Project Development & Environment Study

SR 60 PD&E Study
From Valrico Road to the Polk County Line

Final
Pond Sizing Report
Technical Memorandum

WPI Segment No.: 430055-1
Hillsborough County

Prepared for the

Florida Department of Transportation
District Seven

April 2015

Stephanie Pierce
FDOT Project Manager

Project Development & Environment Study

FINAL POND SIZING REPORT
TECHNICAL MEMORANDUM

State Road (SR) 60
From Valrico Road to the Polk County Line
Project Development and Environment (PD&E) Study
Hillsborough County, Florida

FDOT District 7
FPN: 430055-1-22-01

Prepared for:

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101 West Main Street, Suite 240
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Prepared by:

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3000 Dovera Drive, Suite 200
Oviedo, Florida 32765

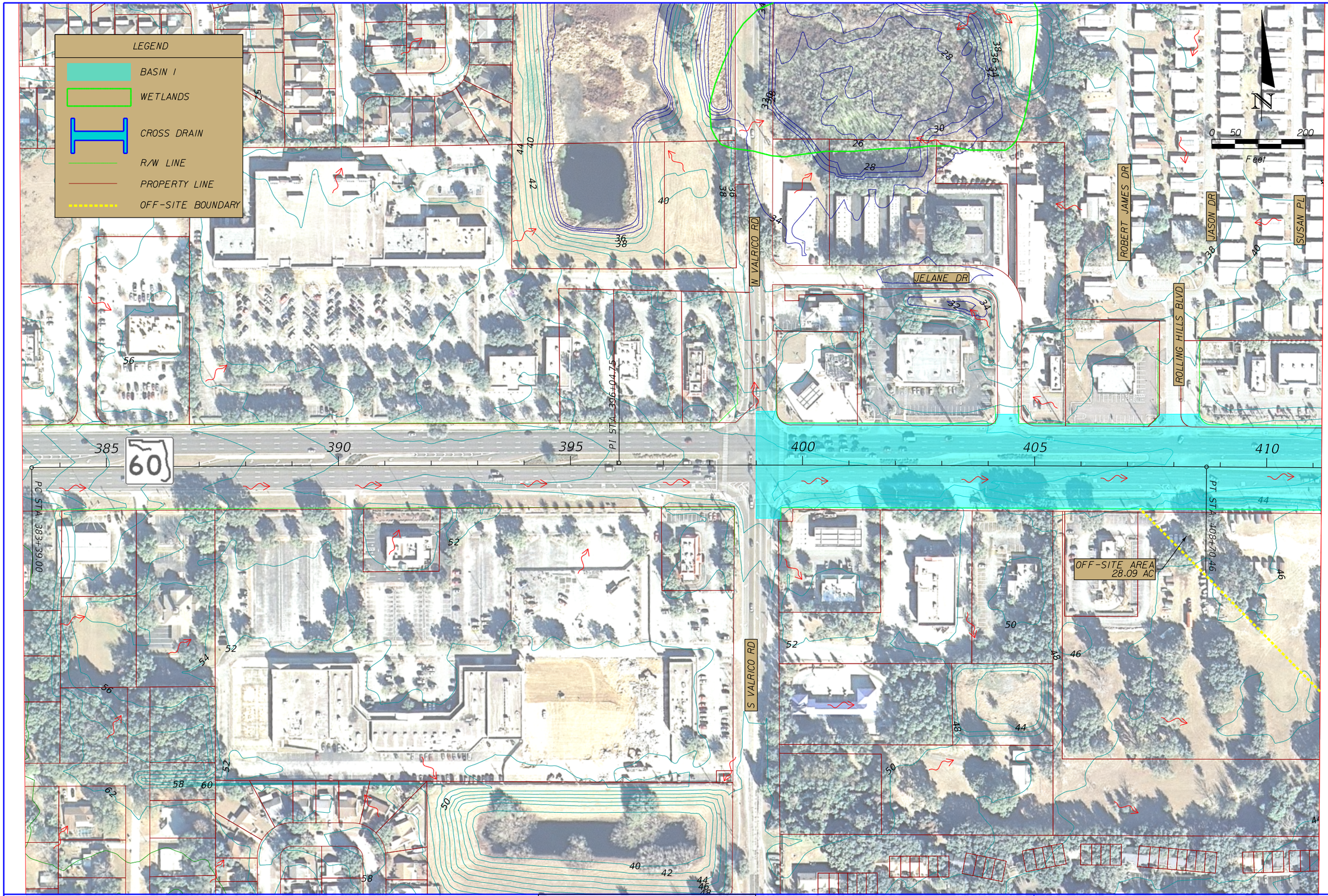
April 2015

APPENDICES

Appendix 1 – DRAINAGE MAPS
Appendix 2 – STORMWATER POND DESIGN CALCULATIONS
Appendix 3 – FLOODPLAIN COMPENSATION POND DESIGN CALCULATIONS

APPENDIX 1

DRAINAGE MAPS



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STATE OF FLORIDA
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60	HILLSBOROUGH	430055-1-22-01

DRAINAGE MAP

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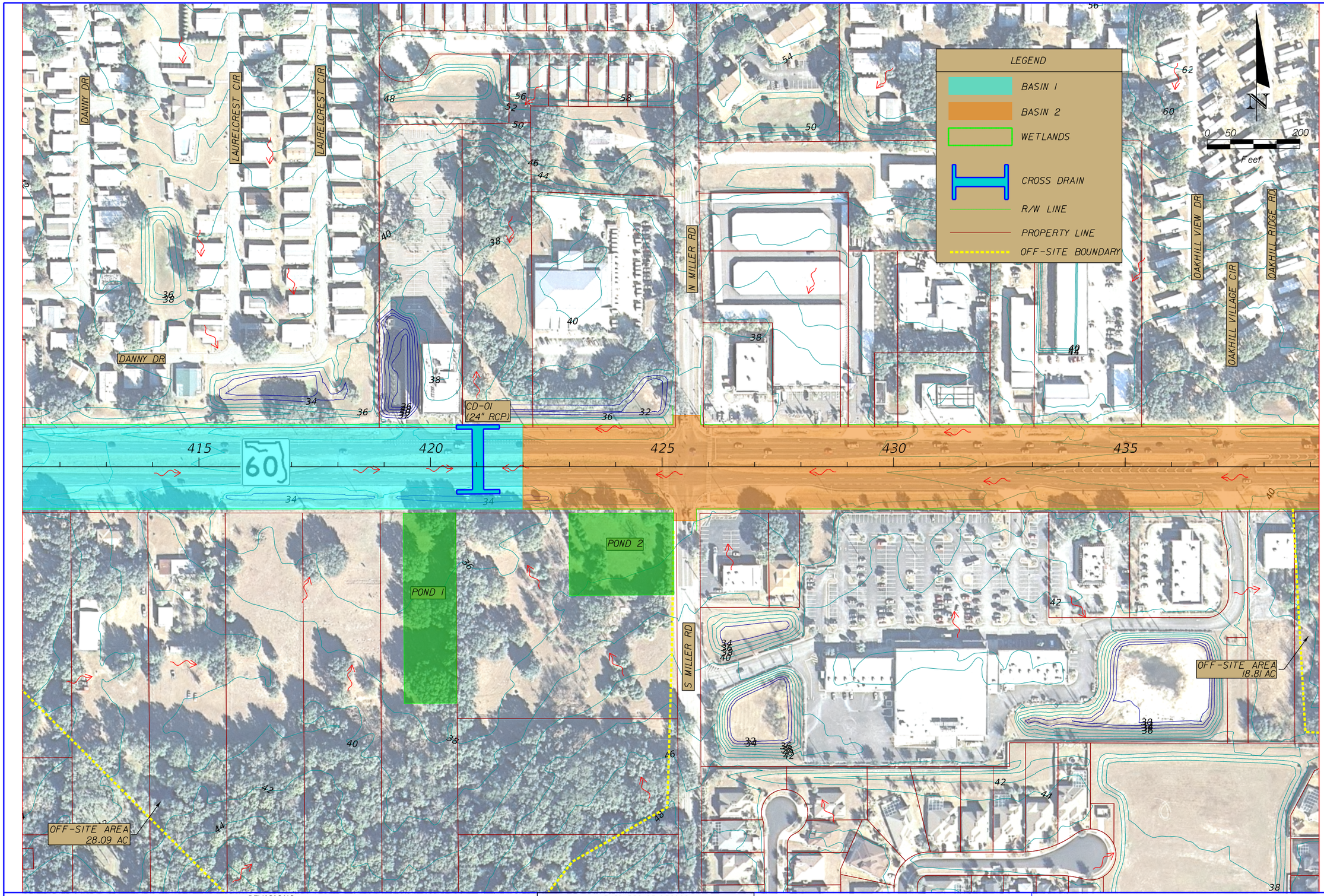

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DRAINAGE MAP

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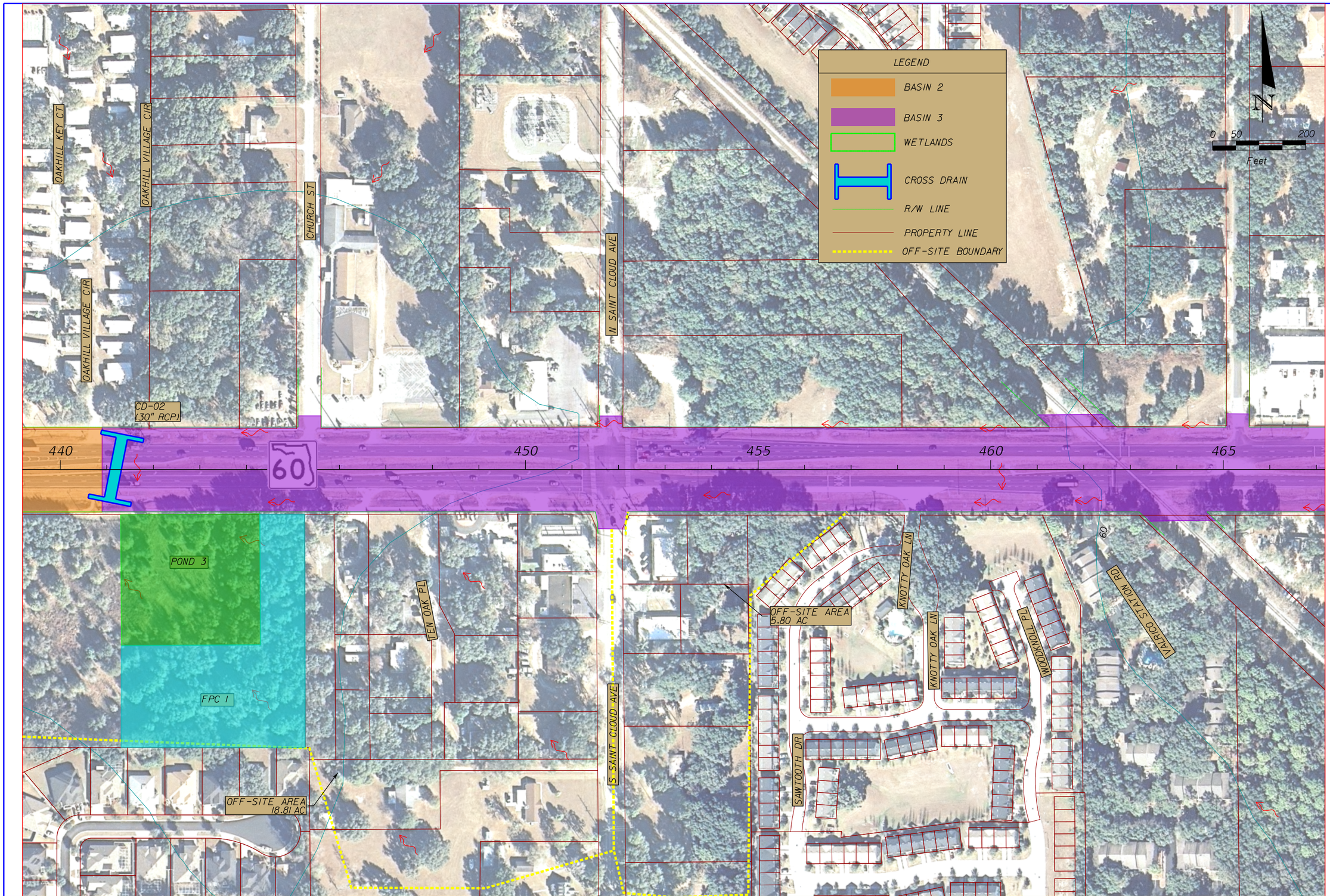

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DRAINAGE MAP

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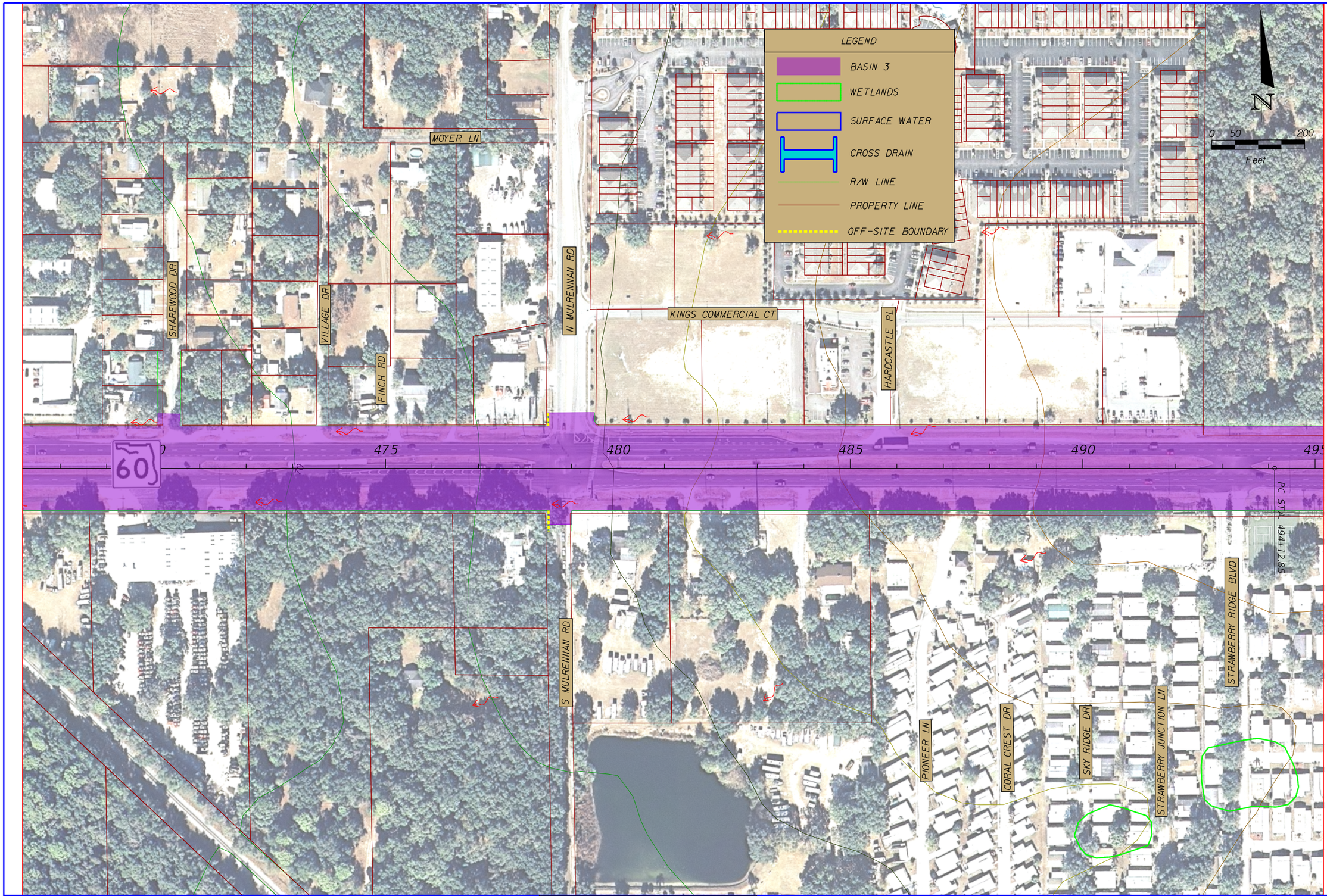

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DRAINAGE MAP

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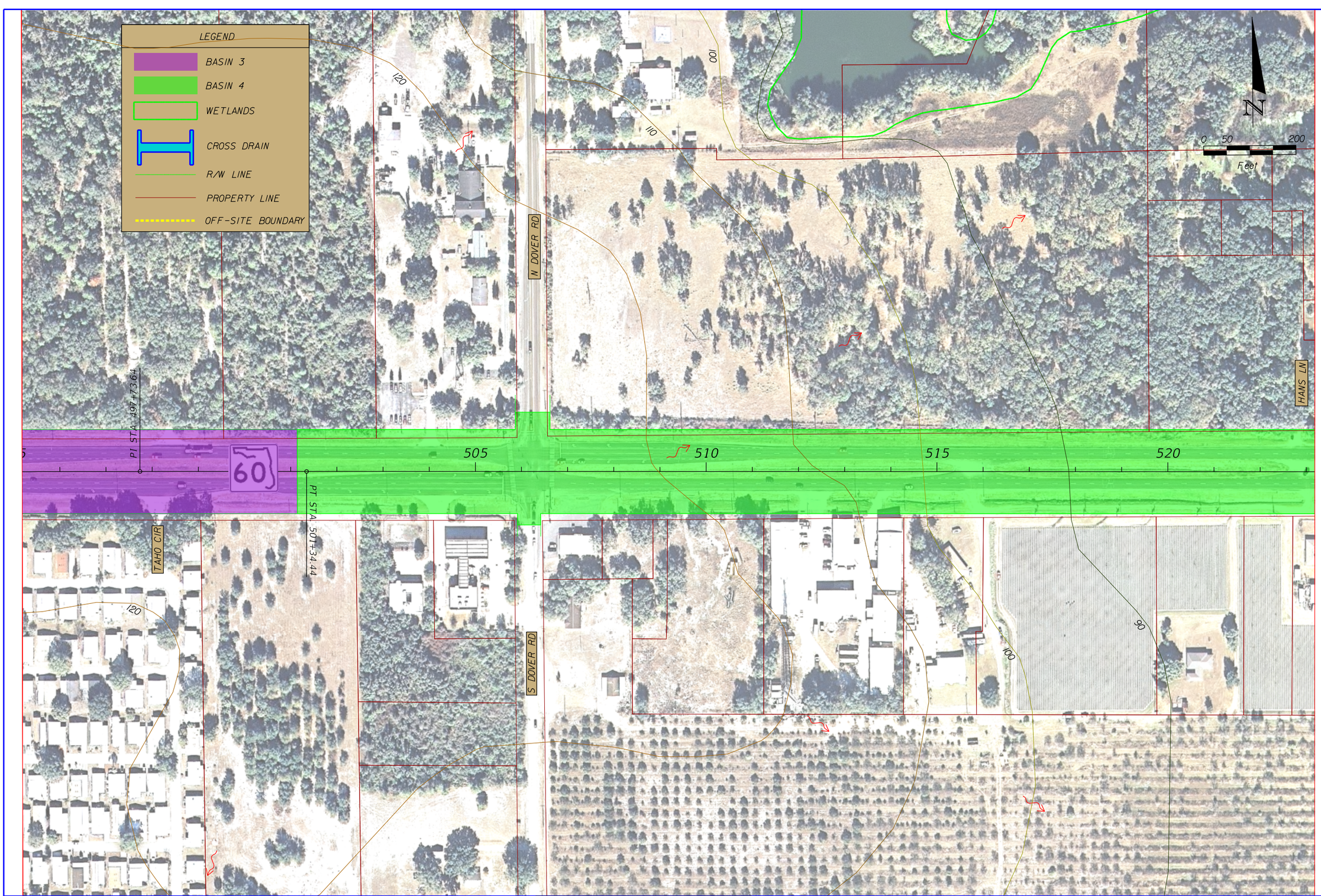

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DRAINAGE MAP

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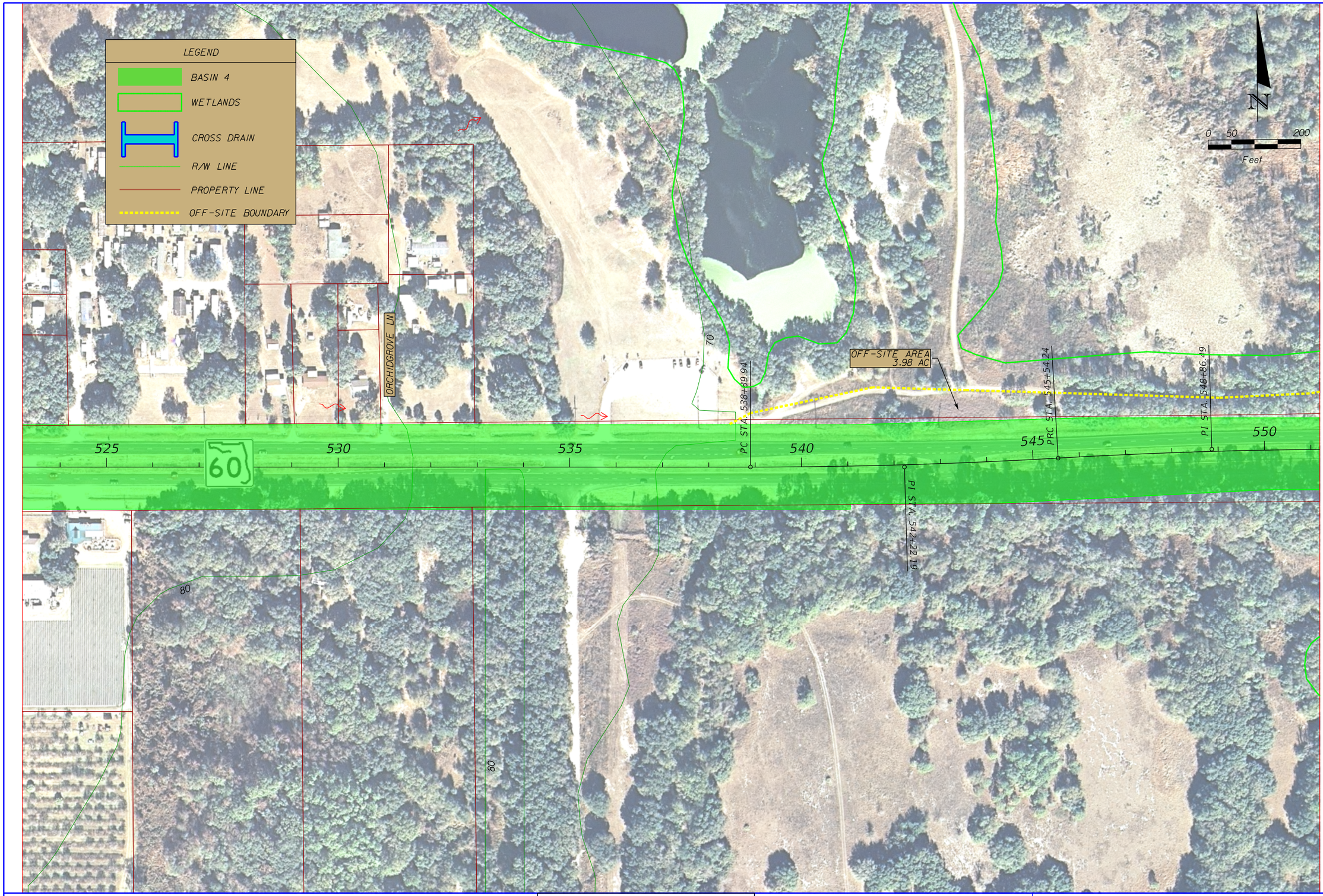

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DRAINAGE MAP

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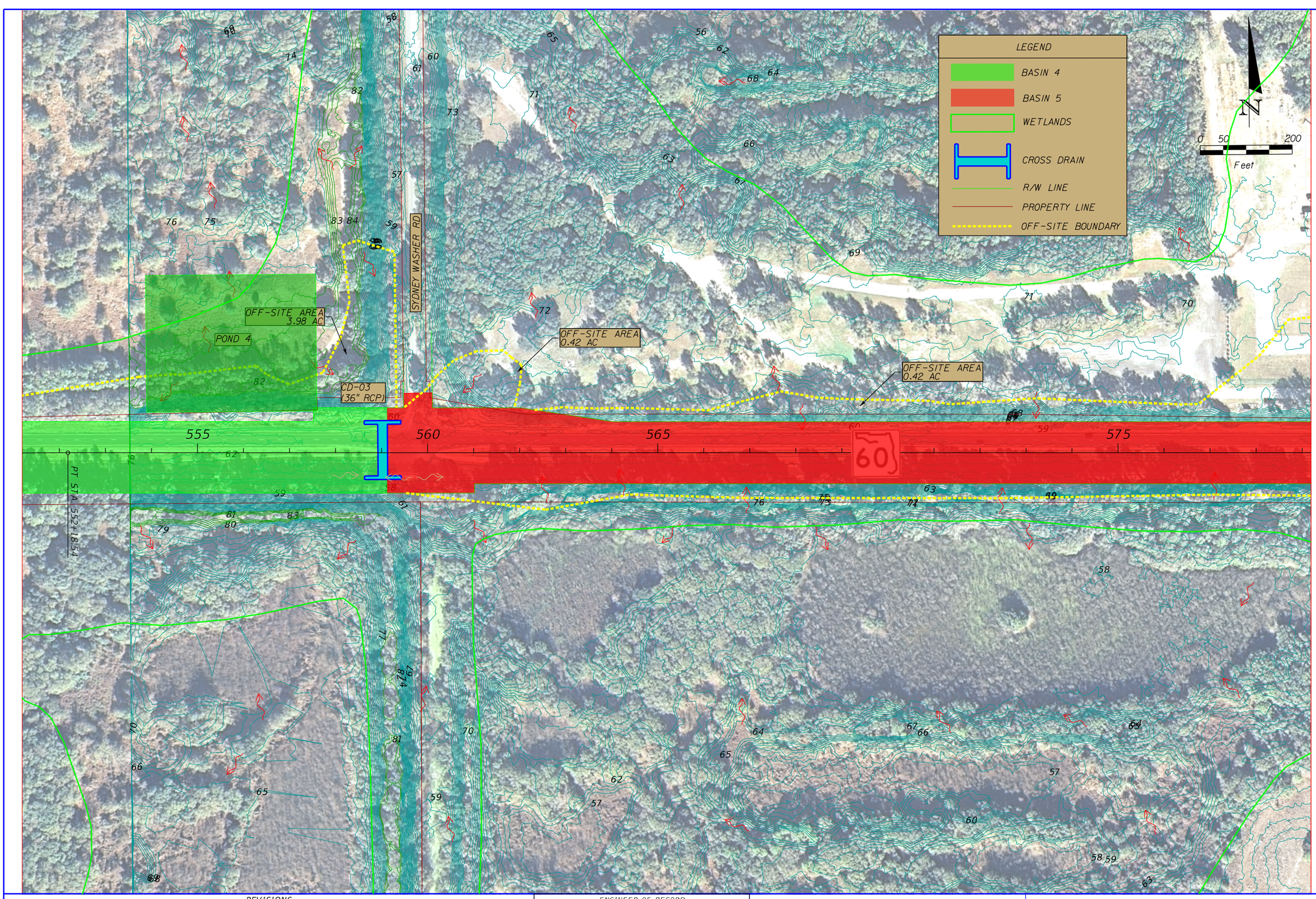

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DRAINAGE MAP

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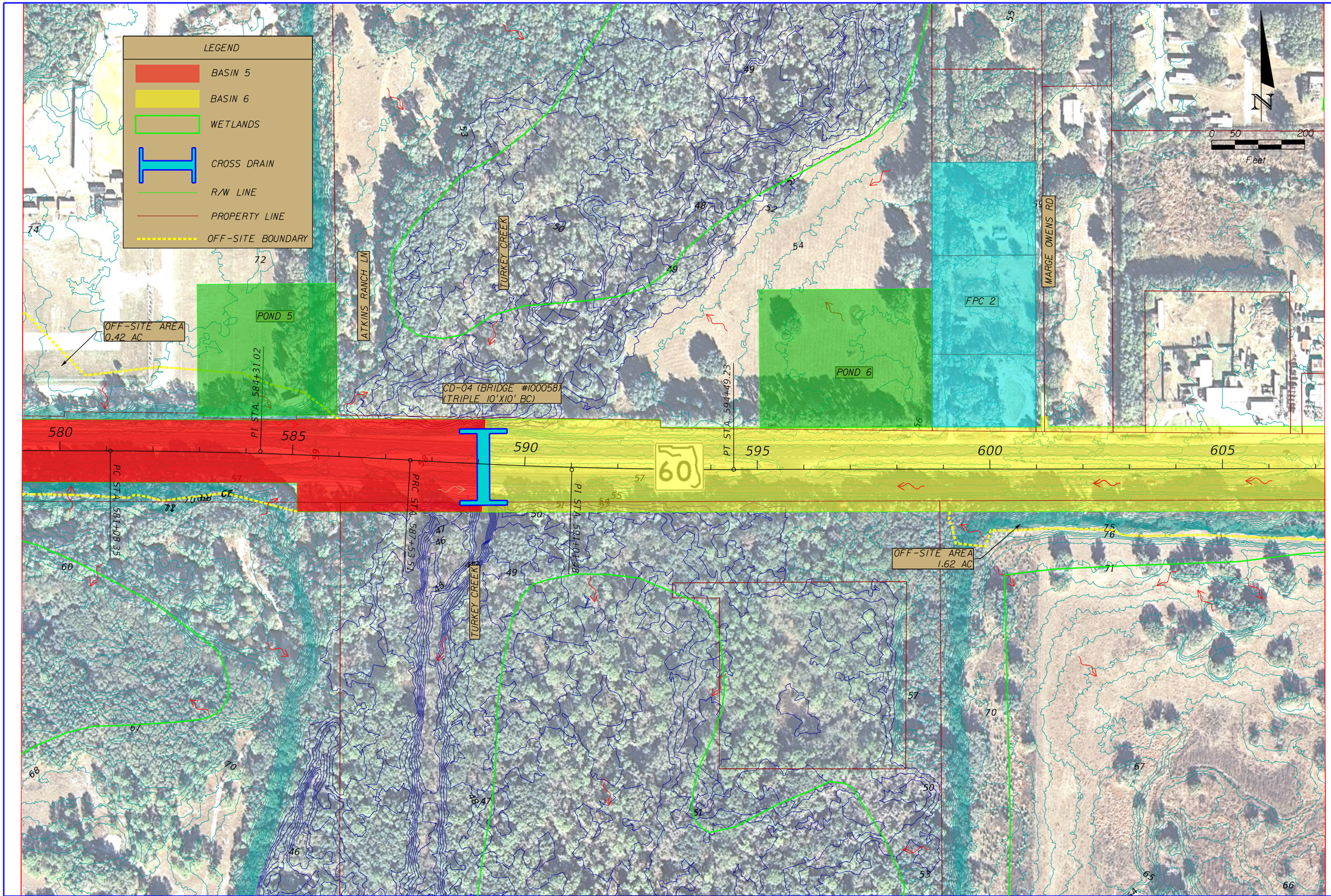

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DRAINAGE MAP

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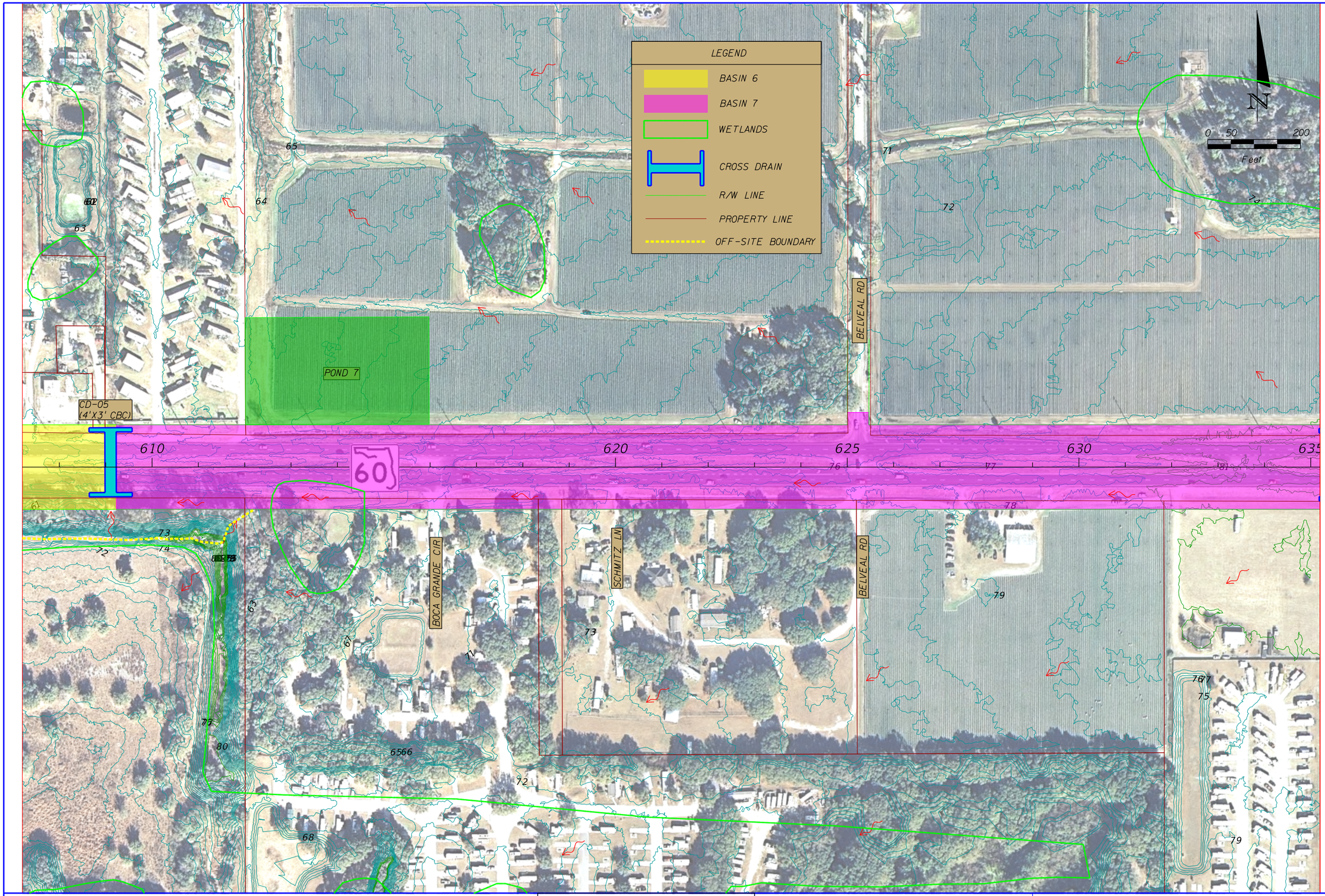

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DRAINAGE MAP

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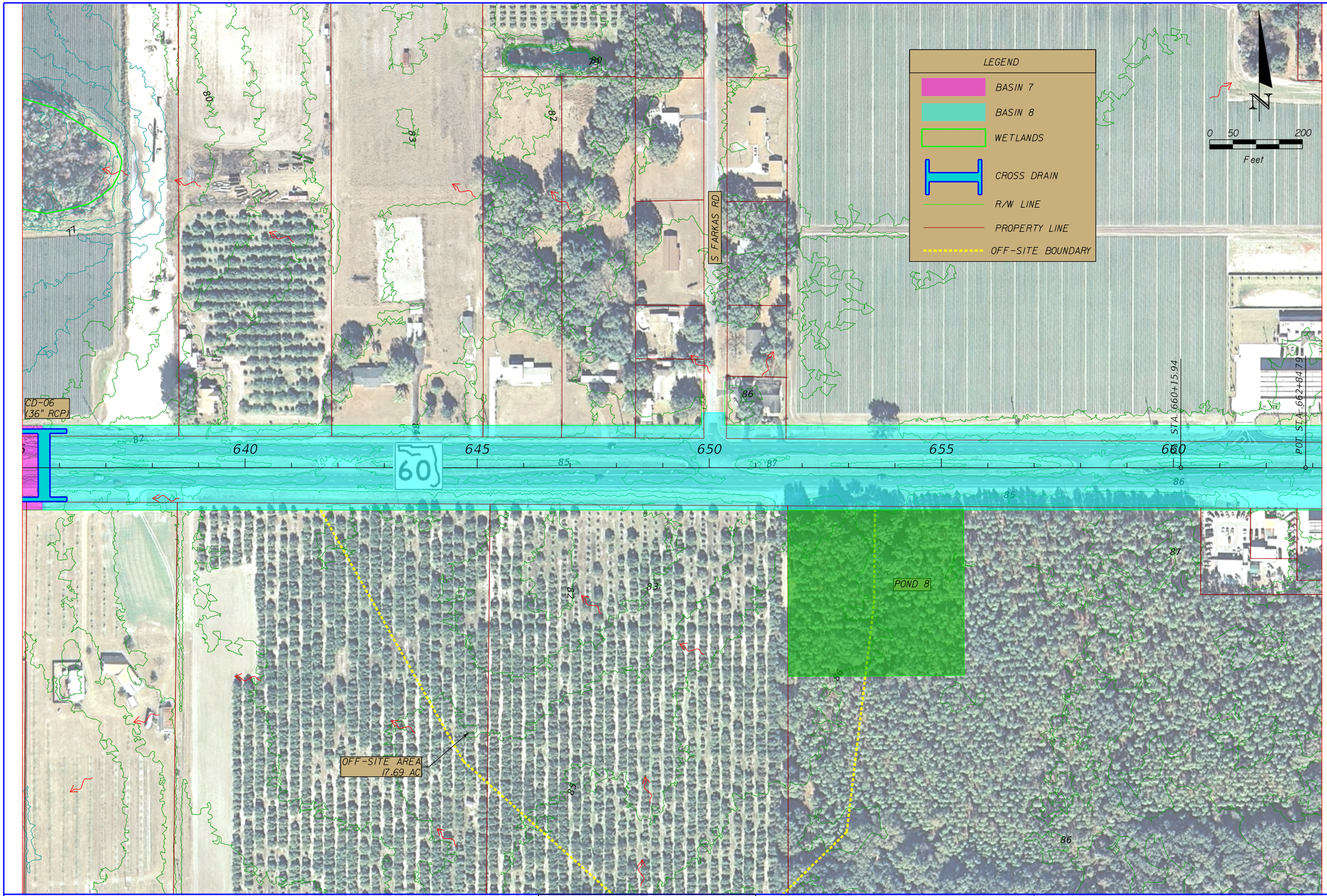

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DRAINAGE MAP

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DRAINAGE MAP

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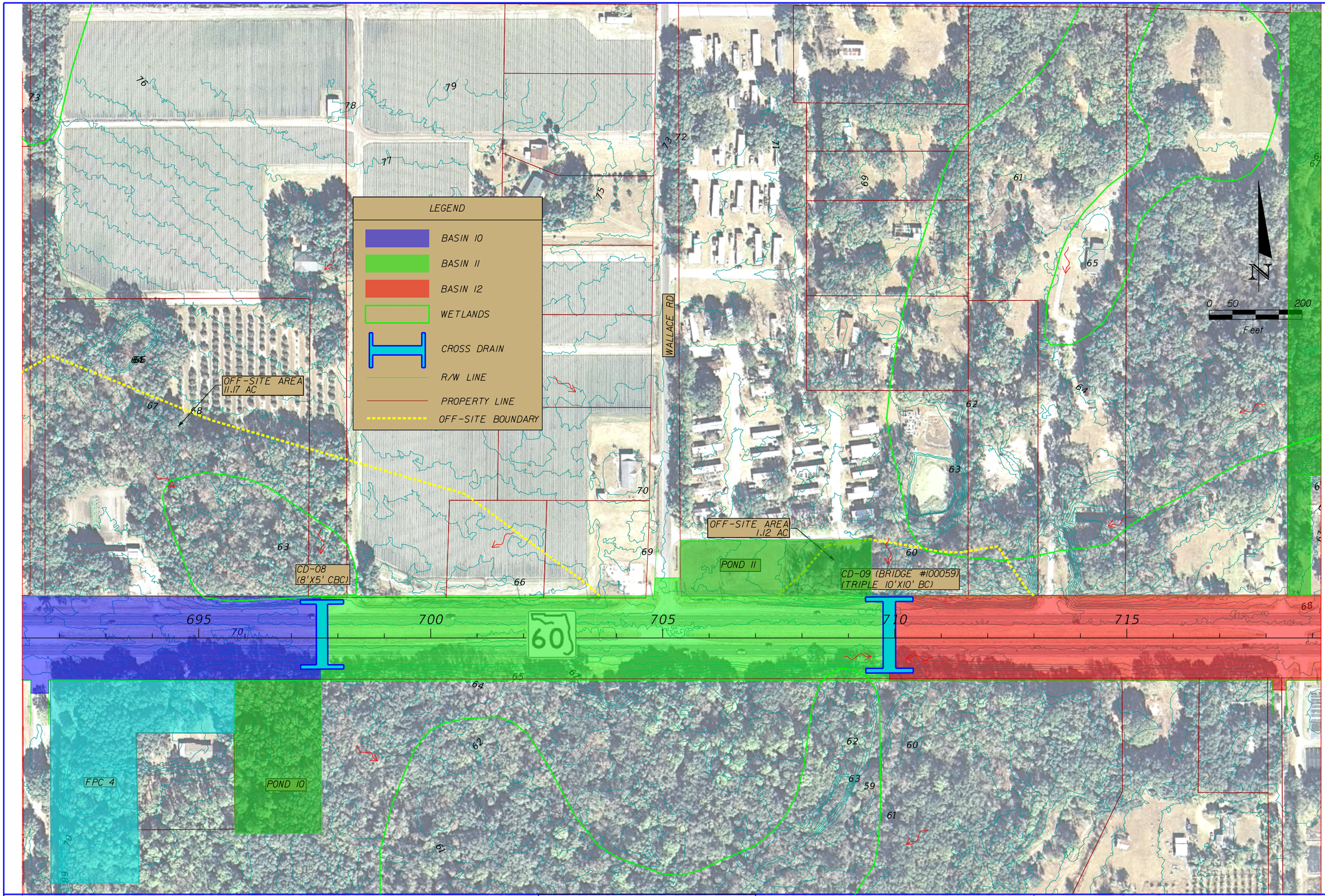

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DRAINAGE MAP

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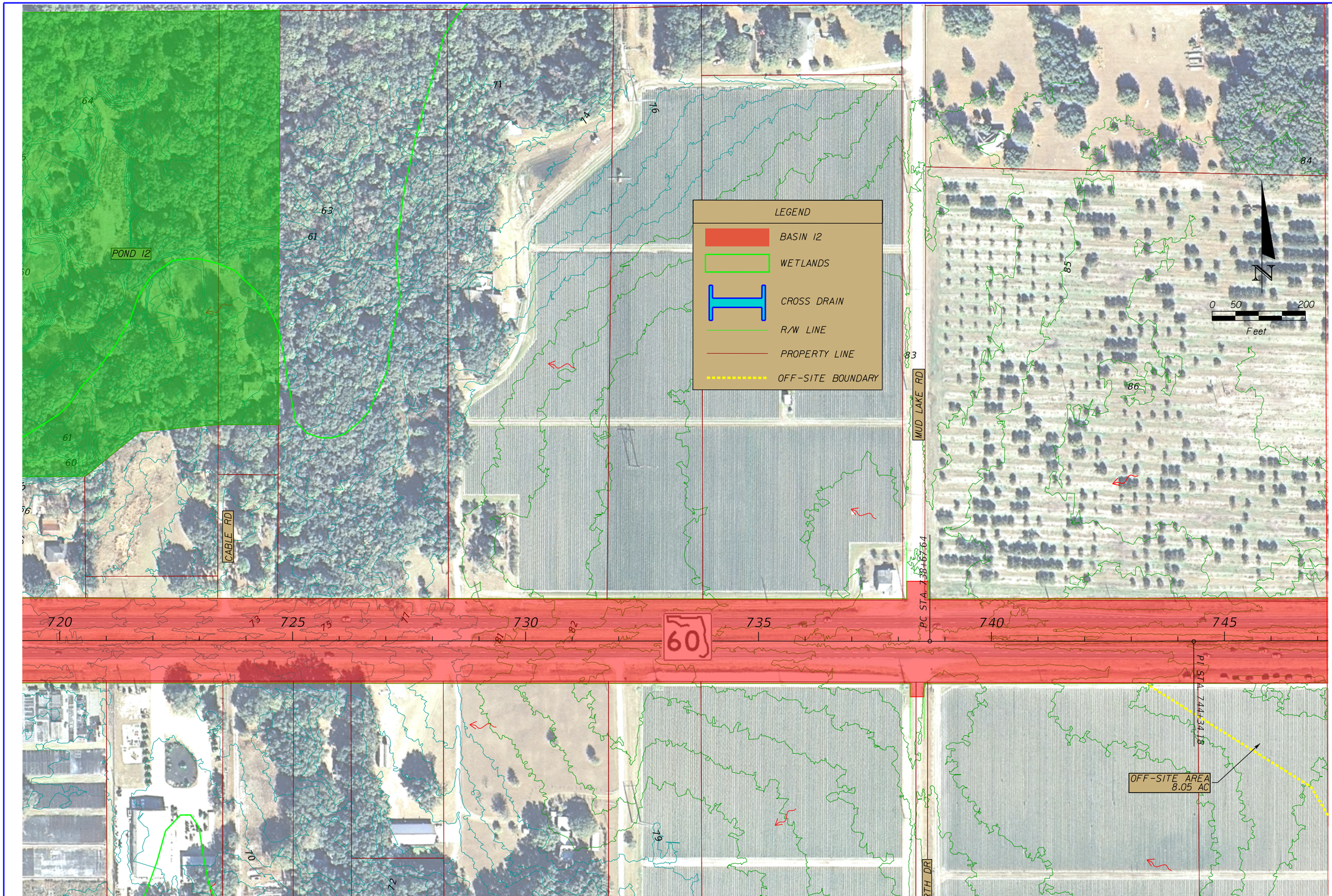

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DRAINAGE MAP

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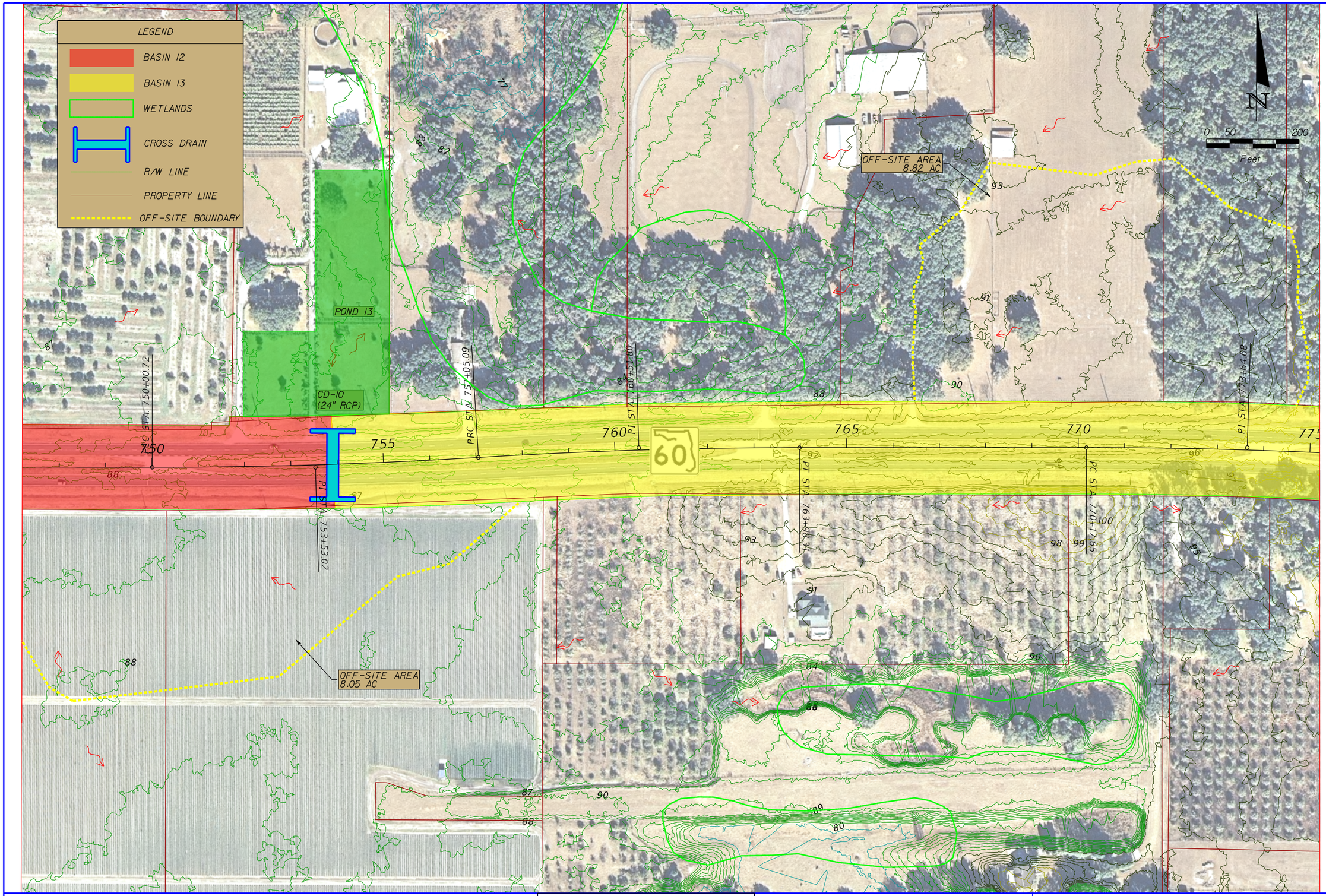

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DRAINAGE MAP

SHEET NO. 14

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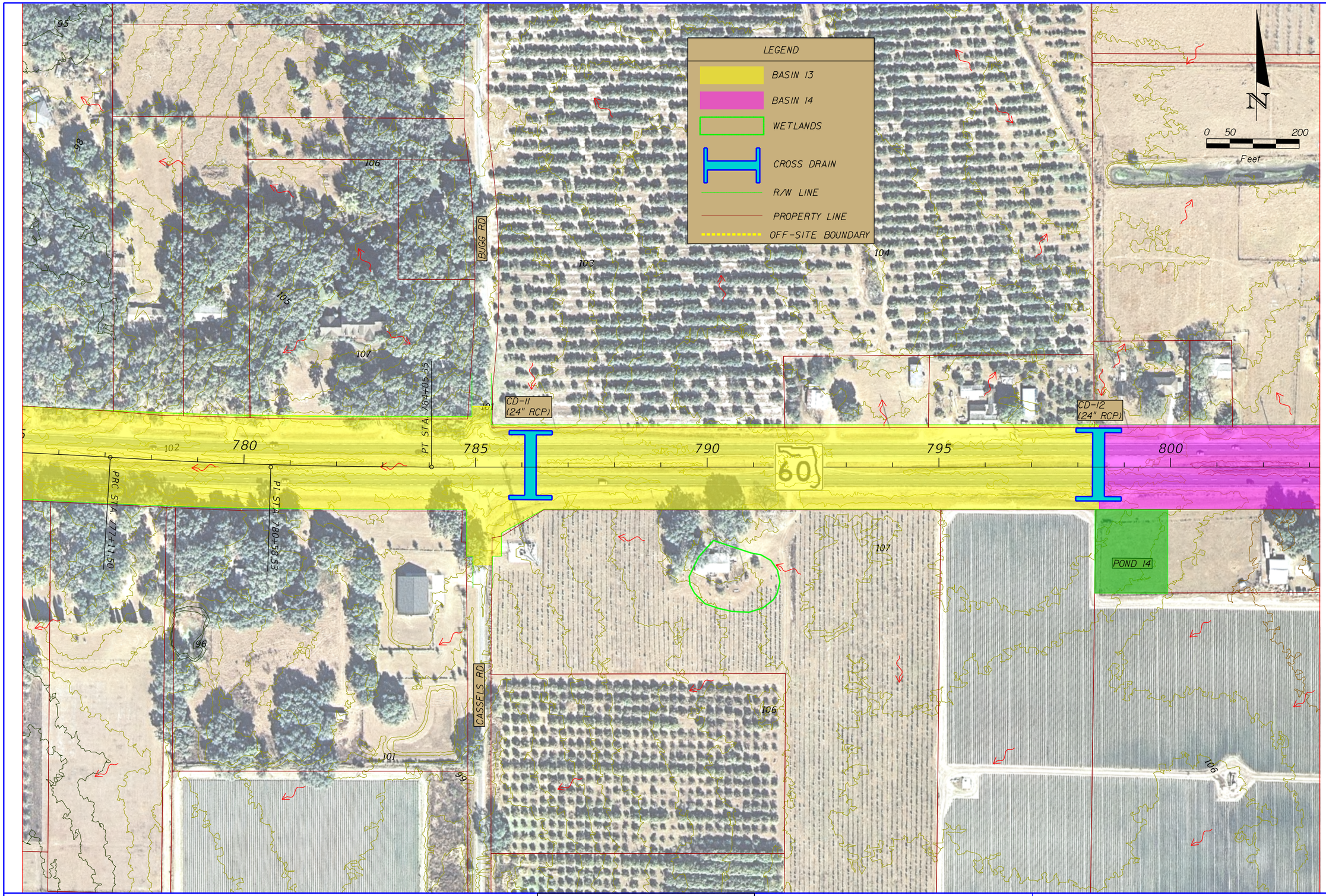

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DRAINAGE MAP

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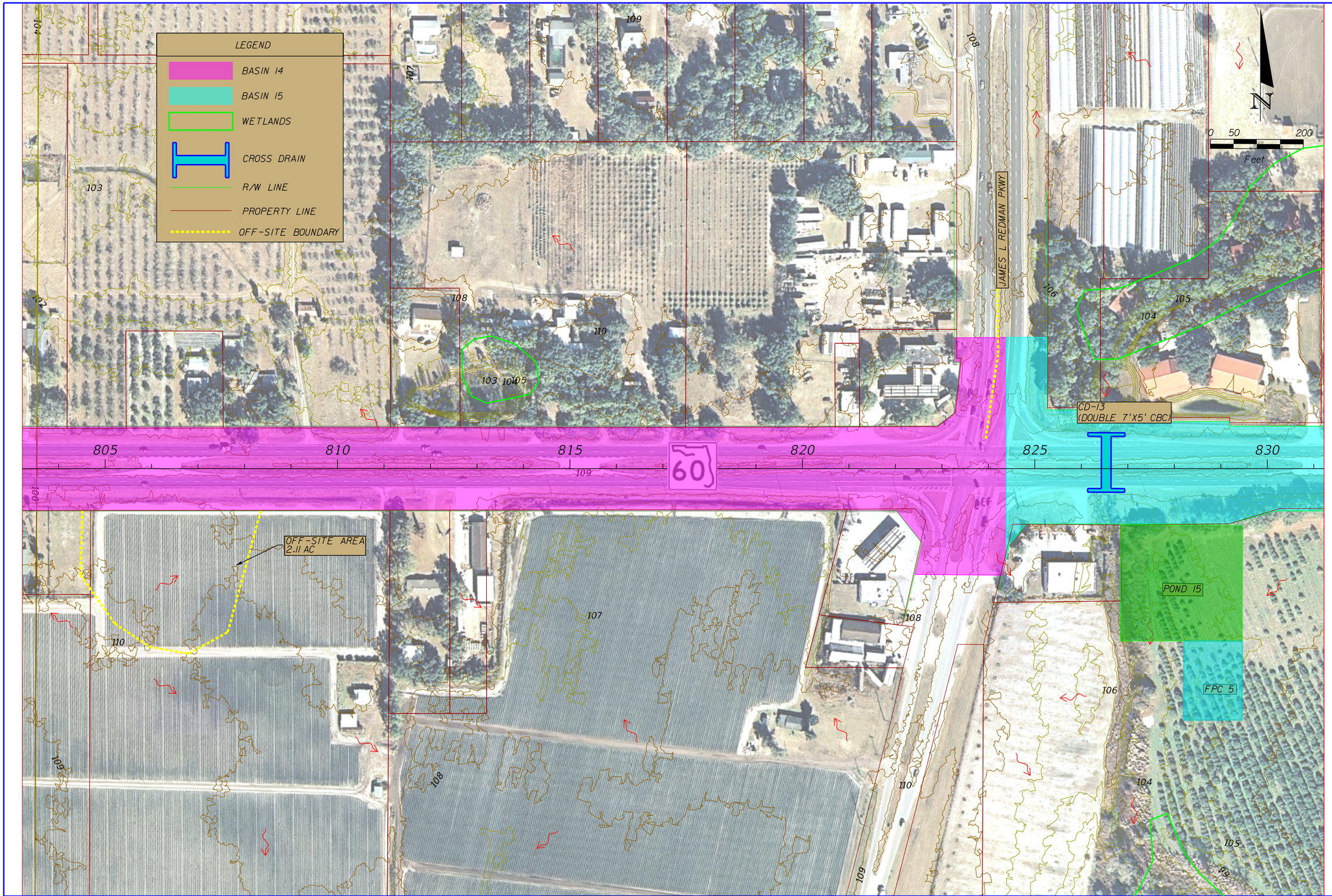

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DRAINAGE MAP

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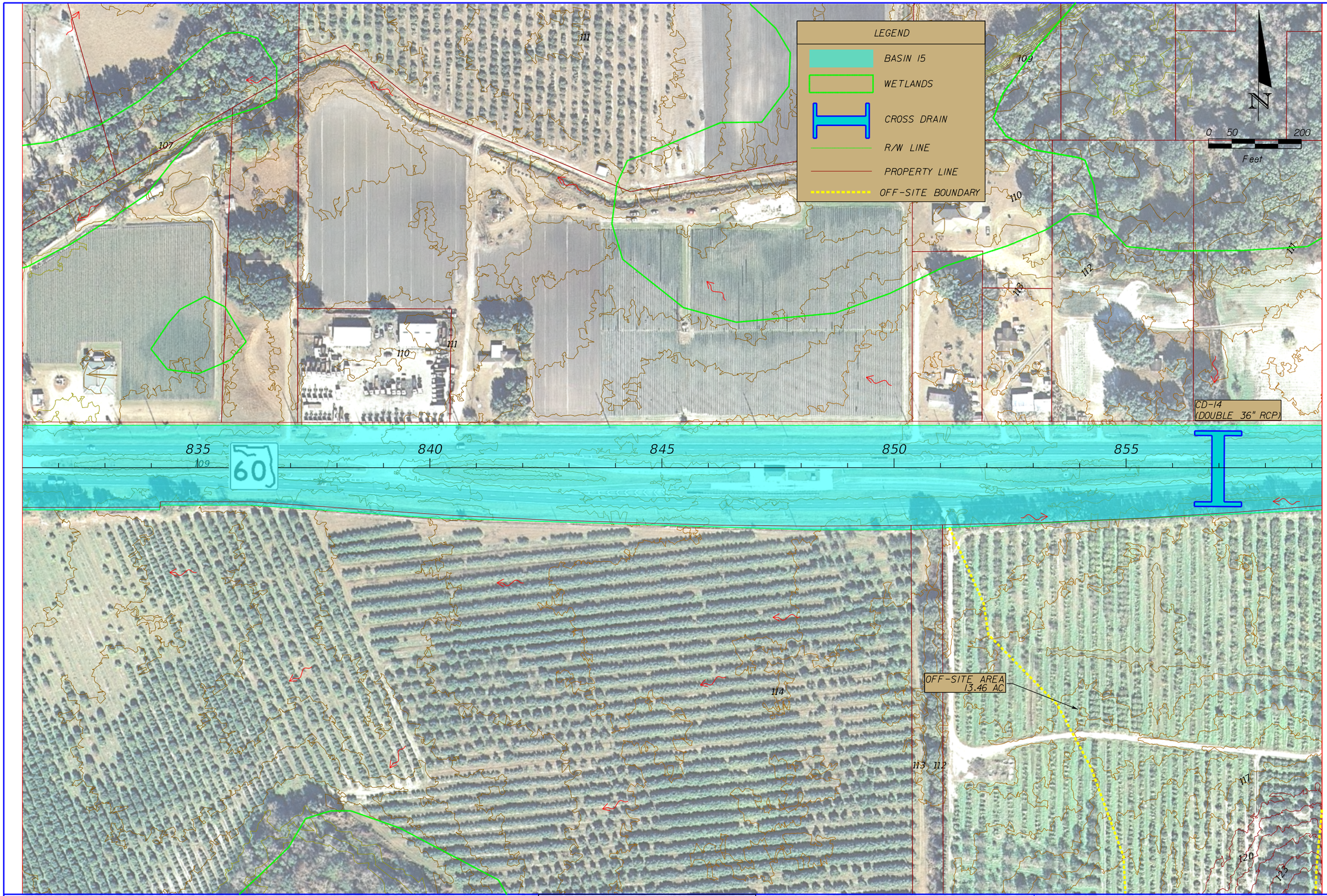

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DRAINAGE MAP

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DRAINAGE MAP

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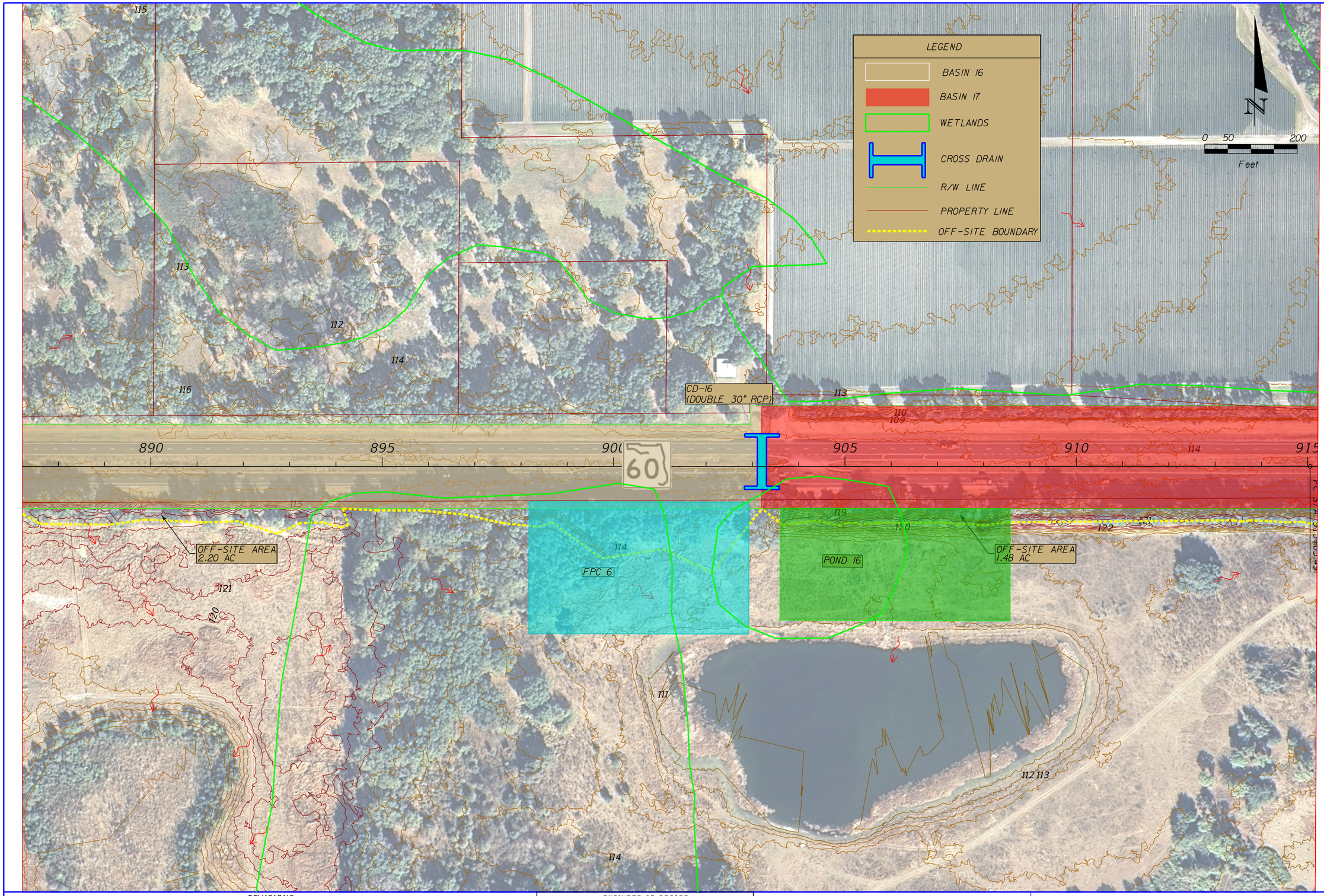

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DRAINAGE MAP

SHEET NO. 19

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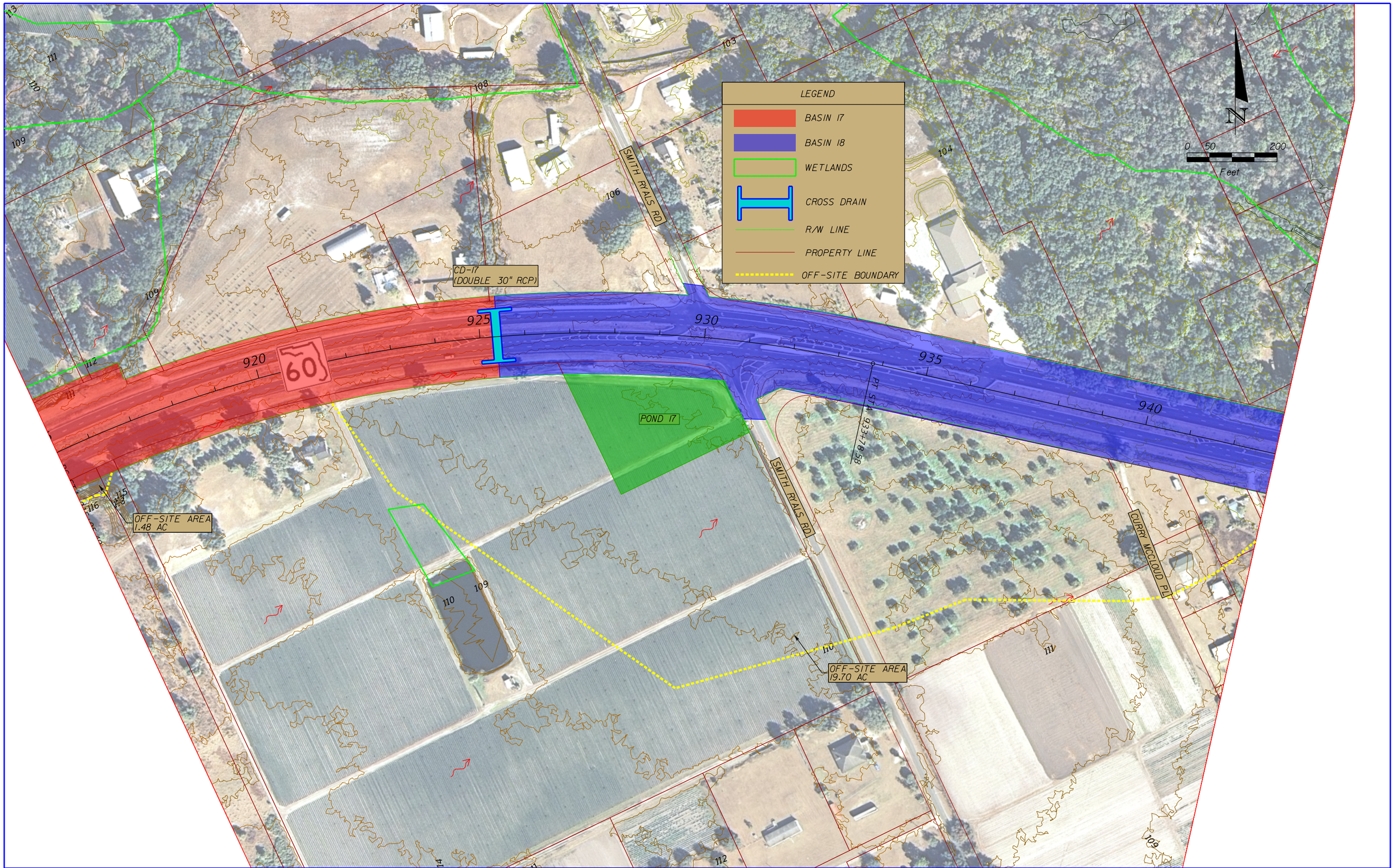

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DRAINAGE MAP

SHEET NO. 20

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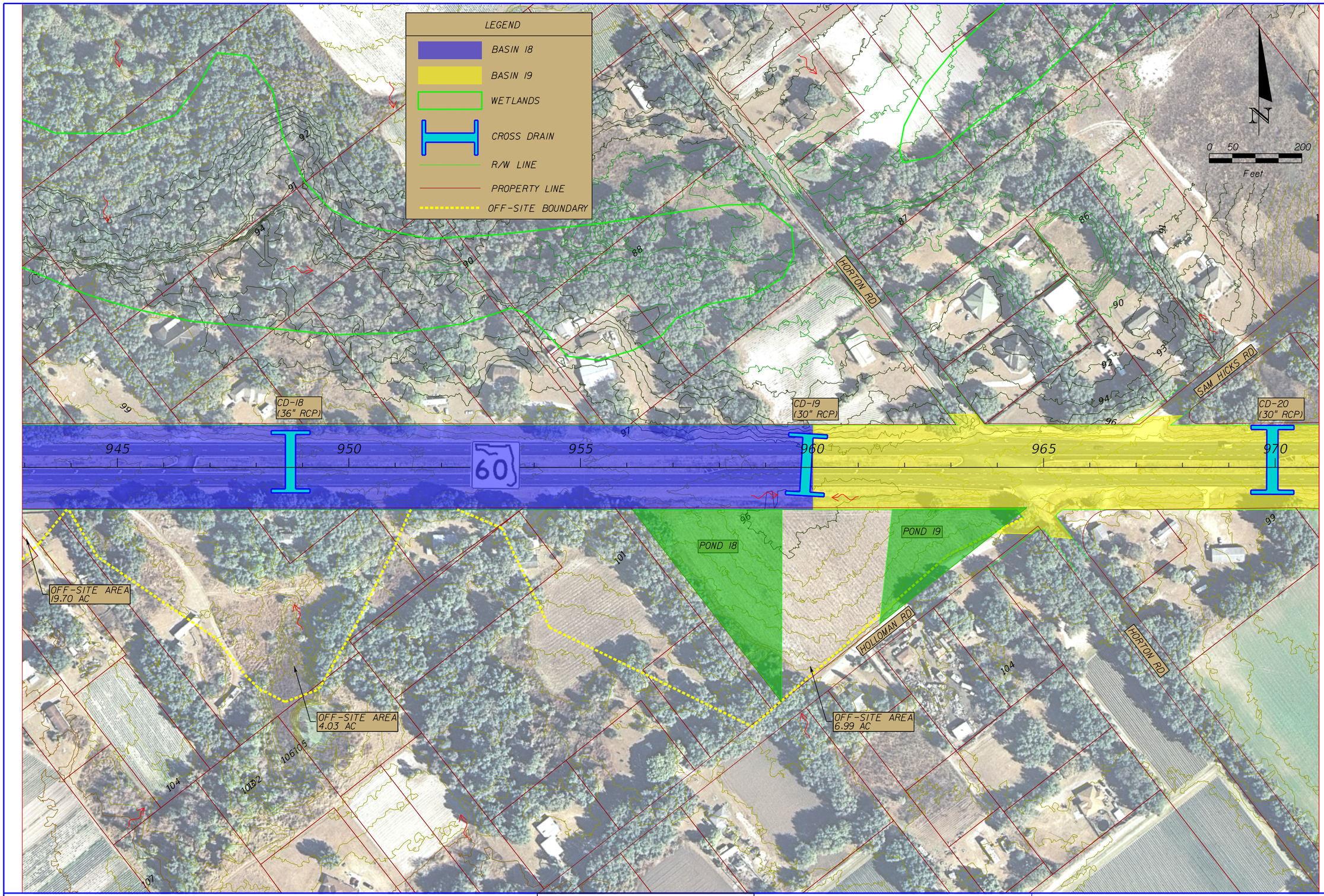

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DRAINAGE MAP

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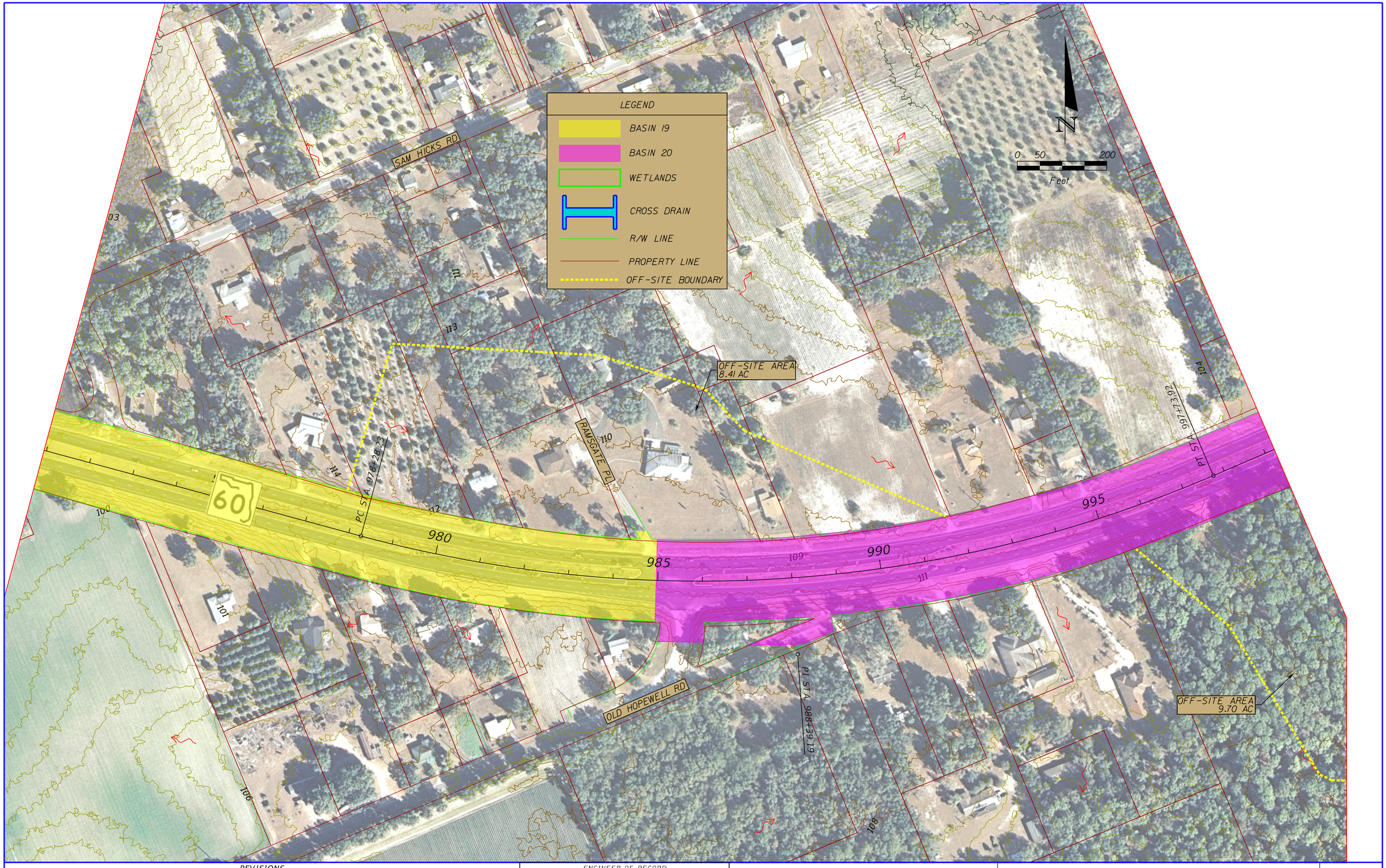

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DRAINAGE MAP

SHEET NO. 22

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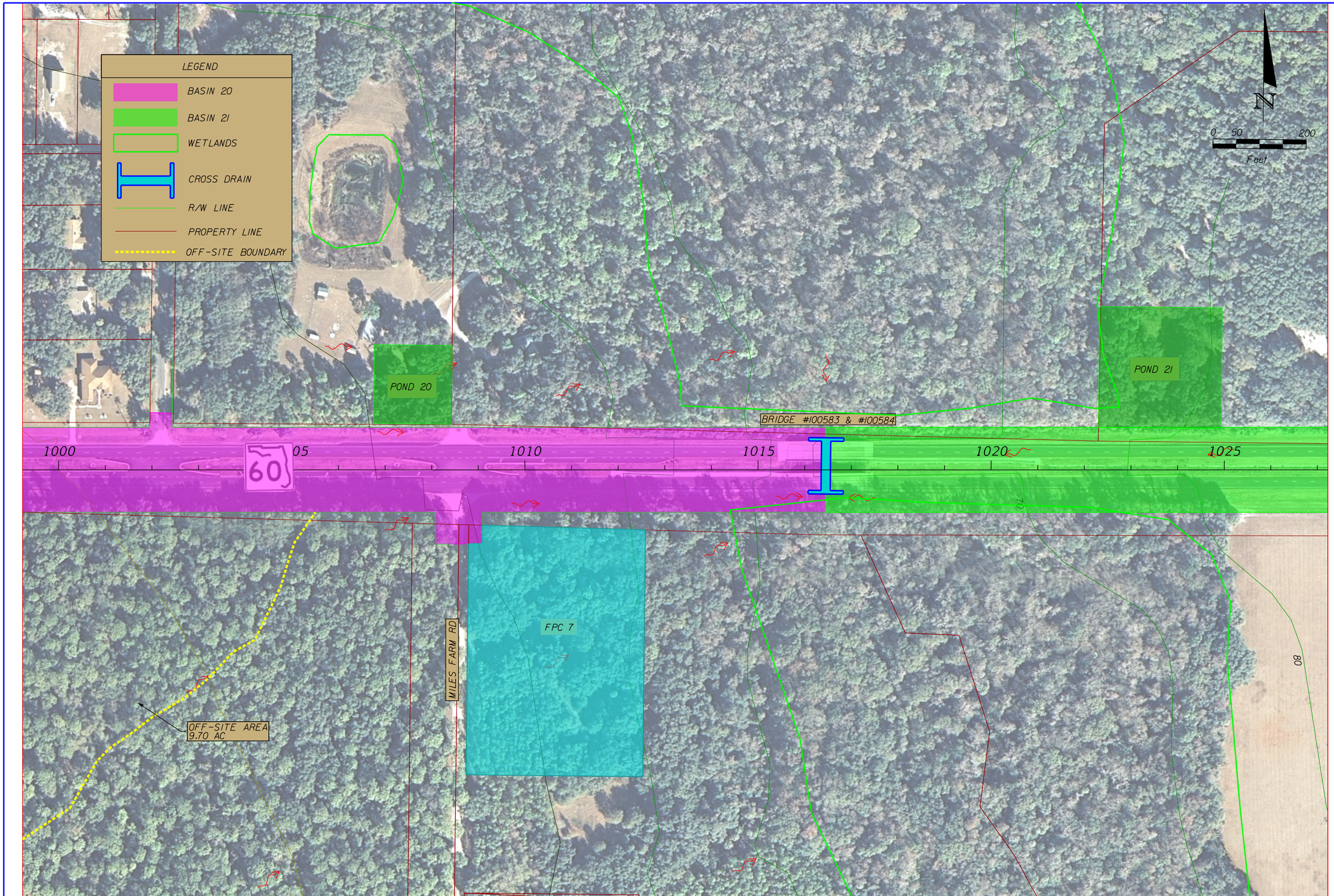

NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
Renato E. Chuw, PE
PE No. 56050
Inwood Consulting Engineers, Inc.
Certificate of Authorization No. 7074
3000 Dovera Drive, Suite 200, Oviedo, Florida 32765
P 407.971.8850

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
60	HILLSBOROUGH	430055-1-22-01

DRAINAGE MAP

SHEET NO. 23

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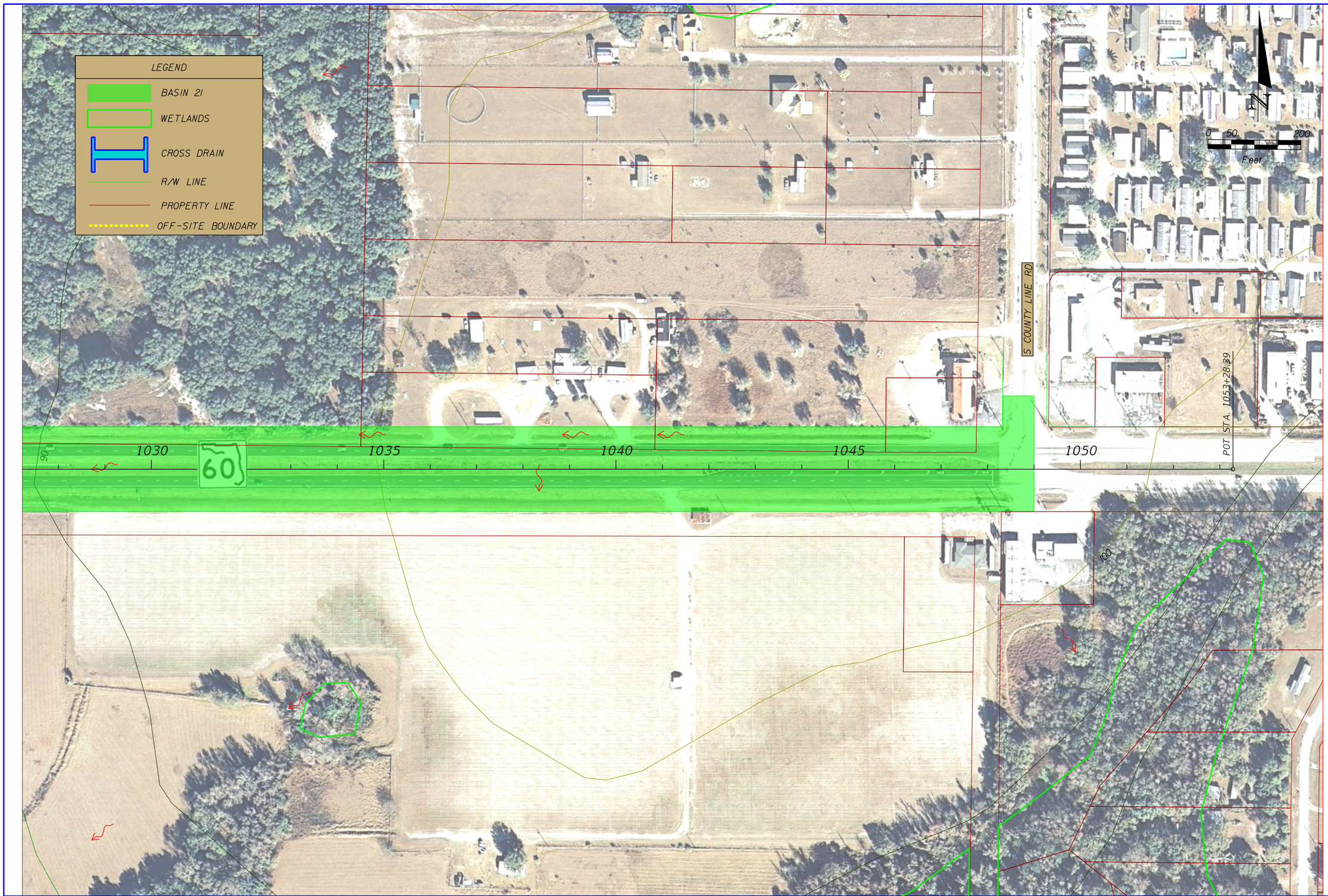

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
60	HILLSBOROUGH	430055-1-22-01

DRAINAGE MAP

SHEET NO. 24

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APPENDIX 2

STORMWATER POND DESIGN CALCULATIONS

Inwood Consulting Engineers
3000 Dovera Drive Suite 200, Oviedo, FL 32765
(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: MKI
Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **1**
POND NAME : **1**

EXISTING CONDITION

Station Limits: From: 399+00 To: 422+00 Roadway Length = 2300 ft R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
Sidewalk	5.5 ft	2	11 ft
		Total Impervious Width:	67 ft

Impervious Roadway Area: 5.76 ac
*Pervious Roadway Area: 4.02 ac
*Total Roadway Area: 9.78 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 1.02 ac

Total Area:
Impervious Area: **5.76 ac**
Pervious Area: **5.04 ac**
Total Area: **10.80 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	5.76 ac	564.5
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	4.02 ac	156.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	1.02 ac	39.8
		Total:	10.80 ac	761.0

CN = Total CN*Area / Total Area = **70.5**

Denotes Pond Area

Runoff:

	SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/240hr
Precipitation (P) =	11.50 in	8.60 in	19.50 in
Runoff (Q) =	**7.65 in**	**5.04 in**	**15.24 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **4.19 in**

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

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **1**
POND NAME : **1**

Segment **1**

Station Limits:
From: 399+00
To: 422+00
Roadway Length = 2300 ft
R/W Width = 182.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Inside Paved Shoulder	6.5	2	13.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.5	2	11.0 ft
Curb & Gutter	2.25	4	9.0 ft
Out. Bike Ln. + Shldr.	6.5	2	13.0 ft
Barrier Wall			
		Total Impervious Width:	118.0 ft

Impervious Roadway Area: 6.23 ac
**Additional Impervious Roadway Area: 1.15 ac
Pervious Roadway Area: 2.40 ac
*Total Roadway Area: 9.78 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area : 1.02 ac Dry Pond
Water Surface Area: 0.00 ac
Total Pond Area: 1.02 ac

Total Area:

Impervious Area: **7.38 ac**
Pervious Area: **3.42 ac**
Water Surface Area: **0.00 ac**
Total Area: **10.80 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	7.38 ac	723.3
Proposed Roadway Pervious	A	39	2.40 ac	93.6
Proposed Pond Pervious	A	39	1.02 ac	39.8
Proposed Ponds (Water Surface)	A	100	0.00 ac	0.0
		Total:	10.80 ac	856.6

CN = Total CN*Area / Total Area = **79.3**

Runoff:

	SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/240hr
Precipitation (P) =	11.50 in	8.60 in	19.50 in
Runoff (Q) =	**8.87 in**	**6.11 in**	**16.69 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 2.61 in

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

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Made by: MKI
Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **1**
POND NAME : **1**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Dry Retention**
Online/Offline	**Online**
Impaired Water/OFW	**No**
Open/Closed Basin	**Closed**

Dry Retention	**0.50 in**	x DCIA =	0.31 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.31 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/240hr
Q_{pre} =	6.89 ac-ft	4.54 ac-ft	13.71 ac-ft
Q_{post} =	7.98 ac-ft	5.50 ac-ft	15.02 ac-ft
ΔQ =	**1.10 ac-ft**	**0.96 ac-ft**	**1.30 ac-ft**

Attenuation V_{req} = 1.30 ac-ft

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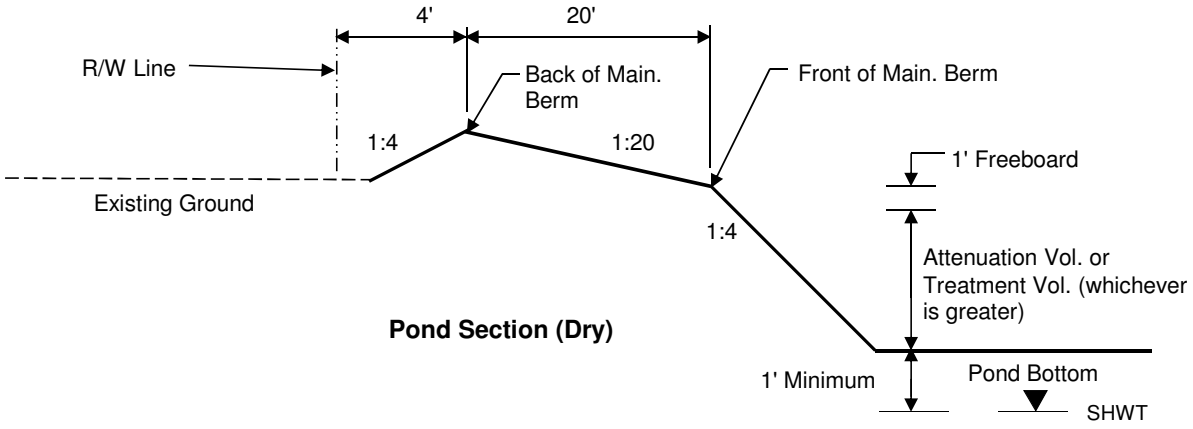
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **1**
POND NAME : **1**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	35.00
Pond Tie-In Width =	4.0 ft	@ 1:4	*ESHWT =	29.00
Maximum Storage Depth (**SD**) =	4.00 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	37.00

Hydraulic Grade Line (HGL) check

**Note: ESHWT based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	160 ft	
Estimated Energy Losses =	0.16 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	35.84 ft	



Pond Section (Dry)

Inwood Consulting Engineers
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(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: MKI
Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **1**
POND NAME : **1**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
35.00	Pond R/W	0.85 ac	200.0 ft	185.0 ft	
36.00	Back of Main. Berm	0.78 ac	192.0 ft	177.0 ft	2.42 ac-ft
35.50		0.62 ac	172.0 ft	157.0 ft	2.06 ac-ft
35.00	Front of Main. Berm	0.48 ac	152.0 ft	137.0 ft	1.79 ac-ft
34.00	Provided Attenuation Vol.	0.43 ac	144.0 ft	129.0 ft	1.34 ac-ft
33.90	Required Attenuation Vol.	0.42 ac	143.2 ft	128.2 ft	1.30 ac-ft
33.05	Estimated Storm Sewer TW	0.38 ac	136.4 ft	121.4 ft	0.96 ac-ft
31.14	Top of Treatment Vol.	0.30 ac	121.1 ft	106.1 ft	0.31 ac-ft
30.00	Pond Bottom	0.25 ac	112.0 ft	97.0 ft	0.00 ac-ft

Required Attenuation Vol. = 1.30 ac-ft
Required Attenuation Stage = 33.90 ft

Provided Attenuation Vol. = 1.34 ft
Provided Attenuation Stage = 34.00 ft

Estimated Storm Sewer Att.= 0.96 ac-ft
Estimated Storm Sewer TW EL.= 33.05 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 1.02 ac

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Made by: MKI
Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **2**
POND NAME : **2**

EXISTING CONDITION

Station Limits: From: 422+00 To: 440+90

Roadway Length = 1890 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
Sidewalk	5.5 ft	2	11 ft
		Total Impervious Width:	67 ft

Impervious Roadway Area: 4.83 ac
*Pervious Roadway Area: 3.12 ac
*Total Roadway Area: 7.95 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 0.89 ac

Total Area:
Impervious Area: **4.83 ac**
Pervious Area: **4.01 ac**
Total Area: **8.84 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	4.83 ac	473.3
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	3.12 ac	121.7
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	0.89 ac	34.8
		Total:	8.84 ac	629.8

CN = Total CN*Area / Total Area = **71.2**

Denotes Pond Area

Runoff:

	SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/240hr
Precipitation (P) =	11.50 in	8.60 in	19.50 in
Runoff (Q) =	**7.76 in**	**5.13 in**	**15.37 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **4.04 in**

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

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Made by: MKI
Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **2**
POND NAME : **2**

Segment **1**

Station Limits:
From: 422+00
To: 440+90

Roadway Length = 1890 ft
R/W Width = 182.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Inside Paved Shoulder	6.5	2	13.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.5	2	11.0 ft
Curb & Gutter	2.25	4	9.0 ft
Out. Bike Ln. + Shldr.	6.5	2	13.0 ft
Barrier Wall			
		Total Impervious Width:	118.0 ft

Impervious Roadway Area:	5.12 ac
**Additional Impervious Roadway Area:	1.04 ac
Pervious Roadway Area:	1.79 ac
*Total Roadway Area:	7.95 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area :	0.89 ac	Dry Pond
Water Surface Area:	0.00 ac	
Total Pond Area:	0.89 ac	

Total Area:

Impervious Area:	**6.16 ac**
Pervious Area:	**2.68 ac**
Water Surface Area:	**0.00 ac**
Total Area:	**8.84 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	6.16 ac	603.6
Proposed Roadway Pervious	A	39	1.79 ac	69.8
Proposed Pond Pervious	A	39	0.89 ac	34.8
		Total:	8.84 ac	708.3

CN = Total CN*Area / Total Area = **80.1**

Runoff:

	SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/240hr
Precipitation (P) =	11.50 in	8.60 in	19.50 in
Runoff (Q) =	**8.98 in**	**6.20 in**	**16.81 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 2.48 in

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

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Made by: MKI
Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **2**
POND NAME : **2**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Dry Retention**
Online/Offline	**Online**
Impaired Water/OFW	**No**
Open/Closed Basin	**Closed**

Dry Retention	**0.50 in**	x DCIA =	0.26 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.26 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/240hr
Q_{pre} =	5.72 ac-ft	3.78 ac-ft	11.33 ac-ft
Q_{post} =	6.61 ac-ft	4.57 ac-ft	12.38 ac-ft
ΔQ =	**0.90 ac-ft**	**0.79 ac-ft**	**1.06 ac-ft**

Attenuation V_{req} = 1.06 ac-ft

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Made by: MKI
Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

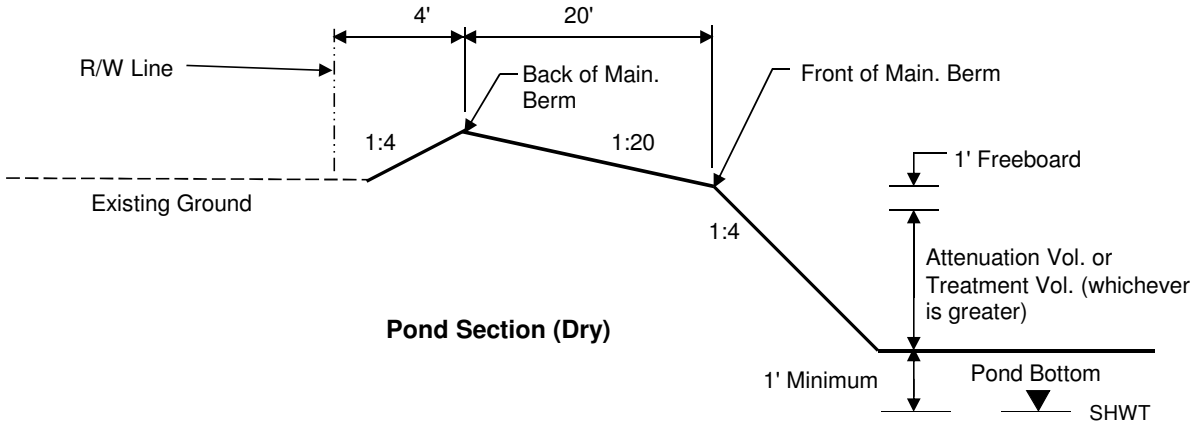
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **2**
POND NAME : **2**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	36.00
Pond Tie-In Width =	4.0 ft	@ 1:4	*ESHWT =	30.00
Maximum Storage Depth (**SD**) =	4.00 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	37.00

Hydraulic Grade Line (HGL) check

**Note: ESHWT based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	200 ft	
Estimated Energy Losses =	0.20 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	35.80 ft	



Pond Section (Dry)

Inwood Consulting Engineers
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(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: MKI
Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **2**
POND NAME : **2**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
36.00	Pond R/W	0.74 ac	180.0 ft	180.0 ft	
37.00	Back of Main. Berm	0.68 ac	172.0 ft	172.0 ft	1.99 ac-ft
36.50		0.53 ac	152.0 ft	152.0 ft	1.69 ac-ft
36.00	Front of Main. Berm	0.40 ac	132.0 ft	132.0 ft	1.46 ac-ft
35.00	Provided Attenuation Vol.	0.35 ac	124.0 ft	124.0 ft	1.08 ac-ft
34.95	Required Attenuation Vol.	0.35 ac	123.6 ft	123.6 ft	1.06 ac-ft
34.14	Estimated Storm Sewer TW	0.31 ac	117.1 ft	117.1 ft	0.79 ac-ft
32.20	Top of Treatment Vol.	0.24 ac	101.6 ft	101.6 ft	0.26 ac-ft
31.00	Pond Bottom	0.19 ac	92.0 ft	92.0 ft	0.00 ac-ft

Required Attenuation Vol. = 1.06 ac-ft
Required Attenuation Stage = 34.95 ft

Provided Attenuation Vol. = 1.08 ft
Provided Attenuation Stage = 35.00 ft

Estimated Storm Sewer Att.= 0.79 ac-ft
Estimated Storm Sewer TW EL.= 34.14 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 0.89 ac

Inwood Consulting Engineers
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Made by: MKI
Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **3**
POND NAME : **3**

EXISTING CONDITION

Station Limits: From: 440+90 To: 455+00 Roadway Length = 1410 ft R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
Sidewalk	5.5 ft	2	11 ft
		Total Impervious Width:	67 ft

Station Limits: From: 455+00 To: 501+14 Roadway Length = 4614 ft R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
		Total Impervious Width:	56 ft

Impervious Roadway Area: 13.76 ac
*Pervious Roadway Area: 11.84 ac
*Total Roadway Area: 25.60 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 1.93 ac

Total Area:
Impervious Area: **13.76 ac**
Pervious Area: **13.77 ac**
Total Area: **27.53 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	13.76 ac	1348.5
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	11.84 ac	461.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	1.93 ac	75.4
		Total:	27.53 ac	1885.7

CN = Total CN*Area / Total Area = **68.5**

Denotes Pond Area

Runoff:

		SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/240hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **4.60 in**	Precipitation (P) =	11.50 in	8.60 in	19.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	Runoff (Q) =	**7.37 in**	**4.80 in**	**14.89 in**

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Made by: MKI
Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **3**
POND NAME : **3**

Segment **1**

Station Limits: From: 440+90 To: 501+14

Roadway Length = 6024 ft
R/W Width = 182.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Inside Paved Shoulder	6.5	2	13.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.5	2	11.0 ft
Curb & Gutter	2.25	4	9.0 ft
Out. Bike Ln. + Shldr.	6.5	2	13.0 ft
Barrier Wall			
		Total Impervious Width:	118.0 ft

Impervious Roadway Area: 16.32 ac
**Additional Impervious Roadway Area: 2.02 ac
Pervious Roadway Area: 7.26 ac
*Total Roadway Area: 25.60 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area : 1.93 ac Dry Pond
Water Surface Area: 0.00 ac
Total Pond Area: 1.93 ac

Total Area:

Impervious Area: **18.34 ac**
Pervious Area: **9.19 ac**
Water Surface Area: **0.00 ac**
Total Area: **27.53 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	18.34 ac	1797.3
Proposed Roadway Pervious	A	39	7.26 ac	283.2
Proposed Pond Pervious	A	39	1.93 ac	75.4
		Total:	27.53 ac	2155.9

CN = Total CN*Area / Total Area = **78.3**

Runoff:

	SWFWMD (100yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/240hr
Precipitation (P) =	11.50 in	8.60 in	19.50 in
Runoff (Q) =	**8.73 in**	**5.98 in**	**16.53 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 2.77 in

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

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DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **3**
POND NAME : **3**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Dry Retention**
Online/Offline	**Online**
Impaired Water/OFW	**No**
Open/Closed Basin	**Closed**

Dry Retention	**0.50 in**	x DCIA =	0.76 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.76 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (100yr/24hr)	**Storm Sewer (10yr/24hr)**	**FDOT 100yr/240hr**
Q_{pre} =	16.92 ac-ft	11.02 ac-ft	34.17 ac-ft
Q_{post} =	20.04 ac-ft	13.73 ac-ft	37.92 ac-ft
ΔQ =	**3.12 ac-ft**	**2.71 ac-ft**	**3.75 ac-ft**

Attenuation V_{req} = 3.75 ac-ft

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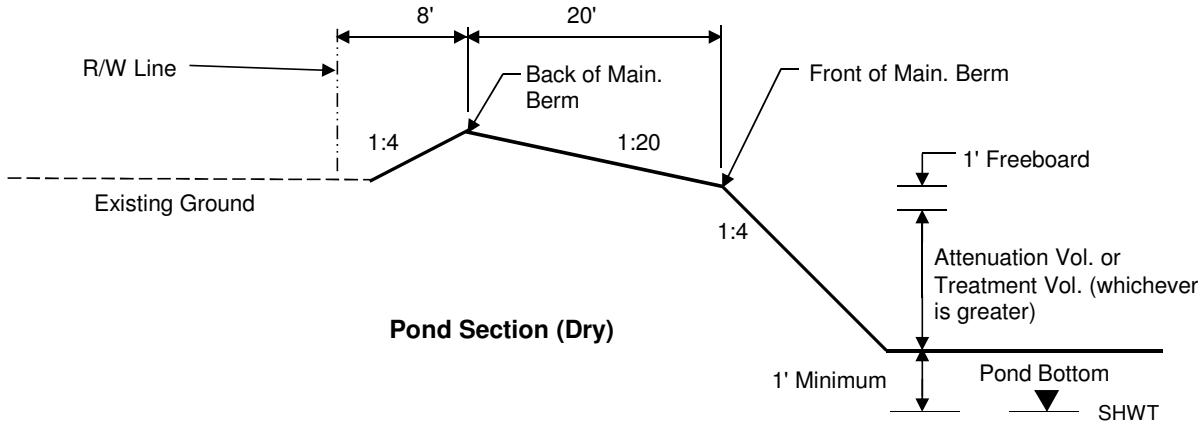
BASIN NAME : **3**
POND NAME : **3**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	36.00
Pond Tie-In Width =	8.0 ft	@ 1:4	*ESHWT =	30.00
Maximum Storage Depth (**SD**) =	5.00 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	40.00

Hydraulic Grade Line (HGL) check

**Note: ESHWT based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	80 ft	
Estimated Energy Losses =	0.08 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	38.92 ft	



Pond Section (Dry)

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **3**
POND NAME : **3**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
36.00	Pond R/W	1.61 ac	270.0 ft	260.0 ft	
38.00	Back of Main. Berm	1.42 ac	254.0 ft	244.0 ft	5.95 ac-ft
37.50		1.20 ac	234.0 ft	224.0 ft	5.29 ac-ft
37.00	Front of Main. Berm	1.00 ac	214.0 ft	204.0 ft	4.74 ac-ft
36.00	Provided Attenuation Vol.	0.93 ac	206.0 ft	196.0 ft	3.78 ac-ft
35.97	Required Attenuation Vol.	0.92 ac	205.8 ft	195.8 ft	3.75 ac-ft
34.79	Estimated Storm Sewer TW	0.84 ac	196.3 ft	186.3 ft	2.71 ac-ft
32.20	Top of Treatment Vol.	0.67 ac	175.6 ft	165.6 ft	0.76 ac-ft
31.00	Pond Bottom	0.59 ac	166.0 ft	156.0 ft	0.00 ac-ft

Required Attenuation Vol. = 3.75 ac-ft
Required Attenuation Stage = 35.97 ft

Provided Attenuation Vol. = 3.78 ft
Provided Attenuation Stage = 36.00 ft

Estimated Storm Sewer Att.= 2.71 ac-ft
Estimated Storm Sewer TW EL.= 34.79 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 1.93 ac

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **4**
POND NAME : **4**

EXISTING CONDITION

Station Limits: From: 501+14 To: 550+00 Roadway Length = 4886 ft R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
		Total Impervious Width:	56 ft

Impervious Roadway Area: 8.94 ac
*Pervious Roadway Area: 11.33 ac
*Total Roadway Area: 20.27 ac

**Note: Measured in MicroStation.*

Station Limits: From: 550+00 To: 559+13 Roadway Length = 913 ft R/W Width = 155.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	4	16 ft
		Total Impervious Width:	64 ft

Impervious Roadway Area: 1.29 ac
*Pervious Roadway Area: 2.07 ac
*Total Roadway Area: 3.36 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 2.37 ac

Total Area:
Impervious Area: **10.23 ac**
Pervious Area: **15.77 ac**
Total Area: **26.00 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	10.23 ac	1002.5
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	13.40 ac	522.6
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	2.37 ac	92.5
		Total:	26.00 ac	1617.7

CN = Total CN*Area / Total Area = **62.2**

Denotes Pond Area

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) =	**4.37 in**	**4.05 in**	**9.12 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **6.07 in**

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

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **4**
POND NAME : **4**

PROPOSED CONDITION

Segment 1

Station Limits: From: 501+14 To: 506+17
Roadway Length = 503 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Inside Paved Shoulder	6.5	2	13.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.5	2	11.0 ft
Curb & Gutter	2.25	4	9.0 ft
Out. Bike Ln. + Shldr.	6.5	2	13.0 ft
Barrier Wall			
		Total Impervious Width:	118.0 ft

Impervious Roadway Area: 1.36 ac
**Additional Impervious Roadway Area: 0.24 ac
Pervious Roadway Area: 0.53 ac
*Total Roadway Area: 2.14 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Segment 2A

Station Limits: From: 506+17 To: 538+90
Roadway Length = 3273 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Inside Paved Shoulder	6.5	2	13.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.5	2	11.0 ft
Curb & Gutter	2.25	4	9.0 ft
Out. Bike Ln. + Shldr.	6.5	2	13.0 ft
Barrier Wall			
		Total Impervious Width:	118.0 ft

Impervious Roadway Area: 8.87 ac
**Additional Impervious Roadway Area: 0.58 ac
Pervious Roadway Area: 4.28 ac
*Total Roadway Area: 13.73 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Segment 2B

Station Limits: From: 538+90 To: 559+13
Roadway Length = 2023 ft
R/W Width = 155.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Inside Paved Shoulder	6.5	2	13.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	6.0	2	12.0 ft
Curb & Gutter	2.25	4	9.0 ft
Out. Bike Ln. + Shldr.	6.5	2	13.0 ft
Barrier Wall			
		Total Impervious Width:	119.0 ft

Impervious Roadway Area: 5.53 ac
**Additional Impervious Roadway Area: 0.07 ac
Pervious Roadway Area: 2.16 ac
*Total Roadway Area: 7.76 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **4**
POND NAME : **4**

Pond Area:

Pervious Pond Area :	2.37 ac	Dry Pond
Water Surface Area:	0.00 ac	
Total Pond Area:	2.37 ac	

Total Area:

Impervious Area:	**16.65 ac**
Pervious Area:	**9.35 ac**
Water Surface Area:	**0.00 ac**
Total Area:	**26.00 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	16.65 ac	1631.7
Proposed Roadway Pervious	A	39	6.98 ac	272.2
Proposed Pond Pervious	A	39	2.37 ac	92.5
Proposed Ponds (Water Surface)	A	100	0.00 ac	0.0
		Total:	26.00 ac	1996.4

CN = Total CN*Area / Total Area = **76.8**

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 3.02 in	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	Runoff (Q) =	**6.17 in**	**5.80 in**	**11.41 in**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Dry Retention**
Online/Offline	**Online**
Impaired Water/OFW	**Yes**
Open/Closed Basin	**Open**

Dry Retention	**0.50 in**	x DCIA = 0.69 ac-ft

(Directly Connected Impervious Area)

Treatment V_{req} = Largest of Trt. Vol. = 0.69 ac-ft

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BASIN NAME : **4**
POND NAME : **4**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	9.48 ac-ft	8.78 ac-ft	19.76 ac-ft
Q_{post} =	13.37 ac-ft	12.57 ac-ft	24.73 ac-ft
ΔQ =	**3.90 ac-ft**	**3.79 ac-ft**	**4.97 ac-ft**

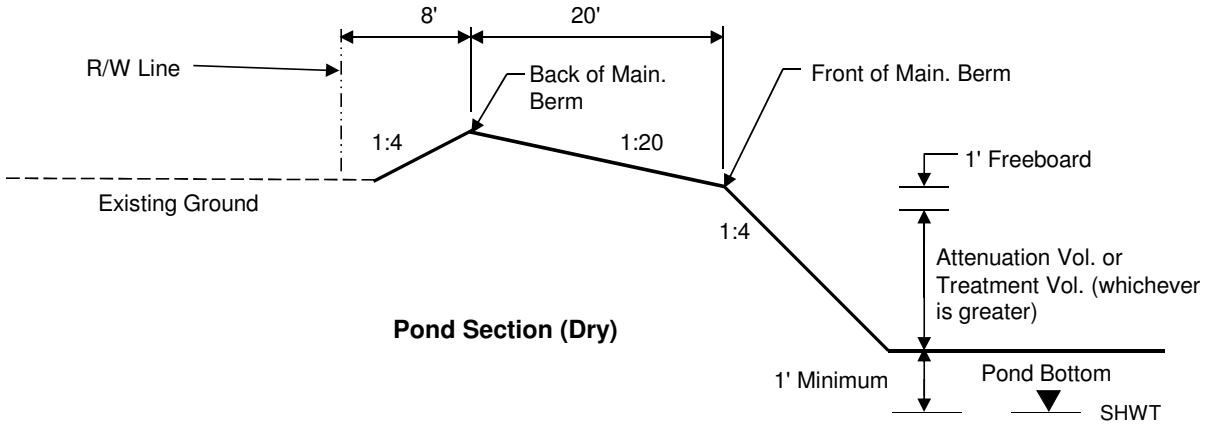
Attenuation V_{req} = 4.97 ac-ft

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	60.00
Pond Tie-In Width =	8.0 ft	@ 1:4	*ESHWT =	54.00
Maximum Storage Depth (**SD**) =	5.00 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	60.00

Hydraulic Grade Line (HGL) check

**Note: ESHWT based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	80 ft	
Estimated Energy Losses =	0.08 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	58.92 ft	



Pond Section (Dry)

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **4**
POND NAME : **4**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
60.00	Pond R/W	1.98 ac	295.0 ft	292.0 ft	
62.00	Back of Main. Berm	1.77 ac	279.0 ft	276.0 ft	7.84 ac-ft
61.50		1.52 ac	259.0 ft	256.0 ft	7.02 ac-ft
61.00	Front of Main. Berm	1.29 ac	239.0 ft	236.0 ft	6.31 ac-ft
60.00	Provided Attenuation Vol.	1.21 ac	231.0 ft	228.0 ft	5.06 ac-ft
59.92	Required Attenuation Vol.	1.20 ac	230.4 ft	227.4 ft	4.96 ac-ft
58.90	Estimated Storm Sewer TW	1.12 ac	222.2 ft	219.2 ft	3.78 ac-ft
55.81	Top of Treatment Vol.	0.88 ac	197.5 ft	194.5 ft	0.69 ac-ft
55.00	Pond Bottom	0.82 ac	191.0 ft	188.0 ft	0.00 ac-ft

Required Attenuation Vol. = 4.97 ac-ft
Required Attenuation Stage = 59.92 ft

Provided Attenuation Vol. = 5.06 ft
Provided Attenuation Stage = 60.00 ft

Estimated Storm Sewer Att.= 3.79 ac-ft
Estimated Storm Sewer TW EL.= 58.90 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 2.37 ac

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN: **4**
POND: **4**

EXISTING AND PROPOSED CONDITIONS POLLUTANT LOADING CALCULATIONS

The following Pollutant Loading equations are referenced from the March 2010 draft of the Stormwater Quality Applicant's Handbook by FDEP.

Annual Rainfall : **50.50** in/yr

Meteorlogical Zone : **4**

Description	Area (ac)	
	Pre-Dev	*Post-Dev
Pervious Roadway Area	15.77	6.98
Proposed Pervious Pond Area	0	2.37
Proposed Pond Water Area	0	0.00
DCIA	10.23	16.65
Total Offsite Area	0.00	0.00
Total Roadway Area Within R/W:	26.00	23.63
Impervious DCIA %	39.34	70.46
Total Basin Area:	26.00	26.00

*Note: DCIA area (Post-Dev) excludes the 5-foot sidewalk and 12-foot shared use path for Pollutant Loading Analysis

1 Annual Runoff (AR) = P/12 (in/ft)xComposite CxA
2 Pollutant Loading (TP) = AR x 43560 (ft2/ac) x 7.48 (gal/ft3) x 3.785 (L/gal) x EMC(TP) (mg/L) x 1 (kg/10^6 mg)
3 Permanent Pool: Proposed permanent pool volume were determined using the permanent pool calculations speadsheets
See Permanent Pool Volume Calculations for proposed pond PPV details
4 Resident Time = PPV/AR x 365 (days/yr)
5 Mean Pond Conc = Pollutant Loading x 1yr/(Pond Volume + Annual Runoff) x 1 ac/43560 ft^2 x 1ft^3/7.48 gal x 1 gal/L x 10^6mg/kg x 1000ug/mg.
6 Mean Chlorophyll Conc: ln(chyl-a) = 1.058 ln(TP)-0.934.
7 Mean Secchi Disk Depth: SD = (24.2386+(0.3041)(chyl-a))/(6.0632 + chyl-a).
8 Anoxic Depth: Depth of DO < 1 = 3.305(SD) = 0.02164(chyl-a) -0.004979(TP). Anoxic Depth is the maximum depth of PPV that can be counted for water quality.
9 Required Reduction = (1-(PreDev Loading [kg/yr]/PostDev Loading [kg/yr)) x 100
10 Removal Efficiency: TP (% Removal) = 44.53 + 6.145 x $ln(t_d)$ + 0.145 x $(ln(t_d))^2$
TN (% Removal) = (43.75 x t_d)/(4.38 + t_d)
11 Event Mean Concentration values are referenced from Table 3.4 of the March 2010 draft ERP Stormwater Quality Applicant's Handbook by FDEP.
12 Roadway Event Mean Concentration values are referenced from the July 2011 Nutrient Loading Calculations Consultants Memo.

PRE-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W (Agriculture - Pasture)	26.00	39.34	39	0.32	35.02	2.48	107.10	0.70	30.23
Total:	**26.00**				**35.02**		**107.10**		**30.23**

POST-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	26.00	70.46	39.00	0.63	68.94	1.37	116.48	0.17	14.45
Pond Water Surface	0.00	0	100	1.00	0.00	0.00	0.00	0.00	0.00
Total:	**26.00**				**68.94**		**116.48**		**14.45**

* Determined from the Mean annual Runoff Coefficients (C Values) as a Function of DCIA Percentage and Non-DCIA Curve Number Table

TREATMENT REQUIRED

Condition	Annual Runoff[1] (ac-ft/yr)	Pollutant Loading[2] (Kg/Yr)		Required Removal Efficiency (%)	
		TN	TP	TN	TP
Pre-Development	35.02	107.10	30.23	8.05	-109.15
Post-Development	68.94	116.48	14.45		

DRY TREATMENT PROVIDED

Pond ID	Retention Depth (in)	Area (ac)	Retention Volume (ac-ft)	Removal Efficiency (%)	Post Development Pollutant Loading	
					TN	TP
Pond 4	0.318	26.00	0.690	43.836	**65.42**	**8.12**

FINAL LOADINGS		
Condition	Pollutant Loading[2]	
	TN	TP
Pre-Development	107.10	30.23
Post-Development	65.42	8.12

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **5**
POND NAME : **5**

EXISTING CONDITION

Station Limits: From: 559+13 To: 585+00 Roadway Length = 2587 ft R/W Width = 135.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
		Total Impervious Width:	56 ft

Impervious Roadway Area: 3.25 ac
*Pervious Roadway Area: 5.20 ac
*Total Roadway Area: 8.45 ac

**Note: Measured in MicroStation.*

Station Limits: From: 585+00 To: 589+12 Roadway Length = 412 ft R/W Width = 200.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	4	16 ft
		Total Impervious Width:	64 ft

Impervious Roadway Area: 1.02 ac
*Pervious Roadway Area: 0.82 ac
*Total Roadway Area: 1.84 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 1.93 ac

Total Area:
Impervious Area: **4.27 ac**
Pervious Area: **7.95 ac**
Total Area: **12.22 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	4.27 ac	418.5
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	6.02 ac	234.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	1.93 ac	75.2
			Total:	12.22 ac	728.4

CN = Total CN*Area / Total Area = **59.6**

Denotes Pond Area

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **6.77 in**			
Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$			
Runoff (Q) =	**4.05 in**	**3.74 in**	**8.68 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **5**
POND NAME : **5**

PROPOSED CONDITION

Segment **2B**

Station Limits: From: 559+13 To: 585+00
Roadway Length = 2587 ft
R/W Width = 135.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Inside Paved Shoulder	6.5	2	13.0 ft
*Imperv. Median			
Ramp			
Sidewalk or Trail	6.0	2	12.0 ft
Curb & Gutter	2.25	4	9.0 ft
Out. Bike Ln. + Shldr.	6.5	2	13.0 ft
Barrier Wall			
		Total Impervious Width:	119.0 ft

Impervious Roadway Area:	7.07 ac
**Additional Impervious Roadway Area:	0.31 ac
Pervious Roadway Area:	1.07 ac
*Total Roadway Area:	8.45 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Segment **2B**

Station Limits: From: 585+00 To: 589+12
Roadway Length = 412 ft
R/W Width = 200.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Inside Paved Shoulder	6.5	2	13.0 ft
*Imperv. Median			
Ramp			
Sidewalk or Trail	6.0	2	12.0 ft
Curb & Gutter	2.25	4	9.0 ft
Out. Bike Ln. + Shldr.	6.5	2	13.0 ft
Barrier Wall			
		Total Impervious Width:	119.0 ft

Impervious Roadway Area:	1.13 ac
*Additional Impervious Roadway Area:	0.00 ac
Pervious Roadway Area:	0.71 ac
*Total Roadway Area:	1.84 ac

Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area :	1.93 ac	Dry Pond
Water Surface Area:	0.00 ac	
Total Pond Area:	1.93 ac	

Total Area:

Impervious Area:	**8.50 ac**
Pervious Area:	**3.72 ac**
Water Surface Area:	**0.00 ac**
Total Area:	**12.22 ac**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **5**
POND NAME : **5**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	8.50 ac	833.3
Proposed Roadway Pervious	A	39	1.79 ac	69.7
Proposed Pond Pervious	A	39	1.93 ac	75.2
Proposed Ponds (Water Surface)	A	100	0.00 ac	0.0
		Total:	12.22 ac	978.2

CN = Total CN*Area / Total Area = **80.1**

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ =	2.49 in	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) =	**6.58 in**	**6.20 in**	**11.89 in**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Dry Retention**
Online/Offline	**Online**
Impaired Water/OFW	**Yes**
Open/Closed Basin	**Open**

Dry Retention	**0.50 in**	x DCIA =	0.35 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = 0.35 ac-ft

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	4.13 ac-ft	3.81 ac-ft	8.83 ac-ft
Q_{post} =	6.69 ac-ft	6.31 ac-ft	12.10 ac-ft
ΔQ =	**2.57 ac-ft**	**2.50 ac-ft**	**3.27 ac-ft**

Attenuation V_{req} = 3.27 ac-ft

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Job Number: RKK-002-01

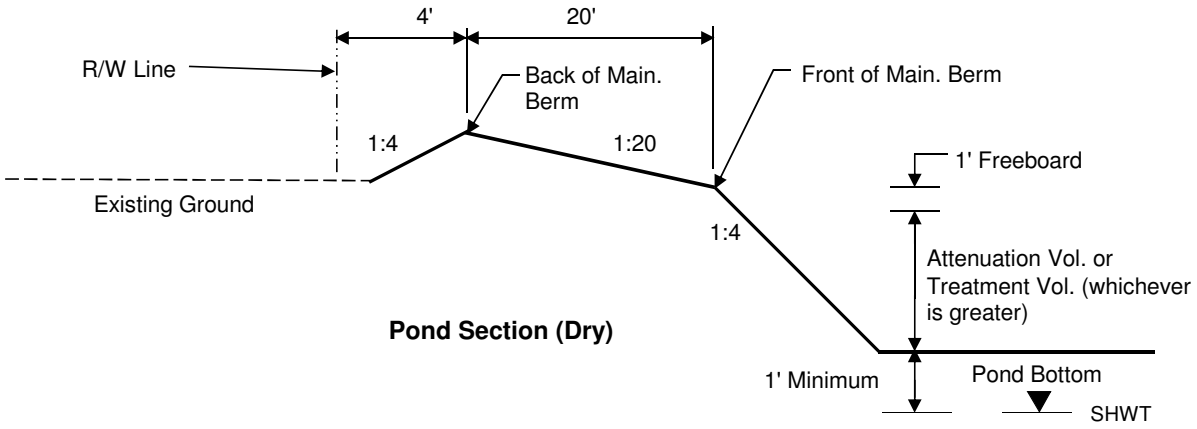
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **5**
POND NAME : **5**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	55.00
Pond Tie-In Width =	4.0 ft	@ 1:4	*ESHWT =	49.00
Maximum Storage Depth (**SD**) =	4.00 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	58.00

Hydraulic Grade Line (HGL) check

**Note: ESHWT based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	80 ft	
Estimated Energy Losses =	0.08 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	56.92 ft	



Pond Section (Dry)

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
55.00	Pond R/W	1.61 ac	280.0 ft	250.0 ft	
56.00	Back of Main. Berm	1.51 ac	272.0 ft	242.0 ft	5.74 ac-ft
55.50		1.28 ac	252.0 ft	222.0 ft	5.04 ac-ft
55.00	Front of Main. Berm	1.08 ac	232.0 ft	202.0 ft	4.45 ac-ft
54.00	Provided Attenuation Vol.	1.00 ac	224.0 ft	194.0 ft	3.41 ac-ft
53.86	Required Attenuation Vol.	0.99 ac	222.9 ft	192.9 ft	3.27 ac-ft
53.05	Estimated Storm Sewer TW	0.93 ac	216.4 ft	186.4 ft	2.50 ac-ft
50.48	Top of Treatment Vol.	0.75 ac	195.8 ft	165.8 ft	0.35 ac-ft
50.00	Pond Bottom	0.71 ac	192.0 ft	162.0 ft	0.00 ac-ft

Required Attenuation Vol. = 3.27 ac-ft
Required Attenuation Stage = 53.86 ft

Provided Attenuation Vol. = 3.41 ft
Provided Attenuation Stage = 54.00 ft

Estimated Storm Sewer Att.= 2.50 ac-ft
Estimated Storm Sewer TW EL.= 53.05 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 1.93 ac

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN: **5**
POND: **5**

EXISTING AND PROPOSED CONDITIONS POLLUTANT LOADING CALCULATIONS

The following Pollutant Loading equations are referenced from the March 2010 draft of the Stormwater Quality Applicant's Handbook by FDEP.

Annual Rainfall : **50.50** in/yr **Meteorlogical Zone :** **4**

Description	Area (ac)	
	Pre-Dev	*Post-Dev
Pervious Roadway Area	7.95	1.79
Proposed Pervious Pond Area	0	1.93
Proposed Pond Water Area	0	0.00
DCIA	4.27	8.50
Total Offsite Area	0.00	0.00
Total Roadway Area Within R/W:	12.22	10.29
Impervious DCIA %:	34.95	82.63
Total Basin Area:	12.22	12.22

*Note: DCIA area (Post-Dev) excludes the 5-foot sidewalk and 12-foot shared use path for Pollutant Loading Analysis

1 Annual Runoff (AR) = P/12 (in/ft)xComposite CxA
2 Pollutant Loading (TP) = AR x 43560 (ft2/ac) x 7.48 (gal/ft3) x 3.785 (L/gal) x EMC(TP) (mg/L) x 1 ($kg/10^6$ mg)
3 Permanent Pool: Proposed permanent pool volume were determined using the permanent pool calculations speadsheets
See Permanent Pool Volume Calculations for proposed pond PPV details
4 Resident Time = PPV/AR x 365 (days/yr)
5 Mean Pond Conc = Pollutant Loading x 1yr/(Pond Volume + Annual Runoff) x 1 ac/43560 ft^2 x 1ft^3/7.48 gal x 1 gal/L x 10^6mg/kg x 1000ug/mg.
6 Mean Chlorophyll Conc: ln(chyl-a) = 1.058 ln(TP)-0.934.
7 Mean Secchi Disk Depth: SD = (24.2386+(0.3041)(chyl-a))/(6.0632 + chyl-a).
8 Anoxic Depth: Depth of DO < 1 = 3.305(SD) = 0.02164(chyl-a) -0.004979(TP). Anoxic Depth is the maximum depth of PPV that can be counted for water quality.
9 Required Reduction = (1-(PreDev Loading [kg/yr]/PostDev Loading [kg/yr)) x 100
10 Removal Efficiency: TP (% Removal) = $44.53 + 6.145 \times ln(t_d) + 0.145 \times (ln(t_d))^2$
TN (% Removal) = $(43.75 \times t_d)/(4.38 + t_d)$
11 Event Mean Concentration values are referenced from Table 3.4 of the March 2010 draft ERP Stormwater Quality Applicant's Handbook by FDEP.
12 Roadway Event Mean Concentration values are referenced from the July 2011 Nutrient Loading Calculations Consultants Memo.

PRE-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W (Agriculture - Pasture)	12.22	34.95	39	0.30	15.43	2.48	47.18	0.70	13.32
Total:	**12.22**				**15.43**		**47.18**		**13.32**

POST-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	12.22	82.63	39.00	0.67	34.45	1.37	58.21	0.17	7.22
Pond Water Surface	0.00	0	100	1.00	0.00	0.00	0.00	0.00	0.00
Total:	**12.22**				**34.45**		**58.21**		**7.22**

* Determined from the Mean annual Runoff Coefficients (C Values) as a Function of DCIA Percentage and Non-DCIA Curve Number Table

TREATMENT REQUIRED

Condition	Annual Runoff[1] (ac-ft/yr)	Pollutant Loading[2] (Kg/Yr)		Required Removal Efficiency (%)	
		TN	TP	TN	TP
Pre-Development	15.43	47.18	13.32	18.95	-84.37
Post-Development	34.45	58.21	7.22		

DRY TREATMENT PROVIDED

Pond ID	Retention Depth (in)	Area (ac)	Retention Volume (ac-ft)	Removal Efficiency (%)	Post Development Pollutant Loading (Kg/Yr)	
					TN	TP
Pond 5	0.344	12.22	0.350	46.200	**31.32**	**3.89**

FINAL LOADINGS		
Condition	Pollutant Loading[2] (Kg/Yr)	
	TN	TP
Pre-Development	47.18	13.32
Post-Development	31.32	3.89

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DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **6**
POND NAME : **6**

EXISTING CONDITION

Station Limits: From: 589+12 To: 592+94 Roadway Length = 382 ft R/W Width = 200.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	4	16 ft
		Total Impervious Width:	64 ft

Impervious Roadway Area: 0.57 ac
*Pervious Roadway Area: 1.16 ac
*Total Roadway Area: 1.73 ac

**Note: Measured in MicroStation.*

Station Limits: From: 592+94 To: 609+23 Roadway Length = 1628 ft R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
		Total Impervious Width:	56 ft

Impervious Roadway Area: 2.75 ac
*Pervious Roadway Area: 4.08 ac
*Total Roadway Area: 6.83 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 2.40 ac

Total Area:
Impervious Area: **3.32 ac**
Pervious Area: **7.63 ac**
Total Area: **10.96 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	3.32 ac	325.7
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	5.24 ac	418.9
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	2.40 ac	191.8
			Total:	10.96 ac	936.4

CN = Total CN*Area / Total Area = **85.5**

Denotes Pond Area

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = 1000/CN - 10 = **1.70 in**	Precipitation (P) = 9.00 in	8.60 in	14.50 in
Runoff (Q) = $(P - 0.2S)^2 / (P + 0.8S)$	Runoff (Q) = **7.24 in**	**6.85 in**	**12.64 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **6**
POND NAME : **6**

PROPOSED CONDITION

Segment 2B

Station Limits: From: 589+12 To: 592+94
Roadway Length = 382 ft
R/W Width = 200.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Inside Paved Shoulder	6.5	2	13.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	6.0	2	12.0 ft
Curb & Gutter	2.25	4	9.0 ft
Out. Bike Ln. + Shldr.	6.5	2	13.0 ft
Barrier Wall			
		Total Impervious Width:	119.0 ft

Impervious Roadway Area: 1.04 ac
**Additional Impervious Roadway Area: 0.00 ac
Pervious Roadway Area: 0.69 ac
*Total Roadway Area: 1.73 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Segment 2B

Station Limits: From: 592+94 To: 600+00
Roadway Length = 706 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Inside Paved Shoulder	6.5	2	13.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	6.0	2	12.0 ft
Curb & Gutter	2.25	4	9.0 ft
Out. Bike Ln. + Shldr.	6.5	2	13.0 ft
Barrier Wall			
		Total Impervious Width:	119.0 ft

Impervious Roadway Area: 1.93 ac
**Additional Impervious Roadway Area: 0.03 ac
Pervious Roadway Area: 1.01 ac
*Total Roadway Area: 2.97 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Segment 2C

Station Limits: From: 600+00 To: 609+23
Roadway Length = 923 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Inside Paved Shoulder	6.5	2	13.0 ft
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter	2.50	2	5.0 ft
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	110.0 ft

Impervious Roadway Area: 2.33 ac
**Additional Impervious Roadway Area: 0.24 ac
Pervious Roadway Area: 1.29 ac
*Total Roadway Area: 3.86 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **6**
POND NAME : **6**

Pond Area:

Pervious Pond Area :	1.26 ac	
Water Surface Area:	1.14 ac	Wet Pond
Total Pond Area:	2.40 ac	

Total Area:

Impervious Area:	**5.58 ac**
Pervious Area:	**4.24 ac**
Water Surface Area:	**1.14 ac**
Total Area:	**10.96 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	5.58 ac	546.4
Proposed Roadway Pervious	D	80	2.98 ac	238.7
Proposed Pond Pervious	D	80	1.26 ac	100.5
Proposed Ponds (Water Surface)	D	100	1.14 ac	114.2
		Total:	10.96 ac	999.8

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

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 0.96 in	Precipitation (P) = 9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	Runoff (Q) = **7.94 in**	**7.55 in**	**13.41 in**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
Impaired Water/OFW	**Yes**
Open/Closed Basin	**Open**

Wet Detention	**1.00 in**	x DCIA = 0.46 ac-ft (Directly Connected Impervious Area)

Treatment V_{req} = Largest of Trt. Vol. = 0.46 ac-ft

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	6.61 ac-ft	6.25 ac-ft	11.54 ac-ft
Q_{post} =	7.25 ac-ft	6.89 ac-ft	12.24 ac-ft
ΔQ =	**0.64 ac-ft**	**0.64 ac-ft**	**0.70 ac-ft**

Attenuation V_{req} = 0.70 ac-ft

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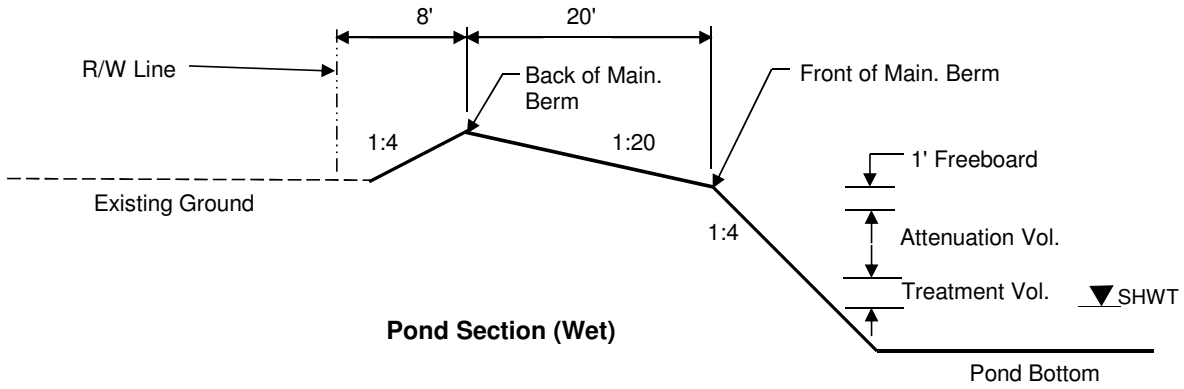
BASIN NAME : **6**
POND NAME : **6**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	56.00
Pond Tie-In Width =	8.0 ft	@ 1:4	*Normal Water Elevation =	55.00
Maximum Storage Depth (**SD**) =	1.00 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	57.00

Hydraulic Grade Line (HGL) check

**Note: NWL based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	30 ft	
Estimated Energy Losses =	0.03 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	55.97 ft	



Pond Section (Wet)

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
56.00	Pond R/W	2.00 ac	295.0 ft	295.0 ft	
58.00	Back of Main. Berm	1.79 ac	279.0 ft	279.0 ft	4.00 ac-ft
57.50		1.54 ac	259.0 ft	259.0 ft	3.16 ac-ft
57.00	Front of Main. Berm	1.31 ac	239.0 ft	239.0 ft	2.45 ac-ft
56.00	Provided Treat.Vol.+Att.Vol	1.23 ac	231.0 ft	231.0 ft	1.18 ac-ft
55.99	Req'd Treat.Vol+Att. Vol	1.22 ac	230.9 ft	230.9 ft	1.17 ac-ft
55.93	Estimated Storm Sewer TW	1.22 ac	230.4 ft	230.4 ft	1.10 ac-ft
55.40	Top of Treatment Vol.	1.17 ac	226.2 ft	226.2 ft	0.46 ac-ft
55.00	Normal Water Level	1.14 ac	223.0 ft	223.0 ft	0.00 ac-ft
49.00		0.70 ac	175.0 ft	175.0 ft	
43.00	Pond Bottom	0.37 ac	127.0 ft	127.0 ft	

Required Treatment+Attenuation Vol.= 1.17 ac-ft
Required Treatment+Attenuation Stage= 55.99 ft

Provided Treatment+Attenuation Vol.= 1.18 ft
Provided Treatment+Attenuation Stage= 56.00 ft

Estimated Treat. Vol.+Storm Sewer Att.= 1.10 ac-ft
Estimated Storm Sewer TW EL.= 55.93 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 2.40 ac

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **6**
POND NAME : **6**

PERMANENT POOL VOLUME CALCULATIONS

Basin Characteristics (Proposed Conditions)

Meteorlogical Zone: 4

Land Use	Area (ac)	CN	Product
Roadway Impervious Area	5.58	98.00	546.41
Roadway Pervious Area	2.98	80.00	238.75
Pond Pervious Area	1.26	80.00	100.46
Pond Area at NWL	1.14	100.00	114.16
Total	**10.96**		999.78

% DCIA = 61.30 %
Non-DCIA CN = 80.00
Composite C = **0.54**
Annual Rainfall (P) = **50.50 in**

Min. Permanent Pool Vol. = (Area x Composite C x P x 14) / (365 x 12) = **0.96 ac-ft**

Stage Storage Calc. for Permanent Pool

ELEV. (ft)	AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
55.00	1.14				8.83
		0.92	6.00	5.53	
49.00	0.70				3.30
		0.63	3.00	1.90	
46.00	0.56				1.40
		0.47	3.00	1.40	
43.00	0.37				0.00

Note: Pond bottom area was calculated using 1:4 side slopes from the permitted SHWT elevation to the pond bottom.

Permanent Pool Volume Provided = **8.83 ac-ft**
Resident Time Provided = (Perm. Pool Vol. Provided x 365 x 12) / (Area x C x P) = **129.5 Days**

Mean Depth = Permanent Pool Volume / Area at NWL = **7.74 ft**
Anoxic Depth Elev. = Permanent Pool Elev. - Anoxic Depth from WQ worksheet = **42.77 ft**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN: **6**
POND: **6**

EXISTING AND PROPOSED CONDITIONS POLLUTANT LOADING CALCULATIONS

The following Pollutant Loading equations are referenced from the March 2010 draft of the Stormwater Quality Applicant's Handbook by FDEP.

Annual Rainfall : **50.50** in/yr

Meteorlogical Zone : **4**

Description	Area (ac)	
	Pre-Dev	*Post-Dev
Pervious Roadway Area	7.63	2.98
Proposed Pervious Pond Area	0	1.26
Proposed Pond Water Area	0	1.14
DCIA	3.32	5.58
Total Offsite Area	0.00	0.00
Total Roadway Area Within R/W:	10.96	8.56
Impervious DCIA %	30.33	65.14
Total Basin Area:	10.96	10.96

*Note: DCIA area (Post-Dev) excludes the 5-foot sidewalk and 12-foot shared use path for Pollutant Loading Analysis

1 Annual Runoff (AR) = P/12 (in/ft)xComposite CxA
2 Pollutant Loading (TP) = AR x 43560 (ft2/ac) x 7.48 (gal/ft3) x 3.785 (L/gal) x EMC(TP) (mg/L) x 1 ($kg/10^6$ mg)
3 Permanent Pool: Proposed permanent pool volume were determined using the permanent pool calculations speadsheets
See Permanent Pool Volume Calculations for proposed pond PPV details
4 Resident Time = PPV/AR x 365 (days/yr)
5 Mean Pond Conc = Pollutant Loading x 1yr/(Pond Volume + Annual Runoff) x 1 ac/43560 ft^2 x 1ft^3/7.48 gal x 1 gal/L x 10^6mg/kg x 1000ug/mg.
6 Mean Chlorophyll Conc: ln(chyl-a) = 1.058 ln(TP)-0.934.
7 Mean Secchi Disk Depth: SD = (24.2386+(0.3041)(chyl-a))/(6.0632 + chyl-a).
8 Anoxic Depth: Depth of DO < 1 = 3.305(SD) = 0.02164(chyl-a) -0.004979(TP). Anoxic Depth is the maximum depth of PPV that can be counted for water quality.
9 Required Reduction = (1-(PreDev Loading [kg/yr]/PostDev Loading [kg/yr)) x 100
10 Removal Efficiency: TP (% Removal) = $44.53 + 6.145 \times ln(t_d) + 0.145 \times (ln(t_d))^2$
TN (% Removal) = $(43.75 \times t_d)/(4.38 + t_d)$
11 Event Mean Concentration values are referenced from Table 3.4 of the March 2010 draft ERP Stormwater Quality Applicant's Handbook by FDEP.
12 Roadway Event Mean Concentration values are referenced from the July 2011 Nutrient Loading Calculations Consultants Memo.

PRE-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W (Agriculture - Pasture)	10.96	30.33	80	0.32	14.76	2.48	45.13	0.70	12.74
Total:	**10.96**				**14.76**		**45.13**		**12.74**

POST-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	9.82	65.14	80.00	0.57	23.55	1.37	39.78	0.17	4.94
Pond Water Surface	1.14	0	100	1.00	4.80	0.00	0.00	0.00	0.00
Total:	**10.96**				**28.35**		**39.78**		**4.94**

* Determined from the Mean annual Runoff Coefficients (C Values) as a Function of DCIA Percentage and Non-DCIA Curve Number Table

TREATMENT REQUIRED

Condition	Annual Runoff[1] (ac-ft/yr)	Pollutant Loading[2] (Kg/Yr)		Required Removal Efficiency (%)	
		TN	TP	TN	TP
Pre-Development	14.76	45.13	12.74	-13.45	-158.05
Post-Development	28.35	39.78	4.94		

TREATMENT PROVIDED

Pond ID	Permanent Pool Volume[3] PPV (ac-ft)	Residence Time[4] t_d (days)	Mean Pond Concentration[5] (ug TP/L)	Mean Chlorophyll Concentration[6] (mgTP/m^3)	Mean Secchi Disk Depth[7] (m)	Anoxic Depth[8] (ft)	Removal Efficiency[10] (%)		Pollutant Loading (Kg/Yr)	
							TN	TP	TN	TP
Pond 6	8.83	129.48	23.85	11.26	1.60	12.23	**42.32**	**77.85**	**22.95**	**1.09**

FINAL LOADINGS		
Condition	Pollutant	
	TN	TP
Pre-Development	45.13	12.74
Post-Development	22.95	1.09

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Made by: MKI
Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **7**
POND NAME : **7**

EXISTING CONDITION

Station Limits: From: 609+23 To: 635+64 Roadway Length = 2641 ft R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
		Total Impervious Width:	56 ft

Impervious Roadway Area: 4.70 ac
*Pervious Roadway Area: 6.38 ac
*Total Roadway Area: 11.08 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 2.07 ac

Total Area:
Impervious Area: **4.70 ac**
Pervious Area: **8.45 ac**
Total Area: **13.15 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	1.81 ac	177.4
Impervious areas; Streets & roads	C	98	2.89 ac	283.2
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	2.45 ac	196.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	3.93 ac	290.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	2.07 ac	165.3
		Total:	13.15 ac	1112.7

CN = Total CN*Area / Total Area = **84.6**

Denotes Pond Area

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **1.81 in**	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	Runoff (Q) =	**7.14 in**	**6.75 in**	**12.53 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **7**
POND NAME : **7**

PROPOSED CONDITION

Segment **2C**

Station Limits: From: 609+23 To: 635+64

Roadway Length = 2641 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Paved Shoulder			
Imperv. Median			
Inside Shoulder	6.5	2	13.0 ft
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter	2.25	2	4.5 ft
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	109.5 ft

Impervious Roadway Area:	6.64 ac
**Additional Impervious Roadway Area:	0.21 ac
Pervious Roadway Area:	4.23 ac
*Total Roadway Area:	11.08 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area :	1.24 ac	
Water Surface Area:	0.82 ac	Wet Pond
Total Pond Area:	2.07 ac	

Total Area:

Impervious Area:	**6.85 ac**
Pervious Area:	**5.47 ac**
Water Surface Area:	**0.82 ac**
Total Area:	**13.15 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	2.22 ac	217.6
Impervious areas; Streets & roads	C	98	4.63 ac	453.7
Proposed Roadway Pervious	D	80	2.03 ac	162.4
Proposed Roadway Pervious	C	74	2.20 ac	162.8
Proposed Pond Pervious	D	80	1.24 ac	99.4
Proposed Ponds (Water Surface)	A	100	0.82 ac	82.3
		Total:	13.15 ac	1178.2

CN = Total CN*Area / Total Area = **89.6**

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) =	**7.75 in**	**7.35 in**	**13.20 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.16 in

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

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **7**
POND NAME : **7**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
Impaired Water/OFW	**Yes**
Open/Closed Basin	**Open**

Wet Detention	**1.00 in**	x DCIA =	0.57 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.57 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	7.82 ac-ft	7.39 ac-ft	13.73 ac-ft
Q_{post} =	8.49 ac-ft	8.05 ac-ft	14.46 ac-ft
ΔQ =	**0.67 ac-ft**	**0.66 ac-ft**	**0.73 ac-ft**

Attenuation V_{req} = 0.73 ac-ft

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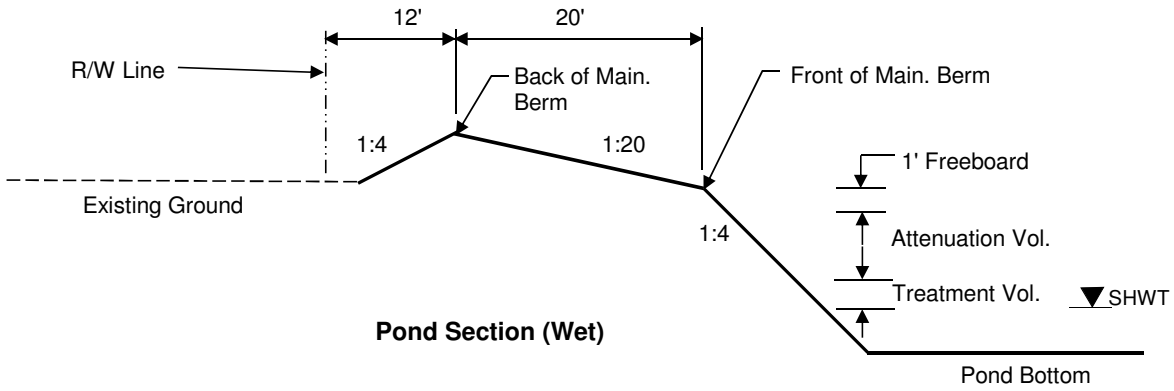
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **7**
POND NAME : **7**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	63.00
Pond Tie-In Width =	12.0 ft	@ 1:4	*Normal Water Elevation =	62.50
Maximum Storage Depth (**SD**) =	1.50 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	65.00

Hydraulic Grade Line (HGL) check

**Note: NWL based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	30 ft	
Estimated Energy Losses =	0.03 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	63.97 ft	



Pond Section (Wet)

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **7**
POND NAME : **7**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
63.00	Pond R/W	1.72 ac	300.0 ft	250.0 ft	
66.00	Back of Main. Berm	1.43 ac	276.0 ft	226.0 ft	3.50 ac-ft
65.50		1.21 ac	256.0 ft	206.0 ft	2.84 ac-ft
65.00	Front of Main. Berm	1.01 ac	236.0 ft	186.0 ft	2.29 ac-ft
64.00	Provided Treat.Vol.+Att.Vol	0.93 ac	228.0 ft	178.0 ft	1.32 ac-ft
63.98	Req'd Treat.Vol+Att. Vol	0.93 ac	227.8 ft	177.8 ft	1.30 ac-ft
63.91	Estimated Storm Sewer TW	0.92 ac	227.3 ft	177.3 ft	1.23 ac-ft
63.17	Top of Treatment Vol.	0.87 ac	221.4 ft	171.4 ft	0.57 ac-ft
62.50	Normal Water Level	0.82 ac	216.0 ft	166.0 ft	0.00 ac-ft
56.50		0.46 ac	168.0 ft	118.0 ft	
50.50	Pond Bottom	0.19 ac	120.0 ft	70.0 ft	

Required Treatment+Attenuation Vol.= 1.30 ac-ft
Required Treatment+Attenuation Stage= 63.98 ft

Provided Treatment+Attenuation Vol.= 1.32 ft
Provided Treatment+Attenuation Stage= 64.00 ft

Estimated Treat. Vol.+Storm Sewer Att.= 1.23 ac-ft
Estimated Storm Sewer TW EL.= 63.91 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 2.07 ac

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **7**
POND NAME : **7**

PERMANENT POOL VOLUME CALCULATIONS

Basin Characteristics (Proposed Conditions)

Meteorlogical Zone: 4

Land Use	Area (ac)	CN	Product
Roadway Impervious Area	6.85	98.00	671.28
Roadway Pervious Area	4.23	76.30	322.77
Pond Pervious Area	1.24	80.00	99.44
Pond Area at NWL	0.82	100.00	82.31
Total	**13.15**		1175.80

% DCIA = 58.37 %
Non-DCIA CN = 76.30
Composite C = **0.53**
Annual Rainfall (P) = **50.50** **in**

Min. Permanent Pool Vol. = (Area x Composite C x P x 14) / (365 x 12) = **1.12 ac-ft**

Stage Storage Calc. for Permanent Pool

ELEV. (ft)	AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)	
62.50	0.82				5.15	
		0.64	6.00	3.83		
56.50	0.46				1.32	
		0.39	2.04	0.79		
54.46	0.32				0.52	
		0.26	2.04	0.52		
52.41	0.19				0.00	**Anoxic Depth**

Note: Pond bottom area was calculated using 1:4 side slopes from the permitted SHWT elevation to the pond bottom.

Permanent Pool Volume Provided = **5.15 ac-ft**
Resident Time Provided = (Perm. Pool Vol. Provided x 365 x 12) / (Area x C x P) = **64.1 Days**

Mean Depth = Permanent Pool Volume / Area at NWL = **6.26 ft**
Anoxic Depth Elev. = Permanent Pool Elev. - Anoxic Depth from WQ worksheet = **52.41 ft**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN: **7**
POND: **7**

EXISTING AND PROPOSED CONDITIONS POLLUTANT LOADING CALCULATIONS

The following Pollutant Loading equations are referenced from the March 2010 draft of the Stormwater Quality Applicant's Handbook by FDEP.

Annual Rainfall : **50.50** in/yr

Meteorlogical Zone : **4**

Description	Area (ac)	
	Pre-Dev	*Post-Dev
Pervious Roadway Area	8.45	4.23
Proposed Pervious Pond Area	0	1.24
Proposed Pond Water Area	0	0.82
DCIA	4.70	6.85
Total Offsite Area	0.00	0.00
Total Roadway Area Within R/W:	13.15	11.08
Impervious DCIA %:	35.75	61.82
Total Basin Area:	13.15	13.15

*Note: DCIA area (Post-Dev) excludes the 5-foot sidewalk and 12-foot shared use path for Pollutant Loading Analysis

1 Annual Runoff (AR) = P/12 (in/ft)xComposite CxA
2 Pollutant Loading (TP) = AR x 43560 (ft2/ac) x 7.48 (gal/ft3) x 3.785 (L/gal) x EMC(TP) (mg/L) x 1 ($kg/10^6$ mg)
3 Permanent Pool: Proposed permanent pool volume were determined using the permanent pool calculations speadsheets
See Permanent Pool Volume Calculations for proposed pond PPV details
4 Resident Time = PPV/AR x 365 (days/yr)
5 Mean Pond Conc = Pollutant Loading x 1yr/(Pond Volume + Annual Runoff) x 1 ac/43560 ft^2 x 1ft^3/7.48 gal x 1 gal/L x 10^6mg/kg x 1000ug/mg.
6 Mean Chlorophyll Conc: ln(chyl-a) = 1.058 ln(TP)-0.934.
7 Mean Secchi Disk Depth: SD = (24.2386+(0.3041)(chyl-a))/(6.0632 + chyl-a).
8 Anoxic Depth: Depth of DO < 1 = 3.305(SD) = 0.02164(chyl-a) -0.004979(TP). Anoxic Depth is the maximum depth of PPV that can be counted for water quality.
9 Required Reduction = (1-(PreDev Loading [kg/yr]/PostDev Loading [kg/yr)) x 100
10 Removal Efficiency: TP (% Removal) = $44.53 + 6.145 \times ln(t_d) + 0.145 \times (ln(t_d))^2$
TN (% Removal) = $(43.75 \times t_d)/(4.38 + t_d)$
11 Event Mean Concentration values are referenced from Table 3.4 of the March 2010 draft ERP Stormwater Quality Applicant's Handbook by FDEP.
12 Roadway Event Mean Concentration values are referenced from the July 2011 Nutrient Loading Calculations Consultants Memo.

PRE-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W (Agriculture - Pasture)	13.15	35.75	76	0.36	19.92	2.48	60.91	0.70	17.19
Total:	**13.15**				**19.92**		**60.91**		**17.19**

POST-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	12.32	61.82	80.00	0.48	24.89	1.37	42.06	0.17	5.22
Pond Water Surface	0.82	0	100	1.00	3.46	0.00	0.00	0.00	0.00
Total:	**13.15**				**28.36**		**42.06**		**5.22**

* Determined from the Mean annual Runoff Coefficients (C Values) as a Function of DCIA Percentage and Non-DCIA Curve Number Table

TREATMENT REQUIRED

Condition	Annual Runoff[1] (ac-ft/yr)	Pollutant Loading[2] (Kg/Yr)		Required Removal Efficiency (%)	
		TN	TP	TN	TP
Pre-Development	19.92	60.91	17.19	-44.84	-229.45
Post-Development	28.36	42.06	5.22		

TREATMENT PROVIDED

Pond ID	Permanent Pool Volume[3] PPV (ac-ft)	Residence Time[4] t_d (days)	Mean Pond Concentration[5] (ug TP/L)	Mean Chlorophyll Concentration[6] (mgTP/m^3)	Mean Secchi Disk Depth[7] (m)	Anoxic Depth[8] (ft)	Removal Efficiency[10] (%)		Pollutant Loading (Kg/Yr)	
							TN	TP	TN	TP
Pond 7	5.15	64.12	34.59	16.70	1.29	10.09	**40.95**	**72.61**	**24.83**	**1.43**

FINAL LOADINGS		
Condition	Pollutant	
	TN	TP
Pre-Development	60.91	17.19
Post-Development	24.83	1.43

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **8**
POND NAME : **8**

EXISTING CONDITION

Station Limits: From: 635+64 To: 664+85

Roadway Length = 2921 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
		Total Impervious Width:	56 ft

Impervious Roadway Area: 6.13 ac
*Pervious Roadway Area: 6.38 ac
*Total Roadway Area: 12.51 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 3.09 ac

Total Area:
Impervious Area: **6.13 ac**
Pervious Area: **9.47 ac**
Total Area: **15.60 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	6.13 ac	600.7
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	6.38 ac	472.1
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	3.09 ac	228.3
		Total:	15.60 ac	1301.2

CN = Total CN*Area / Total Area = **83.4**

Denotes Pond Area

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) =	**6.99 in**	**6.60 in**	**12.36 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **1.99 in**

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

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **8**
POND NAME : **8**

PROPOSED CONDITION

Segment **2C**

Station Limits: From: 635+64 To: 664+85

Roadway Length = 2921 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Inside Paved Shoulder	6.5	2	13.0 ft
*Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter	2.25	2	4.5 ft
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	109.5 ft

Impervious Roadway Area:	7.34 ac
**Additional Impervious Roadway Area:	0.73 ac
Pervious Roadway Area:	4.44 ac
*Total Roadway Area:	12.51 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area :	2.59 ac	
Water Surface Area:	0.49 ac	Wet Pond
Total Pond Area:	3.09 ac	

Total Area:

Impervious Area:	**8.07 ac**
Pervious Area:	**7.03 ac**
Water Surface Area:	**0.49 ac**
Total Area:	**15.60 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	8.07 ac	791.1
Proposed Roadway Pervious	C	74	4.44 ac	328.4
Proposed Pond Pervious	C	74	2.59 ac	192.0
Proposed Ponds (Water Surface)	A	100	0.49 ac	49.1
		Total:	15.60 ac	1360.6

CN = Total CN*Area / Total Area = **87.2**

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.46 in	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	Runoff (Q) =	**7.46 in**	**7.06 in**	**12.88 in**

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BASIN NAME : **8**
POND NAME : **8**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
Impaired Water/OFW	**Yes**
Open/Closed Basin	**Open**

Wet Detention	**1.00 in**	x DCIA =	0.67 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.67 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	9.08 ac-ft	8.58 ac-ft	16.07 ac-ft
Q_{post} =	9.69 ac-ft	9.18 ac-ft	16.74 ac-ft
ΔQ =	**0.61 ac-ft**	**0.60 ac-ft**	**0.67 ac-ft**

Attenuation V_{req} = 0.67 ac-ft

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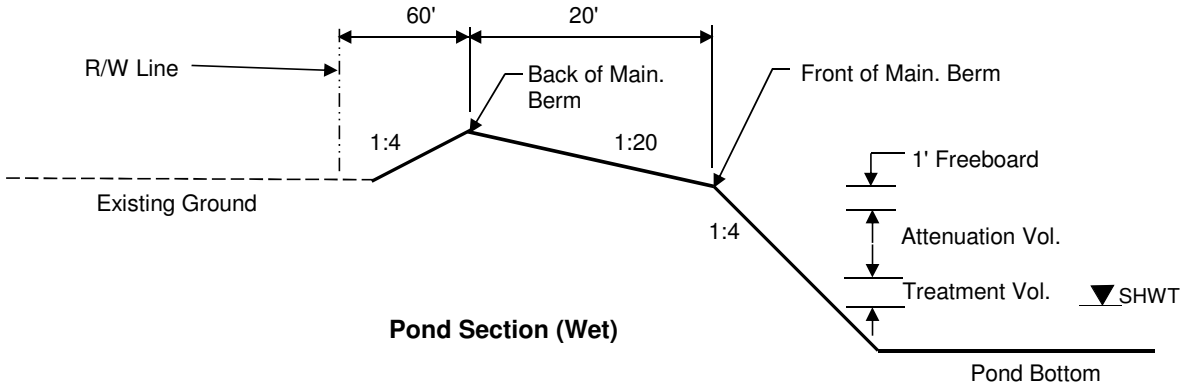
BASIN NAME : **8**
POND NAME : **8**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	85.00
Pond Tie-In Width =	60.0 ft	@ 1:4	*Normal Water Elevation =	82.50
Maximum Storage Depth (**SD**) =	2.50 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	86.00

Hydraulic Grade Line (HGL) check

**Note: NWL based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	30 ft	
Estimated Energy Losses =	0.03 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	84.97 ft	



Pond Section (Wet)

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **8**
POND NAME : **8**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
85.00	Pond R/W	2.57 ac	350.0 ft	320.0 ft	
87.00	Back of Main. Berm	1.06 ac	230.0 ft	200.0 ft	2.94 ac-ft
86.50		0.87 ac	210.0 ft	180.0 ft	2.46 ac-ft
86.00	Front of Main. Berm	0.70 ac	190.0 ft	160.0 ft	2.07 ac-ft
85.00	Provided Treat.Vol.+Att.Vol	0.64 ac	182.0 ft	152.0 ft	1.40 ac-ft
84.91	Req'd Treat.Vol+Att. Vol	0.63 ac	181.3 ft	151.3 ft	1.35 ac-ft
84.78	Estimated Storm Sewer TW	0.62 ac	180.3 ft	150.3 ft	1.27 ac-ft
83.77	Top of Treatment Vol.	0.56 ac	172.2 ft	142.2 ft	0.67 ac-ft
82.50	Normal Water Level	0.49 ac	162.0 ft	132.0 ft	0.00 ac-ft
76.50		0.22 ac	114.0 ft	84.0 ft	
70.50	Pond Bottom	0.05 ac	66.0 ft	36.0 ft	

Required Treatment+Attenuation Vol.= 1.35 ac-ft
Required Treatment+Attenuation Stage= 84.91 ft

Provided Treatment+Attenuation Vol.= 1.40 ft
Provided Treatment+Attenuation Stage= 85.00 ft

Estimated Treat. Vol.+Storm Sewer Att.= 1.27 ac-ft
Estimated Storm Sewer TW EL.= 84.78 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 3.09 ac

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **8**
POND NAME : **8**

PERMANENT POOL VOLUME CALCULATIONS

Basin Characteristics (Proposed Conditions)

Meteorlogical Zone: 4

Land Use	Area (ac)	CN	Product
Roadway Impervious Area	8.07	98.00	791.07
Roadway Pervious Area	4.44	74.00	328.40
Pond Pervious Area	2.59	74.00	191.99
Pond Area at NWL	0.49	100.00	49.09
Total	**15.60**		1360.55

% DCIA = 54.91 %
Non-DCIA CN = 74.00
Composite C = **0.47**
Annual Rainfall (P) = **50.50** **in**

Min. Permanent Pool Vol. = (Area x Composite C x P x 14) / (365 x 12) = **1.18 ac-ft**

Stage Storage Calc. for Permanent Pool

ELEV. (ft)	AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)	
82.50	0.49				2.44	
		0.36	6.00	2.13		
76.50	0.22				0.31	
		0.17	1.21	0.20		
75.29	0.12				0.10	
		0.09	1.21	0.10		
74.08	0.05				0.00	**Anoxic Depth**

Note: Pond bottom area was calculated using 1:4 side slopes from the permitted SHWT elevation to the pond bottom.

Permanent Pool Volume Provided = **2.44 ac-ft**
Resident Time Provided = (Perm. Pool Vol. Provided x 365 x 12) / (Area x C x P) = **28.9 Days**

Mean Depth = Permanent Pool Volume / Area at NWL = **4.97 ft**
Anoxic Depth Elev. = Permanent Pool Elev. - Anoxic Depth from WQ worksheet = **74.08 ft**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN: **8**
POND: **8**

EXISTING AND PROPOSED CONDITIONS POLLUTANT LOADING CALCULATIONS

The following Pollutant Loading equations are referenced from the March 2010 draft of the Stormwater Quality Applicant's Handbook by FDEP.

Annual Rainfall : **50.50** in/yr

Meteorlogical Zone : **4**

Description	Area (ac)	
	Pre-Dev	*Post-Dev
Pervious Roadway Area	9.47	4.44
Proposed Pervious Pond Area	0	2.59
Proposed Pond Water Area	0	0.49
DCIA	6.13	8.07
Total Offsite Area	0.00	0.00
Total Roadway Area Within R/W:	15.60	12.51
Impervious DCIA %	39.31	64.53
Total Basin Area:	15.60	15.60

*Note: DCIA area (Post-Dev) excludes the 5-foot sidewalk and 12-foot shared use path for Pollutant Loading Analysis

1 Annual Runoff (AR) = P/12 (in/ft)xComposite CxA
2 Pollutant Loading (TP) = AR x 43560 (ft2/ac) x 7.48 (gal/ft3) x 3.785 (L/gal) x EMC(TP) (mg/L) x 1 ($kg/10^6$ mg)
3 Permanent Pool: Proposed permanent pool volume were determined using the permanent pool calculations speadsheets
See Permanent Pool Volume Calculations for proposed pond PPV details
4 Resident Time = PPV/AR x 365 (days/yr)
5 Mean Pond Conc = Pollutant Loading x 1yr/(Pond Volume + Annual Runoff) x 1 ac/43560 ft^2 x 1ft^3/7.48 gal x 1 gal/L x 10^6mg/kg x 1000ug/mg.
6 Mean Chlorophyll Conc: ln(chyl-a) = 1.058 ln(TP)-0.934.
7 Mean Secchi Disk Depth: SD = (24.2386+(0.3041)(chyl-a))/(6.0632 + chyl-a).
8 Anoxic Depth: Depth of DO < 1 = 3.305(SD) = 0.02164(chyl-a) -0.004979(TP). Anoxic Depth is the maximum depth of PPV that can be counted for water quality.
9 Required Reduction = (1-(PreDev Loading [kg/yr]/PostDev Loading [kg/yr)) x 100
10 Removal Efficiency: TP (% Removal) = $44.53 + 6.145 \times ln(t_d) + 0.145 \times (ln(t_d))^2$
TN (% Removal) = $(43.75 \times t_d)/(4.38 + t_d)$
11 Event Mean Concentration values are referenced from Table 3.4 of the March 2010 draft ERP Stormwater Quality Applicant's Handbook by FDEP.
12 Roadway Event Mean Concentration values are referenced from the July 2011 Nutrient Loading Calculations Consultants Memo.

PRE-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W (Agriculture - Pasture)	15.60	39.31	74	0.34	22.31	2.48	68.25	0.70	19.26
Total:	**15.60**				**22.31**		**68.25**		**19.26**

POST-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	15.10	64.53	74.00	0.55	34.96	1.37	59.07	0.17	7.33
Pond Water Surface	0.49	0	100	1.00	2.07	0.00	0.00	0.00	0.00
Total:	**15.60**				**37.03**		**59.07**		**7.33**

* Determined from the Mean annual Runoff Coefficients (C Values) as a Function of DCIA Percentage and Non-DCIA Curve Number Table

TREATMENT REQUIRED

Condition	Annual Runoff[1] (ac-ft/yr)	Pollutant Loading[2] (Kg/Yr)		Required Removal Efficiency (%)	
		TN	TP	TN	TP
Pre-Development	22.31	68.25	19.26	-15.54	-162.82
Post-Development	37.03	59.07	7.33		

TREATMENT PROVIDED

Pond ID	Permanent Pool Volume[3] PPV (ac-ft)	Residence Time[4] t_d (days)	Mean Pond Concentration[5] (ug TP/L)	Mean Chlorophyll Concentration[6] (mg TP/m^3)	Mean Secchi Disk Depth[7] (m)	Anoxic Depth[8] (ft)	Removal Efficiency[10] (%)		Pollutant Loading (Kg/Yr)	
							TN	TP	TN	TP
Pond 8	2.44	28.87	49.94	24.62	1.03	8.42	**37.99**	**66.84**	**36.63**	**2.43**

FINAL LOADINGS		
Condition	Pollutant	
	TN	TP
Pre-Development	68.25	19.26
Post-Development	36.63	2.43

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Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **9**
POND NAME : **9**

EXISTING CONDITION

Station Limits: From: 664+85 To: 686+53 Roadway Length = 2168 ft R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
Sidewalk	5.5 ft	2	11 ft
		Total Impervious Width:	67 ft

Impervious Roadway Area: 4.64 ac
*Pervious Roadway Area: 4.96 ac
*Total Roadway Area: 9.60 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 4.63 ac

Total Area:
Impervious Area: **4.64 ac**
Pervious Area: **9.59 ac**
Total Area: **14.23 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	0.51 ac	50.0
Impervious areas; Streets & roads	D	98	4.13 ac	404.7
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	0.68 ac	50.3
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	4.28 ac	342.4
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	4.63 ac	370.5
		Total:	14.23 ac	1217.9

CN = Total CN*Area / Total Area = **85.6**

Denotes Pond Area

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **1.68 in**	Precipitation (P) = 9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	Runoff (Q) = **7.25 in**	**6.86 in**	**12.66 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **9**
POND NAME : **9**

Station Limits: From: 664+85 To: 686+53

Segment 3
Roadway Length = 2168 ft
R/W Width = 182.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Paved Shoulder			
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter			
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	92.0 ft

Impervious Roadway Area: 4.58 ac
**Additional Impervious Roadway Area: 1.30 ac
Pervious Roadway Area: 3.72 ac
*Total Roadway Area: 9.60 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area : 1.95 ac
Water Surface Area: 2.69 ac Wet Pond
Total Pond Area: 4.63 ac

Total Area:

Impervious Area: **5.88 ac**
Pervious Area: **5.67 ac**
Water Surface Area: **2.69 ac**
Total Area: **14.23 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	0.65 ac	63.7
Impervious areas; Streets & roads	D	98	5.23 ac	512.4
Proposed Roadway Pervious	C	74	0.41 ac	30.3
Proposed Roadway Pervious	D	80	3.31 ac	264.9
Proposed Pond Pervious	D	80	1.95 ac	155.7
Proposed Ponds (Water Surface)	A	100	2.69 ac	268.5
		Total:	14.23 ac	1295.5

CN = Total CN*Area / Total Area = **91.0**

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Precipitation (P) =	9.00 in	8.60 in	14.50 in

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 0.98 in

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

Runoff (Q) =	**7.92 in**	**7.52 in**	**13.38 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **9**
POND NAME : **9**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
Impaired Water/OFW	**No**
Open/Closed Basin	**Open**

Wet Detention	**1.00 in**	x DCIA =	0.49 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.49 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	8.60 ac-ft	8.14 ac-ft	15.01 ac-ft
Q_{post} =	9.39 ac-ft	8.92 ac-ft	15.87 ac-ft
ΔQ =	**0.79 ac-ft**	**0.78 ac-ft**	**0.86 ac-ft**

Attenuation V_{req} = 0.86 ac-ft

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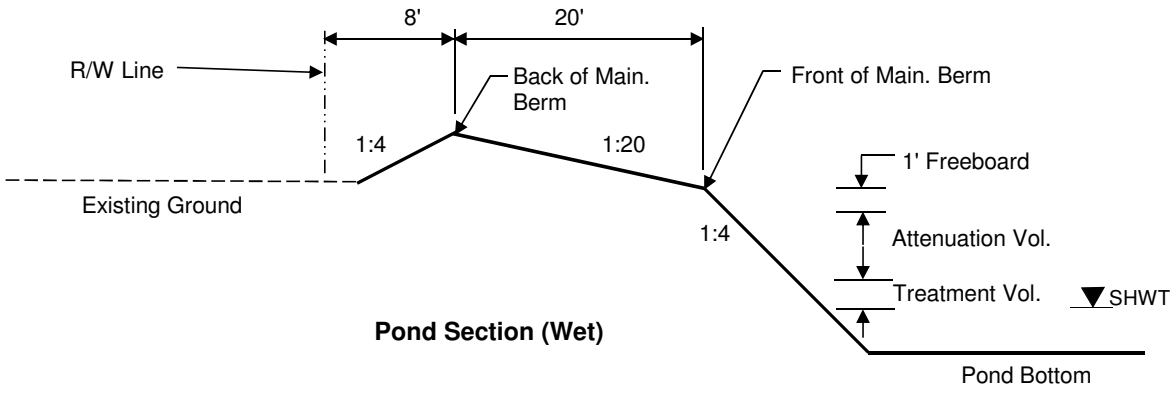
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **9**
POND NAME : **9**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	70.00
Pond Tie-In Width =	8.0 ft	@ 1:4	*Normal Water Elevation =	69.50
Maximum Storage Depth (**SD**) =	0.50 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	71.00

Hydraulic Grade Line (HGL) check

**Note: NWL based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	30 ft	
Estimated Energy Losses =	0.03 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	69.97 ft	



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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **9**
POND NAME : **9**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
70.00	Pond R/W	3.86 ac	410.0 ft	410.0 ft	
72.00	Back of Main. Berm	3.56 ac	394.0 ft	394.0 ft	7.39 ac-ft
71.50		3.21 ac	374.0 ft	374.0 ft	5.69 ac-ft
71.00	Front of Main. Berm	2.88 ac	354.0 ft	354.0 ft	4.17 ac-ft
70.00	Provided Treat.Vol.+Att.Vol	2.75 ac	346.0 ft	346.0 ft	1.36 ac-ft
70.00	Req'd Treat.Vol+Att. Vol	2.75 ac	346.0 ft	346.0 ft	1.35 ac-ft
69.97	Estimated Storm Sewer TW	2.74 ac	345.7 ft	345.7 ft	1.27 ac-ft
69.68	Top of Treatment Vol.	2.71 ac	343.4 ft	343.4 ft	0.49 ac-ft
69.50	Normal Water Level	2.69 ac	342.0 ft	342.0 ft	0.00 ac-ft
63.50		1.98 ac	294.0 ft	294.0 ft	
57.50	Pond Bottom	1.39 ac	246.0 ft	246.0 ft	

Required Treatment+Attenuation Vol.= 1.35 ac-ft
Required Treatment+Attenuation Stage= 70.00 ft

Provided Treatment+Attenuation Vol.= 1.36 ft
Provided Treatment+Attenuation Stage= 70.00 ft

Estimated Treat. Vol.+Storm Sewer Att.= 1.27 ac-ft
Estimated Storm Sewer TW EL.= 69.97 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 4.63 ac

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **10**
POND NAME : **10**

EXISTING CONDITION

Station Limits: From: 686+53 To: 697+64
Roadway Length = 1111 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
Sidewalk	5.5 ft	2	11 ft
		Total Impervious Width:	67 ft

Impervious Roadway Area: 1.57 ac
*Pervious Roadway Area: 3.10 ac
*Total Roadway Area: 4.67 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 1.38 ac

Total Area:
Impervious Area: **1.57 ac**
Pervious Area: **4.48 ac**
Total Area: **6.05 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	1.57 ac	153.9
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	3.10 ac	248.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	1.38 ac	110.2
		Total:	6.05 ac	512.1

CN = Total CN*Area / Total Area = **84.7**

Denotes Pond Area

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ =	**1.81 in**	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) =	**7.14 in**	**6.75 in**	**12.53 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **10**
POND NAME : **10**

Station Limits: From: 686+53 To: 697+64

Segment 3
Roadway Length = 1111 ft
R/W Width = 182.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Paved Shoulder			
*Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter			
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	92.0 ft

Impervious Roadway Area: 2.35 ac
**Additional Impervious Roadway Area: 0.24 ac
Pervious Roadway Area: 2.09 ac
*Total Roadway Area: 4.67 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area : 0.85 ac
Water Surface Area: 0.52 ac Wet Pond
Total Pond Area: 1.38 ac

Total Area:

Impervious Area: **2.58 ac**
Pervious Area: **2.94 ac**
Water Surface Area: **0.52 ac**
Total Area: **6.05 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	2.58 ac	253.3
Proposed Roadway Pervious	D	80	2.09 ac	166.8
Proposed Pond Pervious	D	80	0.85 ac	68.3
Proposed Ponds (Water Surface)	A	100	0.52 ac	52.3
		Total:	6.05 ac	540.8

CN = Total CN*Area / Total Area = **89.4**

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ =	1.18 in	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) =	**7.72 in**	**7.33 in**	**13.17 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **10**
POND NAME : **10**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
Impaired Water/OFW	**No**
Open/Closed Basin	**Open**

Wet Detention	**1.00 in**	x DCIA =	0.22 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.22 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	3.60 ac-ft	3.40 ac-ft	6.32 ac-ft
Q_{post} =	3.89 ac-ft	3.69 ac-ft	6.64 ac-ft
ΔQ =	**0.29 ac-ft**	**0.29 ac-ft**	**0.32 ac-ft**

Attenuation V_{req} = **0.32 ac-ft**

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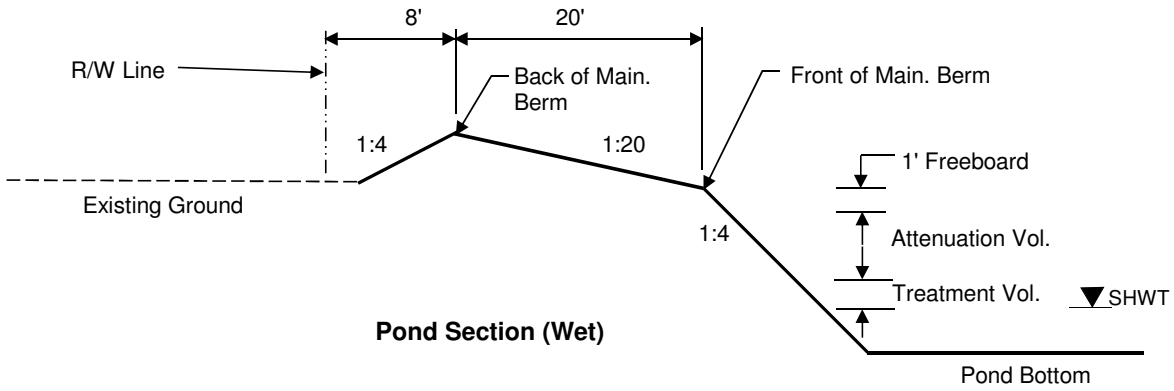
BASIN NAME : **10**
POND NAME : **10**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	63.00
Pond Tie-In Width =	8.0 ft	@ 1:4	*Normal Water Elevation =	62.00
Maximum Storage Depth (**SD**) =	1.00 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	64.00

Hydraulic Grade Line (HGL) check

**Note: NWL based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	60 ft	
Estimated Energy Losses =	0.06 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	62.94 ft	



Pond Section (Wet)

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3000 Dovera Drive Suite 200, Oviedo, FL 32765
(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: MKI
Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **10**
POND NAME : **10**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
63.00	Pond R/W	1.15 ac	250.0 ft	200.0 ft	
65.00	Back of Main. Berm	0.99 ac	234.0 ft	184.0 ft	1.97 ac-ft
64.50		0.81 ac	214.0 ft	164.0 ft	1.52 ac-ft
64.00	Front of Main. Berm	0.64 ac	194.0 ft	144.0 ft	1.16 ac-ft
63.00	Provided Treat.Vol.+Att.Vol	0.58 ac	186.0 ft	136.0 ft	0.55 ac-ft
62.98	Req'd Treat.Vol+Att. Vol	0.58 ac	185.8 ft	135.8 ft	0.54 ac-ft
62.93	Estimated Storm Sewer TW	0.58 ac	185.4 ft	135.4 ft	0.51 ac-ft
62.41	Top of Treatment Vol.	0.55 ac	181.3 ft	131.3 ft	0.22 ac-ft
62.00	Normal Water Level	0.52 ac	178.0 ft	128.0 ft	0.00 ac-ft
56.00		0.24 ac	130.0 ft	80.0 ft	
50.00	Pond Bottom	0.06 ac	82.0 ft	32.0 ft	

Required Treatment+Attenuation Vol.= 0.54 ac-ft
Required Treatment+Attenuation Stage= 62.98 ft

Provided Treatment+Attenuation Vol.= 0.55 ft
Provided Treatment+Attenuation Stage= 63.00 ft

Estimated Treat. Vol.+Storm Sewer Att.= 0.51 ac-ft
Estimated Storm Sewer TW EL.= 62.93 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 1.38 ac

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Checked by:

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **11**
POND NAME : **11**

EXISTING CONDITION

Station Limits: From: 697+64 To: 709+89 Roadway Length = 1225 ft R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
Sidewalk	5.5 ft	2	11 ft
		Total Impervious Width:	67 ft

Impervious Roadway Area: 2.07 ac
*Pervious Roadway Area: 3.10 ac
*Total Roadway Area: 5.17 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 1.10 ac

Total Area:
Impervious Area: **2.07 ac**
Pervious Area: **4.20 ac**
Total Area: **6.27 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	2.07 ac	202.9
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	3.10 ac	248.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	1.10 ac	88.2
		Total:	6.27 ac	539.0

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

Denotes Pond Area

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ =	**1.64 in**	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) =	**7.30 in**	**6.91 in**	**12.71 in**

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **11**
POND NAME : **11**

Station Limits: From: 697+64 To: 709+89

Segment 3
Roadway Length = 1225 ft
R/W Width = 182.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Paved Shoulder			
*Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter			
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	92.0 ft

Impervious Roadway Area: 2.59 ac
**Additional Impervious Roadway Area: 0.29 ac
Pervious Roadway Area: 2.30 ac
*Total Roadway Area: 5.17 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area : 0.79 ac
Water Surface Area: 0.31 ac Wet Pond
Total Pond Area: 1.10 ac

Total Area:

Impervious Area: **2.87 ac**
Pervious Area: **3.09 ac**
Water Surface Area: **0.31 ac**
Total Area: **6.27 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	2.87 ac	281.6
Proposed Roadway Pervious	D	80	2.30 ac	183.7
Proposed Pond Pervious	D	80	0.79 ac	63.4
Proposed Ponds (Water Surface)	A	100	0.31 ac	30.9
		Total:	6.27 ac	559.7

CN = Total CN*Area / Total Area = **89.2**

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ =	1.21 in	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) =	**7.70 in**	**7.30 in**	**13.15 in**

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **11**
POND NAME : **11**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
Impaired Water/OFW	**No**
Open/Closed Basin	**Open**

Wet Detention	**1.00 in**	x DCIA =	0.24 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.24 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	3.81 ac-ft	3.61 ac-ft	6.64 ac-ft
Q_{post} =	4.02 ac-ft	3.82 ac-ft	6.87 ac-ft
ΔQ =	**0.21 ac-ft**	**0.21 ac-ft**	**0.23 ac-ft**

Attenuation V_{req} = **0.23 ac-ft**

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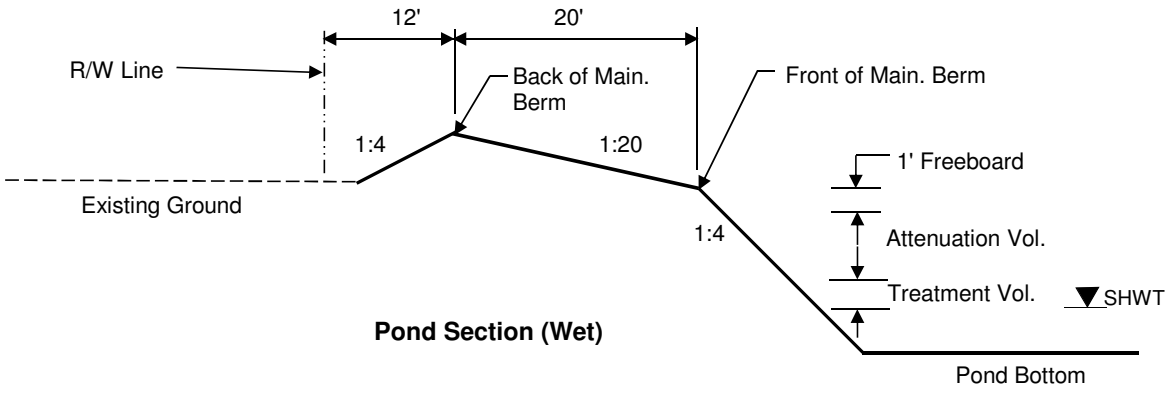
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **11**
POND NAME : **11**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	62.00
Pond Tie-In Width =	12.0 ft	@ 1:4	*Normal Water Elevation =	61.50
Maximum Storage Depth (**SD**) =	1.50 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	65.00

Hydraulic Grade Line (HGL) check

**Note: NWL based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	60 ft	
Estimated Energy Losses =	0.06 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	63.94 ft	



Pond Section (Wet)

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(407) 971-8850 (phone)
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Made by: MKI
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DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **11**
POND NAME : **11**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
62.00	Pond R/W	0.92 ac	200.0 ft	200.0 ft	
65.00	Back of Main. Berm	0.71 ac	176.0 ft	176.0 ft	1.48 ac-ft
64.50		0.56 ac	156.0 ft	156.0 ft	1.16 ac-ft
64.00	Front of Main. Berm	0.42 ac	136.0 ft	136.0 ft	0.91 ac-ft
63.00	Provided Treat.Vol.+Att.Vol	0.38 ac	128.0 ft	128.0 ft	0.51 ac-ft
62.88	Req'd Treat.Vol+Att. Vol	0.37 ac	127.0 ft	127.0 ft	0.47 ac-ft
62.84	Estimated Storm Sewer TW	0.37 ac	126.7 ft	126.7 ft	0.45 ac-ft
62.25	Top of Treatment Vol.	0.34 ac	122.0 ft	122.0 ft	0.24 ac-ft
61.50	Normal Water Level	0.31 ac	116.0 ft	116.0 ft	0.00 ac-ft
55.50		0.11 ac	68.0 ft	68.0 ft	
49.50	Pond Bottom	0.01 ac	20.0 ft	20.0 ft	

Required Treatment+Attenuation Vol.= 0.47 ac-ft
Required Treatment+Attenuation Stage= 62.88 ft

Provided Treatment+Attenuation Vol.= 0.51 ft
Provided Treatment+Attenuation Stage= 63.00 ft

Estimated Treat. Vol.+Storm Sewer Att.= 0.45 ac-ft
Estimated Storm Sewer TW EL.= 62.84 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 1.10 ac

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **12**
POND NAME : **12**

EXISTING CONDITION

Station Limits: From: 709+89 To: 753+92

Roadway Length = 4403 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
Sidewalk	5.5 ft	2	11 ft
		Total Impervious Width:	67 ft

Impervious Roadway Area: 6.61 ac
*Pervious Roadway Area: 11.97 ac
*Total Roadway Area: 18.58 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 13.11 ac

Total Area:
Impervious Area: **6.61 ac**
Pervious Area: **25.08 ac**
Total Area: **31.69 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	2.50 ac	245.0
Impervious areas; Streets & roads	D	98	4.11 ac	402.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	4.54 ac	336.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	7.43 ac	594.4
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	13.11 ac	970.4
		Total:	31.69 ac	2548.5

CN = Total CN*Area / Total Area = **80.4**

Denotes Pond Area

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ =	**2.44 in**	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) =	**6.62 in**	**6.24 in**	**11.94 in**

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **12**
POND NAME : **12**

Station Limits: From: 709+89 To: 753+92

Segment 3
Roadway Length = 4403 ft
R/W Width = 182.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Paved Shoulder			
*Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter			
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	92.0 ft

Impervious Roadway Area: 9.30 ac
**Additional Impervious Roadway Area: 1.20 ac
Pervious Roadway Area: 8.08 ac
*Total Roadway Area: 18.58 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area : 4.23 ac
Water Surface Area: 8.88 ac Wet Pond
Total Pond Area: 13.11 ac

Total Area:

Impervious Area: **10.50 ac**
Pervious Area: **12.32 ac**
Water Surface Area: **8.88 ac**
Total Area: **31.69 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	4.05 ac	396.9
Impervious areas; Streets & roads	D	98	6.45 ac	631.7
Proposed Roadway Pervious	C	74	3.00 ac	222.0
Proposed Roadway Pervious	D	80	5.08 ac	406.7
Proposed Pond Pervious	C	74	4.23 ac	313.3
Proposed Ponds (Water Surface)	A	100	8.88 ac	887.9
		Total:	31.69 ac	2858.5

CN = Total CN*Area / Total Area = **90.2**

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ =	1.09 in	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) =	**7.82 in**	**7.42 in**	**13.27 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **12**
POND NAME : **12**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
Impaired Water/OFW	**No**
Open/Closed Basin	**Open**

Wet Detention	**1.00 in**	x DCIA =	0.87 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.87 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	17.48 ac-ft	16.48 ac-ft	31.53 ac-ft
Q_{post} =	20.64 ac-ft	19.60 ac-ft	35.05 ac-ft
ΔQ =	**3.16 ac-ft**	**3.12 ac-ft**	**3.53 ac-ft**

Attenuation V_{req} = 3.53 ac-ft

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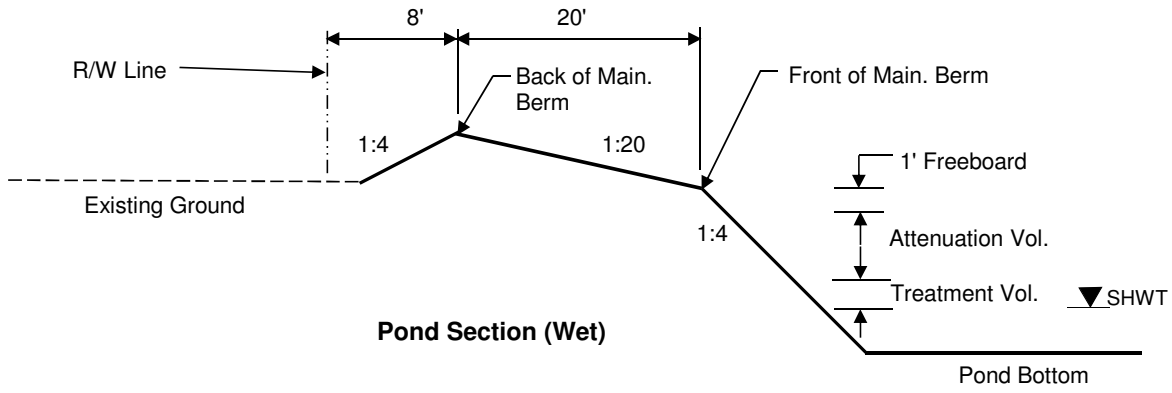
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **12**
POND NAME : **12**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	67.00
Pond Tie-In Width =	8.0 ft	@ 1:4	*Normal Water Elevation =	66.50
Maximum Storage Depth (**SD**) =	0.50 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	68.00

Hydraulic Grade Line (HGL) check

**Note: NWL based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	30 ft	
Estimated Energy Losses =	0.03 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	66.97 ft	



Pond Section (Wet)

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DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **12**
POND NAME : **12**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
67.00	Pond R/W	10.93 ac	700.0 ft	680.0 ft	
69.00	Back of Main. Berm	10.43 ac	684.0 ft	664.0 ft	23.40 ac-ft
68.50		9.82 ac	664.0 ft	644.0 ft	18.34 ac-ft
68.00	Front of Main. Berm	9.23 ac	644.0 ft	624.0 ft	13.58 ac-ft
67.00	Provided Treat.Vol.+Att.Vol	8.99 ac	636.0 ft	616.0 ft	4.47 ac-ft
66.99	Req'd Treat.Vol+Att. Vol	8.99 ac	635.9 ft	615.9 ft	4.40 ac-ft
66.95	Estimated Storm Sewer TW	8.98 ac	635.6 ft	615.6 ft	3.99 ac-ft
66.60	Top of Treatment Vol.	8.90 ac	632.8 ft	612.8 ft	0.87 ac-ft
66.50	Normal Water Level	8.88 ac	632.0 ft	612.0 ft	0.00 ac-ft
60.50		7.56 ac	584.0 ft	564.0 ft	
54.50	Pond Bottom	6.35 ac	536.0 ft	516.0 ft	

Required Treatment+Attenuation Vol.= 4.40 ac-ft
Required Treatment+Attenuation Stage= 66.99 ft

Provided Treatment+Attenuation Vol.= 4.47 ft
Provided Treatment+Attenuation Stage= 67.00 ft

Estimated Treat. Vol.+Storm Sewer Att.= 3.99 ac-ft
Estimated Storm Sewer TW EL.= 66.95 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 13.11 ac

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Checked by:

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **13**
POND NAME : **13**

EXISTING CONDITION

Station Limits: From: 753+92 To: 798+47 Roadway Length = 4455 ft R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
Sidewalk	5.5 ft	2	11 ft
		Total Impervious Width:	67 ft

Impervious Roadway Area: 7.02 ac
*Pervious Roadway Area: 13.15 ac
*Total Roadway Area: 20.17 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 2.56 ac

Total Area:
Impervious Area: **7.02 ac**
Pervious Area: **15.71 ac**
Total Area: **22.73 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	4.74 ac	464.5
Impervious areas; Streets & roads	D	98	0.91 ac	89.2
Impervious areas; Streets & roads	B	98	0.73 ac	71.5
Impervious areas; Streets & roads	A	98	0.64 ac	62.7
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	8.88 ac	657.1
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	1.71 ac	136.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	1.37 ac	83.6
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	1.19 ac	46.4
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	2.56 ac	205.0
			Total:	22.73 ac	1816.8

CN = Total CN*Area / Total Area = **79.9**

Denotes Pond Area

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **2.51 in**			
Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	**6.56 in**	**6.18 in**	**11.87 in**

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Made by: MKI
Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **13**
POND NAME : **13**

Segment **3**

Station Limits: From: 753+92 To: 798+47

Roadway Length = 4455 ft
R/W Width = 182.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Paved Shoulder			
*Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter			
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	92.0 ft

Impervious Roadway Area: 9.41 ac
**Additional Impervious Roadway Area: 1.18 ac
Pervious Roadway Area: 9.58 ac
*Total Roadway Area: 20.17 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area : 1.48 ac
Water Surface Area: 1.08 ac Wet Pond
Total Pond Area: 2.56 ac

Total Area:

Impervious Area: **10.59 ac**
Pervious Area: **11.06 ac**
Water Surface Area: **1.08 ac**
Total Area: **22.73 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	7.15 ac	700.7
Impervious areas; Streets & roads	D	98	1.37 ac	134.3
Impervious areas; Streets & roads	B	98	1.10 ac	107.8
Impervious areas; Streets & roads	A	98	0.97 ac	94.9
Proposed Roadway Pervious	C	74	6.47 ac	478.8
Proposed Roadway Pervious	D	80	1.24 ac	99.2
Proposed Roadway Pervious	B	61	1.00 ac	61.0
Proposed Roadway Pervious	A	39	0.87 ac	34.0
Proposed Pond Pervious	D	80	1.48 ac	118.5
Proposed Ponds (Water Surface)	A	100	1.08 ac	108.0
			Total: 22.73 ac	1937.2

CN = Total CN*Area / Total Area = **85.2**

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) =	**7.21 in**	**6.82 in**	**12.61 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.73 in

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

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Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **13**
POND NAME : **13**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
Impaired Water/OFW	**No**
Open/Closed Basin	**Open**

Wet Detention	**1.00 in**	x DCIA =	0.88 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.88 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	12.42 ac-ft	11.71 ac-ft	22.48 ac-ft
Q_{post} =	13.65 ac-ft	12.92 ac-ft	23.88 ac-ft
ΔQ =	**1.23 ac-ft**	**1.21 ac-ft**	**1.40 ac-ft**

Attenuation V_{req} = 1.40 ac-ft

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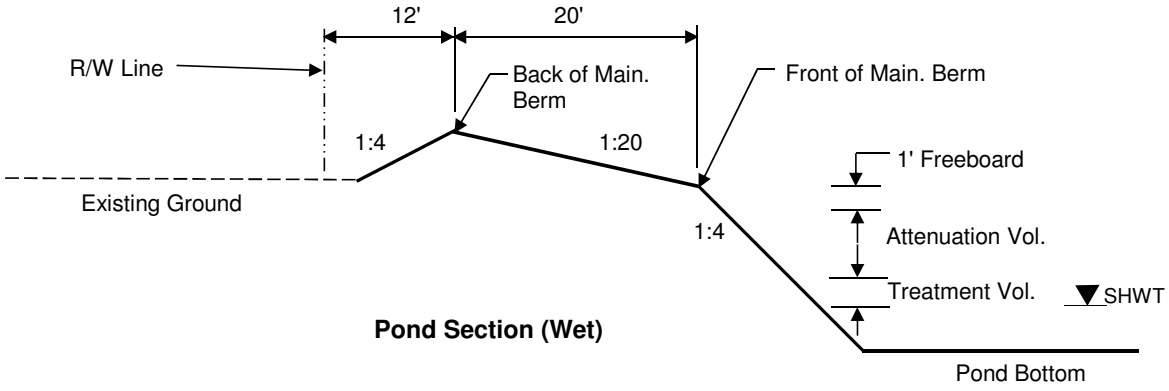
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **13**
POND NAME : **13**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	84.00
Pond Tie-In Width =	12.0 ft	@ 1:4	*Normal Water Elevation =	83.00
Maximum Storage Depth (**SD**) =	2.00 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	86.00

Hydraulic Grade Line (HGL) check

**Note: NWL based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	60 ft	
Estimated Energy Losses =	0.06 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	84.94 ft	



Pond Section (Wet)

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **13**
POND NAME : **13**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
84.00	Pond R/W	2.13 ac	310.0 ft	300.0 ft	
87.00	Back of Main. Berm	1.81 ac	286.0 ft	276.0 ft	5.18 ac-ft
86.50		1.56 ac	266.0 ft	256.0 ft	4.34 ac-ft
86.00	Front of Main. Berm	1.33 ac	246.0 ft	236.0 ft	3.61 ac-ft
85.00	Provided Treat.Vol.+Att.Vol	1.25 ac	238.0 ft	228.0 ft	2.32 ac-ft
84.97	Req'd Treat.Vol+Att. Vol	1.24 ac	237.7 ft	227.7 ft	2.28 ac-ft
84.81	Estimated Storm Sewer TW	1.23 ac	236.5 ft	226.5 ft	2.09 ac-ft
83.79	Top of Treatment Vol.	1.14 ac	228.3 ft	218.3 ft	0.88 ac-ft
83.00	Normal Water Level	1.08 ac	222.0 ft	212.0 ft	0.00 ac-ft
77.00		0.66 ac	174.0 ft	164.0 ft	
71.00	Pond Bottom	0.34 ac	126.0 ft	116.0 ft	

Required Treatment+Attenuation Vol.= 2.28 ac-ft
Required Treatment+Attenuation Stage= 84.97 ft

Provided Treatment+Attenuation Vol.= 2.32 ft
Provided Treatment+Attenuation Stage= 85.00 ft

Estimated Treat. Vol.+Storm Sewer Att.= 2.09 ac-ft
Estimated Storm Sewer TW EL.= 84.81 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 2.56 ac

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **14**
POND NAME : **14**

EXISTING CONDITION

Station Limits: From: 798+47 To: 824+38

Roadway Length = 2591 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
Sidewalk	5.5 ft	2	11 ft
		Total Impervious Width:	67 ft

Impervious Roadway Area: 5.49 ac
*Pervious Roadway Area: 6.45 ac
*Total Roadway Area: 11.94 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 0.55 ac

Total Area:
Impervious Area: **5.49 ac**
Pervious Area: **7.00 ac**
Total Area: **12.49 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	2.25 ac	220.5
Impervious areas; Streets & roads	D	98	3.24 ac	317.5
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	2.64 ac	103.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	3.81 ac	304.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	0.55 ac	21.5
		Total:	12.49 ac	967.3

CN = Total CN*Area / Total Area = **77.4**

Denotes Pond Area

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **2.91 in**	Precipitation (P) = 9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	Runoff (Q) = **6.25 in**	**5.88 in**	**11.51 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **14**
POND NAME : **14**

PROPOSED CONDITION

Segment 3

Station Limits: From: 798+47 To: 824+38

Roadway Length = 2591 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Paved Shoulder			
*Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter			
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	92.0 ft

Impervious Roadway Area:	5.47 ac
**Additional Impervious Roadway Area:	0.83 ac
Pervious Roadway Area:	5.64 ac
*Total Roadway Area:	11.94 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area :	0.55 ac	Dry Pond
Water Surface Area:	0.00 ac	
Total Pond Area:	0.55 ac	

Total Area:

Impervious Area:	**6.30 ac**
Pervious Area:	**6.19 ac**
Water Surface Area:	**0.00 ac**
Total Area:	**12.49 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	2.58 ac	252.8
Impervious areas; Streets & roads	D	98	3.72 ac	364.9
Proposed Roadway Pervious	A	39	2.31 ac	90.1
Proposed Roadway Pervious	D	80	3.33 ac	266.2
Proposed Pond Pervious	A	39	0.55 ac	21.5
		Total:	12.49 ac	995.4

CN = Total CN*Area / Total Area = **79.7**

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) =	**6.53 in**	**6.15 in**	**11.83 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 2.55 in

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

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **14**
POND NAME : **14**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Dry Retention**
Online/Offline	**Online**
Impaired Water/OFW	**Yes**
Open/Closed Basin	**Open**

Dry Retention	**0.50 in**	x DCIA =	0.26 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.26 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	6.51 ac-ft	6.12 ac-ft	11.98 ac-ft
Q_{post} =	6.80 ac-ft	6.40 ac-ft	12.32 ac-ft
ΔQ =	**0.29 ac-ft**	**0.28 ac-ft**	**0.34 ac-ft**

Attenuation V_{req} = **0.34 ac-ft**

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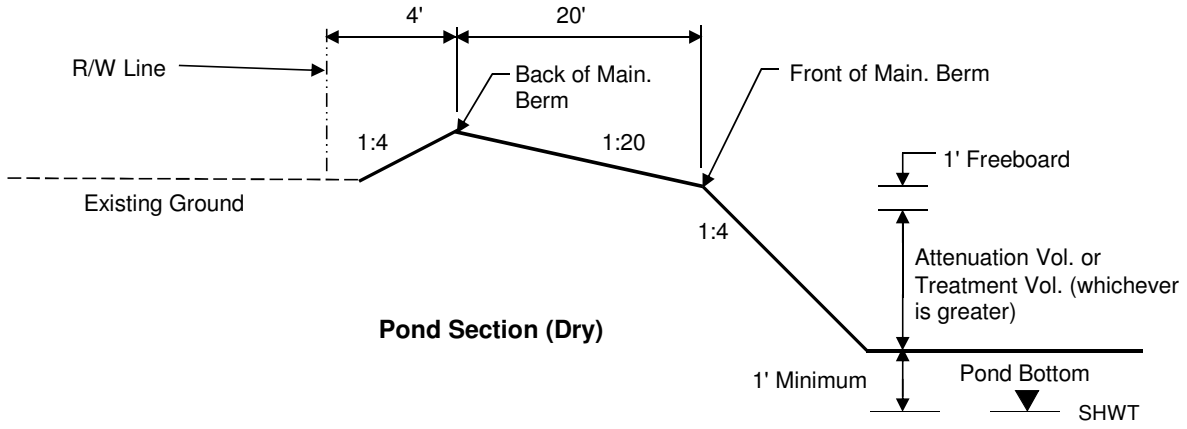
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **14**
POND NAME : **14**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	106.00
Pond Tie-In Width =	4.0 ft	@ 1:4	*ESHWT =	100.00
Maximum Storage Depth (**SD**) =	4.00 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	106.00

Hydraulic Grade Line (HGL) check

**Note: ESHWT based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	30 ft	
Estimated Energy Losses =	0.03 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	104.97 ft	



Pond Section (Dry)

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DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **14**
POND NAME : **14**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
106.00	Pond R/W	0.46 ac	200.0 ft	100.0 ft	
107.00	Back of Main. Berm	0.41 ac	192.0 ft	92.0 ft	0.80 ac-ft
106.50		0.28 ac	172.0 ft	72.0 ft	0.63 ac-ft
106.00	Front of Main. Berm	0.18 ac	152.0 ft	52.0 ft	0.51 ac-ft
105.00	Provided Attenuation Vol.	0.15 ac	144.0 ft	44.0 ft	0.35 ac-ft
104.95	Required Attenuation Vol.	0.14 ac	143.6 ft	43.6 ft	0.34 ac-ft
104.50	Estimated Storm Sewer TW	0.13 ac	140.0 ft	40.0 ft	0.28 ac-ft
104.35	Top of Treatment Vol.	0.12 ac	138.8 ft	38.8 ft	0.26 ac-ft
101.00	Pond Bottom	0.03 ac	112.0 ft	12.0 ft	0.00 ac-ft

Required Attenuation Vol. = 0.34 ac-ft
Required Attenuation Stage = 104.95 ft

Provided Attenuation Vol. = 0.35 ft
Provided Attenuation Stage = 105.00 ft

Estimated Storm Sewer Att.= 0.28 ac-ft
Estimated Storm Sewer TW EL.= 104.50 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 0.55 ac

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN: **14**
POND: **14**

EXISTING AND PROPOSED CONDITIONS POLLUTANT LOADING CALCULATIONS

The following Pollutant Loading equations are referenced from the March 2010 draft of the Stormwater Quality Applicant's Handbook by FDEP.

Annual Rainfall : **50.50** in/yr **Meteorlogical Zone :** **4**

Description	Area (ac)	
	Pre-Dev	*Post-Dev
Pervious Roadway Area	7.00	5.64
Proposed Pervious Pond Area	0	0.55
Proposed Pond Water Area	0	0.00
DCIA	5.49	6.30
Total Offsite Area	0.00	0.00
Total Roadway Area Within R/W:	12.49	11.94
Impervious DCIA %	43.95	52.79
Total Basin Area:	12.49	12.49

*Note: DCIA area (Post-Dev) excludes the 5-foot sidewalk and 12-foot shared use path for Pollutant Loading Analysis

1 Annual Runoff (AR) = P/12 (in/ft)xComposite CxA
2 Pollutant Loading (TP) = AR x 43560 (ft2/ac) x 7.48 (gal/ft3) x 3.785 (L/gal) x EMC(TP) (mg/L) x 1 (kg/10^6 mg)
3 Permanent Pool: Proposed permanent pool volume were determined using the permanent pool calculations speadsheets
See Permanent Pool Volume Calculations for proposed pond PPV details
4 Resident Time = PPV/AR x 365 (days/yr)
5 Mean Pond Conc = Pollutant Loading x 1yr/(Pond Volume + Annual Runoff) x 1 ac/43560 ft^2 x 1ft^3/7.48 gal x 1 gal/L x 10^6mg/kg x 1000ug/mg.
6 Mean Chlorophyll Conc: ln(chyl-a) = 1.058 ln(TP)-0.934.
7 Mean Secchi Disk Depth: SD = (24.2386+(0.3041)(chyl-a))/(6.0632 + chyl-a).
8 Anoxic Depth: Depth of DO < 1 = 3.305(SD) = 0.02164(chyl-a) -0.004979(TP). Anoxic Depth is the maximum depth of PPV that can be counted for water quality.
9 Required Reduction = (1-(PreDev Loading [kg/yr]/PostDev Loading [kg/yr)) x 100
10 Removal Efficiency: TP (% Removal) = 44.53 + 6.145 x $ln(t_d)$ + 0.145 x $(ln(t_d))^2$
TN (% Removal) = (43.75 x t_d)/(4.38 + t_d)
11 Event Mean Concentration values are referenced from Table 3.4 of the March 2010 draft ERP Stormwater Quality Applicant's Handbook by FDEP.
12 Roadway Event Mean Concentration values are referenced from the July 2011 Nutrient Loading Calculations Consultants Memo.

PRE-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W (Agriculture - Pasture)	12.49	43.95	63	0.38	19.98	2.48	61.09	0.70	17.24
Total:	**12.49**				**19.98**		**61.09**		**17.24**

POST-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	12.49	52.79	63	0.45	23.65	1.37	39.97	0.17	4.96
Pond Water Surface	0.00	0	100	1.00	0.00	0.00	0.00	0.00	0.00
Total:	**12.49**				**23.65**		**39.97**		**4.96**

* Determined from the Mean annual Runoff Coefficients (C Values) as a Function of DCIA Percentage and Non-DCIA Curve Number Table

TREATMENT REQUIRED

Condition	Annual Runoff[1] (ac-ft/yr)	Pollutant Loading[2] (Kg/Yr)		Required Removal Efficiency (%)	
		TN	TP	TN	TP
Pre-Development	19.98	61.09	17.24	-52.86	-247.71
Post-Development	23.65	39.97	4.96		

DRY TREATMENT PROVIDED

Pond ID	Retention Depth (in)	Area (ac)	Retention Volume (ac-ft)	Removal Efficiency (%)	Post Development Pollutant Loading (Kg/Yr)	
					TN	TP
Pond 14	0.250	12.49	0.260	35.523	**25.77**	**3.20**

FINAL LOADINGS		
Condition	Pollutant Loading[2] (Kg/Yr)	
	TN	TP
Pre-Development	61.09	17.24
Post-Development	25.77	3.20

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DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **15**
POND NAME : **15**

EXISTING CONDITION

Station Limits: From: 824+38 To: 866+04 Roadway Length = 4166 ft R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
		Total Impervious Width:	56 ft

Impervious Roadway Area: 9.53 ac
*Pervious Roadway Area: 10.37 ac
*Total Roadway Area: 19.90 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 1.45 ac

Total Area:
Impervious Area: **9.53 ac**
Pervious Area: **11.82 ac**
Total Area: **21.35 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	5.17 ac	507.1
Impervious areas; Streets & roads	C	98	0.98 ac	95.7
Impervious areas; Streets & roads	B	98	3.38 ac	331.2
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	5.63 ac	450.4
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	1.06 ac	78.6
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	3.68 ac	224.3
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	1.45 ac	115.7
		Total:	21.35 ac	1803.0

CN = Total CN*Area / Total Area = **84.5**

Denotes Pond Area

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **1.84 in**	Precipitation (P) = 9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	Runoff (Q) = **7.12 in**	**6.73 in**	**12.50 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **15**
POND NAME : **15**

PROPOSED CONDITION

Segment 3

Station Limits: From: 824+38 To: 866+04

Roadway Length = 4166 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Paved Shoulder			
*Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter			
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	92.0 ft

Impervious Roadway Area:	8.80 ac
**Additional Impervious Roadway Area:	0.95 ac
Pervious Roadway Area:	10.16 ac
*Total Roadway Area:	19.90 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area :	0.99 ac	
Water Surface Area:	0.45 ac	Wet Pond
Total Pond Area:	1.45 ac	

Total Area:

Impervious Area:	**9.74 ac**
Pervious Area:	**11.15 ac**
Water Surface Area:	**0.45 ac**
Total Area:	**21.35 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	5.29 ac	518.5
Impervious areas; Streets & roads	C	98	1.00 ac	97.9
Impervious areas; Streets & roads	B	98	3.46 ac	338.6
Proposed Roadway Pervious	D	80	5.51 ac	441.1
Proposed Roadway Pervious	C	74	1.04 ac	77.0
Proposed Roadway Pervious	B	61	3.60 ac	219.7
Proposed Pond Pervious	D	80	0.99 ac	79.4
Proposed Ponds (Water Surface)	A	100	0.45 ac	45.4
		Total:	21.35 ac	1817.5

CN = Total CN*Area / Total Area = **85.1**

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) =	**7.20 in**	**6.81 in**	**12.60 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.74 in

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

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DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **15**
POND NAME : **15**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
Impaired Water/OFW	**Yes**
Open/Closed Basin	**Open**

Wet Detention	**1.00 in**	x DCIA =	0.81 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.81 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	**Storm Sewer (10yr/24hr)**	**FDOT 100yr/72hr**
Q_{pre} =	12.66 ac-ft	11.97 ac-ft	22.24 ac-ft
Q_{post} =	12.81 ac-ft	12.12 ac-ft	22.41 ac-ft
ΔQ =	**0.15 ac-ft**	**0.15 ac-ft**	**0.17 ac-ft**

Attenuation V_{req} = **0.17 ac-ft**

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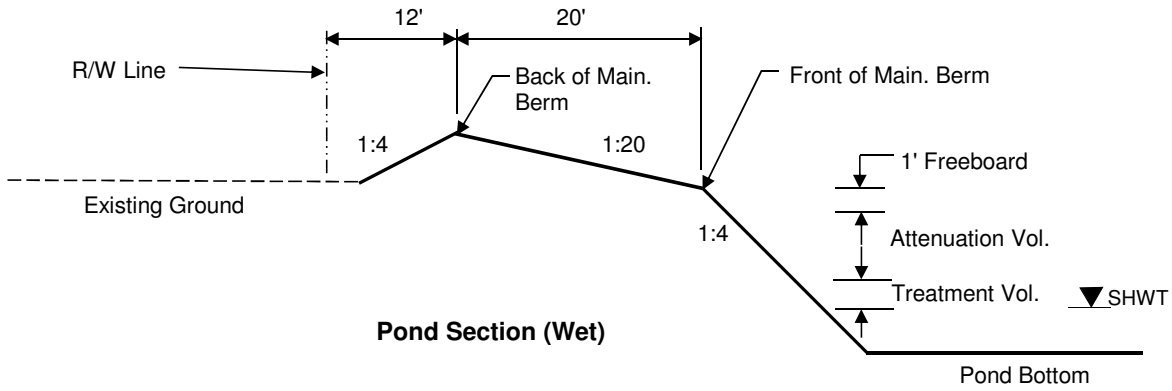
BASIN NAME : **15**
POND NAME : **15**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	105.00
Pond Tie-In Width =	12.0 ft	@ 1:4	*Normal Water Elevation =	104.00
Maximum Storage Depth (**SD**) =	2.00 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	108.00

Hydraulic Grade Line (HGL) check

**Note: NWL based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	60 ft	
Estimated Energy Losses =	0.06 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	106.94 ft	



Pond Section (Wet)

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **15**
POND NAME : **15**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
105.00	Pond R/W	1.21 ac	250.0 ft	210.0 ft	
108.00	Back of Main. Berm	0.97 ac	226.0 ft	186.0 ft	2.40 ac-ft
107.50		0.79 ac	206.0 ft	166.0 ft	1.96 ac-ft
107.00	Front of Main. Berm	0.62 ac	186.0 ft	146.0 ft	1.61 ac-ft
106.00	Provided Treat.Vol.+Att.Vol	0.56 ac	178.0 ft	138.0 ft	1.02 ac-ft
105.93	Req'd Treat.Vol+Att. Vol	0.56 ac	177.4 ft	137.4 ft	0.98 ac-ft
105.90	Estimated Storm Sewer TW	0.56 ac	177.2 ft	137.2 ft	0.96 ac-ft
105.63	Top of Treatment Vol.	0.54 ac	175.0 ft	135.0 ft	0.81 ac-ft
104.00	Normal Water Level	0.45 ac	162.0 ft	122.0 ft	0.00 ac-ft
98.00		0.19 ac	114.0 ft	74.0 ft	
92.00	Pond Bottom	0.04 ac	66.0 ft	26.0 ft	

Required Treatment+Attenuation Vol.= 0.98 ac-ft
Required Treatment+Attenuation Stage= 105.93 ft

Provided Treatment+Attenuation Vol.= 1.02 ft
Provided Treatment+Attenuation Stage= 106.00 ft

Estimated Treat. Vol.+Storm Sewer Att.= 0.96 ac-ft
Estimated Storm Sewer TW EL.= 105.90 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 1.45 ac

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **15**
POND NAME : **15**

PERMANENT POOL VOLUME CALCULATIONS

Basin Characteristics (Proposed Conditions)

Meteorlogical Zone: 4

Land Use	Area (ac)	CN	Product
Roadway Impervious Area	9.74	98.00	955.01
Roadway Pervious Area	10.16	72.60	737.25
Pond Pervious Area	0.99	80.00	79.40
Pond Area at NWL	0.45	100.00	45.37
Total	**21.35**		1817.04

% DCIA = 47.78 %
Non-DCIA CN = 72.60
Composite C = **0.43**
Annual Rainfall (P) = **50.50** **in**

Min. Permanent Pool Vol. = (Area x Composite C x P x 14) / (365 x 12) = **1.48 ac-ft**

Stage Storage Calc. for Permanent Pool

ELEV. (ft)	AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)	
104.00	0.45				2.16	
		0.32	6.00	1.94		
98.00	0.19				0.22	
		0.14	1.04	0.15		
96.96	0.09				0.07	
		0.07	1.04	0.07		
95.91	0.04				0.00	**Anoxic Depth**

Note: Pond bottom area was calculated using 1:4 side slopes from the permitted SHWT elevation to the pond bottom.

Permanent Pool Volume Provided = **2.16 ac-ft**
Resident Time Provided = (Perm. Pool Vol. Provided x 365 x 12) / (Area x C x P) = **20.4 Days**

Mean Depth = Permanent Pool Volume / Area at NWL = **4.76 ft**
Anoxic Depth Elev. = Permanent Pool Elev. - Anoxic Depth from WQ worksheet = **95.91 ft**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN: **15**
POND: **15**

EXISTING AND PROPOSED CONDITIONS POLLUTANT LOADING CALCULATIONS

The following Pollutant Loading equations are referenced from the March 2010 draft of the Stormwater Quality Applicant's Handbook by FDEP.

Annual Rainfall : **50.50** in/yr

Meteorlogical Zone : **4**

Description	Area (ac)	
	Pre-Dev	*Post-Dev
Pervious Roadway Area	11.82	10.16
Proposed Pervious Pond Area	0	0.99
Proposed Pond Water Area	0	0.45
DCIA	9.53	9.74
Total Offsite Area	0.00	0.00
Total Roadway Area Within R/W:	21.35	19.90
Impervious DCIA %:	44.64	48.97
Total Basin Area:	21.35	21.35

*Note: DCIA area (Post-Dev) excludes the 5-foot sidewalk and 12-foot shared use path for Pollutant Loading Analysis

1 Annual Runoff (AR) = P/12 (in/ft)xComposite CxA
2 Pollutant Loading (TP) = AR x 43560 (ft2/ac) x 7.48 (gal/ft3) x 3.785 (L/gal) x EMC(TP) (mg/L) x 1 ($kg/10^6$ mg)
3 Permanent Pool: Proposed permanent pool volume were determined using the permanent pool calculations speadsheets
See Permanent Pool Volume Calculations for proposed pond PPV details
4 Resident Time = PPV/AR x 365 (days/yr)
5 Mean Pond Conc = Pollutant Loading x 1yr/(Pond Volume + Annual Runoff) x 1 ac/43560 ft^2 x 1ft^3/7.48 gal x 1 gal/L x 10^6mg/kg x 1000ug/mg.
6 Mean Chlorophyll Conc: ln(chyl-a) = 1.058 ln(TP)-0.934.
7 Mean Secchi Disk Depth: SD = (24.2386+(0.3041)(chyl-a))/(6.0632 + chyl-a).
8 Anoxic Depth: Depth of DO < 1 = 3.305(SD) = 0.02164(chyl-a) -0.004979(TP). Anoxic Depth is the maximum depth of PPV that can be counted for water quality.
9 Required Reduction = (1-(PreDev Loading [kg/yr]/PostDev Loading [kg/yr)) x 100
10 Removal Efficiency: TP (% Removal) = $44.53 + 6.145 \times ln(t_d) + 0.145 \times (ln(t_d))^2$
TN (% Removal) = $(43.75 \times t_d)/(4.38 + t_d)$
11 Event Mean Concentration values are referenced from Table 3.4 of the March 2010 draft ERP Stormwater Quality Applicant's Handbook by FDEP.
12 Roadway Event Mean Concentration values are referenced from the July 2011 Nutrient Loading Calculations Consultants Memo.

PRE-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W (Agriculture - Pasture)	21.35	44.64	73	0.39	35.03	2.48	107.15	0.70	30.24
Total:	**21.35**				**35.03**		**107.15**		**30.24**

POST-DEVELOPMENT LOADINGS

Land Use	Area (ac)	% DCIA	Non DCIA CN	Runoff C*	Annual Runoff (ac-ft/yr)	Conc. N (mg/L)	N Load (kg/yr)	Conc. P (mg/L)	P Load (kg/yr)
Roadway Area Within R/W	20.89	48.97	72.60	0.43	37.81	1.37	63.88	0.17	7.93
Pond Water Surface	0.45	0	100	1.00	1.91	0.00	0.00	0.00	0.00
Total:	**21.35**				**39.72**		**63.88**		**7.93**

* Determined from the Mean annual Runoff Coefficients (C Values) as a Function of DCIA Percentage and Non-DCIA Curve Number Table

TREATMENT REQUIRED

Condition	Annual Runoff[1] (ac-ft/yr)	Pollutant Loading[2] (Kg/Yr)		Required Removal Efficiency (%)	
		TN	TP	TN	TP
Pre-Development	35.03	107.15	30.24	-67.75	-281.57
Post-Development	39.72	63.88	7.93		

TREATMENT PROVIDED

Pond ID	Permanent Pool Volume[3] PPV (ac-ft)	Residence Time[4] t_d (days)	Mean Pond Concentration[5] (ug TP/L)	Mean Chlorophyll Concentration[6] (mgTP/m^3)	Mean Secchi Disk Depth[7] (m)	Anoxic Depth[8] (ft)	Removal Efficiency[10] (%)		Pollutant Loading (Kg/Yr)	
							TN	TP	TN	TP
Pond 15	2.16	20.42	54.66	27.09	0.98	8.09	**36.02**	**64.39**	**40.87**	**2.82**

FINAL LOADINGS		
Condition	Pollutant	
	TN	TP
Pre-Development	107.15	30.24
Post-Development	40.87	2.82

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Checked by:

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **16**
POND NAME : **16**

EXISTING CONDITION

Station Limits: From: 866+04 To: 903+20

Roadway Length = 3716 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
		Total Impervious Width:	56 ft

Impervious Roadway Area: 5.43 ac
*Pervious Roadway Area: 10.15 ac
*Total Roadway Area: 15.58 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 2.73 ac

Total Area:
Impervious Area: **5.43 ac**
Pervious Area: **12.88 ac**
Total Area: **18.31 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	1.60 ac	156.7
Impervious areas; Streets & roads	B	98	3.83 ac	375.5
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	2.99 ac	239.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	B	61	7.16 ac	436.9
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	2.73 ac	218.6
		Total:	18.31 ac	1426.7

CN = Total CN*Area / Total Area = **77.9**

Denotes Pond Area

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **2.84 in**	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	Runoff (Q) =	**6.31 in**	**5.94 in**	**11.58 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **16**
POND NAME : **16**

Segment **3**

Station Limits: From: 866+04 To: 903+20

Roadway Length = 3716 ft
R/W Width = 182.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Paved Shoulder			
*Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter			
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	92.0 ft

Impervious Roadway Area: 7.85 ac
**Additional Impervious Roadway Area: 0.15 ac
Pervious Roadway Area: 7.59 ac
*Total Roadway Area: 15.58 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area : 1.51 ac
Water Surface Area: 1.22 ac Wet Pond
Total Pond Area: 2.73 ac

Total Area:

Impervious Area: **7.99 ac**
Pervious Area: **9.10 ac**
Water Surface Area: **1.22 ac**
Total Area: **18.31 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	2.35 ac	230.6
Impervious areas; Streets & roads	B	98	5.64 ac	552.7
Proposed Roadway Pervious	D	80	2.23 ac	178.7
Proposed Roadway Pervious	B	61	5.35 ac	326.6
Proposed Pond Pervious	D	80	1.51 ac	120.7
Proposed Ponds (Water Surface)	A	100	1.22 ac	122.4
		Total:	18.31 ac	1531.7

CN = Total CN*Area / Total Area = **83.6**

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 1.96 in	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	Runoff (Q) =	**7.01 in**	**6.63 in**	**12.39 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **16**
POND NAME : **16**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
Impaired Water/OFW	**No**
Open/Closed Basin	**Open**

Wet Detention	**1.00 in**	x DCIA =	0.67 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.67 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	9.63 ac-ft	9.06 ac-ft	17.67 ac-ft
Q_{post} =	10.71 ac-ft	10.12 ac-ft	18.91 ac-ft
ΔQ =	**1.07 ac-ft**	**1.06 ac-ft**	**1.24 ac-ft**

Attenuation V_{req} = 1.24 ac-ft

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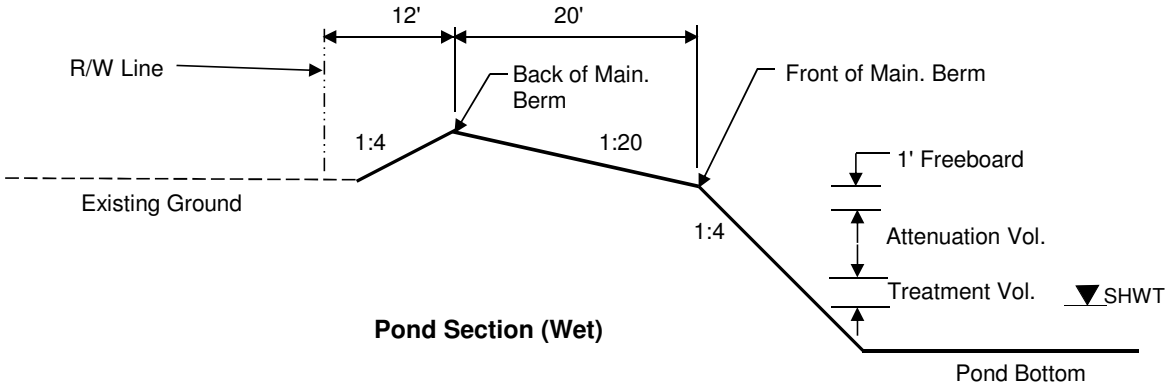
BASIN NAME : **16**
POND NAME : **16**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	113.00
Pond Tie-In Width =	12.0 ft	@ 1:4	*Normal Water Elevation =	112.50
Maximum Storage Depth (**SD**) =	1.50 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	115.00

Hydraulic Grade Line (HGL) check

**Note: NWL based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	60 ft	
Estimated Energy Losses =	0.06 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	113.94 ft	



Pond Section (Wet)

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **16**
POND NAME : **16**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
113.00	Pond R/W	2.28 ac	320.0 ft	310.0 ft	
116.00	Back of Main. Berm	1.94 ac	296.0 ft	286.0 ft	5.02 ac-ft
115.50		1.69 ac	276.0 ft	266.0 ft	4.12 ac-ft
115.00	Front of Main. Berm	1.45 ac	256.0 ft	246.0 ft	3.33 ac-ft
114.00	Provided Treat.Vol.+Att.Vol	1.36 ac	248.0 ft	238.0 ft	1.93 ac-ft
113.98	Req'd Treat.Vol+Att. Vol	1.35 ac	247.8 ft	237.8 ft	1.91 ac-ft
113.85	Estimated Storm Sewer TW	1.34 ac	246.8 ft	236.8 ft	1.73 ac-ft
113.04	Top of Treatment Vol.	1.27 ac	240.3 ft	230.3 ft	0.67 ac-ft
112.50	Normal Water Level	1.22 ac	236.0 ft	226.0 ft	0.00 ac-ft
106.50		0.77 ac	188.0 ft	178.0 ft	
100.50	Pond Bottom	0.42 ac	140.0 ft	130.0 ft	

Required Treatment+Attenuation Vol.= 1.91 ac-ft
Required Treatment+Attenuation Stage= 113.98 ft

Provided Treatment+Attenuation Vol.= 1.93 ft
Provided Treatment+Attenuation Stage= 114.00 ft

Estimated Treat. Vol.+Storm Sewer Att.= 1.73 ac-ft
Estimated Storm Sewer TW EL.= 113.85 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 2.73 ac

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **17**
POND NAME : **17**

EXISTING CONDITION

Station Limits: From: 903+20 To: 925+38 Roadway Length = 2218 ft R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
		Total Impervious Width:	56 ft

Impervious Roadway Area: 3.27 ac
*Pervious Roadway Area: 7.30 ac
*Total Roadway Area: 10.57 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 1.38 ac

Total Area:
Impervious Area: **3.27 ac**
Pervious Area: **8.68 ac**
Total Area: **11.95 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	3.27 ac	320.5
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	7.30 ac	584.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	1.38 ac	110.2
		Total:	11.95 ac	1014.7

CN = Total CN*Area / Total Area = **84.9**

Denotes Pond Area

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **1.77 in**	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	Runoff (Q) =	**7.17 in**	**6.78 in**	**12.57 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **17**
POND NAME : **17**

Segment **3**

Station Limits:
From: 903+20
To: 925+38

Roadway Length = 2218 ft
R/W Width = 182.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Paved Shoulder			
*Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter			
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	92.0 ft

Impervious Roadway Area: 4.68 ac
**Additional Impervious Roadway Area: 0.46 ac
Pervious Roadway Area: 5.43 ac
*Total Roadway Area: 10.57 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area : 0.96 ac
Water Surface Area: 0.42 ac Wet Pond
Total Pond Area: 1.38 ac

Total Area:

Impervious Area: **5.14 ac**
Pervious Area: **6.39 ac**
Water Surface Area: **0.42 ac**
Total Area: **11.95 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	5.14 ac	503.8
Proposed Roadway Pervious	D	80	5.43 ac	434.3
Proposed Pond Pervious	D	80	0.96 ac	76.9
Proposed Ponds (Water Surface)	A	100	0.42 ac	41.7
		Total:	11.95 ac	1056.7

CN = Total CN*Area / Total Area = **88.4**

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ =	1.31 in	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) =	**7.60 in**	**7.21 in**	**13.04 in**

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **17**
POND NAME : **17**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
Impaired Water/OFW	**No**
Open/Closed Basin	**Open**

Wet Detention	**1.00 in**	x DCIA =	0.43 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.43 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	7.14 ac-ft	6.75 ac-ft	12.51 ac-ft
Q_{post} =	7.57 ac-ft	7.18 ac-ft	12.98 ac-ft
ΔQ =	**0.43 ac-ft**	**0.42 ac-ft**	**0.47 ac-ft**

Attenuation V_{req} = **0.47 ac-ft**

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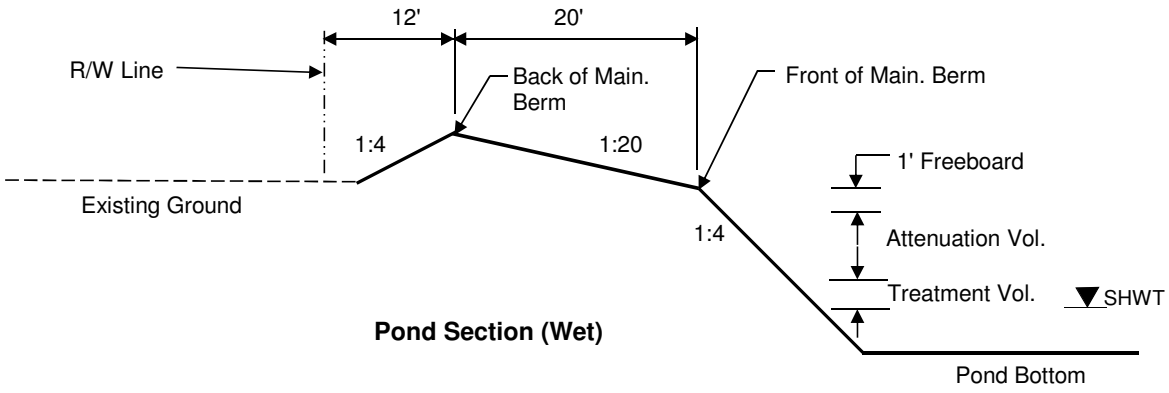
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **17**
POND NAME : **17**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	110.00
Pond Tie-In Width =	12.0 ft	@ 1:4	*Normal Water Elevation =	109.00
Maximum Storage Depth (**SD**) =	2.00 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	113.00

Hydraulic Grade Line (HGL) check

**Note: NWL based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	900 ft	
Estimated Energy Losses =	0.90 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	111.10 ft	



Pond Section (Wet)

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **17**
POND NAME : **17**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
110.00	Pond R/W	1.15 ac	250.0 ft	200.0 ft	
113.00	Back of Main. Berm	0.91 ac	226.0 ft	176.0 ft	2.23 ac-ft
112.50		0.74 ac	206.0 ft	156.0 ft	1.82 ac-ft
112.00	Front of Main. Berm	0.58 ac	186.0 ft	136.0 ft	1.49 ac-ft
111.00	Provided Treat.Vol.+Att.Vol	0.52 ac	178.0 ft	128.0 ft	0.94 ac-ft
110.92	Req'd Treat.Vol+Att. Vol	0.52 ac	177.4 ft	127.4 ft	0.90 ac-ft
110.83	Estimated Storm Sewer TW	0.51 ac	176.6 ft	126.6 ft	0.85 ac-ft
109.97	Top of Treatment Vol.	0.47 ac	169.8 ft	119.8 ft	0.43 ac-ft
109.00	Normal Water Level	0.42 ac	162.0 ft	112.0 ft	0.00 ac-ft
103.00		0.17 ac	114.0 ft	64.0 ft	
97.00	Pond Bottom	0.02 ac	66.0 ft	16.0 ft	

Required Treatment+Attenuation Vol.= 0.90 ac-ft
Required Treatment+Attenuation Stage= 110.92 ft

Provided Treatment+Attenuation Vol.= 0.94 ft
Provided Treatment+Attenuation Stage= 111.00 ft

Estimated Treat. Vol.+Storm Sewer Att.= 0.85 ac-ft
Estimated Storm Sewer TW EL.= 110.83 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 1.38 ac

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **18**
POND NAME : **18**

EXISTING CONDITION

Station Limits: From: 925+38 To: 960+03 Roadway Length = 3465 ft R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
		Total Impervious Width:	56 ft

Impervious Roadway Area: 6.55 ac
*Pervious Roadway Area: 8.13 ac
*Total Roadway Area: 14.68 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 1.45 ac

Total Area:
Impervious Area: **6.55 ac**
Pervious Area: **9.58 ac**
Total Area: **16.13 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	3.40 ac	333.5
Impervious areas; Streets & roads	D	98	3.15 ac	308.4
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	4.22 ac	312.6
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	3.91 ac	312.5
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	1.45 ac	107.6
		Total:	16.13 ac	1374.6

CN = Total CN*Area / Total Area = **85.2**

Denotes Pond Area

Runoff:

		SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ =	**1.74 in**	Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) =	**7.21 in**	**6.82 in**	**12.60 in**

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **18**
POND NAME : **18**

Segment **3**

Station Limits: From: 925+38 To: 960+03

Roadway Length = 3465 ft
R/W Width = 182.0 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Paved Shoulder			
*Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter			
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	92.0 ft

Impervious Roadway Area: 7.32 ac
**Additional Impervious Roadway Area: 0.95 ac
Pervious Roadway Area: 6.42 ac
*Total Roadway Area: 14.68 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area : 0.88 ac
Water Surface Area: 0.57 ac Wet Pond
Total Pond Area: 1.45 ac

Total Area:

Impervious Area: **8.26 ac**
Pervious Area: **7.30 ac**
Water Surface Area: **0.57 ac**
Total Area: **16.13 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	4.29 ac	420.7
Impervious areas; Streets & roads	D	98	3.97 ac	389.1
Proposed Roadway Pervious	C	74	3.33 ac	246.7
Proposed Roadway Pervious	D	80	3.08 ac	246.7
Proposed Pond Pervious	C	74	0.88 ac	65.4
Proposed Ponds (Water Surface)	A	100	0.57 ac	57.1
		Total:	16.13 ac	1425.6

CN = Total CN*Area / Total Area = **88.4**

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) =	**7.59 in**	**7.20 in**	**13.03 in**

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

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

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **18**
POND NAME : **18**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
Impaired Water/OFW	**No**
Open/Closed Basin	**Open**

Wet Detention	**1.00 in**	x DCIA =	0.69 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.69 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	9.69 ac-ft	9.17 ac-ft	16.95 ac-ft
Q_{post} =	10.21 ac-ft	9.68 ac-ft	17.52 ac-ft
ΔQ =	**0.52 ac-ft**	**0.51 ac-ft**	**0.57 ac-ft**

Attenuation V_{req} = **0.57 ac-ft**

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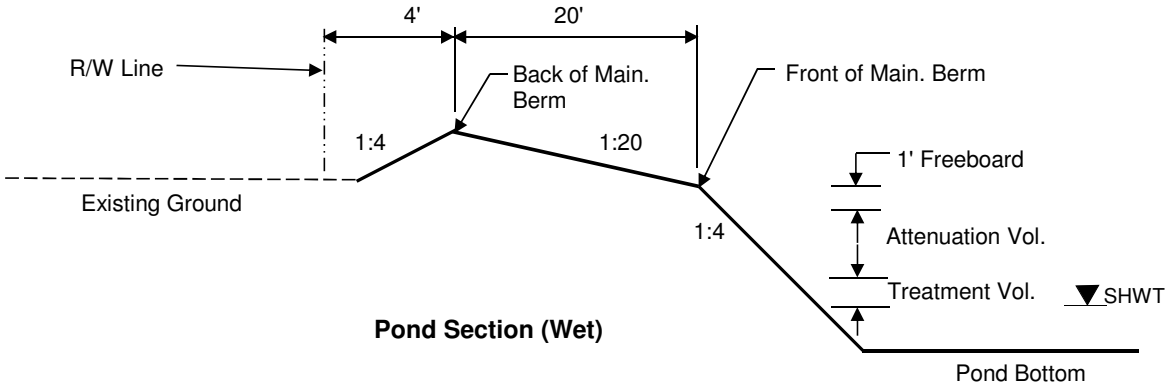
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **18**
POND NAME : **18**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	97.00
Pond Tie-In Width =	4.0 ft	@ 1:4	*Normal Water Elevation =	94.00
Maximum Storage Depth (**SD**) =	2.00 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	98.00

Hydraulic Grade Line (HGL) check

**Note: NWL based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	60 ft	
Estimated Energy Losses =	0.06 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	96.94 ft	



Pond Section (Wet)

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **18**
POND NAME : **18**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
97.00	Pond R/W	1.21 ac	240.0 ft	220.0 ft	
98.00	Back of Main. Berm	1.13 ac	232.0 ft	212.0 ft	2.93 ac-ft
97.50		0.93 ac	212.0 ft	192.0 ft	2.41 ac-ft
97.00	Front of Main. Berm	0.76 ac	192.0 ft	172.0 ft	1.99 ac-ft
96.00	Provided Treat.Vol.+Att.Vol	0.69 ac	184.0 ft	164.0 ft	1.26 ac-ft
96.00	Req'd Treat.Vol+Att. Vol	0.69 ac	184.0 ft	164.0 ft	1.26 ac-ft
95.91	Estimated Storm Sewer TW	0.69 ac	183.3 ft	163.3 ft	1.20 ac-ft
95.14	Top of Treatment Vol.	0.64 ac	177.1 ft	157.1 ft	0.69 ac-ft
94.00	Normal Water Level	0.57 ac	168.0 ft	148.0 ft	0.00 ac-ft
88.00		0.28 ac	120.0 ft	100.0 ft	
82.00	Pond Bottom	0.09 ac	72.0 ft	52.0 ft	

Required Treatment+Attenuation Vol.= 1.26 ac-ft
Required Treatment+Attenuation Stage= 96.00 ft

Provided Treatment+Attenuation Vol.= 1.26 ft
Provided Treatment+Attenuation Stage= 96.00 ft

Estimated Treat. Vol.+Storm Sewer Att.= 1.20 ac-ft
Estimated Storm Sewer TW EL.= 95.91 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 1.45 ac

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **19**
POND NAME : **19**

EXISTING CONDITION

Station Limits: From: 960+03 To: 984+97

Roadway Length = 2494 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
		Total Impervious Width:	56 ft

Impervious Roadway Area: 4.48 ac
*Pervious Roadway Area: 6.14 ac
*Total Roadway Area: 10.62 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 0.73 ac

Total Area:
Impervious Area: **4.48 ac**
Pervious Area: **6.87 ac**
Total Area: **11.35 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	2.19 ac	214.8
Impervious areas; Streets & roads	C	98	2.29 ac	224.3
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	3.00 ac	117.1
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	3.14 ac	232.1
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	0.73 ac	28.4
		Total:	11.35 ac	816.6

CN = Total CN*Area / Total Area = **72.0**

Denotes Pond Area

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **3.90 in**			
Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	**5.58 in**	**5.22 in**	**10.69 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **19**
POND NAME : **19**

PROPOSED CONDITION

Segment 3

Station Limits: From: 960+03 To: 984+97

Roadway Length = 2494 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Paved Shoulder			
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter			
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	92.0 ft

Impervious Roadway Area:	5.27 ac
**Additional Impervious Roadway Area:	0.62 ac
Pervious Roadway Area:	4.73 ac
*Total Roadway Area:	10.62 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area :	0.73 ac	Dry Pond
Water Surface Area:	0.00 ac	
Total Pond Area:	0.73 ac	

Total Area:

Impervious Area:	**5.89 ac**
Pervious Area:	**5.46 ac**
Water Surface Area:	**0.00 ac**
Total Area:	**11.35 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	2.88 ac	282.3
Impervious areas; Streets & roads	C	98	3.01 ac	294.8
Proposed Roadway Pervious	A	39	2.31 ac	90.3
Proposed Roadway Pervious	C	74	2.42 ac	178.9
Proposed Pond Pervious	A	39	0.73 ac	28.4
		Total:	11.35 ac	874.6

CN = Total CN*Area / Total Area = **77.1**

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Precipitation (P) =	9.00 in	8.60 in	14.50 in

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 2.97 in

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

Runoff (Q) =	**6.21 in**	**5.84 in**	**11.45 in**

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **19**
POND NAME : **19**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Dry Retention**
Online/Offline	**Online**
Impaired Water/OFW	**Yes**
Open/Closed Basin	**Open**

Dry Retention	**0.50 in**	x DCIA =	0.25 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.25 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	**Storm Sewer (10yr/24hr)**	**FDOT 100yr/72hr**
Q_{pre} =	5.27 ac-ft	4.94 ac-ft	10.11 ac-ft
Q_{post} =	5.87 ac-ft	5.52 ac-ft	10.83 ac-ft
ΔQ =	**0.60 ac-ft**	**0.58 ac-ft**	**0.73 ac-ft**

Attenuation V_{req} = **0.73 ac-ft**

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DATE: September 16, 2013
Job Number: RKK-002-01

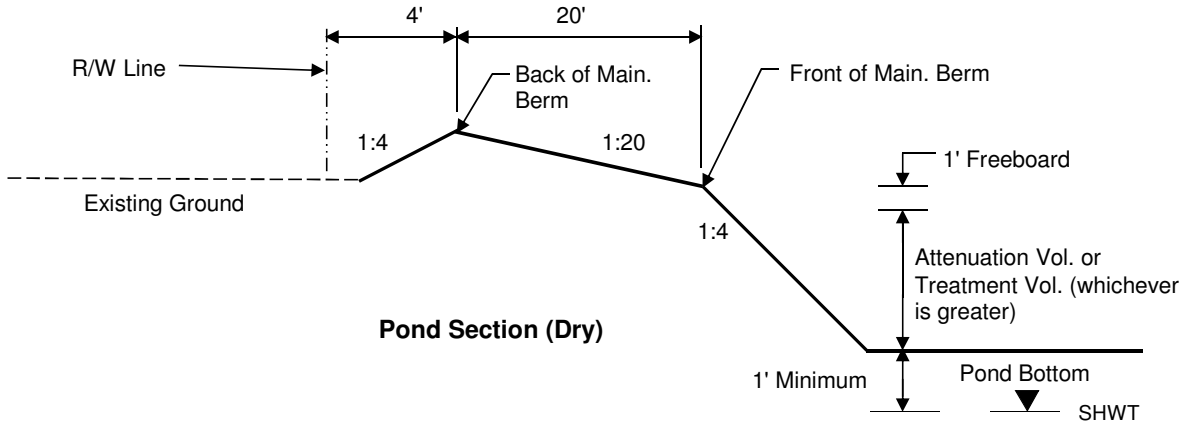
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **19**
POND NAME : **19**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	97.00
Pond Tie-In Width =	4.0 ft	@ 1:4	*ESHWT =	91.00
Maximum Storage Depth (**SD**) =	4.00 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	98.00

Hydraulic Grade Line (HGL) check

**Note: ESHWT based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	200 ft	
Estimated Energy Losses =	0.20 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	96.80 ft	



Pond Section (Dry)

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Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **19**
POND NAME : **19**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
97.00	Pond R/W	0.61 ac	165.0 ft	160.0 ft	
98.00	Back of Main. Berm	0.55 ac	157.0 ft	152.0 ft	1.46 ac-ft
97.50		0.42 ac	137.0 ft	132.0 ft	1.22 ac-ft
97.00	Front of Main. Berm	0.30 ac	117.0 ft	112.0 ft	1.04 ac-ft
96.00	Provided Attenuation Vol.	0.26 ac	109.0 ft	104.0 ft	0.76 ac-ft
95.86	Required Attenuation Vol.	0.25 ac	107.9 ft	102.9 ft	0.73 ac-ft
95.25	Estimated Storm Sewer TW	0.23 ac	103.0 ft	98.0 ft	0.58 ac-ft
93.65	Top of Treatment Vol.	0.18 ac	90.2 ft	85.2 ft	0.25 ac-ft
92.00	Pond Bottom	0.13 ac	77.0 ft	72.0 ft	0.00 ac-ft

Required Attenuation Vol. = 0.73 ac-ft
Required Attenuation Stage = 95.86 ft

Provided Attenuation Vol. = 0.76 ft
Provided Attenuation Stage = 96.00 ft

Estimated Storm Sewer Att.= 0.58 ac-ft
Estimated Storm Sewer TW EL.= 95.25 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 0.73 ac

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DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **20**
POND NAME : **20**

EXISTING CONDITION

Station Limits: From: 984+97 To: 1016+44 Roadway Length = 3148 ft R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
		Total Impervious Width:	56 ft

Impervious Roadway Area: 6.40 ac
*Pervious Roadway Area: 7.20 ac
*Total Roadway Area: 13.60 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 0.62 ac

Total Area:
Impervious Area: **6.40 ac**
Pervious Area: **7.82 ac**
Total Area: **14.22 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	3.46 ac	339.1
Impervious areas; Streets & roads	A	98	1.94 ac	190.5
Impervious areas; Streets & roads	D	98	1.00 ac	97.6
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	3.89 ac	288.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	2.19 ac	85.3
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	1.12 ac	89.7
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	0.62 ac	24.2
		Total:	14.22 ac	1114.4

CN = Total CN*Area / Total Area = **78.4**

Denotes Pond Area

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = 1000/CN - 10 = **2.76 in**	Precipitation (P) = 9.00 in	8.60 in	14.50 in
Runoff (Q) = $(P - 0.2S)^2 / (P + 0.8S)$	Runoff (Q) = **6.37 in**	**5.99 in**	**11.64 in**

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Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **20**
POND NAME : **20**

PROPOSED CONDITION

Segment 3

Station Limits: From: 984+97 To: 1016+44

Roadway Length = 3148 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Paved Shoulder			
Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter			
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	92.0 ft

Impervious Roadway Area:	6.65 ac
**Additional Impervious Roadway Area:	0.81 ac
Pervious Roadway Area:	6.15 ac
*Total Roadway Area:	13.60 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area :	0.62 ac	Dry Pond
Water Surface Area:	0.00 ac	
Total Pond Area:	0.62 ac	

Total Area:

Impervious Area:	**7.45 ac**
Pervious Area:	**6.77 ac**
Water Surface Area:	**0.00 ac**
Total Area:	**14.22 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	4.03 ac	394.9
Impervious areas; Streets & roads	A	98	2.26 ac	221.8
Impervious areas; Streets & roads	D	98	1.16 ac	113.7
Proposed Roadway Pervious	C	74	3.32 ac	245.9
Proposed Roadway Pervious	A	39	1.87 ac	72.8
Proposed Roadway Pervious	D	80	0.96 ac	76.6
Proposed Pond Pervious	A	39	0.62 ac	24.2
		Total:	14.22 ac	1149.8

CN = Total CN*Area / Total Area = **80.9**

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Precipitation (P) =	9.00 in	8.60 in	14.50 in
Runoff (Q) =	**6.67 in**	**6.29 in**	**12.00 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 2.37 in

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

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PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **20**
POND NAME : **20**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Dry Retention**
Online/Offline	**Online**
Impaired Water/OFW	**Yes**
Open/Closed Basin	**Open**

Dry Retention	**0.50 in**	x DCIA =	0.31 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.31 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	7.55 ac-ft	7.10 ac-ft	13.80 ac-ft
Q_{post} =	7.91 ac-ft	7.46 ac-ft	14.22 ac-ft
ΔQ =	**0.36 ac-ft**	**0.36 ac-ft**	**0.42 ac-ft**

Attenuation V_{req} = **0.42 ac-ft**

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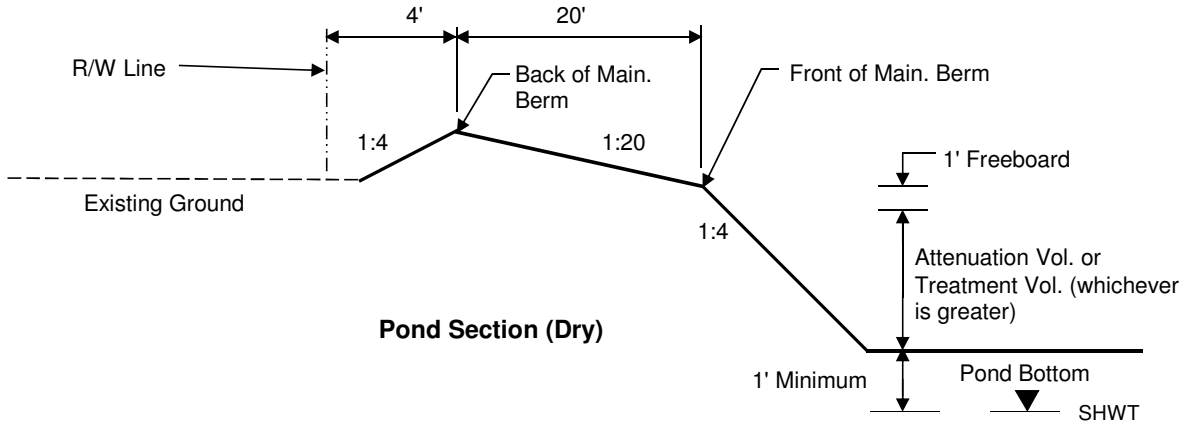
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **20**
POND NAME : **20**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	87.00
Pond Tie-In Width =	4.0 ft	@ 1:4	*ESHWT =	81.00
Maximum Storage Depth (**SD**) =	4.00 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	91.00

Hydraulic Grade Line (HGL) check

**Note: ESHWT based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	200 ft	
Estimated Energy Losses =	0.20 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	89.80 ft	



Pond Section (Dry)

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DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **20**
POND NAME : **20**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
87.00	Pond R/W	0.52 ac	150.0 ft	150.0 ft	
88.00	Back of Main. Berm	0.46 ac	142.0 ft	142.0 ft	1.14 ac-ft
87.50		0.34 ac	122.0 ft	122.0 ft	0.94 ac-ft
87.00	Front of Main. Berm	0.24 ac	102.0 ft	102.0 ft	0.79 ac-ft
86.00	Provided Attenuation Vol.	0.20 ac	94.0 ft	94.0 ft	0.57 ac-ft
85.20	Required Attenuation Vol.	0.18 ac	87.6 ft	87.6 ft	0.42 ac-ft
84.85	Estimated Storm Sewer TW	0.17 ac	84.8 ft	84.8 ft	0.36 ac-ft
84.55	Top of Treatment Vol.	0.16 ac	82.4 ft	82.4 ft	0.31 ac-ft
82.00	Pond Bottom	0.09 ac	62.0 ft	62.0 ft	0.00 ac-ft

Required Attenuation Vol. = 0.42 ac-ft
Required Attenuation Stage = 85.20 ft

Provided Attenuation Vol. = 0.57 ft
Provided Attenuation Stage = 86.00 ft

Estimated Storm Sewer Att.= 0.36 ac-ft
Estimated Storm Sewer TW EL.= 84.85 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 0.62 ac

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DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **21**
POND NAME : **21**

EXISTING CONDITION

Station Limits: From: 1016+44 To: 1049+00
Roadway Length = 3256 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	4	48 ft
Paved Shoulder	4.0 ft	2	8 ft
		Total Impervious Width:	56 ft

Impervious Roadway Area: 5.54 ac
*Pervious Roadway Area: 8.17 ac
*Total Roadway Area: 13.71 ac

**Note: Measured in MicroStation.*

Pond Area: Exist. Land = Open Space = 1.52 ac

Total Area:
Impervious Area: **5.54 ac**
Pervious Area: **9.69 ac**
Total Area: **15.23 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	0.78 ac	76.6
Impervious areas; Streets & roads	A	98	3.38 ac	331.5
Impervious areas; Streets & roads	D	98	1.37 ac	134.7
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	C	74	1.15 ac	85.3
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	4.99 ac	194.6
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	2.03 ac	162.2
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	A	39	1.52 ac	59.1
		Total:	15.23 ac	1044.1

CN = Total CN*Area / Total Area = **68.6**

Denotes Pond Area

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = **4.58 in**	Precipitation (P) = 9.00 in	8.60 in	14.50 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	Runoff (Q) = **5.16 in**	**4.81 in**	**10.16 in**

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DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **21**
POND NAME : **21**

PROPOSED CONDITION

Segment 3

Station Limits: From: 1016+44 To: 1049+00

Roadway Length = 3256 ft
R/W Width = 182.0 ft

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0	6	72.0 ft
Paved Shoulder			
*Imperv. Median			
Ramp			
Sidewalk or Trail	5.0	2	10.0 ft
Curb & Gutter			
Out. Bike Ln. + Shldr.	5.0	2	10.0 ft
Barrier Wall			
		Total Impervious Width:	92.0 ft

Impervious Roadway Area:	6.88 ac
**Additional Impervious Roadway Area:	0.35 ac
Pervious Roadway Area:	6.48 ac
*Total Roadway Area:	13.71 ac

*Note: Measured in Microstation.
**Note: Includes Impervious Median, Turning Lane & Side Streets

Pond Area:

Pervious Pond Area :	1.52 ac	Dry Pond
Water Surface Area:	0.00 ac	
Total Pond Area:	1.52 ac	

Total Area:

Impervious Area:	**7.23 ac**
Pervious Area:	**8.00 ac**
Water Surface Area:	**0.00 ac**
Total Area:	**15.23 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	C	98	1.02 ac	99.9
Impervious areas; Streets & roads	A	98	4.41 ac	432.4
Impervious areas; Streets & roads	D	98	1.79 ac	175.7
Proposed Roadway Pervious	C	74	3.90 ac	288.6
Proposed Roadway Pervious	A	39	1.61 ac	62.8
Proposed Roadway Pervious	D	80	0.98 ac	78.1
Proposed Pond Pervious	A	39	1.52 ac	59.1
		Total:	15.23 ac	1196.6

CN = Total CN*Area / Total Area = **78.6**

Runoff:

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Precipitation (P) =	9.00 in	8.60 in	14.50 in
Soil Capacity (S) = $\frac{1000}{CN} - 10$ = 2.72 in			
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	**6.39 in**	**6.02 in**	**11.68 in**

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Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **21**
POND NAME : **21**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SWFWMD**
StormW.Mgmt.	**Dry Retention**
Online/Offline	**Online**
Impaired Water/OFW	**Yes**
Open/Closed Basin	**Open**

Dry Retention	**0.50 in**	x DCIA =	0.30 ac-ft
		(Directly Connected Impervious Area)	

Treatment V_{req} = Largest of Trt. Vol. = **0.30 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SWFWMD (25yr/24hr)	Storm Sewer (10yr/24hr)	FDOT 100yr/72hr
Q_{pre} =	6.55 ac-ft	6.11 ac-ft	12.89 ac-ft
Q_{post} =	8.11 ac-ft	7.64 ac-ft	14.81 ac-ft
ΔQ =	**1.57 ac-ft**	**1.53 ac-ft**	**1.93 ac-ft**

Attenuation V_{req} = 1.93 ac-ft

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DATE: September 16, 2013
Job Number: RKK-002-01

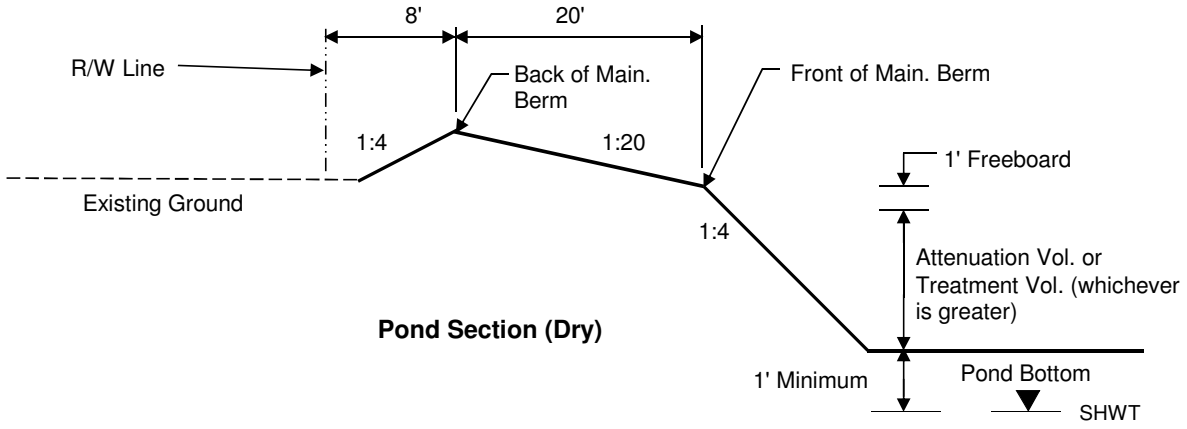
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **21**
POND NAME : **21**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	82.00
Pond Tie-In Width =	8.0 ft	@ 1:4	*ESHWT =	77.50
Maximum Storage Depth (**SD**) =	3.50 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	88.00

Hydraulic Grade Line (HGL) check

**Note: ESHWT based on NRCS Web Soil Survey*

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	60 ft	
Estimated Energy Losses =	0.06 ft	
HGL Clearance =	1.0 ft	Open drainage (ditch) system.
Maximum Storm Sewer Tailwater EL =	86.94 ft	



Pond Section (Dry)

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Made by: MKI
Checked by:

DATE: September 16, 2013
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
BASIN NAME : **21**
POND NAME : **21**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
82.00	Pond R/W	1.26 ac	250.0 ft	220.0 ft	
84.00	Back of Main. Berm	1.10 ac	234.0 ft	204.0 ft	3.58 ac-ft
83.50		0.90 ac	214.0 ft	184.0 ft	3.08 ac-ft
83.00	Front of Main. Berm	0.73 ac	194.0 ft	164.0 ft	2.67 ac-ft
82.00	Provided Attenuation Vol.	0.67 ac	186.0 ft	156.0 ft	1.97 ac-ft
81.94	Required Attenuation Vol.	0.66 ac	185.5 ft	155.5 ft	1.93 ac-ft
81.32	Estimated Storm Sewer TW	0.62 ac	180.6 ft	150.6 ft	1.53 ac-ft
79.13	Top of Treatment Vol.	0.50 ac	163.0 ft	133.0 ft	0.30 ac-ft
78.50	Pond Bottom	0.46 ac	158.0 ft	128.0 ft	0.00 ac-ft

Required Attenuation Vol. = 1.93 ac-ft
Required Attenuation Stage = 81.94 ft

Provided Attenuation Vol. = 1.97 ft
Provided Attenuation Stage = 82.00 ft

Estimated Storm Sewer Att.= 1.53 ac-ft
Estimated Storm Sewer TW EL.= 81.32 ft

HGL requirements met

PROPOSED POND R/W (Safety Factor of 20%) = 1.52 ac

	COVER TYPE	A	B	C	D
1	Open Space (lawns, parks, golf courses, cemeteries, etc.) Poor condition (grass cover < 50%)	68	79	86	89
2	Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	49	69	79	84
3	Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	39	61	74	80
4	Impervious areas; Paved parking lots, roofs, driveways, etc.	98	98	98	98
5	Impervious areas; Streets & roads	98	98	98	98
6	Impervious areas; Paved, open ditches	83	89	92	93
7	Impervious areas; Gravel including right-of-way	76	85	89	91
8	Impervious areas; Dirt including right-of-way	72	82	87	89
9	Commercial & business (85% impervious)	89	92	94	95
10	Industrial (72% Impervious)	81	88	91	93
11	Residential Areas (1/8 acre or less, 65% Impervious)	77	85	90	92
12	Residential Areas (1/4 acre, 38% Impervious)	61	75	83	87
13	Residential Areas (1/3 acre, 30% Impervious)	57	72	81	86
14	Residential Areas (1/2 acre, 25% Impervious)	54	70	80	85
15	Residential Areas (1.0 acre, 20% Impervious)	51	68	79	84
16	Residential Areas (2.0 acre, 12% Impervious)	46	65	77	82
17	Newly graded pervious areas (pervious areas only, no vegetation)	77	86	91	94
18	Pasture, grassland or range; Poor condition (< 50% ground cover or heavily grazed w/ no mulch)	68	79	86	89
19	Pasture, grassland or range; Fair condition (50% to 75% ground cover or not heavily grazed)	49	69	79	84
20	Pasture, grassland or range; Good condition (> 75% ground cover or lightly grazed)	39	61	74	80
21	Meadow, protected from grazing & generally mowed for hay	30	58	71	78
22	Brush-weed-grass mixture; Poor condition (< 50% ground cover)	48	67	77	83
23	Brush-weed-grass mixture; Fair condition (50% to 75% ground cover)	35	56	70	77
24	Brush-weed-grass mixture; Good condition (> 75% ground cover)	30	48	65	73
25	Woods-grass combination (orchard or tree farm); Poor condition	57	73	82	86
26	Woods-grass combination (orchard or tree farm); Fair condition	43	65	76	82
27	Woods-grass combination (orchard or tree farm); Good condition	32	58	72	79
28	Woods; Poor condition (Forest litter, small trees & brush destroyed by heavy grazing or regular burning)	45	66	77	83
29	Woods; Fair condition (Woods grazed but not burned, and with some forest litter)	36	60	73	79
30	Woods; Good condition (Woods are protected from grazing and covered with forest litter and brush)	30	55	70	77
31	Farmsteads - buildings, lanes, driveways & surrounding lots	59	74	82	86
32	Existing Lakes (Water surface)	100	100	100	100
33	Proposed Ponds (Water Surface)	100	100	100	100
34	WETLANDS, Cypress & Bay Heads, Areas of Periodic Inundation.	100	100	100	100
35	Depressional areas & existing storage	87	88	89	90
36	Woods & Wetlands Combination	88	90	94	97
	Agricultural Use				
37	Fallow - Straight Row	77	86	91	94
38	Row Crops - Straight Row - Poor	72	81	88	91
39	Row Crops - Straight Row - Good	67	78	85	89
40	Row Crops - Contoured - Poor	70	79	84	88
41	Row Crops - Contoured - Good	65	75	82	86
42	Row Crops - Contoured and Terraced - Poor	66	74	80	82
43	Row Crops - Contoured and Terraced - Good	62	71	78	81
44	Proposed Roadway Pervious	39	61	74	80
45	Proposed Pond Pervious	39	61	74	80

APPENDIX 3

FLOODPLAIN COMPENSATION POND DESIGN CALCULATIONS

Figure 1: Segments of Floodplain Impacts Area (FIA)

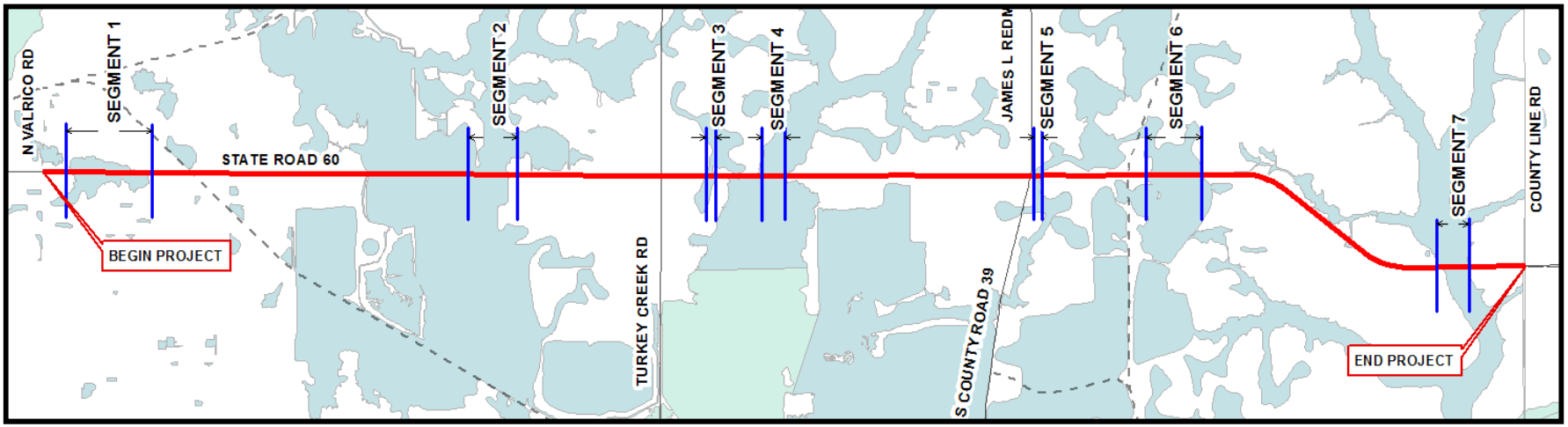

Table 1: Summary of Floodplain Impact Areas (FIA)

Floodplain Impact Area (FIA)	From Station	To Station	Length of Impact (ft)	Width of Impact (ft)	Area of Impact (Acre)	Flood Zone	Floodplain Elev.	Existing Ground Elev.	Seasonal High Watertable Elev.	Depth of Impact (ft)	Volume of Impact (Acre-ft)
Segment 1	409+00.00	446+00.00	3700	54	**4.59**	A	38.50	38.00	31.00	0.50	**2.29**
Segment 2	582+00.00	603+00.00	2100	44	**2.12**	A	58.00	56.00	49.00	2.00	**4.24**
Segment 3	684+00.50	688+00.00	400	70	**0.64**	A	72.60	72.00	71.00	0.60	**0.39**
Segment 4	708+00.50	718+00.00	1000	70	**1.61**	A	68.57	64.00	63.50	4.57	**7.34**
Segment 5	825+00.00	828+45.31	345	70	**0.55**	A	105.39	105.00	104.00	0.39	**0.22**
Segment 6	873+00.50	897+00.50	2400	70	**3.86**	A	117.00	116.00	113.70	1.00	**3.86**
Segment 7	1010+00.00	1024+00.00	1400	70	**2.25**	A	74.00	70.00	69.50	4.00	**9.00**
				Total	**15.62**					**Total**	**27.33**

Table 2: Soil and Water Data of FPC Pond Sites

Pond Name	Soil ID	HSG	SHWT Depth (ft)	Existing Ground Elev.	ESHWT
FPC 1	18	A	6	43	37
FPC 2	46	B/D	1	56	55
FPC 3	46	B/D	1	70	69
FPC 4	29	B/D	3	66	63
FPC 5	33	B/D	1	100	99
FPC 6	33	B/D	1	113	112
FPC 7	60	B/D	1	70	69

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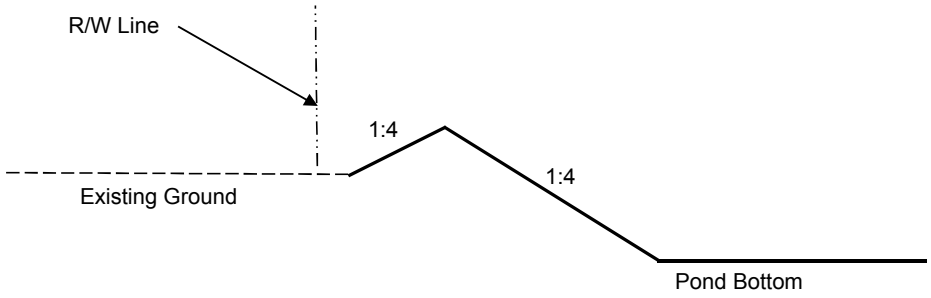
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
POND NAME : **FPC 1**



Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
43.00	Pond R/W	2.07 ac	300.0 ft	300.0 ft	
38.50	Floodplain Elev.	1.60 ac	264.0 ft	264.0 ft	2.29 ac-ft
37.00	Pond Bottom	1.46 ac	252.0 ft	252.0 ft	0.00 ac-ft

Required Attenuation Vol.= 2.29 ac-ft

Provided Attenuation Vol.= 2.29 ac-ft

PROPOSED POND R/W (Safety Factor of 20%) =	2.48 ac

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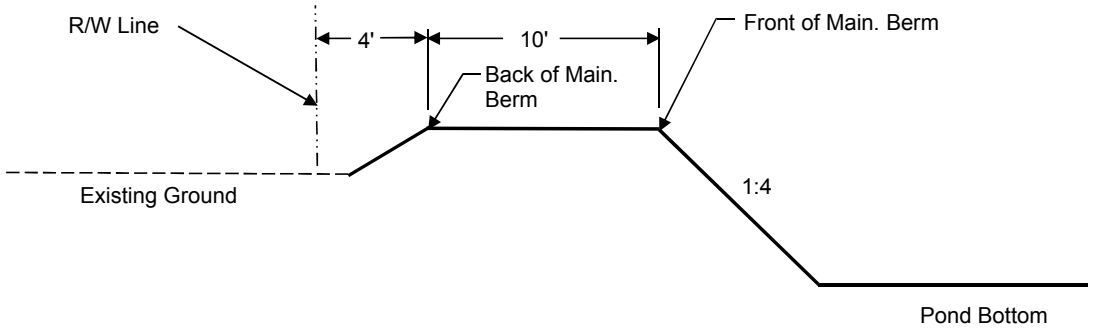
Made by: MKI
Checked by:

DATE: January 6, 2014
Job Number: RKK-002-01

PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
POND NAME : **FPC 2**



Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
56.00	Pond R/W	1.93 ac	300.0 ft	280.0 ft	
58.00	Back of Main. Berm	1.82 ac	292.0 ft	272.0 ft	
58.00	Front of Main. Berm (Floodplain Elev.)	1.57 ac	272.0 ft	252.0 ft	4.31 ac-ft
55.00	Pond Bottom	1.30 ac	248.0 ft	228.0 ft	0.00 ac-ft

Required Attenuation Vol.= 4.24 ac-ft

Provided Attenuation Vol.= 4.31 ac-ft

PROPOSED POND R/W (Safety Factor of 20%) =	2.31 ac

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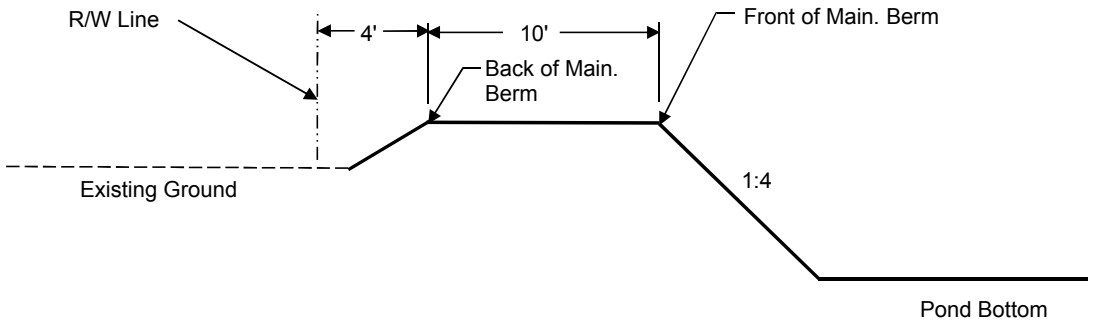
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
POND NAME : **FPC 3**



Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
70.00	Pond R/W	0.45 ac	150.0 ft	130.0 ft	
72.60	Back of Main. Berm	0.40 ac	142.0 ft	122.0 ft	
72.60	Front of Main. Berm (Floodplain Elev.)	0.29 ac	122.0 ft	102.0 ft	0.41 ac-ft
71.00	Pond Bottom	0.22 ac	109.2 ft	89.2 ft	0.00 ac-ft

Required Attenuation Vol.= 0.39 ac-ft

Provided Attenuation Vol.= 0.41 ac-ft

PROPOSED POND R/W (Safety Factor of 20%) =	0.54 ac

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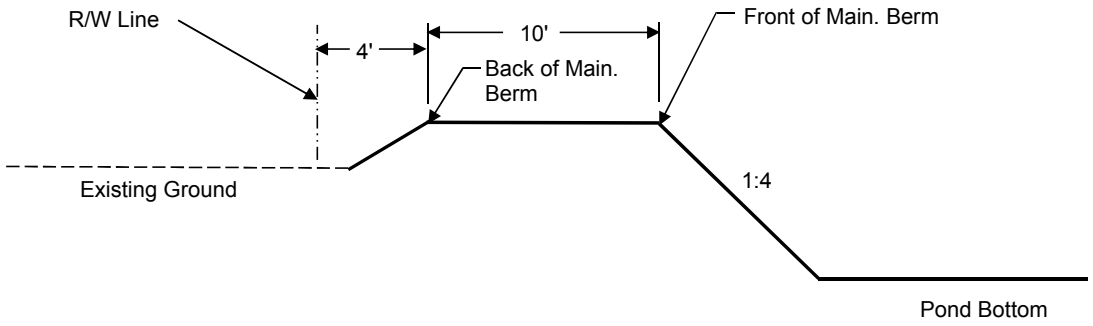
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
POND NAME : **FPC 4**



Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
66.00	Pond R/W	1.93 ac	300.0 ft	280.0 ft	
68.57	Back of Main. Berm	1.82 ac	292.0 ft	272.0 ft	
68.57	Front of Main. Berm (Floodplain Elev.)	1.57 ac	272.0 ft	252.0 ft	7.40 ac-ft
63.00	Pond Bottom	1.08 ac	227.4 ft	207.4 ft	0.00 ac-ft

Required Attenuation Vol.= 7.34 ac-ft

Provided Attenuation Vol.= 7.40 ac-ft

PROPOSED POND R/W (Safety Factor of 20%) =	2.31 ac

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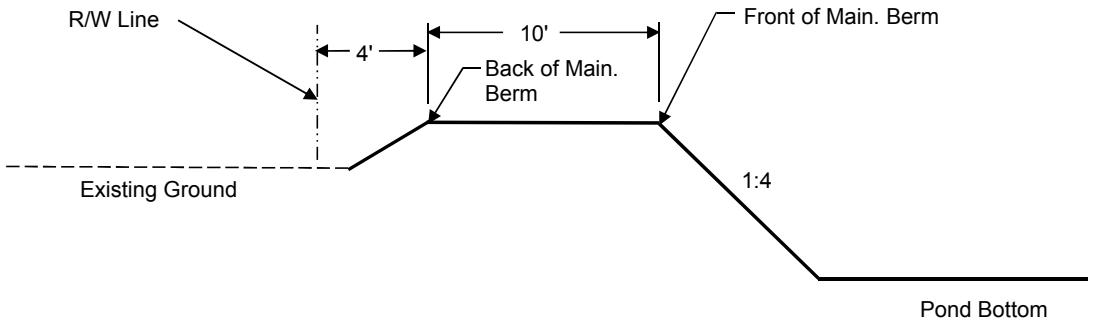
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
POND NAME : **FPC 5**



Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
100.00	Pond R/W	0.33 ac	120.0 ft	120.0 ft	
105.39	Back of Main. Berm	0.29 ac	112.0 ft	112.0 ft	
105.39	Front of Main. Berm (Floodplain Elev.)	0.19 ac	92.0 ft	92.0 ft	0.24 ac-ft
104.00	Pond Bottom	0.15 ac	80.9 ft	80.9 ft	0.00 ac-ft

Required Attenuation Vol.= 0.22 ac-ft

Provided Attenuation Vol.= 0.24 ac-ft

PROPOSED POND R/W (Safety Factor of 20%) =	0.40 ac

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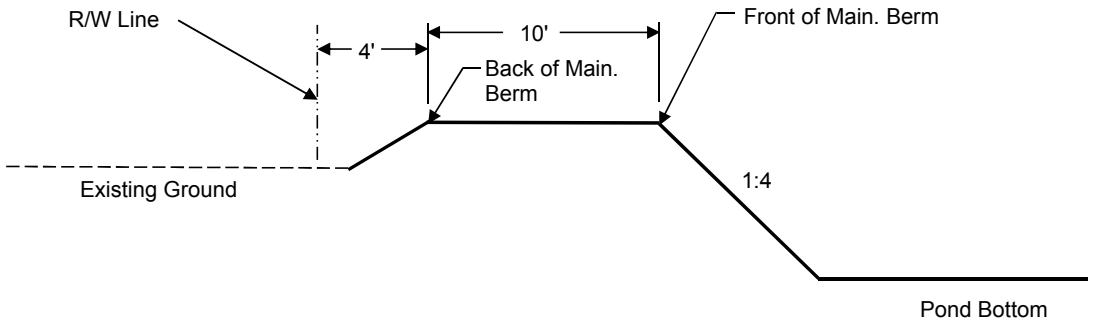
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
POND NAME : **FPC 6**



Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
113.00	Pond R/W	2.46 ac	340.0 ft	315.0 ft	
117.00	Back of Main. Berm	2.34 ac	332.0 ft	307.0 ft	
117.00	Front of Main. Berm (Floodplain Elev.)	2.06 ac	312.0 ft	287.0 ft	3.90 ac-ft
115.00	Pond Bottom	1.84 ac	296.0 ft	271.0 ft	0.00 ac-ft

Required Attenuation Vol.= 3.86 ac-ft

Provided Attenuation Vol.= 3.90 ac-ft

PROPOSED POND R/W (Safety Factor of 20%) =	2.95 ac

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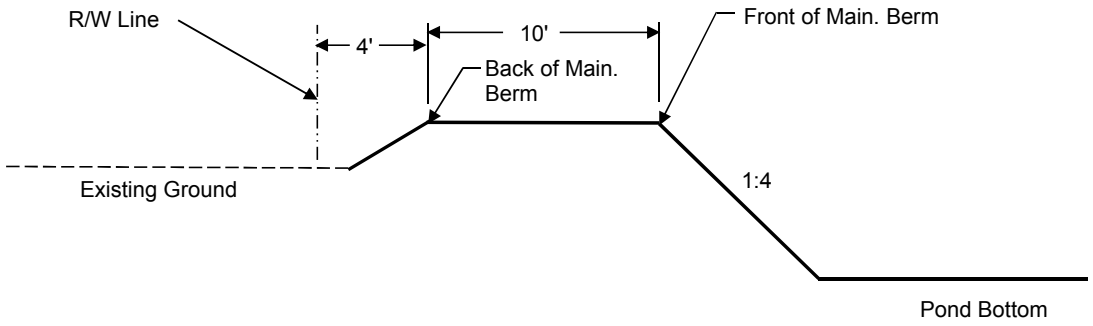
PROJECT : **SR 60 PD&E Study - from Valrico Road to County Line Road**
POND NAME : **FPC 7**



Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
70.00	Pond R/W	3.72 ac	405.0 ft	400.0 ft	
74.00	Back of Main. Berm	3.57 ac	397.0 ft	392.0 ft	
74.00	Front of Main. Berm (Floodplain Elev.)	3.22 ac	377.0 ft	372.0 ft	9.06 ac-ft
71.00	Pond Bottom	2.82 ac	353.0 ft	348.0 ft	0.00 ac-ft

Required Attenuation Vol.= 9.00 ac-ft

Provided Attenuation Vol.= 9.06 ac-ft

PROPOSED POND R/W (Safety Factor of 20%) =	4.46 ac