

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
ENVIRONMENTAL RESOURCE PERMIT #40-069-114354-1

RAI Submittal

SCANNED

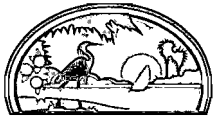
MAY 18 2009

HARTWOOD MARSH ROAD
PHASE II

From 1500 feet east of Hancock Road
to County Line

May 2009

Prepared For:



LAKE COUNTY
FLORIDA

Lake County Public Works
Engineering Division
437 Ardice Avenue
Gustis, FL 32726

Prepared By:

HNTB

HNTB Corporation
300 Primera Boulevard
Suite 200
Lake Mary, Florida 32746

114054-1

RECEIVED IN
ALAMONTE SPRINGS

MAY 15 2009

REGULATORY
REGISTRATION MGT

May 15, 2009

HNTB
SCANNED
MAY 18 2009
ALTAMONTE SPRINGS

Ms. Sandra J. Joiner, P.E.
Department of Water Resources
St. Johns River Water Management District
975 Keller Road
Altamonte Springs, FL 32714

Re: Hartwood Marsh Road—Phase II
1500 feet East of Hancock Road to Orange County Line
Application Number 40-069-114354-1
Response to Request for Additional Information

Dear Ms. Joiner:

Please find included the following revised documents to the Hartwood Marsh Road Environmental Resource Permit Application.

- Construction Plans
- Response to Request for Additional Information

114354-1 -
RECEIVED IN
ALTAMONTE SPRINGS
MAY 15 2009

We offer the following responses to your comments.

Comment 1: In demonstrating that Pond 3, which consists of interconnected Ponds 3A and 3B, will recover the required treatment volume within 72 hours and storage capacity for the 25-year, 96-hour storm event within 14 days, please address the following:

- a. The water quality calculations are based on a drainage basin area of 27.51 acres and an impervious area of 15.14 acres. The sub-basins that will drain to the pond as shown on the Post Development Areas figures have a total area of 48.68 acres. The impervious area for each sub-basin, as shown in Table 2 of the report, indicate a total impervious area of 20.17 acres. Accordingly, please clarify the basin area and impervious area for this

REGULATORY
INFORMATION NOT

basin. Provide revised water quality treatment and recovery calculations, tables and Post Development Areas figures, as necessary, for consistency.

- b. Verify the stage-area input parameters assumed in the PONDS recovery analyses. The values currently assumed are inconsistent with those shown in the stage/storage calculations.
- c. Verify the soil parameters currently assumed in the PONDS recovery analyses. Please consider the following:
 - i) According to the plan view on Sheet 29 of the plans, the existing grade in the vicinity of Pond 3A is approximately 98 feet. The pond was designed with a bottom elevation of 113 feet; thus, fill will be required to construct the pond, which is inconsistent with the plan view. Accordingly, please clarify whether fill or excavation is proposed to construct the pond. Revise the Section A-A detail, as applicable.
 - ii) If excavation is proposed, verify whether the soil properties currently assumed in the PONDS recovery analyses are appropriate for Pond 3A for which the majority of the runoff from the road will be conveyed to. Borings AB-P8 and AB-P9 were utilized in the recovery analyses for Pond 3 and are located in the vicinity of Pond 3B. The unsaturated vertical and horizontal saturated hydraulic conductivity rates of 13.33 feet/day and 20 feet/day assumed are based on testing results for Boring AB-P8. Borings were not obtained in the vicinity of Pond 3A according to the geotechnical report prepared by Ardaman & Associates, Inc., dated September 3, 2008 and that the report is preliminary pending results of additional exploration after the pit has been filled. Include all supporting documentation, as part of your response.
 - iii) If fill is proposed to construct Pond 3A, please include specifications for the fill material on the plans for consistency with the calculations, including percent fines and the permeability rate.

Provide revised calculations and plans, as necessary. [40C-4.301(1)(a),(b),(c),(e),(i),(k); 40C-42.026(1) F.A.C.; Sections 10.3, 10.4, 11.7, A.H.:MSSW]

- Response:*
- a. The drainage areas have been corrected and the water quality treatment and recovery calculations have been updated. Please refer to the revised calculations in the Appendix.*
 - b. The stage-area input parameters have been corrected. Please refer to the revised calculations in the Appendix.*
 - c. The contours on the plan view have been corrected. Pond 3A will be both fill and excavation. Per the Lake County Code of Ordinance, Chapter VI, Section 6.06.02, Part D, paragraph 2: "Topography. All Land Areas either Mined or disturbed by Mining Activities shall be regraded as closely as practical to those contours existing on the Site prior to mining unless the Reclamation plan has established an alternate set of contours that is not contrary to the public interest and leaves the Site beneficial for future use..." In the roadway and pond cross sections through the mine area, there are two existing ground elevations, the lower elevation is what is currently there now and the higher is the "Post Mining Elevation" agreed on by the County. This will be the approximate mine elevation at the time of project construction. The first note under the Drainage heading on the General Notes sheet in the Construction Plans includes a note about the type of fill required for the ponds, including the minimum permeability. Please refer to the revised Construction Plans and Calculations in the Appendix for a copy of the Code of Ordinance and the existing Mine Reclamation Permit.*

Comment 2: In demonstrating that Pond 5 will recover the required treatment volume within 72 hours and storage capacity for the 25-year, 96-hour storm event within 14 days, please address the following:

- a. Verify the stage-area input parameters assumed in the PONDS recovery analyses. The values currently assumed are inconsistent with those shown in the stage/storage calculations.
- b. The design of the pond is based on total retention of the 25-year, 96-hour storm event. The volume of 13.36 ac-ft currently assumed in the PONDS recovery analysis provided; however, does not appear to be the entire runoff volume for this storm event. Accordingly, provide a revised recovery analysis, based on back to back storm events, demonstrating that the pond will not overtop. In addition, provide a revised stage-area-volume table for the pond that includes a cumulative volume column so that pond capacity at varying stages may be easily verified, as part of your response.

- c. The construction of a portion of the road and Pond 5 within Basin 5 will require the placement of fill in the 100-year flood plain for John's Lake. Insufficient information was provided; however, to determine whether impacts to the 10-year floodplain will occur and whether compensating storage will be needed. Accordingly, please provide additional calculations and/or documentation demonstrating that the proposed work will not cause a net reduction in flood storage within the 10-year flood plain pursuant to Section 10.5, Applicant's Handbook: Management and Storage of Surface Waters (A.H.: MSSW).

Provide revised calculations and plans, as necessary. [40C-4.301(1)(a),(b),(c),(e),(i),(k); 40C-42.026(1) F.A.C.; Sections 10.3, 10.4, 10.5, 11.7, A.H.:MSSW]

Response: *a. The stage-area input parameters in PONDS has been corrected. Please refer to the revised recovery calculations in the Appendix.*

b. The volume for the 25-year/96-hour storm is 13.40 ac-ft. Please refer to the Hydrology Time Series report in the ICPR section of the Appendix for Pond 5. The back-to-back storms were run for Pond 5 and the pond will not overtop. Please refer to the stage-storage-volume sheet in the Appendix for Pond 5.

c. The 10-year floodplain calculations and cross sections have been included in the revised calculations in the Appendix. The amount of fill is less than the amount of excavation for the 100-year and 10-year; therefore, there is no net reduction in flood storage area for either storm. Please refer to the 10-year floodplain calculations in the Appendix for Pond 5 as well as the revised cross-sections for the 10-year floodplain.

Comment 3: In demonstrating that Pond 6 and Pond 7 will recover the required treatment volume within 72 hours and storage capacity for the 25-year, 96 hour storm event within 14 days, please address the following:

- a. The seasonal high water table (SHWT) and base aquifer (BOA) elevations of 98 feet and 97 feet, respectively, currently assumed in the recovery analyses for Pond 6 appear to be inconsistent with Soil Borings AB-P15 and AB-P16 located in proximity to the pond location. Based on the soil logs, it appears that the SHWT and BOA elevations are approximately 15 feet and 17.5 feet below grade, respectively. Because the existing grade within the footprint of the pond bottom is approximately 105 feet and 102.5 feet, respectively, on average. Please provide revisions for consistency with the site specific information.

- b. Please clarify the basin area for Pond 7. The water quality calculations were based on a basin area of 15.72 acres; however, the AdICPR volumetric analysis was based on a basin area of 14.11 acres. Provide revisions for consistency.
- c. The SHWT and BOA elevations of 140 feet and 139 feet, respectively, currently assumed in the recovery analysis for Pond 7 appear to be inconsistent with Soil Boring AB-P19 located within the footprint of the pond bottom. Based on the soil log, it appears that the SHWT and BOA elevations are approximately 15 feet and 20 feet below grade, respectively. Accordingly, please verify the aquifer parameters currently assumed for consistency with the site specific information. In addition, please provide supporting geotechnical information for the unsaturated vertical infiltration and horizontal saturated hydraulic conductivity rates of 13.33 feet/day and 20 feet/day currently assumed. The geotechnical report provided, dated September 6, 2007, did not include permeability information for Boring AB-P19; thus, the permeability rates assumed cannot be verified.

Provide revised calculations and plans, as necessary. [40C-4.301(1)(a),(b),(c),(e),(i),(k); 40C-42.026(1) F.A.C.; Sections 10.3, 10.4, 11.7, A.H.:MSSW]

- Response:**
- a. *The seasonal high water table and base of aquifer elevation have been corrected based on soil boring AB-P15. The recovery analysis has been updated. Please refer to the revised calculations in the appendix.*
 - b. *The basin areas for Pond 7 have been corrected in ICPR. Please refer to the revised calculations in the appendix.*
 - c. *The season high water table and base of aquifer elevation have been corrected based on soil boring AB-P19. The permeability was based on boring AB-P20, located west of Pond 7. The location of AB-P20 is shown on Pond Detail Sheet Pond 7 in the Construction Plans. The recovery analysis has been updated. Please refer to the revised calculations in the appendix.*

Comment 4: Sheets 61-66 of the plans indicate that fill up to a depth of approximately 20 feet will be required to construct the road between Stations 173+00 and 200+00 through the sand mine area. Accordingly, please address the following:

- a. The Mine Section Dropoff Buffer details, shown on Sheet 21 of the plans, indicate that the road banks will have side slopes of 2:1 (horizontal: vertical) to match grade in the mine area. Please clarify how the steep side slopes will be stabilized. Provide details, as necessary.

- b. Provide sufficient grading information and details on the plans clarifying how the proposed Pond 3 contours will match grade in the mine area.
- c. Amend the silt fencing locations, shown on Sheets 204-208 of the plans; to encompass all areas proposed for grading. The silt fencing, as shown, does not appear to encompass all work within the mine area.
- d. Revise page 2 of Section A of the application to reflect the correct project area for consistency with the limits of construction, as delineated by the silt fencing.
- e. If the project area will exceed 100 acres in size, and Individual ERP will be required for the project and an additional application fee of \$3,000.00 will be needed. Provide the additional fee, as applicable.

[40C-4.301(1)(i); 40C-42.025(1); 40C-4.900(1); 40C-1.603(5), F.A.C.]

Response:

- a. The side slopes will be sodded. The General Note Sheet in the Construction Plans states "Pegged sod shall be placed on all slopes 1:3 or greater." The cross-sections have been updated to show the elevation the mine will be brought up to per the reclamation requirements of Lake County. Please refer to the general notes sheet and revised cross sections in the Construction Plans and the original mine permit and Lake County standards for mine reclamation for clarification.*
- b. Grading details have been added to the Pond 3 detail sheet. Please refer to the Construction Plans.*
- c. The silt fence has been adjusted to encompass the work in the mine area. Please refer to the Construction Plans for clarification.*
- d. The project area has been amended to 79.64 acres to include the work in the mine area.*
- e. Noted, the project area does not exceed 100 acres.*

Comment 5: The proposed retention system will be constructed on property not owned by the applicant. Accordingly, please provide sufficient legal authorization, as appropriate, prior to permit issuance for stormwater management systems which propose to utilize offsite areas to satisfy the requirements in subsection 40C-42.023(1), F.A.C.

[40C-4.301(1)(i),(j); 40C-42.023; 40C-42.025(6), F.A.C.]

Response: *Lake County will utilize the eminent domain process to obtain drainage easements and right-of-way. The County will provide the pertinent documentation prior to construction.*

Comment 6: Please provide the following revision, clarifications and information on the construction plans:

- a. Provide an overflow device for each pond ensuring that pond overflow will be controlled and will not result in adverse impacts to adjacent property. Please include acceptable reinforcing measures in the design of the weir if an earthen overflow weir is proposed. Provide detail, as necessary.
- b. The Section A-A detail for Pond 5, shown on Sheet 97 of the plans, indicated pond side slopes of 3:1 (horizontal: vertical). Please be advised that dry retention ponds designed to impound more than two feet of water shall be fenced or otherwise restricted from public access, or shall contain side slopes that are no steeper than 4:1 (horizontal: vertical). Accordingly, please provide fencing or a revised design that meets this criteria.

Provide revised sheets, as necessary. [40C-4.301(1)(i); 40C-42.025(3), F.A.C.]

Response: *a. An overflow weir has been added to each pond. Please refer to the revised Pond Detail Sheets in the Construction Plans.*

b. A fence has been added around the perimeter of Pond 5. Please refer to the revised Pond Detail Sheet for Pond 5 in the Construction Plans.

Comment 7: Pond 5 is located next to a wetland delineated by SJRWMD Permit #4-069-95265-3. The edge of the wetland is less than 25 feet (in some cases less than 15 feet) at several locations along the northeastern portion of the pond. The current land use is a pine plantation with little disturbance from light, noise, dumping, etc. Removal of the trees and construction of the pond will introduce increase maintenance of the area that will secondarily impact the adjacent wetland. Please provide reasonable assurance that the proposed pond and activities associated with the pond will not adversely impact the adjacent wetland. If you cannot provide reasonable assurance that secondary impacts will not occur, please provide mitigation to offset the adverse impacts to the adjacent wetland.

[40C-4.301(1); 40C-4.302(1), F.A.C.]

Response: *Pond 5 has a minimum 20' and average greater than 25' buffer between the existing wetland and outer most tie-down slope; therefore, there will be no primary or secondary impacts to the wetland. Please refer to the revised Construction Plans.*

Comment 8: In addition, the proposed project is located in the District's Lake Apopka Hydrologic Basin. Projects located within this special basin must not cause an increase in phosphorus load pursuant to Section 11.7, Applicant's Handbook: Management and Storage of Surface Waters (A.H.:MSSW). Because the retention system design was based on total retention of the 25-year, 96-hour storm event, and not on the results of a site-specific pollutant loading analysis for phosphorous, water level monitoring in the retention system will be required for 10 years following the construction of the project, pursuant to Section 11.7(b)(2), A.H.:MSSW. Please be advised of this additional monitoring requirement.

Response: *Pre versus post phosphorus loading calculations have been performed for basins 4-7. In each instance, the post development phosphorus loading is less than the pre-development phosphorus loading. Please refer to the revised calculations for each basin in the Appendix.*

If you have any questions or need further information, please do not hesitate to contact our office.

Sincerely,

HNTB Corporation



Melinda S. Fischl, P.E.
Project Engineer

cc: Tom McCann, P.E. (Lake County Public Works)
William F. C. Umlauf, P.E. (HNTB)

OWNER(S) OF LAND	ENTITY TO RECEIVE PERMIT (IF OTHER THAN OWNER)
NAME Lake County Board of County Commissioners	NAME James A. Stivender, P.E., PLS
COMPANY AND TITLE	COMPANY AND TITLE Public Works Director Department of Public Works
ADDRESS 315 W. Main St.	ADDRESS 437 Ardice Avenue
CITY, STATE, ZIP Tavares, FL 32778	CITY, STATE, ZIP Eustis, FL 32726
TELEPHONE (352) 483-9005 FAX (352) 483-9025	TELEPHONE (352) 483-9005 FAX (352) 483-9025
AGENT AUTHORIZED TO SECURE PERMIT (IF AN AGENT IS USED)	CONSULTANT (IF DIFFERENT FROM AGENT)
NAME	NAME Melinda S. Fischl, P.E.
COMPANY AND TITLE	COMPANY AND TITLE Project Engineer HNTB Corporation
ADDRESS	ADDRESS 300 Primera Blvd., Suite 200
CITY, STATE, ZIP	CITY, STATE, ZIP Lake Mary, FL 32746
TELEPHONE () FAX ()	TELEPHONE (407) 805-0355 FAX (407) 805-0227

A. Name of Project, including phase if applicable: Hartwood Marsh Road - Phase II
 Is this application for part of a multi-phase project? yes no
 Total applicant-owned area contiguous to the project: 0 acres
 Total project area for which a permit is sought: 79.64 acres.
 Total Impervious area for which a permit is sought: 34.65 acres. (exc. ponds)
 What is the total area (metric equivalent for federally funded projects) of work in, on, or over wetlands or other surface waters: ? NA _____ acres or _____ square feet (_____ hectares or _____ square meters)
 If a docking facility, the number of propose new boat slips NA
 Project Location (use additional sheets if needed)
 County (ies) Lake
 Section(s) 1 Township(s) 23 S Range(s) 26 E
 Section(s) 2 Township(s) 23 S Range(s) 26 E
 Section(s) 3 Township(s) 23 S Range(s) 26 E
 Section(s) 10 Township(s) 23 S Range(s) 26 E
 Section(s) 11 Township(s) 23 S Range(s) 26 E
 Land Grant name, if applicable Not Applicable
 Tax Parcel Identification Number Not Applicable
 Street address, road, or other location Located between North Hancock Road and the Orange County line
 City, Zip code if applicable Clermont

APPENDIX

HARTWOOD MARSH ROAD - PHASE II
1500 FEET EAST OF HANCOCK ROAD TO COUNTY LINE
DRAINAGE CALCULATIONS

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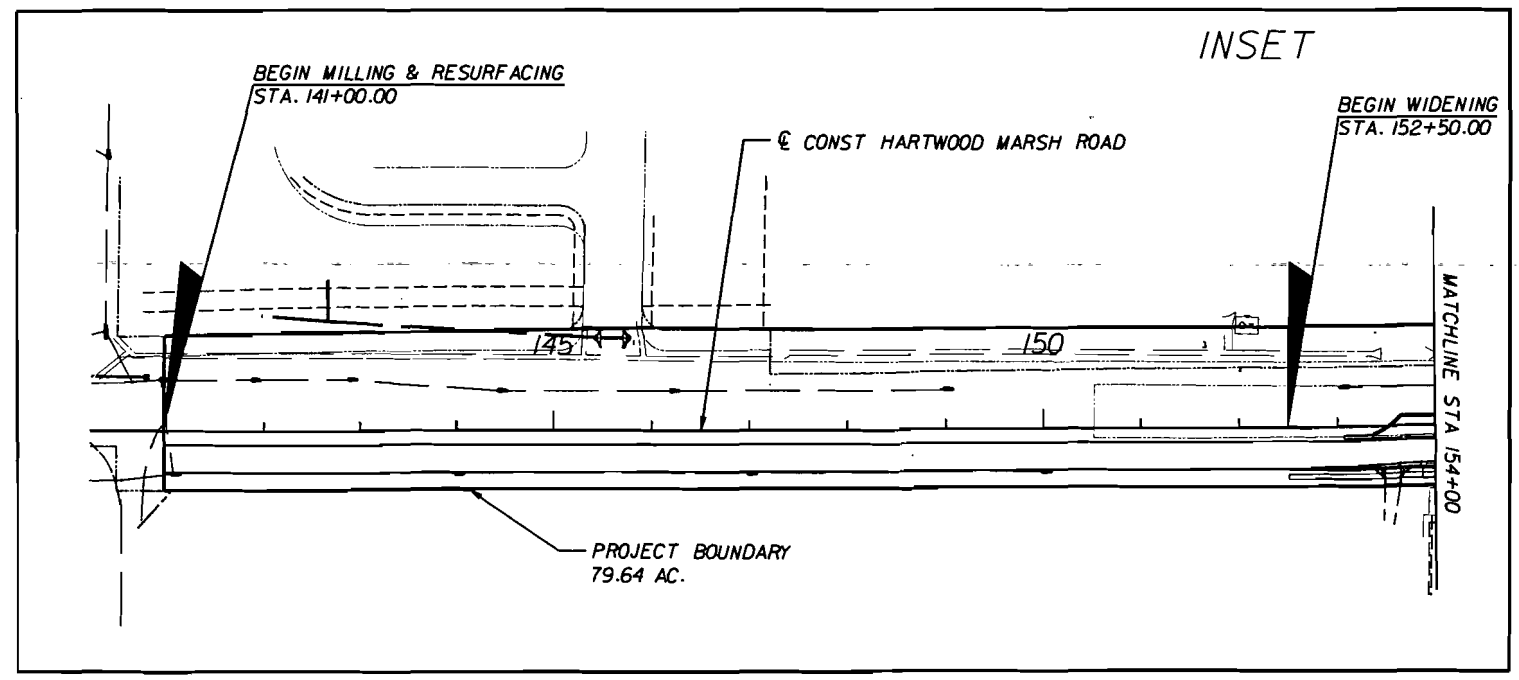
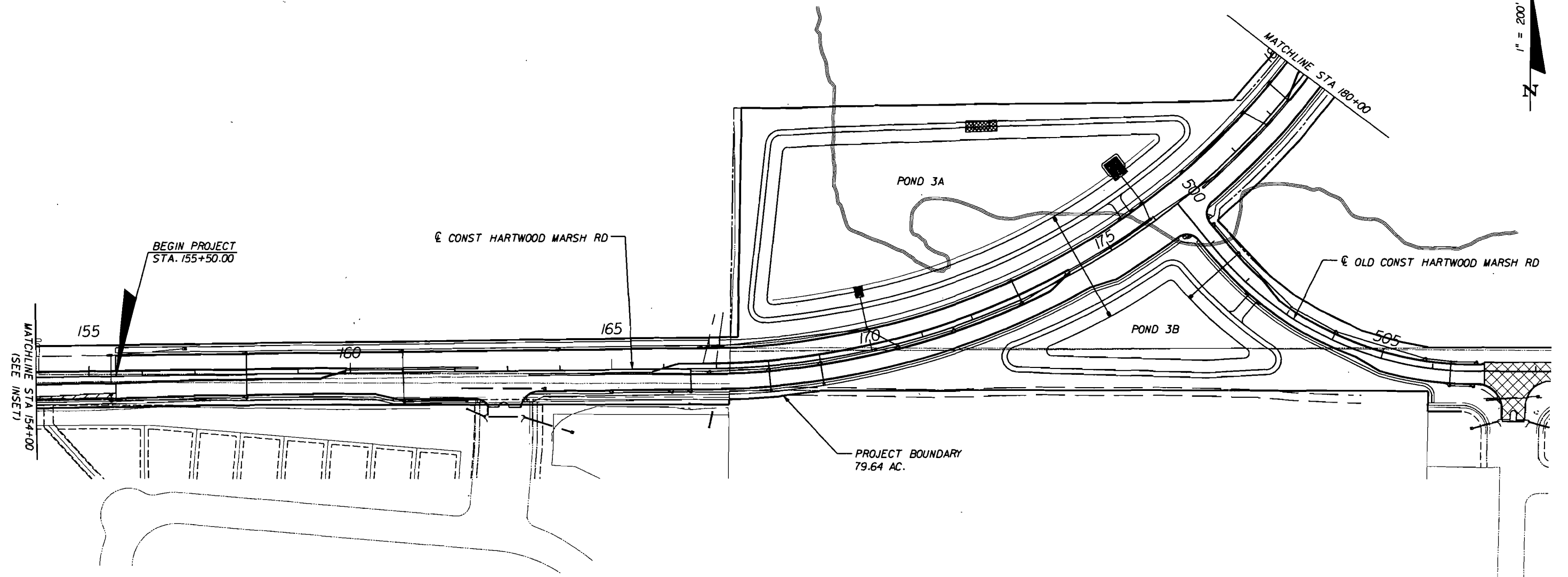
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Melinda Stueckel
5/14/09

APPENDIX
To Drainage Calculations

APPENDIX A

FIGURES



REVISIONS	
DATE	DESCRIPTION

HNTB
 HNTB CORPORATION
 300 PRIMERA BLVD.
 SUITE 200
 LAKE MARY, FL 32746
 (407) 805-0355
 CERT. OF AUTH. NO. 6500

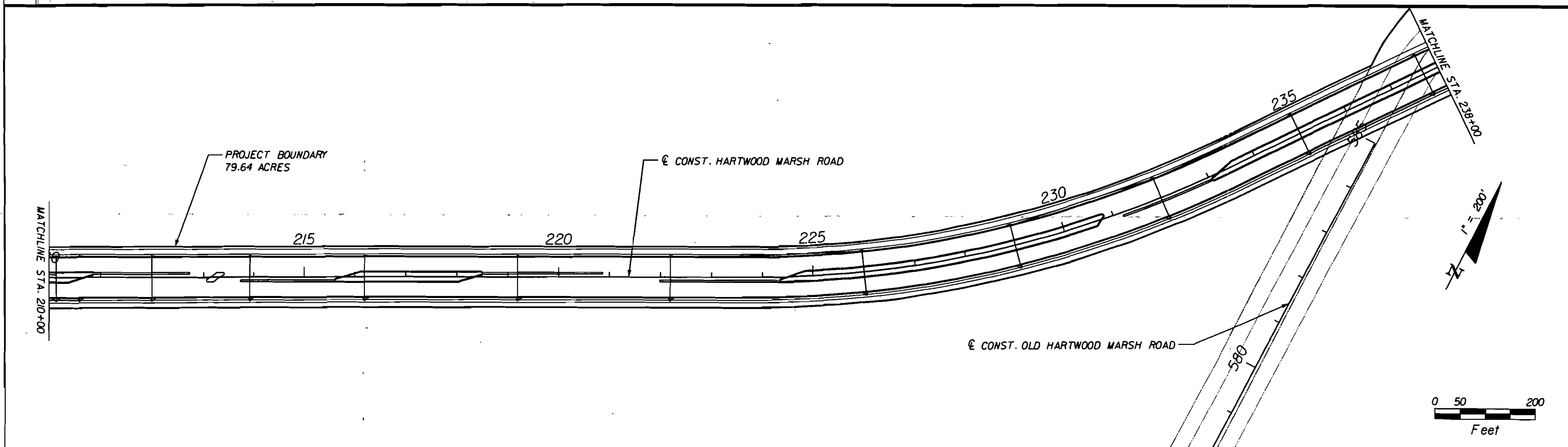
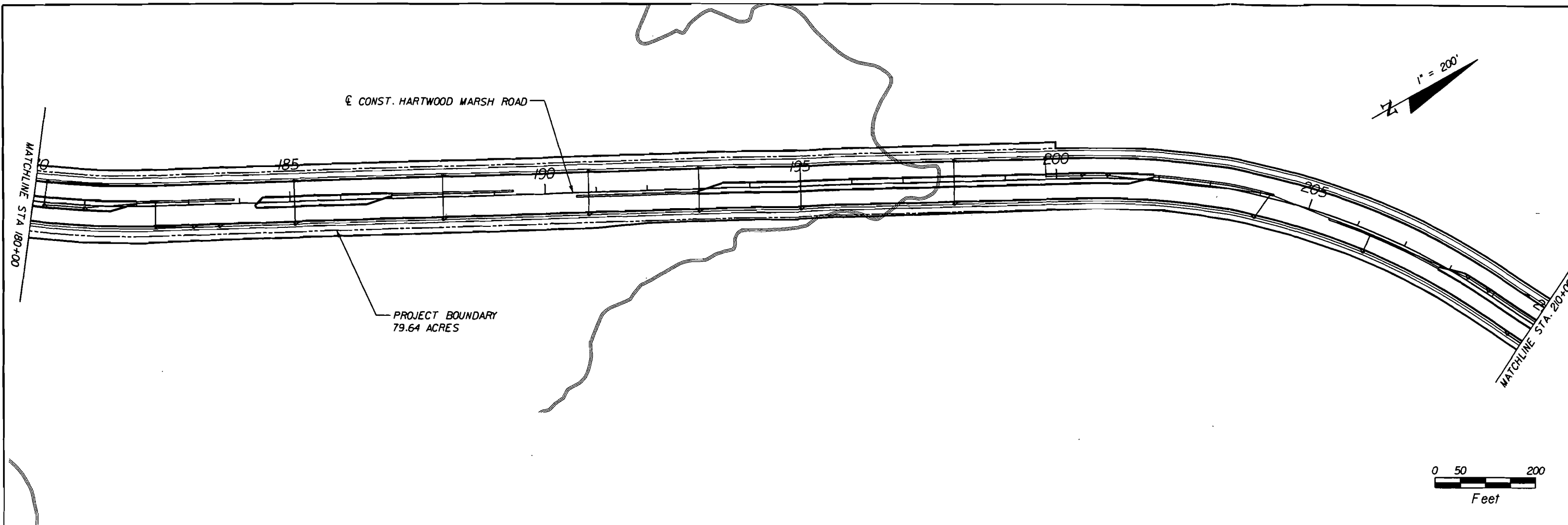
ENGINEER OF RECORD: MELINDA S. FISCHL, P.E.
 FL. REGISTRATION NO. 68406



**HARTWOOD MARSH
ROAD - PHASE II**

PROJECT BOUNDARY

SHEET NO.
2



REVISIONS	
DATE	DESCRIPTION

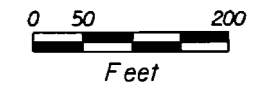
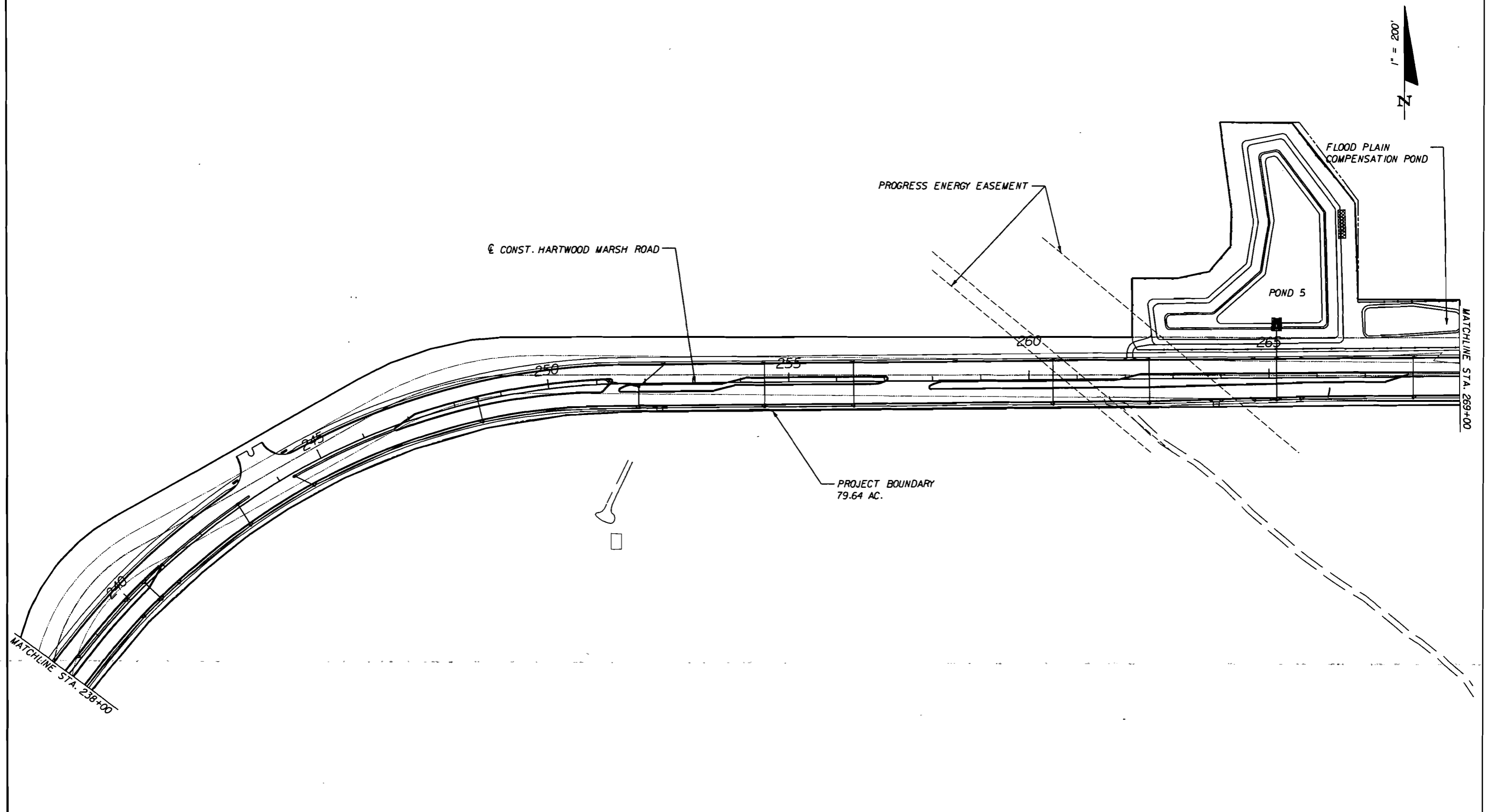
HNTB
 HNTB CORPORATION
 300 PRIMERA BLVD.
 SUITE 200
 LAKE MARY, FL 32746
 (407) 805-0355
 CERT. OF AUTH. NO. 6500
 ENGINEER OF RECORD: MELINDA S. FISCHL, P.E.
 FL. REGISTRATION NO. 68406



HARTWOOD MARSH ROAD - PHASE II

PROJECT BOUNDARY

SHEET NO.
3



REVISIONS	
DATE	DESCRIPTION

HNTB
HNTB CORPORATION
300 PRIMERA BLVD,
SUITE 200
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

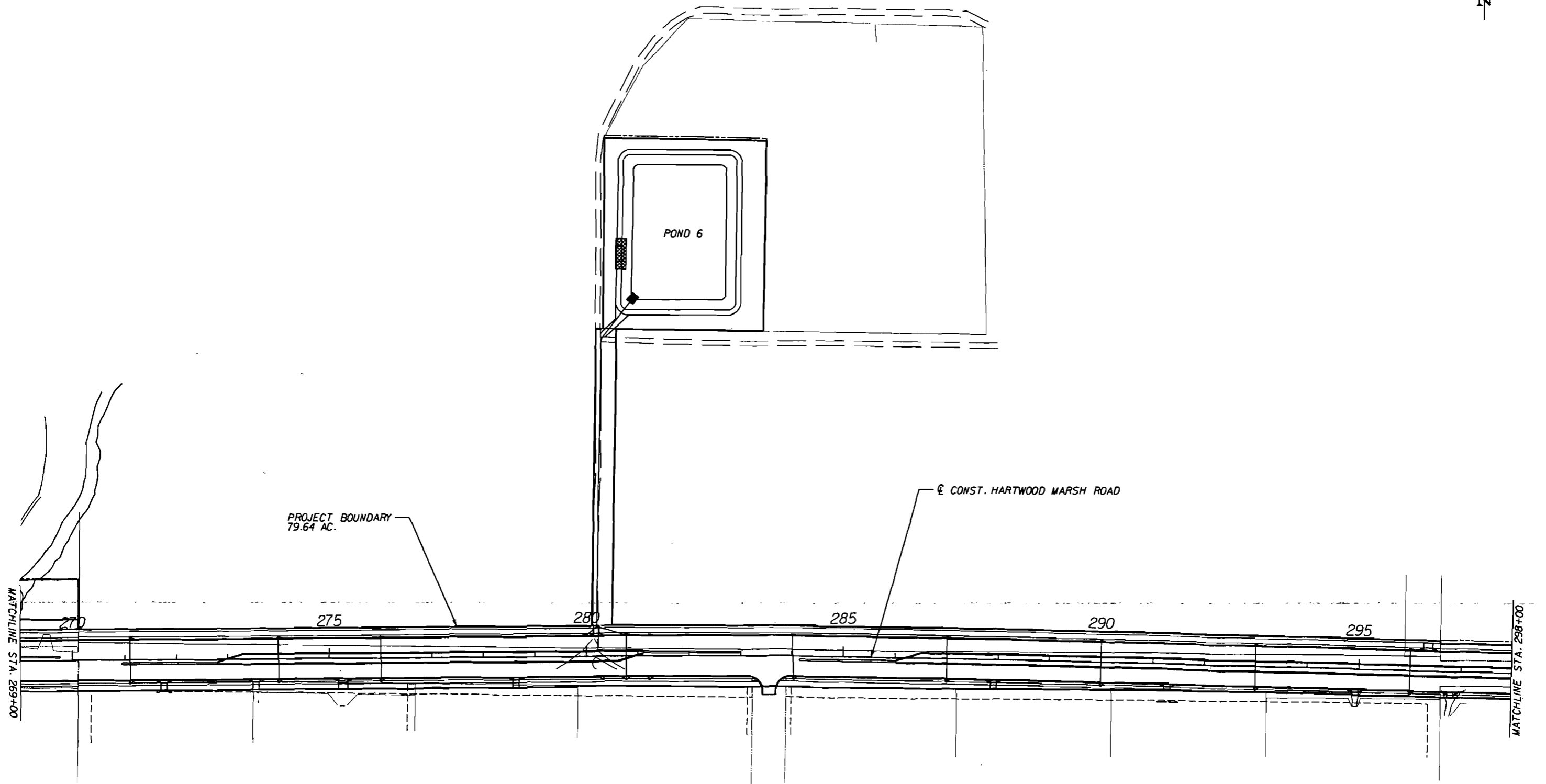
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FL. REGISTRATION NO. 68406



**HARTWOOD MARSH
ROAD - PHASE II**

PROJECT BOUNDARY

SHEET NO.
4

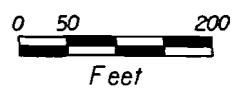


PROJECT BOUNDARY
79.64 AC.

CONST. HARTWOOD MARSH ROAD

MATCHLINE STA. 269+00

MATCHLINE STA. 298+00



REVISIONS	
DATE	DESCRIPTION

HNTB
 HNTB CORPORATION
 300 PRIMERA BLVD.
 SUITE 200
 LAKE MARY, FL 32746
 (407) 805-0355
 CERT. OF AUTH. NO. 6500

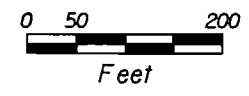
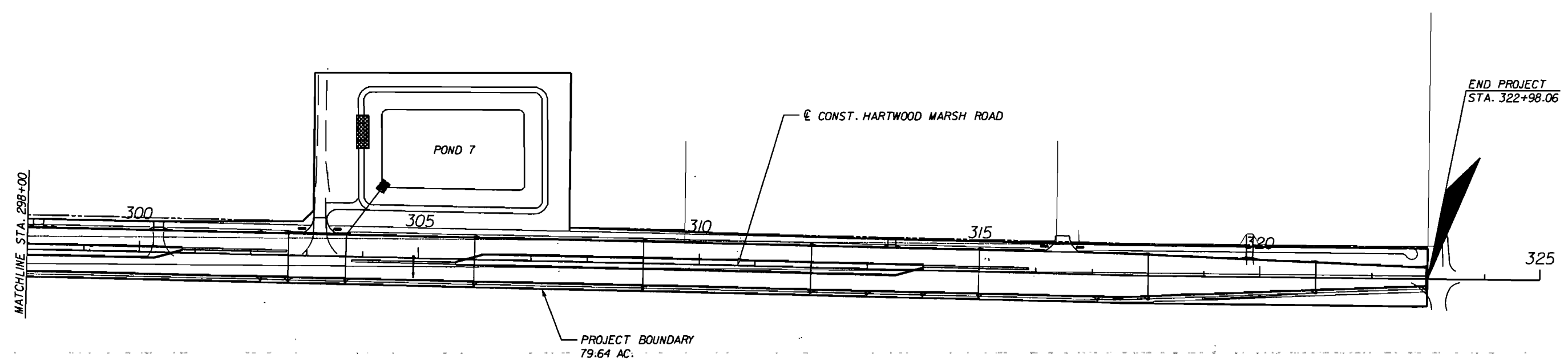
ENGINEER OF RECORD: MELINDA S. FISCHL, P.E.
 FL. REGISTRATION NO. 68406



**HARTWOOD MARSH
ROAD - PHASE II**

PROJECT BOUNDARY

SHEET NO.
5



REVISIONS	
DATE	DESCRIPTION

HNTB
 HNTB CORPORATION
 300 PRIMA BLVD,
 SUITE 200
 LAKE MARY, FL 32746
 (407) 805-0355
 CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: MELINDA S. FISCHL, P.E.
 FL. REGISTRATION NO. 68406



**HARTWOOD MARSH
ROAD - PHASE II**

PROJECT BOUNDARY

SHEET NO.
6

APPENDIX B

***DRAINAGE
CALCULATIONS***

BASIN 3

POLLUTION ABATEMENT VOLUME



	DATE	
MADE BY:	MSF	15-Oct-08
CHCK BY:	BJS	10-Jan-09

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 3

BASIN LIMITS: STA. 152+39.00 to STA 226+00.00, CL CONST. HARTWOOD MARSH ROAD

TOTAL TREATMENT AREA: 48.67 AC.

IMPERVIOUS AREA: 15.89 AC. (excludes pond)

UNDERLINE ONE: RETENTION DETENTION

UNDERLINE ONE: DRY WET

UNDERLINE ONE: ONLINE OFFLINE NOTE: TOTAL RETENTION OF RUNOFF.

REQUIRED TREATMENT VOLUME:

1) COMPUTE FIRST 0.5 INCH OF RUNOFF FROM PROJECT:

(0.5"/12) x 48.67 AC. = 2.03 AF

FOR ONLINE TREATMENT, ADD 0.5 INCH OF RUNOFF

(0.5"/12) x 48.67 AC. = 2.03 AF

TOTAL: 4.06 AF

2) COMPUTE 1.25 INCHES TIMES IMPERVIOUS AREA:

(1.25"/12) x 15.89 AC. = 1.66 AF

FOR ONLINE TREATMENT, ADD 0.5 INCH OF RUNOFF

(0.5"/12) x 48.67 AC. = 2.03 AF

TOTAL: 3.68 AF

CONTROLLING CRITERIA: 1

REQUIRED TREATMENT VOLUME: 4.06 AF

STAGE / STORAGE CALCULATIONS



DATE

MADE BY:	MSF	30-Sep-08
CHCK BY:	BJS	10-Jan-09

PROJECT: HARTWOOD MARSH ROAD

POND: 3A & 3B

Boring	Approx.	Depth to	Estimated	Average	Depth to	Estimated	Average
AB-P8	123.25	20.0	103.3	100.86	15	108.25	105.86
AB-P9	118.47	20.0	98.5		15	103.47	

Note: Above information per pond boring profiles: Ardaman & Associates, May 2007
Per Ardaman report groundwater not encountered.

AVG. SHWT ELEVATION: Ft. (NAVD)

AVG. GROUND WATER TABLE ELEVATION: Ft. (NAVD)

AVG. EXIST. GROUND ELEVATION AT BORING LOCATIONS: Ft. (NAVD)

NOTE: ABOVE INFORMATION PER POND BORINGS PROFILES: ARDAMAN & ASSOCIATES JUNE 07

STAGE Ft. (NAVD)	AREA AC.	AVERAGE AREA AC.	INCREMENTAL VOL. AF
113.0	4.17		0.00
		4.30	
114.0	4.44		4.30
		4.58	
115.0	4.72		4.58
		4.86	
116.0	5.00		4.86
		5.15	
117.0	5.30		5.15
		5.44	
118.0	5.59		5.44
		5.73	
119.0	5.88		5.73
TOTAL:			30.06

REQUIRED TREATMENT VOLUME: AF

TOP EL. OF TREATMENT VOLUME: Ft.

PERCOLATION RATE: Ft./Day or Inches/Hr.

FACTOR OF SAFTEY: = Inches/Hr.

PONDS Version 3.2.0145
Retention Pond Recovery - Refined Method
Copyright 2000
Devo Seereeram, Ph.D., P.E.

Project Data

Project Name: Hartwood Marsh Road Phase II
Simulation Description: Pond 3 Water Quality Recovery
Project Number: 41561-1
Engineer : MSF
Supervising Engineer:
Date: 04-07-2009

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 103.00
Water Table Elevation, [WT] (ft datum): 104.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 13.33
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 192700.7

Geometry Data

Equivalent Pond Length, [L] (ft): 1062.0
Equivalent Pond Width, [W] (ft): 300.0
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)
113.00	181645.2
114.00	193406.4
115.00	205603.2
116.00	217800.0
117.00	230868.0
118.00	243500.4
119.00	256132.8

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Retention Pond Recovery - Refined Method
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Scenario Input Data

Scenario 1 :: Water Quality

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 98881.2

Initial ground water level (ft datum) default, 104.00

<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>
0.100	2.000
0.250	2.500
0.500	3.000
1.000	3.500
1.500	4.000

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Detailed Results :: Scenario 1 :: Water Quality

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	16480.2000	0.0000	104.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	16480.2000	0.0000	113.534	28.00520	0.00000	98881.2	168.1	0.0	U/P
2.400	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
6.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
12.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
24.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
36.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
48.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
60.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
72.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
84.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
96.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry

RECOVER
 < 4 hrs

PONDS Version 3.2.0145
Retention Pond Recovery - Refined Method
Copyright 2000
Devo Seereeram, Ph.D., P.E.

Project Data

Project Name: Hartwood Marsh Road Phase II
Simulation Description: Pond 3 25yr 96hr Recovery
Project Number: 41561-1
Engineer : MSF
Supervising Engineer:
Date: 04-07-2009

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 103.00
Water Table Elevation, [WT] (ft datum): 104.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 13.33
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 256132.8

Geometry Data

Equivalent Pond Length, [L] (ft): 1212.0
Equivalent Pond Width, [W] (ft): 476.0
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

<u>Stage</u> <u>(ft datum)</u>	<u>Area</u> <u>(ft²)</u>
113.00	181645.2
114.00	193406.4
115.00	205603.2
116.00	217800.0
117.00	230868.0
118.00	263500.4
119.00	256132.8

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Scenario Input Data

Scenario 1 :: 25 year/96 hour

Hydrograph Type: Slug Load
 Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 1114578

Initial ground water level (ft datum) default, 104.00

Time After Storm Event (days)	Time After Storm Event (days)	Time After Storm Event (days)	Time After Storm Event (days)	Time After Storm Event (days)
0.100	3.000	6.500	10.000	13.500
0.250	3.500	7.000	10.500	14.000
0.500	4.000	7.500	11.000	14.500
1.000	4.500	8.000	11.500	
1.500	5.000	8.500	12.000	
2.000	5.500	9.000	12.500	
2.500	6.000	9.500	13.000	

PONDS Version 3.2.0145
Retention Pond Recovery - Refined Method
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Detailed Results :: Scenario 1 :: 25 year/96 hour

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	185763.0000	0.0000	104.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	185763.0000	0.0000	118.168	28.03264	0.00000	1114578.0	168.1	0.0	U/P
2.400	0.0000	0.0000	116.783	35.45298	0.00000	1114578.0	341356.1	0.0	U/P
6.000	0.0000	0.0000	115.028	19.42764	0.00000	1114578.0	721771.4	0.0	U/S
12.000	0.0000	0.0000	114.723	2.48106	0.00000	1114578.0	784094.3	0.0	S
24.000	0.0000	0.0000	114.362	1.44228	0.00000	1114578.0	856348.4	0.0	S
36.000	0.0000	0.0000	114.095	1.08933	0.00000	1114578.0	908706.9	0.0	S
48.000	0.0000	0.0000	113.879	0.88938	0.00000	1114578.0	950466.1	0.0	S
60.000	0.0000	0.0000	113.695	0.75838	0.00000	1114578.0	985549.3	0.0	S
72.000	0.0000	0.0000	113.534	0.66479	0.00000	1114578.0	1015990.0	0.0	S
84.000	0.0000	0.0000	113.389	0.59400	0.00000	1114578.0	1042987.0	0.0	S
96.000	0.0000	0.0000	113.258	0.53821	0.00000	1114578.0	1067311.0	0.0	S
108.000	0.0000	0.0000	113.138	0.49288	0.00000	1114578.0	1089489.0	0.0	S
120.000	0.0000	0.0000	113.026	0.29039	0.00000	1114578.0	1109896.0	0.0	S
132.000	0.0000	0.0000	112.904	0.05419	0.00000	1114578.0	1114578.0	0.0	S
144.000	0.0000	0.0000	112.785	0.00000	0.00000	1114578.0	1114578.0	0.0	S
156.000	0.0000	0.0000	112.674	0.00000	0.00000	1114578.0	1114578.0	0.0	S
168.000	0.0000	0.0000	112.571	0.00000	0.00000	1114578.0	1114578.0	0.0	S
180.000	0.0000	0.0000	112.474	0.00000	0.00000	1114578.0	1114578.0	0.0	S
192.000	0.0000	0.0000	112.382	0.00000	0.00000	1114578.0	1114578.0	0.0	S
204.000	0.0000	0.0000	112.295	0.00000	0.00000	1114578.0	1114578.0	0.0	S
216.000	0.0000	0.0000	112.213	0.00000	0.00000	1114578.0	1114578.0	0.0	S
228.000	0.0000	0.0000	112.134	0.00000	0.00000	1114578.0	1114578.0	0.0	S
240.000	0.0000	0.0000	112.059	0.00000	0.00000	1114578.0	1114578.0	0.0	S
252.000	0.0000	0.0000	111.987	0.00000	0.00000	1114578.0	1114578.0	0.0	S
264.000	0.0000	0.0000	111.918	0.00000	0.00000	1114578.0	1114578.0	0.0	S
276.000	0.0000	0.0000	111.852	0.00000	0.00000	1114578.0	1114578.0	0.0	S
288.000	0.0000	0.0000	111.789	0.00000	0.00000	1114578.0	1114578.0	0.0	S
300.000	0.0000	0.0000	111.727	0.00000	0.00000	1114578.0	1114578.0	0.0	S
312.000	0.0000	0.0000	111.668	0.00000	0.00000	1114578.0	1114578.0	0.0	S
324.000	0.0000	0.0000	111.611	0.00000	0.00000	1114578.0	1114578.0	0.0	S
336.000	0.0000	0.0000	111.556	0.00000	0.00000	1114578.0	1114578.0	0.0	S
348.000	0.0000	0.0000	111.502	----	----	1114578.0	1114578.0	0.0	N.A.

← Recover
 < 6 day

PONDS Version 3.2.0145
Retention Pond Recovery - Refined Method
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Devo Seereeram, Ph.D., P.E.

Project Data

Project Name: Hartwood Marsh Road Phase II
Simulation Description: Pond 3 Water Quality Recovery
Project Number: 41561-1
Engineer : MSF
Supervising Engineer:
Date: 04-07-2009

*(min. Permeability
for Recovery)*

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 103.00
Water Table Elevation, [WT] (ft datum): 104.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 8.00 ←
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 5.333
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 192700.7

Geometry Data

Equivalent Pond Length, [L] (ft): 1062.0
Equivalent Pond Width, [W] (ft): 300.0
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

<u>Stage</u> (ft datum)	<u>Area</u> (ft ²)
113.00	181645.2
114.00	193406.4
115.00	205603.2
116.00	217800.0
117.00	230868.0
118.00	243500.4
119.00	256132.8

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Retention Pond Recovery - Refined Method
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Devo Seereeram, Ph.D., P.E.

Scenario Input Data

Scenario 1 :: Water Quality

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 98881.2

Initial ground water level (ft datum) default, 104.00

<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>
0.100	2.000
0.250	2.500
0.500	3.000
1.000	3.500
1.500	4.000

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Retention Pond Recovery - Refined Method
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Devo Seereeram, Ph.D., P.E.

Detailed Results :: Scenario 1 :: Water Quality

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	16480.2000	0.0000	104.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	16480.2000	0.0000	113.535	11.20418	0.00000	98881.2	67.3	0.0	U/P
2.400	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
6.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
12.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
24.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
36.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
48.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
60.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
72.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
84.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry
96.000	0.0000	0.0000	----	----	----	98881.2	98881.2	0.0	dry

← Recovery < 6 hrs

PONDS Version 3.2.0145
Retention Pond Recovery - Refined Method
Copyright 2000
Devo Seereeram, Ph.D., P.E.

Project Data

Project Name: Hartwood Marsh Road Phase II
Simulation Description: Pond 3 25yr 96hr Recovery (Min. Permeability for Recovery)
Project Number: 41561-1
Engineer : MSF
Supervising Engineer:
Date: 05-13-2009

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 103.00
Water Table Elevation, [WT] (ft datum): 104.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 8.00 ←
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 5.333
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 256132.8

Geometry Data

Equivalent Pond Length, [L] (ft): 1212.0
Equivalent Pond Width, [W] (ft): 476.0
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)
113.00	181645.2
114.00	193406.4
115.00	205603.2
116.00	217800.0
117.00	230868.0
118.00	263500.4
119.00	256132.8

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Scenario Input Data

Scenario 1 :: 25 year/96 hour

Hydrograph Type: Slug Load
 Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 1114578

Initial ground water level (ft datum) default, 104.00

Time After Storm Event (days)	Time After Storm Event (days)	Time After Storm Event (days)	Time After Storm Event (days)	Time After Storm Event (days)
0.100	3.000	6.500	10.000	13.500
0.250	3.500	7.000	10.500	14.000
0.500	4.000	7.500	11.000	14.500
1.000	4.500	8.000	11.500	
1.500	5.000	8.500	12.000	
2.000	5.500	9.000	12.500	
2.500	6.000	9.500	13.000	

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Detailed Results :: Scenario 1 :: 25 year/96 hour

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	185763.0000	0.0000	104.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	185763.0000	0.0000	118.168	11.21516	0.00000	1114578.0	67.3	0.0	U/P
2.400	0.0000	0.0000	117.642	15.70320	0.00000	1114578.0	136568.0	0.0	U/P
6.000	0.0000	0.0000	116.797	16.08790	0.00000	1114578.0	338010.0	0.0	U/P
12.000	0.0000	0.0000	115.109	11.78632	0.00000	1114578.0	705111.9	0.0	U/S
24.000	0.0000	0.0000	114.821	1.14518	0.00000	1114578.0	764210.9	0.0	S
36.000	0.0000	0.0000	114.624	0.82246	0.00000	1114578.0	804055.3	0.0	S
48.000	0.0000	0.0000	114.468	0.66396	0.00000	1114578.0	835271.3	0.0	S
60.000	0.0000	0.0000	114.336	0.56596	0.00000	1114578.0	861421.8	0.0	S
72.000	0.0000	0.0000	114.220	0.49793	0.00000	1114578.0	884170.6	0.0	S
84.000	0.0000	0.0000	114.117	0.44723	0.00000	1114578.0	904442.9	0.0	S
96.000	0.0000	0.0000	114.022	0.40761	0.00000	1114578.0	922811.7	0.0	S
108.000	0.0000	0.0000	113.935	0.37555	0.00000	1114578.0	939660.3	0.0	S
120.000	0.0000	0.0000	113.854	0.34894	0.00000	1114578.0	955259.2	0.0	S
132.000	0.0000	0.0000	113.777	0.32640	0.00000	1114578.0	969808.3	0.0	S
144.000	0.0000	0.0000	113.706	0.30701	0.00000	1114578.0	983459.9	0.0	S
156.000	0.0000	0.0000	113.638	0.29011	0.00000	1114578.0	996333.7	0.0	S
168.000	0.0000	0.0000	113.573	0.27523	0.00000	1114578.0	1008526.0	0.0	S
180.000	0.0000	0.0000	113.512	0.26201	0.00000	1114578.0	1020114.0	0.0	S
192.000	0.0000	0.0000	113.453	0.25016	0.00000	1114578.0	1031163.0	0.0	S
204.000	0.0000	0.0000	113.396	0.23947	0.00000	1114578.0	1041727.0	0.0	S
216.000	0.0000	0.0000	113.342	0.22976	0.00000	1114578.0	1051853.0	0.0	S
228.000	0.0000	0.0000	113.289	0.22090	0.00000	1114578.0	1061579.0	0.0	S
240.000	0.0000	0.0000	113.238	0.21277	0.00000	1114578.0	1070939.0	0.0	S
252.000	0.0000	0.0000	113.189	0.20528	0.00000	1114578.0	1079963.0	0.0	S
264.000	0.0000	0.0000	113.142	0.19835	0.00000	1114578.0	1088675.0	0.0	S
276.000	0.0000	0.0000	113.096	0.19191	0.00000	1114578.0	1097100.0	0.0	S
288.000	0.0000	0.0000	113.051	0.18591	0.00000	1114578.0	1105257.0	0.0	S
300.000	0.0000	0.0000	113.008	0.10789	0.00000	1114578.0	1113163.0	0.0	S
312.000	0.0000	0.0000	112.957	0.01638	0.00000	1114578.0	1114578.0	0.0	S
324.000	0.0000	0.0000	112.907	0.00000	0.00000	1114578.0	1114578.0	0.0	S
336.000	0.0000	0.0000	112.858	0.00000	0.00000	1114578.0	1114578.0	0.0	S
348.000	0.0000	0.0000	112.810	---	---	1114578.0	1114578.0	0.0	N.A.

ReCOVERS within 13.5 days.
 (Perm. 8ft/day)

BASIN 5

STAGE / STORAGE CALCULATIONS



DATE

MADE BY:	msf	24-Sep-08
CHCK BY:	BJS	8-Jan-09

PROJECT: **HARTWOOD MARSH ROAD PHASE II**

POND: 5

Boring	Approx. Existing Ground Elevation	Depth to Encountered Water Surface	Estimated Depth to Encountered Water Surface	Average Estimated Depth to Encountered Water Surface	Depth to Seasonal High Water Surface	Estimated Seasonal High Water Elevation	Average Estimated Seasonal High Water Elevation
AB-P61	109.49	20.0	89.49	84.22	17	92.49	87.22
AB-P62	104.27	20.0	84.27		17	87.27	
AB-P63	101.15	20.0	81.15		17	84.15	
AB-P64	101.95	20.0	81.95		17	84.95	

Note: Above information per pond boring profiles: Ardaman & Associates, June 2008
Per Ardaman report groundwater not encountered.

AVG. SHWT ELEVATION: 87.2 Ft. (NAVD)

AVG. GROUND WATER TABLE ELEVATION: 84.2 Ft. (NAVD)

AVG. EXIST. GROUND ELEVATION AT BORING LOCATIONS: 104.2 Ft. (NAVD)

STAGE Ft. (NAVD)	AREA AC.	AVERAGE AREA AC.	INCREMENTAL VOL. AF
90.0	0.88		0.00
		0.92	
91.0	0.96		0.92
		1.02	
92.0	1.08		1.02
		1.12	
93.0	1.16		1.12
		1.21	
94.0	1.25		1.21
		1.30	
95.0	1.34		1.30
		1.39	
96.0	1.44		1.39
		1.48	
97.0	1.53		1.48
		1.58	
98.0	1.63		1.58
		1.68	
99.0	1.72		1.68
		1.77	
100.0	1.82		1.77
		1.87	
101.0	1.93		1.87
		2.10	
102.0	2.27		2.10
TOTAL:			17.44

TOP EL. OF TREATMENT VOLUME: 101.00 Ft.

AVE. PERCOLATION RATE: 21 Ft./Day or 10.5 Inches/Hr.

FACTOR OF SAFTEY: 2 = 5.25 Inches/Hr.

Hartwood Marsh Road Phase II
 Post Development
 Pond 5 Hartwood
 Input Report
 04/22/09

```

Name: BASIN 5-6      Node: POND 5      Status: Onsite
Group: BASE          Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh484      Peaking Factor: 484.0
Rainfall File: Sjrwm96     Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.300 Time of Conc(min): 16.29
Area(ac): 0.050           Time Shift(hrs): 0.00
Curve Number: 39.00      Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00
  
```

Offsite to road

```

Name: POND 5      Base Flow(cfs): 0.000      Init Stage(ft): 90.000
Group: BASE      Warn Stage(ft): 101.000
Type: Stage/Area
  
```

Stage (ft)	Area (ac)
90.000	0.8800
91.000	0.9600
92.000	1.0800
93.000	1.1600
94.000	1.2500
95.000	1.3400
96.000	1.4400
97.000	1.5300
98.000	1.6300
99.000	1.7200
100.000	1.8200
101.000	1.9300
102.000	2.2700

Hydrology Simulations

```

Name: 100Y24H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\100Y24H.R32
  
```

```

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Flmod
Rainfall Amount(in): 11.50
  
```

Time (hrs)	Print Inc(min)
11.000	60.00
16.000	15.00
40.000	60.00

```

Name: 10Y24H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\10Y24H.R32
  
```

```

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Flmod
Rainfall Amount(in): 6.70
  
```

Time (hrs)	Print Inc(min)
11.000	60.00
16.000	15.00
40.000	60.00

```

Name: 2.3Y24H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\2.3Y24H.R32
  
```

```

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Flmod
Rainfall Amount(in): 4.20
  
```

Time (hrs)	Print Inc(min)
11.000	60.00
16.000	15.00
40.000	60.00

Hartwood Marsh Road Phase II
 Post Development
 Pond 5 Hartwood
 Input Report
 04/22/09

```
-----
11.000      60.00
16.000      15.00
40.000      60.00
-----
```

Name: 25Y24H
 Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\25Y24H.R32

Override Defaults: Yes
 Storm Duration(hrs): 24.00
 Rainfall File: Flmod
 Rainfall Amount(in): 8.30

```
Time(hrs)      Print Inc(min)
-----
11.000      60.00
16.000      15.00
40.000      60.00
-----
```

Name: 25Y96H
 Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\25Y96H.R32

Override Defaults: No

```
Time(hrs)      Print Inc(min)
-----
50.000      60.00
62.000      15.00
100.000     60.00
-----
```

==== Routing Simulations =====

Name: 100Y24H Hydrology Sim: 100Y24H
 Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\100Y24H.I32

Execute: No Restart: No Patch: No
 Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
 Time Step Optimizer: 10.000
 Start Time(hrs): 0.000 End Time(hrs): 150.00
 Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
 Boundary Stages: Boundary Flows:

```
Time(hrs)      Print Inc(min)
-----
11.000      60.000
15.000      15.000
150.000     60.000
-----
Group          Run
-----
BASE           Yes
```

Name: 10Y24H Hydrology Sim: 10Y24H
 Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\10Y24H.I32

Execute: Yes Restart: No Patch: No
 Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
 Time Step Optimizer: 10.000
 Start Time(hrs): 0.000 End Time(hrs): 40.00
 Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
 Boundary Stages: Boundary Flows:

```
Time(hrs)      Print Inc(min)
-----
11.000      60.000
15.000      15.000
40.000      60.000
-----
```

Hartwood Marsh Road Phase II
 Post Development
 Pond 5 Hartwood
 Input Report
 04/22/09

Group	Run
BASE	Yes

Name: 2.3Y24H Hydrology Sim: 2.3Y24H
 Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\2.3Y24H.I32

Execute: No Restart: No Patch: No
 Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
 Time Step Optimizer: 10.000
 Start Time(hrs): 0.000 End Time(hrs): 150.00
 Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
 Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
11.000	60.000
15.000	15.000
150.000	60.000

Group	Run
BASE	Yes

Name: 25Y24H Hydrology Sim: 25Y24H
 Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\25Y24H.I32

Execute: Yes Restart: No Patch: No
 Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
 Time Step Optimizer: 10.000
 Start Time(hrs): 0.000 End Time(hrs): 40.000
 Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
 Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
11.000	60.000
15.000	15.000
40.000	60.000

Group	Run
BASE	Yes

Name: 25Y96H Hydrology Sim: 25Y96H
 Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\25Y96H.I32

Execute: Yes Restart: No Patch: No
 Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
 Time Step Optimizer: 10.000
 Start Time(hrs): 0.000 End Time(hrs): 97.00
 Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
 Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
55.000	60.000
65.000	15.000
97.000	60.000

Group	Run
BASE	Yes

Hartwood Marsh Road Phase II
 Post Development
 Pond 5 Hartwood
 Node Min/Max Report
 05/11/09

Simulation	Node	Time hrs	Volume ft3	Volume in	Rate cfs
25Y96H	POND 5	0.00	0.000	0.000	0.000
25Y96H	POND 5	1.00	0.000	0.000	0.000
25Y96H	POND 5	2.00	0.000	0.000	0.000
25Y96H	POND 5	3.00	0.000	0.000	0.000
25Y96H	POND 5	4.00	0.000	0.000	0.000
25Y96H	POND 5	5.00	0.000	0.000	0.000
25Y96H	POND 5	6.00	5.883	0.000	0.003
25Y96H	POND 5	7.00	24.939	0.000	0.007
25Y96H	POND 5	8.00	57.837	0.001	0.011
25Y96H	POND 5	9.00	103.428	0.002	0.014
25Y96H	POND 5	10.00	160.580	0.003	0.017
25Y96H	POND 5	11.00	228.062	0.004	0.020
25Y96H	POND 5	12.00	304.923	0.005	0.023
25Y96H	POND 5	13.00	390.327	0.006	0.025
25Y96H	POND 5	14.00	483.534	0.008	0.027
25Y96H	POND 5	15.00	583.901	0.009	0.029
25Y96H	POND 5	16.00	706.178	0.011	0.039
25Y96H	POND 5	17.00	867.856	0.014	0.051
25Y96H	POND 5	18.00	1070.962	0.017	0.062
25Y96H	POND 5	19.00	1314.208	0.021	0.073
25Y96H	POND 5	20.00	1595.910	0.025	0.083
25Y96H	POND 5	21.00	1915.909	0.030	0.094
25Y96H	POND 5	22.00	2272.973	0.036	0.104
25Y96H	POND 5	23.00	2664.516	0.042	0.113
25Y96H	POND 5	24.00	3089.996	0.049	0.123
25Y96H	POND 5	25.00	3900.754	0.062	0.327
25Y96H	POND 5	26.00	5157.319	0.082	0.371
25Y96H	POND 5	27.00	6562.617	0.104	0.410
25Y96H	POND 5	28.00	8104.602	0.128	0.447
25Y96H	POND 5	29.00	9802.331	0.155	0.497
25Y96H	POND 5	30.00	11649.654	0.184	0.530
25Y96H	POND 5	31.00	13611.249	0.215	0.560
25Y96H	POND 5	32.00	15678.513	0.248	0.588
25Y96H	POND 5	33.00	17807.551	0.282	0.594
25Y96H	POND 5	34.00	19988.867	0.316	0.617
25Y96H	POND 5	35.00	22250.020	0.352	0.639
25Y96H	POND 5	36.00	24585.789	0.389	0.659
25Y96H	POND 5	37.00	26991.412	0.427	0.678
25Y96H	POND 5	38.00	29462.523	0.466	0.695
25Y96H	POND 5	39.00	31995.121	0.506	0.712
25Y96H	POND 5	40.00	34585.633	0.547	0.727
25Y96H	POND 5	41.00	37275.156	0.590	0.767
25Y96H	POND 5	42.00	40062.070	0.634	0.782
25Y96H	POND 5	43.00	42900.461	0.679	0.795
25Y96H	POND 5	44.00	45787.203	0.725	0.808
25Y96H	POND 5	45.00	48672.207	0.770	0.794
25Y96H	POND 5	46.00	51551.875	0.816	0.805
25Y96H	POND 5	47.00	54470.082	0.862	0.816
25Y96H	POND 5	48.00	57425.883	0.909	0.826
25Y96H	POND 5	49.00	60936.559	0.964	1.124
25Y96H	POND 5	50.00	65012.273	1.029	1.140
25Y96H	POND 5	50.25	66092.813	1.046	1.261
25Y96H	POND 5	50.50	67258.961	1.064	1.330
25Y96H	POND 5	50.75	68463.398	1.083	1.346
25Y96H	POND 5	51.00	69677.828	1.103	1.353
25Y96H	POND 5	51.25	70897.398	1.122	1.357
25Y96H	POND 5	51.50	72121.242	1.141	1.362
25Y96H	POND 5	51.75	73349.297	1.161	1.367
25Y96H	POND 5	52.00	74581.500	1.180	1.371
25Y96H	POND 5	52.25	75904.188	1.201	1.568
25Y96H	POND 5	52.50	77369.281	1.224	1.688
25Y96H	POND 5	52.75	78899.820	1.248	1.713
25Y96H	POND 5	53.00	80446.086	1.273	1.723
25Y96H	POND 5	53.25	81999.430	1.297	1.729
25Y96H	POND 5	53.50	83558.367	1.322	1.735
25Y96H	POND 5	53.75	85122.766	1.347	1.741
25Y96H	POND 5	54.00	86692.938	1.372	1.748
25Y96H	POND 5	54.25	88385.672	1.399	2.014
25Y96H	POND 5	54.50	90269.367	1.428	2.172
25Y96H	POND 5	54.75	92239.766	1.460	2.206
25Y96H	POND 5	55.00	94230.961	1.491	2.219
25Y96H	POND 5	55.25	96231.383	1.523	2.227
25Y96H	POND 5	55.50	98239.047	1.554	2.235
25Y96H	POND 5	55.75	100253.750	1.586	2.242
25Y96H	POND 5	56.00	102277.555	1.618	2.255
25Y96H	POND 5	56.25	104624.563	1.655	2.961
25Y96H	POND 5	56.50	107473.703	1.701	3.371
25Y96H	POND 5	56.75	110544.875	1.749	3.454
25Y96H	POND 5	57.00	113665.477	1.799	3.481
25Y96H	POND 5	57.25	116805.016	1.848	3.496

Hartwood Marsh Road Phase II
 Post Development
 Pond 5 Hartwood
 Node Min/Max Report
 05/11/09

Simulation	Node	Time hrs	Volume ft3	Volume in	Rate cfs
25Y96H	POND 5	57.50	119958.313	1.898	3.511
25Y96H	POND 5	57.75	123124.891	1.948	3.526
25Y96H	POND 5	58.00	126307.703	1.999	3.547
25Y96H	POND 5	58.25	130222.695	2.061	5.153
25Y96H	POND 5	58.50	135309.547	2.141	6.151
25Y96H	POND 5	58.75	140937.219	2.230	6.355
25Y96H	POND 5	59.00	146691.484	2.321	6.433
25Y96H	POND 5	59.25	153819.594	2.434	9.408
25Y96H	POND 5	59.50	163236.109	2.583	11.518
25Y96H	POND 5	59.75	195314.453	3.091	59.767
25Y96H	POND 5	60.00	262901.719	4.160	90.427
25Y96H	POND 5	60.25	326456.125	5.166	50.805
25Y96H	POND 5	60.50	360202.313	5.700	24.186
25Y96H	POND 5	60.75	377484.063	5.973	14.218
25Y96H	POND 5	61.00	388525.469	6.148	10.319
25Y96H	POND 5	61.25	396677.188	6.277	7.796
25Y96H	POND 5	61.50	403129.906	6.379	6.543
25Y96H	POND 5	61.75	408930.938	6.471	6.348
25Y96H	POND 5	62.00	414628.063	6.561	6.312
25Y96H	POND 5	63.00	433071.844	6.853	3.934
25Y96H	POND 5	64.00	447241.000	7.077	3.938
25Y96H	POND 5	65.00	458614.531	7.257	2.381
25Y96H	POND 5	66.00	467190.125	7.392	2.383
25Y96H	POND 5	67.00	475773.938	7.528	2.386
25Y96H	POND 5	68.00	484363.531	7.664	2.386
25Y96H	POND 5	69.00	491524.094	7.777	1.592
25Y96H	POND 5	70.00	497255.656	7.868	1.593
25Y96H	POND 5	71.00	502987.125	7.959	1.592
25Y96H	POND 5	72.00	508714.844	8.050	1.590
25Y96H	POND 5	73.00	513068.125	8.118	0.828
25Y96H	POND 5	74.00	516049.156	8.166	0.828
25Y96H	POND 5	75.00	519030.938	8.213	0.828
25Y96H	POND 5	76.00	522013.656	8.260	0.829
25Y96H	POND 5	77.00	525009.313	8.307	0.836
25Y96H	POND 5	78.00	528018.000	8.355	0.836
25Y96H	POND 5	79.00	531027.313	8.403	0.836
25Y96H	POND 5	80.00	534037.625	8.450	0.836
25Y96H	POND 5	81.00	537036.500	8.498	0.830
25Y96H	POND 5	82.00	540023.875	8.545	0.830
25Y96H	POND 5	83.00	543012.000	8.592	0.830
25Y96H	POND 5	84.00	546001.063	8.639	0.830
25Y96H	POND 5	85.00	548990.688	8.687	0.831
25Y96H	POND 5	86.00	551981.125	8.734	0.831
25Y96H	POND 5	87.00	554972.188	8.781	0.831
25Y96H	POND 5	88.00	557964.188	8.829	0.831
25Y96H	POND 5	89.00	560969.000	8.876	0.838
25Y96H	POND 5	90.00	563986.813	8.924	0.838
25Y96H	POND 5	91.00	567005.250	8.972	0.839
25Y96H	POND 5	92.00	570024.375	9.020	0.839
25Y96H	POND 5	93.00	573032.063	9.067	0.832
25Y96H	POND 5	94.00	576028.125	9.115	0.832
25Y96H	POND 5	95.00	579024.938	9.162	0.833
25Y96H	POND 5	96.00	582015.063	9.209	0.829
25Y96H	POND 5	97.00	583506.500	9.233	0.000
25Y96H	POND 5	98.00	583506.500	9.233	0.000
25Y96H	POND 5	99.00	583506.500	9.233	0.000
25Y96H	POND 5	100.00	583506.500	9.233	0.000
25Y96H	POND 5	101.00	583506.500	9.233	0.000
25Y96H	POND 5	102.00	583506.500	9.233	0.000
25Y96H	POND 5	103.00	583506.500	9.233	0.000
25Y96H	POND 5	104.00	583506.500	9.233	0.000
25Y96H	POND 5	105.00	583506.500	9.233	0.000
25Y96H	POND 5	106.00	583506.500	9.233	0.000
25Y96H	POND 5	107.00	583506.500	9.233	0.000
25Y96H	POND 5	108.00	583506.500	9.233	0.000
25Y96H	POND 5	109.00	583506.500	9.233	0.000
25Y96H	POND 5	110.00	583506.500	9.233	0.000
25Y96H	POND 5	111.00	583506.500	9.233	0.000
25Y96H	POND 5	112.00	583506.500	9.233	0.000
25Y96H	POND 5	113.00	583506.500	9.233	0.000
25Y96H	POND 5	114.00	583506.500	9.233	0.000
25Y96H	POND 5	115.00	583506.500	9.233	0.000
25Y96H	POND 5	116.00	583506.500	9.233	0.000
25Y96H	POND 5	117.00	583506.500	9.233	0.000
25Y96H	POND 5	118.00	583506.500	9.233	0.000
25Y96H	POND 5	119.00	583506.500	9.233	0.000
25Y96H	POND 5	120.00	583506.500	9.233	0.000
25Y96H	POND 5	121.00	583506.500	9.233	0.000
25Y96H	POND 5	122.00	583506.500	9.233	0.000
25Y96H	POND 5	123.00	583506.500	9.233	0.000

Total Volume
 = 13.40 ac-ft

Hartwood Marsh Road Phase II
Post Development
Pond 5 Hartwood
Node Min/Max Report
05/11/09

Simulation	Node	Time hrs	Volume ft3	Volume in	Rate cfs
25Y96H	POND 5	124.00	583506.500	9.233	0.000
25Y96H	POND 5	125.00	583506.500	9.233	0.000

Hartwood Marsh Road Phase II
 Post Development
 Pond 5 Hartwood
 Node Min/Max Report
 04/22/09

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
POND 5	BASE	10Y24H	26.01	95.984	101.000	0.0050	62659	12.00	56.657	0.00	0.000
POND 5	BASE	25Y96H	97.00	99.965	101.000	0.0050	79126	60.00	90.422	0.00	0.000

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PONDS Version 3.2.0145
Retention Pond Recovery - Refined Method
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Project Data

Project Name: Hartwood Marsh Road Phase II
Simulation Description: Pond 5 Water Quality Recovery
Project Number: 41561-1
Engineer : MSF
Supervising Engineer:
Date: 04-22-2009

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 86.00
Water Table Elevation, [WT] (ft datum): 87.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 21.00
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 14.0
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 99043.0

Geometry Data

Equivalent Pond Length, [L] (ft): 309.0
Equivalent Pond Width, [W] (ft): 245.0
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

<u>Stage (ft datum)</u>	<u>Area (ft²)</u>
90.00	38453.0
91.00	41698.0
92.00	46870.0
93.00	50689.0
94.00	54581.0
95.00	58545.0
96.00	62582.0
97.00	66692.0
98.00	70873.0
99.00	75128.0
100.00	79455.0
101.00	83854.0
102.00	99043.0

Scenario Input Data

Scenario 1 :: Water Quality

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 81457

Initial ground water level (ft datum) default, 87.00

<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>
0.100	2.000
0.250	2.500
0.500	3.000
1.000	3.500
1.500	4.000

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Detailed Results :: Scenario 1 :: Water Quality

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	13576.1700	0.0000	87.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	13576.1700	0.0000	91.937	6.23172	0.00000	81457.0	37.4	0.0	U/P
2.400	0.0000	0.0000	90.417	4.52641	0.00000	81457.0	65154.4	0.0	U/P
6.000	0.0000	0.0000	----	----	----	81457.0	81457.0	0.0	dry
12.000	0.0000	0.0000	----	----	----	81457.0	81457.0	0.0	dry
24.000	0.0000	0.0000	----	----	----	81457.0	81457.0	0.0	dry
36.000	0.0000	0.0000	----	----	----	81457.0	81457.0	0.0	dry
48.000	0.0000	0.0000	----	----	----	81457.0	81457.0	0.0	dry
60.000	0.0000	0.0000	----	----	----	81457.0	81457.0	0.0	dry
72.000	0.0000	0.0000	----	----	----	81457.0	81457.0	0.0	dry
84.000	0.0000	0.0000	----	----	----	81457.0	81457.0	0.0	dry
96.000	0.0000	0.0000	----	----	----	81457.0	81457.0	0.0	dry

← Recovery < 6 hrs

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Project Data

Project Name: Hartwood Marsh Road Phase II
Simulation Description: Pond 5 25 year/96 hour Recovery
Project Number: 41561-1
Engineer : MSF
Supervising Engineer:
Date: 05-11-2009

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 86.00
Water Table Elevation, [WT] (ft datum): 87.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 21.00
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 14.0
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 99043.0

Geometry Data

Equivalent Pond Length, [L] (ft): 315.0
Equivalent Pond Width, [W] (ft): 263.0
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)
90.00	38453.0
91.00	41698.0
92.00	46870.0
93.00	50689.0
94.00	54581.0
95.00	58545.0
96.00	62582.0
97.00	66692.0
98.00	70973.0
99.00	75128.0
100.00	79455.0
101.00	83854.0
102.00	99043.0

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Scenario Input Data

Scenario 1 :: 25 year/96 hour

Hydrograph Type: Slug Load
 Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 583506.5

Initial ground water level (ft datum) default, 87.00

Time After Storm Event (days)	Time After Storm Event (days)	Time After Storm Event (days)	Time After Storm Event (days)	Time After Storm Event (days)
0.100	2.500	6.500	9.500	12.500
0.250	3.000	7.000	10.000	13.000
0.500	3.500	7.500	10.500	13.500
1.000	4.000	8.000	11.000	14.000
1.500	4.500	8.500	11.500	14.500
2.000	6.000	9.000	12.000	

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Devo Seereeram, Ph.D., P.E.

Detailed Results :: Scenario 1 :: 25 year/96 hour

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	97251.0900	0.0000	87.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	97251.0900	0.0000	99.959	6.23540	0.00000	583506.5	37.4	0.0	U/P
2.400	0.0000	0.0000	98.502	10.77572	0.00000	583506.5	110949.8	0.0	U/P
6.000	0.0000	0.0000	97.084	5.13400	0.00000	583506.5	210328.9	0.0	U/S
12.000	0.0000	0.0000	96.788	0.78484	0.00000	583506.5	229994.5	0.0	S
24.000	0.0000	0.0000	96.434	0.46176	0.00000	583506.5	253047.2	0.0	S
36.000	0.0000	0.0000	96.170	0.35142	0.00000	583506.5	269890.5	0.0	S
48.000	0.0000	0.0000	95.955	0.28858	0.00000	583506.5	283409.6	0.0	S
60.000	0.0000	0.0000	95.771	0.24721	0.00000	583506.5	294824.3	0.0	S
72.000	0.0000	0.0000	95.609	0.21750	0.00000	583506.5	304768.3	0.0	S
84.000	0.0000	0.0000	95.463	0.19493	0.00000	583506.5	313616.5	0.0	S
96.000	0.0000	0.0000	95.330	0.17707	0.00000	583506.5	321610.3	0.0	S
108.000	0.0000	0.0000	95.208	0.16140	0.00000	583506.5	328915.5	0.0	S
144.000	0.0000	0.0000	94.903	0.13168	0.00000	583506.5	346840.0	0.0	S
156.000	0.0000	0.0000	94.806	0.12562	0.00000	583506.5	352433.0	0.0	S
168.000	0.0000	0.0000	94.715	0.11837	0.00000	583506.5	357693.6	0.0	S
180.000	0.0000	0.0000	94.628	0.11196	0.00000	583506.5	362660.6	0.0	S
192.000	0.0000	0.0000	94.546	0.10622	0.00000	583506.5	367366.5	0.0	S
204.000	0.0000	0.0000	94.467	0.10106	0.00000	583506.5	371838.1	0.0	S
216.000	0.0000	0.0000	94.391	0.09639	0.00000	583506.5	376098.3	0.0	S
228.000	0.0000	0.0000	94.318	0.09214	0.00000	583506.5	380166.4	0.0	S
240.000	0.0000	0.0000	94.248	0.08826	0.00000	583506.5	384059.4	0.0	S
252.000	0.0000	0.0000	94.181	0.08468	0.00000	583506.5	387791.7	0.0	S
264.000	0.0000	0.0000	94.116	0.08139	0.00000	583506.5	391376.1	0.0	S
276.000	0.0000	0.0000	94.053	0.07834	0.00000	583506.5	394823.7	0.0	S
288.000	0.0000	0.0000	93.992	0.07551	0.00000	583506.5	398144.6	0.0	S
300.000	0.0000	0.0000	93.934	0.07287	0.00000	583506.5	401347.4	0.0	S
312.000	0.0000	0.0000	93.877	0.07040	0.00000	583506.5	404440.3	0.0	S
324.000	0.0000	0.0000	93.821	0.06809	0.00000	583506.5	407430.2	0.0	S
336.000	0.0000	0.0000	93.767	0.06593	0.00000	583506.5	410323.7	0.0	S
348.000	0.0000	0.0000	93.715	----	----	583506.5	413126.4	0.0	N.A.

After 14 days, 70% Recovered

Remaining Volume in pond: 3.98 ac-ft
 Add 2nd storm: 13.40 ac-ft

 17.38 ac-ft

equates to elev. 101.9 ft in pond

∴ pond will not overtop

STAGE / STORAGE/VOLUME



	DATE	
MADE BY:	msf	22-Apr-09
CHCK BY:	BJS	24-Apr-09

PROJECT: HARTWOOD MARSH ROAD PHASE II

POND: 5

STAGE	AREA	AVERAGE AREA	INCREMENTAL VOL.	CUMULATIVE VOL.
Ft. (NAVD)	AC.	AC.	AF	AF
90.0	0.88		0.00	0.00
		0.92		
91.0	0.96		0.92	0.92
		1.02		
92.0	1.08		1.02	1.94
		1.12		
93.0	1.16		1.12	3.06
		1.21		
94.0	1.25		1.21	4.26
		1.30		
95.0	1.34		1.30	5.56
		1.39		
96.0	1.44		1.39	6.95
		1.48		
97.0	1.53		1.48	8.44
		1.58		
98.0	1.63		1.58	10.02
		1.68		
99.0	1.72		1.68	11.69
		1.77		
100.0	1.82		1.77	13.47
		1.87		
101.0	1.93		1.87	15.34
		2.10		
102.0	2.27		2.10	17.44
TOTAL:				17.44



FLOOD PLAIN COMPENSATION--10 YEAR

DATE

MADE BY:	MSF	22-Apr-09
CHCK BY:	BJS	25-Apr-09

PROJECT: HARTWOOD MARSH ROAD PHASE II

EXCAVATION (POND 5, CL CONST. POND 5)

STATION	AREA (AC.)	AVERAGE AREA (AC.)	INCREMENTAL AREA (AC-FT)	CUMULATIVE VOLUME (AC-FT)	CUMULATIVE VOLUME (FT^3)	CUMULATIVE VOLUME (CY)
5000+71.65	0		0	0	0	0
		0				
5001+00.00	0		0	0	0	0
		0				
5002+00.00	0		0	0	0	0
		0				
5003+00.00	0		0	0	0	0
		0				
5004+00.00	0		0	0	0	0
		0				
5005+00.00	0		0	0	0	0
		0				
5005+15.45	0		0	0	0	0

FILL (POND 5, CL CONST. POND 5)

STATION	AREA (AC.)	AVERAGE AREA (AC.)	INCREMENTAL AREA (AC-FT)	CUMULATIVE VOLUME (AC-FT)	CUMULATIVE VOLUME (FT^3)	CUMULATIVE VOLUME (CY)
5000+71.65	0.00235		0	0	0	0
		0.00181				
5001+00.00	0.00128		0.05133	0.05133	2235.97	82.81
		0.00079				
5002+00.00	0.00031		0.07937	0.13071	5693.53	210.87
		0.00164				
5003+00.00	0.00297		0.16406	0.29477	12840.03	475.56
		0.00414				
5004+00.00	0.00531		0.41407	0.70884	30876.88	1143.59
		0.00294				
5005+00.00	0.00056		0.29352	1.00236	43662.74	1617.14
		0.00043				
5005+15.45	0.00030		0.00666	1.00902	43952.75	1627.88

17



FLOOD PLAIN COMPENSATION--10 YEAR

DATE

MADE BY:	MSF	22-Apr-09
CHK BY:	BJS	25-Apr-09

PROJECT: HARTWOOD MARSH ROAD PHASE II

EXCAVATION (ROADWAY, CL CONST. HARTWOOD MARSH ROAD)

STATION	AREA (AC.)	AVERAGE AREA (AC.)	INCREMENTAL AREA (AC-FT)	CUMULATIVE VOLUME (AC-FT)	CUMULATIVE VOLUME (FT^3)	CUMULATIVE VOLUME (CY)
266+00.00	0	0.0051669	0	0	0	0
267+00.00	0.010334	0.0108103	0.51669	0.51669	22507.13	833.60
268+00.00	0.011287	0.0056434	1.08103	1.59773	69596.93	2577.66
269+00.00	0		0.56434	2.16207	94179.59	3488.13

FILL (ROADWAY, CL CONST. HARTWOOD MARSH ROAD)

STATION	AREA (AC.)	AVERAGE AREA (AC.)	INCREMENTAL AREA (AC-FT)	CUMULATIVE VOLUME (AC-FT)	CUMULATIVE VOLUME (FT^3)	CUMULATIVE VOLUME (CY)
266+00.00	0	0.00155	0	0	0	0
267+00.00	0.00310	0.00270	0.15489	0.15489	6747.17	249.90
268+00.00	0.00230	0.00115	0.26989	0.42478	18503.54	685.32
269+00.00	0		0.11500	0.53978	23512.73	870.84

TOTAL EXCAVATION = 3488.13 CY
TOTAL FILL = 2498.72 CY



FLOOD PLAIN COMPENSATION--100 YEAR

DATE

MADE BY:	MSF	31-Dec-08
CHCK BY:	BJS	8-Jan-09

PROJECT: HARTWOOD MARSH ROAD PHASE II

EXCAVATION (POND 5, CL CONST. POND 5)

STATION	AREA (AC.)	AVERAGE AREA (AC.)	INCREMENTAL AREA (AC-FT)	CUMULATIVE VOLUME (AC-FT)	CUMULATIVE VOLUME (FT^3)	CUMULATIVE VOLUME (CY)
5000+71.65	0		0	0	0	0
		0.0020938				
5001+00.00	0.004188		0.05936	0.05936	2585.66	95.77
		0.0028589				
5002+00.00	0.001530		0.28589	0.34525	15039.24	557.01
		0.0054250				
5003+00.00	0.009320		0.54250	0.88775	38670.59	1432.24
		0.0074200				
5004+00.00	0.005520		0.74200	1.62975	70992.05	2629.34
		0.0027601				
5005+00.00	0		0.27601	1.90577	83015.25	3074.64
		0				
5005+15.45	0		0	1.90577	83015.25	3074.64

FILL (POND 5, CL CONST. POND 5)

STATION	AREA (AC.)	AVERAGE AREA (AC.)	INCREMENTAL AREA (AC-FT)	CUMULATIVE VOLUME (AC-FT)	CUMULATIVE VOLUME (FT^3)	CUMULATIVE VOLUME (CY)
5000+71.65	0.00851		0	0	0	0
		0.00672				
5001+00.00	0.00494		0.19060	0.19060	8302.45	307.50
		0.00389				
5002+00.00	0.00284		0.38892	0.57952	25243.90	934.96
		0.00492				
5003+00.00	0.00700		0.49197	1.07149	46674.18	1728.67
		0.00983				
5004+00.00	0.01267		0.98315	2.05464	89500.27	3314.82
		0.00806				
5005+00.00	0.00345		0.80575	2.86039	124598.65	4614.76
		0.00227				
5005+15.45	0.00110		0.03513	2.89552	126128.79	4671.44

43



FLOOD PLAIN COMPENSATION--100 YEAR

DATE

MADE BY:	MSF	31-Dec-08
CHK BY:	BJS	8-Jan-09

PROJECT: HARTWOOD MARSH ROAD PHASE II

EXCAVATION (ROADWAY, CL CONST. HARTWOOD MARSH ROAD)

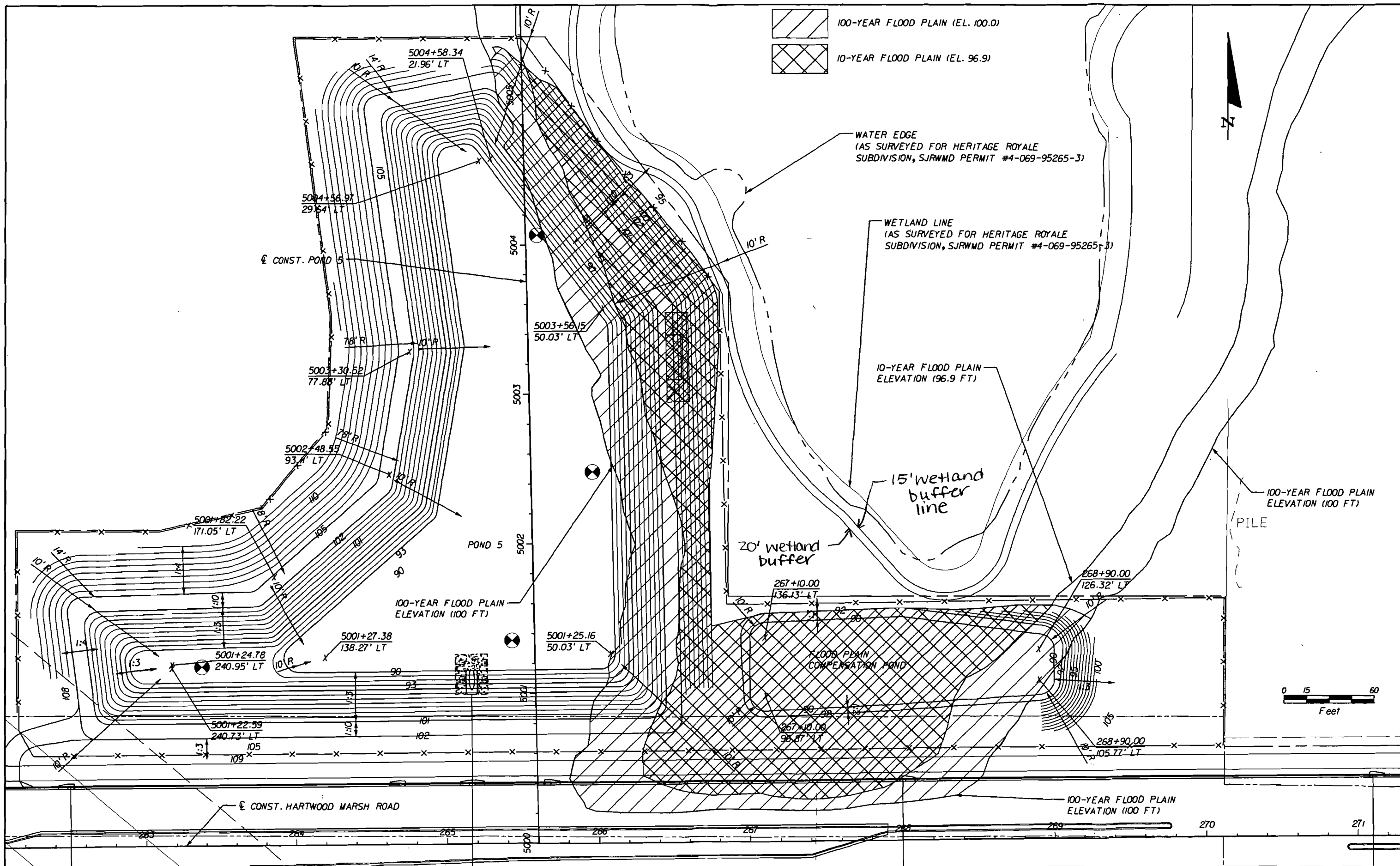
STATION	AREA (AC.)	AVERAGE AREA (AC.)	INCREMENTAL AREA (AC-FT)	CUMULATIVE VOLUME (AC-FT)	CUMULATIVE VOLUME (FT^3)	CUMULATIVE VOLUME (CY)
266+00.00	0	0.0051669	0	0	0	0
267+00.00	0.010334	0.0108103	0.51669	0.51669	22507.13	833.60
268+00.00	0.011287	0.0125141	1.08103	1.59773	69596.93	2577.66
269+00.00	0.013741		1.25141	2.84913	124108.29	4596.60

FILL (ROADWAY, CL CONST. HARTWOOD MARSH ROAD)

STATION	AREA (AC.)	AVERAGE AREA (AC.)	INCREMENTAL AREA (AC-FT)	CUMULATIVE VOLUME (AC-FT)	CUMULATIVE VOLUME (FT^3)	CUMULATIVE VOLUME (CY)
266+00.00	0.00078	0.00467	0	0	0	0
267+00.00	0.00856	0.00871	0.46731	0.46731	20356.24	753.93
268+00.00	0.00886	0.00443	0.87118	1.33849	58304.79	2159.44
269+00.00	0.00000		0.44307	1.78157	77605.05	2874.26

TOTAL EXCAVATION = 7671.24 CY
TOTAL FILL = 7545.70 CY

777



DATE	BY	REVISIONS DESCRIPTION

HNTB
 HNTB CORPORATION
 300 PRIMA BLVD,
 SUITE 200
 LAKE MARY, FL 32746
 (407) 805-0355
 CERT. OF AUTH. NO. 6500

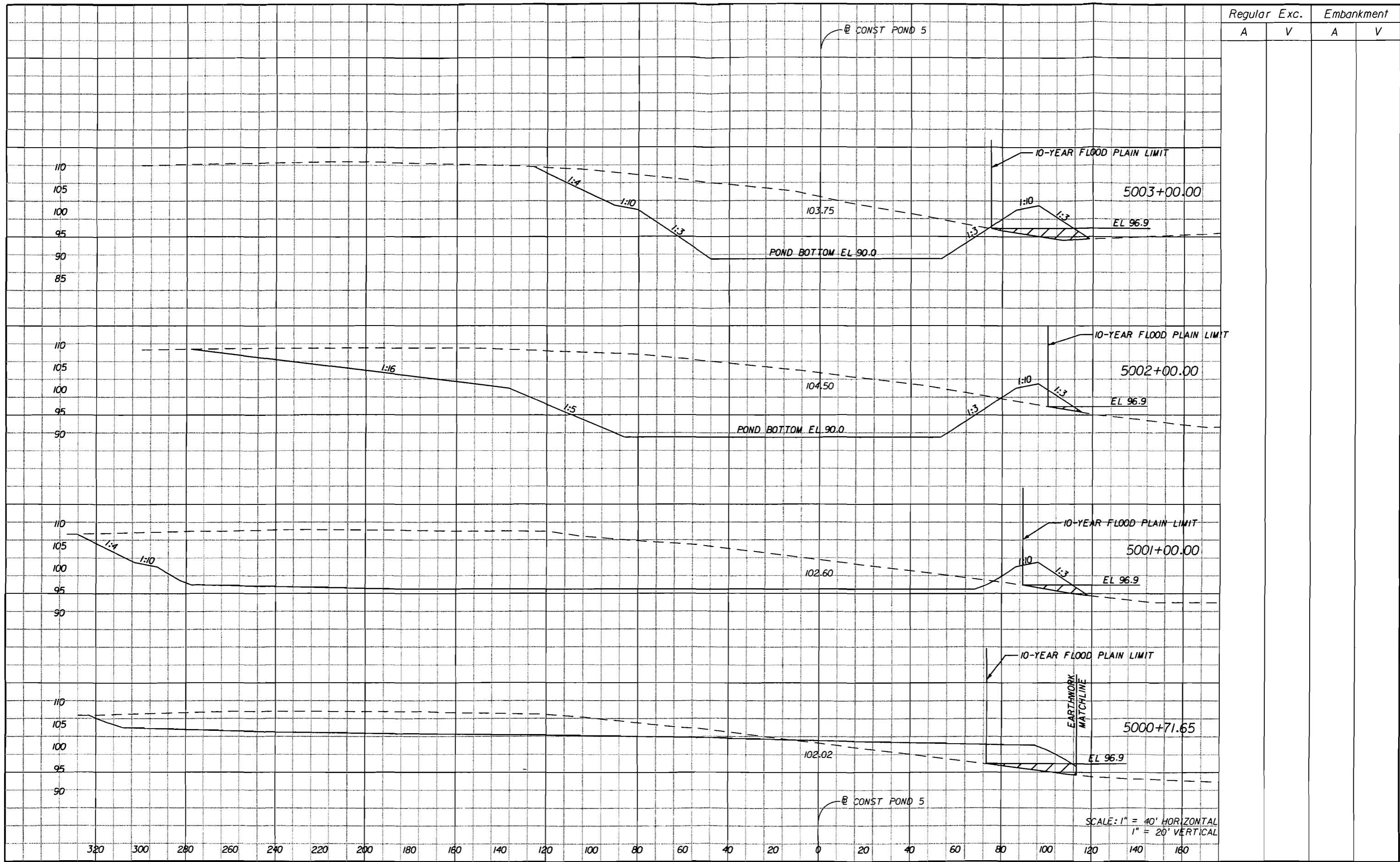
ENGINEER OF RECORD: MELINDA S. FISCHL, P.E.
 FL. REGISTRATION NO. 68406



**HARTWOOD MARSH
ROAD - PHASE II**

**FLOOD PLAIN COMPENSATION
BASIN 5**

SHEET
NO.
45



Regular Exc. Embankment

A V A V

REVISIONS
DATE BY DESCRIPTION

HNTB

HNTB CORPORATION
300 PRIMA BLVD,
SUITE 200
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500
ENGINEER OF RECORD: MELINDA S. FISCHL, P.E.
FL. REGISTRATION NO. 68406



LAKE COUNTY
FLORIDA

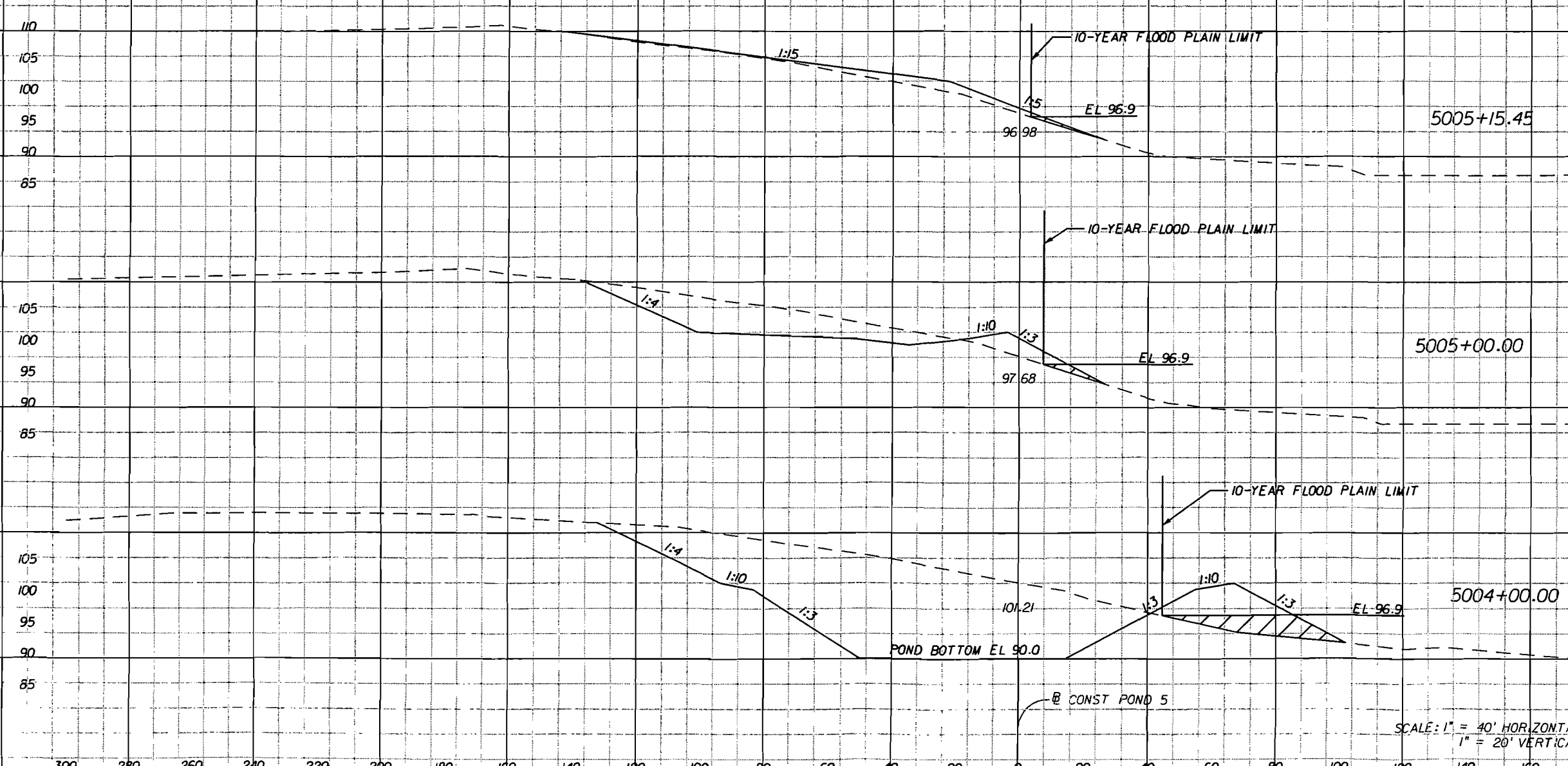
HARTWOOD MARSH
ROAD - PHASE II

CROSS SECTIONS
FLOOD PLAIN

SHEET
NO.

440

Regular		Exc.		Embankment	
A	V	A	V	A	V



REVISIONS	
DATE	DESCRIPTION

HNTB
 HNTB CORPORATION
 300 PRIMERA BLVD,
 SUITE 200
 LAKE MARY, FL 32746
 (407) 805-0355
 CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: MELINDA S. FISCHL, P.E.
 FL. REGISTRATION NO. 68406



**HARTWOOD MARSH
 ROAD - PHASE II**

**CROSS SECTIONS
 FLOOD PLAIN**

SHEET NO.
47

BASIN BREAKDOWN

	DATE
MADE BY: MSF	11-May-09
CHECK BY: BJS	13-May-09

PROJECT: HARTWOOD MARSH ROAD PHASE II

LOCATION: BASIN 5

BASIN LIMITS: STA. 226+00 to STA. 279+20, CL CONST. HARTWOOD MARSH ROAD

EXISTING CONDITIONS:

LOCATION	STATION	To	STATION	BASIN WIDTH (Ft)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)	REMARKS
<i>ON-SITE:</i>								
BASIN 5	226+00	-	279+20	120	2.23	12.54	14.77	Roadway
BASIN 5-1 (POND 5)	-	-	-	-	0.00	2.20	2.20	Zoned Residential
<i>ON-SITE SUBTOTAL:</i>					2.23	14.74	16.97	
<i>OFF-SITE:</i>								
BASIN 5-2 (OFFSITE)					0.00	0.18	0.18	Zoned Residential
BASIN 5-3 (OFFSITE)					0.00	0.06	0.06	Zoned Residential
BASIN 5-4 (OFFSITE)					0.00	0.03	0.03	Agricultural-Groves
BASIN 5-5 (OFFSITE)					0.00	0.12	0.12	Agricultural-Groves
BASIN 5-6 (OFFSITE)					0.00	0.05	0.05	Agricultural-Groves
<i>OFFSITE SUBTOTAL:</i>					0.00	0.45	0.45	
TOTAL DRAINAGE AREA:					2.23	15.19	17.42	

Pre versus Post Phosphorus Loading--Basin 5

Location: Hartwood Marsh Road from 1500 feet east of S. Hancock Road to County Line
 Discharge Point: John's Lake (Pre-Development), No Discharge (Post Development)

Pre-development

Basin	Area (ac)	Outfall	Land Use	Soil Class	Mean Annual Load (kg/ac-yr)	Inflow Mass Phosphorus Loading (kg/yr)	Treatment System	Inches of Retention Area over Basin Area (inches)	Pollutant Removal Efficiency (%)	Outflow Mass Loading (kg/yr)	Comment
5	14.77	John's Lake	Highway - max 50% imp.	A	0.71	10.4867	None	0	0	10.4867	
5-1	2.2	John's Lake	Highway - max 50% imp.	A	0.71	1.562	None	0	0	1.562	
5-2	0.18	John's Lake	Single Family - max 40% imp.	A	0.25	0.045	None	0	0	0.045	
5-3	0.06	John's Lake	Single Family - max 40% imp.	A	0.25	0.015	None	0	0	0.015	
5-4	0.03	John's Lake	Agriculture - Groves	A	0.007	0.00021	None	0	0	0.00021	
5-5	0.12	John's Lake	Agriculture - Groves	A	0.007	0.00084	None	0	0	0.00084	
5-6	0.05	John's Lake	Agriculture - Groves	A	0.007	0.00035	None	0	0	0.00035	
Total	17.41					12.1101				12.1101	

Mean Annual Phosphorus Load from SJRWMD MSSW Table 11.7-3

67

Pre versus Post Phosphorus Loading--Basin 5

Location: Hartwood Marsh Road from 1500 feet east of S. Hancock Road to County Line
 Discharge Point: John's Lake (Pre-Development), No Discharge (Post Development)

Post Development

Basin	Area (ac)	Outfall	Land Use	Soil Class	Mean Annual Load (kg/ac-yr)	Inflow Mass Phosphorus Loading (kg/yr)	Treatment System	Inches of Retention Area over Basin Area (inches)	Pollutant Removal Efficiency (%)	Outflow Mass Loading (kg/yr)	MSSW Table for Removal Efficiency	Comment
5	14.77	Pond 5	Highway - max 75% imp.	A	1.053	15.55281	Dry	1.29	89	1.710809	11.7-30	
5-1	2.2	None	Highway - max 75% imp.	A	1.053	2.3166	Dry	1.29	89	0.254826	11.7-30	
5-2	0.18	Pond 5	Single Family - max 40% imp.	A	0.25	0.045	Dry	1.29	94	0.0027	11.7-14	
5-3	0.06	Pond 5	Single Family - max 40% imp.	A	0.25	0.015	Dry	1.29	94	0.0009	11.7-14	
5-4	0.03	Pond 5	Agriculture - Groves	A	0.007	0.00021	Dry	1.29	0	0.00021	NA	
5-5	0.12	Pond 5	Agriculture - Groves	A	0.007	0.00084	Dry	1.29	0	0.00084	NA	
5-6	0.05	Pond 5	Agriculture - Groves	A	0.007	0.00035	Dry	1.29	0	0.00035	NA	
Total	17.41					17.93081				1.970635		

Mean Annual Phosphorus Load from SJRWMD MSSW Table 11.7-3

Post less than Pre

CHAPTER VI RESOURCE PROTECTION STANDARDS

- 6.00.00 General Provisions.
- 6.01.00 Wetlands Protection.
- 6.02.00 Shoreline and Wetland Protection.
- 6.03.00 Wellfield Protection.
- 6.04.00 Natural Upland Vegetative Communities, Habitat of Designated Species.
- 6.05.00 Reserved.
- 6.06.00 Mining.
- 6.07.00 Protection of Existing Natural Reservations.
- 6.08.00 Air Quality.
- 6.09.00 Groundwater Aquifer Recharge.
- 6.10.00 Water Quality Standards.
- 6.11.00 Operations and Waste Treatment.
- 6.12.00 Central Water System/Central Sewage System.
- 6.13.00 Nonconforming Uses and Development.
- 6.14.00 Golf Courses.
- 6.15.00 Lake Apopka Basin Development Design and Resource Protection Standards.

Lake County
Municipal
Code

6.00.00 General Provisions.

6.00.01 Purpose and Intent. The purpose of this Section is to establish those resources or areas of a Development Site that must be protected from harmful effects of Development. A Developer should apply the provisions of this Section to a proposed Development Site before any other Development design work is done. Application of the provisions of this Section will divide a proposed Development Site into areas that may be Developed and areas that must generally be free of Development Activity. The proposed Development should then be designed to fit within the areas that may be Developed.

6.06.00 Mining.

6.06.01 General Provisions.

6.06.02 Standards for Mining. All Mining Activities Shall at a minimum be conducted in accordance with the following standards. Additional standards deemed necessary by the County may be required in the approved Mining Site Plan or the Operating Permit:

D. Reclamation Standards.

1. Timing. Reclamation Shall commence within ninety (90) days following the completion of each approved phase of the Mining Activities or within ninety (90) days after commencement of Mining Activities for the next phase, whichever is earlier. Reclamation of the area associated with any completed phase of the mining activity Shall be completed no later than two (2) years after termination of mining in that phase. At no time Shall more than two (2) phases remain unreclaimed. In the event that substantial Mining Activities cease for a period of three (3) years, Reclamation of disturbed areas Shall commence and be completed within a five-year period from the date of cessation of operation.
2. Topography. All Land Areas either Mined or disturbed by Mining Activities Shall be regraded as closely as practical to those contours existing on the Site prior to mining unless the Reclamation plan has established an alternate set of contours that is not contrary to the public interest and leaves the Site beneficial for future use. Such alternate contours must be specified in the Mining Site Plan or Operating Permit and approved by the County prior to commencement of regrading. Sloping and grading Shall be conducted in such a manner as to minimize soil Erosion and Surface Water runoff and to make the Land surface suitable for revegetation. In order to enhance slope stabilization, enhance Site aesthetics and maximize potential for beneficial end use of the reclaimed Site, no slope beyond the uppermost perimeter of any excavated area of the Mine Shall be steeper than four (4) feet horizontal to one (1) foot vertical. No slope within an excavated area may be steeper than three (3) feet horizontal to one (1) foot vertical. All wetland Areas Mined or disturbed by Mining Activities Shall be reclaimed in accordance with a wetland Mitigation plan that has been approved by the County.

TARMAC AMERICA LLC

**CENTER SAND MINE
LAKE COUNTY, FLORIDA**

**APPLICATION FOR OPERATING
PERMIT APPROVAL / MODIFICATION**

CONDITIONAL USE PERMIT #119-3



455 Fairway Drive
Deerfield Beach, FL 33441
(954) 481-2800
Fax (954) 421-0296
www.titanamerica.com

March 5, 2003

Walter Wood, PG
Lake County Water Resource Management
315 W. Main Street
Room 511
Tavares, FL 32778

Subject: Application for Operating permit approval/modification for Conditional
Use Permit #119-3.

Dear Mr. ^{Walter}Wood,

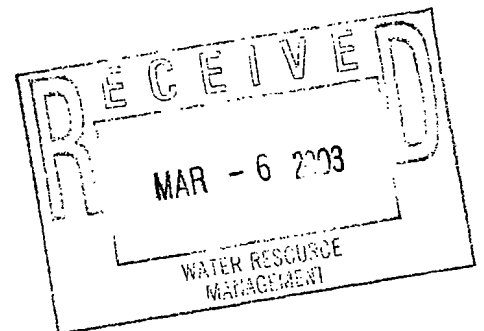
Enclosed please find the operating permit application and check #47518, in the amount of \$1,200.00 to the Lake County Board of County Commissioners.

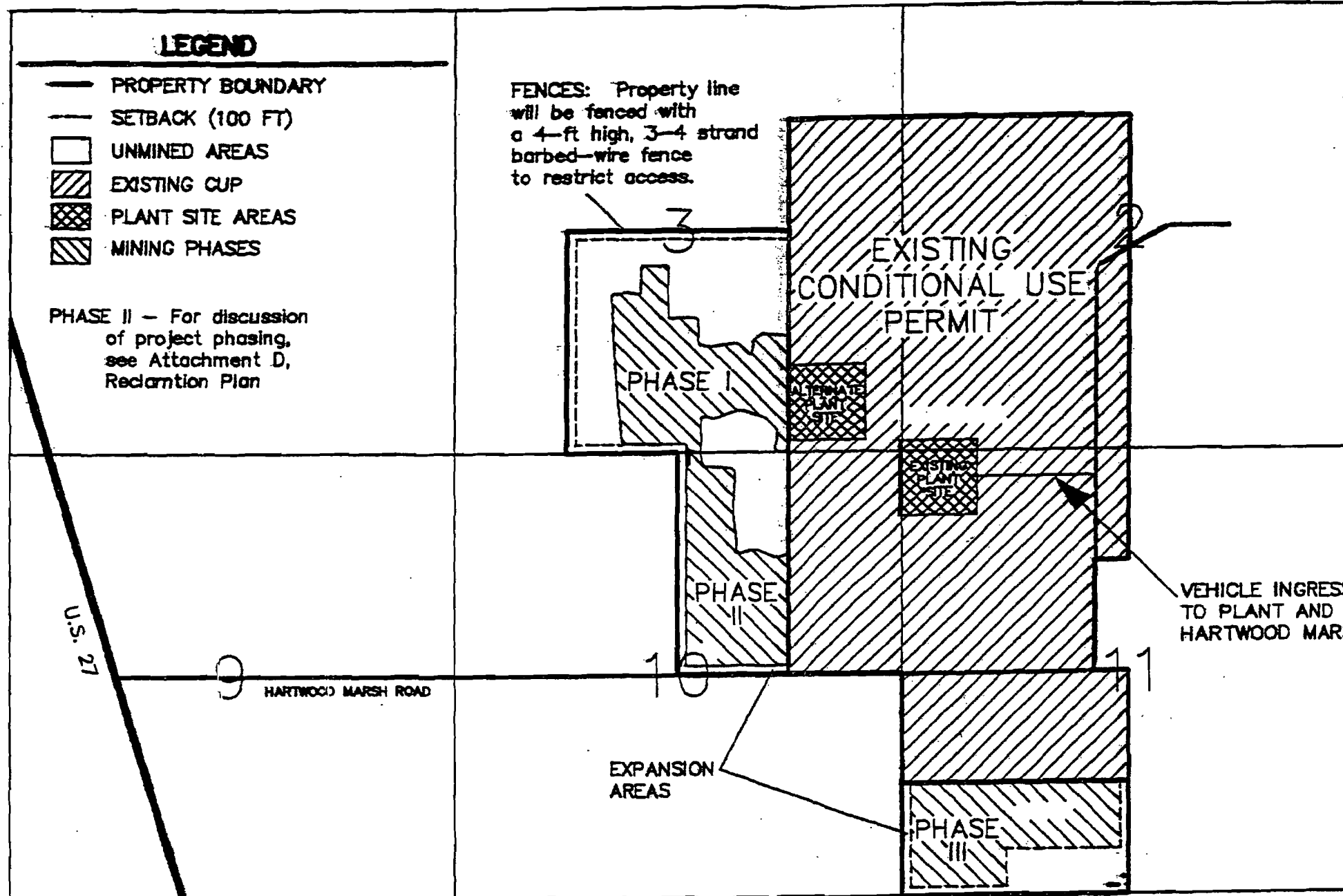
As we understand, this submittal will hold any notice of violation. Also, after review you will ask for additional information deemed necessary.

If you have any questions, please give me a call.

Sincerely,


Albert W. Townsend
Director of Real Estate, Environmental Services & Construction Management





APPLICANT:
 TARMAC OF FLORIDA, INC.
 455 FAIRWAY DRIVE
 DEERFIELD BEACH, FLORIDA 33441
 (305) 481-2800

OWNER:
 CENTER LAKES PROPERTIES, INC.
 P.O. BOX 568367
 ORLANDO, FLORIDA 32856-8367
 (407) 859-3550

CENTER SAND MINE CONDITIONAL USE PERMIT MODIFICATION		PLOT PLAN	
 IMPERIAL TESTING LABORATORIES <small>2000 SOUTH 10th AVE., LAKE WORTH, FL. 33461</small>	Drafted: 07/02/82	PROJECT No. 9059	Figure 1
	Revised:		

CONDITIONAL USE PERMIT -- CASE NO. 119-3

This Conditional Use Permit is granted by the Board of County Commissioners of Lake County, Florida to Southern Fruit Distributors and F. Browne Gregg for the purposes, and the terms, and the conditions as set out herein pursuant to authority contained in Section XIII of the Lake County Zoning Regulations and related parts thereof and Resolution No. CUP 119-3 of the Board of County Commissioners of Lake County.

Hand Carved

1. Permission is hereby granted to Southern Fruit Distributors and F. Browne Gregg, "Permittees", to construct, maintain and operate facilities for the extracting, processing, storing, selling and distribution of sand, gravel and fill dirt, together with the erection and utilization of structures, machinery, equipment and facilities incidental thereto, including the erection and operation of plants processing such products, in and on real property in Lake County on Dist. Rd. 3-1067 in the Johns Lake and Flat Lake areas, and more particularly described as follows:

Sec. 3, Twp. 23 S, R. 26 E. SE $\frac{1}{4}$ of the NE $\frac{1}{4}$; E $\frac{1}{2}$ of the SE $\frac{1}{4}$.

Sec. 10, Twp. 23 S., R. 26 E. The East $\frac{1}{2}$ of the NE $\frac{1}{4}$.

Sec. 2, Twp. 23 S., R. 26 E. The South $\frac{1}{2}$ of the NW $\frac{1}{4}$ and SW $\frac{1}{4}$.

Sec. 11, Twp. 23 S, R. 26 E., The North $\frac{1}{2}$ of the NW $\frac{1}{4}$; the South $\frac{1}{2}$ of the NW $\frac{1}{4}$ less the East 330' thereof.

Sec. 11, Twp. 23 S, R. 26 E. The North $\frac{1}{2}$ of the SW $\frac{1}{4}$.

2. The facilities outlined in Item 1 shall mean and include the total of the following uses:

- a. The extraction of sand, gravel, clay, fill dirt and other minerals contained within the boundaries of described parcels of land and the construction and operation of all equipment necessary for such operations.
- b. The construction and operation of plants processing such products, all to be in substantial conformity with the nature of the above operations.
- c. The construction of any additional incidental structures as may be approved by the Director of Planning and Zoning, from time to time, which is in substantial conformity with the general nature of the above mentioned operations.
- d. Offstreet parking.
- e. ~~The use of the South $\frac{1}{2}$ of the Northeast $\frac{1}{4}$ of Section 2, Township 23 S., Range 26 East and the South $\frac{1}{2}$ of the Southwest $\frac{1}{4}$ of Section 11, Township 23 S, Range 26 East for any purpose, in connection with the above operations, provided that no excavation or extraction shall be accomplished within the boundaries of said described parcels, without first obtaining the permission of the Director of Planning and Zoning.~~

3. Prior to the issuance of any building permits, complete building plans shall be submitted to the Director of Planning and Zoning for approval.
4. Not less than 1 parking space per employee and 1 storage parking space per piece of equipment shall be provided and maintained on the subject property.
5. All outdoor lighting shall be so shaded and adjusted that the light therefrom is directed to fall only on the same premises where such light sources are located.

29 MAY 2 PM 4:19

Handwritten notes:
CAC 3/11
4/11/69
F.B.G.
PC 5/11/69

6. A 50 foot setback shall be established from all surrounding property lines and a cover crop maintained thereon so as to prevent erosion. All sides of the excavated area shall be sloped at a rate of one (1) foot vertically to one and one-half (1 1/2) feet laterally to the point on natural ground not less than fifty (50) feet from the boundary of any adjoining land owned by others.

7. Access to the County Road shall be fortified and meet the approval and specifications of the County Engineer.

8. Construction and operation of the proposed use shall comply at all times with the regulations of this and other governmental agencies, and shall be maintained at all times so as to be innocuous or inoffensive by reason of odors, noise, dust, traffic, etc.

9. Once the process of excavation has been completed, the remaining land must be left suitable for further development.

10. The effectiveness of this Conditional Use Permit is expressly conditioned upon, and the same shall not become effective for any reason unless and until the following events shall have then occurred:

- a. Permittees shall have agreed to each and every condition hereof by having this Conditional Use Permit signed.
- b. This Conditional Use Permit executed as indicated shall have been filed in the Office of the Clerk of the Circuit Court.

11. After the establishment of the facilities as provided herein, the subject property shall not be used for any purposes unless specifically authorized by the Planning & Zoning Commission unless the proposed use meets every requirement of the zone existing for the subject property at the time of conversion.

12. In addition to any other remedy by law, any breach in any of the terms or conditions of this permit or any default on the part of the Permittees, or their successors in interest, shall be deemed a material breach hereof and this Conditional Use Permit may be cancelled or revoked. Cancellation or revocation of this Conditional Use Permit may be instituted by the County or Permittees. The Director of Planning and Zoning shall set this matter for public hearing before the Planning & Zoning Commission, giving the same notice as provided in Section XIII.

13. This Conditional Use Permit shall inure to the benefit of and shall constitute a covenant running with the lands, and the terms, conditions and provisions hereof shall be binding upon Permittees, and any successor or successors thereto, and the interests of any successor shall be subject to each and every condition herein set out.

Passed and adopted by the Board of County Commissioners of Lake County on March 10, 1969.

AUTHENTICATED BY:

James C. Watkins
James C. Watkins,
Director of Planning and Zoning

Frank E. Owens
Frank E. Owens,
Clerk of the Circuit Court

STATE OF FLORIDA)
) SS.
COUNTY OF LAKE)

On March 19, 1969, before me, Norma H. Coven,
a Notary Public in and for said County and State, personally appeared

James C. Watkins and Frank E. Owens

known to me to be the persons whose names are subscribed to the within instrument and acknowledged that they executed the same.

WITNESS my hand and official seal.
(Notary Stamp)

Norma H. Coven
Notary Public in and for said
Lake County, State of Florida

Notary Public, State of Florida
My Comm. Expires Feb. 6, 1970
Bonded by American Fire & Casualty Co.

CUP -- CASE NO. 119-3

ACKNOWLEDGED:

The undersigned Permittee by execution hereof agrees to each and every condition of this Conditional Use Permit and promises to perform each and every obligation of Permittee hereunder.

(CORPORATION SEAL)

Southern Fruit Distributors
"Permittee"

By Austin A. Caruso President

Philip P. Caruso Secy-Treas.

STATE OF FLORIDA)
) SS.
COUNTY OF ~~LAKE~~)

On April 4, 1969, before me, Kenneth C. Shafer,
a Notary Public in and for said County and State, personally appeared

Austin A. Caruso and Philip P. Caruso
respectively President and Secretary
of SOUTHERN FRUIT DISTRIBUTORS, INC., a corporation
under the laws of the State of Florida, known to me to be the persons whose names
are subscribed to the within instrument and severally acknowledged the execution
thereof to be their free act and deed as such officers, for the uses and purposes
therein mentioned; and that they affixed thereto the official seal of said corporation,
and the said instrument is the act and deed of said corporation.

WITNESS my hand and official seal.
(Notary Stamp)

K. C. Shafer
Notary Public in and for said
~~LAKE~~ County, State of Florida
Orange
Notary Public State of Florida at Large
My Commission Expires Oct. 15, 1972
BONDED BY U.S. FIDELITY & GUARANTY

ACKNOWLEDGED:

The undersigned Permittee by execution hereof agrees to each and every condition of this Conditional Use Permit and promises to perform each and every obligation of Permittee hereunder.

F. Browne Gregg
"Permittee"

By F. Browne Gregg

STATE OF FLORIDA)
) SS.
COUNTY OF LAKE)

On March 21, 1969, before me, Florence E. Staneff
a Notary Public in and for said County and State, personally appeared

F. Browne Gregg
known to me to be the person whose name is subscribed to the within instrument
and acknowledged that he executed the same.

WITNESS my hand and official seal.
(Notary Stamp)

Florence E. Staneff
Notary Public in and for said
Lake County, State of Florida
NOTARY PUBLIC, STATE OF FLORIDA AT LARGE
MY COMMISSION EXPIRES SEPT. 10, 1971
BONDED THROUGH ERED W. DIEBELHORST

ATTACHMENT D

RECLAMATION PLAN
FOR
CONDITIONAL USE PERMIT AND MINING PERMIT APPLICATION,
CENTER SAND MINE EXPANSION
LAKE COUNTY, FLORIDA

prepared for

TARMAC FLORIDA, INC.
Deerfield Beach, Florida

prepared by

IMPERIAL TESTING LABORATORIES
3905 Kidron Road
Lakeland, Florida 33811

July 2, 1993
Amended August 31, 1993

This conceptual reclamation plan is presented in response to Lake County Ordinance § 14.14.03.C.19. The following sections are numbered the same as the paragraphs in Lake County's Mining Ordinance § 6.06.02.D, Reclamation Standards. Only those areas described as the Conditional Use Permit Expansion are included in this plan.

1. TIMING

As shown in the attached mine plan (Figure D-1), extraction of sand will commence in the SW¼ SE¼ of Section 3 in late 1993. Mining will proceed west through 1995, then south and southeast to the year 2000.

The open water area is continuously backfilled with unmarketable material. Consequently the mine pit lake "moves" with the dredge. When the pit in the northern part of the expansion area (Phase 1) is completely backfilled with tailings, slopes in the north and west sides will be adjusted to comply with reclamation standards. Backfilling will be complete in 2000. When mining is completed (2000) in the southern area along the north side of Hartwood Marsh Road (Phase II), reclamation will commence and should be completed by late 2002. ~~The southern parcel is scheduled as Phase III and would be only partially backfilled, leaving a waterbody.~~ Mining operations in Phase III would be completed about 2005, with reclamation completed the following year.

2. TOPOGRAPHY

The mining operation removes material, so land surface elevations will be somewhat lower in backfilled areas than in the original undisturbed site. The last mining area will be a waterbody (see Figure D-2). Backfilling of the mined areas is by hydraulic

transport of sand tailings. The tailings may approach 140 feet NGVD in some areas (Figure D-3) and, because the outfall is moved from place to place, will result in hills and depressions similar to the lower elevation undisturbed areas. Banks will be graded to a minimum 4:1 (horizontal:vertical) slope and to blend with adjacent undisturbed land. Drainage will be internal, i.e., runoff goes into depressional areas or the lake. The low-gradient slopes resulting from tailings placement will, with vegetation, prevent any erosion problem.

No wetlands will be disturbed by the mining operation. However, some wetlands will be produced in the littoral zone of the lake and perhaps in some depressions. Wetlands vegetation is discussed in subsection 3 following.

3. REVEGETATION (Amended August 31, 1993)

- a. Upon completion of sand tailings deposition and grading, the disturbed areas will be seeded with a mixture of grasses and forbs to protect the sandy soil from erosion by wind and water. The low slopes will also aid in preventing erosion and gully development. Litter or topsoil materials will also be spread if available from future mining areas.
- b. Ground cover will initially be mixture including bahia grass (*Paspalum notatum*), yellow indiagrass (*Sorghastrum nutans*), and partridge-pea (*Cassia chaemicrista*), rattlebox (*Crotolaria* sp.). With quick establishment of a ground cover, windblown seeds of native plants will be captured in the reclaimed areas.

The regulations require that 10% of the uplands be reforested at a minimum stand density of 200 trees per acre. Approximately 171 acres will be mined in the C.U.P. expansion area, requiring upland reforestation of 17.1 acres with 3,420 trees. Alternatively, the requirement can be met by scattering the 3,420 trees over the entire reclaimed upland area of approximately 105 acres. The number of trees would be the same, but the average planting density would be about 33 trees per acre. It is understood that either method will satisfy the Lake County requirements and TARMAC and the landowner will select the method that best fits the reclaimed land during the reclamation process. Species of trees and shrubs proposed for planting include but are not limited to:

COMMON NAME	SCIENTIFIC NAME
<u>Trees</u>	
Sand Live Oak	<i>Quercus geminata</i>
Bluejack Oak	<i>Quercus incana</i>
Turkey Oak	<i>Quercus laevis</i>
Longleaf Pine	<i>Pinus palustris</i>
Sand Pine	<i>Pinus clausa</i>
Persimmon	<i>Diospyros virginiana</i>
<u>Shrubs</u>	
Southern Black Haw	<i>Viburnum rufidulum</i>
Saw palmetto	<i>Serenoa repens</i>
Prickly Pear Cactus	<i>Opuntia sp.</i>
Gopher Apple or	<i>Licania michauxii</i>
Pawpaw	<i>Asimina sp.</i>

A visual survey of trees on the site indicated a predominance of live oak, clumps of runner oak and persimmon and black haw, found mostly in the southern portion of Phase II of the mining area. The density of these trees,

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approximately nine trees or clumps of trees per acre, will be replaced by the planting of at least 3420 trees/shrubs during reclamation and will satisfy the requirements of Lake County's Tree Protection Ordinance. Ground litter from xeric upland areas of the mine property may be used as available to supplement the diversity of planted trees, shrubs, forbs, and grasses by providing a local natural seed source. Native upland trees in the mining areas likely to survive transplanting shock may be removed by tree spade and transplanted to upland reclamation areas elsewhere within the project area. Such transplants will be counted toward the plantings described above.

c. Native soils on the site are moderately sloped Astatula soils (Lake County Soil Survey Figure D-4). These are excessively drained, nutrient-poor soils with low moisture capacity. The reclaimed soil will have better moisture characteristics as the percentage of coarse particles will be lower than in native soils. Except for its potential value as a seed source, native "topsoil" would provide no particular benefit if spread in this site. Some topsoil from mining areas will be spread in reclamation areas.

d. Establishment of a grass cover will begin within 30 days after completion of grading in each area subject to reclamation. At least ten percent (10%) of the mined area (24 acres) will be planted with trees and shrubs as described in subsection b above. Although ~~no~~ ^{some} citrus groves or row crops are planned for reclaimed areas at this time, TARMAC and the landowner reserve the right to change the plan and allow for establishment of groves or row crops in the reclamation area.

apply for a revision of the reclamation
word more strongly 63

BASIN 6

STAGE / STORAGE CALCULATIONS



DATE

MADE BY:	msf	27-Jun-08
CHK BY:	BJS	10-Jan-09

PROJECT: HARTWOOD MARSH ROAD PHASE II

POND: 6

Boring	Existing Ground Elevation	Depth to Encountered Water Surface	Estimated Encountered Water Surface Elevation	Depth to Seasonal High Water Surface	Estimated Seasonal High Water Elevation
AB-P15	117.32	20	97	15	102.32

Note: Above information per pond boring profiles: Ardaman & Associates, May 2007
Per Ardaman report groundwater not encountered.

AVG. SHWT ELEVATION: 102.3 Ft. (NAVD)

AVG. GROUND WATER TABLE ELEVATION: 97.3 Ft. (NAVD)

AVG. EXIST. GROUND ELEVATION AT BORING LOCATIONS: 117.3 Ft. (NAVD)

STAGE Ft. (NAVD)	AREA AC.	AVERAGE AREA AC.	INCREMENTAL VOL. AF
113.0	1.10		0.00
		1.15	
114.0	1.19		1.15
		1.23	
115.0	1.27		1.23
		1.32	
116.0	1.36		1.32
		1.41	
117.0	1.46		1.41
		1.50	
118.0	1.55		1.50
		1.67	
119.0	1.79		1.67
TOTAL:			8.27

REQUIRED TREATMENT VOLUME: 0.81 AF

TOP EL. OF TREATMENT VOLUME: 113.71 Ft.

PERCOLATION RATE: 30 Ft./Day or 15 Inches/Hr.

FACTOR OF SAFTEY: 2 = 7.5 Inches/Hr.

Hartwood Marsh Road Phase II
 Post Development
 Pond 6 Hartwood
 Input Report
 05/05/09

```

Name: BASIN 6-6      Node: POND 6      Status: Onsite
Group: BASE         Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh484      Peaking Factor: 484.0
Rainfall File: Sjrwd96     Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.300 Time of Conc(min): 40.25
Area(ac): 0.240           Time Shift(hrs): 0.00
Curve Number: 39.00       Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00
  
```

Offsite to road

```

=====
==== Nodes =====
=====
Name: POND 6      Base Flow(cfs): 0.000      Init Stage(ft): 113.000
Group: BASE      Warn Stage(ft): 117.000
Type: Stage/Area
  
```

Stage (ft)	Area (ac)
113.000	1.1000
114.000	1.1900
115.000	1.2700
116.000	1.3600
117.000	1.4600
118.000	1.5500
119.000	1.7900

==== Hydrology Simulations =====

```

Name: 100Y24H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\100Y24H.R32
  
```

```

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Flmod
Rainfall Amount(in): 11.50
  
```

Time(hrs)	Print Inc(min)
11.000	60.00
16.000	15.00
40.000	60.00

```

Name: 10Y24H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\10Y24H.R32
  
```

```

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Flmod
Rainfall Amount(in): 6.70
  
```

Time(hrs)	Print Inc(min)
11.000	60.00
16.000	15.00
40.000	60.00

```

Name: 2.3Y24H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\2.3Y24H.R32
  
```

```

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Flmod
Rainfall Amount(in): 4.20
  
```

Time(hrs)	Print Inc(min)
11.000	60.00
16.000	15.00
40.000	60.00

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Hartwood Marsh Road Phase II
Post Development
Pond 6 Hartwood
Input Report
05/05/09

Name: 25Y24H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\25Y24H.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Flmod
Rainfall Amount(in): 8.30

Time(hrs)	Print Inc(min)
11.000	60.00
16.000	15.00
40.000	60.00

Name: 25Y96H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\25Y96H.R32

Override Defaults: No

Time(hrs)	Print Inc(min)
50.000	60.00
62.000	15.00
100.000	60.00

=====
==== Routing Simulations =====
=====

Name: 100Y24H Hydrology Sim: 100Y24H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\100Y24H.I32

Execute: No Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 150.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
11.000	60.000
15.000	15.000
150.000	60.000

Group	Run
BASE	Yes

Name: 10Y24H Hydrology Sim: 10Y24H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\10Y24H.I32

Execute: No Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 40.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
11.000	60.000
15.000	15.000
40.000	60.000

Group	Run
BASE	Yes

Hartwood Marsh Road Phase II
Post Development
Pond 6 Hartwood
Input Report
05/05/09

Name: 2.3Y24H Hydrology Sim: 2.3Y24H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\2.3Y24H.I32

Execute: No Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 150.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
11.000	60.000
15.000	15.000
150.000	60.000

Group	Run
BASE	Yes

Name: 25Y24H Hydrology Sim: 25Y24H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\25Y24H.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 40.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
11.000	60.000
15.000	15.000
40.000	60.000

Group	Run
BASE	Yes

Name: 25Y96H Hydrology Sim: 25Y96H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\25Y96H.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 97.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
55.000	60.000
65.000	15.000
97.000	60.000

Group	Run
BASE	Yes

Hartwood Marsh Road Phase II
 Post Development
 Pond 6 Hartwood
 Hydrology Time Series Report
 05/05/09

Simulation	Node	Time hrs	Volume ft3	Volume in	Rate cfs
25Y96H	POND 6	0.00	0.000	0.000	0.000
25Y96H	POND 6	1.00	0.000	0.000	0.000
25Y96H	POND 6	2.00	0.000	0.000	0.000
25Y96H	POND 6	3.00	0.000	0.000	0.000
25Y96H	POND 6	4.00	0.000	0.000	0.000
25Y96H	POND 6	5.00	0.000	0.000	0.000
25Y96H	POND 6	6.00	0.000	0.000	0.000
25Y96H	POND 6	7.00	0.000	0.000	0.000
25Y96H	POND 6	8.00	0.000	0.000	0.000
25Y96H	POND 6	9.00	0.000	0.000	0.000
25Y96H	POND 6	10.00	0.000	0.000	0.000
25Y96H	POND 6	11.00	0.000	0.000	0.000
25Y96H	POND 6	12.00	0.000	0.000	0.000
25Y96H	POND 6	13.00	0.000	0.000	0.000
25Y96H	POND 6	14.00	0.000	0.000	0.000
25Y96H	POND 6	15.00	0.000	0.000	0.000
25Y96H	POND 6	16.00	2.995	0.000	0.002
25Y96H	POND 6	17.00	15.716	0.000	0.005
25Y96H	POND 6	18.00	41.661	0.001	0.009
25Y96H	POND 6	19.00	80.351	0.002	0.012
25Y96H	POND 6	20.00	131.319	0.004	0.016
25Y96H	POND 6	21.00	194.426	0.006	0.019
25Y96H	POND 6	22.00	269.333	0.008	0.022
25Y96H	POND 6	23.00	355.412	0.010	0.025
25Y96H	POND 6	24.00	452.418	0.013	0.028
25Y96H	POND 6	25.00	647.844	0.019	0.080
25Y96H	POND 6	26.00	961.863	0.028	0.094
25Y96H	POND 6	27.00	1325.169	0.039	0.107
25Y96H	POND 6	28.00	1734.099	0.051	0.120
25Y96H	POND 6	29.00	2193.587	0.064	0.136
25Y96H	POND 6	30.00	2701.805	0.079	0.147
25Y96H	POND 6	31.00	3248.837	0.095	0.157
25Y96H	POND 6	32.00	3831.938	0.112	0.167
25Y96H	POND 6	33.00	4438.196	0.130	0.170
25Y96H	POND 6	34.00	5064.519	0.148	0.178
25Y96H	POND 6	35.00	5725.715	0.167	0.189
25Y96H	POND 6	36.00	6427.226	0.188	0.200
25Y96H	POND 6	37.00	7167.223	0.210	0.211
25Y96H	POND 6	38.00	7943.854	0.232	0.221
25Y96H	POND 6	39.00	8755.392	0.256	0.230
25Y96H	POND 6	40.00	9600.263	0.281	0.239
25Y96H	POND 6	41.00	10492.047	0.307	0.256
25Y96H	POND 6	42.00	11430.266	0.334	0.265
25Y96H	POND 6	43.00	12399.423	0.363	0.273
25Y96H	POND 6	44.00	13398.130	0.392	0.281
25Y96H	POND 6	45.00	14408.211	0.421	0.280
25Y96H	POND 6	46.00	15427.699	0.451	0.287
25Y96H	POND 6	47.00	16471.621	0.482	0.293
25Y96H	POND 6	48.00	17539.580	0.513	0.300
25Y96H	POND 6	49.00	18822.826	0.550	0.413
25Y96H	POND 6	50.00	20328.744	0.595	0.424
25Y96H	POND 6	50.25	20736.334	0.606	0.482
25Y96H	POND 6	50.50	21178.443	0.619	0.500
25Y96H	POND 6	50.75	21630.980	0.633	0.505
25Y96H	POND 6	51.00	22087.174	0.646	0.509
25Y96H	POND 6	51.25	22546.346	0.659	0.512
25Y96H	POND 6	51.50	23008.445	0.673	0.515
25Y96H	POND 6	51.75	23473.436	0.686	0.518
25Y96H	POND 6	52.00	23941.387	0.700	0.522
25Y96H	POND 6	52.25	24455.324	0.715	0.620
25Y96H	POND 6	52.50	25027.842	0.732	0.652
25Y96H	POND 6	52.75	25617.686	0.749	0.659
25Y96H	POND 6	53.00	26212.773	0.767	0.663
25Y96H	POND 6	53.25	26811.902	0.784	0.668
25Y96H	POND 6	53.50	27414.998	0.802	0.672
25Y96H	POND 6	53.75	28021.992	0.819	0.677
25Y96H	POND 6	54.00	28632.949	0.837	0.681
25Y96H	POND 6	54.25	29308.277	0.857	0.820
25Y96H	POND 6	54.50	30064.393	0.879	0.861
25Y96H	POND 6	54.75	30843.260	0.902	0.870
25Y96H	POND 6	55.00	31629.205	0.925	0.876
25Y96H	POND 6	55.25	32420.629	0.948	0.882
25Y96H	POND 6	55.50	33217.418	0.971	0.888
25Y96H	POND 6	55.75	34019.465	0.995	0.894
25Y96H	POND 6	56.00	34827.215	1.019	0.901
25Y96H	POND 6	56.25	35808.508	1.047	1.280
25Y96H	POND 6	56.50	37006.973	1.082	1.384
25Y96H	POND 6	56.75	38262.055	1.119	1.406
25Y96H	POND 6	57.00	39532.996	1.156	1.419
25Y96H	POND 6	57.25	40815.656	1.194	1.432

Hartwood Marsh Road Phase II
 Post Development
 Pond 6 Hartwood
 Hydrology Time Series Report
 05/05/09

Simulation	Node	Time hrs	Volume ft3	Volume in	Rate cfs
25Y96H	POND 6	57.50	42109.719	1.231	1.444
25Y96H	POND 6	57.75	43414.898	1.270	1.456
25Y96H	POND 6	58.00	44732.000	1.308	1.471
25Y96H	POND 6	58.25	46462.363	1.359	2.375
25Y96H	POND 6	58.50	48719.566	1.425	2.641
25Y96H	POND 6	58.75	51122.242	1.495	2.698
25Y96H	POND 6	59.00	53566.742	1.567	2.734
25Y96H	POND 6	59.25	56811.637	1.661	4.477
25Y96H	POND 6	59.50	61094.000	1.787	5.040
25Y96H	POND 6	59.75	79021.328	2.311	34.799
25Y96H	POND 6	60.00	114716.914	3.355	44.525
25Y96H	POND 6	60.25	142269.641	4.161	16.704
25Y96H	POND 6	60.50	154244.031	4.511	9.906
25Y96H	POND 6	60.75	161262.859	4.716	5.691
25Y96H	POND 6	61.00	165999.406	4.855	4.835
25Y96H	POND 6	61.25	169715.641	4.963	3.424
25Y96H	POND 6	61.50	172657.906	5.049	3.115
25Y96H	POND 6	61.75	175444.359	5.131	3.077
25Y96H	POND 6	62.00	178211.922	5.212	3.073
25Y96H	POND 6	63.00	187202.594	5.475	1.922
25Y96H	POND 6	64.00	194135.063	5.677	1.929
25Y96H	POND 6	65.00	199712.703	5.840	1.170
25Y96H	POND 6	66.00	203926.953	5.964	1.172
25Y96H	POND 6	67.00	208150.781	6.087	1.175
25Y96H	POND 6	68.00	212383.734	6.211	1.177
25Y96H	POND 6	69.00	215918.000	6.314	0.787
25Y96H	POND 6	70.00	218751.375	6.397	0.787
25Y96H	POND 6	71.00	221586.750	6.480	0.788
25Y96H	POND 6	72.00	224422.922	6.563	0.788
25Y96H	POND 6	73.00	226580.953	6.626	0.411
25Y96H	POND 6	74.00	228060.250	6.669	0.411
25Y96H	POND 6	75.00	229539.703	6.713	0.411
25Y96H	POND 6	76.00	231020.328	6.756	0.411
25Y96H	POND 6	77.00	232508.172	6.800	0.415
25Y96H	POND 6	78.00	234003.219	6.843	0.415
25Y96H	POND 6	79.00	235499.484	6.887	0.416
25Y96H	POND 6	80.00	236996.844	6.931	0.416
25Y96H	POND 6	81.00	238489.281	6.974	0.413
25Y96H	POND 6	82.00	239976.813	7.018	0.413
25Y96H	POND 6	83.00	241465.391	7.062	0.414
25Y96H	POND 6	84.00	242955.125	7.105	0.414
25Y96H	POND 6	85.00	244445.906	7.149	0.414
25Y96H	POND 6	86.00	245937.750	7.192	0.415
25Y96H	POND 6	87.00	247430.688	7.236	0.415
25Y96H	POND 6	88.00	248924.688	7.280	0.415
25Y96H	POND 6	89.00	250425.813	7.324	0.419
25Y96H	POND 6	90.00	251934.078	7.368	0.419
25Y96H	POND 6	91.00	253443.422	7.412	0.419
25Y96H	POND 6	92.00	254953.781	7.456	0.420
25Y96H	POND 6	93.00	256459.016	7.500	0.417
25Y96H	POND 6	94.00	257959.172	7.544	0.417
25Y96H	POND 6	95.00	259460.313	7.588	0.417
25Y96H	POND 6	96.00	260956.672	7.632	0.414
25Y96H	POND 6	97.00	261703.250	7.653	0.001
25Y96H	POND 6	98.00	261704.313	7.653	0.000
25Y96H	POND 6	99.00	261704.313	7.653	0.000
25Y96H	POND 6	100.00	261704.313	7.653	0.000

Total Volume
 = 5.99 ac-ft

Hartwood Marsh Road Phase II
 Post Development
 Pond 6 Hartwood
 Node Min/Max Report
 05/05/09

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Max Stage ft	Delta Max Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
POND 6	BASE	25Y24H	26.00	116.143	117.000	0.0050	59865	12.00	36.809	0.00	0.000
POND 6	BASE	25Y96H	97.00	117.611	117.000	0.0050	65991	60.00	44.516	0.00	0.000

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Retention Pond Recovery - Refined Method
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Project Data

Project Name: Hartwood Marsh Road Phase II
Simulation Description: Pond 6 Water Quality Recovery
Project Number: 41561-1
Engineer : MSF
Supervising Engineer:
Date: 05-05-2009

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 97.00
Water Table Elevation, [WT] (ft datum): 98.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 15.00
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 10.0
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 67434.8

Geometry Data

Equivalent Pond Length, [L] (ft): 265.0
Equivalent Pond Width, [W] (ft): 183.0
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)
113.00	47916.0
114.00	50094.0
115.00	55321.2
116.00	59241.6
117.00	63597.6
118.00	67518.0
119.00	78027.0

Scenario Input Data

Scenario 1 :: Water Quality

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration
Treatment Volume (ft³) 35283.6
Initial ground water level (ft datum) default, 98.00

<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>
0.100	2.000
0.250	2.500
0.500	3.000
1.000	3.500
1.500	4.000

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Detailed Results :: Scenario 1 :: Water Quality

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	5880.6000	0.0000	98.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	5880.6000	0.0000	113.724	5.54198	0.00000	35283.6	33.3	0.0	U/P
2.400	0.0000	0.0000	----	----	----	35283.6	35283.6	0.0	dry
6.000	0.0000	0.0000	----	----	----	35283.6	35283.6	0.0	dry
12.000	0.0000	0.0000	----	----	----	35283.6	35283.6	0.0	dry
24.000	0.0000	0.0000	----	----	----	35283.6	35283.6	0.0	dry
36.000	0.0000	0.0000	----	----	----	35283.6	35283.6	0.0	dry
48.000	0.0000	0.0000	----	----	----	35283.6	35283.6	0.0	dry
60.000	0.0000	0.0000	----	----	----	35283.6	35283.6	0.0	dry
72.000	0.0000	0.0000	----	----	----	35283.6	35283.6	0.0	dry
84.000	0.0000	0.0000	----	----	----	35283.6	35283.6	0.0	dry
96.000	0.0000	0.0000	----	----	----	35283.6	35283.6	0.0	dry

← Recovery < 2.4 hrs

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Retention Pond Recovery - Refined Method
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Project Data

Project Name: Hartwood Marsh Road Phase II
Simulation Description: Pond 6 25 year/96 hour Recovery
Project Number: 41561-1
Engineer : MSF
Supervising Engineer:
Date: 05-05-2009

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 97.00
Water Table Elevation, [WT] (ft datum): 98.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 15.00
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 10.0
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 78027.1

Geometry Data

Equivalent Pond Length, [L] (ft): 325.0
Equivalent Pond Width, [W] (ft): 242.0
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)
113.00	48071.6
114.00	51708.9
115.00	55475.2
116.00	59369.5
117.00	63391.8
118.00	67434.8
119.00	78027.1

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Scenario Input Data

Scenario 1 :: 25 year - 96 hour

Hydrograph Type: Slug Load
 Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 260956.7

Initial ground water level (ft datum) default, 98.00

<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>
0.100	3.000	6.500	10.000	13.500
0.250	3.500	7.000	10.500	14.000
0.500	4.000	7.500	11.000	14.500
1.000	4.500	8.000	11.500	
1.500	5.000	8.500	12.000	
2.000	5.500	9.000	12.500	
2.500	6.000	9.500	13.000	

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Detailed Results :: Scenario 1 :: 25 year - 96 hour

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	43492.7900	0.0000	98.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	43492.7900	0.0000	117.598	5.56527	0.00000	260956.7	33.4	0.0	U/P
2.400	0.0000	0.0000	116.566	7.42422	0.00000	260956.7	65797.6	0.0	U/P
6.000	0.0000	0.0000	114.986	4.45939	0.00000	260956.7	158267.5	0.0	U/P
12.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
24.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
36.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
48.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
60.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
72.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
84.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
96.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
108.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
120.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
132.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
144.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
156.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
168.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
180.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
192.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
204.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
216.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
228.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
240.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
252.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
264.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
276.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
288.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
300.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
312.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
324.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
336.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry
348.000	0.0000	0.0000	---	---	---	260956.7	260956.7	0.0	dry

← Recovery < 12 hrs

BASIN BREAKDOWN

	DATE	
MADE BY:	MSF	11-May-09
CHECK BY:	BJS	13-May-09

PROJECT: HARTWOOD MARSH ROAD PHASE II

LOCATION: BASIN 6

BASIN LIMITS: STA. 279+20 to STA 299+91, CL CONST. HARTWOOD MARSH ROAD

EXISTING CONDITIONS:

LOCATION	STATION	To	STATION	BASIN WIDTH (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)	REMARKS
<i>ON-SITE:</i>								
BASIN 6	279+20	-	299+91	120	0.96	4.47	5.43	Roadway
BASIN 6-1 (POND 6)	-	-	-	-	0.00	3.24	3.24	Forest
<i>ON-SITE SUBTOTAL:</i>					0.96	7.71	8.67	
<i>OFF-SITE:</i>								
BASIN 6-2 (OFFSITE)		-		-	0.00	0.07	0.07	Open Land
BASIN 6-3 (OFFSITE)					0.00	0.14	0.14	Open Land
BASIN 6-4 (OFFSITE)					0.00	0.08	0.08	Open Land
BASIN 6-5 (OFFSITE)					0.00	0.22	0.22	Open Land
BASIN 6-6 (OFFSITE)					0.00	0.24	0.24	Open Land
<i>OFFSITE SUBTOTAL:</i>					0.00	0.75	0.75	
TOTAL DRAINAGE AREA:					0.96	8.46	9.42	

lot

Pre versus Post Phosphorus Loading--Basin 6

Location: Hartwood Marsh Road from 1500 feet east of S. Hancock Road to County Line
 Discharge Point: John's Lake (Pre-Development), No Discharge (Post Development)

Pre-development

Basin	Area (ac)	Outfall	Land Use	Soil Class	Mean Annual Load (kg/ac-yr)	Inflow Mass Phosphorus Loading (kg/yr)	Treatment System	Inches of Retention Area over Basin Area (inches)	Pollutant Removal Efficiency (%)	Outflow Mass Loading (kg/yr)	Comment
6	5.43	None	Highway - max 50% imp.	A	0.71	3.8553	None	0	0	3.8553	Depressional Storage
6-1	3.24	None	Forest	A	0.004	0.01296	None	0	0	0.01296	Depressional Storage
6-2	0.07	None	Open Land	A	0.004	0.00028	None	0	0	0.00028	Depressional Storage
6-3	0.14	None	Open Land	A	0.004	0.00056	None	0	0	0.00056	Depressional Storage
6-4	0.08	None	Open Land	A	0.004	0.00032	None	0	0	0.00032	Depressional Storage
6-5	0.22	None	Open Land	A	0.004	0.00088	None	0	0	0.00088	Depressional Storage
6-6	0.24	None	Open Land	A	0.004	0.00096	None	0	0	0.00096	Depressional Storage
Total	9.42					3.87126				3.87126	

Mean Annual Phosphorus Load from SJRWMD MSSW Table 11.7-3

Pre versus Post Phosphorus Loading--Basin 6

Location: Hartwood Marsh Road from 1500 feet east of S. Hancock Road to County Line
 Discharge Point: John's Lake (Pre-Development), No Discharge (Post Development)

Post Development

Basin	Area (ac)	Outfall	Land Use	Soil Class	Mean Annual Load (kg/ac-yr)	Inflow Mass Phosphorus Loading (kg/yr)	Treatment System	Inches of Retention Area over Basin Area (inches)	Pollutant Removal Efficiency (%)	Outflow Mass Loading (kg/yr)	MSSW Table for Removal Efficiency	Comment
6	5.43	Pond 6	Highway - max 75% imp.	A	1.053	5.71779	Dry	1.08	85	0.857669	11.7-30	
6-1	3.24	None	Highway - max 75% imp.	A	1.053	3.41172	Dry	1.08	85	0.511758	11.7-30	
6-2	0.07	Pond 6	Open Land	A	0.004	0.00028	Dry	1.08	0	0.00028	NA	
6-3	0.14	Pond 6	Open Land	A	0.004	0.00056	Dry	1.08	0	0.00056	NA	
6-4	0.08	Pond 6	Open Land	A	0.004	0.00032	Dry	1.08	0	0.00032	NA	
6-5	0.22	Pond 6	Open Land	A	0.004	0.00088	Dry	1.08	0	0.00088	NA	
6-6	0.24	Pond 6	Open Land	A	0.004	0.00096	Dry	1.08	0	0.00096	NA	
Total	9.42					9.13251				1.372427		

Mean Annual Phosphorus Load from SJRWMD MSSW Table 11.7-3

Post less than Pre

BASIN 7

STAGE / STORAGE CALCULATIONS

HNTB

DATE

MADE BY:	msf	28-Jun-08
CHCK BY:	BJS	10-Jan-09

PROJECT: HARTWOOD MARSH ROAD PHASE II

POND: 7

Boring	Existing Ground Elevation	Depth to Encountered Water Surface	Estimated Encountered Water Surface Elevation	Depth to Seasonal High Water Surface	Estimated Seasonal High Water Elevation
AB-P19	160.39	20	140.4	15	145.39

Note: Above information per pond boring profiles: Ardaman & Associates, May 2007
Per Ardaman report groundwater not encountered.

AVG. SHWT ELEVATION: 145.4 Ft. (NAVD)

AVG. GROUND WATER TABLE ELEVATION: 140.4 Ft. (NAVD)

AVG. EXIST. GROUND ELEVATION AT BORING LOCATIONS: 160.4 Ft. (NAVD)

STAGE Ft. (NAVD)	AREA AC.	AVERAGE AREA AC.	INCREMENTAL VOL. AF
153.0	0.83		0.00
		0.87	
154.0	0.91		0.87
		0.95	
155.0	0.98		0.95
		1.02	
156.0	1.06		1.02
		1.11	
157.0	1.15		1.11
		1.19	
158.0	1.23		1.19
		1.28	
159.0	1.32		1.28
		1.37	
160.0	1.41		1.37
		1.46	
161.0	1.51		1.46
TOTAL:			9.24

REQUIRED TREATMENT VOLUME: 1.31 AF

TOP EL. OF TREATMENT VOLUME: 159.33 Ft.

PERCOLATION RATE: 40 Ft./Day or 20 Inches/Hr.

FACTOR OF SAFTEY: 2 = 10 Inches/Hr.

=====
 Basins
 =====

```

Name: BASIN 7          Node: POND 7          Status: Onsite
Group: BASE           Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh484          Peaking Factor: 484.0
Rainfall File: Sjrwm96         Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.300    Time of Conc(min): 67.28
Area(ac): 5.560               Time Shift(hrs): 0.00
Curve Number: 87.00           Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00
  
```

Road Basin

```

-----
Name: BASIN 7-1       Node: POND 7          Status: Onsite
Group: BASE           Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh484          Peaking Factor: 484.0
Rainfall File: Sjrwm96         Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.300    Time of Conc(min): 5.00
Area(ac): 2.540               Time Shift(hrs): 0.00
Curve Number: 61.80           Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00
  
```

Dry Total Retention Pond 7

```

-----
Name: BASIN 7-2       Node: POND 7          Status: Onsite
Group: BASE           Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh484          Peaking Factor: 484.0
Rainfall File: Sjrwm96         Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.300    Time of Conc(min): 65.76
Area(ac): 2.310               Time Shift(hrs): 0.00
Curve Number: 39.00           Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00
  
```

Offsite to road

```

-----
Name: BASIN 7-3       Node: POND 7          Status: Onsite
Group: BASE           Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh484          Peaking Factor: 484.0
Rainfall File: Sjrwm96         Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.300    Time of Conc(min): 60.31
Area(ac): 5.310               Time Shift(hrs): 0.00
Curve Number: 39.00           Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00
  
```

Offsite to road

=====
 Nodes
 =====

```

Name: POND 7          Base Flow(cfs): 0.000    Init Stage(ft): 153.000
Group: BASE           Warn Stage(ft): 160.000
Type: Stage/Area
  
```

Dry Total Retention Pond 7

Stage (ft)	Area (ac)
153.000	0.8300
154.000	0.9100
155.000	0.9800
156.000	1.0600
157.000	1.1500
158.000	1.2300
159.000	1.3200
160.000	1.4100
161.000	1.5100

=====
 Hydrology Simulations
 =====

Hartwood Marsh Road Phase II
Post Development
Pond 7 Hartwood
Input Report
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Time Step Optimizer: 10.000
Start Time(hrs): 0.000
Min Calc Time(sec): 0.5000
Boundary Stages:

End Time(hrs): 150.00
Max Calc Time(sec): 60.0000
Boundary Flows:

Time(hrs)	Print Inc(min)
11.000	60.000
15.000	15.000
150.000	60.000

Group	Run
BASE	Yes

Name: 10Y24H Hydrology Sim: 10Y24H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\10Y24H.I32

Execute: No Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 40.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
11.000	60.000
15.000	15.000
40.000	60.000

Group	Run
BASE	Yes

Name: 2.3Y24H Hydrology Sim: 2.3Y24H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\2.3Y24H.I32

Execute: No Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 150.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
11.000	60.000
15.000	15.000
150.000	60.000

Group	Run
BASE	Yes

Name: 25Y24H Hydrology Sim: 25Y24H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\25Y24H.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 40.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Hartwood Marsh Road Phase II
Post Development
Pond 7 Hartwood
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Time (hrs)	Print Inc (min)
11.000	60.000
15.000	15.000
40.000	60.000

Group	Run
BASE	Yes

Name: 25Y96H Hydrology Sim: 25Y96H
Filename: W:\JOBS\41561-1\41561100001\DRAINAGE\ICPR\25Y96H.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z (ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time (hrs): 0.000 End Time (hrs): 97.00
Min Calc Time (sec): 0.5000 Max Calc Time (sec): 60.0000
Boundary Stages: Boundary Flows:

Time (hrs)	Print Inc (min)
55.000	60.000
65.000	15.000
97.000	60.000

Group	Run
BASE	Yes

Hartwood Marsh Road Phase II
 Post Development
 Pond 7 Hartwood
 Hydrology Time Series Report
 04/15/09

Simulation	Node	Time hrs	Volume ft3	Volume in	Rate cfs
25Y96H	POND 7	0.00	0.000	0.000	0.000
25Y96H	POND 7	1.00	0.000	0.000	0.000
25Y96H	POND 7	2.00	0.000	0.000	0.000
25Y96H	POND 7	3.00	0.000	0.000	0.000
25Y96H	POND 7	4.00	0.000	0.000	0.000
25Y96H	POND 7	5.00	0.000	0.000	0.000
25Y96H	POND 7	6.00	0.000	0.000	0.000
25Y96H	POND 7	7.00	0.000	0.000	0.000
25Y96H	POND 7	8.00	0.000	0.000	0.000
25Y96H	POND 7	9.00	0.000	0.000	0.000
25Y96H	POND 7	10.00	0.000	0.000	0.000
25Y96H	POND 7	11.00	0.021	0.000	0.000
25Y96H	POND 7	12.00	3.876	0.000	0.002
25Y96H	POND 7	13.00	20.478	0.000	0.007
25Y96H	POND 7	14.00	55.305	0.001	0.012
25Y96H	POND 7	15.00	108.307	0.002	0.017
25Y96H	POND 7	16.00	178.627	0.003	0.022
25Y96H	POND 7	17.00	265.113	0.005	0.026
25Y96H	POND 7	18.00	366.738	0.006	0.030
25Y96H	POND 7	19.00	482.893	0.008	0.034
25Y96H	POND 7	20.00	612.971	0.011	0.038
25Y96H	POND 7	21.00	756.742	0.013	0.042
25Y96H	POND 7	22.00	913.847	0.016	0.045
25Y96H	POND 7	23.00	1083.399	0.019	0.049
25Y96H	POND 7	24.00	1265.182	0.022	0.052
25Y96H	POND 7	25.00	1552.694	0.027	0.108
25Y96H	POND 7	26.00	2003.674	0.035	0.143
25Y96H	POND 7	27.00	2547.844	0.045	0.159
25Y96H	POND 7	28.00	3144.268	0.055	0.172
25Y96H	POND 7	29.00	3791.996	0.066	0.188
25Y96H	POND 7	30.00	4491.184	0.079	0.201
25Y96H	POND 7	31.00	5232.293	0.092	0.211
25Y96H	POND 7	32.00	6008.979	0.105	0.220
25Y96H	POND 7	33.00	6810.286	0.119	0.225
25Y96H	POND 7	34.00	7635.132	0.134	0.234
25Y96H	POND 7	35.00	8493.567	0.149	0.243
25Y96H	POND 7	36.00	9386.975	0.165	0.253
25Y96H	POND 7	37.00	10313.676	0.181	0.262
25Y96H	POND 7	38.00	11271.772	0.198	0.270
25Y96H	POND 7	39.00	12259.514	0.215	0.278
25Y96H	POND 7	40.00	13275.344	0.233	0.286
25Y96H	POND 7	41.00	14330.044	0.251	0.300
25Y96H	POND 7	42.00	15427.675	0.270	0.310
25Y96H	POND 7	43.00	16555.975	0.290	0.317
25Y96H	POND 7	44.00	17708.928	0.310	0.324
25Y96H	POND 7	45.00	18871.240	0.331	0.322
25Y96H	POND 7	46.00	20036.346	0.351	0.325
25Y96H	POND 7	47.00	21215.645	0.372	0.330
25Y96H	POND 7	48.00	22413.264	0.393	0.335
25Y96H	POND 7	49.00	23780.934	0.417	0.425
25Y96H	POND 7	50.00	25377.893	0.445	0.463
25Y96H	POND 7	50.25	25802.416	0.452	0.481
25Y96H	POND 7	50.50	26241.645	0.460	0.495
25Y96H	POND 7	50.75	26696.092	0.468	0.515
25Y96H	POND 7	51.00	27167.156	0.476	0.532
25Y96H	POND 7	51.25	27651.691	0.485	0.544
25Y96H	POND 7	51.50	28145.320	0.493	0.552
25Y96H	POND 7	51.75	28645.102	0.502	0.558
25Y96H	POND 7	52.00	29149.498	0.511	0.563
25Y96H	POND 7	52.25	29669.422	0.520	0.593
25Y96H	POND 7	52.50	30212.582	0.529	0.614
25Y96H	POND 7	52.75	30779.607	0.539	0.646
25Y96H	POND 7	53.00	31373.533	0.550	0.674
25Y96H	POND 7	53.25	31989.285	0.561	0.694
25Y96H	POND 7	53.50	32619.715	0.572	0.707
25Y96H	POND 7	53.75	33259.680	0.583	0.715
25Y96H	POND 7	54.00	33906.609	0.594	0.722
25Y96H	POND 7	54.25	34575.895	0.606	0.765
25Y96H	POND 7	54.50	35278.215	0.618	0.796
25Y96H	POND 7	54.75	36012.973	0.631	0.837
25Y96H	POND 7	55.00	36783.676	0.645	0.876
25Y96H	POND 7	55.25	37583.363	0.659	0.902
25Y96H	POND 7	55.50	38402.383	0.673	0.918
25Y96H	POND 7	55.75	39234.234	0.688	0.930
25Y96H	POND 7	56.00	40076.172	0.702	0.941
25Y96H	POND 7	56.25	40976.391	0.718	1.060
25Y96H	POND 7	56.50	41965.602	0.735	1.139
25Y96H	POND 7	56.75	43041.730	0.754	1.253
25Y96H	POND 7	57.00	44217.418	0.775	1.360
25Y96H	POND 7	57.25	45476.695	0.797	1.439

Hartwood Marsh Road Phase II
 Post Development
 Pond 7 Hartwood
 Hydrology Time Series Report
 04/15/09

Simulation	Node	Time hrs	Volume ft3	Volume in	Rate cfs
25Y96H	POND 7	57.50	46795.188	0.820	1.491
25Y96H	POND 7	57.75	48155.613	0.844	1.532
25Y96H	POND 7	58.00	49549.074	0.868	1.565
25Y96H	POND 7	58.25	51098.219	0.895	1.878
25Y96H	POND 7	58.50	52880.633	0.927	2.083
25Y96H	POND 7	58.75	54889.094	0.962	2.380
25Y96H	POND 7	59.00	57158.047	1.002	2.662
25Y96H	POND 7	59.25	59900.711	1.050	3.433
25Y96H	POND 7	59.50	63225.859	1.108	3.957
25Y96H	POND 7	59.75	71862.914	1.259	15.237
25Y96H	POND 7	60.00	89272.766	1.564	23.452
25Y96H	POND 7	60.25	110325.961	1.933	23.333
25Y96H	POND 7	60.50	132804.547	2.327	26.619
25Y96H	POND 7	60.75	154904.047	2.715	22.491
25Y96H	POND 7	61.00	172709.328	3.027	17.076
25Y96H	POND 7	61.25	185946.109	3.259	12.339
25Y96H	POND 7	61.50	195684.156	3.429	9.301
25Y96H	POND 7	61.75	203115.203	3.559	7.212
25Y96H	POND 7	62.00	209026.656	3.663	5.925
25Y96H	POND 7	63.00	225309.672	3.948	3.122
25Y96H	POND 7	64.00	235722.859	4.131	2.664
25Y96H	POND 7	65.00	243868.125	4.274	1.862
25Y96H	POND 7	66.00	250157.906	4.384	1.633
25Y96H	POND 7	67.00	256007.078	4.486	1.617
25Y96H	POND 7	68.00	261838.547	4.589	1.623
25Y96H	POND 7	69.00	266961.000	4.678	1.223
25Y96H	POND 7	70.00	271149.781	4.752	1.104
25Y96H	POND 7	71.00	275106.969	4.821	1.094
25Y96H	POND 7	72.00	279048.594	4.890	1.096
25Y96H	POND 7	73.00	282288.813	4.947	0.705
25Y96H	POND 7	74.00	284610.938	4.988	0.586
25Y96H	POND 7	75.00	286698.219	5.024	0.574
25Y96H	POND 7	76.00	288766.000	5.060	0.575
25Y96H	POND 7	77.00	290842.750	5.097	0.579
25Y96H	POND 7	78.00	292931.125	5.133	0.581
25Y96H	POND 7	79.00	295025.000	5.170	0.582
25Y96H	POND 7	80.00	297122.406	5.207	0.583
25Y96H	POND 7	81.00	299216.750	5.244	0.580
25Y96H	POND 7	82.00	301306.125	5.280	0.580
25Y96H	POND 7	83.00	303396.625	5.317	0.581
25Y96H	POND 7	84.00	305490.094	5.354	0.582
25Y96H	POND 7	85.00	307586.781	5.390	0.583
25Y96H	POND 7	86.00	309686.625	5.427	0.584
25Y96H	POND 7	87.00	311789.625	5.464	0.585
25Y96H	POND 7	88.00	313895.750	5.501	0.585
25Y96H	POND 7	89.00	316011.438	5.538	0.590
25Y96H	POND 7	90.00	318138.625	5.575	0.592
25Y96H	POND 7	91.00	320271.063	5.613	0.593
25Y96H	POND 7	92.00	322406.813	5.650	0.594
25Y96H	POND 7	93.00	324539.063	5.687	0.591
25Y96H	POND 7	94.00	326665.938	5.725	0.591
25Y96H	POND 7	95.00	328793.625	5.762	0.591
25Y96H	POND 7	96.00	330919.719	5.799	0.590
25Y96H	POND 7	97.00	332222.906	5.822	0.134
25Y96H	POND 7	98.00	332487.813	5.827	0.013
25Y96H	POND 7	99.00	332511.656	5.827	0.000
25Y96H	POND 7	100.00	332512.250	5.827	0.000

Total Volume
 7.60 ac-ft

Hartwood Marsh Road Phase II
Post Development
Pond 7 Hartwood
Node Min/Max Report
04/15/09

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
POND 7	BASE	25Y24H	28.01	157.700	160.000	0.0050	52535	12.50	19.946	0.00	0.000

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PONDS Version 3.2.0145
Retention Pond Recovery - Refined Method
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Project Data

Project Name: Hartwood Marsh Road Phase II
Simulation Description: Pond 7 Water Quality Recovery
Project Number: 41561-1
Engineer : MSF
Supervising Engineer:
Date: 12-09-2008

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 139.00
Water Table Elevation, [WT] (ft datum): 140.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 13.33
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 58370.4

Geometry Data

Equivalent Pond Length, [L] (ft): 264.0
Equivalent Pond Width, [W] (ft): 154.0
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)
153.00	36244.0
154.00	39483.0
155.00	42849.7
156.00	46344.4
157.00	49967.1
158.00	53717.9
159.00	57596.7
160.00	61603.6
161.00	65631.0

Scenario Input Data

Scenario 1 :: Water Quality

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 57063.6

Initial ground water level (ft datum) default, 140.00

<u>Time After Storm Event (days)</u>	<u>Time After Storm Event (days)</u>
0.100	2.000
0.250	2.500
0.500	3.000
1.000	3.500
1.500	4.000

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Detailed Results :: Scenario 1 :: Water Quality

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	9510.6000	0.0000	140.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	9510.6000	0.0000	154.476	5.59233	0.00000	57063.6	33.6	0.0	U/P
2.400	0.0000	0.0000	153.063	3.80426	0.00000	57063.6	54761.6	0.0	U/P
6.000	0.0000	0.0000	----	----	----	57063.6	57063.6	0.0	dry
12.000	0.0000	0.0000	----	----	----	57063.6	57063.6	0.0	dry
24.000	0.0000	0.0000	----	----	----	57063.6	57063.6	0.0	dry
36.000	0.0000	0.0000	----	----	----	57063.6	57063.6	0.0	dry
48.000	0.0000	0.0000	----	----	----	57063.6	57063.6	0.0	dry
60.000	0.0000	0.0000	----	----	----	57063.6	57063.6	0.0	dry
72.000	0.0000	0.0000	----	----	----	57063.6	57063.6	0.0	dry
84.000	0.0000	0.0000	----	----	----	57063.6	57063.6	0.0	dry
96.000	0.0000	0.0000	----	----	----	57063.6	57063.6	0.0	dry

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Retention Pond Recovery - Refined Method
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Project Data

Project Name: Hartwood Marsh Road Phase II
Simulation Description: Pond 7 25 year/96 hour Recovery
Project Number: 41561-1
Engineer : MSF
Supervising Engineer:
Date: 04-15-2009

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum): 139.00
Water Table Elevation, [WT] (ft datum): 140.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 20.00
Fillable Porosity, [n] (%): 25.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 13.33
Maximum Area For Unsaturated Infiltration, [Av] (ft²): 61603.6

Geometry Data

Equivalent Pond Length, [L] (ft): 317.0
Equivalent Pond Width, [W] (ft): 207.0
Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft ²)
153.00	36244.0
154.00	39483.0
155.00	42849.7
156.00	46344.4
157.00	49967.1
158.00	53717.9
159.00	57596.7
160.00	65631.0
161.00	65775.6

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Retention Pond Recovery - Refined Method
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Scenario Input Data

Scenario 1 :: 25 year - 96 hour

Hydrograph Type: Slug Load
 Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 330919.7

Initial ground water level (ft datum) default, 140.00

Time After Storm Event (days)	Time After Storm Event (days)	Time After Storm Event (days)	Time After Storm Event (days)	Time After Storm Event (days)
0.100	2.700	3.500	7.500	11.500
0.250	2.800	4.000	8.000	12.000
0.500	2.900	4.500	8.500	12.500
1.000	3.000	5.000	9.000	13.000
1.500	3.100	5.500	9.500	13.500
2.000	3.200	6.000	10.000	14.000
2.500	3.300	6.500	10.500	14.500
2.600	3.400	7.000	11.000	

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Detailed Results :: Scenario 1 :: 25 year - 96 hour

Elapsed Time (hours)	Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Overflow Discharge (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Cumulative Discharge Volume (ft ³)	Flow Type
0.000	55153.2900	0.0000	140.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	55153.2900	0.0000	159.846	5.59453	0.00000	330919.7	33.6	0.0	U/P
2.400	0.0000	0.0000	158.461	9.12831	0.00000	330919.7	82094.1	0.0	U/P
6.000	0.0000	0.0000	156.303	6.84127	0.00000	330919.7	193081.8	0.0	U/P
12.000	0.0000	0.0000	154.355	2.95004	0.00000	330919.7	278839.7	0.0	U/S
24.000	0.0000	0.0000	153.347	0.60278	0.00000	330919.7	318133.9	0.0	S
36.000	0.0000	0.0000	152.379	0.14798	0.00000	330919.7	330919.7	0.0	S ← Recovery < 48 hrs.
48.000	0.0000	0.0000	151.465	0.00000	0.00000	330919.7	330919.7	0.0	S
60.000	0.0000	0.0000	150.782	0.00000	0.00000	330919.7	330919.7	0.0	S
62.400	0.0000	0.0000	150.654	0.00000	0.00000	330919.7	330919.7	0.0	S
64.800	0.0000	0.0000	150.532	0.00000	0.00000	330919.7	330919.7	0.0	S
67.200	0.0000	0.0000	150.416	0.00000	0.00000	330919.7	330919.7	0.0	S
69.600	0.0000	0.0000	150.306	0.00000	0.00000	330919.7	330919.7	0.0	S
72.000	0.0000	0.0000	150.200	0.00000	0.00000	330919.7	330919.7	0.0	S
74.400	0.0000	0.0000	150.100	0.00000	0.00000	330919.7	330919.7	0.0	S
76.800	0.0000	0.0000	150.003	0.00000	0.00000	330919.7	330919.7	0.0	S
79.200	0.0000	0.0000	149.910	0.00000	0.00000	330919.7	330919.7	0.0	S
81.600	0.0000	0.0000	149.821	0.00000	0.00000	330919.7	330919.7	0.0	S
84.000	0.0000	0.0000	149.735	0.00000	0.00000	330919.7	330919.7	0.0	S
96.000	0.0000	0.0000	149.365	0.00000	0.00000	330919.7	330919.7	0.0	S
108.000	0.0000	0.0000	149.043	0.00000	0.00000	330919.7	330919.7	0.0	S
120.000	0.0000	0.0000	148.757	0.00000	0.00000	330919.7	330919.7	0.0	S
132.000	0.0000	0.0000	148.502	0.00000	0.00000	330919.7	330919.7	0.0	S
144.000	0.0000	0.0000	148.271	0.00000	0.00000	330919.7	330919.7	0.0	S
156.000	0.0000	0.0000	148.060	0.00000	0.00000	330919.7	330919.7	0.0	S
168.000	0.0000	0.0000	147.868	0.00000	0.00000	330919.7	330919.7	0.0	S
180.000	0.0000	0.0000	147.690	0.00000	0.00000	330919.7	330919.7	0.0	S
192.000	0.0000	0.0000	147.525	0.00000	0.00000	330919.7	330919.7	0.0	S
204.000	0.0000	0.0000	147.372	0.00000	0.00000	330919.7	330919.7	0.0	S
216.000	0.0000	0.0000	147.229	0.00000	0.00000	330919.7	330919.7	0.0	S
228.000	0.0000	0.0000	147.095	0.00000	0.00000	330919.7	330919.7	0.0	S
240.000	0.0000	0.0000	146.969	0.00000	0.00000	330919.7	330919.7	0.0	S
252.000	0.0000	0.0000	146.850	0.00000	0.00000	330919.7	330919.7	0.0	S
264.000	0.0000	0.0000	146.738	0.00000	0.00000	330919.7	330919.7	0.0	S
276.000	0.0000	0.0000	146.631	0.00000	0.00000	330919.7	330919.7	0.0	S
288.000	0.0000	0.0000	146.530	0.00000	0.00000	330919.7	330919.7	0.0	S
300.000	0.0000	0.0000	146.434	0.00000	0.00000	330919.7	330919.7	0.0	S
312.000	0.0000	0.0000	146.342	0.00000	0.00000	330919.7	330919.7	0.0	S
324.000	0.0000	0.0000	146.254	0.00000	0.00000	330919.7	330919.7	0.0	S
336.000	0.0000	0.0000	146.170	0.00000	0.00000	330919.7	330919.7	0.0	S
348.000	0.0000	0.0000	146.090	---	---	330919.7	330919.7	0.0	N.A.

BASIN BREAKDOWN

	DATE	
MADE BY:	MSF	11-May-09
CHECK BY:	BJS	13-May-09

PROJECT: HARTWOOD MARSH ROAD PHASE II

LOCATION: BASIN 7

BASIN LIMITS: STA. 299+91 to STA. 322+95, CL CONST. HARTWOOD MARSH ROAD

EXISTING CONDITIONS:

LOCATION	STATION	To	STATION	BASIN WIDTH (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)	REMARKS
<i>ON-SITE:</i>								
BASIN 7	299+91	-	322+95	120	1.06	4.50	5.56	Roadway
BASIN 7-1 (POND 7)	-	-	-	-	0.00	2.54	2.54	Open Land
<i>ON-SITE SUBTOTAL:</i>					1.06	7.04	8.10	
<i>OFF-SITE:</i>								
BASIN 7-2 (OFFSITE)	-	-	-	-	0.00	2.31	2.31	Agricultural-Groves
BASIN 7-3 (OFFSITE)	-	-	-	-	0.00	5.31	5.31	Agricultural-Groves
<i>OFFSITE SUBTOTAL:</i>					0.00	7.62	7.62	
TOTAL DRAINAGE AREA:					1.06	14.66	15.72	

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Pre versus Post Phosphorus Loading--Basin 7

Location: Hartwood Marsh Road from 1500 feet east of S. Hancock Road to County Line
 Discharge Point: John's Lake (Pre-Development), No Discharge (Post Development)

Pre-development

Basin	Area (ac)	Outfall	Land Use	Soil Class	Mean Annual Load (kg/ac-yr)	Inflow Mass Phosphorus Loading (kg/yr)	Treatment System	Inches of Retention Area over Basin Area (inches)	Pollutant Removal Efficiency (%)	Outflow Mass Loading (kg/yr)	Comment
7	5.56	None	Highway - max 50% imp.	A	0.71	3.9476	None	0	0	3.9476	Depressional Storage
7-1	2.54	None	Open Land	A	0.004	0.01016	None	0	0	0.01016	Depressional Storage
7-2	2.31	None	Agriculture Groves	A	0.007	0.01617	None	0	0	0.01617	Depressional Storage
7-3	5.31	None	Agriculture Groves	A	0.007	0.03717	None	0	0	0.03717	Depressional Storage
Total	15.72					4.0111				4.0111	

Mean Annual Phosphorus Load from SJRWMD MSSW Table 11.7-3

Pre versus Post Phosphorus Loading--Basin 7

Location: Hartwood Marsh Road from 1500 feet east of S. Hancock Road to County Line
 Discharge Point: John's Lake (Pre-Development), No Discharge (Post Development)

Post Development

Basin	Area (ac)	Outfall	Land Use	Soil Class	Mean Annual Load (kg/ac-yr)	Inflow Mass Phosphorus Loading (kg/yr)	Treatment System	Inches of Retention Area over Basin Area (inches)	Pollutant Removal Efficiency (%)	Outflow Mass Loading (kg/yr)	MSSW Table for Removal Efficiency	Comment
7	5.56	Pond 7	Highway - max 75% imp.	A	1.053	5.85468	Dry	0.96	83	0.995296	11.7-30	
7-1	2.54	None	Highway - max 75% imp.	A	1.053	2.67462	Dry	0.96	83	0.454685	11.7-30	
7-2	2.31	Pond 7	Agriculture Groves	A	0.007	0.01617	Dry	0.96	0	0.01617	NA	
7-3	5.31	Pond 7	Agriculture Groves	A	0.007	0.03717	Dry	0.96	0	0.03717	NA	
Total	15.72					8.58264				1.503321		

Mean Annual Phosphorus Load from SJRWMD MSSW Table 11.7-3

Post less than Pre

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