STORMWATER MANAGEMENT PLAN

Project:
DOLPHIN COURT OFFICE BUILDING
City of Waukesha, Wisconsin
JSD Project No: 15C6779

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Planning & Development
Site/Civil Engineering
Transportation Engineering
Water Resources
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Construction Management

July 13, 2015

Prepared for:

Interstate Partners LLC
Real Estate Development

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1.0 INTRODUCTION

The proposed Dolphin Court Office Building is located in the Southeast 1/4 of the Southwest 1/4 of Section 36, Township 7 North, Range 19 East, in the City of Waukesha, Waukesha County, Wisconsin. The existing site is located at the north end of Dolphin Court, a cul de sac off of Dolphin Drive. The site is generally bounded by commercial development to the east and south, East Main Street to the north, and Hwy 164 to the west. A location map identifying the project site can be found in **Appendix 1**.

This Storm Water Management Plan has been created to address runoff rate control, water quality treatment, and infiltration requirements for the proposed Dolphin Court Office Building.

The development will consist of the construction of a proposed office building with concrete walks, asphalt parking, and drive aisles. Water and sanitary sewer will be extended from Dolphin Court to serve the proposed building and storm sewer will be constructed in the parking lot to provide drainage conveyance. On-site storm water management will be provided by a proposed infiltration basin, detention pond and two grass swales. The property was also included as part of a previous storm water management plan that included a detention pond immediately south of the subject property. The existing and proposed storm water facilities have been designed to provide runoff rate control and water quality treatment in accordance with City of Waukesha and Wisconsin Department of Natural Resources (WDNR) regulations. Please refer to **Section 3.0** and **Section 5.0** for design criteria and more details of the storm water facilities.

2.0 EXISTING CONDITIONS

The subject property is 2.877 acres consisting of a combination of brush and grassland. Approximately 0.7 acres of land to the east and 0.1 acres of land to the north drain onto the project site. The existing topography generally slopes toward the south, where a storm sewer directs runoff to the existing detention pond along the west side of Dolphin Court. See **Appendix 3** for an Existing Conditions Hydrology Exhibit.

On-site soil types have been identified using soils data obtained from the United States Department of Agriculture – Natural Resources Conservation Service Web Soil Survey. The predominant soil type on the site is Hochheim loam, hydrologic soil group D. A soil location map illustrating the identified soil type is included in **Appendix 2**.

3.0 DESIGN CRITERIA

3.1 City of Waukesha
Chapter 32 – Storm Water Management and Erosion Control

3.2 Wisconsin Department of Natural Resources
WDNR – Technical Standards (NR151 and NR216)

Water Quantity: City of Waukesha ordinance requires that peak runoff discharge rates under post-development site conditions shall not exceed the rates under pre-development conditions for the 2-year, 10-year, and 100-year, 24-hour design storm events. WDNR regulations require that post-development peak discharge rates do not exceed existing rates for the 1-year and 2-year storm events. **Section 5.1** of this report details the rate control design utilized to achieve water quantity objectives.

Water Quality: City of Waukesha ordinance and WDNR regulations require a reduction in total suspended solids load of 80%, based on an average annual rainfall, as compared to no runoff management controls. Please refer to **Section 5.2** for a description of the on-site water quality treatment measures.

Infiltration: City of Waukesha ordinance and WDNR regulations require the development to infiltrate 60% of the 1-yr, pre-development infiltration volume; or 10% of the 2-yr, post-development runoff volume; or provide an effective infiltration area equal to 2% of the total site area. Please refer to **Section 5.3** of this report for a description of the infiltration measures.

4.0 ANALYSIS

HydroCAD® Stormwater Modeling System (Version 10.00) software has been used to analyze the storm water characteristics for the Dolphin Court Office Building. HydroCAD® uses the accepted TR-55 methodology for determining peak runoff discharge rates. Storm water modeling was conducted for the 1-year, 2-year, 10-year, and 100-year storm events. The rainfall depths utilized in the HydroCAD® model based on the values listed in Chapter 32 of the City of Waukesha Municipal Code. The pertinent rainfall depths are shown below in Table 1.

Table 1 – Rainfall Depths

Storm Event	Rainfall Depth
1-year	2.30”
2-year	2.70”
10-year	4.00”
100-year	5.60”

Existing conditions ground cover was determined to consist of grass and brush with a curve number of 73. The offsite area to the north consists of grass, with a curve number of 80, and a concrete sidewalk, with a curve number of 98. Curve numbers for the proposed ground cover were selected using the standard values specified in TR-55 for building roof, paved parking, and grass cover. Results of the modeling have been included in **Appendix 3** and **Appendix 4**.

The sediment reduction characteristics of the site have been analyzed using WinSLAMM® (version 10.0) Source Loading and Management Model. Source areas were based on ground cover used in the HydroCAD® model. Pond and basin storage volumes, outlet structure characteristics, and swale dimensions entered into the WinSLAMM® model were also derived from the HydroCAD® analysis. WinSLAMM® input data and results have been included in **Appendix 5**.

5.0 DESIGN

The proposed development will disturb approximately 2.7 acres. Development will include construction of a proposed office building, concrete sidewalks, asphalt parking areas, and drive aisles. Storm water runoff will be conveyed to the proposed detention pond via overland flow, grass swales, and proposed storm sewer. Undisturbed area to the north will drain into the proposed infiltration basin, then conveyed by the west grass swale into the detention pond. The off-site area to the east will be directed around the site via the proposed east grass swale. Please refer to **Appendix 4** for a Proposed Conditions Hydrology Exhibit.

The infiltration basin has been designed to promote infiltration of storm water runoff into the native soil to provide runoff volume reduction and groundwater recharge. Runoff from the 1-year and 2-year storm events will be detained in the basin and will completely infiltrate through the native sandy silt soil. Runoff from larger storm events will pass through an earthen spillway on the west end of the basin and be conveyed by the west grass swale into the proposed detention pond. A 6" diameter HDPE pipe has also been provided to allow the basin to be drained for routine maintenance.

The detention pond has been designed to control runoff from the 1-year and 2-year storm events using a 2" diameter orifice at the normal water level. After passing through the orifice, runoff will discharge from the outlet control structure through a 24" diameter HDPE storm sewer connected to an existing 24" storm sewer that leads to the existing detention pond south of the site. The existing detention pond was previously designed to provide runoff control for the 10-year and 100-year storm events from this site, allowing the proposed pond to discharge runoff from the larger storm events with less restriction. The top of the 30" diameter standpipe will assist in conveying runoff to the existing storm sewer, in addition to a spillway on the east end of the detention pond.

The detention pond, spillway, and outlet structure have been designed in accordance with WDNR Technical Standards 1001. Please refer to **Appendix 6** for further details of the storm water detention pond and outlet structure.

5.1 Runoff Rate Control

The proposed on-site storm water facilities have been designed to reduce the post-development peak discharge rate to below the existing discharge rate for the 1-year and 2-year storm events. Peak discharge control for the 10-year and 100-year storm events has been previously addressed with a separate detention pond as discussed in *Storm Water Management Report – Waukesha Animal Care Facility*, prepared by Michael J. Losik & Associates, Inc. and dated April 17, 2001. The previous storm water report included the property now proposed to be developed as the Dolphin Court Office Building. The report assumed a curve number of 90 and a time of concentration of 5.6 minutes after development of this property. The actual design of the Dolphin Court Office Building will match the assumed curve number of 90 and will have a minimum time of concentration of 6.0 minutes to comply with TR-55. Table 2 demonstrates the calculations used to determine the overall curve number for the site. Tables 3 and 4 summarize the post-development hydrologic characteristics of the site. A comparison of existing and post-development peak discharge rates is provided in Table 5. Please refer to **Appendix 4** for additional details of the HydroCAD® modeling.

Table 2 – Curve Number Calculation

Ground Cover	Area (acres)	Curve Number
Impervious	1.616	98
Pervious	1.258	80
Total Property	2.874	**90**

Table 3 – Proposed Drainage Area Hydrologic Characteristics

Drainage Area (HydroCAD Node)		Area (acres)	Curve Number	Runoff (cfs)			
				1-yr	2-yr	10-yr	100-yr
1S	To Pond	1.958	93	5.25	6.40	10.11	14.62
2S	To East Swale	0.168	80	0.22	0.30	0.59	0.97
3S	Southeast	0.171	83	0.26	0.35	0.66	1.06
4S	To West Swale	0.165	80	0.21	0.30	0.58	0.96
5S	Off-Site North	0.096	82	0.14	0.19	0.36	0.58
6S	To Basin	0.316	87	0.63	0.81	1.41	2.15

Table 4 – Proposed Storm Water Detention Pond Characteristics

Storm Water Facility		1-yr	2-yr	10-yr	100-yr
1P	Peak Inflow (cfs)	5.79	7.13	11.55	17.04
	Peak Outflow (cfs)	0.15	0.60	7.48	14.88
	Peak Water Surface Elevation	95.23	95.41	95.78	96.04
	Spillway Elevation	96.10			
	Top of Berm Elevation	97.10			
2P	Peak Inflow (cfs)	0.77	1.00	1.77	2.73
	Peak Infiltration (cfs)	0.01	0.01	0.02	0.02
	Peak Outflow (cfs)	0.00	0.00	1.22	2.66
	Peak Water Surface Elevation	104.66	104.99	105.12	105.20
	Spillway Elevation	105.00			
	Top of Berm Elevation	106.50			

Table 5 – Peak Discharge Rates (cfs)

	1-year	2-year
Existing	1.11	1.77
Proposed	0.47	0.64

5.2 Water Quality Treatment

Water quality for the Dolphin Court Office Building will be achieved through the settling of suspended solids in the proposed detention pond, filtration through the native soil of the infiltration basin, and filtration through the vegetation of the grass swales. The detention pond has been designed in accordance with the parameters set forth in WDNR Technical Standard 1001 and features a 5-foot permanent pool depth to allow for sediment settling and storage. The infiltration basin has been designed in accordance with WDNR Technical Standard 1003 and has been analyzed using an infiltration rate of 0.50 inches/hour to correspond with the design rate specified in Table 2 of Technical

Standard 1002 for sandy loam soil. Total suspended solids (TSS) reduction has been determined by modeling the solids yield from all drainage areas, including offsite areas. The solids loading from offsite areas has been artificially removed using an "other control" device prior to entering the proposed onsite treatment devices to avoid claiming credit for any removal of offsite sediment. As a result, the proposed treatment practices must remove 80% of TSS yield from areas of onsite disturbance, while still accounting for the runoff volume from offsite areas. Table 6 compares the TSS yield calculated under "without controls" and "with controls" conditions. Refer to **Appendix 5** for input and output data used in the determination of the water quality calculations.

Table 6 – Total Suspended Solids Yield (lbs.)

Without Controls	With Controls	Percent Reduction
1011	185.4	**81.66%**

5.3 Infiltration

Soil data obtained from the Natural Resources Conservation Service Web Soil Survey indicates Hochheim loam soil on-site. Additionally, soil borings performed by CGC Inc. reveal sandy soil above a layer of sandy silt. Table 2 of WDNR Technical Standard 1002 has been used to determine a design infiltration rate of 0.50 inches/hour for the more restrictive sandy loam soil. To meet the DNR and City of Waukesha infiltration requirements, the infiltration basin has been designed to infiltrate over 10% of the post-development runoff volume resulting from the 2-year storm event. The total site runoff from the 2-year storm event is 0.371 acre-feet, which means the site must infiltrate at least 0.0371 acre-feet to satisfy the requirement. The proposed infiltration basin will exceed the requirement by infiltrating 0.048 acre-feet during the 2-year event. Please refer to **Appendix 2** for soil data and **Appendix 4** for runoff volume calculations.

5.4 Storm Sewer

Proposed storm sewer will be constructed to facilitate drainage for the building roof and paved parking areas. The storm sewers have been designed in accordance with the DSPS (formerly Department of Commerce) method and have been sized to accommodate runoff from the 10-year, 24 hour storm event. Complete storm sewer design computations are included in **Appendix 7**.

6.0 CONCLUSION

The storm water management facilities for the Dolphin Court Office Building have been designed to meet or exceed City of Waukesha ordinance and WDNR Technical Standards NR151 and NR216. The post-development storm water peak runoff discharge rate for the 1–year and 2-year storm events have been reduced to below pre-development peak runoff rates, and the existing detention pond will provide rate control for the 10-year and 100-year events, since the site meets the curve number and time of concentration assumptions in the previous report. The infiltration basin, detention pond, and grass swales will reduce the total suspended solids loading by more than 80%, satisfying the WDNR water quality requirement. The infiltration basin will infiltrate in excess of 10% of the 2-year post-development runoff volume.

(Appendices Follow)

APPENDIX 1

Location Map

DOLPHIN COURT OFFICE BUILDING

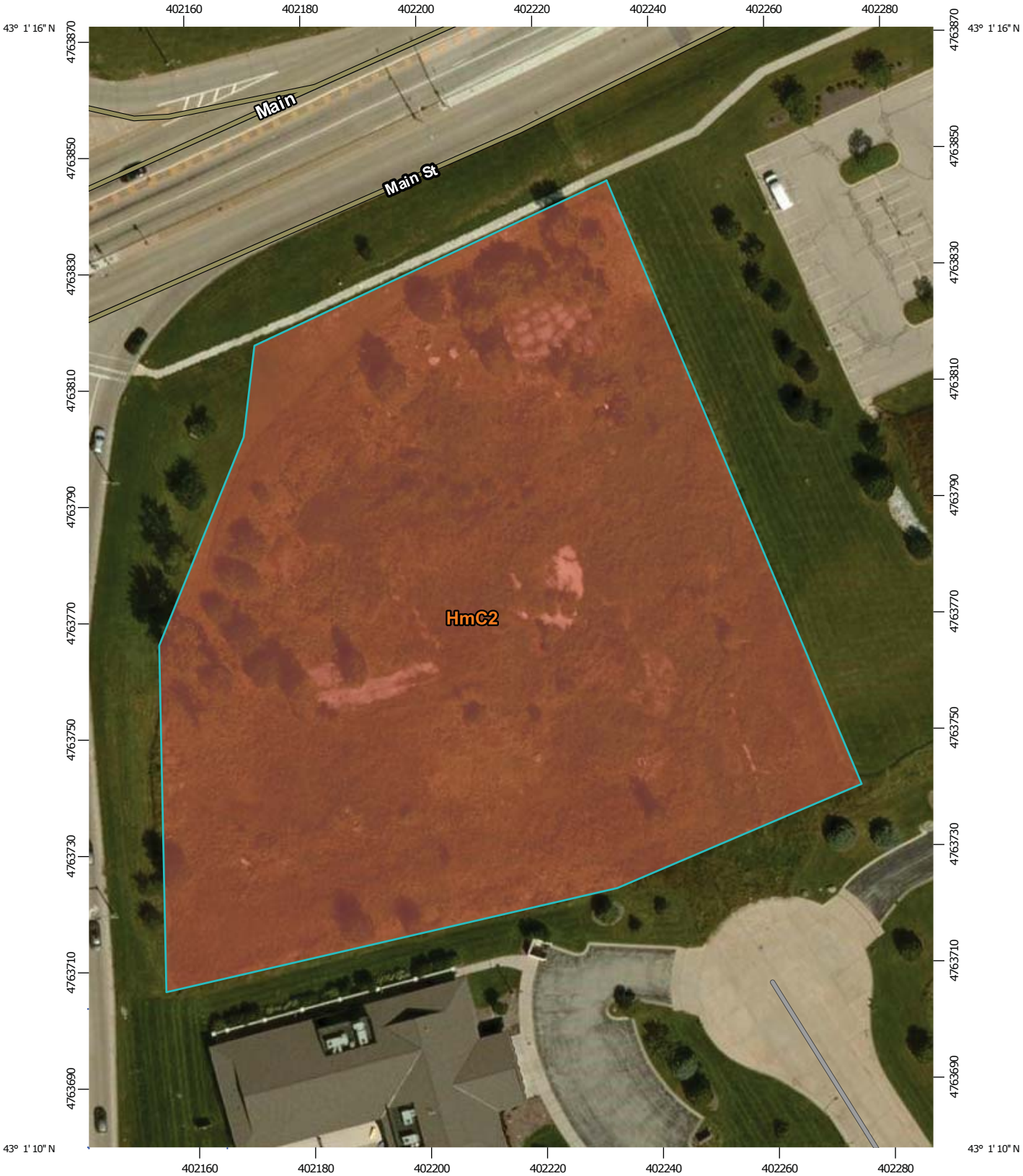
Location Map

City of Waukesha, Waukesha County, WI

(Section 36, Township 7 North, Range 19 East)

APPENDIX 2

Soil Data



Map Scale: 1:939 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 45 90 180 270

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Milwaukee and Waukesha Counties, Wisconsin
Survey Area Data: Version 9, Sep 18, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 7, 2014—Sep 22, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Milwaukee and Waukesha Counties, Wisconsin (WI602)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
HmC2	Hochheim loam, 6 to 12 percent slopes, eroded	D	2.7	100.0%
Totals for Area of Interest			**2.7**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

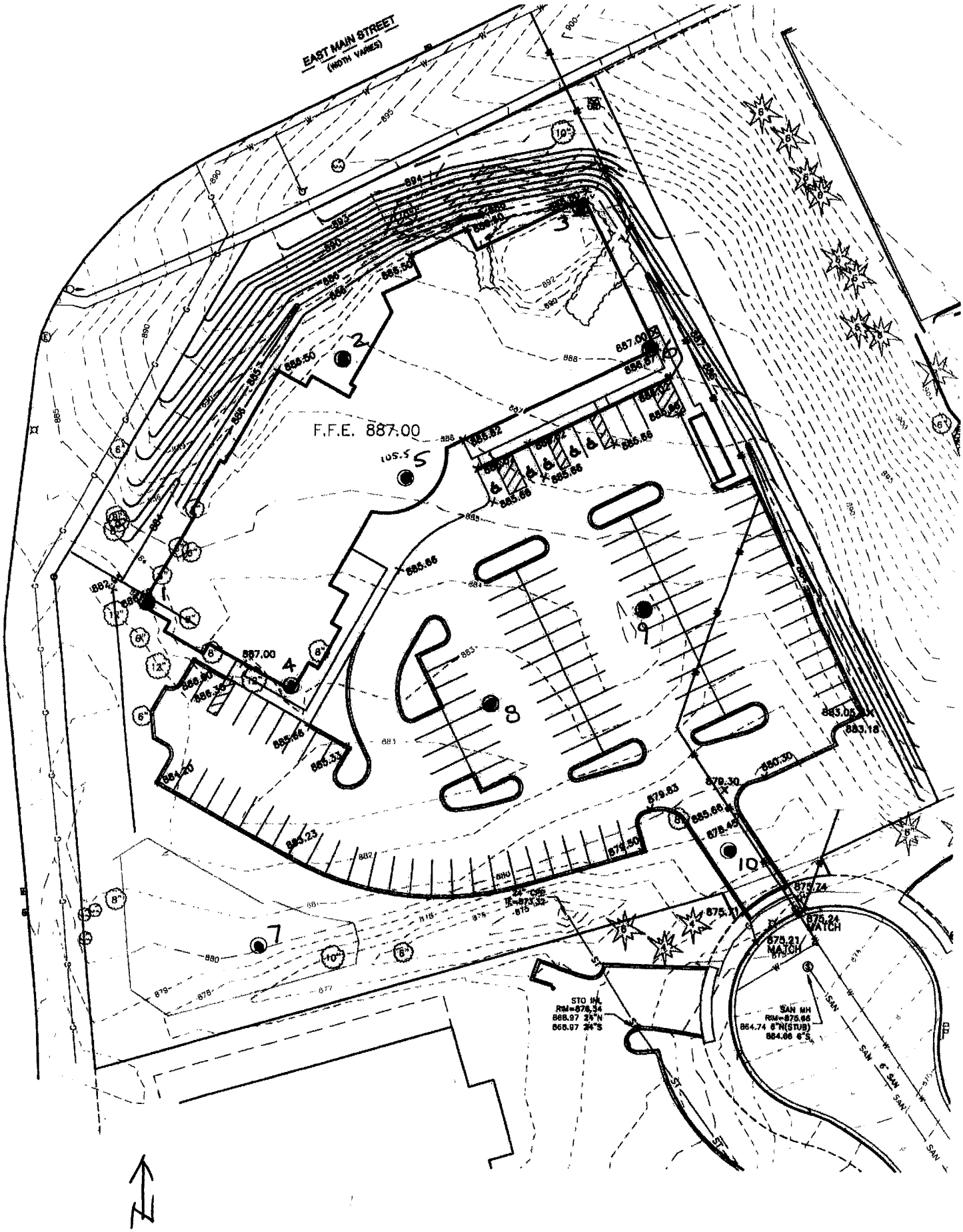
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher


EAST MAIN STREET
(WIDTH VARIES)
LES PAUL PARKWAY (S.T.H. "164")
(WIDTH VARIES)
F.F.E. 887.00
STO MH
RIM=878.34
886.97 24"N
886.97 24"S
SAN MH
RIM=875.66
864.74 6"N(STUB)
864.66 6"S
875.21
MATCH
875.24
MATCH

CGC Inc.

LOG OF TEST BORING

Project **Dolphin Court Parcel**

Location **Waukesha, Wisconsin**

Boring No. **7**
Surface Elevation (ft) **880.0**
Job No. **CM15071**
Sheet **1** of **1**

336 S. Curtis Rd, West Allis, WI 53214 (414) 443-2000, FAX (414) 443-2099

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
					0	FILL: 3" Dark Brown Sandy Topsoil					
1	■	14	M	27		Medium Dense to Very Dense, Brown Fine to Medium SAND; Little Fine Gravel, Trace to Little Silt (SP/SP-SM)					
2	■	18	M	39							
					5						
3	■	18	M	60							
						Dense to Very Dense, Brown Sandy SILT; Little Fine to Coarse Gravel, Trace to Little Clay (ML)					
4	■	18	M	49							
					10						
5	■	18	M	72							
6	■	18	M	61							
					15	End of Boring at 15 ft Backfilled with Bentonite Chips					
					20						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **NW** Upon Completion of Drilling **NW**
Time After Drilling
Depth to Water ▼
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **7/9/15** End **7/9/15**
Driller **J&J** Chief **JP** Rig **CME-45**
Logger **JP** Editor **JPS**
Drill Method **2.25" HSA**

CGC, Inc.

LOG OF TEST BORING

General Notes

Descriptive Soil Classification

GRAIN SIZE TERMINOLOGY

Soil Fraction	Particle Size	U.S. Standard Sieve Size
Boulders	Larger than 12"	Larger than 12"
Cobbles	3" to 12"	3" to 12"
Gravel: Coarse	3/4" to 3"	3/4" to 3"
Fine	4.76 mm to 3/4"	#4 to 3/4"
Sand: Coarse	2.00 mm to 4.76 mm	#10 to #4
Medium	0.42 to mm to 2.00 mm	#40 to #10
Fine	0.074 mm to 0.42 mm	#200 to #40
Silt	0.005 mm to 0.074 mm	Smaller than #200
Clay	Smaller than 0.005 mm	Smaller than #200

Plasticity characteristics differentiate between silt and clay.

GENERAL TERMINOLOGY

Physical Characteristics
Color, moisture, grain shape, fineness, etc.
Major Constituents
Clay, silt, sand, gravel
Structure
Laminated, varved, fibrous, stratified, cemented, fissured, etc.
Geologic Origin
Glacial, alluvial, eolian, residual, etc.

RELATIVE DENSITY

Term	"N" Value
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

RELATIVE PROPORTIONS OF OF COHESIONLESS SOILS

Proportional Term	Defining Range by Percentage of Weight
Trace	0%-5%
Little	5%-12%
Some	12%-35%
And	35%-50%

CONSISTENCY

Term	q_u-tons/sq. ft.
Very Soft	0.0 to 0.25
Soft	0.25 to 0.50
Medium	0.50 to 1.0
Stiff	1.0 to 2.0
Very Stiff	2.0 to 4.0
Hard	Over 4.0

ORGANIC CONTENT BY COMBUSTION METHOD

Soil Description	Loss on Ignition
Non Organic	Less than 4%
Organic Silt/Clay	4-12%
Sedimentary Peat	12-50%
Fibrous and Woody Peat	More than 50%

PLASTICITY

Term	Plastic Index
None to Slight	0-4
Slight	5-7
Medium	8-22
High to Very High	Over 22

The penetration resistance, N, is the summation of the number of blows required to effect two successive 6" penetrations of the 2" split-barrel sampler. The sampler is driven with a 140 lb. weight falling 30" and is seated to a depth of 6" before commencing the standard penetration test.

SYMBOLS

DRILLING AND SAMPLING

CS--Continuous Sampling
RC--Rock Coring: Size AW, BW, NW, 2"W
RQD--Rock Quality Designator
RB--Rock Bit
FT--Fish Tail
DC--Drove Casing
C--Casing: Size 2 1/2", NW, 4", HW
CW--Clear Water
DM--Drilling Mud
HSA--Hollow Stem Auger
FA--Flight Auger
HA--Hand Auger
COA--Clean-Out Auger
SS--2" Diameter Split-Barrel Sample
2ST--2" Diameter Thin-Walled Tube Sample
3ST--3" Diameter Thin-Walled Tube Sample
PT--3" Diameter Piston Tube Sample
AS--Auger Sample
WS--Wash Sample
PTS--Peat Sample
PS--Pitcher Sample
NR--No Recovery
S--Sounding
PMT--Borehole Pressuremeter Test
VS--Vane Shear Test
WPT--Water Pressure Test

LABORATORY TESTS

q_a--Penetrometer Reading, tons/sq. ft.
q_u--Unconfined Strength, tons/sq. ft.
W--Moisture Content, %
LL--Liquid Limit, %
PL--Plastic Limit, %
SL--Shrinkage Limit, %
LI--Loss on Ignition, %
D--Dry Unit Weight, lbs/cu. ft.
pH--Measure of Soil Alkalinity or Acidity
FS--Free Swell, %

WATER LEVEL MEASUREMENT

∇ --Water Level at time shown
NW--No Water Encountered
WD--While Drilling
BCR--Before Casing Removal
ACR--After Casing Removal
CW--Caved and Wet
CM--Caved and Moist

Note: Water level measurements shown on the boring logs represent conditions at the time indicated and may not reflect static levels, especially in cohesive soils.

UNIFIED SOIL CLASSIFICATION SYSTEM

COARSE-GRAINED SOILS

(More than half of material is larger than No. 200 seive size.)

GRAVELS More than half of coarse fraction larger than No. 4 sieve size	**Clean Gravels** (Little or no fines)	
	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
	Gravels with Fines (Appreciable amount of fines)	
	GM^{d}_{u}	Silty gravels, gravel-sand-silt mixtures
	GC	Clayey gravels, gravel-sand-clay mixtures
SANDS More than half of coarse fraction smaller than No. 4 sieve size	**Clean Sands** (Little or no fines)	
	SW	Well-graded sands, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with Fines (Appreciable amount of fines)	
	SM^{d}_{u}	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand-clay mixtures

FINE-GRAINED SOILS

(More than half of material is smaller than No. 200 sieve.)

SILTS AND CLAYS Liquid limit less than 50%	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit greater than 50%	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

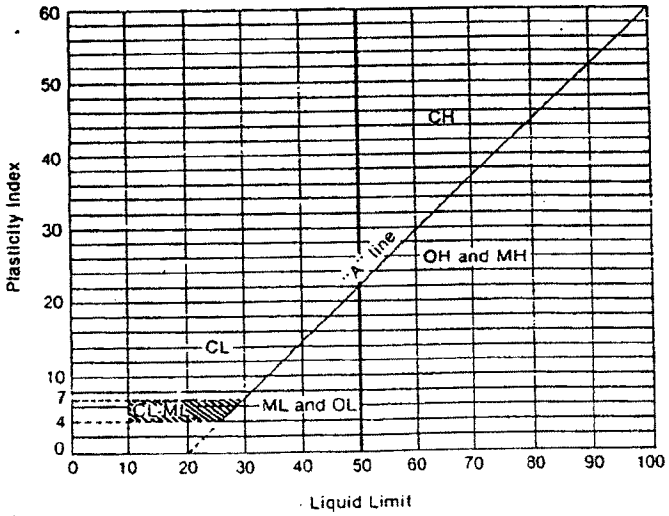
LABORATORY CLASSIFICATION CRITERIA

GW	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for SW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 per cent	GW, GP, SW, SP
More than 12 per cent	GM, GC, SM, SC
5 to 12 per cent	Borderline cases requiring dual symbols

PLASTICITY CHART



For classification of fine-grained soils and fine fraction of coarse-grained soils.

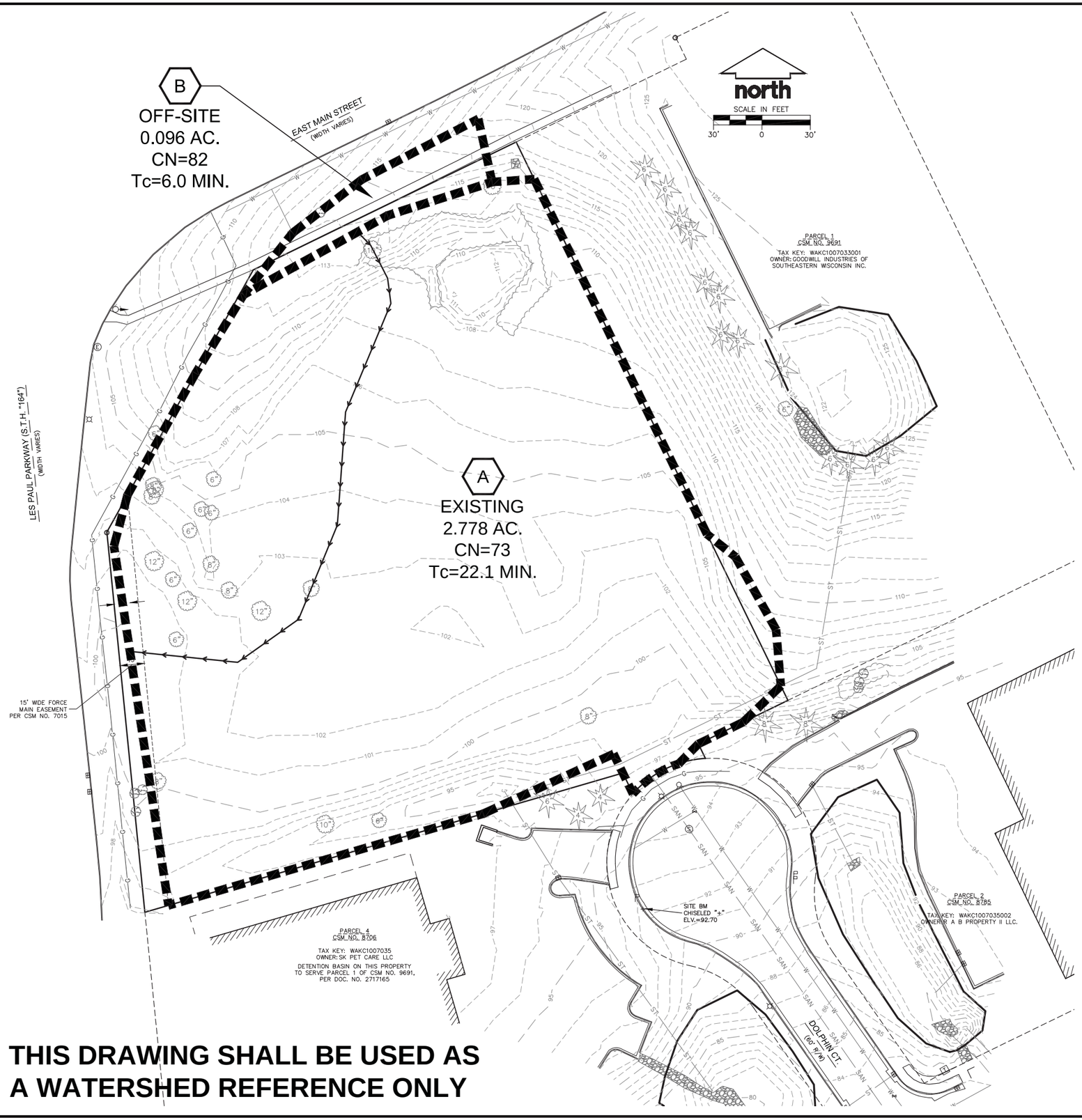
Atterberg Limits plotting in hatched area are borderline classifications requiring use of dual symbols.

Equation of A-line: PI = 0.73 (LL - 20)

APPENDIX 3

Existing Site Hydrology

- Existing Conditions Hydrology Exhibit
- Existing Conditions HydroCAD Output
- Storm Water Management Report – Waukesha Animal Care Facility



THIS DRAWING SHALL BE USED AS A WATERSHED REFERENCE ONLY

LEGEND

- WATERSHED BOUNDARY
- TIME OF CONCENTRATION PATH
- ST — PROPOSED STORM SEWER
- 104 — WATERSHED BOUNDARY
- 105 — WATERSHED BOUNDARY

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DENTAL ASSOCIATES

PROJECT LOCATION:

WAUKESHA
WAUKESHA COUNTY, WI

JSD PROJECT NO.: 15-6779

SEAL/SIGNATURE:

DESIGN BY:	JJS	07-13-15
DRAWN BY:	JJS	07-13-15
CHECKED BY:	TAG	07-13-15

PLAN MODIFICATIONS:	DATE:

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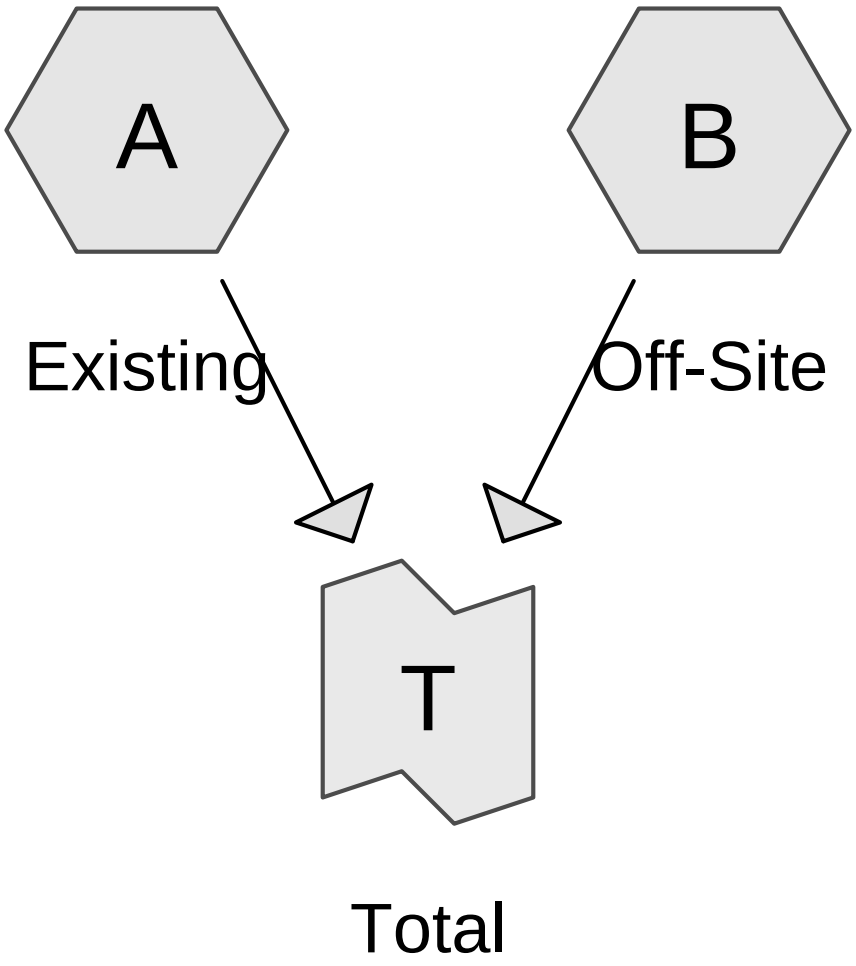
EXISTING
CONDITIONS
HYDROLOGY
EXHIBIT

SHEET NUMBER:

H-1

R:\2015\15G6779 Interstate Partners Dolphin Ct Waukesha\dwg\15G6779 Hydrology.dwg, 7/13/2015 3:02:09 PM



Subcat Reach Pond Link

Routing Diagram for 15-6779 Existing
Prepared by JSD Professional Services, Inc., Printed 7/13/2015

Time span=0.00-120.00 hrs, dt=0.05 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Existing Runoff Area=2.778 ac 0.00% Impervious Runoff Depth=0.46"
Flow Length=370' Tc=22.1 min CN=73 Runoff=1.08 cfs 0.107 af

Subcatchment B: Off-Site Runoff Area=0.096 ac 16.67% Impervious Runoff Depth=0.83"
Tc=6.0 min UI Adjusted CN=82 Runoff=0.14 cfs 0.007 af

Link T: Total Inflow=1.11 cfs 0.114 af
Primary=1.11 cfs 0.114 af

Summary for Subcatchment A: Existing

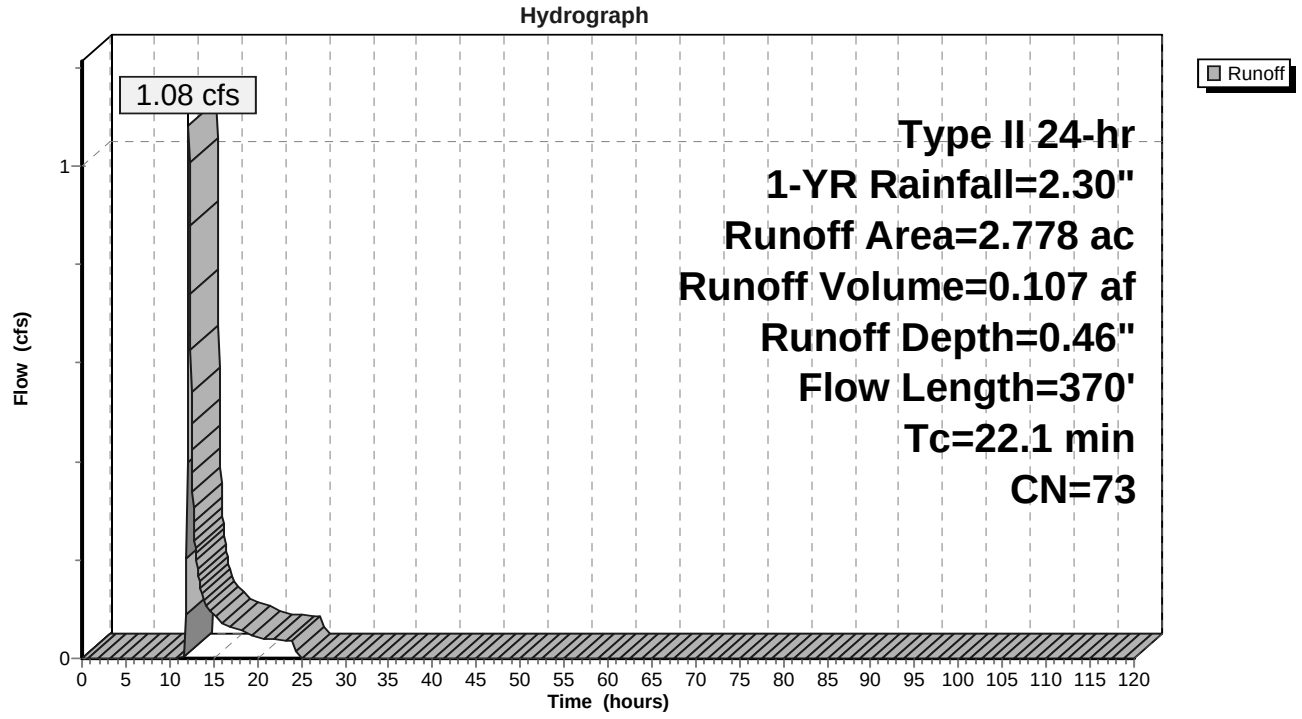
Runoff = 1.08 cfs @ 12.19 hrs, Volume= 0.107 af, Depth= 0.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-YR Rainfall=2.30"

Area (ac)	CN	Description
2.778	73	Brush, Good, HSG D
2.778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	35	0.1536	0.32		**Sheet Flow,** Range n= 0.130 P2= 2.70"
19.0	257	0.0233	0.22		**Sheet Flow,** Range n= 0.130 P2= 2.70"
1.3	78	0.0218	1.03		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
22.1	370	Total			

Subcatchment A: Existing



Summary for Subcatchment B: Off-Site

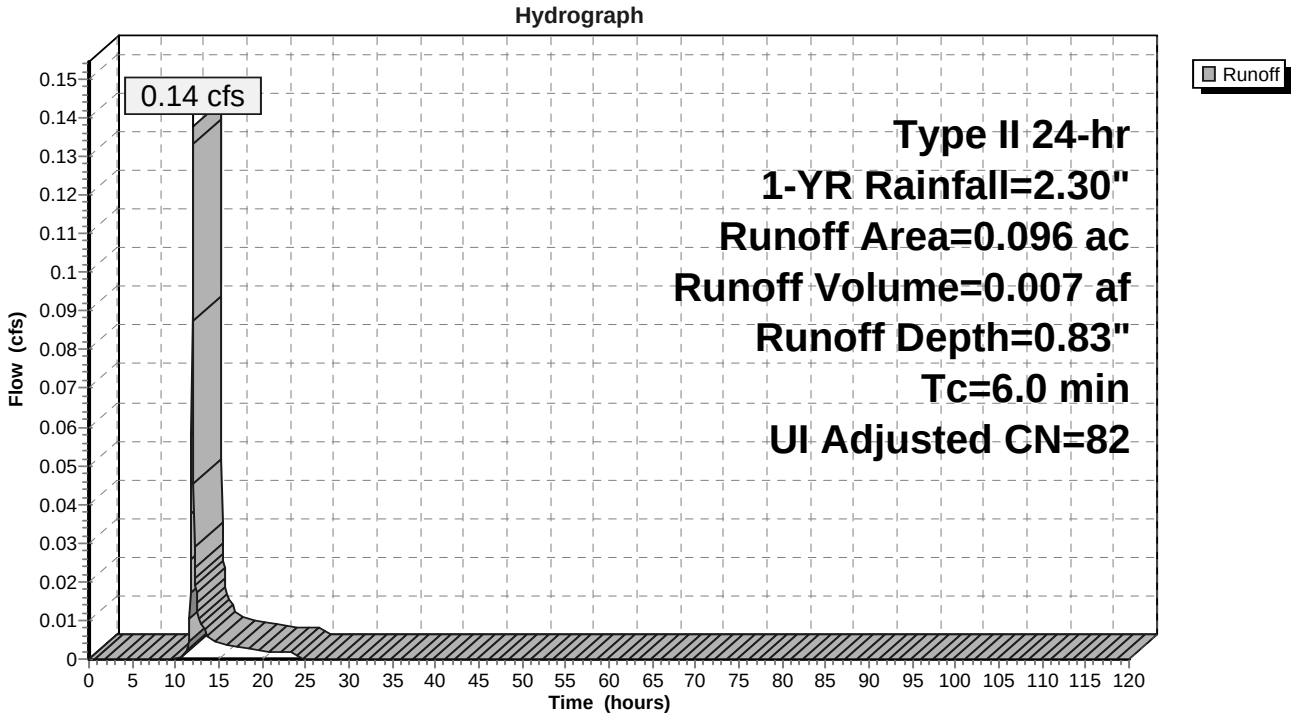
Runoff = 0.14 cfs @ 11.98 hrs, Volume= 0.007 af, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-YR Rainfall=2.30"

Area (ac)	CN	Description
0.016	98	Unconnected pavement, HSG D
0.080	80	>75% Grass cover, Good, HSG D
0.096	83	Weighted Average, UI Adjusted CN = 82
0.080		83.33% Pervious Area
0.016		16.67% Impervious Area
0.016		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment B: Off-Site

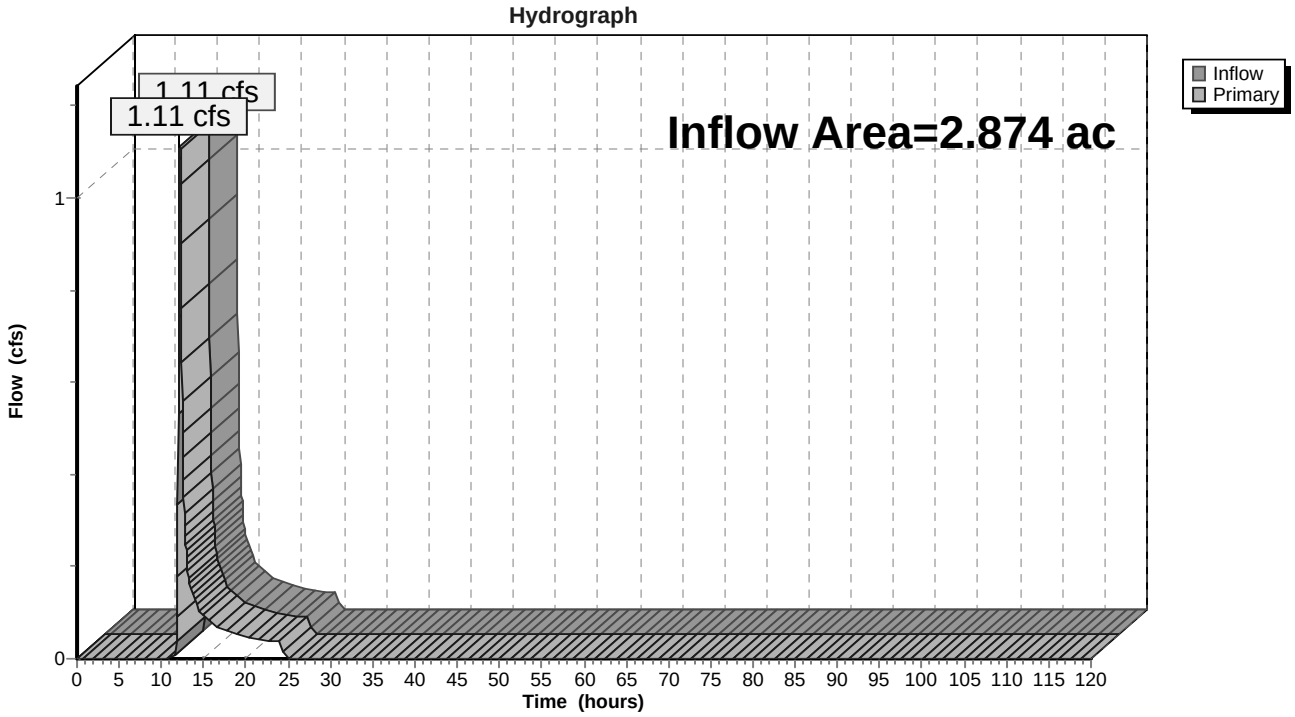


Summary for Link T: Total

Inflow Area = 2.874 ac, 0.56% Impervious, Inflow Depth = 0.48" for 1-YR event
Inflow = 1.11 cfs @ 12.19 hrs, Volume= 0.114 af
Primary = 1.11 cfs @ 12.19 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Link T: Total



Time span=0.00-120.00 hrs, dt=0.05 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Existing Runoff Area=2.778 ac 0.00% Impervious Runoff Depth=0.68"
Flow Length=370' Tc=22.1 min CN=73 Runoff=1.74 cfs 0.157 af

Subcatchment B: Off-Site Runoff Area=0.096 ac 16.67% Impervious Runoff Depth=1.12"
Tc=6.0 min UI Adjusted CN=82 Runoff=0.19 cfs 0.009 af

Link T: Total Inflow=1.77 cfs 0.166 af
Primary=1.77 cfs 0.166 af

Summary for Subcatchment A: Existing

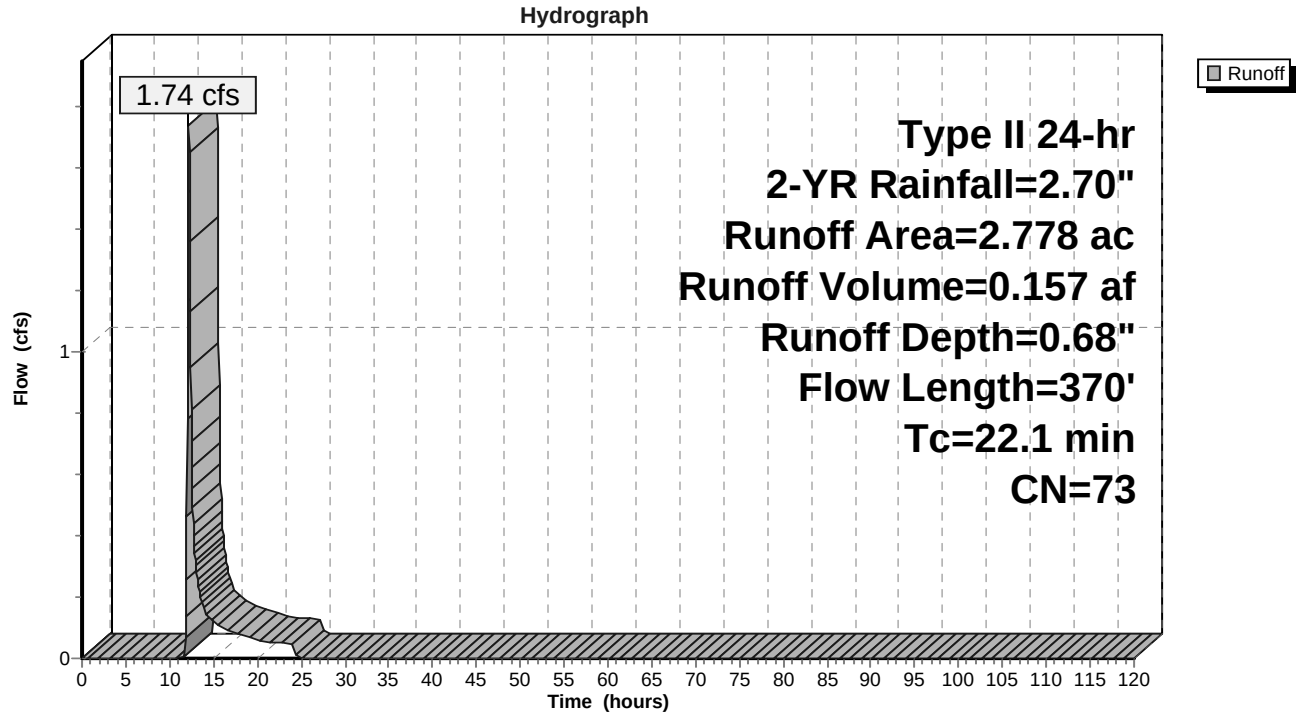
Runoff = 1.74 cfs @ 12.18 hrs, Volume= 0.157 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YR Rainfall=2.70"

Area (ac)	CN	Description
2.778	73	Brush, Good, HSG D
2.778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	35	0.1536	0.32		**Sheet Flow,** Range n= 0.130 P2= 2.70"
19.0	257	0.0233	0.22		**Sheet Flow,** Range n= 0.130 P2= 2.70"
1.3	78	0.0218	1.03		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
22.1	370	Total			

Subcatchment A: Existing



Summary for Subcatchment B: Off-Site

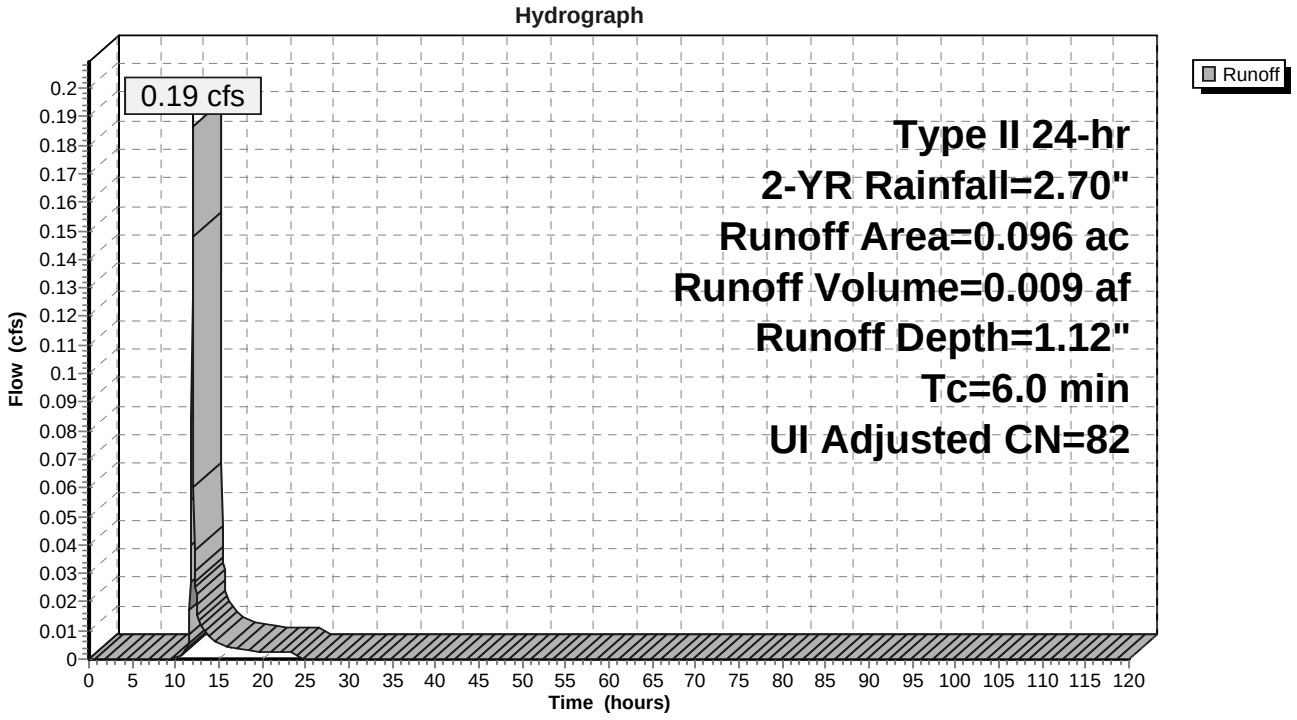
Runoff = 0.19 cfs @ 11.98 hrs, Volume= 0.009 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.016	98	Unconnected pavement, HSG D
0.080	80	>75% Grass cover, Good, HSG D
0.096	83	Weighted Average, UI Adjusted CN = 82
0.080		83.33% Pervious Area
0.016		16.67% Impervious Area
0.016		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment B: Off-Site

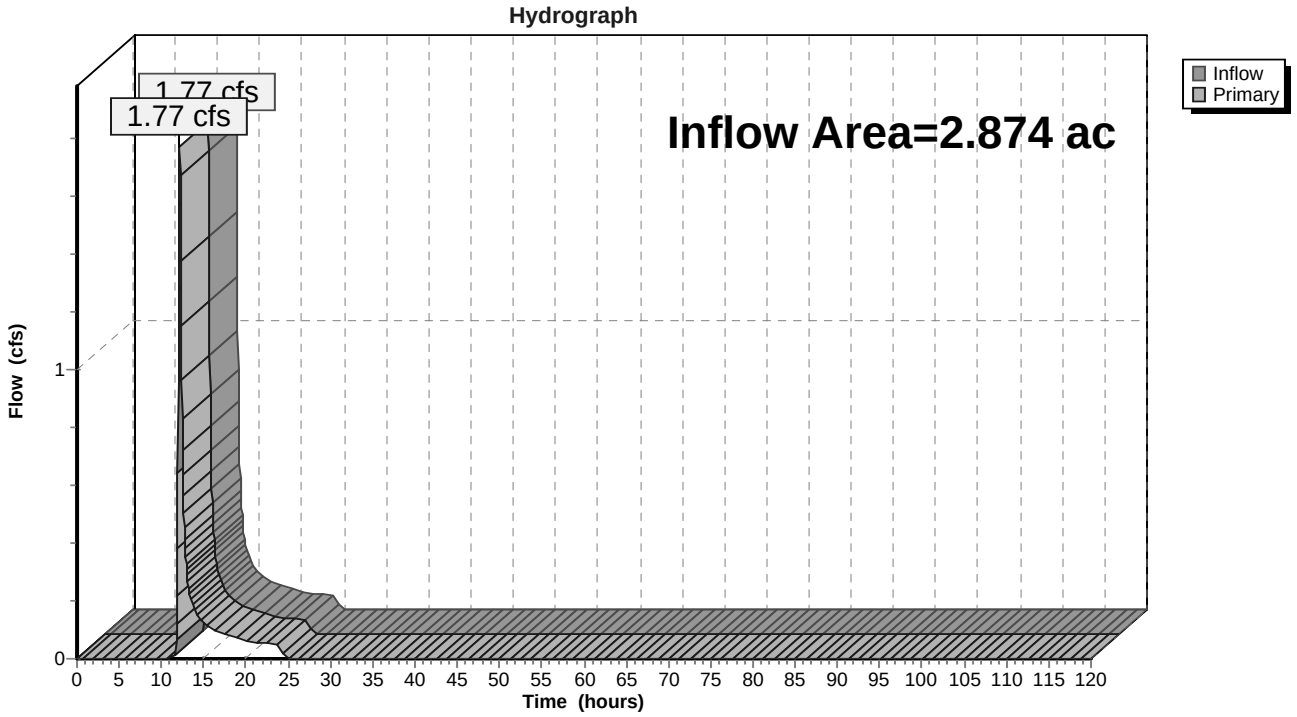


Summary for Link T: Total

Inflow Area = 2.874 ac, 0.56% Impervious, Inflow Depth = 0.69" for 2-YR event
Inflow = 1.77 cfs @ 12.17 hrs, Volume= 0.166 af
Primary = 1.77 cfs @ 12.17 hrs, Volume= 0.166 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Link T: Total



Time span=0.00-120.00 hrs, dt=0.05 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Existing Runoff Area=2.778 ac 0.00% Impervious Runoff Depth=1.53"
Flow Length=370' Tc=22.1 min CN=73 Runoff=4.31 cfs 0.354 af

Subcatchment B: Off-Site Runoff Area=0.096 ac 16.67% Impervious Runoff Depth=2.16"
Tc=6.0 min UI Adjusted CN=82 Runoff=0.36 cfs 0.017 af

Link T: Total Inflow=4.38 cfs 0.371 af
Primary=4.38 cfs 0.371 af

Summary for Subcatchment A: Existing

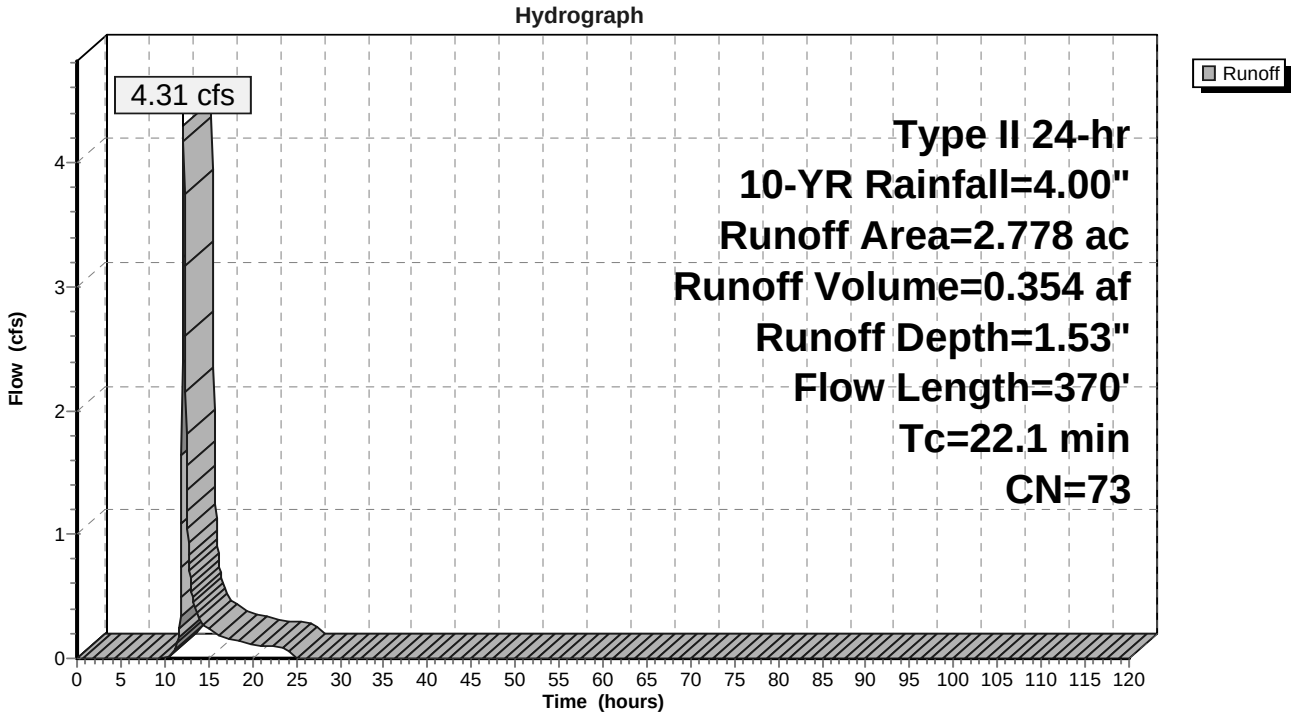
Runoff = 4.31 cfs @ 12.16 hrs, Volume= 0.354 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YR Rainfall=4.00"

Area (ac)	CN	Description
2.778	73	Brush, Good, HSG D
2.778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	35	0.1536	0.32		**Sheet Flow,** Range n= 0.130 P2= 2.70"
19.0	257	0.0233	0.22		**Sheet Flow,** Range n= 0.130 P2= 2.70"
1.3	78	0.0218	1.03		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
22.1	370	Total			

Subcatchment A: Existing



Summary for Subcatchment B: Off-Site

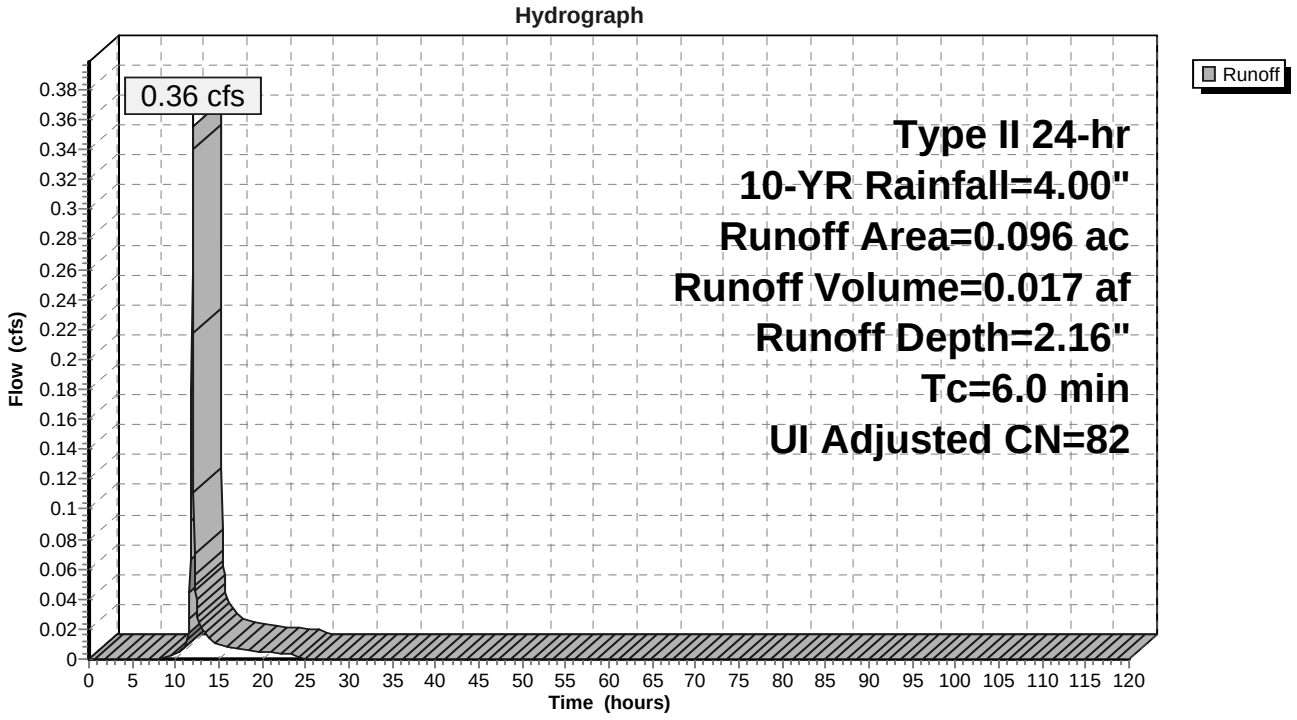
Runoff = 0.36 cfs @ 11.97 hrs, Volume= 0.017 af, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YR Rainfall=4.00"

Area (ac)	CN	Description
0.016	98	Unconnected pavement, HSG D
0.080	80	>75% Grass cover, Good, HSG D
0.096	83	Weighted Average, UI Adjusted CN = 82
0.080		83.33% Pervious Area
0.016		16.67% Impervious Area
0.016		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment B: Off-Site

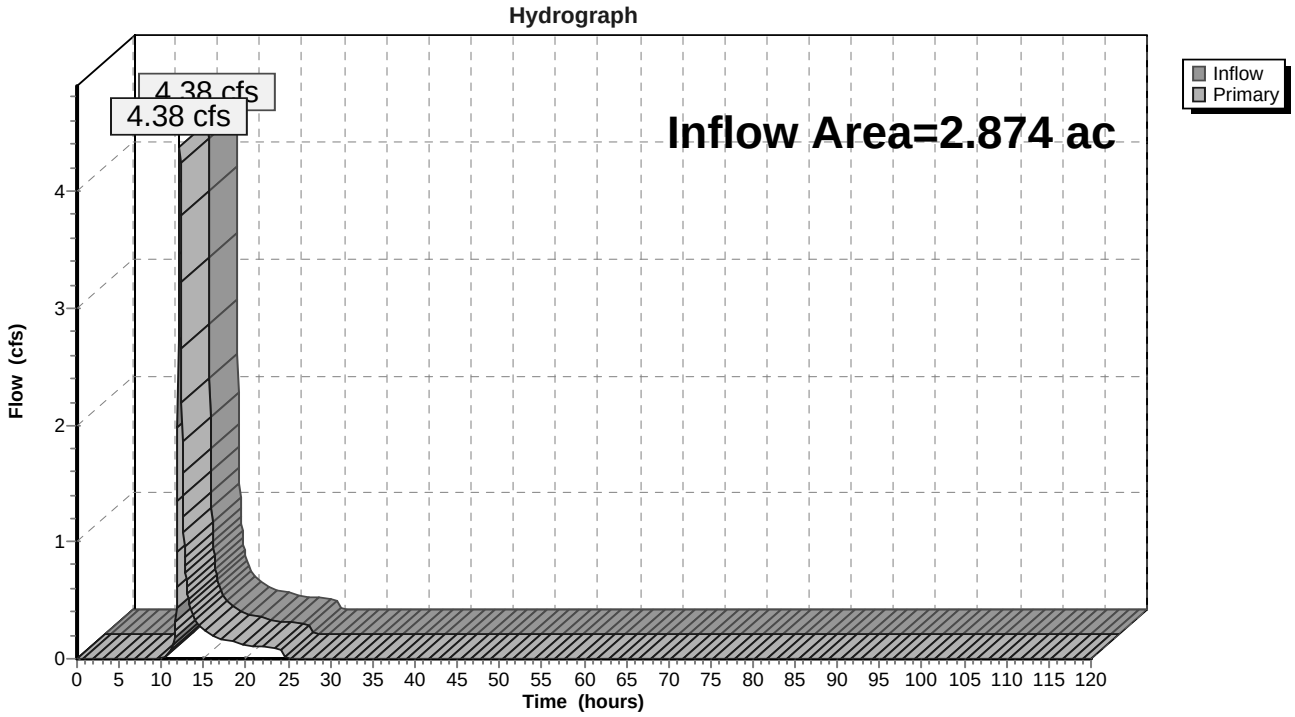


Summary for Link T: Total

Inflow Area = 2.874 ac, 0.56% Impervious, Inflow Depth = 1.55" for 10-YR event
Inflow = 4.38 cfs @ 12.16 hrs, Volume= 0.371 af
Primary = 4.38 cfs @ 12.16 hrs, Volume= 0.371 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Link T: Total



Time span=0.00-120.00 hrs, dt=0.05 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Existing Runoff Area=2.778 ac 0.00% Impervious Runoff Depth=2.76"
Flow Length=370' Tc=22.1 min CN=73 Runoff=7.99 cfs 0.639 af

Subcatchment B: Off-Site Runoff Area=0.096 ac 16.67% Impervious Runoff Depth=3.57"
Tc=6.0 min UI Adjusted CN=82 Runoff=0.58 cfs 0.029 af

Link T: Total Inflow=8.09 cfs 0.667 af
Primary=8.09 cfs 0.667 af

Summary for Subcatchment A: Existing

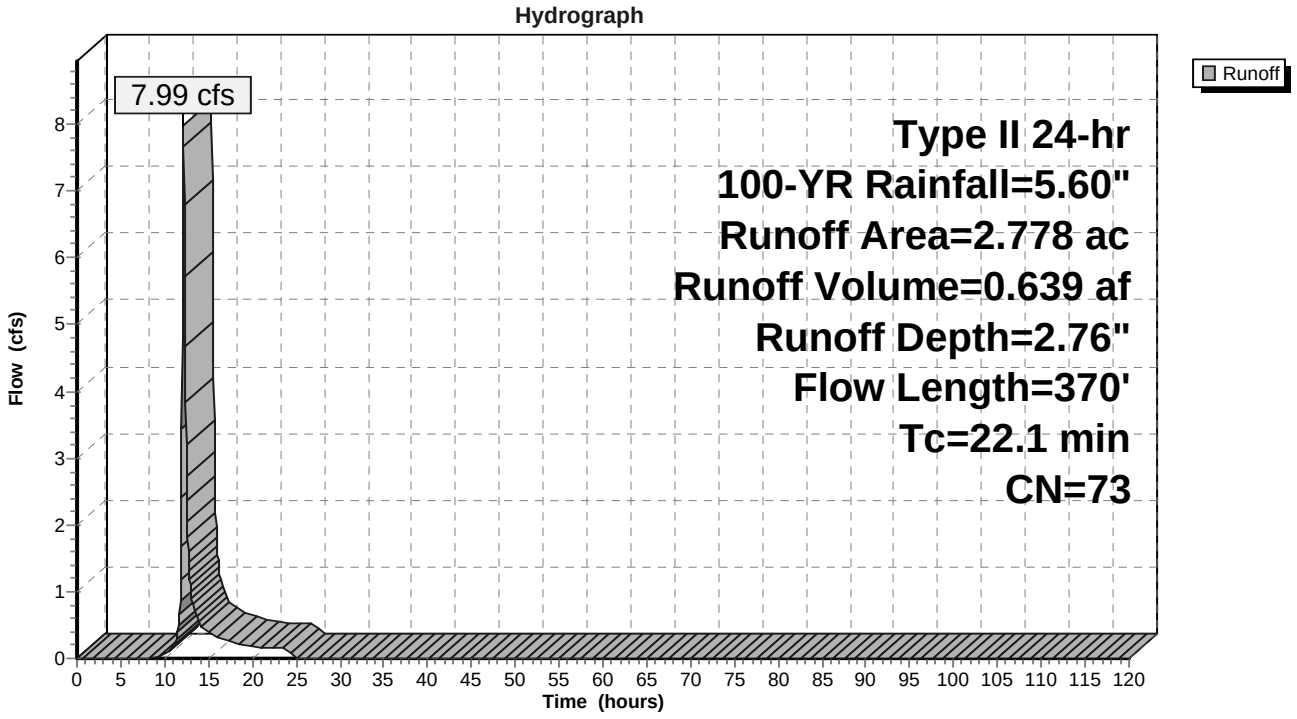
Runoff = 7.99 cfs @ 12.16 hrs, Volume= 0.639 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=5.60"

Area (ac)	CN	Description
2.778	73	Brush, Good, HSG D
2.778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	35	0.1536	0.32		**Sheet Flow,** Range n= 0.130 P2= 2.70"
19.0	257	0.0233	0.22		**Sheet Flow,** Range n= 0.130 P2= 2.70"
1.3	78	0.0218	1.03		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
22.1	370	Total			

Subcatchment A: Existing



Summary for Subcatchment B: Off-Site

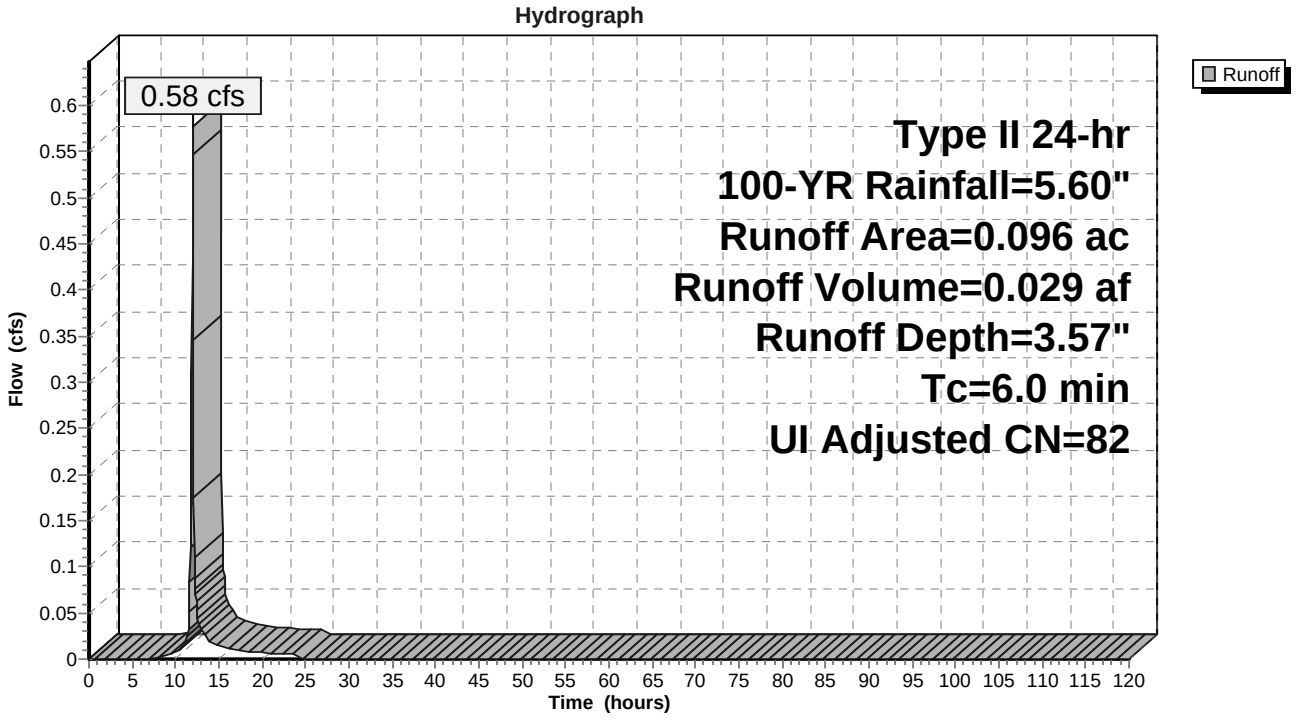
Runoff = 0.58 cfs @ 11.97 hrs, Volume= 0.029 af, Depth= 3.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=5.60"

Area (ac)	CN	Description
0.016	98	Unconnected pavement, HSG D
0.080	80	>75% Grass cover, Good, HSG D
0.096	83	Weighted Average, UI Adjusted CN = 82
0.080		83.33% Pervious Area
0.016		16.67% Impervious Area
0.016		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment B: Off-Site

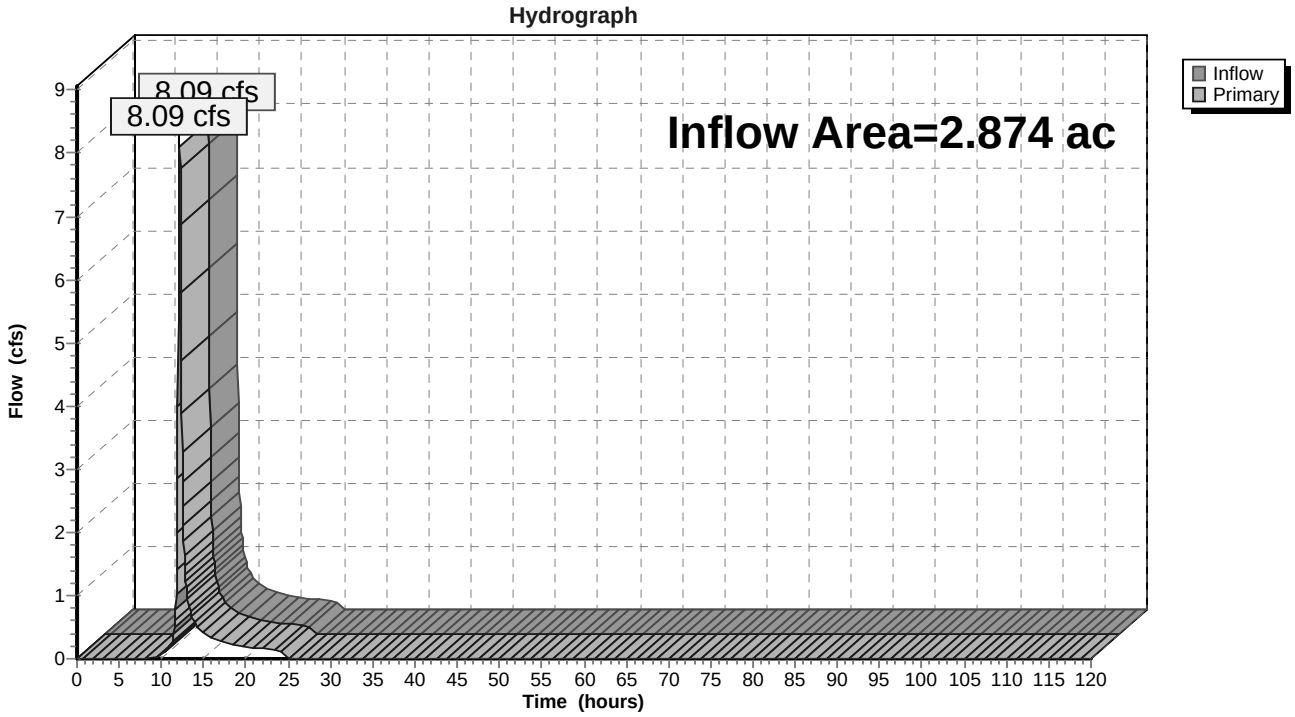


Summary for Link T: Total

Inflow Area = 2.874 ac, 0.56% Impervious, Inflow Depth = 2.79" for 100-YR event
Inflow = 8.09 cfs @ 12.15 hrs, Volume= 0.667 af
Primary = 8.09 cfs @ 12.15 hrs, Volume= 0.667 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Link T: Total



STORM WATER MANAGEMENT REPORT

Waukesha Animal Care Facility
Hillcrest Business Center
Parcel 4, CSM #8706
Waukesha, WI

Prepared By: Michael J. Losik & Assoc., Inc.

April 17, 2001

Mr. Paul Day
City Engineering Dept.
City of Waukesha
130 Delafield Street
Waukesha, WI 53186-3616

Re: Storm Water Management Calculations
Parcel 4, CSM #8706, Waukesha Animal Care Facility
Waukesha, WI

Dear Mr. Day:

In accordance with the City's stormwater management program, we are submitting the following revised Storm Water Management calculations which now includes the site for your review and approval.

Specifically, we have designed a stormwater detention pond in Parcel 4 for the development of Parcels 2 and 4 of CSM #8706 in the Hillcrest Business Center. The facilities have been designed to detain the runoff from the 10 and 100 year events under proposed conditions with a release rate equal to or less than the corresponding event under existing conditions. The 100-year proposed storm was also used to establish an emergency overflow design and associated free board for extreme hydrologic events. The computer model used in our analysis is based on SCS TR-55 methodology, "Urban Hydrology for Small Watersheds". The following data summarizes our findings.

EXISTING CONDITIONS:

Drainage Area ..... 6.37 Acres
Runoff Curve Number 64
Time of Concentration ..... 21 minutes

PROPOSED CONDITIONS:

Drainage Area ..... 6.37 Acres
Runoff Curve Number 90
Time of Concentration ..... 5.6 minutes

Runoff hydrographs were developed for the 10 and 100 year storm events and the results of our analysis are as shown in Table No. 2.

TABLE NO. 2

STORM EVENT	TOTAL DESIGN PRECIPITATION (inches)	EXISTING CONDITIONS (cfs) (allowable release rates)	PROPOSED CONDITIONS (cfs)
10	3.9	5.4	29.1
100	5.6	13.0	44.7

The storm water detention facilities were designed using the above results and design criteria per your regulations. As previously mentioned, the detention basin has been designed to release storm water at less than or equal to the pre-developed rate for each of the storm events. Table No. 3 & 4 presents the results of our detention pond design:

TABLE NO. 3

10 YEAR DESIGN FREQUENCY		
POND OUTLET FLOW RATE (cfs)	WATER SURFACE ELEVATIONS (ft)	STORAGE VOLUME (Ac - Ft)
5.1	83.2	0.55

TABLE NO. 4

100 YEAR DESIGN FREQUENCY		
POND OUTLET FLOW RATE (cfs)	WATER SURFACE ELEVATIONS (ft)	STORAGE VOLUME (Ac - Ft)
6.6	85.7	0.90

In conclusion, the release rates for the 10 year and 100 year proposed events reduce the total discharge to less than the pre-developed rates for this sub-basin. The stage-storage discharge information for these facilities have been included along with the hydrologic report data for your use.

Please advise if you should need further information to complete your review.

Sincerely,

MICHAEL J. LOSIK & ASSOCIATES, INC.

Mark R. Ellena, P.E.
Vice-President

Michael J. Losik, P.E.,L.S.
President

MRE/MJL/jdb

Enclosures

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	13.0	2	728	1.071	100	----	------	------	EXISTING CONDITION
2	SCS Runoff	44.7	2	716	2.218	100	----	------	------	PROPOSED CONDITION
4	SCS Runoff	5.4	2	728	0.495	10	----	------	------	EXISTING CONDITION
5	SCS Runoff	29.1	2	716	1.406	10	----	------	------	PROPOSED CONDITION
7	Reservoir	6.6	2	726	2.218	100	2	85.75	0.900	100YR
8	Reservoir	5.1	2	726	1.406	10	5	83.16	0.555	10YR

Hydrograph Report

English

Hyd. No. 1

EXISTING CONDITIONS

Hydrograph type	= SCS Runoff	Peak discharge	= 12.96 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 6.37 ac	Curve number	= 64
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21 min
Total precip.	= 5.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 1.071 acft

Hydrograph Discharge Table

Time -- Outflow (min cfs)	
712	3.74
722	11.08
732	11.73
742	6.89

...End

TR55 Tc Worksheet

Hyd. No. 1

EXISTING CONDITIONS
Storm frequency = 100 yrs

Sheet Flow

Manning's n-value	= 0.240
Flow length	= 250.0 ft
Two-year 24-hr precip.	= 2.60 in
Land slope	= 8.0 %

Travel Time ..... = 18.9 min

Shallow Concentrated Flow

Flow length	= 450 ft
Watercourse slope	= 5.0 %
Surface description	= Unpaved
Average velocity	= 3.61 ft/s

Travel Time ..... = 2.1 min

Channel Flow

Cross section flow area	= 0.0 sqft
Wetted perimeter	= 0.0 ft
Channel slope	= 0.0 %
Manning's n-value	= 0.015
Velocity	= 0.00 ft/s
Flow length	= 0.0 ft

Travel Time ..... = min

Total Travel Time, Tc ..... = 21.0 min

Hydrograph Report

English

Hyd. No. 2

PROPOSED CONDITIONS

Hydrograph type	= SCS Runoff	Peak discharge	= 44.66 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 6.37 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.6 min
Total precip.	= 5.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 2.218 acft

Hydrograph Discharge Table

Time (min)	Outflow (cfs)
702	12.60
712	32.47
722	21.07

...End

TR55 Tc Worksheet

Hyd. No. 2

PROPOSED CONDITIONS
Storm frequency = 100 yrs

Sheet Flow

Manning's n-value	= 0.240
Flow length	= 50.0 ft
Two-year 24-hr precip.	= 2.60 in
Land slope	= 28.0 %

Travel Time ..... = 3.2 min

Shallow Concentrated Flow

Flow length	= 635 ft
Watercourse slope	= 4.5 %
Surface description	= Paved
Average velocity	= 4.31 ft/s

Travel Time ..... = 2.5 min

Channel Flow

Cross section flow area	= 0.0 sqft
Wetted perimeter	= 0.0 ft
Channel slope	= 0.0 %
Manning's n-value	= 0.015
Velocity	= 0.00 ft/s
Flow length	= 0.0 ft

Travel Time ..... = min

Total Travel Time, Tc ..... = 5.6 min

Hydrograph Report

English

Hyd. No. 4

EXISTING CONDITIONS

Hydrograph type	= SCS Runoff	Peak discharge	= 5.38 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Drainage area	= 6.37 ac	Curve number	= 64
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21 min
Total precip.	= 3.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 0.495 acft

Hydrograph Discharge Table

Time (min)	Outflow (cfs)
714	1.42
724	4.80
734	4.70
744	2.80
754	1.38

...End

TR55 Tc Worksheet

Hyd. No. 4

EXISTING CONDITIONS
Storm frequency = 10 yrs

Sheet Flow

Manning's n-value	= 0.240
Flow length	= 250.0 ft
Two-year 24-hr precip.	= 2.60 in
Land slope	= 8.0 %

Travel Time ..... = 18.9 min

Shallow Concentrated Flow

Flow length	= 450 ft
Watercourse slope	= 5.0 %
Surface description	= Unpaved
Average velocity	= 3.61 ft/s

Travel Time ..... = 2.1 min

Channel Flow

Cross section flow area	= 0.0 sqft
Wetted perimeter	= 0.0 ft
Channel slope	= 0.0 %
Manning's n-value	= 0.015
Velocity	= 0.00 ft/s
Flow length	= 0.0 ft

Travel Time ..... = min

Total Travel Time, Tc ..... = 21.0 min

Hydrograph Report

English

Hyd. No. 5

PROPOSED CONDITIONS

Hydrograph type	= SCS Runoff	Peak discharge	= 29.10 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Drainage area	= 6.37 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.6 min
Total precip.	= 3.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 1.406 acft

Hydrograph Discharge Table

Time -- Outflow (min cfs)	
702	7.75
712	20.81
722	13.93

...End

TR55 Tc Worksheet

Hyd. No. 5

PROPOSED CONDITIONS
Storm frequency = 10 yrs

Sheet Flow

Manning's n-value	= 0.240
Flow length	= 50.0 ft
Two-year 24-hr precip.	= 2.60 in
Land slope	= 28.0 %

Travel Time ..... = 3.2 min

Shallow Concentrated Flow

Flow length	= 635 ft
Watercourse slope	= 4.5 %
Surface description	= Paved
Average velocity	= 4.31 ft/s

Travel Time ..... = 2.5 min

Channel Flow

Cross section flow area	= 0.0 sqft
Wetted perimeter	= 0.0 ft
Channel slope	= 0.0 %
Manning's n-value	= 0.015
Velocity	= 0.00 ft/s
Flow length	= 0.0 ft

Travel Time ..... = min

Total Travel Time, Tc ..... = 5.6 min

Reservoir Report

English

Reservoir No. 1 - POND

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage acft	Total storage acft
0.00	79.00	220	0.000	0.000
7.00	86.00	11,400	0.934	0.934

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 10.0	0.0	0.0	0.0
Span in	= 10.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 79.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= -----	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.0	0.0	0.0	0.0
Crest El. ft	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.00	0.00	0.00	0.00
Eqn. Exp.	= 1.50	0.00	0.00	0.00
Multi-Stage	= No	No	No	No

Tailwater Elevation = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0.000	79.00	0.00	---	---	---	---	---	---	---	0.00
7.00	0.934	86.00	6.74	---	---	---	---	---	---	---	6.74

Hydrograph Report

English

Hyd. No. 7

100YR

Hydrograph type	= Reservoir	Peak discharge	= 6.61 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Inflow hyd. No.	= 2	Reservoir name	= POND
Max. Elevation	= 85.75 ft	Max. Storage	= 0.900 acft

Storage Indication method used.

Total Volume = 2.218 acft

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
690	3.04	79.85	1.66	-----	-----	-----	-----	-----	-----	-----	1.66
700	10.26	80.25	2.34	-----	-----	-----	-----	-----	-----	-----	2.34
710	26.11	81.67	3.93	-----	-----	-----	-----	-----	-----	-----	3.93
720	33.60	85.06	6.23	-----	-----	-----	-----	-----	-----	-----	6.23
730	5.63	85.73	6.59	-----	-----	-----	-----	-----	-----	-----	6.59
740	4.44	85.57	6.51	-----	-----	-----	-----	-----	-----	-----	6.51
750	3.23	85.30	6.37	-----	-----	-----	-----	-----	-----	-----	6.37
760	2.62	84.95	6.17	-----	-----	-----	-----	-----	-----	-----	6.17
770	2.34	84.58	5.96	-----	-----	-----	-----	-----	-----	-----	5.96
780	2.06	84.20	5.74	-----	-----	-----	-----	-----	-----	-----	5.74
790	1.87	83.82	5.51	-----	-----	-----	-----	-----	-----	-----	5.51
800	1.72	83.45	5.27	-----	-----	-----	-----	-----	-----	-----	5.27
810	1.57	83.09	5.03	-----	-----	-----	-----	-----	-----	-----	5.03
820	1.45	82.74	4.78	-----	-----	-----	-----	-----	-----	-----	4.78
830	1.34	82.40	4.53	-----	-----	-----	-----	-----	-----	-----	4.53
840	1.24	82.08	4.28	-----	-----	-----	-----	-----	-----	-----	4.28
850	1.17	81.78	4.03	-----	-----	-----	-----	-----	-----	-----	4.03
860	1.14	81.49	3.77	-----	-----	-----	-----	-----	-----	-----	3.77
870	1.10	81.23	3.53	-----	-----	-----	-----	-----	-----	-----	3.53
880	1.06	80.99	3.28	-----	-----	-----	-----	-----	-----	-----	3.28
890	1.02	80.77	3.03	-----	-----	-----	-----	-----	-----	-----	3.03
900	0.99	80.58	2.80	-----	-----	-----	-----	-----	-----	-----	2.80
910	0.95	80.40	2.60	-----	-----	-----	-----	-----	-----	-----	2.60
920	0.91	80.24	2.33	-----	-----	-----	-----	-----	-----	-----	2.33
930	0.87	80.10	2.10	-----	-----	-----	-----	-----	-----	-----	2.10
940	0.84	79.98	1.90	-----	-----	-----	-----	-----	-----	-----	1.90
950	0.80	79.88	1.72	-----	-----	-----	-----	-----	-----	-----	1.72

...End

Hydrograph Report

English

Hyd. No. 8

10YR

Hydrograph type	= Reservoir	Peak discharge	= 5.08 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Inflow hyd. No.	= 5	Reservoir name	= POND
Max. Elevation	= 83.16 ft	Max. Storage	= 0.555 acft

Storage Indication method used.

Total Volume = 1.406 acft

Hydrograph Discharge Table

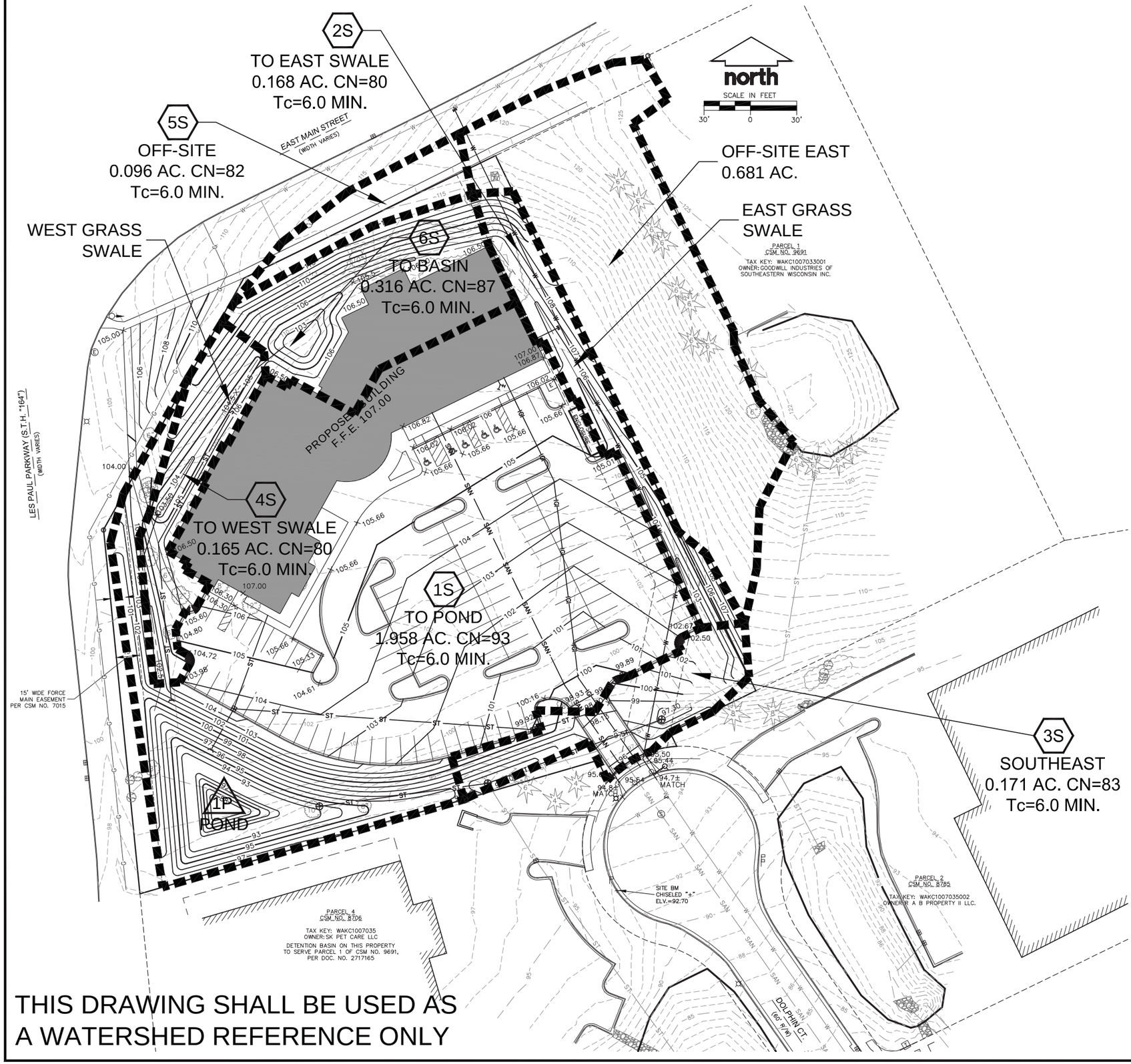
Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
700	6.27	79.73	1.46	-----	-----	-----	-----	-----	-----	-----	1.46
710	16.58	80.60	2.84	-----	-----	-----	-----	-----	-----	-----	2.84
720	22.14	82.75	4.79	-----	-----	-----	-----	-----	-----	-----	4.79
730	3.75	83.12	5.05	-----	-----	-----	-----	-----	-----	-----	5.05
740	2.96	82.95	4.93	-----	-----	-----	-----	-----	-----	-----	4.93
750	2.16	82.71	4.76	-----	-----	-----	-----	-----	-----	-----	4.76
760	1.75	82.43	4.55	-----	-----	-----	-----	-----	-----	-----	4.55
770	1.57	82.14	4.33	-----	-----	-----	-----	-----	-----	-----	4.33
780	1.38	81.86	4.10	-----	-----	-----	-----	-----	-----	-----	4.10
790	1.25	81.58	3.85	-----	-----	-----	-----	-----	-----	-----	3.85
800	1.15	81.32	3.61	-----	-----	-----	-----	-----	-----	-----	3.61
810	1.06	81.08	3.38	-----	-----	-----	-----	-----	-----	-----	3.38
820	0.97	80.85	3.12	-----	-----	-----	-----	-----	-----	-----	3.12
830	0.90	80.63	2.87	-----	-----	-----	-----	-----	-----	-----	2.87
840	0.83	80.44	2.65	-----	-----	-----	-----	-----	-----	-----	2.65
850	0.79	80.26	2.37	-----	-----	-----	-----	-----	-----	-----	2.37
860	0.76	80.11	2.11	-----	-----	-----	-----	-----	-----	-----	2.11
870	0.74	79.98	1.89	-----	-----	-----	-----	-----	-----	-----	1.89
880	0.71	79.87	1.71	-----	-----	-----	-----	-----	-----	-----	1.71
890	0.69	79.78	1.54	-----	-----	-----	-----	-----	-----	-----	1.54
900	0.66	79.69	1.40	-----	-----	-----	-----	-----	-----	-----	1.40

...End

APPENDIX 4

Proposed Site Hydrology

- Proposed Conditions Hydrology Exhibit
- Proposed Conditions HydroCAD Output
- Swale Sizing HydroCAD Output



THIS DRAWING SHALL BE USED AS A WATERSHED REFERENCE ONLY

LEGEND

- WATERSHED BOUNDARY
- TIME OF CONCENTRATION PATH
- ST — PROPOSED STORM SEWER
- 104 — PROPOSED 1' CONTOUR
- 105 — PROPOSED 5' CONTOUR

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SERVICES PROVIDED TO:

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PROJECT:
DENTAL ASSOCIATES

PROJECT LOCATION:
WAUKESHA
WAUKESHA COUNTY, WI

JSD PROJECT NO.: 15-6779

SEAL/SIGNATURE:

ALTHOUGH EVERY EFFORT HAS BEEN MADE IN PREPARING THESE PLANS AND CHECKING THEM FOR ACCURACY, THE CONTRACTOR AND SUBCONTRACTORS MUST CHECK ALL DETAIL AND DIMENSIONS OF THEIR TRADE AND BE RESPONSIBLE FOR THE SAME.

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DRAWN BY:	JJS	07-13-15
CHECKED BY:	TAG	07-13-15

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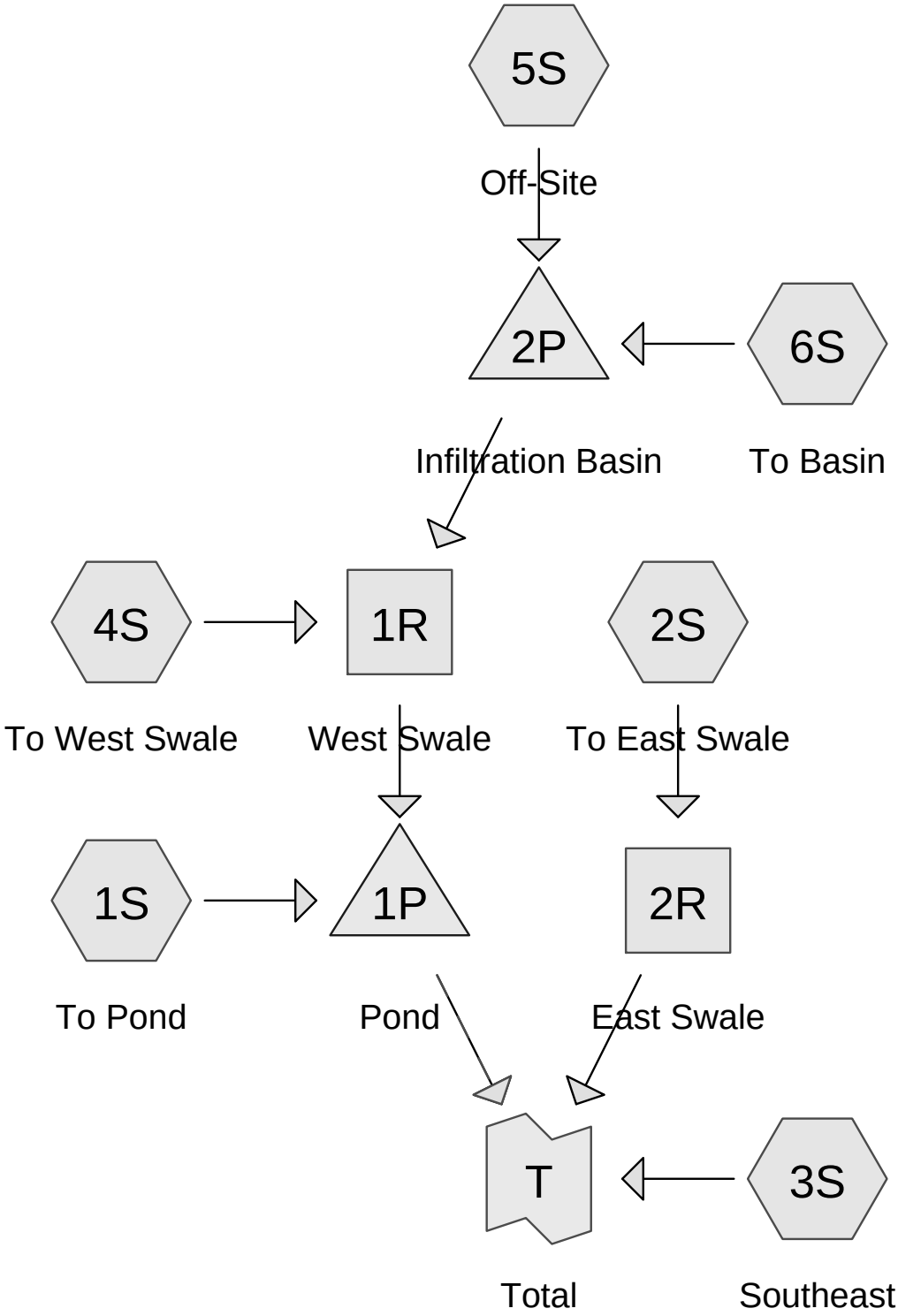
SHEET NUMBER:
H-2

R:\2015\15C6779 Interstate Partners Dolphin Ct Waukesha\dwg\15C6779 Hydrology.dwg, 7/13/2015 3:01:39 PM



Subcat Reach Pond Link

Routing Diagram for 15-6779 Proposed
Prepared by JSD Professional Services, Inc., Printed 7/13/2015

Time span=0.00-120.00 hrs, dt=0.05 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Pond Runoff Area=1.958 ac 73.90% Impervious Runoff Depth=1.62"
Tc=6.0 min CN=93 Runoff=5.25 cfs 0.264 af

Subcatchment 2S: To East Swale Runoff Area=0.168 ac 0.00% Impervious Runoff Depth=0.75"
Tc=6.0 min CN=80 Runoff=0.22 cfs 0.011 af

Subcatchment 3S: Southeast Runoff Area=0.171 ac 14.62% Impervious Runoff Depth=0.89"
Tc=6.0 min CN=83 Runoff=0.26 cfs 0.013 af

Subcatchment 4S: To West Swale Runoff Area=0.165 ac 0.00% Impervious Runoff Depth=0.75"
Tc=6.0 min CN=80 Runoff=0.21 cfs 0.010 af

Subcatchment 5S: Off-Site Runoff Area=0.096 ac 16.67% Impervious Runoff Depth=0.83"
Tc=6.0 min UI Adjusted CN=82 Runoff=0.14 cfs 0.007 af

Subcatchment 6S: To Basin Runoff Area=0.316 ac 40.51% Impervious Runoff Depth=1.16"
Tc=6.0 min CN=87 Runoff=0.63 cfs 0.031 af

Reach 1R: West Swale Avg. Flow Depth=0.09' Max Vel=0.90 fps Inflow=0.21 cfs 0.010 af
n=0.030 L=200.0' S=0.0100 '/' Capacity=4.70 cfs Outflow=0.18 cfs 0.010 af

Reach 2R: East Swale Avg. Flow Depth=0.08' Max Vel=0.98 fps Inflow=0.22 cfs 0.011 af
n=0.030 L=287.0' S=0.0139 '/' Capacity=5.55 cfs Outflow=0.18 cfs 0.011 af

Pond 1P: Pond Peak Elev=95.00' Storage=7,570 cf Inflow=5.34 cfs 0.274 af
Primary=0.15 cfs 0.274 af Secondary=0.00 cfs 0.000 af Outflow=0.15 cfs 0.274 af

Pond 2P: Infiltration Basin Peak Elev=104.66' Storage=1,115 cf Inflow=0.77 cfs 0.037 af
Discarded=0.01 cfs 0.037 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.037 af

Link T: Total Inflow=0.47 cfs 0.298 af
Primary=0.47 cfs 0.298 af

Summary for Subcatchment 1S: To Pond

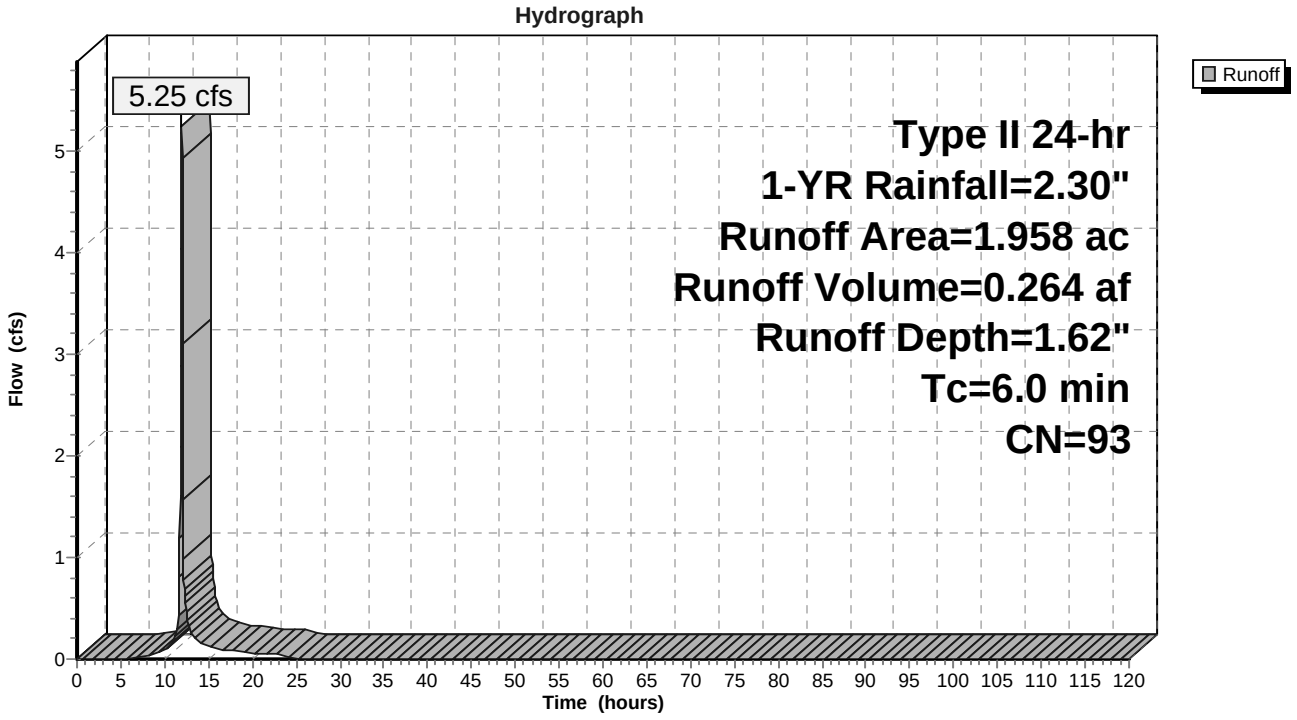
Runoff = 5.25 cfs @ 11.97 hrs, Volume= 0.264 af, Depth= 1.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-YR Rainfall=2.30"

Area (ac)	CN	Description
0.366	98	Roofs, HSG D
1.081	98	Paved parking, HSG D
0.511	80	>75% Grass cover, Good, HSG D
1.958	93	Weighted Average
0.511		26.10% Pervious Area
1.447		73.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 1S: To Pond



Summary for Subcatchment 2S: To East Swale

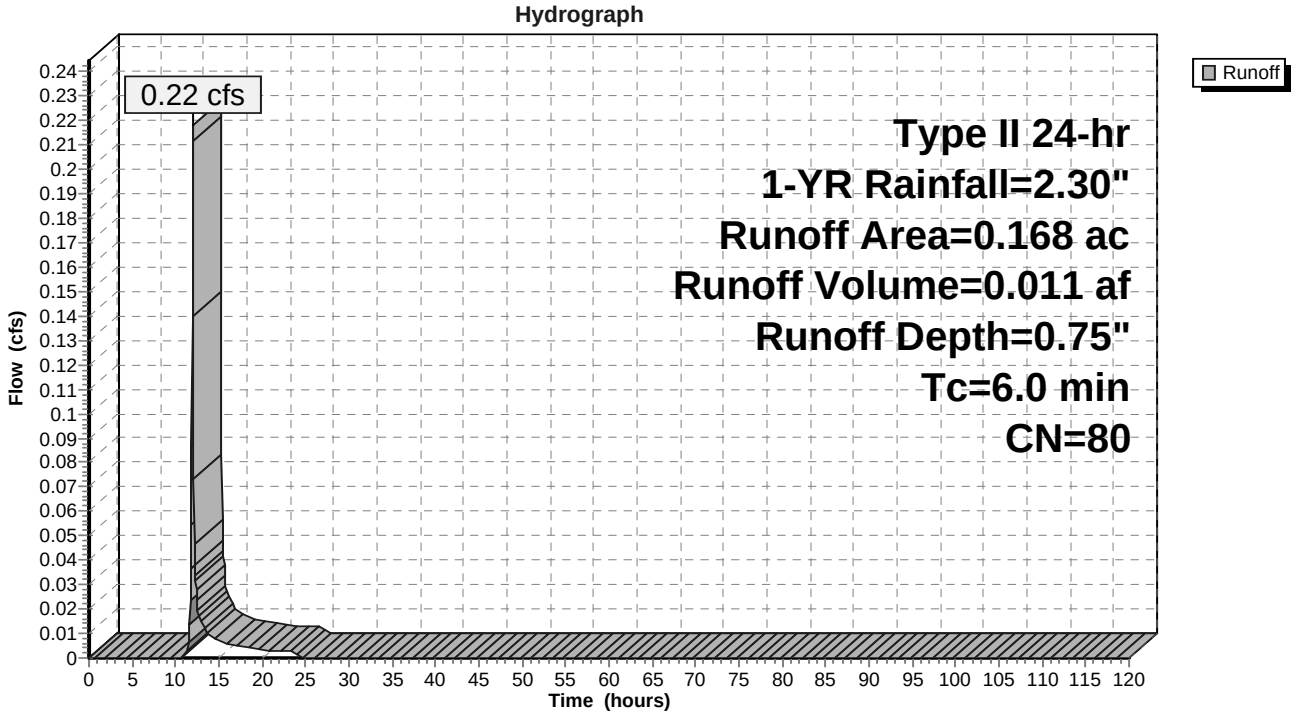
Runoff = 0.22 cfs @ 11.98 hrs, Volume= 0.011 af, Depth= 0.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-YR Rainfall=2.30"

Area (ac)	CN	Description
0.168	80	>75% Grass cover, Good, HSG D
0.168		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 2S: To East Swale



Summary for Subcatchment 3S: Southeast

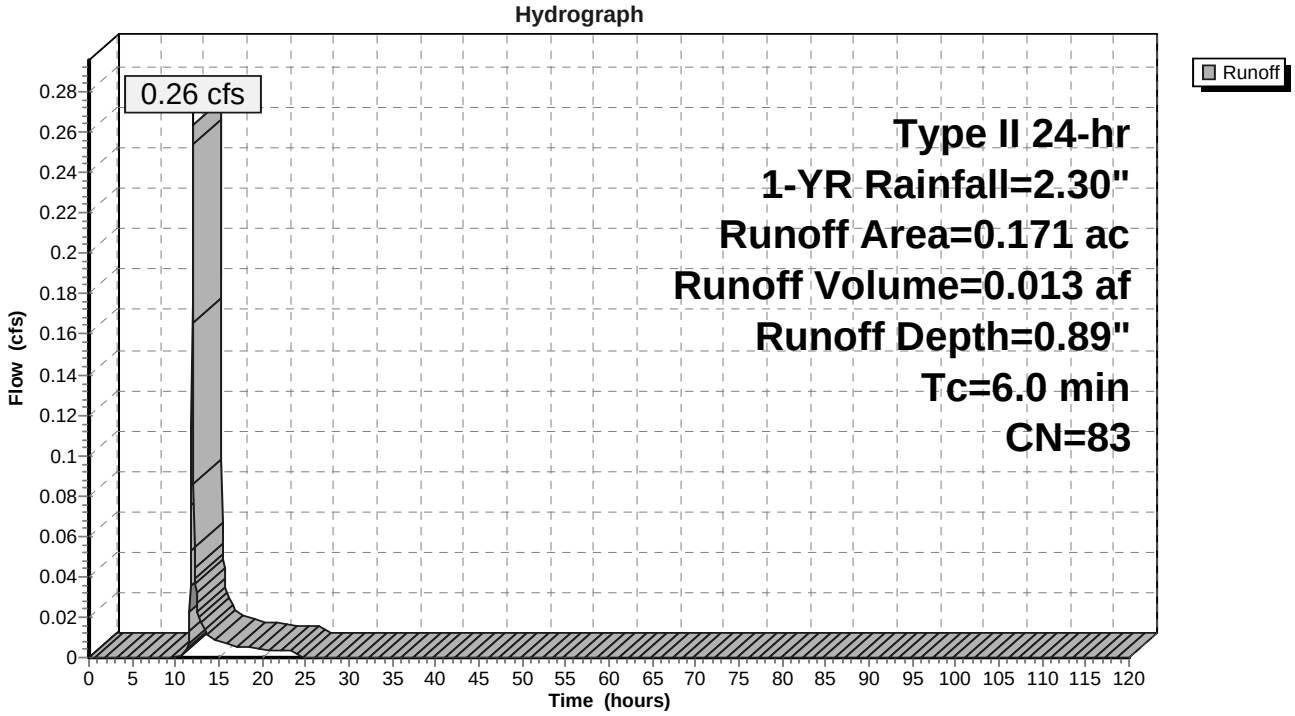
Runoff = 0.26 cfs @ 11.98 hrs, Volume= 0.013 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-YR Rainfall=2.30"

Area (ac)	CN	Description
0.025	98	Paved parking, HSG D
0.146	80	>75% Grass cover, Good, HSG D
0.171	83	Weighted Average
0.146		85.38% Pervious Area
0.025		14.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 3S: Southeast



Summary for Subcatchment 4S: To West Swale

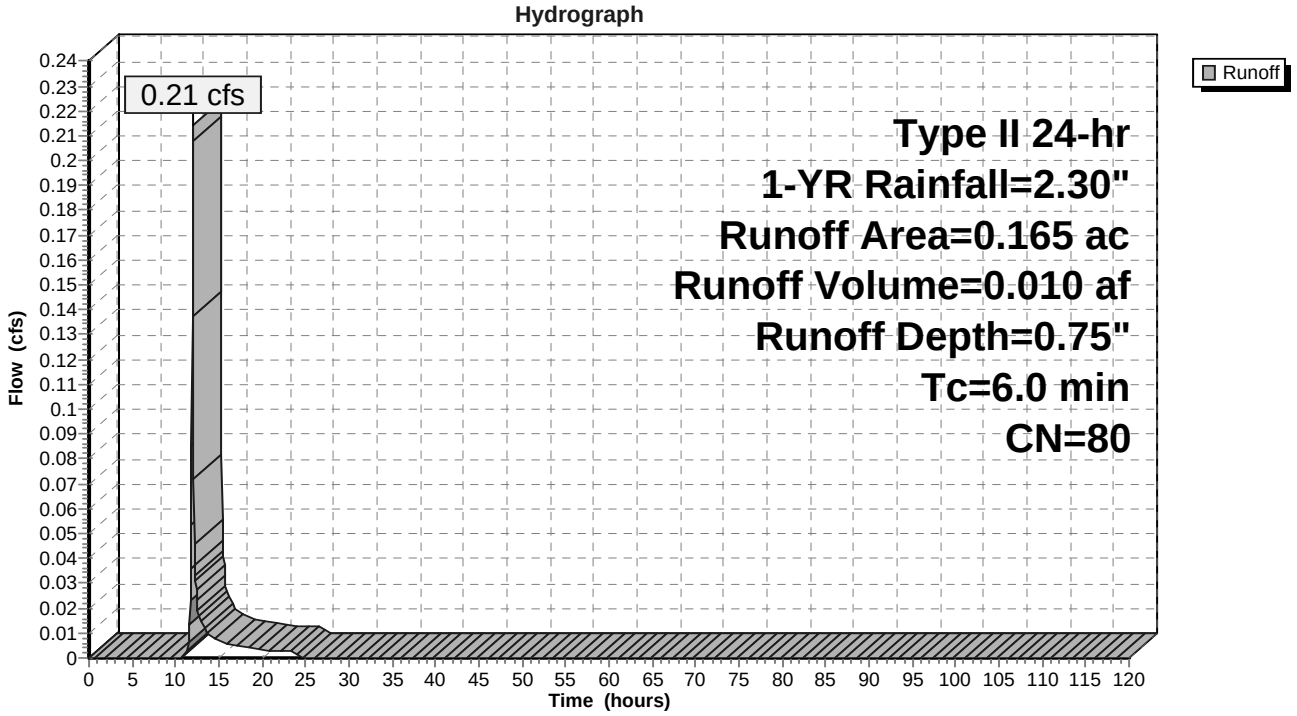
Runoff = 0.21 cfs @ 11.98 hrs, Volume= 0.010 af, Depth= 0.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-YR Rainfall=2.30"

Area (ac)	CN	Description
0.165	80	>75% Grass cover, Good, HSG D
0.165		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 4S: To West Swale



Summary for Subcatchment 5S: Off-Site

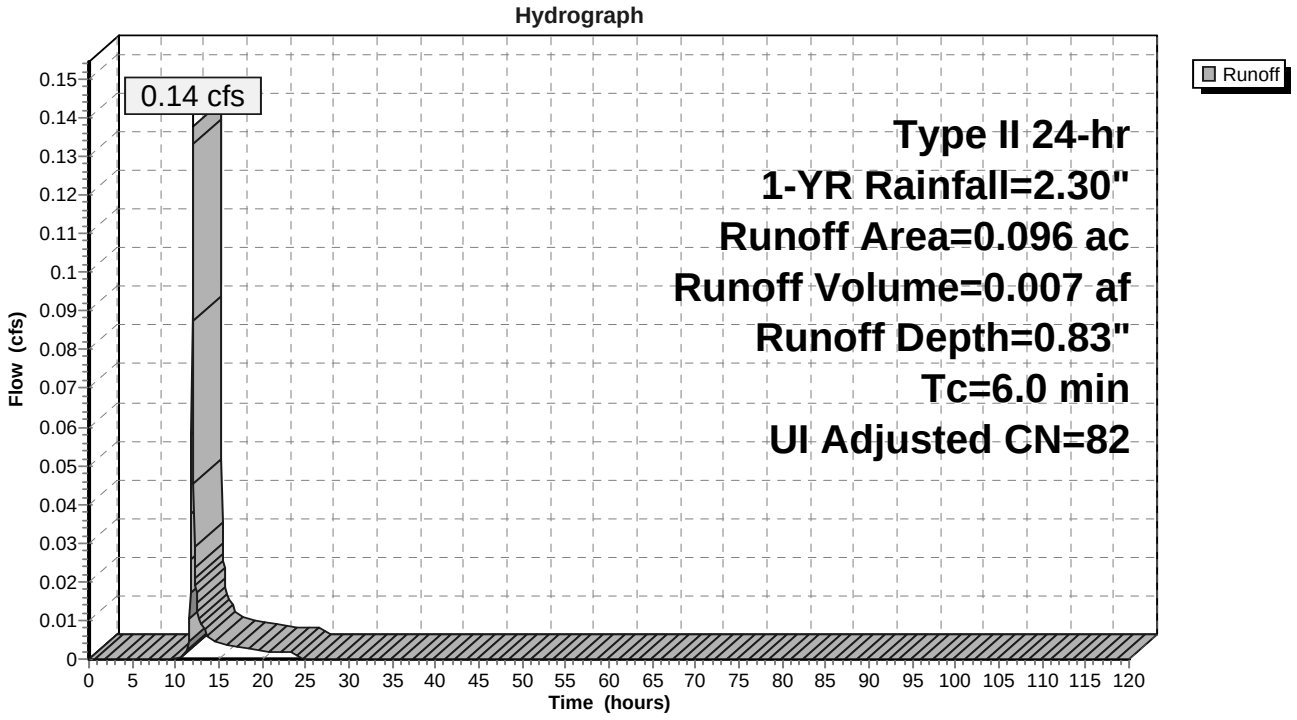
Runoff = 0.14 cfs @ 11.98 hrs, Volume= 0.007 af, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-YR Rainfall=2.30"

Area (ac)	CN	Description
0.016	98	Unconnected pavement, HSG D
0.080	80	>75% Grass cover, Good, HSG D
0.096	83	Weighted Average, UI Adjusted CN = 82
0.080		83.33% Pervious Area
0.016		16.67% Impervious Area
0.016		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 5S: Off-Site



Summary for Subcatchment 6S: To Basin

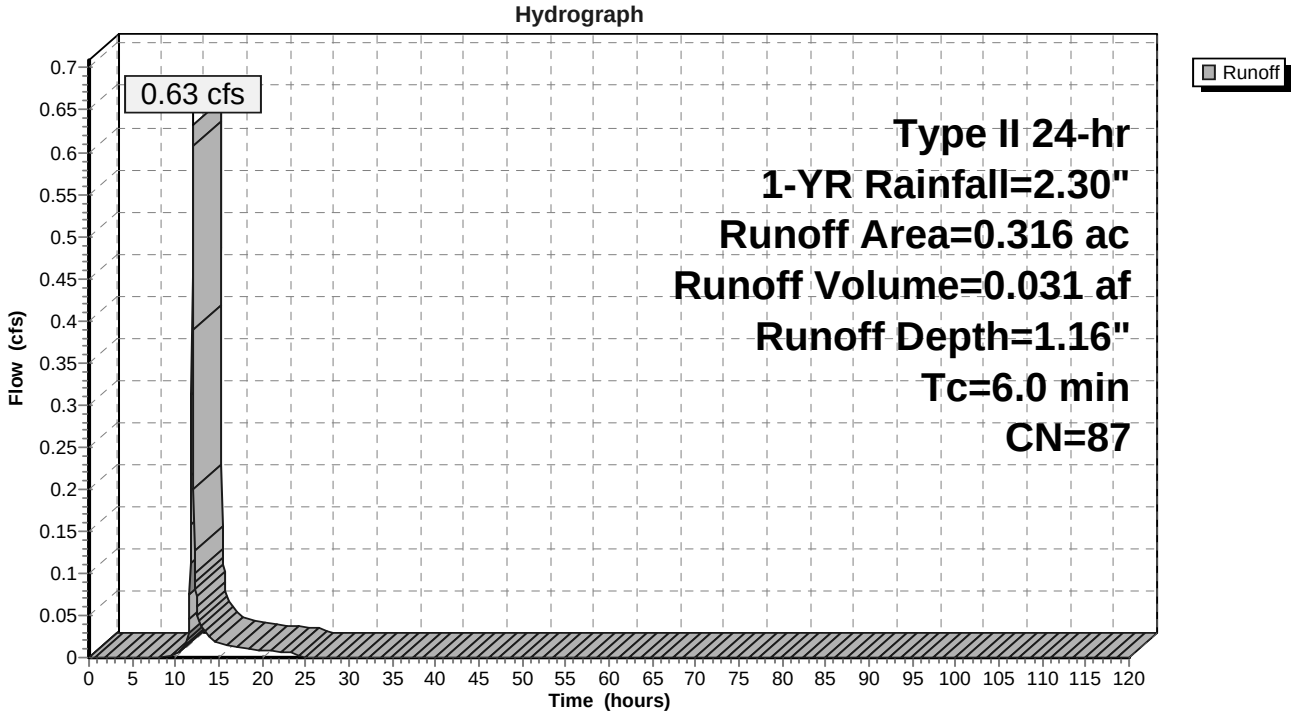
Runoff = 0.63 cfs @ 11.97 hrs, Volume= 0.031 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-YR Rainfall=2.30"

Area (ac)	CN	Description
0.188	80	>75% Grass cover, Good, HSG D
0.128	98	Roofs, HSG D
0.316	87	Weighted Average
0.188		59.49% Pervious Area
0.128		40.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 6S: To Basin



Summary for Reach 1R: West Swale

Inflow Area = 0.577 ac, 24.96% Impervious, Inflow Depth = 0.22" for 1-YR event
Inflow = 0.21 cfs @ 11.98 hrs, Volume= 0.010 af
Outflow = 0.18 cfs @ 12.08 hrs, Volume= 0.010 af, Atten= 14%, Lag= 5.8 min

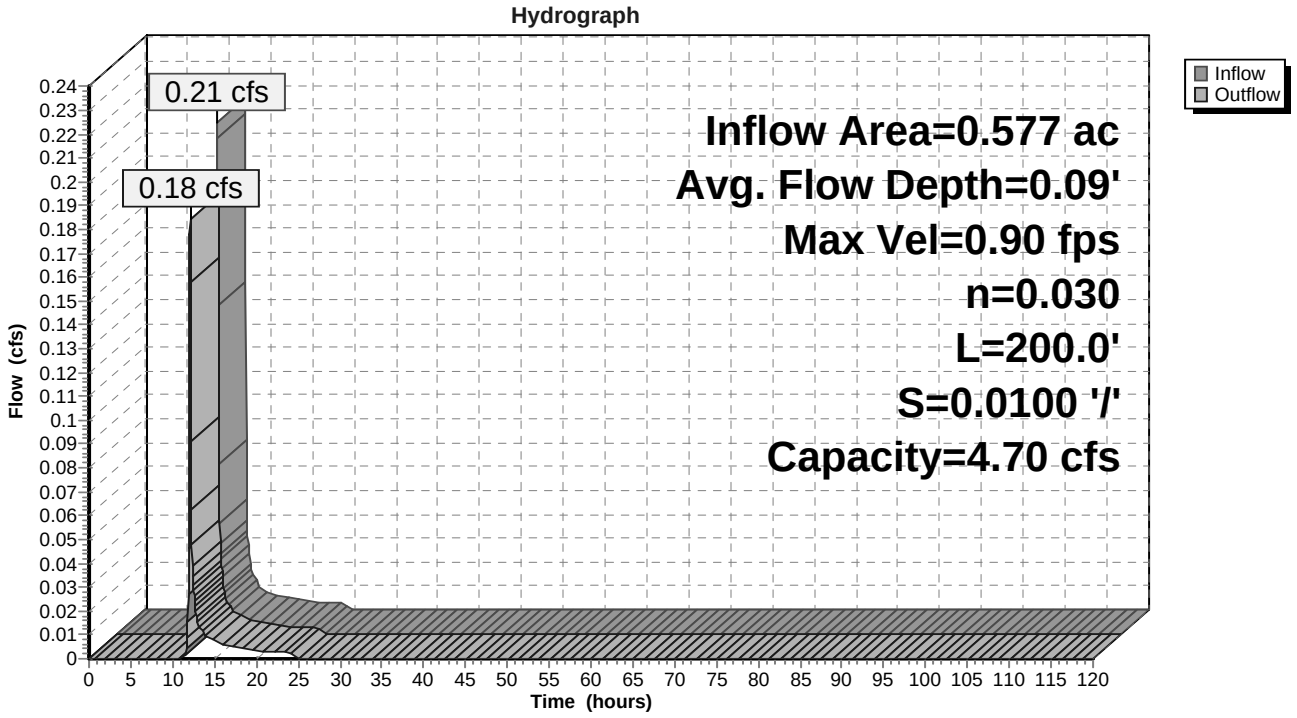
Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.90 fps, Min. Travel Time= 3.7 min
Avg. Velocity = 0.24 fps, Avg. Travel Time= 13.7 min

Peak Storage= 42 cf @ 12.01 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 0.50' Flow Area= 2.0 sf, Capacity= 4.70 cfs

2.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 6.00'
Length= 200.0' Slope= 0.0100 '/'
Inlet Invert= 104.50', Outlet Invert= 102.50'

‡

Reach 1R: West Swale



Summary for Reach 2R: East Swale

Inflow Area = 0.168 ac, 0.00% Impervious, Inflow Depth = 0.75" for 1-YR event
Inflow = 0.22 cfs @ 11.98 hrs, Volume= 0.011 af
Outflow = 0.18 cfs @ 12.11 hrs, Volume= 0.011 af, Atten= 18%, Lag= 7.6 min

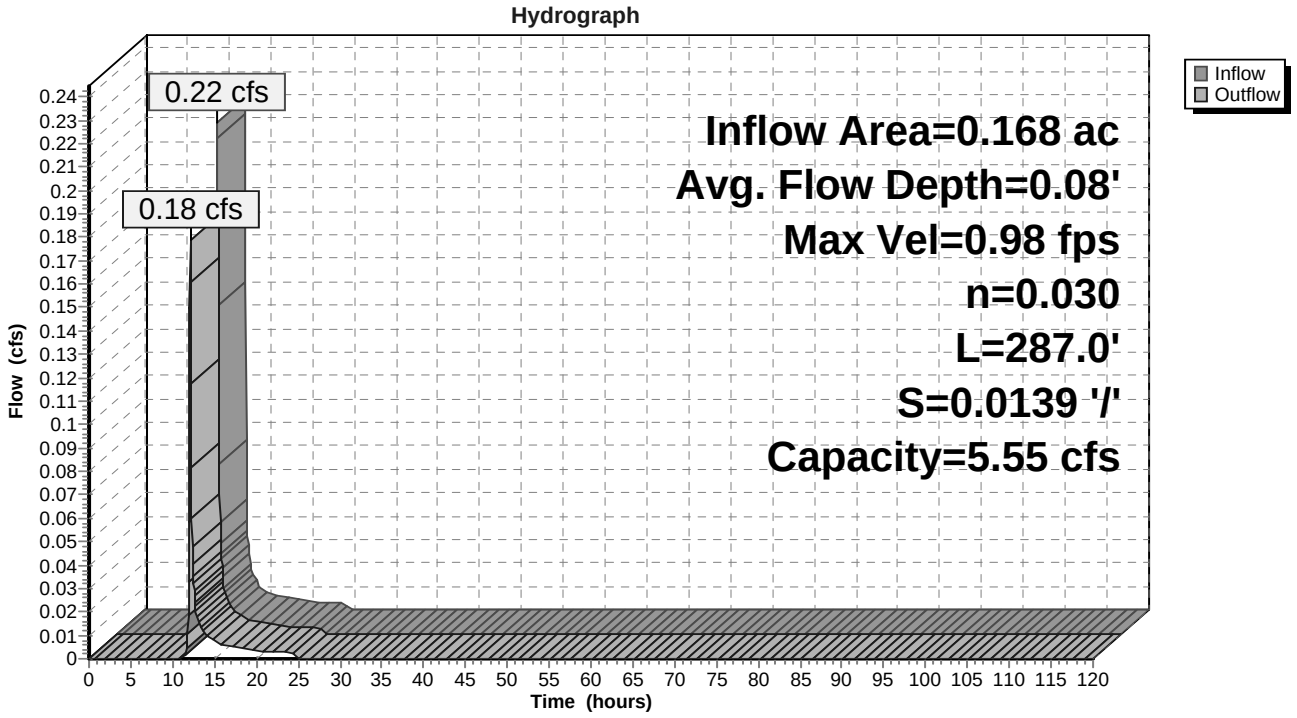
Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.98 fps, Min. Travel Time= 4.9 min
Avg. Velocity = 0.27 fps, Avg. Travel Time= 17.7 min

Peak Storage= 53 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 0.50' Flow Area= 2.0 sf, Capacity= 5.55 cfs

2.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 6.00'
Length= 287.0' Slope= 0.0139 '/'
Inlet Invert= 106.50', Outlet Invert= 102.50'

‡

Reach 2R: East Swale



Summary for Pond 1P: Pond

Inflow Area = 2.535 ac, 62.76% Impervious, Inflow Depth = 1.30" for 1-YR event
Inflow = 5.34 cfs @ 11.97 hrs, Volume= 0.274 af
Outflow = 0.15 cfs @ 14.67 hrs, Volume= 0.274 af, Atten= 97%, Lag= 161.9 min
Primary = 0.15 cfs @ 14.67 hrs, Volume= 0.274 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 95.00' @ 14.67 hrs Surf.Area= 4,812 sf Storage= 7,570 cf

Plug-Flow detention time= 657.0 min calculated for 0.274 af (100% of inflow)
Center-of-Mass det. time= 656.8 min (1,459.2 - 802.4)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	20,140 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

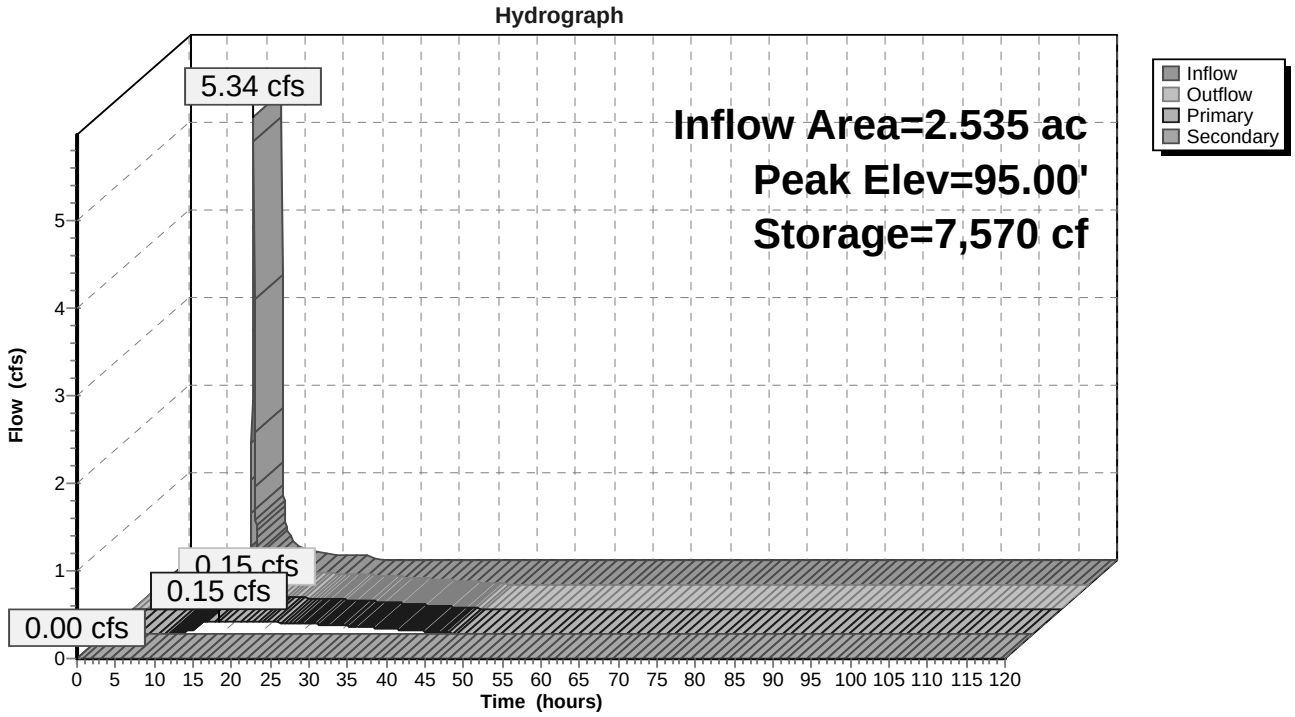
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	2,874	250.3	0	0	2,874
94.00	3,765	294.3	3,309	3,309	4,800
95.00	4,817	345.0	4,280	7,590	7,399
96.00	6,286	475.5	5,535	13,125	15,930
97.00	7,770	500.7	7,015	20,140	17,947

Device	Routing	Invert	Outlet Devices
#1	Primary	92.75'	**24.0" Round Culvert** L= 110.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 92.75' / 92.50' S= 0.0023 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	93.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	95.40'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	96.10'	**5.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.15 cfs @ 14.67 hrs HW=95.00' (Free Discharge)
└**1=Culvert** (Passes 0.15 cfs of 12.76 cfs potential flow)
  └**2=Orifice/Grate** (Orifice Controls 0.15 cfs @ 6.66 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Pond


Hydrograph
Inflow
Outflow
Primary
Secondary
5.34 cfs
0.15 cfs
0.15 cfs
0.00 cfs
Inflow Area=2.535 ac
Peak Elev=95.00'
Storage=7,570 cf
Flow (cfs)
0 1 2 3 4 5
Time (hours)
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120

Summary for Pond 2P: Infiltration Basin

Inflow Area = 0.412 ac, 34.95% Impervious, Inflow Depth = 1.09" for 1-YR event
Inflow = 0.77 cfs @ 11.97 hrs, Volume= 0.037 af
Outflow = 0.01 cfs @ 18.53 hrs, Volume= 0.037 af, Atten= 98%, Lag= 393.5 min
Discarded = 0.01 cfs @ 18.53 hrs, Volume= 0.037 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 104.66' @ 18.53 hrs Surf.Area= 1,069 sf Storage= 1,115 cf

Plug-Flow detention time= 1,099.3 min calculated for 0.037 af (100% of inflow)
Center-of-Mass det. time= 1,099.9 min (1,933.2 - 833.3)

Volume	Invert	Avail.Storage	Storage Description
#1	103.00'	3,205 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

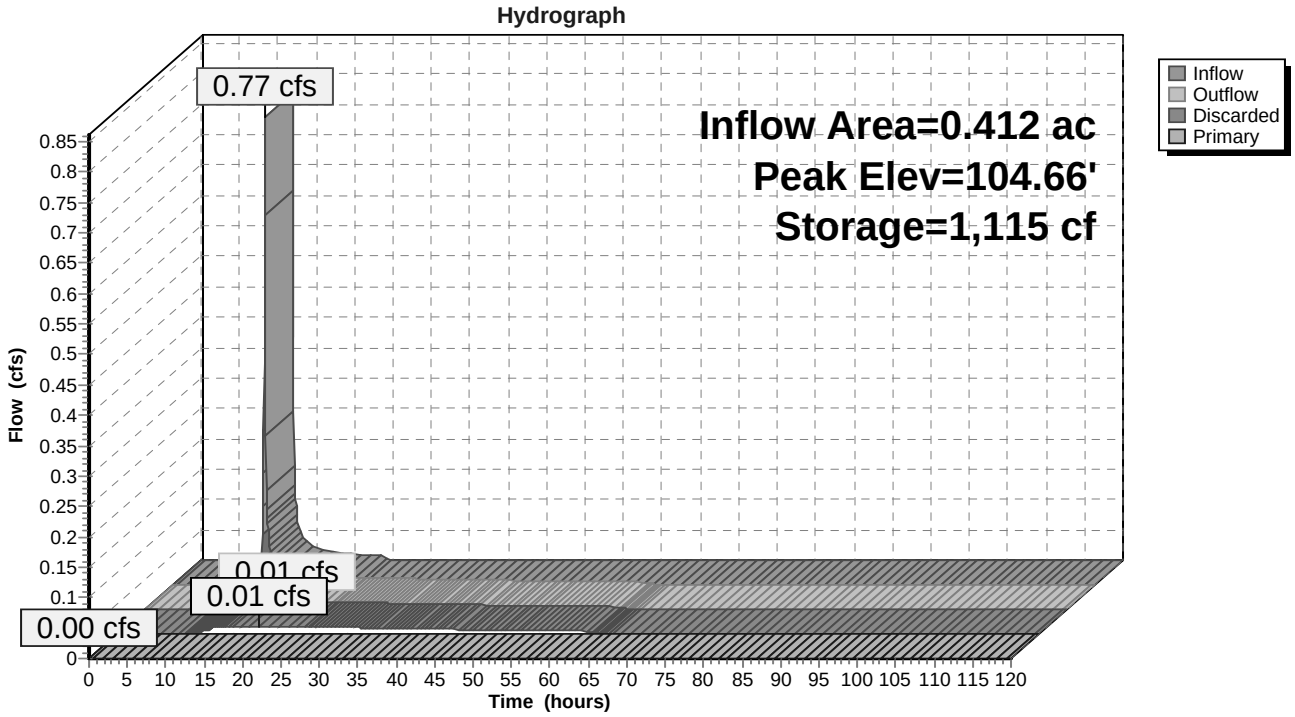
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
103.00	348	72.5	0	0	348
104.00	722	105.5	524	524	824
105.00	1,270	150.8	983	1,507	1,757
106.00	2,166	273.7	1,698	3,205	5,914

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	105.00'	**12.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.01 cfs @ 18.53 hrs HW=104.66' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Infiltration Basin

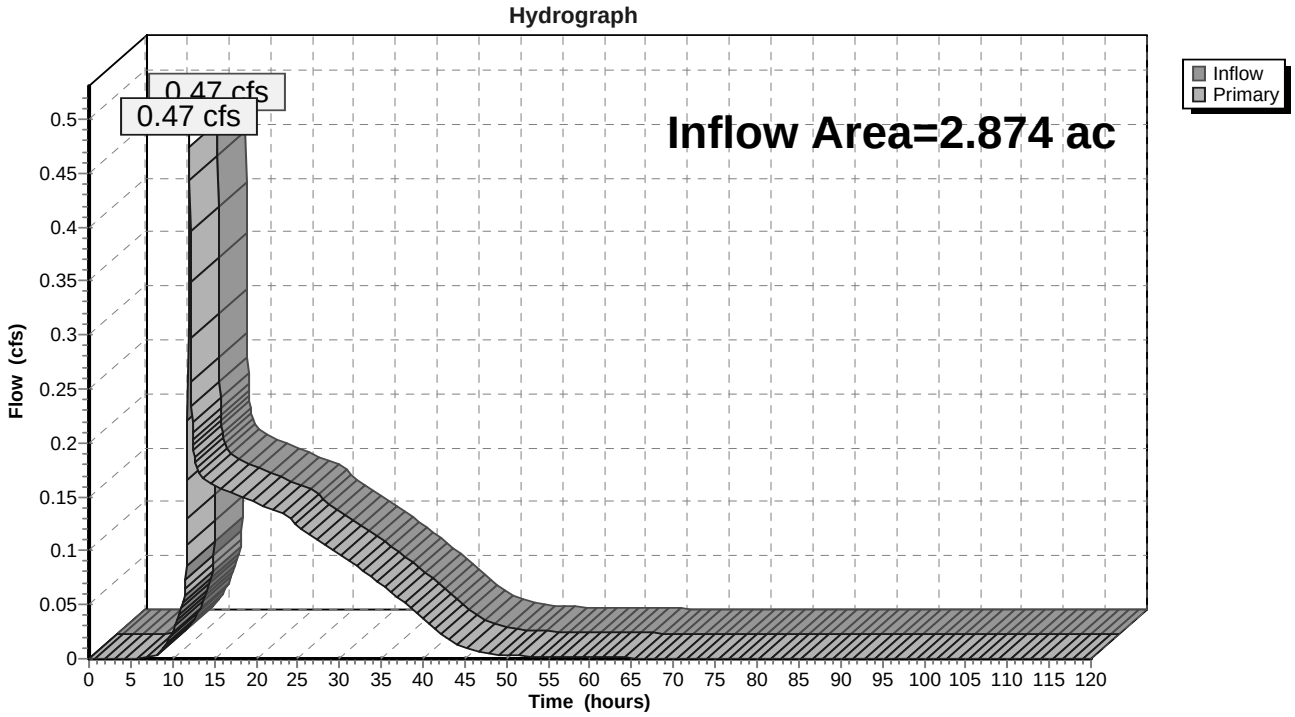


Summary for Link T: Total

Inflow Area = 2.874 ac, 56.23% Impervious, Inflow Depth = 1.24" for 1-YR event
Inflow = 0.47 cfs @ 12.01 hrs, Volume= 0.298 af
Primary = 0.47 cfs @ 12.01 hrs, Volume= 0.298 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Link T: Total



Time span=0.00-120.00 hrs, dt=0.05 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Pond Runoff Area=1.958 ac 73.90% Impervious Runoff Depth=2.00"
Tc=6.0 min CN=93 Runoff=6.40 cfs 0.326 af

Subcatchment 2S: To East Swale Runoff Area=0.168 ac 0.00% Impervious Runoff Depth=1.03"
Tc=6.0 min CN=80 Runoff=0.30 cfs 0.014 af

Subcatchment 3S: Southeast Runoff Area=0.171 ac 14.62% Impervious Runoff Depth=1.19"
Tc=6.0 min CN=83 Runoff=0.35 cfs 0.017 af

Subcatchment 4S: To West Swale Runoff Area=0.165 ac 0.00% Impervious Runoff Depth=1.03"
Tc=6.0 min CN=80 Runoff=0.30 cfs 0.014 af

Subcatchment 5S: Off-Site Runoff Area=0.096 ac 16.67% Impervious Runoff Depth=1.12"
Tc=6.0 min UI Adjusted CN=82 Runoff=0.19 cfs 0.009 af

Subcatchment 6S: To Basin Runoff Area=0.316 ac 40.51% Impervious Runoff Depth=1.50"
Tc=6.0 min CN=87 Runoff=0.81 cfs 0.040 af

Reach 1R: West Swale Avg. Flow Depth=0.11' Max Vel=1.01 fps Inflow=0.30 cfs 0.014 af
n=0.030 L=200.0' S=0.0100 '/' Capacity=4.70 cfs Outflow=0.26 cfs 0.014 af

Reach 2R: East Swale Avg. Flow Depth=0.10' Max Vel=1.11 fps Inflow=0.30 cfs 0.014 af
n=0.030 L=287.0' S=0.0139 '/' Capacity=5.55 cfs Outflow=0.25 cfs 0.014 af

Pond 1P: Pond Peak Elev=95.40' Storage=9,626 cf Inflow=6.55 cfs 0.340 af
Primary=0.16 cfs 0.340 af Secondary=0.00 cfs 0.000 af Outflow=0.16 cfs 0.340 af

Pond 2P: Infiltration Basin Peak Elev=104.99' Storage=1,493 cf Inflow=1.00 cfs 0.048 af
Discarded=0.01 cfs 0.048 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.048 af

Link T: Total Inflow=0.64 cfs 0.371 af
Primary=0.64 cfs 0.371 af

Summary for Subcatchment 1S: To Pond

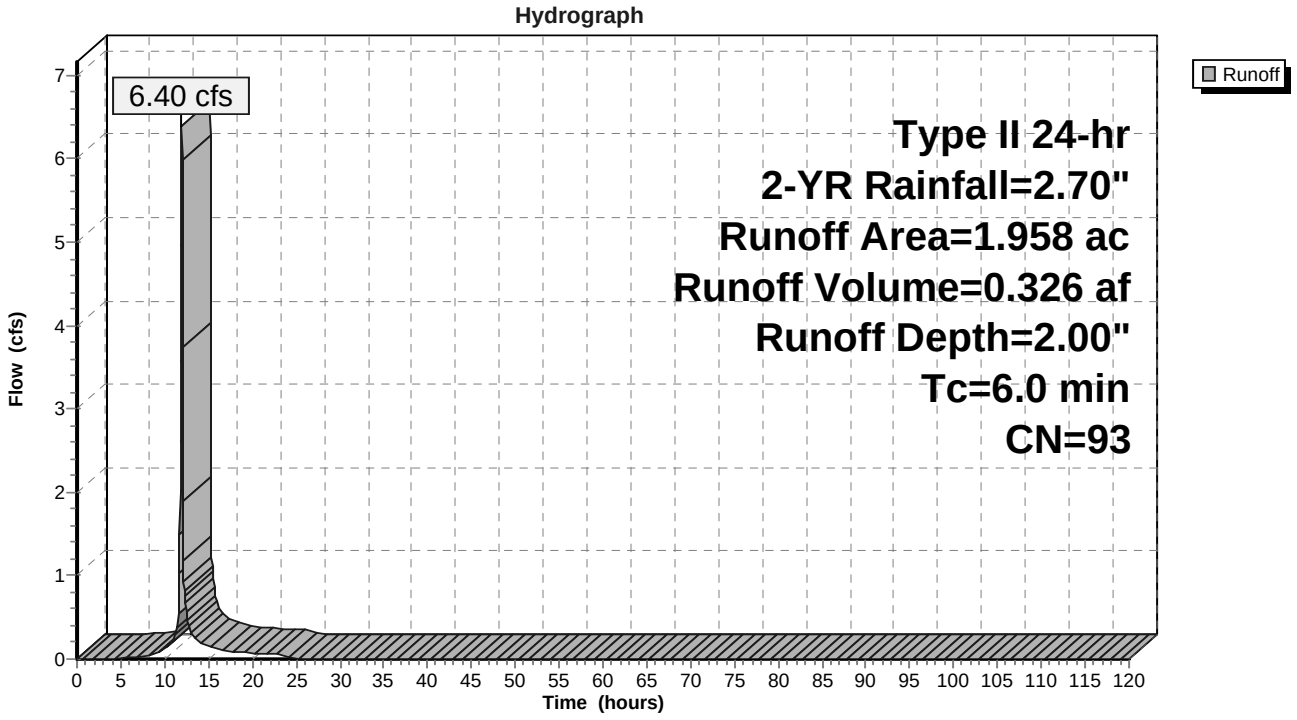
Runoff = 6.40 cfs @ 11.97 hrs, Volume= 0.326 af, Depth= 2.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.366	98	Roofs, HSG D
1.081	98	Paved parking, HSG D
0.511	80	>75% Grass cover, Good, HSG D
1.958	93	Weighted Average
0.511		26.10% Pervious Area
1.447		73.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 1S: To Pond



Summary for Subcatchment 2S: To East Swale

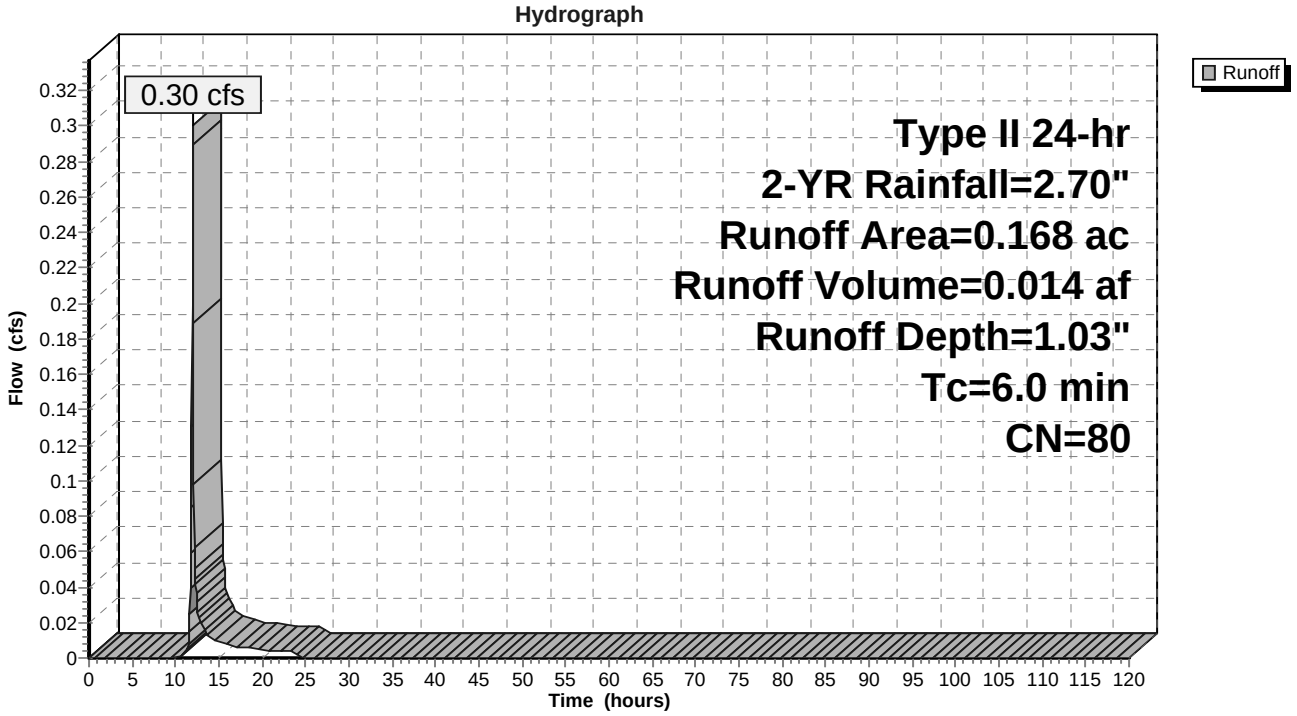
Runoff = 0.30 cfs @ 11.98 hrs, Volume= 0.014 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.168	80	>75% Grass cover, Good, HSG D
0.168		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 2S: To East Swale



Summary for Subcatchment 3S: Southeast

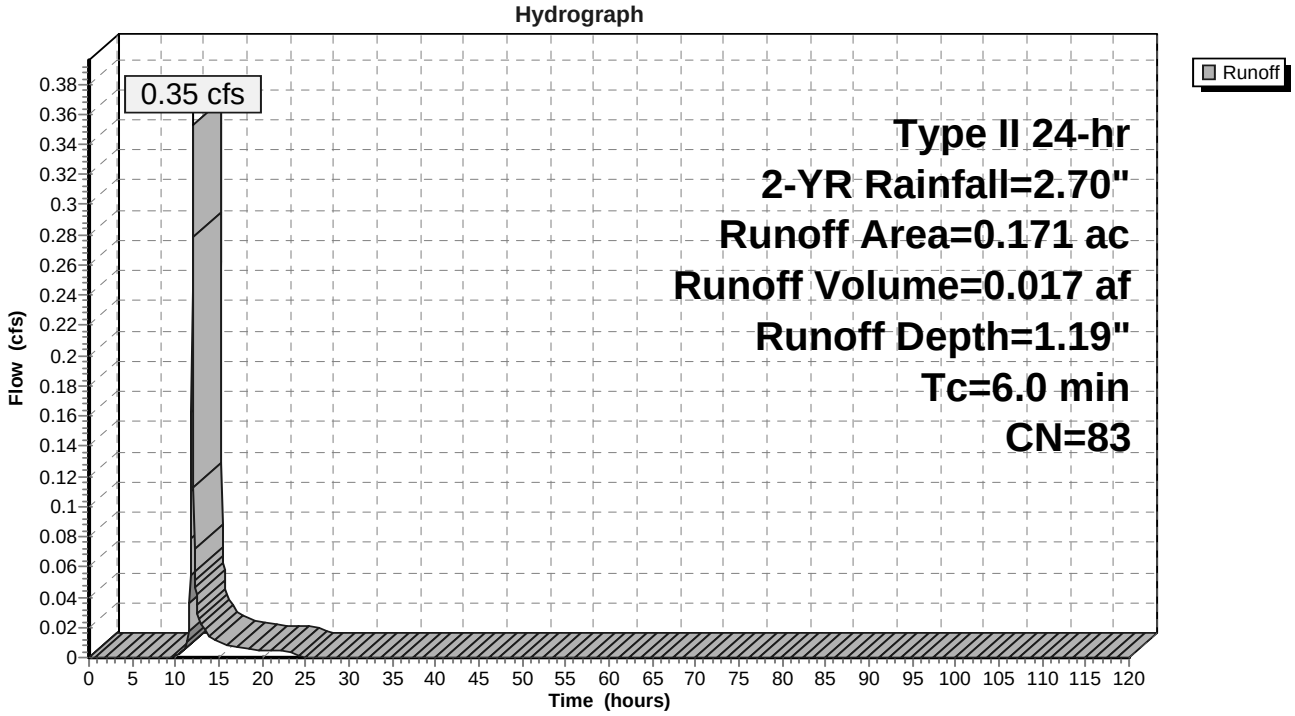
Runoff = 0.35 cfs @ 11.98 hrs, Volume= 0.017 af, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.025	98	Paved parking, HSG D
0.146	80	>75% Grass cover, Good, HSG D
0.171	83	Weighted Average
0.146		85.38% Pervious Area
0.025		14.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 3S: Southeast



Summary for Subcatchment 4S: To West Swale

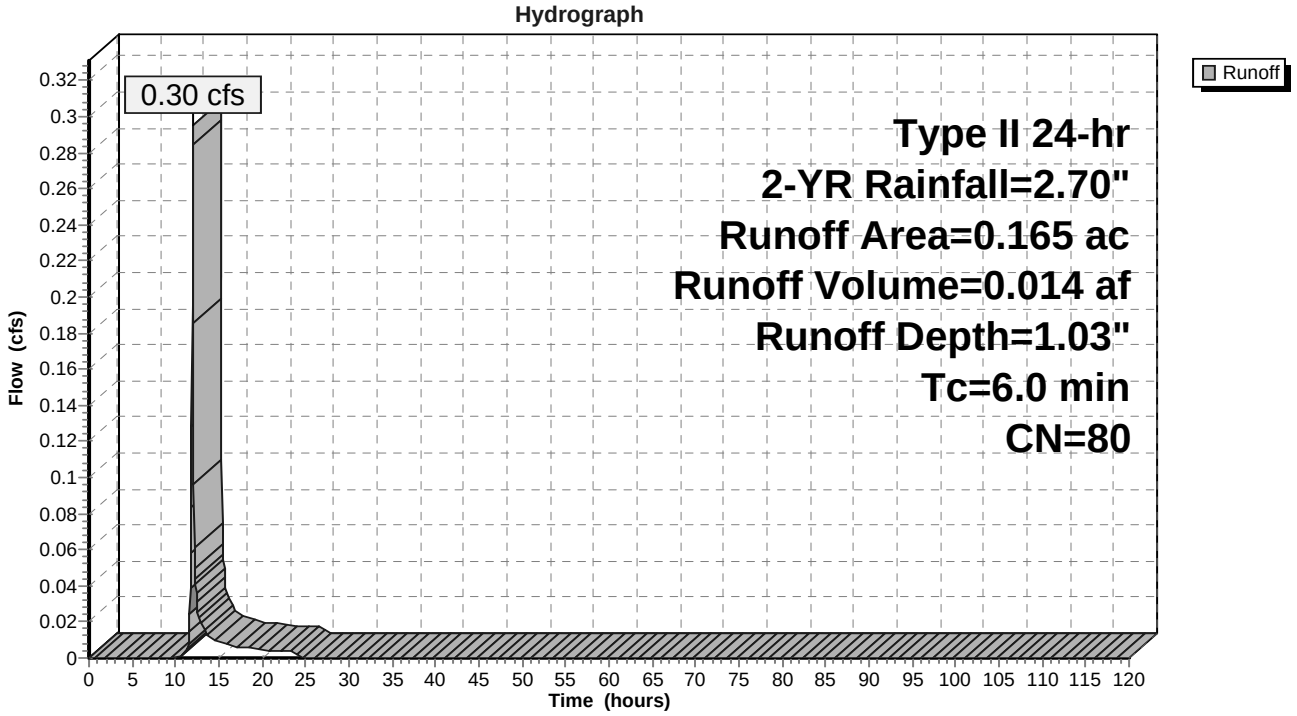
Runoff = 0.30 cfs @ 11.98 hrs, Volume= 0.014 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.165	80	>75% Grass cover, Good, HSG D
0.165		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 4S: To West Swale



Summary for Subcatchment 5S: Off-Site

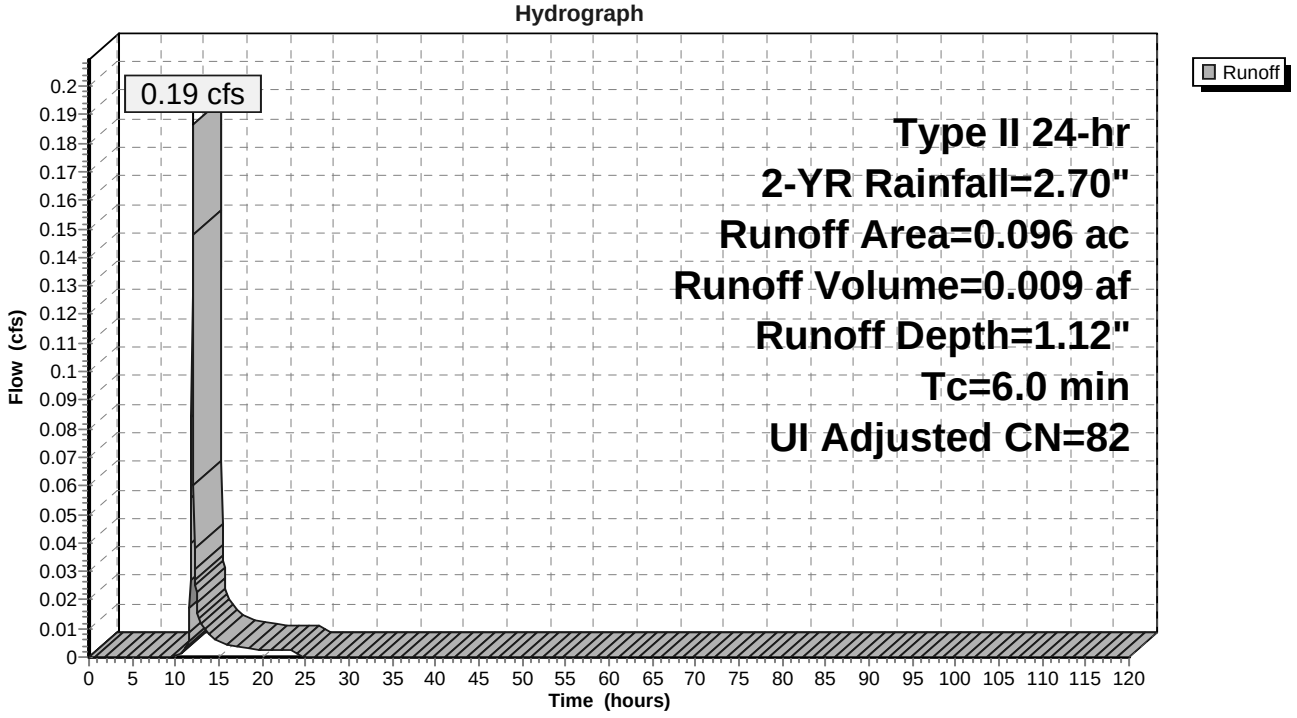
Runoff = 0.19 cfs @ 11.98 hrs, Volume= 0.009 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.016	98	Unconnected pavement, HSG D
0.080	80	>75% Grass cover, Good, HSG D
0.096	83	Weighted Average, UI Adjusted CN = 82
0.080		83.33% Pervious Area
0.016		16.67% Impervious Area
0.016		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 5S: Off-Site



Summary for Subcatchment 6S: To Basin

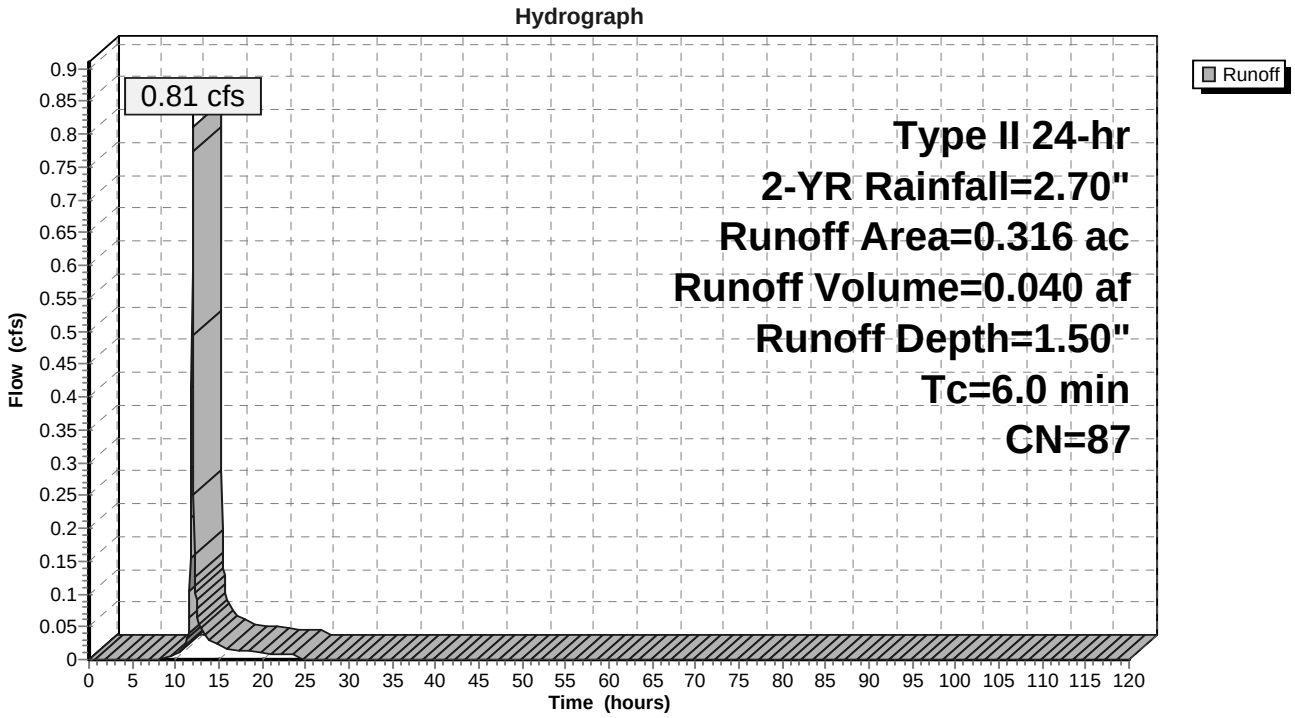
Runoff = 0.81 cfs @ 11.97 hrs, Volume= 0.040 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YR Rainfall=2.70"

Area (ac)	CN	Description
0.188	80	>75% Grass cover, Good, HSG D
0.128	98	Roofs, HSG D
0.316	87	Weighted Average
0.188		59.49% Pervious Area
0.128		40.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 6S: To Basin



Summary for Reach 1R: West Swale

Inflow Area = 0.577 ac, 24.96% Impervious, Inflow Depth = 0.29" for 2-YR event
Inflow = 0.30 cfs @ 11.98 hrs, Volume= 0.014 af
Outflow = 0.26 cfs @ 12.06 hrs, Volume= 0.014 af, Atten= 10%, Lag= 5.1 min

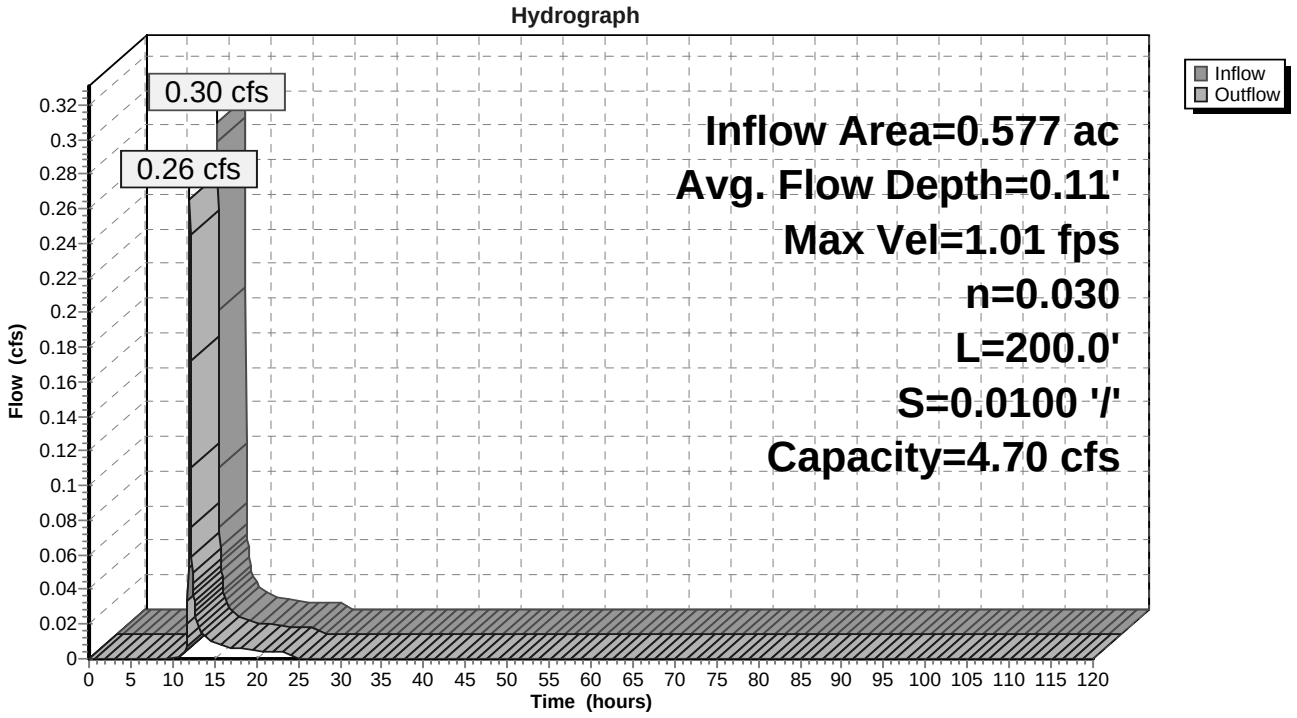
Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.01 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 0.26 fps, Avg. Travel Time= 12.7 min

Peak Storage= 53 cf @ 12.01 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 0.50' Flow Area= 2.0 sf, Capacity= 4.70 cfs

2.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 6.00'
Length= 200.0' Slope= 0.0100 '/'
Inlet Invert= 104.50', Outlet Invert= 102.50'

‡

Reach 1R: West Swale



Summary for Reach 2R: East Swale

Inflow Area = 0.168 ac, 0.00% Impervious, Inflow Depth = 1.03" for 2-YR event
Inflow = 0.30 cfs @ 11.98 hrs, Volume= 0.014 af
Outflow = 0.25 cfs @ 12.09 hrs, Volume= 0.014 af, Atten= 16%, Lag= 6.7 min

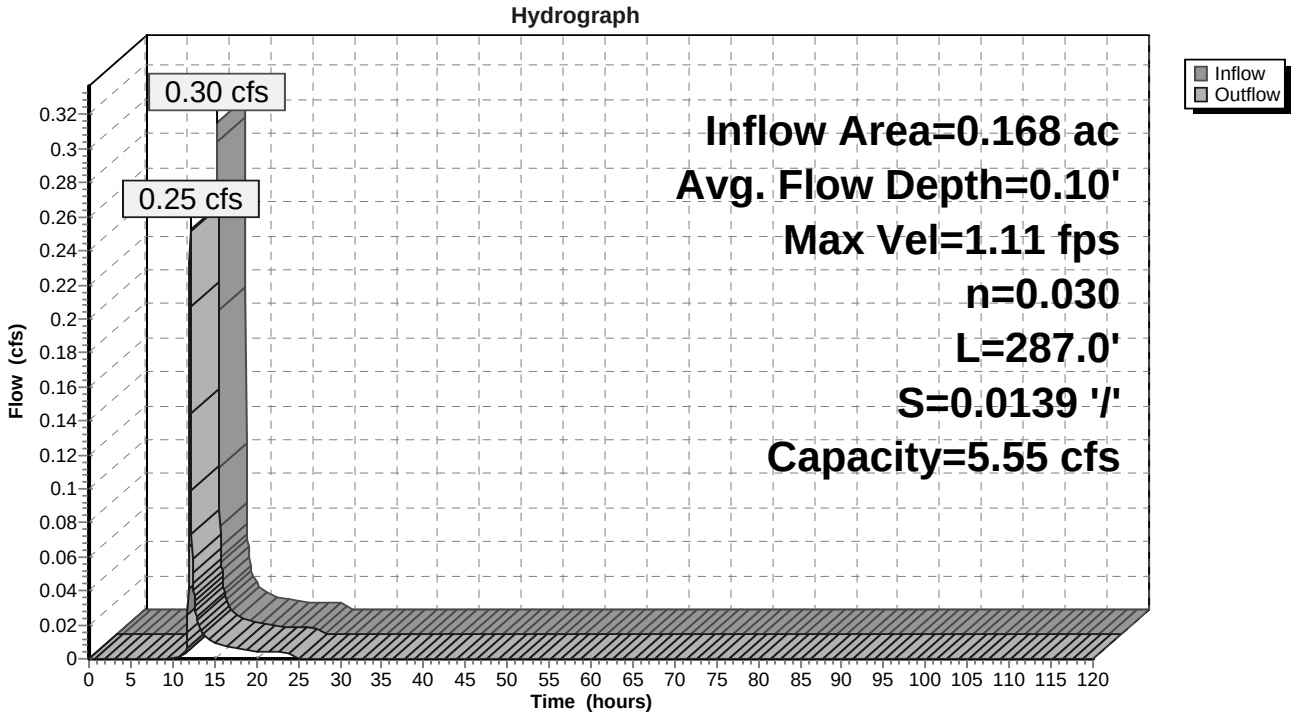
Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.11 fps, Min. Travel Time= 4.3 min
Avg. Velocity = 0.29 fps, Avg. Travel Time= 16.4 min

Peak Storage= 67 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 0.50' Flow Area= 2.0 sf, Capacity= 5.55 cfs

2.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 6.00'
Length= 287.0' Slope= 0.0139 '/'
Inlet Invert= 106.50', Outlet Invert= 102.50'

‡

Reach 2R: East Swale



Summary for Pond 1P: Pond

Inflow Area = 2.535 ac, 62.76% Impervious, Inflow Depth = 1.61" for 2-YR event
Inflow = 6.55 cfs @ 11.97 hrs, Volume= 0.340 af
Outflow = 0.16 cfs @ 15.07 hrs, Volume= 0.340 af, Atten= 98%, Lag= 186.4 min
Primary = 0.16 cfs @ 15.07 hrs, Volume= 0.340 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 95.40' @ 15.07 hrs Surf.Area= 5,380 sf Storage= 9,626 cf

Plug-Flow detention time= 740.4 min calculated for 0.340 af (100% of inflow)
Center-of-Mass det. time= 741.9 min (1,538.5 - 796.6)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	20,140 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

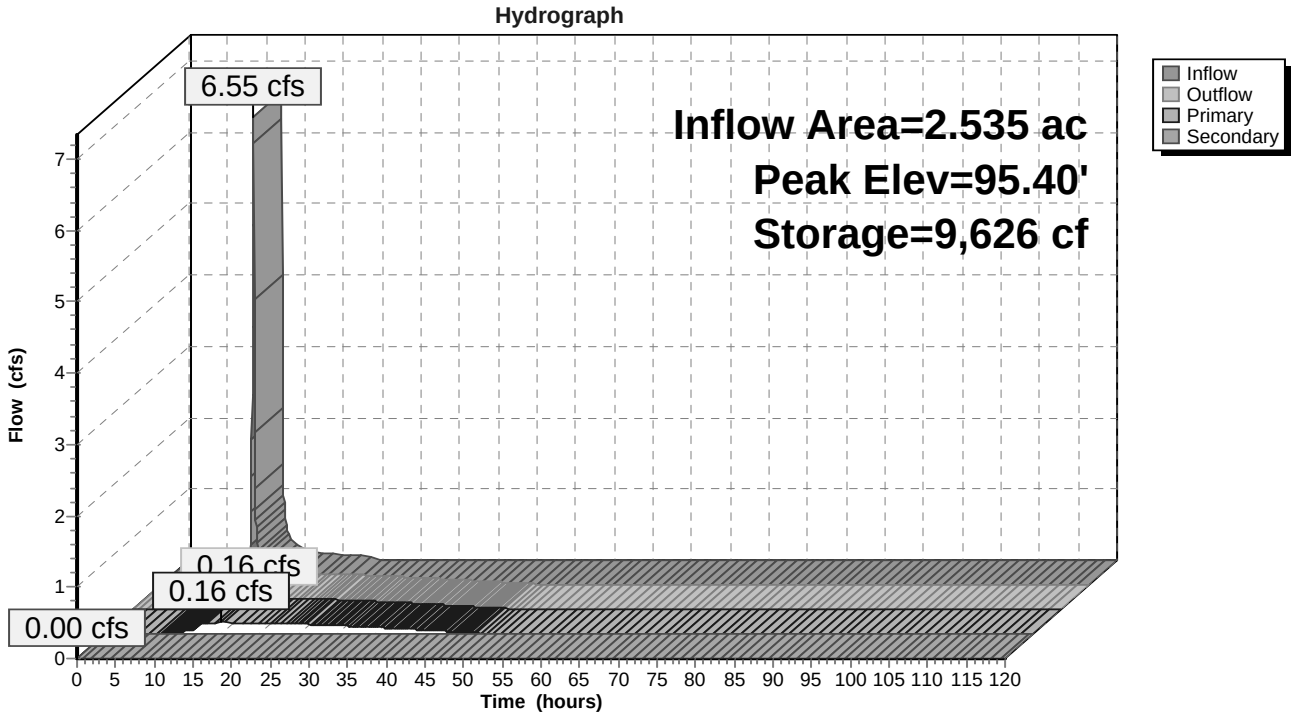
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	2,874	250.3	0	0	2,874
94.00	3,765	294.3	3,309	3,309	4,800
95.00	4,817	345.0	4,280	7,590	7,399
96.00	6,286	475.5	5,535	13,125	15,930
97.00	7,770	500.7	7,015	20,140	17,947

Device	Routing	Invert	Outlet Devices
#1	Primary	92.75'	**24.0" Round Culvert** L= 110.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 92.75' / 92.50' S= 0.0023 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	93.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	95.40'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	96.10'	**5.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.16 cfs @ 15.07 hrs HW=95.40' (Free Discharge)
└**1=Culvert** (Passes 0.16 cfs of 14.43 cfs potential flow)
  └**2=Orifice/Grate** (Orifice Controls 0.16 cfs @ 7.33 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Pond


Hydrograph
Inflow
Outflow
Primary
Secondary
6.55 cfs
Inflow Area=2.535 ac
Peak Elev=95.40'
Storage=9,626 cf
0.16 cfs
0.16 cfs
0.00 cfs
Flow (cfs)
0 1 2 3 4 5 6 7
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120
Time (hours)

Summary for Pond 2P: Infiltration Basin

Inflow Area = 0.412 ac, 34.95% Impervious, Inflow Depth = 1.41" for 2-YR event
Inflow = 1.00 cfs @ 11.97 hrs, Volume= 0.048 af
Outflow = 0.01 cfs @ 18.83 hrs, Volume= 0.048 af, Atten= 99%, Lag= 411.8 min
Discarded = 0.01 cfs @ 18.83 hrs, Volume= 0.048 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 104.99' @ 18.83 hrs Surf.Area= 1,263 sf Storage= 1,493 cf

Plug-Flow detention time= 1,250.8 min calculated for 0.048 af (100% of inflow)
Center-of-Mass det. time= 1,251.5 min (2,077.4 - 825.9)

Volume	Invert	Avail.Storage	Storage Description
#1	103.00'	3,205 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

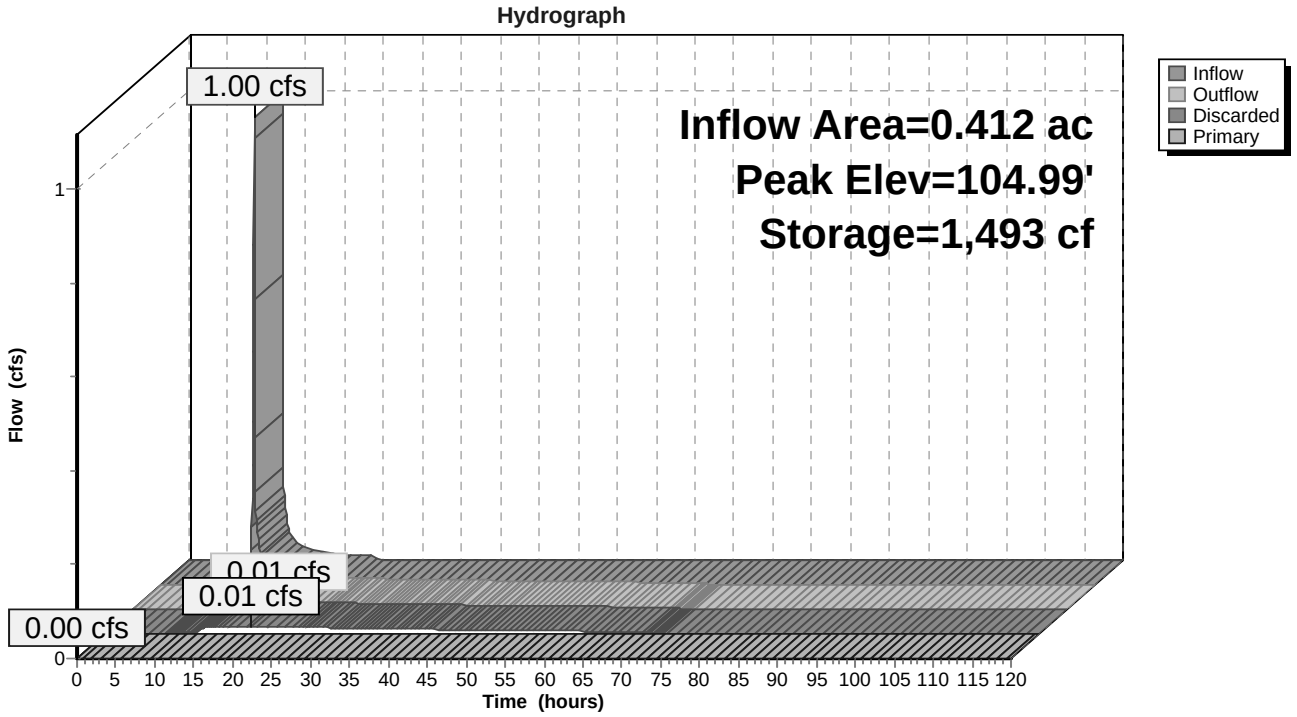
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
103.00	348	72.5	0	0	348
104.00	722	105.5	524	524	824
105.00	1,270	150.8	983	1,507	1,757
106.00	2,166	273.7	1,698	3,205	5,914

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	105.00'	**12.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.01 cfs @ 18.83 hrs HW=104.99' (Free Discharge)
↑**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Infiltration Basin

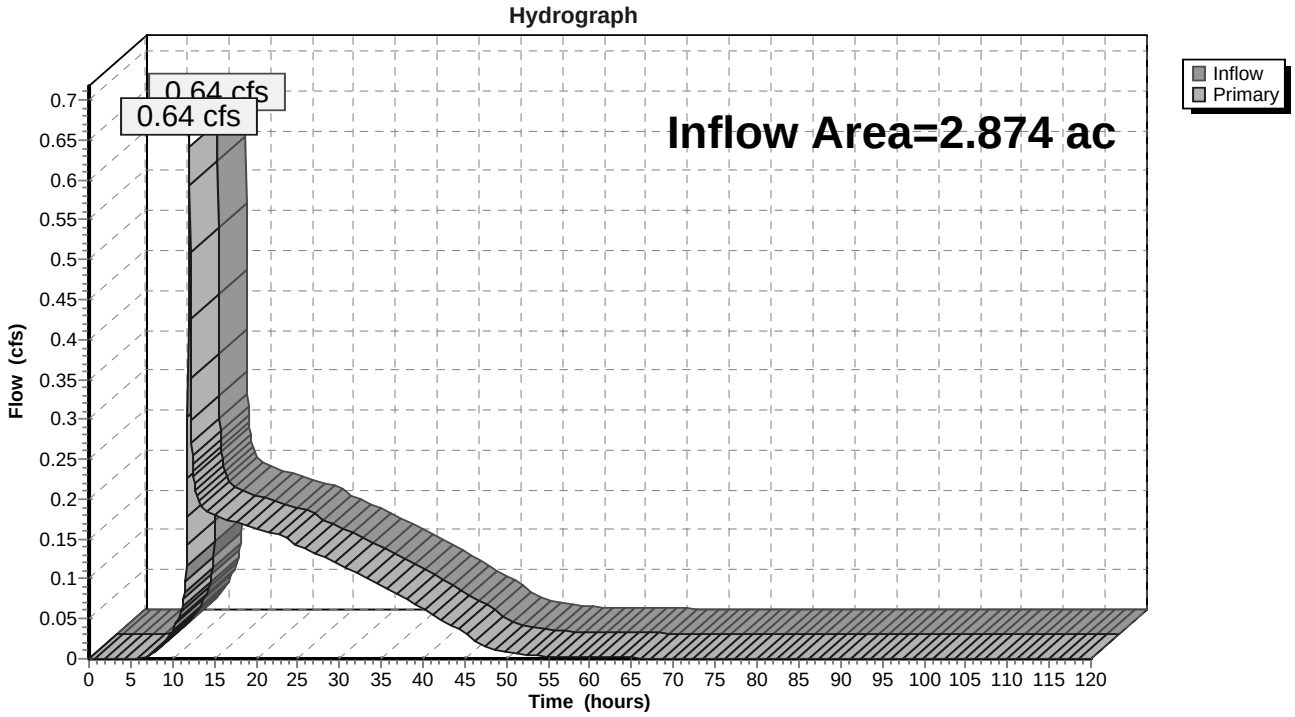


Summary for Link T: Total

Inflow Area = 2.874 ac, 56.23% Impervious, Inflow Depth = 1.55" for 2-YR event
Inflow = 0.64 cfs @ 12.01 hrs, Volume= 0.371 af
Primary = 0.64 cfs @ 12.01 hrs, Volume= 0.371 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Link T: Total



Time span=0.00-120.00 hrs, dt=0.05 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Pond Runoff Area=1.958 ac 73.90% Impervious Runoff Depth=3.25"
Tc=6.0 min CN=93 Runoff=10.11 cfs 0.530 af

Subcatchment 2S: To East Swale Runoff Area=0.168 ac 0.00% Impervious Runoff Depth=2.04"
Tc=6.0 min CN=80 Runoff=0.59 cfs 0.029 af

Subcatchment 3S: Southeast Runoff Area=0.171 ac 14.62% Impervious Runoff Depth=2.26"
Tc=6.0 min CN=83 Runoff=0.66 cfs 0.032 af

Subcatchment 4S: To West Swale Runoff Area=0.165 ac 0.00% Impervious Runoff Depth=2.04"
Tc=6.0 min CN=80 Runoff=0.58 cfs 0.028 af

Subcatchment 5S: Off-Site Runoff Area=0.096 ac 16.67% Impervious Runoff Depth=2.16"
Tc=6.0 min UI Adjusted CN=82 Runoff=0.36 cfs 0.017 af

Subcatchment 6S: To Basin Runoff Area=0.316 ac 40.51% Impervious Runoff Depth=2.66"
Tc=6.0 min CN=87 Runoff=1.41 cfs 0.070 af

Reach 1R: West Swale Avg. Flow Depth=0.26' Max Vel=1.62 fps Inflow=1.54 cfs 0.064 af
n=0.030 L=200.0' S=0.0100 '/' Capacity=4.70 cfs Outflow=1.16 cfs 0.064 af

Reach 2R: East Swale Avg. Flow Depth=0.15' Max Vel=1.42 fps Inflow=0.59 cfs 0.029 af
n=0.030 L=287.0' S=0.0139 '/' Capacity=5.55 cfs Outflow=0.53 cfs 0.029 af

Pond 1P: Pond Peak Elev=95.73' Storage=11,493 cf Inflow=10.52 cfs 0.594 af
Primary=5.08 cfs 0.594 af Secondary=0.00 cfs 0.000 af Outflow=5.08 cfs 0.594 af

Pond 2P: Infiltration Basin Peak Elev=105.12' Storage=1,665 cf Inflow=1.77 cfs 0.087 af
Discarded=0.02 cfs 0.052 af Primary=1.22 cfs 0.036 af Outflow=1.23 cfs 0.087 af

Link T: Total Inflow=5.85 cfs 0.655 af
Primary=5.85 cfs 0.655 af

Summary for Subcatchment 1S: To Pond

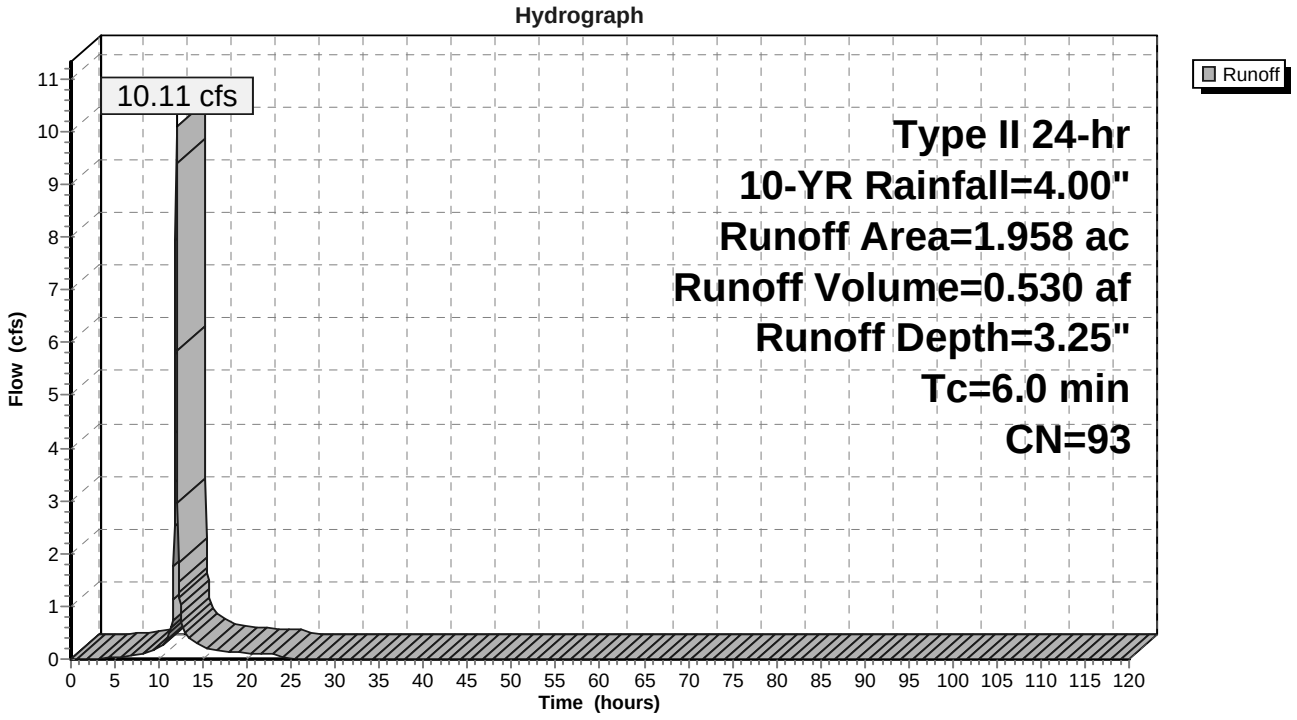
Runoff = 10.11 cfs @ 11.96 hrs, Volume= 0.530 af, Depth= 3.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YR Rainfall=4.00"

Area (ac)	CN	Description
0.366	98	Roofs, HSG D
1.081	98	Paved parking, HSG D
0.511	80	>75% Grass cover, Good, HSG D
1.958	93	Weighted Average
0.511		26.10% Pervious Area
1.447		73.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 1S: To Pond



Summary for Subcatchment 2S: To East Swale

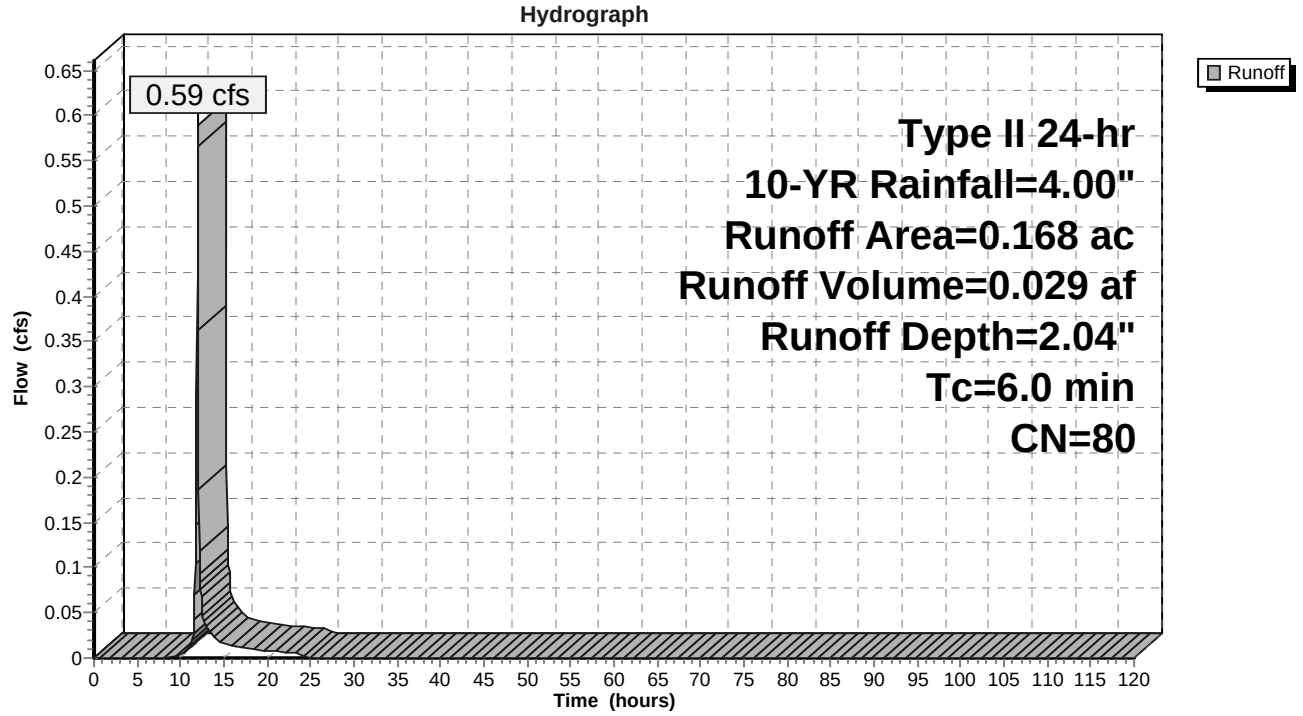
Runoff = 0.59 cfs @ 11.97 hrs, Volume= 0.029 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YR Rainfall=4.00"

Area (ac)	CN	Description
0.168	80	>75% Grass cover, Good, HSG D
0.168		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 2S: To East Swale



Summary for Subcatchment 3S: Southeast

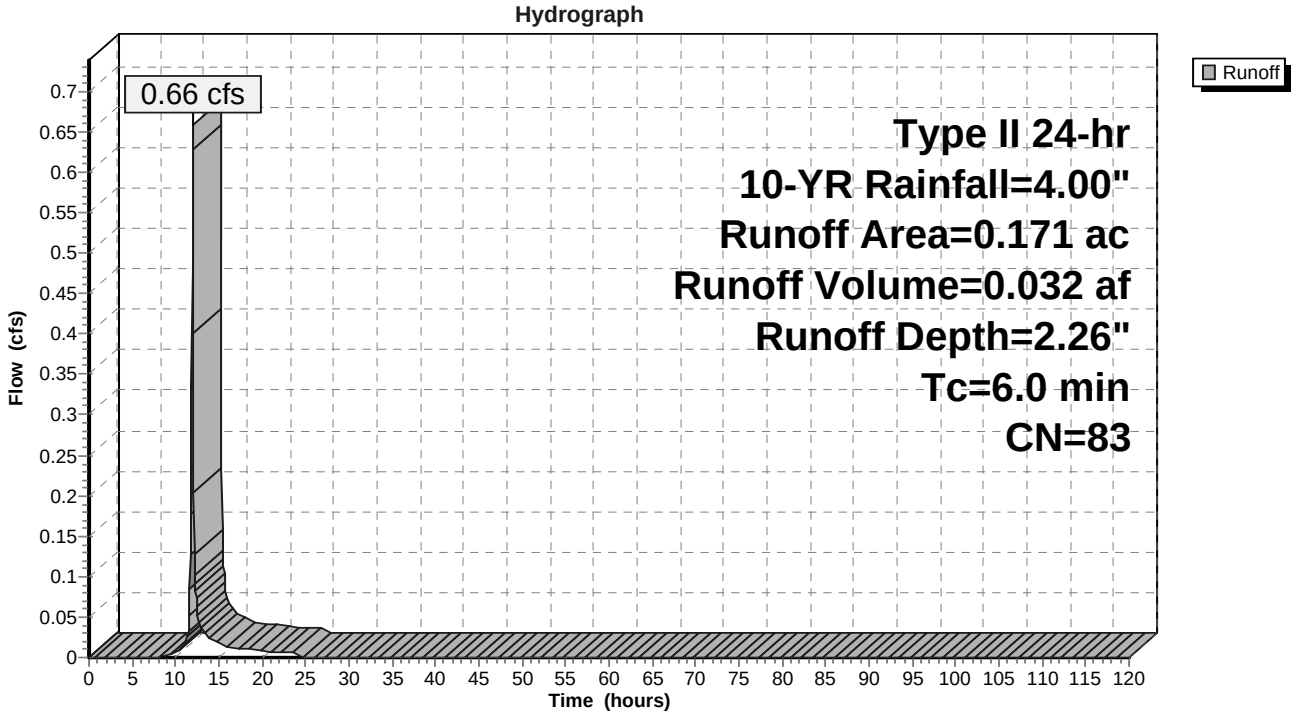
Runoff = 0.66 cfs @ 11.97 hrs, Volume= 0.032 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YR Rainfall=4.00"

Area (ac)	CN	Description
0.025	98	Paved parking, HSG D
0.146	80	>75% Grass cover, Good, HSG D
0.171	83	Weighted Average
0.146		85.38% Pervious Area
0.025		14.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 3S: Southeast



Summary for Subcatchment 4S: To West Swale

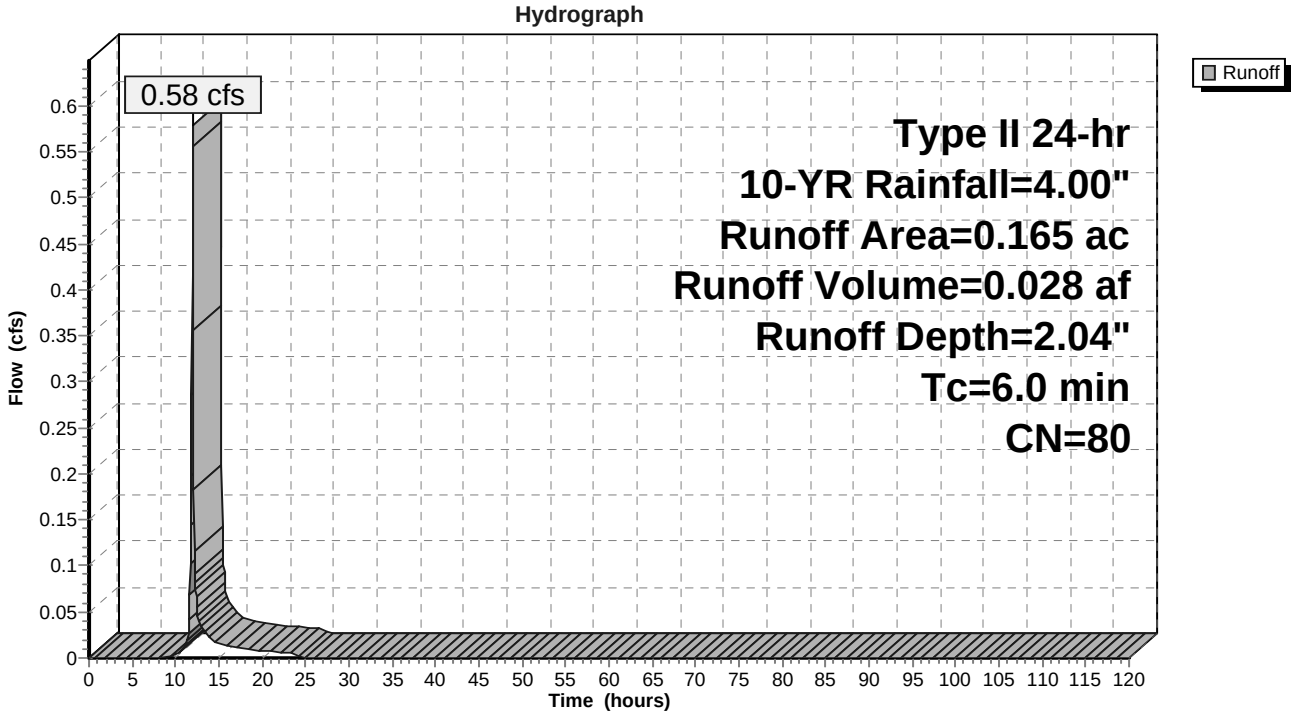
Runoff = 0.58 cfs @ 11.97 hrs, Volume= 0.028 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YR Rainfall=4.00"

Area (ac)	CN	Description
0.165	80	>75% Grass cover, Good, HSG D
0.165		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 4S: To West Swale



Summary for Subcatchment 5S: Off-Site

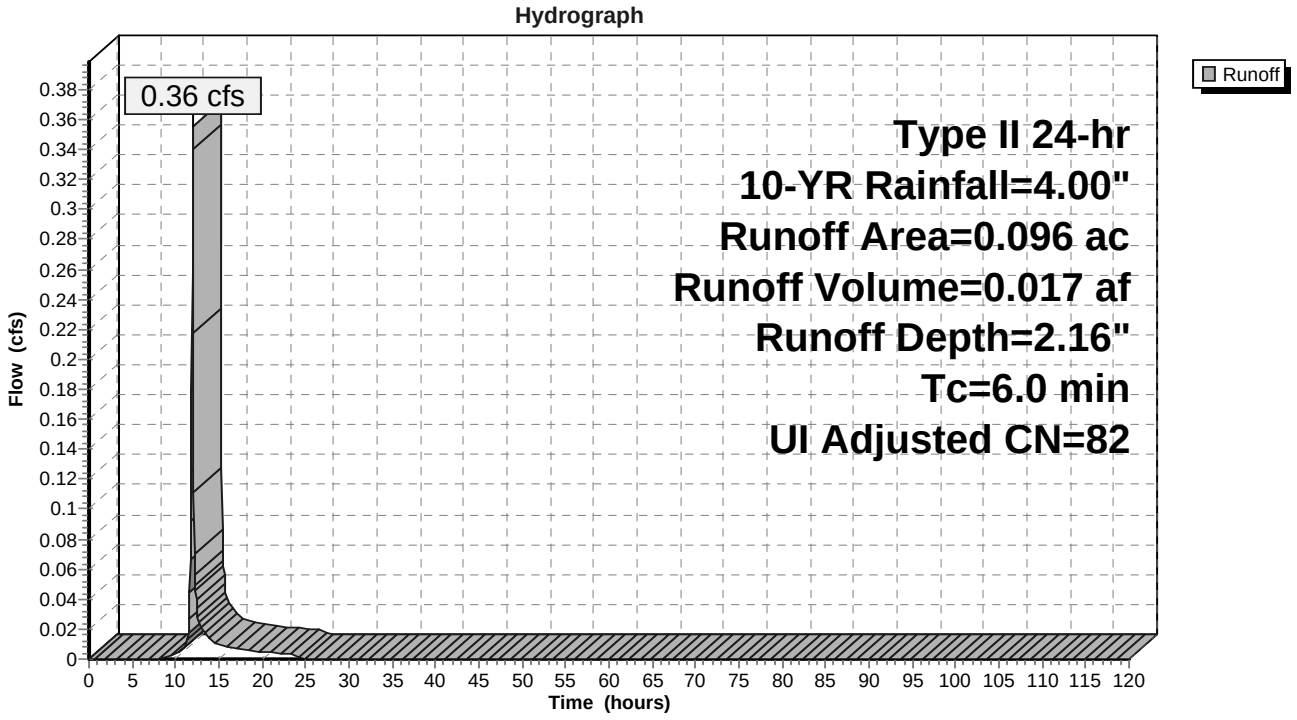
Runoff = 0.36 cfs @ 11.97 hrs, Volume= 0.017 af, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YR Rainfall=4.00"

Area (ac)	CN	Description
0.016	98	Unconnected pavement, HSG D
0.080	80	>75% Grass cover, Good, HSG D
0.096	83	Weighted Average, UI Adjusted CN = 82
0.080		83.33% Pervious Area
0.016		16.67% Impervious Area
0.016		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 5S: Off-Site



Summary for Subcatchment 6S: To Basin

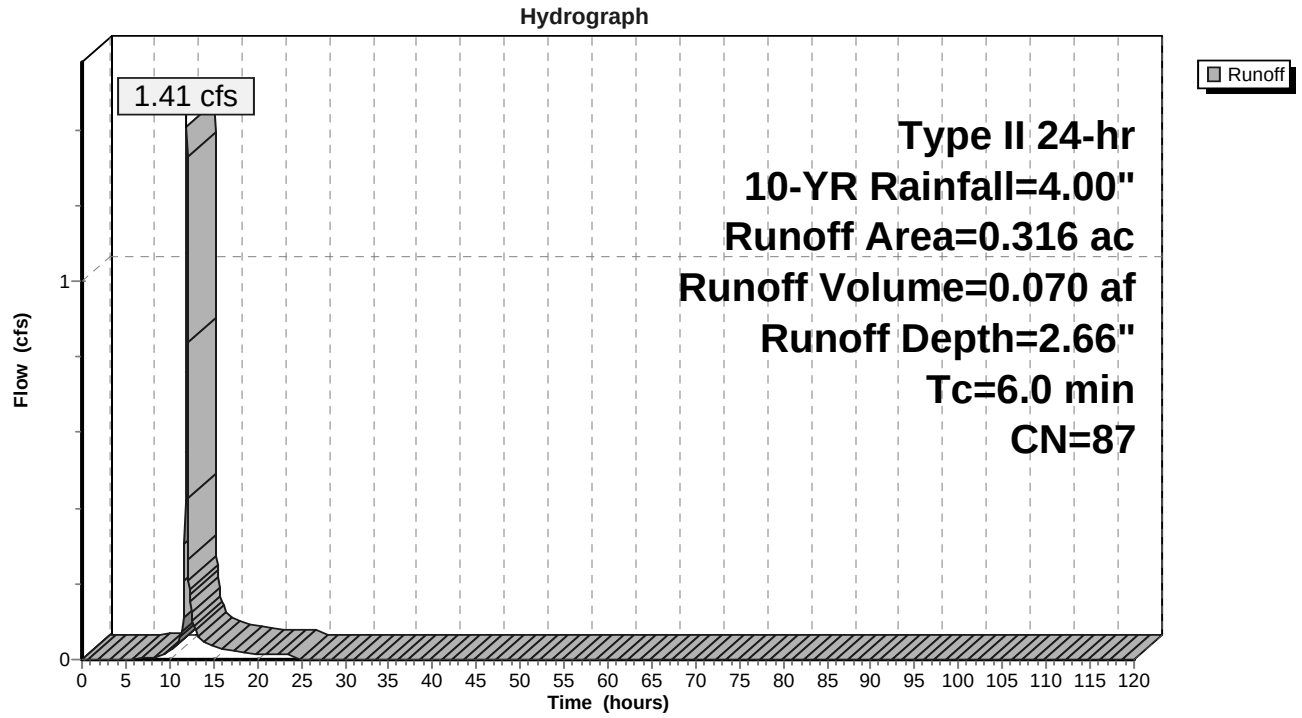
Runoff = 1.41 cfs @ 11.97 hrs, Volume= 0.070 af, Depth= 2.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YR Rainfall=4.00"

Area (ac)	CN	Description
0.188	80	>75% Grass cover, Good, HSG D
0.128	98	Roofs, HSG D
0.316	87	Weighted Average
0.188		59.49% Pervious Area
0.128		40.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 6S: To Basin



Summary for Reach 1R: West Swale

Inflow Area = 0.577 ac, 24.96% Impervious, Inflow Depth = 1.33" for 10-YR event
Inflow = 1.54 cfs @ 12.06 hrs, Volume= 0.064 af
Outflow = 1.16 cfs @ 12.12 hrs, Volume= 0.064 af, Atten= 24%, Lag= 4.0 min

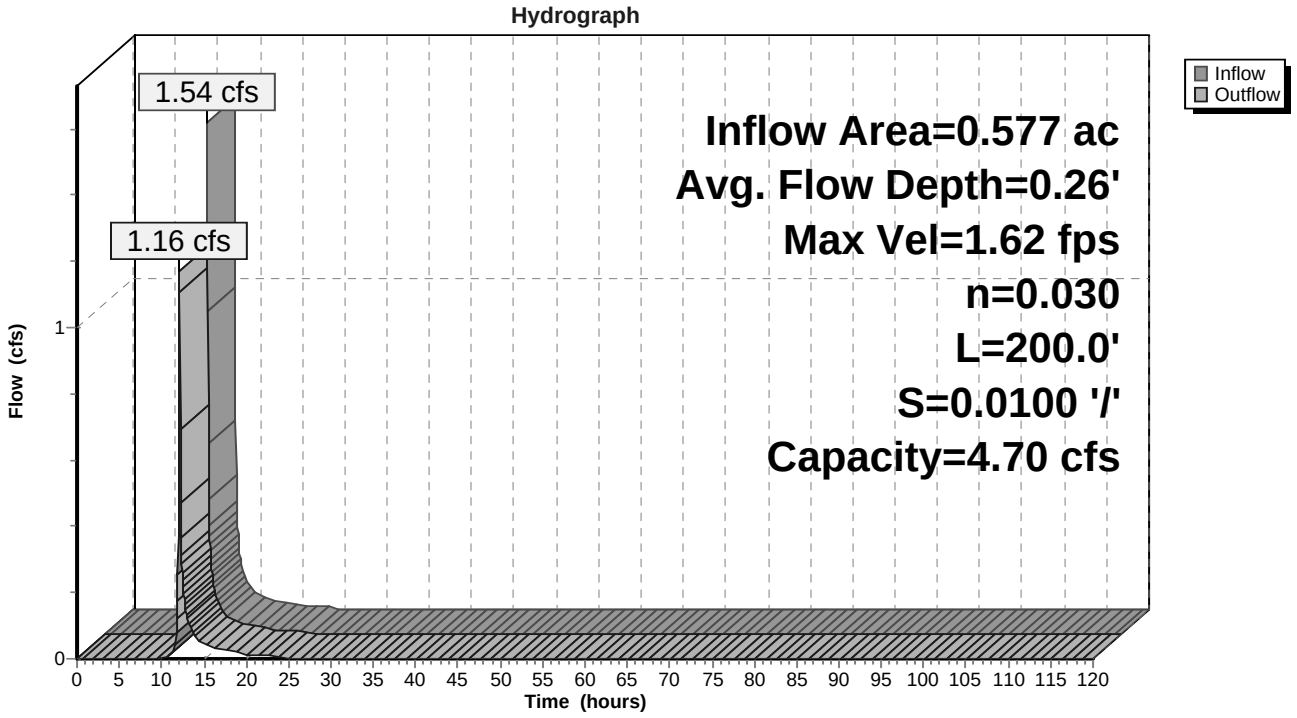
Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.62 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.40 fps, Avg. Travel Time= 8.3 min

Peak Storage= 156 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 0.50' Flow Area= 2.0 sf, Capacity= 4.70 cfs

2.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 6.00'
Length= 200.0' Slope= 0.0100 '/'
Inlet Invert= 104.50', Outlet Invert= 102.50'

‡

Reach 1R: West Swale



Summary for Reach 2R: East Swale

Inflow Area = 0.168 ac, 0.00% Impervious, Inflow Depth = 2.04" for 10-YR event
Inflow = 0.59 cfs @ 11.97 hrs, Volume= 0.029 af
Outflow = 0.53 cfs @ 12.06 hrs, Volume= 0.029 af, Atten= 9%, Lag= 5.3 min

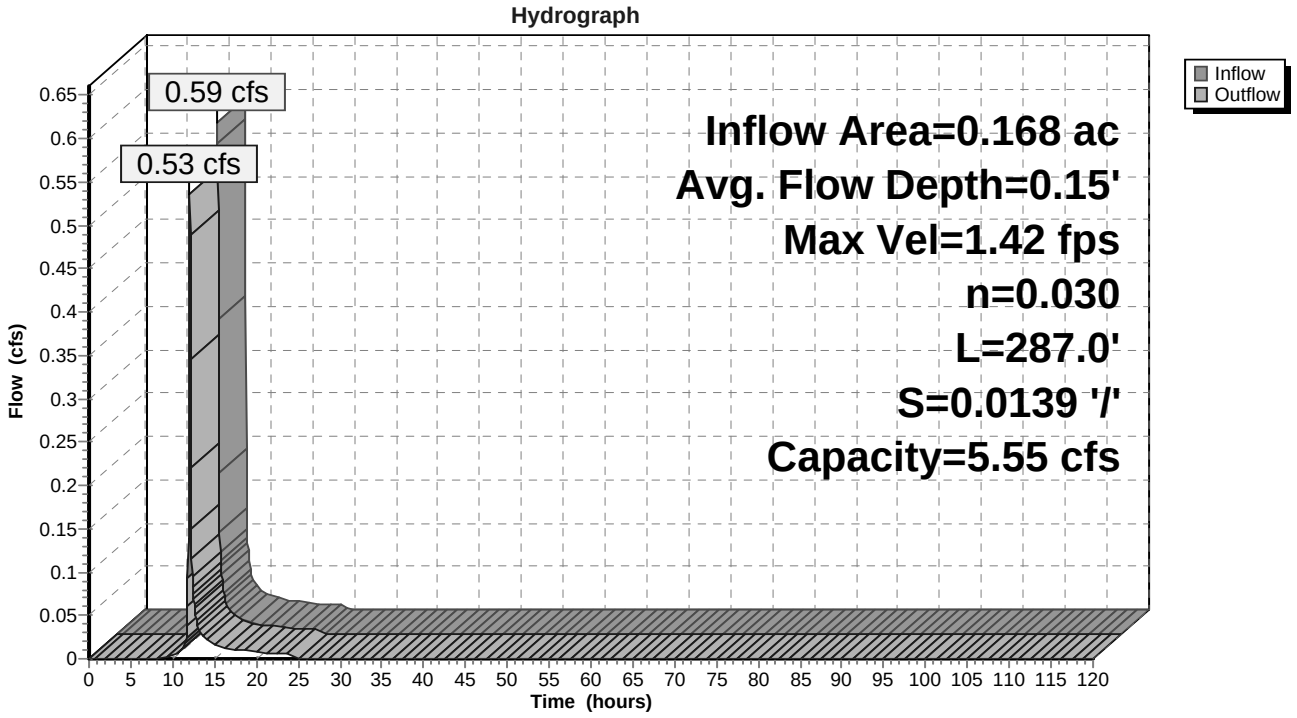
Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.42 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 13.8 min

Peak Storage= 110 cf @ 12.00 hrs
Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 0.50' Flow Area= 2.0 sf, Capacity= 5.55 cfs

2.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 6.00'
Length= 287.0' Slope= 0.0139 '/'
Inlet Invert= 106.50', Outlet Invert= 102.50'

‡

Reach 2R: East Swale



Summary for Pond 1P: Pond

Inflow Area = 2.535 ac, 62.76% Impervious, Inflow Depth = 2.81" for 10-YR event
Inflow = 10.52 cfs @ 11.97 hrs, Volume= 0.594 af
Outflow = 5.08 cfs @ 12.09 hrs, Volume= 0.594 af, Atten= 52%, Lag= 7.4 min
Primary = 5.08 cfs @ 12.09 hrs, Volume= 0.594 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 95.73' @ 12.09 hrs Surf.Area= 5,872 sf Storage= 11,493 cf

Plug-Flow detention time= 497.4 min calculated for 0.594 af (100% of inflow)
Center-of-Mass det. time= 497.1 min (1,283.1 - 785.9)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	20,140 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

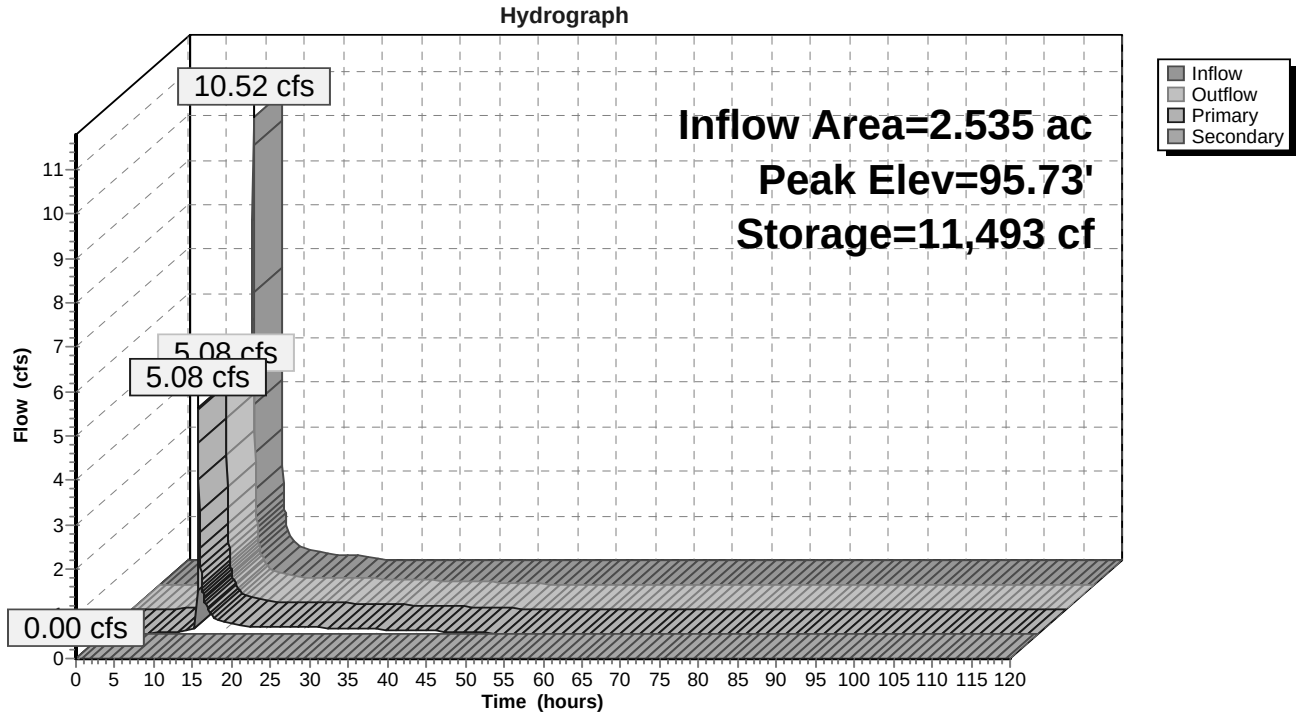
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	2,874	250.3	0	0	2,874
94.00	3,765	294.3	3,309	3,309	4,800
95.00	4,817	345.0	4,280	7,590	7,399
96.00	6,286	475.5	5,535	13,125	15,930
97.00	7,770	500.7	7,015	20,140	17,947

Device	Routing	Invert	Outlet Devices
#1	Primary	92.75'	**24.0" Round Culvert** L= 110.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 92.75' / 92.50' S= 0.0023 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	93.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	95.40'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	96.10'	**5.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=4.98 cfs @ 12.09 hrs HW=95.73' (Free Discharge)
└**1=Culvert** (Passes 4.98 cfs of 16.48 cfs potential flow)
  └**2=Orifice/Grate** (Orifice Controls 0.17 cfs @ 7.83 fps)
  └**3=Orifice/Grate** (Weir Controls 4.81 cfs @ 1.87 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Pond


Hydrograph
10.52 cfs
5.08 cfs
5.08 cfs
0.00 cfs
Inflow Area=2.535 ac
Peak Elev=95.73'
Storage=11,493 cf
Inflow
Outflow
Primary
Secondary
Flow (cfs)
0 1 2 3 4 5 6 7 8 9 10 11
Time (hours)
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120

Summary for Pond 2P: Infiltration Basin

Inflow Area = 0.412 ac, 34.95% Impervious, Inflow Depth = 2.55" for 10-YR event
Inflow = 1.77 cfs @ 11.97 hrs, Volume= 0.087 af
Outflow = 1.23 cfs @ 12.06 hrs, Volume= 0.087 af, Atten= 30%, Lag= 5.6 min
Discarded = 0.02 cfs @ 12.06 hrs, Volume= 0.052 af
Primary = 1.22 cfs @ 12.06 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 105.12' @ 12.06 hrs Surf.Area= 1,365 sf Storage= 1,665 cf

Plug-Flow detention time= 748.3 min calculated for 0.087 af (100% of inflow)
Center-of-Mass det. time= 749.3 min (1,558.6 - 809.3)

Volume	Invert	Avail.Storage	Storage Description
#1	103.00'	3,205 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

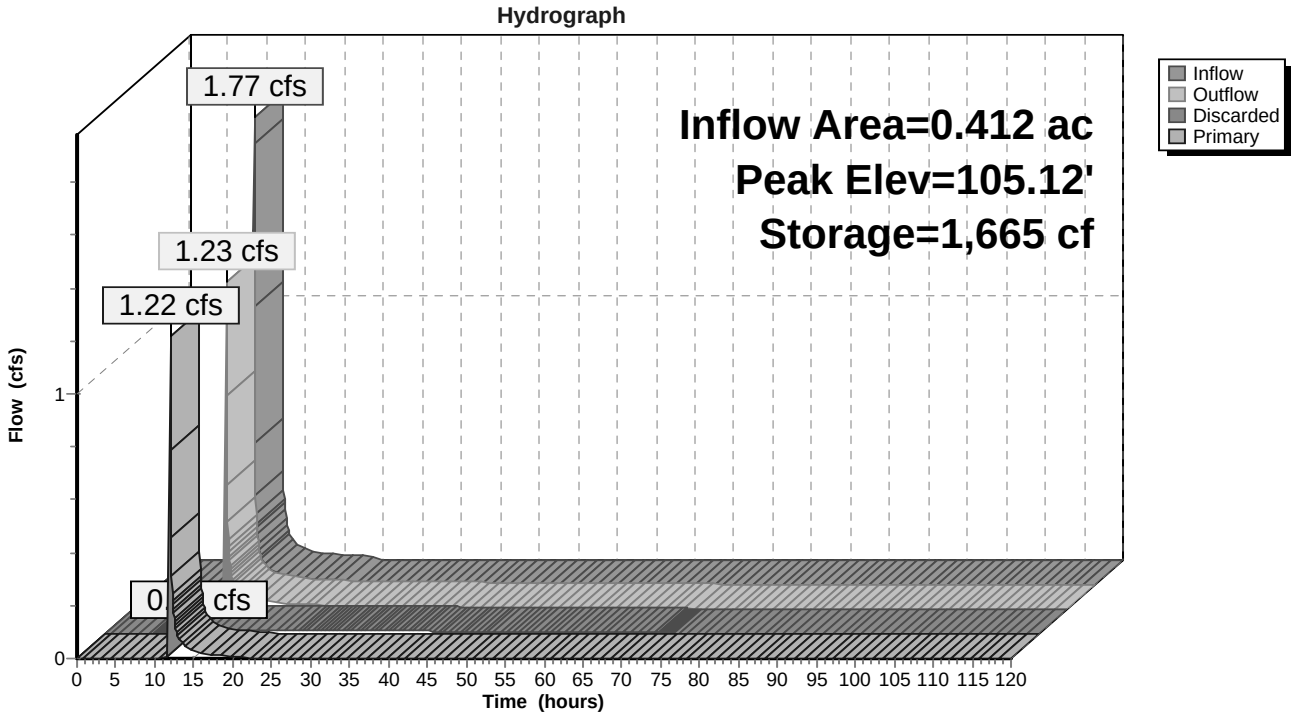
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
103.00	348	72.5	0	0	348
104.00	722	105.5	524	524	824
105.00	1,270	150.8	983	1,507	1,757
106.00	2,166	273.7	1,698	3,205	5,914

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	105.00'	**12.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.02 cfs @ 12.06 hrs HW=105.11' (Free Discharge)
↑**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=1.07 cfs @ 12.06 hrs HW=105.11' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 1.07 cfs @ 0.82 fps)

Pond 2P: Infiltration Basin

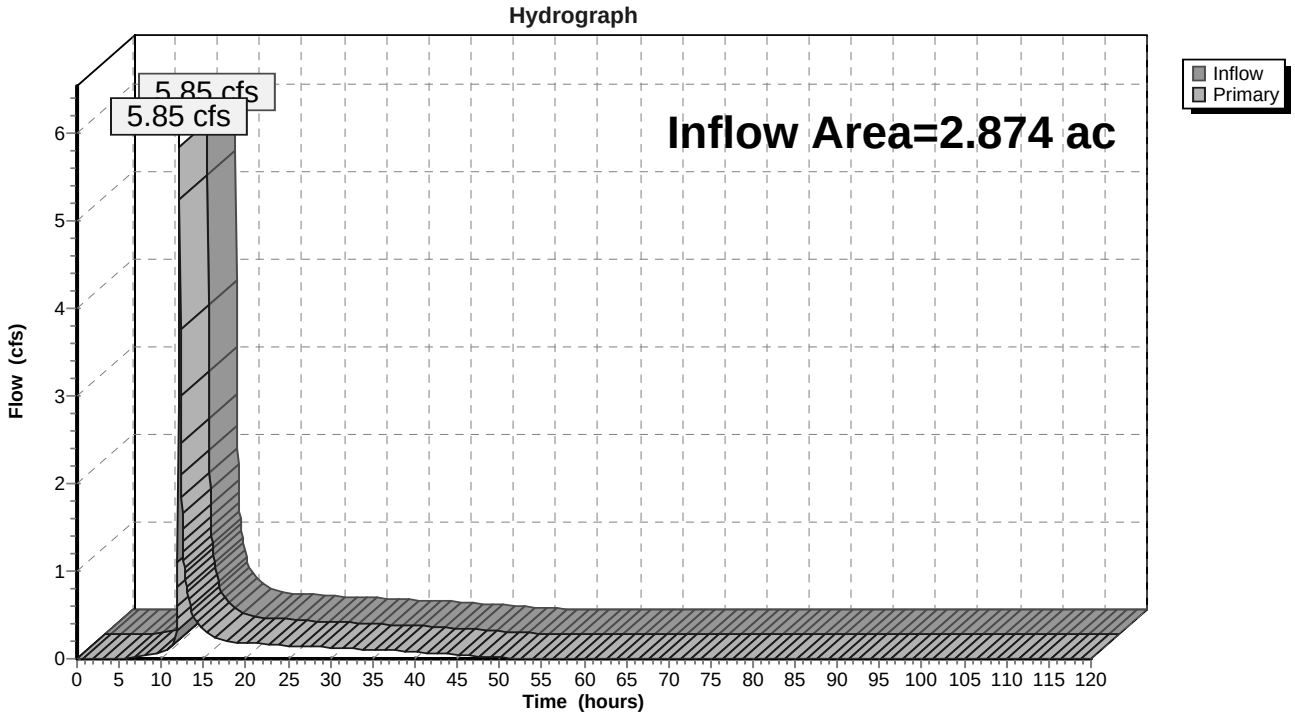


Summary for Link T: Total

Inflow Area = 2.874 ac, 56.23% Impervious, Inflow Depth = 2.74" for 10-YR event
Inflow = 5.85 cfs @ 12.08 hrs, Volume= 0.655 af
Primary = 5.85 cfs @ 12.08 hrs, Volume= 0.655 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Link T: Total



Time span=0.00-120.00 hrs, dt=0.05 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Pond Runoff Area=1.958 ac 73.90% Impervious Runoff Depth=4.82"
Tc=6.0 min CN=93 Runoff=14.62 cfs 0.787 af

Subcatchment 2S: To East Swale Runoff Area=0.168 ac 0.00% Impervious Runoff Depth=3.42"
Tc=6.0 min CN=80 Runoff=0.97 cfs 0.048 af

Subcatchment 3S: Southeast Runoff Area=0.171 ac 14.62% Impervious Runoff Depth=3.68"
Tc=6.0 min CN=83 Runoff=1.06 cfs 0.053 af

Subcatchment 4S: To West Swale Runoff Area=0.165 ac 0.00% Impervious Runoff Depth=3.42"
Tc=6.0 min CN=80 Runoff=0.96 cfs 0.047 af

Subcatchment 5S: Off-Site Runoff Area=0.096 ac 16.67% Impervious Runoff Depth=3.57"
Tc=6.0 min UI Adjusted CN=82 Runoff=0.58 cfs 0.029 af

Subcatchment 6S: To Basin Runoff Area=0.316 ac 40.51% Impervious Runoff Depth=4.17"
Tc=6.0 min CN=87 Runoff=2.15 cfs 0.110 af

Reach 1R: West Swale Avg. Flow Depth=0.44' Max Vel=2.18 fps Inflow=3.61 cfs 0.133 af
n=0.030 L=200.0' S=0.0100 '/' Capacity=4.70 cfs Outflow=3.34 cfs 0.133 af

Reach 2R: East Swale Avg. Flow Depth=0.20' Max Vel=1.66 fps Inflow=0.97 cfs 0.048 af
n=0.030 L=287.0' S=0.0139 '/' Capacity=5.55 cfs Outflow=0.91 cfs 0.048 af

Pond 1P: Pond Peak Elev=96.07' Storage=13,567 cf Inflow=17.17 cfs 0.919 af
Primary=14.25 cfs 0.919 af Secondary=0.00 cfs 0.000 af Outflow=14.25 cfs 0.919 af

Pond 2P: Infiltration Basin Peak Elev=105.20' Storage=1,776 cf Inflow=2.73 cfs 0.138 af
Discarded=0.02 cfs 0.053 af Primary=2.66 cfs 0.085 af Outflow=2.68 cfs 0.138 af

Link T: Total Inflow=15.93 cfs 1.020 af
Primary=15.93 cfs 1.020 af

Summary for Subcatchment 1S: To Pond

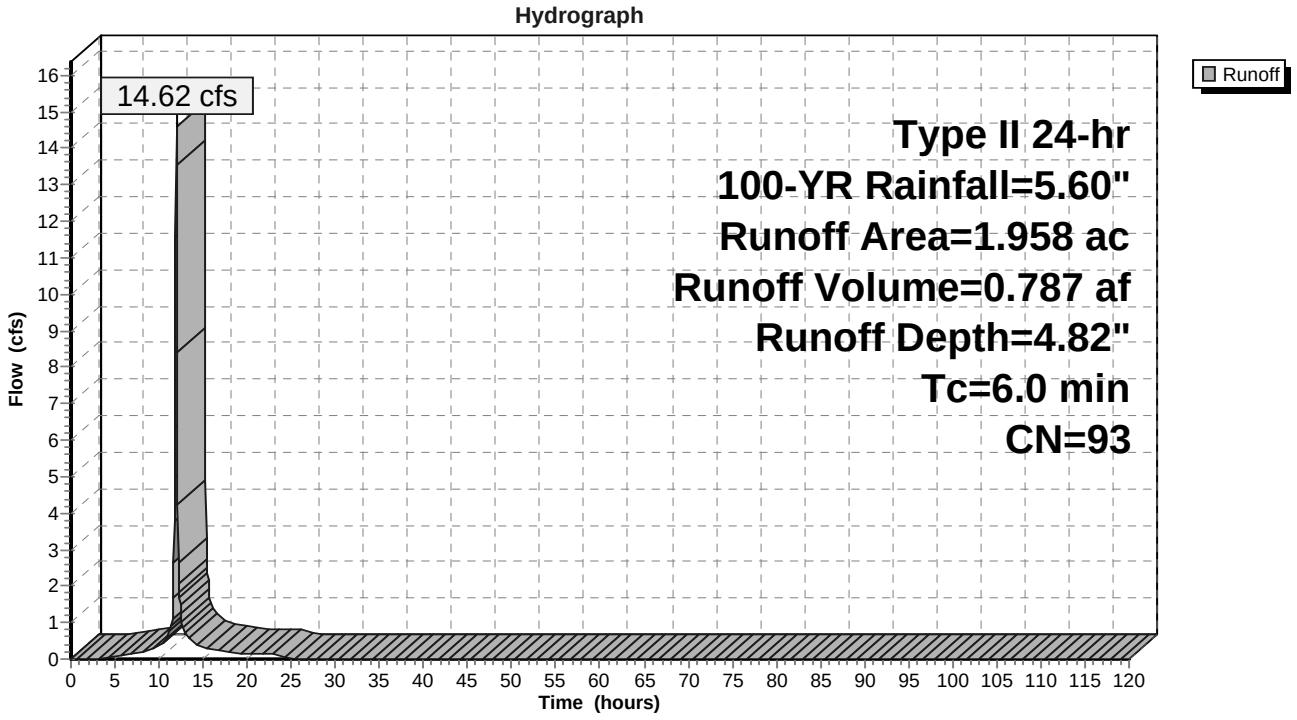
Runoff = 14.62 cfs @ 11.96 hrs, Volume= 0.787 af, Depth= 4.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=5.60"

Area (ac)	CN	Description
0.366	98	Roofs, HSG D
1.081	98	Paved parking, HSG D
0.511	80	>75% Grass cover, Good, HSG D
1.958	93	Weighted Average
0.511		26.10% Pervious Area
1.447		73.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 1S: To Pond



Summary for Subcatchment 2S: To East Swale

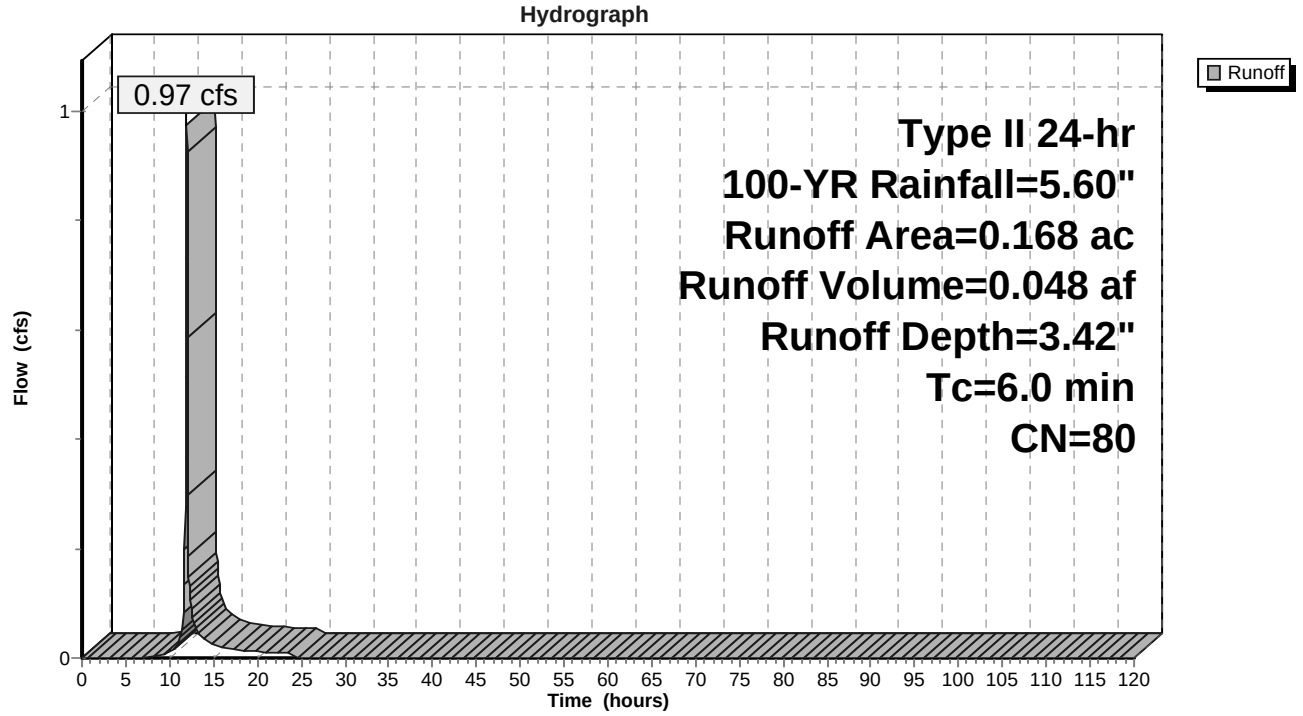
Runoff = 0.97 cfs @ 11.97 hrs, Volume= 0.048 af, Depth= 3.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=5.60"

Area (ac)	CN	Description
0.168	80	>75% Grass cover, Good, HSG D
0.168		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 2S: To East Swale



Summary for Subcatchment 3S: Southeast

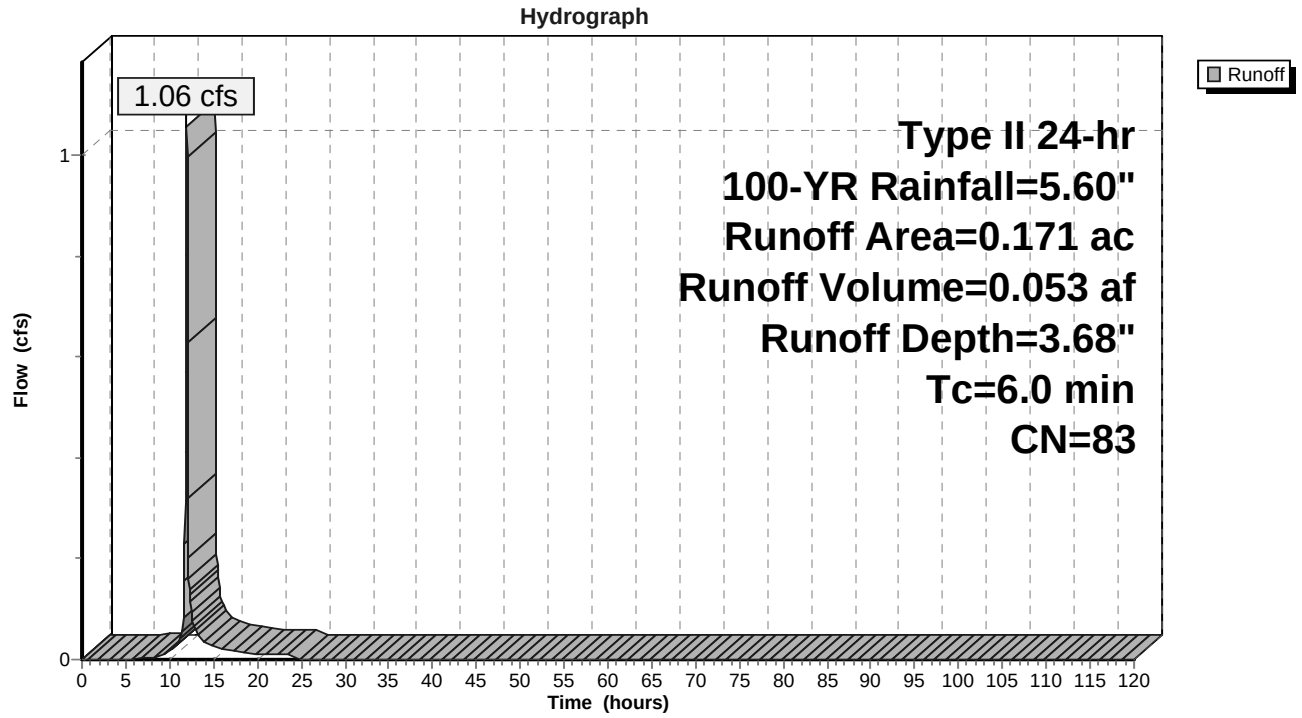
Runoff = 1.06 cfs @ 11.97 hrs, Volume= 0.053 af, Depth= 3.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=5.60"

Area (ac)	CN	Description
0.025	98	Paved parking, HSG D
0.146	80	>75% Grass cover, Good, HSG D
0.171	83	Weighted Average
0.146		85.38% Pervious Area
0.025		14.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 3S: Southeast



Summary for Subcatchment 4S: To West Swale

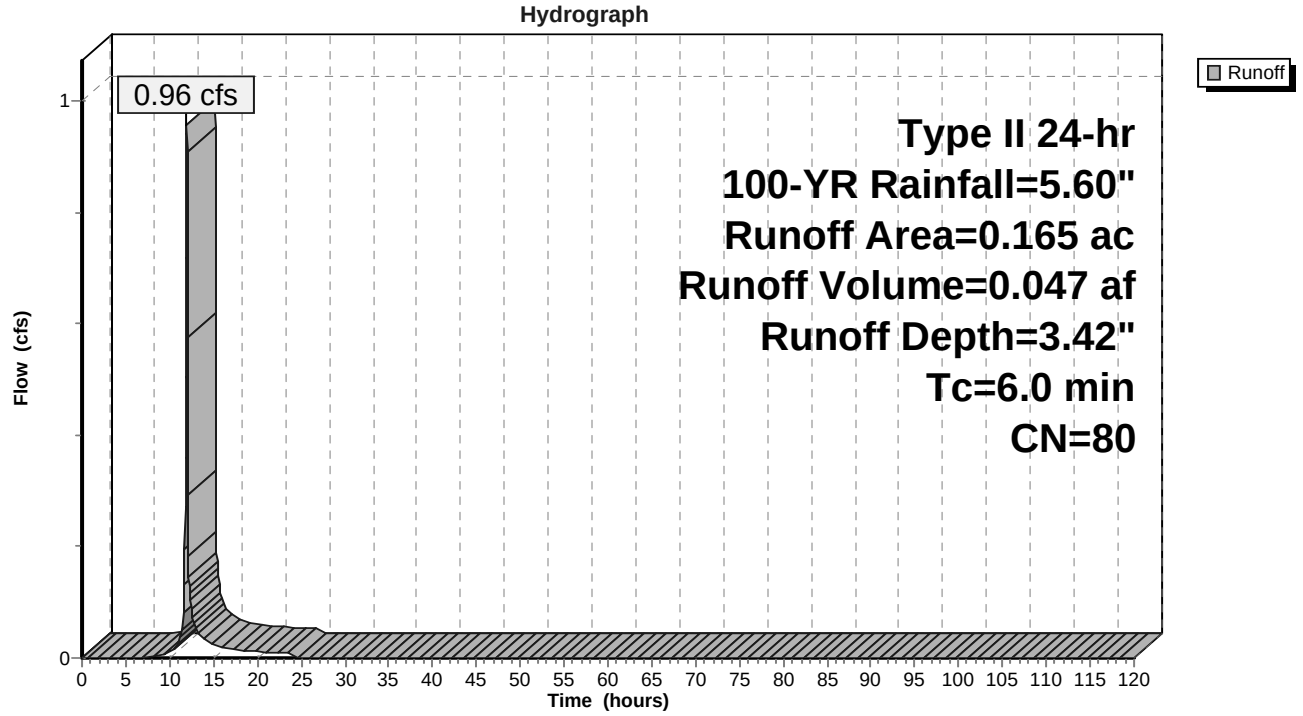
Runoff = 0.96 cfs @ 11.97 hrs, Volume= 0.047 af, Depth= 3.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=5.60"

Area (ac)	CN	Description
0.165	80	>75% Grass cover, Good, HSG D
0.165		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 4S: To West Swale



Summary for Subcatchment 5S: Off-Site

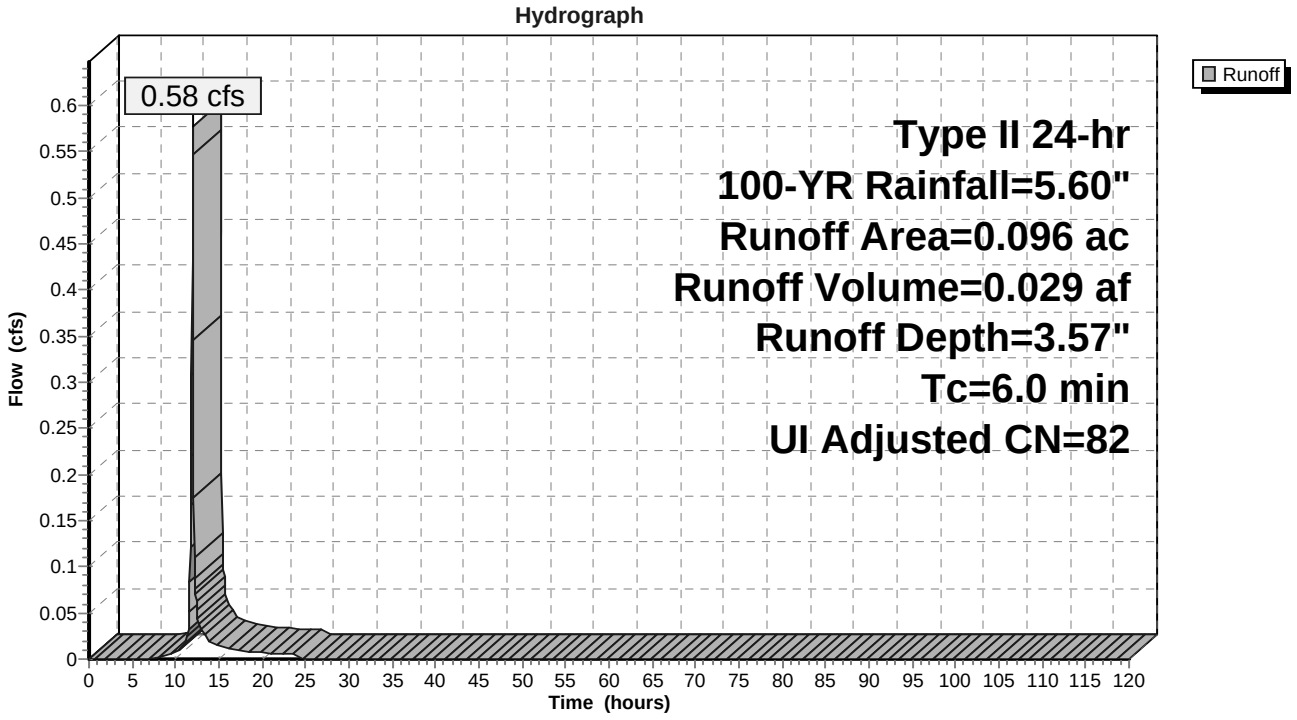
Runoff = 0.58 cfs @ 11.97 hrs, Volume= 0.029 af, Depth= 3.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=5.60"

Area (ac)	CN	Description
0.016	98	Unconnected pavement, HSG D
0.080	80	>75% Grass cover, Good, HSG D
0.096	83	Weighted Average, UI Adjusted CN = 82
0.080		83.33% Pervious Area
0.016		16.67% Impervious Area
0.016		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 5S: Off-Site



Summary for Subcatchment 6S: To Basin

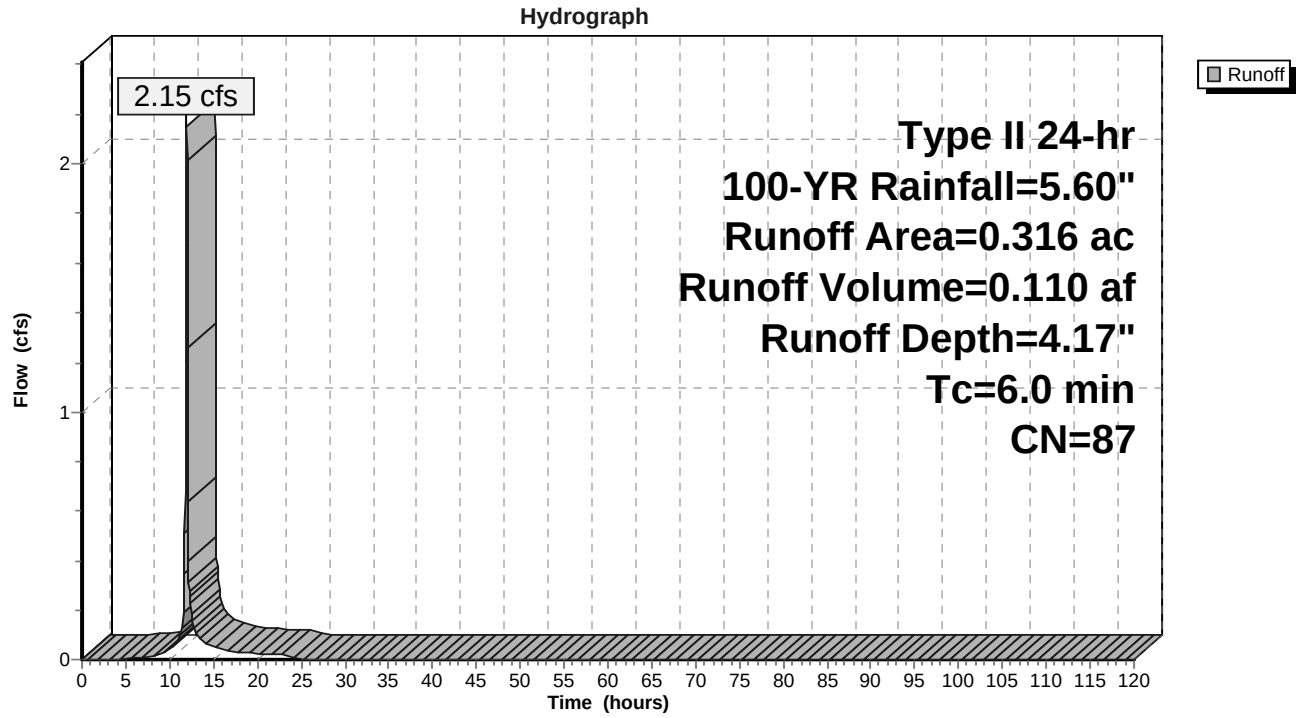
Runoff = 2.15 cfs @ 11.97 hrs, Volume= 0.110 af, Depth= 4.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=5.60"

Area (ac)	CN	Description
0.188	80	>75% Grass cover, Good, HSG D
0.128	98	Roofs, HSG D
0.316	87	Weighted Average
0.188		59.49% Pervious Area
0.128		40.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 6S: To Basin



Summary for Reach 1R: West Swale

Inflow Area = 0.577 ac, 24.96% Impervious, Inflow Depth = 2.76" for 100-YR event
Inflow = 3.61 cfs @ 11.98 hrs, Volume= 0.133 af
Outflow = 3.34 cfs @ 12.03 hrs, Volume= 0.133 af, Atten= 8%, Lag= 3.1 min

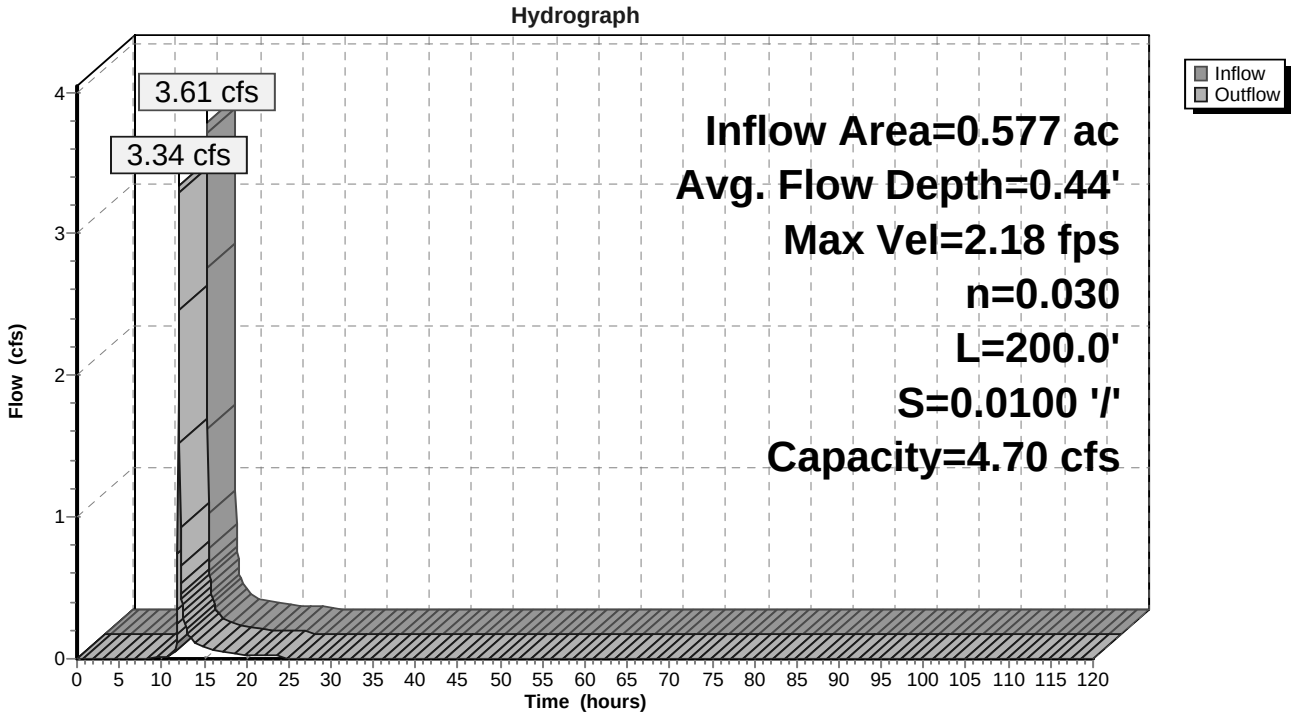
Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.18 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 0.47 fps, Avg. Travel Time= 7.1 min

Peak Storage= 328 cf @ 12.01 hrs
Average Depth at Peak Storage= 0.44'
Bank-Full Depth= 0.50' Flow Area= 2.0 sf, Capacity= 4.70 cfs

2.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 6.00'
Length= 200.0' Slope= 0.0100 '/'
Inlet Invert= 104.50', Outlet Invert= 102.50'

‡

Reach 1R: West Swale



Summary for Reach 2R: East Swale

Inflow Area = 0.168 ac, 0.00% Impervious, Inflow Depth = 3.42" for 100-YR event
Inflow = 0.97 cfs @ 11.97 hrs, Volume= 0.048 af
Outflow = 0.91 cfs @ 12.05 hrs, Volume= 0.048 af, Atten= 6%, Lag= 4.7 min

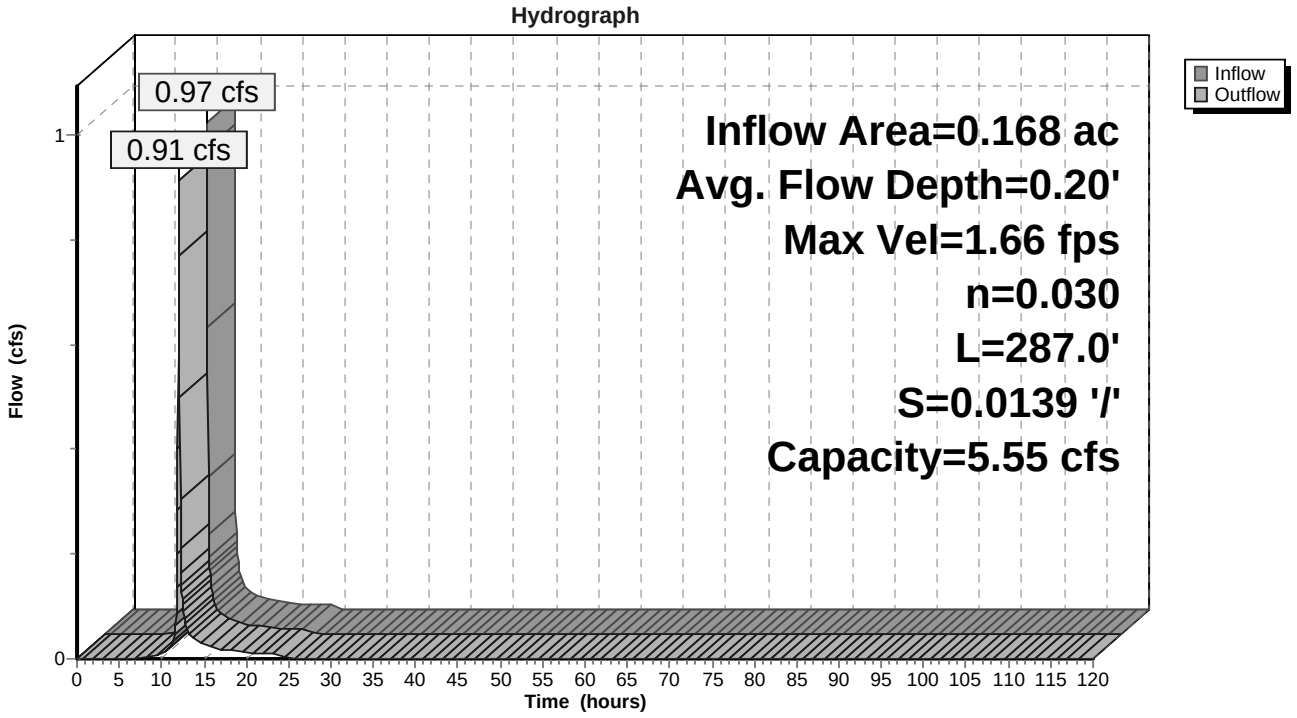
Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.66 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 0.39 fps, Avg. Travel Time= 12.1 min

Peak Storage= 158 cf @ 12.00 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 0.50' Flow Area= 2.0 sf, Capacity= 5.55 cfs

2.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 6.00'
Length= 287.0' Slope= 0.0139 '/'
Inlet Invert= 106.50', Outlet Invert= 102.50'

‡

Reach 2R: East Swale



Summary for Pond 1P: Pond

Inflow Area = 2.535 ac, 62.76% Impervious, Inflow Depth = 4.35" for 100-YR event
Inflow = 17.17 cfs @ 11.98 hrs, Volume= 0.919 af
Outflow = 14.25 cfs @ 12.03 hrs, Volume= 0.919 af, Atten= 17%, Lag= 3.1 min
Primary = 14.25 cfs @ 12.03 hrs, Volume= 0.919 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 96.07' @ 12.03 hrs Surf.Area= 6,384 sf Storage= 13,567 cf

Plug-Flow detention time= 354.9 min calculated for 0.919 af (100% of inflow)
Center-of-Mass det. time= 356.4 min (1,133.4 - 777.0)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	20,140 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

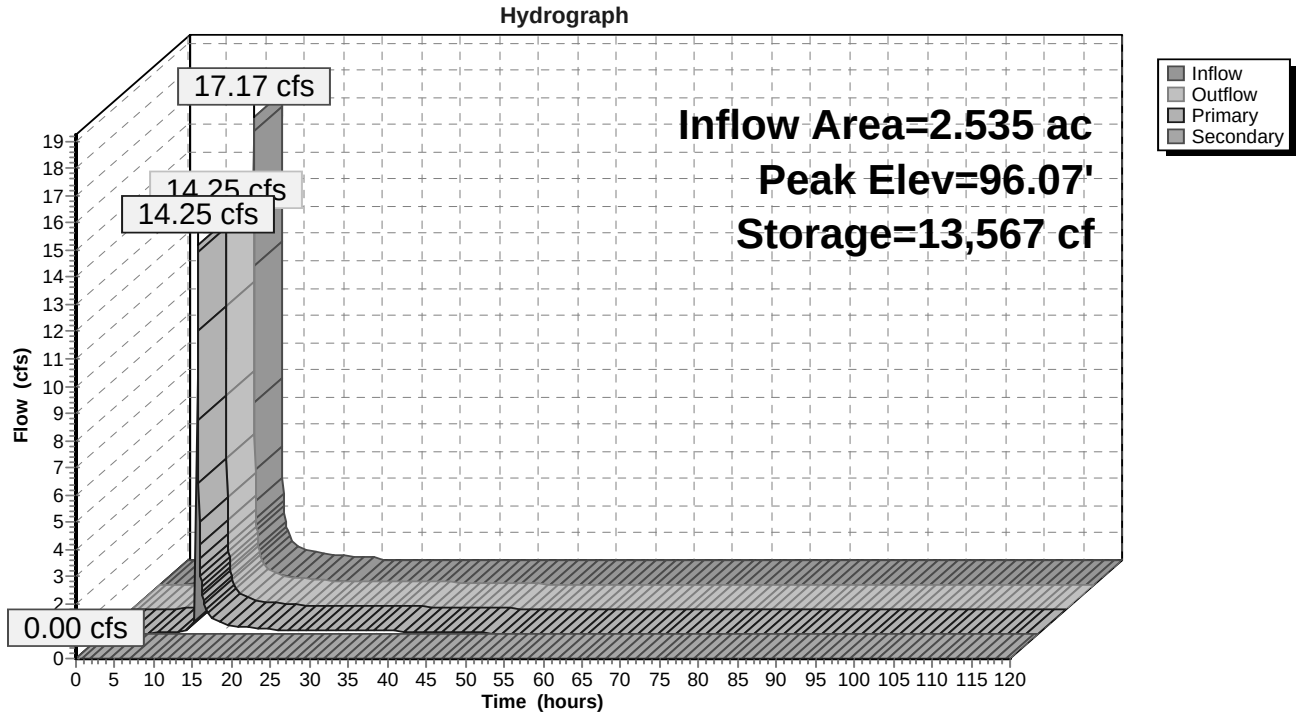
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	2,874	250.3	0	0	2,874
94.00	3,765	294.3	3,309	3,309	4,800
95.00	4,817	345.0	4,280	7,590	7,399
96.00	6,286	475.5	5,535	13,125	15,930
97.00	7,770	500.7	7,015	20,140	17,947

Device	Routing	Invert	Outlet Devices
#1	Primary	92.75'	**24.0" Round Culvert** L= 110.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 92.75' / 92.50' S= 0.0023 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	93.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	95.40'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	96.10'	**5.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=13.86 cfs @ 12.03 hrs HW=96.06' (Free Discharge)
└**1=Culvert** (Passes 13.86 cfs of 18.57 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.18 cfs @ 8.30 fps)
  └**3=Orifice/Grate** (Weir Controls 13.68 cfs @ 2.65 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Pond


Hydrograph
17.17 cfs
14.25 cfs
14.25 cfs
0.00 cfs
Inflow Area=2.535 ac
Peak Elev=96.07'
Storage=13,567 cf
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Summary for Pond 2P: Infiltration Basin

Inflow Area = 0.412 ac, 34.95% Impervious, Inflow Depth = 4.03" for 100-YR event
Inflow = 2.73 cfs @ 11.97 hrs, Volume= 0.138 af
Outflow = 2.68 cfs @ 11.99 hrs, Volume= 0.138 af, Atten= 2%, Lag= 1.2 min
Discarded = 0.02 cfs @ 11.99 hrs, Volume= 0.053 af
Primary = 2.66 cfs @ 11.99 hrs, Volume= 0.085 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 105.20' @ 11.99 hrs Surf.Area= 1,430 sf Storage= 1,776 cf

Plug-Flow detention time= 482.4 min calculated for 0.138 af (100% of inflow)
Center-of-Mass det. time= 483.4 min (1,279.9 - 796.5)

Volume	Invert	Avail.Storage	Storage Description
#1	103.00'	3,205 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

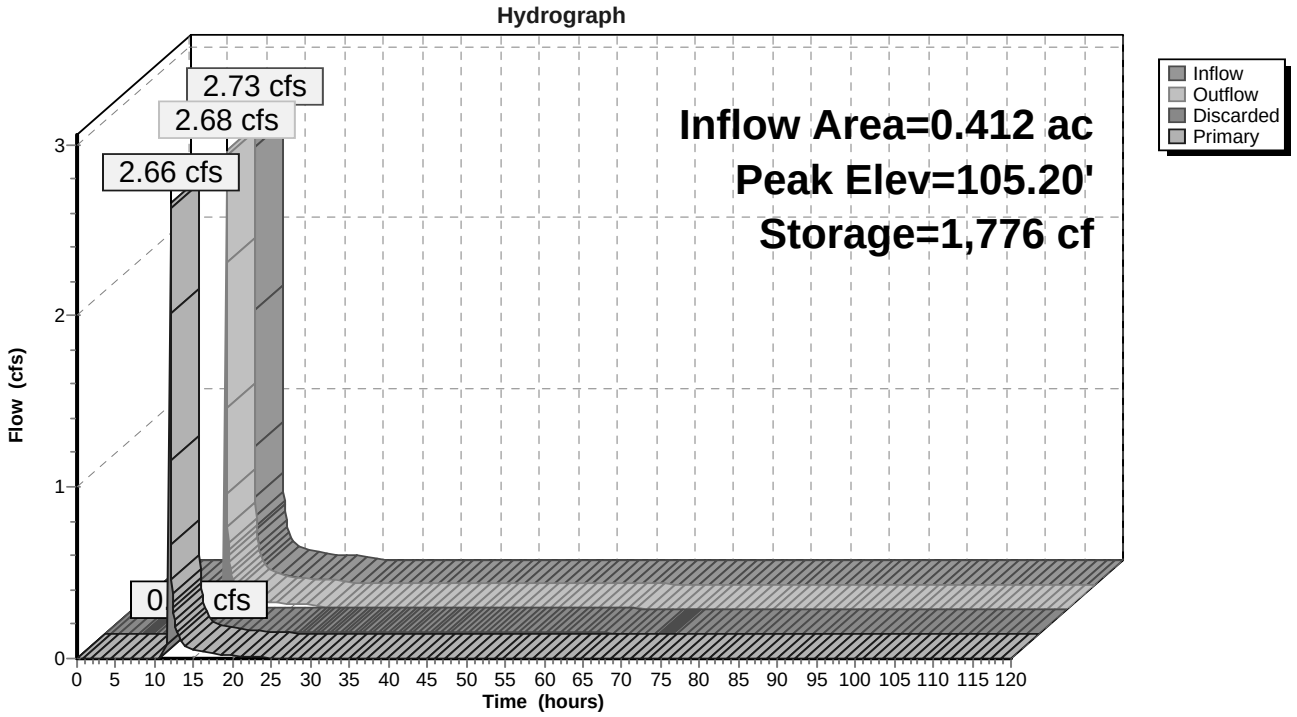
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
103.00	348	72.5	0	0	348
104.00	722	105.5	524	524	824
105.00	1,270	150.8	983	1,507	1,757
106.00	2,166	273.7	1,698	3,205	5,914

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	105.00'	**12.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.02 cfs @ 11.99 hrs HW=105.20' (Free Discharge)
↑└**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=2.57 cfs @ 11.99 hrs HW=105.20' (Free Discharge)
↑└**2=Broad-Crested Rectangular Weir** (Weir Controls 2.57 cfs @ 1.10 fps)

Pond 2P: Infiltration Basin

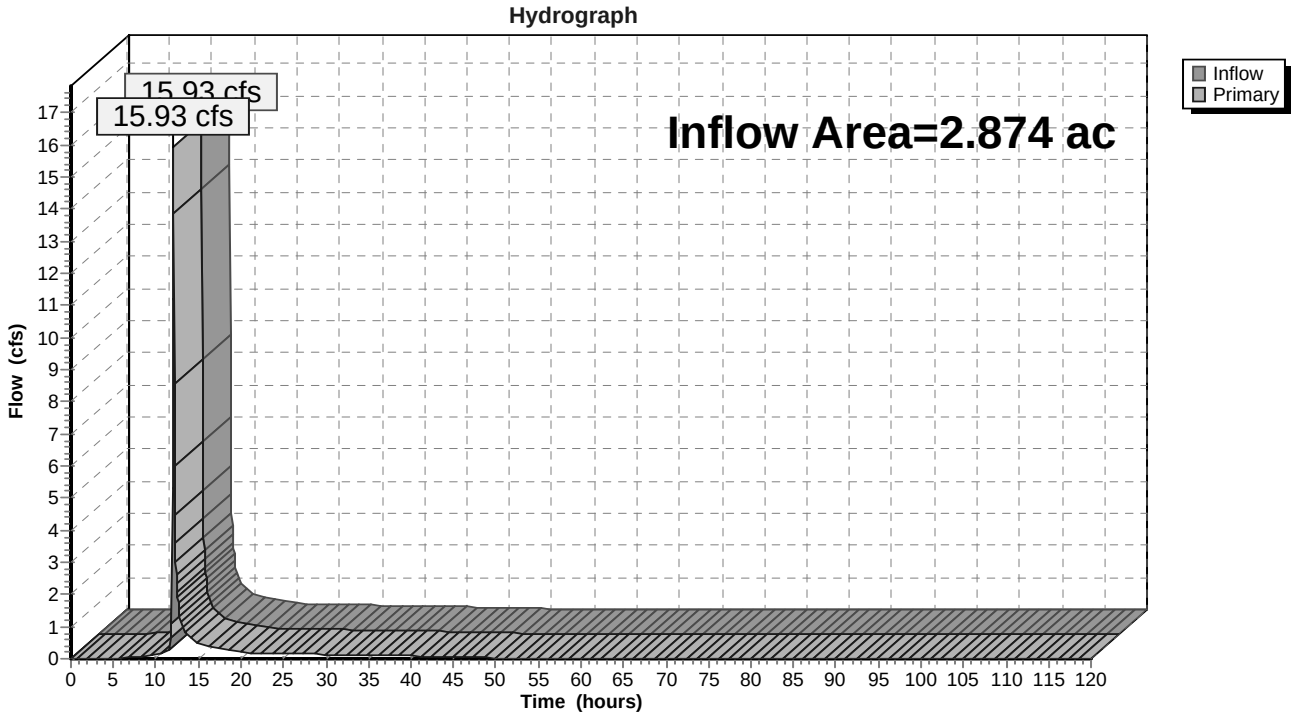


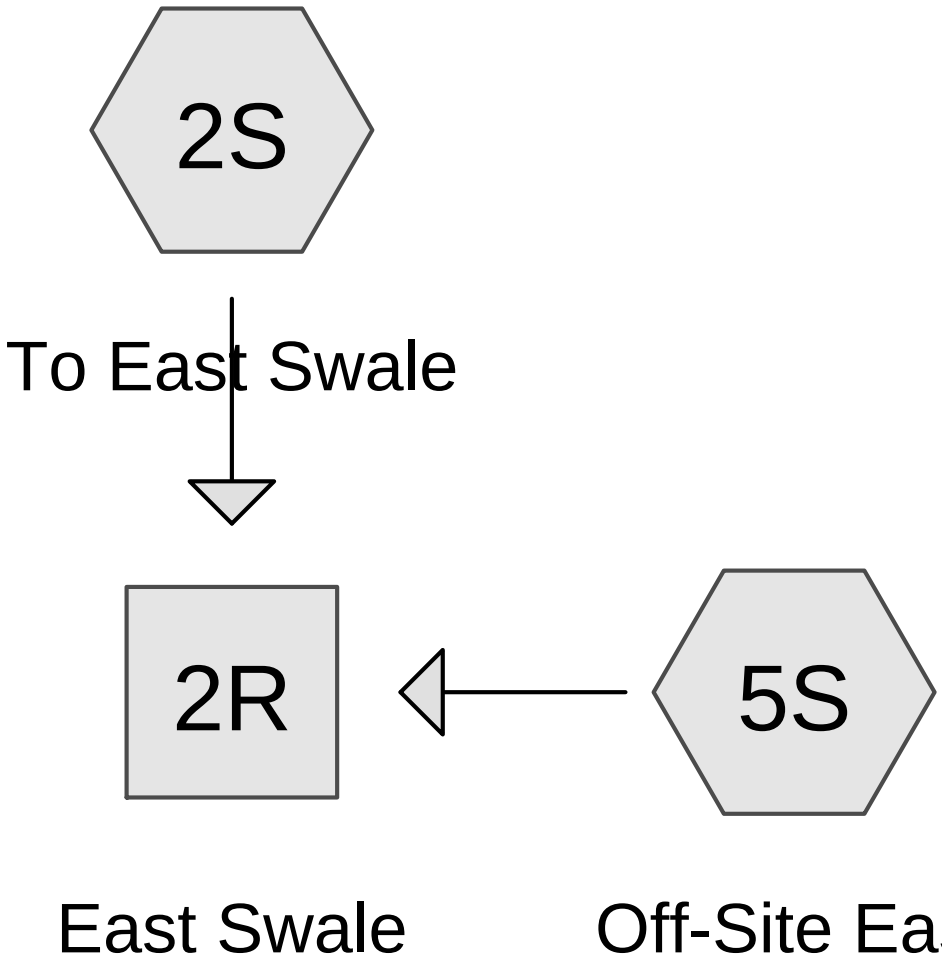
Summary for Link T: Total

Inflow Area = 2.874 ac, 56.23% Impervious, Inflow Depth = 4.26" for 100-YR event
Inflow = 15.93 cfs @ 12.03 hrs, Volume= 1.020 af
Primary = 15.93 cfs @ 12.03 hrs, Volume= 1.020 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Link T: Total





Subcat Reach Pond Link

Routing Diagram for 15-6779 Swale Sizing
Prepared by JSD Professional Services, Inc., Printed 7/9/2015

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 2S: To East Swale Runoff Area=0.168 ac 0.00% Impervious Runoff Depth=3.42"
Tc=6.0 min CN=80 Runoff=0.97 cfs 0.048 af

Subcatchment 5S: Off-Site East Runoff Area=0.681 ac 2.20% Impervious Runoff Depth=3.44"
Flow Length=135' Tc=7.8 min UI Adjusted CN=80 Runoff=3.80 cfs 0.195 af

Reach 2R: East Swale Avg. Flow Depth=0.46' Max Vel=2.63 fps Inflow=4.76 cfs 0.243 af
n=0.030 L=287.0' S=0.0139 '/' Capacity=5.55 cfs Outflow=4.43 cfs 0.243 af

Summary for Subcatchment 2S: To East Swale

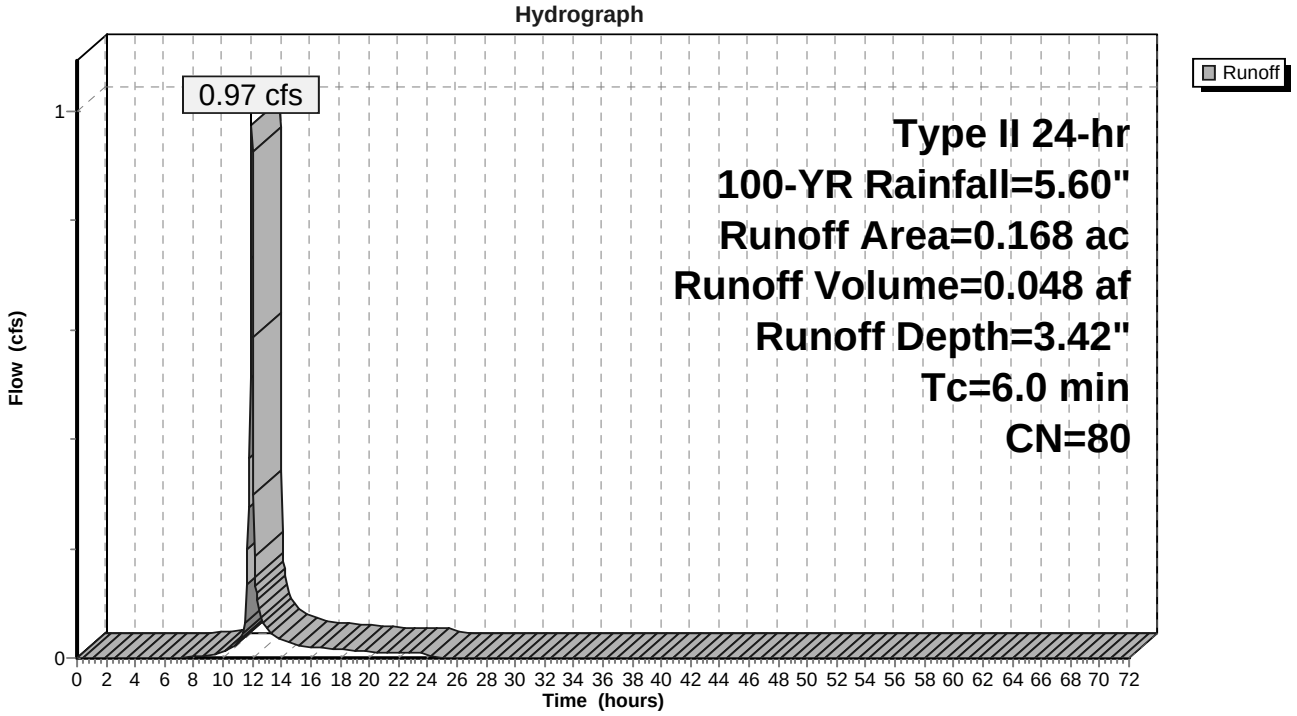
Runoff = 0.97 cfs @ 11.97 hrs, Volume= 0.048 af, Depth= 3.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=5.60"

Area (ac)	CN	Description
0.168	80	>75% Grass cover, Good, HSG D
0.168		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment 2S: To East Swale



Summary for Subcatchment 5S: Off-Site East

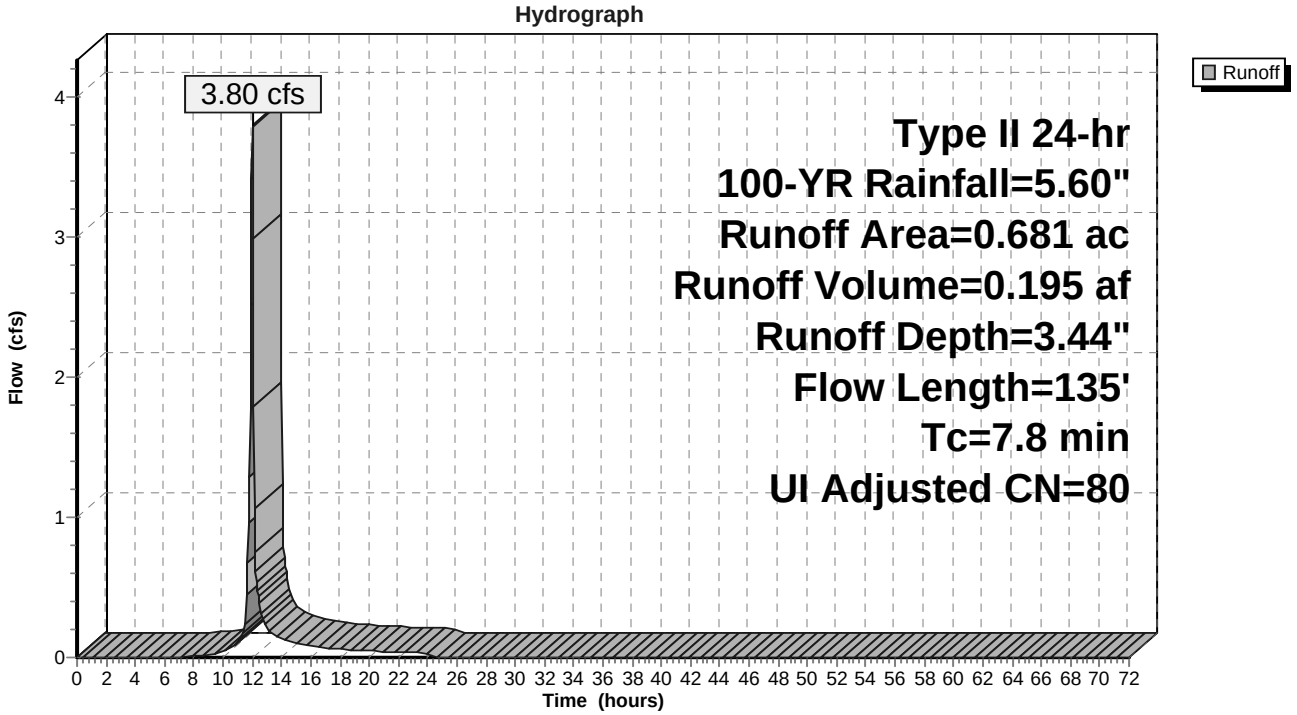
Runoff = 3.80 cfs @ 11.99 hrs, Volume= 0.195 af, Depth= 3.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=5.60"

Area (ac)	CN	Description
0.015	98	Unconnected pavement, HSG D
0.666	80	>75% Grass cover, Good, HSG D
0.681	80	Weighted Average, UI Adjusted CN = 80
0.666		97.80% Pervious Area
0.015		2.20% Impervious Area
0.015		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	66	0.0697	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
0.2	18	0.0722	1.50		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.70"
3.0	51	0.1255	0.28		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
7.8	135	Total			

Subcatchment 5S: Off-Site East



Summary for Reach 2R: East Swale

Inflow Area = 0.849 ac, 1.77% Impervious, Inflow Depth = 3.44" for 100-YR event
Inflow = 4.76 cfs @ 11.99 hrs, Volume= 0.243 af
Outflow = 4.43 cfs @ 12.04 hrs, Volume= 0.243 af, Atten= 7%, Lag= 3.1 min

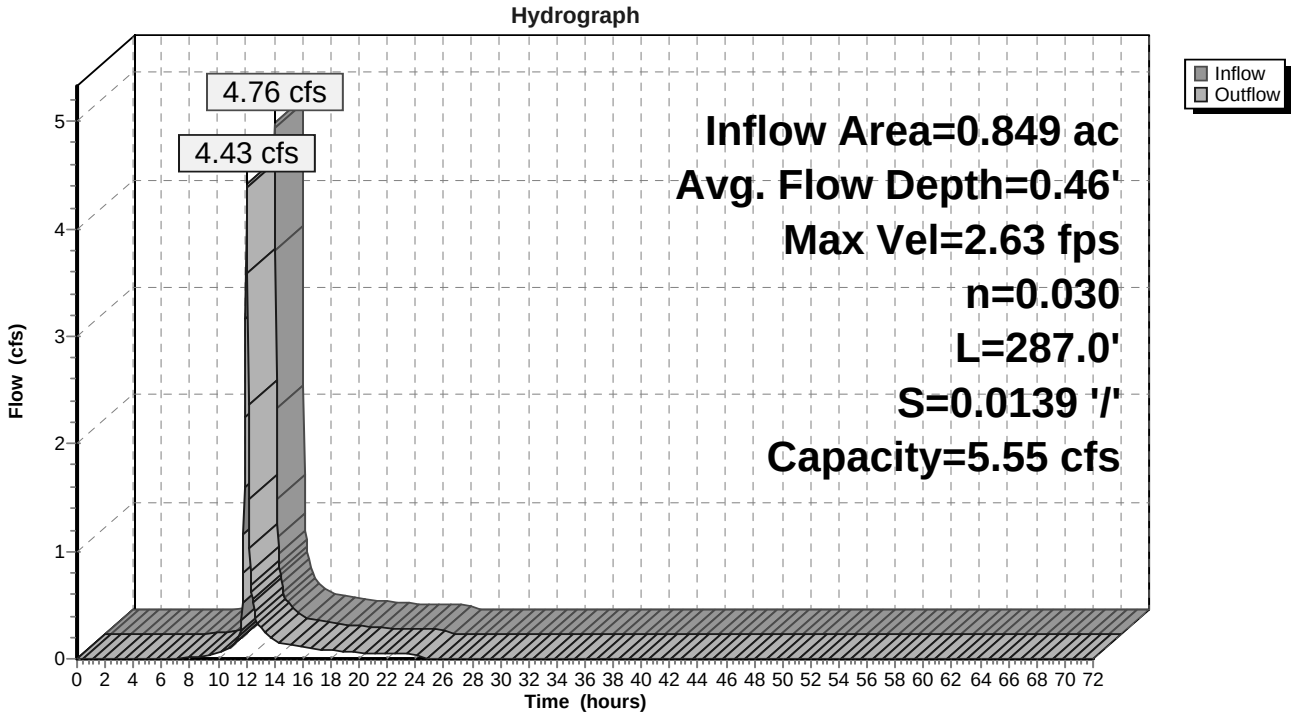
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.63 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 7.0 min

Peak Storage= 499 cf @ 12.01 hrs
Average Depth at Peak Storage= 0.46'
Bank-Full Depth= 0.50' Flow Area= 2.0 sf, Capacity= 5.55 cfs

2.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 6.00'
Length= 287.0' Slope= 0.0139 '/'
Inlet Invert= 106.50', Outlet Invert= 102.50'

‡

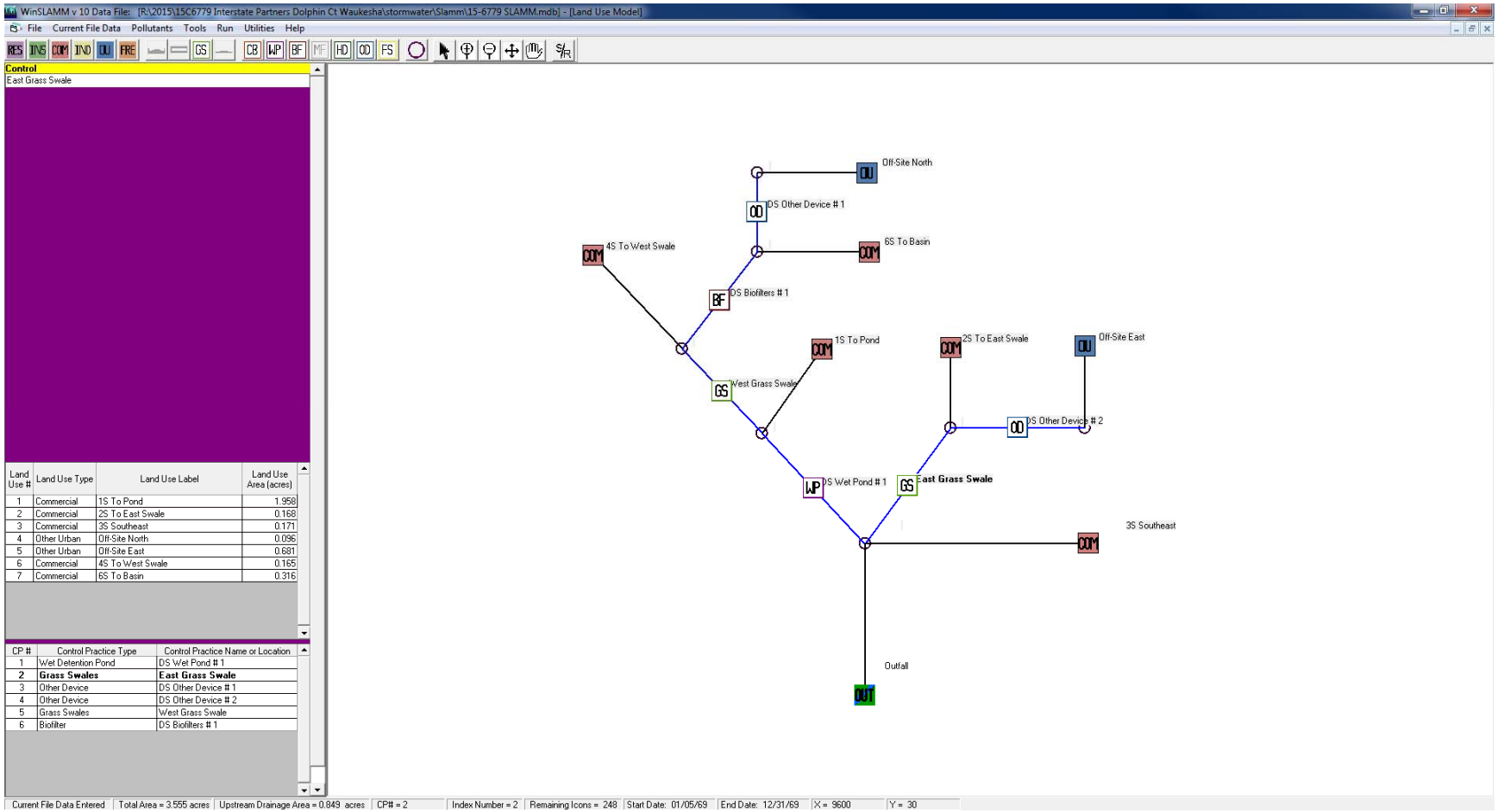
Reach 2R: East Swale



APPENDIX 5

Water Quality Calculations

- SLAMM Input
- SLAMM Output


WinSLAMM v 10 Data File: [R:\2015\15C6779 Interstate Partners Dolphin Ct Waukesha\stormwater\Slamm\15-6779 SLAMM.mdb] - [Land Use Model]
File Current File Data Pollutants Tools Run Utilities Help
Control
East Grass Swale
Land Use # | Land Use Type | Land Use Label | Land Use Area (acres)
1 | Commercial | 1S To Pond | 1.958
2 | Commercial | 2S To East Swale | 0.168
3 | Commercial | 3S Southeast | 0.171
4 | Other Urban | Off-Site North | 0.096
5 | Other Urban | Off-Site East | 0.681
6 | Commercial | 4S To West Swale | 0.165
7 | Commercial | 6S To Basin | 0.316
CP # | Control Practice Type | Control Practice Name or Location
1 | Wet Detention Pond | DS Wet Pond # 1
2 | Grass Swales | East Grass Swale
3 | Other Device | DS Other Device # 1
4 | Other Device | DS Other Device # 2
5 | Grass Swales | West Grass Swale
6 | Biofilter | DS Biofilters # 1
Off-Site North
DS Other Device # 1
4S To West Swale
6S To Basin
DS Biofilters # 1
1S To Pond
2S To East Swale
Off-Site East
West Grass Swale
DS Other Device # 2
DS Wet Pond # 1
East Grass Swale
3S Southeast
Outfall
Current File Data Entered | Total Area = 3.555 acres | Upstream Drainage Area = 0.849 acres | CP# = 2 | Index Number = 2 | Remaining Icons = 248 | Start Date: 01/05/69 | End Date: 12/31/69 | X = 9600 | Y = 30

Data file name: R:\2015\15C6779 Interstate Partners Dolphin Ct Waukesha\stormwater\Slamm\15-6779 SLAMM.mdb
WinSLAMM Version 10.0.2
Rain file name: C:\WinSLAMM Files\Rain Files\WI Milwaukee 69.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\v10 WI_SL06 Dec06.rsv
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO02.ppdx
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Date: 07-13-2015 Time: 14:39:57
Site information:

LU# 1 - Commercial: 1S To Pond Total area (ac): 1.958
 1 - Roofs 1: 0.366 ac. Flat Connected
 13 - Paved Parking 1: 1.081 ac. Connected
 45 - Large Landscaped Areas 1: 0.511 ac. Silty

LU# 2 - Commercial: 2S To East Swale Total area (ac): 0.168
 45 - Large Landscaped Areas 1: 0.168 ac. Silty

LU# 3 - Commercial: 3S Southeast Total area (ac): 0.171
 13 - Paved Parking 1: 0.025 ac. Connected
 45 - Large Landscaped Areas 1: 0.146 ac. Silty

LU# 4 - Other Urban: Off-Site North Total area (ac): 0.096
 31 - Sidewalks 1: 0.016 ac. Disconnected Silty
 45 - Large Landscaped Areas 1: 0.080 ac. Silty

LU# 5 - Other Urban: Off-Site East Total area (ac): 0.681
 31 - Sidewalks 1: 0.015 ac. Disconnected Silty
 45 - Large Landscaped Areas 1: 0.666 ac. Silty

LU# 6 - Commercial: 4S To West Swale Total area (ac): 0.165
 45 - Large Landscaped Areas 1: 0.165 ac. Silty

LU# 7 - Commercial: 6S To Basin Total area (ac): 0.316
1 - Roofs 1: 0.128 ac. Flat Connected
45 - Large Landscaped Areas 1: 0.188 ac. Silty

Control Practice 1: Wet Detention Pond CP# 1 (DS) - DS Wet Pond # 1
Particle Size Distribution file name: C:\WinSLAMM Files\NURP.CPZ
Initial stage elevation (ft): 6
Peak to Average Flow Ratio: 3.8
Maximum flow allowed into pond (cfs): No maximum value entered
Outlet Characteristics:
Outlet type: Orifice 1
1. Orifice diameter (ft): 0.16
2. Number of orifices: 1
3. Invert elevation above datum (ft): 6
Outlet type: Broad Crested Weir
1. Weir crest length (ft): 5
2. Weir crest width (ft): 10
3. Height of weir opening (cfs): 1
4. Height from datum to bottom of weir opening: 9.1
Outlet type: Vertical Stand Pipe
1. Stand pipe diameter (ft): 2.5
2. Stand pipe height above datum (ft): 8.35
Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	1.00	0.0050	0.00	0.00
2	2.00	0.0090	0.00	0.00
3	3.00	0.0130	0.00	0.00
4	4.00	0.0190	0.00	0.00
5	5.00	0.0260	0.00	0.00
6	6.00	0.0660	0.00	0.00
7	7.00	0.0860	0.00	0.00
8	8.00	0.1110	0.00	0.00
9	9.00	0.1440	0.00	0.00
10	10.00	0.1780	0.00	0.00

Control Practice 2: Grass Swale CP# 1 (DS) - East Grass Swale
Total drainage area (acres)= 0.849
Fraction of drainage area served by swales (ac) = 1.00
Swale density (ft/ac) = 338.04
Total swale length (ft) = 287
Average swale length to outlet (ft)= 144
Typical bottom width (ft) = 2.0

Typical swale side slope (_H:1V) = 4.0
Typical longitudinal slope (ft.H/ft.V) = 0.014
Swale retardance factor: D
Typical grass height (in) = 3.0
Swale dynamic infiltration rate (in/hr)= 0.250
Typical swale depth (ft) for cost analysis (optional) = 0.0
Particle size distribution file name: C:\WinSLAMM Files\NURP.CPZ
Use total swale length instead of swale density for infiltration calculations: True

Control Practice 3: Other Device CP# 1 (DS) - DS Other Device # 1
Fraction of drainage area served by device (ac) = 1.00
Concentration reduction fraction = 1.00
Runoff volume reduction fraction = 0

Control Practice 4: Other Device CP# 2 (DS) - DS Other Device # 2
Fraction of drainage area served by device (ac) = 1.00
Concentration reduction fraction = 1.00
Runoff volume reduction fraction = 0

Control Practice 5: Grass Swale CP# 2 (DS) - West Grass Swale
Total drainage area (acres)= 0.577
Fraction of drainage area served by swales (ac) = 1.00
Swale density (ft/ac) = 346.62
Total swale length (ft) = 200
Average swale length to outlet (ft)= 200
Typical bottom width (ft) = 2.0
Typical swale side slope (_H:1V) = 4.0
Typical longitudinal slope (ft.H/ft.V) = 0.010
Swale retardance factor: D
Typical grass height (in) = 3.0
Swale dynamic infiltration rate (in/hr)= 0.250
Typical swale depth (ft) for cost analysis (optional) = 0.0
Particle size distribution file name: C:\WinSLAMM Files\NURP.CPZ
Use total swale length instead of swale density for infiltration calculations: True

Control Practice 6: Biofilter CP# 1 (DS) - DS Biofilters # 1
1. Top area (square feet) = 2166
2. Bottom aea (square feet) = 348
3. Depth (ft): 3.5
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 0.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 1
8. Infiltration rate fraction (bottom): 1

9. Depth of biofilter that is rock filled (ft) 0
10. Fraction of rock filled volume as voids = 0
11. Engineered soil infiltration rate: 0
12. Engineered soil depth (ft) = 0
13. Engineered soil void ratio = 0
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: C:\WinSLAMM Files\NURP.CPZ
18. Initial water surface elevation (ft): 0

Soil Data Soil Type Fraction in Eng. Soil

Biofilter Outlet/Discharge Characteristics:

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 12
2. Weir crest width (ft): 10
3. Height of datum to bottom of weir opening: 2

SLAMM for Windows Version 10.0.2

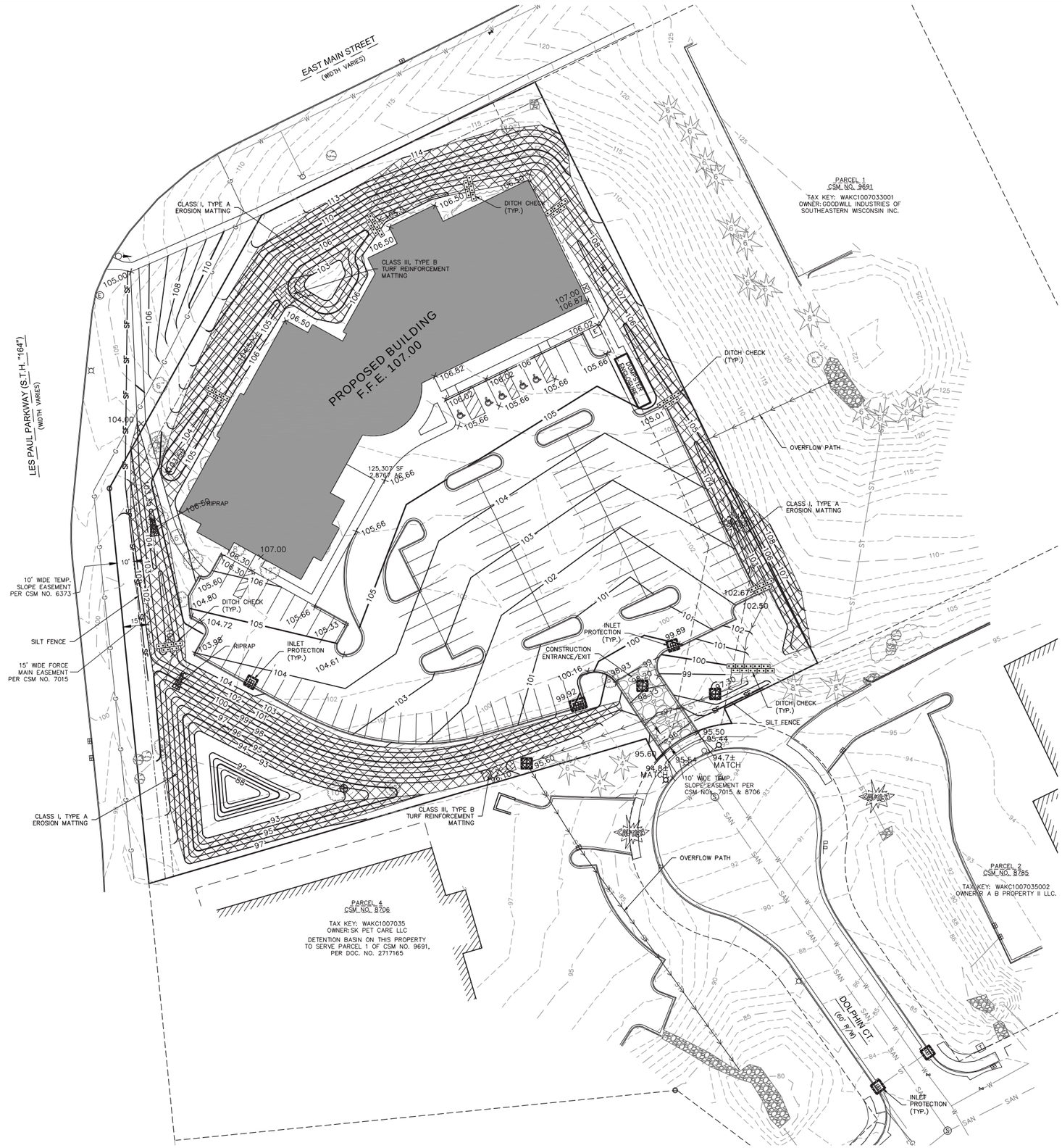
Data file name: R:\2015\15C6779 Interstate Partners Dolphin Ct Waukesha\stormwater\Slamm\15-6779 SLAMM.mdb
Data file description:
Rain file name: C:\WinSLAMM Files\Rain Files\WI Milwaukee 69.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\v10 WI_SL06 Dec06.rsv
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO02.ppdx
Model Run Start Date: 01/05/69 Model Run End Date: 12/31/69
Date of run: 07-13-2015 Time of run: 14:39:36
Total Area Modeled (acres): 3.555
Years in Model Run: 0.99

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	150188	-	107.9	1011	-
Outfall Total with Controls:	133149	11.35%	22.31	185.4	81.66%
Annualized Total After Outfall Controls:	134998			188.0	

APPENDIX 6

Design Details

- Proposed Grading & Erosion Control Plan
- Detention Pond Detail



north

SCALE IN FEET

30' 0 30'

LEGEND

- PROPOSED CATCH BASIN
- PROPOSED STORM MANHOLE
- INLET PROTECTION
- SF — SILT FENCE (SEE DETAIL)
- ST — PROPOSED STORM SEWER
- 104 — PROPOSED 1' CONTOUR
- 105 — PROPOSED 5' CONTOUR
- CONSTRUCTION ENTRANCE
- TURF REINFORCEMENT MAT
- DITCH CHECK (STRAW BALES)

GENERAL GRADING NOTES:

1. CONTRACTOR SHALL VERIFY ALL GRADES, MAKE SURE ALL AREAS DRAIN PROPERLY AND SHALL REPORT ANY DISCREPANCIES TO THE ENGINEER OF RECORD PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITIES.
2. ALL PROPOSED GRADES SHOWN ARE FINISHED GRADES. PARKING LOT AND DRIVEWAY ELEVATIONS ARE PAVEMENT GRADES, NOT TOP OF CURB GRADES, UNLESS OTHERWISE NOTED.
3. WORK WITHIN THE DOLPHIN COURT AND EAST MAIN STREET RIGHT-OF-WAY SHALL BE COORDINATED WITH THE APPROPRIATE CITY OF WAUKESHA OFFICIALS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES. ALL GRADING WITHIN THE RIGHT-OF-WAY IS SUBJECT TO APPROVAL BY SAID OFFICIALS.
4. THE CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR THE COMPUTATIONS OF ALL GRADING QUANTITIES. WHILE JSD ATTEMPTS TO PROVIDE A COST EFFECTIVE APPROACH TO BALANCE EARTHWORK, GRADING DESIGN IS BASED ON MANY FACTORS, INCLUDING SAFETY, AESTHETICS, AND COMMON ENGINEERING STANDARD OF CARE, THEREFORE NO GUARANTEE CAN BE MADE FOR A BALANCED SITE.

CONSTRUCTION SITE SEQUENCING

1. INSTALL PERIMETER SILT FENCE AND TEMPORARY CONSTRUCTION ENTRANCE.
2. ROUGH GRADE DETENTION POND AND INSTALL POND OUTLET.
3. STRIP AND STOCKPILE TOPSOIL, INSTALL SILT FENCE AROUND PERIMETER OF STOCKPILE.
4. CONDUCT ROUGH GRADING EFFORTS AND INSTALL CHECK DAMS WITHIN DRAINAGE DITCHES AS NEEDED.
5. INSTALL UTILITY PIPING AND STRUCTURES, IMMEDIATELY INSTALL INLET PROTECTION.
6. COMPLETE FINAL GRADING, INSTALLATION OF GRAVEL BASE COURSES, PLACEMENT OF CURBS, PAVEMENTS, WALKS, ETC.
7. PLACE TOPSOIL AND IMMEDIATELY STABILIZE DISTURBED AREAS WITH EROSION CONTROLS.
8. RESTORE DETENTION POND AS NEEDED TO MATCH DESIGN GRADES.
9. EROSION CONTROLS SHALL NOT BE REMOVED UNTIL SITE IS FULLY STABILIZED OR 100% VEGETATIVE COVER IS ESTABLISHED.

   CONTRACTOR MAY MODIFY SEQUENCING AFTER ITEM 1 AS NEEDED TO COMPLETE CONSTRUCTION IF EROSION CONTROLS ARE MAINTAINED IN ACCORDANCE WITH THE CONSTRUCTION SITE EROSION CONTROL REQUIREMENTS.

CONSTRUCTION SITE EROSION CONTROL

1. CONTRACTOR IS RESPONSIBLE TO NOTIFY ENGINEER OF RECORD AND OFFICIALS OF ANY CHANGES TO THE EROSION CONTROL AND STORM WATER MANAGEMENT PLANS. ENGINEER OF RECORD AND APPROPRIATE CITY OF WAUKESHA OFFICIALS MUST APPROVE ANY CHANGES PRIOR TO DEVIATION FROM THE APPROVED PLANS.
2. ALL EROSION CONTROL MEASURES SHALL BE CONSTRUCTED AND MAINTAINED BY THE CONTRACTOR IN ACCORDANCE WITH THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES (WDNR) TECHNICAL STANDARDS (REFERRED TO AS BMP'S) AND CITY OF WAUKESHA ORDINANCE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN A COPY OF THESE STANDARDS. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY ADDITIONAL EROSION CONTROL MEASURES WHICH MAY BE NECESSARY TO MEET UNFORESEEN FIELD CONDITIONS.
3. MODIFICATIONS TO THE APPROVED EROSION CONTROL DESIGN IN ORDER TO MEET UNFORESEEN FIELD CONDITIONS IS ALLOWED IF MODIFICATIONS CONFORM TO BMP'S. ALL DESIGN MODIFICATIONS MUST BE APPROVED BY THE CITY OF WAUKESHA PRIOR TO DEVIATION OF THE APPROVED PLAN.
4. ADDITIONAL EROSION CONTROL MEASURES, AS REQUESTED BY STATE INSPECTORS, LOCAL INSPECTORS, COUNTY INSPECTORS AND/OR ENGINEER OF RECORD SHALL BE INSTALLED WITHIN 24 HOURS OF REQUEST.
5. INSTALL PERIMETER EROSION CONTROL MEASURES (SUCH AS CONSTRUCTION ENTRANCES, SILT FENCE, AND EXISTING INLET PROTECTION) PRIOR TO ANY SITE WORK, INCLUDING GRADING OR DISTURBANCE OF EXISTING SURFACE COVER, AS SHOWN ON PLAN IN ORDER TO PROTECT ADJACENT PROPERTIES/STORM SEWER SYSTEMS FROM SEDIMENT TRANSPORT.
6. CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT ALL LOCATIONS OF VEHICLE INGRESS/EGRESS POINTS. CONTRACTOR IS RESPONSIBLE TO COORDINATE LOCATION(S) WITH THE PROPER AUTHORITIES, PROVIDE NECESSARY FEES, AND OBTAIN ALL REQUIRED APPROVALS OR PERMITS. ADDITIONAL CONSTRUCTION ENTRANCES OTHER THAN AS SHOWN ON THE PLANS MUST BE PRIOR APPROVED BY THE CITY OF WAUKESHA.
7. INLET PROTECTION SHALL BE IMMEDIATELY FITTED AT THE INLET OF ALL INSTALLED STORM SEWER AND SILT FENCE SHALL BE IMMEDIATELY FITTED AT ALL INSTALLED CULVERT INLETS TO PREVENT SEDIMENT DEPOSITION WITHIN STORM SEWER SYSTEMS.
8. DITCH CHECKS AND APPLICABLE EROSION NETTING/MATTING SHALL BE INSTALLED IMMEDIATELY AFTER COMPLETION OF GRADING EFFORTS WITHIN DITCHES/SWALES TO PREVENT SOIL TRANSPORTATION.
9. CONTRACTOR SHALL INSTALL SILT FENCING AT DOWNSLOPE SIDE OF STOCKPILES.
10. ALL EXPOSED SOIL AREAS THAT WILL NOT BE BROUGHT TO FINAL GRADE OR ON WHICH LAND DISTURBING ACTIVITIES WILL NOT BE PERFORMED FOR A PERIOD GREATER THAN 30 DAYS AND REQUIRE VEGETATIVE COVER FOR LESS THAN 1 YEAR, REQUIRE TEMPORARY SEEDING FOR EROSION CONTROL. SEEDING FOR EROSION CONTROL SHALL BE IN ACCORDANCE WITH WDNR TECHNICAL STANDARD 1059 AND CITY OF WAUKESHA ORDINANCE.
11. IF TOPSOIL STOCKPILE REMAINS UNDISTURBED FOR MORE THAN SEVEN (7) DAYS, TEMPORARY SEEDING AND STABILIZATION IN ACCORDANCE WITH BEST MANAGEMENT PRACTICES IS REQUIRED. IF DISTURBANCE OCCURS BETWEEN NOVEMBER 15TH AND MAY 15TH, THE MULCHING SHALL BE PERFORMED BY HYDRO-MULCHING WITH A "TACKIFIER."
12. ALL DISTURBED SLOPES EXCEEDING 5:1, SHALL BE STABILIZED WITH CLASS I, TYPE A EROSION MATTING OR APPLICATION OF A WISCONSIN DEPARTMENT OF TRANSPORTATION (WisDOT) APPROVED POLYMER SOIL STABILIZATION TREATMENT OR A COMBINATION THEREOF, AS REQUIRED. EROSION MATTING AND/OR NETTING USED ONSITE SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S GUIDELINES AND WDNR TECHNICAL STANDARDS 1052 AND 1053.
13. THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING WIND EROSION (DUST) DURING CONSTRUCTION AT HIS/HER EXPENSE, WHEN NECESSARY OR REQUIRED BY LOCAL INSPECTORS AND/OR ENGINEER OF RECORD.
14. EROSION CONTROL FOR UTILITY CONSTRUCTION (STORM SEWER, SANITARY SEWER, WATER MAIN, ETC.):
    A. PLACE EXCAVATED TRENCH MATERIAL ON THE HIGH SIDE OF THE TRENCH.
    B. BACKFILL, COMPACT, AND STABILIZE THE TRENCH IMMEDIATELY AFTER PIPE CONSTRUCTION.
    C. DISCHARGE TRENCH WATER INTO A SEDIMENTATION BASIN OR FILTERING TANK IN ACCORDANCE WITH BMP'S PRIOR TO RELEASE INTO THE STORM SEWER, RECEIVING STREAM, OR DRAINAGE DITCH.
15. PAVED SURFACES ADJACENT TO CONSTRUCTION SITE VEHICLE ACCESS SHALL BE SWEPT AND/OR SCRAPED TO REMOVE ACCUMULATED SOIL, DIRT AND/OR DUST AFTER THE END OF EACH WORK DAY AND AS REQUESTED BY THE CITY OF WAUKESHA.
16. INSPECTIONS AND MAINTENANCE OF ALL EROSION CONTROL MEASURES SHALL BE ROUTINE (ONCE PER WEEK MINIMUM) TO ENSURE PROPER FUNCTION OF EROSION CONTROLS AT ALL TIMES. EROSION CONTROL MEASURES ARE TO BE IN WORKING ORDER AT THE END OF EACH WORK DAY.
17. ALL EROSION AND SEDIMENT CONTROL ITEMS SHALL BE INSPECTED WITHIN 24 HOURS OF ALL RAIN EVENTS EXCEEDING 0.5 INCHES. IMMEDIATELY REPAIR ANY DAMAGE OBSERVED DURING THE INSPECTION.
18. EROSION CONTROL MEASURES SHALL BE REMOVED ONLY AFTER SITE CONSTRUCTION IS COMPLETE WITH ALL SOIL SURFACES HAVING AN ESTABLISHED VEGETATIVE COVER.

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Interstate Partners LLC
Real Estate Development

PROJECT:

DENTAL ASSOCIATES

PROJECT LOCATION:

WAUKESHA
WAUKESHA COUNTY, WI

JSD PROJECT NO.: 15-6779

SEAL/SIGNATURE:

ALTHOUGH EVERY EFFORT HAS BEEN MADE IN PREPARING THESE PLANS AND CHECKING THEM FOR ACCURACY, THE CONTRACTOR AND SUBCONTRACTORS MUST CHECK ALL DETAIL AND DIMENSIONS OF THEIR TRADE AND BE RESPONSIBLE FOR THE SAME.

DESIGN BY:	TAG	5-20-15
DRAWN BY:	TAG	5-20-15
CHECKED BY:		

PLAN MODIFICATIONS:	DATE:
CITY SUBMITTAL	07-13-15

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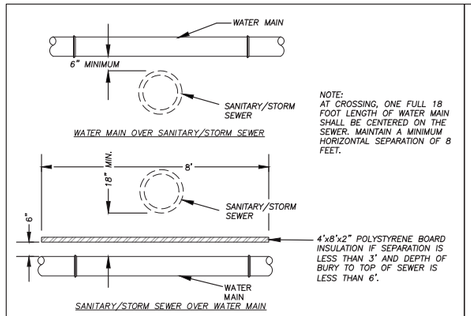
SHEET TITLE:

GRADING PLAN

SHEET NUMBER:

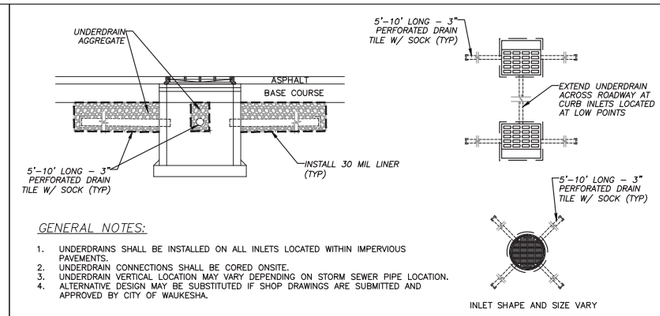
C200

R:\2015\15C6779 Interstate Partners Dolphin Ct, Waukesha\dwg\15C6779 Sheet Grading.dwg, 7/13/2015 3:02:54 PM



SEWER – WATER MAIN SEPARATION

N.T.S.

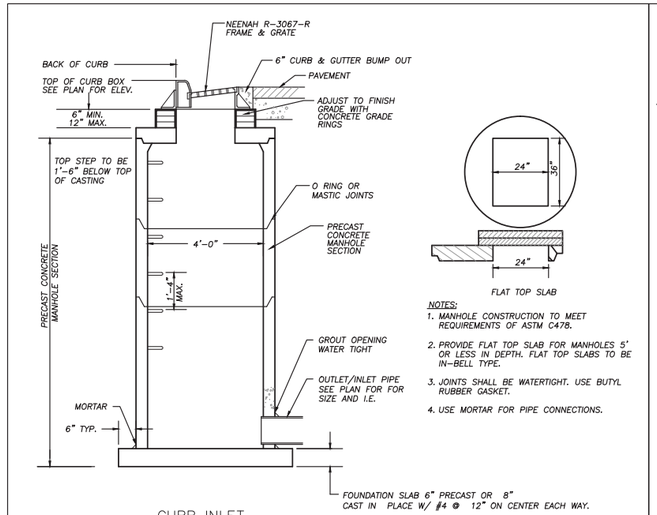


GENERAL NOTES:

1. UNDERDRAINS SHALL BE INSTALLED ON ALL INLETS LOCATED WITHIN IMPERVIOUS PAVEMENTS.
2. UNDERDRAIN CONNECTIONS SHALL BE CORED ONSITE.
3. UNDERDRAIN VERTICAL LOCATION MAY VARY DEPENDING ON STORM SEWER PIPE LOCATION.
4. ALTERNATIVE DESIGN MAY BE SUBSTITUTED IF SHOP DRAWINGS ARE SUBMITTED AND APPROVED BY CITY OF WAUKESHA.

INLET UNDERDRAIN DETAIL

N.T.S.

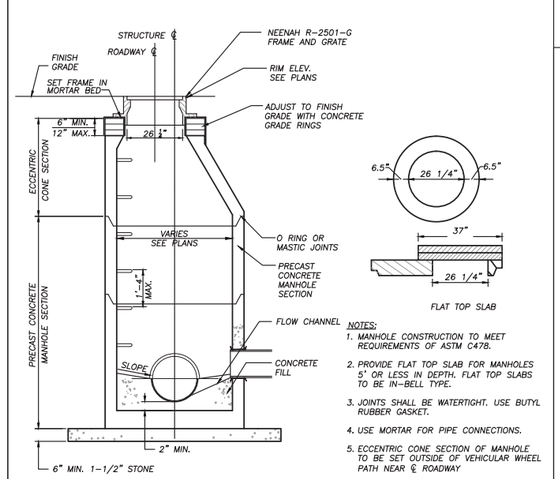


NOTES:

1. MANHOLE CONSTRUCTION TO MEET REQUIREMENTS OF ASTM C478.
2. PROVIDE FLAT TOP SLAB FOR MANHOLES 5' OR LESS IN DEPTH. FLAT TOP SLABS TO BE IN-BELL TYPE.
3. JOINTS SHALL BE WATERTIGHT. USE BUTYL RUBBER GASKET.
4. USE MORTAR FOR PIPE CONNECTIONS.

CURB INLET

N.T.S.

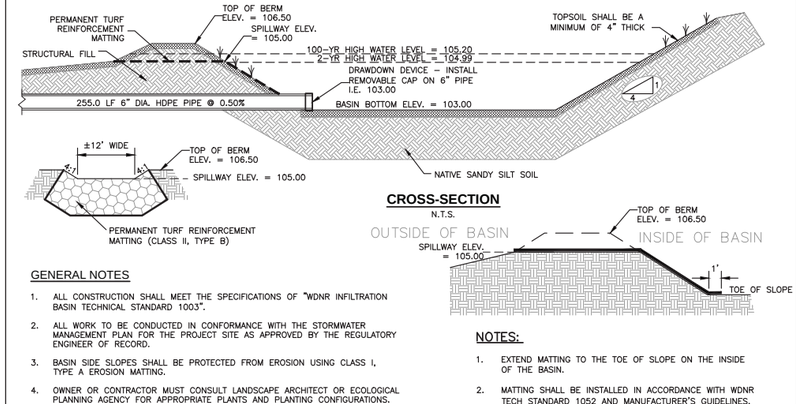


NOTES:

1. MANHOLE CONSTRUCTION TO MEET REQUIREMENTS OF ASTM C478.
2. PROVIDE FLAT TOP SLAB FOR MANHOLES 5' OR LESS IN DEPTH. FLAT TOP SLABS TO BE IN-BELL TYPE.
3. JOINTS SHALL BE WATERTIGHT. USE BUTYL RUBBER GASKET.
4. USE MORTAR FOR PIPE CONNECTIONS.
5. ECCENTRIC CONE SECTION OF MANHOLE TO BE SET OUTSIDE OF VEHICULAR WHEEL PATH NEAR ℄ ROADWAY

STORM MANHOLE

N.T.S.



CROSS-SECTION

N.T.S.

NOTES:

1. EXTEND MATTING TO THE TOE OF SLOPE ON THE INSIDE OF THE BASIN.
2. MATTING SHALL BE INSTALLED IN ACCORDANCE WITH WDNR TECH STANDARD 1052 AND MANUFACTURER'S GUIDELINES.

GENERAL NOTES

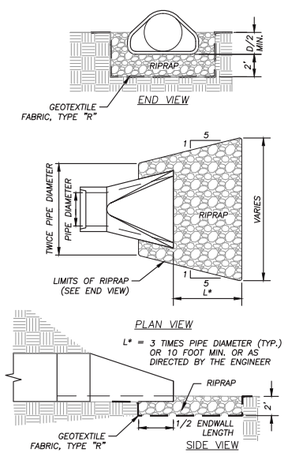
1. ALL CONSTRUCTION SHALL MEET THE SPECIFICATIONS OF "WDNR INFILTRATION BASIN TECHNICAL STANDARD 1003".
2. ALL WORK TO BE CONDUCTED IN CONFORMANCE WITH THE STORMWATER MANAGEMENT PLAN FOR THE PROJECT SITE AS APPROVED BY THE REGULATORY ENGINEER OF RECORD.
3. BASIN SIDE SLOPES SHALL BE PROTECTED FROM EROSION USING CLASS I, TYPE A EROSION MATTING.
4. OWNER OR CONTRACTOR MUST CONSULT LANDSCAPE ARCHITECT OR ECOLOGICAL PLANNING AGENCY FOR APPROPRIATE PLANTS AND PLANTING CONFIGURATIONS.

STORM WATER INFILTRATION BASIN DETAIL

N.T.S.

SPILLWAY DETAIL

N.T.S.

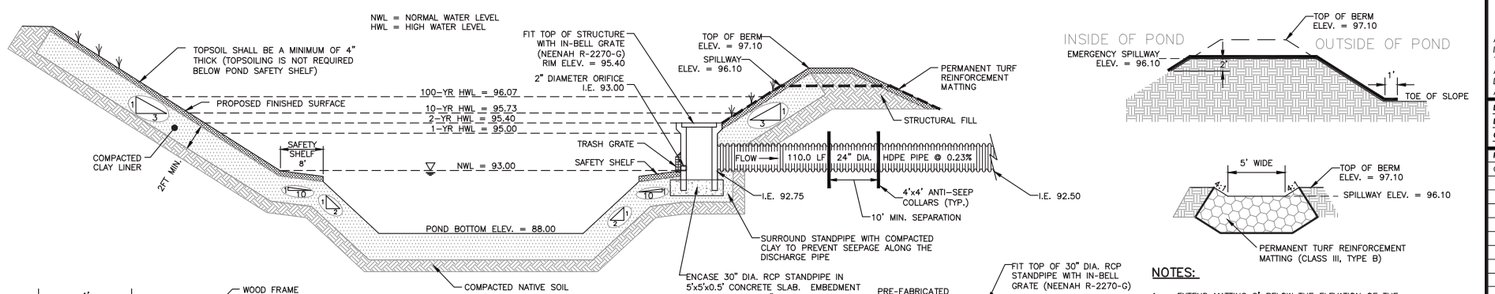


GENERAL NOTES:

1. RIPRAP SHALL MEET REQUIREMENTS FOR STANDARD SPECIFICATIONS FOR HIGHWAY AND STRUCTURE CONSTRUCTION.
2. TYPE "R" GEOTEXTILE FABRIC SHALL BE SELECTED FROM THE WISCONSIN DEPARTMENT OF TRANSPORTATION'S PRODUCT ACCEPTABILITY (PAL) LIST.

RIPRAP APRON ENDWALL

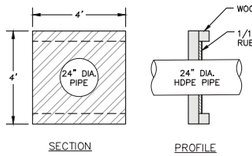
N.T.S.



CROSS-SECTION

N.T.S.

NOTE: POND OUTLET AND SPILLWAY SHOWN FOR GRAPHICAL PURPOSES (SEE SHEET C-2.0 FOR PLAN VIEW LOCATION)



NOTE: ANTI-SEEP COLLAR TO BE AGRI DRAIN ASC04 OR EQUAL

ANTI-SEEP COLLAR

N.T.S.

GENERAL NOTES

1. ALL CONSTRUCTION SHALL MEET THE SPECIFICATIONS OF "WDNR WET DETENTION POND TECHNICAL STANDARD 1001".
2. ALL WORK TO BE CONDUCTED IN CONFORMANCE WITH THE STORMWATER MANAGEMENT PLAN FOR THE PROJECT SITE AS APPROVED BY THE REGULATORY ENGINEER OF RECORD.
3. OWNER OR CONTRACTOR MUST CONSULT LANDSCAPE ARCHITECT OR ECOLOGICAL PLANNING AGENCY FOR APPROPRIATE PLANTS AND PLANTING CONFIGURATIONS.
4. POND LINER SHALL MEET THE SPECIFICATIONS IN APPENDIX D OF "WDNR WET DETENTION POND TECHNICAL STANDARD 1001." CLAY LINER SHALL BE A MINIMUM OF 2-FEET THICK. CLAY SHALL BE COMPACTED AT ±2.0% OPTIMAL MOISTURE CONTENT TO 90% MODIFIED PROCTOR. MEDIUM STIFF TO STIFF CLAYS PRESENT ONSITE MAY BE USED AT THE DISCRETION OF THE GEOTECHNICAL ENGINEER OF RECORD.
5. FOR CONSTRUCTED EMBANKMENTS WHERE THE PERMANENT POOL IS PONDED 3FT OR MORE AGAINST THE EMBANKMENT, THERE SHALL BE A CORE TRENCH OR KEYWAY ALONG THE CENTERLINE OF THE EMBANKMENT UP TO THE PERMANENT POOL ELEVATION. THE CORE TRENCH OR KEYWAY SHALL BE A MINIMUM OF 2FT DEEP AND 8FT WIDE WITH A SIDE SLOPE OF 1:1 OR FLATTER.
6. CONTRACTOR SHALL POSITION ANTI-SEEP COLLARS SUCH THAT THEY ARE COMPLETELY CONTAINED WITHIN EMBANKMENT.

STORM WATER DETENTION POND DETAIL

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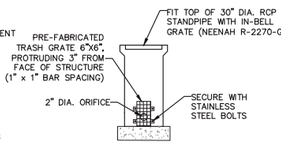

OUTLET STRUCTURE DETAIL

N.T.S.

NOTES:

1. EXTEND MATTING 2' BELOW THE ELEVATION OF THE SPILLWAY ON THE INSIDE OF THE POND.
2. EXTEND MATTING TO THE TOE OF SLOPE ON THE OUTSIDE OF THE POND.
3. MATTING SHALL BE INSTALLED IN ACCORDANCE WITH WDNR TECH STANDARD 1052 AND MANUFACTURER'S GUIDELINES.

EMERGENCY SPILLWAY DETAIL

N.T.S.

IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE PROPER CONSTRUCTION PRACTICES HAVE BEEN UTILIZED AND THAT STORMWATER MANAGEMENT FEATURES HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH APPROVED DESIGN PLANS. JSD, INC. SHALL NOT BE LIABLE FOR ANY CONSTRUCTION PRACTICES OR INSTALLATION WHICH DEVIATES FROM THE APPROVED PLAN SET. ONCE THE OWNER HAS PROVIDED FINAL APPROVAL TO THE WORK PERFORMED BY THE CONTRACTOR AND ENSURED COMPLIANCE WITH THE PLAN, IT IS THE OWNER'S RESPONSIBILITY TO MAINTAIN STORMWATER MANAGEMENT FEATURES IN ACCORDANCE WITH THE RECORDED MAINTENANCE AGREEMENT. PROPER OPERATION IS DEPENDENT ON A MULTITUDE OF VARIABLES INCLUDING WEATHER. THESE COMPONENTS REQUIRE ONGOING MAINTENANCE FOR WHICH THE OWNER IS RESPONSIBLE. JSD TAKES NO RESPONSIBILITY FOR PROPER OPERATION OF THE WATER QUALITY COMPONENTS.

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SERVICES PROVIDED TO:

Interstate Partners LLC
Real Estate Development

PROJECT:

DENTAL ASSOCIATES

PROJECT LOCATION:

WAUKESHA
WAUKESHA COUNTY, WI

JSD PROJECT NO.: 15-6779

SEAL/SIGNATURE:

ALTHOUGH EVERY EFFORT HAS BEEN MADE IN PREPARING THESE PLANS AND CHECKING THEM FOR ACCURACY, THE CONTRACTOR AND SUBCONTRACTORS MUST CHECK ALL DETAIL AND DIMENSIONS OF THEIR TRADE AND BE RESPONSIBLE FOR THE SAME.

DESIGN BY: JJS	06-30-15
DRAWN BY: JJS	06-30-15
CHECKED BY: TAG	06-30-15

PLAN MODIFICATIONS:	DATE:
CITY SUBMITTAL	07-13-15

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SHEET TITLE:

NOTES & DETAILS

SHEET NUMBER:

C401

R:\2015\15C6779 Interstate Partners Dolphin Ct Waukesha\dwg\15C6779 Sheet Details.dwg, 7/13/2015 3:00:15 PM

Anti-Seep Collar Design

Project: **Dolphin Court Office Building**
Project Location: Waukesha, WI
JSD Project # : 15C6779

Performed By: JJS Date: 6/26/2015

MADISON REGIONAL OFFICE
161 Horizon Drive, Suite 101
Verona, Wisconsin 53593
Ph: (608) 848-5060 Fax: (608) 848-2255

MILWAUKEE REGIONAL OFFICE
N22 W22931 Nancy Court, Suite 3
Waukesha, Wisconsin 53186
Ph: (262) 513-0666 Fax: (262) 513-1232

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Detention Pond 1P

Discharge Pipe Diameter =	2	ft
Discharge Pipe Slope =	0.0023	ft/ft
100yr Pond Water Surface Elev. =	96.07	
Pond Discharge Pipe Elev. =	92.75	
Embankment Side Slope (H:1) =	3.00	

Notes:

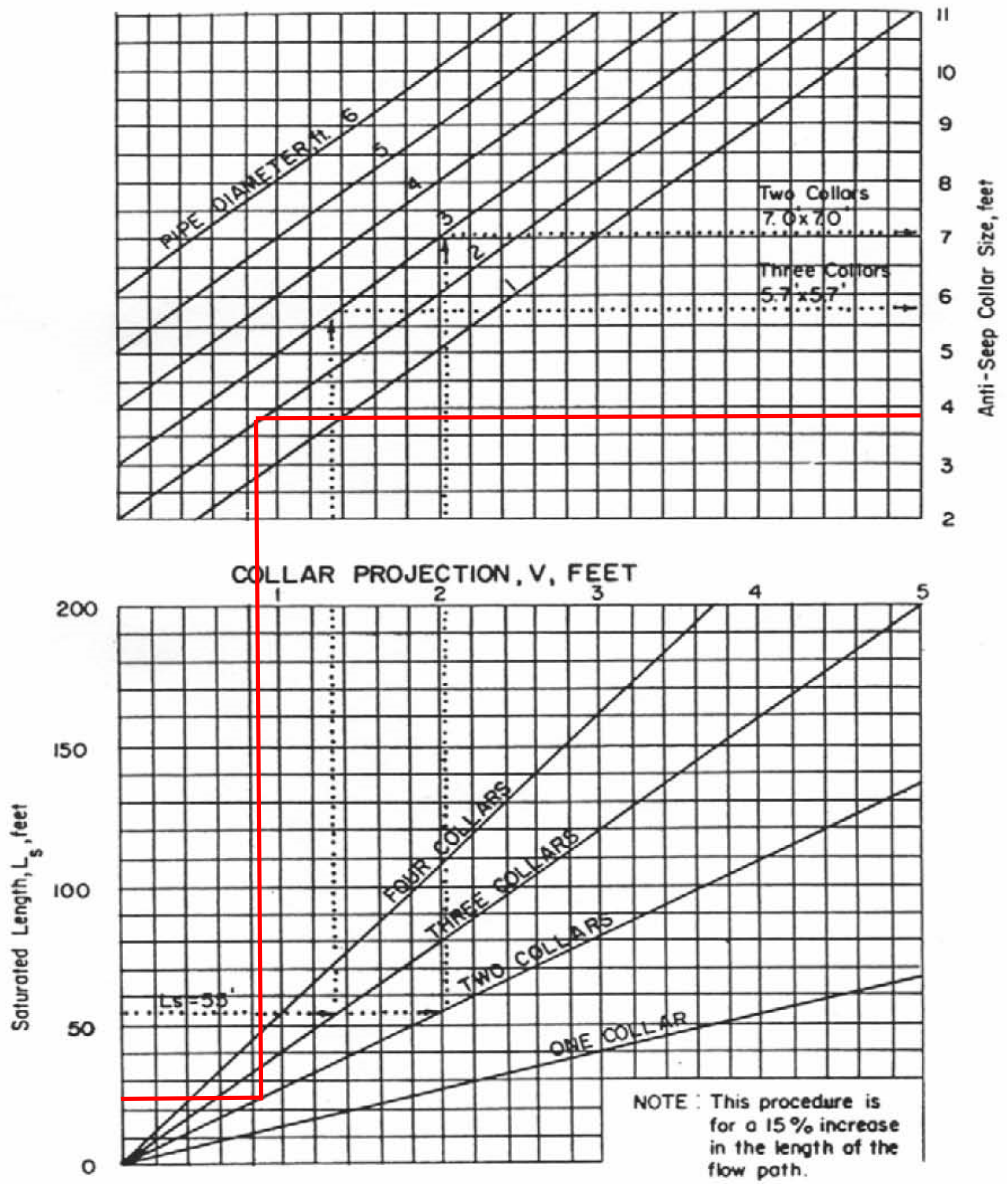
Ls - Length of Discharge Pipe in Saturated Zone
y - Headwater Acting on Discharge Pipe
z - Embankment Side Slope

$$Ls = y(z+4)\left[1+\frac{PipeSlope}{0.25-PipeSlope}\right]$$

$$Ls = (96.07 - 92.75)(3.00 + 4)\left|1 + \frac{0.0023}{(0.25 - 0.0230)}\right|$$

Ls = **23.46 ft**

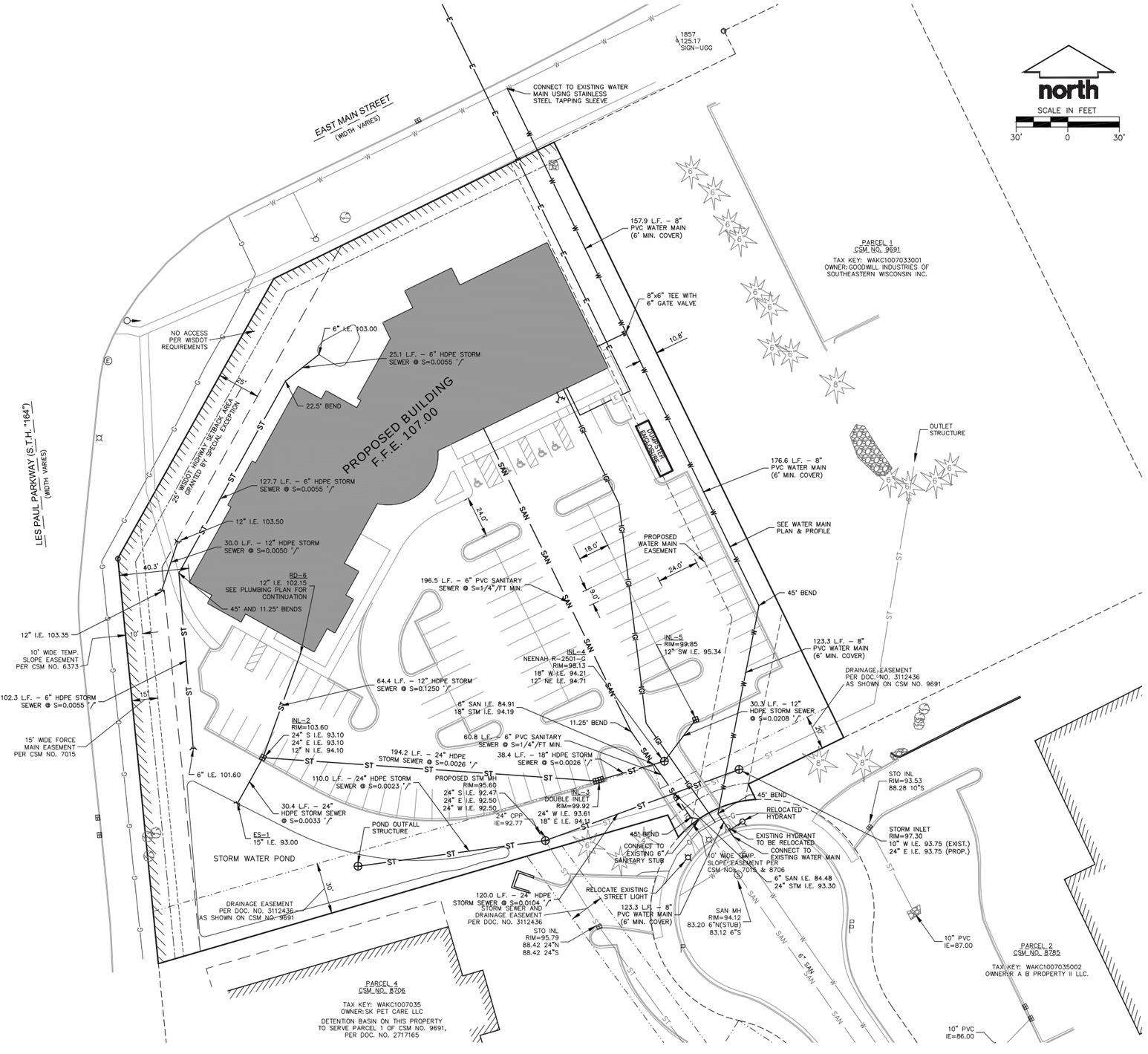
Figure 5A.31(2)
Anti-Seep Collar Design Charts (USDA - NRCS)



APPENDIX 7

Storm Sewer Design

- Proposed Utility Plan
- Storm Sewer Sizing Calculations



LEGEND

SANITARY SEWER MANHOLE	ST	STORM SEWER
SANITARY CLEANOUT	W	WATER MAIN
FIRE HYDRANT	SAN	SANITARY SEWER
WATER VALVE	FIB	FIBER OPTIC
WATER MANHOLE	G	GAS
STORM SEWER MANHOLE	E	BURIED ELECTRIC
CATCH BASIN	T	BURIED TELEPHONE

UTILITY NOTES

1. ALL EXISTING UTILITIES ARE SHOWN FOR INFORMATIONAL PURPOSES ONLY AND ARE NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION AS TO THE TYPE AND LOCATIONS OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. CONTRACTOR/OWNER SHALL CALL "DIGGER'S HOTLINE" PRIOR TO ANY CONSTRUCTION.
2. ALL UTILITY WORK SHALL BE DONE IN ACCORDANCE WITH CITY OF WAUKESHA SPECIFICATIONS AND THE STANDARD SPECIFICATIONS FOR SEWER AND WATER CONSTRUCTION IN WISCONSIN. IT IS THE CONTRACTORS RESPONSIBILITY TO DETERMINE WHICH SPECIFICATIONS AND CODES APPLY, AND TO COORDINATE ALL CONSTRUCTION ACTIVITIES WITH THE APPROPRIATE LOCAL AND STATE AUTHORITIES.
3. SPECIFICATIONS SHALL COMPLY WITH THE CITY OF WAUKESHA MUNICIPAL CODE.
4. LENGTHS OF ALL UTILITIES ARE TO CENTER OF STRUCTURES OR FITTINGS AND MAY VARY SLIGHTLY FROM PLAN. LENGTHS SHALL BE VERIFIED IN THE FIELD DURING CONSTRUCTION.
5. CONTRACTOR SHALL VERIFY ALL ELEVATIONS, LOCATIONS AND SIZES OF SANITARY, WATER AND STORM LATERALS AND CHECK ALL UTILITY CROSSINGS FOR CONFLICTS.
6. CONTRACTOR SHALL ADJUST AND/OR RECONSTRUCT ALL UTILITY COVERS (SUCH AS MANHOLE COVERS, VALVE BOX COVERS, ETC.) TO MATCH THE FINISHED GRADES OF THE AREAS AFFECTED BY THE CONSTRUCTION.
7. STORM SEWER SPECIFICATIONS –

   PIPE – HIGH DENSITY DUAL-WALL POLYETHYLENE CORRUGATED PIPE SHALL BE AS MANUFACTURED BY ADS OR EQUAL WITH WATER TIGHT JOINTS, AND SHALL MEET THE REQUIREMENTS OF AASHTO DESIGNATION M-294 TYPE "S".

   INLETS – INLETS SHALL BE CONSTRUCTED IN ACCORDANCE WITH FILE NO. 28 OF THE "STANDARD SPECIFICATIONS", OR APPROVED EQUAL WITH A 1'-8" X 2'-6" MAXIMUM OPENING. CURB FRAME & GRATE SHALL BE NEENAH R-3067 WITH TYPE R GRATE, OR EQUAL.

   BACKFILL AND BEDDING – STORM SEWER SHALL BE CONSTRUCTED WITH GRAVEL BACKFILL AND CLASS "B" BEDDING IN ALL PAVED AREAS AND TO A POINT 5 FEET BEYOND THE EDGE OF PAVEMENT. TRENCHES RUNNING PARALLEL TO AND LESS THAN 5 FEET FROM THE EDGE OF PAVEMENT SHALL ALSO REQUIRE GRAVEL BACKFILL. LANDSCAPED AREAS MAY BE BACKFILLED WITH EXCAVATED MATERIAL IN CONFORMANCE WITH SECTION 8.43.5 OF THE "STANDARD SPECIFICATIONS".

   FIELD TILE CONNECTION – ALL FIELD TILE ENCOUNTERED DURING CONSTRUCTION SHALL BE INCLUDED IN THE UNIT PRICE(S) FOR STORM SEWER. TILE LINES CROSSED BY THE TRENCH SHALL BE REPLACED WITH THE SAME MATERIAL AS THE STORM SEWER.
8. WATER MAIN SPECIFICATIONS –

   PIPE – WATER MAIN SHALL BE POLYVINYL CHLORIDE (PVC) PIPE MEETING THE REQUIREMENTS OF AWWA STANDARD C-900, CLASS 150, DR-18, WITH CAST IRON O.D. AND INTEGRAL ELASTOMERIC BELL AND SPIGOT JOINTS.

   VALVES AND VALVE BOXES – GATE VALVES SHALL BE AWWA GATE VALVES MEETING THE REQUIREMENTS OF AWWA C-500 AND CHAPTER 8.27.0 OF THE "STANDARD SPECIFICATIONS". GATE VALVES AND VALVE BOXES SHALL CONFORM TO LOCAL PLUMBING ORDINANCES.

   HYDRANTS – HYDRANTS SHALL CONFORM TO THE SPECIFICATIONS OF THE CITY OF WAUKESHA MUNICIPAL CODE. THE DISTANCE FROM THE GROUND LINE TO THE CENTERLINE OF THE LOWEST NOZZLE AND THE LOWEST CONNECTION OF THE FIRE DEPARTMENT SHALL BE NO LESS THAN 18-INCHES AND NO GREATER THAN 23-INCHES (SEE DETAIL).

   BEDDING AND COVER MATERIAL – PIPE BEDDING AND COVER MATERIAL SHALL BE SAND, CRUSHED STONE CHIPS OR CRUSHED STONE SCREENINGS CONFORMING TO CHAPTER 8.43.2 OF THE "STANDARD SPECIFICATIONS".

   BACKFILL – BACKFILL MATERIAL AND INSTALLATION SHALL BE IN ACCORDANCE WITH CHAPTER 2.6.0 OF THE "STANDARD SPECIFICATIONS". GRAVEL BACKFILL IS REQUIRED IN ALL PAVED AREAS AND TO A POINT 5 FEET BEYOND THE EDGE OF PAVEMENT. TRENCHES RUNNING PARALLEL TO AND LESS THAN 5 FEET FROM THE EDGE OF PAVEMENT SHALL ALSO REQUIRE GRAVEL BACKFILL. LANDSCAPED AREAS MAY BE BACKFILLED WITH EXCAVATED MATERIAL IN CONFORMANCE WITH SECTION 8.43.5 OF THE "STANDARD SPECIFICATIONS".
9. SANITARY SEWER SPECIFICATIONS –

   SANITARY SEWER INSTALLATION SHALL COMPLY WITH CHAPTER 19, PLUMBING OF THE CITY OF WAUKESHA MUNICIPAL CODE.

   PIPE – SANITARY SEWER PIPE MATERIAL SHALL BE POLYVINYL CHLORIDE (PVC) MEETING REQUIREMENTS OF ASTM D 3034, SDR-35, WITH INTEGRAL BELL TYPE FLEXIBLE ELASTOMERIC JOINTS, MEETING THE REQUIREMENTS OF ASTM D-3212.

   BEDDING AND COVER MATERIAL – BEDDING AND COVER MATERIAL SHALL CONFORM TO THE APPROPRIATE SECTIONS OF THE "STANDARD SPECIFICATION" WITH THE FOLLOWING MODIFICATION: "COVER MATERIAL SHALL BE THE SAME AS USED FOR BEDDING AND SHALL CONFORM TO SECTION 8.43.2 (A). BEDDING AND COVER MATERIAL SHALL BE PLACED IN A MINIMUM OF THREE SEPARATE LIFTS, OR AS REQUIRED TO INSURE ADEQUATE COMPACTING OF THESE MATERIALS, WITH ONE LIFT OF BEDDING MATERIAL ENDING AT OR NEAR THE SPRINGLINE OF THE PIPE. THE CONTRACTOR SHALL TAKE CARE TO COMPLETELY WORK BEDDING MATERIAL UNDER THE HAUNCH OF THE PIPE TO PROVIDE ADEQUATE SIDE SUPPORT."

   BACKFILL – BACKFILL MATERIAL AND INSTALLATION SHALL BE IN ACCORDANCE CHAPTER 2.6.0 OF THE "STANDARD SPECIFICATIONS." GRAVEL BACKFILL IS REQUIRED IN ALL PAVED AREAS AND TO A POINT 5 FEET BEYOND THE EDGE OF PAVEMENT. TRENCHES RUNNING PARALLEL TO AND LESS THAN 5 FEET FROM THE EDGE OF PAVEMENT SHALL ALSO REQUIRE GRAVEL BACKFILL. LANDSCAPED AREAS MAY BE BACKFILLED WITH EXCAVATED MATERIAL IN CONFORMANCE WITH SECTION 8.43.5 OF THE "STANDARD SPECIFICATIONS."
10. WATERMAIN AND SANITARY SEWER SHALL BE INSULATED WHEREVER THE DEPTH OF COVER IS LESS THAN 6 FEET. INSULATION AND INSTALLATION OF INSULATION SHALL BE CONFORMING WITH CHAPTER 4.17.0 "INSULATION" OF THE STANDARD SPECIFICATIONS FOR SEWER AND WATER CONSTRUCTION IN WISCONSIN 6TH EDITION UPDATED WITH ITS LATEST ADDENDUM (TYP.).

PIPE LOCATION		STRUCTURE CONTRIBUTING AREA					PIPE FLOW				PIPE DATA				PIPE CAPACITY INFORMATION								ELEVATIONS			COVER TO CROWN (FT)
		ROOF	PAVED	GRASS	INDIVID	INDIV COMP	STORM	INTENSITY	INDIV	TOTAL				Manning's	ACTUAL FLOW							DROP				
UP STRUCT	DOWN STRUCT	C = 0.95 (SQ FT)	C = 0.95 (SQ FT)	C = 0.20 (SQ FT)	AREA (ACRES)	C VALUE (UNITLESS)	EVENT 2,5,10,25,50,100	I (IN/HR)	RUNOFF (CFS)	FLOW (CFS)	LENGTH (FT)	DIA. (IN)	SLOPE (FT/FT)	n HDPE	REQD DROP	ACTUAL DROP	PARTS FULL	VEL (FPS)	FULL FLOW (CFS)	TIME TO STRUCT. (MIN)	TIME IN SEWER (MIN)	THRU STRUCT (FT)	RIM/(F/L) UP	INVERT UP	INVERT DOWN	
RD-6	INL-2	21,524	0	0	0.49	0.95	100	8.79	4.12	4.12	64.4	12	0.1250	0.012	0.74	8.05	0.35	15.28	13.64	5.00	5.07	1.00	107.00	102.15	94.10	3.75
INL-5	INL-4	0	1,569	0	0.04	0.95	100	8.79	0.30	0.30	30.3	12	0.0208	0.012	0.00	0.63	0.18	4.85	5.56	5.00	5.10	0.50	99.85	95.34	94.71	3.41
INL-4	INL-3	0	21,463	2,101	0.54	0.88	100	8.75	4.18	4.48	38.4	18	0.0026	0.012	0.06	0.10	0.71	3.63	5.80	5.10	5.28	0.50	98.13	94.21	94.11	2.27
INL-3	INL-2	0	21,189	2,636	0.55	0.87	100	8.69	4.12	8.60	194.2	24	0.0026	0.012	0.24	0.50	0.65	4.31	12.49	5.28	6.03	0.00	99.92	93.61	93.10	4.11
INL-2	ES-1	0	2,798	210	0.07	0.90	100	8.43	0.52	13.25	30.4	24	0.0033	0.012	0.09	0.10	0.84	5.10	14.07	6.03	6.13	--	103.60	93.10	93.00	8.30

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Real Estate Development

PROJECT:

DENTAL ASSOCIATES

PROJECT LOCATION:

WAUKESHA
WAUKESHA COUNTY, WI

JSD PROJECT NO.: 15-6779

SEAL/SIGNATURE:

DESIGN BY:	TAG	5-20-15
DRAWN BY:	TAG	5-20-15
CHECKED BY:		

PLAN MODIFICATIONS:	DATE:
CITY SUBMITTAL	07-13-15

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SHEET TITLE:

SITE UTILITY PLAN

SHEET NUMBER:

C300

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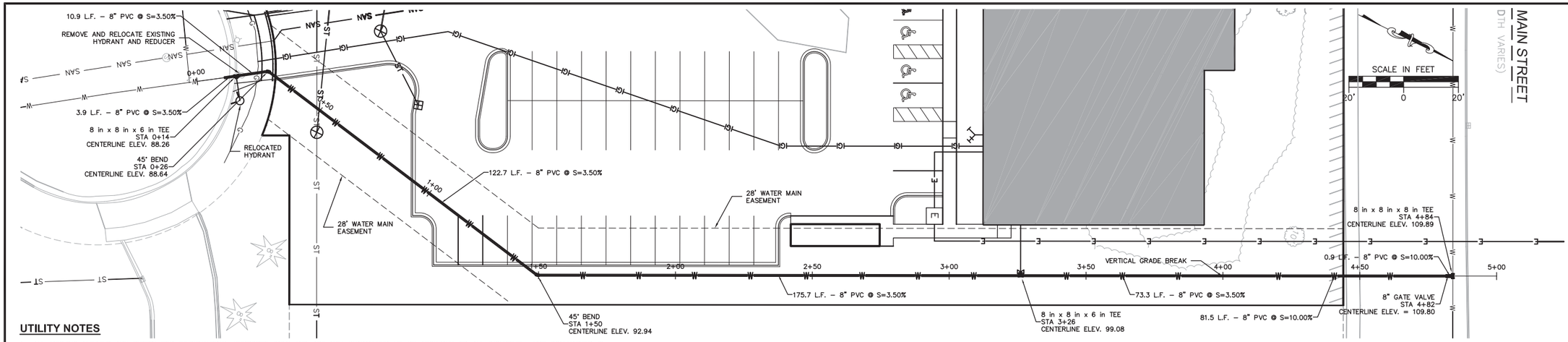

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2. ALL UTILITY WORK SHALL BE DONE IN ACCORDANCE WITH CITY OF WAUKESHA SPECIFICATIONS AND THE STANDARD SPECIFICATIONS FOR SEWER AND WATER CONSTRUCTION IN WISCONSIN – SIXTH EDITION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE WHICH SPECIFICATIONS AND CODES APPLY AND TO COORDINATE ALL CONSTRUCTION ACTIVITIES WITH THE APPROPRIATE LOCAL AND STATE AUTHORITIES.
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4. CONTRACTOR SHALL VERIFY ALL ELEVATIONS, LOCATIONS, AND SIZES OF WATER MAIN AND CHECK ALL UTILITY CROSSINGS FOR CONFLICTS, PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES.
5. WATER MAIN SPECIFICATIONS –

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   BEDDING AND COVER MATERIAL – PIPE BEDDING AND COVER MATERIAL SHALL BE CRUSHED STONE CHIPS CONFORMING TO CHAPTER 8.43.0 OF THE "STANDARD SPECIFICATIONS".

   BACKFILL – BACKFILL MATERIAL AND INSTALLATION SHALL BE IN ACCORDANCE WITH CHAPTER 2.6.0 OF THE "STANDARD SPECIFICATIONS". GRAVEL BACKFILL IS REQUIRED IN ALL PAVED AREAS AND TO A POINT 5 FEET BEYOND THE EDGE OF PAVEMENT. TRENCHES RUNNING PARALLEL TO AND LESS THAN 5 FEET FROM THE EDGE OF PAVEMENT SHALL ALSO REQUIRE GRAVEL BACKFILL. LANDSCAPED AREAS MAY BE BACKFILLED WITH EXCAVATED MATERIAL IN CONFORMANCE WITH SECTION 8.43.5 OF THE "STANDARD SPECIFICATIONS".
6. TRACER WIRE SHALL BE INSTALLED IN CONFORMANCE WITH SECTION 2.11.2 OF THE "STANDARD SPECIFICATIONS".

ESTIMATE OF QUANTITIES	
8" PVC WATER MAIN	472 LF
8" GATE VALVE AND BOX	1 EA
8" 45° BEND	2 EA
8" TAPPING SLEEVE	1 EA
8"X6" ANCHOR TEE	2 EA
HYDRANT ASSY (HYD, LEAD, VALVE, FITTINGS)	1 EA

LEGEND

SANITARY SEWER MANHOLE	ST	STORM SEWER	
FIRE HYDRANT	W	WATER MAIN	
WATER VALVE	SAN	SANITARY SEWER	
STORM SEWER MANHOLE	FIB	FIBER OPTIC	
OUTFALL	GAS	GAS	
CATCH BASIN	E	BURIED ELECTRIC	
	T	BURIED TELEPHONE	

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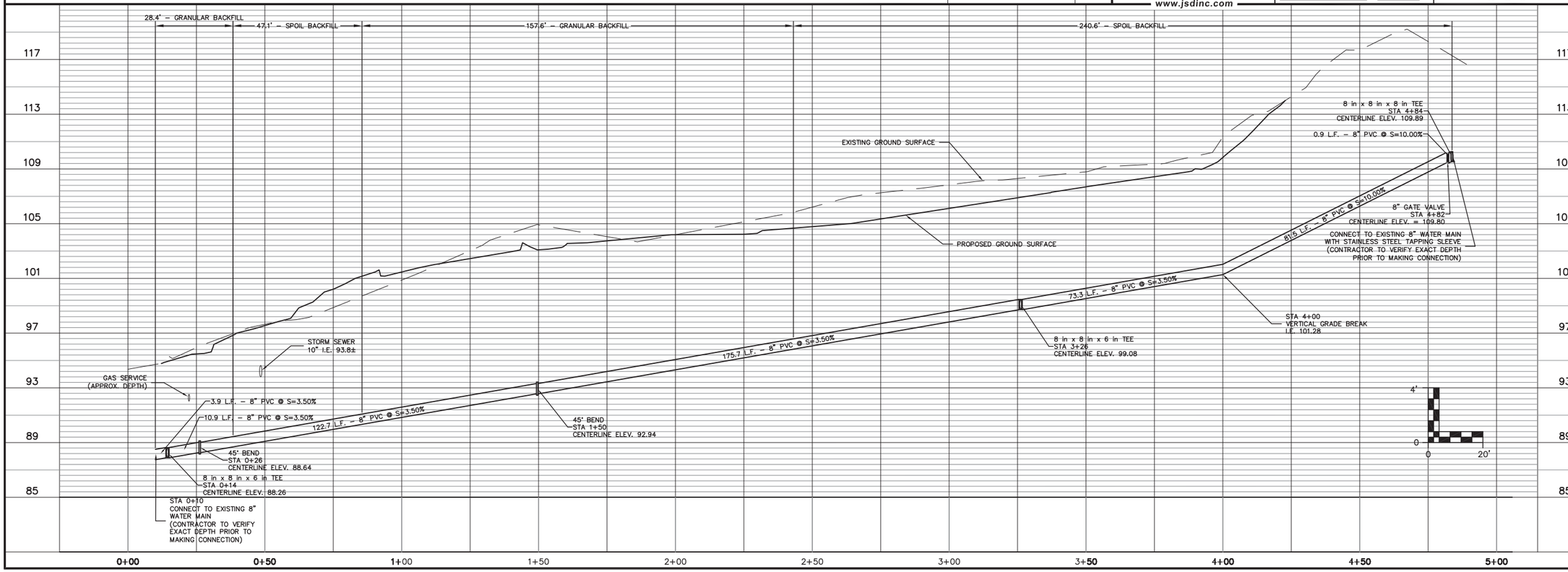
SERVICES PROVIDED TO: Interstate Partners LLC, Real Estate Development

PROJECT: DENTAL ASSOCIATES
PROJECT LOCATION: WAUKESHA
JSD PROJECT NO.: 15-6779

SHEET TITLE: WATERMAIN PLAN & PROFILE
LOCATION: PUBLIC WATERMAIN EASEMENT
FROM: STA 0+10
TO: STA 4+84

DESIGN BY:	JJS	07-13-15
DRAWN BY:	JJS	07-13-15
CHECKED BY:	TAG	07-13-15

SHEET NUMBER: C301



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PROJECT: DENTAL ASSOCIATES
PROJECT LOCATION: WAUKESHA COUNTY, WI
JSD PROJECT NO.: 15-6779

SEAL/SIGNATURE:

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DESIGN BY: JJS 07-13-15
DRAWN BY: JJS 07-13-15
CHECKED BY: TAG 07-13-15

PLAN MODIFICATIONS: | DATE:

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SHEET TITLE: PROPOSED WATERMAIN PLAN & PROFILE

SHEET NUMBER: C301

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DEPARTMENT OF COMMERCE STORM SEWER CALCULATIONS

Project Name: **DOLPHIN COURT**

Project Location: WAUKESHA, WI

JSD Project Number: 15C6779

Performed by: JJS

Date: 6/25/2015

MILWAUKEE REGIONAL OFFICE
N22 W22931 Nancy Court, Suite 3
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MADISON REGIONAL OFFICE
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Ph: (608) 848-5060 Fax: (608) 848-2255

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Structure abbreviations are as follows: ES - End Section, MH - Manhole, FI - Field Inlet, TD - Trench Drain, BC - Building Connection, RD - Roof Drain, STB - Stub

PIPE LOCATION		CONTRIBUTING AREA			PIPE FLOW			PIPE DATA				PIPE CAPACITY INFORMATION					DROP	ELEVATIONS			COVER
						TOTAL FLOW						ACTUAL FLOW				FULL	THRU				TO
UP STRUCT	DOWN STRUCT	ROOF (SQ FT)	PAVED (SQ FT)	GRASS (SQ FT)	AREA RUNOFF (GPM)	(GPM)	(CFS)	LENGTH (FT)	DIA. (IN)	SLOPE (FT/FT)	Manning's n HDPE	REQD DROP	ACTUAL DROP	PARTS FULL	VEL (FPS)	FLOW (CFS)	STRUCT (FT)	RIM/(F/L) UP	INVERT UP	INVERT DOWN	CROWN (FT)
RD-6	INL-2	21,524	0	0	828	828	1.84	64.4	12	0.1250	0.012	0.15	8.05	0.37	15.68	13.64	0.25	107.00	102.47	94.42	3.43
INL-5	INL-4	0	1,569	0	48	48	0.11	30.3	12	0.0052	0.012	0.00	0.16	0.09	1.76	2.78	0.00	99.85	95.18	95.02	3.57
INL-4	INL-3	0	21,463	2,101	681	729	1.62	38.4	12	0.0026	0.012	0.07	0.10	0.75	2.81	1.97	0.25	98.13	95.02	94.92	2.01
INL-3	INL-2	0	21,189	2,636	677	1406	3.13	194.2	15	0.0026	0.012	0.39	0.50	0.79	3.29	3.57	0.00	99.92	94.67	94.17	3.87
INL-2	ES-1	0	2,798	210	88	2322	5.17	30.4	15	0.0055	0.012	0.17	0.17	0.89	4.82	5.19	-	103.60	94.17	94.00	8.06