Hooks Street
Stormwater Improvement Study

Prepared for:

CITY OF CLERMONT

City of Clermont
685 W. Montrose Street
Clermont, Florida 34711

Prepared by:

BESH
BOOTH BRN STRAUGHAN HIOTT

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MAY 2011

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Introduction

Section 1
Introduction

Booth, Ern, Straughan & Hiott, Inc. (BESH) has been retained to provide engineering services to the City of Clermont for the project titled "Hooks Street Drainage Improvements". The purpose of the Study is to identify alternative stormwater treatment systems for the Hooks Street basin, prepare preliminary stormwater calculations for each alternative, including nitrogen and phosphorus removal efficiencies, engineers' estimate of probable cost for at least three (3) alternatives and provide a cost benefit comparison for the three (3) alternatives. In preparing this study, a total of 5 stormwater treatment systems were identified and considered: Dry retention systems (2 possible locations), Infiltrator or trench systems, underground retention or storm boxes, and retention pond with infiltration system.

Description of Study Area

Section 2

Description of Study Area

The study area for the Hooks Street stormwater basin includes all lands laying west US Hwy 27, north of Hooks Street, south of E. Minneola Ave and east of Minnehaha Trailer Park. In order to conduct the Study, BESH utilized Lake County 2008 aerial photography and lidar topography data. Exhibit A depicts the overall Study area, drainage sub basins, alternate pond locations, and potential storm inlet and piping layout. Based upon the County lidar topography, the total drainage area contributing stormwater runoff to Hooks Street is approximately 39.92 acres. This does not include some of the commercial lands that have stormwater treatment systems located near Hwy 27. This overall drainage basin is divided into 2 sub basins for the purposes of this study based upon alternate locations for stormwater treatment.

A field survey was not conducted as part of this study. Right of Way and topography is based upon published data and will need to be verified prior to final designs. Utilities were not located as part of this study and will need to be field verified prior to final design.

Topography

Topography within the study area ranges from a low of 106.00 to a high of 202.00 NAVD (1988 North American Vertical Datum). Road slopes range from 3% up to and in excess of 8.5%.

Soils

Soils within the Hooks Street basin consist of several soil types, as identified on the Lake County SCS Soil Survey Report. Soils within the basin area include:

SCS Map Symbol	Soil Name	SCS Soil Type
AtB	Astatula Sands, 0-5% Slopes	A
AtD	Astatula Sands, 5-12% Slopes	A
LaB	Lake Sands, 0-5% Slopes	A
LaD	Lake Sands, 5-12% Slopes	A
Fm	Fill Material	D

The majority of the soil type consists of SCS Type A soils.

Description of Alternative Stormwater Treatment Systems

Section 3

Description of Alternative Stormwater Treatment Systems

The most effective and easiest to maintain form of stormwater treatment is that of dry swales and retention ponds. Unfortunately, this existing drainage basin is 95% constructed and options for locating stormwater ponds are limited to developed lands in the south western region of the basin. For the purpose of this study, dry retention ponds, infiltrator type trenches and concrete vault underground retention systems were analyzed for stormwater treatment alternatives and recommendation made based upon the amount of treatment provided, nitrogen and phosphorus removal, cost and maintenance.

Stormwater Treatment System – Alternate 1

Alternate 1 stormwater treatment system provides for treatment of stormwater runoff from Basin 1 as shown on Exhibit A and consists of 35.71 acres. The proposed method of treatment is a single dry retention pond located south of Hooks Street and west of Sunset Lane with an outfall to Lake Minnehaha. The dry retention pond is approximately 0.35 acres in size and five (5) foot deep. The total treatment volume is 43,800 cubic feet at elevation 101.50 and provides for approximately 80.4% removal efficiency of nitrogen and phosphorus. This design does not provide for attenuation of peak rates or volumes of discharge to Lake Minnehaha. See preliminary water quality calculations "Alternate 1" Tab B. Final design of pond depth and treatment efficiency will be dependent on site specific geotechnical investigation and soil characteristics.

Stormwater Treatment System – Alternate 2

Alternate 2 stormwater treatment system provides for treatment of stormwater runoff from Basin 2 as shown on Exhibit B and consists of 39.92 Acres. The proposed method of treatment is a single dry retention pond located on the north side of Hooks Street and west of Bloxam Avenue with an outfall to Lake Minnehaha. The dry retention pond is approximately 0.52 acres in size and five (5) foot deep. The total treatment volume is 75,978 cubic feet at elevation 105.5 and provides for approximately 87.5% removal efficiency of nitrogen and phosphorus. This design does not provide for attenuation of peak rates or volumes of discharge to Lake Minnehaha. See preliminary water quality calculations "Alternate 2" Tab B. Final design of pond depth and treatment efficiency will be dependent on site specific geotechnical investigation and soil characteristics.

Stormwater Treatment System – Alternate 3

Alternate 3 stormwater treatment system provides for treatment of stormwater runoff from Basin 1 as shown on Exhibit C and consists of 35.71 acres. The proposed method of treatment is underground exfiltration trench utilizing *StormTech* or *Triton* manufactured plastic open bottom infiltration units to collect and percolate stormwater runoff. To prevent oils, greases, and solids from entering the chambers, a pretreatment stormwater baffle box such as those manufactured by Suntree *Technologies* is needed to extend the life and reduce maintenance of the exfiltration system. The total number of infiltrator system required to achieve 80% removal efficiency of nitrogen and phosphorus is approximately 2700 infiltrator units with a minimum

volume of 16.3cf per unit. This design does not provide for attenuation of peak rates or volumes of discharge to Lake Minnehaha. See preliminary water quality calculations "Alternate 3" Tab B. Final design of infiltrator location, depth, and treatment efficiency will be dependent on site specific geotechnical investigation and soil characteristics.

Stormwater Treatment System – Alternate 4

Alternate 4 stormwater treatment system provides for treatment of stormwater runoff from Basin 1 as shown on Exhibit D and consists of 35.71 acres. The proposed method of treatment is underground retention utilizing precast concrete *Storm Capture Module*. These structures come in 6'x12' with varying depths, open bottom, and flow ports between structures. To prevent oils, greases, and solids from entering the chamber, a pretreatment stormwater baffle box such as those manufactured by *Suntree Technologies* or a small pretreatment dry retention pond is needed to extend the life and reduce maintenance of the exfiltration system. The total number of *Storm Capture Modules* required to achieve 80% removal efficiency of nitrogen and phosphorus is approximately 114 units with a minimum volume of 378cf per unit. This design does not provide for attenuation of peak rates or volumes of discharge to Lake Minnehaha. See preliminary water quality calculations "Alternate 4" Tab B. Final design of the concrete *Storm Capture Modules,* depth, and treatment efficiency will be dependent on site specific geotechnical investigation and soil characteristics.

Stormwater Treatment System – Alternate 5

Alternate 5 stormwater treatment system is a combination of Alternates 1 and Alternate 4 as shown on Exhibit E and consists of 35.71 acres. This alternate may be considered if enough property cannot be purchased to construct a large enough pond or physical constraints determined during final design such as high ground water table or shallow confining layer limit the pond depth, which in turn limits volume of treatment. An example of this alternative is based upon only 3 of the 5 lots, from alternate 1, are available to construct a stormwater pond and the remaining treatment volume to achieve 80% removal efficiency of nitrogen and phosphorus is achieved using *Storm Capture Module's* identified in alternate 4. The stormwater basin remains the same at 35.71 acres and the total treatment volume is 43,100cf for 80% removal. Pond volume at elevation 105.5 is 26,108cf, 16,992cf short of the total treatment volume needed. Each 6'x12'x5' concrete storm capture module holds 378cf, therefore, 45 storm capture modules would be required to make up the difference. In this combination, a pretreatment structure is not needed as stormwater can first flow into the dry retention pond then back into the underground retention system. Final design of pond depth, number of storm capture modules, and treatment efficiency will be dependent on site specific geotechnical investigation and soil characteristics.

Recommendation

Section 4
Recommendation

Alternates 1 and 2, with dry retention ponds, are the recommended Alternative for stormwater treatment. Dry retention ponds are the most efficient form of treatment and the least expensive to maintain over time. Alternate 2 treats approximately 4 more acres than Alternate 1 and can provide up to 88% removal of nitrogen and phosphorus for that basin. Subject to land costs, and potential loss of business income, Alternate 2 provides for the highest removal of nitrogen and phosphorus in pounds per year per cost of construction, with Alternate 1 being the second most cost effective choice. Based upon the preliminary calculations included in this study and estimated project costs, Alternate 1 and 2 are the preferred stormwater treatment systems recommendation for this Hooks Street Basin.

Alternates 3 and 4 are two different types of underground storage and treatment systems, both require a pretreatment box to separate heavier solids and skim oils and greases to increase the life of the system. This type of system should only be considered if adequate land is not available or feasible to purchase for construction of a open pond retention system. Alternate 4, underground concrete storm capture modules are preferred over the infiltrator type units for this application as the boxes come in varying depths and can occupy a smaller footprint, subject to groundwater table and soil profile, thus reducing the cost per volume of stormwater treated.

Alternate 5 is an example of a combination of Alternate 1 and Alternate 4. This alternate could be any combination of Alternates 1 or 2 in conjunction with Alternate 3 or 4. As mentioned above, Alternate 4 concrete storm boxes are preferred over infiltrator units, which is why the concrete storm boxes were chosen for this design alternative. The amount of storm boxes will be dependent on the land available for construction of a retention pond and the volume of treatment available within the pond. If only a small parcel of land is available for stormwater retention, this Alternate should be considered before choosing Alternate 3 or 4. This design will settle solids and keep oils and greases within the open retention pond prior to flowing into the storm chambers.

The cost associated with the construction of a stormwater collection system along Hooks Street and the Alternative Stormwater Treatment Systems is provided behind Tab C. A summary of the construction cost per alternative vs. treatment provided is provided in the table below.

Alternate	Annual Nitrogen Removal - kg per year	Annual Phosphorous Removal- kg per year	Estimated Project Cost
Alternate 1	5.5280 (12.19 lbs)	.9263 (2.04 lbs.)	$ 623,691.44
Alternate 2	6.7254 (14.83 lbs.)	1.1270 (2.48 lbs.)	$ 553,471.33
Alternate 3	5.5004 (12.13 lbs.)	.9217 (2.03 lbs.)	$ 781,778.13
Alternate 4	5.5004 (12.13 lbs.)	.9217 (2.03 lbs.)	$ 651,334.10
Alternate 5	5.5004 (12.13 lbs.)	.9217 (2.03 lbs.)	$ 624,035.10

The estimated project costs include, purchase of lands and easements, survey, civil design and permitting. Land and home values were based on total just value as reported on the Lake County Property Appraisers website April 2011. Easement values were based upon 90% of the land value per square foot of easement. These costs do not account for any loss of business income, appraisals, attorney's fees, or negotiations for purchase.

Exhibits A, B, C, D, & E

CITY OF CLERMONT
Hooks Street Drainage

EXHIBIT 'A'

Sheet 1

DUANE K BOOTH, PE

CITY OF CLERMONT

CITY OF CLERMONT

CITY OF CLERMONT
Hooks Street Drainage

EXHIBIT 'B'

Sheet 1

DUANE K. BOOTH, PE
Registered Eng 44631

CITY OF CLERMONT
Hooks Street Drainage

EXHIBIT 'C'

Sheet 1

DUANE K. BOOTH, PE

CITY OF CLERMONT

CITY OF CLERMONT

CITY OF CLERMONT
Hooks Street Drainage

EXHIBIT 'D'

DATE: FEBRUARY 2010
DESIGNED BY: SPH
DRAWN BY: SPH
CHECKED BY: DKB
JOB NO.: 03H004.0000
FILE NAME: HOOKS ST

Sheet 1

DUANE K. BOOTH, PE
Registered Eng 44831

Scale: 1"=
SCALE IN FEET

CITY OF CLERMONT

DATE	REVISION
	1
	2
	3
	4
	5
	6
	7
	8

CITY OF CLERMONT
Hooks Street Drainage

EXHIBIT 'E'

DATE:	FEBRUARY 2010
DESIGNED BY:	SPH
DRAWN BY:	SPH
CHECKED BY:	DKB
JOB NO.:	031J04.0029
FILE NAME:	HOOKS ST

Sheet 1

DUANE K. BOOTH, PE
Registered Eng 44831

Water Quality Calculations

ALTERNATE 1

AREA = 35.71 AC.
ASSUME 25% FOR IMPERVIOUS AREA = 8.93 AC
PERVIOUS AREA = 26.78 AC

ASSUME 30 MINUTES FOR TIME OF CONCENTRATION

CURVE NUMBER = 53.75

PHOSPHOROUS REMOVED = 80.4% =

ALTERNATE 1 STAGE/STORAGE

ELEV. FT	AREA FT^2	AREA AC.	VOLUME FT^3	VOL. SUM FT^3	VOL SUM AC-FT
97	5489	0.13	0	0	0.000
98	7231	0.17	6360	6360	0.146
99	9104	0.21	8168	14527	0.334
100	11064	0.25	10084	24611	0.565
101	13112	0.30	12088	36699	0.843
101.5	14157	0.33	13145	43800	1.006
102	15290	0.35	14201	50900	1.169

PONDS 3.3
Nitrogen and Phosphorus Loading Calculator
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Data Section 1: Project Data

Node Text: (new project)

Project Name: Hooks Street

Project Description: ALTERNATE 1

Project Number:

Engineer: CCH

Supervising Engineer: CCH

Date: 03-08-2011

End Data Section 1

Data Section 2: Single Basin or Multibasin Pond

Node: Multibasin Pond

Description: HOOKS STREET CLERMONT FL (ALTERNATE 1)

Analysis Type: Specified Reduction In Postdevelopment Nutrient Loading
Pond Type: Dry Pond
Analyze For: Nitrogen and Phosphorus

Climate Data:

Climate zone = 2 - Central Florida
Average annual rainfall depth (inches) = 50

Postdevelopment Basins:

Postdevelopment Basin Input Parameters				
Basin	Basin Area (acres)	Curve Number	DCIA (%)	Land Use
1	35.71	53.75	0	Single-Family
Total	35.71	53.75	0	

Postdevelopment Basin Intermediate Parameters						
Basin	Nitrogen Conc. (mg/l)	Phosphorus Conc. (mg/l)	Runoff Coef.	Annual Runoff Volume (ac-ft/yr)	Annual Nitrogen Load (kg/yr)	Annual Phosphorus Load (kg/yr)
1	1.85	0.31	0.02025	3.013031	6.87556	1.152121
Total	1.85	0.31	0.02025	3.013031	6.87556	1.152121

Postdevelopment Non-Runoff Contributing Area (acres): 0
Postdevelopment Total Area (acres): 35.71

Efficiency:

Required Removal Efficiency (%) = 80.4

Dry Pond Design Requirements:

Required dry pond retention depth (inches) = 0.3379148
Required dry pond retention volume (ac-ft) = 1.005578

Discharge Summary:

	Predevelopment	Postdevelopment
Annual Runoff Volume (ac-ft)	N.A.	3.013031
Annual Discharge Volume (ac-ft)	N.A.	0.590554
Annual Mass of Discharged Nitrogen (kg/yr)	N.A.	1.34761
Annual Mass of Discharged Phosphorus (kg/yr)	N.A.	0.2258157
Nitrogen Concentration in Discharge (mg/l)	N.A.	1.85
Phosphorus Concentration in Discharge (mg/l)	N.A.	0.31

End Data Section 2

ALTERNATE 2

AREA = 39.92 AC.
ASSUME 25% FOR IMPERVIOUS AREA = 9.98 AC
PERVIOUS AREA = 29.94 AC

ASSUME 30 MINUTES FOR TIME OF CONCENTRATION

CURVE NUMBER = 53.75

PHOSPHOROUS REMOVED = 87.5% =

ALTERNATE 2 STAGE/STORAGE

ELEV. FT	AREA FT^2	AREA AC.	VOLUME FT^3	VOL. SUM FT^3	VOL SUM AC-FT
101	12396	0.28	0	0	0.000
102	14258	0.33	13327	13327	0.306
103	16221	0.37	15240	28567	0.656
104	18285	0.42	17253	45820	1.052
105	20449	0.47	19367	65187	1.496
105.5	21582	0.50	20475	75978	1.744
106	22714	0.52	21582	86768	1.992

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Data Section 1: Project Data

Node Text: (new project)

Project Name: Hooks Street

Project Description: ALTERNATE 2

Project Number:

Engineer: CCH

Supervising Engineer: CCH

Date: 03-08-2011

End Data Section 1

Data Section 2: Single Basin or Multibasin Pond

Node: Multibasin Pond

Description: HOOKS STREET CLERMONT FL (ALTERNATE 2)

Analysis Type: Specified Reduction In Postdevelopment Nutrient Loading
Pond Type: Dry Pond
Analyze For: Nitrogen and Phosphorus

Climate Data:

Climate zone = 2 - Central Florida
Average annual rainfall depth (inches) = 50

Postdevelopment Basins:

Postdevelopment Basin Input Parameters				
Basin	Basin Area (acres)	Curve Number	DCIA (%)	Land Use
1	39.92	53.75	0	Single-Family
Total	39.92	53.75	0	

Postdevelopment Basin Intermediate Parameters						
Basin	Nitrogen Conc. (mg/l)	Phosphorus Conc. (mg/l)	Runoff Coef.	Annual Runoff Volume (ac-ft/yr)	Annual Nitrogen Load (kg/yr)	Annual Phosphorus Load (kg/yr)
1	1.85	0.31	0.02025	3.36825	7.686149	1.287949
Total	1.85	0.31	0.02025	3.36825	7.686149	1.287949

Postdevelopment Non-Runoff Contributing Area (acres): 0
Postdevelopment Total Area (acres): 39.92

Efficiency:

Required Removal Efficiency (%) = 87.5

Dry Pond Design Requirements:

Required dry pond retention depth (inches) = 0.5211111
Required dry pond retention volume (ac-ft) = 1.733563

Discharge Summary:

	Predevelopment	Postdevelopment
Annual Runoff Volume (ac-ft)	N.A.	3.36825
Annual Discharge Volume (ac-ft)	N.A.	0.4210312
Annual Mass of Discharged Nitrogen (kg/yr)	N.A.	0.9607686
Annual Mass of Discharged Phosphorus (kg/yr)	N.A.	0.1609936
Nitrogen Concentration in Discharge (mg/l)	N.A.	1.85
Phosphorus Concentration in Discharge (mg/l)	N.A.	0.31

End Data Section 2

ALTERNATE 3

AREA = 35.71 AC.
ASSUME 25% FOR IMPERVIOUS AREA = 8.93 AC
PERVIOUS AREA = 26.78 AC

ASSUME 30 MINUTES FOR TIME OF CONCENTRATION

CURVE NUMBER = 53.75

PHOSPHOROUS REMOVED = 80% =

INFILTRATOR HOLDS 16.3 CF

INFILTRATORS REQUIRED TO ACHIEVE 80% REMOVAL = **2627**

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Data Section 1: Project Data

Node Text: (new project)

Project Name: Hooks Street

Project Description: ALTERNATE 3

Project Number:

Engineer: CCH

Supervising Engineer: CCH

Date: 03-08-2011

End Data Section 1

Data Section 2: Single Basin or Multibasin Pond

Node: Multibasin Pond

Description: HOOKS STREET CLERMONT FL (ALTERNATE 3)

Analysis Type: Specified Reduction In Postdevelopment Nutrient Loading
Pond Type: Dry Pond
Analyze For: Nitrogen and Phosphorus

Climate Data:

Climate zone = 2 - Central Florida
Average annual rainfall depth (inches) = 50

Postdevelopment Basins:

Postdevelopment Basin Input Parameters				
Basin	Basin Area (acres)	Curve Number	DCIA (%)	Land Use
1	35.71	53.75	0	Single-Family
Total	35.71	53.75	0	

Postdevelopment Basin Intermediate Parameters						
Basin	Nitrogen Conc. (mg/l)	Phosphorus Conc. (mg/l)	Runoff Coef.	Annual Runoff Volume (ac-ft/yr)	Annual Nitrogen Load (kg/yr)	Annual Phosphorus Load (kg/yr)
1	1.85	0.31	0.02025	3.013031	6.87556	1.152121
Total	1.85	0.31	0.02025	3.013031	6.87556	1.152121

Postdevelopment Non-Runoff Contributing Area (acres): 0
Postdevelopment Total Area (acres): 35.71

Efficiency:

Required Removal Efficiency (%) = 80

Dry Pond Design Requirements:

Required dry pond retention depth (inches) = 0.3303318
Required dry pond retention volume (ac-ft) = 0.9830124

Discharge Summary:

	Predevelopment	Postdevelopment
Annual Runoff Volume (ac-ft)	N.A.	3.013031
Annual Discharge Volume (ac-ft)	N.A.	0.6026062
Annual Mass of Discharged Nitrogen (kg/yr)	N.A.	1.375112
Annual Mass of Discharged Phosphorus (kg/yr)	N.A.	0.2304242
Nitrogen Concentration in Discharge (mg/l)	N.A.	1.85
Phosphorus Concentration in Discharge (mg/l)	N.A.	0.31

End Data Section 2

ALTERNATE 4

AREA = 35.71 AC.
ASSUME 25% FOR IMPERVIOUS AREA = 8.93 AC
PERVIOUS AREA = 26.78 AC

ASSUME 30 MINUTES FOR TIME OF CONCENTRATION

CURVE NUMBER = 53.75

PHOSPHOROUS REMOVED = 80% =

5' STORM CAPTURE HOLDS 378 CF

STORM CAPTURES REQUIRED TO ACHIEVE 80% REMOVAL = 114

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Nitrogen and Phosphorus Loading Calculator
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Data Section 1: Project Data

Node Text: (new project)

Project Name: Hooks Street

Project Description: ALTERNATE 4

Project Number:

Engineer: CCH

Supervising Engineer: CCH

Date: 03-08-2011

End Data Section 1

Data Section 2: Single Basin or Multibasin Pond

Node: Multibasin Pond

Description: HOOKS STREET CLERMONT FL (ALTERNATE 4)

Analysis Type: Specified Reduction In Postdevelopment Nutrient Loading
Pond Type: Dry Pond
Analyze For: Nitrogen and Phosphorus

Climate Data:

Climate zone = 2 - Central Florida
Average annual rainfall depth (inches) = 50

Postdevelopment Basins:

Postdevelopment Basin Input Parameters				
Basin	Basin Area (acres)	Curve Number	DCIA (%)	Land Use
1	35.71	53.75	0	Single-Family
Total	35.71	53.75	0	

Postdevelopment Basin Intermediate Parameters						
Basin	Nitrogen Conc. (mg/l)	Phosphorus Conc. (mg/l)	Runoff Coef.	Annual Runoff Volume (ac-ft/yr)	Annual Nitrogen Load (kg/yr)	Annual Phosphorus Load (kg/yr)
1	1.85	0.31	0.02025	3.013031	6.87556	1.152121
Total	1.85	0.31	0.02025	3.013031	6.87556	1.152121

Postdevelopment Non-Runoff Contributing Area (acres): 0
Postdevelopment Total Area (acres): 35.71

Efficiency:

Required Removal Efficiency (%) = 80

Dry Pond Design Requirements:

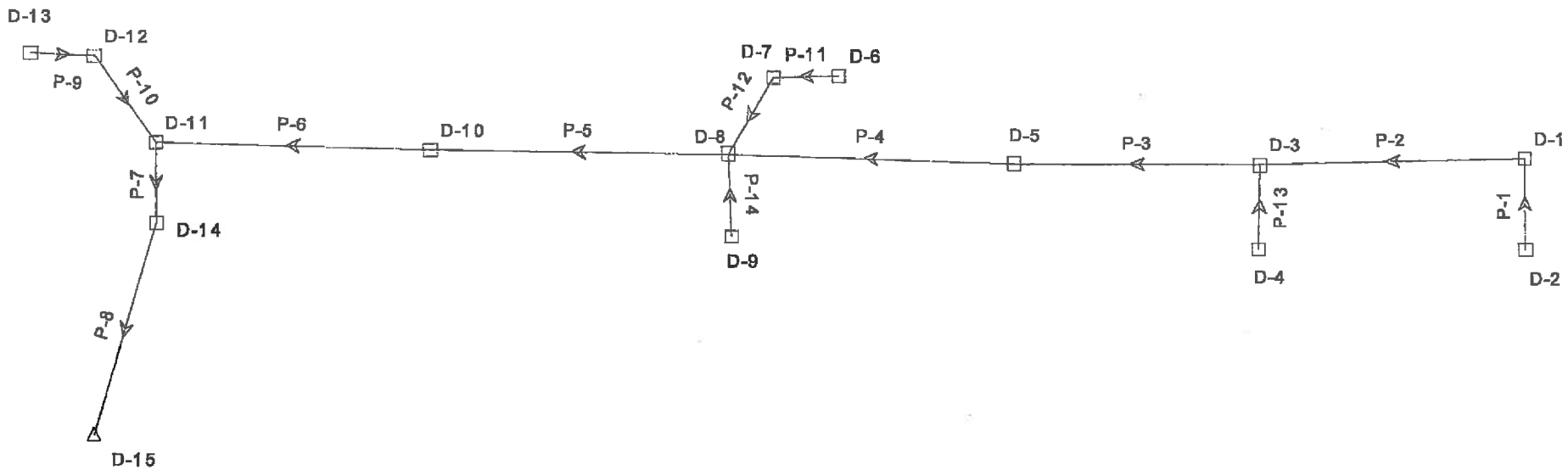
Required dry pond retention depth (inches) = 0.3303318
Required dry pond retention volume (ac-ft) = 0.9830124

Discharge Summary:

	Predevelopment	Postdevelopment
Annual Runoff Volume (ac-ft)	N.A.	3.013031
Annual Discharge Volume (ac-ft)	N.A.	0.6026062
Annual Mass of Discharged Nitrogen (kg/yr)	N.A.	1.375112
Annual Mass of Discharged Phosphorus (kg/yr)	N.A.	0.2304242
Nitrogen Concentration in Discharge (mg/l)	N.A.	1.85
Phosphorus Concentration in Discharge (mg/l)	N.A.	0.31

End Data Section 2

Scenario: Alternate 1 Pr Storm System 4"



Scenario: Alternate 1 Pr Storm System 4"

Combined Pipe\Node Report

Label	Upstream Node	Downstream Node	Length (ft)	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	Upstream Inlet Rational Flow (cfs)	Section Size	Full Capacity (cfs)	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	Description
P-1	D-2	D-1	22.00	0.46	0.70	0.32	0.32	1.30	18 inch	10.50	4.04	128.70	128.48	0.010000	
P-2	D-1	D-3	202.00	0.58	0.70	0.41	0.73	1.64	18 inch	17.64	7.40	128.48	122.78	0.028218	
P-3	D-3	D-5	234.00	0.19	0.70	0.13	0.91	0.54	18 inch	14.04	6.69	122.78	118.60	0.017863	
P-4	D-5	D-8	248.00	0.22	0.70	0.15	1.06	0.62	18 inch	13.00	6.60	118.60	114.80	0.015323	
P-5	D-8	D-10	238.00	1.50	0.39	0.58	6.70	2.36	24 inch	35.31	12.38	114.80	109.00	0.024370	
P-6	D-10	D-11	120.00	4.57	0.39	1.78	8.59	7.19	24 inch	43.81	15.46	109.00	104.50	0.037500	
P-7	D-11	D-14	22.00	2.00	0.39	0.78	12.10	3.14	36 inch	63.59	9.92	104.50	104.30	0.009091	
P-8	D-14	D-15	144.00	0.11	0.70	0.08	12.17	0.31	36 inch	55.58	8.88	98.00	97.00	0.006944	
P-9	D-13	D-12	22.00	6.02	0.39	2.35	1.46	9.47	18 inch	10.01	3.33	105.20	105.00	0.009091	
P-10	D-12	D-11	48.00	1.30	0.39	0.51	1.97	2.04	18 inch	10.72	4.49	105.00	104.50	0.010417	
P-11	D-6	D-7	12.00	9.44	0.39	3.68	1.77	14.84	18 inch	13.56	7.78	116.50	116.30	0.016667	
P-12	D-7	D-8	20.00	7.14	0.39	2.78	3.33	11.23	18 inch	28.77	16.00	116.30	114.80	0.075000	
P-13	D-4	D-3	22.00	0.07	0.70	0.05	0.05	0.20	18 inch	10.50	2.31	123.00	122.78	0.010000	
P-14	D-9	D-8	22.00	0.16	0.70	0.11	0.11	0.45	18 inch	10.01	0.26	115.00	114.80	0.009091	

Scenario: Alternate 1 Pr Storm System 4"

Pipe Report

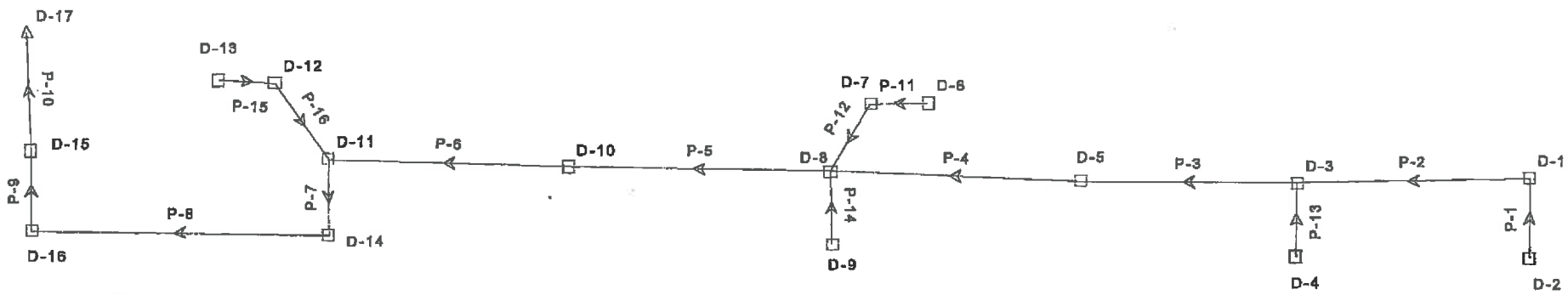
Label	Upstream Node	Downstream Node	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Material	Maximum Velocity (ft/s)	Velocity In (ft/s)	Velocity Out (ft/s)
P-1	D-2	D-1	1.30	22.00	0.010000	18 inch	10.50	128.70	128.48	133.70	133.70	Concrete	15.00	3.14	1.77
P-2	D-1	D-3	2.94	202.00	0.028218	18 inch	17.64	128.48	122.78	133.70	128.00	Concrete	15.00	3.99	3.43
P-3	D-3	D-5	3.67	234.00	0.017863	18 inch	14.04	122.78	118.60	128.00	123.60	Concrete	15.00	4.29	3.86
P-4	D-5	D-8	4.29	248.00	0.015323	18 inch	13.00	118.60	114.80	123.60	120.00	Concrete	15.00	4.52	2.43
P-5	D-8	D-10	27.02	238.00	0.024370	24 inch	35.31	114.80	109.00	120.00	114.00	Concrete	15.00	9.04	8.72
P-6	D-10	D-11	34.65	120.00	0.037500	24 inch	43.81	109.00	104.50	114.00	111.00	Concrete	15.00	11.19	11.03
P-7	D-11	D-14	48.77	22.00	0.009091	36 inch	63.59	104.50	104.30	111.00	111.00	Concrete	15.00	8.48	9.33
P-8	D-14	D-15	49.08	144.00	0.006944	36 inch	55.58	98.00	97.00	111.00	105.00	Concrete	15.00	7.70	6.94
P-9	D-13	D-12	5.88	22.00	0.009091	18 inch	10.01	105.20	105.00	110.20	110.20	Concrete	15.00	3.33	3.33
P-10	D-12	D-11	7.93	48.00	0.010417	18 inch	10.72	105.00	104.50	110.20	111.00	Concrete	15.00	4.49	4.49
P-11	D-6	D-7	7.15	12.00	0.016667	18 inch	13.56	116.50	116.30	121.50	121.50	Concrete	15.00	5.49	4.24
P-12	D-7	D-8	13.43	20.00	0.075000	18 inch	28.77	116.30	114.80	121.50	120.00	Concrete	15.00	7.95	7.60
P-13	D-4	D-3	0.20	22.00	0.010000	18 inch	10.50	123.00	122.78	128.00	128.00	Concrete	15.00	0.37	0.23
P-14	D-9	D-8	0.45	22.00	0.009091	18 inch	10.01	115.00	114.80	120.00	120.00	Concrete	15.00	0.26	0.26

Scenario: Alternate 1 Pr Storm System 4"

Inlet Report

Label	Inlet Location	Ground Elevation (ft)	Set Rim Equal to Ground Elevation?	Rim Elevation (ft)	Sump Elevation (ft)	Area (acres)	Inlet C	Inlet CA (acres)	Time of Concentration (min)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gutter Ditch Spread (ft)	Velocity In (ft/s)	Gutter Ditch Depth (ft)
D-1	On Grade	133.70	true	133.70	128.48	0.58	0.70	0.41	12.00	129.13	129.13	5.40	3.99	0.20
D-2	On Grade	133.70	true	133.70	128.70	0.46	0.70	0.32	10.00	129.13	129.13	4.75	3.14	0.19
D-3	On Grade	128.00	true	128.00	122.78	0.19	0.70	0.13	10.00	123.51	123.51	2.48	4.29	0.14
D-4	On Grade	128.00	true	128.00	123.00	0.07	0.70	0.05	10.00	123.51	123.51	1.20	0.37	0.10
D-5	On Grade	123.60	true	123.60	118.60	0.22	0.70	0.15	10.00	119.39	119.39	3.66	4.52	0.17
D-6	On Grade	121.50	true	121.50	116.50	9.44	0.39	3.68	30.00	117.54	117.54	12.61	5.49	0.35
D-7	On Grade	121.50	true	121.50	116.30	7.14	0.39	2.78	30.00	117.67	117.67	11.25	7.95	0.32
D-8	On Grade	120.00	true	120.00	114.80	1.50	0.39	0.58	30.00	116.61	116.61	16.36	9.04	0.42
D-9	On Grade	120.00	true	120.00	115.00	0.16	0.70	0.11	10.00	116.61	116.61	2.86	0.26	0.15
D-10	On Grade	114.00	true	114.00	109.00	4.57	0.39	1.78	30.00	110.92	110.92	13.94	11.19	0.37
D-11	On Grade	111.00	true	111.00	104.50	2.00	0.39	0.78	30.00	106.77	106.77	11.82	8.48	0.33
D-12	On Grade	110.20	true	110.20	105.00	1.30	0.39	0.51	25.00	107.05	107.05	5.30	4.49	0.20
D-13	On Grade	110.20	true	110.20	105.20	6.02	0.39	2.35	30.00	107.12	107.12	10.75	3.33	0.31
D-14	On Grade	111.00	true	111.00	98.00	0.11	0.70	0.08	10.00	100.54	100.54	1.44	7.70	0.12

Scenario: Alternate 2 Pr Storm System 4"



Scenario: Alternate 2 Pr Storm System 4"

Pipe Report

Label	Upstream Node	Downstream Node	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Material	Maximum Velocity (ft/s)	Velocity In (ft/s)	Velocity Out (ft/s)
P-1	D-2	D-1	1.30	22.00	0.010000	18 inch	10.50	128.70	128.48	133.70	133.70	Concrete	15.00	3.14	1.77
P-2	D-1	D-3	2.94	202.00	0.028218	18 inch	17.64	128.48	122.78	133.70	128.00	Concrete	15.00	3.99	3.43
P-3	D-3	D-5	3.67	234.00	0.017863	18 inch	14.04	122.78	118.60	128.00	123.60	Concrete	15.00	4.29	3.86
P-4	D-5	D-8	4.29	248.00	0.015323	18 inch	13.00	118.60	114.80	123.60	120.00	Concrete	15.00	4.52	2.43
P-5	D-8	D-10	27.02	238.00	0.024370	24 inch	35.31	114.80	109.00	120.00	114.00	Concrete	15.00	9.04	8.72
P-6	D-10	D-11	34.65	120.00	0.037500	24 inch	43.81	109.00	104.50	114.00	111.00	Concrete	15.00	11.19	11.03
P-7	D-11	D-14	48.77	22.00	0.009091	36 inch	63.59	104.50	104.30	111.00	111.00	Concrete	15.00	8.48	8.43
P-15	D-13	D-12	5.88	22.00	0.009091	18 inch	10.01	105.20	105.00	110.20	110.20	Concrete	15.00	3.33	3.33
P-16	D-12	D-11	7.93	48.00	0.010417	18 inch	10.72	105.00	104.50	110.20	111.00	Concrete	15.00	4.49	4.49
P-11	D-6	D-7	7.15	12.00	0.016667	18 inch	13.56	116.50	116.30	121.50	121.50	Concrete	15.00	5.49	4.24
P-12	D-7	D-8	13.43	20.00	0.075000	18 inch	28.77	116.30	114.80	121.50	120.00	Concrete	15.00	7.95	7.60
P-13	D-4	D-3	0.20	22.00	0.010000	18 inch	10.50	123.00	122.78	128.00	128.00	Concrete	15.00	0.37	0.23
P-14	D-9	D-8	0.45	22.00	0.009091	18 inch	10.01	115.00	114.80	120.00	120.00	Concrete	15.00	0.26	0.26
P-8	D-14	D-16	49.08	144.00	0.019444	30 inch	57.19	104.30	101.50	111.00	107.75	Concrete	15.00	10.43	10.00
P-9	D-16	D-15	49.25	22.00	0.011364	36 inch	71.10	101.50	101.25	107.75	107.75	Concrete	15.00	7.00	6.97
P-10	D-15	D-17	52.19	54.00	0.004630	36 inch	45.38	101.25	101.00	107.75	106.00	Concrete	15.00	7.38	7.38

Scenario: Alternate 2 Pr Storm System 4"

Inlet Report

Label	Inlet Location	Ground Elevation (ft)	Set Rim Equal to Ground Elevation?	Rim Elevation (ft)	Sump Elevation (ft)	Area (acres)	Inlet C	Inlet CA (acres)	Time of Concentration (min)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gutter Ditch Spread (ft)	Velocity In (ft/s)	Gutter Ditch Depth (ft)
D-1	On Grade	133.70	true	133.70	128.48	0.58	0.70	0.41	12.00	129.13	129.13	5.40	3.99	0.20
D-2	On Grade	133.70	true	133.70	128.70	0.46	0.70	0.32	10.00	129.13	129.13	4.75	3.14	0.19
D-3	On Grade	128.00	true	128.00	122.78	0.19	0.70	0.13	10.00	123.51	123.51	2.48	4.29	0.14
D-4	On Grade	128.00	true	128.00	123.00	0.07	0.70	0.05	10.00	123.51	123.51	1.20	0.37	0.10
D-5	On Grade	123.60	true	123.60	118.60	0.22	0.70	0.15	10.00	119.39	119.39	3.66	4.52	0.17
D-6	On Grade	121.50	true	121.50	116.50	9.44	0.39	3.68	30.00	117.54	117.54	12.61	5.49	0.35
D-7	On Grade	121.50	true	121.50	116.30	7.14	0.39	2.78	30.00	117.67	117.67	11.25	7.95	0.32
D-8	On Grade	120.00	true	120.00	114.80	1.50	0.39	0.58	30.00	116.61	116.61	16.36	9.04	0.42
D-9	On Grade	120.00	true	120.00	115.00	0.16	0.70	0.11	10.00	116.61	116.61	2.86	0.26	0.15
D-10	On Grade	114.00	true	114.00	109.00	4.57	0.39	1.78	30.00	110.92	110.92	13.94	11.19	0.37
D-11	On Grade	111.00	true	111.00	104.50	2.00	0.39	0.78	30.00	106.77	106.77	11.82	8.48	0.33
D-12	On Grade	110.20	true	110.20	105.00	1.30	0.39	0.51	25.00	107.05	107.05	5.30	4.49	0.20
D-13	On Grade	110.20	true	110.20	105.20	6.02	0.39	2.35	30.00	107.12	107.12	10.75	3.33	0.31
D-14	On Grade	111.00	true	111.00	104.30	0.11	0.70	0.08	10.00	106.59	106.59	1.44	10.43	0.12
D-15	On Grade	107.75	true	107.75	101.25	0.10	0.70	0.07	10.00	104.33	104.33	7.35	7.38	0.24
D-16	On Grade	107.75	true	107.75	101.50	0.06	0.70	0.04	10.00	104.44	104.44	1.15	7.00	0.10

Associated Costs

Hooks Street Drainage Improvements Alternate 1
Estimated Project Costs

	Description	Quantity	Unit	Unit Price	Amount
	Construction Costs				
	SITE WORK				
1	MOBILIZATION	1	LS	$ 10,000.00	$ 10,000.00
2	DEMOLITION OF STRUCTURES & ROADWAY	1	LS	$ 105,000.00	$ 105,000.00
3	TYPE-III SILT FENCE	3,500	LF	$ 2.00	$ 7,000.00
4	SEED & MULCH	1,000	SY	$ 0.45	$ 450.00
5	SODDING	5,780	SY	$ 3.00	$ 17,340.00
6	MAINTENANCE OF TRAFFIC	1	LS	$ 3,500.00	$ 3,500.00
7	SIGNAGE AND STRIPING	1	LS	$ 4,500.00	$ 4,500.00
	TOTAL SITE WORK				**$ 147,790.00**
	ROADS				
1	12" STABILIZED SUBGRADE	1,711	SY	$ 1.50	$ 2,566.50
2	8" LIMEROCK, PRIMED	1,467	SY	$ 8.00	$ 11,736.00
3	2" TYPE S-III ASPHALT (VIRGIN)	1,467	SY	$ 14.00	$ 20,538.00
4	TYPE 'F' CURB	1,100	LF	$ 10.00	$ 11,000.00
5	CONCRETE DRIVEWAYS	150	SY	$ 28.00	$ 4,200.00
6	5' SIDEWALK	650	SY	$ 28.00	$ 18,200.00
	TOTAL ROADS				**$ 68,240.50**
	STORM DRAINAGE				
1	TYPE 6 INLET, MODIFIED	12	EA	$ 2,700.00	$ 32,400.00
2	6' MANHOLE	1	EA	$ 1,700.00	$ 1,700.00
3	18" RCP	852	LF	$ 22.00	$ 18,744.00
4	24" RCP	358	LF	$ 29.00	$ 10,382.00
5	36" RCP	450	LF	$ 34.00	$ 15,300.00
6	36" FES	2	EA	$ 1,500.00	$ 3,000.00
7	TYPE 'D' INLET WITH SKIMMER	1	EA	$ 3,200.00	$ 3,200.00
	TOTAL STORM DRAINAGE				**$ 84,726.00**
	MISCELLANEOUS				
1	CONSTRUCTION STAKING (2%)	1	LS	$ 5,415.13	$ 5,415.13
2	AS-BUILTS (0.5%)	1	LS	$ 1,353.78	$ 1,353.78
3	PAYMENT & PERFORMANCE BOND (1.5%)	1	LS	$ 6,061.35	$ 6,061.35
	TOTAL MISCELLANEOUS				**$ 12,830.26**
				SUB-TOTAL	**$ 313,586.76**
				CONTINGENCY 10%	**$ 31,358.68**
		ESTIMATED CONSTRUCTION TOTAL			**$ 344,945.44**
	Pre-Construction Costs				
1	PURCHASE OF LANDS*				$ 197,909.00
2	PURCHASE OF EASEMENTS**				$ 24,577.00
3	SURVEY, ENGINEERING & PERMITTING FEES				$ 56,260.00
		ESTIMATED TOTAL PROJECT COSTS			**$ 623,691.44**
	*Land purchase based upon just value obtained from Lake County Property Appraiser website April 2011				
	**Easement value based upon 90% of land value per square foot.				

Hooks Street Drainage Improvements Alternate 2
Estimated Project Costs

	Description	Quantity	Unit	Unit Price	Amount
	Construction Costs				
	SITE WORK				
1	MOBILIZATION	1	LS	$ 10,000.00	$ 10,000.00
2	DEMOLITION OF STRUCTURES & ROADWAY	1	LS	$ 105,000.00	$ 105,000.00
3	TYPE-III SILT FENCE	3,500	LF	$ 2.00	$ 7,000.00
4	SEED & MULCH	1,000	SY	$ 0.45	$ 450.00
5	SODDING	5,780	SY	$ 3.00	$ 17,340.00
6	MAINTENANCE OF TRAFFIC	1	LS	$ 3,500.00	$ 3,500.00
7	SIGNAGE AND STRIPING	1	LS	$ 4,500.00	$ 4,500.00
	TOTAL SITE WORK				**$ 147,790.00**
	ROADS				
1	12" STABILIZED SUBGRADE	2,022	SY	$ 1.50	$ 3,033.00
2	8" LIMEROCK, PRIMED	1,780	SY	$ 8.00	$ 14,240.00
3	2" TYPE S-III ASPHALT (VIRGIN)	1,780	SY	$ 14.00	$ 24,920.00
4	TYPE 'F' CURB	1,300	LF	$ 10.00	$ 13,000.00
5	CONCRETE DRIVEWAYS	200	SY	$ 28.00	$ 5,600.00
6	5' SIDEWALK	700	SY	$ 28.00	$ 19,600.00
	TOTAL ROADS				**$ 80,393.00**
	STORM DRAINAGE				
1	TYPE 6 INLET, MODIFIED	14	EA	$ 2,700.00	$ 37,800.00
2	6' MANHOLE	3	EA	$ 1,700.00	$ 5,100.00
3	18" RCP	852	LF	$ 22.00	$ 18,744.00
4	24" RCP	358	LF	$ 29.00	$ 10,382.00
5	36" RCP	592	LF	$ 34.00	$ 20,128.00
6	36" FES	2	EA	$ 1,500.00	$ 3,000.00
7	TYPE 'D' INLET WITH SKIMMER	1	EA	$ 3,200.00	$ 3,200.00
	TOTAL STORM DRAINAGE				**$ 98,354.00**
	MISCELLANEOUS				
1	CONSTRUCTION STAKING (2%)	1	LS	$ 5,930.74	$ 5,930.74
2	AS-BUILTS (0.5%)	1	LS	$ 1,482.68	$ 1,482.68
3	PAYMENT & PERFORMANCE BOND (1.5%)	1	LS	$ 4,448.06	$ 4,448.06
	TOTAL MISCELLANEOUS				**$ 11,861.48**
				SUB-TOTAL	**$ 338,398.48**
				CONTINGENCY 10%	**$ 33,839.85**
		ESTIMATED CONSTRUCTION TOTAL			**$ 372,238.33**
	Pre-Construction Costs				
1	PURCHASE OF LANDS*				$ 113,940.00
2	PURCHASE OF EASEMENTS**				$ 11,983.00
3	SURVEY, ENGINEERING & PERMITTING FEES				$ 55,310.00
		ESTIMATED TOTAL PROJECT COSTS			**$ 553,471.33**
	*Land purchase based upon just value obtained from Lake County Property Appraiser website April 2011				
	**Easement value based upon 90% of land value per square foot.				

Hooks Street Drainage Improvements Alternate 3
Estimated Project Costs

	Description	Quantity	Unit	Unit Price	Amount
	Construction Costs				
	SITE WORK				
1	MOBILIZATION	1	LS	$ 10,000.00	$ 10,000.00
2	DEMOLITION OF ROADWAY	1	LS	$ 30,000.00	$ 30,000.00
3	TYPE-III SILT FENCE	1,800	LF	$ 2.00	$ 3,600.00
4	SODDING	4,480	SY	$ 3.00	$ 13,440.00
5	MAINTENANCE OF TRAFFIC	1	LS	$ 7,000.00	$ 7,000.00
6	SIGNAGE AND STRIPING	1	LS	$ 4,500.00	$ 4,500.00
	TOTAL SITE WORK				**$ 68,540.00**
	ROADS				
1	12" STABILIZED SUBGRADE	4,533	SY	$ 1.50	$ 6,799.50
2	8" LIMEROCK, PRIMED	3,900	SY	$ 8.00	$ 31,200.00
3	2" TYPE S-III ASPHALT (VIRGIN)	3,900	SY	$ 14.00	$ 54,600.00
4	TYPE 'F' CURB	1,900	LF	$ 10.00	$ 19,000.00
5	CONCRETE DRIVEWAYS	200	SY	$ 28.00	$ 5,600.00
6	5' SIDEWALK	700	SY	$ 28.00	$ 19,600.00
	TOTAL ROADS				**$ 136,799.50**
	STORM DRAINAGE				
1	TYPE 6 INLET, MODIFIED	12	EA	$ 2,700.00	$ 32,400.00
2	6' MANHOLE	1	EA	$ 1,700.00	$ 1,700.00
3	18" RCP	852	LF	$ 22.00	$ 18,744.00
4	24" RCP	358	LF	$ 29.00	$ 10,382.00
5	36" RCP	450	LF	$ 34.00	$ 15,300.00
6	36" FES	2	EA	$ 1,500.00	$ 3,000.00
7	INFILTRATOR	2,677	EA	$ 125.00	$ 334,625.00
8	BAFFLE BOX "SUNTREE"	1	EA	$ 50,000.00	$ 50,000.00
	TOTAL STORM DRAINAGE				**$ 416,151.00**
	MISCELLANEOUS				
1	CONSTRUCTION STAKING (2%)	1	LS	$ 12,429.81	$ 12,429.81
2	AS-BUILTS (0.5%)	1	LS	$ 3,107.45	$ 3,107.45
3	PAYMENT & PERFORMANCE BOND (1.5%)	1	LS	$ 9,322.36	$ 9,322.36
	TOTAL MISCELLANEOUS				**$ 24,859.62**
				SUB-TOTAL	**$ 646,350.12**
				CONTINGENCY 10%	**$ 64,635.01**
		ESTIMATED CONSRUCTION TOTAL			**$ 710,985.13**
	Pre-Construction Costs				
1	PURCHASE OF LANDS*				$ -
2	PURCHASE OF EASEMENTS**				$ 11,983.00
3	SURVEY, ENGINEERING & PERMITTING FEES				$ 58,810.00
		ESTIMATED TOTAL PROJECT COSTS			**$ 781,778.13**
	*Land purchase based upon just value obtained from Lake County Property Appraiser website April 2011				
	**Easement value based upon 90% of land value per square foot.				

Hooks Street Drainage Improvements Alternate 4
Estimated Project Costs

	Description	Quantity	Unit	Unit Price	Amount
	Construction Costs				
	SITE WORK				
1	MOBILIZATION	1	LS	$ 10,000.00	$ 10,000.00
2	DEMOLITION OF ROADWAY	1	LS	$ 30,000.00	$ 30,000.00
3	TYPE-III SILT FENCE	1,800	LF	$ 2.00	$ 3,600.00
4	SODDING	4,480	SY	$ 3.00	$ 13,440.00
5	MAINTENANCE OF TRAFFIC	1	LS	$ 7,000.00	$ 7,000.00
6	SIGNAGE AND STRIPING	1	LS	$ 4,500.00	$ 4,500.00
	TOTAL SITE WORK				**$ 68,540.00**
	ROADS				
1	12" STABILIZED SUBGRADE	1,800	SY	$ 1.50	$ 2,700.00
2	8" LIMEROCK, PRIMED	1,550	SY	$ 8.00	$ 12,400.00
3	2" TYPE S-III ASPHALT (VIRGIN)	1,550	SY	$ 14.00	$ 21,700.00
4	TYPE 'F' CURB	1,880	LF	$ 10.00	$ 18,800.00
5	CONCRETE DRIVEWAYS	150	SY	$ 28.00	$ 4,200.00
6	5' SIDEWALK	700	SY	$ 28.00	$ 19,600.00
	TOTAL ROADS				**$ 79,400.00**
	STORM DRAINAGE				
1	TYPE 6 INLET, MODIFIED	12	EA	$ 2,700.00	$ 32,400.00
2	6' MANHOLE	1	EA	$ 1,700.00	$ 1,700.00
3	18" RCP	852	LF	$ 22.00	$ 18,744.00
4	24" RCP	358	LF	$ 29.00	$ 10,382.00
5	36" RCP	450	LF	$ 34.00	$ 15,300.00
6	36" FES	2	EA	$ 1,500.00	$ 3,000.00
7	UNDERGROUND CONCRETE STORM BOX	114	EA	$ 2,000.00	$ 228,000.00
8	BAFFLE BOX "SUNTREE"	1	EA	$ 50,000.00	$ 50,000.00
	TOTAL STORM DRAINAGE				**$ 359,526.00**
	MISCELLANEOUS				
1	CONSTRUCTION STAKING (2%)	1	LS	$ 10,149.32	$ 10,149.32
2	AS-BUILTS (0.5%)	1	LS	$ 2,537.33	$ 2,537.33
3	PAYMENT & PERFORMANCE BOND (1.5%)	1	LS	$ 7,611.99	$ 7,611.99
	TOTAL MISCELLANEOUS				**$ 20,298.64**
				SUB-TOTAL	**$ 527,764.64**
				CONTINGENCY 10%	**$ 52,776.46**
		ESTIMATED TOTAL PROJECT COSTS			**$ 580,541.10**
	Pre-Construction Costs				
1	PURCHASE OF LANDS*				$ -
2	PURCHASE OF EASEMENTS**				$ 11,983.00
3	SURVEY, ENGINEERING & PERMITTING FEES				$ 58,810.00
		ESTIMATED TOTAL PROJECT COSTS			**$ 651,334.10**
	*Land purchase based upon just value obtained from Lake County Property Appraiser website April 2011				
	**Easement value based upon 90% of land value per square foot.				

Hooks Street Drainage Improvements Alternate 5
Estimated Project Costs

	Description	Quantity	Unit	Unit Price	Amount
	Construction Costs				
	SITE WORK				
1	MOBILIZATION	1	LS	$ 10,000.00	$ 10,000.00
2	DEMOLITION OF STRUCTURES & ROADWAY	1	LS	$ 75,000.00	$ 75,000.00
3	TYPE-III SILT FENCE	3,500	LF	$ 2.00	$ 7,000.00
4	SEED & MULCH	1,000	SY	$ 0.45	$ 450.00
5	SODDING	5,780	SY	$ 3.00	$ 17,340.00
6	MAINTENANCE OF TRAFFIC	1	LS	$ 3,500.00	$ 3,500.00
7	SIGNAGE AND STRIPING	1	LS	$ 4,500.00	$ 4,500.00
	TOTAL SITE WORK				**$ 117,790.00**
	ROADS				
1	12" STABILIZED SUBGRADE	1,800	SY	$ 1.50	$ 2,700.00
2	8" LIMEROCK, PRIMED	1,550	SY	$ 8.00	$ 12,400.00
3	2" TYPE S-III ASPHALT (VIRGIN)	1,550	SY	$ 14.00	$ 21,700.00
4	TYPE 'F' CURB	1,880	LF	$ 10.00	$ 18,800.00
5	CONCRETE DRIVEWAYS	150	SY	$ 28.00	$ 4,200.00
6	5' SIDEWALK	700	SY	$ 28.00	$ 19,600.00
	TOTAL ROADS				**$ 79,400.00**
	STORM DRAINAGE				
1	TYPE 6 INLET, MODIFIED	12	EA	$ 2,700.00	$ 32,400.00
2	6' MANHOLE	1	EA	$ 1,700.00	$ 1,700.00
3	18" RCP	852	LF	$ 22.00	$ 18,744.00
4	24" RCP	358	LF	$ 29.00	$ 10,382.00
5	36" RCP	450	LF	$ 34.00	$ 15,300.00
6	36" FES	2	EA	$ 1,500.00	$ 3,000.00
7	UNDERGROUND CONCRETE STORM BOX	45	EA	$ 2,000.00	$ 90,000.00
	TOTAL STORM DRAINAGE				**$ 171,526.00**
	MISCELLANEOUS				
1	CONSTRUCTION STAKING (2%)	1	LS	$ 7,374.32	$ 7,374.32
2	AS-BUILTS (0.5%)	1	LS	$ 1,843.58	$ 1,843.58
3	PAYMENT & PERFORMANCE BOND (1.5%)	1	LS	$ 5,530.74	$ 5,530.74
	TOTAL MISCELLANEOUS				**$ 14,748.64**
				SUB-TOTAL	**$ 383,464.64**
				CONTINGENCY 10%	**$ 38,346.46**
		ESTIMATED CONSTRUCTION TOTAL			**$ 421,811.10**
	Pre-Construction Costs				
1	PURCHASE OF LANDS*				$ 119,087.00
2	PURCHASE OF EASEMENTS**				$ 24,577.00
3	SURVEY, ENGINEERING & PERMITTING FEES				$ 58,560.00
		ESTIMATED TOTAL PROJECT COSTS			**$ 624,035.10**
	*Land purchase based upon just value obtained from Lake County Property Appraiser website April 2011				
	**Easement value based upon 90% of land value per square foot.				