

April 15, 2019 Revised May 22, 2019 Revised June 19, 2019

# FINAL STORMWATER REPORT

For

### W. EDWARD BALMER ELEMENTARY SCHOOL

21 Crescent Street Northbridge, Massachusetts

Prepared for:

### **TOWN OF NORTHBRIDGE**

Community Planning and Development Office 14 Hill Street Whitinsville, MA 01588

Prepared by:

### NITSCH ENGINEERING, INC.

120 Front Street Worcester, MA 01608

Nitsch Project #12260

# Building better communities with you.



# BALMER ELEMENTARY SCHOOL STORMWATER REPORT

Under the Massachusetts Wetland

Protection Act (MGL c. 131, s. 40) and the

Town of Northbridge Wetlands Bylaw and Regulations

(Section 7-700)

Project Name:	Balmer Elementary School	NITSCH PROJECT #12260 6/19/2019
Project Location:	21 Crescent Street Northbridge, MA	SUNFALTH OF MASSR
Prepared for:	Town of Northbridge	SANDRA A.
Nitsch Project #:	#12260	BROCK CIVIL No. 39417
Date Prepared:	April 3, 2019 Revised April 14, 2019	PRO PEGISTEBED
	Revised May 23, 2019, Revised June 19, 2019	SSIONAL ENGLY

### **ATTACHMENTS**

Attachment A: **Precipitation and Stormwater Management Standards Documentation** Atlas 14 Volume 10 Precipitation Data for Site MassDEP Checklist for Stormwater Report Standard 3: 72-Hour Drawdown Recharge Calculation Standard 4: TSS Removal Calculations Standard 10: Illicit Discharge Compliance Statement

- Attachment B: Existing Conditions HydroCAD Calculations
- Attachment C: Proposed Conditions HydroCAD Calculations
- Attachment D: Closed Drainage System Design
- Attachment E: Long-Term Pollution Prevention-Stormwater Operation and Maintenance Plan
- Attachment F: Stormwater Pollution Prevention Plan (SWPPP)
- Attachment G: Soil Investigations NRCS Soil Maps and Descriptions and Soil Testing Logs
- Attachment H: Methodology and Hydrocad Technical Information

Attachment I: Figures: DR- EX Existing Watershed Areas and DR-PR Proposed Watershed Areas

Page 2 of 16	Nitsch Engineering
Introduction:	Nitsch Engineering has prepared this Stormwater Report to support the Notice of Intent and Site Permit applications for the Balmer Elementary School (the Project). The Project site is located at 21 Crescent Street Northbridge, Massachusetts (subsequently referred to as the "Site").
	The Project consists of the demolition of the existing elementary school and the construction of a new elementary school and associated site improvements at the existing Balmer Elementary site.
	EXISTING STORMWATER CONDITIONS
Existing Drainage Infrastructure:	The existing site's drainage system includes a closed drainage system that collects runoff from parking and landscape areas into a series of infrequent catch basins and inlets. The closed drainage system discharges to the Municipal drainage system in Crescent Street. There is overland flow to the Bordering Vegetated Wetlands (BVW) at the rear of the site and there is an existing 36" culvert at the southerly end of the BVW that runs across the Site to the Municipal drainage system in Crescent Street.
	Currently there are no detention systems and no water quality BMPs or Water Quality Structures on the site.
On-site Soil Investigations:	On-site Soil Testing was performed on April 9 and 10, 2019. NRCS soil information along with the on-site soil testing information were used for the4 stormwater management system design. The on-site testing confirmed the Soil Maps Hydrological Groups. In general, the majority of the development area soil's parent materials are a sandy-loams and fall within low permeability range (2.41 inch/hour) of Hydrological Soil Group A. The Seasonal High Ground Water (SHGW) was relatively shallow and generally within 36 inches of the surface except for areas near Crescent Street. See Drainage Area Plans for locations of test pits, SHGW elevations, and general soil descriptions. See soil logs in <b>Attachment G</b> for more detailed information.
NRSC Soils:	<ul> <li>Soils (from NRCS Soils Map) on site include:</li> <li>Udorthents, Smoothed – Hydrological Soil Group A</li> <li>Canton fine sandy loam – Hydrological Soil Group B</li> <li>Scituate fine sandy loam – Hydrological Soil Group C</li> <li>Hinkley loamy sand – Hydrological Soil Group A</li> <li>Montauk fine sandy loam – Hydrological Soil Group C</li> <li>Merrimac fine sandy loam – Hydrological Soil Group A</li> <li>See NOI Report's Attachment G - Figure 5 for locations of soil on the site.</li> </ul>
FEMA Flood Zone:	There are no flood hazard zones on the project site. FIRM MAP Number 25027C1006E Effective Date July 4, 2011 See NOI Report's <b>Attachment E: Figure 4</b> .
Wetland Resource Areas:	The BVW and associated 100-foot buffer zone is located in the northern portion of the property. In addition, a BVW associated with Arcade Pond is located across Crescent Street from the project but a portion of the outer 100-foot buffer crosses the property line. An ORAD, dated January 16, 2019 was issued by the NCC confirming the wetland delineation indicated on the Existing Conditions Plan. See NOI Report's <b>Attachment B</b> .

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Project Description:	The Applicant is proposing to replace the existing elementary school with a new school building, vehicular and pedestrian circulations, athletic fields, play areas, landscaping. See attached plans for extent of site improvements.						
Land Use	Table 1. Proposed land	l use (in acres)					
Table:	Land Use	Existing Site (acres)	Proposed Site (acres)	Change			
	Buildings	1.36	1.70	0.34			
	Site Pavement	2.70	5.51	2.81			
	Other Altered Areas (Fields, etc.)	7.69	9.84	2.15			
	Undeveloped Areas (Woods)	18.33	13.03	-5.18			
	Total	30.08	30.08				
	Stormwater captured in the catch basins will be directed to another treatment or infiltration BMP prior to discharge.         Water Quality Inlet: Proprietary Water Quality Inlets (WQI) are being used at the entrance of the west driveway (WQI CBs) and before Underground Basin #2 and for driveway runoff not able to be treated by WQS or Bio-Basins.         Water Quality Swale: A water Quality Swale is proposed along the westerly main access. The 1,000+ linear feet swale has 3-foot bottom and is at a minimum of 12 inches deep. The swale will have check dams, underdrain, and the roadway runoff will be directed to the WQ swale via inlets and stone lined swale for pre-treatment.         Roof Infiltration System: Stormwater will be collected from roof areas (34,417 SF of the 74,001 SF of the roof will be collected) and infiltrated using 1 roof subsurface infiltration system and Underground Basin 3 at Crescent Street.         Bioretention Basins: Two Bioretention (BR) Basins are proposed. Each will collect runoff from paved areas. The water quality volume (0.5") from impervious areas at BR#2 only. BR#1 does not have the needed two feet of separation from SHGW.         Underground Detention Basins         Three underground detention basins will mitigate increase rate of runoff from the increase in impervious. Only Underground Basin #3 includes recharge since SHGW is sufficiently low to maintain a 2-foot separation.						



SWM During Construction:	See Attachment E.					
	9	Stormwater Management	Analysis			
Methodology:	Nitsch Engineering completed a hydrologic analysis of the existing project site utilizing Soil Conservation Service (SCS) Runoff Curve Number (CN) methodology. <b>See</b> <b>Attachment I</b> for further information.					
HydroCAD:	The HydroCAD computer program uses SCS and TR-20 methods to model the drainage systems. Nitsch Engineering utilizes HydroCAD in our design calculations. <b>See Attachments B and C</b> for further information.					
Precipitation Data:	estimate the ra	•	e 10 by the National Weather Servi 5-year and 100-year 24-hour storm			
		Strom Event	24 Hour Rainfall			
		2-year	3.31			
		10-year	5.14			
		25-year	6.28			
		100-year	8.03			
	See Attachme	nt A for more detailed precipita	ation information.			
Existing	Design Point 1	Northern Wetlands				
Hydrological	Design Point 2	North Main Street				
Design Points:	Design Point 3	Crescent Street – Wetlands S	South of Crescent Street			
	See Figure DR	-EX Existing Watershed Area	as.			
Proposed	Design Point 1	Northern Wetlands				
Hydrological	U U	North Main Street				
Design Points:	U	Crescent Street – Wetlands S	outh of Crescent Street			
	-	-PR Proposed Watershed Ar				

Peak Flow Rates:	Table 2: Preliminary Peak Rates of Runoff in Cubic Feet per Second (cfs)							
Nales.		Storm Event	2-year	10-year	25-year	100-year		
	DB 4	Existing	0.10	1.91	4.05	8.28		
	DP-1 DP-2	Proposed	0.08	1.57	3.39	7.11		
		Existing	0.06	0.33	0.57	.99		
		Proposed	0.06	0.33	0.57	.99		
	DP-3	Existing	4.28	18.61	30.81	52.08		
	DP-3	Proposed	2.16	16.40	27.21	48.56		
	See Attachment	<b>s B and C</b> for ca	lculations.					



Drainage System:	The proposed closed drainage system consists of deep sump and hooded catch basins, drainage manholes, and proprietary water quality treatment units connected with corrugated polyethylene pipe. The closed drainage system was designed to convey the 25-year storm event using the Rational method. Refer to <b>Attachment D</b> for more information.							
	MASSDEF	P Stormwater Man	agement Standar	ds				
Standard 1	stormwater directly to Stormwater from the	<b>No New Untreated Discharges:</b> The Project will not discharge any untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. Stormwater from the Site will be collected and treated in accordance with the MassDEP Stormwater Management Standards and stormwater outfalls will be stabilized to prevent erosion.						
Standard 2	that the post-develop discharge rates. To stormwater manager	<b>Peak Rate Attenuation:</b> The proposed stormwater management system is designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates. To prevent storm damage and downstream flooding, the proposed stormwater management practices will mitigate peak runoff rates for the 2-, 10-, 25- and 100-year, 24-hour storm events.						
	Indard 3Groundwater Recharge: The Site was designed using environmentally-sensitive design, low impact development techniques, and stormwater BMP treatment to minimize the loss of annual recharge to groundwater. The annual recharge from development conditions based on soil type using the guidelines provide MassDEP Stormwater Management Handbook. Infiltration systems are off-designed to capture the two-year storm for recharge. Infiltration system bypass manholes to allow for larger storms to pass. No mounding and required. A minimum 2 feet of separation has been maintained between the bottor infiltration system and seasonal high groundwater.Increase in Impervious Area in HSG A = 136,904 square feet (3.14 Acres) Rv (Recharge Volume)= 136,904 x 0.6 in. / (12 inches/ft) = 6,845 cubic feetThe infiltration BMPs are sized to exceed the recharge volume required under the							
	<b>required.</b> A minimur infiltration system an Increase in Impervio Rv (Recharge Volum	n 2 feet of separation nd seasonal high gr us Area in HSG A ne) s are sized to excee	on has been mainta oundwater. = 136,904 square f = 136,904 x 0.6 in. = 6,845 cubic feet ed the recharge vol	<b>s. No mounding analysis is</b> ained between the bottom of the eet (3.14 Acres) / (12 inches/ft)				
	required. A minimur infiltration system an Increase in Impervio Rv (Recharge Volum The infiltration BMPs MassDEP Stormwat	n 2 feet of separation d seasonal high gr us Area in HSG A ne) s are sized to excee er Management St Areas to Infiltration	on has been mainta oundwater. = 136,904 square fr = 136,904 x 0.6 in. = 6,845 cubic feet ed the recharge vol andards. n Systems and Ava	s. No mounding analysis is ained between the bottom of the eet (3.14 Acres) / (12 inches/ft) ume required under the ailable Recharge Volumes				
	required. A minimur infiltration system an Increase in Impervio Rv (Recharge Volum The infiltration BMPs MassDEP Stormwat	n 2 feet of separation of seasonal high gr us Area in HSG A he) s are sized to excee er Management St Areas to Infiltration Area (sf) of Impervious to	on has been mainta oundwater. = 136,904 square fi = 136,904 x 0.6 in. = 6,845 cubic feet ed the recharge vol andards.	s. No mounding analysis is ained between the bottom of the eet (3.14 Acres) / (12 inches/ft) ume required under the ailable Recharge Volumes Static Recharge Volume Available				
	required. A minimur infiltration system and Increase in Impervio Rv (Recharge Volum The infiltration BMPs MassDEP Stormwat Table 3 –Impervious	n 2 feet of separation d seasonal high gr us Area in HSG A he) s are sized to exceed er Management St Areas to Infiltration <b>Area (sf) of</b>	on has been mainta oundwater. = 136,904 square fi = 136,904 x 0.6 in. = 6,845 cubic feet ed the recharge vol andards. n Systems and Ava Recharge	s. No mounding analysis is ained between the bottom of the eet (3.14 Acres) / (12 inches/ft) ume required under the ailable Recharge Volumes Static Recharge				
	required. A minimur infiltration system and Increase in Impervio Rv (Recharge Volum The infiltration BMPs MassDEP Stormwat Table 3 –Impervious Infiltration BMP	n 2 feet of separation of seasonal high gr us Area in HSG A he) s are sized to exceed er Management St Areas to Infiltration Area (sf) of Impervious to System	on has been mainta oundwater. = 136,904 square f = 136,904 x 0.6 in. = 6,845 cubic feet ed the recharge vol andards. n Systems and Ava Recharge Volume (cf)	s. No mounding analysis is ained between the bottom of the eet (3.14 Acres) / (12 inches/ft) ume required under the ailable Recharge Volumes Static Recharge Volume Available (cf)				
	required. A minimur infiltration system and Increase in Impervio Rv (Recharge Volum The infiltration BMPs MassDEP Stormwat Table 3 –Impervious Infiltration BMP Underground Basin #3 Roof Infiltration	n 2 feet of separation of seasonal high gr us Area in HSG A he) s are sized to exceed er Management St Areas to Infiltration Area (sf) of Impervious to System 105,473	on has been mainta oundwater. = 136,904 square fr = 136,904 x 0.6 in. = 6,845 cubic feet ed the recharge vol andards. n Systems and Ava Recharge Volume (cf) 5,273	s. No mounding analysis is ained between the bottom of the eet (3.14 Acres) / (12 inches/ft) ume required under the ailable Recharge Volumes Static Recharge Volume Available (cf) 4,965				



		. The overflow pipe	s in the Bypass Ma	ver than the overflow pipe in nholes are above the dead owing.
	Based on HydroCAD 0.6 inch recharge de	•		e infiltrations exceeding the tfor an A soils.
	Table 4 –Infiltration S	Systems Elevations	and Available Recl	narge Volumes
	Infiltration BMP	Elevation of System	Overflow Elevation in Bypass MH	Volume Below Overflow
	Underground Basin #3	Stone at 314.70 Chamber at 315.20	316.52	4,965
	Underground Basin #5	Stone at 326.5 Chamber at 327.0	328.75	1,240
	Bioretention Basin #2	Bottom at 314.0 Top at 315.0	315.15	2,621
	Total			8,826
	<ul><li>UDB#5 calc</li><li>BR Basin #2</li></ul>	ulated volume infilt 2 calculated volume	rated is 6054 cubic rated is 1,916 cubic infiltrated is 3,180	feet cubic feet
	printouts provided in within 48 hours for th	Appendix C indicate 2-year storm even	te that all proposed ents, meeting the 72	ration volume. The HydroCAL infiltration BMPs will drain
Standard 4			lations have been p	rovided in <b>Attachment A</b> .



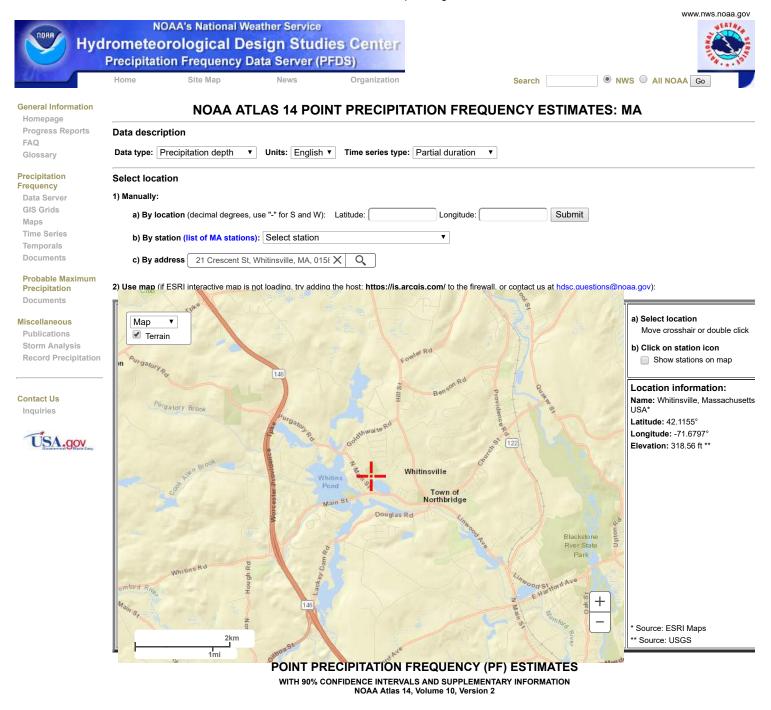
Standard 5	Water Quality Treatment - Land Uses with Higher Potential Pollutant Loads (LUHPPLs): The project is considered a LUHPPL (>1000 trips per day) and therefore, water quality volume is based on 1-inch of runoff. Water Quality Treatment has been sized to treat the first inch of runoff and choice of gravel wetlands was based on the site being a LUHPPL. (This is based on number of students)
Standard 6	<b>Critical Areas:</b> The proposed work is not located within any critical areas. Therefore, this standard is not applicable.
Standard 7	<b>Redevelopments:</b> The Project is not considered a redevelopment under the MassDEP Stormwater Management Standards. The Project is a combination Redevelopment/New, to the greatest extent feasible, standards are being met.
Standard 8	<b>Construction Period Pollution Prevention and Sedimentation Control:</b> Because the Project will disturb more than one (1) acre of land, a Notice of Intent will be submitted to the Environmental Protection Agency (EPA) for coverage under the National Pollution Discharge Elimination System (NPDES) Construction General Permit. As part of this application the Applicant is required to prepare a Stormwater Pollution Prevention Plan (SWPPP) and implement the measures in the SWPPP. The SWPPP, which is to be kept on site, includes erosion and sediment controls (stabilization practices and structural practices), temporary and permanent stormwater management measures, Contractor inspection schedules and reporting of all SWPPP features, materials management, waste disposal, off-site vehicle tracking, spill prevention and response, sanitation, and non-stormwater discharges. A draft SWPPP is provided in <b>Attachment F</b> .
Standard 9	<b>Operation and Maintenance Plan:</b> A post-construction operation and maintenance plan has been prepared and will be implemented to ensure that stormwater management systems function as designed. Source control and stormwater BMP operation requirements for the Site are summarized in the Long-Term Pollution Prevention Plan and Operation and Maintenance Plan provided in <b>Attachment E</b> .
Standard 10	<b>Prohibition of Illicit Discharges:</b> There will be no illicit discharges to the stormwater management system associated with the Project. An Illicit Discharge Compliance Statement is provided in <b>Attachment A</b> .
	Conclusion
through the use discharged from be implemented	The Project's stormwater management system will reduce or maintain peak runoff rates of infiltration and detention basins and improve the water quality of stormwater being the Site. Environmentally sensitive site design and low-impact development techniques will throughout the Site. The Project is being designed to meet and exceed the MassDEP magement Standards.



#### ATTACHMENT A

### **Stormwater Management Standards Documentation**

Atlas 14 Volume 10 Precipitation Data for Site MassDEP Checklist for Stormwater Report Standard 3: 72-Hour Drawdown Recharge Calcs Standard 4: TSS Removal Calculations and Sketch Standard 10: Illicit Discharge Compliance Statement



	PF tabular	PF gra	aphical	Supplement	tary information				Print page	e
	PDS-based precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup>									
Duration					Average recurren	ce interval (years)		-		-
	1	2	5	10	25	50	100	200	500	1000
5-min	<b>0.336</b> (0.266-0.417)	<b>0.400</b> (0.316-0.498)	0.505 (0.398-0.631)	<b>0.593</b> (0.464-0.744)	<b>0.713</b> (0.538-0.936)	<b>0.805</b> (0.594-1.08)	<b>0.898</b> (0.641-1.25)	<b>1.01</b> (0.681-1.44)	<b>1.15</b> (0.747-1.71)	<b>1.26</b> (0.796-1.9
10-min	<b>0.476</b> (0.377-0.591)	<b>0.567</b> (0.448-0.705)	<b>0.716</b> (0.564-0.894)	<b>0.839</b> (0.657-1.05)	<b>1.01</b> (0.763-1.33)	<b>1.14</b> (0.842-1.53)	<b>1.27</b> (0.908-1.77)	<b>1.43</b> (0.965-2.04)	<b>1.63</b> (1.06-2.42)	<b>1.78</b> (1.13-2.7
15-min	<b>0.560</b> (0.443-0.695)	<b>0.667</b> (0.527-0.830)	<b>0.842</b> (0.664-1.05)	<b>0.988</b> (0.773-1.24)	<b>1.19</b> (0.897-1.56)	<b>1.34</b> (0.991-1.80)	<b>1.50</b> (1.07-2.08)	<b>1.68</b> (1.14-2.40)	<b>1.92</b> (1.25-2.85)	<b>2.10</b> (1.33-3.1
30-min	<b>0.770</b> (0.610-0.957)	<b>0.918</b> (0.726-1.14)	<b>1.16</b> (0.914-1.45)	<b>1.36</b> (1.07-1.71)	<b>1.64</b> (1.24-2.15)	<b>1.85</b> (1.37-2.48)	<b>2.06</b> (1.47-2.87)	<b>2.31</b> (1.56-3.31)	<b>2.64</b> (1.72-3.93)	<b>2.89</b> (1.83-4.3
60-min	<b>0.981</b> (0.777-1.22)	<b>1.17</b> (0.925-1.46)	<b>1.48</b> (1.16-1.85)	<b>1.73</b> (1.36-2.18)	<b>2.09</b> (1.58-2.74)	<b>2.36</b> (1.74-3.16)	<b>2.63</b> (1.88-3.66)	<b>2.94</b> (1.99-4.22)	<b>3.36</b> (2.18-5.00)	<b>3.68</b> (2.33-5.5
2-hr	<b>1.27</b> (1.01-1.57)	<b>1.50</b> (1.20-1.86)	<b>1.89</b> (1.50-2.34)	<b>2.21</b> (1.74-2.76)	<b>2.65</b> (2.02-3.46)	<b>2.99</b> (2.22-4.00)	<b>3.33</b> (2.40-4.63)	<b>3.76</b> (2.55-5.35)	<b>4.33</b> (2.82-6.40)	<b>4.76</b> (3.02-7.1
3-hr	<b>1.46</b> (1.17-1.80)	<b>1.74</b> (1.39-2.14)	<b>2.18</b> (1.74-2.70)	<b>2.55</b> (2.02-3.17)	<b>3.06</b> (2.34-3.99)	<b>3.45</b> (2.58-4.60)	<b>3.84</b> (2.78-5.34)	<b>4.36</b> (2.97-6.19)	<b>5.05</b> (3.30-7.44)	<b>5.57</b> (3.54-8.3
6-hr	<b>1.85</b> (1.49-2.26)	<b>2.21</b> (1.78-2.70)	<b>2.79</b> (2.24-3.43)	<b>3.28</b> (2.61-4.05)	<b>3.94</b> (3.04-5.12)	<b>4.46</b> (3.36-5.93)	<b>4.97</b> (3.63-6.90)	<b>5.70</b> (3.89-8.04)	<b>6.66</b> (4.36-9.75)	7.39 (4.71-11
12-hr	2.29	2.76	3.54	4.19	5.08	5.77	6.45	7.46	8.79	9.79

#### PF Map: Contiguous US

	(1.85-2.78)	(2.24-3.36)	(2.86-4.32)	(3.36-5.14)	(3.94-6.56)	(4.37-7.64)	(4.75-8.93)	(5.11-10.5)	(5.77-12.8)	(6.27-14.5)
24-hr	<b>2.70</b> (2.21-3.26)	<b>3.31</b> (2.70-4.00)	<b>4.31</b> (3.50-5.22)	<b>5.14</b> (4.14-6.26)	<b>6.28</b> (4.90-8.07)	<b>7.16</b> (5.46-9.44)	<b>8.03</b> (5.96-11.1)	<b>9.37</b> (6.44-13.1)	<b>11.1</b> (7.33-16.1)	<b>12.5</b> (8.00-18.4)
2-day	<b>3.07</b> (2.53-3.68)	<b>3.81</b> (3.13-4.57)	<b>5.01</b> (4.09-6.03)	<b>6.00</b> (4.87-7.27)	<b>7.37</b> (5.79-9.43)	<b>8.43</b> (6.48-11.1)	<b>9.48</b> (7.09-13.0)	<b>11.1</b> (7.68-15.4)	<b>13.3</b> (8.79-19.1)	<b>15.0</b> (9.63-21.9)
3-day	<b>3.36</b> (2.77-4.01)	<b>4.15</b> (3.42-4.96)	<b>5.45</b> (4.47-6.53)	<b>6.52</b> (5.32-7.87)	8.00 (6.31-10.2)	<b>9.14</b> (7.05-12.0)	<b>10.3</b> (7.71-14.1)	<b>12.1</b> (8.35-16.6)	<b>14.4</b> (9.53-20.6)	<b>16.2</b> (10.4-23.6)
4-day	<b>3.63</b> (3.00-4.31)	<b>4.46</b> (3.68-5.31)	<b>5.81</b> (4.79-6.95)	<b>6.94</b> (5.67-8.35)	<b>8.49</b> (6.70-10.8)	<b>9.69</b> (7.48-12.6)	<b>10.9</b> (8.16-14.8)	<b>12.7</b> (8.82-17.5)	<b>15.1</b> (10.0-21.6)	<b>17.0</b> (11.0-24.7)
7-day	<b>4.36</b> (3.63-5.16)	<b>5.26</b> (4.37-6.23)	<b>6.73</b> (5.57-8.00)	<b>7.95</b> (6.53-9.51)	<b>9.63</b> (7.63-12.1)	<b>10.9</b> (8.45-14.1)	<b>12.2</b> (9.15-16.5)	<b>14.1</b> (9.81-19.2)	<b>16.6</b> (11.0-23.5)	<b>18.4</b> (11.9-26.7)
10-day	<b>5.05</b> (4.22-5.96)	<b>5.99</b> (5.00-7.07)	<b>7.52</b> (6.24-8.91)	<b>8.78</b> (7.25-10.5)	<b>10.5</b> (8.36-13.2)	<b>11.9</b> (9.20-15.2)	<b>13.2</b> (9.89-17.6)	<b>15.1</b> (10.5-20.5)	<b>17.5</b> (11.7-24.7)	<b>19.3</b> (12.5-27.8)
20-day	<b>7.13</b> (6.00-8.36)	<b>8.11</b> (6.81-9.51)	<b>9.71</b> (8.12-11.4)	<b>11.0</b> (9.17-13.1)	<b>12.9</b> (10.3-15.9)	<b>14.3</b> (11.1-18.0)	<b>15.7</b> (11.7-20.5)	<b>17.3</b> (12.2-23.3)	<b>19.4</b> (13.0-27.2)	<b>21.0</b> (13.7-30.1)
30-day	<b>8.87</b> (7.49-10.3)	<b>9.87</b> (8.32-11.5)	<b>11.5</b> (9.66-13.5)	<b>12.9</b> (10.7-15.2)	<b>14.7</b> (11.8-18.0)	<b>16.2</b> (12.6-20.2)	<b>17.6</b> (13.1-22.7)	<b>19.0</b> (13.4-25.5)	<b>20.9</b> (14.1-29.1)	<b>22.3</b> (14.5-31.8)
45-day	<b>11.0</b> (9.37-12.8)	<b>12.1</b> (10.2-14.1)	<b>13.8</b> (11.6-16.1)	<b>15.2</b> (12.7-17.8)	<b>17.1</b> (13.7-20.8)	<b>18.6</b> (14.4-23.0)	<b>20.0</b> (14.9-25.6)	<b>21.3</b> (15.1-28.4)	<b>22.9</b> (15.5-31.7)	<b>24.1</b> (15.7-34.2)
60-day	<b>12.9</b> (11.0-14.9)	<b>13.9</b> (11.8-16.2)	<b>15.7</b> (13.3-18.3)	<b>17.1</b> (14.4-20.0)	<b>19.1</b> (15.3-23.1)	<b>20.6</b> (16.1-25.4)	<b>22.1</b> (16.4-28.1)	<b>23.2</b> (16.5-30.9)	<b>24.7</b> (16.7-34.1)	<b>25.8</b> (16.9-36.5)

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information

Estimates from the table in CSV format: Precipitation frequency estimates V Submit

Main Link Categories: Home | OWP

US Department of Commerce National Oceanic and Atmospheric Administration National Weather Service Office of Water Prediction (OWP) 1325 East West Highway Silver Spring, MD 20910 Page Author: HDSC webmaster Page last modified: April 21, 2017 Map Disclaimer Disclaimer Credits Glossary Privacy Pc About Career Opportur



# Form S3-G: Standard 3 – Recharge 72-Hour Drawdown Calculation

Project Name: Balmer School	Nitsch Project #: 12260
Location: Northbridge, MA	Checked by: SAB
Prepared by: JZ	Sheet No. 1 of <b>3</b>
Date: April 14, 2019 Revised 5/23/2019	UNDERGROUND RECHARGE BASIN #3

**INSTRUCTIONS:** 

- 1. In 'Method' Column, Click on Blue Cell to Activate Drop Down Menu
- 2. Enter the "Required recharge Volume" (in cubic feet) in Blue Cell for the appropriate chosen Method
- 3. Enter the "Bottom Area" (in square feet) in the blue cell as the maximum infiltration surface area. Do not use sidewalls.
- 4. For "Dynamic: In-Situ Method" ONLY (if other go to 4b) Enter hydraulic Conductivity Rate in Blue Cell
- 5. In 'Texture Class' Column, Click on Blue Cell to Activate Drop Down Menu

Step No.				
1	Method:	S	tatic	
2	Required Recharge Volume (in cubic feet):		as determined by the	Static Method
3	Bottom Area (in Sq.Ft.)	3	987	
4a	ONLY - If using Dynamic: In- Situ Method> Enter Hydraulic Conductivity Rate	Hydraulic Conductivity Rate: 2.41	In-Situ Saturated Hydraulic Conductivity Rate 1.205	
		NRCS Hydrologic	Infiltration Rate	
	Texture Class	Soil Group (HSG)	(Inches/Hour)	
4b	Loamy Sand	A	2.41	Hours
			Time <sub>drawdown</sub> =	6.20
	72-Hour D	rawdown Requ	uirement Check:	ОК

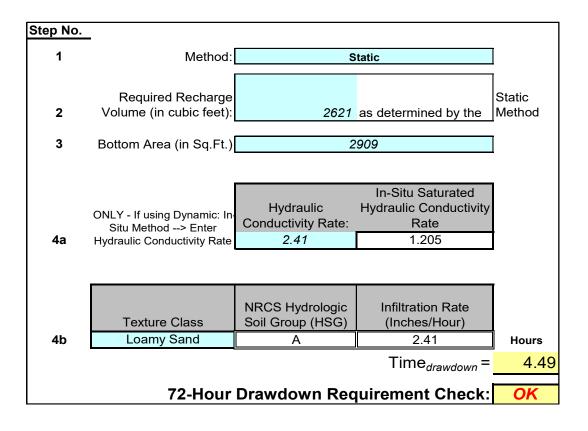


# Form S3-G: Standard 3 – Recharge 72-Hour Drawdown Calculation

Project Name: Balmer School	Nitsch Project #: 12260
Location: Northbridge, MA	Checked by: SAB
Prepared by: JZ	Sheet No. 2 of 3
Date: April 14, 2019 REVISED 5/23/2019	<b>BIORETENTION BASIN #2</b>

**INSTRUCTIONS:** 

- 1. In 'Method' Column, Click on Blue Cell to Activate Drop Down Menu
- 2. Enter the "Required recharge Volume" (in cubic feet) in Blue Cell for the appropriate chosen Method
- 3. Enter the "Bottom Area" (in square feet) in the blue cell as the maximum infiltration surface area. Do not use sidewalls.
- 4. For "Dynamic: In-Situ Method" ONLY (if other go to 4b) Enter hydraulic Conductivity Rate in Blue Cell
- 5. In 'Texture Class' Column, Click on Blue Cell to Activate Drop Down Menu





# Form S3-G: Standard 3 – Recharge 72-Hour Drawdown Calculation

Project Name: Balmer School	Nitsch Project #: 12260
Location: Northbridge, MA	Checked by: SAB
Prepared by: JZ	Sheet No. 2 of 3
Date: April 14, 2019 Revised 5/23/19	Underground Detention Basin #5 (for Roof)

**INSTRUCTIONS:** 

- 1. In 'Method' Column, Click on Blue Cell to Activate Drop Down Menu
- 2. Enter the "Required recharge Volume" (in cubic feet) in Blue Cell for the appropriate chosen Method
- 3. Enter the "Bottom Area" (in square feet) in the blue cell as the maximum infiltration surface area. Do not use sidewalls.
- 4. For "Dynamic: In-Situ Method" ONLY (if other go to 4b) Enter hydraulic Conductivity Rate in Blue Cell
- 5. In 'Texture Class' Column, Click on Blue Cell to Activate Drop Down Menu

Hours 6.31
6.31
ΟΚ



# Massachusetts Department of Environmental Protection Bureau of Resource Protection - Wetlands Program Checklist for Stormwater Report

# A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.<sup>1</sup> This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8<sup>2</sup>
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

<sup>&</sup>lt;sup>1</sup> The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

<sup>&</sup>lt;sup>2</sup> For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



# **B. Stormwater Checklist and Certification**

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

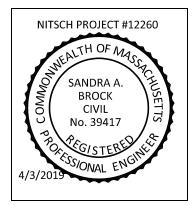
*Note:* Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

# **Registered Professional Engineer's Certification**

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Longterm Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



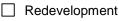
Signature and Date

April 3, 2019

Checklist

**Project Type:** Is the application for new development, redevelopment, or a mix of new and redevelopment?

New development



Mix of New Development and Redevelopment



**LID Measures:** Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

	o dis	turbance	to	anv	Wetland	Resource	Areas
--	-------	----------	----	-----	---------	----------	-------

- Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- Reduced Impervious Area (Redevelopment Only)
- Minimizing disturbance to existing trees and shrubs
- LID Site Design Credit Requested:
  - Credit 1
  - Credit 2
  - Credit 3
- Use of "country drainage" versus curb and gutter conveyance and pipe
- Bioretention Cells (includes Rain Gardens)
- Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- Treebox Filter
- Water Quality Swale
- Grass Channel
- Green Roof
- Other (describe):

#### **Standard 1: No New Untreated Discharges**

No new untreated discharges

- Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



#### Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

Calculations provided to show that post-development peak discharge rates do not exceed predevelopment rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24hour storm.

#### Standard 3: Recharge

$\boxtimes$	Soil	Anal	ysis	provided.
-------------	------	------	------	-----------

- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.

🖂 Static
----------

Dynamic Field<sup>1</sup>

Runoff from all impervious areas at the site discharging to the infiltration BMP.

Simple Dynamic

- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
  - Site is comprised solely of C and D soils and/or bedrock at the land surface
  - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
  - Solid Waste Landfill pursuant to 310 CMR 19.000
  - Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- $\boxtimes$  Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

<sup>&</sup>lt;sup>1</sup> 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



#### Standard 3: Recharge (continued)

- The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

#### **Standard 4: Water Quality**

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- · Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
- Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
  - is within the Zone II or Interim Wellhead Protection Area
  - is near or to other critical areas
  - is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
  - involves runoff from land uses with higher potential pollutant loads.
- The Required Water Quality Volume is reduced through use of the LID site Design Credits.
- Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist	(continued)
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#### Standard 4: Water Quality (continued)

- The BMP is sized (and calculations provided) based on:
  - The 1/2" or 1" Water Quality Volume or
  - The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

#### Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- The NPDES Multi-Sector General Permit does *not* cover the land use.
- LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- All exposure has been eliminated.
- All exposure has *not* been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

#### Standard 6: Critical Areas

- The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- Critical areas and BMPs are identified in the Stormwater Report.



# Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

Limited Projec	t
----------------	---

- Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- Bike Path and/or Foot Path
- Redevelopment Project
- Redevelopment portion of mix of new and redevelopment.
- Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

#### Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



# **Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control** (continued)

- ☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has *not* been included in the Stormwater Report but will be submitted *before* land disturbance begins.
- The project is *not* covered by a NPDES Construction General Permit.
- The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

#### **Standard 9: Operation and Maintenance Plan**

- The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
  - Name of the stormwater management system owners;
  - Party responsible for operation and maintenance;
  - Schedule for implementation of routine and non-routine maintenance tasks;
  - Plan showing the location of all stormwater BMPs maintenance access areas;
  - Description and delineation of public safety features;
  - Estimated operation and maintenance budget; and
  - Operation and Maintenance Log Form.
- The responsible party is *not* the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
  - A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
  - A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

#### Standard 10: Prohibition of Illicit Discharges

- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted *prior to* the discharge of any stormwater to post-construction BMPs.



2 Center Plaza, Suite 430 Boston, MA 02108-1928 T: 617-338-0063 F: 617-338-6472

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#### W. Edward Balmer Elementary School WATER QUALITY TREATMENT SUMMARY (04/14/2019)

Nitsch Engineering has prepared this Water Quality Treatment Summary for the proposed Williams Inn. In compliance with MassDEP Stormwater Management Standard #4, the proposed stormwater management system is designed to remove at least 80% of the average annual post-construction load of TSS prior to discharge. The stormwater management system is designed to remove at least 44% of the average annual post-construction TSS load prior to discharge to the infiltration systems because the infiltration systems are located within areas where soils with rapid infiltration rates were observed.

A summary of treatment trains proposed to provide water quantity control and water quality improvement at the proposed project site is provided below.

<u>Ireatment Train A – Proprietary WQ Inlet</u> Catchment Areas: P1-2 (102S), P1-3 (103S), P3-3 (303S) Deep Sump & Hooded Catch Basin → Water Quality Structure → Discharge <u>Ireatment Train B- WQ Swale</u> Catchment Areas: P3-1 (301S) Deep Sump & Hooded Catch Basin → Water Quality Structure → Discharge <u>Ireatment Train C – Bioretention Basin</u> Catchment Areas: P3-2 (302S), P3-4 (304S) Bioswale → Subsurface Infiltration System → Discharge Williams Inn Williamstown, MA July 13, 2017



 $\frac{\text{Treatment Train A:}}{\text{Rain Garden} \rightarrow \text{Water Quality Structure} \rightarrow \text{Discharge}}$ 

#### Treatment Spreadsheet

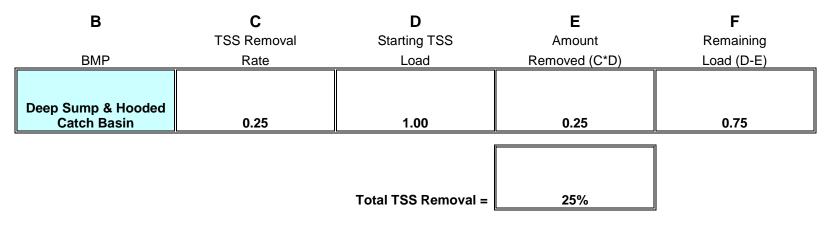
В	С	D	E	F
	TSS Removal	Starting TSS	Amount	Remaining
BMP	Rate	Load	Removed (C*D)	Load (D-E)
Rain Garden (With Stone Strip Pretreatment)	0.90	1.00	0.90	0.10
		]		1
		Total TSS Removal =	90%	Meets 80% TSS removal requirement

Williams Inn Williamstown, MA July 13, 2017



#### Treatment Train B:

Deep Sump & Hooded Catch Basin  $\rightarrow$  Water Quality Structure  $\rightarrow$  Discharge



#### Treatment Spreadsheet

В	С	D	E	F
	TSS Removal	Starting TSS	Amount	Remaining
BMP	Rate	Load	Removed (C*D)	Load (D-E)
Water Quality Structure	0.80	0.75	0.60	0.15
		Total TSS Removal =	85%	Meets 80% TSS removal requirement

Williams Inn Williamstown, MA July 13, 2017

<u>Treatment Train C:</u> Subsurface Infiltration System  $\rightarrow$  Discharge

### Treatment Spreadsheet

В	С	D	E	F
	TSS Removal	Starting TSS	Amount	Remaining
BMP	Rate	Load	Removed (C*D)	Load (D-E)
Water Quality Swale (with Stone Strip Pre- Treatment and check dams)	0.70	1.00	.70	.30
Infiltration System (Basin #3)	.80	.30	.24	.06
		Total TSS Removal =	94%	Meets 80% TSS removal requirement

Nitsch Project No. 11709





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#### **STANDARD 10: Illicit Discharge Compliance Statement**

Project Name: W. Edward Balmer Elementary School	Nitsch Project #: 12260
Location: Northbridge, MA	Checked by: SAB
Prepared by: JCZ	Sheet No. 1 of 1
Date: April 3, 2019	

#### Standard 10 states: All illicit discharges to the stormwater management system are prohibited.

This is to verify:

- 1. Based on the information available there are no known or suspected illicit discharges to the stormwater management system at the proposed W. Edward Balmer Elementary School site as defined in the MassDEP Stormwater Handbook.
- 2. The design of the stormwater system includes no proposed illicit discharges.

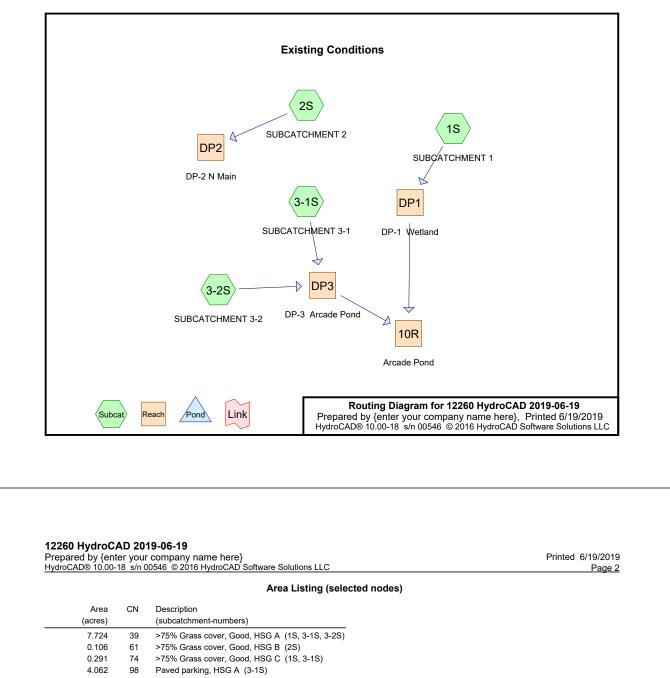
Sandra Brock.

*April 14, 2019* Date



## ATTACHMENT B

**Pre-Development Conditions – HydroCAD Calculations** 



- 3.655 30 Woods, Good, HSG A (1S, 3-1S, 3-2S)
- 1.629 55 Woods, Good, HSG B (1S, 2S)
- 5.367 70 Woods, Good, HSG C (1S, 3-1S)
- 0.128 77 Woods, Good, HSG D (3-2S)
- 22.961 57 TOTAL AREA

Printed 6/19/2019 Page 4

#### Soil Listing (selected nodes)

Area	Soil	Subcatchment	
(acres)	Group	Numbers	
15.440	HSG A	1S, 3-1S, 3-2S	
1.735	HSG B	1S, 2S	
5.658	HSG C	1S, 3-1S	
0.128	HSG D	3-2S	
0.000	Other		
22.961		TOTAL AREA	

12260 HydroCAD 2019-06-19 Prepared by {enter your company name here} HydroCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solutions LLC

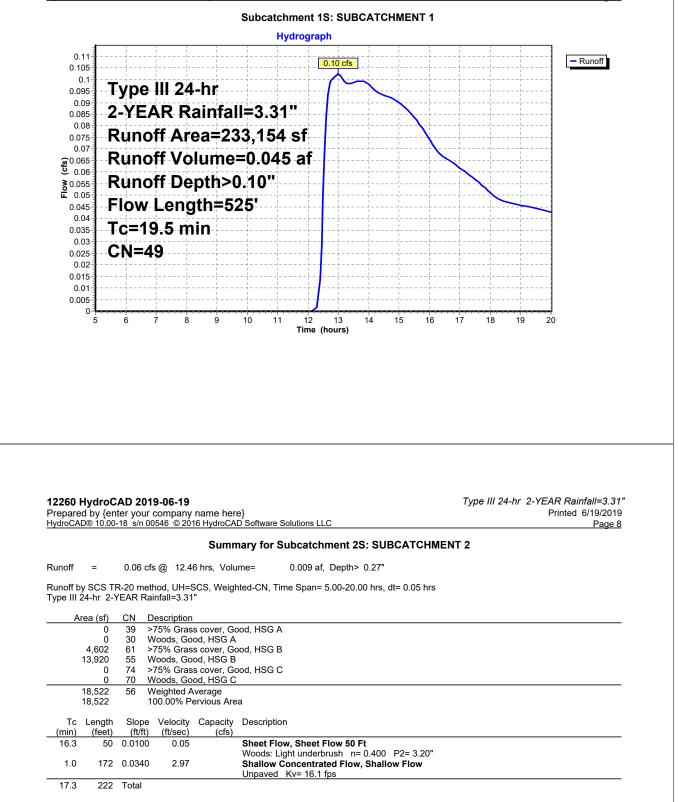
#### Ground Covers (selected nodes)

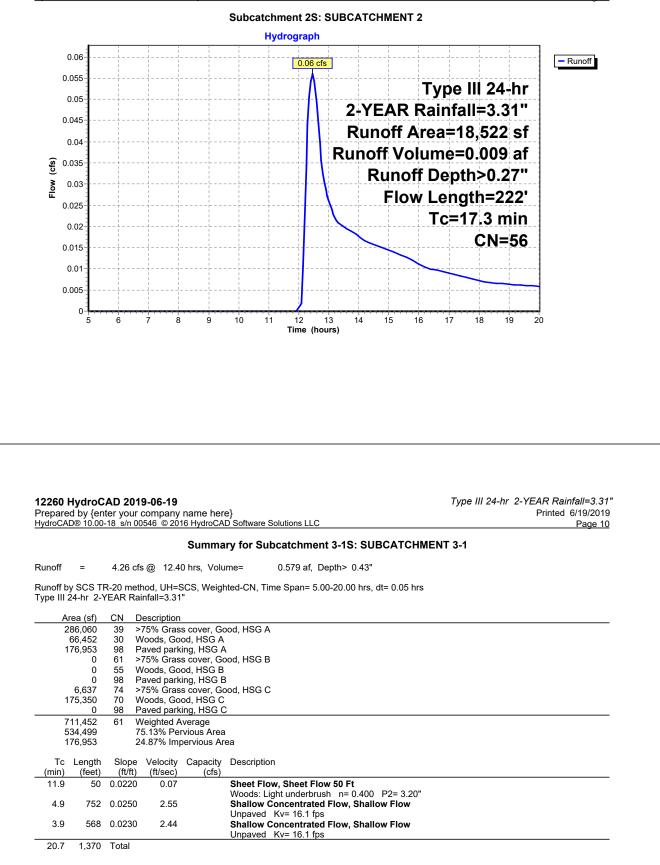
HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
7.724	0.106	0.291	0.000	0.000	8.120	>75% Grass cover, Good	1S, 2S, 3-1S, 3-2S
4.062	0.000	0.000	0.000	0.000	4.062	Paved parking	3-1S
3.655	1.629	5.367	0.128	0.000	10.778	Woods, Good	1S, 2S, 3-1S, 3-2S
15.440	1.735	5.658	0.128	0.000	22.961	TOTAL AREA	

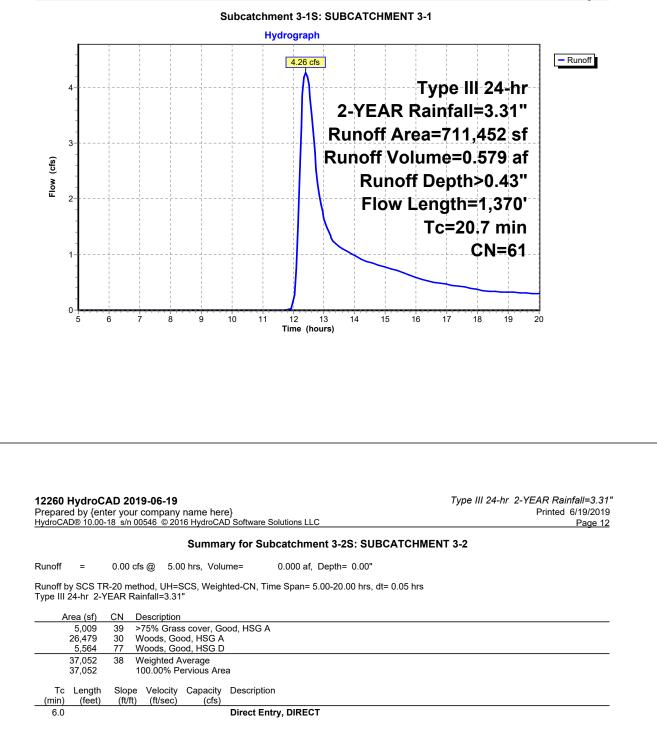
#### Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN each routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

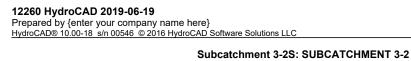
Reach routing by Stor-Ind+T	rans method - Pond routing by Stor-Ind method
Subcatchment1S: SUBCATCHMENT1	Runoff Area=233,154 sf 0.00% Impervious Runoff Depth>0.10" Flow Length=525' Tc=19.5 min CN=49 Runoff=0.10 cfs 0.045 af
Subcatchment2S: SUBCATCHMENT2	Runoff Area=18,522 sf 0.00% Impervious Runoff Depth>0.27" Flow Length=222' Tc=17.3 min CN=56 Runoff=0.06 cfs 0.009 af
Subcatchment3-1S: SUBCATCHMENT3-1	Runoff Area=711,452 sf 24.87% Impervious Runoff Depth>0.43" Flow Length=1,370' Tc=20.7 min CN=61 Runoff=4.26 cfs 0.579 af
Subcatchment3-2S: SUBCATCHMENT3-2	Runoff Area=37,052 sf 0.00% Impervious Runoff Depth=0.00" Tc=6.0 min CN=38 Runoff=0.00 cfs 0.000 af
Reach 10R: Arcade Pond	Inflow=4.28 cfs 0.624 af Outflow=4.28 cfs 0.624 af
Reach DP1: DP-1 Wetland	Inflow=0.10 cfs 0.045 af Outflow=0.10 cfs 0.045 af
Reach DP2: DP-2 N Main	Inflow=0.06 cfs 0.009 af Outflow=0.06 cfs 0.009 af
Reach DP3: DP-3 Arcade Pond	Inflow=4.26 cfs 0.579 af Outflow=4.26 cfs 0.579 af
12260 HudroCAD 2019-06-19	Type III 24-br 2-VEAR Bainfall=3 31"
<b>12260 HydroCAD 2019-06-19</b> Prepared by {enter your company name here} HydroCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solu	Type III 24-hr 2-YEAR Rainfall=3.31" Printed 6/19/2019 utions LLC Page 6
Prepared by {enter your company name here} HydroCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solu	Printed 6/19/2019
Prepared by {enter your company name here} HydroCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solu Summary for Sub	tions LLC Printed 6/19/2019
Prepared by {enter your company name here} HydroCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solu Summary for Sub	Printed 6/19/2019           utions LLC         Page 6           Dcatchment 1S: SUBCATCHMENT 1           .045 af, Depth> 0.10"
Prepared by {enter your company name here} <u>HydroCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solu</u> Summary for Sub Runoff = 0.10 cfs @ 13.00 hrs, Volume= 0 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time	Printed         6/19/2019           vitions LLC         Page 6           Decatchment 1S: SUBCATCHMENT 1           .045 af, Depth> 0.10"

	45,369	39	>75% Gras	s cover, Go	bod, HSG A		
	66,266	30	Woods, Good, HSG A				
	0	32	Woods/gra	Good, HSG A			
	0	61	>75% Gras	s cover, Go	bod, HSG B		
	57,049	55	Woods, Go				
	0	58			Good, HSG B		
	6,050	74			bod, HSG C		
	58,420	70	Woods, Go				
	0	72	Woods/gra	ss comb., C	Good, HSG C		
2	33,154	49	Weighted A	verage			
2	33,154		100.00% P	ervious Are	a de la constante de		
-		~					
Tc	Length	Slop		Capacity	Description		
(min)	(feet)	(ft/f	//	(cfs)			
16.3	50	0.040	0.05		Sheet Flow, Sheet Flow 50 Ft		
					Woods: Dense underbrush n= 0.800 P2= 3.20"		
3.2	475	0.024	) 2.49		Shallow Concentrated Flow, Shallow Flow		
					Unpaved Kv= 16.1 fps		
19.5	525	Total					









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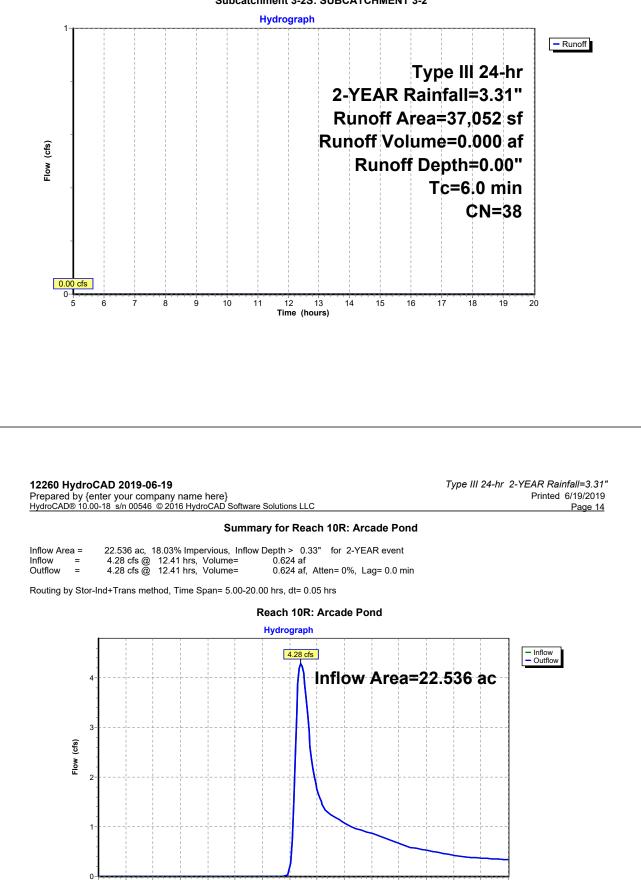
12 13 Time (hours) 14

15 16

17

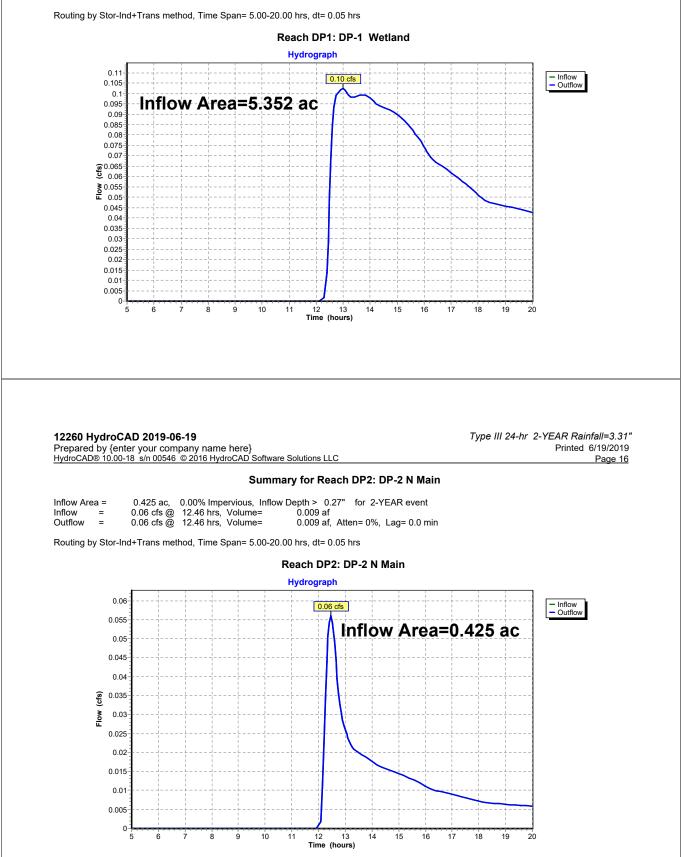
18

19 20



#### Summary for Reach DP1: DP-1 Wetland

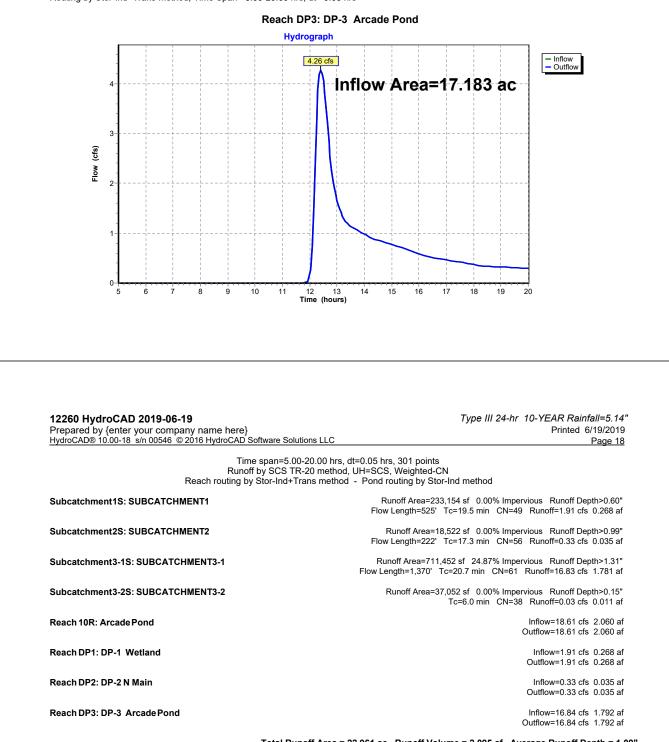
Inflow Area =	5.352 ac,	0.00% Impervious, Inflow [	Depth > 0.10"	for 2-YEAR event
Inflow =	0.10 cfs @	13.00 hrs, Volume=	0.045 af	
Outflow =	0.10 cfs @	13.00 hrs, Volume=	0.045 af, Atte	en= 0%, Lag= 0.0 min



### Summary for Reach DP3: DP-3 Arcade Pond

Inflow Area =	17.183 ac, 23.64% Impervious, Inflow Depth > 0.40" for 2-YEAR event
Inflow =	4.26 cfs @ 12.40 hrs, Volume= 0.579 af
Outflow =	4.26 cfs @ 12.40 hrs, Volume= 0.579 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



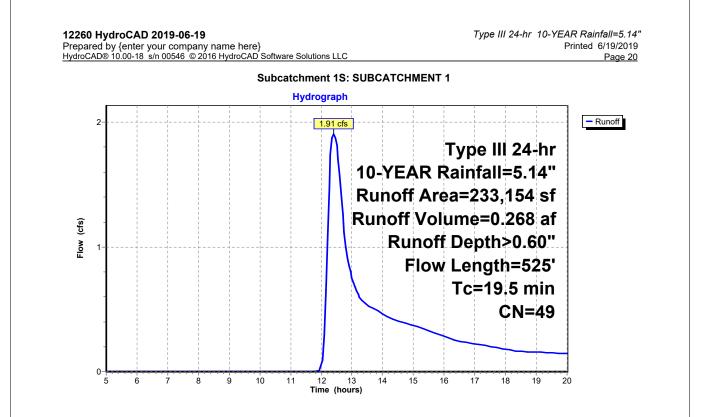
Total Runoff Area = 22.961 ac Runoff Volume = 2.095 af Average Runoff Depth = 1.09" 82.31% Pervious = 18.899 ac 17.69% Impervious = 4.062 ac

## Summary for Subcatchment 1S: SUBCATCHMENT 1

Runoff = 1.91 cfs @ 12.40 hrs, Volume= 0.268 af, Depth> 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 10-YEAR Rainfall=5.14"

	Ar	rea (sf)	CN	Description							
		45,369	39	>75% Grass cover, Good, HSG A							
		66,266	30	Woods, Go	Woods, Good, HSG A						
		0				ood, HSG A					
		0			s cover, Go	od, HSG B					
		57,049		Woods, Go							
		0				ood, HSG B					
		6,050			s cover, Go	od, HSG C					
		58,420		Woods, Go	,						
_		0	72	Woods/gras	ss comb., G	ood, HSG C					
	2	33,154	49	Weighted A							
	2	33,154		100.00% P	ervious Area	a					
	-		~		<b>A</b>						
	Tc	Length	Slop			Description					
	(min)	(feet)	(ft/ft		(cfs)						
	16.3	50	0.040	0.05		Sheet Flow, Sheet Flow 50 Ft					
						Woods: Dense underbrush n= 0.800 P2= 3.20"					
	3.2	475	0.024	) 2.49		Shallow Concentrated Flow, Shallow Flow					
						Unpaved Kv= 16.1 fps					
	19.5	525	Total								



Summary for	or Subcatchment	t 2S: SUBCATCHMEN	Г2
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Runoff = 0.33 cfs @ 12.28 hrs, Volume= 0.035 af, Depth> 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 10-YEAR Rainfall=5.14"

	0 0		Woods, Go		ood, HSG /										
	4,602	61	>75% Gras	s cover, G	ood, HSG I	З									
	13,920 0		Woods, Go >75% Gras			0									
	0	70	Woods, Go	od, HSG C		~									
	18,522 18,522	56	Weighted A 100.00% P		ea										
Tc min)	Length (feet)	Slope (ft/ft	e Velocity ) (ft/sec)	Capacity (cfs)	Descripti	on									
16.3	50	0.010	0.05			ow, Sheet				0"					
1.0	172	0.0340	) 2.97		Shallow	ight under Concentr Kv= 16.	ated Flo								
17.3	222	Total													
260 1	Hydrof		19.06.19									04-hr 1		R Painfall=	5 14"
pare	d by {er	ter vou	<b>19-06-19</b> r company	name her	e}					7	ype III :	24-hr 1		R Rainfall=	
pare	d by {er	ter vou	<b>19-06-19</b> r company 00546 © 20	name her 16 HydroCA	e} D Software	Solutions I	LLC			7	ype III :	24-hr 1			2019
pare	d by {er	ter vou	r company	name her 16 HydroCA	D Software			BCATC	HMENT		ype III :	24-hr 1		Printed 6/19/2	2019
pare	d by {er	ter vou	r company	name her 16 HydroCA	D Software	Solutions L chment 2 Hydrogra	2S: SU	BCATCI	HMENT		ype III :	24-hr 1		Printed 6/19/2	2019
pare roCA	d by {er D® 10.00	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph	BCATCI	HMENT		ype III .	24-hr 1		Printed 6/19/2 Pag	2019 <u>e 22</u>
pare <u>iroCAI</u> 0. 0.	d by {er D® 10.00	ter vou	r company	name her 16 HydroCA	D Software	chment 2	2S: SU aph	BCATC	HMENT		ype III :	24-hr 1		Printed 6/19/2	2019 <u>e 22</u>
pare iroCAI 0. 0.	d by {er D® 10.00 36 34 32	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph	BCATCI	HMENT	2			P	Printed 6/19/2 Pag	2019 <u>e 22</u>
pare <u>iroCA</u> 0.: 0.: 0.:	d by {er D® 10.00 34 32 	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU	·		2 Typ	e III	24-ł	P	Printed 6/19/2 Pag	2019 <u>e 22</u>
pare <u>IroCA</u> 0.1 0.1 0.1	d by {er D® 10.00 36 34 32 28	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU	·		2	e III	24-ł	P	Printed 6/19/2 Pag	2019 <u>e 22</u>
pare <u>roCAI</u> 0.1 0.1 0.1 0.1	d by {er D® 10.00 36 32 ).3 28 26	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph cfs 1	D-YE	ARI	⁻₂ Typ Rain	e III fall=	24-l 5.14	P 1r  '''	Printed 6/19/2 Pag	2019 <u>e 22</u>
0.: 0.: 0.: 0.: 0.: 0.: 0.:	d by {er D® 10.00 36 34 32 28 26 24	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph cfs 1	D-YE	ARI	2 Typ	e III fall=	24-l 5.14	P 1r  '''	Printed 6/19/2 Pag	2019 <u>e 22</u>
(0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	d by {er D® 10.00 36 34 32 28 24 22	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph cfs 1 1	D-YE Runo	AR I off A	2 Typ Rain rea=	e III fall= 18,	24-l 5.14 522 s	₽ 1r I" Sf	Printed 6/19/2 Pag	2019 <u>e 22</u>
(0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	d by {er D® 10.00 36 34 32 28 24 22 0.2	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph cfs 1 1	D-YE Runc unof	AR I off A f Vol	<sup>2</sup> Typ Rain rea=	e III fall= 18,4 =0.(	24-1 5.14 522 (	P nr µ" sf_ af	Printed 6/19/2 Pag	2019 <u>e 22</u>
(0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	d by {er D® 10.00 36 34 32 28 24 22	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph cfs 1 1	D-YE Runc unof	AR I off A f Vol	<sup>2</sup> Typ Rain rea=	e III fall= 18,4 =0.(	24-1 5.14 522 (	P nr µ" sf_ af	Printed 6/19/2 Pag	2019 <u>e 22</u>
pare roCAI 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	d by {er D® 10.00 36 34 28 28 24 22 1.2 18	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph cfs 1 1	D-YE Runc unof	AR I off A f Vol inof	Typ Rain rea= lume f Dej	e III fall= 18,{ =0.( oth>	24-l 5.14 522 ( )35 ( 0.99	P nr I" sf af	Printed 6/19/2 Pag	2019 <u>e 22</u>
pare roCAI 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	d by {er D® 10.00 36 34 28 28 24 22 1.2 18	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph cfs 1 1	D-YE Runc unof	AR I off A f Vol inof	<sup>2</sup> Typ Rain rea=	e III fall= 18,{ =0.( oth>	24-l 5.14 522 ( )35 ( 0.99	P nr I" sf af	Printed 6/19/2 Pag	2019 <u>e 22</u>
pare roCAI 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	d by {er D® 10.00 36 34 32 28 24 24 24 18 16 16	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph cfs 1 1	D-YE Runc unof	AR I off A f Vol inof	Typ Rain rea= lume f Dej v Ler	e III fall= 18,{ =0.( oth> ngth	24-l 5.14 522 ( 0.99 =22	P 1r ↓" sf af )" 2'	Printed 6/19/2 Pag	2019 <u>e 22</u>
pare rocAl 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d by {er D® 10.00 36 34 32 28 24 24 24 18 18 14	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph cfs 1 1	D-YE Runc unof	AR I off A f Vol inof	Typ Rain rea= lume f Dej v Ler	e III fall= 18,{ =0.( oth> ngth =17.	24-l 5.14 522 ( 0.99 =22 3 mi	P nr I''' sf af 2' n	Printed 6/19/2 Pag	2019 <u>e 22</u>
pare rocAl 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	d by {er D® 10.00 36 34 32 28 28 24 24 22 18 14 14 12	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph cfs 1 1	D-YE Runc unof	AR I off A f Vol inof	Typ Rain rea= lume f Dej v Ler	e III fall= 18,{ =0.( oth> ngth =17.	24-l 5.14 522 ( 0.99 =22	P nr I''' sf af 2' n	Printed 6/19/2 Pag	2019 <u>e 22</u>
pare rocAl rocAl 0 0 0 0 0 0. 0. 0. 0. 0. 0. 0	d by {er D® 10.00 36 34 32 28 28 24 22 18 18 14 12 11 11	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph cfs 1 1	D-YE Runc unof	AR I off A f Vol inof	Typ Rain rea= lume f Dej v Ler	e III fall= 18,{ =0.( oth> ngth =17.	24-l 5.14 522 ( 0.99 =22 3 mi	P nr I''' sf af 2' n	Printed 6/19/2 Pag	2019 <u>e 22</u>
pare roCAI 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d by {er D® 10.00 36 34 32 28 28 24 22 18 16 14 12 10	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph cfs 1 1	D-YE Runc unof	AR I off A f Vol inof	Typ Rain rea= lume f Dej v Ler	e III fall= 18,{ =0.( oth> ngth =17.	24-l 5.14 522 ( 0.99 =22 3 mi	P nr I''' sf af 2' n	Printed 6/19/2 Pag	2019 <u>e 22</u>
pare roCAI 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d by {er D® 10.00 36 34 32 28 28 24 22 18 16 14 12 16 10	ter vou	r company	name her 16 HydroCA	D Software	chment 2 Hydrogra	2S: SU aph cfs 1 1	D-YE Runc unof	AR I off A f Vol inof	Typ Rain rea= lume f Dej v Ler	e III fall= 18,{ =0.( oth> ngth =17.	24-l 5.14 522 ( 0.99 =22 3 mi	P nr I''' sf af 2' n	Printed 6/19/2 Pag	2019 <u>e 22</u>

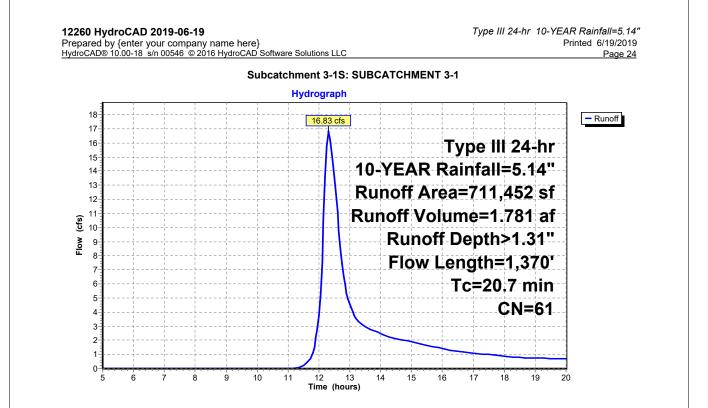
## Summary for Subcatchment 3-1S: SUBCATCHMENT 3-1

Runoff = 16.83 cfs @ 12.32 hrs, Volume= 1.781 af, Depth> 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 10-YEAR Rainfall=5.14"

_	Ar	ea (sf)	CN	Description						
	2	86,060	39	>75% Gras	s cover, Go	ood, HSG A				
		66,452	30	Woods, Go	Voods, Good, HSG A					
	1	76,953	98	Paved park	ing, HSG A					
		0	61	>75% Ġras	s cover, Go	ood, HSG B				
		0	55	Woods, Go	od, HSG B					
		0			ing, HSG B					
		6,637				ood, HSG C				
	1	75,350			od, HSG C					
_		0	98	Paved park	ing, HSG C					
	7	11,452	61	Weighted A	verage					
		34,499			rvious Area					
	1	76,953		24.87% Im	pervious Ar	ea				
	_									
		Length	Slope			Description				
_	(min)	(feet)	(ft/ft		(cfs)					
	11.9	50	0.0220	0.07		Sheet Flow, Sheet Flow 50 Ft				
						Woods: Light underbrush n= 0.400 P2= 3.20"				
	4.9	752	0.0250	) 2.55		Shallow Concentrated Flow, Shallow Flow				
						Unpaved Kv= 16.1 fps				
	3.9	568	0.0230	) 2.44		Shallow Concentrated Flow, Shallow Flow				
_						Unpaved Kv= 16.1 fps				

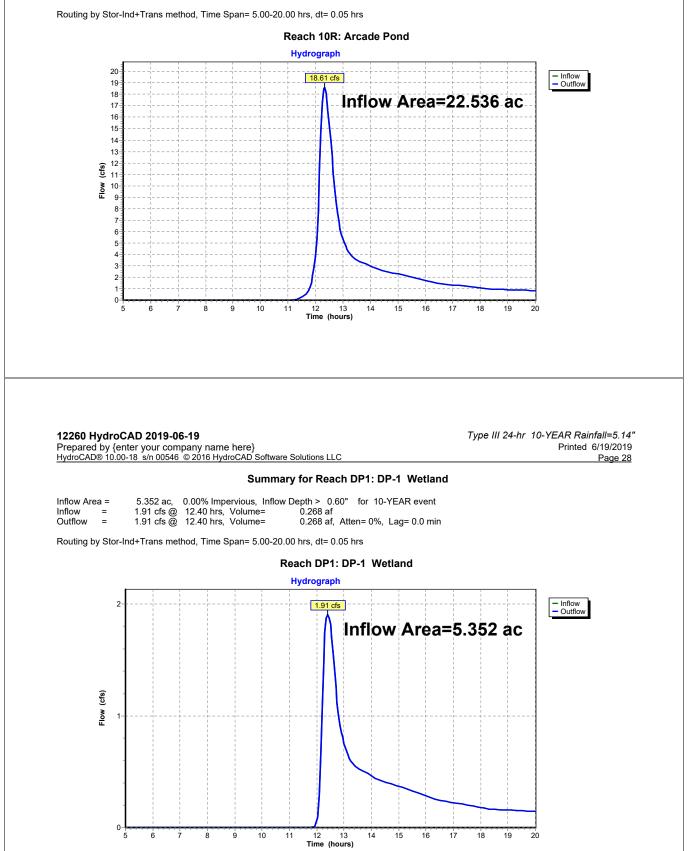
20.7 1,370 Total



Duneff	_	0.00	ofo C 1			-							ENT 3-2					
Runoff	=		cfs @ 12							> 0.15"								
			ethod, Ul Rainfall=		S, Weigh	nted-CN	I, Time	Span=	5.00-20	0.00 hrs,	dt= 0.0	5 hrs						
A	Area (sf) 5,009	CN 39	Descript >75% G		over G	od HS												
	26,479	30	Woods,	Good,	HSG A													
	5,564 37,052	<u>77</u> 38	Woods, Weighte	d Aver	age													
	37,052		100.00%	Pervi	ous Are	a												
Tc (min)	Length (feet)	Slop (ft/t	e Veloc t) (ft/se		apacity (cfs)	Descr	iption											
6.0						Direc	t Entry,	DIRE	т									
12260	HydroC	AD 2	019-06-1	9									Туре	e III 24-	hr 10-	YEAF	R Rainfall=5	5.14"
Prepare	ed by {er	ter vo	ur compa	nv na	me her	e}		tions	<u> </u>				Туре	e III 24-	hr 10-		inted 6/19/2	2019
Prepare	ed by {er	ter vo		nv na	lydroCA	D Softw								e III 24-	hr 10-			2019
Prepare	ed by {er	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2	S: SU	BCATC	CHMEN	IT 3-2		e III 24-	hr 10-		inted 6/19/2	2019
Prepare HydroCA	ed by {er \ <u>D® 10.00</u>	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SUI oh	BCATC	CHMEN	IT 3-2		e III 24-	hr 10-		inted 6/19/2 Page	2019 <u>e 26</u>
Prepare HydroCA	ed by {er AD® 10.00 0.03	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SU	BCATC	CHMEN		2			Pr	inted 6/19/2	2019 <u>e 26</u>
Prepare <u>HydroCA</u> 0 0	ed by {er AD® 10.00 0.03 0.028	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SUI oh	BCATC	HMEN		2			Pr	inted 6/19/2 Page	2019 <u>e 26</u>
Prepare HydroCA 0 0 0	ed by {er <u>AD® 10.00</u> 0.028 0.026 0.024	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SUI				2 ype	111 2	4-h	Pr	inted 6/19/2 Page	2019 <u>e 26</u>
Prepare HydroCA 0 0 0 0	0.03 0.028 0.026 0.026 0.024 0.022	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SUI	0 Y	EAR	T R	2 Type ainfa	III 2 II=5	4-h	Pr	inted 6/19/2 Page	2019 <u>e 26</u>
Prepare HydroCA 0 0 0 0	0.03 0.028 0.028 0.024 0.024 0.022 0.022 0.022	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SUI	0 Y Rui	EAR	T R Ri Are	2 ype ainfa ea=3	2    =5 7,0{	4-h .14' 52 s	Pr	inted 6/19/2 Page	2019 <u>e 26</u>
Prepare HydroCA 0 0 0 0 0	0.03 0.03 0.028 0.028 0.024 0.024 0.022 0.022 0.022 0.022 0.021 0.021 0.021	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SUI	0 Y Rui	EAR	T R Ri Are	2 Type ainfa	2    =5 7,0{	4-h .14' 52 s	Pr	inted 6/19/2 Page	2019 <u>e 26</u>
Prepare HydroCA 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.03 0.028 0.028 0.024 0.024 0.022 0.022 0.022 0.018 0.018 0.018	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SUI	D Y Rui Cunc	EAR noff	T R Ra Arc	ype ainfa ea=3 me=	III 2 II=5 7,05 0.01	4-h .14' 52 s 1 a	Pr  r f f	inted 6/19/2 Page	2019 <u>e 26</u>
Prepare HydroCA 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.03 0.03 0.028 0.028 0.024 0.024 0.022 0.022 0.022 0.022 0.021 0.021 0.021	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SUI	D Y Rui Cunc	EAR noff	T R Ra Arc	² ainfa ea=3 me= Dept	III 2 II=5 7,05 0.01 h>0	4-h .14' 52 s 1 a .15'	Pr <b>r</b> <b>f</b> <b>f</b>	inted 6/19/2 Page	2019 <u>e 26</u>
Prepare HydroCA 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.03 0.028 0.028 0.024 0.024 0.022 0.022 0.022 0.018 0.018 0.018	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SUI	D Y Rui Cunc	EAR noff	T R Ra Arc	ype ainfa ea=3 me=	III 2 II=5 7,05 0.01 h>0 6.0	4-hi 52 s 1 a .15' mir	Pr <b>r</b> <b>f</b> <b>f</b> <b>f</b>	inted 6/19/2 Page	2019 <u>e 26</u>
Prepare HydroCA 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.03 0.028 0.028 0.026 0.024 0.024 0.024 0.024 0.024 0.024 0.024 0.018 0.018 0.016 0.014 0.014 0.014	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SUI	D Y Rui Cunc	EAR noff	T R Ra Arc	² ainfa ea=3 me= Dept	III 2 II=5 7,05 0.01 h>0 6.0	4-h .14' 52 s 1 a .15'	Pr <b>r</b> <b>f</b> <b>f</b> <b>f</b>	inted 6/19/2 Page	2019 <u>e 26</u>
Prepare <u>HydroCA</u> 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.03 0.028 0.028 0.024 0.024 0.024 0.022 0.018 0.018 0.018 0.018 0.0140000000000	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SUI	D Y Rui Cunc	EAR noff	T R Ra Arc	² ainfa ea=3 me= Dept	III 2 II=5 7,05 0.01 h>0 6.0	4-hi 52 s 1 a .15' mir	Pr <b>r</b> <b>f</b> <b>f</b> <b>f</b>	inted 6/19/2 Page	2019 <u>e 26</u>
Prepare HydroCA 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.03 0.028 0.026 0.024 0.022 0.022 0.022 0.018 0.014 0.014 0.012 0.012 0.011 0.011 0.01 0.01 0.01 0.02 0.01	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SUI	D Y Rui Cunc	EAR noff	T R Ra Arc	² ainfa ea=3 me= Dept	III 2 II=5 7,05 0.01 h>0 6.0	4-hi 52 s 1 a .15' mir	Pr <b>r</b> <b>f</b> <b>f</b> <b>f</b>	inted 6/19/2 Page	2019 <u>e 26</u>
Prepare HydroCA 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.03 0.028 0.028 0.026 0.024 0.024 0.024 0.024 0.024 0.024 0.024 0.014 0.014 0.011 0.011 0.011 0.011 0.011 0.011 0.011 0.021 0.021 0.021 0.021 0.022 0.0	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SUI	D Y Rui Cunc	EAR noff	T R Ra Arc	² ainfa ea=3 me= Dept	III 2 II=5 7,05 0.01 h>0 6.0	4-hi 52 s 1 a .15' mir	Pr <b>r</b> <b>f</b> <b>f</b> <b>f</b>	inted 6/19/2 Page	2019 <u>e 26</u>
Prepare <u>HydroCA</u> 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.03 0.028 0.028 0.024 0.024 0.024 0.024 0.024 0.024 0.018 0.018 0.014 0.014 0.014 0.014 0.014 0.014 0.014 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.002 0.0000 0.0020	ter vo	ur compa	nv na	lydroCA	D Softw	tchme	nt 3-2 rogra	S: SUI	D Y Rui Cunc	EAR noff	T R Ra Arc	² ainfa ea=3 me= Dept	III 2 II=5 7,05 0.01 h>0 6.0	4-hi 52 s 1 a .15' mir	Pr <b>r</b> <b>f</b> <b>f</b> <b>f</b>	inted 6/19/2 Page	2019 <u>e 26</u>

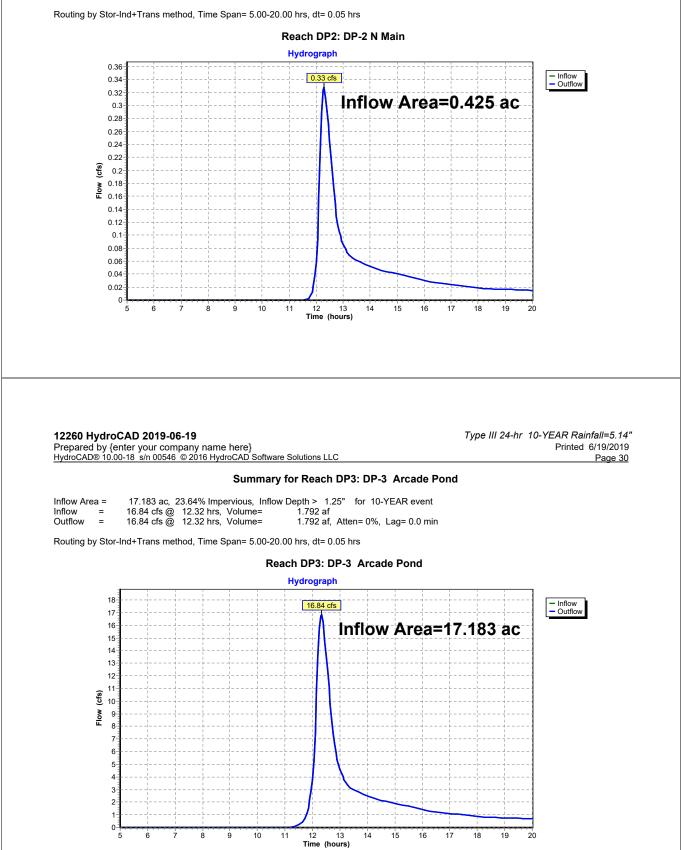
## Summary for Reach 10R: Arcade Pond

Inflow Area =	22.536 ac, 18.03% Impervious, Inflow E	Depth > 1.10" for 10-YEAR event
Inflow =	18.61 cfs @ 12.33 hrs, Volume=	2.060 af
Outflow =	18.61 cfs @ 12.33 hrs, Volume=	2.060 af, Atten= 0%, Lag= 0.0 min



## Summary for Reach DP2: DP-2 N Main

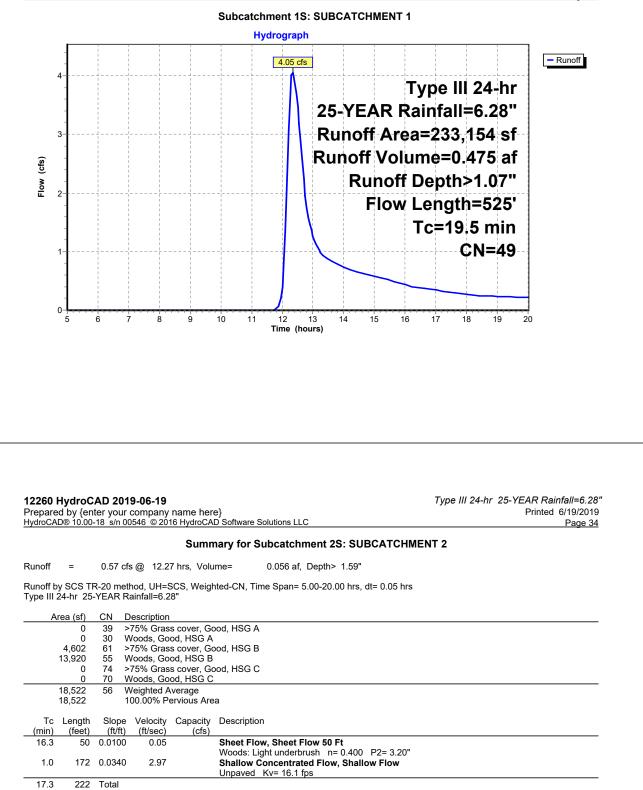
Inflow Area =	0.425 ac,	0.00% Impervious, Inflow D	epth > 0.99"	for 10-YEAR event
Inflow =	0.33 cfs @	12.28 hrs, Volume=	0.035 af	
Outflow =	0.33 cfs @	12.28 hrs, Volume=	0.035 af, Atte	en= 0%, Lag= 0.0 min

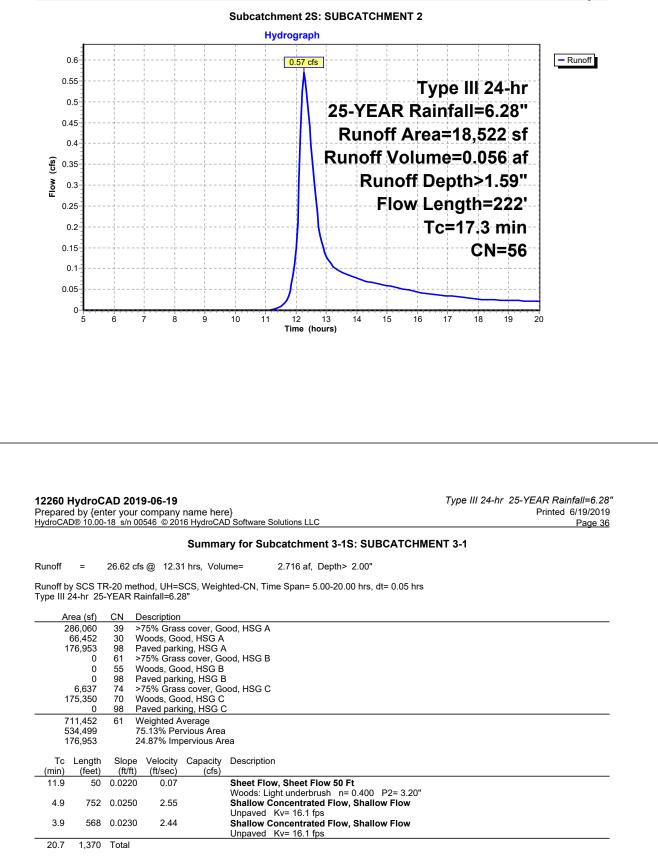


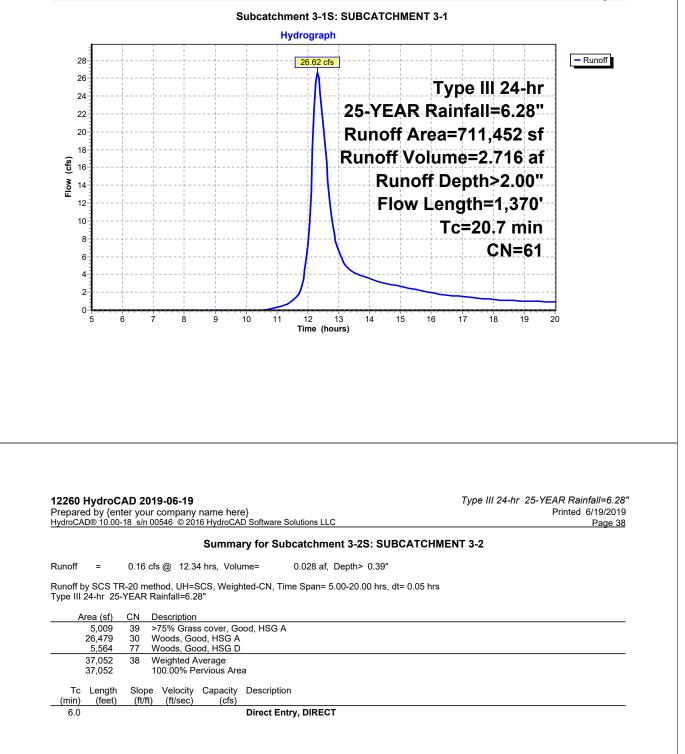
### Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

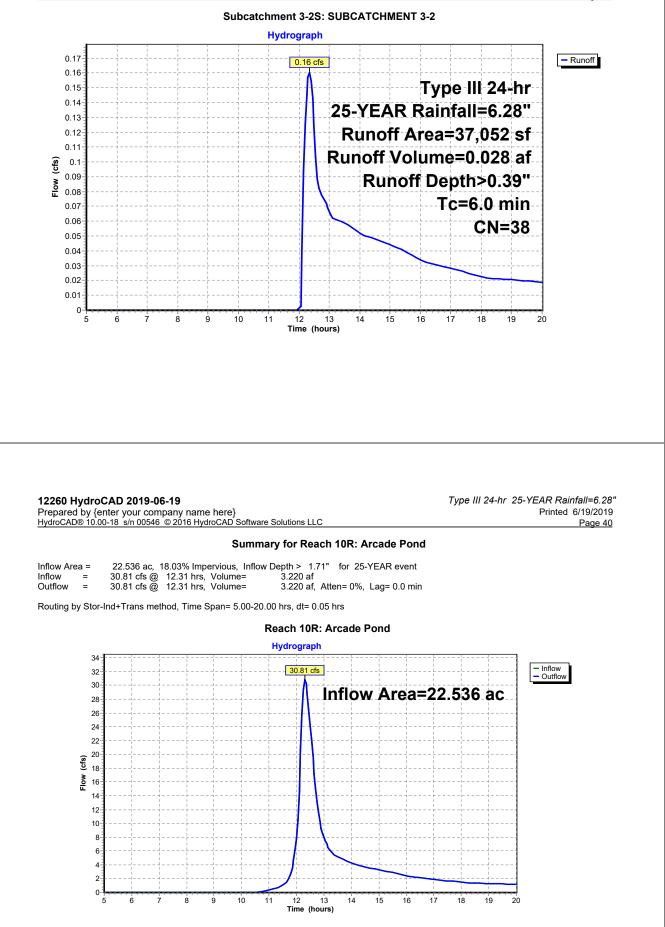
Reach routing by Stor-Ind+Tr	rans method - Pond routing by Stor-Ind method
Subcatchment1S: SUBCATCHMENT1	Runoff Area=233,154 sf 0.00% Impervious Runoff Depth>1.07" Flow Length=525' Tc=19.5 min CN=49 Runoff=4.05 cfs 0.475 af
Subcatchment2S: SUBCATCHMENT2	Runoff Area=18,522 sf 0.00% Impervious Runoff Depth>1.59" Flow Length=222' Tc=17.3 min CN=56 Runoff=0.57 cfs 0.056 af
Subcatchment3-1S: SUBCATCHMENT3-1	Runoff Area=711,452 sf 24.87% Impervious Runoff Depth>2.00" Flow Length=1,370' Tc=20.7 min CN=61 Runoff=26.62 cfs 2.716 af
Subcatchment3-2S: SUBCATCHMENT3-2	Runoff Area=37,052 sf 0.00% Impervious Runoff Depth>0.39" Tc=6.0 min CN=38 Runoff=0.16 cfs 0.028 af
Reach 10R: Arcade Pond	Inflow=30.81 cfs 3.220 af Outflow=30.81 cfs 3.220 af
Reach DP1: DP-1 Wetland	Inflow=4.05 cfs 0.475 af Outflow=4.05 cfs 0.475 af
Reach DP2: DP-2 N Main	Inflow=0.57 cfs 0.056 af Outflow=0.57 cfs 0.056 af
Reach DP3: DP-3 Arcade Pond	Inflow=26.78 cfs 2.744 af Outflow=26.78 cfs 2.744 af
12260 Hudro CAD 2040 06 40	
12260 HydroCAD 2019-06-19 Prepared by {enter your company name here} HydroCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solut	
· · · · · · · · · · · · · · · · · · ·	Type III 24-hr 25-YEAR Rainfall=6.28" Printed 6/19/2019 Pace 32
Summary for Sub	Printed 6/19/2019
	tions LLC Printed 6/19/2019 Page 32
	tions LLC Printed 6/19/2019 Page 32 catchment 1S: SUBCATCHMENT 1 475 af, Depth> 1.07"

_	A	rea (sr)	CN	Description							
		45,369	39	>75% Gras	s cover, Go	bod, HSG A					
		66,266	30	Woods, Good, HSG A							
		0	32	Woods/gra	ss comb., G	Good, HSG A					
		0	61	>75% Gras	s cover, Go	bod, HSG B					
		57,049	55	Woods, Go	od, HSG B						
		0	58	Woods/gra	ss comb., G	Good, HSG B					
		6,050				bod, HSG C					
		58,420	70	Woods, Go	od, HSG C						
_		0	72	Woods/gra	ss comb., G	Good, HSG C					
	2	33,154	49	Weighted A	Verage						
	2	33,154		100.00% P	ervious Are	ea la					
	Tc	Length	Slope			Description					
-	(min)	(feet)	(ft/ft	(ft/sec)	(cfs)						
	16.3	50	0.0400	0.05		Sheet Flow, Sheet Flow 50 Ft					
						Woods: Dense underbrush n= 0.800 P2= 3.20"					
	3.2	475	0.0240	2.49		Shallow Concentrated Flow, Shallow Flow					
_						Unpaved Kv= 16.1 fps					
	19.5	525	Total								



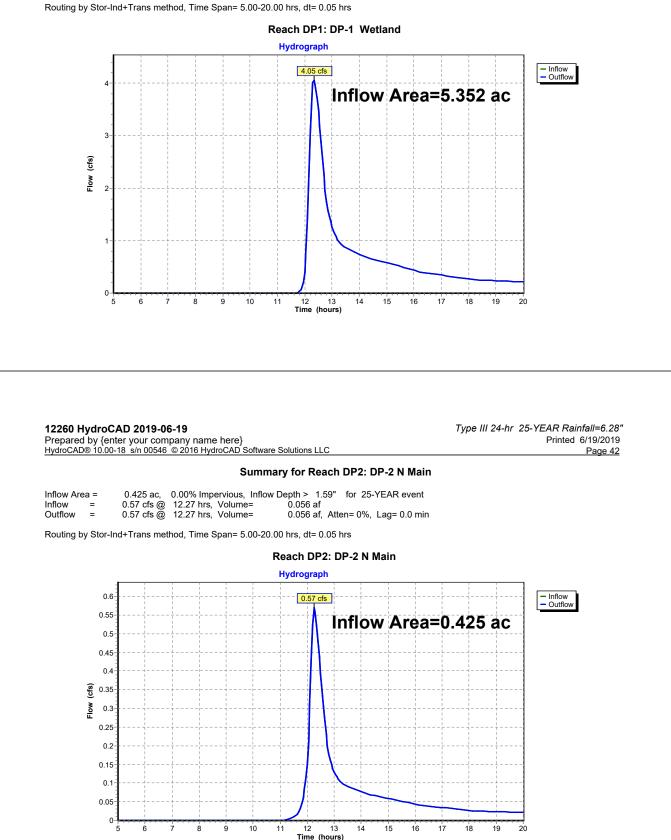






## Summary for Reach DP1: DP-1 Wetland

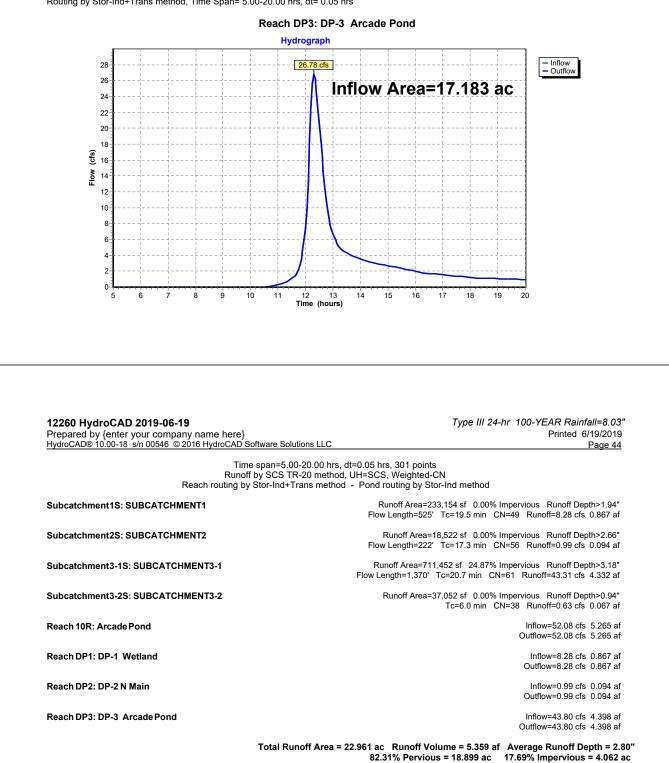
Inflow Area =	5.352 ac,	0.00% Impervious, Inflow I	Depth > 1.07"	for 25-YEAR event
Inflow =	4.05 cfs @	12.34 hrs, Volume=	0.475 af	
Outflow =	4.05 cfs @	12.34 hrs, Volume=	0.475 af, Atte	en= 0%, Lag= 0.0 min



### Summary for Reach DP3: DP-3 Arcade Pond

Inflow Area =	17.183 ac, 23.64% Impervious, Inflow D	epth > 1.92" for 25-YEAR event
Inflow =	26.78 cfs @ 12.31 hrs, Volume=	2.744 af
Outflow =	26.78 cfs @ 12.31 hrs, Volume=	2.744 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



## Summary for Subcatchment 1S: SUBCATCHMENT 1

Runoff = 8.28 cfs @ 12.31 hrs, Volume= 0.867 af, Depth> 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 100-YEAR Rainfall=8.03"

A	Area (sf)	CN	Description		
	45,369	39	>75% Gras	s cover, Go	od, HSG A
	66,266	30	Woods, Go	od, HSG A	
	0	32	Woods/gra	ss comb., G	lood, HSG A
	0	61	>75% Gras	s cover, Go	od, HSG B
	57,049		Woods, Go		
	0				ood, HSG B
	6,050				od, HSG C
	58,420			od, HSG C	
	0	72	Woods/gra	ss comb., G	ood, HSG C
2	233,154	49	Weighted A	verage	
2	233,154		100.00% P	ervious Are	a
Тс	5	Slope			Description
<u>(min)</u>	· /	(ft/ft	(ft/sec)	(cfs)	
16.3	50	0.0400	0.05		Sheet Flow, Sheet Flow 50 Ft
					Woods: Dense underbrush n= 0.800 P2= 3.20"
3.2	475	0.0240	) 2.49		Shallow Concentrated Flow, Shallow Flow
					Unpaved Kv= 16.1 fps
19.5	525	Total			

12260 HydroCAD 2019-06-19 Type III 24-hr 100-YEAR Rainfall=8.03" Prepared by {enter your company name here} HydroCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solutions LLC Printed 6/19/2019 Page 46 Subcatchment 1S: SUBCATCHMENT 1 Hydrograph 9 - Runoff 8.28 cfs 8 Type III 24-hr 100-YEAR Rainfall=8.03" 7 Runoff Area=233,154 sf 6-Runoff Volume=0.867 af Flow (cfs) 5-Runoff Depth>1.94" Flow Length=525' 4 Tc=19.5 min 3-**CN=49** 2 1 0ż ģ 12 13 Time (hours) 5 6 8 10 11 14 15 16 17 18 19 20

										ENT 2				
Runoff	=		-	6 hrs, Volu			Depth> 2							
			hod, UH=8 Rainfall=8.		nted-CN, Time	Span= 5.	00-20.00	hrs, dt= 0.	05 hrs					
Α	Area (sf) 0		Description		ood, HSG A									
	0	30 V	Voods, Go	od, HSG A										
	4,602 13,920	55 V	Voods, Go	od, HSG B										
	0 0			s cover, Go od, HSG C	ood, HSG C									
	18,522 18,522		Veighted A 00.00% Pe	verage ervious Are	a									
(min)	Length (feet)	(ft/ft)	(ft/sec)	Capacity (cfs)	•									
16.3 1.0		0.0100 0.0340	0.05 2.97		Sheet Flow, Woods: Light Shallow Con	underbru centrate	ush n=0 <b>d Flow, S</b>							
17.3	222	Total			Unpaved Kv	= 16.1 fp	S							
	HydroC			name her	e)					Туре	e III 24	4-hr 1		nfall=8.03'
Prepare	ed by {en	ter your	company	name her 16 HydroCA	D Software Solu				NT 2	Туре	e III 2	4-hr 1		nfall=8.03' 6/19/2019 Page 48
Prepare	ed by {en	ter your	company	name her 16 HydroCA	D Software Solu Subcatchm		SUBC	ATCHME	NT 2	Тура	e III 2-	4-hr 1		6/19/2019
Prepare	ed by {en	ter your	company	name her 16 HydroCA	D Software Solu Subcatchm	ent 2S:	SUBC	ATCHME	NT 2	Тур	e III 2	4-hr 1	Printed	6/19/2019

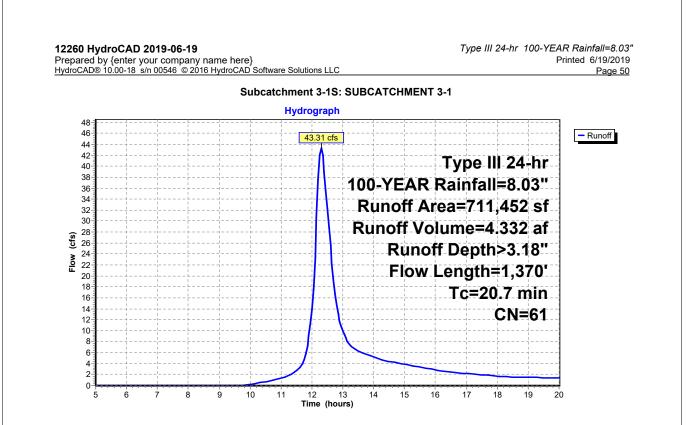
## Summary for Subcatchment 3-1S: SUBCATCHMENT 3-1

Runoff = 43.31 cfs @ 12.30 hrs, Volume= 4.332 af, Depth> 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 100-YEAR Rainfall=8.03"

	Ai	rea (sf)	CN	Description	l .	
	2	86,060	39	>75% Gras	s cover, Go	bod, HSG A
		66,452	30	Woods, Go	od, HSG A	
	1	76,953	98	Paved park	king, HSG A	N
		0	61	>75% Gras	s cover, Go	bod, HSG B
		0		Woods, Go		
		0		Paved park		
		6,637				bod, HSG C
	1	75,350		Woods, Go	,	
-		0		Paved park		
		11,452	61	Weighted A		
		34,499		75.13% Pe		
	1	76,953		24.87% Im	pervious Ar	ea
	т.	Longth	Clam	. Valasitu	Conseitu	Description
	Tc (min)	Length (feet)	Slop (ft/ft		Capacity (cfs)	Description
-	11.9	<u>(ieet)</u> 50	0.022	<u> </u>	(015)	Sheet Flow Sheet Flow 50 Et
	11.9	50	0.0220	0.07		Sheet Flow, Sheet Flow 50 Ft Woods: Light underbrush n= 0.400 P2= 3.20"
	4.9	752	0.025	2.55		Shallow Concentrated Flow, Shallow Flow
	4.9	152	0.020	2.55		Unpaved Kv= 16.1 fps
	3.9	568	0.023	2.44		Shallow Concentrated Flow, Shallow Flow
	0.9	500	0.020	5 2.44		Unpaved Kv= 16.1 fps
-	20.7	1 370	Total			

20.7 1,370 Total

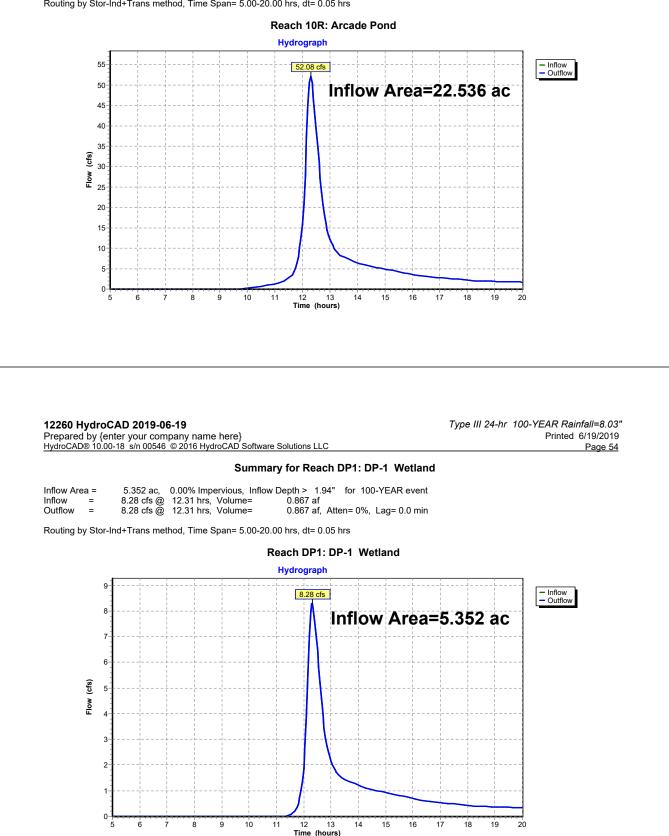


													ENT 3-2	-				
Runoff	=	0.63	cfs @ 1	2.13 ł	nrs, Volu	ume=		0.067 a	f, Deptl	0.94 <ר								
	by SCS T 24-hr 10					hted-C	N, Time	e Span=	= 5.00-2	0.00 hrs	, dt= 0.0	5 hrs						
A	Area (sf) 5,009	<u>CN</u> 39	Descrip >75% G		cover G	ood H	SC A											
	26,479	30	Woods,	Good	I, HSĠ A	۱. ۱	00 7											
	5,564 37,052	77 38	Woods, Weighte	ed Ave	erage													
	37,052		100.009	% Per∖	vious Are	ea												
Tc (min)	Length (feet)	Slop (ft/	e Veloo t) (ft/se		Capacity (cfs)		ription											
6.0						Dire	ct Entry	, DIRE	ст									
																		fe//= 0.02//
Prepare	HydroC	nter vo	ur compa	anv na	ame hei	re}							Туре	III 24-h	nr 100			fall=8.03" 6/19/2019
Prepare		nter vo	ur compa	anv na	ame hei HydroCA	re}	ware So	lutions L	LC				Туре	III 24-h	nr 100			
Prepare	ed bv {er	nter vo	ur compa	anv na	HydroCA	D Soft	atchm	ent 3-2	2S: SU	BCAT	CHME	NT 3-2		III 24-h	nr 100			6/19/2019
Prepare HydroCA	ed bv {er	nter vo	ur compa	anv na	HydroCA	D Soft	atchm		2S: SU	BCAT	CHME	NT 3-2		III 24-h	nr 100		Printed (	6/19/2019 Page 52
Prepare HydroCA	ed by {er <u>\D® 10.00</u>	nter vo	ur compa	anv na	HydroCA	D Soft	atchm	ent 3-2	2S: SU ph	BCAT	CHME	NT 3-2		III 24-h	or 100		Printed (	6/19/2019
Prepare HydroCA	ed by {er \D® 10.00	nter vo	ur compa	anv na	HydroCA	D Soft	atchm	ent 3-2 drogra	2S: SU ph	BCAT	CHMEN					F	Printed (	6/19/2019 Page 52
Prepare HydroCA 0.	ed by {er AD® 10.00	nter vo	ur compa	anv na	HydroCA	D Soft	atchm	ent 3-2 drogra	2S: SU ph fs			т	ype	111 2	24-1	۔ ۱۳	Printed (	6/19/2019 Page 52
Prepare HydroCA 0. 0.	ed by {er <u>AD® 10.00</u> 0.7 0.65 0.6	nter vo	ur compa	anv na	HydroCA	D Soft	atchm	ent 3-2 drogra	2S: SU ph fs	00-Y	EAF	T R Ra	ype	111 2 all=8	24-ř 8.03	۔ مr 8"	Printed (	6/19/2019 Page 52
Prepare <u>HydroCA</u> 0. 0.	0.7 0.65 0.6 0.55 0.5	nter vo	ur compa	anv na	HydroCA	D Soft	atchm	ent 3-2 drogra	2S: SU ph fs	00-Y		T R Ra	ype	111 2 all=8	24-ř 8.03	۔ مr 8"	Printed (	6/19/2019 Page 52
Prepare <u>HydroCA</u> 0. 0. 0.	0.7 .65 .65 .55 .55 	nter vo	ur compa	anv na	HydroCA	D Soft	atchm	ent 3-2 drogra	2S: SU ph fs 1	00-Y Ru	EAF	T R Ra Are	ype ainfa a=3	2 all=8 57,04	24-1 8.03 52 s	nr B"	Printed (	6/19/2019 Page 52
Prepare <u>HydroCA</u> 0. 0. 0.	0.7 0.65 0.65 0.55 0.55 0.55 0.55 0.55 0.45 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	nter vo	ur compa	anv na	HydroCA	D Soft	atchm	ent 3-2 drogra	2S: SU ph fs 1	00-Y Ru Runo	EAF noff off V	T R Ra Are olui	ype ainfa a=3 me=	2 1  =8 37,04	24-h 3.03 52 s 57 a	r }" sf af	Printed (	6/19/2019 Page 52
Prepare HydroCA 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	0.7 0.65 0.65 0.55 0.55 0.45 0.45 0.45	nter vo	ur compa	anv na	HydroCA	D Soft	atchm	ent 3-2 drogra	2S: SU ph fs 1	00-Y Ru Runo	EAF	T R Ra Are olui	ype ainfa a=3 me= Dept	111 2 all=8 57,0 0.06 th>0	24-h 3.03 52 s 57 a 0.94	nr }" sf af µ"	Printed (	6/19/2019 Page 52
Prepare HydroCA 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	0.7 0.65 0.65 0.55 0.55 0.55 0.55 0.55 0.45 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	nter vo	ur compa	anv na	HydroCA	D Soft	atchm	ent 3-2 drogra	2S: SU ph fs 1	00-Y Ru Runo	EAF noff off V	T R Ra Are olui	ype ainfa a=3 me= Dept	111 2 all=8 37,04 0.06 th>0 =6.0	24-1 3.03 52 s 57 a 0.94 mi	nr }" sf af I"	Printed (	6/19/2019 Page 52
Prepare HydroCA 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	0.7 0.65 0.65 0.55 0.55 0.45 0.45 0.45	nter vo	ur compa	anv na	HydroCA	D Soft	atchm	ent 3-2 drogra	2S: SU ph fs 1	00-Y Ru Runo	EAF noff off V	T R Ra Are olui	ype ainfa a=3 me= Dept	111 2 all=8 37,04 0.06 th>0 =6.0	24-h 3.03 52 s 57 a 0.94	nr }" sf af I"	Printed (	6/19/2019 Page 52
Prepare HydroCA 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.7 0.7 0.5 0.6 0.5 0.5 0.5 0.4 0.4 0.4 0.3 0.3 0.3 0.3 0.3	nter vo	ur compa	anv na	HydroCA	D Soft	atchm	ent 3-2 drogra	2S: SU ph fs 1	00-Y Ru Runo	EAF noff off V	T R Ra Are olui	ype ainfa a=3 me= Dept	111 2 all=8 37,04 0.06 th>0 =6.0	24-1 3.03 52 s 57 a 0.94 mi	nr }" sf af I"	Printed (	6/19/2019 Page 52
Prepare HydroCA 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	0.7 0.7 0.5 0.6 0.5 0.5 0.4 0.4 0.4 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	nter vo	ur compa	anv na	HydroCA	D Soft	atchm	ent 3-2 drogra	2S: SU ph fs 1	00-Y Ru Runo	EAF noff off V	T R Ra Are olui	ype ainfa a=3 me= Dept	111 2 all=8 37,04 0.06 th>0 =6.0	24-1 3.03 52 s 57 a 0.94 mi	nr }" sf af I"	Printed (	6/19/2019 Page 52
Prepare HydroCA 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	0.7 0.7 0.65 0.6 0.5 0.5 0.5 0.4 0.4 0.4 0.3 0.3 0.3 0.3 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	nter vo	ur compa	anv na	HydroCA	D Soft	atchm	ent 3-2 drogra	2S: SU ph fs 1	00-Y Ru Runo	EAF noff off V	T R Ra Are olui	ype ainfa a=3 me= Dept	111 2 all=8 37,04 0.06 th>0 =6.0	24-1 3.03 52 s 57 a 0.94 mi	nr }" sf af I"	Printed (	6/19/2019 Page 52
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## Summary for Reach 10R: Arcade Pond

Inflow Area =	=	22.536 ac, 18.03% Impervious, Inflow Depth > 2.80" for 100-YEAR event	
Inflow =	:	52.08 cfs @ 12.30 hrs, Volume= 5.265 af	
Outflow =		52.08 cfs @ 12.30 hrs, Volume= 5.265 af, Atten= 0%, Lag= 0.0 min	

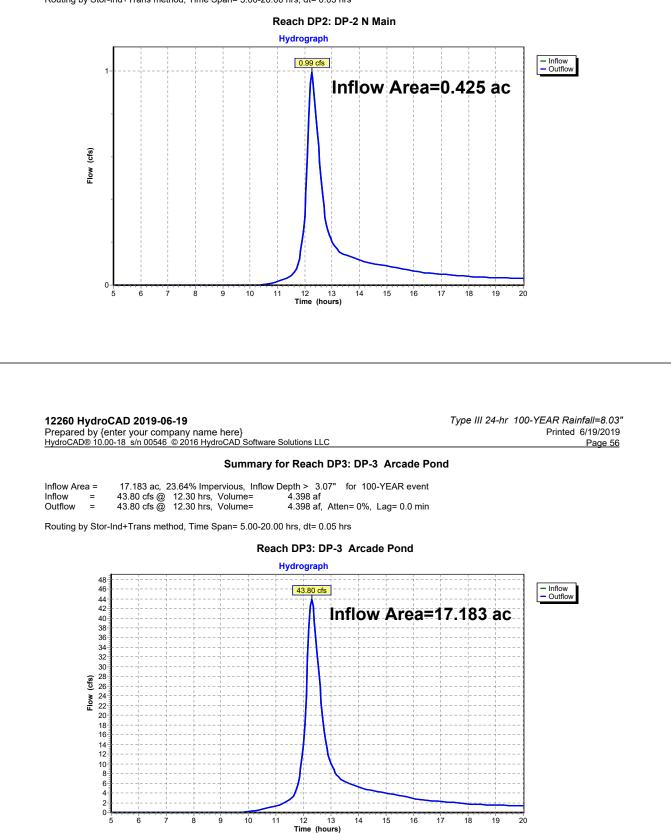
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



## Summary for Reach DP2: DP-2 N Main

Inflow Area =	0.425 ac,	0.00% Impervious, Inflow D	Depth > 2.66" for 100-YEAR event
Inflow =	0.99 cfs @	12.26 hrs, Volume=	0.094 af
Outflow =	0.99 cfs @	12.26 hrs, Volume=	0.094 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

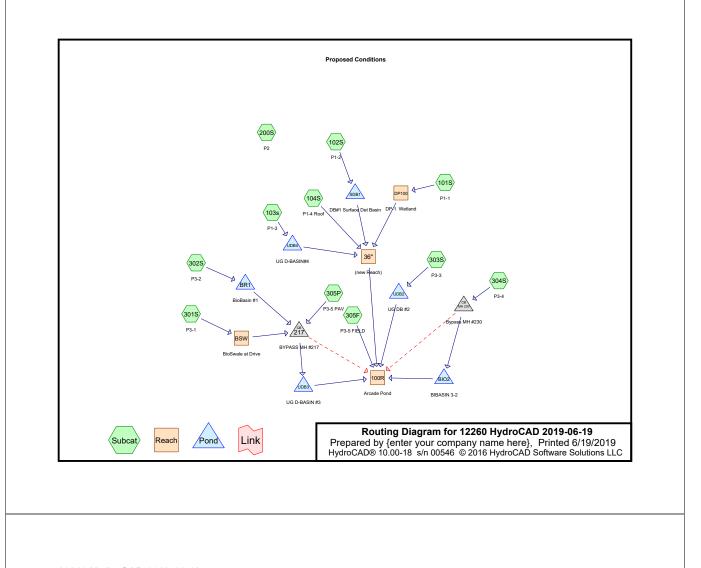


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# ATTACHMENT C

Post-Development Conditions – HydroCAD Calculations



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## Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
7.426	39	>75% Grass cover, Good, HSG A (102S, 103s, 301S, 302S, 303S, 304S, 305F)
0.106	61	>75% Grass cover, Good, HSG B (200S)
2.340	74	>75% Grass cover, Good, HSG C (102S, 301S, 303S, 304S)
5.508	98	Paved parking, HSG A (102S, 103s, 301S, 302S, 303S, 304S, 305F, 305P)
1.228	98	Roofs, HSG A (102S, 301S, 303S)
0.470	98	Roofs, HSG C (104S)
2.993	30	Woods, Good, HSG A (101S, 301S)
1.631	55	Woods, Good, HSG B (101S, 200S)
1.256	70	Woods, Good, HSG C (101S, 301S)
22.957	63	TOTAL AREA

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## Soil Listing (selected nodes)

Are	ea Soil	Subcatchment
(acre	s) Group	Numbers
17.1	54 HSG A	101S, 102S, 103s, 301S, 302S, 303S, 304S, 305F, 305P
1.73	37 HSG B	101S, 200S
4.00	65 HSG C	101S, 102S, 104S, 301S, 303S, 304S
0.0	00 HSG D	
0.0	00 Other	
22.9	57	TOTAL AREA

**12260 HydroCAD 2019-06-19** Prepared by {enter your company name here} HydroCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solutions LLC

## Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
7.426	0.106	2.340	0.000	0.000	9.871	>75% Grass cover, Good	102S, 103s, 200S, 301S, 302S, 303S, 304S, 305F
5.508	0.000	0.000	0.000	0.000	5.508	Paved parking	102S, 103s, 301S, 302S, 303S, 304S, 305F, 305P
1.228	0.000	0.470	0.000	0.000	1.697	Roofs	102S, 104S, 301S, 303S
2.993	1.631	1.256	0.000	0.000	5.880	Woods, Good	101S, 200S, 301S
17.154	1.737	4.065	0.000	0.000	22.957	TOTAL AREA	

	Node	In-Invert	Out-Invert	Length	Slope	n	elected n Diam/Wid	-	Inside-Fill			
Line#	Number	(feet)	(feet)	(feet)	(ft/ft)		(inche	•	(inches)			
1	36"	324.40	312.78	1,162.0	0.0100	0.015	36	.0 0.0	0.0			
260 H	lvdroCAI	) 2019-06	j-19						Type III	24-hr 2-YEA	AR Rainfall-	=3.31
epared	by {enter		oany name l		are Soluti	ons LLC			Type III	24-hr 2-YEA F	Printed 6/19	/2019
epared	by {enter	your com		CAD Softw			s, dt=0.05	nrs, 301 poir			Printed 6/19	/2019
epared	by {enter	your com	oany name l © 2016 Hydro	CAD Softw Time sp Runoff by	an=5.00- SCS TR-	20.00 hrs 20 metho	od, UH=SC	S, Weighted	its I-CN		Printed 6/19	/2019
epared droCAD	I by {enter <u>® 10.00-18</u>	your comp s/n 00546	oany name l © 2016 Hydro	CAD Softw Time sp Runoff by	an=5.00- SCS TR-	20.00 hrs 20 metho	od, UH=SC	S, Weighted I routing by S	its	F	Printed 6/19 P	/2019 age 6
epared droCAD	by {enter	your comp s/n 00546	oany name l © 2016 Hydro	CAD Softw Time sp Runoff by	an=5.00- SCS TR-	20.00 hrs 20 metho	od, UH=SC od - Ponc	S, Weighted I routing by S Runoff Area=	ts I-CN Stor-Ind method	F Impervious F	Printed 6/19 P	/2019 age 6
epared droCAD bcatch	I by {enter <u>® 10.00-18</u>	your com; s/n 00546	oany name l © 2016 Hydro	CAD Softw Time sp Runoff by	an=5.00- SCS TR-	20.00 hrs 20 metho	od, UH=SC od - Pono Fla F	S, Weighted I routing by S Runoff Area= w Length=28 unoff Area=1	tts I-CN Stor-Ind method 173,800 sf 0.00% 0' Tc=13.5 min ( 08,268 sf 32.75%	F Impervious F N=49 Runoff Impervious F	Printed 6/19 P Runoff Depth> =0.08 cfs 0.0 Runoff Depth>	/2019 age 6 •0.10" 034 af •1.44"
epared droCAD bcatch bcatch	1 by {enter 10.00-18 10.	your com; s/n 00546 5: P1-1 5: P1-2	oany name l © 2016 Hydro	CAD Softw Time sp Runoff by	an=5.00- SCS TR-	20.00 hrs 20 metho	od, UH=SC od - Pono Fla Fla Fla	CS, Weighted I routing by S Runoff Area= w Length=28 unoff Area=1 w Length=33	ts I-CN Stor-Ind method 173,800 sf 0.00% 0' Tc=13.5 min ( 08,268 sf 32.75% 4' Tc=14.1 min (	Impervious R N=49 Runoff Impervious R N=81 Runoff	Printed 6/19 P Runoff Depth> =0.08 cfs 0.0 Runoff Depth> =3.47 cfs 0.2	/2019 age 6 •0.10" 034 af •1.44" 298 af
epared droCAD bcatch bcatch	1 by {enter 10.00-18 10.00-18 10.00-18	your com; s/n 00546 5: P1-1 5: P1-2	oany name l © 2016 Hydro	CAD Softw Time sp Runoff by	an=5.00- SCS TR- r-Ind+Tra	20.00 hrs 20 metho ans meth	od, UH=SC od - Pond Fla Fla Fla	S, Weighted I routing by S Runoff Area= w Length=28 unoff Area=1 w Length=33 Runoff Area=	tts I-CN Stor-Ind method 173,800 sf 0.00% 0' Tc=13.5 min ( 08,268 sf 32.75%	Impervious R N=49 Runoff Impervious R N=81 Runoff Impervious R	Printed 6/19 P Runoff Depth> =0.08 cfs 0.0 Runoff Depth> =3.47 cfs 0.2 Runoff Depth>	<ul> <li>/2019</li> <li>age 6</li> <li>0.10"</li> <li>0.34 af</li> <li>1.44"</li> <li>298 af</li> <li>1.12"</li> </ul>
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epared droCAD bcatch bcatch bcatch bcatch bcatch bcatch	J by {enter 10.00-18 10	your com; s/n 00546 S: P1-1 S: P1-2 S: P1-3 S: P1-4 Roo S: P2 S: P3-1 S: P3-3	oany name I © 2016 Hydro Reach rou	CAD Softw Time sp Runoff by	an=5.00- SCS TR- r-Ind+Tra	20.00 hrs 20 metho ans meth	od, UH=SC od - Pond Fic gth=123' 5 Fic Fic ength=45' F F	S, Weighted I routing by S Runoff Area= w Length=28 unoff Area=1 w Length=33 Runoff Area= ilope=0.0200 unoff Area=2 Runoff Area=1 low Length=22 Runoff Area=1 low Length=1 Runoff Area=1 low Length=1 Runoff Area=1	tts I-CN Stor-Ind method 173,800 sf 0.00% 0' Tc=13.5 min ( 08,268 sf 32.75% 4' Tc=14.1 min ( 80,176 sf 62.34% 7' Tc=13.1 min ( 0,457 sf 100.00% Tc=6.0 min ( 2' Tc=17.3 min ( 77,985 sf 34.44% 79' Tc=6.0 min ( 40,507 sf 72.71% 0 '/' Tc=6.0 min ( 02,797 sf 64.58%	Impervious R N=49 Runoff Impervious R N=81 Runoff Impervious R N=76 Runoff Impervious R N=58 Runoff Impervious R N=58 Runoff Impervious R N=82 Runoff Impervious R N=81 Runoff Impervious R	Printed 6/19 Printed 6/19 P Runoff Depth> =0.08 cfs 0.0 Runoff Depth> =2.02 cfs 0.1 Runoff Depth> =1.47 cfs 0.2 Runoff Depth> =0.06 cfs 0.0 Runoff Depth> =0.91 cfs 0.1 Runoff Depth> =1.74 cfs 0.1 Runoff Depth> =3.76 cfs 0.2 Runoff Depth> =3.76 cfs 0.2 Runoff Depth>	/2019 age 6 -0.10" 034 af 11.24" 298 af -1.12" 172 af -2.87" 112 af -0.27" 009 af -0.33" 112 af -0.33" 112 af -0.33" 112 af -0.33" -1.51" 117 af -1.51" 117 af -1.51" -1.5
epared droCAD bcatch bcatch bcatch bcatch bcatch bcatch bcatch bcatch	J by {enter 1000-18	your com; s/n 00546 S: P1-1 S: P1-2 S: P1-3 S: P1-4 Roo S: P2 S: P3-1 S: P3-3	oany name f © 2016 Hydro Reach rou	CAD Softw Time sp Runoff by	an=5.00- SCS TR- r-Ind+Tra	20.00 hrs 20 metho ans metho Flow Len-	od, UH=SC od - Pond Fic gth=123' S Fic ength=45' F F F F F	S, Weighted I routing by S Runoff Area= w Length=28 unoff Area=1 w Length=33 Runoff Area=: ilope=0.0200 unoff Area=20 Runoff Area=20 unoff Area=1 low Length=22 Runoff Area=1 low Length=1 Runoff Area=1 low Length=1 Runoff Area=3 Runoff Area Runoff Area=3 Runoff Area Runoff Area Runo	tts I-CN Stor-Ind method 173,800 sf 0.00% 0' Tc=13.5 min ( 08,268 sf 32.75% 4' Tc=14.1 min ( 80,176 sf 62.34% 7' Tc=13.1 min ( 0,457 sf 100.00% Tc=6.0 min ( 2' Tc=17.3 min ( 77,985 sf 34.44% 79' Tc=6.0 min ( 40,507 sf 72.71% 0 '/ Tc=6.0 min ( 02,797 sf 64.58% 10' Tc=9.3 min ( 97,832 sf 36.89%	Impervious R N=49 Runoff Impervious R N=81 Runoff Impervious R N=76 Runoff Impervious R N=58 Runoff Impervious R N=58 Runoff Impervious R N=81 Runoff Impervious R N=81 Runoff Impervious R N=67 Runoff Impervious R	Printed         6/19           Printed         6/19           P         P           =0.08 cfs         0.0           =0.08 cfs         0.0           =3.47 cfs         0.2           Runoff Depth>         =           =2.02 cfs         0.1           Runoff Depth>         =           =1.47 cfs         0.1           Runoff Depth>         =           =0.06 cfs         0.1           Runoff Depth>         =           =0.91 cfs         0.1           Runoff Depth>         =           =1.74 cfs         0.1           Runoff Depth>         =           =3.76 cfs         0.2           Runoff Depth>         =           =3.76 cfs         0.2           Runoff Depth>         =           =3.76 cfs         0.1           Runoff Depth>         =           =1.53 cfs         0.1	/2019 age 6 0.10" 034 af 1.144" 298 af 1.12" 172 af 2.87" 112 af 0.027" 009 af 0.33" 112 af 0.227" 2.87" 112 af 0.23" 112 af 0.33" 112 af 0.63" 125 af 0.64" 1.44" 2.83 af 1.44" 2.83 af 1.44" 2.83 af 1.44" 2.83 af 1.44" 2.83 af 1.44" 2.83 af 1.44" 2.83 af 1.44" 2.83 af 1.44" 2.83 af 1.44" 2.83 af 1.44" 2.8

<b>12260 HydroCAD 2019-06-19</b> Prepared by {enter your company name HydroCAD® 10.00-18 s/n 00546 © 2016 Hyd	
Reach 36": (new Reach)	Avg. Flow Depth=0.35' Max Vel=3.63 fps Inflow=1.87 cfs 0.549 af 36.0" Round Pipe n=0.015 L=1,162.0' S=0.0100 '/' Capacity=57.81 cfs Outflow=1.69 cfs 0.544 af
Reach 100R: Arcade Pond	Inflow=2.16 cfs 0.759 af Outflow=2.16 cfs 0.759 af
Reach BSW: BioSwale at Drive	Avg. Flow Depth=0.16' Max Vel=1.11 fps Inflow=0.91 cfs 0.112 af n=0.035 L=1,063.0' S=0.0094 '/ Capacity=18.42 cfs Outflow=0.62 cfs 0.107 af
Reach DP100: DP-1 Wetland	Inflow=0.08 cfs_0.034 af Outflow=0.08 cfs_0.034 af
Pond 217: BYPASS MH #217	Peak Elev=316.30' Inflow=1.15 cfs 0.246 af Primary=1.15 cfs 0.246 af Secondary=0.00 cfs 0.000 af Outflow=1.15 cfs 0.246 af
Pond BIO2: BIBASIN 3-2	Peak Elev=314.85' Storage=2,141 cf Inflow=1.25 cfs 0.123 af Discarded=0.17 cfs 0.106 af Primary=0.00 cfs 0.000 af Outflow=0.17 cfs 0.106 af
Pond BR1: BioBasin#1	Peak Elev=328.68' Storage=2,207 cf Inflow=1.74 cfs 0.117 af Outflow=0.68 cfs 0.073 af
Pond MH 230: Bypass MH #230	Peak Elev=328.99' Inflow=1.53 cfs 0.125 af Primary=1.25 cfs 0.123 af Secondary=0.29 cfs 0.002 af Outflow=1.53 cfs 0.125 af
Pond SDB1: DB#1 Surface Det Basin	Peak Elev=329.95' Storage=6,452 cf Inflow=3.47 cfs 0.298 af Outflow=0.54 cfs 0.246 af
Pond UDB2: UG DB #2	Peak Elev=314.87' Storage=0.146 af Inflow=3.76 cfs 0.283 af Outflow=0.49 cfs 0.212 af
Pond UDB3: UG D-BASIN#3	Peak Elev=316.55' Storage=0.100 af Inflow=1.15 cfs 0.246 af Discarded=0.22 cfs 0.170 af Primary=0.01 cfs 0.000 af Outflow=0.23 cfs 0.170 af
Pond UDB4: UG D-BASIN#4	Peak Elev=326.02' Storage=0.057 af Inflow=2.02 cfs 0.172 af Outflow=0.80 cfs 0.157 af

Type III 24-hr 2-YEAR Rainfall=3.31" Printed 6/19/2019 Page 8

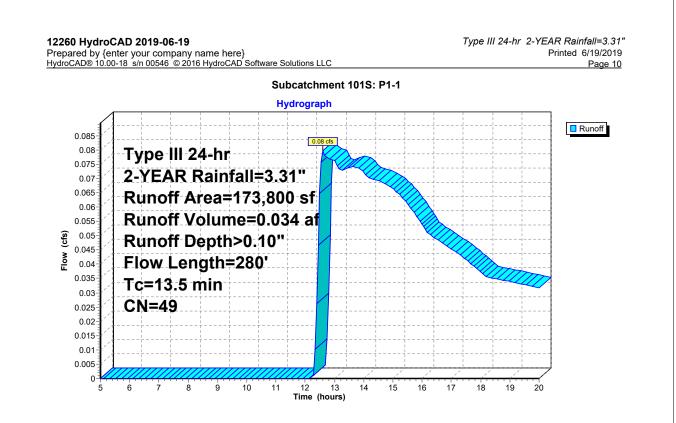
Total Runoff Area = 22.957 ac Runoff Volume = 1.329 af Average Runoff Depth = 0.69" 68.61% Pervious = 15.752 ac 31.39% Impervious = 7.205 ac

### Summary for Subcatchment 101S: P1-1

Runoff = 0.08 cfs @ 12.62 hrs, Volume= 0.034 af, Depth> 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 2-YEAR Rainfall=3.31"

	<u>rea (sf)</u> 70,742	30 V		od, HSG A		
	57,144			od, HSG B		
	45,914			od, HSG C		
	73,800	49 V	Veighted A	verage ervious Are		
I	73,800	1	00.00% P	ervious Are	3a	
Тс	Length	Slope	Velocity	Capacity	Description	
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)		
12.3	50	0.0200	0.07		Sheet Flow, Sheet Flow 50 Ft	
					Woods: Light underbrush n= 0.400 P2= 3.20"	
1.2	230	0.0380	3.14		Shallow Concentrated Flow, Shallow Flow Unpaved Kv= 16.1 fps	
13.5	280	Total			Olipaved RV- 10.1 lps	
15.5	200	TOLAI				

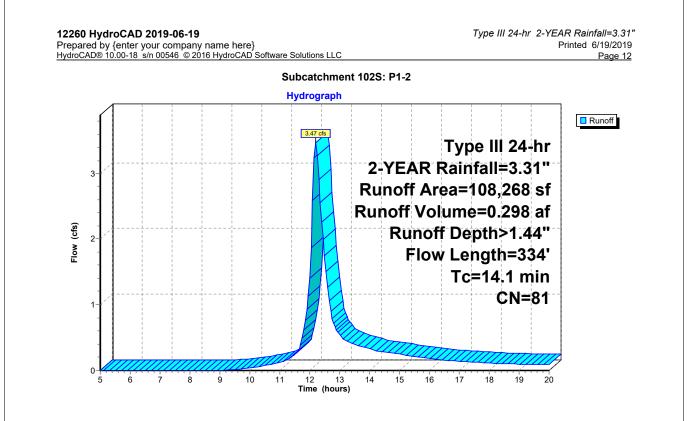


## Summary for Subcatchment 102S: P1-2

Runoff = 3.47 cfs @ 12.20 hrs, Volume= 0.298 af, Depth> 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 2-YEAR Rainfall=3.31"

_	A	rea (sf)	CN	Description		
		1,531	39	>75% Gras	s cover, Go	bod, HSG A
		71,278				ood, HSG C
		14,084	98	Paved park	ing, HSG A	
		21,375	98	Roofs, HSC	βĂ	
_	1	08,268	81	Weighted A	verage	
		72,809		67.25% Pe	vious Area	
		35,459		32.75% Im	pervious Ar	ea
	Tc	Length	Slope	e Velocity	Capacity	Description
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	12.6	50	0.0200	0.07		Sheet Flow. Sheet Flow 50 Ft
						Grass: Bermuda n= 0.410 P2= 3.20"
	1.2	229	0.0380	3.14		Shallow Concentrated Flow, Shallow Flow
						Unpaved Kv= 16.1 fps
	0.3	55	0.0200	) 2.87		Shallow Concentrated Flow, PARKING
						Paved Kv= 20.3 fps
-	14.1	334	Total			

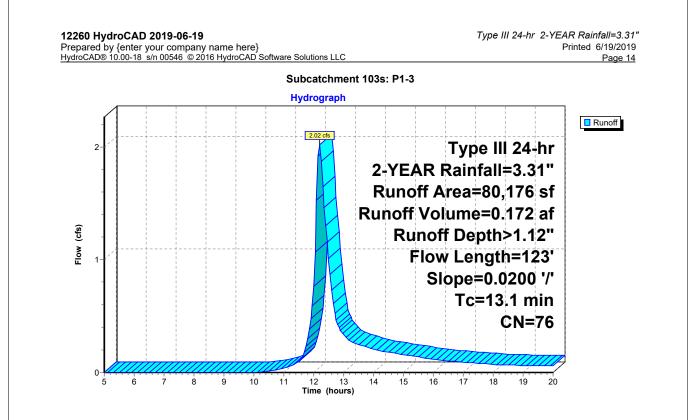


### Summary for Subcatchment 103s: P1-3

Runoff = 2.02 cfs @ 12.19 hrs, Volume= 0.172 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 2-YEAR Rainfall=3.31"

_	A	rea (sf)	CN	Description		
		30,191				ood, HSG A
		49,985	98	Paved park	ing, HSG A	
		80,176	76	Weighted A	verage	
		30,191		37.66% Pe	rvious Area	
		49,985		62.34% Im	pervious Ar	ea
	Тс	Length	Slope	<ul> <li>Velocity</li> </ul>	Capacity	Description
	(min)	(feet)	(ft/ft	(ft/sec)	(cfs)	
	12.6	50	0.0200	0.07		Sheet Flow, Fields
						Grass: Bermuda n= 0.410 P2= 3.20"
	0.5	73	0.0200	2.28		Shallow Concentrated Flow, Field
						Unpaved Kv= 16.1 fps
	13.1	123	Total			



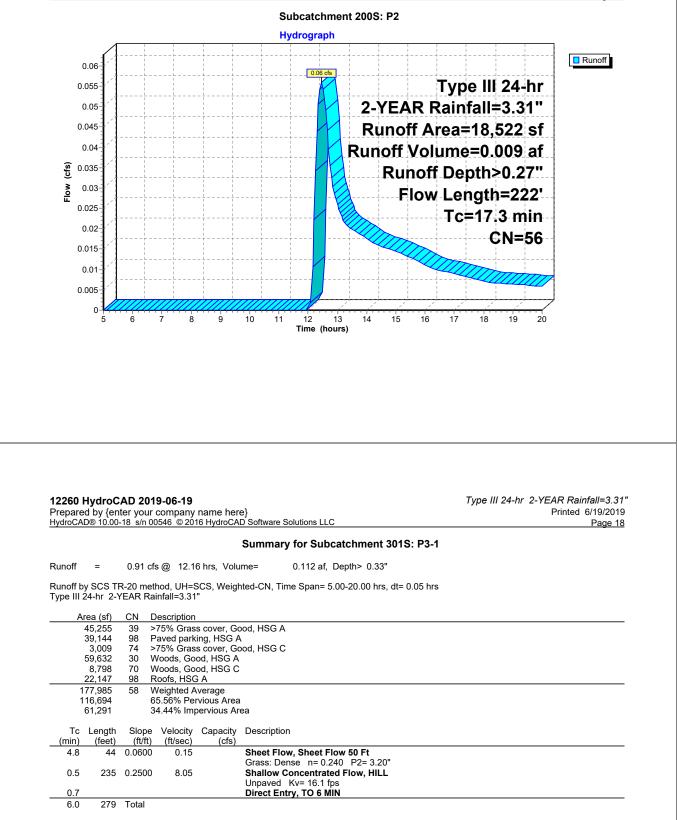
## Summary for Subcatchment 104S: P1-4 Roof

Runoff = 1.47 cfs @ 12.09 hrs, Volume= 0.112 af, Depth> 2.87"

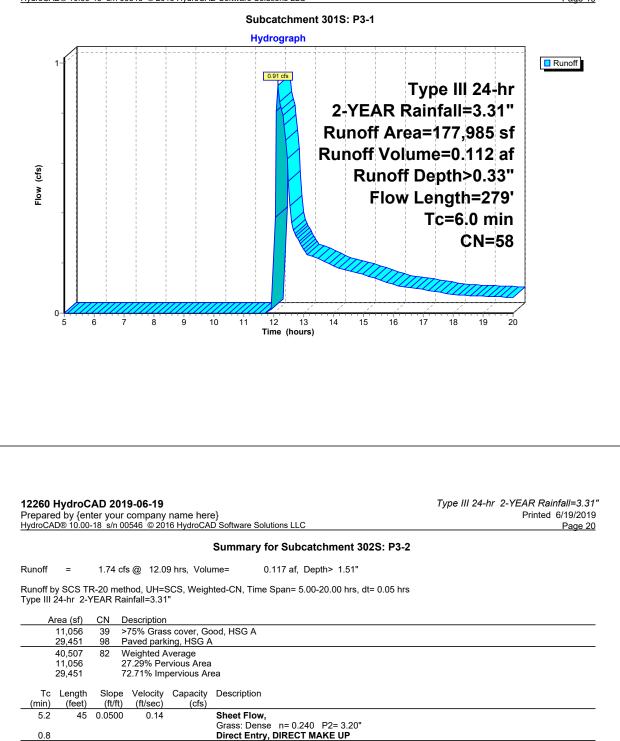
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 2-YEAR Rainfall=3.31"

	<u>ea (sf)</u> 20,457		escription oofs, HSG	C			
	20,457			pervious A			
4	20,437		00.00 /0 11				
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	escription		
6.0	(1001)	(1010)	(10300)	(00)	rect Entry, Direct Entry		
					Subcatchment 104S: P1-4 Roof		
					Hydrograph		
							Runoff
						III 24⊦hr	
					2-YEAR Rainfal		
					Runoff Area=20		
			1 		Runoff Volume=0		
			Flow (cfs)		Runoff Depth		
			£			6.0 min	
						CN=98	
			0-				
			5 6	7 8	9 10 11 12 13 14 15 16 17 18 Time (hours)	8 19 20	
40260 1	hideo C	AD 201	0.06.40			Turne	
12260 H				name here		Туре	III 24-hr 2-YEAR Rainfall=3.31 Printed 6/19/2019
Prepared	d by {en	ter your	company	name here 6 HydroCAI	oftware Solutions LLC	Туре	III 24-hr 2-YEAR Rainfall=3.31 Printed 6/19/2019 Page 16
Prepared	d by {en	ter your	company	name here 6 HydroCAI			Printed 6/19/2019
Prepared	d by {en	ter your 18 s/n 00	company 0546 © 201	6 HydroCAI	ummary for Subcatchment 200S: P2		Printed 6/19/2019
Prepared	d by {en	ter your 18 s/n 00	company 0546 © 201	name here <u>6 HydroCAI</u> 6 hrs, Volu	ummary for Subcatchment 200S: P2		Printed 6/19/2019
Prepared HydroCAE Runoff Runoff by	d by {en <u>)® 10.00</u> . = ∙ SCS TF	ter your <u>18 s/n 00</u> 0.06 cfs R-20 metl	company ) <u>546 © 201</u> s @ 12.46 hod, UH=S	<u>6 HydroCAI</u> 6 hrs, Volu 6CS, Weigh	ummary for Subcatchment 200S: P2	1	Printed 6/19/2019
Prepared HydroCAE Runoff Runoff by	d by {en <u>)® 10.00</u> . = ∙ SCS TF	ter your <u>18 s/n 00</u> 0.06 cfs R-20 metl	company 0546 © 201 5 @ 12.46	<u>6 HydroCAI</u> 6 hrs, Volu 6CS, Weigh	ummary for Subcatchment 200S: P2 = 0.009 af, Depth> 0.27"	1	Printed 6/19/2019
Prepared HydroCAE Runoff Runoff by Type III 2	d by {en <u>)® 10.00-</u> = / SCS TF /4-hr 2-\ ea (sf)	ter your <u>18 s/n 00</u> 0.06 cfs R-20 metl /EAR Rai <u>CN D</u>	company <u>546 © 201</u> s @ 12.46 hod, UH=S infall=3.31 <u>rescription</u>	6 HydroCAI 6 hrs, Volu 6CS, Weigh	ummary for Subcatchment 200S: P2 = 0.009 af, Depth> 0.27" -CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs	1	Printed 6/19/2019
Prepared HydroCAE Runoff Runoff by Type III 2	d by {en	ter your ( <u>18 s/n 00</u> 0.06 cfs R-20 metl (EAR Rai <u>CN D</u> 39 >	company <u>546</u> © 201 s @ 12.46 hod, UH=S infall=3.31 <u>escription</u> 75% Grass	6 HydroCAI 6 hrs, Volu CS, Weigh s cover, Go	ummary for Subcatchment 200S: P2 = 0.009 af, Depth> 0.27" -CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs	1	Printed 6/19/2019
Prepared HydroCAE Runoff Runoff by Type III 2	d by {en <u>)® 10.00-</u> = / SCS TF /4-hr 2-\ ea (sf)	ter your <u>18 s/n 00</u> 0.06 cfs R-20 metl ′EAR Rai <u>CN D</u> 39 > 30 W	company <u>546</u> © 201 s @ 12.4( hod, UH=S infall=3.31 <u>escription</u> 75% Grass Voods, Go	6 HydroCAI 6 hrs, Volu 6CS, Weigh	ummary for Subcatchment 200S: P2 = 0.009 af, Depth> 0.27" -CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs	1	Printed 6/19/2019
Prepared HydroCAE Runoff Runoff by Type III 2 Are	d by {en <u>≫ 10.00-</u> = r SCS TF 4-hr 2-1 <u>ea (sf)</u> 0 0 4,602 13,920	ter your <u>18 s/n 00</u> 0.06 cfs R-20 metl (EAR Rai 230 V 30 V 61 > 55 V	company <u>1546 © 201</u> s @ 12.46 hod, UH=S infall=3.31 <u>rescription</u> 75% Grass Voods, Go 75% Grass Voods, Go	6 HydroCAI 6 hrs, Volu 3CS, Weigh " s cover, Go od, HSG A s cover, Go od, HSG B	ummary for Subcatchment 200S: P2 = 0.009 af, Depth> 0.27" -CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs HSG A HSG B	1	Printed 6/19/2019
Prepared HydroCAE Runoff Runoff by Type III 2 Are	d by {en <u>∞ 10.00</u> = / SCS TF 4-hr 2-1 <u>ea (sf)</u> 0 4,602 13,920 0	ter your <u>18 s/n 00</u> 0.06 cfs R-20 mett (EAR Rai <u>CN D</u> 39 > 30 V 61 > 55 V 74 >	company <u>1546 © 201</u> s @ 12.44 hod, UH=S infall=3.31 <u>tescription</u> 75% Grass /oods, Gor 75% Grass /oods, Gor 75% Grass	6 HydroCAI 6 hrs, Volu 6 CS, Weigh 8 cover, Go od, HSG A 5 cover, Go 0d, HSG B 5 cover, Go	ummary for Subcatchment 200S: P2 = 0.009 af, Depth> 0.27" -CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs HSG A HSG B	1	Printed 6/19/2019
Preparece HydroCAE Runoff Type III 2 Arr	3 by {en ∞ 10.00-	ter your <u>18 s/n 00</u> 0.06 cfs R-20 metl (EAR Rai <u>CN D</u> 39 > 30 W 61 > 55 W 74 > 70 W	company <u>1546 © 201</u> s @ 12.44 nod, UH=S infall=3.31 <u>rescription</u> 75% Grass Voods, Go 75% Grass Voods, Go 75% Grass Voods, Go	6 HydroCAI 6 hrs, Volu 5 cover, Go 5 d, HSG A 5 cover, Go 5 d, HSG B 5 cover, B 5 cover, B 5 cover, C	ummary for Subcatchment 200S: P2 = 0.009 af, Depth> 0.27" -CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs HSG A HSG B	1	Printed 6/19/2019
Preparece HydroCAE Runoff Type III 2 Arr	d by {en <u>∞ 10.00</u> = / SCS TF 4-hr 2-1 <u>ea (sf)</u> 0 4,602 13,920 0	ter your <u>18 s/n 00</u> 0.06 cfs R-20 meti EAR Rai <u>CN D</u> 39 > 30 % 61 > 55 % 74 > 70 % 56 %	company <u>1546</u> © 201 s @ 12.44 hod, UH=S infall=3.31 <u>escription</u> 75% Grass Joods, Goi 75% Grass Joods, Goi 75% Grass Joods, Goi 26% Grass Joods, Goi Joods, Goi Joods Joo	6 HydroCAI 6 hrs, Volu 5 cover, Go 5 d, HSG A 5 cover, Go 5 d, HSG B 5 cover, B 5 cover, B 5 cover, C	ummary for Subcatchment 200S: P2 = 0.009 af, Depth> 0.27" -CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs HSG A HSG B	1	Printed 6/19/2019
Preparece HydroCAE Runoff Runoff by Type III 2 Arr	] by {en ≫ 10.00- >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	ter your <u>18 s/n 00</u> 0.06 cfs R-20 metl (EAR Rai <u>CN D</u> 39 > 30 V 61 > 55 V 74 > 70 V 56 V 1	company <u>1546 © 201</u> s @ 12.44 hod, UH=S infall=3.31 <u>tescription</u> 75% Grass <u>/oods, Go</u> 75% Grass <u>/oods, Go</u> 75% Grass <u>/oods, Go</u> <u>/oods, Go</u> <u>/oods</u> <u>/oods, Go</u>	6 HydroCAI 6 hrs, Volu 3CS, Weigh 7 5 cover, Go 5d, HSG A 5 cover, Go 5d, HSG B 5 cover, Go 5d, HSG C verage ervious Area	ummary for Subcatchment 200S: P2 = 0.009 af, Depth> 0.27" -CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs HSG A HSG B HSG C	1	Printed 6/19/2019
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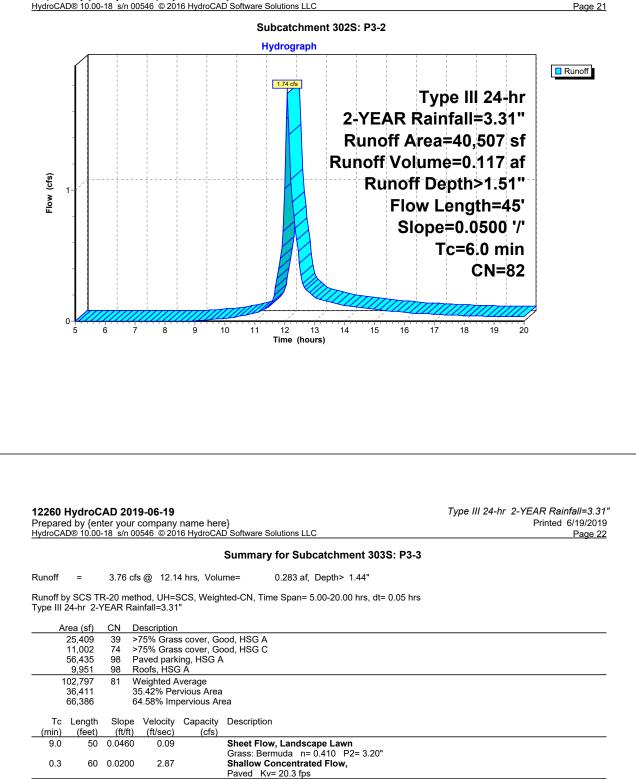
17.3 222 Total







6.0 45 Total

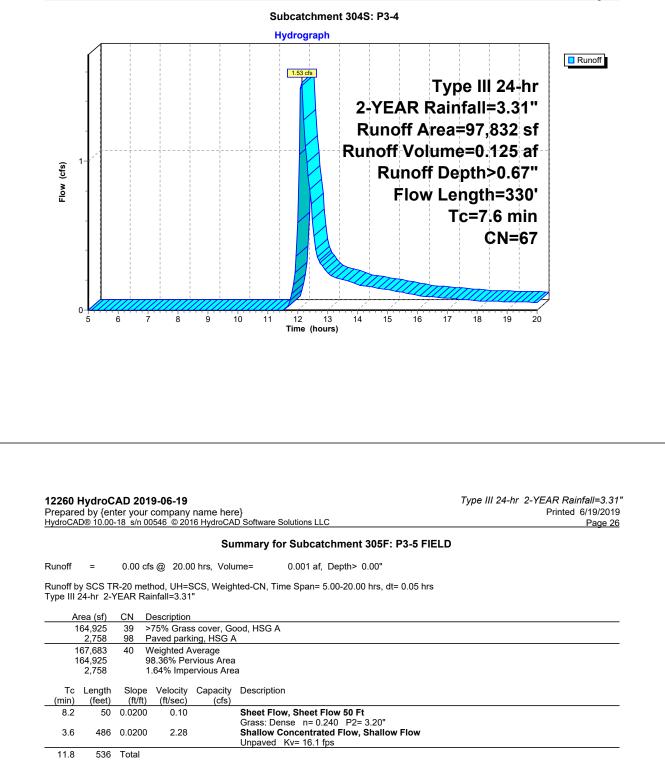


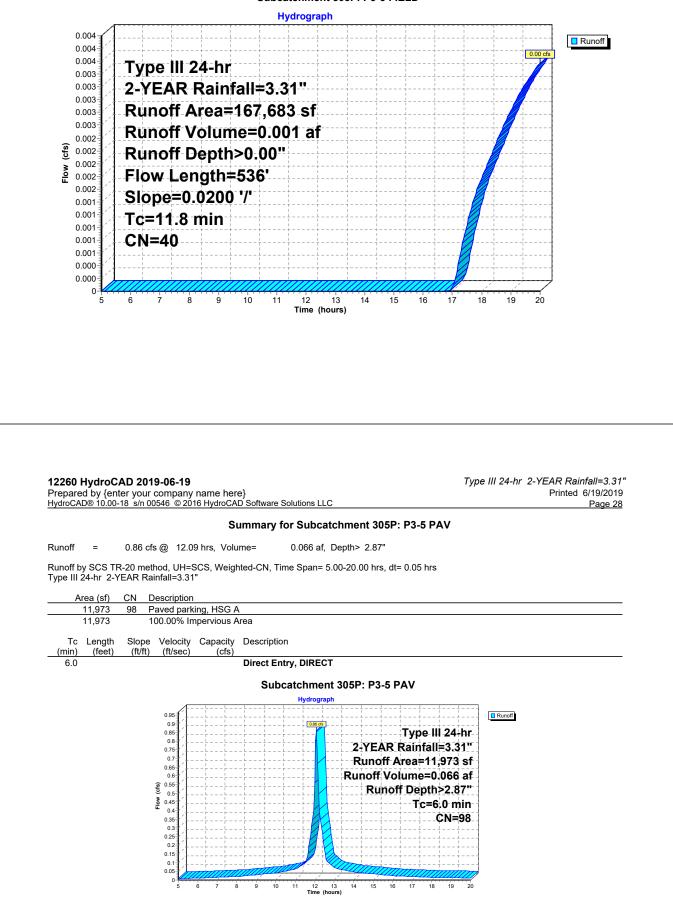
9.3 110 Total

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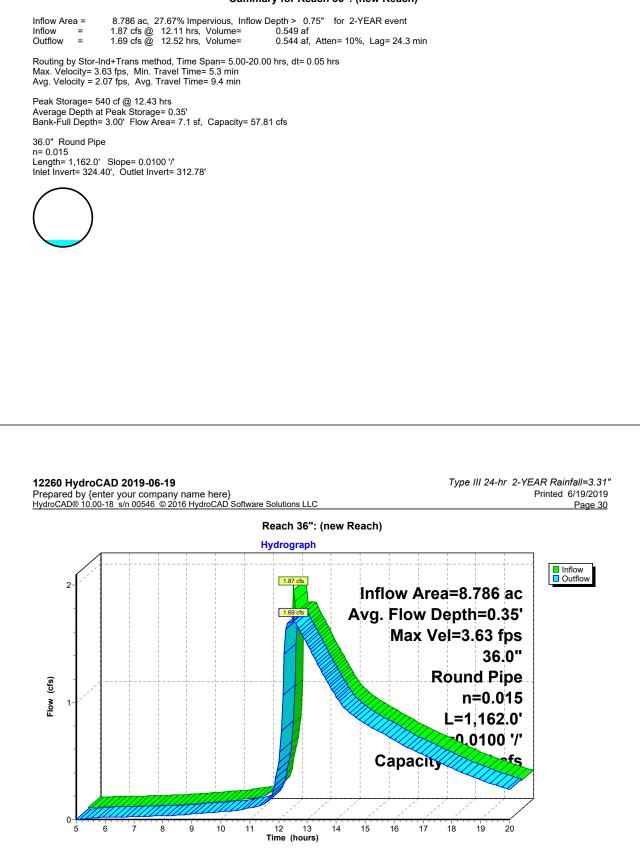
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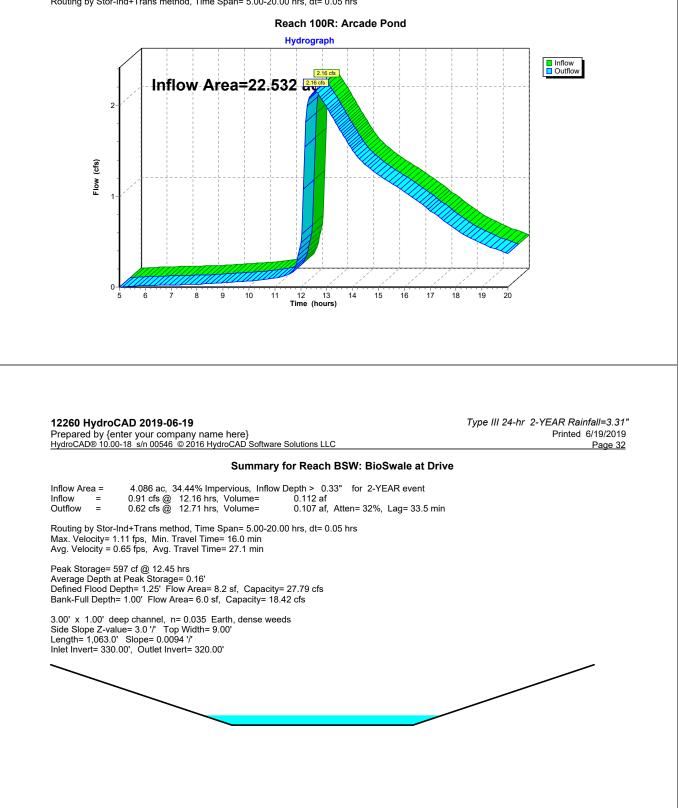
### Summary for Reach 36": (new Reach)

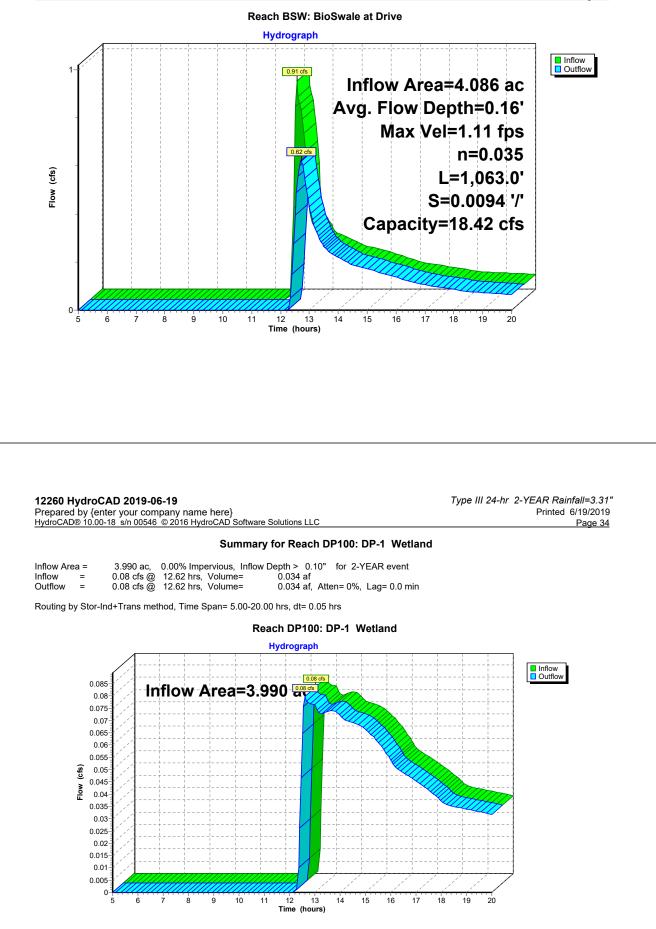


### Summary for Reach 100R: Arcade Pond

Inflow Area =	22.532 ac, 31.98% Impervious, Inflow E	Depth > 0.40" for 2-YEAR event
Inflow =	2.16 cfs @ 12.56 hrs, Volume=	0.759 af
Outflow =	2.16 cfs @ 12.56 hrs, Volume=	0.759 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs





## Summary for Pond 217: BYPASS MH #217

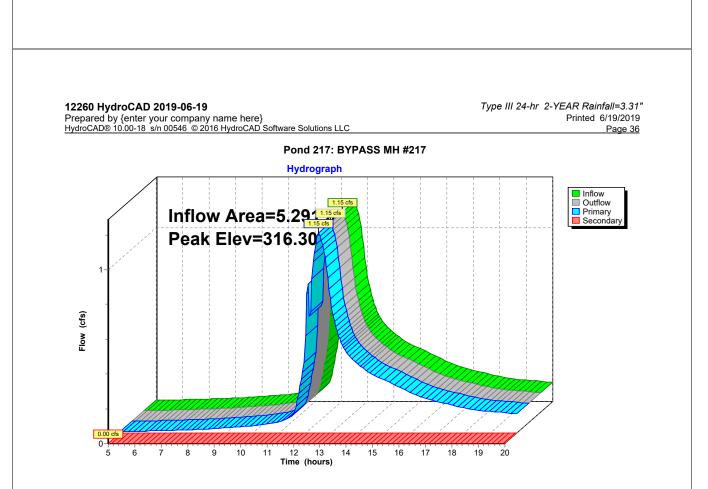
Inflow Area =	5.291 ac, 44.57% Impervious, Inflow De	epth > 0.56" for 2-YEAR event
Inflow =	1.15 cfs @ 12.50 hrs, Volume=	0.246 af
Outflow =	1.15 cfs @ 12.50 hrs, Volume=	0.246 af, Atten= 0%, Lag= 0.0 min
Primary =	1.15 cfs @ 12.50 hrs, Volume=	0.246 af
Secondary =	0.00 cfs @ 5.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 316.30'@ 12.50 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	315.50'	8.0" Vert. Orifice/Grate C= 0.600
#2	Secondary	316.52'	24.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=1.15 cfs @ 12.50 hrs HW=316.30' (Free Discharge) 1=Orifice/Grate (Orifice Controls 1.15 cfs @ 3.29 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=315.55' (Free Discharge)



### Summary for Pond BIO2: BIBASIN 3-2

Inflow Area =	2.246 ac, 36.89% Impervious, Inflow D	epth > 0.65" for 2-YEAR event
Inflow =	1.25 cfs @ 12.13 hrs, Volume=	0.123 af
Outflow =	0.17 cfs @ 14.06 hrs, Volume=	0.106 af, Atten= 86%, Lag= 116.0 min
Discarded =	0.17 cfs @ 14.06 hrs, Volume=	0.106 af
Primary =	0.00 cfs @ 5.00 hrs, Volume=	0.000 af
	<b>u</b>	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 314.85' @ 14.06 hrs Surf.Area= 3,017 sf Storage= 2,141 cf

Plug-Flow detention time=153.7 min calculated for 0.106 af (86% of inflow) Center-of-Mass det. time= 112.8 min ( 950.6 - 837.9 )

Volume	Invert	Avai	I.Storage	Storage	Description	
#1	314.00'		6,412 cf	Custon	n Stage Data (Pri	smatic)_isted below (Recalc)
Elevation (feet)		Area sq-ft)		.Store c-feet)	Cum.Store (cubic-feet)	
314.00	2	2,047		0	0	

315.00 3,194 2,621 2,621 4.388 316.00 3.791 6.412

Device Routing Invert Outlet Devices

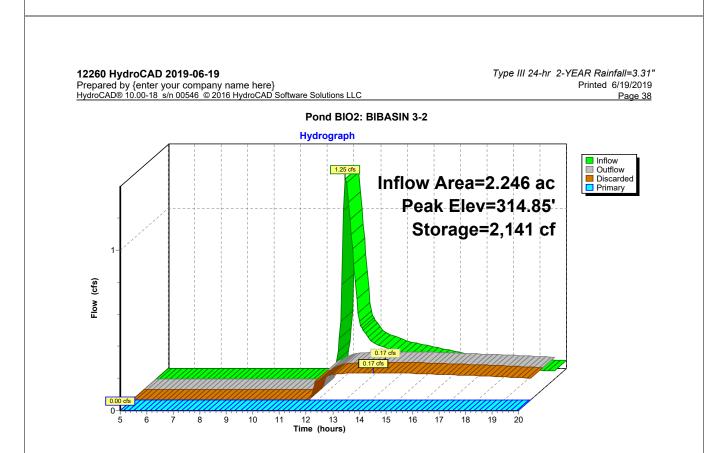
2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columnsX 6 rows C= 0.600 Limited to weir flow at low heads 315.50' #1 Primary #2

314.00' Discarded

2.410 in/hr Exfiltration over Horizontal area 24.0" Horiz. Orifice/Grate X 0.43 C= 0.600 Limited to weir flow at low heads #3 Primary 315.00'

Discarded OutFlow Max=0.17 cfs @ 14.06 hrs HW=314.85' (Free Discharge) -2=Exfiltration (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=314.00' (Free Discharge) -1=Orifice/Grate (Controls 0.00 cfs) -3=Orifice/Grate (Controls 0.00 cfs)

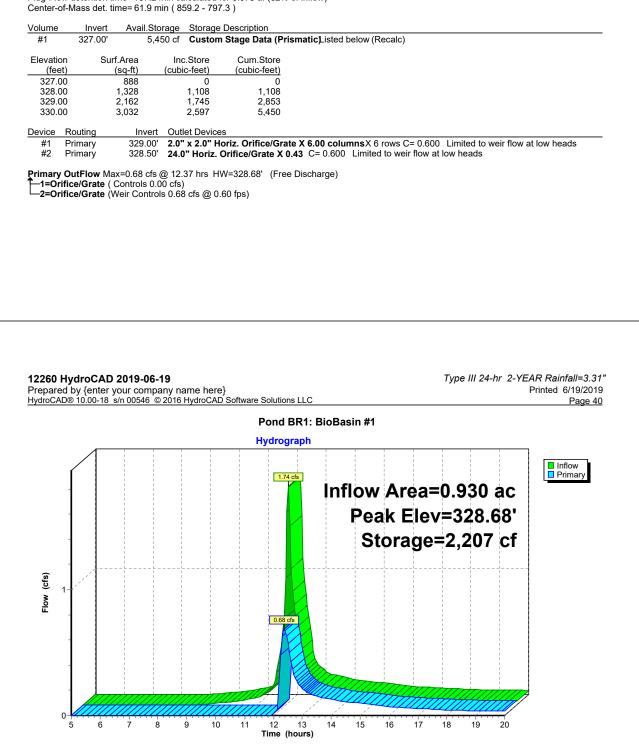


### Summary for Pond BR1: BioBasin #1

Inflow Area =	0.930 ac, 72.71% Impervious, Inflo	w Depth > 1.51" for 2-YEAR event
Inflow =	1.74 cfs @ 12.09 hrs, Volume=	0.117 af
Outflow =	0.68 cfs @ 12.37 hrs, Volume=	0.073 af, Atten= 61%, Lag= 16.4 min
Primary =	0.68 cfs @ 12.37 hrs, Volume=	0.073 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 328.68' @ 12.37 hrs Surf.Area= 1,897 sf Storage= 2,207 cf

Plug-Flow detention time=137.2 min calculated for 0.073 af (62% of inflow)



## Summary for Pond MH 230: Bypass MH #230

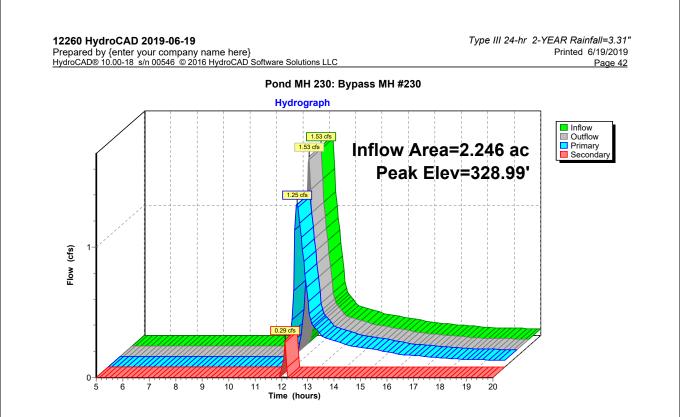
Inflow Area =	2.246 ac, 36.89% Impervious, Inflow De	epth > 0.67" for 2-YEAR event
Inflow =	1.53 cfs @ 12.13 hrs, Volume=	0.125 af
Outflow =	1.53 cfs @ 12.13 hrs, Volume=	0.125 af, Atten= 0%, Lag= 0.0 min
Primary =	1.25 cfs @ 12.13 hrs, Volume=	0.123 af
Secondary =	0.29 cfs @ 12.13 hrs, Volume=	0.002 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 328.99'@ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	327.00'	6.0" Vert. Orifice/Grate C= 0.600
#2	Secondary	328.75'	18.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=1.24 cfs @ 12.13 hrs HW=328.97' (Free Discharge) 1=Orifice/Grate (Orifice Controls 1.24 cfs @ 6.32 fps)

Secondary OutFlow Max=0.26 cfs @ 12.13 hrs HW=328.97' (Free Discharge)

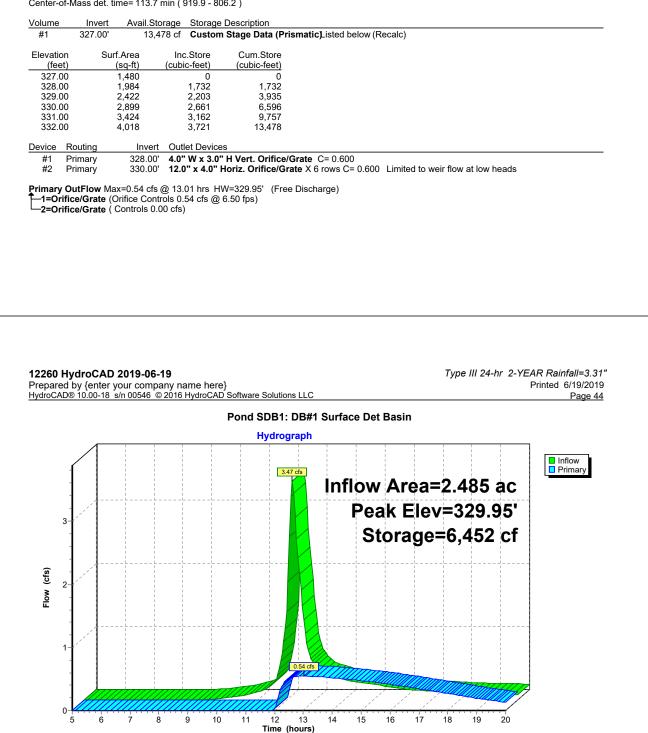


### Summary for Pond SDB1: DB#1 Surface Det Basin

Inflow Area =	2.485 ac, 32.75% Impervious, Inflow D	epth > 1.44" for 2-YEAR event
Inflow =	3.47 cfs @ 12.20 hrs, Volume=	0.298 af
Outflow =	0.54 cfs @ 13.01 hrs, Volume=	0.246 af, Atten= 84%, Lag= 48.6 min
Primary =	0.54 cfs @ 13.01 hrs, Volume=	0.246 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 329.95' @ 13.01 hrs Surf.Area= 2,875 sf Storage= 6,452 cf

Plug-Flow detention time= 160.8 min calculated for 0.246 af (83% of inflow) Center-of-Mass det. time= 113.7 min ( 919.9 - 806.2 )



## Summary for Pond UDB2: UG DB #2

Inflow Area =	2.360 ac, 64.58% Impervious, Inflow I	Depth > 1.44" for 2-YEAR event
Inflow =	3.76 cfs @ 12.14 hrs, Volume=	0.283 af
Outflow =	0.49 cfs @ 12.98 hrs, Volume=	0.212 af, Atten= 87%, Lag= 50.8 min
Primary =	0.49 cfs @ 12.98 hrs, Volume=	0.212 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 314.87' @ 12.98 hrs Surf.Area= 0.303 ac Storage= 0.146 af

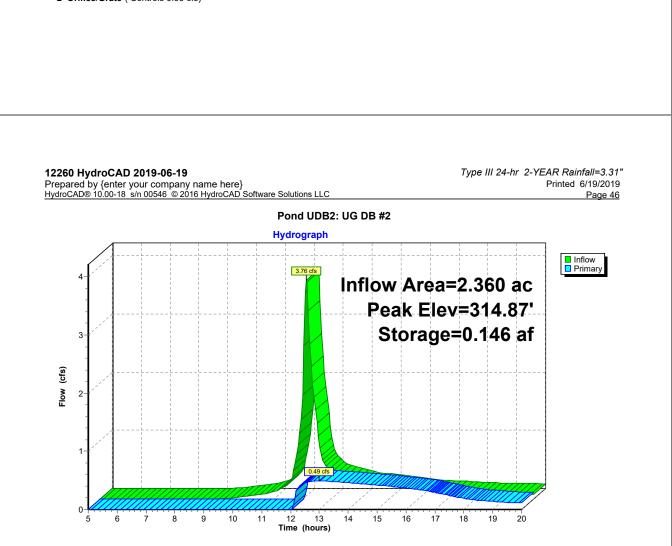
Plug-Flow detention time=171.6 min calculated for 0.212 af (75% of inflow) Center-of-Mass det. time= 110.0 min ( 912.4 - 802.4 )

Volume	Invert	Avail.Storage	Storage Description
#1A	314.00'	0.233 af	82.25'W x 160.26'L x 3.50'H Field A
			1.059 af Overall - 0.394 af Embedded = 0.665 af x 35.0% Voids
#2A	314.50'	0.394 af	ADS_StormTech SC-740 +Capx 374 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			17 Rows of 22 Chambers
		0.627 af	Total Available Storage
Storage	Storage Group & created with Chamber Wizard		

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	314.50'	6.0" x 4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Primary	315.80'	10.0" W x 4.0" H Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=0.49 cfs @ 12.98 hrs HW=314.87' (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.49 cfs @ 2.92 fps) 2=Orifice/Grate ( Controls 0.00 cfs)



ntew = 1.5 cm g 12.0 hrs. Volume 0.248 af Decarded 0.122 cm g 12.0 hrs. Volume 0.170 af .40m = 00%, Lag = 212.0 min Decarded 0.122 cm g 11.85 hrs. Volume 0.170 af .40m = 00%, Lag = 212.0 min Decarded 0.102 cm g 10.03 hrs. Suthware 0.022 cm g 10.00 af the Elser 31.85 (m) g 10.03 hrs. Suthware 0.022 cm g 10% of inflow) Elser 6-456 societ time 73.8 min (b 24.84 f 1.000 f 1.0000 f 1.0000 f 1.000 f 1.000 f 1.0000 f 1.0000 f 1.0000 f 1	Summary for Pond UDB3: UG D-BASIN #3	
	Inflow         =         1.15 cfs @         12.50 hrs,         Volume=         0.246 af           Outflow         =         0.23 cfs @         16.03 hrs,         Volume=         0.170 af,         Atten= 80%,         Lag= 212.0 min           Discarded         =         0.22 cfs @         11.85 hrs,         Volume=         0.170 af	
Part - Variable determines       15.2 min calculated to 0.169 e (6% of inflow)         Service Advances of the time 7.3.3 min (151.2 * 441.1)         Service Advances of the time 7.3.3 min (151.2 * 441.1)         Service Advances of the time 7.3.3 min (151.2 * 441.1)         Service Advances of the time 7.3.3 min (151.2 * 441.1)         Service Advances of the time 7.3.3 min (151.2 * 441.1)         Service Advances of the time 7.3.3 min (151.2 * 441.1)         Service Advances of the time 7.3.3 min (151.2 * 441.1)         Service Advances of the time 7.3.3 min (151.2 * 441.1)         Service Advances of the time 7.3.3 min (151.2 * 441.1)         Service Advances of the time 7.3.3 min (151.2 * 441.1)         Service Advances of the time 7.3.3 min (151.2 * 441.1)         Service Advances of the time 7.3.3 min (151.2 * 441.1)         Service Advances of the time 7.3.3 min (151.2 * 441.1)         Service Advances of the time 7.3.3 min (151.2 * 441.1)         Service Advances of time 7.3.4 min (151.2 * 441.1)         Service Advances of time 7.3.4 min (151.2 * 441.1)         Service Advances of time 7.3.4 min (151.2 * 441.1)         Service Advances of time 7.3.4 min (151.2 * 441.1)         Service Advances of time 7.3.4 min (151.2 * 441.1)         Service Advances of time 7.3.4 min (151.2 * 441.1)         Service Advances of time 7.3.4 min (151.2 * 441.1)         Service Advances of time 7.3.4 min (151.2 * 441.1) </td <td>Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs</td> <td></td>	Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs	
Server-Chanse ded Lime-7.38 min (915.2 - 84.1.)         Volume Inter Avail Storage Boorgelow         13       13 / 17 0       104.31 W. 33 Storage Description         14       13 / 17 0       104.31 W. 33 Storage Description         152       105.20       0.053 af Storage Description         14       13 / 17 0       104.31 W. 33 Storage 2.327 Field A         152       105.307 af MOV at 100.13 V. 155 Inside #1         164       17 of Total Available Storage         17       Total Available Storage         17       Total Available Storage         18       Storage Coup A created with Chamber Wized         19       105.27 2.401 Inthr Extilitation over Surface area         18       Discarded DuiFlow Max=0.02 cfs (11.85 hrs HW-316.357 (Free Discharge)         19       116.57 2.407 Vect Office/Orate C = 0.600         19       14 Discarded DuiFlow Max=0.02 cfs (0.50 hrs H)         19       106.57 2.407 Vect Office/Orate C = 0.500 hrs (10.50 hrs H)         19       116.57 2.407 Vect Office/Orate C = 0.500 hrs (10.50 hrs (10.5		
#1A       314.70 <sup>+</sup> 0.064 af 104.83 W x 38.44 <sup>+</sup> x 2.33 <sup>+</sup> Field A 0.214 af Overall-0.053 af Embedded = 0.161 af x 40.0% Voids 224 af Overall-0.053 af Embedded = 0.161 af x 40.0% Voids BERGUE Starse 28.0 <sup>+</sup> X 16 (J <sup>+</sup> + 2.0 <sup>+</sup> St X 121 = 14.7 of Control Starse 28.0 <sup>+</sup> X 16 (J <sup>+</sup> + 2.0 <sup>+</sup> St X 121 = 14.7 of Control Starse 28.0 <sup>+</sup> X 16 (J <sup>+</sup> + 2.0 <sup>+</sup> St X 121 = 14.7 of Control Starse 28.0 <sup>+</sup> X 16 (J <sup>+</sup> + 2.0 <sup>+</sup> St X 121 = 14.7 of Control Starse 28.0 <sup>+</sup> X 16 (J <sup>+</sup> + 2.0 <sup>+</sup> St X 121 = 14.7 of Control Starse 28.0 <sup>+</sup> X 16 (J <sup>+</sup> + 2.0 <sup>+</sup> St X 121 = 14.7 of Control Starse 28.0 <sup>+</sup> X 16 (J <sup>+</sup> + 2.0 <sup>+</sup> St X 121 = 14.7 of Control Starse 28.0 <sup>+</sup> X 16.0 <sup>+</sup> X 14.0 <sup>+</sup> X 14.0 <sup>+</sup> X 10 V x 15.0 <sup>+</sup> X 10 V x	Center-of-Mass det. time= 73.8 min ( 915.2 - 841.4 )	
Bit and Overall - 0.053 at Embedded = 0.161 at x 40.0% Volds         Bit A       315.20       0.058 at ADS_StormChosC3310 x 151 inside #1         Effective Size= 28.9W x 16.0°H => 2.0°8 x 7.121 = 14.7 cf       December 20.0°8 x 7.121 = 14.7 cf         Decards Outper 20.0°8 x 7.121 = 14.7 cf       Decards Outper 20.0°8 x 7.121 = 14.7 cf         Storage Group A created with Chamber Wizard       Endetwork         Beneford       117 at Total Available Storage         Storage Group A created with Chamber Wizard       Endetwork         Beneford       118 at Total Available Storage         Storage Group A created with Chamber Wizard       Endetwork         Device Max-02.26 (at 11.6 hrs HW-314.74" (Free Discharge)       Endetwork         Preards OutFlow Max-0.00 cfs @ 11.85 hrs HW-316.55" (Free Discharge)       Endetwork         Preards OutFlow Max-0.00 cfs @ 0.03 hrs HW-316.55" (Free Discharge)       Printed Gif/92019         Propered by (ender your company name here)       Printed Gif/92019         Propered by (ender your company name here)       Printed Gif/92019         Propered by (ender your company name here)       Printed Gif/92019         Propered by (ender your company name here)       Printed Gif/92019         Propered by (ender your company name here)       Printed Gif/92019         Propered by (ender your company name here)       Printed Gif/92019         Pr		_
0.117 af Total Available Storage Storage Group A created with Chamber Wizard Device Routing Invert Outlet Devices #1 Discarded 0.116 STs HW-S14.74' (Free Discharge) Primary OutFlow Max-0.00 drs @ 11.85 Ts HW-S14.74' (Free Discharge) -1=Exfiltration Controls 0.02 ds) Primary OutFlow Max-0.00 drs @ 10.03 hs HW-S16.55' (Free Discharge) -2=Orffice/Grate (Onfice Controls 0.00 ds @ 0.56 fps) Primary OutFlow Max-0.00 ds @ 10.03 hs HW-S16.55' (Free Discharge) -2=Orffice/Grate (Onfice Controls 0.00 ds @ 0.56 fps) Primary OutFlow Max-0.00 ds @ 10.03 hs HW-S16.55' (Free Discharge) -2=Orffice/Grate (Onfice Controls 0.00 ds @ 0.56 fps) Primary OutFlow Max-0.00 ds @ 2016 HydroCAD Software Solutions LLC Primary OutFlow Areea=5.291 add Hydrograph Hydrograph 1000 df 000 af 000	#2A       315.20'       0.214 af Overall - 0.053 af Embedded = 0.161 af x 40.0% Voids         #2A       315.20'       0.053 af         ADS_StormTech SC-310 x 155       Inside #1         Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf         Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap	
Device Routing I Invert Outlet Devices #1 Discarded 114.70 2.440 InVPr Edification over Surface area 24.0 Vert. or Infectorate 0.600 Discarded OutFlow Max=0.22 cfs @ 11.85 hrs HW=314.74 (Free Discharge) -==Edification Controls 0.22 cfs Primary OutFlow Max=0.02 cfs @ 16.03 hrs HW=316.55 (Free Discharge) -==20rifice/Grate (Onfice Controls 0.00 cfs @ 0.56 (ps) Prepared by (enter your company name here) hydroCADB 1000-16 sh 00646 © 2016 HydroCAD Software Solutions LLC Pond UDB3: UG D-BASIN #3 Hydrograph fund outFlow Area==5.291 are Peak Elev=316.55' Storage=0.100 af 000 af		-
#1       Discarded       314.70"       24.10 inhr Extilication over Surface area         With any 316.52"       316.52"       24.00" (Free Discharge)         H=Extilization Controls 0.22 cfs       91.85 hrs HW-316.75" (Free Discharge)         H=Extilization Controls 0.00 cfs       0.63 hrs HW-316.55" (Free Discharge)         H=Extilization Controls 0.00 cfs       0.056 (ps)         Prepared by (enter your company name here)       Print of the state	Storage Group A created with Chamber Wizard	
Hard 2 Primary 316.52 24.0° Vert. Orifice/Grate C = 0.600 Siscarded OutFlow Max=0.22 cfs (±) 11.85 hrs HW=314.74' (Free Discharge) Triany OutFlow Max=0.01 cfs (±) 16.35 hrs HW=316.55' (Free Discharge) Triany OutFlow Max=0.00 cfs (±) 16.35 hrs HW=316.55' (Free Discharge) Type III 24-hr 2-YEAR Rainfall=3.31° Prepared by (enter your company name here) Prove the your company name here) Prove the	Device Routing Invert Outlet Devices	_
Presver de la control de la co		
<figure><figure><figure><figure><figure></figure></figure></figure></figure></figure>	Discarded OutFlow Max=0.22 cfs @ 11.85 hrs HW=314.74' (Free Discharge)	
Type III 24-hr 2-YEAR Rainfall=3.31* Prepared by (enter your company name here) Printed 6/19/2019 Page 48 Pond UDB3: UG D-BASIN #3 Hydrograph Peak Elev=316.55' Storage=0.100 af Peak Elev=316.55' Pia		
Pon UDB3: UG D-BASIN #3 Hydrograph Inflow Area=5.291 ac Peak Elev=316.55' Storage=0.100 af Generation of the storage of t	Prepared by {enter your company name here} Printed 6/19/201	19
Wydrograph         Inflow Area=5.291 ad         Peak Elev=316.55'         Storage=0.100 af         Image: Comparison of the storage of the st		<u>.8</u>
(g) Mg		
	Inflow Area=5.291 ad       Peak Elev=316.55'       Storage=0 100 af	
0- <i>111111111111111111111111111111111111</i>	0.22 cfs	
Time (hours)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	

### Summary for Pond UDB4: UG D-BASIN#4

Inflow Area =	1.841 ac, 62.34% Impervious, Inflow D	epth > 1.12" for 2-YEAR event
Inflow =	2.02 cfs @ 12.19 hrs, Volume=	0.172 af
Outflow =	0.80 cfs @ 12.58 hrs, Volume=	0.157 af, Atten= 61%, Lag= 22.9 min
Primary =	0.80 cfs @ 12.58 hrs, Volume=	0.157 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 326.02' @ 12.58 hrs Surf.Area= 0.080 ac Storage= 0.057 af

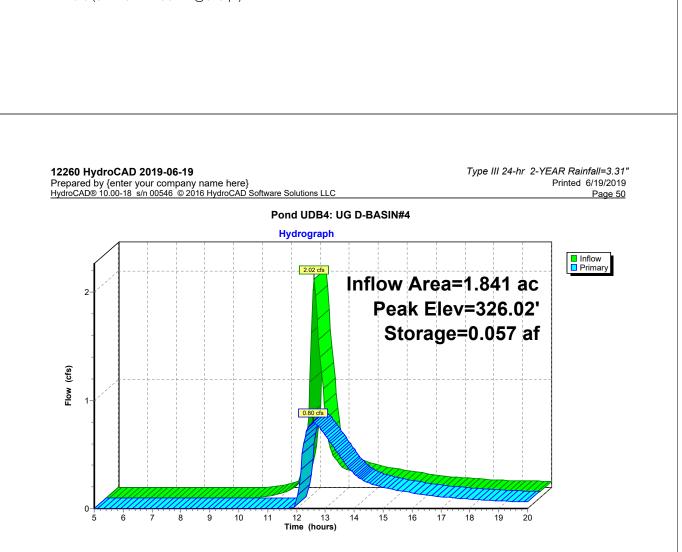
Plug-Flow detention time=68.6 min calculated for 0.157 af (91% of inflow) Center-of-Mass det. time= 39.4 min ( 856.9 - 817.4 )

Volume	Invert	Avail.Storage	Storage Description
#1A	324.90'	0.071 af	39.50'W x 87.88'L x 3.50'H Field A
			0.279 af Overall - 0.102 af Embedded = 0.177 af x 40.0% Voids
#2A	325.40'	0.102 af	ADS_StormTech SC-740 x 96 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			Row Length Adjustment= +0.44' x 6.45 sf x 8 rows
		0.173 af	Total Available Storage
			-

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	325.30'	8.0" W x 4.0" H Vert. Orifice/Grate C= 0.600
#2	Primary	326.00'	12.0" W x 6.0" H Vert. 326 C= 0.600

Primary OutFlow Max=0.80 cfs @ 12.58 hrs HW=326.02' (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.79 cfs @ 3.55 fps) 2=326 (Orifice Controls 0.01 cfs @ 0.40 fps)



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### Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

5,	5 7
Subcatchment101S: P1-1	Runoff Area=173,800 sf 0.00% Impervious Runoff Depth>0.60" Flow Length=280' Tc=13.5 min CN=49 Runoff=1.57 cfs 0.201 af
Subcatchment102S: P1-2	Runoff Area=108,268 sf 32.75% Impervious Runoff Depth>2.90" Flow Length=334' Tc=14.1 min CN=81 Runoff=6.97 cfs 0.601 af
Subcatchment103s: P1-3	Runoff Area=80,176 sf 62.34% Impervious Runoff Depth>2.46" Flow Length=123' Slope=0.0200 '/' Tc=13.1 min CN=76 Runoff=4.50 cfs 0.377 af
Subcatchment104S: P1-4 Roof	Runoff Area=20,457 sf 100.00% Impervious Runoff Depth>4.55" Tc=6.0 min CN=98 Runoff=2.31 cfs 0.178 af
Subcatchment200S: P2	Runoff Area=18,522 sf 0.00% Impervious Runoff Depth>0.99" Flow Length=222' Tc=17.3 min CN=56 Runoff=0.33 cfs 0.035 af
Subcatchment301S: P3-1	Runoff Area=177,985 sf 34.44% Impervious Runoff Depth>1.12" Flow Length=279' Tc=6.0 min CN=58 Runoff=5.16 cfs 0.382 af
Subcatchment302S: P3-2	Runoff Area=40,507 sf 72.71% Impervious Runoff Depth>3.00" Flow Length=45' Slope=0.0500 '/' Tc=6.0 min CN=82 Runoff=3.41 cfs 0.233 af
Subcatchment303S: P3-3	Runoff Area=102,797 sf 64.58% Impervious Runoff Depth>2.91" Flow Length=110' Tc=9.3 min CN=81 Runoff=7.54 cfs 0.572 af
Subcatchment304S: P3-4	Runoff Area=97,832 sf 36.89% Impervious Runoff Depth>1.74" Flow Length=330' Tc=7.6 min CN=67 Runoff=4.53 cfs 0.326 af
Subcatchment305F: P3-5 FIELD	Runoff Area=167,683 sf 1.64% Impervious Runoff Depth>0.22" Flow Length=536' Slope=0.0200 '/' Tc=11.8 min CN=40 Runoff=0.27 cfs 0.069 af
Subcatchment305P: P3-5 PAV	Runoff Area=11,973 sf 100.00% Impervious Runoff Depth>4.55" Tc=6.0 min CN=98 Runoff=1.35 cfs 0.104 af

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Reach 36": (new Reach)	Avg. Flow Depth=0.89' Max Vel=6.29 fps Inflow=11.17 cfs 36.0" Round Pipe n=0.015 L=1,162.0' S=0.0100 '/' Capacity=57.81 cfs Outflow=10.95 cfs	
Reach 100R: Arcade Pond	Inflow=16.40 cfs Outflow=16.40 cfs	
Reach BSW: BioSwale at Drive	Avg. Flow Depth=0.44' Max Vel=1.95 fps Inflow=5.16 cfs n=0.035 L=1,063.0' S=0.0094 '/ Capacity=18.42 cfs Outflow=3.67 cfs	
Reach DP100: DP-1 Wetland	Inflow=1.57 cfs Outflow=1.57 cfs	
Pond 217: BYPASSMH #217	Peak Elev=317.35' Inflow=5.86 cfs Primary=2.07 cfs 0.508 af Secondary=3.80 cfs 0.159 af Outflow=5.86 cfs	
Pond BIO2: BIBASIN 3-2	Peak Elev=315.18' Storage=3,229 cf Inflow=1.44 cfs Discarded=0.19 cfs 0.130 af Primary=0.70 cfs 0.081 af Outflow=0.89 cfs	
Pond BR1: BioBasin#1	Peak Elev=328.97' Storage=2,790 cf Inflow=3.41 cfs Outflow=2.85 cfs	
Pond MH 230: Bypass MH #230	Peak Elev=329.58' Inflow=4.53 cfs Primary=1.44 cfs 0.259 af Secondary=3.09 cfs 0.067 af Outflow=4.53 cfs	
Pond SDB1: DB#1 Surface Det Basin	Peak Elev=330.32' Storage=7,548 cf Inflow=6.97 cfs Outflow=6.03 cfs	
Pond UDB2: UG DB #2	Peak Elev=315.58' Storage=0.315 af Inflow=7.54 cfs Outflow=0.83 cfs	
Pond UDB3: UG D-BASIN#3	Peak Elev=317.00' Storage=0.116 af Inflow=2.07 cfs Discarded=0.22 cfs 0.181 af Primary=1.34 cfs 0.227 af Outflow=1.57 cfs	
Pond UDB4: UG D-BASIN#4	Peak Elev=326.70' Storage=0.099 af Inflow=4.50 cfs Outflow=2.79 cfs	

Total Runoff Area = 22.957 ac Runoff Volume = 3.078 af Average Runoff Depth = 1.61" 68.61% Pervious = 15.752 ac 31.39% Impervious = 7.205 ac

12260 HydroCAD 2019-06-19 Prepared by {enter your company name here} HydroCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solutions LLC Type III 24-hr 10-YEAR Rainfall=5.14" Printed 6/19/2019 Page 54

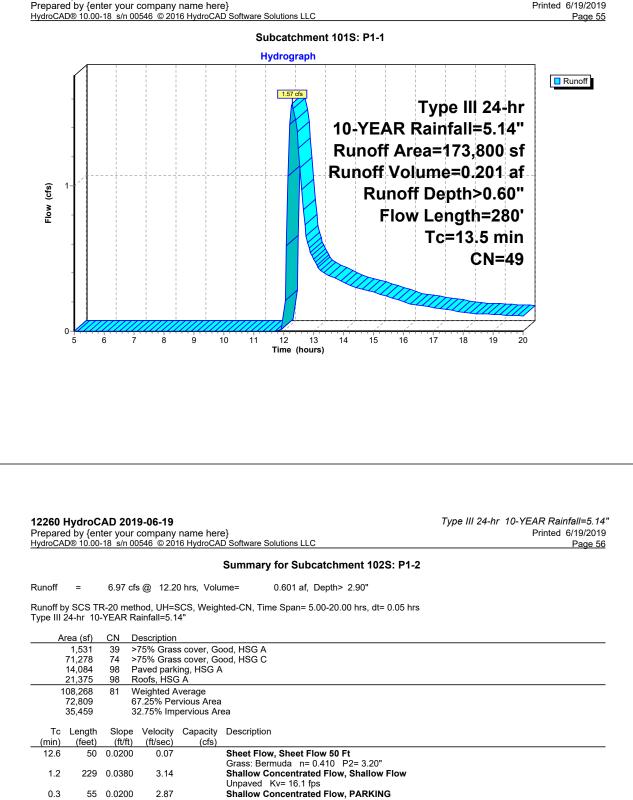
### Summary for Subcatchment 101S: P1-1

Runoff = 1.57 cfs @ 12.27 hrs, Volume= 0.201 af, Depth> 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr  $\,$  10-YEAR Rainfall=5.14"

A	rea (sf)	CN	Description	1	
	70,742	30	Woods, Go	od, HSG A	
	57,144	55	Woods, Go	od, HSG B	
	45,914	70	Woods, Go	od, HSG C	
1	73,800	49	Weighted A	verage	
1	73,800		100.00% P	ervious Are	a
Tc	Length	Slope	,		Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
12.3	50	0.0200	0.07		Sheet Flow, Sheet Flow 50 Ft
					Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	230	0.0380	3.14		Shallow Concentrated Flow, Shallow Flow
					Unpaved Kv= 16.1 fps

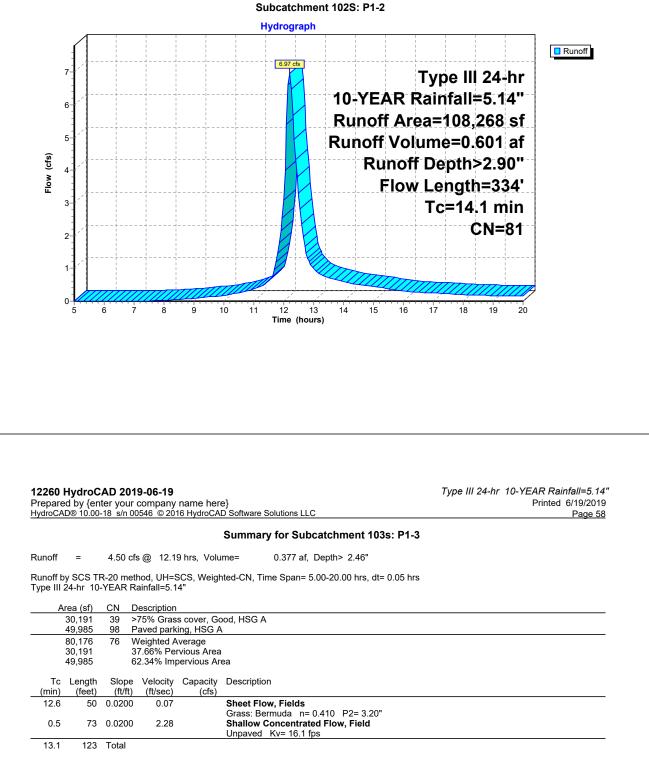
13.5 280 Total

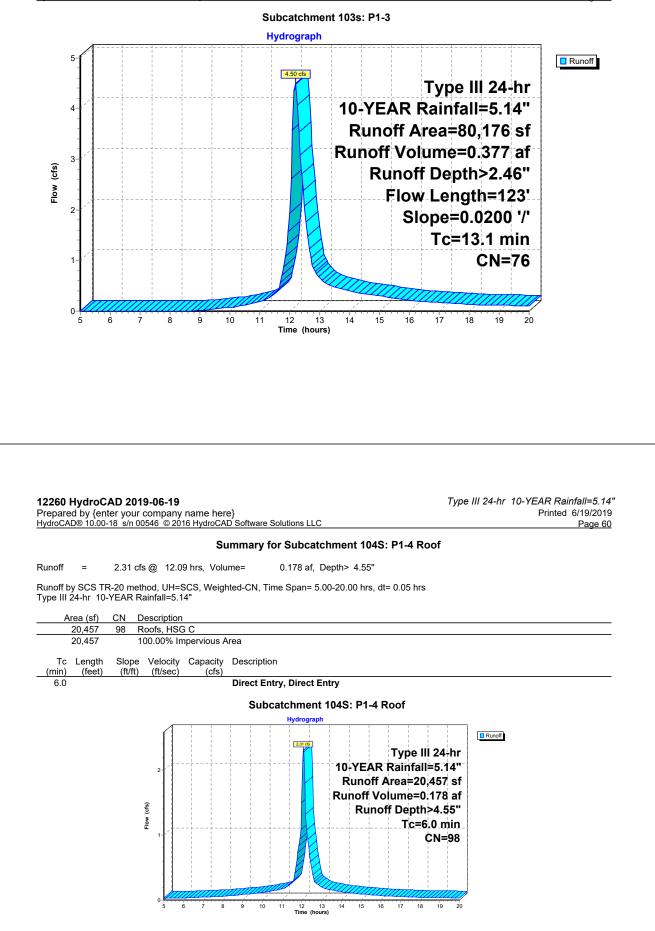


Paved Kv= 20.3 fps

14.1 334 Total

12260 HydroCAD 2019-06-19





# Summary for Subcatchment 200S: P2

Runoff = 0.33 cfs @ 12.28 hrs, Volume= 0.035 af, Depth> 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr  $\,$  10-YEAR Rainfall=5.14"

4,602 61 >75% Grass cover, Good, HSG B 13,920 55 Woods, Good, HSG C 0 70 Woods, Good, HSG C 18,522 56 Weighted Average 18,522 56 Velocity Capacity Description (fret) (ft/ft) (ft/sec) (cfs) 16.3 50 0.0100 0.05 Sheet Flow, Sheet Flow 50 Ft Woods: Light underbrush n= 0.400 P2= 3.20" 1.0 172 0.0340 2.97 Shallow Concentrated Flow, Shallow Flow Unpaved Kv= 16.1 fps 17.3 222 Total	
0       70       Woods, Good, HSG C         18,522       56       Weighted Average 100.00% Pervious Area         Tc       Length       Slope       Velocity       Capacity         Minin       (feet)       (ft/ft)       (ft/sec)       (cfs)         16.3       50       0.0100       0.05       Sheet Flow, Sheet Flow 50 Ft Woods: Light underbrush n= 0.400 P2= 3.20"         1.0       172       0.0340       2.97       Shallow Concentrated Flow, Shallow Flow Unpaved Kv= 16.1 fps	
18,522       56       Weighted Average         18,522       100.00% Pervious Area         Tc       Length       Slope       Velocity       Capacity         Minin       (feet)       (ft/ft)       (ft/sec)       (cfs)         16.3       50       0.0100       0.05       Sheet Flow, Sheet Flow 50 Ft         Woods:       Light underbrush       n= 0.400       P2= 3.20"         1.0       172       0.0340       2.97       Shallow Concentrated Flow, Shallow Flow         Unpaved       Kv= 16.1 fps       100       0.05       Shallow Flow	
18,522       100.00% Pervious Area         Tc       Length       Slope       Velocity       Capacity       Description         (min)       (feet)       (ft/ft)       (ft/sec)       (cfs)         16.3       50       0.0100       0.05       Sheet Flow, Sheet Flow 50 Ft         Woods:       Light underbrush       n= 0.400       P2= 3.20"         1.0       172       0.0340       2.97       Shallow Concentrated Flow, Shallow Flow         Unpaved       Kv= 16.1 fps       fps	
(min)         (feet)         (ft/sec)         (cfs)           16.3         50         0.0100         0.05         Sheet Flow, Sheet Flow 50 Ft Woods: Light underbrush n= 0.400 P2= 3.20"           1.0         172         0.0340         2.97         Shallow Concentrated Flow, Shallow Flow Unpaved Kv= 16.1 fps	
16.3         50         0.0100         0.05         Sheet Flow, Sheet Flow 50 Ft Woods: Light underbrush n= 0.400 P2= 3.20"           1.0         172         0.0340         2.97         Shallow Concentrated Flow, Shallow Flow Unpaved Kv= 16.1 fps	
1.0       172       0.0340       2.97       Woods: Light underbrush n= 0.400 P2= 3.20"         Shallow Concentrated Flow, Shallow Flow       Unpaved Kv= 16.1 fps	
Unpaved Kv= 16.1 fps	
260 HydroCAD 2019-06-19 Type III 24-hr 10-YEAR Rainfa	EAR Rainfall=5.14"
	Printed 6/19/2019 Page 62
droCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solutions LLC F	
droCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solutions LLC F Subcatchment 200S: P2	
droCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solutions LLC F	
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droCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solutions LLC F Subcatchment 200S: P2 Hydrograph	Page 62
droCAD® 10.00-18 s/n 00546 @ 2016 HydroCAD Software Solutions LLC         F           Subcatchment 200S: P2           Hydrograph           0.36         0.34         0.33 cfs         Type III 24-hr         Image: Colspan="2">Colspan="2">Image: Colspan="2">Colspan="2"         Colspan="2"	Page 62
droCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solutions LLC F Subcatchment 200S: P2 Hydrograph 0.36 0.34 0.32 0.3 0.3 0.3 0.30 cs 0.32 cs 0.3 0.30 cs 0.32 cs 0.30 cs 0.32 cs 0.30 cs 0.32 cs 0.30 cs 0.32 cs 0.32 cs 0.30 cs 0.32 cs 0.	Page 62
droCAD® 10.00-18 s/n 00546 @ 2016 HydroCAD Software Solutions LLC         F           Subcatchment 200S: P2           Hydrograph           0.36         0.34         0.35         Type III 24-hr         Image: Solution Software Software Solution Software Software Solution Software Solution Software Solution Software Software Software Solution Software Softwa	Page 62
droCAD® 10.00-18 s/n 00546 @ 2016 HydroCAD Software Solutions LLC F Subcatchment 200S: P2 Hydrograph 0.36 0.34 0.32 0.33 0.28 0.28 0.24 0.22 0.3 0.24 0.22 0.3 0.24 0.22 0.3 0.35 0.35 0.35 0.34 0.36 0.34 0.36 0.34 0.36 0.34 0.36 0.34 0.32 0.33 0.34 0.34 0.35 0.34 0.34 0.35 0.34 0.35 0.35 0.24 0.35 0.35 0.24 0.24 0.35 0.35 0.35 0.24 0.35 0.35 0.24 0.35 0.24 0.35 0.24 0.35 0.24 0.35 0.24 0.35 0.24 0.35 0.24 0.35 0.24 0.35 0.24 0.35 0.24 0.35 0.24 0.35 0.24 0.35 0.24 0.35 0.24 0.35 0.24 0.35 0.24 0.24 0.35 0.24 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Page 62
droCAD® 10.00-18 s/n 00546 @ 2016 HydroCAD Software Solutions LLC F Subcatchment 200S: P2 Hydrograph 0.36 0.34 0.32 0.33 0.28 0.28 0.24 0.24 0.22 0.3 0.28 0.24 0.22 0.3 0.35 0.34 0.36 0.34 0.36 0.34 0.36 0.34 0.32 0.30 0.33 cfs 0.33 cfs 0.33 cfs 0.33 cfs 0.34 0.32 0.34 0.32 0.34 0.32 0.34 0.32 0.34 0.32 0.34 0.32 0.34 0.32 0.34 0.32 0.34 0.32 0.34 0.34 0.34 0.35 0.34 0.32 0.34 0.32 0.34 0.32 0.34 0.35 0.34 0.35 0.34 0.32 0.33 cfs 0.36 0.34 0.35 0.37 0.36 0.36 0.34 0.35 0.37 0.37 0.37 0.37 0.37 0.38 0.28 0.24 0.24 0.24 0.35 0.24 0.24 0.24 0.24 0.25 0.24 0.24 0.25 0.24 0.24 0.25 0.24 0.24 0.25 0.24 0.25 0.24 0.25 0.24 0.25 0.24 0.25 0.24 0.25 0.24 0.25 0.24 0.25 0.24 0.25 0.24 0.25 0.24 0.24 0.25 0.24 0.25 0.24 0.25 0.24 0.25 0.24 0.25 0.25 0.24 0.25	Page 62
In 00546 @ 2016 HydroCAD Software Solutions LLC         F           Subcatchment 200S: P2           Hydrograph           0.36         0.34         0.356         Type III 24-hr         Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Colspan="2"         Colspan="2"          Colspan="2"	Page 62
drocAD® 10.00-18 s/n 00546 @ 2016 HydroCAD Software Solutions LLC F Subcatchment 200S: P2 Hydrograph 0.36 0.34 0.32 0.3 0.38 0.28 0.28 0.28 0.22 0.2 0.2 0.2 0.3 0.4 0.36 0.36 0.34 0.36 0.36 0.36 0.37 0.30 0.33 cfs 10-YEAR Rainfall=5.14" Runoff Area=18,522 sf Runoff Depth>0.99"	Page 62
drocAD® 10.00-18 s/n 00546 @ 2016 HydroCAD Software Solutions LLC Subcatchment 200S: P2 Hydrograph 0.36 0.34 0.32 0.3 0.38 0.28 0.28 0.28 0.24 0.22 0.2 0.3 0.4 0.36 0.34 0.36 0.34 0.36 0.34 0.32 0.3 0.32 0.3 0.4 0.32 0.3 0.32 0.3 0.32 0.3 0.32 0.3 0.32 0.3 0.32 0.3 0.32 0.3 0.32 0.3 0.32 0.3 0.32 0.3 0.32 0.3 0.32 0.3 0.32 0.3 0.32 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	Page 62
drocAD® 10.00-18 s/n 00546 @ 2016 HydroCAD Software Solutions LLC       F         Subcatchment 200S: P2         Hydrograph         0.36       0.34         0.34       0.33         0.34       0.34         0.34       0.33         0.34       0.34         0.34       0.34         0.34       0.34         0.34       0.34         0.32       0.34         0.34       0.34         0.32       0.34         0.34       0.34         0.34       0.34         0.34       0.34         0.34       0.34         0.34       0.34         0.34       0.34         0.34       0.34         0.34       0.34         0.32       0.34         0.32       0.34         0.34       0.34         0.32       0.34         0.32       0.34         0.32       0.34         0.32       0.34         0.32       0.34         0.32       0.34         0.32       0.34         0.32       0.34 <td>Page 62</td>	Page 62
drocAD® 10.00-18 s/n 00546 @ 2016 HydroCAD Software Solutions LLC       F         Subcatchment 200S: P2         Hydrograph         0.36       0.34         0.34       0.33         0.34       0.34         0.34       0.33         0.34       0.34         0.34       0.34         0.34       0.34         0.34       0.34         0.32       0.34         0.34       0.34         0.32       0.34         0.34       0.34         0.34       0.34         0.34       0.34         0.34       0.34         0.34       0.34         0.34       0.34         0.34       0.34         0.34       0.34         0.32       0.34         0.32       0.34         0.34       0.34         0.32       0.34         0.32       0.34         0.32       0.34         0.32       0.34         0.32       0.34         0.32       0.34         0.32       0.34         0.32       0.34 <td>Page 62</td>	Page 62
In constant with a constant	Page 62
drocAD® 10.00-18 s/n 00546 @ 2016 HydroCAD Software Solutions LLC       F         Subcatchment 200S: P2         Hydrograph         0.36       0.34         0.34       0.33 ds         0.36       Type III 24-hr         0.37       10-YEAR Rainfall=5.14"         0.38       Runoff Area=18,522 sf         0.24       Runoff Depth>0.99"         0.37       Flow Length=222'         0.38       Tc=17.3 min         0.18       CN=56	Page 62
Image: Subcatchment 200S: P2         Hydrograph           0.36         0.34         0.36         Type III 24-hr           0.36         0.34         0.33 ds         Type III 24-hr           0.36         0.34         0.33 ds         Type III 24-hr           0.36         0.34         0.36         Type III 24-hr           0.36         0.34         0.36         Type III 24-hr           0.37         0.38         Runoff Area=18,522 sf         Runoff Volume=0.035 af           0.28         0.38         Runoff Depth>0.99"         Flow Length=222'           0.18         0.14         CN=56         CN=56	Page 62
drocAD® 10.00-18 s/n 00546 @ 2016 HydroCAD Software Solutions LLC       F         Subcatchment 200S: P2         Hydrograph         0.36       0.34         0.34       0.33 ds         0.36       Type III 24-hr         0.37       10-YEAR Rainfall=5.14"         0.38       Runoff Area=18,522 sf         0.24       Runoff Depth>0.99"         0.37       Flow Length=222'         0.38       Tc=17.3 min         0.18       CN=56	Page 62

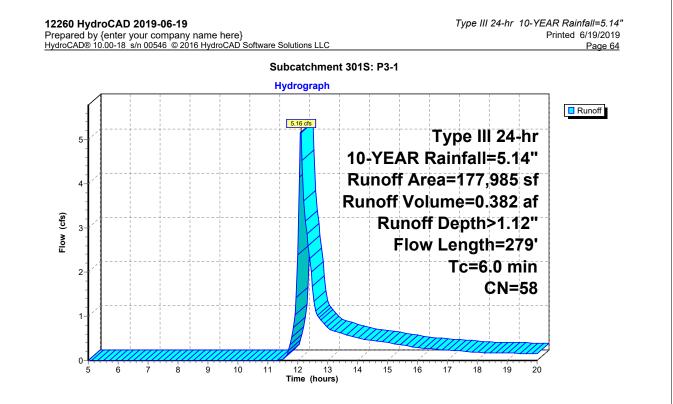
### Summary for Subcatchment 301S: P3-1

Runoff = 5.16 cfs @ 12.11 hrs, Volume= 0.382 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 10-YEAR Rainfall=5.14"

_	A	rea (sf)	CN	Description		
-		45,255	39	>75% Gras	s cover, Go	bod, HSG A
		39,144	98	Paved park	ing, HSG A	
		3,009	74	>75% Gras	s cover, Go	bod, HSG C
		59,632	30	Woods, Go	od, HSG A	
	8,798 70 Woods, Good, HSG C					
_	22,147 98 Roofs, HSG A				Э А	
	177,985 58 Weighted Average				verage	
		16,694			rvious Area	
		61,291		34.44% Im	pervious Ar	ea
	Tc (min)	Length (feet)	Slope (ft/ft)		Capacity (cfs)	Description
-	4.8	44	0.0600	0.15		Sheet Flow, Sheet Flow 50 Ft
	0.5	225	0.2500	8.05		Grass: Dense n= 0.240 P2= 3.20" Shallow Concentrated Flow, HILL
	0.5	235	0.2500	0.05		Unpaved Kv= 16.1 fps
_	0.7					Direct Entry, TO 6 MIN
-	6.0	270	Total			

6.0 279 Total



# Summary for Subcatchment 302S: P3-2

Runoff = 3.41 cfs @ 12.09 hrs, Volume= 0.233 af, Depth> 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr  $\,$  10-YEAR Rainfall=5.14"

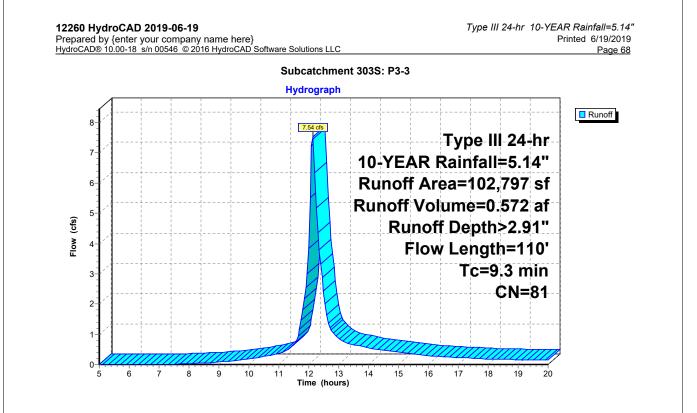
	Area (sf)	<u>CN</u>	Descripti		Cocil	8C A									
	11,056 29,451	39 98		ass cover, irking, HSC		36 A									
	40,507	82	Weighted	Average											
	11,056 29,451			Pervious Ar mpervious											
-	,	<b>C</b> 1		•											
Tc (min)	Length (feet)			y Capaci c) (cfs		cription									
5.2		0.050			She	et Flow,									
0.8							n= 0.240 DIRECT N								
6.0		Total			516	<b>-</b> nu <b>y</b> ,	DIREOT								
epar	ed by {e	nter vo	<b>019-06-1</b> ur compai 00546 ©2	iv name h	nere}	ware Solu	tions LLC					Type III	24-hr		<i>AR Rainfall=5.1</i> Printed 6/19/201 Page 6
epar	ed by {e	nter vo	ur compai	<b>9</b> ny name h 2016 Hydro(	nere} CAD Soft							Type III	24-hr		
epar	ed by {e	nter vo	ur compai	iv name h	nere} CAD Soft		tions LLC	nt 302S	: P3-2	2		Type III	24-hr		Printed 6/19/201
epar	ed by {e	nter vo	ur compai	iv name h	nere} CAD Soft	Subc		nt 302S	: P3-2	2		Type III	24-hr		Printed 6/19/201
epar	ed by {e	nter vo	ur compai	iv name h	nere}	Subc	atchmer	nt 302S	: P3-2	2		Type III	24-hr		Printed 6/19/201 Page 6
epar	ed by {e	nter vo	ur compai	iv name h	nere} CAD Soft	Subc Hyd	atchmer rograph	nt 302S	: P3-2	2		Type III	24-hr		Printed 6/19/201
epar	ed by {e	nter vo	ur compai	iv name h	nere} CAD Soft	Subc Hyd	atchmer	nt 302S	: P3-2	2					Printed 6/19/201 Page 6
epar	ed by {e	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph				Туј	be II	24	hr	Printed 6/19/201 Page 6
epar	ed by {e	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph					be II	24	hr	Printed 6/19/201 Page 6
epar	ed by {el AD® 10.00	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph	10-	YE	AR	Ty <sub>l</sub> Rair	pe II nfall	l 24 =5.1	-hr 4"	Printed 6/19/201 Page 6
epar	ed by {el AD® 10.00	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph	10- R	YE	AR off A	Tyj Rair Area	pe II 1fall =40	l 24 =5.1 507	-hr 4" sf	Printed 6/19/201 Page 6
repar	ed by {el AD® 10.00	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph	10- R	YE	AR off A	Ty <sub>l</sub> Rair	pe II 1fall =40	l 24 =5.1 507	-hr 4" sf	Printed 6/19/201 Page 6
repar	ed by {ei AD® 10.00	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph	10- R	YE	AR off A Vo	Tyj Rair Area Ium	pe II nfall =40 e=0	24 =5.1 507 233	-hr 4'' sf af	Printed 6/19/201 Page 6
repar	ed by {el AD® 10.00	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph	10- R	YE	AR off A Vo	Tyj Rair Area Ium ff De	pe II nfall =40 e=0	24 =5.1 507 233 >3.0	-hr 4'' sf af 00''	Printed 6/19/201 Page 6
epar	ed by {ei AD® 10.00	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph	10- R	YE	AR off A Vo	Tyj Rair Area Ium	pe II nfall =40 e=0	24 =5.1 507 233 >3.0	-hr 4'' sf af 00''	Printed 6/19/201 Page 6
repar	ed by {ei AD® 10.00	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph	10- R	YE	AR off A Vo Inol Flo	Tyj Rair Area Ium ff De	pe II Ifall =40 e=0 pth eng	l 24 =5.1 507 233 >3.0 th=4	-hr 4" sf af 0" 45'	Printed 6/19/201 Page 6
repar	ed by {ei AD® 10.00	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph	10- R	YE	AR off A Vo Inol Flo	Tyj Rain Ium If De bw L	pe II fall =40 e=0 pth eng =0.(	24 =5.1 507 233 >3.0 th=4 )500	-hr 4" sf af 00" 45'	Printed 6/19/201 Page 6
repar	ed by {ei AD® 10.00	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph	10- R	YE	AR off A Vo Inol Flo	Tyj Rain Ium If De bw L	pe II Ifall =40 e=0 pth eng	24 =5.1 507 233 >3.0 th=4 )500	-hr 4" sf af 00" 45'	Printed 6/19/201 Page 6
repar	ed by {ei AD® 10.00	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph	10- R	YE	AR off A Vo Inol Flo	Tyj Rain Ium If De bw L	pe II nfall =40, e=0, pth eng =0.( c=6	l 24 =5.1 507 233 >3.0 th=4 )500	-hr 4" sf af 0" 45' 17	Printed 6/19/201 Page 6
repar	ed by {ei AD® 10.00	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph	10- R	YE	AR off A Vo Inol Flo	Tyj Rain Ium If De bw L	pe II nfall =40, e=0, pth eng =0.( c=6	24 =5.1 507 233 >3.0 th=4 )500	-hr 4" sf af 0" 45' 17	Printed 6/19/201 Page 6
repar	ed by {ei AD® 10.00	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph	10- R	YE	AR off A Vo Inol Flo	Tyj Rain Ium If De bw L	pe II nfall =40, e=0, pth eng =0.( c=6	l 24 =5.1 507 233 >3.0 th=4 )500	-hr 4" sf af 0" 45' 17	Printed 6/19/201 Page 6
repar	ed by {ei AD® 10.00	nter vo	ur compai	iv name h	nere}	Subc Hyd	atchmer rograph	10- R	YE	AR off A Vo Inol Flo	Tyj Rain Ium If De bw L	pe II nfall =40, e=0, pth eng =0.( c=6	l 24 =5.1 507 233 >3.0 th=4 )500	-hr 4" sf af 0" 45' 17	Printed 6/19/201 Page 6
repar	ed by {ei AD® 10.00	nter vo	ur compai	iv name h	nere} CAD Soft	Subc Hyd	atchmer rograph	10- R Rur	YE	AR off A Vo Inol Flo	Tyj Rain Ium If De bw L	pe II nfall =40, e=0, pth eng =0.( c=6	l 24 =5.1 507 233 >3.0 th=4 )500	-hr 4" sf af 0" 45' 17	Printed 6/19/201 Page 6

### Summary for Subcatchment 303S: P3-3

Runoff = 7.54 cfs @ 12.13 hrs, Volume= 0.572 af, Depth> 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 10-YEAR Rainfall=5.14"

	Ar	ea (sf)	CN	Description							
		25,409		>75% Grass cover, Good, HSG A							
		11,002	74	>75% Grass cover, Good, HSG C							
	:	56,435	98	Paved parking, HSG A							
		9,951	98	Roofs, HSC	<u> </u>						
	1(	02,797	81	Weighted A	verage						
	:	36,411		35.42% Pe	rvious Area						
	(	66,386		64.58% Im	pervious Ar	ea					
	_				<b>.</b> .						
		Length	Slope			Description					
(r	nin)	(feet)	(ft/ft	) (ft/sec)	(cfs)						
	9.0	50	0.0460	0.09		Sheet Flow, Landscape Lawn					
						Grass: Bermuda n= 0.410 P2= 3.20"					
	0.3	60	0.0200	) 2.87		Shallow Concentrated Flow,					
						Paved Kv= 20.3 fps					
	9.3	110	Total								



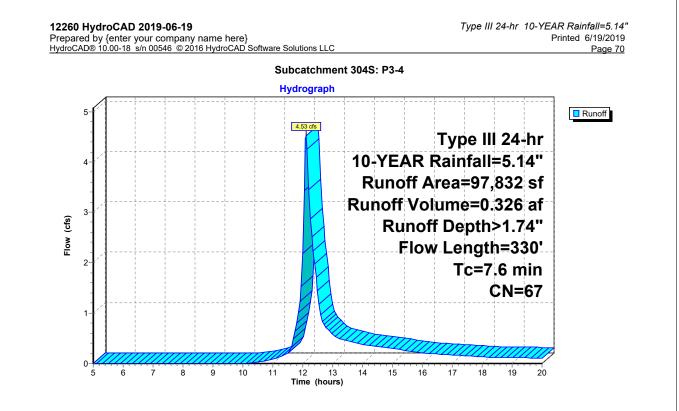
### Summary for Subcatchment 304S: P3-4

Runoff = 4.53 cfs @ 12.12 hrs, Volume= 0.326 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 10-YEAR Rainfall=5.14"

A	Area (sf)	CN	Description		
	45,107	39	>75% Gras	s cover, Go	bod, HSG A
	16,631	74	>75% Gras	s cover, Go	ood, HSG C
	36,094	98	Paved park	ing, HSG A	A
	97,832	67	Weighted A	verage	
	61,738		63.11% Pe	rvious Area	
	36,094		36.89% Im	pervious Ar	ea
Tc	Length	Slope	e Velocity	Capacity	Description
(min)	(feet)	(ft/ft	(ft/sec)	(cfs)	
6.2	50	0.0400	0.13		Sheet Flow, Sheet Flow 50 Ft
					Grass: Dense n= 0.240 P2= 3.20"
1.4	280	0.0420	3.30		Shallow Concentrated Flow, Shallow Flow
					Unpaved Kv= 16.1 fps

7.6 330 Total



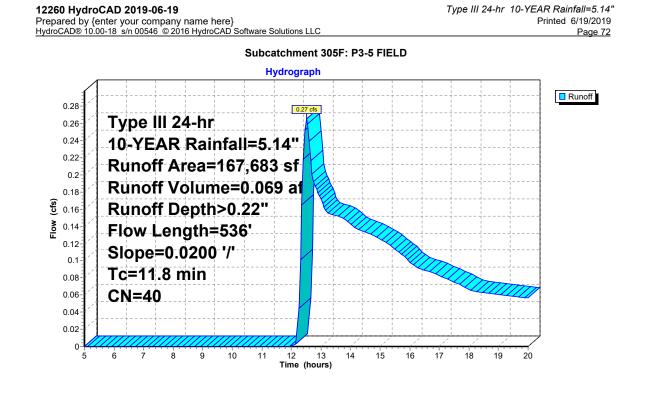
Summary	for	Subcatchment	305F:	P3-5	FIEL	D.
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Runoff = 0.27 cfs @ 12.51 hrs, Volume= 0.069 af, Depth> 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 10-YEAR Rainfall=5.14"  $\,$ 

Ai	rea (sf)	CN	Description		
1	64,925	39	>75% Gras	s cover, Go	ood, HSG A
	2,758	98	Paved park	ting, HSG A	х
1	67,683	40	Weighted A	verage	
1	64,925		98.36% Pe	rvious Area	
	2,758		1.64% Imp	ervious Are	a
Tc	Length	Slope	<ul> <li>Velocity</li> </ul>	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
8.2	50	0.0200	0.10		Sheet Flow, Sheet Flow 50 Ft
					Grass: Dense n= 0.240 P2= 3.20"
3.6	486	0.0200	2.28		Shallow Concentrated Flow, Shallow Flow
					Unpaved Kv= 16.1 fps
110	E26	Tatal			





# Summary for Subcatchment 305P: P3-5 PAV

Runoff = 1.35 cfs @ 12.09 hrs, Volume= 0.104 af, Depth> 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr  $\,$  10-YEAR Rainfall=5.14"

11,975	Paved parking, HSG A 100.00% Impervious Ar	~~~				
	100.00 % Impervious Ai	ea				
Tc Length Slope (min) (feet) (ft/ft	e Velocity Capacity ) (ft/sec) (cfs)	Description				
6.0		Direct Entry, DIRECT				
			205D: D2 5 DA			
		Subcatchment Hydrograph	305P: P3-5 PA	4 V		
					Runoff	
		1.35 cfs			Kunoli	
				Type III 24-hr ainfall=5.14"		
				ea=11,973 sf		
	1-**		1 I I I	ume=0.104 af		
	(class			Depth>4.55"		
	Flow (cfs)			Tc=6.0 min		
				CN=98		
			1000000			
	0 5 6 7 8	9 10 11 12 13	14 15 16	17 18 19 20	×	
		Time (hours	)			
				Туре	ə III 24-hr 10-`	YEAR Rainfall=5.14"
Prepared by {enter you	r company name here	} Software Solutions LLC		Туре	e III 24-hr 10-`	Printed 6/19/2019
Prepared by {enter you	r company name here	Software Solutions LLC			e III 24-hr 10-`	
Prepared by {enter you	r company name here	} Software Solutions LLC Summary for Reac	h 36": (new R		ə III 24-hr 10-`	Printed 6/19/2019
Prepared by {enter you HydroCAD® 10.00-18 s/n	r company name here 00546 © 2016 HydroCAE	Software Solutions LLC		each)	ə III 24-hr 10-`	Printed 6/19/2019
Prepared by {enter you <u>HydroCAD® 10.00-18 s/n (</u> Inflow Area = 8.786 Inflow = 11.17 (	r company name here 00546 © 2016 HydroCAE 6 ac, 27.67% Imperviou ofs @ 12.29 hrs, Volur	Summary for Reac s, Inflow Depth > 1.73' ne= 1.268 af	for 10-YEAR	each)	ə III 24-hr 10-`	Printed 6/19/2019
Prepared by {enter you <u>HydroCAD® 10.00-18 s/n (</u> Inflow Area = 8.786 Inflow = 11.17 (	r company name here 20546 © 2016 HydroCAE 3 ac, 27.67% Imperviou	Summary for Reac s, Inflow Depth > 1.73' ne= 1.268 af		each)	e III 24-hr 10-`	Printed 6/19/2019
Prepared by {enter you           HydroCAD® 10.00-18 s/n           Inflow Area =         8.786           Inflow =         11.17 c           Outflow =         10.95 c           Routing by Stor-Ind+Trar	r company name here 20546 © 2016 HydroCAE 3 ac, 27.67% Imperviou 5 @ 12.29 hrs, Volur 15 @ 12.39 hrs, Volur is method, Time Span=	Software Solutions LLC           Summary for Reac           s, Inflow Depth > 1.73'           ne=         1.268 af           ne=         1.260 af, Ai           5.00-20.00 hrs, dt= 0.05	for 10-YEAR tten= 2%, Lag= 6	each)	e III 24-hr 10-`	Printed 6/19/2019
Prepared by {enter you           HydroCAD® 10.00-18 s/n           Inflow Area =         8.786           Inflow =         11.17 c           Outflow =         10.95 c           Routing by Stor-Ind+Trar         Max. Velocity= 6.29 fps,	r company name here 20546 © 2016 HydroCAE 6 ac, 27.67% Imperviou 25 @ 12.29 hrs, Volur 25 @ 12.39 hrs, Volur 26 method, Time Span= Min. Travel Time= 3.1 r	Software Solutions LLC           Summary for Reac           s, Inflow Depth > 1.73'           ne= 1.268 af           ne= 1.260 af, A'           5.00-20.00 hrs, dt= 0.05           nin	for 10-YEAR tten= 2%, Lag= 6	each)	e III 24-hr 10-`	Printed 6/19/2019
Prepared by {enter you <u>HydroCAD® 10.00-18 s/n</u> Inflow Area = 8.786 Inflow = 11.17 c Outflow = 10.95 c Routing by Stor-Ind+Trar Max. Velocity= 6.29 fps, Avg. Velocity = 2.52 fps,	r company name here 20546 © 2016 HydroCAE 5 ac, 27.67% Imperviou cfs @ 12.29 hrs, Volur cfs @ 12.39 hrs, Volur is method, Time Span= Min. Travel Time= 3.1 r Avg. Travel Time= 7.7	Software Solutions LLC           Summary for Reac           s, Inflow Depth > 1.73'           ne= 1.268 af           ne= 1.260 af, A'           5.00-20.00 hrs, dt= 0.05           nin	for 10-YEAR tten= 2%, Lag= 6	each)	e III 24-hr 10-`	Printed 6/19/2019
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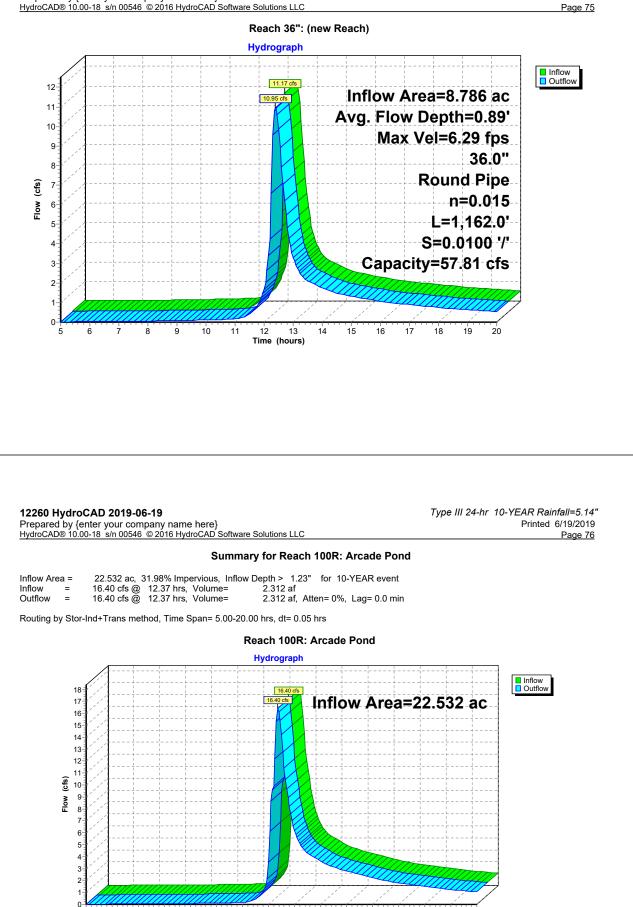
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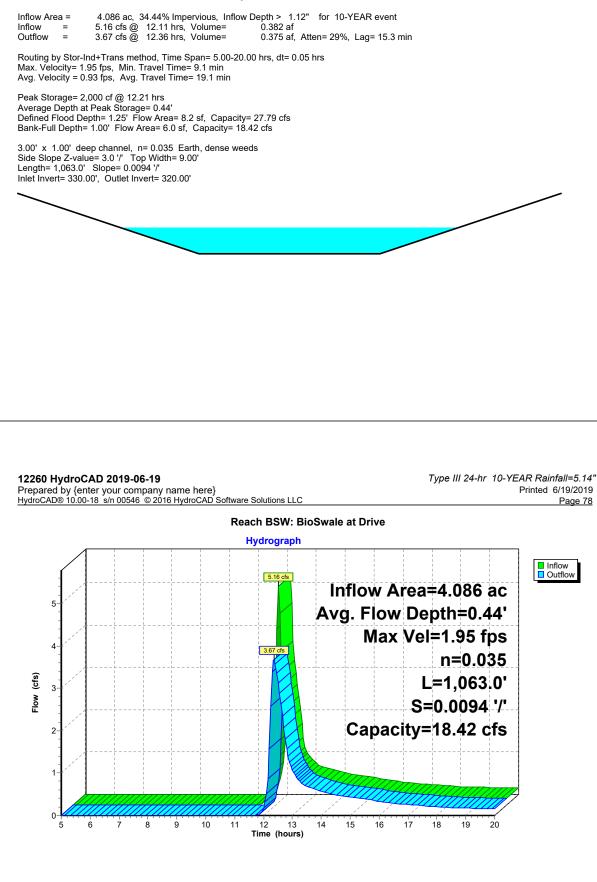
11

13 14 15 16 17 18 19 20

12 13 Time (hours)



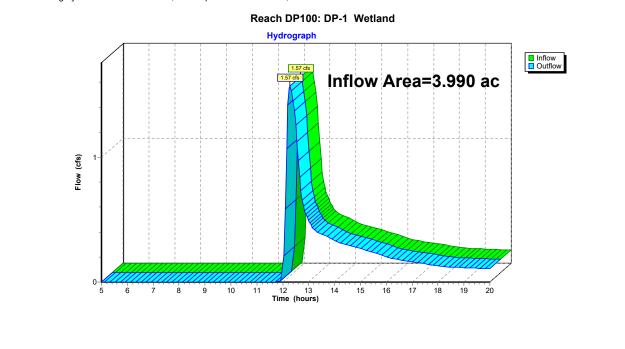
### Summary for Reach BSW: BioSwale at Drive



## Summary for Reach DP100: DP-1 Wetland

Inflow Area =	3.990 ac,	0.00% Impervious, Inflow D	epth > 0.60"	for 10-YEAR event
Inflow =	1.57 cfs @	12.27 hrs, Volume=	0.201 af	
Outflow =	1.57 cfs @	12.27 hrs, Volume=	0.201 af, Atte	en= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



### 12260 HydroCAD 2019-06-19 Prepared by {enter your company name here} HydroCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solutions LLC

Type III 24-hr 10-YEAR Rainfall=5.14" Printed 6/19/2019 Page 80

### Summary for Pond 217: BYPASS MH #217

Inflow Area =	5.291 ac, 44.57% Impervious, Inflow Depth > 1.51" for 10-YEAR event	
Inflow =	5.86 cfs @ 12.32 hrs, Volume= 0.667 af	
Outflow =	5.86 cfs @ 12.32 hrs, Volume= 0.667 af, Atten= 0%, Lag= 0.0 min	
Primary =	2.07 cfs @ 12.32 hrs, Volume= 0.508 af	
Secondary =	3.80 cfs @ 12.32 hrs, Volume= 0.159 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 317.35' @ 12.32 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	315.50'	8.0" Vert. Orifice/Grate C= 0.600
#2	Secondary	316.52'	24.0" Vert. Orifice/Grate C= 0.600

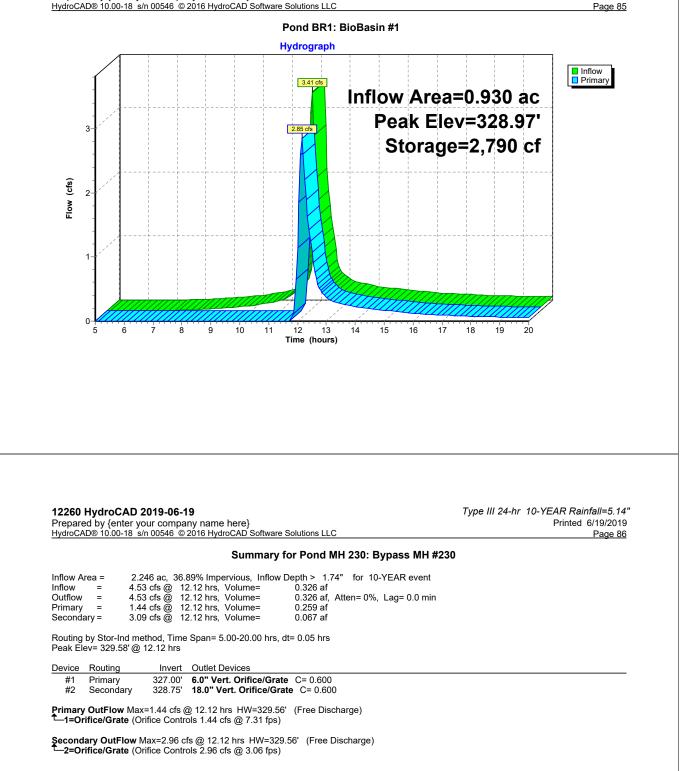
Primary OutFlow Max=2.06 cfs @ 12.32 hrs HW=317.34' (Free Discharge) 1=Orifice/Grate (Orifice Controls 2.06 cfs @ 5.91 fps)

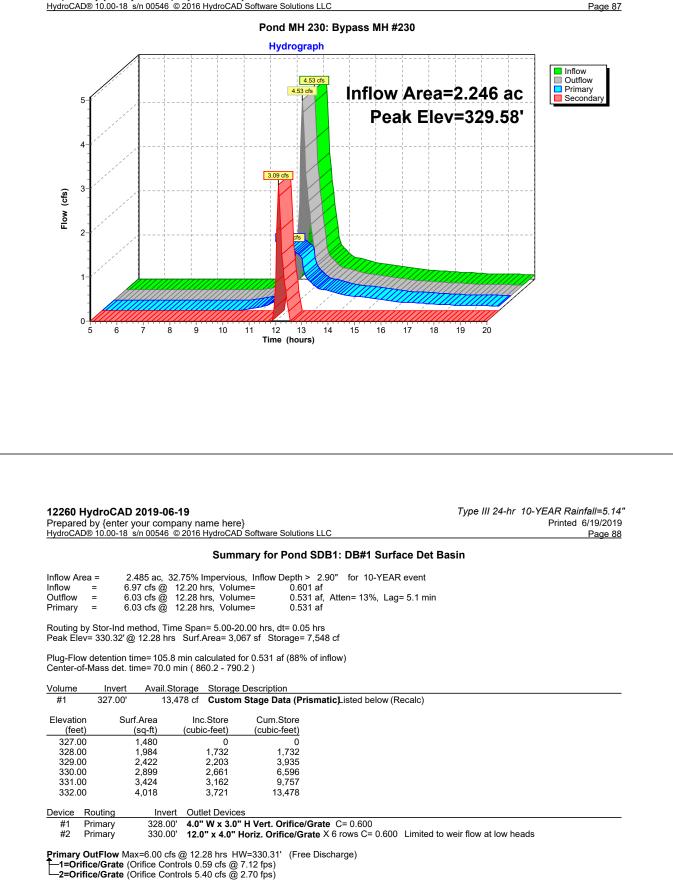
Secondary OutFlow Max=3.75 cfs @ 12.32 hrs HW=317.34' (Free Discharge) -2=Orifice/Grate (Orifice Controls 3.75 cfs @ 3.08 fps)

		Pond 217:	BYPASS MH #2'	17		
4		Hydrograp	h			
						Inflow
		5.86 5.86 cfs		A	E 204 -	<ul> <li>Outflow</li> <li>Primary</li> </ul>
				Area=	5.291 a	Secondary
6			🖌 🛛 Pea	ik Elev	=317.35	
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$\hat{\mathbf{a}}^{4}$		3.80 cfs				
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Prepared by {enter yo	ur company name	oCAD Software Solutions L			Type III 24-hr	
Prepared by {enter yo HydroCAD® 10.00-18 s/i	our company name n 00546 © 2016 Hydro	oCAD Software Solutions L	ond BIO2: BIBA		Type III 24-hr	Printed 6/19/2019
Prepared by {enter yo <u>HydroCAD® 10.00-18 s/r</u> nflow Area = 2.2- nflow = 1.44	ur company name n 00546 © 2016 Hydro 46 ac, 36.89% Imper 4 cfs @ 12.12 hrs. \	CAD Software Solutions L Summary for Periods (Construction) rvious, Inflow Depth > 1 Volume= 0.259 a	ond BIO2: BIBA 1.39" for 10-YEAF f	Revent	Type III 24-hr	Printed 6/19/2019
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Prepared by {enter yo <u>HydroCAD® 10.00-18 s/r</u> nflow Area = 2.2- nflow = 1.44 Dutflow = 0.85 Discarded = 0.15	ur company name n 00546 © 2016 Hydro 46 ac, 36.89% Impel cfs @ 12.12 hrs, \ cfs @ 12.63 hrs, \	CAD Software Solutions L Summary for Po rvious, Inflow Depth > 1 Volume= 0.259 a Volume= 0.210 a Volume= 0.130 a	ond BIO2: BIBA 1.39" for 10-YEAF f f, Atten= 38%, Lag f	Revent	Type III 24-hr	Printed 6/19/2019
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Prepared by {enter yo           tydroCAD® 10.00-18 s/r           nflow Area =         2.2           nflow =         1.44           Dutflow =         0.89           Discarded =         0.15           Primary =         0.70           Routing by Stor-Ind me           Peak Elev= 315.18' @ 7	46 ac, 36.89% Impe 46 ac, 36.89% Impe 46 ac, 12.12 hrs, V 46 ac, 12.12 hrs, V 46 ac, 12.63 hrs, V 47 ac, 12.6	Summary for Period           Summary for Period           rvious, Inflow Depth > 1           Volume=         0.259 a           Volume=         0.210 a           Volume=         0.210 a           Volume=         0.130 a           Volume=         0.081 a           00-20.00 hrs, dt=         0.05 hr           = 3,414 sf         Storage= 3,2	ond BIO2: BIBA 1.39" for 10-YEAF f f, Atten= 38%, Lag f f s 29 cf	Revent	Type III 24-hr	Printed 6/19/2019
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Prepared by {enter yo           tydroCAD® 10.00-18           http://www.sec.ac.ac.ac.ac.ac.ac.ac.ac.ac.ac.ac.ac.ac	Aff ac, 36.89% Imper 266 ac, 36.89% Imper 267 ac, 12.12 hrs, 1 267 ac, 12.23 hrs, 1 267 ac, 12.63 hrs, 1 267 ac, 12.63 hrs, 1 268 ac, 12.64 hrs, 1 268 ac, 12.64 hrs, 1 268 ac, 12.64 hrs, 1	Summary for Performance         Summary for Performance         rvious, Inflow Depth > 1         Volume=       0.259 a         Volume=       0.210 a         Volume=       0.130 a         Volume=       0.30 a         Volume=       0.081 a         00-20.00 hrs, dt= 0.05 hr         = 3,414 sf         Storage= 3,2         ated for 0.210 af (81% of - 834.7 )         rage Description         stom Stage Data (Prism	ond BIO2: BIBA 1.39" for 10-YEAF f f, Atten= 38%, Lag f f s 29 cf inflow)	R event = 31.0 min	Type III 24-hr	Printed 6/19/2019
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Prepared by {enter yo           tydroCAD® 10.00-18           hflow Area =         2.2           nflow =         1.44           Dutflow =         0.89           Discarded =         0.19           Primary =         0.70           Routing by Stor-Ind me         Peak Elev= 315.18' @ ^           Plug-Flow detention tim         Center-of-Mass det. tim           /olume         Invert           #1         314.00'           Elevation         Surf./	Afficiency and a second	Summary for Period           Summary for Period           rvious, Inflow Depth > 1           Volume=         0.259 a           Volume=         0.210 a           Volume=         0.210 a           Volume=         0.210 a           Volume=         0.081 a           00-20.00 hrs, dt= 0.05 hr           = 3,414 sf           Storage= 3,2           ated for 0.210 af (81% of - 834.7 )           rage Description           stom Stage Data (Prism           re         Cum.Store           att         (cubic-feet)           0         0	ond BIO2: BIBA 1.39" for 10-YEAF f f, Atten= 38%, Lag f f s 29 cf inflow)	R event = 31.0 min	Type III 24-hr	Printed 6/19/2019
Prepared by {enter yo           tydroCAD® 10.00-18           tydroCAD® 10.00-18           nflow         =           nflow         =           nflow         =           0.00-18         #           nflow         =           0.10         =           0.11         =           0.12         =           0.13         =           0.14         =           0.15         =           0.16         =           0.17         =           0.18         =           0.19         =           0.19         =           0.19         =           0.19         =           0.19         =           0.11         =           0.11         =           0.11         =           0.11         =           0.11         =           0.11         =           0.11         =           0.11         =           0.11         =           0.11         =           0.11         =           0.11         =	Area Inc.Stor (047) (0546 © 2016 Hydro (058 @ 12.12 hrs, V) (058 @ 12.63 hrs, V) (0	Summary for Period           Summary for Period           rvious, Inflow Depth > 1           Volume=         0.259 a           Volume=         0.210 a           Volume=         0.210 a           Volume=         0.130 a           Volume=         0.081 a           00-20.00 hrs, dt= 0.05 hr           = 3,414 sf           Storage= 3,2           ated for 0.210 af (81% of - 834.7 )           rage Description           stom Stage Data (Prism           re         Cum.Store           o         0           21         2,621	ond BIO2: BIBA 1.39" for 10-YEAF f f, Atten= 38%, Lag f f s 29 cf inflow)	R event = 31.0 min	Type III 24-hr	Printed 6/19/2019
Prepared by {enter yo           tydroCAD® 10.00-18           tydroCAD® 10.00-18           nflow =         2.2           nflow =         1.44           Dutflow =         0.89           Discarded =         0.19           Primary =         0.70           Routing by Stor-Ind me         2           Peak Elev= 315.18' @ '         2           Plug-Flow detention tim         2           Center-of-Mass det. tim         #1           /olume         Invert           #1         314.00'           Elevation         Surf.//           (feet)         (s           314.00         2           315.00         3           316.00         4	Area Inc.Stor (1944) (1954)	Summary for Period           Summary for Period           rvious, Inflow Depth > 1           Volume=         0.259 a           Volume=         0.210 a           Volume=         0.210 a           Volume=         0.210 a           Volume=         0.081 a           00-20.00 hrs, dt= 0.05 hr           = 3,414 sf           Storage= 3,2           ated for 0.210 af (81% of - 834.7 )           rage Description           stom Stage Data (Prism           re         Cum.Store           (cubic-feet)         0           0         0           21         2,621           21         6,412           evices	ond BIO2: BIBA 1.39" for 10-YEAF f, Atten= 38%, Lag f f ss 29 cf inflow) haticListed below (R	R event = 31.0 min Recalc)		Printed 6/19/2019 Page 82
Prepared by {enter yo           tydroCAD® 10.00-18           tydroCAD® 10.00-18           nflow =         1.44           Discarded =         0.15           Discarded =         0.16           Primary =         0.70           Routing by Stor-Ind me         Peak Elev= 315.18' @ ^           Plug-Flow detention tim         Center-of-Mass det. tim           /olume         Invert           #1         314.00'           Elevation         Surf./           (feet)         (s           314.00         2           315.00         3           316.00         4	Aff ac, 36.89% Imper a 00546 © 2016 Hydro 46 ac, 36.89% Imper cfs @ 12.12 hrs, V o cfs @ 12.63 hrs, V 0 cfs @ 12.63 hrs, V 0 cfs @ 12.63 hrs, V thod, Time Span= 5. 12.63 hrs Surf.Area: are=109.0 min calculate are=55.8 min ( 890.4 - <u>Avail.Storage Storestorestorestorestorestorestorestores</u>	Summary for Period           Summary for Period           rvious, Inflow Depth > 1           Volume=         0.259 a           volume=         0.210 a           volume=         0.210 a           volume=         0.130 a           volume=         0.081 a           00-20.00 hrs, dt= 0.05 hr           = 3,414 sf           Storage= 3,2           ated for 0.210 af (81% of - 834.7 )           rage Description           stom Stage Data (Prism           re         Cum.Store           att 2,621           att 2,621	ond BIO2: BIBA 1.39" for 10-YEAF f, Atten= 38%, Lag f f 29 cf inflow) hatic]_isted below (R X 6.00 columnsX 6	R event = 31.0 min Recalc)		Printed 6/19/2019 Page 82
nflow Area =       2.2         nflow =       1.44         Dutflow =       0.85         Discarded =       0.19         Primary =       0.70         Routing by Stor-Ind me         Peak Elev=       315.18'@'         Plug-Flow detention tim         Center-of-Mass det. tim         Volume       Invert         #1       314.00'         Elevation       Surf.J         (feet)       (s         314.00       2         316.00       4         Device       Routing         #1       Primary	Affective company name <u>n 00546 © 2016 Hydro</u> 46 ac, 36.89% Imper- t ofs @ 12.12 hrs, V 0 cfs @ 12.63 hrs, V 0 cfs @ 12.63 hrs, V 0 cfs @ 12.63 hrs, V 12.63 hrs Surf.Area- thod, Time Span= 5.1 12.63 hrs Surf.Area- the= 109.0 min calcula alter to the span set of the span set	Summary for Period           Summary for Period           rvious, Inflow Depth > 1           Volume=         0.259 a           Volume=         0.210 a           Volume=         0.210 a           Volume=         0.130 a           Volume=         0.081 a           00-20.00 hrs, dt= 0.05 hr           = 3,414 sf           Storage= 3,2           ated for 0.210 af (81% of - 834.7 )           rage Description           stom Stage Data (Prism           re         Cum.Store           (cubic-feet)         0           0         0           21         2,621           21         6,412           evices         0" Horiz. Orifice/Grate 2	ond BIO2: BIBA 1.39" for 10-YEAF f f, Atten= 38%, Lag f f 29 cf inflow) hatic].isted below (R K 6.00 columns X 6 izontal area	R event = 31.0 min Recalc)	0 Limited to we	Printed 6/19/2019 Page 82
Prepared by {enter yo           HydroCAD® 10.00-18 s/m           Inflow Area =         2.2           Inflow =         1.44           Dutflow =         0.89           Discarded =         0.19           Primary =         0.70           Routing by Stor-Ind me         Peak Elev= 315.18' @ -7           Plug-Flow detention tim         Center-of-Mass det. tim           /olume         Invert           #1         314.00'           Elevation         Surf./ (feet)           (feet)         (s           314.00         2           315.00         3           316.00         4           Device         Routing           #1         Primary           #2         Discarded           #3         Primary	Affective and a set of the set of	Summary for Period           Summary for Period           rvious, Inflow Depth > 1           Volume=         0.259 a           volume=         0.210 a           volume=         0.210 a           volume=         0.30 a           volume=         0.30 a           volume=         0.081 a           00-20.00 hrs, dt= 0.05 hr           = 3,414 sf Storage= 3,2           ated for 0.210 af (81% of - 834.7 )           rage Description           stom Stage Data (Prism           re         Cum.Store           (cubic-feet)         0           0         0           21         2,621           21         2,621           21         6,412           evices         0'' Horiz. Orifice/Grate X           0'' Horiz. Orifice/Grate X 0.43           'hrs HW=315.18' (Free	ond BIO2: BIBA: 1.39" for 10-YEAF f, Atten= 38%, Lag f s 29 cf inflow) haticListed below (R K 6.00 columnsX 6 izontal area 3 C= 0.600 Limited	R event = 31.0 min Recalc)	0 Limited to we	Printed 6/19/2019 Page 82

-3=Orifice/Grate (Weir Controls 0.70 cfs @ 0.60 fps)

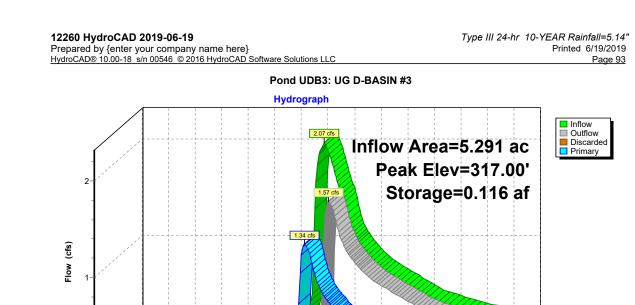
		Pond BIO2: Hydrograph	BIBASIN 3-2		
Flow (cfs)		0.89 cfs	Peak E	ea=2.246 a lev=315.18 ge=3,229 c	3'
	7 8 9 10	11 12 13 14 Time (hours)	15 16 17	18 19 20	7
12260 HydroCAD Prepared by {enter \	our company name here	}		Type III 24-hr	10-YEAR Rainfall=5.14 Printed 6/19/2019
Prepared by (enter )	/our company name here} s/n 00546 © 2016 HydroCAD	Software Solutions LLC	1 BP1: BioBasin #4		10-YEAR Rainfall=5.14 Printed 6/19/2019 Page 84
Prepared by {enter y HydroCAD® 10.00-18 s Inflow Area = 0. Inflow = 3.4 Outflow = 2.4	/our company name here} s/n 00546 © 2016 HydroCAD	Software Solutions LLC           Summary for Ponces, Inflow Depth > 3.00'           ne=         0.233 af           ne=         0.188 af, A'			Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18 s Inflow Area = 0. Inflow = 3.4 Outflow = 2.4 Primary = 2.4 Routing by Stor-Ind m	your company name here} s/n 00546 © 2016 HydroCAD 930 ac, 72.71% Impervious 41 cfs @ 12.09 hrs, Volum 85 cfs @ 12.15 hrs, Volum	Software Solutions LLC           Summary for Ponce           s, Inflow Depth > 3.00'           ne=         0.233 af           ne=         0.188 af, Ai           ne=         0.188 af           0.00 hrs, dt=         0.05 hrs	" for 10-YEAR event tten= 16%, Lag= 3.6 m		Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18 s Inflow Area = 0. Inflow = 3.4 Outflow = 2.4 Primary = 2.4 Routing by Stor-Ind m Peak Elev= 328.97' @ Plug-Flow detention ti	your company name here} s/n 00546 © 2016 HydroCAD 930 ac, 72.71% Impervious 41 cfs @ 12.09 hrs, Volum 55 cfs @ 12.15 hrs, Volum 85 cfs @ 12.15 hrs, Volum ethod, Time Span= 5.00-20	Software Solutions LLC           Summary for Ponce           s, Inflow Depth > 3.00'           ne=         0.233 af           ne=         0.188 af, A'           ne=         0.188 af           0.00 hrs, dt=         0.05 hrs           37 sf         Storage=         2,790 c           r         0.188 af         (81% of inflow)	" for 10-YEAR event tten= 16%, Lag= 3.6 m f		Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18 s Inflow Area = 0. Inflow = 3.4 Outflow = 2.4 Primary = 2.4 Routing by Stor-Ind m Peak Elev= 328.97'@ Plug-Flow detention ti Center-of-Mass det. ti Volume Invert	your company name here) <u>s/n 00546 © 2016 HydroCAD</u> 930 ac, 72.71% Impervious 41 cfs @ 12.09 hrs, Volum 55 cfs @ 12.15 hrs, Volum 55 cfs @ 12.15 hrs, Volum 12.15 hrs, Surf.Area= 2,13 me=85.3 min calculated for me=35.0 min (816.5 - 781. Avail.Storage Storage I	Software Solutions LLC           Summary for Ponce           s, Inflow Depth > 3.00'           ne=         0.233 af           ne=         0.188 af, A'           ne=         0.188 af, A'           0.00 hrs, dt= 0.05 hrs         37 sf           37 sf         Storage= 2,790 c           r 0.188 af (81% of inflow         5)           Description         Description	" for 10-YEAR event tten= 16%, Lag= 3.6 m f /)		Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18 st Inflow Area = 0. Inflow = 3.4 Outflow = 2.4 Primary = 2.4 Routing by Stor-Ind m Peak Elev= 328.97' @ Plug-Flow detention ti Center-of-Mass det. ti <u>Volume Invert</u> #1 327.00'	your company name here) <u>s/n 00546 © 2016 HydroCAD</u> 930 ac, 72.71% Impervious 41 cfs @ 12.09 hrs, Volum 55 cfs @ 12.15 hrs, Volum 55 cfs @ 12.15 hrs, Volum 12.15 hrs, Surf.Area= 2,13 me=85.3 min calculated for me=35.0 min (816.5 - 781. Avail.Storage Storage I	Software Solutions LLC           Summary for Ponce           s, Inflow Depth > 3.00'           ne=         0.233 af           ne=         0.188 af, Ai           ne=         0.188 af           0.00 hrs, dt=         0.05 hrs           37 sf         Storage=         2,790 c           r         0.188 af         (81% of inflow           5         )         (81% of inflow	" for 10-YEAR event tten= 16%, Lag= 3.6 m f /)		Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18 s Inflow Area = 0. Inflow = 3. Outflow = 2.8 Primary = 2.8 Routing by Stor-Ind m Peak Elev= 328.97' @ Plug-Flow detention ti Center-of-Mass det. ti Volume Invert #1 327.00' Elevation Sur	your company name here) <u>s/n 00546</u> © 2016 HydroCAD 930 ac, 72.71% Impervious 41 cfs @ 12.09 hrs, Volum 85 cfs @ 12.15 hrs, Volum 85 cfs @ 12.15 hrs, Volum 12.15 hrs, Volum 13.15 hrs, Volum 13.15 hrs, Volum 13.15 hrs, Volum 13.15 hrs, Volum 13.15 hrs, Volum 13.15 hrs, Volum 14.15 hrs, Volum 14.15 hrs, Volum 15.15 hrs, V	Software Solutions LLC           Summary for Ponce           s, Inflow Depth > 3.00'           ne=         0.233 af           ne=         0.188 af, Ai           ne=         0.188 af           0.00 hrs, dt=         0.05 hrs           37 sf         Storage=         2,790 c           r         0.188 af         (81% of inflow           5         )         Description           Stage Data (Prismatic)         1000000000000000000000000000000000000	" for 10-YEAR event tten= 16%, Lag= 3.6 m f /)		Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18 s Inflow Area = 0. Inflow = 3.4 Outflow = 2.4 Routing by Stor-Ind m Peak Elev= 328.97' @ Plug-Flow detention ti Center-of-Mass det. ti Volume Invert #1 327.00	your company name here) <u>s/n 00546</u> © 2016 HydroCAD 930 ac, 72.71% Impervious 41 cfs @ 12.09 hrs, Volum 35 cfs @ 12.15 hrs, Volum 35 cfs @ 12.15 hrs, Volum 12.15 hrs Surf.Area= 2,12 me= 85.3 min calculated for me= 85.3 min calculated for me= 85.3 min calculated for me= 85.0 min ( 816.5 - 781. <u>Avail.Storage Storage I</u> 5,450 cf <b>Custom</b> f.Area Inc.Store (sq-ft) (cubic-feet)	Software Solutions LLC           Summary for Ponce           s, Inflow Depth > 3.00'           ne=         0.233 af           ne=         0.188 af, Ai           ne=         0.188 af, Ai           0.00 hrs, dt= 0.05 hrs         37 sf           37 sf         Storage= 2,790 cf           0.188 af (81% of inflow         5)           Description         Stage Data (Prismatic           Cum.Store         (cubic-feet)	" for 10-YEAR event tten= 16%, Lag= 3.6 m f /)		Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18 s Inflow Area = 0. Inflow = 3.4 Outflow = 2.8 Primary = 2.8 Routing by Stor-Ind m Peak Elev= 328.97' @ Plug-Flow detention ti Center-of-Mass det. ti Volume Invert #1 327.00' Elevation Sur (feet) 327.00 328.00 329.00	your company name here) <u>s/n 00546</u> © 2016 HydroCAD 930 ac, 72.71% Impervious 41 cfs @ 12.09 hrs, Volum 55 cfs @ 12.15 hrs, Volum 55 cfs @ 12.15 hrs, Volum 12.15 hrs Surf.Area= 2,12 me=85.3 min calculated for me=35.0 min (816.5 - 781. <u>Avail.Storage Storage I</u> 5,450 cf <b>Custom</b> f.Area Inc.Store (sq-ft) (cubic-feet) 888 0 1,328 1,108 2,162 1,745 3,032 2,597 <u>Invert Outlet Devices</u> 329.00' <b>2.0" x 2.0" Ho</b>	Software Solutions LLC           Summary for Ponce           s, Inflow Depth > 3.00'           ne=         0.233 af           ne=         0.188 af           0.00 hrs, dt= 0.05 hrs           37 sf Storage= 2,790 c           r 0.188 af (81% of inflow           0.00 hrs, dt= 0.05 hrs           37 sf Storage= 2,790 c           r 0.188 af (81% of inflow           5.)           Description           Stage Data (Prismatic           Cum.Store           (cubc-feet)           0           1,108           2,853           5,450	" for 10-YEAR event tten= 16%, Lag= 3.6 m of (/) c) isted below (Recalc)	in = 0.600 Limited to we	Printed 6/19/2019 Page 84





	4			Pond	Hydrogra	B#1 Surf aph	ace Det	Basin	1				-	
Flow (cfs)	7- 6- 5- 4-				6.03 ds			Are ak E cora	lev	=33	30.3	82'		Inflow Primary
	2-												-	
	0 5 6	7 8	9	10 11	12 Time (ho	13 14	15	16	- <u>(</u>	18	- í · · · 19	20		
	HydroCAD									Type II.	I 24-hr	10-YE		infall=5.14
Prepare	HydroCAD ed by {enter y AD® 10.00-18 s	our company	y name he	AD Softwa						Type II.	l 24-hr	10-YE		<i>infall=5.14</i> 6/19/2019 Page 9(
Prepare HydroCA	ed by {enter y AD® 10.00-18 s	our company /n 00546 ©20	y name he )16 HydroC	AD Softwa	mary for	Pond UD				Type II.	l 24-hr	10-YE		6/19/2019
Prepare	ed by {enter y AD® 10.00-18 s vrea = 2.3 = 7.5 = 0.8	our company	y name he 016 HydroC 3% Impervi 13 hrs, Vo 05 hrs, Vo	AD Softwa Sum ious, Inflo lume= lume=	w Depth > 0.572	Pond UD 2.91" for af af, Atten=3	10-YEAR	R event		Type II	l 24-hr	10-YE		6/19/2019
Prepare HydroCA	ed by {enter y AD® 10.00-18 s vrea = 2.3 = 7.5 = 0.8	our company /n 00546 © 20 360 ac, 64.58 i4 cfs @ 12.1 i3 cfs @ 13.0 i3 cfs @ 13.0 ethod, Time S	y name he <u>016 HydroC</u> 3% Impervi 13 hrs, Vc 05 hrs, Vc 05 hrs, Vc Span= 5.00	AD Softwa Sum ious, Inflo lume= lume= lume= )-20.00 hr	w Depth > 0.572 : 0.450 : 0.450 : 0.450 : s, dt= 0.05 h	Pond UD 2.91" for af af, Atten= a af	10-YEAR	R event		Type II	I 24-hr	10-YE		6/19/2019
Prepare HydroCA Inflow A Inflow Outflow Primary Routing Peak Ele Plug-Flc	ed by {enter y AD® 10.00-18 s vrea = 2.3 = 7.5 = 0.8 = 0.8 by Stor-Ind mo	our company /n 00546 © 20 360 ac, 64.58 /4 cfs @ 12. /3 cfs @ 13.0 /3 cfs @ 13.0 /13.05 hrs S me=201.6 mir	y name he 016 HydroC 8% Impervi 13 hrs, Vo 05 hrs, Vo	CAD Softwar Sum ious, Inflo lume= lume= lume= 0-20.00 hr 0.303 ac d for 0.44	w Depth > 0.572 : 0.450 : 0.450 : 0.450 : s, dt= 0.05 h Storage= 0.	Pond UD 2.91" for af af, Atten= af 	10-YEAR	R event		Type II	I 24-hr	10-YE		6/19/2019
Prepare HydroCA Inflow A Inflow Outflow Primary Routing Peak Ele Plug-Flc	ed by {enter y AD® 10.00-18 s AD® = 2.: = 7.5 = 0.8 = 0.8 by Stor-Ind m lev= 315.58'@ bow detention tin of-Mass det. tin	our company /n 00546 © 20 360 ac, 64.58 4 cfs @ 12. 3 cfs @ 13.0 3 cfs @ 13.0 13.05 hrs S ne=201.6 mir ne= 147.5 mir <u>Avail.Storag</u> 0.233 a	y name he <u>116 HydroC</u> 3% Impervi 13 hrs, Vc 05 hrs, Vc 05 hrs, Vc 05 hrs, Vc 05 hrs, Vc 05 ans, Vc 05 an	AD Softwa Sum ious, Inflo ilume= ilume= ilume= 0-20.00 hr 0.303 ac d for 0.44 786.4 ) e Descrip W x 160.2 af Overall StormTec y Size= 4	Immary for           0.572           0.450           0.450           0.450           s, dt= 0.05 h           Storage= 0.           8 af (78% of           tion           16'L x 3.50'H           - 0.394 af E           h: SC-740 +           44.6''W x 30.	Pond UD 2.91" for af af, Atten= a af .315 af f inflow) H Field A mbedded = Capx 374 .0"H => 6.4	10-YEAR 89%, Lag 0.665 af Inside #1 5 sf x 7.12	R event = 54.9 n x 35.0% 2'L = 45.	nin 6 Voids .9 cf	Type II	I 24-hr	10-Y		6/19/2019
Prepare HydroCA Inflow A Inflow Outflow Primary Routing Peak Ele Plug-Flc Center-c Volume #1A	ed by {enter y AD® 10.00-18 s = 2.3 = 7.5 = 0.8 = 0.8 by Stor-Ind m. lev= 315.58'@ by detention tin of-Mass det. tin Invert 314.00'	our company /n 00546 © 20 360 ac, 64.58 4 cfs @ 12.1 3 cfs @ 13.0 3 cfs @ 13.0 13.05 hrs S me=201.6 mir ne=147.5 mir <u>Avail.Storag</u> 0.233 a 0.394 a	y name he <u>116 HydroC</u> 3% Impervi 13 hrs, Vc 05 hrs, Vc 05 brs, Vc 05 pars 5.00 urf.Area= 1 n calculate n ( 933.9 - <u>e Storag</u> 1.059 a af <b>ADS_5</b> Effectin Overal 17 Rov	AD Softwa Suma ious, Inflo ioume=	Immary for           0.572 :           0.450 :           0.450 :           0.450 :           0.450 :           s, dt= 0.05 h           Storage= 0.           8 af (78% of           tion           16'L x 3.50'h           - 0.394 af E           th SC-W4 +           14.6''W x 30.0           Chambers	Pond UD 2.91" for af af, Atten= a af .315 af f inflow) H Field A mbedded = Capx 374 .0"H => 6.4	10-YEAR 89%, Lag 0.665 af Inside #1 5 sf x 7.12	R event = 54.9 n x 35.0% 2'L = 45.	nin 6 Voids .9 cf	Type II	I 24-hr	10-YE		6/19/2019
Prepare HydroCA Inflow A Inflow Outflow Primary Routing Peak Ele Plug-Flc Center-c Volume #1A #2A	ed by {enter y AD® 10.00-18 s = 2.3 = 7.5 = 0.8 = 0.8 by Stor-Ind m. lev= 315.58'@ by detention tin of-Mass det. tin Invert 314.00'	our company /n 00546 © 20 360 ac, 64.58 4 cfs @ 12.1 3 cfs @ 13.0 ethod, Time S 13.05 hrs S ne=201.6 mir ne=147.5 mir Avail.Storag 0.233 a 0.394 a	y name he <u>116 HydroC</u> 3% Impervit 13 hrs, Vc 05 h	AD Softwa Sum ious, Inflo lume= lume= lume= lume= 0.20.00 hr 0.303 ac d for 0.44 786.4 ) e Descrip W x 160.2 af Overall StormTec ye Size= 2 V sof 22 C vvailable S	Immary for           0.572 :           0.450 :           0.450 :           0.450 :           0.450 :           s, dt= 0.05 h           Storage= 0.           8 af (78% of           tion           16'L x 3.50'h           - 0.394 af E           th SC-W4 +           14.6''W x 30.0           Chambers	Pond UD 2.91" for af af, Atten= a af .315 af f inflow) H Field A mbedded = Capx 374 .0"H => 6.4	10-YEAR 89%, Lag 0.665 af Inside #1 5 sf x 7.12	R event = 54.9 n x 35.0% 2'L = 45.	nin 6 Voids .9 cf	Type II	l 24-hr	10-YE		6/19/2019
Prepare HydroCA Inflow A Inflow Outflow Primary Routing Peak Ele Plug-Flc Center-co Volume #1A #2A	ed by {enter y AD® 10.00-18 s = 7.5 = 7.5 = 0.8 by Stor-Ind me ev= 315.58'@ bw detention ti of-Mass det. tin <u>Invert</u> 314.00' 314.50'	our company /n 00546 © 20 360 ac, 64.58 4 cfs @ 12.1 3 cfs @ 13.0 13.05 hrs S ne=201.6 mir ne=147.5 mir Avail.Storag 0.233 a 0.394 a 0.627 a reated with Ch	y name he <u>116 HydroC</u> 3% Impervit 13 hrs, Vc 05 h	AD Softwa Sum ious, Inflo jume= jume= jume= jume= -20.00 hr 0.303 ac d for 0.44 786.4 ) <u>e Descrip</u> W x 160.2 af Overall StormTec ve Size= 4 l Size= 51 vs of 22 C vvailable S izard	Immary for           0.572 :           0.450 :           0.450 :           0.450 :           0.450 :           s, dt= 0.05 h           Storage= 0.           8 af (78% of           tion           16'L x 3.50'h           - 0.394 af E           th SC-W4 +           14.6''W x 30.0           Chambers	Pond UD 2.91" for af af, Atten= a af .315 af f inflow) H Field A mbedded = Capx 374 .0"H => 6.4	10-YEAR 89%, Lag 0.665 af Inside #1 5 sf x 7.12	R event = 54.9 n x 35.0% 2'L = 45.	nin 6 Voids .9 cf	Type II	I 24-hr	10-YE		6/19/2019
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Prepared HydroCAL Inflow Are Inflow Discarder Primary Routing b Peak Ele Plug-Flov Center-of #1A #2A Storag Device #1 #2 Plug-Flov Center-of #1A	a by {enter yu ≥ 10.00-18 s = 2.0 = 1.5 d = 0.2 = 1.3 by Stor-Ind me v= 317.00'@ v detention tir -Mass det. tir Invert 314.70' 315.20' ge Group A cr Routing Discarded Primary ed OutFlow M	291 ac, 44.5 7 cfs @ 12 2 cfs @ 11 4 cfs @ 12 2 cfs @ 12 2 cfs @ 11 4 cfs @ 12 2 athod, Time 12.92 hrs 14 cfs @ 12 2 athod, Time 12.92 hrs 14 cfs @ 12 3 ne= 90.0 min ne= 34.3 min 0.064 0.053 0.117 eated with 0 <u>Invert</u> 314.70' 316.52' lax=0.22 cfs	ny nam 2016 Hy 2016 Hy 2017	droCAD So Sum bervious, I Volume= Volume= Volume= Volume= Solo-20.0( a = 0.092 ated for 0. 7 - 846.4 ) orage Des 4.83 w X 214 af Ove Sa Storm ective Siz rerall Size: w Length tal Availab ar Wizard Devices n/hr Exfili/ vert. Orifid 70 hrs HW	amary f Inflow D 	for Pond epth > 1.1 0.508 af 0.408 af, 0.181 af 0.227 af = 0.05 hrs rage= 0.11 80% of influe x 2.33'H Fi 053 af Emb C-310 x 154 'W x 16.0"H hent= +0.44 age over Surfa e C = 0.600	UDB3: U 15" for 1 Atten= 24 6 af ow) ield A bedded = 0, 5 Inside # H => 2.07 sf H => 2.07 sf ield A we ded = 0, 5 Inside # H => 2.07 sf ield A cce area 0	0-YEAR %, Lag= .161 af x sf x 7.12 ith 0.44'	x 40.0% 2'L = 14. Overlap	<b>#3</b> hin Voids 7 cf		I 24-hi	- 10-YE		6/19/2019
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2 cfs

Time (hours)

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	by {enter y	<b>2019-06-19</b> /our company r s/n 00546 © 2016	name here} 6 HydroCAD Software	Solutions LLC	i ype ill 24-ill	r 10-YEAR Rainfall=5.14 Printed 6/19/201 Page 9
			Summary	y for Pond UDB4: UG D-BASIN#	<b>#4</b>	
Inflow Are	ea = 1.	.841 ac, 62.34%	Impervious, Inflow I	Depth > 2.46" for 10-YEAR event		
Inflow		50 cfs @ 12.19		0.377 af		
Outflow			hrs, Volume=	0.359 af, Atten= 38%, Lag= 12.3 m	in	
Primary	= 2.1	79 cfs @ 12.39	hrs, Volume=	0.359 af		
Peak Ele						
Plug-Flov Center-of	-Mass det. ti	me= 31.9 min ( 8	,	, , , , , , , , , , , , , , , , , , ,		
Plug-Flov Center-of <u>Volume</u>	-Mass det. ti Invert	me= 31.9 min(8 Avail.Storage	332.0 - 800.0) Storage Descriptior	'n		
Plug-Flov Center-of	-Mass det. ti	me= 31.9 min(8 Avail.Storage	332.0 - 800.0 ) Storage Descriptior <b>39.50'W x 87.88'L</b> :	n x 3.50'H Field A		
Plug-Flov Center-of <u>Volume</u> #1A	-Mass det. ti Invert 324.90'	me= 31.9 min ( 8 <u>Avail.Storage</u> 0.071 af	332.0 - 800.0 ) <u>Storage Descriptior</u> <b>39.50'W x 87.88'L</b> : 0.279 af Overall - 0	n <b>x 3.50'H Field A</b> 0.102 af Embedded = 0.177 af x 40.0%	Voids	
Plug-Flov Center-of <u>Volume</u>	-Mass det. ti Invert	me= 31.9 min ( 8 <u>Avail.Storage</u> 0.071 af	332.0 - 800.0 ) <u>Storage Descriptior</u> 39.50'W x 87.88'L : 0.279 af Overall - 0 ADS_StormTech \$	n x 3.50'H Field A .102 af Embedded = 0.177 af x 40.0% SC-740 x 96 Inside #1		
Plug-Flov Center-of <u>Volume</u> #1A	-Mass det. ti Invert 324.90'	me= 31.9 min ( 8 <u>Avail.Storage</u> 0.071 af	332.0 - 800.0 ) <u>Storage Description</u> 39.50'W x 87.88'L : 0.279 af Overall - 0 ADS_StormTech S Effective Size= 44.6	n <b>x 3.50'H Field A</b> 0.102 af Embedded = 0.177 af x 40.0% <b>SC-740</b> x 96 Inside #1 .6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9	9 cf	
Plug-Flov Center-of <u>Volume</u> #1A	-Mass det. ti Invert 324.90'	me= 31.9 min ( 8 <u>Avail.Storage</u> 0.071 af	332.0 - 800.0 ) <u>Storage Descriptior</u> 39.50'W x 87.88'L : 0.279 af Overall - 0 ADS_StormTech 2 Effective Size= 44.6 Overall Size= 51.0"	n <b>x 3.50'H Field A</b> 0.102 af Embedded = 0.177 af x 40.0% <b>SC-740</b> x 96 Inside #1 6'W x 30.0"H => 6.45 sf x 7.12'L = 45.9 "W x 30.0"H x 7.56'L with 0.44' Overlap	9 cf	
Plug-Flov Center-of <u>Volume</u> #1A	-Mass det. ti Invert 324.90'	me= 31.9 min ( 8 <u>Avail.Storage</u> 0.071 af 0.102 af	332.0 - 800.0 ) Storage Descriptior 39.50'W x 87.88'L 0.279 af Overall - 0 ADS_StormTech S Effective Size= 44.0 Overall Size= 51.0' Row Length Adjust	n <b>x 3.50'H Field A</b> 0.102 af Embedded = 0.177 af x 40.0% <b>SC-740</b> x 96 Inside #1 .6''W x 30.0''H = > 6.45 sf x 7.12'L = 45.9 ''W x 30.0''H x 7.56'L with 0.44' Overlap tment= +0.44' x 6.45 sf x 8 rows	9 cf	
Plug-Flov Center-of <u>Volume</u> #1A #2A	-Mass det. ti Invert 324.90' 325.40'	me= 31.9 min ( 8 <u>Avail.Storage</u> 0.071 af 0.102 af 0.173 af	332.0 - 800.0 ) Storage Description 39.50'W x 87.88'L : 0.279 af Overall - 0 ADS_StormTech S Effective Size= 44.0 Overall Size= 51.0'' Row Length Adjust Total Available Stor	n <b>x 3.50'H Field A</b> 0.102 af Embedded = 0.177 af x 40.0% <b>SC-740</b> x 96 Inside #1 .6''W x 30.0''H = > 6.45 sf x 7.12'L = 45.9 ''W x 30.0''H x 7.56'L with 0.44' Overlap tment= +0.44' x 6.45 sf x 8 rows	9 cf	
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Plug-Flov Center-of #1A #2A Storag Device #1	-Mass det. ti <u>Invert</u> 324.90' 325.40' e Group A c	me= 31.9 min ( 8 Avail.Storage 0.071 af 0.102 af 0.173 af treated with Cha <u>Invert</u> Ou 325.30' <b>8.0</b>	332.0 - 800.0 ) Storage Description 39.50'W x 87.88'L : 0.279 af Overall - 0 ADS_StormTech S Effective Size= 51.0" Row Length Adjust Total Available Stor mber Wizard ttet Devices	n x 3.50'H Field A 0.102 af Embedded = 0.177 af x 40.0% SC-740 x 96 Inside #1 6"W x 30.0"H ⇒ 6.45 sf x 7.12'L = 45.9 "W x 30.0"H x 7.56'L with 0.44' Overlap tment= +0.44' x 6.45 sf x 8 rows orage Orifice/Grate C= 0.600	9 cf	

(tps) **2=326** (Orifice Controls 1.59 cfs @ 3.19 fps)

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5- 4- 3-							4.50 cfs		flow Pea St	ak E		/=32	26.	70'	,		Inflow Primar
( <b>cts</b> ) 2- 1-										······				  			
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Prepared	by {enter y	our comp	any na © 2016	HydroC/ Ru	AD Soft Time s unoff by	pan=5.0 / SCS 1	00-20.00 R-20 me	hrs, dt=( thod, Uh	0.05 hrs, 3 I=SCS, W Pond routi	/eighted	nts J-CN			or 25-			d 6/19
Prepared HydroCAD	by {enter y	our comp <u>n 00546 《</u>	any na © 2016	HydroC/ Ru	AD Soft Time s unoff by	pan=5.0 / SCS 1	00-20.00 R-20 me	hrs, dt=( thod, Uh	I=SCS, W Pond rout	/eighteo ting by \$ off Area=	nts J-CN Stor-Ind 173,800	metho sf 0.0	id 10% Imp	perviou	P Is R	Printe	d 6/19/ Pag
Prepared HydroCADO Subcatch	by {enter y ® 10.00-18_s	our comp n 00546 《 21-1	any na © 2016	HydroC/ Ru	AD Soft Time s unoff by	pan=5.0 / SCS 1	00-20.00 R-20 me	hrs, dt=( thod, Uh	I=SCS, W Pond routi Runoi Flow Ler	/eighted ting by \$ off Area= ngth=28 f Area=1	nts I-CN Stor-Ind 173,800 0' Tc=1 08,268 s	metho sf 0.0 3.5 mir	nd 10% Imp 1 CN≕ 75% Imp	perviou 49 Ru perviou	P us R unoff= us R	Printe Runoff =3.43 Runoff	d 6/19, Pag Depth> cfs 0.3
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12260 HydroCAD 2019-06-19 Prepared by {enter your company name HydroCAD® 10.00-18 s/n 00546 © 2016 Hydro	
Reach 36": (new Reach)	Avg. Flow Depth=1.07' Max Vel=6.98 fps Inflow=16.05 cfs 1.791 af 36.0" Round Pipe n=0.015 L=1,162.0' S=0.0100 '/' Capacity=57.81 cfs Outflow=15.86 cfs 1.782 af
Reach 100R: Arcade Pond	Inflow=27.21 cfs 3.502 af Outflow=27.21 cfs 3.502 af
Reach BSW: BioSwale at Drive	Avg. Flow Depth=0.59' Max Vel=2.30 fps Inflow=8.55 cfs 0.599 af n=0.035 L=1,063.0' S=0.0094 '/ Capacity=18.42 cfs Outflow=6.42 cfs 0.590 af
Reach DP100: DP-1 Wetland	Inflow=3.43 cfs_0.356 af Outflow=3.43 cfs_0.356 af
Pond 217: BYPASS MH #217	Peak Elev=317.70' Inflow=9.44 cfs 0.982 af Primary=2.30 cfs 0.658 af Secondary=7.14 cfs 0.325 af Outflow=9.44 cfs 0.982 af
Pond BIO2: BIBASIN 3-2	Peak Elev=315.24' Storage=3,405 cf Inflow=1.53 cfs 0.343 af Discarded=0.19 cfs 0.140 af Primary=1.01 cfs 0.146 af Outflow=1.20 cfs 0.286 af
Pond BR1: BioBasin#1	Peak Elev=329.04' Storage=2,940 cf Inflow=4.48 cfs 0.309 af Outflow=4.11 cfs 0.265 af
Pond MH 230: Bypass MH #230	Peak Elev=329.88' Inflow=6.67 cfs 0.474 af Primary=1.53 cfs 0.343 af Secondary=5.14 cfs 0.131 af Outflow=6.67 cfs 0.474 af
Pond SDB1: DB#1 Surface Det Basin	Peak Elev=330.57' Storage=8,345 cf Inflow=9.23 cfs 0.803 af Outflow=7.92 cfs 0.720 af
Pond UDB2: UG DB #2	Peak Elev=316.04' Storage=0.417 af Inflow=9.98 cfs 0.764 af Outflow=1.31 cfs 0.591 af
Pond UDB3: UG D-BASIN#3	Peak Elev=317.08' Storage=0.117 af Inflow=2.30 cfs 0.658 af Discarded=0.22 cfs 0.188 af Primary=1.83 cfs 0.366 af Outflow=2.05 cfs 0.554 af
Pond UDB4: UG D-BASIN#4	Peak Elev=327.21' Storage=0.128 af Inflow=6.16 cfs 0.518 af Outflow=3.77 cfs 0.498 af

**12260 HydroCAD 2019-06-19** Prepared by {enter your company name here} HydroCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solutions LLC

Type III 24-hr 25-YEAR Rainfall=6.28" Printed 6/19/2019 Page 98

Total Runoff Area = 22.957 ac Runoff Volume = 4.386 af Average Runoff Depth = 2.29" 68.61% Pervious = 15.752 ac 31.39% Impervious = 7.205 ac

# Summary for Subcatchment 101S: P1-1

Runoff = 3.43 cfs @ 12.23 hrs, Volume= 0.356 af, Depth> 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 25-YEAR Rainfall=6.28"

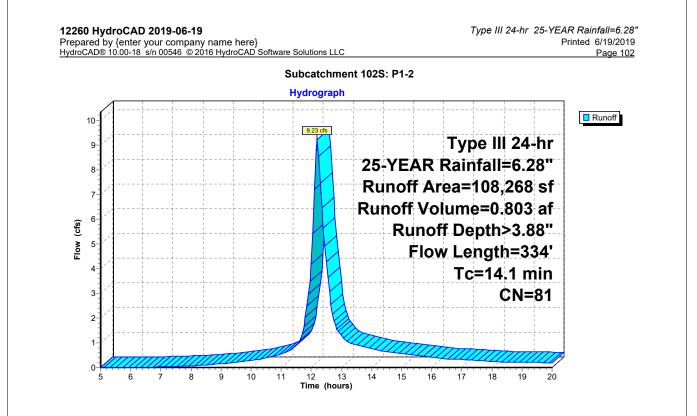
$\frac{51,144}{9,194} \frac{55}{100} \frac{100}{100} \frac{100}{10} $		<u>rea (sf)</u> 70,742	<u>CN</u> 30	Description Woods, Go		
17.8.00       49       Weighted Average         17.8.00       100.005 Pervious Area         17.8.00       50       0.020       0.007         12.3       50       0.020       0.07       Woods: Light underhaves in the 0.400 P2=3.20*         12.3       200       0.0380       3.14       Shallow Flow 50 F1         13.5       280       Total       Unpaved Ky= 16.1 (ps		57,144	55	Woods, Go	od, HSG B	
$\text{True in the integral of $						
Child         (ftex)         (ftex) </th <th>1</th> <th>73,800</th> <th></th> <th>100.00% P</th> <th>ervious Are</th> <th>a</th>	1	73,800		100.00% P	ervious Are	a
12         230         0.030         3.14         Weeds: Light underbrash in 6.400         P2P 3.20° Station Concentrated Flow, Shallow Flow           13.5         280         Total         Type III 24-hr 25-YEAR Rainfall-6.28°           2260 HydroCAD 2019-06-19         Type III 24-hr 25-YEAR Rainfall-6.28°         Printed 6/19/2019           2260 HydroCAD 2019-06-19         Type III 24-hr 25-YEAR Rainfall-6.28°         Printed 6/19/2019           2260 HydroCAD 2019-06-19         Type III 24-hr 25-YEAR Rainfall-6.28°         Printed 6/19/2019           2260 HydroCAD 2019-06-19         Subcatchment 1015: P1-1         Printed 6/19/2019         Page 100           Subcatchment 1015: P1-1           4         4         4         Character         Subcatchment 1015: P1-1           4         4         4         Character         Subcatchment 1015: P1-1         Funorf           9         9         C         Signa function for the second for						Description
1.2       230       0.0380       3.14       Shallow Concentrated Flow, Shallow Flow         13.5       280       Total       Uppaved Kv=16.1 fps         Type III 24-hr 25-YEAR Rainfall=6.28"         Printed 6/19/2019         Type III 24-hr 25-YEAR Rainfall=6.28"         Printed 6/19/2019         Yepared by (enter your company name here)         Printed 6/19/2019         Subcatchment 101S: P1-1         HydroCAD 2019-06-19         Subcatchment 101S: P1-1         HydroCAD 2019-06-19         Printed 6/19/2019         Printed 6/19/2019         Printed 6/19/2019         Printed 6/19/2019         OPINE Subcatchment 101S: P1-1         HydroCAD 2019-06-19         Type III 24-hr         OPINE Subcatchment 101S: P1-1         HydroCAD 2019-06-19         Type III 24-hr         OPINE Subcatchment 101S: P1-1         HydroCAD 2019-06-19         Type III 24-hr         OPINE Subcatchment 101S: P1-1         HydroCAD 2019-06-19         OPINE Su	12.3	50	0.020	0 0.07		
2260 HydroCAD 2019-06-19 Type III 24-hr 25-YEAR Rainfall-6.28" Prepared by (enter your company name here) hydroCADB 10.00-18 sin 00546 @ 2016 HydroCAD Software Solutions LLC Subcatchment 1015: P1-1 Hydrograph Type III 24-hr 25-YEAR Rainfall=6.28" Runoff Area=173,800 sf Runoff Volume=0.356 af Runoff Volume=0.356 af Runoff Depth>1.0,7" Flow Length=280' Tc=13,5 min CN=49 0 0 0 0 0 0 0 0 0 0 0 0 0	1.2	230	0.038	0 3.14		Shallow Concentrated Flow, Shallow Flow
Pripage dy (enter your company name here) yourocADB 10.00-18 s/n 00546 @ 2016 HydroCAD Software Solutions LLC Subcatchment 101S: P1-1 Hydrograph Type III 24-hr 25-YEAR Rainfall=6.28'' Runoff Area=173,800 sf Runoff Volume=0.356 af Runoff Depth>1.07'' Flow Length=280' Tc=13.5 min CN=49	13.5	280	Total			
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3 (g) 2 (g) 2	repare	ed by {er	iter vou	r company	name her 16 HydroCA	e} Printed 6/19/2019 D Software Solutions LLC Page 100 Subcatchment 101S: P1-1
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Runoff Depth>1.07" Flow Length=280' Tc=13.5 min CN=49	repare ydroCA	ed by {er .D® 10.00	iter vou	r company	name hero 16 HydroCA	e} Printed 6/19/2019 Page 100 Subcatchment 101S: P1-1 Hydrograph 3.43 dfs Type III 24-hr 25-YEAR Rainfall=6.28"
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Tc=13.5 min CN=49	repare ydroCA	ed by {er D® 10.00	iter vou	r company	name hero 16 HydroCA	e} D Software Solutions LLC Subcatchment 101S: P1-1 Hydrograph 343 dfs Type III 24-hr 25-YEAR Rainfall=6.28" Runoff Area=173,800 sf Runoff Volume=0.356 af
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	repare ydroCA	ed by {er D® 10.00	iter vou	r company	name hero 16 HydroCA	e} <u>D Software Solutions LLC</u> Subcatchment 101S: P1-1 Hydrograph 343 dfs Type III 24-hr 25-YEAR Rainfall=6.28" Runoff Area=173,800 sf Runoff Volume=0.356 af Runoff Depth>1.07" Flow Length=280'
	repare ydroCA	ed by {er D® 10.00	iter vou	r company	name hero 16 HydroCA	e} <u>D Software Solutions LLC</u> Subcatchment 101S: P1-1 Hydrograph 343 dfs Type III 24-hr 25-YEAR Rainfall=6.28" Runoff Area=173,800 sf Runoff Volume=0.356 af Runoff Depth>1.07" Flow Length=280'
	repare ydroCA	ed by {er D® 10.00	iter vou	r company	name hero 16 HydroCA	e} <u>Printed 6/19/2019</u> <u>Page 100</u> Subcatchment 101S: P1-1 Hydrograph 343 dfs Type III 24-hr 25-YEAR Rainfall=6.28" Runoff Area=173,800 sf Runoff Volume=0.356 af Runoff Depth>1.07" Flow Length=280' Tc=13.5 min
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	Flow (cts)	ed by {er 	iter vou	r company	name hero 16 HydroCA	e} <u>Printed 6/19/2019</u> <u>Page 100</u> Subcatchment 101S: P1-1 Hydrograph 343 dfs Type III 24-hr 25-YEAR Rainfall=6.28" Runoff Area=173,800 sf Runoff Volume=0.356 af Runoff Depth>1.07" Flow Length=280' Tc=13.5 min
0- <b>////////////////////////////////////</b>	Flow (cts)	ed by {er 	iter vou	r company	name hero 16 HydroCA	e} <u>Printed 6/19/2019</u> <u>Page 100</u> Subcatchment 101S: P1-1 Hydrograph 343 dfs Type III 24-hr 25-YEAR Rainfall=6.28" Runoff Area=173,800 sf Runoff Volume=0.356 af Runoff Depth>1.07" Flow Length=280' Tc=13.5 min
	Flow (cts)	ed by {er 	iter vou	r company	name hero 16 HydroCA	e} <u>Printed 6/19/2019</u> <u>Page 100</u> Subcatchment 101S: P1-1 Hydrograph 343 dfs Type III 24-hr 25-YEAR Rainfall=6.28" Runoff Area=173,800 sf Runoff Volume=0.356 af Runoff Depth>1.07" Flow Length=280' Tc=13.5 min

### Summary for Subcatchment 102S: P1-2

Runoff = 9.23 cfs @ 12.19 hrs, Volume= 0.803 af, Depth> 3.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 25-YEAR Rainfall=6.28"

A	rea (sf)	CN	Description		
	1,531	39	>75% Gras	bod, HSG A	
	71,278	74	>75% Gras	s cover, Go	ood, HSG C
	14,084	98	Paved park	ing, HSG A	
	21,375	98	Roofs, HSC	θĂ.	
	108,268	81	Weighted A	verage	
	72,809		67.25% Pe	rvious Area	
	35,459		32.75% Im	pervious Ar	ea
Tc	Length	Slope	e Velocity	Capacity	Description
(min)	(feet)	(ft/ft	) (ft/sec)	(cfs)	
12.6	50	0.0200	0.07		Sheet Flow, Sheet Flow 50 Ft
					Grass: Bermuda n= 0.410 P2= 3.20"
1.2	229	0.0380	) 3.14		Shallow Concentrated Flow, Shallow Flow
					Unpaved Kv= 16.1 fps
0.3	55	0.0200	2.87		Shallow Concentrated Flow, PARKING
					Paved Kv= 20.3 fps
14.1	334	Total			

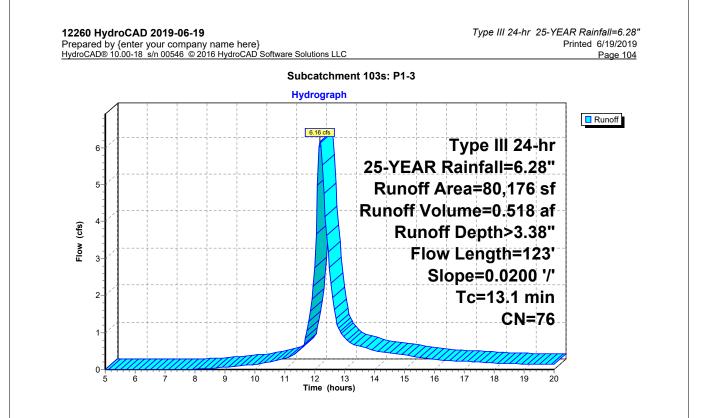


#### Summary for Subcatchment 103s: P1-3

Runoff = 6.16 cfs @ 12.18 hrs, Volume= 0.518 af, Depth> 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 25-YEAR Rainfall=6.28"

A	Area (sf)	CN	Description		
	30,191	39	>75% Gras	s cover, Go	ood, HSG A
	49,985	98	Paved park	ing, HSG A	
	80,176	76	Weighted A	verage	
	30,191		37.66% Pe	rvious Area	
	49,985		62.34% Im	pervious Ar	ea
Тс	Length	Slope	Velocity	Capacity	Description
(min)	0	(ft/ft)		(cfs)	1
12.6	50	0.0200	0.07		Sheet Flow, Fields
					Grass: Bermuda n= 0.410 P2= 3.20"
0.5	73	0.0200	2.28		Shallow Concentrated Flow, Field
					Unpaved Kv= 16.1 fps
13.1	123	Total			



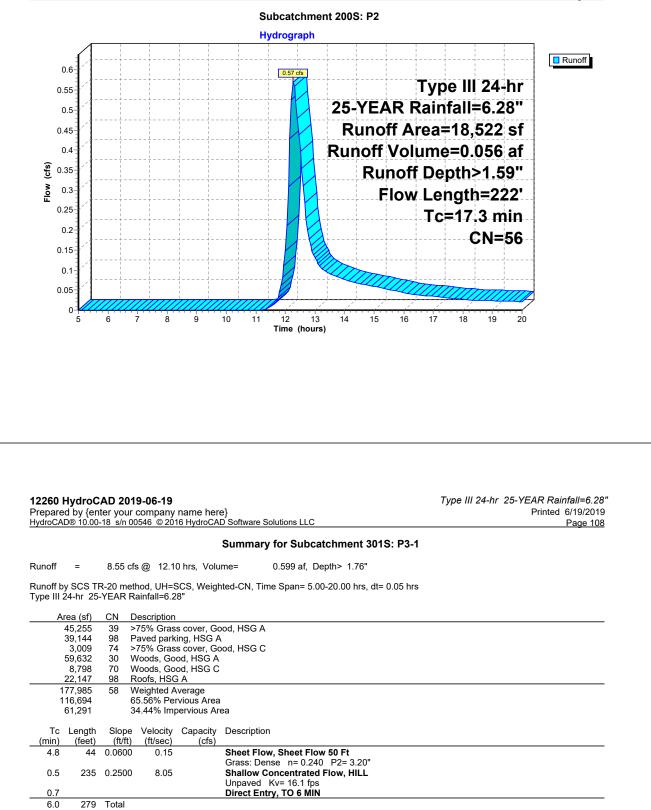
# Summary for Subcatchment 104S: P1-4 Roof

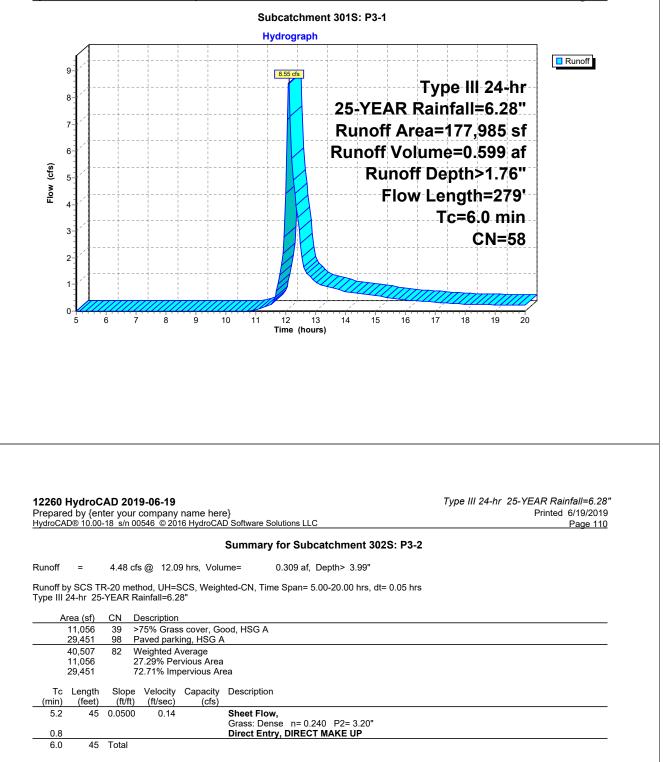
Runoff = 2.82 cfs @ 12.09 hrs, Volume= 0.219 af, Depth> 5.58"

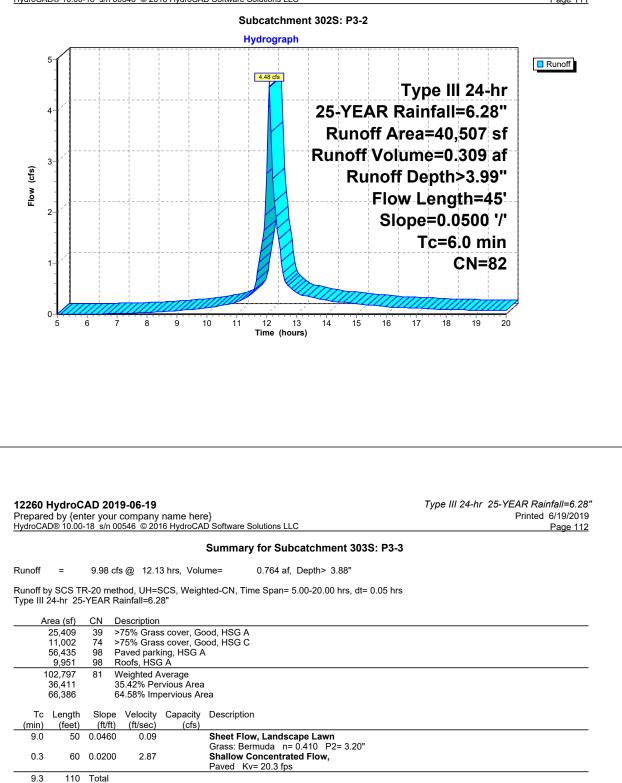
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 25-YEAR Rainfall=6.28"

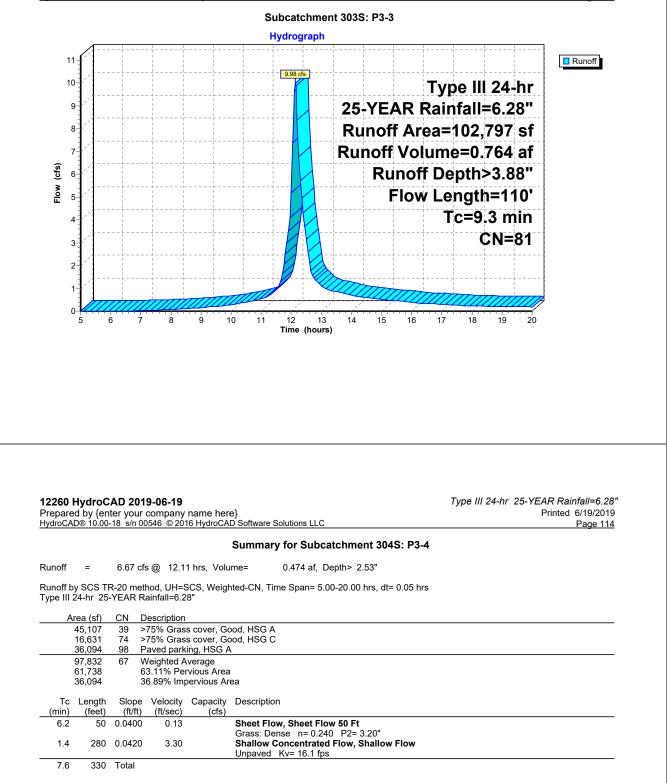
	20,457		escription										
	20,457			npervious A	Irea								
	20,101		00.0070 11	iipoi tiodo /	104								
	Length				Description								
(min) 6.0	(feet)	(ft/ft)	(ft/sec)	(cfs)	Direct Entry	Direct En	tru						
0.0					Direct Lifting	, Direct En	u y						
					Subcat	chment 1	04S: P1-	-4 Roo	of				
			_			Hydrograph							
			{									Runoff	
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							25-YEA						
								ff Are					
			2-1				Runoff						
			(cts)					noff D	- i -	i i			
			Flow						Tc=6				
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			9-06-19	name her	e)					7	Гуре I.	II 24-hr 25	ainfall=6.28
Prepare	ed by {en	ter your	company	name her 16 HydroCA	e} D Software Solu	utions LLC				7	Type I.	II 24-hr 2:	ainfall=6.28 d 6/19/2019 Page 106
Prepare	ed by {en	ter your	company	name her 16 HydroCA	D Software Solu			4 2005		7	Type I	II 24-hr 25	d 6/19/2019
Prepare	ed by {en	ter your	company	name her 16 HydroCA	e} <u>D Software Solu</u> <b>Summary</b>		atchmen	1t 200S	5: P2	7	Гуре I.	ll 24-hr 23	d 6/19/2019
Prepare	ed by {en	ter your -18 s/n 0	company 0546 © 20	name her 16 HydroCA 7 hrs, Volu	D Software Solu				5: P2	7	Гуре I.	ll 24-hr 2:	d 6/19/2019
Prepare <u>HydroCA</u> Runoff	ed by {en . <u>D® 10.00</u> =	ter your <u>-18 s/n 0</u> 0.57 cf	company <u>)546 © 20</u> s @ 12.2	<u>16 HydroCA</u> 7 hrs, Volu	D Software Solu Summary Ime= 0	for Subc	epth> 1.59	)"			Type I	II 24-hr 23	d 6/19/2019
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Prepare HydroCA Runoff Runoff b Type III 2	ed by {en _D® 10.00 = py SCS TI 24-hr 25 <u>rea (sf)</u>	ter your <u>-18 s/n 0</u> 0.57 cf R-20 met -YEAR R <u>CN E</u>	company 0546 © 20 s @ 12.2 hod, UH=1 ainfall=6.2 Description	1 <u>6 HydroCA</u> 7 hrs, Volu SCS, Weigl 8"	D Software Solu Summary Ime= 0 nted-CN, Time	for Subc	epth> 1.59	)"			Гуре I.	ll 24-hr 2:	d 6/19/2019
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Prepare HydroCA Runoff Runoff b Type III 2 A	ed by {en <u>D</u> ® 10.00 = y SCS TI 24-hr 25 <u>rea (sf)</u> 0 0 4,602 13,920	ter your - <u>18 s/n 0</u> 0.57 cf R-20 met -YEAR R -YEAR R 30 > 30 V 61 > 55 V	company <u>546 © 20</u> s @ 12.2 hod, UH=3 ainfall=6.2 <u>Description</u> 75% Gras Voods, Go Voods, Go	16 HydroCA 7 hrs, Volu SCS, Weigl 88" 	D Software Solu Summary ime= 0 nted-CN, Time bod, HSG A bod, HSG B	for Subc	epth> 1.59	)"			Type I.	ll 24-hr 25	d 6/19/2019
Prepare HydroCA Runoff Runoff b Type III 2 A	ed by {en 	ter your - <u>18 s/n 0</u> 0.57 cf R-20 met -YEAR R -YEAR R 39 > 30 V 61 > 55 V 74 >	company <u>5546 © 20</u> s @ 12.2 hod, UH=: ainfall=6.2 <u>Description</u> 75% Gras Voods, Go 75% Gras Voods, Go 75% Gras	16 HydroCA 7 hrs, Volu SCS, Weigl 88" 	D Software Solu Summary Ime= 0 Inted-CN, Time Dod, HSG A Dod, HSG B Dod, HSG C	for Subc	epth> 1.59	)"			Гуре I.	ll 24-hr 25	d 6/19/2019
Prepare HydroCA Runoff Type III 2 A	ed by {en _D® 10.00 = yy SCS TI 24-hr 25 <u>rea (sf)</u> 0 4,602 13,920 0	ter your <u>-18 s/n 0</u> 0.57 cf R-20 met -YEAR R <u>CN E</u> 30 V 61 > 55 V 74 > 70 V 56 V	company <u>1546</u> © 20 s @ 12.2 hod, UH=3 ainfall=6.2 <u>Pescription</u> 75% Gras Voods, Go 75% Gras Voods, Go 75% Gras Voods, Go Voods, Go Voods, Go	16 HydroCA 7 hrs, Volu SCS, Weigh 88" is cover, Go od, HSG A is cover, Go od, HSG B is cover, Go	D Software Solu Summary ume= 0 nted-CN, Time Dod, HSG A Dod, HSG B Dod, HSG C	for Subc	epth> 1.59	)"			Type I.	ll 24-hr 25	d 6/19/2019
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Prepare HydroCA Runoff Runoff b Type III 2 A	ed by {en D® 10.00 = y SCS TI 24-hr 25 rea (sf) 0 4,602 13,920 0 18,522 18,522 18,522 Length (feet)	ter your - <u>18 s/n 0</u> 0.57 cf R-20 met -YEAR R -YEAR R 39 > 30 V 61 > 55 V 61 > 55 V 74 > 70 V 56 V 1 Slope	company <u>5546</u> © 20 s @ 12.2 hod, UH=: ainfall=6.2 <u>Description</u> 75% Gras Voods, Go 75% Gras <u>Voods</u> , Go 75% Gras <u>Voods</u> , Go Voods, Go 75% Gras <u>Voods</u> , Go Voods, Go Voods Vo	16 HydroCA 7 hrs, Volu SCS, Weigl 88" ss cover, Gd od, HSG A ss cover, Gd od, HSG B ss cover, Gd od, HSG C werage ervious Are Capacity	D Software Solu Summary Ime= 0 Inted-CN, Time Dod, HSG A Dod, HSG B Dod, HSG C a Description Sheet Flow,	for Subc 0.056 af, De Span= 5.00	epth> 1.59 0-20.00 hrs	9" s, dt= 0.	05 hrs		Type I.	ll 24-hr 23	d 6/19/2019
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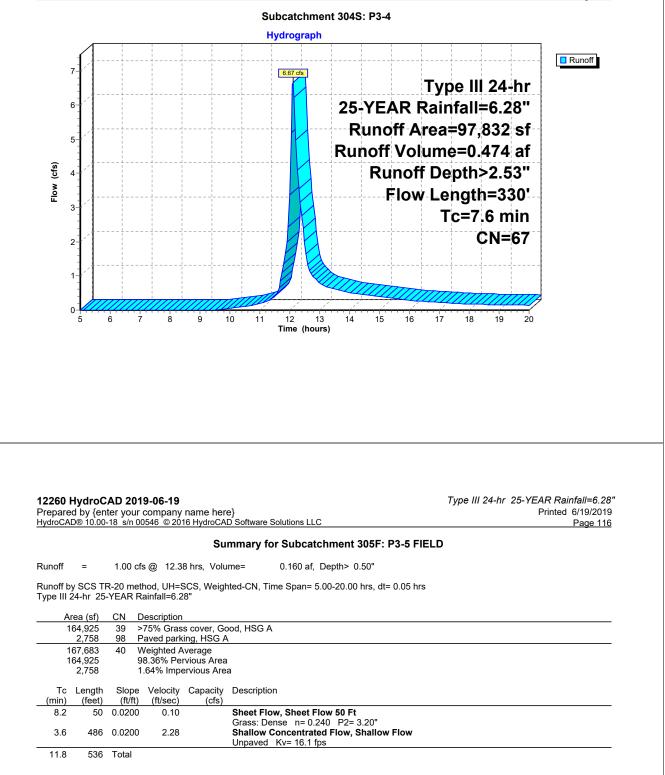
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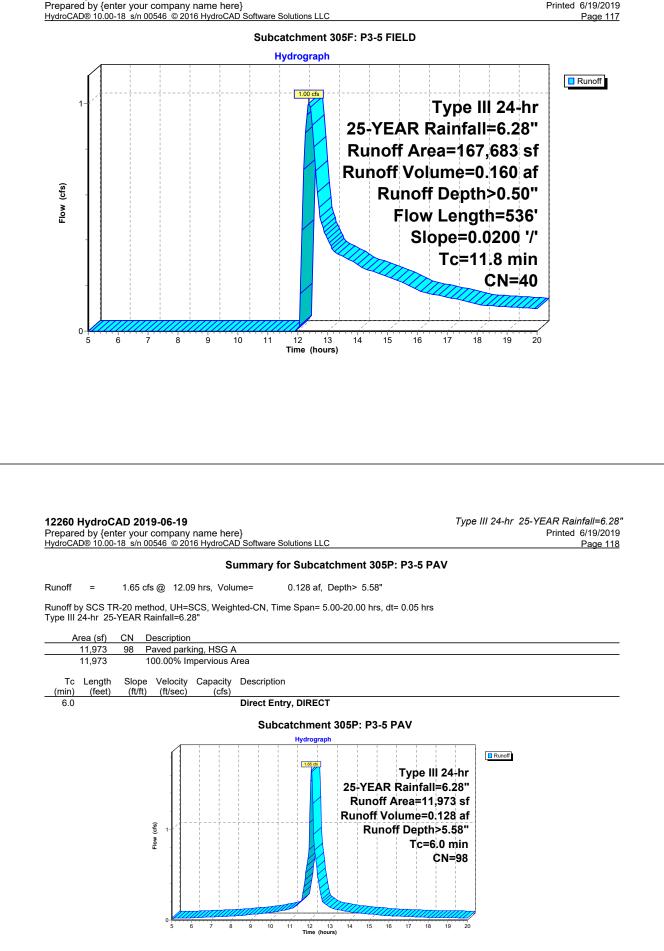












12260 HydroCAD 2019-06-19

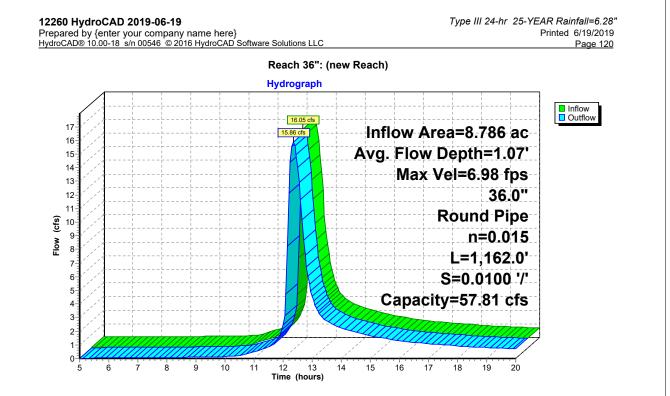
## Summary for Reach 36": (new Reach)

Inflow Area =	8.786 ac, 27.67% Impervious, Inflow Depth > 2.45" for 25-YEAR event
Inflow =	16.05 cfs @ 12.27 hrs, Volume= 1.791 af
Outflow =	15.86 cfs @ 12.35 hrs, Volume= 1.782 af, Atten= 1%, Lag= 5.2 min
Max. Velocity= 6	Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs 3.98 fps, Min. Travel Time= 2.8 min 2.77 fps, Avg. Travel Time= 7.0 min

Peak Storage= 2,645 cf @ 12.31 hrs Average Depth at Peak Storage= 1.07' Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 57.81 cfs

36.0" Round Pipe n= 0.015 Length= 1,162.0' Slope= 0.0100 '/' Inlet Invert= 324.40', Outlet Invert= 312.78'

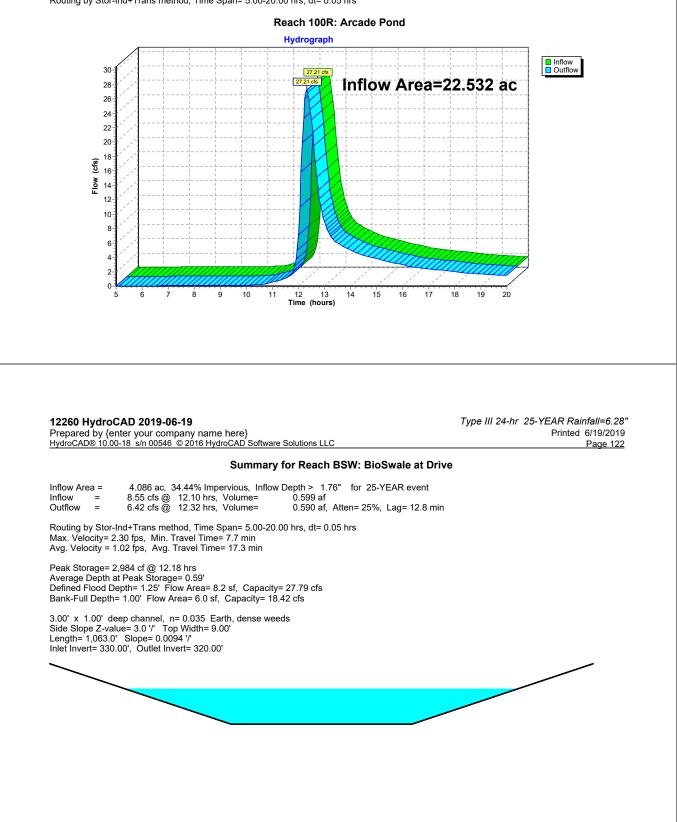


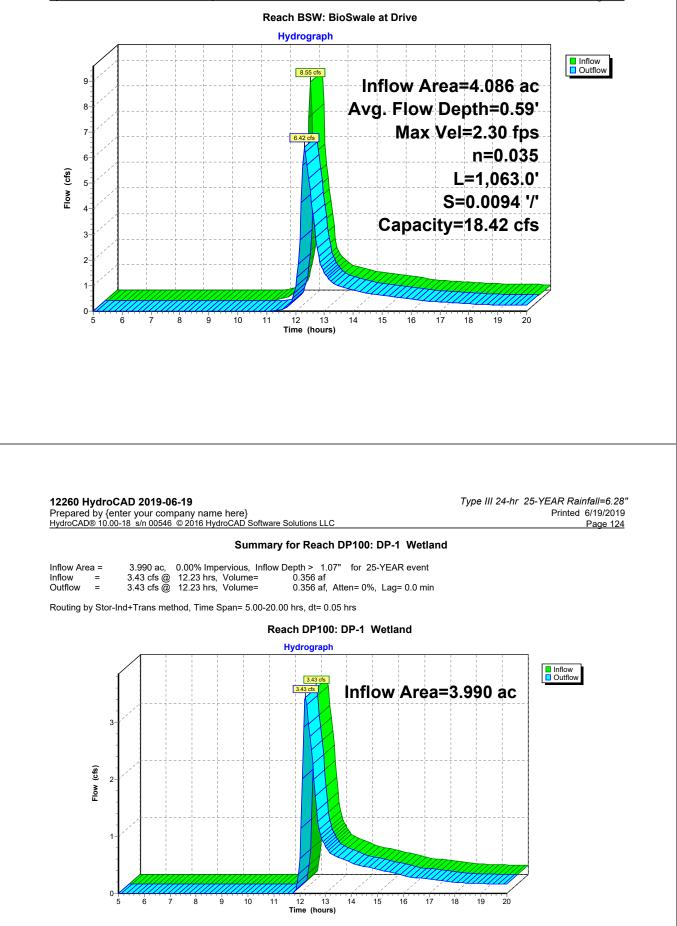


### Summary for Reach 100R: Arcade Pond

Inflow Are	ea =	22.532 ac, 31.98% Impervious, Inflow Depth > 1.87" for 25-YEAR event
Inflow	=	27.21 cfs @ 12.31 hrs, Volume= 3.502 af
Outflow	=	27.21 cfs @ 12.31 hrs, Volume= 3.502 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs





# Summary for Pond 217: BYPASS MH #217

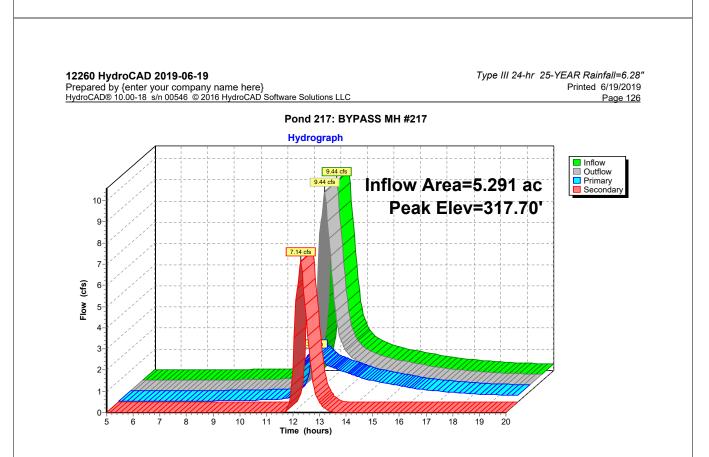
Inflow Area =	5.291 ac, 44.57% Impervious, Inflow D	epth > 2.23" for 25-YEAR event
Inflow =	9.44 cfs @ 12.29 hrs, Volume=	0.982 af
Outflow =	9.44 cfs @ 12.29 hrs, Volume=	0.982 af, Atten= 0%, Lag= 0.0 min
Primary =	2.30 cfs @ 12.29 hrs, Volume=	0.658 af
Secondary =	7.14 cfs @ 12.29 hrs, Volume=	0.325 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 317.70'@ 12.29 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	315.50'	8.0" Vert. Orifice/Grate C= 0.600
#2	Secondary	316.52'	24.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=2.29 cfs @ 12.29 hrs HW=317.69' (Free Discharge) 1=Orifice/Grate (Orifice Controls 2.29 cfs @ 6.57 fps)

Secondary OutFlow Max=7.08 cfs @ 12.29 hrs HW=317.69' (Free Discharge)



### Summary for Pond BIO2: BIBASIN 3-2

Inflow Area =	2.246 ac, 36.89% Impervious, Inflow D	epth > 1.83" for 25-YEAR event
Inflow =	1.53 cfs @ 12.11 hrs, Volume=	0.343 af
Outflow =	1.20 cfs @ 12.61 hrs, Volume=	0.286 af, Atten= 21%, Lag= 29.9 min
Discarded =	0.19 cfs @ 12.61 hrs, Volume=	0.140 af
Primary =	1.01 cfs @ 12.61 hrs, Volume=	0.146 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 315.24'@ 12.61 hrs Surf.Area= 3,475 sf Storage= 3,405 cf

Plug-Flow detention time=87.6 min calculated for 0.286 af (83% of inflow) Center-of-Mass det. time= 38.8 min (872.3 - 833.5)

Volume	Invert	Avail.Storage	Storage Description
#1	314.00'	6,412 cf	Custom Stage Data (Prismatic)_isted below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
314.00	2,047	0	0
315.00	3,194	2,621	2,621
316.00	4,388	3,791	6,412

Invert Outlet Devices Device Routing

#3

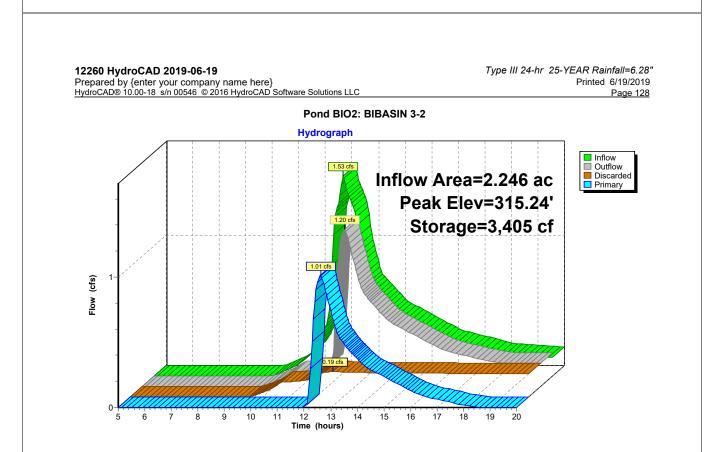
315.50' 314.00' 2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columnsX 6 rows C= 0.600 Limited to weir flow at low heads #1 Primary #2

Discarded

2.410 in/hr Exfiltration over Horizontal area 24.0" Horiz. Orifice/Grate X 0.43 C= 0.600 Limited to weir flow at low heads Primary 315.00'

Discarded OutFlow Max=0.19 cfs @ 12.61 hrs HW=315.24' (Free Discharge) -2=Exfiltration (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=1.01 cfs @ 12.61 hrs HW=315.24' (Free Discharge) -1=Orifice/Grate ( Controls 0.00 cfs) -3=Orifice/Grate (Weir Controls 1.01 cfs @ 0.68 fps)

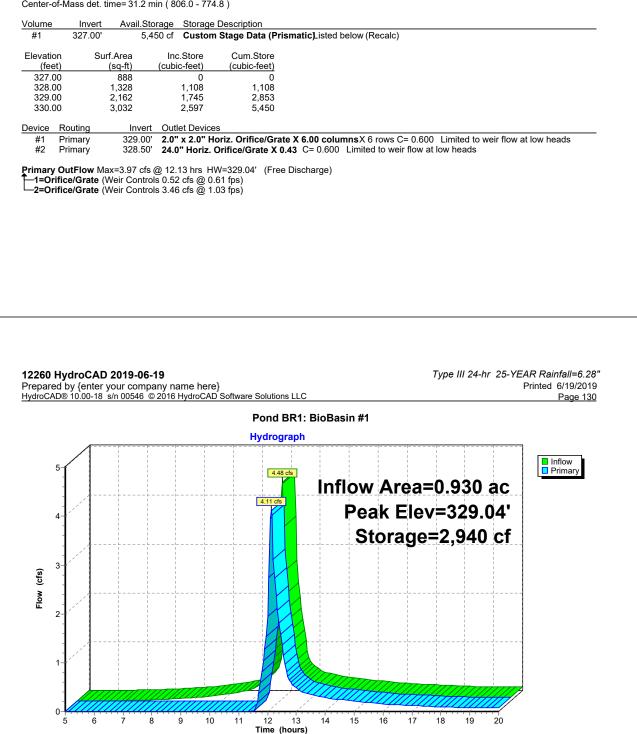


### Summary for Pond BR1: BioBasin #1

Inflow Area =	0.930 ac, 72.71% Impervious, Inflow I	Depth > 3.99" for 25-YEAR event
Inflow =	4.48 cfs @ 12.09 hrs, Volume=	0.309 af
Outflow =	4.11 cfs @ 12.13 hrs, Volume=	0.265 af, Atten= 8%, Lag= 2.3 min
Primary =	4.11 cfs @ 12.13 hrs, Volume=	0.265 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 329.04'@ 12.13 hrs Surf.Area= 2,197 sf Storage= 2,940 cf

Plug-Flow detention time=72.9 min calculated for 0.264 af (85% of inflow) Center-of-Mass det. time=31.2 min ( 806.0 - 774.8 )



# Summary for Pond MH 230: Bypass MH #230

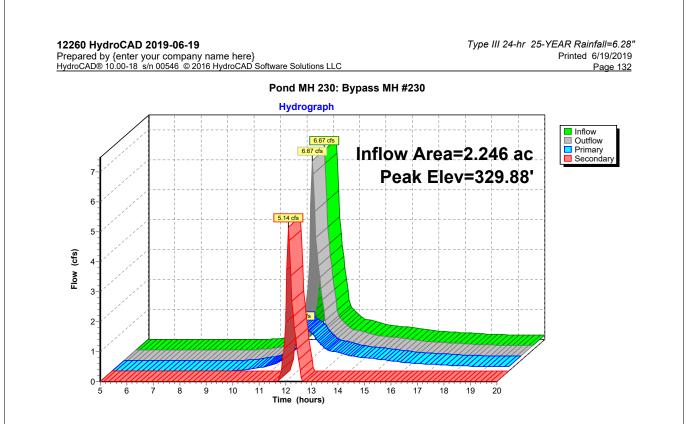
Inflow Area =	2.246 ac, 36.89% Impervious, Inflow De	epth > 2.53" for 25-YEAR event
Inflow =	6.67 cfs @ 12.11 hrs, Volume=	0.474 af
Outflow =	6.67 cfs @ 12.11 hrs, Volume=	0.474 af, Atten= 0%, Lag= 0.0 min
Primary =	1.53 cfs @ 12.11 hrs, Volume=	0.343 af
Secondary =	5.14 cfs @ 12.11 hrs, Volume=	0.131 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 329.88'@ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	327.00'	6.0" Vert. Orifice/Grate C= 0.600
#2	Secondary	328.75'	18.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=1.52 cfs @ 12.11 hrs HW=329.85' (Free Discharge) 1=Orifice/Grate (Orifice Controls 1.52 cfs @ 7.76 fps)

Secondary OutFlow Max=4.96 cfs @ 12.11 hrs HW=329.85' (Free Discharge)

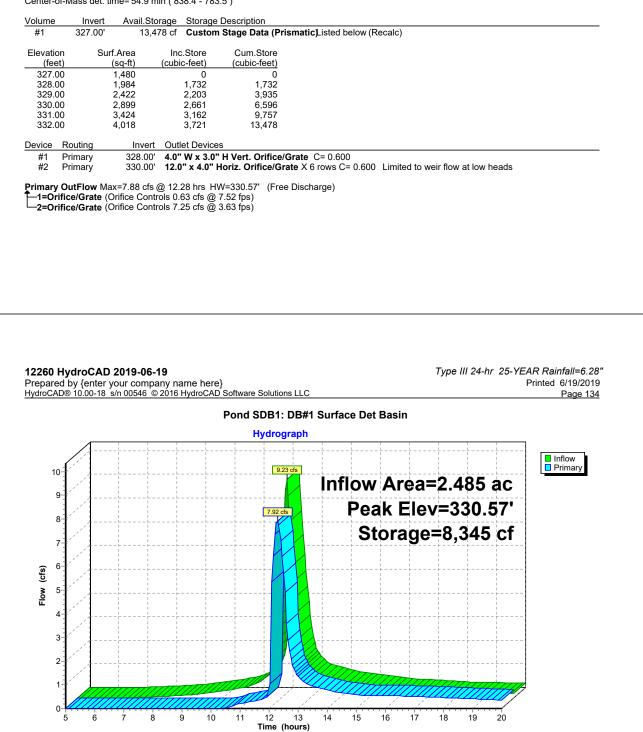


#### Summary for Pond SDB1: DB#1 Surface Det Basin

Inflow Area =	2.485 ac, 32.75% Impervious, Inflow Depth > 3.88" for 25-YEAR event	
Inflow =	9.23 cfs @ 12.19 hrs, Volume= 0.803 af	
Outflow =	7.92 cfs @ 12.28 hrs, Volume= 0.720 af, Atten= 14%, Lag= 5.2 min	
Primary =	7.92 cfs @ 12.28 hrs, Volume= 0.720 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 330.57' @ 12.28 hrs Surf.Area= 3,200 sf Storage= 8,345 cf

Plug-Flow detention time=87.8 min calculated for 0.720 af (90% of inflow) Center-of-Mass det. time=54.9 min ( 838.4 - 783.5 )



# Summary for Pond UDB2: UG DB #2

Inflow Area =	2.360 ac, 64.58% Impervious, Inflow Depth > 3.88" for 25-YEAR event	
Inflow =	9.98 cfs @ 12.13 hrs, Volume= 0.764 af	
Outflow =	1.31 cfs @ 12.84 hrs, Volume= 0.591 af, Atten= 87%, Lag= 42.7 min	
Primary =	1.31 cfs @ 12.84 hrs, Volume= 0.591 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 316.04' @ 12.84 hrs Surf.Area= 0.303 ac Storage= 0.417 af

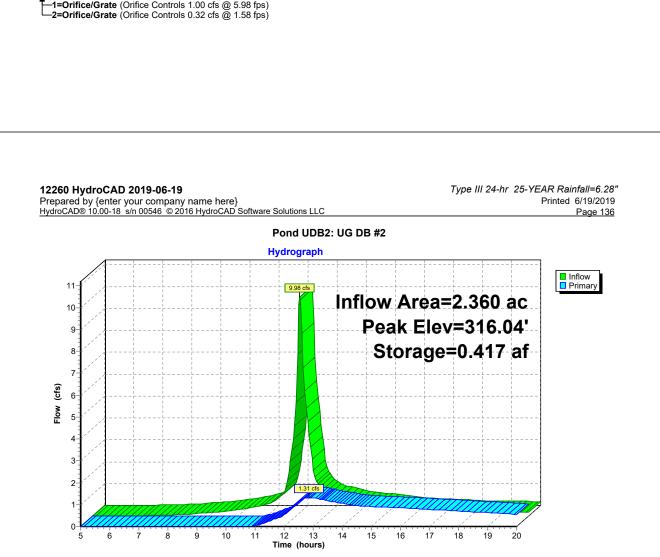
Plug-Flow detention time=200.6 min calculated for 0.591 af (77% of inflow) Center-of-Mass det. time= 144.2 min ( 923.8 - 779.6 )

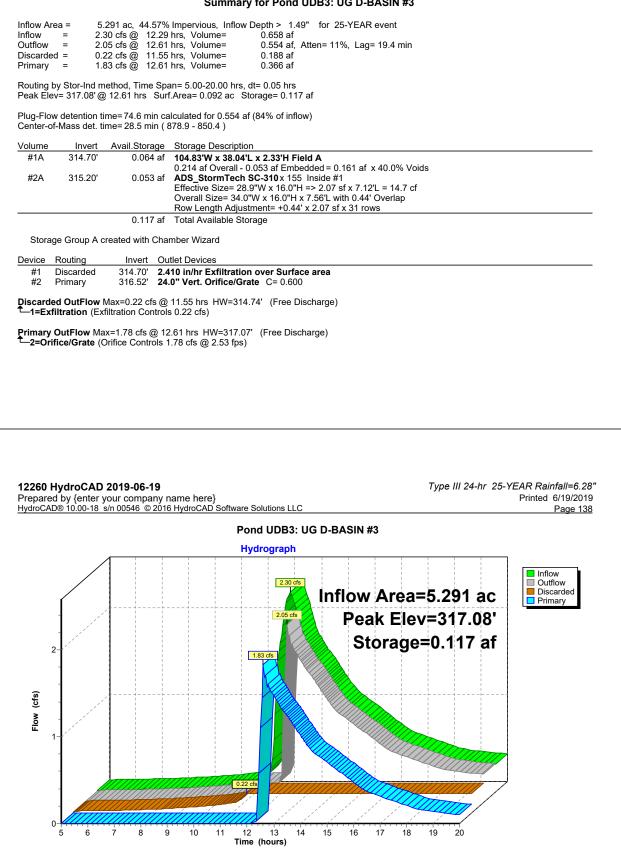
Volume	Invert	Avail.Storage	Storage Description
#1A	314.00'	0.233 af	82.25'W x 160.26'L x 3.50'H Field A
			1.059 af Overall - 0.394 af Embedded = 0.665 af x 35.0% Voids
#2A	314.50'	0.394 af	ADS_StormTech SC-740 +Capx 374 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			17 Rows of 22 Chambers
		0.627 af	Total Available Storage
			-
Storage	Group A c	reated with Cha	mber Wizard

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	314.50'	6.0" x 4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Primary	315.80'	10.0" W x 4.0" H Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=1.31 cfs @ 12.84 hrs HW=316.04' (Free Discharge) 1=Orifice/Grate (Orifice Controls 1.00 cfs @ 5.98 fps) 2=Orifice/Grate (Orifice Controls 0.32 cfs @ 1.58 fps)





## Summary for Pond UDB4: UG D-BASIN#4

Inflow Area =	1.841 ac, 62.34% Impervious, Inflow Depth > 3.38" for 25-YEAR event
Inflow =	6.16 cfs @ 12.18 hrs, Volume= 0.518 af
Outflow =	3.77 cfs @ 12.39 hrs, Volume= 0.498 af, Atten= 39%, Lag= 12.3 min
Primary =	3.77 cfs @ 12.39 hrs, Volume= 0.498 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 327.21' @ 12.39 hrs Surf.Area= 0.080 ac Storage= 0.128 af

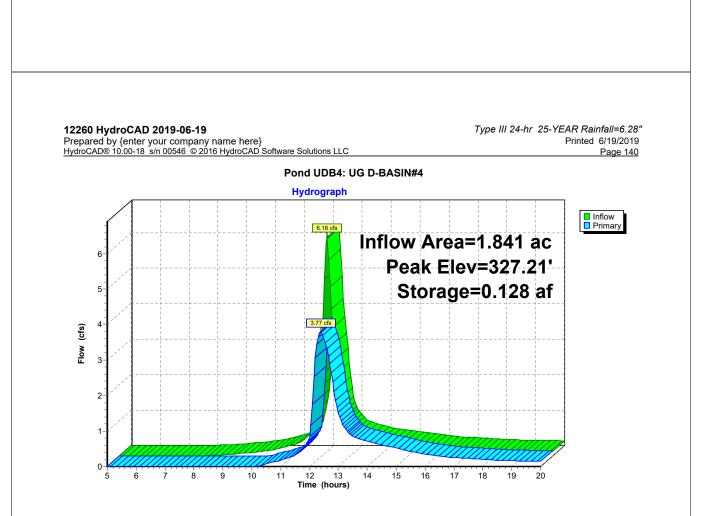
Plug-Flow detention time=44.1 min calculated for 0.498 af (96% of inflow) Center-of-Mass det. time=29.8 min ( 822.6 - 792.8 )

Volume	Invert	Avail.Storage	Storage Description
#1A	324.90'	0.071 af	39.50'W x 87.88'L x 3.50'H Field A
			0.279 af Overall - 0.102 af Embedded = 0.177 af x 40.0% Voids
#2A	325.40'	0.102 af	ADS_StormTech SC-740 x 96 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			Row Length Adjustment= +0.44' x 6.45 sf x 8 rows
		0.173 af	Total Available Storage
			-

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	325.30'	8.0" W x 4.0" H Vert. Orifice/Grate C= 0.600
#2	Primary	326.00'	12.0" W x 6.0" H Vert. 326 C= 0.600

Primary OutFlow Max=3.76 cfs @ 12.39 hrs HW=327.21' (Free Discharge) 1=Orifice/Grate (Orifice Controls 1.41 cfs @ 6.35 fps) 2=326 (Orifice Controls 2.35 cfs @ 4.70 fps)



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### Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

	······································
Subcatchment101S: P1-1	Runoff Area=173,800 sf 0.00% Impervious Runoff Depth>1.95" Flow Length=280' Tc=13.5 min CN=49 Runoff=7.11 cfs 0.648 af
Subcatchment102S: P1-2	Runoff Area=108,268 sf 32.75% Impervious Runoff Depth>5.43" Flow Length=334' Tc=14.1 min CN=81 Runoff=12.74 cfs 1.124 af
Subcatchment103s: P1-3	Runoff Area=80,176 sf 62.34% Impervious Runoff Depth>4.85" Flow Length=123' Slope=0.0200 // Tc=13.1 min CN=76 Runoff=8.78 cfs 0.745 af
Subcatchment104S: P1-4 Roof	Runoff Area=20,457 sf 100.00% Impervious Runoff Depth>7.17" Tc=6.0 min CN=98 Runoff=3.62 cfs 0.281 af
Subcatchment200S: P2	Runoff Area=18,522 sf 0.00% Impervious Runoff Depth>2.66" Flow Length=222' Tc=17.3 min CN=56 Runoff=0.99 cfs 0.094 af
Subcatchment301S: P3-1	Runoff Area=177,985 sf 34.44% Impervious Runoff Depth>2.88" Flow Length=279' Tc=6.0 min CN=58 Runoff=14.42 cfs 0.981 af
Subcatchment302S: P3-2	Runoff Area=40,507 sf 72.71% Impervious Runoff Depth>5.55" Flow Length=45' Slope=0.0500 '/' Tc=6.0 min CN=82 Runoff=6.13 cfs 0.430 af
Subcatchment303S: P3-3	Runoff Area=102,797 sf 64.58% Impervious Runoff Depth>5.43" Flow Length=110' Tc=9.3 min CN=81 Runoff=13.76 cfs 1.069 af
Subcatchment304S: P3-4	Runoff Area=97,832 sf 36.89% Impervious Runoff Depth>3.85" Flow Length=330' Tc=7.6 min CN=67 Runoff=10.19 cfs 0.721 af
Subcatchment305F: P3-5 FIELI	Runoff Area=167,683 sf 1.64% Impervious Runoff Depth>1.11" Flow Length=536' Slope=0.0200 '/' Tc=11.8 min CN=40 Runoff=3.23 cfs 0.355 af
Subcatchment305P: P3-5 PAV	Runoff Area=11,973 sf 100.00% Impervious Runoff Depth>7.17" Tc=6.0 min CN=98 Runoff=2.12 cfs 0.164 af

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Reach 36": (new Reach)	Avg. Flow Depth=1.33' Max Vel=7.74 fps Inflow=23.52 cfs 36.0" Round Pipe n=0.015 L=1,162.0' S=0.0100 '/' Capacity=57.81 cfs Outflow=23.26 cfs	
Reach 100R: Arcade Pond	Inflow=48.56 cfs Outflow=48.56 cfs	
Reach BSW: BioSwale at Drive	Avg. Flow Depth=0.79' Max Vel=2.70 fps Inflow=14.42 cfs n=0.035 L=1,063.0' S=0.0094 '/' Capacity=18.42 cfs Outflow=11.40 cfs	
Reach DP100: DP-1 Wetland	Inflow=7.11 cfs Outflow=7.11 cfs	
Pond 217: BYPASSMH #217	Peak Elev=318.24' Inflow=15.41 cfs Primary=2.61 cfs 0.877 af Secondary=12.81 cfs 0.641 af Outflow=15.41 cfs	
Pond BIO2: BIBASIN 3-2	Peak Elev=315.27' Storage=3,525 cf Inflow=1.70 cfs Discarded=0.20 cfs 0.153 af Primary=1.24 cfs 0.255 af Outflow=1.43 cfs	
Pond BR1: BioBasin#1	Peak Elev=329.11' Storage=3,100 cf Inflow=6.13 cfs Outflow=5.86 cfs	
Pond MH 230: Bypass MH #230	Peak Elev=330.49' Inflow=10.19 cfs Primary=1.70 cfs 0.469 af Secondary=8.49 cfs 0.252 af Outflow=10.19 cfs	
Pond SDB1: DB#1 Surface Det Basin	Peak Elev=331.00' Storage=9,765 cf Inflow=12.74 cfs Outflow=10.32 cfs	
Pond UDB2: UG DB #2	Peak Elev=316.81' Storage=0.552 af Inflow=13.76 cfs Outflow=2.45 cfs	
Pond UDB3: UG D-BASIN#3	Peak Elev=317.25' Storage=0.117 af Inflow=2.61 cfs Discarded=0.22 cfs 0.201 af Primary=3.06 cfs 0.571 af Outflow=3.28 cfs	
Pond UDB4: UG D-BASIN#4	Peak Elev=328.45' Storage=0.173 af Inflow=8.78 cfs Outflow=5.41 cfs	

Total Runoff Area = 22.957 ac Runoff Volume = 6.612 af Average Runoff Depth = 3.46" 68.61% Pervious = 15.752 ac 31.39% Impervious = 7.205 ac

12260 HydroCAD 2019-06-19 Prepared by {enter your company name here} HydroCAD® 10.00-18 s/n 00546 © 2016 HydroCAD Software Solutions LLC Type III 24-hr 100-YEAR Rainfall=8.03" Printed 6/19/2019 Page 144

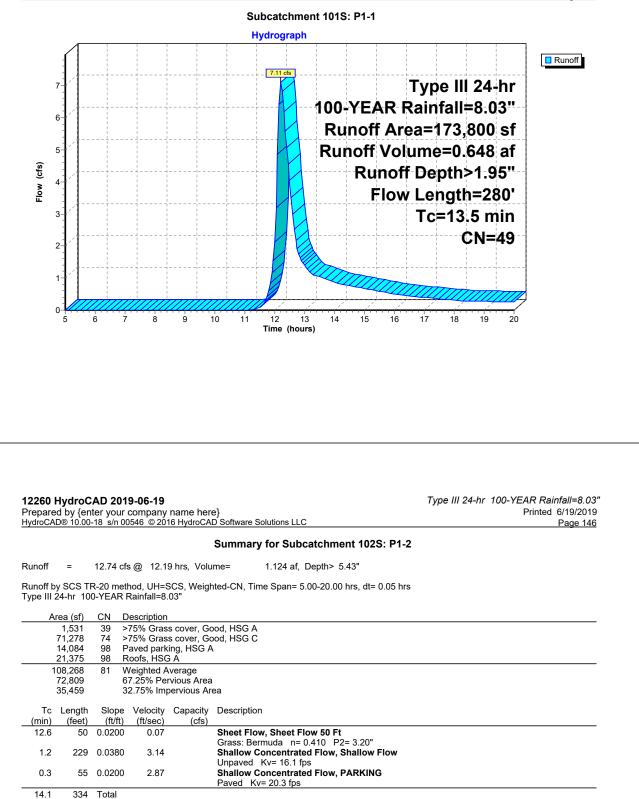
## Summary for Subcatchment 101S: P1-1

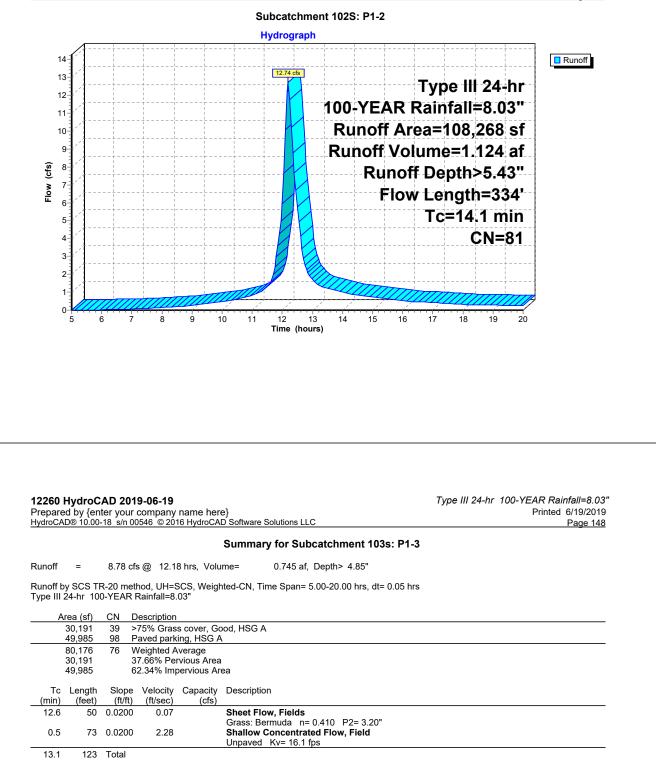
Runoff = 7.11 cfs @ 12.21 hrs, Volume= 0.648 af, Depth> 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 100-YEAR Rainfall=8.03"

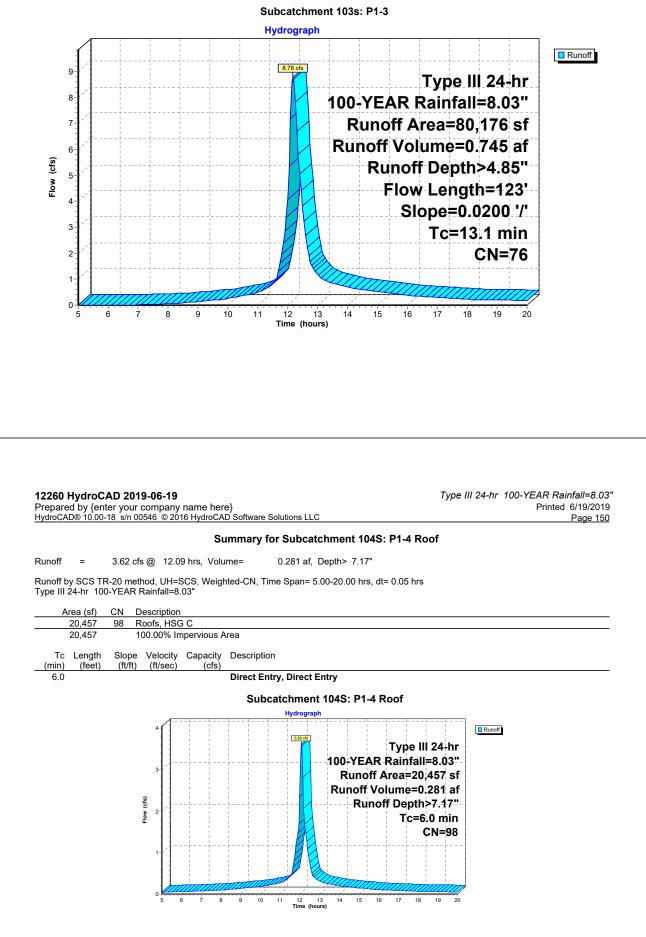
	A	rea (sf)	CN	Description		
		70,742	30	Woods, Go	od, HSG A	
		57,144	55	Woods, Go	od, HSG B	
_		45,914	70	Woods, Go	od, HSG C	
	1	73,800	49	Weighted A	verage	
	1	73,800		100.00% P	ervious Are	а
	-		<u>.</u>		<b>.</b>	<b>-</b> 14
	Tc	Length	Slop	,		Description
-	(min)	(feet)	(ft/ft	) (ft/sec)	(cfs)	
	12.3	50	0.020	0.07		Sheet Flow, Sheet Flow 50 Ft
						Woods: Light underbrush n= 0.400 P2= 3.20"
	1.2	230	0.038	) 3.14		Shallow Concentrated Flow, Shallow Flow
_						Unpaved Kv= 16.1 fps

13.5 280 Total





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# Summary for Subcatchment 200S: P2

Runoff = 0.99 cfs @ 12.26 hrs, Volume= 0.094 af, Depth> 2.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr  $\,$  100-YEAR Rainfall=8.03"

A	Area (sf) 0	<u>CN</u> 39	Description >75% Grass		ood HSG	Δ									
	0	30	Woods, Go			~									
	4,602	61	>75% Gras	s cover, G	ood, HSG	В									
	13,920 0		Woods, Go >75% Gras			c									
	0		Woods, Go			C									
	18,522		Weighted A		-										
	18,522		100.00% P	ervious Are	ea										
(min)	Length (feet)	(ft/f		Capacity (cfs)											
16.3	50	0.010	0 0.05				t Flow 50 Ft rbrush n= 0	400 02-	- 3 20"						
1.0	172	0.034	0 2.97		Shallow		ated Flow, \$								
17.3	222	Total													
2260	Hydro	CAD 20	)19-06-19							Туре	e III 24	1-hr 1	00-YE	AR Rain	nfall=8.03"
repare	ed by {e	nter you	1 <b>19-06-19</b> Ir company 00546 © 20	name her 16 HydroCA	D Software					Туре	e III 24	1-hr 1		Printed (	ofall=8.03" 6/19/2019 Page 152
repare	ed by {e	nter you	ir company	name her 16 HydroCA	AD Software	Subcatc	hment 200	9S: P2		Туре	e III 24	1-hr 1		Printed (	6/19/2019
Prepare	ed by {e	nter you	ir company	name her 16 HydroCA	AD Software		hment 200	)S: P2		Туре	e III 24	1-hr 1		Printed (	6/19/2019
repare	ed by {e	nter you	ir company	name her 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 Iph	S: P2		Туре	e III 24	1-hr 1		Printed	6/19/2019
Prepare	ed by {e	nter you	ir company	name her 16 HydroCA	AD Software	Subcatc	hment 200 Iph	IS: P2						Printed	6/19/2019 Page 152
repare	ed by {ei AD® 10.00	nter you	ir company	name her 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200			Гуре	e III	24.	hr	Printed	6/19/2019 Page 152
repare	ed by {ei AD® 10.00	nter you	ir company	name her 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200	'S: P2 YEA		Гуре	e III	24.	hr	Printed	6/19/2019 Page 152
repare	ed by {ei AD® 10.00	nter you	ir company	name her 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 iph 100	-YEA	RR	Гуре ainf	e III all=	24- :8.0	-hr 13"	Printed	6/19/2019 Page 152
repare	ed by {ei AD® 10.00	nter you	ir company	name her 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 Iph 100 F	-YEA lunof	R Ra f Are	Гуре ainf ea≕	e III all= 18,{	24- :8.0	-hr 3" sf	Printed	6/19/2019 Page 152
repare	ed by {ei AD® 10.00	nter you	ir company	name her 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 Iph 100 F	-YEA lunof	R Ra f Are	Гуре ainf ea≕	e III all= 18,{	24- :8.0	-hr 3" sf	Printed	6/19/2019 Page 152
Prepare lydroCA	ed by {ei AD® 10.00	nter you	ir company	name her 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 Iph 100 F	-YEA Sunof	R Ra f Are Volu	ſype ainf ea=′	e III all= 18, <b>!</b> =0.(	24- :8.0 522 )94	hr 3" sf af	Printed	6/19/2019 Page 152
Prepare lydroCA	ed by {ei AD® 10.00	nter you	ir company	name her 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 Iph 100 F	-YEA Sunof	R Ra f Are	ſype ainf ea=′	e III all= 18, <b>!</b> =0.(	24- :8.0 522 )94	hr 3" sf af	Printed	6/19/2019 Page 152
Prepare lydroCA	ed by {ei AD® 10.00	nter you	ir company	name her 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 Iph 100 F	-YEA lunof noff \ Rur	R Ra f Are Volu noff I	ſype ainf ea= ime⊨ Dep	e III all= 18,: =0.( oth>	24- :8.0 522 )94 •2.6	hr 3" sf af 6"	Printed	6/19/2019 Page 152
repare	ed by {ei AD® 10.00	nter you	ir company	name her 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 Iph 100 F	-YEA lunof noff \ Rur	R Ra f Are Volu noff I Iow I	ſype ainf ea=′ Ime Dep Len	e III all= 18,: =0.( oth> gth	24- :8.0 522 )94 :2.6 =22	-hr 3" sf af 6" 22'	Printed	6/19/2019 Page 152
Prepare lydroCA	ed by {ei AD® 10.00	nter you	ir company	r name hei 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 Iph 100 F	-YEA lunof noff \ Rur	R Ra f Are Volu noff I Iow I	ſype ainf ea=′ Ime Dep Len	e III all= 18,: =0.( oth> gth	24- :8.0 522 )94 :2.6 =22	-hr 3" sf af 6" 22'	Printed	6/19/2019 Page 152
Prepare lydroCA	ed by {ei AD® 10.00	nter you	ir company	r name hei 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 Iph 100 F	-YEA lunof noff \ Rur	R Ra f Are Volu noff I Iow I	ſype ainf ea= ime⊨ Dep	<ul> <li>→ III</li> <li>all=</li> <li>18,</li> <li>=0.(</li> <li>th&gt;</li> <li>gth</li> <li>17.</li> </ul>	24- :8.0 522 )94 •2.6 =22 3 m	hr 3" sf af 6" 22'	Printed	6/19/2019 Page 152
Prepare lydroCA	ed by {ei AD® 10.00	nter you	ir company	r name hei 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 Iph 100 F	-YEA lunof noff \ Rur	R Ra f Are Volu noff I Iow I	ſype ainf ea=′ Ime Dep Len	<ul> <li>→ III</li> <li>all=</li> <li>18,</li> <li>=0.(</li> <li>th&gt;</li> <li>gth</li> <li>17.</li> </ul>	24- :8.0 522 )94 •2.6 =22 3 m	hr 3" sf af 6" 22'	Printed	6/19/2019 Page 152
Prepare lydroCA	ed by {ei AD® 10.00	nter you	ir company	r name hei 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 Iph 100 F	-YEA lunof noff \ Rur	R Ra f Are Volu noff I Iow I	ſype ainf ea=′ Ime Dep Len	<ul> <li>→ III</li> <li>all=</li> <li>18,</li> <li>=0.(</li> <li>th&gt;</li> <li>gth</li> <li>17.</li> </ul>	24- :8.0 522 )94 :2.6 =22	hr 3" sf af 6" 22'	Printed	6/19/2019 Page 152
Prepare lydroCA	ed by {ei AD® 10.00	nter you	ir company	r name hei 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 Iph 100 F	-YEA lunof noff \ Rur	R Ra f Are Volu noff I Iow I	ſype ainf ea=′ Ime Dep Len	<ul> <li>→ III</li> <li>all=</li> <li>18,</li> <li>=0.(</li> <li>th&gt;</li> <li>gth</li> <li>17.</li> </ul>	24- :8.0 522 )94 •2.6 =22 3 m	hr 3" sf af 6" 22'	Printed	6/19/2019 Page 152
Prepare lydroCA	ed by {ei AD® 10.00	nter you	ir company	r name hei 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 Iph 100 F	-YEA lunof noff \ Rur	R Ra f Are Volu noff I Iow I	ſype ainf ea=′ Ime Dep Len	<ul> <li>→ III</li> <li>all=</li> <li>18,</li> <li>=0.(</li> <li>th&gt;</li> <li>gth</li> <li>17.</li> </ul>	24- :8.0 522 )94 •2.6 =22 3 m	hr 3" sf af 6" 22'	Printed	6/19/2019 Page 152
Prepare lydroCA	ed by {ei AD® 10.00	nter you	ir company	r name hei 16 HydroCA	AD Software	Subcatc Hydrogra	hment 200 Iph 100 F	-YEA lunof noff \ Rur	R Ra f Are Volu noff I Iow I	ſype ainf ea=′ Ime Dep Len	<ul> <li>→ III</li> <li>all=</li> <li>18,</li> <li>=0.(</li> <li>th&gt;</li> <li>gth</li> <li>17.</li> </ul>	24- :8.0 522 )94 •2.6 =22 3 m	hr 3" sf af 6" 22'	Printed	6/19/2019 Page 152

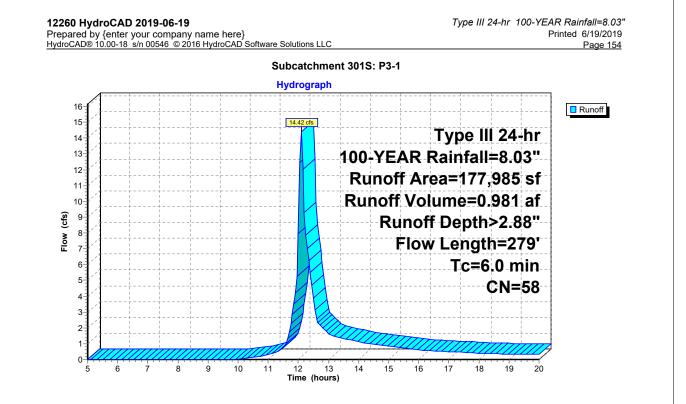
### Summary for Subcatchment 301S: P3-1

Runoff = 14.42 cfs @ 12.10 hrs, Volume= 0.981 af, Depth> 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 100-YEAR Rainfall=8.03"

	Ar	ea (sf)	CN	Description	1	
		45,255	39	>75% Gras	s cover, Go	bod, HSG A
	:	39,144	98	Paved park	king, HSG A	
		3,009	74	>75% Gras	s cover, Go	bod, HSG C
	4	59,632	30	Woods, Go	od, HSG A	
		8,798	70	Woods, Go	od, HSG C	
		22,147	98	Roofs, HSC	Ξ A	
	1	77,985	58	Weighted A	Verage	
	1	16,694		65.56% Pe	rvious Area	
	(	61,291		34.44% Im	pervious Ar	ea
		Length	Slope			Description
	(min)	(feet)	(ft/ft	(ft/sec)	(cfs)	
	4.8	44	0.0600	0.15		Sheet Flow, Sheet Flow 50 Ft
						Grass: Dense n= 0.240 P2= 3.20"
	0.5	235	0.2500	8.05		Shallow Concentrated Flow, HILL
						Unpaved Kv= 16.1 fps
_	0.7					Direct Entry, TO 6 MIN
	~ ~	070	<b>T</b> ( )			

6.0 279 Total

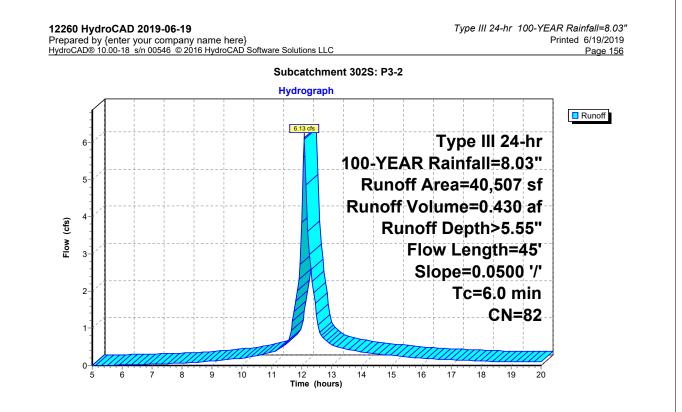


Summary fo	Subcatchment	302S: P3-2
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Runoff = 6.13 cfs @ 12.09 hrs, Volume= 0.430 af, Depth> 5.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 100-YEAR Rainfall=8.03"

A	rea (sf)	CN I	Description		
	11,056	39 :	>75% Gras	s cover, Go	bod, HSG A
	29,451	98 I	Paved park	ing, HSG A	
	40.507	82	Neighted A	verage	
	11.056			rvious Area	
	29,451	-	72.71% Im	pervious Ar	ea
Tc	Length	Slope		Capacity	Description
(min)	(feet)	(ft/ft)	/	(cfs)	
5.2	45	0.0500	0.14		Sheet Flow,
0.8					Grass: Dense n= 0.240 P2= 3.20" Direct Entry, DIRECT MAKE UP
6.0	45	Total			

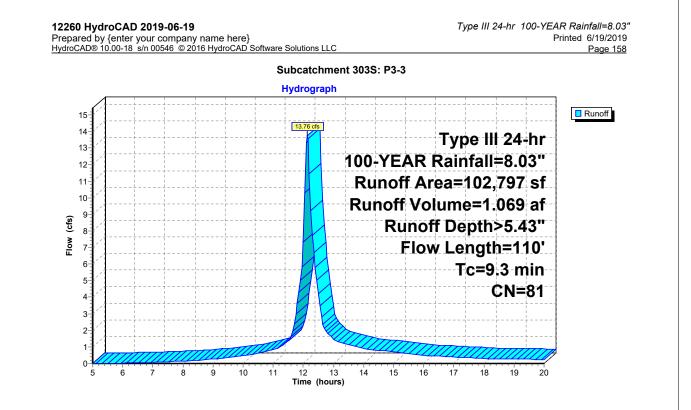


#### Summary for Subcatchment 303S: P3-3

Runoff = 13.76 cfs @ 12.13 hrs, Volume= 1.069 af, Depth> 5.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 100-YEAR Rainfall=8.03"

	Ar	ea (sf)	CN	Description		
		25,409				bod, HSG A
		11,002	74	>75% Gras	s cover, Go	bod, HSG C
		56,435	98	Paved park	ing, HSG A	N
		9,951	98	Roofs, HSC	θĂ	
	1	02,797	81	Weighted A	verage	
		36,411		35.42% Pe	rvious Area	
		66,386		64.58% Im	pervious Ar	ea
	Tc	Length	Slope	e Velocity	Capacity	Description
	(min)	(feet)	(ft/ft	(ft/sec)	(cfs)	
	9.0	50	0.0460	0.09		Sheet Flow, Landscape Lawn
						Grass: Bermuda n= 0.410 P2= 3.20"
	0.3	60	0.0200	) 2.87		Shallow Concentrated Flow,
						Paved Kv= 20.3 fps
_	9.3	110	Total			



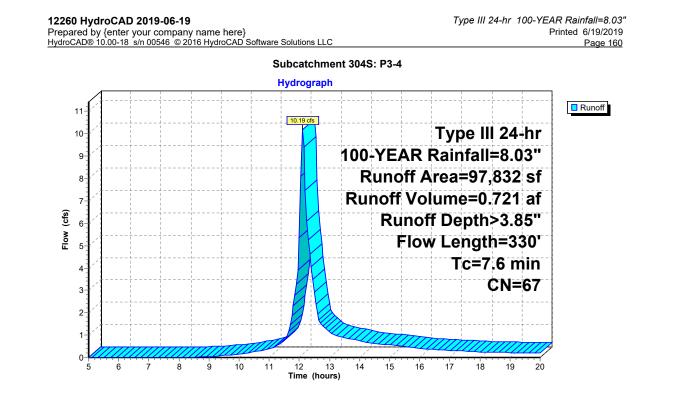
### Summary for Subcatchment 304S: P3-4

Runoff = 10.19 cfs @ 12.11 hrs, Volume= 0.721 af, Depth> 3.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 100-YEAR Rainfall=8.03"

_	Ai	rea (sf)	CN	Description		
		45,107	39	>75% Gras	s cover, Go	bod, HSG A
		16,631	74	>75% Gras	s cover, Go	bod, HSG C
		36,094	98	Paved park	ting, HSG A	N
_		97,832	67	Weighted A	verage	
		61,738		63.11% Pe	rvious Area	
		36,094		36.89% Im	pervious Ar	ea
	Tc	Length	Slope	e Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft	(ft/sec)	(cfs)	
	6.2	50	0.0400	0.13		Sheet Flow, Sheet Flow 50 Ft
						Grass: Dense n= 0.240 P2= 3.20"
	1.4	280	0.0420	3.30		Shallow Concentrated Flow, Shallow Flow
						Unpaved Ky= 16.1 fps

7.6 330 Total



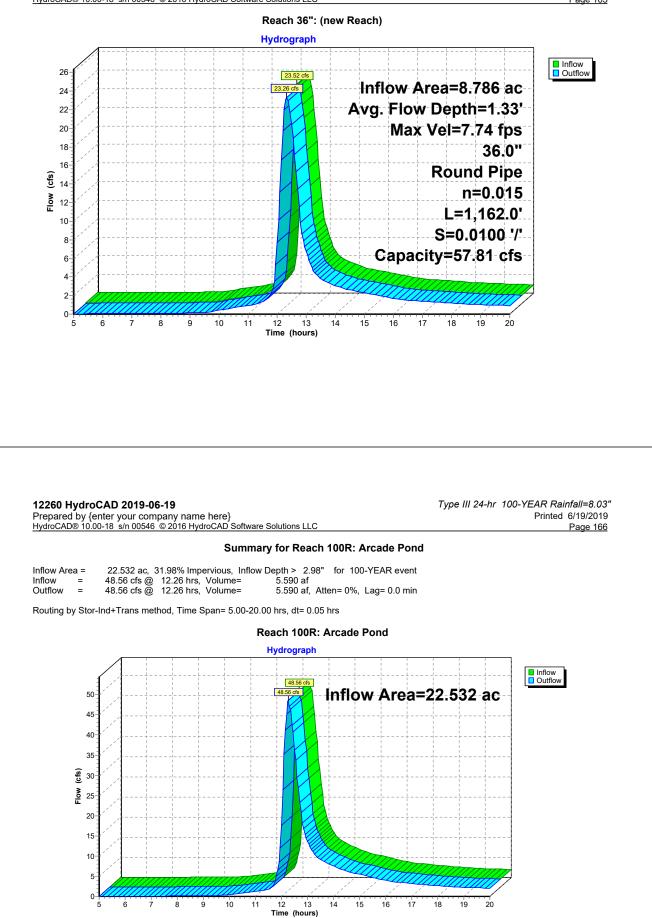
						Su	mmar	y ior	SUDO	alC	hment	3051	. ۳3-	-o r II	LD					
unoff	=	3.23	cfs @	12.22	2 hrs,	Volu	me=		0.355	af, C	)epth>	1.11"								
	oy SCS T 24-hr 10					Veigh	ited-CN	I, Tim	e Spar	า= 5.(	00-20.00	) hrs, (	dt= 0.0	)5 hrs	;					
	rea (sf) 64,925		Descri >75%		S COV	ar Go	od HS													
	2,758	98	Paved	parki	ng, H	SG A														
	167,683 164,925 2,758	40	Weigh 98.36% 1.64%	6 Per	vious	Area	а													
Tc (min)	Length (feet)	Slop (ft/ft	e Velo :) (ft/s	ocity sec)		acity (cfs)	Descr	iption												
8.2 3.6	50 486	0.020 0.020		0.10 2.28			Grass Shall	: Den ow Co	se n=	: 0.24 trated	<b>w 50 F</b> 0 P2= d Flow,	3.20"	ow Flo	w						
11.8	536	Total					Unpa	veu i	<u> </u>	. 1 1p3	5									
																	0.4 km			
repare	HydroC ed by {er D® 10.00	nter you	ir comp	bany i				are Sc	olutions	LLC					Tj	/pe III	24-hr	100-YE		Rainfall=8.03" ed 6/19/2019 Page 162
repare	ed by {er	nter you	ir comp	bany i			O Softw				305F:	23-5	FIELC	 D	Ţ	/pe III	24-hr	100-YE		ed 6/19/2019
repare	ed by {er	nter you	ir comp	bany i			O Softw	ubca		ent 3	305F: I	23-5	FIELC	<b>D</b>	<i>T</i> ]	/pe III	24-hr	100-YE		
repare ydroCA	ed by {er	nter you	ir comp	bany i			O Softw	ubca	tchme	ent 3 raph					Тур	pe-I	1-24	-hr	Printe	ed 6/19/2019
repare ydroCA	ed by {er .D® 10.00	nter you	ir comp	bany i			O Softw	ubca	tchme drogr	ent 3 raph	100	-YI	EAF	R R	Typ Rair	pe I Ifal	24  =8.	-hr 03"	Printe	ed 6/19/2019 Page 162
repare ydroCA	ed by {er .D® 10.00	nter you	ir comp	bany i			O Softw	ubca	tchme drogr	ent 3 raph	100 Ri	-YI	EAF	R R Are	Typ Rair ea=	pe I Ifal 167	24  =8. ,68;	-hr 03" 3 sf	Printe	ed 6/19/2019 Page 162
repare ydroCA	ed by {er .D® 10.00	nter you	ir comp	bany i			O Softw	ubca	tchme drogr	ent 3 raph	100 Ri	-YI unc	EAF off / ff V tun Flo	R R Are Oli off	Typ Rair ea= um De Le	pe I Ifall 167 e=0 pth ngt	II-24  =8. ,68∶ ,68∶ ,35∜  >1. h=5	-hr 03" 3 sf 5 af 11" 36'	Printe	ed 6/19/2019 Page 162
repare ydroCA	ed by {er D® 10.00	nter you	ir comp	bany i			O Softw	ubca	tchme drogr	ent 3 raph	100 Ri	-YI unc	EAF off / ff V tun Flo	R R Are Oli off	Tyr tair ea= um De Le ope	pe    167 e=0 pth ngt =0.1	24  =8. ,683 ,35!	-hr 03" 3 sf 5 af 11" 36' 0 '/'	Printe	ed 6/19/2019 Page 162
repare ydroCA	ed by {er D® 10.00	nter you	ir comp	bany i			O Softw	ubca	tchme drogr	ent 3 raph	100 Ri	-YI unc	EAF off / ff V tun Flo	R R Are Oli off	Tyr tair ea= um De Le ope	pe    167 e=0 pth ngt =0.1	l 24 =8. ,68: .35! >1. h=5 020	-hr 03" 3 sf 5 af 11" 36' 0 '/'	Printe	ed 6/19/2019 Page 162

# Summary for Subcatchment 305P: P3-5 PAV

Runoff = 2.12 cfs @ 12.09 hrs, Volume= 0.164 af, Depth> 7.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Type III 24-hr 100-YEAR Rainfall=8.03"

	rea (sf)		Description	<u>ı</u> king, HSG A												
	11,973 11,973	98		npervious A												
				•												
Tc (min)	Length (feet)	Slope (ft/ft		Capacity (cfs)	Description											
6.0	(1001)	(1010	) (10000)	(0.0)	Direct Entry	, DIRECT										
					-											
					Subca		t 305P: P	23-5 PA	AV							
						Hydrograp	h		1			1				
						2.12 cfs			-			Run	off			
			2		+++				Туре	11 2	24-hr					
							100-YE	EAR R	lainfa	all=8	3.03"					
								off Ar								
							Runo									
			Flow (cfs)				R	unoff								
			<sup>8</sup> 1-7 <sup>−</sup>		+++				Tc=	- i	min					
										ÇN	<b>1=98</b>					
											Ì					
					mmm		Thin	m	1							
			0	6 7 8	9 10 1	1 12	13 14 15	5 16		40	19 20					
			5	U 1 0	9 IU 1	1 12 Time (hou	13 14 15 Irs)	01 0	17 1	18 1	13 20					
12260	Hudro		10.06.10								Tupe		r 100	VEAD	Painfall	8 02"
			<b>19-06-19</b>	y name here							Туре	III 24-h	r 100-		Rainfall=	
Prepare	ed by {en	iter you	r company	r name here	e} D Software So	lutions LLC					Туре	III 24-h	r 100-		ted 6/19/	
Prepare	ed by {en	iter you	r company		O Software So						Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare	ed by {en	iter you	r company					new R	(each)	)	Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare HydroCA	ed by {en . <u>D® 10.00</u>	iter you -18 s/n	r company 00546 © 20	16 HydroCAI	O Software So	for Rea	ch 36": (				Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare <u>HydroCA</u> Inflow Ar Inflow	ed by {en . <u>D® 10.00</u> rea = =	ter you <u>-18 s/n</u> 8.786 23.52 (	r company 00546 © 20 6 ac, 27.67 cfs @ 12.2	16 HydroCAI % Imperviou % hrs, Volu	<u>Software So</u> Summary us, Inflow De me=	r <b>for Rea</b> pth > 3.6 2.673 af	<b>ch 36": (</b> 5" for 10	0-YEAF	Revent	it	Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare <u>HydroCA</u> Inflow Ar Inflow	ed by {en . <u>D® 10.00</u> rea = =	ter you <u>-18 s/n</u> 8.786 23.52 (	r company 00546 © 20 6 ac, 27.67 cfs @ 12.2	16 HydroCAI	<u>Software So</u> Summary us, Inflow De me=	r <b>for Rea</b> pth > 3.6 2.673 af	ch 36": (	0-YEAF	Revent	it	Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare HydroCA Inflow Ar Inflow Outflow Routing	ed by {en . <u>D® 10.00</u> rea = = = by Stor-Ii	8.786 8.786 23.52 0 23.26 0 nd+Trar	r company 00546 © 20 6 ac, 27.67 cfs @ 12.2 cfs @ 12.3 as method,	16 HydroCAI % Imperviou 26 hrs, Volu 33 hrs, Volu Time Span=	D Software So Summary us, Inflow De me= me= 5.00-20.00 h	t <b>for Rea</b> pth > 3.6 2.673 af 2.662 af,	<b>ch 36": (</b> 5" for 10 Atten= 1%,	0-YEAF	Revent	it	Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare HydroCA Inflow Ar Inflow Outflow Routing Max. Vel	ed by {en .D® 10.00 rea = = = by Stor-In locity= 7.	8.786 8.786 23.52 ( 23.26 ( nd+Trar 74 fps,	r company 00546 © 20 6 ac, 27.67 fs @ 12.2 ofs @ 12.3 as method, Min. Trave	16 HydroCAI % Imperviou 26 hrs, Volu 33 hrs, Volu Time Span= I Time= 2.5	D Software So Summary us, Inflow De me= me= 5.00-20.00 h min	t <b>for Rea</b> pth > 3.6 2.673 af 2.662 af,	<b>ch 36": (</b> 5" for 10 Atten= 1%,	0-YEAF	Revent	it	Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare HydroCA Inflow Ar Inflow Outflow Routing Max. Vel	ed by {en .D® 10.00 rea = = = by Stor-In locity= 7.	8.786 8.786 23.52 ( 23.26 ( nd+Trar 74 fps,	r company 00546 © 20 6 ac, 27.67 fs @ 12.2 ofs @ 12.3 as method, Min. Trave	16 HydroCAI % Imperviou 26 hrs, Volu 33 hrs, Volu Time Span=	D Software So Summary us, Inflow De me= me= 5.00-20.00 h min	t <b>for Rea</b> pth > 3.6 2.673 af 2.662 af,	<b>ch 36": (</b> 5" for 10 Atten= 1%,	0-YEAF	Revent	it	Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare HydroCA Inflow Ar Inflow Outflow Routing Max. Vel Avg. Vel Peak Sto	ed by {en <u>D® 10.00</u> rea = = = by Stor-III locity= 7. ocity = 3. prage= 3,	8.786 8.786 23.52 ( 23.26 ( nd+Trar 74 fps, 10 fps, 501 cf (	r company 00546 © 20 6 ac, 27.67 5fs @ 12.2 ofs @ 12.3 as method, Min. Trave Avg. Trave @ 12.29 hrs	16 HydroCAI % Imperviou 16 hrs, Volui 13 hrs, Volui Time Span= 1 Time= 2.5 el Time= 6.2	D Software So Summary us, Inflow De me= me= 5.00-20.00 h min	t <b>for Rea</b> pth > 3.6 2.673 af 2.662 af,	<b>ch 36": (</b> 5" for 10 Atten= 1%,	0-YEAF	Revent	it	Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare HydroCA Inflow Ar Inflow Outflow Routing Max. Vel Avg. Vel Peak Sto Average	ed by {en <u>D</u> ® 10.00 rea = = by Stor-II locity= 7. ocity = 3. Drage= 3. Depth ai	8.786 8.786 23.52 ( 23.26 ( nd+Trar 74 fps, 10 fps, 501 cf ( t Peak S	r company 00546 © 20 5 ac, 27.67 ofs @ 12.2 ofs @ 12.3 as method, Min. Trave Avg. Trave @ 12.29 hrs Storage= 1.	16 HydroCAI % Imperviou 26 hrs, Voluu 33 hrs, Voluu Time Span= 1 Time= 2.5 21 Time= 6.2 33'	Summary Summary us, Inflow De me= me= 5,00-20.00 f min min	pth > 3.6 2.673 af 2.662 af, . nrs, dt= 0.0	<b>ch 36": (</b> 5" for 10 Atten= 1%,	0-YEAF	Revent	it	Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare HydroCA Inflow Ar Inflow Outflow Routing Max. Vel Avg. Vel Peak Sto Average Bank-Fu	ed by {en D® 10.00 rea = = by Stor-II locity = 7. locity = 3. orage = 3. o Depth ai II Depth=	8.786 23.52 c 23.26 c nd+Trar 74 fps, 10 fps, 501 cf ( t Peak S : 3.00' F	r company 00546 © 20 5 ac, 27.67 ofs @ 12.2 ofs @ 12.3 as method, Min. Trave Avg. Trave @ 12.29 hrs Storage= 1.	16 HydroCAI % Imperviou 26 hrs, Voluu 33 hrs, Voluu Time Span= 1 Time= 2.5 21 Time= 6.2 33'	D Software So Summary us, Inflow De me= me= 5.00-20.00 h min	pth > 3.6 2.673 af 2.662 af, . nrs, dt= 0.0	<b>ch 36": (</b> 5" for 10 Atten= 1%,	0-YEAF	Revent	it	Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare HydroCA Inflow Ar Inflow Outflow Routing Max. Vel Avg. Vel Peak Sto Average Bank-Fu 36.0" Ro	ed by {en <u>D® 10.00</u> rea = = by Stor-II locity= 7. ocity = 3. orage= 3. Depth ai II Depth= ound Pip.	8.786 23.52 c 23.26 c nd+Trar 74 fps, 10 fps, 501 cf ( t Peak S : 3.00' F	r company 00546 © 20 5 ac, 27.67 ofs @ 12.2 ofs @ 12.3 as method, Min. Trave Avg. Trave @ 12.29 hrs Storage= 1.	16 HydroCAI % Imperviou 26 hrs, Voluu 33 hrs, Voluu Time Span= 1 Time= 2.5 21 Time= 6.2 33'	Summary Summary us, Inflow De me= me= 5,00-20.00 f min min	pth > 3.6 2.673 af 2.662 af, . nrs, dt= 0.0	<b>ch 36": (</b> 5" for 10 Atten= 1%,	0-YEAF	Revent	it	Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare HydroCA Inflow Ar Inflow Outflow Routing I Max. Vel Avg. Vel Peak Stc Average Bank-Fu 36.0" Rc n= 0.015	ed by {en <u>D</u> ® 10.00 rea = = = by Stor-II locity= 7. ocity = 3. orage= 3. Depth al II Depth= ound Pip. 5	8.786 23.520 23.260 nd+Trar 74 fps, 10 fps, 501 cf ( t Peak S : 3.00' F e	r company 00546 © 20 6 ac, 27.67 cfs @ 12.2 cfs @ 12.3 as method, Min. Trave Avg. Trave Q 12.29 hr: torage= 1. Flow Area=	16 HydroCAI % Imperviou 26 hrs, Voluu 33 hrs, Voluu Time Span= 1 Time= 2.5 21 Time= 6.2 33'	Summary Summary us, Inflow De me= me= 5,00-20.00 f min min	pth > 3.6 2.673 af 2.662 af, . nrs, dt= 0.0	<b>ch 36": (</b> 5" for 10 Atten= 1%,	0-YEAF	Revent	it	Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare HydroCA Inflow Ar Inflow Outflow Routing Max. Vel Avg. Vel Avg. Vel Peak Sto Average Bank-Fu 36.0" Ro n= 0.015 Length=	ed by {en <u>D® 10.00</u> rea = = by Stor-II locity = 7. oocity = 3. orage = 3. Depth ai II Depth= ound Pip. 5. 1,162.0'	8.786 23.52 ( 23.26 ( ad+Trar 74 fps, 10 fps, 501 cf ( t Peak § : 3.00' F e Slope:	r company 00546 © 20 5 ac, 27.67 ofs @ 12.2 ofs @ 12.3 as method, Min. Trave Avg. Trave @ 12.29 hrs Storage= 1.	16 HydroCAI % Imperviou 6 hrs, Volui 33 hrs, Volui 33 hrs, Volui Time Span= 1 Time= 2.5 el Time= 6.2 s 33' 7.1 sf, Cap	Summary Summary us, Inflow De me= me= 5,00-20.00 f min min	pth > 3.6 2.673 af 2.662 af, . nrs, dt= 0.0	<b>ch 36": (</b> 5" for 10 Atten= 1%,	0-YEAF	Revent	it	Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare HydroCA Inflow Ar Inflow Outflow Routing Max. Vel Avg. Vel Avg. Vel Peak Sto Average Bank-Fu 36.0" Ro n= 0.015 Length=	ed by {en <u>D® 10.00</u> rea = = by Stor-II locity = 7. oocity = 3. orage = 3. Depth ai II Depth= ound Pip. 5. 1,162.0'	8.786 23.52 ( 23.26 ( ad+Trar 74 fps, 10 fps, 501 cf ( t Peak § : 3.00' F e Slope:	r company 00546 © 20 5 ac, 27.67 cfs @ 12.2 cfs @ 12.2 cfs @ 12.3 as method, Min. Trave Avg. Trave @ 12.29 hr: ctorage= 1. -low Area= = 0.0100 '/'	16 HydroCAI % Imperviou 6 hrs, Volui 33 hrs, Volui 33 hrs, Volui Time Span= 1 Time= 2.5 el Time= 6.2 s 33' 7.1 sf, Cap	Summary Summary us, Inflow De me= me= 5,00-20.00 f min min	pth > 3.6 2.673 af 2.662 af, . nrs, dt= 0.0	<b>ch 36": (</b> 5" for 10 Atten= 1%,	0-YEAF	Revent	it	Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare HydroCA Inflow Ar Inflow Outflow Routing Max. Vel Avg. Vel Avg. Vel Peak Sto Average Bank-Fu 36.0" Ro n= 0.015 Length=	ed by {en <u>D® 10.00</u> rea = = by Stor-II locity = 7. oocity = 3. orage = 3. Depth ai II Depth= ound Pip. 5. 1,162.0'	8.786 23.52 ( 23.26 ( ad+Trar 74 fps, 10 fps, 501 cf ( t Peak § : 3.00' F e Slope:	r company 00546 © 20 5 ac, 27.67 cfs @ 12.2 cfs @ 12.2 cfs @ 12.3 as method, Min. Trave Avg. Trave @ 12.29 hr: ctorage= 1. -low Area= = 0.0100 '/'	16 HydroCAI % Imperviou 6 hrs, Volui 33 hrs, Volui 33 hrs, Volui Time Span= 1 Time= 2.5 el Time= 6.2 s 33' 7.1 sf, Cap	Summary Summary us, Inflow De me= me= 5,00-20.00 f min min	pth > 3.6 2.673 af 2.662 af, . nrs, dt= 0.0	<b>ch 36": (</b> 5" for 10 Atten= 1%,	0-YEAF	Revent	it	Туре	III 24-h	r 100-		ted 6/19/	2019
Prepare HydroCA Inflow Ar Inflow Outflow Routing Max. Vel Avg. Vel Avg. Vel Peak Sto Average Bank-Fu 36.0" Ro n= 0.015 Length=	ed by {en <u>D® 10.00</u> rea = = by Stor-II locity = 7. oocity = 3. orage = 3. Depth ai II Depth= ound Pip. 5. 1,162.0'	8.786 23.52 ( 23.26 ( ad+Trar 74 fps, 10 fps, 501 cf ( t Peak § : 3.00' F e Slope:	r company 00546 © 20 5 ac, 27.67 cfs @ 12.2 cfs @ 12.2 cfs @ 12.3 as method, Min. Trave Avg. Trave @ 12.29 hr: ctorage= 1. -low Area= = 0.0100 '/'	16 HydroCAI % Imperviou 6 hrs, Volui 33 hrs, Volui 33 hrs, Volui Time Span= 1 Time= 2.5 el Time= 6.2 s 33' 7.1 sf, Cap	Summary Summary us, Inflow De me= me= 5,00-20.00 f min min	pth > 3.6 2.673 af 2.662 af, . nrs, dt= 0.0	<b>ch 36": (</b> 5" for 10 Atten= 1%,	0-YEAF	Revent	it	Туре	III 24-h	r 100-		ted 6/19/	2019



### Summary for Reach BSW: BioSwale at Drive

 Inflow Area =
 4.086 ac, 34.44% Impervious, Inflow Depth > 2.88" for 100-YEAR event

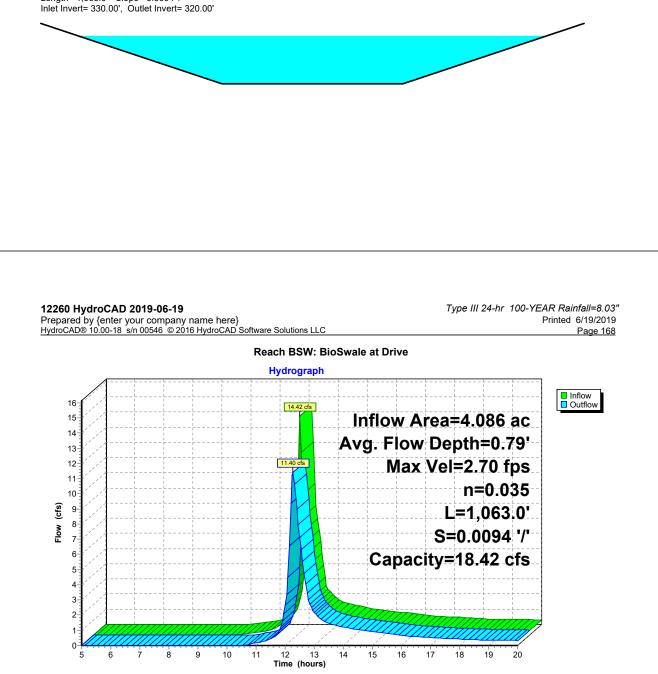
 Inflow =
 14.42 cfs @
 12.10 hrs, Volume=
 0.981 af

 Outflow =
 11.40 cfs @
 12.27 hrs, Volume=
 0.969 af, Atten= 21%, Lag= 10.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Max. Velocity= 2.70 fps, Min. Travel Time= 6.6 min Avg. Velocity = 1.14 fps, Avg. Travel Time= 15.5 min

Peak Storage= 4,544 cf @ 12.17 hrs Average Depth at Peak Storage= 0.79' Defined Flood Depth= 1.25' Flow Area= 8.2 sf, Capacity= 27.79 cfs Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 18.42 cfs

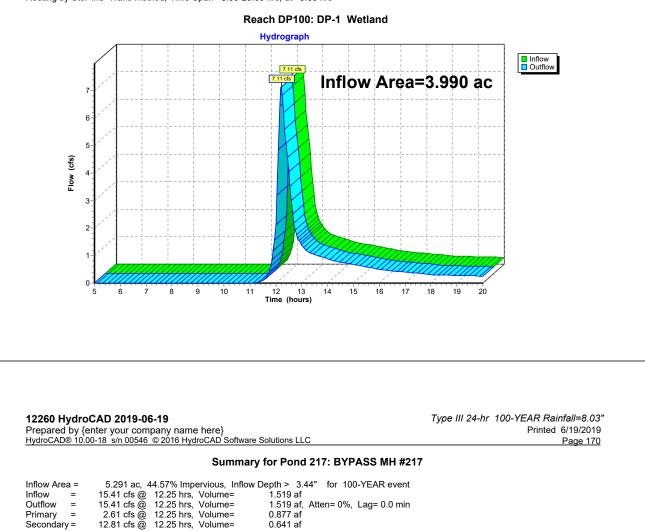
3.00' x 1.00' deep channel, n= 0.035 Earth, dense weeds Side Slope Z-value= 3.0 '/' Top Width= 9.00' Length= 1,063.0' Slope= 0.0094 '/' Inlet Invert= 330 00' Outlet Invert= 320 00'



#### Summary for Reach DP100: DP-1 Wetland

Inflow Area =	3.990 ac,	0.00% Impervious, Inflow Dep	th > 1.95" for 10	0-YEAR event
Inflow =	7.11 cfs @	12.21 hrs, Volume= 0	.648 af	
Outflow =	7.11 cfs @	12.21 hrs, Volume= 0	.648 af, Atten= 0%,	Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

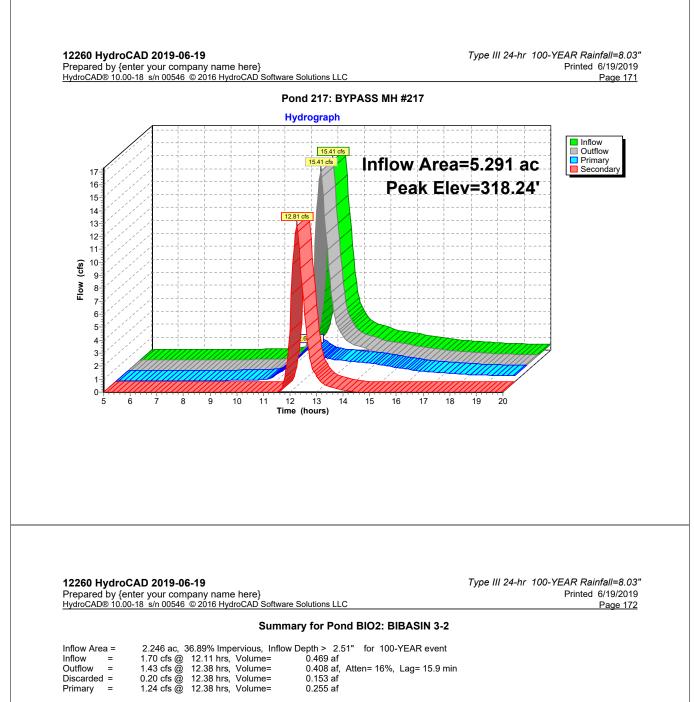


Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 318.24' @ 12.25 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	315.50'	8.0" Vert. Orifice/Grate C= 0.600
#2	Secondary	316.52'	24.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=2.60 cfs @ 12.25 hrs HW=318.23' (Free Discharge)

Secondary OutFlow Max=12.78 cfs @ 12.25 hrs HW=318.23' (Free Discharge) -2=Orifice/Grate (Orifice Controls 12.78 cfs @ 4.46 fps)



Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs Peak Elev= 315.27'@ 12.38 hrs Surf.Area= 3,516 sf Storage= 3,525 cf

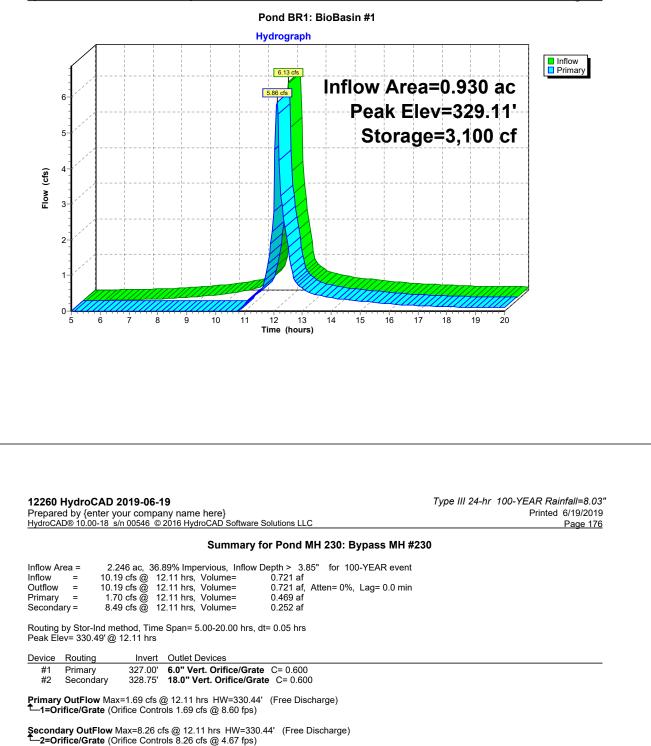
Plug-Flow detention time=71.1 min calculated for 0.406 af (87% of inflow) Center-of-Mass det. time= 30.6 min ( 861.2 - 830.6 )

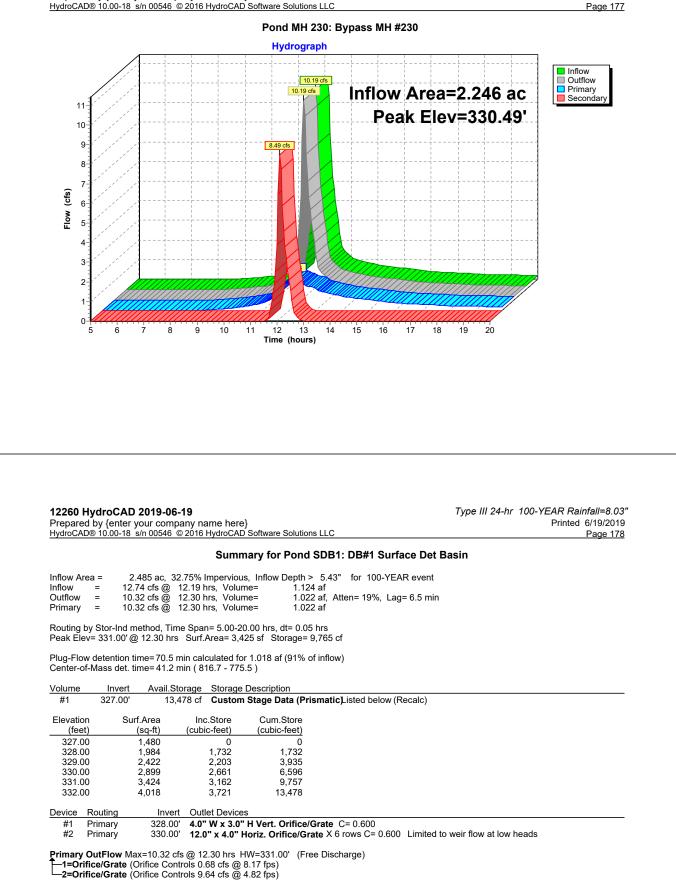
Volume	Invert	Avail.Sto	rage Storage	Description	
#1	314.00'	6,41	12 cf Custon	n Stage Data (Pris	smatic)_isted below (Recalc)
Elevatio (fee		ırf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
314.0 315.0 316.0	00	2,047 3,194 4,388	0 2,621 3,791	0 2,621 6,412	
Device	Routing	Invert	Outlet Device	s	
#1 #2 #3	Primary Discarded Primary	315.50' 314.00' 315.00'	2.410 in/hr E	xfiltration over H	e X 6.00 columnsX 6 rows C= 0.600 Limited to weir flow at low heads lorizontal area .43 C= 0.600 Limited to weir flow at low heads

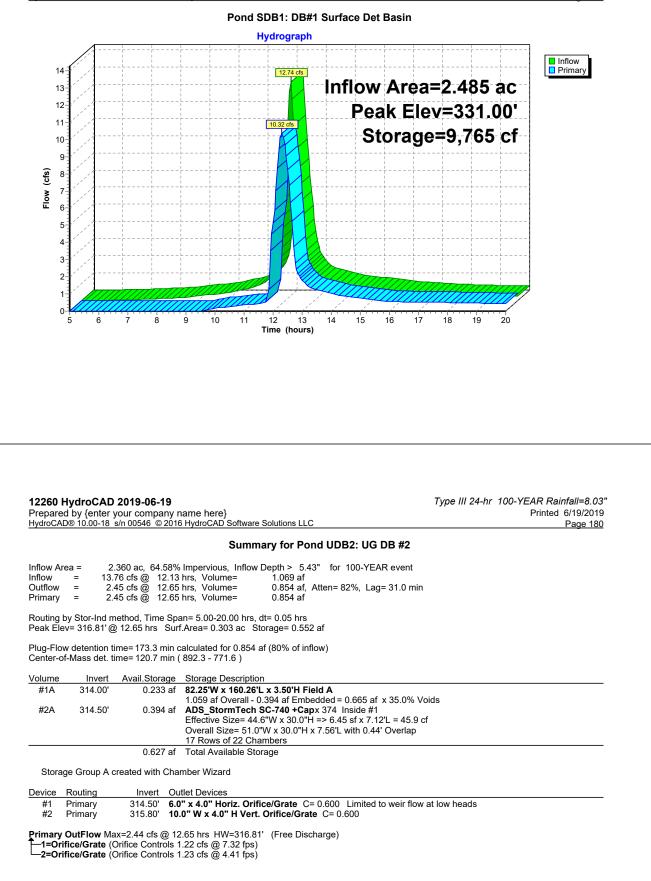
**Discarded OutFlow** Max=0.20 cfs @ 12.38 hrs HW=315.27' (Free Discharge) **2=Exfiltration** (Exfiltration Controls 0.20 cfs)

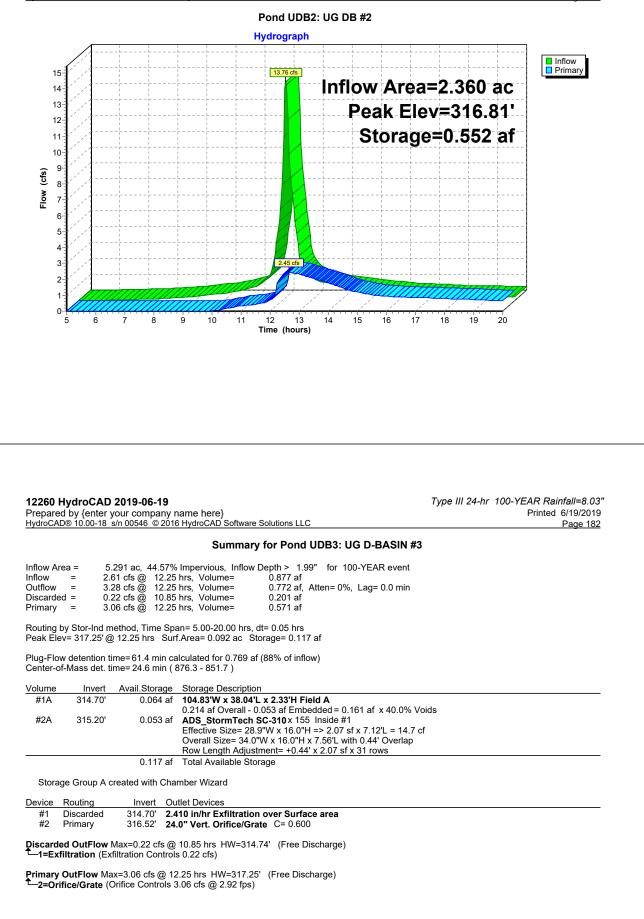
Primary OutFlow Max=1.24 cfs @ 12.38 hrs HW=315.27' (Free Discharge) 1=Orifice/Grate (Controls 0.00 cfs) 3=Orifice/Grate (Weir Controls 1.24 cfs @ 0.73 fps)

			BIBASIN 3-2		
		Hydrograph	Peak El	a=2.246 ac ev=315.27' je=3,525 cf	<ul> <li>Inflow</li> <li>Outflow</li> <li>Discarded</li> <li>Primary</li> </ul>
Elow (cts)		124 cfs			
	7 8 9 10	11 12 13 14 Time (hours)	15 16 17 1	8 19 20	7
Prepared by {enter	our company name here}	Software Solutions LLC		Type III 24-hr 10	0-YEAR Rainfall=8.03 Printed 6/19/2019 Page 174
<b>12260 HydroCAD</b> Prepared by {enter y HydroCAD® 10.00-18	our company name here} /n 00546 © 2016 HydroCAD \$	Software Solutions LLC	I BR1: BioBasin #1	Type III 24-hr 10	
Prepared by {enter y           HydroCAD® 10.00-18           Inflow Area =         0.           Inflow =         6.           Outflow =         5.4	our company name here} /n 00546 © 2016 HydroCAD \$	Software Solutions LLC           Summary for Ponc           , Inflow Depth > 5.55"           e=         0.430 af           e=         0.385 af, Al		Type III 24-hr 10	Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18 Inflow Area = 0 Inflow = 6. Outflow = 5. Primary = 5.4 Routing by Stor-Ind m	our company name here} /n 00546 © 2016 HydroCAD ( 930 ac, 72.71% Impervious, 3 cfs @ 12.09 hrs, Volumo 66 cfs @ 12.12 hrs, Volumo	Software Solutions LLC           Summary for Ponce           , Inflow Depth > 5.55"           e=         0.430 af           e=         0.385 af, Ai           e=         0.385 af           .00 hrs, dt=         0.05 hrs	' for 100-YEAR event tten= 4%, Lag= 1.6 min	Type III 24-hr 10	Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18 Inflow = 0. Outflow = 5. Primary = 5. Routing by Stor-Ind m Peak Elev= 329.11' @ Plug-Flow detention ti	our company name here} <u>/n 00546 © 2016 HydroCAD (</u> 930 ac, 72.71% Impervious, 3 cfs @ 12.09 hrs, Volume 16 cfs @ 12.12 hrs, Volume 16 cfs @ 12.12 hrs, Volume ethod, Time Span= 5.00-20.	Software Solutions LLC           Summary for Ponce           , Inflow Depth > 5.55"           e=         0.430 af           e=         0.385 af           e=         0.385 af           .00 hrs, dt= 0.05 hrs           9 sf         Storage= 3,100 c           0.385 af         90% of inflow	' for 100-YEAR event tten= 4%, Lag= 1.6 min f	Type III 24-hr 10	Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18 Inflow Area = 0. Inflow = 6. Outflow = 5. Primary = 5. Routing by Stor-Ind m Peak Elev= 329.11'@ Plug-Flow detention ti Center-of-Mass det. ti Volume Invert	our company name here} <u>/n 00546 © 2016 HydroCAD 5</u> 930 ac, 72.71% Impervious, 3 cfs @ 12.09 hrs, Volumu 66 cfs @ 12.12 hrs, Volumu 66 cfs @ 12.12 hrs, Volumu ethod, Time Span= 5.00-20. 12.11 hrs Surf.Area= 2,25 me=62.3 min calculated for me=28.1 min ( 794.9 - 766.5 <u>Avail.Storage Storage E</u>	Software Solutions LLC           Summary for Ponce           e         0.430 af           e         0.385 af, Al           e         0.385 af           0.00 hrs, dt= 0.05 hrs           69 sf Storage= 3,100 c           0.385 af (90% of inflow           9)           Description	' for 100-YEAR event tten= 4%, Lag= 1.6 min f /)	Type III 24-hr 10	Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18 Inflow Area = 0 Dutflow = 6. Outflow = 5. Primary = 5. Routing by Stor-Ind m Peak Elev= 329.11' @ Plug-Flow detention ti Center-of-Mass det. ti	our company name here} <u>/n 00546 © 2016 HydroCAD 5</u> 930 ac, 72.71% Impervious, 3 cfs @ 12.09 hrs, Volumu 66 cfs @ 12.12 hrs, Volumu 66 cfs @ 12.12 hrs, Volumu ethod, Time Span= 5.00-20. 12.11 hrs Surf.Area= 2,25 me=62.3 min calculated for me=28.1 min ( 794.9 - 766.5 <u>Avail.Storage Storage E</u>	Software Solutions LLC           Summary for Ponce           , Inflow Depth > 5.55"           e=         0.430 af           e=         0.385 af, Ai           e=         0.385 af           .00 hrs, dt=         0.05 hrs           9 sf         Storage=           9 )	' for 100-YEAR event tten= 4%, Lag= 1.6 min f /)	Type III 24-hr 10	Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18           Inflow Area =         0           Inflow =         6.           Outflow =         5.           Primary =         5.           Routing by Stor-Ind m Peak Elev= 329.11' @           Plug-Flow detention ti Center-of-Mass det. ti <u>volume Invert</u> #1 327.00'           Elevation         Sur	our company name here} /n 00546 © 2016 HydroCAD ( 930 ac, 72.71% Impervious, 3 cfs @ 12.09 hrs, Volume 6 cfs @ 12.12 hrs, Volume 16 cfs @ 12.12 hrs, Volume 16 cfs @ 12.12 hrs, Volume 12.11 hrs Surf.Area= 2,25 me= 62.3 min calculated for me= 28.1 min ( 794.9 - 766.9 <u>Avail.Storage Storage E</u> 5,450 cf <b>Custom S</b> 2. Area Inc.Store	Software Solutions LLC           Summary for Ponc           , Inflow Depth > 5.55"           e=         0.430 af           e=         0.385 af, Ai           e=         0.385 af           .00 hrs, dt=         0.05 hrs           9 sf         Storage=           0.385 af (90% of inflow           9)         Description           Stage Data (Prismatic Cum.Store	' for 100-YEAR event tten= 4%, Lag= 1.6 min f /)	Type III 24-hr 10	Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18 Inflow Area = 0 Inflow = 6. Outflow = 5. Primary = 5. Routing by Stor-Ind m Peak Elev= 329.11' @ Plug-Flow detention ti Center-of-Mass det. ti Volume Invert #1 327.00' Elevation Sur (feet) 327.00	our company name here} <u>/n 00546 © 2016 HydroCAD 5</u> 930 ac, 72.71% Impervious, 3 cfs @ 12.09 hrs, Volume 66 cfs @ 12.12 hrs, Volume 66 cfs @ 12.12 hrs, Volume ethod, Time Span= 5.00-20. 12.11 hrs Surf.Area= 2,25 me=62.3 min calculated for me= 28.1 min ( 794.9 - 766.5 <u>Avail.Storage Storage E</u> 5,450 cf <b>Custom 5</b> 5.Area Inc.Store (sq-ft) (cubic-feet) 888 0	Software Solutions LLC           Summary for Ponce           e         0.430 af           e         0.385 af, Al           e         0.385 af           .00 hrs, dt= 0.05 hrs           99 sf Storage= 3,100 c           0.385 af (90% of inflow           9)           Description           Stage Data (Prismatic           Cum.Store           (cubic-feet)           0	' for 100-YEAR event tten= 4%, Lag= 1.6 min f /)	Type III 24-hr 10	Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18 Inflow Area = 0 Inflow = 6. Outflow = 5. Primary = 5. Routing by Stor-Ind m Peak Elev= 329.11' @ Plug-Flow detention ti Center-of-Mass det. ti <u>Volume Invert</u> #1 327.00 328.00 329.00	our company name here} <u>in 00546 © 2016 HydroCAD</u> ( 930 ac, 72.71% Impervious, 3 cfs @ 12.09 hrs, Volume 6 cfs @ 12.12 hrs, Volume 16 cfs @ 12.12 hrs, Volume 16 cfs @ 12.12 hrs, Volume 12.11 hrs Surf.Area= 2,25 me=62.3 min calculated for me=28.1 min ( 794.9 - 766.5 <u>Avail.Storage Storage E</u> 5,450 cf <b>Custom S</b> Carea Inc.Store (sq-ft) (cubic-feet) 888 0 1,328 1,108 2,162 1,745	Software Solutions LLC           Summary for Ponc           , Inflow Depth > 5.55"           e=         0.430 af           e=         0.385 af, Ai           e=         0.385 af           .00 hrs, dt= 0.05 hrs           9 sf Storage= 3,100 c           0.385 af (90% of inflow           9 )           Description           Stage Data (Prismatic           Cum.Store           (cubic-feet)           0           1,108           2,853	' for 100-YEAR event tten= 4%, Lag= 1.6 min f /)	Type III 24-hr 10	Printed 6/19/2019
Prepared by {enter y           HydroCAD® 10.00-18           HydroCAD® 10.00-18           Inflow = 0.           Inflow = 5.           Primary = 5.           Routing by Stor-Ind m           Peak Elev= 329.11' @           Plug-Flow detention ti           Center-of-Mass det. ti           Volume         Invert           #1         327.00'           Elevation         Sur (feet)           327.00         328.00           329.00         330.00	our company name here} <u>/n 00546 © 2016 HydroCAD 5</u> 930 ac, 72.71% Impervious, 3 cfs @ 12.09 hrs, Volume 66 cfs @ 12.12 hrs, Volume 66 cfs @ 12.12 hrs, Volume ethod, Time Span= 5.00-20. 12.11 hrs Surf.Area= 2,25 me=62.3 min calculated for me= 28.1 min ( 794.9 - 766.5 <u>Avail.Storage Storage E</u> 5,450 cf <b>Custom 5</b> <u>5,450 cf <b>Custom 5</b></u> <u>5,450 cf <b>Custom 5</b> <u>5,450 cf <b>Custom 5</b></u> <u>5,450 cf <b>Custom 5</b></u> <u>5,450 cf <b>Custom 5</b> <u>5,450 cf <b>Custom 5</b></u> <u>5,450 cf <b>Custom </b></u></u></u>	Software Solutions LLC           Summary for Ponce           , Inflow Depth > 5.55"           e=         0.430 af           e=         0.385 af, Al           e=         0.385 af           .00 hrs, dt= 0.05 hrs           i9 sf Storage= 3,100 c           0.385 af (90% of inflow           9 )           Description           Stage Data (Prismatic           Cum.Store           (cubic-feet)           0           1,108           2,853           5,450	' for 100-YEAR event tten= 4%, Lag= 1.6 min f /)	Type III 24-hr 10	Printed 6/19/2019
Prepared by {enter y HydroCAD® 10.00-18 Inflow Area = 0 Inflow = 6. Outflow = 5. Primary = 5. Routing by Stor-Ind m Peak Elev= 329.11'@ Plug-Flow detention ti Center-of-Mass det. ti <u>Volume Invert</u> #1 327.00' Elevation Sur (feet) 327.00 328.00 329.00 330.00 Device Routing #1 Primary	our company name here} /n 00546 © 2016 HydroCAD ( 930 ac, 72.71% Impervious, 3 cfs @ 12.09 hrs, Volume 6 cfs @ 12.12 hrs, Volume 16 cfs @ 12.12 hrs, Volume 16 cfs @ 12.12 hrs, Volume 12.11 hrs Surf.Area= 2,25 me= 62.3 min calculated for me= 28.1 min ( 794.9 - 766.5 Avail.Storage Storage E 5,450 cf Custom S Area Inc.Store (sq-ft) (cubic-feet) 888 0 1,328 1,108 2,162 1,745 3,032 2,597 Invert Outlet Devices 329.00' 2.0" x 2.0" Hoi	Software Solutions LLC           Summary for Ponce           , Inflow Depth > 5.55"           e=         0.430 af           e=         0.385 af, Af           e=         0.385 af           .00 hrs, dt=         0.05 hrs           9 sf         Storage=           0.0385 af (90% of inflow           9)         Description           Stage Data (Prismatic           (cubic-feet)           0           1,108           2,853           5,450           riz. Orifice/Grate X 6.0	' for 100-YEAR event tten= 4%, Lag= 1.6 min f () )Listed below (Recalc) 00 columnsX 6 rows C=	0.600 Limited to weir	Printed 6/19/2019 Page 174
Prepared by {enter y HydroCAD® 10.00-18           HydroCAD® 10.00-18           Inflow = 0.           Inflow = 5.           Primary = 5.           Routing by Stor-Ind m Peak Elev= 329.11' @           Plug-Flow detention ti Center-of-Mass det. ti Volume Invert #1 327.00'           Elevation Sur (feet) 327.00 328.00 329.00 330.00           Device Routing #1 Primary #2 Primary	our company name here} <u>/n 00546 © 2016 HydroCAD 5</u> 930 ac, 72.71% Impervious, 3 cfs @ 12.09 hrs, Volume 66 cfs @ 12.12 hrs, Volume 66 cfs @ 12.12 hrs, Volume ethod, Time Span= 5.00-20. 12.11 hrs Surf.Area= 2,25 me=62.3 min calculated for me=28.1 min ( 794.9 - 766.5 <u>Avail.Storage Storage E</u> 5,450 cf <b>Custom 5</b> 5,450 cf <b>Custom 5</b>	Software Solutions LLC           Summary for Ponce           , Inflow Depth > 5.55"           e=         0.430 af           e=         0.385 af, Al           e=         0.385 af           .00 hrs, dt= 0.05 hrs           i9 sf Storage= 3,100 c           0.385 af (90% of inflow           9 )           Description           Stage Data (Prismatic           Cum.Store           (cubic-feet)           0           1,108           2,853           5,450           riz. Orifice/Grate X 6.0	<ul> <li>for 100-YEAR event</li> <li>tten= 4%, Lag= 1.6 min</li> <li>f</li> <li><i>i</i>)</li> <li><i>i</i>)<!--</td--><td>0.600 Limited to weir</td><td>Printed 6/19/2019 Page 174</td></li></ul>	0.600 Limited to weir	Printed 6/19/2019 Page 174

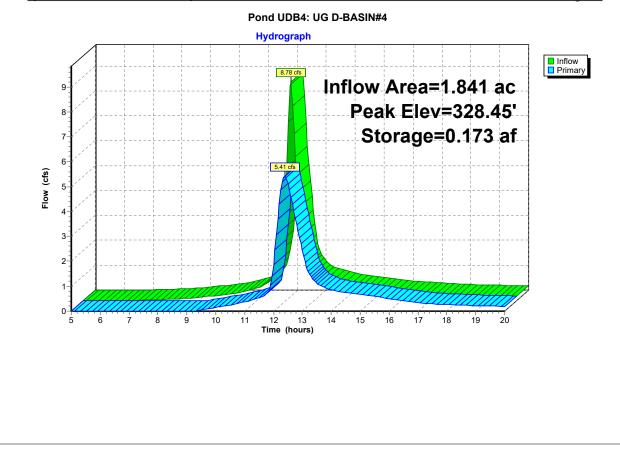








	Pond UDB3: UG D-BASIN #3		
	Hydrograph		
3- 3- \$	328 cfs Inflow Area= Peak Elev Storage:	1 1 1	<ul> <li>Inflow</li> <li>Outflow</li> <li>Discarded</li> <li>Primary</li> </ul>
Liow (cg)			
5 6 7 8 9	10 11 12 13 14 15 16 17 18 Time (hours)	19 20	
12260 HydroCAD 2019-06-19 Prepared by (enter your company n		Туре III 24-hr 100-Y	
<b>12260 HydroCAD 2019-06-19</b> Prepared by {enter your company n HydroCAD® 10.00-18 s/n 00546 © 2016	name here}	Туре III 24-hr 100-ү	<i>'EAR Rainfall=8.03"</i> Printed 6/19/2019 Page 184
Prepared by {enter your company n	name here}	Type III 24-hr 100-Y	Printed 6/19/2019
Prepared by {enter your company n HydroCAD® 10.00-18 s/n 00546 © 2016 Inflow Area = 1.841 ac, 62.34% Inflow = 8.78 cfs @ 12.18 Dutflow = 5.41 cfs @ 12.39 Primary = 5.41 cfs @ 12.39	Aname here} <u>5 HydroCAD Software Solutions LLC</u> Summary for Pond UDB4: UG D-BASIN#4 Impervious, Inflow Depth > 4.85" for 100-YEAR event hrs, Volume= 0.745 af hrs, Volume= 0.722 af, Atten= 38%, Lag= 12.5 min hrs, Volume= 0.722 af	Type III 24-hr 100-Y	Printed 6/19/2019
Prepared by {enter your company n HydroCAD® 10.00-18 s/n 00546 © 2016 Inflow Area = 1.841 ac, 62.34% Inflow = 8.78 cfs @ 12.18 Dutflow = 5.41 cfs @ 12.39	ame here} b HydroCAD Software Solutions LLC  Summary for Pond UDB4: UG D-BASIN#4  Impervious, Inflow Depth > 4.85" for 100-YEAR event hrs, Volume= 0.745 af hrs, Volume= 0.722 af, Atten= 38%, Lag= 12.5 min hrs, Volume= 0.722 af an= 5.00-20.00 hrs, dt= 0.05 hrs	Туре III 24-hr 100-Y	Printed 6/19/2019
Prepared by {enter your company n HydroCAD® 10.00-18 s/n 00546 © 2016 Inflow Area = 1.841 ac, 62.34% Inflow = 8.78 cfs @ 12.18 Dutflow = 5.41 cfs @ 12.39 Primary = 5.41 cfs @ 12.39 Routing by Stor-Ind method, Time Spa	Aame here} 5 HydroCAD Software Solutions LLC Summary for Pond UDB4: UG D-BASIN#4 Impervious, Inflow Depth > 4.85" for 100-YEAR event hrs, Volume= 0.745 af hrs, Volume= 0.722 af, Atten= 38%, Lag= 12.5 min hrs, Volume= 0.722 af an= 5.00-20.00 hrs, dt= 0.05 hrs f.Area= 0.080 ac Storage= 0.173 af ilculated for 0.722 af (97% of inflow)	Туре III 24-hr 100-ү	Printed 6/19/2019
Prepared by {enter your company n HydroCAD® 10.00-18 s/n 00546 © 2016 Inflow Area = 1.841 ac, 62.34% Inflow = 8.78 cfs @ 12.18 Outflow = 5.41 cfs @ 12.39 Primary = 5.41 cfs @ 12.39 Routing by Stor-Ind method, Time Spa Peak Elev= 328.45' @ 12.39 hrs Surf Plug-Flow detention time= 39.6 min ca Center-of-Mass det. time= 28.1 min ( 8 Volume Invert Avail.Storage	Anne here} 8 HydroCAD Software Solutions LLC Summary for Pond UDB4: UG D-BASIN#4 Impervious, Inflow Depth > 4.85" for 100-YEAR event hrs, Volume 0.745 af hrs, Volume 0.722 af, Atten= 38%, Lag= 12.5 min hrs, Volume 0.722 af an= 5.00-20.00 hrs, dt= 0.05 hrs Area= 0.080 ac Storage= 0.173 af Idulated for 0.722 af (97% of inflow) 812.5 - 784.4 ) Storage Description	Туре III 24-hr 100-Y	Printed 6/19/2019
Prepared by {enter your company n           HydroCAD® 10.00-18 s/n 00546 © 2016           Inflow Area =         1.841 ac, 62.34%           Inflow =         8.78 cfs @ 12.18           Dutflow =         5.41 cfs @ 12.39           Primary =         5.41 cfs @ 12.39           Routing by Stor-Ind method, Time Spa         Peak Elev= 328.45' @ 12.39 hrs           Plug-Flow detention time= 39.6 min ca         Center-of-Mass det. time= 28.1 min ( 8           Volume         Invert         Avail.Storage           #1A         324.90'         0.071 af	Aname here} 6 HydroCAD Software Solutions LLC Summary for Pond UDB4: UG D-BASIN#4 Impervious, Inflow Depth > 4.85" for 100-YEAR event hrs, Volume= 0.745 af hrs, Volume= 0.722 af, Atten= 38%, Lag= 12.5 min hrs, Volume= 0.722 af an= 5.00-20.00 hrs, dt= 0.05 hrs f.Area= 0.080 ac Storage= 0.173 af ilculated for 0.722 af (97% of inflow) 312.5 - 784.4 )		Printed 6/19/2019
Prepared by {enter your company n           HydroCAD® 10.00-18 s/n 00546 © 2016           Inflow Area =         1.841 ac, 62.34%           Inflow =         8.78 cfs @ 12.18           Dutflow =         5.41 cfs @ 12.39           Primary =         5.41 cfs @ 12.39           Routing by Stor-Ind method, Time Spa         Peak Elev= 328.45' @ 12.39 hrs           Plug-Flow detention time= 39.6 min ca         Center-of-Mass det. time= 28.1 min ( 8           Volume         Invert         Avail.Storage           #1A         324.90'         0.071 af	Aame here} 3 HydroCAD Software Solutions LLC Summary for Pond UDB4: UG D-BASIN#4 Impervious, Inflow Depth > 4.85" for 100-YEAR event hrs, Volume 0.745 af hrs, Volume 0.722 af, Atten= 38%, Lag= 12.5 min hrs, Volume 0.722 af an= 5.00-20.00 hrs, dt= 0.05 hrs Area= 0.080 ac Storage= 0.173 af ilculated for 0.722 af (97% of inflow) 312.5 - 784.4 ) Storage Description 39.50'W x 87.88'L x 3.50'H Field A 0.279 af Overall - 0.102 af Embedded = 0.177 af x 40.0% Void ADS_StormTech SC-740 x 96 Inside #1 Effective Size= 44.6''W x 30.0''H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0''W x 30.0''H x 7.56'L with 0.44' Overlap		Printed 6/19/2019
Prepared by {enter your company n           HydroCAD® 10.00-18 s/n 00546 © 2016           Inflow Area =         1.841 ac, 62.34%           Inflow =         8.78 cfs @ 12.18           Dutflow =         5.41 cfs @ 12.39           Primary =         5.41 cfs @ 12.39           Routing by Stor-Ind method, Time Spa           Peak Elev= 328.45' @ 12.39 hrs           Surf Play-Flow detention time= 39.6 min ca           Center-of-Mass det. time= 28.1 min ( &           Volume         Invert         Avail.Storage           #1A         324.90'         0.071 af           #2A         325.40'         0.102 af	amme here}         b HydroCAD Software Solutions LLC         Summary for Pond UDB4: UG D-BASIN#4         Impervious, Inflow Depth > 4.85" for 100-YEAR event         hrs, Volume=       0.745 af         hrs, Volume=       0.745 af         hrs, Volume=       0.722 af, Atten= 38%, Lag= 12.5 min         hrs, Volume=       0.722 af         an= 5.00-20.00 hrs, dt= 0.05 hrs         .Area= 0.080 ac       Storage= 0.173 af         Iculated for 0.722 af (97% of inflow)         312.5 - 784.4 )         Storage Description         39.50'W x 87.88'L x 3.50'H Field A         0.279 af Overall - 0.102 af Embedded = 0.177 af x 40.0% Void         ADS_StormTech SC-740 x 96 Inside #1         Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf		Printed 6/19/2019
Prepared by {enter your company n           HydroCAD® 10.00-18 s/n 00546 © 2016           Inflow Area =         1.841 ac, 62.34%           Inflow =         8.78 cfs @ 12.18           Dutflow =         5.41 cfs @ 12.39           Primary =         5.41 cfs @ 12.39           Routing by Stor-Ind method, Time Spa           Peak Elev= 328.45' @ 12.39 hrs           Surf Play-Flow detention time= 39.6 min ca           Center-of-Mass det. time= 28.1 min ( &           Volume         Invert         Avail.Storage           #1A         324.90'         0.071 af           #2A         325.40'         0.102 af	Aame here} 3 HydroCAD Software Solutions LLC  Summary for Pond UDB4: UG D-BASIN#4 Impervious, Inflow Depth > 4.85" for 100-YEAR event hrs, Volume= 0.745 af hrs, Volume= 0.722 af, Atten= 38%, Lag= 12.5 min hrs, Volume= 0.722 af an= 5.00-20.00 hrs, dt= 0.05 hrs f.Area= 0.080 ac Storage= 0.173 af Ideulated for 0.722 af (97% of inflow) 812.5 - 784.4 )  Storage Description  39.50'W x 87.88'L x 3.50'H Field A 0.279 af Overall - 0.102 af Embedded = 0.177 af x 40.0% Void ADS_StormTech SC-740 x 96 Inside #1 Effective Size= 44.6''W x 30.0''H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0''W x 30.0''H => 6.45 sf x 8 rows Total Available Storage		Printed 6/19/2019
Prepared by {enter your company n HydroCAD® 10.00-18 s/n 00546 © 2016 Inflow Area = 1.841 ac, 62.34% Inflow = 8.78 cfs @ 12.18 Dutflow = 5.41 cfs @ 12.39 Primary = 5.41 cfs @ 12.39 Prouting by Stor-Ind method, Time Spa Peak Elev= 328.45' @ 12.39 hrs Surf Plug-Flow detention time= 39.6 min ca Center-of-Mass det. time= 28.1 min ( 8 Volume Invert Avail.Storage #1A 324.90' 0.071 af #2A 325.40' 0.102 af 0.173 af Storage Group A created with Char	Aame here} 3 HydroCAD Software Solutions LLC  Summary for Pond UDB4: UG D-BASIN#4 Impervious, Inflow Depth > 4.85" for 100-YEAR event hrs, Volume= 0.745 af hrs, Volume= 0.722 af, Atten= 38%, Lag= 12.5 min hrs, Volume= 0.722 af an= 5.00-20.00 hrs, dt= 0.05 hrs f.Area= 0.080 ac Storage= 0.173 af Ideulated for 0.722 af (97% of inflow) 812.5 - 784.4 )  Storage Description  39.50'W x 87.88'L x 3.50'H Field A 0.279 af Overall - 0.102 af Embedded = 0.177 af x 40.0% Void ADS_StormTech SC-740 x 96 Inside #1 Effective Size= 44.6''W x 30.0''H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0''W x 30.0''H => 6.45 sf x 8 rows Total Available Storage		Printed 6/19/2019
Prepared by {enter your company n HydroCAD® 10.00-18 s/n 00546 © 2016 Inflow = 1.841 ac, 62.34% Inflow = 8.78 cfs @ 12.18 Outflow = 5.41 cfs @ 12.39 Primary = 5.41 cfs @ 12.39 Routing by Stor-Ind method, Time Spa Peak Elev= 328.45' @ 12.39 hrs Surf Plug-Flow detention time=39.6 min ca Center-of-Mass det. time=28.1 min ( E Volume Invert Avail.Storage #1A 324.90' 0.071 af #2A 325.40' 0.102 af 0.173 af Storage Group A created with Char Device Routing Invert Ou #1 Primary 325.30' 8.0	Aame here} 3 HydroCAD Software Solutions LLC  Summary for Pond UDB4: UG D-BASIN#4 Impervious, Inflow Depth > 4.85" for 100-YEAR event hrs, Volume= 0.745 af hrs, Volume= 0.722 af, Atten= 38%, Lag= 12.5 min hrs, Volume= 0.722 af an= 5.00-20.00 hrs, dt= 0.05 hrs f.Area= 0.080 ac Storage= 0.173 af ilculated for 0.722 af (97% of inflow) 812.5 - 784.4 )  Storage Description  39.50'W x 87.88'L x 3.50'H Field A 0.279 af Overall - 0.102 af Embedded = 0.177 af x 40.0% Void ADS_StormTech SC-740x 96 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H => 6.45 sf x 8 rows Total Available Storage mber Wizard		Printed 6/19/2019



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## ATTACHMENT D

Closed Drainage System Design

#### **Project Description**

File Name ...... 12260-PR SSA Drainage Model\_2019-05-23.SPF

#### **Project Options**

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

# Analysis Options

Start Analysis On	May 24, 2019	00:00:00
End Analysis On	May 24, 2019	01:00:00
Start Reporting On	May 24, 2019	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step		days hh:mm:ss
Routing Time Step	30	seconds

#### Number of Elements

	Qty
Rain Gages	0
Subbasins	98
Nodes	288
Junctions	271
Outfalls	17
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	255
Channels	0
Pipes	255
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

#### **Rainfall Details**

Return Period...... 25 year(s)

#### **Subbasin Summary**

SN Subbasin ID	Area	Weighted Runoff Coefficient	Total Rainfall	Total Runoff	Total Runoff Volume	Peak Runoff	Time of Concentration
	(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
1 Sub-01	0.83	0.30	0.64	0.19	0.16	1.58	0 00:06:00
2 Sub-02 3 Sub-03	0.16 0.01	0.30 0.30	0.64 0.64	0.19 0.19	0.03 0.00	0.31 0.02	0 00:06:00 0 00:06:00
3 Sub-03 4 Sub-04	0.01	0.30	0.64	0.19	0.00	0.02	0 00:06:00
5 Sub-05	0.02	0.80	0.64	0.51	0.00	0.45	0 00:06:00
6 Sub-06	0.25	0.55	0.64	0.35	0.09	0.89	0 00:06:00
7 Sub-07	0.09	0.60	0.64	0.38	0.03	0.35	0 00:06:00
8 Sub-08	0.03	0.90	0.64	0.58	0.02	0.16	0 00:06:00
9 Sub-09	0.03	0.30	0.64	0.19	0.00	0.05	0 00:06:00
10 Sub-10 11 Sub-11	0.01 0.01	0.30 0.55	0.64 0.64	0.19 0.35	0.00 0.00	0.03 0.03	0 00:06:00 0 00:06:00
12 Sub-12	0.01	0.30	0.64	0.35	0.00	0.03	0 00:06:00
13 Sub-13	0.00	0.56	0.64	0.36	0.00	0.02	0 00:06:00
14 Sub-14	0.09	0.90	0.64	0.58	0.05	0.54	0 00:06:00
15 Sub-15	0.10	0.70	0.64	0.45	0.05	0.47	0 00:06:00
16 Sub-16	0.13	0.30	0.64	0.19	0.02	0.25	0 00:06:00
17 Sub-17 18 Sub-18	0.13 0.13	0.30 0.30	0.64 0.64	0.19 0.19	0.02 0.02	0.25 0.25	0 00:06:00 0 00:06:00
19 Sub-19	0.13	0.30	0.64	0.19	0.02	0.25	0 00:06:00
20 Sub-20	0.04	0.30	0.64	0.19	0.00	0.07	0 00:06:00
21 Sub-21	0.04	0.30	0.64	0.19	0.01	0.07	0 00:06:00
22 Sub-22	0.04	0.30	0.64	0.19	0.01	0.07	0 00:06:00
23 Sub-23	0.04	0.30	0.64	0.19	0.01	0.07	0 00:06:00
24 Sub-24	0.04	0.90	0.64	0.58	0.02	0.23	0 00:06:00
25 Sub-25 26 Sub-26	0.03 0.03	0.73 0.75	0.64 0.64	0.47 0.48	0.01 0.01	0.14 0.13	0 00:06:00 0 00:06:00
20 Sub-20 27 Sub-27	0.03	0.75	0.64	0.48	0.01	0.13	0 00:06:00
28 Sub-28	0.02	0.67	0.64	0.43	0.01	0.08	0 00:06:00
29 Sub-29	0.02	0.75	0.64	0.48	0.01	0.09	0 00:06:00
30 Sub-30	0.01	0.75	0.64	0.48	0.01	0.06	0 00:06:00
31 Sub-31	0.07	0.30	0.64	0.19	0.01	0.14	0 00:06:00
32 Sub-32	0.12	0.30	0.64	0.19	0.02	0.23	0 00:06:00
33 Sub-33 34 Sub-34	0.08 0.08	0.90 0.90	0.64 0.64	0.58 0.58	0.05 0.05	0.48 0.48	0 00:06:00 0 00:06:00
35 Sub-35	0.04	0.30	0.64	0.19	0.00	0.08	0 00:06:00
36 Sub-36	0.09	0.30	0.64	0.19	0.02	0.17	0 00:06:00
37 Sub-37	0.11	0.30	0.64	0.19	0.02	0.21	0 00:06:00
38 Sub-38	0.03	0.90	0.64	0.58	0.02	0.17	0 00:06:00
39 Sub-39	0.02	0.90	0.64	0.58	0.01	0.11	0 00:06:00
40 Sub-40 41 Sub-41	0.11 0.11	0.86 0.90	0.64 0.64	0.55 0.58	0.06 0.06	0.58 0.63	0 00:06:00 0 00:06:00
42 Sub-42	0.09	0.30	0.64	0.45	0.00	0.40	0 00:06:00
43 Sub-43	0.03	0.90	0.64	0.58	0.02	0.15	0 00:06:00
44 Sub-44	0.07	0.79	0.64	0.51	0.03	0.34	0 00:06:00
45 Sub-45	0.03	0.90	0.64	0.58	0.02	0.18	0 00:06:00
46 Sub-46	0.06	0.90	0.64	0.58	0.04	0.37	0 00:06:00
47 Sub-47 48 Sub-48	0.22 0.12	0.90 0.76	0.64 0.64	0.58 0.49	0.13 0.06	1.29 0.61	0 00:06:00 0 00:06:00
49 Sub-49	0.12	0.70	0.64	0.45	0.06	0.57	0 00:06:00
50 Sub-50	0.09	0.90	0.64	0.58	0.05	0.54	0 00:06:00
51 Sub-51	0.03	0.90	0.64	0.58	0.02	0.20	0 00:06:00
52 Sub-52	0.09	0.90	0.64	0.58	0.05	0.50	0 00:06:00
53 Sub-53	0.01	0.90	0.64	0.58	0.01	0.07	0 00:06:00
54 Sub-54 55 Sub-55	0.02 0.04	0.90 0.90	0.64 0.64	0.58 0.58	0.01 0.02	0.11 0.24	0 00:06:00 0 00:06:00
56 Sub-56	0.05	0.90	0.64	0.58	0.02	0.27	0 00:06:00
57 Sub-57	0.14	0.90	0.64	0.58	0.08	0.81	0 00:06:00
58 Sub-58	0.04	0.90	0.64	0.58	0.02	0.22	0 00:06:00
59 Sub-59	0.05	0.90	0.64	0.58	0.03	0.30	0 00:06:00
60 Sub-60	0.01	0.90	0.64	0.58	0.01	0.08	0 00:06:00
61 Sub-61 62 Sub-62	0.02 0.02	0.90 0.90	0.64 0.64	0.58 0.58	0.01 0.01	0.13 0.12	0 00:06:00 0 00:06:00
63 Sub-63	0.55	0.90	0.64	0.58	0.32	3.18	0 00:06:00
64 Sub-64	0.06	0.67	0.64	0.43	0.02	0.24	0 00:06:00
65 Sub-65	0.02	0.90	0.64	0.58	0.01	0.12	0 00:06:00
66 Sub-66	0.02	0.90	0.64	0.58	0.01	0.12	0 00:06:00
67 Sub-67	0.01	0.90	0.64	0.58	0.01	0.08	0 00:06:00
68 Sub-68	0.03	0.90	0.64	0.58	0.02	0.17	0 00:06:00
69 Sub-69 70 Sub-70	0.05 0.06	0.90 0.90	0.64 0.64	0.58 0.58	0.03 0.04	0.30 0.37	0 00:06:00 0 00:06:00
71 Sub-71	0.00	0.75	0.64	0.48	0.04	0.82	0 00:06:00
72 Sub-72	0.03	0.90	0.64	0.58	0.02	0.20	0 00:06:00
73 Sub-73	0.19	0.47	0.64	0.30	0.06	0.56	0 00:06:00
74 Sub-74	0.14	0.66	0.64	0.42	0.06	0.59	0 00:06:00
75 Sub-75 76 Sub-76	0.15 0.15	0.90 0.90	0.64 0.64	0.58 0.58	0.08 0.09	0.85 0.87	0 00:06:00 0 00:06:00
77 Sub-77	0.15	0.90	0.64	0.58	0.09	0.87	0 00:06:00
78 Sub-78	0.09	0.90	0.64	0.58	0.05	0.53	0 00:06:00
79 Sub-79	0.08	0.62	0.64	0.40	0.03	0.32	0 00:06:00
80 Sub-80	0.10	0.57	0.64	0.36	0.04	0.38	0 00:06:00
81 Sub-81	0.04	0.90	0.64	0.58	0.02	0.23	0 00:06:00
82 Sub-82	0.10	0.90	0.64	0.58	0.06	0.55	0 00:06:00

#### **Subbasin Summary**

SN Subbasin ID	Area	Weighted Runoff	Total Rainfall		Total Runoff	Peak Runoff	Time of Concentration
		Coefficient			Volume		
	(ac)		(in)	(in)	(ac-in)	(cfs)	(days hh:mm:ss)
83 Sub-83	0.09	0.81	0.64	0.52	0.05	0.47	0 00:06:00
84 Sub-84	0.31	0.41	0.64	0.26	0.08	0.82	0 00:06:00
85 Sub-85	0.08	0.90	0.64	0.58	0.05	0.47	0 00:06:00
86 Sub-86	0.03	0.90	0.64	0.58	0.02	0.20	0 00:06:00
87 Sub-87	0.05	0.90	0.64	0.58	0.03	0.30	0 00:06:00
88 Sub-88	0.05	0.67	0.64	0.43	0.02	0.23	0 00:06:00
89 Sub-89	0.06	0.90	0.64	0.58	0.03	0.32	0 00:06:00
90 Sub-90	0.07	0.90	0.64	0.58	0.04	0.38	0 00:06:00
91 Sub-91	0.16	0.54	0.64	0.35	0.05	0.55	0 00:06:00
92 Sub-92	0.03	0.90	0.64	0.58	0.02	0.16	0 00:06:00
93 Sub-93	0.13	0.56	0.64	0.36	0.05	0.48	0 00:06:00
94 Sub-94	0.07	0.90	0.64	0.58	0.04	0.42	0 00:06:00
95 Sub-95	0.42	0.90	0.64	0.58	0.24	2.39	0 00:06:00
96 Sub-96	0.35	0.90	0.64	0.58	0.20	1.99	0 00:06:00
97 Sub-98	0.47	0.90	0.64	0.58	0.27	2.70	0 00:06:00
98 Sub-99	0.49	0.90	0.64	0.58	0.28	2.82	0 00:06:00

- SN Element	Invert	Ground/Rim
ID	Elevation	(Max)
	(ft)	Elevation (ft)
1 AB#299	335.75	338.92
2 AB#395 3 AB#398	331.15 329.45	334.50 332.86
4 AB#399	329.66	332.72
5 AD #400	330.00	332.34
6 AD #401 7 AD #406	330.00 330.00	332.00 332.12
8 AD #407	329.35	332.15
9 AD #408 10 AD #428	339.90	341.92 332.65
10 AD #428 11 AD #432	330.60 330.80	332.05 332.77
12 AD#300	318.00	321.00
13 AD#313 14 AD#398	323.50 338.50	328.50 341.04
15 AD#399	331.50	335.56
16 AD#401 17 AD#402	329.75	332.25 332.74
17 AD#402 18 AD#403	329.50 329.40	332.74
19 AD#404	329.90	332.40
20 AD#405 21 AD#406	330.15 329.60	332.66 332.12
22 AD#400	329.00	332.15
23 AD#408	336.18	336.75
24 AD#409 25 AD#411	341.60 329.00	343.68 332.07
26 AD#412	330.75	332.75
27 AD#413 28 AD#414	338.70 336.50	341.70 339.50
28 AD#414 29 AD#415	333.50	336.50 336.50
30 AD#416	332.10	335.10
31 AD#417 32 AD#418	328.70 330.05	331.24 332.59
33 AD#419	329.80	332.30
34 AD#420	329.95	331.55
35 AD#421 36 AD#422	329.30 329.90	330.93 332.40
37 AD#423	329.90	332.40
38 AD#424 39 AD#425	329.00 330.00	332.50 332.50
40 AD#426	329.40	332.50
41 AD#427	329.00	332.56
42 AD#428 43 AD#429	330.15 329.80	332.65 332.43
44 AD#430	328.85	331.37
45 AD#431	330.75	332.75
46 AD#432 47 AD#433	330.70 331.40	332.70 333.93
48 AD#434	329.40	332.52
49 AD#435 50 AD#495	313.00 330.35	315.00 332.87
51 BYPASS MH#200	316.02	319.88
52 BYPASS MH#203	328.25	332.78
53 CB #315 54 CB #316	328.50 329.00	331.20 331.50
55 CB #320	329.00	332.50
56 CB #327 57 CB #336	329.50 330.00	332.60 333.80
57 CB #350 58 CB #369	329.00	331.67
59 CB#310	326.50	330.03
60 CB#311 61 CB#312	325.95 323.17	329.47 329.00
62 CB#317	327.61	331.12
63 CB#318	327.50	331.01
64 CB#319 65 CB#321	327.50 327.15	331.01 330.68
66 CB#323	326.20	329.73
67 CB#324 68 CB#325	311.64 327.15	315.14
69 CB#326	327.15	330.69 330.70
70 CB#327	328.33	331.83
71 CB#328 72 CB#329	328.38 328.37	331.88 331.87
73 CB#331	327.98	331.48
74 CB#332	327.40	330.94
75 CB#333 76 CB#334	327.15 328.35	330.68 331.85
77 CB#335	328.35	331.85
78 CB#336 79 CB#337	330.00 330.15	333.49 333.64
80 CB#338	330.15	333.64 334.67
81 CB#339	327.11	331.17
82 CB#340	330.00	333.51

SN Element	Invert Elevation	Ground/Rim (Max)
	(ft)	Elevation (ft)
83 CB#342	329.00	332.51
84 CB#343	327.95	331.45
85 CB#344 86 CB#346	327.75 312.60	331.29 315.50
87 CB#347	325.30	328.82
88 CB#348	324.70	328.20
89 CB#349	315.25	318.78
90 CB#350 91 CB#351	327.15 315.50	330.68 318.77
92 CB#352	317.50	321.02
93 CB#353	323.65	327.18
94 CB#354 95 CB#355	324.40 325.60	327.94 329.15
96 CB#356	320.00	323.49
97 CB#357	320.50	324.05
98 CB#358 99 CB#359	322.35 322.50	325.87 326.00
100 CB#360	324.90	328.40
101 CB#361	325.75	329.28
102 CB#362 103 CB#363	325.90 317.50	329.40 321.00
103 CB#363	324.70	328.20
105 CB#365	326.50	330.06
106 CB#366	326.80	330.33
107 CB#367 108 CB#368	322.55 320.10	326.09 323.65
109 CB#369	328.15	331.66
110 CB#370	327.50	331.00
111 CB#371 112 CB#394	328.15 330.00	331.68 333.52
113 CB#XXX	315.25	318.75
114 CO#6	334.50	341.76
115 DB #3 OUT 116 DBL CB #300	311.60 318.00	313.79 320.00
117 DCB#301	326.80	320.00
118 DCO#1	341.85	343.86
119 DCO#10	333.50	335.55
120 DCO#11 121 DCO#2	331.95 340.25	334.56 342.27
122 DCO#20	328.25	329.60
123 DCO#21	327.00	328.18
124 DCO#22 125 DCO#3	322.95 341.25	324.48 343.28
126 DCO#4	339.85	341.88
127 DCO#5	340.75	342.78
128 DCO#7 129 DCO#8	333.50 333.30	334.07 335.37
130 DCO#9	334.50	341.66
131 DMH #203	318.40	332.88
132 DMH #214	318.00	323.60 332.40
133 DMH #224 134 DMH #226	328.10 327.00	331.00
135 DMH #242	323.30	332.50
136 DMH #254 137 DMH #260	319.04	323.80
137 DMH #200 138 DMH#200	324.30 327.30	332.63 332.40
139 DMH#200A	323.40	332.19
140 DMH#201	324.55	328.68
141 DMH#201A 142 DMH#202	322.50 314.65	332.43 319.16
143 DMH#202a	321.75	333.87
144 DMH#203	318.33	332.85
145 DMH#204 146 DMH#205	315.60 310.90	327.40 316.75
147 DMH#206	317.25	321.78
148 DMH#207	317.68	321.58
149 DMH#208	311.16	316.00
150 DMH#209 151 DMH#210	322.69 328.80	329.88 332.75
152 DMH#211	329.35	333.57
153 DMH#212	328.60	332.57
154 DMH#213 155 DMH#214	327.35 318.65	331.80 323.29
156 DMH#216	312.07	317.20
157 DMH#218	327.36	333.25
158 DMH#219 159 DMH#220	328.20 324.40	333.10 329.92
159 DMH#220 160 DMH#221	324.40 325.75	329.92 330.12
161 DMH#222	327.10	331.23
162 DMH#223 163 DMH#224	326.63	331.03
163 DMH#224 164 DMH#225	327.64 328.20	332.47 332.09
	0	

SN Element		Ground/Rim
ID	Elevation	(Max) Elevation
405 DMU//000	(ft)	(ft)
165 DMH#226 166 DMH#227	326.09 326.39	
167 DMH#228	320.38	
168 DMH#231	316.55	321.18
169 DMH#236 170 DMH#237	329.85 328.02	333.85 331.87
170 DMH#237	330.30	
172 DMH#238A	327.45	332.20
173 DMH#240	330.10	
174 DMH#241 175 DMH#242	328.75 326.90	332.83 332.38
176 DMH#243	325.90	331.49
177 DMH#244	324.25	330.89
178 DMH#245 179 DMH#248	323.60 322.35	
180 DMH#249	324.00	
181 DMH#251	324.30	328.91
182 DMH#252 183 DMH#253	326.10 314.70	330.60 320.12
184 DMH#254	319.30	
185 DMH#255	322.00	
186 DMH#257	325.40	
187 DMH#260 188 DMH#287	324.35 327.27	
189 DMH#289	313.23	
190 DMH#290	329.05	
191 DMH#296 192 DMH#297	320.50 322.50	325.61 328.37
193 DMH#298	328.50	
194 DMH#391	312.40	318.00
195 DMH#395 196 FD#1	327.90 330.00	
196 FD#1 197 FD#2	333.00	333.39
198 FD#3	330.00	330.57
199 NS#1A	339.95	340.52
200 NS#1B 201 NS1	339.90 330.73	340.47 331.30
202 OCS DB #4	321.82	
203 OCS#215	314.00	319.55
204 OCS#4 205 OCS#4 (1)	325.40 326.80	331.95 330.93
205 0C3#4 (1) 206 RD#1	320.80	333.00
207 RD#2	329.56	330.72
208 RD#3	329.50	330.66
209 RD#4 210 REDUCER#1	329.00 338.10	330.16 339.26
211 RW FD#1	333.25	333.82
212 SB OCS#1	325.00	333.00
213 Structure - (538) 214 Structure - (539)	315.33 313.96	315.90 314.52
215 Structure - (540)	313.65	314.22
216 Structure - (541)	313.29	313.86
217 Structure - (543) 218 Structure - (544)	312.87	313.43
219 Structure - (545)	312.66 312.09	313.22 312.66
220 Structure - (546)	311.95	312.52
221 Structure - (547)	311.63	312.20
222 Structure - (548) 223 Structure - (549)	310.47 310.14	311.04 310.71
224 Structure - (550)	309.96	310.53
225 Structure - (551)	309.79	310.36
226 Structure - (552) 227 Structure - (553)	309.61 309.35	310.18 309.92
228 Structure - (554)	309.12	309.68
229 Structure - (555)	308.86	309.42
230 Structure - (556) 231 Structure - (558)	308.64	309.20 308.78
231 Structure - (559)	308.21 307.75	308.31
233 Structure - (560)	307.58	308.15
234 Structure - (561)	307.34 306.70	307.91
235 Structure - (562) 236 Structure - (563)	305.85	307.27 306.41
237 Structure - (565)	328.19	328.75
238 Structure - (639)	339.00	339.57
239 Structure - (666) 240 Structure - (669)	330.54 330.50	331.11 331.07
241 TRENCH DRAIN	325.85	326.60
242 UD	327.13	327.70
243 UDB#2 OUT 244 UDB#3A	314.50 316.02	316.77 316.77
245 UDB#3B	315.55	316.30
246 UDB#4	325.40	327.12

SN Element		Ground/Rim
ID	Elevation	(Max)
		Elevation
	(ft)	(ft)
247 WALL UD #1	327.00	-4.53
248 WALL UD #2	329.00	-3.15
249 WALL UD #6	331.00	0.32
250 WQI#314	317.78	321.28
251 WQI#322	318.05	321.55
252 WQI#330	311.55	315.05
253 WQS #401	327.25	332.32
254 WQS#401	325.70	331.56
255 WQS#402	324.20	329.95
256 WQS#403	319.25	324.50
257 WYE#1	339.50	340.07
258 WYE#10	329.65	330.81
259 WYE#11	329.48	330.64
260 WYE#12	328.82	329.98
261 WYE#13	328.30	329.46
262 WYE#14	327.70	328.86
263 WYE#2	338.00	339.16
264 WYE#3	337.00	338.16
265 WYE#30	329.30	330.47
266 WYE#30A	329.32	330.48
267 WYE#4	338.05	339.21
268 WYE#5	336.90	338.06
269 WYE#6	329.21	330.42
270 WYE#7	333.25	333.82
271 WYE#8	331.35	331.92

Balmer Elementary School Nitsch Project #12260 Link Summary

Peak Flow Depth/ Total Depth Ratio		0.15	1.00	0.30	0.33	0.32	0.49	0.67	1.00	0.96	1.00	0.13	0.67	0.68	0.74	0.18	17.0	0.03	0.05	0.21	0.35	0.78	0.71	0.32	0.62	0.74	0.0	0.00	0.50	0.07	0.06	0.23	0.39	0.10	0.42	0.24	0.42	0.19	0.38	0.12	0.17	0.09	0.12	0.23	0.58	0.47	0.34	0.31	0.00	0.38	0.62	0.67	0.38
Peak Flow Depth T	(ft)	0.23	1.00	0.91	0.1	0.95	1.46	2.00	1.00	1.44	1.00	0.20	0.67	1.02	1.11	0.18	0.47	0.03	0.05	0.21	0.35	0.78	0.71	0.39	0.92	1.12	0.0	0.00	0.50	0.07	0.06	0.23	0.58	0.10	0.64	0.24	0.63	0.19	0.10	0.12	0.47	0.09	0.12	0.23	0.86	0.47	0.34	0.31	0.00	0.38	0.62	0.67	0.38
Peak Flow I Velocity V	(ft/sec)	2.46	1.94	3.72	0./4 7.60	7.88	5.17	8.31	1.06	5.59	1.37	3.37	4.78	5.23	1.07	4./4	00 7.8-0	46.73	50.00	2.86	3.71	3.59	3.30	3.40	5.45	4.4Z	3.10 1.66	0.00	3.22	1.67	2.43	0.84	4.71	10.0	5.12	5.49	5.43	5.15 r.o.r	0.02 0.02	3.07	5 t t t t t	+ .c	5.66	0.88	3.85	3.01	3.39	1.1	0.00	3.78	4.74	4.97	3.73
Q/Qf Ratio		0.01	0.28	0.09	12.0	0.19	0.19	0.57	0.10	0.62	0.14	0.04	0.66	0.58	1.25	0.06	00	0.00	0.00	0.09	0.22	0.61	0.33	0.13	0.54	0.20	0.00	0000	0.21	0.01	0.01	0.03	0.26		0.31	0.08	0.29	0.06	77.0	0.00	0.00	0.0	0.03	0.03	0.33	0.13	0.13	0.09	0.00	0.27	0.62	0.72	0.26
Design Flow Capacity Qf	(cfs)	17.68	2.73	71.73	72 08	78.03	78.31	73.42	3.66	11.09	2.73	13.67	4.05	11.53	5.09	8.15	4.02	231.24	228.39	4.02	4.24	3.87	5.74	7.17	11.52	00.11 90.5	0.90 3.66	4.49	4.15	4.31	7.44	3.59	11.47	02.02	11.62	9.66	13.29	8.80	13.82	0.23	6 88	12.11	11.43	3.81	11.46	4.23	4.53	3./6	5.0.0 6.46	3.87	3.89	3.86	3.91
Peak Flow Q	(cfs)	0.17	0.78	6.69	15.07	15.05	15.03	41.67	0.38	6.83	0.38	0.48	2.69	6.69	6.36	0.46	10.0	0.25	1.02	0.35	0.91	2.37	1.92	0.92	6.23	0.23	016	0.00	0.86	0.04	0.04	0.11	2.98	3 35	3.65	0.82	3.83	0.55	3.05	0 10	980	0.17	0.29	0.12	3.82	0.55	0.60	0.34	0.00	1.04	2.41	2.80	1.03
Manning's Roughness		0.015	0.012	0.012	0.012	0.012				0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Pipe Pipe Manning's Slope Diameter Roughness	(in)	18	12	36	36 36	36	36	36	12	18	12	18	12	18	18	27	7 5	1 0	12	12	12	12	12	15	, 18 18	<u> </u>	7 5	1 2	12	12	12	12	18	<u>ν</u> α	9 0	12	18	12	81 (	7 5	4 5	1 0	12	12	18	12	12	12	2 5	12	12	12	12
Pipe Slope	(%)	3.77	0.50	0.99	3.6	1.17	1.17	1.03	0.90	0.95	0.50	1.44	1.10	1.03	0.00	4.46	e0.1	3589.52	3501.29	1.09	1.21	1.00	2.21	1.05	1.02	00 1. 00		1.35	1.15	1.25	3.72	1.30	1.02	7.10 108	1.04	6.26	1.36	5.20	1.48	10.2	- 1 - 1	9.84	8.76	1.46	1.01	1.20	1.38	0.90 0.10	2.13 2.80	1.01	1.02	1.00	1.03
Outlet Invert Elevation	(H)	328.80	317.62	322.60	218.43	315.70	311.25	310.60	317.73	317.65	317.73	328.50	329.45	324.45	325.40	326.90	320.50		-0.50	330.05	329.60	328.85	327.20	328.75	327.00	38 705	20 062	329.90	328.25	331.25	330.20	329.85	325.50	07.820	323.00	324.90	323.85	326.60	324.40	320.0U	325,70	326.50	326.50	329.85	325.80	326.90	326.90	328.25	328.85 00 705	327.69	325.85	324.65	327.32
Inlet Invert Elevation	(H)	330.00	317.68	323.40	321.20	318.33	315.60	310.90	318.05	318.00	317.78	329.00	329.56	325.40	325.40	327.40	30 05	329.30	326.80	330.30	329.85	329.00	329.50	329.35	327.25	CH. 125	320.02	330.00	328.35	331.40	331.15	330.00	325.90	324.25	323.60	325.30	324.30	327.15	320.10	01.120	326.20	327.95	327.75	330.00	326.09	327.15	327.20	328.37	329.75	328.20	327.10	325.75	327.64
Pipe Length	(11)	31.81	10.09	81.18	333.60	225.50	370.38	29.06	35.80	36.86	10.99	34.65	10.00	92.62	11.54	11.22	C0.02	91.9	9.35	23.03	20.74	14.94	104.03	57.13	24.39	10.00	10.10 22.23	7.40	8.66	12.02	25.56	11.58	39.38	40.04 F1 00	57.58	6.39	33.00	10.59	115.23	21.10	15.76	14.74	14.26	10.29	28.59	20.84	21.82	12.63	02.60 10.70	50.61	123.01	110.15	31.17
To (Outlet) Node		DMH#210	DMH#206	DMH#201A		DMH#204	DMH#205	Out-1Pipe - (164)	DMH#207	DMH#206	DMH#207	DMH#257	AB#398	DMH#260	OCS#4	OCS#4 (1)	0.00#4 (=)	Out-1Pipe - (183)	Out-1Pipe - (186) (2)	DMH#236	DMH#211	BYPASS MH#203	DMH#222	DMH#298	Out-1Pipe - (192)	VV (JO #40   DMH#238 A		DMH#211	DMH#237	AB#395	DMH#240	DMH#240	DMH#244		DMH#297	DMH#251	DMH#297	DMH#252				DMH#243	DMH#243	DMH#240	WQS#401	DMH#223	DMH#227	977#HIMO	DMH#224 DMH#222	DMH#224	DMH#221	DMH#220	DMH#287
From (Inlet) Node		AD #400	DMH#207	DMH#200A		DMH#203	DMH#204	DMH#205	WQI#322	AD#300	WQI#314	AD#411	RD#2	OCS#4	001874	CB#332		AD#421	OCS#4 (1)	DMH#238	DMH#236	RD#4	RD#3	DMH#211	WQS #401		DINIT#20/ CB#337	CB#336	CB#334	AD#433	AB#395	CB#340	DMH#243		DMH#245	CB#347	DMH#251	CB#321			00#303	CB#343 CB#343	CB#344	CB#394	DMH#226	CB#325	CB#326	CB#329	AD#401 CB#310	DMH#225	DMH#222	DMH#221	DMH#224

Balmer Elementary School Nitsch Project #12260

# Link Summary

Peak Flow Depth/ Total Depth Ratio	0.00	0.58	0.19 0.07	0.45	0.11	0.28	0.38	0.42	0.80	0.68	0.13	0.03	0.00	0.90	1.00	0.60	0.00	0.29	0.55	0.34	0.36	0.47	0.97	0.39	0.49	0.4.0	0.01	0.33	0.15	0.33	0.45	0.57	0.25	0.35	0.33	0.27	0.26	0.32	0.18	0.23	07.0 22.0	0.37	1.00	1.00	0.60	0.27	0.20	0.86	0.19	0.33	0.00	0.4.0	0.26
Peak Flow Depth	(ft)	0.58	0.28	0.45	0.11	0.28	0.38	0.42	0.80	1.01	0.13	0.03	0.00	2.25	1.00	1.50	0.00	0.73	1.10	0.85	0.53	0.70	0.48	0.39	0.49	0.04	0.01	0.49	0.15	0.33	0.45	0.57	0.50	0.07	0.33	0.27	0.26	0.32	0.18	0.23	0770 220	16.0	1.00	1.50	1.21	0.27	0.20	0.86	0.19	0.33	0.03	0.4.0 80.0	0.26
Peak Flow Velocity V	(ft/sec)	2.52	2.41 4.88	9.31	4.86	1.39	2.18	4.06	3.75	3.02	1.67	0.00	1.56	5.04	1.45	5.79	0.00	5.55	3.66	5.86	5.61	5.37	5.09	0.36	2.38	1000	5.81	5.78	5.22	5.85	4.99	6.66	17.78	3.50	3.78	3.12	2.84	2.94	3.46	1.4.7	07.0	20.02	3.75	2.91	8.88	4.67	4.04	3.07	1.30	2.92	4.40 0 7 0	2.10	1.82
Q/Qf Ratio		0.27	0.07	0.32	0.02	0.04	0.03	0.28	0.68	0.33	0.04	0.00	0.06	0.25	0.10	0.15	0.00	0.15	0.59	0.14	0.18	0.37	1.55	0.02	0.12	1010	0.41	0.18	0.04	0.07	0.35	0.46	0.07	0.40	0.22	0.14	0.05	0.10	0.02	0.00	1.0		0.41	0.43	0.47	0.12	0.07	0.54	0.04	0.16	0.43		0.06
Design Flow Capacity Qf	(cfs)	3.88	7.68 13.05	9.80	9.82	3.81	6.29	4.67	3.92	11.39	2.70	06.5 80 F	20.7	45.47	3.94	45.02	3.88	44.62	10.96	46.58	17.22	11.83	0.64	3.86	3.65 12 11	1 73	5.07	16.57	9.93	11.78	4.85	6.60	162.63	03.43 4.56	3.86	3.99	6.57	5.38	9.82	4.00	10.1	0.23	3.47	11.59	32.68	6.78	6.41	3.95	3.37	4.10	4.04 2 80	0.03 A 0.03	4.87
Peak Flow Q	(cfs)	1.03	0.55	3.17	0.23	0.15	0.18	1.28	2.08	3.80	11.0	0.00	0.00	11.48	0.39	6.79	0.00	6.60	6.45	6.73	3.15	4.36	0.99	0.09	0.43	0.17	202	2.93	0.38	0.85	1.71	3.07	11.02	20.11	0.86	0.54	0.31	0.53	0.22	0.30	0.00	15.13	1.43	5.04	15.44	0.81	0.46	2.15	0.13	0.66	0.66	0.50	0.29
Pipe Pipe Manning's Slope Diameter Roughness		0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012		0.012		0.012			0.012	0.012	0.012	0.012	210.0	210.0	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Pipe Diameter	(in)	12	18	12	12	12	12	21 5		<u>8</u> (		2 5	4 6	30	12	30	12	30	24	30	18	18	9 9	21	71	5 5	4 6	1 8	12	12	12	12	24	1, 1,	12	12	12	12	22	2 5	2 5	71	12	18	24	12	12	12	12	12	7 5	4 5	12
Pipe Slope	(%)	1.01	0.46	6.45	6.47	0.98	2.66	1.46	1.03	1.00	0.49	CU.T	0.34	1.05	1.04	1.03	1.01	1.01	0.00	1.10	2.29	1.08	1.11	1.00	0.89	<u>+</u> 0	1 73	2.12	6.62	9.32	1.58	2.93	44.03	1 40	1.00	1.07	2.89	1.95	6.47	04.1	3.04 1 00	0.50	0.81	1.04	1.78	3.09	2.76	1.05	0.76	1.13	2.5	20.1 BO	1.59
Outlet Invert Elevation	(H)	326.68	327.00	327.00	327.00	328.28	327.20	326.65	320.14	325.45	327.00	328.00	325 90	311.00	311.54	311.40	314.80	313.33	314.50	312.50	316.65	315.15	314.40	314.10	315.25	315.25	319.80	318.75	319.80	322.55	322.55	321.60	315.00	324.10	324.60	319.80	322.10	322.10	324.65	324.00	00.420	316.57	312.17	311.35	311.90	317.15	317.15	326.44	329.65	328.00	00.126	01.120	329.48
Inlet Invert Elevation	(ft)	327.27	327.36 328.50	329.00	329.00	328.38	327.50	326.80	320.39	325.70	10.125	328.33 326 ED	325 95	311.16	311.64	312.40	315.25	314.00	314.50	313.23	318.65	316.55	314.65	314.70	315.5U	315.25	322 00	319.30	320.50	323.65	324.00	322.35	319.25	00.020	325.60	320.00	322.50	322.35	325.75	324.90	320.90	317 25	312.60	312.07	316.52	317.50	317.50	326.63	329.90	328.30	00 265	05.120 228 82	329.65
Pipe Length	(H)	58.50	78.95 13 13	31.00	30.89	10.25	11.28	10.26	24.20	24.95	124.98	50.15 17 82	14.76	15.28	9.61	97.40	44.62	66.45	16.07	66.42	87.32	129.63	22.59	59.88	21.99	10.10	127.38	25.94	10.58	11.80	91.74	25.63	9.65	20.00 21 48	99.87	18.71	13.82	12.85	16.99	11.14	32.04	136.51	53.33	69.63	259.88	11.33	12.70	18.10	32.85	26.55	10,70	11.07	10.68
To (Outlet) Node		AH#223	Out-1Pipe - (227) Out-1Pine - (227) (1) (1)	rt-1Pipe - (229)	ut-1Pipe - (235)	AH#225	DMH#222				JI-11Pipe - (244)		MH#220	AH#205	AH#208	DMH#208	AH#253	DMH#289	OCS#215	DMH#391	DMH#231		Out-1Pipe - (253)				DMH#254	MH#214	DMH#254	DMH#248	DMH#248	AH#296	Out-1Pipe - (259) (1) (4) (3) (1) MCS#403			DMH#254	DMH#255	DMH#255	DMH#201				AH#216	DMH#208	AH#205	AH#231	AH#231	DMH#227	YE#10	AH#395	UIVIT#242 \v/VE#14	VV I C# 14 DMH#010	WYE#11
To (C Node		DMH	õ ē	no	ŋ		Δi	ה ה ה	ב מ	ב ב כ	วีอี	ב ב ב			2	2	5	2	0	D	ā		00	วีอี	בֿ בֿ				2	D	D	5	J S			D	D	5	ב ב נ	ב ב	ב ב	ה ב מ				D	D		Ś		23		Ś
From (Inlet) Node		DMH#287	DMH#218 CB #315	CB #316	CB #320	CB#328	CB#318	DCB#301		WQS#401	CB#317	CB#32/ CB#310	CE#310 CE#311	DMH#208	CB#324	DMH#391	CB#XXX	OCS#215	UDB#2 OUT	DMH#289	DMH#214	DMH#231	DMH#202	DMH#253	CB#351		DMH#255	DMH#254	CB#357	CB#353	DMH#249	DMH#248			CB#355	CB#356	CB#359	CB#358	CB#361	CB#300			CB#346	DMH#216	BYPASS MH#200	CB#352	CB#363	DMH#223	AD#422	WYE#13			WYE#10

Balmer Elementary School Nitsch Project #12260

# Link Summary

Peak Flow Depth/ Total Depth Ratio	00 0	0.22	0.12	0.24	0.13	0.13	0.13	0.06	0.54	00.0	0.09	01.10	0.13	0.25	0.20	0.16	00.0	0.35	0.29	0.23	0.11	0.21	0.36	0.20	0.15	0.1	0.07	0.0	0.35	0.20	0.24	0.52	0.59	0.00	0.0	0.00	1.00	0.14	0.00	0.24	0.25	70.0	0.00	0.31	0.17	0.51	0.28	0.08	0.49	0.00	0.00	0.00	0.00
	6000	0.22	0.12	0.23	0.13	0.13	0.13	0.06	0.68	0.02	0.09	01.0	0.79	0.20	0.20	0.16	0.00	0.35	0.29	0.23	0.11	0.21	0.54	0.20	0.15	0.1	0.07	0.00	0.69	0.10	0.24	0.26	0.29	0.00	0.00	0.00	1.00	0.14	0.00	0.24	0.25	26.0	0.00	0.31	0.17	0.51	0.28	0.08	0.32	0.00	0.00	0.00	0.00
Peak Flow Peak Flow Velocity Depth V (ft)	(0000)	2.51	2.28	2.33	2.95	3.71	0.00	0.00	4.08	4.07	1.19	1.98	4.20	1.06	1 49	0.00	0.00	3.76	4.03	3.00	1.74	2.85	4.56	4.32	3.66	4.U3	2.94	7 03	9.51	0.00	11.06	2.88	2.84	0.00	0.00	0.00	1.48	2.87	0.00	3.27	3.30	C7 7	10.0	2.36	2.29	2.10	2.59	2.33	2.53	0.00	0.00	0.00	0.00
Q/Qf Ratio		0.070	0.02	0.02	0.01	0.04	0.00	0.00	0.40	0.47	0.01	20.0	100	0.0	10.0	0.00	0.00	0.24	0.02	0.01	0.02	0.09	0.21	0.08	0.05	0.0	0.07	0.00	0.15	0.00	0.11	0.17	0.34	0.00		0.00	0.18	0.04	0.00	0.03	0.04	0.13		0.19	0.05	0.18	0.09	0.01	0.28	0.00	0.00	0.00	0.00
Design Flow Capacity Qf		3.99 4.81	5.75	9.25	8.51	6.32	8.98	4.06	10.7	0.0	20.5	4.47	0.00 9.36	2.00	3.87	3.84	4.07	3.87	13.51	9.34	4.09	3.87	12.14	6.21	5.92	0.00	0.00 6.64	15.62	60.95	0.61	14.01	1.56	0.88	0.74	1 96	1.99	3.86	5.02	4.61	7.15	6.17	4.20	4.16	2.65	4.07	3.91	5.53	5.81	1.38	5.83	0.00	0.71	4.00 0.88
Peak I Flow Q (cfs)	(010)	0.33	0.09	0.17	0.09	0.23	0.00	0.00	2.18	ν. γ. γ.	0.03	0.00	2.00	0.0	0.16	0.00	0.00	0.93	0.23	0.13	0.07	0.34	2.58	0.48	0.27	0.40	0.13	0.06	9.05	0.00	1.57	0.27	0.30	0.00		0.00	0.69	0.20	0.00	0.24	0.27	10.0	000	0.49	0.19	0.71	0.48	0.07	0.38	0.00		0.00	0.00
Manning's Roughness	0100	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.010	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	210.0	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012		0.012	0.012
Pipe Pipe Slope Diameter F (%) (in)		2 2	12	12	12	12	12	12	0 L T	0 - 1	21	2 ;	<u>1</u>	5 5	1 0	12	12	12	12	12	12	12	18	12	12	<u>1</u> 5	2 5	1 5	24	9	12	9	9	in ci	ی د	9 9	12	12	12	12	12	2 5	10	12	12	12	12	12	œ	12	2	jo ç	9
Pipe Slope (%)	10/	1.56	2.22	5.74	4.86	2.68	5.41	1.10	00.1	95.T	0.83	1.0.1	0.1	07 T	80.0	0.99	1.11	1.01	12.26	5.86	1.12	1.00	1.14	2.59	2.35	5.00 7.23	5.20 6.24	16.38	6.19	1.01	13.17	6.57	2.10	1.48	10.36	10.70	1.00	1.69	1.43	3.43	2.55	77.I	1.16	0.47	1.11	1.03	2.05	2.26	1.11	2.28	1.40	1.35 C	1.42 2.10
Outlet Invert Elevation (ft)	600 000	328.82 329.15	329.15	328.82	328.70	328.30	328.00	330.40	329.21	328.13	330.40	330.40	11.820	320.20	329.32	328.45	329.00	328.25	327.70	328.30	328.85	328.35	326.00	330.35	330.50	333 50	336.50	328.85	324.00	339.90	328.70	333.50	339.00	327.00	331.35	329.35	311.26	324.35	329.25	326.10	326.10	322.45	327.90	327.36	327.40	326.75	328.85	327.70	325.10	336.25	330.UU	338.60	339.50 339.50
	(hi)	329.48 329.48	329.90	329.00	330.00	330.05	330.35	330.70	329.00	329.21	330.75	37,005	329.40	320 32	329.50	329.00	329.60	328.85	328.70	329.00	329.00	328.75	326.90	331.15	331.50	336.50	338.70	332.10	325.00	341.60	335.75	336.18	339.90	329.00	331 95	331.35	311.55	324.70	330.15	326.50	326.80	01.000	328.15	327.50	328.15	327.30	329.80	327.98	325.85	337.00	330.1U	339.50	340.25
Pipe Length (ft)	() 1	21.21	33.83	3.13	26.75	65.27	43.42	27.18	44.90	33.00	42.10	20.02	0.00 13 30	1 00	18.54	55.46	53.96	59.65	8.16	11.94	13.37	39.81	79.14	30.92	42.47	40.33	10.10	19.84	16.17	168.51	53.52	40.79	42.77	134.71	5 79	3.73 18.70	28.93	20.72	62.98	11.66	27.41	8.22 17 10	21.52	29.77	67.59	53.65	46.29	12.37	67.83	32.91	4.03	66.47 70.50	35.64
To (Outlet) Node	14025-440	W Y E#12 DMH#290	DMH#290	WYE#12	DMH#212	DMH#213	DMH#395	DMH#238				UMIT#238 ^ D#300		WV F L = C = C = C = C = C = C = C = C = C =	WYF#30A	DMH#237	AD#407	DMH#213	WYE#14	WYE#13	DMH#241	DMH#242	DMH#243	DMH#236	DMH#238	AD#410 AD#415	AD#413 AD#414		DMH#201A	AD #408	DMH#238A	AD#399	Structure - (639)	WALL UD #1	UCO#11 WVF#8	W 1 L#9 DMH#242	DMH#208	DMH#297	DMH#210	DMH#221	DMH#221			DMH#218	DMH#200	DMH#223	AD#430	DMH#218	DMH#244	AB#299		KEDUCEK#1	WY E#3 WYE#1
From (Inlet) Node		UMH#290 WYE#11	AD#423	AD#424	AD#425	AD#418	AD#495	AD#432	AB#399		AU#412				AD#402	AD#407	AD#406	AD#430	AD#417	AD#427	CB#342	DMH#241	DMH#242	CB#338	AD#399	AD#413 AD#414	AD#414 AD#413	AD#416	SB OCS#1	AD#409	AB#299	AD#408	AD #408		DCO#0	WYE#8	WQ1#330	CB#364	AD#428	CB#365	CB#366	CB#30/	CB#369	CB#370	CB#371	DMH#200	AD#419	CB#331	TRENCH DRAIN			WYE#1	WTE#Z DCO#2

Balmer Elementary School Nitsch Project #12260 Link Summary

Peak Flow Depth/ Total Depth Ratio		0.00	00.0	0.61	0.53	0.69	0.82	1.00	09.0	0.22	0.17	0.18	0.62	0.58	0.20	0.22	0.04	0.65	06.0	1.00	0.50	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	00.0	00.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(H)	0.00	00.0	0.76	0.67	1.04	1.24	1.00	0.60	0.22	0.17	0.18	0.62	0.58	0.20	0.21	0.04	0.98	0.90	1.00	0.50	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	00.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(tt/sec)	0.00	0.00	3.83	4.49	6.63	5.55	7.82	1.78	4.54	2.10	1.73	1.05	0.72	1.81	2.29	1.42	5.49	3.83	5.81	6.77	8.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00
Q/Qf Ratio		0.00		0.37	0.41	0.75	0.76	1.59	0.05	0.10	0.01	0.03	0.13	0.09	0.03	0.07	0.00	0.58	0.36	1.18	0.43	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00
~ ~	(cts)	0.87	0.86	8.13	7.25	11.44	11.44	3.86	4.02	5.86	6.51	4.70	4.16	3.87	4.39	3.98	5.19	11.48	3.73	3.86	6.17	9.22	0.61	0.61	0.61	3.31	6.07	0.61	0.61	0.61	0.61	19.0	0.01	10.0	0.01	0.01	0.61	0.61	0.52	5.92	6.76	0.61	0.61	0.61	0.61	0.61	0.61	0.40	0.40	0.93	4.14	60.6 F	4.9- 7.06	0.70	0.96	0.76
	(cts)	0.00	0000	2.98	2.98	8.63	8.65	6.13	0.21	0.57	0.08	0.12	0.54	0.34	0.11	0.29	0.01	6.68	1.34	4.56	2.66	2.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00
Manning's Roughness		0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	210.0			0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	210.0	210.0	0.012	0.012	0.012
Pipe Pipe Manning's Slope Diameter Roughness	(III)	99	ي د	15	15	18	18	12	12	12	12	12	12	12	12	12	12	18	12	12	12	12	9	9	9	9	9	9	9	90	90	0 4	9 9	69	9 9	e Second	ي د ا	с С	9 0	9	9	9	9	9	9	9	9	9	9	∞ α	χ	2	2 5	<u>1</u> (C	<u>ب</u> د	9 9
Pipe Slope	(%)	2.03	8.6	1.35	1.07	1.01	1.01	1.00	1.08	2.30	2.85	1.48	-1.16	-1.01	1.29	1.06	1.81	1.02	0.93	1.00	2.56	5.70	1.00	1.00	1.00	-29.71	99.81	1.00	1.00	1.00	00.1	0.1	8.6	9.6	9.6	3.6	8.0	1.00	0.73	-94.83	123.69	1.00	1.00	1.00	1.00	1.00	1.00	0.43	0.43	0.50	-10.00	1.7.1	7 20	1 42	2 50	1.56
Outlet Invert Elevation	(H)	338.50	338.55	324.30	324.10	320.48	317.65	322.79	328.30	328.50	329.48	329.65	328.00	328.90	329.30	329.00	329.00	324.15	312.70	323.27	327.95	326.60	313.96	313.65	313.29	322.95	312.87	312.66	312.09	311.95	311.63	310.47	310.14	02.800	200.61	300.35	309.12	308.86	308.64					307.34	306.70	305.85	305.74	328.13	328.19	315.55	315.85	338.05	330.9U 336.25	330.05	330 00	339.50
Inlet Invert Elevation	(H)	341.25	339.85	324.40	324.20	322.69	320.38	323.17	328.80	330.15	329.90	329.80	327.11	328.20	329.40	329.30	329.40	324.35	313.00	323.50	329.45	328.75	315.33	313.96	313.65	313.29	322.95	312.87	312.66	312.09	311.95	211.03	310.47	300.06	202.202	300.61	309.35	309.12	308.86	308.64	327.00	308.21	307.75	307.58	307.34	306.70	305.85	328.19	328.25	316.02	315.55	338.50	336.UD	341 85	330 05	339.90
Pipe Length	(H)	135.60	65.22	7.41	9.31	218.20	270.36	37.80	46.14	71.64	14.76	10.10	76.39	69.55	7.73	28.21	22.13	19.65	32.17	23.27	58.64	37.69	137.38	30.43	36.12	32.51	10.10	20.93	56.56	13.87	31.75	12.01.1	33.U3 17 00	11.60	10.9/	75.86	23.43	26.16	30.03	19.37	15.19	46.21	16.49	24.12	63.80	85.52	10.60	12.69	14.96	94.00	3.00	07.02	37.82	133.58	00 0	25.72
To (Outlet) Node		WYE#2 M/VE#2	WYF#4	WQS#402	DMH#209	DMH#228	DMH#206	DMH#209	DMH#219	DMH#225	WYE#11	WYE#10	DMH#200	DMH#257	WYE#30	DMH#219	DMH#260	DMH#200A	CB#346	CB#312	OCS#4		Structure - (539)	Structure - (540)	Structure - (541)	DCO#22	Structure - (543)	Structure - (544)	Structure - (545)	Structure - (546)	Structure - (547)	Structure - (548)	Structure - (549)	Structure - (330) Structure (551)	Structure - (553) Structure - (553)	Structure - (553)	Structure - (554)	Structure - (555)	Structure - (556)	DCO#21	Structure - (558)	Structure - (559)	Structure - (560)	Structure - (561)	Structure - (562)	Structure - (563)	Out-1Pipe - (412)	Out-1Pipe - (413)	Structure - (565)		Out-1Pipe - (415) (1)	VV Y E#4	VV 7 E#5		NS#1B	WYE#1
From (Inlet) Node				DMH#220	WQS#402	DMH#209	DMH#228	CB#312	DMH#210	AD#405	AD#404	AD#429	CB#339	DMH#219	AD#403	WYE#30	AD#434	DMH#260	AD#435	AD#313	AB#398	<b>BYPASS MH#203</b>	Structure - (538)		Structure - (540)	Structure - (541)							Structure - (546)	Structure - (349) Structure (660)		Stricture - (552)	Structure - (553)	Structure - (554)	Structure - (555)	Structure - (556)	DCO#21	Structure - (558)	Structure - (559)	Structure - (560)	Structure - (561)	Structure - (562)		Structure - (565)	DCO#20	UDB#3A	0015#3B		VV YE#4 \//VF#6		NS#1A	NS#1B

Balmer Elementary School Nitsch Project #12260 Link Summary

Peak Flow Depth/ Total Depth Ratio	0.51	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.34	0.50	0.00	0.41	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00
	0.77	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.34	0.50	0.00	0.82	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.00
	4.68	0.00	2.77 1 96	0.00	0.00	0.00	0.00	0.00	2.35	2.73	0.00	6.65	0.00	3.77	0.00	0.00	0.00	0.00	0.00	0.00
Q/Qf Ratio	0.31	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.14	0.22	0.00	0.20	0.00	0.89	0.00	0.00	0.00	0.00	0.00	0.00
Design Flow Capacity Qf (cfs)	11.75	0.79	1.43 3.80	0.64	0.76	0.27	0.79	0.59	4.02	4.05	2.53	39.44	0.42	5.09	0.43	1.74	1.54	0.42	0.43	0.69
Peak Flow (cfs)	3.68	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.55	0.88	0.00	7.98	0.00	4.52	0.00	0.00	0.00	0.00	0.00	0.00
Manning's Roughness 0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Pipe Diameter 1 (in) 6	18 6	9	6 1 2	9	9	9	9	9	12	12	9	24	9	18	9	9	9	9	9	9
Pipe Slope (%) 2.03	1.07	1.69	5.50	1.10	1.58	0.00	1.69	0.94	1.09	1.10	17.27	2.59	0.48	0.00	0.50	8.16	-6.45	0.47	0.50	1.31
Outlet Invert Elevation (ft) 337 40	327.90	331.35	336.18 328.12	329.90	333.25	333.25	333.10	333.25	328.30	327.45	329.50	320.60	329.90	325.40	330.54	327.13	331.00	330.45	330.50	329.80
Inlet Invert Elevation (ft) 340.75	328.50	333.50	339.00 328.35	330.00	334.50	333.25	333.25	333.30	328.60	327.70	333.00	322.50	330.00	325.40	330.73	330.73	327.13	330.73	330.54	330.50
Pipe Length [165.20	56.28 75.47	127.07	51.26 22.63	9.07	79.13	3.76	8.87	5.30	27.65	22.74	20.27	73.35	20.88	1.82	37.50	44.08	59.94	59.75	8.49	53.66
To (Outlet) Node WYFE#5	DMH#238A	WYE#8	AD#408 DMH#037	AD#434	RW FD#1	WYE#7	AD#399	WYE#7	WYE#13	DMH#213	DMH#212	DMH#296	AD#402	Out-1Pipe - (455)	Structure - (666)	DD	AD#411	AD#420	Structure - (669)	AD#421
From (Inlet) Node DCO#5	DMH#298	DCO#10	Structure - (639) CB#335	FD#1	CO#6	RW FD#1	WYE#7	DCO#8	DMH#212	WYE#14	FD#2	DMH#297	FD#3	DMH#257	NS1	NS1	an	NS1	Structure - (666)	Structure - (669)

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# ATTACHMENT E

Long-Term Pollution Prevention and Stormwater Operation and Maintenance Plan

INSPECTION	CHECKLI	ST (BIORETE	ENTION AREA)
Location:		· · · · ·	Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items		tory (S) or factory (U)	Comments/Corrective Action
Initial Inspection After Pla	nting		
Plants are stable, roots not exposed	S	U	
Surface is at design level	S	U	
Overflow bypass/inlet is functional	S	U	
Debris Cleanup (2 times a year minimu	m, Spring	& Fall)	
Litter, leaves, and dead vegetation removed from the system	S	U	
Prune perennial vegetation	S	U	
Standing Water (1 time a year, After lar	ge storm	events)	
No evidence of standing water after 72 hours	S	U	
Short Circuiting & Erosion (1 time a year events)	, After lar	ge storm	
No evidence of animal burrows or other holes	S	U	
No evidence of erosion	S	U	
Drought Conditions (As ne	eded)		
Water plants as needed	S	U	
Dead or dying plants	S	U	
Overflow Bypass/Inlet Inspection (1 time storm events)	a year, A	fter large	
No evidence of blockage or accumulated leaves	S	U	
Good condition, no need for repair	S	U	
Vegetation Coverage (once a	a year)		
50% coverage established throughout system by first year	S	U	
Substantial coverage by year 2 or later	S	U	
Vegetation Health (once every	3 years)		
Dead or decaying plants removed from the system	S	U	
Corrective Action Neede	ed		Due Date
1.			
2.			
3.			
4.			

INSPECTION CHECKL	IST (UND	ERGROUND	DETENTION SYSTEM)
Location: Date: Time:	<b>v</b>		Inspector: Site Conditions:
Date Since Last Rain Event:			
Inspection Items		ctory (S) or factory (U)	Comments/Corrective Action
Inspections (1 time a year, After large	storm ev	ents)	
Visual evidence of trash, debris or dumping	S	U	
Evidence of oil, gasoline, contaminants, or other pollutants in manhole sumps	S	U	-
Condition of manholes. Is there a safety, function, or design problem (need for repair)	S	U	
Grout fillet is separated or cracked wider than ½ inch and longer than 1 foot at the joint of inlet/outlet pipes; evidence of soil entering through cracks	S	U	
Sediment observed in piping or manhole sumps	S	U	
Trash or debris blocking inlet/outlet pipe	S	U	
Condition of manhole frame and cover	S	U	
Manhole rungs are determined to be unsafe (missing rungs, misaligned, cracked)			
Maintenance (1 time a year, After large	e storm ev	vents)	
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Repair manholes (as necessary)	S	U	
Replace manhole castings (as necessary)			
Corrective Action Neede	ed		Due Date
1.			
2.			
3.			
4.			

	HECKLIS	ST (WATER Q	UALITY UNITS)
Location:			Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items		actory (S) or	Comments/Corrective Action
	Unsati	sfactory (U)	
Inspections (2 times a year minimum	, Spring a	& Fall)	
Visual evidence of trash, debris or dumping	S	U	
Evidence of oil, gasoline, contaminants, or other pollutants	S	U	
Condition of structure. Is there a safety, function, or design problem (need for repair)	S	U	
Condition of frame and cover	S	U	
Sediment in the basin exceeds manufacturer recommended levels	S	U	
Trash or debris blocking inlet/outlet pipe	S	U	
Debris Cleanup (2 times a year minimu	m, Spring	g & Fall)	
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Repair structure (as necessary)	S	U	
Replace structure castings (as necessary)			
Corrective Action Neede	ed		Due Date
1.			
2.			
3.			
4.			

INSPECTI	ON CHEC	KLIST (ARE	A DRAINS)
Location:		- \	Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items	Satisfa	ctory (S) or	Comments/Corrective Action
-		sfactory (U)	
Inspections (2 times a year minimum	, Spring 8	Fall)	
Visual evidence of trash, debris or dumping	S	U	
Dead animals or vegetation that could generate odors or gases and could cause complaints	S	U	
Evidence of oil, gasoline, contaminants, or other pollutants	S	U	
Condition of basin. Is there a safety, function, or design problem (need for repair)	S	U	
Vegetation blocking more than 10% of the basin opening (lawn areas)	S	U	
Trash and debris blocking more than 20% of grate surface inlet capacity	S	U	
Missing grate, missing or broken grate members	S	U	
Trash or debris in the basin exceeds 50% of the sump depth from the bottom of basin to invert of the outlet pipe; less than 6 inches clearance from the debris surface to the invert of the outlet pipe	S	U	
Sediment in the basin exceeds 50% of the sump depth from the bottom of basin to invert of the outlet pipe; less than 6 inches clearance from the debris surface to the invert of the outlet pipe	S	U	
Trash or debris blocking outlet pipe	S	U	
Debris Cleanup (2 times a year minimu	m, Spring	& Fall)	
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Repair area drain (as necessary)	S	U	
Replace area drain castings (as necessary)			
Controlling Run-On (2-4 times	a year)		
Adjacent vegetated areas show no signs of erosion and run-on to area drain	S	U	
Corrective Action Neede	ed		Due Date
1.			
2.			
3.			
4.			

INSPECTION	CHECKLI	ST (VEGETA	TED SWALES)
Location:			Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items	Satisfa	ctory (S) or	Comments/Corrective Action
	Unsati	sfactory (U)	
Inspections (2 times a year during first yea then 1 time a year and after rain events			
Inspect the riprap on the channel bottom and side slopes for signs of erosion and formation of rills and gullies. Replace riprap as necessary.	S	U	
Visual evidence of trash, debris or dumping	S	U	
Inspect check dams after every significant rainfall event. Repair damage as needed. Remove sediment as needed.	S	U	
Maintenance (2 times a year during first yea then 1 time a year and after rain events			
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Corrective Action Neede	d		Due Date
1.			
2.			
3.			

INSPECTION	HECKLIS	T (INFILTRA	TION BASINS)
Location:			Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items	Satisfac	ctory (S) or	Comments/Corrective Action
	Unsatis	factory (U)	
Inspections (After major storm events duri operation and 2 times a year thereafte			
Visual evidence of trash, debris or dumping	S	U	
During and after major storm events, the length of time standing water remains in the basin shall be recorded.	S	U	
Examine the outlet structure for evidence of clogging or outflow release velocities that are greater than the design velocity	S	U	
Condition of basin. Is there a safety, function, or design problem (need for repair)	S	U	
Identify areas of sediment accumulation, differential settlement, cracking, and erosion within the basin	S	U	
Inspect embankments for leakage and tree growth	S	U	
Examine the health of the vegetation within the basin and on the embankments	S	U	
Debris Cleanup (After major storm events or of operation and 2 times a year thereaft			
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Mow the buffer area and basin bottom and side slopes, if vegetated	S	U	
Corrective Action Neede	d		Due Date
1.			
2.			
3.			
4.			

INSPECTION	CHECKLI	ST (DETENT	TION BASINS)
Location:			Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items		tory (S) or actory (U)	Comments/Corrective Action
Inspections (During and after major storm o minimum)			
Visual evidence of trash, debris or dumping	S	U	
Examine the outlet structure for evidence of clogging or outflow release velocities that are greater than design flow.	S	U	
Condition of basin. Is there a safety, function, or design problem (need for repair)	S	U	
Identify areas of sediment accumulation, differential settlement, cracking, and erosion within the basin	S	U	
Note any changes to the extended dry detention basin or the contributing watershed, because these could affect basin performance	S	U	
Examine the health of the vegetation within the basin and on the embankments	S	U	
Debris Cleanup (During and after major sto year minimum)	orm events	s, 1 time a	
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Mow the upper-stage, side slopes, embankment, and emergency spillway at least twice per year.	S	U	
Remove sediment from the extended dry detention basin as necessary (at least once every 5 years)	S	U	
Corrective Action Neede	d		Due Date
1.			
2.			
3.			

INSPECTION CH	ECKLIST	(STORMWA	TER OUTFALLS)
Location:			Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items		ctory (S) or sfactory (U)	Comments/Corrective Action
Inspections (1 time a year minimum, and af than 2.5")	ter rain ev	vents larger	-
Visual evidence of trash, debris or dumping	S	U	
Condition of structure. Is there a safety, function, or design problem (need for repair)	S	U	
Inspect flared end sections and associated riprap to ensure that the stability of the outlet area is maintained	S	U	
Trash or debris blocking inlet/outlet pipe	S	U	
Maintenance (1 time a year minimum, an larger than 2.5")	d after rai	in events	
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Make repairs immediately if riprap displacement or downstream channel scour is observed	S	U	
Corrective Action Neede	d		Due Date
1.			
2.			
3.			

INSPECTION CH	IECKLIST	(OIL/WATER	R SEPERATORS)
Location:			Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items		ctory (S) or factory (U)	Comments/Corrective Action
Inspections (Once per month mini	mum)		
Visual evidence of trash, debris or dumping	S	U	
Debris Cleanup (Once per month r	ninimum)		
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and dispose of accumulated oil and grease and sediment using a vacuum truck	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Remove and legally dispose sediment, trash, and debris	S	U	
Cleaning (2 times a year minimum, S	Spring & F	Fall)	
Clean oil/water separators out at least twice per year. In the event of a hazardous waste spill, the oil/water separator should be cleaned immediately.	S	U	
Corrective Action Neede	ed		Due Date
1.			
2.			
3.			
4.			

# LONG-TERM POLLUTION PREVENTION PLAN AND STORMWATER OPERATION AND MAINTENANCE PLAN

W. Edward Balmer Elementary School, Northbridge, MA

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#### INTRODUCTION

The purpose of this document is to specify the pollution prevention measures and stormwater management system operation and maintenance for the W. Edward Elementary School site. The Responsible Party indicated below shall implement the management practices outlined in this document and proactively conduct operations at the project site in an environmentally responsible manner. Compliance with this Manual does not in any way dismiss the responsible party, owner, property manager, or occupants from compliance with other applicable federal, state or local laws.

Responsible Party: Town of Northbridge 7 Main Street, Northbridge, MA 01588

This Document has been prepared in compliance with Standards 4 and 9 of the 2008 Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards, which state:

#### Standard 4:

The Long Term Pollution Prevention Plan shall include the proper procedures for the following:

- Good housekeeping
- Storing materials and waste products inside or under cover
- Vehicle washing
- Routine inspections of stormwater best management practices
- Spill prevention and response
- Maintenance of lawns, gardens, and other landscaped areas
- Pet waste management
- Operation and management of septic systems
- Proper management of deicing chemicals and snow

#### Standard 9:

The Long-Term Operation and Maintenance Plan shall at a minimum include:

- Stormwater management system(s) owner(s)
- The party or parties responsible for operation and maintenance, including how future property owners shall be notified of the presence of the stormwater management system and the requirement for operation and maintenance
- The routine and non-routine maintenance tasks to be undertaken after construction is complete and a schedule for implementing those tasks
- A plan that is drawn to scale and shows the location of all stormwater BMPs in each treatment train along with the discharge point
- A description of public safety features
- An estimated operations and maintenance budget

## 1.0 LONG-TERM POLLUTION PREVENTION PLAN

The Responsible Party shall implement the following good housekeeping procedures at the project site to reduce the possibility of accidental releases and to reduce safety hazards.

#### 1.1 Storage of Hazardous Materials

To prevent leaks and spills, keep hazardous materials and waste products under cover or inside. Use drip pans or spill containment systems to prevent chemicals from entering the drainage system. Inspect storage areas for materials and waste products at least once per year to determine amount and type of the material on site, and if the material requires disposal.

Securely store liquid petroleum products and other liquid chemicals in federally- and state-approved containers. Restrict access to maintenance personnel and administrators.

#### 1.2 Storage of Waste Products

Collect and store all waste materials in securely lidded dumpster(s) or other secure containers as applicable to the material. Keep dumpster lids closed and the areas around them clean. Do not fill the dumpsters with liquid waste or hose them out. Sweep areas around the dumpster regularly and put the debris in the garbage, instead of sweeping or hosing it into the parking lot. Legally dispose of collected waste on a regular basis.

Segregate liquid wastes, including motor oil, antifreeze, solvents, and lubricants, from solid waste and recycle through hazardous waste disposal companies, whenever possible. Separate oil filters, batteries, tires, and metal filings from grinding and polishing metal parts from common trash items and recycle. These items are not trash and are illegal to dump. Contact a hazardous waste hauler for proper disposal to a hazardous waste collection center.

#### **1.3 Spill Prevention and Response**

Implement spill response procedures for releases of significant materials such as fuels, oils, or chemical materials onto the ground or other area that could reasonably be expected to discharge to surface or groundwater.

- For minor spills, keep fifty (50) gallon spill control kits and Speedy Dry at all shop and work areas.
- Immediately contact applicable Federal, State, and local agencies for reportable quantities as required by law.
- Immediately perform applicable containment and cleanup procedures following a spill release.
- Promptly remove and dispose of all material collected during the response in accordance with Federal, State and local requirements. A licensed emergency response contractor may be required to assist in cleanup of releases depending on the amount of the release, and the ability of the Contractor to perform the required response.
- Reportable quantities of chemicals, fuels, or oils are established under the Clean Water Act and enforced through Massachusetts Department of Environmental Protection (DEP).

#### 1.4 Minimize Soil Erosion

Soil erosion facilitates mechanical transport of nutrients, pathogens, and organic matter to surface water bodies. Repair all areas where erosion is occurring throughout the project site. Stabilize bare soil with riprap, seed, mulch, or vegetation.

#### 1.5 Vehicle Washing

Vehicle washing will occur within the covered service area. The car wash will be a state-of-the art system that will reclaim and reuse water for the car wash operation. Eventual discharge of the wash water will be directed to the sanitary sewer.

### 1.6 Maintenance of Lawns, Gardens, and other Landscaped Areas

Pesticides and fertilizers shall not be used in the landscaped areas associated with the project site and shall not be stored on-site. Dumping of lawn wastes, brush or leaves or other materials or debris is not permitted in any Resource Area. Grass clippings, pruned branches and any other landscaped waste should be disposed of or composted in an appropriate location. No irrigation shall be used in the landscaped areas for this project.

## 1.7 Management of Deicing Chemicals and Snow

The qualified contractor selected for snow plowing and deicing shall be made fully aware of the requirements of this section.

No road salt (sodium chloride) shall be stored on-site. The use of magnesium chloride de-icing product with a 0.5 to 1.0 percent sodium chloride mix for snow and ice treatment is permitted. The product shall be stored in a locked room inside the building and shall be used at exterior stairs and walkways. The snow plow contractor shall adhere to these magnesium chloride use and storage requirements.

During typical snow plowing operations, snow shall be pushed to the designated snow removal areas noted on the Snow Storage Plan (Figure 2). Snow shall not be stockpiled in wetland resource areas or the 100-foot Buffer Zone, catch basins, or bioretention basins, . In severe conditions where snow cannot be stockpiled on site, the snow shall be removed from the site and properly disposed of in accordance with DEP Guideline BRP601-01.

Use of sand is permitted only for impervious roadways and parking areas. If sand is applied, the snow plowed from impervious areas shall not be stored on porous asphalt.

Porous asphalt areas are proposed throughout the site, as indicated on the Stormwater Management System Location Map (Figure 1). These areas will be delineated on-site using pavement markings. Porous asphalt performs well in cold climates and can reduce meltwater runoff during the snowmelt period; however there are specific winter management techniques that must be followed for porous asphalt systems.

The porous asphalt areas shall be maintained during snow events as provided below:

- Apply anti-icing treatments only when absolutely necessary (in extreme events). It is not anticipated that deicing chemicals will be required for typical winter events.
- Plow as needed after storm events. Avoid scarifying the porous asphalt surface. Special plow blades should be used whenever possible. Raised blade is not recommended.
- Apply the minimum amount of deicing agents during and after storms required to control compact snow and ice that are not removed by plowing.
- Do not apply sand in porous asphalt areas "No Sanding" signs shall be posted before the first snowfall and maintenance and snow removal contractors shall be made aware of this requirement.

Before winter begins, the property owner and the contractor shall review snow plowing, deicing, and stockpiling procedures. Areas designated for stockpiling should be cleaned of any debris. Street and parking lot sweeping should be followed in accordance with the Operation and Maintenance Plan.

#### **1.8** Coordination with other Permits and Requirements

Certain conditions of other approvals affecting the long term management of the property shall be considered part of this Long Term Pollution Prevention Plan. The Owner shall become familiar with those documents and comply with the guidelines set forth in those documents.

#### 2.0 STORMWATER MANAGEMENT SYSTEM OPERATION AND MAINTENANCE PLAN

#### 2.1 Introduction

This Operation and Maintenance Plan (O&M Plan) for W. Edward Balmer Elementary School site is required under Standard 9 of the 2008 MassDEP Stormwater Handbook to provide best management practices for implementing maintenance activities for the stormwater management system in a manner that minimizes impacts to wetland resource areas.

The Owner shall implement this O&M Plan and proactively conduct operations at the site in an environmentally responsible manner. Compliance with this O&M Plan does not in any way dismiss the Owner from compliance with other applicable Federal, State or local laws.

Routine maintenance during construction and post-development phases of the project, as defined in the Operation and Maintenance Plan, shall be permitted without amendment to the Order of Conditions. A continuing condition in the Certificate of Compliance shall ensure that maintenance can be performed without triggering further filings under the Wetlands Protection Act.

All stormwater best management practices (BMPs) shall be operated and maintained in accordance with the design plans and the Operation and Maintenance Plan approved by the issuing authority. The Owner shall:

- a. Maintain an operation and maintenance log for the last three years, including inspections, repairs, replacement and disposal (for disposal the log shall indicate the type of material and the disposal location). This is a rolling log in which the responsible party records all operation and maintenance activities for the past three years.
- b. Make this log available to MassDEP and the Conservation Commissions upon request; and
- c. Allow members and agents of the MassDEP and the Conservation Commissions to enter and inspect the premises to evaluate and ensure that the Owner complies with the Operation and Maintenance requirements for each BMP.

#### 2.2 Stormwater Operation and Maintenance Requirements

Inspect and maintain the stormwater management system as directed below. Refer to the Stormwater Management System Location Map (Figure 1) for the location of each component of the system. Repairs to any component of the system shall be made as soon as possible to prevent any potential pollutants (including silt) from entering the resource areas.

#### Porous Pavement

Porous pavement areas are proposed throughout the site, as indicated on the Stormwater Management System Location Map (Figure 1). These areas will be delineated on-site using pavement markings.

Frequent cleaning and maintenance of the porous pavement surface is critical to prevent clogging. Frequent vacuum sweeping along with jet washing of porous pavement is required. No winter sanding shall be conducted on the porous surface. For proper maintenance:

- Minimize salt use during winter months.
- No winter sanding is allowed.
- Keep landscaped areas well maintained to prevent soil from being transported onto the pavement.
- Regularly monitor the porous pavement surface to check for deterioration and make sure that it drains properly after storm events.
- Clean the surface of each porous pavement area using vacuum sweeping as required to keep the pavement functioning as designed. At a minimum, the porous pavement shall be cleaned after the winter season and every three months thereafter. This requirement may be adjusted as needed, based on regular visual inspections of the porous pavement surface.

- Never reseal or repave with impermeable materials.
- Once per year, the infiltrative capacity of the porous pavement should be tested by running a hose over each porous pavement area for 30 minutes.
- Sections of damaged porous asphalt (rutting, etc.) can be repaired by heating and rerolling the asphalt.
- When infiltrative capacity of porous pavement is reduced to less than the design rate, the porous pavement shall be replaced by milling to the choker course.

#### Area Drains

Inspect area drains at least once per month and remove debris from the grate. Clean out accumulated sediments at least once per year and more frequently as necessary.

#### Water Quality Units (Proprietary Separators)

Maintain water quality units according the recommendations set forth by the manufacturer. General inspection and maintenance procedures for proprietary devices are provided below:

- Inspect units following completion of construction, prior to being put into service.
- Inspect units at least twice per year following installation and no less than once per year thereafter.
- Inspect units immediately after any oil, fuel or chemical spill.
- All inspections shall include checking the oil level and sediment depth in the unit. Removal of sediments/oils shall occur per manufacturer recommendations.
- A licensed waste management company shall remove captured petroleum waste products from any oil, chemical or fuel spills and dispose.
- OSHA confined space entry protocols shall be followed if entry into the unit is required.

#### Vegetated Swales

Vegetated swales shall be inspected twice per year during the first year after construction. In subsequent years, the swales shall be inspected annually and after rain events greater than 3 inches in 24 hours. Inspection and maintenance procedures for drainage channels are provided below:

- Inspect the riprap on the channel bottom and side slopes for signs of erosion and formation of rills and gullies. Replace riprap as necessary.
- Remove accumulated trash and debris.
- Remove sediment as needed. Use hand methods (i.e. a person with a shovel) when cleaning to minimize disturbance to vegetation and underlying soils.
- Check Dams: Inspect check dams after every significant rainfall event. Repair damage as needed. Remove sediment as needed.

#### Detention Basin

Inspect the detention basin at least once per year to ensure that the basin is operating as intended. Inspect the detention basin during and after major storms to determine if the basin is meeting the expected detention times.

- Examine the outlet structure for evidence of clogging or outflow release velocities that are greater than design flow.
  - Potential problems that should be checked include: subsidence, erosion, cracking or tree growth on the embankment; damage to the emergency spillway; sediment accumulation around the outlet; inadequacy of the inlet/outlet channel erosion control measures; changes in the condition of the pilot channel; and erosion within the basin and banks. Make any necessary repairs immediately.
- During inspections, note any changes to the extended dry detention basin or the contributing watershed, because these could affect basin performance.
- Mow the upper-stage, side slopes, embankment, and emergency spillway at least twice per year. Also remove trash and debris at this time.

• Remove sediment from the extended dry detention basin as necessary, but at least once every 5 years. Providing an on-site sediment disposal area will reduce the overall sediment removal costs.

#### **Bioretention Areas**

Perform annual maintenance of all components of the bioretention area, including plants, soil, and mulch. Table 1, below, outlines recommended maintenance activities.

Location	Description	Frequency	Time of Year
Surface	Inspect and remove trash	Monthly	Year round
Soil	Inspect and repair erosion	Monthly	Year round
	Remulch void areas	Annually	Spring
Organic Layer	Remove previous mulch layer before applying new layer (optional)	Annually	Spring
	Water vegetation at end of day for 14 consecutive days after planting	Immediately after planting	As needed
Plants	Remove and replace all dead and diseased vegetation that cannot be treated	Annually	Spring
	Treat all diseased trees and shrubs	As needed	Variable

During and after storm events, record the length of time standing water remains in the bioretention areas. If the time is greater than 72 hours, thoroughly inspect the basins for signs of clogging and develop a corrective action plan. The corrective action plan, prepared by a qualified professional, will outline procedures to restore infiltrative function. The owner of the site shall take immediate action to implement these corrective measures.

#### Stormwater Outfalls

Inspect flared end sections and associated riprap spillways at least once per year and after major storm events (rainfall totals greater than 2.5 inches in 24 hours) to ensure that the stability of the outlet area is maintained. Keep the outfall area clear of debris such as trash, branches, and sediment. Make repairs immediately if riprap displacement or downstream channel scour is observed.

#### **Oil/Water Separators**

At a minimum, inspect oil/water separators monthly, and clean them out at least twice per year. In the event of a hazardous waste spill, the oil/water separator should be cleaned immediately. Cleaning involves the removal of accumulated oil and grease and sediment using a vacuum truck. Polluted water or sediments removed from the oil/water separators shall be disposed of in accordance with all applicable local, state, and federal laws and regulations, including M.G.L.c. 21C and 310 CMR 30.00.

#### 2.3 Street Sweeping

Perform street sweeping at least twice per year, whenever there is significant debris present on roads and parking lots. Street sweeping shall occur in the spring and fall. Sweepings must be handled and disposed of properly according to the Northbridge Conservation Commissions.

#### 2.4 Repair of the Stormwater Management System

The stormwater management system shall be maintained. The repair of any component of the system shall be made as soon as possible to prevent any potential pollutants including silt from entering the resource areas or the existing closed drainage system.

#### 2.5 Reporting

The Owner shall maintain a record of drainage system inspections and maintenance (per this Plan) and submit a yearly report to the Northbridge Conservation Commissions.

#### STORMWATER MANAGEMENT SYSTEM INSPECTION FORM

W. Edward Balmer School – 21 ( Northbridge, MA	Crescent Street Inspected	by: Date:
Component	Status/Inspection	Action Taken
Deep Sump Catch Basins, Area Drains and Drain Manholes		
Bioretention Basin		
Subsurface Infiltration System		
Water Quality Units		
Oil/Water Separator		
Porous Asphalt		
Stormwater Outfalls & Level Spreaders		
General site conditions – evidence of erosion, etc.		

# SUBMIT COPIES OF STORMWATER MANAGEMENT SYSTEM INSPECTION FORM TO THE NORTHBRIDGE CONSERVATION COMMISSIONS WITH THE YEARLY REPORT.

INSPECTION	CHECKLI	ST (BIORETE	ENTION AREA)
Location:		· · · · · ·	Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items		tory (S) or factory (U)	Comments/Corrective Action
Initial Inspection After Pla	nting		
Plants are stable, roots not exposed	S	U	
Surface is at design level	S	U	
Overflow bypass/inlet is functional	S	U	
Debris Cleanup (2 times a year minimu	m, Spring	& Fall)	
Litter, leaves, and dead vegetation removed from the system	S	U	
Prune perennial vegetation	S	U	
Standing Water (1 time a year, After lar	ge storm	events)	
No evidence of standing water after 72 hours	S	U	
Short Circuiting & Erosion (1 time a year events)	, After lar	ge storm	
No evidence of animal burrows or other holes	S	U	
No evidence of erosion	S	U	
Drought Conditions (As ne	eded)		
Water plants as needed	S	U	
Dead or dying plants	S	U	
Overflow Bypass/Inlet Inspection (1 time storm events)	a year, A	fter large	
No evidence of blockage or accumulated leaves	S	U	
Good condition, no need for repair	S	U	
Vegetation Coverage (once a	a year)		
50% coverage established throughout system by first year	S	U	
Substantial coverage by year 2 or later	S	U	
Vegetation Health (once every	3 years)		
Dead or decaying plants removed from the system	S	U	
Corrective Action Neede	ed		Due Date
1.			
2.			
3.			
4.			

INSPECTION CHECKL	IST (UND	ERGROUND	DETENTION SYSTEM)
Location: Date: Time:	<b>v</b>		Inspector: Site Conditions:
Date Since Last Rain Event:			
Inspection Items		ctory (S) or factory (U)	Comments/Corrective Action
Inspections (1 time a year, After large	storm ev	ents)	
Visual evidence of trash, debris or dumping	S	U	
Evidence of oil, gasoline, contaminants, or other pollutants in manhole sumps	S	U	-
Condition of manholes. Is there a safety, function, or design problem (need for repair)	S	U	
Grout fillet is separated or cracked wider than ½ inch and longer than 1 foot at the joint of inlet/outlet pipes; evidence of soil entering through cracks	S	U	
Sediment observed in piping or manhole sumps	S	U	
Trash or debris blocking inlet/outlet pipe	S	U	
Condition of manhole frame and cover	S	U	
Manhole rungs are determined to be unsafe (missing rungs, misaligned, cracked)			
Maintenance (1 time a year, After large	e storm ev	vents)	
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Repair manholes (as necessary)	S	U	
Replace manhole castings (as necessary)			
Corrective Action Neede	ed		Due Date
1.			
2.			
3.			
4.			

	HECKLIS	ST (WATER Q	UALITY UNITS)
Location:			Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items		actory (S) or	Comments/Corrective Action
	Unsati	sfactory (U)	
Inspections (2 times a year minimum	, Spring a	& Fall)	
Visual evidence of trash, debris or dumping	S	U	
Evidence of oil, gasoline, contaminants, or other pollutants	S	U	
Condition of structure. Is there a safety, function, or design problem (need for repair)	S	U	
Condition of frame and cover	S	U	
Sediment in the basin exceeds manufacturer recommended levels	S	U	
Trash or debris blocking inlet/outlet pipe	S	U	
Debris Cleanup (2 times a year minimu	m, Spring	g & Fall)	
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Repair structure (as necessary)	S	U	
Replace structure castings (as necessary)			
Corrective Action Neede	ed		Due Date
1.			
2.			
3.			
4.			

INSPECTI	ON CHEC	KLIST (ARE	A DRAINS)
Location:		- \	Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items	Satisfa	ctory (S) or	Comments/Corrective Action
-		sfactory (U)	
Inspections (2 times a year minimum	, Spring 8	Fall)	
Visual evidence of trash, debris or dumping	S	U	
Dead animals or vegetation that could generate odors or gases and could cause complaints	S	U	
Evidence of oil, gasoline, contaminants, or other pollutants	S	U	
Condition of basin. Is there a safety, function, or design problem (need for repair)	S	U	
Vegetation blocking more than 10% of the basin opening (lawn areas)	S	U	
Trash and debris blocking more than 20% of grate surface inlet capacity	S	U	
Missing grate, missing or broken grate members	S	U	
Trash or debris in the basin exceeds 50% of the sump depth from the bottom of basin to invert of the outlet pipe; less than 6 inches clearance from the debris surface to the invert of the outlet pipe	S	U	
Sediment in the basin exceeds 50% of the sump depth from the bottom of basin to invert of the outlet pipe; less than 6 inches clearance from the debris surface to the invert of the outlet pipe	S	U	
Trash or debris blocking outlet pipe	S	U	
Debris Cleanup (2 times a year minimu	m, Spring	& Fall)	
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Repair area drain (as necessary)	S	U	
Replace area drain castings (as necessary)			
Controlling Run-On (2-4 times	a year)		
Adjacent vegetated areas show no signs of erosion and run-on to area drain	S	U	
Corrective Action Neede	ed		Due Date
1.			
2.			
3.			
4.			

INSPECTION	TED SWALES)		
Location:			Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items	Satisfa	ctory (S) or	Comments/Corrective Action
	Unsati	sfactory (U)	
Inspections (2 times a year during first yea then 1 time a year and after rain events			
Inspect the riprap on the channel bottom and side slopes for signs of erosion and formation of rills and gullies. Replace riprap as necessary.	S	U	
Visual evidence of trash, debris or dumping	S	U	
Inspect check dams after every significant rainfall event. Repair damage as needed. Remove sediment as needed.	S	U	
Maintenance (2 times a year during first yea then 1 time a year and after rain events			
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Corrective Action Neede	d		Due Date
1.			
2.			
3.			

INSPECTION	HECKLIS	T (INFILTRA	TION BASINS)
Location:			Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items	Satisfac	ctory (S) or	Comments/Corrective Action
	Unsatis	factory (U)	
Inspections (After major storm events duri operation and 2 times a year thereafte			
Visual evidence of trash, debris or dumping	S	U	
During and after major storm events, the length of time standing water remains in the basin shall be recorded.	S	U	
Examine the outlet structure for evidence of clogging or outflow release velocities that are greater than the design velocity	S	U	
Condition of basin. Is there a safety, function, or design problem (need for repair)	S	U	
Identify areas of sediment accumulation, differential settlement, cracking, and erosion within the basin	S	U	
Inspect embankments for leakage and tree growth	S	U	
Examine the health of the vegetation within the basin and on the embankments	S	U	
Debris Cleanup (After major storm events or of operation and 2 times a year thereaft			
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Mow the buffer area and basin bottom and side slopes, if vegetated	S	U	
Corrective Action Neede	d		Due Date
1.			
2.			
3.			
4.			

INSPECTION	CHECKLI	ST (DETENT	TION BASINS)
Location:			Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items		tory (S) or actory (U)	Comments/Corrective Action
Inspections (During and after major storm o minimum)			
Visual evidence of trash, debris or dumping	S	U	
Examine the outlet structure for evidence of clogging or outflow release velocities that are greater than design flow.	S	U	
Condition of basin. Is there a safety, function, or design problem (need for repair)	S	U	
Identify areas of sediment accumulation, differential settlement, cracking, and erosion within the basin	S	U	
Note any changes to the extended dry detention basin or the contributing watershed, because these could affect basin performance	S	U	
Examine the health of the vegetation within the basin and on the embankments	S	U	
Debris Cleanup (During and after major sto year minimum)	orm events	s, 1 time a	
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Mow the upper-stage, side slopes, embankment, and emergency spillway at least twice per year.	S	U	
Remove sediment from the extended dry detention basin as necessary (at least once every 5 years)	S	U	
Corrective Action Neede	d		Due Date
1.			
2.			
3.			

INSPECTION CH	ECKLIST	(STORMWA	TER OUTFALLS)
Location:			Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items		ctory (S) or sfactory (U)	Comments/Corrective Action
Inspections (1 time a year minimum, and af than 2.5")	ter rain ev	vents larger	-
Visual evidence of trash, debris or dumping	S	U	
Condition of structure. Is there a safety, function, or design problem (need for repair)	S	U	
Inspect flared end sections and associated riprap to ensure that the stability of the outlet area is maintained	S	U	
Trash or debris blocking inlet/outlet pipe	S	U	
Maintenance (1 time a year minimum, an larger than 2.5")	d after rai	in events	
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Make repairs immediately if riprap displacement or downstream channel scour is observed	S	U	
Corrective Action Neede	d		Due Date
1.			
2.			
3.			

INSPECTION CH	IECKLIST	(OIL/WATER	R SEPERATORS)
Location:			Inspector:
Date: Time:			Site Conditions:
Date Since Last Rain Event:			
Inspection Items		ctory (S) or factory (U)	Comments/Corrective Action
Inspections (Once per month mini	mum)		
Visual evidence of trash, debris or dumping	S	U	
Debris Cleanup (Once per month r	ninimum)		
Remove and legally dispose sediment, trash, and debris	S	U	
Remove and dispose of accumulated oil and grease and sediment using a vacuum truck	S	U	
Remove and legally dispose contaminants or pollutants	S	U	
Remove and legally dispose sediment, trash, and debris	S	U	
Cleaning (2 times a year minimum, S	Spring & F	Fall)	
Clean oil/water separators out at least twice per year. In the event of a hazardous waste spill, the oil/water separator should be cleaned immediately.	S	U	
Corrective Action Neede	ed		Due Date
1.			
2.			
3.			
4.			

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#### ATTACHMENT F

DRAFT Stormwater Pollution Prevention Plan (SWPPP)

NOTE FINAL SWPPP Submitted as a Separate File



#### ATTACHMENT G

#### Soil Investigations

NRCS Soil Maps and Descriptions



Commonwealth of Massachusetts CHATOWN of North bridge Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A.	Facility Information Northbridge School Owner Name 21 Crescent St.	D's #1,	ct		
	Street Address Whittyinsville City		MA State	Map/Lot # <u> O/ 55</u> Zip Code	
B.	Site Information				
1.	(Check one) X New Construction	Upgrade	Repair		
2.	Soil Survey Available? X Yes	D No	If yes: Web Soil	Sourvey 651 Soll Map Unit	
	Soil Survey Available? X Yes Udarghents, 5100046rd Soil Name		Soil Limitations		
3.	Geologic/Parent Material Surficial Geological Report Available?	🗌 No	Landform If yes: 2008 Year Published/Source	1:24,000 Cearse De Publication Scale Map Unit	pasits
4.	Flood Rate Insurance Map			<i>}</i>	
	Above the 500-year flood boundary? X Yes	🗌 No	Within the 100-year flood bounda	y? 🗌 Yes 💢 No	
5.	Within a velocity zone?	No		11/2 77	hund
6.	Within a Mapped Wetland Area?	🗌 No	MassGIS Wetland Data Layer:	Wooded Sup my Decid	uous
7.	Current Water Resource Conditions (USGS):	Month/Year	Range: 🗌 Above Normal 🗌	Normal 🔲 Below Normal	
8.	Other references reviewed:				

MARC GABRIEL, PE SOIL EVALUATOR #2879

Prairage Purposes Only Form 11 - Soil Suitability Assessment for On-Site Savage Disposal - Page 4-of 8-

t5form11.doc • rev. 8/15



#### Commonwealth of Massachusetts City/Town of

# Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C.	On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)
	Deep Observation Hole Number: TP-1 4/9/19 8125 and Cloudy Date Time Weather
1.	Location       Ground Elevation at Surface of Hole: <u>feet</u> <u>feet</u> <u>feet</u> <u>fiet</u>
2.	Land Use $A+h e+c F e d $ (e.g., woodland, agricultural field, vacant lot, etc.) Grass Vegetation Vegetation Vegetation A+h e+c F e d  Surface Stones (e.g., cobbles, stones, boulders, etc.) No Surface Stones (e.g., cobbles, stones, boulders, etc.) Sof S Position on Landscape (SU, SH, BS, FS, TS)
3.	Distances from: Open Water Body Drainage Way Wetlands feet feet feet feet Other
4.	Parent Material: <u>Proglacial Outwash</u> Unsuitable Materials Present: Yes No
5.	If Yes: Disturbed Soil Fill Material Impervious Layer(s) Weathered/Fractured Rock Bedrock Groundwater Observed: Yes No If yes: <u>44"</u> Estimated Depth to High Groundwater: <u>44"</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u> <u>inches</u>
	5 Motte ling

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal • Page 2 of 8



#### City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

#### C. On-Site Review (continued)

Deep Observation Hole Number:

.

	Soll Horizon/ Layer	Soil Matrix: Color-	Redoximorphic Features			Soil Texture	Coarse Fragments % by Volume		Soll Structure	Soil	Other
Depth (in.)		Moist (Munsell)	Depth	Color	Percent	(USDA)	Gravel	Cobbles & Stones		(Moist)	
0-26	F	_	-	-	-		-152.00			agentite".	
26-34	A	104R2/2				52	42	0	WG	F	
34 - 44	B	10484/4		-	watter	52	12	0	WSAB	F	
44-68	C,	2.546/2	214"	D: 2.546/2 R: 7.54R5/8	5	Fine LS	10	1. Zu	p	6	
68-84	62	2.546/3	¥	b	10	25	10	62	M	6	
											1

Additional Notes:

C, Material was Hight in place but loose when excavated.

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal • Page 3 of 8



# City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C.	On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)
	Deep Observation Hole Number: <u>TP-2</u> <u>U/9/19</u> <u>Jan</u> <u>Cloudy</u> Date Time Weather
1.	Location Ground Elevation at Surface of Hole: <u>318.1</u> Description of Location: Grass Field
2.	Land Use $A+h _{e+ic}$ Field $No$ (e.g., woodland, agricultural field, vacant lot, etc.) $No$ Surface Stones (e.g., cobbles, stones, boulders, etc.) $4 \rightarrow 6$ Slope (%)
3.	Grace     Outputtion     Side of Slope       Vegetation     Landform     Position on Landscape (SU, SH, BS, FS, TS)       Distances from:     Open Water Body     Drainage Way     Wetlands       feet     feet     feet     feet       Property Line     Drinking Water Well     Other
4.	Parent Material: <u>Proglacial Outwash</u> Unsuitable Materials Present: XYes INO
5.	If Yes:       Disturbed Soil       Fill Material       Impervious Layer(s)       Weathered/Fractured Rock       Bedrock         Groundwater Observed:       Yes       No       If yes: $\frac{42''}{Depth Weeping from Pit}$ $\frac{57''}{Depth Standing Water in Hole}$ Estimated Depth to High Groundwater: $\frac{47''}{Inches}$ $\frac{314.6}{elevation}$
	AMottles

Form 11 – Soil Suitability Assessment for On-Site Sewage Disposal • Page 2 of 8

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## City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

\*:

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-2

.

	Soil Horizon/ Layer		Redoximorphic Features			Soil Texture	Coarse Fragments % by Volume		s Soll Structure		Other
Depth (in.)		Soll Matrix: Color- Moist (Munsell)	Depth	Color	Percent	(USDA)	Gravel	Cobbles & Stones		(Moist)	Other
0-10	F			- State	-		-	-		-	
42-	<i>C</i> ,	2.54/0/2	42"	D: 2.546/2 R: 7.54R 5/8	2	Fire 1/5	10	0	m	L	
60-72	62	2.5/6/3	V	,h	5	Course L/s	15	0	m	L	
C											
							·				
								1			

Additional Notes:

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## Commonwealth of Massachusetts City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C.	On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)
0.	Deep Observation Hole Number: <u>TP-3</u> <u>4/9/19</u> <u>9:20am</u> <u>Cloudy</u> Date Time Weather
1.	Location Ground Elevation at Surface of Hole: 316,6 Latitude/Longitude: 1 Description of Location: Groups Field
2.	Land Use $Airh lie rice Eigld No Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)  Grass Vegetation Vegetation Landform Position on Landscape (SU, SH, BS, FS, TS)$
3.	Distances from: Open Water Body Drainage Way Feet Feet Feet Other
4.	Parent Material: <u>Proglacial Oritwash</u> Unsuitable Materials Present: Yes INO
5.	If Yes:       Disturbed Soil       Fill Material       Impervious Layer(s)       Weathered/Fractured Rock       Bedrock         Groundwater Observed:       Yes       No       If yes:       62"       70"         Estimated Depth to High Groundwater:       60"       311.6       Depth Weeping from Pit       Depth Standing Water in Hole

.

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal • Page 2 of 8

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# City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-3

1

	Soil Horizon/ Layer	o II Matein Calar	Redoximorphic Features			Soil Texture	Coarse Fragments % by Volume		Soil Structure	Soil Consistence	Other
Depth (in.)		Moist (Munsell)	Depth	Color	Percent	(USDA)	Gravel	Cobbies & Stones		(Moist)	Other
0 48"	E	_		_		-	~	~	-	<u>م</u> سن	
48"- 82"	C	2.546/3	42"	D: 2.546/2 R:7,54R5/8	10	Coarse 2/3	25	12	m	2	
			1		<u> </u>						
	<u>}</u>										

Additional Notes:

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# City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C.	On-Site Review (minimum of two holes required at every proposed primary and reserve disposal a	area)
	Deep Observation Hole Number: <u>TP-4</u> <u>4/9/19</u> <u>9:55am</u> <u>Cloudy</u> <u>Date</u> <u>Time</u> <u>Weather</u>	. a an an an an an an
1.	Location Ground Elevation at Surface of Hole: 315,5 Latitude/Longitude: 1 Description of Location: Gross Field	
2.	Land Use <u>Auhletic Field</u> (e.g., woodland, agricultural field, vacant lot, etc.) Grass <u>Dutinash</u> Plain Bot. of Slope	<u>4-6'</u> Slope (%)
3.	Distances from: Open Water Body Drainage Way Wetlands Feet Property Line Drinking Water Well Other	feet
4.	Parent Material: Proglacial Dutrush Unsuitable Materials Present: RYes	feet
5.	Groundwater Observed: Yes $\Box$ No If yes: $\underline{GA''}$	
	Estimated Depth to High Groundwater: 58" Depth Weeping from Pit Depth Standing inches elevation	g Water in Hole



## City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-4

,

	Soil Horizon/ Layer	Call Matrix: Color-	Redoximorphic Features			Soll Texture	Coarse Fragments % by Volume			Soil Consistence	Other
Depth (in.)		Moist (Munsell)	Depth	Color	Percent	(USDA)	Gravel	Cobbles & Stones		(Moist)	Other
0-53	F	-	NS.	etras.	andr	u Ulinaria		ger 20-	e2-		
53-80	C	2.546/3	58	D: 2.546/3 R: 7.54R5/8	10	Loarse	25	42	m	<u> </u>	
										1	
	<u> </u>										
<u> </u>											

Additional Notes:

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#### Commonwealth of Massachusetts City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C.	. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)
	Deep Observation Hole Number: TP-5 4/9/19 10:30 and Cloudy Date Time Weather
1.	Location
	Ground Elevation at Surface of Hole: 317.2 Latitude/Longitude: /
	Description of Location: Grass Field
2.	Land Use Athletic Field
	Vegetation Contract of Cartwords Plan Bort. of Slope Landform Position on Landscape (SU, SH, BS, FS, TS)
3.	Distances from: Open Water Body Drainage Way Wetlands feet
	Property Line Drinking Water Well Other
4.	Parent Material: <u>Resplacial Outroash</u> Unsuitable Materials Present: XYes No
	If Yes: Disturbed Soil K Fill Material Impervious Layer(s) Weathered/Fractured Rock Bedrock
5.	Groundwater Observed: X Yes No If yes: 82"
	Estimated Depth to High Groundwater:
	sweeping

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2



#### City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-5

	Soil Horizon/ Layer		Redoximorphic Features			Soil Texture	Coarse Fragments % by Volume			Soil Consistence	Other
Depth (in.)		Moist (Munsell)	Depth	Color	Percent	(USDA)	Gravei	Cobbles & Stones	Son Shucture	(Moist)	
D-90	F		Not	-visible in	Sill	aaut+		***	€aur		
<u> </u>		,									
·											

Fill material mostly a loomy sand of high gravel convent (25%) and pochets of buried loom.



#### Commonwealth of Massachusetts City/Town of

# Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C.	. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)
	Deep Observation Hole Number: <u>TP-6</u> <u>U19/19</u> <u>10:50an</u> <u>Box of Stope</u> Date <u>Time</u> Weather
1.	Location Ground Elevation at Surface of Hole: 3/9.7 Latitude/Longitude: /
	Description of Location: Grass Field
2.	Land Use <u>A'thletic Field</u> . <u>No</u> (e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones (e.g., cobbles, stones, boulders, etc.) <u>Slope (%)</u>
	Grass Outwash Plain Bet of Slope Venetation Landform Position on Landscape (SU, SH, BS, FS, TS)
•	
3.	Distances from: Open Water Body Drainage Way Metlands feet
	Property Line Drinking Water Well Other
4.	Parent Material: <u>Proglacial Durasch</u> Unsuitable Materials Present: XYes INO
	If Yes: Disturbed Soil Kill Material Impervious Layer(s) Weathered/Fractured Rock Bedrock
5.	Groundwater Observed: X Yes No If yes:
υ.	Estimated Depth to High Groundwater: 72" 313,7 Depth Weeping from Pit Depth Standing Water in Hole elevation
	La Montles



# City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

<b>^ /</b>	
TU-L	

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	Soll Horizon/ Layer	o it Matsin Color	Redoximorphic Features			Soil Texture	Coarse Fragments % by Volume		Soil Structure	Soil Consistence	Other
Depth (in.)		Moist (Munsell)	Depth	Color	Percent	(USDA)	Gravel	Cobbles & Stones		(Moist)	Other
076	A	104R2/2			A REAL	15	62	0	We	F	
16-30	B	IDYR4/6		-		25	5	0	WSAB	F	
30	C	2545/4	-	~	-	Gruys	2.5	0	109	6	
64-64-	G	2.54573	72"	D: 2.545/3 R: 7.54R5/8	15%	FineLS	42	0	m	L	
88											
								<u> </u>			

Additional Notes:

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## City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C.	On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)
	Deep Observation Hole Number: TP-7 4/9/19 12 pros Cloudy
1.	Location Ground Elevation at Surface of Hole: <u>323.55</u> Latitude/Longitude: <u>/</u>
2.	Description of Location: <u>Fage of Arive cusey</u> Land Use <u>Parking lot</u> (e.g., woodland, agricultural field, vacant lot, etc.) <u>Surface Stones (e.g., cobbles, stones, boulders, etc.)</u> <u>3:1</u> None <u>Kame</u> <u>Bot</u> . of Slope
3.	Vegetation     Landform     Position on Landscape (SU, SH, BS, FS, TS)       Distances from:     Open Water Body     Drainage Way     Wetlands       feet     feet     feet       Property Line     Drinking Water Well     Other
4.	Parent Material: Ice Contract Outwash Unsuitable Materials Present: XYes INO
5.	If Yes:       Disturbed Soil       Fill Material       Impervious Layer(s)       Use Weathered/Fractured Rock       Bedrock         Groundwater Observed:       Yes       No       If yes:       Depth Weeping from Pit       Depth Standing Water in Hole         Estimated Depth to High Groundwater: $\frac{40^{\prime\prime}}{\text{inches}}$ $\frac{320.2}{\text{elevation}}$ Depth Standing Water in Hole



#### City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-7\_\_\_\_

	0-11 11-11-00	Color	Redoximorphic Features			Soil Texture	Coarse Fragments % by Volume			Soil Consistence	Other
Depth (in.)	Layer	Soil Matrix: Color- Moist (Munsell)	Depth	Color	Percent	(USDA)	Gravel	Cobbles & Stones		(Moist)	
0-0	F	-		e19	-			-	at Contra		
20 20 40	C	2.576/1	•	water.		Grily	5	15	M	L	
				-							
									<u> </u>		

Additional Notes: Large boulders in bale made execution dissient. No weeping, standing water or nottles



# City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C.	On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)
	Deep Observation Hole Number: <u>TP-8</u> <u>4/9/19</u> <u>12:25 pm</u> <u>Cloudy</u> Date Time Weather
1.	Location       Ground Elevation at Surface of Hole:
2.	Description of Location: <u>Edge of driveway</u> Land Use <u>Parking Lot</u> . <u>Yes</u> <u>3</u> :1 (e.g., woodland, agricultural field, vacant lot, etc.) <u>Kane</u> <u>Bot</u> , of Slope
3.	Vegetation     Landform     Position on Landscape (SU, SH, BS, FS, TS)       Distances from:     Open Water Body     Drainage Way     Wetlands       feet     feet     feet       Property Line     Drinking Water Well     Other
4.	Parent Material: Icc-Confact Outwash Unsuitable Materials Present: X Yes No
5.	If Yes: Disturbed Soil Fill Material Impervious Layer(s) Weathered/Fractured Rock Bedrock Groundwater Observed: Yes No If yes: <u>444''</u> Estimated Depth to High Groundwater: <u>444''</u> <u>accepting</u> <i>Betrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>Bedrock</i> <i>B</i>



#### City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-8

			Redoximorphic Features			Soil Texture	Coarse Fragments % by Volume			Soil Consistence	Other
Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Depth	Color	Percent	(USDA)	Gravel	Cobbles & Stones		(Moist)	
0-	15	-	war				P28-		522.0-		
13-	13	IDYR5/H		ga%.		15	5	0	WSAB	F	
19 44	C	2.546/1	-			Gruly	10	25	m	<u>L</u>	
										<u> </u>	
									<u> </u>	-	2. io
		1									
	29.90								<u> </u>	<u> </u> ]	

Additional Notes: No redok or weeping. La boulders Making excevation difficult.



#### Commonwealth of Massachusetts City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C.	. On-Site Review (minimum of two ho		A	eserve disposal	area)
	Deep Observation Hole Number: 7	2.9 4/9/19 Date	12:50pm 0 Time W	eather J	<u>u it si it</u>
1.	Location				
	Ground Elevation at Surface of Hole:		ude/Longitude:	1	_
	Description of Location: Edge	f driveway			
2	Land Use Parking Lot	· .	Yes		3:1
2.	(e.g., woodland, agricultural field, vaca	Karze.	Surface Stones (e.g., cobbles		Slope (%)
	Vegetation	Landform		andscape (SU, SH, BS,	FS, TS)
3.	Distances from: Open Water Body	Drainage Way	feet	/etlands	feet
	Property Line	Drinking Water	1072723 (072723)	ther	
4.	Parent Material: Ice-Contact		feet ble Materials Present:	X Yes	<sup>feet</sup> ☐ No
	If Yes: 🔲 Disturbed Soil 🛛 📈 Fill Mat	erial 🗌 Impervious Layer(s)	Weathered/Fi	ractured Rock	Bedrock
5.	Groundwater Observed:	No If yes:		None-plate	
	,	60 32 Ly Bor, of hel	Depth Weeping from Pit	Depth Standir	ng Water in Hole

.



#### City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-9\_

		Call Matrix: Color-	RedoxImorphic Features			Soil Texture		ragments Volume	s Soil Structure	Soil Consistence	Other
Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Depth	Color	Percent	(USDA)	Gravel	Cobbles & Stones		(Molst)	
032	F	~	-	~			حنيتو	~	بنصبح		
32 -	C,	2544/3	-	<u>~</u>	-	Fine LS	15	62	M	2	
45 60	62	2.546/1		<b>1</b> 100-		Gravely	10	25	M	L	
								<u> </u>	_		
	<u> </u>										
						L.,			L		

Additional Notes: No werping, standing water or Nettling. No werping, standing water or Nettling. Ring of "rust" @ 45" down but not consistent the remainder of the depth of the bole. Not nottling.



## City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

0	On Site Powiew (minimum of two holes required at eveny proposed primary and reserve disposed area)
υ.	On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)
	Deep Observation Hole Number: <u>TP-10</u> <u>4/9/19</u> <u>1:35pm</u> <u>Cloudy</u> Date Time Weather
	Date Time Weather
1.	Location
	Ground Elevation at Surface of Hole: 329 Latitude/Longitude: /
	feet
	Description of Location: Edge of particing
2.	Land Use Packing lot No 3:1
	(e.g. woodland adricultural field, vacant lot, etc.) Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)
	Brush Kame Bot. of Slope
	Vegetation Landform Position on Landscape (SU, SH, BS, FS, TS)
3.	Distances from: Open Water Body Drainage Way Wetlands
	feet     feet     feet     feet       Property Line     Drinking Water Well     Other
	feet feet feet
4.	Parent Material: Icc-Contact Outroash Unsuitable Materials Present: Yes No
	If Yes: Disturbed Soil 🕅 Fill Material Dimpervious Layer(s) Disturbed Fractured Rock Dedrock
5.	Groundwater Observed: XYes No If yes: 27" 42"
0.	Depth Weeping from Pit Depth Standing Water in Hole
	Estimated Depth to High Groundwater: 27 326.75
	inches elevation
	C>Moxtles



#### City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-10

	Soil Horizon/ Layer	Sail Matrix: Color-	Redoximorphic Features			Soil Texture	Coarse Fragments % by Volume		Soil Structure	Soil Consistence	Other
Depth (in.)		Moist (Munsell)	Depth	Color	Percent	(USDA)	Gravel	Cobbles & Stones		(Moist)	
0-	E	100 m	+11A-	*1~	e7-	~	~~~	AC. 10	£ 1920-10	e12279	
16 27	B	IOYR4/4	areas		e-20	Gravely	15	0	WSAB	F	
27 45	C	104R4/4 2.546/2	27	D: 2.546/2 R: 7.5485/5	2	Fines	42	0	M	bon	
				!							
					]		1				

Additional Notes:

Maryling was visible but faint in C. layer



## Commonwealth of Massachusetts City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C.	On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)
	Deep Observation Hole Number: <u>TP-11</u> <u>L1/9/19</u> <u>2pm</u> <u>Cloudy</u> Date Time Weather
1.	Location Ground Elevation at Surface of Hole: 330 Latitude/Longitude: /
2.	Description of Location: <u>Grass Field</u> Land Use <u>Athletic Field</u> <u>No</u> <u>O-3</u> . (e.g., woodland, agricultural field, vacant lot, etc.) <u>Grass</u> <u>Outwash Plain</u> <u>Box</u> , of <u>Slope</u> Vegetation <u>Landform</u> Position on Landscape (SU, SH, BS, FS, TS)
3.	Distances from: Open Water Body Drainage Way Wetlands feet feet
4.	Property Line Drinking Water Well Other Other
5.	If Yes: Disturbed Soil Fill Material Impervious Layer(s) Weathered/Fractured Rock Bedrock Groundwater Observed: Yes No If yes: <u>— 25''</u> Estimated Depth to High Groundwater: <u>25''</u> inches <u>Correction</u> <u>327,9</u> <i>Correction Correction</i>



#### City/Town of Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-11

	) Soil Horizon/ Layer	Sall Matrix: Color-	Redoximorphic Features			Soil Texture	Coarse Fragments % by Volume		Soil Consistence	Other
Depth (in.)		Moist (Munsell)	Depth	Color	Percent	(USDA)	Gravel	Cobbles & Stones	(Moist)	
0-36"	F	_	-		-	ан. Ф.Т.Т.Стан.	-	****	 	
• 11 - 122									 	
								ļ		
502								ļ	 	

Additional Notes:

No norreles visible in Fill.



## Commonwealth of Massachusetts City/Town of

# Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C	On-Site Review (continued)				
	Deep Observation Hole Number: <u>TP-12</u>	21.15pm Date	4/9/19 Time	<u>Cloudy</u> Weather	
1.	Location				
	Ground Elevation at Surface of Hole: 338	Latitude/L	ongitude:	1	
2.	Land Use Athletic Field		No		6-7
	(e.g., woodland, agricultural field, vacant lot, etc.	Outroash P		obbles, stones, boulders,	etc.) Slope (%)**
	Vegetation	Landform	10001	Position on Landscap	be (SU, SH, BS, FS,
3.	Distances from: Open Water Body	Drainage Way		Wetlands	
	feet		feet		feet
	Property Line	Drinking Water V		Other	
4.	Parent Material: Proglacial Out	<u>stash</u> Unsuitat	feet ble Materials Prese	ent: 🖄 Yes	feet
	If Yes: Disturbed Soil Fill Material	Impervious Layer(s)	U Weathe	ered/Fractured Rock	Bedrock
5.	Groundwater Observed: Xes 🗌 No	If yes:	8	·	
	Estimated Depth to High Groundwater: 20	"	Depth Weeping fr	om Pit Depth S	Standing Water in Hole



#### Commonwealth of Massachusetts City/Town of

## Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

#### C. On-Site Review (continued)

Deep Observation Hole Number:

TP-12

	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features			Soil Texture	Coarse Fragments % by Volume		Soil Structure	Soll re Consistence	Other
Depth (in.)			Depth	Color	Percent	(USDA)	Gravel	Cobbles & Stones		(Moist)	omer
0744	F	ي. الإندارين	-	ggantadı.		estation of a	<b>P</b> <sup>22424</sup>	e - 1	**************************************		
44-48	C	2,5/5/1	20"	D:2.576/1 R:7.57R5/8	5	Fines	10	0	M	L	
							-				
				-							
							_		· · · · · · · · · · · · · · · · · · ·		

Additional Notes:

Fill was gravely

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal + Page 5 of 8



Commonwealth of Massachusetts

# Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

\_\_\_\_\_ inches

elevation

April 10, 2019 (8:15 am) Balmer School Whitinsville, MA Cloudy / Drizzle 38°F For Drainage Only

Deep Observation Hole Number: A

Depth	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	ist (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
(In.)			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-10	о	10YR 2/1	-	-	-	ORGANIC	-	-	-	-	
10-48	FILL	-	20"	2.5Y 5/8	5%	SANDY LOAM	10%	-	SUB ANG BLKY	FRIABLE	

Additional Notes: GROUNDWATER AT 48 INCHES / WEEPING AT 20 INCHES



\_\_\_\_ inches

elevation

April 10, 2019 (8:15 am) Beal School, Whitinsville, MA Cloudy / Drizzle 38°F For Drainage Only

Deep Observation Hole Number: B

Depth	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)		Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	e Soil Consistence (Moist)	Other	
(In.)			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-10	A(loam)	10YR 3/3	-	-	-	SANDY LOAM	-	-	GRANULAR	V. FRIABLE	
10-24	FILL	-	-	-	-	-	-	-	-	-	
24-53	C1	10YR 4/6	-	-	-	LOAMY SAND	20%	5%	LOOSE	V. FRIABLE	
53-63	C2	10YR 6/2	-	-	-	FINE SANDY LOAM	-	-	MASSIVE	V. FRIABLE	

Additional Notes: REFUSAL AT 63 INCHES



\_\_\_\_ inches

\_\_\_\_\_ elevation

April 10, 2019 (8:15 am) Beal School, Whitinsville, MA Cloudy / Drizzle 38°F For Drainage Only

Deep Observation Hole Number: C

Depth	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)		Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	e Soil Consistence (Moist)	Other	
(ln.)	-	. ,	Depth	Color	Percent	. ,	Gravel	Cobbles & Stones			
0-18	A(loam)	10YR 3/3	-	-	-	SANDY LOAM	-	-	GRANULAR	V. FRIABLE	
18-80	FILL	-	-	-	-	-	-	-	-	-	

Additional Notes: WEEPING AT 56 INCHES



\_\_\_\_ inches

\_\_\_\_\_ elevation

April 10, 2019 (8:15 am) Beal School, Whitinsville, MA Sunny 45°F For Drainage Only

Deep Observation Hole Number: D

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	st (mottles)		Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other	
(In.)			Depth	Color	Percent		Gravel	avel Cobbles & Stones			
0-31	FILL	-	-	-	-	-	-	-	-	-	VARIED STRATIFIED FILL

Additional Notes: REFUSAL AT 31 INCHES NO GROUNDWATER OR REDOX VISIBLE



inches

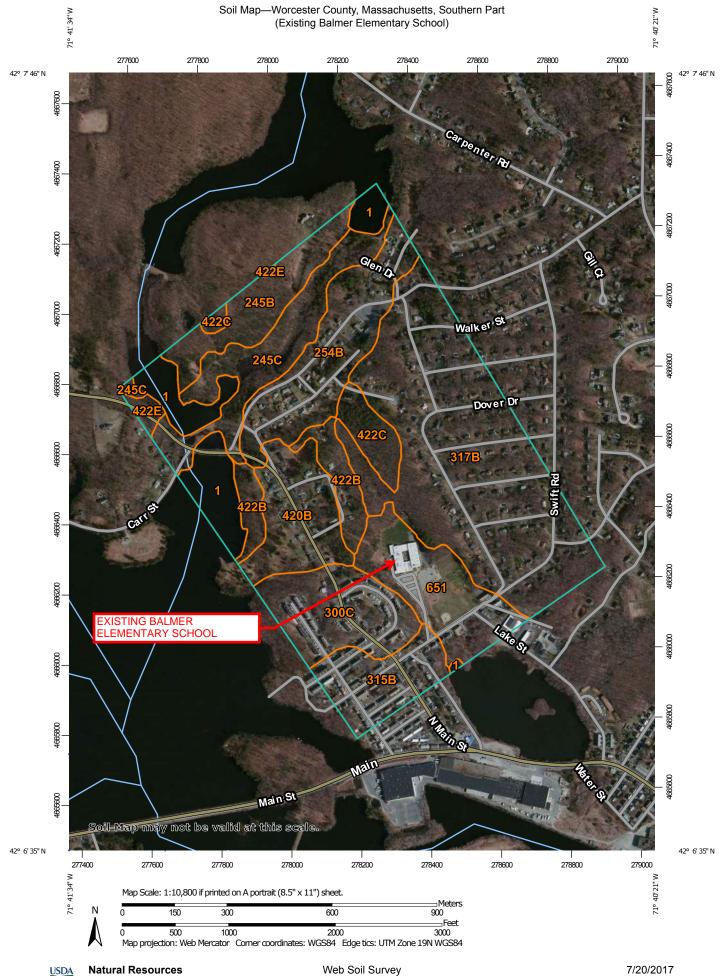
elevation

April 10, 2019 (8:15 am) Beal School, Whitinsville, MA Sunny 45°F For Drainage Only

Deep Observation Hole Number: E

Depth	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)			Soil Texture (USDA)	Coarse F % by \	ragments /olume	Soil Structure	Soil Consistence (Moist)	Other	
(ln.)		. ,	Depth	Color	Percent		Gravel	Cobbles & Stones			
0-80	FILL	-	-	-	-	-	10%	10%	-	-	VARIED STRATIFIED FILL
80-88	с	10YR 6/4	81"	2.5YR 3/6	10%	SANDY LOAM	3%	-	LOOSE	V. FRIABLE	

Additional Notes: NO GROUNDWATER OR WEEPING VISIBLE



National Cooperative Soil Survey

**Conservation Service** 

Page 1 of 3

MAP	LEGEND	MAP INFORMATION
Area of Interest (AOI) Area of Interest (AOI)	Spoil Area	The soil surveys that comprise your AOI were mapped at 1:25,000.
	Image: ConstructionImage: Construction <t< th=""><th>, , , , ,</th></t<>	, , , , ,
<ul> <li>Severely Eroded Spot</li> <li>Sinkhole</li> <li>Slide or Slip</li> <li>Sodic Spot</li> </ul>		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.



# Map Unit Legend

Worcester County, Massachusetts, Southern Part (MA615)								
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI					
1	Water	18.7	6.8%					
245B	Hinckley loamy sand, 3 to 8 percent slopes	15.9	5.7%					
245C	Hinckley loamy sand, 8 to 15 percent slopes	24.4	8.8%					
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	28.8	10.4%					
300C	Montauk fine sandy loam, 8 to 15 percent slopes	22.1	8.0%					
315B	Scituate fine sandy loam, 3 to 8 percent slopes	15.9	5.8%					
317B	Scituate fine sandy loam, 3 to 8 percent slopes, extremely stony	86.7	31.3%					
420B	Canton fine sandy loam, 3 to 8 percent slopes	20.1	7.3%					
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	10.9	4.0%					
422C Canton fine sandy loam, 8 to 15 percent slopes, extremel stony		7.8	2.8%					
422E	Canton fine sandy loam, 15 to 35 percent slopes, extremely stony	1.9	0.7%					
651	Udorthents, smoothed	23.4	8.5%					
Totals for Area of Interest		276.6	100.0%					

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#### ATTACHMENT H

Methodology and HydroCAD Technical Information



ATTACHMENT H							
METHODOLOGY AND HYDROCAD TECHNICAL INFORMATION							
Project Name:	Balmer Elementary School						
Nitsch Project #:	12260						

#### HYDROLOGY CALCULATIONS

Nitsch Engineering completed a hydrologic analysis of the existing project site utilizing Soil Conservation Service (SCS) Runoff Curve Number (CN) methodology. The SCS method calculates the rate at which the runoff reaches the design point considering several factors: the slope and flow lengths of the subcatchment area, the soil type of the subcatchment area, and the type of surface cover in the subcatchment area. HydroCAD Version 10.00 computer modeling software was used in conjunction with the SCS method to determine the peak runoff rates and runoff volumes for the 2-, 10-, 25-, and 100-year, 24-hour storm events. The proposed project site is being analyzed with the same methodology.

The Site was divided into multiple drainage areas, or subcatchments, which drain to the design points along the property boundary and within the site. For each subcatchment area, SCS Runoff Curve Numbers (CNs) were selected by using the cover type and hydrologic soil group of each area. The peak runoff rates and runoff volumes for the 2-, 10-, 25- and 100-year 24-hour storm events were then determined by inputting the drainage areas, CNs, and time of concentration ( $T_c$ ) paths into the HydroCAD model.

#### HydroCAD Version 10.00

The HydroCAD computer program uses SCS and TR-20 methods to model drainage systems. TR-20 (Technical Release 20) was developed by the Soil Conservation Service to estimate runoff and peak discharges in small watersheds. TR-20 is generally accepted by engineers and reviewing authorities as the standard method for estimating runoff and peak discharges.

HydroCAD Version 10.00 uses up to four types of components to analyze the hydrology of a given site: subcatchments, reaches, basins, and links. Subcatchments are areas of land that produce surface runoff. The area, weighted CN, and  $T_c$  characterize each individual subcatchment area. Reaches are generally uniform streams, channels, or pipes that convey water from one point to another. A basin is any impoundment that fills with water from one or more sources and empties via an outlet structure. Links are used to introduce hydrographs into a project from another source or to provide a junction for more than one hydrograph within a project. The time span for the model was set for 0-48 hours in order to prevent truncation of the hydrograph.

#### HYDRAULIC CALCULATIONS (Closed Drainage System)

The closed drainage system, catch basin to drain manhole system, was designed to convey the 25-year storm event using the Rational method. Refer to Appendix D for more information.

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### ATTACHMENT J

DR-EX Existing Watershed Areas

DR-PR Proposed Watershed Areas

Submitted Separate File