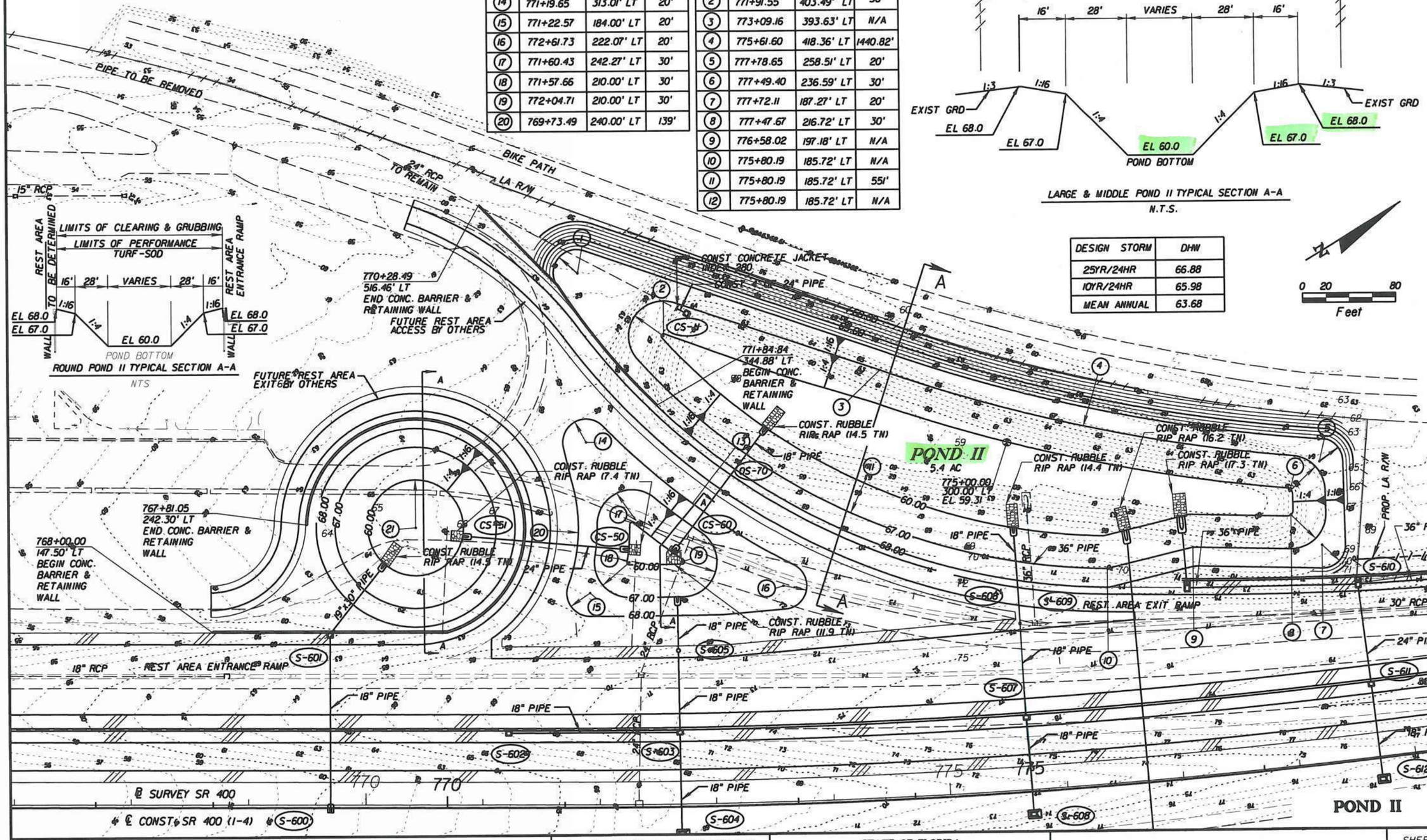
LARGE POND II			
POINT	STATION	OFFSET	RADIUS
1	771+00.65	458.03' LT	20'
2	771+91.55	403.49' LT	30'
3	773+09.16	393.63' LT	N/A
4	775+61.60	418.36' LT	1440.82'
5	777+78.65	258.51' LT	20'
6	777+49.40	236.59' LT	30'
7	777+72.11	187.27' LT	20'
8	777+47.67	216.72' LT	30'
9	776+58.02	197.18' LT	N/A
10	775+80.19	185.72' LT	N/A
11	775+80.19	185.72' LT	551'
12	775+80.19	185.72' LT	N/A



LARGE & MIDDLE POND II TYPICAL SECTION A-A
N.T.S.

DESIGN STORM	DHW
25YR/24HR	66.88
10YR/24HR	65.98
MEAN ANNUAL	63.68

ROUND POND II TYPICAL SECTION A-A
NTS



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Jacobs Engineering Group Inc.
1000 Legion Place, Suite 1400
Orlando, Florida 32801
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CERTIFICATE OF AUTHORIZATION NO. 2822
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MURRAY B. SANTORO, P.E. NO. 66065

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 400	SEMINOLE	242592-3-32-01

POND DETAIL SHEET

SHEET NO.

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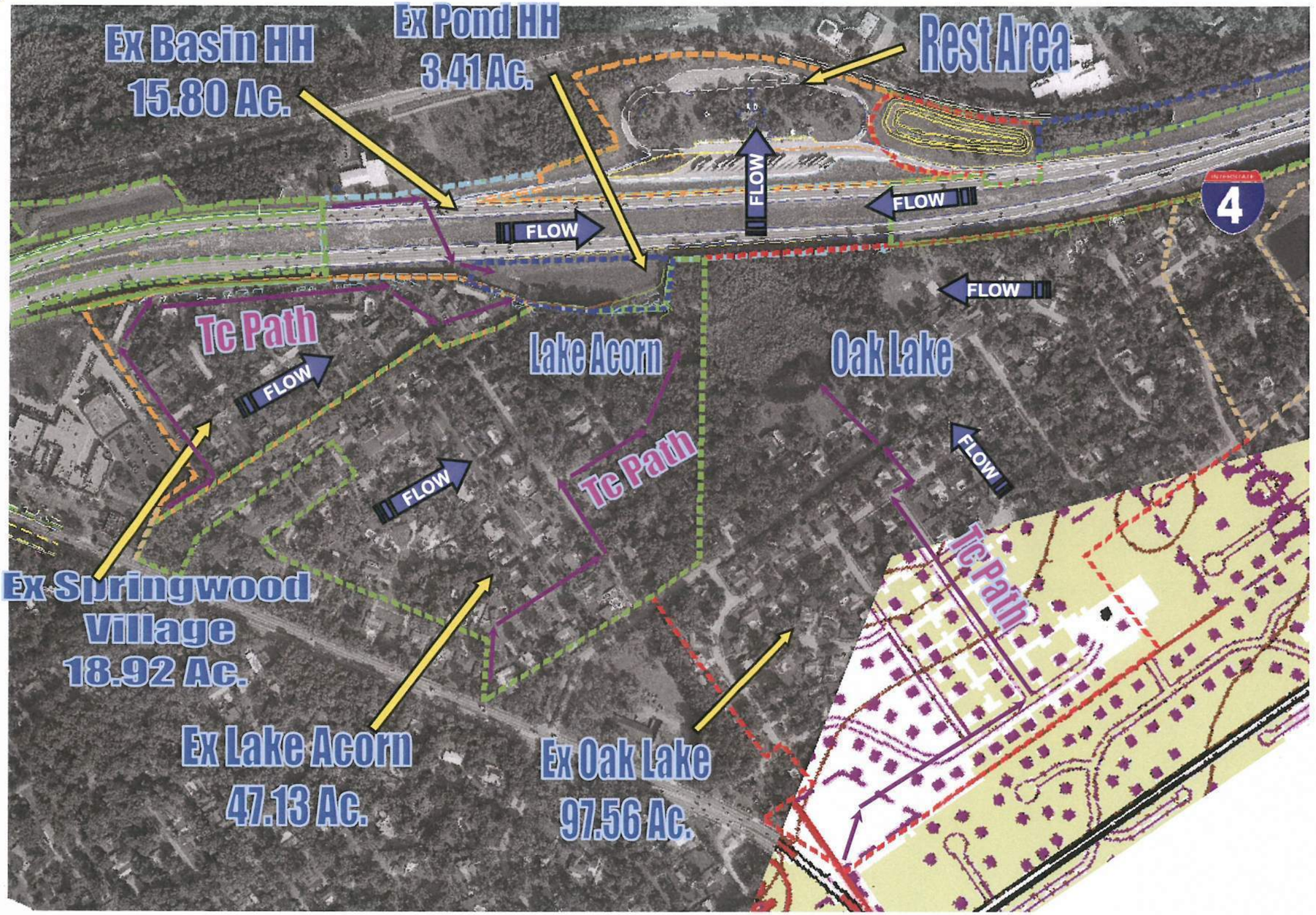
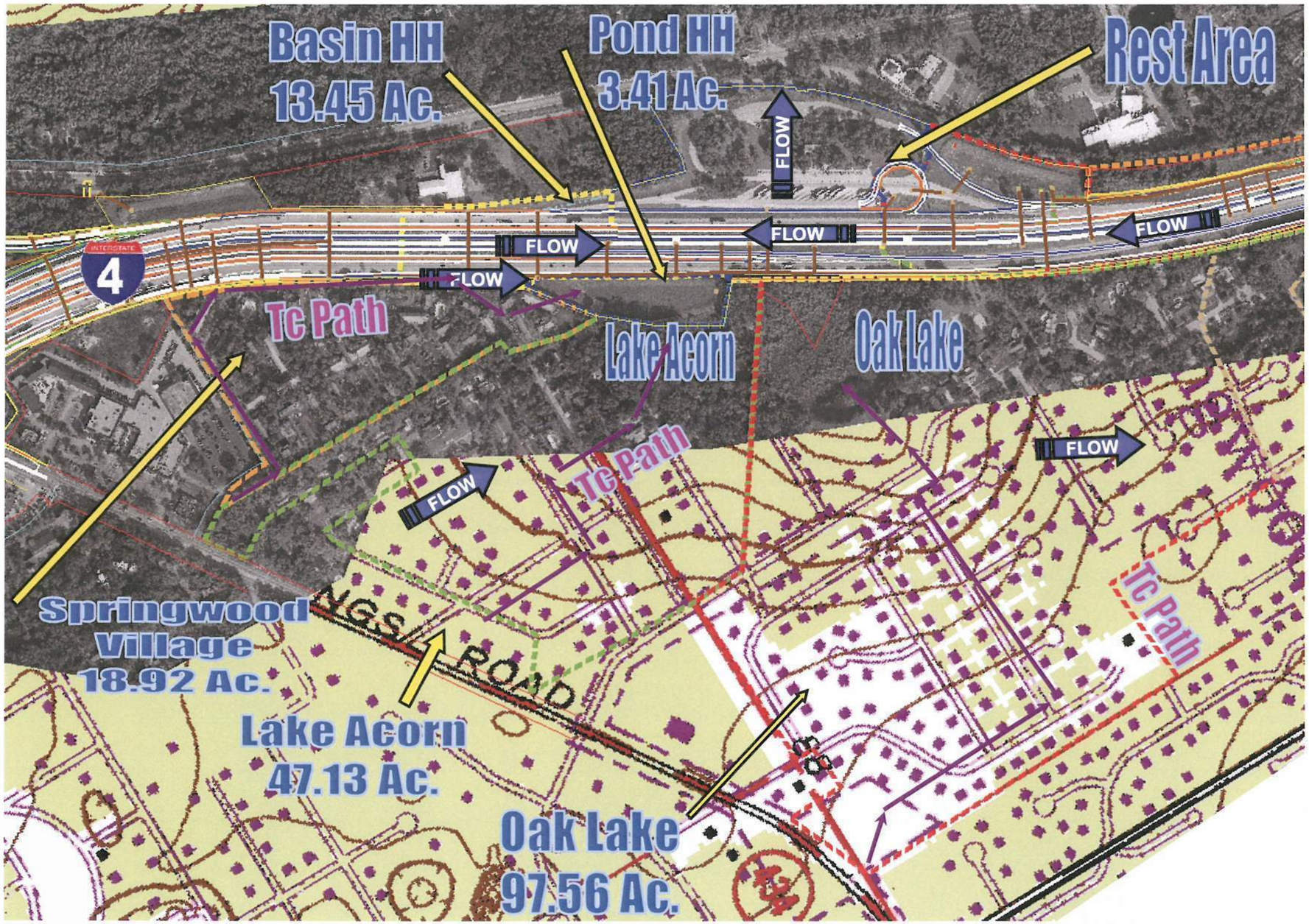
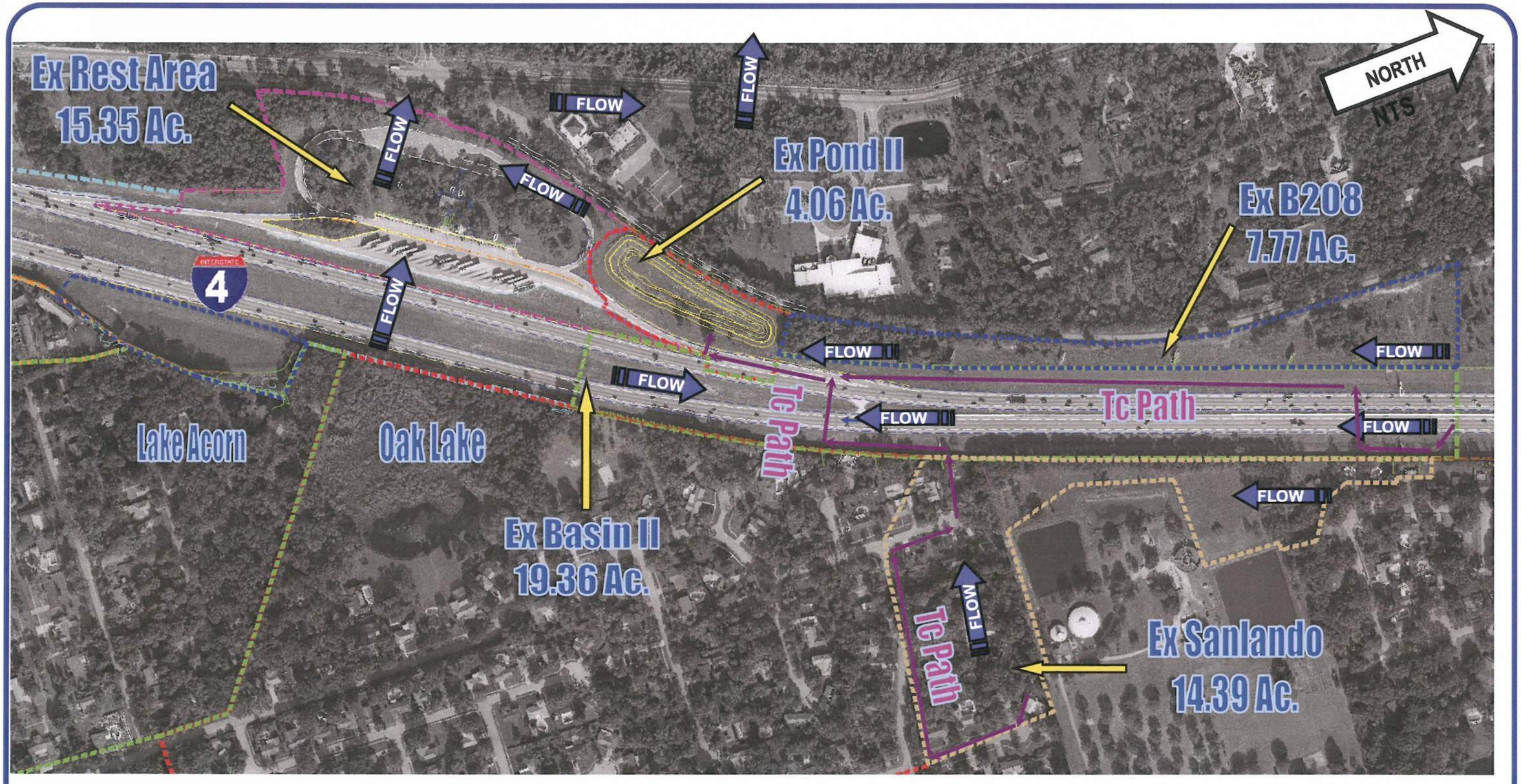


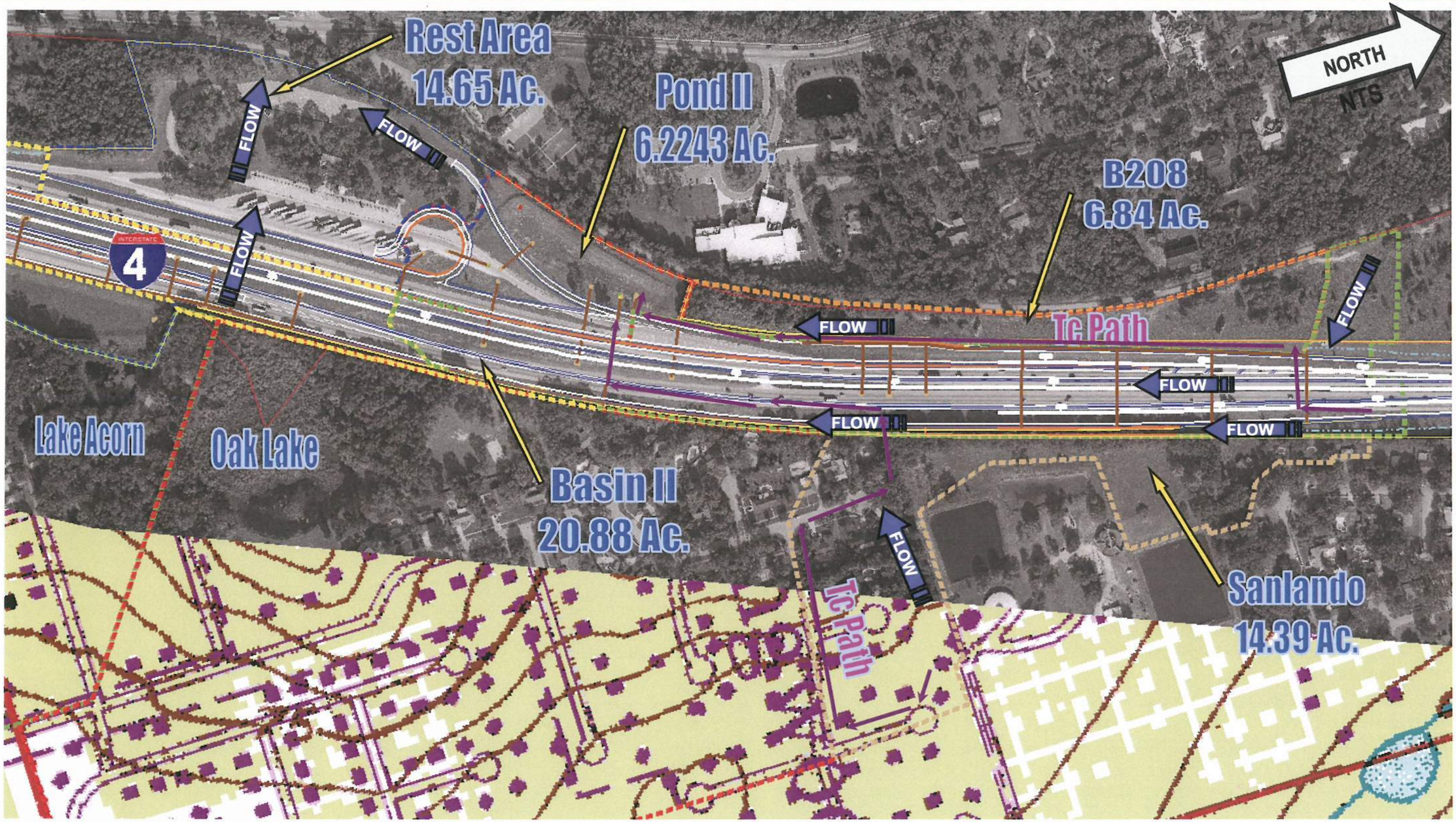
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	Ex Basin HH Existing Contributing Areas	JACOBS™	I-4 /SR 434 From N. of Central Pkwy to EE. Williamson, Seminole County, FL	Figure 1



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	Basin HH Proposed Contributing Areas	JACOBS	I-4 /SR 434 From N. of Central Pkwy to EE. Williamson, Seminole County, FL	Figure 2



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	Ex Basin II Existing Contributing Areas	JACOBS™	I-4 /SR 434 From N. of Central Pkwy to EE. Williamson, Seminole County, FL	Figure 3



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	Basin II Proposed Contributing Areas	JACOBS™	I-4 /SR 434 From N. of Central Pkwy to EE. Williamson, Seminole County, FL	Figure 4

Permit No. 22434-1

I-4 Widening from SR 434 to Lake Mary Boulevard

SEASONAL HIGH GROUNDWATER LEVELS

Pond	Estimated Seasonal High Groundwater Elevation (Ft., NGVD)	Seasonal High Used in PONDFLOW Model (Ft., NGVD)
A	+33.7 to +45.5	+49.1, (+46.1)*
B	+44.3 to +48.0	+48.1, (+45.6)*
C	+50.0	-55.1
E	+55.5 to +59.0	Wet Pond
F	+49.0	+46.0
G	+42.0 to +42.5	+43.1
I	+44.7 to +46.1	+52.1, (+51.0)*
J	+46.0	+46.0

* The seasonal high estimated based on recommended over excavation.

BASIN E

Basin E extends from Sta. 261+00 to Sta. 293+00. There is approximately 6.20 acres in the post-development drainage basin. The stormwater runoff is conveyed to Pond E via median ditch bottom inlets and storm sewer pipe. All widening is to be accomplished in the median with the cross slope of the proposed pavement toward the center line of I-4. No work is planned for the roadside ditches in this basin. Only proposed impervious areas in the basin will be treated in Pond E. The existing four lane section of I-4 will continue to drain to the outside roadway ditches and be carried away from I-4.

The location for Pond E is a heavily wooded parcel within the floodplain of Grace Lake, adjacent to the right (east) side of Interstate 4 (Sta. 284+00 to Sta. 289+00). The SCS Soil Survey indicates that Myakka and Eau Gallie fine sands are present at this location. These soils are classified in Hydrologic Soil Group B/D, and in their undrained condition exhibit groundwater levels at or near the surface. Pond E is be a wet detention system with a maintained water elevation equal to the normal water level of Grace Lake. Discharge from the pond will be dependent upon the level of Grace Lake. Pond E will serve as an extension of Grace Lake, providing additional floodplain storage to compensate for the new impervious areas and any existing storage that may be eliminated by placement of fill. According to the FEMA Maps in the vicinity of the pond location, the 100-year floodplain elevation is 66.00. The pond maintenance berm will displace approximately 388 cubic-feet of volume. However, Pond E will provide greater than 388 cubic-feet of compensating volume.

In order to maximize the flow-path through the pond and eliminate problems with short-circuiting, the pond is designed so that runoff enters from the south and discharges to the north. Pond E is designed in conformance with the Land-Locked Basin Criteria.

Pond E has a meandering shape due to an effort to save many of the native mature hardwood trees. These trees act as a visual and sound buffer for the Northridge and Northcove subdivision homeowners. See Table 8 in Section 2 for a summary of required retention volumes and drawdown results.

G-1

GREINER INC: WATER RESOURCES GROUP
CURVE NUMBER AND RUNOFF VOLUME WORKSHEET

PROJECT TITLE:	I-4 WIDENING	FILENAME:	CNPR-PDE.WK3	
PROJECT NUMBER:	V0187.10	SCALE (1" = _)	0	DATE
BASIN DESIGNATION:	POND E	MADE BY:	MJJ	28-Apr-94
BASIN ANALYSIS (PRE/POST):	PRE	CHECKED BY:	(RCC)	[illegible]

SUB-BASIN ANALYSIS

1) BASIN / STUDY DATA

PLANIMETERED BASIN AREA (in^2)	0.00
COMPUTED BASIN AREA (Ac)	6.20
RAINFALL (inches) - P	18.84

DETERMINE BASIN RUNOFFF CURVE NUMBER - CN

LAND-USE DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
RANGE / GRASS BASIN I-4			39	✓4.11	160.29
WOODS POND SITE			80	✓1.50	120.00
PAVEMENT BASIN I-4			98	✓0.59	57.82
			TOTALS	✓6.20	338.11

COMPOSITE CN	✓54.5

ESTIMATE OF RUNOFF VOLUME

1) DETERMINE SOIL STORAGE - S

$$S = (1000 / CN) - 10$$

SOIL STORAGE (inches)	S	8.34

2) DETERMINE RUNOFF - R

$$R = (P - 0.2*S)^2 / (P + 0.8*S)$$

RUNOFF (inches)	R	11.56

3) DETERMINE RUNOFF VOLUME - V(R)

$$V(R) = R / 12 * AREA$$

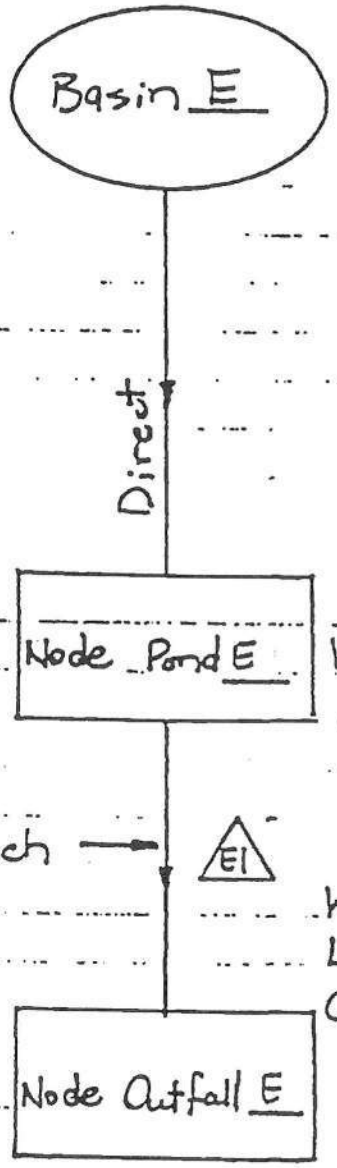
RUNOFF (Ac-ft)	V(R)	✓5.97

6-2

Job _____ Project No. _____ Sheet ____ of ____

Description _____ Computed By _____ Date _____

_____ Checked By _____ Date _____



Basin Characteristics:
Drainage Area = 6.20 ac.
CN = 77.3
T_c = 31.6 min

Drop Structure:
Weir 64.70 Pipe Length 168'
Length 3' U.S. Inv 60.5
Orifice 61.0 D.S. Inv 58.8
Dia. 2" Dia. 24

Post-Development Nodal Diagram

6-21

GREINER INC: WATER RESOURCES GROUP CURVE NUMBER AND RUNOFF VOLUME WORKSHEET				
PROJECT TITLE:	I – 4 WIDENING	FILENAME:	CN–PONDE.WK3	
PROJECT NUMBER:	V0187.10	SCALE (1" = _)	0	DATE
BASIN DESIGNATION:	POND E	MADE BY:	MJJ	28–Apr–94
BASIN ANALYSIS (PRE/POST):	POST	CHECKED BY:	[illegible]	[illegible]

SUB–BASIN ANALYSIS

1) BASIN / STUDY DATA

PLANIMETERED BASIN AREA (in^2)	0.00
COMPUTED BASIN AREA (Ac)	6.20
RAINFALL (inches) – P	18.84

DETERMINE BASIN RUNOFFF CURVE NUMBER – CN

LAND–USE DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
RANGE / GRASS BASIN I–4			39	✓1.11	43.29
POND SITE			39	✓1.08	42.12
PAVEMENT BASIN I–4			98	✓3.59	351.82
POND SITE			98	0	0.00
WATER POND SITE			100	✓0.42	42.00
			TOTALS	✓6.20	479.23

COMPOSITE CN	77.3

ESTIMATE OF RUNOFF VOLUME

1) DETERMINE SOIL STORAGE – S

S = (1000 / CN) – 10

SOIL STORAGE (inches)	S	2.94

2) DETERMINE RUNOFF – R

R = (P – 0.2*S)^2 / (P + 0.8*S)

RUNOFF (inches)	R	15.72

3) DETERMINE RUNOFF VOLUME – V(R)

V(R) = R / 12 * AREA

RUNOFF (Ac–ft)	V(R)	✓8.12

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ST JOHN'S RIVER WATER MANAGEMENT DISTRICT
POLLUTION ABATEMENT VOLUME REQUIREMENT
OFFLINE RETENTION

POND E

POST DEVELOPMENT LAND USE	
1) IMPERVIOUS AREA (Ac.)	3.59
2) PERVIOUS AREA (Ac.)	2.61
3) TOTAL AREA (Ac.)	6.20

POLLUTION ABATEMENT VOLUME (REQUIRED)		(Ac-ft)
1) 1.0 inch OF RUNOFF OVER ENTIRE AREA	1.0" / (12" / 1 ft) * (TOTAL AREA) =	0.52
2) 2.5 inches OVER THE IMPERVIOUS AREA	2.5" / (12" / 1 ft) * (IMP. AREA) =	0.75
3) 3 year / 1 Hour STORM EVENT RUNOFF	SEE CURVE NUMBER SHEET	N/A
4) POLLUTION ABATEMENT VOLUME (REQUIRED)		0.75

RECHARGE VOLUME (REQUIRED)		(Ac-ft)
1) POST-DEVELOPMENT IMPERVIOUS AREA		3.59
2) PRE-DEVELOPMENT IMPERVIOUS AREA		0.59
4) RECHARGE VOLUME (REQUIRED)	(3.0 " / (12" / 1 FT) * (IMP. DELTA)	0.90

GREINER INC: WATER RESOURCES GROUP POLLUTION ABATEMENT/ RECHARGE VOLUME CALCULATIONS				
PROJECT TITLE:	I - 4 WIDENING	FILENAME:	PAVPONDE.WK3	
PROJECT NUMBER:	V0180.10	SCALE (1" = __)	200	DATE
BASIN DESIGNATION:	POND E	MADE BY:	MJJ	29-Apr-94
ANALYSIS (PRE/POST):	POST	CHECKED BY:	RCO	1-29-[illegible]

6-23

GREINER INC: WATER RESOURCES GROUP POND STAGE STORAGE CALCULATIONS – POND E					
PROJECT TITLE:	I – 4 WIDENING	FILENAME:	SSPONDE.WK3		
PROJECT NUMBER:	V0180.10	SCALE (1" = _)	200	DATE	
BASIN DESIGNATION:	POND E	MADE BY:	MJJ	09–Jun–94	
BASIN ANALYSIS (PRE/POST):	POST	CHECKED BY:			

ELEV.	PLAN. VALUE 1 (si)	PLAN. VALUE 2 (si)	AREA (ac)	AVE. AREA (ac)	DELTA D (ft)	DELTA STORAGE (ac–ft)	STORAGE P.A.V.* (ac–ft)	ATTENUATION OF PEAK DISCHARGE (ac–ft)
53.00	0.104	0.081	0.085				0	0
				0.17	6	1.04		
59.00	0.283	0.286	0.261				1.04	1.04
				0.33	1	0.33		
60.00			0.395				1.37	1.37
				0.46	1	0.46		
61.00	0.569	0.579	0.527				1.83	*** 1.83
				0.59	1	0.59		
62.00			0.660				0.59	0.59
				0.69	0.5	0.35		
62.50	0.789	0.796	0.728				0.94	0.94
				0.79	0.5	0.39		
63.00			0.851				1.34	1.34
				0.91	1	0.91		
64.00			0.973				2.25	2.25
				1.00	0.7	0.70		
64.70			1.034				2.95	** 2.95
				1.12	0.8	0.89		
65.50	1.302	1.313	1.201				3.84	3.84
				1.28	0.5	0.64		
66.00			1.368				4.49	4.49
				1.41	1	1.41		
67.00	1.589	1.572	1.451				5.89	5.90

* P.A.V. = POLLUTION ABATEMENT VOLUME.
** VOLUME IS BASED ON POLLUTION ABATEMENT AND LANDLOCKED CONTROL VOLUME.
*** PERMANENT POOL VOLUME.

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Job I-4 Widening Project No. V0150.10 Sheet ____ of ____

Description Pond E Tailwater Info Computed By RCA Date 6/94

Checked By ____ Date ____

Pond E discharges to Grace Lake. Grace Lake is located in a land-locked basin and Pond E is located with sufficient vertical clearance from Grace Lake that Grace Lake has no effect on the tailwater associated with Pond E.

BASIN F

Basin F extends from Sta. 293+00 to Sta. 312+00. There is approximately 5.89 acres in the post-development drainage basin. The stormwater runoff is conveyed to Pond F via median ditch bottom inlets and storm sewer pipe. All widening is to be accomplished in the median with the cross slope of the proposed pavement toward the center line of I-4. No work is planned for the roadside ditches in this basin. Only proposed impervious areas in the basin will be treated in Pond F and a small basin draining to the gore area of the eastbound rest area and I-4. The existing four lane section of I-4 will continue to drain to the outside roadway ditches and be carried away from I-4.

The location of Pond F is within the southwest corner of the existing eastbound Rest Area. It is within right-of-way currently owned by FDOT. The site is bounded on the south by an existing water retention area that serves the Northridge Subdivision. The outfall for Pond F will be to an existing isolated depression on the left (west) side of Interstate 4 via an existing 54" cross drain at Sta. 302±00. This depression currently receives runoff from Interstate 4, as well as from a large portion of the residential area to the west. Pond F is designed in conformance with the Land-Locked Basin Criteria, as the depression has no positive outfall.

Pond F is proposed as a dry facility with a bond bottom located at elevation 53.00. Pond F discharges via an overflow weir constructed into the maintenance berm of the pond. The discharge from Pond F is contained within a ditch inside FDOT right-of-way. Pond F recovers the required pollution abatement volume within 2.0 hours. See attached L. J. Nodarse & Associates, Inc. geotechnical report. See Table 8 in Section 2 for a summary of required retention volumes and drawdown analysis.

GREINER INC: WATER RESOURCES GROUP CURVE NUMBER AND RUNOFF VOLUME WORKSHEET				
PROJECT TITLE:	I – 4 WIDENING	FILENAME:	CNPR–PDF.WK3	
PROJECT NUMBER:	V0187.10	SCALE (1" =)	0	DATE
BASIN DESIGNATION:	POND F	MADE BY:	MJJ	28–Apr–94
BASIN ANALYSIS (PRE/POST):	PRE	CHECKED BY:	RCG	

SUB–BASIN ANALYSIS

1) BASIN / STUDY DATA

PLANIMETERED BASIN AREA (in^2)	0.00
COMPUTED BASIN AREA (Ac)	5.89
RAINFALL (inches) – P	18.84

DETERMINE BASIN RUNOFFF CURVE NUMBER – CN

LAND–USE DESCRIPTION		SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
RANGE / GRASS	BASIN I–4			39	2.44	95.16
RANGE / GRASS	GORE AREA			39	0.85	33.15
RANGE / GRASS	POND SITE			39	1.68	65.52
PAVEMENT	BASIN I–4			98	0.35	34.30
PAVEMENT	POND SITE			98	0.57	55.86
				TOTALS	5.89	283.99

COMPOSITE CN	48.2

ESTIMATE OF RUNOFF VOLUME

1) DETERMINE SOIL STORAGE – S

S = (1000 / CN) – 10

SOIL STORAGE (inches)	S	10.74

2) DETERMINE RUNOFF – R

R = (P – 0.2*S)^2 / (P + 0.8*S)

RUNOFF (inches)	R	10.16

3) DETERMINE RUNOFF VOLUME – V(R)

V(R) = R / 12 * AREA

RUNOFF (Ac–ft)	V(R)	4.99

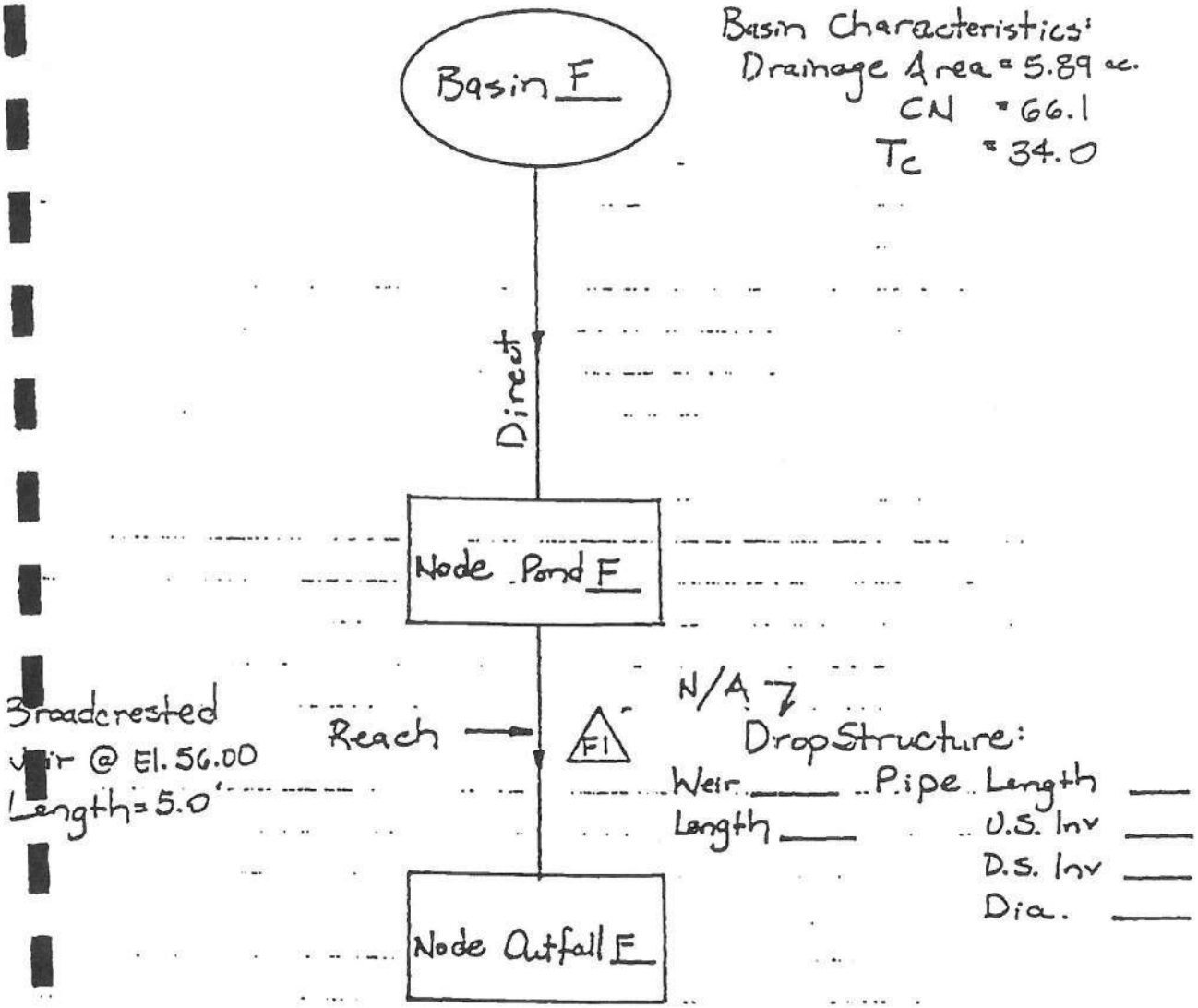
7-2

Greiner

Job _____ Project No. _____ Sheet ____ of ____

Description _____ Computed By _____ Date _____

_____ Checked By _____ Date _____



Post-Development Nodal Diagram

7-21

GREINER INC: WATER RESOURCES GROUP CURVE NUMBER AND RUNOFF VOLUME WORKSHEET				
PROJECT TITLE:	I – 4 WIDENING	FILENAME:	CN–PONDF.WK3	
PROJECT NUMBER:	V0187.10	SCALE (1" =)	0	DATE
BASIN DESIGNATION:	POND F	MADE BY:	MJJ	28–Apr–94
BASIN ANALYSIS (PRE/POST):	POST	CHECKED BY:	RCa	

SUB–BASIN ANALYSIS

1) BASIN / STUDY DATA

PLANIMETERED BASIN AREA (in^2)	0.00
COMPUTED BASIN AREA (Ac)	5.89
RAINFALL (inches) – P	18.84

DETERMINE BASIN RUNOFFF CURVE NUMBER – CN

LAND–USE DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
RANGE / GRASS BASIN I–4			39	✓ 0.65	25.35
RANGE / GRASS GORE AREA			39	✓ 0.85	33.15
RANGE / GRASS POND SITE			39	✓ 1.68	65.52
PAVEMENT BASIN I–4			98	✓ 2.14	209.72
PAVEMENT POND SITE			98	✓ 0.57	55.86
			TOTALS	5.89	389.60

COMPOSITE CN	✓ 66.1

ESTIMATE OF RUNOFF VOLUME

1) DETERMINE SOIL STORAGE – S

S = (1000 / CN) – 10

SOIL STORAGE (inches)	S	5.12

2) DETERMINE RUNOFF – R

R = (P – 0.2*S)^2 / (P + 0.8*S)

RUNOFF (inches)	R	13.84

3) DETERMINE RUNOFF VOLUME – V(R)

V(R) = R / 12 * AREA

RUNOFF (Ac–ft)	V(R)	✓ 6.79

ST JOHN'S RIVER WATER MANAGEMENT DISTRICT
POLLUTION ABATEMENT VOLUME REQUIREMENT
OFFLINE RETENTION

POND F

POST DEVELOPMENT LAND USE	
1) IMPERVIOUS AREA (Ac.)	2.71
2) PERVIOUS AREA (Ac.)	3.18
3) TOTAL AREA (Ac.)	5.89

POLLUTION ABATEMENT VOLUME (REQUIRED)	(Ac–ft)
1) 1.0 inch OF RUNOFF OVER ENTIRE AREA ------ 1.0" / (12" / 1 ft) * (TOTAL AREA) =	0.49
2) 1.75 inches OVER THE IMPERVIOUS AREA ----- 1.75" / (12" / 1 ft) * (IMP. AREA) =	0.40
3) 3 year / 1 Hour STORM EVENT RUNOFF ------ SEE CURVE NUMBER SHEET	N/A
4) POLLUTION ABATEMENT VOLUME (REQUIRED)	0.49

RECHARGE VOLUME (REQUIRED)	(Ac–ft)
1) POST–DEVELOPMENT IMPERVIOUS AREA	2.71
2) PRE–DEVELOPMENT IMPERVIOUS AREA	0.92
4) RECHARGE VOLUME (REQUIRED) ---- (3.0 " / (12" / 1 FT) * (IMP. DELTA)	0.68

GREINER INC: WATER RESOURCES GROUP POLLUTION ABATEMENT/ RECHARGE VOLUME CALCULATIONS				
PROJECT TITLE:	I – 4 WIDENING	FILENAME:	PAVPONDF.WK3	
PROJECT NUMBER:	V0180.10	SCALE (1" = __)	200	DATE
BASIN DESIGNATION:	POND F	MADE BY:	MJJ	29–Apr–94
ANALYSIS (PRE/POST):	POST	CHECKED BY:	BCW	4-29-94

GREINER INC: WATER RESOURCES GROUP POND STAGE STORAGE CALCULATIONS – POND F				
PROJECT TITLE:	I – 4 WIDENING	FILENAME:	SSPONDF.WK3	
PROJECT NUMBER:	V0180.10	SCALE (1" =)	200	DATE
BASIN DESIGNATION:	POND F	MADE BY:	MJJ	09–Jun–94
BASIN ANALYSIS (PRE/POST):	POST	CHECKED BY:	RCG	

ELEV.	PLAN. VALUE 1 (si)	PLAN. VALUE 2 (si)	AREA (ac)	AVE. AREA (ac)	DELTA D (ft)	DELTA STORAGE (ac–ft)	STORAGE P.A.V.* (ac–ft)	ATTENUATION OF PEAK DISCHARGE (ac–ft)
53.00	1.145	1.171	1.063				0	0
				1.09	0.62	0.67		
53.62			1.113				0.67	0.67
				1.13	0.38	0.43		
54.00			1.143				1.10	1.10
				1.16	0.5	0.58		
54.50			1.184				1.69	1.69
				1.20	0.5	0.60		
55.00	1.364	1.301	1.224				2.29	2.29
				1.33	1	1.33		
56.00			1.445				3.62	** 3.62
				1.56	1	1.56		
57.00	1.79	1.84	1.667				5.18	5.18

* P.A.V. = POLLUTION ABATEMENT VOLUME.
** VOLUME IS BASED ON POLLUTION ABATEMENT AND LANDLOCKED CONTROL VOLUME.

BASIN G

Basin G extends from Sta. 312+00 to Sta. 335+00. There is approximately 19.89 acres in the post-development drainage basin. The stormwater runoff is conveyed to Pond G via roadside ditches and a 36" cross-drain at Sta. 320+82. The widening of I-4 will be to the inside (median) at the beginning of the basin and transition to the outside in the middle of the basin, therefore the existing and proposed travel lanes will be treated in Pond G.

The location for Pond G is within a large open pasture, adjacent to the left (west) side of Interstate 4. The SCS Soil Survey indicates that Astatula - Apopka fine sands are present at this location. These soils are classified in Hydrologic Soil Group A, and groundwater levels are normally more than six (6) ft. below the surface. The site is across from the eastbound Rest Area, and lies just north of a small, isolated depression. The depression currently receives runoff from Interstate 4 and the Rest Area via a 36" cross drain (Sta. 320+00) along with sheetflow runoff from a large, off-site area to the west. This depression has no positive outfall enough to flow back under Interstate 4 to the east via cross drains under the Rest Area ramps. Pond G must be designed in conformance with the Land-Locked Basin Criteria.

Pond G is proposed as a dry facility with a pond bottom located at elevation 50.00. Pond G recovers the required pollution abatement volume within 4.5 hours. Due to the landlocked property of the basin, attenuation of the pre-development peak rate of discharge is accomplished within Pond G. See attached L. J. Nodarse & Associates, Inc. geotechnical report for complete drawdown analysis and soil properties. See Table 8 in Section 2 for a summary of required retention volumes and drawdown analysis.

GREINER INC: WATER RESOURCES GROUP CURVE NUMBER AND RUNOFF VOLUME WORKSHEET				
PROJECT TITLE:	I – 4 WIDENING	FILENAME:	CNPR–PDG.WK3	
PROJECT NUMBER:	V0187.10	SCALE (1" = _)	0	DATE
BASIN DESIGNATION:	POND G	MADE BY:	MJJ	28–Apr–94
BASIN ANALYSIS (PRE/POST):	PRE	CHECKED BY:	(RCD)	[illegible]

SUB–BASIN ANALYSIS

1) BASIN / STUDY DATA

PLANIMETERED BASIN AREA (in^2)	0.00
COMPUTED BASIN AREA (Ac)	19.45
RAINFALL (inches) – P	18.84

DETERMINE BASIN RUNOFFF CURVE NUMBER – CN

LAND–USE DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
RANGE / GRASS BASIN I–4			39	✓ 11.65	454.35
RANGE / GRASS REST AREA			39	✓ 1.79	69.81
PAVEMENT BASIN I–4			98	✓ 4.22	413.56
PAVEMENT REST AREA			98	✓ 0.26	25.48
WODDS POND SITE			30	✓ 1.53	45.90
			TOTALS	19.45	1009.10

COMPOSITE CN	51.9

ESTIMATE OF RUNOFF VOLUME

1) DETERMINE SOIL STORAGE – S

S = (1000 / CN) – 10

SOIL STORAGE (inches)	S	9.27

2) DETERMINE RUNOFF – R

R = (P – 0.2*S)^2 / (P + 0.8*S)

RUNOFF (inches)	R	10.99

3) DETERMINE RUNOFF VOLUME – V(R)

V(R) = R / 12 * AREA

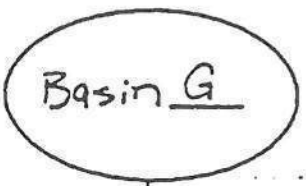
RUNOFF (Ac–ft)	V(R)	✓ 17.81

Greiner

Job _____ Project No. _____ Sheet _____ of _____

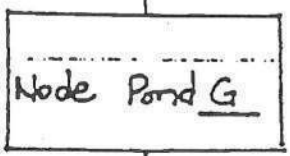
Description _____ Computed By _____ Date _____

_____ Checked By _____ Date _____



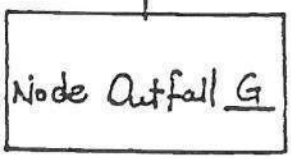
Basin Characteristics:
Drainage Area = 19.89 ac.
CN = 58.4
T_c = 29.3 min.

Direct



Reach → G1

Drop Structure:
Weir 55.00 Pipe Length 58'
Length 3' U.S. Inv 52.5
D.S. Inv 52.0
Dia. 24"



Post-Development Nodal Diagram

GREINER INC: WATER RESOURCES GROUP CURVE NUMBER AND RUNOFF VOLUME WORKSHEET				
PROJECT TITLE:	I – 4 WIDENING	FILENAME:	CN–PONDG.WK3	
PROJECT NUMBER:	V0187.10	SCALE (1" = _)	0	DATE
BASIN DESIGNATION:	POND G	MADE BY:	MJJ	28–Apr–94
BASIN ANALYSIS (PRE/POST):	POST	CHECKED BY:	RCD	

SUB–BASIN ANALYSIS

1) BASIN / STUDY DATA

PLANIMETERED BASIN AREA (in^2)	0.00
COMPUTED BASIN AREA (Ac)	19.89
RAINFALL (inches) – P	18.84

DETERMINE BASIN RUNOFFF CURVE NUMBER – CN

LAND–USE DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
RANGE / GRASS BASIN I–4			39	✓11.81	460.59
RANGE / GRASS POND SITE			39	✓1.53	59.67
PAVEMENT BASIN I–4			98	✓6.55	641.90
			TOTALS	✓19.89	1162.16

COMPOSITE CN	✓58.4

ESTIMATE OF RUNOFF VOLUME

1) DETERMINE SOIL STORAGE – S

S = (1000 / CN) – 10

SOIL STORAGE (inches)	S	7.11

2) DETERMINE RUNOFF – R

R = (P – 0.2*S)^2 / (P + 0.8*S)

RUNOFF (inches)	R	12.37

3) DETERMINE RUNOFF VOLUME – V(R)

V(R) = R / 12 * AREA

RUNOFF (Ac–ft)	V(R)	✓20.50

ST JOHN'S RIVER WATER MANAGEMENT DISTRICT

POLLUTION ABATEMENT VOLUME REQUIREMENT

OFFLINE RETENTION

POND G

POST DEVELOPMENT LAND USE	
1) IMPERVIOUS AREA (Ac.)	6.55
2) PERVIOUS AREA (Ac.)	13.34
3) TOTAL AREA (Ac.)	19.89

POLLUTION ABATEMENT VOLUME (REQUIRED)		(Ac–ft)
1) 1.0 inch OF RUNOFF OVER ENTIRE AREA	1.0" / (12" / 1 ft) * (TOTAL AREA) =	1.66
2) 1.75 inches OVER THE IMPERVIOUS AREA	1.75" / (12" / 1 ft) * (IMP. AREA) =	0.96
3) 3 year / 1 Hour STORM EVENT RUNOFF	SEE CURVE NUMBER SHEET	N/A
4) POLLUTION ABATEMENT VOLUME (REQUIRED)		1.66

RECHARGE VOLUME (REQUIRED)		(Ac–ft)
1) POST–DEVELOPMENT IMPERVIOUS AREA		6.55
2) PRE–DEVELOPMENT IMPERVIOUS AREA		4.48
4) RECHARGE VOLUME (REQUIRED)	(3.0 " / (12" / 1 FT) * (IMP. DELTA)	1.64

GREINER INC: WATER RESOURCES GROUP POLLUTION ABATEMENT/ RECHARGE VOLUME CALCULATIONS				
PROJECT TITLE:	I – 4 WIDENING	FILENAME:	PAVPONDG.WK3	
PROJECT NUMBER:	V0180.10	SCALE (1" = __)	200	DATE
BASIN DESIGNATION:	POND G	MADE BY:	MJJ	29–Apr–94
ANALYSIS (PRE/POST):	POST	CHECKED BY:	RCG	4-29-94

1-23

GREINER INC: WATER RESOURCES GROUP
POND STAGE STORAGE CALCULATIONS – POND G

PROJECT TITLE:	I – 4 WIDENING	FILENAME:	SSPONDG.WK3		
PROJECT NUMBER:	V0180.10	SCALE (1" = __)	200	DATE	
BASIN DESIGNATION:	POND G	MADE BY:	MJJ	09–Jun–94	
BASIN ANALYSIS (PRE/POST):	POST	CHECKED BY:			

ELEV.	PLAN. VALUE 1 (si)	PLAN. VALUE 2 (si)	AREA (ac)	AVE. AREA (ac)	DELTA D (ft)	DELTA STORAGE (ac–ft)	STORAGE P.A.V.* (ac–ft)	ATTENUATION OF PEAK DISCHARGE (ac–ft)
50.00	0.791	0.74	0.70				0	0
				0.74	1	0.74		
51.00			0.777				0.74	0.74
				0.81	1	0.82		
52.00			0.852				1.56	1.56
				0.89	1	0.89		
53.00			0.926				2.46	2.46
				0.96	1	0.96		
54.00			1.001				3.42	3.42
				1.04	1	1.04		
55.00			1.075				4.46	** 4.46
				1.11	1	1.11		
56.00	1.27	1.23	1.150				5.57	5.57
				1.26	1	1.26		
57.00			1.372				6.83	6.83
				1.43	0.5	0.71		
57.50			1.483				7.55	7.55
				1.54	0.5	0.77		
58.00	1.725	1.746	1.59				8.31	8.31

* P.A.V. = POLLUTION ABATEMENT VOLUME.
** VOLUME IS BASED ON POLLUTION ABATEMENT AND LANDLOCKED CONTROL VOLUME.

BASIN I

Basin I extends from Sta. 335+00 to Sta. 358+85. There is approximately 18.08 acres in the post-development drainage basin. The stormwater runoff is conveyed to Pond I via roadside and median ditches and an existing 24" cross-drain at Sta. 345±60. The widening of I-4 will be to the outside through the entire basin; therefore, the existing and proposed travel lanes and paved shoulders will be treated in Pond I.

The location for Pond I is a triangular parcel bounded by Interstate 4 on the west and Emma Oaks Trail on the south (Sta. 344+00 to Sta. 349+00 Rt.). The SCS Soil Survey indicates that Astatula - Apopka fine sands are present at this location. These soils are classified in Hydrologic Soil Group A, and groundwater levels are normally more than six (6) ft. below the surface. The parcel is currently traversed by a 40-foot strip of FDOT right-of-way, which contains an outfall ditch connecting an existing 24" cross drain (Sta. 345+00) to Lake Myrtle. Lake Myrtle is a land-locked lake, and Pond I must be designed in conformance with the Land-Locked Basin Criteria. The existing outfall ditch and 40-foot right-of-way is used to accommodate the Pond I outfall.

Pond I is proposed as a dry facility with a pond bottom at elevation 56.00. Pond I recovers the required pollution abatement volume within 70.5 hours. Due to the landlocked property of the basin, attenuation of the pre-development peak rate of discharge is accomplished within Pond I. See attached L. J. Nodarse & Associates, Inc. geotechnical report for complete drawdown analysis and soil properties. See Table 8 in Section 2 for a summary of required retention volumes and drawdown analysis.

GREINER INC: WATER RESOURCES GROUP CURVE NUMBER AND RUNOFF VOLUME WORKSHEET				
PROJECT TITLE:	I – 4 WIDENING	FILENAME:	CNPR–PDI.WK3	
PROJECT NUMBER:	V0187.10	SCALE (1" =)	0	DATE
BASIN DESIGNATION:	POND I	MADE BY:	MJJ	28–Apr–94
BASIN ANALYSIS (PRE/POST):	PRE	CHECKED BY:	RCD	

SUB–BASIN ANALYSIS

1) BASIN / STUDY DATA

PLANIMETERED BASIN AREA (in^2)	0.00
COMPUTED BASIN AREA (Ac)	18.07
RAINFALL (inches) – P	18.84

DETERMINE BASIN RUNOFFF CURVE NUMBER – CN

LAND–USE DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
RANGE / GRASS BASIN I–4			39	✓12.05	469.95
RANGE / GRASS REST AREA			39	✓ 1.65	64.35
PAVEMENT BASIN I–4			98	✓ 4.37	428.26
			TOTALS	18.07	962.56

COMPOSITE CN	✓53.3

ESTIMATE OF RUNOFF VOLUME

1) DETERMINE SOIL STORAGE – S

S = (1000 / CN) – 10

SOIL STORAGE (inches)	S	8.77

2) DETERMINE RUNOFF – R

R = (P – 0.2*S) ^2 / (P + 0.8*S)

RUNOFF (inches)	R	11.29

3) DETERMINE RUNOFF VOLUME – V(R)

V(R) = R / 12 * AREA

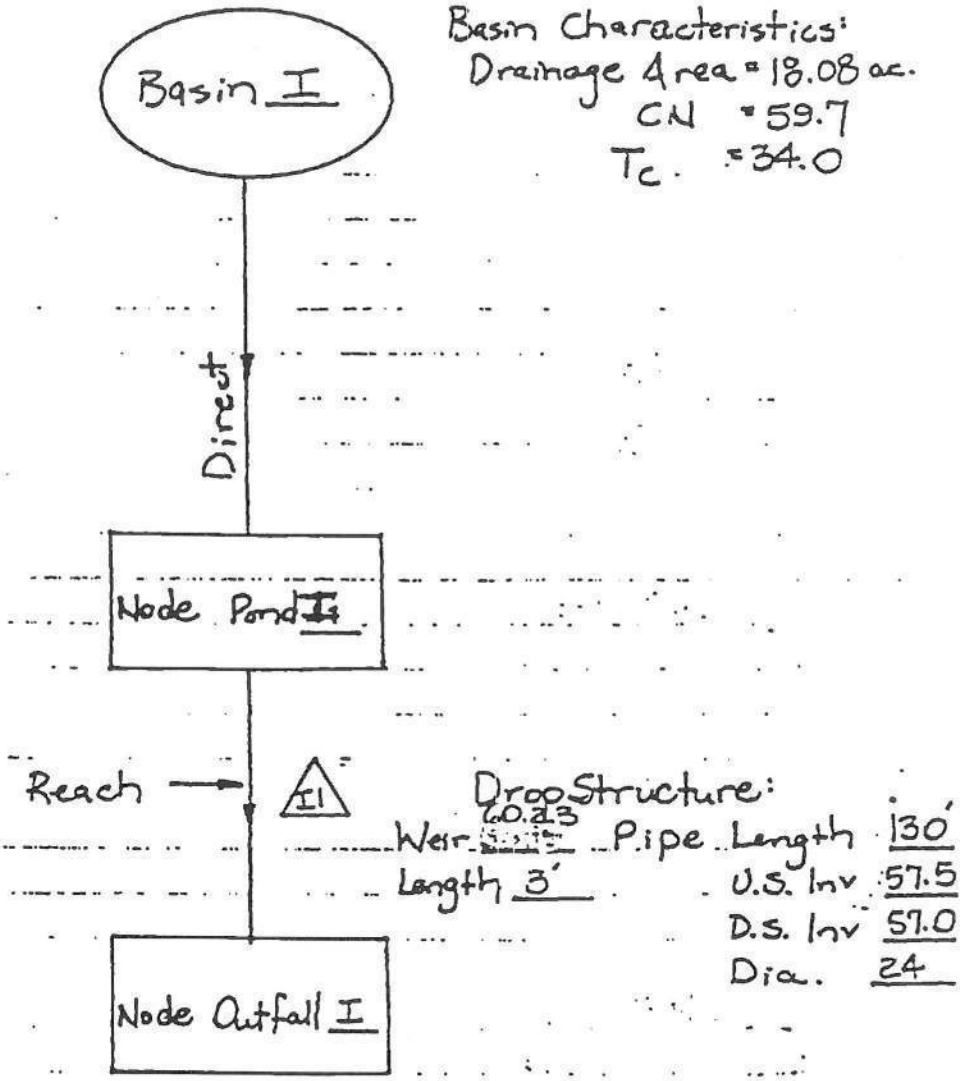
RUNOFF (Ac–ft)	V(R)	✓17.00

Greiner

Job _____ Project No. _____ Sheet _____ of _____

Description _____ Computed By _____ Date _____

_____ Checked By _____ Date _____



Post-Development Nodal Diagram

GREINER INC: WATER RESOURCES GROUP CURVE NUMBER AND RUNOFF VOLUME WORKSHEET				
PROJECT TITLE:	I-4 WIDENING	FILENAME:	CN-PONDI.WK3	
PROJECT NUMBER:	V0187.10	SCALE (1" = _)	0	DATE
BASIN DESIGNATION:	POND I	MADE BY:	MJJ	28-Apr-94
BASIN ANALYSIS (PRE/POST):	POST	CHECKED BY:	(RCP)	4-29-94

SUB-BASIN ANALYSIS

1) BASIN / STUDY DATA

PLANIMETERED BASIN AREA (in^2)	0.00
COMPUTED BASIN AREA (Ac)	18.08
RAINFALL (inches) - P	18.84

DETERMINE BASIN RUNOFFF CURVE NUMBER - CN

LAND-USE DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
RANGE / GRASS BASIN I-4			39	✓10.08	393.12
RANGE / GRASS REST AREA			39	✓1.65	64.35
PAVEMENT BASIN I-4			98	✓6.35	622.30
			TOTALS	✓18.08	1079.77

COMPOSITE CN	✓59.7

ESTIMATE OF RUNOFF VOLUME

1) DETERMINE SOIL STORAGE - S

$S = (1000 / CN) - 10$

SOIL STORAGE (inches)	S	6.74

2) DETERMINE RUNOFF - R

$R = (P - 0.2*S)^2 / (P + 0.8*S)$

RUNOFF (inches)	R	12.62

3) DETERMINE RUNOFF VOLUME - V(R)

$V(R) = R / 12 * AREA$

RUNOFF (Ac-ft)	V(R)	✓19.02

2-22

ST JOHN'S RIVER WATER MANAGEMENT DISTRICT
POLLUTION ABATEMENT VOLUME REQUIREMENT
OFFLINE RETENTION

POND I

POST DEVELOPMENT LAND USE	
1) IMPERVIOUS AREA (Ac.)	6.35
2) PERVIOUS AREA (Ac.)	11.73
3) TOTAL AREA (Ac.)	18.08

POLLUTION ABATEMENT VOLUME (REQUIRED)		(Ac–ft)
1) 1.0 inch OF RUNOFF OVER ENTIRE AREA	1.0" / (12" / 1 ft) * (TOTAL AREA) =	1.51
2) 1.75 inches OVER THE IMPERVIOUS AREA	1.75" / (12" / 1 ft) * (IMP. AREA) =	0.93
3) 3 year / 1 Hour STORM EVENT RUNOFF	SEE CURVE NUMBER SHEET	N/A
4) POLLUTION ABATEMENT VOLUME (REQUIRED)		1.51

RECHARGE VOLUME (REQUIRED)		(Ac–ft)
1) POST–DEVELOPMENT IMPERVIOUS AREA		6.35
2) PRE–DEVELOPMENT IMPERVIOUS AREA		4.37
4) RECHARGE VOLUME (REQUIRED)	(3.0 " / (12" / 1 FT) * (IMP. DELTA)	1.59

GREINER INC: WATER RESOURCES GROUP POLLUTION ABATEMENT/ RECHARGE VOLUME CALCULATIONS				
PROJECT TITLE:	I – 4 WIDENING	FILENAME:	PAVPOND1.WK3	
PROJECT NUMBER:	V0180.10	SCALE (1" = _)	200	DATE
BASIN DESIGNATION:	POND I	MADE BY:	MJJ	29–Apr–94
ANALYSIS (PRE/POST):	POST	CHECKED BY:	RCA	4-29-94

2-23

GREINER INC: WATER RESOURCES GROUP

POND STAGE STORAGE CALCULATIONS – POND I

PROJECT TITLE:	I – 4 WIDENING	FILENAME:	SSPOND1.WK3	
PROJECT NUMBER:	V0180.10	SCALE (1" =__)	200	DATE
BASIN DESIGNATION:	POND I	MADE BY:	MJJ	09–Jun–94
BASIN ANALYSIS (PRE/POST):	POST	CHECKED BY:		

ELEV.	PLAN. VALUE 1 (si)	PLAN. VALUE 2 (si)	AREA (ac)	AVE. AREA (ac)	DELTA D (ft)	DELTA STORAGE (ac–ft)	STORAGE P.A.V.* (ac–ft)	ATTENUATION OF PEAK DISCHARGE (ac–ft)
56.00	0.730	0.681	0.648				0	0
				0.70	1	0.70		
57.00			0.742				0.70	0.70
				0.79	1	0.79		
58.00			0.837				1.48	1.48
				0.88	0.55	0.49		
58.55			0.928				1.97	1.97
				0.93	0.45	0.42		
59.00			0.931				2.39	2.39
				0.98	1	0.98		
60.00			1.025				3.37	3.37
				1.07	0.25	0.27		
60.25			1.120				3.63	** 3.63
				1.16	0.75	0.87		
61.00	1.313	1.294	1.197				4.50	4.50
				1.31	1	1.31		
62.00			1.421				5.81	5.81
				1.53	1	1.53		
63.00	1.812	1.773	1.646				7.35	7.35

* P.A.V. = POLLUTION ABATEMENT VOLUME.

** VOLUME IS BASED ON POLLUTION ABATEMENT AND LANDLOCKED CONTROL VOLUME.

2-24

BASIN J

Basis J extends from Sta. 358+85 to Sta. 395+00. There is approximately 24.07 acres in the post-development drainage basin. The stormwater runoff is conveyed to Pond J via roadside and median ditches and several crossdrains in the basin. The widening of I-4 will be the outside through the entire basin.

The location for Pond J is adjacent to the left (west) side of Interstate 4 (Sta. 385+00 to Sta. 389+00 Lt.). The SCS Soil Survey indicates that Astatula - Apopka fine sands are present at this location. These soils are classified in Hydrologic Soil Group A, and groundwater levels are normally more than six (6) ft. below the surface. The site is north of Long Pond Road and includes a 30-foot by 150-foot strip of FDOT right-of-way. This right-of-way currently serves as a drainage outfall to convey runoff from Interstate 4 to an isolated depression. This isolated depression also receives runoff from a large off-site area west of Interstate 4. The depression has no positive outfall until water stages high enough (approximate elevation 63.0) to enter the I-4 ditch (left side Sta. 396+85) and flow north to the Lake Mary Boulevard system. Therefore, Pond J must be designed in conformance with the Land-Locked Basin Criteria.

Under existing conditions, the isolated depression receives runoff only from the left side (Sta. 358+85 to Sta. 395+85) and the median (Sta. 358+85 to Sta. 393+00) of Interstate 4. Runoff from the right side (Sta. 372+85 ahead) is currently directed north to stormwater facilities within the recently completed Lake Mary Boulevard Interchange.

Under post-development conditions, the total impervious area (and total runoff volume) contributing to the Lake Mary Boulevard system will not be increased. This will be accomplished by constructing a new cross drain under I-4 (by jacking and boring) near Sta. 380+85. The cross-drain will divert an area equivalent to the new impervious area (including the new paved shoulder in the median from Sta. 393±00 to Sta. 406+00) into Pond J. The remainder of the runoff from right side of I-4 (Sta. 380+85 ahead) will continue to flow to the Lake Mary Boulevard system.

Pond J is proposed as a dry facility with a pond bottom at elevation 56.00 and 6:1 side slopes to natural ground. The pond site is currently owned by a Catholic Church and a joint use agreement has been worked out between the Catholic Church and FDOT. Pond J recovers the required pollution abatement volume within 8.0 hours. Due to the landlocked property of the basin, attenuation of the pre-development peak rate of discharge is accomplished within Pond J. See attached L. J. Nodarse & Associates, Inc. geotechnical report for complete drawdown analysis and soil properties. See Table 8 in Section 2 for a summary of required retention volumes and drawdown analysis.

GREINER INC: WATER RESOURCES GROUP CURVE NUMBER AND RUNOFF VOLUME WORKSHEET					
PROJECT TITLE:	I – 4 WIDENING	FILENAME:	CNPR–PDJ.WK3		
PROJECT NUMBER:	V0187.10	SCALE (1" = _)	0	DATE	
BASIN DESIGNATION:	POND J	MADE BY:	MJJ	28–Apr–94	
BASIN ANALYSIS (PRE/POST):	PRE	CHECKED BY:	RCG		

SUB–BASIN ANALYSIS

1) BASIN / STUDY DATA

PLANIMETERED BASIN AREA (in^2)	0.00
COMPUTED BASIN AREA (Ac)	✓ 23.96
RAINFALL (inches) – P	18.84

DETERMINE BASIN RUNOFFF CURVE NUMBER – CN

LAND–USE DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
RANGE / GRASS BASIN I–4			39	11.56	450.84
RANGE / GRASS OFFSITE			39	5.99	233.61
RANGE / GRASS POND SITE			39	2.89	112.71
RANGE / GRASS RT SIDE BASIN I–4			39	4.24	165.36
PAVEMENT BASIN I–4			98	3.52	344.96
PAVEMENT OFFSITE			98	0.00	0.00
PAVEMENT POND SITE			98	0.00	0.00
PAVEMENT RT SIDE BASIN I–4			98	1.72	168.56
			TOTALS	✓23.96	1142.12

** (RIGHT SIDE I–4) DOES NOT DRAIN TO THE LEFTSIDE I–4 IN THE PREDEVELOPMENT CONDITION.

COMPOSITE CN	✓47.7

ESTIMATE OF RUNOFF VOLUME

1) DETERMINE SOIL STORAGE – S

S = (1000 / CN) – 10

SOIL STORAGE (inches)	S	10.98

2) DETERMINE RUNOFF – R

R = (P – 0.2*S) ^ 2 / (P + 0.8*S)

RUNOFF (inches)	R	10.03

3) DETERMINE RUNOFF VOLUME – V(R)

V(R) = R / 12 * AREA

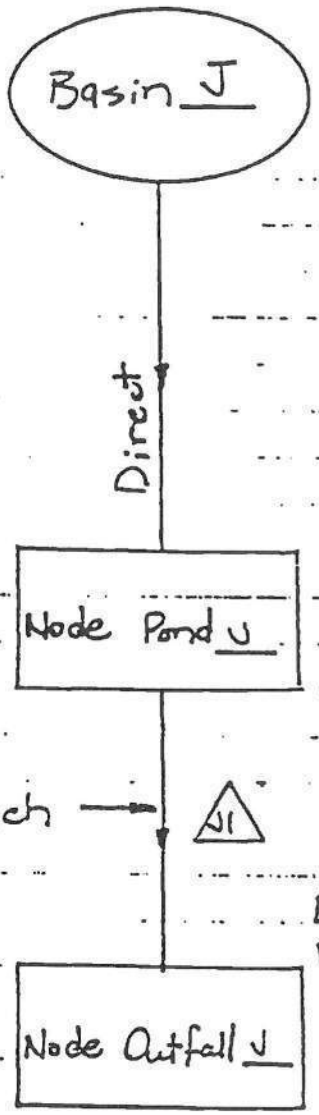
RUNOFF (Ac–ft)	V(R)	✓20.02

Greiner

Job _____ Project No. _____ Sheet _____ of _____

Description _____ Computed By _____ Date _____

_____ Checked By _____ Date _____



Basin Characteristics:
Drainage Area = 29.93 ac.
CN = 54.4
T_c = 73.7 min

Drop Structure:
Pipe Length 71
U.S. Inv 57.3
D.S. Inv 57.0
Dia. 24"
Length 3'
Weir 63.50

Post-Development Nodal Diagram

GREINER INC: WATER RESOURCES GROUP
CURVE NUMBER AND RUNOFF VOLUME WORKSHEET

PROJECT TITLE:	I – 4 WIDENING	FILENAME:	CN–PONDJ.WK3	
PROJECT NUMBER:	V0187.10	SCALE (1" = _)	0	DATE
BASIN DESIGNATION:	POND J	MADE BY:	MJJ	28–Apr–94
BASIN ANALYSIS (PRE/POST):	POST	CHECKED BY:		

SUB–BASIN ANALYSIS

1) BASIN / STUDY DATA

PLANIMETERED BASIN AREA (in^2)	0.00
COMPUTED BASIN AREA (Ac)	29.93
RAINFALL (inches) – P	18.84

DETERMINE BASIN RUNOFFF CURVE NUMBER – CN

LAND–USE DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
RANGE / GRASS BASIN I–4			39	✓13.24	516.36
RANGE / GRASS OFFSITE			39	✓5.99	233.61
RANGE / GRASS POND SITE			39	✓2.89	112.89
PAVEMENT BASIN I–4			98	✓7.80	764.84
PAVEMENT OFFSITE			98	0.00	0.00
PAVEMENT POND SITE			98	0.00	0.00
			TOTALS	✓29.93	1627.70

COMPOSITE CN	54.4

ESTIMATE OF RUNOFF VOLUME

1) DETERMINE SOIL STORAGE – S

S = (1000 / CN) – 10

SOIL STORAGE (inches)	S	8.39

2) DETERMINE RUNOFF – R

R = (P – 0.2*S)^2 / (P + 0.8*S)

RUNOFF (inches)	R	11.53

3) DETERMINE RUNOFF VOLUME – V(R)

V(R) = R / 12 * AREA

RUNOFF (Ac–ft)	V(R)	✓28.75

3-24

ST JOHN'S RIVER WATER MANAGEMENT DISTRICT
POLLUTION ABATEMENT VOLUME REQUIREMENT
OFFLINE RETENTION

POND J

POST DEVELOPMENT LAND USE	
1) IMPERVIOUS AREA (Ac.)	7.80
2) PERVIOUS AREA (Ac.)	22.12
3) TOTAL AREA (Ac.)	29.92

POLLUTION ABATEMENT VOLUME (REQUIRED)		(Ac-ft)
1) 1.0 inch OF RUNOFF OVER ENTIRE AREA	1.0" / (12" / 1 ft) * (TOTAL AREA) =	2.49
2) 1.75 inches OVER THE IMPERVIOUS AREA	1.75" / (12" / 1 ft) * (IMP. AREA) =	1.14
3) 3 year / 1 Hour STORM EVENT RUNOFF	SEE CURVE NUMBER SHEET	N/A
4) POLLUTION ABATEMENT VOLUME (REQUIRED)		2.49

RECHARGE VOLUME (REQUIRED)		(Ac-ft)
1) POST-DEVELOPMENT IMPERVIOUS AREA		7.80
2) PRE-DEVELOPMENT IMPERVIOUS AREA		5.24
4) RECHARGE VOLUME (REQUIRED)	(3.0 " / (12" / 1 FT) * (IMP. DELTA)	1.95

GREINER INC: WATER RESOURCES GROUP POLLUTION ABATEMENT/ RECHARGE VOLUME CALCULATIONS				
PROJECT TITLE:	I - 4 WIDENING	FILENAME:	PAVPONDJ.WK3	
PROJECT NUMBER:	V0180.10	SCALE (1" = _)	200	DATE
BASIN DESIGNATION:	POND J	MADE BY:	MJJ	29-Apr-94
ANALYSIS (PRE/POST):	POST	CHECKED BY:	RCO	4-29-94

3-25

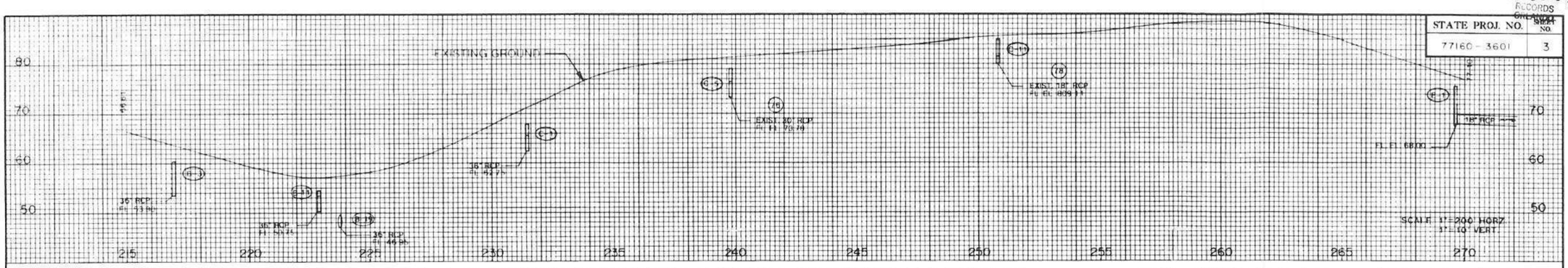
GREINER INC: WATER RESOURCES GROUP
POND STAGE STORAGE CALCULATIONS – POND J

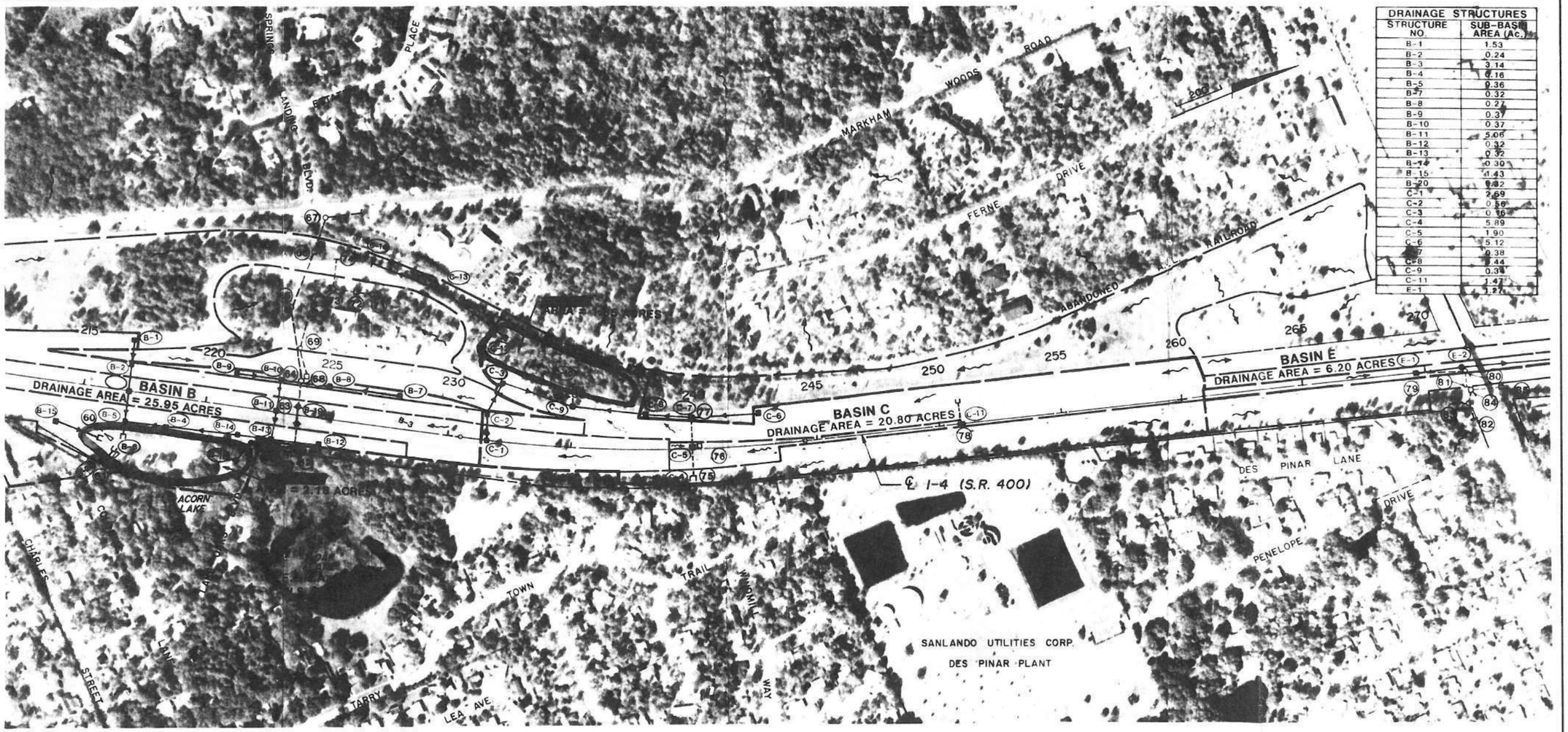
PROJECT TITLE:	I – 4 WIDENING	FILENAME:	SSPONDJ.WK3		
PROJECT NUMBER:	V0180.10	SCALE (1" = _)	200	DATE	
BASIN DESIGNATION:	POND J	MADE BY:	MJJ	09–Jun–94	
BASIN ANALYSIS (PRE/POST):	POST	CHECKED BY:			

ELEV.	PLAN. VALUE 1 (si)	PLAN. VALUE 2 (si)	AREA (ac)	AVE. AREA (ac)	DELTA D (ft)	DELTA STORAGE (ac–ft)	STORAGE P.A.V.* (ac–ft)	ATTENUATION OF PEAK DISCHARGE (ac–ft)
56.00	1.41	1.428	1.303				0	0
				1.39	1	1.39		
57.00			1.479				1.39	1.39
				1.57	1	1.57		
58.00			1.656				2.96	2.96
				1.74	1	1.74		
59.00			1.832				4.70	4.70
				1.92	1	1.92		
60.00			2.008				6.62	6.62
				2.10	1	2.10		
61.00			2.185				8.72	8.72
				2.27	1	2.27		
62.00			2.361				10.99	10.99
				2.45	1	2.45		
63.00			2.538				13.44	13.44
				2.58	0.5	1.29		
63.50			2.626				14.73	** 14.73
				2.71	1	2.71		
64.50			2.802				17.45	17.44
				2.85	0.5	1.42		
65.00	3.189	3.106	2.890				18.87	18.87

* P.A.V. = POLLUTION ABATEMENT VOLUME.
** VOLUME IS BASED ON POLLUTION ABATEMENT AND LANDLOCKED CONTROL VOLUME.

STATE PROJ. NO.	SHEET NO.
77160-3601	3





DRAINAGE STRUCTURES	
STRUCTURE NO.	SUB-BASIN AREA (Ac.)
B-1	1.53
B-2	0.24
B-3	3.14
B-4	0.16
B-5	0.36
B-7	0.32
B-8	0.27
B-9	0.37
B-10	0.37
B-11	5.06
B-12	0.32
B-13	0.32
B-14	0.30
B-15	1.43
B-20	0.82
C-1	2.69
C-2	0.56
C-3	0.16
C-4	5.89
C-5	1.90
C-6	5.12
C-7	0.38
C-8	9.44
C-9	0.34
C-11	1.47
E-1	1.27

REVISIONS								
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

AERIAL PHOTOGRAPHY DATA	
FLOWN BY	F.D.O.T.
PHOTO DATE	2-13-93
PHOTO ID. NO.	P.D. 4125 3-08

	NAME	DATE		NAME	DATE
DESIGNED BY	MAJ	7/93	DRAWN BY	GIY	7/93
CHECKED BY	BAK	7/93	CHECKED BY	BAK	7/93

SUPERVISED BY: KENNETH A CARPER, PE

FLORIDA DEPARTMENT OF TRANSPORTATION

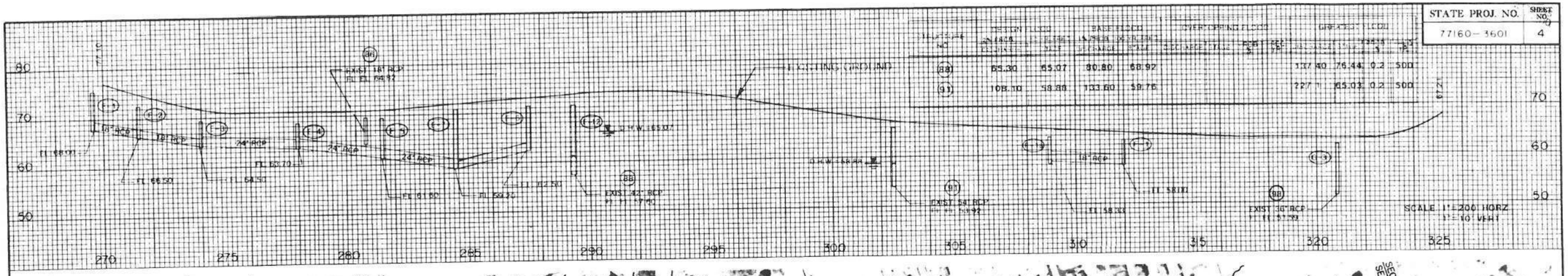
APPROVED BY:

DATE:

DRAINAGE MAP

4-1170398 08

STATE PROJ. NO.	SHEET NO.
77160-3601	4



LOCATION NO.	DESIGN FLOOD ELEVATION	DESIGN FLOOD DISCHARGE	BASE FLOOD ELEVATION	BASE FLOOD DISCHARGE	OVERTOPPING FLOOD ELEVATION	OVERTOPPING FLOOD DISCHARGE	GREATEST FLOOD ELEVATION	GREATEST FLOOD DISCHARGE
(88)	65.30	65.07	90.80	68.92			77.40	76.44
(91)	108.00	58.88	133.60	59.76			227.0	65.03

FREQUENCY	OVERTOPPING	GREATEST
0.2	500	
0.2	500	

DEFINITIONS

DESIGN FLOOD: THE FLOOD SELECTED BY THE F.D.O.T. TO BE UTILIZED TO ASSURE A STANDARD LEVEL OF HYDRAULIC PERFORMANCE.

BASE FLOOD: THE FLOOD HAVING A 1% CHANCE OF BEING EXCEEDED IN ANY YEAR (100 YEAR FREQUENCY).

OVERTOPPING FLOOD: THE FLOOD WHERE FLOOD OCCURS OVER THE HIGHWAY, OVER A WATERWAY OR DIVIDER OR THRU EMERGENCY RELIEF STRUCTURES.

GREATEST FLOOD: THE MOST SEVERE FLOOD WHICH CAN BE PREDICTED (WHERE OVERTOPPING IS NOT APPLICABLE, NORMALLY ONE WITH 0.2% CHANCE OF BEING EXCEEDED IN ANY YEAR (500 YEAR FREQUENCY).

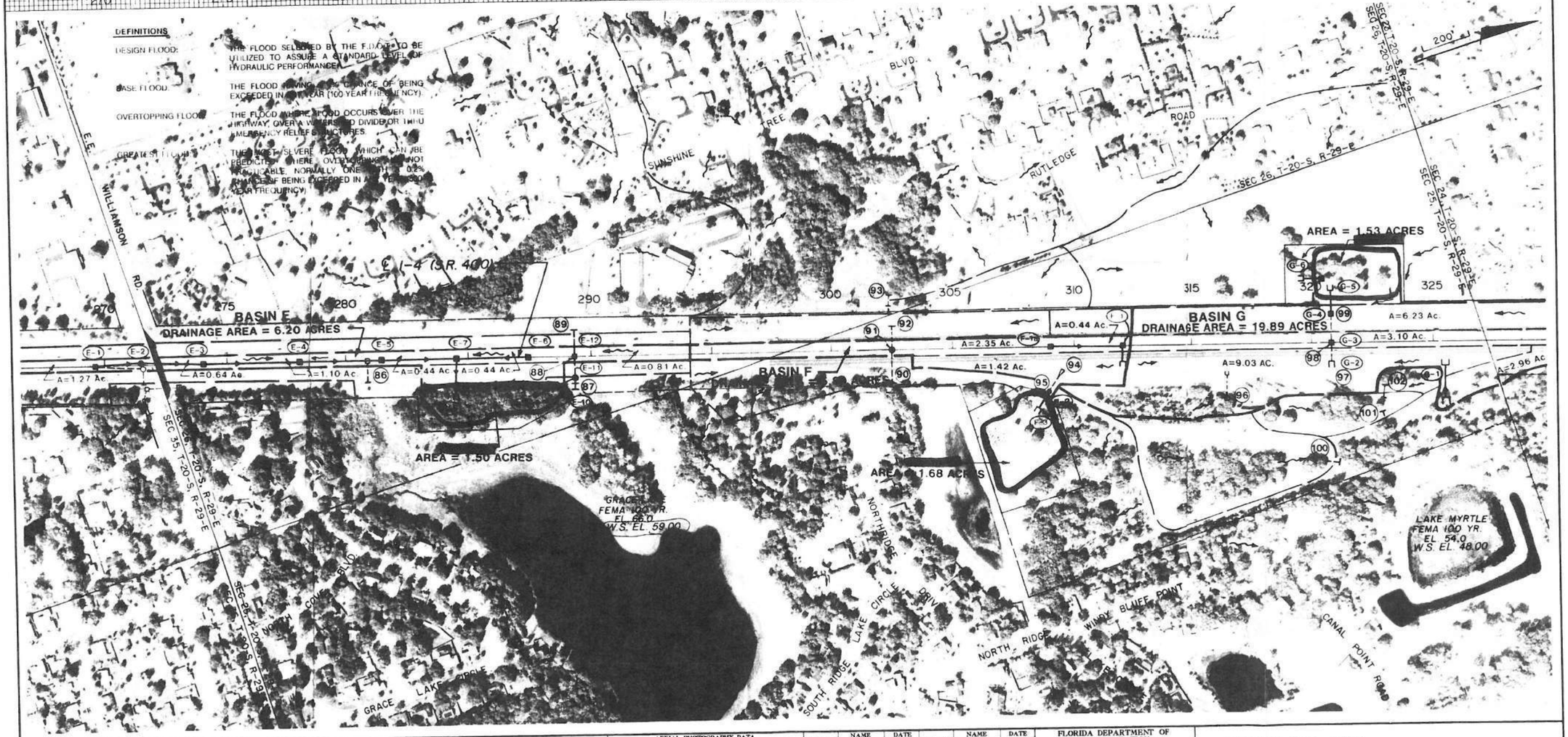


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PHOTO DATE	2-13-93
PHOTO ID. NO.	P.D. 4125 3-08

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DESIGNED BY	MAJ	7/93	DRAWN BY	GIY	7/93
CHECKED BY	BAK	7/93	CHECKED BY	BAK	7/93
SUPERVISED BY : KENNETH A. CARPER, PE					

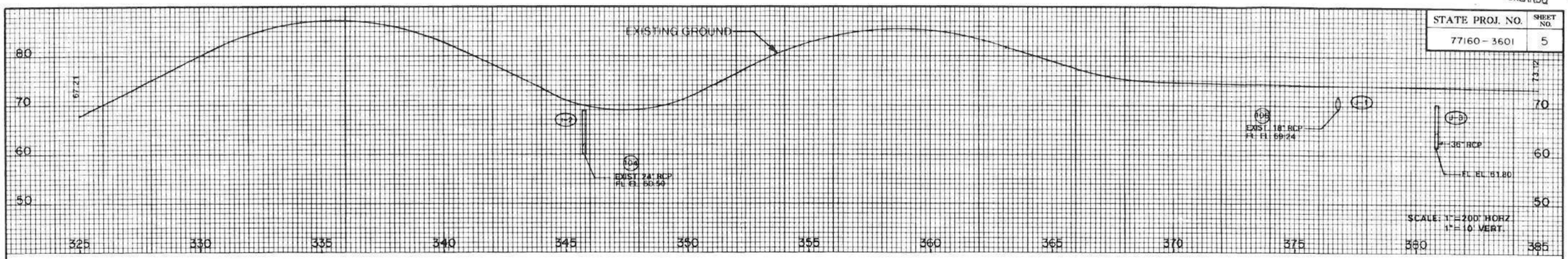
FLORIDA DEPARTMENT OF TRANSPORTATION

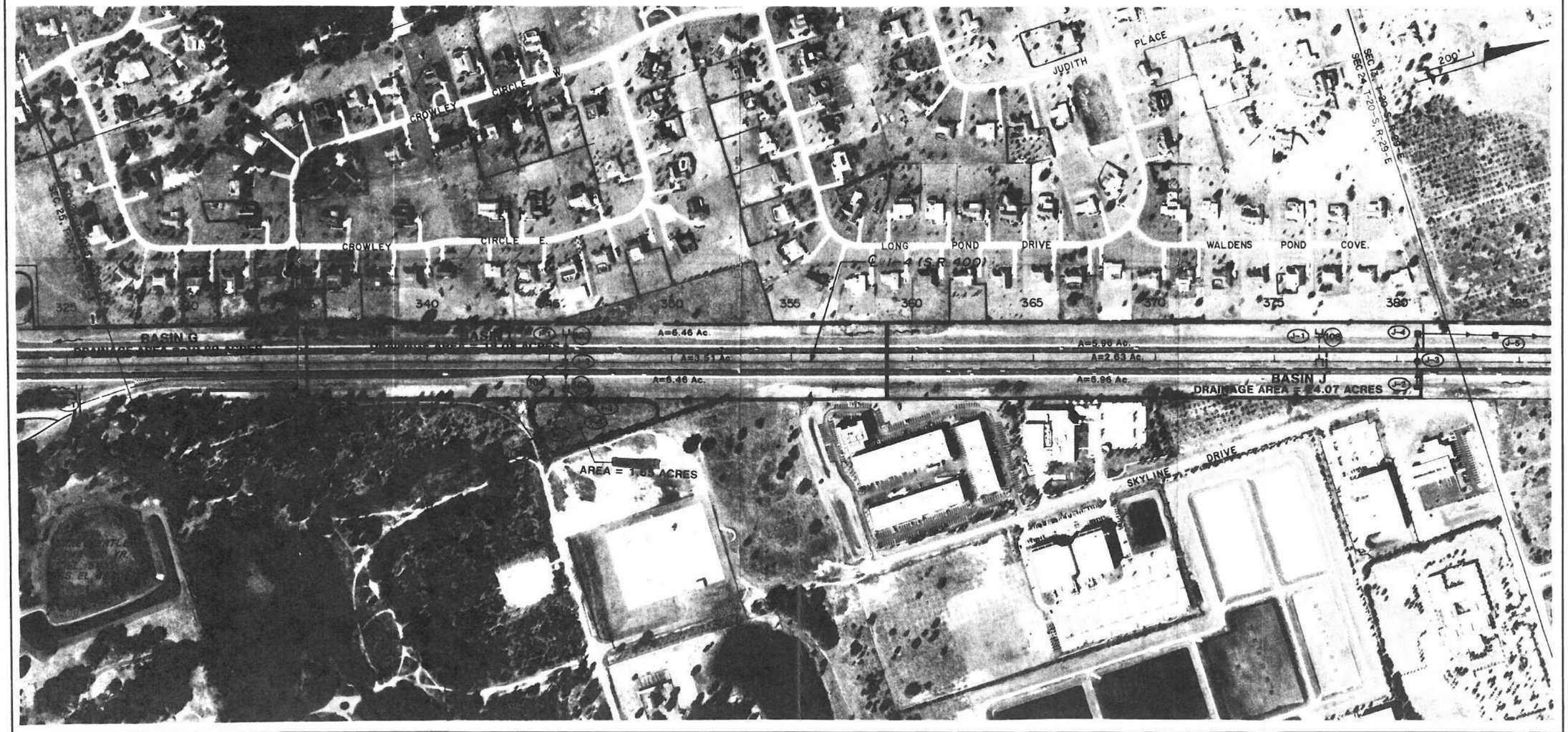
APPROVED BY :

DATE :

DRAINAGE MAP

STATE PROJ. NO.	SHEET NO.
77160-3601	5





REVISION								
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PHOTO ID. NO.	P.D. 4125 3-11

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DESIGNED BY	MAJ	7/93	DRAWN BY	GIY	7/93
CHECKED BY	BAK	7/93	CHECKED BY	BAK	7/93
SUPERVISED BY:	KENNETH A CARPER, PE				

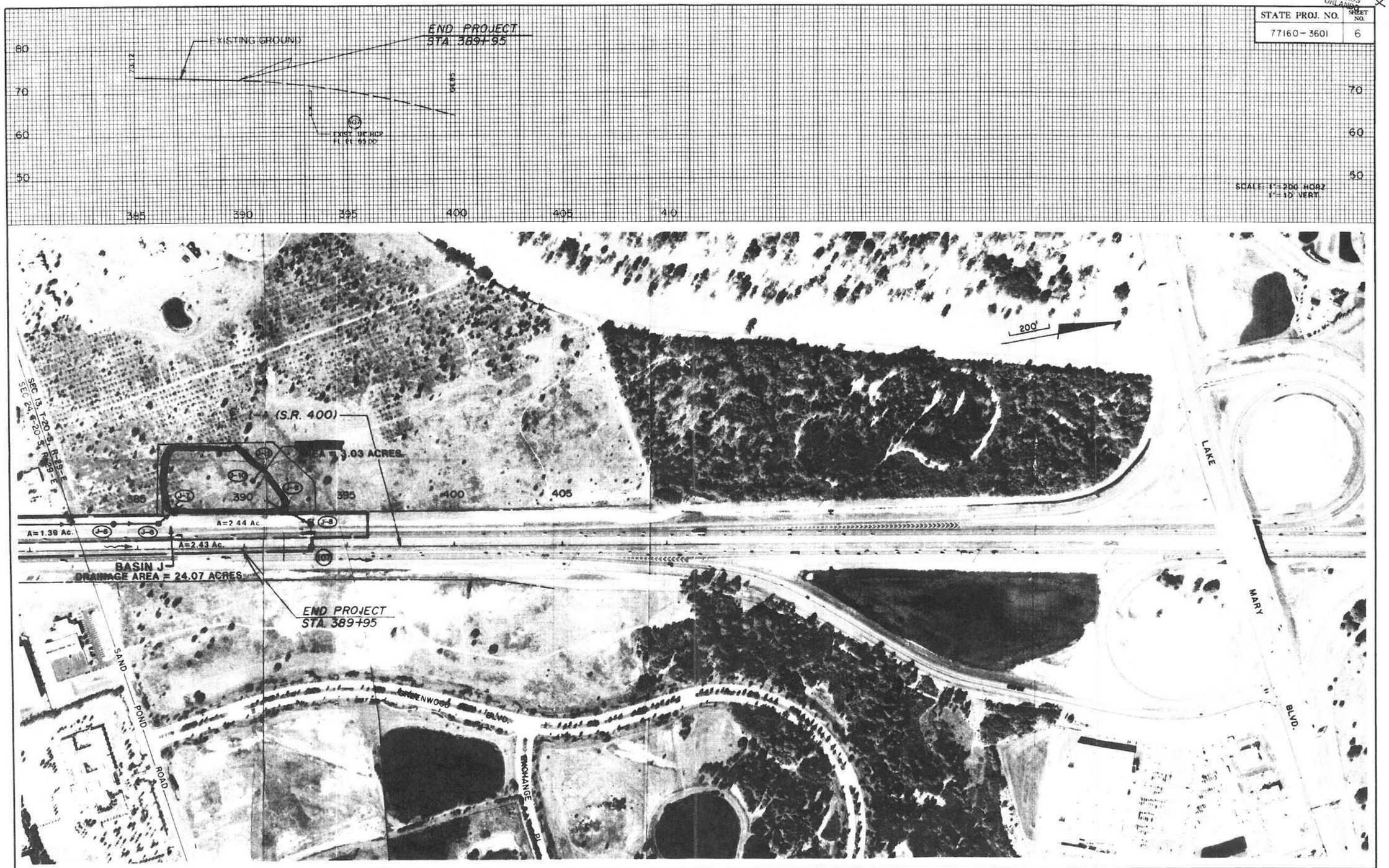
FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

DATE:

DRAINAGE MAP

STATE PROJ. NO.	SHEET NO.
77160-3601	6



REVISIONS								
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

AERIAL PHOTOGRAPHY DATA	
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PHOTO DATE	2-13-93
PHOTO ID NO.	P.D. 4125 3-11

	NAME	DATE		NAME	DATE
DESIGNED BY	MAJ	7/93	DRAWN BY	GIY	7/93
CHECKED BY	BAK	7/93	CHECKED BY	BAK	7/93

SUPERVISED BY: KENNETH A. CARPER, PE

FLORIDA DEPARTMENT OF TRANSPORTATION

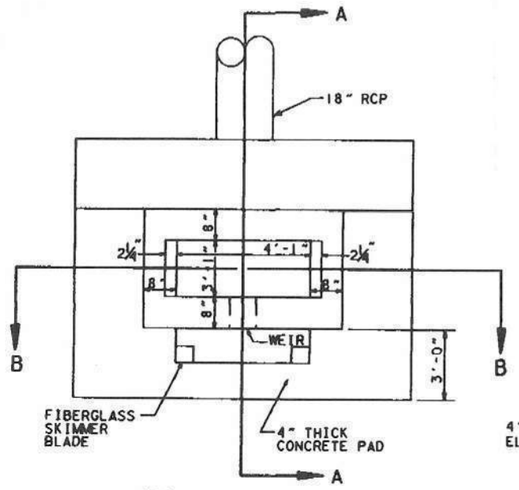
APPROVED BY:

DATE:

DRAINAGE MAP

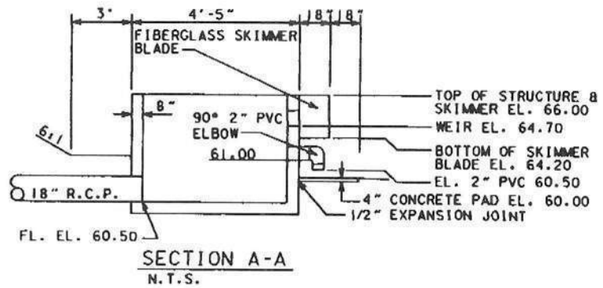
STATE PROJ. NO.	SHEET NO.
77160-3601	51

4-117-0398AG X

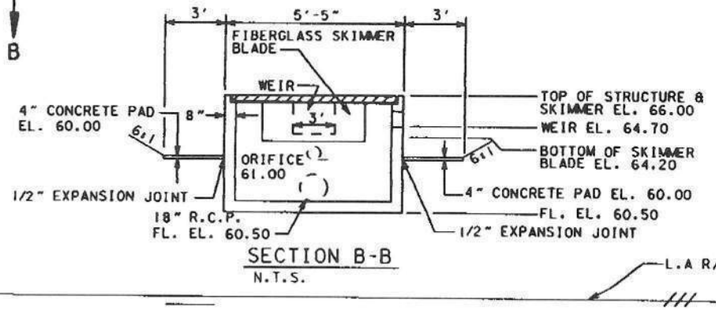


E-9

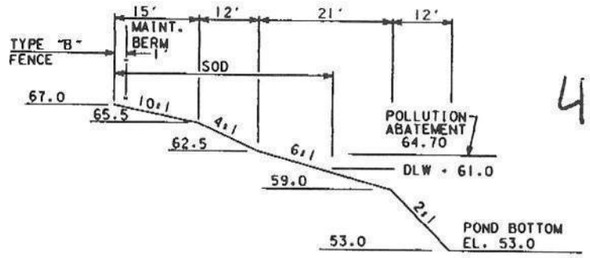
PLAN VIEW
TYPE D SPECIAL
N.T.S.



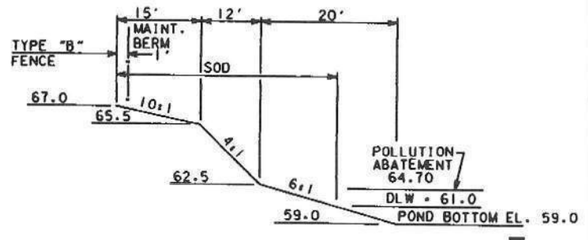
SECTION A-A
N.T.S.



SECTION B-B
N.T.S.



POND E TYPICAL SECTION A-A



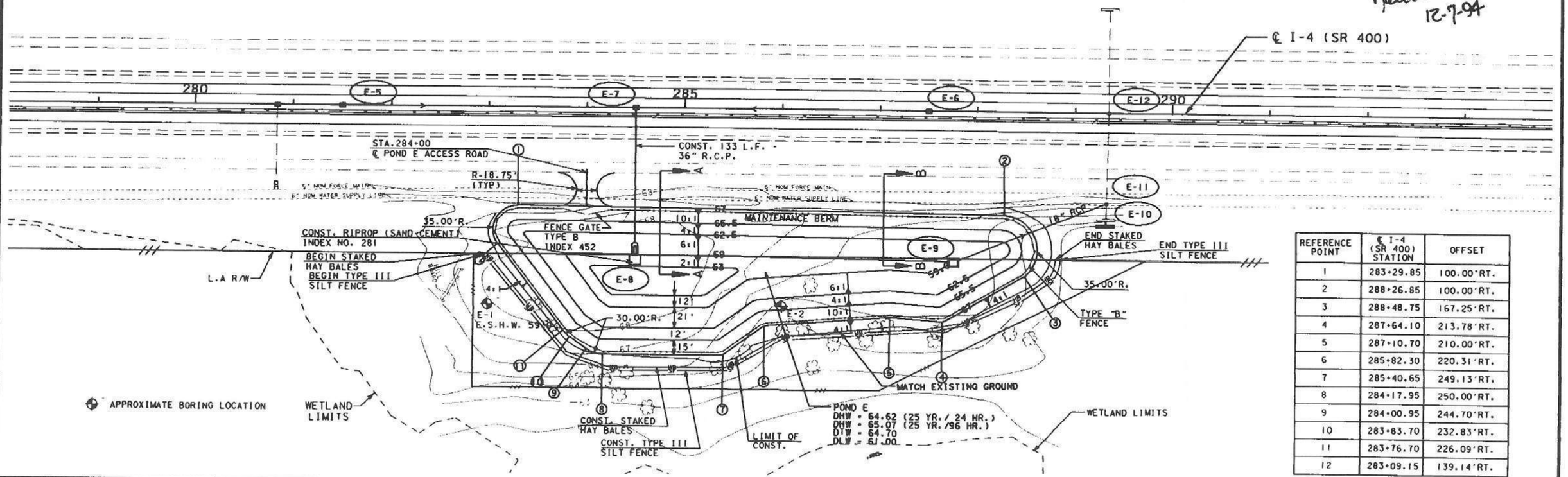
POND E TYPICAL SECTION B-B

E.S.H.W. 55.50 TO 59.00

NOTES:

1. MINIMUM RADIUS FOR CURVES IS 5 FEET. CURVES BELOW TOP OF BERM CONTOUR ARE CONCENTRIC.
2. SKIMMERS SHALL BE CONSTRUCTED OF 3/16" FIBERGLASS, STAINLESS STEEL TUBING, REINFORCED PLASTIC PLATES AND ANGLES, CONNECTED BY EPOXY BONDING AND NON-METALLIC RIVETS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. PLASTIC ANGLES SHALL BE ATTACHED TO THE CONCRETE WITH STAINLESS STEEL BOLTS. ALL WORK SHALL CONFORM TO THE SPECIAL SPECIFICATIONS.
3. SKIMMER SHALL EXTEND FROM 6" BELOW WEIR CREST TO 6" TOP OF STRUCTURE
4. SKIMMER BLADE, WEIR, ORIFICE, CONCRETE PAD ETC. TO BE INCLUDED IN CONTRACT UNIT PRICE FOR CONTROL STRUCTURE.

Robert C. Alderman 12-7-94



REFERENCE POINT	℄ I-4 (SR 400) STATION	OFFSET
1	283+29.85	100.00'RT.
2	288+26.85	100.00'RT.
3	288+48.75	167.25'RT.
4	287+64.10	213.78'RT.
5	287+10.70	210.00'RT.
6	285+82.30	220.31'RT.
7	285+40.65	249.13'RT.
8	284+17.95	250.00'RT.
9	284+00.95	244.70'RT.
10	283+83.70	232.83'RT.
11	283+76.70	226.09'RT.
12	283+09.15	139.14'RT.

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	R.C.A.	8/94	DRAWN BY	R.T.M.	8/94
CHECKED BY	R.D.M.	8/94	CHECKED BY	R.C.A.	8/94

SUPERVISED BY: KENNETH A. CARPER, P.E.

FLORIDA DEPARTMENT OF TRANSPORTATION
APPROVED BY:
DATE:

Greiner

POND E DETAIL

STATE PROJ. NO.	SHEET NO.
77160-3601	52

NOTES:

1. MINIMUM RADIUS FOR CURVES IS 5 FEET. CURVES BELOW TOP OF BERM CONTOUR ARE CONCENTRIC.
2. MAINTENANCE ACCESS AND MAINTENANCE BERM SHALL BE SOD ON 12" STABILIZED SUBGRADE TYPE "B" (LBR 40).
3. SKIMMERS SHALL BE CONSTRUCTED OF 3/16" FIBERGLASS, STAINLESS STEEL TUBING, REINFORCED PLASTIC PLATES AND ANGLES, CONNECTED BY EPOXY BONDING AND NON-METALLIC RIVETS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. PLASTIC ANGLES SHALL BE ATTACHED TO THE CONCRETE WITH STAINLESS STEEL BOLTS. ALL WORK SHALL CONFORM TO THE SPECIAL SPECIFICATIONS.
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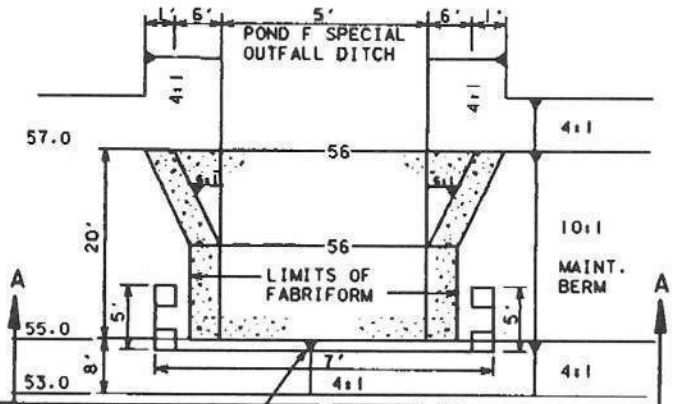
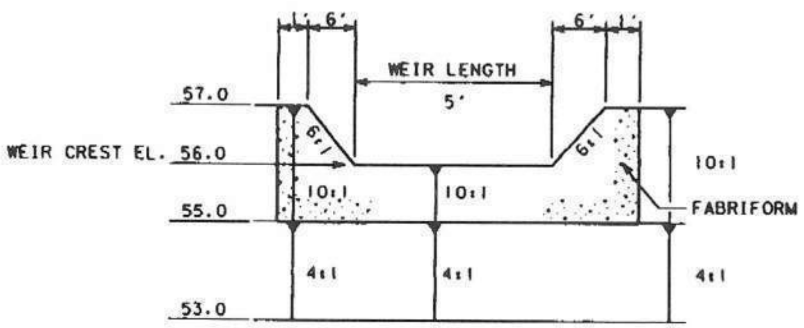
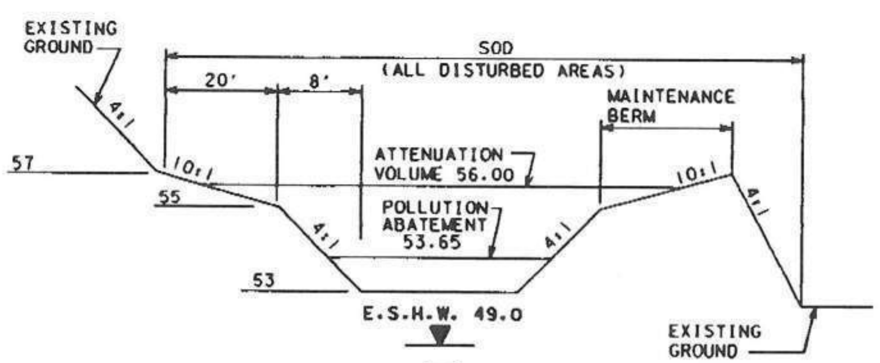


PLAN

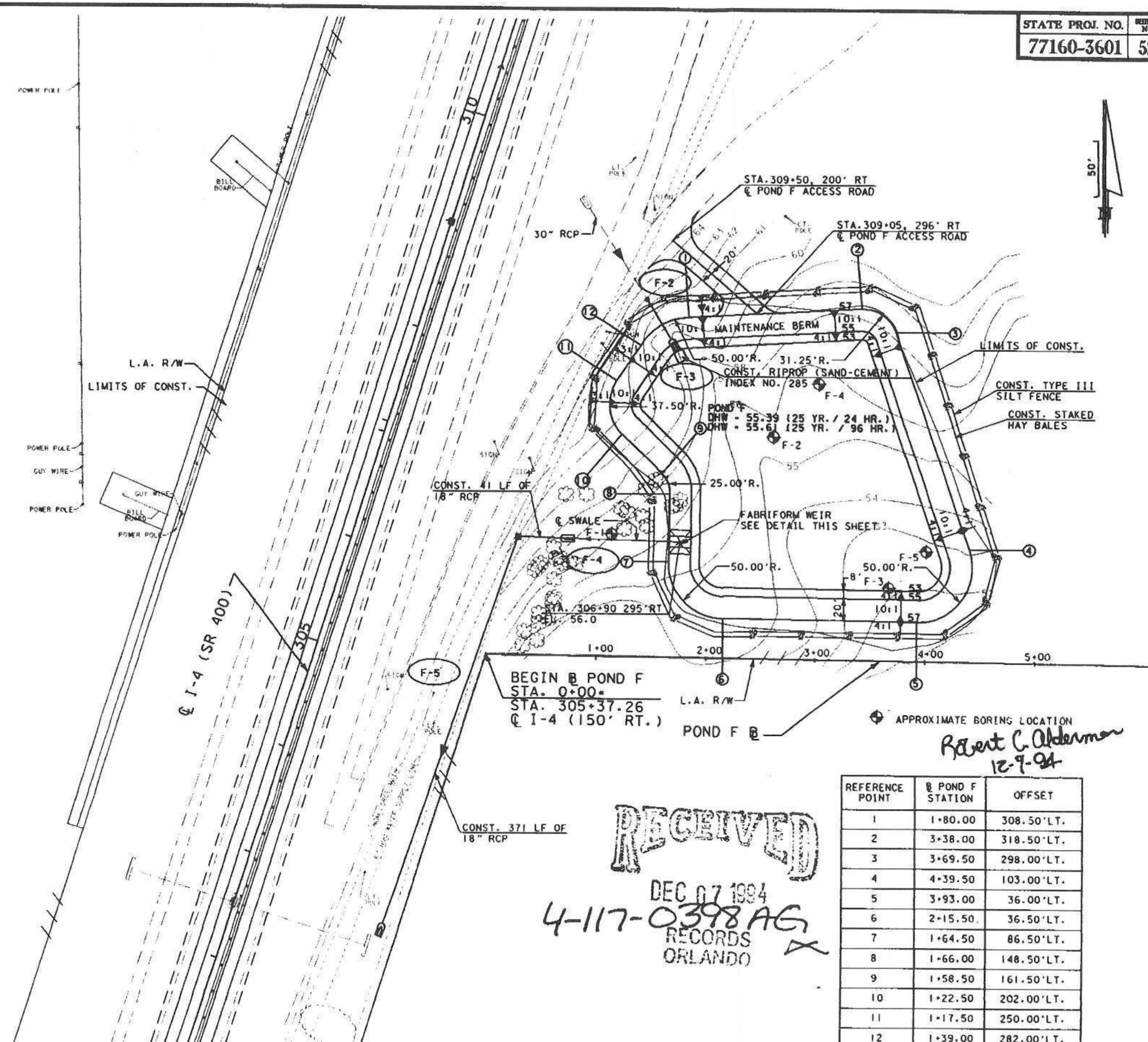
POND F OUTFALL WEIR DETAIL



SECTION A-A



POND F TYPICAL SECTION



Robert C. Alderman
12-9-94

RECEIVED
DEC 07 1994
4-117-0398 AG
RECORDS
ORLANDO

REFERENCE POINT	℄ POND F STATION	OFFSET
1	1+80.00	308.50'LT.
2	3+38.00	318.50'LT.
3	3+69.50	298.00'LT.
4	4+39.50	103.00'LT.
5	3+93.00	36.00'LT.
6	2+15.50	36.50'LT.
7	1+64.50	86.50'LT.
8	1+66.00	148.50'LT.
9	1+58.50	161.50'LT.
10	1+22.50	202.00'LT.
11	1+17.50	250.00'LT.
12	1+39.00	282.00'LT.

	NAME	DATE		NAME	DATE
DESIGNED BY	R.C.A.	8/94	DRAWN BY	R.T.M.	8/94
CHECKED BY	R.D.M.	8/94	CHECKED BY	R.C.A.	8/94

SUPERVISED BY: KENNETH A. CARPER, P.E.

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

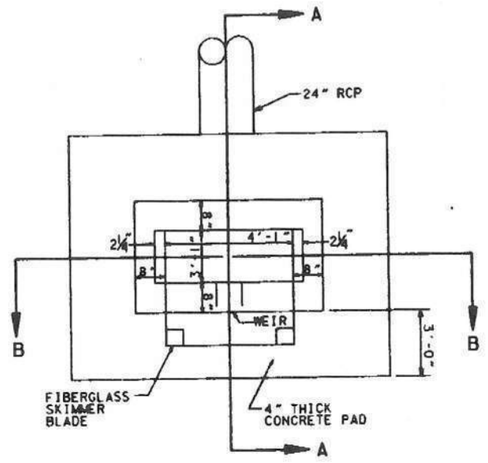
DATE:

Greiner

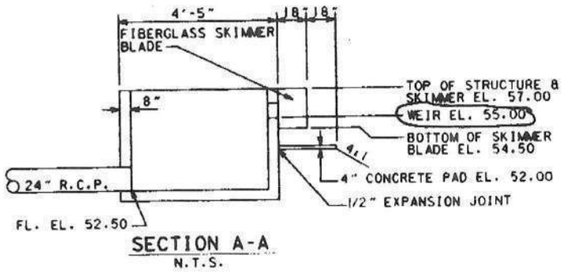
POND F DETAIL

Treatment volume is greater than recharge volume.

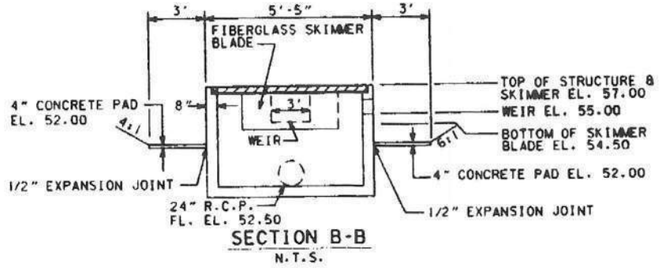
STATE PROJ. NO.	SHEET NO.
77160-3601	53



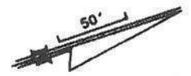
G-6 PLAN VIEW
TYPE D SPECIAL
N.T.S.



SECTION A-A
N.T.S.



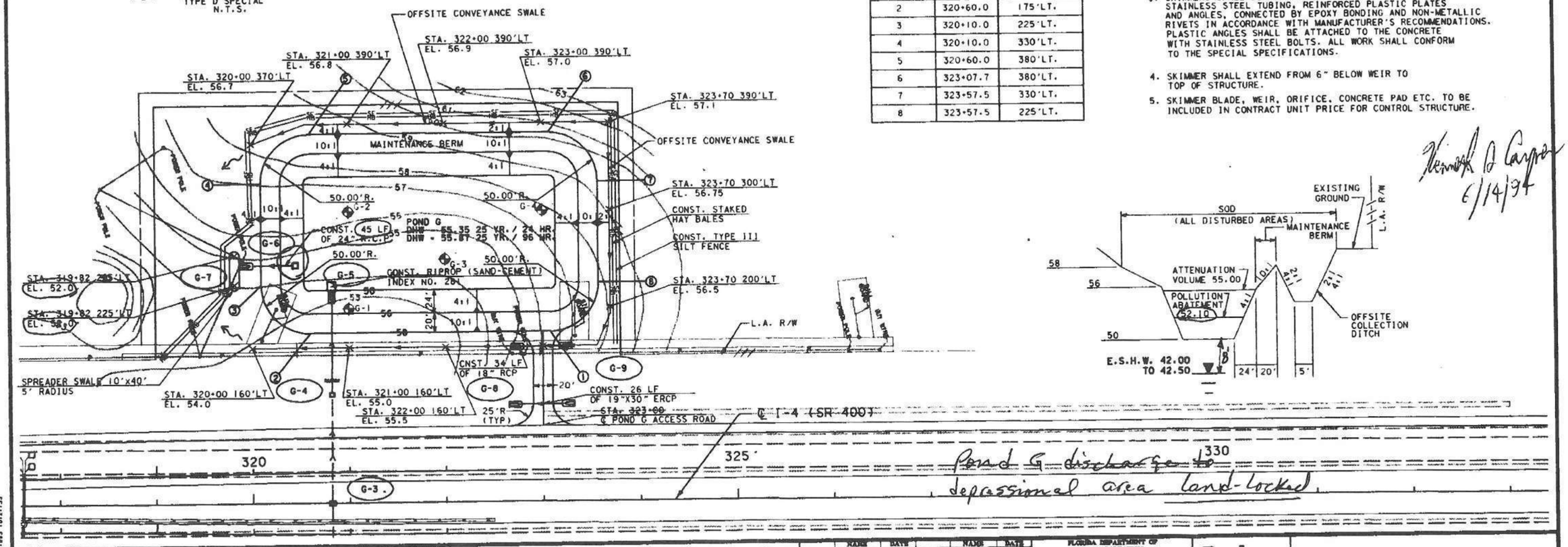
SECTION B-B
N.T.S.



REFERENCE POINT	℄ I-4 (SR 400) STATION	OFFSET
1	323+07.7	175'LT.
2	320+60.0	175'LT.
3	320+10.0	225'LT.
4	320+10.0	330'LT.
5	320+60.0	380'LT.
6	323+07.7	380'LT.
7	323+57.5	330'LT.
8	323+57.5	225'LT.

NOTES:
1. MINIMUM RADIUS FOR CURVES IS 5 FEET. CURVES BELOW TOP OF BERM CONTOUR ARE CONCENTRIC.
2. MAINTENANCE ACCESS ROAD AND MAINTENANCE BERM SHALL BE SOD ON 12" STABILIZED SUBGRADE TYPE "B" (LBR 40).
3. SKIMMERS SHALL BE CONSTRUCTED OF 3/16" FIBERGLASS, STAINLESS STEEL TUBING, REINFORCED PLASTIC PLATES AND ANGLES, CONNECTED BY EPOXY BONDING AND NON-METALLIC RIVETS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. PLASTIC ANGLES SHALL BE ATTACHED TO THE CONCRETE WITH STAINLESS STEEL BOLTS. ALL WORK SHALL CONFORM TO THE SPECIAL SPECIFICATIONS.
4. SKIMMER SHALL EXTEND FROM 6" BELOW WEIR TO TOP OF STRUCTURE.
5. SKIMMER BLADE, WEIR, ORIFICE, CONCRETE PAD ETC. TO BE INCLUDED IN CONTRACT UNIT PRICE FOR CONTROL STRUCTURE.

Kenneth A Carper
6/14/94



Pond G discharge to depressional area land-locked

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	R.C.A.	6/94	DRAWN BY	R.T.M.	6/94
CHECKED BY	R.D.M.	6/94	CHECKED BY	R.C.A.	6/94

SUPERVISED BY: KENNNETH A. CARPER, P.E.

FLORIDA DEPARTMENT OF TRANSPORTATION
APPROVED BY:
DATE:

Greiner

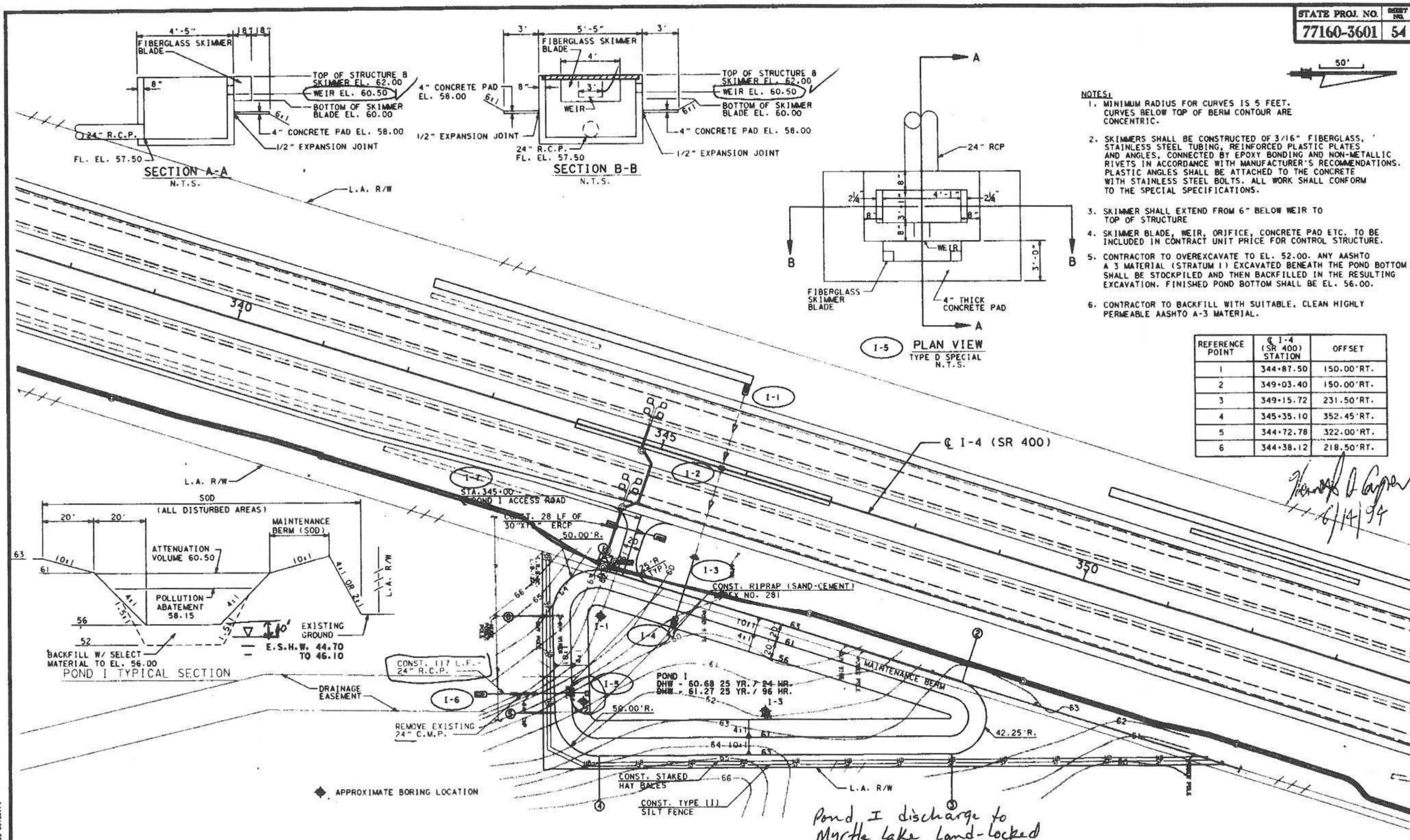
POND G DETAIL

Dry bottom pond

H:\PROJECTS\DETAIL07.DGN
Date: Jun. 23, 1993 10:21:35
Scale: 1.0:1

Total volume holding below crest El.
is grater than Recharge volume
3.63 Ac-ft > 1.59 Recharge

STATE PROJ. NO.	SHEET NO.
77160-3601	54



NOTES:

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2. SKIMMERS SHALL BE CONSTRUCTED OF 3/16" FIBERGLASS, STAINLESS STEEL TUBING, REINFORCED PLASTIC PLATES AND ANGLES, CONNECTED BY EPOXY BONDING AND NON-METALLIC RIVETS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. PLASTIC ANGLES SHALL BE ATTACHED TO THE CONCRETE WITH STAINLESS STEEL BOLTS. ALL WORK SHALL CONFORM TO THE SPECIAL SPECIFICATIONS.
3. SKIMMER SHALL EXTEND FROM 6" BELOW WEIR TO TOP OF STRUCTURE
4. SKIMMER BLADE, WEIR, ORIFICE, CONCRETE PAD ETC. TO BE INCLUDED IN CONTRACT UNIT PRICE FOR CONTROL STRUCTURE.
5. CONTRACTOR TO OVEREXCAVATE TO EL. 52.00. ANY AASHTO A 3 MATERIAL (STRATUM I) EXCAVATED BENEATH THE POND BOTTOM SHALL BE STOCKPILED AND THEN BACKFILLED IN THE RESULTING EXCAVATION. FINISHED POND BOTTOM SHALL BE EL. 56.00.
6. CONTRACTOR TO BACKFILL WITH SUITABLE, CLEAN HIGHLY PERMEABLE AASHTO A-3 MATERIAL.

REFERENCE POINT	℄ I-4 (SR 400) STATION	OFFSET
1	344+87.50	150.00'RT.
2	349+03.40	150.00'RT.
3	349+15.72	231.50'RT.
4	345+35.10	352.45'RT.
5	344+72.78	322.00'RT.
6	344+38.12	218.50'RT.

Kenneth A. Carper 6/14/94

Pond I discharge to Myrtle Lake Land-locked

	NAME	DATE		NAME	DATE
DESIGNED BY	R.C.A.	6/94	DRAWN BY	R.T.M.	6/94
CHECKED BY	R.D.M.	6/94	CHECKED BY	R.C.A.	6/94

SUPERVISED BY: KENNETH A. CARPER, P.E.

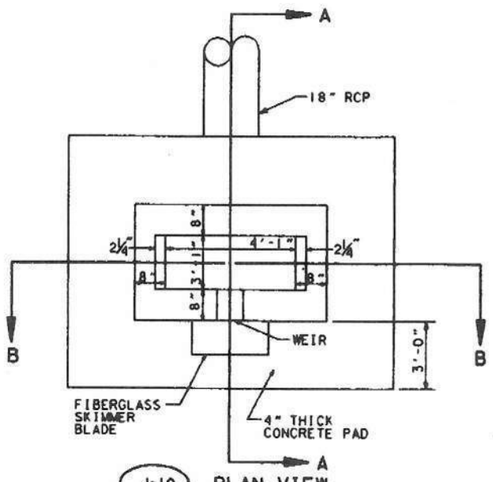
FLORIDA DEPARTMENT OF TRANSPORTATION
APPROVED BY:
DATE:

Greiner

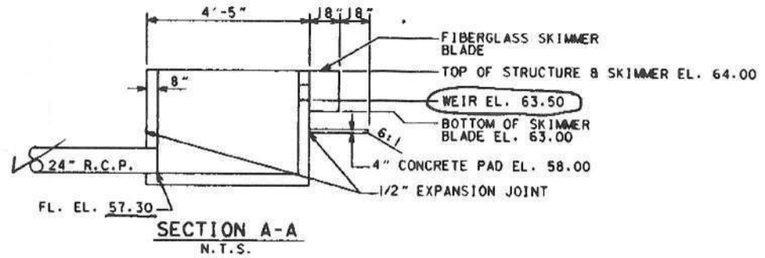
POND I DETAIL

Dry bottom pond

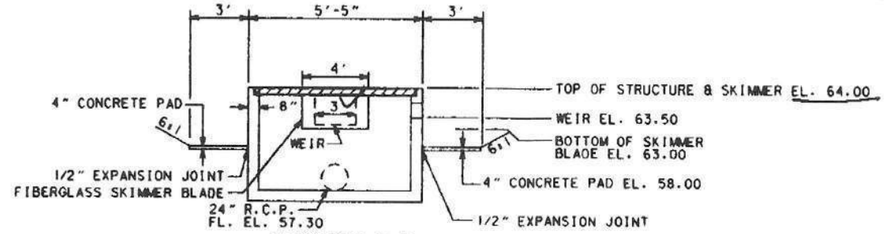
STATE PROJ. NO.	SHEET NO.
77160-3601	55



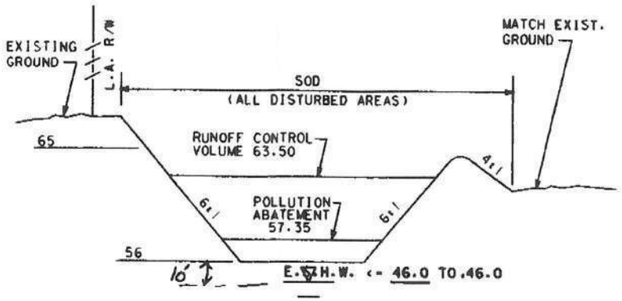
J-10 PLAN VIEW
TYPE D SPECIAL
N.T.S.



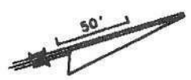
SECTION A-A
N.T.S.



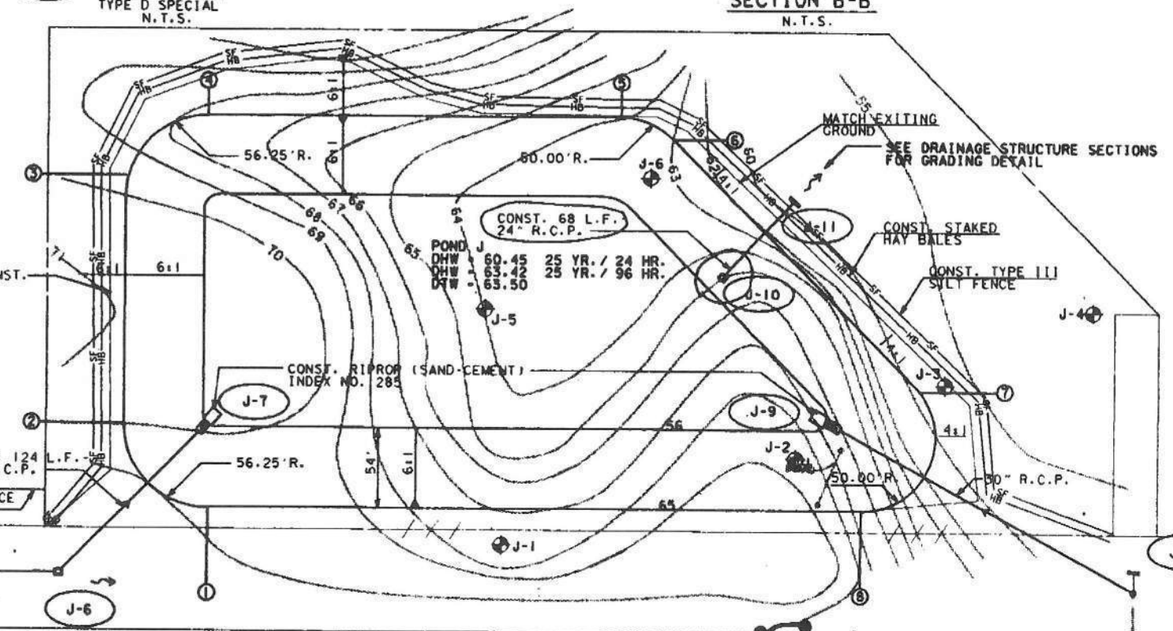
SECTION B-B
N.T.S.



TYPICAL POND SECTION



Kenneth A Carper
6/14/94



REFERENCE POINT	℄ I-4 (SR 400) STATION	OFFSET
1	387+00.00	162.00'LT.
2	386+43.75	218.25'LT.
3	386+43.75	372.00'LT.
4	387+00.00	428.25'LT.
5	389+80.03	428.25'LT.
6	390+15.69	413.30'LT.
7	391+83.55	242.20'LT.
8	391+44.10	162.00'LT.

NOTES:
1. MINIMUM RADIUS FOR CURVES IS 5 FEET. CURVES BELOW TOP OF BERM CONTOUR ARE CONCENTRIC.
2. SKIMMERS SHALL BE CONSTRUCTED OF 3/16" FIBERGLASS, STAINLESS STEEL TUBING, REINFORCED PLASTIC PLATES AND ANGLES, CONNECTED BY EPOXY BONDING AND NON-METALLIC RIVETS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. PLASTIC ANGLES SHALL BE ATTACHED TO THE CONCRETE WITH STAINLESS STEEL BOLTS. ALL WORK SHALL CONFORM TO THE SPECIAL SPECIFICATIONS.
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4. SKIMMER BLADE, WEIR, ORIFICE, CONCRETE PAD ETC. TO BE INCLUDED IN CONTRACT UNIT PRICE FOR CONTROL STRUCTURE.

◆ APPROXIMATE BORING LOCATION

Pond J discharge to depressional area land-locked

Dry bottom Pond

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	R.C.A.	6/94	DRAWN BY	R.T.M.	6/94
CHECKED BY	R.D.M.	6/94	CHECKED BY	R.C.A.	6/94

SUPERVISED BY: KENNETH A. CARPER, P.E.

FLORIDA DEPARTMENT OF TRANSPORTATION
APPROVED BY:
DATE:

Greiner

POND J DETAIL

H:\VO180\PONDS\JET\ADD06.DGN
DGN: Jun. 24, 1993 08:23:32
MSPC 4.0.3.1

Permit No. 22124-2

I-4 Widening from west of Lake Mary Boulevard to west of SR 15/600 (US 17/92)

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
Post Office Box 1429
Palatka, Florida 32178-1429

PERMIT NO. 4-117-22124-2 **DATE ISSUED:** January 8, 2002

PROJECT I-4 Widening (From West of Lake Mary Blvd. to W. of SR 15/600)

A PERMIT AUTHORIZING:

the construction and operation of a surface water management system consisting of 6.47 miles of Interstate 4, from west of Lake Mary Boulevard to west of SR 15/600 (US 17/92). The project includes the widening of the existing four-lane rural highway facility to a six-lane rural highway facility by the addition of one auxiliary lane in each direction. The project also includes the realignment of ramps at the Lake Mary Boulevard, SR 417, SR 46A and SR 46 interchanges, and the construction of two dry retention ponds, three wet detention ponds and modifications to two existing dry retention ponds. This permit also authorizes work in 16.22 acres of wetlands and other surface waters.

LOCATION:

Section(s):	6, 18	Township(s):	19S	Range(s):	30E
	20, 21, 29, 31, 32		20S		30E

Seminole County

ISSUED TO:

Florida Department of Transportation
719 S. Woodland Blvd.
De Land, FL 32720

Permittee agrees to hold and save the St. Johns River Water Management District and its successors harmless from any and all damages, claims, or liabilities which may arise from permit issuance. Said application, including all plans and specifications attached thereto, is by reference made a part hereof.

This permit does not convey to permittee any property rights nor any rights of privileges other than those specified therein, nor relieve the permittee from complying with any law, regulation or requirement affecting the rights of other bodies or agencies. All structures and works installed by permittee hereunder shall remain the property of the permittee.

This permit may be revoked, modified or transferred at any time pursuant to the appropriate provisions of Chapter 373, Florida Statutes:

The Interstate 4 (I-4) Widening project extends from west of Lake Mary Boulevard to west of SR 15/600 (US 17/92), in Seminole County. The Interstate 4 widening project length is 6.47 miles. The existing four-lane limited access facility will be widened to a six-lane typical section with the addition of a single auxiliary lane in each direction. The project consists of five drainage basins with stormwater management facilities that provide water quality and attenuation needs. A portion of the project lies within the Wekiva River Hydrologic Basin (Basin 15). However, the project does not contain any portions of the Riparian Habitat Protection Zone (RHPZ). The remaining portion of the project is located within the St Johns Hydrologic Basin (Canaveral Marshes to Wekiva, Basin 18).

STAFF COMMENTS:

This application seeks authorization to construct a surface water management system for 6.47 miles of Interstate 4, from west of Lake Mary Boulevard to west of SR 15/600 (US 17/92). The project includes the widening of the existing four-lane rural highway facility to a six-lane rural highway facility by the addition of one auxiliary lane in each direction. The project also includes the realignment of ramps at the Lake Mary Boulevard, SR 417, SR 46A and SR 46 interchanges, and the construction of two dry retention ponds, three wet detention ponds and modifications to two existing dry retention ponds. Stormwater runoff will be captured and conveyed by roadside swales to ditch bottom inlets which will route the runoff through storm sewer systems to the proposed two dry retention ponds, three wet detention ponds, and the two existing modified dry retention ponds for the required water quality treatment and peak discharge rate attenuation.

Drainage Basin 1 includes the Lake Mary Boulevard / Interstate 4 interchange. The surface water management ponds for the existing interchange were designed and permitted under the SJRWMD permit number 4-117-0237. The existing ponds will be modified to accommodate the water quality and peak flow attenuation needs for this project. Portions of this basin are located in the Wekiva River Hydrologic Basin Most Effective Recharge Area. The existing ponds are dry retention ponds and outfall to the Heathrow development stormwater management system.

Drainage Basin 2 is located within the land-locked Lake Emma basin. The surface water management pond is designed as a dry retention pond and it retains the volumetric difference between the pre- and post-development 25-year, 96-hour design storm event. The pond will maintain existing flow patterns by discharging through the Primera property. Portions of this basin are located in the Wekiva River Hydrologic Basin Most Effective Recharge Area.

Drainage Basin 3 discharges to the land-locked portion of the Heathrow development. The surface water management pond is designed as a dry retention pond and it retains the volumetric difference between the pre- and post-development 25-year, 96-hour design storm event. The pond will maintain existing discharge patterns by discharging to the International Parkway storm sewer system. Portions of this basin are located in the Wekiva River Hydrologic Basin Most Effective Recharge Area.

Drainage Basin 4 includes the SR 46 interchange area. The two stormwater ponds are designed as wet detention ponds and were designed to open-basin criteria as the ponds discharge directly to the Lockhart Smith Canal. Drainage Basin 5 includes the Orange Boulevard area. The surface water management pond is designed as a wet detention pond and was designed to open-basin criteria as the pond discharges directly to Elder Ditch, which discharges to Lake Monroe.

The applicant has submitted calculations demonstrating that the proposed surface water management system will provide treatment and recovery of the required pollution abatement volumes for each drainage basin pursuant to Chapter 40C-42, F.A.C.. Treatment has been provided for all the existing impervious surfaces and the proposed impervious surfaces. The proposed surface water management system will also provide attenuation for the increase in impervious areas proposed by this project. The project has been designed to meet the applicable Wekiva Basin criteria for the sections of the project located within the Wekiva Basin.

The 100-year floodplain analysis of the Interstate-4 project corridor using FEMA Flood Insurance Rate Maps indicates no areas of flood plain encroachment. A detailed watershed study is available for the project area and was reviewed by the applicant. The detailed study, "Lockhart-Smith Canal Monroe Basin, Engineering Study and Drainage Inventory", prepared by Singhofen & Associates, Inc, indicates portions of the Interstate-4 project corridor are within the 100-year floodplain. The floodplain areas where impacts were identified are limited to Drainage Basins 4 and 5. The 100-year floodplain elevations were determined from study information and plotted onto cross-section diagrams for the roadway and pond areas. The cross-section diagrams indicated the areas of encroachment and allowed for the encroachment amount to be calculated. The 100-year floodplain impacts will be compensated for in Ponds 4-I, 4-II, and 5.

The portion of Interstate 4 between Lake Mary Boulevard and State Road 46 generally passes through xeric sandhill uplands with widely scattered depressional wetlands. The portion of Interstate 4 between State Road 46 and U.S. Highway 17/92 generally passes through low-lying lands underlaid with poorly drained soils which were drained historically for agriculture by the M.M. Smith Canal. The entire length of the project is within a rapidly urbanizing area of Central Florida.

The project limits contain eight wetland areas ranging in size from 0.05 acres to 3.48 acres. Of these, five are located within the existing right-of-way of Interstate 4 and three are located in the vicinity of the proposed surface water management ponds. Owing to their historical hydrological alterations and the relatively inefficient drainage topography that underlies the area, most project wetlands maintain sufficient hydroperiods to maintain the existing vegetative communities, although species typical of disturbance were encountered in most of the wetland communities. Although degraded, the on -site wetlands likely provided suitable habitat for certain wildlife species.

The applicant proposes to fill 8.99 acres of wetlands to expand the interstate highway. Forty-six percent of those impacts (4.14 acres) are to occur to herbaceous wetlands that are routinely mowed, but which continue to provide suitable habitat for those species requiring minimal cover. Twenty-four percent of the proposed wetland impacts (2.14 acres) is to occur to a forested wetland imbedded within an oak and pine dominated forest. This wetland provides suitable habitat for those terrestrial wildlife species not requiring far ranging mobility, as well as avian and other flying wildlife species. The remaining wetlands to be dredged or filled (2.71 acres) consist of herbaceous and forested wetland areas immediately adjacent to the existing roadway or within the in-fieldsof the existing intersections. All of the wetland impacts that need mitigation are located within Basin 18.

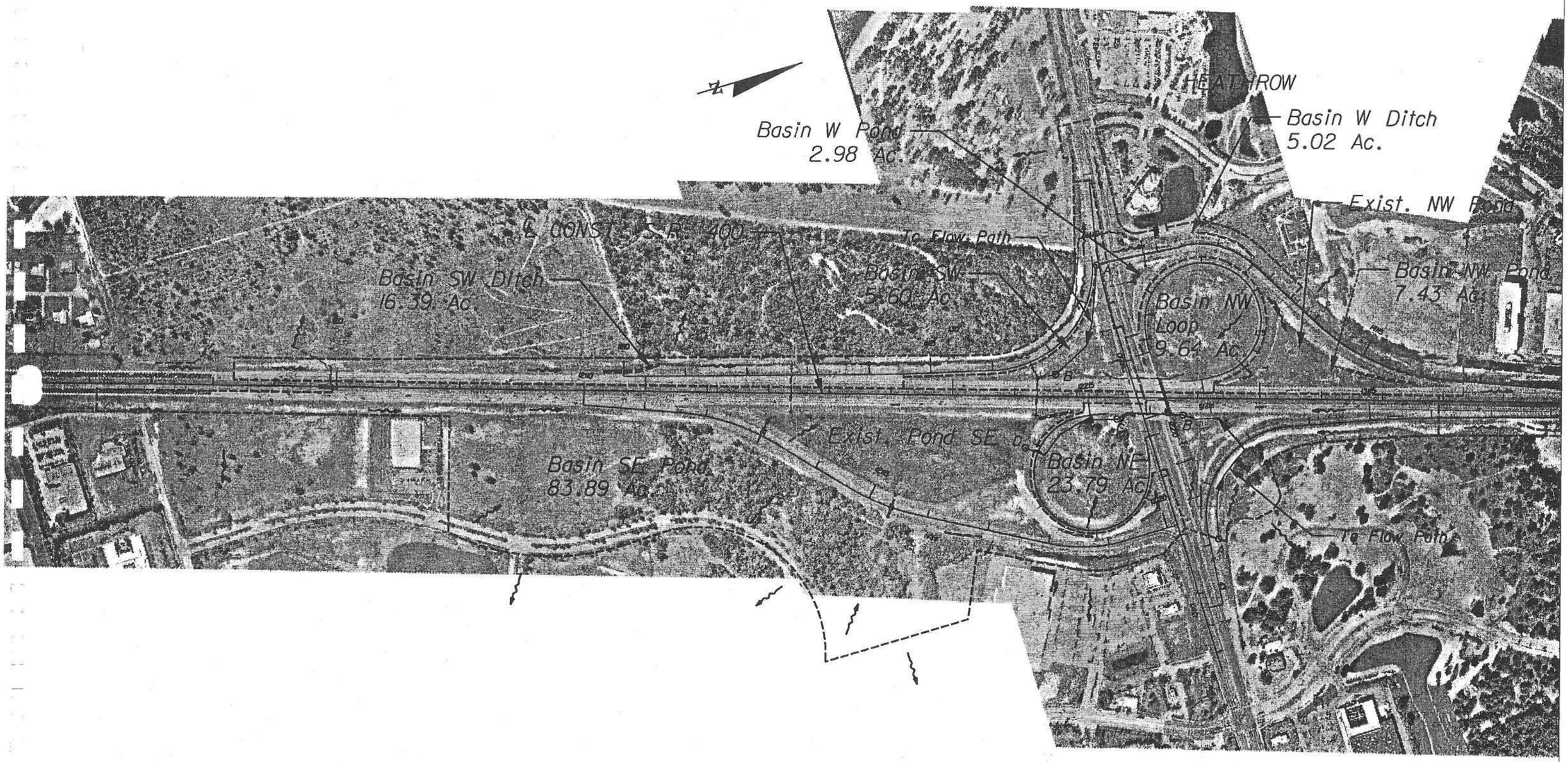
BASIN 1

This basin includes the Lake Mary Boulevard / Interstate-4 interchange. Stormwater management ponds were designed and permitted by St. Johns River Water Management District in 1989 (Permit No. 4-117-0237) for the existing interchange design. These ponds will be utilized to store the water quality and attenuation needs of this project. Future widening of Interstate-4 per the Ultimate Interstate-4 Master Plan will require additional pond sites. The configuration of the southeast pond (Pond 1-SE) will be slightly modified, and the only modification to the configuration of the northwest (Pond 1-NW) is to construct a new cross drain under the ramp in order to intercept a small area that was not previously treated. Existing cross-drain pipes will remain and will be extended, as necessary.

Portions of this basin are located in the Wekiva River Hydrologic Basin Most Effective Recharge Area. This area is legally represented as that portion of the project that lies west of the centerline of Interstate-4. This criteria requires that a volume equivalent to three (3) inches times the impervious area, within SCS Type "A" soils in the Most Effective Recharge Area, be recovered within 14 days. Recovery calculations indicate that draw-down of this volume occurs within the 14-day requirement.

Water Quality Volume calculations have been performed and this volume is provided in each of the pond sites. Pond control elevations are being maintained from the previously permitted configurations. Pond SE receives runoff from Basins SE Pond, NE, NW Loop, SW, W Ditch, and SW Ditch; and the control elevation is set by the existing DBI which discharges to Heathrow. Pond NW receives runoff from Basins NW Pond, and the control elevation is set by the existing cross drain under the NW Loop Ramp. Pond W receives runoff from Basin W Pond only, which discharges to W Ditch, and the existing outfall control structure will remain unchanged. The water quality volumes recover prior to the 72-hour requirement.

This basin is designed with open-basin pond criteria. The design storm is a 25-year 24-hour storm event with the SCS Type II rainfall distribution. The ponds have been designed as dry ponds. The outfall of this system is an existing pond within the Heathrow development. The tailwater for this stormwater management system is set at the existing edge of water for the existing Heathrow Pond. The interconnected pond system was modeled using AdICPR 2.20. Results from the routed model are provided on the table below. Post-Development flow rates do not exceed the 120 cfs agreement that the FDOT has with Heathrow. Documentation of this agreement has been provided in this section and can also be found in the original 1989 permit for the existing interchange. The existing control structure has been modeled and no changes are proposed. No impacts to the Heathrow system are anticipated with the design of this project.



Pre Basin I
Scale 1:6000 2-4

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cph
ENGINEERS, INC.
600 W. FULTON STREET
POST OFFICE BOX 1976
SANFORD, FLORIDA 32772-1976
TEL 407-322-6841 TEL 407-831-5717
FAX #407-330-0639

(11)

September 12, 1988

Mr. Wayne Waters
Department of Transportation
719 South Boulevard
P.O. Box 47
DeLand, FL 32721-0047

Re: Heathrow Southeast Area Master Drainage Plan and I-4 Intersection Drainage
CPH Project No. P0077.00

Dear Mr. Waters:

Per our meeting, attached is a copy of the Heathrow Master Drainage Plan Revision No. 7, which details the drainage assumptions and results for the Heathrow Southeast Basin. It contains data as to the assumptions made for the drainage area that includes the present intersection of Lake Mary Blvd. and Interstate 4. Additionally, the report contains a drainage map of the southeast portion of Heathrow. The report has been submitted to and approved by Seminole County, portions submitted to the St. Johns River Water Management District.

The methodology used in the report consisted of generation of runoff hydrographs for individual drainage basins. These hydrographs were generated using the Santa Barbara Urban Hydrograph method for a 25 year / 24 hour SCS Type II Florida modified storm event. Soils data from Soils Conservation Service mapping of Seminole County and from previous soils reports in the Heathrow area were used as well as existing and proposed cover conditions to determine runoff curve numbers The extent of the offsite drainage basin including the intersection was estimated from USGS topographic mapping at 201 acres with an overall SCS curve number of 60 and a time of concentration of 163 minutes. Using a Santa Barbara Urban Hydrograph generator program resulted in an estimated peak flow rate of approximately 120 CFS and a runoff volume of approximately 63 AcFt for the 25 Year / 24 Hour Type II Modified event. In the report, the drainage basin, including the intersection, is identified as Basin 110.

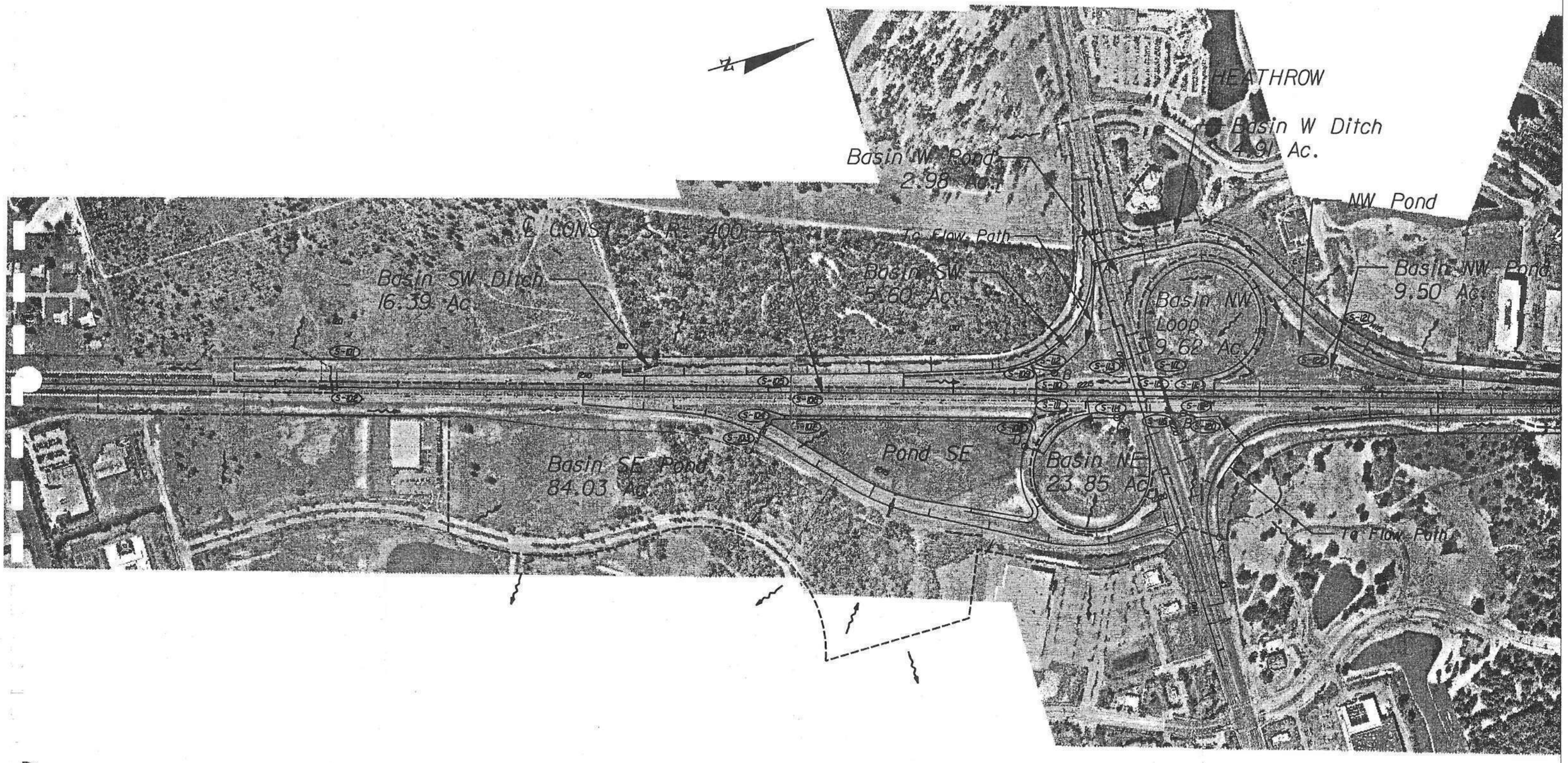
25YR 24HR
A=201
CN=60
TC=163
Santa Barbara
Q=120cfs

For purposes of this report, no attenuation of flow rate from basin 110 due to internal ponding had various low places within the intersection was considered. This was done due to lack of sufficient data on that drainage basin to estimate any valid stage storage constraints. From physical observation of the site, there are presently low areas within the intersection and to the east of the intersection which function as stormwater retention, which would have the effect of attenuating that peak runoff.

Allowable Discharge to Heathrow

*Information From original Lake Mary Interchange Permit.

2-5



Post Basin 1
Scale 1:6000

2-37

Jan 07/2001 03:43:27 PM H:@14ikmry@drainage@postbasinexhibits.dgn

I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 8/27/01
Checked by: CJL Date: 9-10-01

Water Quality Treatment Volume Requirements
Basin 1: Pond SE

Basin Parameters: Contributing Basins are SE Pond, NE, NW Loop, SW, W ditch and SW ditch

Basin Area (ac)	144.41	(58.441 ha)	Roadway Impervious Area (ac)	30.79	(12.460 ha)
Offsite Area (ac)	37.6	(15.202 ha)	Composite Curve Number (CN)	63	
SHGWT	40.0 ft	(12.200 m)			

SJRWMD Water Quality Volume Criteria:

Wet Detention: The greater of 1" of Runoff times the Basin Area, or the total runoff of 2.5" times the impervious Area

Dry Retention (Off-line): The greater of 0.5" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area

Dry Retention (On-line): The greater of 1" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area plus an additional 0.5" of runoff times the Basin Area

Pond Treatment Method: Dry Retention (On-line)

WQV Calculation:

1"of Runoff times Basin Area=	**12.03 ac-ft**	**Control**
1.25" times the Impervious Area plus 0.5" of Runoff times the Basin Area=	**9.22 ac-ft**	

Wekiva Basin Most Effective Recharge Area:

Volume Requirement: 3" of Runoff times the Impervious Area of Hydrologic Group "A" Soils Located West of the I-4 Centerline.

Impervious Area of Group A soils West of the I-4 Centerline: 18.10 ac (7.326 ha)

3"of Runoff times above Impervious Area= **4.53 ac-ft**

Treatment Pond Stage-Area-Storage Relationship:

	Stage		Area		Incremental Storage	Cumulative Storage
	ft	M	ac	ha	ac-ft	ac-ft
Pond Bottom	40.8	12.45	10.78	4.363	0.00	0.00
Low Berm	45.8	13.95	12.40	5.018	57.04	57.04
Maintenance Berm	47.7	14.55	13.60	5.504	25.59	82.63

Water Quality Volume Required = **12.03 ac- ft** @ **41.88 ft**
Water Quality Volume Provided= **16.73 ac- ft** @ **42.29 ft** (12.890 m) **OK**

I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 8/27/01
Checked by: CJL Date: 9-5-01

Water Quality Treatment Volume Requirements
Basin 1: Pond NW

Basin Parameters:

Basin Area (ac)	9.50	(3.846 ha)	Roadway Impervious Area (ac)	2.55	(1.032 ha)
Offsite Area (ac)	0.0	(0.000 ha)	Composite Curve Number (CN)	62	
SHGWT	39.4 ft	(12.000 m)			

SJRWMD Water Quality Volume Criteria:

Wet Detention: The greater of 1" of Runoff times the Basin Area, or the total runoff of 2.5" times the impervious Area

Dry Retention (Off-line): The greater of 0.5" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area

Dry Retention (On-line): The greater of 1" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area plus an additional 0.5" of runoff times the Basin Area

Pond Treatment Method: Dry Retention (On-line)

WQV Calculation:

1"of Runoff times Basin Area= **0.79 ac-ft** **Control**

1.25" times the Impervious Area plus 0.5" of Runoff times the Basin Area= **0.66 ac-ft**

Wekiva Basin Most Effective Recharge Area:

Volume Requirement: 3" of Runoff times the Impervious Area of Hydrologic Group "A" Soils Located West of the I-4 Centerline.

Impervious Area of Group A soils West of the I-4 Centerline: 2.55 ac (1.032 ha)

3"of Runoff times above Impervious Area= **0.64 ac-ft**

Treatment Pond Stage-Area-Storage Relationship:

	Stage		Area		Incremental Storage	Cumulative Storage
	ft	M	ac	ha	ac-ft	ac-ft
Pond Low Point	45.3	13.80	0.05	0.021	0.00	0.00
Full Pond Bottom	47.9	14.60	1.74	0.704	2.35	2.35
	53.1	16.20	3.00	1.216	12.45	14.80

Water Quality Volume Required = **0.79 ac- ft** @ **46.16 ft**
Water Quality Volume Provided= **3.53 ac- ft** @ **49.21 ft** (15.000 m) **OK**

I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 8/27/01
Checked by: CJL Date: 9.5.01

Water Quality Treatment Volume Requirements
Basin 1: Pond West

Basin Parameters:

Basin Area (ac)	2.98	(1.204 ha)	Roadway Impervious Area (ac)	1.54	(0.623 ha)
Offsite Area (ac)	0.0	(0.000 ha)	Composite Curve Number (CN)	82	
SHGWT	39.4 ft	(12.000 m) Estimated			

SJRWMD Water Quality Volume Criteria:

Wet Detention: The greater of 1" of Runoff times the Basin Area, or the total runoff of 2.5" times the impervious Area

Dry Retention (Off-line): The greater of 0.5" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area

Dry Retention (On-line): The greater of 1" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area plus an additional 0.5" of runoff times the Basin Area

Pond Treatment Method: Dry Retention (On-line)

WQV Calculation:

1"of Runoff times Basin Area= **0.25 ac-ft**

1.25" times the Impervious Area plus 0.5" of Runoff times the Basin Area= **0.28 ac-ft**

Wekiva Basin Most Effective Recharge Area:

Volume Requirement: 3" of Runoff times the Impervious Area of Hydrologic Group "A" Soils Located West of the I-4 Centerline.

Impervious Area of Group A soils West of the I-4 Centerline: 1.26 ac (0.511 ha)

3"of Runoff times above Impervious Area= **0.32 ac-ft** **Control**

Treatment Pond Stage-Area-Storage Relationship:

	Stage		Area		Incremental Storage	Cumulative Storage
	ft	M	ac	ha	ac-ft	ac-ft
Pond Bottom	48.9	14.89	0.21	0.08	0.00	0.00
Low Berm	50.4	15.35	0.25	0.10	0.35	0.35
Maintenance Berm	51.1	15.56	0.26	0.11	0.18	0.52

Water Quality Volume Required = **0.32 ac- ft** @ **50.25 ft**
Water Quality Volume Provided= **0.39 ac- ft** @ **50.54 ft** (15.405 m) **OK**

I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 6/29/01
Checked by: CJL Date: 9-5-01

Recovery Calculations for Water Quality / Wekiva Basin Most Effective Recharge Area Volumes

Basin 1 : Pond SE

Boring # AB-10
Void Ratio: 0.32
S.H.W.T. (ft)= 40.0 (12.200 m)
Pond Bottom (ft)= 40.8 (12.450 m)

Water Quality Volume = 16.73 ac-ft
Recharge Volume = 4.53 ac-ft
Permeability Rate :
k = 1 in/hr
FS = 2

Proposed Pond Elevation - Infiltration Relationship

	ELEVATION		AREA		INFILTRATION	
	(English) ft	(Metric) m	(English) ac	(Metric) ha	(English) ft3/sec	(Metric) m3/sec
Pond Bottom in "A" soils	40.8	12.45	5.53	2.239	5.53	0.157
	45.8	13.95	7.15	2.894	7.15	0.202
	47.7	14.55	8.35	3.380	8.35	0.236

Darcy Equation:

$Q = KIA/FS$

Where Q = Flow Rate (cfs)
or Required Volume (cf) Divided by Time (sec)
K = Permeability Rate (in/hr)
I = Hydraulic Gradient (Use a gradient of 1)
A = Area of Pond Bottom (ac)

I. Recovery of Water Quality Treatment Volume

$$\text{Time} = \frac{\text{Water Quality Volume}}{KIA} =$$ **36.3 hrs << 72 hours OK**

Designed as Dry Retention Pond. Water Quality Treatment Volume Must be Recovered within 72 Hours.

II. Recovery of Wekiva Basin Most Effective Recharge Area Volume

$$\text{Time} = \frac{\text{Most Effective Recharge Volume x Safety Factor}}{KIA}$$

= **0.8 days << 14 days OK**

Wekiva Basin Most Effective Recharge Area Volume Must be Recovered within 14 Days

I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 8/27/01
Checked by: CJL Date: 9-5-01

Recovery Calculations for Water Quality / Wekiva Basin Most Effective Recharge Area Volumes

Basin 1 : Pond NW

Boring #	AB-1			Water Quality Volume =	3.53 ac-ft
Void Ratio:		0.32		Recharge Volume =	0.64 ac-ft
S.H.W.T. (ft)=		39.4	(12.000 m)	**Permeability Rate :**	
Pond Bottom (ft)=		45.3	(13.800 m)	k =	8 in/hr
				FS =	2

Proposed Pond Elevation - Infiltration Relationship

	ELEVATION		AREA		INFILTRATION	
	(English) ft	(Metric) m	(English) ac	(Metric) ha	(English) ft3/sec	(Metric) m3/sec
Pond Low Point	45.3	13.80	0.05	0.021	0.42	0.012
Full Pond Bottom	47.9	14.60	1.74	0.704	13.92	0.394
	53.1	16.20	3.00	1.216	24.04	0.680

Darcy Equation:

$Q = KIA/FS$

Where Q = Flow Rate (cfs)
or Required Volume (cf) Divided by Time (sec)
K = Permeability Rate (in/hr)
I = Hydraulic Gradient (Use a gradient of 1)
A = Area of Pond Bottom (ac)

I. Recovery of Water Quality Treatment Volume

$$\text{Time} = \frac{\text{Water Quality Volume}}{\text{KIA}} = \boxed{\textbf{3.0 hrs} \quad << 72 \text{ hours} \quad \textbf{OK}}$$

Designed as Dry Retention Pond. Water Quality Treatment Volume Must be Recovered within 72 Hours.

II. Recovery of Wekiva Basin Most Effective Recharge Area Volume

$$\text{Time} = \frac{\text{Most Effective Recharge Volume x Safety Factor}}{\text{KIA}}$$

$$= \boxed{\textbf{0.0 days} \quad << 14 \text{ days} \quad \textbf{OK}}$$

Wekiva Basin Most Effective Recharge Area Volume Must be Recovered within 14 Days

I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 8/27/01
Checked by: CJL Date: 9-5-01

Recovery Calculations for Water Quality / Wekiva Basin Most Effective Recharge Area Volumes

Basin 1 : Pond W

Boring #	AB-2			Water Quality Volume =	0.39 ac-ft
Void Ratio:		0.32		Recharge Volume =	0.32 ac-ft
S.H.W.T. (ft)=		39.4	(12.000 m)	**Permeability Rate :**	
Pond Bottom (ft)=		48.9	(14.893 m)	k =	3 in/hr
				FS =	2

Proposed Pond Elevation - Infiltration Relationship

	ELEVATION		AREA		INFILTRATION	
	(English) ft	(Metric) m	(English) ac	(Metric) ha	(English) ft3/sec	(Metric) m3/sec
Pond Bottom	48.9	14.89	0.21	0.085	0.63	0.018
	50.4	15.35	0.25	0.101	0.75	0.021
	51.1	15.56	0.26	0.105	0.78	0.022

Darcy Equation:

$Q = KIA/FS$

Where Q = Flow Rate (cfs)
or Required Volume (cf) Divided by Time (sec)
K = Permeability Rate (in/hr)
I = Hydraulic Gradient (Use a gradient of 1)
A = Area of Pond Bottom (ac)

I. Recovery of Water Quality Treatment Volume

$$\text{Time} = \frac{\text{Water Quality Volume}}{KIA} = \boxed{\textbf{7.4 hrs} \quad << 72 \text{ hours} \quad \textbf{OK}}$$

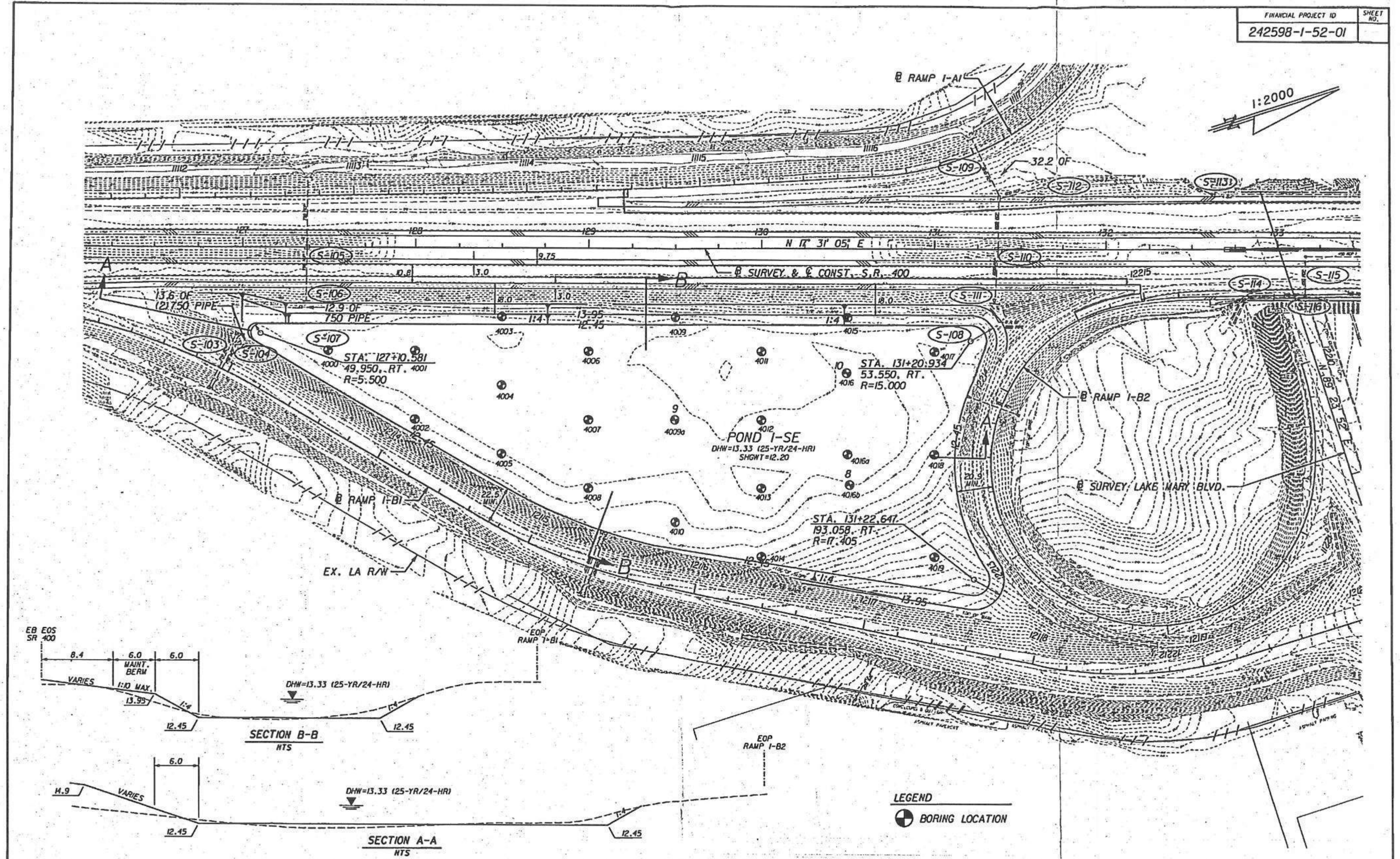
Designed as Dry Retention Pond. Water Quality Treatment Volume Must be Recovered within 72 Hours.

II. Recovery of Wekiva Basin Most Effective Recharge Area Volume

$$\text{Time} = \frac{\text{Most Effective Recharge Volume x Safety Factor}}{KIA}$$

$$= \boxed{\textbf{0.5 days} \quad << 14 \text{ days} \quad \textbf{OK}}$$

Wekiva Basin Most Effective Recharge Area Volume Must be Recovered within 14 Days



DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

REVISIONS

HDR ENGINEERING, INC.
12015 ORLANDO AVENUE,
SUITE 200
WINTER PARK, FLORIDA 32789
PE LICENSE NUMBER: 5288

FLORIDA DEPARTMENT OF TRANSPORTATION

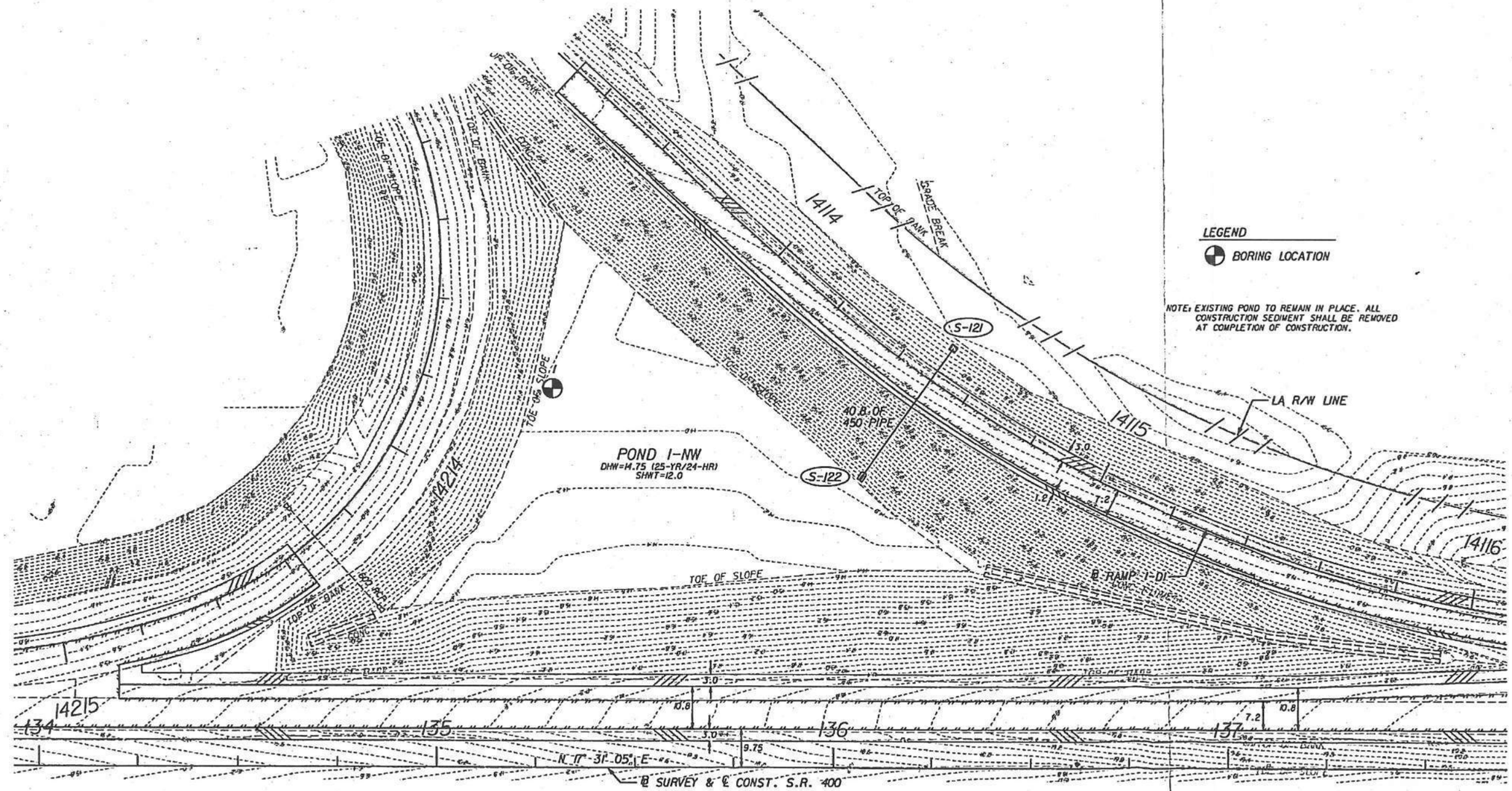
S.R. 400 (I-4)
RETENTION POND 1-SE

09/05/2001 10:04:15 AM

2-72

FINANCIAL PROJECT ID	SHEET NO.
242598-1-52-01	

1:1000



LEGEND

BORING LOCATION

NOTE: EXISTING POND TO REMAIN IN PLACE. ALL CONSTRUCTION SEDIMENT SHALL BE REMOVED AT COMPLETION OF CONSTRUCTION.

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HDR ENGINEERING, INC.
1201 S. ORLANDO AVENUE,
SUITE 200
WINTER PARK, FLORIDA 32789
PE LICENSE NUMBER: 51288

FLORIDA DEPARTMENT OF TRANSPORTATION

S.R. 400 (I-4) RETENTION POND 1-NW

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2-13

BASIN 2

This basin includes a proposed pond will maintain the existing flow pattern by discharging through to the Primera property, located within the land-locked Lake Emma basin. A stormwater management pond has been designed to store the water quality and attenuation needs of this project. However, enough right of way was acquired in order to design a new pond that will handle the water quality and attenuation needs for the ultimate I-4 build out. This pond site is located within a drainage easement so that the property owners, at their discretion, can relocate the pond in the future as long as they provide the required treatment and attenuation volumes.

Portions of this basin are located in the Wekiva River Hydrologic Basin Most Effective Recharge Area. This area is legally represented as that portion of the project that lies west of the centerline of Interstate-4. This criteria requires that a volume equivalent to three (3) inches times the impervious area, within SCS Type "A" soils in the Most Effective Recharge Area, be recovered within 14 days. Recovery calculations indicate that draw-down of this volume occurs within the 14-day requirement.

Water Quality Volume calculations have been performed and this volume is provided in the pond site. A control structure has been designed to retain this volume and therefore has been set above the water quality volume elevation.

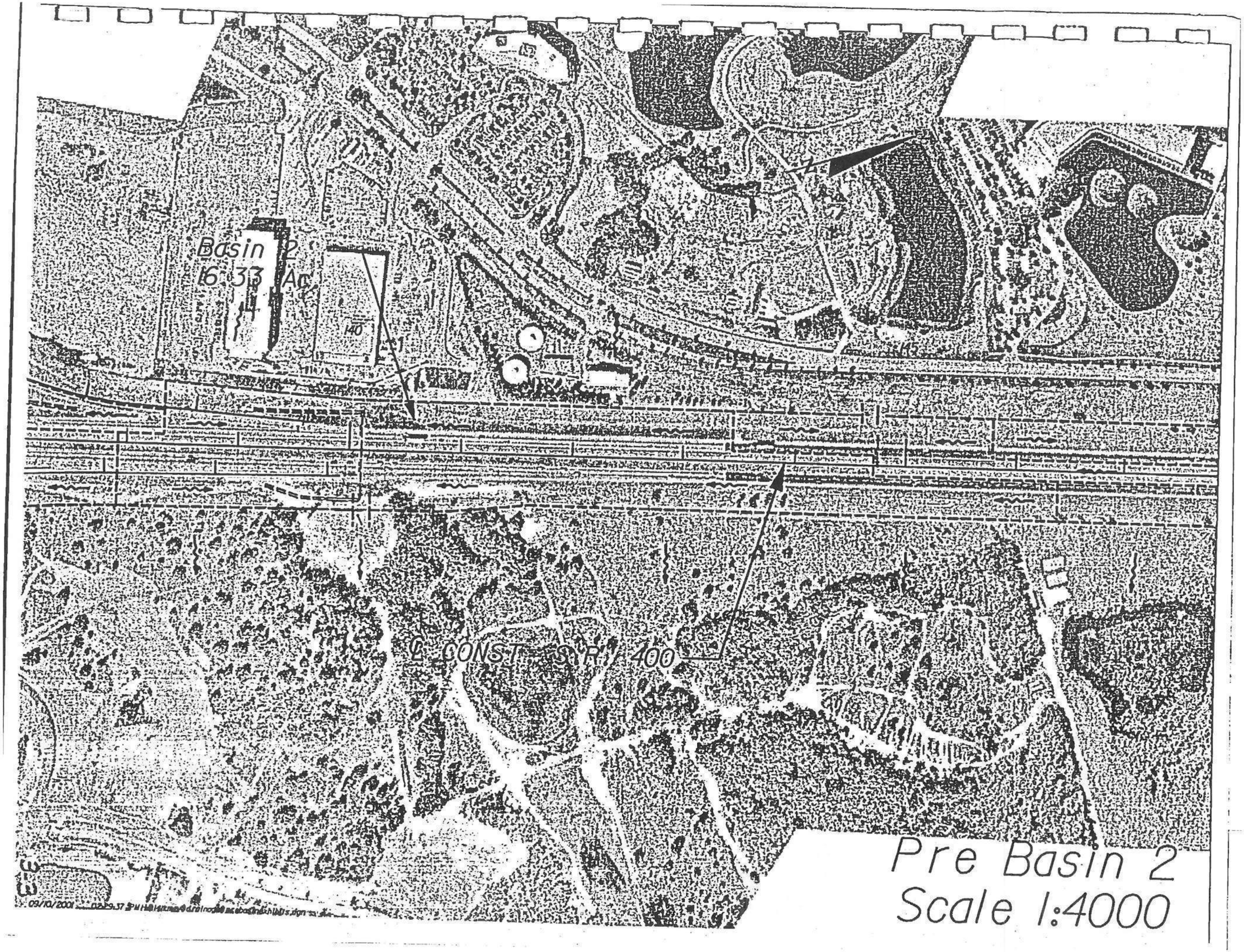
This pond is designed to meet the SJRWMD closed-basin criteria. To meet closed basin requirements, a control structure was designed for the pond with a slot set at the elevation required to retain the volumetric difference between the pre- and post-development 25-year 96-hour storm event with the SJRWMD-96 rainfall distribution. This volume is recovered prior to the 72-hour requirement. From a stage and flow rate standpoint, the design criteria storm is the 25-year 24-hour storm event with the SCS Type II rainfall distribution. Both of these storm events were evaluated.

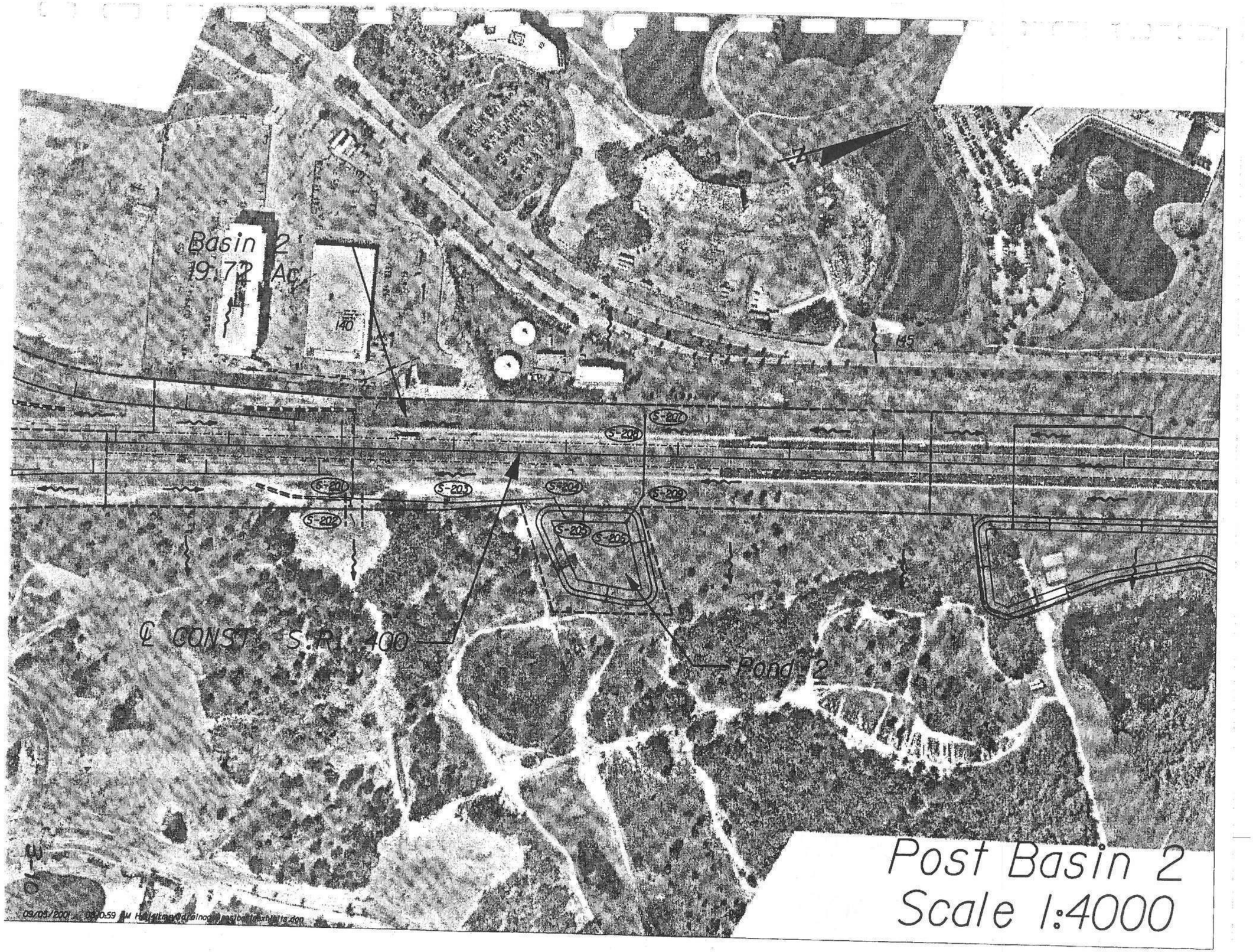
The Pond-2 site has been designed as a dry pond. The tailwater for this stormwater management system is set at the crown of pipe at the proposed straight concrete endwall that will discharge via overland flow to the Primera development property.

The system was modeled using AdICPR 2.20. Results from the routed model are provided on the table below. Post-Development flow rates do not exceed pre-development for the design storms evaluated. Thus, no impacts to the Primera system are anticipated with the design of this project.

Basin 2 Pre-Post Comparison

	Pre	Post
Q – 25Y24H (cfs)	29.66	6.31
Volume – 25Y96H (ac-ft)	9.92	9.66
Stage – 25Y24H (ft)	N/A	54.36


Basin 2
16.33 Ac
140
CONST. STR. 400
Pre Basin 2
Scale 1:4000


Basin 2
19.7? Ac.
140
145
S-201
S-204
S-200
S-203
S-204
S-206
S-202
S-205
S-206
℄ CONST. S.R. 400
Pond 2
N
03/05/2001 09:10:59 AM
Post Basin 2
Scale 1:4000

I-4 Widening (Lake Mary to US 17-92) | Prepared by: GTP | Date: 6/29/01
Seminole County | Checked by: CJL | Date: 9-6-01

Water Quality Treatment Volume Requirements
Basin 2: Pond 2

Basin Parameters:

Basin Area (ac)	19.72	(7.980 ha)	Roadway Impervious Area (ac)	7.39	(2.992 ha)
Offsite Area (ac)	0.0	(0.000 ha)	Composite Curve Number (CN)	73	
SHGWT	40.4 ft	(12.300 m)			

SJRWMD Water Quality Volume Criteria:

Wet Detention: The greater of 1" of Runoff times the Basin Area, or the total runoff of 2.5" times the impervious Area

Dry Retention (Off-line): The greater of 0.5" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area

Dry Retention (On-line): The greater of 1" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area plus an additional 0.5" of runoff times the Basin Area

Pond Treatment Method: Dry Retention (On-line)

WQV Calculation:

1"of Runoff times Basin Area=	**1.64 ac-ft**	**Control**
1.25" times the Impervious Area plus 0.5" of Runoff times the Basin Area=	**1.59 ac-ft**	

Wekiva Basin Most Effective Recharge Area:

Volume Requirement: 3" of Runoff times the Impervious Area of Hydrologic Group "A" Soils Located West of the I-4 Centerline.

Impervious Area of Group A soils West of the I-4 Centerline: 3.40 ac (1.374 ha)

3"of Runoff times above Impervious Area= **0.85 ac-ft**

Treatment Pond Stage-Area-Storage Relationship:

	Stage		Area		Incremental Storage	Cumulative Storage
	ft	M	ac	ha	ac-ft	ac-ft
Pond Bottom	48.9	14.90	0.85	0.346	0.00	0.00
Low Berm	56.4	17.20	1.47	0.596	8.78	8.78
Maintenance Berm	57.9	17.65	1.82	0.737	2.43	11.21

Water Quality Volume Required = **1.64 ac- ft** @ **50.29 ft**
Water Quality Volume Provided= **4.58 ac- ft** @ **52.82 ft** (16.100 m) **OK**

I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 6/29/01
Checked by: CJL Date: 9-6-01

Recovery Calculations for Water Quality / Wekiva Basin Most Effective Recharge Area Volumes

Basin 2

Boring # AB-11, 12			Water Quality Volume =	4.58 ac-ft
Void Ratio:	0.32		Recharge Volume =	0.85 ac-ft
S.H.W.T. (ft)=	40.4	(12.300 m)	**Permeability Rate :**	
Pond Bottom (ft)=	48.9	(14.900 m)	k =	2 in/hr
Unsaturated Storage			FS =	2
Volume Available (ac-ft)=	2.33			

Proposed Pond Elevation - Infiltration Relationship

	ELEVATION		AREA		INFILTRATION	
	(English) ft	(Metric) m	(English) ac	(Metric) ha	(English) ft3/sec	(Metric) m3/sec
Pond Bottom	48.9	14.90	0.85	0.346	1.71	0.048
	56.4	17.20	1.47	0.596	2.95	0.083
	57.9	17.65	1.82	0.737	3.64	0.103

Darcy Equation:

$Q = KIA/FS$

Where Q = Flow Rate (cfs)
or Required Volume (cf) Divided by Time (sec)
K = Permeability Rate (in/hr)
I = Hydraulic Gradient (Use a gradient of 1)
A = Area of Pond Bottom (ac)

I. Recovery of Water Quality Treatment Volume

$$\text{Time} = \frac{\text{Water Quality Volume}}{KIA} = \boxed{\textbf{32.2 hrs} \ll 72 \text{ hours} \quad \textbf{OK}}$$

Designed as Dry Retention Pond. Water Quality Treatment Volume Must be Recovered within 72 Hours.

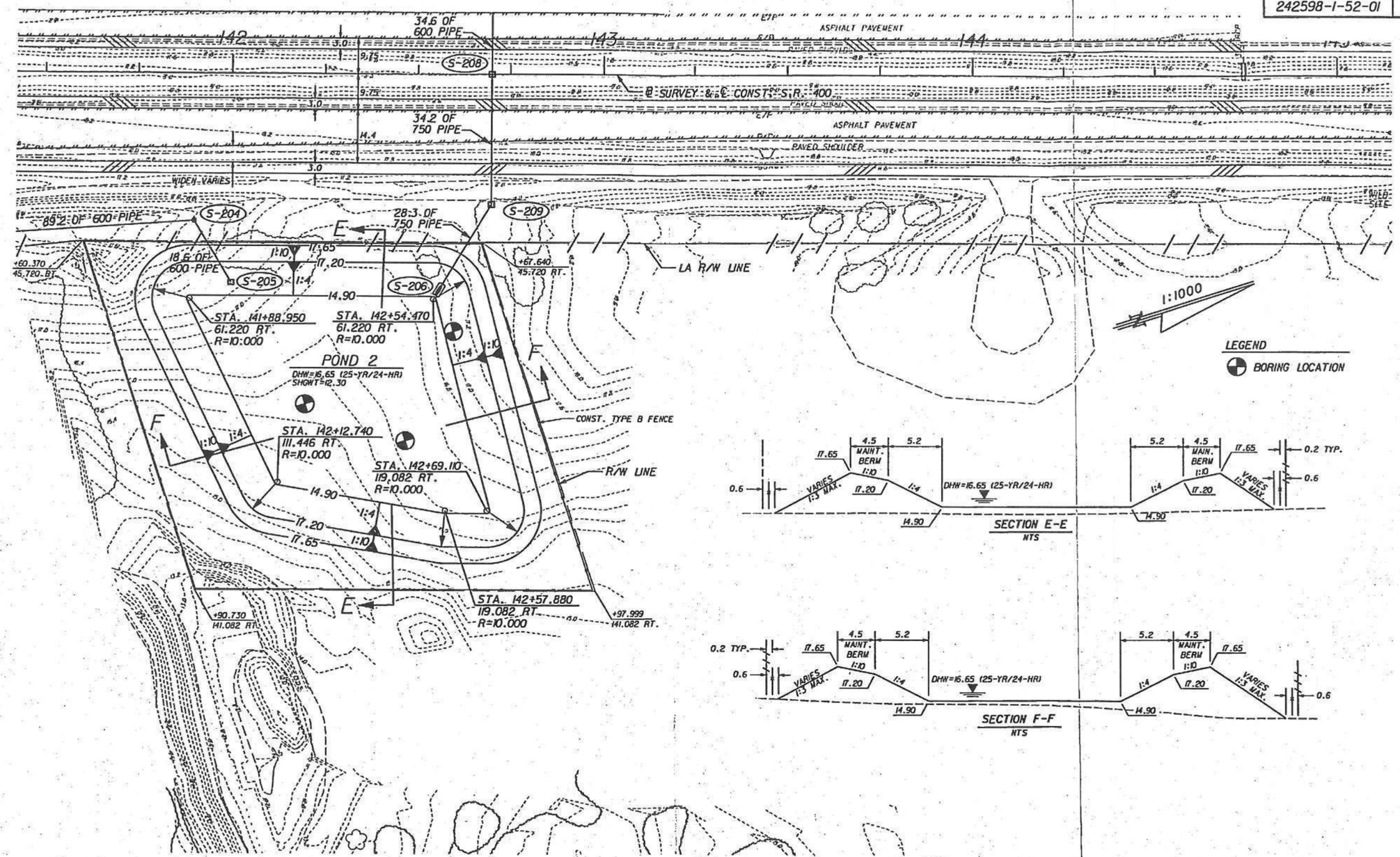
II. Recovery of Wekiva Basin Most Effective Recharge Area Volume

$$\text{Time} = \frac{\text{Most Effective Recharge Volume x Safety Factor}}{KIA}$$

$$= \boxed{\textbf{0.5 days} \ll 14 \text{ days} \quad \textbf{OK}}$$

Wekiva Basin Most Effective Recharge Area Volume Must be Recovered within 14 Days

FINANCIAL PROJECT ID	SHEET NO.
242598-1-52-01	



REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HDR ENGINEERING, INC.
12015 ORLANDO AVENUE, SUITE 200
WINTER PARK, FLORIDA 32789
PE LICENSE NUMBER: 51288

FLORIDA DEPARTMENT OF TRANSPORTATION

S.R. 400 (I-4) RETENTION POND 2

3-23

09/10/2009 02:27:27 PM H:\I4\dmy\hydrology\ponds\sr4ord03.dgn

BASIN 3

This basin is comprised of two sub-basins which both discharge to the Heathrow property, which is considered a land-locked or closed basin. The proposed pond site will maintain this drainage pattern by discharging to the International Parkway storm sewer system. The proposed stormwater management pond has been designed to store the water quality and attenuation needs of this project.

Portions of this basin are located in the Wekiva River Hydrologic Basin Most Effective Recharge Area. This area is legally represented as that portion of the project that lies west of the centerline of Interstate-4. This criteria requires that a volume equivalent to three (3) inches times the impervious area, within SCS Type "A" soils in the Most Effective Recharge Area, be recovered within 14 days. Recovery calculations indicate that draw-down of this volume occurs within the 14-day requirement.

Water Quality Volume calculations have been performed and this volume is provided in the pond site. A control structure has been designed to retain this volume and therefore has been set above the water quality volume elevation. This volume is recovered within the 72-hour requirement.

This basin is designed with closed-basin pond criteria. From a volume standpoint, the design storm is the 25-year 96-hour storm event with the SJRWMD-96 rainfall distribution. From a stage and flow rate standpoint, the design storm is the 25-year 24-hour storm event with the SCS Type II rainfall distribution. Both of these storm events were evaluated. To meet closed basin requirements, a control structure was designed for the pond with a slot set at the elevation required to retain the volumetric difference between the pre- and post-development 25-year 96-hour hydrographs.

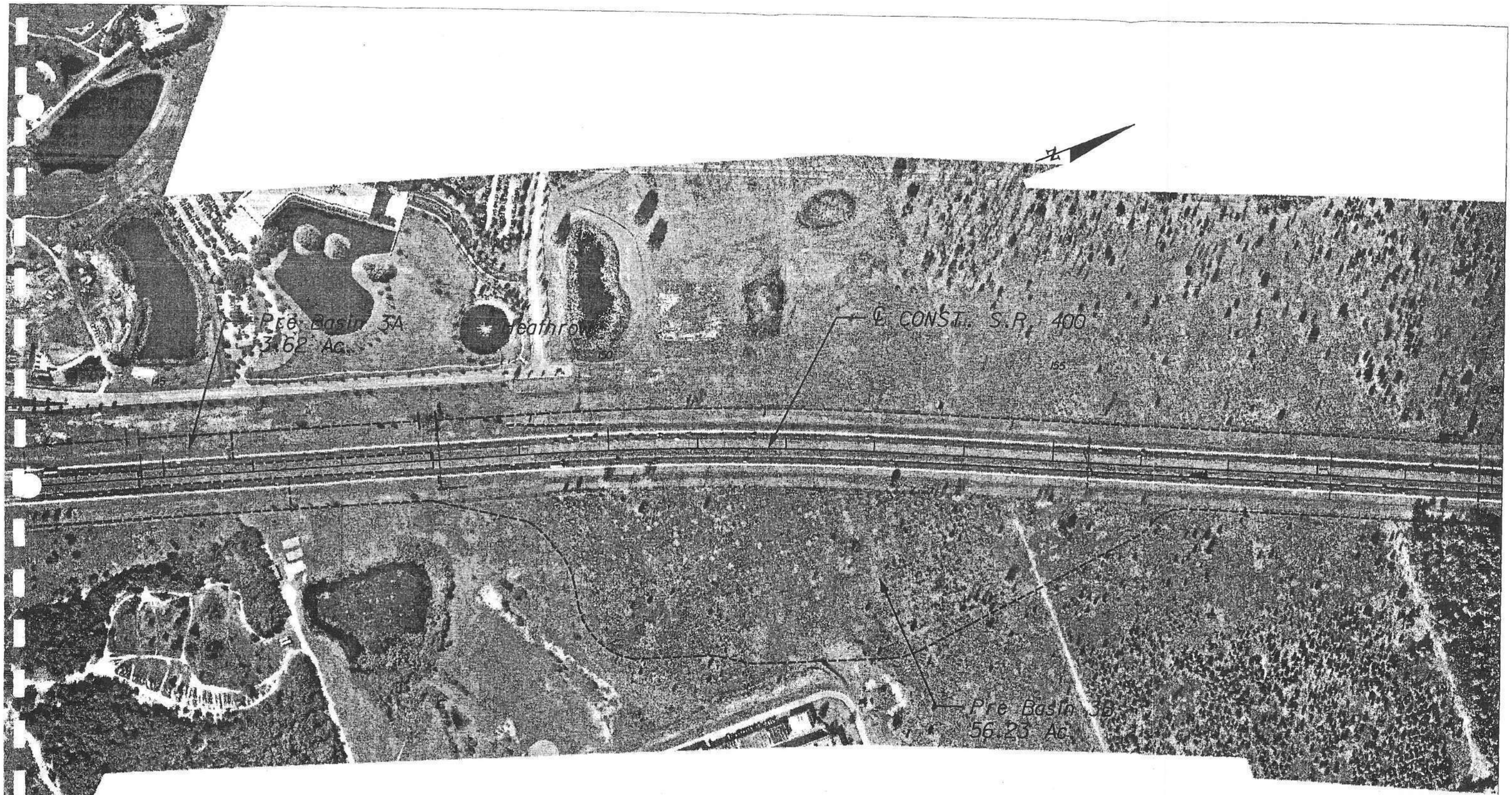
The Pond-3 site has been designed as a dry pond. The tailwater for this stormwater management system is set at the crown of pipe of the proposed pond outfall pipe at the tie in to the existing Heathrow storm sewer system. Coordination of the storm sewer tie-in with Pizutti, developers of Heathrow, has taken place. The ultimate outfall of this system is the Heathrow development.

The system was modeled using AdICPR 2.20. Results from the routed model are provided on the table below. Post-Development flow rates and volumes do not exceed pre-development for the design storms evaluated. Thus, no impacts to the Heathrow system are anticipated with the design of this project.

Basin 3 Pre-Post Comparison

	Pre	Post
Q – 25Y24H (cfs)	47.05	11.59
Volume – 25Y96H (ac-ft)	24.05	23.57
Stage – 25Y96H (ft)	N/A	54.61

4-1



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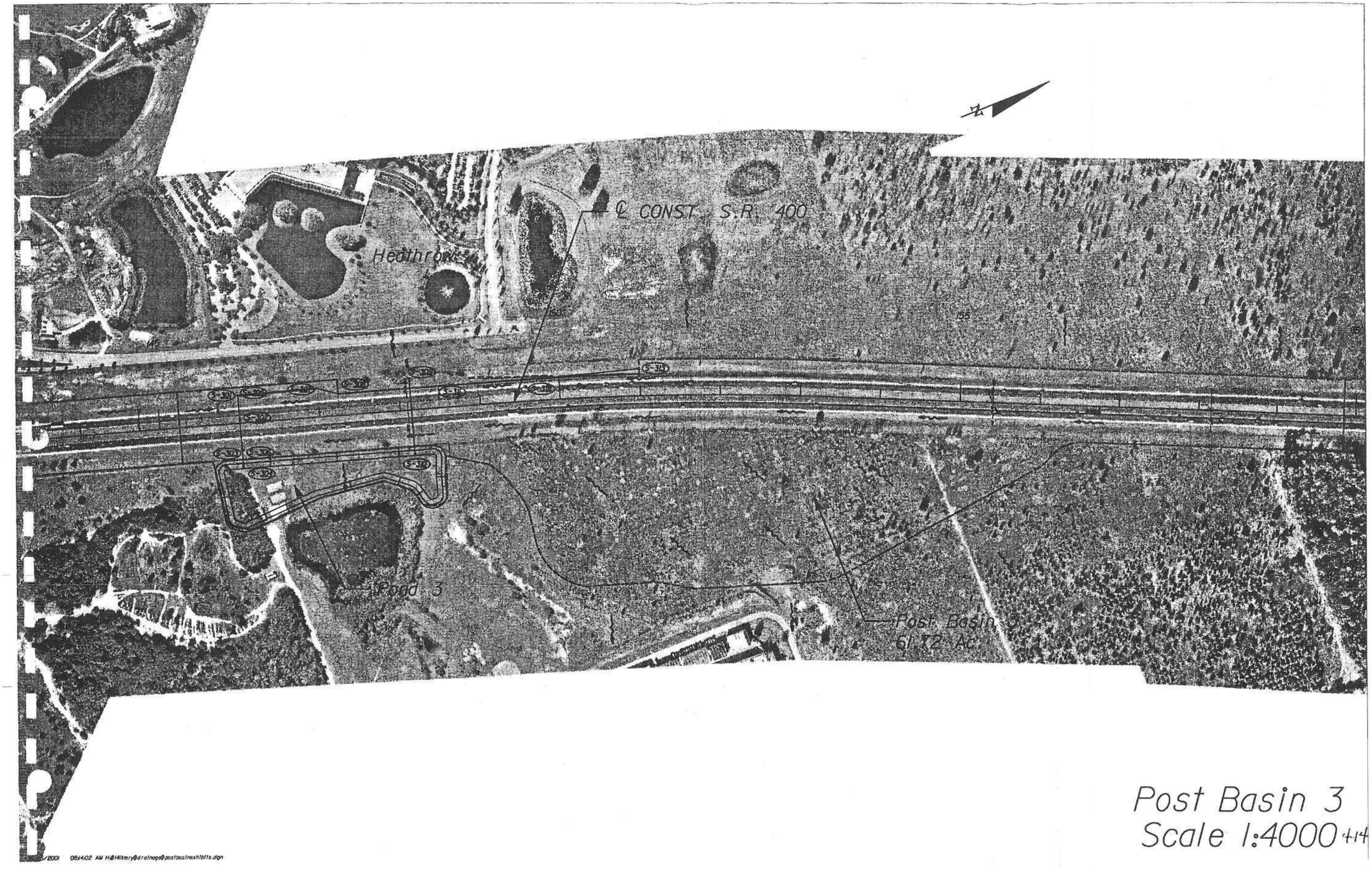
Pre Basin 3
Scale 1:4000 4-3



Post Basin 3
Scale 1:4000

I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 7/29/01
Checked by: CJL Date: 9-6-01

Water Quality Treatment Volume Requirements
Basin 3: Pond 3

Basin Parameters:

Basin Area (ac)	61.72	(24.979 ha)	Roadway Impervious Area (ac)	15.16	(6.136 ha)
Offsite Area (ac)	26.55	(10.745 ha)	Composite Curve Number (CN)	55	
SHGWT	48.2 ft	(14.700 m)			

SJRWMD Water Quality Volume Criteria:

Wet Detention: The greater of 1" of Runoff times the Basin Area, or the total runoff of 2.5" times the impervious Area

Dry Retention (Off-line): The greater of 0.5" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area

Dry Retention (On-line): The greater of 1" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area plus an additional 0.5" of runoff times the Basin Area

Pond Treatment Method: Dry Retention (On-line)

WQV Calculation:

1"of Runoff times Basin Area=	**5.14 ac-ft**	Control
1.25" times the Impervious Area plus 0.5" of Runoff times the Basin Area=	**4.15 ac-ft**	

Wekiva Basin Most Effective Recharge Area:

Volume Requirement: 3" of Runoff times the Impervious Area of Hydrologic Group "A" Soils Located West of the I-4 Centerline.

Impervious Area of Group A soils West of the I-4 Centerline: 6.37 ac (2.578 ha)

3"of Runoff times above Impervious Area= **1.59 ac-ft**

Treatment Pond Stage-Area-Storage Relationship:

	Stage		Area		Incremental Storage	Cumulative Storage
	ft	M	ac	ha	ac-ft	ac-ft
Pond Bottom	51.2	15.60	2.57	1.040	0.00	0.00
Low Berm	56.6	17.25	3.67	1.487	16.90	16.90
Maintenance Berm	58.1	17.70	4.47	1.808	6.01	22.91

Water Quality Volume Required = **5.14 ac- ft** @ **52.83 ft**
Water Quality Volume Provided= **6.15 ac- ft** @ **53.15 ft** (16.200 m) **OK**

I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 7/29/01
Checked by: CJL Date: 9-6-01

Recovery Calculations for Water Quality / Wekiva Basin Most Effective Recharge Area Volumes

Basin 3

Boring # AB-13
Void Ratio: 0.32
S.H.W.T. (ft)= 48.2 (14.700 m)
Pond Bottom (ft)= 51.2 (15.600 m)
Unsaturated Storage Volume Available (ac-ft)= 2.43

Water Quality Volume = 6.15 ac-ft
Recharge Volume = 1.59 ac-ft
Permeability Rate :
k = 8 in/hr
FS = 2

Proposed Pond Elevation - Infiltration Relationship

	ELEVATION		AREA		INFILTRATION	
	(English) ft	(Metric) m	(English) ac	(Metric) ha	(English) ft3/sec	(Metric) m3/sec
Pond Bottom	51.2	15.60	2.57	1.040	20.56	0.582
	56.6	17.25	3.67	1.487	29.40	0.832
	58.1	17.70	4.47	1.808	35.74	1.011

Darcy Equation:

$Q = KIA/FS$

Where Q = Flow Rate (cfs)
or Required Volume (cf) Divided by Time (sec)
K = Permeability Rate (in/hr)
I = Hydraulic Gradient (Use a gradient of 1)
A = Area of Pond Bottom (ac)

I. Recovery of Water Quality Treatment Volume

$$\text{Time} = \frac{\text{Water Quality Volume}}{\text{KIA}} = \boxed{\textbf{3.6 hrs} \quad << 72 \text{ hours} \quad \textbf{OK}}$$

Designed as Dry Retention Pond. Water Quality Treatment Volume Must be Recovered within 72 Hours.

II. Recovery of Wekiva Basin Most Effective Recharge Area Volume

$$\text{Time} = \frac{\text{Most Effective Recharge Volume x Safety Factor}}{\text{KIA}}$$

$$= \boxed{\textbf{0.1 days} \quad << 14 \text{ days} \quad \textbf{OK}}$$

Wekiva Basin Most Effective Recharge Area Volume Must be Recovered within 14 Days

FINANCIAL PROJECT ID	SHEET NO.
242598-1-52-01	

1:1000

CONSTR STD. CONC. DITCH PAVT. STA 146+00 TO 147+00

0.7 OF 600 PIPE

27.1 OF 600 PIPE

123.2 OF 600 PIPE

33.8 OF 750 PIPE

33.5 OF 750 PIPE

95.9 OF 750 PIPE

22.0 OF 900 PIPE

0.7 OF 600 PIPE

S-302 S-303 S-304 S-305 S-306 S-307 S-308 S-309 S-310

146 147 148

N 17°-31'-05" E.

℄ SURVEY & ℄ CONST. S.R. 400

E.P. TOP = 18.019
E. INV. ELEV. = 15.765
W. INV. ELEV. = 15.741
CATCH BASIN WITH BOX CULVERT CENTER INV. EL. 15.422

E. ENDWALL INV. = 15.369

CONC. FLUME

17.70
17.25
15.60

1:10
1:4

+60.453 45.750 RT.

+56.591 45.742 RT.

STA. 145+79.153 61.220, RT. R=10.000

STA. 148+36.335 61.220, RT. R=10.000

4060 4061 4062 4063 4064 4065 4066 4067 4068 4069

13 14

POND 3
DHW=16.65 (25-YR/24-HR)
SHOWT=14.7

STA. 145+87.128 120.012, RT. R=10.000

STA. 145+96.165 123.159, RT. R=10.000

STA. 146+90.032 114.075, RT. R=14.500

STA. 147+71.908 97.818, RT. R=14.500

STA. 147+99.573 108.872, RT. R=14.500

STA. 148+29.791 111.519, RT. R=10.000

STA. 148+34.170 110.603, RT. R=10.000

+96.534 110.245 RT.

+72.120 96.414 RT.

+01.943 107.195 RT. R/W LINE

+21.432 130.519 RT.

+56.594 130.518 RT.

+60.456 144.279 RT.

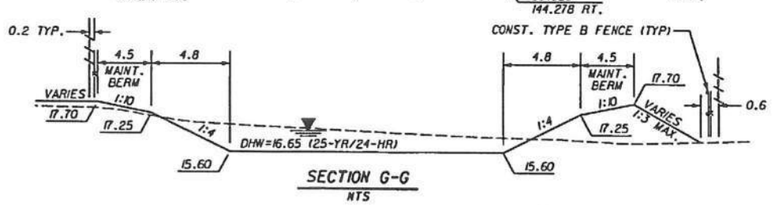
+05.920 144.278 RT.

CONST. TYPE B FENCE

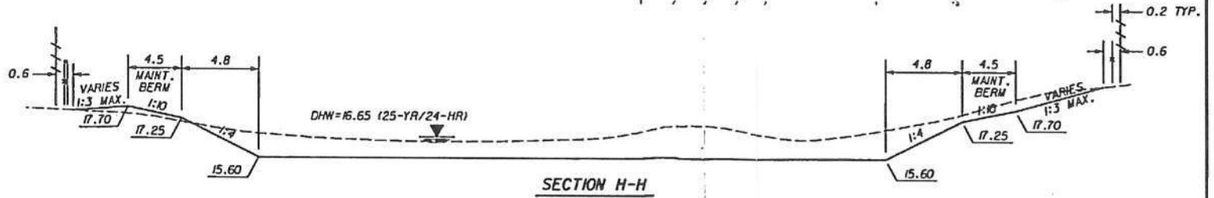
CONST. 389 OF TEMP. STAKED TYPE III SILT FENCE .5 INSIDE RIGHT OF WAY

LEGEND
BORING LOCATION

SECTION G-G
NTS



SECTION H-H
NTS



REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HDR ENGINEERING, INC.
1201 S. ORLANDO AVENUE.
SUITE 200
WINTER PARK, FLORIDA 32789
PE LICENSE NUMBER: 51288

FLORIDA DEPARTMENT OF TRANSPORTATION

S.R. 400 (I-4) 4-27
RETENTION POND 3

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BASIN 4

The existing drainage pattern along I-4 within this basin is that the west side drains north under SR 46 to a perimeter ditch and ultimately to the Lockhart Smith Canal. The east side of I-4 flows north and east to the Lockhart Smith Canal. The two proposed pond sites also discharge directly to the Lockhart-Smith Canal. The proposed stormwater management ponds will discharge directly into the Lockhart Smith Canal and do provide the water quality and attenuation needs of this project.

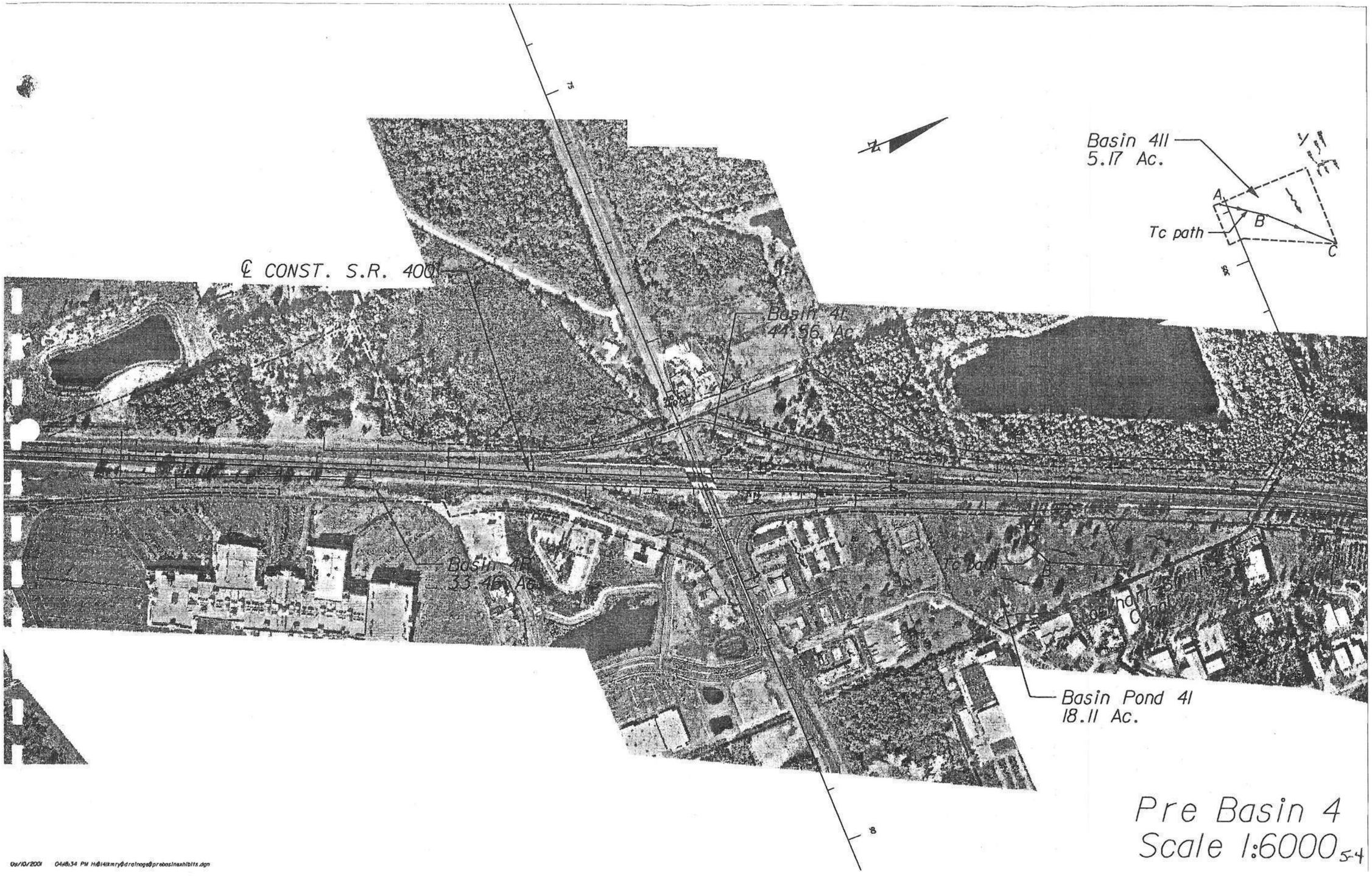
Water Quality Volume calculations have been performed and this volume is provided in the pond sites. Each control structure has been designed to detain this volume and therefore has been set above the water quality volume elevation. This volume is recovered via an orifice per SJRWMD design criteria; i.e., 1/2 the volume is recovered within 48-60 hours.

This basin is designed with open-basin pond criteria. From a stage and flow rate standpoint, the design storm is the 25-year 24-hour storm event with the SCS Type II rainfall distribution. To meet open basin requirements, a control structure was designed with a slot set at the water quality volume elevation and sized such that post development flows would not exceed pre-development flows.

Both Basin 4 pond sites have been designed as wet ponds. The tailwater elevation used in the analysis for the ponds was set at the elevation of the stain-line on the Lockhart Smith Canal box culvert under I-4. The proposed pond system was modeled using AdICPR 2.20. Results from the routed model are provided on the table below. Post-Development flow rates do not exceed pre-development for the design storm evaluated. Thus, no impacts to the Lockhart-Smith Canal system are anticipated with the design of this project.

The 5.81 ac Parcel, adjacent to and including the Comfort Inn development, (Parcel 105) South of Proposed Pond 4-I is in the process of being developed and the runoff from the parcel flows into a newly constructed pond in the north portion of the proposed Pond 4-I pond site. Pond 4-I is designed to treat and attenuate the runoff from I-4 and Parcel 105. This is assuming that Parcel 105 will be developed with up to 80 % impervious area and a minimum time of concentration of 10 minutes. The newly constructed Comfort Inn pond will be replaced by the Proposed Pond 4-I and maintained by the FDOT.

A Bridge Culvert Hydraulics Analysis entitled "*Bridge Culvert Extension at Lockhart – Smith Canal*", was prepared by HDR and submitted to FDOT in April 1999. This study was subsequently accepted by FDOT and provides design documentation for the dual (2) 3.05 x2.44 CBC (10 ft x 8 ft) under Interstate-4. Substantial sediment and erosion control measures have been recommended for this structure in the form of temporary staked silt fence and permanent rubble rip-rap at the upstream and downstream ends of the box culvert structure.



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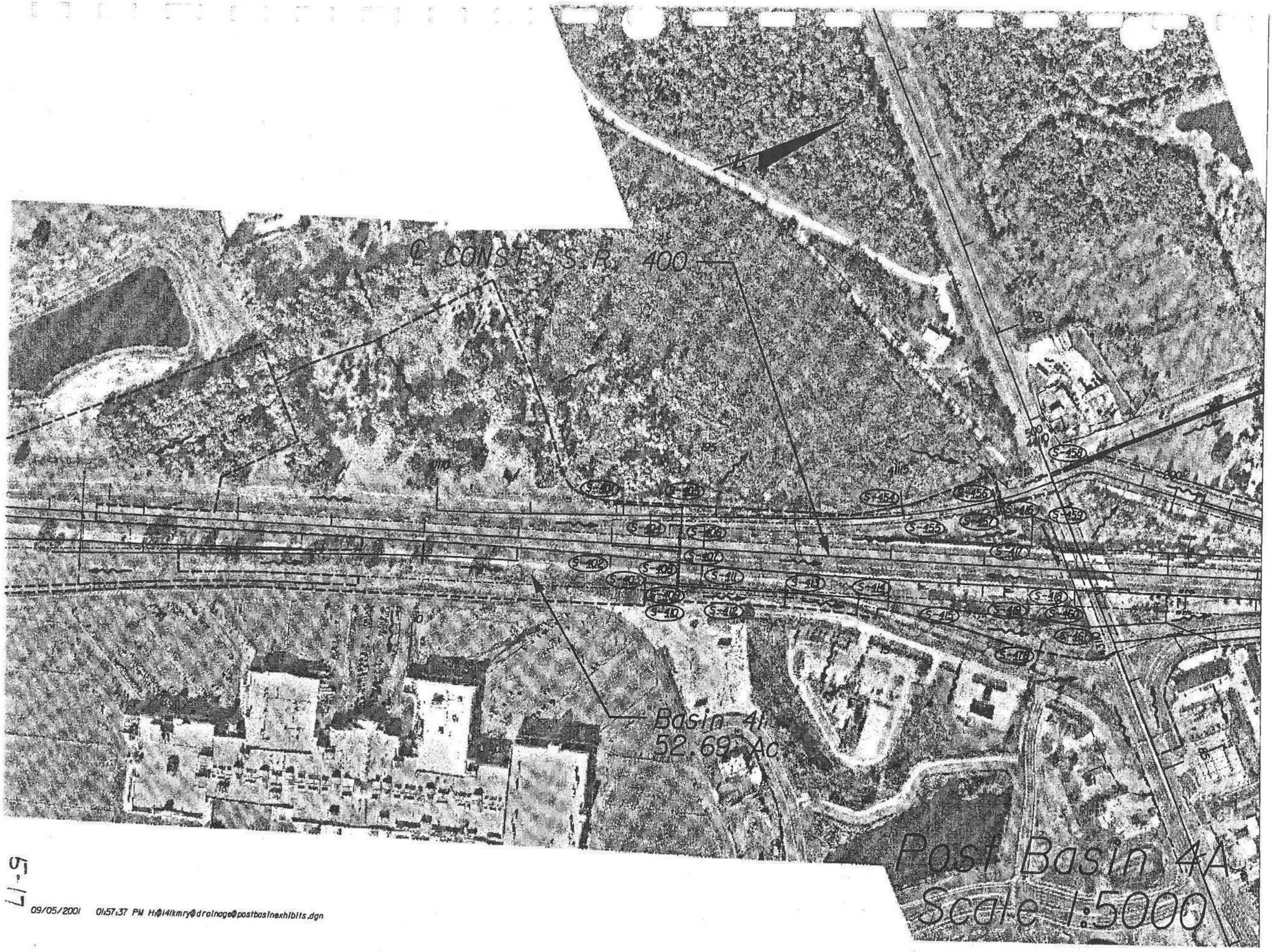
℄ CONST. S.R. 400
Basin 4A
52.69 Ac
Post Basin 4A
Scale 1:5000
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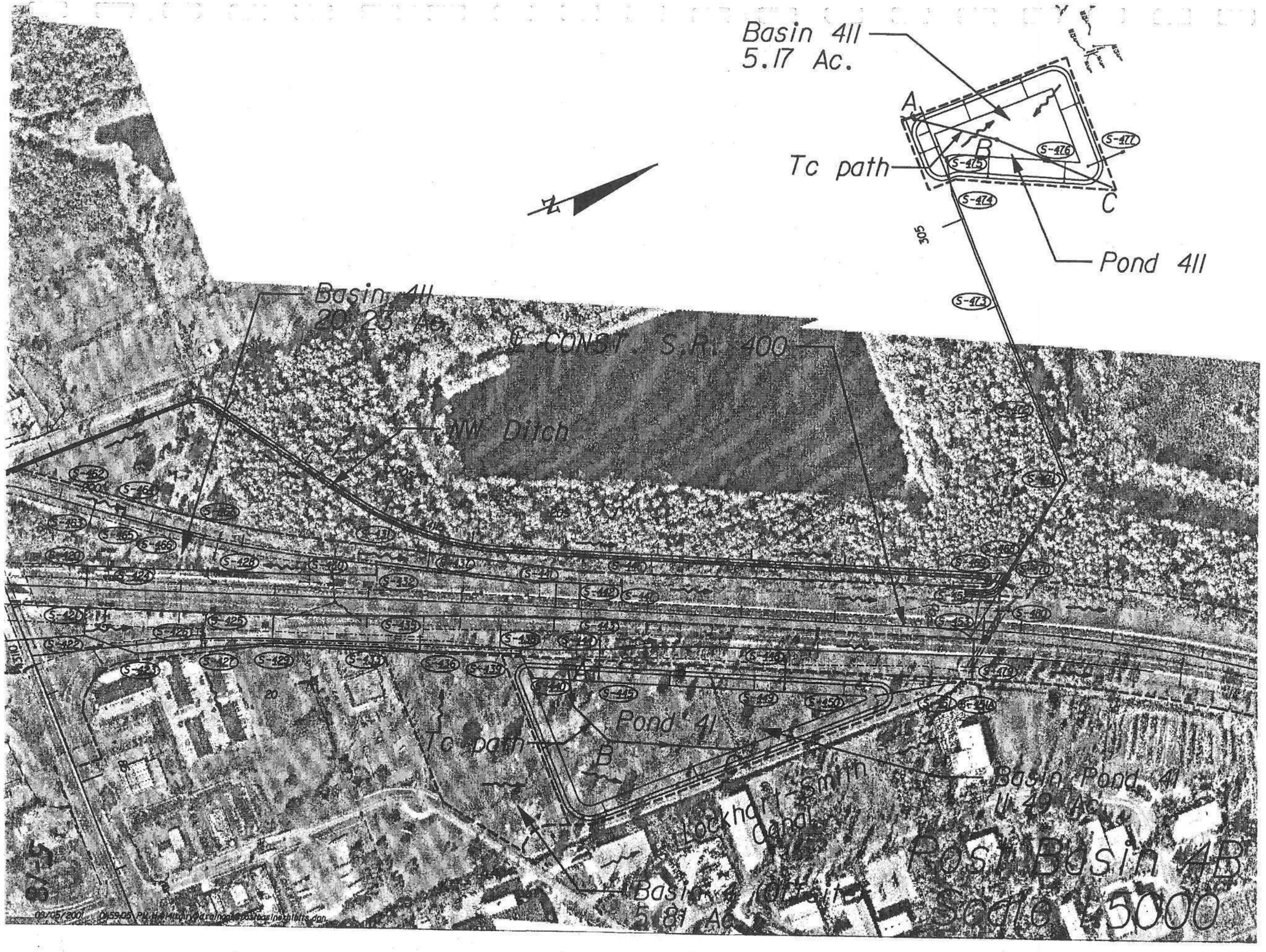
Basin 411
5.17 Ac.
A
B
C
Tc path
S-477
S-476
S-475
S-474
S-473
305
Pond 411
Basin 411
20.23 Ac.
℄ CONST. S.R. 400
NW Ditch
Tc path
Pond 411
Lockhart-Smith Canal
Basin Pond 411
11.49 Ac.
Post Basin 4B
Basin 4 (Offsite)
5.81 Ac.
Scale 1"=500'
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I-4 Widening (Lake Mary to US 17-92) | Prepared by: GTP | Date: 8/13/01
Seminole County | Checked by: CJL | Date: 9-10-01

Water Quality Treatment Volume Requirements
Basin 4: Pond 4I

Basin Parameters:

Basin Area (ac)	70.0	(28.325 ha)	Roadway Impervious Area (ac)	25.0	(10.111 ha)
Offsite Area (ac)	17.9	(7.228 ha)	Composite Curve Number (CN)	84.9	
SHGWT	21.98 ft	(6.700 m)	SLGWT	16.90 ft	(5.150 m)

SJRWMD Water Quality Volume Criteria:

Wet or Dry Detention: The greater of 1" of Runoff times the Basin Area, or the total runoff of 2.5" times the impervious Area

Dry Retention (Off-line): The greater of 0.5" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area

Dry Retention (On-line): The greater of 1" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area plus an additional 0.5" of runoff times the Basin Area

Pond Treatment Method: Wet Detention

WQV Calculation:

1"of Runoff times Basin Area=	5.83	ac-ft	Control
2.5" times the Impervious Area =	5.21	ac-ft	

Treatment Pond Stage-Area-Storage Relationship:

	Stage		Area		Incremental Storage	Cumulative Storage
	ft	M	ac	ha	ac-ft	ac-ft
Pond Bottom	15.9	4.85	6.25	2.528	0.00	0.00
Control el.	21.8	6.65	7.90	3.199	41.79	0.00
Low Berm	25.1	7.65	8.72	3.530	27.28	27.28
Maintenance Berm	26.6	8.10	9.77	3.954	13.65	40.93

Water Quality Volume Required = **5.83 ac- ft** @ **22.52 ft**
Water Quality Volume Provided= **6.82 ac- ft** @ **22.64 ft** (6.900 m) **OK**

I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 8/13/01
Checked by: CJL cl Date: 9-10-01

Water Quality Treatment Volume Requirements
Basin 4: Pond 4II

Basin Parameters:

Basin Area (ac)	25.4	(10.280 ha)	Roadway Impervious Area (ac)	7.0	(2.847 ha)
Offsite Area (ac)	0.0	(0.000 ha)	Composite Curve Number (CN)	86.7	
SHGWT	21.33 ft	(6.500 m)	SLGWT	16.90 ft	(5.150 m)

SJRWMD Water Quality Volume Criteria:

Wet or Dry Detention: The greater of 1" of Runoff times the Basin Area, or the total runoff of 2.5" times the impervious Area

Dry Retention (Off-line): The greater of 0.5" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area

Dry Retention (On-line): The greater of 1" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area plus an additional 0.5" of runoff times the Basin Area

Pond Treatment Method: Wet Detention

WQV Calculation:

1"of Runoff times Basin Area=	**2.12**	**ac-ft**	**Control**
2.5" times the Impervious Area =	**1.47**	**ac-ft**	

Treatment Pond Stage-Area-Storage Relationship:

	Stage		Area		Incremental Storage	Cumulative Storage
	ft	M	ac	ha	ac-ft	ac-ft
Pond Bottom	9.8	3.00	1.82	0.736	0.00	0.00
Control el.	19.7	6.00	3.13	1.268	24.37	0.00
Low Berm	25.1	7.65	3.95	1.600	19.18	19.18
Maintenance Berm	26.6	8.10	4.55	1.842	6.28	25.46

Water Quality Volume Required = **2.12 ac- ft** @ **20.28 ft**
Water Quality Volume Provided= **2.33 ac- ft** @ **20.34 ft** (6.200 m) **OK**

I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 8/13/01
Checked by: CJL Date: 9-10-01

Permament Pool Volume And Mean Depth Requirement
Basin 4: Pond 4I

Basin Parameters:

Basin Area (ac)	70.0	(28.325 ha)	Roadway Impervious Area (ac)	25.0	(10.111 ha)
Impervious C	0.95		Calculated Runoff Coefficient (C)	0.47	
Pervious C	0.20		Volume Between Pond Bottom and Control Elevation (ac-ft)	41.79	

Permament Pool Volume Required (PPV):

Littoral Zone : The permament pool should be sized to provide at least a 14-day residence during the wet season (June - October).

Non - Littoral Zone : An additional 50% of the above permament pool volume.

Option Selected: Non - Littoral Zone

$$PPV = \frac{DA * C * R * RT}{WS * CF} = 11.61 \text{ ac-ft} < 41.79 \text{ ac- ft} \quad \underline{OK}$$

DA =	Drainage Area to Pond (ac)	70.0	
R =	Wet Season Rainfall Depth (in)	31	
RT =	Residence Time (days)	21	
WS =	Length of Wet Season (days)	153	(June to October)
CF =	Conversion Factor	12 in/ft	

Mean depth of Pond (MD):

Criteria : Requires a maximum pond depth of 12 feet and a mean depth (pond volume divided by the pond area at the control elevation) between 2 and 8 feet.

$$MD = \frac{PPV}{Ap} = 5.3 \text{ ft.} \quad \underline{OK}$$

Ap = Area of Pond measured at the control el. (ft^2) 344330

5-28

I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 8/13/01
Checked by: CJL Date: 9-10-01

Permament Pool Volume And Mean Depth Requirement
Basin 4: Pond 4II

Basin Parameters:

Basin Area (ac)	25.4	(10.280 ha)	Roadway Impervious Area (ac)	7.0	(2.847 ha)
Impervious C	0.95		Calculated Runoff Coefficient (C)	0.41	
Pervious C	0.20		Volume Between Pond Bottom and Control Elevation (ac-ft)	24.37	

Permament Pool Volume Required (PPV):

Littoral Zone : The permament pool should be sized to provide at least a 14-day residence during the wet season (June - October).

Non - Littoral Zone : An additional 50% of the above permament pool volume.

Option Selected: Non - Littoral Zone

$$PPV = \frac{DA * C * R * RT}{WS * CF} = 3.67 \text{ ac-ft} < 24.37 \text{ ac- ft}$$ **OK**

DA =	Drainage Area to Pond (ac)	25.4	
R =	Wet Season Rainfall Depth (in)	31	
RT =	Residence Time (days)	21	
WS =	Length of Wet Season (days)	153	(June to October)
CF =	Conversion Factor	12 in/ft	

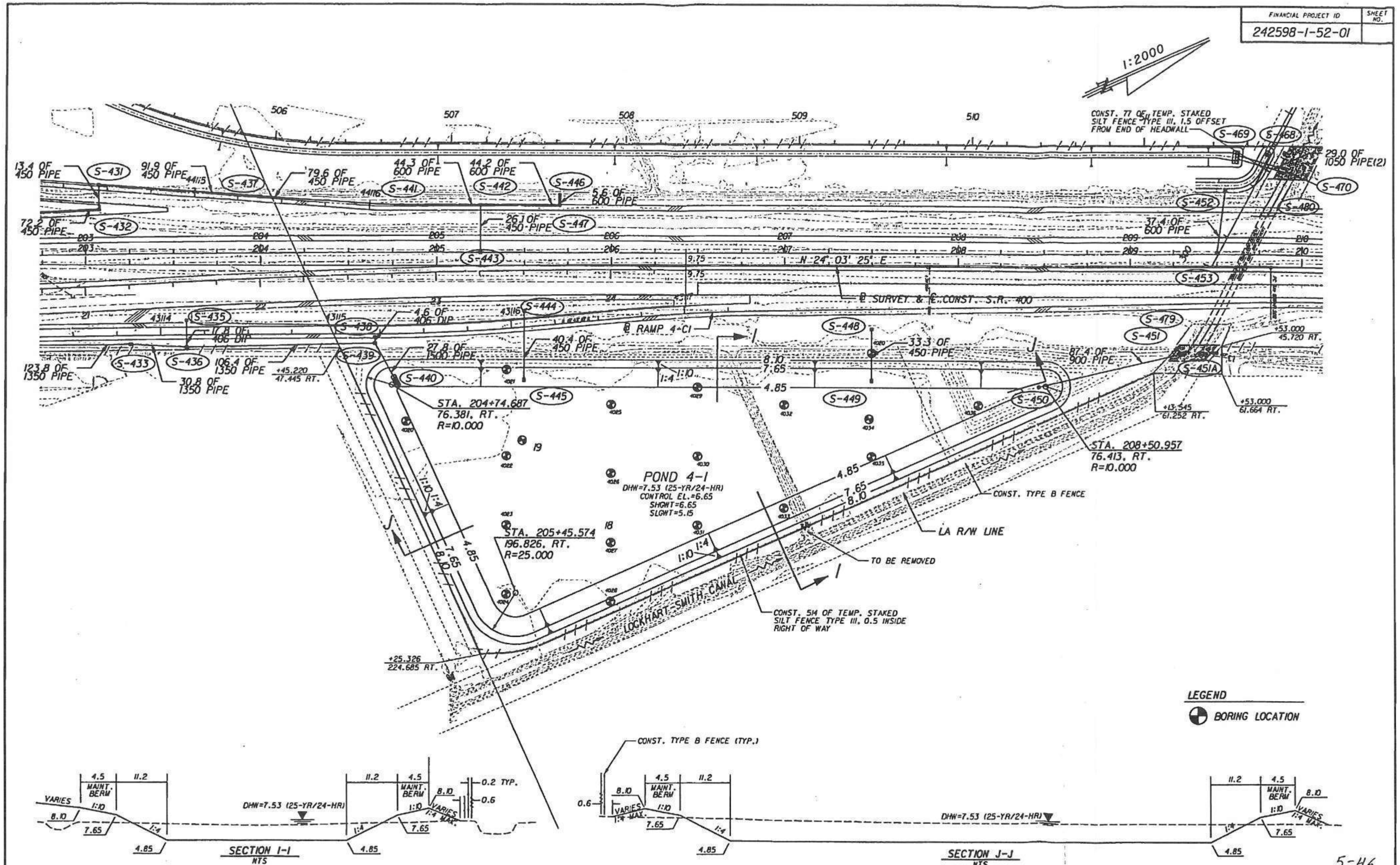
Mean depth of Pond (MD):

Criteria : Requires a maximum pond depth of 12 feet and a mean depth (pond volume divided by the pond area at the control elevation) between 2 and 8 feet.

$$MD = \frac{PPV}{Ap} = 7.8 \text{ ft.}$$ **OK**

Ap = Area of Pond measured at the control el. (ft^2) 136483

5-29



1:2000
CONST. 77 OF TEMP. STAKED SILT FENCE TYPE III, 1.5 OFFSET FROM END OF HEADWALL
S-469
S-468
29.0 OF 1050 PIPE(2)
S-470
S-480
S-452
S-453
S-479
S-451
S-451A
13.4 OF 450 PIPE
S-431
91.9 OF 450 PIPE
S-437
79.6 OF 450 PIPE
44.3 OF 600 PIPE
S-441
44.2 OF 600 PIPE
S-442
S-446
5.6 OF 600 PIPE
72.2 OF 450 PIPE
S-432
26.1 OF 450 PIPE
S-447
37.4 OF 600 PIPE
S-443
N 24° 03' 25" E
℄ SURVEY & ℄ CONST. S.R. 400
℄ RAMP 4-C1
S-435
S-444
4.6 OF 406 DIP
17.8 OF 406 DIP
S-438
S-439
S-433
S-436
123.8 OF 1350 PIPE
106.4 OF 1350 PIPE
30.8 OF 1350 PIPE
27.8 OF 1500 PIPE
40.4 OF 450 PIPE
S-448
33.3 OF 450 PIPE
87.4 OF 900 PIPE
S-440
S-445
S-449
S-450
STA. 204+74.687
76.381, RT.
R=10.000
STA. 208+50.957
76.413, RT.
R=10.000
POND 4-1
DHW=7.53 (25-YR/24-HR)
CONTROL EL.=6.65
SHGWT=6.65
SLGWT=5.15
STA. 205+45.574
196.826, RT.
R=25.000
CONST. TYPE B FENCE
LA R/W LINE
TO BE REMOVED
LOCKHART SMITH CANAL
CONST. 514 OF TEMP. STAKED SILT FENCE TYPE III, 0.5 INSIDE RIGHT OF WAY
+25.326
224.685 RT.
+45.220
47.445 RT.
+53.000
45.720 RT.
+53.000
61.664 RT.
+13.545
61.252 RT.
LEGEND
BORING LOCATION
CONST. TYPE B FENCE (TYP.)
SECTION I-I
NTS
DHW=7.53 (25-YR/24-HR)
SECTION J-J
NTS
MAINT. BERM
VARIES

5-46

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

REVISIONS

HDR ENGINEERING, INC.
12015 ORLANDO AVENUE, SUITE 200
WINTER PARK, FLORIDA 32789
PE LICENSE NUMBER: 51288

FLORIDA DEPARTMENT OF TRANSPORTATION

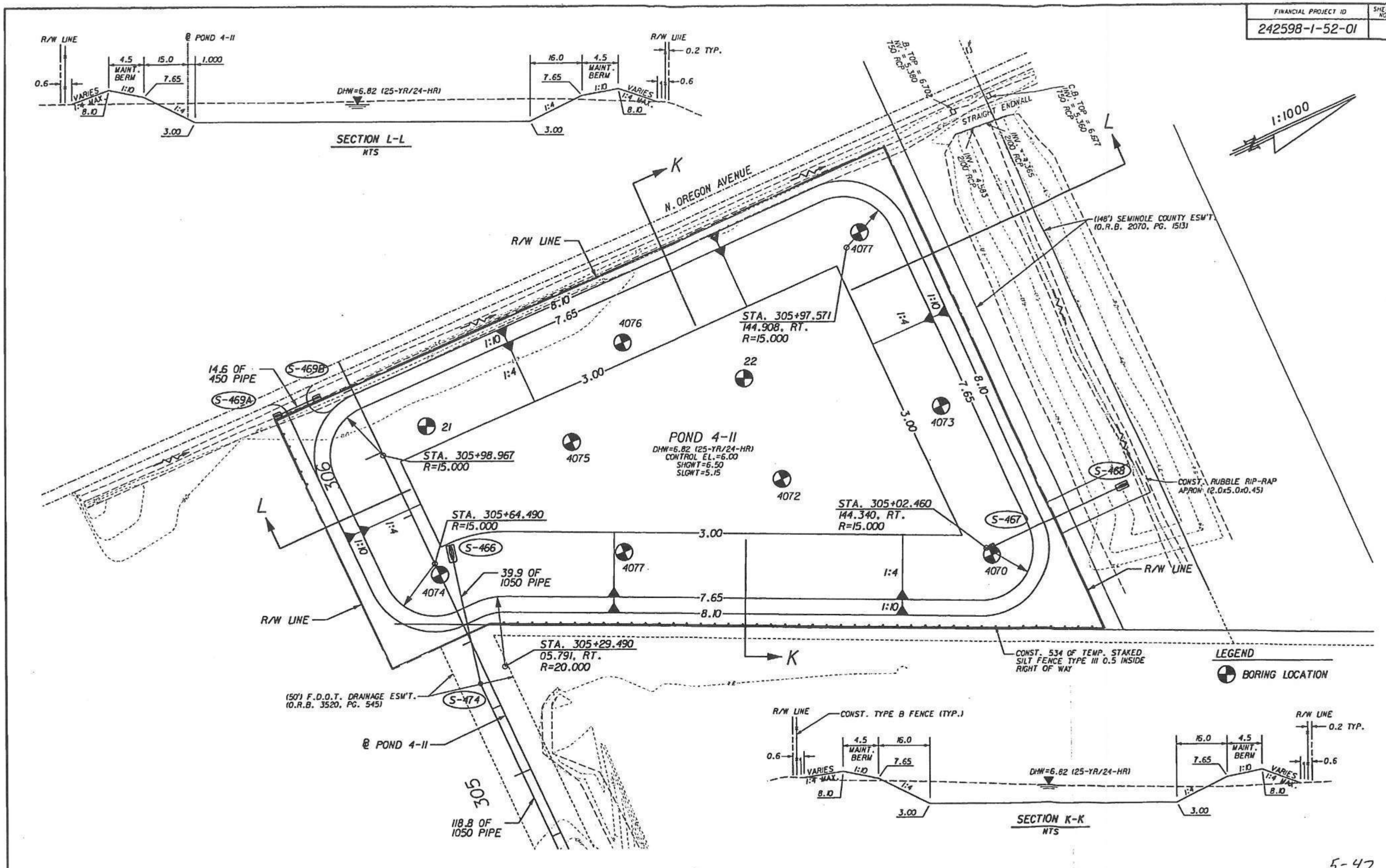
FINANCIAL PROJECT ID: 242598-1-52-01

SHEET NO.

S.R. 400 (I-4) RETENTION POND 4-1

09/10/2001

FINANCIAL PROJECT ID	SHEET NO.
242598-1-52-01	



5-47

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REVISIONS											

HDR ENGINEERING, INC.
1201 S. ORLANDO AVENUE,
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PE LICENSE NUMBER: 51288

FLORIDA DEPARTMENT OF TRANSPORTATION

S.R. 400 (I-4)
RETENTION POND 4-11

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BASIN 5

The existing drainage pattern along I-4 within this basin is that the west side drains north under Orange Boulevard. The east side of I-4 flows north by roadside ditches to a point where it mergers with Elder Ditch and ultimately discharges to Lake Monroe. The proposed Pond 5 site discharges directly to Elder Ditch and does provide the water quality and attenuation needs of this project.

Water Quality Volume calculations have been performed and this volume is provided within the pond site. A control structure has been designed to retain this volume and therefore has been set above the water quality volume elevation. This volume is recovered via a small weir per SJRWMD design criteria; i.e., 1/2 the volume is recovered within 48-60 hours.

This basin is designed following the open-basin pond criteria. From a stage and flow rate standpoint, the design storm is the 25-year 24-hour storm event with the SCS Type II rainfall distribution. To meet open basin requirements, a control structure was designed with a slot set at the water quality volume elevation and sized such that post development flows would not exceed pre-development flows.

The Pond-5 pond site has been designed as wet ponds. The existing tailwater elevation is the 25-year stage from the 1992 Lake Monroe Basin Study with a datum conversion applied, ('29 - 10.7 feet to the '88 – 9.84 feet). The proposed tailwater elevation is from the URS proposed Elder Ditch improvement calculations 10.3 feet. Elder Ditch will still ultimately discharges to Lake Monroe.

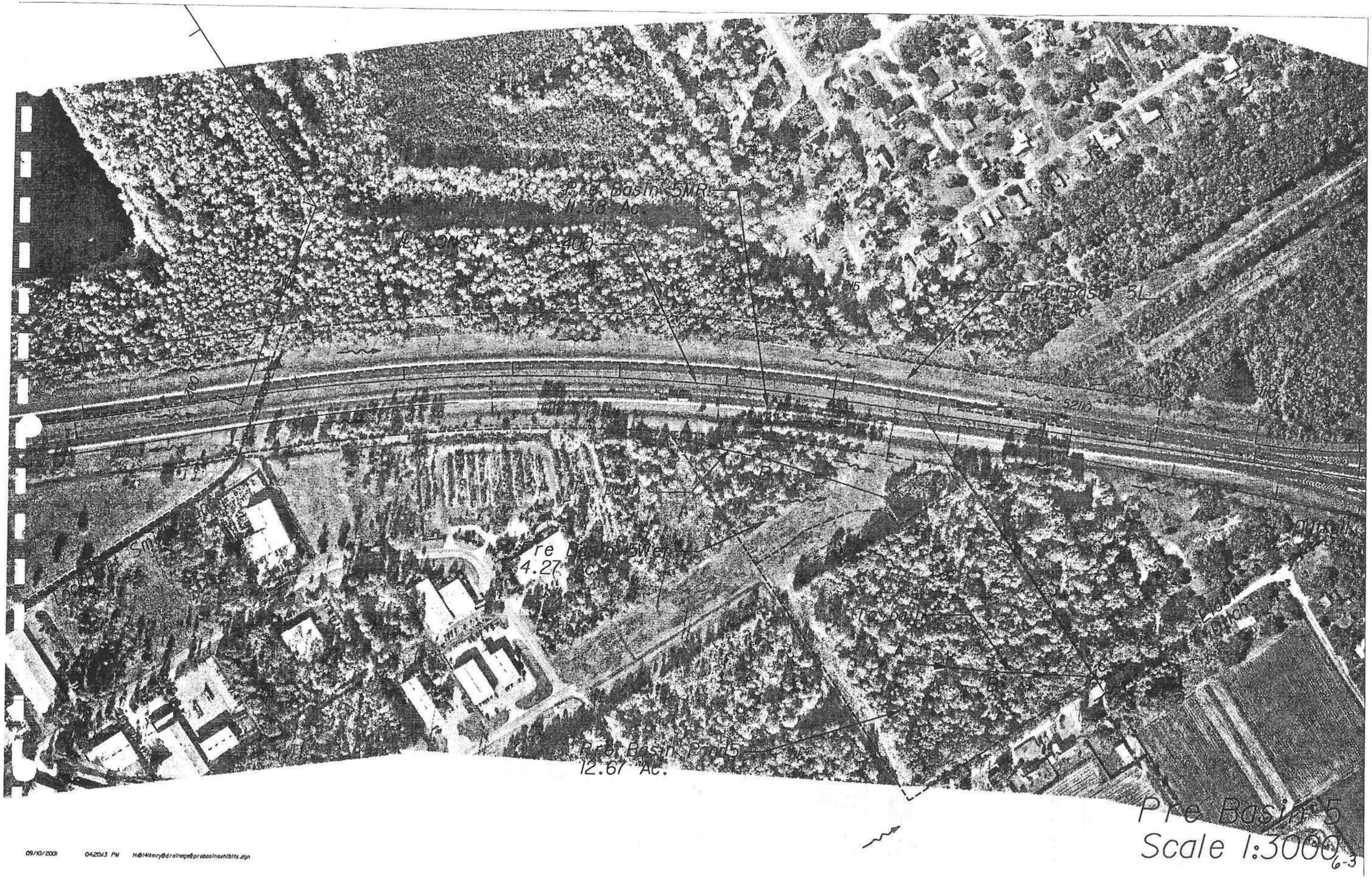
The proposed improvements will require that the groundwater table be lowered to accommodate hydraulic constraints. Per SJRWMD criteria, the groundwater table cannot be lowered more than three (3) feet on average, lower than the low season groundwater table. The project geotechnical sub-consultant provided this information for use in the calculations (See Section 10 for Geotechnical data). The control water elevation has been set between the seasonal high and seasonal low water tables.

The system was modeled using AdICPR 2.20. Results from the routed model are provided on the table below. Post-Development flow rates do not exceed pre-development for the design storm evaluated. Thus, no impacts to the Elder Ditch system are anticipated with the design of this project.

Basin 5 Pre – Post Comparison

	Pre	Post
Q – (cfs)	36.27	18.83
Pond Stage (ft)	N/A	14.48

6-1



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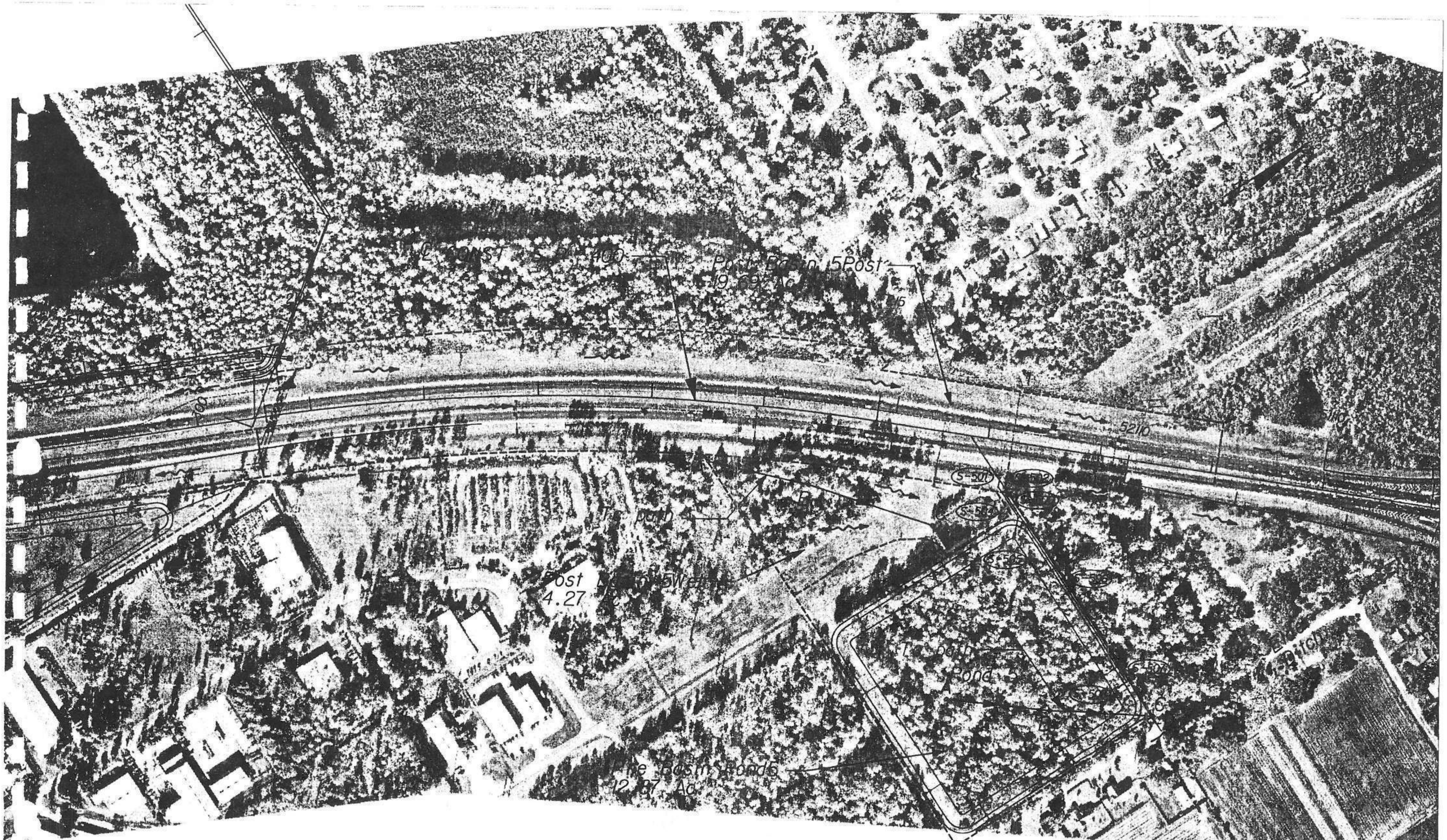

Post Basin 5
Scale 1:3000

6-19

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I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 7/3/01
Checked by: CJL Date: 9-6-01

Water Quality Treatment Volume Requirements
Basin 5: Pond 5

Basin Parameters:

Basin Area (ac)	32.4	(13.098 ha)	Roadway Impervious Area (ac)	7.7	(3.118 ha)
Offsite Area (ac)	4.3	(1.728 ha)	Composite Curve Number (CN)	89.4	
SHGWT	16.90 ft	(5.150 m)	SLGWT	12.96 ft	(3.950 m)

SJRWMD Water Quality Volume Criteria:

Wet or Dry Detention: The greater of 1" of Runoff times the Basin Area, or the total runoff of 2.5" times the impervious Area

Dry Retention (Off-line): The greater of 0.5" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area

Dry Retention (On-line): The greater of 1" of Runoff times the Basin Area, or the total runoff of 1.25" times the impervious Area plus an additional 0.5" of runoff times the Basin Area

Pond Treatment Method: Wet Detention

WQV Calculation:

1"of Runoff times Basin Area=	**2.70**	**ac-ft**	**Control**
2.5" times the Impervious Area =	**1.61**	**ac-ft**	

Treatment Pond Stage-Area-Storage Relationship:

	Stage		Area		Incremental Storage	Cumulative Storage
	ft	M	ac	ha	ac-ft	ac-ft
Pond Bottom	7.1	2.15	7.78	3.150	0.00	0.00
Control el.	13.1	4.00	9.12	3.689	51.29	0.00
Low Berm	17.1	5.20	10.02	4.056	37.67	37.67
Maintenance Berm	18.5	5.65	10.90	4.413	15.45	53.12

Water Quality Volume Required = **2.70 ac- ft** @ **13.41 ft**
Water Quality Volume Provided= **3.14 ac- ft** @ **13.45 ft** (4.100 m) **OK**

I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 7/3/01
Checked by: CJL cl Date: 9-8-01

Permament Pool Volume And Mean Depth Requirement
Basin 5: Pond 5

Basin Parameters:

Basin Area (ac)	32.4	(13.098 ha)	Roadway Impervious Area (ac)	7.7	(3.118 ha)
Impervious C	0.95		Calculated Runoff Coefficient (C)	0.38	
Pervious C	0.20		Volume Between Pond Bottom and Control Elevation (ac-ft)	51.29	

Permament Pool Volume Required (PPV):

Littoral Zone : The permament pool should be sized to provide at least a 14-day residence during the wet season (June - October).

Non - Littoral Zone : An additional 50% of the above permament pool volume.

Option Selected: Non - Littoral Zone

$$PPV = \frac{DA * C * R * RT}{WS * CF} = 4.34 \text{ ac-ft} < 51.29 \text{ ac- ft}$$ **OK**

DA =	Drainage Area to Pond (ac)	32.4	
R =	Wet Season Rainfall Depth (in)	31	
RT =	Residence Time (days)	21	
WS =	Length of Wet Season (days)	153	(June to October)
CF =	Conversion Factor	12 in/ft	

Mean depth of Pond (MD):

Criteria : Requires a maximum pond depth of 12 feet and a mean depth (pond volume divided by the pond area at the control elevation) between 2 and 8 feet.

$$MD = \frac{PPV}{Ap} = 5.6 \text{ ft.}$$ **OK**

Ap = Area of Pond measured at the control el. (ft^2) 397072

FINANCIAL PROJECT ID	SHEET NO.
242598-1-52-01	

℄ CONST. S.R. 400

96.5 OF 600 PIPE

90.3 OF 600 PIPE

7.7 OF 900 PIPE

S-502

10.0 OF 750 PIPE

S-501

31.4 OF 1050 PIPE

+54.538 7.349 RT.

S-503

5.5 OF 750 PIPE

+61.921 1.000 LT.

+78.730 7.398 RT.

S-504

92.0 OF 750 PIPE

18.4 OF 1050 PIPE

S-505

S-506

104.0 OF 750 PIPE

CONST. TYPE B FENCE (TYP.)

+78.709 208.488 RT.

+97.966 1.000 LT.

S-507

8.3 OF 750 PIPE

S-508

STA. 301+00.728 21.000, RT. R=16.000

STA. 301+00.711 186.488, RT. R=16.000

POND 5

DHW=4.41 (25-YR/24-HR)
CONTROL EL.=4.00
SHGWT=5.15
SLGWT=3.95

STA. 302+76.119 21.000, RT. R=16.000

STA. 302+77.208 186.488, RT. R=16.000

+99.435 208.488 RT.

(25') (D)

(15') (P)

FOOT DITCH

1:2000

CONST. TYPE A FENCE

0.3 TYP.

4.5 MAINT. BERM

12.20

1:10

1:4

5.65

5.20

2.15

DHW=4.41 (25-YR/24-HR)

CONTROL EL.=4.00

LA R/W LINE

SECTION M-M
NTS

CONST. TYPE B FENCE (TYP.)

VARIES

CONST. TYPE A FENCE

0.6

VARIES 1:4 MAX.

SECTION N-N
NTS

LEGEND

BORING LOCATION

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HDR ENGINEERING, INC.
12015 ORLANDO AVENUE, SUITE 200
WINTER PARK, FLORIDA 32789
PE LICENSE NUMBER: 51288

FLORIDA DEPARTMENT OF TRANSPORTATION

S.R. 400 (I-4) DETENTION POND 5

6-38

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100-Year Flood Plain Compensating Storage

FEMA

A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) for the proposed corridor indicates possible flood plain encroachment areas. These areas are located approximately at the Interstate 4 / Lake Mary interchange, Station 149+00; from Station 169+00 to Station 178+00; and from Station 194+00 to Station 215+00 (see Exhibit A).

Based upon further review of the FIRM floodplain maps, quadrangle maps and the Interstate 4 construction plans, it was determined that the flood plain for the Lake Mary interchange and Station 149+00 were outside of the Interstate 4 right-of-way. Station 169+00 to Station 178+00 is located within the State Road 417 Greenway interchange, presently under construction. Therefore, the flood plain encroachment and compensating storage for this area should be included in the design for the State Road 417 Greenway project. According to the FIRM maps, the portion from Station 194+00 to Station 215+00 is not in the flood plain.

Floodplain analysis is generally based upon the FIRM's provided by the FEMA. However, if detailed watershed studies are available in the subject project area and they identify a greater 100-year floodplain area, these reports should and have been considered in the floodplain evaluation. Seminole County has adopted the findings of the *Lockhart-Smith Canal Monroe Basin, Engineering Study and Drainage Inventory.*

Lockhart-Smith Canal Monroe Basin, Engineering Study and Drainage Inventory

According to the study *Lockhart-Smith Canal Monroe Basin, Engineering Study and Drainage Inventory,* prepared by Singhofen & Associates, Inc. for Seminole County, portions of the Interstate 4 project are within the 100-year flood plain. These floodplain areas where impacts have been identified are limited to Basins 4 and 5 (see Exhibit A). Elevations were determined from the information contained within the study and plotted onto the cross-section for the roadway and the pond areas. From these, the areas of encroachment were identified and the amount of encroachment was calculated. The amount of encroachment was determined using the average end areas provided by the cross-sections. The area south of the Lockhart-Smith canal drains to Ponds 4-I and 4-II and is referred to as Basin 4 in the calculations. The area north of the Lockhart-Smith canal drains to Pond 5 and is referred to as Basin 5. It was determined that the amount

of encroachment in Basin 4 is 8,527 m^3 and 1,475 m^3 in Basin 5 (see Exhibit B). These encroachments will be compensated for in Basins 4 and 5, as shown below.

Basin 4

Location	Encroachment	Compensation
I – 4 R/W	5,831 m^3	916 m^3
Ramp 4A-1	280 m^3	50 m^3
Ramp 4D-1	842 m^3	116 m^3
Pond 4I	1,574 m^3	21,981m^3
Pond 4II	0 m^3	6,602 m^3
	8,527m^3	29,665 m^3

Basin 5

Location	Encroachment	Compensation
I – 4 R/W	1,475 m^3	2,032 m^3
Pond 5	0 m^3	25,260 m3
	1,475 m3	27,292 m^3

100-year Flood Elevations – Sta. 194+00 to Sta. 215+00

Derived from the Lockhart-Smith Canal Monroe Basin Study

Station	Elevations (m) (Left)	(Right)
215+00	6.661	6.661
214+00	6.661	6.661
213+00	6.661	6.661
212+00	6.661	6.722
211+00	6.783	6.753
210+00	6.966	6.783
209+00	7.119	6.844
208+00	7.301	7.088
207+00	7.453	7.332
206+00	7.637	7.484
205+00	7.789	7.637
204+00	7.941	7.789
203+00	8.094	7.942
202+00	8.246	8.185
201+00	8.399	8.460
200+00	8.582	8.734
199+00	8.886	9.008
198+00	9.161	9.283
197+00	9.435	9.588
196+00	9.740	9.862
195+00	10.014	
194+00	10.288	

I-4 Widening (Lake Mary to US 17-92) | Prepared by: GTP | Date: 10/31/01
Seminole County | Checked by: cl | Date: 11-2-01

Floodplain Encroachment and Compensation
Basin 4: Results

I) Volumes to be Compensated for -

A) Volume of increased Runoff -

Post Runoff -	131.82 ac-ft
Pre Runoff -	126.03 ac-ft
Increase in Runoff -	**5.79 ac-ft**

B) Volume of Floodplain lost due to fill - **7.35 ac-ft**

II) Increased Runoff Volume -

The increase of runoff is to be compensated for between the Normal Water Level (NWL) of the proposed ponds and the Water Quality Volume elevation (WQV).

Increase in Runoff -	5.79 ac-ft
WQV Provided -	9.14 ac-ft **OK**

Since the WQV Provided is greater than the Increase in Runoff, then the increased volume has been compensated for.

III) Lost Floodplain Volume -

This volume is to be compensated for between the WQV elevation of the pond and the 100 YR Floodplain elevation.

Volume of Floodplain lost due to fill -	7.35 ac-ft
Volume Provided in Ponds 4I and 4II-	9.95 ac-ft **OK**

Since the Volume Provided in Pond 5 is greater than Volume of Floodplain lost due to fill, then compensation for the floodplain impacts is provided.

POND 4-I		**POND 4-II**	
NWL Elevation -	21.818 ft.	NWL Elevation -	19.685 ft.
WQV Elevation -	22.638 ft.	WQV Elevation -	20.341 ft.
100 Year Floodplain Elevation -	22.855 ft.	100 Year Floodplain Elevation -	22.855 ft.

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I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 10/31/01
Checked by: cc Date: 11-1-01

Floodplain Encroachment and Compensation
Basin 5: I-4

Station (m)	Baseline	Fill			Excavation		
		Area m^2	Area ft^2	Volume ac-ft	Area m^2	Area ft^2	Volume ac-ft
210+50	I-4	0.0	0		0.0	0	
				0.00			0.00
211+00	I-4	0.1	1		0.0	0	
				0.01			0.00
211+50	I-4	0.2	2		0.0	0	
				0.02			0.00
212+00	I-4	0.8	9		0.0	0	
				0.03			0.00
212+50	I-4	0.9	10		0.0	0	
				0.01			0.00
212+65	I-4	1.2	13		0.0	0	
				0.07			0.00
213+00	I-4	3.4	37		0.0	0	
				0.17			0.00
213+50	I-4	4.9	53		0.0	0	
				0.24			0.00
214+00	I-4	7.0	75		0.0	0	
				0.33			0.00
214+50	I-4	9.4	101		0.0	0	
				0.25			0.00
215+16	I-4	0.0	0		0.0	0	

Total Impacts: 1.13 ac-ft **Total Compensation: 0.00 ac-ft**

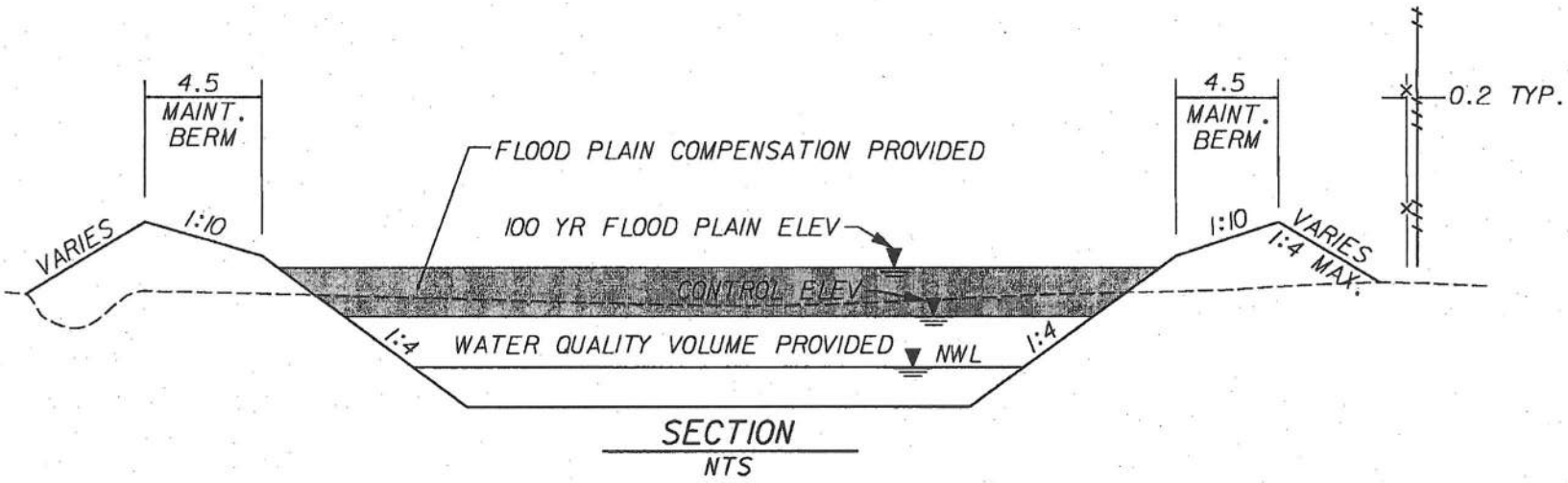
I-4 Widening (Lake Mary to US 17-92)
Seminole County

Prepared by: GTP Date: 10/31/01
Checked by: CR Date: 11-1-01

Floodplain Encroachment and Compensation
Basin 5: Pond 5

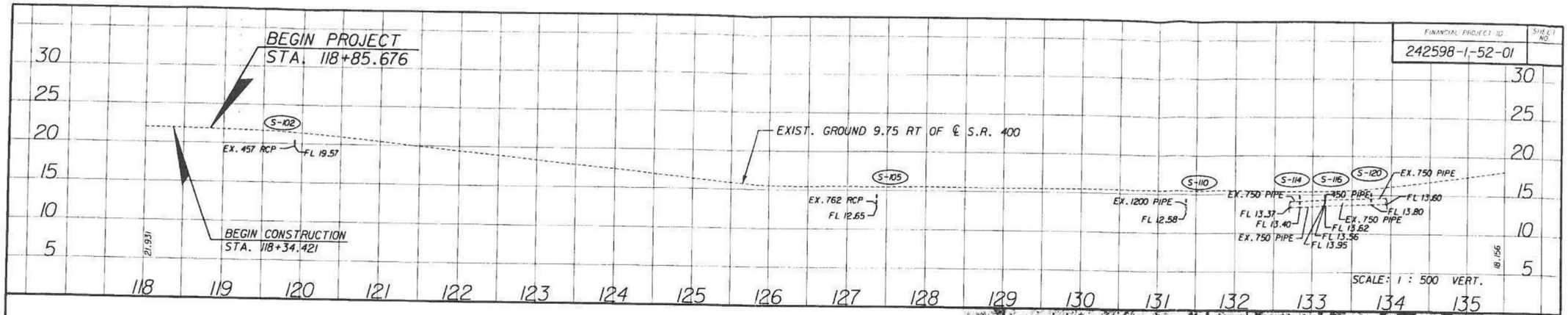
Station (m)	Baseline	Fill			Excavation		
		Area m^2	Area ft^2	Volume ac-ft	Area m^2	Area ft^2	Volume ac-ft
500+85	I-4	0.0	0		0.0	0	
				0.00			0.11
500+97	I-4	0.0	0		23.1	249	
				0.00			0.26
501+11	I-4	0.0	0		23.3	250	
				0.00			0.92
501+60	I-4	0.0	0		23.3	250	
				0.00			0.98
502+12	I-4	0.0	0		23.3	250	
				0.00			0.94
502+62	I-4	0.0	0		23.3	250	
				0.00			0.31
502+78	I-4	0.0	0		23.1	249	
				0.00			0.11
502+90	I-4	0.0	0		0.0	0	

Total Impacts: 0.00 ac-ft **Total Compensation: 3.65 ac-ft**



TYPICAL WET POND SECTION FOR FLOOD PLAIN COMPENSATION

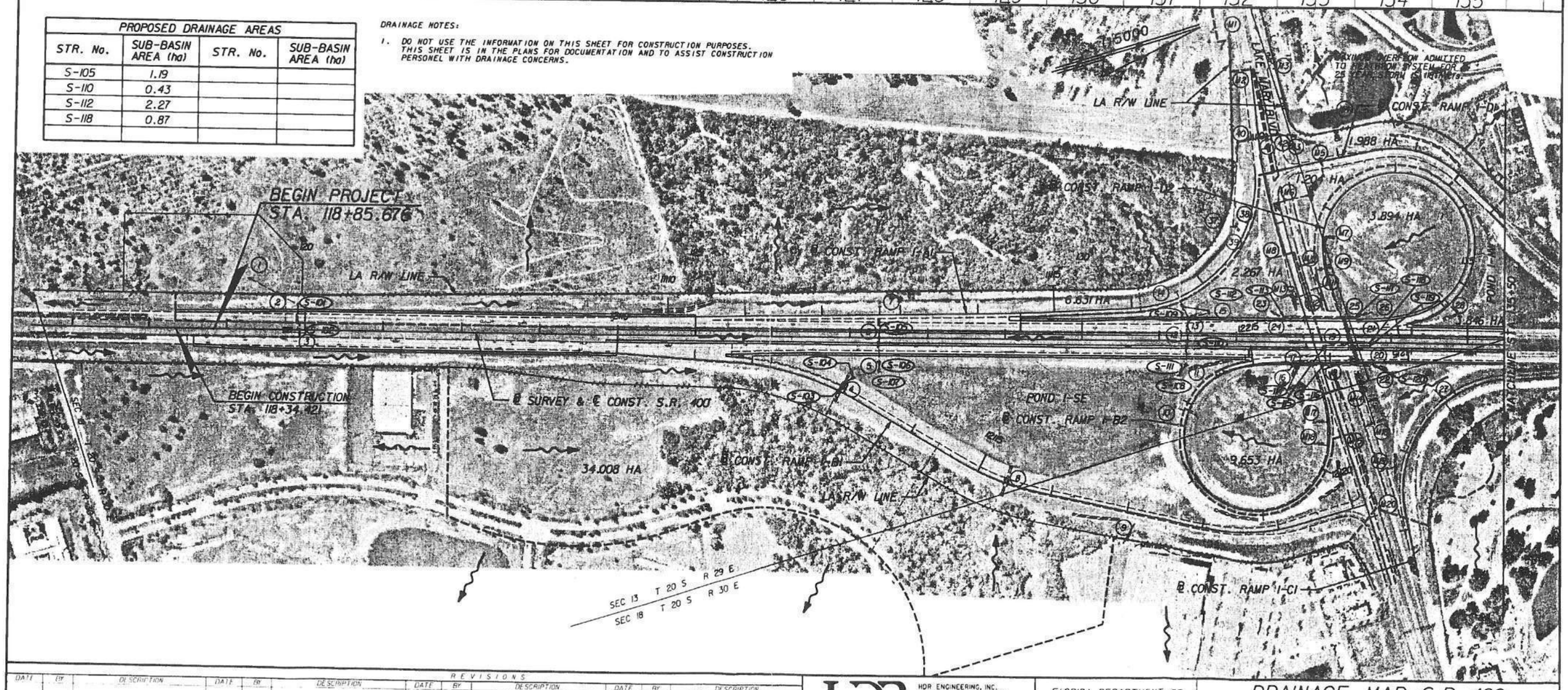
FINANCIAL PROJECT ID	SHEET NO.
242598-1-52-01	



PROPOSED DRAINAGE AREAS			
STR. No.	SUB-BASIN AREA (ha)	STR. No.	SUB-BASIN AREA (ha)
S-105	1.19		
S-110	0.43		
S-112	2.27		
S-118	0.87		

DRAINAGE NOTES:

1. DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONEL WITH DRAINAGE CONCERNS.



REVISIONS											
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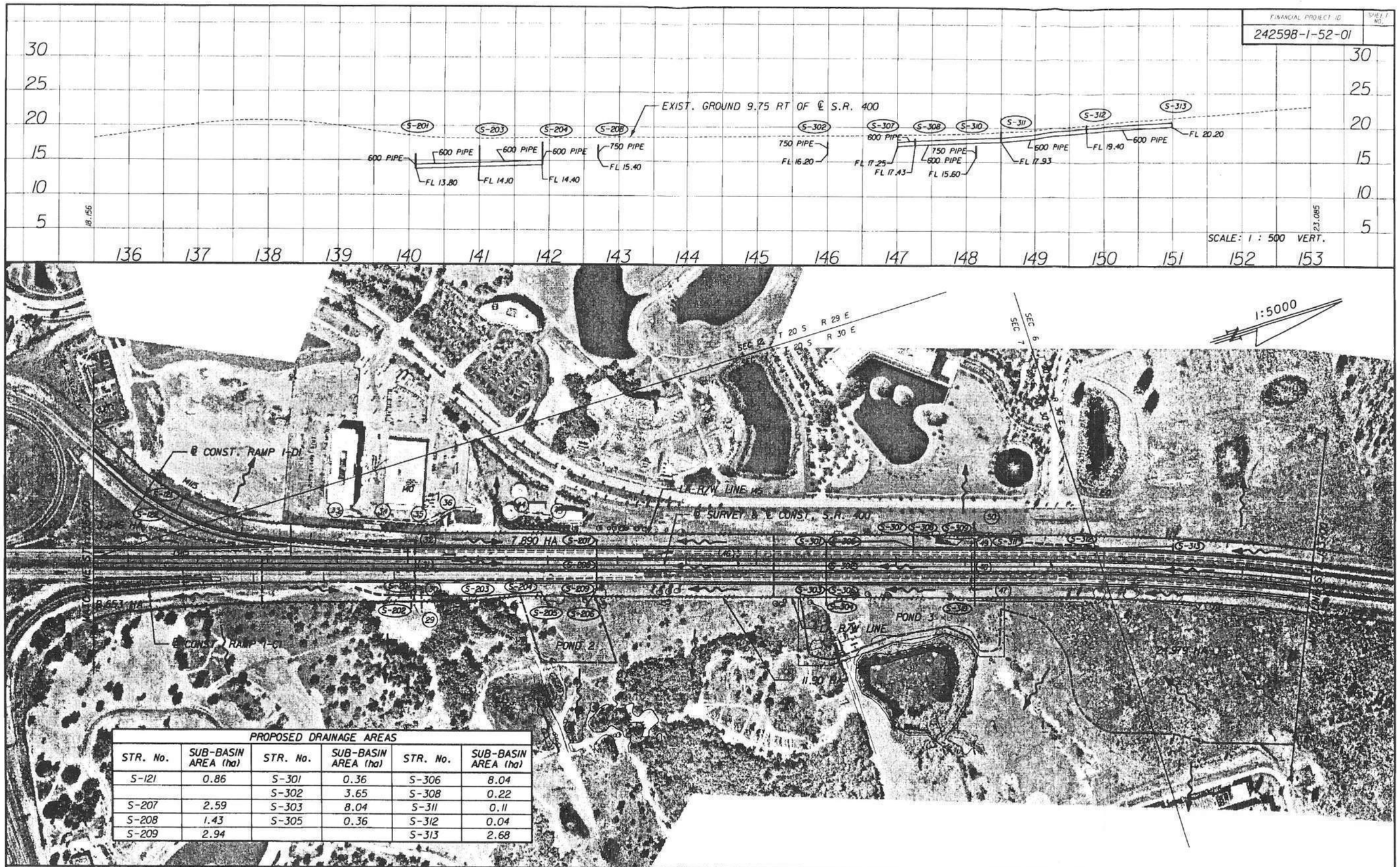
HDR ENGINEERING, INC.
1201 S. ORLANDO AVENUE,
SUITE 200
WINTER PARK, FLORIDA 32789
PE LICENSE NUMBER: 51288

FLORIDA DEPARTMENT OF TRANSPORTATION

DRAINAGE MAP-S.R. 400 STA. 118+00 TO STA. 135+50

FINANCIAL PROJECT ID	SHEET NO.
242598-1-52-01	



PROPOSED DRAINAGE AREAS					
STR. No.	SUB-BASIN AREA (ha)	STR. No.	SUB-BASIN AREA (ha)	STR. No.	SUB-BASIN AREA (ha)
S-121	0.86	S-301	0.36	S-306	8.04
		S-302	3.65	S-308	0.22
S-207	2.59	S-303	8.04	S-311	0.11
S-208	1.43	S-305	0.36	S-312	0.04
S-209	2.94			S-313	2.68

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PE LICENSE NUMBER: 51288

FLORIDA DEPARTMENT OF TRANSPORTATION

DRAINAGE MAP-S.R. 400 STA. 135+50 TO STA. 153+00

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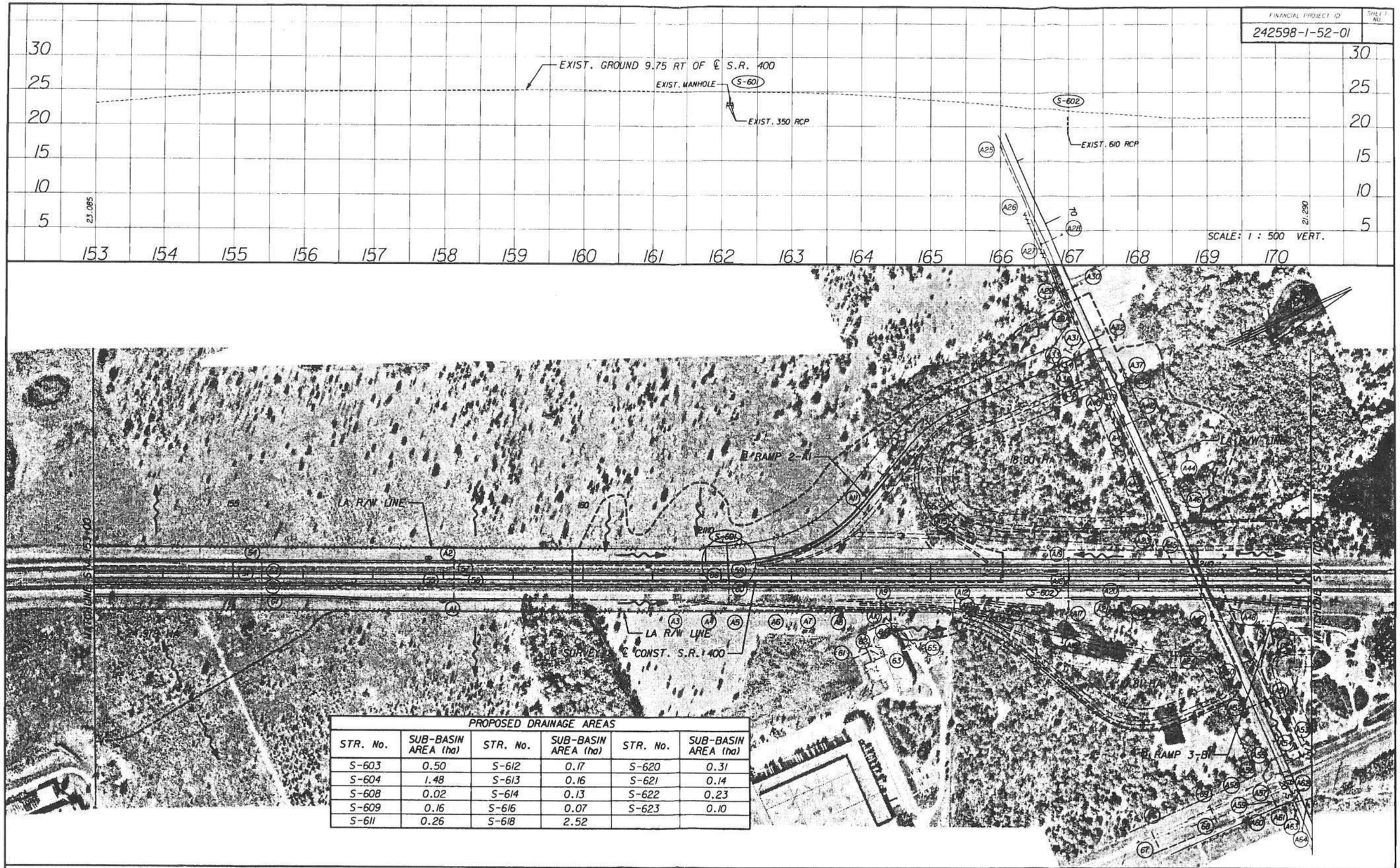
FINANCIAL PROJECT ID	SHEET NO.
242598-1-52-01	



PROPOSED DRAINAGE AREAS

STR. No.	SUB-BASIN AREA (ha)	STR. No.	SUB-BASIN AREA (ha)	STR. No.	SUB-BASIN AREA (ha)
S-603	0.50	S-612	0.17	S-620	0.31
S-604	1.48	S-613	0.16	S-621	0.14
S-608	0.02	S-614	0.13	S-622	0.23
S-609	0.16	S-616	0.07	S-623	0.10
S-611	0.26	S-618	2.52		

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PE LICENSE NUMBER: 51288

FLORIDA DEPARTMENT OF TRANSPORTATION

DRAINAGE MAP-S.R. 400
STA. 153+00 TO STA. 170+50

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FINANCIAL PROJECT ID: 242598-1-52-01

SHEET NO.:

EXIST. GROUND 9.75 RT OF ℄ S.R. 400

S-603 FL 18.04 — S-604 FL 18.11, 450 PIPE

S-605 EX. 900 RCP — S-606 EX. 600 RCP — S-607 EX. 450 RCP

S-608 FL 22.50, 450 PIPE — S-609 FL 22.80 — S-611 FL 24.20, 450 PIPE — FL 22.40

BEGIN BRIDGE EXCEPTION
STA. 180+52.085

S-612 FL 27.50 — S-613 450 PIPE, FL 25.25 — FL 24.30, 450 PIPE — S-614 FL 22.80 — S-615 450 PIPE, FL 21.97 — FL 22.00, 450 PIPE

END BRIDGE EXCEPTION
STA. 180+96.586

S-617 FL 18.20 — S-618 FL 18.50, 450 PIPE

21.294 — 20.261

SCALE: 1 : 500 VERT.

170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188

30 25 20 15 10 5

1:5000

SEC 30 T 19 S R 30 E

DA = 11.82 HA

LA R/W LINE

3.52 HA

POND BY OTHERS

BEGIN BRIDGE EXCEPTION
STA. 180+52.085

END BRIDGE EXCEPTION
STA. 180+96.586

18.90 HA

B RAMP 1-A

B RAMP 2-C

1.74 HA

9.19 HA

LA R/W LINE

POND BY OTHERS

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DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HDR ENGINEERING, INC.
1201 S. ORLANDO AVENUE,
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PE LICENSE NUMBER: 51288

FLORIDA DEPARTMENT OF TRANSPORTATION

DRAINAGE MAP-S.R. 400
STA. 170+50 TO STA. 188+00

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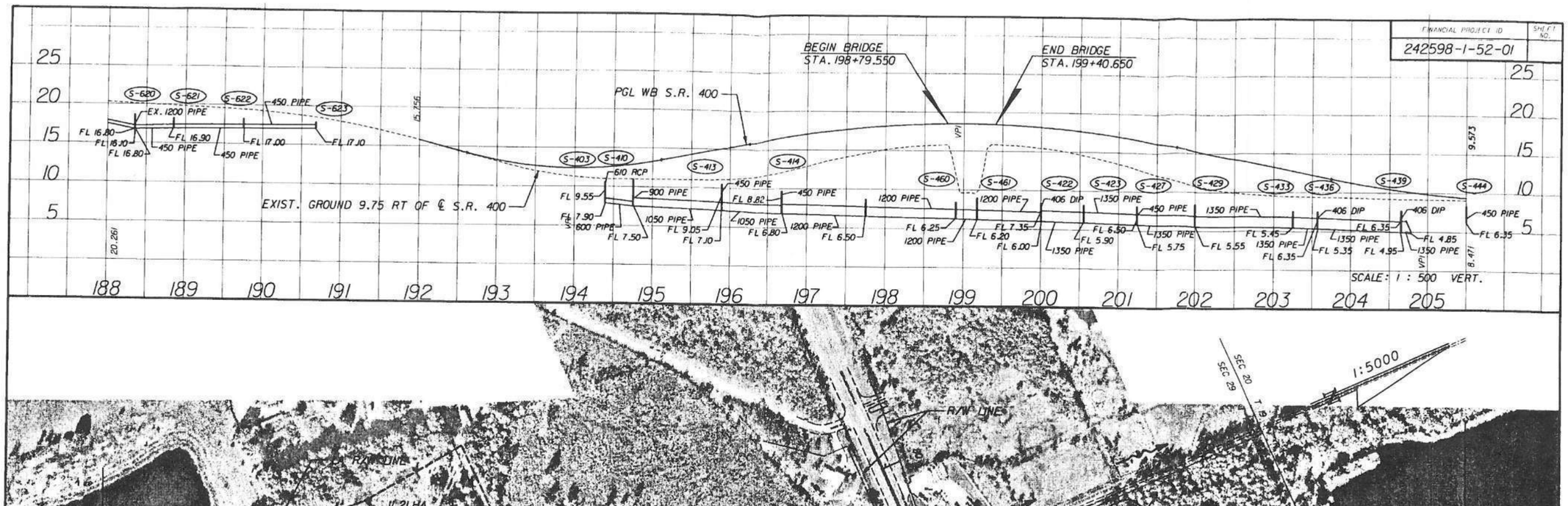

PROPOSED DRAINAGE AREAS

STR. No.	SUB-BASIN AREA (ha)	STR. No.	SUB-BASIN AREA (ha)	STR. No.	SUB-BASIN AREA (ha)	STR. No.	SUB-BASIN AREA (ha)
S-401	6.22	S-413	0.09	S-424	0.13	S-433	0.08
S-402	1.31	S-414	0.11	S-425	0.22	S-435	0.46
S-403	2.07	S-416	1.17	S-426	0.19	S-436	0.07
S-404	0.02	S-417	0.09	S-427	0.21	S-437	0.25
S-405	0.22	S-418	0.09	S-428	0.13	S-438	0.10
S-406	0.54	S-420	0.11	S-430	0.11	S-441	0.16
S-407	1.20	S-421	0.18	S-431	0.14	S-442	0.79
S-408	0.06	S-422	0.47	S-432	0.11	S-443	1.66
S-411	0.67	S-423	0.60				

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HDR ENGINEERING, INC.
1201 S. ORLANDO AVENUE,
SUITE 200
WINTER PARK, FLORIDA 32789
PE LICENSE NUMBER: 51288

FLORIDA DEPARTMENT OF TRANSPORTATION

DRAINAGE MAP-S.R. 400 STA. 188+00 TO STA. 205+50

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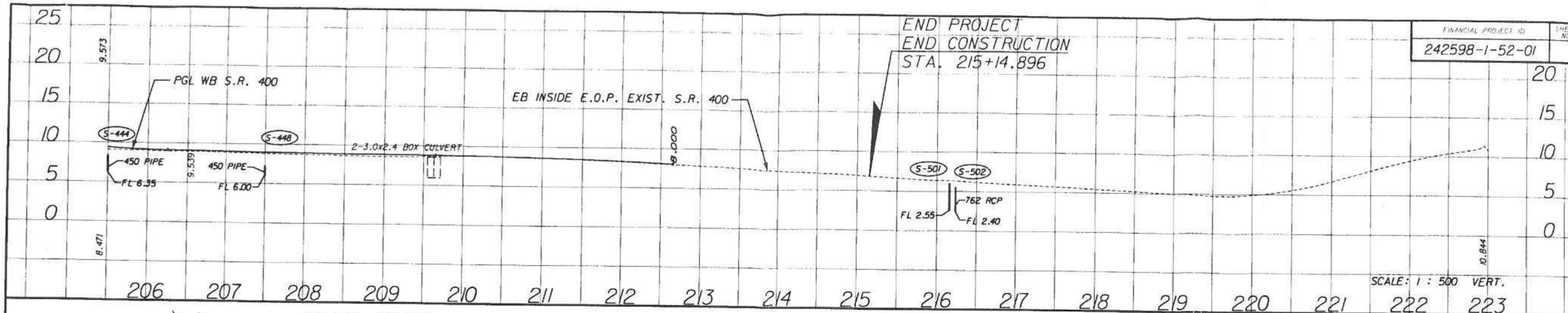

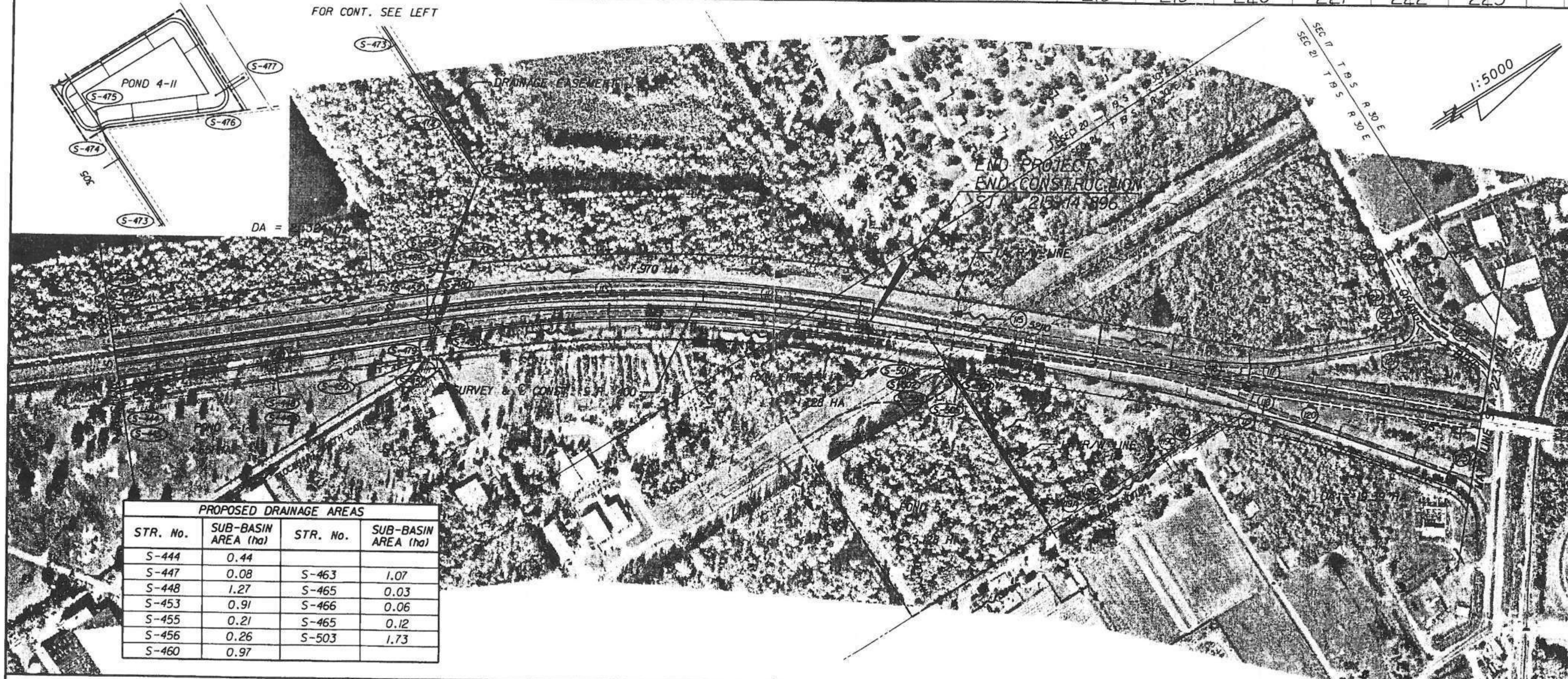

PROPOSED DRAINAGE AREAS			
STR. No.	SUB-BASIN AREA (ha)	STR. No.	SUB-BASIN AREA (ha)
S-444	0.44		
S-447	0.08	S-463	1.07
S-448	1.27	S-465	0.03
S-453	0.91	S-466	0.06
S-455	0.21	S-465	0.12
S-456	0.26	S-503	1.73
S-460	0.97		

FINANCIAL PROJECT ID 242598-1-52-01

REVISIONS: DATE | BY | DESCRIPTION

HDR ENGINEERING, INC.
1201 S. ORLANDO AVENUE, SUITE 200
WINTER PARK, FLORIDA 32789
PE LICENSE NUMBER: 5128

FLORIDA DEPARTMENT OF TRANSPORTATION

DRAINAGE MAP-S.R. 400
STA. 205+50 TO STA. 223+00

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Permit No. 22514-1

I-4 / CR 46A Interchange

SECTION I: INTRODUCTION

This report is the final drainage design for the proposed construction of an interchange connection between Interstate 4 and C.R. 46A, referenced hence forth as the project. The project consists of the construction of a combination diamond/partial cloverleaf interchange and the widening of C.R. 46A to a four lane divided urban roadway. The project is located in a largely undeveloped landlocked basin within the Wekiva River Basin in central Seminole County in the Florida Department of Transportation's District Five.

PROJECT DESCRIPTION

The existing condition consists of a two-lane bridge which carries C.R. 46A over Interstate 4 without a connection. The project will address the drainage of I-4 3400 feet north and 3000 feet south of C.R. 46A as well as 3810 feet of C.R. 46A. A portion of Rinehart Road will also contribute runoff to the design project basins. The project is located in Sections 5 and 6, Township 20S, Range 30E, and Sections 31 and 32, Township 19S, Range 30E, Seminole County, Florida. The location of the project is shown on Figure I-1, Location Map and Figure I-2, Vicinity Map.

The study area consists of 353.40 acres in the post-developed condition, which has been divided into seventeen basins designated A thru K; basins A, B, F, J and K represent more than one basin. The project area, basin A, A2, B, J and J2, consists of 133.67 acres. The study area consists of elevations ranging from 58.0' NGVD to 90.0' NGVD. The higher elevations are predominantly Type A soils, consisting of woods and meadow. The lower elevations consist of several small shallow lakes and depressions. The majority of the runoff drains to three existing depressions. A 24 inch cross-culvert is located across I-4 at Station 547+87, south of C.R. 46A which drains the west side of I-4 to the east side and into a small wetland, W1. The remaining two depressions are located along I-4, north of C.R. 46A. The wetland known as Loch Lehman is located in the northwest quadrant and wetland W4 is located in the north east quadrant. The two areas are connected by a 30-inch cross-culvert located at Station 563+86. Wetland W4 is an abandoned FDOT borrow pit dug during the initial construction of Interstate 4 in the early 1960's.

SECTION II: PROJECT SUMMARY

PRE-DEVELOPMENT ANALYSIS

There are two existing cross-culverts along I-4 within the project area. The first of these is a 24-inch RCP culvert located at Station 547+87 joining Basin A and Basin B. The runoff from basin A is collected in the existing roadside swale and conveyed through this cross-culvert to Wetland W1 in Basin B. The second is a 30-inch RCP cross-culvert which is located at Station 563+86. This culvert joins the east side of I-4, which is a discontinued borrow pit, to Loch Lehman located on the west side of I-4 in Basin I. A detailed analysis was performed with the aid of the routing program AdICPR. The following table is the pre-developed conditions summary for the basins located within the project boundaries. (See Figure II-1 for basin location map and Figure II-2 - Figure II-7 for the Pre-Development Nodal Diagram.)

TABLE II-1: Pre-Development Conditions Summary

BASIN	AREA (AC)	CN	Tc (MIN)	Q 100y/24h Discharge (CFS)	Stage (NGVD)	Q 25yr/96hr Discharge (CFS)	Stage (NGVD)
A	28.69	48.75	29.8	58.23	68.61	27.95	68.36
A2	1.88	82.34	10	53.81	79.02	23.58	79.01
B	17.49	55.27	50.4	0 *	66.05	0 *	67.13
B2	7.05	36	30.4	3.64	67.53	2.17	67.52
C	9.48	54.65	18.6	0 *	63.8	0 *	64.08
D	3.66	44.95	39.3	0 *	64.1	0 *	64.34
E	6.09	37.63	18.7	1.23	70.53	0.48	70.51
F	8.93	43.92	22.7	28.56	70.09	14.46	70.06
F2	7.86	46.63	21.3	16.54	76.11	7.55	76.06
G	16.27	57.73	17	0 *	68.11	0 *	68.36
H	61.87	55.04	21.7	0 *	72.39	0 *	72.61
I (Loch Lehman)	73.9	56.22	22.1	13.38	62.11	10.67	62.30
J (Borrow Pit)	57.89	73.84	41	0 *	62.11	0 *	62.30
K	14.87	47.45	26.9	3.23	65.03	1.27	65.02
K2	9.84	44.74	20.2	1.02	67.01	0.35	67.00
K3	12.89	63.38	44.3	0 *	71.32	0 *	71.40

* closed basin - no discharge

The computer model input data and output results are located in Appendix A of this report. The pre-development curve number and time of concentration worksheets are located in Section III.

POST-DEVELOPMENT ANALYSIS

The post-development condition consists of seventeen basins, designated A, A2, B, B2, C-F, F2, G-J, J2, K, K2 and K3. Refer to Figure II-8 for the basin location map for the post-development conditions and Figure II-9 through Figure II-14 for the Post-Development Nodal Diagram. The pre-development basins are modified for the post-development conditions. Post-Basin B is a combination of the pre-development basins B and 3.28 acres of pre-development basin C. Pre-Basin J is divided into two separate basins designated post-basins J and J2. The remaining basins coincide with the pre-development basin designations. (For further basin descriptions refer to Section IV.)

TABLE II-2: POST DEVELOPMENT LAND USE

LAND USE	CONTRIBUTING AREA (ac.)	CONTRIBUTING AREA (%)
PAVEMENT	34.78	26.02
WATER MANAGEMENT AREAS	18.22	13.63
GRASSED AREAS	76.30	57.08
WETLANDS (preserved)	4.37	3.27
TOTAL	133.67	100.00

The post-development analysis was completed on the basis of the I-4 initial plan which consists of widening C.R. 46A to a four lane divided urban roadway and constructing a combination diamond/partial clover leaf interchange between I-4 and C.R. 46A. The following Table II-3 summarizes the post-development conditions for each basin.

TABLE II-3: Post-Development Conditions Summary

BASIN	AREA (AC)	CN	Tc (MIN)	Q 100y/24h Discharge (CFS)	Stage (NGVD)	Q 25yr/96hr Discharge (CFS)	Stage (NGVD)
A (Pond A)	47.74	77.98	33.69	0 *	71.30	0*	71.52
A2	1.88	82.34	10	12.62	79.01	3.99	79.00
B (Pond B)	27.24	84.79	36.77	0 *	67.18	0 *	67.44
B2	7.05	36	30.4	0 *	67.06	0 *	67.04
C	6.2	61.53	18.6	0 *	66.09	0 *	66.30
D	3.79	44.95	39.3	0 *	64.17	0 *	64.42
E	5.56	36	18.7	5.05	70.07	3.06	70.05
F	4.95	36	22.7	0 *	69.43	0 *	69.67
F2	7.73	45.76	21.3	12.4	76.02	7.38	76.01
G	16.27	57.73	17	0 *	68.15	0 *	68.36
H	61.87	55.04	21.7	0 *	72.39	0 *	72.61
I (Loch Lehman)	66.4	58.29	22.1	17.85	61.37	12.82	61.56
J (Borrow Pit)	10.71	75.64	41	0 *	61.37	0 *	61.56
J2 (Pond C)	46.1	79.06	19.01	0 *	64.52	0 *	64.86
K	19.74	55.89	20.6	1.91	66.32	0.78	66.31
K2	7.28	36	20.2	0 *	66.19	0 *	66.33
K3	12.89	63.38	44.3	0 *	71.69	0 *	71.80

* Closed basin - no discharge

The computer model input data and output results are located in Appendix B of this report. The post-development curve number worksheets are located in Section IV.

The post-development drainage design consists of three wet retention ponds. The first is Pond A located in Basin A. This pond is 12.13 acres and is capable of storing 62.3 ac-ft of stormwater while maintaining a 1 foot maintenance berm. Pond A is connected to a storage area, 2.05 acres in size located south of Pond A, via a 24-inch RCP at elevation 69' NGVD. This area is capable of storing 3.48 ac-ft of stormwater (see Section IV, page IV-32) . The second pond is located in Basin B, designated Pond B. This pond is 6.44 acres and is capable of storing 33.88 ac-ft of stormwater while maintaining a 1 foot maintenance berm. Pond B is connected to a storage area, 1.35 acres in size located to the west of Pond B, via a 30-inch RCP at elevation 67' NGVD. This area is capable of storing 3.80 ac-ft of stormwater. The third pond is located in Basin J2 and is designated Pond C. This pond is 6.87 acres and is capable of storing 42.59 ac-ft of stormwater while maintaining a 1 foot maintenance berm.

SECTION IV: POST-DEVELOPED BASIN DESCRIPTIONS

BASIN DESCRIPTIONS

The post-development study consists of seventeen basins, designated A, A2, B, B2, C-F, F2, G-J, J2, K, K2 and K3 with a total post-development study basin area of 353.40 acres. Basins A, A2, B, B2, C, D and E are located south of C.R. 46A in the southwest and southeast quadrants in Sections 5 and 6, Township 20 S, Range 30 E. Basins F, F2, G, H, I, J, J2, K, K2 and K3 are located north of C.R. 46A in the northwest and northeast quadrants in Sections 31 and 32, Township 19 S, Range 30 E.

The proposed design of S.R. 417 (Greenway Improvements) impacts the drainage design of the I-4 and C.R. 46A improvements. The MEI is routing 1.94 acres of impervious area from the S.R. 417 project into Pond C. This area has been accounted for in the post-development Basin J. The remaining project area was treated according to post-development conditions. This I-4/C.R. 46A proposed project is scheduled to begin construction late next year, whereas the S.R. 417 project is scheduled for at least one year later. Therefore, the S.R. 417 project will consider the I-4/C.R. 46A project as existing conditions.

Basin A

Basin A is located south of C.R. 46A on the west side of I-4. The area is 47.74 acres consisting of 10.67 acres of impervious area. The impervious area consists of C.R. 46A from Station 224+40 to the middle of the C.R. 46A bridge crossing I-4 at Station 247+70.5 and I-4 south of C.R. 46A, from Station 524+00 to Station 545+00. Proposed construction through this basin includes Ramp A contributing and Ramp A1 contributing. A 12.13 acre wet retention pond, designated Pond A, is being proposed to provide water quality and attenuation for the new construction. In the proposed design, C.R. 46A will consist of closed drainage with the use of curb inlets and piping to be discharged in Pond A. I-4, Ramp A and Ramp A1 will consist of open drainage through the use of swales, also discharging to Pond A. Tc was found by determining the longest flow path in the proposed ditch and/or storm sewers. These calculations are shown in Appendix C.

Basin A2

Basin A2 is a 1.88 acre area of I-4 from Station 517+68 to Station 524+00. Station 524+00 is the breakpoint, high point, where the runoff flows to the north and south of this station. This area consists of 0.60 acres of impervious area. This area of the project will have water quality via the use of roadside swales. A ditch block one foot high allows for three inches of retention to meet the Wekiva River Basin criteria.

Basin B

Basin B is located south of C.R. 46A on the east side of I-4. The basin area is 27.24 acres consisting of 6.84 acres of impervious area. This basin is a combination of basin A, B, C and J from the pre-development conditions. The pre-development basin C which contributes to this basin is all pervious and includes wetland W2. A 6.44 acre wet retention pond is being proposed to provide water quality and attenuation for the new construction. I-4 contributes impervious area, from Station 524+00 to Station 553+80 and proposed construction includes Ramp B. Pond B will receive runoff from I-4 and Ramp B by means of open drainage through the use of swales. Tc was found by determining the longest flow path in the proposed ditch and/or storm sewers. These calculations are shown in Appendix C.

Wetlands W1 and W2 are impacted by the construction of this project. The area of impact consists of 1.54 acres of wetland W1 and 0.62 acres of wetland W2. Section VI of this report details the wetland impacts.

Basin B2

Basin B2 is equivalent to basin B2 in the pre-development analysis. This basin is included in the post-development model to determine the bank elevation of Pond B. In the pre-development conditions, basin B2 does not receive discharge from basin B during a 25 year - 96 hour storm event, therefore the post-development basin B2 must not receive runoff from basin B. The post-development analysis shows that Pond B does not overflow into basin B2.

Basin C

Basin C is in the same location as pre-basin C, although in the post-development conditions its area decreases to 6.20 acres because 3.28 acres of the pre-development basin C contributes to basin B in the post-development analysis. This basin includes a portion of wetland W2 mentioned above.

Basin D

Post-basin D is equivalent to basin D in the pre-development analysis, consisting of 3.79 acres of pervious area. This area was included in the post-development analysis to ensure that the pre-development conditions are not exceeded. During both a 100 year - 24 hour and a 25 year - 96 hour storm events basin D remains landlocked. Therefore the post-condition meets the criteria of the pre-condition.

Basin E

Basin E in the post-development condition is equivalent to basin E in the pre-development condition. This basin is included in the post-development model for the same reasoning mentioned above; pre-basin E does not discharge into pre-basin B2, therefore the same condition must be met, and is met, in the post-development model.

Basin F

Basin F in the post-development condition is similar to basin F in the pre-development condition, except, basin F in the post-development model does not include the 0.48 acres of impervious area from C.R. 46A which contributed in the pre-development condition. This impervious area contributes to basin A in the post-development model. A pervious area consisting of 2.72 acres is also directly connected to Basin A and does not contribute to Basin F in the post condition.

Basin F2

Basin F2 in the post development condition is similar to Basin F2 in the pre-development condition, except, the 0.13 acres of impervious from C.R. 46A contributes to Basin A in the post condition. Basin F2 also overflows to Basin A, Pond A, via a broad-crested weir in the post condition.

Basin J2

Basin J2 is located north of C.R. 46A in the northeast quadrant. This basin consists of onsite drainage on the west side of I-4. The basin area is 46.10 acres including I-4 north of C.R. 46A from Station 553+80 to Station 579+07, Rinehart Road south of C.R. 46A from Station 99+50 to Station 119+80, Rinehart Road north of C.R. 46A from Station 50+61 to Station 63+20 and C.R. 46A east of I-4 from Station 247+70.5 to Station 266+21 (WB) and Station 264+60 (EB). The proposed construction within this basin consists of Ramp C and the widening of C.R. 46A. A 6.87 acre wet retention pond is proposed to provide water quality and attenuation for the new construction. This pond is controlled by discharging to Basin J via a Type H inlet and sharp crested weir. In the proposed design, I-4 and Ramp C will have open drainage through the use of swales discharging into Pond C. Tc was found by determining the longest flow path in the proposed ditch and/or storm sewers. These calculations are shown in Appendix C.

The FDOT discontinued borrow pit, wetland W4 is located in this basin. The proposed construction impacts 0.75 acres of this wetland. Section VI of this report details the wetland impacts.

Basin K

The post-development basin K, 19.74 acres, is a combination of the pre-development basins K and a remnant of K2. Basin K2 contributes 2.56 acres of area due to the construction of Rinehart Road. This basin is included in the post-development model to ensure that in the post condition the basin does not exceed the pre-development 25 year - 96 hour maximum storm water discharge of 1.27 cfs to the adjacent outfall. This condition has been met, discharging at a maximum rate of 0.78 cfs into the adjacent outfall.

Basin Parameters

The SJRWMD criteria states that a wet retention stormwater management system shall provide a treatment volume for the first 1 inch of runoff or 2.5 inches of runoff over the impervious, whichever is greater. This project is located in the most effective recharge area of the Wekiva River Basin, therefore treatment volume must be provided for 3 inches of runoff over the impervious, if this volume is greater than the standard criteria mentioned above. Table II-4 illustrates the different treatment volumes required. The greatest value for each basin is the minimum treatment volume required for each wet retention system.

TABLE II-4: Required Treatment Volume Comparison

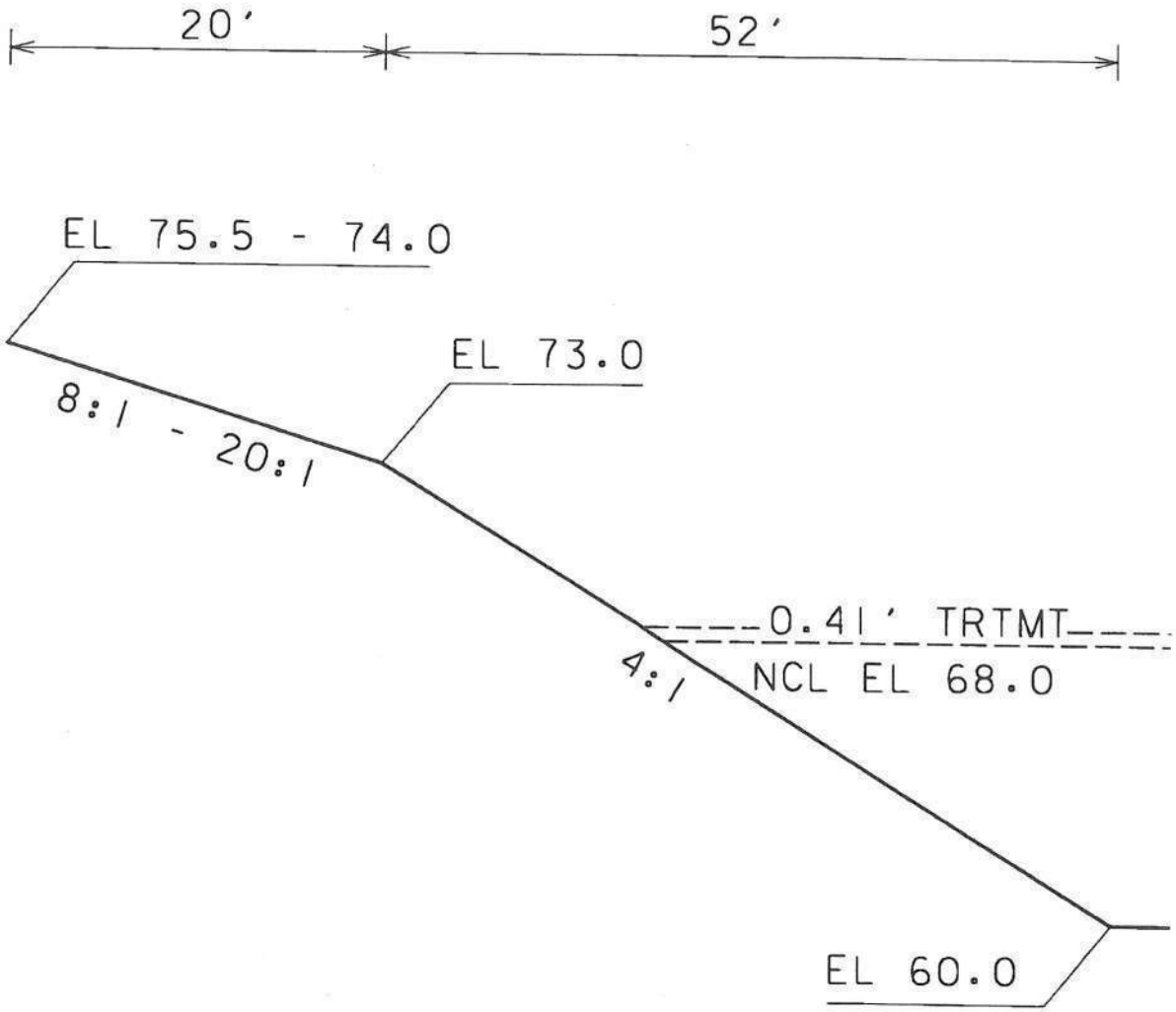
	BASIN / POND		
REQUIRED TREATMENT VOLUME	BASIN A / POND A	BASIN B / POND B	BASIN J2 / POND C
1" of runoff (ac-ft)	**3.98**	**2.27**	3.84
2.5" over the impervious (ac-ft	2.22	1.43	3.47
3" over the impervious (ac-ft)	2.68	1.71	**4.17**

* bold value designates greatest value

Pond A

Pond A is located in the Southwest quadrant in Basin A. This pond handles the water quality and attenuates for the increased runoff resulting from the new impervious area from Basin A. Basin F2 overflows to Pond A in the post condition via a broad-crested weir. Normal control for this pond is set at elevation 68' NGVD. The pond is set to overflow at elevation 73' NGVD to Basin B via a broad crested weir. In the post condition, Pond A and the storage area directly connected to Pond A stage to elevation 71.3' NGVD during a 100 year - 24 hour storm event and store 34.20 ac-ft of stormwater. Therefore, the pond does not overflow to Basin B during a 100 year - 24 hour storm event. Follows is the pond typical section (Figure II-15), the stage/storage relationship proposed, the permanent pool volume and the treatment volume.

WET RETENTION POND TYPICAL SECTION
POND A



I-4/CR 46A INT. DRAINAGE REPORT	POND DETAILS NTS	FIG. II-15	

ELEVATION - STORAGE VALUES

Prgm : DTBSIN6R.VOL

DETENTION BASIN DESIGN

03-24-1997

Name of Storage Basin : BASIN A - POND A

ELEVATION TOP STORAGE BASIN-FT ==> 73

ELEVATION BOT STORAGE BASIN - FT ==> 60

INCREMENTAL STAGE DEPTH - FT ==> 0.5

STORAGE BASIN AREA - ACRES AT TOP OF BASIN ==> 10.85

STORAGE BASIN PERIMETER @ TOP OF BASIN ==> 2717

AVERAGE SIDE SLOPE RATIO ==> 4

STAGE EL.	AREA-ACRES	STORAGE-AC FT	
60.00	7.610	0.00	
60.50	7.730	3.83	
61.00	7.860	7.73	
61.50	7.980	11.69	
62.00	8.110	15.71	
62.50	8.230	19.80	
63.00	8.360	23.94	
63.50	8.480	28.15	
64.00	8.600	32.42	
64.50	8.730	36.76	
65.00	8.850	41.15	
65.50	8.980	45.61	
66.00	9.100	50.13	
66.50	9.230	54.71	
67.00	9.350	59.36	
67.50	9.480	64.07	
68.00	9.600	68.84	NCL EL=68.0'
68.50	9.730	73.67	
69.00	9.850	78.56	
69.50	9.980	83.52	Water Quality Vol = 72.82 ac ft EL = 68.41'
70.00	10.100	88.54	
70.50	10.230	93.62	
71.00	10.350	98.77	
71.50	10.480	103.97	
72.00	10.600	109.24	
72.50	10.730	114.57	
73.00	10.850	119.97	

*** End of This Calculation ***

ELEVATION - STORAGE VALUES

Prgm : DTBSIN6R.VOL

DETENTION BASIN DESIGN

03-31-1997

Name of Storage Basin : BASIN A - POND A

ELEVATION TOP STORAGE BASIN-FT ==> 75

ELEVATION BOT STORAGE BASIN - FT ==> 73

INCREMENTAL STAGE DEPTH - FT ==> 0.5

STORAGE BASIN AREA - ACRES AT TOP OF BASIN ==> 12.13

STORAGE BASIN PERIMETER @ TOP OF BASIN ==> 2844

AVERAGE SIDE SLOPE RATIO ==> 9.8

STAGE EL.	AREA-ACRES	STORAGE-AC FT
73.00	10.850	0.00
73.50	11.170	5.51
74.00	11.490	11.17
74.50	11.810	17.00
75.00	12.130	22.98

*** End of This Calculation ***

FLORIDA DEPARTMENT OF TRANSPORTATION
WATER RETENTION AREA DESIGN
WET POND DESIGN
SJRWMD (40C-42)

15:38:52 03-25-1997

Pond A

Pond location _____
Designed by: _____ Sheet ___ of ___

INPUT DATA

TOTAL PROJECT DRAINAGE AREA (acres)	= 47.74
PROJECT IMPERVIOUS AREA (acres)	= 20.31
PROJECT PERVIOUS AREA (acres)	= 27.43
Rational Runoff Coef. 'C 'for (Impervious Areas)	= 0.95
Rational Runoff Coef. 'C 'for (Pervious Areas)	= 0.30
Nearest Record Rainfall Site Station	==> SANFORD
RAINFALL FOR WET SEASON MONTHS (INCHES) .	
JUNE= 6.38 JULY= 7.25 AUGUST= 7.11 SEPT.= 6.9	= 27.64
Annual Rainfall (average in inches)	= 51.14

VOLUME COMPUTATIONS

Minimum Pool Storage Requirements:	(ac. ft.)
Average 14 Day Residence Time Using Wet Season Avg.	7.3962
Average 14 Day Residence Time Using Annual Avg.	4.5615
Minimum Treatment Volume (1 Inch Over Drainage Area)	= 3.9783
Minimum Treatment Volume (2.5 Inches Over Imp. Area)	= 4.2312

MINIMUN DESIGN REQUIREMENTS

Minimum Total Permanent Pool Volume (Below Orifice)	= 7.3962
Storage Provided = 68.84 Ac.Ft.	
Minimum Treatment Volume (Between Orifice & Weir)	= 4.2312
Storage Provided = 62.30 Ac.Ft.	
TOTAL MINIMUM VOLUME REQUIRED	= 11.6274

Notes :
Rainfall Data From SJRWMD Tech. Pub SJ-86-4
SJRWMD METHOD(Residence Time = 14 Days / 120 Day Wet Season)
DER METHOD(Residence Time = 14 Days / 365 Day Year)
Minimum Treatment Volume = 1 inch Of Runoff

METRIC ENGINEERING INC.

PROJECT TITLE:	I-4 and CR 46A Interchange			
PROJECT NUMBER:	4.1063 Phase # 1300			
FILE NAME:	BasinA	SCALE (1" = _)	200	DATE
BASIN NAME:	A	MADE BY:	EMZ	17-Sep-96
BASIN ANALYSIS (PRE/POST):	Pre	CHECKED BY:	JY	9/20/96

SANTA BARBARA METHOD - PLANIMETER WORKSHEET

BASIN AREA LAND USE DESCRIPTIONS	PLANIMETER VALUES READING 1 (IN^2)	PLANIMETER VALUES READING 2 (IN^2)	AVG AREA (Ac)
ENTIRE BASIN			
ALL LAND SURFACES			
TOTAL BASIN AREA			
DIRECTLY CONNECTED IMPERVIOUS AREA (DCIA)			
BUILDING			
DRIVEWAY			
ROADWAY			
PAVEMENT (MISC.)			
WATER SURFACE			
TOTAL DCIA			
NON - DIRECTLY CONNECTED IMPERVIOUS AREA (NDCIA)			
BUILDING			
DRIVEWAY			
ROADWAY			
PAVEMENT (MISC.)			
TOTAL N - DCIA			

PERCENT DCIA	(TOTAL DCIA /TOTAL BASIN AREA)		
PERVIOUS AREA	(BASIN AREA -DCIA -NDCIA)	(Ac)	
CN AREA	(BASIN AREA - DCIA)	(Ac)	

LAND-USE	DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
woods - fair	fine sand	Myakka-EauG.	B/D	79	2.07	163.53
woods - fair	fine sand - 0-5% s	Tav. - Millhop.	A	36	11.96	430.56
pasture-fair	fine sand - 0-5% s	Tav. - Millhop.	A	49	12.90	632.10
roadway	impervious		A	98	1.76	172.48
				TOTALS	28.69	1398.67

COMPOSITE CN	**48.75**

METRIC ENGINEERING INC.

PROJECT TITLE:	I-4 and CR 46A Interchange			
PROJECT NUMBER:	4.1063 Phase # 1300			
FILE NAME:	POSTA (INITIAL PLAN)	SCALE (1" =)		DATE
BASIN NAME:	A	MADE BY:	EMZ	19-Sep-96
BASIN ANALYSIS (PRE/POST):	POST	CHECKED BY:		

SANTA BARBARA METHOD - PLANIMETER WORKSHEET

BASIN AREA LAND USE DESCRIPTIONS	PLANIMETER VALUES READING 1 (IN^2)	READING 2 (IN^2)	AVG AREA (Ac)
ENTIRE BASIN			
ALL LAND SURFACES			
TOTAL BASIN AREA			
DIRECTLY CONNECTED IMPERVIOUS AREA (DCIA)			
BUILDING			
DRIVEWAY			
ROADWAY			
PAVEMENT (MISC.)			
WATER SURFACE			
TOTAL DCIA			
NON - DIRECTLY CONNECTED IMPERVIOUS AREA (NDCIA)			
BUILDING			
DRIVEWAY			
ROADWAY			
PAVEMENT (MISC.)			
TOTAL N - DCIA			
PERCENT DCIA	(TOTAL DCIA /TOTAL BASIN AREA)		
PERVIOUS AREA	(BASIN AREA -DCIA -NDCIA)	(Ac)	
CN AREA	(BASIN AREA - DCIA)	(Ac)	

LAND-USE	DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
roadway	impervious area			98	9.28	909.44
ervious area	pervious area			75	25.73	1929.75
asture - fair	fine sand - 0-5%s	Tav. - Millhop.	A	49	5.56	272.44
pasture - fair	fine sand	Adam. - Sparr	C	79	1.79	141.41
				TOTALS	**42.36**	**3253.04**

COMPOSITE CN	**76.80**

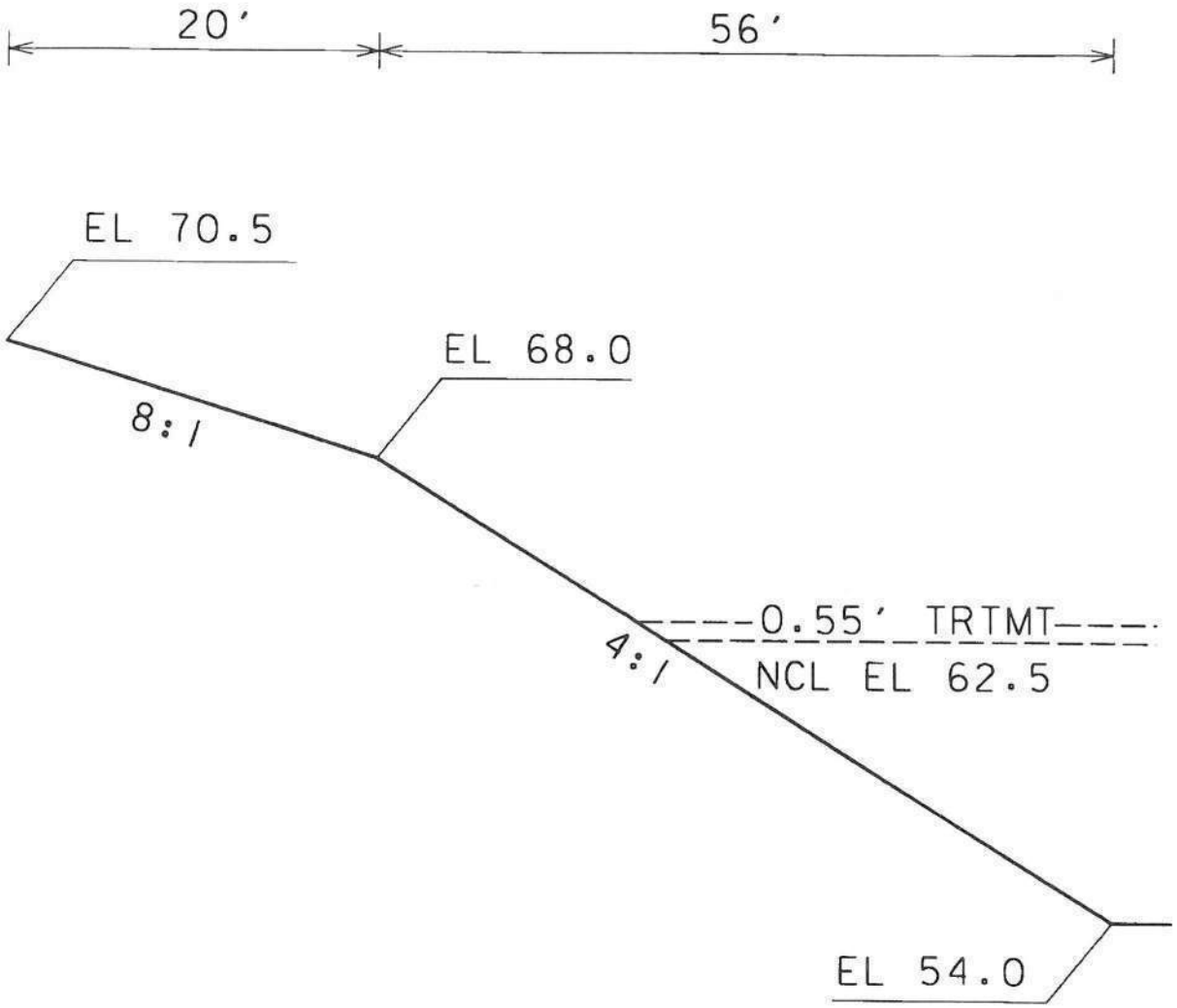
Pond B

Pond B has a post-development seasonal high ground water table of 62.5' NGVD. During the first 100 year storm event Pond B stages to 67.19' NGVD treating 21.55 ac-ft of stormwater runoff. The pond recovers to a depth of 66.39' NGVD in fourteen days. The pond does not completely recover within 14 days, therefore the volume of a second 100 year - 24 hour storm event was added to the remaining storage area to determine if the stormwater conveyance system could treat and store this runoff without flooding. The remaining storage area in Pond B after the first storm is 16.52 ac-ft between stages 66.39' NGVD and one foot below the maintenance berm at elevation 69.5' NGVD. The 100 year storm generates 21.55' ac-ft of runoff which requires storage. The difference in volume, 5.03 ac-ft, is routed to two locations. A storage area located west of Pond B is capable of storing 3.80 ac - ft Pond B and this area are connected via a 24-inch equalization pipe set at elevation 61' NGVD. The ditches located along the CD road, Interstate 4 and Ramp B are capable of storing 3.30 ac.ft. The total amount of available storage, including the 16.52 ac - ft remaining storage in Pond B, is 23.62 ac-ft The stormwater conveyance system is capable of treating and storing the volume generated by a second 100 year storm event 14 days following the first 100 year storm event. Therefore, the SJRWMD criteria has been met. Follows is the volume analysis calculations.

Pond B

Pond B is located in the Southeast quadrant in Basin B. This pond handles the water quality and attenuates for the increased runoff resulting from the new impervious area from Basin B. Normal control for this pond is set at elevation 62.5' NGVD. The pond is set to overflow at elevation 69.5' NGVD to Basin J2 via a broad crested weir. In the post condition, Pond B stages to elevation 67.19' NGVD during a 100 year- 24 hour storm event and stores 21.55 ac-ft of stormwater. Therefore, Pond B does not overflow to Basin J2 during a 100 year - 24 hour storm event. Follows is the pond typical section (Figure II-16), the stage/storage relationship proposed, the permanent pool volume and the treatment volume.

WET RETENTION POND TYPICAL SECTION
POND B



I-4/CR 46A INT. DRAINAGE REPORT	POND DETAILS NTS	FIG. II-16	

METRIC ENGINEERING INC.

PROJECT TITLE:	I-4 and CR 46A Interchange			
PROJECT NUMBER:	4.1063 Phase # 1300			
FILE NAME:	BasinB	SCALE (1" =__)	200	DATE
BASIN NAME:	B	MADE BY:	EMZ	17-Sep-96
BASIN ANALYSIS (PRE/POST):	Pre	CHECKED BY:	JY	9/20/96

SANTA BARBARA METHOD - PLANIMETER WORKSHEET

BASIN AREA LAND USE DESCRIPTIONS	PLANIMETER VALUES READING 1 (IN^2)	READING 2 (IN^2)	AVG AREA (Ac)
ENTIRE BASIN			
ALL LAND SURFACES			
TOTAL BASIN AREA			
DIRECTLY CONNECTED IMPERVIOUS AREA (DCIA)			
BUILDING			
DRIVEWAY			
ROADWAY			
PAVEMENT (MISC.)			
WATER SURFACE			
TOTAL DCIA			
NON - DIRECTLY CONNECTED IMPERVIOUS AREA (NDCIA)			
BUILDING			
DRIVEWAY			
ROADWAY			
PAVEMENT (MISC.)			
TOTAL N - DCIA			

PERCENT DCIA	(TOTAL DCIA /TOTAL BASIN AREA)		
PERVIOUS AREA	(BASIN AREA -DCIA -NDCIA)	(Ac)	
CN AREA	(BASIN AREA - DCIA)	(Ac)	

LAND-USE	DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
pond	fine sand	EauG. - Immok.	B/D	100	2.63	263.00
woods-fair	fine sand - 0-5% s	Tav. - Millhop.	A	36	12.14	437.04
roadway	impervious		A	98	2.72	266.56
				TOTALS	17.49	966.60

COMPOSITE CN	55.27

III - 9

ELEVATION - STORAGE VALUES

Prgm : DTBSIN6R.VOL

DETENTION BASIN DESIGN

03-25-1997

Name of Storage Basin : BASIN B - POND B

ELEVATION TOP STORAGE BASIN-FT ==> 68

ELEVATION BOT STORAGE BASIN - FT ==> 54

INCREMENTAL STAGE DEPTH - FT ==> 0.5

STORAGE BASIN AREA - ACRES AT TOP OF BASIN ==> 5.27

STORAGE BASIN PERIMETER @ TOP OF BASIN ==> 2423

AVERAGE SIDE SLOPE RATIO ==> 4

STAGE EL.	AREA-ACRES	STORAGE-AC FT
54.00	2.160	0.00
54.50	2.270	1.11
55.00	2.380	2.27
55.50	2.490	3.48
56.00	2.600	4.76
56.50	2.710	6.08
57.00	2.820	7.47
57.50	2.930	8.91
58.00	3.050	10.40
58.50	3.160	11.95
59.00	3.270	13.56
59.50	3.380	15.22
60.00	3.490	16.94
60.50	3.600	18.71
61.00	3.710	20.54
61.50	3.820	22.42
62.00	3.940	24.36
62.50	4.050	26.36 NCL EL = 62.5'
63.00	4.160	28.41
63.50	4.270	30.51 Water Quality Vol. = 28.63 ac-ft
64.00	4.380	32.68 EL = 63.05
64.50	4.490	34.89
65.00	4.600	37.17
65.50	4.710	39.50
66.00	4.830	41.88
66.50	4.940	44.32
67.00	5.050	46.82
67.50	5.160	49.37
68.00	5.270	51.98

*** End of This Calculation ***

ELEVATION - STORAGE VALUES

Prgm : DTBSIN6R.VOL

DETENTION BASIN DESIGN

03-25-1997

Name of Storage Basin : BASIN B - POND B

ELEVATION TOP STORAGE BASIN-FT ==> 70.5

ELEVATION BOT STORAGE BASIN - FT ==> 68

INCREMENTAL STAGE DEPTH - FT ==> 0.5

STORAGE BASIN AREA - ACRES AT TOP OF BASIN ==> 6.44

STORAGE BASIN PERIMETER @ TOP OF BASIN ==> 2897

AVERAGE SIDE SLOPE RATIO ==> 8

STAGE EL.	AREA-ACRES	STORAGE-AC FT
68.00	5.110	0.00
68.50	5.380	2.62
69.00	5.640	5.38
69.50	5.910	8.26
70.00	6.170	11.28
70.50	6.440	14.44

*** End of This Calculation ***

METRIC ENGINEERING INC.

PROJECT TITLE:	I-4 and CR 46A Interchange			
PROJECT NUMBER:	4.1063 Phase # 1300			
FILE NAME:	BasinB	SCALE (1" = __)	200	DATE
BASIN NAME:	B	MADE BY:	EMZ	17-Sep-96
BASIN ANALYSIS (PRE/POST):	Pre	CHECKED BY:	JY	9/20/96

SANTA BARBARA METHOD - PLANIMETER WORKSHEET

BASIN AREA LAND USE DESCRIPTIONS	PLANIMETER VALUES READING 1 (IN^2)	PLANIMETER VALUES READING 2 (IN^2)	AVG AREA (Ac)
ENTIRE BASIN			
ALL LAND SURFACES			
TOTAL BASIN AREA			
DIRECTLY CONNECTED IMPERVIOUS AREA (DCIA)			
BUILDING			
DRIVEWAY			
ROADWAY			
PAVEMENT (MISC.)			
WATER SURFACE			
TOTAL DCIA			
NON - DIRECTLY CONNECTED IMPERVIOUS AREA (NDCIA)			
BUILDING			
DRIVEWAY			
ROADWAY			
PAVEMENT (MISC.)			
TOTAL N - DCIA			

PERCENT DCIA	(TOTAL DCIA /TOTAL BASIN AREA)		
PERVIOUS AREA	(BASIN AREA -DCIA -NDCIA)	(Ac)	
CN AREA	(BASIN AREA - DCIA)	(Ac)	

LAND-USE	DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
pond	fine sand	EauG. - Immok.	B/D	100	2.63	263.00
woods-fair	fine sand - 0-5% s	Tav. - Millhop.	A	36	12.14	437.04
roadway	impervious		A	98	2.72	266.56
				TOTALS	17.49	966.60

COMPOSITE CN	55.27

METRIC ENGINEERING INC.

ROJECT TITLE:	I-4 and CR 46A Interchange			
PROJECT NUMBER:	4.1063 Phase # 1300			
FILE NAME:	POSTB (INITIAL PLAN)	SCALE (1" =)		DATE
BASIN NAME:	B	MADE BY:	EMZ	19-Sep-96
BASIN ANALYSIS (PRE/POST):	POST	CHECKED BY:		

SANTA BARBARA METHOD - PLANIMETER WORKSHEET

BASIN AREA LAND USE DESCRIPTIONS	PLANIMETER VALUES READING 1 (IN^2)	READING 2 (IN^2)	AVG AREA (Ac)
ENTIRE BASIN			
ALL LAND SURFACES			
TOTAL BASIN AREA			
DIRECTLY CONNECTED IMPERVIOUS AREA (DCIA)			
BUILDING			
DRIVEWAY			
ROADWAY			
PAVEMENT (MISC.)			
WATER SURFACE			
TOTAL DCIA			
NON - DIRECTLY CONNECTED IMPERVIOUS AREA (NDCIA)			
BUILDING			
DRIVEWAY			
ROADWAY			
PAVEMENT (MISC.)			
TOTAL N - DCIA			
PERCENT DCIA	(TOTAL DCIA /TOTAL BASIN AREA)		
PERVIOUS AREA	(BASIN AREA -DCIA -NDCIA) (Ac)		
CN AREA	(BASIN AREA - DCIA) (Ac)		

LAND-USE	DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
roadway	impervious area			98	5.05	494.90
pervious area	pervious area			75	16.73	1254.75
pasture - fair	fine sand	Adam. - Sparr	C	79	0.59	46.61
				TOTALS	22.37	1796.26

COMPOSITE CN	**80.30**

Pond C

Pond C is located in the Northeast quadrant in Basin J2. This pond handles the water quality and attenuates for the increased runoff resulting from the new impervious area from Basin J2. Normal control for this pond is set at elevation 58' NGVD. The pond overflows at elevation 66.0' NGVD to Basin J, the FDOT borrow pit, via a broad crested weir. In the post condition, Pond C stages to 64.52' NGVD during a 100 year - 24 hour storm event and stores 33.59 ac-ft of stormwater. Therefore, Pond C does not overflow to the borrow pit, Basin J, during a 100 year- 24 hour storm event. Follows is the pond typical section (Figure II-17), the stage/storage relationship proposed, the permanent pool volume and the treatment volume.

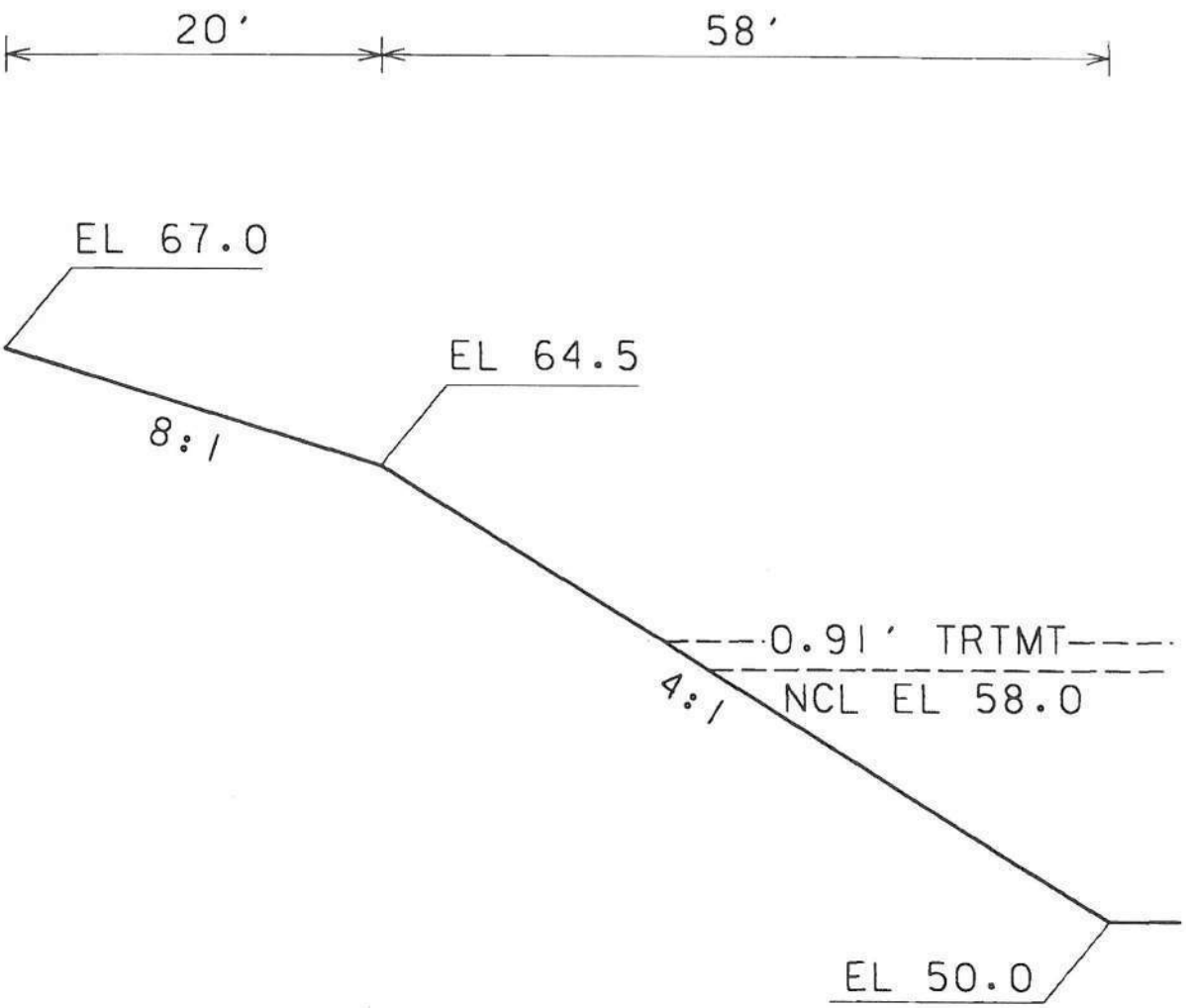
Basin J (FDOT borrow pit) and Basin I (Loch Lehman) are connected via a 30" equalization pipe. This pipe is an extension to an existing cross-culvert located under I-4 at Station 563+90. This model was analyzed using AdICPR. Appendix B contains the post-development computer input and output of the 100 year - 24 hour storm event and the 25 year - 96 hour storm event.

Pond C

Pond C has a post-development seasonal high ground water table of 58' NGVD. During the first 100 year storm event Pond C stages to 64.52' NGVD treating 33.59 ac-ft of stormwater runoff. The pond recovers to a depth of 63.12' NGVD in fourteen days. The pond does not completely recover within 14 days, therefore the volume of a second 100 year - 24 hour storm event was added to the remaining storage area to determine if the stormwater conveyance system could treat and store this runoff without flooding. The remaining storage area in Pond C after the first storm is 17.15 ac-ft between stages 63.12' NGVD and one foot below the maintenance berm at elevation 66' NGVD. The 100 year storm generates 33.59 ac-ft of runoff which requires storage. The difference in volume, 16.44 ac-ft, is routed to five different locations.

An 7.53 ac-ft volume is excavated for floodplain compensation which can treat and store runoff. The difference between the pre/post volume for Loch Lehman and the FDOT Borrow Pit is 4.68 ac-ft and 2.42 ac-ft, respectively. Runoff may be treated and stored in these areas. There is 2.36 ac-ft of storage in the Rinehart Road ditches located east of Pond C and 2.24 ac-ft of storage in the Ramp C ditches located west of Pond C. The total amount of available storage, including the 17.15 ac-ft remaining storage in Pond C, is 36.38 ac-ft. The stormwater conveyance system is capable of treating and storing the volume generated by a second 100 year storm event 14 days following the first 100 year storm event. Therefore, the SJRWMD criteria has been met. Follows is the volume analysis calculations.

WET RETENTION POND TYPICAL SECTION
POND C



I-4/CR 46A INT. DRAINAGE REPORT	POND DETAILS NTS	FIG. II-17	

METRIC ENGINEERING INC.

PROJECT TITLE:	I-4 and CR 46A Interchange			
PROJECT NUMBER:	4.1063 Phase # 1300			
FILE NAME:	BasinC	SCALE (1" = __)	200	DATE
BASIN NAME:	C	MADE BY:	EMZ	17-Sep-96
BASIN ANALYSIS (PRE/POST):	Pre	CHECKED BY:	JY	9/20/96

SANTA BARBARA METHOD - PLANIMETER WORKSHEET

BASIN AREA LAND USE DESCRIPTIONS	PLANIMETER VALUES READING 1 (IN^2)	READING 2 (IN^2)	AVG AREA (Ac)
ENTIRE BASIN			
ALL LAND SURFACES			
TOTAL BASIN AREA			
DIRECTLY CONNECTED IMPERVIOUS AREA (DCIA)			
BUILDING			
DRIVEWAY			
ROADWAY			
PAVEMENT (MISC.)			
WATER SURFACE			
TOTAL DCIA			
NON - DIRECTLY CONNECTED IMPERVIOUS AREA (NDCIA)			
BUILDING			
DRIVEWAY			
ROADWAY			
PAVEMENT (MISC.)			
TOTAL N - DCIA			

PERCENT DCIA	(TOTAL DCIA /TOTAL BASIN AREA)	
PERVIOUS AREA	(BASIN AREA -DCIA -NDCIA)	(Ac)
CN AREA	(BASIN AREA - DCIA)	(Ac)

LAND-USE	DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA	PRODUCT
pond	fine sand	EauG. - Immok.	B/D	100	0.66	66.00
woods-fair	fine sand	EauG. - Immok.	B/D	79	3.13	247.27
woods-fair	fine sand - 0-5% s	Tav. - Millhop.	A	36	1.65	59.40
woods-fair	fine sand - 0-5% s	Astat. - Apopka	A	36	4.04	145.44
				TOTALS	**9.48**	**518.11**

COMPOSITE CN	**54.65**

ELEVATION - STORAGE VALUES

Prgm : DTBSIN6R.VOL

DETENTION BASIN DESIGN

03-25-1997

Name of Storage Basin : BASIN J2 - POND C

ELEVATION TOP STORAGE BASIN-FT ==> 64.5

ELEVATION BOT STORAGE BASIN - FT ==> 50

INCREMENTAL STAGE DEPTH - FT ==> 0.5

STORAGE BASIN AREA - ACRES AT TOP OF BASIN ==> 5.82

STORAGE BASIN PERIMETER @ TOP OF BASIN ==> 2223

AVERAGE SIDE SLOPE RATIO ==> 4

STAGE EL.	AREA-ACRES	STORAGE-AC FT	
50.00	2.860	0.00	
50.50	2.960	1.46	
51.00	3.060	2.96	
51.50	3.170	4.52	
52.00	3.270	6.13	
52.50	3.370	7.79	
53.00	3.470	9.50	
53.50	3.570	11.26	
54.00	3.680	13.07	
54.50	3.780	14.94	
55.00	3.880	16.85	
55.50	3.980	18.82	
56.00	4.080	20.83	
56.50	4.190	22.90	
57.00	4.290	25.02	
57.50	4.390	27.19	
58.00	4.490	29.41	NCL EL=58.0'
58.50	4.600	31.68	
59.00	4.700	34.01	Water Quality Vol = 33.58 ac -
59.50	4.800	36.38	EL = 58.91'
60.00	4.900	38.81	
60.50	5.000	41.28	
61.00	5.110	43.81	
61.50	5.210	46.39	
62.00	5.310	49.02	
62.50	5.410	51.70	
63.00	5.510	54.43	
63.50	5.620	57.21	
64.00	5.720	60.05	
64.50	5.820	62.93	

*** End of This Calculation ***

ELEVATION - STORAGE VALUES

Prgm : DTBSIN6R.VOL

DETENTION BASIN DESIGN

03-25-1997

Name of Storage Basin : BASIN J2 - POND C

ELEVATION TOP STORAGE BASIN-FT ==> 67

ELEVATION BOT STORAGE BASIN - FT ==> 64.5

INCREMENTAL STAGE DEPTH - FT ==> 0.5

STORAGE BASIN AREA - ACRES AT TOP OF BASIN ==> 6.8

STORAGE BASIN PERIMETER @ TOP OF BASIN ==> 2348

AVERAGE SIDE SLOPE RATIO ==> 8

STAGE EL.	AREA-ACRES	STORAGE-AC FT
64.50	5.720	0.00
65.00	5.940	2.91
65.50	6.150	5.94
66.00	6.370	9.07
66.50	6.580	12.31
67.00	6.800	15.65

*** End of This Calculation ***

FLORIDA DEPARTMENT OF TRANSPORTATION
WATER RETENTION AREA DESIGN
WET POND DESIGN
SJRWMD (40C-42)

Pond C 15:40:45 03-25-1997

Pond location _____
Designed by:_____ Sheet ___of ___

INPUT DATA

TOTAL PROJECT DRAINAGE AREA (acres)	=	46.10
PROJECT IMPERVIOUS AREA (acres)	=	21.22
PROJECT PERVIOUS AREA (acres)	=	24.88
Rational Runoff Coef. 'C 'for (Impervious Areas)	=	0.95
Rational Runoff Coef. 'C 'for (Pervious Areas)	=	0.30
Nearest Record Rainfall Site Station ==> SANFORD		
RAINFALL FOR WET SEASON MONTHS (INCHES) .		
JUNE= 6.38 JULY= 7.25 AUGUST= 7.11 SEPT.= 6.9	=	27.64
Annual Rainfall (average in inches)	=	51.14

VOLUME COMPUTATIONS

Minimum Pool Storage Requirements:	(ac. ft.)
Average 14 Day Residence Time Using Wet Season Avg.	7.4229
Average 14 Day Residence Time Using Annual Avg.	4.5780

Minimum Treatment Volume (1 Inch Over Drainage Area)	=	3.8417
Minimum Treatment Volume (2.5 Inches Over Imp. Area)	=	4.4208

MINIMUN DESIGN REQUIREMENTS

Minimum Total Permanent Pool Volume (Below Orifice)	=	7.4229
Storage Provided = 29.41 Ac.Ft.		
Minimum Treatment Volume (Between Orifice & Weir)	=	4.4208
Storage Provided = 42.59 Ac.Ft.		
TOTAL MINIMUM VOLUME REQUIRED	=	11.8437

Notes :
Rainfall Data From SJRWMD Tech. Pub SJ-86-4
SJRWMD METHOD(Residence Time = 14 Days / 120 Day Wet Season)
DER METHOD(Residence Time = 14 Days / 365 Day Year)
Minimum Treatment Volume = 1 inch Of Runoff

METRIC ENGINEERING, INC.
ENGINEERS, PLANNERS, SURVEYORS

JOB I-4 and C.R. 46A: Pre-Development
SHEET No. Nodal Diagram OF
CALCULATED BY EMZ DATE 08/12/96
CHECKED BY DATE

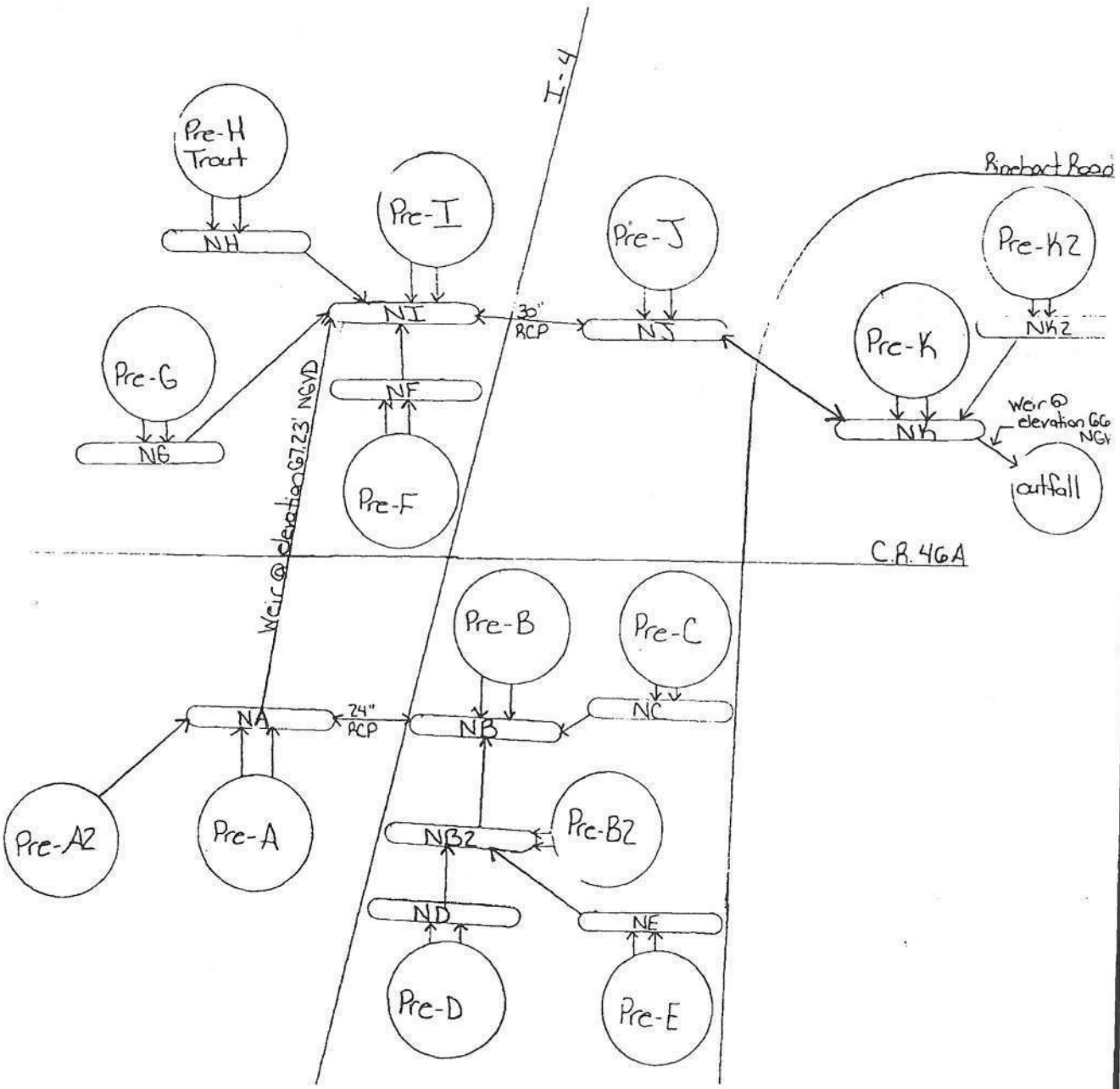


FIGURE II-2: Pre-Development Nodal Diagram

II-2

METRIC ENGINEERING, INC.
ENGINEERS, PLANNERS, SURVEYORS

JOB I-4 and C.R. 46A: Post-Development
SHEET No. Nodal Diagram OF
CALCULATED BY EMZ DATE 08/12/96
CHECKED BY JY DATE 9/20/96

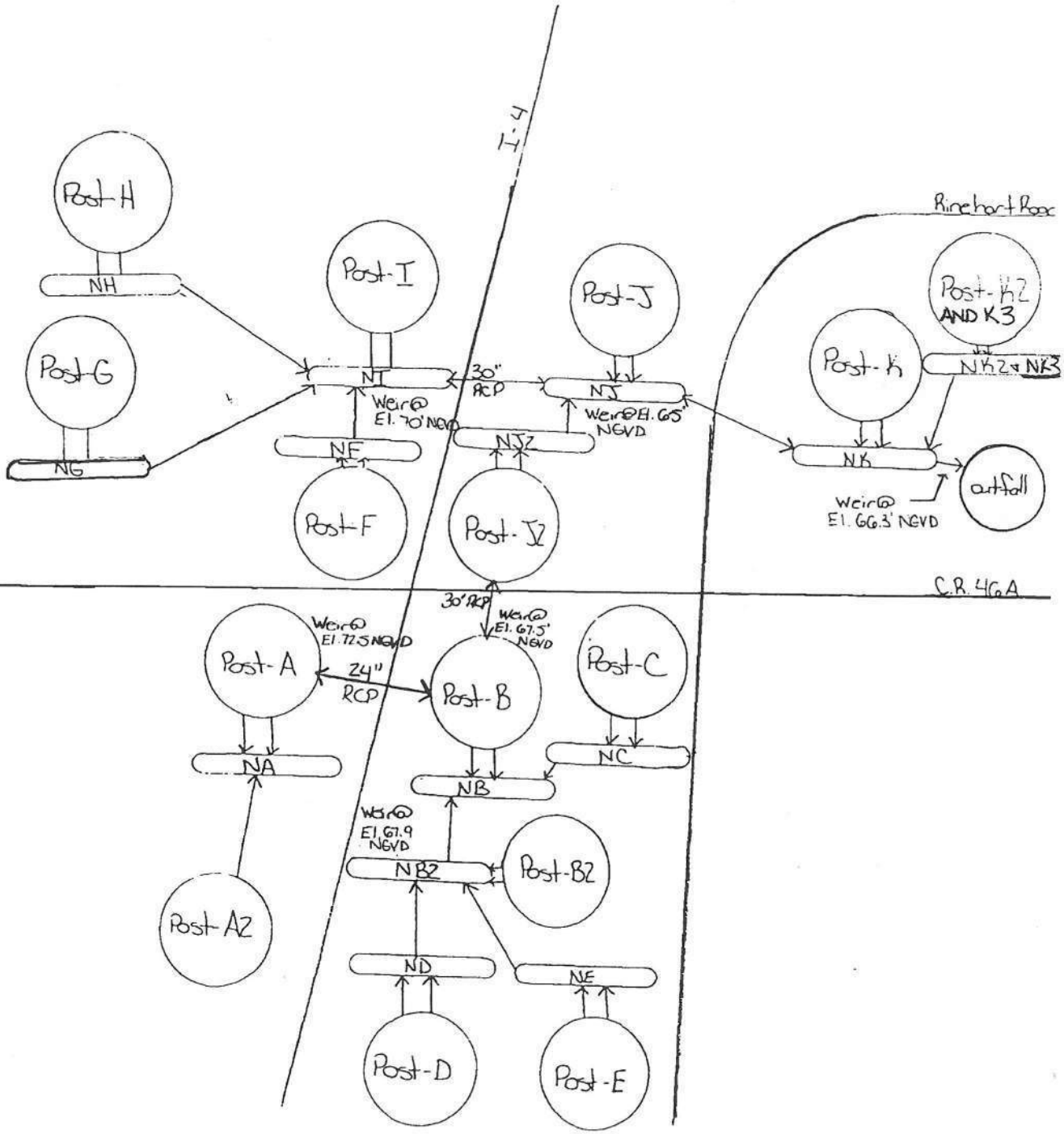


FIGURE II-4: Post-Development Nodal Diagram

Receiving Water Bodies

There are two major receiving water bodies located in this landlocked basin: Loch Lehman and the FDOT Borrow. The stormwater conveyance system is designed for Pond A to overflow to Pond B via a broad crested weir at elevation 73' NGVD. Pond B is designed to overflow to Pond C via a broad crested weir at elevation 69.5' NGVD. Pond C is designed to overflow to the discontinued FDOT Borrow Pit, Wetland 4, via a broad crested weir at elevation 66.0' NGVD. During the first 100 year - 24 hour storm event neither of the three ponds overflow. Due to the Ponds not recovering within 14 days, a second 100 year - 24 hour storm is applied to determine the Basins' volume capabilities. During this storm event, Pond A and B do not overflow, and Pond C overflows to the FDOT Borrow Pit, Wetland 4. This major receiving water body and Loch Lehman are connected by a 30" equalization cross-culvert which runs under Interstate 4.

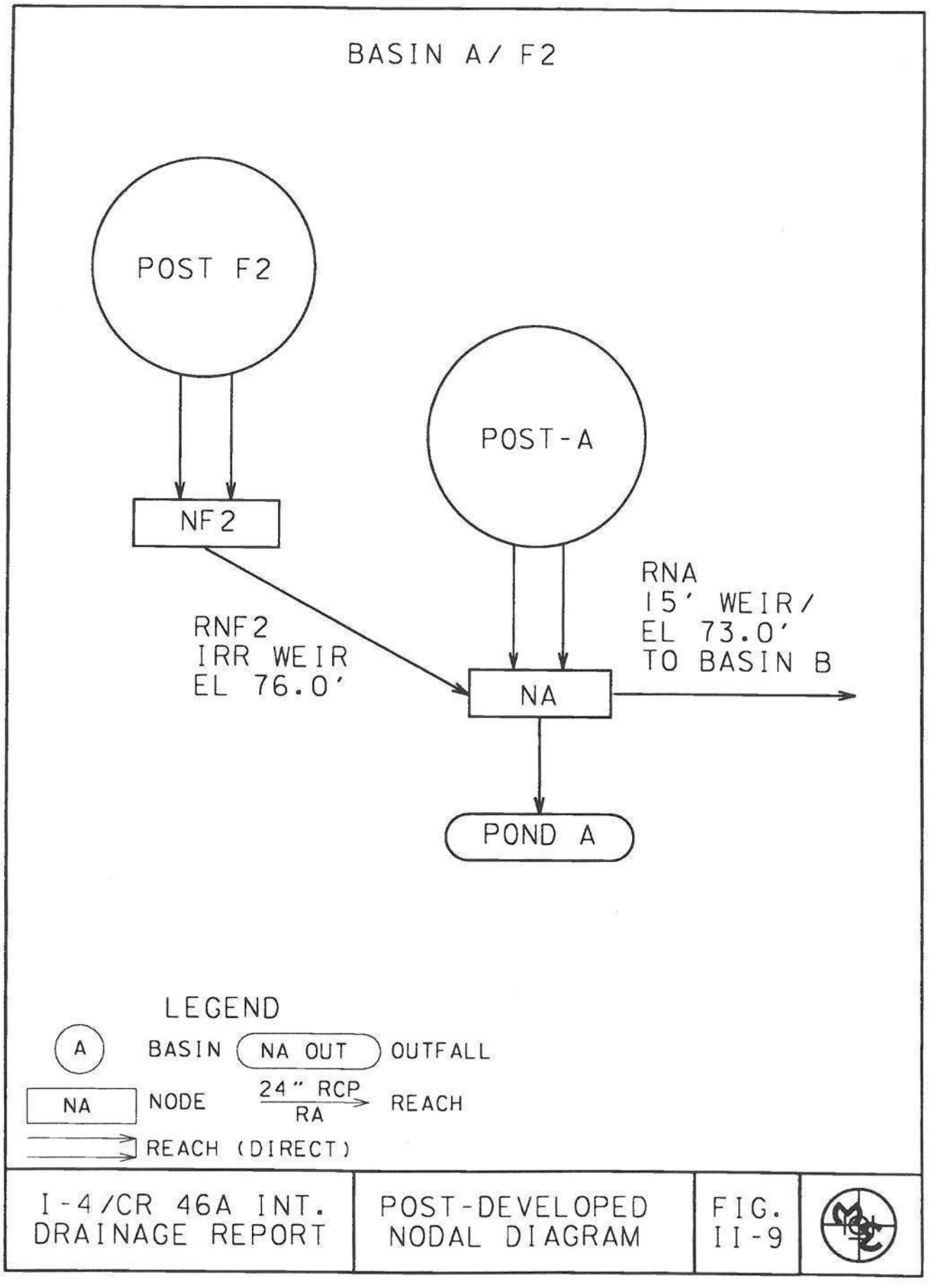
The project site is landlocked and therefore does not have a positive outfall. The SJRWMD indicates that for a landlocked basin, the post-development volume of direct runoff may not exceed the pre-development volume of direct runoff for the 25 year - 96 hour storm event. A volume analysis was performed to determine if the above criteria is met. The following table illustrates the results of this analysis.

TABLE A1: Pre/Post Volume Analysis - 25 year/96 hour storm

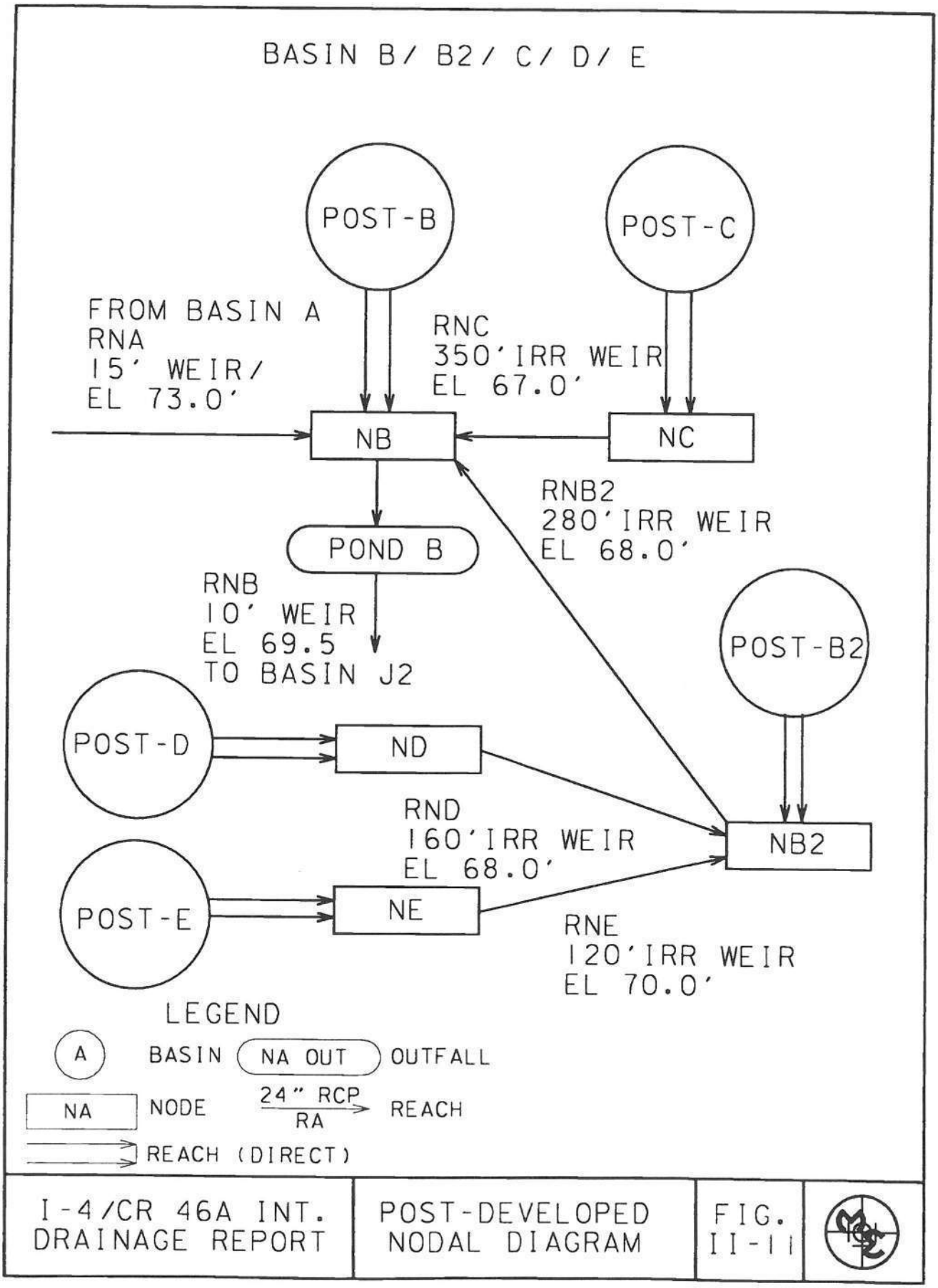
Water Body	Pre-Development Stage (ft. NGVD)	Pre-Development Storage Volume (ac-ft)	Post-Development Stage (ft. NGVD)	Post-Development Storage Volume (ac-ft)	Difference in Volume (ac-ft)
Loch Lehman	61.96	38.83	61.56	35.34	+ 3.49
FDOT Borrow Pit	61.96	20.25	61.56	17.91	+ 2.34

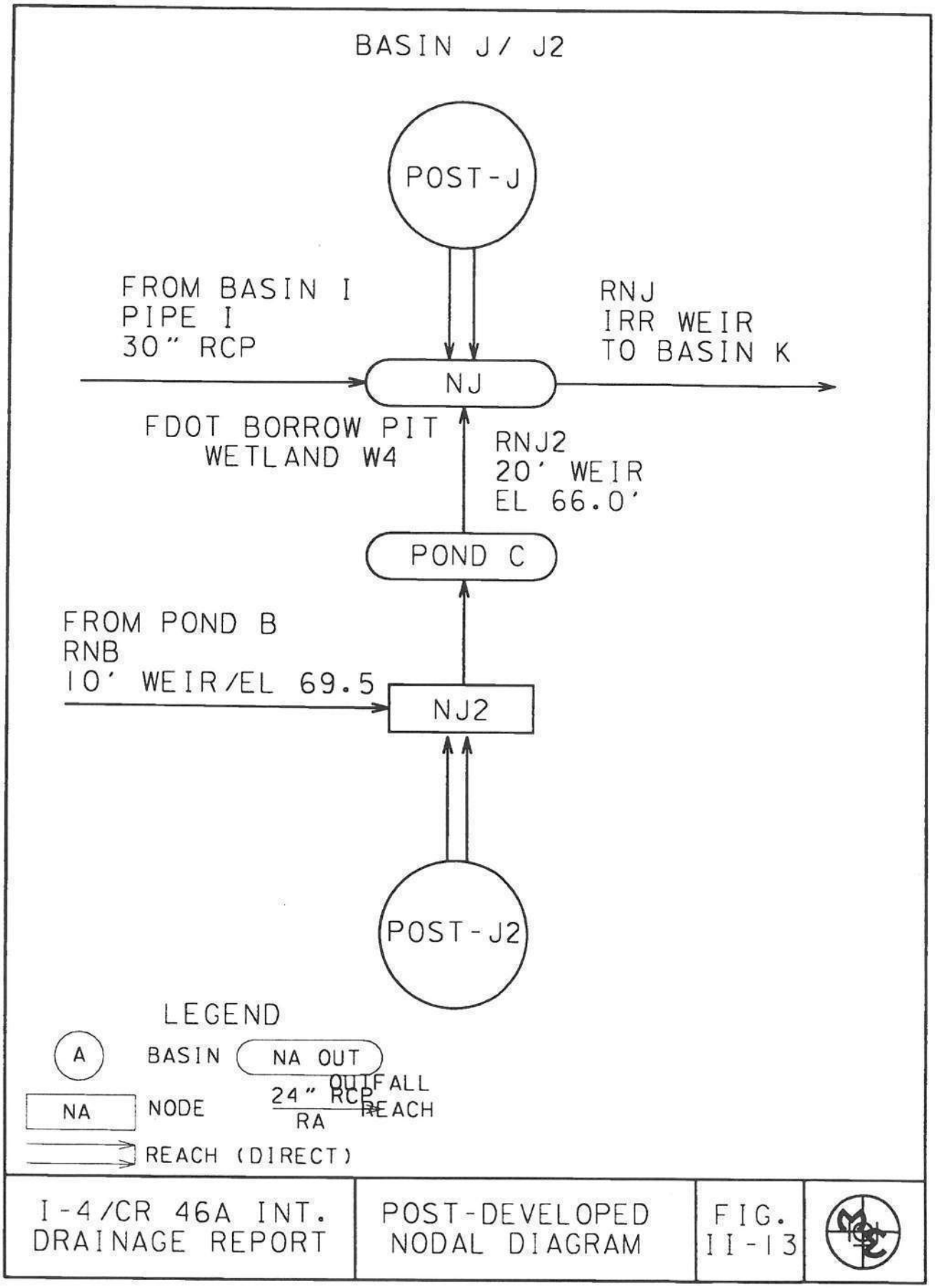
(+) indicates volume surplus
(-) indicates volume shortage

The above table indicates that the pre-development/post-development requirement has not been exceeded. The post-development volume of direct runoff does not exceed the pre-development volume of direct runoff. Therefore, the SJRWMD criteria has been met. Attached are the calculations to support these results.

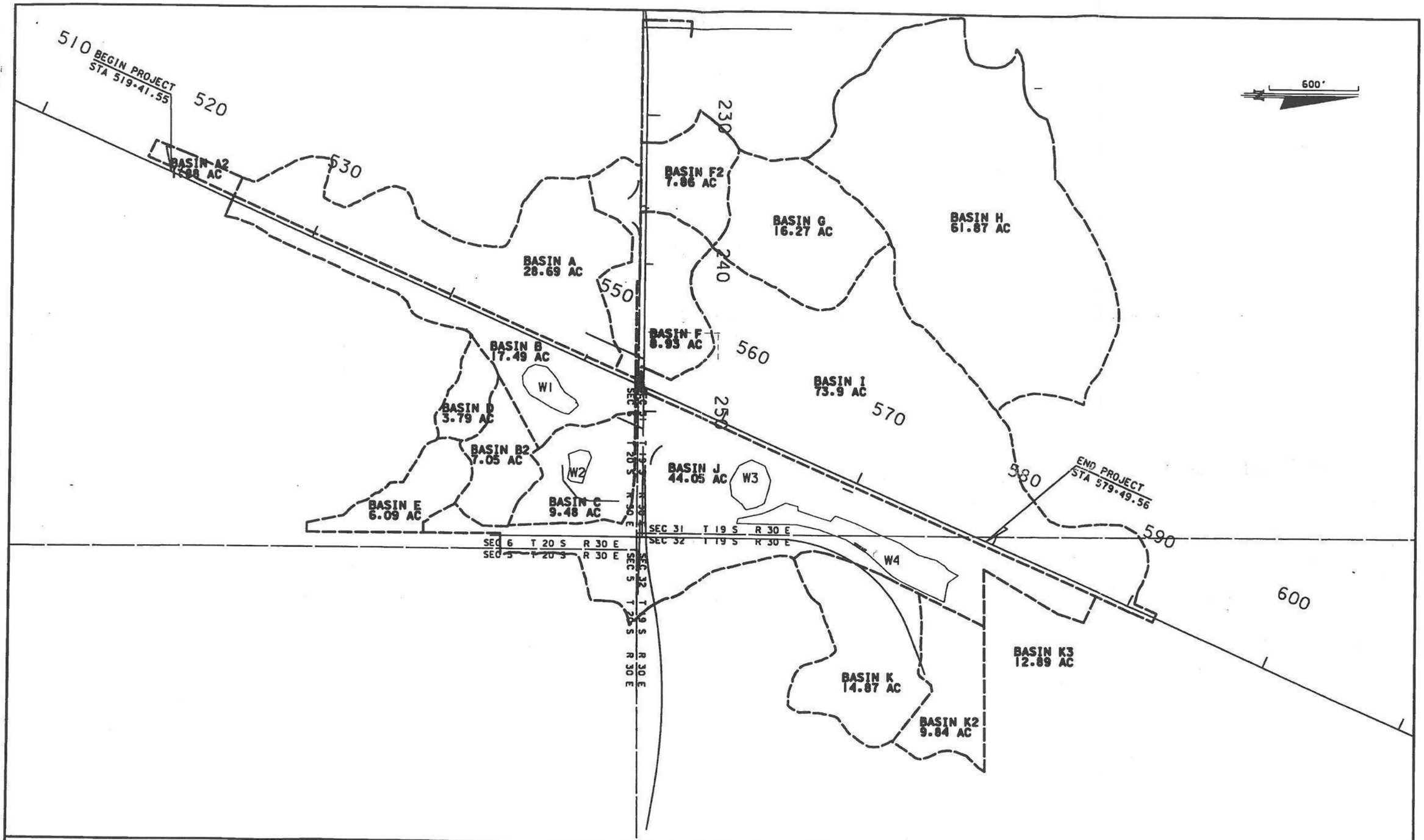


I-4/CR 46A INT. DRAINAGE REPORT	POST-DEVELOPED NODAL DIAGRAM	FIG. II-9	


BASIN B/ B2/ C/ D/ E
POST-B
POST-C
FROM BASIN A
RNA
15' WEIR/
EL 73.0'
RNC
350'IRR WEIR
EL 67.0'
NB
NC
RNB2
280'IRR WEIR
EL 68.0'
POND B
RNB
10' WEIR
EL 69.5
TO BASIN J2
POST-B2
POST-D
ND
RND
160'IRR WEIR
EL 68.0'
NB2
POST-E
NE
RNE
120'IRR WEIR
EL 70.0'
LEGEND
A
BASIN
NA OUT
OUTFALL
NA
NODE
24" RCP
RA
REACH
REACH (DIRECT)
I-4/CR 46A INT.
DRAINAGE REPORT
POST-DEVELOPED
NODAL DIAGRAM
FIG.
II-11



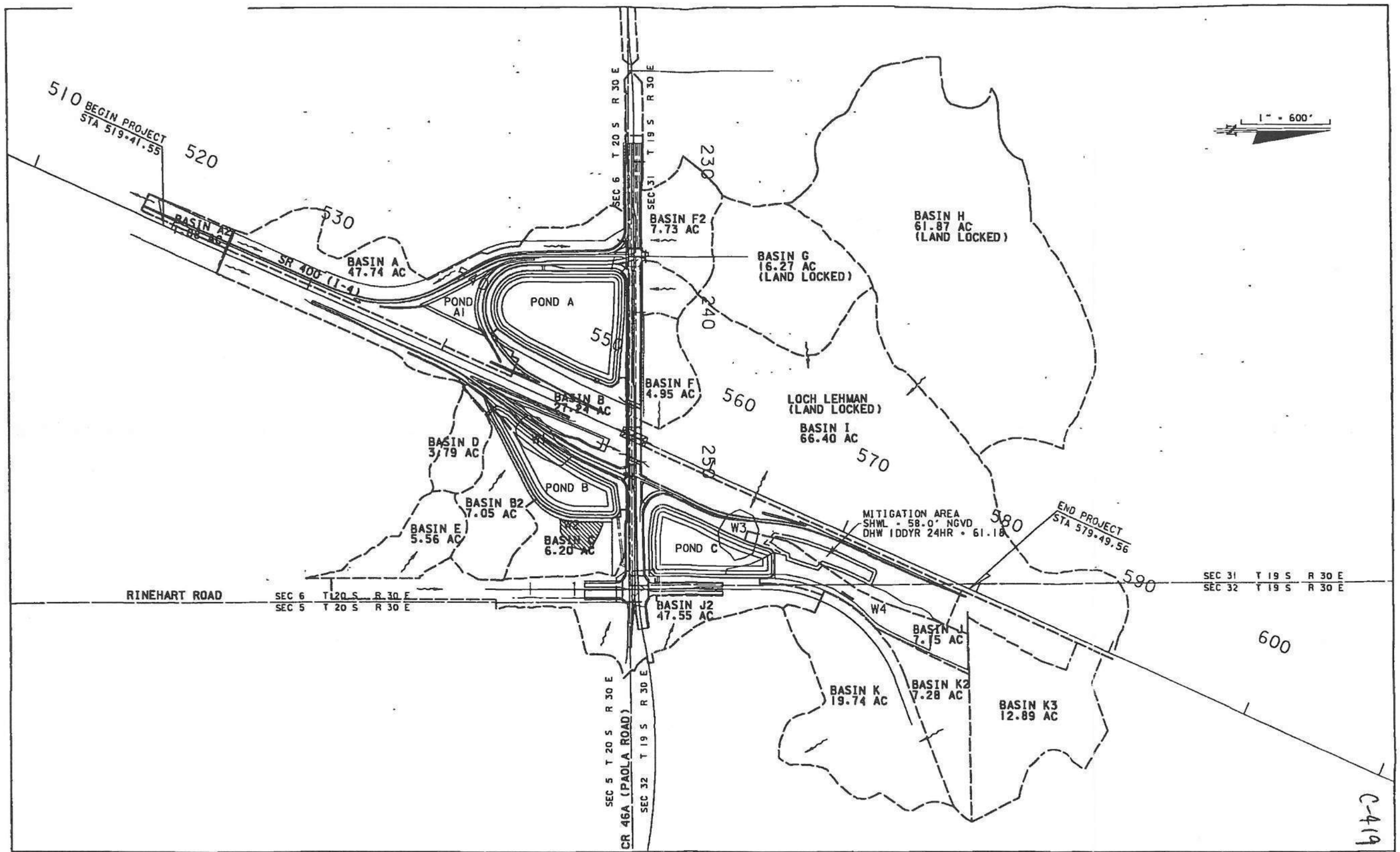
I-4/CR 46A INT. DRAINAGE REPORT	POST-DEVELOPED NODAL DIAGRAM	FIG. II-13	



I-4 / CR 46A
DRAINAGE REPORT

PRE-DEVELOPED BASIN AREAS

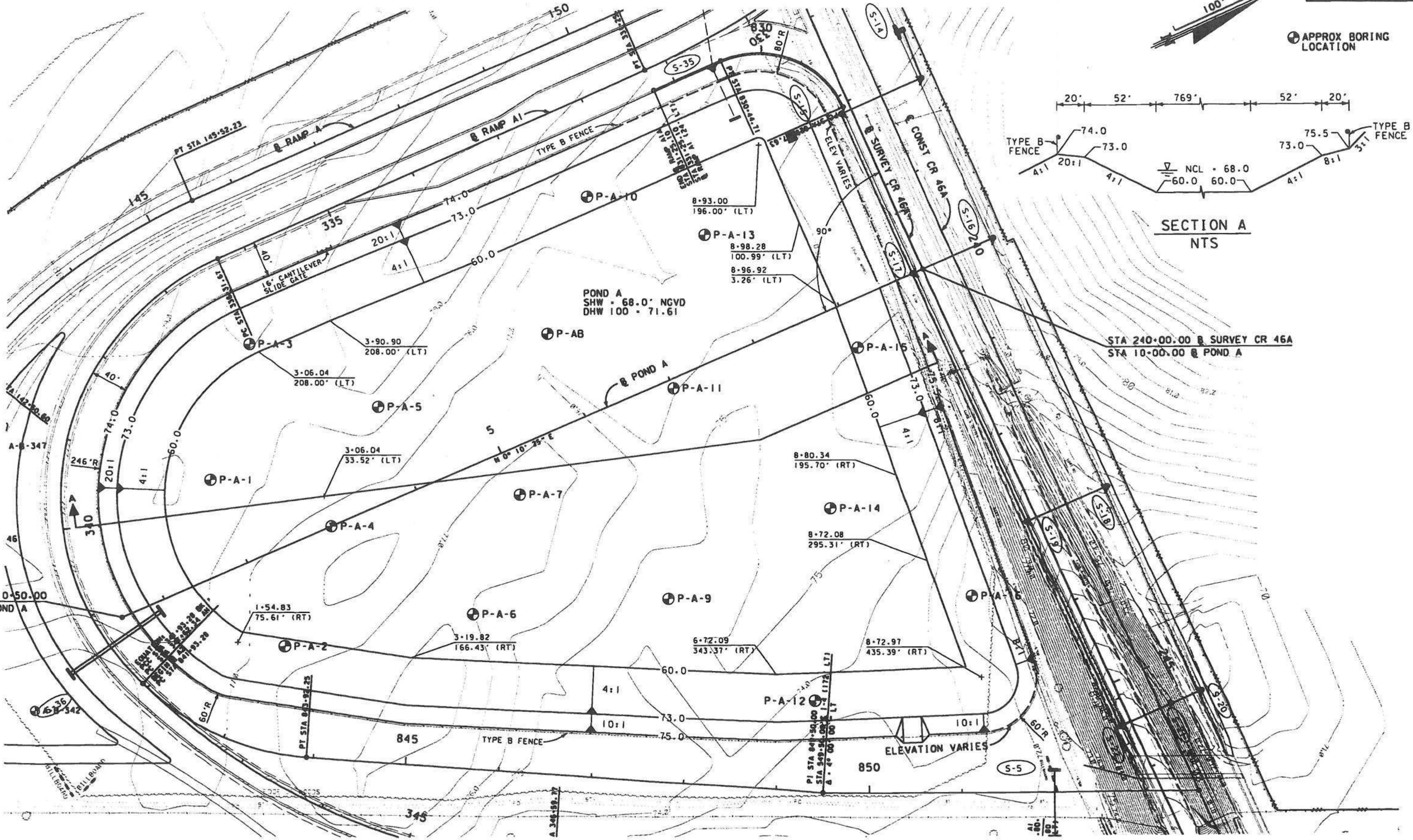
FIG.
II-1



I-4 / CR 46A DRAINAGE REPORT	POST-DEVELOPED BASIN AREAS	FIG. 11-8

22514-1

STATE PROJ. NO.	SHEET NO.
77160-3436	82



DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

REVISIONS

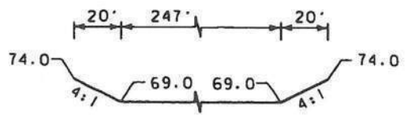
FLORIDA DEPARTMENT OF TRANSPORTATION

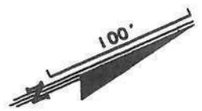
PREPARED BY: METRIC ENGINEERING, INC.

POND DETAIL SHEET
POND A

STATE PROJ. NO.	SHEET NO.
77160-3436	85

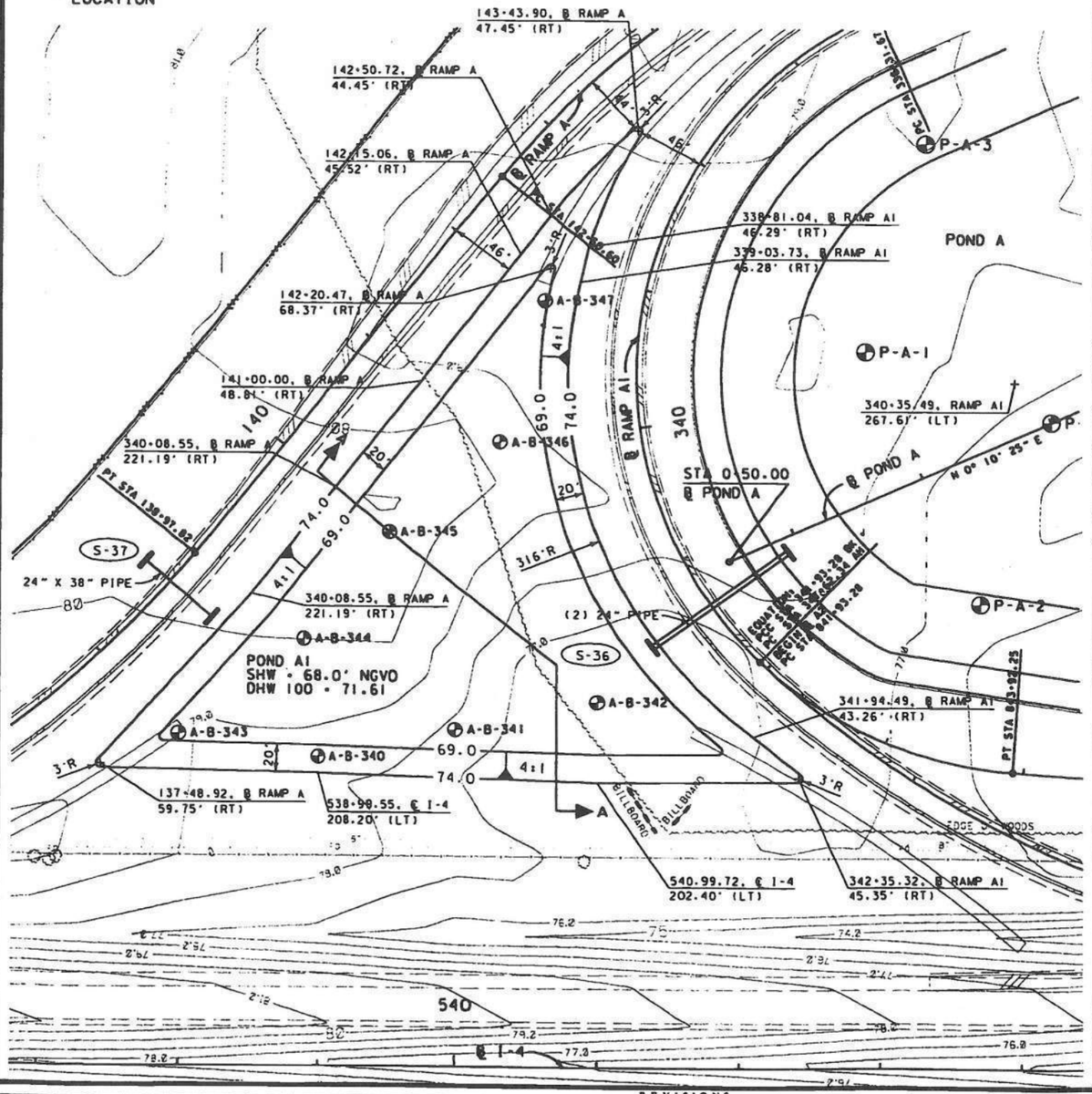
POND A1



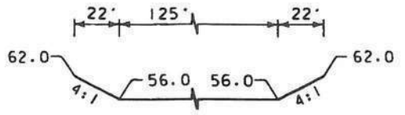


SECTION A
NTS

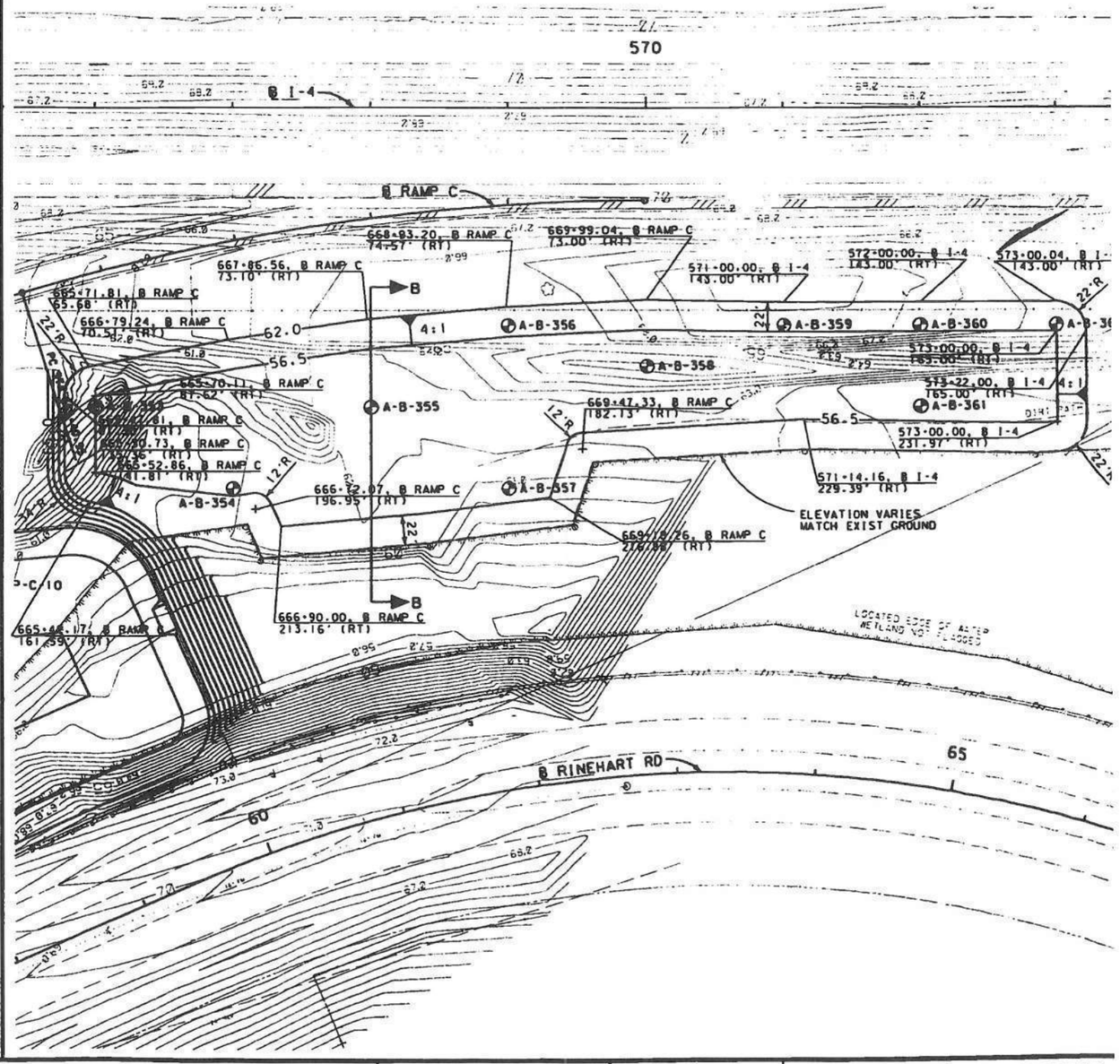
APPROX BORING LOCATION



MITIGATION AREA



SECTION B
NTS

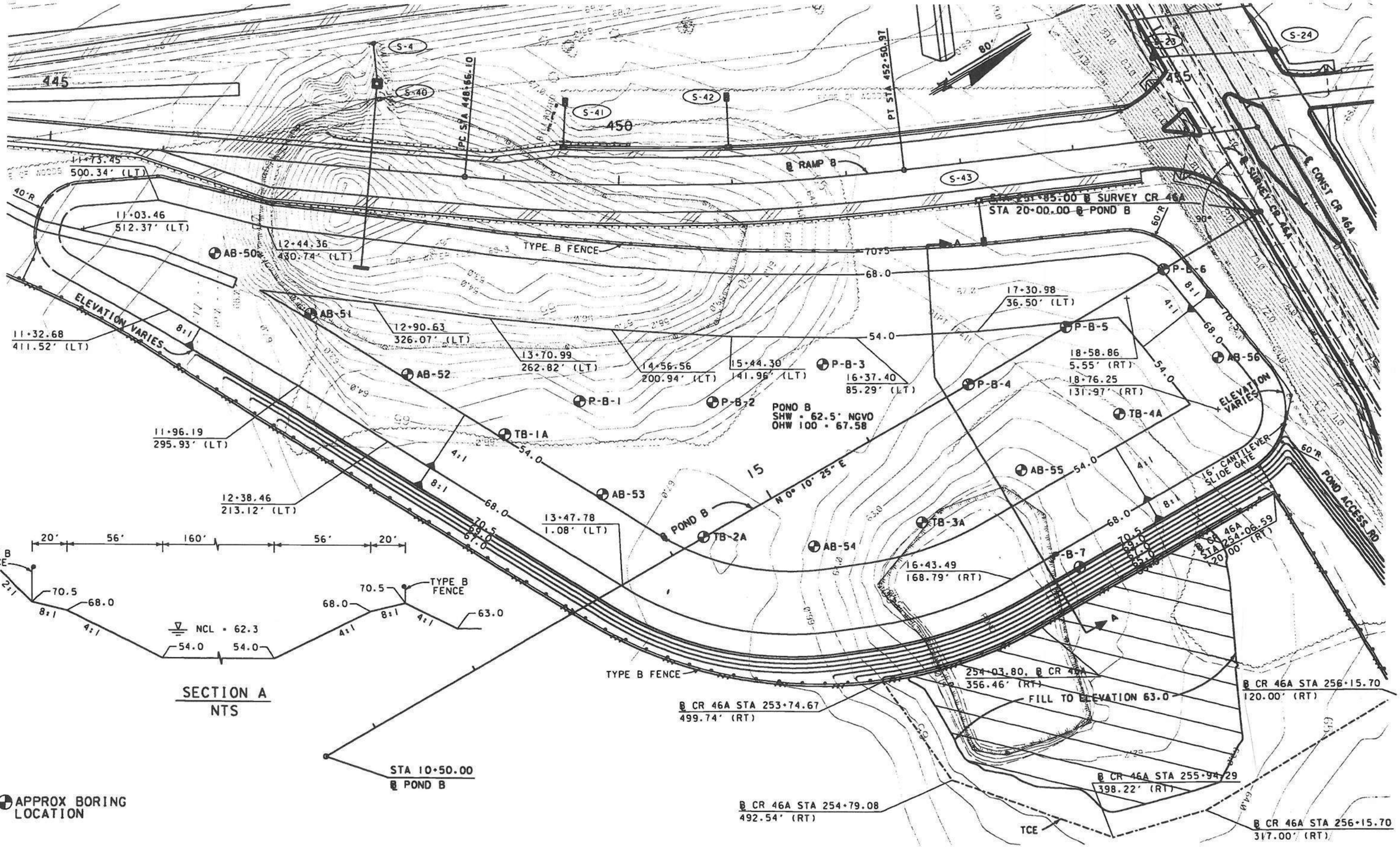


REVISIONS												
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

FLORIDA DEPARTMENT OF TRANSPORTATION

PREPARED BY: METRIC ENGINEERING, INC.

POND DETAIL SHEET
POND A1 & MITIGATION AREA



REVISIONS															
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	

FLORIDA DEPARTMENT OF TRANSPORTATION

PREPARED BY: METRIC ENGINEERING, INC.

POND DETAIL SHEET
POND B

STATE PROJ. NO. 77160-3436

A-B-3

A-B-353

A-B-355

FLOOD MITIGATION AREA

A-B-354

PC STA 660+40.95

660

℄ RAMP C

S-44

S-45

S-6

30" PIPE

24" PIPE

S-46

TYPE B FENCE

67.0

64.5

50.0

8:1

4:1

A

END ℄ RAMP CA STA 759+10.68
℄ RAMP C STA 659+10.68 RT.
℄ RAMP C 19.00' RT.

80'R

STA 755+29.61

P-C-1

P-C-2

P-C-3

P-C-4

P-C-5

P-C-6

P-C-8

P-C-9

P-C-10

32+32.58
330.50' (LT)

34+70.10
240.47' (LT)

36+15.57
169.27' (LT)

37+71.72
102.00' (LT)

39+40.00
61.96' (LT)

39+25.00
51.13' (LT)

39+25.00
0.30' (LT)

39+61.00
35.47' (RT)

34+91.25
1.82' (RT)

32+11.73
195.09' (LT)

32+11.21
100.59' (LT)

33+69.30
3.64' (RT)

31+97.57
13.35' (RT)

POND C
SHW = 58.0' NGVD
DHW 100 = 64.97

STA 257+00.00 ℄ SURVEY CR 46A
STA 30+00.00 ℄ POND C

℄ POND C

N 0° 10' 25" E

℄ CONST CR 46A
℄ SURVEY CR 46A

255 ℄ NB ROADWAY

260

TYPE B FENCE

42" PIPE

36" PIPE

18" PIPE

℄ RINEHART RD

16' CANTILEVER SLIDE GATE

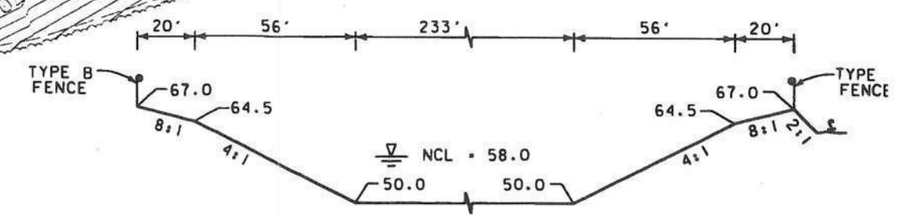
S-26 S-28 S-29 S-54 S-55 S-56 S-57

60'R

35

30

APPROX BORING LOCATION



SECTION A
NTS

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

FLORIDA DEPARTMENT OF TRANSPORTATION

PREPARED BY METRIC ENGINEERING, INC.

POND DETAIL SHEET
POND C

RETAINED

Permit No. 22514-10

I-4/SR 46 Ramp Improvements

Basin 13 was previously identified and delineated during the SR 417 Greeneway, Project 2 Section 3 (URS Greiner, March 2000). However, the basin limit has slightly changed because the existing Pond 13 is expanded to the north to regain capacity lost by the encroachment of the proposed westbound CD ramp, impacting the southern portion of the existing pond. Refer to the post-development basin map in Appendix C.

The existing Pond 13 originally designed under the SR 417 project, was designed with an outfall system that discharged to an existing roadside ditch along westbound I-4, eventually draining to the existing double 30" RCP under SR 46. However, with the I-4 Widening project, this outfall system was modified to connect to the storm drain system that connects to existing Pond 4I, northeast of the I-4 and SR 46 Interchange.

Pond 13 will be designed as a wet detention pond with the control elevation set at 54.12 (1988 NAVD) as originally permitted for the SR 417 project. As mentioned earlier, the proposed pond modification includes an extension to the north to the available remnant parcel. This extension was necessary to provide the lost storage resulting by the encroachment of the new alignment of the CD road. The proposed Pond 13 has a peak stage for the 25 year / 24 hour storm event at elevation 58.62 ft (1988 NAVD) which is well below the berm elevation of 61.34 ft (1988 NAVD). The peak discharge rate out of the pond is 17.88 cfs which is less than the pre-development rate of 42.98 cfs, therefore meeting pre and post discharge attenuation.

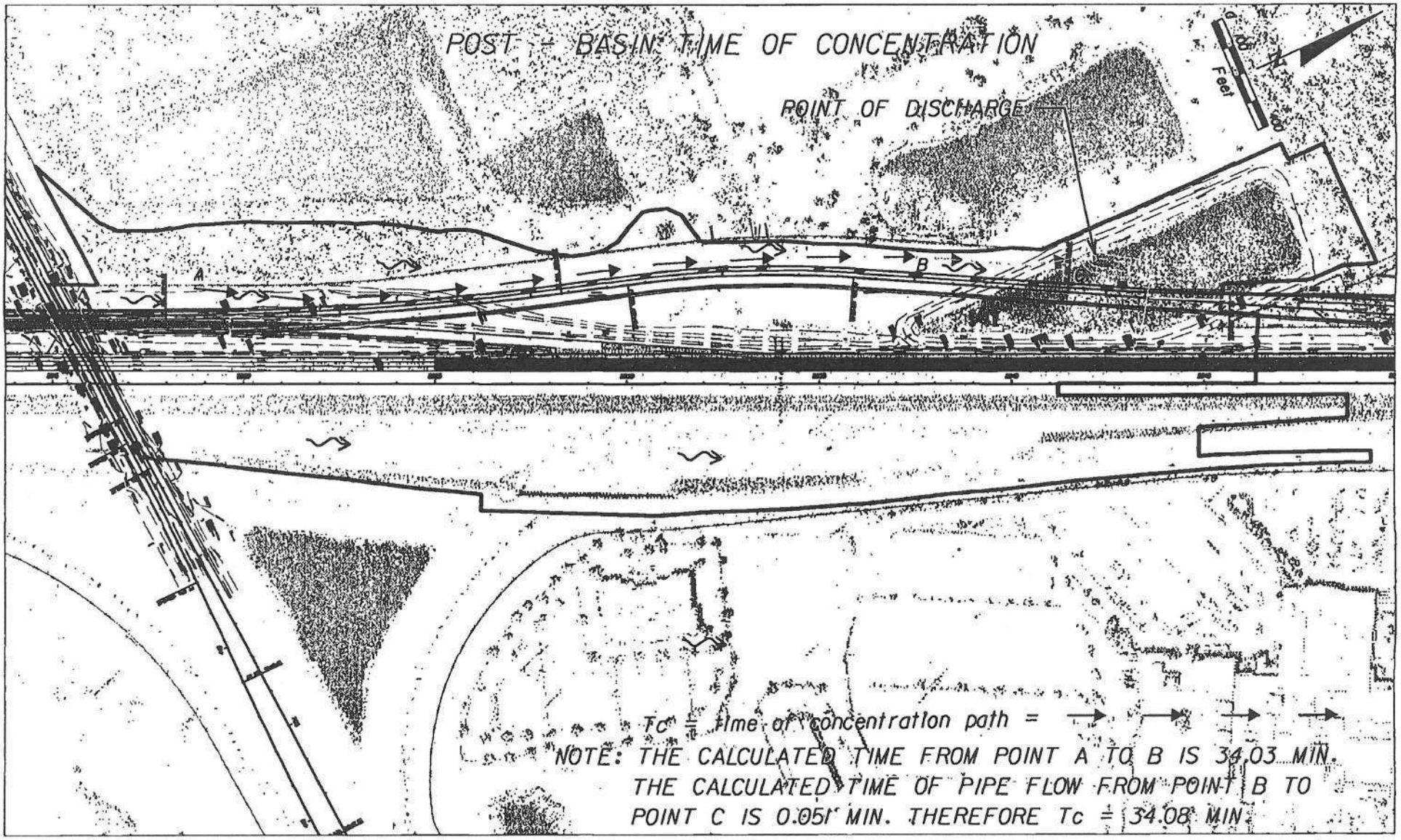
Recovery analysis indicates that a 5.75 inch orifice at the control elevation of the pond will recover the required water quality volume within 24 to 30 hours (24.27 hours recovery). Table 1 provides a summary of the results.

Basin analysis and routing models consisting of Curve Number (CN) worksheets, Time of Concentration (Tc), pond stage/storage worksheets and ICPR output models are included in Appendix C. Also note that a copy of the existing drainage calculations for this basin is included under the Existing Drainage Calculations section.

4.5 Basin 1

Basin 1 consists of the areas concentrated at the I-4 and SR 46 Interchange. For a graphical representation, please refer to the post-development basin map in Appendix C.

The proposed roadway improvements include a new on ramp from westbound I-4 to SR 46, an exit


POST - BASIN TIME OF CONCENTRATION
POINT OF DISCHARGE
A
B
C
Feet
Tc = time of concentration path =
NOTE: THE CALCULATED TIME FROM POINT A TO B IS 34.03 MIN.
THE CALCULATED TIME OF PIPE FLOW FROM POINT B TO
POINT C IS 0.051 MIN. THEREFORE Tc = 34.08 MIN.

URS				
PROJECT TITLE:	I-4 Interchange at SR 46			
PROJECT NUMBER:	407573			DATE
BASIN DESIGNATION:	Pond 13 (ULTIMATE I-4)	MADE BY:	LDP	3/5/06
BASIN ANALYSIS (PRE/POST):	POST	CHECKED BY:	REC	3/6/06

BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open Space (Rdwy Pervious)		C	74	9.58	708.55
Open Space (Rdwy Pervious)		A	39	13.40	522.41
Existing Pavement			98	11.00	1078.00
Pond - Open Space		A	39	2.61	101.79
Water at NWL			100	2.07	207.00
Proposed Pavement			98	10.49	1028.02
			TOTALS	49.14	3645.77

COMPOSITE CN	74.19

ESTIMATE OF RUNOFF VOLUME

PROCEDURE TO DETERMINE RUNOFF VOLUME IS BASED ON THE SCS EQUATION AND IS AS FOLLOWS:

1) DETERMINE SOIL STORAGE - S ——————> S = (1000 / CN) - 10 (inches)

2) DETERMINE RUNOFF - R ——————> R = (P - 0.2*S)^2 / (P + 0.8*S) (inches)

P = rainfall in inches

3) DETERMINE RUNOFF VOLUME - V(R) ——————> V(R) = (R / 12)*BASIN AREA (acres-feet)

CALCULATION TABLE

Agency	Design Storm Frequency	P (in)	S (in)	R (in)	V(R) (ac-ft)
SJRWMD Open Basin	25 yr / 24 hr	8.60	3.48	5.49	22.48
FDOT Critical Duration	100 yr / 240 hr	18.00	3.48	14.41	59.00

C-157

URS

MADE BY:	REC	DATE:	03/05/06	JOB NO.	407573
CHECKED BY:	LDP	DATE:	3/31/06	SHEET NO.	
CALCULATIONS FOR:	I-4 Interchange at SR 46	POND:	P-13	BASIN:	Pond 13

Water Quality

ULTIMATE I-4

Total Basin Area =	49.14	ac
Paved Area =	21.49	ac
Pond Area at NWL =	2.07	ac

A.	1.0 " Over Total Basin Area =	4.10	Ac-Ft
B.	2.5 " Over Paved Area =	4.48	Ac-Ft
	Required PAV =	4.48	Ac-Ft

Stage Storage Calculations

ELEV. (ft)	AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
61.34 Out. Berm	3.43				18.89
		3.18	1.34	4.27	
60.00	2.94				14.62
		2.88	0.30	0.87	
59.70 In. Berm	2.83				13.76
		2.66	2.70	7.18	
57.00	2.49				6.58
		2.43	0.85	2.07	
56.15 (PAV)	2.38				4.51
		2.22	2.03	4.51	
54.12 (NWL)	2.07				
47.56 Bottom	1.28				

Bleed Down Volume

1/2 the req'd PAV	=	0.5 * 4.48	=	2.24 Ac-Ft

Volume remaining in pond after recovery of 1/2 PAV = 2.27 Ac-Ft

URS

MADE BY:	LDP	DATE:	03/05/06	JOB NO.	407573
CHECKED BY:	REC	DATE:	3/3/06	SHEET NO.	
CALCULATIONS FOR:	I-4 Interchange at SR 46			BASIN:	Pond 13

Permanent Pool Calculations

ULTIMATE I-4

Basin Characteristics

Land Use	Area (ac)	Runoff Coeff.	Product
Roadway Paved Area	21.49	0.95	20.42
Roadway Pervious Area	24.22	0.20	4.84
Pond Pervious Area	1.36	0.20	0.27
Pond Area at NWL	2.07	1.00	2.07
Total	49.14		27.60

Composite C = **0.56**

Wet Season Normal Rainfall (P) = **31 in**

Min. Permanent Pool Vol = Area x Composite C x P x 14 / 153 / 12 = **6.52 ac-ft**

Min. Permanent Pool Vol. Req. if Littoral Zone is Not Provic = 1.5 x Min Perm Pool Vol. = **9.79 ac-ft**

Stage Storage Calc.

ELEV. (ft)		AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
61.34	Out. Berm	3.43				
60.00		2.94				
59.70	In. Berm	2.83				
56.15	(PAV)	2.38				
54.12	(NWL)	2.07				10.99
			1.68	6.56	10.99	
47.56	Bottom	1.28				

Permanent Pool Volume Provided = **10.99 ac-ft**

Resident Time Provided = Perm. Pool Vol. Provided *153*12 / Area / C / P **23.6 Days**

Note: An additional 50% permanent pool volume is provided in lieu of providing a littoral zone. (See 40C-42.026)

Mean Depth = Permanent Pool Volume / Area at NWL = **5.31 ft**

filename: Pond13.xls
worksheet: ULT. PERMANENT POOL

Permit No. 22514-11

I-4/SR 46 Ramp Improvements

EXECUTIVE SUMMARY

In 2006, URS designed, permitted, and obtained approval on behalf of the Florida Department of Transportation (FDOT) from St. Johns River Water Management District (SJRWMD) (permit no. 4-117-22514-3) to construct ramp improvements at the I-4/SR 46 interchange and westbound Collector Distributor (CD) road between SR 46 to south of CR 46A interchange for the Florida Department of Transportation (FDOT). The 3.5 miles project was originally designed as a Design-Bid-Build project.

In 2011, FDOT decided to let the project as a Design-Build project and was granted a SJRWMD permit no. 4-117-22514-10 to modify Pond 1 and Pond 13 to accommodate the changes made to some of the components of the SR 46 interchange and the West Bound Collector-Distributor (WBCD) road.

Since then, FDOT is proposing to improve a segment of SR 46 west of N. Oregon Ave to the intersection of Town Center Blvd and SR 46. (See enclosed construction plans). The improvements include the widening of SR 46 and the resurfacing the existing pavement, converting the existing rural roadway segment to an urban roadway segment with sidewalks, bike lanes, and additional turn lanes. A new stormwater management facility, in addition to the permitted ponds, will be constructed to accommodate the additional drainage areas from SR 46 that will be collected by the proposed storm sewer systems. These improvements are consistent with the proposed plans for the Wekiva Parkway.

In general, the existing condition model will best conform to the original URS design and permitted construction plans to convey the general stormwater runoff to the permitted detention systems and outfall points. The drainage areas for each of the basins contributing to the Lockhart-Smith Canal will best mirror the permitted calculations (provided as Appendix D) with the exception for basins Offsite, SR46W, and SR46E. The limits established for these basins are based on field visits and topographic survey. Each of the basins will be further discussed in Section 2 of this report. Refer to Figure 5 to Figure 8.

The proposed work will affect Basins 1, Infield Ramp D, and 4 (established by URS and approved by SJRWMD) as well as the newly established basins Offsite, SR46W and SR46E. For the most, Basin 1 (include Basin 1A) is the only basin that will have an increased drainage area from 11.23 acres to approximately 20.72 acres. To accommodate the additional flow, FDOT proposed to construct a smaller Pond 1A directly south of Pond 1. One 36" RCP pipe interconnects the ponds so that they will function as one. A control structure located at the north end of Pond 1, as previously permitted (SJRWMD no. 4-117-22514-3 and 4-117-22514-10), with a point of discharge to the perimeter ditch (Node Boundary) west of Ramp D and ultimately discharges to the Lockhart-Smith Canal. Minor modification to the control structure is necessary to meet all SJRWMD and FDOT design criteria. Instead of a 3.50" orifice with an 18" outflow pipe, as permitted under SJRWMD no. 4-117-22514-3 and 4-117-22514-10, the control structure is designed with a 4.75" orifice at the control elevation with a 24" outflow pipe to facilitate the required recovery of half the water quality volume within 24 to 30 hours.

Although the basins areas differ from the permitted drainage calculations, the overall rate of discharge to the Lockhart-Smith Canal is less in the developed condition. Table 4 provides the modeling comparisons for review.

1.0 Introduction

1.1 Purpose

FDOT is proposing to improve a segment of SR 46 west of N. Oregon Ave to the intersection of Town Center Blvd and SR 46. The improvements include resurfacing the existing pavement and converting the existing rural roadway segment to an urban roadway segment with curb and gutter, sidewalks, bike lanes, and additional turn lanes. All improvement along SR 46 that could be collected in the proposed storm sewer collection systems will be directed to a new pond (Pond 1A), which will be interconnected to the permitted Pond 1 (SJRWMD Permit No. 4-117-22514-3 and 4-117-22514-10), for treatment and attenuation prior to discharging to an existing perimeter ditch west of Ramp D that ties to Lockhart Smith Canal. This report is intended to document the changes to the drainage design from the original permitted project.

For purposes of this report, existing development conditions refer to the originally URS permitted project in post condition and proposed development conditions refer to the proposed modifications to the originally permitted project.

1.2 Project Location

This project is located within Sections 29 of Township 19 South, Range 30 East in Seminole County, FL. The project begins at approximately 400-ft west of N. Oregon Avenue and ends at the intersection of Town Center Blvd and SR 46. The limits of the project are shown on the project location map in Figure 1 and the USGS map Figure 2. The project datum is NAVD 88 and all elevations contained in this report reference this datum unless otherwise noted.

1.3 Project Description

S.R. 46 is currently a rural roadway consisting of four or six 12-ft lanes with five foot grassed shoulders. The horizontal alignment in general follows a west to east bearing along the length of the project. The vertical alignment is relatively flat.

The proposed roadway will be a newly resurfaced six-lane divided urban section with three 12-ft travel lanes in each direction separated by a raised median. A newly constructed 5-ft bike lane and a newly constructed 14-ft sidewalk in each direction, depending on location, are provided. A proposed closed storm sewer system along SR 46 collects and conveys most of the runoff from the improved segment of SR 46 to one of two provided water detention ponds (Pond 1A and Pond 1). Any areas within the project limits along SR 46 not collected by the proposed storm sewer system will continue to be directed to the existing storm sewer system that is currently collecting it. Although these existing systems may be collecting new impervious areas resulting from the proposed sidewalks and bike lanes, the overall impervious areas to the system is less. See Table 1 below for the acreage breakdown and comparison.

Overall, the rate of discharge to each boundary nodes in the developed condition will be less than the existing condition. See Table 4 provided in Section 4 of the report.

Table 1 – Summary of Acreage Breakdown

	Area as Permitted (acres)		*Proposed Area (acres)*	
	Total	***Impervious***	***Total***	***Impervious***
Basin 1	11.23	3.46	20.07	9.26
Basin Infield Ditch	3.16	0.00	3.16	0.00
Basin Infield Ramp D	5.22	0.00	2.36	0.00
Basin 4I	52.69	24.36	50.09	23.11
Basin 4IOffsite	3.40	2.72	3.40	2.72
Basin Pond4I	11.49	0.00	11.49	0.00

2.0 Existing Conditions

2.1 Soils

According to the Soil Survey for Seminole county, the soils classified within the project limits are Myakka, Eau Gallie fine sands and Urban Land (Hydrologic group B/D and D – poorly drained soils). See Soil Map in Figure 3.

Table 2 – Soil types identified throughout project corridor according to SCS Soil Survey

Soil Map Reference No.	Soil Description	Hydrologic Group
20	Myakka/Eau Gallie	B/D
34	Urban Land	D

2.1 Land Use

The existing land use encompassing the project boundaries consists of commercial development. There is one existing interchange within the project limits at SR 46.

2.2 Wetlands

There will be approximately 0.13 acres of surface water impacts, 0.19 acres of forested wetland impacts as well as approximately 0.08 acres of permanent wetland impacts (previously permitted as secondary impacts under FDEP no. 59-0308840-001) within the project boundaries other than those indentified under permit No's 4-117-22514-3 and 4-117-22514-4. For detailed information, please refer to the permits on file and the attached Environmental Assessment.

2.3 Floodplains

The project is located outside of the 100-year flood elevation (Zone A) in accordance to the current effective Federal Emergency Management Agency (FEMA) map. An exhibit of the project overlaid on the FIRM map is provided as Figure 4.

2.4 Drainage Patterns

The project is within the Lockhart-Smith Canal/Lake Monroe Drainage Basin of the St. Johns River Water Management District (SJRWMD) jurisdictional boundaries. Due to its direct connection to the St. Johns River, the Lockhart-Smith Canal is an open basin. The Lockhart-Smith Canal is the receiving water body to which I-4 and SR 46 ultimately discharges.

2.4.1 Basin 1

According to URS permitted Drainage Calculations, Basin 1 consists of the areas at the I-4 and SR 46 Interchange. It includes a ramp from westbound I-4 to SR 46, an exit ramp from westbound SR 46 to westbound I-4 and the realignment of the eastbound SR 46 to westbound I-4. Refer to Figure 6. Pond 1 is located in the triangular infield's areas bounded by Ramps D and D1 and westbound I-4. It is permitted by SJRWMD no. 4-117-22514-3 to provide water quality treatment and stormwater runoff attenuation for receiving areas from Basin 1. The approved Pond 1 will discharge to an existing perimeter ditch west of the Ramp D, which is hydraulically connected to the Lockhart-Smith Canal. The tailwater elevation for the routing model, as well as the basin analysis and routing models parameters (Curve Number and Time of Concentration), were established by URS. A copy of the information is provided under Appendix D.

2.4.2 Basin Infield Ditch

Basin Infield Ditch is a small 3.16 acres parcel north of SR 46 that is wedged between an existing commercial development to the east of N Oregon Ave and Ramp D. Refer to Figure 6. Stormwater runoff generated from this basin follows an easterly and northerly flow pattern to an existing perimeter ditch west of Ramp D that ultimately discharges to the Lockhart-Smith Canal.

2.4.3 Basin Infield Ramp D

Ramp D1 bound a 5.22 acres parcel, Basin Infield Ramp D. Stormwater runoff from the basin flows easterly and westerly toward an existing onsite ditch. Two 42" pipes provide positive outfall for the existing ditch to the existing perimeter ditch west of Ramp D.

2.4.4 Basin Offsite

Basin Offsite, according to URS, is a 4.12 acre parcel west of I-4 that drains to an existing roadside ditch flowing easterly to an existing double 30" pipes under SR 46 and outfalls to an existing ditch within Basin Infield Ramp D and ultimately discharges to the Lockhart-Smith Canal. The basin areas include eastbound of SR 46 (approximately 558-ft west of Wadeside Dr), a sliver of Ramp A, and a triangular shaped wetland bounded by an existing pond to the south, an existing Fire Station to the west, Ramp A to the east, and SR 46 to the north. See Figure 6.

Based on field visit, an existing MES (approximately 192-ft west of Wadeside Drive) intercepts the runoff generated from SR 46 directly west of it. The existing MES is part of an existing closed drainage system along SR 46 ROW that currently accepts runoff from SR 46 and adjacent existing stormwater detention facilities and conveys it to the Lockhart-Smith Canal. The existing system is permitted under SJRWMD no. 4-117-79878-3. A copy of the permit and approved plans as downloaded from the SJRWMD website is included in Appendix D.

Based on this discovery, the drainage area is refined and recomputed to approximately 3.07 acres. The remaining 1.05 acres is added on to a new basin SR46W, which is being collected and conveyed by the existing storm sewer system described in the previously paragraph. Figure 6 shows the new basin boundary.

2.4.5 Basin 4 (include 4I, Exist Pond 4I, and 4Ioffsite)

According to the permitted URS Drainage Calculations (SJRWMD no. 4-117-22514-3), Basin 4 is an existing basin determined for the I-4 Widening project from Lake Mary Blvd to US 17-92 (HDR, September 2001). In 2006, under SJRWMD permit 4-117-22514-3, URS modified the basin limits. These limits are reciprocated as shown in Figure 7 and 8. The permitted post drainage map, as generated by URS, is provided as reference material in Appendix D. Table 1 above show the drainage areas as permitted under SJRWMD no. 4-117-22514-3.

An existing wet detention pond 4I provides treatment and attenuates stormwater runoff for Basin 4.

2.4.6 Basin SR 46W

Basin SR46W is approximately 3.58 acres. As shown in Figure 6, its boundaries are limited to the proposed improvement to SR 46 west of where the approved I-4/SR 46 Interchange project stops. Overall, runoff from the existing eastbound SR 46 drains away

from the road to an existing roadside swale/ditches, which collects and conveys the runoff to an existing MES located approximately 192-ft west of Wadeside Dr. The existing MES is part of an existing storm sewer system along SR 46 ROW that currently accepts runoff from westbound SR 46 and adjacent stormwater ponds. The existing storm sewer system, permitted under SJRWMD no. 4-117-79878-3, conveys the runoff that it collects to a wetland that hydraulically connects to the Lockhart-Smith Canal. A copy of the permit and approved plans as downloaded from the SJRWMD website is included in Appendix D.

2.4.7 Basin SR 46E

Basin SR46E, shown in Figure 7, is approximately 6.82 acres. Currently, it drains to the Lockhart-Smith Canal with no treatment through a closed storm sewer system on the south side of the road and an open ditch on the north side. The storm sewer system along the south side of SR 46 also collects the discharge from adjacent stormwater ponds.

2.5 Models

All modeling parameters used in the Existing Condition Model were established by URS (SJRWMD # 4-117-22514-3), with the exception to Basins Offsite, SR46E and SR46W. These basins boundaries were established based on field visits and topographic survey provided. Please refer to Appendix A – Drainage Calculations and Appendix D – Referenced Material for parameters utilized in the model.

The Interconnected Channel and Pond Routing (ICPR) model was used to simulate the affect of the 25-year / 24-hour and the Mean Annual storm events within permitted Pond 1 and Pond 4I per SJRWMD requirements. The results of the model are provided in Table 3 below.

Table 3 – SJRWMD Existing Condition Summary of Results

	Rate of Discharge (cfs)		
	25-yr / 24-hr	**10-yr / 24-hr**	**Mean Annual**
Q_{peak} to Boundary (cfs)	34.73	28.21	12.25
Q_{peak} to Outfall (cfs)	39.02	29.70	15.98
Q_{peak} to LHS Canal (cfs)	17.09	14.77	8.37
Total Q_{peak} to Lockhart-Smith (cfs)	90.84	72.68	36.60
	25-yr/24-hr Max Stage (ft)	**25-yr/24-hr Max Outflow (cfs)**	**MeanAnnual Max Outflow (cfs)**
Pond 1	29.15	8.24	1.37
Exist Pond 4I	24.57	36.71	7.70

3.0 Proposed Conditions

3.1 Drainage Patterns

The project site has been divided into ten drainage basins maintaining, to the largest extent possible, the permitted drainage patterns. As permitted, a combination of open (ditches) and closed storm sewer systems will be used to convey runoff from Basin 1 and Basin 4 to Ponds 1 and 4l respectively. These ponds are located near the basin low points. Treatment will be provided in these ponds.

All offsite basins will continue to maintain its current drainage flow paths.

3.1.1 Basin 1 (include 1A and 1)

As permitted under SJRWMD no. 4-117-22514-3, Basin 1 consists of the areas at the I-4 and SR 46 Interchange. It includes a ramp from westbound I-4 to SR 46, an exit ramp from westbound SR 46 to westbound I-4 and the realignment of the eastbound SR 46 to westbound I-4.

For this permit modification request, Basin 1 encompassed not only the areas established by URS under SJRWMD no. 4-117-22514-3 but it also includes most of the improvements along SR 46 shown in Figure 10. Stormwater runoff generated from the basin will be collected and convey to two ponds (permitted Pond 1 and proposed Pond 1A) for treatment and attenuation. Pond 1A is designed as a wet detention pond with a control elevation set at the Estimated Seasonal High Water Elevation (ESHW) of 27.50-ft (same as permitted Pond 1) because of its close proximity to Pond 1. One 36" RCP pipe interconnects Ponds 1 and 1A to function as one. A control structure is located at the north end of Pond 1 with a point of discharge to the perimeter ditch (Node Boundary) west of Ramp D as permitted. The ditch is hydraulically connected to the Lockhart-Smith Canal, as discussed earlier. The control structure is modified to include a 4.75-inch orifice at the control elevation to facilitate the required recovery of half the water quality volume within 24 to 30 hours as required by SJRWMD. Additionally, the control structure is also modified to include a trapezoidal weir at elevation 28.20-ft with a 24" outflow pipe to provide attenuation of the 25-year/24-hour storm. Table 4 below outlines the rate of discharge as compared to that permitted for review.

3.1.2 Basin Infield Ditch

Basin Infield Ditch is the same small parcel, describe previously under Section 2 of the report. SR 46 bound it to the south, and it is wedge between an existing commercial development to the west and Ramp D to the east. Stormwater runoff generated from this basin will continue to flow in the pattern it did as permitted.

3.1.3 Basin Infield Ramp D

As a results of the improvement to SR 46, basin Infield Ramp D is reduced to 2.36 acres (half moon shaped parcel). Ramp D1 and the proposed new Pond 1A set this basin limits. Stormwater runoff will continue to drain toward an existing onsite ditch, which connects to the perimeter ditch west of Ramp D via two 42" pipes and ultimately outfalls to the Lockhart-Smith Canal.

3.1.4 Basin Offsite

Basin Offsite is a small parcel, approximately 1.61 acres, that is bounded to the north by SR 46, west by Wadeside Dr, east by Ramp A, and south by an existing detention pond.

The drainage areas include a triangular piece of wetland wedge between SR 46 to the north and the existing storm water pond to the south.

As previously discussed, the wetland and existing SR 46 currently drains to an existing roadside swale/ditch that collects and conveys the runoff to existing two 30" pipes under SR 46 and ultimately outfalls to the Lockhart-Smith Canal. However, runoff from SR 46 will be collected in a proposed storm sewer system and be conveyed to the interconnected Ponds 1 and 1A for treatment. The runoff from the triangular shaped wetland will continue to be conveyed to the existing two 30" pipes under SR 46 by a proposed swale/ditch behind the proposed 14-ft sidewalk.

3.1.5 Basin 4 (include 4I, Exist Pond 4I, and 4Ioffsite)

Due to the improvements along SR 46, Basin 4I, which now includes a smaller portion of SR 46 east of I-4, is reduced to 50.69 acres instead of the permitted 52.69 acres. The drainage areas continue to be collected by an existing storm sewer system, now accepting approximately 1.25 acres less of impervious area, to the permitted existing Pond 4I (SJRWMD no. 4-117-22514-3) for treatment and storm attenuation prior to discharging to the Lockhart-Smith Canal. FDOT proposed to leave the control structure as designed by URS and permitted by SJRWMD. .

3.1.6 Basin SR 46W

Basin SR46W is a short segment of SR 46 that FDOT will be resurfaced and shoulders added to the westbound lanes. No additional travel lanes will be constructed on this Basin. The segment will continue to be a rural segment. Runoff from the basin will continue as it does currently to drain to a collection of existing swale/ditch and storm sewer system (SJRWMD no. 4-117-79878-3) along SR 46 ROW that conveys it to the Lockhart-Smith Canal. FDOT proposed to extend the existing 24" pipe under west SR 46 and approximately 192-ft from Wadeside Dr to collect the runoff from the east side of the roadway. FDOT is not proposing to increase the overall rate of discharge into the existing system. As shown in Table 8 below, the rate of discharge to Node LHS Canal in the proposed condition is less than the existing condition.

3.1.7 Basin SR 46E

In the proposed condition the majority of SR 46 east of I-4 will be collected and routed to Pond 1A. Basin SR 46E will continue to discharge directly to the Lockhart-Smith Canal. The only additional impervious area within this basin will be a bike lane and sidewalk. The entire north side of SR 46 that now discharges directly to the Lockhart-Smith Canal will go to Pond 1A. The impervious area discharging directly to the Lockhart-Smith Canal will go from 2.64 acres to 1.82 acres. Table 7 below is a summary of existing vs developed condition of the rate of discharge to the Lockhart-Smith Canal. As shown, the proposed rate is less than the existing.

3.2 Models

All modeling parameters used in the Proposed Condition Model were either established by URS (SJRWMD # 4-117-22514-3) or recomputed due to changes in the basin boundaries. Please refer to Appendix A – Drainage Calculations for the information used in the model obtained directly from the permitted URS drainage calculations.

The Interconnected Channel and Pond Routing (ICPR) model was used to simulate the affect of the 25-year / 24-hour and the Mean Annual storm events within Pond 1 and Pond 4 per SJRWMD

requirements. The results of the model as compared to the existing condition are provided in Table 4 and 8 below.

Table 4 – SJRWMD Developed Condition Summary of Results

	25 yr / 24 hr Discharge Rate (cfs)		Mean Annual Discharge Rate (cfs)	
	Existing	Proposed	Existing	Proposed
Q_{peak} to Boundary (cfs)	34.73	23.37	12.25	9.19
Q_{peak} to Outfall (cfs)	39.02	36.07	15.98	12.74
Q_{peak} to LHS Canal (cfs)	17.09	14.86	8.37	7.41
Total Q_{peak} to Lockhart-Smith (cfs)	90.84	74.30	36.60	29.34

Permit No. 22434-8

I-4 Ultimate - Richey Green Rest Area Modifications

I. OVERVIEW

This documentation was prepared to support the application to modify the permit for a section of I-4 and the Richey Green Rest Area located in Seminole County. This permit modification was prepared for the Florida Department of Transportation (FDOT) in accordance with St. Johns River Water Management District (SJRWMD) and FDOT criteria. The Richey Green Rest Area is located along westbound I-4 approximately 4,000 feet north of the I-4/SR 434 interchange. Please refer to **Figure 1** provided at the end of this write-up for a project location map. **Figure 2** shows the USGS Quad map for the area. The vertical datum used for this project is the North American Vertical Datum of 1988 (NAVD 88).

II. PROPOSED MODIFICATIONS

The proposed project is a modification of existing SJRWMD permit numbers 4-117-22434-3, 40-117-22434-6 and 4-117-22434-2. The FDOT is proposing to modify the I-4 westbound rest area and the entrance and exit ramps that connect the rest area to I-4. Since the entire modified rest area has been added to the project, the impervious area within the project limits will increase by 12.30 acres. In addition to this increase in impervious area, two permitted stormwater management facilities (Pond II from permit 40-117-22434-6 and the treatment pond shown in 4-117-22434-2) will need to be reconfigured because of impacts resulting from the project. Adjustments to Pond II and the project limits are shown in the attached permit plans.

Both treatment and attenuation requirements were analyzed for the proposed modifications to ensure that water management district criteria are met. In addition to the typical water management district treatment requirements, three inches of runoff from the additional impervious area over Type "A" soils is required because the proposed improvements are located within the Wekiva Recharge Protection Basin. Since the project discharges to the Little Wekiva River, Outstanding Florida Waters

(OFW) criteria will need to be met. An additional 50% of storage above the typical treatment criteria will be provided in the proposed ponds. It should be noted that this project is not located within the Wekiva River Riparian Habitat Protection Zone.

The proposed modifications to Pond II will meet all water management district treatment requirements. Treatment calculations are provided in **Appendix A**. Drawdown calculations were also performed to ensure that the water management district requirements for drawdown are met. Drawdown calculations are provided in **Appendix A**.

Pond II was also designed to meet the water management district's requirements for attenuation. The ICPR model included with permit 40-117-22434-6 was modified to include the proposed changes resulting from this project. The proposed model utilizes the same pre/post discharge comparison location (node Little Wekiva R). The proposed improvements will decrease the flowrate for the SJRWMD 25-year 24 hour storm and the mean annual storm at node Little Wekiva R. Attenuation calculations are provided in **Appendix B**.

III. WATER QUALITY AND ATTENUATION SUMMARY

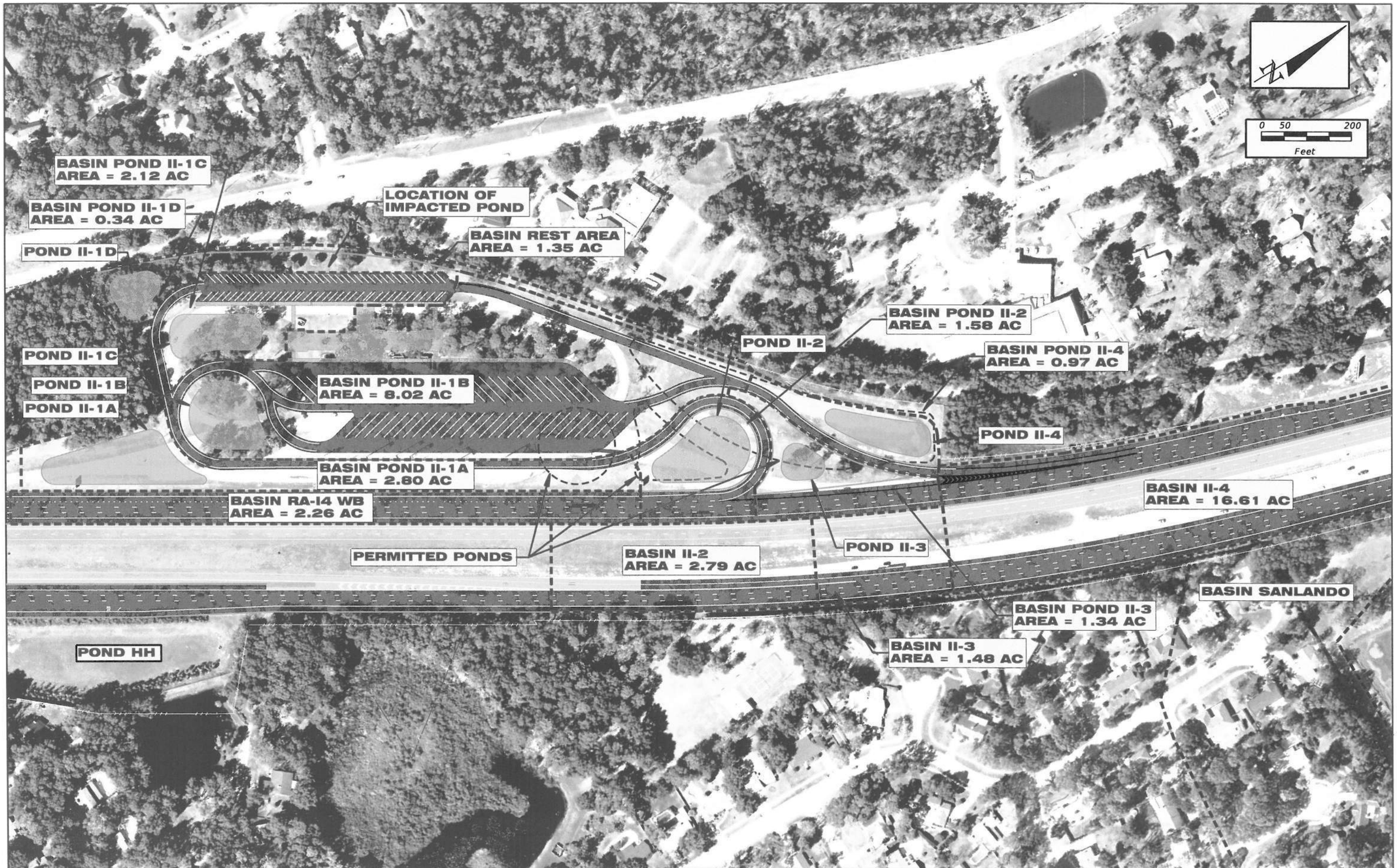
The proposed project has been designed in accordance with SJRWMD and FDOT criteria. All water management treatment requirements are met and the flowrate for the mean annual storm and the 25-year 24-hour storm have been maintained at pre-development levels. The treatment requirements are outlined in **Table 1** and attenuation requirements are outlined in **Table 2**.

Table 1 Treatment Requirements

	Required (acre-ft)	Provided (acre-ft)
Treatment Volume	5.52	5.53

Table 2 Attenuation Requirements

	Pre-Development	Post Development
SJRWMD Mean Annual Storm (cfs)	10.56	10.01
SJRWMD 25-year 24-hour Discharge (cfs)	65.95	65.82



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RS&H
IMPROVING YOUR WORLD
Reynolds, Smith and Hills, Inc.
1000 Legion Place, Suite 800
Orlando, Florida 32801
407-893-5800
FL Cert. No. EB0005620
Engineer of Record: Jeffrey S. Glenn PE No. 47210

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 400	ORANGE SEMINOLE	432193-1-52-01

FIGURE 1

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Project: I-4 EXPRESS
Designed by: ZSG
Date:

Basin: II
Checked by: JSG
Date:
rvsd 8/21/2013

DRY RETENTION POND DESIGN CALCULATIONS
BASED ON SJRWMD REQUIREMENTS

Calculate the Required Treatment Volume

Treatment volume is the greater of 1.25" over the impervious + 0.5" over total drainage area or 1" over the total drainage area. We are also required to meet the Wekiva Protection Basin Criteria (3" over the additional impervious over "A" soils).

Basin Areas		
Basin Name	**Impervious (ac.)**	**Total (ac.)**
Pond II-1A	0.49	2.80
Pond II-1B	4.53	8.02
Pond II-1C	1.06	2.12
Pond II-1D	0.00	0.34
Pond II-2	0.78	1.58
Pond II-3	0.69	1.34
Pond II-4	0.24	0.97
Basin II-2	1.76	2.79
Basin II-3	0.91	1.48
Basin II-4	9.67	16.61
Total	**20.13**	**38.05**

Total Proposed Drainage Area (ac) = A = 38.05
Total Impervious Area (ac) = I1 = 20.13
Existing Impervious Areas, from permit (ac) = 7.83
Additional Impervious Area over "A" soils (ac) = I2 = 12.30

1.25" over the impervious + 0.5" over total drainage area = $\frac{I1\ (1.25\ in) + A\ (0.5\ in)}{12\ in/ft}$ = 3.68

1" over total area = $\frac{A(1\ in)}{12\ in/ft}$ = 3.17

Check 3" over additional impervious over "A" soils = $\frac{I2\ (3\ in)}{12\ in/ft}$ = 3.08

Required Treatment Volume (higher of the above x 1.5 to meet OFW criteria) = 5.52 ac-ft

Project: I-4 EXPRESS
Designed by: ZSG
Date:

Basin: II
Checked by: JSG
Date:
rvsd 8/21/2013

Set Control and Weir Elevations

Calculate area at control and top of bank elevation (Pond II-1A, II-1B, II-1C, II-1D)

Control Elevation =	51.00 ft
Low Top of bank elevation =	55.00 ft
Area @ control elevation =	0.88 ac
Area @ Low Top of bank =	1.58 ac

Calculate Weir Elevation and Treatment provided in Pond (II-1A, II-1B, II-1C)

Elevation ft		Area acres	Volume acre-ft
51.00	Control Elev.	0.88	0.00
54.25	Treat. El	1.45	3.78
55.00	Inside TOB	1.58	4.92

Provided Treatment Volume (Pond II-1A, II-1B, II-1C = 3.78 ac-ft

Calculate area at control and top of bank elevation (Pond II-2, II-3, II-4)

Control Elevation =	60.00 ft
Top of bank elevation =	67.00 ft
Area @ control elevation =	0.26 ac
Area @ Top of bank =	1.01 ac

Calculate Weir Elevation and Treatment provided in Pond (II-2, II-3, II-4)

Elevation ft		Area acres	Volume acre-ft
60.00	Control Elev.	0.26	0.00
63.77	Treat. El	0.66	1.75
67.00	Inside TOB	1.01	4.45

Provided Treatment Volume (Pond II-2, II-3, II-4) = 1.75 ac-ft

Total Provided Treatment Volume = 5.53 ac-ft

Project: I-4 EXPRESS
Designed by: ZSG
Date: 9/11/2013

Basin: II
Checked by: JSG
Date: 9/11/2013

DRY RETENTION POND DESIGN CALCULATIONS
BASED ON SJRWMD REQUIREMENTS

Calculate the Required Treatment Volume (Southern Ponds Only)

Treatment volume is the greater of 1.25" over the impervious + 0.5" over total drainage area or 1" over the total drainage area. We are also required to meet the Wekiva Protection Basin Criteria (3" over the additional impervious over "A" soils).

Basin Areas		
Basin Name	**Impervious (ac.)**	**Total (ac.)**
Pond II-1A	0.49	2.80
Pond II-1B	4.53	8.02
Pond II-1C	1.06	2.12
Pond II-1D	0.00	0.34
Total	**6.08**	**13.28**

Total Proposed Drainage Area (ac) = A = 13.28
Total Impervious Area (ac) = I1 = 6.08
Additional Impervious Area over "A" soils (ac) = I2 = 6.08

1.25" over the impervious + 0.5" over total drainage area = $\frac{I1\ (1.25\ in) + A\ (0.5\ in)}{12\ in/ft}$ = 1.19

1" over total area = $\frac{A(1\ in)}{12\ in/ft}$ = 1.11

Check 3" over additional impervious over "A" soils = $\frac{I2\ (3\ in)}{12\ in/ft}$ = 1.52

Required Treatment Volume (higher of the above x 1.5 to meet OFW criteria) = 2.28 ac-ft

Set Control and Weir Elevations

Calculate area at control and top of bank elevation (Pond II-1A, II-1B, II-1C, II-1D)

Control Elevation = 51.00 ft
Low Top of bank elevation = 55.00 ft
Area @ control elevation = 0.88 ac
Area @ Low Top of bank = 1.58 ac

Calculate Weir Elevation and Treatment provided in Pond (II-1A, II-1B, II-1C)

Elevation ft		Area acres	Volume acre-ft
51.00	Control Elev.	0.88	0.00
54.25	Treat. El	1.45	3.78
55.00	Inside TOB	1.58	4.92

Provided Treatment Volume (Pond II-1A, II-1B, II-1C) = 3.78 ac-ft

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Project Name: I4 Express - Rest Area
Task Description: SCS RUNOFF CURVE NUMBER

Prepared by: ZG
Checked by: JG
Date: 9/10/2013
Revised by: ZG
Revised Date: 9/12/2013

BASIN NAME/NO.: Rest Area

POST-DEVELOPMENT

Land Use Type	Hydrologic Soil Group	SCS Curve Number Value	Area Covered by CN Value	AREA*CN
Impervious	N/A	98	0.00	0.00
Grass	A	39	1.35	52.65
Grass	A/D	80	0.00	0.00
			$Sum_{Area*CN}$ =	52.65
			Total Area =	1.35
			Composite CN Value =	**39.0**

BASIN NAME/NO.: RA-I4 WB

POST-DEVELOPMENT

Land Use Type	Hydrologic Soil Group	SCS Curve Number Value	Area Covered by CN Value	AREA*CN
Impervious	N/A	98	2.26	221.48
Grass	A	39	0.00	0.00
Grass	A/D	80	0.00	0.00
			$Sum_{Area*CN}$ =	221.48
			Total Area =	2.26
			Composite CN Value =	**98.0**

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IMPROVING YOUR WORLD

Project Name: I4 Express - Rest Area
Task Description: SCS RUNOFF CURVE NUMBER

Prepared by: ZG
Checked by: JG
Date: 9/10/2013
Revised by: ZG
Revised Date: 9/12/2013

BASIN NAME/NO.: Pond II-1A

POST-DEVELOPMENT

Land Use Type	Hydrologic Soil Group	SCS Curve Number Value	Area Covered by CN Value	AREA*CN
Impervious	N/A	98	0.49	48.02
Grass	A	39	2.31	90.09
Grass	A/D	80	0.00	0.00
			$Sum_{Area*CN}$ =	138.11
			Total Area =	2.80
			Composite CN Value =	**49.3**

BASIN NAME/NO.: Pond II-1B

POST-DEVELOPMENT

Land Use Type	Hydrologic Soil Group	SCS Curve Number Value	Area Covered by CN Value	AREA*CN
Impervious	N/A	98	4.53	443.94
Grass	A	39	3.49	136.11
Grass	A/D	80	0.00	0.00
			$Sum_{Area*CN}$ =	580.05
			Total Area =	8.02
			Composite CN Value =	**72.3**

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Project Name:	I4 Express - Rest Area
Task Description:	SCS RUNOFF CURVE NUMBER

Prepared by:	ZG
Checked by:	JG
Date:	9/10/2013
Revised by:	ZG
Revised Date:	9/12/2013

BASIN NAME/NO.: Pond II-1C

POST-DEVELOPMENT

Land Use Type	Hydrologic Soil Group	SCS Curve Number Value	Area Covered by CN Value	AREA*CN
Impervious	N/A	98	1.06	103.88
Grass	A	39	1.06	41.34
Grass	A/D	80	0.00	0.00
			$Sum_{Area*CN}$ =	145.22
			Total Area =	2.12
			Composite CN Value =	**68.5**

BASIN NAME/NO.: Pond II-1D

POST-DEVELOPMENT

Land Use Type	Hydrologic Soil Group	SCS Curve Number Value	Area Covered by CN Value	AREA*CN
Impervious	N/A	98	0.00	0.00
Grass	A	39	0.34	13.26
Grass	A/D	80	0.00	0.00
			$Sum_{Area*CN}$ =	13.26
			Total Area =	0.34
			Composite CN Value =	**39.0**

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Project Name: I4 Express - Rest Area
Task Description: SCS RUNOFF CURVE NUMBER

Prepared by: ZG
Checked by: JG
Date: 9/10/2013
Revised by: ZG
Revised Date: 9/12/2013

BASIN NAME/NO.: Pond II-2

POST-DEVELOPMENT

Land Use Type	Hydrologic Soil Group	SCS Curve Number Value	Area Covered by CN Value	AREA*CN
Impervious	N/A	98	0.78	76.44
Grass	A	39	0.80	31.20
Grass	A/D	80	0.00	0.00
			$Sum_{Area*CN}$ =	107.64
			Total Area =	1.58
			Composite CN Value =	**68.1**

BASIN NAME/NO.: Pond II-3

POST-DEVELOPMENT

Land Use Type	Hydrologic Soil Group	SCS Curve Number Value	Area Covered by CN Value	AREA*CN
Impervious	N/A	98	0.69	67.62
Grass	A	39	0.65	25.35
Grass	A/D	80	0.00	0.00
			$Sum_{Area*CN}$ =	92.97
			Total Area =	1.34
			Composite CN Value =	**69.4**

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Project Name:	I4 Express - Rest Area
Task Description:	SCS RUNOFF CURVE NUMBER

Prepared by:	ZG
Checked by:	JG
Date:	9/10/2013
Revised by:	ZG
Revised Date:	9/12/2013

BASIN NAME/NO.: Pond II-4

POST-DEVELOPMENT

Land Use Type	Hydrologic Soil Group	SCS Curve Number Value	Area Covered by CN Value	AREA*CN
Impervious	N/A	98	0.24	23.52
Grass	A	39	0.73	28.47
Grass	A/D	80	0.00	0.00
			$Sum_{Area*CN}$ =	51.99
			Total Area =	0.97
			Composite CN Value =	**53.6**

BASIN NAME/NO.: Basin II-2

POST-DEVELOPMENT

Land Use Type	Hydrologic Soil Group	SCS Curve Number Value	Area Covered by CN Value	AREA*CN
Impervious	N/A	98	1.76	172.48
Grass	A	39	1.03	40.17
Grass	A/D	80	0.00	0.00
			$Sum_{Area*CN}$ =	212.65
			Total Area =	2.79
			Composite CN Value =	**76.2**

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Project Name: I4 Express - Rest Area
Task Description: SCS RUNOFF CURVE NUMBER

Prepared by: ZG
Checked by: JG
Date: 9/10/2013
Revised by: ZG
Revised Date: 9/12/2013

BASIN NAME/NO.: Basin II-3

POST-DEVELOPMENT

Land Use Type	Hydrologic Soil Group	SCS Curve Number Value	Area Covered by CN Value	AREA*CN
Impervious	N/A	98	0.91	89.18
Grass	A	39	0.57	22.23
Grass	A/D	80	0.00	0.00
			$Sum_{Area*CN}$ =	111.41
			Total Area =	1.48
			Composite CN Value =	**75.3**

BASIN NAME/NO.: Basin II-4

POST-DEVELOPMENT

Land Use Type	Hydrologic Soil Group	SCS Curve Number Value	Area Covered by CN Value	AREA*CN
Impervious	N/A	98	9.67	947.66
Grass	A	39	6.94	270.66
Grass	A/D	80	0.00	0.00
			$Sum_{Area*CN}$ =	1218.32
			Total Area =	16.61
			Composite CN Value =	**73.3**

Permit No. 64105-7

I-4 (SR 400) St. Johns River Bridge

Replacement and Six-Laning

completed, in order to meet the projects owner's time constraints. State agencies are governed by statutes that establish requirements for use of a design-build process. The state agency is required to develop a design criteria package or scope of services document to use in selection of the design-build firm to bid or prepare a proposal in response to an agency solicitation. The design criteria package must specify performance-based criteria for the project, including provisions for stormwater management.

No final construction plans were prepared for the road widening and bridge replacements approved in June 2000. The final design (such as proposed by the present ERP) was to be based on the preliminary information submitted as a part of the 2000 permit application. The FDOT is required to obtain Environmental Resource Permits for each phase of construction, provided that the phase is consistent with the 2000 master ERP.

The present ERP proposes to modify the west end of the St. Johns River Bridge to better integrate with two existing roads (Orange Boulevard [= CR 15] and US Highway 17-92) on the west bank (northwest Seminole County). The proposed modification includes the addition of Ramp B1,a 0.8 -mile long superstructure that will extend over part of the Lake Monroe shore to connect I-4 with US 17-92. The applicant also proposes to improve a brief segment of contiguous Orange Boulevard by expanding it from two to four lanes.

There are three (3) basins within the project limits, which ultimately outfall into Lake Monroe. Basin 1 has been defined as the proposed CR 15 and Ramp B1 from the high point down to US 17/92. This basin outfalls to proposed modified pond 1. A total of 9.59 acres contribute runoff to this pond. The pond has been designed to outfall to an existing wetland, which discharge north into Lake Monroe.

Basin 2 is defined as the existing basin for Pond QQ5 along with Ramp B1 from its high point down to the I-4. The existing Pond QQ5 is interconnected with Pond QQ3 (Basin3). Basin2 has been modified by reducing the contributing area by 15.14 acres. The 15.14 acres, is an area intercepted and treated by Pond QQ5. Basin 3 is defined as the area contributing to existing Pond QQ3, which is interconnected into Pond QQ5. Basin 3 will remain unchanged. Therefore, additional storage capacity would be required for Pond QQ5. This was accomplished by adding storage with Pond 1 and interconnecting it with QQ5.

Plans and calculations submitted for the proposed improvement show that the project meets the requirements for water quality treatment and water quantity attenuation for the 25-year, and the mean-annual, 24-hour storm events.

Site Description:

The present project includes 7.5 acres of wetlands and waters. All site wetlands have been diminished by initial highway construction that antedates effective water resource regulation. Road construction isolated these wetlands from their historical watershed so that hydroperiods have been diminished and food webs disjointed through reduced animal movement. Habitat fragmentation and isolation is especially severe in the present case. The three project wetlands were historically part of the Lake Monroe floodplain swamp that was fragmented into three bodies within the existing interchange.

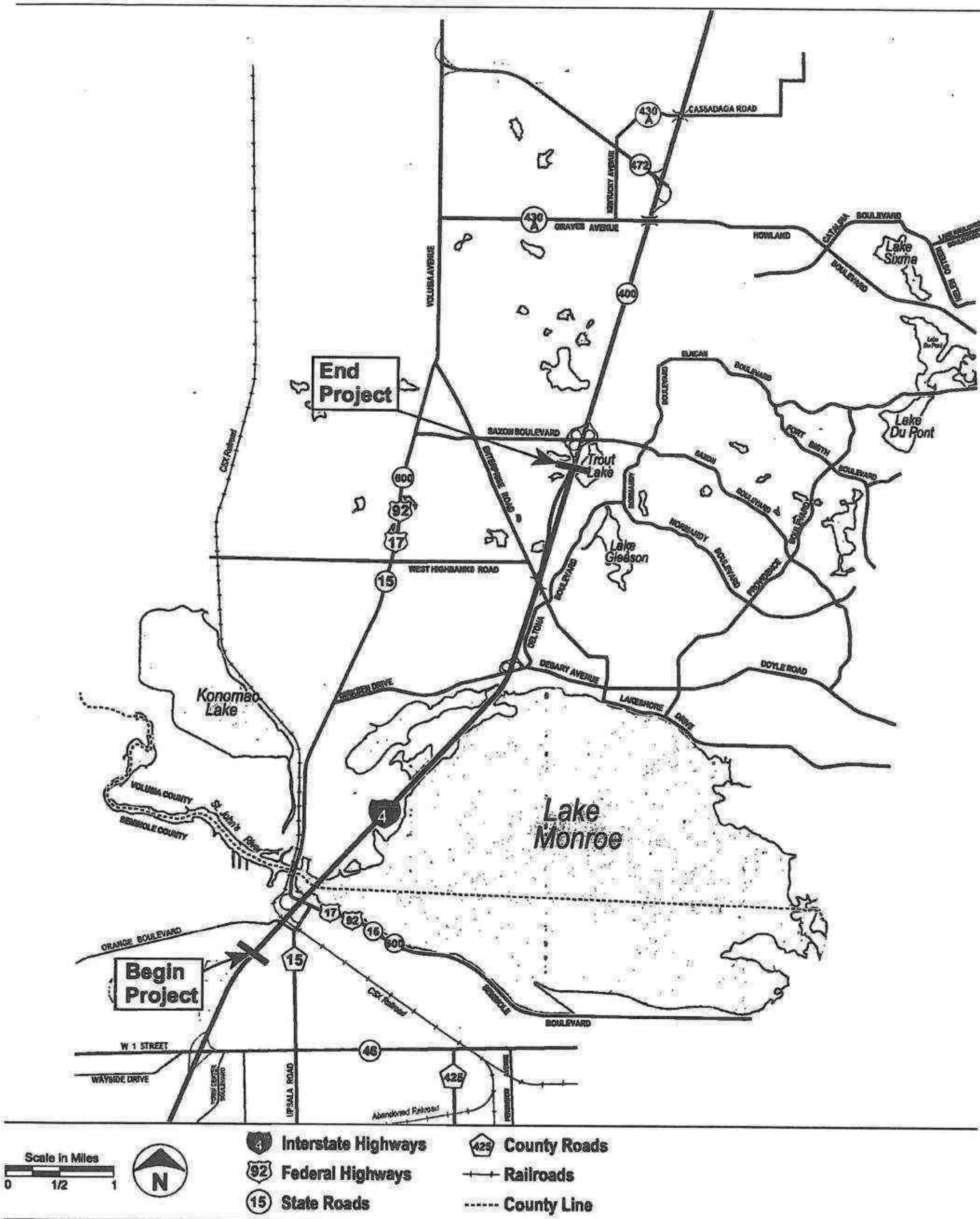


Exhibit 1

Project Location Map

I-4 (SR400) St. Johns River Bridge Replacement and Six-Laning

URS

1.0 INTRODUCTION

The Florida Department of Transportation (FDOT) District 5 is proposing to replace the existing Interstate 4 (I-4) Bridge over the St. Johns River and widen approximately 6.7 miles of existing I-4 from four (4) lanes to an ultimate eight (8) lane typical section. In addition, the bridge over Orange Boulevard will also be replaced and the bridge over Padgett Creek will be widened. The ultimate build-out to eight (8) lanes is to be staggered into two phases. The first phase is to widen I-4 to six-lanes and to ensure that bridge construction accommodates the ultimate condition (the project). The second phase will complete the last two lanes and finalize interchange modifications. This report and permit modification applies to the first phase.

This project is to be designed and constructed using a Design/Build delivery process where the owner (FDOT) will enter into a contractual arrangement with a single Design/Build Team to both design and then build the project.

1.1 Project Overview

On June 13, 2000 the Florida Department of Transportation (FDOT) was issued a St. Johns River Water Management District (SJRWMD) Environmental Resource Permit (4-127-64105-1). This permit authorizes FDOT to proceed with specified activities associated with the St. Johns River Bridge and I-4 Six-laning Design-Build project from just west of Orange Boulevard to just west of Saxon Boulevard.

In order to move forward with construction, final design of stormwater management facilities are required and are presented within this report. Additionally, the limits of wetland impacts have been refined and are presented herewith in compliance with the conditions of the permit. Therefore, this report and associated Construction Plans are provided in support of the Formal Modification of permit 4-127-64105-1.

1.2 Project Description

This project consists of the widening of I-4 from four lanes to six lanes from west of the Orange Boulevard/US 17-92 interchange to the west of the Saxon Boulevard interchange, a length of approximately 6.7 miles. This work also includes partial reconstruction of the Orange Boulevard/US 17-92 interchange including replacement of both the Orange Blvd/CSX Railroad and St. Johns River Bridges. From just east of the St. Johns River Bridge, the project includes widening I-4 to the median and widening the existing bridges at Padgett Creek and Dirksen./Debary Road. The replacement of the existing Enterprise Bridge over I-4 is included in this project and has been issued a permit (40-127-0454G-ERP) for all improvements associated with its construction.

The project is located in Section 39 of Township 19S, Range 30E in Seminole County and Sections 2, 10, 11, 15 and 16 of Township 19S, Range 30E in Volusia County (see Exhibit 1). The project is also within the jurisdiction of the SJRWMD, Seminole County and Volusia County and all stormwater management and drainage issues comply with the regulations set forth by all agencies.

URS

MADE BY:	IGN	DATE:	09/30/03	JOB NO.	2427022
CHECKED BY:	APY	DATE:	11/02/03	SHEET NO.	
CALCULATIONS FOR:	RAMP B1			BASIN:	CR15

Permanent Pool Calculations

Basin Characteristics

Land Use	Area (ac)	Runoff Coeff.	Product
Roadway Paved Area	6.36	0.95	6.04
Roadway Pervious Area	0.87	0.20	0.17
Pond Pervious Area	1.51	0.20	0.30
Pond Area at NWL	0.85	1.00	0.85
Total	9.59		7.37

Composite C = **0.77**

Wet Season Normal Rainfall (P) = **31 in**

Min. Permanent Pool Vol. = Area x Composite C x P x 14 / 153 / 12 = **1.74 ac-ft**

Min. Permanent Pool Vol. Req. if Littoral Zone is Not Provided = 1.5 x Min Perm Pool Vol. = **2.61 ac-ft**

Stage Storage Calc.

ELEV. (ft)		AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
9.50	Out. Berm	2.27				
8.50	In. Berm	1.63				
4.50	(NWL)	0.85				0.00
			0.59	2.00	1.17	
2.50		0.50				1.17
			0.41	2.25	0.92	
0.25		0.32				2.09
			0.24	4.00	0.96	
-3.75	Bottom	0.16				3.05

Permanent Pool Volume Provided = **3.05 ac-ft**

Resident Time Provided = Perm. Pool Vol. Provided *153*12 / Area / C / P = **24.5 Days**

Note: An additional 50% permanent pool volume is provided in lieu of providing a littoral zone.

Mean Depth = Permanent Pool Volume / Area at NWL = **3.59 ft**

64105-7

URS

MADE BY:	IGN	DATE:	09/30/03	JOB NO.	2427022
CHECKED BY:	APV	DATE:	10/02/03	SHEET NO.	
CALCULATIONS FOR:	RAMP B1	POND:	POND 1	BASIN:	CR15

Water Quality

Total Basin Area =	9.59	ac
Paved Area =	6.36	ac
Pond Area at NWL =	0.56	ac

A.	1.0	" Over Total Basin Area =	0.80	Ac-Ft
B.	2.5	" Over Paved Area =	1.33	Ac-Ft
		Required PAV =	1.33	Ac-Ft

Stage Storage Calculations

ELEV. (ft)		AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
9.50	Out. Berm	2.27				6.91
			1.95	1.00	1.95	
8.50		1.63				4.96
			1.63	0.00	0.00	
8.50	In. Berm	1.63				4.96
			1.39	2.50	3.47	
6.00		1.14				1.49
			1.13	0.15	0.17	
5.85	(PAV)	1.11				1.33
			0.98	1.35	1.33	
4.50	(NWL)	0.85				
-3.75	Bottom	0.16				

Freeboard provided =

1.57 ft

Bleed Down Volume

1/2 the req'd PAV = 0.5 * 1.33 = 0.66 Ac-Ft

Volume remaining in pond after recovery of 1/2 PAV = 0.66 Ac-Ft

Bleed Down Calculations

ELEV. (ft)		AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)
5.85	(PAV)	1.11			
			1.05	0.63	0.66
5.22	(at time t)	0.99			

URS CORPORATION

MADE BY:	AFY	DATE:	10/17/02	JOB NO.	242702
CHECKED BY:	ALW	DATE:	12/20/02	SHEET NO.	1
CALCULATIONS FOR:	St Johns River Bridge	POND:	QQ-3 & QQ-5	BASIN:	QQ

Water Quality

Total Basin Area =	5.104	ac
Paved Area =	2.52	ac ← total paved area (including new ramp D1)
Pond Area at NWL =	2.97	ac

A.	1.0	" Over Total Basin Area =	4.25	Ac-Ft
B.	2.5	" Over Paved Area =	5.11	Ac-Ft
		Required PAV =	5.11	Ac-Ft

Stage Storage Calculations

ELEV. (ft)	AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)	
9.50	6.75	6.06	1.00	6.06	23.76	
8.50	5.37	4.84	2.50	12.10	17.70	
6.00 "(PAV)	4.31	4.18	0.50	2.09	5.60	← provided WQ
5.50	4.05	3.51	1.00	3.51	3.51	
4.50 (NWL)	2.97					

Bleed Down Volume

1/2 the PAV = 0.5 * 3.51 = 1.76 Ac-Ft

Bleed Down Calculations

ELEV (ft)	AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)
5.50 (PAV)	4.05			
		3.80	0.46	1.76
5.04 (at time t)	3.55			

Pond Bleed Down Design

Orifice Design

t = 1/2 PAV / (CF*C*Ao*(2*g*h)^0.5)

V-notch Design

Theta = 2*atan(0.492*Vdet/H^2.5)

Diameter of orifice (do) =	6.00	in (both ponds)	Vdet=	1.76 Ac-Ft
Recovery time (t) =	25.6	hrs	H=	1.000 ft
Orifice coefficient (C) =	0.60		Theta =	81.619 deg
1/2 Pollution Abatement Volume (PAV) =	76,447.80	ft^3	b =	1.727 ft
Depth from PAV Elev. to orifice flow line (h1) =	1.000	ft		
Depth from Water Elev. at time t to orifice flow line (h2) =	0.538	ft		
Average depth (h) = (h1+h2) / 2 =	0.769	ft		
Area of orifice (Ao) =	0.19635	ft^2		
Gravitational constant (g) =	32.20	ft/sec^2		
Conversion Factor (CF) =	3,600	sec/hr		

Permitted

URS CORPORATION

MADE BY:	JCW	DATE:	06/27/02	JOB NO.	242702
CHECKED BY:		DATE:		SHEET NO.	1
CALCULATIONS FOR:	St Johns River Bridge	POND:	QQ-3 & QQ-5	BASIN:	QQ

Water Quality

Total Basin Area =	51.83	ac
Paved Area =	22.68	ac
Pond Area at NWL =	2.97	ac

A.	1.0	" Over Total Basin Area =	4.32	Ac-Ft
B.	2.5	" Over Paved Area =	4.73	Ac-Ft
		Required PAV =	4.73	Ac-Ft

Stage Storage Calculations

ELEV. (ft)	AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
9.50	5.77				19.90
		5.10	1.00	5.10	
8.50	4.43				14.80
		3.97	2.50	9.93	
6.00 (PAV)	3.52				4.87
		3.24	1.50	4.87	
4.50 (NWL)	2.97				

Bleed Down Volume

1/2 the PAV = 0.5 * 4.87 = 2.43 Ac-Ft

Bleed Down Calculations

ELEV. (ft)	AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)
6.00 (PAV)	3.52			
		3.39	0.72	2.43
5.28 (at time t)	3.26			

Pond Bleed Down Design

Orifice Design

$t = 1/2\ PAV / (CF*C*Ao*(2*g*h)^{0.5})$

Diameter of orifice (do) =	6.00	in (both ponds)
Recovery time (t) =	29.2	hrs
Orifice coefficient (C) =	0.60	
1/2 Pollution Abatement Volume (PAV) =	105,973.31	ft^3
Depth from PAV Elev. to orifice flow line (h1) =	1.500	ft
Depth from Water Elev. at time t to orifice flow line (h2) =	0.782	ft
Average depth (h) = (h1+h2) / 2 =	1.141	ft
Area of orifice (Ao) =	0.19635	ft^2
Gravitational constant (g) =	32.20	ft/sec^2
Conversion Factor (CF) =	3,600	sec/hr

V-notch Design

Theta = 2*atan(0.492*Vdet/H^2.5)

Vdet=	2.43	Ac-Ft
H=	1.500	ft
Theta =	46.956	deg
b =	1.303	ft

Excerpt from "Addendum to Bridge Hydraulics Report" dated May 2001

A-20

I-4 Bridge over St. Johns River
An Analysis of Water Surface Profiles for Temporary Causeways

Volusia and Seminole Counties

Description:

In order to meet the construction needs, two temporary causeways are proposed along the existing I-4 bridge. The temporary causeways are 30 feet wide. The causeway will be contained by sheet-pile up to the elevation of 6.2 feet, NAVD from Station 2970+00 to Station 2980+50. At west bank, the temporary causeways will be connected to a temporary road at the elevation of approximately 4 feet, NAVD.

Water Surface Profile Analysis:

To evaluate the impacts of water surface profiles due the temporary causeways, the WSPRO programs are used to calculate water surface profiles. The bridge section was modified to include the causeway up to the elevation of 6.2 ft, NAVD. Flood events of NHW, 10-, 50-, 100- and 500-year events are analyzed.

The results of stages and average velocities are summarized in following tables:

			With Causeways		Without Causeways	
	Flows	Stage	Stage	Stage	Stage	Stage
	(cfs)	Exit	Bridge	Approach	Bridge	Approach
		(ft, NAVD)	(ft, NAVD)	(ft, NAVD)	(ft, NAVD)	(ft, NAVD)
NHW	4330	2.460	2.465	2.478	2.466	2.474
10-yr	13000	6.200	6.22	6.250	6.221	6.238
50-yr	21800	8.070	8.100	8.156	8.109	8.135
100-yr	26500	8.680	8.730	8.788	8.732	8.764
500-yr	40700	10.310	10.402	10.483	10.404	10.452

URS CORPORATION

MADE BY:	JCW	DATE:	03/28/01	JOB NO.	242702
CHECKED BY:	[illegible]	DATE:	03/29/01	SHEET NO.	1
CALCULATIONS FOR:	St Johns River Bridge	POND:	QQ-3 & QQ-5	BASIN:	QQ

Water Quality

Total Basin Area = [redacted] ac
Paved Area = [redacted] ac
Pond Area at NWL = [redacted] ac

A.	1.0 " Over Total Basin Area =	4.67	Ac-Ft
B.	2.5 " Over Paved Area =	4.73	Ac-Ft
	Required PAV =	[redacted]	Ac-Ft

Stage Storage Calculations

(A)	(B)	(C)	(D)	(E)	(F)
9.50	5.77				19.90
		5.10	1.00	5.10	
8.50	4.43				14.80
		3.97	2.50	9.93	
6.00 (PAV)	3.52				4.87
		3.24	1.50	4.87	
4.50 (NWL)	2.97				

Bleed Down Volume

1/2 the PAV = 0.5 * 4.87 = 2.43 Ac-Ft

Bleed Down Calculations

(A)	(B)	AREA (C)	(D)	(E)
6.00 (PAV)	3.52			
		3.39	0.72	2.43
5.28 (at time t)	3.26			

Pond Bleed Down Design

Orifice Design

t = 1/2 PAV / (CF*C*Ao*(2*g*h)^0.5)

Diameter of orifice (do) =	* 6.00 in (both ponds)	
Recovery time (t) =	29.2 hrs	
Orifice coefficient (C) =	0.60	
1/2 Pollution Abatement Volume (PAV) =	105,973.31 ft^3	
Depth from PAV Elev. to orifice flow line (h1) =	1.500 ft	
Depth from Water Elev. at time t to orifice flow line (h2) =	0.782 ft	
Average depth (h) = (h1+h2) / 2 =	1.141 ft	
Area of orifice (Ao) =	0.19635 ft^2	
Gravitational constant (g) =	32.20 ft/sec^2	
Conversion Factor (CF) =	3,600 sec/hr	

V-notch Design

Theta = 2*atan(0.492*Vdet/H^2.5)

Vdet=	2.43	Ac-Ft
H=	1.500	ft
Theta =	46.956	deg
b =	1.303	ft

* 6" diameter used as first step in iterative design process. Actual design includes two 3.5" ϕ orifices.

English Worksheet

URS CORPORATION

MADE BY:	JCW	DATE:	08/30/01	JOB NO.	242702
CHECKED BY:		DATE:	09/04/01	SHEET NO.	
CALCULATIONS FOR:	PONDS QQ-3 & QQ-5			BASIN:	QQ

Permanent Pool Calculations

Basin Characteristics

Land Use	Area (ac)	Runoff Coeff.	Product
Roadway Paved Area	22.68	0.95	21.55
Roadway Pervious Area	23.38	0.20	4.68
Pond Pervious Area	2.80	0.20	0.56
Pond Area at NWL	2.97	1.00	2.97
Total	51.83		29.75

Composite C = 0.57

Wet Season Normal Rainfall (P) = 31 In

Min. Permanent Pool Vol. = Area x Composite C x P x 14 / 153 / 12 = 7.0 ac-ft

Min. Permanent Pool Vol. Req. If Littoral Zone is Not Provid= 1.5 x Min Perm Pool Vol. = 10.5 ac-ft

Stage Storage Calc.

Elev. (ft)		Area (ac)	Avg Area (ac)	Delta D (ft)	Delta Storage (ac ft)	Sum Storage (ac ft)
9.50		5.77				
8.50		4.43				
6.00	(PAV)	3.52				
4.50	(NWL)	2.97				24
			2.06	11.50	24	
-7.00		1.15				

Permanent Pool Volume Provided = 23.7 ac-ft

Resident Time Provided = Perm. Pool Vol. Provided *153*12 / Area / C / P 47.2 Days

Note: An additional 50% permanent pool volume is provided in lieu of providing a littoral zone. (See 40C-42.026)

Mean Depth = Permanent Pool Volume / Area at NWL = 7.98 ft

filename: basinqq_pond.xls
worksheet: PERMANENT POOL

URS CORPORATION

MADE BY:	JCW	DATE:	03/28/01	JOB NO.	242702
CHECKED BY:		DATE:	03/29/01	SHEET NO.	1
CALCULATIONS FOR:	St Johns River Bridge	POND:	QQ-3 & QQ-5	BASIN:	QQ

Combined ponds QQ3+QQ5

Water Quality

Total Basin Area =	36.03	ac
Paved Area =	22.68	ac
Pond Area at NWL =	2.97	ac

A.	1.0	" Over Total Basin Area =	4.67	Ac-Ft
B.	2.5	" Over Paved Area =	4.73	Ac-Ft
		Required PAV =	4.73	Ac-Ft

Stage Storage Calculations

ELEV. (ft)	AREA (ac)	AVG. AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
9.50	5.77				19.90
		5.10	1.00	5.10	
8.50	4.43				14.80
		3.97	2.50	9.93	
6.00 (PAV)	3.52				4.87
		3.24	1.50	4.87	
4.50 (NWL)	2.97				

Bleed Down Volume

1/2 the PAV = 0.5 * 4.87 = 2.43 Ac-Ft

Bleed Down Calculations

ELEV. (ft)	AREA (ac)	AVG. AREA (ac)	Delta D (ft)	Delta storage (ac-ft)
6.00 (PAV)	3.52			
		3.39	0.72	2.43
5.28 (at time t)	3.26			

Pond Bleed Down Design

Orifice Design

t = 1/2 PAV / (CF*C*Ao*(2*g*h)^0.5)

V-notch Design

Theta = 2*atan(0.492*Vdet/H^2.5)

Diameter of orifice (do) =	* 6.00 in (both ponds)			
Recovery time (t) =	29.2 hrs	Vdet=	2.43	Ac-Ft
Orifice coefficient (C) =	0.60	H=	1.500	ft
1/2 Pollution Abatement Volume (PAV) =	105,973.31 ft^3	Theta =	46.956	deg
Depth from PAV Elev. to orifice flow line (h1) =	1.500 ft	b =	1.303	ft
Depth from Water Elev. at time t to orifice flow line (h2) =	0.782 ft			
Average depth (h) = (h1+h2) / 2 =	1.141 ft			
Area of orifice (Ao) =	0.19635 ft^2			
Gravitational constant (g) =	32.20 ft/sec^2			
Conversion Factor (CF) =	3,600 sec/hr			

* 6" diameter used as first step in iterative design process. Actual design includes TWO 3.5" ϕ orifices.

URS CORPORATION

MADE BY:	JCW	DATE:	08/30/01	JOB NO.	242702
CHECKED BY:		DATE:	09/04/01	SHEET NO.	
CALCULATIONS FOR:	PONDS QQ-3 & QQ-5			BASIN:	QQ

Permanent Pool Calculations

Basin Characteristics

Land Use	Area (ac)	Runoff Coeff.	Product
Roadway Paved Area	22.68	0.95	21.55
Roadway Pervious Area	23.38	0.20	4.68
Pond Pervious Area	2.80	0.20	0.56
Pond Area at NWL	2.97	1.00	2.97
Total	**51.83**		29.75

Composite C = **0.57**

Wet Season Normal Rainfall (P) = **31 in**

Min. Permanent Pool Vol. = Area x Composite C x P x 14 / 153 / 12 = **7.0 ac-ft**

Min. Permanent Pool Vol. Req. If Littoral Zone is Not Provid = 1.5 x Min Perm Pool Vol. = **10.5 ac-ft**

Stage Storage Calc.

ELEV. (ft)		AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
9.50		5.77				
8.50		4.43				
6.00	(PAV)	3.52				
4.50	(NWL)	2.97				24
			2.06	11.50	24	
-7.00		1.15				

Permanent Pool Volume Provided = **23.7 ac-ft**

Resident Time Provided = Perm. Pool Vol. Provided *153*12 / Area / C / P **47.2 Days**

Note: An additional 50% permanent pool volume is provided in lieu of providing a littoral zone. (See 40C-42.026)

Mean Depth = Permanent Pool Volume / Area at NWL = **7.98 ft**

URS CORPORATION				
PROJECT TITLE:	St Johns River Bridge Project			
PROJECT NUMBER:	242702			DATE
BASIN DESIGNATION:	Basin QQ (PD-QQ3)	MADE BY:	AFY	04-Oct-02
BASIN ANALYSIS (PRE/POST):	POST D1	CHECKED BY:	ALW	12/20/02

RAINFALL (in) - P: 8.60

BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open Spaces - Good Condition	15 Felda/Manatee	D	80	1.75	140.00
Open Spaces - Good Condition	25 Pineda	D			
Pond Area (normal water level)			100	1.63	163.00
Proposed and Existing Pavement			98	4.96	486.08
			TOTALS	8.34	789.08

COMPOSITE CN	94.6

ESTIMATE OF RUNOFF VOLUME

1) DETERMINE SOIL STORAGE - S

S = (1000 / CN) - 10

SOIL STORAGE (in)	S	0.57

2) DETERMINE RUNOFF - R

R = (P - 0.2*S)^2 / (P + 0.8*S)

RUNOFF (in)	R	7.95

3) DETERMINE RUNOFF VOLUME - V(R)

V(R) = R/12*AREA

RUNOFF (ac-ft)	V(R)	5.53

URS CORPORATION				
PROJECT TITLE:	St Johns River Bridge Project			
PROJECT NUMBER:	242702			DATE
BASIN DESIGNATION:	Basin QQ (INFIELD)	MADE BY:	AFY	04-Oct-02
BASIN ANALYSIS (PRE/POST):	POST D1	CHECKED BY:	ALW	12/20/02

RAINFALL (in) - P: 8.60

BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open Spaces - Good Condition	15 Felda/Manatee	B	80	3.93	314.40
Open Spaces - Good Condition	25 Pineda	B			
Proposed pavement			98	0.27	26.46
			TOTALS	4.20	340.86

COMPOSITE CN	81.2

ESTIMATE OF RUNOFF VOLUME

1) DETERMINE SOIL STORAGE - S

S = (1000 / CN) - 10

SOIL STORAGE (in)	S	2.32

2) DETERMINE RUNOFF - R

R = (P - 0.2*S)^2 / (P + 0.8*S)

RUNOFF (in)	R	6.33

3) DETERMINE RUNOFF VOLUME - V(R)

V(R) = R/12*AREA

RUNOFF (ac-ft)	V(R)	2.22

URS CORPORATION				
PROJECT TITLE:	St Johns River Bridge Project			
PROJECT NUMBER:	242702			DATE
BASIN DESIGNATION:	Basin QQ (PD-QQ5)	MADE BY:	AFY	04-Oct-02
BASIN ANALYSIS (PRE/POST):	POST D1	CHECKED BY:	ALW	16/OCT/02

RAINFALL (in) - P: 8.60

BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open Spaces - Good Condition	15 Felda/Manatee	B	80	7.59	607.20
Open Spaces - Good Condition	25 Pineda	B			
Pond Area (normal water level)			100	1.34	134.00
Proposed and Existing Pavement			98	5.70	558.60
			TOTALS	14.63	1299.80

COMPOSITE CN	88.8

ESTIMATE OF RUNOFF VOLUME

1) DETERMINE SOIL STORAGE - S

S = (1000 / CN) - 10

SOIL STORAGE (in)	S	1.26

2) DETERMINE RUNOFF - R

R = (P - 0.2*S)^2 / (P + 0.8*S)

RUNOFF (in)	R	7.26

3) DETERMINE RUNOFF VOLUME - V(R)

V(R) = R/12*AREA

RUNOFF (ac-ft)	V(R)	8.85

URS CORPORATION				
PROJECT TITLE:	St Johns River Bridge Project			
PROJECT NUMBER:	242702			DATE
BASIN DESIGNATION:	Basin QQ (DITCHQQ5)	MADE BY:	AFY	04-Oct-02
BASIN ANALYSIS (PRE/POST):	POST D1	CHECKED BY:	A.W	10/30/02

RAINFALL (in) - P: 8.60

BASIN RUNOFF CURVE NUMBER WORKSHEET

LAND-USE DESCRIPTION	SOIL NAME	SOIL GROUP	CN	AREA (ac)	PRODUCT
Open Spaces - Good Condition	15 Felda/Manatee	B	80	3.47	277.60
Open Spaces - Good Condition	25 Pineda	B			
Proposed and Existing Pavement			98	0.56	54.88
			TOTALS	4.03	332.48

COMPOSITE CN	82.5

ESTIMATE OF RUNOFF VOLUME

1) DETERMINE SOIL STORAGE - S

S = (1000 / CN) - 10

SOIL STORAGE (in)	S	2.12

2) DETERMINE RUNOFF - R

R = (P - 0.2*S)^2 / (P + 0.8*S)

RUNOFF (in)	R	6.49

3) DETERMINE RUNOFF VOLUME - V(R)

V(R) = R/12*AREA

RUNOFF (ac-ft)	V(R)	2.18

2.0 EXISTING CONDITIONS

I-4 was constructed prior to any regulatory requirements to treat and attenuate runoff from development. Therefore, none of the basins provide any formal stormwater management in the existing condition. Each of the 5 basins within this project shares a common discharge, which is the St. Johns River/Lake Monroe. Pre-Developed hydrographs have been developed for each of the basins in compliance with applicable design criteria (see Appendix A). These hydrographs have been modeled as a direct discharge or routed through existing structures to assess the affect of the proposed improvements on design high water stages and flow rates. See Exhibit 2 for pre-development drainage maps.

2.1 Basin QQ-3/QQ-5

Basin QQ-3/QQ-5 extends from the beginning of the project (just south of the Lockhart-Smith Canal) to the high point of the St. Johns River Bridge. The basin slopes from southwestern boundary of the project to the east in the direction of the river. The runoff in the basin is a combination of overland flow and ditch conveyance. The basin consists of existing roadway, infield areas, commercial (offsite) and disturbed range.

Basins QQ-3 and QQ-5 are within the Elder Creek basin, which is part of the Lake Monroe Watershed. Sub-basin QQ-3 is bounded by I-4 on the east, CSX Railroad on the south and existing Ramp D-1 on the north. Discharge from sub-basin QQ-3 is conveyed through sheet flow into the adjacent wetland and ultimately into Lake Monroe.

Sub-basin QQ-5 commences just south of the Lockhart-Smith Canal. It is bounded by I-4 on the west, existing Ramp C on the north and CR 15 on the East. Discharge from sub-basin QQ-5 is combined with off-site flow from the Elder Ditch entering I-4 right-of-way. The combined discharge flows in the ditch adjacent to the EB off ramp at Orange Boulevard to an existing 48" culvert under Orange Boulevard and the CSX Railroad. Discharge from this existing culvert is deposited into an unnamed ditch north of the CSX

accommodate the ultimate improvements to I-4 including all ramps, high occupancy vehicle (HOV) lanes and general use lanes (GUL). Any exceptions or clarifications are presented in the individual design narrative and calculations in Appendix B. See Exhibit 3 for the Post-Developed Drainage Maps and Exhibit 4 for the SCS Soils Maps and Exhibit 5 for limits of the FEMA floodplain map.

Unavoidable impacts to wetlands have been permitted and are depicted in Appendix C. Construction over the St. Johns River and Padgett Creek is within a Sovereign and Submerged Land Easement provided in Appendix D. Impacts to the Lake Monroe floodplain are summarized in Appendix E.

3.1 Basin QQ-3 and QQ-5

Ponds QQ-3 and QQ-5 are interconnected and provide treatment and attenuation for the combined basin for the interim condition. With minor modifications to the basin limits and stormsewer system, the ponds will accommodate the ultimate condition. Pond QQ-3 discharges into the downstream end of the existing cross culvert located under the westbound off ramp at US 17-92. Pond QQ-5 discharges into the upstream end of the existing cross culvert under CR 15. Conveyance to this pond system is via ditch and stormsewer system.

3.2 Basin RR-3

Pond RR-3 is designed to provide treatment and attenuation for the basin and discharges into an existing ditch that eventually flows to the St. Johns River. This pond will accommodate the ultimate condition and the results of both the ultimate and interim design can be found in Appendix B. Conveyance to this stormwater treatment facility is by median ditch and stormsewer flow.

6.0 ROADWAY DRAINAGE SYSTEM

6.1 Roadway Base Clearance

The base clearance in the vicinity of each pond was calculated using a design high water equal to the pollution abatement volume elevation. This elevation was selected since the definition of design high water per the FDOT Drainage Manual is the elevation at the end of 24 hours. The elevation of the base of the roadway was determined by defining the profile low point of all the mainline or ramps adjacent to each pond and subtracting 1.5' To determine base clearance, subtract the design high water elevation from the base elevation for the separation. The following table summarizes the base clearance adjacent to each pond.

TABLE 6.1 SUMMARY OF BASE CLEARANCE ADJACENT TO WATER MANAGEMENT FACILITITES

Pond	Baseline	Station	PGL Elev. (NAVD)	Elevation of Base (NAVD)	Design High Water Elev.	Base Clearance (ft)
QQ-3	Ramp D	402+00	11.26	10.76	6.00	4.76'
QQ-5	Ramp C	10+84	10.64	9.14	6.00	3.14'
RR-3	(1)	(1)	(1)	(1)	6.00	(1)
SS-2			18.70	17.20	15.0	2.5
Ditch	I-4	288+00	42.50	41.0	40.0	1.0
Ditch	I-4	292+00	41.75	40.25	39.0	1.25
Ditch	I-4	296+00	39.50	38.00	37.00	1.0
Ditch	I-4	300+00	35.5	34.0	32.5	2.5

(1) Pond not located adjacent to roadway; therefore, stages do not impact roadway.

The base clearance for roadway (ramps) on less than 6 feet of fill was calculated using the information gathered for this project. The soil boring information provides a depth to the estimated seasonal high water level and the existing ground was determined using the "digital terrain model" (DTM) which defines existing topography. The roadway base elevation was determined by subtracting 1.5 feet from the profile grade elevation or the

B.1 Basin QQ

Basin QQ is composed of several sub-basins which all discharge to Lake Monroe via ditches, stormsewer and overland flow. To comply with SJRWMD criteria, pre-developed and post-developed hydrographs for each sub-basin have been developed for the 2.33-yr/24-hr (Mean Annual), 10-yr/24-hr, 25-yr/24-hr, and 50-yr/24-hr storm events to comply with SJRWMD criteria and to provide tail water conditions for the storm sewer design.

This project is an interim condition with respect to the I-4 PD&E Study – Section 2. In addition, the western limits of the project eventually will tie to a six-laning project, which is currently in design. The in-design six-laning project will re-route a portion of the post-developed runoff from this design/build project and convey it to a future pond. The ultimate condition runoff from I-4 will be accommodated within this future pond as well as the QQ-3/QQ-5 system. To minimize constructability issues and additional right-of-way requirements in the future, the outfall for Pond 5 will be constructed at this time, and require minor modifications to accommodate the final Pond 5 design.

The entire basin has been analyzed in the "Monroe Basin Engineering Study and Drainage Inventory Update Phase I – Final Report", prepared by Singhoffen and Associates (SAI) for Seminole County in December 1999. Based on the findings in this report, flooding and deficient structures are prevalent within the overall basin. By utilizing the above referenced basin study and field verification, routing models were developed for both the pre and post-developed conditions. Even though these ponds are interconnected in the post-developed condition, each pond is equipped with a discharge structure that necessitates the maximum allowable discharge rates be determined.

The pre-developed condition for Pond QQ-3 has been determined by use of hydrograph results using existing site conditions. The model that was developed for the Pond QQ-5 pre-developed condition includes information that was gleaned from the SAI report, including the Elder ditch that flows parallel to I-4 on the east side of the EB off ramp at Orange Boulevard. Much of the runoff that this ditch conveys is attributed to off-site

sources. The Elder Ditch basin produced 49 cfs in predevelopment conditions for the 25 year/24hr event at the Orange Blvd crossing according to table 2.2A from SAI report for the Lockhart-Smith/Lake Monroe Basin Study (See references for basin QQ). This flow consist of a combination of I-4 basin and Elder Ditch basin runoff. The intent of the hydraulic model for this basin is to demonstrate the effects of the proposed improvements on the water stages in particular in the Orange Blvd outfall system. The Orange Blvd outfall system consists of the Elder ditch along ramp A, the 48" RCP cross culvert under Orange Blvd, the junction box in the median, the double 30" RCP culverts under the rail road, the Orange Blvd Ditch and the double 30"RCP culverts under CR15. The hydraulic model also provides actual tail water conditions in the Orange Blvd Ditch used for conveyance of pond QQ5 discharges. Due to the complexity of the SAI model, the offsite flow contribution from the actual Elder Ditch Basin was calculated by subtracting the calculated pre development I-4 flows from the total Elder Ditch basin flows obtained from the SAI hydraulic model. This approach yields conservative results due to the actual lag between both hydrographs.

A synthetic hydrograph was created from random input parameters to match the resulting offsite flow (29cfs). A combination of both the existing I-4 basin and the synthetic Elder ditch basin hydrographs were then modeled through the Orange Blvd outfall system and showed to produced comparable results with the SAI model. This base-line (reference) model allowed for demonstration of no adverse effects to the Orange Blvd outfall system in post-development conditions. The results of the post-development model actually showed an improvement (lowering) of water stages within the Orange Blvd. outfall system.

The proposed ponds in this basin are wet detention and their associated normal water elevations were determined from soil boring information. The ultimate tailwater conditions for the pre and post developed condition were determined and derived from historical water stages in Lake Monroe. Pond bleed-down of one-half of the pollution abatement volume is accomplished through an orifice set at the normal water elevation.

One-half of the pollution abatement volume recovers within the required range of 48-60 hours.

The proposed ponds were checked to determine if the system fully recovers within 14 days after the end of the design storm, which it did not. At the end of 14 days, the pond system was still at stage 4.57; therefore, the volume of an additional design storm was stacked in the pond system. The total volume of runoff from a design storm (7.72 inches over 8.34 acres in Basin QQ-3 and 7.16 inches over 14.63 acres in Basin QQ-5) is a total of 14.10 acre-feet. A "static" stacking of this additional volume is well contained within the pond.

The ultimate condition has also been modeled as part of this design. The overall basin limits will be reduced when the in-design six-laning project to the west is permitted and constructed. Therefore, the ultimate condition parameters have been determined using the reduced basin limits with the increased pavement area.

2.5 Basin East of Bifurcation

The basin east of the bifurcation extends from station 275+00 to the end of construction at station 302+70. Runoff from this basin partially flows into the depression within the bifurcated area with the remainder of the basin conveyed northerly into cross culverts under the eastbound I-4 lanes.

2.6 Summary of Existing Conditions

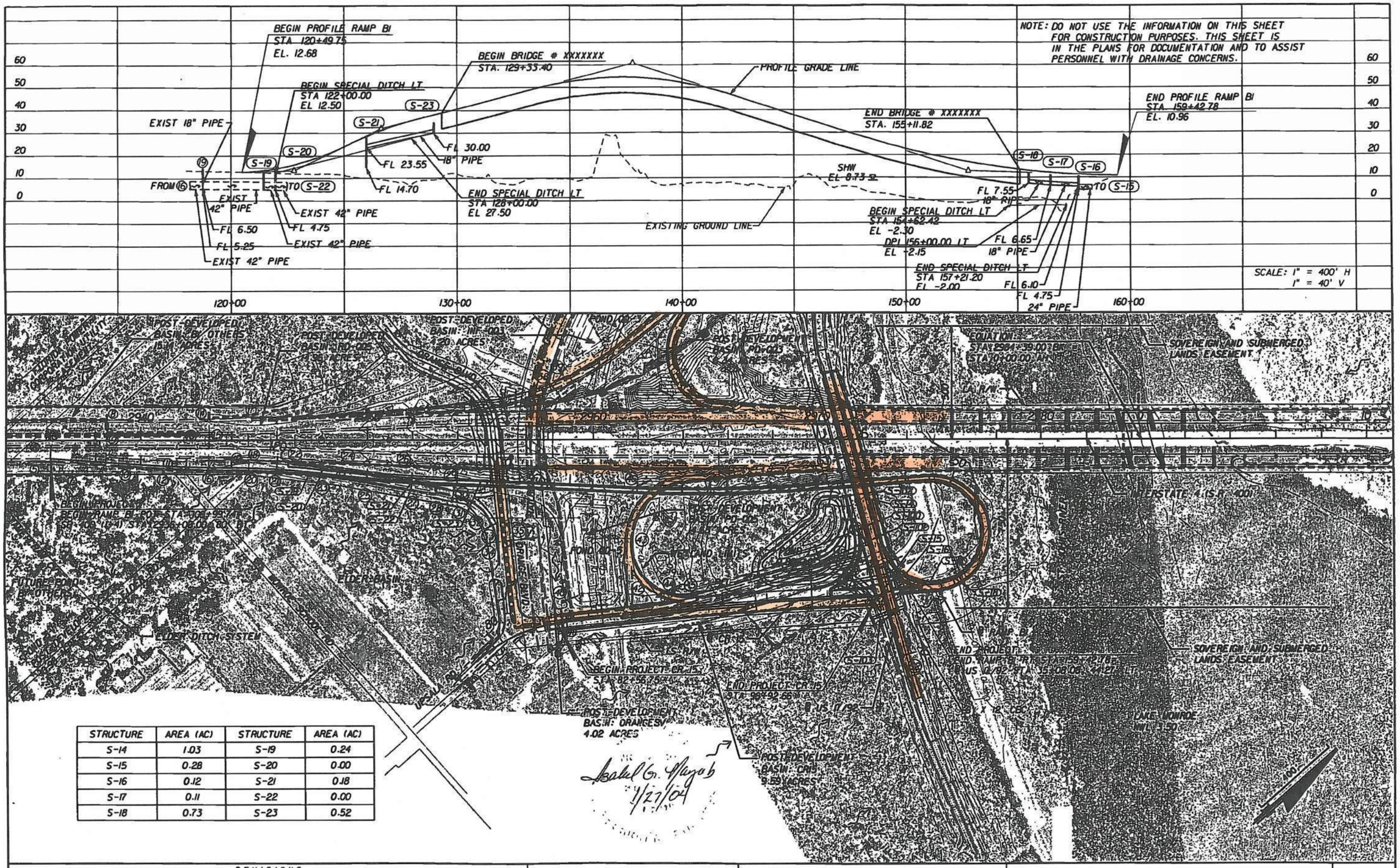
TABLE 2.1 SUMMARY OF EXISTING CONDITIONS

Basin	Area	Tc (minutes)	Curve Number	25-year/24-hour Peak Q (cfs)
PD-QQ-3	11.95	19.1	82.7	37.33
PD-QQ-5 *(1)*	72.84	N/A	N/A	51.68
RR-3	47.92	77.3	75.8	79.3
SS-2 *(2)*	42.74	N/A	N/A	36.62

(1) Area is sum of sub-basins, no composite Tc or CN is necessary, 25-year/24-hour peak Q is the routed discharge rate.. See drainage calculations.

(2) Area is sum of sub-basins, no composite Tc or CN is necessary, 25-year/24-hour peak Q is the routed discharge rate.. See drainage calculations

64105-7



STRUCTURE	AREA (AC)	STRUCTURE	AREA (AC)
S-14	1.03	S-19	0.24
S-15	0.28	S-20	0.00
S-16	0.12	S-21	0.18
S-17	0.11	S-22	0.00
S-18	0.73	S-23	0.52

Abdul G. Nayab
4/27/04

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ALBERT T. HORMIS
P.E. LICENSE NO. 41940
URS CORPORATION
315 E. ROBINSON STREET, SUITE 245
ORLANDO, FL 32801-1949
CERTIFICATE OF AUTHORIZATION NO. 000002

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 400	SEMINOLE	242702-2-32-01

RAMP BI
DRAINAGE MAP

SHEET NO. 4

H:\PROJECTS\ 2427022\DRAINAGE\drainage map\DRMPDR01.DGN

64105-7

REF POINT	℄ CR 15	OFFSET	SIDE
1	91+91.24	172.99'	LT
2	92+07.55	151.27'	LT
3	94+34.23	204.94'	LT
4	95+47.34	376.01'	LT
5	95+41.87	408.20'	LT
6	95+10.65	437.18'	LT
7	94+90.70	439.06'	LT
8	94+52.45	402.72'	LT
9	94+25.02	346.88'	LT
10	92+09.75	193.99'	LT
11	92+06.04	130.41'	LT
12	91+97.92	106.17'	LT
13	92+43.43	84.68'	LT
14	93+96.64	85.40'	LT
15	95+64.91	268.49'	LT
16	95+49.86	271.60'	LT

LEGEND:
NWL = NORMAL WATER LEVEL
SHW = SEASONAL HIGH WATER TABLE
DHW = DESIGN HIGH WATER

APPROXIMATE BORING LOCATION

(S-100)
STA 94+25.60, 240.66 LT
℄ CR 15
CONST 24" MES (1:4)
FL 0.25 RT
INDEX NO. 272

(S-101)
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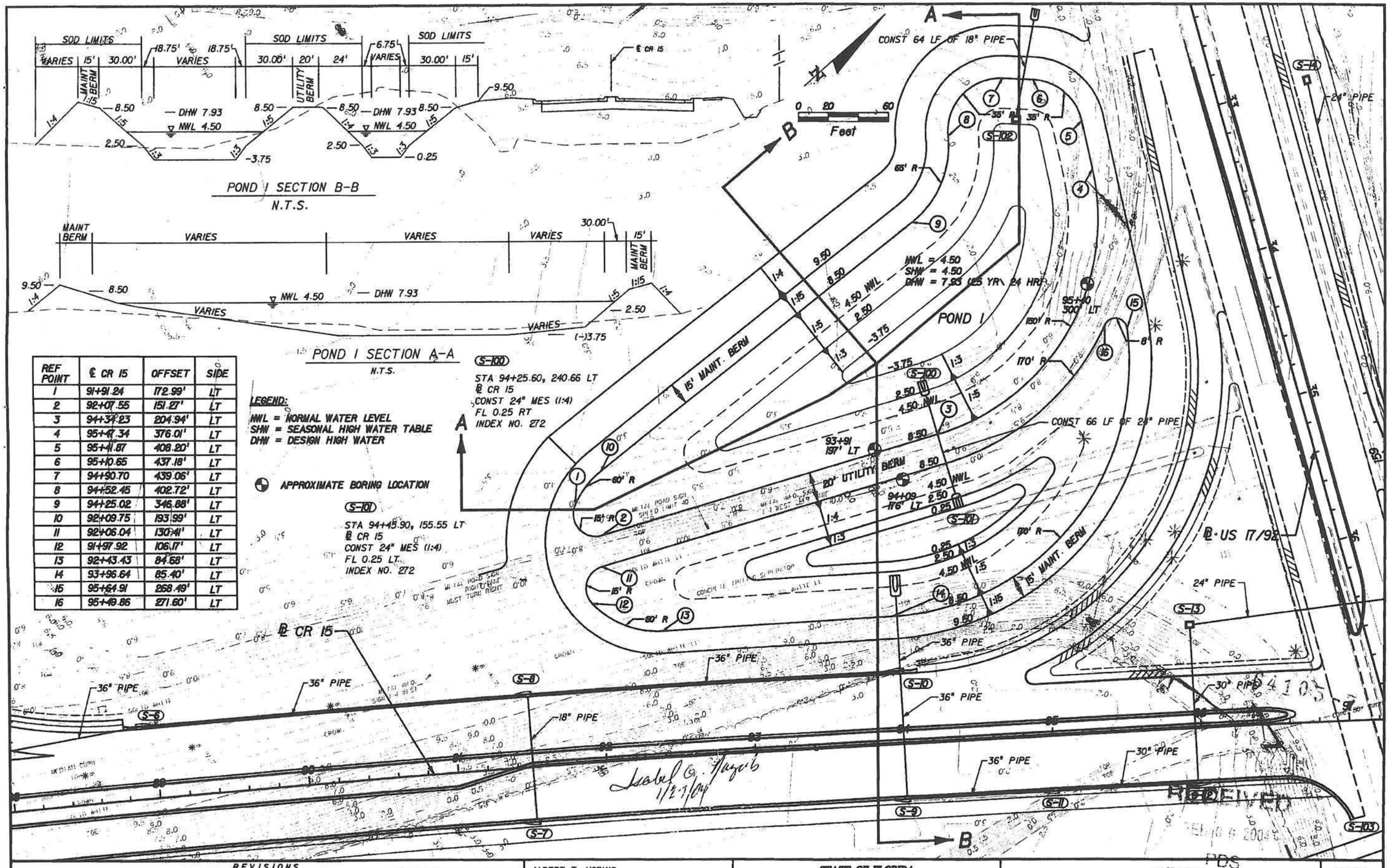
℄ CR 15
CONST 24" MES (1:4)
FL 0.25 LT.
INDEX NO. 272



Isabel G. Hazzard 11-7-04

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ALBERT T. HORMIS
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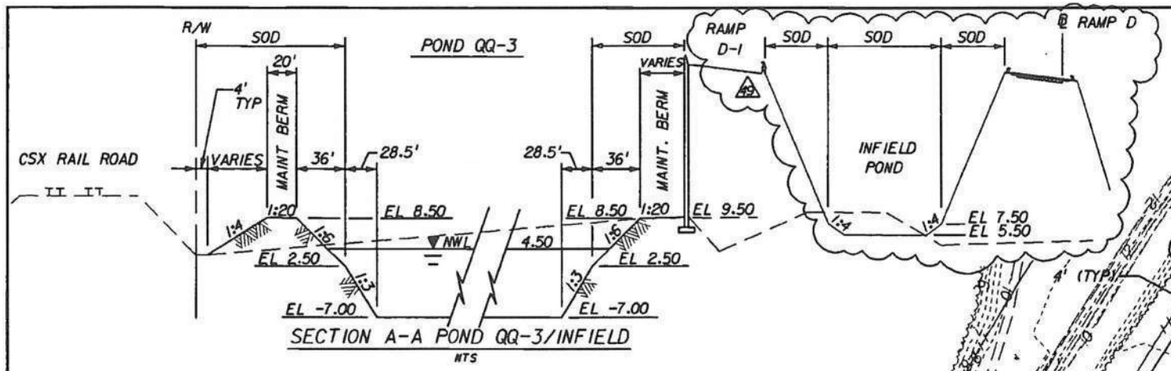
315 E. ROBINSON STREET, SUITE 245
ORLANDO, FL 32801-1949
CERTIFICATE OF AUTHORIZATION NO. 000002

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 400	SEMINOLE	242702-2-32-01

POND I
DETAIL SHEET

SHEET NO. 32

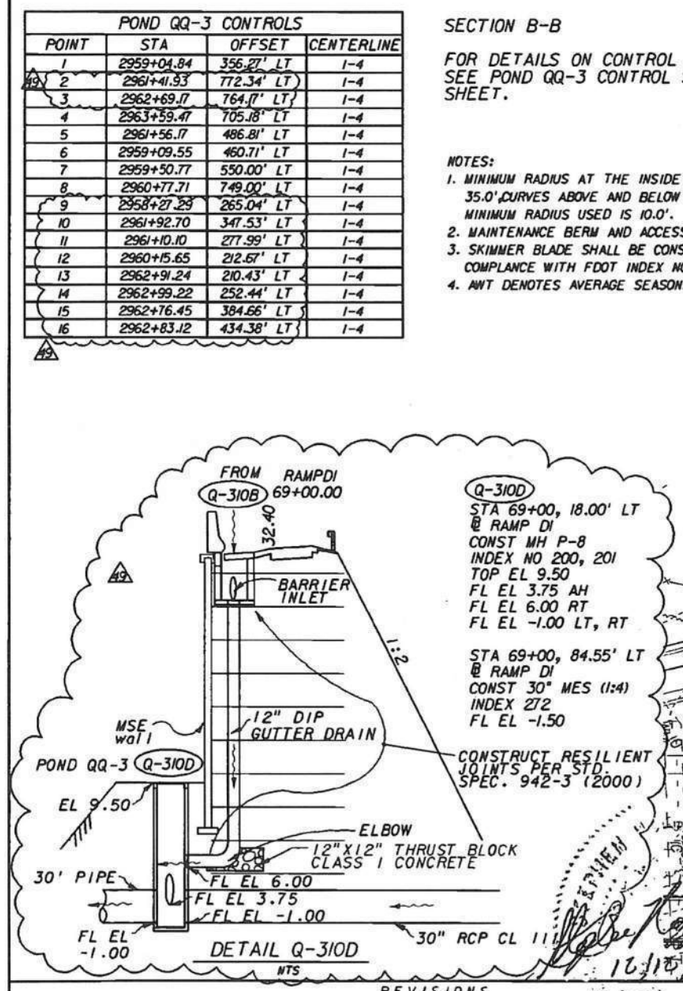


POND QQ-3 CONTROLS			
POINT	STA	OFFSET	CENTERLINE
1	2959+04.84	356.27' LT	I-4
2	2961+41.93	772.34' LT	I-4
3	2962+69.17	764.17' LT	I-4
4	2963+59.47	705.18' LT	I-4
5	2961+56.17	486.81' LT	I-4
6	2959+09.55	460.71' LT	I-4
7	2959+50.77	550.00' LT	I-4
8	2960+77.71	749.00' LT	I-4
9	2958+27.29	265.04' LT	I-4
10	2961+92.70	347.53' LT	I-4
11	2961+10.10	277.99' LT	I-4
12	2960+15.65	212.67' LT	I-4
13	2962+91.24	210.43' LT	I-4
14	2962+99.22	252.44' LT	I-4
15	2962+76.45	384.66' LT	I-4
16	2962+83.12	434.38' LT	I-4

SECTION B-B

FOR DETAILS ON CONTROL STRUCTURE Q-315, SEE POND QQ-3 CONTROL STRUCTURE DETAIL SHEET.

NOTES:
1. MINIMUM RADIUS AT THE INSIDE MAINTENANCE BERM IS 35.0', CURVES ABOVE AND BELOW ARE CONCENTRIC. MINIMUM RADIUS USED IS 10.0'.
2. MAINTENANCE BERM AND ACCESS SHALL BE SODDED.
3. SKIMMER BLADE SHALL BE CONSTRUCTED IN COMPLIANCE WITH FDOT INDEX NO 240.
4. AWT DENOTES AVERAGE SEASONAL WATER TABLE.



Q-310D
STA 69+00, 18.00' LT
@ RAMP D1
CONST MH P-8
INDEX NO 200, 201
TOP EL 9.50
FL EL 3.75 AH
FL EL 6.00 RT
FL EL -1.00 LT, RT

STA 69+00, 84.55' LT
@ RAMP D1
CONST 30" MES (1:4)
INDEX 272
FL EL -1.50

CONSTRUCT RESILIENT JOINTS PER STD. SPEC. 942-3 (2000)

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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
9-12-01	CCB	3 REVISE DRAINAGE NOTES, CHANGED POND BOTTOM			
7-25-02	ATH AFY	49 ADD RAMP D1, UPDATE DRAINAGE			

URS
315 E. ROBINSON STREET, SUITE 245
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NO. 000002

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 400	SEM & VOL	242702-1-52-01

POND QQ-3
DETAIL SHEET

SHEET NO. 1.68

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\\S006NT06\SPOOL\PLOT2\DRPREM01.prf
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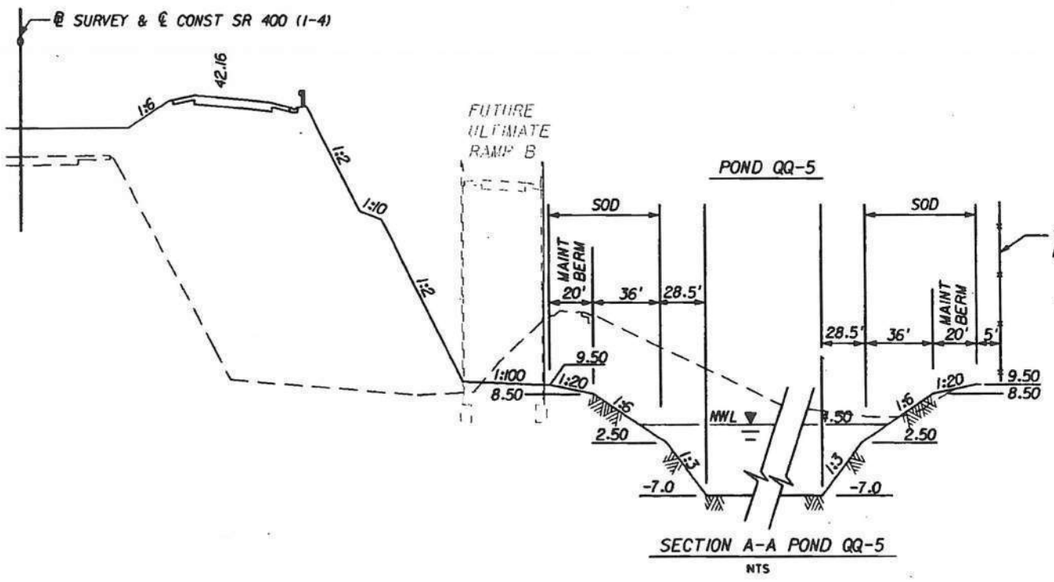
NOTES:

1. MINIMUM RADIUS AT THE INSIDE MAINTENANCE BERM IS 35.0', CURVES ABOVE AND BELOW ARE CONCENTRIC. MINIMUM RADIUS USED IS 10.0'.
2. MAINTENANCE BERM AND ACCESS SHALL BE SODDED.
3. SKIMMER BLADE SHALL BE CONSTRUCTED IN COMPLIANCE WITH FDOT INDEX NO. 240
4. AWT DENOTES AVERAGE SEASONAL WATER TABLE.

SECTION B-B

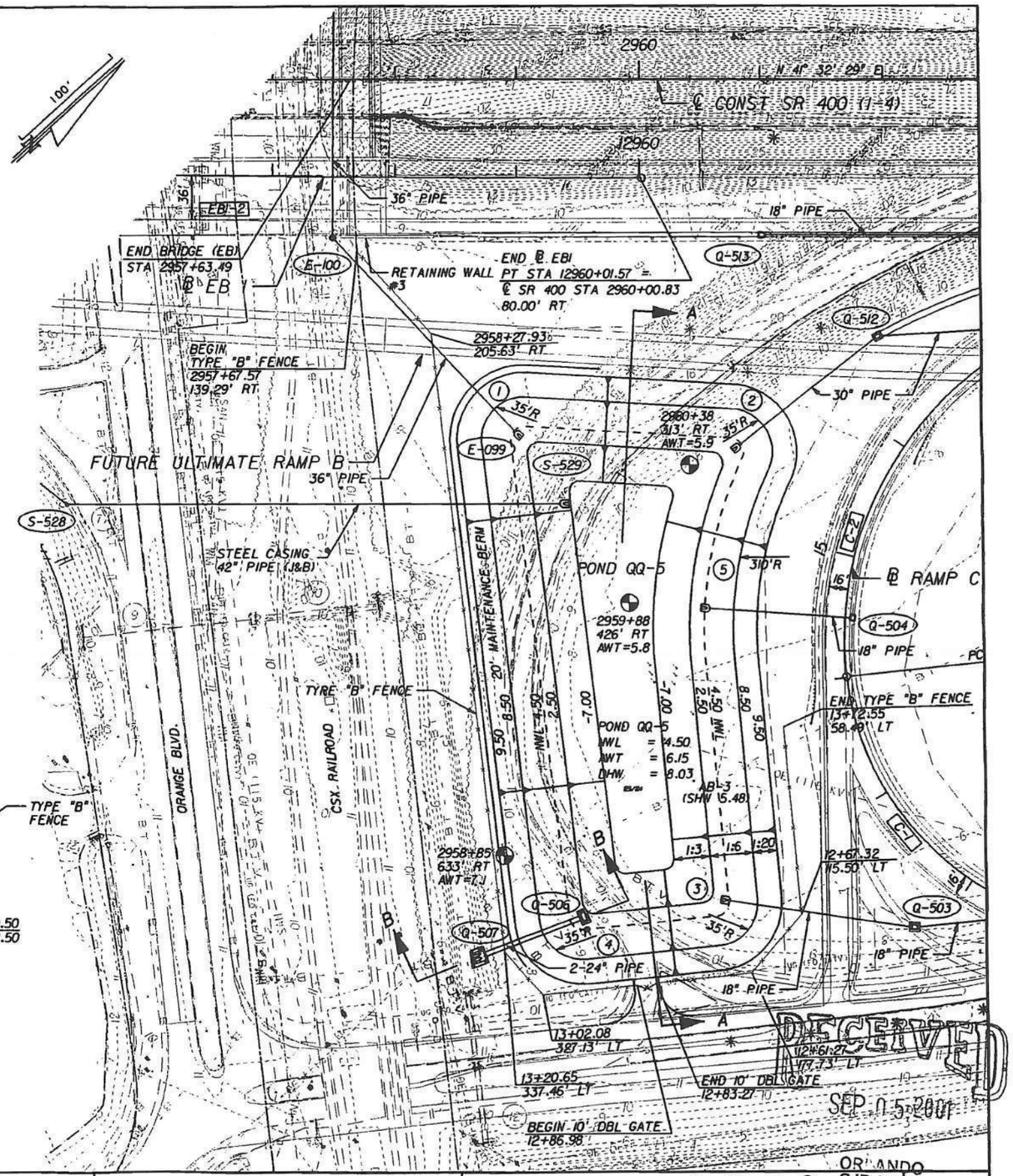
FOR DETAILS ON CONTROL STRUCTURE Q-506, SEE POND QQ-5 CONTROL STRUCTURE DETAIL SHEET.

POND QQ-5 CONTROLS			
POINT NO.	STA.	OFFSET	CENTERLINE
1	2959+04.06	292.19' RT	I-4
2	2960+72.10	302.12' RT	I-4
3	2960+56.09	671.85' RT	I-4
4	2959+47.90	682.82' RT	I-4
5	2960+79.28	389.12' RT	I-4



SECTION A-A POND QQ-5

NTS



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NO. 000002

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 400	SEM & VOL	242702-1-52-01

46-127-42105-3
POND QQ-5
DETAIL SHEET

SJR WMD SHEET NO. 1.70

POND QQ-3 CONTROLS			
POINT	STA	OFFSET	CENTERLINE
1	2959+04.84	356.27' LT	1-4
2	2961+41.93	772.34' LT	1-4
3	2962+69.17	764.17' LT	1-4
4	2963+59.47	705.18' LT	1-4
5	2961+56.17	486.81' LT	1-4
6	2959+09.55	460.71' LT	1-4
7	2959+50.77	550.00' LT	1-4
8	2960+77.71	749.00' LT	1-4
9	2958+27.29	265.04' LT	1-4
10	2961+92.70	347.53' LT	1-4
11	2961+10.10	277.99' LT	1-4
12	2960+15.65	212.67' LT	1-4
13	2962+91.24	210.43' LT	1-4
14	2962+99.22	252.44' LT	1-4
15	2962+76.45	384.66' LT	1-4
16	2962+83.12	434.38' LT	1-4

SECTION B-B

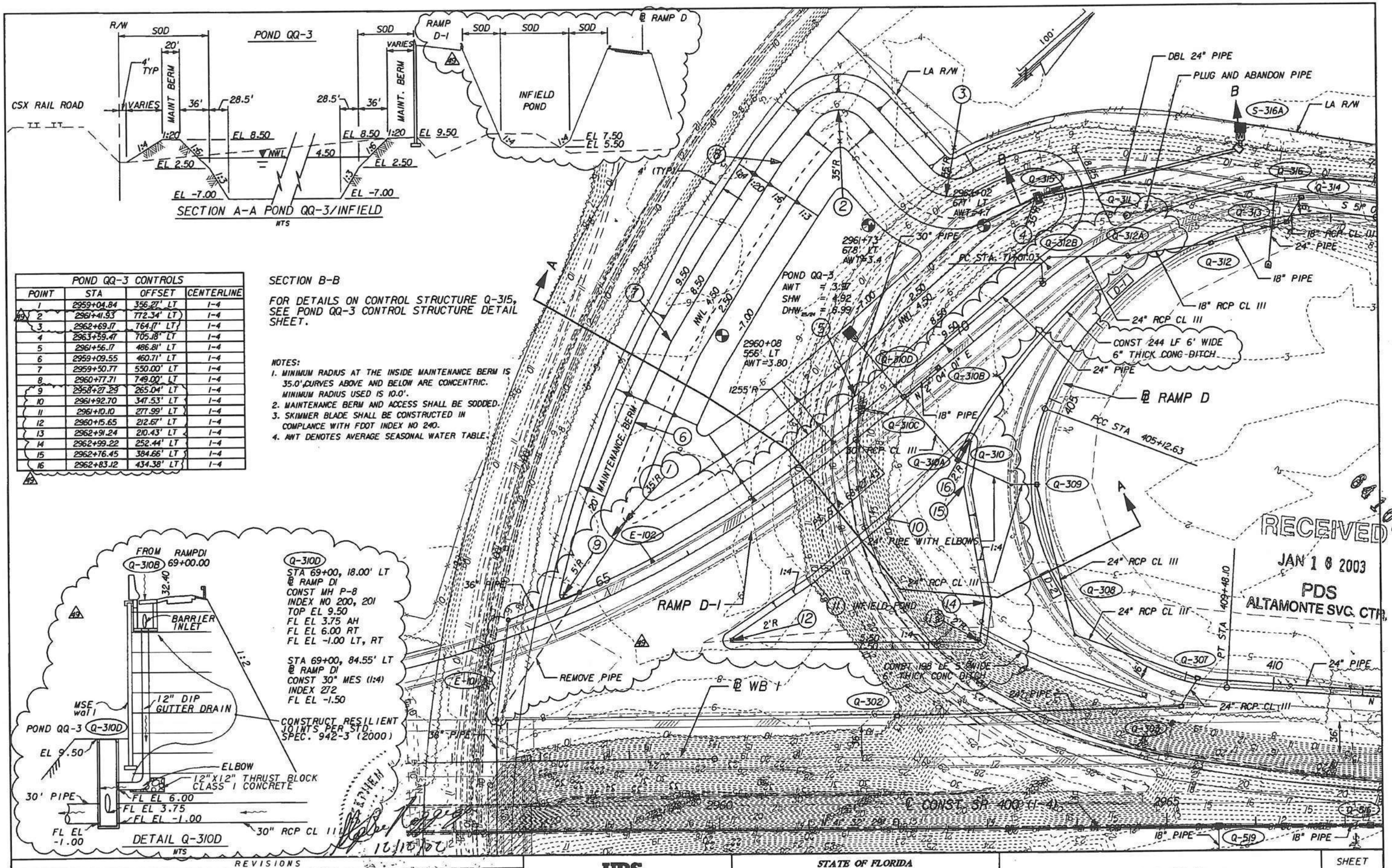
FOR DETAILS ON CONTROL STRUCTURE Q-315, SEE POND QQ-3 CONTROL STRUCTURE DETAIL SHEET.

NOTES:
1. MINIMUM RADIUS AT THE INSIDE MAINTENANCE BERM IS 35.0', CURVES ABOVE AND BELOW ARE CONCENTRIC. MINIMUM RADIUS USED IS 10.0'.
2. MAINTENANCE BERM AND ACCESS SHALL BE SODDED.
3. SKIMMER BLADE SHALL BE CONSTRUCTED IN COMPLIANCE WITH FDOT INDEX NO 240.
4. AWT DENOTES AVERAGE SEASONAL WATER TABLE.

(Q-310D)
STA 69+00, 18.00' LT
@ RAMP D1
CONST MH P-8
INDEX NO 200, 201
TOP EL 9.50
FL EL 3.75 AH
FL EL 6.00 RT
FL EL -1.00 LT, RT

STA 69+00, 84.55' LT
@ RAMP D1
CONST 30" MES (1:4)
INDEX 272
FL EL -1.50

CONSTRUCT RESILIENT JOINTS PER STD. SPEC. 942-3 (2000)



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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
9-12-01	CCB	3 REVISE DRAINAGE NOTES, CHANGED POND BOTTOM			
7-25-02	ATH AFY	49 ADD RAMP D1, UPDATE DRAINAGE			

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NO. 000002

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 400	SEM & VOL	242702-1-52-01

POND QQ-3
DETAIL SHEET

SHEET NO. 1.68

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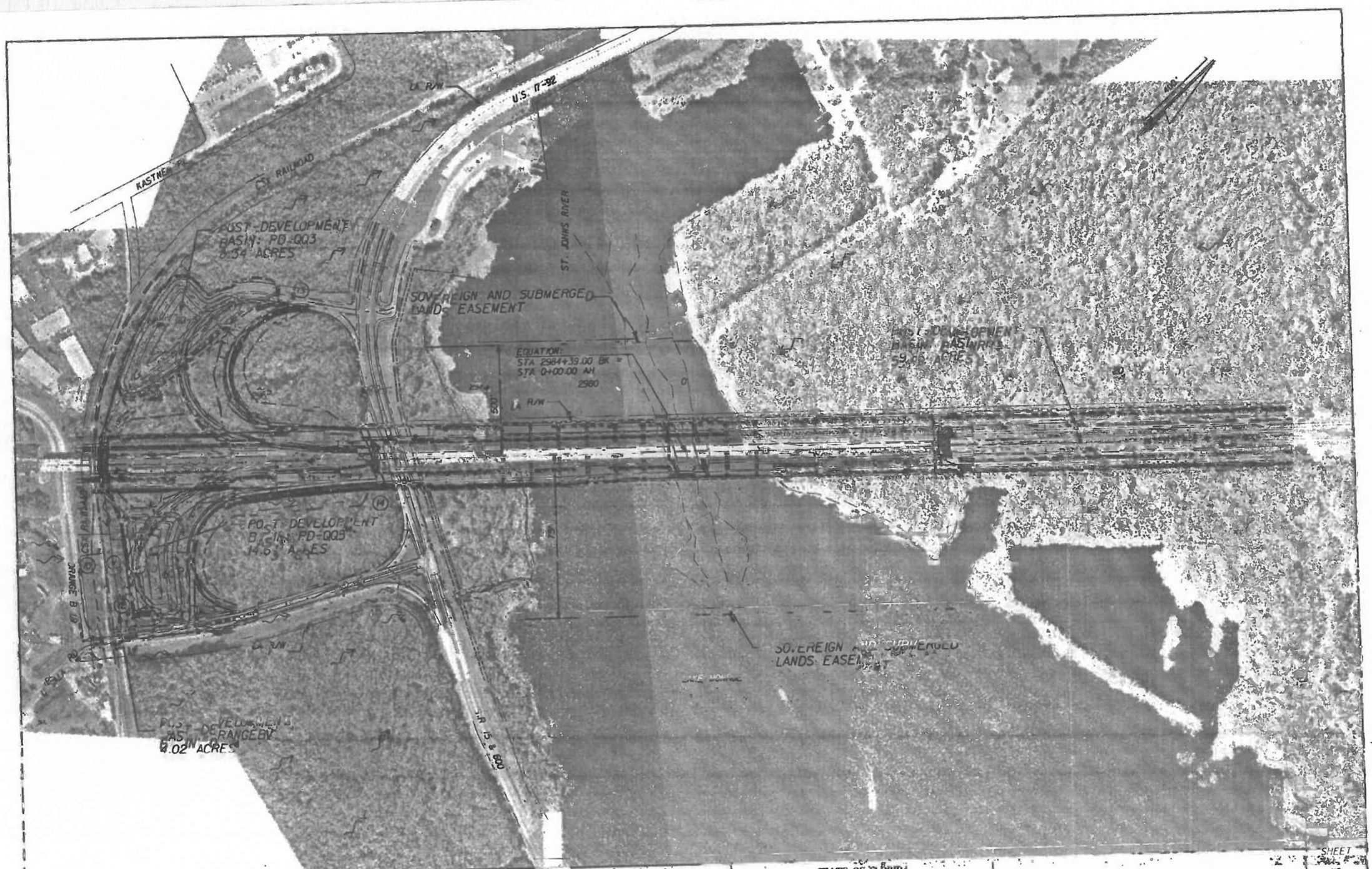

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

URS
315 E. ROBINSON STREET, SUITE 245
ORLANDO, FL 32801-1949
PH (407) 422-0353 FAX (407) 423-2695
NO. 000002

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 400	SEM & VOL	242702-1-52-01

SR 400 (I-4) WIDENING DRAINAGE MAP

SHEET NO.

PRINTED: $$$$$$SYTIME$$$$$$ $$$$$$$DGNSPECIFICATION$$$$$$$

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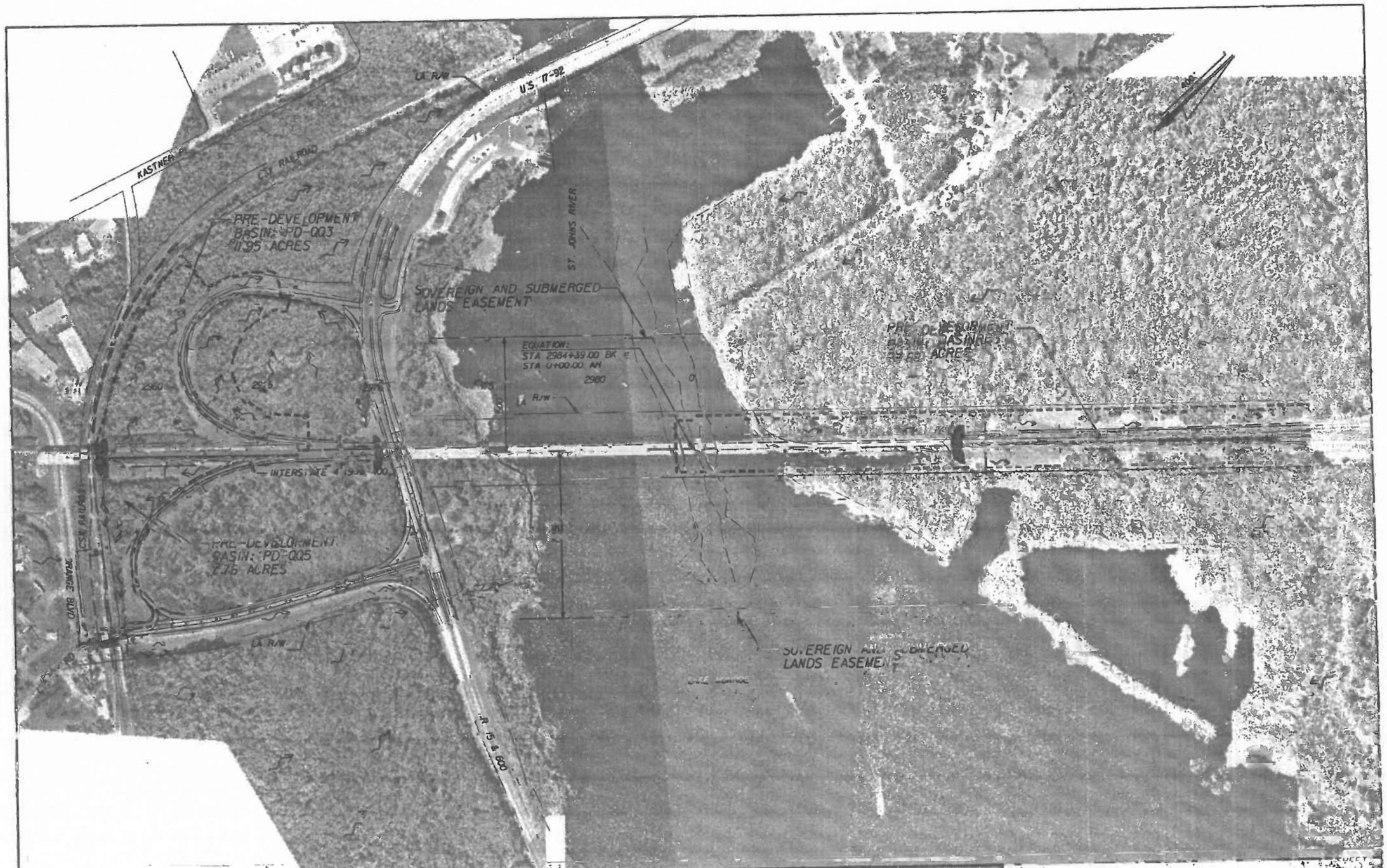

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 400	SEM & VOL	242702-1-52-01

SR 400 (I-4) WIDENING
PRE-DEVELOPMENT DRAINAGE MAP

SHEET NO.

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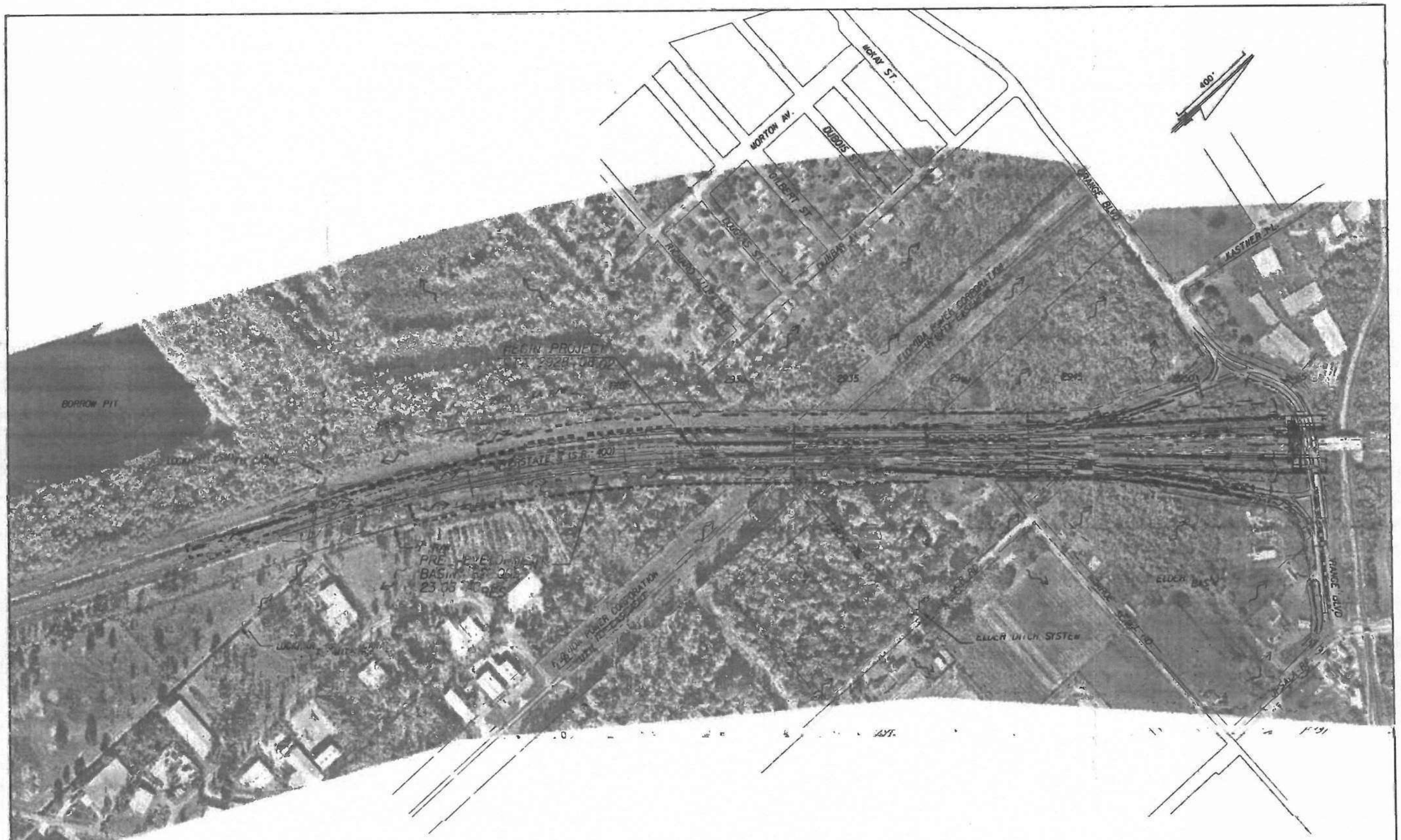

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 400	SEM & VOL	242702-1-52-01

SR 400 (I 4) WIDENING
PRE-DEVELOPMENT DRAINAGE MAP

SHEET NO.

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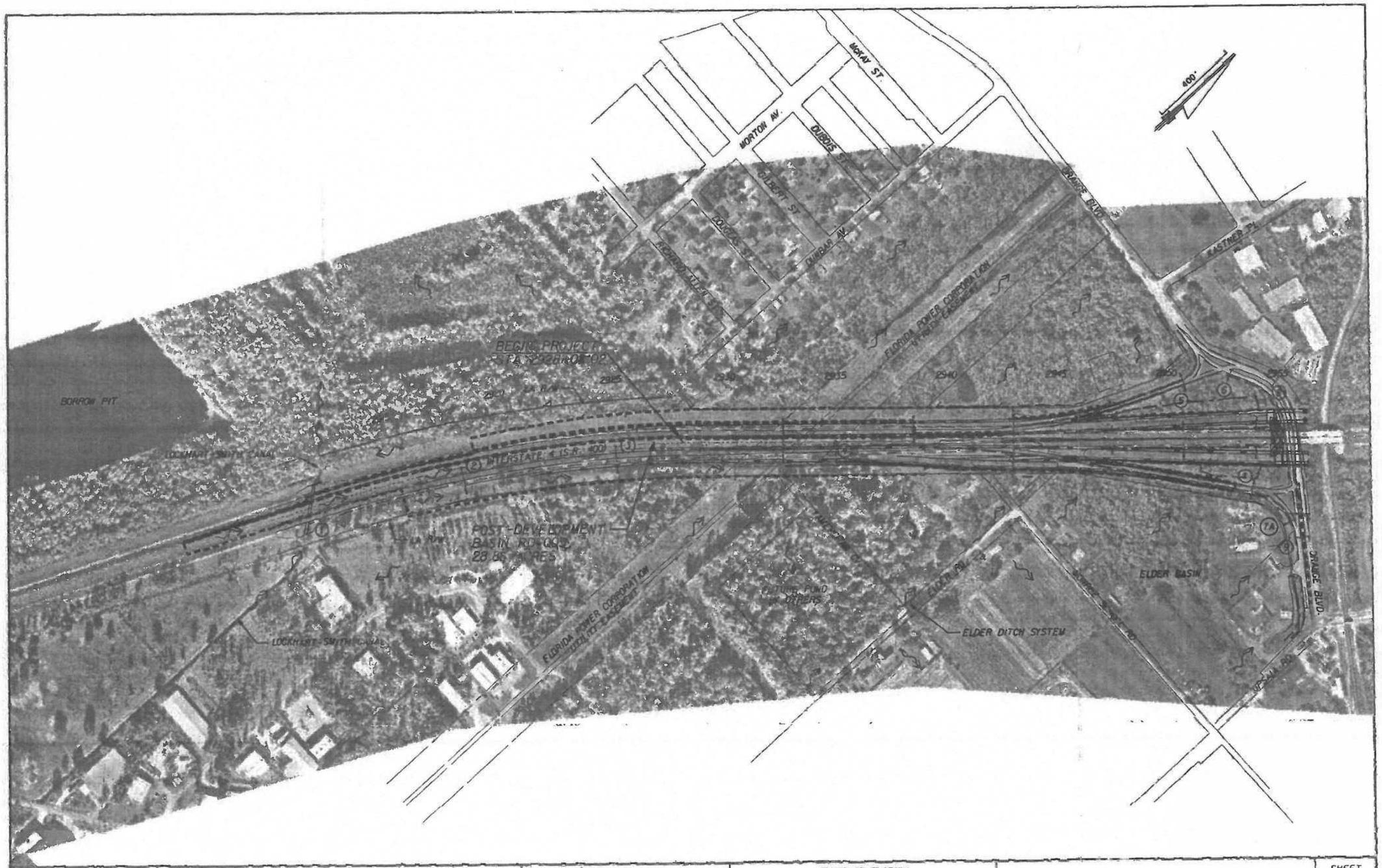
DGNSPECIFICATION



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DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 400	SEM & VOL	242702-1-52-01

SR 400 (I-4) WIDENING
DRAINAGE MAP

SHEET NO

PRINTED: $$$$$$SYSTIME$$$$$$ $$$$$$$$DGNSPECIFICATION$$$$$$$$

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Permit No. 90901-2

I-4 Exit Ramp B1 Construction and Realignment of CR 15

SITE INFORMATION

The County Road (C.R.) 15 improvement project is located in Seminole County, Florida and begins at State Road 46 to the south and extends north to State Road 600 (US 17-92) (Figure 1). The proposed improvements include widening the existing two-lane rural roadway to a five-lane urban section. The area adjacent to the project corridor can be best categorized as agricultural, residential and light industrial.

The primary purpose of this project is to enhance travel safety within the local area. This project lies within Sections 21 and 28, Township 19 South, Range 30 East of Seminole County, Florida. The approximate center of the project is at Latitude: 28° 49' 17" N / Longitude: 81° 19' 22" W.

Historic land use within the corridor is agricultural, predominately celery and other agricultural crops and activities, with supporting residences and field houses (Figure 2). Lake Monroe is immediately north of the project area. Wetland areas include excavated wet prairies, disturbed wet shrub scrub, pine flatwood with graminoid understory and freshwater marshes (Figure 3). Channeled portions of Elder Creek are also within limits of the proposed project.

ENVIRONMENTAL CONSIDERATIONS

Wetland communities within the project limits were identified and classified using the Florida Land Use, Cover and Forms Classification System (FLUCFCS, FDOT, 1999) and are referenced as FLUCFCS Class in the following discussion. Representatives of Bowyer-Singleton & Associates, Inc. delineated the limits of on-site wetlands. Field delineation of jurisdictional wetlands and other surface waters were accomplished using methodologies prescribed by the State of Florida (Chapter 62-340, FAC) and the U.S. Army Corps of Engineers (USACOE) (Technical Report Y-87-1, Corps of Engineers Wetlands Delineation Manual).

Seven soil phases, were identified within the United States Department of Agriculture Soil Conservation Service (SCS), Soil Survey of Seminole County, Florida, 1971. These soil series have been identified by the Natural Resources Conservation Service (NRCS) formerly the SCS (Figure 5). These phases are Arents, 0-5% slopes (3), Basinger an Delray fine sands (9), Basinger, Samsula and Hontoon soils, depressional (10), EauGallie and Immokalee fine sands (13), Felda and Manatee mucky fine sands, depressional (15), Nittaw mucky fine sand, depressional (21), and Pineda fine sand (25). With the exception of Arents (3), all of the identified series and phases are listed as hydric using federal criteria. The Basinger, Samsula, Hontoon, Felda, Manatee, and Nittaw soil series are classified as hydric using the state criteria. Fill land, loamy material (Fm) is a classification used to indicate disturbed soils. The hydric classification of soils encountered within wetlands within the project follows Figure 4.

Proposed wetland impacts are listed in Figure 5. Permit sketches corresponding to these impacts are provided in the construction plan set and are identified as Sheets 115 through 126 (Environmental Considerations).

1.0 PROJECT DESCRIPTION

The proposed urban section provides two 12-foot travel lanes and a 4-foot bike lane in each direction.

Seminole County proposes to widen CR-15 from State Road 46 to CR431. The existing roadway is currently a two-lane rural section. The proposed urban section provides two 12-foot travel lanes and a 4-foot bike lane in each direction. A center 12-ft lane is provided as a bi-directional left turn lane. A sidewalk is proposed along the east side of the roadway, and a 10-ft wide asphalt jogging trail will be provided along the west side of the roadway.

The project is located in Sections 21 and 28, Township 19 South, Range 30 East in Seminole County, within the Elder Creek Drainage Basin, which is considered an open basin. The area can be categorized as agricultural with some residential and light industrial. The existing topography is relatively flat with drainage ditch systems that provide surface water drainage to Elder Creek and, ultimately, to Lake Monroe.

2.0 DESIGN SUMMARY

The purpose of this report is to document our design of the stormwater management systems for the CR 15 Widening Project from State Road 46 north to CR 431 in Seminole County, Florida. A project location map is included in Appendix A.

This report documents our evaluation of the stormwater management system needs for this project based on our review of the following:

- USGS Topographic Map, Lake Jessup Florida Quadrangle
- Seminole County National Resource Conservation Service (NRCS) Soils Survey Map
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps
- Field Visits

There are three proposed wet detention stormwater ponds (Ponds 2, 3 and 4).

In addition to the Regional Pond that will accept runoff from CR 15 from SR 46 north to Narcissus Avenue, there are three proposed wet detention ponds (Ponds 2, 3 and 4). The proposed storm sewer systems consist of curb inlets that will collect runoff from the roadway. Stormwater runoff from the crown in the roadway to the 2 ft wide grassed areas outside the sidewalks will drain to the roadway and will be collected and conveyed via the proposed storm sewer systems to the stormwater management ponds. Back-of-sidewalk inlets will collect off-site runoff that is trapped behind the sidewalk and convey to the stormwater ponds.

2.0 DESIGN SUMMARY, CONTINUED

...impacted systems will be collected and conveyed to the...stormwater ponds...

We are impacting the stormwater management systems for several commercial properties on the west side of the project. Runoff contributing to these impacted systems will be collected and conveyed to the proposed CR 15 stormwater ponds for treatment and attenuation.

The runoff from Station 46+90 to Station 50+00 and from Station 76+50 to the end of the project at Station 82+02 will bypass the stormwater ponds and discharge directly to Elder Creek. To compensate for these areas, we plan to provide additional attenuation and treatment in Ponds 2, 3 and 4. The gutter elevations are too low between Stations 46+90 and 50+00 to drain to Pond 2, and the proposed cross drain at Elder Creek would require that the storm sewer system to Pond 3 would be quite deep. The elevations at Pond 4 and the profile grade at the end of the project prevent this area (Station 76+50 to 82+02) from draining to Pond 4.

3.0 STORMWATER MANAGEMENT CRITERIA

A stormwater management system consists of the collection, conveyance and storage of surface water runoff in order to provide adequate drainage, water quality treatment and flood control. In order to meet these requirements, the following issues must be addressed: the design of an adequate drainage collection system, retention/detention of additional runoff volumes resulting from the proposed improvements, peak discharge rate attenuation, erosion and sediment control, and a reduction of pollutants in the system discharge. This project lies within the St. Johns River Water Management District, and must meet their criteria to obtain an Environmental Resource Permit.

3.10 SJRWMD Criteria

SJRWMD Criteria

On-line wet detention systems are required to treat the greater of the first one-inch of runoff from the contributing area or 2.5 inches of runoff from the impervious area.

- The pre- and post-development discharge rates are calculated using FLMOD rainfall distributions for the 100-year, 25-year and Mean Annual 24-hour rainfall distributions.
- On-line wet detention systems are required to treat the greater of the first one-inch of runoff from the contributing area or 2.5 inches of runoff from the impervious area.
- Recover one-half of the water quality volume within 24 to 30 hours.

6.22 Pond 2

Pond 2 receives runoff from Station 39+46 to Station 46+90.

Pond 2 is a proposed wet detention pond located in the southwest quadrant of the CR 15/Iowa Avenue intersection. Pond 2 receives runoff from Station 39+46 to Station 46+90. The pond discharge will be piped along CR 15 and discharged directly into the new culvert crossing at approximately Station 52+00. Our water quality calculations and flood routings are included in the Appendix.

The area between Station 46+90 and 50+00 will be collected in curb inlets and piped directly to the culvert crossing which carries Elder Creek through the project corridor. This area is too low to convey it to Pond 2, and crossing under the cross drain at Station 52+00 would require the storm sewer main to be quite deep. Therefore, compensating treatment in the regional pond is provided to address the water quality treatment for this area. The drainage areas are presented in Table 3.

6.2.3 Pond 3

Pond 3 receives runoff from Station 50+00 to Station 60+85.

Pond 3 is a proposed wet detention pond located approximately 500 feet east of CR 15 on the north side of Church Street. Pond 3 receives runoff from Station 50+00 to Station 60+85. The pond will discharge via a 24-inch pipe running west from the pond and discharging directly into Elder Creek. This outfall pipe requires a drainage easement through private property. Our water quality calculations and flood routings are included in the Appendix.

6.2.4 Pond 4

Pond 4 receives runoff from Station 60+85 to Station 76+50.

Pond 4 is a proposed wet detention pond located approximately 400 to 800 feet east of CR 15 on the north side of School Street. Pond 4 receives runoff from Station 60+85 to Station 76+50. The pond will discharge via a 24-inch pipe directly into Elder Creek which is located just west of the pond. Our water quality calculations and flood routings are included in the Appendix.

The area between Station 76+50 and 82+02 will be collected in curb inlets and piped directly to Elder Creek through an existing 24-inch diameter pipe. This area is too low to convey it to Pond 4. Therefore, compensating treatment in Pond 4 is provided to address the water quality treatment for this area. The drainage areas are presented in Table 3.

6.2.5 Off-site Areas

The stormwater treatment systems of the following off-site areas will be impacted by the proposed roadway widening. Stormwater runoff contributing to the impacted stormwater management systems of these off-site businesses will be conveyed to our proposed ponds for stormwater treatment and attenuation.

Table 2: Impacted Off-Site Areas

Pond Basin	Off-Site ID	Location	Impacted Drainage Area (ac)	Impacted Water Quality Volume (ac-ft)	Comments
3	Monroe Center South	Southwest corner of CR15/Church St.	8.0	1.42	Treatment provided in Pond 3
4	Wharton Smith/Monroe Supply	South of School Street/West Side of CR15	2.7	0.48	Treatment provided in Pond 4
4	McKee Contractors	Southwest corner of CR15/School Street	2.2	0.46	Treatment provided in Pond 4
4	Monroe Professional Center	Northwest corner of CR15/School Street	0.9	0.17	Treatment provided in Pond 4

5.8

6.2.6 Bypass Areas

To compensate for these bypass areas we will provide additional attenuation and stormwater treatment in Ponds 2, 3 and/or 4.

Due to hydraulic constraints, we could not provide stormwater treatment and attenuation for the roadway runoff in the areas shown on the table, below. To compensate for these bypass areas we will provide additional attenuation and stormwater treatment in Ponds 2, 3 and/or 4. We will update our pond designs to reflect the overtreatment and attenuation after we have coordinated with the St. Johns River Water Management District.

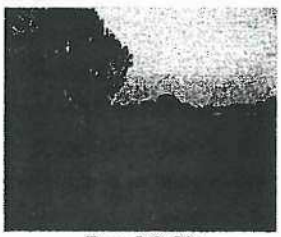
Table 3: Bypass Drainage Areas

Location	Limits	Approximate Drainage Area (ac)		
		Impervious	Pervious	Total
CR15 Mainline	Sta. 46+90 to Sta. 50+00	0.63	0.07	0.70
CR15 Mainline	Sta. 76+50 to Sta. 82+02	1.12	0.13	1.25

EXECUTIVE SUMMARY

Existing CR 15 (Typical)

The purpose of this Drainage Notebook is to document our design of the stormwater management systems for the CR 15 Widening Project from State Road 46 north to CR 17-92 in Seminole County, Florida. The existing facility is a two-lane rural roadway. The proposed improvements include widening the existing roadway to a five-lane urban section. The drainage improvements were designed to meet applicable criteria from the St. Johns River Water Management District, Seminole County and the Florida Department of Transportation.



Pond 3 Site

The proposed stormwater system includes a traditional storm sewer conveyance system with curb inlets. Inlet spacing was based on a maximum spread of 4 feet into the outside travel lane. The storm sewer systems convey the runoff to four wet detention ponds. Runoff from the southern portion of the project will be treated in a regional pond designed by Camp Dresser & McKee. The remaining areas will be treated in three wet detention ponds (Ponds 2, 3 and 4) proposed for this project. New right-of-way will be acquired for each of these ponds. Portions of the roadway were not able to be treated, because it was not hydraulically possible to convey the stormwater to the pond sites. Compensation for these untreated areas will be provided in Ponds 2, 3 and 4.

Offsite Pond (Wharton/Mckee Site)

The roadway improvements are impacting several off-site stormwater treatment systems. The runoff from the impacted sites will be collected in our storm sewer system and conveyed to our stormwater ponds for treatment and attenuation. The drainage patterns of the remaining off-site areas will not be altered by the roadway improvements and will be conveyed to their existing outfalls.

Ponds 2, 3 and 4 will be impacting existing wetland systems. These impacts will be quantified prior to the submittal of the permit application.

Drainage Areas:

Project:	CR-15	By:	PQS
Job Number:	SM7-J1	Date:	2/11/03
Job Description:	Basin 4 Pre-Developed Drainage Areas		

On-site areas:

Impervious:

Description	Begin STA	End STA	Width (ft)	Area (acres)
CR 15	6085.00	7650.00	30.00	1.08
				0.00
				0.00
			TOTAL IMP. =	1.08

Pervious:

Basin	Begin STA	End STA	Width (ft)	Area (acres)
Roadside Grassed Areas	6085.00	7650.00	68.00	2.44
Pond Site	--	---	---	1.83
				0.00
			TOTAL PERV. =	4.27

TOTAL ON-SITE =	5.35

Off-Site areas:

Description	Location	Area (acres)
offsite trapped at sidewalk	S-46A	0.08
offsite trapped at sidewalk	S-49A	0.06
offsite trapped at sidewalk	S-51A	0.12
Monroe Prof. Ctr	NW Corner of School St./CR 15	0.94
Wharton-Smith/Monroe Supply	South of School/West Side of CR 15	2.70
McKee	SW Corner of School St./CR15	2.19

TOTAL OFF-SITE=	6.09

Total Area:

TOTAL AREA =	11.44

SCS Runoff Curve Number

Project:	*CR-15*	*By:*	*PQS*
Job Number:	*SM7-J1*	*Date:*	*2/12/2003*
Job Description:	*Basin 4 Pre-Developed Curve Number*		

CN:

Description	*Location*	*Soil*	*CN*	*Area (acres)*	*CN x Area*
On-Site					
Roadway	---	Asphalt pavement	98	1.08	105.63
Roadside Grassed Areas	---	Felda, Manatee, Pineda, Eau Gallie, Immokalee & Arents Hydro Group B/D, D	84	2.44	205.22
Pond Site	---	Felda, Manatee, Eau Gallie & Immokalee Hydro Group B/D, D	84	1.83	153.72
Off-Site					
offsite pervious that drains into R/W	----	Open Space, Fair Eau Gallie & Immokalee Sands Hydro Group B/D	84	0.26	21.84
Monroe Prof. Ctr	NW Corner of School St./CR 15	Commercial Pineda Sand Hydro Group B/D	95	0.94	89.30
Wharton - Smith	South of School/West Side of CR 15	Commercial --- Eau Gallie/Immokalee Sands Hydro Group B/D	95	2.70	256.50
Monroe Supply Co.	SW Corner of School St./CR15	Commercial --- Pineda, Eau Gallie and Immokalee Sands Hydro Group B/D	95	2.19	208.05
			TOTALS :	11.44	1040.25

$$CN\ (weighted) = \frac{\sum CN \times A}{\sum A}$$

Use CN = 90.9

Travel Time (Tt) and Time of Concentration (Tc): (SCS TR-55)

Project:	CR-15	By:	PQS
Job Number:	SM7-J1	Date:	2/12/03
Description:	Basin 4 Time of Concentration (Pre-Development)		

Sheet Flow:

1. Surface	----------	Grass
2. Manning's N	----------	0.016
3. Flow length, L (< 300 ft)(crown to roadside ditch at Sta. 60+85)	ft	15
4. 2 Yr, 24 hr Rainfall	in	4.8
5. Slope, s	ft/ft	0.02

$$T_t = \frac{0.007(n\ L)^{0.8}}{P_2^{0.5} s^{0.4}}$$

Tt =	0.005	hours

Shallow Concentrated Flow:

1. Surface (paved/unpaved)	----------	unpaved
2. Flow length, L (roadside ditch from Sta. 60+85 to Sta. 73+50, BL CR15 and ditch from Sta.71+60 to Sta. 73+70, BL School ST. and ~260' of Elder Creek from School St. to Pond 4 outfall)	ft	1780
3. Slope, s	ft/ft	0.0026
4. Average velocity, V	ft/s	0.82

$$T_t = \frac{L}{3600\ V}$$

Tt =	0.601	hours

Time of Flow in Pipe:

1. Flow length, L (pipe on school st. from sta. 70+50 to sta. 71+60)	ft	110
2. Average velocity, V	ft/s	4

$$T_t = \frac{L}{3600\ V}$$

Tt =	0.008	hours

Time of Concentration:

$Tc = \Sigma\ Tt$

Tc =	36.81	minutes

90901-2

Pond 4 Summary Sheet

Location (Station, ft):	74+00 to 77+00, LEFT (CL SCHOOL STREET)

PRE-DEVELOPMENT

Total Area	11.44	acres
Curve Number	90.9	

Discharge

	100 yr/24 hr	25 yr/24 hr	Mean Annual
Peak Discharge (cfs)	48.52	35.01	20.90

POST-DEVELOPMENT

Basin Information

Total Area	11.44	acres
Curve Number	95.0	

Pond Information

Pond Bottom Elevation (ft NGVD)	0.00
Normal Groundwater Elevation (ft NGVD)	6.92 -1.04 = 5.88
Control Elevation (ft NGVD)	7.50
Storage Provided (ac-ft)	1.88
100-year/24-hr Stage (ft NGVD)	11.44
Top of Berm Elevation (ft NGVD)	12.00

*** Attenuation Volume Provided**

Discharge & Freeboard

	100 yr/24 hr	25 yr/24 hr	Mean Annual
Peak Discharge (cfs)*	18.37	12.89	8.49
Peak Stage (ft NGVD)	11.44	10.30	9.69
Top of Berm Elevation (ft NGVD)	12.00	12.00	12.00
Minimum Freeboard (ft)	0.56	1.70	2.31

10.96

Water Quality

Required Water Quality Volume (ac-ft)	1.77
Weir Elevation (ft NGVD)	8.80
J.H. Control Elevation (ft NGVD)	7.50 -1.04 = 6.46
Provided Water Quality Volume (ac-ft)	1.88

Stormsewer Tailwater

3-yr Peak Stage (ft NGVD)	9.76
Low Inlet Elevation (ft NGVD)	11.29 -1.04 = 10.25

Drainage Areas:

Project:	CR-15	By:	PQS
Job Number:	SM7-J1	Date:	2/10/03
Job Description:	Basin 4 Post-Developed Drainage Areas		

On-site areas:

Impervious:

Description	Begin STA	End STA	Width (ft)	Area (acres)
CR 15	6085.00	7650.00	88.00	3.16
				0.00
				0.00
			TOTAL IMP. =	3.16

Pervious:

Description	Begin STA	End STA	Width (ft)	Area (acres)
Roadside Grassed Areas	6085.00	7650.00	10.00	0.36
Pond	---	---		1.07
Pond Berm	---	---		0.76
			TOTAL PERV. =	2.19

TOTAL ON-SITE =	5.35

Off-Site areas:

Description	Location	Area (acres)
offsite trapped at sidewalk	*S-46A*	*0.08*
offsite trapped at sidewalk	*S-49A*	*0.06*
offsite trapped at sidewalk	*S-51A*	*0.12*
Monroe Prof. Ctr	NW Corner of School St./CR 15	0.94
Wharton-Smith/Monroe Supply	South of School/West Side of CR 15	2.70
McKee	SW Corner of School St./CR 15	2.19

TOTAL OFF-SITE=	6.09

Total Area:

TOTAL AREA =	11.44

Stage - Area - Storage

Project:	*CR-15*	*By:*	*PQS*
Job Number:	*SM7-J1*	*Date:*	*9/25/2003*
Job Description		*Basin 4 Stage - Area - Storage*	

	Elevation	Area	Average Area	Delta D	Delta Storage	Total PAV
	(ft)	(ac)	(ac)	(ft)	(ac-ft)	(ac-ft)
	0.0	0.92				
			1.05	5.5	5.78	
	5.5	1.18				
		4.46	1.28	2	2.56	
Control Elevation	7.5	1.38				0.00
		6.46	1.45	1.3	1.88	
Weir Elevation	8.8	1.51				1.88
		7.76	1.62	1.7	2.75	
Inside Top of Berm	10.5	1.72				4.62
		9.46	1.92	1.5	2.88	
Outside Top of Berm	12.0	2.12				7.50
		10.96				

SCS Runoff Curve Number:

Project:	CR-15	By:	PQS
Job Number:	SM7-J1	Date:	2/10/03
Job Description:	Basin 4 Post-Developed Curve Number		

CN:

Description	Location	Cover description	CN	Area (acres)	CN x Area
On-Site					
CR15 Roadway	---	Asphalt pavement	98	3.16	309.84
Roadside Grassed Areas	---	Open spaces, fair Felda, Manatee, Pineda, Eau Gallie, Immokalee & Arents Hydro Group B/D	84	0.36	30.18
Pond	---	Wet Detention Pond	100	1.07	107.00
Pond Berm	---	Felda, Manatee, Eau Gallie & Immokalee Hydro Group B/D, D	84	0.76	63.84
Off-Site					
offsite trapped at sidewalk	S-46A, S-49A, S-51A	Open Space, Fair Eau Gallie & Immokalee Sands Hydro Group B/D	84	0.26	21.84
Monroe Prof. Ctr	NW Corner of School St./CR 15	Commercial Pineda Sand Hydro Group B/D	95	0.94	89.30
Wharton - Smith	South of School/West Side of CR 15	Commercial --- Eau Gallie/Immokalee Sands Hydro Group B/D	95	2.70	256.50
Monroe Supply Co.	SW Corner of School St./CR15	Commercial --- Pineda, Eau Gallie and Immokalee Sands Hydro Group B/D	95	2.19	208.05
			TOTALS :	11.44	1086.55

$$CN\ (weighted) = \frac{\sum CN \times A}{\sum A}$$

Use CN = 95.0

Water Treatment Volume:

Project:	*CR-15*	*By:*	*PQS*
Job Number:	*SM7-J1*	*Date:*	*2/12/03*
Job Description:	*Basin 4 Required Treatment Volume*		

Wet Detention Pollution Abatement Volume:

Pollution abatement shall be provided for the greater of:

A) First inch of runoff from the developed project.

B) 2.5 inches times the impervious area

Basin Area (on-site only)= 3.52 acres

Impervious Area = 3.16 acres

A) 1" x Basin Area

Volume (acre-ft) = 1in x (1ft/12in) x Basin Area (acres)

Volume = 0.293 acre-feet

B) 2.5" x Impervious Area

Volume (acre-ft) = 2.5in x (1ft/12in) x Impervious area (acres)

Volume = 0.659 acre-feet

CR15 Pollution Abatement Volume = 0.659 acre-ft

Provide Treatment Volume for Off-Site Pond Impacts

Lake Monroe Professional Center = 0.17 acre-ft

Wharton Smith/Monroe Supply = 0.48 acre-ft

McKee = 0.46 acre-ft

Off-Site Pollution Abatement Volume = 1.11 acre-ft

Total Required Pollution Abatement Volume = 1.77 acre-ft

Project:	CR 15	
Project Number:	SM7-J1	

Basin:	**Pond 4**	Calculated by:	PQS	Date:	2/26/2003
Basin Analysis:	**Permanent Pool**	Checked by:		Date:	

BASINS	POST	
POND	4	
BASIN AREA	11.44	ACRES
IMPERVIOUS AREA	8.12	ACRES
AVG RAINFALL	32	INCHES (JUNE-OCTOBER)
WET SEASON	153	DAYS
C - FACTOR	0.95	

ELEV (FEET)	AREA (ACRES)	AVG AREA (ACRES)	INC DEPTH (FEET)	INC STORAGE (AC-FT)	CUM STORAGE (AC-FT)
0.00	0.92	---	---	---	---
5.50	1.18	1.05	5.50	5.78	5.78
7.50	1.38	1.28	2.00	2.56	8.34

PERMANENT POOL AVAIL.= 8.34 AC-FT

AVERAGE DAILY RUNOFF VOLUME (USING 153 DAY RAINFALL PERIOD) =
(TOTAL AREA*C)(32"/153 DAYS)(1'/12") =
= 0.19 AC-FT/DAY

POND INFLOW = CFD = 0.0000 AC-FT/DAY

SEEPAGE INFLOW = 544 CFD = 0.0125 AC-FT/DAY

SEEPAGE INFLOW = 0 CFD = 0.0000 AC-FT/DAY

TOTAL INFLOW = 0.20 AC-FT/DAY

$$\text{RESIDENCE TIME} = \frac{\text{PERMANENT VOLUME AVAILABLE}}{\text{AVERAGE DAILY RUNOFF VOLUME}} = 41.3 \text{ DAYS}$$

RESIDENCE TIME = 41.3 > 14.0 DAYS O.K.

****

RESIDENCE TIME >= 21.0 DAYS,
NO LITTORAL ZONE REQUIRED

****

$$\text{MEAN DEPTH} = \frac{\text{PERMANENT POOL AVAILABLE}}{\text{NWL AREA}} = 6.0$$

Travel Time (Tt) and Time of Concentration (Tc): (SCS TR-55)

Project:	CR-15	By:	PQS
Job Number:	SM7-J1	Date:	2/12/03
Description:	Basin 4 Time of Concentration (Post Development)		

Sheet Flow:

1. Surface	----------	Asphalt
2. Manning's N	----------	0.016
3. Flow length, L (< 300 ft)(from crown to curb and along curb from ~60+85 to Sta. 63+10)	ft	260
4. 2 Yr, 24 hr Rainfall	in	4.8
5. Slope, s	ft/ft	0.003

$$T_t = \frac{0.007(n\ L)^{0.8}}{P_2^{0.5}\, s^{0.4}}$$

Tt =	0.102	hours

Shallow Concentrated Flow:

1. Surface (paved/unpaved)	----------	paved
2. Flow length, L	ft	0
3. Slope, s	ft/ft	0.003
4. Average velocity, V	ft/s	1.11

$$T_t = \frac{L}{3600\ V}$$

Tt =	0.000	hours

Time of Flow in Pipe:

1. Flow length, L (pipe from Sta. 63+10, LT to Sta. 74+00, RT, BL CR15 and from Sta. 70+40 to Sta.76+00 BL School St. and ~50' to Pond 4)	ft	1720
2. Average velocity, V	ft/s	4

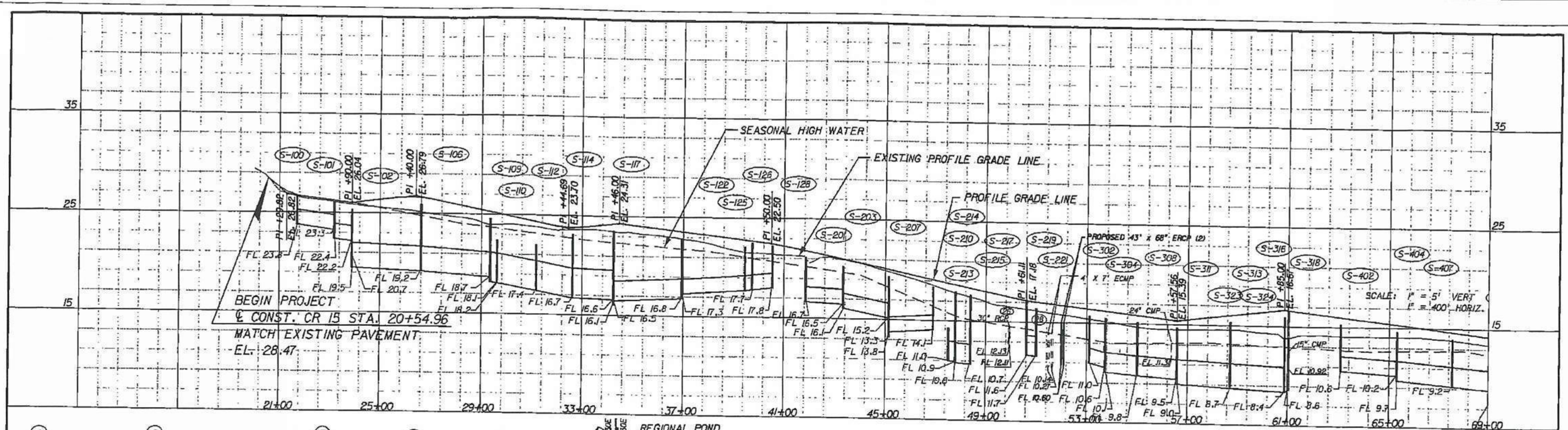
$$T_t = \frac{L}{3600\ V}$$

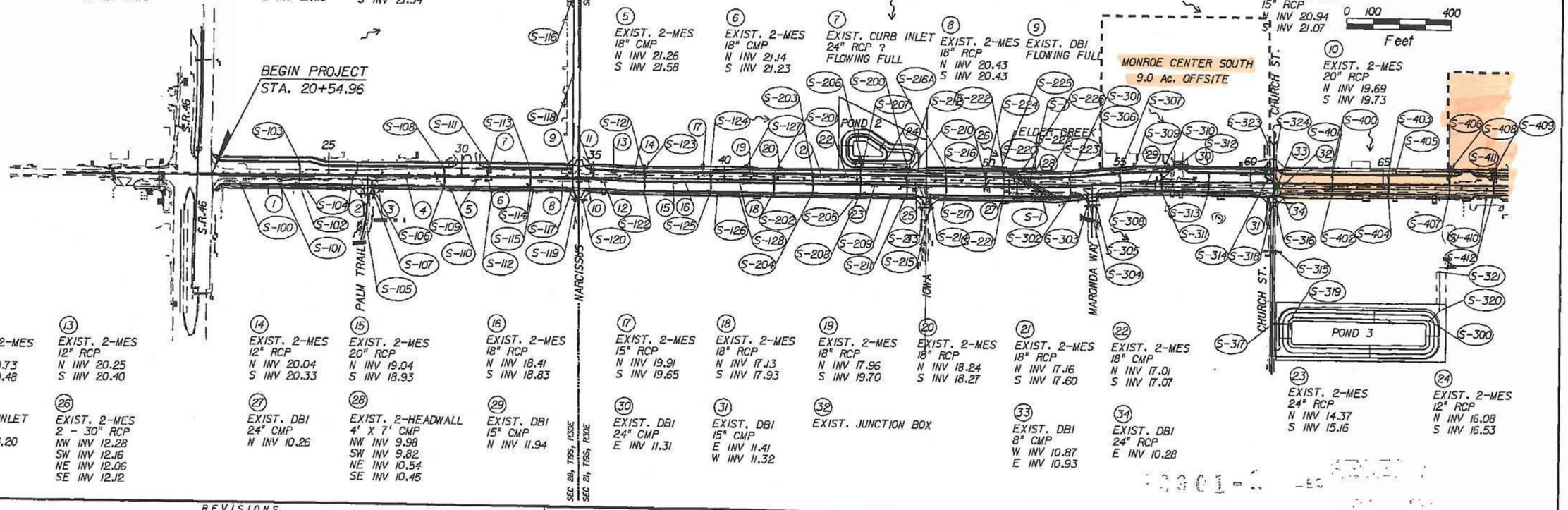
Tt =	0.119	hours

Time of Concentration:

$Tc = \Sigma\ Tt$

Tc =	13.29	minutes





DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. This sheet is in the plans for documentation and to assist construction personnel with drainage concerns.

(1) EXIST. DBI
18"x15" ELLIP. RCP
INV 22.57

(2) EXIST. DBI
18"x15" ELLIP. RCP
N INV 21.77
S INV 21.78

(3) EXIST. DBI
18" RCP
N INV 20.77
S INV 21.38

(4) EXIST. MANHOLE
18" RCP
N INV 21.45
S INV 21.34

(5) EXIST. 2-MES
18" CMP
N INV 21.26
S INV 21.58

(6) EXIST. 2-MES
18" CMP
N INV 21.14
S INV 21.23

(7) EXIST. CURB INLET
24" RCP ?
FLOWING FULL

(8) EXIST. 2-MES
18" RCP
N INV 20.43
S INV 20.43

(9) EXIST. DBI
FLOWING FULL

(10) EXIST. 2-MES
20" RCP
N INV 19.69
S INV 19.73

(11) EXIST. 2-MES
15" RCP
N INV 20.94
S INV 21.07

(12) EXIST. 2-MES
18" RCP
N INV 19.73
S INV 19.48

(13) EXIST. 2-MES
12" RCP
N INV 20.25
S INV 20.40

(14) EXIST. 2-MES
12" RCP
N INV 20.04
S INV 20.33

(15) EXIST. 2-MES
20" RCP
N INV 19.04
S INV 18.93

(16) EXIST. 2-MES
18" RCP
N INV 18.41
S INV 18.83

(17) EXIST. 2-MES
15" RCP
N INV 19.91
S INV 19.65

(18) EXIST. 2-MES
18" RCP
N INV 17.13
S INV 17.93

(19) EXIST. 2-MES
18" RCP
N INV 17.96
S INV 19.70

(20) EXIST. 2-MES
18" RCP
N INV 18.24
S INV 18.27

(21) EXIST. 2-MES
18" RCP
N INV 17.16
S INV 17.60

(22) EXIST. 2-MES
18" CMP
N INV 17.01
S INV 17.07

(23) EXIST. 2-MES
24" RCP
N INV 14.37
S INV 15.16

(24) EXIST. 2-MES
12" RCP
N INV 16.08
S INV 16.53

(25) EXIST. INLET
24" RCP
W INV 14.20

(26) EXIST. 2-MES
2 - 30" RCP
NW INV 12.28
SW INV 12.16
NE INV 12.06
SE INV 12.12

(27) EXIST. DBI
24" CMP
N INV 10.26

(28) EXIST. 2-HEADWALL
4' X 7' CMP
NW INV 9.98
SW INV 9.82
NE INV 10.54
SE INV 10.45

(29) EXIST. DBI
15" CMP
N INV 11.94

(30) EXIST. DBI
24" CMP
E INV 11.31

(31) EXIST. DBI
15" CMP
E INV 11.41
W INV 11.32

(32) EXIST. JUNCTION BOX

(33) EXIST. DBI
8" CMP
W INV 10.87
E INV 10.93

(34) EXIST. DBI
24" RCP
E INV 10.28

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

BOWYER-SINGLETON & ASSOCIATES, INCORPORATED
520 S. MAGNOLIA AVENUE/ORLANDO, FLORIDA 32801
FBPR CERTIFICATE OF AUTHORIZATION NO. 1221

SEMINOLE COUNTY

DRAINAGE MAP

SHEET NO. 3

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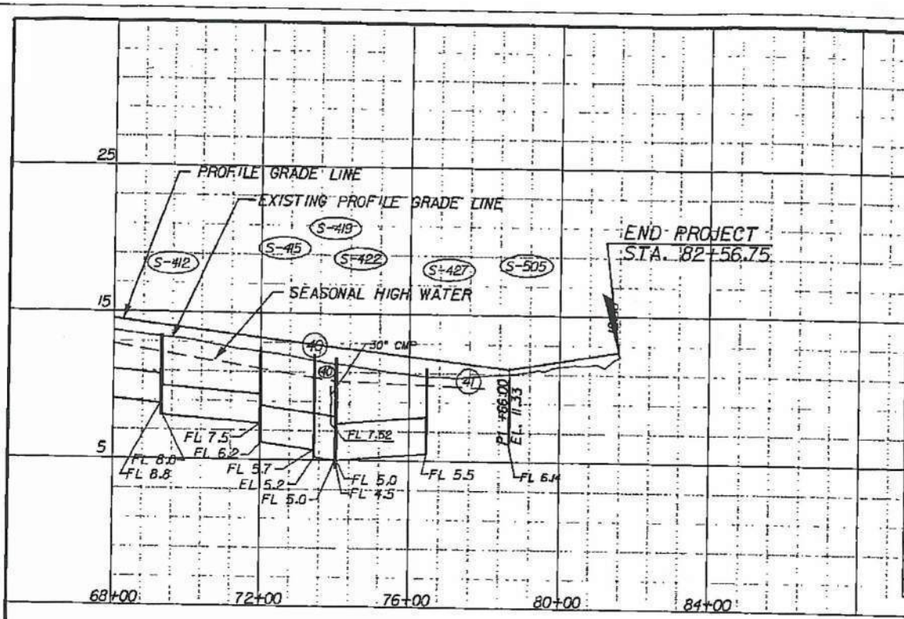


STRUCTURE	DRAINAGE AREA (ACRES)	STRUCTURE	DRAINAGE AREA (ACRES)	STRUCTURE	DRAINAGE AREA (ACRES)	STRUCTURE	DRAINAGE AREA (ACRES)
S-100	0.22	S-128	0.06	S-307	0.22	S-416	0.80
S-101	0.78	S-201	0.28	S-308	0.26	S-417	0.80
S-102	0.63	S-202	0.27	S-309	0.14	S-418	0.26
S-103	1.60	S-203	0.16	S-310	0.51	S-419	0.26
S-104	0.03	S-204	0.16	S-311	0.47	S-420	0.06
S-105	1.51	S-205	0.08	S-312	0.24	S-421	0.00
S-106	0.000	S-206	0.00	S-313	0.24	S-422	0.00
S-107	0.10	S-207	0.19	S-314	0.00	S-423	0.00
S-108	0.11	S-208	0.19	S-315	0.00	S-424	0.00
S-109	0.11	S-209	0.12	S-316	0.00	S-425	0.94
S-110	2.61	S-210	0.27	S-317	0.00	S-426	0.24
S-111	0.22	S-211	0.25	S-318	0.00	S-427	0.27
S-112	0.95	S-212	0.00	S-401	0.26	S-429	0.00
S-113	0.37	S-213	4.40	S-402	0.24	S-501	0.00
S-114	0.35	S-214	0.00	S-403	0.26	S-502	0.00
S-115	0.69	S-215	0.11	S-404	0.24	S-503	0.27
S-116	0.00	S-216	0.18	S-405	0.08	S-504	0.00
S-117	0.00	S-217	0.18	S-406	0.26	S-505	0.27
S-118	0.000	S-218	0.30	S-407	0.24		
S-119	0.94	S-219	0.20	S-408	0.13		
S-120	0.07	S-220	0.29	S-409	0.06		
S-121	0.28	S-221	0.17	S-410	0.12		
S-122	0.27	S-301	0.34	S-411	0.24		
S-123	0.08	S-302	0.37	S-412	0.26		
S-124	0.28	S-303	0.15	S-413	0.15		
S-125	0.27	S-304	0.00	S-414	0.24		
S-126	0.27	S-305	0.16	S-415	0.26		
S-127	0.07						

SCALE: 1" = 5' VERT.
1" = 100' HORIZ.

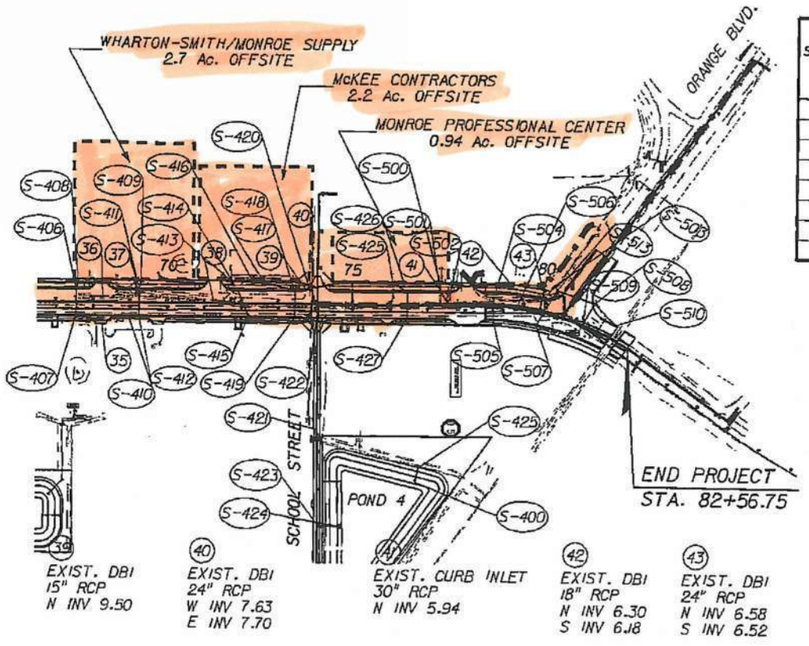
(35) EXIST. 2-MES
17" X 13" RCP
N INV 11.75
S INV 11.18

(36) EXIST. 2-MES
15" RCP
N INV 11.68
S INV 11.64

(37) EXIST. DBI
24" DIP
E INV 10.88

(38) EXIST. 2-MES
18" RCP
N INV 9.53
S INV 9.51

DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. This sheet is in the plans for documentation and to assist construction personnel with drainage concerns.



(39) EXIST. DBI
15" RCP
N INV 9.50

(40) EXIST. DBI
24" RCP
W INV 7.63
E INV 7.70

EXIST. CURB INLET
30" RCP
N INV 5.94

(42) EXIST. DBI
18" RCP
N INV 6.30
S INV 6.18

(43) EXIST. DBI
24" RCP
N INV 6.58
S INV 6.52

STRUCTURE NO.	STATION	DESIGN FLOOD		BASE FLOOD		OVERTOPPING FLOOD				GREATEST FLOOD			
		2% PROB.	50 YR.FREQ.	1% PROB.	100 YR.FREQ.								
		DISCHARGE	STAGE	DISCHARGE	STAGE	DISCHARGE	STAGE	PROB. %	FREQ. YR.	DISCHARGE	STAGE	PROB. %	FREQ. YR.
S-1	52+00	170	15.9	230	17.4	190	16.4	1.5	67	---	---	---	---

NOTE: THE HYDRAULIC DATA IS SHOWN FOR INFORMATIONAL PURPOSES ONLY, TO INDICATE THE FLOOD DISCHARGES AND WATER SURFACE ELEVATIONS WHICH MAY BE ANTICIPATED IN ANY GIVEN YEAR. THIS DATA WAS GENERATED USING HIGHLY VARIABLE FACTORS DETERMINED BY A STUDY OF THE WATERSHED. MANY JUDGEMENTS AND ASSUMPTIONS ARE REQUIRED TO ESTABLISH THESE FACTORS. THE RESULTANT HYDRAULIC DATA IS SENSITIVE TO CHANGES, PARTICULARLY OF ANTECEDENT CONDITIONS, URBANIZATION, CHANNELIZATION, AND LAND USE. USERS OF THIS DATA ARE CAUTIONED AGAINST THE ASSUMPTION OF PRECISION WHICH CAN NOT BE ATTAINED. DISCHARGES ARE IN CUBIC FEET PER SECOND AND STAGES ARE IN FEET, NGVD, 1929.

DEFINITIONS:

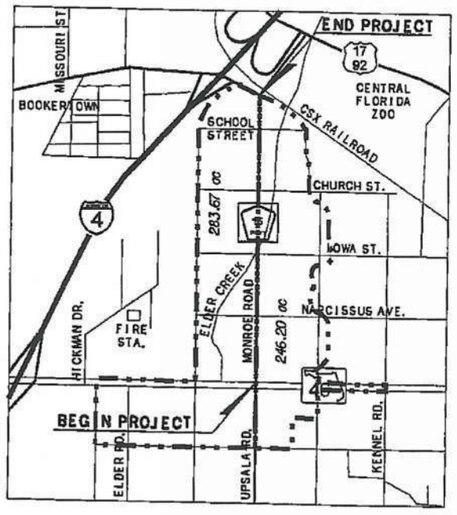
DESIGN FLOOD: THE FLOOD SELECTED BY F.D.O.T. TO BE UTILIZED TO ASSURE A STANDARD LEVEL OF HYDRAULIC PERFORMANCE.

BASE FLOOD: THE FLOOD HAVING A 1% CHANCE OF BEING EXCEEDED IN ANY YEAR. (100 YR. FREQUENCY)

OVERTOPPING FLOOD: THE FLOOD WHERE FLOW OCCURS (A) OVER THE HIGHWAY (B) OVER A WATERSHED DIVIDE OR (C) THRU EMERGENCY RELIEF STRUCTURES.

GREATEST FLOOD: THE MOST SEVERE FLOOD WHICH CAN BE PREDICTED WHERE OVERTOPPING IS NOT PRACTICAL, NORMALLY ONE WITH A 0.2% CHANCE OF BEING EXCEEDED IN ANY YEAR. (500 YR. FREQUENCY)

0 100 400
Feet



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REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

BOWYER-SINGLETON & ASSOCIATES, INCORPORATED
520 S. MAGNOLIA AVENUE/ORLANDO, FLORIDA 32801
FBPR CERTIFICATE OF AUTHORIZATION NO. 1221

SEMINOLE COUNTY

DRAINAGE MAP

SHEET NO. 4

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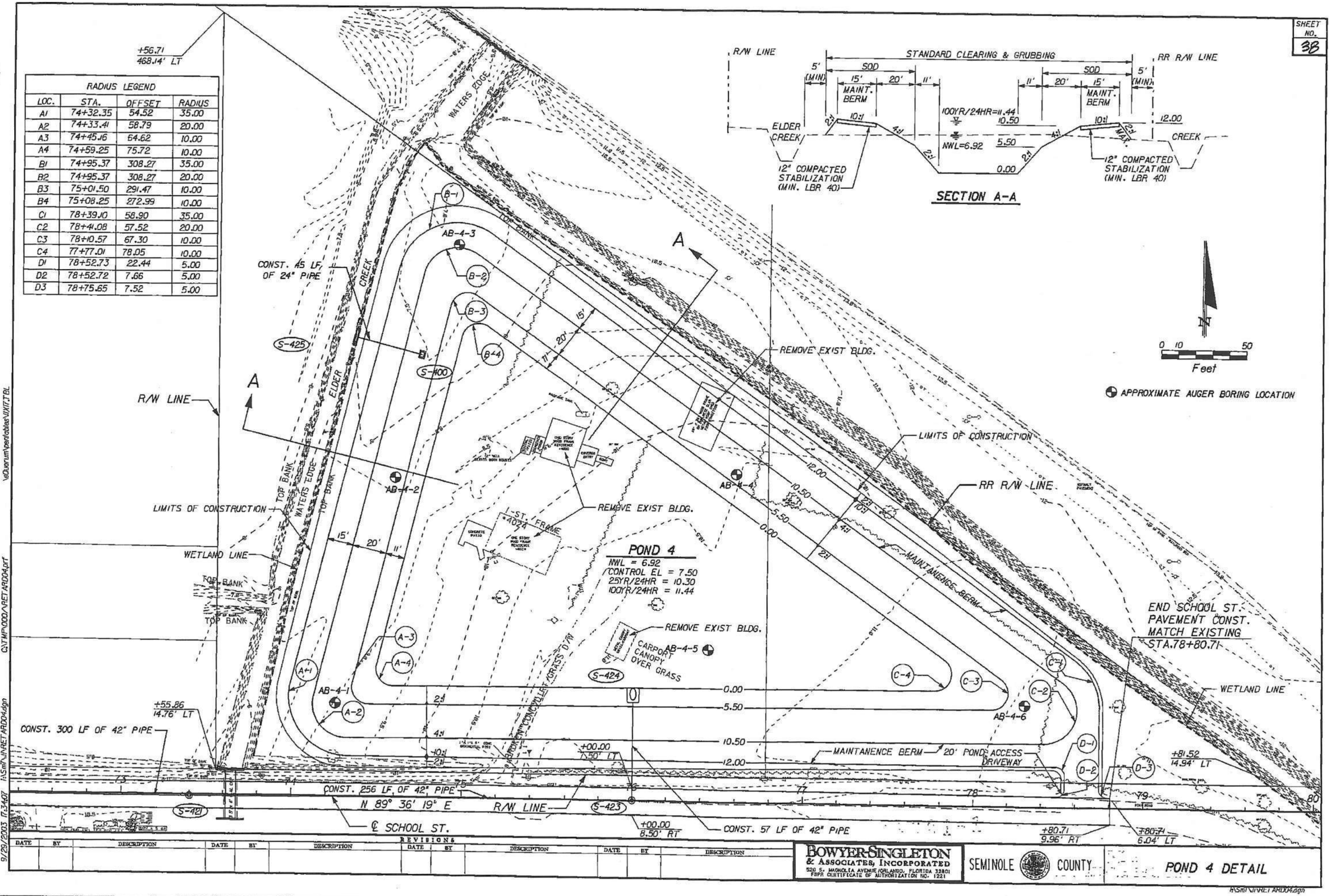
RADIUS LEGEND			
LOC.	STA.	OFFSET	RADIUS
A1	74+32.35	54.52	35.00
A2	74+33.41	58.79	20.00
A3	74+45.16	64.62	10.00
A4	74+59.25	75.72	10.00
B1	74+95.37	308.27	35.00
B2	74+95.37	308.27	20.00
B3	75+01.50	291.47	10.00
B4	75+08.25	272.99	10.00
C1	78+39.10	58.90	35.00
C2	78+41.08	57.52	20.00
C3	78+10.57	67.30	10.00
C4	77+77.01	78.05	10.00
D1	78+52.73	22.44	5.00
D2	78+52.72	7.66	5.00
D3	78+75.65	7.52	5.00

SECTION A-A

APPROXIMATE AUGER BORING LOCATION



REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

BOWYER-SINGLETON & ASSOCIATES, INCORPORATED
520 S. MAGNOLIA AVENUE ORLANDO, FLORIDA 32801
FBPE CERTIFICATE OF AUTHORIZATION NO. 1221

SEMINOLE COUNTY

POND 4 DETAIL

APPENDIX F –

PARSONS BRINKERHOFF

POND 310 CALCULATIONS

PROJECT TITLE:	I-4 BtU Segment 3	**DATE:**	September 24, 2015
PROJECT NUMBER:	242592-4-52-01	**MADE BY:**	TDA
BASIN DESIGNATION:	Basin 310	**CHECKED BY:**	JLL

I ***PRE DEVELOPMENT***

RUNOFF CURVE NUMBER (CN) CALCULATIONS

Basin 310

Pond: B

COMPUTED BASIN AREA (Ac) 36.13

DETERMINE BASIN RUNOFF CURVE-NUMBER-CN

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA	PRODUCT
Impervious				
Roadway, Shoulder and sidewalk		98	8.15	798.70
Sub-total for Impervious Land Uses			8.15	798.70
Pervious				
Open Space, Fair Condition	A	49	18.24	893.76
Open Space, Fair Condition - Urban Land Soil Type	A/D	80	3.20	256.00
Existing Pond Site - Wet Detention		100	6.54	654.00
Sub-total for Pervious Land Uses			27.98	1803.76
		TOTAL	36.13	2602.46

COMPOSITE CN **72**

ESTIMATED RUNOFF VOLUME

SUMMARY TABLE:

DESIGN STORM	Agency	P [in]	S [in]	R [in]	V[R] [ac-ft]
10 yr / 24 hr	SWFWMD	7.44	3.88	4.21	12.68
25 yr / 96 hr	SWFWMD	11.20	3.88	7.59	22.87
100 yr / 24 hr	SWFWMD	18.50	3.88	14.54	43.77

SAMPLE CALCULATION:

1) DETERMINE SOIL STORAGE - S

S= (1000/CN) - 10

SOIL STORAGE (inches)	S	3.88

2) DETERMINE RUNOFF - R

P = 18.50

R = (P - 0.2*S)^2 / (P + 0.8*S)

RUNOFF (inches)	R	14.54

3) DETERMINE RUNOFF VOLUME - V[R]

V[R] = R / 12 * AREA

RUNOFF (ac-ft)	V[R]	43.77

PROJECT TITLE:	I-4 BtU Segment 3	**DATE:**	September 24, 2015
PROJECT NUMBER:	242592-4-52-01	**MADE BY:**	TDA
BASIN DESIGNATION:	Basin 310	**CHECKED BY:**	JLL

II ***POST DEVELOPMENT***

RUNOFF CURVE NUMBER (CN) CALCULATIONS

Basin 310

Pond: B

COMPUTED BASIN AREA (Ac) 25.86

DETERMINE BASIN RUNOFF CURVE-NUMBER-CN

LAND-USE DESCRIPTION	SOIL GROUP	CN	AREA	PRODUCT
Impervious				
Roadway, Shoulder and sidewalk		98	15.26	1495.48
Sub-total for Impervious Land Uses			15.26	1495.48
Pervious				
Open Space, Fair Condition	A	49	3.57	174.93
Open Space, Fair Condition - Urban Land Soil Type	A/D	80	0.49	39.20
Pond Site - Wet Detention		100	6.54	654.00
Sub-total for Pervious Land Uses			10.60	868.13
		TOTAL	25.86	2363.61

COMPOSITE CN **91**

ESTIMATED RUNOFF VOLUME

SUMMARY TABLE:

DESIGN STORM	Agency	P [in]	S [in]	R [in]	V[R] [ac-ft]
10 yr / 24 hr	SWFWMD	7.44	0.94	6.42	13.83
25 yr / 96 hr	SWFWMD	11.20	0.94	10.14	21.86
100 yr / 24 hr	SWFWMD	18.50	0.94	17.42	37.53

SAMPLE CALCULATION:

1) DETERMINE SOIL STORAGE - S

S= (1000/CN) - 10

SOIL STORAGE (inches)	S	0.94

2) DETERMINE RUNOFF - R

P = 18.50

R = (P - 0.2*S)^2 / (P + 0.8*S)

RUNOFF (inches)	R	17.42

3) DETERMINE RUNOFF VOLUME - V[R]

V[R] = R / 12 * AREA

RUNOFF (ac-ft)	V[R]	37.53

PROJECT TITLE:	I-4 BtU Segment 3	**DATE:**	September 24, 2015
PROJECT NUMBER:	242592-4-52-01	**MADE BY:**	TDA
BASIN DESIGNATION:	Basin 310	**CHECKED BY:**	JLL

III ***GEOTECHNICAL INFORMATION***

NRCS SOIL SURVEY		
Approximate Depth to SHWT (Ft)	**Adjacent Ground Elevation (Ft)**	**Estimated NRCS SHWT (Ft)**
	Permit No. 22514-1 (Contol Elevation)	61.50
	Estimated SHWT	61.50

IV ***SUMMARY OF REQUIRED ATTENUTION AND TREATMENT VOLUME***

Basin 310

Pond: B

REQUIRED ATTENUTATION CACULATION

PRE-DEVELOPED CONDITION		**POST-DEVELOPED CONDITION**	
AREA (AC):	36.13	AREA (AC):	25.86
CN:	72	CN:	91
IMPERVIOUS AREA (AC):	8.15	IMPERVIOUS AREA (AC):	15.26
PERVIOUS AREA (AC):	24.78	PERVIOUS AREA (AC):	10.11
		NEW IMPERVIOUS AREA (AC):	7.11

SUMMARY OF WATER MANAGEMENT DISTRICT ATTENUATION ESTIMATES

AGENCY	DESIGN STORM	RUNOFF VOLUME V[R] PRE [AC-FT]	POST [AC-FT]	TOTAL RETENTION [AC-FT]
SWFWMD	10 yr / 24 hr	12.68	13.83	**1.16**
SWFWMD	25 yr / 96 hr	22.87	21.86	**-1.00**
SWFWMD	100 yr / 24 hr	43.77	37.53	**-6.24**

REQUIRED TREATMENT VOLUME CALCULATION (WET DETENTION)	AC-FT
1.0 inch of Runoff over the Basin Area	2.16
Total Runoff from 2.5 inches over the Impervious Area	3.18

Closed Basin Volume	**AC-FT**	
Pre Devp. Runoff Volume	43.77	
Post Devp. Runoff Volume	37.53	
Current Project Delta	-6.24	
Previous Project Required Volume	21.50	Permit No. 22514-1
Current Project Delta + Prevous Project Required Volume	15.26	***<< CONTROLS>>***

V ***PROVIDED TREATMENT & ATTENUATION VOLUME CALCULATIONS***

Basin 310

Pond: B

POND STAGE, AREA & STORAGE			
DESCRIPTION	**STAGE (FT)**	**AREA (AC)**	**CUMMULATIVE STORAGE (AC-FT)**
Pond Bottom	53.00	4.48	0.00
SHWT	61.50	6.54	46.84
Weir Crest Elevation	62.26	6.70	51.87
DHW 10	63.00	6.86	56.89
DHW 25	64.37	7.16	66.50
Top of Bank Elevation (DHW 100)	67.00	7.73	86.08
Top of Berm	70.00	8.78	110.84

PROJECT TITLE:	I-4 BtU Segment 3	**DATE:**	September 24, 2015
PROJECT NUMBER:	242592-4-52-01	**MADE BY:**	TDA
BASIN DESIGNATION:	Basin 310	**CHECKED BY:**	JLL

PROVIDED TREATMENT VOLUME	AC-FT
Treatment Volume Provided = Volume between Seasonal High and Weir Crest Elevation	5.03

PROVIDED ATTENUATION VOLUME		AC-FT
DHW 10	Provided between Weir Crest and 10 Year Stage	10.05
DHW 25	Provided between Weir Crest and 25 Year Stage	19.66
Top of Bank Elevation (DHW 100)	Provided between Weir Crest and 25 Year Stage	39.24

PROJECT TITLE:	I-4 BtU Segment 3	**DATE:**	September 24, 2015
PROJECT NUMBER:	242592-4-52-01	**MADE BY:**	TDA
BASIN DESIGNATION:	Basin 310	**CHECKED BY:**	JLL

VI ***BASIN HYDRAULICS - VERIFY POND DOES NOT ADVERSELY IMPACT BASIN INLETS***

Basin 310

Pond: B

Low Edge of Pavement in Basin =	69.0 Ft	Station/Location: Sta 2772+00/Edge of southbound bound travel lane
1.0' of Clearance =	68.0 Ft	
Distance from EOP to Pond =	110 Ft	
Hydraulic Grade Line (HGL) at EOP =	.09 Ft	(Assume Slope = 0.0008 ft/ft)
10 year HGL =	67.91 Ft	
10 year Pond Stage =	63.0 Ft	**HGL Below EOP**