ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
ENVIRONMENTAL RESOURCE PERMIT APPLICATION
REQUEST FOR ADDITIONAL INFORMATION

SOUTH HANCOCK ROAD
From US 27 to Hartwood Marsh Road

June 2008

Prepared For:

LAKE COUNTY
FLORIDA

Lake County Public Works
Engineering Division
437 Ardice Avenue
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SOUTH HANCOCK ROAD
US 27 TO HARTWOOD MARSH ROAD
LAKE COUNTY, FLORIDA

DRAINAGE CALCULATIONS

TABLE OF CONTENTS

76466-2

SECTION		PAGE
1.0	Introduction	1
2.0	Project Description	1
3.0	Soil Characteristics	1
4.0	Design Criteria	2
5.0	FEMA Information	2
6.0	Existing Roadway Drainage	2
	6.1 Basin 1	3
	6.2 Basin 2	3
	6.2 Basin 3	3
7.0	Proposed Roadway Drainage	5
	7.1 Basin 1	5
	7.2 Basin 2	8
	7.3 Basin 3	9
	7.4 Water Quality Treatment	14
8.0	Wetland Impacts	15
9.0	Floodplain Encroachment	15
9.0	Special Basin Information	15
10.0	Permit History	15

LIST OF TABLES

		PAGE
1.	Water Table Elevations	2
2.	Basin 1 Pre-Development Drainage Basin Data	4
3.	Basin 2 Pre-Development Drainage Basin Data	4
4.	Peak Stage in Wetland (Basin 1)	6
5.	Basin 1 Post Development Drainage Basin Data	6
6.	Basin 1 Discharge to Pond 1	7
7.	Basin 1 SJRWMD Routed Peak Discharge	7
8.	Peak Stage in Unnamed Lake	10
9.	Basin 2 Post Development Drainage Basin Data	10
10.	SJRWMD Routed Peak Discharge Volume	11
11.	Basin 2 Discharge and Peak Stage	11
12.	25 Year/96 Hour Attenuation Volume Recovery	11
13.	Basin 3 Post Development Drainage Basin Data	12
14.	Basin 3 25 Year/96 Hour Peak Volume and Peak Stage	12
15.	Pond Details	13
16.	Pond Control Structure	13
17.	Water Quality Treatment	14

1.0 INTRODUCTION

Lake County intends to construct South Hancock Road as a four-lane divided urban roadway. The project begins at US 27 and ends at Hartwood Marsh Road, a total distance of 1.333 miles.

This Drainage Report describes the existing drainage system and the proposed storm water management system.

2.0 PROJECT DESCRIPTION

Lake County intends to construct South Hancock Road to provide a four-lane divided urban roadway with raised median, bicycle lanes, sidewalk, a multipurpose recreational path and storm water management facilities.

The project is located in Sections 9, 10, 15 and 16, in Township 23 South, Range 26 East in Lake County.

3.0 SOIL CHARACTERISTICS

Within the limits of the project the soil is classified as Astatula sand, dark surface; Lake sand and Myakka sand. The auger borings encountered generally clean light brown to orange brown fine sand mixed with silt and clay classified as Hydrologic Group A.

Table 1 summarizes the encountered water surface and estimated seasonal high water elevation for Ponds I and 2.

Table 1

Water Table Elevations			
Pond	Encountered Groundwater Surface (ft)	Estimated Normal Water Groundwater Surface (ft)	Estimated Seasonal High Groundwater Surface (ft)
1	92.79	96.42	100.04
2	73.69	82.85	92.02

4.0 DESIGN CRITERIA

The conveyance and storm water management systems for this project are designed in accordance with the Lake County Drainage Standards and the applicable design and performance criteria established by the St. Johns River Water Management District (SJRWMD) in the Applicants Handbook (December 2006).

5.0 FEMA INFORMATION

A portion of Pond 2 is located in the 100 year floodplain associated with the unnamed lake as indicated on the Federal Emergency Management Agency's (FEMA) 2002 Flood Insurance Rate Map Panel Number 12069C0650D.

6.0 EXISTING ROADWAY DRAINAGE

The South Hancock Road project is divided into three separate drainage basins, which are then divided into smaller sub-basins. The drainage basin data can be found in the Appendix to Drainage Calculations.

6.1 Basin 1

Basin 1 begins at US 27 (Sta. 400+65) and ends approximately 500 feet east of US 27 (Sta. 426+04). The pre-development condition consists generally of open field. The runoff flows to a wetland located east of US 27.

Table 2 describes the pre-development condition hydrologic data.

6.2 Basin 2

Basin 2 begins approximately 500 feet east of US 27 (Sta. 426+04) and ends at the Regency Hills subdivision (Sta. 457+60) on the right side of the road and ends at the end of construction (Sta. 470+85) on the left side of the road. The basin consists of two subbasins. The larger subbasin consists of an undeveloped field. The basin runoff flows to a low point east of the future road corridor on Conserv II property. The second basin is the future location of Pond 2. This basin runoff flows to an unnamed lake south of Hartwood Marsh Road.

Table 3 describes the pre-development condition hydrologic data.

6.3 Basin 3

Basin 3 begins at the Regency Hills subdivision (Sta. 457+60) on the right hand side of the road and ends at the end of the construction (Sta. 470+85) on the right side of the road. Basin 3 is included in the Hartwood Marsh Road permit Basin 2 calculations. The Hartwood Marsh Road permit application (40-069-114354-1) is currently pending.

The Hartwood Marsh Road Basin 2 which includes South Hancock Road begins just west of Hancock Road (Sta. 138+50) and ends 1200 feet east of Hancock Road (Sta. 152+39). The pre-development condition consists of a two-lane roadway with contributing offsite drainage basins to the roadway corridor. The roadway runoff is contained within roadside swales which do not have a positive outfall. There are three offsite basins contributing to the roadside swales. The proposed pond for this basin will be located on the vacant parcel owned by the First Baptist Church of Clermont. The church site has been included as an offsite basin. Runoff from the southern half of the church site flows to the south toward the Regency Hills subdivision. The design of the storm water management

system for Regency Hills accounted for some runoff from the church site in the pre-development condition. Regency Hills constructed a ditch bottom inlet (Structure No. 41 in the Regency Hills Plans) to intercept runoff from the vacant parcel.

Table 2

Basin 1 Pre-Development Drainage Basin Data					
Basin Name	**Outfall Location**	**Area (Ac.)**	**Impervious Area (Ac.)**	**Curve Number**	**Time of Concentration (min.)**
1	Wetland	37.28	0	39.0	27.40
Total		**37.28**	**0.00**		

Table 3

Basin 2 Pre-Development Drainage Basin Data					
Basin Name	**Outfall Location**	**Area (Ac.)**	**Impervious Area (Ac.)**	**Curve Number**	**Time of Concentration (min.)**
2	Conserv II	46.88	0	39.0	42.81
2-1 (Pond)	Unnamed Lake	3.90	0	39.0	17.09
Total		**50.78**	**0**		

7.0 PROPOSED ROADWAY DRAINAGE

In the post development condition, the drainage basin boundaries will essentially be maintained. Storm water will be conveyed in storm sewer to the respective discharge points. A detention pond located south of South Hancock Road and east of US 27 will be used to provide treatment for Basin 1. A detention pond located south of Hartwood Marsh Road and west of Hancock Road will provide treatment for Basin 2. Hartwood Marsh Road proposed Pond 2 on the future First Baptist Church site will provide treatment for Basin 3. Roadside swales will convey the offsite areas to cross drains and outfall to the wetland in Basin 1 and to the Conserv II property in Basin 2. The post development drainage basin data can be found in the Appendix to Drainage Calculations.

7.1 Basin 1

In the post development condition, the basin area contributing to Pond 1 consists of the roadway (Sta. 400+46 to Sta. 425+20) and the offsite basin directly adjacent to the road. Pond 1 is considered a separate basin. The runoff from the offsite area will be bypassed to the wetland through a cross drain located at Sta. 402+00. Pond 1 will discharge to the wetland.

Water quality treatment and attenuation of the 25 year/24 hour runoff volume will be provided in Pond 1. Pond 1 is designed as a wet detention pond. The control structure in the pond consists of a ditch bottom inlet with a bleed down orifice and weir in the side of the box set at the top of the water quality volume. The control elevation of this pond is set at the 25-year tail water elevation in the downstream wetland.

Table 4 summarizes the tail water elevations of the wetland. These values were taken from the flood data table in the FDOT US 27 roadway plans (FPID 23844-1-52-01) for the culvert located at the downstream end of the wetland at US 27.

Table 5 summarizes the post development drainage basin data. Table 6 shows the post development discharge rate to Pond 1 and the peak stage in the pond for various storm events. Table 7 shows the pre-development and post development discharge rates to the wetland.

Table 4

Peak Stage in Wetland (Basin 1)	
Storm Event	Estimated Elevation (ft.)
Mean Annual	97.10
10 yr/24 hr	97.70
25 yr/24 hr	98.10
100 yr/24 hr	98.58

Table 5

Basin 1 Post Development Drainage Basin Data					
Basin Name	**Outfall Location**	**Area (Ac.)**	**Impervious Area (Ac.)**	**Curve Number**	**Time of Concentration (min.)**
1 (Road)	Pond 1	3.30	2.44	82.6	11.70
1A (Road)	Pond 1	3.72	2.74	82.5	15.78
1-2 (Pond 1)	Pond 1	3.88	1.07	55.2	5.00
1-3 (Offsite)	Wetland	26.38	0	39.0	42.85
Total		**37.28**	**6.25**		

Table 6

Basin 1 Discharge to Pond 1			
Storm Event	Post Development Discharge to Pond 1 (cfs)	Basin Outflow Discharge to Wetland (cfs)	Pond 1 Peak Stage (ft)
Mean Annual	15.45	0.35	99.15
10 yr/24 hr	33.43	2.36	99.78
25 yr/24 hr	45.59	5.71	100.15
100 yr/24 hr	70.76	15.31	100.92

Table 7

Basin 1 SJRWMD Routed Peak Discharge		
Storm Event	Pre-Development Discharge to Wetland (cfs)	Post Development Discharge to Wetland (cfs)
Mean Annual	0.27	0.35*
10 yr/24 hr	9.15	2.36
25 yr/24 hr	23.39	5.71
100 yr/24 hr	65.02	15.31

*Discharge controlled by orifice size

7.2 Basin 2

In the post development condition, the basin area contributing to Pond 2 consists of the roadway (Sta. 426+20 to Sta. 457+60) and offsite basins directly adjacent to the road. Pond 2 is considered a separate basin. Pond 2 is located south of Hartwood Marsh Road and east of South Hancock Road. Pond 2 will discharge to an unnamed lake.

Water quality treatment and attenuation of the 25 year/96 hour runoff volume will be provided in Pond 2. Pond 2 is designed as a dry retention pond. The pond control structure consists of a ditch bottom inlet with the grate set above the required 25 year/96 hour attenuation volume. The grate is set above the required volume in order to provide additional storage for floodplain compensation. The recovery of the attenuation volume is through infiltration through the pond bottom and side slopes.

The pond does not recover its total volume in 14 days. However, if a second 25 year/96 hour event occurs immediately after the first storm event 100% of the attenuation volume associated with the second storm event can retained inside the pond berm.

Table 8 summarizes the tail water elevations of the unnamed lake. These values were based on estimating the 100 year floodplain elevation for the unnamed lake through comparison of contour data with the limits of floodplain shown on the Flood Insurance Rate Maps. The 100 year elevation in the unnamed lake is close to what the Flood Insurance Rate Map shows for Lake Louisa. Therefore, it is assumed that the unnamed lake will have similar stages for various storm events.

Offsite area that is not treated in Pond 2 will be collected in a roadside ditch on the west side of the corridor. Two cross drains will convey the runoff to two separate spreader swales located on the east side of the corridor. The runoff from the spreader swales will sheet flow to the low areas on the Conserv II property, where the runoff currently drains. Calculations for the bypass runoff are located in the Appendix to Drainage Calculations.

Table 9 summarizes the post development drainage basin data. Table 10 shows the routed discharge volume for the 25 year/96 hour event. Table 11 shows the pre-development and post development discharge rates from the pond. Table 12 shows 25 year/96 hour attenuation volume recovery.

7.3 Basin 3

In the post development condition, the Basin 3 area consists of the roadway (Sta. 426+20 to Sta. 457+20) on the right hand side of the road. Basin 3 is included in the Basin 2 calculations for Hartwood Marsh Road (Permit Application No. 40-069-114354-1).

In the post development condition, the basin area contributing to Pond 2 (Hartwood) consists of Hartwood Marsh Road, South Hancock Road and offsite basins directly adjacent to the road. Pond 2 (Hartwood) is considered a separate basin. Pond 2 is located on the future First Baptist Church of Clermont property. The County has designed this pond to accommodate the runoff from the First Baptist church site assuming that the future development will be no more than 80% impervious.

Water quality treatment and attenuation of the 25 year/96 hour runoff volume will be provided in Pond 2. Pond 2 is designed as a dry detention pond with no outfall.

Table 13 summarizes the post development drainage basin data. Table 14 shows the routed discharge volume for the 25 year/96 hour event.

Tables 15 and 16 describe the pond details.

Table 8

Peak Stage in Unnamed Lake (Basin 1)	
Storm Event	Estimated Elevation (ft.)
Mean Annual	98.4
10 yr/24 hr	99.0
25 yr/24 hr	99.3
100 yr/24 hr	99.8
25 yr/96 hr	100.0

Table 9

Basin 2 Post Development Drainage Basin Data					
Basin Name	**Outfall Location**	**Area (Ac.)**	**Impervious Area (Ac.)**	**Curve Number**	**Time of Concentration (min.)**
2 (Road)	Pond 2	10.66	7.69	81.6	22.63
2-1 (Pond 2)	Pond 2	3.90	2.30	73.8	5.00
2-2a (Offsite)	Conserv II	27.42	0	39.0	32.63
2-2b (Offsite)	Conserv II	7.27	0	39.0	31.01
2-3 (Pond 2)	Pond 2	0.82	0	39.0	23.84
2-4a (Offsite)	Conserv II	0.39	0	39.0	5.00
2-4b (Offsite)	Conserv II	0.32	0	39.0	5.00
Total		**50.78**	**9.99**		

Table 10

SJRWMD Routed Peak Discharge Volume				
Basin	Pre-Development 25 Year/96 Hour Runoff (ac-ft)	Post Development 25 Year/96 Hour Runoff (ac-ft)	Required Attenuation Volume (ac-ft)	Retained Attenuation Volume (ac-ft)
2 (to unnamed lake)	0.89	10.62	9.72	11.29

Table 11

Basin 2 Discharge and Peak Stage				
Storm Event	Pre-Development Discharge to Lake (cfs)	Post Development Discharge to Pond 2 (cfs)	Basin Outflow Discharge to Unnamed Lake (cfs)	Pond 2 Peak Stage (ft)
Mean Annual	0.03	6.56	0	96.96
10 yr/24 hr	1.09	13.94	0	98.06
25 yr/24 hr	2.90	18.87	0	98.77
100 yr/24 hr	8.20	28.81	0	100.16

Table 12

25 Year/96 Hour Attenuation Volume Recovery for Pond 2					
Pond	Attenuation Volume (ac-ft)	Volume Recovered after 14 days (ac-ft)	Volume Remaining in Pond (ac-ft)	Second Attenuation Volume	Percentage of Second Attenuation Volume that can be Retained in the Pond (ft.)
2	9.72	8.13 (84%)	1.59	9.72+1.59	100%

Table 13

Basin 3 Post Development Drainage Basin Data					
Basin Name	**Outfall Location**	**Area (Ac.)**	**Impervious Area (Ac.)**	**Curve Number**	**Time of Concentration (min.)**
3 (Road)	Pond 3	7.67	6.00	85.2	17.34
3-1 (Offsite)	Pond 3	0.08	0.00	39.0	10.20
3-2 (Offsite)	Pond 3	0.30	0.08	54.7	9.24
3-3 (Offsite)	Pond 3	0.14	0.01	43.2	8.50
3-4 (Pond)	Pond 3	6.34	1.96	57.9	5.00
First Baptist Church	Pond 3	30.53	24.42	86.2	14.38
Total		**45.07**	**32.47**		

Table 14

Basin 3 (Basin 2 Hartwood) 25 Year/96 Hour Peak Volume and Peak Stage		
Storm Event	Pond 2 (Hartwood) Peak Volume (ac-ft)	Pond 2 (Hartwood) Peak Stage (ft)
25 yr/96 hr	33.99	115.99

Table 15

Pond Details				
Pond	Type of System	Pond Surface Area including Maintenance Berms (ac.)	Side Slopes	Pond Bottom Elevation/Top of Berm (ft.)
1	Wet	3.88	1:4/1:2	94.0 / 101.0
2	Dry	3.90	1:4	95.80 / 101.0

Table 16

Pond Control Structure	
Pond	Type of Structure
1	(1) Ditch bottom inlet Type C with bleed down orifice set at control elevation and a weir set at the water quality volume.
2	(1) Ditch bottom inlet Type C with grate set above the 25 year/96 hour attenuation volume.

7.4 Water Quality Treatment

Water quality treatment for Basin 1 is provided in wet detention Pond 1. The treatment for Basin 2 runoff is provided in dry retention Pond 2. The treatment volume is calculated using the contributing drainage basins to the road and pond. Offsite area that is bypassed through the cross drains is not included in the calculation. In Basin 3, water quality treatment is provided in the Pond 2 Hartwood on the First Baptist Church property. In Basin 3, the water quality treatment volume calculation assumed that the First Baptist Church site is developed and that it has 80% impervious area.

The volume recovery is based on St. Johns River Water Management District criteria for the type of stormwater management system. The ponds are to recover the treatment volume in 72 hours which is accomplished through soil percolation. Tables 17 summarize the water quality requirements for each basin.

Table 17

Water Quality Treatment								
Basin	Total Basin Area Contributing to Pond (ac)	Impervious Area (ac.)	Type of Treatment System	Location of Treatment System	Treatment Volume Required (ac-ft)	Treatment Volume Provided (ac-ft)	Stage in Retention Pond (ft)	Recovery Time (hours)
1	10.90	5.18	Wet Detention	Pond 1	1.62	1.62	99.40	25.5
2	14.56	7.69	Dry Retention	Pond 2	1.41	1.41	96.41	2.4
3	45.07	30.52	Dry Retention	Pond 2 Hartwood on First Baptist Church site	3.18	3.18	105.12	18

8.0 WETLAND IMPACTS

There are no wetlands impacts on this project.

9.0 FLOODPLAIN IMPACTS

A portion of Pond 2 is located in the 100 year floodplain associated with the unnamed lake. There is 12,569 cf of fill in the floodplain associated with construction of the west side of the pond berm. There is 13,504 cf of storage volume available between the 100 year/24 hour design high water in the pond and the top of the outfall structure grate to compensate for the encroachment.

10.0 SPECIAL BASIN INFORMATION

This project lies within the Ochlawaha River Basin. It does not lie with the boundaries of the Lake Apopka Hydrologic Basin.

11.0 PERMIT HISTORY

Pond 2 Hartwood which will treat South Hancock Road Basin 3 is included in the Hartwood Marsh Road permit application No. 40069-114354-1, which is pending.

APPENDIX TO DRAINAGE CALCULATIONS

SOUTH HANCOCK ROAD
US 27 TO HARTWOOD MARSH ROAD
DRAINAGE CALCULATIONS

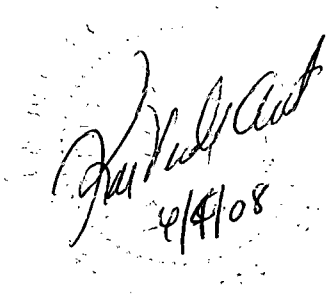


TABLE OF CONTENTS

BASIN 1 1
- Pre-Development Drainage Basin Data 2
  - Nodal Diagram 3
  - Basin Data 4
  - Curve Numbers 5
  - Time of Concentration 6
- Drainage Flow Path Pre-Development 7
  - Pre-Development AdICPR Model 8
- Post Development Drainage Basin Data 16
  - Nodal Diagram 17
  - Basin Data 18
  - Curve Numbers 19
  - Time of Concentration & Storm Sewer Calculations 23
- Drainage Flow Path Post Development 30
- Water Quality Treatment and Recovery Calculations 31
  - Treatment Calculations 32
  - Stage Storage Calculations 33
  - Water Quality Recovery Calculations 34
  - Permanent Pool Volume Calculations 36
- Boundary Condition Wetland 37
- Post Development AdICPR Model 39
- Bypass Drainage Basin Data 47
  - Ditch Calculations 48
  - Culvert Calculations 58

BASIN 2 71
- Pre-Development Drainage Basin Data 72
  - Nodal Diagram 73
  - Basin Data 74
  - Curve Numbers 75
  - Time of Concentration 77
- Drainage Flow Path Pre-Development 79
- Pre-Development AdICPR Model 81
- Post Development Drainage Basin Data 84
  - Nodal Diagram 85
  - Basin Data 86
  - Curve Numbers 87
  - Time of Concentration & Storm Sewer Calculations 90
- Bypass Drainage Basin Data 97
  - Nodal Diagram 98
  - Curve Numbers 99
  - Time of Concentration 103
- Drainage Flow Path Post Development 107
- Water Quality Treatment and Recovery Calculations 109
  - Treatment Calculations 110
  - Stage Storage Calculations 111

25 Year/96 Hour Attenuation Recovery 112
Boundary Condition Unnamed Lake 114
Post Development AdICPR Model & Recovery Calculations 115
Bypass Drainage Basin Data 136
Ditch Calculations 137
Culvert Calculations 149

FLOODPLAIN ENCROACHMENT CALCULATIONS 166

BASIN 3 170
Post Development Drainage Basin Data 171
Nodal Diagram 172
Basin Data 173
Curve Numbers 174
Time of Concentration 180
Water Quality Treatment and Recovery Calculations (Hartwood Marsh Pond 2) 186
Treatment Calculations 187
Stage Storage Calculations 188
Water Quality Recovery Calculations 189
Post Development AdICPR Model 195

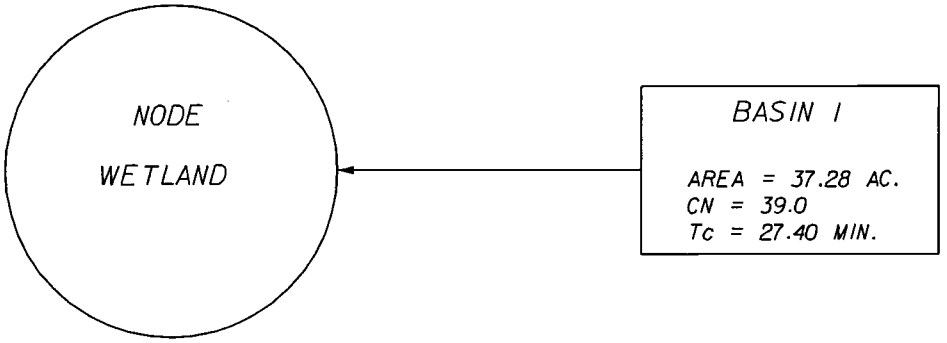
RESPONSE TO COMMENTS by LOTSPEICH AND ASSOCIATES, INC. 202

6/4/08

APPENDIX
To Drainage Calculations

BASIN 1

Pre-Development Drainage Basin Data



BASIN 1

LOCATION: LAKE COUNTY SEC. 9, 10, 15 & 16; T23S; R26E SOUTH HANCOCK ROAD CONSTRUCTION US 27 TO HARTWOOD MARSH ROAD	COUNTY: LAKE STATE: FLORIDA DATE: 12/07	DATUM: NAVD 88 PURPOSE: PRE-DEVELOPMENT NODAL DIAGRAM
HNTB HNTB CORPORATION 300 PRIMERA BLVD, SUITE 200 LAKE MARY, FL 32746 (407) 805-0355 CERT. OF AUTH. NO. 6500 ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E. FL. REGISTRATION NO. 44794	LAKE COUNTY FLORIDA	LAKE COUNTY SOUTH HANCOCK ROAD

5/12/2008 5:09:00 PM \\LKMw00\pmwork\Jobs\41561-2\41561205201\drainage\NODALDIAGRAMpre.dgn

BASIN BREAKDOWN

HNTB

		DATE
MADE BY:	MSF	10-Feb-08
CHCK BY:	KMV	13-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION: BASIN 1

BASIN LIMITS: STA. 400+65 to STA 426+04, CL CONST. S HANCOCK ROAD

EXISTING CONDITIONS:

LOCATION	STATION	To	STATION	BASIN WIDTH (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)	REMARKS
ON-SITE:								
BASIN 1	400+65	-	414+08		0.00	37.28	37.280	Discharge to Wetland
ON-SITE SUBTOTAL:					*0.00*	*37.28*	*37.280*	
OFF-SITE:								
TOTAL DRAINAGE AREA:					0.000	37.280	37.280	

PROPOSED CONDITIONS:

LOCATION	STATION	To	STATION	BASIN WIDTH (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)	REMARKS
ON-SITE:								
BASIN 1	400+65	-	414+08	120	2.44	0.86	3.300	
BASIN 1A	414+08	-	426+04	120	2.74	0.98	3.720	
BASIN 1-2 (POND AREA)	-	-	-	-	1.07	2.81	3.880	Impervious area considered at control elevation
ON-SITE SUBTOTAL:					*6.25*	*4.65*	*10.900*	
OFF-SITE:								
BASIN 1-3 (OFF-SITE)	400+65	-	426+04	-	0.00	26.38	26.380	Runoff Bypassed to Wetland
OFF-SITE SUBTOTAL:					*0.00*	*26.38*	*26.380*	
TOTAL DRAINAGE AREA:					6.247	31.033	37.280	

RUNOFF CURVE NUMBER

HNTB

MADE BY: MSF DATE: 10-Feb-08
CHECKED BY: KMV DATE: 13-Feb-08

PROJECT: SOUTH SOUTH HANCOCK ROAD

LOCATION: BASIN 1

UNDERLINE ONE: EXISTING PROPOSED

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab 2-2	CN Fig 2-3	CN Fig 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98				0.00
Astatula Sand (A)	GRASS Good Condition (On-Site)	39			37.28	1453.92
		Totals =			37.28	1453.92
		Use CN =			39.0	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

HNTB

		DATE:
MADE BY:	MSF	10-Feb-08
CHECKED BY:	KMV	13-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION : BASIN 1

UNDERLINE ONE: **EXISTING** **PROPOSED**

UNDERLINE ONE: **Tc** **Tt Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION	SHORT GRASS			
2	MANNING'S COEFFICIENT, n	0.150			
3	FLOW LENGTH, L, (< 300')	300		FT.	
4	2 YR/ 24 HR RAINFALL, P	4.70		IN.	
5	LAND SLOPE, S	0.0160			
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)	0.3548		HR. OR	21.29 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)	UNPAVED			
8	FLOW LENGTH, L	1110		L.F.	
9	WATERCOURSE SLOPE, S	0.0351		FT./ FT.	
10	AVERAGE VELOCITY, V	3.024		FT./SEC.	
11	Tt = L / (3600 * V)	0.102		HR. OR	6.12 MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A			S.F.	
13	WETTED PERIMETER, Pw			L.F.	
14	HYDRAULIC RADIUS, R = (A / Pw)			L.F.	
15	CHANNEL SLOPE, S			FT./FT.	
16	MANNING'S ROUGHNESS COEFFICIENT, n				
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n			FT./SEC.	
18	FLOW LENGTH, L			L.F.	
19	Tt = L / (3600 V)			HR. OR	0.00 MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)				

TOTAL Tc = 27.40 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

MATCH LINE STA. 437+00

BASIN 2

FLOW PATH BASIN 2

℄ CONST. SOUTH HANCOCK ROAD

CONSERV II

FLOW PATH BASIN 1

BASIN 1

℄ CONST. US 27

Wetland Line

BEGIN PROJECT STA. 400+45.98

E LOUISA ROAD

Wetland Line

Wetland Line

℄ CONST. POND 1

1" = 200'

N

0 50 200

Feet

REVISIONS		
DATE	BY	DESCRIPTION

HNTB

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

ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.
FL. REGISTRATION NO. 44794

LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

DRAINAGE FLOW PATH PRE-DEVELOPMENT

SHEET NO.

South Hancock Road
Basin 1
Pre-development
Input

```
================================================================================
==== Basins ====================================================================
================================================================================

        Name: BASIN 1                 Node: wetland               Status: Onsite
       Group: BASE                    Type: SCS Unit Hydrograph CN

        Unit Hydrograph: Uh484                  Peaking Factor: 484.0
          Rainfall File: Flmod            Storm Duration(hrs): 24.00
    Rainfall Amount(in): 8.300              Time of Conc(min): 27.40
               Area(ac): 37.280               Time Shift(hrs): 0.00
         Curve Number: 39.00             Max Allowable Q(cfs): 999999.000
              DCIA(%): 0.00


================================================================================
==== Nodes =====================================================================
================================================================================

      Name: wetland             Base Flow(cfs): 0.000          Init Stage(ft): 96.800
     Group: BASE                                              Warn Stage(ft): 99.600
      Type: Time/Stage


      Time(hrs)       Stage(ft)
--------------- ---------------
           0.00          96.800
          15.00          98.100
          40.00          97.500

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

         Name: 100Y24H
     Filename: W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\PRE\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
15.000          5.00
40.000          60.00

--------------------------------------------------------------------------------
         Name: 10Y24H
     Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\PRE\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
15.000          5.00
40.000          60.00

--------------------------------------------------------------------------------
         Name: 2.3Y24H
     Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\PRE\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
15.000          5.00
40.000          60.00

--------------------------------------------------------------------------------
```

South Hancock Road
Basin 1
Pre-development
Input

Name: 25Y24H
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\PRE\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
15.000	5.00
40.000	60.00

South Hancock Road
Basin 1
Pre-development
Hydrology time series

Simulation	Node	Time hrs	Volume ft3	Volume in	Rate cfs	
100Y24H	wetland	0.00	0.000	0.000	0.000	
100Y24H	wetland	1.00	0.000	0.000	0.000	
100Y24H	wetland	2.00	0.000	0.000	0.000	
100Y24H	wetland	3.00	0.000	0.000	0.000	
100Y24H	wetland	4.00	0.000	0.000	0.000	
100Y24H	wetland	5.00	0.000	0.000	0.000	
100Y24H	wetland	6.00	0.000	0.000	0.000	
100Y24H	wetland	7.00	0.000	0.000	0.000	
100Y24H	wetland	8.00	0.000	0.000	0.000	
100Y24H	wetland	9.00	0.000	0.000	0.000	
100Y24H	wetland	10.00	0.000	0.000	0.000	
100Y24H	wetland	11.00	0.000	0.000	0.000	
100Y24H	wetland	11.08	0.000	0.000	0.000	
100Y24H	wetland	11.17	0.000	0.000	0.000	
100Y24H	wetland	11.25	0.211	0.000	0.001	
100Y24H	wetland	11.33	3.963	0.000	0.024	
100Y24H	wetland	11.42	26.516	0.000	0.127	
100Y24H	wetland	11.50	102.400	0.001	0.379	
100Y24H	wetland	11.58	332.501	0.002	1.155	
100Y24H	wetland	11.67	975.579	0.007	3.132	
100Y24H	wetland	11.75	2470.215	0.018	6.832	
100Y24H	wetland	11.83	5506.066	0.041	13.407	
100Y24H	wetland	11.92	11049.600	0.082	23.550	
100Y24H	wetland	12.00	20235.813	0.150	37.692	
100Y24H	wetland	12.08	33744.484	0.249	52.366	
100Y24H	wetland	12.17	50965.789	0.377	62.443	
100Y24H	wetland	12.25	70042.641	0.518	64.737	← peak
100Y24H	wetland	12.33	88992.266	0.658	61.594	
100Y24H	wetland	12.42	106544.211	0.787	55.419	
100Y24H	wetland	12.50	122066.289	0.902	48.062	
100Y24H	wetland	12.58	135430.141	1.001	41.030	
100Y24H	wetland	12.67	146759.203	1.084	34.497	
100Y24H	wetland	12.75	156300.438	1.155	29.112	
100Y24H	wetland	12.83	164382.438	1.215	24.768	
100Y24H	wetland	12.92	171297.219	1.266	21.330	
100Y24H	wetland	13.00	177311.203	1.310	18.763	
100Y24H	wetland	13.08	182643.938	1.350	16.788	
100Y24H	wetland	13.17	187445.844	1.385	15.224	
100Y24H	wetland	13.25	191821.938	1.417	13.950	
100Y24H	wetland	13.33	195859.828	1.447	12.970	
100Y24H	wetland	13.42	199652.781	1.475	12.317	
100Y24H	wetland	13.50	203283.125	1.502	11.886	
100Y24H	wetland	13.58	206802.391	1.528	11.576	
100Y24H	wetland	13.67	210219.609	1.553	11.205	
100Y24H	wetland	13.75	213507.797	1.578	10.716	
100Y24H	wetland	13.83	216647.891	1.601	10.218	
100Y24H	wetland	13.92	219653.141	1.623	9.817	
100Y24H	wetland	14.00	222557.516	1.645	9.546	
100Y24H	wetland	14.08	225393.344	1.666	9.360	
100Y24H	wetland	14.17	228169.641	1.686	9.149	
100Y24H	wetland	14.25	230874.063	1.706	8.881	
100Y24H	wetland	14.33	233498.656	1.725	8.617	
100Y24H	wetland	14.42	236051.672	1.744	8.404	
100Y24H	wetland	14.50	238552.141	1.763	8.266	
100Y24H	wetland	14.58	241015.094	1.781	8.153	
100Y24H	wetland	14.67	243435.922	1.799	7.985	
100Y24H	wetland	14.75	245794.406	1.816	7.738	
100Y24H	wetland	14.83	248077.484	1.833	7.483	
100Y24H	wetland	14.92	250290.219	1.850	7.269	
100Y24H	wetland	15.00	252450.859	1.865	7.135	
100Y24H	wetland	16.00	275974.000	2.039	5.933	
100Y24H	wetland	17.00	295794.781	2.186	5.079	
100Y24H	wetland	18.00	312753.094	2.311	4.343	
100Y24H	wetland	19.00	327648.281	2.421	3.932	
100Y24H	wetland	20.00	341738.719	2.525	3.896	
100Y24H	wetland	21.00	354827.875	2.622	3.376	
100Y24H	wetland	22.00	367035.781	2.712	3.406	
100Y24H	wetland	23.00	378659.406	2.798	3.051	
100Y24H	wetland	24.00	388776.563	2.873	2.569	
100Y24H	wetland	25.00	393446.406	2.907	0.025	
100Y24H	wetland	26.00	393491.781	2.908	0.000	
100Y24H	wetland	27.00	393491.781	2.908	0.000	
100Y24H	wetland	28.00	393491.781	2.908	0.000	
100Y24H	wetland	29.00	393491.781	2.908	0.000	
100Y24H	wetland	30.00	393491.781	2.908	0.000	
100Y24H	wetland	31.00	393491.781	2.908	0.000	
100Y24H	wetland	32.00	393491.781	2.908	0.000	
100Y24H	wetland	33.00	393491.781	2.908	0.000	
100Y24H	wetland	34.00	393491.781	2.908	0.000	
100Y24H	wetland	35.00	393491.781	2.908	0.000	

South Hancock Road
Basin 1
Pre-development
Hydrology time series

Simulation	Node	Time hrs	Volume ft3	Volume in	Rate cfs	
100Y24H	wetland	36.00	393491.781	2.908	0.000	
100Y24H	wetland	37.00	393491.781	2.908	0.000	
100Y24H	wetland	38.00	393491.781	2.908	0.000	
100Y24H	wetland	39.00	393491.781	2.908	0.000	
100Y24H	wetland	40.00	393491.781	2.908	0.000	
10Y24H	wetland	0.00	0.000	0.000	0.000	
10Y24H	wetland	1.00	0.000	0.000	0.000	
10Y24H	wetland	2.00	0.000	0.000	0.000	
10Y24H	wetland	3.00	0.000	0.000	0.000	
10Y24H	wetland	4.00	0.000	0.000	0.000	
10Y24H	wetland	5.00	0.000	0.000	0.000	
10Y24H	wetland	6.00	0.000	0.000	0.000	
10Y24H	wetland	7.00	0.000	0.000	0.000	
10Y24H	wetland	8.00	0.000	0.000	0.000	
10Y24H	wetland	9.00	0.000	0.000	0.000	
10Y24H	wetland	10.00	0.000	0.000	0.000	
10Y24H	wetland	11.00	0.000	0.000	0.000	
10Y24H	wetland	11.08	0.000	0.000	0.000	
10Y24H	wetland	11.17	0.000	0.000	0.000	
10Y24H	wetland	11.25	0.000	0.000	0.000	
10Y24H	wetland	11.33	0.000	0.000	0.000	
10Y24H	wetland	11.42	0.000	0.000	0.000	
10Y24H	wetland	11.50	0.000	0.000	0.000	
10Y24H	wetland	11.58	0.000	0.000	0.000	
10Y24H	wetland	11.67	0.000	0.000	0.000	
10Y24H	wetland	11.75	0.000	0.000	0.000	
10Y24H	wetland	11.83	2.765	0.000	0.018	
10Y24H	wetland	11.92	42.333	0.000	0.245	
10Y24H	wetland	12.00	260.704	0.002	1.210	
10Y24H	wetland	12.08	937.206	0.007	3.300	
10Y24H	wetland	12.17	2294.292	0.017	5.748	
10Y24H	wetland	12.25	4312.009	0.032	7.704	
10Y24H	wetland	12.33	6796.874	0.050	8.862	
10Y24H	wetland	12.42	9498.324	0.070	9.148	← peak
10Y24H	wetland	12.50	12177.780	0.090	8.715	
10Y24H	wetland	12.58	14685.898	0.109	8.005	
10Y24H	wetland	12.67	16958.715	0.125	7.147	
10Y24H	wetland	12.75	18978.387	0.140	6.318	
10Y24H	wetland	12.83	20766.043	0.153	5.600	
10Y24H	wetland	12.92	22355.529	0.165	4.997	
10Y24H	wetland	13.00	23784.754	0.176	4.531	
10Y24H	wetland	13.08	25089.953	0.185	4.170	
10Y24H	wetland	13.17	26296.191	0.194	3.872	
10Y24H	wetland	13.25	27419.141	0.203	3.615	
10Y24H	wetland	13.33	28472.803	0.210	3.410	
10Y24H	wetland	13.42	29475.484	0.218	3.275	
10Y24H	wetland	13.50	30445.457	0.225	3.192	
10Y24H	wetland	13.58	31394.586	0.232	3.136	
10Y24H	wetland	13.67	32323.598	0.239	3.058	
10Y24H	wetland	13.75	33223.813	0.246	2.944	
10Y24H	wetland	13.83	34089.055	0.252	2.825	
10Y24H	wetland	13.92	34922.211	0.258	2.730	
10Y24H	wetland	14.00	35732.152	0.264	2.670	
10Y24H	wetland	14.08	36527.426	0.270	2.632	
10Y24H	wetland	14.17	37310.082	0.276	2.586	
10Y24H	wetland	14.25	38076.219	0.281	2.522	
10Y24H	wetland	14.33	38823.207	0.287	2.458	
10Y24H	wetland	14.42	39553.094	0.292	2.408	
10Y24H	wetland	14.50	40271.102	0.298	2.379	
10Y24H	wetland	14.58	40981.320	0.303	2.356	
10Y24H	wetland	14.67	41682.172	0.308	2.316	
10Y24H	wetland	14.75	42367.527	0.313	2.253	
10Y24H	wetland	14.83	43033.336	0.318	2.186	
10Y24H	wetland	14.92	43680.887	0.323	2.131	
10Y24H	wetland	15.00	44315.359	0.327	2.099	
10Y24H	wetland	16.00	51340.770	0.379	1.804	
10Y24H	wetland	17.00	57436.453	0.424	1.582	
10Y24H	wetland	18.00	62767.875	0.464	1.380	
10Y24H	wetland	19.00	67535.867	0.499	1.269	
10Y24H	wetland	20.00	72115.711	0.533	1.275	
10Y24H	wetland	21.00	76422.594	0.565	1.118	
10Y24H	wetland	22.00	80485.141	0.595	1.139	
10Y24H	wetland	23.00	84390.766	0.624	1.030	
10Y24H	wetland	24.00	87819.891	0.649	0.875	
10Y24H	wetland	25.00	89409.594	0.661	0.009	
10Y24H	wetland	26.00	89425.070	0.661	0.000	
10Y24H	wetland	27.00	89425.070	0.661	0.000	
10Y24H	wetland	28.00	89425.070	0.661	0.000	
10Y24H	wetland	29.00	89425.070	0.661	0.000	
10Y24H	wetland	30.00	89425.070	0.661	0.000	

South Hancock Road
Basin 1
Pre-development
Hydrology time series

Simulation	Node	Time hrs	Volume ft3	Volume in	Rate cfs
10Y24H	wetland	31.00	89425.070	0.661	0.000
10Y24H	wetland	32.00	89425.070	0.661	0.000
10Y24H	wetland	33.00	89425.070	0.661	0.000
10Y24H	wetland	34.00	89425.070	0.661	0.000
10Y24H	wetland	35.00	89425.070	0.661	0.000
10Y24H	wetland	36.00	89425.070	0.661	0.000
10Y24H	wetland	37.00	89425.070	0.661	0.000
10Y24H	wetland	38.00	89425.070	0.661	0.000
10Y24H	wetland	39.00	89425.070	0.661	0.000
10Y24H	wetland	40.00	89425.070	0.661	0.000
2.3Y24H	wetland	0.00	0.000	0.000	0.000
2.3Y24H	wetland	1.00	0.000	0.000	0.000
2.3Y24H	wetland	2.00	0.000	0.000	0.000
2.3Y24H	wetland	3.00	0.000	0.000	0.000
2.3Y24H	wetland	4.00	0.000	0.000	0.000
2.3Y24H	wetland	5.00	0.000	0.000	0.000
2.3Y24H	wetland	6.00	0.000	0.000	0.000
2.3Y24H	wetland	7.00	0.000	0.000	0.000
2.3Y24H	wetland	8.00	0.000	0.000	0.000
2.3Y24H	wetland	9.00	0.000	0.000	0.000
2.3Y24H	wetland	10.00	0.000	0.000	0.000
2.3Y24H	wetland	11.00	0.000	0.000	0.000
2.3Y24H	wetland	11.08	0.000	0.000	0.000
2.3Y24H	wetland	11.17	0.000	0.000	0.000
2.3Y24H	wetland	11.25	0.000	0.000	0.000
2.3Y24H	wetland	11.33	0.000	0.000	0.000
2.3Y24H	wetland	11.42	0.000	0.000	0.000
2.3Y24H	wetland	11.50	0.000	0.000	0.000
2.3Y24H	wetland	11.58	0.000	0.000	0.000
2.3Y24H	wetland	11.67	0.000	0.000	0.000
2.3Y24H	wetland	11.75	0.000	0.000	0.000
2.3Y24H	wetland	11.83	0.000	0.000	0.000
2.3Y24H	wetland	11.92	0.000	0.000	0.000
2.3Y24H	wetland	12.00	0.000	0.000	0.000
2.3Y24H	wetland	12.08	0.000	0.000	0.000
2.3Y24H	wetland	12.17	0.000	0.000	0.000
2.3Y24H	wetland	12.25	0.000	0.000	0.000
2.3Y24H	wetland	12.33	0.000	0.000	0.000
2.3Y24H	wetland	12.42	0.000	0.000	0.000
2.3Y24H	wetland	12.50	0.000	0.000	0.000
2.3Y24H	wetland	12.58	0.000	0.000	0.000
2.3Y24H	wetland	12.67	0.000	0.000	0.000
2.3Y24H	wetland	12.75	0.000	0.000	0.000
2.3Y24H	wetland	12.83	0.004	0.000	0.000
2.3Y24H	wetland	12.92	0.105	0.000	0.001
2.3Y24H	wetland	13.00	0.774	0.000	0.004
2.3Y24H	wetland	13.08	3.029	0.000	0.011
2.3Y24H	wetland	13.17	8.275	0.000	0.024
2.3Y24H	wetland	13.25	17.786	0.000	0.040
2.3Y24H	wetland	13.33	32.364	0.000	0.058
2.3Y24H	wetland	13.42	52.494	0.000	0.077
2.3Y24H	wetland	13.50	78.467	0.001	0.096
2.3Y24H	wetland	13.58	110.293	0.001	0.116
2.3Y24H	wetland	13.67	147.404	0.001	0.132
2.3Y24H	wetland	13.75	188.747	0.001	0.144
2.3Y24H	wetland	13.83	233.401	0.002	0.154
2.3Y24H	wetland	13.92	280.972	0.002	0.163
2.3Y24H	wetland	14.00	331.544	0.002	0.174
2.3Y24H	wetland	14.08	385.262	0.003	0.184
2.3Y24H	wetland	14.17	441.852	0.003	0.193
2.3Y24H	wetland	14.25	500.653	0.004	0.199
2.3Y24H	wetland	14.33	561.122	0.004	0.204
2.3Y24H	wetland	14.42	623.158	0.005	0.210
2.3Y24H	wetland	14.50	687.005	0.005	0.216
2.3Y24H	wetland	14.58	752.826	0.006	0.223
2.3Y24H	wetland	14.67	820.252	0.006	0.227
2.3Y24H	wetland	14.75	888.450	0.007	0.228
2.3Y24H	wetland	14.83	956.793	0.007	0.228
2.3Y24H	wetland	14.92	1025.247	0.008	0.229
2.3Y24H	wetland	15.00	1094.216	0.008	0.231
2.3Y24H	wetland	16.00	1960.854	0.014	0.250
2.3Y24H	wetland	17.00	2863.985	0.021	0.252
2.3Y24H	wetland	18.00	3750.714	0.028	0.241
2.3Y24H	wetland	19.00	4613.278	0.034	0.238
2.3Y24H	wetland	20.00	5497.531	0.041	0.253 ← peak
2.3Y24H	wetland	21.00	6370.571	0.047	0.232
2.3Y24H	wetland	22.00	7229.743	0.053	0.245
2.3Y24H	wetland	23.00	8084.730	0.060	0.230
2.3Y24H	wetland	24.00	8858.152	0.065	0.200
2.3Y24H	wetland	25.00	9221.944	0.068	0.002

South Hancock Road
Basin 1
Pre-development
Hydrology time series

Simulation	Node	Time hrs	Volume ft3	Volume in	Rate cfs
2.3Y24H	wetland	26.00	9225.506	0.068	0.000
2.3Y24H	wetland	27.00	9225.506	0.068	0.000
2.3Y24H	wetland	28.00	9225.506	0.068	0.000
2.3Y24H	wetland	29.00	9225.506	0.068	0.000
2.3Y24H	wetland	30.00	9225.506	0.068	0.000
2.3Y24H	wetland	31.00	9225.506	0.068	0.000
2.3Y24H	wetland	32.00	9225.506	0.068	0.000
2.3Y24H	wetland	33.00	9225.506	0.068	0.000
2.3Y24H	wetland	34.00	9225.506	0.068	0.000
2.3Y24H	wetland	35.00	9225.506	0.068	0.000
2.3Y24H	wetland	36.00	9225.506	0.068	0.000
2.3Y24H	wetland	37.00	9225.506	0.068	0.000
2.3Y24H	wetland	38.00	9225.506	0.068	0.000
2.3Y24H	wetland	39.00	9225.506	0.068	0.000
2.3Y24H	wetland	40.00	9225.506	0.068	0.000
25Y24H	wetland	0.00	0.000	0.000	0.000
25Y24H	wetland	1.00	0.000	0.000	0.000
25Y24H	wetland	2.00	0.000	0.000	0.000
25Y24H	wetland	3.00	0.000	0.000	0.000
25Y24H	wetland	4.00	0.000	0.000	0.000
25Y24H	wetland	5.00	0.000	0.000	0.000
25Y24H	wetland	6.00	0.000	0.000	0.000
25Y24H	wetland	7.00	0.000	0.000	0.000
25Y24H	wetland	8.00	0.000	0.000	0.000
25Y24H	wetland	9.00	0.000	0.000	0.000
25Y24H	wetland	10.00	0.000	0.000	0.000
25Y24H	wetland	11.00	0.000	0.000	0.000
25Y24H	wetland	11.08	0.000	0.000	0.000
25Y24H	wetland	11.17	0.000	0.000	0.000
25Y24H	wetland	11.25	0.000	0.000	0.000
25Y24H	wetland	11.33	0.000	0.000	0.000
25Y24H	wetland	11.42	0.000	0.000	0.000
25Y24H	wetland	11.50	0.000	0.000	0.000
25Y24H	wetland	11.58	0.000	0.000	0.000
25Y24H	wetland	11.67	0.988	0.000	0.007
25Y24H	wetland	11.75	16.636	0.000	0.098
25Y24H	wetland	11.83	167.297	0.001	0.907
25Y24H	wetland	11.92	801.131	0.006	3.319
25Y24H	wetland	12.00	2518.502	0.019	8.130
25Y24H	wetland	12.08	5916.624	0.044	14.524
25Y24H	wetland	12.17	11096.626	0.082	20.009
25Y24H	wetland	12.25	17517.631	0.129	22.797
25Y24H	wetland	12.33	24423.045	0.180	23.239 ← peak
25Y24H	wetland	12.42	31212.398	0.231	22.023
25Y24H	wetland	12.50	37488.977	0.277	19.820
25Y24H	wetland	12.58	43076.594	0.318	17.430
25Y24H	wetland	12.67	47944.715	0.354	15.024
25Y24H	wetland	12.75	52137.770	0.385	12.930
25Y24H	wetland	12.83	55757.000	0.412	11.198
25Y24H	wetland	12.92	58906.402	0.435	9.798
25Y24H	wetland	13.00	61686.816	0.456	8.738
25Y24H	wetland	13.08	64185.043	0.474	7.917
25Y24H	wetland	13.17	66460.398	0.491	7.252
25Y24H	wetland	13.25	68553.078	0.507	6.699
25Y24H	wetland	13.33	70498.000	0.521	6.267
25Y24H	wetland	13.42	72335.266	0.535	5.981
25Y24H	wetland	13.50	74101.977	0.548	5.797
25Y24H	wetland	13.58	75821.680	0.560	5.668
25Y24H	wetland	13.67	77497.430	0.573	5.504
25Y24H	wetland	13.75	79114.914	0.585	5.279
25Y24H	wetland	13.83	80664.000	0.596	5.048
25Y24H	wetland	13.92	82150.609	0.607	4.863
25Y24H	wetland	14.00	83591.109	0.618	4.741
25Y24H	wetland	14.08	85001.156	0.628	4.660
25Y24H	wetland	14.17	86384.859	0.638	4.565
25Y24H	wetland	14.25	87735.719	0.648	4.441
25Y24H	wetland	14.33	89049.477	0.658	4.318
25Y24H	wetland	14.42	90330.008	0.667	4.219
25Y24H	wetland	14.50	91586.695	0.677	4.159
25Y24H	wetland	14.58	92826.906	0.686	4.110
25Y24H	wetland	14.67	94048.117	0.695	4.032
25Y24H	wetland	14.75	95239.914	0.704	3.913
25Y24H	wetland	14.83	96395.492	0.712	3.790
25Y24H	wetland	14.92	97517.266	0.721	3.688
25Y24H	wetland	15.00	98614.359	0.729	3.626
25Y24H	wetland	16.00	110652.375	0.818	3.062
25Y24H	wetland	17.00	120935.867	0.894	2.651
25Y24H	wetland	18.00	129826.578	0.959	2.288
25Y24H	wetland	19.00	137703.375	1.018	2.088
25Y24H	wetland	20.00	145209.766	1.073	2.082

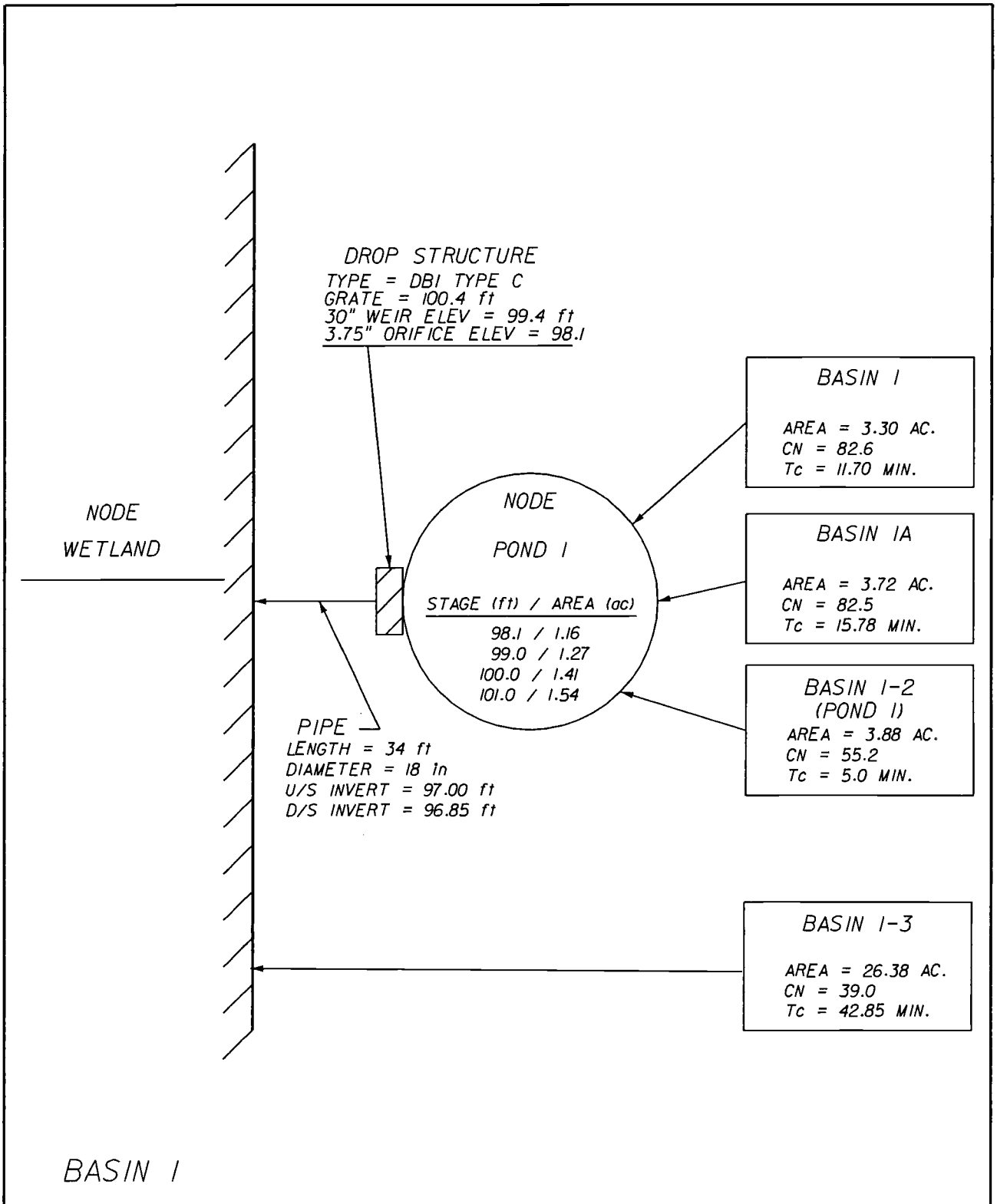
South Hancock Road
Basin 1
Pre-development
Hydrology time series

Simulation	Node	Time hrs	Volume ft3	Volume in	Rate cfs
25Y24H	wetland	21.00	152224.406	1.125	1.815
25Y24H	wetland	22.00	158802.969	1.173	1.840
25Y24H	wetland	23.00	165096.422	1.220	1.656
25Y24H	wetland	24.00	170597.719	1.261	1.400
25Y24H	wetland	25.00	173142.453	1.279	0.014
25Y24H	wetland	26.00	173167.203	1.280	0.000
25Y24H	wetland	27.00	173167.203	1.280	0.000
25Y24H	wetland	28.00	173167.203	1.280	0.000
25Y24H	wetland	29.00	173167.203	1.280	0.000
25Y24H	wetland	30.00	173167.203	1.280	0.000
25Y24H	wetland	31.00	173167.203	1.280	0.000
25Y24H	wetland	32.00	173167.203	1.280	0.000
25Y24H	wetland	33.00	173167.203	1.280	0.000
25Y24H	wetland	34.00	173167.203	1.280	0.000
25Y24H	wetland	35.00	173167.203	1.280	0.000
25Y24H	wetland	36.00	173167.203	1.280	0.000
25Y24H	wetland	37.00	173167.203	1.280	0.000
25Y24H	wetland	38.00	173167.203	1.280	0.000
25Y24H	wetland	39.00	173167.203	1.280	0.000
25Y24H	wetland	40.00	173167.203	1.280	0.000

South Hancock Road
Basin 1
Pre-development
Basin Max

Simulation	Basin	Group	Time Max hrs	Flow Max cfs	Volume in	Volume ft3
100Y24H	BASIN 1	BASE	12.24	65.020	2.914	394363.632
10Y24H	BASIN 1	BASE	12.42	9.150	0.663	89708.506
2.3Y24H	BASIN 1	BASE	18.57	0.268	0.069	9281.896
25Y24H	BASIN 1	BASE	12.30	23.393	1.283	173632.117

Post Development Drainage Basin Data



BASIN 1

LOCATION: LAKE COUNTY SEC. 9, 10, 15 & 16; T23S; R26E SOUTH HANCOCK ROAD CONSTRUCTION US 27 TO HARTWOOD MARSH ROAD	COUNTY: LAKE STATE: FLORIDA DATE: 12/07	DATUM: NAVD 88 PURPOSE: POST-DEVELOPMENT NODAL DIAGRAM
HNTB HNTB CORPORATION 300 PRIMERA BLVD, SUITE 200 LAKE MARY, FL 32746 (407) 805-0355 CERT. OF AUTH. NO. 6500 ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E. FL. REGISTRATION NO. 44794	LAKE COUNTY FLORIDA	*LAKE COUNTY* SOUTH HANCOCK ROAD

5/14/2008 2:38:50 PM \\LKMW00\pmwork\Jobs\41561-2\41561205201\drainage\NODALDIAGRAMpost.dgn

BASIN BREAKDOWN

HNTB

		DATE
MADE BY:	MSF	10-Feb-08
CHCK BY:	KMV	13-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION: BASIN 1

BASIN LIMITS: STA. 400+65 to STA 426+04, CL CONST. S HANCOCK ROAD

EXISTING CONDITIONS:

LOCATION	STATION	To	STATION	BASIN WIDTH (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)	REMARKS
ON-SITE:								
BASIN 1	400+65	-	414+08		0.00	37.28	37.280	Discharge to Wetland
ON-SITE SUBTOTAL:					*0.00*	*37.28*	*37.280*	
OFF-SITE:								
TOTAL DRAINAGE AREA:					0.000	37.280	37.280	

PROPOSED CONDITIONS:

LOCATION	STATION	To	STATION	BASIN WIDTH (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)	REMARKS
ON-SITE:								
BASIN 1	400+65	-	414+08	120	2.44	0.86	3.300	
BASIN 1A	414+08	-	426+04	120	2.74	0.98	3.720	
BASIN 1-2 (POND AREA)	-	-	-	-	1.07	2.81	3.880	Impervious area considered at control elevation
ON-SITE SUBTOTAL:					*6.25*	*4.65*	*10.900*	
OFF-SITE:								
BASIN 1-3 (OFF-SITE)	400+65	-	426+04	-	0.00	26.38	26.380	Runoff Bypassed to Wetland
OFF-SITE SUBTOTAL:					*0.00*	*26.38*	*26.380*	
TOTAL DRAINAGE AREA:					6.247	31.033	37.280	

RUNOFF CURVE NUMBER

HNTB

MADE BY: MSF DATE: 10-Feb-08
CHECKED BY: KMV DATE: 13-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION: BASIN 1

UNDERLINE ONE: EXISTING **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition; percent impervious; unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98			2.44	239.12
Astatula Sand (A)	GRASS Good Condition (On-Site)	39			0.86	33.54
		Totals =			3.30	272.66
		Use CN =			82.6	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

RUNOFF CURVE NUMBER

HNTB

MADE BY: MSF DATE: 10-Feb-08
CHECKED BY: KMV DATE: 13-Feb-08

PROJECT: SOUTH SOUTH HANCOCK ROAD

LOCATION: BASIN 1A

UNDERLINE ONE: EXISTING **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition; percent impervious; unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98			2.74	268.52
Astatula Sand (A)	GRASS Good Condition (On-Site)	39			0.98	38.22
		Totals =			3.72	306.74
		Use CN =			**82.5**	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

RUNOFF CURVE NUMBER

HNTB

MADE BY: MSF DATE: 10-Feb-08
CHECKED BY: KMV DATE: 13-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION: BASIN 1-2

UNDERLINE ONE: EXISTING **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA	98			1.07	104.58
Astatula Sand (A)	GRASS Good Condition (On-Site)	39			2.81	109.70
		Totals =			3.88	214.28
		Use CN =			55.2	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

RUNOFF CURVE NUMBER

HNTB

MADE BY: MSF DATE: 10-Feb-08
CHECKED BY: KMV DATE: 13-Feb-08

PROJECT: SOUTH SOUTH HANCOCK ROAD

LOCATION: BASIN 1-3

UNDERLINE ONE: EXISTING **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98			0.00	0.00
Astatula Sand (A)	GRASS Good Condition (On-Site)	39			26.38	1028.82
		Totals =			26.38	1028.82
		Use CN =			**39.0**	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

HNTB

DATE:

MADE BY: MSF 10-Feb-08

CHECKED BY: KMV 13-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION : BASIN 1

UNDERLINE ONE: EXISTING **PROPOSED**

UNDERLINE ONE: **Tc** **Tt Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION			
2	MANNING'S COEFFICIENT, n			
3	FLOW LENGTH, L, (< 300')		FT.	
4	2 YR/ 24 HR RAINFALL, P		IN.	
5	LAND SLOPE, S			
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)		HR. OR	MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)			
8	FLOW LENGTH, L		L.F.	
9	WATERCOURSE SLOPE, S		FT./ FT.	
10	AVERAGE VELOCITY, V		FT./SEC.	
11	Tt = L / (3600 * V)		HR. OR	MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A		S.F.	
13	WETTED PERIMETER, Pw		L.F.	
14	HYDRAULIC RADIUS, R = (A / Pw)		L.F.	
15	CHANNEL SLOPE, S		FT./FT.	
16	MANNING'S ROUGHNESS COEFFICIENT, n			
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n		FT./SEC.	
18	FLOW LENGTH, L		L.F.	
19	Tt = L / (3600 V)		HR. OR	MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)			

TOTAL Tc = 11.70 MIN.

PER ASAD

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

STORM SEWER HYDRAULICS

System: **POND 1**

PROJECT			
Number:	41516-2	Organization:	HNTB Corporation
Description:	HANCOCK ROAD	Designed by:	MSF
County:	LAKE	Checked by:	

CONDITIONS					
Outfall Tailwater El:	99.73	Storm Event - IDF Curve		Runoff Coeff. (default)		
Exit Loss at Outfall:	3.84	Zone	Frequency	Area 1	Area 2	Area 3
Storm Sewer Control El	103.57	7	10	0.95	0.20	0.00

HGL method: Standard FDOT (Jump HGL to pipe crown).

FROM / TO	Drainage Areas				Tc	Travel	Inten.	Total	Flow (cfs)			Inlet Elevations		Pipe Elevations		Fall	Pipe	HGL	Flow	Velocity	Capacity	Mann'g
Station / Offset	Area	Runoff Coeff	C*A	Lcl CA JpStrm		Time		CA	Qb / Qfd / Qdw	S-Qb / S-Qfd / S-Qdw	CIA / TOTAL	Inlet / Clear.	HGL / Min HGL / Jnc Loss	HGL / Crown Line / Flow Line			Height / Width	(%) / FL	Type	Actual / Physical		'N'
Type Brls Len	(A)	(C)	(CA)	Tot CA	(min)	(min)	(in/hr)	(ac)								(ft)	(in)	(%)		(fps)	(cfs)	
S-112 **S-113**	0.04	0.95	0.04	0.04					0.00	0.00		116.65	114.00	114.00	114.00	0.00	18.00	0.0008	Full	0.19		
414+51.65 40.25	0.00	0.20	0.00	0.00	10.00	0.72	7.41	0.04	0.00	0.00	0.33		0.00	114.10	114.00						3.86	0.0120
CI-5-J 1 86.90	0.00	0.00	0.00	0.04					0.00	0.00	**0.33**	2.65	0.00	112.60	112.50	0.10	18.00	0.1151		2.18		
S-113 **S-115**	0.08	0.95	0.08	0.08					0.00	0.00		116.56	112.99	112.74	109.14	3.60	18.00	2.1457	Partial	5.15		
415+35.65 5.50	0.02	0.20	0.00	0.04	10.72	0.54	7.24	0.13	0.00	0.00	0.94		0.00	114.00	110.40				sub		16.67	0.0120
CI-1-B 1 167.77	0.00	0.00	0.00	0.13					0.00	0.00	**0.94**	3.57	0.25	112.50	108.90	3.60	18.00	2.1457		9.43		
S-114 **S-116**	0.29	0.95	0.27	0.30					0.00	0.00		113.24	111.49	111.46	111.45	0.01	18.00	0.0385	Full	1.26		
417+06.00 -44.50	0.12	0.20	0.02	0.00	10.00	0.32	7.41	0.30	0.00	0.00	2.23		0.00	110.70	110.60						5.82	0.0120
CI-1-B 1 38.17	0.00	0.00	0.00	0.30					0.00	0.00	**2.23**	1.75	0.02	109.20	109.10	0.10	18.00	0.2620		3.30		
S-115 **S-112A**	0.16	0.95	0.16	0.17					0.00	0.00		114.64	105.75	103.83	103.57	0.26	30.00	0.1549	Full	3.56		
417+06.00 5.48	0.07	0.20	0.01	2.31	11.70	0.00	7.02	2.49	0.00	0.00	17.49		0.00	105.60	96.50						103.49	0.0120
CI-1-B 1 167.77	0.00	0.00	0.00	2.49					0.00	0.00	**17.49**	8.89	1.92	103.10	94.00	9.10	30.00	5.4240		21.08		
S-116 **S-117**	0.07	0.95	0.06	0.07					0.00	0.00		113.10	111.45	111.37	111.29	0.08	18.00	0.1742	Full	2.69		
417+50.00 -44.50	0.04	0.20	0.00	0.57	10.32	0.29	7.33	0.64	0.00	0.00	4.75		0.00	110.60	110.50						5.25	0.0120
CI-2-B 1 46.93	0.00	0.00	0.00	0.64					0.00	0.00	**4.75**	1.65	0.08	109.10	109.00	0.10	18.00	0.2131		2.97		
S-117 **S-115**	0.08	0.95	0.08	0.09					0.00	0.00		114.50	111.29	111.06	110.90	0.16	24.00	0.3961	Full	4.91		
417+50.00 5.43	0.03	0.20	0.00	2.09	11.56	0.14	7.05	2.18	0.00	0.00	15.42		0.00	111.00	110.90						12.05	0.0120
CI-2-B 1 41.34	0.00	0.00	0.00	2.18					0.00	0.00	**15.42**	3.21	0.22	109.00	108.90	0.10	24.00	0.2419		3.84		
S-118 **S-116**	0.25	0.95	0.24	0.27					0.00	0.00		113.24	111.48	111.46	111.45	0.01	18.00	0.0310	Full	1.13		
417+93.00 -44.50	0.14	0.20	0.02	0.00	10.00	0.31	7.41	0.27	0.00	0.00	2.00		0.00	110.70	110.60						5.90	0.0120
CI-1-B 1 37.24	0.00	0.00	0.00	0.27					0.00	0.00	**2.00**	1.76	0.02	109.20	109.10	0.10	18.00	0.2685		3.34		
S-119 **S-117**	0.34	0.95	0.32	0.34					0.00	0.00		114.64	111.88	111.62	111.29	0.33	18.00	0.8105	Full	5.80		
417+93.00 5.48	0.11	0.20	0.02	1.10	11.45	0.12	7.07	1.44	0.00	0.00	10.25		0.00	112.10	111.00						18.79	0.0120
CI-1-B 1 40.33	0.00	0.00	0.00	1.44					0.00	0.00	**10.25**	2.76	0.26	110.60	109.50	1.10	18.00	2.7274		10.63		
S-121 **S-119**	0.00	0.95	0.00	0.00					0.00	0.00		117.16	114.54	113.98	112.10	1.88	18.00	1.2164	Partial	8.50		
419+50.00 0.00	0.00	0.20	0.00	1.10	11.14	0.30	7.14	1.10	0.00	0.00	7.87		0.00	114.70	112.10				sub		14.77	0.0120
MH-7 1 154.38	0.00	0.00	0.00	1.10					0.00	0.00	**7.87**	2.62	0.56	113.20	110.60	2.60	18.00	1.6842		8.36		
S-122 **S-123**	0.28	0.95	0.26	0.28					0.00	0.00		118.77	116.28	116.19	116.10	0.09	18.00	0.2599	Full	3.28		
421+00.00 -44.52	0.08	0.20	0.01	0.51	10.60	0.18	7.26	0.79	0.00	0.00	5.80		0.00	116.20	116.10						6.04	0.0120
CI-1-B 1 35.52	0.00	0.00	0.00	0.79					0.00	0.00	**5.80**	2.49	0.08	114.70	114.60	0.10	18.00	0.2815		3.42		
S-123 **S-121**	0.30	0.95	0.29	0.30					0.00	0.00		119.34	115.90	115.54	114.70	0.84	18.00	0.5685	Partial	6.84		
421+00.00 -7.50	0.04	0.20	0.01	0.79	10.79	0.36	7.22	1.10	0.00	0.00	7.96		0.00	116.10	114.70				sub		11.08	0.0120
CI-7 1 147.59	0.00	0.00	0.00	1.10					0.00	0.00	**7.96**	3.44	0.36	114.60	113.20	1.40	18.00	0.9486		6.27		
S-124 **S-122**	0.00	0.95	0.00	0.00					0.00	0.00		124.88	119.83	119.40	116.28	3.12	18.00	1.4891	Partial	7.45		
423+27.75 -43.00	0.00	0.20	0.00	0.51	10.14	0.47	7.38	0.51	0.00	0.00	3.79		0.00	120.40	116.20				sub		16.11	0.0120
MH-7 1 209.45	0.00	0.00	0.00	0.51					0.00	0.00	**3.79**	5.05	0.43	118.90	114.70	4.20	18.00	2.0053		9.12		

Units: ENGLISH

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Portions of ASAD were developed by Kenneth J. Leeming, P.E. at International Engineering Consultants, Inc.

STORM SEWER HYDRAULICS

System: **POND 1**

PROJECT			
Number:	41516-2	Organization:	HNTB Corporation
Description:	HANCOCK ROAD	Designed by:	MSF
County:	LAKE	Checked by:	

CONDITIONS					
Outfall Tailwater El:	99.73	Storm Event - IDF Curve		Runoff Coeff. (default)		
Exit Loss at Outfall:	3.84	Zone	Frequency	Area 1	Area 2	Area 3
Storm Sewer Control El	103.57	7	10	0.95	0.20	0.00

HGL method: Standard FDOT (Jump HGL to pipe crown).

FROM / Station / Type	TO / Offset / Brls / Len	Drainage Areas: Area (A)	Runoff Coeff (C)	C*A (CA)	Lcl CA / JpStrm / Tot CA	Tc (min)	Travel Time (min)	Inten. (in/hr)	Total CA (ac)	Flow (cfs): Qb / Qfd / Qdw	S-Qb / S-Qfd / S-Qdw	CIA / TOTAL	Inlet Elevations: Inlet Clear.	HGL / Min HGL / Jnc Loss	Pipe Elevations: HGL / Crown Line / Flow Line		Fall (ft)	Pipe Height / Width (in)	HGL (%) / FL (%)	Flow Type	Velocity: Actual / Physical (fps)	Capacity (cfs)	Mann'g 'N'
S-125	**S-124**	0.29	0.95	0.28	0.29					0.00	0.00		125.78	122.81	121.60	120.40	1.20	18.00	2.4466	Partial	8.82		
423+27.47	7.50	0.07	0.20	0.01	0.00	10.00	0.09	7.41	0.29	0.00	0.00	2.21		0.00	122.80	120.40				sub		25.18	0.0120
CI-7	1 49.00	0.00	0.00	0.00	0.29					0.00	0.00	**2.21**	2.97	1.21	121.30	118.90	2.40	18.00	4.8979		14.25		
S-126	**S-124**	0.21	0.95	0.20	0.21					0.00	0.00		126.20	123.13	122.16	120.40	1.76	18.00	2.7175	Partial	7.91		
424+00.00	-44.51	0.07	0.20	0.01	0.00	10.00	0.14	7.41	0.21	0.00	0.00	1.60		0.00	123.40	120.40				sub		24.51	0.0120
CI-1-B	1 64.68	0.00	0.00	0.00	0.21					0.00	0.00	**1.60**	3.07	0.97	121.90	118.90	3.00	18.00	4.6379		13.87		

52

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TIME OF CONCENTRATION CALCULATIONS

HNTB

		DATE:
MADE BY:	MSF	10-Feb-08
CHECKED BY:	KMV	13-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION : BASIN 1A

UNDERLINE ONE: EXISTING **PROPOSED**

UNDERLINE ONE: **Tc** **Tt Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION		
2	MANNING'S COEFFICIENT, n		
3	FLOW LENGTH, L, (< 300')		FT.
4	2 YR/ 24 HR RAINFALL, P		IN.
5	LAND SLOPE, S		
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)		HR. OR MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)		
8	FLOW LENGTH, L		L.F.
9	WATERCOURSE SLOPE, S		FT./ FT.
10	AVERAGE VELOCITY, V		FT./SEC.
11	Tt = L / (3600 * V)		HR. OR MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A		S.F.
13	WETTED PERIMETER, Pw		L.F.
14	HYDRAULIC RADIUS, R = (A / Pw)		L.F.
15	CHANNEL SLOPE, S		FT./FT.
16	MANNING'S ROUGHNESS COEFFICIENT, n		
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n		FT./SEC.
18	FLOW LENGTH, L		L.F.
19	Tt = L / (3600 V)		HR. OR MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)		

TOTAL Tc = 15.78 MIN.
PER ASAD

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

STORM SEWER HYDRAULICS

System: **POND1A**

PROJECT

Number: 41516-2
Description: HANCOCK ROAD
County: LAKE

Organization: HNTB Corporation
Designed by: MSF
Checked by: KMV

CONDITIONS

Outfall Tailwater El:	99.73	Storm Event - IDF Curve		Runoff Coeff. (default)		
Exit Loss at Outfall:	0.10	Zone	Frequency	Area 1	Area 2	Area 3
Storm Sewer Control El	99.83	7	10	0.95	0.20	0.00

HGL method: Standard FDOT (Jump HGL to pipe crown).

FROM / Station / Type	TO / Offset / Brls / Len	Drainage Areas: Area (A)	Runoff Coeff (C)	C*A (CA)	Lcl CA / JpStrm Tot CA	Tc (min)	Travel Time (min)	Inten. (in/hr)	Total CA (ac)	Flow (cfs): Qb / Qfd / Qdw	S-Qb / S-Qfd / S-Qdw	CIA / TOTAL	Inlet Elevations: Inlet / Clear.	HGL / Min HGL / Jnc Loss	Pipe Elevations: HGL / Crown Line / Flow Line		Fall (ft)	Pipe Height / Width (in)	HGL (%) / FL (%)	Flow Type	Velocity: Actual / Physical (fps)	Capacity (cfs)	Mann'g 'N'
S-100	**S-101**	0.24	0.95	0.22	0.23					0.00	0.00		106.98	101.81	101.79	101.77	0.02	18.00	0.0238	Full	0.99		
402+50.00	-48.00	0.04	0.20	0.00	0.00	10.00	0.71	7.41	0.23	0.00	0.00	1.76		0.00	101.50	101.40						3.90	0.0120
CI-1-B 1	85.25	0.00	0.00	0.00	0.23					0.00	0.00	**1.76**	5.17	0.02	100.00	99.90	0.10	18.00	0.1173		2.21		
S-101	**S-103**	0.20	0.95	0.19	0.20					0.00	0.00		106.98	101.77	101.72	101.54	0.18	18.00	0.0776	Full	1.79		
402+50.00	40.25	0.04	0.20	0.00	0.23	10.71	1.94	7.24	0.43	0.00	0.00	3.17		0.00	101.40	100.00						8.82	0.0120
CI-5-B 1	233.00	0.00	0.00	0.00	0.43					0.00	0.00	**3.17**	5.21	0.05	99.90	98.50	1.40	18.00	0.6009		4.99		
S-102	**S-104**	0.29	0.95	0.27	0.28					0.00	0.00		102.59	101.62	101.60	101.59	0.01	18.00	0.0350	Full	1.20		
404+86.00	-48.00	0.05	0.20	0.01	0.00	10.00	0.32	7.41	0.28	0.00	0.00	2.13		0.00	100.00	99.90						5.84	0.0120
CI-1-B 1	37.96	0.00	0.00	0.00	0.28					0.00	0.00	**2.13**	0.97	0.02	98.50	98.40	0.10	18.00	0.2634		3.31		
S-103	**S-105**	0.25	0.95	0.23	0.24					0.00	0.00		102.59	101.54	101.49	101.42	0.06	18.00	0.1694	Full	2.65		
404+86.00	40.25	0.04	0.20	0.01	0.43	12.65	0.24	6.83	0.68	0.00	0.00	4.68		0.00	100.00	99.80						8.29	0.0120
CI-5-B 1	37.67	0.00	0.00	0.00	0.68					0.00	0.00	**4.68**	1.05	0.05	98.50	98.30	0.20	18.00	0.5310		4.69		
S-104	**S-105**	0.07	0.95	0.06	0.07					0.00	0.00		102.45	101.59	101.54	101.42	0.12	18.00	0.1407	Full	2.42		
405+26.80	-48.00	0.04	0.20	0.00	0.50	10.32	0.59	7.33	0.58	0.00	0.00	4.27		0.00	99.90	99.80						3.90	0.0120
CI-2-B 1	85.25	0.00	0.00	0.00	0.58					0.00	0.00	**4.27**	0.86	0.05	98.40	98.30	0.10	18.00	0.1173		2.21		
S-105	**S-107**	0.07	0.95	0.07	0.08					0.00	0.00		102.45	101.42	101.21	100.98	0.24	18.00	0.6467	Full	5.18		
405+26.80	40.25	0.03	0.20	0.00	1.26	12.89	0.12	6.78	1.35	0.00	0.00	9.15		0.00	99.80	99.40						11.93	0.0120
CI-6-B 1	36.42	0.00	0.00	0.00	1.35					0.00	0.00	**9.15**	1.03	0.21	98.30	97.90	0.40	18.00	1.0982		6.75		
S-106	**S-104**	0.20	0.95	0.19	0.21					0.00	0.00		102.59	101.61	101.60	101.59	0.01	18.00	0.0203	Full	0.92		
405+67.00	-48.00	0.11	0.20	0.02	0.00	10.00	0.32	7.41	0.21	0.00	0.00	1.62		0.00	100.00	99.90						5.83	0.0120
CI-1-B 1	38.13	0.00	0.00	0.00	0.21					0.00	0.00	**1.62**	0.98	0.01	98.50	98.40	0.10	18.00	0.2623		3.30		
S-107	**S-109**	0.22	0.95	0.21	0.23					0.00	0.00		102.59	100.98	100.89	100.46	0.43	24.00	0.1906	Full	3.41		
405+67.00	40.25	0.08	0.20	0.01	1.35	13.01	1.10	6.76	1.58	0.00	0.00	10.70		0.00	99.90	99.80						5.16	0.0120
CI-5-B 1	225.38	0.00	0.00	0.00	1.58					0.00	0.00	**10.70**	1.61	0.09	97.90	97.80	0.10	24.00	0.0444		1.64		
S-108	**S-109**	0.26	0.95	0.24	0.28					0.00	0.00		106.41	103.25	103.17	103.07	0.10	18.00	0.1194	Partial	2.26		
408+00.00	-46.50	0.15	0.20	0.03	0.00	10.00	0.62	7.41	0.28	0.00	0.00	2.07		0.00	103.90	103.80				super		3.93	0.0120
CI-1-B 1	83.77	0.00	0.00	0.00	0.28					0.00	0.00	**2.07**	3.16	0.08	102.40	102.30	0.10	18.00	0.1194		2.22		
S-109	**S-111**	0.28	0.95	0.27	0.29					0.00	0.00		106.41	100.46	100.39	100.10	0.29	30.00	0.1016	Full	2.89		
408+00.00	40.27	0.12	0.20	0.02	1.86	14.11	1.67	6.56	2.16	0.00	0.00	14.17		0.00	100.30	100.10						11.67	0.0120
CI-5-B 1	289.95	0.00	0.00	0.00	2.16					0.00	0.00	**14.17**	5.95	0.06	97.80	97.60	0.20	30.00	0.0690		2.38		
S-110	**S-111**	0.31	0.95	0.29	0.32					0.00	0.00		112.71	109.62	109.53	109.43	0.10	18.00	0.1238	Partial	2.37		
411+00.00	-44.50	0.13	0.20	0.02	0.00	10.00	0.57	7.41	0.32	0.00	0.00	2.39		0.00	110.20	110.10				super		4.00	0.0120
CI-1-B 1	80.75	0.00	0.00	0.00	0.32					0.00	0.00	**2.39**	3.09	0.09	108.70	108.60	0.10	18.00	0.1238		2.27		
S-111	**S-111A**	0.31	0.95	0.29	0.31					0.00	0.00		112.71	99.95	99.89	99.83	0.06	36.00	0.0592	Full	2.49		
411+00.00	40.25	0.09	0.20	0.01	2.48	15.78	0.00	6.28	2.79	0.00	0.00	17.58		0.00	100.60	97.00						135.08	0.0120
CI-5-J 1	103.01	0.00	0.00	0.00	2.79					0.00	0.00	**17.58**	12.76	0.07	97.60	94.00	3.60	36.00	3.4949		19.11		

Units: ENGLISH

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Portions of ASAD were developed by Kenneth J. Leeming, P.E. at International Engineering Consultants, Inc.

TIME OF CONCENTRATION CALCULATIONS

HNTB

		DATE:
MADE BY:	MSF	10-Feb-08
CHECKED BY:	KMV	13-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION : BASIN 1-2

UNDERLINE ONE: EXISTING **PROPOSED**

UNDERLINE ONE: Tc Tt **Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION			
2	MANNING'S COEFFICIENT, n			
3	FLOW LENGTH, L, (< 300')		FT.	
4	2 YR/ 24 HR RAINFALL, P		IN.	
5	LAND SLOPE, S			
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)		HR. OR	0.00 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)			
8	FLOW LENGTH, L		L.F.	
9	WATERCOURSE SLOPE, S		FT./ FT.	
10	AVERAGE VELOCITY, V		FT./SEC.	
11	Tt = L / (3600 * V)		HR. OR	0.00 MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A		S.F.	
13	WETTED PERIMETER, Pw		L.F.	
14	HYDRAULIC RADIUS, R = (A / Pw)		L.F.	
15	CHANNEL SLOPE, S		FT./FT.	
16	MANNING'S ROUGHNESS COEFFICIENT, n			
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n		FT./SEC.	
18	FLOW LENGTH, L		L.F.	
19	Tt = L / (3600 V)		HR. OR	0.00 MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)			

TOTAL Tc = 5.00 MIN.

ASSUME 5 MIN FOR POND

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

HNTB

		DATE:
MADE BY:	MSF	10-Feb-08
CHECKED BY:	KMV	13-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION : BASIN I-3

UNDERLINE ONE: EXISTING **PROPOSED**

UNDERLINE ONE: Tc Tt **Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION	SHORT GRASS			
2	MANNING'S COEFFICIENT, n	0.150			
3	FLOW LENGTH, L, (< 300')	300		FT.	
4	2 YR/ 24 HR RAINFALL, P	4.70		IN.	
5	LAND SLOPE, S	0.0137			
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)	0.3779		HR. OR	22.67 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)	UNPAVED			
8	FLOW LENGTH, L	317		L.F.	
9	WATERCOURSE SLOPE, S	0.0596		FT./ FT.	
10	AVERAGE VELOCITY, V	3.940		FT./SEC.	
11	Tt = L / (3600 * V)	0.022		HR. OR	1.34 MIN.

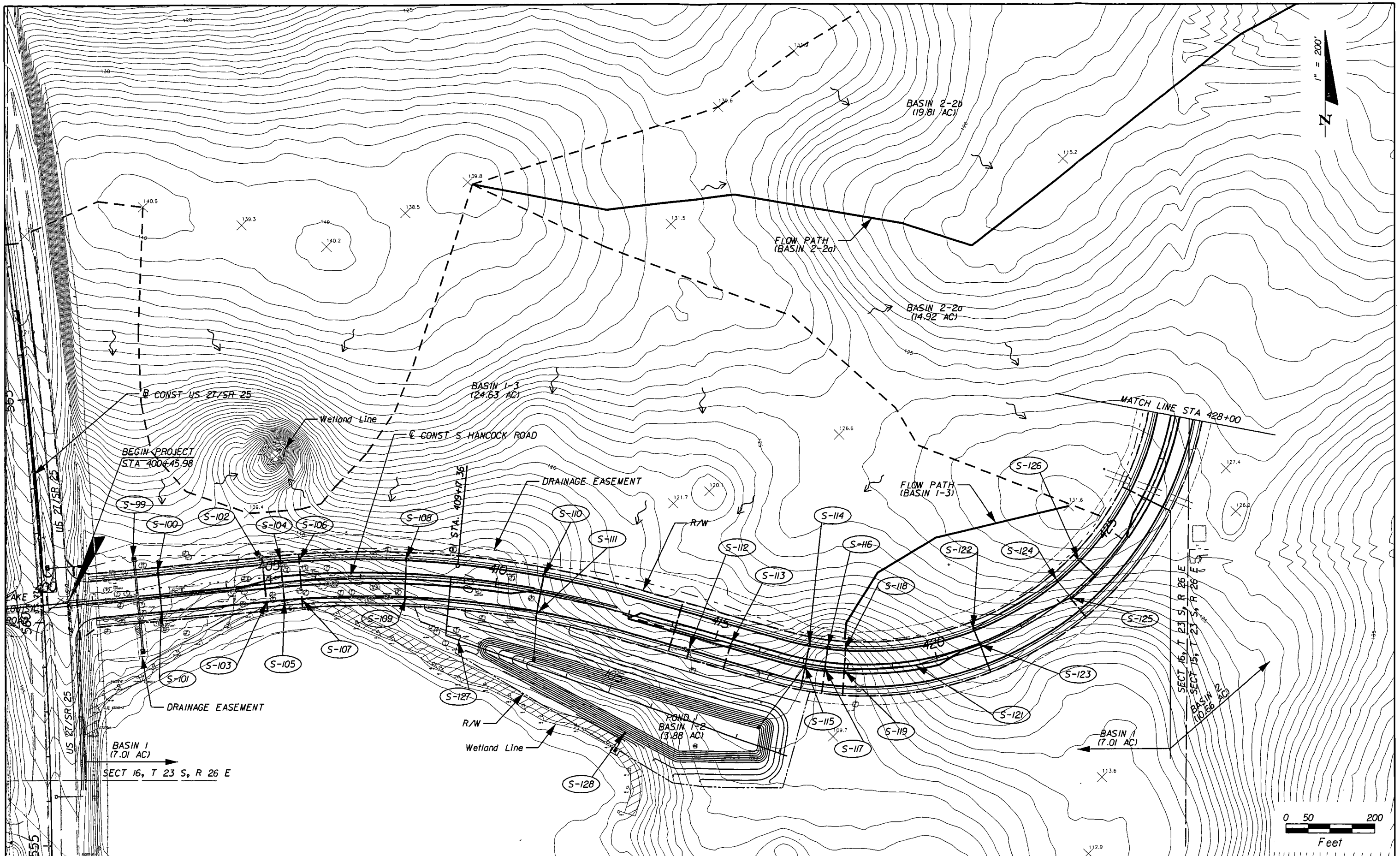
CHANNEL FLOW:

		(ditch)	(pipe flow)		
12	CROSS-SECTIONAL FLOW AREA, A	24.00		S.F.	
13	WETTED PERIMETER, Pw	13.50		L.F.	
14	HYDRAULIC RADIUS, R = (A / Pw)	0.56	0.50	L.F.	
15	CHANNEL SLOPE, S	0.005	0.0005	FT./FT.	
16	MANNING'S ROUGHNESS COEFFICIENT, n	0.042	0.012		
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n	1.691	1.744	FT./SEC.	
18	FLOW LENGTH, L	1716	201	L.F.	
19	Tt = L / (3600*V)	0.28	0.03	HR. OR	18.83 MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)				

TOTAL Tc = 42.85 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986



REVISIONS		
DATE	BY	DESCRIPTION

HNTB

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

ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.
FL. REGISTRATION NO. 44794

LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

DRAINAGE FLOW PATH
POST DEVELOPMENT

SHEET NO.

30

kvandenavont 5/13/2008 4:26:36 PM

Water Quality Treatment and Recovery Calculations

POLLUTION ABATEMENT VOLUME

HNTB

		DATE
MADE BY:	MSF	10-Feb-08
CHCK BY:	KMV	13-Feb-08

PROJECT: **SOUTH HANCOCK ROAD**

LOCATION: **BASIN 1**

BASIN LIMITS: STA. 400+65.00 to STA 426+04.00 CL CONST. HANCOCK ROAD

TOTAL TREATMENT AREA: 10.90 AC.

IMPERVIOUS AREA: 5.18 AC. Less Pond

UNDERINE ONE: RETENTION DETENTION

UNDERINE ONE: DRY WET

UNDERINE ONE: ONLINE OFFLINE

REQUIRED TREATMENT VOLUME:

1) COMPUTE FIRST 1.0 INCH OF RUNOFF FROM PROJECT:

(1.0"/12) x 10.90 AC. = **0.91** AF

2) COMPUTE 2.50 INCHES TIMES IMPERVIOUS AREA:

(2.5"/12) x 5.18 AC. = **1.08** AF

CONTROLLING CRITERIA: 2

REQUIRED TREATMENT VOLUME: **1.08** AF

ADD ADDITIONAL 50% FOR DISCHARGE TO OFW = **1.62** AF

STAGE / STORAGE CALCULATIONS

HNTB

		DATE
MADE BY:	MSF	10-Feb-08
CHCK BY:	KMV	13-Feb-08

PROJECT: SOUTH HANCOCK ROAD

POND: 1

Boring	Existing Ground Elevation	Depth to Encountered Water Surface	Estimated Encountered Water Elevation	Depth to Seasonal High Water Surface	Estimated Seasonal High Water Elevation	Estimated Normal High Water Elevation
AB-1	103.4	12.8	90.7	3.25	100.15	95.4
AB-2	109.1	17.8	91.4	9.15	99.95	95.65
AB-3	108.63	12.3	96.4	8.6	100.03	98.205

Note: Above information per pond boring profiles: Ardaman & Associates, August 2007

AVERAGE ELEVATION (FT) 92.79 ft. 100.04 ft. 96.42 ft.

AVG. SHWT ELEVATION: 100.0 Ft. (NAVD)

AVG. GROUND WATER TABLE ELEVATION: 92.8 Ft. (NAVD)

Instead of using normal high water elevation, use
Starting water surface set at 25 year elevation in downstream wetland. 98.1 Ft. (NAVD)

STAGE Ft. (NAVD)	AREA AC.	AVERAGE AREA AC.	INCREMENTAL VOL. AF	CUMULATIVE VOL AF
98.1	1.157		1.21	0.00
		1.22		
99.0	1.274		1.09	1.09
		1.34		
100.0	1.405		1.34	2.43
		1.47		
101.0	1.538		1.47	3.90

REQUIRED TREATMENT VOLUME: 1.62 AF

TREATMENT ELEVATION 99.40 Ft.

PERCOLATION RATE: 38 Ft./Day or 19 Inches/Hr.

FACTOR OF SAFETY: 2 = 9.5 Inches/Hr.= 19 Ft./Day

ORIFICE CALCULATIONS

HNTB

		DATE
MADE BY:	MSF	10-Feb-08
CHCK BY:	KMV	13-Feb-08

PROJECT: SOUTH HANCOCK ROAD

POND: 1

Water Quality Volume = 1.619 ac-ft

Control Elevation = 98.10 ft.
Stage of Water Quality Treatment Volume = 99.40 ft.
Stage 1/2 Water Quality Treatment Volume = 98.84 ft.

Recover 1/2 Volume in 24 to 30 hours

$Q = Volume/(2t)(3600)$

$$Q = \frac{1.079 \text{ ac-ft}(43560 \text{ sf/ac})}{2(24 \text{ hrs})(3600 \text{ s/hr})}$$

$Q =$ 0.41 cfs

$h = (h_1 + h_2)/2$

Trial 1

$h_1 =$ 99.40 ft - 98.10 ft
1.30 ft

$h_2 =$ 98.84 ft - 98.10 ft
0.74 ft

$h =$ (1.30 + 0.74)/2
1.02 ft

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

$$A = \frac{0.41}{0.6(2(32.2)(1.02))^{1/2}}$$

$A =$ 0.0839 sf

$D = ((4A)/3.1416)^{1/2}$

D = 0.326866 ft. 3.92 in.

Trial 2

h_1= 99.40 ft - (98.10 ft + D/2)
1.14 ft

h_2 = 98.84 ft - (98.10 ft + D/2)
0.58 ft

h = (1.14 + 0.58)/2
0.86 ft

$$A = \frac{0.41}{0.6(2(32.2)(0.86)^{1/2}}$$

A = 0.09 sf

$D = ((4A)/3.1416)^{1/2}$

D = 0.3412 ft. 4.09 in.

Trial 3

h_1= 99.40 ft - (98.10 ft + D/2)
1.13 ft

h_2 = 98.84 ft - (98.10 ft + D/2)
0.57

h = (1.13 + 0.57)/2
0.85

$$A = \frac{0.41}{0.6(2(32.2)(0.85)^{1/2}}$$

A = 0.0918 sf

$D = ((4A)/3.1416)^{1/2}$

D = 0.3420 ft. 4.10 in.

Use 3.75" , see AdICPR

HNTB

PERMANENT POOL VOLUME

		DATE
MADE BY:	MSF	10-Feb-08
CHCK BY:	KMV	13-Feb-08

PROJECT: SOUTH HANCOCK ROAD

POND: 1

PERMANENT POOL VOLUME (PPV) = RT FR

WHERE: PPV = PERMANENT POOL VOLUME (AF)
RT = RESIDENCE TIME (DAYS)
FR = AVERAGE FLOW RATE (AF/DAY)

FR = DA C R / WS

WHERE: DA = DRAINAGE AREA TO POND (AC) =	10.90	AC	inc. pond
ROAD IMPERVIOUS AREA =	2.44	AC	
POND IMPERVIOUS AREA =	1.07	AC	
PERVIOUS AREA =	7.39	AC	

C = (RD IMP AREA (0.95) + POND IMP (1) +PERV (0.2))/TOTAL AREA

C = RUNOFF COEFFICIENT =	0.446	
R = WET SEASON RAINFALL DEPTH (IN) =	31	IN
WS = LENGTH OF WET SEASON (DAYS) =	153	DAYS
CF = CONVERSION FACTOR =	12	IN/FT
RT = RESIDENCE TIME (ASSUME NO LITTORAL ZONE)	21	DAYS

THEREFORE:

PPV = DA C R RT / WS CF = 1.72 AF
ADD 50% ADDITIONAL VOLUME FOR DISCHARGE TO OFW = 2.59 AF

STAGE Ft. (NAVD)	AREA AC.	AVERAGE AREA AC.	INCREMENTAL VO AF	CUMULATIVE VOL AF
94.0	0.76		0.00	0.00
		0.82		
96.0	0.88		1.63	1.63
		0.95		
97.0	1.02		0.95	2.58
		1.09		
98.1	1.16		1.20	3.78

CHECK MEAN DEPTH:

3.78 / 1.16 = 3.27 < 8.00 FT. O.K.

FINANCIAL PROJECT ID 238422-1-52-01
DATE: 10 / 14 /2004

SHEET 1 OF 1

STRUCTURE NO.	STATION	DESIGN FLOOD		BASE FLOOD		OVERTOPPING FLOOD				GREATEST FLOOD			
		2% PROB.	50 YR.FREQ.	1% PROB.	100 YR.FREQ.								
		DISCHARGE	STAGE	DISCHARGE	STAGE	DISCHARGE	STAGE	PROB. %	FREQ. YR.	DISCHARGE	STAGE	PROB. %	FREQ. YR.
S-213	287+13	285.8	112.59	344.1	113.00					470	113.83	0.2	500
S-235	305+50	90.0	112.76	100.8	113.38	132.4	115.29	0.44	299				
S-307	321+48	36.8	111.19	41.2	112.07	64.5	117.00	0.26	388				
S-419	348+48	75.0	107.90	84.0	108.49	107.7	110.37	0.47	213				
S-726	511+72	90.0	101.60	100.8	102.18	119.6	103.34	0.60	168				
S-765	533+53	273.4	98.35	314.7	98.58					420	99.17	0.2	500

← CULVERT UNDER US 27

NOTE: THE HYDRAULIC DATA IS SHOWN FOR INFORMATIONAL PURPOSES ONLY, TO INDICATE THE FLOOD DISCHARGES AND WATER SURFACE ELEVATIONS WHICH MAY BE ANTICIPATED IN ANY GIVEN YEAR. THIS DATA WAS GENERATED USING HIGHLY VARIABLE FACTORS DETERMINED BY A STUDY OF THE WATERSHED. MANY JUDGEMENTS AND ASSUMPTIONS ARE REQUIRED TO ESTABLISH THESE FACTORS. THE RESULTANT HYDRAULIC DATA IS SENSITIVE TO CHANGES, PARTICULARLY OF ANTECEDENT CONDITIONS, URBANIZATION, CHANNELIZATION, AND LAND USE. USERS OF THIS DATA ARE CAUTIONED AGAINST THE ASSUMPTION OF PRECISION WHICH CAN NOT BE ATTAINED. DISCHARGES ARE IN CUBIC FEET PER SECOND AND STAGES ARE IN FEET, NAVD, 1988.

DEFINITIONS:

DESIGN FLOOD: THE FLOOD SELECTED BY F.D.O.T. TO BE UTILIZED TO ASSURE A STANDARD LEVEL OF HYDRAULIC PERFORMANCE.

BASE FLOOD: THE FLOOD HAVING A 1% CHANCE OF BEING EXCEEDED IN ANY YEAR. (100 YR. FREQUENCY)

OVERTOPPING FLOOD: THE FLOOD WHERE FLOW OCCURS (A) OVER THE HIGHWAY (B) OVER A WATERSHED DIVIDE OR (C) THRU EMERGENCY RELIEF STRUCTURES.

GREATEST FLOOD: THE MOST SEVERE FLOOD WHICH CAN BE PREDICTED WHERE OVERTOPPING IS NOT PRACTICABLE, NORMALLY ONE WITH A 0.2% CHANCE OF BEING EXCEEDED IN ANY YEAR. (500 YR. FREQUENCY)

PREPARED BY: GLEN T. PARTLOW, P.E.

DATE: 10/14/2004

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

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD: GLEN T. PARTLOW
P.E. NO: 58726
HDR Engineering, Inc.
315 E. Robinson Street, Suite 400
Orlando, FL 32801-1949
(407) 420-4200
www.hdrinc.com
Employee owned
FBPR Certificate of Authorization No. 4213

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 25	LAKE	238422-1-52-01

FLOOD DATA

SHEET NO. 19

USER: tmelvin 12/5/2005 11:48:27 AM X:\238422\5201\drainage\crt1-d01.dgn

37

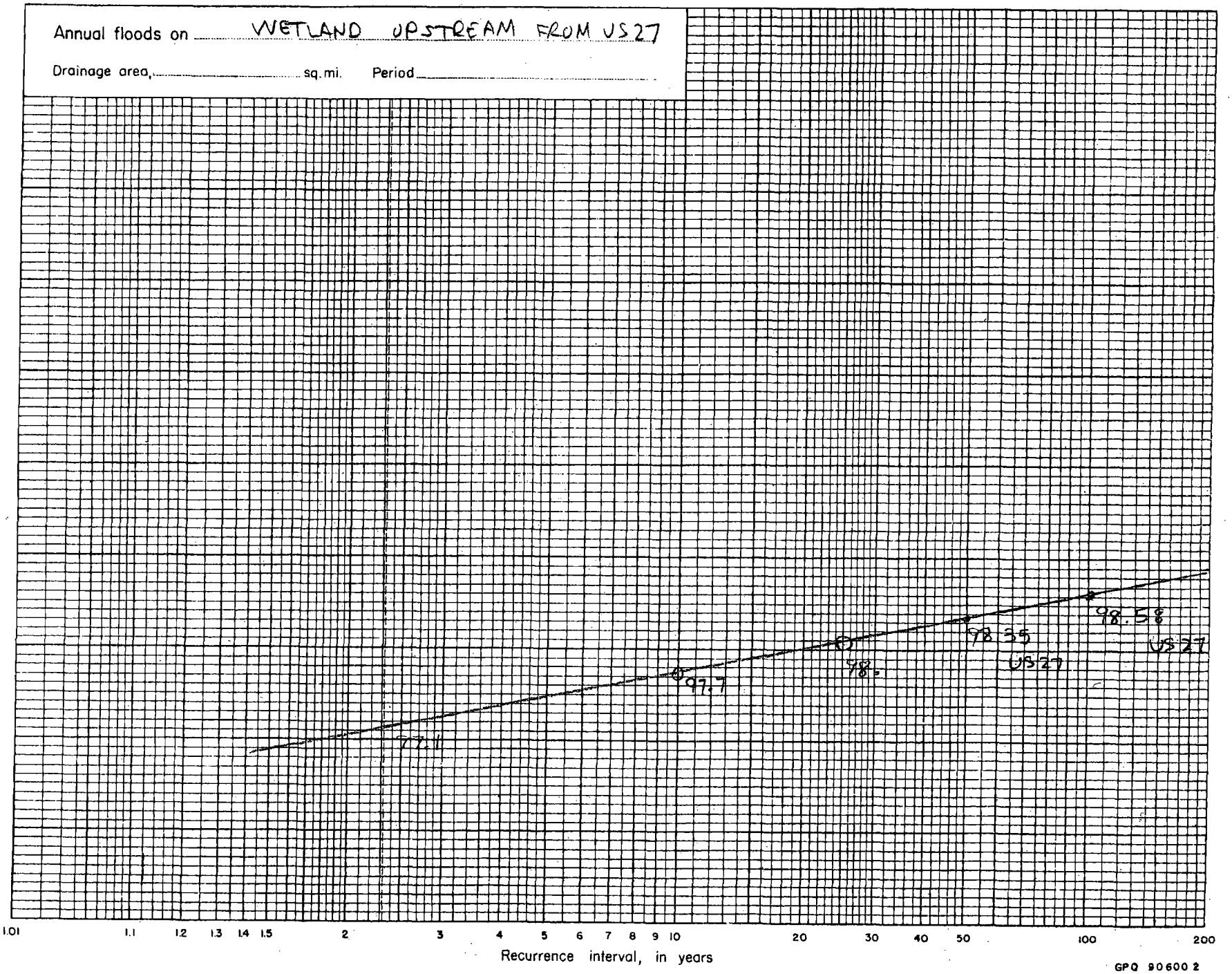
9-179a
Flood data plot
(March 1949)

UNITED STATES DEPARTMENT OF THE INTERIOR — GEOLOGICAL SURVEY — WATER RESOURCES DIVISION

File Number .....

Annual floods on WETLAND UPSTREAM FROM US27

Drainage area, ... sq. mi. Period .....



GPO 90600 2

==========
==== Basins ====
==========

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

Unit Hydrograph	Uh484	Peaking Factor	484.0
Rainfall File	Flmod	Storm Duration(hrs)	24.00
Rainfall Amount(in)	8.300	Time of Conc(min)	11.70
Area(ac)	3.300	Time Shift(hrs)	0.00
Curve Number	82.60	Max Allowable Q(cfs)	999999.000
DCIA(%)	0.00		

Name: BASIN 1-2 | Node: POND 1 | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph	Uh484	Peaking Factor	484.0
Rainfall File	Flmod	Storm Duration(hrs)	24.00
Rainfall Amount(in)	8.300	Time of Conc(min)	5.00
Area(ac)	3.880	Time Shift(hrs)	0.00
Curve Number	55.20	Max Allowable Q(cfs)	999999.000
DCIA(%)	0.00		

Name: BASIN 1-3 | Node: WETLAND | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph	Uh484	Peaking Factor	484.0
Rainfall File	Flmod	Storm Duration(hrs)	24.00
Rainfall Amount(in)	8.300	Time of Conc(min)	42.85
Area(ac)	26.380	Time Shift(hrs)	0.00
Curve Number	39.00	Max Allowable Q(cfs)	999999.000
DCIA(%)	0.00		

Name: BASIN 1A | Node: POND 1 | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph	Uh484	Peaking Factor	484.0
Rainfall File	Flmod	Storm Duration(hrs)	24.00
Rainfall Amount(in)	8.300	Time of Conc(min)	15.78
Area(ac)	3.720	Time Shift(hrs)	0.00
Curve Number	82.50	Max Allowable Q(cfs)	999999.000
DCIA(%)	0.00		

==========
==== Nodes ====
==========

Name: POND 1 | Base Flow(cfs): 0.000 | Init Stage(ft): 98.100
Group: BASE | Warn Stage(ft): 101.000
Type: Stage/Area

Stage(ft)	Area(ac)
98.100	1.1570
99.000	1.2740
100.000	1.4050
101.000	1.5380

Name: WETLAND | Base Flow(cfs): 0.000 | Init Stage(ft): 91.000
Group: BASE | Warn Stage(ft): 100.000
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	91.000

120.00	99.000
150.00	98.000

Drop Structures

Name:	POND 1	From Node:	POND 1	Length(ft):	34.00
Group:	BASE	To Node:	WETLAND	Count:	1

	UPSTREAM	DOWNSTREAM		
Geometry:	Circular	Circular	Friction Equation:	Average Conveyance
Span(in):	18.00	18.00	Solution Algorithm:	Automatic
Rise(in):	18.00	18.00	Flow:	Both
Invert(ft):	97.000	96.850	Entrance Loss Coef:	0.500
Manning's N:	0.012000	0.012000	Exit Loss Coef:	1.000
Top Clip(in):	0.000	0.000	Outlet Ctrl Spec:	Use dc or tw
Bot Clip(in):	0.000	0.000	Inlet Ctrl Spec:	Use dn
			Solution Incs:	10

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular CMP: Mitered to slope

*** Weir 1 of 3 for Drop Structure POND 1 ***

TABLE

Count:	1	Bottom Clip(in):	0.000
Type:	Horizontal	Top Clip(in):	0.000
Flow:	Both	Weir Disc Coef:	3.200
Geometry:	Rectangular	Orifice Disc Coef:	0.600
Span(in):	37.00	Invert(ft):	100.400
Rise(in):	24.00	Control Elev(ft):	100.400

*** Weir 2 of 3 for Drop Structure POND 1 ***

TABLE

Count:	1	Bottom Clip(in):	0.000
Type:	Vertical: Mavis	Top Clip(in):	0.000
Flow:	Both	Weir Disc Coef:	3.200
Geometry:	Circular	Orifice Disc Coef:	0.600
Span(in):	3.75	Invert(ft):	98.100
Rise(in):	3.75	Control Elev(ft):	98.100

*** Weir 3 of 3 for Drop Structure POND 1 ***

TABLE

Count:	1	Bottom Clip(in):	0.000
Type:	Vertical: Mavis	Top Clip(in):	0.000
Flow:	Both	Weir Disc Coef:	3.200
Geometry:	Rectangular	Orifice Disc Coef:	0.600
Span(in):	30.00	Invert(ft):	99.400
Rise(in):	12.00	Control Elev(ft):	99.400

Hydrology Simulations

Name:	100Y24H
Filename:	W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\POST\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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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

Name: 25Y24H
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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

==== Routing Simulations ====

Name: 100Y24H Hydrology Sim: 100Y24H
Filename: W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\POST\100Y24H.I32

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

Max Delta Z(ft): 1.00 Delta Z Factor: 0.01000
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: 100 YEAR Boundary Flows:

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

Group	Run
BASE	Yes

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

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

Max Delta Z(ft): 1.00 Delta Z Factor: 0.01000
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: 10 YEAR 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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\2.3Y24H.I32

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

Max Delta Z(ft): 1.00 Delta Z Factor: 0.01000
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: MEAN ANNUAL Boundary Flows:

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

Group	Run
BASE	Yes

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

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

Max Delta Z(ft): 1.00 Delta Z Factor: 0.01000
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 100.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: 25 YEAR Boundary Flows:

Time(hrs)	Print Inc(min)
11.000	60.000
15.000	15.000
100.000	60.000

Group	Run
BASE	Yes

==== Boundary Conditions ====

Name: 100 YEAR Node: WETLAND Type: Stage

Time(hrs)	Stage(ft)
0.000	96.800
15.000	98.580
40.000	98.000

Name: 25 YEAR Node: WETLAND Type: Stage

Time(hrs)	Stage(ft)
0.000	96.800
15.000	98.100
40.000	97.500
100.000	96.800

Name: MEAN ANNUAL Node: WETLAND Type: Stage

Time(hrs)	Stage(ft)
0.000	96.800
15.000	97.100
40.000	96.900

Name: 10 YEAR Node: WETLAND Type: Stage

Time(hrs)	Stage(ft)
0.000	96.800
15.000	97.700
40.000	97.200

South Hancock Road
Basin 1
Post Development
Node Min/Max

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 1	BASE	100Y24H	12.60	100.919	101.000	0.0100	66526	12.00	70.757	12.62	15.308
WETLAND	BASE	100Y24H	15.01	98.580	100.000	5.8000	0	12.50	51.793	0.00	0.000
POND 1	BASE	10Y24H	14.13	99.784	101.000	0.0100	59972	12.00	33.431	14.13	2.363
WETLAND	BASE	10Y24H	15.00	97.700	100.000	5.8000	0	12.74	6.728	0.00	0.000
POND 1	BASE	2.3Y24H	23.67	99.151	101.000	0.0100	56354	12.00	15.449	23.67	0.349
WETLAND	BASE	2.3Y24H	15.00	97.100	100.000	5.8000	0	20.00	0.527	0.00	0.000
POND 1	BASE	25Y24H	12.93	100.153	101.000	0.0100	62091	12.00	45.590	12.93	5.707
WETLAND	BASE	25Y24H	15.01	98.100	100.000	5.8000	0	12.51	18.446	0.00	0.000

44

South Hancock Road
Basin 1
Post Development
Pond 1 Node Time Series

Simulation	Node	Group	Time hrs	Stage ft	Warning Stage ft	Surface Area ft2	Total Inflow cfs	Total Outflow cfs	Total Vol In af	Total Vol Out af
25Y24H	POND 1	BASE	0.00	98.100	101.000	50399	0.000	0.000	0.0	0.0
25Y24H	POND 1	BASE	1.02	98.100	101.000	50399	0.000	0.000	0.0	0.0
25Y24H	POND 1	BASE	2.02	98.100	101.000	50399	0.000	0.000	0.0	0.0
25Y24H	POND 1	BASE	3.02	98.100	101.000	50399	0.000	0.000	0.0	0.0
25Y24H	POND 1	BASE	4.02	98.100	101.000	50400	0.007	0.000	0.0	0.0
25Y24H	POND 1	BASE	5.02	98.105	101.000	50426	0.122	0.000	0.0	0.0
25Y24H	POND 1	BASE	6.02	98.118	101.000	50500	0.241	0.000	0.0	0.0
25Y24H	POND 1	BASE	7.02	98.141	101.000	50629	0.403	0.003	0.0	0.0
25Y24H	POND 1	BASE	8.02	98.175	101.000	50826	0.593	0.011	0.1	0.0
25Y24H	POND 1	BASE	9.02	98.229	101.000	51127	0.953	0.030	0.2	0.0
25Y24H	POND 1	BASE	10.02	98.307	101.000	51574	1.410	0.072	0.2	0.0
25Y24H	POND 1	BASE	11.02	98.446	101.000	52356	2.791	0.152	0.4	0.0
25Y24H	POND 1	BASE	12.00	99.337	101.000	57416	45.590	0.384	2.4	0.0
25Y24H	POND 1	BASE	12.25	99.865	101.000	60431	26.127	3.004	3.1	0.1
25Y24H	POND 1	BASE	12.51	100.087	101.000	61708	12.246	5.043	3.5	0.2
25Y24H	POND 1	BASE	12.76	100.147	101.000	62055	6.875	5.644	3.7	0.3
25Y24H	POND 1	BASE	13.01	100.152	101.000	62083	5.189	5.694	3.9	0.4
25Y24H	POND 1	BASE	13.26	100.139	101.000	62006	4.293	5.558	4.0	0.5
25Y24H	POND 1	BASE	13.51	100.121	101.000	61902	4.139	5.376	4.0	0.6
25Y24H	POND 1	BASE	13.76	100.099	101.000	61775	3.419	5.155	4.1	0.7
25Y24H	POND 1	BASE	14.01	100.074	101.000	61633	3.289	4.913	4.2	0.8
25Y24H	POND 1	BASE	14.26	100.050	101.000	61489	2.924	4.671	4.3	0.9
25Y24H	POND 1	BASE	14.51	100.025	101.000	61348	2.850	4.437	4.3	1.0
25Y24H	POND 1	BASE	14.76	100.001	101.000	61206	2.487	4.206	4.4	1.1
25Y24H	POND 1	BASE	15.01	99.977	101.000	61069	2.424	3.982	4.4	1.2
25Y24H	POND 1	BASE	15.26	99.954	101.000	60940	2.301	3.778	4.5	1.3
25Y24H	POND 1	BASE	16.26	99.876	101.000	60492	1.911	3.091	4.6	1.6
25Y24H	POND 1	BASE	17.26	99.812	101.000	60130	1.614	2.577	4.8	1.8
25Y24H	POND 1	BASE	18.26	99.758	101.000	59823	1.354	2.168	4.9	2.0
25Y24H	POND 1	BASE	19.26	99.715	101.000	59574	1.245	1.859	5.0	2.2
25Y24H	POND 1	BASE	20.26	99.684	101.000	59399	1.207	1.652	5.1	2.3
25Y24H	POND 1	BASE	21.26	99.658	101.000	59249	1.094	1.484	5.2	2.4
25Y24H	POND 1	BASE	22.26	99.638	101.000	59135	1.056	1.361	5.3	2.6
25Y24H	POND 1	BASE	23.26	99.618	101.000	59022	0.904	1.245	5.4	2.7
25Y24H	POND 1	BASE	24.26	99.595	101.000	58889	0.579	1.115	5.5	2.8
25Y24H	POND 1	BASE	25.26	99.547	101.000	58614	0.000	0.868	5.5	2.8
25Y24H	POND 1	BASE	26.26	99.500	101.000	58348	0.000	0.664	5.5	2.9
25Y24H	POND 1	BASE	27.26	99.463	101.000	58138	0.000	0.532	5.5	3.0
25Y24H	POND 1	BASE	28.26	99.433	101.000	57966	0.000	0.448	5.5	3.0
25Y24H	POND 1	BASE	29.26	99.407	101.000	57816	0.000	0.400	5.5	3.0
25Y24H	POND 1	BASE	30.26	99.382	101.000	57676	0.000	0.392	5.5	3.1
25Y24H	POND 1	BASE	31.26	99.358	101.000	57537	0.000	0.387	5.5	3.1
25Y24H	POND 1	BASE	32.26	99.334	101.000	57399	0.000	0.383	5.5	3.1
25Y24H	POND 1	BASE	33.26	99.310	101.000	57263	0.000	0.379	5.5	3.2
25Y24H	POND 1	BASE	34.26	99.286	101.000	57128	0.000	0.375	5.5	3.2
25Y24H	POND 1	BASE	35.26	99.263	101.000	56993	0.000	0.370	5.5	3.2
25Y24H	POND 1	BASE	36.26	99.239	101.000	56861	0.000	0.366	5.5	3.2
25Y24H	POND 1	BASE	37.26	99.216	101.000	56729	0.000	0.362	5.5	3.3
25Y24H	POND 1	BASE	38.26	99.193	101.000	56599	0.000	0.357	5.5	3.3
25Y24H	POND 1	BASE	39.26	99.171	101.000	56470	0.000	0.353	5.5	3.3
25Y24H	POND 1	BASE	40.26	99.148	101.000	56342	0.000	0.349	5.5	3.4
25Y24H	POND 1	BASE	41.26	99.126	101.000	56215	0.000	0.344	5.5	3.4
25Y24H	POND 1	BASE	42.26	99.104	101.000	56090	0.000	0.340	5.5	3.4
25Y24H	POND 1	BASE	43.26	99.083	101.000	55966	0.000	0.335	5.5	3.4
25Y24H	POND 1	BASE	44.26	99.061	101.000	55844	0.000	0.331	5.5	3.5
25Y24H	POND 1	BASE	45.26	99.040	101.000	55723	0.000	0.327	5.5	3.5

WATER QUALITY VOLUME EL 99.4

45

South Hancock Road
Basin 1
Post Development
Pond 1 Node Time Series

Simulation	Node	Group	Time hrs	Stage ft	Warning Stage ft	Surface Area ft2	Total Inflow cfs	Total Outflow cfs	Total Vol In af	Total Vol Out af
25Y24H	POND 1	BASE	46.26	99.019	101.000	55603	0.000	0.322	5.5	3.5
25Y24H	POND 1	BASE	47.26	98.998	101.000	55485	0.000	0.318	5.5	3.6
25Y24H	POND 1	BASE	48.26	98.978	101.000	55369	0.000	0.313	5.5	3.6
25Y24H	POND 1	BASE	49.26	98.957	101.000	55254	0.000	0.309	5.5	3.6
25Y24H	POND 1	BASE	50.26	98.937	101.000	55141	0.000	0.305	5.5	3.6
25Y24H	POND 1	BASE	51.26	98.918	101.000	55029	0.000	0.300	5.5	3.7
25Y24H	POND 1	BASE	52.26	98.898	101.000	54918	0.000	0.296	5.5	3.7
25Y24H	POND 1	BASE	53.26	98.879	101.000	54809	0.000	0.291	5.5	3.7
25Y24H	POND 1	BASE	54.26	98.860	101.000	54702	0.000	0.287	5.5	3.7
25Y24H	POND 1	BASE	55.26	98.841	101.000	54595	0.000	0.282	5.5	3.8
25Y24H	POND 1	BASE	56.26	98.823	101.000	54491	0.000	0.278	5.5	3.8
25Y24H	POND 1	BASE	57.26	98.804	101.000	54388	0.000	0.273	5.5	3.8
25Y24H	POND 1	BASE	58.26	98.786	101.000	54286	0.000	0.269	5.5	3.8
25Y24H	POND 1	BASE	59.26	98.769	101.000	54186	0.000	0.264	5.5	3.8
25Y24H	POND 1	BASE	60.26	98.751	101.000	54087	0.000	0.260	5.5	3.9
25Y24H	POND 1	BASE	61.26	98.734	101.000	53990	0.000	0.255	5.5	3.9
25Y24H	POND 1	BASE	62.26	98.717	101.000	53894	0.000	0.251	5.5	3.9
25Y24H	POND 1	BASE	63.26	98.701	101.000	53800	0.000	0.246	5.5	3.9
25Y24H	POND 1	BASE	64.26	98.684	101.000	53708	0.000	0.241	5.5	4.0
25Y24H	POND 1	BASE	65.26	98.668	101.000	53617	0.000	0.237	5.5	4.0
25Y24H	POND 1	BASE	66.26	98.653	101.000	53528	0.000	0.232	5.5	4.0
25Y24H	POND 1	BASE	67.26	98.637	101.000	53440	0.000	0.228	5.5	4.0
25Y24H	POND 1	BASE	68.26	98.622	101.000	53354	0.000	0.223	5.5	4.0
25Y24H	POND 1	BASE	69.26	98.607	101.000	53270	0.000	0.219	5.5	4.0
25Y24H	POND 1	BASE	70.26	98.592	101.000	53187	0.000	0.214	5.5	4.1
25Y24H	POND 1	BASE	71.26	98.578	101.000	53106	0.000	0.209	5.5	4.1
25Y24H	POND 1	BASE	72.26	98.564	101.000	53026	0.000	0.205	5.5	4.1
25Y24H	POND 1	BASE	73.26	98.550	101.000	52948	0.000	0.200	5.5	4.1
25Y24H	POND 1	BASE	74.26	98.537	101.000	52872	0.000	0.195	5.5	4.1
25Y24H	POND 1	BASE	75.26	98.524	101.000	52797	0.000	0.191	5.5	4.1
25Y24H	POND 1	BASE	76.26	98.511	101.000	52725	0.000	0.186	5.5	4.2
25Y24H	POND 1	BASE	77.26	98.498	101.000	52653	0.000	0.182	5.5	4.2
25Y24H	POND 1	BASE	78.26	98.486	101.000	52584	0.000	0.177	5.5	4.2
25Y24H	POND 1	BASE	79.26	98.474	101.000	52516	0.000	0.172	5.5	4.2
25Y24H	POND 1	BASE	80.26	98.462	101.000	52451	0.000	0.164	5.5	4.2
25Y24H	POND 1	BASE	81.26	98.451	101.000	52389	0.000	0.156	5.5	4.2
25Y24H	POND 1	BASE	82.26	98.441	101.000	52329	0.000	0.149	5.5	4.2
25Y24H	POND 1	BASE	83.26	98.431	101.000	52272	0.000	0.142	5.5	4.3
25Y24H	POND 1	BASE	84.26	98.421	101.000	52218	0.000	0.136	5.5	4.3
25Y24H	POND 1	BASE	85.26	98.412	101.000	52166	0.000	0.130	5.5	4.3
25Y24H	POND 1	BASE	86.26	98.403	101.000	52116	0.000	0.127	5.5	4.3
25Y24H	POND 1	BASE	87.26	98.395	101.000	52067	0.000	0.123	5.5	4.3
25Y24H	POND 1	BASE	88.26	98.386	101.000	52019	0.000	0.119	5.5	4.3
25Y24H	POND 1	BASE	89.26	98.378	101.000	51974	0.000	0.115	5.5	4.3
25Y24H	POND 1	BASE	90.26	98.370	101.000	51929	0.000	0.110	5.5	4.3
25Y24H	POND 1	BASE	91.26	98.363	101.000	51887	0.000	0.106	5.5	4.3
25Y24H	POND 1	BASE	92.26	98.356	101.000	51846	0.000	0.102	5.5	4.3
25Y24H	POND 1	BASE	93.26	98.349	101.000	51807	0.000	0.098	5.5	4.4
25Y24H	POND 1	BASE	94.26	98.342	101.000	51769	0.000	0.094	5.5	4.4
25Y24H	POND 1	BASE	95.26	98.336	101.000	51733	0.000	0.090	5.5	4.4
25Y24H	POND 1	BASE	96.26	98.330	101.000	51699	0.000	0.086	5.5	4.4
25Y24H	POND 1	BASE	97.26	98.324	101.000	51665	0.000	0.082	5.5	4.4
25Y24H	POND 1	BASE	98.26	98.318	101.000	51634	0.000	0.079	5.5	4.4
25Y24H	POND 1	BASE	99.26	98.313	101.000	51603	0.000	0.076	5.5	4.4
25Y24H	POND 1	BASE	100.00	98.309	101.000	51582	0.000	0.073	5.5	4.4

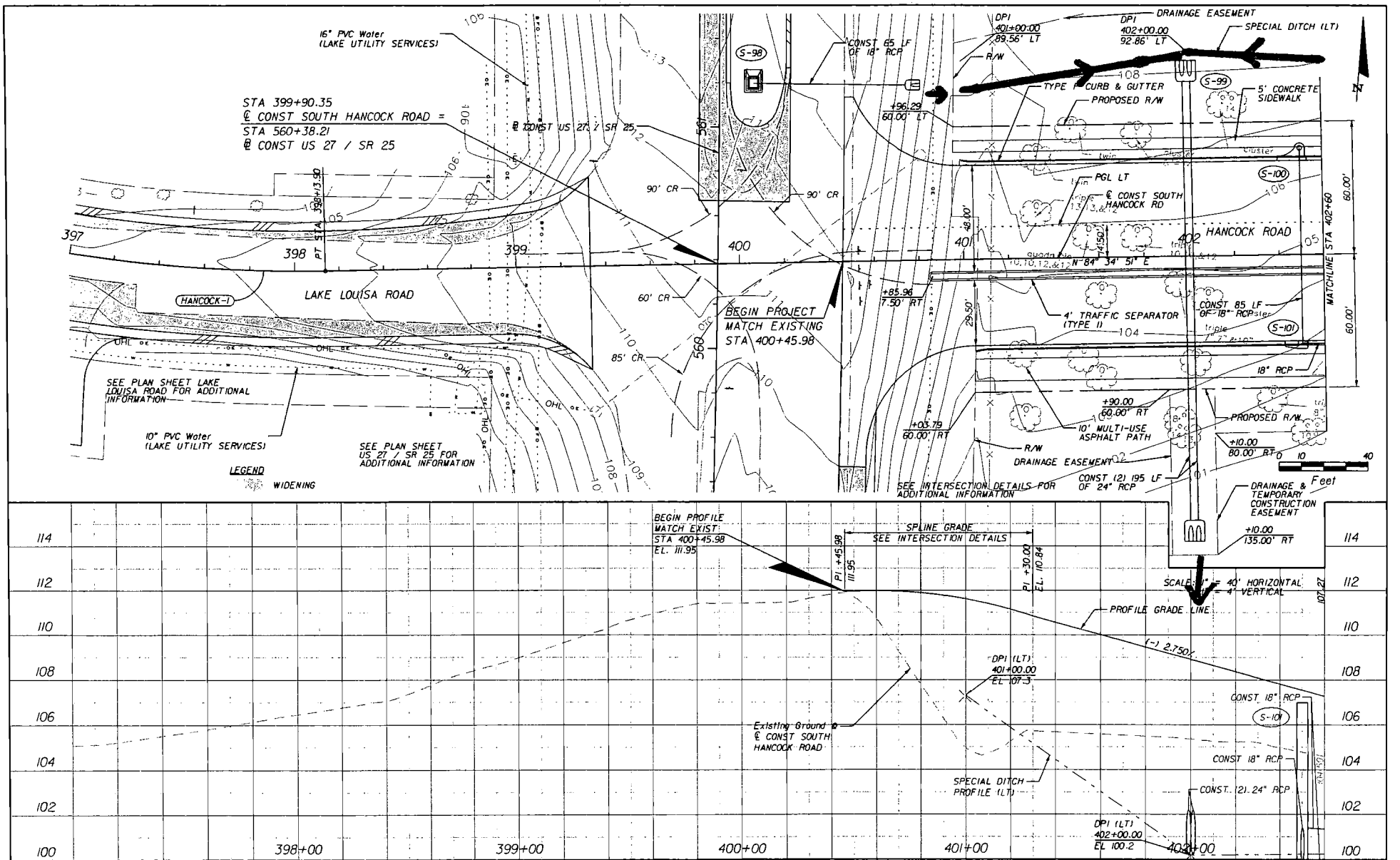
½ WATER QUALITY VOLUME
EL 98.84

TIME OF DRAWDOWN
55.26 - 29.76 = 25.5 HRS

A6

Bypass Drainage Basin Data

Ditch Calculations



REVISIONS		
DATE	BY	DESCRIPTION

HNTB

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

ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.
FL. REGISTRATION NO. 44794

LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

PLAN AND PROFILE

SHEET NO. 19

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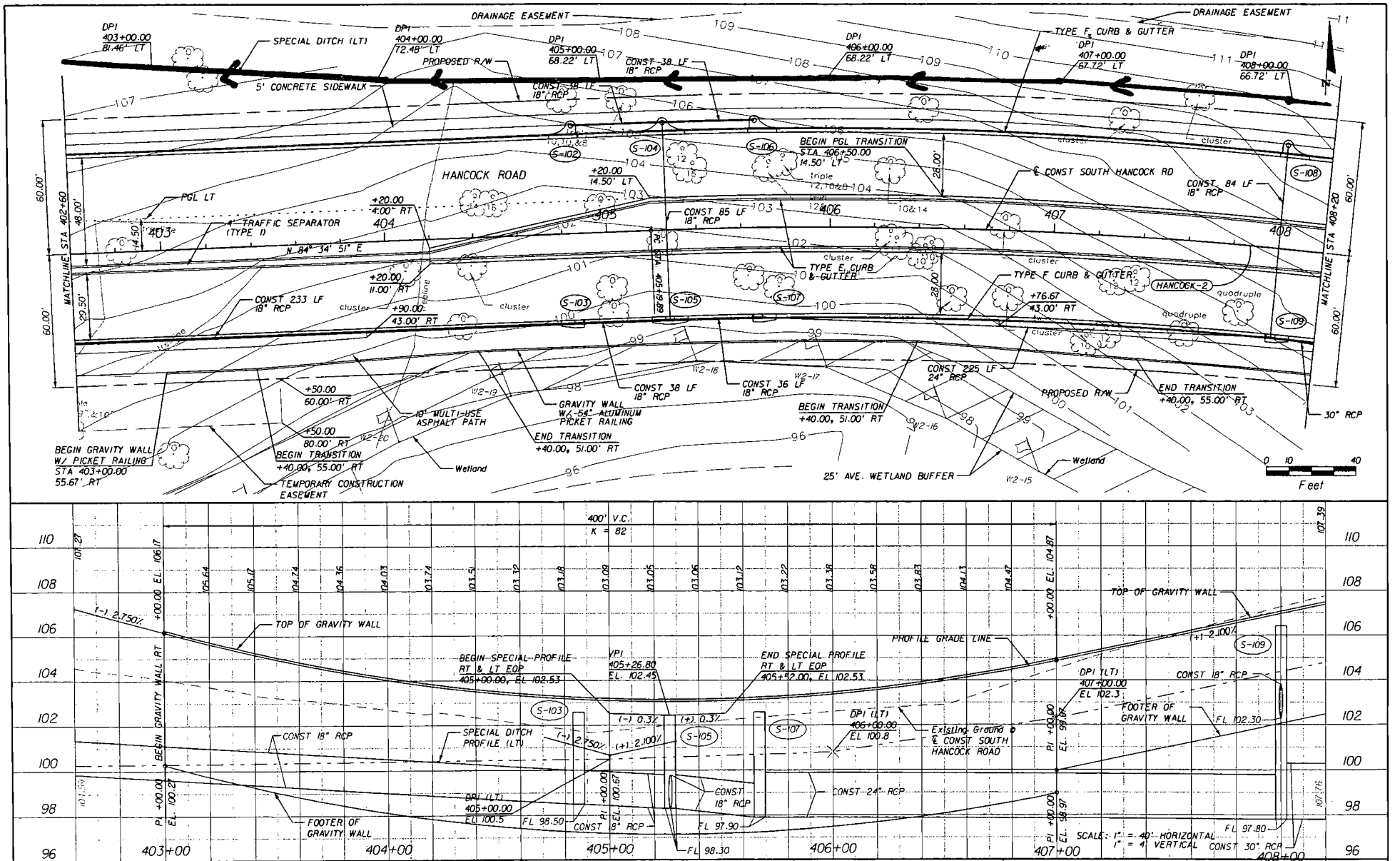

REVISIONS		
DATE	BY	DESCRIPTION

HNTB

HNTB CORPORATION
300 PRIMERA BLVD.
SUITE 200
LAKE MARY, FL 32746
(407) 805-0355
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FL. REGISTRATION NO. 44794

LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

PLAN AND PROFILE

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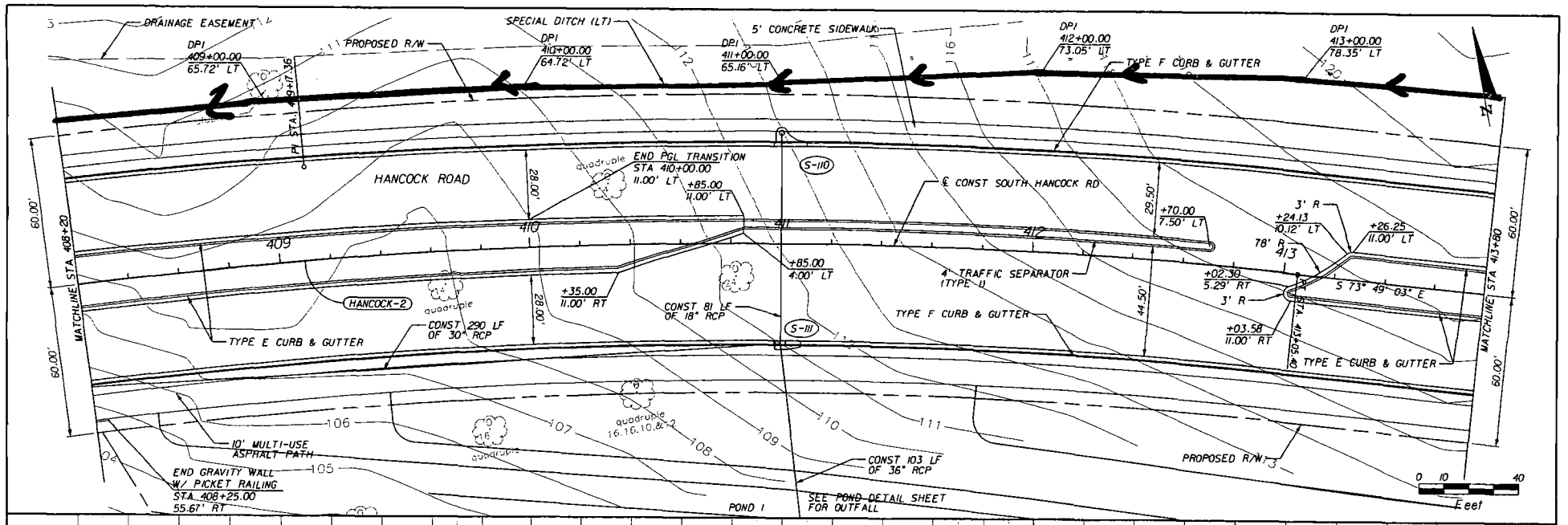

SEE NEXT SHEET FOR PROFILE

SCALE: 1" = 40' HORIZONTAL
1" = 4' VERTICAL

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DATE	BY	DESCRIPTION

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

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LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

PLAN AND PROFILE

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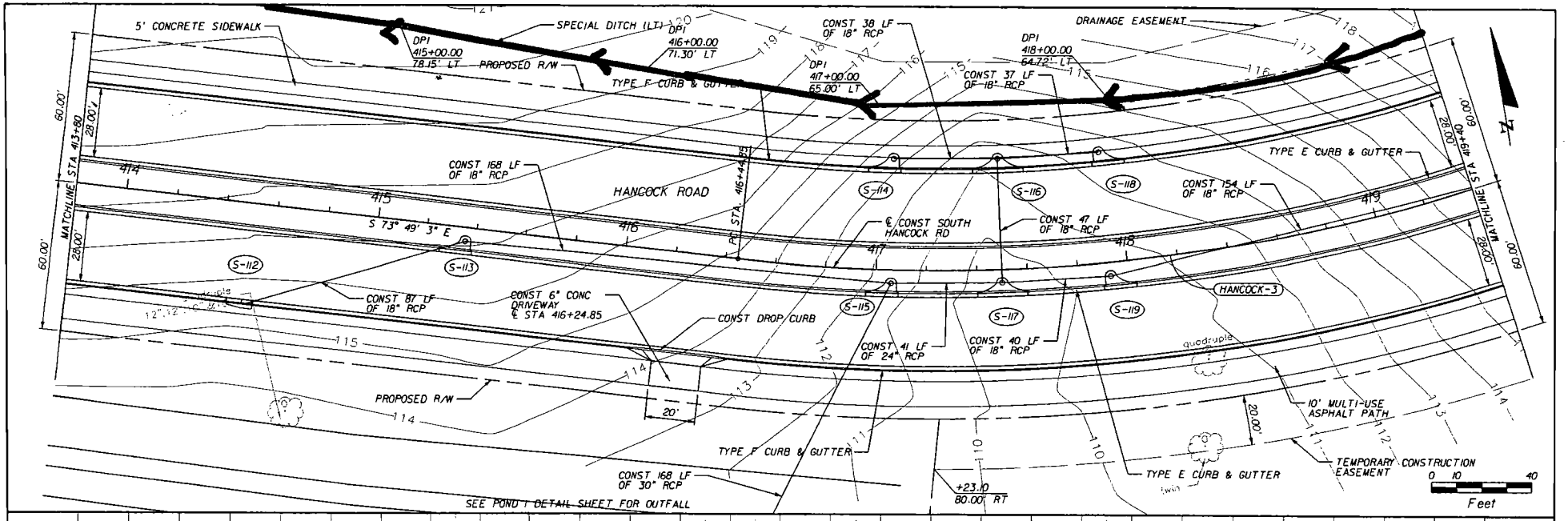

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414+00 415+00 416+00 417+00 418+00 419+00

REVISIONS		
DATE	BY	DESCRIPTION

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

ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.
FL. REGISTRATION NO. 44794

LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

PLAN AND PROFILE

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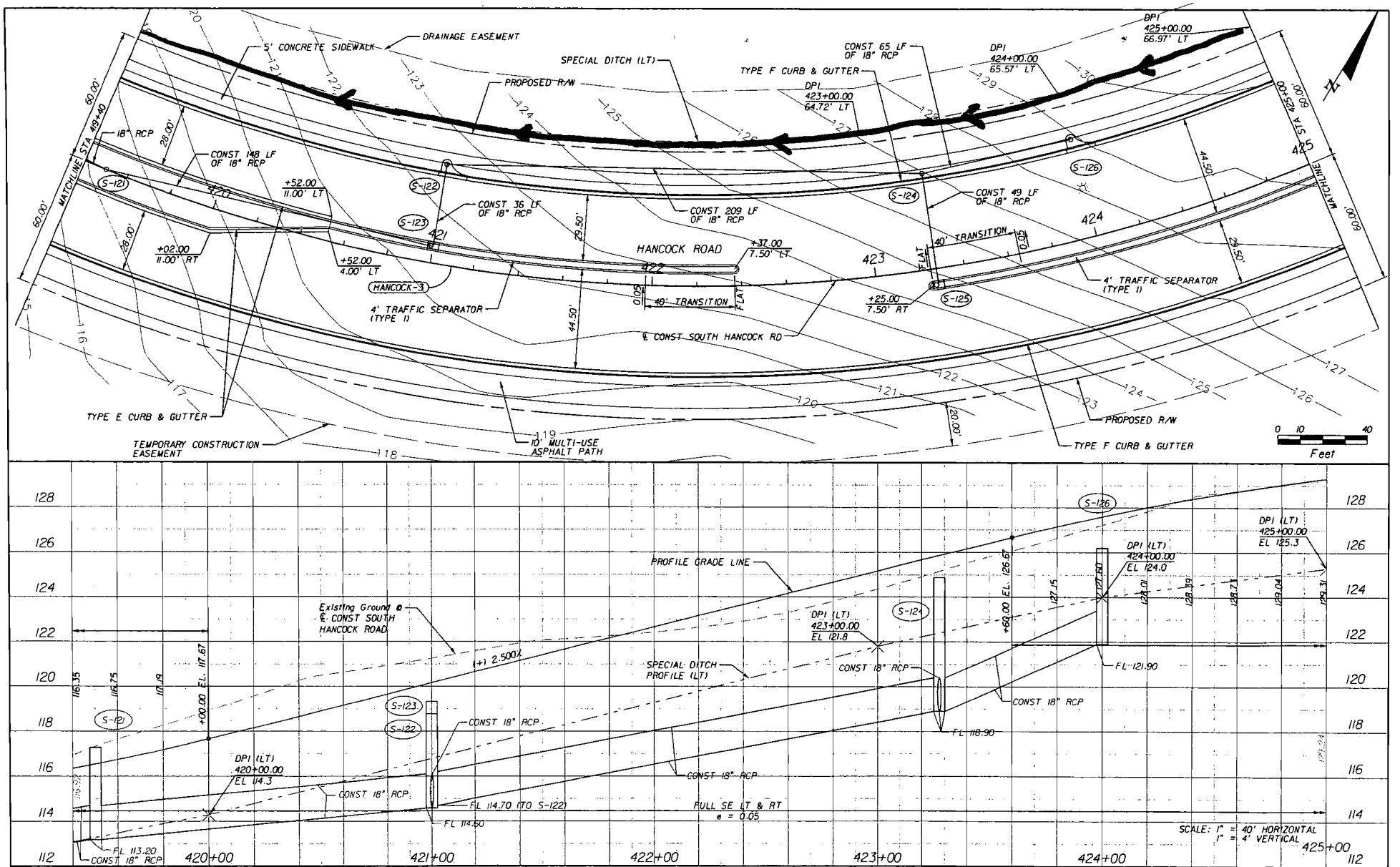

REVISIONS		
DATE	BY	DESCRIPTION

HNTB

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

ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.
FL. REGISTRATION NO. 44794

LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

PLAN AND PROFILE

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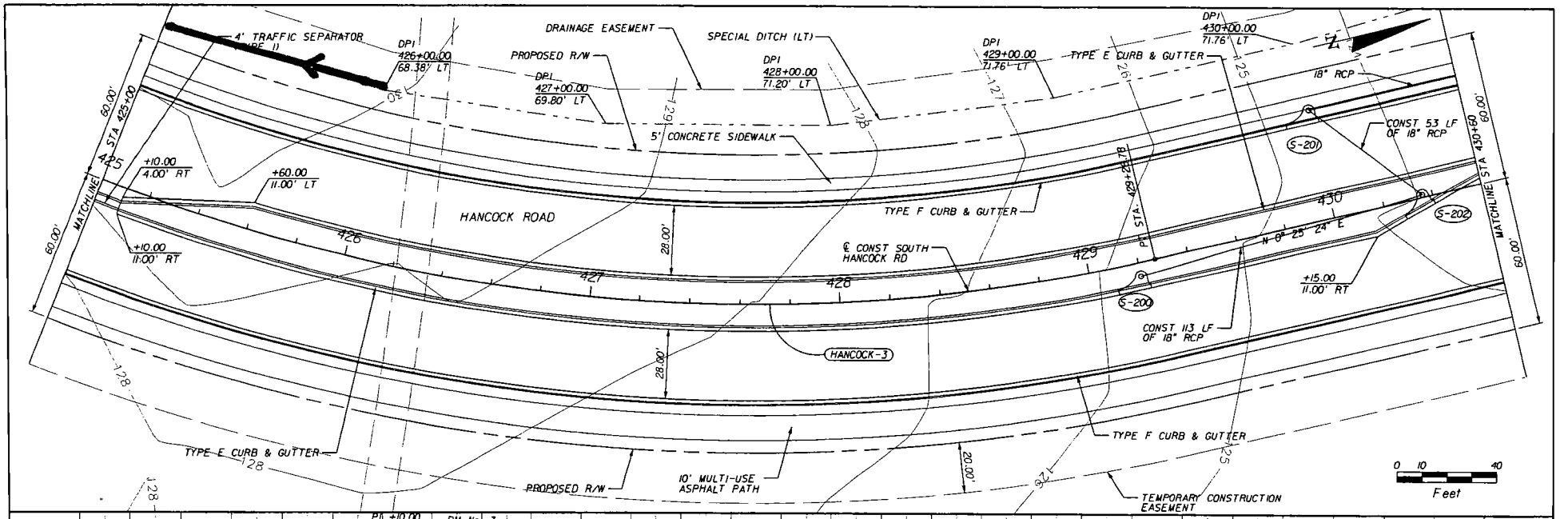
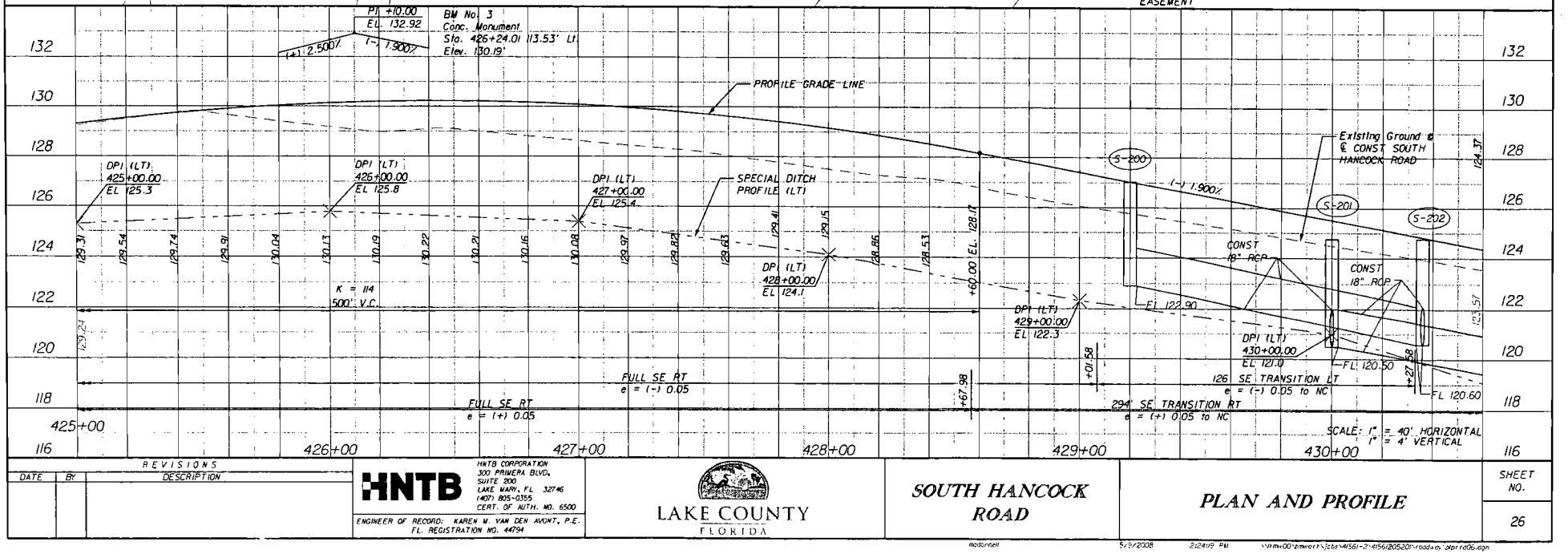
25

53





REVISIONS		
DATE	BY	DESCRIPTION

HNTB

HNTB CORPORATION
300 PRIMERA BLVD.
SUITE 350
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500

ENGINEER OF RECORD: KAREN W. VAN DEN AVONT, P.E.
FL. REGISTRATION NO. 44794

LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

PLAN AND PROFILE

SHEET NO. 26

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FHWA Urban Drainage Design Program, HY-22
HYDRAULIC PARAMETERS OF OPEN CHANNELS

Trapezoidal, Rectangular, or Triangular X-Section
Date: 02/14/2008

Project No. :41561-2
Project Name.:South Hancock Road
Computed by :MSF

Project Description
Sta 426+00 to Sta 402+00
Left Side
S-99

INPUT PARAMETERS

1.	Channel Slope (ft/ft)	0.0110
2.	Channel Bottom Width (ft)	5.00
3.	Left Side Slope (Horizontal to 1)	3.00
4.	Right Side Slope (Horizontal to 1)	4.00
5.	Manning's Coefficient	0.042
6.	Discharge (cfs)	19.65
7.	Depth of Flow (ft)	0.88

OUTPUT RESULTS

Cross Section Area (Sqft)	7.11
Average Velocity (ft/sec)	2.76
Top Width (ft)	11.16
Hydraulic Radius (ft)	0.62
Froude Number	0.61

$y > y_c$
$V < V_c$
∴ subcritical flow

FHWA Urban Drainage Design Program, HY-22
HYDRAULIC PARAMETERS OF OPEN CHANNELS

Trapezoidal, Rectangular, or Triangular X-Section
Date: 02/14/2008

Project No. :41561-2
Project Name.:South Hancock Road
Computed by :MSF

Project Description
Sta 426+00 to Sta 402+00
Left Side
S-99

INPUT PARAMETERS

1.	Channel Slope (ft/ft)	0.0110
2.	Channel Bottom Width (ft)	5.00
3.	Left Side Slope (Horizontal to 1)	3.00
4.	Right Side Slope (Horizontal to 1)	4.00
5.	Manning's Coefficient	0.060
6.	Discharge (cfs)	19.65
7.	Depth of Flow (ft)	1.06

OUTPUT RESULTS

Cross Section Area (Sqft)	9.23
Average Velocity (ft/sec)	2.13
Top Width (ft)	12.42
Hydraulic Radius (ft)	0.73
Froude Number	0.44

FHWA Urban Drainage Design Program, HY-22
Critical Depth for Open Channels

TRAPEZOIDAL ANALYSIS
Date: 02/14/2008

Project No. :41561-2
Project Name.:South Hancock Road
Computed by :MSF

Project Description
Sta 426+00 to Sta 402+00
Left Side
S-99

INPUT PARAMETERS

1.	Discharge (cfs)	19.65
2.	Manning's Coefficient	0.042
3.	Channel Bottom Width (ft)	5.0
4.	Left Side Slope (Horizontal to 1)	3.00
5.	Right Side Slope (Horizontal to 1)	4.00

OUTPUT RESULTS

Critical Depth (ft)	0.66
Critical Area (ft**2)	4.86
Critical Velocity (ft/sec)	4.04
Critical Slope (ft/ft)	0.033

Culvert Calculations

For S Hancock Road	Job No. 41561-2	Sheet No. 1
Made by MSF	Checked by	Backchecked by
Date 2-14-08	Date	Date

HNTB

Q for HY-8 Analysis

S-99

Per Lake County standards:
Culvert design for 25 year
(Rational Method)

$Q = CiA$ where $C = 0.20$ (all pervious)
$i = 4.47$ in/hr ($tc = 42.85$ min.)
$A = 26.38$ ac

$Q = (.20)(4.47 \text{ in/hr})(26.38 \text{ ac})$
$Q = 23.58$ cfs (25 yr) (design)

$Q = 1.7(23.58 \text{ cfs}) = 40.09$ cfs (500 yr design)

S-209A

$Q = CiA$ where $C = 0.20$ (all pervious)
$i = 5.18$ in/hr ($tc = 32.63$ min.)
$A = 27.42$ ac

$Q = (.20)(27.42 \text{ ac})(5.18 \text{ in/hr})$
$Q = 28.41$ cfs (25 yr design)

$Q = 1.7(28.41 \text{ cfs}) = 48.30$ cfs (500 yr design)

S-216A

$Q = CiA$ where $C = 0.20$ (all pervious)
$i = 5.30$ in/hr ($tc = 31.01$ min.)
$A = 7.27$ ac

$Q = (.20)(5.30 \text{ in/hr})(7.27 \text{ ac})$
$Q = 7.71$ cfs (25 yr design)

$Q = 1.7(7.71) = 13.11$ cfs (500 yr design)

ME101-1204

Culvert Calculations

HY-8 Culvert Analysis Report

S-99
Sta 402+00

Table 1 - Summary of Culvert Flows at Crossing: Crossing 1

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
100.20	0.00	0.00	0.00	1
101.01	4.01	4.01	0.00	1
101.35	8.02	8.02	0.00	1
101.63	12.03	12.03	0.00	1
101.89	16.04	16.04	0.00	1
102.14	20.05	20.05	0.00	1
102.41	24.05	24.05	0.00	1
102.61	26.38	26.38	0.00	1
103.12	32.07	31.88	0.08	33
103.22	36.08	32.82	3.15	10
103.27	40.09	33.27	6.69	6

Rating Curve Plot for Crossing: Crossing 1

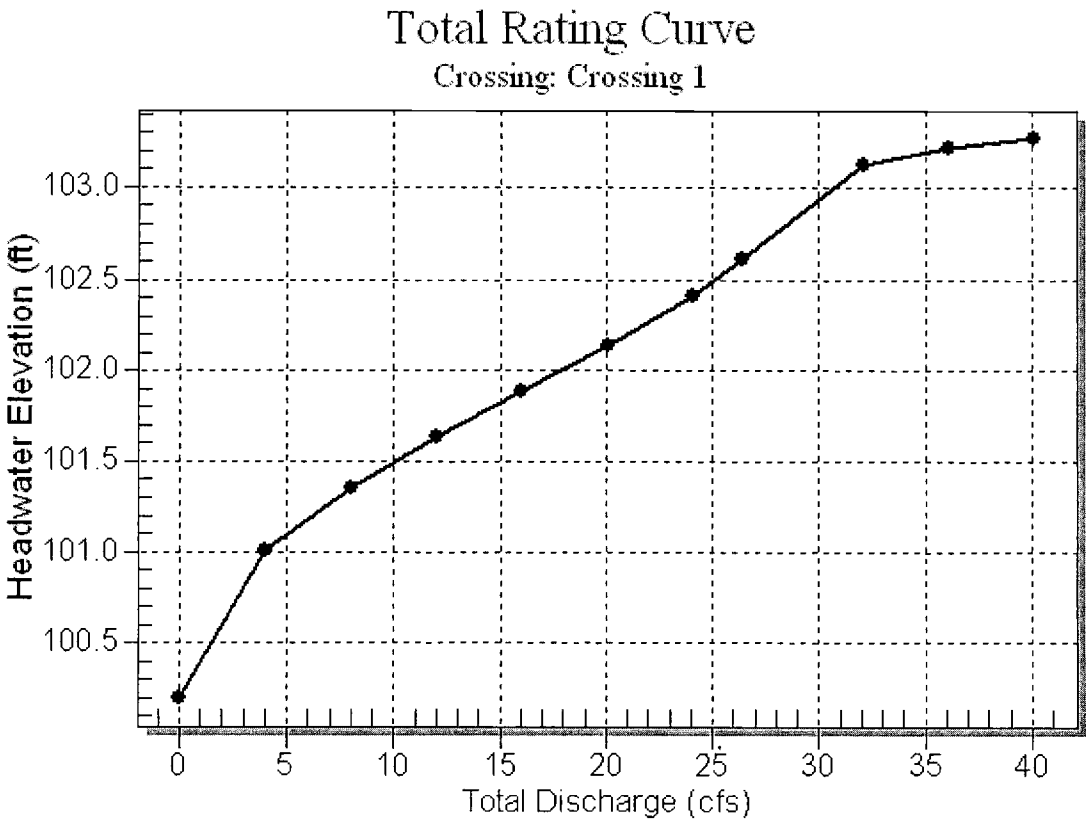


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	100.20	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
4.01	4.01	101.01	0.665	0.808	2-M2c	0.836	0.482	0.482	0.380	3.404	1.718
8.02	8.02	101.35	0.963	1.151	2-M2c	1.273	0.696	0.696	0.560	4.112	2.142
12.03	12.03	101.63	1.218	1.432	2-M2c	2.000	0.863	0.863	0.699	4.633	2.422
16.04	16.04	101.89	1.435	1.689	2-M2c	2.000	1.007	1.007	0.817	5.058	2.636
20.05	20.05	102.14	1.629	1.940	2-M2c	2.000	1.129	1.129	0.919	5.486	2.813
24.05	24.05	102.41	1.813	2.211	2-M2c	2.000	1.243	1.243	1.012	5.858	2.959
26.38	26.38	102.61	1.920	2.413	7-M2c	2.000	1.303	1.303	1.060	6.097	3.042
32.07	31.88	103.12	2.185	2.921	7-M2c	2.000	1.436	1.436	1.172	6.594	3.212
36.08	32.82	103.22	2.233	3.025	7-M2c	2.000	1.456	1.456	1.245	6.712	3.318
40.09	33.27	103.27	2.256	3.071	7-M2c	2.000	1.465	1.465	1.313	6.759	3.416

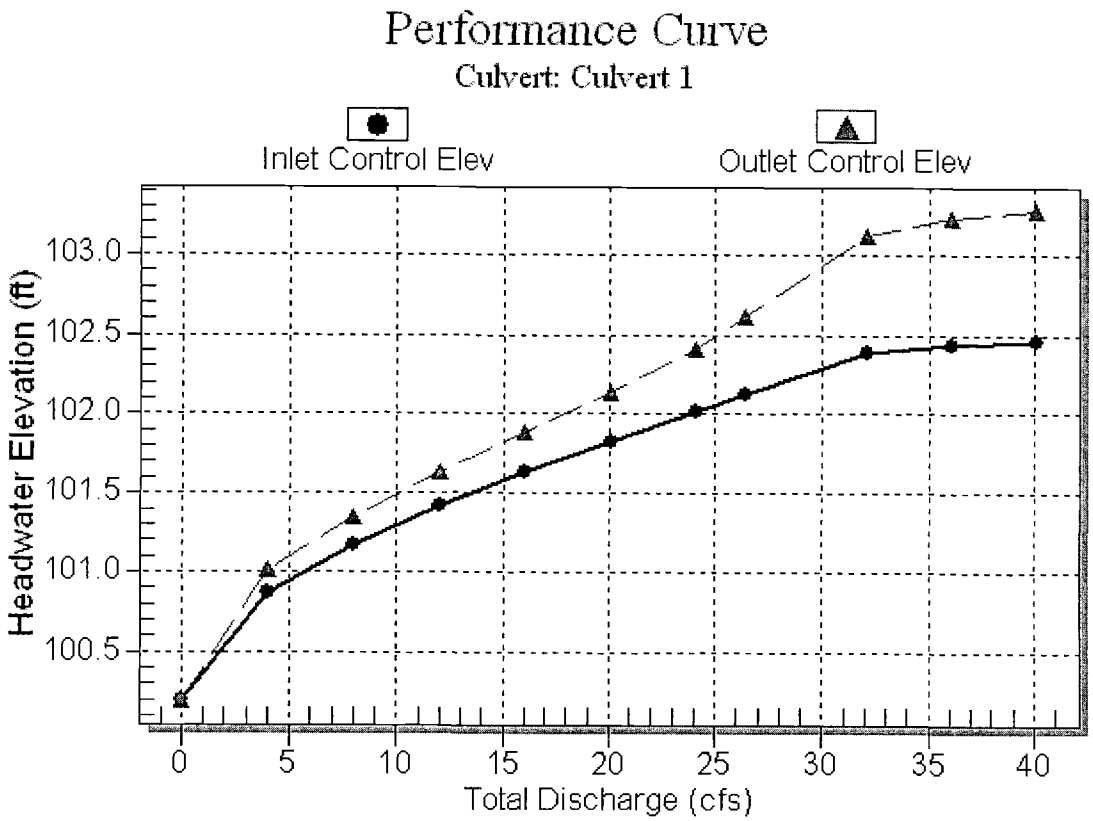
****

Inlet Elevation (invert): 100.20 ft, Outlet Elevation (invert): 100.10 ft

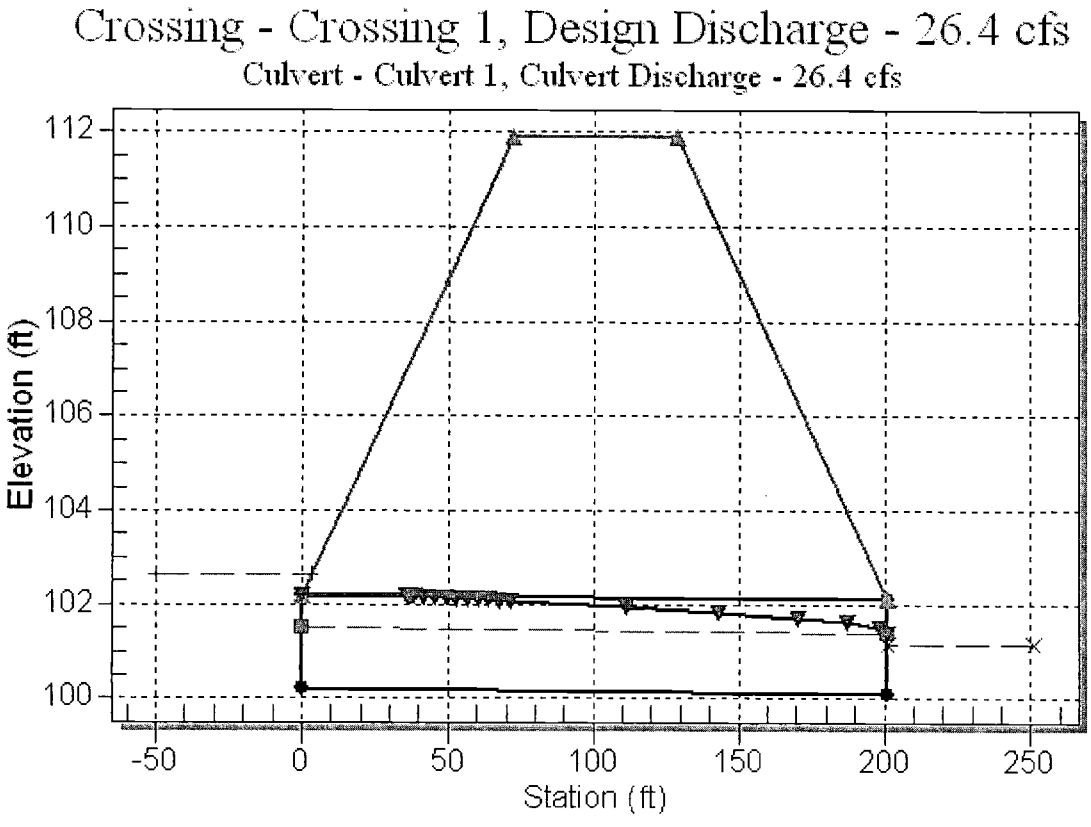
Culvert Length: 201.00 ft, Culvert Slope: 0.0005

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 100.20 ft

Outlet Station: 201.00 ft

Outlet Elevation: 100.10 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material:

Barrel Manning's n: 0.0120

Inlet Type:

Inlet Edge Condition:

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Crossing 1)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	100.10	0.00	0.00	0.00	0.00
4.01	100.48	0.38	1.72	0.26	0.53
8.02	100.66	0.56	2.14	0.38	0.56
12.03	100.80	0.70	2.42	0.48	0.58
16.04	100.92	0.82	2.64	0.56	0.59
20.05	101.02	0.92	2.81	0.63	0.60
24.05	101.11	1.01	2.96	0.69	0.61
26.38	101.16	1.06	3.04	0.73	0.61
32.07	101.27	1.17	3.21	0.80	0.62
36.08	101.34	1.24	3.32	0.85	0.63
40.09	101.41	1.31	3.42	0.90	0.63

Tailwater Channel Data - Crossing 1

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 5.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0110

Channel Manning's n: 0.0420

Channel Invert Elevation: 100.10 ft

Roadway Data for Crossing: Crossing 1

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
1	40100.00	111.89
2	40200.00	108.91
3	40300.00	106.16
4	40400.00	104.02
5	40500.00	103.09
6	40600.00	103.37
7	40700.00	104.87
8	40800.00	106.97
9	40900.00	109.07
10	41000.00	111.16
11	41100.00	113.26
12	41200.00	115.34
13	41300.00	116.76
14	41400.00	117.29
15	41500.00	116.91

Roadway Surface: Paved

Roadway Top Width: 57.00 ft

Calculations For Med swale on Hwy 27	Job No. 41561-2	Sheet No. 1
Made by MSF	Date 5-1-08	
Checked by	Date	
Backchecked by	Date	

HNTB

Med. Swale on Hwy 27
(Sta 561+00 to Sta 568+50) (S-98)

$Q = CiA$

$C = 0.20$ (grass swale)

$A = 0.53$ ac

$Tc = 33$ min

$i = 4.55$ in/hr (10 yr - 33 min, Zone 7)

$Q = (.20)(4.55)(0.53)$

$Q = 0.48$ cfs

$Q = VA$ $V = 2.5$ fps (self-cleaning)

$$\frac{0.48 \text{ cfs}}{2.5 \text{ fps}} = A = \frac{\pi d^2}{4}$$

$$\frac{0.192(4)}{\pi} = d^2$$

$d = 0.49$ ft

Use 18" pipe

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
S. Hancock Road	msf	5-1-08
Location	**Checked**	**Date**
Med. Swale on Hwy 27 (sta 561+00 to sta 568+50) (S-98)		

Check one: ☐ Present ☒ Developed

Check one: ☒ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

Segment ID	A-B	
1. Surface description (table 3-1)	short grass	
2. Manning's roughness coefficient, n (table 3-1)	0.15	
3. Flow length, L (total L † 300 ft) ft	300	
4. Two-year 24-hour rainfall, P_2 in	4.70	
5. Land slope, s ft/ft	0.0073	
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t hr	0.486 +	= .486

Shallow concentrated flow

Segment ID	B-C	
7. Surface description (paved or unpaved)	unpaved	
8. Flow length, L ft	480	
9. Watercourse slope, s ft/ft	0.0173	
10. Average velocity, V (figure 3-1) ft/s	2.122	
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	0.0628 +	= 0.0628

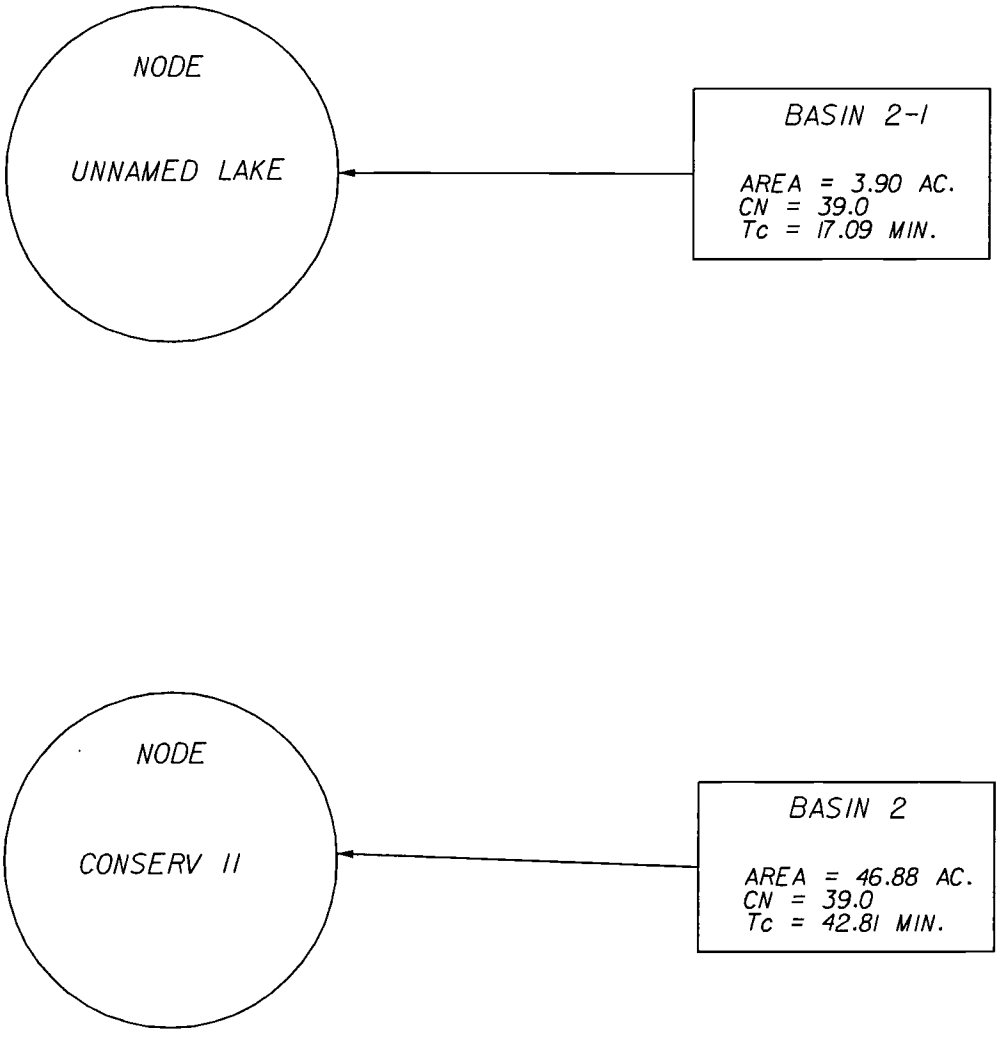
Channel flow

Segment ID		
12. Cross sectional flow area, a ft^2		
13. Wetted perimeter, p_w ft		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft		
15 Channel slope, s ft/ft		
16. Manning's roughness coefficient, n		
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ft/s		
18. ~~Flow~~ length, L ft		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr	+	=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr		0549

≈ 33min.

BASIN 2

Pre-Development Drainage Basin Data



BASIN 2

LOCATION: LAKE COUNTY SEC. 9, 10, 15 & 16; T23S; R26E SOUTH HANCOCK ROAD CONSTRUCTION US 27 TO HARTWOOD MARSH ROAD	COUNTY: LAKE STATE: FLORIDA DATE: 12/07	DATUM: NAVD 88 PURPOSE: PRE-DEVELOPMENT NODAL DIAGRAM
HNTB HNTB CORPORATION 300 PRIMERA BLVD, SUITE 200 LAKE MARY, FL 32746 (407) 805-0355 CERT. OF AUTH. NO. 6500 ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E. FL. REGISTRATION NO. 44794	LAKE COUNTY FLORIDA	LAKE COUNTY SOUTH HANCOCK ROAD

5/12/2008 5:10:46 PM \\LKMW00\pmwork\Jobs\41561-2\41561205201\drainage\NODAL_DIAGRAMpre.dgn

BASIN BREAKDOWN

HNTB

		DATE
MADE BY:	MSF	13-Feb-08
CHCK BY:	KMV	14-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION: BASIN 2

BASIN LIMITS: STA. 426+04.00 to STA 462+75, CL CONST. HANCOCK ROAD

EXISTING CONDITIONS:

LOCATION	STATION	To	STATION	BASIN WIDTH (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)	REMARKS
ON-SITE:								
BASIN 2		-		120	0.00	46.88	46.880	Discharge to Conserv II
ON-SITE SUBTOTAL:					*0.00*	*46.88*	*46.880*	
OFF-SITE:								
BASIN 2-1 (POND AREA)	-	-	-	-	0.00	3.90	3.899	Discharge to unnamed lake
OFF-SITE SUBTOTAL:					*0.00*	*3.90*	*3.899*	
TOTAL DRAINAGE AREA:					0.000	50.779	50.779	

PROPOSED CONDITIONS:

LOCATION	STATION	To	STATION	BASIN WIDTH (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)	REMARKS
ON-SITE:								
BASIN 2	426+04	-	462+75	120	7.69	2.97	10.660	
BASIN 2-1 (POND AREA)	-	-	-	-	2.30	1.60	3.899	Impervious is at water quality volume
ON-SITE SUBTOTAL:					*9.99*	*4.57*	*14.559*	
OFF-SITE:								
BASIN 2-2a (OFF-SITE)	426+04	-	441+00	-	0.00	27.42	27.420	Runoff Bypassed to Conserv II
BASIN 2-2b (OFF-SITE)	441+00	-	456+80	-	0.00	7.27	7.273	Runoff Bypassed to Conserv II
BASIN 2-3 (OFF-SITE)	456+80		461+20		0.00	0.82	0.817	
BASIN 2-4a (OFF-SITE)					0.00	0.39	0.390	
BASIN 2-4b (OFF-SITE)					0.00	0.32	0.320	
OFF-SITE SUBTOTAL:					*0.00*	*36.22*	*36.22*	
TOTAL DRAINAGE AREA:					9.990	40.789	50.779	

RUNOFF CURVE NUMBER

HNTB

MADE BY: MSF DATE: 13-Feb-08
CHECKED BY: KMV DATE: 14-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION: BASIN 2

UNDERLINE ONE: EXISTING PROPOSED

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98				0.00
Lakeland Sand (A)	GRASS Good Condition (On-Site)	39			46.88	1828.32
		Totals =			46.88	1828.32
		Use CN =			**39.0**	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

RUNOFF CURVE NUMBER

MADE BY: MSF DATE: 13-Feb-08
CHECKED BY: KMV DATE: 14-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION: BASIN 2-1

UNDERLINE ONE: **EXISTING** **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site) (Pond Bottom)	98			0.00	0.00
Lakeland Sand (A)	GRASS Good Condition (On-Site)	39			3.90	152.06
		Totals =			3.90	152.06
		Use CN =			**39.0**	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

HNTB

DATE:

MADE BY: MSF 13-Feb-08
CHECKED BY: KMV 14-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION : BASIN 2

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

1	SURFACE DESCRIPTION	SHORT GRASS			
2	MANNING'S COEFFICIENT, n	0.150			
3	FLOW LENGTH, L, (< 300')	300		FT.	
4	2 YR/ 24 HR RAINFALL, P	4.70		IN.	
5	LAND SLOPE, S	0.0207			
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)	0.3203		HR. OR	19.22 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)	UNPAVED			
8	FLOW LENGTH, L	2603		L.F.	
9	WATERCOURSE SLOPE, S	0.0130		FT./ FT.	
10	AVERAGE VELOCITY, V	1.839		FT./SEC.	
11	Tt = L / (3600 * V)	0.393		HR. OR	23.60 MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A			S.F.	
13	WETTED PERIMETER, Pw			L.F.	
14	HYDRAULIC RADIUS, R = (A / Pw)			L.F.	
15	CHANNEL SLOPE, S			FT./FT.	
16	MANNING'S ROUGHNESS COEFFICIENT, n				
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n			FT./SEC.	
18	FLOW LENGTH, L			L.F.	
19	Tt = L / (3600 V)			HR. OR	0.00 MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)				

TOTAL Tc = 42.81 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

HNTB

DATE:

MADE BY: MSF 13-Feb-08

CHECKED BY: KMV 14-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION : BASIN 2-1

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt **Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION	SHORT GRASS			
2	MANNING'S COEFFICIENT, n	0.150			
3	FLOW LENGTH, L, (< 300')	300		FT.	
4	2 YR/ 24 HR RAINFALL, P	4.70		IN.	
5	LAND SLOPE, S	0.0440			
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)	0.2367		HR. OR	14.20 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)	UNPAVED			
8	FLOW LENGTH, L	472		L.F.	
9	WATERCOURSE SLOPE, S	0.0286		FT./ FT.	
10	AVERAGE VELOCITY, V	2.729		FT./SEC.	
11	Tt = L / (3600 * V)	0.048		HR. OR	2.88 MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A			S.F.	
13	WETTED PERIMETER, Pw			L.F.	
14	HYDRAULIC RADIUS, R = (A / Pw)			L.F.	
15	CHANNEL SLOPE, S			FT./FT.	
16	MANNING'S ROUGHNESS COEFFICIENT, n				
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n			FT./SEC.	
18	FLOW LENGTH, L			L.F.	
19	Tt = L / (3600 V)			HR. OR	0.00 MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)				

TOTAL Tc = 17.09 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

MATCH LINE STA. 437+00

1" = 200'

BASIN 2

BASIN 1

FLOW PATH BASIN 2

FLOW PATH BASIN 1

℄ CONST. SOUTH HANCOCK ROAD

℄ CONST. US 27

℄ CONST. POND 1

BEGIN PROJECT STA. 400+45.98

Wetland Line

Wetland Line

Wetland Line

CONSERV II

0 50 200

Feet

REVISIONS		
DATE	BY	DESCRIPTION

HNTB

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

ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.
FL. REGISTRATION NO. 44794

LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

DRAINAGE FLOW PATH PRE-DEVELOPMENT

SHEET NO.

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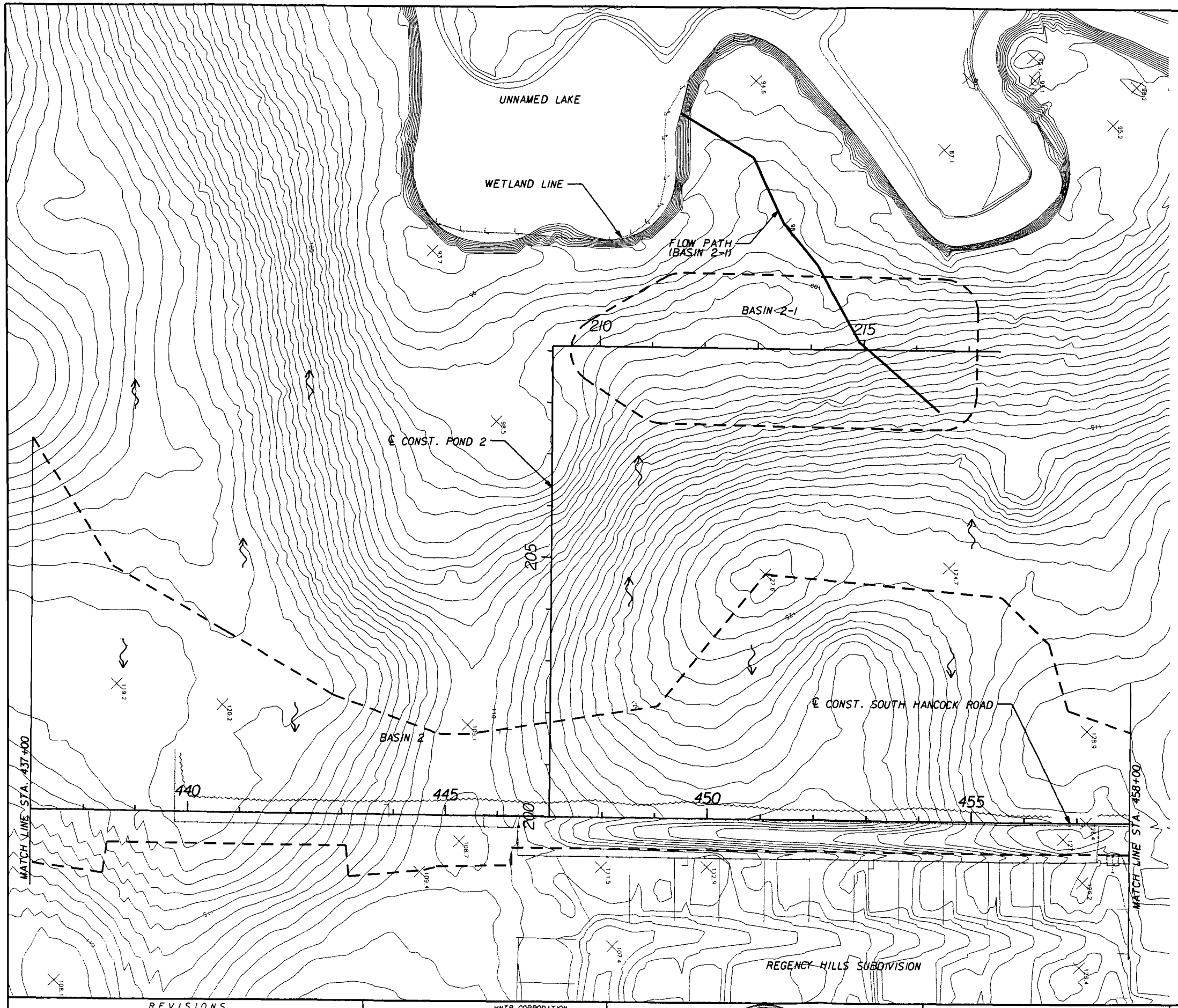

1" = 200'

0 50 200
Feet

REVISIONS		
DATE	BY	DESCRIPTION

HNTB

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

ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.
FL. REGISTRATION NO. 44794

LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

DRAINAGE FLOW PATH PRE-DEVELOPMENT AREAS

SHEET NO.

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```
==========================================================================================
==== Basins ==============================================================================
==========================================================================================

         Name: BASIN 2                  Node: CONSERVII              Status: Onsite
        Group: BASE                     Type: SCS Unit Hydrograph CN

        Unit Hydrograph: Uh484                   Peaking Factor: 484.0
          Rainfall File: Sjrwmd96          Storm Duration(hrs): 96.00
    Rainfall Amount(in): 11.200              Time of Conc(min): 42.81
               Area(ac): 46.880                 Time Shift(hrs): 0.00
         Curve Number: 39.00              Max Allowable Q(cfs): 999999.000
              DCIA(%): 0.00

Runoff to Coserv II

------------------------------------------------------------------------------------------
         Name: BASIN 2-1                Node: UNNAMED LK             Status: Onsite
        Group: BASE                     Type: SCS Unit Hydrograph CN

        Unit Hydrograph: Uh484                   Peaking Factor: 484.0
          Rainfall File: Sjrwmd96          Storm Duration(hrs): 96.00
    Rainfall Amount(in): 11.200              Time of Conc(min): 17.09
               Area(ac): 3.900                  Time Shift(hrs): 0.00
         Curve Number: 39.00              Max Allowable Q(cfs): 999999.000
              DCIA(%): 0.00

Future Pond site discharge to unnnamed lake

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

         Name: 100Y24H
     Filename: W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\PRE\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
15.000          15.00
40.000          60.00

------------------------------------------------------------------------------------------
         Name: 10Y24H
     Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\PRE\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
15.000          15.00
40.000          60.00

------------------------------------------------------------------------------------------
         Name: 2.3Y24H
     Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\PRE\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
15.000          15.00
40.000          60.00

------------------------------------------------------------------------------------------
         Name: 25Y24H
     Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\PRE\25Y24H.R32
```

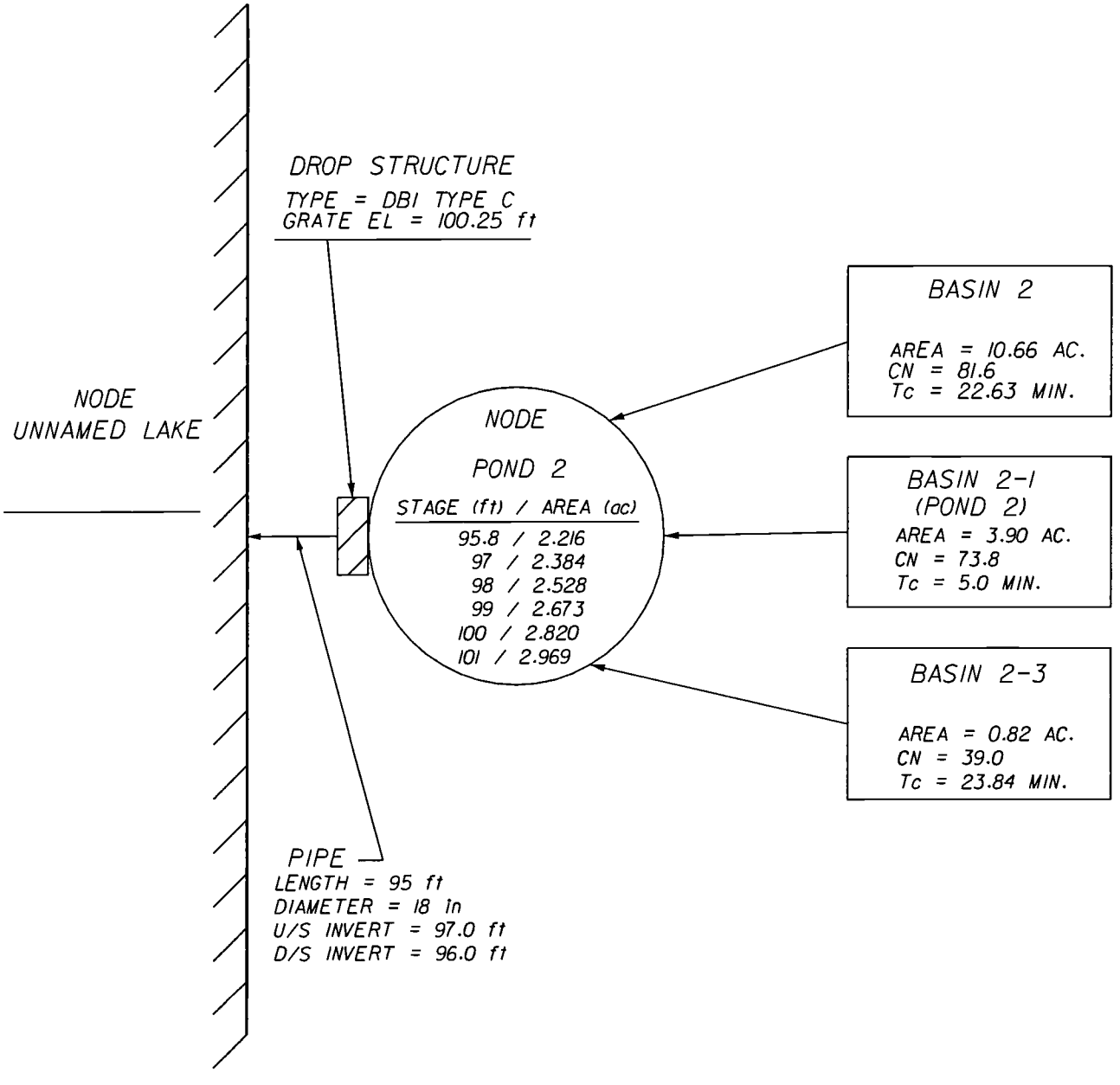
```
      Override Defaults: Yes
    Storm Duration(hrs): 24.00
          Rainfall File: Flmod
    Rainfall Amount(in): 8.30

Time(hrs)       Print Inc(min)
--------------- ---------------
11.000          60.00
15.000          15.00
40.000          60.00

-------------------------------------------------------------------------------------------------------
         Name: 25Y96H
     Filename: W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\PRE\25Y96H.R32

      Override Defaults: No

Time(hrs)       Print Inc(min)
--------------- ---------------
55.000          60.00
62.000          15.00
120.000         60.00

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

         Name:                      Hydrology Sim:
     Filename:

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

       Max Delta Z(ft): 0.00                     Delta Z Factor: 0.00000
   Time Step Optimizer: 0.000
      Start Time(hrs): 0.000                      End Time(hrs): 0.00
    Min Calc Time(sec): 0.0000               Max Calc Time(sec): 0.0000
       Boundary Stages:                          Boundary Flows:


Time(hrs)       Print Inc(min)
--------------- ---------------

Group           Run
--------------- -----
BASE            Yes
```

South Hancock Road
Basin 2
Pre-development
Basin Max

Simulation	Basin	Group	Time Max hrs	Flow Max cfs	Volume in	Volume ft3	
100Y24H	BASIN 2	BASE	12.46	66.375	2.913	495729.463	
100Y24H	BASIN 2-1	BASE	12.11	8.200	2.912	41231.286	
10Y24H	BASIN 2	BASE	12.56	9.484	0.663	112745.585	
10Y24H	BASIN 2-1	BASE	12.30	1.090	0.662	9376.359	
2.3Y24H	BASIN 2	BASE	17.69	0.330	0.069	11657.362	
2.3Y24H	BASIN 2-1	BASE	18.53	0.029	0.068	969.080	
25Y24H	BASIN 2	BASE	12.46	23.912	1.282	218242.208	
25Y24H	BASIN 2-1	BASE	12.15	2.903	1.282	18150.902	
25Y96H	BASIN 2	BASE	60.31	55.671	2.744	466893.601	≤ MAX
25Y96H	BASIN 2-1	BASE	60.08	6.963	2.743	38833.750	

83

Post Development Drainage Basin Data



BASIN 2

LOCATION: LAKE COUNTY SEC. 9, 10, 15 & 16; T23S; R26E SOUTH HANCOCK ROAD CONSTRUCTION US 27 TO HARTWOOD MARSH ROAD	COUNTY: LAKE STATE: FLORIDA DATE: 12/07	DATUM: NAVD 88 PURPOSE: POST-DEVELOPMENT NODAL DIAGRAM
HNTB HNTB CORPORATION 300 PRIMERA BLVD, SUITE 200 LAKE MARY, FL 32746 (407) 805-0355 CERT. OF AUTH. NO. 6500 ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E. FL. REGISTRATION NO. 44794	LAKE COUNTY FLORIDA	*LAKE COUNTY* SOUTH HANCOCK ROAD

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BASIN BREAKDOWN

HNTB

		DATE
MADE BY:	MSF	13-Feb-08
CHCK BY:	KMV	14-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION: BASIN 2

BASIN LIMITS: STA. 426+04.00 to STA 462+75, CL CONST. HANCOCK ROAD

EXISTING CONDITIONS:

LOCATION	STATION	To	STATION	BASIN WIDTH (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)	REMARKS
ON-SITE:								
BASIN 2		-		120	0.00	46.88	46.880	Discharge to Conserv II
ON-SITE SUBTOTAL:					*0.00*	*46.88*	*46.880*	
OFF-SITE:								
BASIN 2-1 (POND AREA)	-	-	-	-	0.00	3.90	3.899	Discharge to unnamed lake
OFF-SITE SUBTOTAL:					*0.00*	*3.90*	*3.899*	
TOTAL DRAINAGE AREA:					**0.000**	**50.779**	**50.779**	

PROPOSED CONDITIONS:

LOCATION	STATION	To	STATION	BASIN WIDTH (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)	REMARKS
ON-SITE:								
BASIN 2	426+04	-	462+75	120	7.69	2.97	10.660	
BASIN 2-1 (POND AREA)	-	-	-	-	2.30	1.60	3.899	Impervious is at water quality volume
ON-SITE SUBTOTAL:					*9.99*	*4.57*	*14.559*	
OFF-SITE:								
BASIN 2-2a (OFF-SITE)	426+04	-	441+00	-	0.00	27.42	27.420	Runoff Bypassed to Conserv II
BASIN 2-2b (OFF-SITE)	441+00	-	456+80	-	0.00	7.27	7.273	Runoff Bypassed to Conserv II
BASIN 2-3 (OFF-SITE)	456+80		461+20		0.00	0.82	0.817	
BASIN 2-4a (OFF-SITE)					0.00	0.39	0.390	
BASIN 2-4b (OFF-SITE)					0.00	0.32	0.320	
OFF-SITE SUBTOTAL:					*0.00*	*36.22*	*36.22*	
TOTAL DRAINAGE AREA:					**9.990**	**40.789**	**50.779**	

RUNOFF CURVE NUMBER

HNTB

MADE BY: MSF DATE: 13-Feb-08
CHECKED BY: KMV DATE: 14-Feb-08

PROJECT: SOUTH SOUTH HANCOCK ROAD

LOCATION: BASIN 2

UNDERLINE ONE: EXISTING **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious; unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98			7.69	753.62
Lakeland Sand (A)	GRASS Good Condition (On-Site)	39			2.97	115.83
		Totals =			10.66	869.45
		Use CN =			**81.6**	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

RUNOFF CURVE NUMBER

HNTB

MADE BY: MSF DATE: 13-Feb-08
CHECKED BY: KMV DATE: 14-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION: BASIN 2-1

UNDERLINE ONE: EXISTING **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site) (Water Quality)	98			2.30	225.40
Lakeland Sand (A)	GRASS Good Condition (On-Site)	39			1.60	62.36
		Totals =			3.90	287.76
		Use CN =			73.8	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

RUNOFF CURVE NUMBER

HNTB

MADE BY: MSF DATE: 13-Feb-08
CHECKED BY: KMV DATE: 14-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION: BASIN 2-3

UNDERLINE ONE: EXISTING **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98			0.00	0.00
Lakeland Sand (A)	GRASS Good Condition (On-Site)	39			0.82	31.86
		Totals =			0.82	31.86
		Use CN =			39.0	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

DATE:

MADE BY: MSF 13-Feb-08
CHECKED BY: KMV 14-Feb-08

HNTB

PROJECT: SOUTH SOUTH HANCOCK ROAD

LOCATION : BASIN 2

UNDERLINE ONE: EXISTING **PROPOSED**

UNDERLINE ONE: Tc Tt **Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION			
2	MANNING'S COEFFICIENT, n			
3	FLOW LENGTH, L, (< 300')		FT.	
4	2 YR/ 24 HR RAINFALL, P		IN.	
5	LAND SLOPE, S			
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)		HR. OR	MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)			
8	FLOW LENGTH, L		L.F.	
9	WATERCOURSE SLOPE, S		FT./ FT.	
10	AVERAGE VELOCITY, V		FT./SEC.	
11	Tt = L / (3600 * V)		HR. OR	MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A		S.F.	
13	WETTED PERIMETER, Pw		L.F.	
14	HYDRAULIC RADIUS, R = (A / Pw)		L.F.	
15	CHANNEL SLOPE, S		FT./FT.	
16	MANNING'S ROUGHNESS COEFFICIENT, n			
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n		FT./SEC.	
18	FLOW LENGTH, L		L.F.	
19	Tt = L / (3600 V)		HR. OR	MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)			

TOTAL Tc = 22.63 MIN.
PER ASAD

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

STORM SEWER HYDRAULICS

System: **POND 2**

PROJECT			
Number:	41516-2	Organization:	HNTB Corporation
Description:	HANCOCK ROAD	Designed by:	MSF
County:	LAKE	Checked by:	

CONDITIONS					
Outfall Tailwater El:	98.06	Storm Event - IDF Curve		Runoff Coeff. (default)		
Exit Loss at Outfall:	0.00	Zone	Frequency	Area 1	Area 2	Area 3
Storm Sewer Control El	100.00	7	10	0.95	0.20	0.20

HGL method: Standard FDOT (Jump HGL to pipe crown).

FROM / TO	Drainage Areas				Tc	Travel	Inten.	Total	Flow (cfs)			Inlet Elevations		Pipe Elevations		Fall	Pipe	HGL	Flow	Velocity	Capacity	Mann'g
Station / Offset	Area	Runoff	C*A	Lcl CA		Time		CA	Qb	S-Qb		Inlet	HGL	HGL			Height	(%)	Type	Actual		'N'
Type Brls Len		Coeff		JpStrm					Qfd	S-Qfd	CIA		Min HGL	Crown Line			Width	FL		Physical		
	(A)	(C)	(CA)	Tot CA	(min)	(min)	(in/hr)	(ac)	Qdw	S-Qdw	TOTAL	Clear.	Jnc Loss	Flow Line		(ft)	(in)	(%)		(fps)	(cfs)	
S-200	0.32	0.95	0.30	0.33					0.00	0.00		127.03	123.98	123.29	122.24	1.05	18.00	0.9289	Partial	6.66		
429+20.00 5.48	0.13	0.20	0.02	0.00	10.00	0.28	7.41	0.33	0.00	0.00	2.46		0.00	124.40	122.10				sub		16.22	0.0120
CI-1-B 1 113.23	0.00	0.00	0.00	0.33					0.00	0.00	**2.46**	3.05	0.69	122.90	120.60	2.30	18.00	2.0313		9.18		
S-201	0.32	0.95	0.31	0.35					0.00	0.00		124.77	122.15	121.14	117.79	3.35	18.00	1.4074	Partial	8.08		
430+00.00 -44.50	0.19	0.20	0.03	0.44	10.73	0.49	7.24	0.80	0.00	0.00	5.79		0.00	122.00	117.70				sub		15.30	0.0120
CI-1-B 1 238.02	0.00	0.00	0.00	0.80					0.00	0.00	**5.79**	2.62	1.01	120.50	116.20	4.30	18.00	1.8066		8.66		
S-202	0.11	0.95	0.10	0.11					0.00	0.00		124.76	122.24	122.20	122.15	0.04	18.00	0.0838	Full	1.86		
430+35.98 -1.29	0.04	0.20	0.00	0.33	10.28	0.44	7.34	0.44	0.00	0.00	3.29		0.00	122.10	122.00						4.93	0.0120
CI-1-B 1 53.23	0.00	0.00	0.00	0.44					0.00	0.00	**3.29**	2.52	0.04	120.60	120.50	0.10	18.00	0.1879		2.79		
S-204	0.10	0.95	0.10	0.10					0.00	0.00		122.95	119.30	119.12	117.85	1.27	18.00	1.0687	Partial	4.91		
431+19.98 40.25	0.01	0.20	0.00	0.00	10.00	0.40	7.41	0.10	0.00	0.00	0.77		0.00	120.40	117.80				sub		16.84	0.0120
CI-5-B 1 118.70	0.00	0.00	0.00	0.10					0.00	0.00	**0.77**	3.65	0.19	118.90	116.30	2.60	18.00	2.1904		9.53		
S-205	0.27	0.95	0.26	0.28					0.00	0.00		120.36	117.79	117.49	115.22	2.26	18.00	0.7838	Full	5.70		
432+41.02 -44.50	0.10	0.20	0.02	1.12	11.22	0.84	7.12	1.41	0.00	0.00	10.07		0.00	117.70	112.90						14.67	0.0120
CI-1-B 1 288.98	0.00	0.00	0.00	1.41					0.00	0.00	**10.07**	2.57	0.30	116.20	111.40	4.80	18.00	1.6610		8.30		
S-206	0.22	0.95	0.21	0.22					0.00	0.00		120.36	117.85	117.83	117.79	0.04	18.00	0.0446	Full	1.36		
432+41.68 40.25	0.03	0.20	0.00	0.10	10.40	0.68	7.31	0.32	0.00	0.00	2.40		0.00	117.80	117.70						3.98	0.0120
CI-5-B 1 81.75	0.00	0.00	0.00	0.32					0.00	0.00	**2.40**	2.51	0.02	116.30	116.20	0.10	18.00	0.1223		2.25		
S-207	0.26	0.95	0.25	0.26					0.00	0.00		115.53	115.22	114.88	114.42	0.46	18.00	1.0518	Full	6.60		
435+33.00 -44.50	0.08	0.20	0.01	1.41	12.06	0.11	6.94	1.68	0.00	0.00	11.67		0.00	112.90	112.70						7.67	0.0120
CI-1-B 1 44.00	0.00	0.00	0.00	1.68					0.00	0.00	**11.67**	0.31	0.34	111.40	111.20	0.20	18.00	0.4546		4.34		
S-208	0.24	0.95	0.23	0.24					0.00	0.00		115.53	114.58	114.57	114.56	0.01	18.00	0.0249	Full	1.02		
435+33.00 40.25	0.05	0.20	0.01	0.00	10.00	0.37	7.41	0.24	0.00	0.00	1.80		0.00	112.90	112.60						9.40	0.0120
CI-5-B 1 44.00	0.00	0.00	0.00	0.24					0.00	0.00	**1.80**	0.95	0.01	111.40	111.10	0.30	18.00	0.6818		5.32		
S-209	0.09	0.95	0.09	0.10					0.00	0.00		115.28	114.42	114.14	113.96	0.18	24.00	0.4194	Full	5.05		
435+80.00 -44.50	0.03	0.20	0.00	2.19	12.17	0.15	6.92	2.29	0.00	0.00	15.87		0.00	109.40	109.30						11.68	0.0120
CI-2-B 1 44.00	0.00	0.00	0.00	2.29					0.00	0.00	**15.87**	0.86	0.28	107.40	107.30	0.10	24.00	0.2273		3.72		
S-210	0.09	0.95	0.08	0.09					0.00	0.00		115.28	114.56	114.51	114.42	0.09	18.00	0.1082	Full	2.12		
435+80.00 40.25	0.03	0.20	0.00	0.41	10.37	0.64	7.32	0.51	0.00	0.00	3.74		0.00	109.90	109.80						3.98	0.0120
CI-6-B 1 81.75	0.00	0.00	0.00	0.51					0.00	0.00	**3.74**	0.72	0.05	108.40	108.30	0.10	18.00	0.1223		2.25		
S-211	0.14	0.95	0.14	0.15					0.00	0.00		115.35	113.96	113.73	112.92	0.81	24.00	0.4754	Full	5.38		
436+27.00 -44.50	0.09	0.20	0.01	2.29	12.32	0.53	6.89	2.45	0.00	0.00	16.90		0.00	109.30	109.10						8.41	0.0120
CI-1-B 1 170.00	0.00	0.00	0.00	2.45					0.00	0.00	**16.90**	1.39	0.22	107.30	107.10	0.20	24.00	0.1176		2.68		
S-212	0.16	0.95	0.16	0.17					0.00	0.00		115.35	114.57	114.56	114.56	0.01	18.00	0.0128	Full	0.73		
436+27.00 40.25	0.07	0.20	0.01	0.00	10.00	0.37	7.41	0.17	0.00	0.00	1.29		0.00	110.00	109.90						5.43	0.0120
CI-5-B 1 44.00	0.00	0.00	0.00	0.17					0.00	0.00	**1.29**	0.78	0.01	108.50	108.40	0.10	18.00	0.2273		3.07		

16

Units: ENGLISH

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Portions of ASAD were developed by Kenneth J. Leeming, P.E. at International Engineering Consultants, Inc.

STORM SEWER HYDRAULICS

System: **POND 2**

PROJECT

Number: 41516-2
Description: HANCOCK ROAD
County: LAKE

Organization: HNTB Corporation
Designed by: MSF
Checked by:

CONDITIONS

Outfall Tailwater El:	98.06	Storm Event - IDF Curve		Runoff Coeff. (default)		
Exit Loss at Outfall:	0.00	Zone	Frequency	Area 1	Area 2	Area 3
Storm Sewer Control El	100.00	7	10	0.95	0.20	0.20

HGL method: Standard FDOT (Jump HGL to pipe crown).

FROM / TO	Drainage Areas				Tc	Travel	Inten.	Total	Flow (cfs)			Inlet Elevations		Pipe Elevations		Fall	Pipe	HGL	Flow	Velocity	Capacity	Mann'g
Station / Offset	Area	Runoff Coeff	C*A	Lcl CA / JpStrm		Time		CA	Qb / Qfd / Qdw	S-Qb / S-Qfd / S-Qdw	CIA / TOTAL	Inlet / Clear.	HGL / Min HGL / Jnc Loss	HGL / Crown Line / Flow Line			Height / Width	(%) / FL	Type	Actual / Physical		'N'
Type Brls Len	(A)	(C)	(CA)	Tot CA	(min)	(min)	(in/hr)	(ac)								(ft)	(in)	(%)		(fps)	(cfs)	
S-213 **S-215**	0.17	0.95	0.16	0.18					0.00	0.00		117.38	112.92	112.63	111.41	1.22	24.00	0.6206	Full	6.15		
438+00.00 -44.50	0.10	0.20	0.02	2.65	12.85	0.53	6.79	2.84	0.00	0.00	19.31		0.00	109.10	108.90						7.81	0.0120
CI-1-B 1 197.01	0.00	0.00	0.00	2.84					0.00	0.00	**19.31**	4.46	0.29	107.10	106.90	0.20	24.00	0.1015		2.49		
S-214 **S-213**	0.19	0.95	0.18	0.20					0.00	0.00		117.38	113.94	113.83	113.63	0.20	18.00	0.2447	Partial	2.71		
438+00.00 40.25	0.08	0.20	0.01	0.00	10.00	0.50	7.41	0.20	0.00	0.00	1.52		0.00	114.80	114.60				super		5.63	0.0120
CI-5-B 1 81.75	0.00	0.00	0.00	0.20					0.00	0.00	**1.52**	3.44	0.11	113.30	113.10	0.20	18.00	0.2447		3.19		
S-215 **S-216**	0.00	0.95	0.00	0.00					0.00	0.00		119.29	111.41	111.12	109.33	1.79	24.00	0.6023	Full	6.05		
440+00.00 -43.00	0.00	0.20	0.00	2.84	13.38	0.82	6.69	2.84	0.00	0.00	19.02		0.00	108.90	108.50						8.99	0.0120
MH-7 1 297.00	0.00	0.00	0.00	2.84					0.00	0.00	**19.02**	7.88	0.28	106.90	106.50	0.40	24.00	0.1347		2.86		
S-216 **S-218**	0.25	0.95	0.23	0.26					0.00	0.00		114.22	109.33	108.93	106.87	2.07	24.00	0.8470	Full	7.18		
443+00.00 -44.50	0.13	0.20	0.02	3.18	14.20	0.57	6.54	3.44	0.00	0.00	22.55		0.00	104.50	104.40						4.96	0.0120
CI-1-B 1 244.00	0.00	0.00	0.00	3.44					0.00	0.00	**22.55**	4.89	0.40	102.50	102.40	0.10	24.00	0.0410		1.58		
S-217 **S-216**	0.33	0.95	0.32	0.33					0.00	0.00		114.22	111.05	110.90	110.70	0.20	18.00	0.2446	Partial	3.10		
443+00.00 40.25	0.09	0.20	0.01	0.00	10.00	0.44	7.41	0.33	0.00	0.00	2.51		0.00	111.70	111.50				super		5.63	0.0120
CI-5-B 1 81.75	0.00	0.00	0.00	0.33					0.00	0.00	**2.51**	3.17	0.15	110.20	110.00	0.20	18.00	0.2446		3.19		
S-218 **S-220**	0.24	0.95	0.23	0.24					0.00	0.00		110.29	106.87	106.42	106.01	0.41	24.00	0.9441	Full	7.58		
445+47.00 -44.50	0.07	0.20	0.01	3.44	14.76	0.10	6.45	3.69	0.00	0.00	23.81		0.00	104.40	104.30						11.77	0.0120
CI-1-B 1 43.33	0.00	0.00	0.00	3.69					0.00	0.00	**23.81**	3.42	0.45	102.40	102.30	0.10	24.00	0.2308		3.75		
S-219 **S-221**	0.30	0.95	0.29	0.30					0.00	0.00		110.29	107.77	107.75	107.73	0.02	18.00	0.0386	Full	1.27		
445+47.00 40.25	0.05	0.20	0.01	0.00	10.00	0.36	7.41	0.30	0.00	0.00	2.24		0.00	107.70	107.60						5.47	0.0120
CI-5-B 1 43.33	0.00	0.00	0.00	0.30					0.00	0.00	**2.24**	2.52	0.02	106.20	106.10	0.10	18.00	0.2308		3.09		
S-220 **S-222**	0.11	0.95	0.10	0.11					0.00	0.00		110.14	106.01	105.64	105.49	0.15	30.00	0.4175	Full	5.85		
445+93.33 -44.50	0.03	0.20	0.00	4.35	14.86	0.10	6.43	4.46	0.00	0.00	28.71		0.00	104.80	104.20						57.05	0.0120
CI-2-B 1 36.40	0.00	0.00	0.00	4.46					0.00	0.00	**28.71**	4.13	0.37	102.30	101.70	0.60	30.00	1.6484		11.62		
S-221 **S-220**	0.09	0.95	0.09	0.09					0.00	0.00		110.14	107.73	107.65	107.50	0.15	18.00	0.1804	Full	2.74		
445+93.33 40.25	0.02	0.20	0.00	0.56	10.36	0.50	7.32	0.66	0.00	0.00	4.83		0.00	107.60	107.50						3.98	0.0120
CI-6-B 1 81.75	0.00	0.00	0.00	0.66					0.00	0.00	**4.83**	2.41	0.08	106.10	106.00	0.10	18.00	0.1223		2.25		
S-222 **S-236**	0.24	0.95	0.23	0.25					0.00	0.00		110.29	105.49	105.18	104.00	1.18	36.00	0.3746	Full	6.26		
446+33.73 -44.50	0.11	0.20	0.02	7.64	20.95	0.84	5.59	7.90	0.00	0.00	44.23		0.00	104.70	104.00						34.03	0.0120
CI-1-J 1 315.50	0.00	0.00	0.00	7.90					0.00	0.00	**44.23**	4.80	0.30	101.70	101.00	0.70	36.00	0.2219		4.81		
S-223 **S-221**	0.25	0.95	0.24	0.26					0.00	0.00		110.29	107.76	107.74	107.73	0.01	18.00	0.0291	Full	1.10		
446+40.00 40.25	0.09	0.20	0.01	0.00	10.00	0.36	7.41	0.26	0.00	0.00	1.94		0.00	107.70	107.60						5.45	0.0120
CI-5-B 1 43.67	0.00	0.00	0.00	0.26					0.00	0.00	**1.94**	2.53	0.02	106.20	106.10	0.10	18.00	0.2290		3.08		
S-224 **S-222**	0.25	0.95	0.24	0.27					0.00	0.00		112.72	109.94	109.39	106.89	2.50	24.00	0.9532	Partial	8.38		
449+00.00 -44.50	0.15	0.20	0.03	2.90	20.43	0.52	5.65	3.18	0.00	0.00	18.00		0.00	110.10	107.60				sub		23.93	0.0120
CI-1-B 1 262.27	0.00	0.00	0.00	3.18					0.00	0.00	**18.00**	2.78	0.55	108.10	105.60	2.50	24.00	0.9532		7.62		

92

Units: ENGLISH

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STORM SEWER HYDRAULICS

System: **POND 2**

PROJECT			
Number:	41516-2	Organization:	HNTB Corporation
Description:	HANCOCK ROAD	Designed by:	MSF
County:	LAKE	Checked by:	

CONDITIONS					
Outfall Tailwater El:	98.06	Storm Event - IDF Curve		Runoff Coeff. (default)		
Exit Loss at Outfall:	0.00	Zone	Frequency	Area 1	Area 2	Area 3
Storm Sewer Control El	100.00	7	10	0.95	0.20	0.20

HGL method: Standard FDOT (Jump HGL to pipe crown).

FROM / TO	Drainage Areas				Tc	Travel	Inten.	Total	Flow (cfs)			Inlet Elevations		Pipe Elevations		Fall	Pipe	HGL	Flow	Velocity	Capacity	Mann'g
Station / Offset	Area	Runoff Coeff	C*A	Lcl CA JpStrm		Time		CA	Qb S-Qb			Inlet	HGL Min HGL	HGL Crown Line			Height Width	(%) FL	Type	Actual Physical		'N'
Type Brls Len	(A)	(C)	(CA)	Tot CA	(min)	(min)	(in/hr)	(ac)	Qfd S-Qfd Qdw S-Qdw		CIA TOTAL	Clear.	Jnc Loss	Flow Line		(ft)	(in)	(%)		(fps)	(cfs)	
S-225 **S-224**	0.29	0.95	0.27	0.30					0.00	0.00		112.72	110.16	110.13	110.10	0.03	18.00	0.0384	Full	1.26		
449+00.00 40.25	0.12	0.20	0.02	0.00	10.00	0.68	7.41	0.30	0.00	0.00	2.23		0.00	110.20	110.10						3.98	0.0120
CI-5-B 1 81.75	0.00	0.00	0.00	0.30					0.00	0.00	**2.23**	2.56	0.02	108.70	108.60	0.10	18.00	0.1223		2.25		
S-226 **S-224**	0.25	0.95	0.24	0.27					0.00	0.00		115.72	112.24	111.71	110.10	1.61	24.00	0.5404	Partial	7.56		
452+00.00 -44.50	0.15	0.20	0.03	2.33	19.77	0.66	5.73	2.60	0.00	0.00	14.94		0.00	112.50	110.10				sub		22.03	0.0120
CI-1-B 1 297.00	0.00	0.00	0.00	2.60					0.00	0.00	**14.94**	3.48	0.53	110.50	108.10	2.40	24.00	0.8081		7.01		
S-227 **S-226**	0.29	0.95	0.27	0.30					0.00	0.00		115.72	113.06	113.03	113.00	0.03	18.00	0.0388	Full	1.27		
452+00.00 40.25	0.12	0.20	0.02	0.00	10.00	0.68	7.41	0.30	0.00	0.00	2.24		0.00	113.20	113.00						5.63	0.0120
CI-5-B 1 81.75	0.00	0.00	0.00	0.30					0.00	0.00	**2.24**	2.66	0.02	111.70	111.50	0.20	18.00	0.2446		3.19		
S-228 **S-226**	0.29	0.95	0.28	0.30					0.00	0.00		121.12	119.46	117.83	112.24	5.59	18.00	1.8816	Partial	10.27		
455+00.00 -44.50	0.10	0.20	0.02	1.72	19.29	0.48	5.79	2.02	0.00	0.00	11.75		0.00	118.40	112.00				sub		16.70	0.0120
CI-1-B 1 297.00	0.38	0.00	0.00	2.02					0.00	0.00	**11.75**	1.66	1.64	116.90	110.50	6.40	18.00	2.1549		9.45		
S-228A **S-228**	0.00	0.95	0.00	0.00					0.00	0.00		123.74	120.34	120.17	119.46	0.70	18.00	0.5410	Full	4.74		
456+00.00 42.80	0.00	0.20	0.00	1.31	15.14	0.46	6.38	1.31	0.00	0.00	8.37		0.00	120.49	118.40						14.44	0.0120
MH-7 1 129.75	0.00	0.00	0.00	1.31					0.00	0.00	**8.37**	3.40	0.17	118.99	116.90	2.09	18.00	1.6108		8.17		
S-229 **S-228**	0.42	0.95	0.40	0.41					0.00	0.00		121.12	119.57	119.52	119.46	0.06	18.00	0.0730	Full	1.74		
455+00.00 40.25	0.05	0.20	0.01	0.00	10.00	0.68	7.41	0.41	0.00	0.00	3.07		0.00	118.60	118.40						5.63	0.0120
CI-5-B 1 81.75	0.00	0.00	0.00	0.41					0.00	0.00	**3.07**	1.55	0.05	117.10	116.90	0.20	18.00	0.2446		3.19		
S-230 **S-228A**	0.30	0.95	0.29	0.31					0.00	0.00		128.28	125.53	124.47	120.49	3.98	18.00	1.6707	Partial	9.19		
458+25.18 -44.50	0.09	0.20	0.01	0.99	14.70	0.43	6.46	1.31	0.00	0.00	8.46		0.00	125.20	120.49				sub		15.99	0.0120
CI-1-B 1 238.51	0.43	0.00	0.00	1.31					0.00	0.00	**8.46**	2.75	1.05	123.70	118.99	4.71	18.00	1.9748		9.05		
S-231 **S-230**	0.14	0.95	0.13	0.15					0.00	0.00		134.27	127.76	127.40	125.53	1.87	18.00	0.6896	Partial	6.84		
461+00.00 -44.50	0.08	0.20	0.01	0.84	14.04	0.66	6.57	0.99	0.00	0.00	6.56		0.00	128.10	125.20				sub		11.75	0.0120
CI-1-B 1 271.82	0.00	0.00	0.00	0.99					0.00	0.00	**6.56**	6.51	0.36	126.60	123.70	2.90	18.00	1.0669		6.65		
S-232 **S-231**	0.11	0.95	0.10	0.11					0.00	0.00		134.98	128.94	128.86	128.10	0.76	18.00	0.2569	Full	3.26		
464+00.00 -44.52	0.06	0.20	0.01	0.72	12.53	1.51	6.85	0.84	0.00	0.00	5.77		0.00	128.50	128.10						4.18	0.0120
CI-1-B 1 296.47	0.00	0.00	0.00	0.84					0.00	0.00	**5.77**	6.04	0.08	127.00	126.60	0.40	18.00	0.1349		2.37		
S-233 **S-232**	0.24	0.95	0.22	0.25					0.00	0.00		132.15	129.58	129.52	128.94	0.57	18.00	0.2081	Full	2.94		
466+80.00 -44.50	0.14	0.20	0.02	0.46	10.97	1.56	7.18	0.72	0.00	0.00	5.19		0.00	129.00	128.50						4.86	0.0120
CI-1-B 1 274.54	0.00	0.00	0.00	0.72					0.00	0.00	**5.19**	2.57	0.07	127.50	127.00	0.50	18.00	0.1821		2.75		
S-234 **S-233**	0.11	0.95	0.11	0.12					0.00	0.00		131.87	129.67	129.64	129.58	0.06	18.00	0.0897	Full	1.93		
467+49.16 -44.47	0.04	0.20	0.00	0.34	10.41	0.56	7.31	0.46	0.00	0.00	3.41		0.00	129.20	129.00						6.19	0.0120
CI-2-B 1 67.63	0.00	0.00	0.00	0.46					0.00	0.00	**3.41**	2.20	0.03	127.70	127.50	0.20	18.00	0.2957		3.50		
S-235 **S-234**	0.34	0.95	0.32	0.34					0.00	0.00		131.82	129.73	129.70	129.67	0.02	18.00	0.0505	Full	1.45		
468+00.00 -44.50	0.11	0.20	0.02	0.00	10.00	0.41	7.41	0.34	0.00	0.00	2.56		0.00	129.30	129.20						5.14	0.0120
CI-1-B 1 48.92	0.00	0.00	0.00	0.34					0.00	0.00	**2.56**	2.09	0.03	127.80	127.70	0.10	18.00	0.2044		2.91		

Units: ENGLISH

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Portions of ASAD were developed by Kenneth J. Leeming, P.E. at International Engineering Consultants, Inc.

STORM SEWER HYDRAULICS

System: **POND 2**

PROJECT		
Number:	41516-2	Organization: HNTB Corporation
Description:	HANCOCK ROAD	Designed by: MSF
County:	LAKE	Checked by:

		CONDITIONS				
Outfall Tailwater El:	98.06	Storm Event - IDF Curve		Runoff Coeff. (default)		
Exit Loss at Outfall:	0.00	Zone	Frequency	Area 1	Area 2	Area 3
Storm Sewer Control El	100.00	7	10	0.95	0.20	0.20

HGL method: Standard FDOT (Jump HGL to pipe crown).

FROM / TO	Drainage Areas				Tc	Travel	Inten.	Total	Flow (cfs)			Inlet Elevations		Pipe Elevations		Fall	Pipe	HGL	Flow	Velocity	Capacity	Mann'g
Station / Offset	Area	Runoff Coeff	C*A	Lcl CA JpStrm		Time		CA	Qb	S-Qb		Inlet	HGL	HGL			Height	(%)	Type	Actual		'N'
Type Brls Len									Qfd	S-Qfd	CIA		Min HGL	Crown Line			Width	FL		Physical		
	(A)	(C)	(CA)	Tot CA	(min)	(min)	(in/hr)	(ac)	Qdw	S-Qdw	**TOTAL**	Clear.	Jnc Loss	Flow Line		(ft)	(in)	(%)		(fps)	(cfs)	
S-236	0.00	0.95	0.00	0.00					0.00	0.00		108.40	103.15	102.86	101.73	1.12	36.00	0.3621	Full	6.15		
446+35.14 -365.00	0.00	0.20	0.00	7.90	21.79	0.84	5.50	7.90	0.00	0.00	43.48		0.00	104.00	100.20						80.00	0.0120
MH-7-J 1 309.99	0.00	0.00	0.00	7.90					0.00	0.00	**43.48**	5.25	0.29	101.00	97.20	3.80	36.00	1.2258		11.32		
S-237 **S-237A**	0.00	0.95	0.00	0.00					0.00	0.00		101.97	101.73	101.45	100.00	1.45	36.00	0.3503	Full	6.05		
446+36.52 -679.99	0.00	0.20	0.00	7.90	22.63	0.00	5.41	7.90	0.00	0.00	42.77		0.00	100.20	100.00						15.89	0.0120
MH-7-J 1 413.74	0.00	0.00	0.00	7.90					0.00	0.00	**42.77**	0.24	0.28	97.20	97.00	0.20	36.00	0.0483		2.25		

Units: ENGLISH

Automated Storm sewer Analysis & Design (ASAD), copyright 1992-2007, Hiteshew Engineering Systems, Inc. Ph: (352) 383-4191
Portions of ASAD were developed by Kenneth J. Leeming, P.E. at International Engineering Consultants, Inc.

TIME OF CONCENTRATION CALCULATIONS

HNTB

DATE:

MADE BY: MSF 13-Feb-08
CHECKED BY: KMV 14-Feb-08

PROJECT: SOUTH SOUTH HANCOCK ROAD

LOCATION : BASIN 2-1

UNDERLINE ONE: EXISTING **PROPOSED**

UNDERLINE ONE: Tc Tt **Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION		
2	MANNING'S COEFFICIENT, n		
3	FLOW LENGTH, L, (< 300')		FT.
4	2 YR/ 24 HR RAINFALL, P		IN.
5	LAND SLOPE, S		
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)		HR. OR 0.00 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)		
8	FLOW LENGTH, L		L.F.
9	WATERCOURSE SLOPE, S		FT./ FT.
10	AVERAGE VELOCITY, V		FT./SEC.
11	Tt = L / (3600 * V)		HR. OR 0.00 MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A		S.F.
13	WETTED PERIMETER, Pw		L.F.
14	HYDRAULIC RADIUS, R = (A / Pw)		L.F.
15	CHANNEL SLOPE, S		FT./FT.
16	MANNING'S ROUGHNESS COEFFICIENT, n		
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n		FT./SEC.
18	FLOW LENGTH, L		L.F.
19	Tt = L / (3600 V)		HR. OR 0.00 MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)		

TOTAL Tc = 5.00 MIN.

ASSUME 5 MIN FOR POND

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

HNTB

DATE:
MADE BY: MSF 13-Feb-08
CHECKED BY: KMV 14-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION : BASIN 2-3

UNDERLINE ONE: EXISTING **PROPOSED**

UNDERLINE ONE: **Tc** **Tt Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION	SHORT GRASS			
2	MANNING'S COEFFICIENT, n	0.150			
3	FLOW LENGTH, L, (< 300')	300		FT.	
4	2 YR/ 24 HR RAINFALL, P	4.70		IN.	
5	LAND SLOPE, S	0.0233			
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)	0.3051		HR. OR	18.31 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)	UNPAVED	PAVED		
8	FLOW LENGTH, L	124	244	L.F.	
9	WATERCOURSE SLOPE, S	0.0315	0.018	FT./ FT.	
10	AVERAGE VELOCITY, V	2.861	2.755	FT./SEC.	
11	Tt = L / (3600 * V)	0.012	0.025	HR. OR	2.20 MIN.
			(to S-228)		

CHANNEL FLOW:

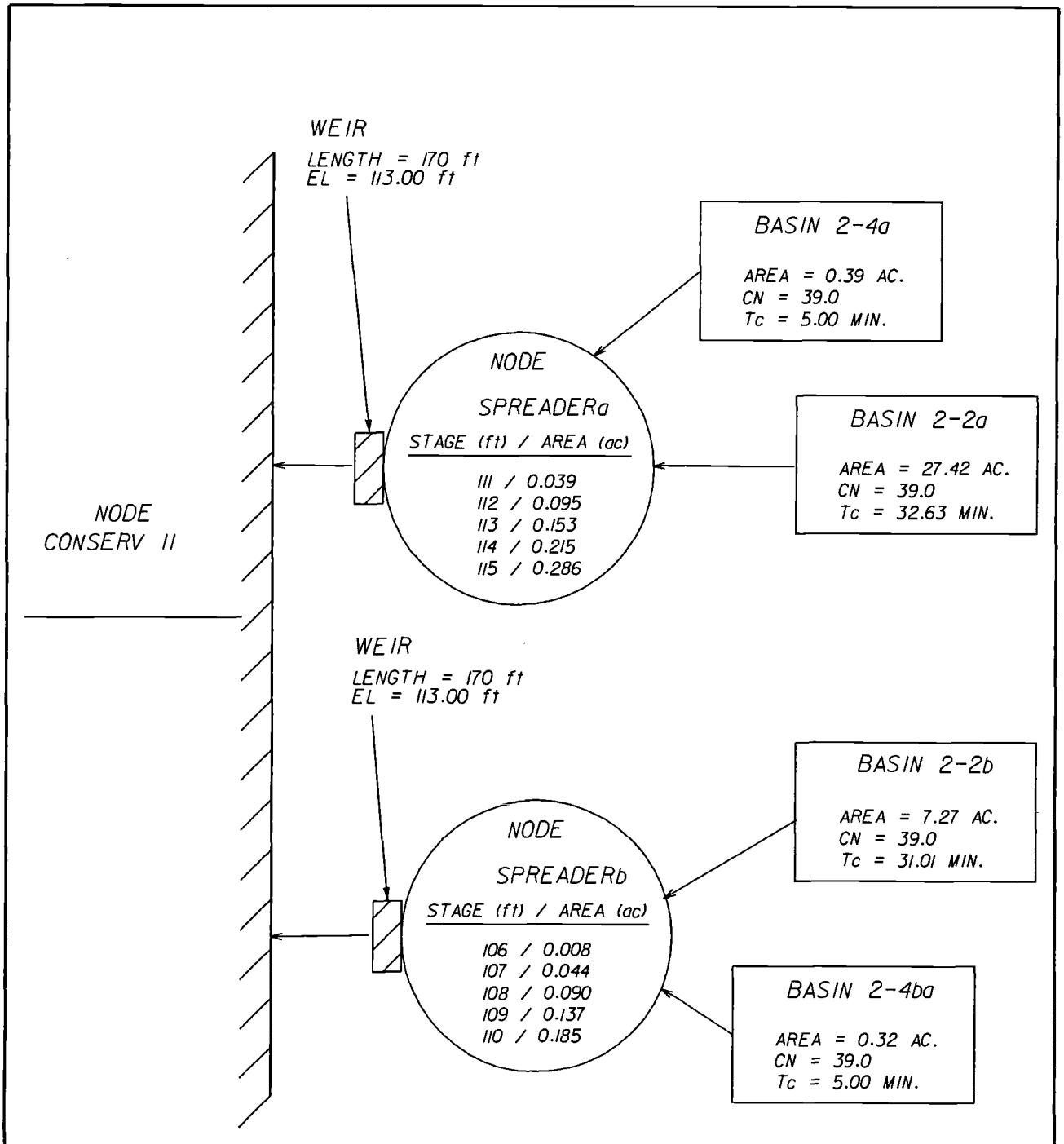
12	CROSS-SECTIONAL FLOW AREA, A			S.F.	
13	WETTED PERIMETER, Pw			L.F.	
14	HYDRAULIC RADIUS, R = (A / Pw)			L.F.	
15	CHANNEL SLOPE, S			FT./FT.	
16	MANNING'S ROUGHNESS COEFFICIENT, n				
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n			FT./SEC.	(pipe flow from S-228)
18	FLOW LENGTH, L			L.F.	
19	Tt = L / (3600 V)			HR. OR	3.34 MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)				

TOTAL Tc = 23.84 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

Bypass Drainage Basin Data



BASIN 2 (BYPASS)

LOCATION: LAKE COUNTY SEC. 9, 10, 15 & 16; T23S; R26E SOUTH HANCOCK ROAD CONSTRUCTION US 27 TO HARTWOOD MARSH ROAD	COUNTY: LAKE STATE: FLORIDA DATE: 12/07	DATUM: NAVD 88 PURPOSE: POST-DEVELOPMENT NODAL DIAGRAM
HNTB HNTB CORPORATION 300 PRIMERA BLVD, SUITE 200 LAKE MARY, FL 32746 (407) 805-0355 CERT. OF AUTH. NO. 6500 ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E. FL. REGISTRATION NO. 44794	LAKE COUNTY FLORIDA	*LAKE COUNTY* SOUTH HANCOCK ROAD

5/12/2008 5:12:39 PM \\LKMw00\prmwork\Jobs\41561-2\41561205201\drainage\NODALDIAGRAMpost.dgn

RUNOFF CURVE NUMBER

HNTB

MADE BY: MSF DATE: 13-Feb-08
CHECKED BY: KMV DATE: 14-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION: BASIN 2-2a Runoff Bypassed to Conservation Area

UNDERLINE ONE: EXISTING **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98			0.00	0.00
Lakeland Sand (A)	GRASS Good Condition (On-Site)	39			27.42	1069.38
		Totals =			27.42	1069.38
		Use CN =			39.0	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

HNTB

RUNOFF CURVE NUMBER

MADE BY: MSF DATE: 13-Feb-08
CHECKED BY: KMV DATE: 14-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION: BASIN 2-2b Runoff Bypassed to Conservation Area

UNDERLINE ONE: EXISTING **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98			0.00	0.00
Lakeland Sand (A)	GRASS Good Condition (On-Site)	39			7.27	283.64
		Totals =			7.27	283.64
		Use CN =			39.0	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

RUNOFF CURVE NUMBER

MADE BY: MSF DATE: 13-Feb-08
CHECKED BY: KMV DATE: 14-Feb-08

PROJECT: **SOUTH HANCOCK ROAD**

LOCATION: **BASIN 2-4a**

UNDERLINE ONE: **EXISTING** **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98			0.00	0.00
Lakeland Sand (A)	GRASS Good Condition (On-Site)	39			0.39	15.21
		Totals =			0.39	15.21
		Use CN =			**39.0**	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

RUNOFF CURVE NUMBER

MADE BY: MSF DATE: 13-Feb-08
CHECKED BY: KMV DATE: 14-Feb-08

PROJECT: **SOUTH HANCOCK ROAD**

LOCATION: **BASIN 2-4b**

UNDERLINE ONE: **EXISTING** **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98			0.00	0.00
Lakeland Sand (A)	GRASS Good Condition (On-Site)	39			0.32	12.48
		Totals =			0.32	12.48
		Use CN =			**39.0**	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

DATE:

MADE BY: MSF 13-Feb-08
CHECKED BY: KMV 14-Feb-08

P HNTB **SOUTH SOUTH HANCOCK ROAD**

LOCATION : BASIN 2-2a Runoff Bypassed to Conservation Area

UNDERLINE ONE: **EXISTING** **PROPOSED**

UNDERLINE ONE: **Tc** **Tt** **Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION	SHORT GRASS			
2	MANNING'S COEFFICIENT, n	0.150			
3	FLOW LENGTH, L, (< 300')	300		FT.	
4	2 YR/ 24 HR RAINFALL, P	4.70		IN.	
5	LAND SLOPE, S	0.0207			
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)	0.3203		HR. OR	19.22 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)	UNPAVED			
8	FLOW LENGTH, L	1325		L.F.	
9	WATERCOURSE SLOPE, S	0.0159		FT./ FT.	
10	AVERAGE VELOCITY, V	2.036		FT./SEC.	
11	Tt = L / (3600 * V)	0.181		HR. OR	10.85 MIN.

CHANNEL FLOW:

		ditch flow	pipe flow			
12	CROSS-SECTIONAL FLOW AREA, A	8.50	1.96	S.F.		
13	WETTED PERIMETER, Pw	12.28	9.96	L.F.		
14	HYDRAULIC RADIUS, R = (A / Pw)	0.69	0.20	L.F.		
15	CHANNEL SLOPE, S	0.015	0.001	FT./FT.		
16	MANNING'S ROUGHNESS COEFFICIENT, n	0.042	0.012			
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n	3.399	1.122	FT./SEC.		
18	FLOW LENGTH, L	100	140	L.F.		
19	Tt = L / (3600*V)	0.01	0.03	HR. OR	2.57	MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)					

TOTAL Tc = 32.63 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

DATE:

MADE BY: MSF 13-Feb-08
CHECKED BY: KMV 14-Feb-08

PHNTB **SOUTH SOUTH HANCOCK ROAD**

LOCATION : BASIN 2-2b Runoff Bypassed to Conservation Area

UNDERLINE ONE: **EXISTING** **PROPOSED**

UNDERLINE ONE: **Tc** **Tt** **Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION	SHORT GRASS		
2	MANNING'S COEFFICIENT, n	0.150		
3	FLOW LENGTH, L, (< 300')	300	FT.	
4	2 YR/ 24 HR RAINFALL, P	4.70	IN.	
5	LAND SLOPE, S	0.0207		
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)	0.3203	HR. OR	19.22 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)	UNPAVED	UNPAVED	
8	FLOW LENGTH, L	595		L.F.
9	WATERCOURSE SLOPE, S	0.0197		FT./ FT.
10	AVERAGE VELOCITY, V	2.263		FT./SEC.
11	Tt = L / (3600 * V)	0.073		HR. OR 4.38 MIN.

CHANNEL FLOW:

		ditch flow	pipe flow	
12	CROSS-SECTIONAL FLOW AREA, A	8.50	0.98	S.F.
13	WETTED PERIMETER, Pw	12.28	4.98	L.F.
14	HYDRAULIC RADIUS, R = (A / Pw)	0.69	0.20	L.F.
15	CHANNEL SLOPE, S	0.008	0.0004	FT./FT.
16	MANNING'S ROUGHNESS COEFFICIENT, n	0.042	0.012	
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n	2.555	0.859	FT./SEC.
18	FLOW LENGTH, L	425	239	L.F.
19	Tt = L / (3600 V)	0.046	0.08	HR. OR 7.41 MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)			

TOTAL Tc = 31.01 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

DATE:

MADE BY: MSF 13-Feb-08
CHECKED BY: KMV 14-Feb-08

PROJECT: SOUTH SOUTH HANCOCK ROAD

LOCATION : BASIN 2-4a

UNDERLINE ONE: EXISTING **PROPOSED**

UNDERLINE ONE: Tc Tt **Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION		
2	MANNING'S COEFFICIENT, n		
3	FLOW LENGTH, L, (< 300')		FT.
4	2 YR/ 24 HR RAINFALL, P		IN.
5	LAND SLOPE, S		
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)		HR. OR 0.00 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)		
8	FLOW LENGTH, L		L.F.
9	WATERCOURSE SLOPE, S		FT./ FT.
10	AVERAGE VELOCITY, V		FT./SEC.
11	Tt = L / (3600 * V)		HR. OR 0.00 MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A		S.F.
13	WETTED PERIMETER, Pw		L.F.
14	HYDRAULIC RADIUS, R = (A / Pw)		L.F.
15	CHANNEL SLOPE, S		FT./FT.
16	MANNING'S ROUGHNESS COEFFICIENT, n		
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n		FT./SEC.
18	FLOW LENGTH, L		L.F.
19	Tt = L / (3600 V)		HR. OR 0.00 MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)		

TOTAL Tc = 5.00 MIN.

ASSUME 5 MIN FOR SPREADER SWALE

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

DATE:

MADE BY: MSF 13-Feb-08
CHECKED BY: KMV 14-Feb-08

PROJECT: SOUTH SOUTH HANCOCK ROAD

LOCATION : BASIN 2-4b

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

1	SURFACE DESCRIPTION		
2	MANNING'S COEFFICIENT, n		
3	FLOW LENGTH, L, (< 300')		FT.
4	2 YR/ 24 HR RAINFALL, P		IN.
5	LAND SLOPE, S		
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)		HR. OR 0.00 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)		
8	FLOW LENGTH, L		L.F.
9	WATERCOURSE SLOPE, S		FT./ FT.
10	AVERAGE VELOCITY, V		FT./SEC.
11	Tt = L / (3600 * V)		HR. OR 0.00 MIN.

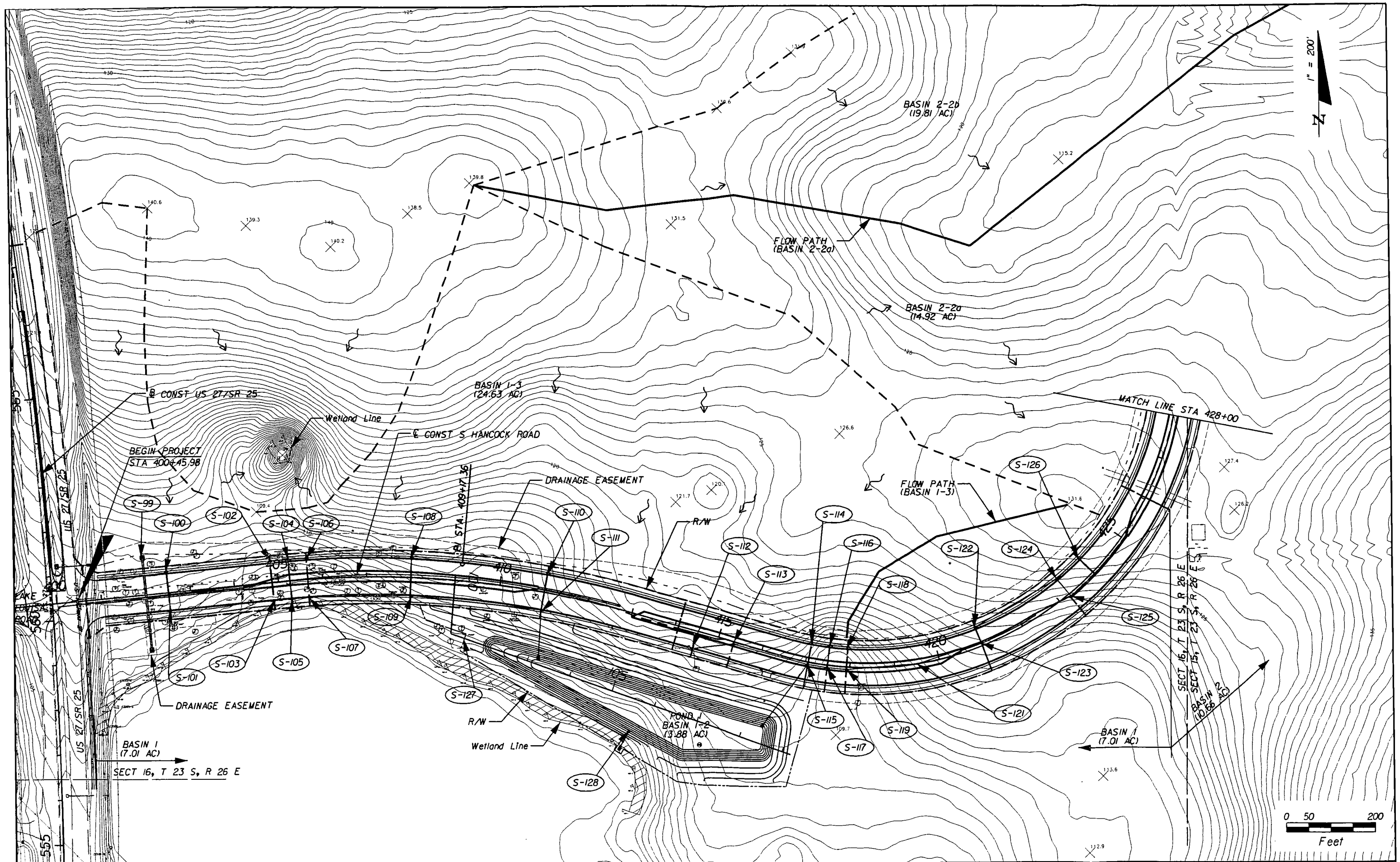
CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A		S.F.
13	WETTED PERIMETER, Pw		L.F.
14	HYDRAULIC RADIUS, R = (A / Pw)		L.F.
15	CHANNEL SLOPE, S		FT./FT.
16	MANNING'S ROUGHNESS COEFFICIENT, n		
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n		FT./SEC.
18	FLOW LENGTH, L		L.F.
19	Tt = L / (3600 V)		HR. OR 0.00 MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)		

TOTAL Tc = 5.00 MIN.

ASSUME 5 MIN FOR SPREADER SWALE

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986



REVISIONS		
DATE	BY	DESCRIPTION

HNTB

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

ENGINEER OF RECORD: KAREN W. VAN DEN AVONT, P.E.
FL. REGISTRATION NO. 44794

LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

DRAINAGE FLOW PATH POST DEVELOPMENT

SHEET NO.

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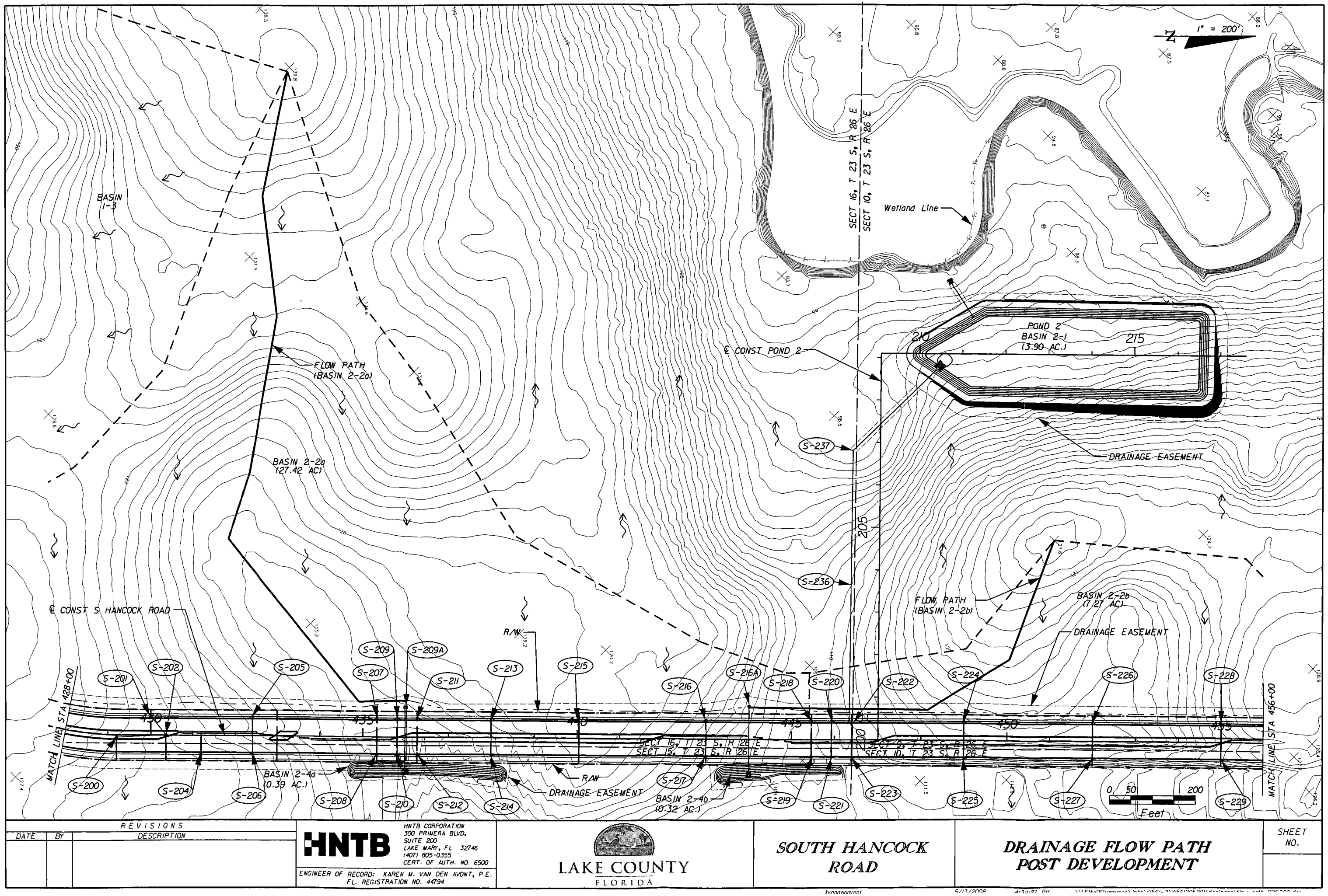

REVISIONS		
DATE	BY	DESCRIPTION

HNTB

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ENGINEER OF RECORD: KAREN W. VAN DEN AVONT, P.E.
FL. REGISTRATION NO. 44794

LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

DRAINAGE FLOW PATH POST DEVELOPMENT

SHEET NO.

Water Quality Treatment and Recovery Calculations

POLLUTION ABATEMENT VOLUME

HNTB

		DATE
MADE BY:	MSF	13-Feb-08
CHCK BY:	KMV	14-Feb-08

PROJECT: SOUTH HANCOCK ROAD

LOCATION: BASIN 2

BASIN LIMITS: STA. 426+04.00 to STA 462+75.00 CL CONST. HANCOCK ROAD

TOTAL TREATMENT AREA: 14.56 AC.

IMPERVIOUS AREA: 7.69 AC. Less Pond

UNDERINE ONE: RETENTION DETENTION

UNDERINE ONE: DRY WET

UNDERINE ONE: ONLINE OFFLINE

REQUIRED TREATMENT VOLUME:

1) COMPUTE FIRST 0.5 INCH OF RUNOFF FROM PROJECT:

(0.5"/12) x 14.56 AC. = **0.61** AF

FOR ONLINE TREATMENT, ADD 0.5 IN RUNOFF

(0.5"/12) x 14.56 AC. = **0.61** AF

TOTAL = **1.21** AF

2) COMPUTE 1.25 INCHES TIMES IMPERVIOUS AREA:

(1.25"/12) x 7.69 AC. = **0.80** AF

FOR ONLINE TREATMENT, ADD 0.5 IN RUNOFF

(0.5"/12) x 14.56 AC. = **0.61** AF

TOTAL = **1.41** AF

CONTROLLING CRITERIA: 2

REQUIRED TREATMENT VOLUME: 1.41 AF

STAGE / STORAGE CALCULATIONS

HNTB

		DATE
MADE BY:	MSF	13-Feb-08
CHCK BY:	KMV	14-Feb-08

PROJECT: SOUTH HANCOCK ROAD

POND: 2

Boring	Existing Ground Elevation	Depth to Encountered Water Surface	Estimated Encountered Water Elevation	Depth to Seasonal High Water Surface	Estimated Seasonal High Water Elevation	Estimated Normal High Water Elevation	Depth to Impermeable Boundary (Stratum 3)	Estimated Impermeable Boundary Elevation
AB-4	99.5	25.0	74.5	7.5	92	83.25	8.5	91
AB-5	96.98	25.0	72.0	5	91.98	81.98	14	82.98
AB-6	99.58	25.0	74.6	7.5	92.08	83.33	9	90.58

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

AVERAGE ELEVATION (FT) 73.69 ft. 92.02 ft. 82.85 ft. 88.19 ft.

AVG. SHWT ELEVATION: 92.0 Ft. (NAVD)

AVG. GROUND WATER TABLE ELEVATION: 73.7 Ft. (NAVD)

MINIMUM POND CONTROL ELEVATION 95.0 Ft. (NAVD)
Lake County criteria is pond bottom needs to be 3 feet above seasonal high water elevation

STAGE Ft. (NAVD)	AREA AC.	AVERAGE AREA AC.	INCREMENTAL VOL. AF	CUMULATIVE VOL. AF
95.8	2.216		0.00	0.00
		2.30		
97.0	2.384		2.76	2.76
		2.46		
98.0	2.528		2.46	5.22
		2.60		
99.0	2.673		2.60	7.82
		2.75		
100.0	2.820		2.75	10.56
		2.89		
101.0	2.969		2.89	13.46

REQUIRED TREATMENT VOLUME: 1.41 AF

TREATMENT ELEVATION 96.41 Ft. Check total retention volume

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

FACTOR OF SAFETY: 2 = 7.5 Inches/Hr.= 15 Ft./Day

1 / 1

STAGE / STORAGE CALCULATIONS

HNTB

		DATE
MADE BY:	MSF	13-May-08
CHCK BY:	KMV	14-May-08

PROJECT: SOUTH HANCOCK ROAD

POND: 2

Retention Volume for 25 Year/96 Hour Storm Event
Discharge to unnamed lake
Volumes from AdICPR

Basin	Pre-development	Post Development
	CF	CF
2	0	343,358
2-1	38,834	110,807
2-2a	0	0
2-2b	0	0
2-3	0	8,137
2-4a	0	0
2-4b	0	0
TOTAL	**38,834**	**462,302**

REQUIRED ATTENUATION VOLUME: 423,468 CF

REQUIRED ATTENUATION VOLUME: 9.72 AF

POND STAGE: 99.69 Ft.

Discharge to Conserv II
Volumes from AdICPR

Basin	Pre-development	Post Development
	CF	CF
2	466,894	0
2-1	0	0
2-2a	0	272,928
2-2b	0	72,407
2-3	0	0
2-4a	0	3,884
2-4b	0	3,187
TOTAL	**466,894**	**352,406**

REQUIRED ATTENUATION VOLUME: -114,488 CF

REQUIRED ATTENUATION VOLUME: -2.63 AF

No attenuation is required. Construct spreader swale to dissipate energy of outflow to Conserv II.

Actual Swale Size - Spreadera

STAGE	AREA	AVERAGE AREA	INCREMENTAL VOL.	CUMULATIVE VOL
Ft. (NAVD)	AC.	AC.	AF	AF
111.0	0.000		0.00	0.00
		0.00		
112.0	0.000		0.00	0.00
		0.00		
113.0	0.000		0.00	0.00
		0.00		
114.0	0.000		0.00	0.00
		0.00		
115.0	0.000		0.00	0.00

Actual Swale Size - Spreaderb

STAGE	AREA	AVERAGE AREA	INCREMENTAL VOL.	CUMULATIVE VOL
Ft. (NAVD)	AC.	AC.	AF	AF
106.0	0.000		0.00	0.00
		0.00		
107.0	0.000		0.00	0.00
		0.00		
108.0	0.000		0.00	0.00
		0.00		
109.0	0.000		0.00	0.00
		0.00		
110.0	0.000		0.00	0.00

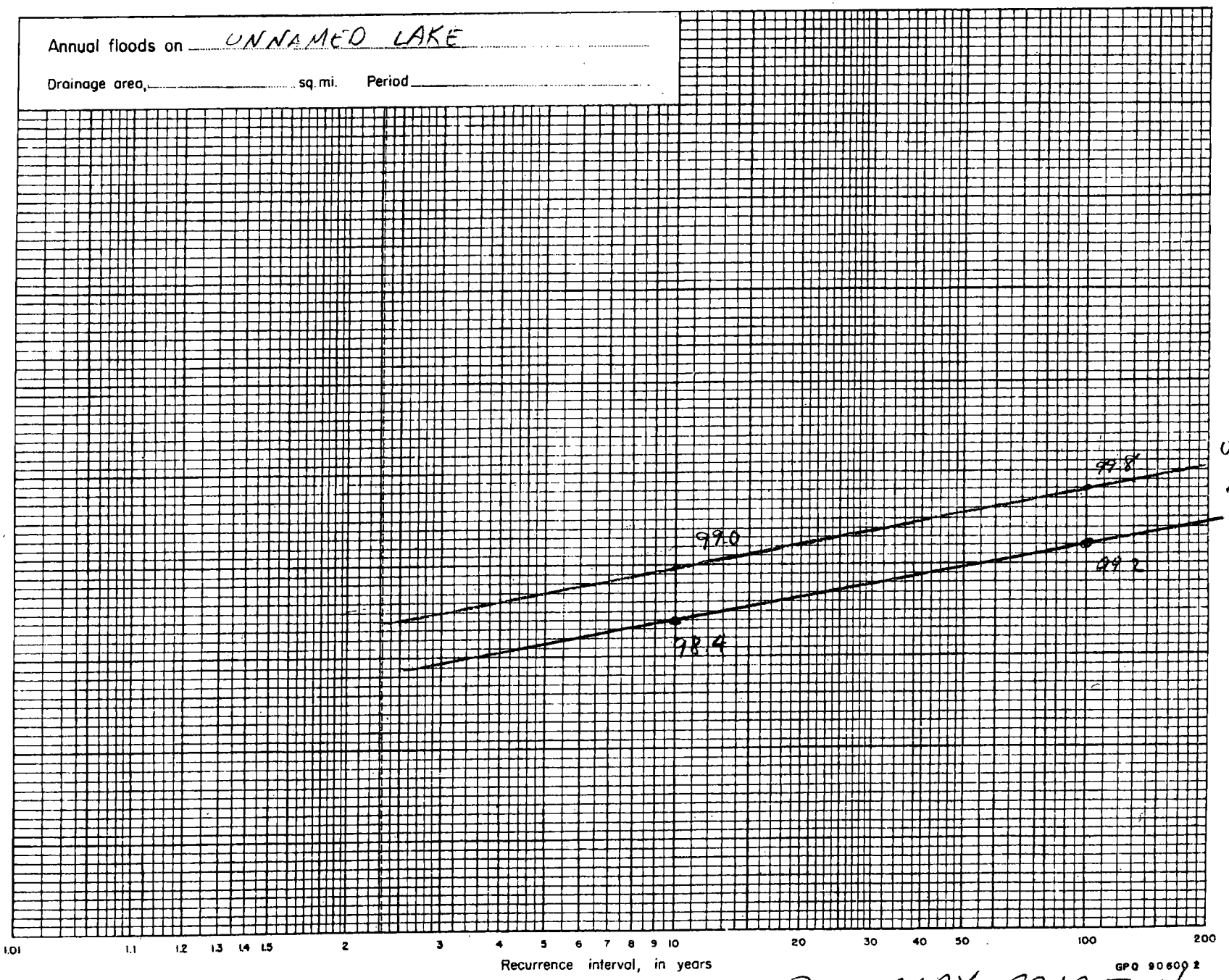
9 – 179a
Flood data plot
(March 1949)

UNITED STATES DEPARTMENT OF THE INTERIOR — GEOLOGICAL SURVEY — WATER RESOURCES DIVISION

File Number .....

Annual floods on UNNAMED LAKE

Drainage area, ... sq. mi. Period .....



GPO 90600 2

611

BOUNDARY CONDITION

==========

==== Basins ==========

==========

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

Unit Hydrograph:	Uh484	Peaking Factor:	484.0
Rainfall File:	Sjrwmd96	Storm Duration(hrs):	96.00
Rainfall Amount(in):	11.200	Time of Conc(min):	22.63
Area(ac):	10.660	Time Shift(hrs):	0.00
Curve Number:	81.60	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

Road discharge to pond

Name: BASIN 2-1 | Node: POND 2 | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph:	Uh484	Peaking Factor:	484.0
Rainfall File:	Sjrwmd96	Storm Duration(hrs):	96.00
Rainfall Amount(in):	11.200	Time of Conc(min):	5.00
Area(ac):	3.900	Time Shift(hrs):	0.00
Curve Number:	73.80	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

Pond discharge

Name: BASIN 2-2a | Node: spreadera | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph:	Uh484	Peaking Factor:	484.0
Rainfall File:	Sjrwmd96	Storm Duration(hrs):	96.00
Rainfall Amount(in):	11.200	Time of Conc(min):	32.63
Area(ac):	27.420	Time Shift(hrs):	0.00
Curve Number:	39.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

To spreader swale and then depression on Conserv II property

Name: BASIN 2-2b | Node: spreaderb | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph:	Uh484	Peaking Factor:	484.0
Rainfall File:	Sjrwmd96	Storm Duration(hrs):	96.00
Rainfall Amount(in):	11.200	Time of Conc(min):	31.01
Area(ac):	7.270	Time Shift(hrs):	0.00
Curve Number:	39.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

To spreader swale and then depression on Conserv II property

Name: BASIN 2-3 | Node: POND 2 | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph:	Uh484	Peaking Factor:	484.0
Rainfall File:	Sjrwmd96	Storm Duration(hrs):	96.00
Rainfall Amount(in):	11.200	Time of Conc(min):	23.84
Area(ac):	0.817	Time Shift(hrs):	0.00
Curve Number:	39.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

Offsite area discharge to road and then pond

Name: BASIN 2-4a | Node: spreadera | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph:	Uh484	Peaking Factor:	484.0
Rainfall File:	Sjrwmd96	Storm Duration(hrs):	96.00
Rainfall Amount(in):	11.200	Time of Conc(min):	5.00
Area(ac):	0.390	Time Shift(hrs):	0.00
Curve Number:	39.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

To spreader swale and then depression on Conserv II property

Name: BASIN 2-4b Node: spreadera Status: Onsite
Group: BASE Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh484 Peaking Factor: 484.0
Rainfall File: Sjrwmd96 Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.200 Time of Conc(min): 5.00
Area(ac): 0.320 Time Shift(hrs): 0.00
Curve Number: 39.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

To spreader swale and then depression on Conserv II property

Nodes

Name: conservII Base Flow(cfs): 0.000 Init Stage(ft): 105.000
Group: BASE Warn Stage(ft): 105.000
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	105.000
120.00	105.000

Name: POND 2 Base Flow(cfs): 0.000 Init Stage(ft): 95.800
Group: BASE Warn Stage(ft): 101.000
Type: Stage/Area

Stage(ft)	Area(ac)
95.800	2.2160
97.000	2.3840
98.000	2.5280
99.000	2.6730
100.000	2.8200
101.000	2.9690

Name: spreadera Base Flow(cfs): 0.000 Init Stage(ft): 111.000
Group: BASE Warn Stage(ft): 115.000
Type: Stage/Area

Stage(ft)	Area(ac)
111.000	0.0390
112.000	0.0950
113.000	0.1530
114.000	0.2150
115.000	0.2860

Name: spreaderb Base Flow(cfs): 0.000 Init Stage(ft): 106.000
Group: BASE Warn Stage(ft): 110.000
Type: Stage/Area

Stage(ft)	Area(ac)
106.000	0.0080
107.000	0.0440
108.000	0.0900
109.000	0.1370
110.000	0.1850

Name: UNNAMED LK Base Flow(cfs): 0.000 Init Stage(ft): 91.000
Group: BASE Warn Stage(ft): 100.000
Type: Time/Stage

Time(hrs)	Stage(ft)

0.00	91.000
120.00	99.000
150.00	98.000

==== Drop Structures ====

Name: POND 2 From Node: POND 2 Length(ft): 95.00
Group: BASE To Node: UNNAMED LK Count: 1

	UPSTREAM	DOWNSTREAM
Geometry:	Circular	Circular
Span(in):	18.00	18.00
Rise(in):	18.00	18.00
Invert(ft):	97.000	96.000
Manning's N:	0.012000	0.012000
Top Clip(in):	0.000	0.000
Bot Clip(in):	0.000	0.000

Friction Equation: Average Conveyance
Solution Algorithm: Automatic
Flow: Both
Entrance Loss Coef: 0.500
Exit Loss Coef: 1.000
Outlet Ctrl Spec: Use dc or tw
Inlet Ctrl Spec: Use dn
Solution Incs: 10

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

*** Weir 1 of 1 for Drop Structure POND 2 ***

TABLE

Count: 1 Bottom Clip(in): 0.000
Type: Horizontal Top Clip(in): 0.000
Flow: Both Weir Disc Coef: 3.200
Geometry: Rectangular Orifice Disc Coef: 0.600

Span(in): 36.00 Invert(ft): 100.250
Rise(in): 28.00 Control Elev(ft): 100.250

==== Weirs ====

Name: spreadera From Node: spreadera
Group: BASE To Node: conservII
Flow: Both Count: 1
Type: Vertical: Mavis Geometry: Rectangular

Span(in): 170.00
Rise(in): 240.00
Invert(ft): 113.000
Control Elevation(ft): 113.000

TABLE

Bottom Clip(in): 0.000
Top Clip(in): 0.000
Weir Discharge Coef: 3.200
Orifice Discharge Coef: 0.600

Name: spreaderb From Node: spreaderb
Group: BASE To Node: conservII
Flow: Both Count: 1
Type: Vertical: Mavis Geometry: Rectangular

Span(in): 138.00
Rise(in): 240.00
Invert(ft): 108.600
Control Elevation(ft): 108.600

TABLE

Bottom Clip(in): 0.000
Top Clip(in): 0.000
Weir Discharge Coef: 3.200
Orifice Discharge Coef: 0.600

==== Hydrology Simulations ====

Name:
Filename:

Override Defaults: No

Time(hrs)	Print Inc(min)

Name: 100Y24H
Filename: W:\Jobs\41561-2\TECHPROD\DRAIN\ICPR\1003Y24H.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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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

Name: 25Y24H
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y96H.R32

Override Defaults: No

Time(hrs)	Print Inc(min)
50.000	60.00
62.000	15.00
97.000	60.00

==========

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

Name: 100Y24H Hydrology Sim: 100Y24H
Filename: W:\Jobs\41561-2\TECHPROD\DRAIN\ICPR\100Y24H.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: 10Y24H Hydrology Sim: 10Y24H
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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

Group	Run
BASE	Yes

Name: 2.3Y24H Hydrology Sim: 2.3Y24H
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\2.3Y24H.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: 25Y24H Hydrology Sim: 25Y24H

Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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

South Hancock Road
Post Development
Basin 2
Basin Max

Simulation	Basin	Group	Time Max hrs	Flow Max cfs	Volume in	Volume ft3
100Y24H	BASIN 2	BASE	12.12	68.167	9.163	354557.412
100Y24H	BASIN 2-1	BASE	12.00	28.808	8.108	114783.284
100Y24H	BASIN 2-2a	BASE	12.33	44.343	2.910	289655.322
100Y24H	BASIN 2-2b	BASE	12.27	11.993	2.914	76889.163
100Y24H	BASIN 2-3	BASE	12.18	1.505	2.915	8644.280
100Y24H	BASIN 2-4a	BASE	12.01	1.082	2.915	4126.501
100Y24H	BASIN 2-4b	BASE	12.01	0.888	2.915	3385.847
10Y24H	BASIN 2	BASE	12.12	35.102	4.585	177425.298
10Y24H	BASIN 2-1	BASE	12.00	13.939	3.756	53172.398
10Y24H	BASIN 2-2a	BASE	12.47	6.342	0.662	65843.754
10Y24H	BASIN 2-2b	BASE	12.47	1.701	0.663	17488.669
10Y24H	BASIN 2-3	BASE	12.34	0.212	0.663	1966.566
10Y24H	BASIN 2-4a	BASE	12.02	0.160	0.663	938.787
10Y24H	BASIN 2-4b	BASE	12.02	0.132	0.663	770.286
2.3Y24H	BASIN 2	BASE	12.12	18.048	2.337	90448.457
2.3Y24H	BASIN 2-1	BASE	12.01	6.559	1.728	24459.855
2.3Y24H	BASIN 2-2a	BASE	18.63	0.196	0.068	6795.112
2.3Y24H	BASIN 2-2b	BASE	18.61	0.052	0.069	1808.812
2.3Y24H	BASIN 2-3	BASE	18.54	0.006	0.069	203.549
2.3Y24H	BASIN 2-4a	BASE	18.50	0.003	0.069	97.173
2.3Y24H	BASIN 2-4b	BASE	18.50	0.002	0.069	79.732
25Y24H	BASIN 2	BASE	12.12	46.152	6.088	235589.201
25Y24H	BASIN 2-1	BASE	12.00	18.867	5.164	73110.729
25Y24H	BASIN 2-2a	BASE	12.40	16.091	1.281	127488.058
25Y24H	BASIN 2-2b	BASE	12.33	4.331	1.283	33851.409
25Y24H	BASIN 2-3	BASE	12.24	0.538	1.283	3806.121
25Y24H	BASIN 2-4a	BASE	12.02	0.421	1.283	1816.930
25Y24H	BASIN 2-4b	BASE	12.02	0.345	1.283	1490.814
25Y96H	BASIN 2	BASE	60.04	53.561	8.873	343358.420
25Y96H	BASIN 2-1	BASE	60.00	20.303	7.827	110806.707
25Y96H	BASIN 2-2a	BASE	60.18	37.946	2.742	272928.246
25Y96H	BASIN 2-2b	BASE	60.16	10.330	2.744	72407.003
25Y96H	BASIN 2-3	BASE	60.13	1.300	2.744	8137.281
25Y96H	BASIN 2-4a	BASE	60.01	0.834	2.744	3884.547
25Y96H	BASIN 2-4b	BASE	60.01	0.684	2.744	3187.321

12

South Hancock Road
Post Development
Basin 2
Node Min/Max

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
conservII	BASE	100Y24H	0.00	105.000	105.000	0.0000	0	12.31	54.262	0.00	0.000
POND 2	BASE	100Y24H	26.02	100.158	101.000	0.0050	123864	12.00	89.258	0.00	0.000
spreadera	BASE	100Y24H	12.31	113.967	115.000	0.0050	9276	12.25	44.494	12.31	43.093
spreaderb	BASE	100Y24H	12.33	109.053	110.000	0.0048	6078	12.25	11.862	12.33	11.211
UNNAMED LK	BASE	100Y24H	40.00	93.667	100.000	0.0011	0	0.00	0.000	0.00	0.000
conservII	BASE	10Y24H	0.00	105.000	105.000	0.0000	0	12.73	5.182	0.00	0.000
POND 2	BASE	10Y24H	26.00	98.061	101.000	0.0050	110505	12.00	43.935	0.00	0.000
spreadera	BASE	10Y24H	12.73	113.236	115.000	0.0050	7301	12.50	6.388	12.73	5.182
spreaderb	BASE	10Y24H	14.44	108.655	110.000	0.0040	5262	12.50	1.676	14.44	0.477
UNNAMED LK	BASE	10Y24H	40.00	93.667	100.000	0.0011	0	0.00	0.000	0.00	0.000
conservII	BASE	2.3Y24H	0.00	105.000	105.000	0.0000	0	0.00	0.000	0.00	0.000
POND 2	BASE	2.3Y24H	26.00	96.960	101.000	0.0050	103604	12.00	21.493	0.00	0.000
spreadera	BASE	2.3Y24H	26.00	112.790	115.000	0.0042	6135	20.00	0.192	0.00	0.000
spreaderb	BASE	2.3Y24H	26.00	107.303	110.000	0.0036	2523	20.00	0.050	0.00	0.000
UNNAMED LK	BASE	2.3Y24H	40.00	93.667	100.000	0.0011	0	0.00	0.000	0.00	0.000
conservII	BASE	25Y24H	0.00	105.000	105.000	0.0000	0	12.61	16.286	0.00	0.000
POND 2	BASE	25Y24H	26.02	98.771	101.000	0.0050	114993	12.00	58.900	0.00	0.000
spreadera	BASE	25Y24H	12.51	113.481	115.000	0.0050	7965	12.50	15.234	12.51	15.138
spreaderb	BASE	25Y24H	12.71	108.785	110.000	0.0050	5527	12.25	4.012	12.71	2.922
UNNAMED LK	BASE	25Y24H	40.00	93.667	100.000	0.0011	0	0.00	0.000	0.00	0.000
conservII	BASE	25Y96H	0.00	105.000	105.000	0.0000	0	60.27	45.552	0.00	0.000
POND 2	BASE	25Y96H	97.00	100.060	101.000	0.0030	123230	60.00	73.779	0.00	0.000
spreadera	BASE	25Y96H	60.27	113.859	115.000	0.0050	8984	60.25	36.895	60.27	36.085
spreaderb	BASE	25Y96H	60.27	109.005	110.000	0.0050	5977	60.25	9.740	60.27	9.467
UNNAMED LK	BASE	25Y96H	97.00	97.466	100.000	0.0011	0	0.00	0.000	0.00	0.000

122

PONDS Version 3.3.0223
Retention Pond Recovery - Refined Method
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Project Data

Project Name:	South Hancock Road Pond 2
Simulation Description:	Pond 2 Water Qualtiy Volume Recovery
Project Number:	41561.002
Engineer :	KMV
Supervising Engineer:	
Date:	05-13-2008

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum):	88.20
Water Table Elevation, [WT] (ft datum):	92.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day):	15.00
Fillable Porosity, [n] (%):	30.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day):	15.0
Maximum Area For Unsaturated Infiltration, [Av] (ft^2):	100248.0

Geometry Data

Equivalent Pond Length, [L] (ft):	554.0
Equivalent Pond Width, [W] (ft):	180.0

Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft^2)
95.80	96541.0
97.00	103862.0
98.00	110111.0
99.00	116447.0
100.00	122847.0
101.00	129348.0

Scenario Input Data

Scenario 1 :: Water Quality

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft^3) 61420

Initial ground water level (ft datum) default, 92.00

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	2.100	3.200	7.000	14.000
0.250	2.200	3.300	8.000	15.000
0.500	2.300	3.400	9.000	16.000
1.000	2.400	3.500	10.000	
1.500	2.500	4.000	11.000	
1.750	3.000	5.000	12.000	
2.000	3.100	6.000	13.000	

Detailed Results :: *Scenario 1* :: *Water Quality*

Elapsed Time (hours)	Inflow Rate (ft³/s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft³/s)	Overflow Discharge (ft³/s)	Cumulative Inflow Volume (ft³)	Cumulative Infiltration Volume (ft³)	Cumulative Discharge Volume (ft³)	Flow Type
0.000	10236.6700	0.0000	92.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	10236.6700	0.0000	96.423	17.39208	0.00000	61420.0	104.4	0.0	U/P
2.400	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
6.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
12.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
24.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
36.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
42.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
48.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
50.400	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
52.800	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
55.200	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
57.600	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
60.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
72.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
74.400	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
76.800	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
79.200	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
81.600	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
84.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
96.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
120.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
144.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
168.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
192.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
216.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
240.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
264.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
288.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
312.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
336.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
360.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry
384.000	0.0000	0.0000	----	----	----	61420.0	61420.0	0.0	dry

← RECOVERY

PONDS Version 3.3.0223
Retention Pond Recovery - Refined Method
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Devo Seereeram, Ph.D., P.E.

Project Data

Project Name:	South Hancock Road Pond 2
Simulation Description:	Pond 2 25 yr/96hr Attenuation Volume Recovery
Project Number:	41561.002
Engineer :	KMV
Supervising Engineer:	
Date:	05-13-2008

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum):	88.20
Water Table Elevation, [WT] (ft datum):	92.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day):	15.00
Fillable Porosity, [n] (%):	30.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day):	15.0
Maximum Area For Unsaturated Infiltration, [Av] (ft^2):	121981.0

Geometry Data

Equivalent Pond Length, [L] (ft):	602.0
Equivalent Pond Width, [W] (ft):	204.0

Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft^2)
95.80	96541.0
97.00	103862.0
98.00	110111.0
99.00	116447.0
100.00	122847.0
101.00	129348.0

Scenario Input Data

Scenario 1 :: 25 year/96 hour attenuation

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft^3) 423468

Initial ground water level (ft datum) default, 92.00

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	2.400	6.000	16.000	26.000
0.250	2.500	7.000	17.000	27.000
0.500	3.000	8.000	18.000	28.000
1.000	3.100	9.000	19.000	29.000
1.500	3.200	10.000	20.000	30.000
1.750	3.300	11.000	21.000	31.000
2.000	3.400	12.000	22.000	
2.100	3.500	13.000	23.000	
2.200	4.000	14.000	24.000	
2.300	5.000	15.000	25.000	

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

Elapsed Time (hours)	Inflow Rate (ft³/s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft³/s)	Overflow Discharge (ft³/s)	Cumulative Inflow Volume (ft³)	Cumulative Infiltration Volume (ft³)	Cumulative Discharge Volume (ft³)	Flow Type
0.000	70578.0000	0.0000	92.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	70578.0000	0.0000	99.698	20.99252	0.00000	423468.0	126.0	0.0	U/P
2.400	0.0000	0.0000	98.207	12.42517	0.00000	423468.0	173365.8	0.0	U/S
6.000	0.0000	0.0000	98.095	0.82526	0.00000	423468.0	185777.5	0.0	S
12.000	0.0000	0.0000	97.976	0.53695	0.00000	423468.0	198835.3	0.0	S
24.000	0.0000	0.0000	97.818	0.35517	0.00000	423468.0	216192.6	0.0	S
36.000	0.0000	0.0000	97.695	0.28654	0.00000	423468.0	229522.0	0.0	S
42.000	0.0000	0.0000	97.640	0.26306	0.00000	423468.0	235473.5	0.0	S
48.000	0.0000	0.0000	97.590	0.24419	0.00000	423468.0	240886.0	0.0	S
50.400	0.0000	0.0000	97.570	0.23759	0.00000	423468.0	242973.8	0.0	S
52.800	0.0000	0.0000	97.552	0.22986	0.00000	423468.0	244991.6	0.0	S
55.200	0.0000	0.0000	97.533	0.22279	0.00000	423468.0	246945.7	0.0	S
57.600	0.0000	0.0000	97.516	0.21630	0.00000	423468.0	248841.5	0.0	S
60.000	0.0000	0.0000	97.498	0.20934	0.00000	423468.0	250683.4	0.0	S
72.000	0.0000	0.0000	97.421	0.18646	0.00000	423468.0	258894.8	0.0	S
74.400	0.0000	0.0000	97.406	0.18370	0.00000	423468.0	260499.6	0.0	S
76.800	0.0000	0.0000	97.392	0.17973	0.00000	423468.0	262069.1	0.0	S
79.200	0.0000	0.0000	97.377	0.17597	0.00000	423468.0	263605.3	0.0	S
81.600	0.0000	0.0000	97.363	0.17241	0.00000	423468.0	265109.9	0.0	S
84.000	0.0000	0.0000	97.349	0.16835	0.00000	423468.0	266584.6	0.0	S
96.000	0.0000	0.0000	97.285	0.14996	0.00000	423468.0	273353.2	0.0	S
120.000	0.0000	0.0000	97.173	0.12889	0.00000	423468.0	285147.9	0.0	S
144.000	0.0000	0.0000	97.073	0.11528	0.00000	423468.0	295624.9	0.0	S
168.000	0.0000	0.0000	96.982	0.10447	0.00000	423468.0	305068.3	0.0	S
192.000	0.0000	0.0000	96.899	0.09565	0.00000	423468.0	313677.2	0.0	S
216.000	0.0000	0.0000	96.822	0.08831	0.00000	423468.0	321596.9	0.0	S
240.000	0.0000	0.0000	96.751	0.08208	0.00000	423468.0	328936.8	0.0	S
264.000	0.0000	0.0000	96.684	0.07673	0.00000	423468.0	335781.0	0.0	S
288.000	0.0000	0.0000	96.621	0.07208	0.00000	423468.0	342196.3	0.0	S
312.000	0.0000	0.0000	96.561	0.06798	0.00000	423468.0	348236.1	0.0	S
336.000	0.0000	0.0000	96.504	0.06435	0.00000	423468.0	353943.9	0.0	S
360.000	0.0000	0.0000	96.451	0.06111	0.00000	423468.0	359356.0	0.0	S
384.000	0.0000	0.0000	96.399	0.05818	0.00000	423468.0	364502.8	0.0	S
408.000	0.0000	0.0000	96.350	0.05553	0.00000	423468.0	369409.9	0.0	S
432.000	0.0000	0.0000	96.303	0.05312	0.00000	423468.0	374099.2	0.0	S
456.000	0.0000	0.0000	96.258	0.05092	0.00000	423468.0	378589.8	0.0	S
480.000	0.0000	0.0000	96.215	0.04889	0.00000	423468.0	382898.1	0.0	S
504.000	0.0000	0.0000	96.173	0.04702	0.00000	423468.0	387038.5	0.0	S
528.000	0.0000	0.0000	96.133	0.04529	0.00000	423468.0	391023.8	0.0	S
552.000	0.0000	0.0000	96.094	0.04369	0.00000	423468.0	394865.3	0.0	S
576.000	0.0000	0.0000	96.056	0.04219	0.00000	423468.0	398572.9	0.0	S
600.000	0.0000	0.0000	96.019	0.04079	0.00000	423468.0	402155.7	0.0	S
624.000	0.0000	0.0000	95.984	0.03948	0.00000	423468.0	405621.7	0.0	S
648.000	0.0000	0.0000	95.949	0.03825	0.00000	423468.0	408978.3	0.0	S
672.000	0.0000	0.0000	95.916	0.03710	0.00000	423468.0	412232.1	0.0	S
696.000	0.0000	0.0000	95.883	0.03601	0.00000	423468.0	415389.0	0.0	S
720.000	0.0000	0.0000	95.852	0.03498	0.00000	423468.0	418454.7	0.0	S
744.000	0.0000	0.0000	95.821	----	----	423468.0	421433.9	0.0	N.A.

after 14 days

2ND STORM (25 YR / 96 HR)

South Hancock Road
Post Development
Basin 2
Input

==========
==== Basins ====
==========

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

Unit Hydrograph: Uh484 | Peaking Factor: 484.0
Rainfall File: Sjrwmd96 | Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.200 | Time of Conc(min): 22.63
Area(ac): 10.660 | Time Shift(hrs): 0.00
Curve Number: 81.60 | Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Road discharge to pond

Name: BASIN 2-1 | Node: POND 2 | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh484 | Peaking Factor: 484.0
Rainfall File: Sjrwmd96 | Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.200 | Time of Conc(min): 5.00
Area(ac): 3.900 | Time Shift(hrs): 0.00
Curve Number: 73.80 | Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Pond discharge

Name: BASIN 2-2a | Node: spreadera | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh484 | Peaking Factor: 484.0
Rainfall File: Sjrwmd96 | Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.200 | Time of Conc(min): 32.63
Area(ac): 27.420 | Time Shift(hrs): 0.00
Curve Number: 39.00 | Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

To spreader swale and then depression on Conserv II property

Name: BASIN 2-2b | Node: spreaderb | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh484 | Peaking Factor: 484.0
Rainfall File: Sjrwmd96 | Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.200 | Time of Conc(min): 31.01
Area(ac): 7.270 | Time Shift(hrs): 0.00
Curve Number: 39.00 | Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

To spreader swale and then depression on Conserv II property

Name: BASIN 2-3 | Node: POND 2 | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh484 | Peaking Factor: 484.0
Rainfall File: Sjrwmd96 | Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.200 | Time of Conc(min): 23.84
Area(ac): 0.817 | Time Shift(hrs): 0.00
Curve Number: 39.00 | Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Offsite area discharge to road and then pond

Name: BASIN 2-4a | Node: spreadera | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh484 | Peaking Factor: 484.0
Rainfall File: Sjrwmd96 | Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.200 | Time of Conc(min): 5.00
Area(ac): 0.390 | Time Shift(hrs): 0.00
Curve Number: 39.00 | Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

To spreader swale and then depression on Conserv II property

Name: BASIN 2-4b Node: spreadera Status: Onsite
Group: BASE Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh484 Peaking Factor: 484.0
Rainfall File: Sjrwmd96 Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.200 Time of Conc(min): 5.00
Area(ac): 0.320 Time Shift(hrs): 0.00
Curve Number: 39.00 Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

To spreader swale and then depression on Conserv II property

Nodes

Name: conservII Base Flow(cfs): 0.000 Init Stage(ft): 105.000
Group: BASE Warn Stage(ft): 105.000
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	105.000
120.00	105.000

Name: POND 2 Base Flow(cfs): 0.000 Init Stage(ft): 96.500
Group: BASE Warn Stage(ft): 101.000
Type: Stage/Area

STAGE IN POND AFTER 14 DAYS SEE 'PONDS' OUTPUT

Stage(ft)	Area(ac)
95.800	2.2160
97.000	2.3840
98.000	2.5280
99.000	2.6730
100.000	2.8200
101.000	2.9690

Name: spreadera Base Flow(cfs): 0.000 Init Stage(ft): 111.000
Group: BASE Warn Stage(ft): 115.000
Type: Stage/Area

Stage(ft)	Area(ac)
111.000	0.0390
112.000	0.0950
113.000	0.1530
114.000	0.2150
115.000	0.2860

Name: spreaderb Base Flow(cfs): 0.000 Init Stage(ft): 106.000
Group: BASE Warn Stage(ft): 110.000
Type: Stage/Area

Stage(ft)	Area(ac)
106.000	0.0080
107.000	0.0440
108.000	0.0900
109.000	0.1370
110.000	0.1850

Name: UNNAMED LK Base Flow(cfs): 0.000 Init Stage(ft): 91.000
Group: BASE Warn Stage(ft): 100.000
Type: Time/Stage

Time(hrs)	Stage(ft)

```
--------------- ---------------
          0.00          91.000
        120.00          99.000
        150.00          98.000

=====================================================================================
==== Drop Structures ===============================================================
=====================================================================================

        Name: POND 2              From Node: POND 2            Length(ft): 95.00
       Group: BASE                  To Node: UNNAMED LK             Count: 1

              UPSTREAM       DOWNSTREAM                 Friction Equation: Average Conveyance
    Geometry: Circular       Circular                  Solution Algorithm: Automatic
    Span(in): 18.00          18.00                                  Flow: Both
    Rise(in): 18.00          18.00                    Entrance Loss Coef: 0.500
  Invert(ft): 97.000         96.000                        Exit Loss Coef: 1.000
 Manning's N: 0.012000       0.012000                    Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000          0.000                        Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000          0.000                          Solution Incs: 10

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall


*** Weir 1 of 1 for Drop Structure POND 2 ***
                                                                                TABLE
                 Count: 1                        Bottom Clip(in): 0.000
                  Type: Horizontal                  Top Clip(in): 0.000
                  Flow: Both                      Weir Disc Coef: 3.200
              Geometry: Rectangular            Orifice Disc Coef: 0.600

              Span(in): 36.00                        Invert(ft): 100.250
              Rise(in): 28.00                   Control Elev(ft): 100.250


=====================================================================================
==== Weirs =========================================================================
=====================================================================================

        Name: spreadera           From Node: spreadera
       Group: BASE                  To Node: conservII
        Flow: Both                    Count: 1
        Type: Vertical: Mavis      Geometry: Rectangular

                  Span(in): 170.00
                  Rise(in): 240.00
                Invert(ft): 113.000
      Control Elevation(ft): 113.000
                                                TABLE
            Bottom Clip(in): 0.000
               Top Clip(in): 0.000
        Weir Discharge Coef: 3.200
     Orifice Discharge Coef: 0.600


-------------------------------------------------------------------------------------------------
        Name: spreaderb           From Node: spreaderb
       Group: BASE                  To Node: conservII
        Flow: Both                    Count: 1
        Type: Vertical: Mavis      Geometry: Rectangular

                  Span(in): 138.00
                  Rise(in): 240.00
                Invert(ft): 108.600
      Control Elevation(ft): 108.600
                                                TABLE
            Bottom Clip(in): 0.000
               Top Clip(in): 0.000
        Weir Discharge Coef: 3.200
     Orifice Discharge Coef: 0.600


=====================================================================================
==== Hydrology Simulations =========================================================
=====================================================================================
```

```
         Name:
     Filename:

      Override Defaults: No

Time(hrs)       Print Inc(min)
--------------- ---------------

-------------------------------------------------------------------------------------------------------
         Name: 100Y24H
     Filename: W:\Jobs\41561-2\TECHPROD\DRAIN\ICPR\1003Y24H.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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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

-------------------------------------------------------------------------------------------------------
         Name: 25Y24H
     Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y96H.R32

      Override Defaults: No

Time(hrs)       Print Inc(min)
--------------- ---------------
50.000          60.00
62.000          15.00
97.000          60.00

=======================================================================================
```

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

Name: 100Y24H Hydrology Sim: 100Y24H
Filename: W:\Jobs\41561-2\TECHPROD\DRAIN\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): 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: 10Y24H Hydrology Sim: 10Y24H
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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): 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: 25Y24H Hydrology Sim: 25Y24H

Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\25Y24H.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: 25Y96H Hydrology Sim: 25Y96H
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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

South Hancock Road
Post Development
Basin 2
Node Min/Max for second storm even in pond

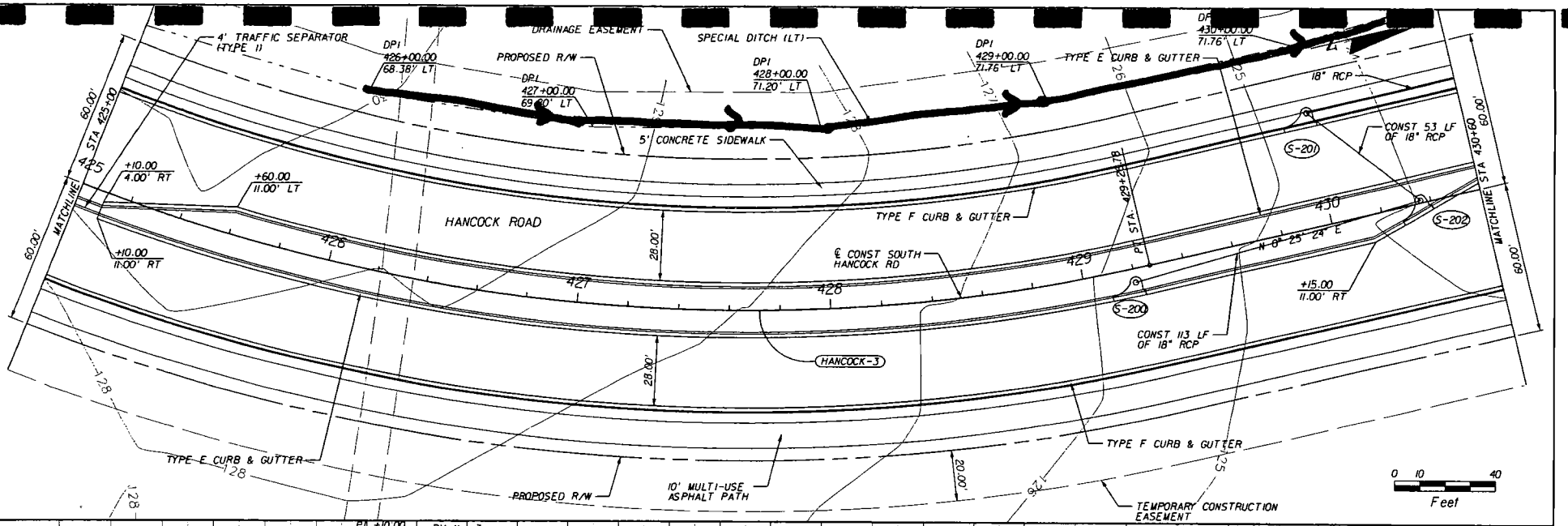
Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
conservII	BASE	25Y96H	0.00	105.000	105.000	0.0000	0	60.27	45.552	0.00	0.000
POND 2	BASE	25Y96H	96.00	100.325	101.000	0.0030	124952	60.00	73.779	96.00	0.707
spreadera	BASE	25Y96H	60.27	113.859	115.000	0.0050	8984	60.25	36.903	60.27	36.086
spreaderb	BASE	25Y96H	60.27	109.005	110.000	0.0050	5977	60.25	9.743	60.27	9.468
UNNAMED LK	BASE	25Y96H	97.00	97.467	100.000	0.0011	0	96.00	0.707	0.00	0.000

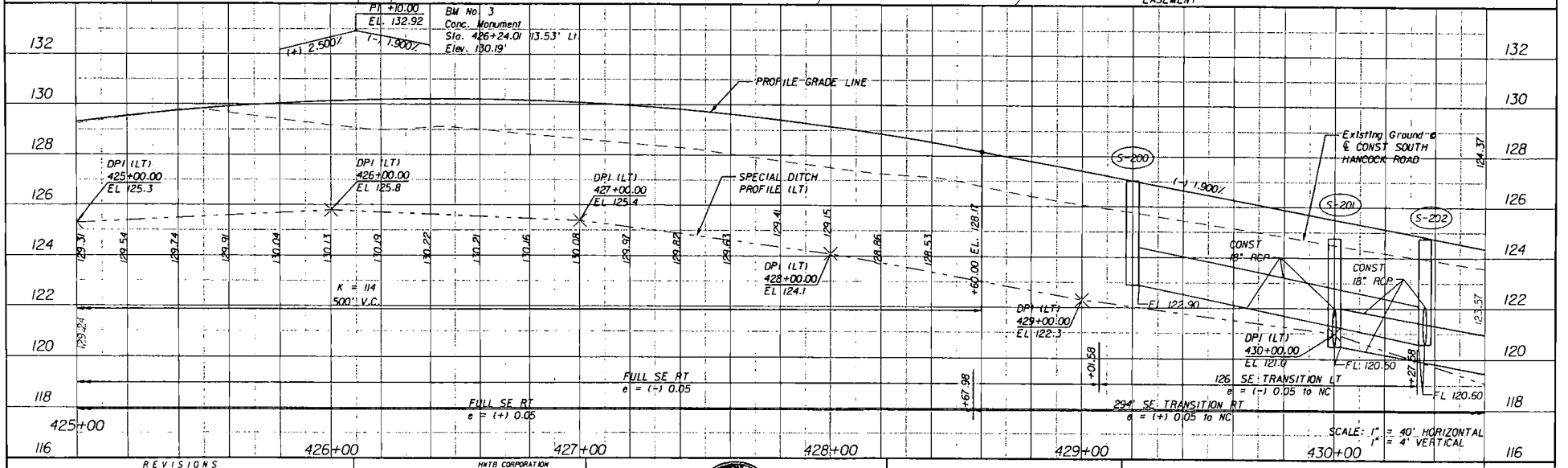
STAGE IN POND AFTER 2ND STORM
IS ADDED AFTER INITIAL 14DAY DRAWDOWN
NO INFILTRATION CONSIDERED

58/35

Bypass Drainage Basin Data

Ditch Calculations





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DATE	BY	DESCRIPTION

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300 RIVIERA BLVD.
SUITE 200
LAKE MARY, FL 32746
(407) 805-0355
CERT. OF AUTH. NO. 6500
ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.
FL. REGISTRATION NO. 44794

LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

PLAN AND PROFILE

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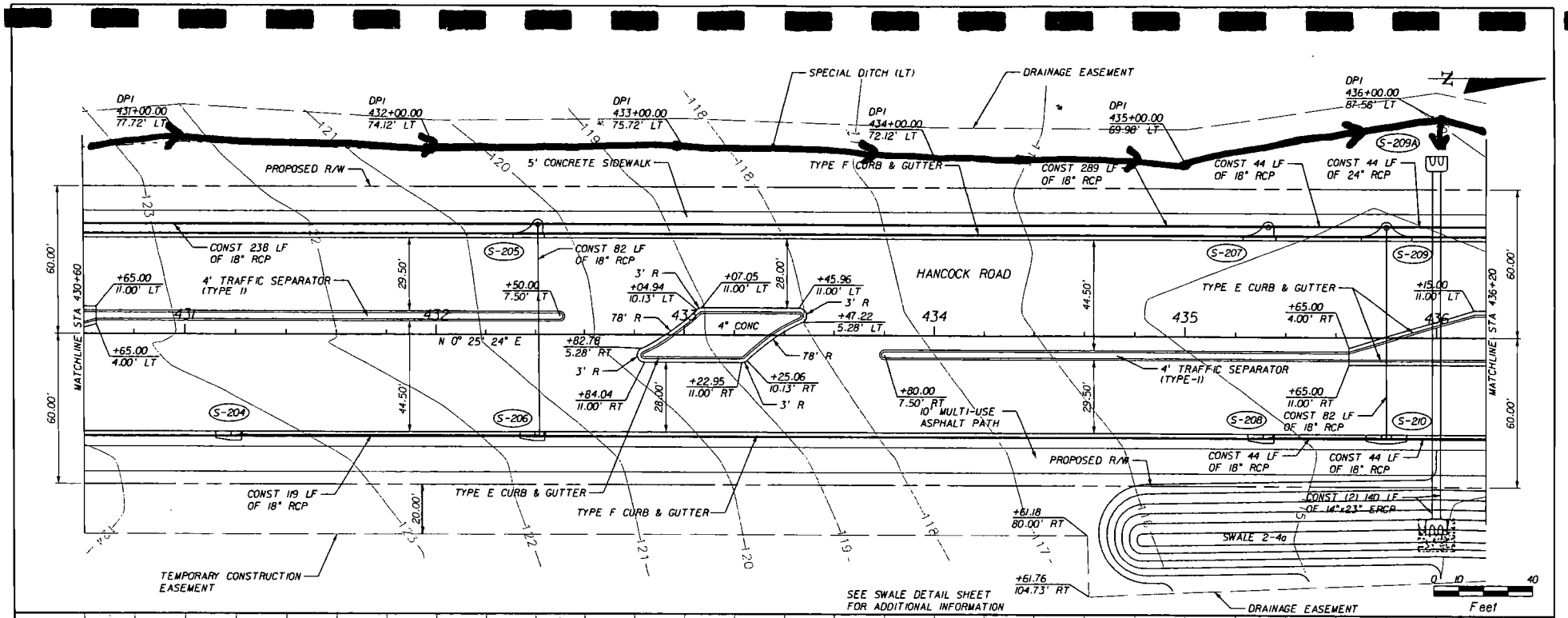

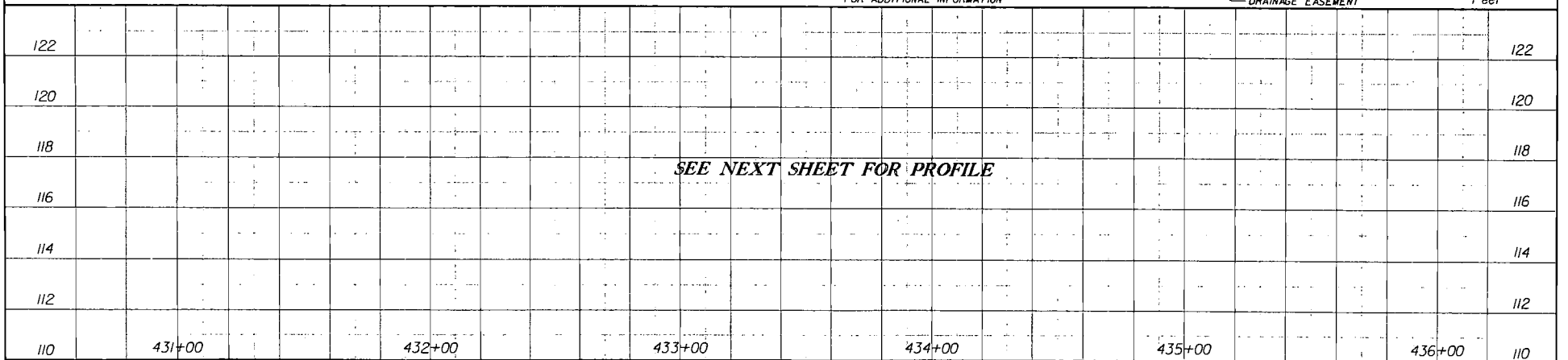

SEE NEXT SHEET FOR PROFILE

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LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

PLAN AND PROFILE

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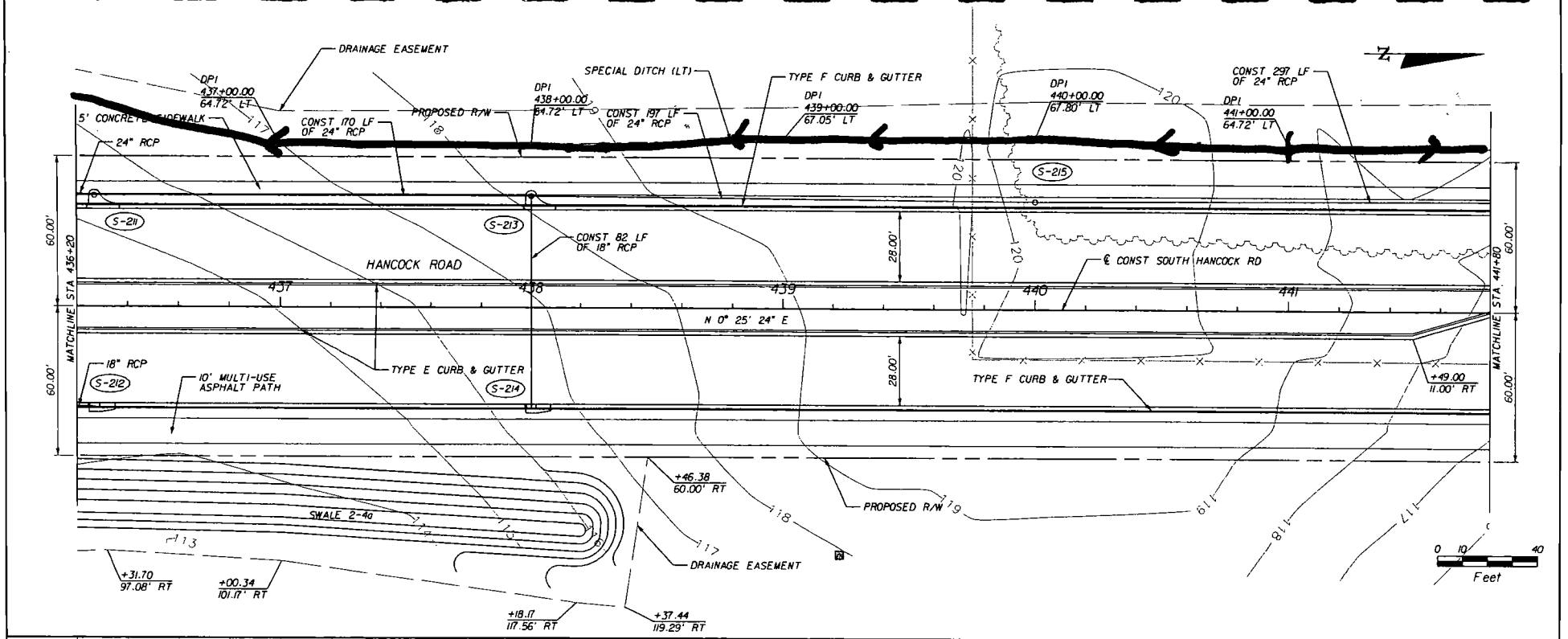
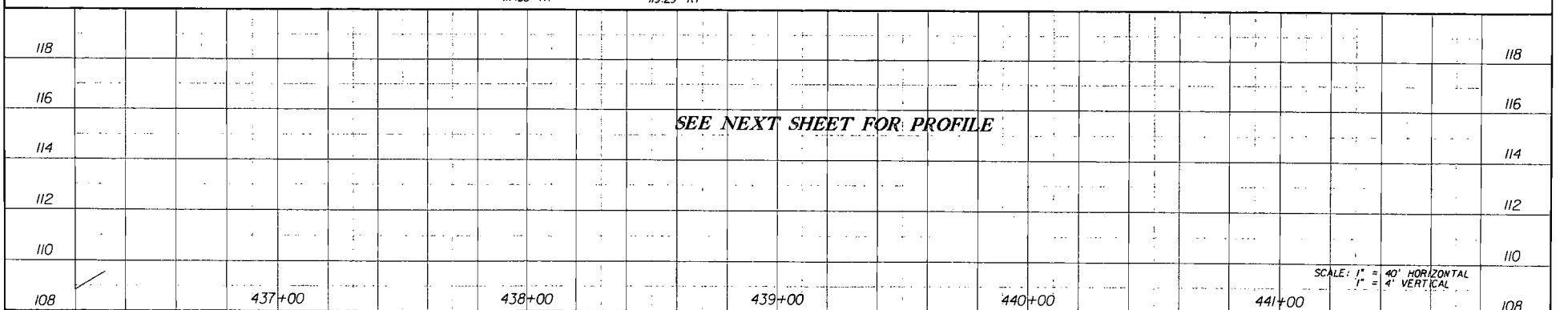
139





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SOUTH HANCOCK ROAD

PLAN AND PROFILE

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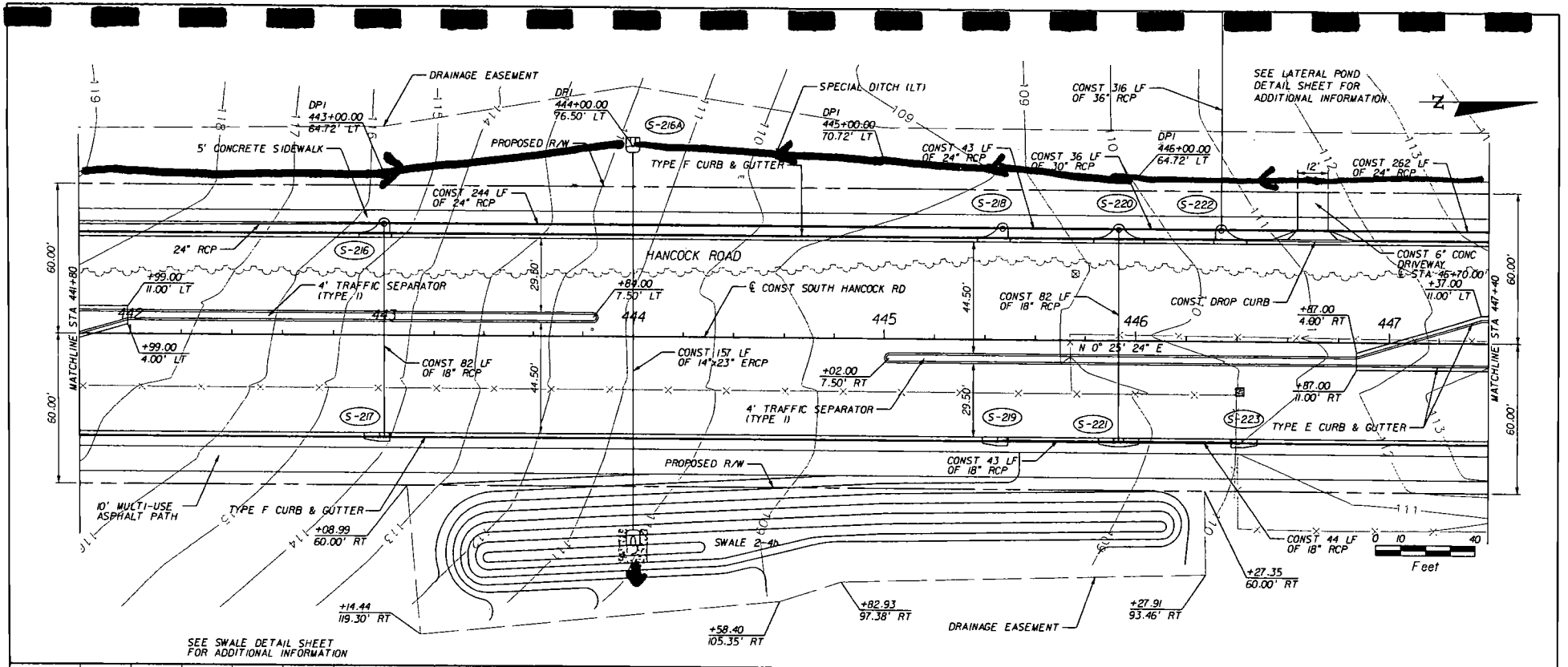
146



SEE NEXT SHEET FOR PROFILE

SCALE: 1" = 40' HORIZONTAL
1" = 4' VERTICAL

442+00 443+00 444+00 445+00 446+00 447+00

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SOUTH HANCOCK ROAD

PLAN AND PROFILE

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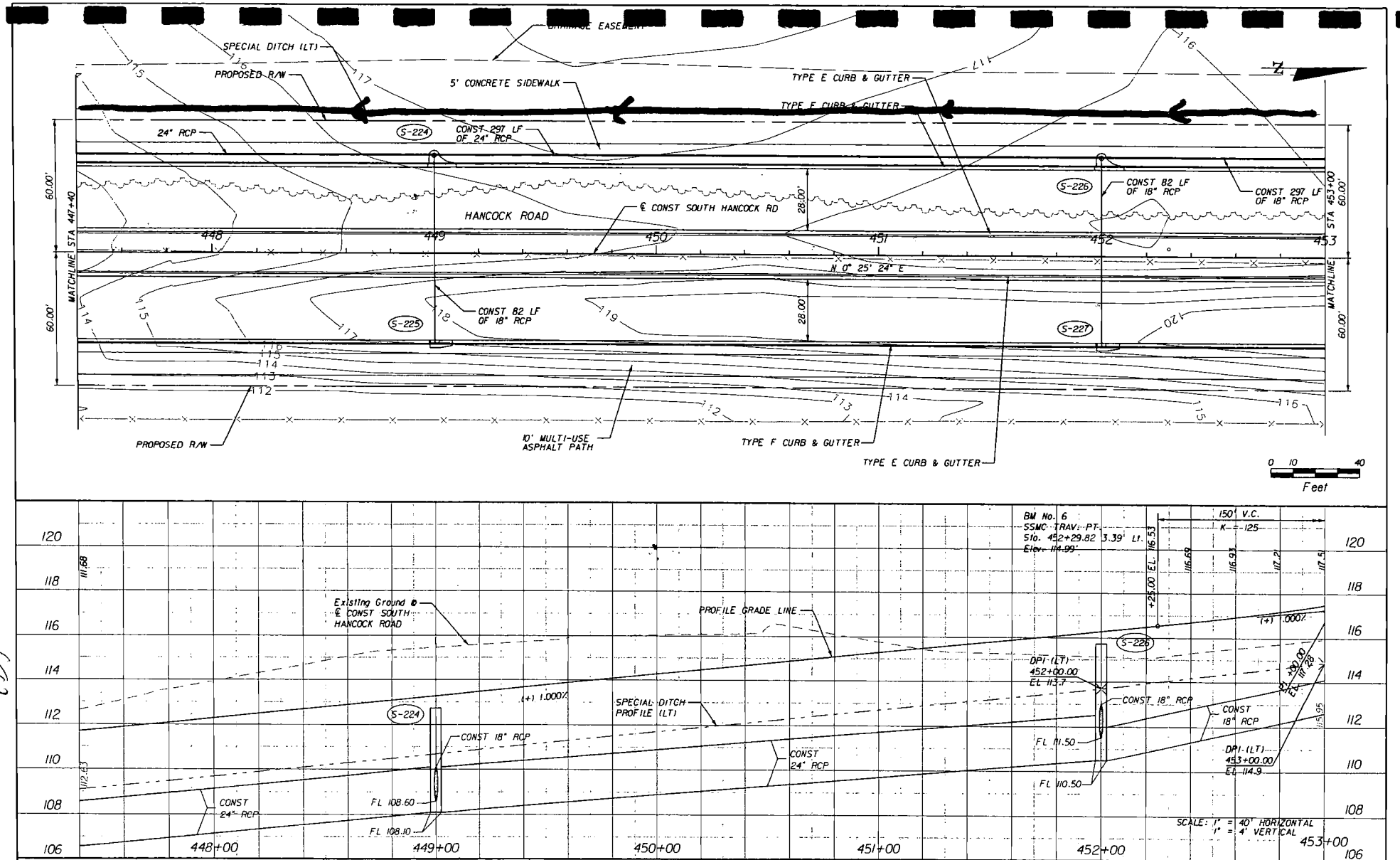
161



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FLORIDA

SOUTH HANCOCK ROAD

PLAN AND PROFILE

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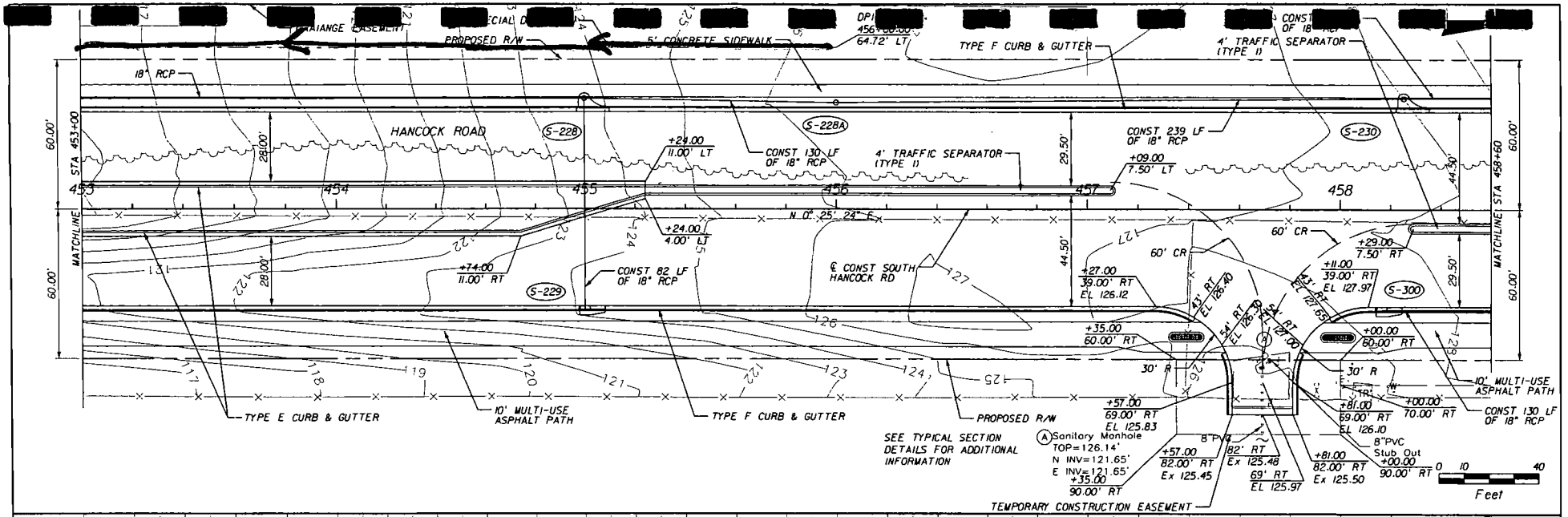

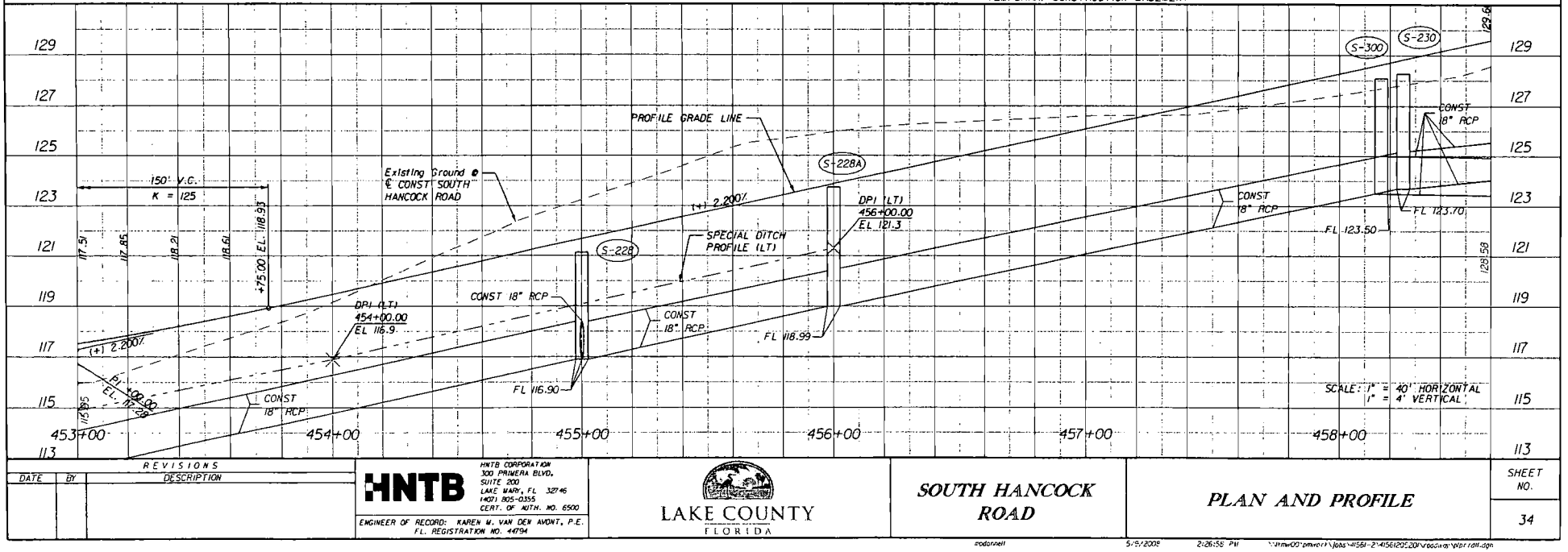

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SOUTH HANCOCK ROAD

PLAN AND PROFILE

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3 of

FHWA Urban Drainage Design Program, HY-22
HYDRAULIC PARAMETERS OF OPEN CHANNELS

Trapezoidal, Rectangular, or Triangular X-Section
Date: 02/14/2008

Project No. :41561-2
Project Name.:South Hancock Road
Computed by :MSF

Project Description
Sta 441+00 to Sta 426+00
Left Side
S-209A

INPUT PARAMETERS

1.	Channel Slope (ft/ft)	0.0150
2.	Channel Bottom Width (ft)	5.00
3.	Left Side Slope (Horizontal to 1)	3.00
4.	Right Side Slope (Horizontal to 1)	4.00
5.	Manning's Coefficient	0.042
6.	Discharge (cfs)	24.95
7.	Depth of Flow (ft)	0.92

OUTPUT RESULTS

Cross Section Area (Sqft)	7.56
Average Velocity (ft/sec)	3.30
Top Width (ft)	11.44
Hydraulic Radius (ft)	0.65
Froude Number	0.72

$y > y_c$

$V < V_c$

$\therefore$ subcritical flow

FHWA Urban Drainage Design Program, HY-22
HYDRAULIC PARAMETERS OF OPEN CHANNELS

Trapezoidal, Rectangular, or Triangular X-Section
Date: 02/14/2008

Project No. :41561-2
Project Name.:South Hancock Road
Computed by :MSF

Project Description

Sta 441+00 to Sta 426+00
Left Side
S-209A

INPUT PARAMETERS

1.	Channel Slope (ft/ft)	0.0150
2.	Channel Bottom Width (ft)	5.00
3.	Left Side Slope (Horizontal to 1)	3.00
4.	Right Side Slope (Horizontal to 1)	4.00
5.	Manning's Coefficient	0.060
6.	Discharge (cfs)	24.95
7.	Depth of Flow (ft)	1.11

OUTPUT RESULTS

Cross Section Area (Sqft)	9.86
Average Velocity (ft/sec)	2.53
Top Width (ft)	12.77
Hydraulic Radius (ft)	0.75
Froude Number	0.51

FHWA Urban Drainage Design Program, HY-22
Critical Depth for Open Channels

TRAPEZOIDAL ANALYSIS
Date: 02/14/2008

Project No. :41561-2
Project Name.:South Hancock Road
Computed by :MSF

Project Description
Sta 441+00 to Sta 426+00
Left Side
S-209A

INPUT PARAMETERS

1.	Discharge (cfs)	24.95
2.	Manning's Coefficient	0.042
3.	Channel Bottom Width (ft)	5.0
4.	Left Side Slope (Horizontal to 1)	3.00
5.	Right Side Slope (Horizontal to 1)	4.00

OUTPUT RESULTS

Critical Depth (ft)	0.76
Critical Area (ft**2)	5.83
Critical Velocity (ft/sec)	4.28
Critical Slope (ft/ft)	0.032

FHWA Urban Drainage Design Program, HY-22
HYDRAULIC PARAMETERS OF OPEN CHANNELS

Trapezoidal, Rectangular, or Triangular X-Section
Date: 02/14/2008

Project No. :41561-2
Project Name.:South Hancock Road
Computed by :MSF

Project Description

Sta 457+00 to Sta 441+00
Left Side
S-216A

INPUT PARAMETERS

1.	Channel Slope (ft/ft)	0.0100
2.	Channel Bottom Width (ft)	5.00
3.	Left Side Slope (Horizontal to 1)	3.00
4.	Right Side Slope (Horizontal to 1)	4.00
5.	Manning's Coefficient	0.060
6.	Discharge (cfs)	6.84
7.	Depth of Flow (ft)	0.63

OUTPUT RESULTS

Cross Section Area (Sqft)	4.54
Average Velocity (ft/sec)	1.51
Top Width (ft)	9.41
Hydraulic Radius (ft)	0.47
Froude Number	0.38

$y > y_c$

$V < V_c$

$\therefore$ subcritical flow

FHWA Urban Drainage Design Program, HY-22
Critical Depth for Open Channels

TRAPEZOIDAL ANALYSIS
Date: 02/14/2008

Project No. :41561-2
Project Name.:South Hancock Road
Computed by :MSF

Project Description
Sta 457+00 to Sta 441+00
Left Side
S-216A

INPUT PARAMETERS

1.	Discharge (cfs)	6.84
2.	Manning's Coefficient	0.060
3.	Channel Bottom Width (ft)	5.0
4.	Left Side Slope (Horizontal to 1)	3.00
5.	Right Side Slope (Horizontal to 1)	4.00

OUTPUT RESULTS

Critical Depth (ft)	0.35
Critical Area (ft**2)	2.21
Critical Velocity (ft/sec)	3.10
Critical Slope (ft/ft)	0.081

Culvert Calculations

For S Hancock Road	Job No. 41561-2	Sheet No. 1
Made by MSF	Checked by	Backchecked by
Date 2-14-08	Date	Date

HNTB

Q for HY-8 Analysis

S-99

Per Lake County standards:
Culvert design for 25 year
(Rational Method)

$Q = CiA$ where $C = 0.20$ (all pervious)
$i = 4.47$ in/hr ($tc = 42.85$ min.)
$A = 24.63$ ac

$Q = (.20)(4.47 \text{ in/hr})(24.63 \text{ ac})$
$Q = 22.02$ cfs (25 yr) (design)

$Q = 1.7(22.02 \text{ cfs}) = 37.43$ cfs (500 yr design)

S-209A

$Q = CiA$ where $C = 0.20$ (all pervious)
$i = 5.18$ in/hr ($tc = 32.63$ min.)
$A = 27.42$ ac

$Q = (.20)(27.42 \text{ ac})(5.18 \text{ in/hr})$
$Q = 28.41$ cfs (25 yr design)

$Q = 1.7(28.41 \text{ cfs}) = 48.30$ cfs (500 yr design)

S-216A

$Q = CiA$ where $C = 0.20$ (all pervious)
$i = 5.30$ in/hr ($tc = 31.01$ min.)
$A = 7.27$ ac

$Q = (.20)(5.30 \text{ in/hr})(7.27 \text{ ac})$
$Q = 7.71$ cfs (25 yr design)

$Q = 1.7(7.71) = 13.11$ cfs (500 yr design)

ME101-1204

HY-8 Culvert Analysis Report

S-209A
Sta 436+00

Table 1 - Summary of Culvert Flows at Crossing: Crossing 1

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
111.00	0.00	0.00	0.00	1
111.19	0.28	0.28	0.00	1
111.31	0.56	0.56	0.00	1
111.32	0.85	0.85	0.00	1
111.36	1.13	1.13	0.00	1
111.40	1.41	1.41	0.00	1
111.44	1.69	1.69	0.00	1
111.46	1.91	1.91	0.00	1
111.51	2.26	2.26	0.00	1
111.53	2.54	2.54	0.00	1
111.56	2.82	2.82	0.00	1

Rating Curve Plot for Crossing: Crossing 1

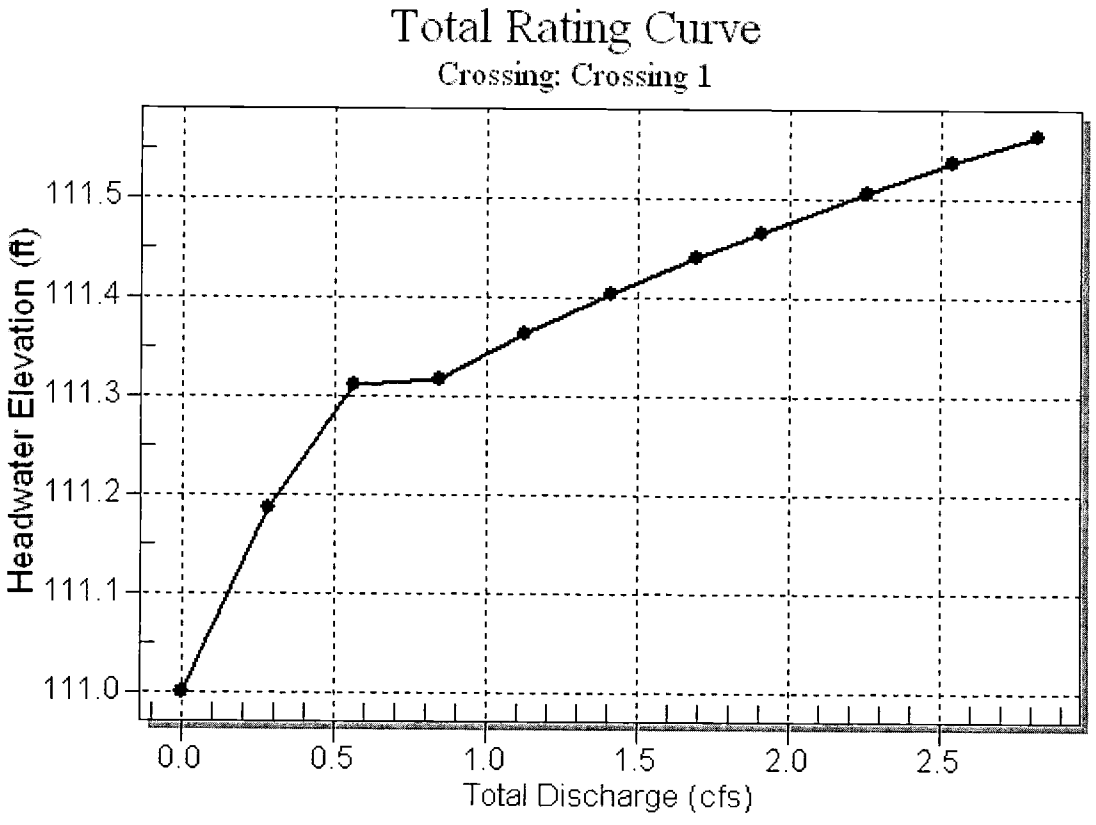


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	111.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.28	0.28	111.19	0.153	0.186	3-M1t	0.167	0.108	0.176	0.076	0.771	0.704
0.56	0.56	111.31	0.312	0.263	3-M2t	0.244	0.150	0.215	0.115	1.173	0.902
0.85	0.85	111.32	0.261	0.316	3-M2t	0.292	0.187	0.245	0.145	1.483	1.046
1.13	1.13	111.36	0.305	0.362	3-M2t	0.340	0.223	0.272	0.172	1.734	1.153
1.41	1.41	111.40	0.346	0.403	3-M2t	0.377	0.249	0.295	0.195	1.832	1.248
1.69	1.69	111.44	0.384	0.439	3-M2t	0.411	0.271	0.317	0.217	1.986	1.326
1.91	1.91	111.46	0.397	0.464	3-M2t	0.437	0.288	0.333	0.233	2.097	1.381
2.26	2.26	111.51	0.433	0.505	3-M2t	0.476	0.315	0.357	0.257	2.258	1.459
2.54	2.54	111.53	0.461	0.535	3-M2t	0.502	0.337	0.374	0.274	2.386	1.521
2.82	2.82	111.56	0.488	0.562	3-M2t	0.528	0.357	0.391	0.291	2.499	1.572

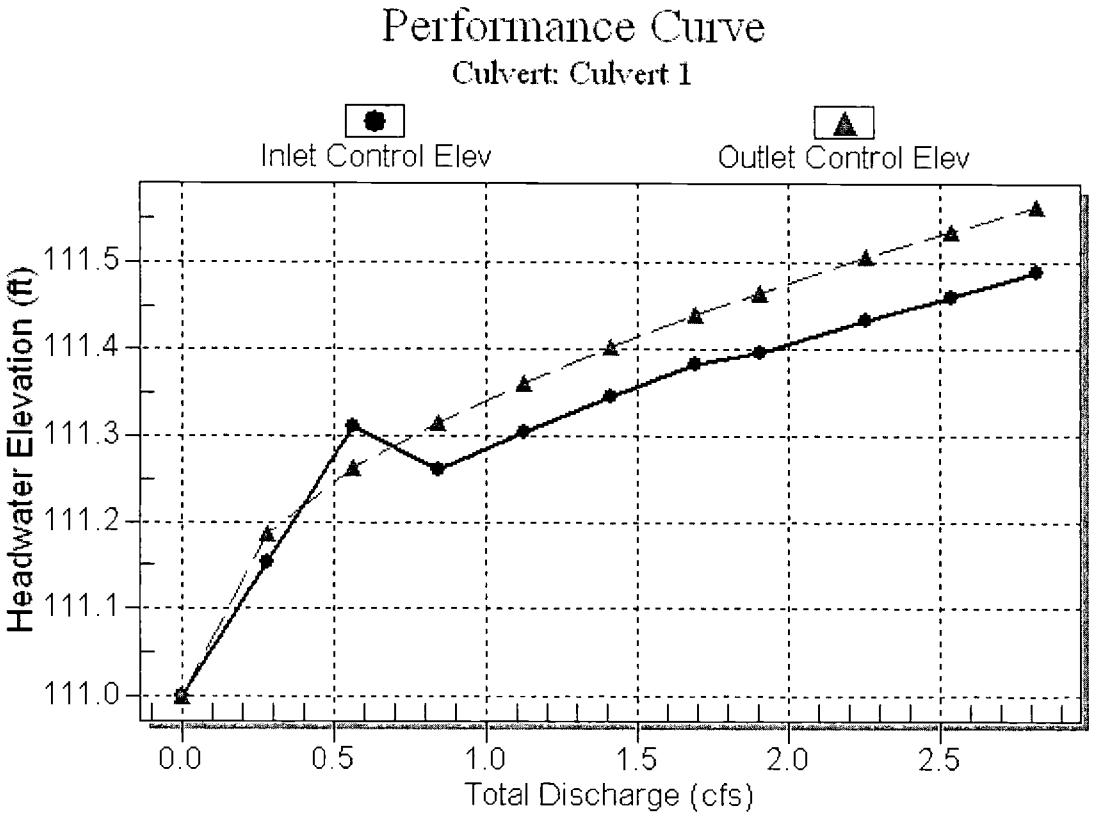
****

Inlet Elevation (invert): 111.00 ft, Outlet Elevation (invert): 110.90 ft

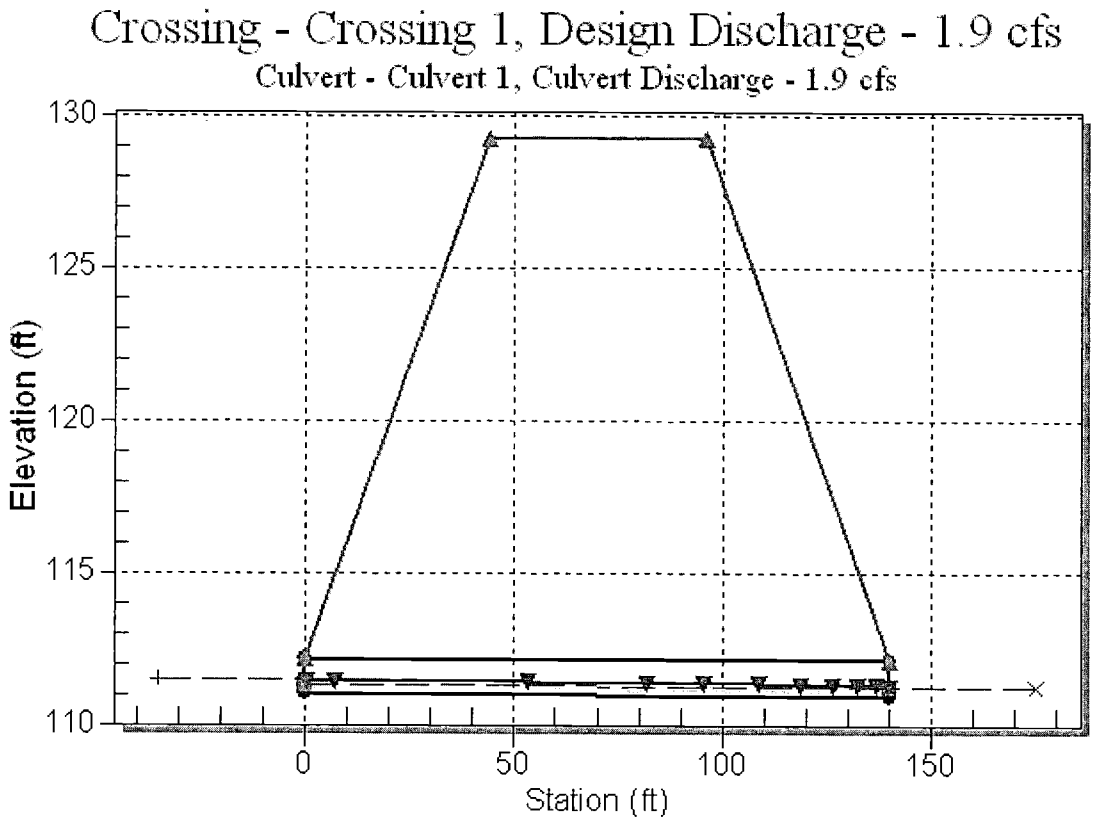
Culvert Length: 140.00 ft, Culvert Slope: 0.0007

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 111.00 ft

Outlet Station: 140.00 ft

Outlet Elevation: 110.90 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Elliptical

Barrel Span: 23.00 in

Barrel Rise: 14.00 in

Barrel Material:

Barrel Manning's n: 0.0120

Inlet Type:

Inlet Edge Condition:

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Crossing 1)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	111.00	0.00	0.00	0.00	0.00
0.28	111.08	0.08	0.70	0.06	0.46
0.56	111.11	0.11	0.90	0.09	0.49
0.85	111.14	0.14	1.05	0.12	0.51
1.13	111.17	0.17	1.15	0.14	0.52
1.41	111.20	0.20	1.25	0.16	0.53
1.69	111.22	0.22	1.33	0.18	0.54
1.91	111.23	0.23	1.38	0.19	0.54
2.26	111.26	0.26	1.46	0.21	0.55
2.54	111.27	0.27	1.52	0.22	0.56
2.82	111.29	0.29	1.57	0.24	0.56

Tailwater Channel Data - Crossing 1

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 5.00 ft

Side Slope (H:V): 4.00 (_:1)

Channel Slope: 0.0130

Channel Manning's n: 0.0420

Channel Invert Elevation: 111.00 ft

Roadway Data for Crossing: Crossing 1

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
1	42700.00	129.24
2	42800.00	128.09
3	42900.00	126.60
4	43000.00	124.50
5	43100.00	122.00
6	43200.00	120.10
7	43300.00	118.20
8	43400.00	116.60
9	43500.00	115.30

Roadway Surface: Paved

Roadway Top Width: 52.00 ft

HY-8 Culvert Analysis Report

S-216A

Sta 444+00

Table 1 - Summary of Culvert Flows at Crossing: Crossing 1

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
106.10	0.00	0.00	0.00	1
106.65	1.31	1.31	0.00	1
106.92	2.62	2.62	0.00	1
107.17	3.93	3.93	0.00	1
107.41	5.24	5.24	0.00	1
107.77	6.55	6.55	0.00	1
108.13	7.71	7.71	0.00	1
108.62	9.18	9.18	0.00	1
109.14	10.49	10.49	0.00	1
109.69	11.80	11.80	0.00	1
110.33	13.11	13.11	0.00	1

Rating Curve Plot for Crossing: Crossing 1

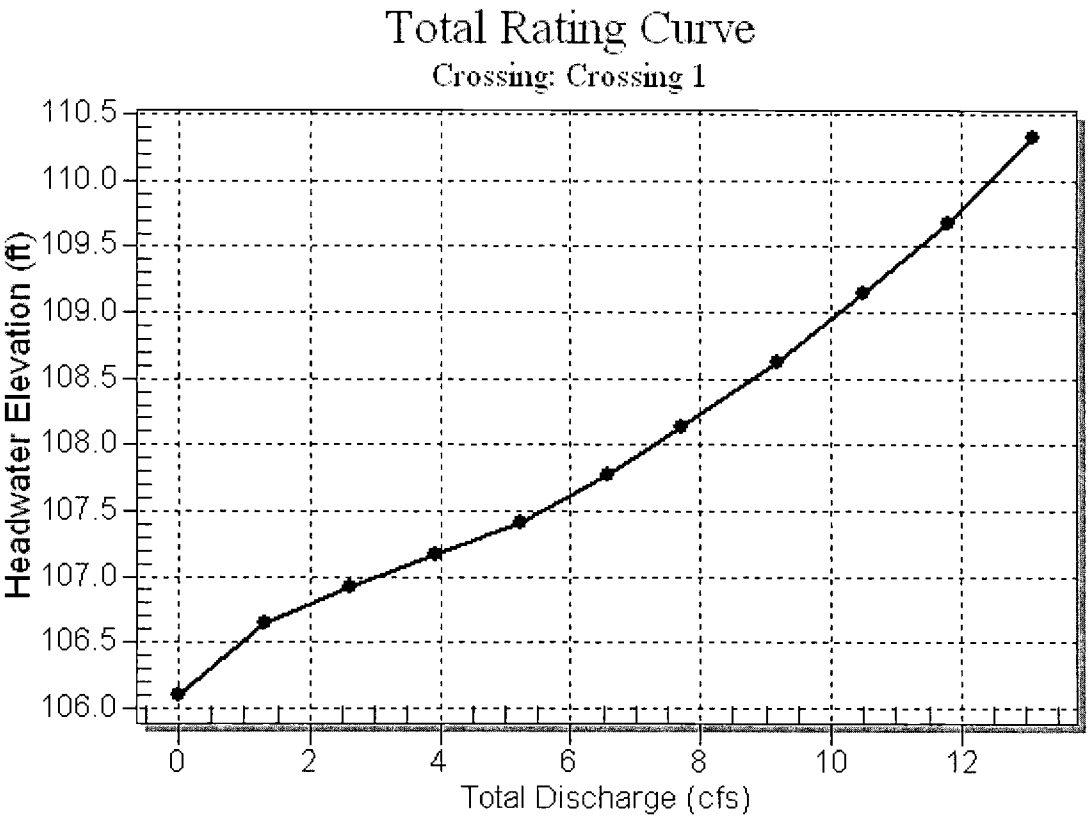


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	106.10	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.31	1.31	106.65	0.469	0.548	2-M2c	0.523	0.344	0.344	0.203	2.757	1.109
2.62	2.62	106.92	0.682	0.817	2-M2c	0.866	0.488	0.488	0.304	3.330	1.390
3.93	3.93	107.17	0.872	1.070	2-M2c	1.167	0.694	0.694	0.380	3.794	1.588
5.24	5.24	107.41	1.046	1.308	2-M2c	1.167	0.780	0.780	0.445	4.325	1.737
6.55	6.55	107.77	1.219	1.667	7-M2c	1.167	0.854	0.854	0.503	4.773	1.859
7.71	7.71	108.13	1.379	2.030	7-M2c	1.167	0.914	0.914	0.550	5.230	1.946
9.18	9.18	108.62	1.602	2.519	7-M2c	1.167	0.974	0.974	0.603	5.781	2.052
10.49	10.49	109.14	1.827	3.040	7-M2c	1.167	1.023	1.023	0.647	6.381	2.134
11.80	11.80	109.69	2.079	3.586	7-M2c	1.167	1.072	1.072	0.689	6.876	2.210
13.11	13.11	110.33	2.362	4.228	7-M2c	1.167	1.121	1.121	0.728	7.527	2.276

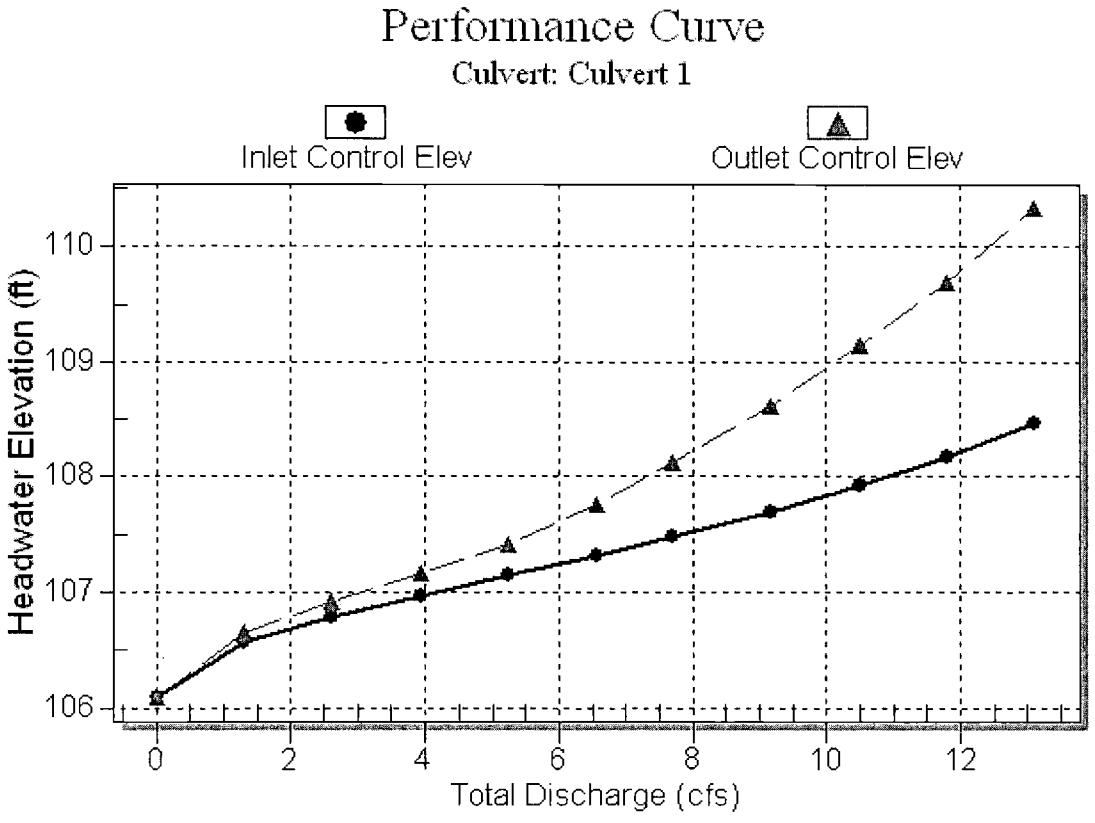
****

Inlet Elevation (invert): 106.10 ft, Outlet Elevation (invert): 106.00 ft

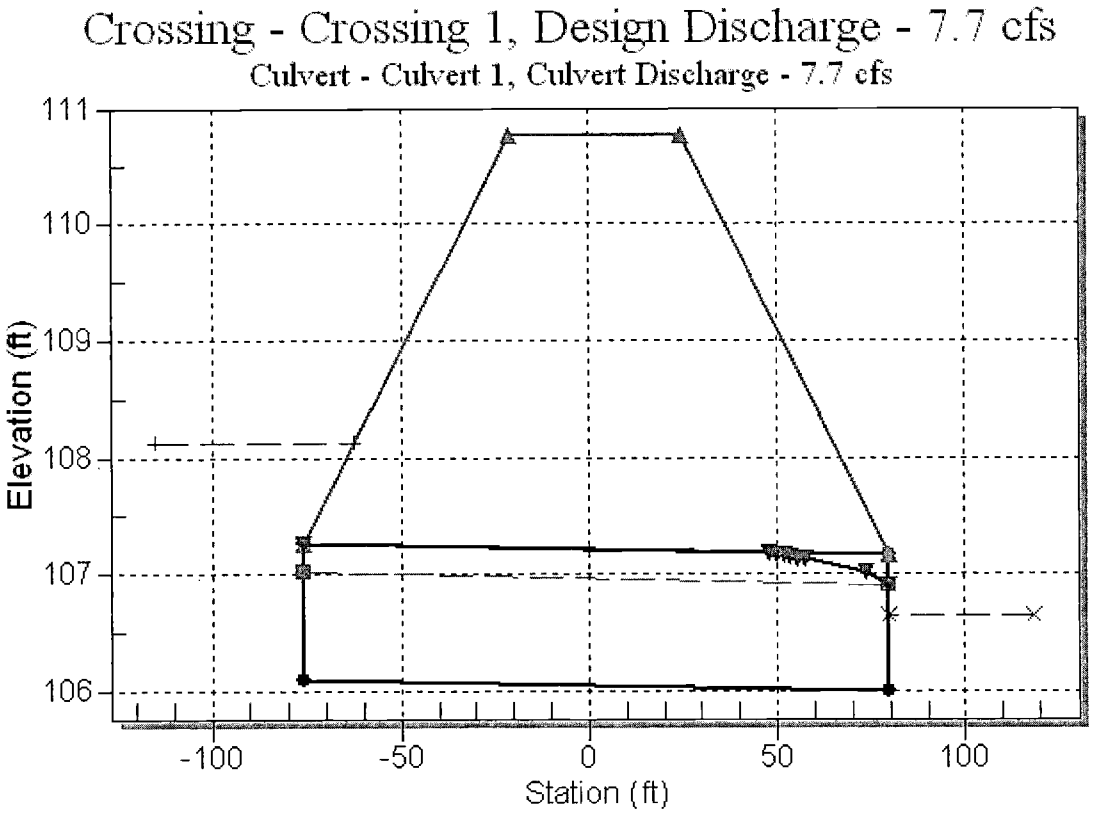
Culvert Length: 155.81 ft, Culvert Slope: 0.0006

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: -76.13 ft

Inlet Elevation: 106.10 ft

Outlet Station: 79.68 ft

Outlet Elevation: 106.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Elliptical

Barrel Span: 23.00 in

Barrel Rise: 14.00 in

Barrel Material:

Barrel Manning's n: 0.0120

Inlet Type:

Inlet Edge Condition:

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Crossing 1)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	106.10	0.00	0.00	0.00	0.00
1.31	106.30	0.20	1.11	0.25	0.46
2.62	106.40	0.30	1.39	0.38	0.49
3.93	106.48	0.38	1.59	0.47	0.50
5.24	106.55	0.45	1.74	0.56	0.52
6.55	106.60	0.50	1.86	0.63	0.52
7.71	106.65	0.55	1.95	0.69	0.53
9.18	106.70	0.60	2.05	0.75	0.54
10.49	106.75	0.65	2.13	0.81	0.54
11.80	106.79	0.69	2.21	0.86	0.55
13.11	106.83	0.73	2.28	0.91	0.55

Tailwater Channel Data - Crossing 1

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 5.00 ft

Side Slope (H:V): 4.00 (_:1)

Channel Slope: 0.0200

Channel Manning's n: 0.0600

Channel Invert Elevation: 106.10 ft

Roadway Data for Crossing: Crossing 1

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

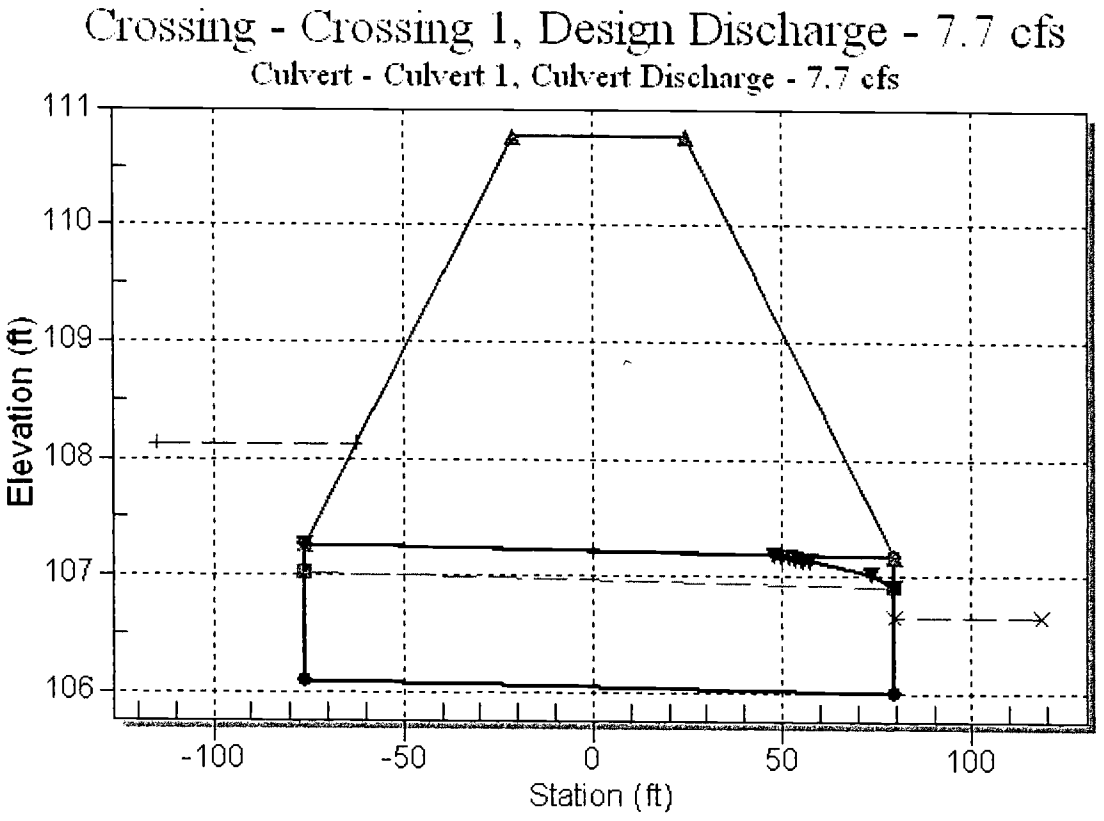
Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
1	44400.00	110.75
2	44500.00	111.15
3	44600.00	111.17
4	44700.00	111.28
5	44800.00	112.28
6	44900.00	113.28
7	45000.00	114.28
8	45100.00	115.28
9	45200.00	116.28

Roadway Surface: Paved

Roadway Top Width: 46.00 ft

Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: -76.13 ft

Inlet Elevation: 106.10 ft

Outlet Station: 79.68 ft

Outlet Elevation: 106.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Elliptical

Barrel Span: 23.00 in

Barrel Rise: 14.00 in

Barrel Material: Concrete

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Grooved End with Headwall

Inlet Depression: None

Floodplain Encroachment Calculations

STAGE / STORAGE CALCULATIONS

HNTB

		DATE
MADE BY:	MSF	13-Feb-08
CHCK BY:	KMV	14-Feb-08

PROJECT: SOUTH HANCOCK ROAD

POND: 2

FLOODPLAIN COMPENSATION

STAGE Ft. (NAVD)	AREA AC.	AVERAGE AREA AC.	INCREMENTAL VOL. AF	CUMULATIVE VOL AF
100.14	2.841		0.00	0.00
100 yr DHW in pond		2.85		
100.25	2.857		0.31	0.31
Top of outfall structure in pond				

Total Encroachment = 12569 cf

Total Compensation = 0.31 af = 13503.6 cf

HNTB

FLOOD PLAIN COMPENSATION

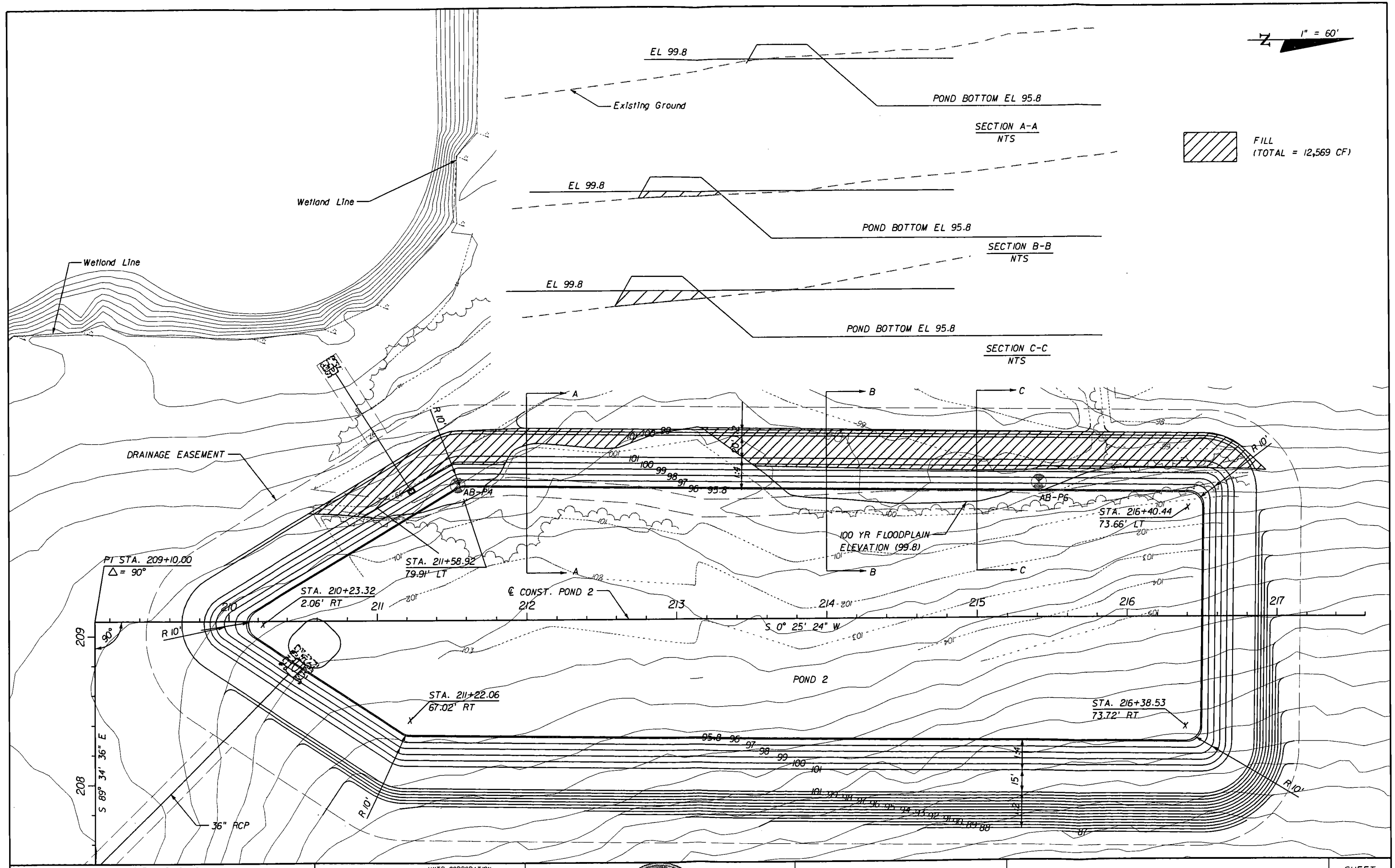
		DATE
MADE BY:	MSF	13-May-08
CHCK BY:	KMV	14-May-08

PROJECT: SOUTH HANCOCK ROAD

FILL POND 2

STATION	AREA	AVERAGE AREA	INCREMENTAL VOL	CUMULATIVE VOL	CUMULATIVE VOL
	AC.	AC.	AF	AF	FT^3
21100.0	0.001102509		0.00000000	0.00000000	0.00000000
		0.00055797			
21200.0	0.0000134252		0.05579672	0.05579672	2430.50500000
		0.00000671			
21300.0	0.0000000000		0.00067126	0.05646798	2459.74500000
		0.00022789			
21400.0	0.0004557851		0.02278926	0.07925723	3452.44500000
		0.00077713			
21500.0	0.0010984848		0.07771350	0.15697073	6837.64500000
		0.00092806			
21600.0	0.0007576263		0.09280556	0.24977629	10880.25500000
		0.00077538			
21650.0	0.0007931336		0.03876900	0.28854528	12569.03250000

168



REVISIONS		
DATE	BY	DESCRIPTION

HNTB

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

ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E.
FL. REGISTRATION NO. 44794

LAKE COUNTY
FLORIDA

SOUTH HANCOCK ROAD

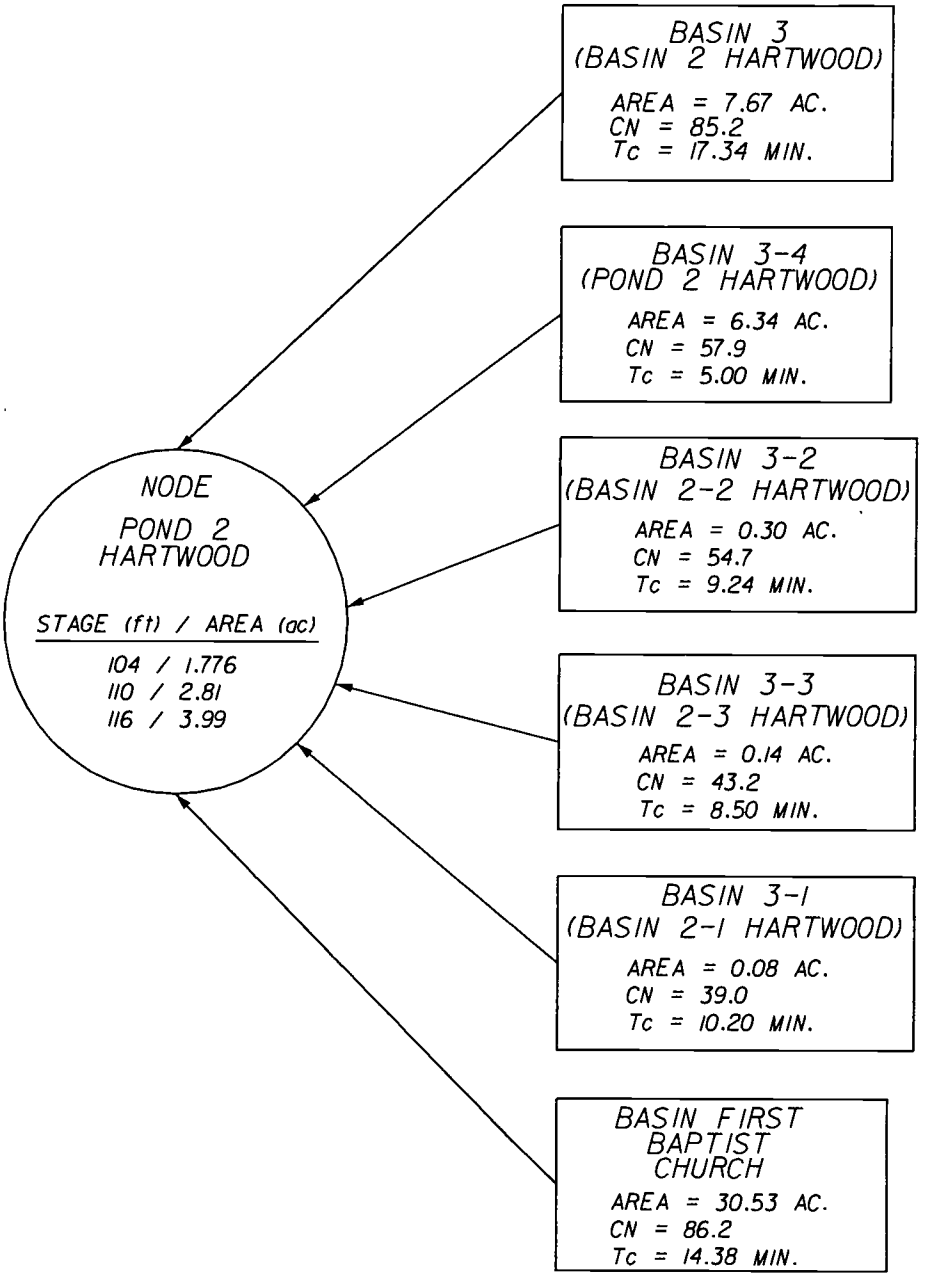
FLOODPLAIN ENCROACHMENT POND 2

SHEET NO.

kvandenavont 5/21/2008 2:20:37 PM \\LKMw00\pmwork\Jobs\41561-2\41561205201\drainage\100 yr flood plain comp_POND2.dgn

BASIN 3

Post Development Drainage Basin Data



BASIN 3

LOCATION: LAKE COUNTY SEC. 9, 10, 15 & 16; T23S; R26E SOUTH HANCOCK ROAD CONSTRUCTION US 27 TO HARTWOOD MARSH ROAD	COUNTY: LAKE STATE: FLORIDA DATE: 12/07	DATUM: NAVD 88 PURPOSE: POST-DEVELOPMENT NODAL DIAGRAM
HNTB HNTB CORPORATION 300 PRIMERA BLVD, SUITE 200 LAKE MARY, FL 32746 (407) 805-0355 CERT. OF AUTH. NO. 6500 ENGINEER OF RECORD: KAREN M. VAN DEN AVONT, P.E. FL. REGISTRATION NO. 44794	LAKE COUNTY FLORIDA	*LAKE COUNTY* SOUTH HANCOCK ROAD

5/23/2008 4:45:20 PM \\LKMw00\pmwork\Jobs\41561-2\41561205201\drainage\NODALDIAGRAMpost.dgn

BASIN BREAKDOWN

HNTB

		DATE
MADE BY:	MSF	13-Feb-08
CHCK BY:	KMV	13-Feb-08

PROJECT: HANCOCK ROAD

LOCATION: BASIN 3

BASIN LIMITS: STA. 458+11 to STA 470+55, CL CONST. HANCOCK ROAD

PROPOSED CONDITIONS:

LOCATION	STATION	To	STATION	BASIN WIDTH (Ft.)	IMP. AREA (Acres)	PERV. AREA (Acres)	TOTAL AREA (Acres)	REMARKS
ON-SITE:								
BASIN 3	458+11	-	470+55	120	6.00	1.67	7.674	Includes Hartwood Marsh Rd and Proposed S Hancock Rd
ON-SITE SUBTOTAL:					***6.00***	***1.67***	***7.674***	
OFF-SITE:								
BASIN 3-1 (OFF-SITE)	-	-	-	-	0.00	0.08	0.081	
BASIN 3-2 (OFF-SITE)	-	-	-	-	0.08	0.22	0.301	
BASIN 3-3 (OFF-SITE)	-	-	-	-	0.01	0.13	0.141	
BASIN 3-4 (Pond 2Hartwood)	-	-	-	-	1.96	4.38	6.340	Impervious at water quality
First Baptist Church	-	-	-	-	24.42	6.11	30.530	Joint Use of Pond 2--Assume 80% empervious, in Clermont
OFF-SITE SUBTOTAL:					***26.470***	***10.923***	***37.393***	
TOTAL DRAINAGE AREA:					**32.470**	**12.597**	**45.067**	

Note:
Basin 3 = Basin 2 Hartwood Marsh Road
Basin 3-1 = Basin 2-1 Hartwood Marsh Road
Basin 3-2 = Basin 2-2 Hartwood Marsh Road
Basin 3-3 = Basin 2-3 Hartwood Marsh Road
Basin 3-4 = Basin 2-4 Hartwood Marsh Road

173

RUNOFF CURVE NUMBER

MADE BY: MSF DATE: 20-Nov-07
CHECKED BY: KMV DATE: 22-Nov-07

PROJECT: HANCOCK ROAD

LOCATION: BASIN 3 (BASIN 2 HARTWOOD)

UNDERLINE ONE: EXISTING **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98			6.00	588.00
Lakeland Sand (A)	GRASS Good Condition (On-Site)	39			1.67	65.29
		Totals =			7.67	653.29
		Use CN =			85.2	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

HNTB

RUNOFF CURVE NUMBER

MADE BY: MSF DATE: 20-Nov-07
CHECKED BY: KMV DATE: 22-Nov-07

PROJECT: HANCOCK ROAD

LOCATION: BASIN 3-1 (BASIN 2-1 HARTWOOD)

UNDERLINE ONE: **EXISTING** **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98			0.00	0.00
Lakeland Sand (A)	GRASS Good Condition (On-Site)	39			0.08	3.16
		Totals =			0.08	3.16
		Use CN =			**39.0**	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

HNTB

RUNOFF CURVE NUMBER

MADE BY: MSF DATE: 20-Nov-07
CHECKED BY: KMV DATE: 22-Nov-07

PROJECT: HANCOCK ROAD

LOCATION: BASIN 3-2 (BASIN 2-2 HARTWOOD)

UNDERLINE ONE: EXISTING **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98			0.08	7.84
Lakeland Sand (A)	GRASS Good Condition (On-Site)	39			0.22	8.62
		Totals =			0.30	16.46
		Use CN =			**54.7**	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

HNTB

RUNOFF CURVE NUMBER

MADE BY: MSF DATE: 20-Nov-07
CHECKED BY: KMV DATE: 22-Nov-07

PROJECT: HANCOCK ROAD

LOCATION: BASIN 3-3 (BASIN 2-3 HARTWOOD)

UNDERLINE ONE: EXISTING **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab 2-2	CN Fig 2-3	CN Fig 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98			0.01	0.98
Lakeland Sand (A)	GRASS Good Condition (On-Site)	39			0.13	5.11
		Totals =			0.14	6.09
		Use CN =			43.2	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

RUNOFF CURVE NUMBER

HNTB

MADE BY: MSF DATE: 20-Nov-07
CHECKED BY: KMV DATE: 22-Nov-07

PROJECT: HANCOCK ROAD

LOCATION: BASIN 3-4 (BASIN 2-4 HARTWOOD)

UNDERLINE ONE: EXISTING **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pond Site at Water Qual	100			1.96	196.00
Lakeland Sand (A)	GRASS Proposed Pond Site (Good Condition)	39			4.38	170.82
			Totals =		6.34	366.82
			Use CN =		57.9	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

HNTB

RUNOFF CURVE NUMBER

MADE BY: MSF DATE: 20-Nov-07
CHECKED BY: KMV DATE: 22-Nov-07

PROJECT: HANCOCK ROAD

LOCATION: First Baptist Church

UNDERLINE ONE: EXISTING **PROPOSED**

Soil Name and Hydrologic group (Appendix A)	Cover Description (Cover type, treatment, and hydrologic condition: percent impervious: unconnected / connected impervious area ratio)	CN Tab. 2-2	CN Fig. 2-3	CN Fig. 2-4	Area acres	Product of CN x Area
-	IMPERVIOUS AREA Proposed Pavement (On-Site)	98			24.42	2393.16
Lakeland Sand (A)	GRASS Good Condition (On-Site)	39			6.11	238.29
		Totals =			30.53	2631.45
		Use CN =			86.2	

REFERENCE: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

HNTB

DATE:

MADE BY: MSF 20-Nov-07
CHECKED BY: KMV 22-Nov-07

PROJECT: HANCOCK ROAD

LOCATION : BASIN 3 (BASIN 2 HARTWOOD)

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

1	SURFACE DESCRIPTION		
2	MANNING'S COEFFICIENT, n		
3	FLOW LENGTH, L, (< 300')	FT.	
4	2 YR/ 24 HR RAINFALL, P	IN.	
5	LAND SLOPE, S		
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)	HR. OR	0.00 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)		
8	FLOW LENGTH, L	L.F.	
9	WATERCOURSE SLOPE, S	FT./ FT.	
10	AVERAGE VELOCITY, V	FT./SEC.	
11	Tt = L / (3600 * V)	HR. OR	0.00 MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A	S.F.	
13	WETTED PERIMETER, Pw	L.F.	
14	HYDRAULIC RADIUS, R = (A / Pw)	L.F.	
15	CHANNEL SLOPE, S	FT./FT.	
16	MANNING'S ROUGHNESS COEFFICIENT, n		
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n	FT./SEC.	
18	FLOW LENGTH, L	L.F.	
19	Tt = L / (3600 V)	HR. OR	0.00 MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)		

TOTAL Tc = 17.34 MIN.
(per ASAD for Hartwood Marsh Road)
(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

HNTB

DATE:

MADE BY: MSF 20-Nov-07

CHECKED BY: KMV 22-Nov-07

PROJECT: HANCOCK ROAD

LOCATION : BASIN 3-1 (BASIN 2-1 HARTWOOD)

UNDERLINE ONE: EXISTING **PROPOSED**

UNDERLINE ONE: Tc Tt **Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION	SHORT GRASS			
2	MANNING'S COEFFICIENT, n	0.150			
3	FLOW LENGTH, L, (< 300')	41		FT.	
4	2 YR/ 24 HR RAINFALL, P	4.70		IN.	
5	LAND SLOPE, S	0.0541			
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)	0.0443		HR. OR	2.66 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)				
8	FLOW LENGTH, L			L.F.	
9	WATERCOURSE SLOPE, S			FT./ FT.	
10	AVERAGE VELOCITY, V			FT./SEC.	
11	Tt = L / (3600 * V)			HR. OR	0.00 MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A			S.F.	
13	WETTED PERIMETER, Pw			L.F.	
14	HYDRAULIC RADIUS, R = (A / Pw)			L.F.	
15	CHANNEL SLOPE, S			FT./FT.	Pipe flow from S-200
16	MANNING'S ROUGHNESS COEFFICIENT, n				to pond (Hartwood Marsh
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n			FT./SEC.	Rd ASAD)
18	FLOW LENGTH, L			L.F.	
19	Tt = L / (3600 V)			HR. OR	7.54 MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)				

TOTAL Tc = 10.20 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

HNTB

DATE:
MADE BY: MSF 20-Nov-07
CHECKED BY: KMV 22-Nov-07

PROJECT: HANCOCK ROAD

LOCATION : BASIN 3-2 (BASIN 2-2 HARTWOOD) Runoff Bypassed to Conservation Area

UNDERLINE ONE: EXISTING **PROPOSED**

UNDERLINE ONE: **Tc** **Tt Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION	SHORT GRASS				
2	MANNING'S COEFFICIENT, n	0.150				
3	FLOW LENGTH, L, (< 300')	68		FT.		
4	2 YR/ 24 HR RAINFALL, P	4.70		IN.		
5	LAND SLOPE, S	0.0688				
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)	0.0604		HR. OR	3.62	MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)					
8	FLOW LENGTH, L			L.F.		
9	WATERCOURSE SLOPE, S			FT./ FT.		
10	AVERAGE VELOCITY, V			FT./SEC.		
11	Tt = L / (3600 * V)			HR. OR	0.00	MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A			S.F.		
13	WETTED PERIMETER, Pw			L.F.		
14	HYDRAULIC RADIUS, R = (A / Pw)			L.F.		
15	CHANNEL SLOPE, S			FT./FT.	Pipe flow from S-204	
16	MANNING'S ROUGHNESS COEFFICIENT, n				to pond (Hartwood Marsh	
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n			FT./SEC.	Rd ASAD)	
18	FLOW LENGTH, L			L.F.		
19	Tt = L / (3600 V)			HR. OR	5.62	MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)					

TOTAL Tc = 9.24 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

HNTB

DATE:

MADE BY: MSF 20-Nov-07

CHECKED BY: KMV 22-Nov-07

PROJECT: HANCOCK ROAD

LOCATION : BASIN 3-3 (BASIN 2-3 HARTWOOD) Runoff Bypassed to Conservation Area

UNDERLINE ONE: EXISTING **PROPOSED**

UNDERLINE ONE: **Tc** **Tt Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION	SHORT GRASS			
2	MANNING'S COEFFICIENT, n	0.240			
3	FLOW LENGTH, L, (< 300')	41		FT.	
4	2 YR/ 24 HR RAINFALL, P	4.70		IN.	
5	LAND SLOPE, S	0.4137			
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)	0.0286		HR. OR	1.72 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)				
8	FLOW LENGTH, L			L.F.	
9	WATERCOURSE SLOPE, S			FT./ FT.	
10	AVERAGE VELOCITY, V			FT./SEC.	
11	Tt = L / (3600 * V)			HR. OR	0.00 MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A			S.F.	
13	WETTED PERIMETER, Pw			L.F.	
14	HYDRAULIC RADIUS, R = (A / Pw)			L.F.	
15	CHANNEL SLOPE, S			FT./FT.	Pipe flow from S-212
16	MANNING'S ROUGHNESS COEFFICIENT, n				to pond (Hartwood Marsh
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n			FT./SEC.	Rd ASAD)
18	FLOW LENGTH, L			L.F.	
19	Tt = L / (3600 V)			HR. OR	6.78 MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)				

TOTAL Tc = 8.50 MIN.

(IF < 10 MIN. THAN ASSUME 10 MIN.)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

HNTB

DATE:

MADE BY: MSF 20-Nov-07

CHECKED BY: KMV 22-Nov-07

PROJECT: HANCOCK ROAD

LOCATION : BASIN 3-4 (BASIN 2-4 HARTWOOD)

UNDERLINE ONE: EXISTING **PROPOSED**

UNDERLINE ONE: **Tc** **Tt** **Through subarea**

SHEET FLOW:

1	SURFACE DESCRIPTION			
2	MANNING'S COEFFICIENT, n			
3	FLOW LENGTH, L, (< 300')		FT.	
4	2 YR/ 24 HR RAINFALL, P		IN.	
5	LAND SLOPE, S			
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)		HR. OR	0.00 MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)			
8	FLOW LENGTH, L		L.F.	
9	WATERCOURSE SLOPE, S		FT./ FT.	
10	AVERAGE VELOCITY, V		FT./SEC.	
11	Tt = L / (3600 * V)		HR. OR	0.00 MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A		S.F.	
13	WETTED PERIMETER, Pw		L.F.	
14	HYDRAULIC RADIUS, R = (A / Pw)		L.F.	
15	CHANNEL SLOPE, S		FT./FT.	
16	MANNING'S ROUGHNESS COEFFICIENT, n			
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n		FT./SEC.	
18	FLOW LENGTH, L		L.F.	
19	Tt = L / (3600 V)		HR. OR	0.00 MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)			

TOTAL Tc = 5.00 MIN.

(assume 5 min for pond)

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

TIME OF CONCENTRATION CALCULATIONS

HNTB

DATE:

MADE BY: MSF 20-Nov-07

CHECKED BY: KMV 22-Nov-07

PROJECT: HANCOCK ROAD

LOCATION : First Baptist Church

UNDERLINE ONE: EXISTING PROPOSED

UNDERLINE ONE: Tc Tt Through subarea

SHEET FLOW:

1	SURFACE DESCRIPTION		
2	MANNING'S COEFFICIENT, n		
3	FLOW LENGTH, L, (< 300')		FT.
4	2 YR/ 24 HR RAINFALL, P		IN.
5	LAND SLOPE, S		
6	Tt = (0.007 (nL)^0.8) / (P^0.5 * S^0.4)		HR. OR MIN.

SHALLOW CONCENTRATED FLOW:

7	SURFACE DESCRIPTION (PAVED OR UNPAVED)		
8	FLOW LENGTH, L		L.F.
9	WATERCOURSE SLOPE, S		FT./ FT.
10	AVERAGE VELOCITY, V		FT./SEC.
11	Tt = L / (3600 * V)		HR. OR MIN.

CHANNEL FLOW:

12	CROSS-SECTIONAL FLOW AREA, A		S.F.
13	WETTED PERIMETER, Pw		L.F.
14	HYDRAULIC RADIUS, R = (A / Pw)		L.F.
15	CHANNEL SLOPE, S		FT./FT.
16	MANNING'S ROUGHNESS COEFFICIENT, n		
17	VELOCITY, V, = (1.49 * R ^0.667 * S ^0.5) / n		FT./SEC.
18	FLOW LENGTH, L		L.F.
19	Tt = L / (3600 V)		HR. OR MIN.
20	Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)		

TOTAL Tc = 14.38 MIN.

Assume to Pond

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

Water Quality Treatment and Recovery Calculations

Hartwood Marsh Pond 2

POLLUTION ABATEMENT VOLUME

HNTB

		DATE
MADE BY:	MSF	23-Apr-08
CHCK BY:	KMV	24-Apr-08

PROJECT: HARTWOOD MARSH ROAD

LOCATION: BASIN 2

BASIN LIMITS: STA. 138+50.00 to STA 152+39.00, CL CONST. HARTWOOD MARSH

TOTAL TREATMENT AREA: 45.07 AC.

IMPERVIOUS AREA: 30.52 AC. Less Pond

UNDERINE ONE: RETENTION DETENTION

UNDERINE ONE: DRY WET

UNDERINE 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 45.07 AC. = 1.88 AF

2) COMPUTE 1.25 INCHES TIMES IMPERVIOUS AREA:

(1.25"/12) x 30.52 AC. = 3.18 AF

CONTROLLING CRITERIA: 2

REQUIRED TREATMENT VOLUME: 3.18 AF

STAGE / STORAGE CALCULATIONS

HNTB

		DATE
MADE BY:	MSF	23-Apr-08
CHCK BY:	KMV	24-Apr-08

PROJECT: HARTWOOD MARSH ROAD

POND: 2

Boring	Existing Ground Elevation	Depth to Encountered Water Surface	Estimated Encountered Water Elevation	Depth to Seasonal High Water Surface	Estimated Seasonal High Water Elevation	Estimated Normal High Water Elevation
TH -P3	126.8	39.3	87.5	34.8	92	89.75

Note: Based on boring performed 3/24/08

AVERAGE ELEVATION (FT) 87.50 ft. 92.00 ft. 89.75 ft.

AVG. SHWT ELEVATION: 92.0 Ft. (NAVD)

AVG. GROUND WATER TABLE ELEVATION: 87.5 Ft. (NAVD)

MINIMUM POND CONTROL ELEVATION 95.0 Ft. (NAVD)

Lake County criteria is pond bottom needs to be 3 feet above seasonal high water elevation

STAGE Ft (NAVD)	AREA AC.	AVERAGE AREA AC.	INCREMENTAL VOL. AF	CUMULATIVE VOL AF
104.0	1.776		0.00	0.00
		2.11		
108.0	2.442		8.44	8.44
		2.63		
110.0	2.813		5.26	13.69
		3.10		
113.0	3.391		9.31	23.00
		3.69		
116.0	3.985		11.06	34.06
		4.37		
117.0	4.758		4.37	38.43

REQUIRED TREATMENT VOLUME: 3.18 AF

TREATMENT ELEVATION 105.12 Ft. Check total retention volume

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

FACTOR OF SAFETY: 2 = 7.5 Inches/Hr.= 15 Ft./Day

ESTIMATED IMPERMEABLE BOUNDARY 91.00 Ft.

PONDS Version 3.3.0223
Retention Pond Recovery - Refined Method
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Project Data

Project Name:	Hartwood Marsh Road Phase 1
Simulation Description:	Pond 2 Water Quality recovery
Project Number:	41561
Engineer :	KMV
Supervising Engineer:	
Date:	04-24-2008

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum):	91.00
Water Table Elevation, [WT] (ft datum):	92.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day):	15.00
Fillable Porosity, [n] (%):	30.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day):	15.0
Maximum Area For Unsaturated Infiltration, [Av] (ft^2):	85813.0

Geometry Data

Equivalent Pond Length, [L] (ft):	527.0
Equivalent Pond Width, [W] (ft):	162.0

Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft^2)
104.00	77377.0
108.00	106386.0
110.00	122540.0
113.00	147715.0
116.00	173595.0
117.00	207263.0

Scenario Input Data

Scenario 1 :: Water Quality volume

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft^3) 138478

Initial ground water level (ft datum) default, 92.00

Time After Storm Event (days)	Time After Storm Event (days)
0.100	2.000
0.250	2.500
0.500	3.000
1.000	3.500
1.500	

Scenario 3 ::

Hydrograph Type: Local Hydrograph
Modflow Routing: Routed with infiltration
Repetitions: 1

Initial ground water level (ft datum) default, 92.00

Time After Storm Event (days)
1.000
5.000
10.000
15.000
20.000

Detailed Results :: *Scenario 1* :: *Water Quality volume*

Elapsed Time (hours)	Inflow Rate (ft³/s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft³/s)	Overflow Discharge (ft³/s)	Cumulative Inflow Volume (ft³)	Cumulative Infiltration Volume (ft³)	Cumulative Discharge Volume (ft³)	Flow Type
0.000	23079.6700	0.0000	92.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	23079.6700	0.0000	105.659	14.89782	0.00000	138478.0	89.4	0.0	U/P
2.400	0.0000	0.0000	104.168	8.70803	0.00000	138478.0	125363.1	0.0	U/P
6.000	0.0000	0.0000	---	---	---	138478.0	138478.0	0.0	dry
12.000	0.0000	0.0000	---	---	---	138478.0	138478.0	0.0	dry
24.000	0.0000	0.0000	---	---	---	138478.0	138478.0	0.0	dry
36.000	0.0000	0.0000	---	---	---	138478.0	138478.0	0.0	dry
48.000	0.0000	0.0000	---	---	---	138478.0	138478.0	0.0	dry
60.000	0.0000	0.0000	---	---	---	138478.0	138478.0	0.0	dry
72.000	0.0000	0.0000	---	---	---	138478.0	138478.0	0.0	dry
84.000	0.0000	0.0000	---	---	---	138478.0	138478.0	0.0	dry

RECOVERY < 3HRS

PONDS Version 3.3.0223
Retention Pond Recovery - Refined Method
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Project Data

Project Name:	Hartwood Marsh Road Phase 1
Simulation Description:	Pond 2 25 year/96 hour recovery
Project Number:	41561
Engineer :	KMV
Supervising Engineer:	
Date:	04-24-2008

Aquifer Data

Base Of Aquifer Elevation, [B] (ft datum):	91.00
Water Table Elevation, [WT] (ft datum):	92.00
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day):	15.00
Fillable Porosity, [n] (%):	30.00
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day):	15.0
Maximum Area For Unsaturated Infiltration, [Av] (ft^2):	173594.0

Geometry Data

Equivalent Pond Length, [L] (ft):	694.0
Equivalent Pond Width, [W] (ft):	250.0

Ground water mound is expected to intersect the pond bottom

Stage vs Area Data

Stage (ft datum)	Area (ft^2)
104.00	77377.0
108.00	106386.0
110.00	122540.0
113.00	147715.0
116.00	173595.0
117.00	207263.0

Scenario Input Data

Scenario 1 :: 25 year/96 hour volume

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft^3) 1480978

Initial ground water level (ft datum) default, 92.00

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	2.000	5.000	10.000	15.000
0.250	2.500	6.000	11.000	16.000
0.500	3.000	7.000	12.000	
1.000	3.500	8.000	13.000	
1.500	4.000	9.000	14.000	

Scenario 3 ::

Hydrograph Type: Local Hydrograph
Modflow Routing: Routed with infiltration
Repetitions: 1

Initial ground water level (ft datum) default, 92.00

Time After Storm Event (days)
1.000
5.000
10.000
15.000
20.000

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

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	246829.7000	0.0000	92.000	0.00000	0.00000	0.0	0.0	0.0	N.A.
0.002	246829.7000	0.0000	115.983	30.11241	0.86098	1480978.0	180.7	2.6	U/P
2.400	0.0000	0.0000	113.463	26.26452	0.73155	1480978.0	244524.1	165339.5	U/P
6.000	0.0000	0.0000	109.150	22.27702	0.42709	1480978.0	545312.3	440452.9	U/P
12.000	0.0000	0.0000	104.598	14.18298	0.00000	1480978.0	992946.1	440452.9	U/S
24.000	0.0000	0.0000	103.854	0.55068	0.00000	1480978.0	1040525.0	440452.9	S
36.000	0.0000	0.0000	103.207	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
48.000	0.0000	0.0000	102.733	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
60.000	0.0000	0.0000	102.355	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
72.000	0.0000	0.0000	102.041	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
84.000	0.0000	0.0000	101.770	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
96.000	0.0000	0.0000	101.533	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
120.000	0.0000	0.0000	101.146	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
144.000	0.0000	0.0000	100.820	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
168.000	0.0000	0.0000	100.539	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
192.000	0.0000	0.0000	100.292	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
216.000	0.0000	0.0000	100.073	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
240.000	0.0000	0.0000	99.875	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
264.000	0.0000	0.0000	99.696	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
288.000	0.0000	0.0000	99.532	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
312.000	0.0000	0.0000	99.381	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
336.000	0.0000	0.0000	99.242	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
360.000	0.0000	0.0000	99.112	0.00000	0.00000	1480978.0	1040525.0	440452.9	S
384.000	0.0000	0.0000	98.991	---	---	1480978.0	1040525.0	440452.9	N.A.

← RECOVERY ~ 18 HRS

==========
==== Basins ====
==========

Name: 1ST BAPTIST CH | Node: POND 2 | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484 | Peaking Factor: 484.0
Rainfall File: Sjrwmd96 | Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.300 | Time of Conc(min): 14.38
Area(ac): 30.530 | Time Shift(hrs): 0.00
Curve Number: 86.20 | Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

First Baptist Church

Name: BASIN 2 | Node: POND 2 | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484 | Peaking Factor: 484.0
Rainfall File: Sjrwmd96 | Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.300 | Time of Conc(min): 17.34
Area(ac): 7.670 | Time Shift(hrs): 0.00
Curve Number: 85.20 | Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Road Basin

Name: BASIN 2-1 | Node: POND 2 | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484 | Peaking Factor: 484.0
Rainfall File: Sjrwmd96 | Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.300 | Time of Conc(min): 10.20
Area(ac): 0.081 | Time Shift(hrs): 0.00
Curve Number: 39.00 | Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Offsite to road

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

Unit Hydrograph: Uh484 | Peaking Factor: 484.0
Rainfall File: Sjrwmd96 | Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.300 | Time of Conc(min): 9.24
Area(ac): 0.300 | Time Shift(hrs): 0.00
Curve Number: 54.70 | Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Offsite to road

Name: BASIN 2-3 | Node: POND 2 | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484 | Peaking Factor: 484.0
Rainfall File: Sjrwmd96 | Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.300 | Time of Conc(min): 8.50
Area(ac): 0.140 | Time Shift(hrs): 0.00
Curve Number: 43.20 | Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Offsite to road

Name: BASIN 2-4 | Node: POND 2 | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph

Unit Hydrograph: Uh484 | Peaking Factor: 484.0
Rainfall File: Sjrwmd96 | Storm Duration(hrs): 96.00
Rainfall Amount(in): 11.300 | Time of Conc(min): 5.00
Area(ac): 6.340 | Time Shift(hrs): 0.00
Curve Number: 57.90 | Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

Dry Total Retention Pond 2

==== Nodes ====

Name: POND 2 Base Flow(cfs): 0.000 Init Stage(ft): 104.000
Group: BASE Warn Stage(ft): 117.000
Type: Stage/Area

Stage(ft)	Area(ac)
104.000	1.7760
108.000	2.4420
110.000	2.8130
113.000	3.3910
116.000	3.9850
117.000	4.7580

==== Hydrology Simulations ====

Name: 100Y24H
Filename: W:\Jobs\41561-1\Phase 1\41561100001\drainage\ROUTINGS\POST\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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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

Name: 25Y24H
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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\Phase 1\41561100001\drainage\ROUTINGS\POST\100Y24H.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): 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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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

Group	Run
BASE	Yes

Name: 2.3Y24H Hydrology Sim: 2.3Y24H
Filename: W:\JOBS\41561-1\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\2.3Y24H.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): 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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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\PHASE 1\41561100001\DRAINAGE\ROUTINGS\POST\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

==== Boundary Conditions ====

Hartwood Marsh Road Phase I inc. S. Hancock runoff
Post Development
Pond 2 Hartwood
Hydrology time series 25y/96h

Simulation	Node	Time hrs	Volume ft3	Volume in	Rate cfs
25Y96H	POND 2	0.00	0.000	0.000	0.000
25Y96H	POND 2	1.00	0.000	0.000	0.000
25Y96H	POND 2	2.00	0.000	0.000	0.000
25Y96H	POND 2	3.00	0.000	0.000	0.000
25Y96H	POND 2	4.00	0.000	0.000	0.000
25Y96H	POND 2	5.00	0.000	0.000	0.000
25Y96H	POND 2	6.00	0.000	0.000	0.000
25Y96H	POND 2	7.00	0.000	0.000	0.000
25Y96H	POND 2	8.00	0.000	0.000	0.000
25Y96H	POND 2	9.00	0.000	0.000	0.000
25Y96H	POND 2	10.00	0.000	0.000	0.000
25Y96H	POND 2	11.00	0.000	0.000	0.000
25Y96H	POND 2	12.00	10.978	0.000	0.006
25Y96H	POND 2	13.00	86.064	0.001	0.036
25Y96H	POND 2	14.00	274.525	0.002	0.069
25Y96H	POND 2	15.00	580.682	0.004	0.101
25Y96H	POND 2	16.00	999.017	0.006	0.131
25Y96H	POND 2	17.00	1521.685	0.009	0.159
25Y96H	POND 2	18.00	2142.986	0.013	0.186
25Y96H	POND 2	19.00	2860.141	0.017	0.212
25Y96H	POND 2	20.00	3668.887	0.022	0.237
25Y96H	POND 2	21.00	4569.164	0.028	0.263
25Y96H	POND 2	22.00	5557.803	0.034	0.286
25Y96H	POND 2	23.00	6627.856	0.041	0.308
25Y96H	POND 2	24.00	7776.730	0.048	0.330
25Y96H	POND 2	25.00	9937.145	0.061	0.870
25Y96H	POND 2	26.00	13249.920	0.081	0.970
25Y96H	POND 2	27.00	16906.262	0.103	1.061
25Y96H	POND 2	28.00	20876.051	0.128	1.144
25Y96H	POND 2	29.00	25208.141	0.154	1.262
25Y96H	POND 2	30.00	29886.457	0.183	1.337
25Y96H	POND 2	31.00	34821.023	0.213	1.405
25Y96H	POND 2	32.00	39990.676	0.244	1.467
25Y96H	POND 2	33.00	45287.203	0.277	1.475
25Y96H	POND 2	34.00	50688.531	0.310	1.525
25Y96H	POND 2	35.00	56264.117	0.344	1.572
25Y96H	POND 2	36.00	62001.566	0.379	1.615
25Y96H	POND 2	37.00	67901.039	0.415	1.662
25Y96H	POND 2	38.00	73965.156	0.452	1.707
25Y96H	POND 2	39.00	80185.711	0.490	1.749
25Y96H	POND 2	40.00	86554.055	0.529	1.789
25Y96H	POND 2	41.00	93172.219	0.570	1.888
25Y96H	POND 2	42.00	100036.563	0.612	1.926
25Y96H	POND 2	43.00	107033.797	0.654	1.962
25Y96H	POND 2	44.00	114156.391	0.698	1.995
25Y96H	POND 2	45.00	121280.141	0.741	1.962
25Y96H	POND 2	46.00	128395.797	0.785	1.991
25Y96H	POND 2	47.00	135611.984	0.829	2.018
25Y96H	POND 2	48.00	142926.188	0.874	2.045
25Y96H	POND 2	49.00	151622.781	0.927	2.786
25Y96H	POND 2	50.00	161731.172	0.989	2.830
25Y96H	POND 2	50.25	164448.000	1.005	3.208
25Y96H	POND 2	50.50	167387.484	1.023	3.324
25Y96H	POND 2	50.75	170389.375	1.042	3.346
25Y96H	POND 2	51.00	173407.000	1.060	3.360
25Y96H	POND 2	51.25	176436.281	1.079	3.372
25Y96H	POND 2	51.50	179476.969	1.097	3.385
25Y96H	POND 2	51.75	182528.828	1.116	3.397
25Y96H	POND 2	52.00	185592.672	1.135	3.411
25Y96H	POND 2	52.25	188944.406	1.155	4.037
25Y96H	POND 2	52.50	192668.375	1.178	4.239
25Y96H	POND 2	52.75	196497.953	1.201	4.272
25Y96H	POND 2	53.00	200350.375	1.225	4.289
25Y96H	POND 2	53.25	204218.359	1.248	4.306
25Y96H	POND 2	53.50	208101.391	1.272	4.323
25Y96H	POND 2	53.75	211999.172	1.296	4.339
25Y96H	POND 2	54.00	215912.422	1.320	4.357
25Y96H	POND 2	54.25	220218.250	1.346	5.211
25Y96H	POND 2	54.50	225026.344	1.376	5.473
25Y96H	POND 2	54.75	229971.797	1.406	5.517
25Y96H	POND 2	55.00	234947.250	1.436	5.540
25Y96H	POND 2	55.25	239943.172	1.467	5.562
25Y96H	POND 2	55.50	244958.969	1.498	5.584
25Y96H	POND 2	55.75	249994.078	1.528	5.605
25Y96H	POND 2	56.00	255053.891	1.559	5.639
25Y96H	POND 2	56.25	261154.641	1.597	7.918
25Y96H	POND 2	56.50	268578.625	1.642	8.579
25Y96H	POND 2	56.75	276342.969	1.689	8.675
25Y96H	POND 2	57.00	284170.000	1.737	8.719
25Y96H	POND 2	57.25	292035.375	1.785	8.760
25Y96H	POND 2	57.50	299937.375	1.834	8.800

Hartwood Marsh Road Phase I inc. S. Hancock runoff
Post Development
Pond 2 Hartwood
Hydrology time series 25y/96h

Simulation	Node	Time hrs	Volume ft3	Volume in	Rate cfs
25Y96H	POND 2	57.75	307874.844	1.882	8.839
25Y96H	POND 2	58.00	315850.281	1.931	8.884
25Y96H	POND 2	58.25	326230.906	1.994	14.184
25Y96H	POND 2	58.50	339726.000	2.077	15.806
25Y96H	POND 2	58.75	354055.313	2.165	16.037
25Y96H	POND 2	59.00	368550.875	2.253	16.175
25Y96H	POND 2	59.25	387533.063	2.369	26.008
25Y96H	POND 2	59.50	412345.656	2.521	29.132
25Y96H	POND 2	59.75	511849.813	3.129	191.989
25Y96H	POND 2	60.00	707722.500	4.327	243.284
25Y96H	POND 2	60.25	859052.000	5.252	93.004
25Y96H	POND 2	60.50	924035.063	5.649	51.403
25Y96H	POND 2	60.75	960619.750	5.873	29.896
25Y96H	POND 2	61.00	985376.125	6.024	25.118
25Y96H	POND 2	61.25	1004767.750	6.143	17.975
25Y96H	POND 2	61.50	1020165.438	6.237	16.243
25Y96H	POND 2	61.75	1034725.938	6.326	16.114
25Y96H	POND 2	62.00	1049226.125	6.414	16.109
25Y96H	POND 2	63.00	1096292.875	6.702	10.040
25Y96H	POND 2	64.00	1132471.000	6.923	10.059
25Y96H	POND 2	65.00	1161522.000	7.101	6.080
25Y96H	POND 2	66.00	1183423.625	7.235	6.088
25Y96H	POND 2	67.00	1205352.625	7.369	6.095
25Y96H	POND 2	68.00	1227299.375	7.503	6.098
25Y96H	POND 2	69.00	1245597.625	7.615	4.068
25Y96H	POND 2	70.00	1260248.625	7.705	4.071
25Y96H	POND 2	71.00	1274901.750	7.794	4.069
25Y96H	POND 2	72.00	1289548.000	7.884	4.067
25Y96H	POND 2	73.00	1300680.375	7.952	2.117
25Y96H	POND 2	74.00	1308304.125	7.998	2.118
25Y96H	POND 2	75.00	1315930.250	8.045	2.119
25Y96H	POND 2	76.00	1323559.500	8.092	2.120
25Y96H	POND 2	77.00	1331222.625	8.138	2.138
25Y96H	POND 2	78.00	1338919.250	8.186	2.138
25Y96H	POND 2	79.00	1346618.625	8.233	2.139
25Y96H	POND 2	80.00	1354320.500	8.280	2.140
25Y96H	POND 2	81.00	1361993.750	8.327	2.123
25Y96H	POND 2	82.00	1369638.750	8.373	2.124
25Y96H	POND 2	83.00	1377286.000	8.420	2.125
25Y96H	POND 2	84.00	1384935.750	8.467	2.125
25Y96H	POND 2	85.00	1392588.000	8.514	2.126
25Y96H	POND 2	86.00	1400242.875	8.560	2.127
25Y96H	POND 2	87.00	1407900.000	8.607	2.127
25Y96H	POND 2	88.00	1415559.500	8.654	2.128
25Y96H	POND 2	89.00	1423252.750	8.701	2.146
25Y96H	POND 2	90.00	1430979.375	8.748	2.147
25Y96H	POND 2	91.00	1438708.750	8.796	2.147
25Y96H	POND 2	92.00	1446440.250	8.843	2.148
25Y96H	POND 2	93.00	1454142.500	8.890	2.131
25Y96H	POND 2	94.00	1461815.875	8.937	2.132
25Y96H	POND 2	95.00	1469491.750	8.984	2.132
25Y96H	POND 2	96.00	1477153.625	9.031	2.124
25Y96H	POND 2	97.00	1480977.375	9.054	0.000
25Y96H	POND 2	98.00	1480977.375	9.054	0.000
25Y96H	POND 2	99.00	1480977.375	9.054	0.000
25Y96H	POND 2	100.00	1480977.375	9.054	0.000

33.99 af

TOTAL VOLUME

Hartwood Marsh Road Phase I inc. S. Hancock runoff
Post Development
Pond 2 Hartwood
Node Min/Max

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 2	BASE	100Y24H	25.00	116.064	117.000	0.0050	175745	12.00	314.083	0.00	0.000
POND 2	BASE	10Y24H	25.01	111.267	117.000	0.0050	133170	12.00	162.377	0.00	0.000
POND 2	BASE	2.3Y24H	25.00	108.276	117.000	0.0050	108601	12.00	85.119	0.00	0.000
POND 2	BASE	25Y24H	25.02	112.987	117.000	0.0050	147605	12.00	212.731	0.00	0.000
POND 2	BASE	25Y96H	96.99	115.985	117.000	0.0050	173455	60.00	243.249	0.00	0.000

182

RESPONSE TO COMMENTS

by

LOTSPEICH and ASSOCIATES, INC.

Lotspeich and Associates, Inc.
ECOLOGICAL CONSULTANTS

29 May 2008
L&A No. 2005-117.23
Doc: \2005-117-WMDRAI-29E08.wpd

Ms. Gayle Albers
St. Johns River Water Management District
975 Keller Road
Altamonte Springs, FL 32714-1618

RE: South Hancock Road Extension
1.4± miles *in* Sections 9, 10, 15, and 16, Township 23 South, Range 26 East
Lake County, Florida
SJRWMD File # 40-069-76466-2
Response to Request for Additional Information

Dear Ms. Albers:

Lotspeich and Associates, Inc. (L&A) is in receipt of your Request for Additional Information (RAI) dated 26 March 2008. For convenience, we have restated each comment/question, followed by our response. The remainder of the responses (Questions 1 through 9) will be prepared by HNTB, Inc., and submitted under separate cover.

10. District staff needs to be able to determine the location of all wetlands and other surface waters within the project area and the extent of work proposed within wetlands and other surface waters. During a visit to the project site on March *25*, 2008, staff could not locate the wetland flags in the field. Note also that an environmental report by Lotspeich and Associates, Inc. does not depict the accurate location of the proposed ponds for the road expansion in relation to existing wetlands (e.g., north end of Pond 2). Please address the following:

a. Reestablish the wetland flags and contact Gayle Albers at 407-659-4882 to set up a site inspection. Provide a survey depicting the wetland flag numbers at a scale that is legible at the time of inspection.

Response: A site review was conducted with Ms. Albers on 13 May 2008. The wetland delineation adjacent to Pond 1 was accepted without change. The wetland line adjacent to Pond 2 was adjusted to the top-of-bank for that portion where the outfall would be constructed.

b. Provide an aerial map clearly labeling the onsite wetlands and other surface waters (e.g., Wetland 1) and all associated impacts (e.g., Impact 1), as applicable.

Response: Please see the exhibit prepared by HNTB.

c. Describe how any temporarily disturbed areas will be revegetated after the proposed work is completed. Please note that the planting of non-native vegetation within these areas could adversely affect the surrounding wetland by encouraging the spread of nuisance species.

Response: Temporary disturbance is only anticipated to occur adjacent to Wetland 2. Given the herbaceous nature of this system and the seedbank that naturally exists, it was the applicant's intention to allow these areas to naturally re-vegetate.

d. Revise the construction plans to clearly depict the extent of wetlands and other surface waters within and adjacent to the project area on a plan view. Crosshatch any proposed impact areas, as applicable.

Response: Please refer to HNTB's plan submittal.

e. Revise the application form (Sections A, C, and B, Tables 1-3), as necessary:

- **total existing onsite wetland and other surface water acreages;**
- **proposed impact acreages for each wetland and other surface water;**
- **proposed unaffected acreages for each wetland and other surface water;**
- **natural community type (e.g., FLUCCS code or list abundant canopy and groundcover species) of each wetland and other surface water;**
- **type of impact (temporary or permanent) to each wetland and other surface water.**

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

Response: No direct impacts are proposed to wetlands or surface waters; therefore, Sections A, C, and E, as well as Tables 1-3 are correct as previously submitted.

11. The submittal for the proposed road project does not include details on how you intend to address secondary impacts to wetlands or other surface waters that may be caused during and after construction. Although the environmental report by Lotspeich and Associates, Inc. states that all direct and secondary impacts have been avoided, the locations of the retention ponds associated with the road extension are not accurately depicted (e.g., Figure 5). In addition, construction of the gravity wall appears to be within 10 feet of onsite wetlands (e.g., Plan Sheet 16). An applicant must provide reasonable assurance that a regulated activity will not cause unacceptable adverse secondary impacts to water resources (12.2.7, ERP A.H.). Reasonably expected activities (e.g., landscaping maintenance, increased traffic, litter) will diminish the ecological functions provided by the wetlands by destroying wildlife habitat and introducing nuisance plant species.

Pursuant to subsection 12.2.7 (a), ERP A.H., one way to demonstrate that the proposed project will not have adverse secondary impacts to water resources is to establish a 15-foot minimum, 25-foot average undisturbed upland buffer landward of wetlands and other surface waters. The present design does not specify upland buffers on the construction plans or clearly demonstrate that the proposed works are sufficiently distant from offsite water resources.

Please indicate how you will demonstrate that the proposed project will not have adverse unacceptable secondary impacts to water resources. Alternatively, secondary impacts will be assessed. Provide the linear extent of all impacted wetlands where adverse secondary impacts are expected to occur. Additional mitigation may be required to offset these impacts.
[40C-.30 1(1)(d)(e)(f)(3); 40C-4.302(1)(a)2.,7.,(b),F.A.C.]

Response: Direct impacts to wetlands and surface waters were avoided through design alternatives, and through the utilization of the referenced gravity wall. The District is correct in that the gravity wall is located approximately 10 feet landward of the wetland limits, for an extent of approximately 80 feet. Fifteen (15) foot minimum, twenty five (25) foot average width undisturbed upland buffers will be provided adjacent to Wetland 2, where available. In order to make up for the shortfall in buffer acreage, the applicant proposes to provide buffer acreage in excess of the 25-feet required to either side of constriction. Further, the applicant is currently proposing handrails along the sidewalk bordering the gravity wall adjacent to the narrow area of buffer. The applicant will also provide signage denoting the sensitivity of the wetlands.

12. **Should you choose to utilize upland buffers as the recourse for addressing secondary impacts to water resources, you must provide reasonable assurance that the upland buffers and unaffected onsite wetlands will remain in an undisturbed condition and that the buffers it will be sufficient to prevent secondary impacts to water resources in perpetuity. Pursuant to Subsection 122.7 (a), Applicant's Handbook, one way to provide such assurance is to place the upland buffer and wetland areas under a conservation easement (CE) dedicated to the District that will adequately preserve buffer structure and function. If you choose to establish a conservation easement, please specify the acreage for the preservation of onsite wetlands and uplands separately in the supporting documentation.**

Please submit a draft conservation easement that is consistent with Section 704.06, Florida Statutes, and that contains restrictions ensuring the ecological viability of the site. The draft easement must (i) identify the grantor of the easement and include an appropriate signature block for the grantor, (ii) include a "Return Recorded Original to:" block in the top left hand corner of the first page of the conservation easement indicating the recorded original easement should be returned to the Office of General Counsel, St. Johns River Water Management District, 4049 Reid Street, Palatka, Florida 32177-2529, and (iii) the permit number for the proposed project in the opening recitals. Please note that if the mitigation areas are owned in fee simple by different entities or individuals, a draft conservation easement must be submitted for each mitigation area owned by each entity or owner. Be sure to attach Exhibits. Additionally, please submit the following documentation in support of each conservation easement:

a) **Proof of ownership of the real property described in the conservation easement area by the grantor. Examples of such documents include, but are not limited to, an attorney's title opinion, title certificate, owners and encumbrance report or warranty deed.**

b) **An attorney's title opinion, title certificate, or ownership and encumbrance report to demonstrate that the conservation easement area is not subject to any encumbrance(s) (e.g. utility easements and right of way easements) which may impair the ecological value of the area subject to the conservation easement. If encumbrances exist or will exist at the time the conservation easement is recorded, please provide a copy of the instrument creating each such encumbrance and depict the location of the encumbrance within the conservation easement area on the mitigation plans and/or surveyor's sketch.**

c) **Is the property that will be encumbered by a conservation easement subject to a mortgage? If so, please submit a draft Consent and Joinder of Mortgagee containing the name of the mortgagee, the title of the mortgage document(s), including any amendments and UCC financing statements, and the official records book and page number(s) of the public records of the county where the mortgage is recorded. The Consent and Joinder of Mortgagee will need to be executed by the lending institution in the presence of two witnesses.**

d) **The conservation easement must be executed by an individual who has the authority to transfer interests in the real property being encumbered by the conservation easement. Therefore, please identify the person who will be executing the easement on behalf of the grantor. If the grantor is a business entity (corporation, limited liability company, limited partnership, etc.), please identify the name and title or position of the signatory in the signature block appearing at the end of the conservation easement. Please also submit documentation of the signatory's authority to convey property interests on behalf of the business entity. Examples of such documents include, a corporate resolution, partnership or limited liability company affidavit, or partnership/operating agreement.**

e) **The draft conservation easement should include as an attachment: (1) a metes and bounds legal description of the area to be placed under conservation easement, and (2) a surveyor's sketch with the easement area clearly delineated and labeled, with the acreage of the easement area noted on the sketch. Please clearly label the pages as Exhibit "...", page of _. The District will need to review these documents and approve them in writing before the easement may be recorded. Please provide the acreages for the uplands and wetlands for each easement separately.**

f) **If the conservation easement area will be described by reference to a plat, please provide a copy of the plat. The conservation easement must reference the book and page number in a recorded plat. If the plat has not yet been recorded, please provide a preliminary or draft plat with the following note added to the face of the plat:**

> **Tracts _____ are subject to a Conservation Easement in favor of the St. Johns River Water Management District pursuant to Section 704.06, Florida Statutes.**

g) **Please submit a USGS quadrangle map depicting the area to be preserved by conservation easement. Please ensure that the official quad map name is included on your submittal.**

h) **The District must be assured of access to mitigation areas that will be encumbered by the conservation easement. Please provide information confirming the District's right of access via public road or, if not available, a draft access easement conveying a right of access to the District.**

[Sections 40C-4.301(1)(d),(f), F.A.C.; 40C-4.302(1)(a)2,7, F.A.C, 12.3.8, A.H.]

Response: The applicant (Lake County) does not own the wetlands and uplands adjacent to the proposed roadway right-of-way or the proposed Pond #1. They are part of the Water Conserv II - Site 2 property, and are jointly owned by the city of Orlando and Orange County. City and County decrees cite that the Water Conserv II site provides a preserve for endangered and threatened species of plants and animals. It is reasonable to anticipate that the Water Conserv II property will remain in its current state for the foreseeable future. Therefore, it is the applicant's belief that Conservation Easements on the Water Conserv II property are not necessary.

Additionally, the proposed Pond #2 on South Hancock Road is located on property owned by Hartwood Residential, LLC (Parcel No. 09-23-23-000400002400). Lake County has been working with the property owner for a future joint-use pond when the property is developed. Since the development of the property could occur after the construction of South Hancock Road, the County is planning to construct Pond #2 in a temporary location on the Hartwood Residential parcel. The temporary location shown in the plans was provided to the County by the property owner. The County will obtain a drainage easement for Pond 2. As the pond is located well away from the wetland edge (well outside the required 25-foot average width buffer), and is not proposed to permanently remain in this location, the placement of Conservation Easements over the upland and wetland is not considered to be practicable.

Please feel free to contact me if you require any additional information.

Sincerely,

LOTSPEICH AND ASSOCIATES, INC.

Don J. Silverberg
Project Manager

DJS\ms

cc: Melinda Fischl, EI; HNTB
FILE/Renee L. Thomas, President

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