
From: David Campbell
To: Greg Graham
CC: 'Brad Herndon'
Sent: 4/10/2012 5:05:17 PM
Subject: FW: Driftwood Volume Checks
Attachments: Driftwood Calcs Checks.pdf; DriftwoodStormwater2-29-12.pdf

Greg,

Please see the email below for the approval from FDEP. I will still need to provide them an as-built. Can you meet me at Driftwood either Thursday or Friday?

David O. Campbell, PE

Campbell Engineering, Inc.
8729 North Lagoon Drive
Panama City Beach, FL 32408
850-685-3603
dcampbell214@comcast.net

From: Shortt, Christopher [mailto:Christopher.Shortt@dep.state.fl.us]
Sent: Monday, March 19, 2012 8:53 AM
To: dcampbell214@comcast.net
Subject: Driftwood Volume Checks

David,

Please see the below email summarizing my review of the Driftwood calculations that were submitted to the Department. I also attached a pdf of my calculations spreadsheet. Based on my numbers, the elevations of the weirs will need to be above the stated minimum.

If you have any questions or concerns upon reviewing this information, please do not hesitate to give me a call.

Thanks,

Chris Shortt, E.I.

Stormwater Engineer

Florida Department of Environmental Protection

Panama City Branch Office

2353 Jenks Avenue

Panama City, Florida 32405

(850) 767-0043 Fax (850) 872-7790

christopher.shortt@dep.state.fl.us

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[DEP Customer Survey.](#)

From: Shortt, Christopher

Sent: Friday, March 09, 2012 3:14 PM

To: Dickey, Kenneth; Wilson, Cliff

Subject: RE: Driftwood Geotechnical

I've completed my review of the submitted calculations for Driftwood. The only concern I have is with the treatment volume. The results of my calculations (see attached) are slightly different than those of the submitted calculations. Here is a summary of my findings and methodologies:

Treatment Volume:

I recreated the calculations using the areas and elevations shown in the submitted calculations. As an independent means of checking the "in-between" elevations/areas (areas for the as-built condition of the orifice elevations), I interpolated the areas. All of these areas matched up well with the numbers provided in the calculations. The provided calculations used an interpolation of the cumulative volumes to back into a required weir elevation. In my confirmation calculations (see attached), I performed the interpolation on the front end to determine an area for the stated minimum weir elevation. I then calculated the provided volume.

Due to some potential rounding issues and the fact that my interpolation was based on areas rather than volumes (in acre-feet), the treatment volumes resulting from my calculations were slightly lower than the required volumes for Drainage Areas 1 and 3. However, the areas are so large in these calculations that even the slightest upward adjustment from the minimum weir elevations shown in the submitted calculations will meet the required treatment volume. Reasonable assurance will need to be provided showing that the proposed weir elevations will be above the stated minimum (if only slightly) to ensure that the required volume is met. Setting them at the exact elevations shown in the submitted calculations will not leave any room for error in the field and will not, according to my calculations, provide the required volumes.

Permanent Pool:

The permanent pool provided exceeds the required.

Orifice Calculations:

Based on the Florida Development Manual, the orifice diameters should be sized so as to not discharge

more than ½ of the treatment volume in 60 hours. Based on the calculations, the proposed orifice pipe diameters appear to be sufficient to meet this requirement.

If you have any questions or would like to discuss my calculations, please feel free to give me a call.

Thank you,

Chris Shortt, E.I.

Stormwater Engineer

Florida Department of Environmental Protection

Panama City Branch Office

2353 Jenks Avenue

Panama City, Florida 32405

(850) 767-0043 Fax (850) 872-7790

christopher.shortt@dep.state.fl.us

DRIFTWOOD ESTATES NCL RESPONSE CALCULATIONS:

Drainage Area 1

	Area (sf)	Area (ac)	Volume (ac-ft)	Cumul. Vol. (ac-ft)	
-3	118245	2.714532	0	0	
-2	137606	3.158969	2.936765381	2.936765381	
-1	163474	3.752847	3.455922865	6.392688246	*interpolated to account for apparent error in stage/storage table
0	189342	4.348694	4.049770432	10.44245868	
1	221940	5.095041	4.720867789	15.16332645	
2	251933	5.783586	5.43931359	20.60264004	
3	298247	6.848809	6.315197429	26.91783747	
4	343943	7.895945	7.371326505	34.28916437	
4.15	361432.7	8.297353	1.214489642	35.50365421	*interpolated area
4.5	402242	9.234208	3.068022785	38.571677	
4.82	427572.2	9.815707	4.00048168	42.57215868	*interpolated area
5	432397	9.926489	0.789687052	43.36184573	
5.5	465099	10.6772	5.150918274	48.512764	
6	486290	11.18368	5.460221534	53.97285554	
6.5	506978	11.63632	5.7	59.67286554	7.068504 ac-ft 7.094 ac-ft

Provided (interpolated weir elev - interpolated orifice elev)
Required

Orifice Check:

Volume Required = 7.094 ac-ft
309014.6 cf

Q/2 = 154507.3 cf Q/2 in 60 hrs = 0.715312 cfs

C = 0.6

h = 0.5775 ft

A = 0.19549 sf

So D = 28.1508 in²
5.988945 in

Using proposed D to solve for Q

D = 6 in

A = 28.2735 in²
0.196344 sf

Q = CA(2gh)^{1/2}
0.715312 cfs

Single 6" diameter pipe proposed, so it is good (will draw down 1/2 of volume between 48-60 hours).

D.A. 2

	Area (sf)	Area (ac)	Volume (ac-ft)	Cumul. Vol. (ac-ft)	
-3	49531	1.137075	0	0	
-2	56030	1.266272	1.211673554	1.211673554	
-1	62733	1.440152	1.363211662	2.574885216	
0	70107	1.609435	1.524793388	4.099676604	
1	77409	1.777066	1.693250689	5.792929293	
2	84984	1.950984	1.864015152	7.656944444	
3	98871	2.269769	2.110365014	9.767309458	
4	117928	2.707254	2.488510101	12.25581956	
4.2	126238.6	2.888044	0.560529644	12.8163494	*interpolated area
4.5	136705	3.164229	0.912340609	13.72866031	
5	145818	3.347475	1.632925649	15.36161816	
5.17	149856.6	3.440233	0.576955179	15.93857134	*interpolated area
5.5	167700	3.820294	1.18498697	17.10355831	
6	183307	3.749013	1.842326676	18.94588499	
6.5	168964	3.87868	1.90697314	20.85285813	3.122222 ac-ft 2.96 ac-ft

Provided (interpolated weir elev - interpolated orifice elev)
Required

Orifice Check:

Volume Required = 2.96 ac-ft
128937.6 cf

Q/2 = 64468.8 cf Q/2 in 60 hrs = 0.298467 cfs

C = 0.6

h = 0.7275 ft

A = 0.072875 sf

So D = 10.4652 in²
3.650357 in

Using proposed D to solve for Q

D = 3 in D = 2 in

A = 7.068375 in² A = 3.1415 in²
0.049086 sf 0.021816 sf

Q = CA(2gh)^{1/2} Q = CA(2gh)^{1/2}
0.201589 cfs 0.089595 cfs

Qtotal = 0.291185 cfs

Proposed 3" and 2" pipes.

D.A. 3

	Area (sf)	Area (ac)	Volume (ac-ft)	Cumul. Vol. (ac-ft)	
-3	46799	1.074357	0	0	
-2	62566	1.439318	1.255337466	1.255337466	
-1	75127	1.724679	1.580498163	2.835835629	
0	89480	2.054178	1.889428375	4.725264004	
1	105801	2.428857	2.241617447	6.966781451	
2	120927	2.776102	2.602479339	9.56926079	
3	142252	3.265857	3.020879247	12.59014004	
4	144728	3.322458	3.294077135	15.88421717	
4.4	183372	4.209642	1.506427916	17.39064509	*interpolated area
4.5	193033	4.431428	0.432053489	17.82269855	
5	208401	4.784229	2.303914141	20.12661272	
5.21	213888.3	4.9102	1.017914979	21.1445277	*interpolated area
5.5	221496	5.08416	1.449182128	22.59370983	
6	232259	5.331933	2.604023186	25.19773301	
6.5	243298	5.585354	2.729321625	27.92705464	3.753883 ac-ft 3.79 ac-ft

Provided (interpolated weir elev - interpolated orifice elev)
Required

Orifice Check:

Volume Required = 3.79 ac-ft
165992.4 cf

Q/2 = 82546.2 cf Q/2 in 60 hrs = 0.382158 cfs

C = 0.6

h = 0.8075 ft

A = 0.10183 sf

So D = 14.69353 in²
4.320965 in

Using proposed D to solve for Q

D = 3 in D = 3 in

A = 7.068375 in² A = 7.068375 in²
0.049086 sf 0.049086 sf

Q = CA(2gh)^{1/2} Q = CA(2gh)^{1/2}
0.184215 cfs 0.184215 cfs

Qtotal = 0.36843 cfs

Proposed (2) 3" pipes.

DRIFTWOOD ESTATES-PHASE II

EVALUATION OF OUTFALL CONTROL STRUCTURES BASED ON AS-BUILT CONDITIONS

WALTON COUNTY, FLORIDA

PREPARED BY DAVID O. CAMPBELL, PE
February 29, 2012

In response to the noncompliance letter dated November 29, 2011 and the subsequent meeting with the FDEP, I have evaluated the as-built data regarding the outfall control structures of Driftwood Estates-Phase II and recommend the following minor modifications based on the attached calculations.

Drainage Area #1 – Outfall structure at Lake #5

1. Because the drawdown orifice was adjusted from the design elevation of 4.5 to the as-built elevation of 4.15 lowering the permanent pool elevation 0.35 ft, the discharge weir elevation shall be adjusted from the as-built elevation of approximately 4.7 to a new elevation of 4.92. This will ensure the 1" retention volume requirement is met.
2. The as-built permanent pool volume remains well above the required volume.
3. The drawdown orifice as-built will function according to design.
4. Adjust each skimmer according to the proposed weir elevation.

Drainage Area #2 – Outfall structure at Lake #9

1. Because the drawdown orifice was adjusted from the design elevation of 4.5 to the as-built elevation of 4.2 lowering the permanent pool elevation 0.30 ft, the discharge weir elevation shall be adjusted from the as-built elevation of approximately 5.0 to a new elevation of 5.17. This will ensure the 1" retention volume requirement is met.
2. The as-built permanent pool volume remains well above the required volume.
3. The drawdown orifice as-built will function according to design.
4. Adjust each skimmer according to the proposed weir elevation.

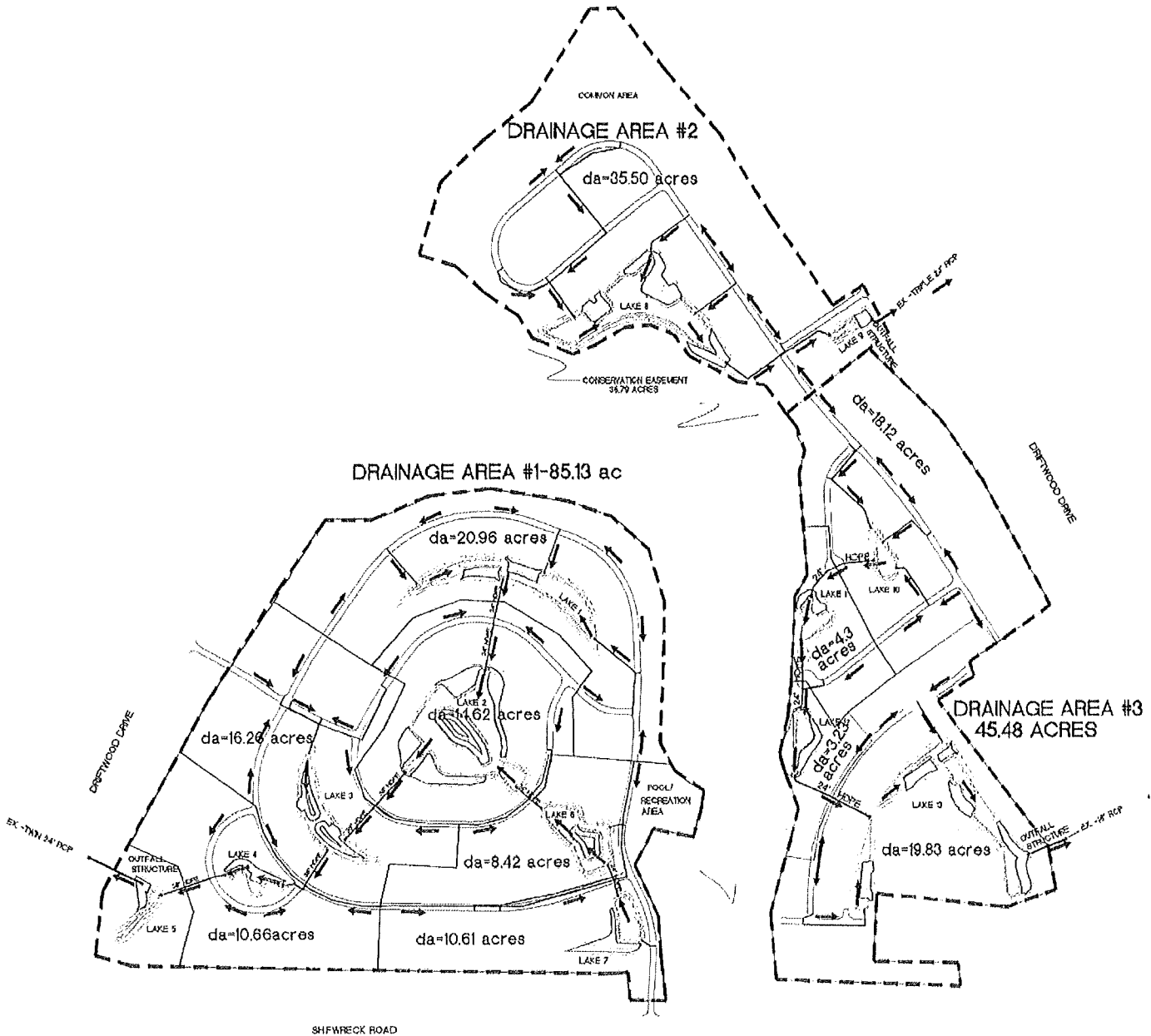
Drainage Area #3 – Outfall structure at Lake #13

1. Because the drawdown orifice was adjusted from the design elevation of 4.5 to the as-built elevation of 4.4 lowering the permanent pool elevation 0.1 ft, the discharge weir elevation shall be adjusted from the as-built elevation of approximately 4.9 to a new elevation of 5.21. This will ensure the 1" retention volume requirement is met.
2. The as-built permanent pool volume remains well above the required volume.
3. The drawdown orifice as-built will function according to design.
4. Adjust each skimmer according to the proposed weir elevation.

As-built drawings shall be submitted to the FDEP and the County after these adjustments are made.

David O. Campbell
2-29-12

DRIFTWOOD ESTATE PHASE II DRAINAGE AREAS



Retention Volumes LAKES #1 THROUGH #7
 Project: DRIFTWOOD ESTATES PHASE II
 Location: Walton County, Florida
 Revised: 29-Feb-12

DRAINAGE AREA #1 - PERMITTED DESIGN

ELEVATION (ft)	AREA (sf)	AREA (ac)	STORAGE (ac-ft)	CUMM STORAGE (ac-ft)	DISCHARGE (cfs)	PERCOLATION (cfs)
-3.00	118245.00	2.71453	0.00000	0.00000	0	
-2.00	137606.00	3.15900	2.93677	2.93677	0	
-1.00	15909.00	0.36522	1.76211	4.69888	0	
0.00	189342.00	4.34669	2.35596	7.05483	0	
1.00	221940.00	5.09504	4.72087	11.77570	0	
2.00	251933.00	5.78359	5.43931	17.21501	0	
3.00	298247.00	6.84681	6.31520	23.53021	0	
4.00	343943.00	7.89584	7.37133	30.90154	0	
4.50	402242.00	9.23421	4.28251	35.18405	0	

ELEVATION (ft)	AREA (sf)	AREA (ac)	STORAGE (ac-ft)	CUMM STORAGE (ac-ft)	DISCHARGE (cfs)	PERCOLATION (cfs)
4.50	402242.00	9.23421	0.00000	0.00000	0	
5.00	432397.00	9.92647	4.79017	4.79017	0	
5.50	465099.00	10.67720	5.15092	9.94109	0	
6.00	486290.00	11.16368	5.46022	15.40131	0	
6.50	506878.00	11.63632	5.70000	21.10131	0	

DRAINAGE AREA #1 - REVISED DESIGN

REVISED 2-29-12 CENTER LINE DRAWDOWN ORIFICE ELEV. = 4.15 (as-built)

ELEVATION (ft)	AREA (sf)	AREA (ac)	STORAGE (ac-ft)	CUMM STORAGE (ac-ft)	DISCHARGE (cfs)	PERCOLATION (cfs)
-3.00	118245.00	2.71453	0.00000	0.00000	0	
-2.00	137606.00	3.15900	2.93677	2.93677	0	
-1.00	15909.00	0.36522	1.76211	4.69888	0	
0.00	189342.00	4.34669	2.35596	7.05483	0	
1.00	221940.00	5.09504	4.72087	11.77570	0	
2.00	251933.00	5.78359	5.43931	17.21501	0	
3.00	298247.00	6.84681	6.31520	23.53021	0	
4.00	343943.00	7.89584	7.37133	30.90154	0	
4.15	361432.00	8.29734	1.21449	32.11603	0	

ELEVATION (ft)	AREA (sf)	AREA (ac)	STORAGE (ac-ft)	CUMM STORAGE (ac-ft)	DISCHARGE (cfs)	PERCOLATION (cfs)
4.15	361432.00	8.29734	0.00000	0.00000	0	
4.50	402242.00	9.23421	3.06802	3.06802	0	
5.00	432397.00	9.92647	4.79017	7.85819	0	
5.50	465099.00	10.67720	5.15092	13.00911	0	
6.00	486290.00	11.16368	5.46022	18.46933	0	
6.50	506878.00	11.63632	5.70000	24.16933	0	

DRAINAGE AREA = 85.126 ACRE DISCHARGE STRUCTURE AT LAKE #5
 FDEP AND COUNTY 1" RETENTION REQUIRED = 7.094 AC-FT
 CENTER LINE 6" DRAWDOWN ORIFICE ELEV. = 4.15 (as-built)
 REQUIRED WEIR ELEVATION = 4.92

$$5.0 - [(7.85819 - 7.094) / (7.85819 - 3.06802) * 0.5] = 4.92$$

AS-BUILT WEIR VARIES FROM ELEVATION = 4.67 TO 4.75
 WEIR ELEVATION TO BE SET AT MINIMUM ELEVATION = 4.92

CALCULATIONS

DRAINAGE AREA #1

TOTAL AREA TO RETENTION POND = 3,708,096 SF = 85.126
IMPERVIOUS AREA = 1,324,421 sf
PERVIOUS AREA = 2,383,675 sf
RATIONAL 'C' FACTOR = 0.51

PERM. POOL VOLUME REQ'D - THREE METHODS

1. 3.84% OF THE ANNUAL RAIN
 2. 9.15% OF THE YEARLY PEAK SEASON RAIN
 3. 2" X IMPERVIOUS AREA + ½" X PERVIOUS
-
1. $0.0384 \times 61" \times 3,708,096 \times 0.51 = 369,148 \text{ CF} = 8.47 \text{ ac-ft (FL. DEV. MANUAL)}$
 2. $0.0915 \times 30" \times 3,708,096 \times 0.51 = 432,596 \text{ CF} = 9.93 \text{ ac-ft}$
 3. $[(2/12) \times 1,324,421] + [(0.5/12) \times 2,383,675] = 320,056 \text{ CF} = 7.35 \text{ (FL. DEV. MANUAL)}$

PERM. POOL PROVIDED = 32.116 ac-ft > 9.93 O.K. MEETS CRITERIA FOR FL. DEV. MANUAL

ORIFICE DRAWDOWN OF THE TREATMENT VOLUME 7.094 AC-FT = 309,015 CF

$$Q = CA (2gh)^{1/2}$$

$$C = 0.6$$

$$Q \text{ REQUIRED} = 309015/2 \text{ PER 60 HRS} = 0.7153 \text{ CFS}$$

$$h = \text{HEAD} = 4.92 - 4.15 = 0.77' \text{ USE 75\% TO ACCOUNT FOR FALLING HEAD} = 0.6'$$

$$A = Q/[C(2gh)^{1/2}] = 0.7153/[0.6\{(64.4)(.6)\}^{1/2}] = 0.192 \text{ SF} = 27.6 \text{ SQ. IN.}$$

AREA OF 6" PIPE = 28.27 SQ. IN., THEREFORE USE ONE 6" PIPE

Retention Volumes LAKES #8 AND #9

Project: DRIFTWOOD ESTATES PHASE II

Location: Walton County, Florida

Revised:

DRAINAGE AREA #2 - PERMITTED DESIGN

ELEVATION (ft)	AREA (sf)	AREA (ac)	STORAGE (ac-ft)	CUMM STORAGE (ac-ft)	DISCHARGE (cfs)	PERCOLATION (cfs)
-3.00	49531.00	1.13708	0.00000	0.00000	0	
-2.00	56030.00	1.28627	1.21167	1.21167	0	
-1.00	62733.00	1.44015	1.36321	2.57489	0	
0.00	70107.00	1.60944	1.52479	4.09968	0	
1.00	77409.00	1.77707	1.69325	5.79293	0	
2.00	84984.00	1.95096	1.86402	7.65694	0	
3.00	98871.00	2.26977	2.11037	9.76731	0	
4.00	117928.00	2.70725	2.48851	12.25582	0	
4.50	138705.00	3.18423	1.47287	13.72869	0	

ELEVATION (ft)	AREA (sf)	AREA (ac)	STORAGE (ac-ft)	CUMM STORAGE (ac-ft)	DISCHARGE (cfs)	PERCOLATION (cfs)
4.50	138705.00	3.18423	0.00000	0.00000	0	
5.00	145816.00	3.34747	1.63293	1.63293	0	
5.50	157700.00	3.62029	1.74194	3.37487	0	
6.00	163307.00	3.74901	1.84233	5.21719	0	
6.50	168964.00	3.87888	1.90697	7.12417	0	

DRAINAGE AREA #2 - REVISED DESIGN

REVISED 2-29-12

CENTER LINE DRAWDOWN ORIFICE ELEV. = 4.2 (as-built)

ELEVATION (ft)	AREA (sf)	AREA (ac)	STORAGE (ac-ft)	CUMM STORAGE (ac-ft)	DISCHARGE (cfs)	PERCOLATION (cfs)
-3.00	49531.00	1.13708	0.00000	0.00000	0	
-2.00	56030.00	1.28627	1.21167	1.21167	0	
-1.00	62733.00	1.44015	1.36321	2.57489	0	
0.00	70107.00	1.60944	1.52479	4.09968	0	
1.00	77409.00	1.77707	1.69325	5.79293	0	
2.00	84984.00	1.95096	1.86402	7.65694	0	
3.00	98871.00	2.26977	2.11037	9.76731	0	
4.00	117928.00	2.70725	2.48851	12.25582	0	
4.20	126239.00	2.89805	0.56053	12.81635	0	

ELEVATION (ft)	AREA (sf)	AREA (ac)	STORAGE (ac-ft)	CUMM STORAGE (ac-ft)	DISCHARGE (cfs)	PERCOLATION (cfs)
4.20	126239.00	2.89805	0.00000	0.00000	0	
4.50	138705.00	3.18423	0.91234	0.91234	0	
5.00	145816.00	3.34747	1.63293	2.54527	0	
5.50	157700.00	3.62029	1.74194	4.28721	0	
6.00	163307.00	3.74901	1.84233	6.12954	0	
6.50	168964.00	3.87888	1.90697	8.03651	0	

DRAINAGE AREA = 35.517 ACRE DISCHARGE STRUCTURE AT LAKE #9

FDEP AND COUNTY 1" RETENTION REQUIRED = 2.96 AC-FT

CENTER LINE DRAWDOWN ORIFICE ELEV. = 4.20 (as-built)

REQUIRED WEIR ELEVATION = 5.12

$$5.5 - [(4.28721 - 2.96)/(4.28721 - 2.54527) \times 0.5] = 5.12$$

AS-BUILT WEIR VARIES FROM ELEVATION = 4.96 TO ELEVATION 5.17

WEIR ELEVATION TO BE SET AT MINIMUM ELEVATION = 5.17

DRAINAGE AREA #2

TOTAL AREA TO RETENTION POND = 1,547,111 SF = 35.5
IMPERVIOUS AREA = 475,897 sf
PERVIOUS AREA = 1,071,214 sf
RATIONAL 'C' FACTOR = 0.47

PERM. POOL VOLUME REQ'D - THREE METHODS

1. 3.84% OF THE ANNUAL RAIN
 2. 9.15% OF THE YEARLY PEAK SEASON RAIN
 3. 2" X IMPERVIOUS AREA + 1/2" X PERVIOUS
-
1. $0.0384 \times 61" \times 1,547,111 \times 0.47 = 141,938 \text{ CF} = 3.26 \text{ ac-ft (FL. DEV. MANUAL)}$
 2. $0.0915 \times 30" \times 1,547,111 \times 0.47 = 166,333 \text{ CF} = 3.81 \text{ ac-ft}$
 3. $[(2/12) \times 475,897] + [(0.5/12) \times 1,071,214] = 123,950 \text{ CF} = 2.84 \text{ (FL. DEV. MANUAL)}$

PERM. POOL PROVIDED = 12.81 ac-ft > 3.81 O.K. MEETS CRITERIA FOR FL. DEV. MANUAL

ORIFICE DRAWDOWN OF THE TREATMENT VOLUME 2.96 AC-FT = 128,926 CF

$$Q = CA (2gh)^{1/2}$$

$$C = 0.6$$

$$Q \text{ REQUIRED} = 128,926 / 2 \text{ PER 60 HRS} = 0.298 \text{ CFS}$$

$$h = \text{HEAD} = 5.17 - 4.2 = 0.97' \text{ USE 75\% TO ACCOUNT FOR FALLING HEAD} = 0.73'$$

$$A = Q / [C(2gh)^{1/2}] = 0.298 / [0.6 \{ (64.4) (.73) \}^{1/2}] = 0.0724 \text{ SF} = 10.4 \text{ SQ. IN}$$

AREA OF 3" PIPE = 7.06 SQ. IN

AREA OF 2" PIPE = 3.14 SQ IN THEREFORE, USE ONE 3" PIPE, AND ONE 2" PIPE

Retention Volumes LAKES #10 THROUGH #13
 Project: DRIFTWOOD ESTATES PHASE II
 Location: Walton County, Florida
 Revised:

DRAINAGE AREA #3 - PERMITTED DESIGN

ELEVATION (ft)	AREA (sf)	AREA (ac)	STORAGE (ac-ft)	CUMM STORAGE (ac-ft)	DISCHARGE (cfs)	PERCOLATION (cfs)
-3.00	46799.00	1.07436	0.00000	0.00000	0	
-2.00	62566.00	1.43632	1.25534	1.25534	0	
-1.00	75127.00	1.72468	1.58050	2.83584	0	
0.00	89480.00	2.05418	1.88943	4.72526	0	
1.00	105801.00	2.42886	2.24152	6.96678	0	
2.00	120927.00	2.77610	2.60248	9.56926	0	
3.00	142252.00	3.26566	3.02088	12.59014	0	
4.00	144728.00	3.32250	3.29408	15.88422	0	
4.50	193033.00	4.43143	1.93848	17.82270	0	

ELEVATION (ft)	AREA (sf)	AREA (ac)	STORAGE (ac-ft)	CUMM STORAGE (ac-ft)	DISCHARGE (cfs)	PERCOLATION (cfs)
4.50	193033.00	4.43143	0.00000	0.00000	0	
5.00	208401.00	4.78423	2.30391	2.30391	0	
5.50	221466.00	5.08416	2.46710	4.77101	0	
6.00	232259.00	5.33193	2.60402	7.37503	0	
6.50	243298.00	5.58535	2.72932	10.10436	0	

DRAINAGE AREA #3 - REVISED DESIGN

REVISED 2-29-12

CENTER LINE DRAWDOWN ORIFICE ELEV. = 4.4 average (as-built)

ELEVATION (ft)	AREA (sf)	AREA (ac)	STORAGE (ac-ft)	CUMM STORAGE (ac-ft)	DISCHARGE (cfs)	PERCOLATION (cfs)
-3.00	46799.00	1.07436	0.00000	0.00000	0	
-2.00	62566.00	1.43632	1.25534	1.25534	0	
-1.00	75127.00	1.72468	1.58050	2.83584	0	
0.00	89480.00	2.05418	1.88943	4.72526	0	
1.00	105801.00	2.42886	2.24152	6.96678	0	
2.00	120927.00	2.77610	2.60248	9.56926	0	
3.00	142252.00	3.26566	3.02088	12.59014	0	
4.00	144728.00	3.32250	3.29408	15.88422	0	
4.40	183372.00	4.20964	1.50643	17.39065	0	

ELEVATION (ft)	AREA (sf)	AREA (ac)	STORAGE (ac-ft)	CUMM STORAGE (ac-ft)	DISCHARGE (cfs)	PERCOLATION (cfs)
4.40	183372.00	4.20964	0.00000	0.00000	0	
4.50	193033.00	4.43143	0.43205	0.43205	0	
5.00	208401.00	4.78423	2.30391	2.73597	0	
5.50	221466.00	5.08416	2.46710	5.20306	0	
6.00	232259.00	5.33193	2.60402	7.80709	0	
6.50	243298.00	5.58535	2.72932	10.53641	0	

DRAINAGE AREA = 45.6 ACRE DISCHARGE STRUCTURE AT LAKE #13
 FDEP AND COUNTY 1" RETENTION REQUIRED = 3.79 AC-FT
 CENTER LINE DRAWDOWN ORIFICE ELEV. = 4.3 and 4.5 (as-built)
 REQUIRED WEIR ELEVATION = 5.21

$$5.5 - [(5.20306 - 3.79) / (5.20306 - 2.73597) \times 0.5] = 5.21$$

AS-BUILT WEIR VARIES FROM ELEVATION = 4.86 TO ELEVATION 5.03
 WEIR ELEVATION TO BE SET AT MINIMUM ELEVATION = 5.21

DRAINAGE AREA #3

TOTAL AREA TO RETENTION POND = 1,981,287 SF = 45.5

IMPERVIOUS AREA = 659,345 sf

PERVIOUS AREA = 1,321,942 sf

RATIONAL 'C' FACTOR = 0.49

PERM. POOL VOLUME REQ'D - THREE METHODS

1. 3.84% OF THE ANNUAL RAIN

2. 9.15% OF THE YEARLY PEAK SEASON RAIN

3. 2" X IMPERVIOUS AREA + 1/2" X PERVIOUS

1. $0.0384 \times 61" \times 1,981,287 \times 0.49 = 189,506 \text{ CF} = 4.35 \text{ ac-ft (FL. DEV. MANUAL)}$

2. $0.0915 \times 30" \times 1,981,287 \times 0.49 = 222,077 \text{ CF} = 5.10 \text{ ac-ft}$

3. $[(2/12) \times 659,345] + [(0.5/12) \times 1,321,942] = 164,971 \text{ CF} = 3.78$
(FL. DEV. MANUAL)

PERM. POOL PROVIDED = 17.39 ac-ft > 5.10 O.K. MEETS CRITERIA FOR FL. DEV. MANUAL

ORIFICE DRAWDOWN OF THE TREATMENT VOLUME 3.79 AC-FT = 165,106 CF

$$Q = CA (2gh)^{1/2}$$

C = 0.6

Q REQUIRED = 165,106/2 PER 60 HRS = 0.382 CFS

h = HEAD = 5.2 - 4.4 = 0.8' USE 75% TO ACCOUNT FOR FALLING HEAD = 0.60'

$$A = Q/[C(2gh)^{1/2}] = 0.381/[0.6\{(64.4)(.60)\}^{1/2}] = 0.1022 \text{ SF} = 14.7 \text{ SQ. IN}$$

AREA OF 3" PIPE = 7.06 SQ. IN THEREFORE, USE TWO 3" PIPES,