

APPENDIX D

POND SIZING CALCULATIONS



PRE-DEVELOPMENT CONDITIONS AREA BREAKDOWN

BASIN No.	TOTAL DRAINAGE AREA (ACRES)	PERVIOUS DRAINAGE AREA (ACRES)	IMPERVIOUS DRAINAGE AREA (ACRES)
1	7.95	3.90	4.05
2	8.66	7.71	0.95
3	10.78	9.59	1.19
4	6.60	5.91	0.69
5	7.51	6.69	0.82
6	12.86	11.45	1.41
7	9.34	8.31	1.03
8	10.82	9.63	1.19
9	15.18	13.51	1.67
10	12.67	11.30	1.37
11	9.06	7.92	1.14
12	5.74	4.95	0.79
13	9.07	8.32	0.75
14	29.39	20.47	8.92
15	28.23	19.87	8.36
16	34.22	22.79	11.43
17	32.00	20.02	11.98
18	16.02	7.81	8.21
19	5.18	3.19	1.99
20	5.71	3.42	2.29
Total On-Site	276.99	206.75	70.24
1	10.09	10.09	0.00
2	26.76	26.76	0.00
3	33.36	33.36	0.00
4	24.58	24.58	0.00
5	3.14	3.14	0.00
6	15.44	15.44	0.00
7	47.51	47.51	0.00
8	38.34	38.34	0.00
16	36.42	23.57	12.85
Total Off-Site	235.64	222.79	12.85
Grand Total Area	512.63	429.54	83.09

POST-DEVELOPMENT CONDITIONS AREA BREAKDOWN

BASIN No.	TOTAL	PERVIOUS	IMPERVIOUS
	DRAINAGE	DRAINAGE	DRAINAGE
	AREA	AREA	AREA
	(ACRES)	(ACRES)	(ACRES)
1	7.95	2.68	5.27
2	8.66	5.28	3.38
3	10.78	6.58	4.20
4	6.60	4.05	2.55
5	7.51	4.58	2.93
6	12.86	7.85	5.01
7	9.34	5.70	3.64
8	10.82	6.60	4.22
9	15.18	9.26	5.92
10	12.67	7.75	4.92
11	9.06	5.43	3.63
12	5.74	2.65	3.09
13	9.07	3.10	5.97
14	29.39	18.41	10.98
15	28.23	17.65	10.58
16	34.22	23.60	10.62
17	32.00	19.61	12.39
18	16.02	5.21	10.81
19	5.18	3.06	2.12
20	5.71	2.48	3.23
Total On-Site	276.99	161.52	115.47
16	36.42	23.57	12.85
Total Off-Site	36.42	23.57	12.85
Grand Total Area	313.41	185.09	128.32

POND SIZING CALCULATIONS

Pond 1A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.22

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	9.17	7.95	+ 1.22
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Treatment Volume + 50% O.F.W. (ac-ft): 1.14

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	4.05	A	98	397
Pervious	3.90	A	85	332
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.22	A/D	67	81

Pre-Development Weighted CN: 88.3
Total Contributing Area (ac): 9.17

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	5.27	A	98	517
Pervious	2.68	A	85	227
Pervious				0
Pervious				0
Pond	1.22	AD/Water	98	120

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.68

Post-Development Weighted CN: 94.2
Total Contributing Area (ac): 9.17

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 9.17
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 1A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.33	0.62
Runoff Depth Q (in):	7.30	8.02
Runoff Volume (ac-ft):	5.58	6.13

Attenuation Volume (ac-ft): 0.55

Permanent Pool Volume Needed
PPV= 2.14 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S \text{ (in)} = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.55	(above)
Treatment Volume (ac-ft):	1.14	(above)
Pond Volume Required (ac-ft):	1.69	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 221.5
W_{Rect} (ft): 110.8

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 233.5
W_{Rect} (ft): 122.8

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 273.50
W_{Rect} (ft): 162.80
Area (ac): 1.02

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.22

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	1
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	237.5
W _{Rect} (ft):	126.8
Area (ac):	0.69
	ac-ft
Available	2.76
Required	2.14
Enough?	yes

POND SIZING CALCULATIONS

Pond 1B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.22

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	9.17	7.95	+ 1.22
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Treatment Volume + 50% O.F.W. (ac-ft): 1.14

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	4.05	A	98	397
Pervious	3.90	A	85	332
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.22	A/D	67	81

Pre-Development Weighted CN: 88.3
Total Contributing Area (ac): 9.17

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	5.27	A	98	517
Pervious	2.68	A	85	227
Pervious				0
Pervious				0
Pervious				0
Pond	1.22	AD/Water	98	120

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.68

Post-Development Weighted CN: 94.2
Total Contributing Area (ac): 9.17

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 9.17
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 1B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.33	0.62
Runoff Depth Q (in):	7.30	8.02
Runoff Volume (ac-ft):	5.58	6.13

Attenuation Volume (ac-ft): 0.55

Permanent Pool Volume Needed
PPV= 2.14 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.55	(above)
Treatment Volume (ac-ft):	1.14	(above)
Pond Volume Required (ac-ft):	1.69	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 221.5
W_{Rect} (ft): 110.8

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 233.5
W_{Rect} (ft): 122.8

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 273.50
W_{Rect} (ft): 162.80
Area (ac): 1.02

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.22

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	237.5
W _{Rect} (ft):	126.8
Area (ac):	0.69
	ac-ft
Available	2.76
Required	2.14
Enough?	yes

POND SIZING CALCULATIONS

Pond 1C+2A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.17

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	18.78	16.61	+ 2.17
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Treatment Volume + 50% O.F.W. (ac-ft): 2.36

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	5.00	A	98	490
Pervious	11.61	A	85	987
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.17	A/D	67	144

Pre-Development Weighted CN: 86.3
Total Contributing Area (ac): 18.78

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	8.65	A	98	848
Pervious	7.96	A	85	676
Pervious				0
Pervious				0
Pond	2.17	AD/Water	98	213

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.55

Post-Development Weighted CN: 92.5
Total Contributing Area (ac): 18.78

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 18.78
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 1C+2A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.59	0.81
Runoff Depth Q (in):	7.07	7.82
Runoff Volume (ac-ft):	11.06	12.24

Attenuation Volume (ac-ft): 1.18

Permanent Pool Volume Needed
PPV= 3.57 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.18	(above)
Treatment Volume (ac-ft):	2.36	(above)
Pond Volume Required (ac-ft):	3.54	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 320.4
W_{Rect} (ft): 160.2

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 332.4
W_{Rect} (ft): 172.2

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 372.40
W_{Rect} (ft): 212.20
Area (ac): 1.81

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.17

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	336.4
W _{Rect} (ft):	176.2
Area (ac):	1.36
	ac-ft
Available	5.44
Required	3.57
Enough?	yes

POND SIZING CALCULATIONS

Pond 2B+3A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.54

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	21.98	19.44	+ 2.54
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Treatment Volume + 50% O.F.W. (ac-ft): 2.75

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	2.14	A	98	210
Pervious	17.30	A	85	1471
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.54	A/D	67	169

Pre-Development Weighted CN: 84.1
Total Contributing Area (ac): 21.98

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	7.58	A	98	743
Pervious	11.86	A	85	1008
Pervious				0
Pervious				0
Pervious				0
Pond	2.54	AD/Water	98	249

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.44

Post-Development Weighted CN: 91.0
Total Contributing Area (ac): 21.98

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 21.98
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 2B+3A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.89	0.99
Runoff Depth Q (in):	6.80	7.64
Runoff Volume (ac-ft):	12.46	13.99

Attenuation Volume (ac-ft): 1.53

Permanent Pool Volume Needed
PPV= 3.34 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.53	(above)
Treatment Volume (ac-ft):	2.75	(above)
Pond Volume Required (ac-ft):	4.28	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 352.3
W_{Rect} (ft): 176.2

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 364.3
W_{Rect} (ft): 188.2

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 404.30
W_{Rect} (ft): 228.20
Area (ac): 2.12

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.54

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	368.3
W _{Rect} (ft):	192.2
Area (ac):	1.63
	ac-ft
Available	6.52
Required	3.34
Enough?	yes

POND SIZING CALCULATIONS

Pond 3B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.63

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	12.41	10.78	+ 1.63
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Treatment Volume + 50% O.F.W. (ac-ft): 1.55

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.19	A	98	116
Pervious	9.59	A	85	815
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.63	A/D	67	108

Pre-Development Weighted CN: 83.8
Total Contributing Area (ac): 12.41

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	4.20	A	98	412
Pervious	6.58	A	85	559
Pervious				0
Pervious				0
Pond	1.63	AD/Water	98	160

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.45

Post-Development Weighted CN: 91.1
Total Contributing Area (ac): 12.41

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 12.41
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 3B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.93	0.98
Runoff Depth Q (in):	6.77	7.65
Runoff Volume (ac-ft):	7.00	7.91

Attenuation Volume (ac-ft): 0.91

Permanent Pool Volume Needed
PPV= 1.93 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S (in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.91	(above)
Treatment Volume (ac-ft):	1.55	(above)
Pond Volume Required (ac-ft):	2.46	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 267.0
W_{Rect} (ft): 133.5

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 279.0
W_{Rect} (ft): 145.5

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 319.00
W_{Rect} (ft): 185.50
Area (ac): 1.36

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.63

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	283.0
W _{Rect} (ft):	149.5
Area (ac):	0.97
	ac-ft
Available	3.88
Required	1.93
Enough?	yes

POND SIZING CALCULATIONS

Pond 3C+4A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.34

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	19.72	17.38	+ 2.34
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Treatment Volume + 50% O.F.W. (ac-ft): 2.46

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.88	A	98	184
Pervious	15.50	A	85	1318
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.34	A/D	67	156

Pre-Development Weighted CN: 84.0
Total Contributing Area (ac): 19.72

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	6.75	A	98	662
Pervious	10.63	A	85	903
Pervious				0
Pervious				0
Pervious				0
Pond	2.34	AD/Water	98	229

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.44

Post-Development Weighted CN: 91.0
Total Contributing Area (ac): 19.72

$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	DA = Drainage area to pond (ac)	19.72
	R = wet season rainfall depth (in)	30
	RT = residence time (days)	21
	(NOTE: 14 if littoral shelf, 21 if no littoral shelf)	
$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	WS = length of wet season (days)	153
	CF = conversion factor (12 in/ft)	12

POND SIZING CALCULATIONS

Pond 3C+4A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.90	0.99
Runoff Depth Q (in):	6.79	7.64
Runoff Volume (ac-ft):	11.16	12.56

Attenuation Volume (ac-ft): 1.40

Permanent Pool Volume Needed
PPV= 3.00 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.40	(above)
Treatment Volume (ac-ft):	2.46	(above)
Pond Volume Required (ac-ft):	3.86	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 334.8
W_{Rect} (ft): 167.4

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 346.8
W_{Rect} (ft): 179.4

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 386.80
W_{Rect} (ft): 219.40
Area (ac): 1.95

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.34

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	350.8
W _{Rect} (ft):	183.4
Area (ac):	1.48
	ac-ft
Available	5.92
Required	3.00
Enough?	yes

POND SIZING CALCULATIONS

Pond 4B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.16

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	7.76	6.60	+ 1.16
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Treatment Volume + 50% O.F.W. (ac-ft): 0.98

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	0.69	A	98	68
Pervious	5.91	A	85	502
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.16	A/D	67	77

Pre-Development Weighted CN: 83.4
Total Contributing Area (ac): 7.76

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	2.55	A	98	250
Pervious	4.05	A	85	344
Pervious				0
Pervious				0
Pervious				0
Pond	1.16	AD/Water	98	114

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.46

Post-Development Weighted CN: 91.2
Total Contributing Area (ac): 7.76

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 7.76
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 4B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.99	0.96
Runoff Depth Q (in):	6.72	7.67
Runoff Volume (ac-ft):	4.35	4.96

Attenuation Volume (ac-ft): 0.61

Permanent Pool Volume Needed
PPV= 1.23 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.61	(above)
Treatment Volume (ac-ft):	0.98	(above)
Pond Volume Required (ac-ft):	1.59	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 214.5
W_{Rect} (ft): 107.3

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 226.5
W_{Rect} (ft): 119.3

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 266.50
W_{Rect} (ft): 159.30
Area (ac): 0.97

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.16

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	230.5
W _{Rect} (ft):	123.3
Area (ac):	0.65
	ac-ft
Available	2.6
Required	1.23
Enough?	yes

POND SIZING CALCULATIONS

Pond 4C+5A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.99

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	16.10	14.11	+ 1.99
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Treatment Volume + 50% O.F.W. (ac-ft): 2.01

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.52	A	98	148
Pervious	12.59	A	85	1071
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.99	A/D	67	132

Pre-Development Weighted CN: 83.9
Total Contributing Area (ac): 16.10

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	5.48	A	98	537
Pervious	8.63	A	85	734
Pervious				0
Pervious				0
Pervious				0
Pond	1.99	AD/Water	98	195

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.45

Post-Development Weighted CN: 91.0
Total Contributing Area (ac): 16.10

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 16.10
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 4C+5A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.92	0.99
Runoff Depth Q (in):	6.78	7.64
Runoff Volume (ac-ft):	9.10	10.25

Attenuation Volume (ac-ft): 1.15

Permanent Pool Volume Needed
PPV= 2.47 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.15	(above)
Treatment Volume (ac-ft):	2.01	(above)
Pond Volume Required (ac-ft):	3.16	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 302.9
W_{Rect} (ft): 151.5

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 314.9
W_{Rect} (ft): 163.5

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 354.90
W_{Rect} (ft): 203.50
Area (ac): 1.66

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.99

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	318.9
W _{Rect} (ft):	167.5
Area (ac):	1.23
	ac-ft
Available	4.92
Required	2.47
Enough?	yes

POND SIZING CALCULATIONS

Pond 5B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.28

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	8.79	7.51	+ 1.28
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Treatment Volume + 50% O.F.W. (ac-ft): 1.10

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	0.82	A	98	81
Pervious	6.69	A	85	568
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.28	A/D	67	85

Pre-Development Weighted CN: 83.5
Total Contributing Area (ac): 8.79

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	2.93	A	98	287
Pervious	4.58	A	85	390
Pervious				0
Pervious				0
Pervious				0
Pond	1.28	AD/Water	98	125

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.46

Post-Development Weighted CN: 91.2
Total Contributing Area (ac): 8.79

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 8.79
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 5B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.98	0.96
Runoff Depth Q (in):	6.72	7.67
Runoff Volume (ac-ft):	4.92	5.62

Attenuation Volume (ac-ft): 0.70

Permanent Pool Volume Needed
PPV= 1.39 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.70	(above)
Treatment Volume (ac-ft):	1.10	(above)
Pond Volume Required (ac-ft):	1.80	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 228.3
W_{Rect} (ft): 114.2

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 240.3
W_{Rect} (ft): 126.2

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 280.30
W_{Rect} (ft): 166.20
Area (ac): 1.07

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.28

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	244.3
W _{Rect} (ft):	130.2
Area (ac):	0.73
	ac-ft
Available	2.92
Required	1.39
Enough?	yes

POND SIZING CALCULATIONS

Pond 5C+6A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.65

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	23.02	20.37	+ 2.65
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Treatment Volume + 50% O.F.W. (ac-ft): 2.88

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	2.23	A	98	218
Pervious	18.14	A	85	1542
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.65	A/D	67	176

Pre-Development Weighted CN: 84.1
Total Contributing Area (ac): 23.02

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	7.94	A	98	778
Pervious	12.43	A	85	1057
Pervious				0
Pervious				0
Pervious				0
Pond	2.65	AD/Water	98	260

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.44

Post-Development Weighted CN: 91.0
Total Contributing Area (ac): 23.02

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) **23.02**
R = wet season rainfall depth (in) **30**
RT = residence time (days) **21**
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) **153**
CF = conversion factor (12 in/ft) **12**

POND SIZING CALCULATIONS

Pond 5C+6A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.89	0.99
Runoff Depth Q (in):	6.80	7.64
Runoff Volume (ac-ft):	13.04	14.66

Attenuation Volume (ac-ft): 1.62

Permanent Pool Volume Needed
PPV= 3.50 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.62	(above)
Treatment Volume (ac-ft):	2.88	(above)
Pond Volume Required (ac-ft):	4.50	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 361.5
W_{Rect} (ft): 180.8

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 373.5
W_{Rect} (ft): 192.8

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 413.50
W_{Rect} (ft): 232.80
Area (ac): 2.21

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.65

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	377.5
W _{Rect} (ft):	196.8
Area (ac):	1.71
	ac-ft
Available	6.84
Required	3.50
Enough?	yes

POND SIZING CALCULATIONS

Pond 6B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.86

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	14.72	12.86	+ 1.86
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Treatment Volume + 50% O.F.W. (ac-ft): 1.85

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.41	A	98	138
Pervious	11.45	A	85	974
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.86	A/D	67	124

Pre-Development Weighted CN: 83.9
Total Contributing Area (ac): 14.72

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	5.01	A	98	491
Pervious	7.85	A	85	667
Pervious				0
Pervious				0
Pond	1.86	AD/Water	98	182

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.45

Post-Development Weighted CN: 91.1
Total Contributing Area (ac): 14.72

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 14.72
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 6B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.92	0.98
Runoff Depth Q (in):	6.78	7.65
Runoff Volume (ac-ft):	8.32	9.38

Attenuation Volume (ac-ft): 1.06

Permanent Pool Volume Needed
PPV= 2.27 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.06	(above)
Treatment Volume (ac-ft):	1.85	(above)
Pond Volume Required (ac-ft):	2.91	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 290.4
W_{Rect} (ft): 145.2

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 302.4
W_{Rect} (ft): 157.2

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 342.40
W_{Rect} (ft): 197.20
Area (ac): 1.55

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.86

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
Dimensions Of Equivalent Rectangular PP With Vertical Sides	
L _{Rect} (ft):	306.4
W _{Rect} (ft):	161.2
Area (ac):	1.13
	ac-ft
Available	4.52
Required	2.27
Enough?	yes

POND SIZING CALCULATIONS

Pond 6C

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.86

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	14.72	12.86	+ 1.86
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Treatment Volume + 50% O.F.W. (ac-ft): 1.85

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.41	A	98	138
Pervious	11.45	A	85	974
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.86	A/D	67	124

Pre-Development Weighted CN: 83.9
Total Contributing Area (ac): 14.72

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	5.01	A	98	491
Pervious	7.85	A	85	667
Pervious				0
Pervious				0
Pervious				0
Pond	1.86	AD/Water	98	182

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.45

Post-Development Weighted CN: 91.1
Total Contributing Area (ac): 14.72

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 14.72
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 6C

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.92	0.98
Runoff Depth Q (in):	6.78	7.65
Runoff Volume (ac-ft):	8.32	9.38

Attenuation Volume (ac-ft): 1.06

Permanent Pool Volume Needed
PPV= 2.27 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.06	(above)
Treatment Volume (ac-ft):	1.85	(above)
Pond Volume Required (ac-ft):	2.91	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 290.4
W_{Rect} (ft): 145.2

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 302.4
W_{Rect} (ft): 157.2

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 342.40
W_{Rect} (ft): 197.20
Area (ac): 1.55

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.86

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
Dimensions Of Equivalent Rectangular PP With Vertical Sides	
L _{Rect} (ft):	306.4
W _{Rect} (ft):	161.2
Area (ac):	1.13
	ac-ft
Available	4.52
Required	2.27
Enough?	yes

POND SIZING CALCULATIONS

Floodp. Comp. (Pond 6D,6E,6F)

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin: Tomoka River Basin
Approximate Drainage Area Beginning Sta.
Approximate Drainage Area Ending Sta.
Storm Frequency (yrs)
Storm Duration (hrs)

Pre-basin Post-basin

Post-basin: Tomoka River Basin

Wet/Dry Pond: **Wet**
Det/Ret Pond: **Det**
Rainfall Depth (P)(in): **8.72**
Req. Site Size (ac)*: **1.86**

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):

+ 1.86

Treatment Volume + 50% O.F.W. (ac-ft): 0.00

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious				0
Pervious				0
Pervious				0
Pervious				0
Pervious				0
Pond Site				0

Pre-Development Weighted CN: #DIV/0!
Total Contributing Area (ac): 0.00

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious				0
Pervious				0
Pervious				0
Pervious				0
Pervious				0
Pond				0

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw #DIV/0!

Post-Development Weighted CN: #DIV/0!
Total Contributing Area (ac): 0.00

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac)
R = wet season rainfall depth (in)
RT = residence time (days)
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days)
CF = conversion factor (12 in/ft)

0.00

POND SIZING CALCULATIONS

Floodp. Comp. (Pond 6D,6E,6F)

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	#DIV/0!	#DIV/0!
Runoff Depth Q (in):	#DIV/0!	#DIV/0!
Runoff Volume (ac-ft):	#DIV/0!	#DIV/0!

Attenuation Volume (ac-ft): 0.39

Permanent Pool Volume Needed
PPV= #DIV/0! ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	6.50	Avg. Normal Water Level Depth:	7.5

Required Pond Volume

Attenuation Volume (ac-ft):	0.39	(above)
Treatment Volume (ac-ft):	0.00	(above)
Pond Volume Required (ac-ft):	0.39	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 72.6
W_{Rect} (ft): 36.3

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 98.6
W_{Rect} (ft): 62.3

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 138.60
W_{Rect} (ft): 102.30
Area (ac): 0.33

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 0.40

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	88.6
W _{Rect} (ft):	52.3
Area (ac):	0.11
	ac-ft
	0.44
Available	
Required	#DIV/0!
Enough?	yes

POND SIZING CALCULATIONS

Pond 7A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.49

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	10.83	9.34	+ 1.49
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Treatment Volume + 50% O.F.W. (ac-ft): 1.35

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.03	A	98	101
Pervious	8.31	A	85	707
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.49	A/D	67	99

Pre-Development Weighted CN: 83.7
Total Contributing Area (ac): 10.83

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	3.64	A	98	357
Pervious	5.70	A	85	484
Pervious				0
Pervious				0
Pond	1.49	AD/Water	98	146

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.46

Post-Development Weighted CN: 91.2
Total Contributing Area (ac): 10.83

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 10.83
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 7A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.95	0.96
Runoff Depth Q (in):	6.75	7.67
Runoff Volume (ac-ft):	6.09	6.92

Attenuation Volume (ac-ft): 0.83

Permanent Pool Volume Needed
PPV= 1.70 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.83	(above)
Treatment Volume (ac-ft):	1.35	(above)
Pond Volume Required (ac-ft):	2.18	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 251.6
W_{Rect} (ft): 125.8

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 263.6
W_{Rect} (ft): 137.8

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 303.60
W_{Rect} (ft): 177.80
Area (ac): 1.24

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.49

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	267.6
W _{Rect} (ft):	141.8
Area (ac):	0.87
	ac-ft
Available	3.48
Required	1.70
Enough?	yes

POND SIZING CALCULATIONS

Pond 7B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.49

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	10.83	9.34	+ 1.49
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Treatment Volume + 50% O.F.W. (ac-ft): 1.35

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.03	A	98	101
Pervious	8.31	A	85	707
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.49	A/D	67	99

Pre-Development Weighted CN: 83.7
Total Contributing Area (ac): 10.83

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	3.64	A	98	357
Pervious	5.70	A	85	484
Pervious				0
Pervious				0
Pervious				0
Pond	1.49	AD/Water	98	146

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.46

Post-Development Weighted CN: 91.2
Total Contributing Area (ac): 10.83

$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	DA = Drainage area to pond (ac)	10.83
	R = wet season rainfall depth (in)	30
	RT = residence time (days)	21
	(NOTE: 14 if littoral shelf, 21 if no littoral shelf)	
$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	WS = length of wet season (days)	153
	CF = conversion factor (12 in/ft)	12

POND SIZING CALCULATIONS

Pond 7B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.95	0.96
Runoff Depth Q (in):	6.75	7.67
Runoff Volume (ac-ft):	6.09	6.92

Attenuation Volume (ac-ft): 0.83

Permanent Pool Volume Needed
PPV= 1.70 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.83	(above)
Treatment Volume (ac-ft):	1.35	(above)
Pond Volume Required (ac-ft):	2.18	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 251.6
W_{Rect} (ft): 125.8

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 263.6
W_{Rect} (ft): 137.8

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 303.60
W_{Rect} (ft): 177.80
Area (ac): 1.24

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.49

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	267.6
W _{Rect} (ft):	141.8
Area (ac):	0.87
	ac-ft
Available	3.48
Required	1.70
Enough?	yes

POND SIZING CALCULATIONS

Pond 7C+8A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.63

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	22.79	20.16	+ 2.63
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Treatment Volume + 50% O.F.W. (ac-ft): 2.85

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	2.22	A	98	217
Pervious	17.94	A	85	1525
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.63	A/D	67	175

Pre-Development Weighted CN: 84.1
Total Contributing Area (ac): 22.79

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	7.86	A	98	771
Pervious	12.30	A	85	1045
Pervious				0
Pervious				0
Pond	2.63	AD/Water	98	258

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.44

Post-Development Weighted CN: 91.0
Total Contributing Area (ac): 22.79

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 22.79
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 7C+8A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.89	0.99
Runoff Depth Q (in):	6.80	7.64
Runoff Volume (ac-ft):	12.91	14.51

Attenuation Volume (ac-ft): 1.60

Permanent Pool Volume Needed
PPV= 3.47 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.60	(above)
Treatment Volume (ac-ft):	2.85	(above)
Pond Volume Required (ac-ft):	4.45	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 359.5
W_{Rect} (ft): 179.8

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 371.5
W_{Rect} (ft): 191.8

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 411.50
W_{Rect} (ft): 231.80
Area (ac): 2.19

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.63

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	375.5
W _{Rect} (ft):	195.8
Area (ac):	1.69
	ac-ft
Available	6.76
Required	3.47
Enough?	yes

POND SIZING CALCULATIONS

Pond 8B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.64

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	12.46	10.82	+ 1.64
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Treatment Volume + 50% O.F.W. (ac-ft): 1.56

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.19	A	98	117
Pervious	9.63	A	85	818
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.64	A/D	67	109

Pre-Development Weighted CN: 83.8
Total Contributing Area (ac): 12.46

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	4.22	A	98	414
Pervious	6.60	A	85	561
Pervious				0
Pervious				0
Pond	1.64	AD/Water	98	161

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.45

Post-Development Weighted CN: 91.1
Total Contributing Area (ac): 12.46

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 12.46
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 8B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.93	0.98
Runoff Depth Q (in):	6.77	7.65
Runoff Volume (ac-ft):	7.03	7.94

Attenuation Volume (ac-ft): 0.91

Permanent Pool Volume Needed
PPV= 1.94 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.91	(above)
Treatment Volume (ac-ft):	1.56	(above)
Pond Volume Required (ac-ft):	2.47	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 267.8
W_{Rect} (ft): 133.9

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 279.8
W_{Rect} (ft): 145.9

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 319.80
W_{Rect} (ft): 185.90
Area (ac): 1.36

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.63

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2*0.5*H*Side Slope + 2*Berm Width}$$

$$W_{Rect} = L*(L/W Ratio) + 2*0.5*H*Side Slope + 2*Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	283.8
W _{Rect} (ft):	149.9
Area (ac):	0.98
	ac-ft
Available	3.92
Required	1.94
Enough?	yes

POND SIZING CALCULATIONS

Pond 8C

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.64

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	12.46	10.82	+ 1.64
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Treatment Volume + 50% O.F.W. (ac-ft): 1.56

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.19	A	98	117
Pervious	9.63	A	85	818
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.64	A/D	67	109

Pre-Development Weighted CN: 83.8
Total Contributing Area (ac): 12.46

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	4.22	A	98	414
Pervious	6.60	A	85	561
Pervious				0
Pervious				0
Pond	1.64	AD/Water	98	161

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.45

Post-Development Weighted CN: 91.1
Total Contributing Area (ac): 12.46

$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	DA = Drainage area to pond (ac) 12.46 R = wet season rainfall depth (in) 30 RT = residence time (days) 21 (NOTE: 14 if littoral shelf, 21 if no littoral shelf) WS = length of wet season (days) 153 CF = conversion factor (12 in/ft) 12
$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	

POND SIZING CALCULATIONS

Pond 8C

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.93	0.98
Runoff Depth Q (in):	6.77	7.65
Runoff Volume (ac-ft):	7.03	7.94

Attenuation Volume (ac-ft): 0.91

Permanent Pool Volume Needed
PPV= 1.94 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.91	(above)
Treatment Volume (ac-ft):	1.56	(above)
Pond Volume Required (ac-ft):	2.47	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 267.8
W_{Rect} (ft): 133.9

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 279.8
W_{Rect} (ft): 145.9

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 319.80
W_{Rect} (ft): 185.90
Area (ac): 1.36

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.63

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	283.8
W _{Rect} (ft):	149.9
Area (ac):	0.98
	ac-ft
Available	3.92
Required	1.94
Enough?	yes

POND SIZING CALCULATIONS

Pond 9A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.10

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	17.28	15.18	+ 2.10
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Treatment Volume + 50% O.F.W. (ac-ft): 2.16

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.67	A	98	164
Pervious	13.51	A	85	1148
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.10	A/D	67	140

Pre-Development Weighted CN: 84.0
Total Contributing Area (ac): 17.28

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	5.92	A	98	580
Pervious	9.26	A	85	787
Pervious				0
Pervious				0
Pond	2.10	AD/Water	98	206

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.45

Post-Development Weighted CN: 91.0
Total Contributing Area (ac): 17.28

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 17.28
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 9A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.90	0.99
Runoff Depth Q (in):	6.79	7.64
Runoff Volume (ac-ft):	9.78	11.00

Attenuation Volume (ac-ft): 1.22

Permanent Pool Volume Needed
PPV= 2.65 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.22	(above)
Treatment Volume (ac-ft):	2.16	(above)
Pond Volume Required (ac-ft):	3.38	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 313.3
W_{Rect} (ft): 156.7

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 325.3
W_{Rect} (ft): 168.7

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 365.30
W_{Rect} (ft): 208.70
Area (ac): 1.75

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.10

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	329.3
W _{Rect} (ft):	172.7
Area (ac):	1.31
	ac-ft
Available	5.24
Required	2.65
Enough?	yes

POND SIZING CALCULATIONS

Pond 9B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.91

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	17.09	15.18	+ 1.91
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Treatment Volume + 50% O.F.W. (ac-ft): 2.13

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.67	A	98	164
Pervious	13.51	A	85	1148
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.91	A/D	67	127

Pre-Development Weighted CN: 84.2
Total Contributing Area (ac): 17.09

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	5.92	A	98	580
Pervious	9.26	A	85	787
Pervious				0
Pervious				0
Pervious				0
Pond	1.91	AD/Water	98	187

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.44

Post-Development Weighted CN: 91.0
Total Contributing Area (ac): 17.09

$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	DA = Drainage area to pond (ac)	17.09
	R = wet season rainfall depth (in)	30
	RT = residence time (days)	21
	(NOTE: 14 if littoral shelf, 21 if no littoral shelf)	
$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	WS = length of wet season (days)	153
	CF = conversion factor (12 in/ft)	12

POND SIZING CALCULATIONS

Pond 9B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.88	0.99
Runoff Depth Q (in):	6.81	7.64
Runoff Volume (ac-ft):	9.70	10.88

Attenuation Volume (ac-ft): 1.18

Permanent Pool Volume Needed
PPV= 2.59 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	15	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.18	(above)
Treatment Volume (ac-ft):	2.13	(above)
Pond Volume Required (ac-ft):	3.31	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 310.0
W_{Rect} (ft): 155.0

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 322.0
W_{Rect} (ft): 167.0

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 352.00
W_{Rect} (ft): 197.00
Area (ac): 1.59

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.91

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	326.0
W _{Rect} (ft):	171.0
Area (ac):	1.28
	ac-ft
Available	5.12
Required	2.59
Enough?	yes

POND SIZING CALCULATIONS

Pond 9C+10A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	3.36

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	31.21	27.85	+ 3.36
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Treatment Volume + 50% O.F.W. (ac-ft): 3.90

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	3.04	A	98	298
Pervious	24.81	A	85	2109
Pervious				0
Pervious				0
Pervious				0
Pond Site	3.36	A/D	67	223

Pre-Development Weighted CN: 84.3
Total Contributing Area (ac): 31.21

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.85	A	98	1063
Pervious	17.00	A	85	1445
Pervious				0
Pervious				0
Pond	3.36	AD/Water	98	329

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.44

Post-Development Weighted CN: 90.9
Total Contributing Area (ac): 31.21

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 31.21
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 9C+10A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.86	1.00
Runoff Depth Q (in):	6.83	7.63
Runoff Volume (ac-ft):	17.76	19.84

Attenuation Volume (ac-ft): 2.08

Permanent Pool Volume Needed
PPV= 4.69 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	2.08	(above)
Treatment Volume (ac-ft):	3.90	(above)
Pond Volume Required (ac-ft):	5.98	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 416.7
W_{Rect} (ft): 208.4

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 428.7
W_{Rect} (ft): 220.4

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 468.70
W_{Rect} (ft): 260.40
Area (ac): 2.80

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 3.36

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	432.7
W _{Rect} (ft):	224.4
Area (ac):	2.23
	ac-ft
Available	8.92
Required	4.69
Enough?	yes

POND SIZING CALCULATIONS

Pond 10B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.84

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	14.51	12.67	+ 1.84
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Treatment Volume + 50% O.F.W. (ac-ft): 1.82

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.37	A	98	134
Pervious	11.30	A	85	961
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.84	A/D	67	122

Pre-Development Weighted CN: 83.9
Total Contributing Area (ac): 14.51

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	4.92	A	98	482
Pervious	7.75	A	85	659
Pervious				0
Pervious				0
Pervious				0
Pond	1.84	AD/Water	98	180

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.45

Post-Development Weighted CN: 91.1
Total Contributing Area (ac): 14.51

$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	DA = Drainage area to pond (ac) R = wet season rainfall depth (in) RT = residence time (days) (NOTE: 14 if littoral shelf, 21 if no littoral shelf) WS = length of wet season (days) CF = conversion factor (12 in/ft)	14.51 30 21 153 12
$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$		

POND SIZING CALCULATIONS

Pond 10B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.92	0.98
Runoff Depth Q (in):	6.78	7.65
Runoff Volume (ac-ft):	8.20	9.25

Attenuation Volume (ac-ft): 1.05

Permanent Pool Volume Needed
PPV= 2.24 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.05	(above)
Treatment Volume (ac-ft):	1.82	(above)
Pond Volume Required (ac-ft):	2.87	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 288.4
W_{Rect} (ft): 144.2

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 300.4
W_{Rect} (ft): 156.2

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 340.40
W_{Rect} (ft): 196.20
Area (ac): 1.53

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.84

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	304.4
W _{Rect} (ft):	160.2
Area (ac):	1.12
	ac-ft
Available	4.48
Required	2.24
Enough?	yes

POND SIZING CALCULATIONS

Pond 10C

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.84

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	14.51	12.67	+ 1.84
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Treatment Volume + 50% O.F.W. (ac-ft): 1.82

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.37	A	98	134
Pervious	11.30	A	85	961
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.84	A/D	67	122

Pre-Development Weighted CN: 83.9
Total Contributing Area (ac): 14.51

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	4.92	A	98	482
Pervious	7.75	A	85	659
Pervious				0
Pervious				0
Pervious				0
Pond	1.84	AD/Water	98	180

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.45

Post-Development Weighted CN: 91.1
Total Contributing Area (ac): 14.51

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 14.51
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 10C

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.92	0.98
Runoff Depth Q (in):	6.78	7.65
Runoff Volume (ac-ft):	8.20	9.25

Attenuation Volume (ac-ft): 1.05

Permanent Pool Volume Needed
PPV= 2.24 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.05	(above)
Treatment Volume (ac-ft):	1.82	(above)
Pond Volume Required (ac-ft):	2.87	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 288.4
W_{Rect} (ft): 144.2

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 300.4
W_{Rect} (ft): 156.2

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 340.40
W_{Rect} (ft): 196.20
Area (ac): 1.53

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.84

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	304.4
W _{Rect} (ft):	160.2
Area (ac):	1.12
	ac-ft
Available	4.48
Required	2.24
Enough?	yes

POND SIZING CALCULATIONS

Pond 11A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.45

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	10.51	9.06	+ 1.45
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Treatment Volume + 50% O.F.W. (ac-ft): 1.32

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.14	A	98	112
Pervious	7.92	A	85	673
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.45	A/D	67	96

Pre-Development Weighted CN: 83.9
Total Contributing Area (ac): 10.51

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	3.63	A	98	356
Pervious	5.43	A	85	461
Pervious				0
Pervious				0
Pond	1.45	AD/Water	98	142

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.47

Post-Development Weighted CN: 91.3
Total Contributing Area (ac): 10.51

$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	DA = Drainage area to pond (ac) 10.51 R = wet season rainfall depth (in) 30 RT = residence time (days) 21 (NOTE: 14 if littoral shelf, 21 if no littoral shelf) WS = length of wet season (days) 153 CF = conversion factor (12 in/ft) 12
$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	

POND SIZING CALCULATIONS

Pond 11A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.92	0.95
Runoff Depth Q (in):	6.78	7.68
Runoff Volume (ac-ft):	5.94	6.73

Attenuation Volume (ac-ft): 0.79

Permanent Pool Volume Needed
PPV= 1.68 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.79	(above)
Treatment Volume (ac-ft):	1.32	(above)
Pond Volume Required (ac-ft):	2.11	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 247.5
W_{Rect} (ft): 123.8

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 259.5
W_{Rect} (ft): 135.8

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 299.50
W_{Rect} (ft): 175.80
Area (ac): 1.21

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.45

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
Dimensions Of Equivalent Rectangular PP With Vertical Sides	
L _{Rect} (ft):	263.5
W _{Rect} (ft):	139.8
Area (ac):	0.85
	ac-ft
Available	3.4
Required	1.68
Enough?	yes

POND SIZING CALCULATIONS

Pond 11B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.45

TREATMENT VOLUME COMPUTATION

Treatment Area (ac): 10.51 9.06 + 1.45

Treatment Volume + 50% O.F.W. (ac-ft): 1.32

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.14	A	98	112
Pervious	7.92	A	85	673
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.45	A/D	67	96

Pre-Development Weighted CN: 83.9
Total Contributing Area (ac): 10.51

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	3.63	A	98	356
Pervious	5.43	A	85	461
Pervious				0
Pervious				0
Pond	1.45	AD/Water	98	142

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.47

Post-Development Weighted CN: 91.3
Total Contributing Area (ac): 10.51

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 10.51
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 11B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.92	0.95
Runoff Depth Q (in):	6.78	7.68
Runoff Volume (ac-ft):	5.94	6.73

Attenuation Volume (ac-ft): 0.79

Permanent Pool Volume Needed
PPV= 1.68 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.79	(above)
Treatment Volume (ac-ft):	1.32	(above)
Pond Volume Required (ac-ft):	2.11	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 247.5
W_{Rect} (ft): 123.8

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 259.5
W_{Rect} (ft): 135.8

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 299.50
W_{Rect} (ft): 175.80
Area (ac): 1.21

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.45

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	263.5
W _{Rect} (ft):	139.8
Area (ac):	0.85
	ac-ft
Available	3.4
Required	1.68
Enough?	yes

POND SIZING CALCULATIONS

Pond 11C

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.45

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	10.51	9.06	+ 1.45
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Treatment Volume + 50% O.F.W. (ac-ft): 1.32

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.14	A	98	112
Pervious	7.92	A	85	673
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.45	A/D	67	96

Pre-Development Weighted CN: 83.9
Total Contributing Area (ac): 10.51

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	3.63	A	98	356
Pervious	5.43	A	85	461
Pervious				0
Pervious				0
Pond	1.45	AD/Water	98	142

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.47

Post-Development Weighted CN: 91.3
Total Contributing Area (ac): 10.51

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) **10.51**
R = wet season rainfall depth (in) **30**
RT = residence time (days) **21**
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) **153**
CF = conversion factor (12 in/ft) **12**

POND SIZING CALCULATIONS

Pond 11C

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.92	0.95
Runoff Depth Q (in):	6.78	7.68
Runoff Volume (ac-ft):	5.94	6.73

Attenuation Volume (ac-ft): 0.79

Permanent Pool Volume Needed
PPV= 1.68 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.79	(above)
Treatment Volume (ac-ft):	1.32	(above)
Pond Volume Required (ac-ft):	2.11	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 247.5
W_{Rect} (ft): 123.8

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 259.5
W_{Rect} (ft): 135.8

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 299.50
W_{Rect} (ft): 175.80
Area (ac): 1.21

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.45

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2*0.5*H*Side Slope + 2*Berm Width}$$

$$W_{Rect} = L*(L/W Ratio) + 2*0.5*H*Side Slope + 2*Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	263.5
W _{Rect} (ft):	139.8
Area (ac):	0.85
	ac-ft
Available	3.4
Required	1.68
Enough?	yes

POND SIZING CALCULATIONS

Pond 12A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.13

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	6.87	5.74	+ 1.13
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Treatment Volume + 50% O.F.W. (ac-ft): 0.86

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	0.79	A	98	78
Pervious	4.95	A	85	420
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.13	A/D	67	75

Pre-Development Weighted CN: 83.5
Total Contributing Area (ac): 6.87

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	3.09	A	98	303
Pervious	2.65	A	85	225
Pervious				0
Pervious				0
Pond	1.13	AD/Water	98	111

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.59

Post-Development Weighted CN: 93.0
Total Contributing Area (ac): 6.87

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 6.87
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 12A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.98	0.75
Runoff Depth Q (in):	6.72	7.88
Runoff Volume (ac-ft):	3.85	4.51

Attenuation Volume (ac-ft): 0.66

Permanent Pool Volume Needed
PPV= 1.40 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.66	(above)
Treatment Volume (ac-ft):	0.86	(above)
Pond Volume Required (ac-ft):	1.52	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 209.8
W_{Rect} (ft): 104.9

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 221.8
W_{Rect} (ft): 116.9

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 261.80
W_{Rect} (ft): 156.90
Area (ac): 0.94

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.13

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
Dimensions Of Equivalent Rectangular PP With Vertical Sides	
L _{Rect} (ft):	225.8
W _{Rect} (ft):	120.9
Area (ac):	0.63
	ac-ft
Available	2.52
Required	1.40
Enough?	yes

POND SIZING CALCULATIONS

Pond 12B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.06

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	6.80	5.74	+ 1.06
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Treatment Volume + 50% O.F.W. (ac-ft): 0.86

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	0.79	A	98	78
Pervious	4.95	A	85	420
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.06	B/D	77	81

Pre-Development Weighted CN: 85.2
Total Contributing Area (ac): 6.80

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	3.09	A	98	303
Pervious	2.65	A	85	225
Pervious				0
Pervious				0
Pond	1.06	BD/Water	98	104

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.59

Post-Development Weighted CN: 92.9
Total Contributing Area (ac): 6.80

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 6.80
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 12B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.74	0.76
Runoff Depth Q (in):	6.93	7.87
Runoff Volume (ac-ft):	3.93	4.46

Attenuation Volume (ac-ft): 0.53

Permanent Pool Volume Needed
PPV= 1.37 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.53	(above)
Treatment Volume (ac-ft):	0.86	(above)
Pond Volume Required (ac-ft):	1.39	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L _{Rect} (ft):	200.6
W _{Rect} (ft):	100.3

Pond Dimensions Considering Sides Slopes

L _{Rect} (ft):	212.6
W _{Rect} (ft):	112.3

Pond Site Dimensions Considering Maintenance Berm

L _{Rect} (ft):	252.60
W _{Rect} (ft):	152.30
Area (ac):	0.88

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.06

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	216.6
W _{Rect} (ft):	116.3
Area (ac):	0.58
	ac-ft
Available	2.32
Required	1.37
Enough?	yes

POND SIZING CALCULATIONS

Pond 12C+13A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.35

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	17.16	14.81	+ 2.35
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Treatment Volume + 50% O.F.W. (ac-ft): 2.15

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.54	A	98	151
Pervious	13.27	A	85	1128
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.35	B/D	67	156

Pre-Development Weighted CN: 83.6
Total Contributing Area (ac): 17.16

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	9.06	A	98	888
Pervious	5.75	A	85	489
Pervious				0
Pervious				0
Pond	2.35	BD/Water	98	230

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.64

Post-Development Weighted CN: 93.6
Total Contributing Area (ac): 17.16

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) **17.16**
R = wet season rainfall depth (in) **30**
RT = residence time (days) **21**
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) **153**
CF = conversion factor (12 in/ft) **12**

POND SIZING CALCULATIONS

Pond 12C+13A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.96	0.68
Runoff Depth Q (in):	6.74	7.95
Runoff Volume (ac-ft):	9.64	11.37

Attenuation Volume (ac-ft): 1.73

Permanent Pool Volume Needed
PPV= 3.76 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.73	(above)
Treatment Volume (ac-ft):	2.15	(above)
Pond Volume Required (ac-ft):	3.88	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 335.5
W_{Rect} (ft): 167.8

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 347.5
W_{Rect} (ft): 179.8

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 387.50
W_{Rect} (ft): 219.80
Area (ac): 1.96

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.35

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	351.5
W _{Rect} (ft):	183.8
Area (ac):	1.48
	ac-ft
Available	5.92
Required	3.76
Enough?	yes

POND SIZING CALCULATIONS

Pond 13B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.69

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	10.76	9.07	+ 1.69
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Treatment Volume + 50% O.F.W. (ac-ft):	1.35
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Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	0.75	A	98	74
Pervious	8.32	A	85	707
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.69	A/D	67	112

Pre-Development Weighted CN: 83.0
Total Contributing Area (ac): 10.76

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	5.97	A	98	585
Pervious	3.10	A	85	264
Pervious				0
Pervious				0
Pond	1.69	AD/Water	98	166

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.68

Post-Development Weighted CN: 94.3
Total Contributing Area (ac): 10.76

$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	DA = Drainage area to pond (ac)	10.76
	R = wet season rainfall depth (in)	30
	RT = residence time (days)	21
	(NOTE: 14 if littoral shelf, 21 if no littoral shelf)	
$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	WS = length of wet season (days)	153
	CF = conversion factor (12 in/ft)	12

POND SIZING CALCULATIONS

Pond 13B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	2.05	0.60
Runoff Depth Q (in):	6.67	8.04
Runoff Volume (ac-ft):	5.98	7.21

Attenuation Volume (ac-ft): 1.23

Permanent Pool Volume Needed
PPV= 2.53 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.23	(above)
Treatment Volume (ac-ft):	1.35	(above)
Pond Volume Required (ac-ft):	2.58	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L _{Rect} (ft):	273.7
W _{Rect} (ft):	136.9

Pond Dimensions Considering Sides Slopes

L _{Rect} (ft):	285.7
W _{Rect} (ft):	148.9

Pond Site Dimensions Considering Maintenance Berm

L _{Rect} (ft):	325.70
W _{Rect} (ft):	188.90
Area (ac):	1.41

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.69

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
Dimensions Of Equivalent Rectangular PP With Vertical Sides	
L _{Rect} (ft):	289.7
W _{Rect} (ft):	152.9
Area (ac):	1.02
	ac-ft
Available	4.08
Required	2.53
Enough?	yes

POND SIZING CALCULATIONS

Pond 14B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	3.38

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	32.77	29.39	+ 3.38
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Treatment Volume + 50% O.F.W. (ac-ft): 4.10

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	8.92	A	98	874
Pervious	20.47	A	85	1740
Pervious				0
Pervious				0
Pervious				0
Pond Site	3.38	A	49	166

Pre-Development Weighted CN: 84.8
Total Contributing Area (ac): 32.77

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.98	A	98	1076
Pervious	18.41	A	85	1565
Pervious				0
Pervious				0
Pond	3.38	A/Water	98	331

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.42

Post-Development Weighted CN: 90.7
Total Contributing Area (ac): 32.77

$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	DA = Drainage area to pond (ac) 32.77 R = wet season rainfall depth (in) 30 RT = residence time (days) 21 (NOTE: 14 if littoral shelf, 21 if no littoral shelf) WS = length of wet season (days) 153 CF = conversion factor (12 in/ft) 12
$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	

POND SIZING CALCULATIONS

Pond 14B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.79	1.03
Runoff Depth Q (in):	6.89	7.60
Runoff Volume (ac-ft):	18.82	20.75

Attenuation Volume (ac-ft): 1.93

Permanent Pool Volume Needed
PPV= 4.74 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.93	(above)
Treatment Volume (ac-ft):	4.10	(above)
Pond Volume Required (ac-ft):	6.03	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 418.3
W_{Rect} (ft): 209.2

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 430.3
W_{Rect} (ft): 221.2

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 470.30
W_{Rect} (ft): 261.20
Area (ac): 2.82

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 3.38

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	3.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	430.3
W _{Rect} (ft):	221.2
Area (ac):	2.19
	ac-ft
Available	6.57
Required	4.74
Enough?	yes

POND SIZING CALCULATIONS

Pond 14C

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.87

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	32.26	29.39	+ 2.87
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Treatment Volume + 50% O.F.W. (ac-ft): 4.04

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	8.92	A	98	874
Pervious	20.47	A	85	1740
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.87	B/D	77	220

Pre-Development Weighted CN: 87.8
Total Contributing Area (ac): 32.26

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.98	A	98	1076
Pervious	18.41	A	85	1565
Pervious				0
Pervious				0
Pond	2.87	BD/Water	98	281

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.41

Post-Development Weighted CN: 90.6
Total Contributing Area (ac): 32.26

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 32.26
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 14C

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.39	1.04
Runoff Depth Q (in):	7.25	7.59
Runoff Volume (ac-ft):	19.49	20.40

Attenuation Volume (ac-ft): 0.91

Permanent Pool Volume Needed
PPV= 4.56 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.91	(above)
Treatment Volume (ac-ft):	4.04	(above)
Pond Volume Required (ac-ft):	4.95	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 378.9
W_{Rect} (ft): 189.5

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 390.9
W_{Rect} (ft): 201.5

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 430.90
W_{Rect} (ft): 241.50
Area (ac): 2.39

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.87

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	394.9
W _{Rect} (ft):	205.5
Area (ac):	1.86
	ac-ft
Available	7.44
Required	4.56
Enough?	yes

POND SIZING CALCULATIONS

Pond 14D

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.87

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	32.26	29.39	+ 2.87
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Treatment Volume + 50% O.F.W. (ac-ft): 4.04

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	8.92	A	98	874
Pervious	20.47	A	85	1740
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.87	B/D	77	220

Pre-Development Weighted CN: 87.8
Total Contributing Area (ac): 32.26

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.98	A	98	1076
Pervious	18.41	A	85	1565
Pervious				0
Pervious				0
Pond	2.87	BD/Water	98	281

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.41

Post-Development Weighted CN: 90.6
Total Contributing Area (ac): 32.26

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 32.26
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 14D

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.39	1.04
Runoff Depth Q (in):	7.25	7.59
Runoff Volume (ac-ft):	19.49	20.40

Attenuation Volume (ac-ft): 0.91

Permanent Pool Volume Needed
PPV= 4.56 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.91	(above)
Treatment Volume (ac-ft):	4.04	(above)
Pond Volume Required (ac-ft):	4.95	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 378.9
W_{Rect} (ft): 189.5

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 390.9
W_{Rect} (ft): 201.5

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 430.90
W_{Rect} (ft): 241.50
Area (ac): 2.39

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.87

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	394.9
W _{Rect} (ft):	205.5
Area (ac):	1.86
	ac-ft
Available	7.44
Required	4.56
Enough?	yes

POND SIZING CALCULATIONS

Pond 14E

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.87

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	32.26	29.39	+ 2.87
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Treatment Volume + 50% O.F.W. (ac-ft): 4.04

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	8.92	A	98	874
Pervious	20.47	A	85	1740
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.87	B/D	77	220

Pre-Development Weighted CN: 87.8
Total Contributing Area (ac): 32.26

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.98	A	98	1076
Pervious	18.41	A	85	1565
Pervious				0
Pervious				0
Pervious				0
Pond	2.87	BD/Water	98	281

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.41

Post-Development Weighted CN: 90.6
Total Contributing Area (ac): 32.26

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 32.26
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 14E

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.39	1.04
Runoff Depth Q (in):	7.25	7.59
Runoff Volume (ac-ft):	19.49	20.40

Attenuation Volume (ac-ft): 0.91

Permanent Pool Volume Needed
PPV= 4.56 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.91	(above)
Treatment Volume (ac-ft):	4.04	(above)
Pond Volume Required (ac-ft):	4.95	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L _{Rect} (ft):	378.9
W _{Rect} (ft):	189.5

Pond Dimensions Considering Sides Slopes

L _{Rect} (ft):	390.9
W _{Rect} (ft):	201.5

Pond Site Dimensions Considering Maintenance Berm

L _{Rect} (ft):	430.90
W _{Rect} (ft):	241.50
Area (ac):	2.39

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.87

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	394.9
W _{Rect} (ft):	205.5
Area (ac):	1.86
	ac-ft
Available	7.44
Required	4.56
Enough?	yes

POND SIZING CALCULATIONS

Pond 15A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.78

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	31.01	28.23	+ 2.78
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Treatment Volume + 50% O.F.W. (ac-ft): 3.87

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	8.36	A	98	820
Pervious	19.87	A	85	1689
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.78	B/D	77	213

Pre-Development Weighted CN: 87.7
Total Contributing Area (ac): 31.01

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.58	A	98	1037
Pervious	17.65	A	85	1500
Pervious				0
Pervious				0
Pervious				0
Pond	2.78	BD/Water	98	272

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.41

Post-Development Weighted CN: 90.6
Total Contributing Area (ac): 31.01

$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	DA = Drainage area to pond (ac)	31.01
	R = wet season rainfall depth (in)	30
	RT = residence time (days)	21
	(NOTE: 14 if littoral shelf, 21 if no littoral shelf)	
$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	WS = length of wet season (days)	153
	CF = conversion factor (12 in/ft)	12

POND SIZING CALCULATIONS

Pond 15A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.40	1.04
Runoff Depth Q (in):	7.24	7.59
Runoff Volume (ac-ft):	18.71	19.61

Attenuation Volume (ac-ft): 0.90

Permanent Pool Volume Needed
PPV= 4.40 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.90	(above)
Treatment Volume (ac-ft):	3.87	(above)
Pond Volume Required (ac-ft):	4.77	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 372.2
W_{Rect} (ft): 186.1

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 384.2
W_{Rect} (ft): 198.1

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 424.20
W_{Rect} (ft): 238.10
Area (ac): 2.32

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.78

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	388.2
W _{Rect} (ft):	202.1
Area (ac):	1.80
	ac-ft
Available	7.2
Required	4.40
Enough?	yes

POND SIZING CALCULATIONS

Pond 15B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.78

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	31.01	28.23	+ 2.78
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Treatment Volume + 50% O.F.W. (ac-ft): 3.87

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	8.36	A	98	820
Pervious	19.87	A	85	1689
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.78	B/D	77	213

Pre-Development Weighted CN: 87.7
Total Contributing Area (ac): 31.01

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.58	A	98	1037
Pervious	17.65	A	85	1500
Pervious				0
Pervious				0
Pervious				0
Pond	2.78	BD/Water	98	272

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.41

Post-Development Weighted CN: 90.6
Total Contributing Area (ac): 31.01

$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	DA = Drainage area to pond (ac)	31.01
	R = wet season rainfall depth (in)	30
	RT = residence time (days)	21
	(NOTE: 14 if littoral shelf, 21 if no littoral shelf)	
$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	WS = length of wet season (days)	153
	CF = conversion factor (12 in/ft)	12

POND SIZING CALCULATIONS

Pond 15B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.40	1.04
Runoff Depth Q (in):	7.24	7.59
Runoff Volume (ac-ft):	18.71	19.61

Attenuation Volume (ac-ft): 0.90

Permanent Pool Volume Needed
PPV= 4.40 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.90	(above)
Treatment Volume (ac-ft):	3.87	(above)
Pond Volume Required (ac-ft):	4.77	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 372.2
W_{Rect} (ft): 186.1

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 384.2
W_{Rect} (ft): 198.1

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 424.20
W_{Rect} (ft): 238.10
Area (ac): 2.32

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.78

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	388.2
W _{Rect} (ft):	202.1
Area (ac):	1.80
	ac-ft
Available	7.2
Required	4.40
Enough?	yes

POND SIZING CALCULATIONS

Pond 15C

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.78

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	31.01	28.23	+ 2.78
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Treatment Volume + 50% O.F.W. (ac-ft): 3.87

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	8.36	A	98	820
Pervious	19.87	A	85	1689
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.78	B/D	77	213

Pre-Development Weighted CN: 87.7
Total Contributing Area (ac): 31.01

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.58	A	98	1037
Pervious	17.65	A	85	1500
Pervious				0
Pervious				0
Pervious				0
Pond	2.78	BD/Water	98	272

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.41

Post-Development Weighted CN: 90.6
Total Contributing Area (ac): 31.01

$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	DA = Drainage area to pond (ac)	31.01
	R = wet season rainfall depth (in)	30
	RT = residence time (days)	21
	(NOTE: 14 if littoral shelf, 21 if no littoral shelf)	
$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	WS = length of wet season (days)	153
	CF = conversion factor (12 in/ft)	12

POND SIZING CALCULATIONS

Pond 15C

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.40	1.04
Runoff Depth Q (in):	7.24	7.59
Runoff Volume (ac-ft):	18.71	19.61

Attenuation Volume (ac-ft): 0.90

Permanent Pool Volume Needed
PPV= 4.40 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.90	(above)
Treatment Volume (ac-ft):	3.87	(above)
Pond Volume Required (ac-ft):	4.77	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 372.2
W_{Rect} (ft): 186.1

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 384.2
W_{Rect} (ft): 198.1

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 424.20
W_{Rect} (ft): 238.10
Area (ac): 2.32

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.78

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	388.2
W _{Rect} (ft):	202.1
Area (ac):	1.80
	ac-ft
Available	7.2
Required	4.40
Enough?	yes

POND SIZING CALCULATIONS

Pond 15D

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.78

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	31.01	28.23	+ 2.78
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Treatment Volume + 50% O.F.W. (ac-ft): 3.87

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	8.36	A	98	820
Pervious	19.87	A	85	1689
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.78	B/D	77	213

Pre-Development Weighted CN: 87.7
Total Contributing Area (ac): 31.01

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.58	A	98	1037
Pervious	17.65	A	85	1500
Pervious				0
Pervious				0
Pervious				0
Pond	2.78	BD/Water	98	272

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.41

Post-Development Weighted CN: 90.6
Total Contributing Area (ac): 31.01

$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$ $CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$	DA = Drainage area to pond (ac) 31.01 R = wet season rainfall depth (in) 30 RT = residence time (days) 21 (NOTE: 14 if littoral shelf, 21 if no littoral shelf) WS = length of wet season (days) 153 CF = conversion factor (12 in/ft) 12
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POND SIZING CALCULATIONS

Pond 15D

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.40	1.04
Runoff Depth Q (in):	7.24	7.59
Runoff Volume (ac-ft):	18.71	19.61

Attenuation Volume (ac-ft): 0.90

Permanent Pool Volume Needed
PPV= 4.40 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.90	(above)
Treatment Volume (ac-ft):	3.87	(above)
Pond Volume Required (ac-ft):	4.77	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 372.2
W_{Rect} (ft): 186.1

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 384.2
W_{Rect} (ft): 198.1

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 424.20
W_{Rect} (ft): 238.10
Area (ac): 2.32

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.78

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	388.2
W _{Rect} (ft):	202.1
Area (ac):	1.80
	ac-ft
Available	7.2
Required	4.40
Enough?	yes

POND SIZING CALCULATIONS

Pond 16A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	3.18

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	37.40	34.22	+ 3.18
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Treatment Volume + 50% O.F.W. (ac-ft): 4.68

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	11.43	A	98	1120
Pervious	22.79	A	85	1937
Pervious				0
Pervious				0
Pervious				0
Pond Site	3.18	A/D	67	211

Pre-Development Weighted CN: 87.4
Total Contributing Area (ac): 37.40

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.62	A	98	1040
Pervious	23.60	A	85	2006
Pervious				0
Pervious				0
Pervious				0
Pond	3.18	AD/Water	98	312

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.35

Post-Development Weighted CN: 89.8
Total Contributing Area (ac): 37.40

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) **37.40**
R = wet season rainfall depth (in) **30**
RT = residence time (days) **21**
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) **153**
CF = conversion factor (12 in/ft) **12**

POND SIZING CALCULATIONS

Pond 16A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.44	1.14
Runoff Depth Q (in):	7.20	7.49
Runoff Volume (ac-ft):	22.44	23.34

Attenuation Volume (ac-ft): 0.90

Permanent Pool Volume Needed
PPV= 4.55 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.90	(above)
Treatment Volume (ac-ft):	4.68	(above)
Pond Volume Required (ac-ft):	5.58	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 402.5
W_{Rect} (ft): 201.3

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 414.5
W_{Rect} (ft): 213.3

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 454.50
W_{Rect} (ft): 253.30
Area (ac): 2.64

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 3.17

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
Dimensions Of Equivalent Rectangular PP With Vertical Sides	
L _{Rect} (ft):	418.5
W _{Rect} (ft):	217.3
Area (ac):	2.09
	ac-ft
Available	8.36
Required	4.55
Enough?	yes

POND SIZING CALCULATIONS

Pond 16B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	3.18

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	37.40	34.22	+ 3.18
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Treatment Volume + 50% O.F.W. (ac-ft): 4.68

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	11.43	A	98	1120
Pervious	22.79	A	85	1937
Pervious				0
Pervious				0
Pervious				0
Pond Site	3.18	A/D	67	211

Pre-Development Weighted CN: 87.4
Total Contributing Area (ac): 37.40

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.62	A	98	1040
Pervious	23.60	A	85	2006
Pervious				0
Pervious				0
Pervious				0
Pond	3.18	AD/Water	98	312

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.35

Post-Development Weighted CN: 89.8
Total Contributing Area (ac): 37.40

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 37.40
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 16B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.44	1.14
Runoff Depth Q (in):	7.20	7.49
Runoff Volume (ac-ft):	22.44	23.34

Attenuation Volume (ac-ft): 0.90

Permanent Pool Volume Needed
PPV= 4.55 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.90	(above)
Treatment Volume (ac-ft):	4.68	(above)
Pond Volume Required (ac-ft):	5.58	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 402.5
W_{Rect} (ft): 201.3

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 414.5
W_{Rect} (ft): 213.3

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 454.50
W_{Rect} (ft): 253.30
Area (ac): 2.64

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 3.17

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	418.5
W _{Rect} (ft):	217.3
Area (ac):	2.09
	ac-ft
Available	8.36
Required	4.55
Enough?	yes

POND SIZING CALCULATIONS

Pond 16C

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	3.18

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	37.40	34.22	+ 3.18
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Treatment Volume + 50% O.F.W. (ac-ft): 4.68

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	11.43	A	98	1120
Pervious	22.79	A	85	1937
Pervious				0
Pervious				0
Pervious				0
Pond Site	3.18	A/D	67	211

Pre-Development Weighted CN: 87.4
Total Contributing Area (ac): 37.40

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.62	A	98	1040
Pervious	23.60	A	85	2006
Pervious				0
Pervious				0
Pervious				0
Pond	3.18	AD/Water	98	312

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.35

Post-Development Weighted CN: 89.8
Total Contributing Area (ac): 37.40

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) **37.40**
R = wet season rainfall depth (in) **30**
RT = residence time (days) **21**
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) **153**
CF = conversion factor (12 in/ft) **12**

POND SIZING CALCULATIONS

Pond 16C

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.44	1.14
Runoff Depth Q (in):	7.20	7.49
Runoff Volume (ac-ft):	22.44	23.34

Attenuation Volume (ac-ft): 0.90

Permanent Pool Volume Needed
PPV= 4.55 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.90	(above)
Treatment Volume (ac-ft):	4.68	(above)
Pond Volume Required (ac-ft):	5.58	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 402.5
W_{Rect} (ft): 201.3

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 414.5
W_{Rect} (ft): 213.3

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 454.50
W_{Rect} (ft): 253.30
Area (ac): 2.64

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 3.17

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	418.5
W _{Rect} (ft):	217.3
Area (ac):	2.09
	ac-ft
Available	8.36
Required	4.55
Enough?	yes

POND SIZING CALCULATIONS

Pond 16D

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	3.18

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	37.40	34.22	+ 3.18
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Treatment Volume + 50% O.F.W. (ac-ft): 4.68

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	11.43	A	98	1120
Pervious	22.79	A	85	1937
Pervious				0
Pervious				0
Pervious				0
Pond Site	3.18	A/D	67	211

Pre-Development Weighted CN: 87.4
Total Contributing Area (ac): 37.40

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.62	A	98	1040
Pervious	23.60	A	85	2006
Pervious				0
Pervious				0
Pervious				0
Pond	3.18	AD/Water	98	312

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.35

Post-Development Weighted CN: 89.8
Total Contributing Area (ac): 37.40

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 34.22
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 16D

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.44	1.14
Runoff Depth Q (in):	7.20	7.49
Runoff Volume (ac-ft):	22.44	23.34

Attenuation Volume (ac-ft): 0.90

Permanent Pool Volume Needed
PPV= 4.16 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.90	(above)
Treatment Volume (ac-ft):	4.68	(above)
Pond Volume Required (ac-ft):	5.58	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 402.5
W_{Rect} (ft): 201.3

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 414.5
W_{Rect} (ft): 213.3

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 454.50
W_{Rect} (ft): 253.30
Area (ac): 2.64

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 3.17

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	418.5
W _{Rect} (ft):	217.3
Area (ac):	2.09
	ac-ft
Available	8.36
Required	4.16
Enough?	yes

POND SIZING CALCULATIONS

Pond 17A

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.93

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	34.93	32.00	+ 2.93
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Treatment Volume + 50% O.F.W. (ac-ft): 4.37

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	11.98	A	98	1175
Pervious	20.02	A	85	1701
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.93	B/D	77	224

Pre-Development Weighted CN: 88.7
Total Contributing Area (ac): 34.93

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	12.39	A	98	1214
Pervious	19.61	A	85	1667
Pervious				0
Pervious				0
Pervious				0
Pond	2.93	BD/Water	98	287

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.42

Post-Development Weighted CN: 90.7
Total Contributing Area (ac): 34.93

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 34.93
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 17A

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.27	1.03
Runoff Depth Q (in):	7.36	7.60
Runoff Volume (ac-ft):	21.42	22.12

Attenuation Volume (ac-ft): 0.70

Permanent Pool Volume Needed
PPV= 5.04 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.70	(above)
Treatment Volume (ac-ft):	4.37	(above)
Pond Volume Required (ac-ft):	5.07	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 383.5
W_{Rect} (ft): 191.8

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 395.5
W_{Rect} (ft): 203.8

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 435.50
W_{Rect} (ft): 243.80
Area (ac): 2.44

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.93

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
Dimensions Of Equivalent Rectangular PP With Vertical Sides	
L _{Rect} (ft):	399.5
W _{Rect} (ft):	207.8
Area (ac):	1.91
	ac-ft
Available	7.64
Required	5.04
Enough?	yes

POND SIZING CALCULATIONS

Pond 17B

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	3.10

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	35.10	32.00	+ 3.10
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Treatment Volume + 50% O.F.W. (ac-ft): 4.40

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	11.98	A	98	1175
Pervious	20.02	A	85	1701
Pervious				0
Pervious				0
Pervious				0
Pond Site	3.10	A/D	67	206

Pre-Development Weighted CN: 87.8
Total Contributing Area (ac): 35.10

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	12.39	A	98	1214
Pervious	19.61	A	85	1667
Pervious				0
Pervious				0
Pervious				0
Pond	3.10	AD/Water	98	304

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.42

Post-Development Weighted CN: 90.7
Total Contributing Area (ac): 35.10

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) **35.10**
R = wet season rainfall depth (in) **30**
RT = residence time (days) **21**
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) **153**
CF = conversion factor (12 in/ft) **12**

POND SIZING CALCULATIONS

Pond 17B

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.39	1.03
Runoff Depth Q (in):	7.25	7.60
Runoff Volume (ac-ft):	21.21	22.23

Attenuation Volume (ac-ft): 1.02

Permanent Pool Volume Needed
PPV= 5.10 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.02	(above)
Treatment Volume (ac-ft):	4.40	(above)
Pond Volume Required (ac-ft):	5.42	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 396.5
W_{Rect} (ft): 198.3

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 408.5
W_{Rect} (ft): 210.3

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 448.50
W_{Rect} (ft): 250.30
Area (ac): 2.58

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 3.10

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
Dimensions Of Equivalent Rectangular PP With Vertical Sides	
L _{Rect} (ft):	412.5
W _{Rect} (ft):	214.3
Area (ac):	2.03
	ac-ft
Available	8.12
Required	5.10
Enough?	yes

POND SIZING CALCULATIONS

Pond 17C

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	3.10

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	35.10	32.00	+ 3.10
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Treatment Volume + 50% O.F.W. (ac-ft): 4.40

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	11.98	A	98	1175
Pervious	20.02	A	85	1701
Pervious				0
Pervious				0
Pervious				0
Pond Site	3.10	A/D	67	206

Pre-Development Weighted CN: 87.8
Total Contributing Area (ac): 35.10

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	12.39	A	98	1214
Pervious	19.61	A	85	1667
Pervious				0
Pervious				0
Pervious				0
Pond	3.10	AD/Water	98	304

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.42

Post-Development Weighted CN: 90.7
Total Contributing Area (ac): 35.10

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 35.10
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Pond 17C

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.39	1.03
Runoff Depth Q (in):	7.25	7.60
Runoff Volume (ac-ft):	21.21	22.23

Attenuation Volume (ac-ft): 1.02

Permanent Pool Volume Needed
PPV= 5.10 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.02	(above)
Treatment Volume (ac-ft):	4.40	(above)
Pond Volume Required (ac-ft):	5.42	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 396.5
W_{Rect} (ft): 198.3

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 408.5
W_{Rect} (ft): 210.3

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 448.50
W_{Rect} (ft): 250.30
Area (ac): 2.58

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 3.10

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	412.5
W _{Rect} (ft):	214.3
Area (ac):	2.03
	ac-ft
Available	8.12
Required	5.10
Enough?	yes

POND SIZING CALCULATIONS

Basin 18

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	2.05

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	18.07	16.02	+ 2.05
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Treatment Volume + 50% O.F.W. (ac-ft): 2.27

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	8.21	A	98	805
Pervious	7.81	A	85	664
Pervious				0
Pervious				0
Pervious				0
Pond Site	2.05	A	67	136

Pre-Development Weighted CN: 88.8
Total Contributing Area (ac): 18.07

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.81	A	98	1059
Pervious	5.21	A	85	443
Pervious				0
Pervious				0
Pond	2.05	A/Water	98	201

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.68

Post-Development Weighted CN: 94.3
Total Contributing Area (ac): 18.07

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 18.07
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Basin 18

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.26	0.60
Runoff Depth Q (in):	7.37	8.04
Runoff Volume (ac-ft):	11.10	12.11

Attenuation Volume (ac-ft): 1.01

Permanent Pool Volume Needed
PPV= 4.23 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S \text{ (in)} = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	1.01	(above)
Treatment Volume (ac-ft):	2.27	(above)
Pond Volume Required (ac-ft):	3.28	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 308.4
W_{Rect} (ft): 154.2

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 320.4
W_{Rect} (ft): 166.2

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 360.40
W_{Rect} (ft): 206.20
Area (ac): 1.71

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 2.05

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	324.4
W _{Rect} (ft):	170.2
Area (ac):	1.27
	ac-ft
Available	5.08
Required	4.23
Enough?	yes

POND SIZING CALCULATIONS

Basin 19

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	0.88

TREATMENT VOLUME COMPUTATION

Treatment Area (ac): 6.06 5.18 + 0.88

Treatment Volume + 50% O.F.W. (ac-ft): 0.77

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	1.99	A	98	195
Pervious	3.19	A	85	271
Pervious				0
Pervious				0
Pervious				0
Pond Site	0.88	A	67	59

Pre-Development Weighted CN: 86.6
Total Contributing Area (ac): 6.06

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	2.12	A	98	208
Pervious	3.06	A	85	260
Pervious				0
Pervious				0
Pervious				0
Pond	0.88	A/Water	98	86

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.48

Post-Development Weighted CN: 91.4
Total Contributing Area (ac): 6.06

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 6.06
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Basin 19

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.55	0.94
Runoff Depth Q (in):	7.10	7.69
Runoff Volume (ac-ft):	3.59	3.88

Attenuation Volume (ac-ft): 0.29

Permanent Pool Volume Needed
PPV= 0.99 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.29	(above)
Treatment Volume (ac-ft):	0.77	(above)
Pond Volume Required (ac-ft):	1.06	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L _{Rect} (ft):	175.0
W _{Rect} (ft):	87.5

Pond Dimensions Considering Sides Slopes

L _{Rect} (ft):	187.0
W _{Rect} (ft):	99.5

Pond Site Dimensions Considering Maintenance Berm

L _{Rect} (ft):	227.00
W _{Rect} (ft):	139.50
Area (ac):	0.73

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 0.88

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
Dimensions Of Equivalent Rectangular PP With Vertical Sides	
L _{Rect} (ft):	191.0
W _{Rect} (ft):	103.5
Area (ac):	0.45
	ac-ft
Available	1.8
Required	0.99
Enough?	yes

POND SIZING CALCULATIONS

Basin 20

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.00

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	6.71	5.71	+ 1.00
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Treatment Volume + 50% O.F.W. (ac-ft): 0.84

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	2.29	A	98	224
Pervious	3.42	A	85	291
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.00	A	67	67

Pre-Development Weighted CN: 86.7
Total Contributing Area (ac): 6.71

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	3.23	A	98	317
Pervious	2.48	A	85	211
Pervious				0
Pervious				0
Pervious				0
Pond	1.00	A/Water	98	98

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.61

Post-Development Weighted CN: 93.2
Total Contributing Area (ac): 6.71

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) 6.71
R = wet season rainfall depth (in) 30
RT = residence time (days) 21
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) 153
CF = conversion factor (12 in/ft) 12

POND SIZING CALCULATIONS

Basin 20

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.53	0.73
Runoff Depth Q (in):	7.12	7.90
Runoff Volume (ac-ft):	3.98	4.42

Attenuation Volume (ac-ft): 0.44

Permanent Pool Volume Needed
PPV= 1.40 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S \text{ (in)} = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	0.44	(above)
Treatment Volume (ac-ft):	0.84	(above)
Pond Volume Required (ac-ft):	1.28	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 192.8
W_{Rect} (ft): 96.4

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 204.8
W_{Rect} (ft): 108.4

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 244.80
W_{Rect} (ft): 148.40
Area (ac): 0.83

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 1.00

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
Dimensions Of Equivalent Rectangular PP With Vertical Sides	
L _{Rect} (ft):	208.8
W _{Rect} (ft):	112.4
Area (ac):	0.54
	ac-ft
Available	2.16
Required	1.40
Enough?	yes

POND SIZING CALCULATIONS

Pond 18A (REGIONAL 18 & 20)

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.90

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	26.23	24.33	+ 1.90
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Treatment Volume + 50% O.F.W. (ac-ft): 3.29

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.50	A	98	1029
Pervious	11.23	A	85	955
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.90	A/D	67	126

Pre-Development Weighted CN: 89.3
Total Contributing Area (ac): 23.63

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	14.04	A	98	1376
Pervious	10.29	A	85	875
Pervious				0
Pervious				0
Pervious				0
Pond	1.90	AD/Water	98	186

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.58

Post-Development Weighted CN: 92.9
Total Contributing Area (ac): 26.23

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) **26.23**
R = wet season rainfall depth (in) **30**
RT = residence time (days) **21**
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) **153**
CF = conversion factor (12 in/ft) **12**

POND SIZING CALCULATIONS

Pond 18A (REGIONAL 18 & 20)

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.20	0.76
Runoff Depth Q (in):	7.43	7.87
Runoff Volume (ac-ft):	14.63	17.20

Attenuation Volume (ac-ft): 2.57

Permanent Pool Volume Needed
PPV= 5.23 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	2.57	(above)
Treatment Volume (ac-ft):	3.29	(above)
Pond Volume Required (ac-ft):	5.86	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L_{Rect} (ft): 412.3
W_{Rect} (ft): 206.2

Pond Dimensions Considering Sides Slopes

L_{Rect} (ft): 424.3
W_{Rect} (ft): 218.2

Pond Site Dimensions Considering Maintenance Berm

L_{Rect} (ft): 464.30
W_{Rect} (ft): 258.20
Area (ac): 2.75

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 3.30

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
<u>Dimensions Of Equivalent Rectangular PP With Vertical Sides</u>	
L _{Rect} (ft):	428.3
W _{Rect} (ft):	222.2
Area (ac):	2.18
	ac-ft
Available	8.72
Required	5.23
Enough?	yes

POND SIZING CALCULATIONS

Pond 18B (REGIONAL 18 & 20)

Wet detention, sized for treatment and attenuation

Computed by:	ABR	Date:
Checked by:	LF	Jan-23

DESCRIPTION OF SITE AND FACILITY

Pre-drainage basin:	Tomoka River Basin	Pre-basin	Post-basin	Post-basin:	Tomoka River Basin
Approximate Drainage Area Beginning Sta.				Wet/Dry Pond:	Wet
Approximate Drainage Area Ending Sta.				Det/Ret Pond:	Det
Storm Frequency (yrs)	25			Rainfall Depth (P)(in):	8.72
Storm Duration (hrs)	24			Req. Site Size (ac)*:	1.90

TREATMENT VOLUME COMPUTATION

Treatment Area (ac):	26.23	24.33	+ 1.90
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Treatment Volume + 50% O.F.W. (ac-ft): 3.29

Treatment Volume For Wet System (ac-ft) = (1 in)*(1ft/12in)*(Treatment Area In Acres)

Note that for wet systems the treatment volume is based on 1" over the treatment area.
The treatment area spans the limits of construction; offsite runoff will be diverted.

COMPUTATION OF CURVE NUMBER AND SCS COEFFICIENTS

Table 1: Weighted Curve Number Computation (Pre-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	10.50	A	98	1029
Pervious	11.23	A	85	955
Pervious				0
Pervious				0
Pervious				0
Pond Site	1.90	A/D	67	126

Pre-Development Weighted CN: 89.3
Total Contributing Area (ac): 23.63

Table 2: Weighted Curve Number Computation (Post-Development)

Description	Area (ac)	Soil Gr.	CN	Product
Impervious	14.04	A	98	1376
Pervious	10.29	A	85	875
Pervious				0
Pervious				0
Pervious				0
Pond	1.90	AD/Water	98	186

This is the Cw used to calculate required the permanent pool
Cw for permanent pool criteria (does include pond)

Cw 0.58

Post-Development Weighted CN: 92.9
Total Contributing Area (ac): 26.23

$$CN_{Pre} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

$$CN_{Post} = \frac{(Area_1)(CN_1) + (Area_2)(CN_2) + \dots + (Area_n)(CN_n)}{\sum Area (ac)}$$

DA = Drainage area to pond (ac) **26.23**
R = wet season rainfall depth (in) **30**
RT = residence time (days) **21**
(NOTE: 14 if littoral shelf, 21 if no littoral shelf)
WS = length of wet season (days) **153**
CF = conversion factor (12 in/ft) **12**

POND SIZING CALCULATIONS

Pond 18B (REGIONAL 18 & 20)

COMPUTATION OF ATTENUATION VOLUME

Description	Pre	Post
Potential Abstraction (S):	1.20	0.76
Runoff Depth Q (in):	7.43	7.87
Runoff Volume (ac-ft):	14.63	17.20

Attenuation Volume (ac-ft): 2.57

Permanent Pool Volume Needed
PPV= 5.23 ac-ft

$$PPV = \frac{(DA)(C_w)(R)(RT)}{(WS)(CF)}$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad S(in) = \frac{1000}{CN} - 10$$

Attenuation volume (ac-ft) = Post(Total Contributing Area * Q * (1ft/12in)) - Pre(Total Contributing Area * Q * (1ft/12in))

ANALYSIS OF SITE REQUIRED

Assumed Pond Configuration:

Pond Maintenance Berm Width (ft):	20	Freeboard Desired (ft):	1
L/W Ratio:	2	Pond Side Slopes (X:1):	4
Anticipated Storage Depth (ft):	3.00	Avg. GW Depth:	1

Required Pond Volume

Attenuation Volume (ac-ft):	2.57	(above)
Treatment Volume (ac-ft):	3.29	(above)
Pond Volume Required (ac-ft):	5.86	

Dimensions Of Equivalent Rectangular Pond With Vertical Sides

L _{Rect} (ft):	412.3
W _{Rect} (ft):	206.2

Pond Dimensions Considering Sides Slopes

L _{Rect} (ft):	424.3
W _{Rect} (ft):	218.2

Pond Site Dimensions Considering Maintenance Berm

L _{Rect} (ft):	464.30
W _{Rect} (ft):	258.20
Area (ac):	2.75

Estimated Site Size Including 20% Factor Of Safety

Area (ac): 3.30

Pond Volume Required = Attenuation Volume + Treatment Volume

Anticipated Pond Depth_{Wet} = Depth To SHGWT - Freeboard

$$L_{Rect} = \sqrt{\frac{V}{H} (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width}$$

$$W_{Rect} = L * (L/W Ratio) + 2 * 0.5 * H * Side Slope + 2 * Berm Width$$

Permanent pool volume:	
Pond Side Slopes (X:1):	4
Freeboard Desired (ft):	0
L/W Ratio:	2
Anticipated Depth (ft):	4.0
Dimensions Of Equivalent Rectangular PP With Vertical Sides	
L _{Rect} (ft):	428.3
W _{Rect} (ft):	222.2
Area (ac):	2.18
	ac-ft
Available	8.72
Required	5.23
Enough?	yes

APPENDIX E

POND SITE EVALUATION MATRIX



APPENDIX F

MEETING MINUTES



**FDOT District Five
Drainage Office Kickoff Meeting
LPGA Boulevard PD&E Study
Financial Project Identification (FPID): 448456-1-22-01**

MEETING MINUTES

Date: March 1, 2022, at 9:00 AM

Location: Microsoft Teams

Attendees: Jesse Blouin (FDOT); Stephen Costello II (FDOT); Frank Fu (HDR); Ferrell Hickson (FDOT); Lazaro Ferrero(A&P); Victor-Muchuruza (HDR); Efren Rivera (FDOT); Adriana Rodriguez (HDR); Arnelio Alfonso (A&P); Angela M. Baron-Ruiz (A&P).
(See page 5)

- **Brief project overview**

- The design team explained the limits of the project and the proposed scope.
- Segment 1 extends from SR 600 to Tymber Creek Road.
 - The proposed typical section in this area will consist of a 4-lane divided roadway with curb and gutter, drainage swales and shared use paths on both sides.
- Segment 2 extends from Tymber Creek Road to N. Williamson Blvd.
 - The proposed typical section in this area consists of a 6 - 8 lane divided roadway with curb and gutter, drainage swales and shared use paths on both sides.
 - This segment includes the replacement of the bridge over the Tomoka River and the reconfiguration of the I-95 interchange to accommodate future traffic demands.
 - FDOT noted that wildlife crossings shall be accommodated in the Tomoka River bridge crossing and emphasized that pedestrian and bicycle use shall be accommodated in the design.
- It was noted that LPGA is a Volusia County Road within the project limits except for the I-95 Interchange area which is FDOT right-of-way.

- **General drainage overview of existing drainage**

- Segment 1:
 - Runoff from Segment 1 sheet flows to the adjacent roadside swales.

- There are fourteen (14) double culverts crossing on LPGA Boulevard which eventually discharge into the Tomoka River.
- The culverts range between 18 inches and 30 inches except for the crossing at the Thayer Canal which consists of two 7'x8' box culverts.
- There is offsite runoff from the west which will be considered in the drainage design for the proposed roadway.
- Segment 2:
 - There are two culvert crossings in the area between Tymber Creek Road and the I-95 Interchange which discharge into the ditch on the north and eventually discharge into the Tomoka River.
 - Runoff from the northwest and northeast quadrants of the interchange discharge into the ditches adjacent to the on/off ramps.
 - The NW ditch discharges directly into the Tomoka River while runoff from the NE ditch is conveyed through culvert crossings discharging into the 11th Street Canal.
 - Runoff from the southeastern and southwestern quadrants discharges into the 11th Street Canal which eventually discharges into the Tomoka River.
 - FDOT Drainage Office mentioned that there is a culvert discharging into the northeast ditch which shall be accounted for in the redesign of the project.
 - FDOT Drainage Office also noted that there was a previous project which proposed to reconfigure the existing interchange for which a Drainage Report was prepared. This Report has detailed existing drainage information and permitting requirements specific to this area.
 - FDOT will request a copy of this Report for the Team's reference and use.
- **Impacts to existing drainage**
 - Segment 1:
 - Roadside swales will be impacted with the proposed widening of the roadway.
 - The existing culvert crossings will be impacted and will be replaced/extended to accommodate the proposed widening. All offsite runoff from the west will be considered when sizing the new culvert crossings.
 - Segment 2:
 - All existing drainage in the interchange will be reconfigured to accommodate the proposed roadway improvements.
 - FDOT Drainage Office noted that the new Buc-ee's in the north quadrant of the interchange discharges into FDOT's right-of-way therefore that runoff needs to be considered when designing the new interchange drainage system.

- FDOT Drainage Office also mentioned that maintenance access to the northwest ditch is currently a challenge and should be addressed with this project.
- **General overview of proposed drainage**
 - The consultant team presented a map with the preliminary drainage basins and outfall locations. It was explained that the basins were delineated based on the existing culvert crossings and the existing roadway topography.
 - The consultant team noted that per extensive coordination with FDEP and National Marine Fishery Service it was determined that the Tomoka River is not tidally influenced. However, FDOT Drainage Office emphasized that sea level and groundwater rise shall be considered in the design of the proposed drainage system and of the proposed bridge crossing the Tomoka River.
 - The consultant team mentioned that canal flows and stage information was requested from FEMA three months ago and no information has been received. FDOT recommended that the team request the information from Volusia County FEMA coordinator.
 - Segment 1:
 - The proposed drainage will consist of curb inlets and will route the runoff to the proposed roadside swales.
 - Consultant team noted that dry detention could be considered as an alternative to provide water quality treatment if the groundwater elevation allows it however, it was noted that SJRWMD does not allow dry detention even though it's part of their criteria.
 - The consultant team explained that the southernmost basin will discharge into the U.S 92 Canal. FDOT noted that there is a planned project for the proposed widening of U.S. 92 therefore the opportunity to use ponds proposed for that project should be evaluated and considered.
 - Segment 2:
 - Due to the complete reconfiguration of the interchange, all the existing drainage infrastructure will be replaced, and drainage patterns will be reconfigured.
 - The ponds will be placed in the infield areas of the interchange.
- **Potential pond sites**
 - The consultant team noted that they are evaluating potential locations for ponds ensuring that there are no impacts to wetlands. FDOT Drainage Office mentioned that

- there is a wetland conservation easement that needs to be considered when evaluating the potential pond sites.
- o The design team presented potential alternatives for joint use ponds. FDOT emphasized that all environmental look around (ELA) opportunities should be presented and considered for stormwater reuse for irrigation in areas such as the golf course, the schools, the stadium, and the wastewater plant.
 - o FDOT also emphasized that 3 stormwater management alternatives per basin shall be presented. Alternatives may include innovative stormwater management strategies.
- **Design Criteria**
 - o SJRWMD water quality treatment and discharge criteria will be followed.
 - o FDOT criteria for the 3 yr- 1 day storm event will be used for the design of the proposed roadway drainage design.

- **Action Items**

Assigned	Action Item	Schedule/Status
Consultant	Determine 3 stormwater management alternatives per basin	03-11-2022
Consultant	Request stage/flow information for the Tomoka River from Volusia County	
FDOT	Request copy of I-95 Interchange Drainage Report	FDOT provided this information on 3/3/22

**FDOT District Five
Environmental Look Around (ELA) Meeting
LPGA Blvd PD&E Study
Financial Project Identification (FPID): 448456-1-22-01**

MEETING MINUTES

Date: October 28, 2022, at 1:30 PM

Location: Microsoft Teams

Attendees: See Attendees List

Items of Discussion:

- **Brief project overview**
 - The design team explained the limits of the project and the scope of improvements.
 - The improvements will address travel demand and enhance safety along LPGA Boulevard.
 - The improvements will involve widening of LPGA Boulevard and adding pedestrian and bicycle facilities, replacing and widening Tomoka River Bridge, and improvements to the I-95 interchange.
- **Existing Drainage Conditions**
 - Major drainage features
 - There are fourteen (14) double cross drains on LPGA Boulevard which eventually discharge into the Tomoka River.
 - The US 92 Canal is at the southernmost limit of the project. The Thayer Canal is located just north of the Ralph Brennan Water Treatment Plant. The 11th Street Canal runs along the south side of LPGA Boulevard at the I-95 intersection and flows west to east to the Tomoka River. The relocated 11th Street Canal was completed in 1995 and flows to the south and eventually to the Tomoka River. The relocated 11th Street Canal was designed to discharge 100-year flow rate, approximately 1,100 cfs.
 - Tomoka River
 - SJRWMD noted that the Tomoka River and its tributaries are Outstanding Florida Waters (OFW). Impaired waterbodies are designated on most south and north parts of the project limits per GIS data from Florida Department of Environmental Protection.
 - FDOT also noted that the Tomoka River is tidally influenced north of the study area; therefore, tidal conditions shall be considered in the proposed design.
- **Design Criteria**

- o Water Quality
 - An additional 50% water quality treatment shall be provided prior to discharge into the Tomoka River. Nutrient loading analysis will also be required for areas discharging into impaired waters.
 - The project team inquired about the possibility of providing compensatory treatment in the I-95 interchange infield areas for areas where treatment cannot be provided due to limited locations for pond placement.
 - SJRWMD noted that compensatory treatment will be evaluated in a case-by-case basis depending on what is being treated, with the best scenario being acre/acre compensation of “like” areas.
- o Water Quantity
 - The design team noted that the proposed drainage system will be designed to provide attenuation for the 25-year 1-day storm event.
- o Floodplain Compensation
 - FDOT and SJRWMD noted that floodplain compensation shall be provided for encroachments into the 100-year floodplain only with cup-by-cup approach.
- **Proposed drainage system**
 - o Pond Locations
 - The project team discussed the 22 basins proposed for the project and the 3 pond location alternatives for each of the basins.
 - The City of Daytona Beach noted that there is a proposed park at the SE corner of LPGA and Tournament Drive. The design of this park is in preliminary stages and no layout has been proposed yet. FDOT noted that the project team could work together with the City’s Park Design team to determine if a joint use pond could be proposed in this area.
 - o The potential park parcel identification number is 521700000070 (City owned).
 - o The City of Daytona Beach provided a sketch of the potential park location (see attachment).
 - The City of Daytona Beach also noted that the expansion of the existing pond in the stadium is not an ideal alternative as it may affect functional use of the park such as the parking.
 - The City of Daytona Beach mentioned that Welshinger-Butler Circle is being expanded and its design should be considered as part of the LPGA improvements. This design is in preliminary stages, there are no concept plans yet. FDOT will request the available plans.
 - Volusia County inquired about alternatives to provide water quality treatment within the existing right-of-way. It was noted by the project team that the groundwater table is high and good soils are necessary for this to be an option; therefore, locations for dry retention areas are limited to the area west of the Tomoka River bridge.

- Volusia County inquired about the placement of the pond just south of the Tennis Center where there is a conservation easement. They noted that the easement extends to the right of way line. The project team noted that the conservation easement document was reviewed, and the pond was placed outside of the easement. The county requested the project team to further review the conservation easement limits.
- FDOT inquired about the placement of the pond just east of Timber Creek Road. within the limits of the proposed Timber Creek Village development. The project team noted that the site plan for this development was reviewed, and the pond was placed to avoid conflicts with any proposed features. FDOT requested the project team to further review potential impacts of this pond.
- The project team presented the alternative to provide regional ponds that will treat upstream runoff prior to discharge into the Tomoka River. Regional pond alternatives presented are in the southeast quadrant of the intersection of LPGA Boulevard and Tomoka Farms Road, and two ponds off Williamson Boulevard south of the Cornerstone Boulevard and Williamson Boulevard intersections.
 - SJRWMD supported that approach; however, they requested to be informed throughout the design process should regional ponds be selected as a preferred pond alternative.
- **Environmental-Look-Around**
 - Joint-use and regional facility opportunities
 - FDOT inquired about upcoming SJRWMD, City of Daytona Beach, and/or Volusia County projects which may impact or be impacted by this project.
 - FDOT also noted that their goal is to provide innovative pond site alternatives that offer additional benefits to the project area and provide more than just the typical water quality treatment (i.e., water reuse, irrigation, additional nutrient loading treatment, etc.).
 - SJRWMD mentioned that future projects should be coordinated with Rich Burklew and Erich Marzolf from the Projects Division.
 - The project team inquired about the possibility to discharge runoff into the Bennett Swamp as part of the SJRWMD's Bennett Swamp Rehydration project.¹
 - SJRWMD will provide feedback on the matter.
- **General Discussion**
 - FDOT noted that during Hurricane Ian the westbound lanes on US 92 were severely flooded since they are lower than the eastbound lanes.
 - FDOT recommended raising LPGA Boulevard and US 92 intersection as part of the proposed design.
 - FDOT has not yet determined what storm event Hurricane Ian was.

¹ [Bennett Swamp Fact Sheet 4-29-19 - Updated - Small \(codb.us\)](#)

- o City of Daytona Beach Utilities Department inquired about the consideration of the force main project along LPGA Boulevard into the proposed design.
 - The project team noted that the utility plans are being reviewed as part of the PD&E analysis; however, utility conflicts will be addressed as part of the design phase of this project.
- o The project team stated that an environmental look around meeting will be held next with the private stakeholders to determine additional stormwater joint use facilities.
- o Copies of the maps presented during the meeting were requested by the agencies for review and feedback.

With no further discussion the meeting was adjourned at 2:30 PM

• **Action Items**

Assigned	Action Item	Schedule/Status
HDR Project Team	Revise pond site alternatives based on additional water quality treatment requirements.	11-04-2022 / on going
HDR Team	Provide copies of information shared during the meeting	Included in the meeting summary.
HDR Team	Schedule coordination meeting with private developers.	
FDOT	Request copies of Dunn Avenue extension plans.	
FDOT	Request copies of preliminary plans for the park west of the Water Treatment Plant.	11-07-2022 / City emailed FDOT a sketch of the site. There are no plans developed yet.
SJRWMD	Provide feedback on possibility of stormwater management alternative to support Bennet Swamp recharge.	

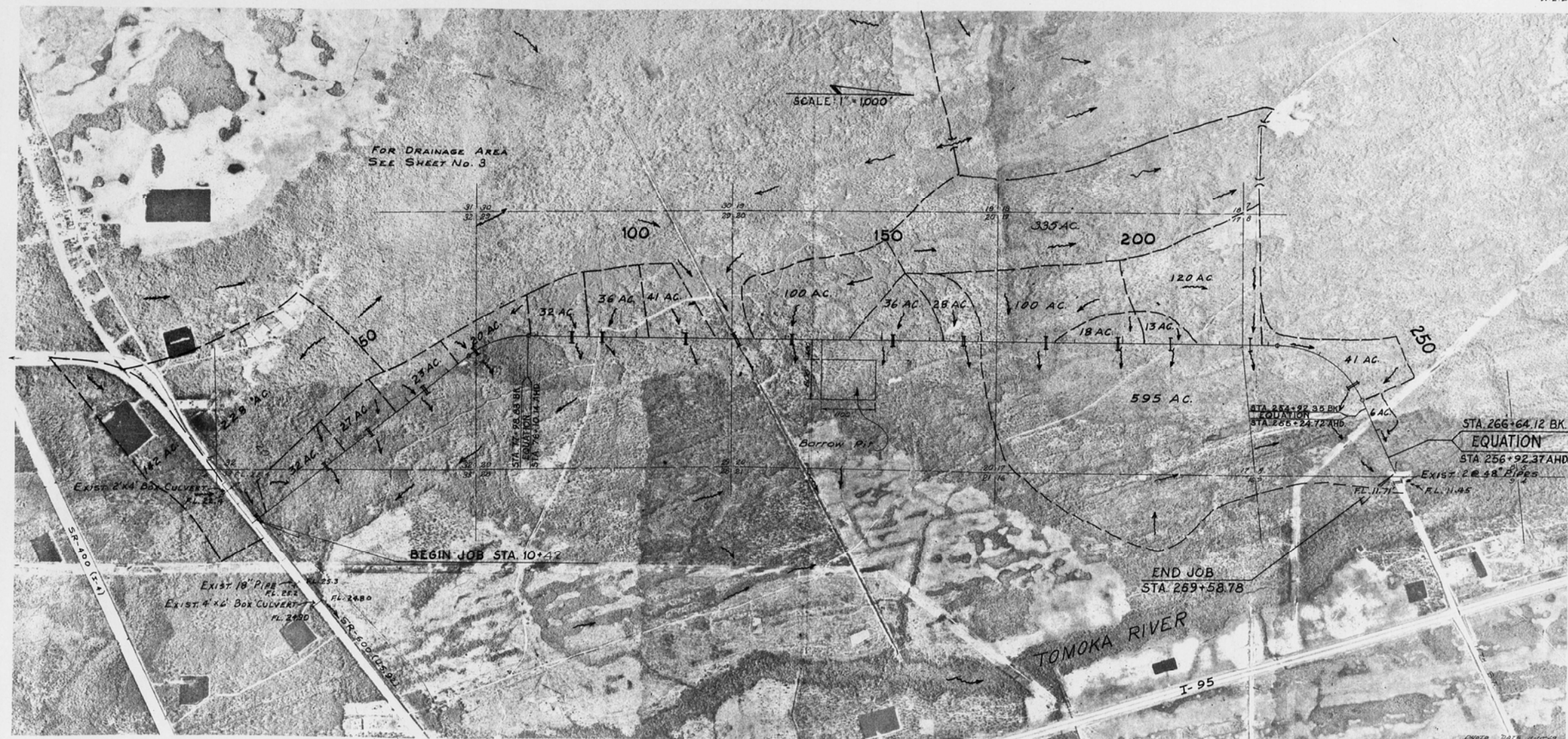
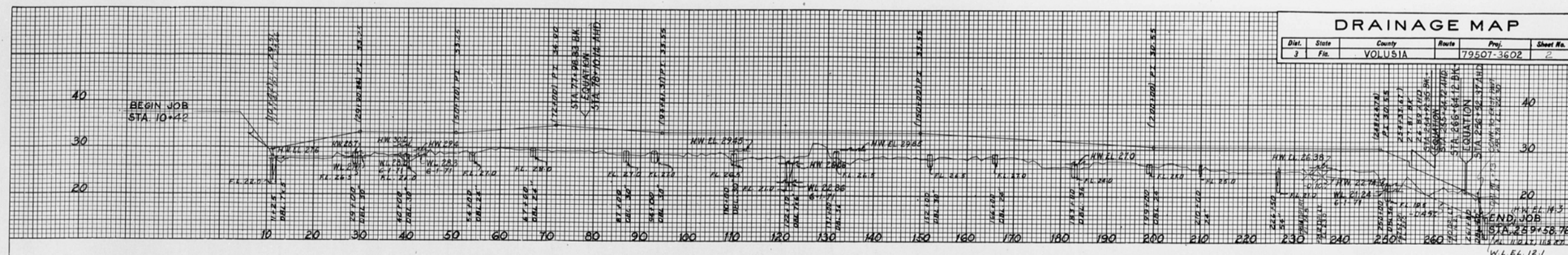
Prepared by Angela Baron-Ruiz and reviewed by Victor Muchuruza

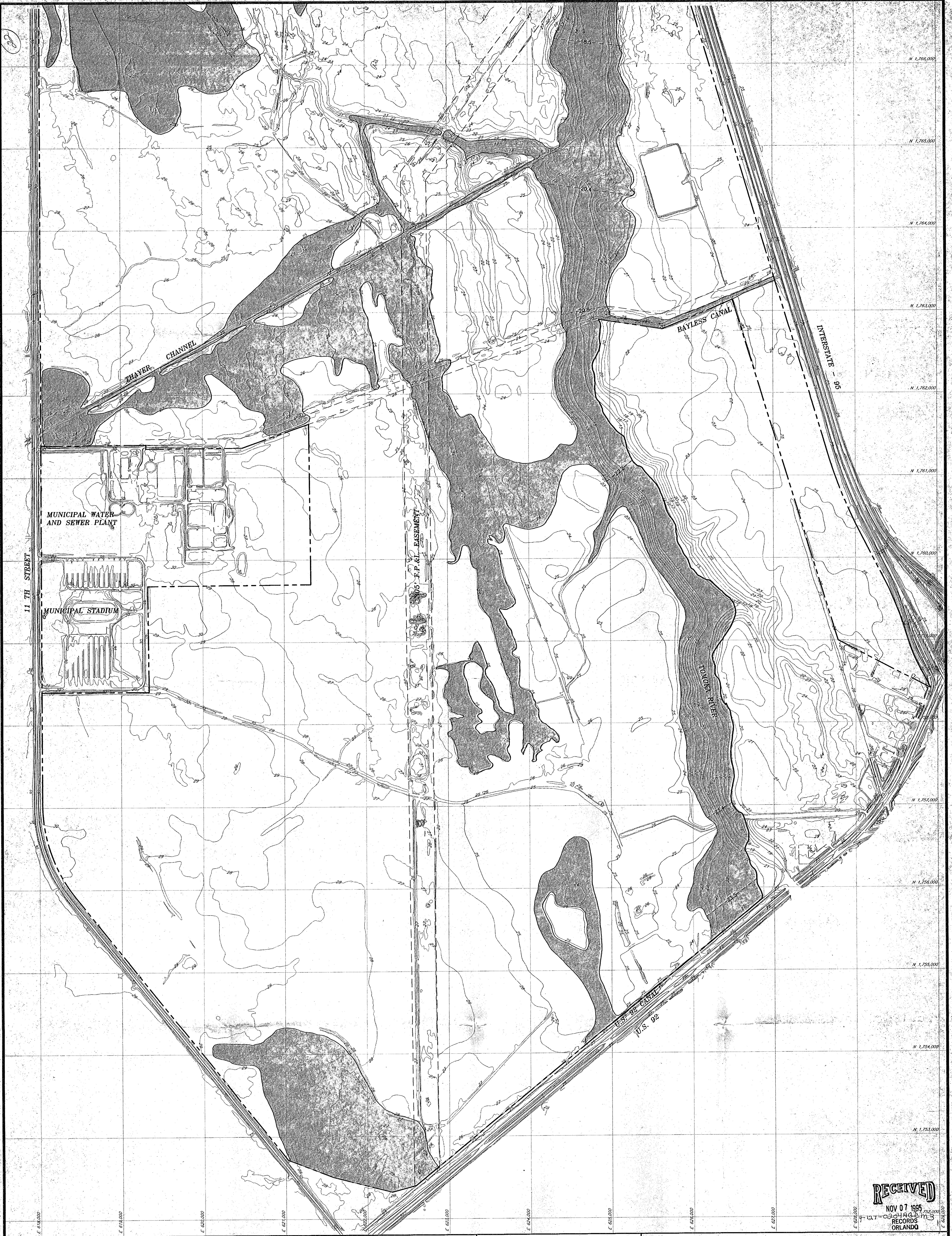
Attendees

Name	Agency
Alejandro Aleman	CHA
Angela Baron-Ruiz	CHA
Justin Barton	SJRWMD
Benjamin Bartlett	Volusia County
Jesse Blouin	FDOT
Steve Ferrell	HDR
Lazaro Ferrero	CHA
Frank Fu	HDR
Ferrell Hickson	FDOT
Andrew Holmes	City of Daytona Beach
Jay Williams	Volusia County
Jeff Reindl	SJRWMD
Lee Kissick	SJRWMD
Nichole Lloyd	City of Daytona Beach
Marc von Canal	SJRWMD
James Nelson	City of Daytona Beach
David Waller	City of Daytona Beach
Victor Muchuruza	HDR
Donald Kean	City of Daytona Beach
Brian Woodworth	City of Daytona Beach

ATTACHMENTS

- 1971 LPGA Drainage Map
- LPGA 10 Year FloodPlains
- Overall Basin Model Diagram (prepared by CDM)
- 1995 LPGA Blvd Interchange Drainage Report Calculations (79002-3429)
- Kmz file showing LPGA Boulevard PD&E Basin Boundaries (emailed attachment)
- Potential City park, Parcel ID 521700000070 (City owned)



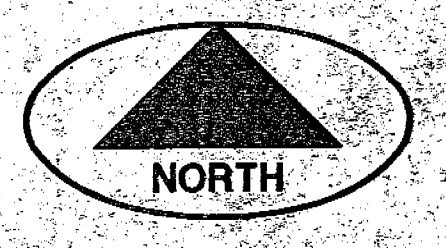
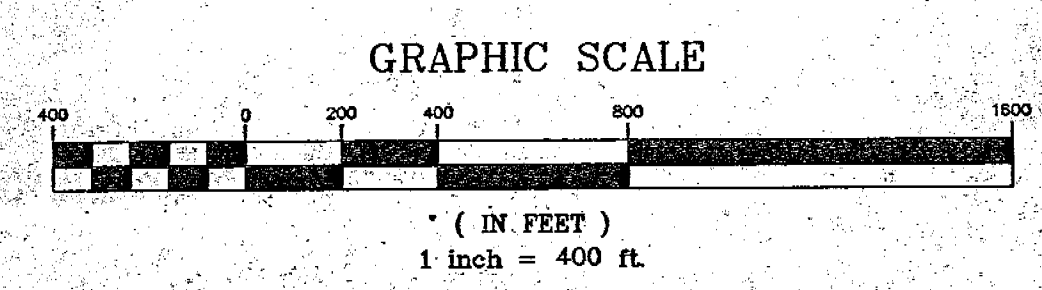


10 YEAR FLOODPLAIN BOUNDARIES

L.P.G.A. SOUTH GOLF COURSE
S.J.R.W.M.D. CONCEPTUAL APPLICATION



MILLER - SELLEN ASSOCIATES, INC.
214 East Lucerne Circle - Orlando, Florida 32801 (407) 422-3330
URBAN PLANNERS & ENGINEERS

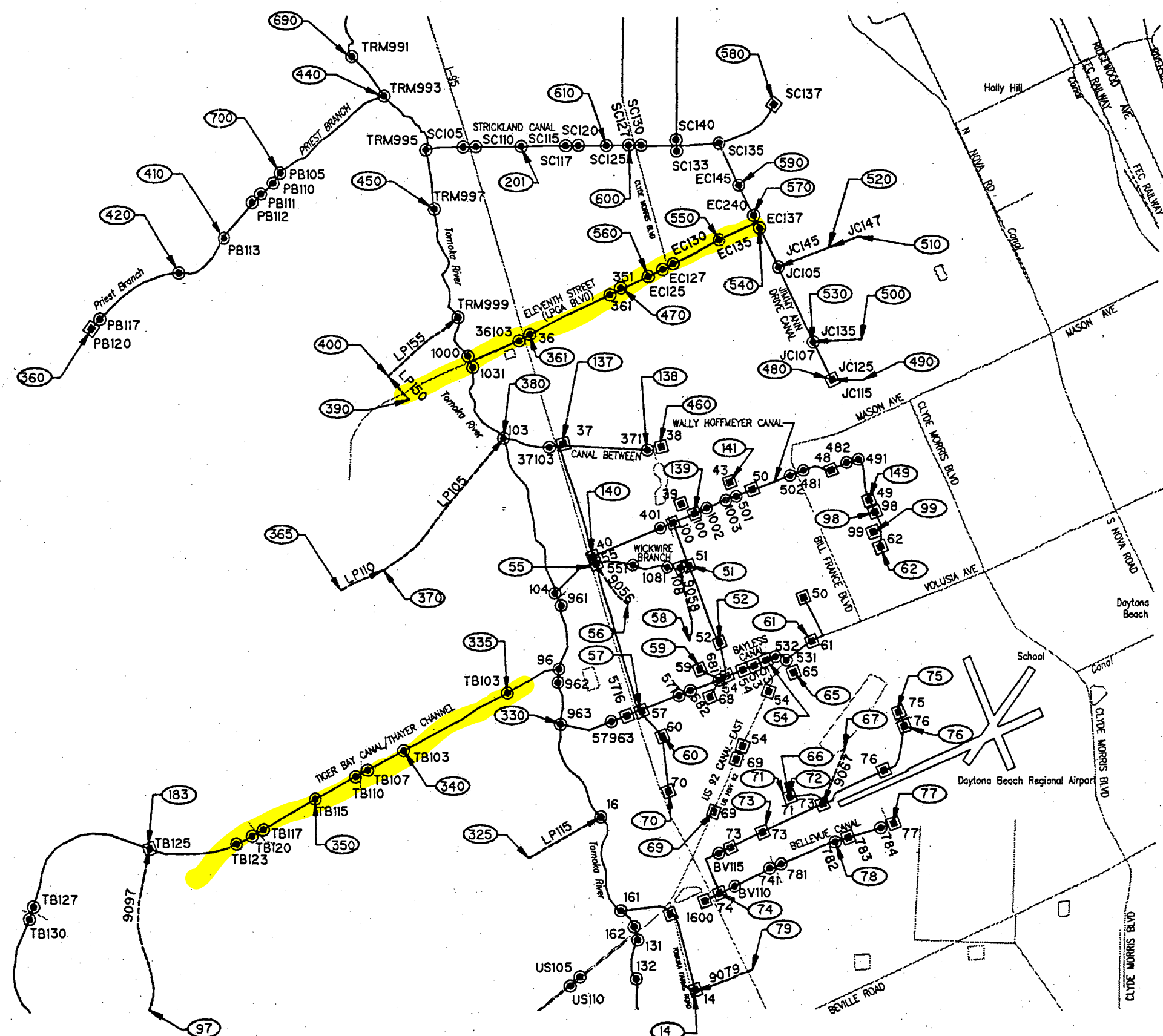


MSA JOB NO. 9310.23

DATE: **AUGUST 1995**

EXHIBIT IV-A

RECEIVED
NOV 07 1995
12.7-03442-13
RECORDS
ORLANDO



LEGEND

- EXTRAN CLOSED CONDUIT
- EXTRAN OPEN CHANNEL
- EXTRAN LINKING JUCTION
- EXTRAN STORAGE JUCTION
- (1100) RUNOFF HYDROGRAPH LOAD POINT
- RUNOFF CONDUIT

RUNOFF & EXTRAN SCHEMATIC PART B
TOMOKA RIVER WATERSHED MANAGEMENT PLAN
VOLUSIA COUNTY, FLORIDA

624

Volusia
Shelf 1 Box 1

11th Street Interchange

Project No. 79002-3429

Prepared by:

Bessent, Hammack & Ruckman, Inc.

Consulting and Design Engineers

Jacksonville, Florida

September 1992

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Project Description

Currently, 11th St. is a two-lane facility running east and west thru Daytona Beach and turning southward and connecting to U.S. 92 with a grade separation crossing on Interstate 95 (I-95) in Volusia County. It's intersection with I-95 is approximately 3.40 miles north of the present U.S. 92 exit on I-95. The project can also be located on the Daytona Beach Quadrangle in section 7, township 15 south, range 32 east.

The proposed interchange is planned to be a four-lane divided grade separation with a diamond configuration with a loops located in the S.E. and N.W. quadrants of the interchange. The other two quadrants were layed out so that future loops could be added. These future loops are labeled in the plan drawings.

The area adjacent to the existing overpass consists of wooded areas. The only development in the proposed interchange area is the Humane Society located in the N.W. quadrant of the interchange. The Humane Society will remain in its present location after construction of the interchange. However, some of its existing buildings, which are located in the proposed R/W, will be demolished for construction of the interchange.

The project will also impact existing wetlands located in the N.E. and S.E. quadrant. The mitigation area is located between I-95 and the Tomoka River. We have also set aside lands along the Tomoka River as a preserve area and buffer for the river. These areas represent high quality mitigation versus the low quality wetlands that are being impacted for the construction of the interchange. The preservation concept is consistent with the LPGA plans for the Tomoka River corridor. We have not included a mitigation plan in this submittal. The lands for the mitigation area are still being negotiated with the land owner.

The other feature of this project is that the existing 11th St. canal, which flows along 11th St. and into the Tomoka River, is to be realigned. The new alignment calls for the canal to be redirected at 11th St. and Williamson Blvd. The canal will be realigned to run along the east side of Williamson Blvd. until a point approximately 300 feet north of Mason Ave. The canal then is directed under Williamson Blvd. at a 45 degree angle until it intersects with an existing F,P & L easement. It then parallels the easement under I-95 and flows into the Tomoka River. We provide an overflow canal, at the existing box culvert location on I-95, to an existing 10'x 7' box culvert that will be used in high flow conditions.

The canal realignment offers enhanced public safety features for the new 11th St. roadway. The existing canal top of bank is located approximately 30 feet off the existing edge of pavement for 11th St. The current design standard calls for the canal to be at least 60 feet or greater away from the edge of the roadway. If the canal is located closer than 60 feet from the edge of pavement guardrail would be required. For new construction

projects, such as this, placing guardrail along the roadway is considered creating a safety hazard for the driver. Also, if the new canal were set at a distance of greater than 60 along the new alignment of 11th St. then along Ramp A and under I-95, as recommended by the FDOT study, it would have greater wetland impacts than the proposed canal alignment. These were the factors that led to the canal being located along Williamson Blvd. with the canal top of bank set at a location 70 feet away from the future edge of pavement of Williamson Blvd. This location also will not go directly thru any wetland areas. The new alignment was set with the canal being routed thru only upland areas. The FDOT study also studied the cost of the different alternatives. The FDOT alignment which cut across land in the S.W. quadrant, alternate no. 11, was the best route cost wise. However, that alignment would have impacted more wetlands than the alignment that is now used. The new alignment is the best solution that has the greatest public safety and the least environmental impact. We have enclosed the FDOT hydraulic report for your review. We have also enclosed after this section a copy of the minimum standards for canal hazards.

The amount of stormwater that flows thru the canal was modeled to be approximately 1100 cfs for the whole length of the canal. This represents a conservative estimate of the flow for this canal in a 100 year storm event. This number also is on par with the numbers used in the CDM, FEMA and FDOT study. The USGS lag equation was used with BRN to create a hydrograph for the canal, TOTAR1, which has a drainage area of 2005 acres and produces a runoff of 1199.21 cfs. It was this storm that was routed thru the new canal alignment. We also obtained flow data on the existing canal at the outfall point, shown at Sta. 109+00 to the right side in the plan set, which was recorded by the USGS, which we have enclosed for your review. The highest flow thru the canal during the 10 year recording period was recorded on September 10, 1984 with a flow of 136 cfs. Which is well under our proposed design flow. This storm event, the September 10, 1984 date, is the storm that is associated with tropical storm Diana which stalled off the coast of Daytona Beach and dumped a heavy amount of rainfall in the area of the canal. We could not obtain the Daytona Beach paper to record the storm event. However, we were able to obtain the Jacksonville Times-Union for the days around September 10. We have enclosed these for your review after this section.

The USGS also recorded the flow at the box culvert under I-95 show at Sta. 1685+00. The flow through the double 10'x 7' box was recorded from June 1983 to September 1985 after this point the USGS determined that the flowmeter recording at this location was not justified due to the low flow through the box. This can be seen in the data recorded. The average flow through the box is approximately 1.5 cfs. This is the structure that we will utilize during high flow conditions in the 11th St. canal.

The existing 11th St. canal was modeled using WSPRO and FDOT nomographs thru box culverts. The existing canal was modeled from its connection with the Tomoka River to just south of Williamson Blvd. to the point where the new section joins the old at Sta. 161+70. The surface water profile was then obtained at this location and the surface water elevation set. When we designed the relocated canal we made sure that the water surface profile did not exceed the existing profile elevation at this point. The

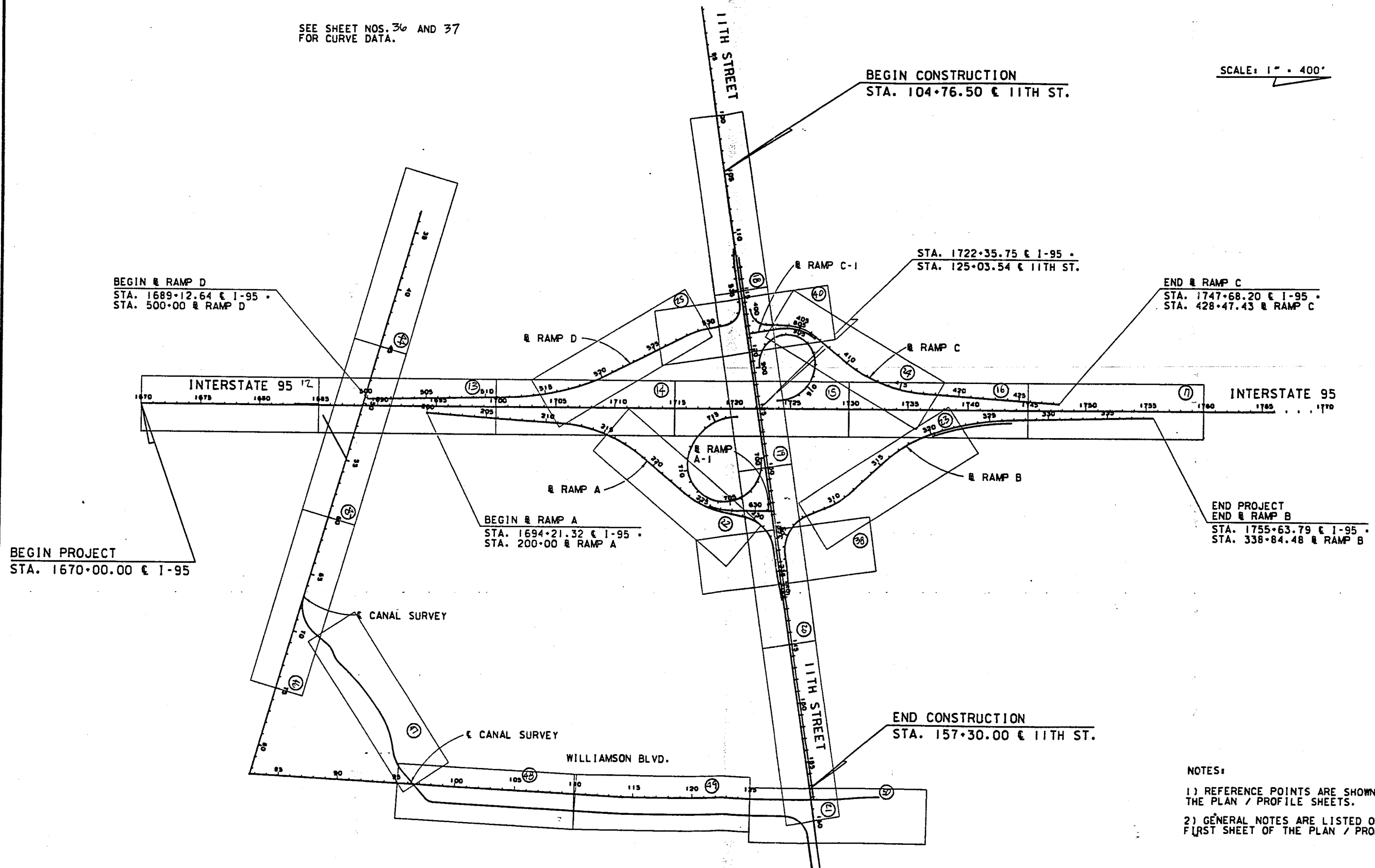
predevelopment water surface profile at Sta. 161+70 is elevation 26.23 from the WSPRO analysis and the post development water surface elevation from the BRN run is elevation 23.78. This shows the new canal to be more efficient than the older canal. So not only is the new canal more efficient, it will have the ability to carry more flow than the older canal, which will help the overall drainage basin.

The stormwater routing thru the proposed interchange was done so that the existing drainage patterns from the off-site areas east of I-95 and west of Williamson Blvd. would be maintained. The old drainage patterns will be maintained, with the replacement of the old structures with structures of the same size. The two cross drains under 11th St. are the best examples. At Sta. 130+90 on 11th St. is an existing 6'x 5' concrete box culvert, this culvert was replaced with a box culvert under Ramp B at Sta. 312+00 and under the proposed 11th St. at Sta. 130+50. These two new culverts will allow the off-site runoff to flow directly to the Tomoka River as it presently does. The same is true for the existing double 48" pipe located at Sta. 142+00. These two existing pipes were replaced with two new 48" culverts. The only difference at this location is the new pipes have a higher invert than the old pipes. The new inverts are higher because the old inverts appear to be set low to help drain the wetland areas to the north of 11th St. The new inverts are set higher to match the new roadside swale grade. This should help raise the water table on both sides of the roadway. It could even help restore some areas that were, in the past, wetlands.

It should be noted again that this submittal does not include a mitigation plan for the impacted wetlands. That will be forwarded as soon as the land owner selects the site.

SEE SHEET NOS. 36 AND 37
FOR CURVE DATA.

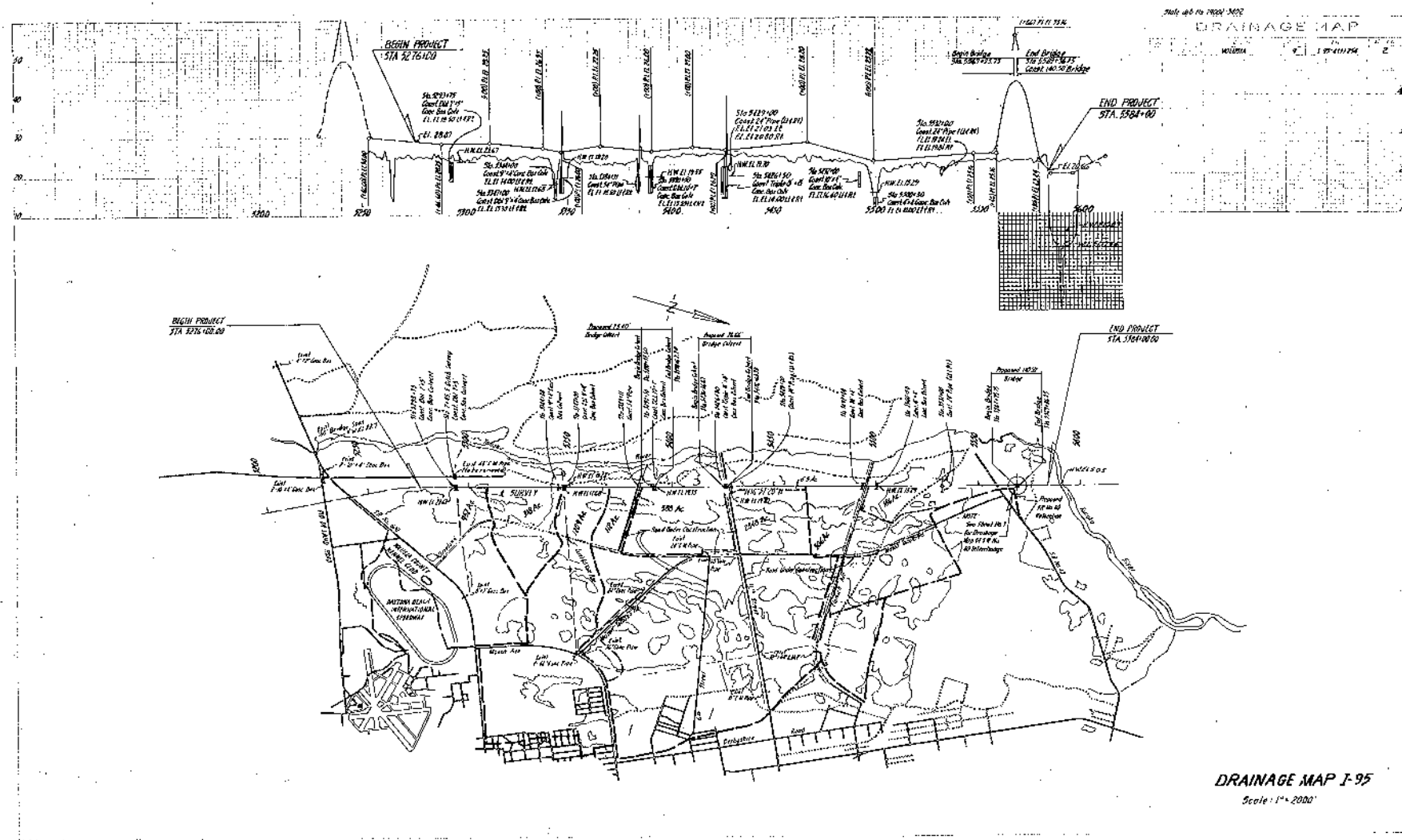
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NOTES:

- 1) REFERENCE POINTS ARE SHOWN ON THE PLAN / PROFILE SHEETS.
- 2) GENERAL NOTES ARE LISTED ON THE FIRST SHEET OF THE PLAN / PROFILE SHEETS.

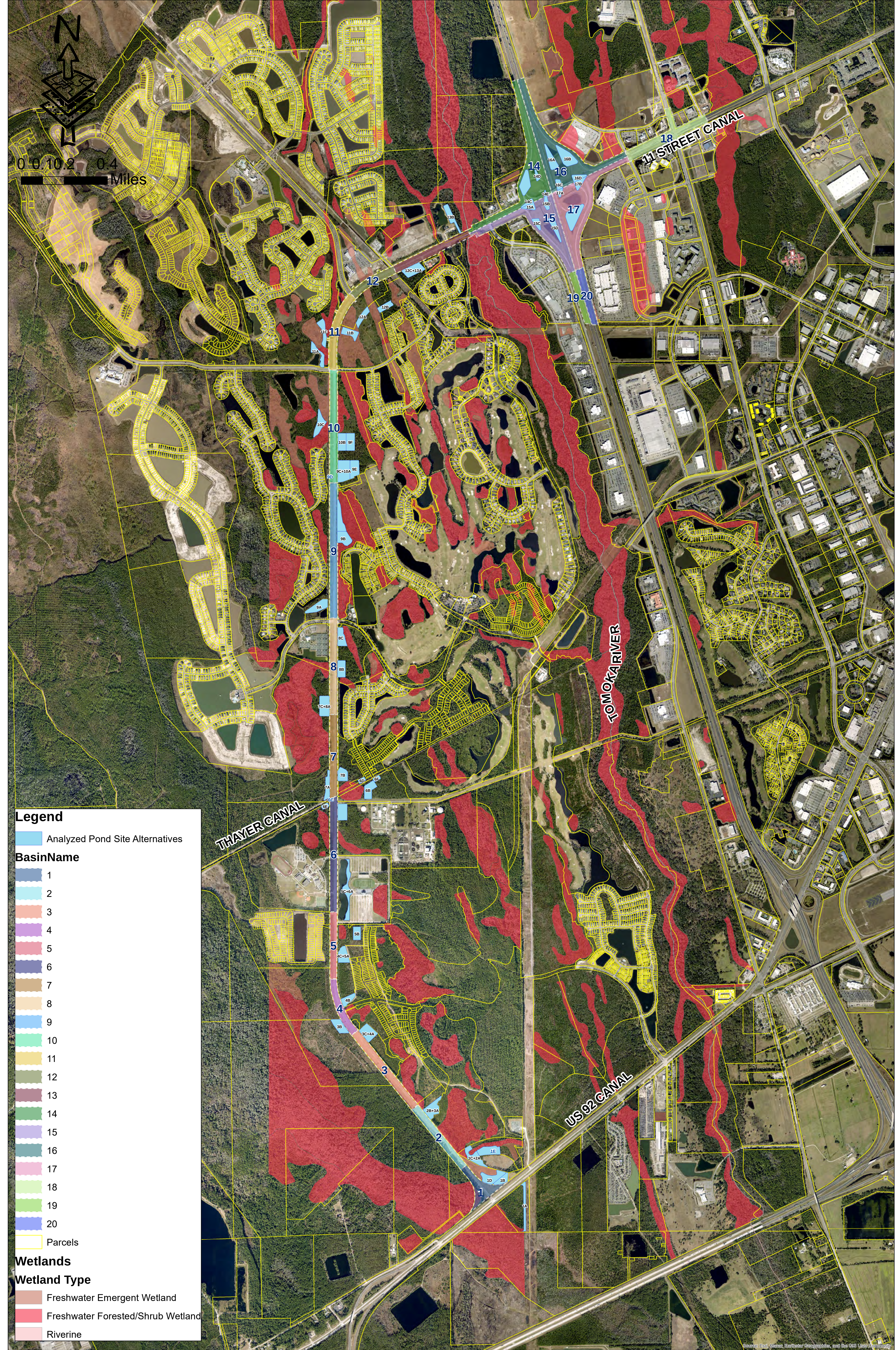
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DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	NAME	DATE	NAME	DATE	APPROVED BY	DATE				
												DESIGNED BY	G.H.	10/91	DRAWN BY	A.M.S.	10/91				
												CHECKED BY	F.M.S.	10/91	CHECKED BY	G.H.	10/91				
												SUPERVISED BY: R.C.									



APPENDIX G

EVALUATED POND SITE ALTERNATIVES





LPGA Boulevard from US 92 (SR 600) to Williamson Boulevard PD&E Study
EVALUATED POND SITE ALTERNATIVES

BASIN No.	POND NO.	POND AREA AC	DEVELOPMENT NAME	Parcel #	REMARKS			
1	1A	1.52	SR 600	523300000022	FDOT Public Property. No longer feasible bc of FPL Easement			
1	1B	1.22	NE Corner of LPGA and ISB	523300000015	Permit app. withdrawn. No Active permit/ application on record			
FLOODPLAIN	1D	2.47	NE Corner of LPGA and ISB	523300000015	Permit app. withdrawn. No Active permit/ application on record			
1 & 2	1C+2A	2.36		523300000140	No active permit/ application on record			
FLOODPLAIN	1E	2.41		523300000140	No active permit/ application on record			
2 & 3	2B+3A	2.62	-	523200000060	Preferred site. No active permit/ application on record			
3	3B	1.91	-	523200000010	No active permit/ application on record			
3 & 4	3C+4A	2.51	Adjacent to Integrated LPGA	523200000040	No active permit/ application on record			
4	4B	1.32	Adjacent to Integrated LPGA	522900000040	Preferred site. No active permit/ application on record			
4 & 5	4C+5A	2.01	Adjacent to Integrated LPGA	522900000040	No active permit/ application on record			
5	5B	1.39		522900000090	Preferred site. Public Property			
5 & 6	5C+6A	2.69	Stadium	522900000011	ELA Comments: Not an ideal location per City of Daytona Beach			
6	6B	1.91	LPGA - Legends Preserve Phase 2	52200000032A	Removed. Found new permit documents that show conflicts with new parcels. Only available space is wetlands to the west.			
6	6C	2.12	-	522800000030	Preferred site. Proposed Park Location. Potential Joint Use opportunity			
FLOODPLAIN	6D	0.40	LPGA - Legends Preserve Phase 1	52200000028A	Removed. Found new permit documents that show conflicts. Only available space is wetlands to the west.			
FLOODPLAIN	6E	0.40	Father Lopez High School	522901000010	Preferred site. Floodplain Encroachment compensation			
FLOODPLAIN	6F	0.40	LPGA - Legends Preserve Phase 2	52200000032A	Removed. Found new permit documents that show conflicts. Only available space is wetlands to the west.			
7	7A	1.51	Mosaic Southern Parcel	522000000010	Preferred site. Adjusted pond per site plan found			
7	7B	1.66	Legends Preserve	52200000028A				
7 & 8	7C+8A	2.76	-	522000000010	Removed. ELA Comments: Conservation easement extends to ROW line			
8	8B	1.82	-	522000000290	No active permit/ application on record			
8	8C	1.78	-	522000000290	No active permit/ application on record			
9	9A	2.24	Bayberry Lakes	521704000002				
9	9B	2.23	-	521700000080	No active permit/ application on record			
FLOODPLAIN	9D	2.16	-	521700000080	No active permit/ application on record			
9 & 10	9C+10A	3.47	-	521700000070	Preferred site. Public Property			
FLOODPLAIN	9E	2.09		521700000070	Preferred site. Public Property			
FLOODPLAIN	9F	2.08		521700000070	Public Property			
10	10B	1.97	-	521700000070	Public Property			
10	10C	2.05	Bayberry Lakes	521704000001				
11	11A	1.56	Latitude	520805000001	Preferred site. No anticipated development in the area and near existing wet pond.			
11	11B	1.62	Timber Creek Village Apartments	520800000022	Removed. Approved plans from August 2022 show proposed parcels in conflict with proposed pond location.			
11	11C	1.64	Latitude	520805000001	-			
12	12A	1.15	Timber Creek Village Apartments	520800000022	Removed. Approved plans from August 2022 show proposed parcels in conflict with proposed pond location.			
12	12B	1.20	Timber Creek	520800000022	Not in conflict with proposed development. Adjacent to proposed wet pond.			
12 & 13	12C+13A	2.48	Timber Creek	520800000022	Preferred site. Need to adjust to accommodate proposed entrance. Adjacent to proposed dry retention area.			
13	13B	1.72	Latitude	520800000220				
14	14B	3.62	Infield Areas	FDOT ROW				
	14C							
	14D							
	14E							
15	15A	3.96						
	15B							
	15C							
	15D							
16	16A	6.67						
	16B							
	16C							
	16D							
17	17A	4.75						
	17B							
	17C							