CARMAX WILMINGTON

NEW HANOVER COUNTY, NC

STORM WATER - EROSION CONTROL

DESIGN NARRATIVE

Prepared for:

CarMax Auto Superstores, Inc.
12800 Tuckahoe Creek Parkway
Richmond, VA 23238

Prepared by:

PARAMOUNTE
ENGINEERING, INC.

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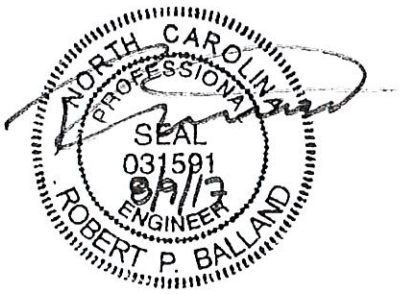

Project #15253.PE

May 2017
Revised August 2017

Final SW Calcs
SWP2017035
8/17/17
RAC

CARMAX WILMINGTON
NEW HANOVER COUNTY, NORTH CAROLINA

Project #15253.PE

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CARMAX WILMINGTON
NEW HANOVER COUNTY, NORTH CAROLINA
Project #15253.PE

DESIGN NARRATIVE

CarMax Auto Superstores, Inc. proposes to construct a used car dealership off of Market Street, approximately 0.75 miles southwest of the intersection of Hwy 74 and Hwy 17 Business. As a result, please find this design narrative, plans, and supporting calculations. The property is located at 6030 Market Street in Wilmington with a latitude and longitude of 34°15'07"N, 77°51'07"W (Deed Book 6058, Page 568-574 and Deed Book 6058, Page 575-581). The property drains to Spring Branch to Smith Creek (C; Sw 18-74-63-1). According to the NRCS Soil Survey of New Hanover County the soil across the site consists mainly of Leon Sand (Le), with parts of Murville Fine Sand (Mu), with very minor traces of Seagate Fine Sand (Se), and the ground cover consists of fair woodlands.

All stormwater runoff will be directed by way of storm sewer pipe system which outflows directly to a proposed wet detention basin for peak attenuation. The storm water will be permitted under the high-density option with an impervious coverage of 67.2%. The proposed storm sewer pipe has been designed to meet City of Wilmington requirements. Please find all supported calculations within the following pages of the report.

The pond has been designed to meet NCDEQ requirements for treatment of the first 1.5-inches of runoff, which includes a wet pond that releases the 1.5-inches of runoff through a low flow orifice within 2-5 days. The retention requirements for the 1.5-inch rainfall runoff were calculated using the Simple Method and the 90% TSS removal requirements.

Storm water from greater storm events will be allowed to exit the wet detention pond by means of a riser barrel outlet structure and a secondary spillway during emergency situations. The wet detention pond will also be used to provide peak discharge control to at or below pre-developed peak discharge in the 2, 10, and 25-yr design storm. The wet pond was calculated utilizing SCS TR-20 hydrograph routing through the HydroCAD software application.

PRE vs. POST RUNOFF SUMMARY:

Pre-Dev:	Post-Dev:
Q2 = 2.99 cfs	<Q2 = 2.41 cfs
Q10 = 8.91 cfs	<Q10 = 8.31 cfs
Q25 = 11.70 cfs	<Q25 = 10.03 cfs

Wet Pond #1

Pond Routing Peak Elev:
WSEL2 = 40.75
WSEL10 = 41.45
WSEL25 = 41.81 < 42.10' (Emer. Spillway)
WSEL50 = 42.12
WSEL100 = 42.40 < 44.00' (Top of Pond)
Top of Pond = 44.00' (6" Freeboard-50-yr storm)

Wet Pond #1

Principal Outlet Blocked - Emergency Spillway Active Only
WSEL50 = 42.39 < 44.00' (Top of Pond)
Q50 = 10.00 cfs

During construction, temporary sediment basins will be used to treat runoff. Runoff will be conveyed to the sediment basins via temporary diversion ditches, and eventually outfall to existing ditch. Other erosion control BMPs that have been implemented include sediment traps, silt fence, rip-rap aprons, and construction entrances.

MAINTENANCE

Contractors shall be responsible for periodic inspection and maintenance of all indicated erosion control devices. In addition, inspection and any necessary maintenance will be required immediately following any significant storm event. Any erosion control measure that fails to function as intended shall be repaired immediately. Upon completion of construction and the establishment of stabilized ground cover, the property owner shall be responsible for any ongoing site maintenance.

EROSION AND SEDIMENTATION CONTROL SPECIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENT

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

A. Contractor shall take every reasonable precaution throughout construction to prevent the erosion of soil and the sedimentation of streams, lakes, reservoirs, other water impoundments, ground surfaces, or other property as required by State and Local regulations.

B. Contractor shall, upon suspension or completion of land-disturbing activities, provide protection covering for disturbed areas. Permanent vegetation shall be established at the earliest practicable time. Temporary and permanent erosion control measures shall be coordinated to assure economical, effective, and continuous erosion and sediment control throughout the construction and post construction period.

1.3 RELATED SECTIONS

A. Related Sections – The following Sections contain requirements that relate to this Section:
1. 01011 – Existing Underground Utilities
2. 01015 – Special Conditions for this Contract
3. 01070 – Shop Drawings, Project Data & Samples
4. 02200 – Earthwork, Excavation Trenching, and Backfilling
5. 02230 – Site Clearing
6. 02240 – Dewatering
7. 02485 – Seeding General Areas

1.4 REGULATORY REQUIREMENTS

A. Contractor shall be responsible for prevention of damage to properties outside the construction limits from siltation due to construction of the project. The Contractor will assume all responsibilities to the affected property owners for correction of damages that may occur. Erosion control measures shall be performed by the Contractor, conforming to the requirements of, and in accordance with plans approved by applicable state and local agencies and as per the erosion control portion of the construction drawings and these specifications. The Contractor shall not allow mud and debris to accumulate in the streets. Should the Contractor pump water from trenches during construction, appropriate siltation preventative measures shall be taken prior to discharge of pumped water into any storm drain or stream.

PART 2 - PRODUCTS

2.1 Open mesh biodegradable mulching cloth.

2.2 Fertilizer shall be 10-10-10 grade or equivalent.

2.3 Lime shall be dolomitic agricultural ground 1 limestone containing not less than 10 percent magnesium oxide.

2.4 Phosphate shall be 20 percent super phosphate or equivalent.

2.5 Provide grass seed mixture as shown on the plans.

2.6 Silt fence shall consist of non-biodegradable filter fabric (Trevira, Mirafi, etc.) wired to galvanized wire mesh fencing and supported by wood or metal posts.

2.7 NCDOT Class B stone for erosion control.

PART 3 - EXECUTION

3.1 CLEARING

A. Clearing and grubbing shall be scheduled and performed in such a manner that subsequent grading operation and erosion control practices can follow immediately thereafter. Excavation, borrow, and embankment operations will be conducted such that continuous operation. All construction areas not otherwise protected shall be planted with permanent vegetative cover within 7 working days after completion of active construction. All slopes shall be planted within 14 calendar days after completion of such activity.

3.2 STABILIZING

A. The angle for graded slopes and fills shall be no greater than the angle that can be retained by vegetative cover or other adequate erosion control devices or structures. All disturbed areas not to be paved and left exposed will, within 14 calendar days of completion of any phase of grading, be planted or otherwise provided with either temporary or permanent ground cover, devices, or structures sufficient to restrain erosion. All slopes steeper than 3:1 shall be planted or otherwise provided with either temporary or permanent ground cover, devices, or structures sufficient to restrain erosion within 7 calendar days.

3.3 REGULATORY REQUIREMENTS

A. Whenever land disturbing activity is undertaken on a tract, a ground cover sufficient to restrain erosion must be planted or otherwise provided within 7 calendar days on that portion of the tract upon which further active construction is to being undertaken.

B. If any earthwork is to be suspended for any reason whatsoever for longer than 7 calendar days, the areas involved shall be seeded with vegetative cover or otherwise protected against excessive erosion during the suspension period. Suspension of work in any area of operation does not relieve the Contractor of the responsibility for the control of erosion in that area.

PART 4 - CONSTRUCTION PHASE

4.1 PRACTICES

A. Avoid dumping soil or sediment into any streambed or watercourse. Backfill for stream crossings shall be placed dry and compacted to minimize siltation of the watercourse, where applicable.

B. Maintain an undisturbed vegetative buffer where possible between a natural watercourse and trenching and grading operations.

C. Avoid equipment crossings of streams, creeks, and ditches where practicable.

PART 5 - SEDIMENT CONTROL FEATURES

5.1 GENERAL

A. All devices (silt fences, retention areas, etc.), for sediment control shall be constructed at the locations indicated prior to beginning excavation on the site. All devices shall be properly maintained in place until a structure or paving makes the device unnecessary or until directed to permanently remove the device.

5.2 DESIGN APPLICATIONS

A. Mulch shall be used for temporary stabilization of areas subject to excessive erosion, and for protection of seed beds after planting where required.
   1. Jute, mesh, etc. should be installed as per manufacturer's instructions.

B. Silt fences shall be used at the base of slopes to restrict movement of sediment from the site.

C. Riprap shall be used at the proposed outfall pipes as indicated on plans.

D. Establish vegetative cover on all unpaved areas disturbed by the work.
   1. Preparation of Seedbed. Areas to be seeded shall be scarified a depth of 6 inches until a firm, well-pulverized, uniform seedbed is prepared. Lime, phosphorous, and fertilizer shall be applied during the scarification process in accordance with the following rates.
      a. Lime – 2 ton per acre
      b. Nitrogen – 100 pounds per acre
      c. P_2O_5 – 200 pounds per acre
   2. Seeding. Disturbed areas along roads and ditches shall be permanently seeded with 10-20 pounds per acre of centipede during the period from March through September. Seeding performed during the period from April to August shall be temporarily seeded with 40 pounds per acre of German Millet. The permanent vegetative cover will be over seeded at the earliest possible time as specified above.
   3. Mulch all areas immediately after seeding. Mulch shall be applied and anchored as specified hereinbefore.

5.3 MAINTENANCE

A. The Contractor shall be responsible for maintaining all temporary and permanent erosion control measures in functioning order. Temporary structures shall be maintained until such time as vegetation is firmly established and grassed areas shall be maintained until completion of the project. Areas which fail to show a suitable stand of grass or which are damaged by erosion shall be immediately repaired.

5.4 REMOVAL OF SEDIMENT CONTROL DEVICES

A. Near completion of the project, when directed by the Owner's agent, the Contractor shall dismantle and remove the temporary devices used for sediment control during construction. All erosion control devices in seeded areas shall be left in place until the grass is established. Seed areas around devices and mulch after removing or filling temporary control devices.

END OF SECTION 02410

SOILS MAP

Hydrologic Soil Group—New Hanover County, North Carolina

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: New Hanover County, North Carolina
Survey Area Data: Version 15, Sep 12, 2014

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

Date(s) aerial images were photographed: Data not available.

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 — New Hanover County, North Carolina (NC129)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Le	Leon sand	A/D	11.2	72.0%
Mu	Murville fine sand	A/D	4.3	27.3%
Se	Seagate fine sand	B	0.1	0.7%
Totals for Area of Interest			**15.6**	**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

USGS MAP


USGS
science for a changing world
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
The National Map
US Topo
SCOTTS HILL QUADRANGLE
NORTH CAROLINA
7.5-MINUTE SERIES
Scotts Hill
Kirkland
Smith Creek
WILMINGTON
Figure Eight Island
ATLANTIC OCEAN
Middle Sound
Intracoastal Waterway
Site
SCALE 1:24 000
CONTOUR INTERVAL 5 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988
ROAD CLASSIFICATION
SCOTTS HILL, NC
2016

CALCULATIONS

6030 MARKET STREET

NC DENR Retention Requirements

Objective: design a wet detention basin with the following characteristics: a permanent water pool depth between 3- and 6-feet, a surface area that meets TSS removal requirements (values set by NC DENR and included here), a forebay that is approximately 20% of the total pond volume, a temporary water pool sized to detain the initial 1.5 inch of rainfall runoff, an outlet device that drains the temporary water pool within 2-5 days, and a length-to-width ratio of approximately 3:1.

Step 1: *Determine the surface area required for 90% TSS removal*

Post-Development Conditions			
Total Drainage Area	11.88	ACRE	*Value from CAD*
Impervious Drainage Area	10.10	ACRE	*Value from CAD*
Impervious Cover	85.0%		*Impervious Cover=(Impervious Drainage Area)/(Total Drainage Area)*100%*
Elevation of Permanent Pool Surface	**39.0**	**FT**	*Value selected by designer*
Depth of Permanent Pool	**11.0**	**FT**	*Value selected by designer*
Elevation of Wet Detention Pond Bottom	28.0	FT	*(Bottom Elevation)=(Permanent Pool Surface Elevation)-(Depth of Permanent Pool)*
Approximate Pond Length	480	FT	*Value from CAD*
Approximate Pond Width	130	FT	*Value from CAD*
Length:Width Ratio	**4:1**		*Ratio=(Length)/(Width):1*
Required SA/DA Ratio for 90% TSS Removal	3.05		*Value from chart. Reference: 90% TSS Removal*
Required Permanent Pool Surface Area	**15,784**	**SF**	*Required Surface Area=(Required SA/DA Ratio)*(Total Drainage Area)*
Provided Permanent Pool Surface Area	**61,411**	**SF**	*Interpolated value from stage-storage calculations*

Step 2: *Determine the 1.5-inch runoff elevation within the wet detention pond.*

Runoff Coefficient, Rv	0.815	IN/IN	*Rv=0.05+0.009*(% Impervious)*
Required 1.5" Runoff Volume (Volume of Temporary Pool)	52,729	CF	*1.5" Runoff Volume=1.5 inch*Rv*1 foot/12 inch*(Total Drainage Area)*
Volume Below Permanent Pool	408,073	CF	*Value from stage-storage calculations (cumulative pond volume at permanent pool elevation)*
Total Volume to be Controlled	**460,802**	**CF**	*Total Volume to be Controlled=(Volume Below Permanent Pool)+(1.5" Runoff Volume)*
Storage Elevation at Required Volume	**39.84**	**FT**	*Value is interpolation based upon stage-storage values. See stage-storage calculations*

Step 3: *Calculate the required forebay volume (18-22% of total pond volume) and compare to the forebay volume provided.*

Total Pond Volume	408,073	CF	*Value from stage-storage calculations*
Required Total Forebay Volume	**81,615**	**CF**	*Forebay Volume=(Total Pond Volume)*20%*
Provided Total Forebay Volume	**74,574**	**CF**	*Value from stage-storage calculations*
Provided Forebay Volume:Total Pond Volume	**18%**		*(Provided Forebay Volume)/(Total Pond Volume)*100%*

Step 4: *Verify that time required to drawdown the 1.5-inch runoff volume is within 2 to 5 days.*

Diameter of Proposed Low-flow Orifice	4.00	IN	*Value chosen by designer*
Elevation 1.5" Volume	39.84	FT	*Value chosen by designer*
Total Elevation Head Above Orifice	0.84	FT	*(Total Elevation Head Above Orifice)=(Weir Elevation)-(Elevation of Permanent Pool Surface)*
Average Elevation Head Above Orifice	0.28	FT	*(Average Elevation Head Above Orifice)=[(Storage Elevation at Required Volume)+(Elevation of Permanent Pool Surface)]/3-(Storage Elevation at Required Volume)*
Cd, Coefficient of Discharge	0.60		*Value chosen by designer*
Q, Flowrate Through Low-flow Orifice	0.22	CFS	*Q=Cd*(Pi)*[(Diameter of Orifice)*(1 ft/12 in)]^2/4*[2*32.2*(Average Head)]^1/2*
Drawdown Time for 1.5-inch Runoff	**2.74**	**DAYS**	*(Drawdown Time)=(1.5" Runoff Volume)/Q*(1 day/86400 seconds)*

Diameter of Proposed Low-flow Orifice	4.00	IN	*Value chosen by designer*
Elevation of Outlet Structure	40.50	FT	*Value chosen by designer*
Total Elevation Head Above Orifice	1.50	FT	*(Total Elevation Head Above Orifice)=(Weir Elevation)-(Elevation of Permanent Pool Surface)*
Average Elevation Head Above Orifice	0.50	FT	*(Average Elevation Head Above Orifice)=[(Storage Elevation at Required Volume)+(Elevation of Permanent Pool Surface)]/3-(Storage Elevation at Required Volume)*
Cd, Coefficient of Discharge	0.60		*Value chosen by designer*
Q, Flowrate Through Low-flow Orifice	0.30	CFS	*Q=Cd*(Pi)*[(Diameter of Orifice)*(1 ft/12 in)]^2/4*[2*32.2*(Average Head)]^1/2*
Drawdown Time for Temporary Pool	**3.74**	**DAYS**	*(Drawdown Time)=(Temp Pool Volume)/Q*(1 day/86400 seconds)*

6030 MARKET STREET

Stage-Storage Calculations for Proposed Wet Detention Pond #1

Stage/Storage Above Permanent Pool (Including Forebay)

Contour	Contour Area (SF)	Incremental Volume (CF)	Cumulative Volume, S (CF)	
39.0	**61,411**	0	0	**←Permanent Pool**
39.8	**64,360**	52,824	52,824	
40.0	**65,009**	10,350	63,173	
40.5	**66,802**	32,953	96,126	
41.0	**68,602**	33,851	129,977	
41.5	**70,446**	34,762	164,739	
42.0	**72,224**	35,668	200,407	
43.0	**75,970**	74,097	274,504	
44.0	**79,768**	77,869	352,373	

Stage/Storage Total Pond (Including Forebay)

Contour	Contour Area (SF)	Incremental Volume (CF)	Cumulative Volume, S (CF)	
27.0	0	0	0	**←Pond Bottom**
28.0	19,212	0	0	**←Sediment Storage**
29.0	22,001	20,607	20,607	
30.0	24,933	23,467	44,074	
31.0	27,997	26,465	70,539	
32.0	31,165	29,581	100,120	
33.0	34,466	32,816	132,935	
34.0	37,997	36,232	169,167	
35.0	41,575	39,786	208,953	
36.0	45,286	43,431	252,383	
37.0	49,172	47,229	299,612	
38.0	53,169	51,171	350,783	
39.0	61,411	57,290	408,073	**←Permanent Pool**
40.0	65,009	63,210	471,283	
41.0	68,602	66,806	538,088	
42.0	72,224	70,413	608,501	
43.0	75,970	74,097	682,598	
44.0	79,768	77,869	760,467	

Forebay #1

Contour	Contour Area (SF)	Incremental Volume (CF)	Cumulative Volume, S (CF)	
27.0	0	0	0	**←Bottom Elev.**
28.0	2,180	0	0	**←Sediment Storage**
29.0	2,802	2,491	2,491	
30.0	3,496	3,149	5,640	
31.0	4,246	3,871	9,511	
32.0	5,071	4,659	14,170	
33.0	5,971	5,521	19,691	
34.0	6,944	6,458	26,148	
35.0	7,957	7,451	33,599	
36.0	9,040	8,499	42,097	
37.0	10,201	9,621	51,718	
38.0	11,415	10,808	62,526	
39.0	12,682	12,049	74,574	**←Forebay Volume**

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Prepared By: RPB
Date: 7/31/17

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Average Depth Calculation: (Option 2 per Errata)
**Note: Only used areas relative to the main pond*

Pond #1

$A_{Bottom\ Shelf}$ =	53,169	sf
$A_{Bottom\ Pond}$ =	17,032	sf
$A_{Perm\ Pool}$ =	61,411	sf
Depth =	11.0	ft
d_{avg} =	7.7	ft

Project Name:	6030 Market St
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Basin: DA #1 [PRE]	Drainage Area =	11.88	Ac.

Soil Type	**Area (Ac.)**	**HSG:**	**% of Basin**	
Leon (Le)	8.72	A/D	73.40	
Murville (Mu)	3.16	A/D	26.60	
Sum:			100.00	

HSG:	**% of Basin**
A	50.00
B	0.00
C	0.00
D	50.00

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Basin: DA #1 [PRE] Drainage area= 11.88 acres = 0.019 mi^2

Time of Concentration

Time of Concentration	
Overland Flow	
Hydraulic Length =	1130 ft.
Slope =	0.5 %
Ground Cover =	Wooded
V (Figure 12.7) =	0.18 fps
T_c =	104.6 min.

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Basin: DA #1 [PRE] Drainage area= 11.88 acres = 0.019 mi^2

Curve Number

	HSG:	**A**	**B**	**C**	**D**	Sum
	% of Basin	50.0	0.0	0.0	50.0	100.0
Land Use	**% of Basin**	**CN A**	**CN B**	**CN C**	**CN D**	**Weighted CN**
Wooded - Good	100.0	39	55	70	77	58.00
Sum:	100.0					Sum: 58.00

Curve numbers taken from: TR-55 **Use: 58**

= values input by user
= values calculated by spreadsheet

* = This land use classification is based on assumed Pre-Development conditions of where the property lies in reference to a natural barrier island cross section in North Carolina.

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Basin: DA #1 [POST] Drainage area= 11.88 acres = 0.019 mi^2

Area Calculations

Land Use	**Area (Ac.)**	**% of Basin**
Building (Roof Top)	0.00	
Pavement (Sidewalk/Drive)	0.00	
Future	0.00	
Impervious (Total) =	10.10	85.0%
Open Space - Good	1.78	15.0%
Sum:	11.88	100%

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PARAMOUNTE ENGINEERING, INC.

Basin: DA #1 [POST] Drainage area= 15.03 acres = 0.023 mi^2

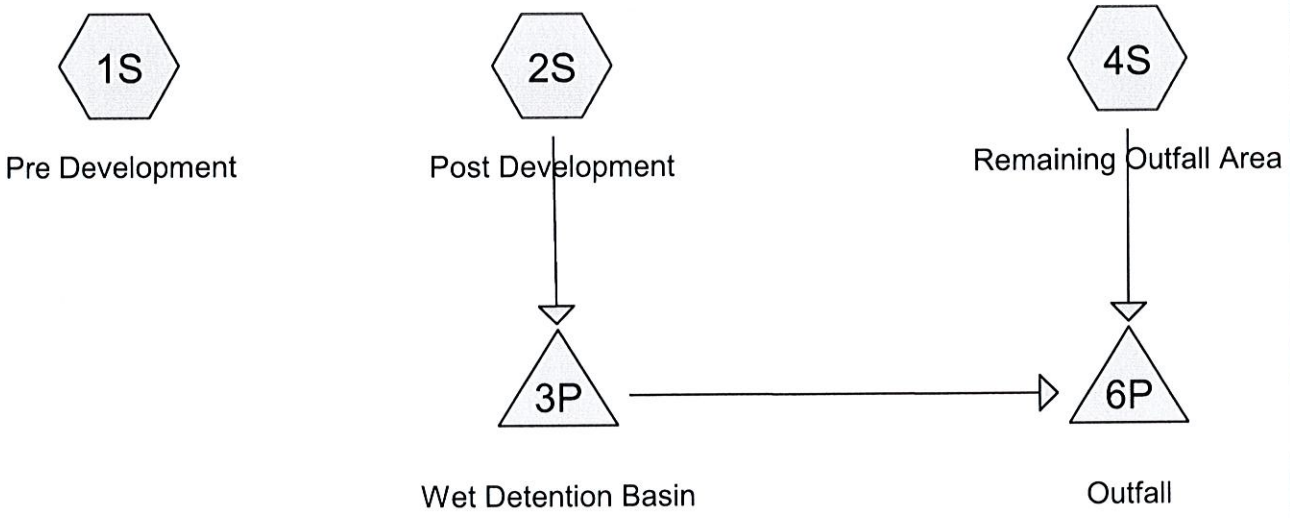
Curve Number

	HSG:	**A**	**B**	**C**	**D**	Sum
	% of Basin	50.0	0.0	0.0	50.0	100.0
Land Use	**% of Basin**	**CN A**	**CN B**	**CN C**	**CN D**	**Weighted CN**
Impervious	85.0	98	98	98	98	83.30
Open Space - Good	15.0	39	61	74	80	8.93
Sum:	100.0				Sum:	92.23

Curve numbers taken from: TR-55 **Use:** **93**

= values input by user
= values calculated by spreadsheet

Pre vs Post



Subcat Reach Pond Link

Routing Diagram for Carmax Wet Detention Basin
Prepared by Microsoft, Printed 7/31/2017

Summary for Subcatchment 1S: Pre Development

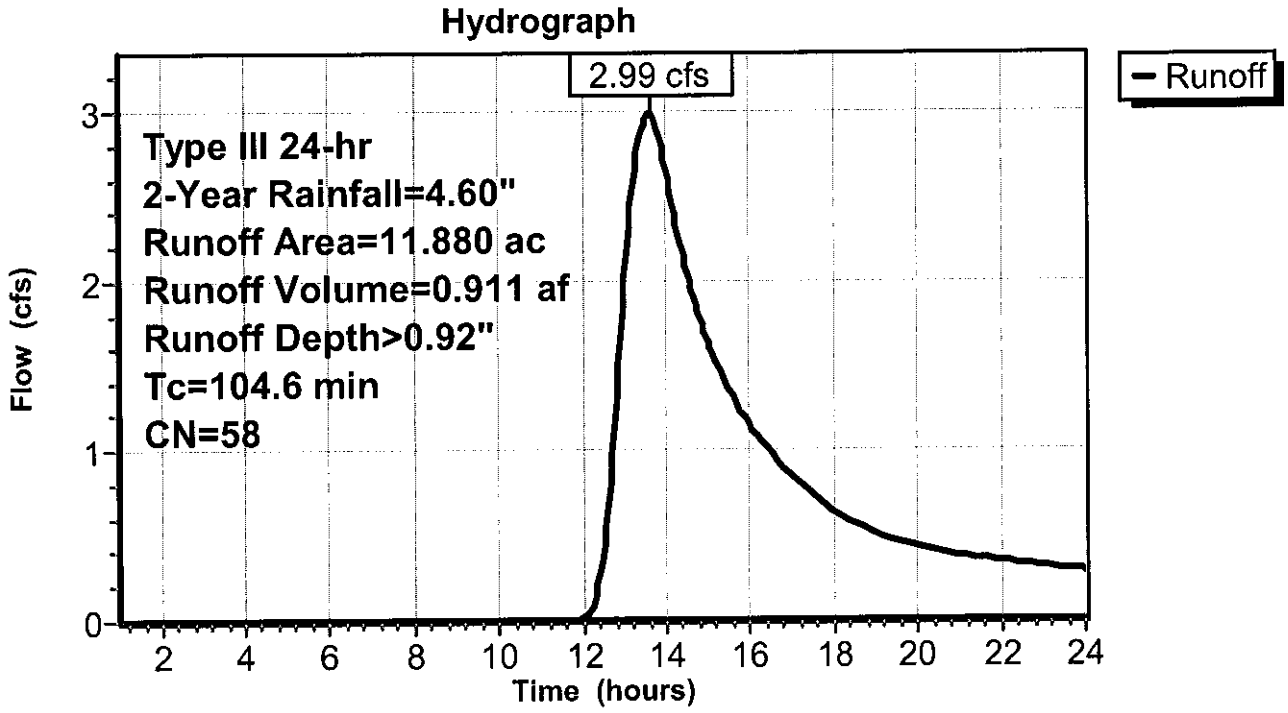
Runoff = 2.99 cfs @ 13.60 hrs, Volume= 0.911 af, Depth> 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=4.60"

	Area (ac)	CN	Description
*	5.940	39	Woods, Good, HSG A
	5.940	77	Woods, Good, HSG D
	11.880	58	Weighted Average
	11.880		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
104.6					**Direct Entry,**

Subcatchment 1S: Pre Development



Summary for Subcatchment 2S: Post Development

Runoff = 49.47 cfs @ 12.07 hrs, Volume= 3.660 af, Depth> 3.70"

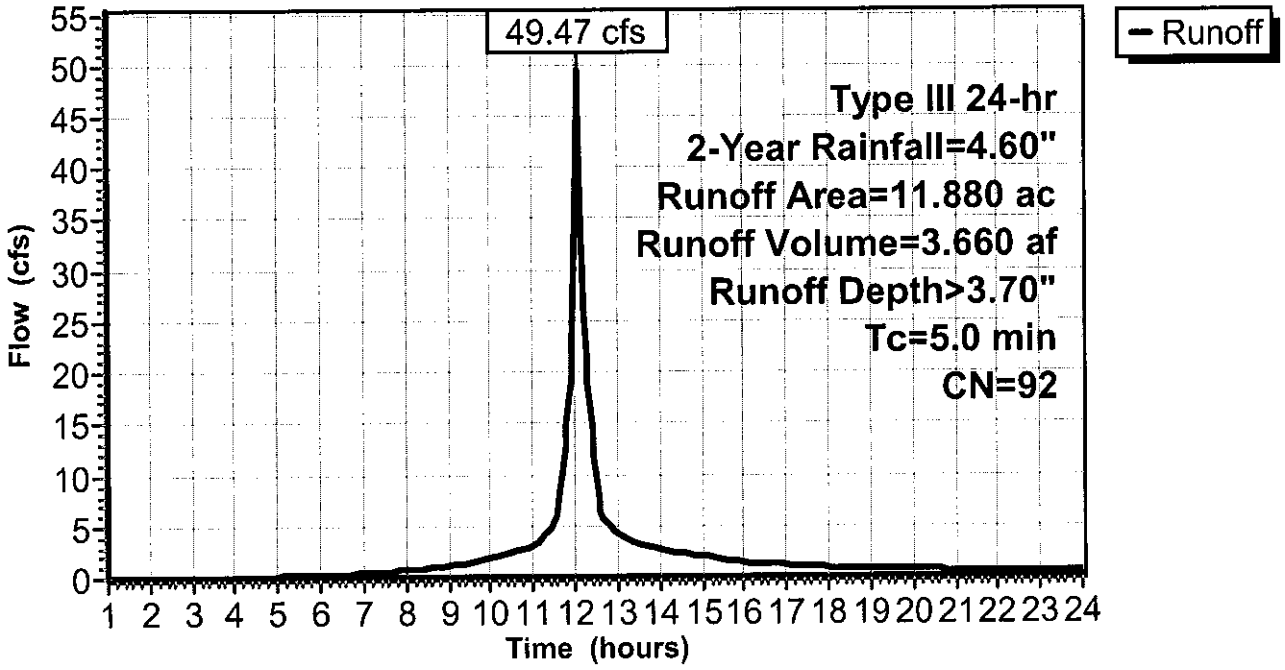
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=4.60"

Area (ac)	CN	Description
0.890	39	>75% Grass cover, Good, HSG A
0.890	80	>75% Grass cover, Good, HSG D
5.050	98	Paved parking, HSG A
5.050	98	Paved parking, HSG D
11.880	92	Weighted Average
1.780		14.98% Pervious Area
10.100		85.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: Post Development

Hydrograph



Summary for Subcatchment 4S: Remaining Outfall Area

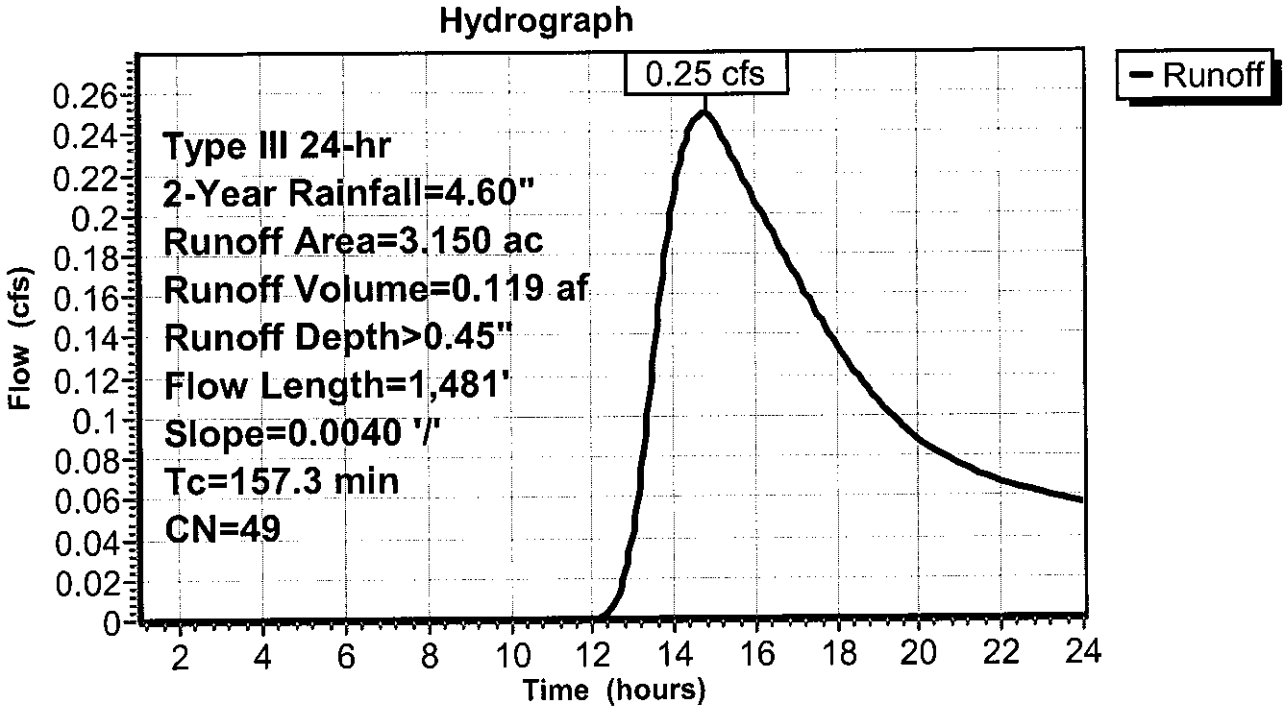
Runoff = 0.25 cfs @ 14.81 hrs, Volume= 0.119 af, Depth> 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=4.60"

Area (ac)	CN	Description
3.150	49	50-75% Grass cover, Fair, HSG A
3.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
157.3	1,481	0.0040	0.16		**Lag/CN Method,**

Subcatchment 4S: Remaining Outfall Area



Summary for Pond 3P: Wet Detention Basin

Inflow Area = 11.880 ac, 85.02% Impervious, Inflow Depth > 3.70" for 2-Year event
Inflow = 49.47 cfs @ 12.07 hrs, Volume= 3.660 af
Outflow = 2.16 cfs @ 14.80 hrs, Volume= 1.357 af, Atten= 96%, Lag= 163.6 min
Primary = 2.16 cfs @ 14.80 hrs, Volume= 1.357 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 40.75' @ 14.80 hrs Surf.Area= 67,714 sf Storage= 113,165 cf

Plug-Flow detention time= 375.3 min calculated for 1.354 af (37% of inflow)
Center-of-Mass det. time= 242.7 min (1,026.8 - 784.1)

Volume	Invert	Avail.Storage	Storage Description
#1	39.00'	352,395 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

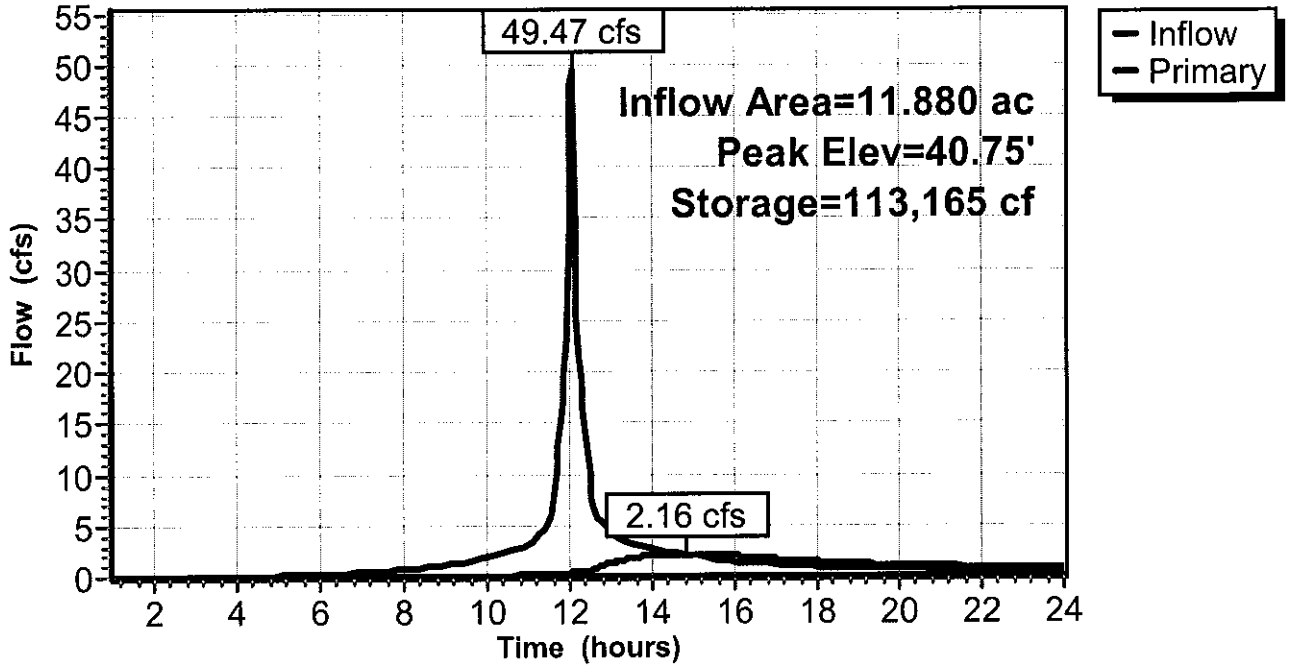
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.00	61,411	0	0
40.00	65,009	63,210	63,210
41.00	68,602	66,806	130,016
42.00	72,224	70,413	200,429
43.00	75,970	74,097	274,526
44.00	79,768	77,869	352,395

Device	Routing	Invert	Outlet Devices
#1	Primary	42.10'	**25.0' 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
#2	Primary	39.00'	**18.0" Round Culvert** L= 92.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 39.00' / 39.00' S= 0.0000 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Device 2	39.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	40.50'	**48.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600
#5	Device 2	41.50'	**16.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.16 cfs @ 14.80 hrs HW=40.75' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Passes 2.16 cfs of 5.20 cfs potential flow)
  - **3=Orifice/Grate** (Orifice Controls 0.53 cfs @ 6.06 fps)
  - **4=Orifice/Grate** (Orifice Controls 1.63 cfs @ 1.61 fps)
  - **5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

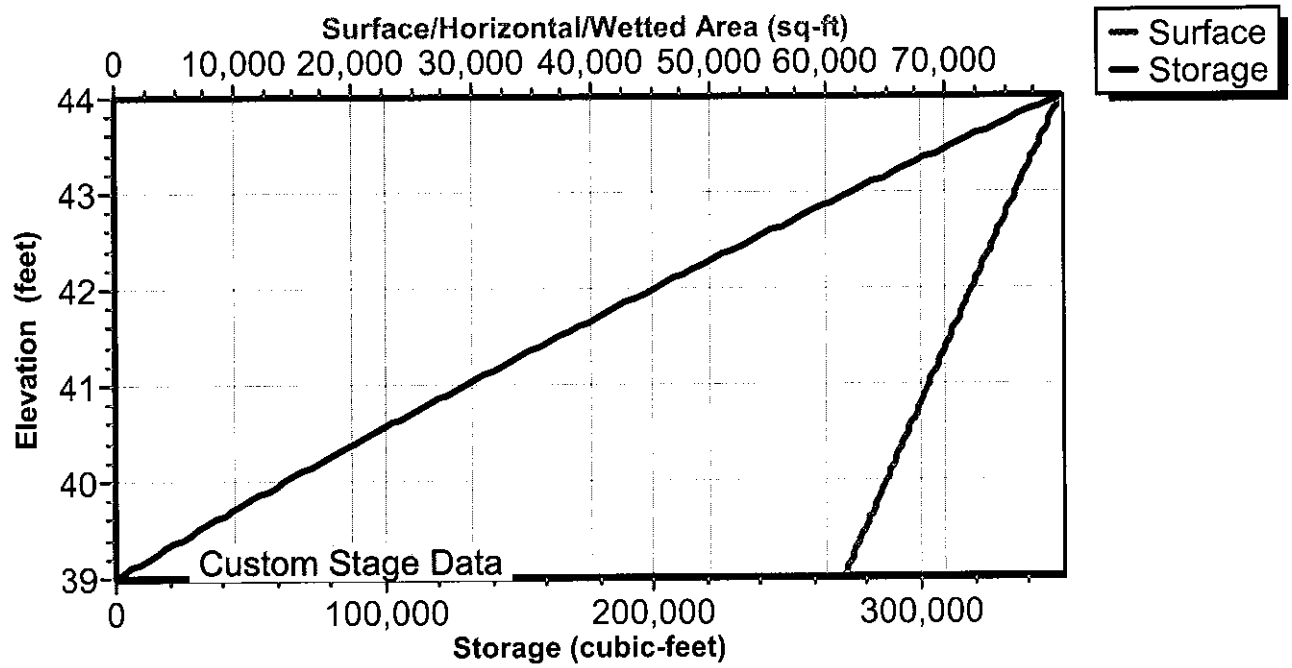
Pond 3P: Wet Detention Basin

Hydrograph



Pond 3P: Wet Detention Basin

Stage-Area-Storage



Summary for Pond 6P: Outfall

Inflow Area = 15.030 ac, 67.20% Impervious, Inflow Depth > 1.18" for 2-Year event
Inflow = 2.41 cfs @ 14.80 hrs, Volume= 1.476 af
Outflow = 2.41 cfs @ 14.83 hrs, Volume= 1.468 af, Atten= 0%, Lag= 1.9 min
Primary = 2.41 cfs @ 14.83 hrs, Volume= 1.468 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 36.94' @ 14.83 hrs Surf.Area= 979 sf Storage= 558 cf

Plug-Flow detention time= 5.2 min calculated for 1.468 af (99% of inflow)
Center-of-Mass det. time= 3.2 min (1,030.6 - 1,027.4)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	58,351 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

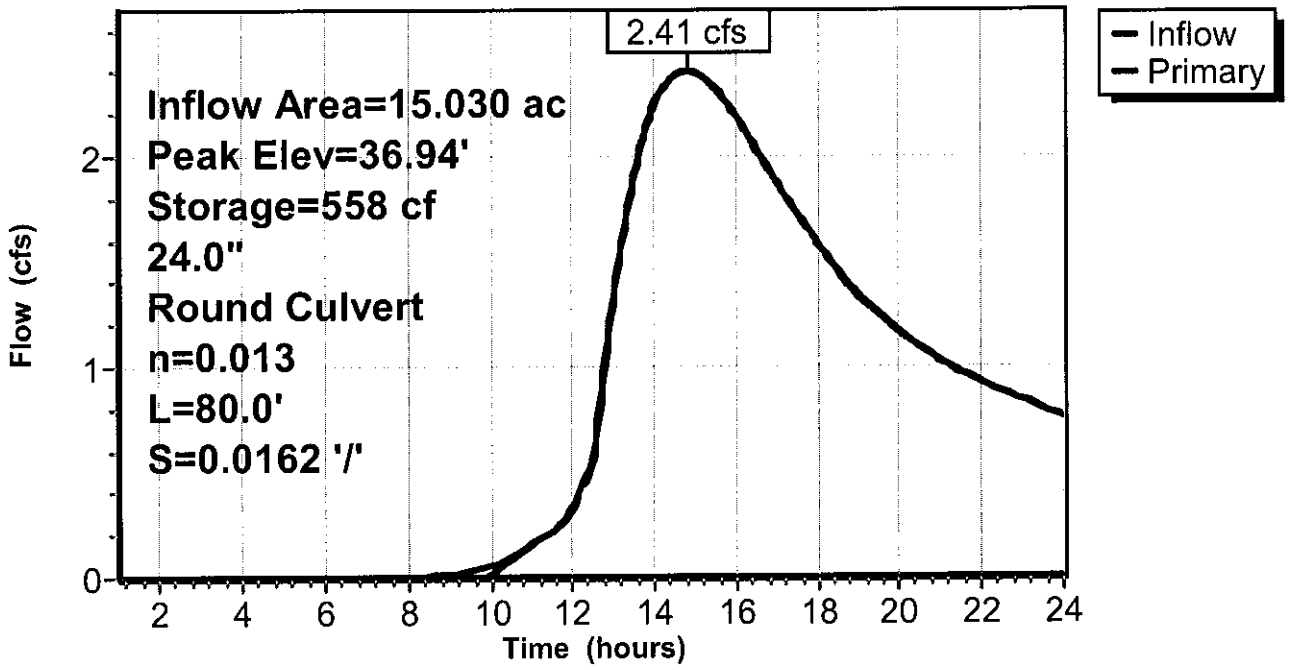
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.00	203	0	0
37.00	1,025	614	614
38.00	3,620	2,323	2,937
39.00	6,332	4,976	7,913
40.00	13,444	9,888	17,801
41.00	20,353	16,899	34,699
42.00	26,950	23,652	58,351

Device	Routing	Invert	Outlet Devices
#1	Primary	36.37'	**24.0" Round Culvert** L= 80.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 36.37' / 35.07' S= 0.0162 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=2.41 cfs @ 14.83 hrs HW=36.94' (Free Discharge)
↑**1=Culvert** (Inlet Controls 2.41 cfs @ 3.23 fps)

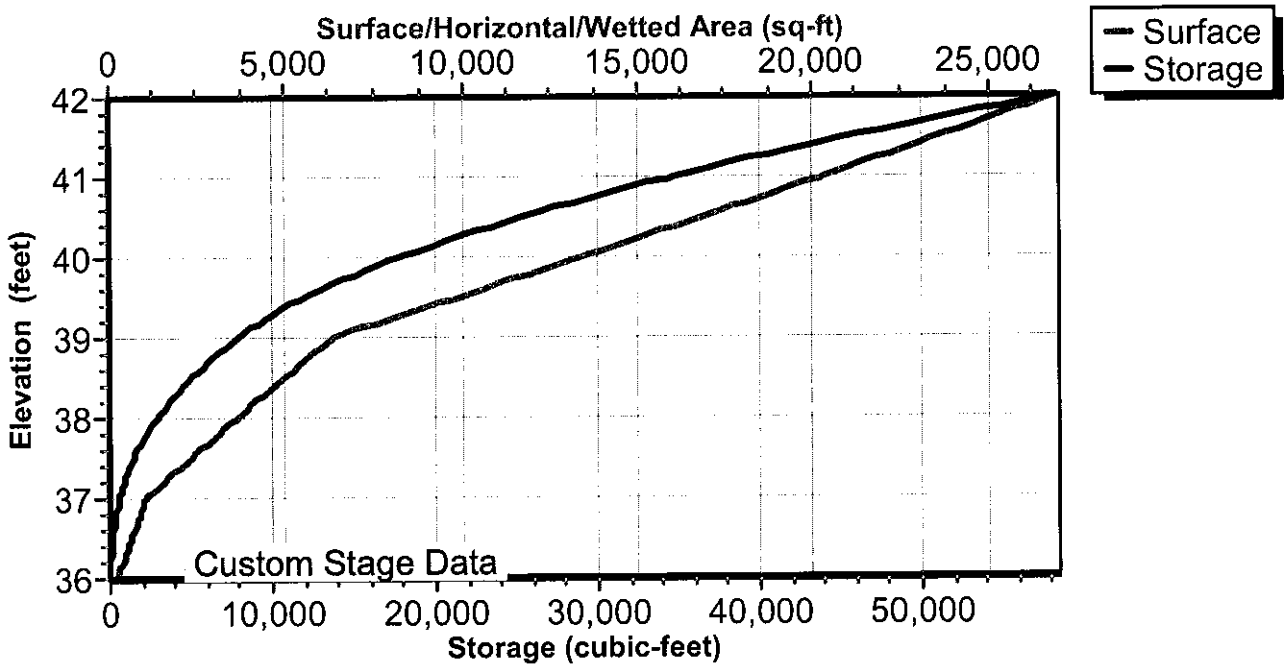
Pond 6P: Outfall

Hydrograph



Pond 6P: Outfall

Stage-Area-Storage



Summary for Subcatchment 1S: Pre Development

Runoff = 8.91 cfs @ 13.47 hrs, Volume= 2.379 af, Depth> 2.40"

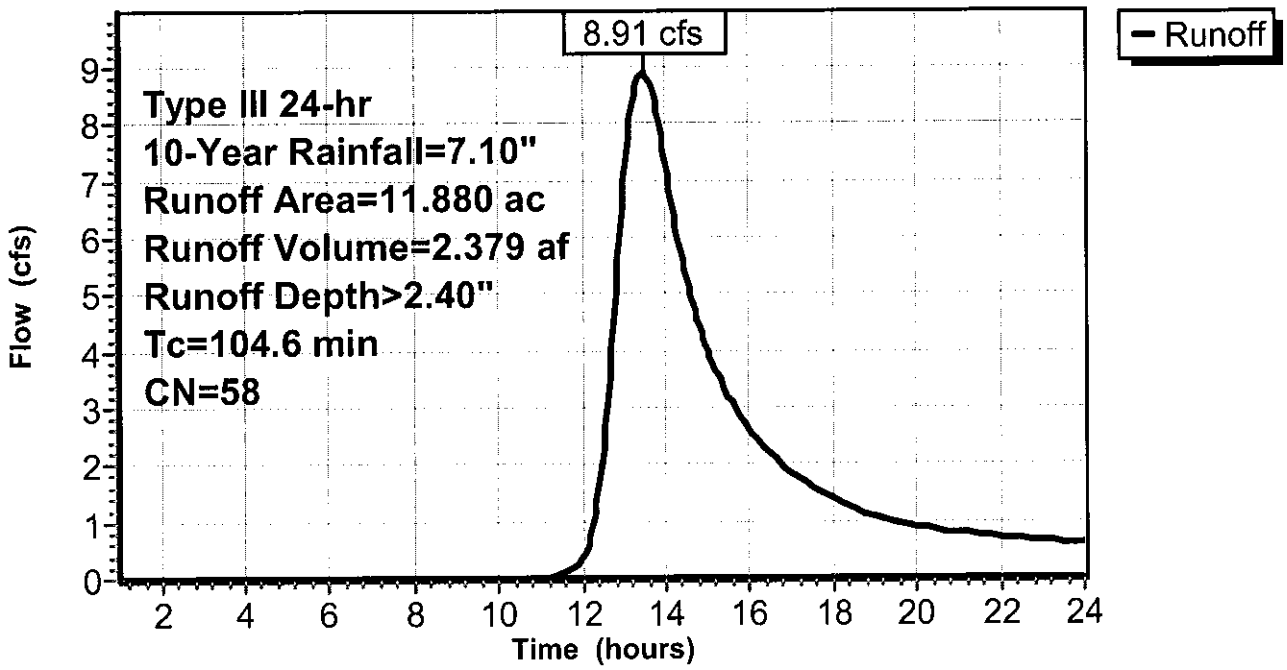
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=7.10"

	Area (ac)	CN	Description
*	5.940	39	Woods, Good, HSG A
	5.940	77	Woods, Good, HSG D
	11.880	58	Weighted Average
	11.880		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
104.6					**Direct Entry,**

Subcatchment 1S: Pre Development

Hydrograph



Summary for Subcatchment 2S: Post Development

Runoff = 79.96 cfs @ 12.07 hrs, Volume= 6.089 af, Depth> 6.15"

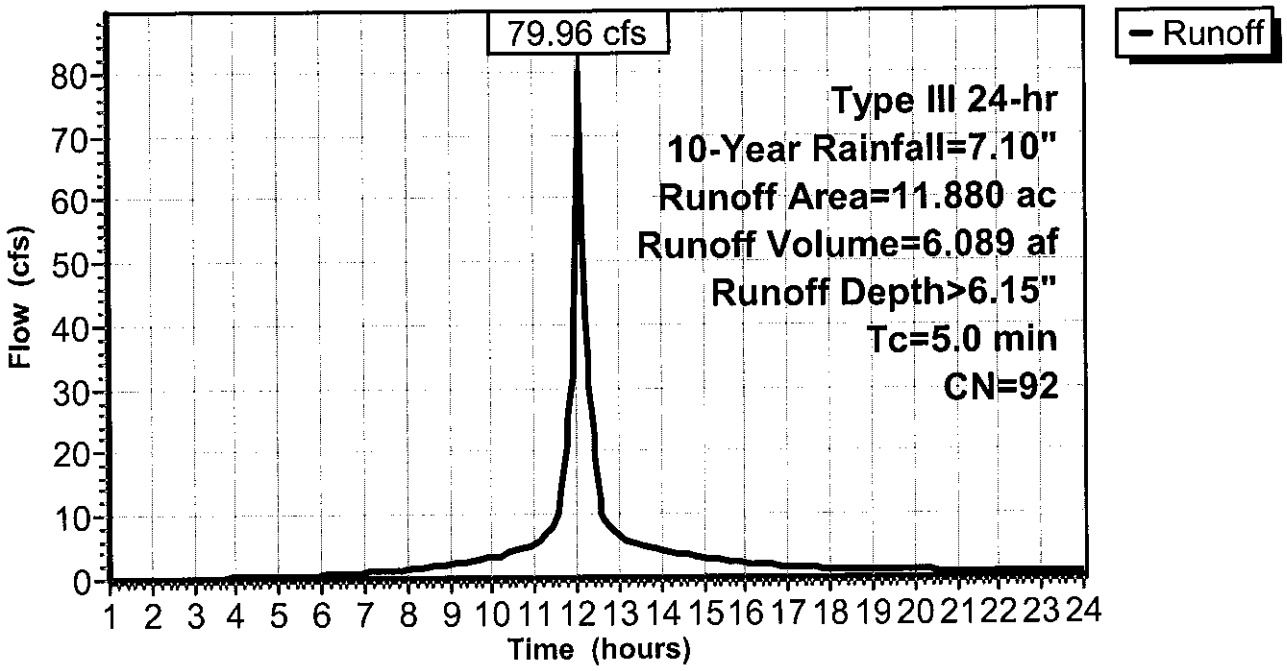
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=7.10"

Area (ac)	CN	Description
0.890	39	>75% Grass cover, Good, HSG A
0.890	80	>75% Grass cover, Good, HSG D
5.050	98	Paved parking, HSG A
5.050	98	Paved parking, HSG D
11.880	92	Weighted Average
1.780		14.98% Pervious Area
10.100		85.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: Post Development

Hydrograph



Summary for Subcatchment 4S: Remaining Outfall Area

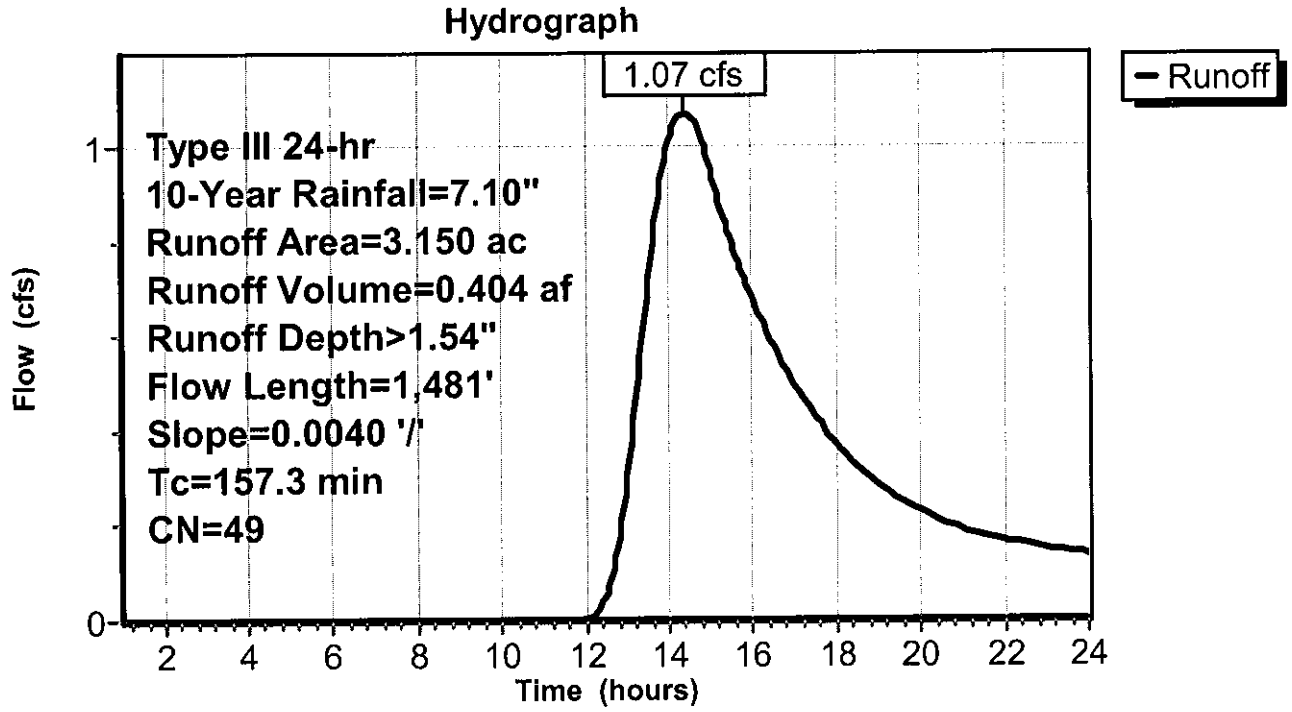
Runoff = 1.07 cfs @ 14.37 hrs, Volume= 0.404 af, Depth> 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=7.10"

Area (ac)	CN	Description
3.150	49	50-75% Grass cover, Fair, HSG A
3.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
157.3	1,481	0.0040	0.16		**Lag/CN Method,**

Subcatchment 4S: Remaining Outfall Area



Summary for Pond 3P: Wet Detention Basin

Inflow Area = 11.880 ac, 85.02% Impervious, Inflow Depth > 6.15" for 10-Year event
Inflow = 79.96 cfs @ 12.07 hrs, Volume= 6.089 af
Outflow = 7.76 cfs @ 12.86 hrs, Volume= 3.701 af, Atten= 90%, Lag= 47.1 min
Primary = 7.76 cfs @ 12.86 hrs, Volume= 3.701 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 41.45' @ 12.86 hrs Surf.Area= 70,246 sf Storage= 161,536 cf

Plug-Flow detention time= 278.8 min calculated for 3.701 af (61% of inflow)
Center-of-Mass det. time= 175.8 min (946.8 - 771.1)

Volume	Invert	Avail.Storage	Storage Description
#1	39.00'	352,395 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

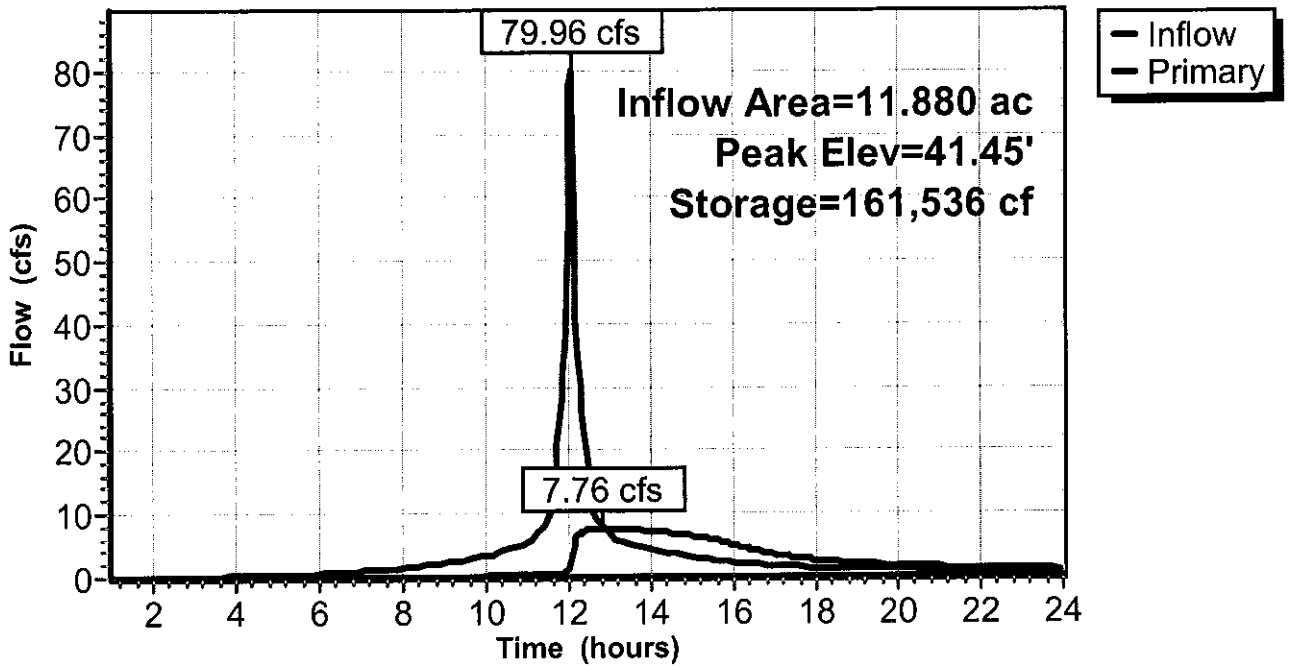
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.00	61,411	0	0
40.00	65,009	63,210	63,210
41.00	68,602	66,806	130,016
42.00	72,224	70,413	200,429
43.00	75,970	74,097	274,526
44.00	79,768	77,869	352,395

Device	Routing	Invert	Outlet Devices
#1	Primary	42.10'	**25.0' 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
#2	Primary	39.00'	**18.0" Round Culvert** L= 92.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 39.00' / 39.00' S= 0.0000 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Device 2	39.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	40.50'	**48.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600
#5	Device 2	41.50'	**16.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=7.76 cfs @ 12.86 hrs HW=41.45' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Barrel Controls 7.76 cfs @ 4.39 fps)
  - **3=Orifice/Grate** (Passes < 0.64 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 8.04 cfs potential flow)
  - **5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

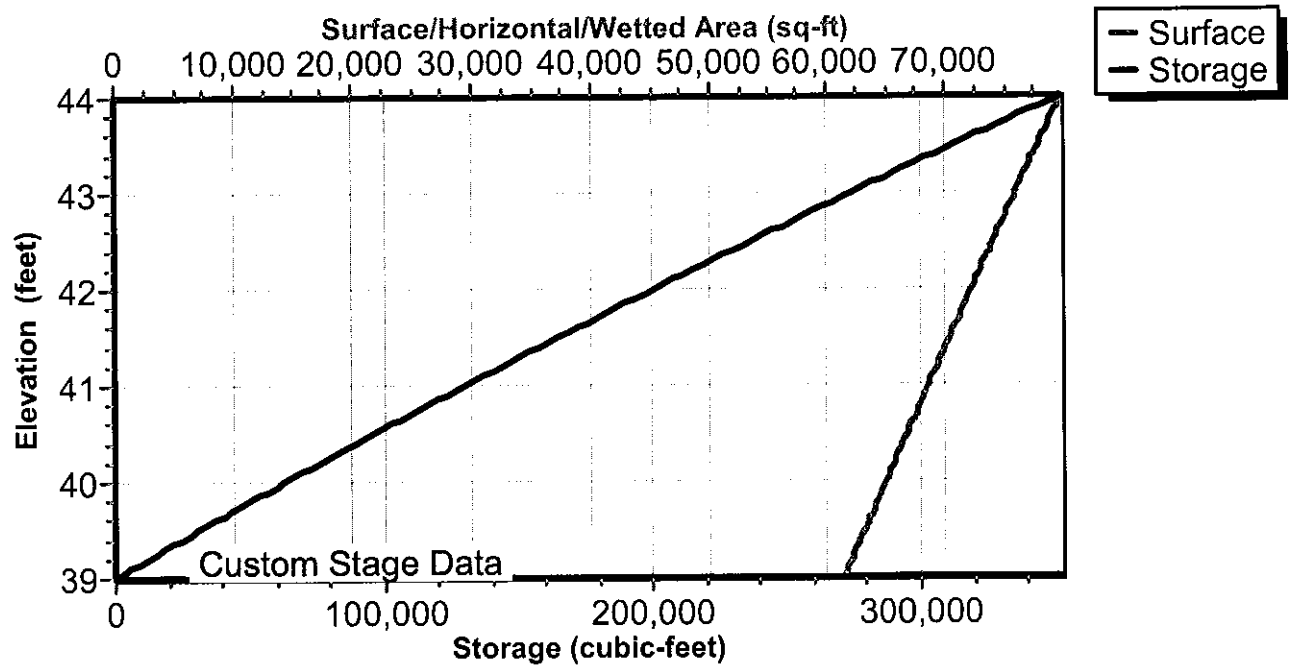
Pond 3P: Wet Detention Basin

Hydrograph



Pond 3P: Wet Detention Basin

Stage-Area-Storage



Summary for Pond 6P: Outfall

Inflow Area = 15.030 ac, 67.20% Impervious, Inflow Depth > 3.28" for 10-Year event
Inflow = 8.31 cfs @ 13.78 hrs, Volume= 4.105 af
Outflow = 8.31 cfs @ 13.80 hrs, Volume= 4.096 af, Atten= 0%, Lag= 1.6 min
Primary = 8.31 cfs @ 13.80 hrs, Volume= 4.096 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 37.50' @ 13.80 hrs Surf.Area= 2,328 sf Storage= 1,456 cf

Plug-Flow detention time= 3.5 min calculated for 4.096 af (100% of inflow)
Center-of-Mass det. time= 2.5 min (953.8 - 951.3)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	58,351 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

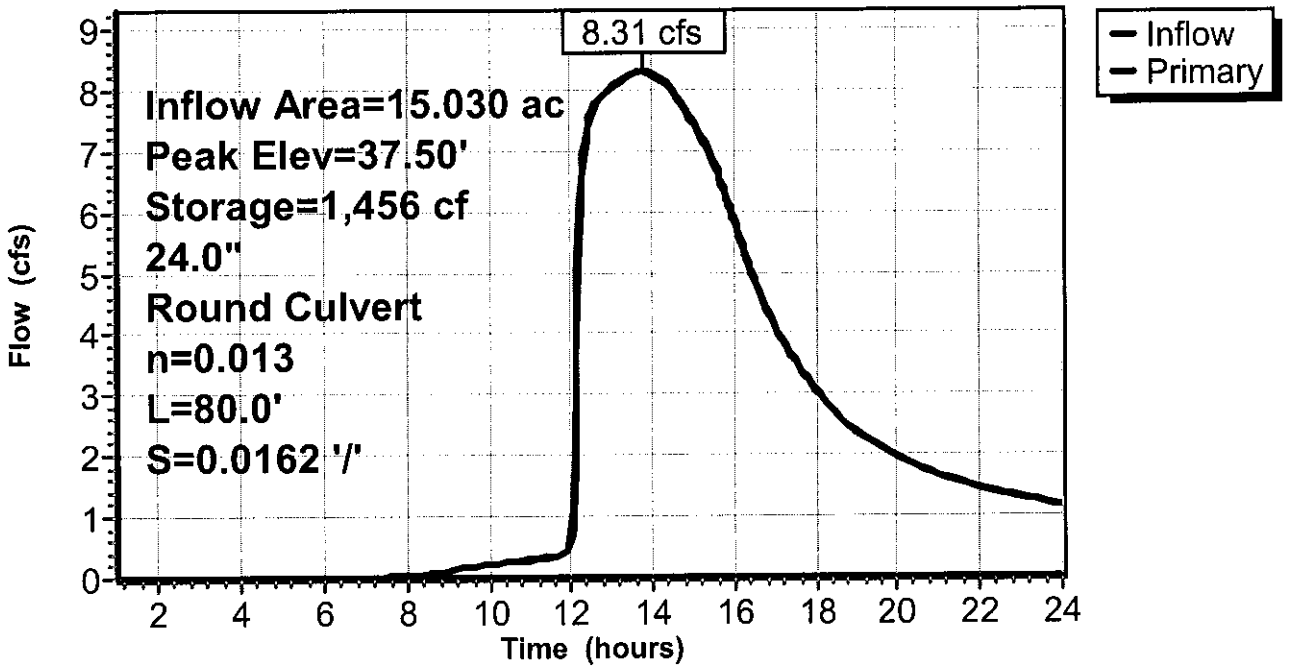
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.00	203	0	0
37.00	1,025	614	614
38.00	3,620	2,323	2,937
39.00	6,332	4,976	7,913
40.00	13,444	9,888	17,801
41.00	20,353	16,899	34,699
42.00	26,950	23,652	58,351

Device	Routing	Invert	Outlet Devices
#1	Primary	36.37'	**24.0" Round Culvert** L= 80.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 36.37' / 35.07' S= 0.0162 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=8.31 cfs @ 13.80 hrs HW=37.50' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 8.31 cfs @ 4.53 fps)

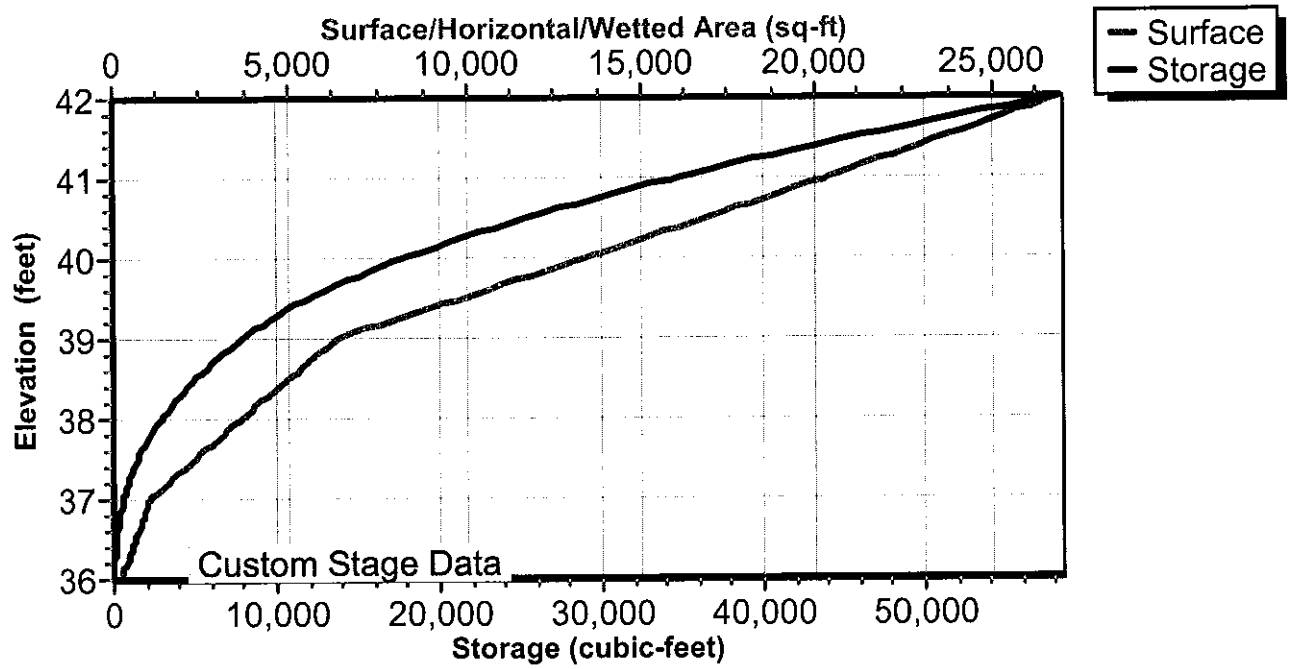
Pond 6P: Outfall

Hydrograph



Pond 6P: Outfall

Stage-Area-Storage



Summary for Subcatchment 1S: Pre Development

Runoff = 11.70 cfs @ 13.43 hrs, Volume= 3.064 af, Depth> 3.09"

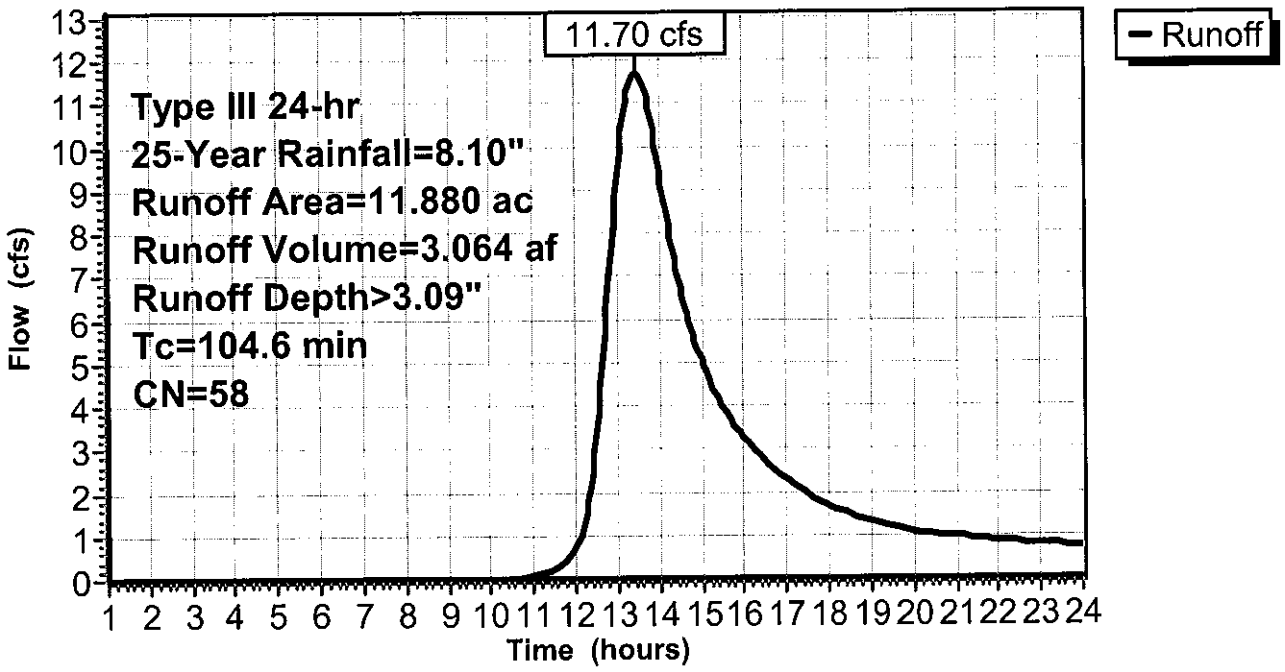
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=8.10"

	Area (ac)	CN	Description
*	5.940	39	Woods, Good, HSG A
	5.940	77	Woods, Good, HSG D
	11.880	58	Weighted Average
	11.880		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
104.6					**Direct Entry,**

Subcatchment 1S: Pre Development

Hydrograph



Summary for Subcatchment 2S: Post Development

Runoff = 92.04 cfs @ 12.07 hrs, Volume= 7.068 af, Depth> 7.14"

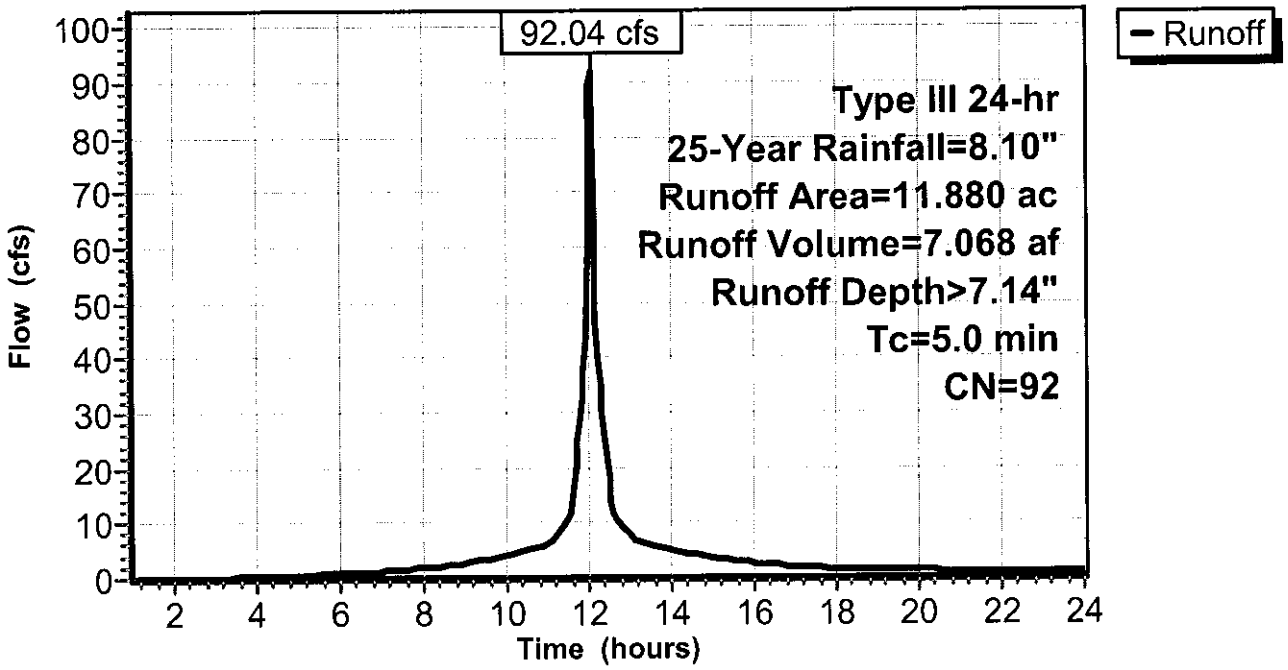
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=8.10"

Area (ac)	CN	Description
0.890	39	>75% Grass cover, Good, HSG A
0.890	80	>75% Grass cover, Good, HSG D
5.050	98	Paved parking, HSG A
5.050	98	Paved parking, HSG D
11.880	92	Weighted Average
1.780		14.98% Pervious Area
10.100		85.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: Post Development

Hydrograph



Summary for Subcatchment 4S: Remaining Outfall Area

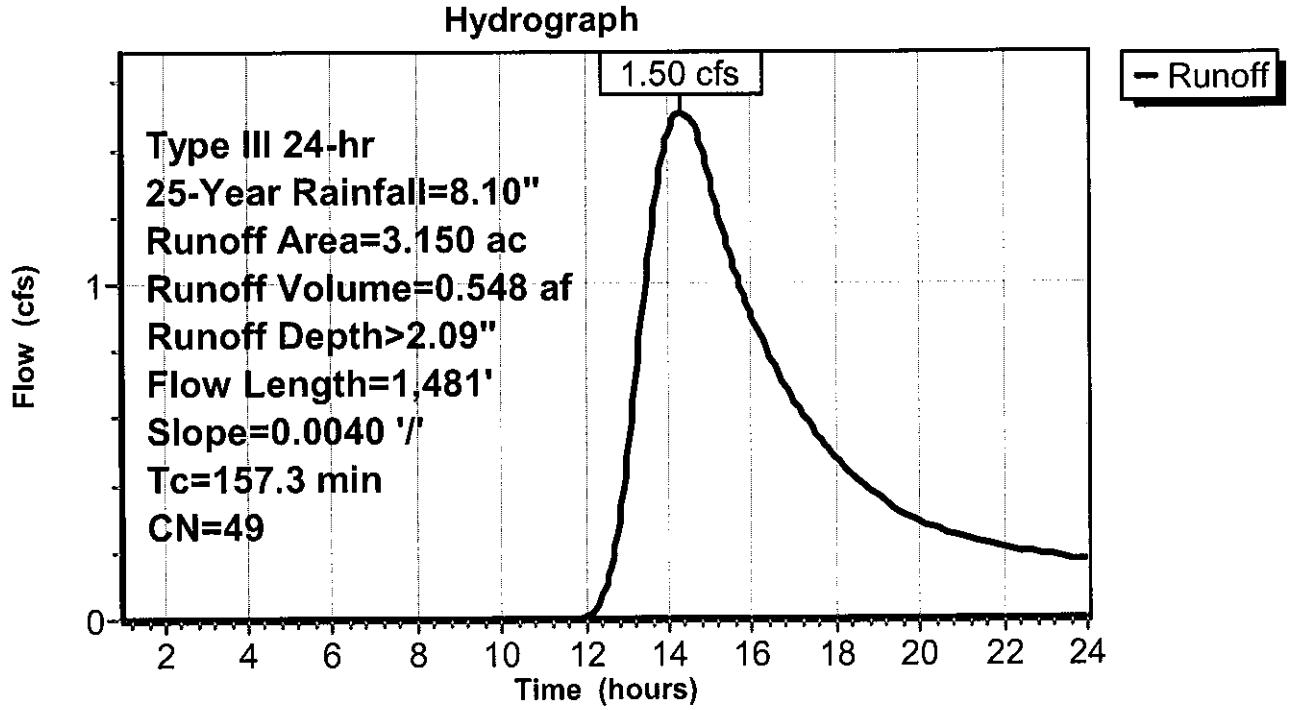
Runoff = 1.50 cfs @ 14.32 hrs, Volume= 0.548 af, Depth> 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=8.10"

Area (ac)	CN	Description
3.150	49	50-75% Grass cover, Fair, HSG A
3.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
157.3	1,481	0.0040	0.16		**Lag/CN Method,**

Subcatchment 4S: Remaining Outfall Area



Summary for Pond 3P: Wet Detention Basin

Inflow Area = 11.880 ac, 85.02% Impervious, Inflow Depth > 7.14" for 25-Year event
Inflow = 92.04 cfs @ 12.07 hrs, Volume= 7.068 af
Outflow = 9.09 cfs @ 12.83 hrs, Volume= 4.647 af, Atten= 90%, Lag= 45.8 min
Primary = 9.09 cfs @ 12.83 hrs, Volume= 4.647 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 41.81' @ 12.83 hrs Surf.Area= 71,531 sf Storage= 186,680 cf

Plug-Flow detention time= 278.4 min calculated for 4.647 af (66% of inflow)
Center-of-Mass det. time= 181.0 min (948.4 - 767.5)

Volume	Invert	Avail.Storage	Storage Description
#1	39.00'	352,395 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

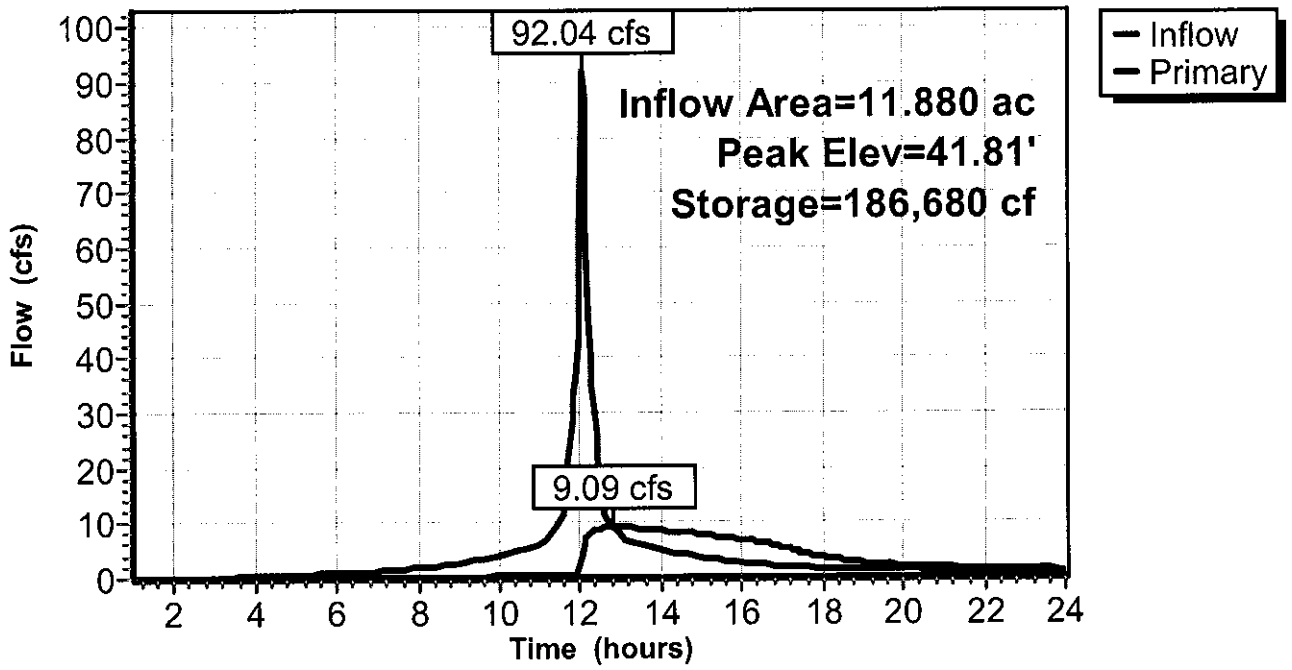
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.00	61,411	0	0
40.00	65,009	63,210	63,210
41.00	68,602	66,806	130,016
42.00	72,224	70,413	200,429
43.00	75,970	74,097	274,526
44.00	79,768	77,869	352,395

Device	Routing	Invert	Outlet Devices
#1	Primary	42.10'	**25.0' 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
#2	Primary	39.00'	**18.0" Round Culvert** L= 92.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 39.00' / 39.00' S= 0.0000 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Device 2	39.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	40.50'	**48.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600
#5	Device 2	41.50'	**16.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=9.09 cfs @ 12.83 hrs HW=41.81' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Barrel Controls 9.09 cfs @ 5.15 fps)
  - **3=Orifice/Grate** (Passes < 0.68 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 9.88 cfs potential flow)
  - **5=Sharp-Crested Rectangular Weir** (Passes < 8.94 cfs potential flow)

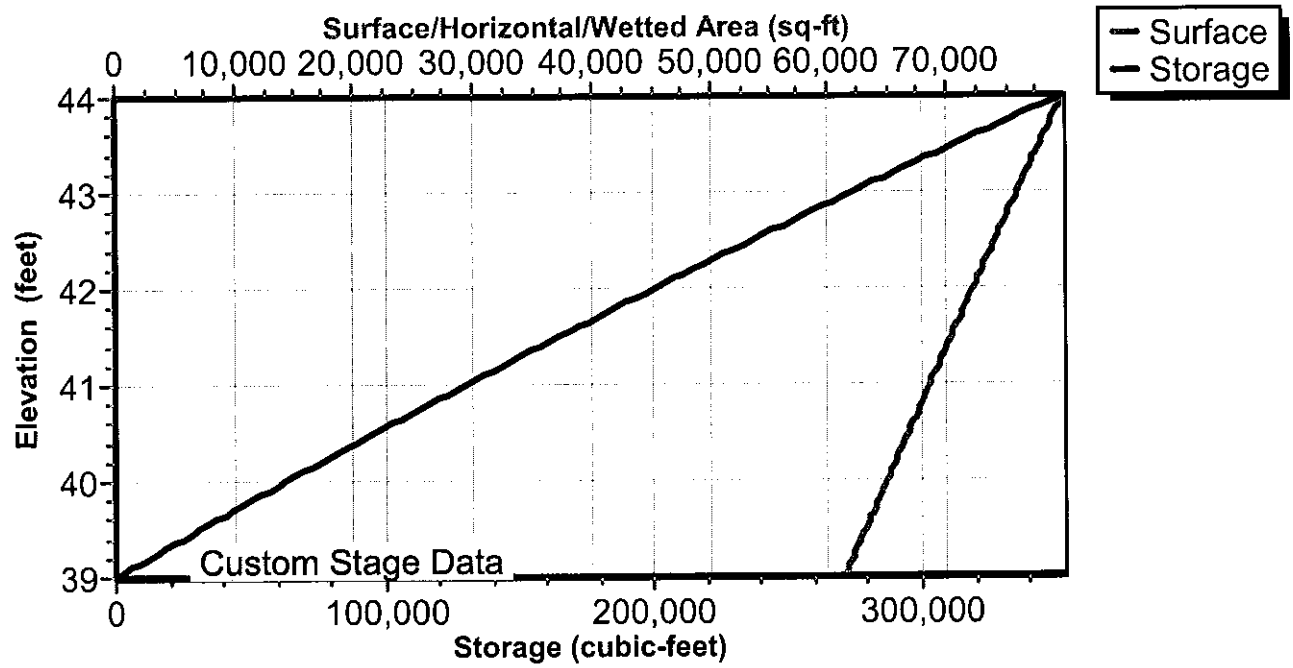
Pond 3P: Wet Detention Basin

Hydrograph



Pond 3P: Wet Detention Basin

Stage-Area-Storage



Summary for Pond 6P: Outfall

Inflow Area = 15.030 ac, 67.20% Impervious, Inflow Depth > 4.15" for 25-Year event
Inflow = 10.03 cfs @ 13.81 hrs, Volume= 5.195 af
Outflow = 10.03 cfs @ 13.88 hrs, Volume= 5.186 af, Atten= 0%, Lag= 3.8 min
Primary = 10.03 cfs @ 13.88 hrs, Volume= 5.186 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 37.64' @ 13.88 hrs Surf.Area= 2,678 sf Storage= 1,793 cf

Plug-Flow detention time= 3.3 min calculated for 5.186 af (100% of inflow)
Center-of-Mass det. time= 2.5 min (954.7 - 952.2)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	58,351 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

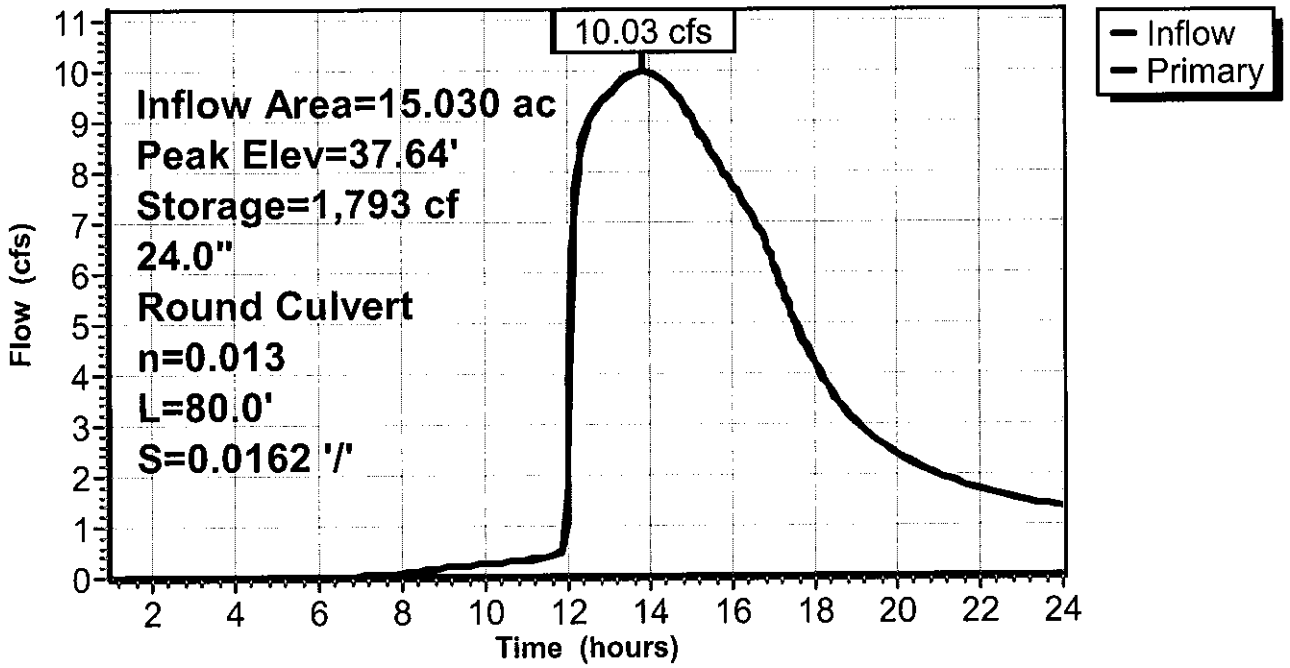
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.00	203	0	0
37.00	1,025	614	614
38.00	3,620	2,323	2,937
39.00	6,332	4,976	7,913
40.00	13,444	9,888	17,801
41.00	20,353	16,899	34,699
42.00	26,950	23,652	58,351

Device	Routing	Invert	Outlet Devices
#1	Primary	36.37'	**24.0" Round Culvert** L= 80.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 36.37' / 35.07' S= 0.0162 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=10.03 cfs @ 13.88 hrs HW=37.64' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 10.03 cfs @ 6.81 fps)

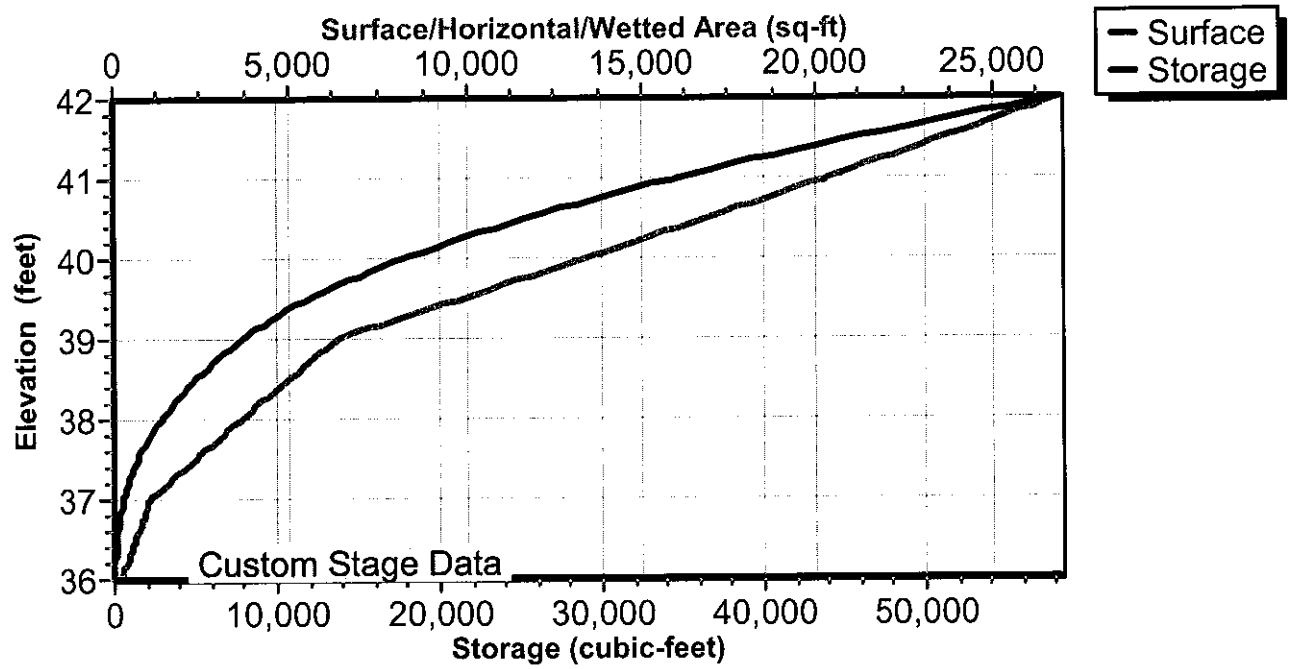
Pond 6P: Outfall

Hydrograph



Pond 6P: Outfall

Stage-Area-Storage



Summary for Subcatchment 1S: Pre Development

Runoff = 14.36 cfs @ 13.41 hrs, Volume= 3.713 af, Depth> 3.75"

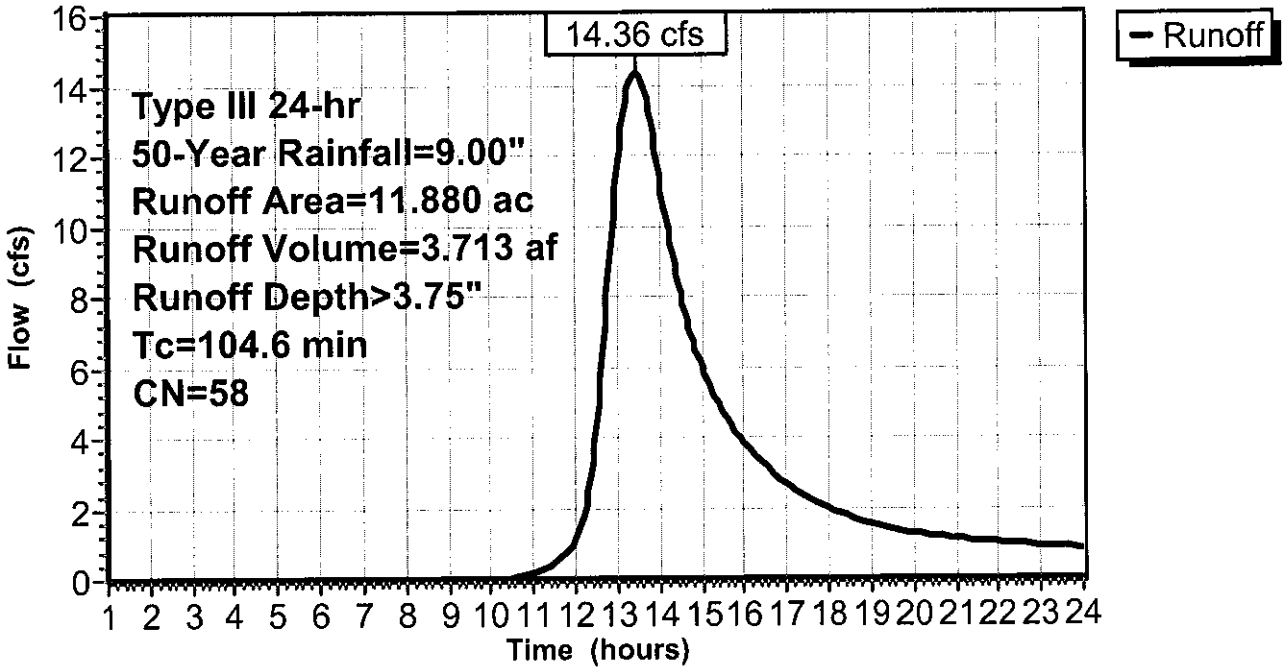
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=9.00"

	Area (ac)	CN	Description
*	5.940	39	Woods, Good, HSG A
	5.940	77	Woods, Good, HSG D
	11.880	58	Weighted Average
	11.880		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
104.6					**Direct Entry,**

Subcatchment 1S: Pre Development

Hydrograph



Summary for Subcatchment 2S: Post Development

Runoff = 102.87 cfs @ 12.07 hrs, Volume= 7.950 af, Depth> 8.03"

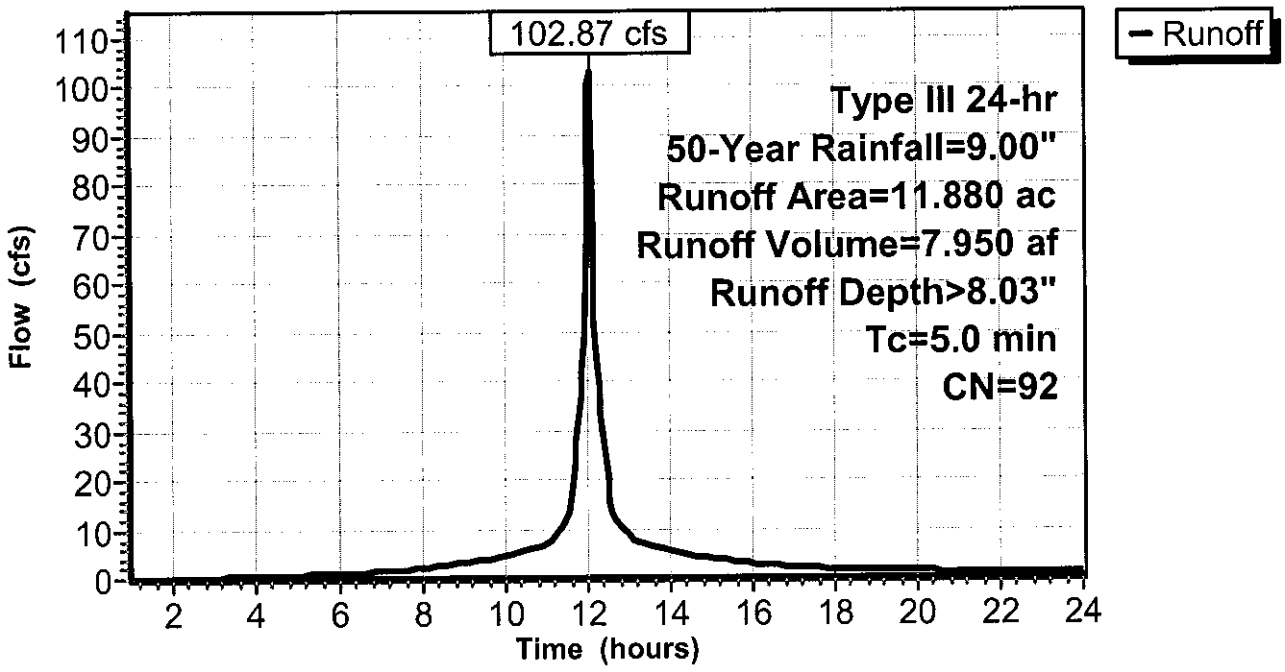
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=9.00"

Area (ac)	CN	Description
0.890	39	>75% Grass cover, Good, HSG A
0.890	80	>75% Grass cover, Good, HSG D
5.050	98	Paved parking, HSG A
5.050	98	Paved parking, HSG D
11.880	92	Weighted Average
1.780		14.98% Pervious Area
10.100		85.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: Post Development

Hydrograph



Summary for Subcatchment 4S: Remaining Outfall Area

Runoff = 1.94 cfs @ 14.20 hrs, Volume= 0.688 af, Depth> 2.62"

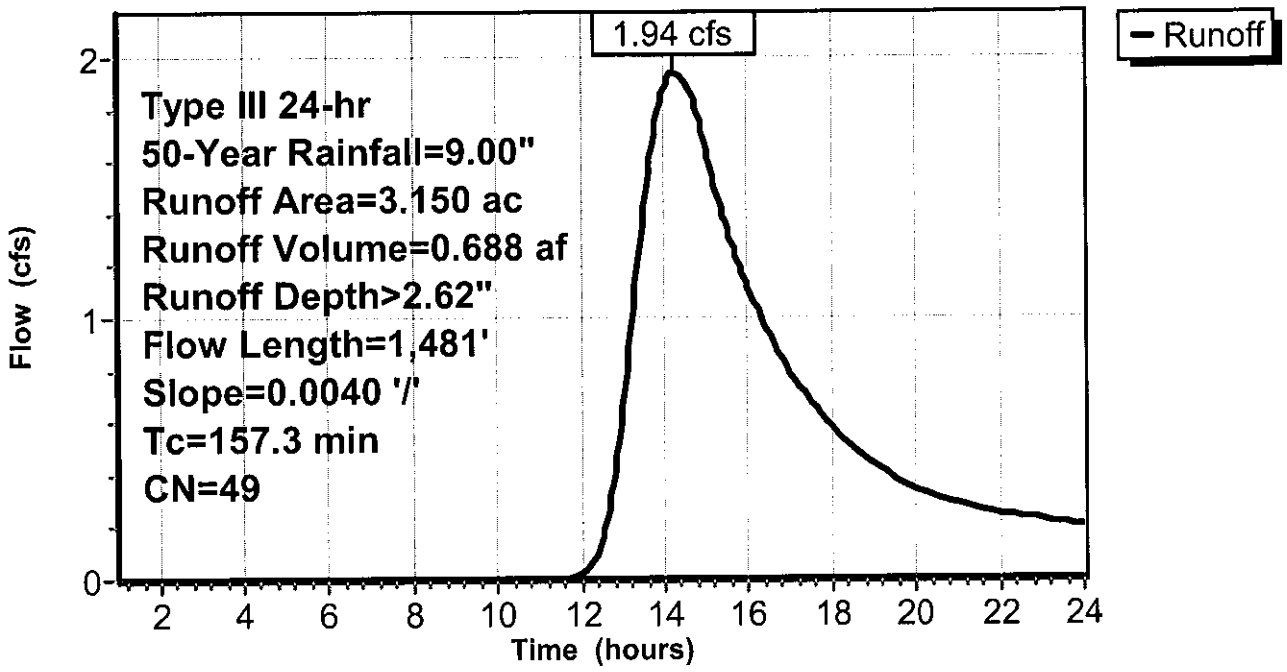
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=9.00"

Area (ac)	CN	Description
3.150	49	50-75% Grass cover, Fair, HSG A
3.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
157.3	1,481	0.0040	0.16		**Lag/CN Method,**

Subcatchment 4S: Remaining Outfall Area

Hydrograph



Summary for Pond 3P: Wet Detention Basin

Inflow Area = 11.880 ac, 85.02% Impervious, Inflow Depth > 8.03" for 50-Year event
Inflow = 102.87 cfs @ 12.07 hrs, Volume= 7.950 af
Outflow = 10.46 cfs @ 12.80 hrs, Volume= 5.502 af, Atten= 90%, Lag= 43.8 min
Primary = 10.46 cfs @ 12.80 hrs, Volume= 5.502 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 42.12' @ 12.80 hrs Surf.Area= 72,687 sf Storage= 209,390 cf

Plug-Flow detention time= 280.4 min calculated for 5.490 af (69% of inflow)
Center-of-Mass det. time= 187.9 min (952.7 - 764.8)

Volume	Invert	Avail.Storage	Storage Description
#1	39.00'	352,395 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

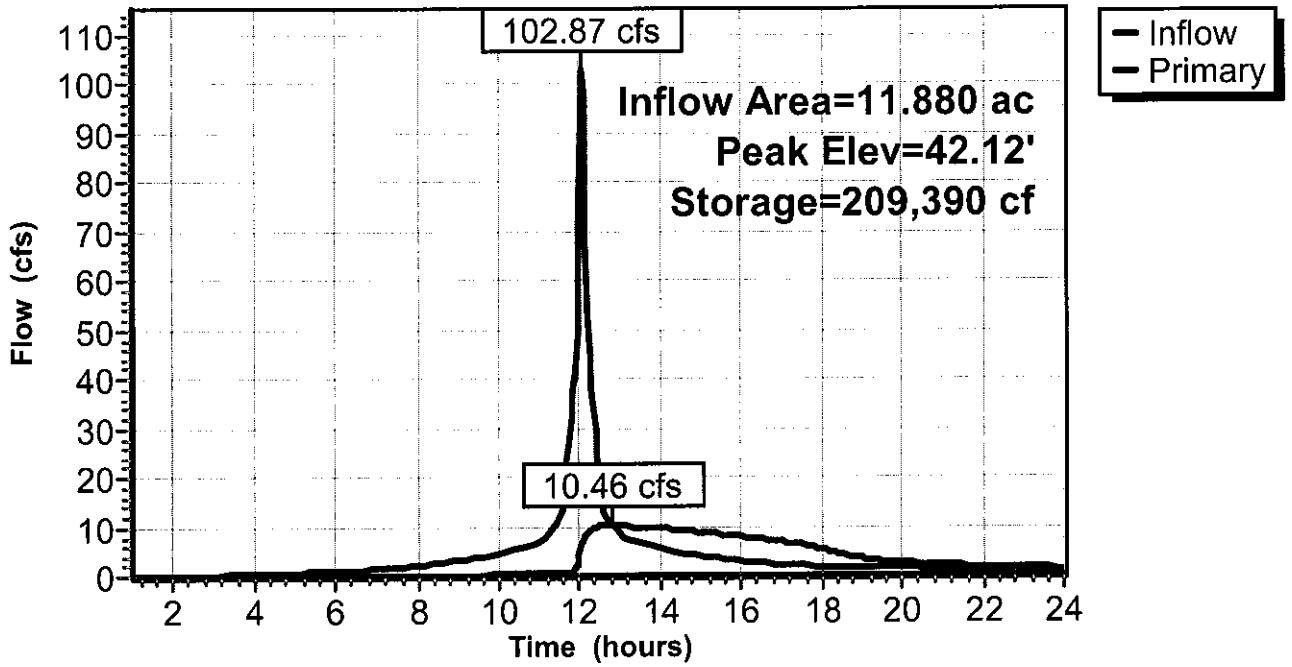
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.00	61,411	0	0
40.00	65,009	63,210	63,210
41.00	68,602	66,806	130,016
42.00	72,224	70,413	200,429
43.00	75,970	74,097	274,526
44.00	79,768	77,869	352,395

Device	Routing	Invert	Outlet Devices
#1	Primary	42.10'	**25.0' 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
#2	Primary	39.00'	**18.0" Round Culvert** L= 92.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 39.00' / 39.00' S= 0.0000 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Device 2	39.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	40.50'	**48.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600
#5	Device 2	41.50'	**16.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=10.36 cfs @ 12.80 hrs HW=42.12' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 0.23 cfs @ 0.38 fps)
- **2=Culvert** (Barrel Controls 10.13 cfs @ 5.73 fps)
  - **3=Orifice/Grate** (Passes < 0.72 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 11.27 cfs potential flow)
  - **5=Sharp-Crested Rectangular Weir** (Passes < 25.57 cfs potential flow)

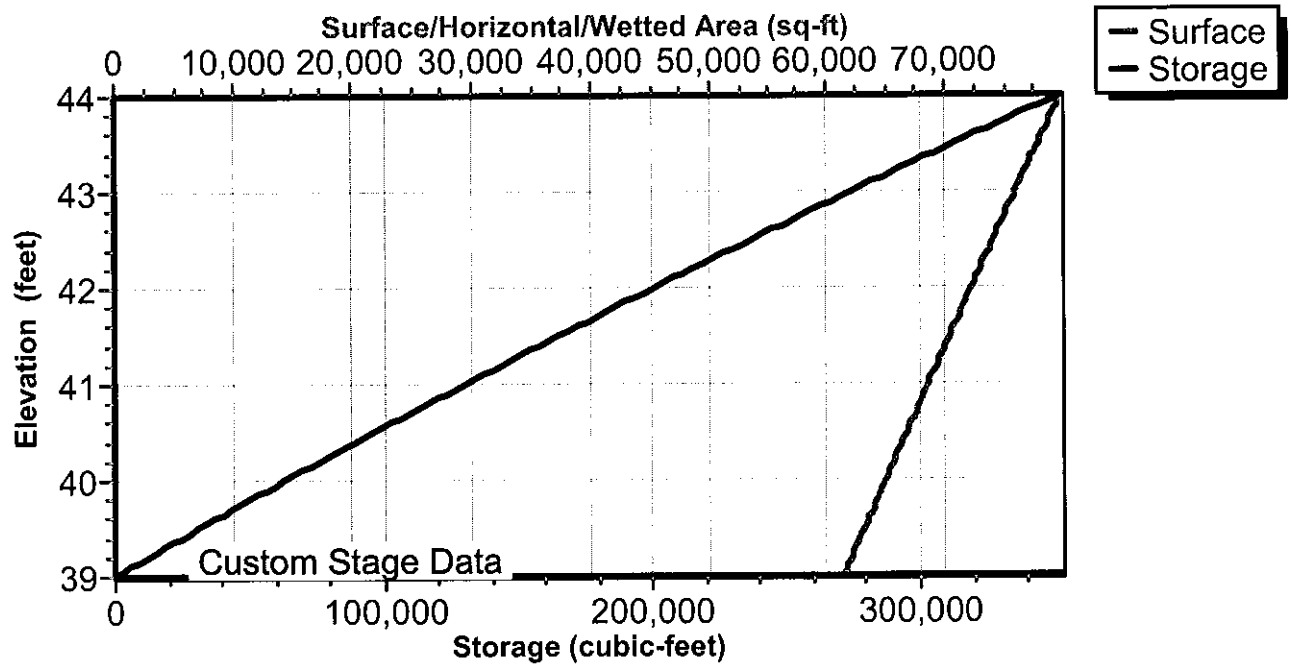
Pond 3P: Wet Detention Basin

Hydrograph



Pond 3P: Wet Detention Basin

Stage-Area-Storage



Summary for Pond 6P: Outfall

Inflow Area = 15.030 ac, 67.20% Impervious, Inflow Depth > 4.94" for 50-Year event
Inflow = 11.48 cfs @ 13.86 hrs, Volume= 6.190 af
Outflow = 11.48 cfs @ 13.95 hrs, Volume= 6.180 af, Atten= 0%, Lag= 5.7 min
Primary = 11.48 cfs @ 13.95 hrs, Volume= 6.180 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 37.75' @ 13.95 hrs Surf.Area= 2,973 sf Storage= 2,115 cf

Plug-Flow detention time= 3.3 min calculated for 6.180 af (100% of inflow)
Center-of-Mass det. time= 2.6 min (958.1 - 955.5)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	58,351 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

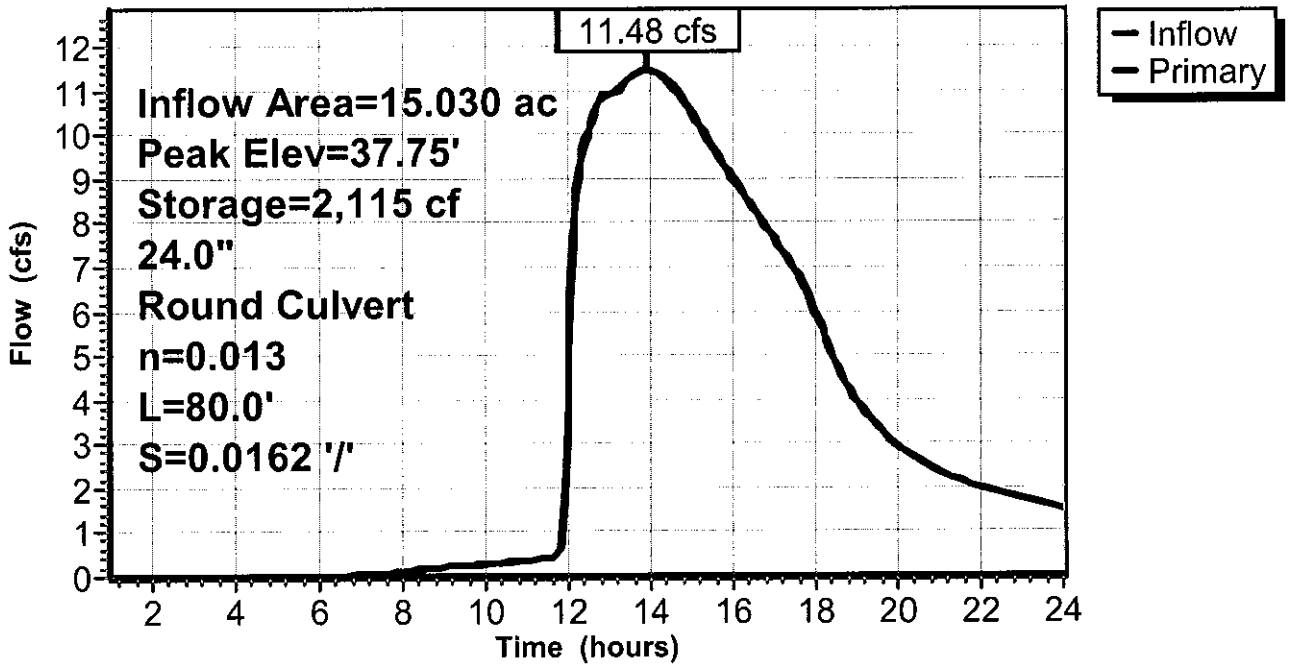
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.00	203	0	0
37.00	1,025	614	614
38.00	3,620	2,323	2,937
39.00	6,332	4,976	7,913
40.00	13,444	9,888	17,801
41.00	20,353	16,899	34,699
42.00	26,950	23,652	58,351

Device	Routing	Invert	Outlet Devices
#1	Primary	36.37'	**24.0" Round Culvert** L= 80.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 36.37' / 35.07' S= 0.0162 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=11.48 cfs @ 13.95 hrs HW=37.75' (Free Discharge)
↑**1=Culvert** (Barrel Controls 11.48 cfs @ 6.99 fps)

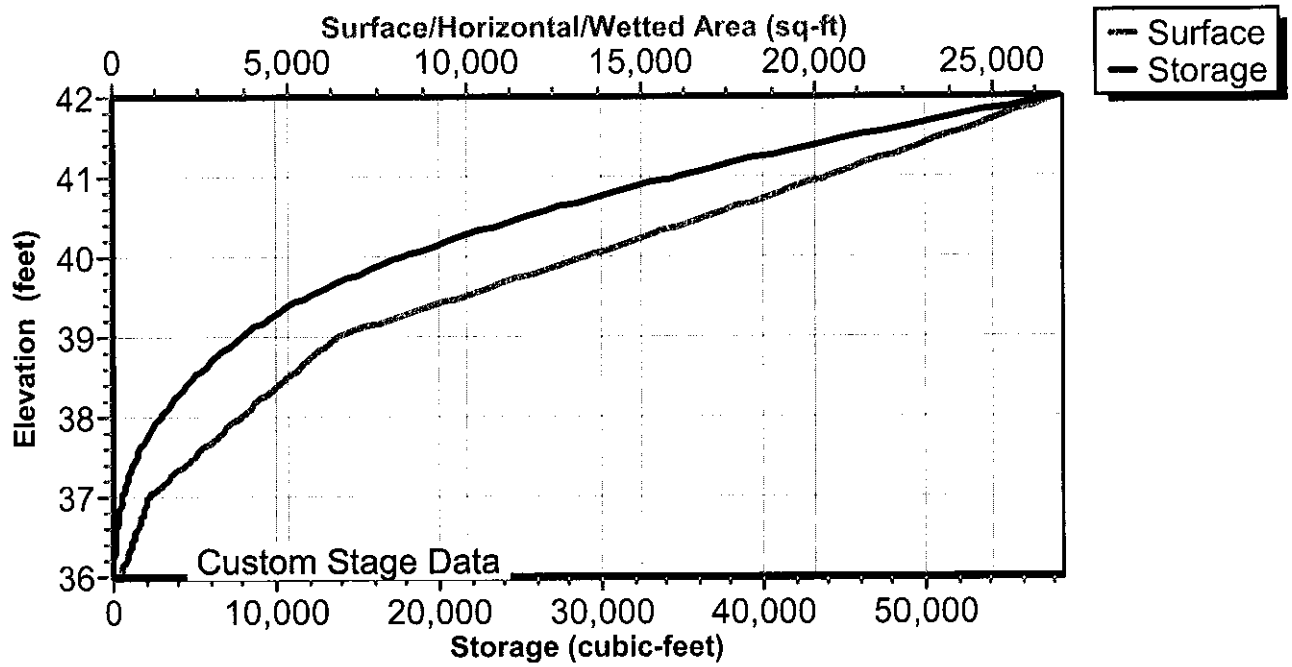
Pond 6P: Outfall

Hydrograph

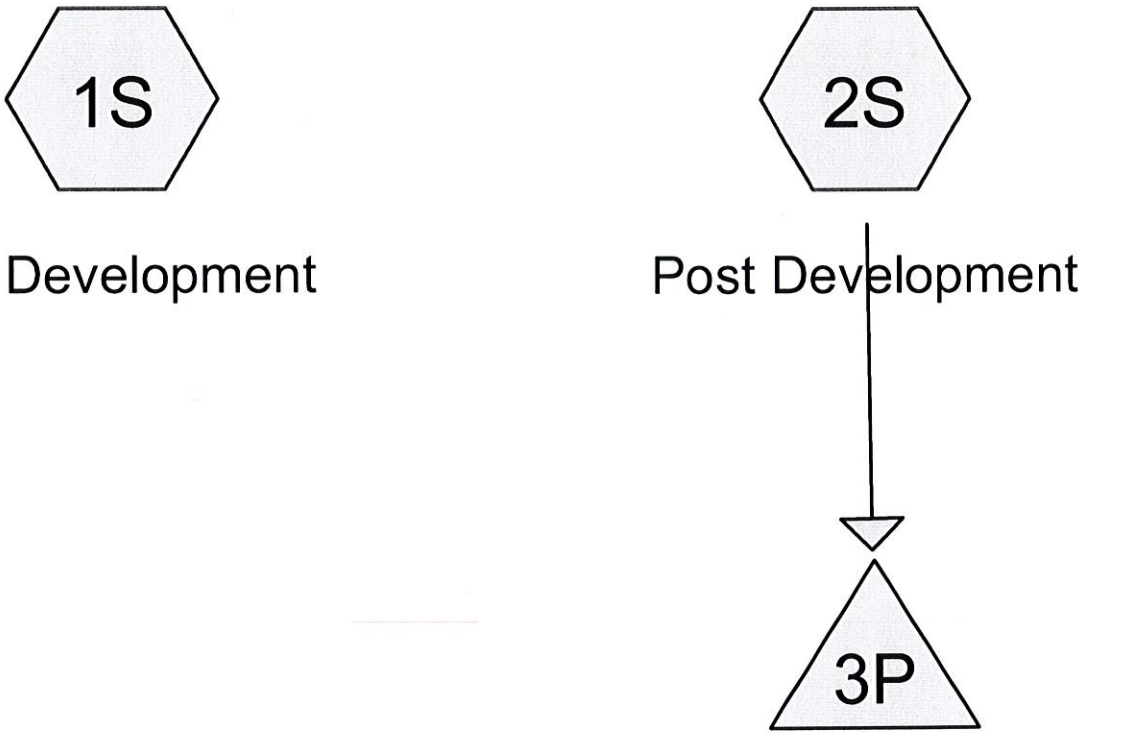


Pond 6P: Outfall

Stage-Area-Storage



50yr. Obstructed



Subcat Reach Pond Link

Routing Diagram for Carmax Wet Detention Basin Emergency Only
Prepared by Microsoft, Printed 7/31/2017

Summary for Subcatchment 1S: Pre Development

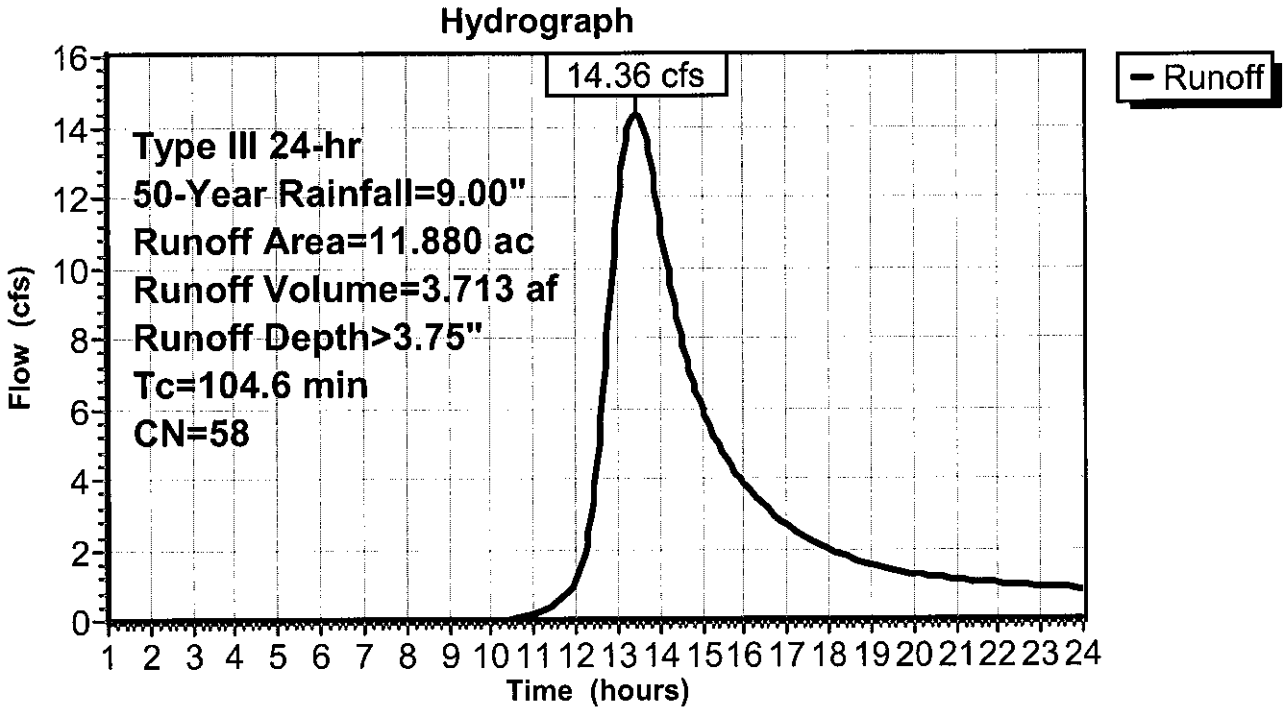
Runoff = 14.36 cfs @ 13.41 hrs, Volume= 3.713 af, Depth> 3.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=9.00"

	Area (ac)	CN	Description
*	5.940	39	Woods, Good, HSG A
	5.940	77	Woods, Good, HSG D
	11.880	58	Weighted Average
	11.880		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
104.6					**Direct Entry,**

Subcatchment 1S: Pre Development



Summary for Subcatchment 2S: Post Development

Runoff = 102.87 cfs @ 12.07 hrs, Volume= 7.950 af, Depth> 8.03"

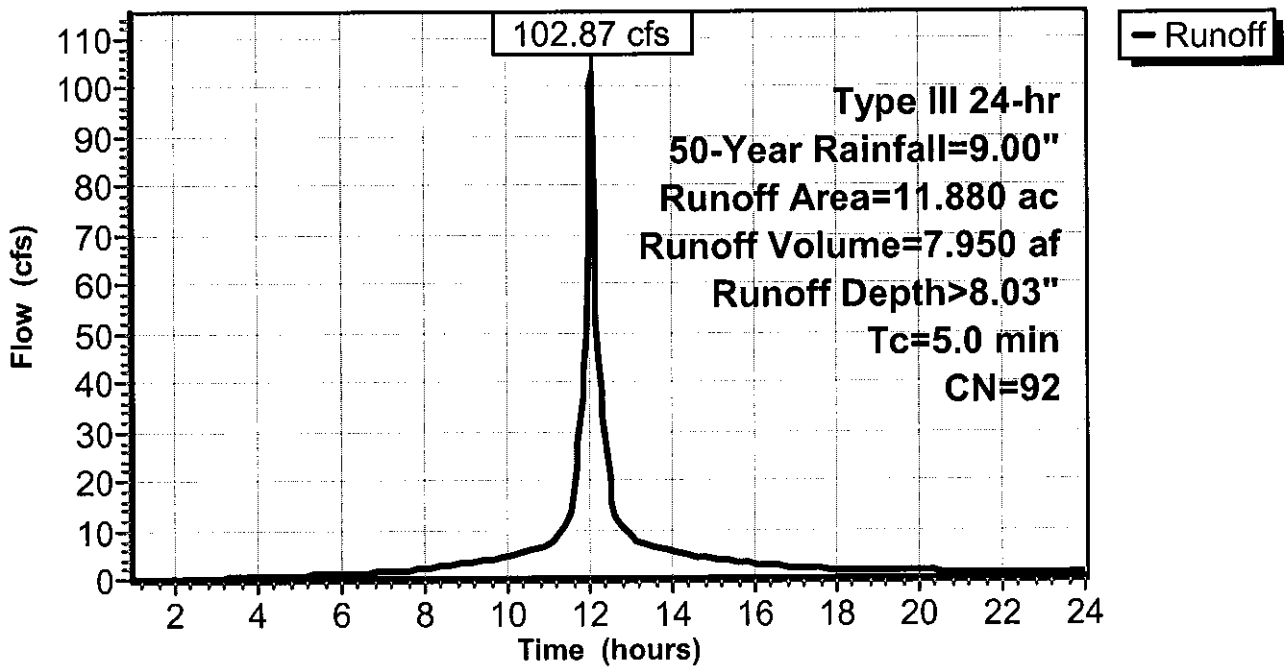
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=9.00"

Area (ac)	CN	Description
0.890	39	>75% Grass cover, Good, HSG A
0.890	80	>75% Grass cover, Good, HSG D
5.050	98	Paved parking, HSG A
5.050	98	Paved parking, HSG D
11.880	92	Weighted Average
1.780		14.98% Pervious Area
10.100		85.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: Post Development

Hydrograph



Summary for Pond 3P: Wet Detention Basin

Inflow Area = 11.880 ac, 85.02% Impervious, Inflow Depth > 8.03" for 50-Year event
Inflow = 102.87 cfs @ 12.07 hrs, Volume= 7.950 af
Outflow = 10.00 cfs @ 12.85 hrs, Volume= 3.079 af, Atten= 90%, Lag= 46.7 min
Primary = 10.00 cfs @ 12.85 hrs, Volume= 3.079 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 42.39' @ 12.85 hrs Surf.Area= 73,695 sf Storage= 229,076 cf

Plug-Flow detention time= 332.2 min calculated for 3.079 af (39% of inflow)
Center-of-Mass det. time= 189.6 min (954.4 - 764.8)

Volume	Invert	Avail.Storage	Storage Description
#1	39.00'	352,395 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

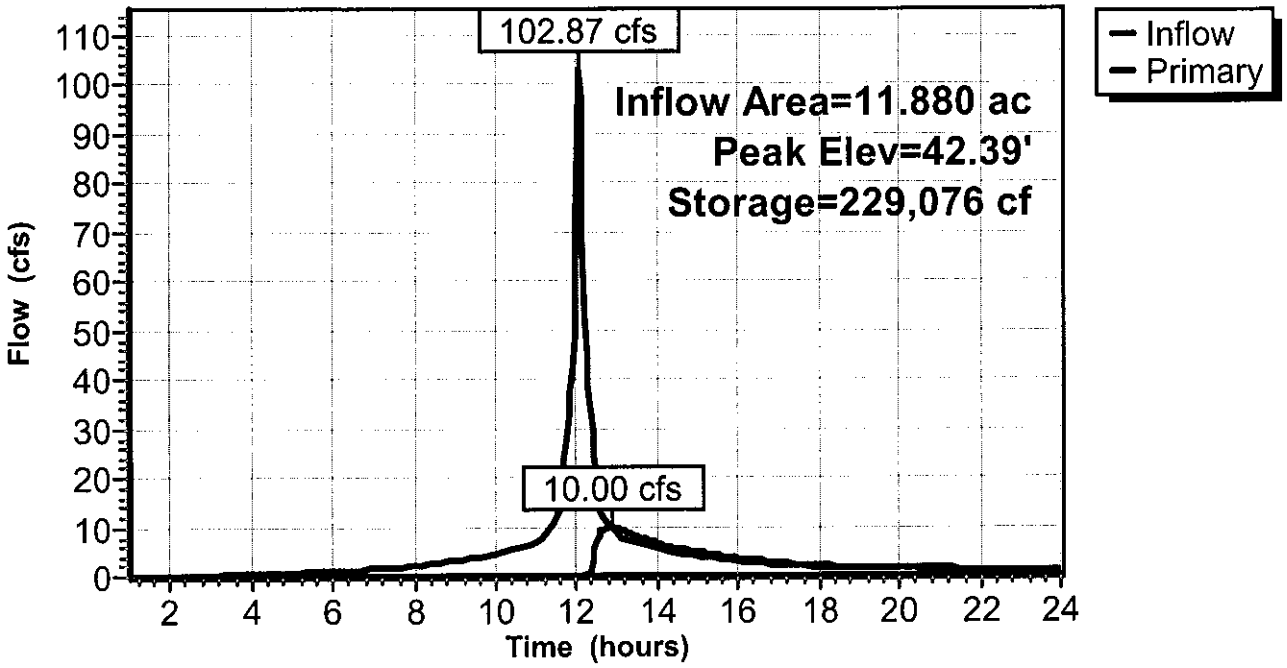
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.00	61,411	0	0
40.00	65,009	63,210	63,210
41.00	68,602	66,806	130,016
42.00	72,224	70,413	200,429
43.00	75,970	74,097	274,526
44.00	79,768	77,869	352,395

Device	Routing	Invert	Outlet Devices
#1	Primary	42.10'	**25.0' 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=9.98 cfs @ 12.85 hrs HW=42.39' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 9.98 cfs @ 1.36 fps)

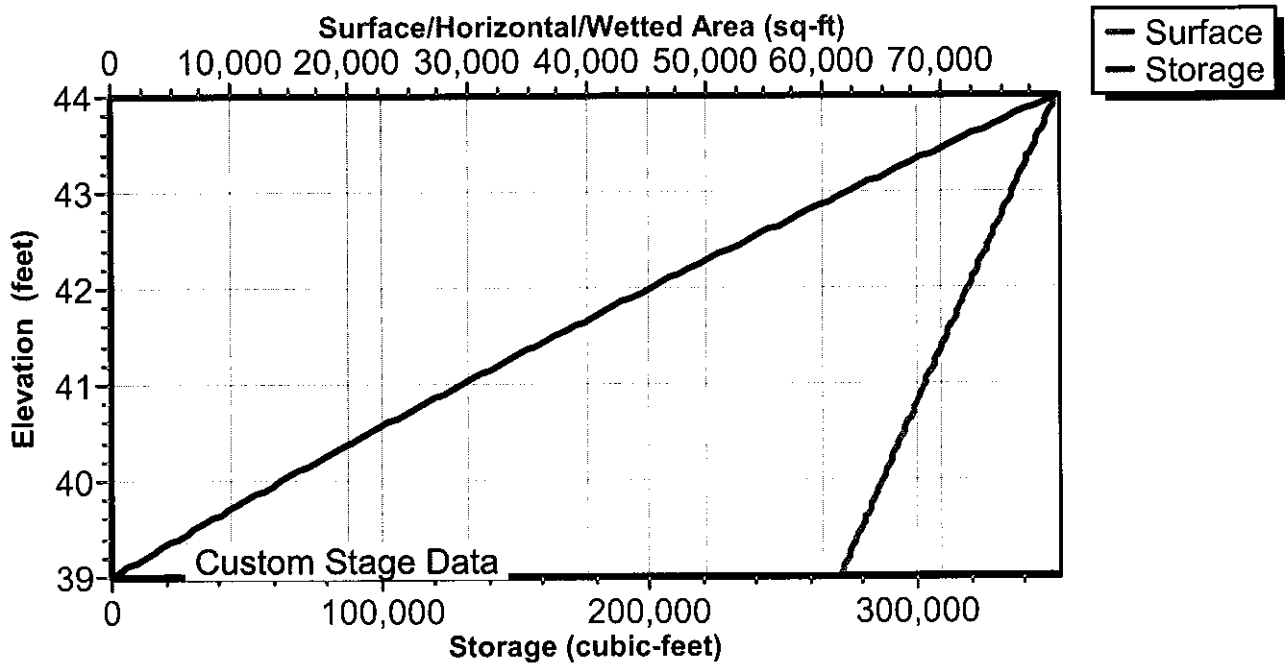
Pond 3P: Wet Detention Basin

Hydrograph



Pond 3P: Wet Detention Basin

Stage-Area-Storage

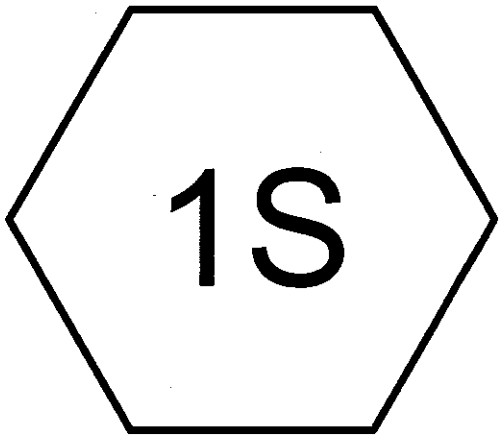


10yr HGL - CarMax

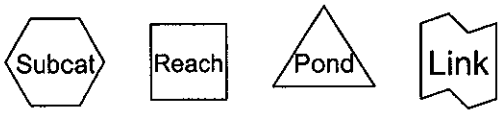
Upstream Node	Downstream Node	Diameter (in)	Pipe Length (ft)	Slope (%)	Upstream Pipe Invert (ft)	Downstream Pipe Invert(ft)	Upstream Rim Elev (ft)	Downstream Rim Elev (ft)	Upstream HGL (ft)	Downstream HGL (ft)
CO-14	DI-13	15	92	0.50	33.25	32.79	42.90	41.42	40.80	40.74
DI-13	DI-12	18	130	0.50	32.79	32.14	41.42	41.42	40.65	40.19
DI-12	DI-11	42	122	0.50	32.14	31.52	41.42	41.42	40.01	39.93
DI-11	MH-02	42	70	0.54	31.52	31.15	41.42	42.15	39.76	39.70
MH-02	MH-01	48	121	0.57	31.15	30.46	42.15	43.35	39.38	39.24
MH-01	FES-100	48	116	2.54	30.46	27.50	43.35	38.00	39.13	39.00
CO-18	DI-17	12	80	3.24	39.42	36.84	43.50	41.86	40.52	40.51
DI-17	DI-16	36	117	0.50	34.84	34.25	41.86	41.42	40.49	40.47
DI-16	DI-15	36	130	0.50	34.25	33.60	41.42	41.75	40.42	40.38
DI-15	DI-12	36	192	0.50	33.60	32.64	41.75	41.42	40.28	40.15
CO-22	DI-15	12	110	0.75	37.12	36.29	43.50	41.75	40.92	40.42
CO-23	DI-21	15	59	0.50	36.15	35.86	43.50	42.51	41.06	40.98
DI-21	DI-20	15	80	0.50	35.86	35.46	42.51	41.54	40.86	40.65
DI-20	DI-17	30	125	0.50	35.46	34.84	41.54	41.86	40.57	40.53
CO-26	CI-10	12	48	8.49	40.00	35.94	43.55	42.58	41.22	41.19
CI-10	CI-09	18	153	0.32	35.94	35.45	42.58	42.32	41.17	41.08
CI-09	CI-08	24	238	0.46	35.45	34.36	42.32	41.79	41.04	40.94
CI-08	DI-06	24	173	0.34	34.36	33.77	41.79	41.42	40.87	40.71
DI-06	DI-05	30	134	0.48	33.77	33.13	41.42	41.42	40.61	40.49
DI-05	DI-04	36	128	0.52	33.13	32.46	41.42	41.42	40.39	40.32
DI-04	MH-03	36	127	0.50	32.46	31.82	41.42	43.25	40.17	40.06
MH-03	MH-02	36	143	0.47	31.82	31.15	43.25	42.15	39.86	39.71
CO-27	DI-06	8	107	0.50	39.50	38.97	43.50	41.42	40.69	40.68
CB-07	DI-06	15	169	0.50	34.61	33.77	42.20	41.42	40.72	40.68
CI-25	CI-24	18	171	0.32	36.70	36.16	42.12	42.15	40.68	40.64
CI-24	DI-20	24	85	0.83	36.16	35.46	42.15	41.54	40.62	40.61

50 yr. HGL - CarMax 7/31/17

Upstream Node	Downstream Node	Diameter (in)	Pipe Length (ft)	Slope (%)	Upstream Pipe Invert (ft)	Downstream Pipe Invert(ft)	Upstream Rim Elev (ft)	Downstream Rim Elev (ft)	Upstream HGL (ft)	Downstream HGL (ft)
CI-07	DI-06	15	169	0.50	34.61	33.77	42.20	41.42	41.41	41.36
DI-06	DI-05	30	134	0.48	33.77	33.13	41.42	41.42	41.26	41.10
DI-05	DI-04	36	128	0.52	33.13	32.46	41.42	41.42	40.96	40.86
DI-04	MH-03	36	127	0.50	32.46	31.82	41.42	43.25	40.66	40.50
MH-03	MH-02	36	143	0.47	31.82	31.15	43.25	42.15	40.22	40.01
MH-02	MH-01	48	121	0.57	31.15	30.46	42.15	43.35	39.55	39.34
MH-01	FES-100	48	116	2.54	30.46	27.50	43.35	38.00	39.19	39.00
CI-25	CI-24	18	171	0.32	36.70	36.16	42.12	42.15	41.35	41.29
CI-24	DI-20	24	85	0.83	36.16	35.46	42.15	41.54	41.28	41.26
DI-20	DI-17	30	125	0.50	35.46	34.84	41.54	41.86	41.20	41.15
DI-17	DI-16	36	117	0.50	34.84	34.25	41.86	41.42	41.09	41.07
DI-16	DI-15	36	130	0.50	34.25	33.60	41.42	41.75	41.00	40.95
DI-15	DI-12	36	192	0.50	33.60	32.64	41.75	41.42	40.81	40.63
DI-12	DI-11	42	122	0.50	32.14	31.52	41.42	41.42	40.44	40.33
DI-11	MH-02	42	70	0.54	31.52	31.15	41.42	42.15	40.08	40.00
CO-14	DI-13	15	92	0.50	33.25	32.79	42.90	41.42	41.37	41.31
DI-13	DI-12	18	130	0.50	32.79	32.14	41.42	41.42	41.20	40.67
CO-18	DI-17	12	80	3.24	39.42	36.84	43.50	41.86	41.14	41.13
CO-22	DI-15	12	110	0.75	37.12	36.29	43.50	41.75	41.58	40.99
CO-23	DI-21	15	59	0.50	36.15	35.86	43.50	42.51	41.79	41.70
DI-21	DI-20	15	80	0.50	35.86	35.46	42.51	41.54	41.55	41.30
CO-26	CI-10	12	48	8.49	40.00	35.94	43.55	42.58	42.05	42.02
CI-10	CI-09	18	153	0.32	35.94	35.45	42.58	42.32	41.99	41.88
CI-09	CI-08	24	238	0.46	35.45	34.36	42.32	41.79	41.84	41.71
CI-08	DI-06	24	173	0.34	34.36	33.77	41.79	41.42	41.61	41.40
CO-27	DI-06	8	107	0.50	39.50	38.97	43.50	41.42	41.37	41.36



OFF-SITE BYPASS



Routing Diagram for OFF-SITE BYPASS
Prepared by Microsoft, Printed 7/21/2017

Summary for Subcatchment 1S: OFF-SITE BYPASS

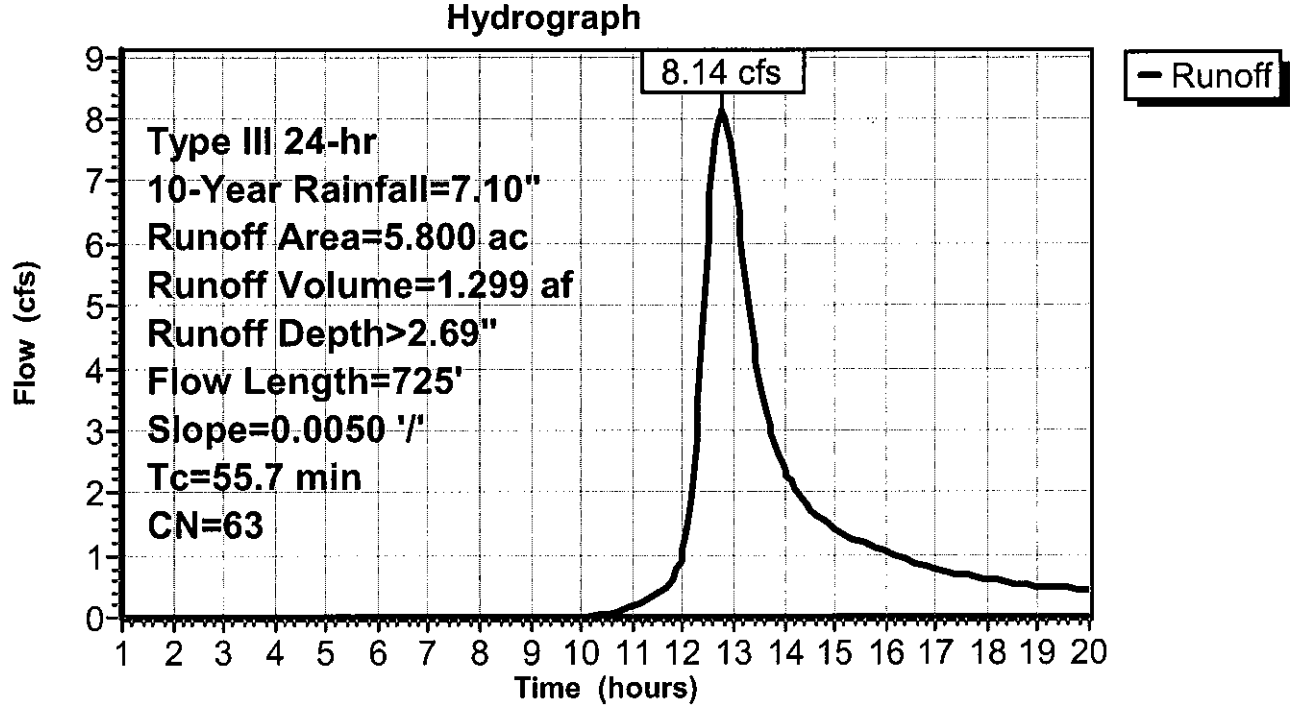
Runoff = 8.14 cfs @ 12.79 hrs, Volume= 1.299 af, Depth> 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=7.10"

Area (ac)	CN	Description
2.900	82	Woods/grass comb., Fair, HSG D
2.900	43	Woods/grass comb., Fair, HSG A
5.800	63	Weighted Average
5.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.7	725	0.0050	0.22		**Lag/CN Method,**

Subcatchment 1S: OFF-SITE BYPASS



Summary for Subcatchment 1S: OFF-SITE BYPASS

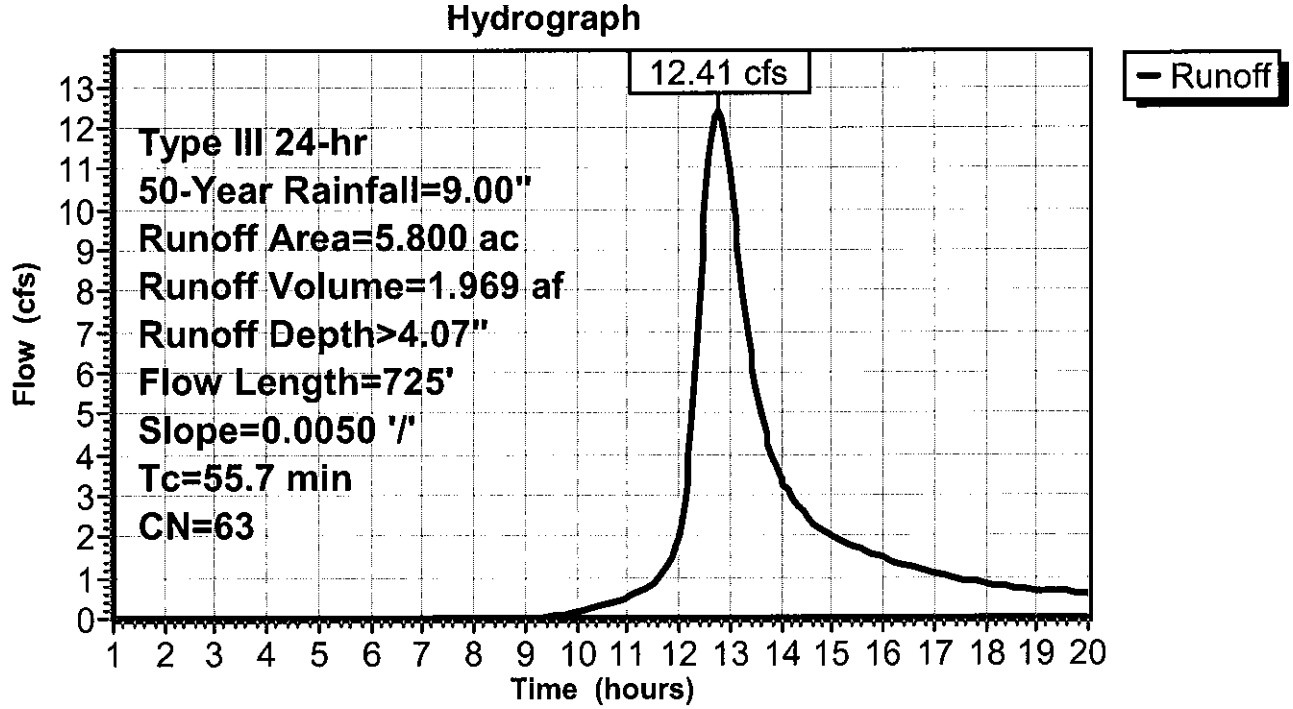
Runoff = 12.41 cfs @ 12.78 hrs, Volume= 1.969 af, Depth> 4.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=9.00"

Area (ac)	CN	Description
2.900	82	Woods/grass comb., Fair, HSG D
2.900	43	Woods/grass comb., Fair, HSG A
5.800	63	Weighted Average
5.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.7	725	0.0050	0.22		**Lag/CN Method,**

Subcatchment 1S: OFF-SITE BYPASS



Summary for Subcatchment 1S: OFF-SITE BYPASS

Runoff = 15.23 cfs @ 12.77 hrs, Volume= 2.417 af, Depth> 5.00"

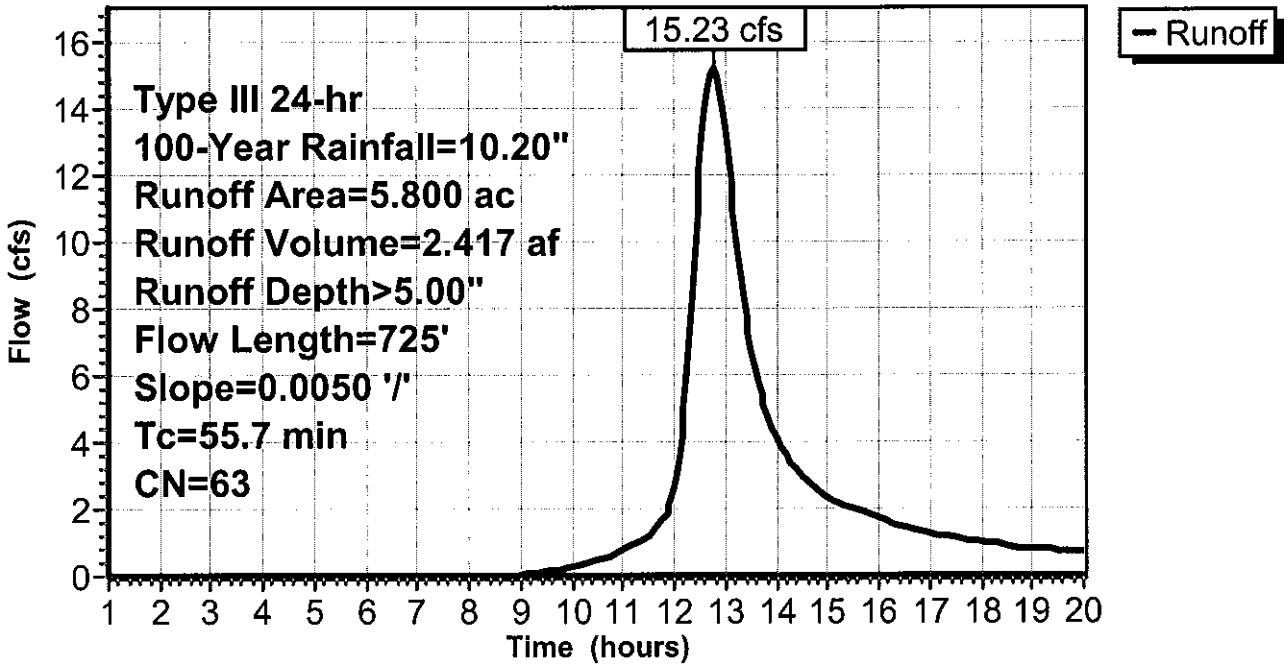
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=10.20"

Area (ac)	CN	Description
2.900	82	Woods/grass comb., Fair, HSG D
2.900	43	Woods/grass comb., Fair, HSG A
5.800	63	Weighted Average
5.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.7	725	0.0050	0.22		**Lag/CN Method,**

Subcatchment 1S: OFF-SITE BYPASS

Hydrograph



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Jul 21 2017

BY-PASS SWALE 10 yr.

Trapezoidal

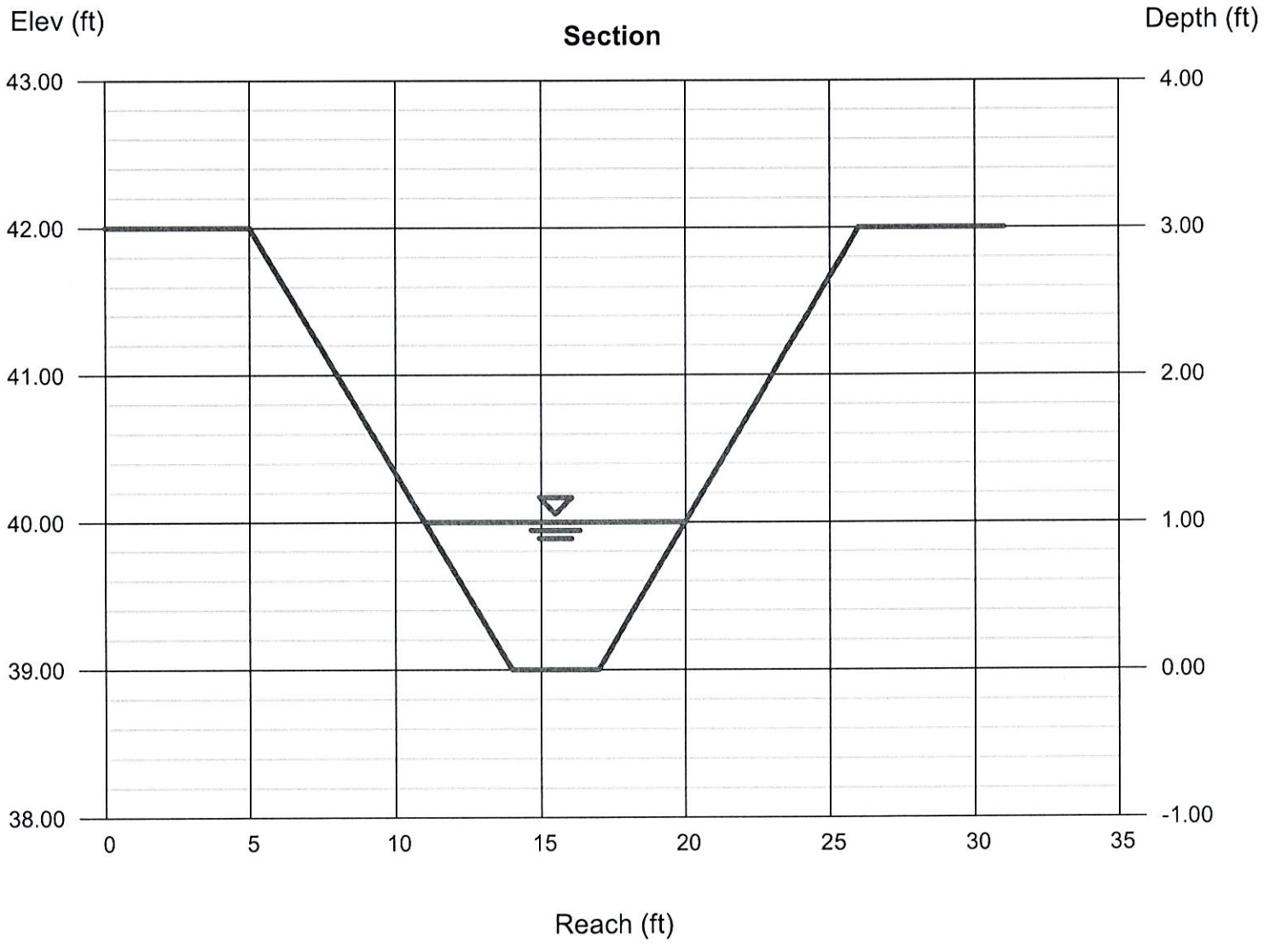
Bottom Width (ft)	= 3.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 39.00
Slope (%)	= 0.25
N-Value	= 0.040

Calculations

Compute by:	Known Q
Known Q (cfs)	= 8.14

Highlighted

Depth (ft)	= 1.00
Q (cfs)	= 8.140
Area (sqft)	= 6.00
Velocity (ft/s)	= 1.36
Wetted Perim (ft)	= 9.32
Crit Depth, Yc (ft)	= 0.52
Top Width (ft)	= 9.00
EGL (ft)	= 1.03



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Jul 21 2017

BY-PASS SWALE 50 yr.

Trapezoidal

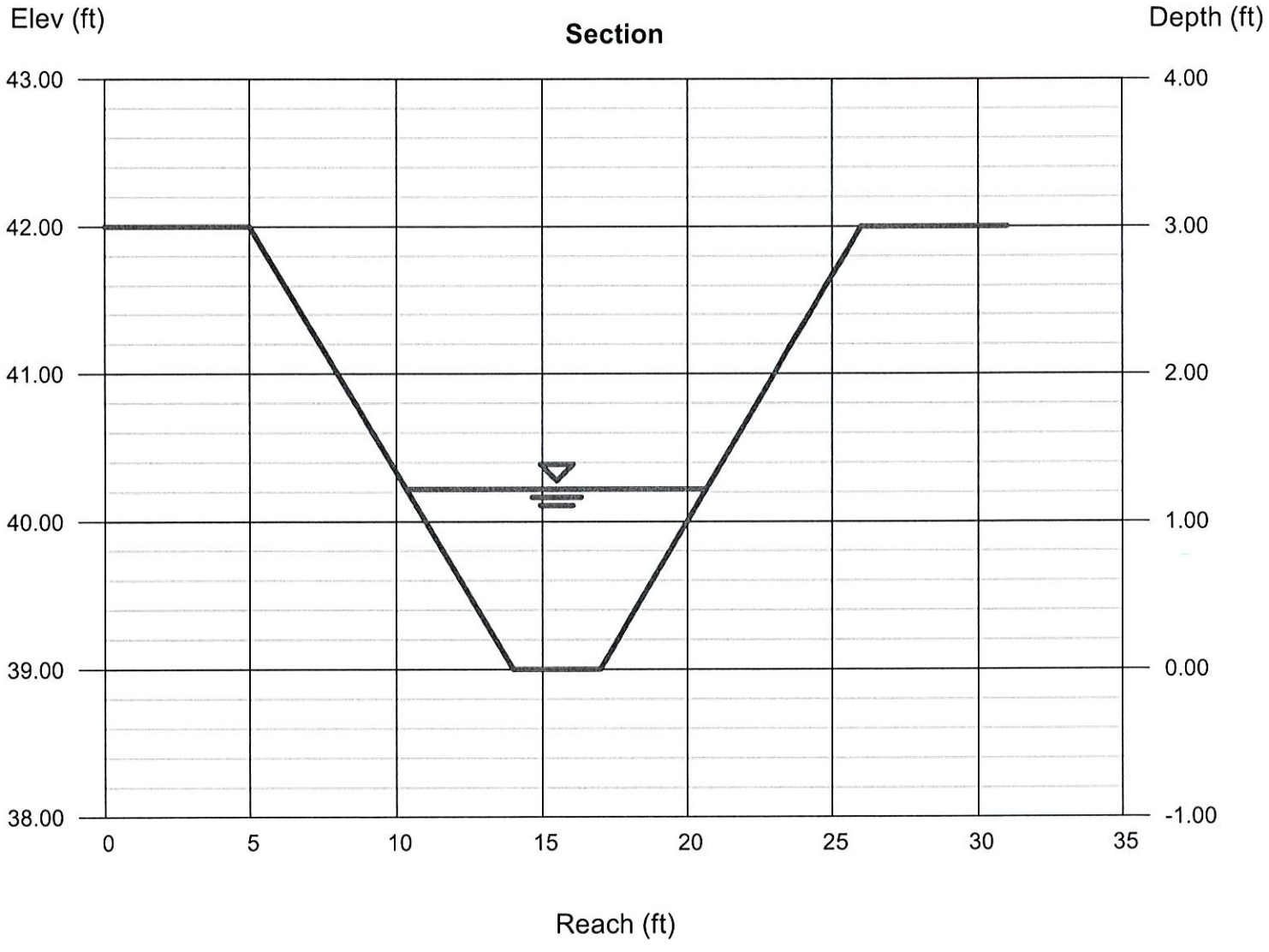
Bottom Width (ft)	= 3.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 39.00
Slope (%)	= 0.25
N-Value	= 0.040

Calculations

Compute by:	Known Q
Known Q (cfs)	= 12.41

Highlighted

Depth (ft)	= 1.22
Q (cfs)	= 12.41
Area (sqft)	= 8.13
Velocity (ft/s)	= 1.53
Wetted Perim (ft)	= 10.72
Crit Depth, Yc (ft)	= 0.65
Top Width (ft)	= 10.32
EGL (ft)	= 1.26

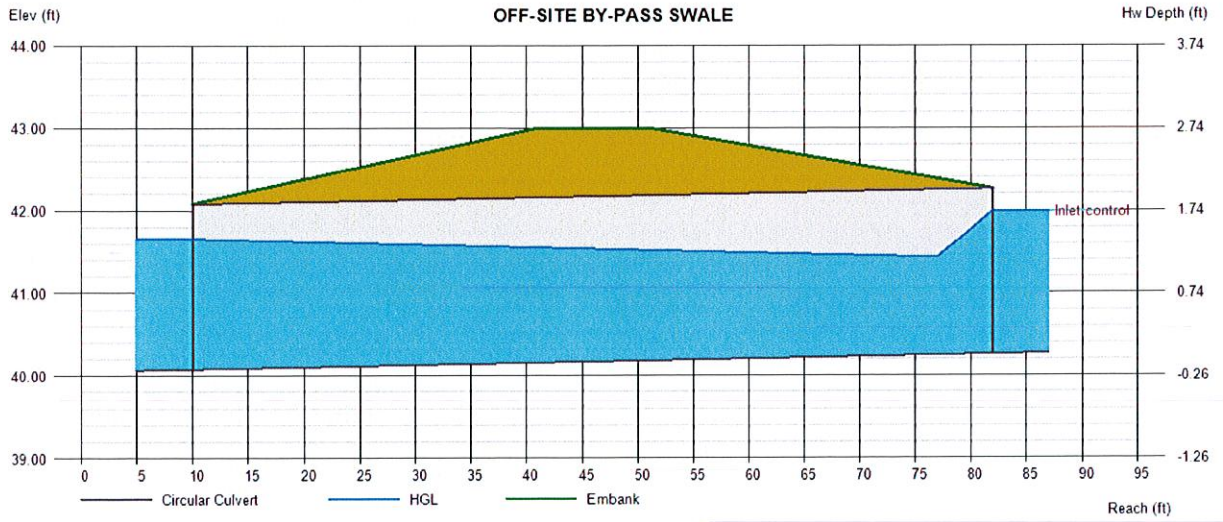


Culvert Report

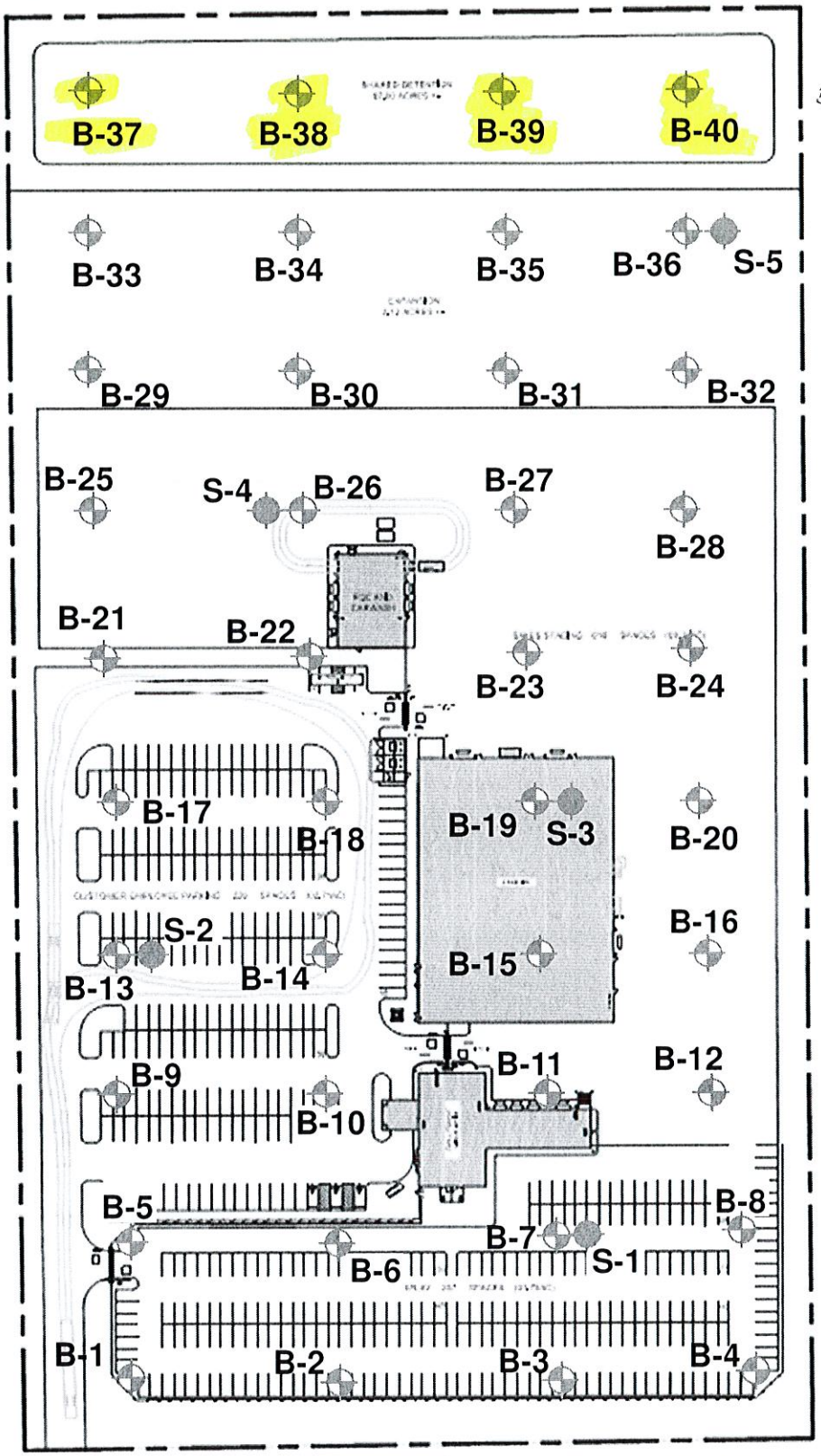
Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, May 18 2017

OFF-SITE BY-PASS SWALE

Invert Elev Dn (ft)	= 40.08	**Calculations**	
Pipe Length (ft)	= 72.00	Qmin (cfs)	= 10.35
Slope (%)	= 0.25	Qmax (cfs)	= 15.23
Invert Elev Up (ft)	= 40.26	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 24.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 24.0	Qtotal (cfs)	= 10.35
No. Barrels	= 1	Qpipe (cfs)	= 10.35
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 3.90
Culvert Entrance	= Square edge w/headwall (C)	Veloc Up (ft/s)	= 5.53
Coeff. K,M,c,Y,k	= 0.0098, 2, 0.0398, 0.67, 0.5	HGL Dn (ft)	= 41.66
		HGL Up (ft)	= 41.41
Embankment		Hw Elev (ft)	= 41.99
Top Elevation (ft)	= 43.00	Hw/D (ft)	= 0.87
Top Width (ft)	= 10.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 100.00		



MISC.



DENOTES APPROXIMATE LOCATION OF CPT SOUNDING

DENOTES APPROXIMATE LOCATION OF SOIL TEST BORING

EXPLORATION LOCATION DIAGRAM

ECS

CarMax - Wilmington

Wilmington, North Carolina

ENGINEER: WEG	DRAFTING: FMW
SCALE: NTS	FIGURE: 1
PROJECT NO.: 22.22866	
DATE: 8/20/2015	

CLIENT	JOB #	BORING #	SHEET
Centerpoint Intergrated Solutions	22.22866	B-37	1 OF 1
PROJECT NAME	**ARCHITECT-ENGINEER**		
Carmax - Wilmington			

SITE LOCATION

6016 and 6020 Market Street, Wilmington, New Hanover County, NC

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% - — - REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

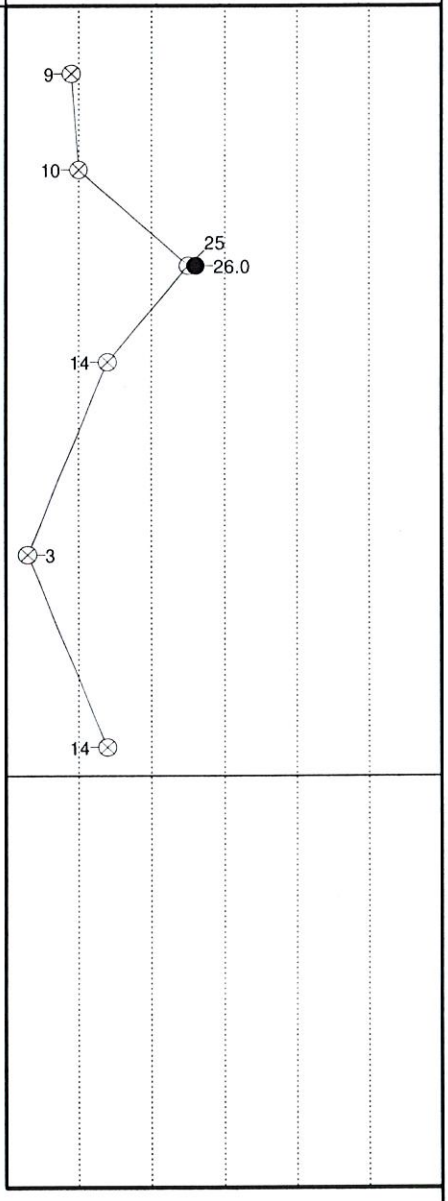
STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [4"]			
	S-1	SS	18	18	(SM) SILTY FINE SAND, Brown, Moist to Saturated, Loose			4 4 5
	S-2	SS	18	18	(SP) FINE SAND, Dark Brown, Saturated, Loose			3 5 5
5	S-3	SS	18	18	(SP-SM) FINE SAND WITH SILT, Brown, Saturated, Medium Dense and Very Loose			7 10 15
	S-4	SS	18	18				6 7 7
10	S-5	SS	18	18				2 1 2
15	S-6	SS	18	18				5 7 7
20					END OF BORING @ 20'			
25								
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL 2.8 WS ☐ WD ☒	BORING STARTED 06/18/15	CAVE IN DEPTH
WL(BCR) WL(ACR)	BORING COMPLETED 06/18/15	HAMMER TYPE Auto
WL	RIG CME-45C FOREMAN MW	DRILLING METHOD Mud Rotary

CLIENT	JOB #	BORING #	SHEET
Centerpoint Intergrated Solutions	22.22866	B-38	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Carmax - Wilmington	

SITE LOCATION

6016 and 6020 Market Street, Wilmington, New Hanover County, NC

NORTHING	EASTING	STATION

CALIBRATED PENETROMETER TONS/FT²

ROCK QUALITY DESIGNATION & RECOVERY
RQD% - — - REC% ———

PLASTIC LIMIT% — WATER CONTENT% — LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

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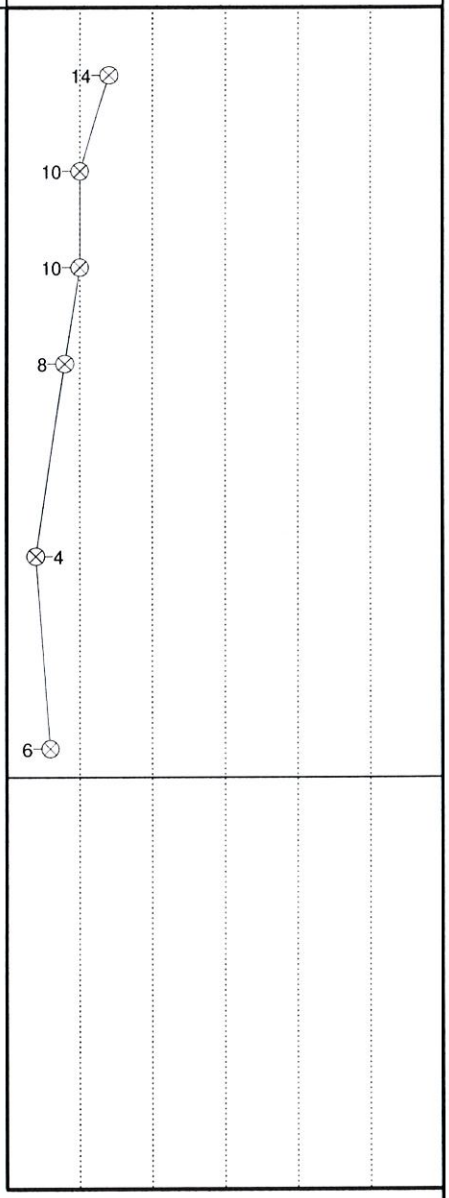
DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [4"]			
	S-1	SS	18	18	(SP) FINE TO MEDIUM SAND, Light Gray, Moist to Saturated, Medium Dense	▽		2 5 9
						▽		
	S-2	SS	18	18	(SM) SILTY FINE SAND, Brown, Saturated, Loose			4 4 6
5	S-3	SS	18	18	(SP) FINE SAND, Brown, Saturated, Loose and Very Loose			4 4 6
	S-4	SS	18	18				3 3 5
10								
	S-5	SS	18	18				2 2 2
15								
	S-6	SS	18	18				2 3 3
20					END OF BORING @ 20'			
25								
30								



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▽ WL 3.0 WS ☐ WD ☒	BORING STARTED 06/18/15	CAVE IN DEPTH
▽ WL(BCR) ▼ WL(ACR)	BORING COMPLETED 06/18/15	HAMMER TYPE Auto
▽ WL 1.8	RIG CME-45C FOREMAN MW	DRILLING METHOD Mud Rotary

CLIENT	JOB #	BORING #	SHEET
Centerpoint Intergrated Solutions	22.22866	B-39	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Carmax - Wilmington	

SITE LOCATION

6016 and 6020 Market Street, Wilmington, New Hanover County, NC

NORTHING	EASTING	STATION

CALIBRATED PENETROMETER TONS/FT²

ROCK QUALITY DESIGNATION & RECOVERY
RQD% - — - REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

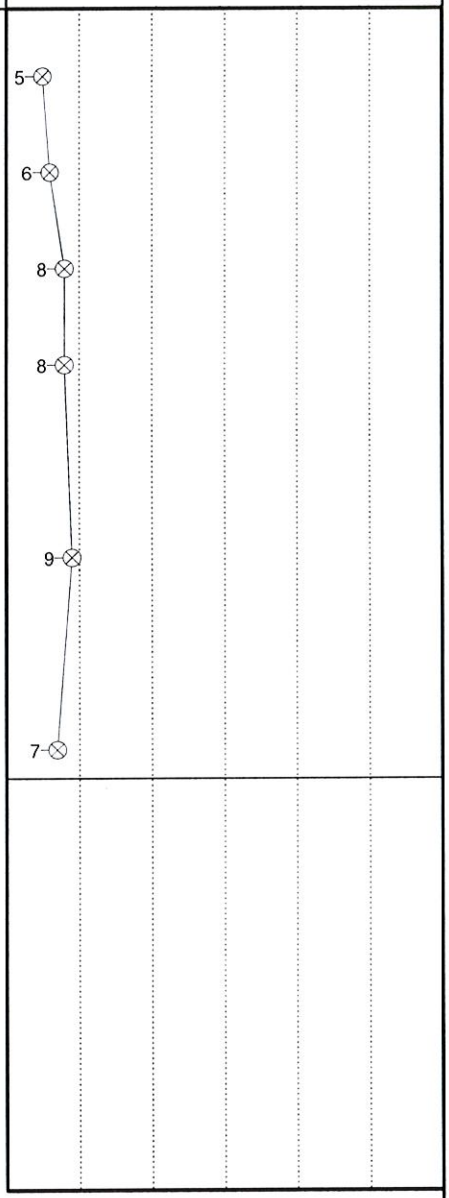
STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [4"]			
	S-1	SS	18	18	(SP) FINE SAND, Gray, Moist, Loose			2 2 3
	S-2	SS	18	18	(SM) SILTY FINE SAND, Brown, Moist to Saturated, Loose			3 3 3
5	S-3	SS	18	18				4 4 4
	S-4	SS	18	18				3 3 5
10					(SP) FINE SAND, Brown to Gray, Saturated, Loose			
	S-5	SS	18	18				3 4 5
15								
	S-6	SS	18	18				3 3 4
20					END OF BORING @ 20'			
25								
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL 3.0 WS ☐ WD ☒	BORING STARTED 06/19/15	CAVE IN DEPTH
WL(BCR) WL(ACR)	BORING COMPLETED 06/19/15	HAMMER TYPE Auto
WL 8.4	RIG D-25 Track FOREMAN MC	DRILLING METHOD Mud Rotary

CLIENT	JOB #	BORING #	SHEET
Centerpoint Intergrated Solutions	22.22866	B-40	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Carmax - Wilmington	

SITE LOCATION

6016 and 6020 Market Street, Wilmington, New Hanover County, NC

NORTHING	EASTING	STATION

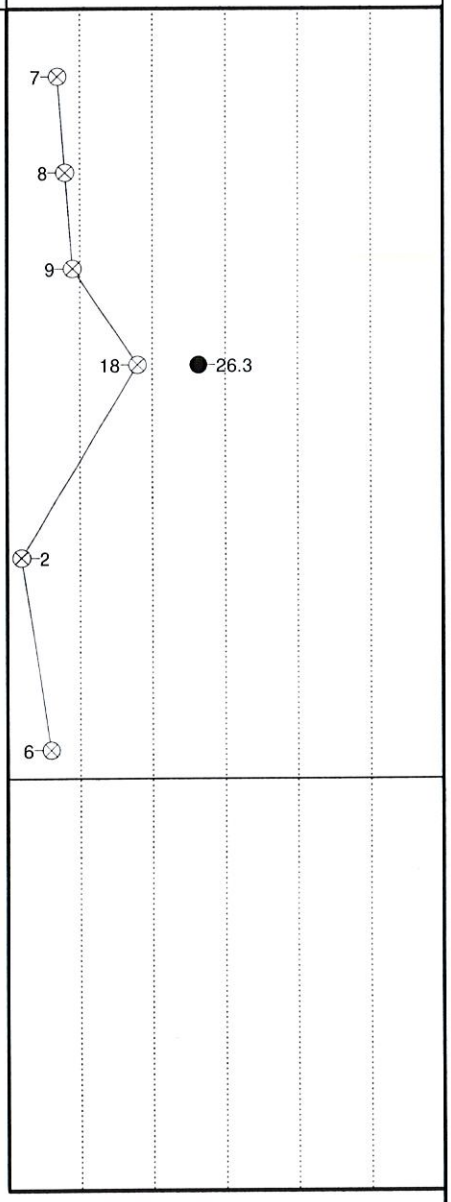
CALIBRATED PENETROMETER TONS/FT²

ROCK QUALITY DESIGNATION & RECOVERY
RQD% - — - REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL (ENGLISH UNITS; BOTTOM OF CASING; LOSS OF CIRCULATION; SURFACE ELEVATION)	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [4"]			
	S-1	SS	18	18	(SP) FINE SAND, Gray, Moist, Loose			2 3 4
	S-2	SS	18	18	(SM) SILTY FINE SAND, Brown, Moist, Loose, Trace Wood			3 4 4
5	S-3	SS	18	18	(SM) SILTY FINE SAND, Dark Brown, Moist, Loose			3 3 6
	S-4	SS	18	18	(SP-SM) FINE SAND WITH SILT, Brown to Gray, Moist to Saturated, Medium Dense, Very Loose and Loose			5 8 10
10								
	S-5	SS	18	18				2 1 1
15								
	S-6	SS	18	18				3 2 4
20					END OF BORING @ 20'			
25								
30								



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WL WS ☐ WD ☒	BORING STARTED 06/19/15	CAVE IN DEPTH	
WL(BCR) WL(ACR)	BORING COMPLETED 06/19/15	HAMMER TYPE Auto	
WL	RIG D-25 Track FOREMAN MC	DRILLING METHOD Mud Rotary	